



---

# Packaging Specification

---

---

**Note the following details of the code protection feature on Microchip devices:**

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

---

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights.

#### Trademarks

The Microchip name and logo, the Microchip logo, dsPIC, KEELOQ, KEELOQ logo, MPLAB, PIC, PICmicro, PICSTART, PIC<sup>32</sup> logo, rfPIC and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

FilterLab, Hampshire, HI-TECH C, Linear Active Thermistor, MXDEV, MXLAB, SEEVAL and The Embedded Control Solutions Company are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Analog-for-the-Digital Age, Application Maestro, BodyCom, chipKIT, chipKIT logo, CodeGuard, dsPICDEM, dsPICDEM.net, dsPICworks, dsSPEAK, ECAN, ECONOMONITOR, FanSense, HI-TIDE, In-Circuit Serial Programming, ICSP, Mindi, MiWi, MPASM, MPLAB Certified logo, MPLIB, MPLINK, mTouch, Omniscient Code Generation, PICC, PICC-18, PICDEM, PICDEM.net, PICkit, PICtail, REAL ICE, rfLAB, Select Mode, Total Endurance, TSHARC, UniWinDriver, WiperLock and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

All other trademarks mentioned herein are property of their respective companies.

© 1998-2012, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

 Printed on recycled paper.

ISBN: 978-1-62076-542-5

*Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.*

---

**QUALITY MANAGEMENT SYSTEM  
CERTIFIED BY DNV  
— ISO/TS 16949 —**

# PACKAGING SPECIFICATION

---

---

## TABLE OF CONTENTS

---

SIDEBRAZE Family .....	17
CERDIP Family .....	21
CERQUAD Family .....	35
SOT Family .....	41
DDPAK Family .....	87
PDIP Family .....	95
SPDIP Family .....	111
PLCC Family .....	117
SOP Family .....	137
SOIC Family .....	141
DFN Family .....	187
PDFN Family .....	207
TDFN Family .....	215
UDFN Family .....	225
VDFN Family .....	231
QFN Family .....	235
UQFN Family .....	273
MSOP Family .....	287
SSOP Family .....	303
TSSOP Family .....	311
TSOP Family and VSOP Family .....	323
LQFP Family .....	327
MQFP Family .....	335
TQFP Family .....	345
CSP Family .....	365
TFBGA Family (Formerly XBGA Family) .....	381
TLA Family .....	385
Appendix A: Revision History .....	395
Appendix B: Control Dimensions .....	405
Overview of Microchip Die/Wafer Support .....	407
Worldwide Sales and Service .....	410

# **PACKAGING SPECIFICATION**

---

---

**NOTES:**

## Package Index

---



---

### **CERAMIC SIDE BRAZED DUAL IN-LINE PACKAGE [SIDEBRAZE] FAMILY**

---

8-Lead Ceramic Side Brazed Dual In-Line with Window (JW) .300"	18
14-Lead Ceramic Side Brazed Dual In-Line with Window (JW) .300"	19
28-Lead Ceramic Side Brazed Dual In-Line with Window (JW) .300"	20

---

### **CERAMIC DUAL IN-LINE PACKAGE [CERDIP] FAMILY**

---

8-Lead Ceramic Dual In-Line (JA) .300" Body	22
8-Lead Ceramic Dual In-Line with Window (JW) .300" Body	23
14-Lead Ceramic Dual In-Line (JD) .300" Body	24
14-Lead Ceramic Dual In-Line with Window (JW) .300" Body	25
16-Lead Ceramic Dual In-Line (JE) .300" Body	26
18-Lead Ceramic Dual In-Line with Window (JW) .300" Body	27
20-Lead Ceramic Dual In-Line with Window (JW) .300" Body	28
24-Lead Ceramic Dual In-Line (JG) .600" Body	29
28-Lead Ceramic Dual In-Line (JN) .600" Body	30
28-Lead Ceramic Dual In-Line with Window (JW) .300" Body	31
28-Lead Ceramic Dual In-Line with Window (JW) .600" Body	32
40-Lead Ceramic Dual In-Line (JK) .600" Body	33
40-Lead Ceramic Dual In-Line with Window (JW) .600" Body	34

---

### **CERAMIC CHIP CARRIER PACKAGE [CERQUAD] FAMILY**

---

68-Lead Ceramic Leaded (CL) Chip Carrier with Window	36
68-Lead Ceramic Leaded (CL) Chip Carrier with Window Sq Land Pattern	37
84-Lead Ceramic Leaded (CL) Chip Carrier with Window	38
84-Lead Ceramic Leaded (CL) Chip Carrier with Window Sq Land Pattern	39

---

### **SMALL-OUTLINE TRANSISTOR PACKAGE [SOT] FAMILY**

---

SC70, 3-Lead Plastic Small Outline Transistor (LB)	42
SC70, 3-Lead Plastic Small Outline Transistor (LB) Land Pattern	43
SC70, 5-Lead Plastic Small Outline Transistor (LT)	44
SC70, 5-Lead Plastic Small Outline Transistor (LT) Land Pattern	45
SC70, 5-Lead Plastic Small Outline Transistor (LTY)	46
SC70, 5-Lead Plastic Small Outline Transistor (LTY) Land Pattern	47
SC70, 6-Lead Plastic Small Outline Transistor (LT)	48
SC70, 6-Lead Plastic Small Outline Transistor (LT), sheet 2	49

## Package Index

---

SC70, 6-Lead Plastic Small Outline Transistor (LT) Land Pattern.....	50
SOT-23, 3-Lead Plastic Small Outline Transistor (NB) .....	51
SOT-23, 3-Lead Plastic Small Outline Transistor (NB) Land Pattern .....	52
SOT-23, 3-Lead Plastic Small Outline Transistor (TT).....	53
SOT-23, 3-Lead Plastic Small Outline Transistor (TT) Land Pattern .....	54
SOT-23, 5-Lead Plastic Small Outline Transistor (CT) .....	55
SOT-23, 5-Lead Plastic Small Outline Transistor (CT) Land Pattern.....	56
SOT-23, 5-Lead Plastic Small Outline Transistor (OT) .....	57
SOT-23, 5-Lead Plastic Small Outline Transistor (OT) Land Pattern .....	58
SOT-23, 6-Lead Plastic Small Outline Transistor (CH).....	59
SOT-23, 6-Lead Plastic Small Outline Transistor (CH) Land Pattern .....	60
SOT-23, 6-Lead Plastic Small Outline Transistor (CHY) .....	61
SOT-23, 6-Lead Plastic Small Outline Transistor (CHY) Land Pattern.....	62
SOT-23, 6-Lead Plastic Small Outline Transistor (OT) .....	63
SOT-23, 6-Lead Plastic Small Outline Transistor (OT) Land Pattern .....	64
SOT-23A, 3-Lead Plastic Small Outline Transistor (CB).....	65
SOT-23A, 3-Lead Plastic Small Outline Transistor (CB) Land Pattern .....	66
SOT-89, 3-Lead Plastic Small Outline Transistor Header (MB).....	67
SOT-89, 3-Lead Plastic Small Outline Transistor Header (MB) Land Pattern .....	68
SOT-89, 5-Lead Plastic Small Outline Transistor Header (MT) .....	69
SOT-89, 5-Lead Plastic Small Outline Transistor Header (MT) Land Pattern .....	70
SOT-143, 4-Lead Plastic Small Outline Transistor (RC).....	71
SOT-143, 4-Lead Plastic Small Outline Transistor (RC) Land Pattern .....	72
SOT-223, 3-Lead Plastic Small Outline Transistor (DB) .....	73
SOT-223, 3-Lead Plastic Small Outline Transistor (DB) Land Pattern .....	74
SOT-223, 5-Lead Plastic Small Outline Transistor (DC) .....	75
SOT-223, 5-Lead Plastic Small Outline Transistor (DC) Land Pattern .....	76
SOT-385, Leadless Wedge Module Plastic Small Outline Transistor (WM) .....	77
TO-92, 3-Lead Plastic Transistor Outline (TO) .....	78
TO-92, 3-Lead Plastic Transistor Outline (ZB).....	79
TO-220, 3-Lead Plastic Transistor Outline (AB) .....	80
TO-220, 5-Lead Plastic Transistor Outline (AT) .....	81
TSOT, 5-Lead Plastic Thin Small Outline Transistor (OS) .....	82
TSOT, 5-Lead Plastic Thin Small Outline Transistor (OS) Land Pattern .....	83
TSOT, 6-Lead Thin Small Outline Transistor (OS).....	84
TSOT, 6-Lead Thin Small Outline Transistor (OS), sheet 2 .....	85

## Package Index

---



---

### **DOUBLE DECA-WATT PACKAGE [DDPAK] FAMILY**

---

3-Lead Plastic (EB) .....	88
3-Lead Plastic (EB) Land Pattern .....	89
5-Lead Plastic (ET) .....	90
5-Lead Plastic (ET) Land Pattern.....	91
7-Lead Plastic (EK) .....	92
7-Lead Plastic (EK) Land Pattern .....	93

---

### **PLASTIC DUAL IN-LINE PACKAGE [PDIP] FAMILY**

---

8-Lead Plastic Dual In-Line (P) 300 mil Body .....	96
8-Lead Plastic Dual In-Line (PA) 300 mil Body .....	97
14-Lead Plastic Dual In-Line (P) 300 mil Body .....	98
14-Lead Plastic Dual In-Line (PD) 300 mil Body.....	99
16-Lead Plastic Dual In-Line (P) 300 mil Body .....	100
16-Lead Plastic Dual In-Line (PE) 300 mil Body.....	101
18-Lead Plastic Dual In-Line (P) 300 mil Body .....	102
20-Lead Plastic Dual In-Line (P) 300 mil Body .....	103
24-Lead Plastic Dual In-Line (P) 600 mil Body .....	104
24-Lead Plastic Dual In-Line (PG) 600 mil Body .....	105
28-Lead Plastic Dual In-Line (P) 600 mil Body .....	106
28-Lead Plastic Dual In-Line (PI) 600 mil Body .....	107
40-Lead Plastic Dual In-Line (P) 600 mil Body .....	108
40-Lead Plastic Dual In-Line (PL) 600 mil Body .....	109
64-Lead Shrink Plastic Dual In-Line (SP) 750 mil Body.....	110
SPDIP, 24-Lead Skinny Plastic Dual In-Line (PF) 300 mil Body .....	112
SPDIP, 24-Lead Skinny Plastic Dual In-Line (SP) 300 mil Body.....	113
SPDIP, 28-Lead Skinny Plastic Dual In-Line (PJ) 300 mil Body .....	114
SPDIP, 28-Lead Skinny Plastic Dual In-Line (SP) 300 mil Body.....	115

---

### **PLASTIC LEADED CHIP CARRIER PACKAGE [PLCC] FAMILY**

---

20-Lead Plastic Leaded Chip Carrier (L) .....	118
20-Lead Plastic Leaded Chip Carrier (L) Square Land Pattern .....	119
28-Lead Plastic Leaded Chip Carrier (L) .....	120
28-Lead Plastic Leaded Chip Carrier (L) Square Land Pattern .....	121
28-Lead Plastic Leaded Chip Carrier (LI) .....	122

## Package Index

---

28-Lead Plastic Leaded Chip Carrier (L) Square Land Pattern .....	123
32-Lead Plastic Leaded Chip Carrier (L) .....	124
32-Lead Plastic Leaded Chip Carrier (L) Rectangle Land Pattern.....	125
44-Lead Plastic Leaded Chip Carrier (L) .....	126
44-Lead Plastic Leaded Chip Carrier (L) Square Land Pattern .....	127
44-Lead Plastic Leaded Chip Carrier (LW) .....	128
44-Lead Plastic Leaded Chip Carrier (LW) Square Land Pattern.....	129
68-Lead Plastic Leaded Chip Carrier (L) .....	130
68-Lead Plastic Leaded Chip Carrier (L) Square Land Pattern .....	131
68-Lead Plastic Leaded Chip Carrier (LS).....	132
68-Lead Plastic Leaded Chip Carrier (LS) Square Land Pattern.....	133
84-Lead Plastic Leaded Chip Carrier (L) .....	134
84-Lead Plastic Leaded Chip Carrier (L) Square Land Pattern .....	135

### **SMALL-OUTLINE PACKAGE [SOP] FAMILY**

---

8-Lead Thermally Enhanced Plastic Outline (SE) Narrow 3.90 mm Body.....	138
8-Lead Thermally Enhanced Plastic Outline (SE) Narrow 3.90 mm Body, sheet 2 .....	139
8-Lead Thermally Enhanced Plastic Small Outline (SE) Narrow 3.90 mm Land Pattern .....	140

### **PLASTIC SMALL-OUTLINE PACKAGE [SOIC] FAMILY**

---

8-Lead Plastic Small Outline (SN) Narrow 3.90 mm.....	142
8-Lead Plastic Small Outline (SN) Narrow 3.90 mm, sheet 2 .....	143
8-Lead Plastic Small Outline (SN) Narrow 3.90 mm Land Pattern .....	144
8-Lead Plastic Small Outline (OA) Narrow 3.90 mm .....	145
8-Lead Plastic Small Outline (OA) Narrow 3.90 mm, sheet 2.....	146
8-Lead Plastic Small Outline (OA) Narrow 3.90 mm Land Pattern .....	147
8-Lead Thermally Enhanced Plastic Small Outline (SE) Narrow 3.9 mm Body.....	148
8-Lead Thermally Enhanced Plastic Small Outline (SE) Narrow 3.9 mm Body, sheet 2 .....	149
8-Lead Thermally En Plastic Small Outline (SE) Narrow 3.90 mm Land Pattern .....	150
14-Lead Plastic Small Outline (SL) Narrow 3.9 mm Body .....	151
14-Lead Plastic Small Outline (SL) Narrow 3.9 mm Body, sheet 2.....	152
14-Lead Plastic Small Outline (SL) Narrow 3.90 mm Land Pattern.....	153
14-Lead Plastic Small Outline (OD) Narrow 3.9 mm Body .....	154
14-Lead Plastic Small Outline (OD) Narrow 3.9 mm Body, sheet 2.....	155
14-Lead Plastic Small Outline (OD) Narrow 3.90 mm Land Pattern.....	156
16-Lead Plastic Small Outline (SL) Narrow 3.9 mm Body .....	157

## Package Index

---

16-Lead Plastic Small Outline (SL) Narrow 3.9 mm Body, sheet 2.....	158
16-Lead Plastic Small Outline (SL) Narrow 3.90 Land Pattern.....	159
SOIJ, 8-Lead Plastic Small Outline (SM) Medium 5.28 mm .....	160
SOIJ, 8-Lead Plastic Small Outline (SM) Medium 5.28 mm, sheet 2 .....	161
SOIJ, 8-Lead Plastic Small Outline (SM) Medium 5.28 mm Land Pattern.....	162
16-Lead Plastic Small Outline (SO) Wide 7.5 mm Body.....	163
16-Lead Plastic Small Outline (SO) Wide 7.5 mm Body, sheet 2 .....	164
16-Lead Plastic Small Outline (SO) Wide 7.50 mm Land Pattern .....	165
16-Lead Plastic Small Outline (OE) Wide 7.5 mm Body.....	166
16-Lead Plastic Small Outline (OE) Wide 7.5 mm Body, sheet 2 .....	167
16-Lead Plastic Small Outline (OE) Wide 7.50 mm Land Pattern .....	168
18-Lead Plastic Small Outline (SO) Wide 7.5 mm Body.....	169
18-Lead Plastic Small Outline (SO) Wide 7.5 mm Body, sheet 2 .....	170
18-Lead Plastic Small Outline (SO) Wide 7.50 mm Land Pattern .....	171
20-Lead Plastic Small Outline (SO) Wide 7.5 mm Body.....	172
20-Lead Plastic Small Outline (SO) Wide 7.5 mm Body, sheet 2 .....	173
20-Lead Plastic Small Outline (SO) Wide 7.50 mm Land Pattern .....	174
24-Lead Plastic Small Outline (SO) Wide 7.5 mm Body.....	175
24-Lead Plastic Small Outline (SO) Wide 7.5 mm Body, sheet 2 .....	176
24-Lead Plastic Small Outline (SO) Wide 7.50 mm Land Pattern .....	177
24-Lead Plastic Small Outline (OG) Wide 7.5 mm Body .....	178
24-Lead Plastic Small Outline (OG) Wide 7.5 mm Body, sheet 2 .....	179
24-Lead Plastic Small Outline (OG) Wide 7.50 mm Land Pattern .....	180
28-Lead Plastic Small Outline (SO) Wide 7.5 mm Body .....	181
28-Lead Plastic Small Outline (SO) Wide 7.5 mm Body, sheet 2 .....	182
28-Lead Plastic Small Outline (SO) Wide 7.50 mm Land Pattern .....	183
28-Lead Plastic Small Outline (OI) Wide 7.5 mm Body .....	184
28-Lead Plastic Small Outline (OI) Wide 7.5 mm Body, sheet 2.....	185
28-Lead Plastic Small Outline (OI) Wide 7.50 mm Land Pattern.....	186

### **PLASTIC DUAL FLAT NO LEAD PACKAGE [DFN]**

---

6-Lead Plastic Dual Flat, No Lead Package (MAY) 2x2x0.9 mm Body .....	188
6-Lead Plastic Dual Flat, No Lead Package (MAY) 2x2x0.9 mm Body, sheet 2 .....	189
6-Lead Plastic Dual Flat No Lead Package (MA) 2x2x0.9 mm Land Pattern .....	190
6-Lead Plastic Dual Flat No Lead Package (ME) 2x3x0.9 mm.....	191
6-Lead Plastic Dual Flat No Lead Package (MH) 3x3x0.9 mm.....	192

## Package Index

---

8-Lead Plastic Dual Flat No Lead Package (MC) 2x3x0.9 mm .....	193
8-Lead Plastic Dual Flat No Lead Package (MC) 2x3x0.9 mm Land Pattern .....	194
8-Lead Plastic Dual Flat No Lead Package (MF) 3x3x0.9 mm.....	195
8-Lead Plastic Dual Flat No Lead Package (MF) 3x3x0.9 mm, sheet 2 .....	196
8-Lead Plastic Dual Flat No Lead Package (MF) 3x3x0.9 mm Land Pattern .....	197
8-Lead Plastic Dual Flat No Lead Package (MD) 4x4x0.9 mm .....	198
8-Lead Plastic Dual Flat No Lead Package (MD) 4x4x0.9 mm, sheet 2.....	199
8-Lead Plastic Dual Flat No Lead Package (MD) 4x4x0.9 mm Land Pattern .....	200
8-Lead Plastic Dual Flat No Lead Package (MF) 6x5 mm PUNCH SINGULATED .....	201
8-Lead Plastic Dual Flat No Lead Package (MF) 6x5 mm.....	202
8-Lead Plastic Dual Flat No Lead Package (MF) 6x5 mm Land Pattern .....	203
10-Lead Plastic Dual Flat No Lead Package (MF) 3x3x0.9 mm Body.....	204
10-Lead Plastic Dual Flat No Lead Package (MF) 3x3x0.9 mm Body, sheet 2 .....	205
10-Lead Plastic Dual Flat No Lead Package (MF) 3x3x0.9 mm Land Pattern .....	206

### **HIGH POWER DUAL FLAT NO LEAD PACKAGE [PDFN]**

---

8-Lead Power Dual Flat No Lead Pkg (MF) 5x6x1 mm .....	208
8-Lead Power Dual Flat No Lead Pkg (MF) 5x6x1 mm, sheet 2 .....	209
8-Lead Power Dual Flat No Lead Pkg (MF) 5x6x1 mm Land Pattern .....	210
8-Lead Power Dual Flat No Lead Pkg (LC) 3.3x3.3x1 mm.....	211
8-Lead Power Dual Flat No Lead Pkg (LC) 3.3x3.3x1 mm, sheet 2 .....	212
8-Lead Power Dual Flat No Lead Pkg (LC) 3.3x3.3x1 mm Land Pattern .....	213

### **PLASTIC THIN DUAL FLAT NO LEAD PACKAGE [TDFN]**

---

6-Lead Plastic Thin Dual Flat, No Lead Package (MY) 2x2x0.8 mm Body .....	216
6-Lead Plastic Thin Dual Flat, No Lead Package (MY) 2x2x0.8 mm Body, sheet 2.....	217
6-Lead Plastic Thin Dual Flat, No Lead Package (MYY) 2x2x0.8 mm Body .....	218
6-Lead Plastic Thin Dual Flat, No Lead Package (MYY) 2x2x0.8 mm Body, sheet 2.....	219
8-Lead Plastic Dual Flat No Lead Package (MN) 2x3x0.75 mm .....	220
8-Lead Plastic Dual Flat No Lead Package (MN) 2x3x0.75 mm, sheet 2.....	221
8-Lead Plastic Dual Flat No Lead Package (MN) 2x3x0.75 mm Land Pattern.....	222
10-Lead Thin Plastic Dual Flat, No Lead Package (MN) 3x3x0.8 mm Body .....	223
10-Lead Thin Plastic Dual Flat, No Lead Package (MN) 3x3x0.8 mm Body, sheet 2 .....	224

## Package Index

---

### **PLASTIC DUAL FLAT NO LEAD PACKAGE [UDFN]**

---

8-Lead Plastic Dual Flat No Lead Package (MU) 2x3x0.5 mm.....	226
8-Lead Plastic Dual Flat No Lead Package (MU) 2x3x0.5 mm Land Pattern .....	227
10-Lead Plastic Ultra Thin Dual Flat No Lead (NAY) 3x3x0.5 mm Body .....	228
10-Lead Plastic Ultra Thin Dual Flat No Lead (NAY) 3x3x0.5 mm Body, sheet 2.....	229

### **VERY THIN DUAL FLAT NO LEAD PACKAGE [VDFN]**

---

8-Lead Very Thin Dual Flatpack No-Lead (LZ) 2x2x0.9 mm.....	232
8-Lead Very Thin Dual Flatpack No-Lead (LZ) 2x2x0.9 mm, sheet 2.....	233
8-Lead Very Thin Dual Flatpack No-Lead (LZ) 2x2x0.9 mm Land Pattern .....	234

### **PLASTIC QUAD FLAT NO LEAD PACKAGE [QFN] FAMILY**

---

16-Lead Plastic Quad Flat No Lead Package (NG) 3x3x0.9 mm Body .....	236
16-Lead Plastic Quad Flat No Lead Package (NG) 3x3x0.9 mm Body, sheet 2.....	237
16-Lead Plastic Quad Flat No Lead Package (NG) 3x3x0.9 mm Land Pattern.....	238
16-Lead Plastic Quad Flat No Lead Package (MG) 3x3x0.9 mm .....	239
16-Lead Plastic Quad Flat No Lead Package (MG) 3x3x0.9 mm, sheet 2 .....	240
16-Lead Plastic Quad Flat No Lead Package (MG) 3x3x0.9 mm Land Pattern .....	241
16-Lead Plastic Quad Flat No Lead Package (ML) 4x4x0.9 mm.....	242
16-Lead Plastic Quad Flat No Lead Package (ML) 4x4x0.9 mm Land Pattern .....	243
20-Lead Plastic Quad Flat No Lead Package (ML) 4x4x0.9 mm.....	244
20-Lead Plastic Quad Flat No Lead Package (ML) 4x4 mm Land Pattern .....	245
20-Lead Plastic Quad Flat No Lead Package (MQ) 5x5x0.9 mm .....	246
20-Lead Plastic Quad Flat No Lead Package (MQ) 5x5x0.9 mm Land Pattern .....	247
24-Lead Plastic Quad Flat No Lead Package (MJ) 4x4x0.9 mm .....	248
24-Lead Plastic Quad Flat No Lead Package (MJ) 4x4 mm Land Pattern .....	249
28-Lead Plastic Quad Flat No Lead Package (MK) 4x4x0.9 mm .....	250
28-Lead Plastic Quad Flat No Lead Package (MK) 4x4x0.9 mm Land Pattern.....	251
28-Lead Plastic Quad Flat, No Lead Package (MQ) 5x5x0.9 mm .....	252
28-Lead Plastic Quad Flat, No Lead Package (MQ) 5x5x0.9 mm, sheet 2 .....	253
28-Lead Plastic Quad Flat No Lead Package (MQ) 5x5 mm Land Pattern .....	254
28-Lead Plastic Quad Flat No Lead Pkg (ML) 6x6 mm with 0.55 mm Terminal .....	255
28-Lead Plastic Quad Flat No Lead Pkg (ML) 6x6 mm with 0.55 mm Terminal, sheet 2.....	256
28-Lead Plastic Quad Flat No Lead Package (ML) 6x6 mm Land Pattern .....	257
28-Lead Plastic Quad Flat No Lead Pkg (MM) 6x6x0.9 mm with 0.40 mm Terminal.....	258

## Package Index

---

28-Lead Plastic Quad Flat No Lead Pkg (MM) 6x6x0.9 mm with 0.40 mm Terminal, sheet 2.	259
28-Lead Plastic Quad Flat No Lead Package (MM) 6x6x0.9 mm Land Pattern .....	260
40-Lead Plastic Quad Flat No Lead (ML) 6x6X0.9 mm .....	261
40-Lead Plastic Quad Flat No Lead (ML) 6x6X0.9 mm, sheet 2 .....	262
40-Lead Plastic Quad Flat No Lead (ML) 6x6X0.9 mm Land Pattern .....	263
44-Lead Plastic Quad Flat No Lead Package (ML) 8x8 mm .....	264
44-Lead Plastic Quad Flat No Lead Package (ML) 8x8 mm, sheet 2 .....	265
44-Lead Plastic Quad Flat No Lead Package (ML) 8x8 mm Land Pattern .....	266
64-Lead Plastic Quad Flat, No Lead Package (MR) 9x9x0.9 mm Body, 7.15 mm Exp Pad....	267
64-Lead Plastic Quad Flat, No Lead Package (MR) 9x9x0.9 Body, 7.15 mm Exp Pad, sheet 2....	268
64-Lead Plastic Quad Flat No Lead Package (MR) 9x9x0.9 mm Land Pattern .....	269
64-Lead Plastic Quad Flat No Lead Package (MR) 9x9x0.9 mm Body, 5.40 mm Exposed Pad....	270
64-Lead Plastic Quad Flat No Lead Package (MR) 9x9x0.9 mm Body, 5.40 mm Exposed Pad, sheet 2 .....	271

### **PLASTIC ULTRA THIN QUAD FLAT NO LEAD PACKAGE [UQFN] FAMILY**

---

28-L Plastic Ultra Thin Quad Flat No Lead Package (MV) 4x4x0.5 mm Body .....	274
28-L Plastic Ultra Thin Quad Flat No Lead Package (MV) 4x4x0.5 mm Body, sheet 2 .....	275
28-L Ultra Thin Plastic Quad Flat No Lead Package (MV) 4x4 mm Body Land Pattern.....	276
28-L Plastic Quad Flat No Lead Package (MV) 6x6x0.5 mm Ultra-Thin .....	277
28-L Plastic Quad Flat No Lead Package (MV) 6x6x0.5 mm Ultra-Thin, sheet 2.....	278
28-L Plastic Quad Flat No Lead Package (MV) 6x6x0.5 mm Ultra-Thin Land Pattern.....	279
40-L Plastic Ultra Thin Quad Flat (MV) 5x5 mm .....	280
40-L Plastic Ultra Thin Quad Flat (MV) 5x5, mm sheet 2 .....	281
40-L Plastic Ultra Thin Quad Flat No Lead (MV) 5x5 mm Land Pattern.....	282
48-L Plastic Ultra Thin Quad Flat No Lead (MV) 6x6x0.5 mm Body .....	283
48-L Plastic Ultra Thin Quad Flat No Lead (MV) 6x6x0.5 mm Body, sheet 2 .....	284
48-L Ultra Thin Plastic Quad Flat (MV) 6x6 mm Land Pattern .....	285

### **PLASTIC MICRO SMALL-OUTLINE PACKAGE [MSOP] FAMILY**

---

8-Lead Plastic Micro Small Outline Package (MS) .....	288
8-Lead Plastic Micro Small Outline Package (MS), sheet 2 .....	289
8-Lead Plastic Micro Small Outline Package (MS) Land Pattern .....	290
8-Lead Plastic Micro Small Outline Package (UA) .....	291

## Package Index

---

8-Lead Plastic Micro Small Outline Package (UA), sheet 2.....	292
8-Lead Plastic Micro Small Outline Package (UA) Land Pattern.....	293
10-Lead Plastic Micro Small Outline Package (MS) .....	294
10-Lead Plastic Micro Small Outline Package (MS), sheet 2 .....	295
10-Lead Plastic Micro Small Outline Package (MS) Land Pattern.....	296
10-Lead Plastic Micro Small Outline Package (UN) .....	297
10-Lead Plastic Micro Small Outline Package (UN), sheet 2.....	298
10-Lead Plastic Micro Small Outline Package (UN) Land Pattern.....	299

### **PLASTIC MICRO SMALL-OUTLINE PACKAGE [QSOP] FAMILY**

---

16-Lead Plastic Shrink Small Outline Narrow Body (QR) .150".....	300
16-Lead Plastic Shrink Small Outline Narrow Body (QR) .150" Land Pattern .....	301

### **SHRINK SMALL OUTLINE PACKAGE [SSOP] FAMILY**

---

20-Lead Plastic Shrink Small Outline (SS) 5.30 mm .....	304
20-Lead Plastic Shrink Small Outline (SS) 5.30 mm Land Pattern.....	305
24-Lead Plastic Shrink Small Outline (SS) 5.30 mm .....	306
24-Lead Plastic Shrink Small Outline (SS) 5.30 mm Land Pattern.....	307
28-Lead Plastic Shrink Small Outline (SS) 5.30 mm .....	308
28-Lead Plastic Shrink Small Outline (SS) 5.30 mm Land Pattern.....	309

### **PLASTIC THIN SHRINK SMALL-OUTLINE PACKAGE [TSSOP] FAMILY**

---

8-Lead Plastic Thin Shrink Small Outline (ST) 4.4 mm.....	312
8-Lead Plastic Thin Shrink Small Outline (ST) 4.4 mm Land Pattern.....	313
14-Lead Plastic Thin Shrink Small Outline (ST) 4.4 mm.....	314
14-Lead Plastic Thin Shrink Small Outline (ST) 4.4 mm, sheet 2.....	315
14-Lead Plastic Thin Shrink Small Outline (ST) 4.4 mm Land Pattern.....	316
16-Lead Plastic Thin Shrink Small Outline (ST) 4.4 mm.....	317
16-Lead Plastic Thin Shrink Small Outline (ST) 4.4 mm, sheet 2.....	318
16-Lead Plastic Thin Shrink Small Outline (ST) 4.4 mm Land Pattern.....	319
20-Lead Plastic Thin Shrink Small Outline (ST) 4.4 mm.....	320
20-Lead Plastic Thin Shrink Small Outline (ST) 4.4 mm Land Pattern.....	321

## Package Index

---

---

### **PLASTIC THIN SMALL-OUTLINE PACKAGE [TSOP] AND VERY SMALL OUTLINE PACKAGE [VSOP] FAMILY**

---

28-Lead Plastic Thin Small Outline (TS) 8x20 mm .....	324
28-Lead Plastic Very Small Outline (VS) 8x13.4 mm .....	325

---

### **PLASTIC LOW-PROFILE QUAD FLATPACK PACKAGE [LQFP] FAMILY**

---

32-Lead Plastic Low-Profile Quad Flatpack (PL) 7x7x1.4 mm .....	328
128-Lead Low Profile Plastic Quad Flat Pack(PT) 14x14x1.4mm .....	329
128-Lead Low Profile Plastic Quad Flat Pack(PT) 14x14x1.4mm, sheet 2 .....	330
144-Lead Plastic Low Profile Quad Flatpack (PL) 20x20x1.40 mm.....	331
144-Lead Plastic Low Profile Quad Flatpack (PL) 20x20x1.40 mm, sheet 2.....	332
144-Lead Plastic Low Profile Quad Flatpack (PL) 20x20x1.40 mm Body Land Pattern.....	333

---

### **PLASTIC METRIC-QUAD FLATPACK PACKAGE [MQFP] FAMILY**

---

44-Lead Plastic Metric Quad Flatpack (KW) 10x10x2 mm .....	336
44-Lead Plastic Metric Quad Flatpack (KW) 10x10x2 mm Land Pattern.....	337
44-Lead Plastic Metric Quad Flatpack (PQ) 10x10x2 mm .....	338
44-Lead Plastic Metric Quad Flatpack (PQ) 10x10x2 mm Land Pattern .....	339
64-Lead Plastic Metric Quad Flatpack (BU) 14x14x2.7 mm .....	340
64-Lead Plastic Metric Quad Flatpack (BU) 14x14x2.7 mm Land Pattern .....	341
256-Lead Plastic Metric Quad Flatpack (PQ) 28x28x3.40 mm Body.....	342
256-Lead Plastic Metric Quad Flatpack (PQ) 28x28x3.40 mm Body, sheet 2 .....	343

---

### **PLASTIC THIN-QUAD FLATPACK PACKAGE [TQFP] FAMILY**

---

32-Lead Plastic Thin Quad Flatpack (PT) 7x7x1.0 mm .....	346
32-Lead Plastic Thin Quad Flatpack (PT) 7x7x1 mm Body Land Pattern .....	347
44-Lead Plastic Thin Quad Flatpack (PT) 10x10x1 mm .....	348
44-Lead Plastic Thin Quad Flatpack (PT) 10x10x1 mm Body Land Pattern .....	349
64-Lead Plastic Thin Quad Flatpack (PF) 14x14x1 mm .....	350
64-Lead Plastic Thin Quad Flatpack (PF) 14x14x1 mm Land Pattern.....	351
64-Lead Plastic Thin Quad Flatpack (PT) 10x10x1 mm .....	352
64-Lead Plastic Thin Quad Flatpack (PT) 10x10x1 mm Body Land Pattern .....	353
80-Lead Plastic Thin Quad Flatpack (PF) 14x14x1 mm .....	354
80-Lead Plastic Thin Quad Flatpack (PF) 14x14 mm Body Land Pattern .....	355
80-Lead Plastic Thin Quad Flatpack (PT) 12x12x1 mm .....	356

## Package Index

---

80-Lead Plastic Thin Quad Flatpack (PT) 12x12x1 mm Body Land Pattern .....	357
100-Lead Plastic Thin Quad Flatpack (PF) 14x14x1 mm .....	358
100-Lead Plastic Thin Quad Flatpack (PF) 14x14 mm Body Land Pattern .....	359
100-Lead Plastic Thin Quad Flatpack (PT) 12x12x1 mm .....	360
100-Lead Plastic Thin Quad Flatpack (PT) 12x12x1 mm Body Land Pattern .....	361
144-Lead Plastic Thin Quad Flat Pack (PH) 16x16 mm Body .....	362
144-Lead Plastic Thin Quad Flat Pack (PH) 16x16 mm Body, sheet 2 .....	363
144-Lead Plastic Thin Quad Flat Pack (PH) 16x16 mm Body Land Pattern .....	364

### **CHIP SCALE PACKAGE [CSP] FAMILY**

---

4-Lead Chip Scale Package (CS) square .....	366
4-Lead Chip Scale (CS) square, sheet 2 .....	367
4-Lead Chip Scale Package (CS) Land Pattern (square) .....	368
4-Lead Chip Scale (CS) rectangle .....	369
4-Lead Chip Scale (CS) rectangle, sheet 2 .....	370
4-Lead Chip Scale (CS) Land Pattern (rectangle) .....	371
5-Lead Chip Scale Package (CS) .....	372
5-Lead Chip Scale Package (CS), sheet 2 .....	373
5-Lead Chip Scale Package (CS) Ball Pattern 2x1x2 Land Pattern .....	374
8-Lead Chip Scale Package (CS) .....	375
8-Lead Chip Scale Package (CS), sheet 2 .....	376
8-Lead Chip Scale Package (CS) Ball Pattern 3x2x3 Land Pattern .....	377
32-Lead Chip Scale Package (CS) .....	378
32-Lead Chip Scale Package (CS), sheet 2 .....	379

### **BALL GRID ARRAY PACKAGE [TFBGA] FAMILY**

---

121-Lead Plastic Thin Profile Ball Grid Array (BG) 10x10x1.10 mm .....	382
121-Lead Plastic Thin Profile Ball Grid Array (BG) 10x10x1.10 mm, sheet 2 .....	383
121-Lead Plastic Thin Profile Ball Grid Array (BG) 10x10x1.10 mm Land Pattern .....	384

### **THERMAL LEADLESS ARRAY PACKAGE [TLA] FAMILY**

---

20-Lead Thermal Leadless Array Package (TL) 3x3x0.7 mm Exposed Pad .....	386
20-Lead Thermal Leadless Array Package (TL) 3x3x0.7 mm Exposed Pad, sheet 2 .....	387
36-Lead Thermal Leadless Array Package (TL) 5x5x0.9 mm Exposed Pad .....	388
36-Lead Thermal Leadless Array Package (TL) 5x5x0.9 mm Exposed Pad, sheet 2 .....	389

## **Package Index**

---

---

44-Lead Thermal Leadless Array Package (TL) 6x6x0.9 mm Exposed Pad .....	390
44-Lead Thermal Leadless Array Package (TL) 6x6x0.9 mm Exposed Pad, sheet 2 .....	391
124-Lead Very Thin Leadless Array (TL) 9x9x0.9 mm .....	392
124-Lead Very Thin Leadless Array (TL) 9x9x0.9 mm, sheet 2 .....	393

## Packaging Diagrams and Parameters

---

---

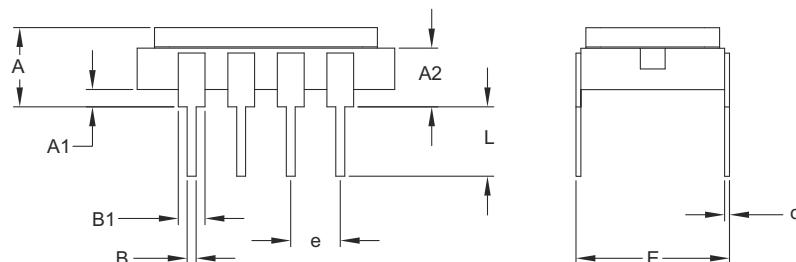
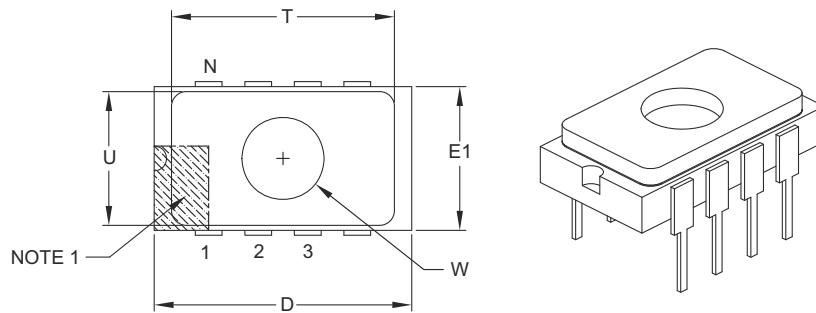
### SIDEBRAZE Family

Ceramic Side Brazed Dual In-Line Packages

## Packaging Diagrams and Parameters

### 8-Lead Ceramic Side Brazed Dual In-Line with Window (JW) – .300" Body

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



	Dimension Limits	INCHES		
		MIN	NOM	MAX
Number of Pins	N		8	
Pitch	e		.100 BSC	
Top to Seating Plane	A	.085	—	.200
Top of Body to Seating Plane	A2	.103	—	.143
Standoff	A1	.025	—	.070
Package Width	E1	.280	—	.310
Overall Length	D	.500	—	.540
Tip to Seating Plane	L	.125	—	.200
Lead Thickness	c	.008	—	.015
Upper Lead Width	B1	.045	—	.065
Lower Lead Width	B	.015	—	.022
Overall Row Spacing §	E	.300	—	.325
Window Diameter	W	.161	—	.171
Lid Length	T	.440	—	.460
Lid Width	U	.260	—	.280

#### Notes:

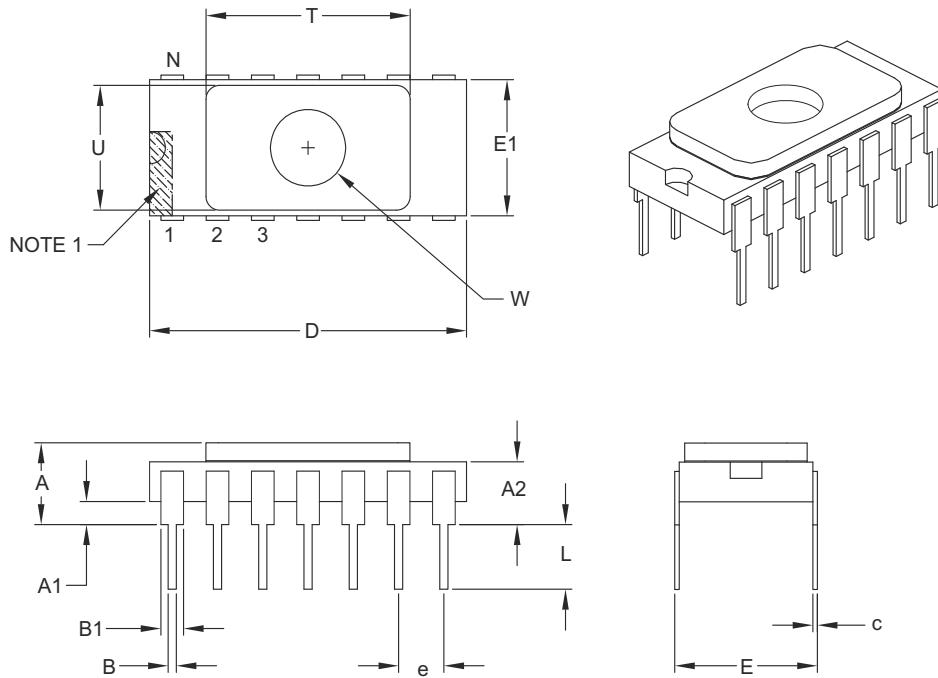
1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include burrs and/or projections of package material. These particles shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Packaging Diagrams and Parameters

### 14-Lead Ceramic Side Brazed Dual In-Line with Window (JW) – .300" Body

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	INCHES		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		14		
Pitch	e		.100 BSC		
Top to Seating Plane	A	.085	–	.200	
Top of Body to Seating Plane	A2	.100	–	.140	
Standoff	A1	.025	–	.070	
Package Width	E1	.280	–	.310	
Overall Length	D	.693	–	.770	
Tip to Seating Plane	L	.125	–	.200	
Lead Thickness	c	.008	–	.015	
Upper Lead Width	B1	.045	–	.065	
Lower Lead Width	B	.015	–	.022	
Overall Row Spacing §	E	.300	–	.325	
Window Diameter	W	.161	–	.171	
Lid Length	T	.440	–	.460	
Lid Width	U	.260	–	.280	

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include burrs and/or projections of package material. These particles shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

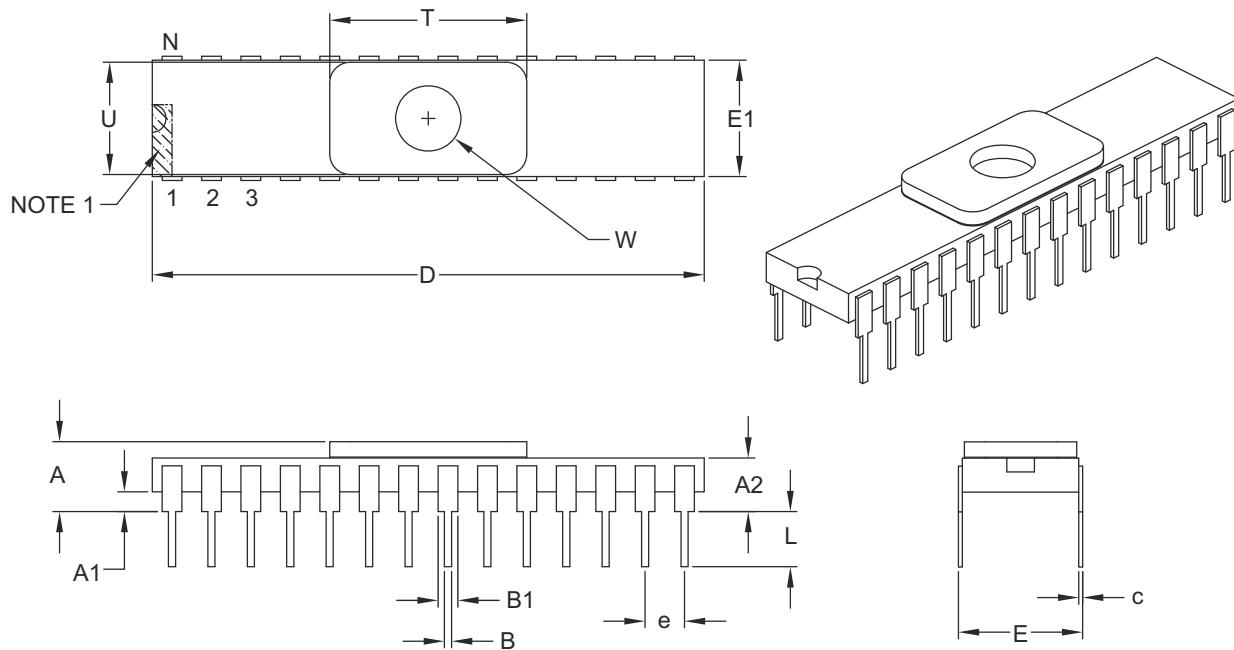
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-107B

## Packaging Diagrams and Parameters

### 28-Lead Ceramic Side Brazed Dual In-Line with Window (JW) – .300" Body

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		28	
Pitch	e		.100 BSC	
Top to Seating Plane	A	.085	—	.200
Top of Body to Seating Plane	A2	.115	—	.155
Standoff	A1	.025	—	.070
Package Width	E1	.280	—	.310
Overall Length	D	1.380	—	1.420
Tip to Seating Plane	L	.125	—	.200
Lead Thickness	c	.008	—	.015
Upper Lead Width	B1	.045	—	.065
Lower Lead Width	B	.015	—	.022
Overall Row Spacing §	E	.300	—	.325
Window Diameter	W	.161	—	.171
Lid Length	T	.490	—	.510
Lid Width	U	.275	—	.295

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include burrs and/or projections of package material. These particles shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-084B

## Packaging Diagrams and Parameters

---

---

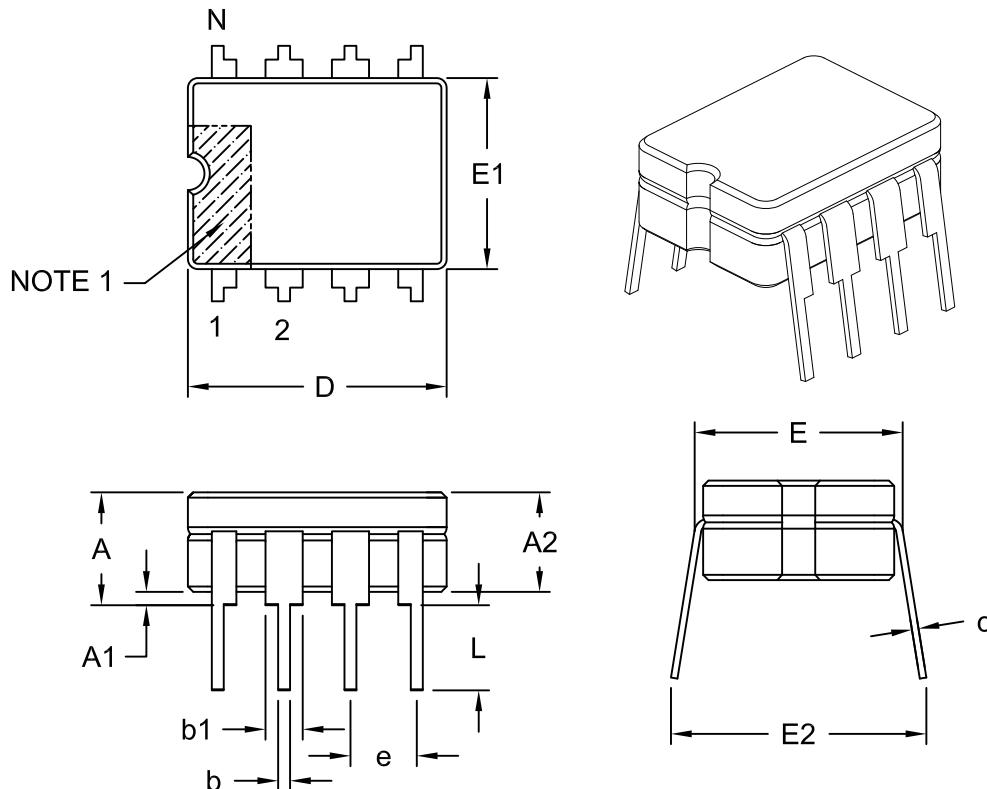
### CERDIP Family

#### Ceramic Dual In-Line Packages

## Packaging Diagrams and Parameters

### 8-Lead Ceramic Dual In-Line (JA) ~ .300" Body [CERDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		8	
Pitch	e		.100 BSC	
Top to Seating Plane	A	-	-	.200
Base to Seating Plane §	A1	.015	-	-
Ceramic Package Height	A2	.140	-	.175
Shoulder to Shoulder Width	E	.290	-	.320
Ceramic Pkg. Width	E1	.230	.248	.300
Overall Length	D	.370	.380	.400
Tip to Seating Plane	L	.125	-	.200
Lead Thickness	c	.008	-	.015
Upper Lead Width	b1	.045	-	.065
Lower Lead Width	b	.015	-	.023
Overall Row Spacing	E2	.314	-	.410

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimensioning and tolerancing per ASME Y14.5M

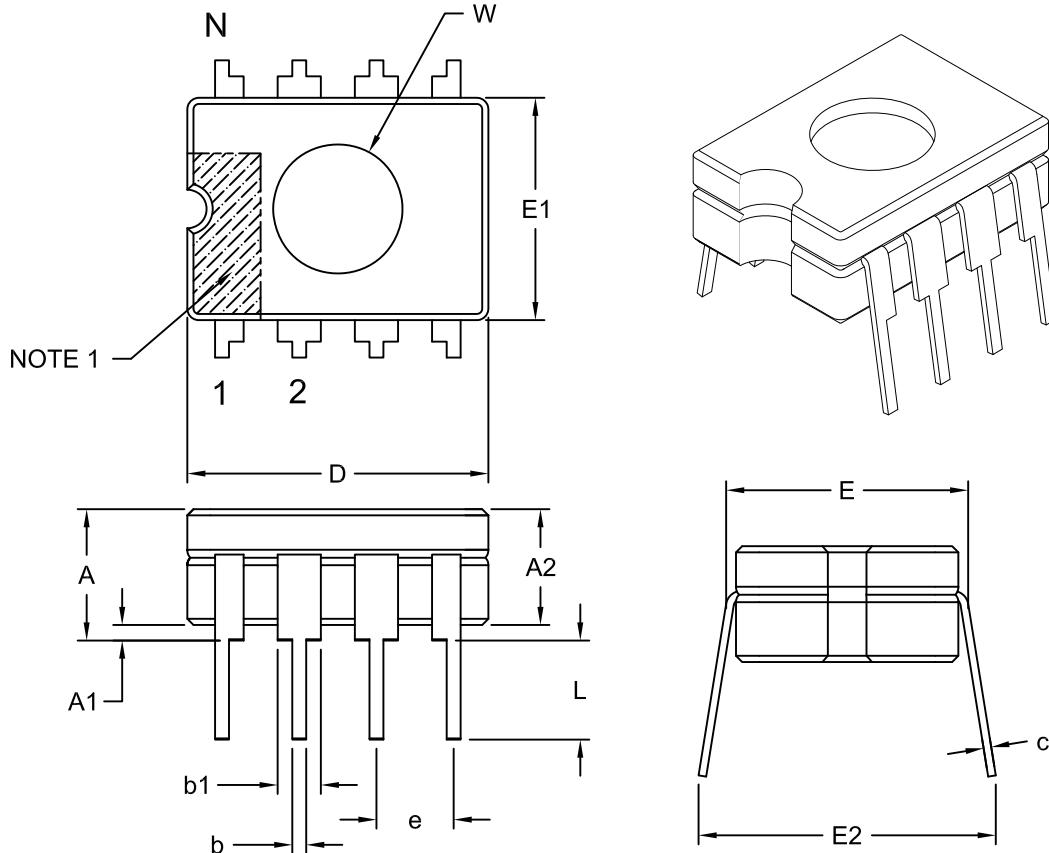
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-001C

## Packaging Diagrams and Parameters

### 8-Lead Ceramic Dual In-Line with Window (JW) ~ .300" Body [CERDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension Limits	INCHES		
	MIN	NOM	MAX
Number of Pins	N	8	
Pitch	e	.100 BSC	
Top to Seating Plane	A	-	.200
Base to Seating Plane §	A1	.015	-
Ceramic Package Height	A2	.140	.175
Shoulder to Shoulder Width	E	.290	.320
Ceramic Pkg. Width	E1	.230	.248
Overall Length	D	.370	.380
Tip to Seating Plane	L	.125	.200
Lead Thickness	c	.008	.015
Upper Lead Width	b1	.045	.065
Lower Lead Width	b	.015	.023
Overall Row Spacing	E2	.314	.410
Window Diameter	W	.267	.273

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimensioning and tolerancing per ASME Y14.5M

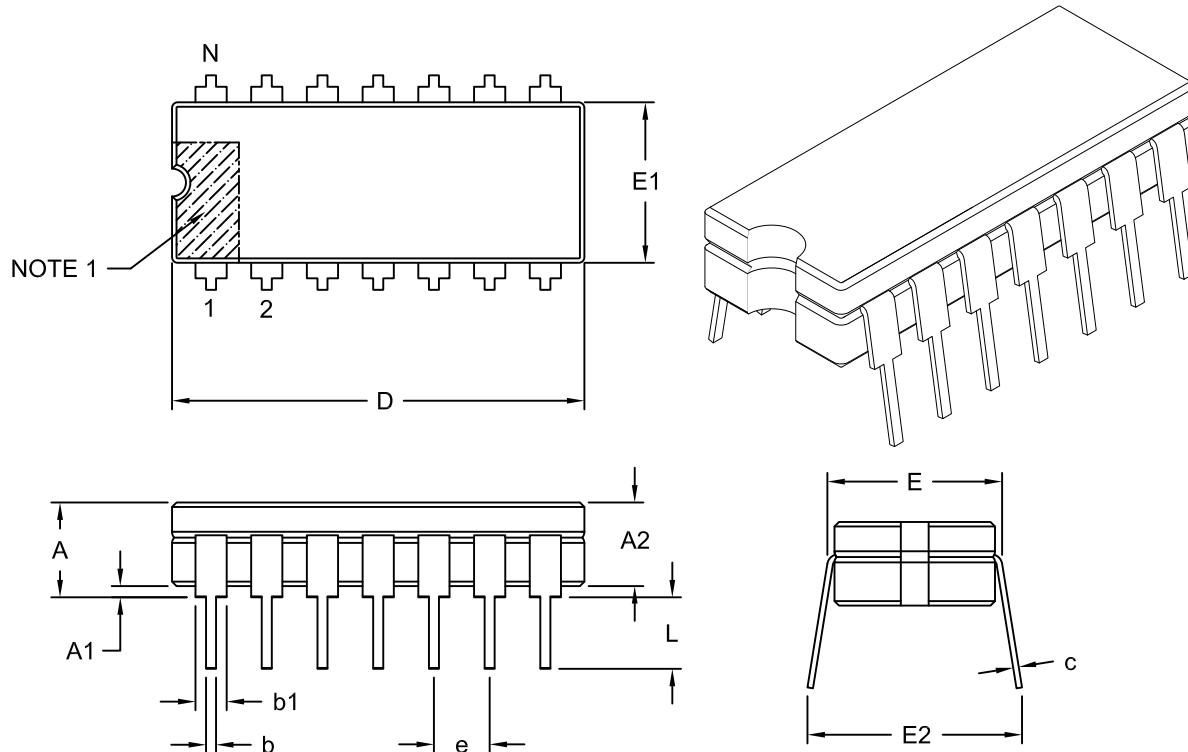
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-027C

## Packaging Diagrams and Parameters

### 14-Lead Ceramic Dual In-Line (JD) ~ .300" Body [CERDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	INCHES		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		14		
Pitch	e		.100	BSC	
Top to Seating Plane	A	-	-	.200	
Base to Seating Plane §	A1	.015	-	-	
Ceramic Package Height	A2	.140	-	.175	
Shoulder-to-Shoulder Width	E	.290	-	.325	
Ceramic Pkg. Width	E1	.230	.288	.300	
Overall Length	D	.740	.760	.780	
Tip to Seating Plane	L	.125	-	.200	
Lead Thickness	c	.008	-	.015	
Upper Lead Width	b1	.045	-	.065	
Lower Lead Width	b	.015	-	.023	
Overall Row Spacing	E2	.320	-	.410	

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimensioning and tolerancing per ASME Y14.5M

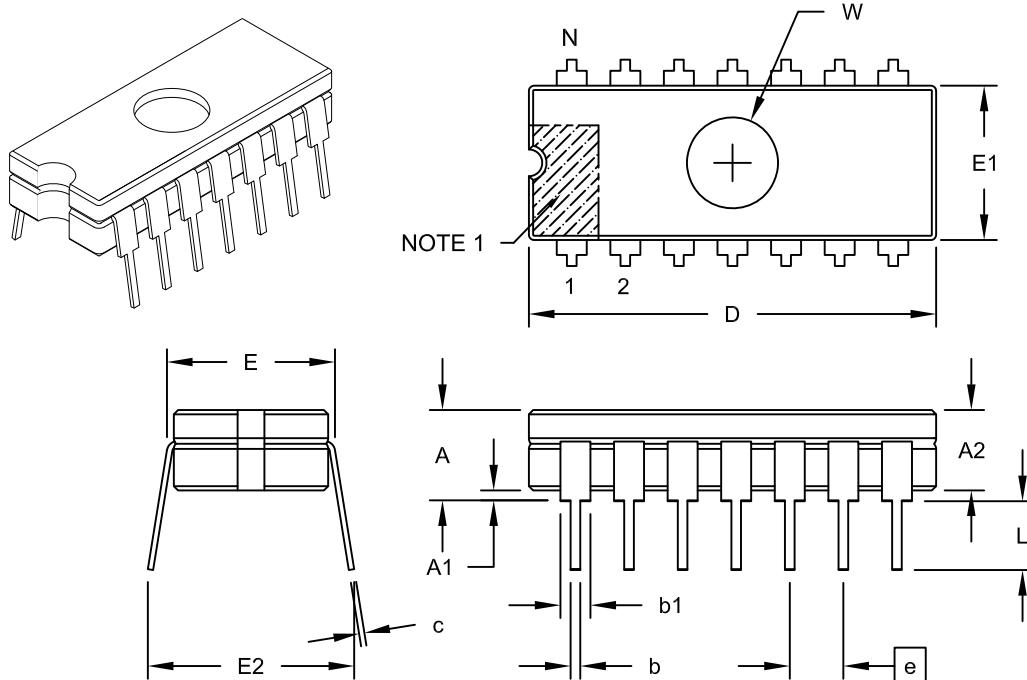
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-002C

## Packaging Diagrams and Parameters

### 14-Lead Ceramic Dual In-Line with Window (JW) ~ .300" Body [CERDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		14	
Pitch	e		.100 BSC	
Top to Seating Plane	A	-	-	.200
Base to Seating Plane §	A1	.015	-	-
Ceramic Package Height	A2	.140	-	.175
Shoulder to Shoulder Width	E	.290	-	.325
Ceramic Pkg. Width	E1	.230	.288	.300
Overall Length	D	.740	.760	.780
Window Diameter	W	.125	.170	.210
Tip to Seating Plane	L	.125	-	.200
Lead Thickness	c	.008	-	.015
Upper Lead Width	b1	.045	-	.065
Lower Lead Width	b	.015	-	.023
Overall Row Spacing	E2	.320	-	.410

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.

2. § Significant Characteristic

3. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

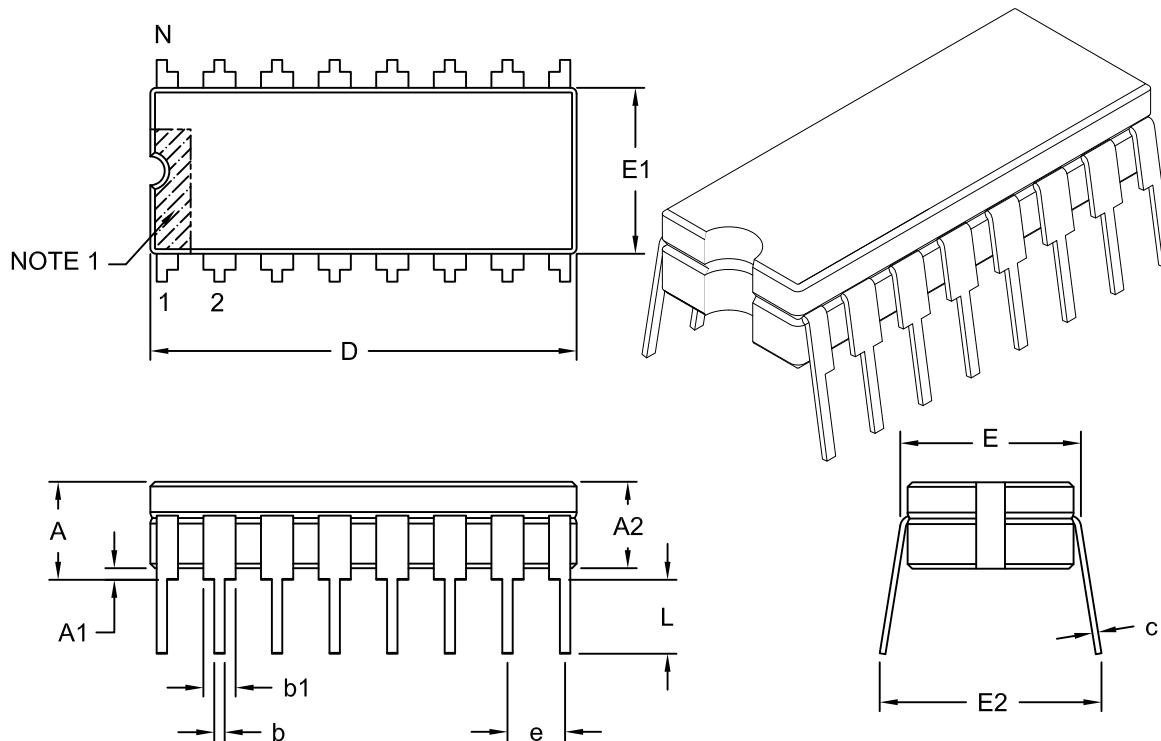
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing No. C04-099C

## Packaging Diagrams and Parameters

### 16-Lead Ceramic Dual In-Line (JE) ~ .300" Body [CERDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		16	
Pitch	e		.100 BSC	
Top to Seating Plane	A	-	-	.200
Base to Seating Plane §	A1	.015	-	-
Ceramic Package Height	A2	.140	-	.175
Shoulder to Shoulder Width	E	.290	-	.325
Ceramic Pkg. Width	E1	.245	.288	.300
Overall Length	D	.740	.760	.780
Tip to Seating Plane	L	.125	-	.200
Lead Thickness	c	.008	-	.015
Upper Lead Width	b1	.045	-	.065
Lower Lead Width	b	.015	-	.023
Overall Row Spacing	E2	.320	-	.410

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimensioning and tolerancing per ASME Y14.5M

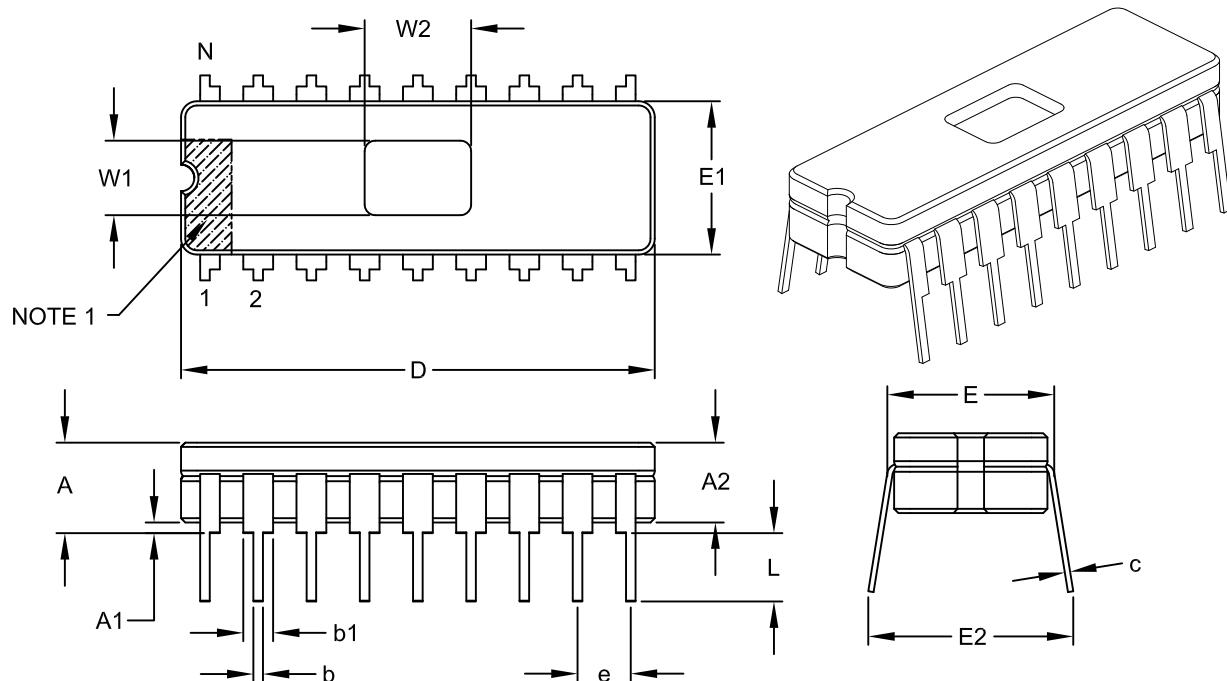
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-003C

## Packaging Diagrams and Parameters

### 18-Lead Ceramic Dual In-Line with Window (JW) ~ .300" Body [CERDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension Limits	Units	INCHES		
	N	MIN	NOM	MAX
Number of Pins	18			
Pitch	e	.100	BSC	
Top to Seating Plane	A	-	-	.200
Ceramic Package Height	A2	.140	-	.175
Base to Seating Plane §	A1	.015	-	-
Shoulder to Shoulder Width	E	.308	-	.325
Ceramic Pkg. Width	E1	.280	.288	.296
Overall Length	D	.882	.890	.910
Tip to Seating Plane	L	.125	-	.200
Lead Thickness	c	.008	-	.014
Upper Lead Width	b1	.045	-	.065
Lower Lead Width	b	.015	-	.023
Overall Row Spacing	E2	.325	-	.410
Window Width	W1	.130	.140	.150
Window Length	W2	.190	.200	.210

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimensioning and tolerancing per ASME Y14.5M

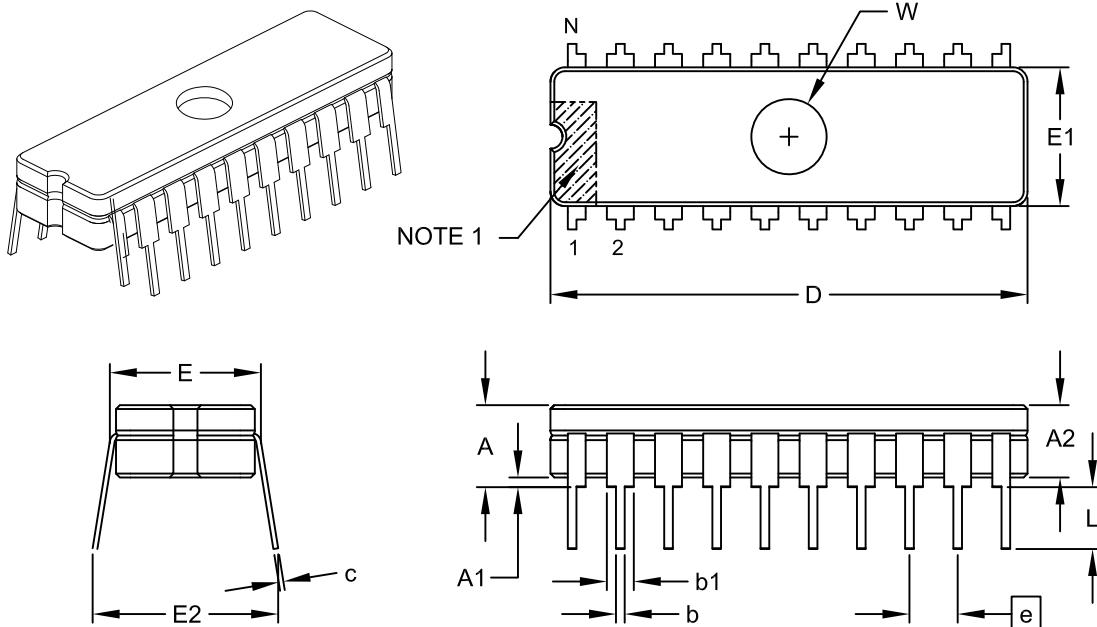
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-010C

## Packaging Diagrams and Parameters

### 20-Lead Ceramic Dual In-Line with Window (JW) ~ .300" Body [CERDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension	Units	INCHES		
		MIN	NOM	MAX
Number of Pins	N	20		
Pitch	e	.100	BSC	
Top to Seating Plane	A	-	-	.200
Ceramic Package Height	A2	.140	-	.175
Base to Seating Plane §	A1	.015	-	-
Shoulder to Shoulder Width	E	.308	-	.325
Ceramic Package Width	E1	.280	.288	.296
Overall Length	D	.942	.950	.970
Tip to Seating Plane	L	.125	-	.200
Lead Thickness	c	.008	-	.014
Upper Lead Width	b1	.045	-	.065
Lower Lead Width	b	.015	-	.023
Overall Row Spacing	E2	.325	-	.410
Window Diameter	W	.167	.170	.173

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimensioning and tolerancing per ASME Y14.5M

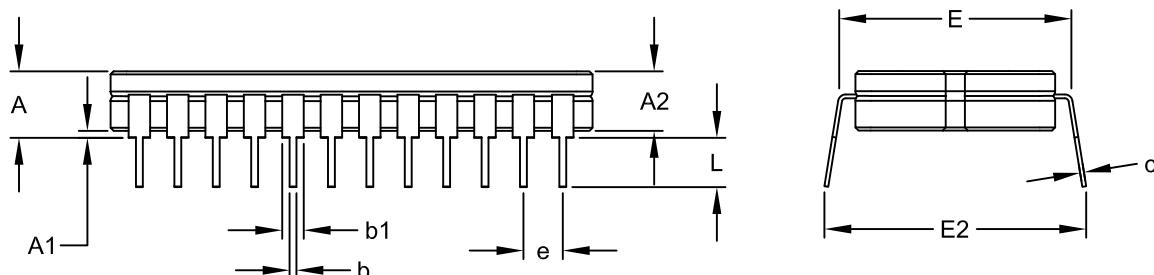
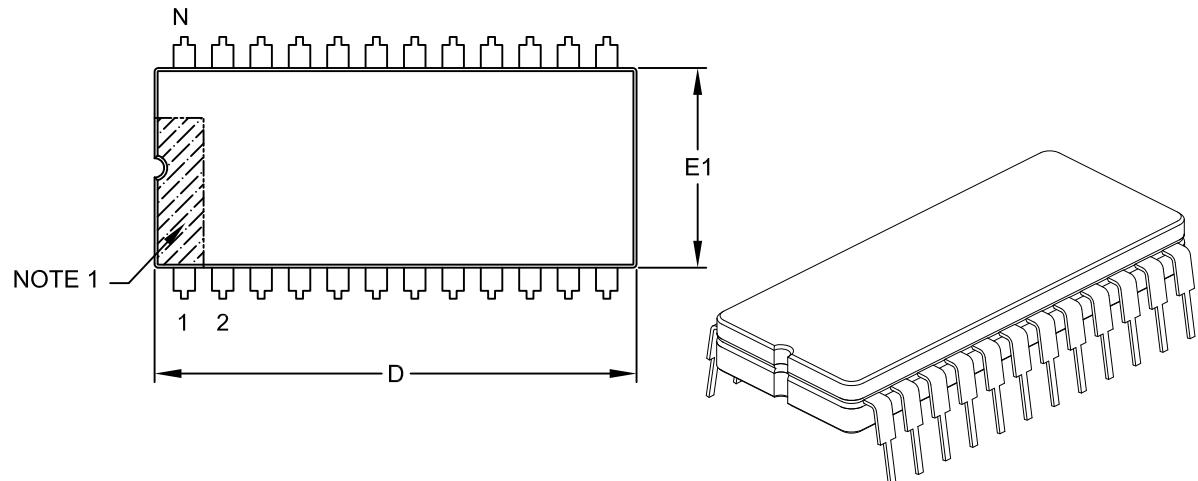
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-115C

## Packaging Diagrams and Parameters

### 24-Lead Ceramic Dual In-Line (JG) ~ .600" Body [CERDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension	Units	INCHES		
		MIN	NOM	MAX
Number of Pins	N		24	
Pitch	e		.100 BSC	
Top to Seating Plane	A	-	-	.225
Ceramic Package Height	A2	.140	-	.175
Base to Seating Plane §	A1	.015	-	-
Shoulder to Shoulder Width	E	.590	-	.625
Ceramic Pkg. Width	E1	.510	.520	.540
Overall Length	D	1.240	1.250	1.270
Tip to Seating Plane	L	.125	-	.200
Lead Thickness	c	.008	-	.015
Upper Lead Width	b1	.045	-	.065
Lower Lead Width	b	.015	-	.023
Overall Row Spacing	E2	.620	-	.710

**Notes:**

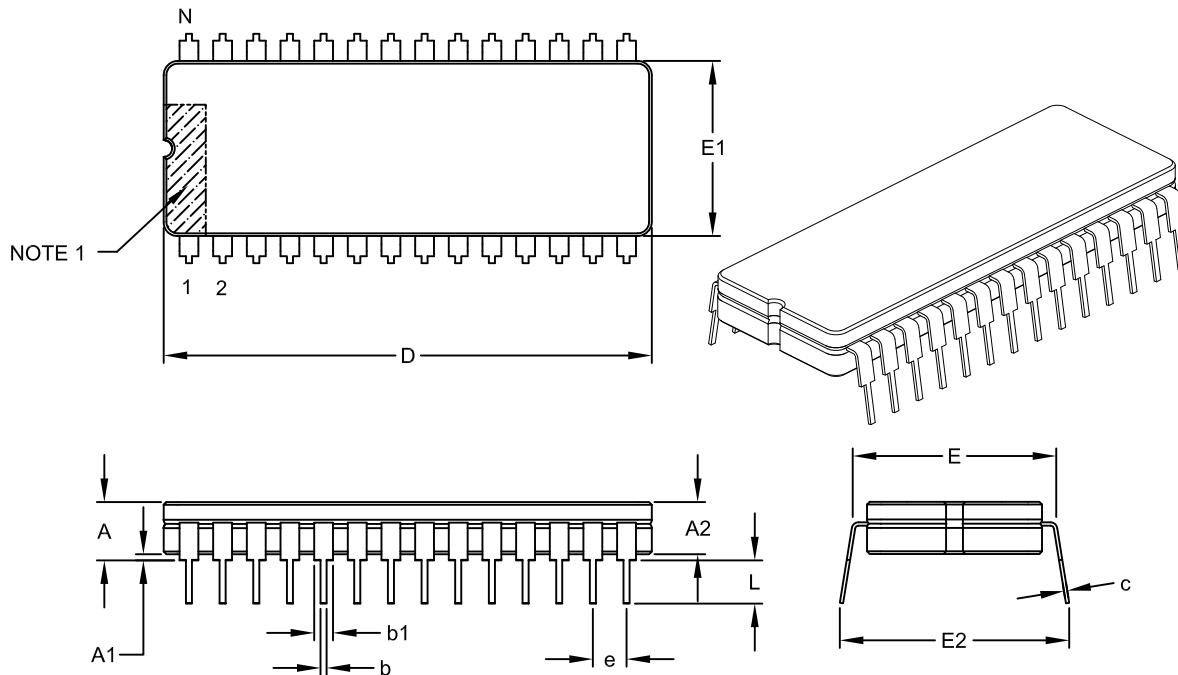
1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Packaging Diagrams and Parameters

### 28-Lead Ceramic Dual In-Line (JN) ~ .600" Body [CERDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension Limits		Units	INCHES		
			MIN	NOM	MAX
Number of Pins	N			28	
Pitch	e			.100 BSC	
Top to Seating Plane	A	-	-	.225	
Ceramic Package Height	A2	.140	-	.175	
Base to Seating Plane §	A1	.015	-	-	
Shoulder to Shoulder Width	E	.590	-	.625	
Ceramic Pkg. Width	E1	.510	.520	.540	
Overall Length	D	1.440	1.450	1.470	
Tip to Seating Plane	L	.125	-	.200	
Lead Thickness	c	.008	-	.015	
Upper Lead Width	b1	.045	-	.065	
Lower Lead Width	b	.015	-	.023	
Overall Row Spacing	E2	.620	-	.710	

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimensioning and tolerancing per ASME Y14.5M

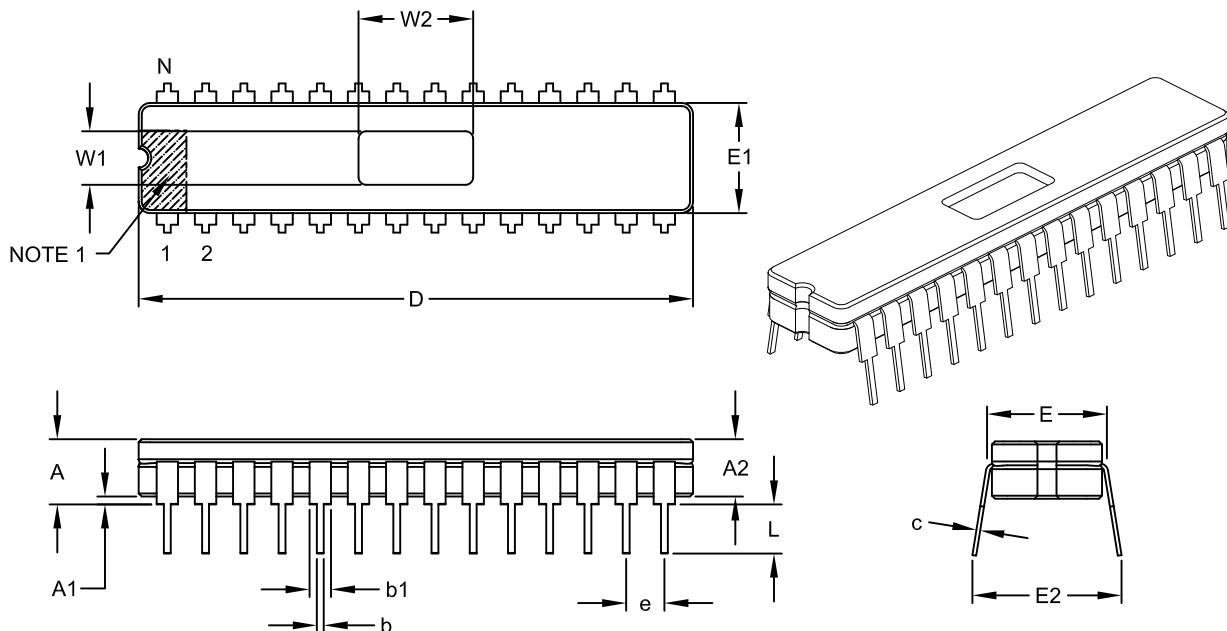
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-006C

## Packaging Diagrams and Parameters

### 28-Lead Ceramic Dual In-Line with Window (JW) ~ .300" Body [CERDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension	Limits	INCHES		
		MIN	NOM	MAX
Number of Pins	N		28	
Pitch	e		.100 BSC	
Top to Seating Plane	A	-	-	.200
Ceramic Package Height	A2	.140	-	.175
Base to Seating Plane §	A1	.015	-	-
Shoulder to Shoulder Width	E	.308	-	.325
Ceramic Package Width	E1	.280	.288	.296
Overall Length	D	1.442	1.450	1.470
Tip to Seating Plane	L	.125	-	.200
Lead Thickness	c	.008	-	.014
Upper Lead Width	b1	.045	-	.065
Lower Lead Width	b	.015	-	.023
Overall Row Spacing	E2	.325	-	.410
Window Width	W1	.130	.140	.150
Window Length	W2	.290	.300	.310

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimensioning and tolerancing per ASME Y14.5M

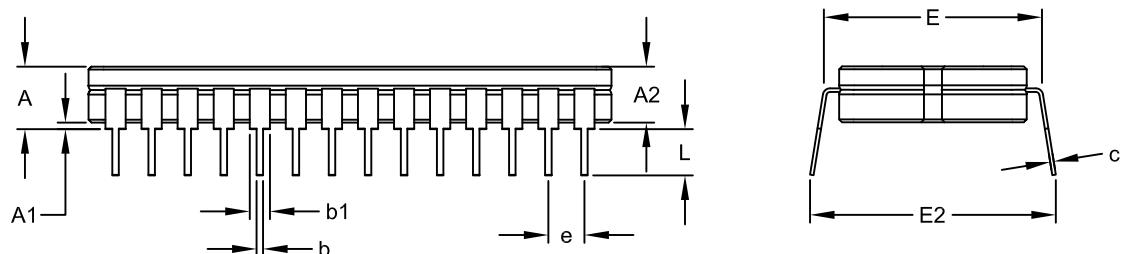
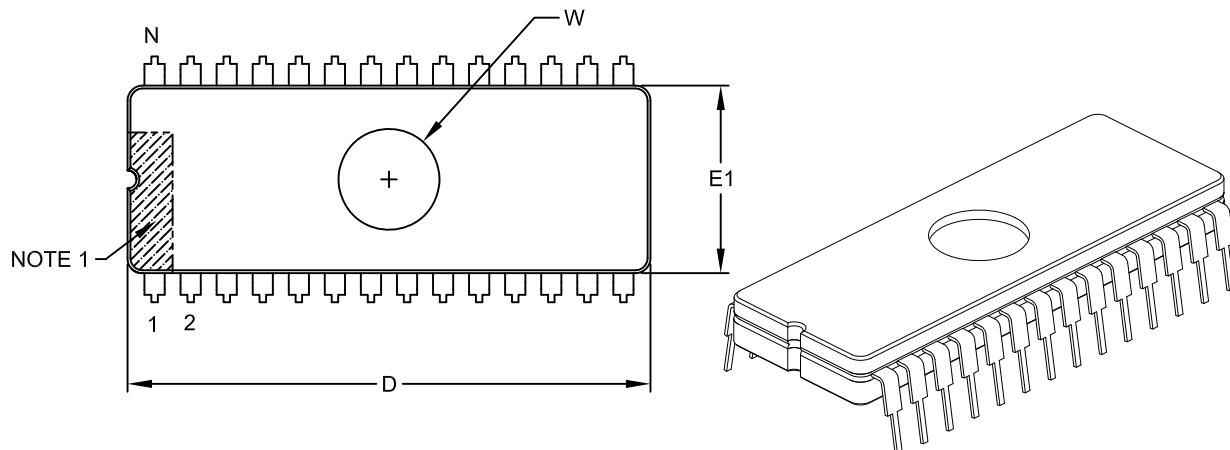
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-080C

## Packaging Diagrams and Parameters

### 28-Lead Ceramic Dual In-Line with Window (JW) ~ .600" Body [CERDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



	Dimension Limits	Units INCHES		
		MIN	NOM	MAX
Number of Pins	N		28	
Pitch	e		.100 BSC	
Top to Seating Plane	A	-	-	.225
Ceramic Package Height	A2	.140	-	.175
Base to Seating Plane §	A1	.015	-	-
Shoulder to Shoulder Width	E	.590	-	.625
Ceramic Package Width	E1	.510	.520	.540
Overall Length	D	1.440	1.450	1.470
Tip to Seating Plane	L	.125	-	.200
Lead Thickness	c	.008	-	.015
Upper Lead Width	b1	.045	-	.065
Lower Lead Width	b	.015	-	.023
Overall Row Spacing	E2	.620	-	.710
Window Diameter	W	.270	.280	.290

#### Notes:

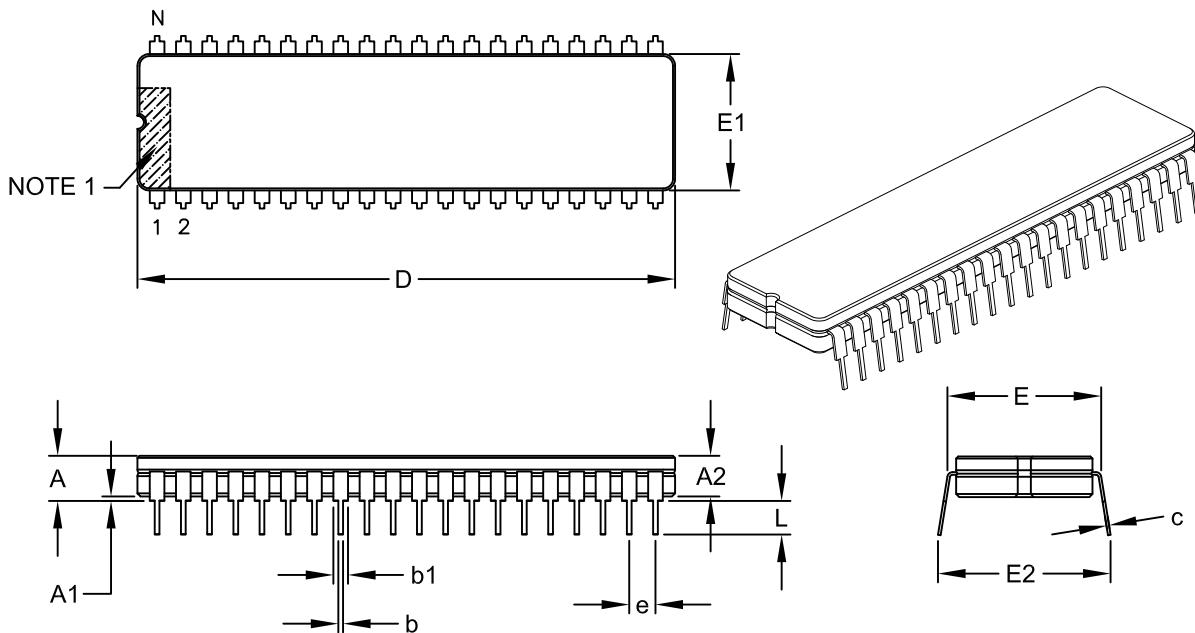
1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Packaging Diagrams and Parameters

### 40-Lead Ceramic Dual In-Line (JK) ~ .600" Body [CERDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension Limits	INCHES		
	MIN	NOM	MAX
Number of Pins	N	40	
Pitch	e	.100 BSC	
Top to Seating Plane	A	-	.225
Ceramic Package Height	A2	.140	.175
Base to Seating Plane §	A1	.015	-
Shoulder to Shoulder Width	E	.590	.625
Ceramic Package Width	E1	.510	.540
Overall Length	D	2.030	2.050
Tip to Seating Plane	L	.125	.200
Lead Thickness	c	.008	.015
Upper Lead Width	b1	.045	.065
Lower Lead Width	b	.015	.023
Overall Row Spacing	E2	.620	.710

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimensioning and tolerancing per ASME Y14.5M

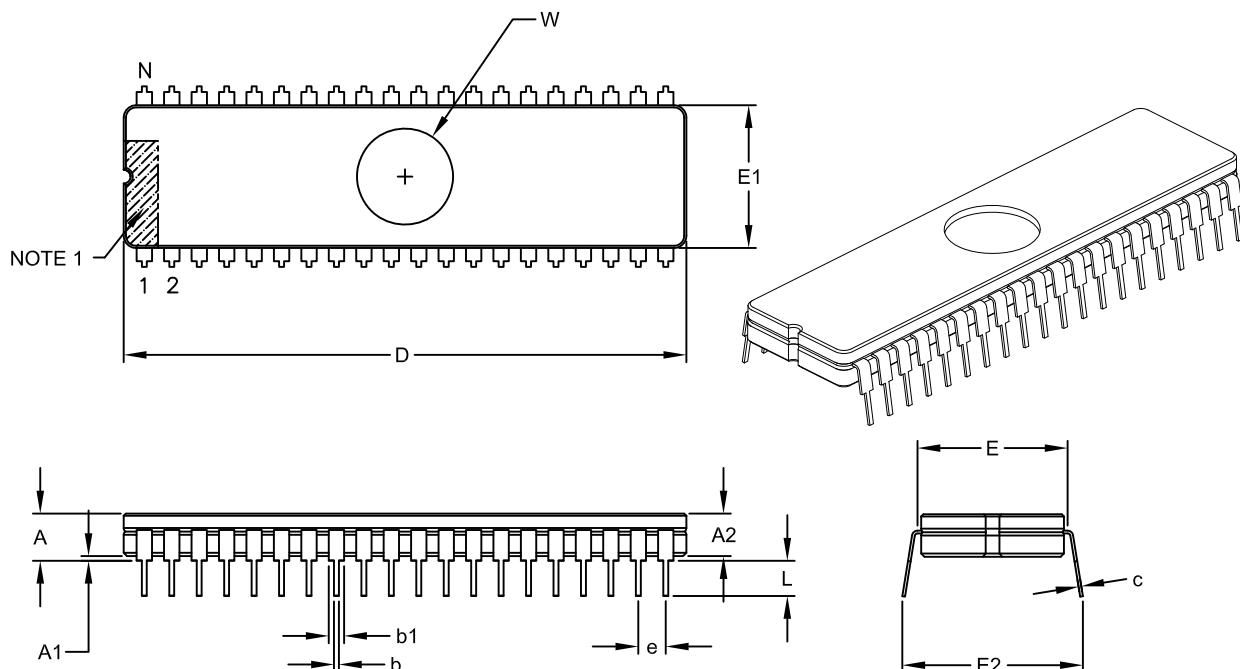
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-008C

## Packaging Diagrams and Parameters

### 40-Lead Ceramic Dual In-Line with Window (JW) ~ .600" Body [CERDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N	40		
Pitch	e	.100	BSC	
Top to Seating Plane	A	-	-	.225
Ceramic Package Height	A2	.140	-	.175
Base to Seating Plane §	A1	.015	-	-
Shoulder to Shoulder Width	E	.590	-	.625
Ceramic Package Width	E1	.510	.520	.583
Overall Length	D	2.030	2.050	2.070
Tip to Seating Plane	L	.125	-	.200
Lead Thickness	c	.008	-	.015
Upper Lead Width	b1	.045	-	.065
Lower Lead Width	b	.015	-	.023
Overall Row Spacing	E2	.620	-	.710
Window Diameter	W	.340	.350	.360

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Packaging Diagrams and Parameters

---

---

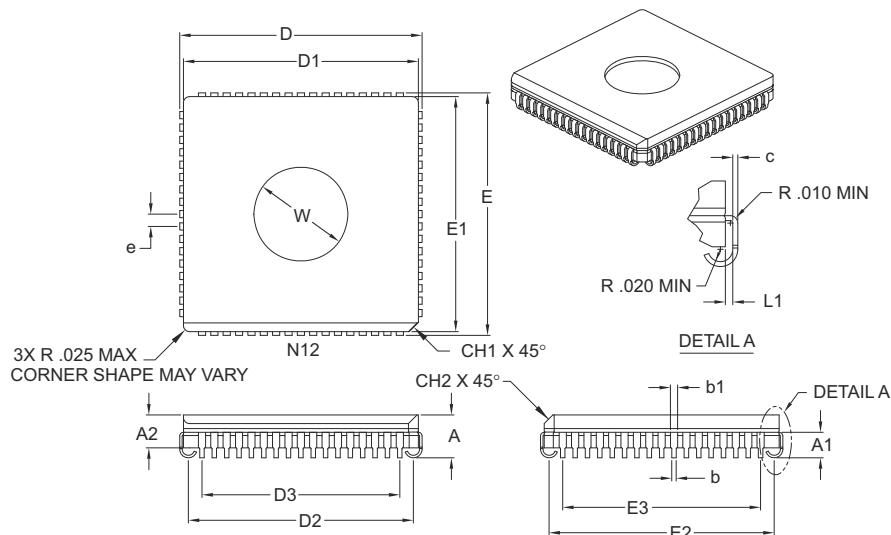
### CERQUAD Family

Ceramic Leaded Chip Carrier Packages

## Packaging Diagrams and Parameters

### 68-Lead Ceramic Leaded (CL) Chip Carrier with Window – Square [CERQUAD]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	INCHES		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N			68	
Pitch	e			.050 BSC	
Overall Height	A		.155	.172	.190
Package Thickness	A2			.132 REF	
Lead Height	A1		0.90	.100	.120
Side Chamfer	CH2			.035 REF	
Corner Chamfer	CH1			.040 REF	
Overall Package Width	E		.985	.990	.995
Overall Package Length	D		.985	.990	.995
Ceramic Package Width	E1		.930	.950	.965
Ceramic Package Length	D1		.930	.950	.965
Overall Lead Centers	E3			.800 REF	
Overall Lead Centers	D3			.800 REF	
Footprint Width	E2		.880	.910	.940
Footprint Length	D2		.880	.910	.940
Lead Length	L1		.006	–	–
Lead Thickness	c		.006	.007	.010
Upper Lead Width	b1		.026	.029	.032
Lower Lead Width	b		.017	.019	.021
Window Diameter	W		.370	.380	.390

#### Notes:

- Dimensions D1 and E1 do not include glass protrusion. These protrusions shall not exceed .005" per side.
- Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

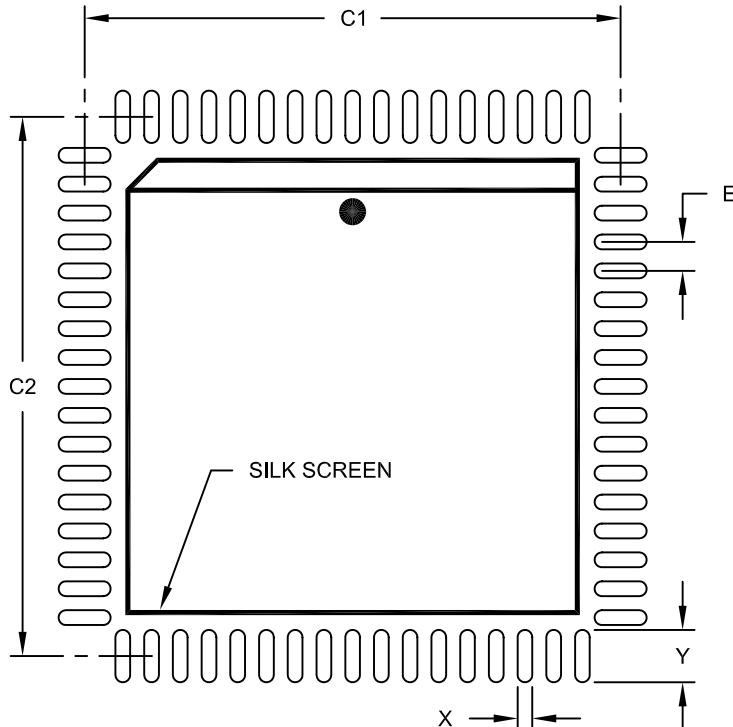
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-097B

## Land Pattern (Footprint)

68-Lead Ceramic Leaded (CL) Chip Carrier with Window - Square [CERQUAD]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Dimension Limits	Units	INCHES	
		MIN	NOM
Contact Pitch	E	.050	BSC
Contact Pad Spacing	C1		.933
Contact Pad Spacing	C2		.933
Contact Pad Width (X68)	X1		.026
Contact Pad Length (X68)	Y1		.091

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

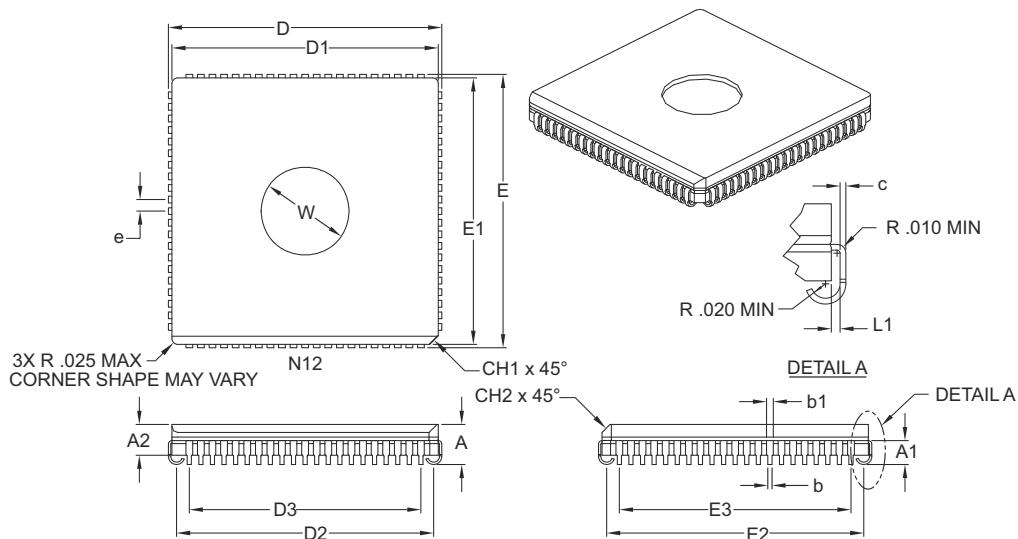
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2097A

## Packaging Diagrams and Parameters

### 84-Lead Ceramic Leaded (CL) Chip Carrier with Window – Square [CERQUAD]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	INCHES		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N			84	
Pitch	e			.050 BSC	
Overall Height	A		.155	.172	.190
Package Thickness	A2			.132 REF	
Lead Height	A1		0.90	.100	.120
Side Chamfer	CH2			.035 REF	
Corner Chamfer	CH1			.040 REF	
Overall Package Width	E		1.185	1.190	1.195
Overall Package Length	D		1.185	1.190	1.195
Ceramic Package Width	E1		1.130	1.150	1.165
Ceramic Package Length	D1		1.130	1.150	1.165
Overall Lead Centers	E3			1.00 REF	
Overall Lead Centers	D3			1.00 REF	
Footprint Width	E2		1.080	1.110	1.140
Footprint Length	D2		1.080	1.110	1.140
Lead Length	L1		.006	–	–
Lead Thickness	c		.006	.007	.010
Lower Lead Width	b		.017	.019	.021
Upper Lead Width	b1		.026	.029	.032
Window Diameter	W		.395	.400	.405

#### Notes:

- Dimensions D1 and E1 do not include glass protrusion. These protrusions shall not exceed .005" per side.
- Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

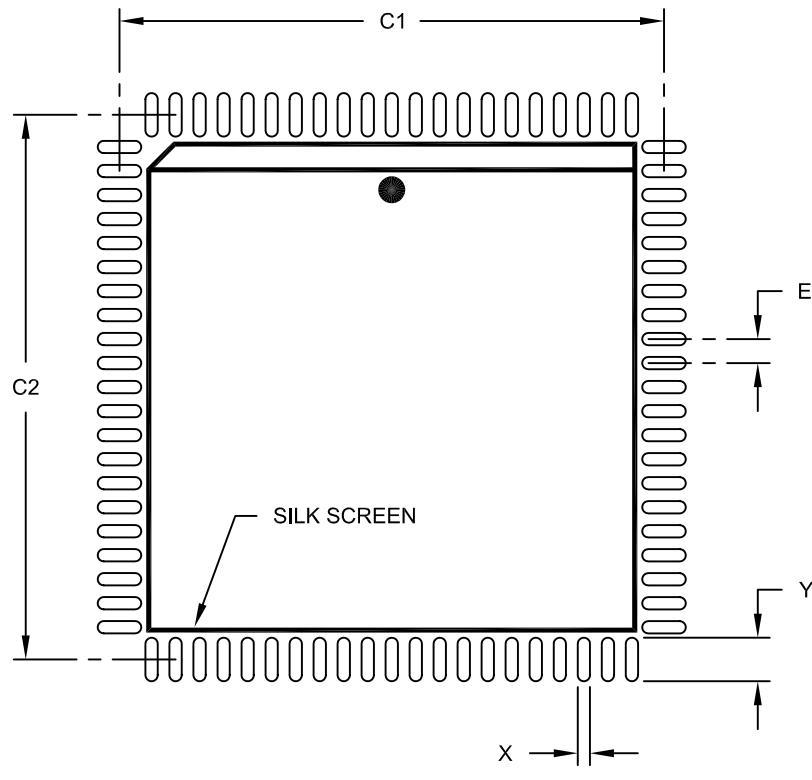
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-112B

## Land Pattern (Footprint)

84-Lead Ceramic Leaded (CL) Chip Carrier with Window - Square [CERQUAD]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		.050	
Contact Pad Spacing	C1		1.134	
Contact Pad Spacing	C2		1.134	
Contact Pad Width (X84)	X			.026
Contact Pad Length (X84)	Y			.091

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2112A

## Packaging Diagrams and Parameters

---

---

**NOTES:**

## Packaging Diagrams and Parameters

---

---

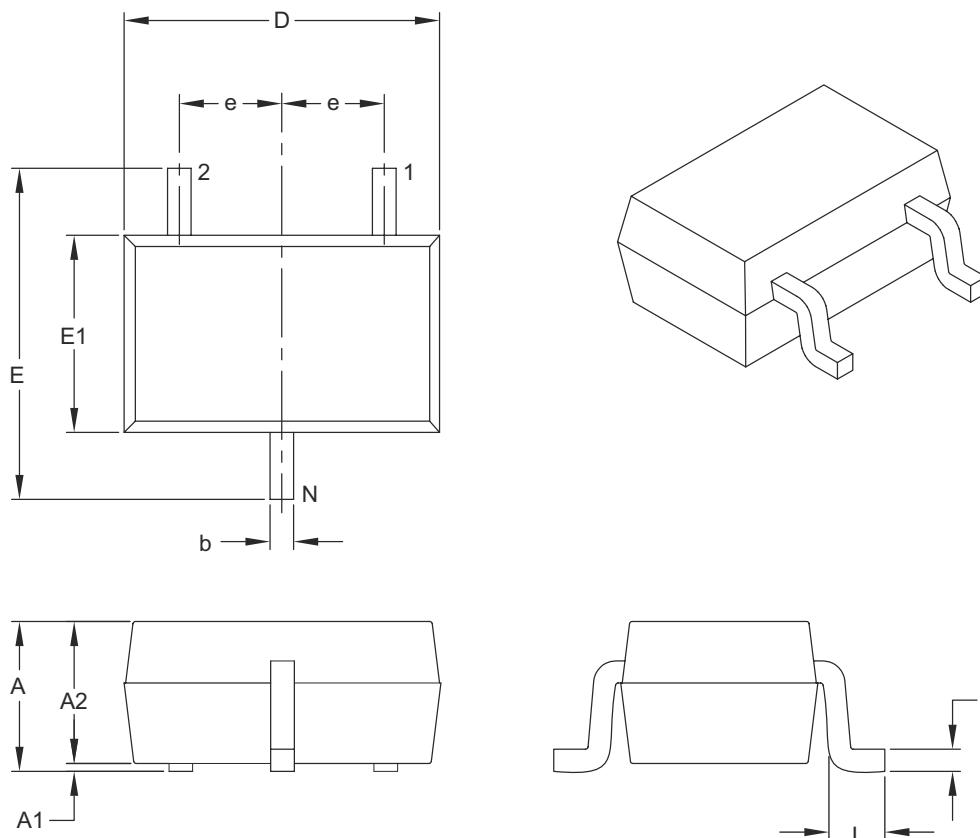
### SOT Family

#### Small Outline Transistor Packages

## Packaging Diagrams and Parameters

### 3-Lead Plastic Small Outline Transistor (LB) [SC70]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		UNITS			MILLIMETERS		
		Dimension Limits			MIN	NOM	MAX
Number of Pins	N				3		
Pitch	e				0.65	BSC	
Overall Height	A	0.80		—	—	1.10	
Molded Package Thickness	A2	0.80		—	—	1.00	
Standoff	A1	0.00		—	—	0.10	
Overall Width	E	1.80		2.10	—	2.40	
Molded Package Width	E1	1.15		1.25	—	1.35	
Overall Length	D	1.80		2.00	—	2.25	
Foot Length	L	0.10		0.20	—	0.46	
Lead Thickness	c	0.08		—	—	0.26	
Lead Width	b	0.15		—	—	0.40	

#### Notes:

- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.127 mm per side.
- Dimensioning and tolerancing per ASME Y14.5M.

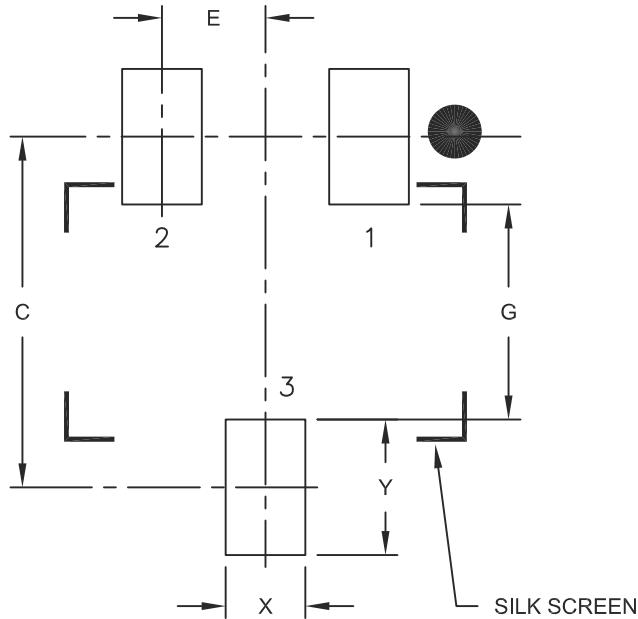
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-060B

## Land Pattern (Footprint)

3-Lead Plastic Small Outline Transistor (LB) [SC70]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		0.65	BSC
Contact Pad Spacing	C		2.20	
Contact Pad Width	X			0.50
Contact Pad Length	Y			0.95
Distance Between Pads	G	1.25		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

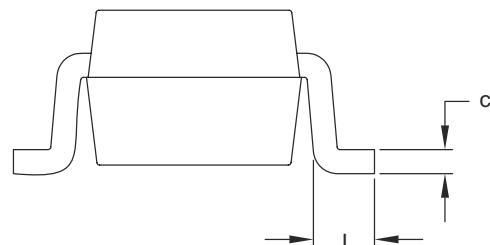
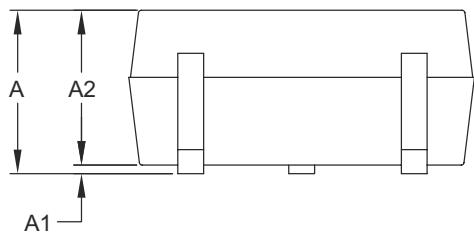
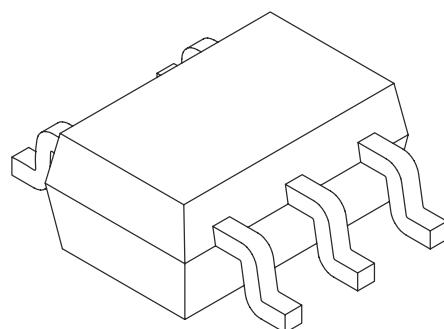
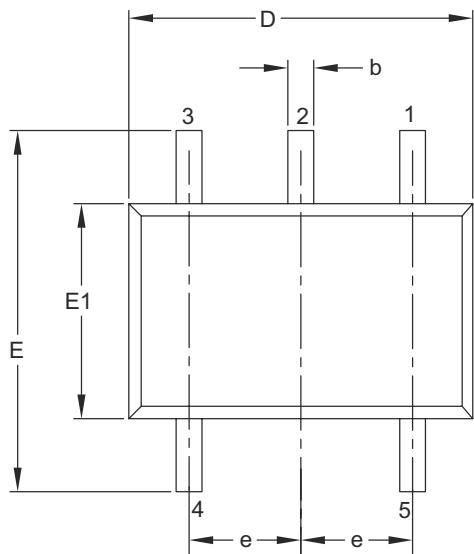
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2060A

## Packaging Diagrams and Parameters

### 5-Lead Plastic Small Outline Transistor (LT) [SC70]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		5		
Pitch	e		0.65	BSC	
Overall Height	A	0.80	—	1.10	
Molded Package Thickness	A2	0.80	—	1.00	
Standoff	A1	0.00	—	0.10	
Overall Width	E	1.80	2.10	2.40	
Molded Package Width	E1	1.15	1.25	1.35	
Overall Length	D	1.80	2.00	2.25	
Foot Length	L	0.10	0.20	0.46	
Lead Thickness	c	0.08	—	0.26	
Lead Width	b	0.15	—	0.40	

#### Notes:

- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.127 mm per side.
- Dimensioning and tolerancing per ASME Y14.5M.

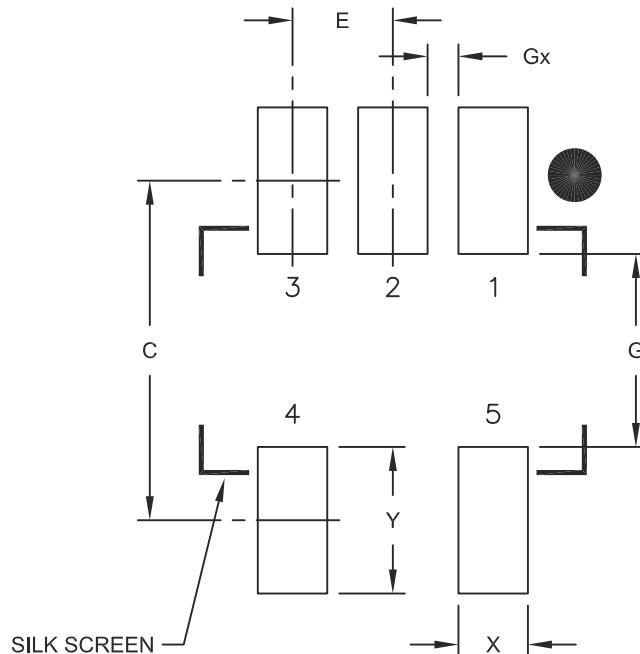
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-061B

## Land Pattern (Footprint)

5-Lead Plastic Small Outline Transistor (LT) [SC70]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



**RECOMMENDED LAND PATTERN**

		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E		0.65	BSC	
Contact Pad Spacing	C		2.20		
Contact Pad Width	X			0.45	
Contact Pad Length	Y			0.95	
Distance Between Pads	G	1.25			
Distance Between Pads	Gx	0.20			

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

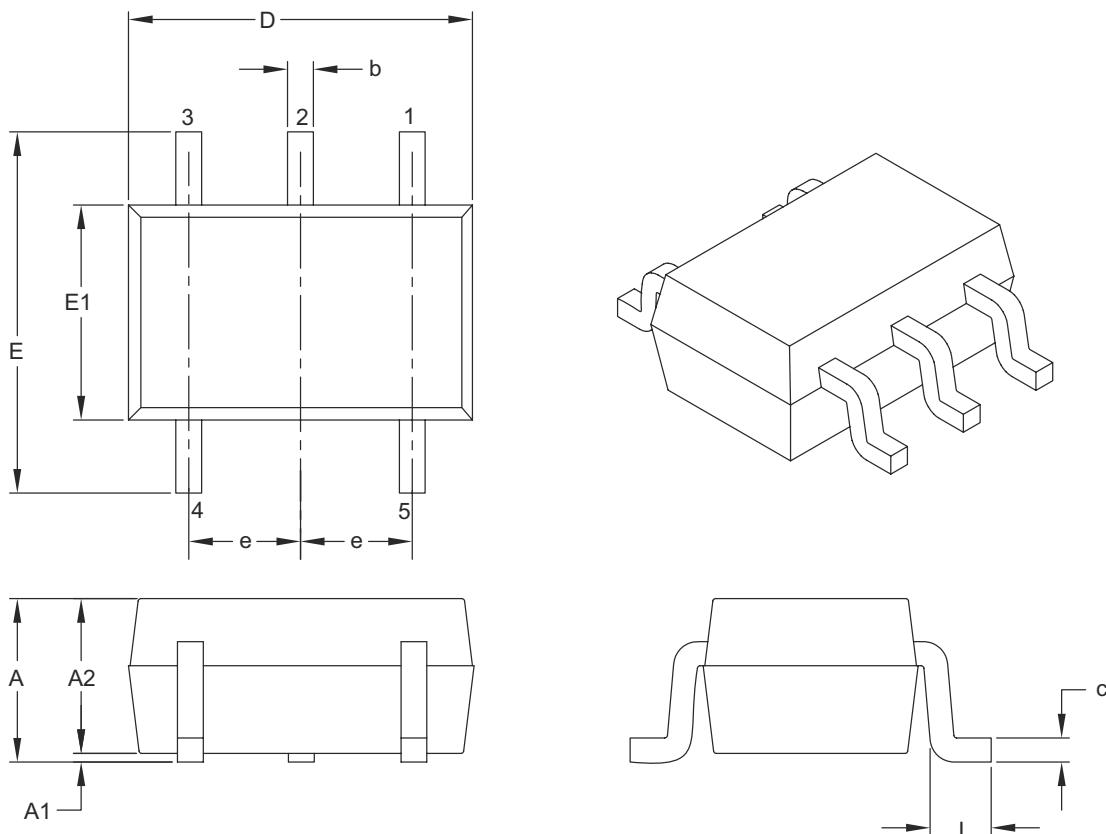
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2061A

## Packaging Diagrams and Parameters

### 5-Lead Plastic Small Outline Transistor (LTY) [SC70]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		5	
Pitch	e		0.65 BSC	
Overall Height	A	0.80	—	1.10
Molded Package Thickness	A2	0.80	—	1.00
Standoff	A1	0.00	—	0.10
Overall Width	E	1.80	2.10	2.40
Molded Package Width	E1	1.15	1.25	1.35
Overall Length	D	1.80	2.00	2.25
Foot Length	L	0.10	0.20	0.46
Lead Thickness	c	0.08	—	0.26
Lead Width	b	0.15	—	0.40

#### Notes:

- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.127 mm per side.
- Dimensioning and tolerancing per ASME Y14.5M.

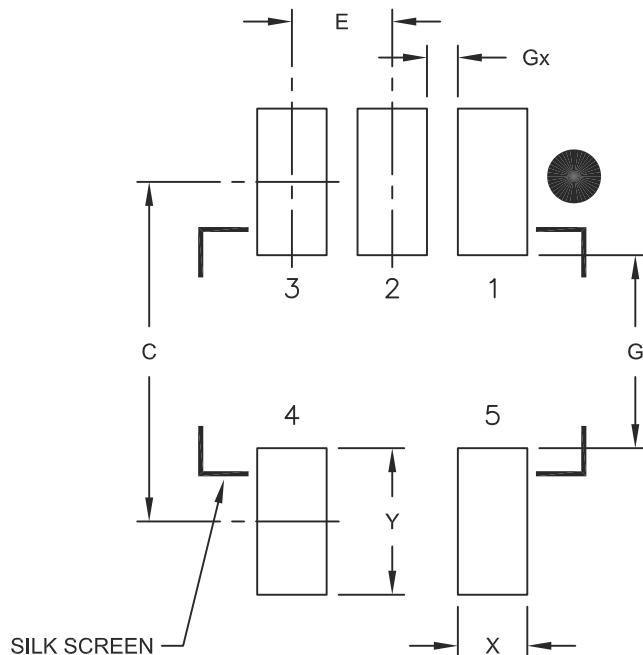
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-061B

## Land Pattern (Footprint)

### 5-Lead Plastic Small Outline Transistor (LTY) [SC70]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



**RECOMMENDED LAND PATTERN**

		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E		0.65	BSC	
Contact Pad Spacing	C		2.20		
Contact Pad Width	X			0.45	
Contact Pad Length	Y			0.95	
Distance Between Pads	G	1.25			
Distance Between Pads	Gx	0.20			

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

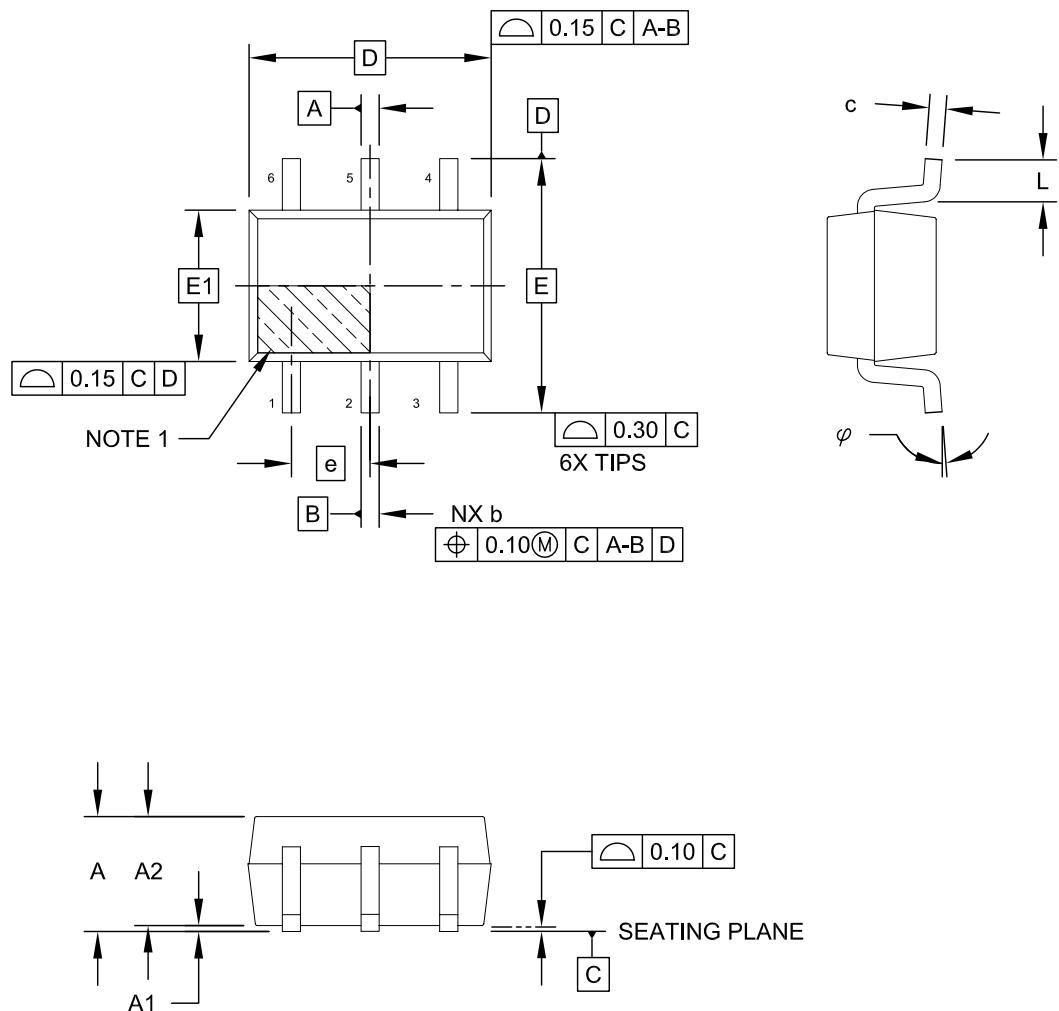
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2061A

## Packaging Diagrams and Parameters

6-Lead Plastic Small Outline Transistor (LT) [SC70]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



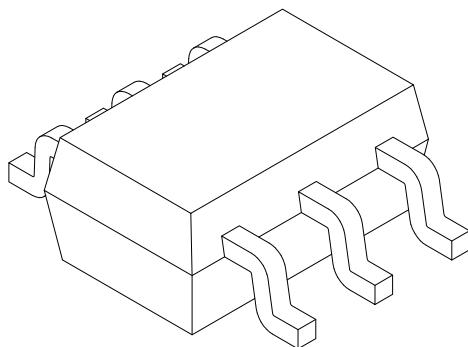
---

## Packaging Diagrams and Parameters

---

### 6-Lead Plastic Small Outline Transistor (LT) [SC70]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		6		
Pitch	e		0.65	BSC	
Overall Height	A	0.80	-	1.10	
Molded Package Thickness	A2	0.70	0.90	1.00	
Standoff	A1	0.00	-	0.10	
Overall Width	E	2.10 BSC			
Molded Package Width	E1	1.25 BSC			
Overall Length	D	2.00 BSC			
Foot Length	L	0.10	0.20	0.46	
Lead Thickness	c	0.08	-	0.22	
Lead Width	b	0.15	-	0.30	

**Notes:**

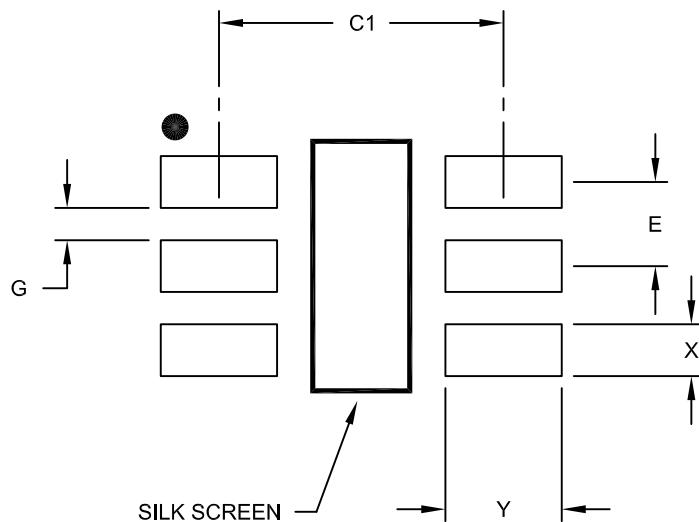
1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm per side.
3. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Land Pattern (Footprint)

### 6-Lead Plastic Small Outline Transistor (LT) [SC70]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units			MILLIMETERS		
		Dimension Limits			MIN	NOM	MAX
Contact Pitch		E			0.65 BSC		
Contact Pad Spacing		C			2.20		
Contact Pad Width (X6)		X			0.40		
Contact Pad Length (X6)		Y			0.90		
Distance Between Pads		G			0.25		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

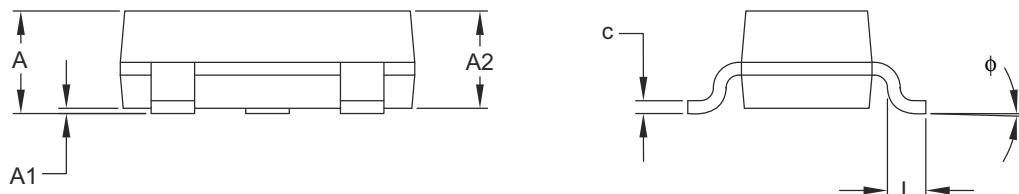
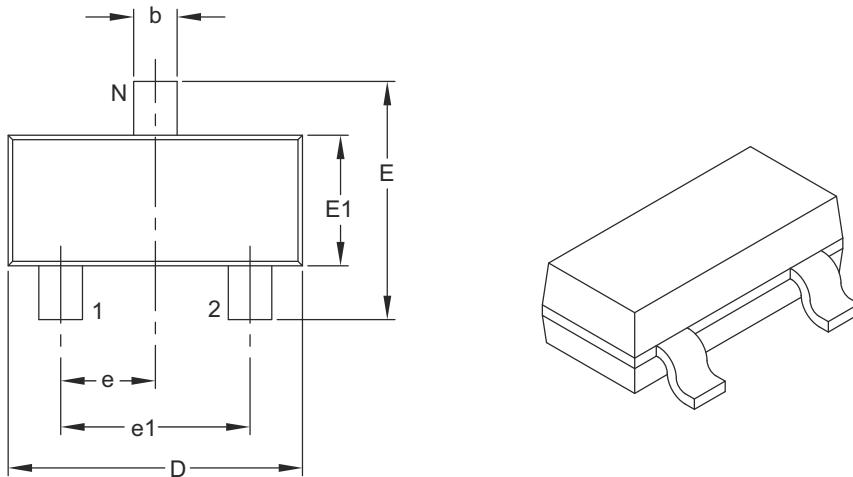
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2151A

## Packaging Diagrams and Parameters

### 3-Lead Plastic Small Outline Transistor (NB) [SOT-23]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		3		
Lead Pitch	e		0.95 BSC		
Outside Lead Pitch	e1		1.90 BSC		
Overall Height	A	0.89	–	1.12	
Molded Package Thickness	A2	0.79	0.95	1.02	
Standoff	A1	0.01	–	0.10	
Overall Width	E	2.10	–	2.64	
Molded Package Width	E1	1.16	1.30	1.40	
Overall Length	D	2.67	2.90	3.05	
Foot Length	L	0.13	0.50	0.60	
Foot Angle	phi	0°	–	10°	
Lead Thickness	c	0.08	–	0.20	
Lead Width	b	0.30	–	0.54	

#### Notes:

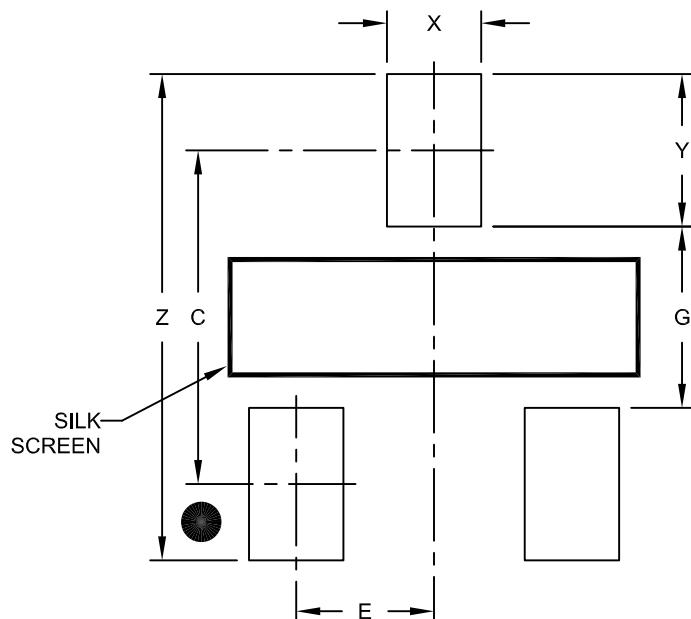
- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25 mm per side.
- Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Land Pattern (Footprint)

### 3-Lead Plastic Small Outline Transistor (NB) [SOT-23]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	0.95	BSC	
Contact Pad Spacing	C		2.30	
Contact Pad Width (X3)	X			0.65
Contact Pad Length (Y3)	Y			1.05
Distance Between Pads	G	1.25		
Overall Width	Z			3.35

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

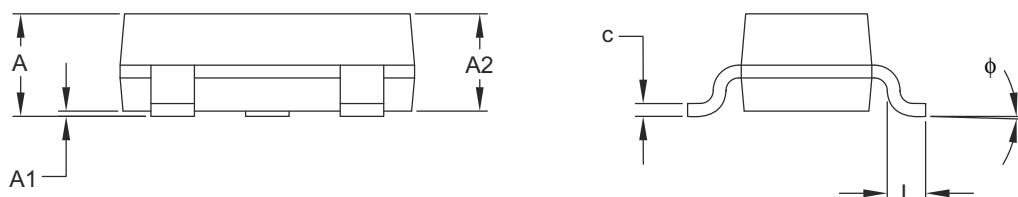
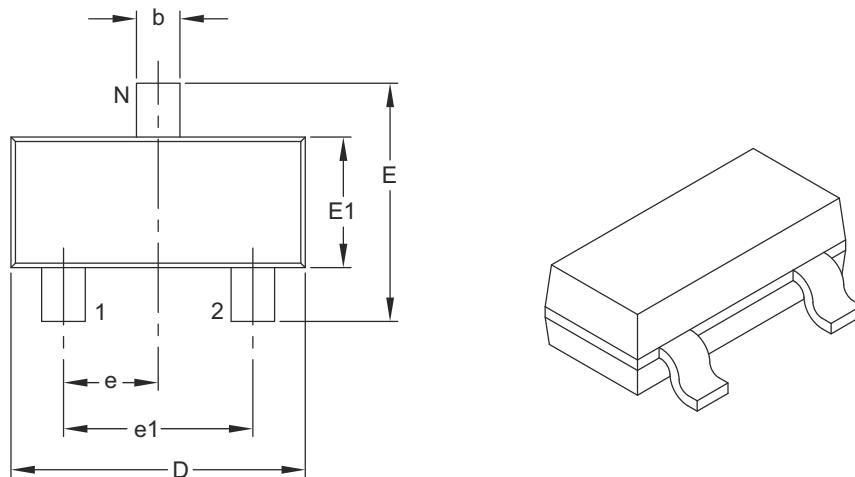
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2104A

## Packaging Diagrams and Parameters

### 3-Lead Plastic Small Outline Transistor (TT) [SOT-23]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N			3	
Lead Pitch	e			0.95 BSC	
Outside Lead Pitch	e1			1.90 BSC	
Overall Height	A	0.89	—	1.12	
Molded Package Thickness	A2	0.79	0.95	1.02	
Standoff	A1	0.01	—	0.10	
Overall Width	E	2.10	—	2.64	
Molded Package Width	E1	1.16	1.30	1.40	
Overall Length	D	2.67	2.90	3.05	
Foot Length	L	0.13	0.50	0.60	
Foot Angle	phi	0°	—	10°	
Lead Thickness	c	0.08	—	0.20	
Lead Width	b	0.30	—	0.54	

#### Notes:

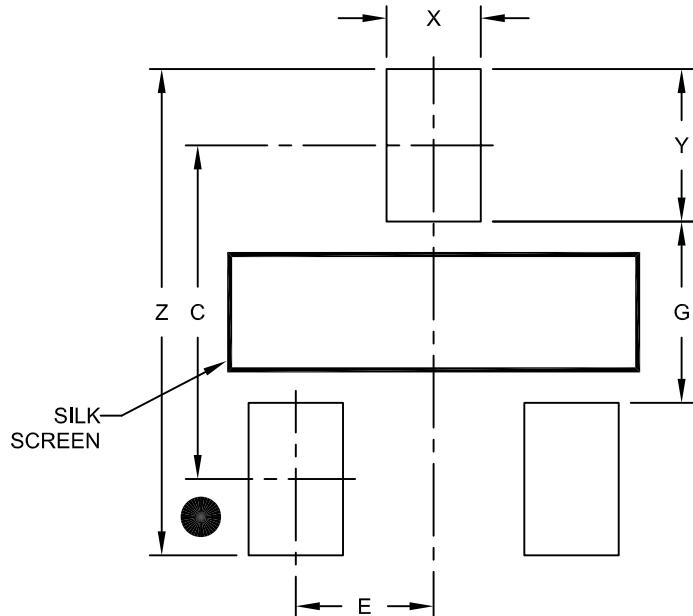
- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25 mm per side.
- Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Land Pattern (Footprint)

3-Lead Plastic Small Outline Transistor (TT) [SOT-23]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units			MILLIMETERS		
		Dimension Limits			MIN	NOM	MAX
Contact Pitch	E				0.95	BSC	
Contact Pad Spacing	C				2.30		
Contact Pad Width (X3)	X					0.65	
Contact Pad Length (X3)	Y					1.05	
Distance Between Pads	G	1.25					
Overall Width	Z				3.35		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

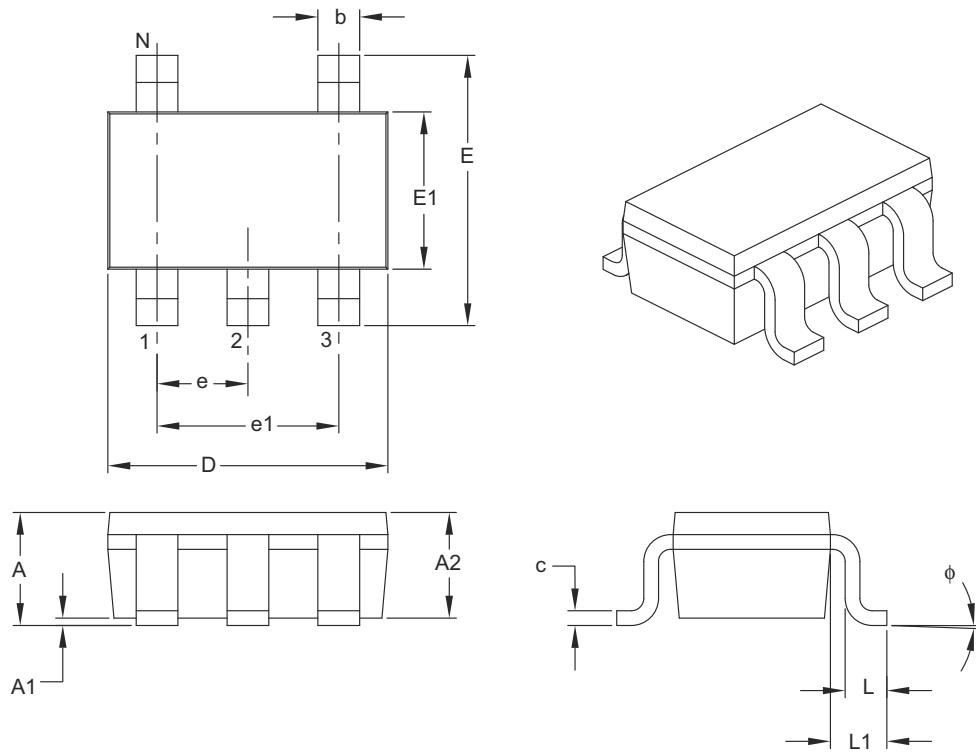
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2104A

## Packaging Diagrams and Parameters

### 5-Lead Plastic Small Outline Transistor (CT) [SOT-23]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		5		
Lead Pitch	e		0.95 BSC		
Outside Lead Pitch	e1		1.90 BSC		
Overall Height	A	0.90	—	1.45	
Molded Package Thickness	A2	0.89	—	1.30	
Standoff	A1	0.00	—	0.15	
Overall Width	E	2.20	—	3.20	
Molded Package Width	E1	1.30	—	1.80	
Overall Length	D	2.70	—	3.10	
Foot Length	L	0.10	—	0.60	
Footprint	L1	0.35	—	0.80	
Foot Angle	φ	0°	—	30°	
Lead Thickness	c	0.08	—	0.26	
Lead Width	b	0.20	—	0.51	

#### Notes:

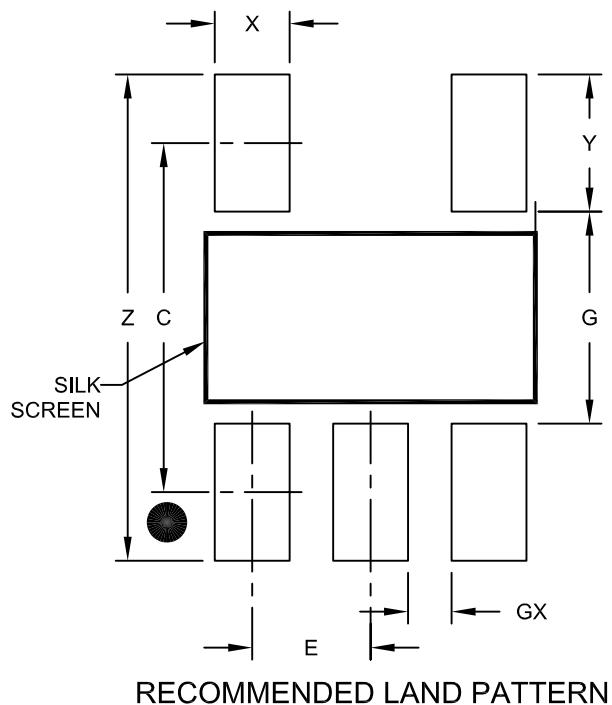
- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.127 mm per side.
- Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Land Pattern (Footprint)

### 5-Lead Plastic Small Outline Transistor (CT) [SOT-23]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	0.95	BSC	
Contact Pad Spacing	C		2.80	
Contact Pad Width (X5)	X			0.60
Contact Pad Length (X5)	Y			1.10
Distance Between Pads	G	1.70		
Distance Between Pads	GX	0.35		
Overall Width	Z			3.90

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

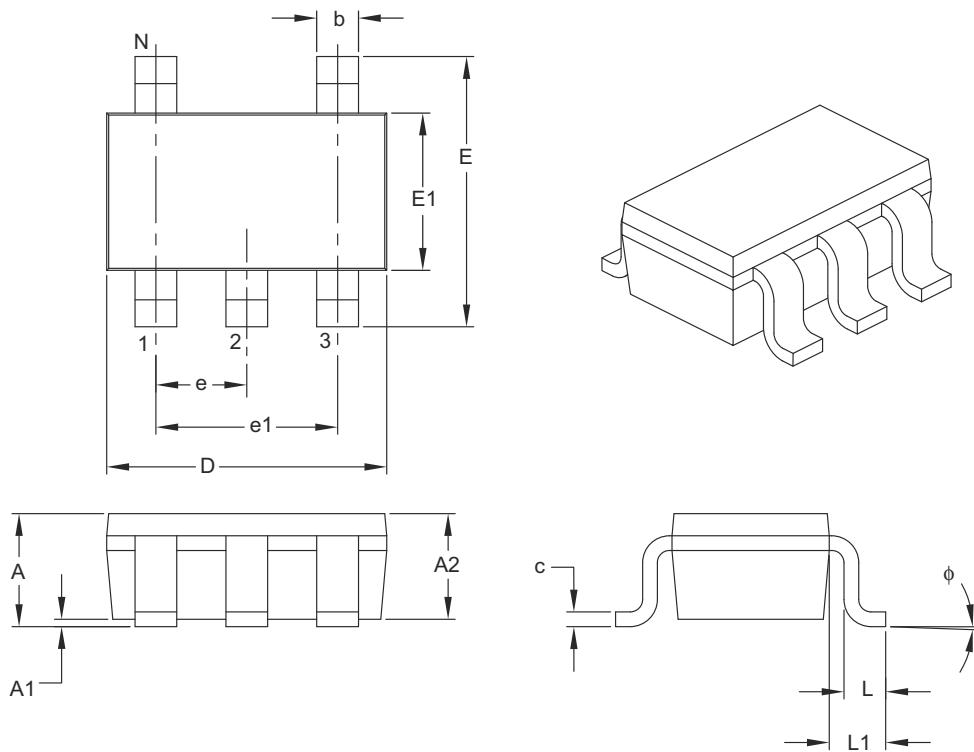
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2091A

## Packaging Diagrams and Parameters

### 5-Lead Plastic Small Outline Transistor (OT) [SOT-23]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		5	
Lead Pitch	e		0.95 BSC	
Outside Lead Pitch	e1		1.90 BSC	
Overall Height	A	0.90	—	1.45
Molded Package Thickness	A2	0.89	—	1.30
Standoff	A1	0.00	—	0.15
Overall Width	E	2.20	—	3.20
Molded Package Width	E1	1.30	—	1.80
Overall Length	D	2.70	—	3.10
Foot Length	L	0.10	—	0.60
Footprint	L1	0.35	—	0.80
Foot Angle	φ	0°	—	30°
Lead Thickness	c	0.08	—	0.26
Lead Width	b	0.20	—	0.51

#### Notes:

- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.127 mm per side.
- Dimensioning and tolerancing per ASME Y14.5M.

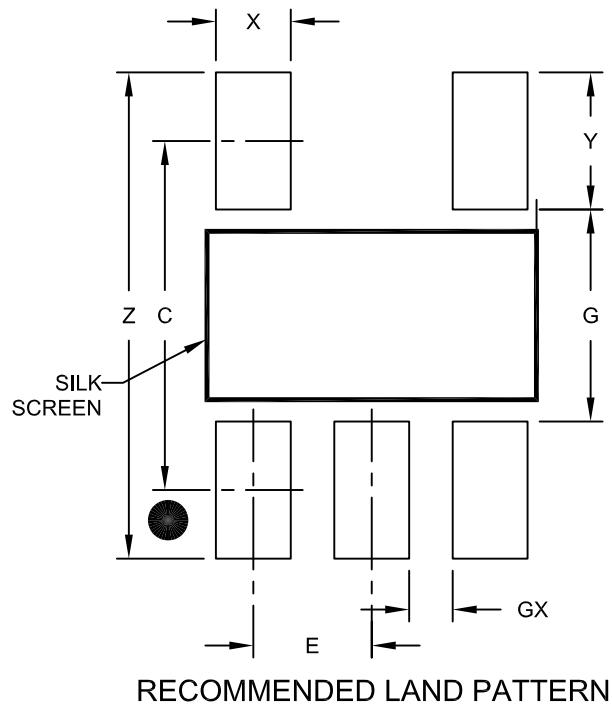
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-091B

## Land Pattern (Footprint)

## **5-Lead Plastic Small Outline Transistor (OT) [SOT-23]**

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		0.95	BSC
Contact Pad Spacing	C		2.80	
Contact Pad Width (X5)	X			0.60
Contact Pad Length (X5)	Y			1.10
Distance Between Pads	G	1.70		
Distance Between Pads	GX	0.35		
Overall Width	Z			3.90

## Notes:

- ## 1. Dimensioning and tolerancing per ASME Y14.5M

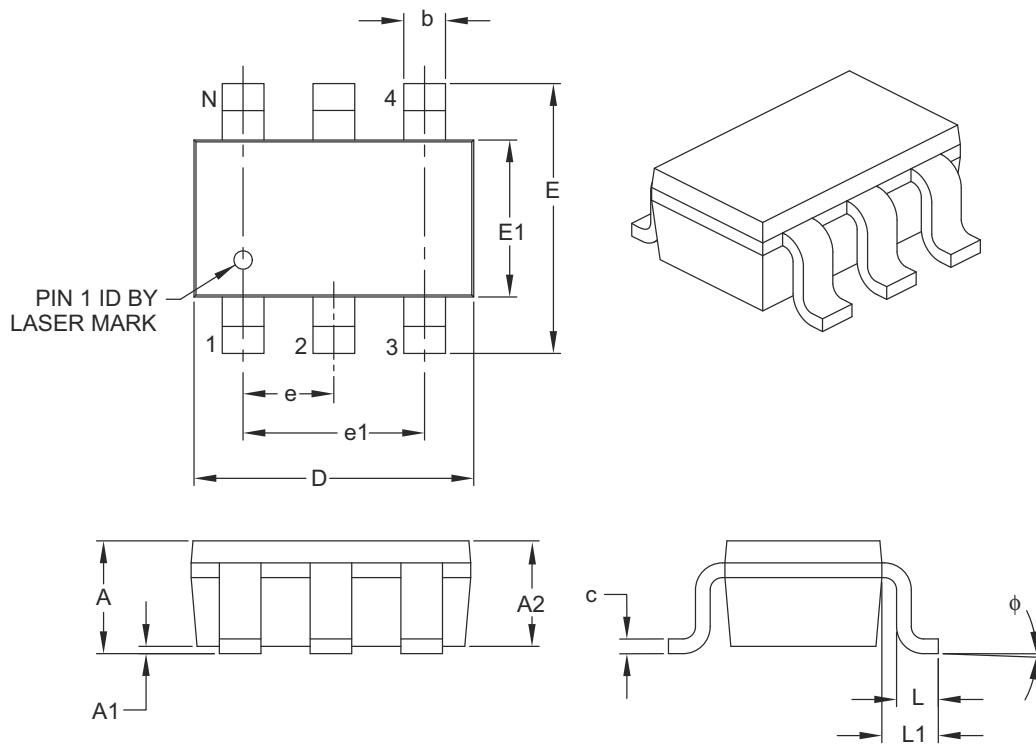
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2091A

## Packaging Diagrams and Parameters

### 6-Lead Plastic Small Outline Transistor (CH) [SOT-23]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		6	
Pitch	e		0.95 BSC	
Outside Lead Pitch	e1		1.90 BSC	
Overall Height	A	0.90	—	1.45
Molded Package Thickness	A2	0.89	—	1.30
Standoff	A1	0.00	—	0.15
Overall Width	E	2.20	—	3.20
Molded Package Width	E1	1.30	—	1.80
Overall Length	D	2.70	—	3.10
Foot Length	L	0.10	—	0.60
Footprint	L1	0.35	—	0.80
Foot Angle	ϕ	0°	—	30°
Lead Thickness	c	0.08	—	0.26
Lead Width	b	0.20	—	0.51

#### Notes:

- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.127 mm per side.
- Dimensioning and tolerancing per ASME Y14.5M.

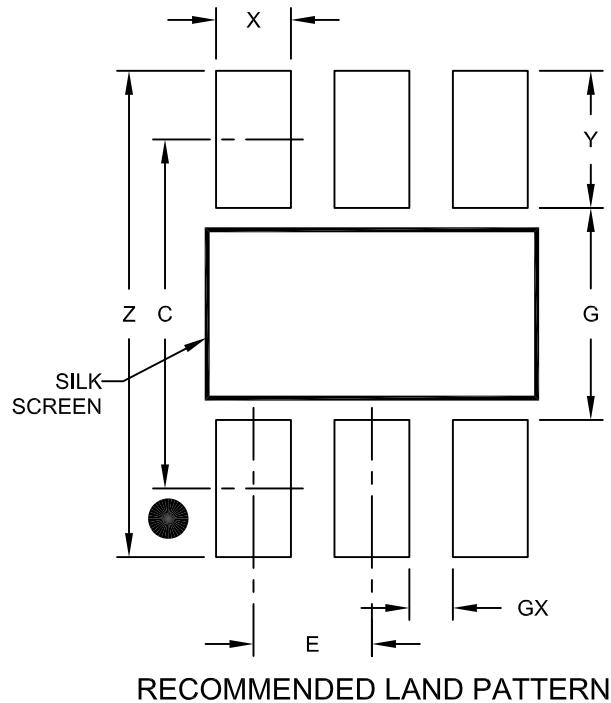
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-028B

## Land Pattern (Footprint)

6-Lead Plastic Small Outline Transistor (CH) [SOT-23]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	0.95	BSC	
Contact Pad Spacing	C		2.80	
Contact Pad Width (X6)	X			0.60
Contact Pad Length (X6)	Y			1.10
Distance Between Pads	G	1.70		
Distance Between Pads	GX	0.35		
Overall Width	Z			3.90

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

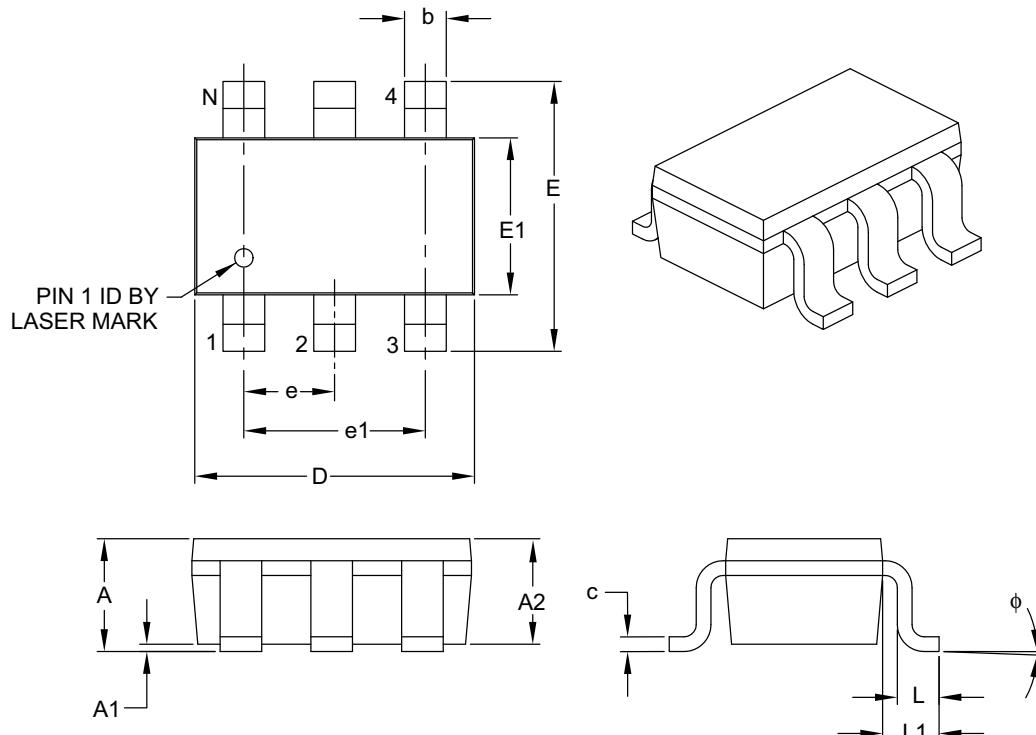
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2028A

## Packaging Diagrams and Parameters

### 6-Lead Plastic Small Outline Transistor (CHY) [SOT-23]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
		Dimension Limits	MIN	NOM	MAX
Number of Pins	N		6		
Pitch	e		0.95 BSC		
Outside Lead Pitch	e1		1.90 BSC		
Overall Height	A	0.90	—	1.45	
Molded Package Thickness	A2	0.89	—	1.30	
Standoff	A1	0.00	—	0.15	
Overall Width	E	2.20	—	3.20	
Molded Package Width	E1	1.30	—	1.80	
Overall Length	D	2.70	—	3.10	
Foot Length	L	0.10	—	0.60	
Footprint	L1	0.35	—	0.80	
Foot Angle	φ	0°	—	30°	
Lead Thickness	c	0.08	—	0.26	
Lead Width	b	0.20	—	0.51	

**Notes:**

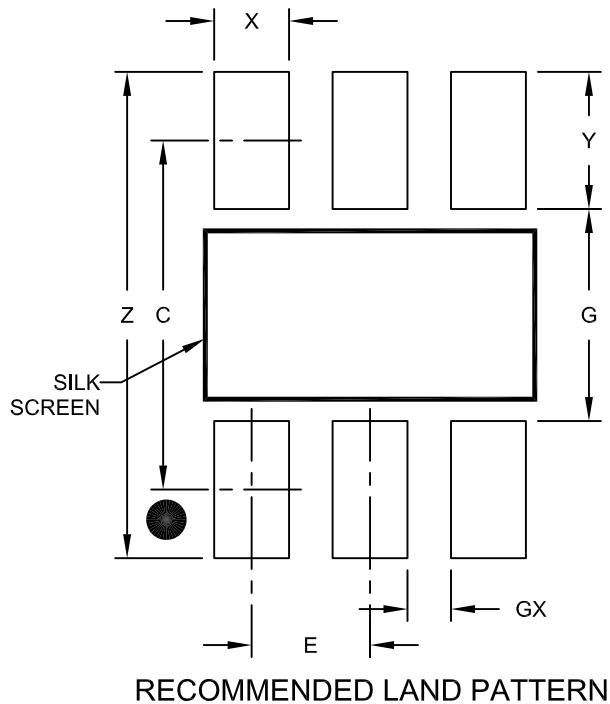
- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.127 mm per side.
- Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Land Pattern (Footprint)

### 6-Lead Plastic Small Outline Transistor (CHY) [SOT-23]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units			MILLIMETERS		
		Dimension Limits			MIN	NOM	MAX
Contact Pitch	E				0.95	BSC	
Contact Pad Spacing	C				2.80		
Contact Pad Width (X6)	X					0.60	
Contact Pad Length (X6)	Y					1.10	
Distance Between Pads	G	1.70					
Distance Between Pads	GX	0.35					
Overall Width	Z				3.90		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

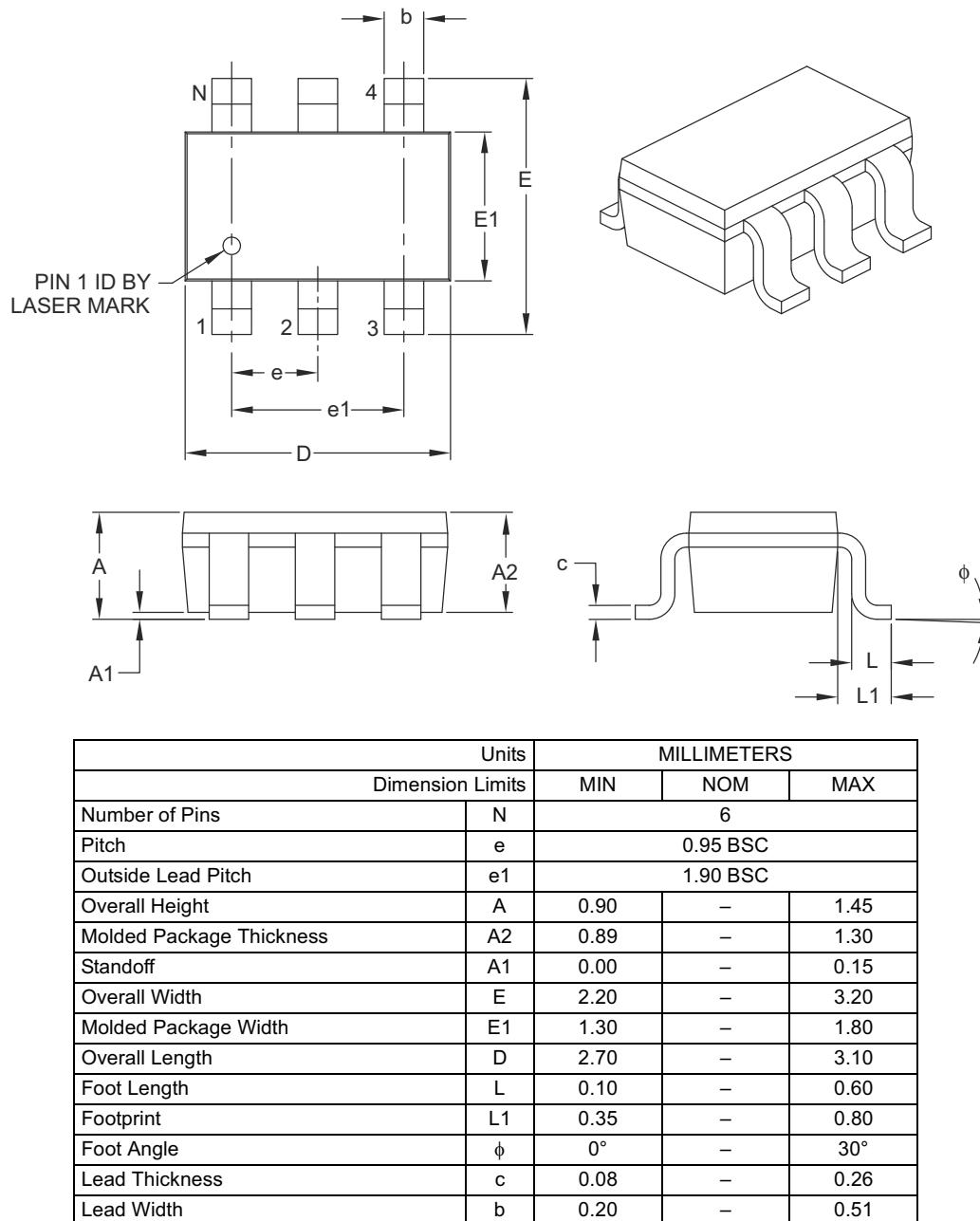
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2028A

## Packaging Diagrams and Parameters

### 6-Lead Plastic Small Outline Transistor (OT) [SOT-23]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



**Notes:**

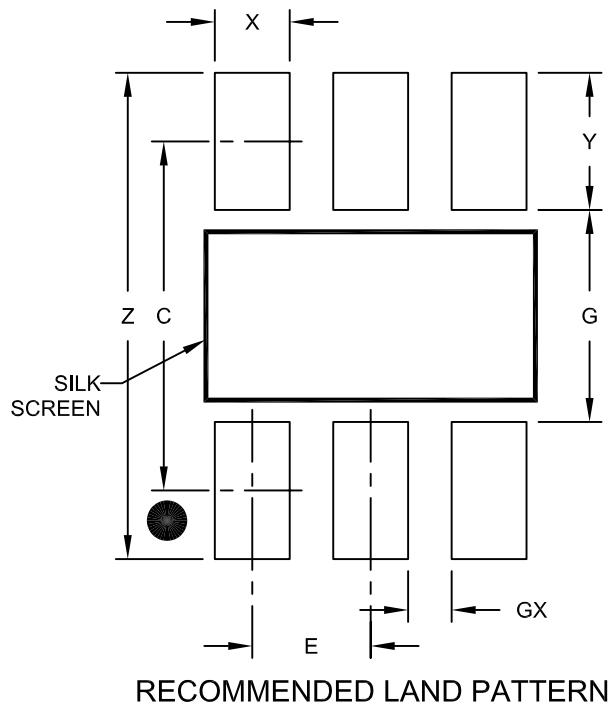
- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.127 mm per side.
- Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Land Pattern (Footprint)

6-Lead Plastic Small Outline Transistor (OT) [SOT-23]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E		0.95	BSC	
Contact Pad Spacing	C		2.80		
Contact Pad Width (X6)	X			0.60	
Contact Pad Length (X6)	Y			1.10	
Distance Between Pads	G	1.70			
Distance Between Pads	GX	0.35			
Overall Width	Z			3.90	

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

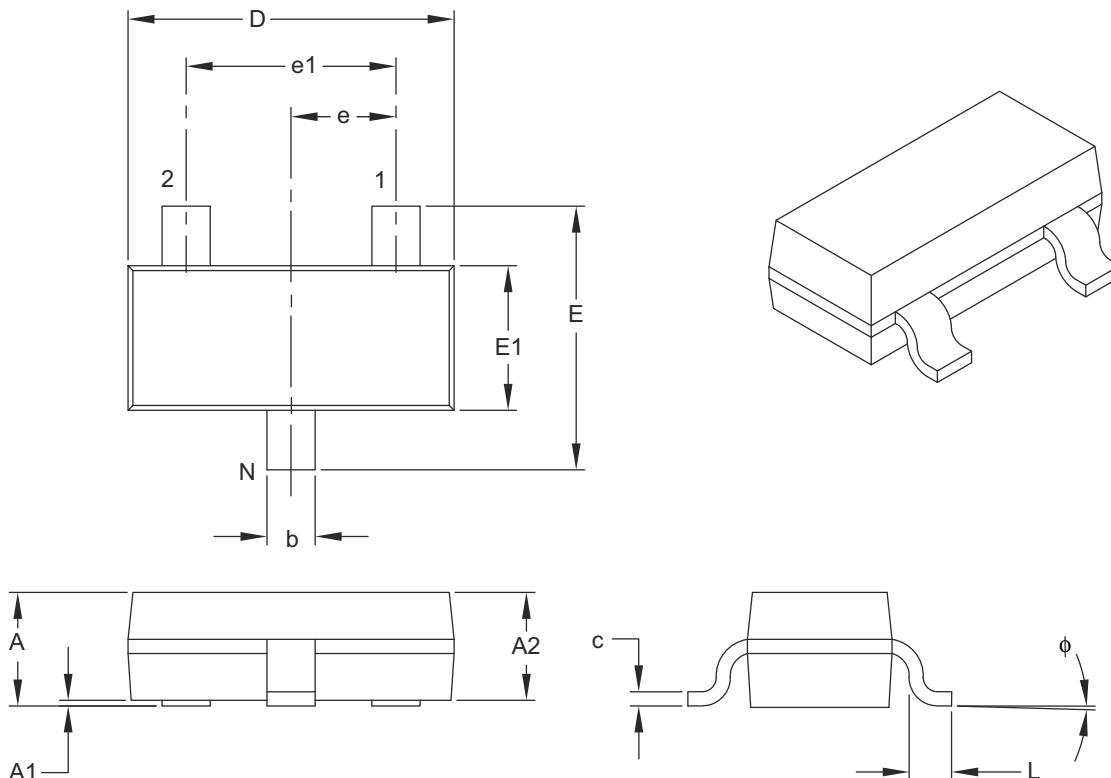
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2028A

## Packaging Diagrams and Parameters

### 3-Lead Plastic Small Outline Transistor (CB) [SOT-23A]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		3	
Lead Pitch	e		0.95 BSC	
Outside Lead Pitch	e1		1.90 BSC	
Overall Height	A	0.89	—	1.45
Molded Package Thickness	A2	0.90	—	1.30
Standoff	A1	0.00	—	0.15
Overall Width	E	2.10	—	3.00
Molded Package Width	E1	1.20	—	1.80
Overall Length	D	2.70	—	3.10
Foot Length	L	0.15	—	0.60
Foot Angle	phi	0°	—	30°
Lead Thickness	c	0.09	—	0.26
Lead Width	b	0.30	—	0.51

**Notes:**

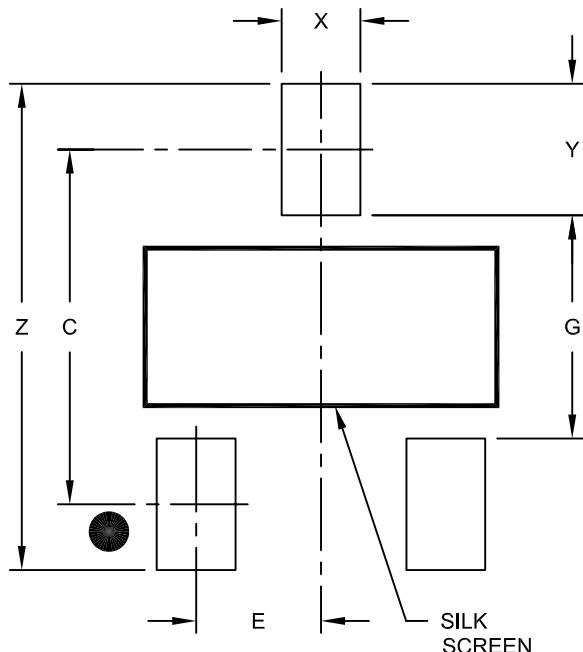
- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.127 mm per side.
- Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Land Pattern (Footprint)

3-Lead Plastic Small Outline Transistor (CB) [SOT-23A]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E		0.95	BSC	
Contact Pad Spacing	C			2.70	
Contact Pad Width (X3)	X				0.60
Contact Pad Length (Y3)	Y				1.00
Distance Between Pads	G	1.70			
Overall Width	Z				3.70

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

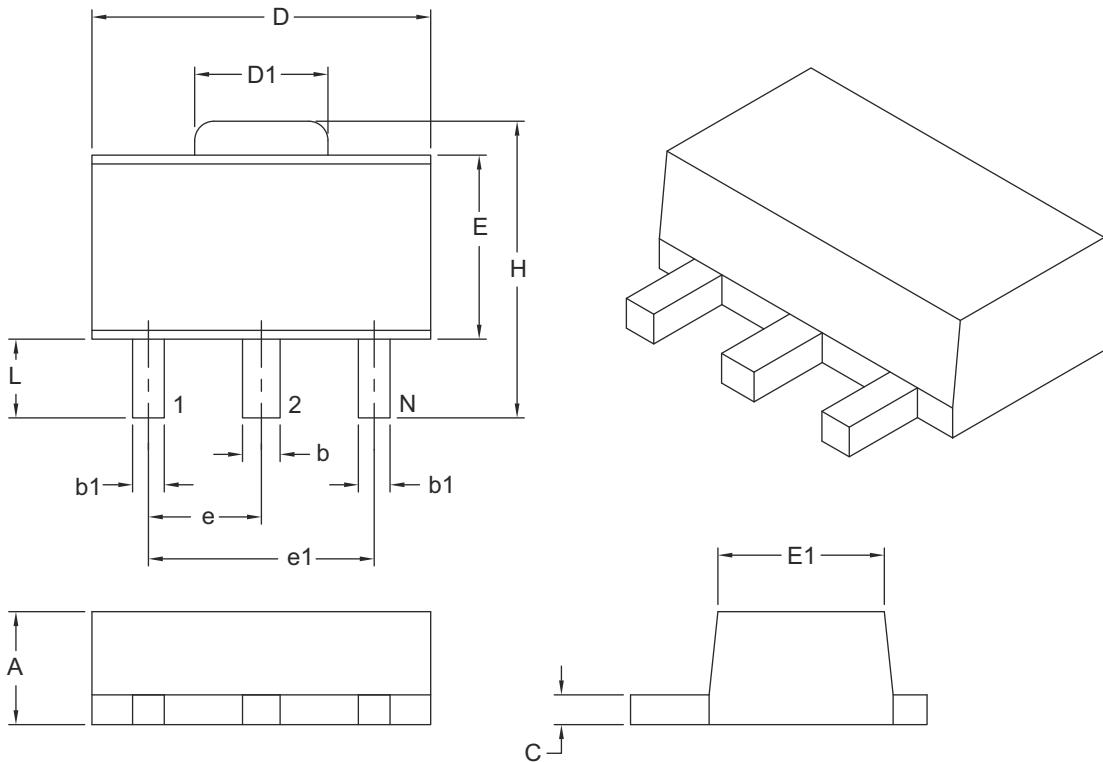
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2130A

## Packaging Diagrams and Parameters

### 3-Lead Plastic Small Outline Transistor Header (MB) [SOT-89]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS	
		Dimension Limits	MIN	MAX
Number of Leads	N		3	
Pitch	e		1.50 BSC	
Outside Lead Pitch	e1		3.00 BSC	
Overall Height	A	1.40	1.60	
Overall Width	H	3.94	4.25	
Molded Package Width at Base	E	2.29	2.60	
Molded Package Width at Top	E1	2.13	2.29	
Overall Length	D	4.39	4.60	
Tab Length	D1	1.40	1.83	
Foot Length	L	0.79	1.20	
Lead Thickness	c	0.35	0.44	
Lead 2 Width	b	0.41	0.56	
Leads 1 & 3 Width	b1	0.36	0.48	

**Notes:**

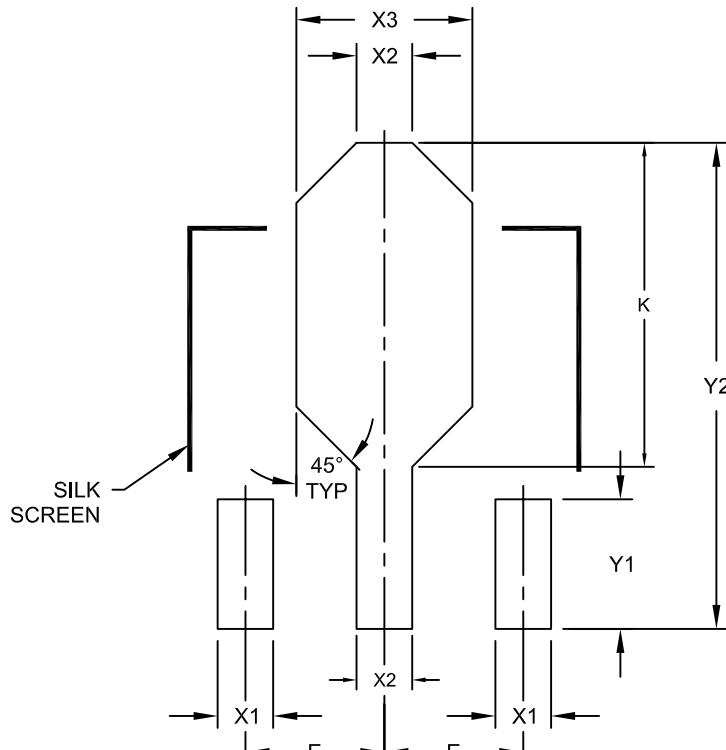
- Dimensions D and E do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.127 mm per side.
- Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Land Pattern (Footprint)

3-Lead Plastic Small Outline Transistor Header (MB) [SOT-89]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Dimension Limits		MILLIMETERS		
		MIN	NOM	MAX
Contact Pitch	E		1.50 BSC	
Contact Pads 1 & 3 Width	X1			0.48
Contact Pad 2 Width	X2			0.56
Heat Slug Pad Width	X3			1.20
Contact Pads 1 & 3 Length	Y1		1.40	
Contact 2 Pad Length	Y2			4.25
-	K	2.60		2.85

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

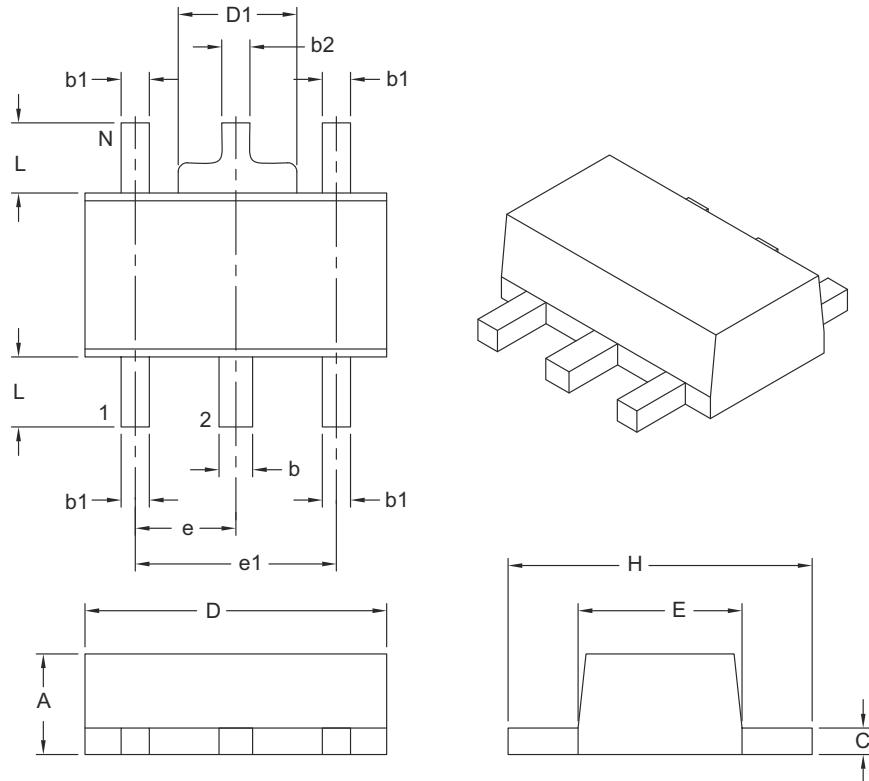
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2029A

## Packaging Diagrams and Parameters

### 5-Lead Plastic Small Outline Transistor Header (MT) [SOT-89]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS	
Dimension Limits			MIN	MAX
Number of Leads	N		5	
Lead Pitch	e		1.50 BSC	
Outside Lead Pitch	e1		3.00 BSC	
Overall Height	A	1.40	1.60	
Overall Width	H	3.94	4.50	
Molded Package Width	E	2.29	2.60	
Overall Length	D	4.40	4.60	
Tab Width	D1	1.40	1.83	
Foot Length	L	0.80	1.20	
Lead Thickness	c	0.35	0.44	
Lead 2 Width	b	0.41	0.56	
Leads 1, 3, 4 & 5 Width	b1	0.36	0.48	
Tab Lead Width	b2	0.32	0.48	

**Notes:**

1. Dimensions D and E do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.127 mm per side.
2. Dimensioning and tolerancing per ASME Y14.5M.

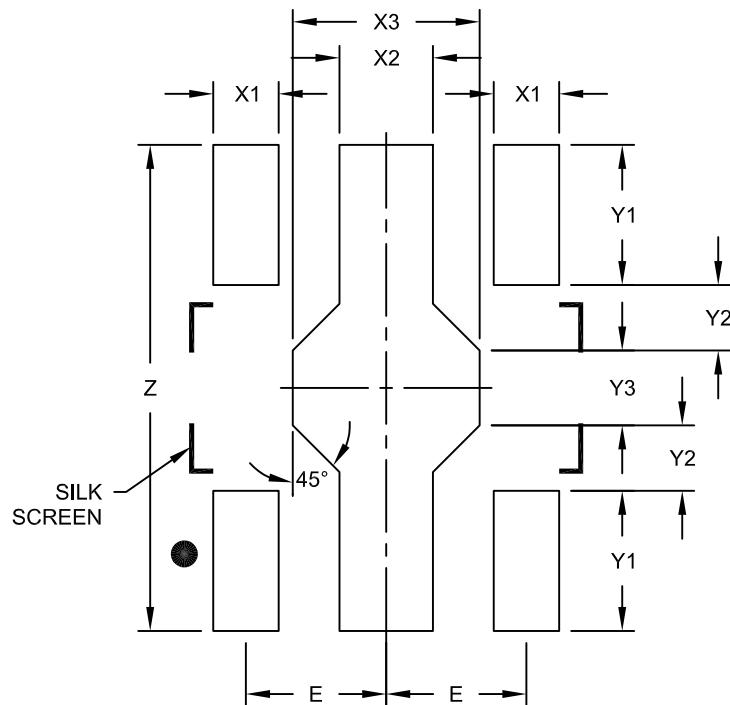
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-030B

## Land Pattern (Footprint)

### 5-Lead Plastic Small Outline Transistor Header (MT) [SOT-89]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		1.50 BSC	
Contact Pad Width (X4)	X1			0.70
Contact Pad Width	X2		1.00	
Contact Pad Width	X3		2.00	
Contact Pad Length (X4)	Y1		1.50	
Contact Pad Length (X2)	Y2		0.70	
Contact Pad Length	Y3		0.80	
Overall Length	Z		5.20	

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

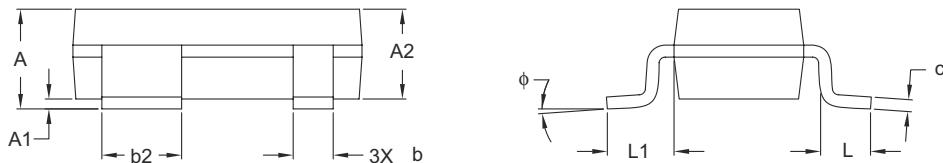
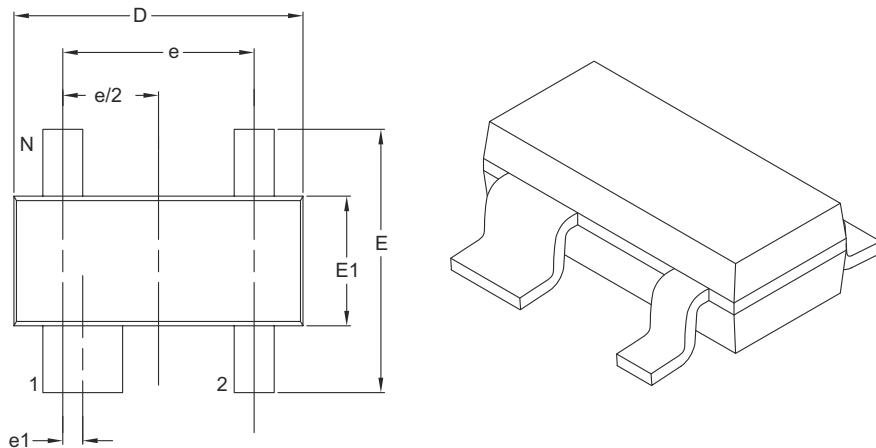
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2030C

## Packaging Diagrams and Parameters

### 4-Lead Plastic Small Outline Transistor (RC) [SOT-143]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		4	
Pitch	e		1.92 BSC	
Lead 1 Offset	e1		0.20 BSC	
Overall Height	A	0.80	—	1.22
Molded Package Thickness	A2	0.75	0.90	1.07
Standoff §	A1	0.01	—	0.15
Overall Width	E	2.10	—	2.64
Molded Package Width	E1	1.20	1.30	1.40
Overall Length	D	2.67	2.90	3.05
Foot Length	L	0.13	0.50	0.60
Footprint	L1	0.54 REF		
Foot Angle	ϕ	0°	—	8°
Lead Thickness	c	0.08	—	0.20
Lead 1 Width	b1	0.76	—	0.94
Leads 2, 3 & 4 Width	b	0.30	—	0.54

**Notes:**

- § Significant Characteristic.
- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25 mm per side.
- Dimensioning and tolerancing per ASME Y14.5M.

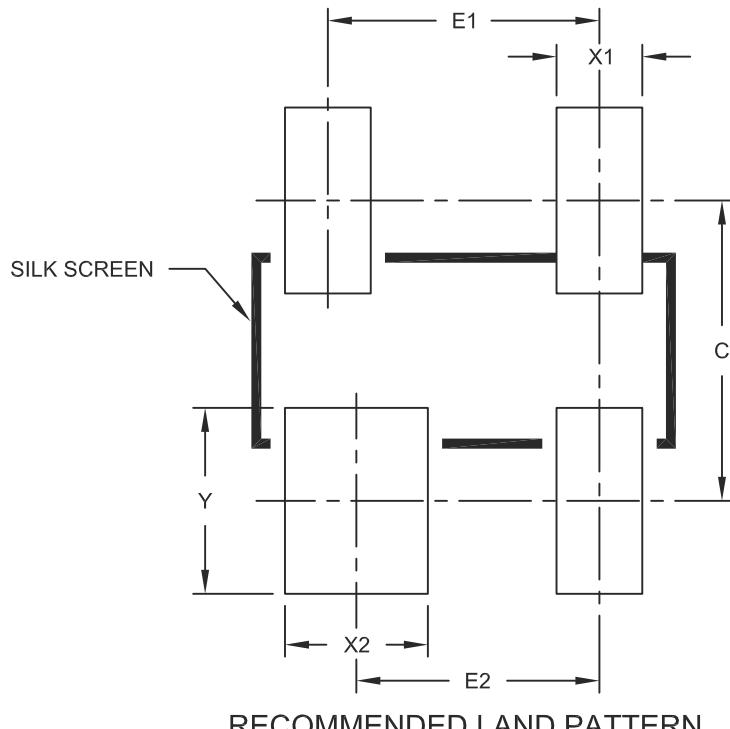
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

### 4-Lead Plastic Small Outline Transistor (RC) [SOT-143]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E1		1.90	BSC	
Contact Pitch	E2		1.60	BSC	
Contact Width	X1				0.60
Contact Width	X2				1.00
Contact Length	Y				1.30
Contact Pad Spacing	C		2.10		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

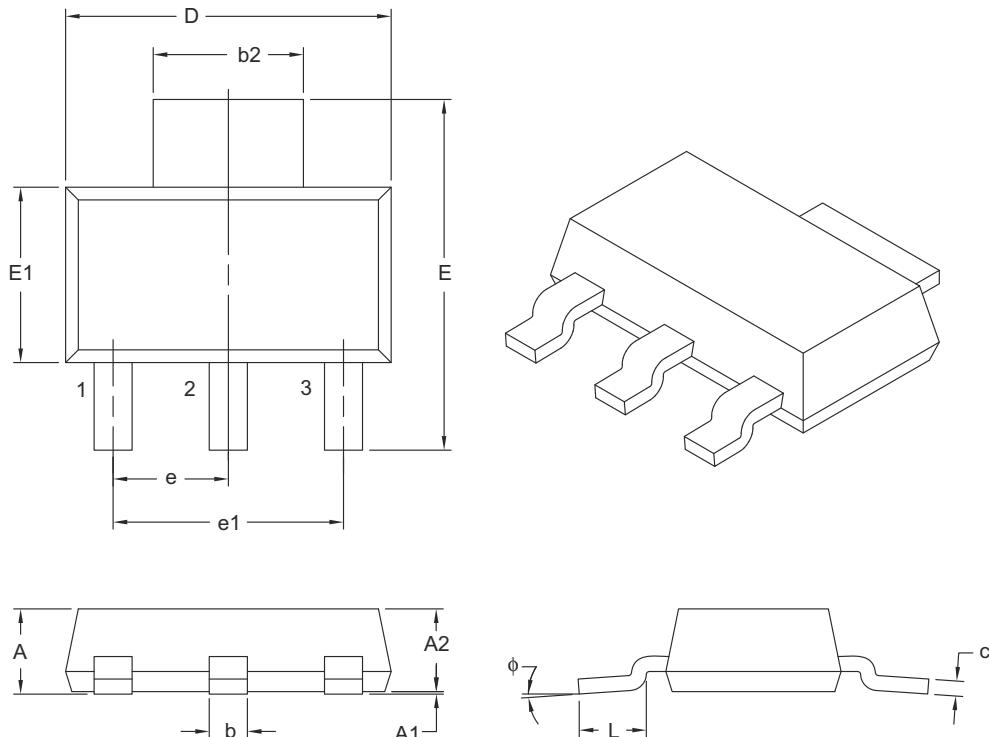
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2031A

## Packaging Diagrams and Parameters

### 3-Lead Plastic Small Outline Transistor (DB) [SOT-223]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Leads	N		3	
Lead Pitch	e		2.30 BSC	
Outside Lead Pitch	e1		4.60 BSC	
Overall Height	A	—	—	1.80
Standoff	A1	0.02	—	0.10
Molded Package Height	A2	1.50	1.60	1.70
Overall Width	E	6.70	7.00	7.30
Molded Package Width	E1	3.30	3.50	3.70
Overall Length	D	6.30	6.50	6.70
Lead Thickness	c	0.23	0.30	0.35
Lead Width	b	0.60	0.76	0.84
Tab Lead Width	b2	2.90	3.00	3.10
Foot Length	L	0.75	—	—
Lead Angle	φ	0°	—	10°

#### Notes:

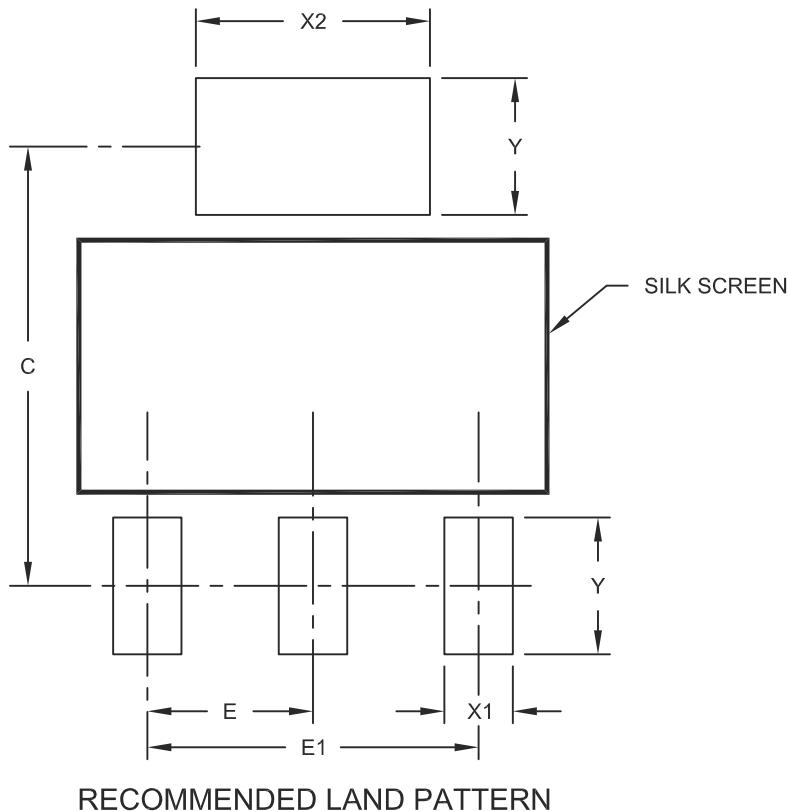
- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.127 mm per side.
- Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Land Pattern (Footprint)

### 3-Lead Plastic Small Outline Transistor (DB) [SOT-223]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E		2.30	BSC	
Overall Pitch	E1		4.60	BSC	
Contact Pad Spacing	C		6.10		
Contact Pad Width	X1			0.95	
Contact Pad Width	X2			3.25	
Contact Pad Length	Y			1.90	

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

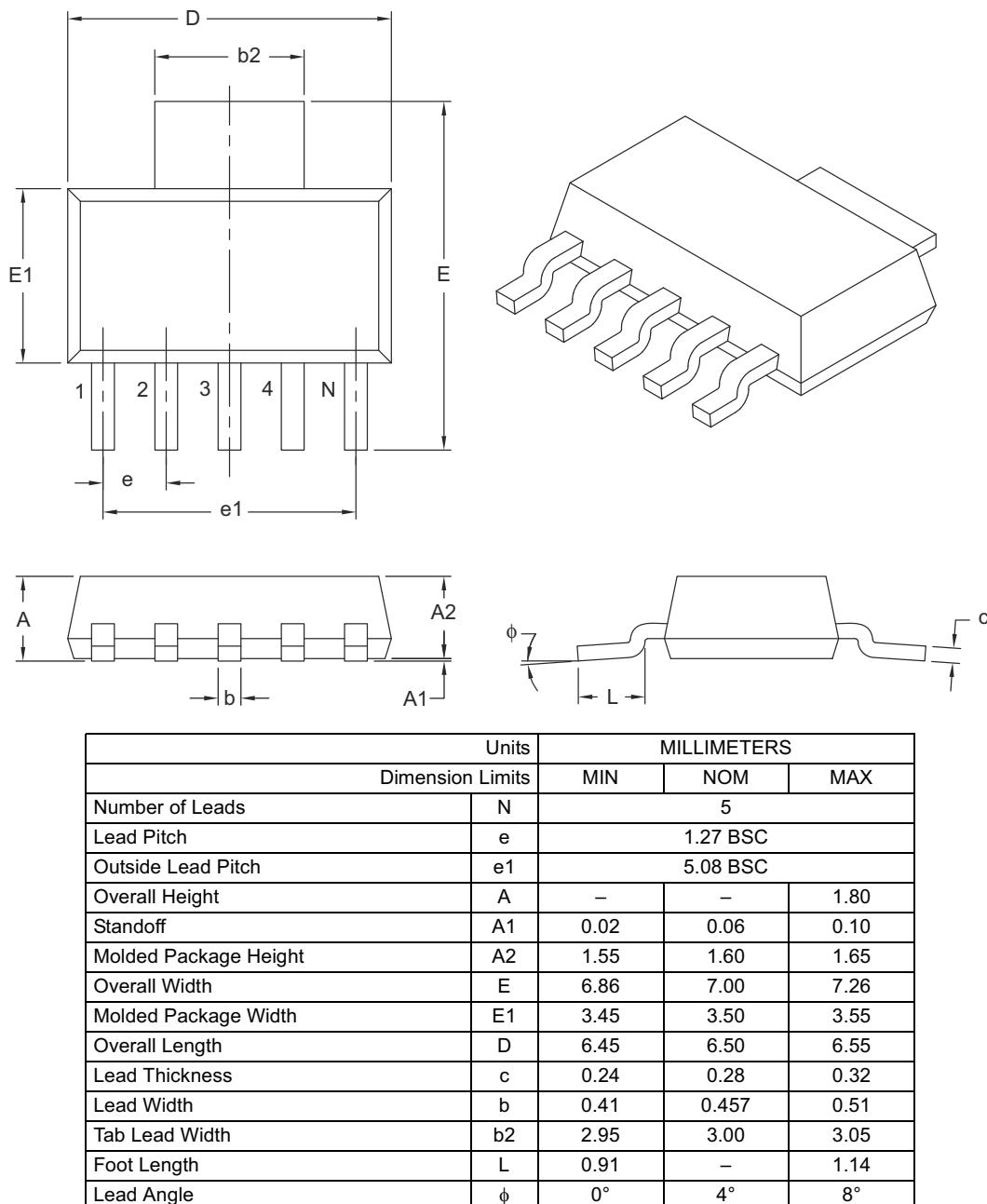
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2032A

## Packaging Diagrams and Parameters

### 5-Lead Plastic Small Outline Transistor (DC) [SOT-223]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



**Notes:**

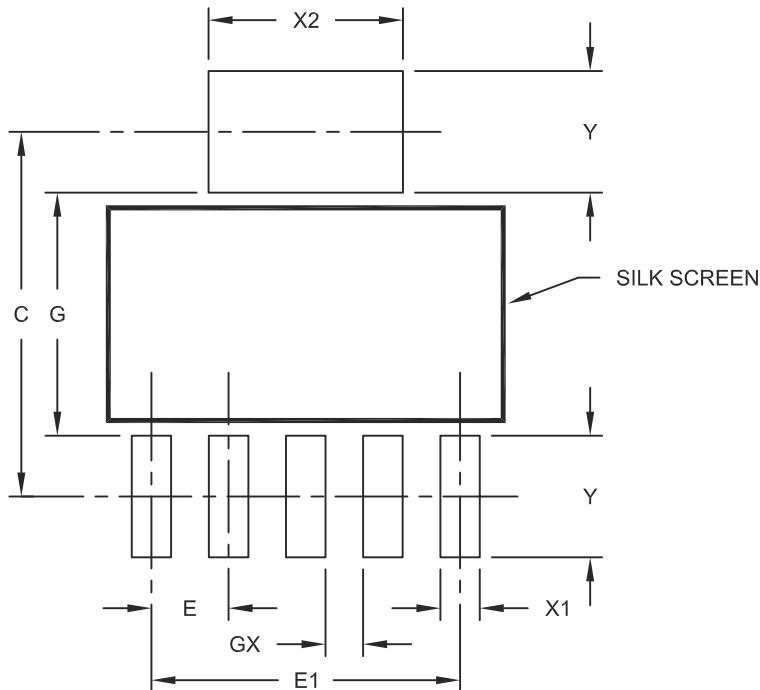
- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.127 mm per side.
- Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Land Pattern (Footprint)

### 5-Lead Plastic Small Outline Transistor (DC) [SOT-223]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Pad Pitch	E	1.27	BSC	
Overall Pad Pitch	E1	5.08	BSC	
Pad Spacing	C		6.00	
Pad Width	X1			0.65
Pad Width	X2			3.20
Pad Length	Y			2.00
Distance Between Pads	G	4.00		
Distance Between Pads	GX	0.62		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

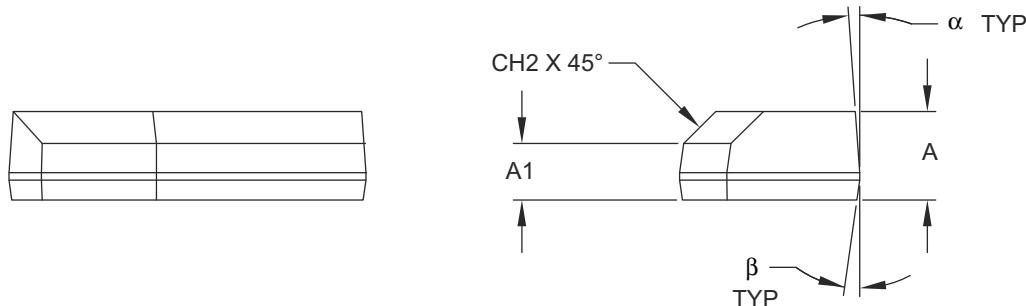
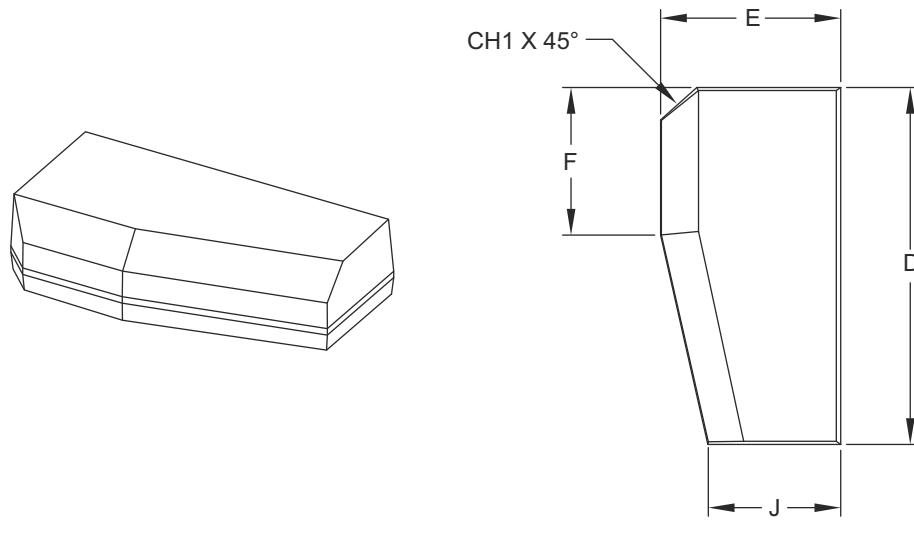
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2137A

## Packaging Diagrams and Parameters

### Leadless Wedge Module Plastic Small Outline Transistor (WM) [SOT-385]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Overall Height	A	2.90	3.00	3.05
Bottom of Package to Chamfer	A1	1.90	2.00	2.10
Overall Width	E	6.00	6.10	6.20
Overall Length	D	12.00	12.10	12.20
Width at Tapered End	J	4.40	4.50	4.60
Length of Flat	F	4.90	5.00	5.10
Chamfer Distance, Horizontal	CH1	1.00	1.10	1.20
Chamfer Distance, Vertical	CH2	1.00	1.10	1.20
Mold Draft Angle Top	α	4°	6°	8°
Mold Draft Angle Bottom	β	4°	6°	8°

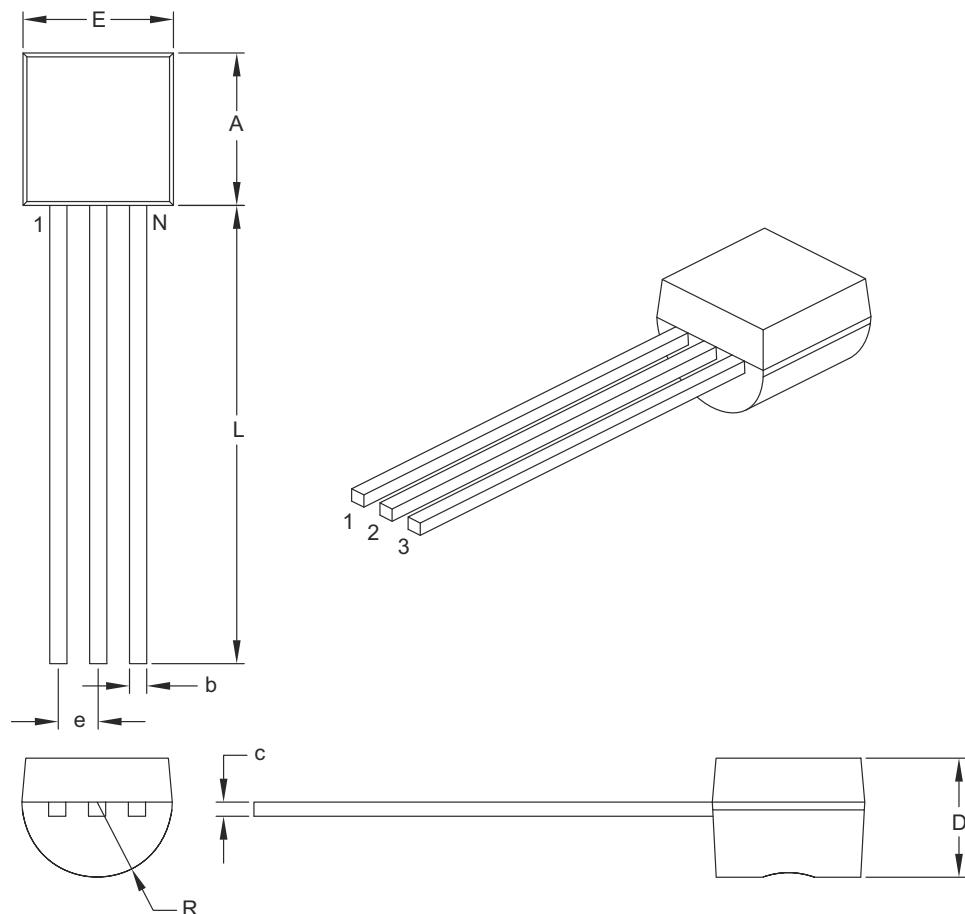
**Note:**

- Dimensions D, E, F and J do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25 mm per side.

## Packaging Diagrams and Parameters

### 3-Lead Plastic Transistor Outline (TO) [TO-92]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	INCHES	
Dimension Limits			MIN	MAX
Number of Pins	N		3	
Pitch	e		.050 BSC	
Bottom to Package Flat	D		.125	.165
Overall Width	E		.175	.205
Overall Length	A		.170	.210
Molded Package Radius	R		.080	.105
Tip to Seating Plane	L		.500	—
Lead Thickness	c		.014	.021
Lead Width	b		.014	.022

#### Notes:

- Dimensions A and E do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .005" per side.
- Dimensioning and tolerancing per ASME Y14.5M.

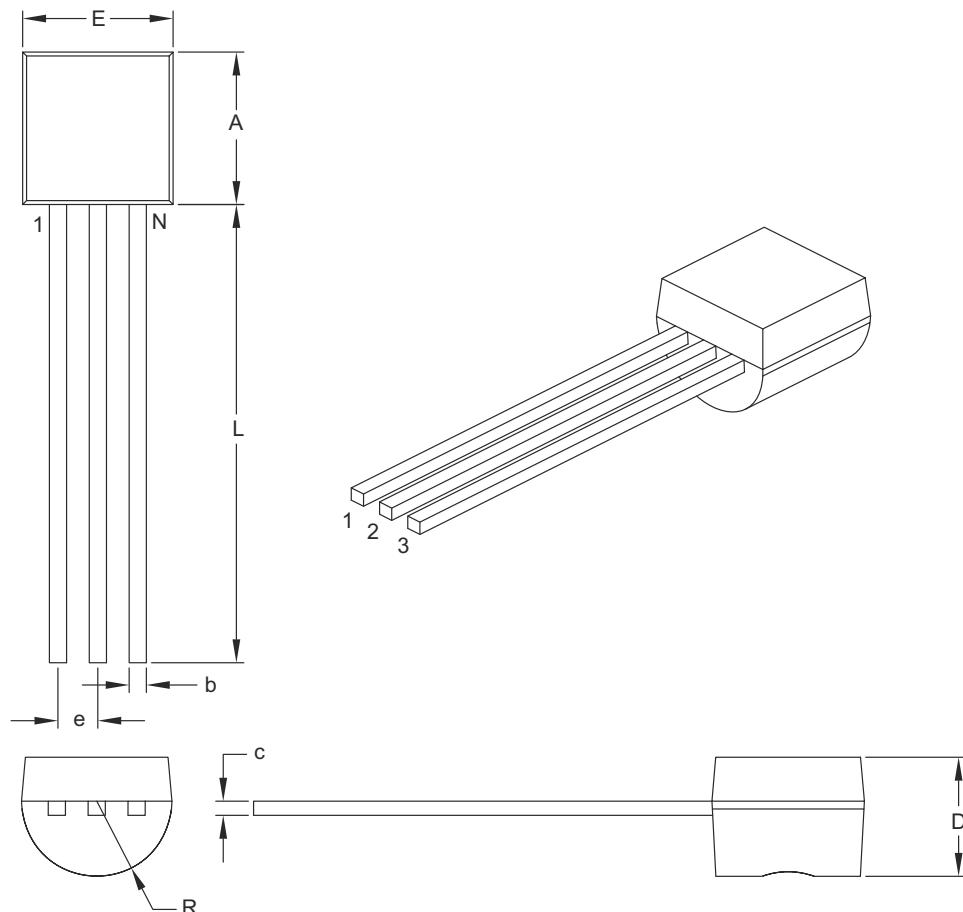
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-101B

## Packaging Diagrams and Parameters

### 3-Lead Plastic Transistor Outline (ZB) [TO-92]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension Limits		Units	INCHES	
			MIN	MAX
Number of Pins	N		3	
Pitch	e		.050 BSC	
Bottom to Package Flat	D		.125	.165
Overall Width	E		.175	.205
Overall Length	A		.170	.210
Molded Package Radius	R		.080	.105
Tip to Seating Plane	L		.500	-
Lead Thickness	c		.014	.021
Lead Width	b		.014	.022

**Notes:**

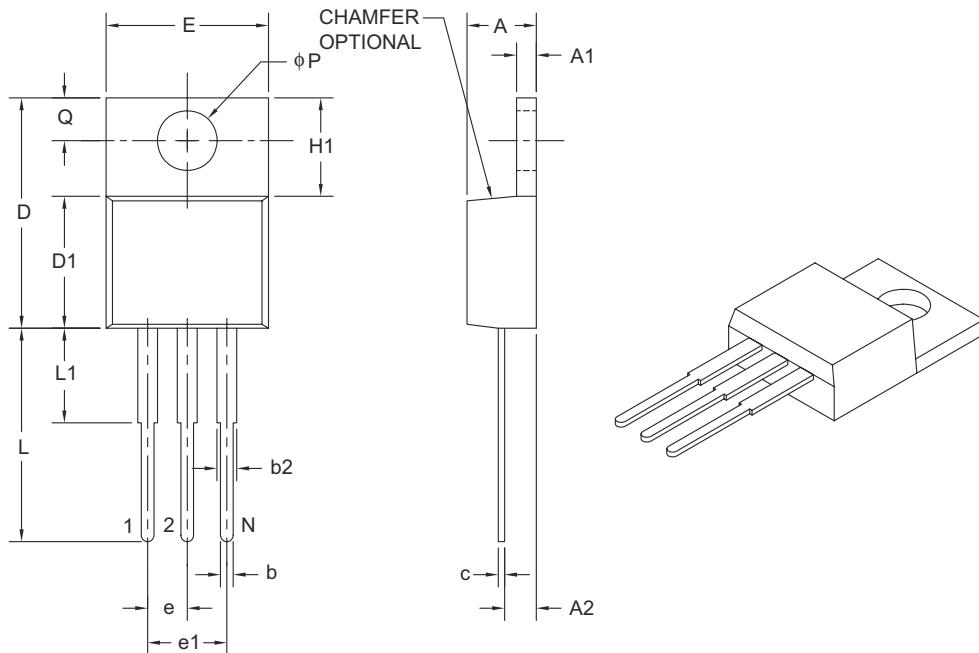
- Dimensions A and E do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .005" per side.
- Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Packaging Diagrams and Parameters

### 3-Lead Plastic Transistor Outline (AB) [TO-220]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	INCHES		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N			3	
Pitch	e		.100	BSC	
Overall Pin Pitch	e1		.200	BSC	
Overall Height	A	.140	—	.190	
Tab Thickness	A1	.020	—	.055	
Base to Lead	A2	.080	—	.115	
Overall Width	E	.357	—	.420	
Mounting Hole Center	Q	.100	—	.120	
Overall Length	D	.560	—	.650	
Molded Package Length	D1	.330	—	.355	
Tab Length	H1	.230	—	.270	
Mounting Hole Diameter	φP	.139	—	.156	
Lead Length	L	.500	—	.580	
Lead Shoulder	L1	—	—	.250	
Lead Thickness	c	.012	—	.024	
Lead Width	b	.015	.027	.040	
Shoulder Width	b2	.045	.057	.070	

#### Notes:

- Dimensions D and E do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .005" per side.
- Dimensioning and tolerancing per ASME Y14.5M.

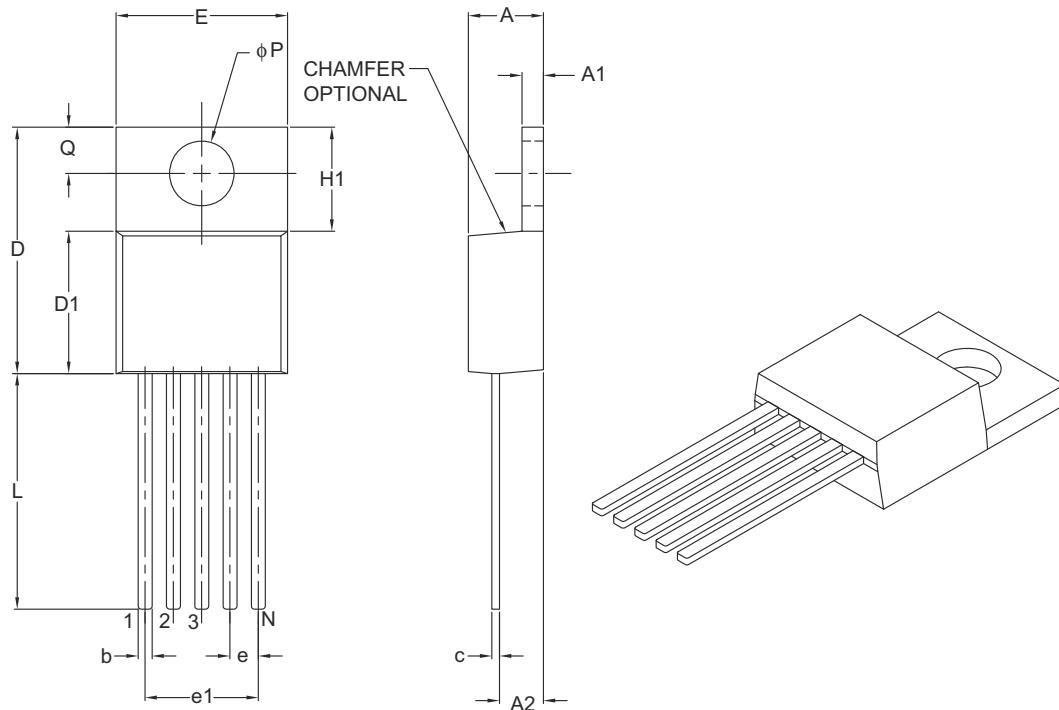
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-034B

## Packaging Diagrams and Parameters

### 5-Lead Plastic Transistor Outline (AT) [TO-220]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	INCHES		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N			5	
Pitch	e		.067	BSC	
Overall Pin Pitch	e1		.268	BSC	
Overall Height	A	.140	—	.190	
Overall Width	E	.380	—	.420	
Overall Length	D	.560	—	.650	
Molded Package Length	D1	.330	—	.355	
Tab Length	H1	.204	—	.293	
Tab Thickness	A1	.020	—	.055	
Mounting Hole Center	Q	.100	—	.120	
Mounting Hole Diameter	φP	.139	—	.156	
Lead Length	L	.482	—	.590	
Base to Bottom of Lead	A2	.080	—	.115	
Lead Thickness	c	.012	—	.025	
Lead Width	b	.015	.027	.040	

#### Notes:

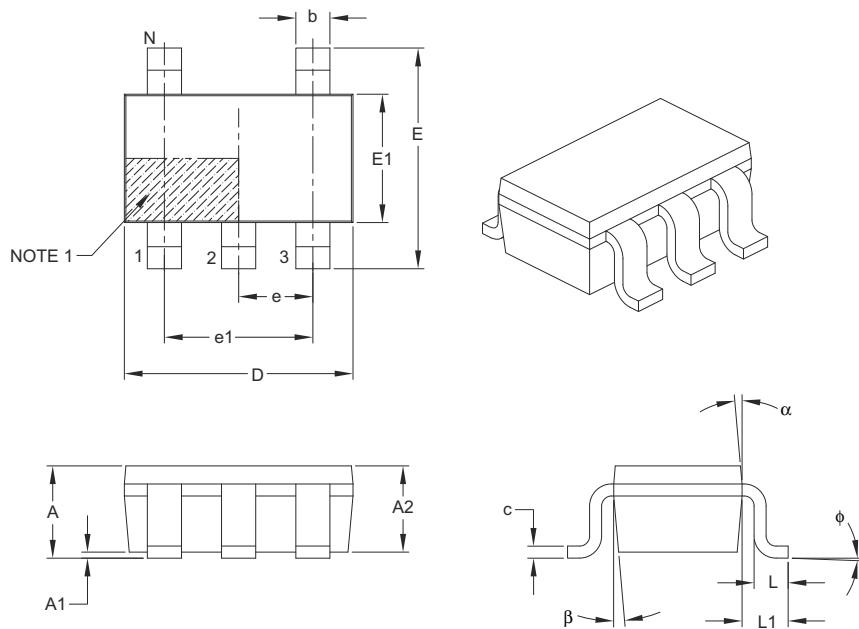
- Dimensions D and E do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .005" per side.
- Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Packaging Diagrams and Parameters

### 5-Lead Plastic Thin Small Outline Transistor (OS) [TSOT]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units			MILLIMETERS		
		Dimension Limits			MIN	NOM	MAX
Number of Leads	N				5		
Lead Pitch	e				0.95	BSC	
Outside Lead Pitch	e1				1.90	BSC	
Overall Height	A	—	—	—	—	1.10	
Molded Package Thickness	A2	0.70	0.90	1.00			
Standoff	A1	0.00	—	0.10			
Overall Width	E	2.80 BSC					
Molded Package Width	E1	1.60 BSC					
Overall Length	D	2.90 BSC					
Foot Length	L	0.30	0.45	0.60			
Footprint	L1	0.60 REF					
Foot Angle	phi	0°	4°	8°			
Lead Thickness	c	0.08	—	0.20			
Lead Width	b	0.30	—	0.50			
Mold Draft Angle Top	alpha	4°	10°	12°			
Mold Draft Angle Bottom	beta	4°	10°	12°			

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15 mm per side.
3. Dimensioning and tolerancing per ASME Y14.5M.

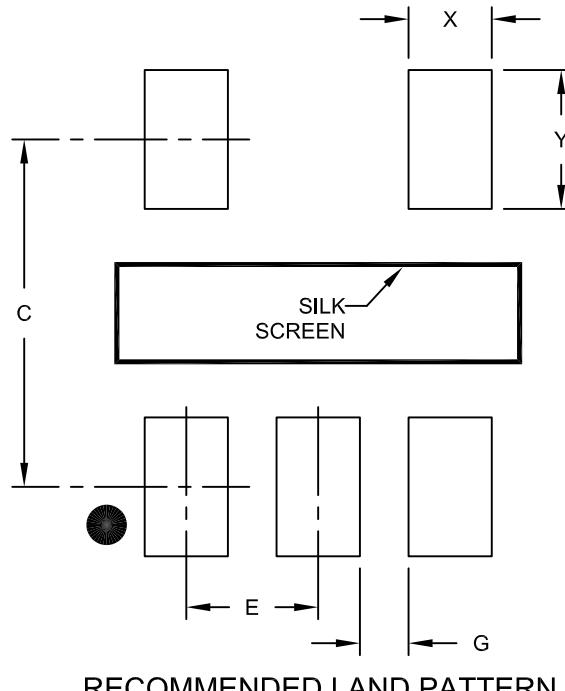
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

5-Lead Plastic Thin Small Outline Transistor (OS) [TSOT]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch		E	0.95 BSC		
Contact Pad Spacing		C	2.80		
Contact Pad Width (X5)		X	0.60		
Contact Pad Length (X5)		Y	1.10		
Distance Between Pads		G	0.35		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

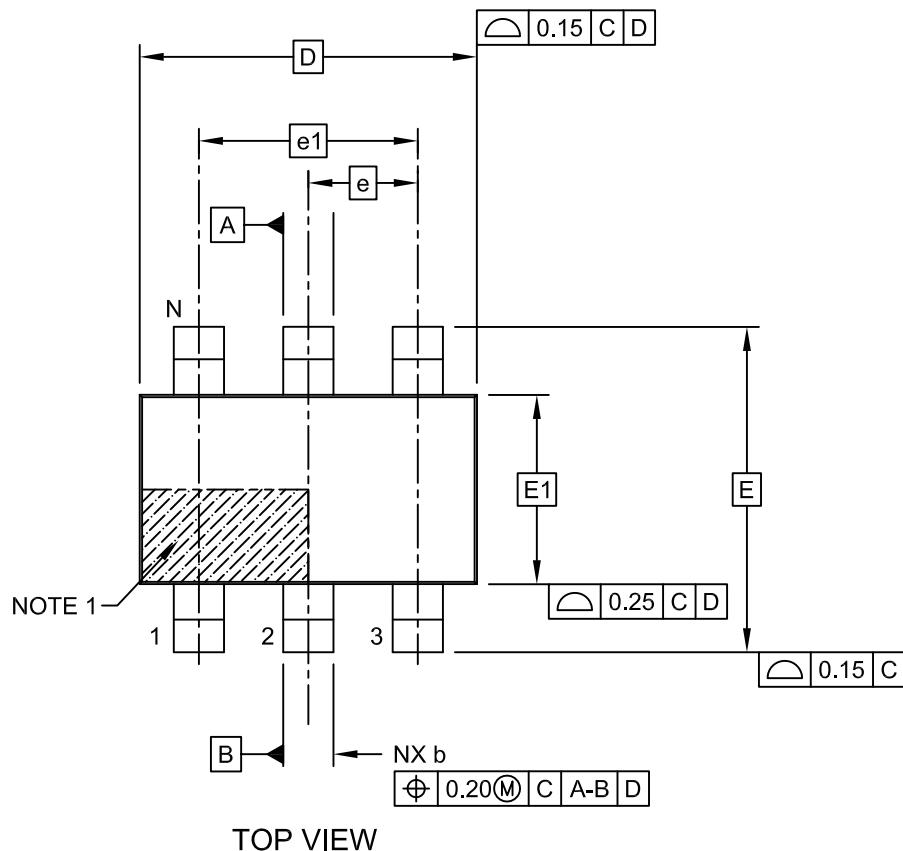
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2128A

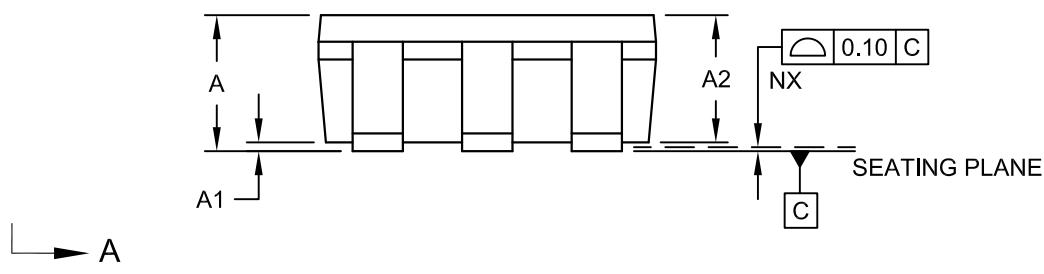
## Packaging Diagrams and Parameters

### 6-Lead Thin Small Outline Transistor (OS) [TSOT]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



→ A

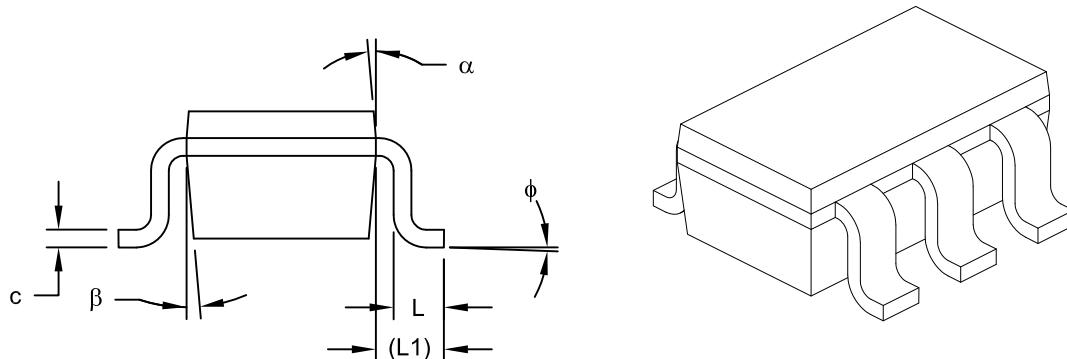


SEE SHEET 2

## Packaging Diagrams and Parameters

### 6-Lead Thin Small Outline Transistor (OS) [TSOT]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



VIEW A-A

Dimension	Units	MILLIMETERS		
		MIN	NOM	MAX
Number of Leads	N	6		
Lead Pitch	e	0.95	BSC	
Outside Lead Pitch	e1	1.90	BSC	
Overall Height	A	-	-	1.10
Molded Package Thickness	A2	0.70	0.90	1.00
Standoff	A1	0.00	-	0.10
Overall Width	E	2.80	BSC	
Molded Package Width	E1	1.60	BSC	
Overall Length	D	2.90	BSC	
Foot Length	L	0.30	0.45	0.60
Footprint	L1	0.60	REF	
Foot Angle	phi	0°	4°	8°
Lead Thickness	c	0.08	-	0.20
Lead Width	theta	0.30	-	0.50
Mold Draft Angle Top	alpha	4°	10°	12°
Mold Draft Angle Bottom	beta	4°	10°	12°

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.

2. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm per side.

3. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Packaging Diagrams and Parameters

---

---

**NOTES:**

## Packaging Diagrams and Parameters

---

---

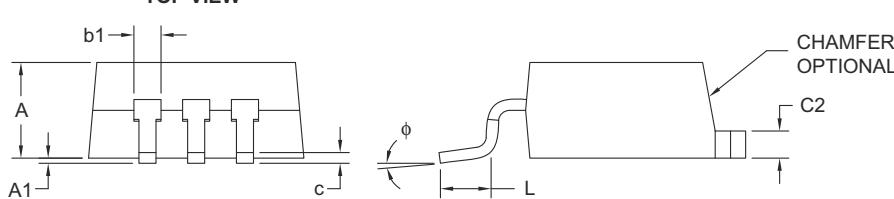
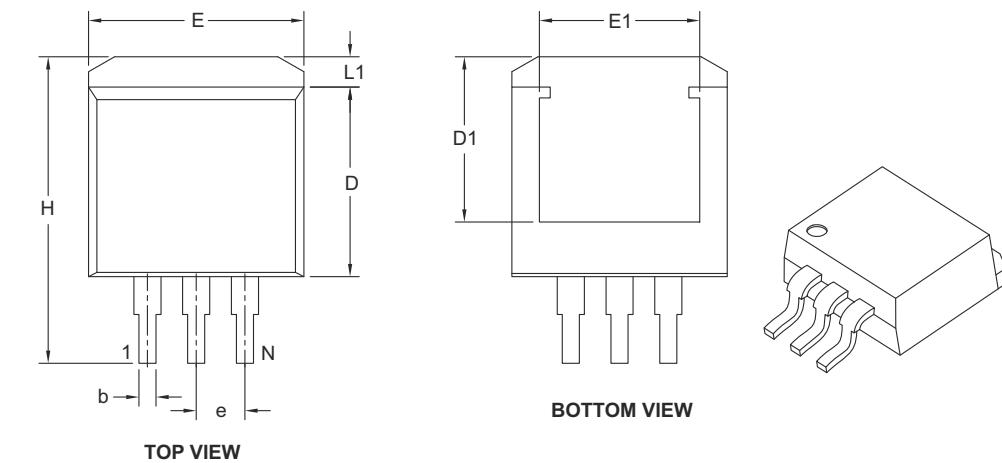
### DDPAK Family

#### Double Deca-Watt Packages

## Packaging Diagrams and Parameters

### 3-Lead Plastic (EB) [DDPAK]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N	3		
Pitch	e	.100	BSC	
Overall Height	A	.160	—	.190
Standoff §	A1	.000	—	.010
Overall Width	E	.380	—	.420
Exposed Pad Width	E1	.245	—	—
Molded Package Length	D	.330	—	.380
Overall Length	H	.549	—	.625
Exposed Pad Length	D1	.270	—	—
Lead Thickness	c	.014	—	.029
Pad Thickness	C2	.045	—	.065
Lower Lead Width	b	.020	—	.039
Upper Lead Width	b1	.045	—	.070
Foot Length	L	.068	—	.110
Pad Length	L1	—	—	.067
Foot Angle	φ	0°	—	8°

**Notes:**

- § Significant Characteristic.
- Dimensions D and E do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .005" per side.
- Dimensioning and tolerancing per ASME Y14.5M.

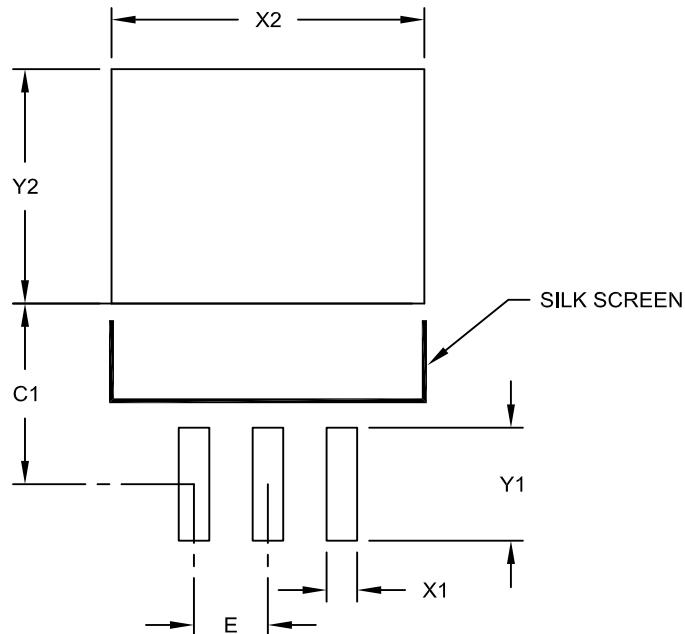
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-011B

## Land Pattern (Footprint)

### 3-Lead Plastic (EB) [DDPAK]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



**RECOMMENDED LAND PATTERN**

		Units			INCHES		
Dimension Limits		MIN	NOM	MAX			
Contact Pitch	E		.100	BSC			
Pad Width	X2			.423			
Pad Length	Y2			.327			
Contact Pad Spacing	C1		.252				
Contact Pad Width (X3)	X1			.041			
Contact Pad Length (X3)	Y1			.157			

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

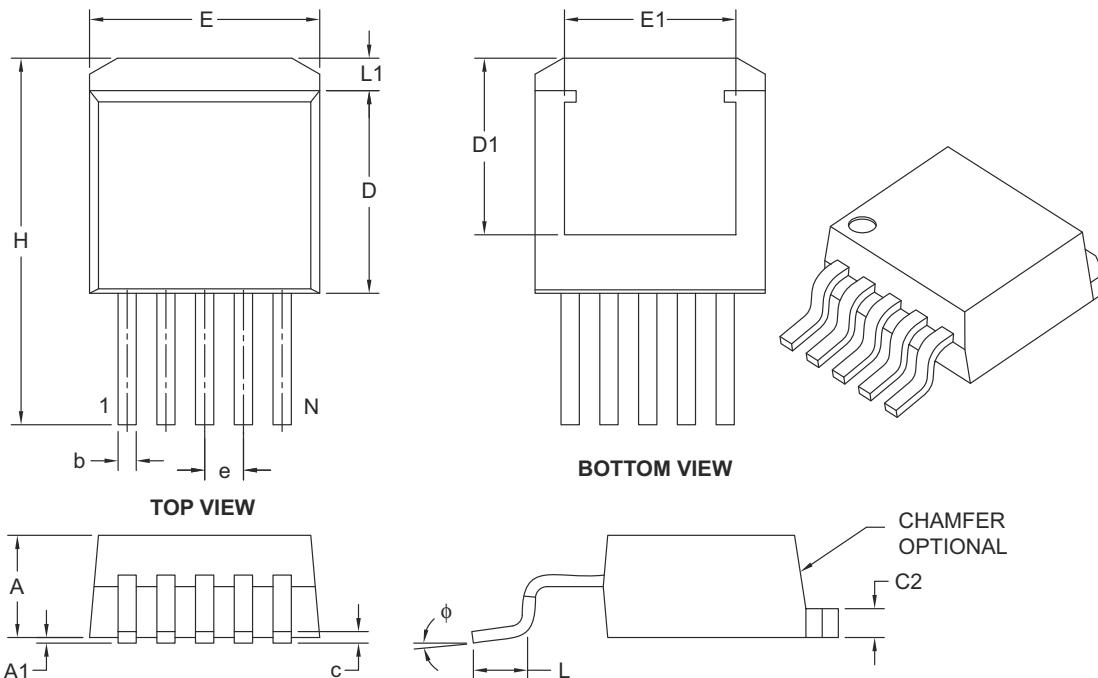
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2011A

## Packaging Diagrams and Parameters

### 5-Lead Plastic (ET) [DDPAK]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	INCHES		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		5		
Pitch	e		.067 BSC		
Overall Height	A	.160	—	.190	
Standoff §	A1	.000	—	.010	
Overall Width	E	.380	—	.420	
Exposed Pad Width	E1	.245	—	—	
Molded Package Length	D	.330	—	.380	
Overall Length	H	.549	—	.625	
Exposed Pad Length	D1	.270	—	—	
Lead Thickness	c	.014	—	.029	
Pad Thickness	C2	.045	—	.065	
Lead Width	b	.020	—	.039	
Foot Length	L	.068	—	.110	
Pad Length	L1	—	—	.067	
Foot Angle	ϕ	0°	—	8°	

**Notes:**

- § Significant Characteristic.
- Dimensions D and E do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .005" per side.
- Dimensioning and tolerancing per ASME Y14.5M.

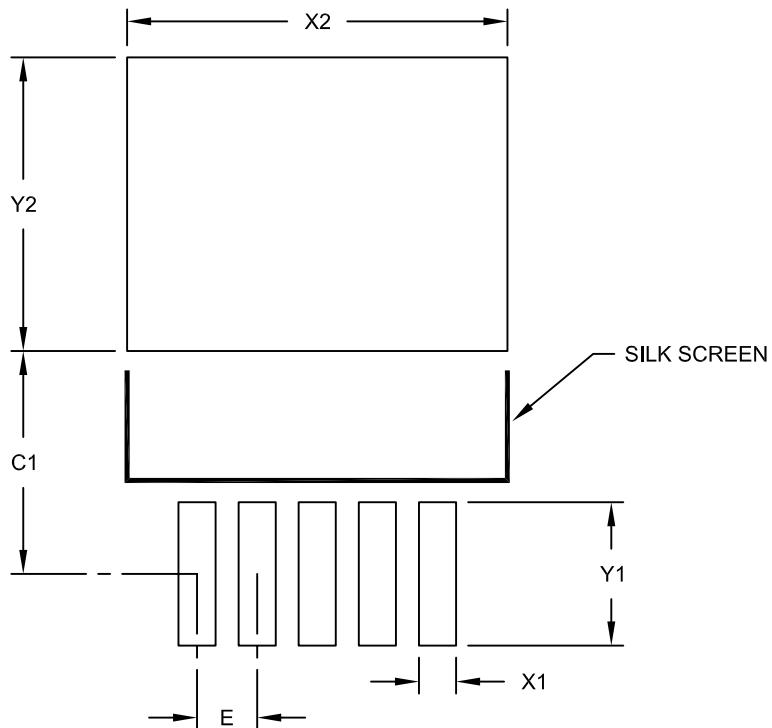
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-012B

## Land Pattern (Footprint)

### 5-Lead Plastic (ET) [DDPAK]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



**RECOMMENDED LAND PATTERN**

		Units	INCHES		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E		.067	BSC	
Optional Center Pad Width	X2			.423	
Optional Center Pad Length	Y2			.327	
Contact Pad Spacing	C1		.248		
Contact Pad Width (X5)	X1			.041	
Contact Pad Length (X5)	Y1			.159	

**Notes:**

1. Dimensioning and tolerancing per ASME Y14.5M

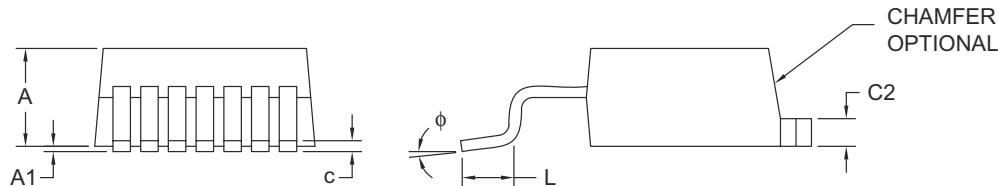
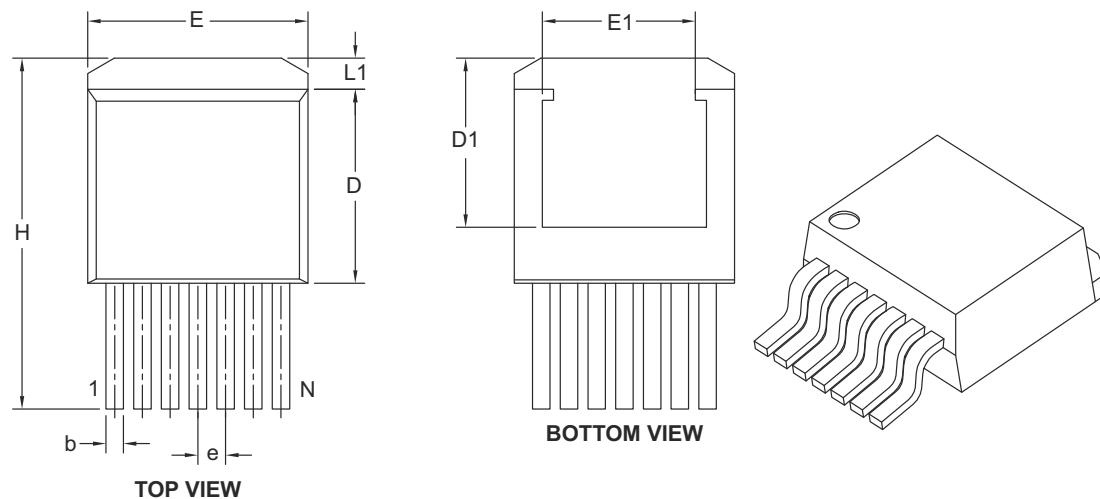
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2012A

## Packaging Diagrams and Parameters

### 7-Lead Plastic (EK) [DDPAK]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		7	
Pitch	e		.050 BSC	
Overall Height	A	.160	—	.190
Standoff §	A1	.000	—	.010
Overall Width	E	.380	—	.420
Exposed Pad Width	E1	.245	—	—
Molded Package Length	D	.330	—	.380
Overall Length	H	.549	—	.625
Exposed Pad Length	D1	.270	—	—
Lead Thickness	c	.014	—	.029
Pad Thickness	C2	.045	—	.065
Lead Width	b	.020	—	.037
Foot Length	L	.068	—	.110
Pad Length	L1	—	—	.067
Foot Angle	ϕ	0°	—	8°

#### Notes:

- § Significant Characteristic.
- Dimensions D and E do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .005" per side.
- Dimensioning and tolerancing per ASME Y14.5M.

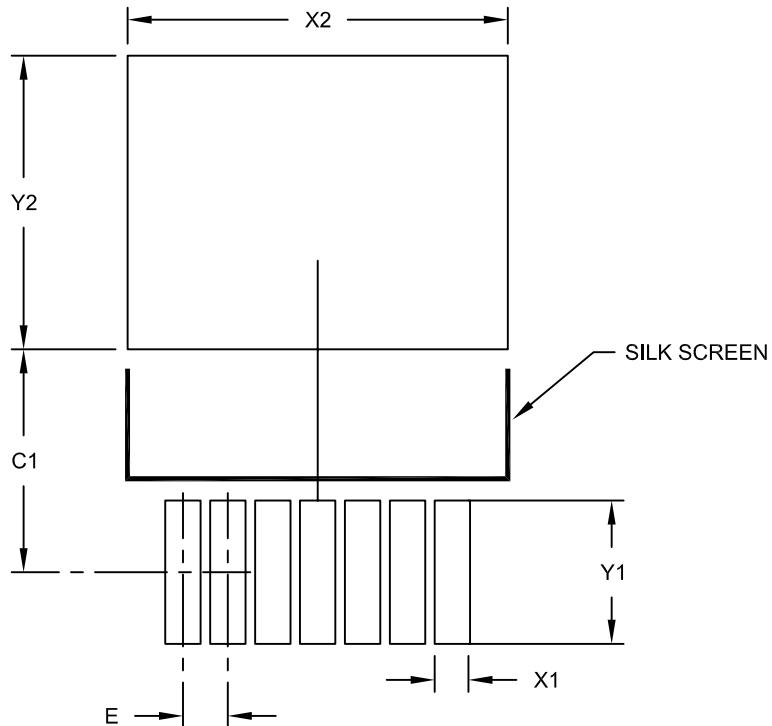
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-015B

## Land Pattern (Footprint)

### 7-Lead Plastic (EK) [DDPAK]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		.050	BSC
Optional Center Pad Width	X2			.423
Optional Center Pad Length	Y2			.327
Contact Pad Spacing	C1		.248	
Contact Pad Width (X7)	X1			.039
Contact Pad Length (X7)	Y1			.159

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2015B

## Packaging Diagrams and Parameters

---

---

**NOTES:**

## Packaging Diagrams and Parameters

---

---

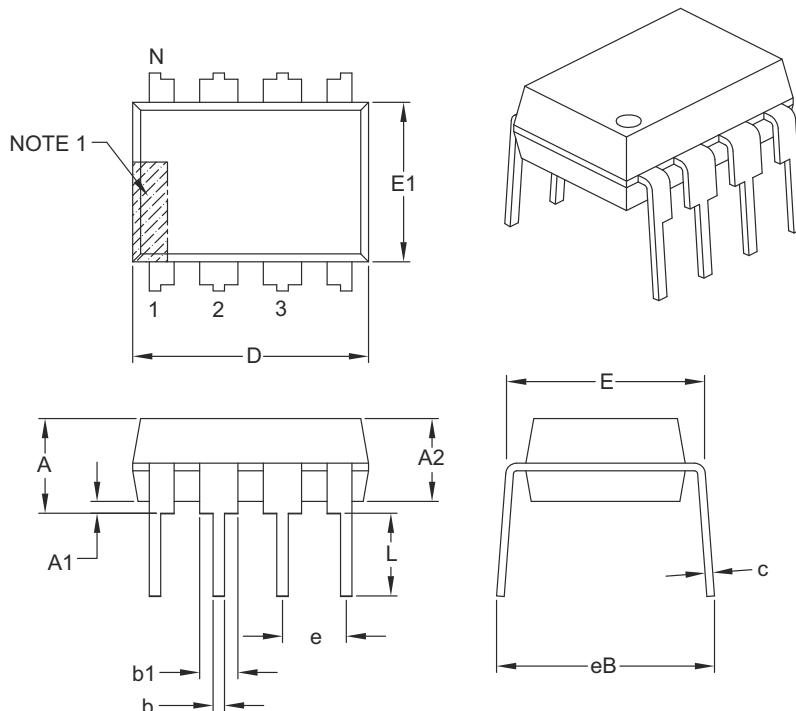
### PDIP Family

#### Plastic Dual In-Line Packages

## Packaging Diagrams and Parameters

### 8-Lead Plastic Dual In-Line (P) – 300 mil Body [PDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		8	
Pitch	e		.100 BSC	
Top to Seating Plane	A	–	–	.210
Molded Package Thickness	A2	.115	.130	.195
Base to Seating Plane	A1	.015	–	–
Shoulder to Shoulder Width	E	.290	.310	.325
Molded Package Width	E1	.240	.250	.280
Overall Length	D	.348	.365	.400
Tip to Seating Plane	L	.115	.130	.150
Lead Thickness	c	.008	.010	.015
Upper Lead Width	b1	.040	.060	.070
Lower Lead Width	b	.014	.018	.022
Overall Row Spacing §	eB	–	–	.430

**Notes:**

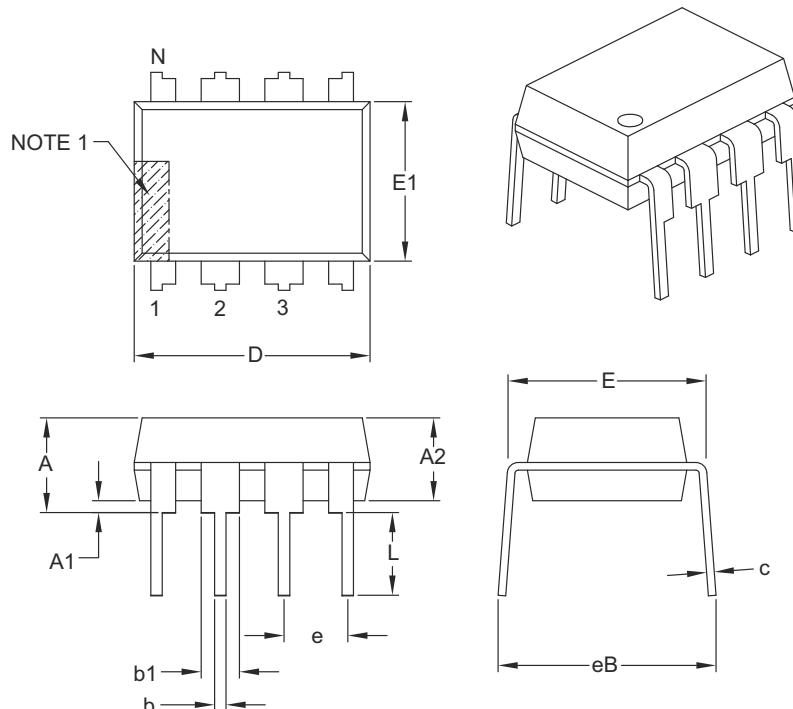
1. Pin 1 visual index feature may vary, but must be located with the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Packaging Diagrams and Parameters

### 8-Lead Plastic Dual In-Line (PA) – 300 mil Body [PDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	INCHES		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N			8	
Pitch	e			.100 BSC	
Top to Seating Plane	A	—	—	.210	
Molded Package Thickness	A2	.115	.130	.195	
Base to Seating Plane	A1	.015	—	—	
Shoulder to Shoulder Width	E	.290	.310	.325	
Molded Package Width	E1	.240	.250	.280	
Overall Length	D	.348	.365	.400	
Tip to Seating Plane	L	.115	.130	.150	
Lead Thickness	c	.008	.010	.015	
Upper Lead Width	b1	.040	.060	.070	
Lower Lead Width	b	.014	.018	.022	
Overall Row Spacing §	eB	—	—	.430	

#### Notes:

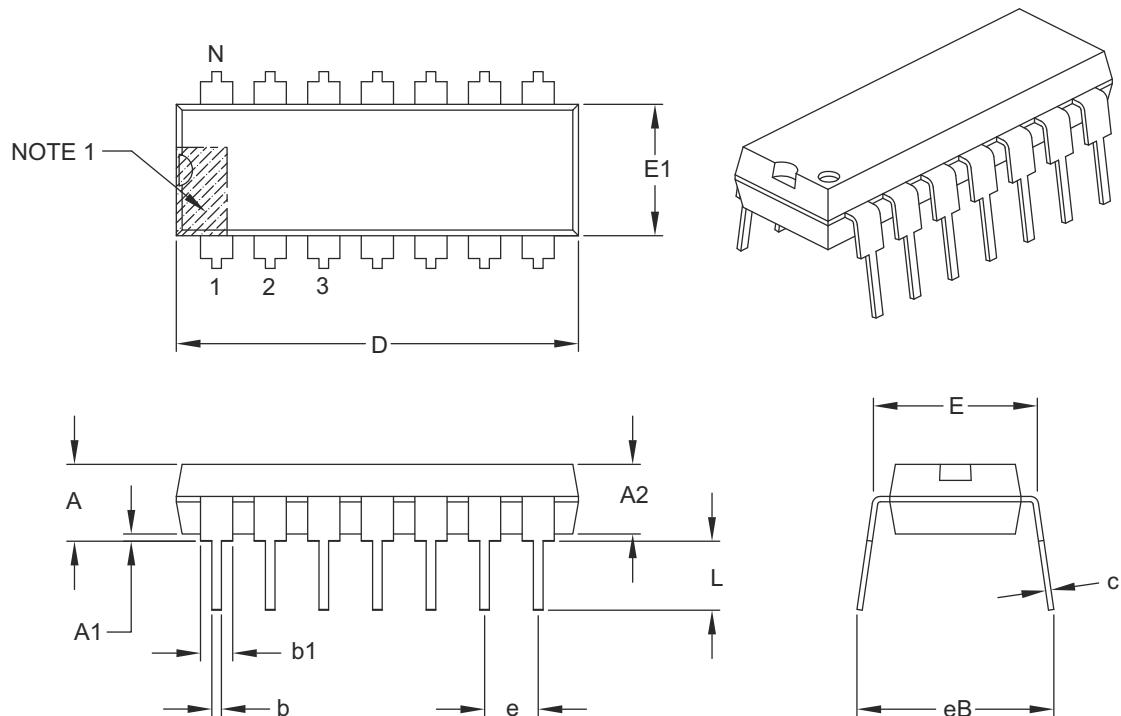
1. Pin 1 visual index feature may vary, but must be located with the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Packaging Diagrams and Parameters

### 14-Lead Plastic Dual In-Line (P) – 300 mil Body [PDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		14	
Pitch	e		.100 BSC	
Top to Seating Plane	A	—	—	.210
Molded Package Thickness	A2	.115	.130	.195
Base to Seating Plane	A1	.015	—	—
Shoulder to Shoulder Width	E	.290	.310	.325
Molded Package Width	E1	.240	.250	.280
Overall Length	D	.735	.750	.775
Tip to Seating Plane	L	.115	.130	.150
Lead Thickness	c	.008	.010	.015
Upper Lead Width	b1	.045	.060	.070
Lower Lead Width	b	.014	.018	.022
Overall Row Spacing §	eB	—	—	.430

**Notes:**

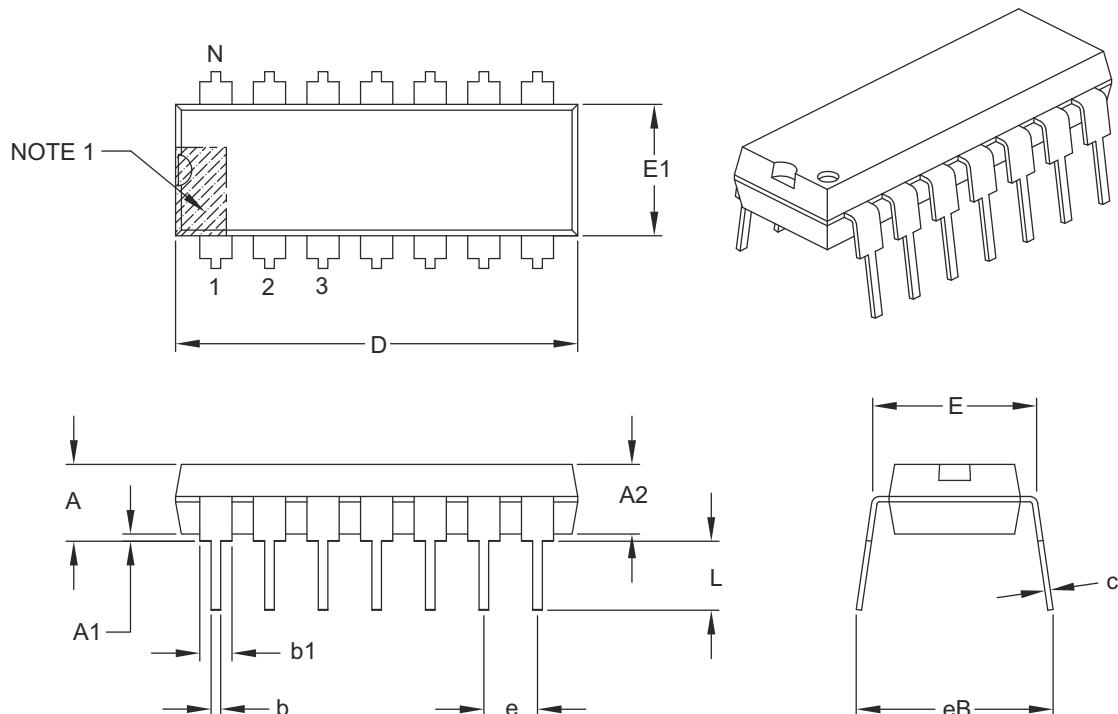
1. Pin 1 visual index feature may vary, but must be located with the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Packaging Diagrams and Parameters

### 14-Lead Plastic Dual In-Line (PD) – 300 mil Body [PDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		14	
Pitch	e		.100 BSC	
Top to Seating Plane	A	—	—	.210
Molded Package Thickness	A2	.115	.130	.195
Base to Seating Plane	A1	.015	—	—
Shoulder to Shoulder Width	E	.290	.310	.325
Molded Package Width	E1	.240	.250	.280
Overall Length	D	.735	.750	.775
Tip to Seating Plane	L	.115	.130	.150
Lead Thickness	c	.008	.010	.015
Upper Lead Width	b1	.045	.060	.070
Lower Lead Width	b	.014	.018	.022
Overall Row Spacing §	eB	—	—	.430

**Notes:**

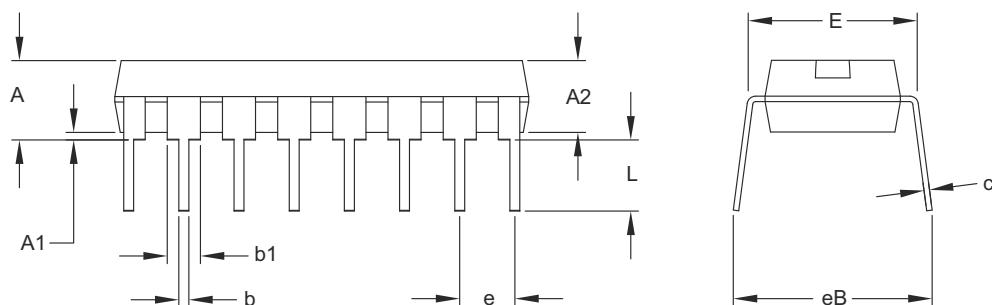
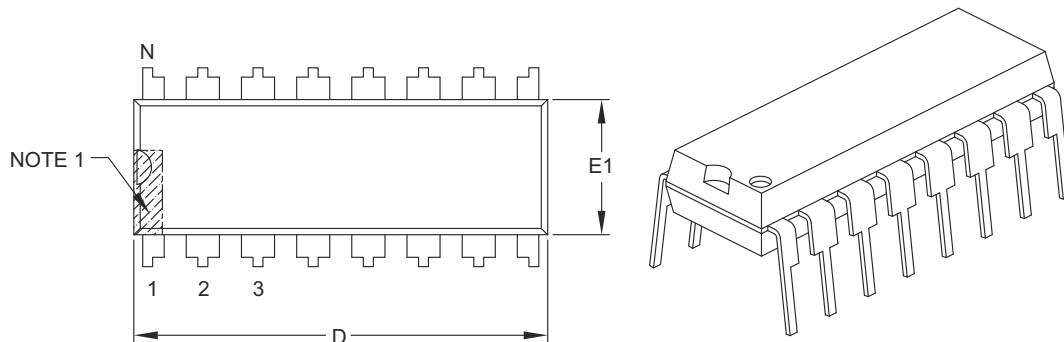
1. Pin 1 visual index feature may vary, but must be located with the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Packaging Diagrams and Parameters

### 16-Lead Plastic Dual In-Line (P) – 300 mil Body [PDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins		16		
Pitch		.100 BSC		
Top to Seating Plane		A	–	.210
Molded Package Thickness		A2	.115	.130
Base to Seating Plane		A1	.015	–
Shoulder to Shoulder Width		E	.290	.310
Molded Package Width		E1	.240	.250
Overall Length		D	.735	.755
Tip to Seating Plane		L	.115	.130
Lead Thickness		c	.008	.010
Upper Lead Width		b1	.045	.060
Lower Lead Width		b	.014	.018
Overall Row Spacing §		eB	–	.430

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

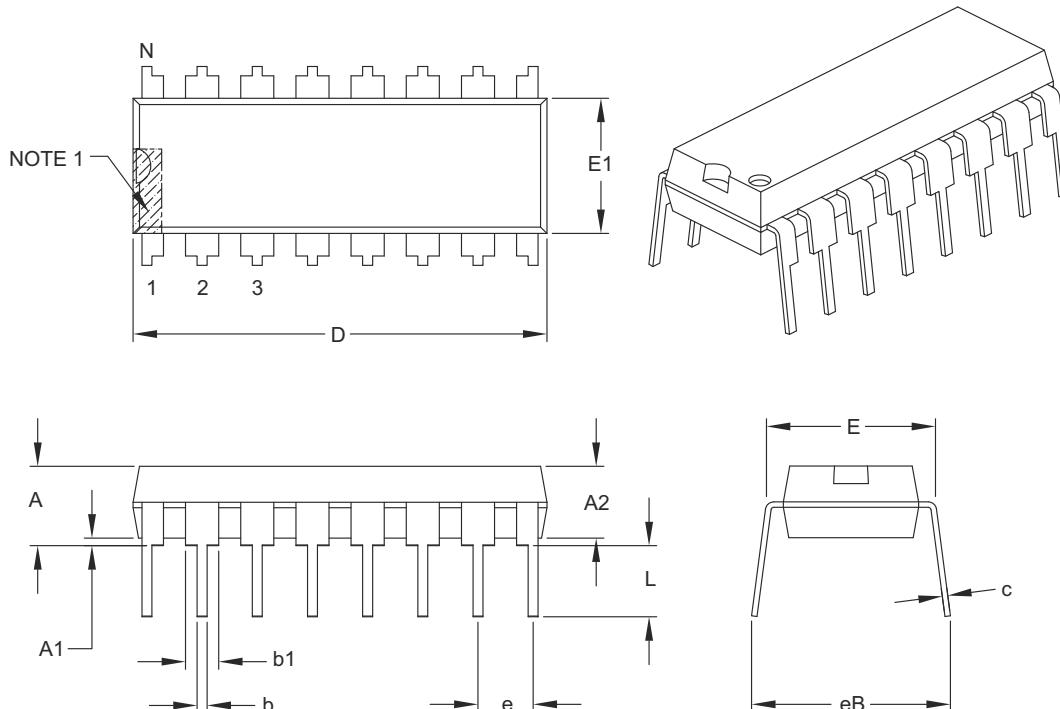
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-017B

## Packaging Diagrams and Parameters

### 16-Lead Plastic Dual In-Line (PE) – 300 mil Body [PDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	INCHES		
Dimension Limits			MIN	NOM	MAX
Number of Pins		N	16		
Pitch		e	.100 BSC		
Top to Seating Plane	A	—	—	.210	
Molded Package Thickness	A2	.115	.130	.195	
Base to Seating Plane	A1	.015	—	—	
Shoulder to Shoulder Width	E	.290	.310	.325	
Molded Package Width	E1	.240	.250	.280	
Overall Length	D	.735	.755	.775	
Tip to Seating Plane	L	.115	.130	.150	
Lead Thickness	c	.008	.010	.015	
Upper Lead Width	b1	.045	.060	.070	
Lower Lead Width	b	.014	.018	.022	
Overall Row Spacing §	eB	—	—	.430	

**Notes:**

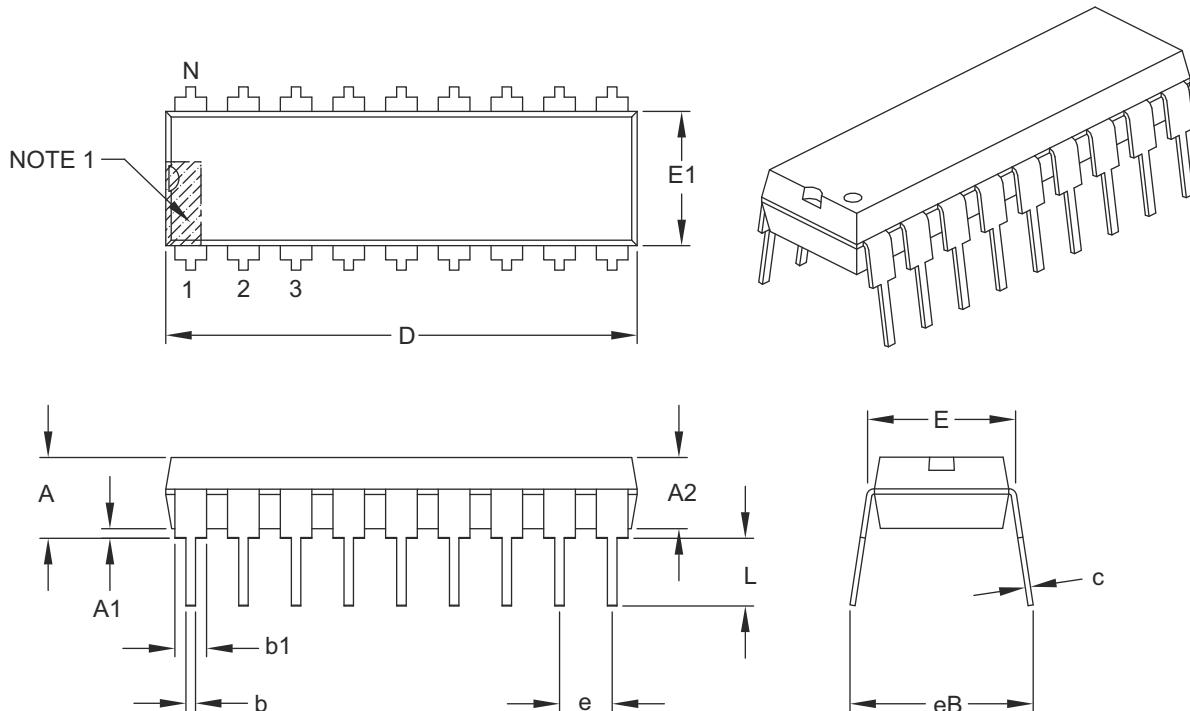
1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Packaging Diagrams and Parameters

### 18-Lead Plastic Dual In-Line (P) – 300 mil Body [PDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		18	
Pitch	e		.100 BSC	
Top to Seating Plane	A	—	—	.210
Molded Package Thickness	A2	.115	.130	.195
Base to Seating Plane	A1	.015	—	—
Shoulder to Shoulder Width	E	.300	.310	.325
Molded Package Width	E1	.240	.250	.280
Overall Length	D	.880	.900	.920
Tip to Seating Plane	L	.115	.130	.150
Lead Thickness	c	.008	.010	.014
Upper Lead Width	b1	.045	.060	.070
Lower Lead Width	b	.014	.018	.022
Overall Row Spacing §	eB	—	—	.430

**Notes:**

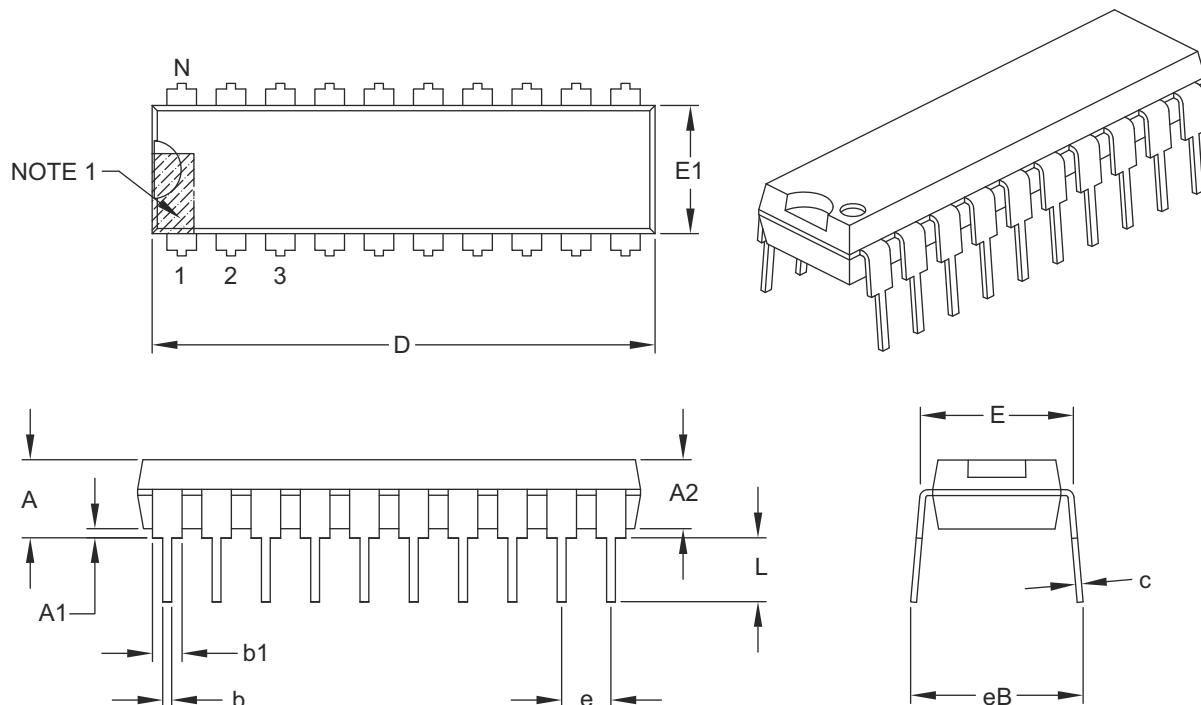
1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Packaging Diagrams and Parameters

### 20-Lead Plastic Dual In-Line (P) – 300 mil Body [PDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	INCHES		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N			20	
Pitch	e			.100 BSC	
Top to Seating Plane	A	—	—	.210	
Molded Package Thickness	A2	.115	.130	.195	
Base to Seating Plane	A1	.015	—	—	
Shoulder to Shoulder Width	E	.300	.310	.325	
Molded Package Width	E1	.240	.250	.280	
Overall Length	D	.980	1.030	1.060	
Tip to Seating Plane	L	.115	.130	.150	
Lead Thickness	c	.008	.010	.015	
Upper Lead Width	b1	.045	.060	.070	
Lower Lead Width	b	.014	.018	.022	
Overall Row Spacing §	eB	—	—	.430	

**Notes:**

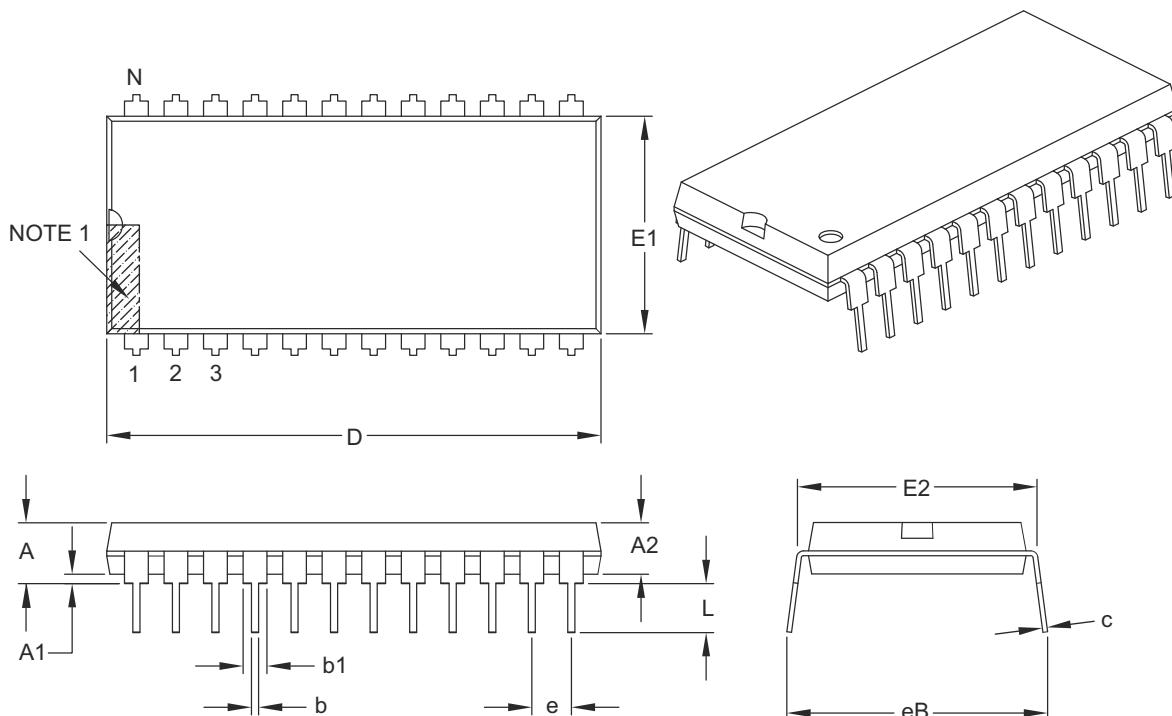
1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Packaging Diagrams and Parameters

### 24-Lead Plastic Dual In-Line (P) – 600 mil Body [PDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N	24		
Pitch	e	.100	BSC	
Top to Seating Plane	A	—	—	.250
Molded Package Thickness	A2	.125	—	.195
Base to Seating Plane	A1	.015	—	—
Shoulder to Shoulder Width	E	.590	—	.625
Molded Package Width	E1	.485	—	.580
Overall Length	D	1.150	—	1.290
Tip to Seating Plane	L	.115	—	.200
Lead Thickness	c	.008	—	.015
Upper Lead Width	b1	.030	—	.070
Lower Lead Width	b	.014	—	.022
Overall Row Spacing §	eB	—	—	.700

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

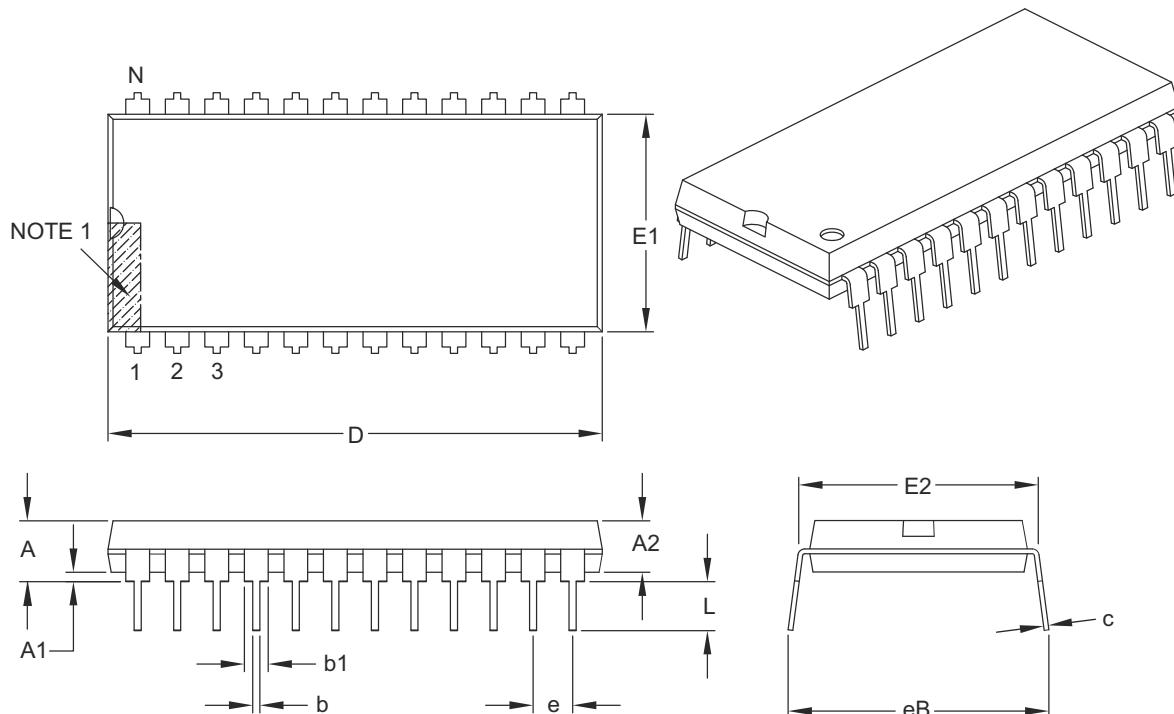
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-081B

## Packaging Diagrams and Parameters

### 24-Lead Plastic Dual In-Line (PG) – 600 mil Body [PDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	INCHES		
Dimension Limits			MIN	NOM	MAX
Number of Pins		N	24		
Pitch		e	.100 BSC		
Top to Seating Plane		A	–	–	.250
Molded Package Thickness		A2	.125	–	.195
Base to Seating Plane		A1	.015	–	–
Shoulder to Shoulder Width		E	.590	–	.625
Molded Package Width		E1	.485	–	.580
Overall Length		D	1.150	–	1.290
Tip to Seating Plane		L	.115	–	.200
Lead Thickness		c	.008	–	.015
Upper Lead Width		b1	.030	–	.070
Lower Lead Width		b	.014	–	.022
Overall Row Spacing §		eB	–	–	.700

**Notes:**

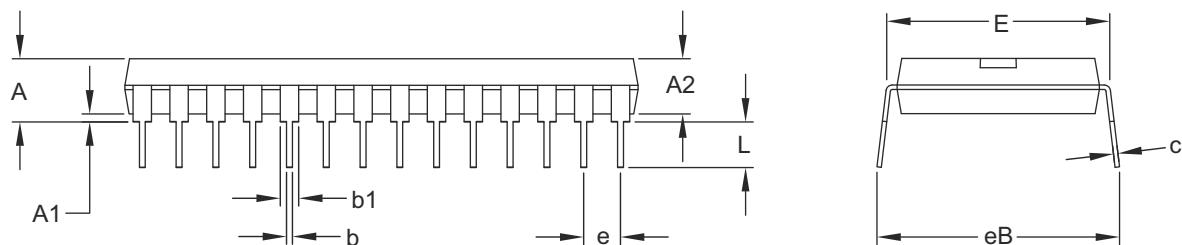
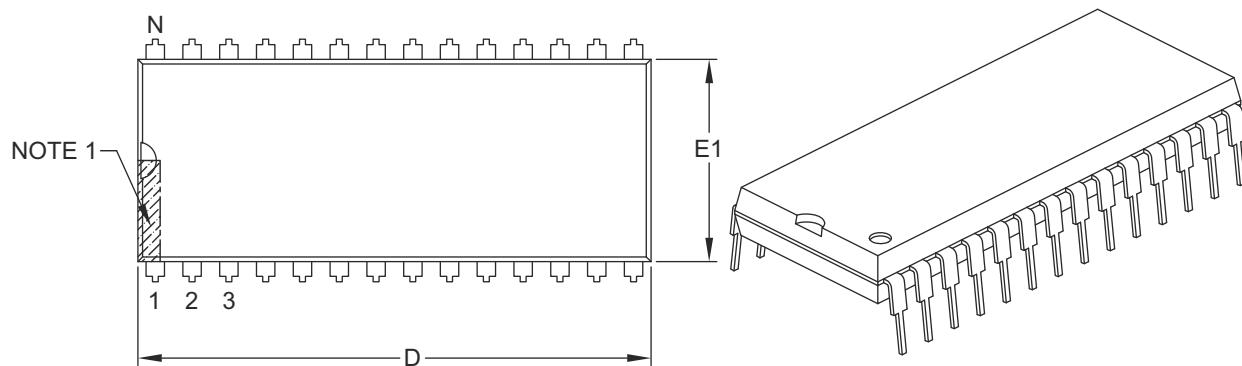
1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Packaging Diagrams and Parameters

### 28-Lead Plastic Dual In-Line (P) – 600 mil Body [PDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		28	
Pitch	e		.100 BSC	
Top to Seating Plane	A	—	—	.250
Molded Package Thickness	A2	.125	—	.195
Base to Seating Plane	A1	.015	—	—
Shoulder to Shoulder Width	E	.590	—	.625
Molded Package Width	E1	.485	—	.580
Overall Length	D	1.380	—	1.565
Tip to Seating Plane	L	.115	—	.200
Lead Thickness	c	.008	—	.015
Upper Lead Width	b1	.030	—	.070
Lower Lead Width	b	.014	—	.022
Overall Row Spacing §	eB	—	—	.700

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

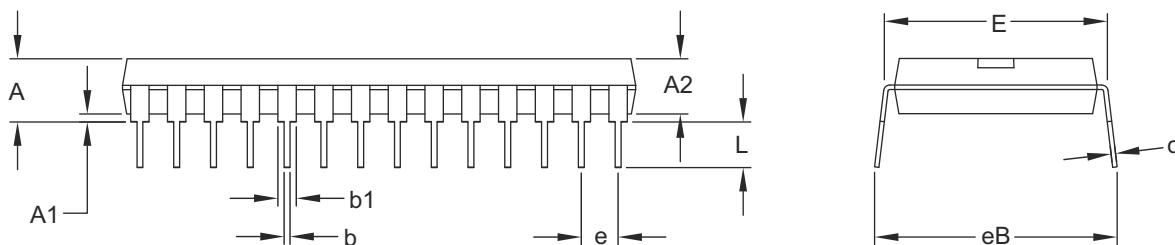
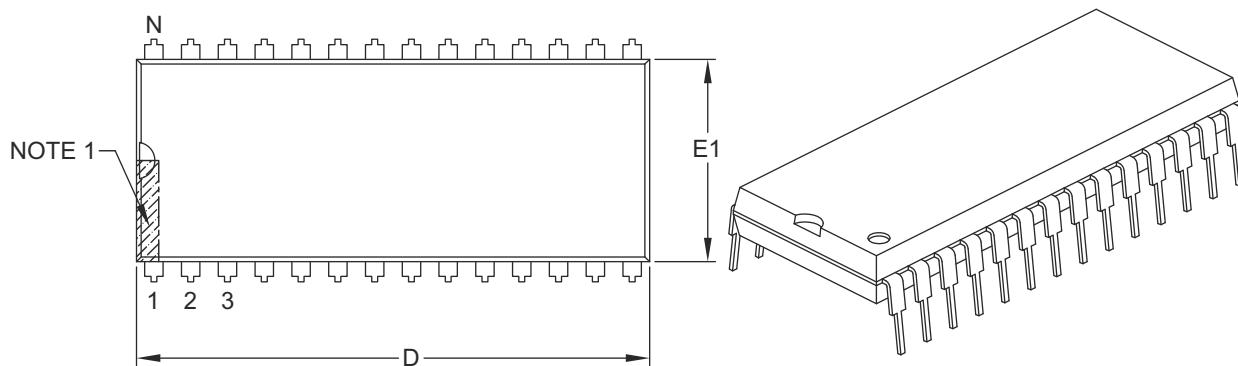
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-079B

# Packaging Diagrams and Parameters

## **28-Lead Plastic Dual In-Line (PI) – 600 mil Body [PDIP]**

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins		N	28	
Pitch		e	.100 BSC	
Top to Seating Plane	A	—	—	.250
Molded Package Thickness	A2	.125	—	.195
Base to Seating Plane	A1	.015	—	—
Shoulder to Shoulder Width	E	.590	—	.625
Molded Package Width	E1	.485	—	.580
Overall Length	D	1.380	—	1.565
Tip to Seating Plane	L	.115	—	.200
Lead Thickness	c	.008	—	.015
Upper Lead Width	b1	.030	—	.070
Lower Lead Width	b	.014	—	.022
Overall Row Spacing §	eB	—	—	.700

## Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
  2. § Significant Characteristic.
  3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
  4. Dimensioning and tolerancing per ASME Y14.5M.

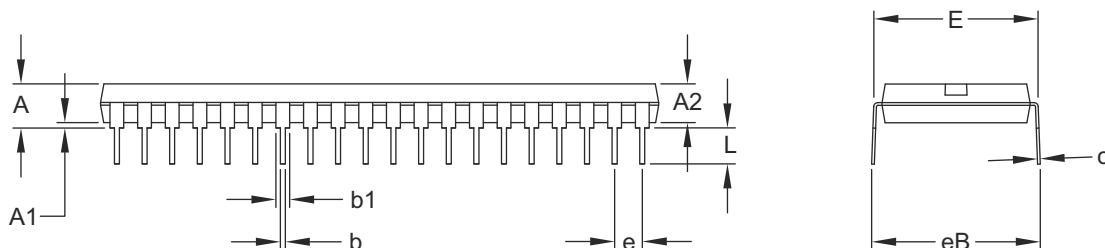
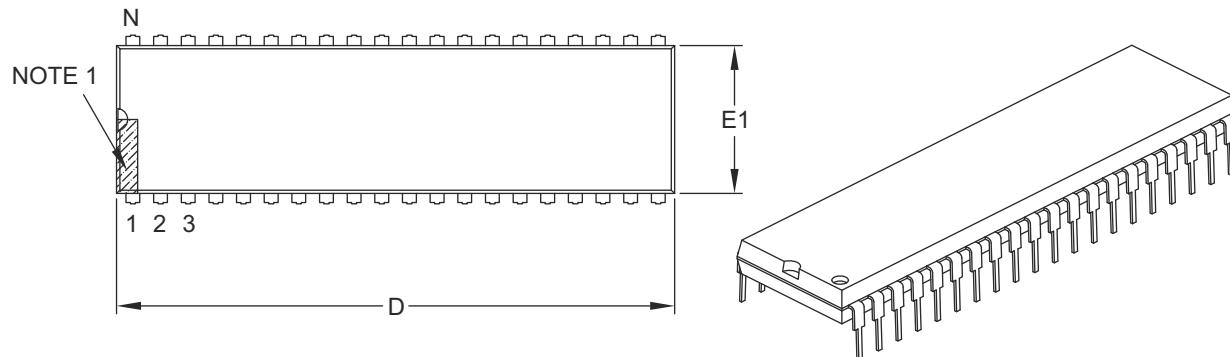
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-079B

## Packaging Diagrams and Parameters

### 40-Lead Plastic Dual In-Line (P) – 600 mil Body [PDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		40	
Pitch	e		.100 BSC	
Top to Seating Plane	A	—	—	.250
Molded Package Thickness	A2	.125	—	.195
Base to Seating Plane	A1	.015	—	—
Shoulder to Shoulder Width	E	.590	—	.625
Molded Package Width	E1	.485	—	.580
Overall Length	D	1.980	—	2.095
Tip to Seating Plane	L	.115	—	.200
Lead Thickness	c	.008	—	.015
Upper Lead Width	b1	.030	—	.070
Lower Lead Width	b	.014	—	.023
Overall Row Spacing §	eB	—	—	.700

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

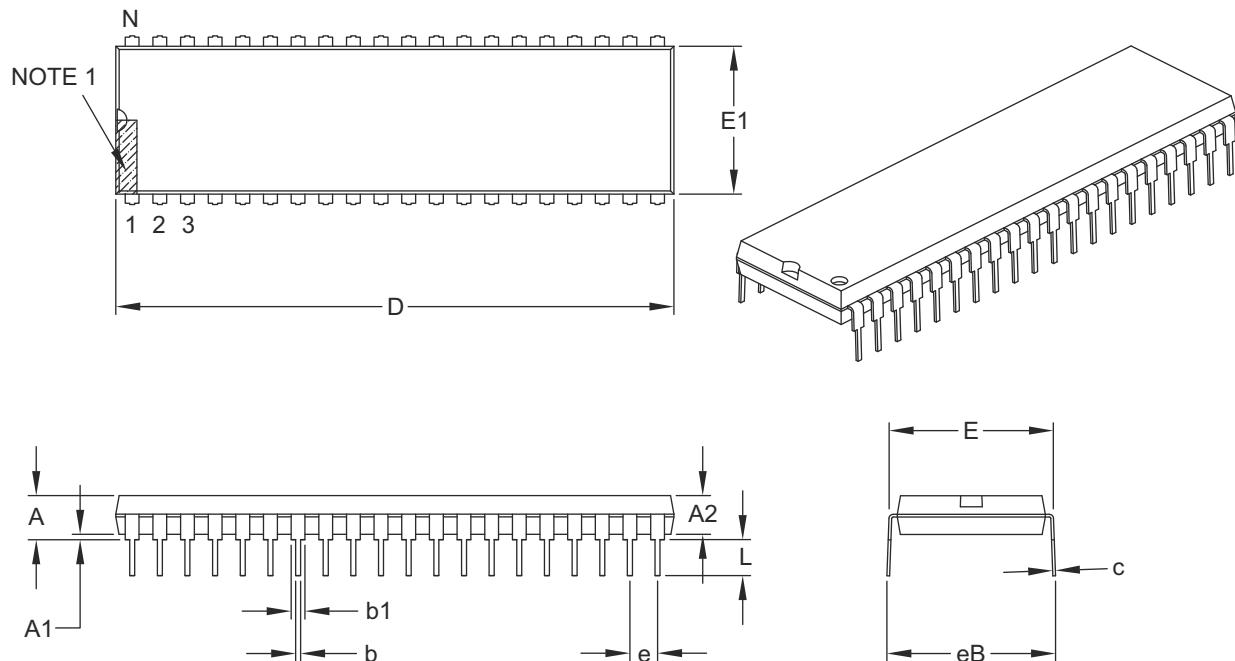
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-016B

## Packaging Diagrams and Parameters

### 40-Lead Plastic Dual In-Line (PL) – 600 mil Body [PDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	INCHES		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		40		
Pitch	e		.100	BSC	
Top to Seating Plane	A	—	—	.250	
Molded Package Thickness	A2	.125	—	.195	
Base to Seating Plane	A1	.015	—	—	
Shoulder to Shoulder Width	E	.590	—	.625	
Molded Package Width	E1	.485	—	.580	
Overall Length	D	1.980	—	2.095	
Tip to Seating Plane	L	.115	—	.200	
Lead Thickness	c	.008	—	.015	
Upper Lead Width	b1	.030	—	.070	
Lower Lead Width	b	.014	—	.023	
Overall Row Spacing §	eB	—	—	.700	

**Notes:**

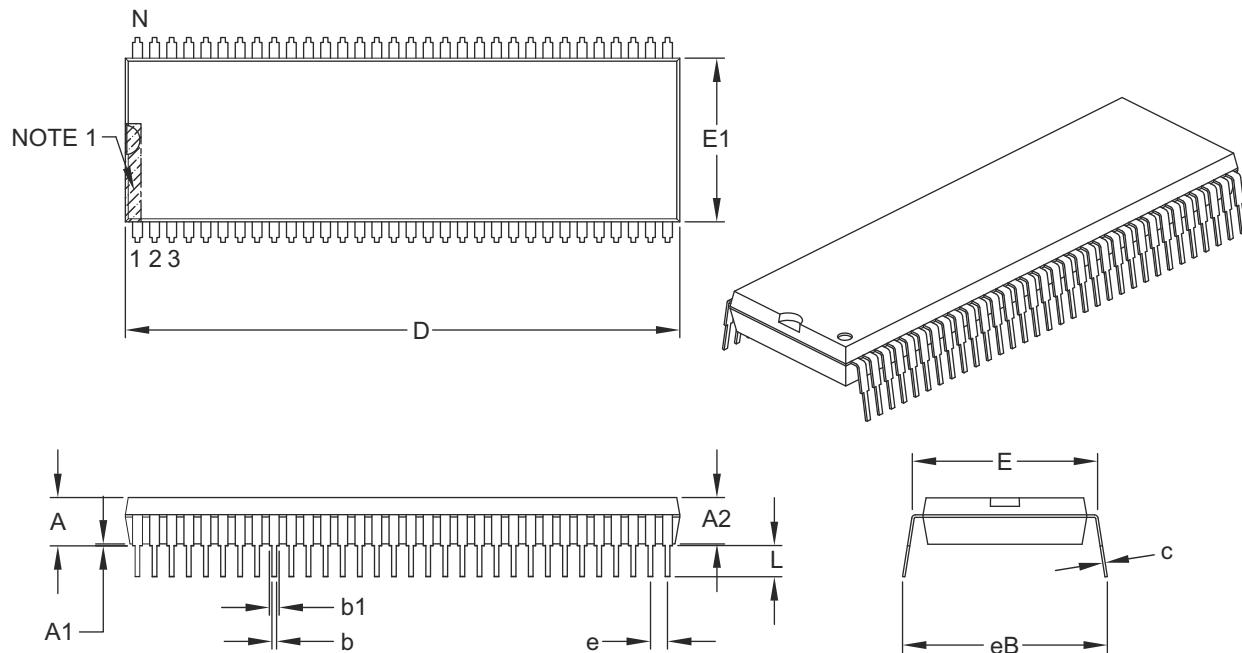
1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Packaging Diagrams and Parameters

### 64-Lead Shrink Plastic Dual In-Line (SP) – 750 mil Body [PDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		64	
Pitch	e		.070 BSC	
Top to Seating Plane	A	—	—	.200
Molded Package Thickness	A2	.120	.150	.180
Base to Seating Plane	A1	.020	—	—
Shoulder to Shoulder Width	E	.750	—	.785
Molded Package Width	E1	.650	.670	.690
Overall Length	D	2.260	2.270	2.280
Tip to Seating Plane	L	.100	.130	.150
Lead Thickness	c	.009	.010	.015
Upper Lead Width	b1	.035	.040	.045
Lower Lead Width	b	.014	.018	.022
Overall Row Spacing §	eB	—	—	.880

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-090B

## Packaging Diagrams and Parameters

---

---

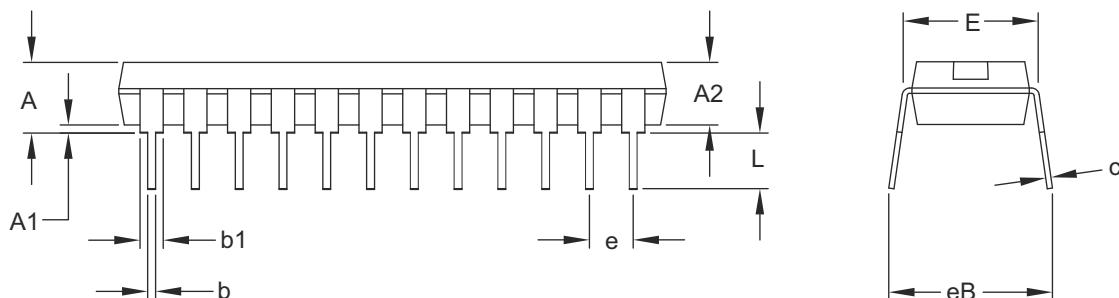
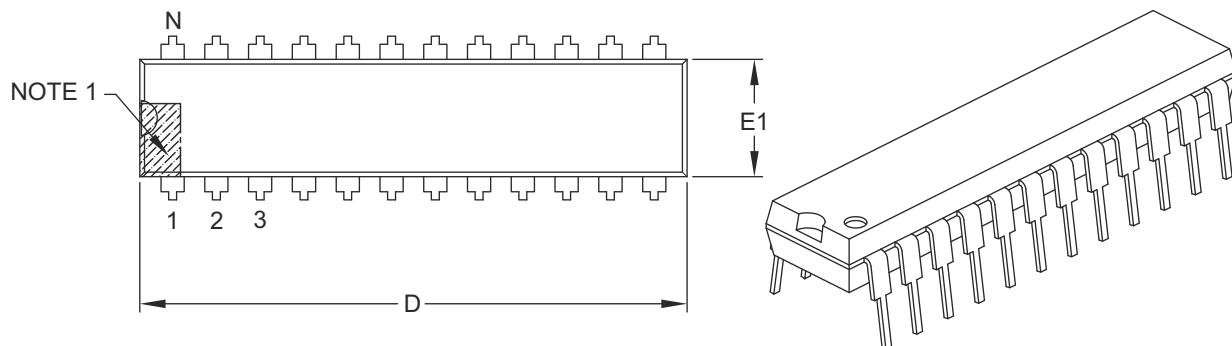
### **SPDIP Family**

#### **Skinny Plastic Dual In-Line Packages**

## Packaging Diagrams and Parameters

### 24-Lead Skinny Plastic Dual In-Line (PF) – 300 mil Body [SPDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		24	
Pitch	e		.100 BSC	
Top to Seating Plane	A	–	–	.210
Molded Package Thickness	A2	.115	.130	.195
Base to Seating Plane	A1	.015	–	–
Shoulder to Shoulder Width	E	.280	.310	.325
Molded Package Width	E1	.240	.250	.280
Overall Length	D	1.155	1.250	1.280
Tip to Seating Plane	L	.115	.130	.160
Lead Thickness	c	.008	.010	.015
Upper Lead Width	b1	.045	.060	.070
Lower Lead Width	b	.014	.018	.023
Overall Row Spacing §	eB	–	–	.430

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

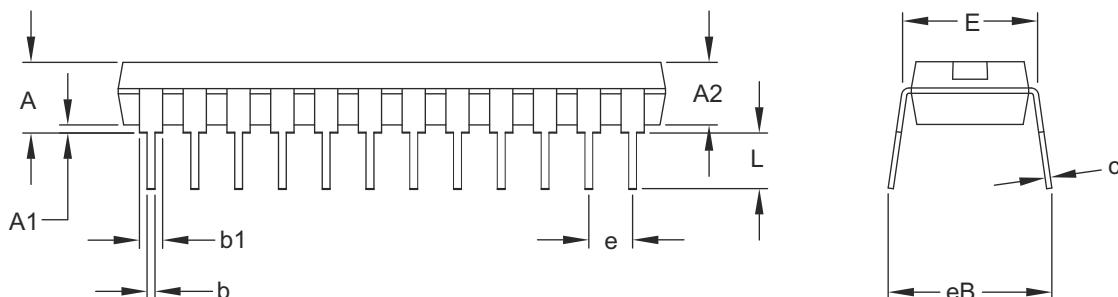
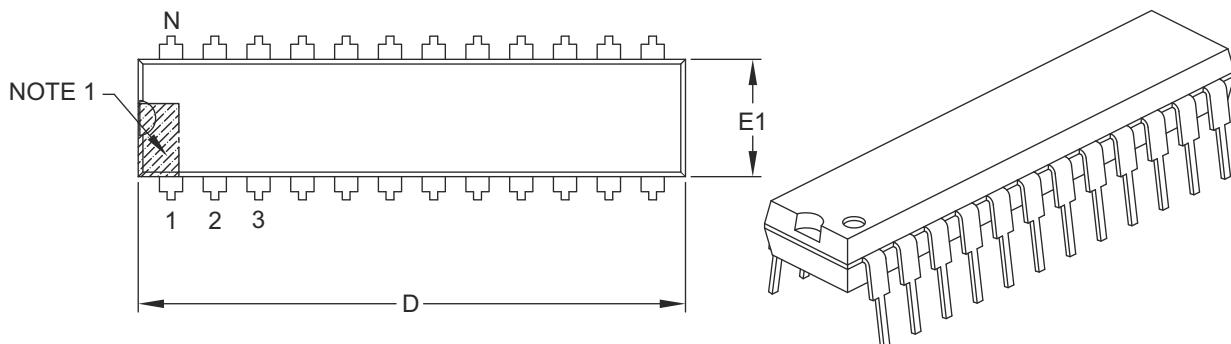
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-043B

## Packaging Diagrams and Parameters

### 24-Lead Skinny Plastic Dual In-Line (SP) – 300 mil Body [SPDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins		N		
Pitch		e		
Top to Seating Plane		A	—	.210
Molded Package Thickness		A2	.115	.130
Base to Seating Plane		A1	.015	—
Shoulder to Shoulder Width		E	.280	.325
Molded Package Width		E1	.240	.250
Overall Length		D	1.155	1.250
Tip to Seating Plane		L	.115	.160
Lead Thickness		c	.008	.010
Upper Lead Width		b1	.045	.060
Lower Lead Width		b	.014	.018
Overall Row Spacing §		eB	—	.430

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

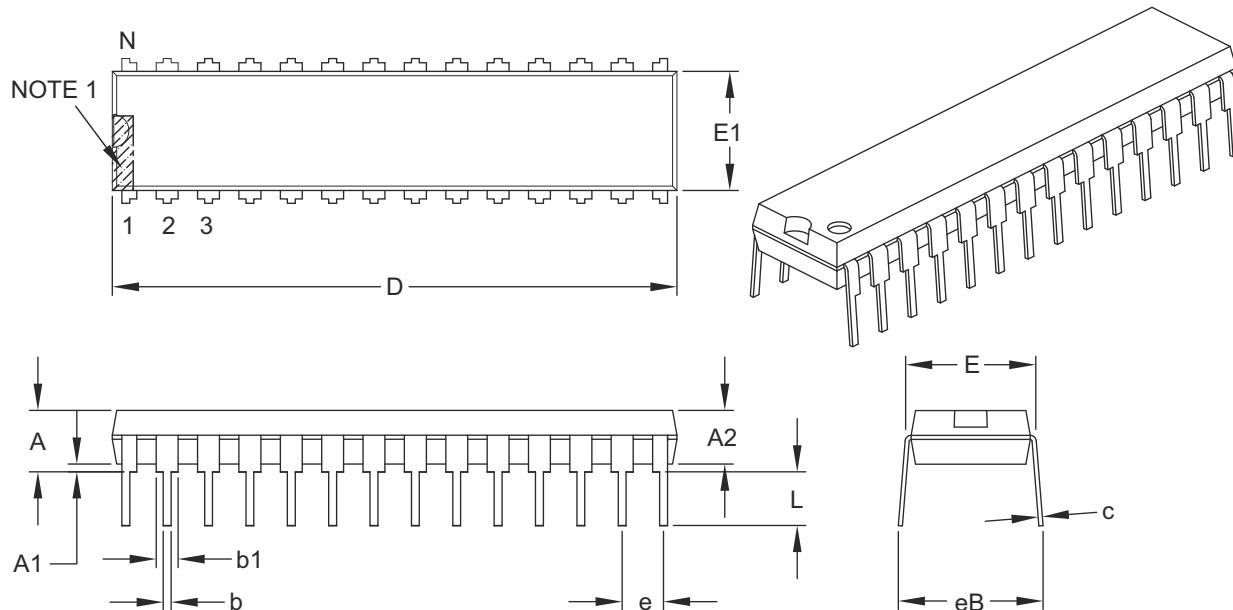
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-043B

## Packaging Diagrams and Parameters

### 28-Lead Skinny Plastic Dual In-Line (PJ) – 300 mil Body [SPDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins		N		
Pitch		e		
Top to Seating Plane		A		
Molded Package Thickness		A2		
Base to Seating Plane		A1		
Shoulder to Shoulder Width		E		
Molded Package Width		E1		
Overall Length		D		
Tip to Seating Plane		L		
Lead Thickness		c		
Upper Lead Width		b1		
Lower Lead Width		b		
Overall Row Spacing §		eB		

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

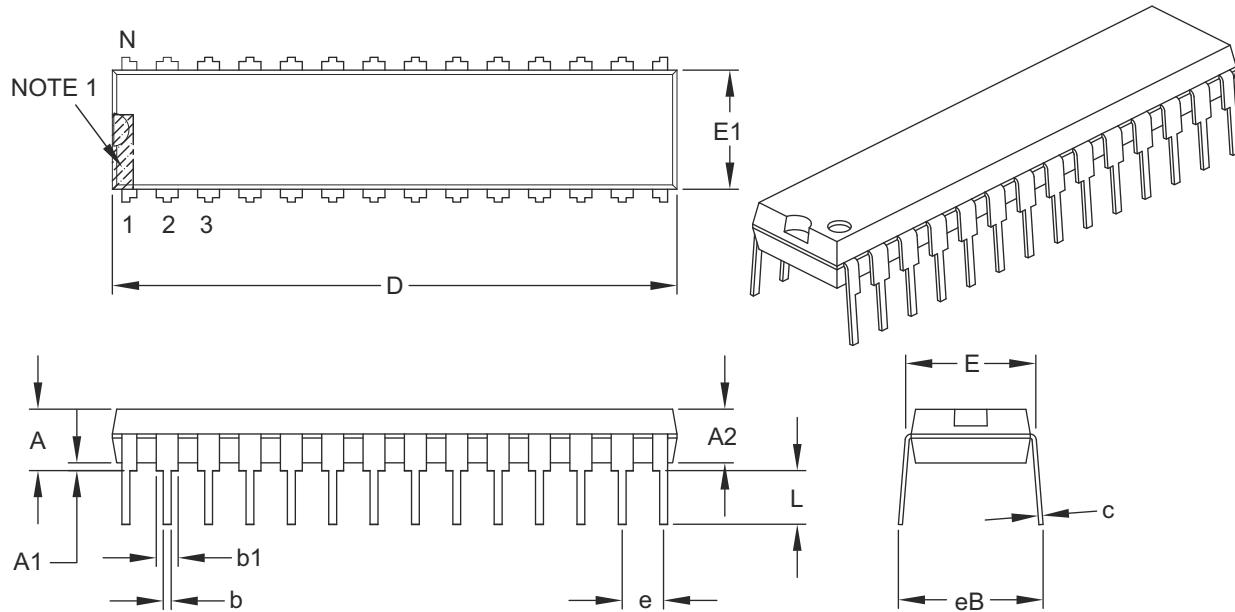
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-070B

## Packaging Diagrams and Parameters

### 28-Lead Skinny Plastic Dual In-Line (SP) – 300 mil Body [SPDIP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	INCHES		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N			28	
Pitch	e			.100 BSC	
Top to Seating Plane	A	—	—	.200	
Molded Package Thickness	A2	.120	.135	.150	
Base to Seating Plane	A1	.015	—	—	
Shoulder to Shoulder Width	E	.290	.310	.335	
Molded Package Width	E1	.240	.285	.295	
Overall Length	D	1.345	1.365	1.400	
Tip to Seating Plane	L	.110	.130	.150	
Lead Thickness	c	.008	.010	.015	
Upper Lead Width	b1	.040	.050	.070	
Lower Lead Width	b	.014	.018	.022	
Overall Row Spacing §	eB	—	—	.430	

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

## Packaging Diagrams and Parameters

---

---

**NOTES:**

## Packaging Diagrams and Parameters

---

---

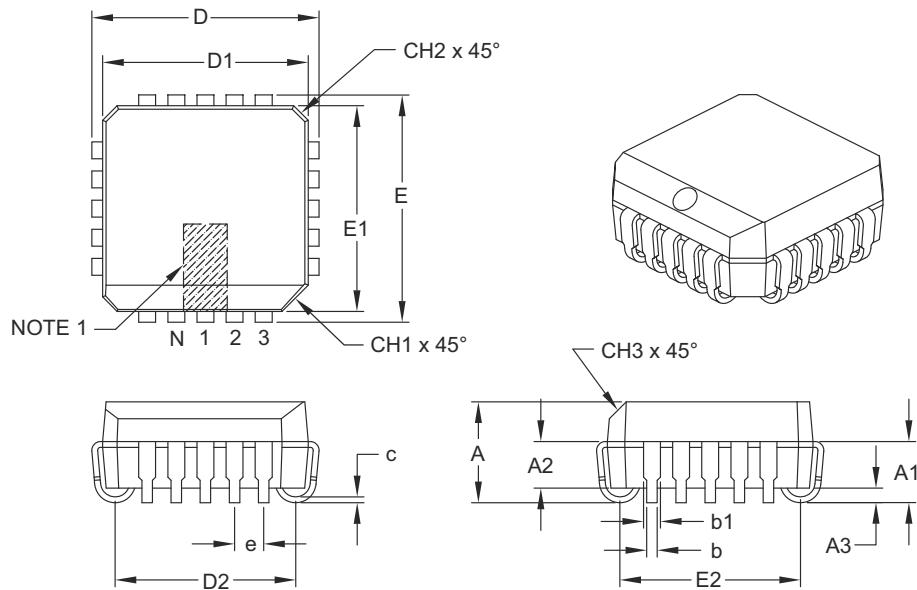
### PLCC Family

#### Plastic Leaded Chip Carrier Packages

## Packaging Diagrams and Parameters

### 20-Lead Plastic Leaded Chip Carrier (L) – Square [PLCC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	INCHES		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N			20	
Pitch	e			.050	
Overall Height	A	.165	.172	.180	
Contact Height	A1	.090	.105	.120	
Molded Package to Contact	A2	.062	–	.083	
Standoff §	A3	.020	–	–	
Corner Chamfer	CH1	.042	–	.048	
Chamfers	CH2	–	–	.020	
Side Chamfer	CH3	.042	–	.056	
Overall Width	E	.385	.390	.395	
Overall Length	D	.385	.390	.395	
Molded Package Width	E1	.350	.353	.356	
Molded Package Length	D1	.350	.353	.356	
Footprint Width	E2	.282	.310	.338	
Footprint Length	D2	.282	.310	.338	
Lead Thickness	c	.0075	–	.0125	
Upper Lead Width	b1	.026	–	.032	
Lower Lead Width	b	.013	–	.021	

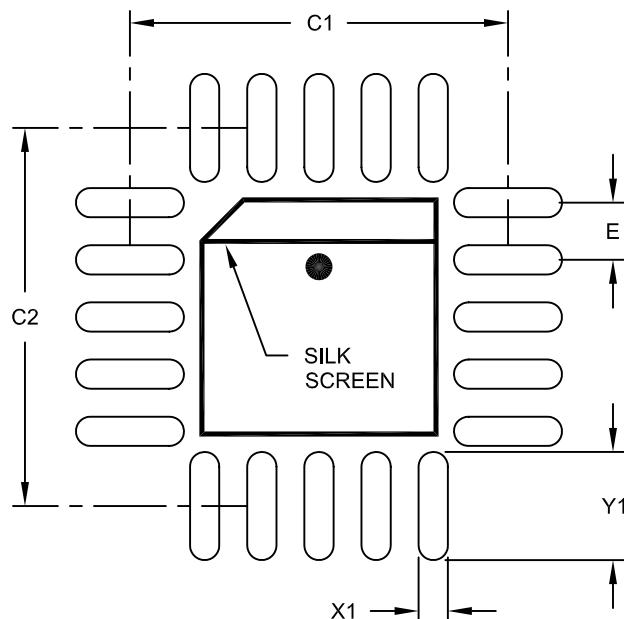
#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

## Land Pattern (Footprint)

20-Lead Plastic Leaded Chip Carrier (L) - Square [PLCC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units			INCHES		
		Dimension Limits			MIN	NOM	MAX
Contact Pitch	E				.050	BSC	
Contact Pad Spacing	C1				.331		
Contact Pad Spacing	C2				.331		
Contact Pad Width (X20)	X1					.026	
Contact Pad Length (X20)	Y1						.094

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

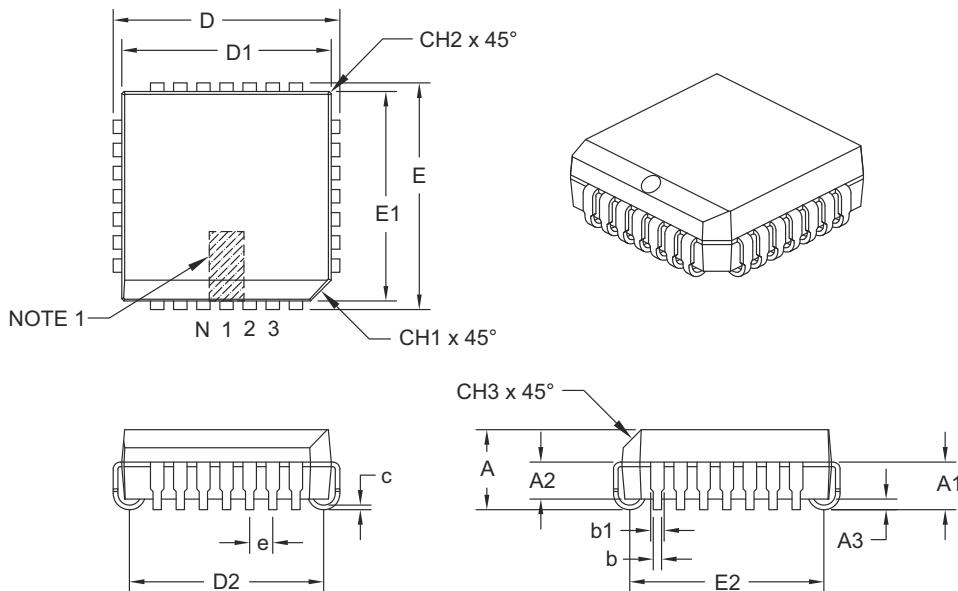
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2064A

## Packaging Diagrams and Parameters

### 28-Lead Plastic Leaded Chip Carrier (L) – Square [PLCC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		28	
Pitch	e		.050	
Overall Height	A	.165	.172	.180
Contact Height	A1	.090	.105	.120
Molded Package to Contact	A2	.062	–	.083
Standoff §	A3	.020	–	–
Corner Chamfer	CH1	.042	–	.048
Chamfers	CH2	–	–	.020
Side Chamfer	CH3	.042	–	.056
Overall Width	E	.485	.490	.495
Overall Length	D	.485	.490	.495
Molded Package Width	E1	.450	.453	.456
Molded Package Length	D1	.450	.453	.456
Footprint Width	E2	.382	.410	.438
Footprint Length	D2	.382	.410	.438
Lead Thickness	c	.0075	–	.0125
Upper Lead Width	b1	.026	–	.032
Lower Lead Width	b	.013	–	.021

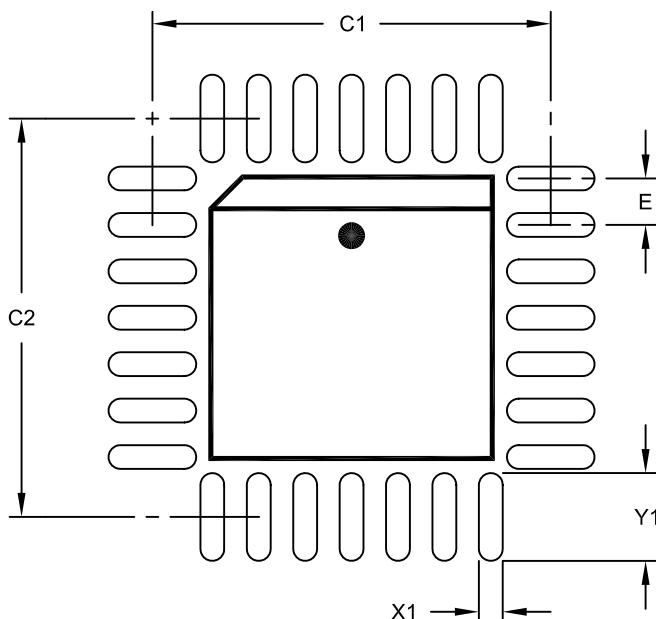
#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

## Land Pattern (Footprint)

28-Lead Plastic Leaded Chip Carrier (L) - Square [PLCC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		.050 BSC	
Contact Pad Spacing	C1		.429	
Contact Pad Spacing	C2		.429	
Contact Pad Width (X28)	X1			.026
Contact Pad Length (X28)	Y1			.094

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

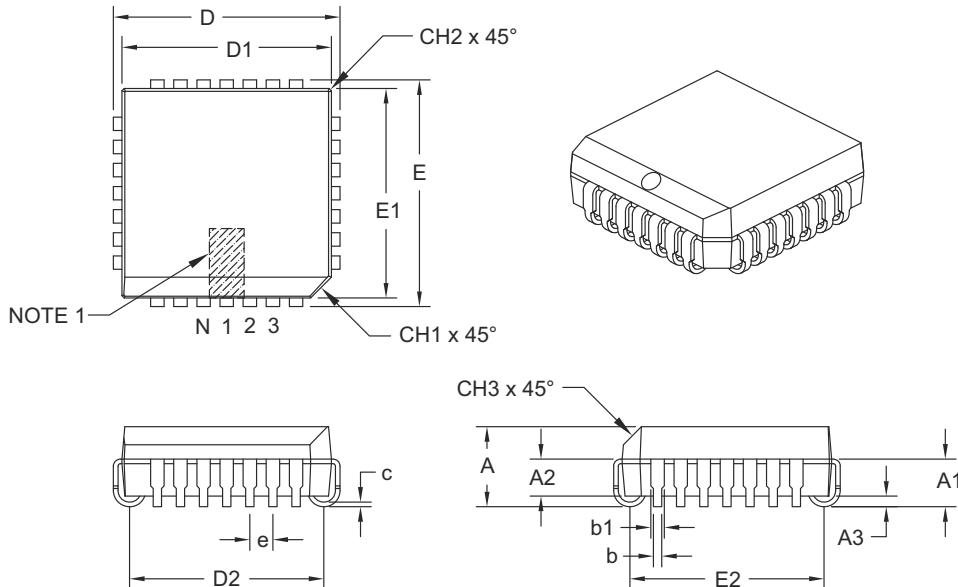
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2026A

## Packaging Diagrams and Parameters

### 28-Lead Plastic Leaded Chip Carrier (LI) – Square [PLCC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension Limits		INCHES		
	N	MIN	NOM	MAX
Number of Pins	N		28	
Pitch	e		.050	
Overall Height	A	.165	.172	.180
Contact Height	A1	.090	.105	.120
Molded Package to Contact	A2	.062	–	.083
Standoff §	A3	.020	–	–
Corner Chamfer	CH1	.042	–	.048
Chamfers	CH2	–	–	.020
Side Chamfer	CH3	.042	–	.056
Overall Width	E	.485	.490	.495
Overall Length	D	.485	.490	.495
Molded Package Width	E1	.450	.453	.456
Molded Package Length	D1	.450	.453	.456
Footprint Width	E2	.382	.410	.438
Footprint Length	D2	.382	.410	.438
Lead Thickness	c	.0075	–	.0125
Upper Lead Width	b1	.026	–	.032
Lower Lead Width	b	.013	–	.021

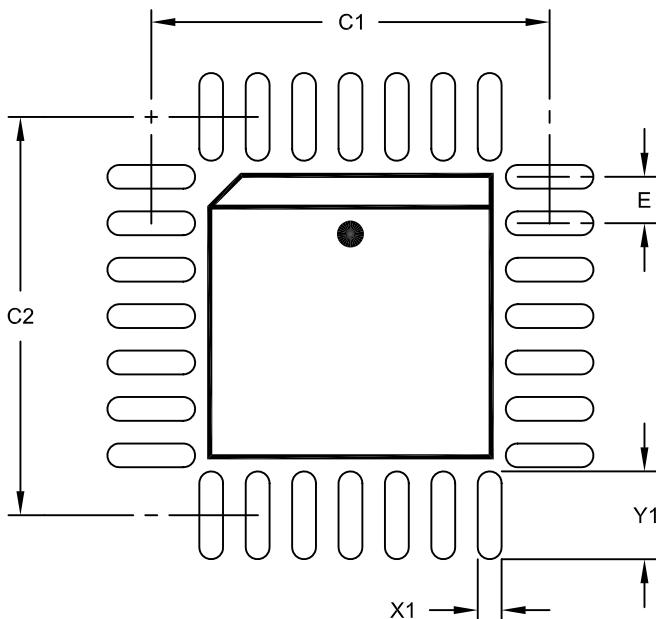
#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

## Land Pattern (Footprint)

28-Lead Plastic Leaded Chip Carrier (L1) - Square [PLCC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units			INCHES		
		Dimension Limits			MIN	NOM	MAX
Contact Pitch	E				.050	BSC	
Contact Pad Spacing	C1				.429		
Contact Pad Spacing	C2				.429		
Contact Pad Width (X28)	X1					.026	
Contact Pad Length (X28)	Y1						.094

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

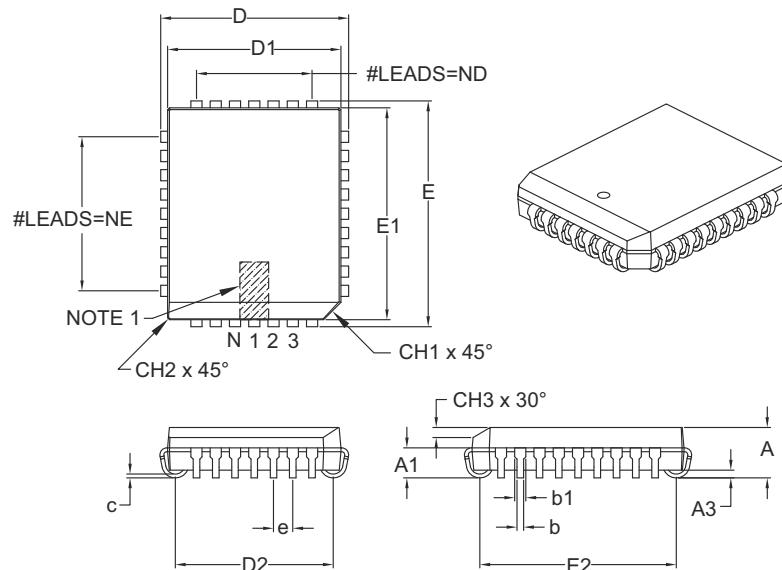
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2026A

## Packaging Diagrams and Parameters

### 32-Lead Plastic Leaded Chip Carrier (L) – Rectangle [PLCC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension Limits		INCHES		
		MIN	NOM	MAX
Number of Pins	N		32	
Pitch	e		.050	
Pins along Length	ND		7	
Pins along Width	NE		9	
Overall Height	A	.125	—	.140
Contact Height	A1	.060	—	.095
Standoff §	A3	.015	—	—
Corner Chamfer	CH1	.042	—	.048
Chamfers	CH2	—	—	.020
Side Chamfer Height	CH3	.023	—	.029
Overall Length	D	.485	—	.495
Overall Width	E	.585	—	.595
Molded Package Length	D1	.447	—	.453
Molded Package Width	E1	.547	—	.553
Footprint Length	D2	.376	—	.446
Footprint Width	E2	.476	—	.546
Lead Thickness	c	.008	—	.013
Upper Lead Width	b1	.026	—	.032
Lower Lead Width	b	.013	—	.021

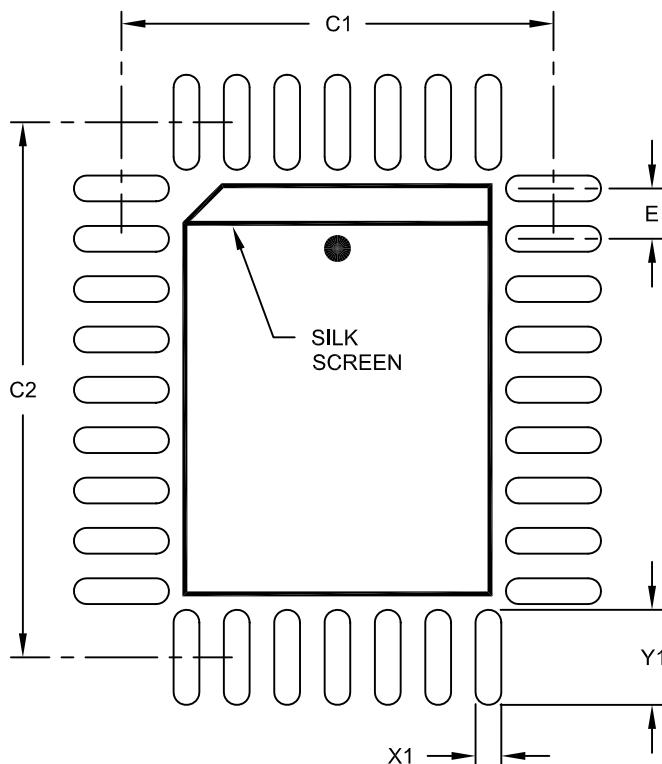
#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

## Land Pattern (Footprint)

32-Lead Plastic Leaded Chip Carrier (L) - Rectangle [PLCC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



### RECOMMENDED LAND PATTERN

		Units			INCHES		
		Dimension Limits			MIN	NOM	MAX
Contact Pitch	E				.050	BSC	
Contact Pad Spacing	C1				.429		
Contact Pad Spacing	C2				.531		
Contact Pad Width (X32)	X1					,026	
Contact Pad Length (X32)	Y1						.094

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

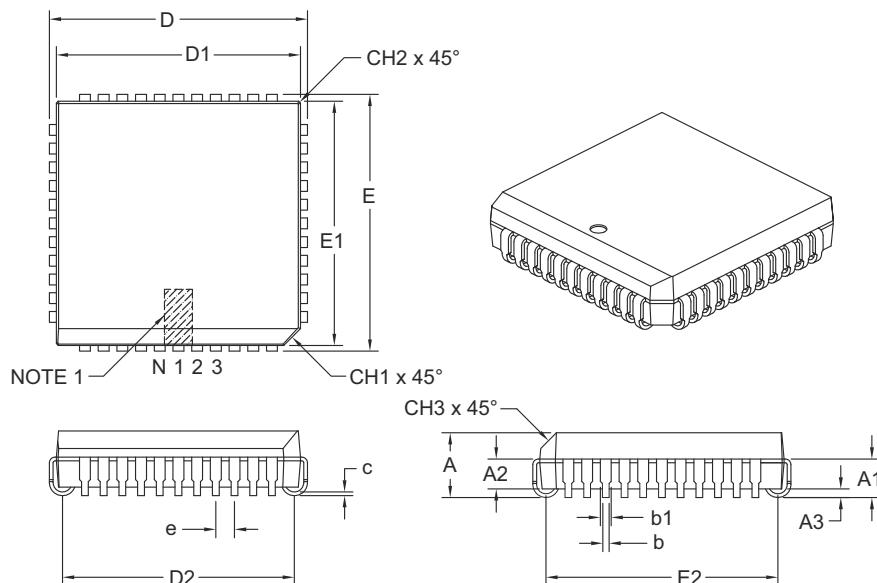
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2023A

## Packaging Diagrams and Parameters

### 44-Lead Plastic Leaded Chip Carrier (L) – Square [PLCC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N	44		
Pitch	e	.050		
Overall Height	A	.165	.172	.180
Contact Height	A1	.090	.105	.120
Molded Package to Contact	A2	.062	—	.083
Standoff §	A3	.020	—	—
Corner Chamfer	CH1	.042	—	.048
Chamfers	CH2	—	—	.020
Side Chamfer	CH3	.042	—	.056
Overall Width	E	.685	.690	.695
Overall Length	D	.685	.690	.695
Molded Package Width	E1	.650	.653	.656
Molded Package Length	D1	.650	.653	.656
Footprint Width	E2	.582	.610	.638
Footprint Length	D2	.582	.610	.638
Lead Thickness	c	.0075	—	.0125
Upper Lead Width	b1	.026	—	.032
Lower Lead Width	b	.013	—	.021

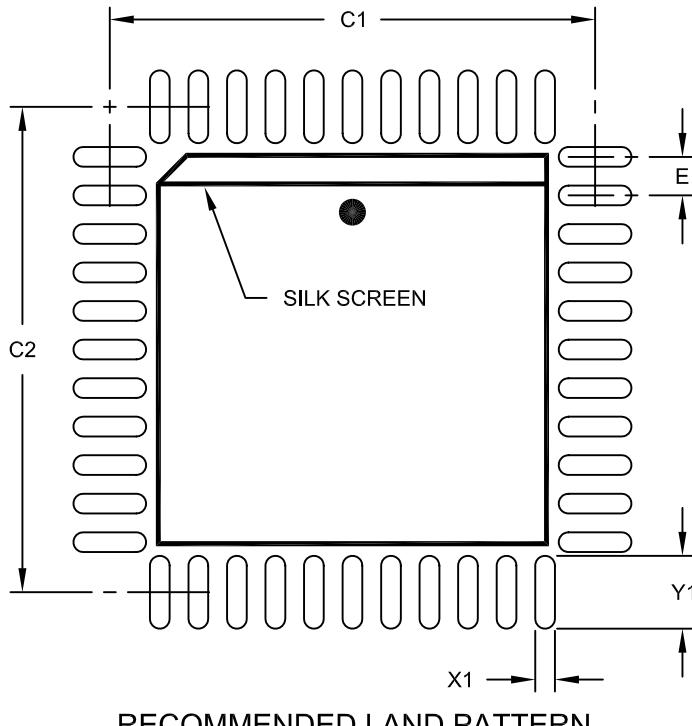
#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

## Land Pattern (Footprint)

44-Lead Plastic Leaded Chip Carrier (L) - Square [PLCC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension	Units	INCHES		
		MIN	NOM	MAX
Contact Pitch	E		.050 BSC	
Contact Pad Spacing	C1		.630	
Contact Pad Spacing	C2		.630	
Contact Pad Width (X44)	X1			.026
Contact Pad Length (X44)	Y1			.094

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

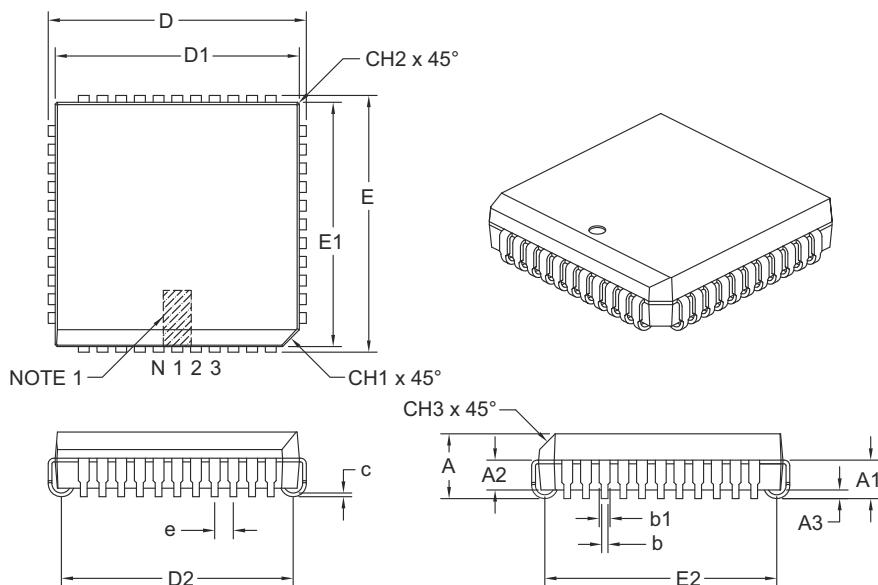
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2048A

## Packaging Diagrams and Parameters

### 44-Lead Plastic Leaded Chip Carrier (LW) – Square [PLCC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	INCHES		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		44		
Pitch	e		.050		
Overall Height	A	.165	.172	.180	
Contact Height	A1	.090	.105	.120	
Molded Package to Contact	A2	.062	—	.083	
Standoff §	A3	.020	—	—	
Corner Chamfer	CH1	.042	—	.048	
Chamfers	CH2	—	—	.020	
Side Chamfer	CH3	.042	—	.056	
Overall Width	E	.685	.690	.695	
Overall Length	D	.685	.690	.695	
Molded Package Width	E1	.650	.653	.656	
Molded Package Length	D1	.650	.653	.656	
Footprint Width	E2	.582	.610	.638	
Footprint Length	D2	.582	.610	.638	
Lead Thickness	c	.0075	—	.0125	
Upper Lead Width	b1	.026	—	.032	
Lower Lead Width	b	.013	—	.021	

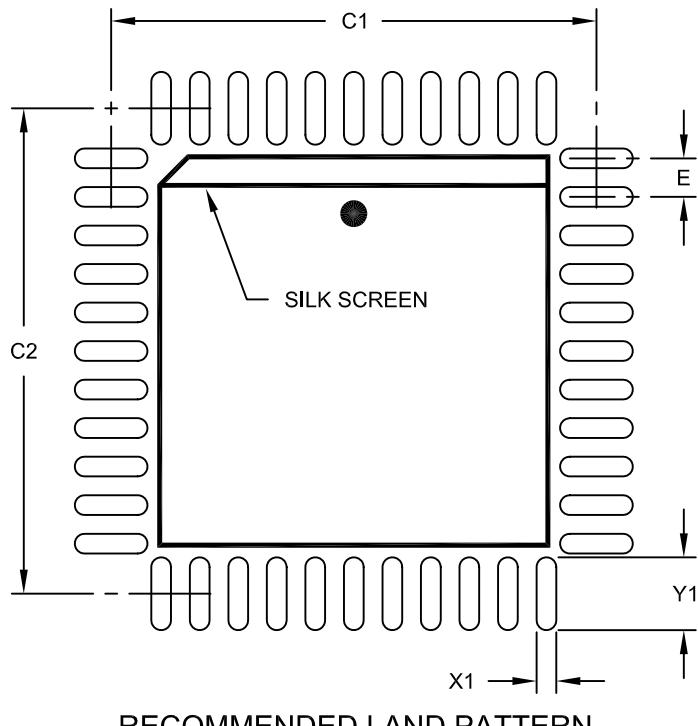
#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

## Land Pattern (Footprint)

### 44-Lead Plastic Leaded Chip Carrier (LW) – Square [PLCC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension	Units	INCHES		
		MIN	NOM	MAX
Contact Pitch	E		.050 BSC	
Contact Pad Spacing	C1		.630	
Contact Pad Spacing	C2		.630	
Contact Pad Width (X44)	X1			.026
Contact Pad Length (X44)	Y1			.094

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

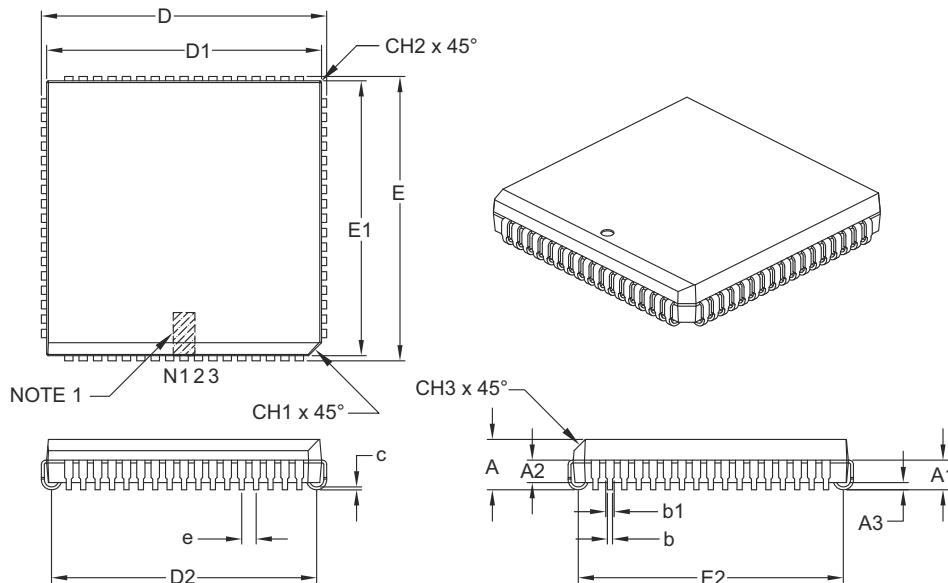
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2048A

## Packaging Diagrams and Parameters

### 68-Lead Plastic Leaded Chip Carrier (L) – Square [PLCC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		68	
Pitch	e		.050	
Overall Height	A	.165	.172	.180
Contact Height	A1	.090	.105	.120
Molded Package to Contact	A2	.062	—	.083
Standoff §	A3	.020	—	—
Corner Chamfer	CH1	.042	—	.048
Chamfers	CH2	—	—	.020
Side Chamfer	CH3	.042	—	.056
Overall Width	E	.985	.990	.995
Overall Length	D	.985	.990	.995
Molded Package Width	E1	.950	.954	.958
Molded Package Length	D1	.950	.954	.958
Footprint Width	E2	.882	.910	.938
Footprint Length	D2	.882	.910	.938
Lead Thickness	c	.0075	—	.0125
Upper Lead Width	b1	.026	—	.032
Lower Lead Width	b	.013	—	.021

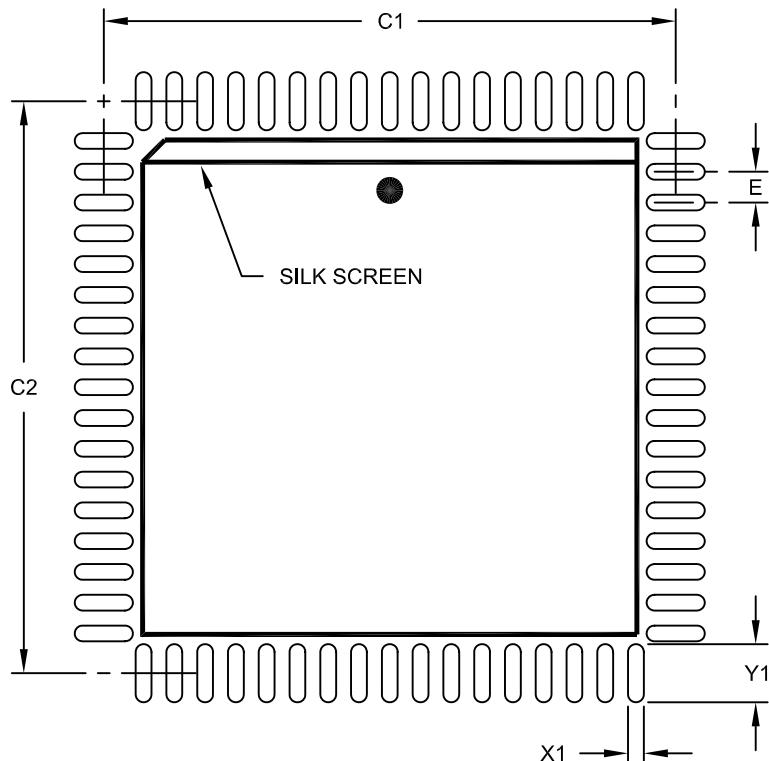
#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

## Land Pattern (Footprint)

68-Lead Plastic Leaded Chip Carrier (L) - Square [PLCC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



### RECOMMENDED LAND PATTERN

		INCHES		
Dimension	Limits	MIN	NOM	MAX
Contact Pitch	E	.050	BSC	
Contact Pad Spacing	C1		.929	
Contact Pad Spacing	C2		.929	
Contact Pad Width (X68)	X1			.026
Contact Pad Length (X68)	Y1			.094

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

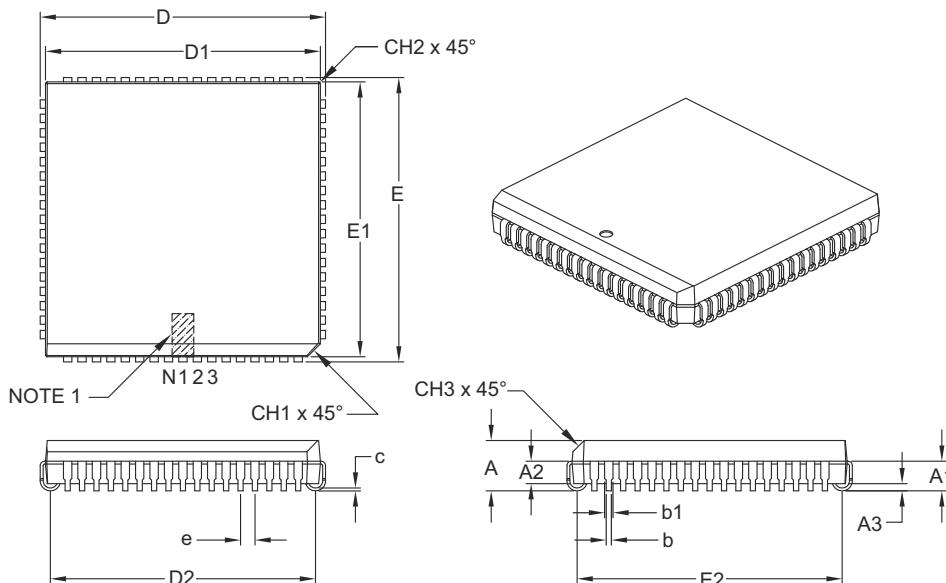
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2049A

## Packaging Diagrams and Parameters

### 68-Lead Plastic Leaded Chip Carrier (LS) – Square [PLCC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	INCHES		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		68		
Pitch	e		.050		
Overall Height	A	.165	.172	.180	
Contact Height	A1	.090	.105	.120	
Molded Package to Contact	A2	.062	–	.083	
Standoff §	A3	.020	–	–	
Corner Chamfer	CH1	.042	–	.048	
Chamfers	CH2	–	–	.020	
Side Chamfer	CH3	.042	–	.056	
Overall Width	E	.985	.990	.995	
Overall Length	D	.985	.990	.995	
Molded Package Width	E1	.950	.954	.958	
Molded Package Length	D1	.950	.954	.958	
Footprint Width	E2	.882	.910	.938	
Footprint Length	D2	.882	.910	.938	
Lead Thickness	c	.0075	–	.0125	
Upper Lead Width	b1	.026	–	.032	
Lower Lead Width	b	.013	–	.021	

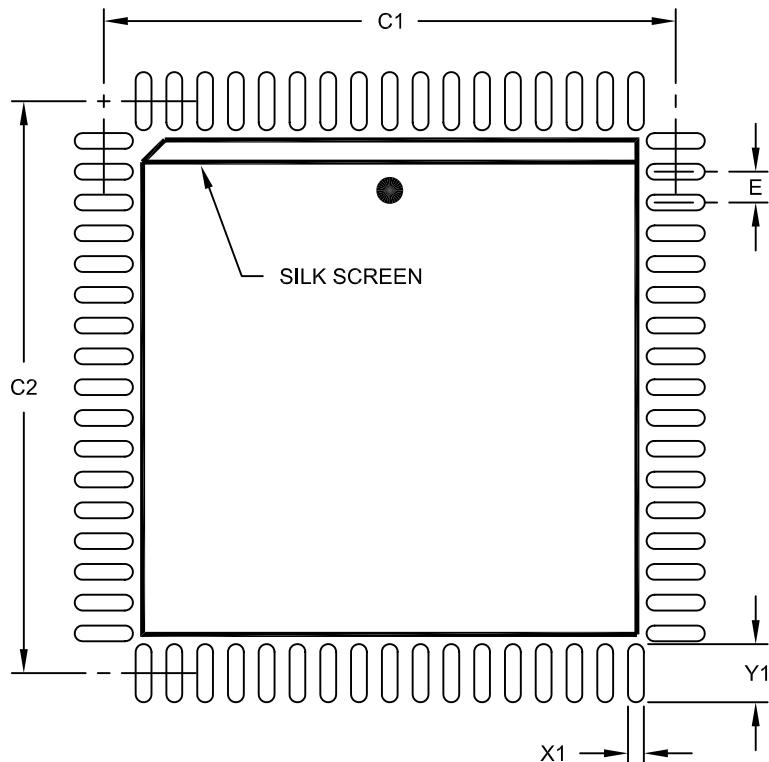
#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

## Land Pattern (Footprint)

68-Lead Plastic Leaded Chip Carrier (LS) - Square [PLCC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



### RECOMMENDED LAND PATTERN

Dimension	Limits	Units INCHES		
		MIN	NOM	MAX
Contact Pitch	E		.050 BSC	
Contact Pad Spacing	C1		.929	
Contact Pad Spacing	C2		.929	
Contact Pad Width (X68)	X1			.026
Contact Pad Length (X68)	Y1			.094

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

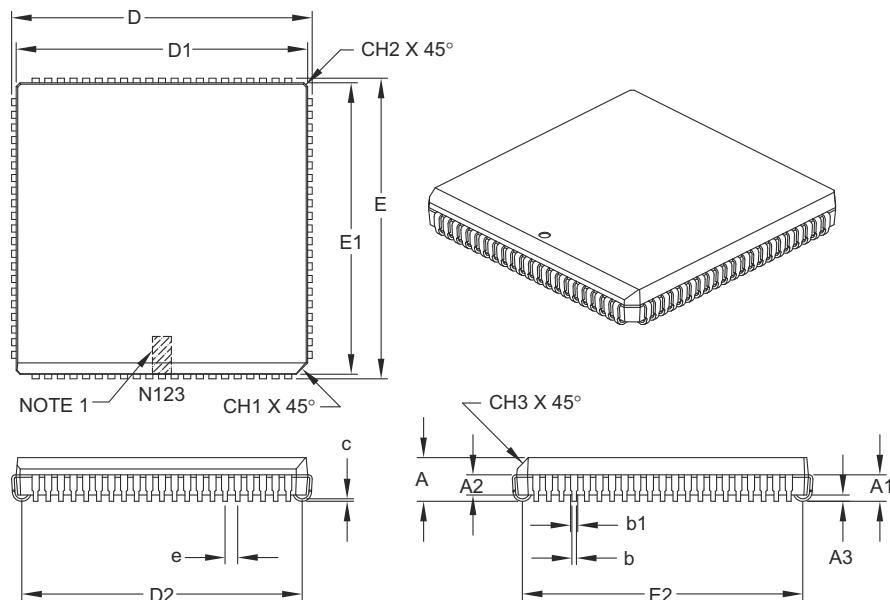
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2049A

## Packaging Diagrams and Parameters

### 84-Lead Plastic Leaded Chip Carrier (L) – Square [PLCC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		84	
Pitch	e		.050	
Overall Height	A	.165	.172	.200
Contact Height	A1	.090	.105	.130
Molded Package to Contact	A2	.059	—	.080
Standoff §	A3	.020	—	—
Corner Chamfer	CH1	.042	—	.048
Chamfers	CH2	—	—	.020
Side Chamfer	CH3	.042	—	.056
Overall Width	E	1.185	1.190	1.195
Overall Length	D	1.185	1.190	1.195
Molded Package Width	E1	1.150	1.154	1.158
Molded Package Length	D1	1.150	1.154	1.158
Footprint Width	E2	1.082	1.110	1.138
Footprint Length	D2	1.082	1.110	1.138
Lead Thickness	c	.0075	—	.0125
Upper Lead Width	b1	.026	—	.032
Lower Lead Width	b	.013	—	.021

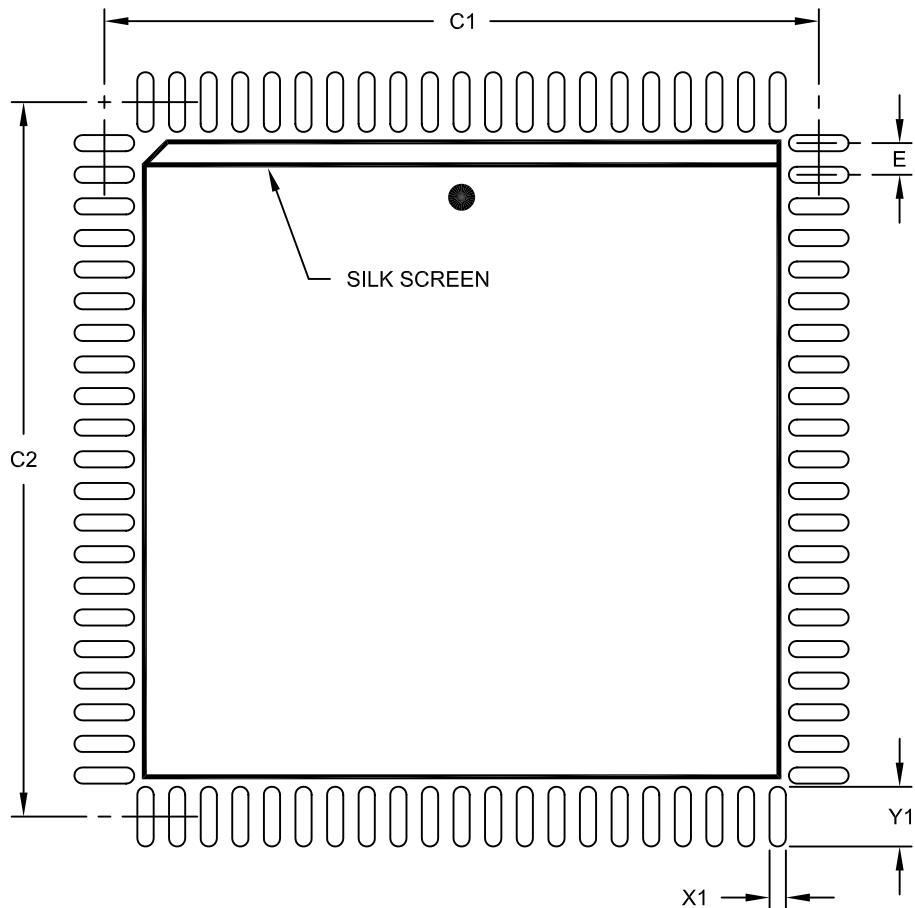
#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

## Land Pattern (Footprint)

84-Lead Plastic Leaded Chip Carrier (L) - Square [PLCC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



### RECOMMENDED LAND PATTERN

Units		INCHES		
Dimension	Limits	MIN	NOM	MAX
Contact Pitch	E		.050 BSC	
Contact Pad Spacing	C1		1.130	
Contact Pad Spacing	C2		1.130	
Contact Pad Width (X84)	X1			.026
Contact Pad Length (X84)	Y1			.094

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2093A

## Packaging Diagrams and Parameters

---

---

**NOTES:**

## Packaging Diagrams and Parameters

---

---

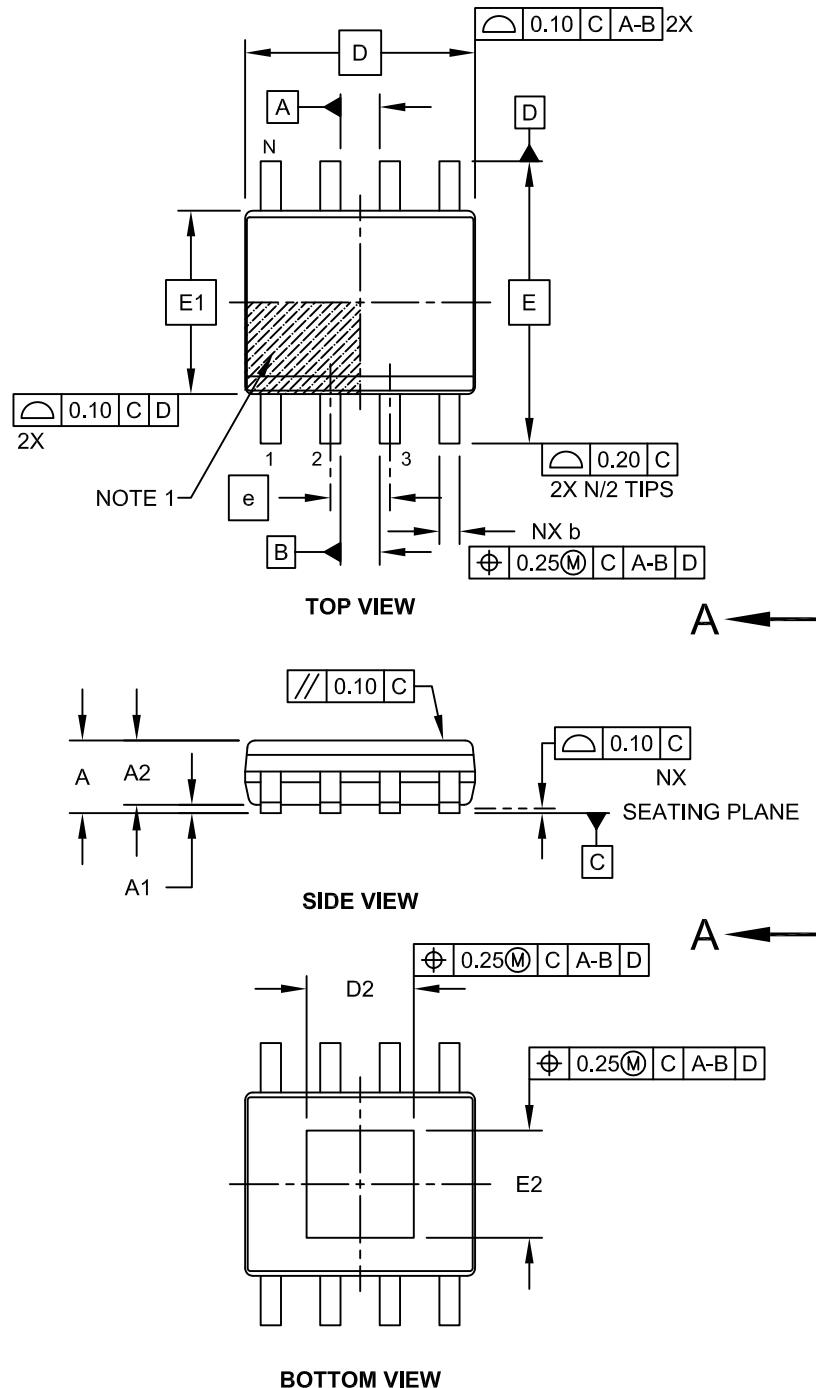
### SOP Family

#### Small Outline Packages

## Packaging Diagrams and Parameters

### 8-Lead Thermally Enhanced Plastic Small Outline (SE) - Narrow, 3.90 mm Body [SOP]

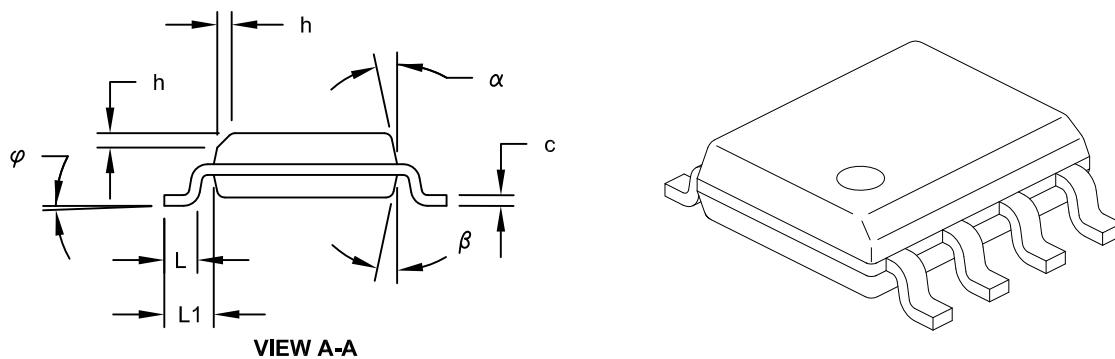
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 8-Lead Thermally Enhanced Plastic Small Outline (SE) - Narrow, 3.90 mm Body [SOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		8	
Pitch	e		1.27	
Overall Height	A	-	-	1.75
Molded Package Thickness	A2	1.25	-	-
Standoff §	A1	0.00	-	0.15
Overall Width	E	5.80	6.00	6.20
Molded Package Width	E1	3.80	3.90	4.00
Overall Length	D	4.70	4.90	5.10
Exposed Pad Width	E2	2.19	2.29	2.39
Exposed Pad Length	D2	2.19	2.29	2.39
Chamfer (Optional)	h	0.25	-	0.50
Foot Length	L	0.40	-	1.27
Footprint	L1	1.04	1.04	1.04
Foot Angle	φ	0°	-	8°
Lead Thickness	c	0.17	-	0.25
Lead Width	b	0.31	-	0.51
Mold Draft Angle Top	α	5°	-	15°
Mold Draft Angle Bottom	β	5°	-	15°

#### Notes:

- Pin 1 visual index feature may vary, but must be located within the hatched area.
- § Significant Characteristic
- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm per side.
- Dimensioning and tolerancing per ASME Y14.5M

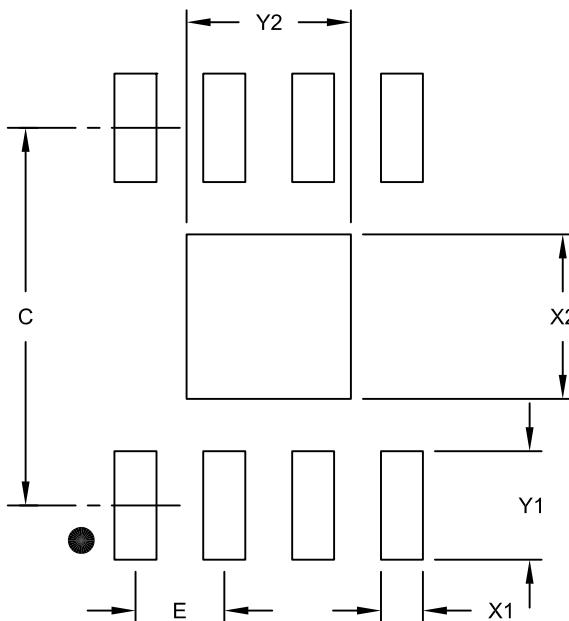
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

### 8-Lead Thermally Enhanced Plastic Small Outline (SE) - Narrow, 3.90 mm Body [SOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		1.27 BSC	
Contact Pad Spacing	C		5.40	
Contact Pad Width (X8)	X1		0.60	
Contact Pad Length (X8)	Y1		1.55	
Exposed Pad Width	X2		2.35	
Exposed Pad Length	Y2		2.35	

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2121A

## Packaging Diagrams and Parameters

---

---

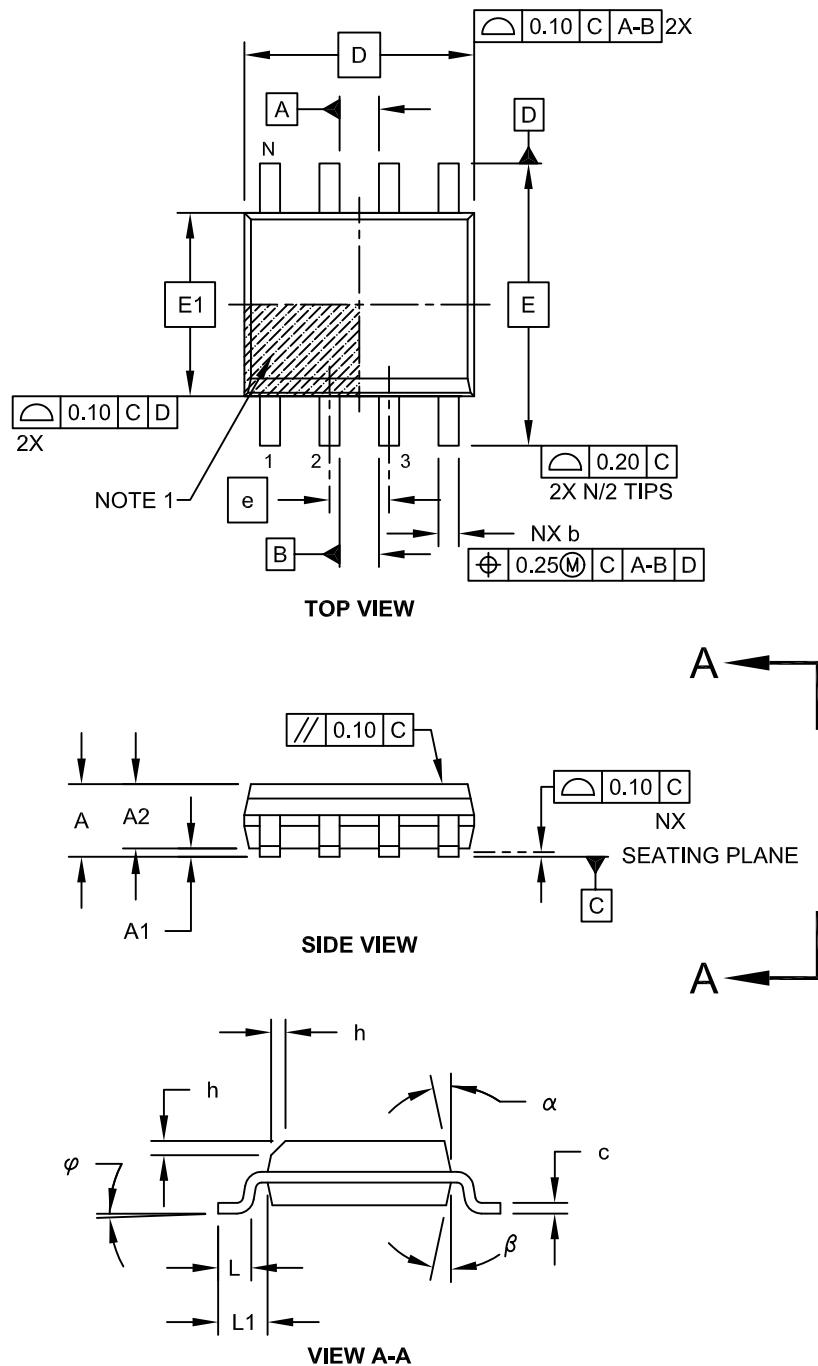
### **SOIC Family**

#### **Small Outline Plastic Packages**

## Packaging Diagrams and Parameters

### 8-Lead Plastic Small Outline (SN) - Narrow, 3.90 mm Body [SOIC]

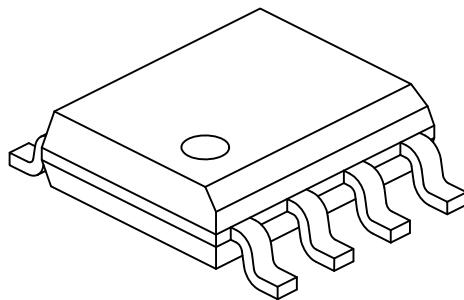
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 8-Lead Plastic Small Outline (SN) - Narrow, 3.90 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N			8	
Pitch	e			1.27 BSC	
Overall Height	A		-	-	1.75
Molded Package Thickness	A2		1.25	-	-
Standoff	§	A1	0.10	-	0.25
Overall Width	E			6.00 BSC	
Molded Package Width	E1			3.90 BSC	
Overall Length	D			4.90 BSC	
Chamfer (Optional)	h		0.25	-	0.50
Foot Length	L		0.40	-	1.27
Footprint	L1			1.04 REF	
Foot Angle	φ		0°	-	8°
Lead Thickness	c		0.17	-	0.25
Lead Width	b		0.31	-	0.51
Mold Draft Angle Top	α		5°	-	15°
Mold Draft Angle Bottom	β		5°	-	15°

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M

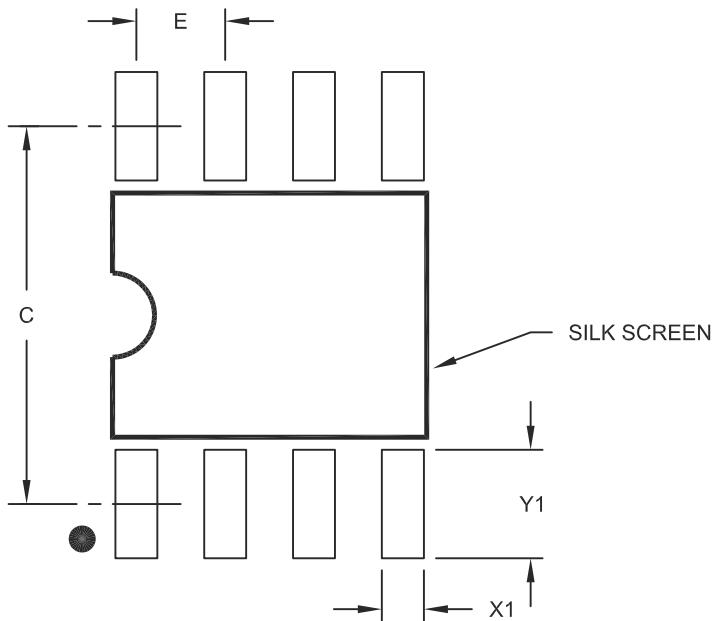
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

### 8-Lead Plastic Small Outline (SN) – Narrow, 3.90 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units			MILLIMETERS		
		Dimension Limits			MIN	NOM	MAX
Contact Pitch		E			1.27 BSC		
Contact Pad Spacing		C			5.40		
Contact Pad Width (X8)		X1			0.60		
Contact Pad Length (X8)		Y1			1.55		

Notes:

- Dimensioning and tolerancing per ASME Y14.5M

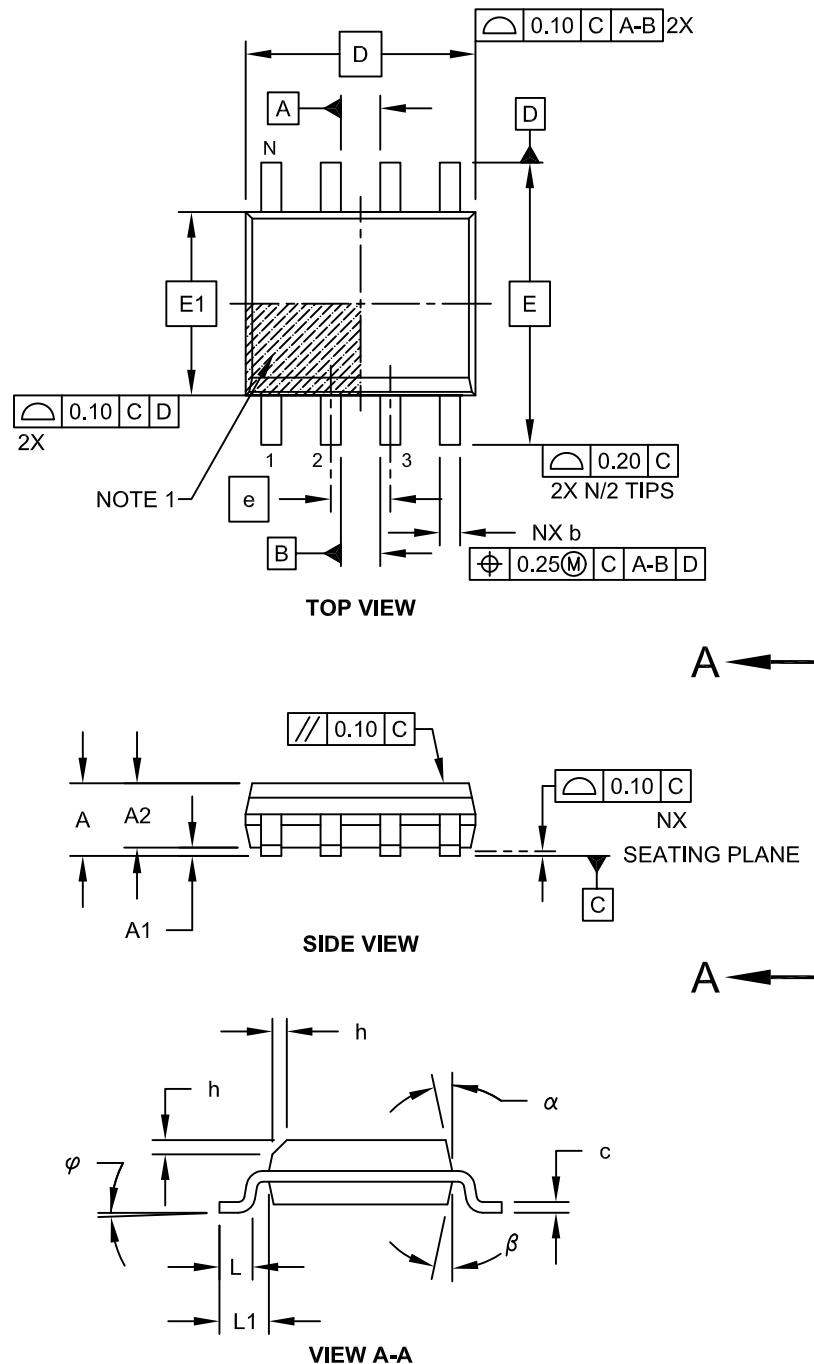
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2057A

## Packaging Diagrams and Parameters

### 8-Lead Plastic Small Outline (OA) - Narrow, 3.90 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

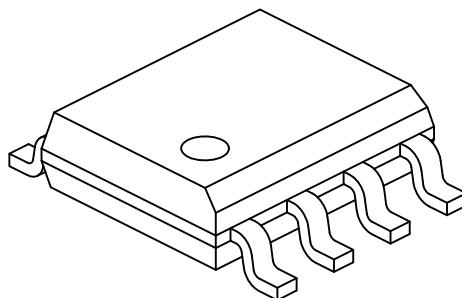


## Packaging Diagrams and Parameters

---

### 8-Lead Plastic Small Outline (OA) - Narrow, 3.90 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units			MILLIMETERS		
		Dimension Limits			MIN	NOM	MAX
Number of Pins	N				8		
Pitch	e				1.27	BSC	
Overall Height	A	-	-		1.75		
Molded Package Thickness	A2	1.25	-		-		
Standoff	§	A1	0.10	-	0.25		
Overall Width	E	6.00 BSC					
Molded Package Width	E1	3.90 BSC					
Overall Length	D	4.90 BSC					
Chamfer (Optional)	h	0.25	-		0.50		
Foot Length	L	0.40	-		1.27		
Footprint	L1	1.04 REF					
Foot Angle	φ	0°	-		8°		
Lead Thickness	c	0.17	-		0.25		
Lead Width	b	0.31	-		0.51		
Mold Draft Angle Top	α	5°	-		15°		
Mold Draft Angle Bottom	β	5°	-		15°		

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M

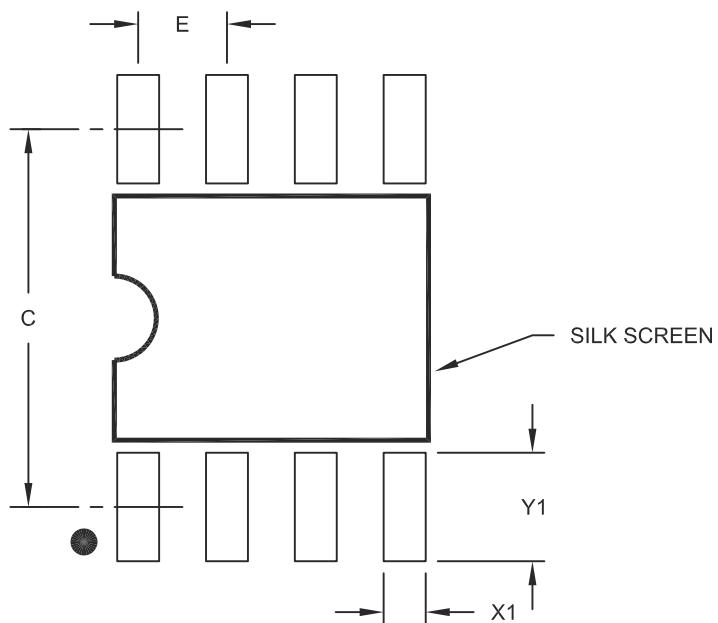
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

### 8-Lead Plastic Small Outline (OA) – Narrow, 3.90 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units			MILLIMETERS		
		Dimension Limits			MIN	NOM	MAX
Contact Pitch		E			1.27 BSC		
Contact Pad Spacing		C			5.40		
Contact Pad Width (X8)		X1			0.60		
Contact Pad Length (X8)		Y1			1.55		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

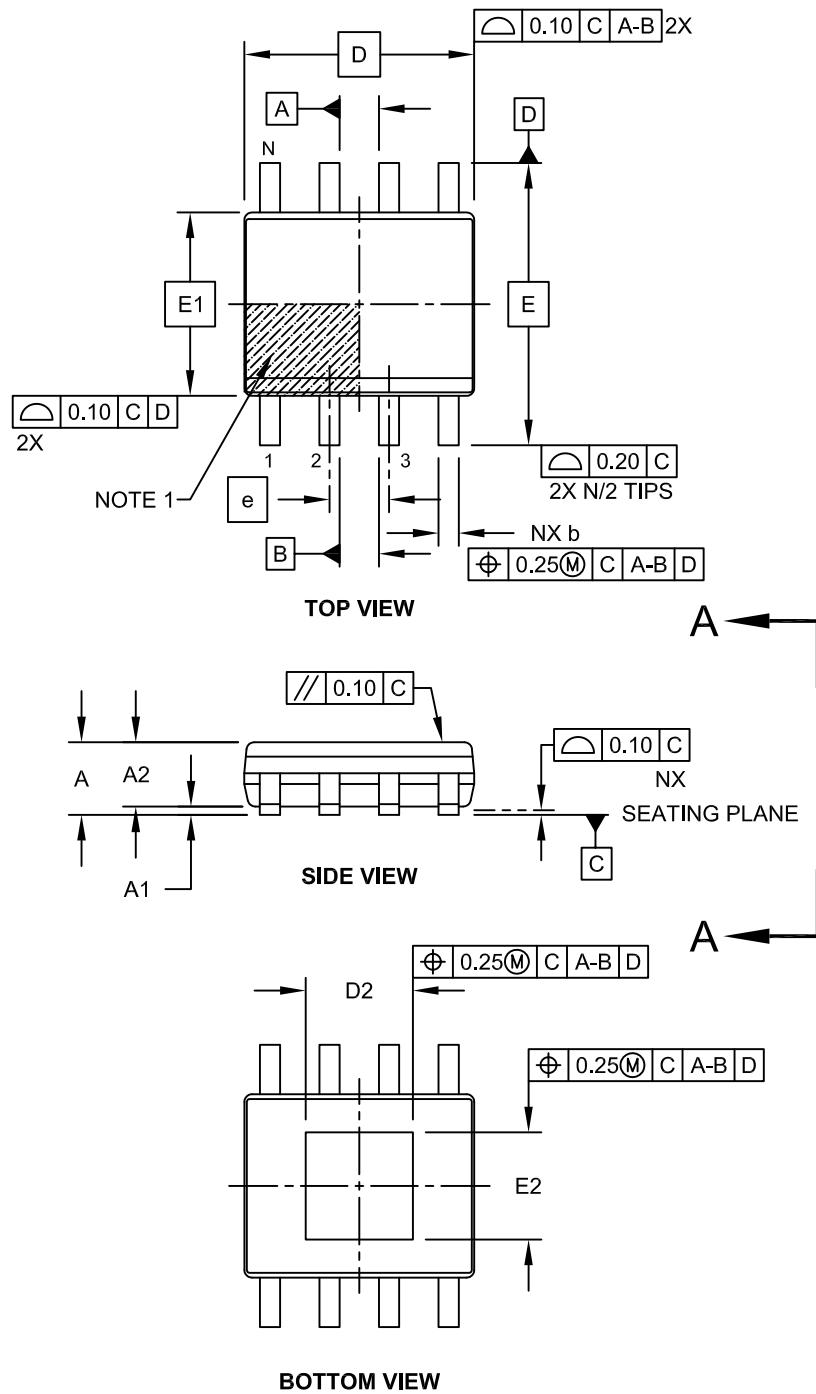
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2057A

# Packaging Diagrams and Parameters

## **8-Lead Thermally Enhanced Plastic Small Outline (SE) - Narrow, 3.90 mm Body [SOIC]**

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

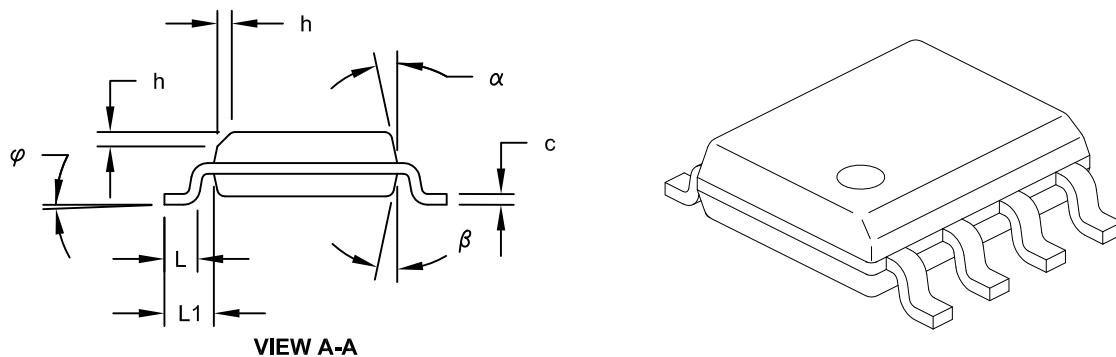


Microchip Technology Drawing No. C04-162B Sheet 1 of 2

## Packaging Diagrams and Parameters

### 8-Lead Thermally Enhanced Plastic Small Outline (SE) - Narrow, 3.90 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension	Limits	Units		
		MILLIMETERS		
Number of Pins	N		MIN	NOM
Pitch	e		1.27	BSC
Overall Height	A	-	-	1.75
Molded Package Thickness	A2	1.25	-	-
Standoff §	A1	0.10	-	0.15
Overall Width	E	6.00	BSC	
Molded Package Width	E1	3.90	BSC	
Overall Length	D	4.90	BSC	
Exposed Pad Width	E2	2.19	2.29	2.39
Exposed Pad Length	D2	2.19	2.29	2.39
Chamfer (Optional)	h	0.25	-	0.50
Foot Length	L	0.40	-	1.27
Footprint	L1	1.04	REF	
Foot Angle	φ	0°	-	8°
Lead Thickness	c	0.17	-	0.25
Lead Width	b	0.31	-	0.51
Mold Draft Angle Top	α	5°	-	15°
Mold Draft Angle Bottom	β	5°	-	15°

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.

2. § Significant Characteristic

3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm per side.

4. Dimensioning and tolerancing per ASME Y14.5M

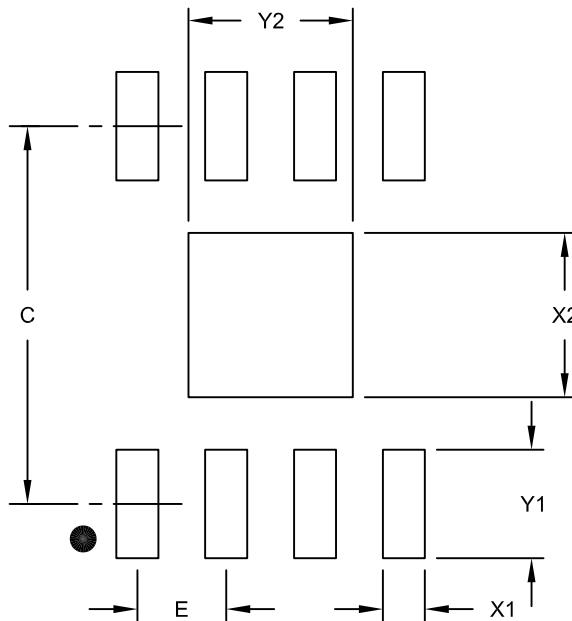
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

### 8-Lead Thermally Enhanced Plastic Small Outline (SE) - Narrow, 3.90 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		1.27 BSC	
Contact Pad Spacing	C		5.40	
Contact Pad Width (X8)	X1			0.60
Contact Pad Length (X8)	Y1			1.55
Exposed Pad Width	X2			2.35
Exposed Pad Length	Y2			2.35

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

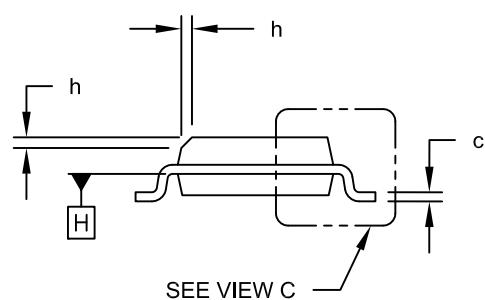
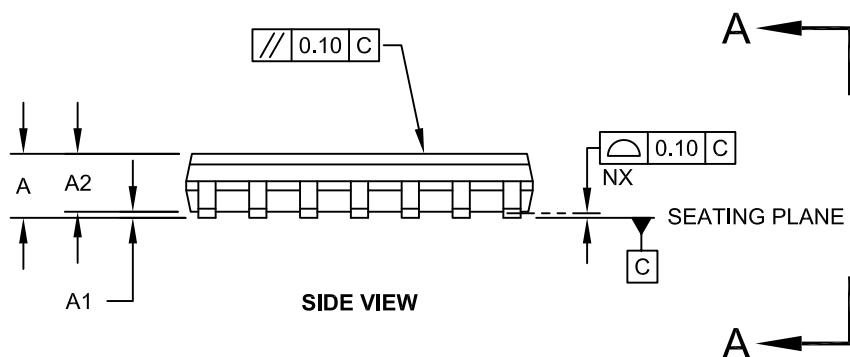
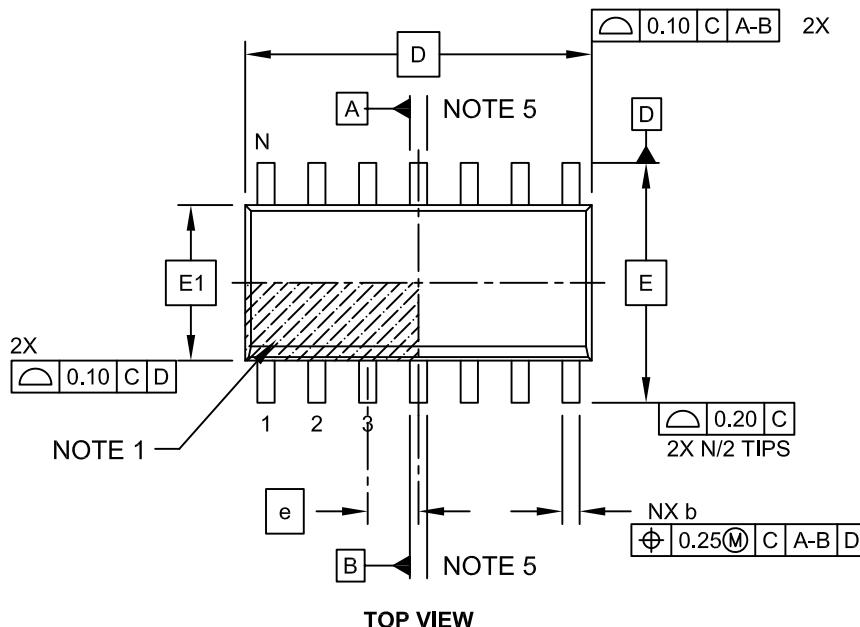
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2162A

## Packaging Diagrams and Parameters

### 14-Lead Plastic Small Outline (SL) - Narrow, 3.90 mm Body [SOIC]

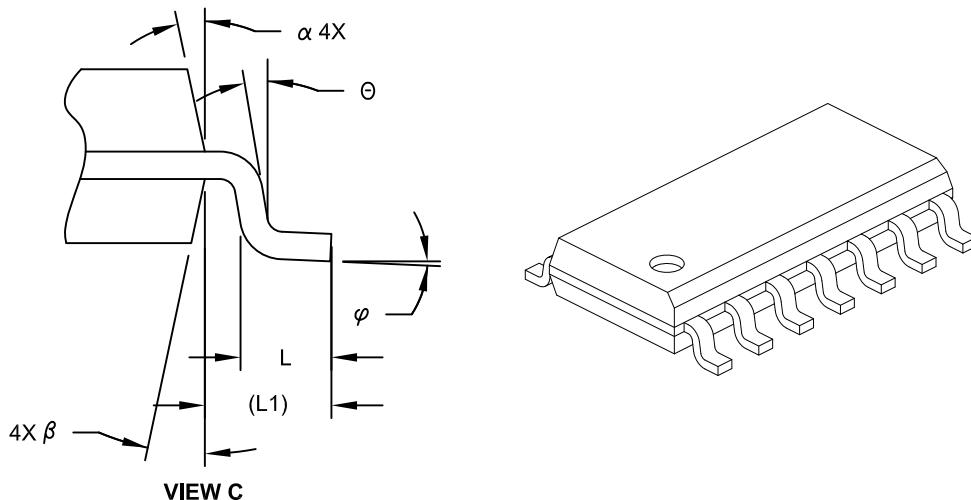
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 14-Lead Plastic Small Outline (SL) - Narrow, 3.90 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		14		
Pitch	e		1.27	BSC	
Overall Height	A	-	-	1.75	
Molded Package Thickness	A2	1.25			
Standoff §	A1	0.10			0.25
Overall Width	E	6.00	BSC		
Molded Package Width	E1	3.90	BSC		
Overall Length	D	8.65	BSC		
Chamfer (Optional)	h	0.25		-	0.50
Foot Length	L	0.40		-	1.27
Footprint	L1	1.04	REF		
Lead Angle	θ	0°		-	-
Foot Angle	φ	0°		-	8°
Lead Thickness	c	0.10		-	0.25
Lead Width	b	0.31		-	0.51
Mold Draft Angle Top	α	5°		-	15°
Mold Draft Angle Bottom	β	5°		-	15°

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimension D does not include mold flash, protrusions or gate burrs, which shall not exceed 0.15 mm per end. Dimension E1 does not include interlead flash or protrusion, which shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

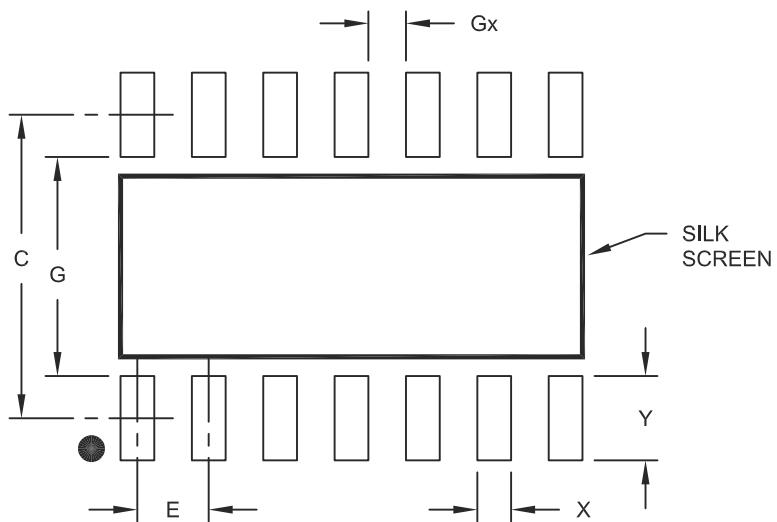
REF: Reference Dimension, usually without tolerance, for information purposes only.

5. Datums A & B to be determined at Datum H.

## Land Pattern (Footprint)

14-Lead Plastic Small Outline (SL) - Narrow, 3.90 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		1.27	BSC
Contact Pad Spacing	C		5.40	
Contact Pad Width	X			0.60
Contact Pad Length	Y			1.50
Distance Between Pads	Gx	0.67		
Distance Between Pads	G	3.90		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

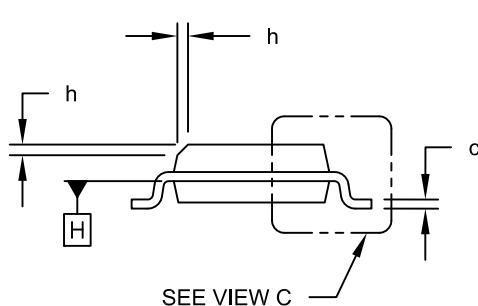
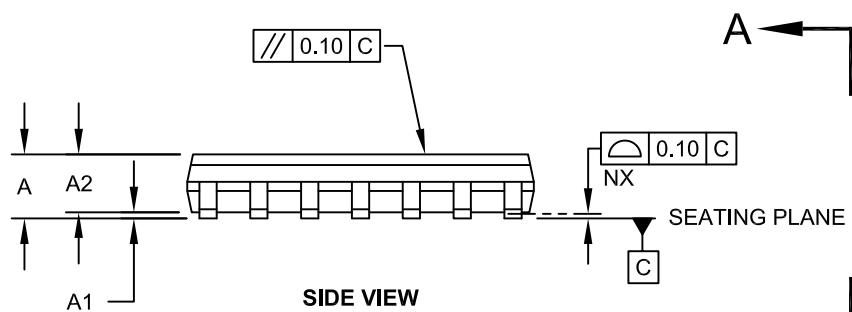
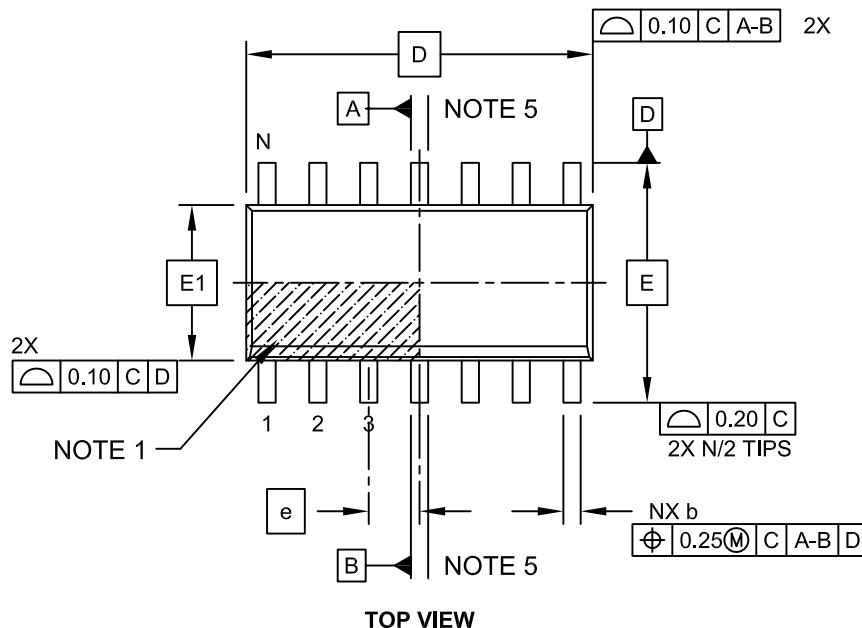
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2065A

## Packaging Diagrams and Parameters

### 14-Lead Plastic Small Outline (OD) - Narrow, 3.90 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



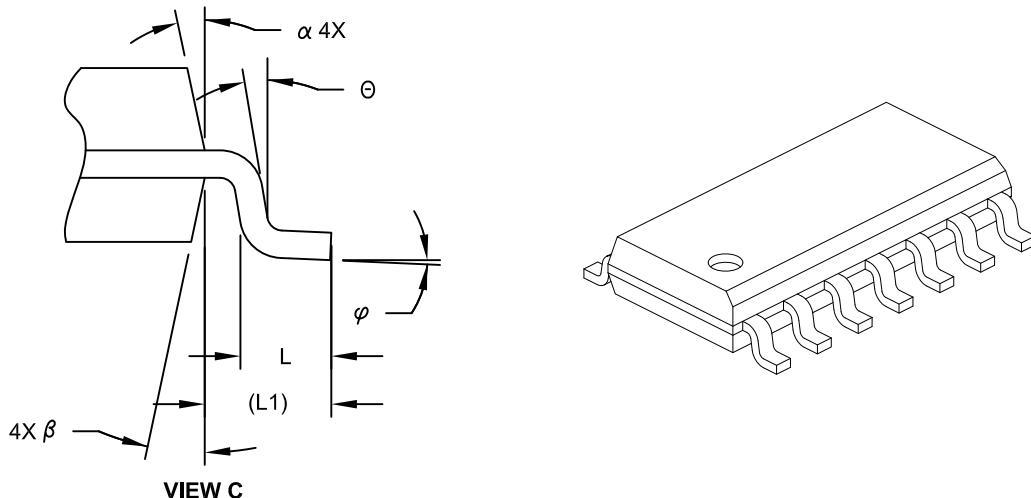
VIEW A-A

Microchip Technology Drawing No. C04-065C Sheet 1 of 2

## Packaging Diagrams and Parameters

### 14-Lead Plastic Small Outline (OD) - Narrow, 3.90 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
		Dimension Limits	MIN	NOM	MAX
Number of Pins	N			14	
Pitch	e		1.27	BSC	
Overall Height	A		-	-	1.75
Molded Package Thickness	A2		1.25	-	-
Standoff	§	A1	0.10	-	0.25
Overall Width	E		6.00	BSC	
Molded Package Width	E1		3.90	BSC	
Overall Length	D		8.65	BSC	
Chamfer (Optional)	h		0.25	-	0.50
Foot Length	L		0.40	-	1.27
Footprint	L1		1.04	REF	
Lead Angle	θ		0°	-	-
Foot Angle	φ		0°	-	8°
Lead Thickness	c		0.10	-	0.25
Lead Width	b		0.31	-	0.51
Mold Draft Angle Top	α		5°	-	15°
Mold Draft Angle Bottom	β		5°	-	15°

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimension D does not include mold flash, protrusions or gate burrs, which shall not exceed 0.15 mm per end. Dimension E1 does not include interlead flash or protrusion, which shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

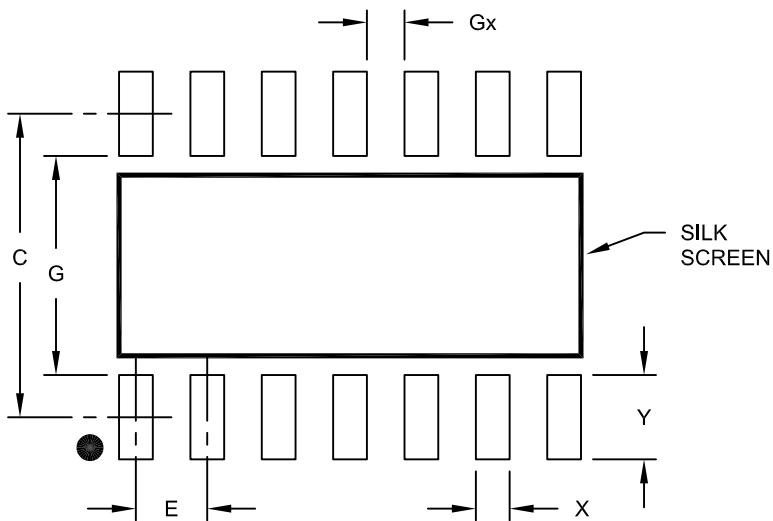
REF: Reference Dimension, usually without tolerance, for information purposes only.

5. Datums A & B to be determined at Datum H.

## Land Pattern (Footprint)

### 14-Lead Plastic Small Outline (OD) – Narrow, 3.90 mm Body [SOIC] Land Pattern

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units	MILLIMETERS		
		Dimension Limits	MIN	NOM	MAX
Contact Pitch		E	1.27 BSC		
Contact Pad Spacing	C		5.40		
Contact Pad Width	X			0.60	
Contact Pad Length	Y				1.50
Distance Between Pads	Gx	0.67			
Distance Between Pads	G	3.90			

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

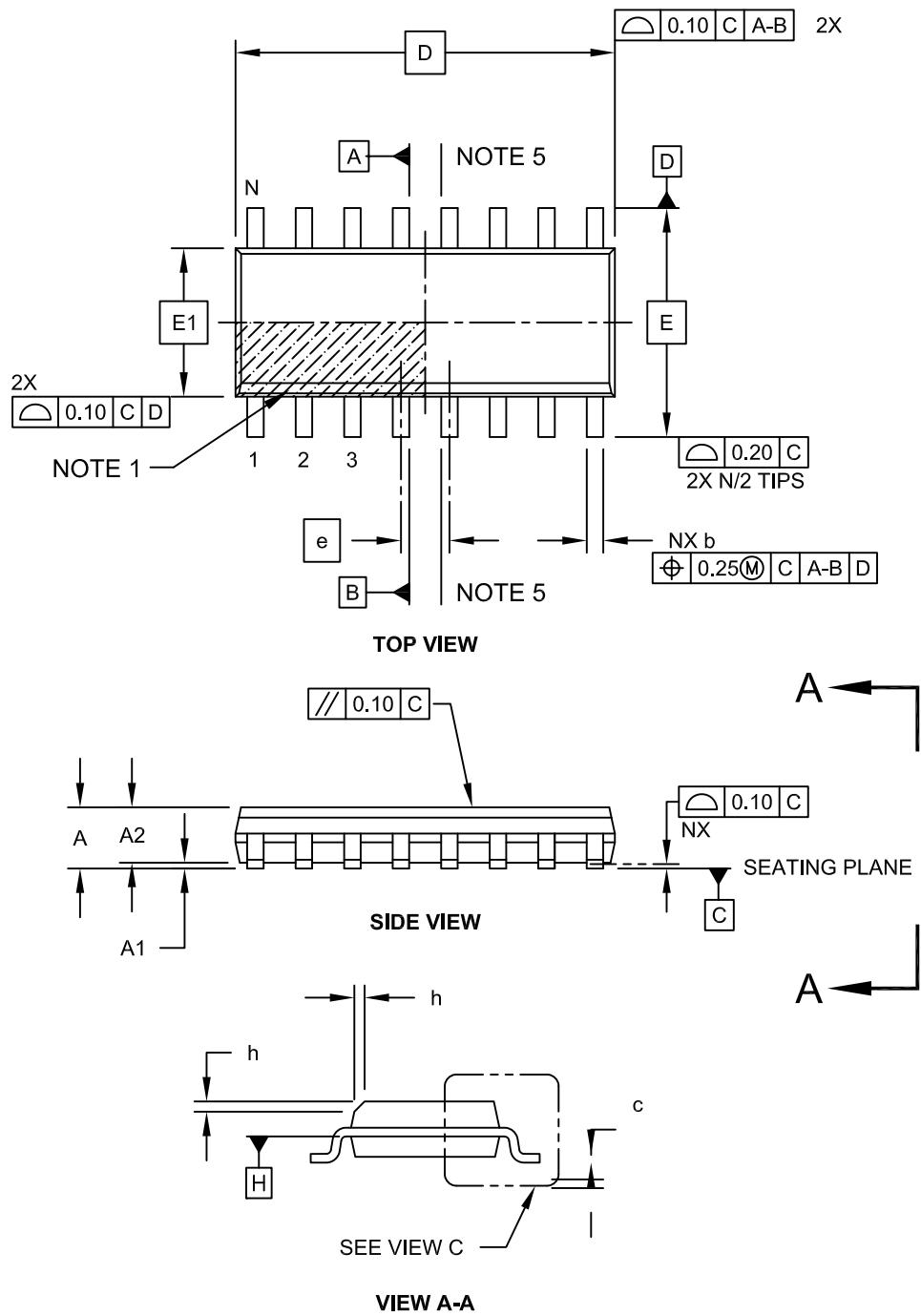
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2065A

## Packaging Diagrams and Parameters

### 16-Lead Plastic Small Outline (SL) - Narrow, 3.90 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

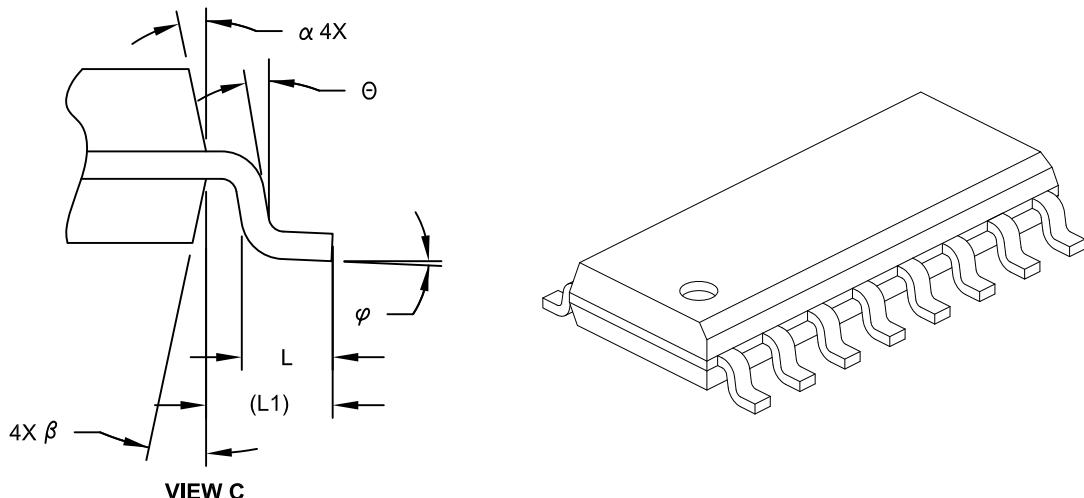


Microchip Technology Drawing No. C04-108C Sheet 1 of 2

## Packaging Diagrams and Parameters

### 16-Lead Plastic Small Outline (SL) - Narrow, 3.90 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		16		
Pitch	e		1.27	BSC	
Overall Height	A	-	-	1.75	
Molded Package Thickness	A2	1.25	-	-	
Standoff §	A1	0.10	-	0.25	
Overall Width	E	6.00	BSC		
Molded Package Width	E1	3.90	BSC		
Overall Length	D	9.90	BSC		
Chamfer (Optional)	h	0.25	-	0.50	
Foot Length	L	0.40	-	1.27	
Footprint	L1	1.04 REF			
Lead Angle	θ	0°	-	-	
Foot Angle	φ	0°	-	8°	
Lead Thickness	c	0.10	-	0.25	
Lead Width	b	0.31	-	0.51	
Mold Draft Angle Top	α	5°	-	15°	
Mold Draft Angle Bottom	β	5°	-	15°	

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimension D does not include mold flash, protrusions or gate burrs, which shall not exceed 0.15 mm per end. Dimension E1 does not include interlead flash or protrusion, which shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

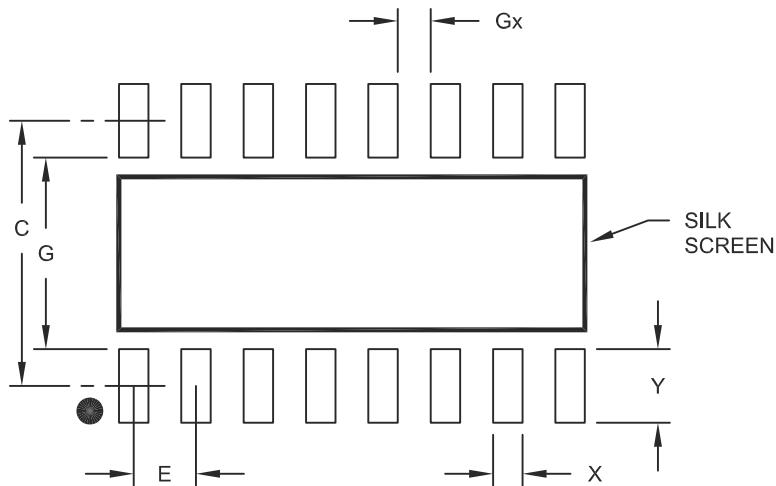
5. Datums A & B to be determined at Datum H.

Microchip Technology Drawing No. C04-108C Sheet 2 of 2

## Land Pattern (Footprint)

16-Lead Plastic Small Outline (SL) - Narrow, 3.90 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units			MILLIMETERS		
		Dimension Limits			MIN	NOM	MAX
Contact Pitch	E				1.27	BSC	
Contact Pad Spacing	C				5.40		
Contact Pad Width	X				0.60		
Contact Pad Length	Y				1.50		
Distance Between Pads	Gx	0.67					
Distance Between Pads	G	3.90					

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

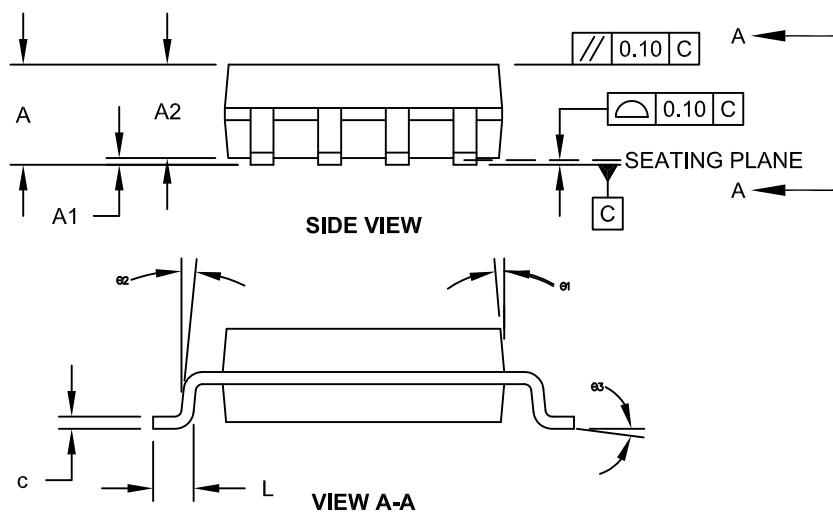
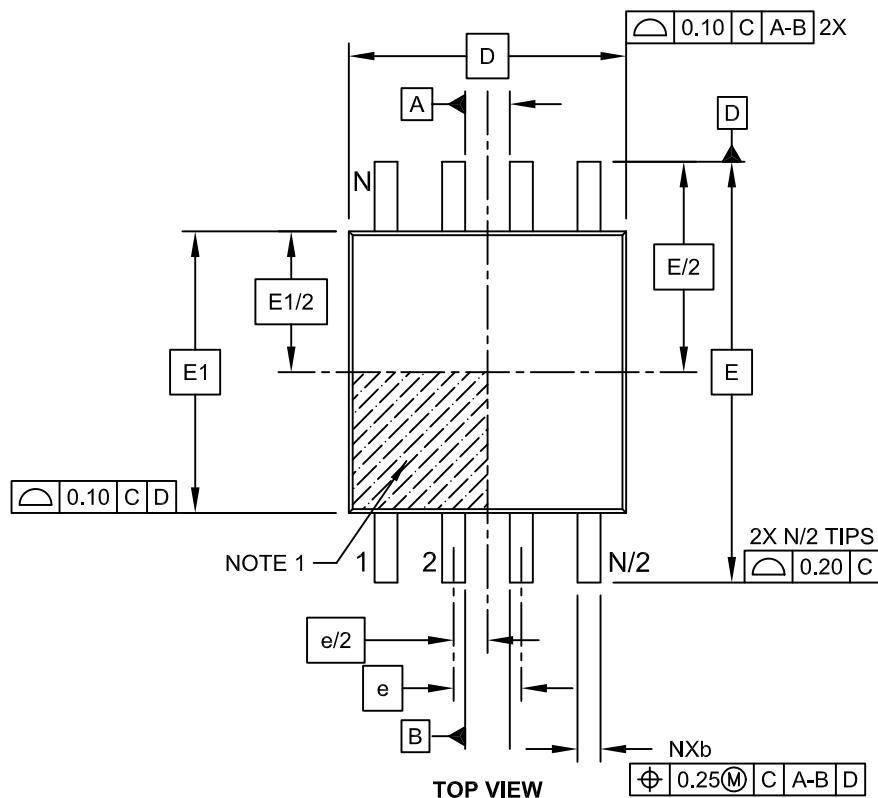
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2108A

## Packaging Diagrams and Parameters

### 8-Lead Plastic Small Outline (SM) - Medium, 5.28 mm Body [SOIJ]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

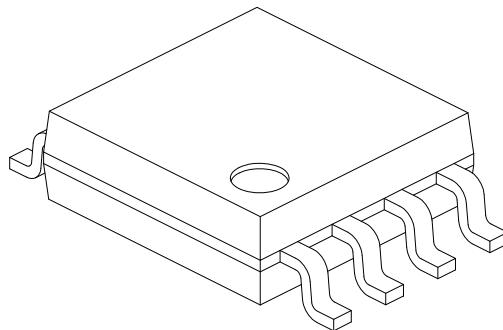


## Packaging Diagrams and Parameters

---

### 8-Lead Plastic Small Outline (SM) - Medium, 5.28 mm Body [SOIJ]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		8		
Pitch	e		1.27	BSC	
Overall Height	A	1.77	-	2.03	
Standoff §	A1	0.05		0.25	
Molded Package Thickness	A2	1.75	-	1.98	
Overall Width	E		7.94	BSC	
Molded Package Width	E1		5.25	BSC	
Overall Length	D		5.26	BSC	
Foot Length	L	0.51	-	0.76	
Lead Thickness	c	0.15	-	0.25	
Lead Width	b	0.36	-	0.51	
Mold Draft Angle	Θ1	-	-	15°	
Lead Angle	Θ2	0°	-	8°	
Foot Angle	Θ3	0°	-	8°	

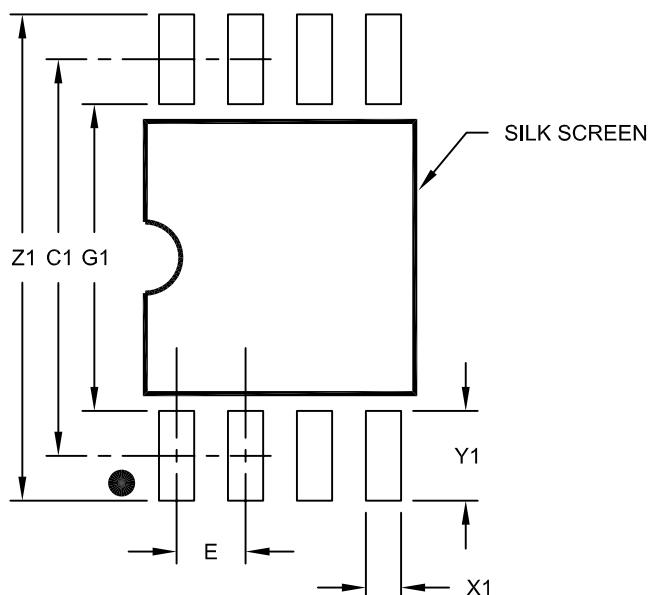
Notes:

1. SOIJ, JEITA/EIAJ Standard, Formerly called SOIC
2. § Significant Characteristic
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25mm per side.

## Land Pattern (Footprint)

8-Lead Plastic Small Outline (SM) - Medium, 5.28 mm Body [SOIJ]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch		E      1.27 BSC		
Overall Width	Z1			9.00
Contact Pad Spacing	C1		7.30	
Contact Pad Width (X8)	X1			0.65
Contact Pad Length (X8)	Y1			1.70
Distance Between Pads	G1	5.60		
Distance Between Pads	G	0.62		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

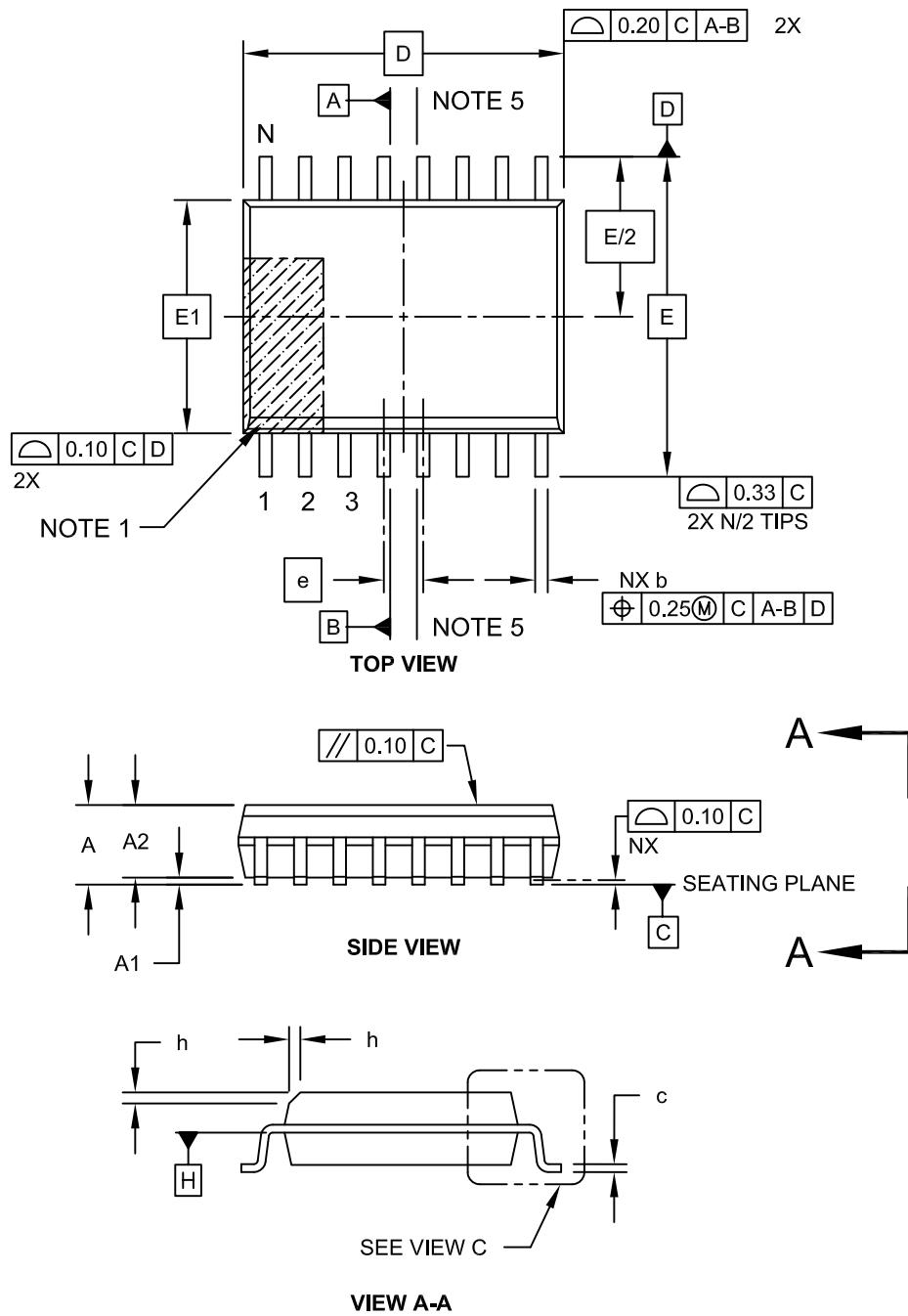
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2056C

# Packaging Diagrams and Parameters

## 16-Lead Plastic Small Outline (SO) - Wide, 7.50 mm Body [SOIC]

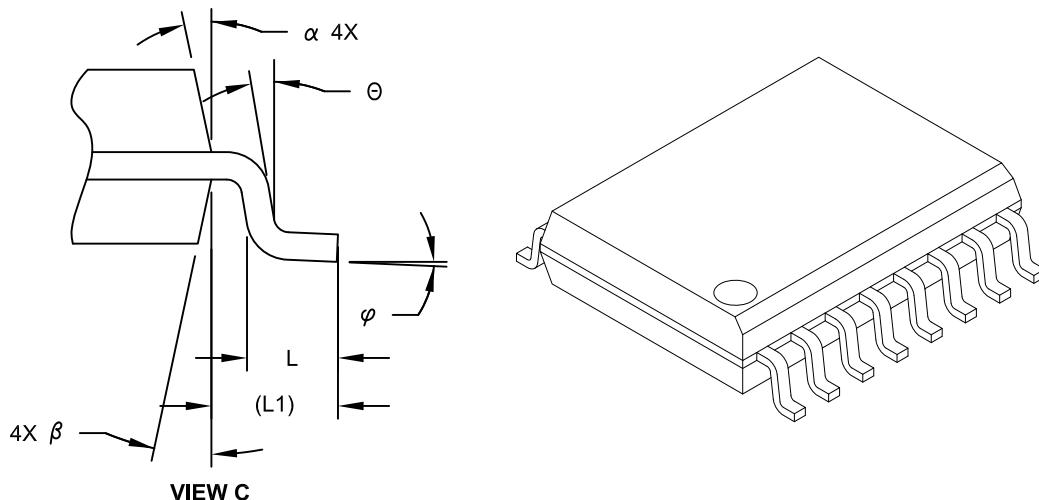
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 16-Lead Plastic Small Outline (SO) - Wide, 7.50 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		16		
Pitch	e		1.27 BSC		
Overall Height	A		-	-	2.65
Molded Package Thickness	A2	2.05	-	-	-
Standoff	§	A1	0.10	-	0.30
Overall Width	E		10.30 BSC		
Molded Package Width	E1		7.50 BSC		
Overall Length	D		10.30 BSC		
Chamfer (Optional)	h	0.25	-	0.75	
Foot Length	L	0.40	-	1.27	
Footprint	L1		1.40 REF		
Lead Angle	θ	0°	-	-	-
Foot Angle	φ	0°	-	8°	
Lead Thickness	c	0.20	-	0.33	
Lead Width	b	0.31	-	0.51	
Mold Draft Angle Top	α	5°	-	15°	
Mold Draft Angle Bottom	β	5°	-	15°	

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimension D does not include mold flash, protrusions or gate burrs, which shall not exceed 0.15 mm per end. Dimension E1 does not include interlead flash or protrusion, which shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

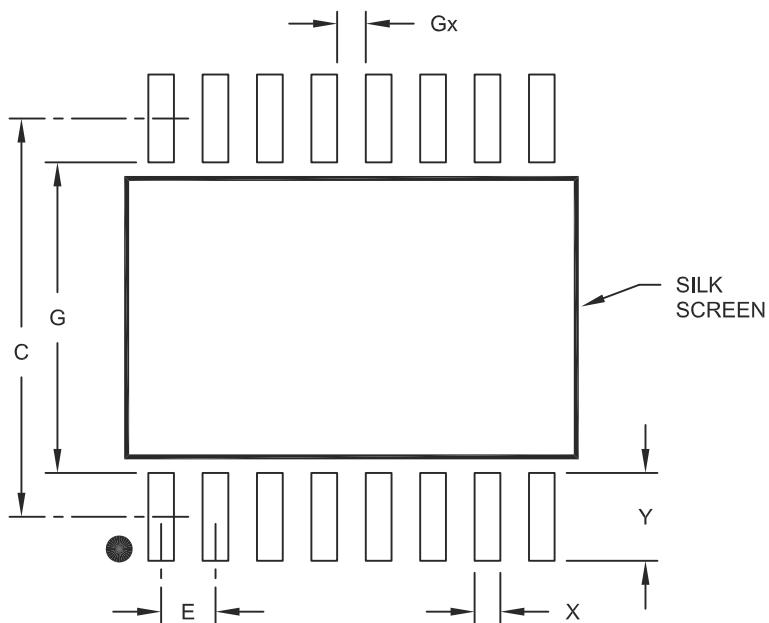
REF: Reference Dimension, usually without tolerance, for information purposes only.

5. Datums A & B to be determined at Datum H.

## Land Pattern (Footprint)

### 16-Lead Plastic Small Outline (SO) – Wide, 7.50 mm Body [SOIC] Land Pattern

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E		1.27	BSC	
Contact Pad Spacing	C		9.30		
Contact Pad Width	X			0.60	
Contact Pad Length	Y				2.05
Distance Between Pads	Gx	0.67			
Distance Between Pads	G	7.25			

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

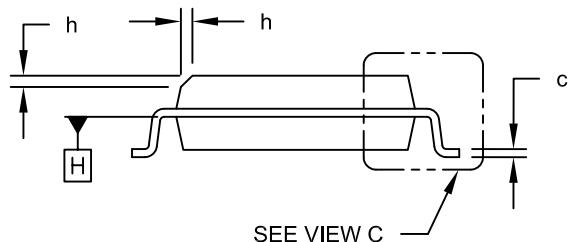
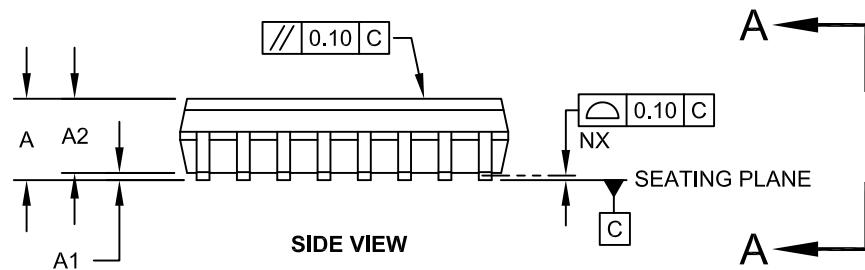
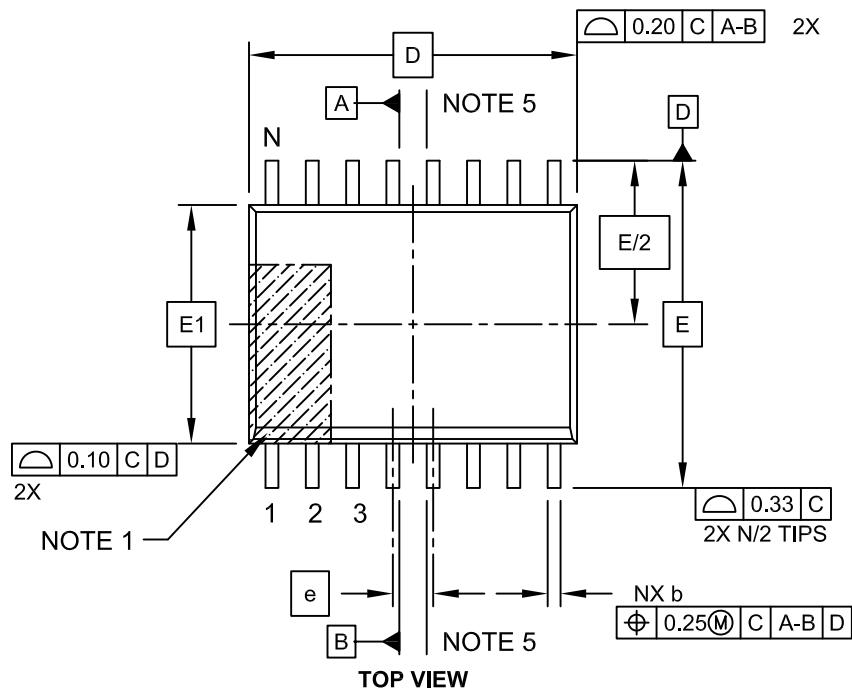
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2102A

## Packaging Diagrams and Parameters

### 16-Lead Plastic Small Outline (OE) - Wide, 7.50 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

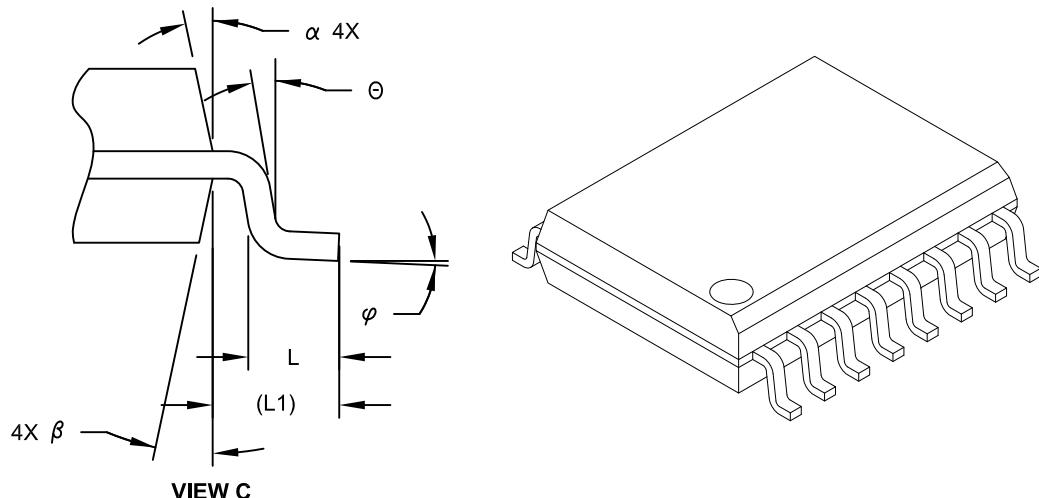


VIEW A-A

## Packaging Diagrams and Parameters

### 16-Lead Plastic Small Outline (OE) - Wide, 7.50 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		16	
Pitch	e		1.27 BSC	
Overall Height	A	-	-	2.65
Molded Package Thickness	A2	2.05	-	-
Standoff	§	A1	0.10	-
Overall Width	E		10.30 BSC	
Molded Package Width	E1		7.50 BSC	
Overall Length	D		10.30 BSC	
Chamfer (Optional)	h	0.25	-	0.75
Foot Length	L	0.40	-	1.27
Footprint	L1		1.40 REF	
Lead Angle	Θ	0°	-	-
Foot Angle	φ	0°	-	8°
Lead Thickness	c	0.20	-	0.33
Lead Width	b	0.31	-	0.51
Mold Draft Angle Top	α	5°	-	15°
Mold Draft Angle Bottom	β	5°	-	15°

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimension D does not include mold flash, protrusions or gate burrs, which shall not exceed 0.15 mm per end. Dimension E1 does not include interlead flash or protrusion, which shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

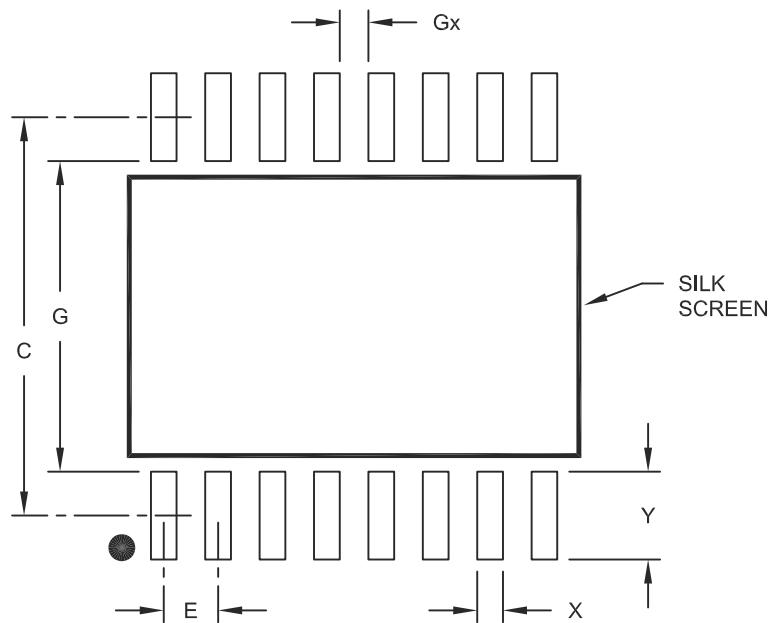
REF: Reference Dimension, usually without tolerance, for information purposes only.

5. Datums A & B to be determined at Datum H.

## Land Pattern (Footprint)

### 16-Lead Plastic Small Outline (OE) – Wide, 7.50 mm Body [SOIC] Land Pattern

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		1.27	BSC
Contact Pad Spacing	C		9.30	
Contact Pad Width	X			0.60
Contact Pad Length	Y			2.05
Distance Between Pads	Gx	0.67		
Distance Between Pads	G	7.25		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

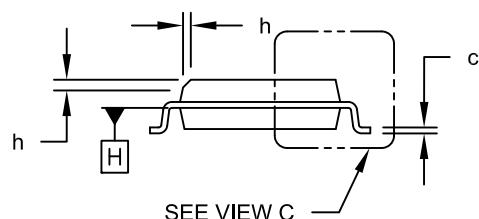
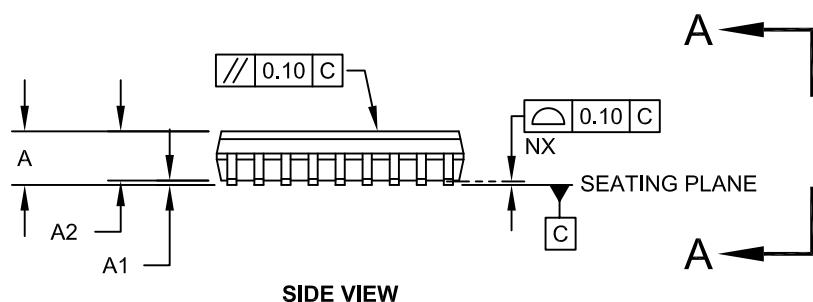
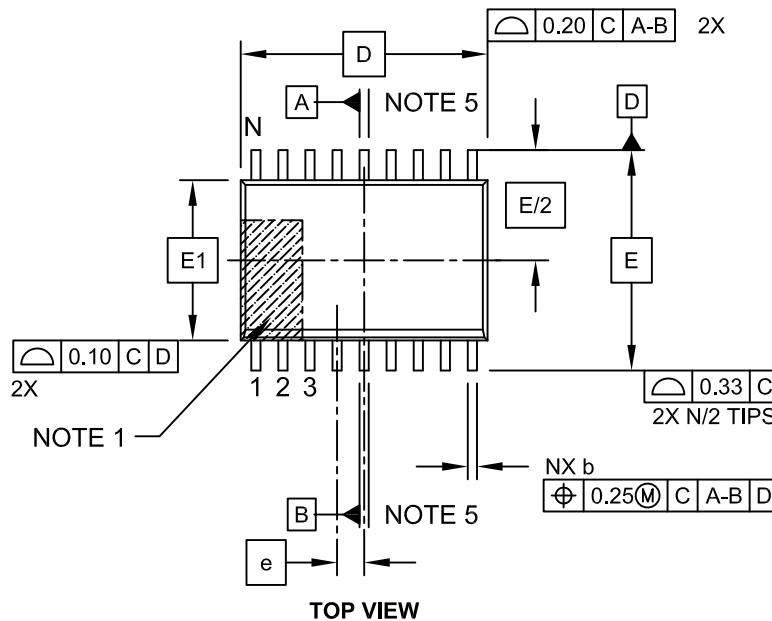
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2102A

## Packaging Diagrams and Parameters

### 18-Lead Plastic Small Outline (SO) - Wide, 7.50 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

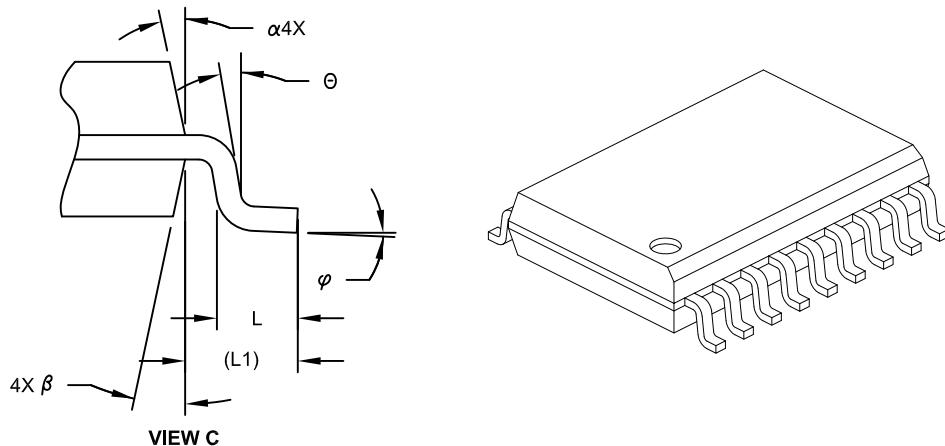


VIEW A-A

## Packaging Diagrams and Parameters

### 18-Lead Plastic Small Outline (SO) - Wide, 7.50 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N	18		
Pitch	e	1.27	BSC	
Overall Height	A	-	-	2.65
Molded Package Thickness	A2	2.05	-	-
Standoff	§	0.10	-	0.30
Overall Width	E	10.30	BSC	
Molded Package Width	E1	7.50	BSC	
Overall Length	D	11.55	BSC	
Chamfer (Optional)	h	0.25	-	0.75
Foot Length	L	0.40	-	1.27
Footprint	L1	1.40 REF		
Lead Angle	θ	0°	-	-
Foot Angle	φ	0°	-	8°
Lead Thickness	c	0.20	-	0.33
Lead Width	b	0.31	-	0.51
Mold Draft Angle Top	α	5°	-	15°
Mold Draft Angle Bottom	β	5°	-	15°

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.

2. § Significant Characteristic

3. Dimension D does not include mold flash, protrusions or gate burrs, which shall not exceed 0.15 mm per end. Dimension E1 does not include interlead flash or protrusion, which shall not exceed 0.25 mm per side.

4. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

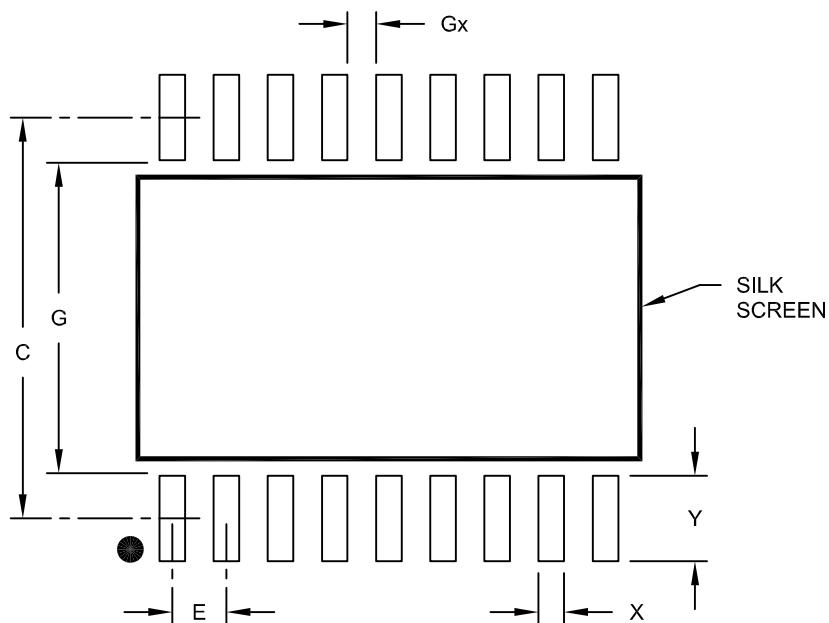
REF: Reference Dimension, usually without tolerance, for information purposes only.

5. Datums A & B to be determined at Datum H.

## Land Pattern (Footprint)

18-Lead Plastic Small Outline (SO) - Wide, 7.50 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Dimension	Limits	UNITS MILLIMETERS		
		MIN	NOM	MAX
Contact Pitch	E		1.27	BSC
Contact Pad Spacing	C		9.40	
Contact Pad Width	X			0.60
Contact Pad Length	Y			2.00
Distance Between Pads	Gx	0.67		
Distance Between Pads	G	7.40		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

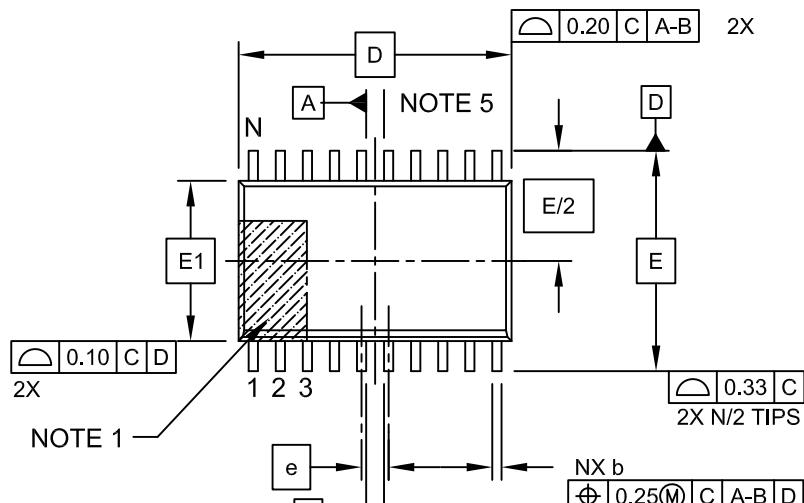
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2051A

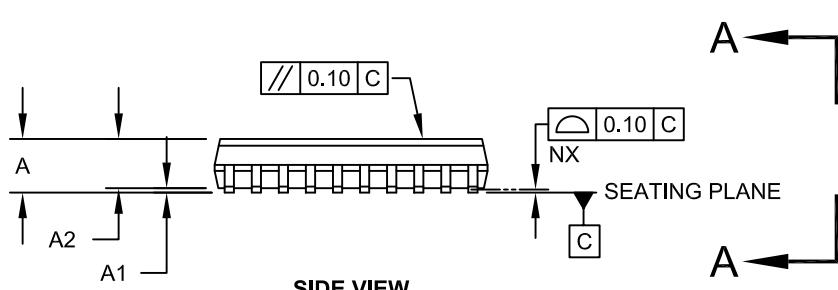
## Packaging Diagrams and Parameters

### 20-Lead Plastic Small Outline (SO) - Wide, 7.50 mm Body [SOIC]

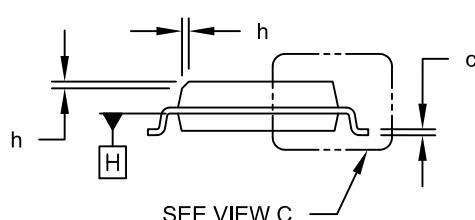
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



TOP VIEW



SIDE VIEW

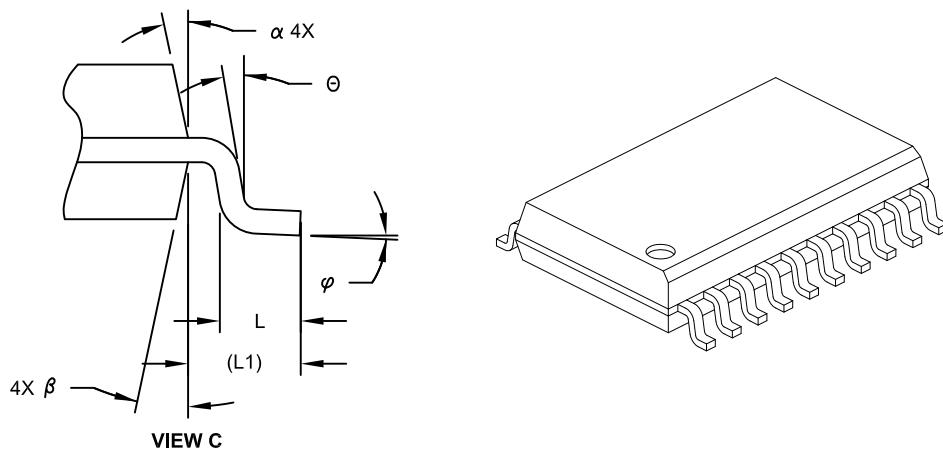


VIEW A-A

## Packaging Diagrams and Parameters

### 20-Lead Plastic Small Outline (SO) - Wide, 7.50 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Number of Pins	N	20		
Pitch	e	1.27 BSC		
Overall Height	A	-	-	2.65
Molded Package Thickness	A2	2.05	-	-
Standoff	§	A1	0.10	-
Overall Width	E	10.30 BSC		
Molded Package Width	E1	7.50 BSC		
Overall Length	D	12.80 BSC		
Chamfer (Optional)	h	0.25	-	0.75
Foot Length	L	0.40	-	1.27
Footprint	L1	1.40 REF		
Lead Angle	Θ	0°	-	-
Foot Angle	φ	0°	-	8°
Lead Thickness	c	0.20	-	0.33
Lead Width	b	0.31	-	0.51
Mold Draft Angle Top	α	5°	-	15°
Mold Draft Angle Bottom	β	5°	-	15°

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimension D does not include mold flash, protrusions or gate burrs, which shall not exceed 0.15 mm per end. Dimension E1 does not include interlead flash or protrusion, which shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

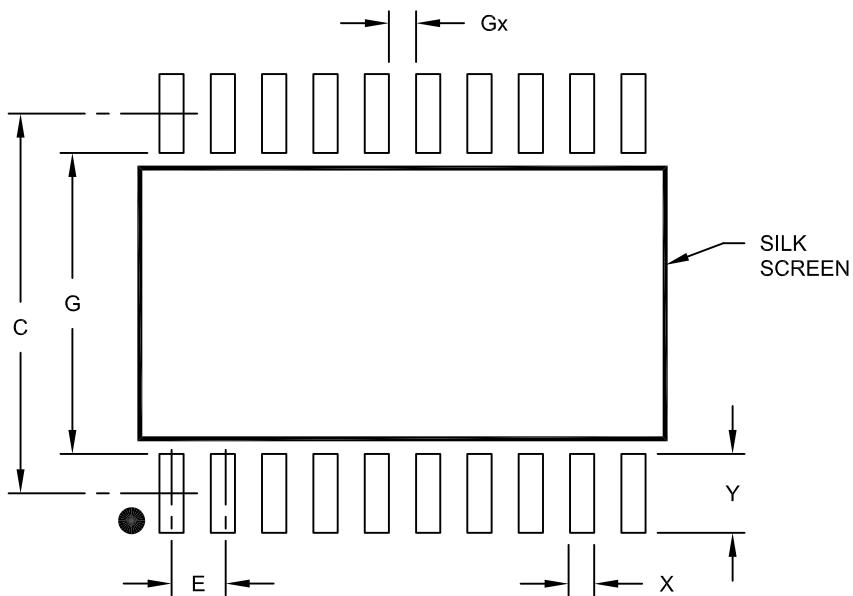
REF: Reference Dimension, usually without tolerance, for information purposes only.

5. Datums A & B to be determined at Datum H.

## Land Pattern (Footprint)

20-Lead Plastic Small Outline (SO) - Wide, 7.50 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch		1.27 BSC		
Contact Pad Spacing	C		9.40	
Contact Pad Width (X20)	X			0.60
Contact Pad Length (X20)	Y			1.95
Distance Between Pads	Gx	0.67		
Distance Between Pads	G	7.45		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

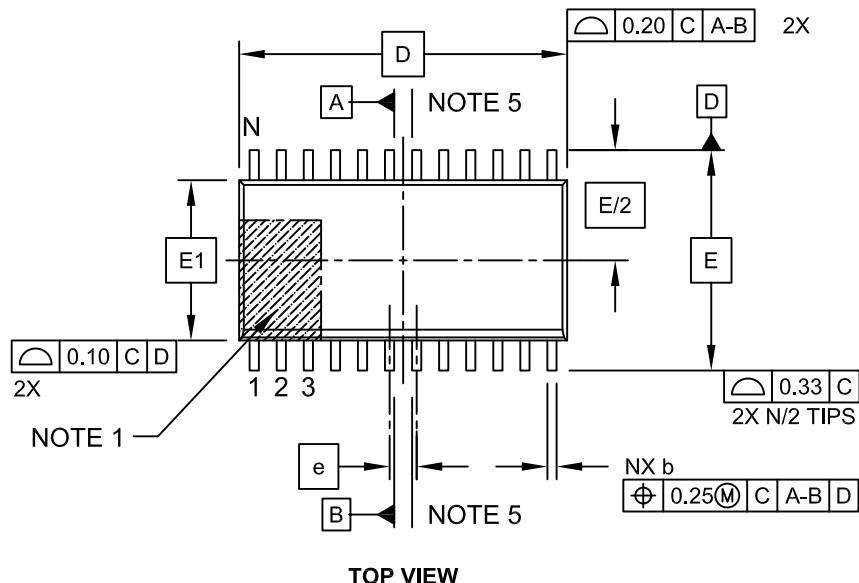
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2094A

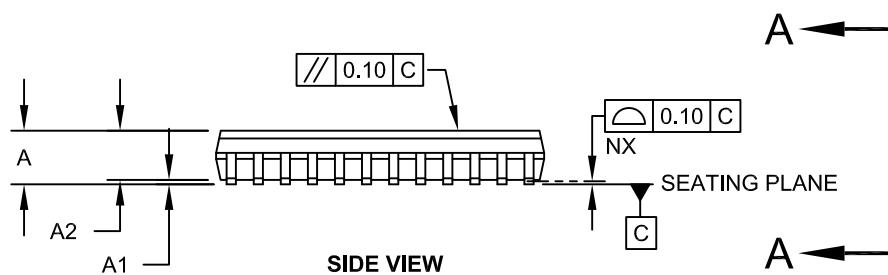
## Packaging Diagrams and Parameters

### 24-Lead Plastic Small Outline (SO) - Wide, 7.50 mm Body [SOIC]

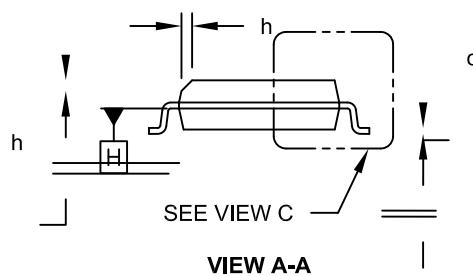
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



TOP VIEW



SIDE VIEW

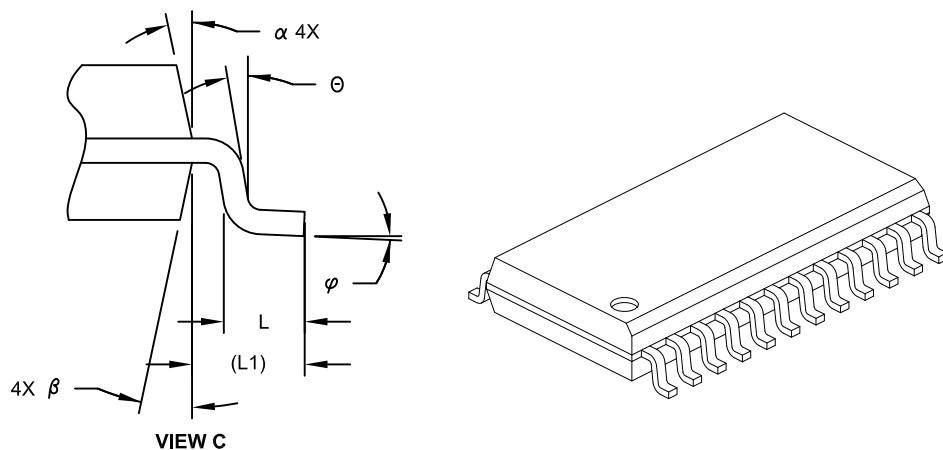


VIEW A-A

## Packaging Diagrams and Parameters

### 24-Lead Plastic Small Outline (SO) - Wide, 7.50 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension Limits		MILLIMETERS		
		MIN	NOM	MAX
Number of Pins	N		24	
Pitch	e		1.27 BSC	
Overall Height	A	-	-	2.65
Molded Package Thickness	A2	2.05	-	-
Standoff	§	A1	0.10	-
Overall Width	E	10.30 BSC		
Molded Package Width	E1	7.50 BSC		
Overall Length	D	15.40 BSC		
Chamfer (Optional)	h	0.25	-	0.75
Foot Length	L	0.40	-	1.27
Footprint	L1	1.40 REF		
Lead Angle	θ	0°	-	-
Foot Angle	φ	0°	-	8°
Lead Thickness	c	0.20	-	0.33
Lead Width	b	0.31	-	0.51
Mold Draft Angle Top	α	5°	-	15°
Mold Draft Angle Bottom	β	5°	-	15°

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimension D does not include mold flash, protrusions or gate burrs, which shall not exceed 0.15 mm per end. Dimension E1 does not include interlead flash or protrusion, which shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

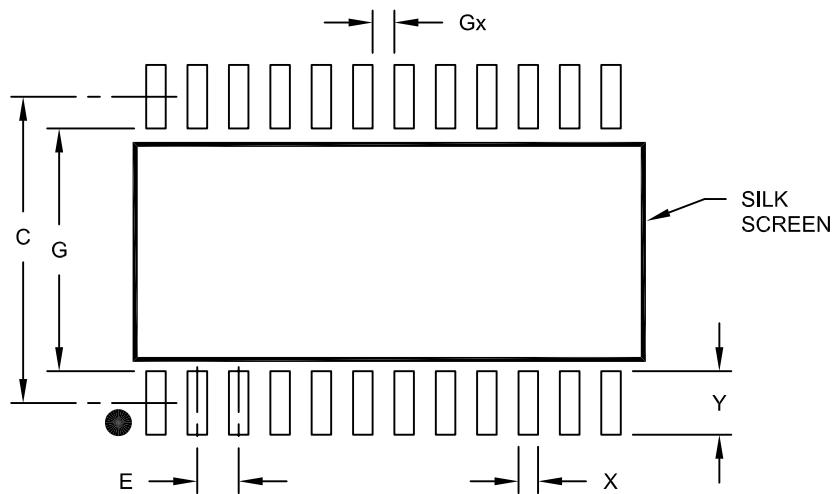
REF: Reference Dimension, usually without tolerance, for information purposes only.

5. Datums A & B to be determined at Datum H.

## Land Pattern (Footprint)

### 24-Lead Plastic Small Outline (SO) – Wide, 7.50 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		1.27	BSC
Contact Pad Spacing	C		9.40	
Contact Pad Width (X24)	X			0.60
Contact Pad Length (X24)	Y			2.00
Distance Between Pads	Gx	0.67		
Distance Between Pads	G	7.40		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

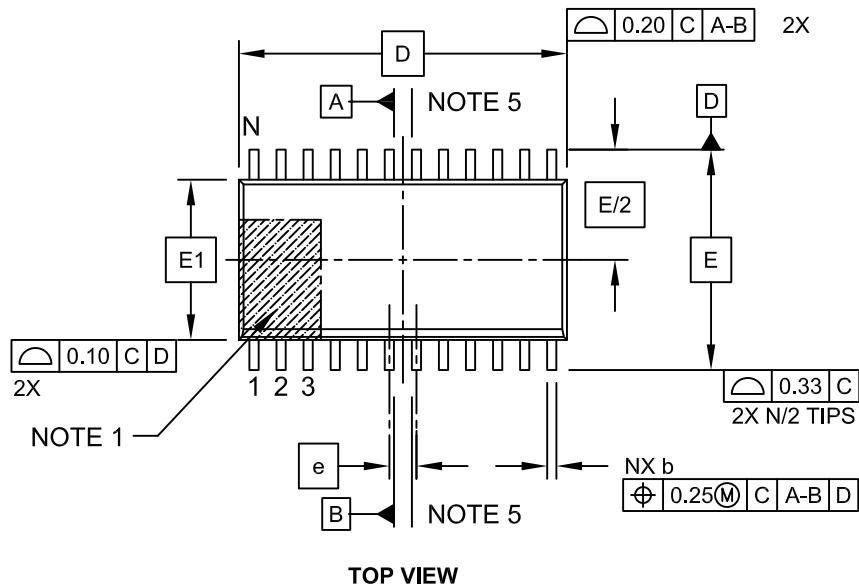
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2025A

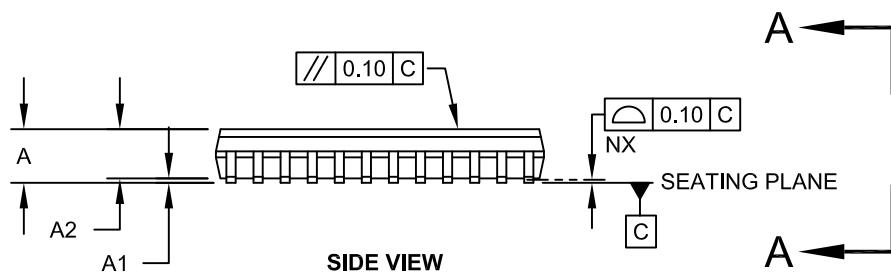
## Packaging Diagrams and Parameters

### 24-Lead Plastic Small Outline (OG) - Wide, 7.50 mm Body [SOIC]

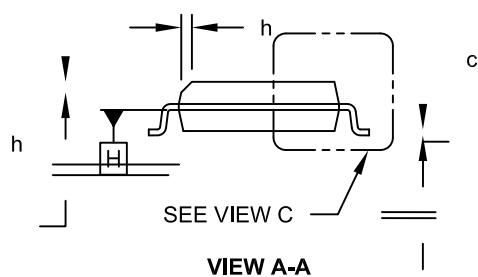
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



TOP VIEW



SIDE VIEW



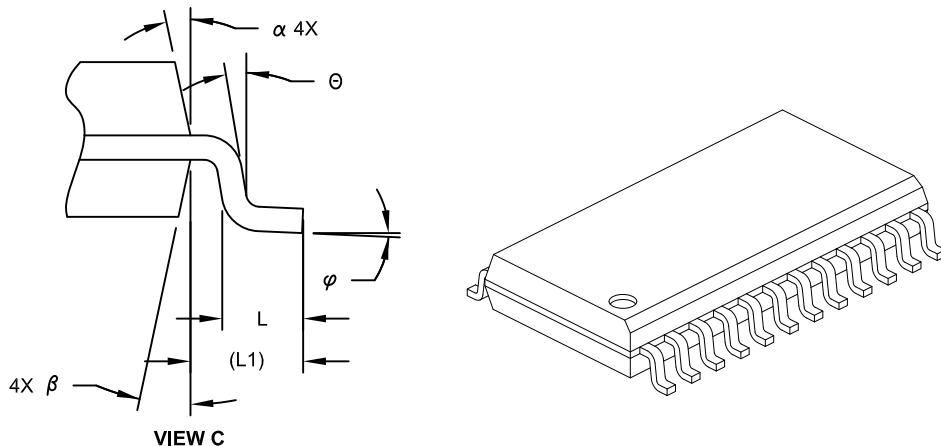
VIEW A-A

Microchip Technology Drawing C04-025C Sheet 1 of 2

## Packaging Diagrams and Parameters

### 24-Lead Plastic Small Outline (OG) - Wide, 7.50 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		24		
Pitch	e		1.27 BSC		
Overall Height	A	-	-	2.65	
Molded Package Thickness	A2	2.05	-	-	
Standoff §	A1	0.10	-	0.30	
Overall Width	E	10.30 BSC			
Molded Package Width	E1	7.50 BSC			
Overall Length	D	15.40 BSC			
Chamfer (Optional)	h	0.25	-	0.75	
Foot Length	L	0.40	-	1.27	
Footprint	L1	1.40 REF			
Lead Angle	θ	0°	-	-	
Foot Angle	φ	0°	-	8°	
Lead Thickness	c	0.20	-	0.33	
Lead Width	b	0.31	-	0.51	
Mold Draft Angle Top	α	5°	-	15°	
Mold Draft Angle Bottom	β	5°	-	15°	

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimension D does not include mold flash, protrusions or gate burrs, which shall not exceed 0.15 mm per end. Dimension E1 does not include interlead flash or protrusion, which shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

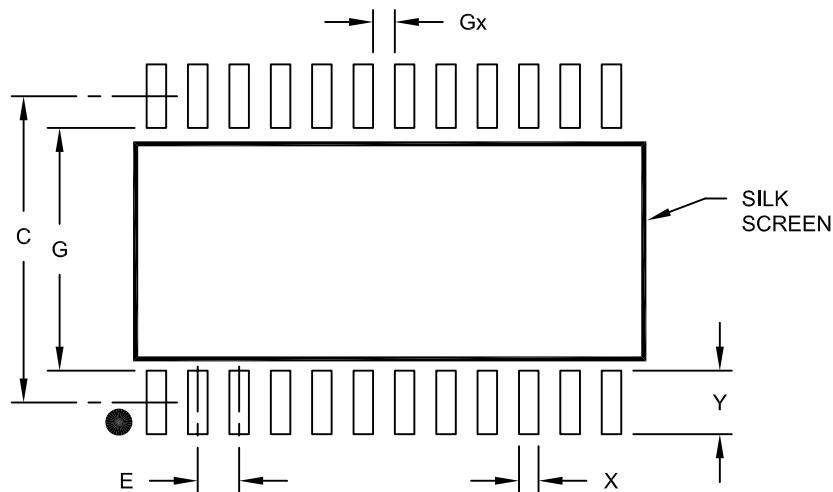
REF: Reference Dimension, usually without tolerance, for information purposes only.

5. Datums A & B to be determined at Datum H.

## Land Pattern (Footprint)

### 24-Lead Plastic Small Outline (OG) – Wide, 7.50 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	1.27	BSC	
Contact Pad Spacing	C		9.40	
Contact Pad Width (X24)	X			0.60
Contact Pad Length (X24)	Y			2.00
Distance Between Pads	Gx	0.67		
Distance Between Pads	G	7.40		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

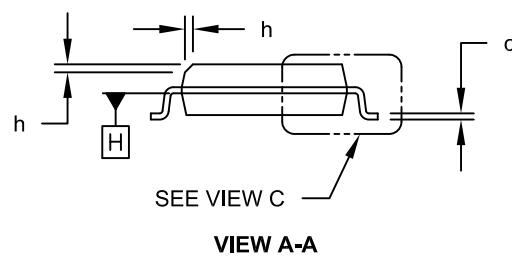
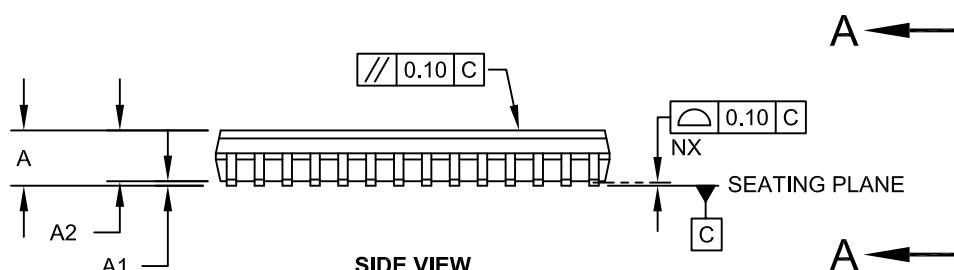
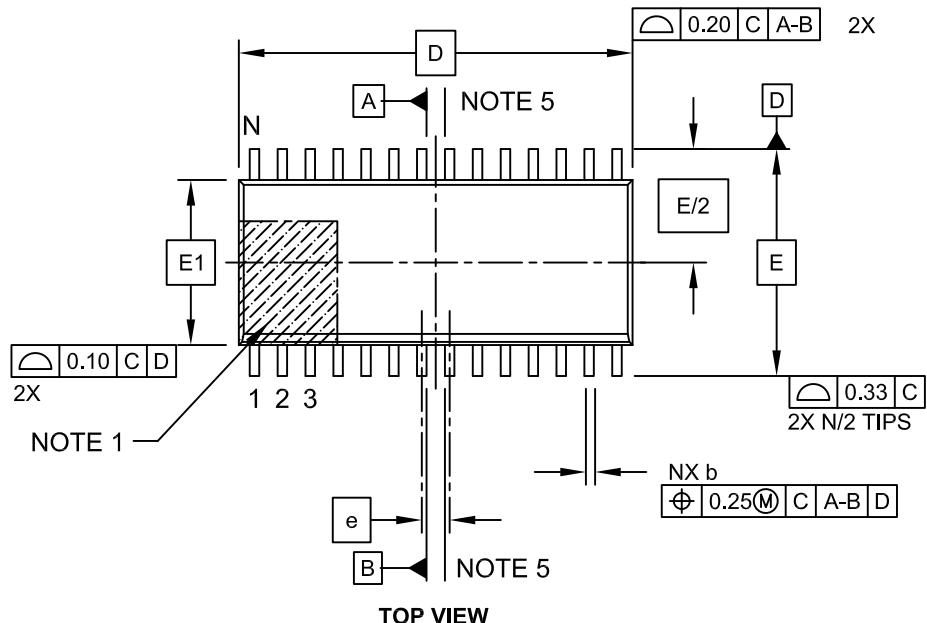
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2025A

## Packaging Diagrams and Parameters

### 28-Lead Plastic Small Outline (SO) - Wide, 7.50 mm Body [SOIC]

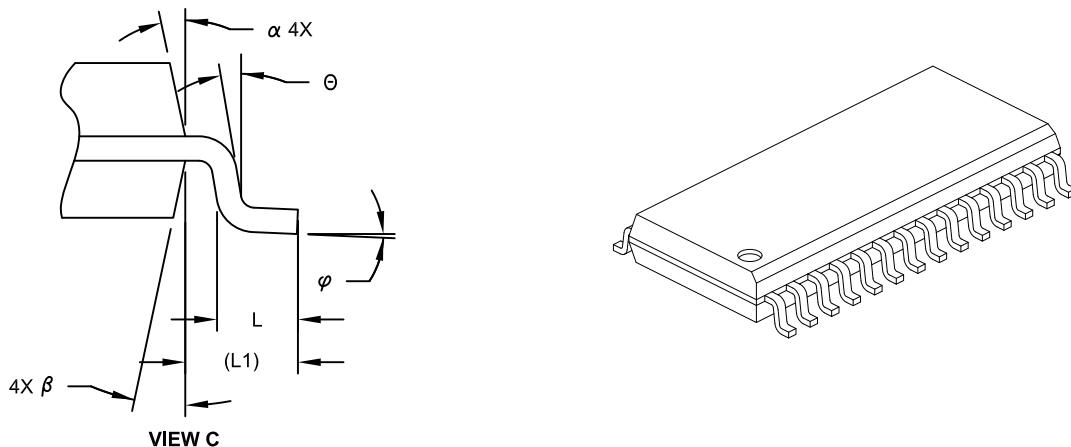
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 28-Lead Plastic Small Outline (SO) - Wide, 7.50 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N	28		
Pitch	e	1.27	BSC	
Overall Height	A	-	-	2.65
Molded Package Thickness	A2	2.05	-	-
Standoff	§	0.10	-	0.30
Overall Width	E	10.30	BSC	
Molded Package Width	E1	7.50	BSC	
Overall Length	D	17.90	BSC	
Chamfer (Optional)	h	0.25	-	0.75
Foot Length	L	0.40	-	1.27
Footprint	L1	1.40 REF		
Lead Angle	Θ	0°	-	-
Foot Angle	φ	0°	-	8°
Lead Thickness	c	0.18	-	0.33
Lead Width	b	0.31	-	0.51
Mold Draft Angle Top	α	5°	-	15°
Mold Draft Angle Bottom	β	5°	-	15°

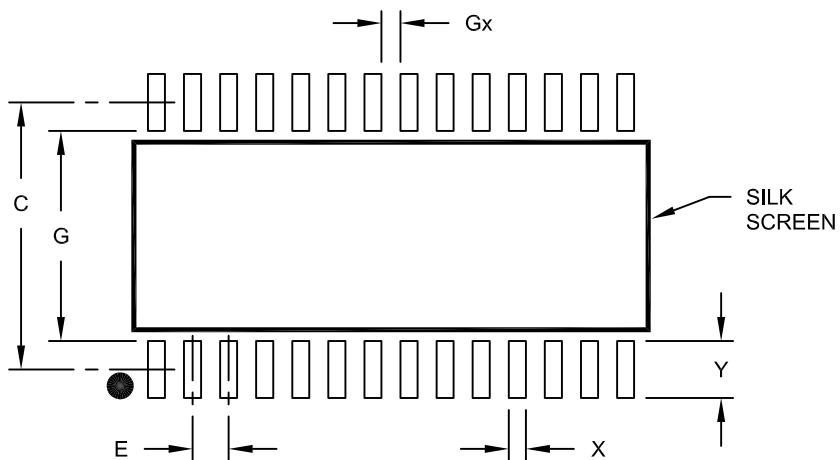
#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
  2. § Significant Characteristic
  3. Dimension D does not include mold flash, protrusions or gate burrs, which shall not exceed 0.15 mm per end. Dimension E1 does not include interlead flash or protrusion, which shall not exceed 0.25 mm per side.
  4. Dimensioning and tolerancing per ASME Y14.5M
- BSC: Basic Dimension. Theoretically exact value shown without tolerances.  
 REF: Reference Dimension, usually without tolerance, for information purposes only.
5. Datums A & B to be determined at Datum H.

## Land Pattern (Footprint)

28-Lead Plastic Small Outline (SO) - Wide, 7.50 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		1.27 BSC	
Contact Pad Spacing	C		9.40	
Contact Pad Width (X28)	X			0.60
Contact Pad Length (X28)	Y			2.00
Distance Between Pads	Gx	0.67		
Distance Between Pads	G	7.40		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

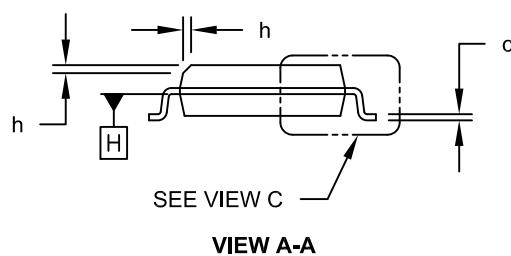
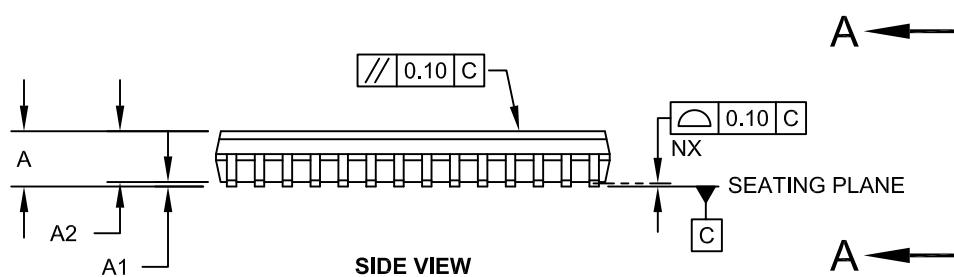
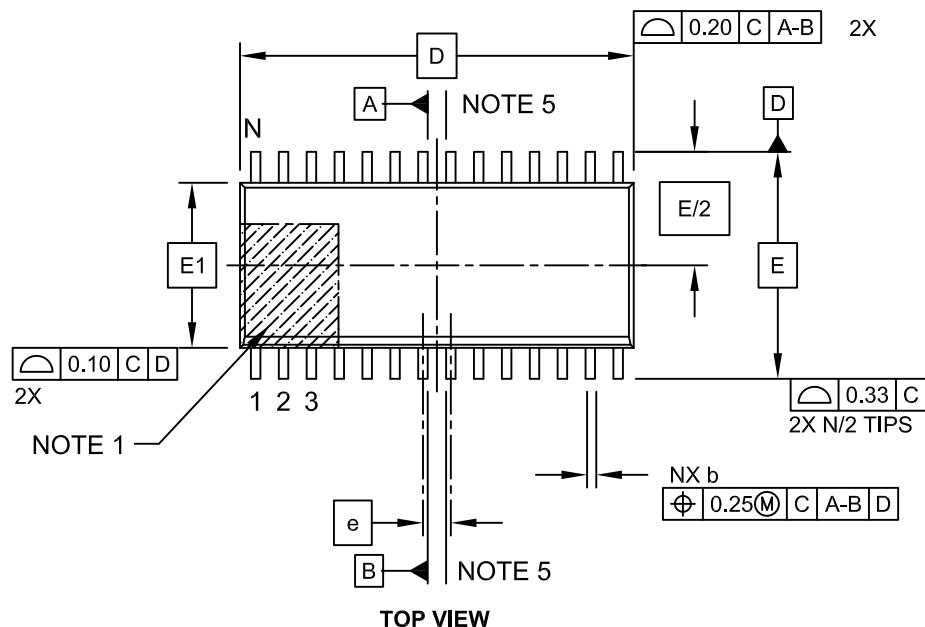
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2052A

## Packaging Diagrams and Parameters

### 28-Lead Plastic Small Outline (OI) - Wide, 7.50 mm Body [SOIC]

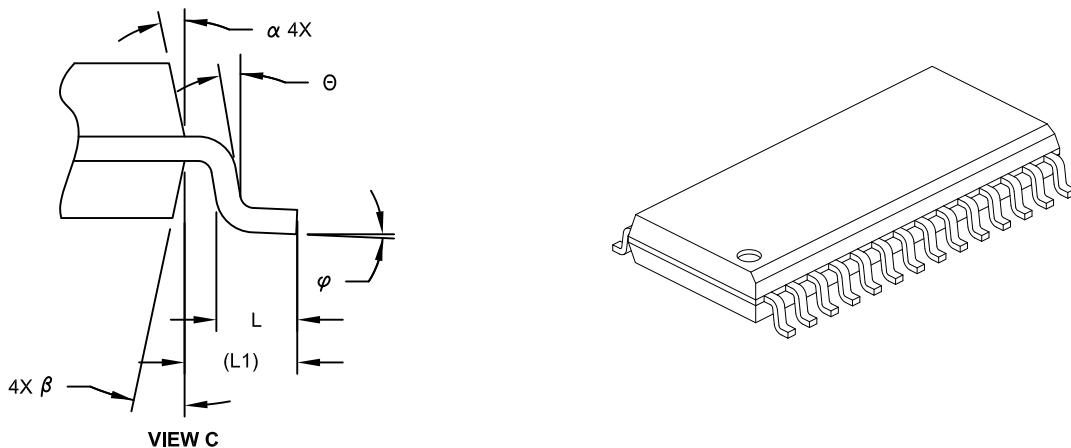
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 28-Lead Plastic Small Outline (O) - Wide, 7.50 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		28		
Pitch	e		1.27	BSC	
Overall Height	A		-	-	2.65
Molded Package Thickness	A2		2.05	-	-
Standoff	§	A1	0.10	-	0.30
Overall Width	E		10.30	BSC	
Molded Package Width	E1		7.50	BSC	
Overall Length	D		17.90	BSC	
Chamfer (Optional)	h	0.25	-	0.75	
Foot Length	L	0.40	-	1.27	
Footprint	L1		1.40	REF	
Lead Angle	θ	0°	-	-	
Foot Angle	φ	0°	-	8°	
Lead Thickness	c	0.18	-	0.33	
Lead Width	b	0.31	-	0.51	
Mold Draft Angle Top	α	5°	-	15°	
Mold Draft Angle Bottom	β	5°	-	15°	

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimension D does not include mold flash, protrusions or gate burrs, which shall not exceed 0.15 mm per end. Dimension E1 does not include interlead flash or protrusion, which shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

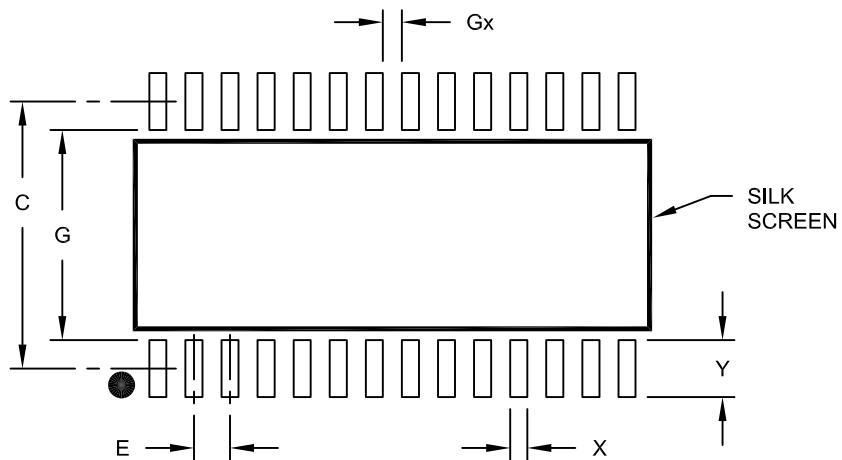
REF: Reference Dimension, usually without tolerance, for information purposes only.

5. Datums A & B to be determined at Datum H.

## Land Pattern (Footprint)

28-Lead Plastic Small Outline (OI) - Wide, 7.50 mm Body [SOIC]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E		1.27	BSC	
Contact Pad Spacing	C			9.40	
Contact Pad Width (X28)	X			0.60	
Contact Pad Length (X28)	Y			2.00	
Distance Between Pads	Gx	0.67			
Distance Between Pads	G	7.40			

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2052A

## Packaging Diagrams and Parameters

---

---

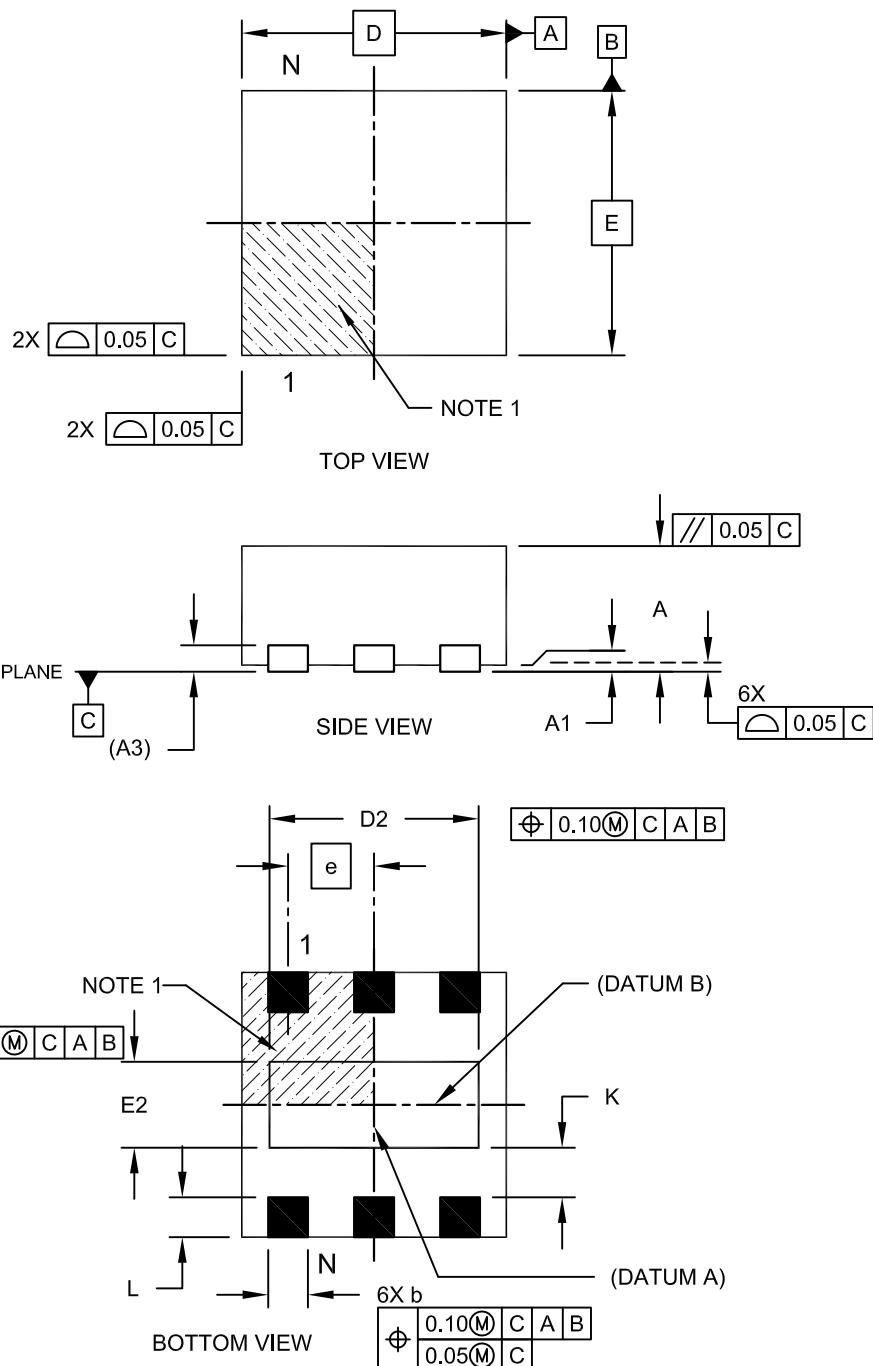
### **DFN Family**

#### **Dual Flat, No Lead Packages**

## Packaging Diagrams and Parameters

### 6-Lead Plastic Dual Flat, No Lead Package (MA[Y]) - 2x2x0.9mm Body [DFN]

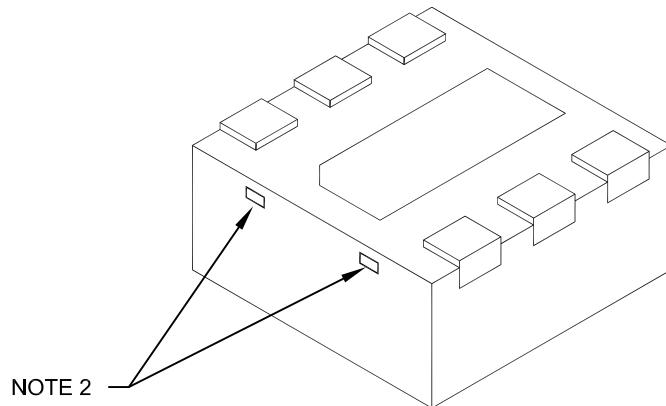
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 6-Lead Plastic Dual Flat, No Lead Package (MA[Y]) - 2x2x0.9mm Body [DFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		6		
Pitch	e		0.65	BSC	
Overall Height	A	0.80	0.85	0.90	
Standoff	A1	0.00	0.02	0.05	
Contact Thickness	A3	0.20 REF			
Overall Length	D	2.00 BSC			
Overall Width	E	2.00 BSC			
Exposed Pad Length	D2	1.50	1.60	1.70	
Exposed Pad Width	E2	0.90	1.00	1.10	
Contact Width	b	0.25	0.30	0.35	
Contact Length	L	0.20	0.25	0.30	
Contact-to-Exposed Pad	K	0.20	-	-	

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package may have one or more exposed tie bars at ends.
3. Package is saw singulated.
4. Dimensioning and tolerancing per ASME Y14.5M.

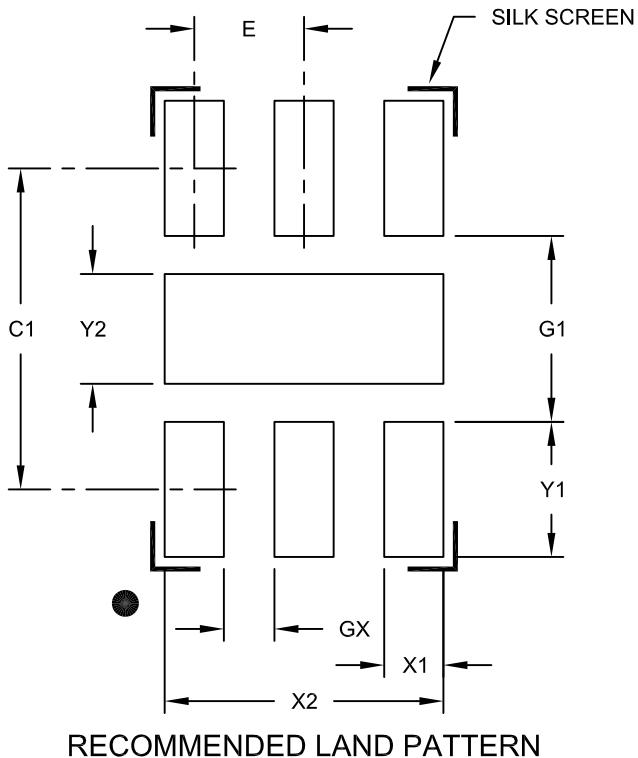
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

### 6-Lead Plastic Dual Flat, No Lead Package (MA) - 2x2x0.9mm Body [DFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch		0.65 BSC		
Optional Center Pad Width	Y2			1.00
Optional Center Pad Length	X2			1.70
Contact Pad Spacing	C1		2.10	
Contact Pad Width (X6)	X1			0.35
Contact Pad Length (X6)	Y1			0.65
Distance Between Pads	GX	0.20		
Distance Between Pads	G1	1.10		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

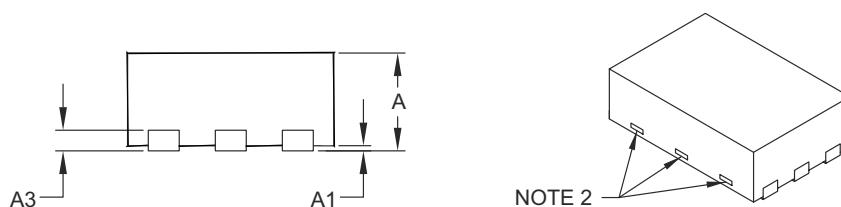
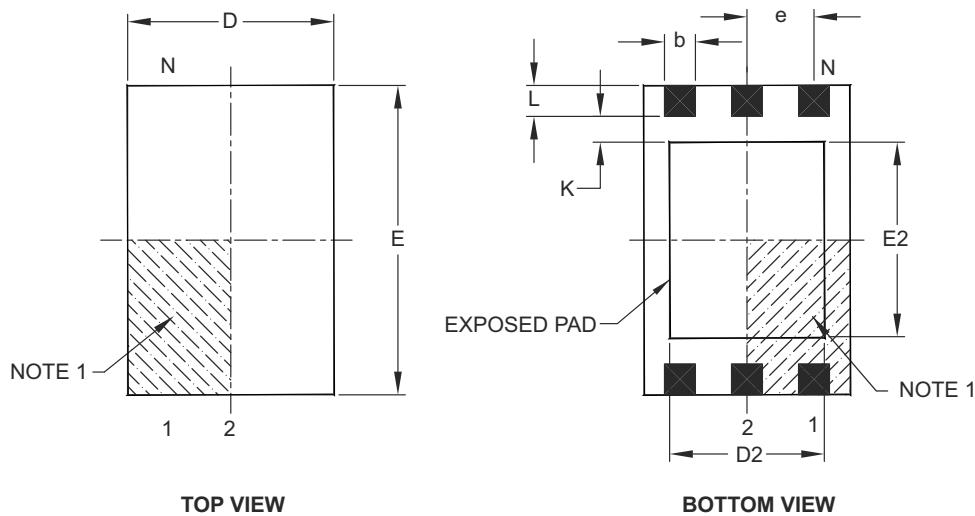
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2120A

## Packaging Diagrams and Parameters

### 6-Lead Plastic Dual Flat, No Lead Package (ME) – 2x3x0.9 mm Body [DFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		6		
Pitch	e		0.65	0.65	BSC
Overall Height	A	0.80	0.90	1.00	
Standoff	A1	0.00	0.02	0.05	
Contact Thickness	A3		0.20	REF	
Overall Length	D	2.00		BSC	
Overall Width	E	3.00		BSC	
Exposed Pad Length	D2	1.40	–	1.60	
Exposed Pad Width	E2	1.80	–	2.00	
Contact Width	b	0.25	0.30	0.35	
Contact Length	L	0.20	0.30	0.40	
Contact-to-Exposed Pad	K	0.20	–	–	

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package may have one or more exposed tie bars at ends.
3. Package is saw singulated.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

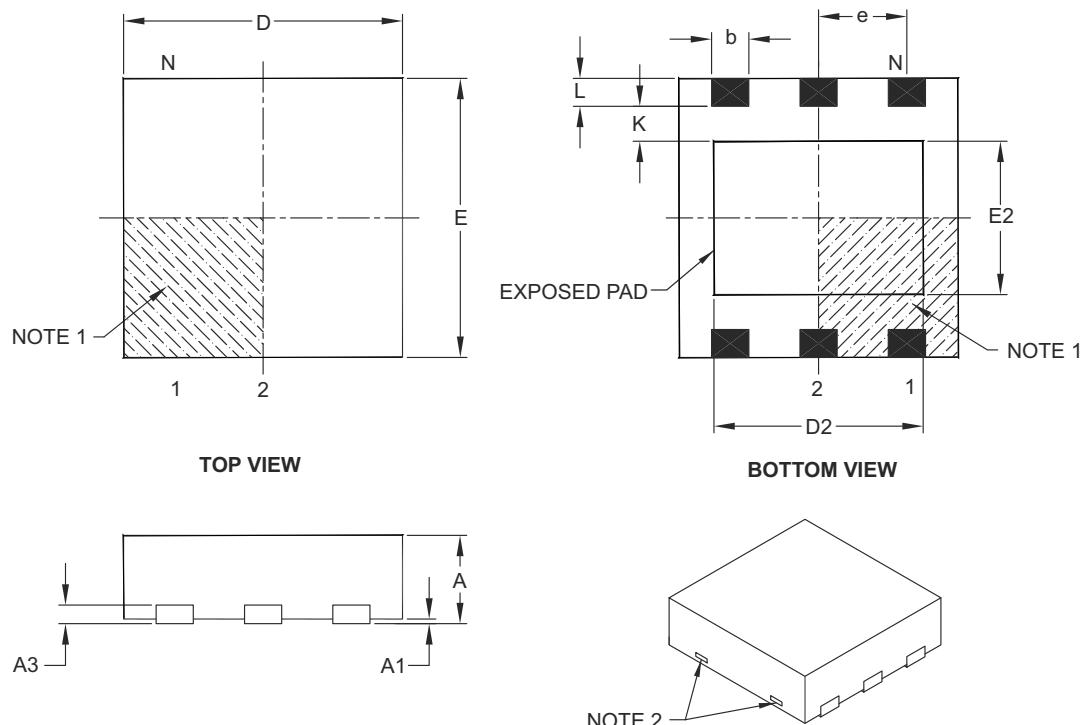
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-134A

## Packaging Diagrams and Parameters

### 6-Lead Plastic Dual Flat, No Lead Package (MH) – 3x3x0.9 mm Body [DFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		6		
Pitch	e		0.95	BSC	
Overall Height	A	0.80	0.90	1.00	
Standoff	A1	0.00	0.02	0.05	
Contact Thickness	A3	0.20	REF		
Overall Length	D	3.00	BSC		
Overall Width	E	3.00	BSC		
Exposed Pad Length	D2	0.00	–	2.25	
Exposed Pad Width	E2	0.00	–	1.65	
Contact Width	b	0.30	0.40	0.45	
Contact Length	L	0.20	0.30	0.45	
Contact-to-Exposed Pad	K	0.20	–	–	

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.

2. Package may have one or more exposed tie bars at ends.

3. Package is saw singulated.

4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

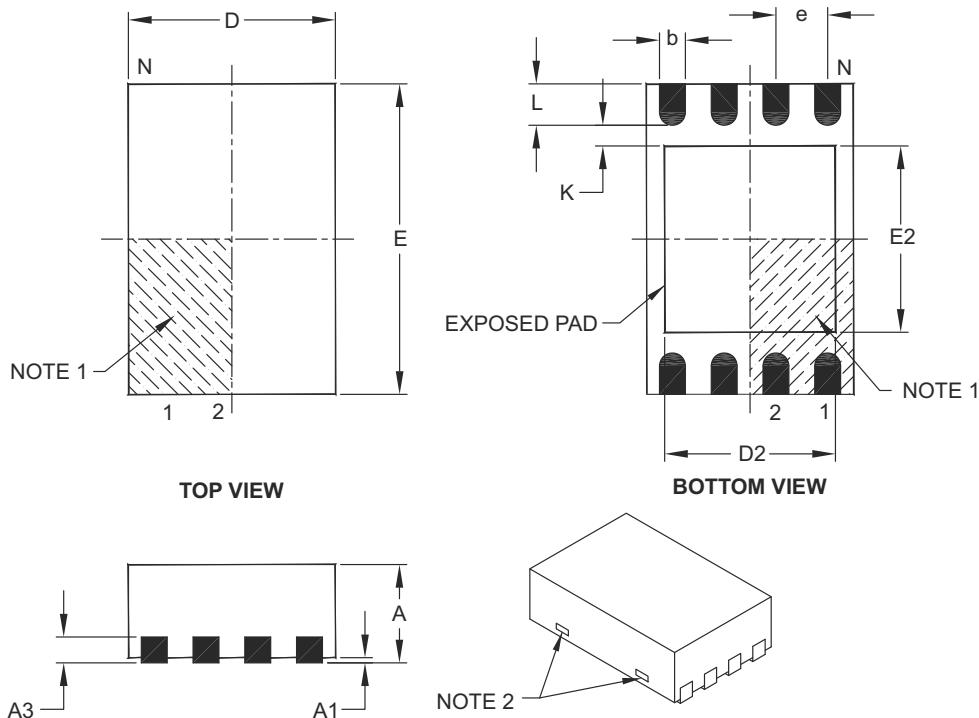
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-135A

## Packaging Diagrams and Parameters

### 8-Lead Plastic Dual Flat, No Lead Package (MC) – 2x3x0.9 mm Body [DFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		8	
Pitch	e		0.50 BSC	
Overall Height	A	0.80	0.90	1.00
Standoff	A1	0.00	0.02	0.05
Contact Thickness	A3		0.20 REF	
Overall Length	D		2.00 BSC	
Overall Width	E		3.00 BSC	
Exposed Pad Length	D2	1.30	–	1.55
Exposed Pad Width	E2	1.50	–	1.75
Contact Width	b	0.20	0.25	0.30
Contact Length	L	0.30	0.40	0.50
Contact-to-Exposed Pad	K	0.20	–	–

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package may have one or more exposed tie bars at ends.
3. Package is saw singulated.
4. Dimensioning and tolerancing per ASME Y14.5M.

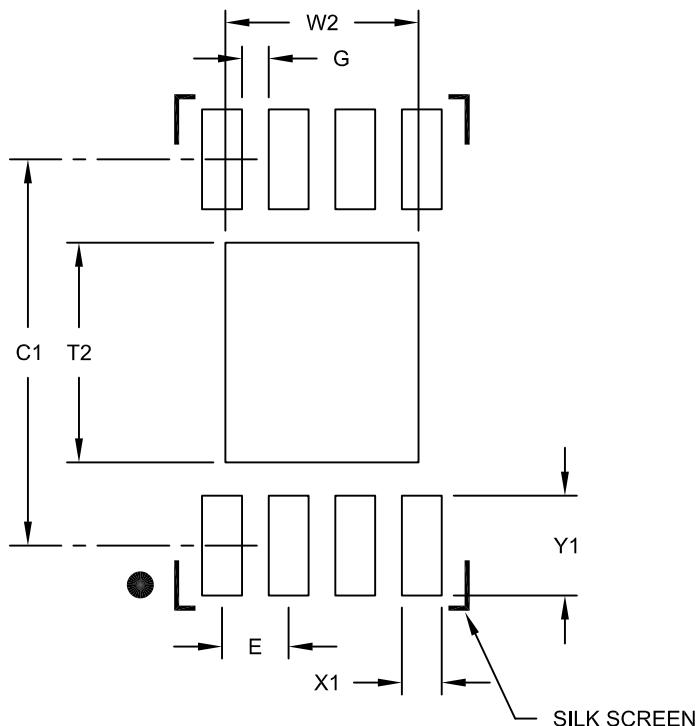
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

8-Lead Plastic Dual Flat, No Lead Package (MC) - 2x3x0.9mm Body [DFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	0.50 BSC		
Optional Center Pad Width	W2			1.45
Optional Center Pad Length	T2			1.75
Contact Pad Spacing	C1		2.90	
Contact Pad Width (X8)	X1			0.30
Contact Pad Length (X8)	Y1			0.75
Distance Between Pads	G	0.20		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

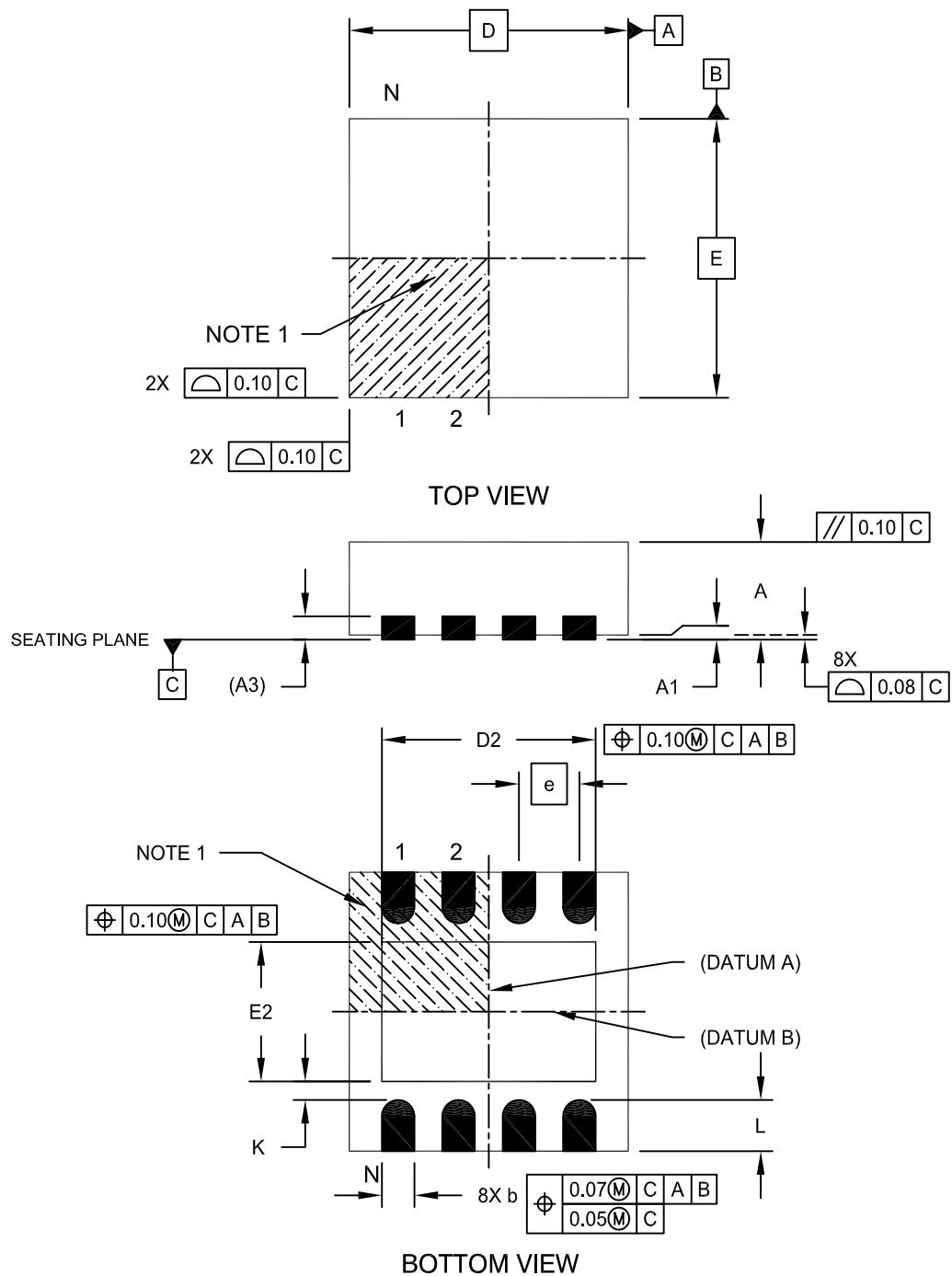
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2123B

## Packaging Diagrams and Parameters

### 8-Lead Plastic Dual Flat, No Lead Package (MF) - 3x3x0.9mm Body [DFN]

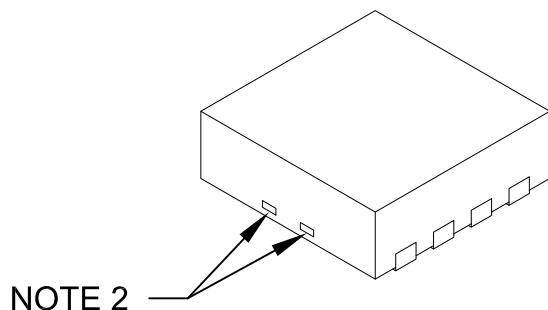
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 8-Lead Plastic Dual Flat, No Lead Package (MF) - 3x3x0.9mm Body [DFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
		Dimension Limits	MIN	NOM	MAX
Number of Pins	N		8		
Pitch	e		0.65	BSC	
Overall Height	A	0.80	0.90	1.00	
Standoff	A1	0.00	0.02	0.05	
Contact Thickness	A3		0.20	REF	
Overall Length	D		3.00	BSC	
Exposed Pad Width	E2	1.34	-	1.60	
Overall Width	E		3.00	BSC	
Exposed Pad Length	D2	1.60	-	2.40	
Contact Width	b	0.25	0.30	0.35	
Contact Length	L	0.20	0.30	0.55	
Contact-to-Exposed Pad	K	0.20	-	-	

Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package may have one or more exposed tie bars at ends.
3. Package is saw singulated
4. Dimensioning and tolerancing per ASME Y14.5M

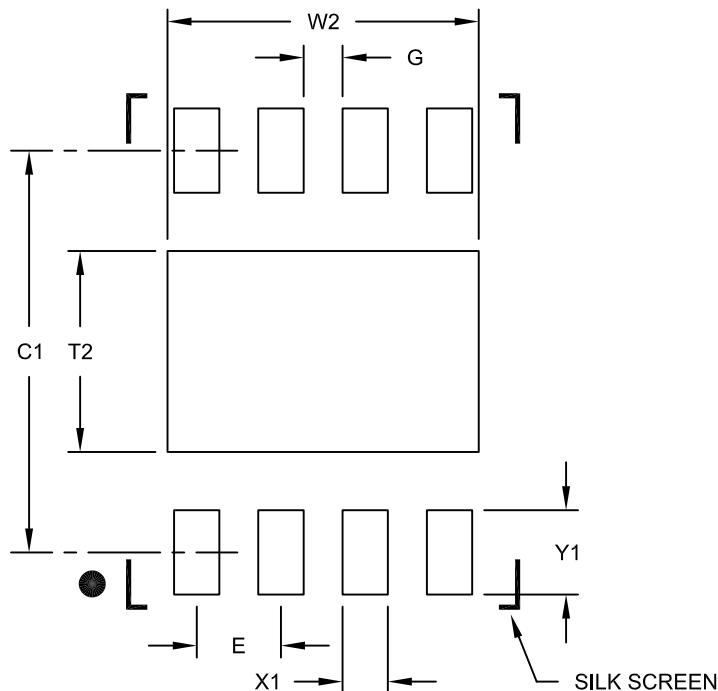
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

### 8-Lead Plastic Dual Flat, No Lead Package (MF) - 3x3x0.9mm Body [DFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension	Limits	MIN	NOM	MAX
Contact Pitch	E		0.65 BSC	
Optional Center Pad Width	W2			2.40
Optional Center Pad Length	T2			1.55
Contact Pad Spacing	C1		3.10	
Contact Pad Width (X8)	X1			0.35
Contact Pad Length (X8)	Y1			0.65
Distance Between Pads	G	0.30		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

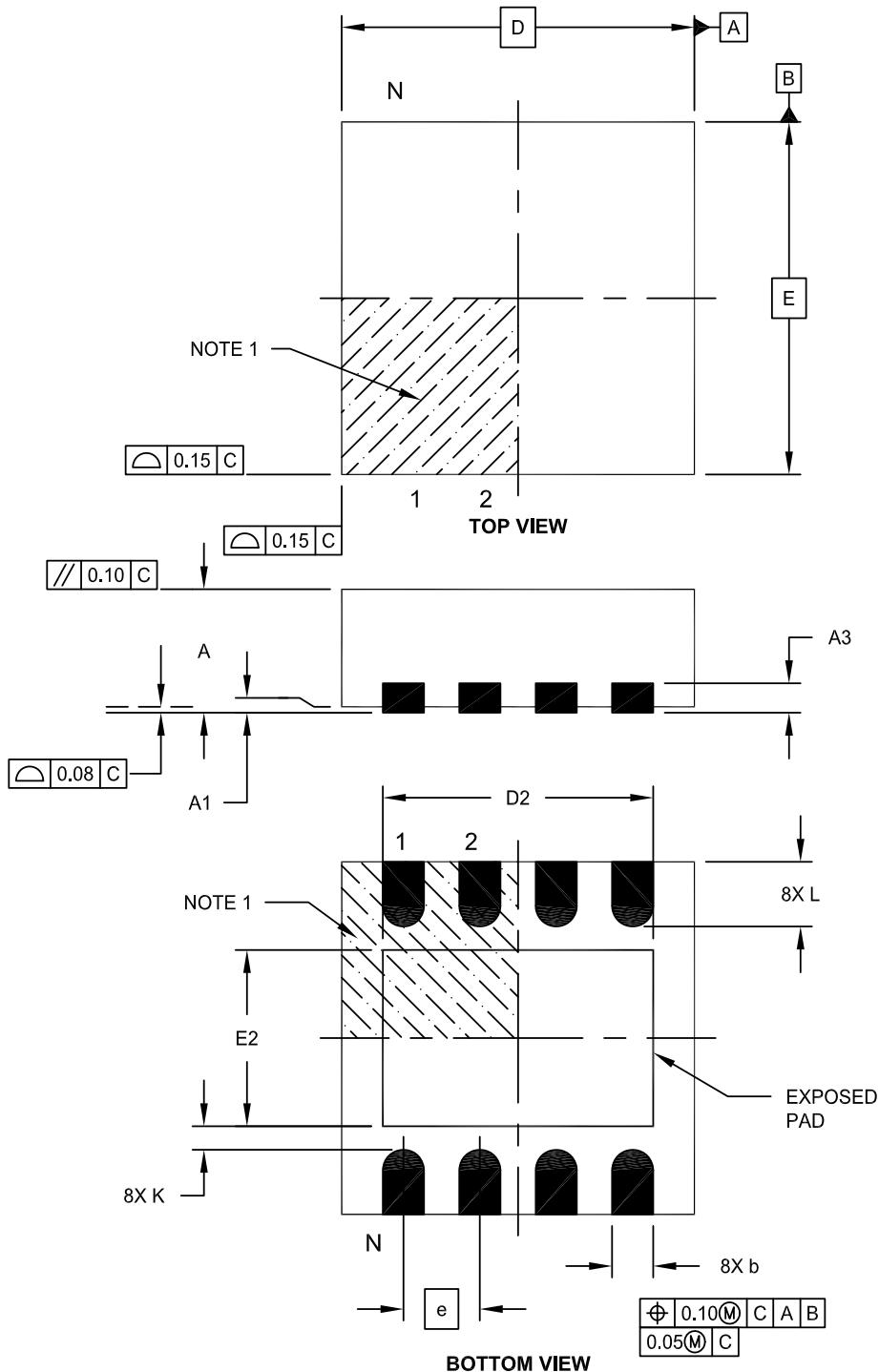
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2062B

## Packaging Diagrams and Parameters

### 8-Lead Plastic Dual Flat, No Lead Package (MD) – 4x4x0.9 mm Body [DFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

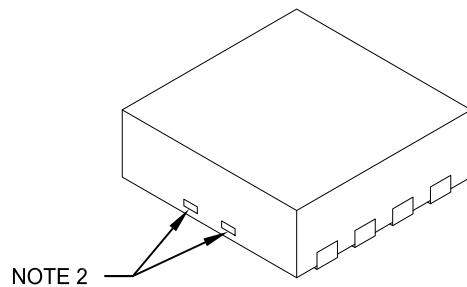


## Packaging Diagrams and Parameters

---

### 8-Lead Plastic Dual Flat, No Lead Package (MD) – 4x4x0.9 mm Body [DFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		8	
Pitch	e		0.80 BSC	
Overall Height	A	0.80	0.90	1.00
Standoff	A1	0.00	0.02	0.05
Contact Thickness	A3		0.20 REF	
Overall Length	D		4.00 BSC	
Exposed Pad Width	E2	2.60	2.70	2.80
Overall Width	E		4.00 BSC	
Exposed Pad Length	D2	3.40	3.50	3.60
Contact Width	b	0.25	0.30	0.35
Contact Length	L	0.30	0.40	0.50
Contact-to-Exposed Pad	K	0.20	-	-

Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package may have one or more exposed tie bars at ends.
3. Package is saw singulated
4. Dimensioning and tolerancing per ASME Y14.5M

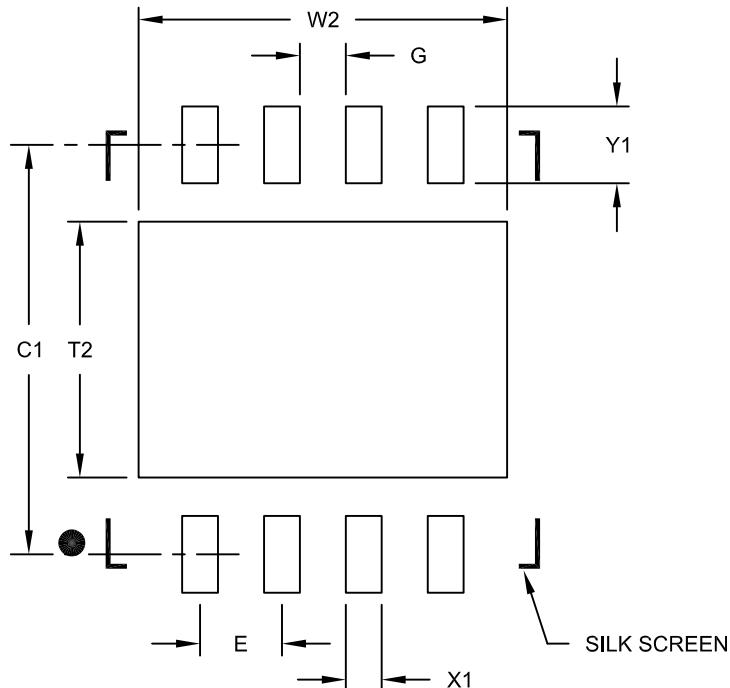
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

8-Lead Plastic Dual Flat, No Lead Package (MD) - 4x4x0.9 mm Body [DFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		0.80 BSC	
Optional Center Pad Width	W2			3.60
Optional Center Pad Length	T2			2.50
Contact Pad Spacing	C1		4.00	
Contact Pad Width (X8)	X1			0.35
Contact Pad Length (X8)	Y1			0.75
Distance Between Pads	G	0.45		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

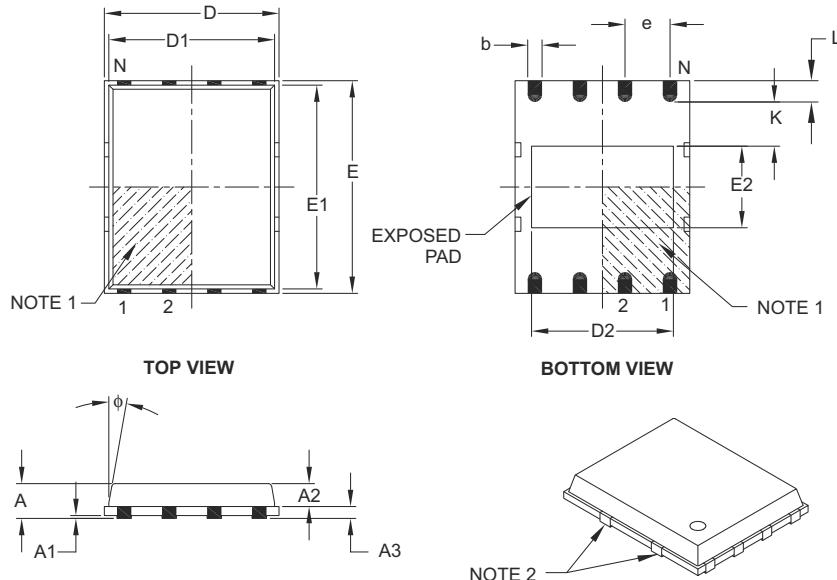
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2131C

## Packaging Diagrams and Parameters

### 8-Lead Plastic Dual Flat, No Lead Package (MF) – 6x5 mm Body [DFN-S] PUNCH SINGULATED

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		8	
Pitch	e		1.27 BSC	
Overall Height	A	–	0.85	1.00
Molded Package Thickness	A2	–	0.65	0.80
Standoff	A1	0.00	0.01	0.05
Base Thickness	A3		0.20 REF	
Overall Length	D		4.92 BSC	
Molded Package Length	D1		4.67 BSC	
Exposed Pad Length	D2	3.85	4.00	4.15
Overall Width	E		5.99 BSC	
Molded Package Width	E1		5.74 BSC	
Exposed Pad Width	E2	2.16	2.31	2.46
Contact Width	b	0.35	0.40	0.47
Contact Length	L	0.50	0.60	0.75
Contact-to-Exposed Pad	K	0.20	–	–
Model Draft Angle Top	ϕ	–	–	12°

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package may have one or more exposed tie bars at ends.
3. Dimensioning and tolerancing per ASME Y14.5M.

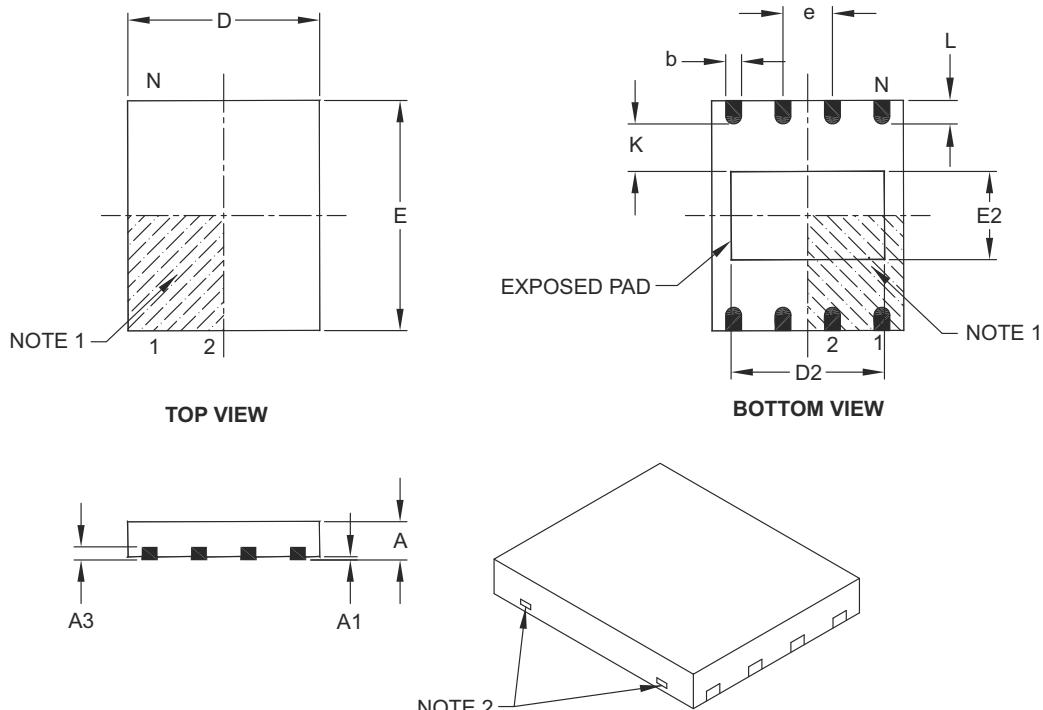
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Packaging Diagrams and Parameters

### 8-Lead Plastic Dual Flat, No Lead Package (MF) – 6x5 mm Body [DFN-S]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		UNITS			MILLIMETERS		
		DIMENSION LIMITS			MIN	NOM	MAX
Number of Pins	N				8		
Pitch	e				1.27	BSC	
Overall Height	A	0.80	0.85	1.00			
Standoff	A1	0.00	0.01	0.05			
Contact Thickness	A3	0.20 REF					
Overall Length	D	5.00 BSC					
Overall Width	E	6.00 BSC					
Exposed Pad Length	D2	3.90	4.00	4.10			
Exposed Pad Width	E2	2.20	2.30	2.40			
Contact Width	b	0.35	0.40	0.48			
Contact Length	L	0.50	0.60	0.75			
Contact-to-Exposed Pad	K	0.20	–	–			

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package may have one or more exposed tie bars at ends.
3. Package is saw singulated.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

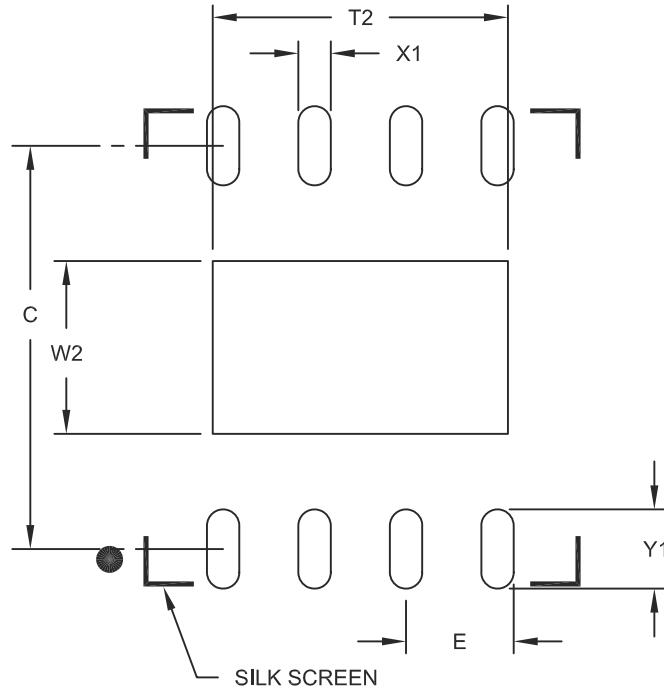
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-122B

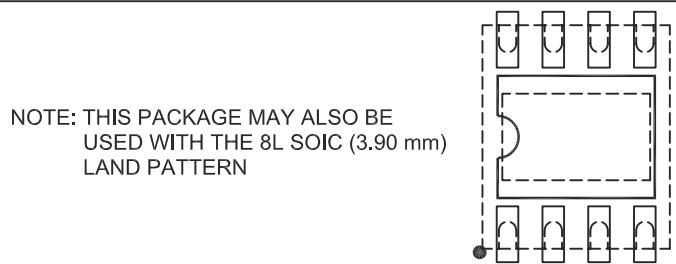
## Land Pattern (Footprint)

8-Lead Plastic Dual Flat, No Lead Package (MF) - 6x5 mm Body [DFN-S]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		1.27 BSC	
Optional Center Pad Width	W2			2.40
Optional Center Pad Length	T2			4.10
Contact Pad Spacing	C		5.60	
Contact Pad Width (X8)	X1			0.45
Contact Pad Length (X8)	Y1			1.10

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

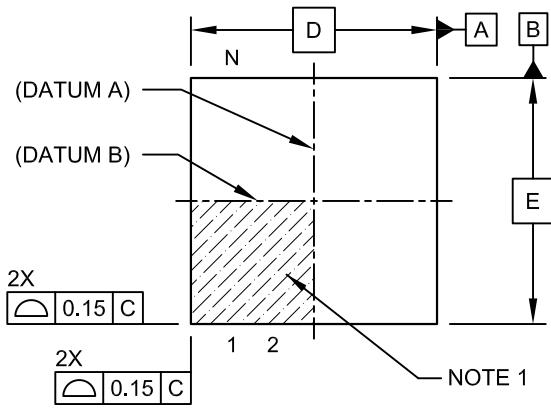
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2122A

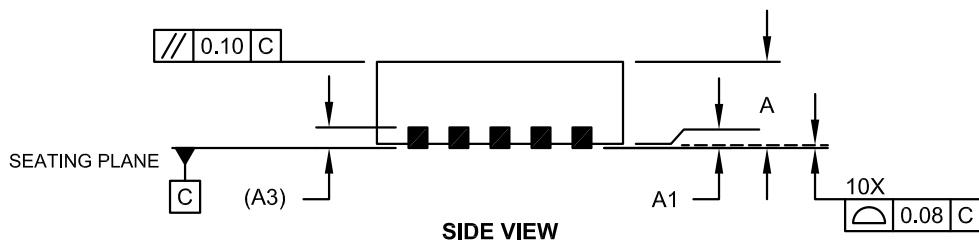
## Packaging Diagrams and Parameters

### 10-Lead Plastic Dual Flat, No Lead Package (MF) - 3x3x0.9mm Body [DFN]

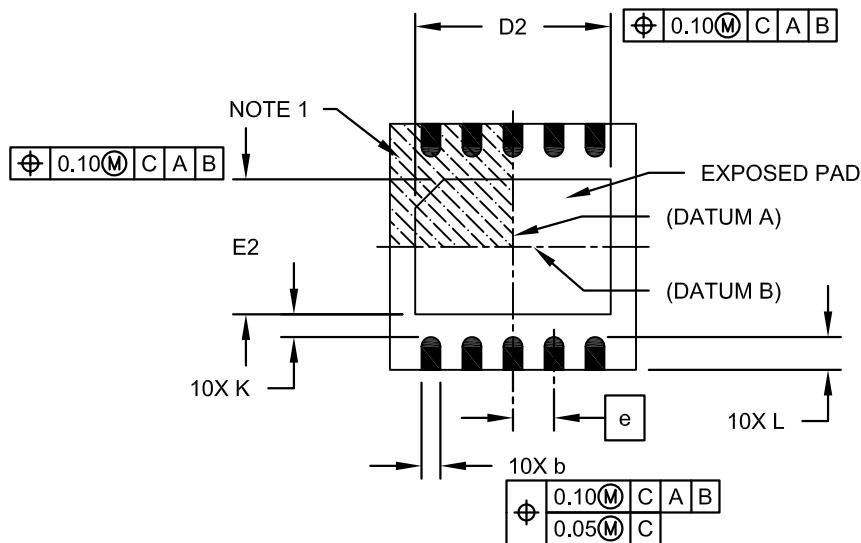
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



TOP VIEW



SIDE VIEW

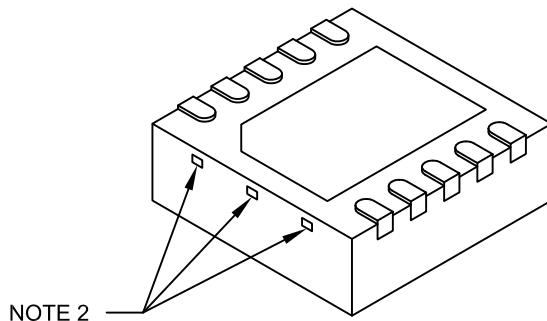


BOTTOM VIEW

## Packaging Diagrams and Parameters

### 10-Lead Plastic Dual Flat, No Lead Package (MF) - 3x3x0.9mm Body [DFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension	Limits	UNITS MILLIMETERS		
		MIN	NOM	MAX
Number of Pins	N	10		
Pitch	e	0.50	BSC	
Overall Height	A	0.80	0.90	1.00
Standoff	A1	0.00	0.02	0.05
Contact Thickness	A3	0.20	REF	
Overall Length	D	3.00	BSC	
Exposed Pad Length	D2	2.15	2.35	2.45
Overall Width	E	3.00	BSC	
Exposed Pad Width	E2	1.40	1.50	1.75
Contact Width	b	0.18	0.25	0.30
Contact Length	L	0.30	0.40	0.50
Contact-to-Exposed Pad	K	0.20	-	-

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package may have one or more exposed tie bars at ends.
3. Package is saw singulated.
4. Dimensioning and tolerancing per ASME Y14.5M.

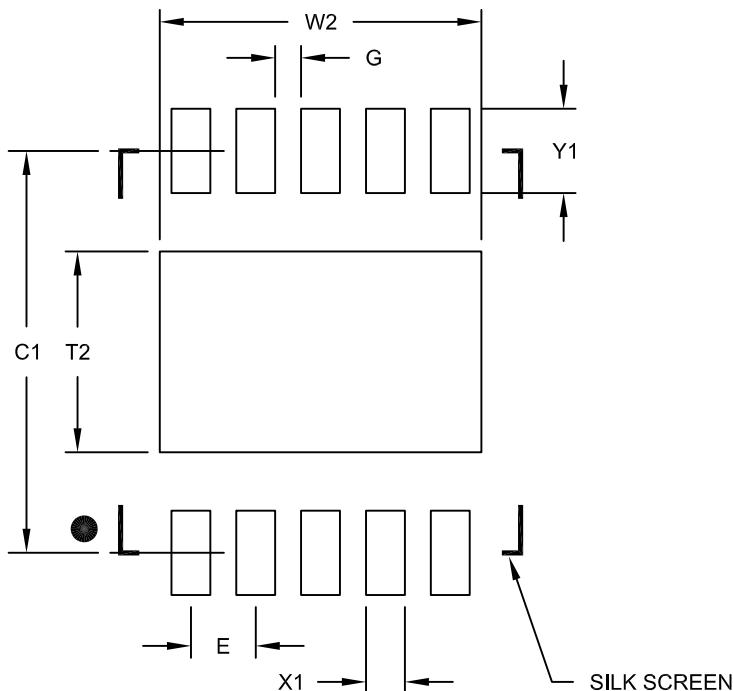
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

### 10-Lead Plastic Dual Flat, No Lead Package (MF) - 3x3x0.9mm Body [DFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	0.50 BSC		
Optional Center Pad Width	W2			2.48
Optional Center Pad Length	T2			1.55
Contact Pad Spacing	C1		3.10	
Contact Pad Width (X10)	X1			0.30
Contact Pad Length (X10)	Y1			0.65
Distance Between Pads	G	0.20		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2063B

## Packaging Diagrams and Parameters

---

---

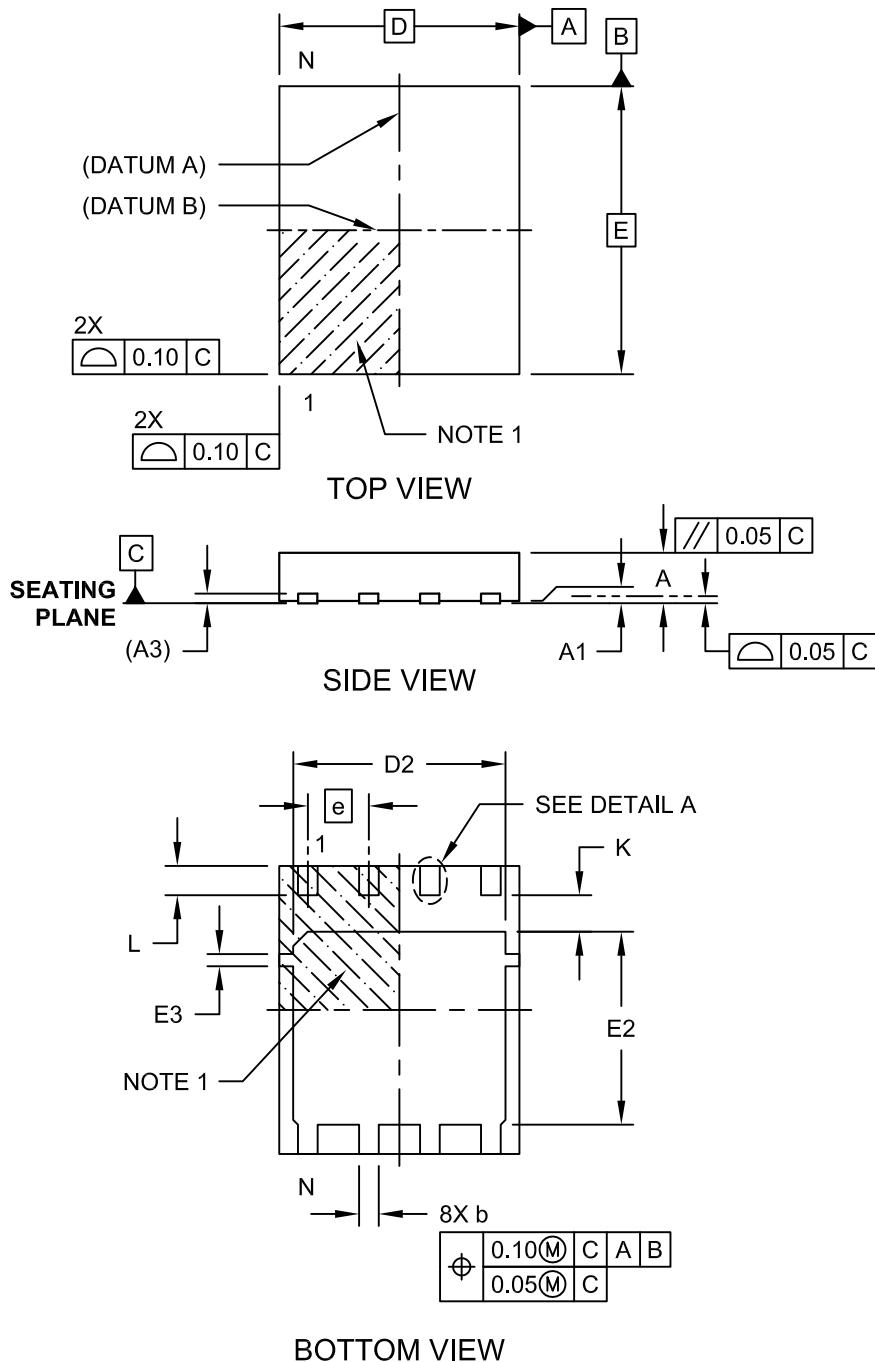
### **PDFN Family**

#### **High Power Dual Flat, No Lead Packages**

## Packaging Diagrams and Parameters

### 8-Lead Power Dual Flatpack No Lead Package (MF) – 5x6x1.0 mm Body [PDFN]

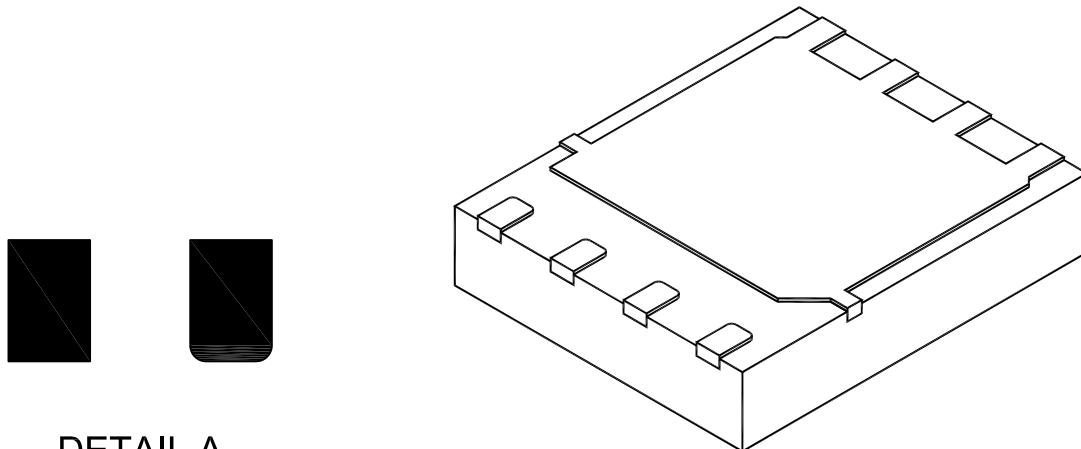
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 8-Lead Power Dual Flatpack No Lead Package (MF) – 5x6x1.0 mm Body [PDFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



#### DETAIL A

ALTERNATE  
CONTACT  
SHAPES

Dimension	Limits	MILLIMETERS		
		MIN	NOM	MAX
Number of Pins	N		8	
Pitch	e		1.27 BSC	
Overall Height	A	0.80	1.00	1.03
Standoff	A1	0.00	-	0.05
Terminal Thickness	(A3)		0.20 REF	
Overall Length	D		5.00 BSC	
Overall Width	E		6.00 BSC	
Exposed Pad length	D2	4.27	4.42	4.52
Exposed Pad Width	E2	3.87	4.02	4.12
Tab Width	E3	0.20	0.25	0.30
Terminal Width	b	0.36	0.41	0.46
Terminal Length	L	0.51	0.61	0.71
Terminal to Exposed Pad	K	0.71	0.76	0.81

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Package dimension does not include mold flash, protrusions, burrs or metal smearing.
4. Dimensioning and tolerancing per ASME Y14.5M.

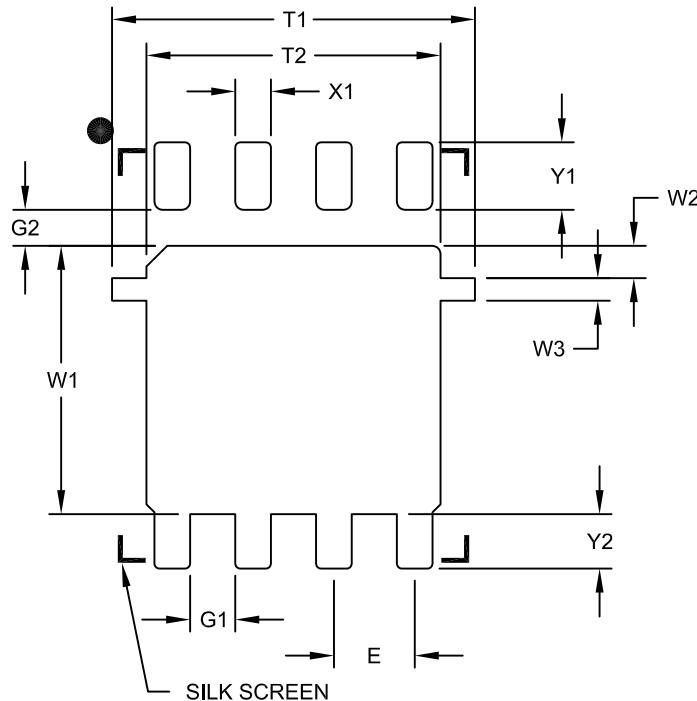
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

8-Lead Power Dual Flatpack No Lead Package (MF) – 5x6x1.0 mm Body [PDFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



### RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		1.27 BSC	
Center Pad Width	W1			4.22
Pad Edge to Tab	W2		0.51	
Tab Width	W3		0.35	
Center Pad Length With Tabs	T1			5.70
Center Pad Length	T2			4.62
Distance Between Terminals	G1	0.71		
Terminal To Center Pad (X4)	G2	0.57		
Terminal Pad Width (X8)	X1			0.56
Terminal Pad Length (X4)	Y1			1.06
Terminal Pad Length (X8)	Y2			0.86

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

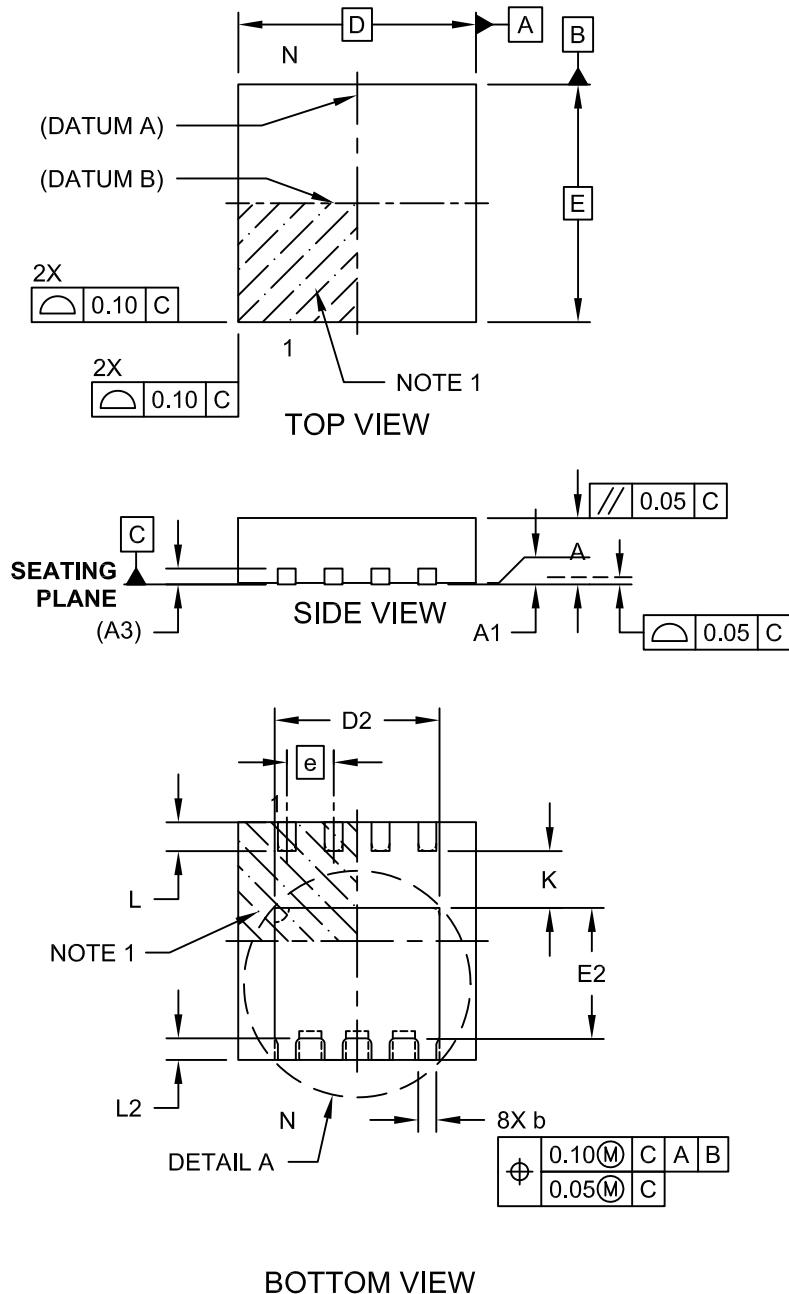
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2188A

## Packaging Diagrams and Parameters

### 8-Lead Power Dual Flatpack No Lead Package (LC) – 3.3x3.3x1.0 mm Body [PDFN]

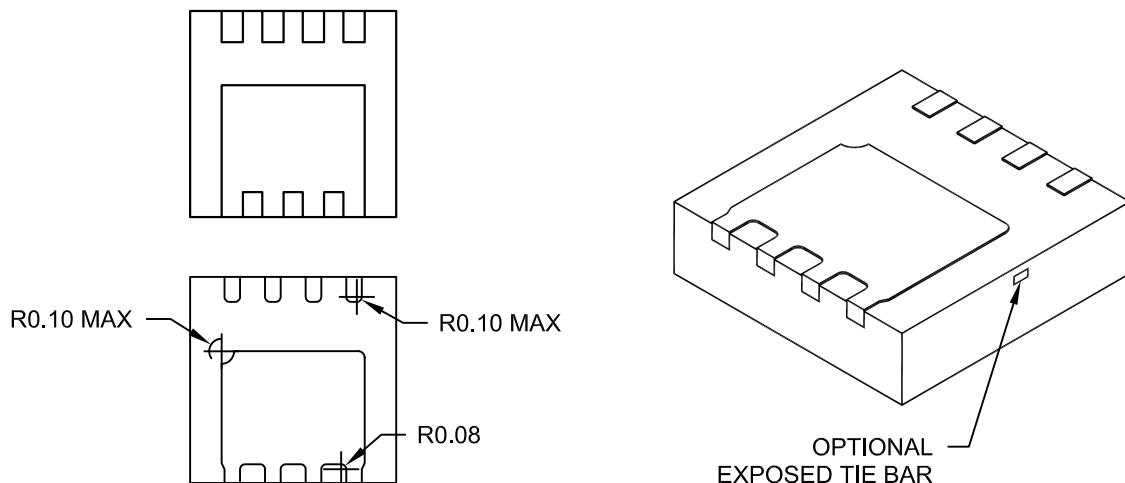
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 8-Lead Power Dual Flatpack No Lead Package (LC) – 3.3x3.3x1.0 mm Body [PDFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



**DETAIL A**  
ALTERNATE EXPOSED PAD CONFIGURATIONS

Dimension	Units	MILLIMETERS		
		MIN	NOM	MAX
Number of Pins	N	8		
Pitch	e	0.65	BSC	
Overall Height	A	0.80	1.00	1.03
Standoff	A1	0.00	-	0.05
Terminal Thickness	(A3)	0.20 REF		
Overall Length	D	3.30 BSC		
Overall Width	E	3.30 BSC		
Exposed Pad length	D2	2.14	2.29	2.39
Exposed Pad Width	E2	1.66	1.81	1.91
Terminal Width	b	0.25	0.30	0.35
Terminal Length	L	0.30	0.40	0.50
Terminal Length	L2	0.30	-	0.40
Terminal to Exposed Pad	K	0.60	-	-

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package may have one or more exposed tie bars.
3. Package is saw singulated.
4. Package dimension does not include mold flash, protrusions, burrs or metal smearing.
5. Dimensioning and tolerancing per ASME Y14.5M.

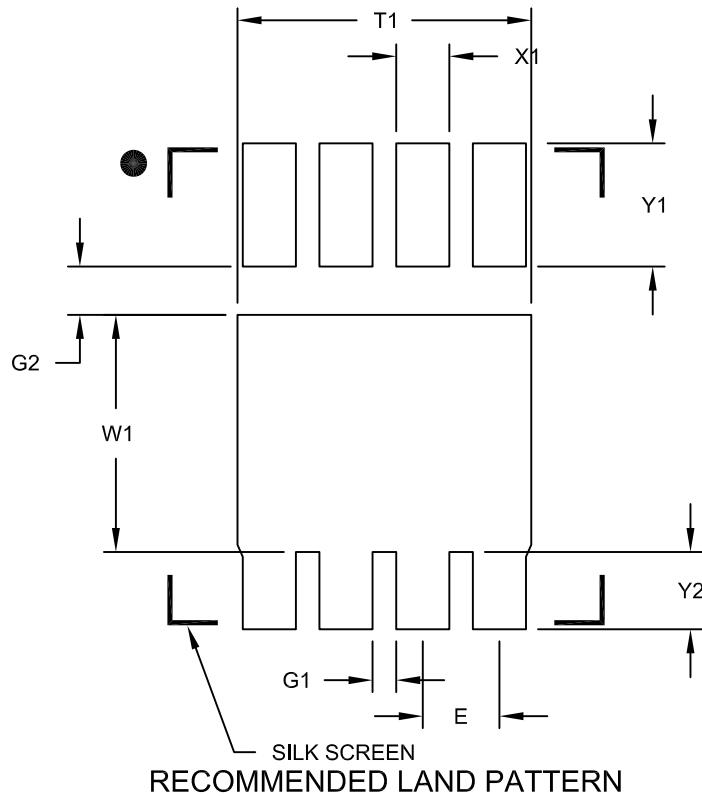
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

8-Lead Power Dual Flatpack No Lead Package (LC) – 3.3x3.3x1.0 mm Body [PDFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch		0.65 BSC		
Center Pad Width	W1			2.01
Center Pad Length	T1			2.49
Distance Between Terminals	G1	0.20		
Terminal Edge to Center Pad	G2	0.41		
Terminal Pad Width (X8)	X1			0.45
Terminal Pad Length (X4)	Y1			1.05
Terminal Pad Length (X8)	Y2			0.66

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2195A



**MICROCHIP**

---

---

## Packaging Diagrams and Parameters

---

---

**NOTES:**

## Packaging Diagrams and Parameters

---

---

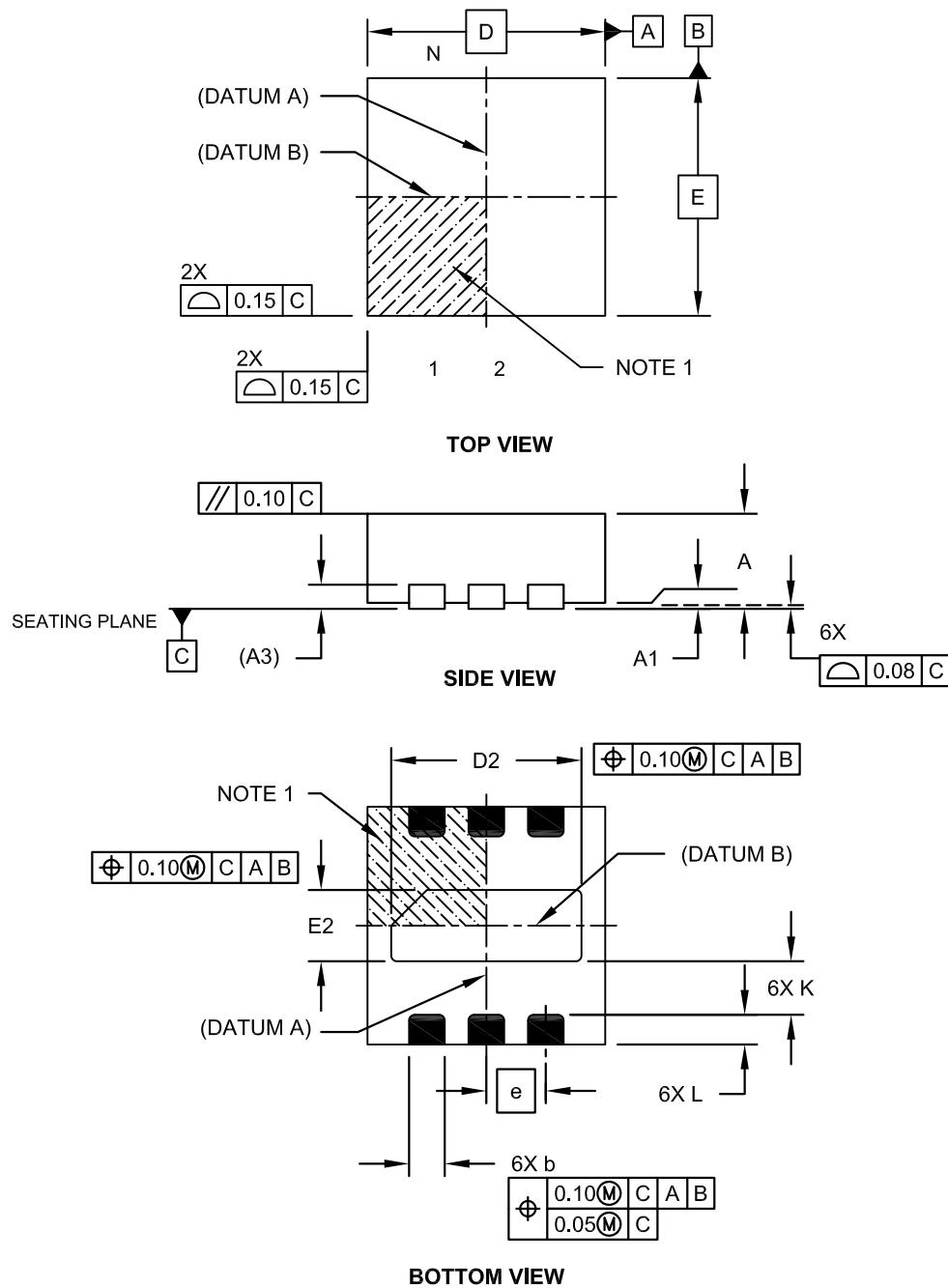
### TDFN Family

Thin Dual Flat, No Lead Packages

## Packaging Diagrams and Parameters

### 6-Lead Plastic Thin Dual Flat, No Lead Package (MY) – 2x2x0.8 mm Body [TDFN]

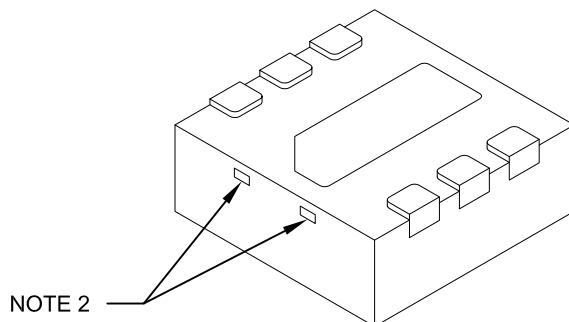
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 6-Lead Plastic Thin Dual Flat, No Lead Package (MY) – 2x2x0.8 mm Body [TDFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		6		
Pitch	e		0.50	BSC	
Overall Height	A	0.70	0.75	0.80	
Standoff	A1	0.00	0.02	0.05	
Contact Thickness	A3		0.20	REF	
Overall Width	E		2.00	BSC	
Exposed Pad Width	E2	0.55	0.60	0.65	
Overall Length	D		2.00	BSC	
Exposed Pad Length	D2	1.55	1.60	1.65	
Contact Width	b	0.25	0.30	0.35	
Contact Length	L	0.20	0.25	0.30	
Contact-to-Exposed Pad	K	0.20	-	-	

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package may have one or more exposed tie bars at ends.
3. Package is saw singulated.
4. Dimensioning and tolerancing per ASME Y14.5M.

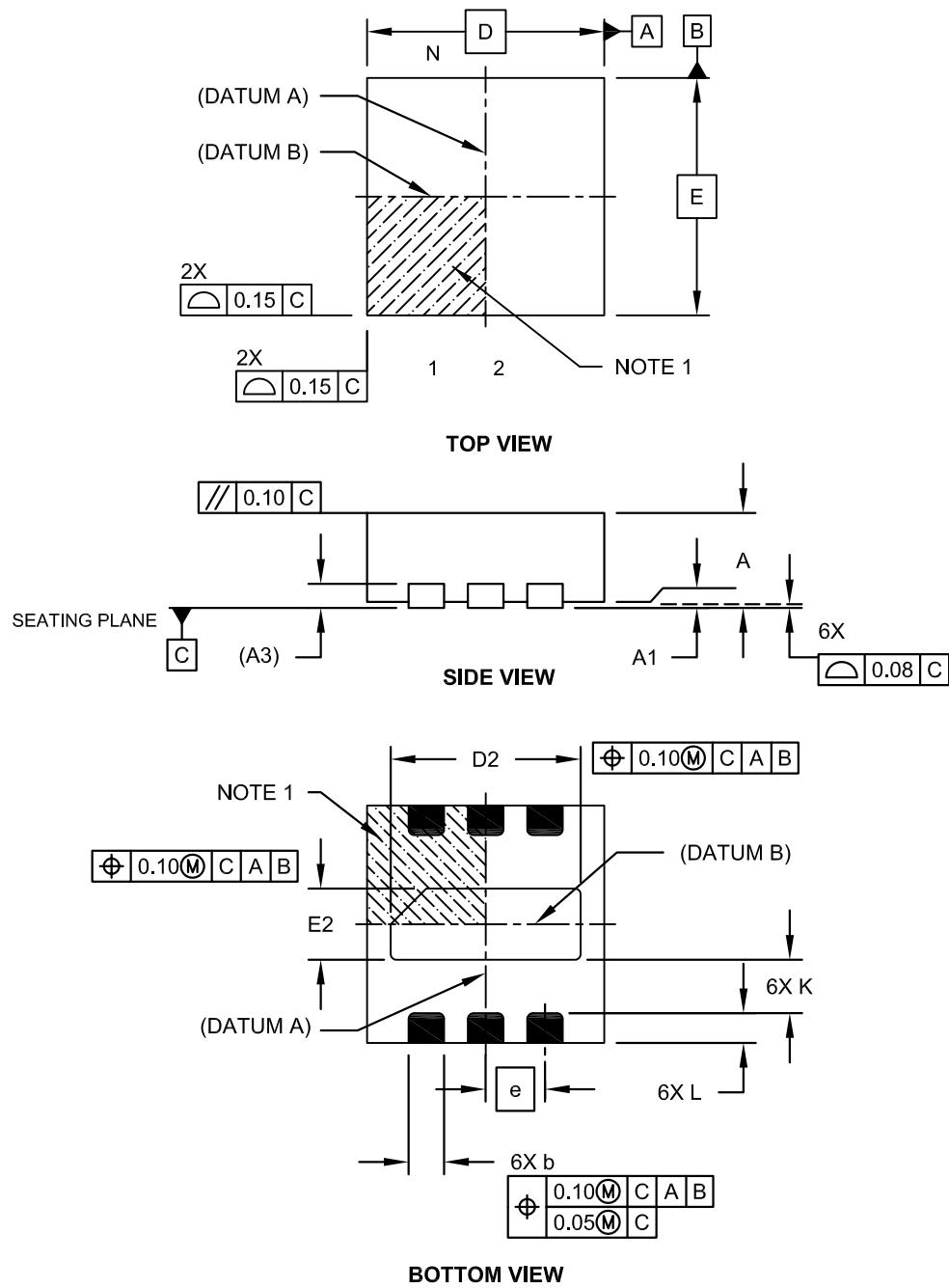
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Packaging Diagrams and Parameters

### 6-Lead Plastic Thin Dual Flat, No Lead Package (MYY) – 2x2x0.8 mm Body [TDFN]

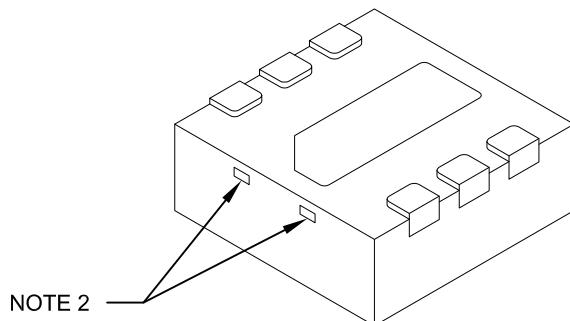
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 6-Lead Plastic Thin Dual Flat, No Lead Package (MYY) – 2x2x0.8 mm Body [TDFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		6		
Pitch	e		0.50	0.50	BSC
Overall Height	A	0.70	0.75	0.80	
Standoff	A1	0.00	0.02	0.05	
Contact Thickness	A3	0.20	0.20	REF	
Overall Width	E	2.00	2.00	BSC	
Exposed Pad Width	E2	0.55	0.60	0.65	
Overall Length	D	2.00	2.00	BSC	
Exposed Pad Length	D2	1.55	1.60	1.65	
Contact Width	b	0.25	0.30	0.35	
Contact Length	L	0.20	0.25	0.30	
Contact-to-Exposed Pad	K	0.20	-	-	

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package may have one or more exposed tie bars at ends.
3. Package is saw singulated.
4. Dimensioning and tolerancing per ASME Y14.5M.

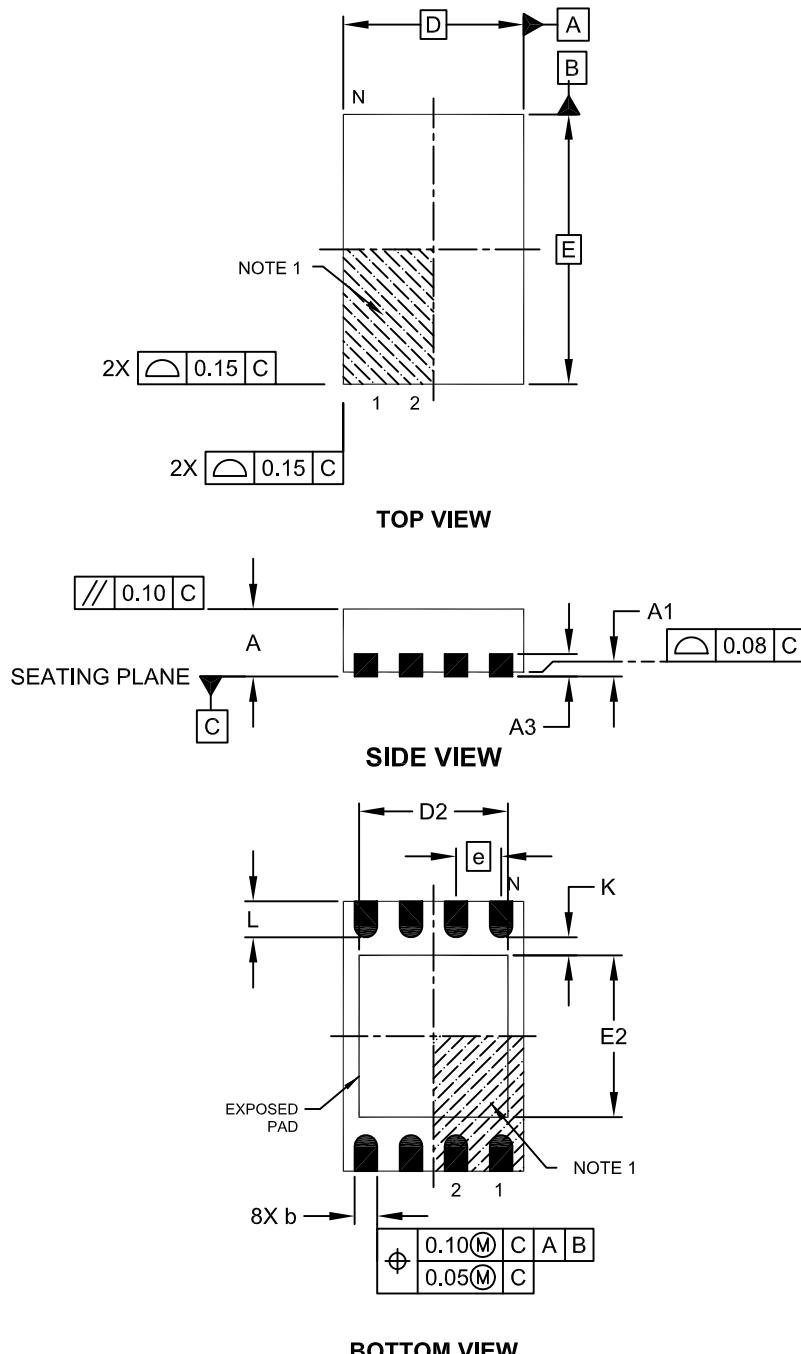
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Packaging Diagrams and Parameters

### 8-Lead Plastic Dual Flat, No Lead Package (MN) – 2x3x0.75mm Body [TDFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

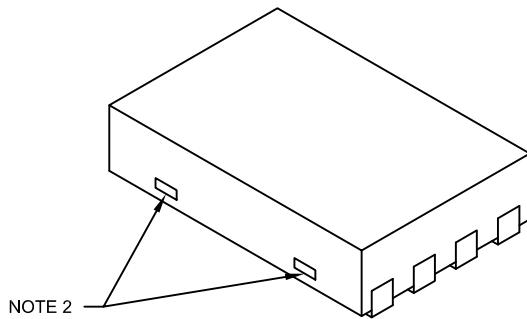


Microchip Technology Drawing No. C04-129C Sheet 1 of 2

## Packaging Diagrams and Parameters

### 8-Lead Plastic Dual Flat, No Lead Package (MN) – 2x3x0.75mm Body [TDFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins		N		8
Pitch		e		0.50 BSC
Overall Height		A		0.70    0.75    0.80
Standoff		A1		0.00    0.02    0.05
Contact Thickness		A3		0.20 REF
Overall Length		D		2.00 BSC
Overall Width		E		3.00 BSC
Exposed Pad Length		D2		1.20    -    1.60
Exposed Pad Width		E2		1.20    -    1.60
Contact Width		b		0.20    0.25    0.30
Contact Length		L		0.25    0.30    0.45
Contact-to-Exposed Pad		K		0.20    -    -

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package may have one or more exposed tie bars at ends.
3. Package is saw singulated
4. Dimensioning and tolerancing per ASME Y14.5M

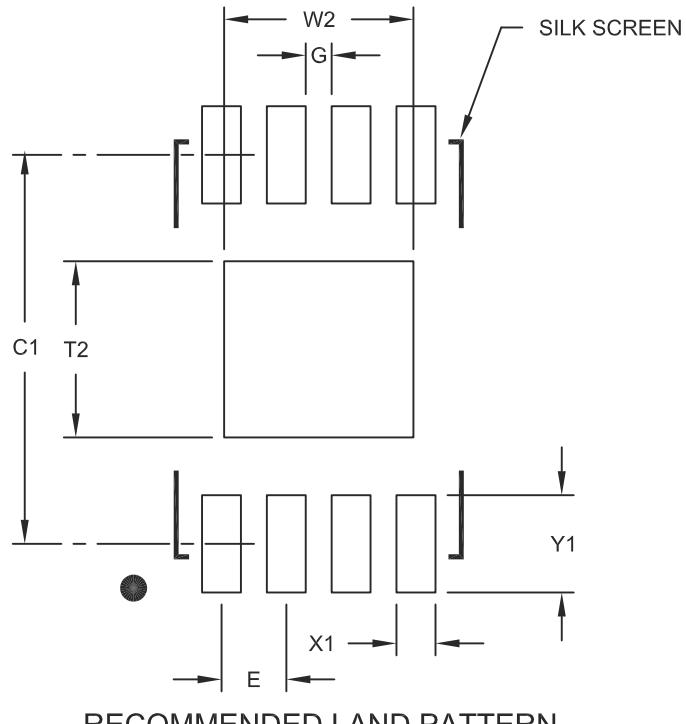
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

### 8-Lead Plastic Dual Flat, No Lead Package (MN) – 2x3x0.75 mm Body [TDFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E		0.50	BSC	
Optional Center Pad Width	W2			1.46	
Optional Center Pad Length	T2			1.36	
Contact Pad Spacing	C1		3.00		
Contact Pad Width (X8)	X1			0.30	
Contact Pad Length (X8)	Y1			0.75	
Distance Between Pads	G	0.20			

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

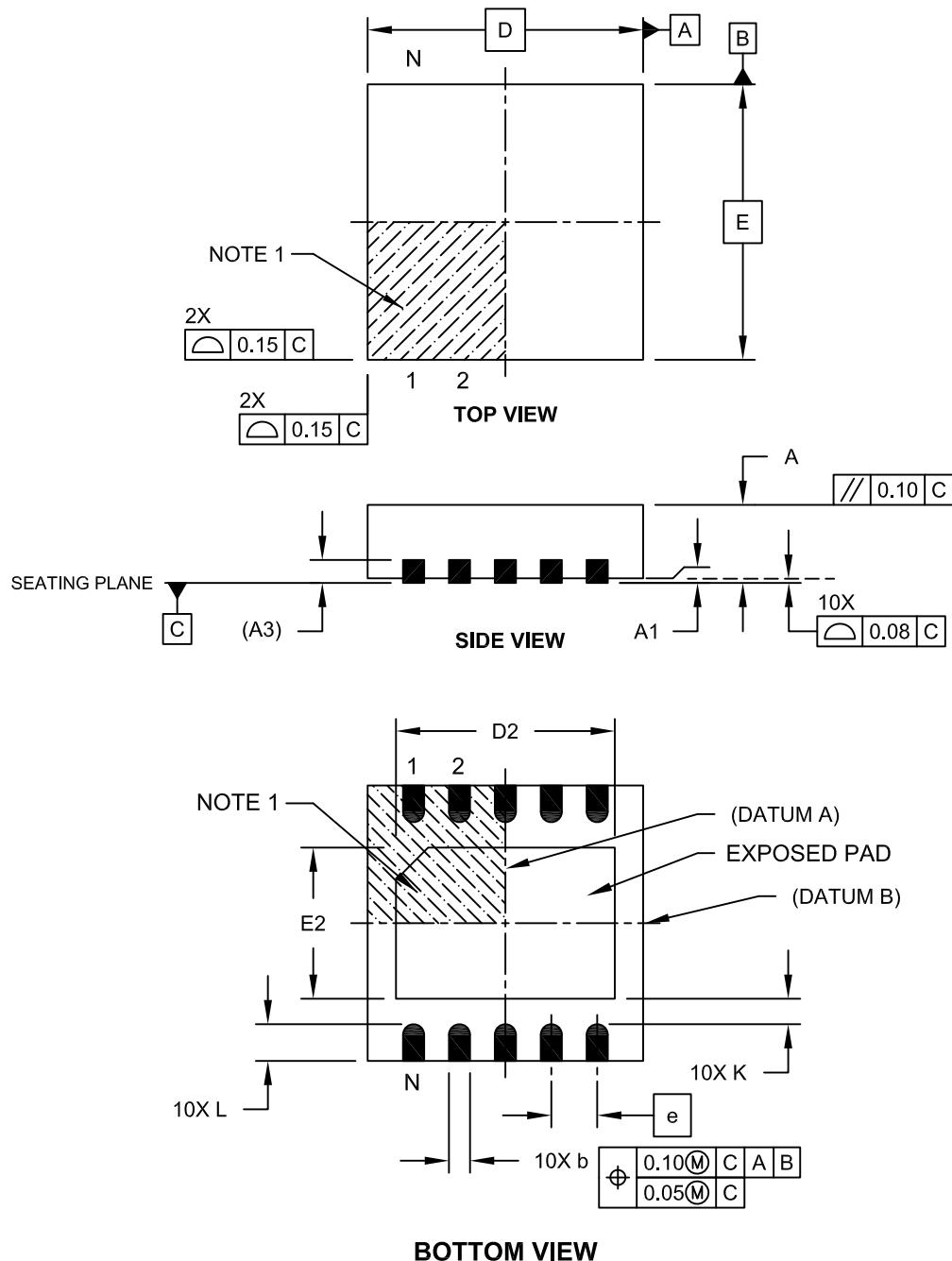
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2129A

## Packaging Diagrams and Parameters

### 10-Lead Thin Plastic Dual Flat, No Lead Package (MN) - 3x3x0.8mm Body [TDFN]

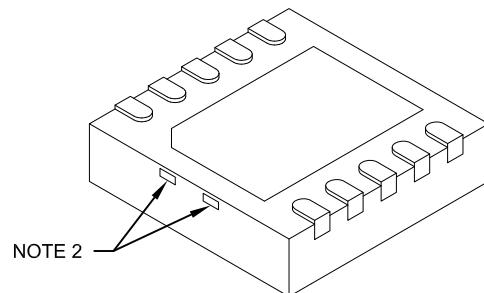
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 10-Lead Thin Plastic Dual Flat, No Lead Package (MN) - 3x3x0.8mm Body [TDFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units			MILLIMETERS		
		Dimension Limits			MIN	NOM	MAX
Number of Pins	N				10		
Pitch	e				0.50	BSC	
Overall Height	A	0.70	0.75	0.80			
Standoff	A1	0.00	0.02	0.05			
Contact Thickness	A3	0.20 REF					
Overall Length	D	3.00 BSC					
Exposed Pad Length	D2	2.20	2.30	2.35			
Overall Width	E	3.00 BSC					
Exposed Pad Width	E2	1.55	1.65	1.70			
Contact Width	b	0.18	0.25	0.30			
Contact Length	L	0.30	0.40	0.50			
Contact-to-Exposed Pad	K	0.20	-	-			

Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package may have one or more exposed tie bars at ends.
3. Package is saw singulated
4. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Packaging Diagrams and Parameters

---

---

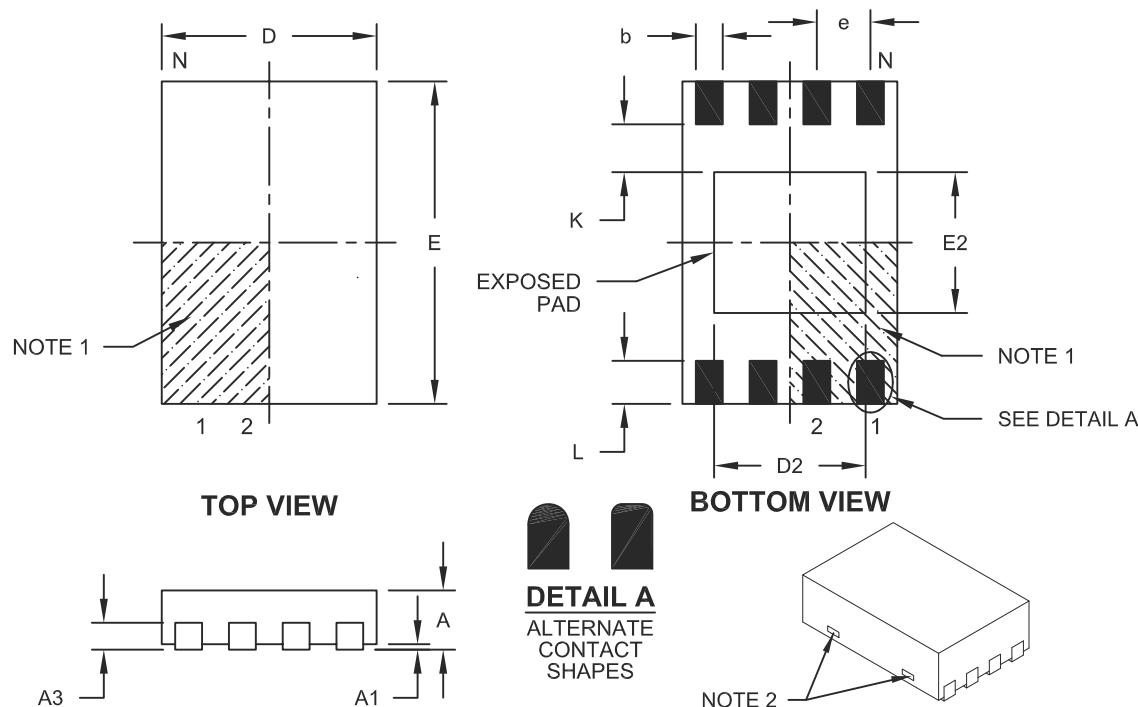
### **UDFN Family**

**Ultra Thin Dual Flat, No Lead Packages**

## Packaging Diagrams and Parameters

### 8-Lead Plastic Dual Flat, No Lead Package (MU) – 2x3x0.5 mm Body [UDFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension	Units	MILLIMETERS		
		MIN	NOM	MAX
Number of Pins	N		8	
Pitch	e		0.50 BSC	
Overall Height	A	0.45	0.50	0.55
Standoff	A1			0.07
Contact Thickness	A3	0.127 REF		
Overall Length	D	1.95	2.00	2.05
Overall Width	E	2.95	3.00	3.05
Exposed Pad Length	D2	1.30	1.40	1.50
Exposed Pad Width	E2	1.20	1.30	1.40
Contact Width	b	0.20	0.25	0.30
Contact Length	L	0.25	0.30	0.35
Contact-to-Exposed Pad	K	0.55 REF		

#### Notes:

- Pin 1 visual index feature may vary, but must be located within the hatched area.
- Package may have one or more exposed tie bars at ends.
- Package is saw singulated
- Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

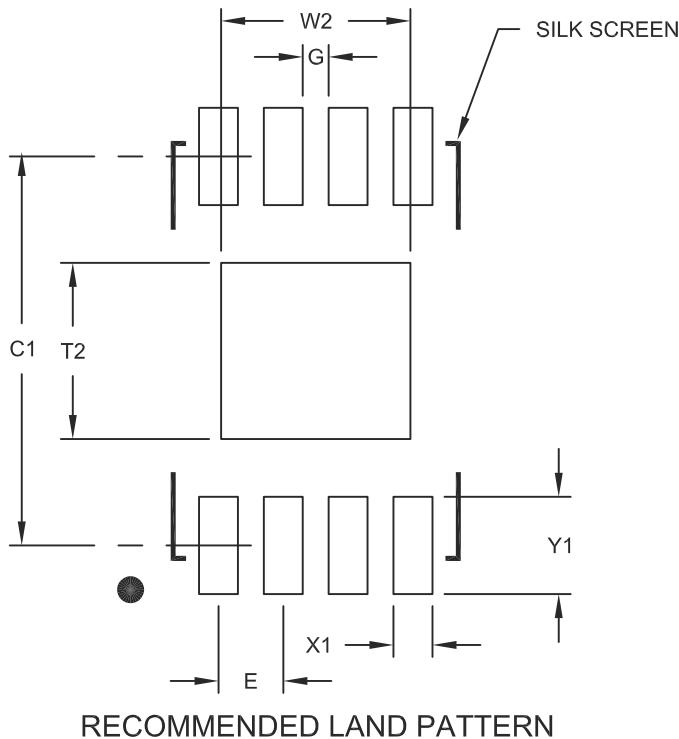
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing No. C04-136B

## Land Pattern (Footprint)

### 8-Lead Plastic Dual Flat, No Lead Package (MU) – 2x3x0.5 mm Body [UDFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	0.50	BSC	
Optional Center Pad Width	W2			1.46
Optional Center Pad Length	T2			1.36
Contact Pad Spacing	C1	3.00		
Contact Pad Width (X8)	X1			0.30
Contact Pad Length (X8)	Y1			0.75
Distance Between Pads	G	0.20		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

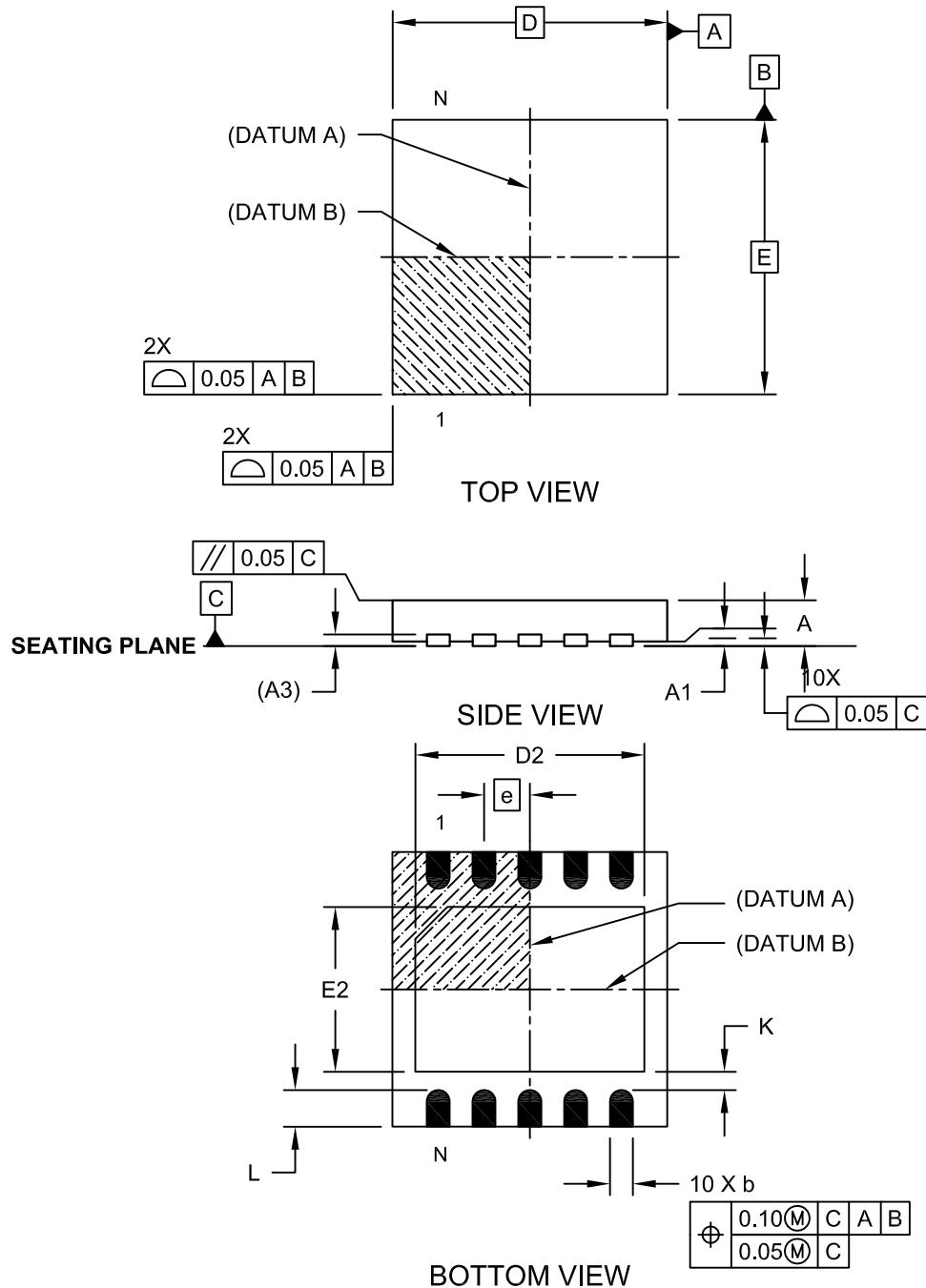
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2136A

## Packaging Diagrams and Parameters

### 10-Lead Ultra-thin Dual Flatpack No-Lead (NA[Y]) – 3x3x0.5 mm Body [UDFN]

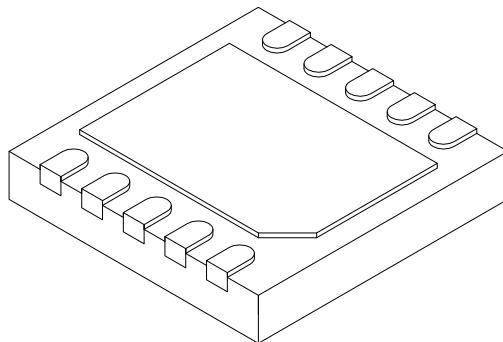
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 10-Lead Ultra-thin Dual Flatpack No-Lead (NA[Y]) – 3x3x0.5 mm Body [UDFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension	Units	MILLIMETERS		
		MIN	NOM	MAX
Number of Pins	N		10	
Pitch	e		0.50 BSC	
Overall Height	A	0.45	0.50	0.55
Standoff	A1	0.00	-	0.05
Overall Length	D		3.00 BSC	
Overall Width	E		3.00 BSC	
Exposed Pad Length	D2	2.40	2.50	2.60
Exposed Pad Width	E2	1.70	1.80	1.90
Terminal Thickness	(A3)		0.127 REF	
Terminal Width	b	0.20	0.25	0.30
Terminal Length	L	0.30	0.40	0.50
Terminal-to-Exposed Pad	K	0.20	-	-

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package may have one or more exposed tie bars at ends.
2. Package is saw singulated
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Packaging Diagrams and Parameters

---

---

**NOTES:**

## Packaging Diagrams and Parameters

---

---

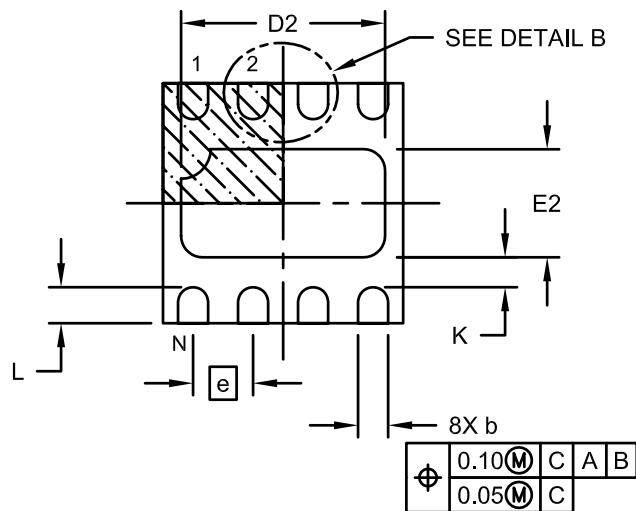
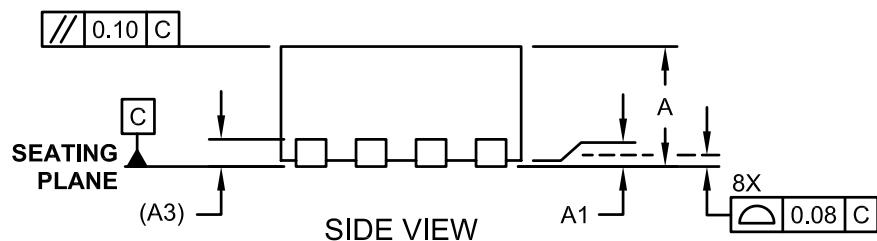
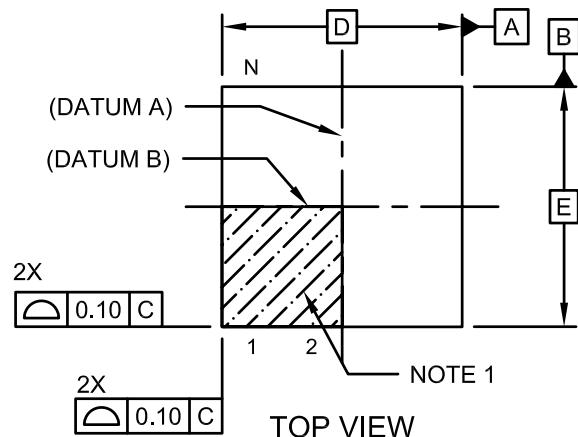
### VDFN Family

Very Thin Dual Flat, No Lead Packages

## Packaging Diagrams and Parameters

### 8-Lead Very Thin Dual Flatpack No-Lead (LZ) – 2x2x0.9 mm Body [VDFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

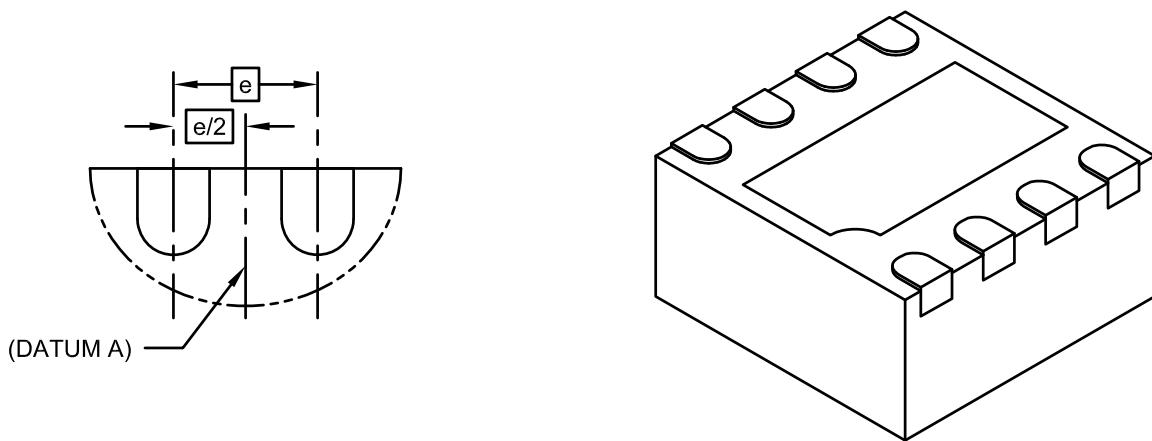


BOTTOM VIEW

## Packaging Diagrams and Parameters

### 8-Lead Very Thin Dual Flatpack No-Lead (LZ) – 2x2x0.9 mm Body [VDFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



DETAIL B

Dimension	Limits	Units MILLIMETERS		
		MIN	NOM	MAX
Number of Pins	N	8		
Pitch	e	0.50	BSC	
Overall Height	A	0.80	0.90	1.00
Standoff	A1	0.00	0.02	0.05
Terminal Thickness (REF)	(A3)	0.20	(REF)	
Overall Width	D	2.00	BSC	
Exposed Pad Width	D2	1.55	1.70	1.80
Overall Length	E	2.00	BSC	
Exposed Pad Length	E2	0.75	0.90	1.00
Terminal Width	b	0.18	0.25	0.30
Terminal Length	L	0.20	0.30	0.40
Terminal-to-Exposed Pad	K	0.20	-	-

**Notes:**

- Pin 1 visual index feature may vary, but must be located within the hatched area.
- Package may have one or more exposed tie bars at ends.
- Package is saw singulated
- Dimensioning and tolerancing per ASME Y14.5M.

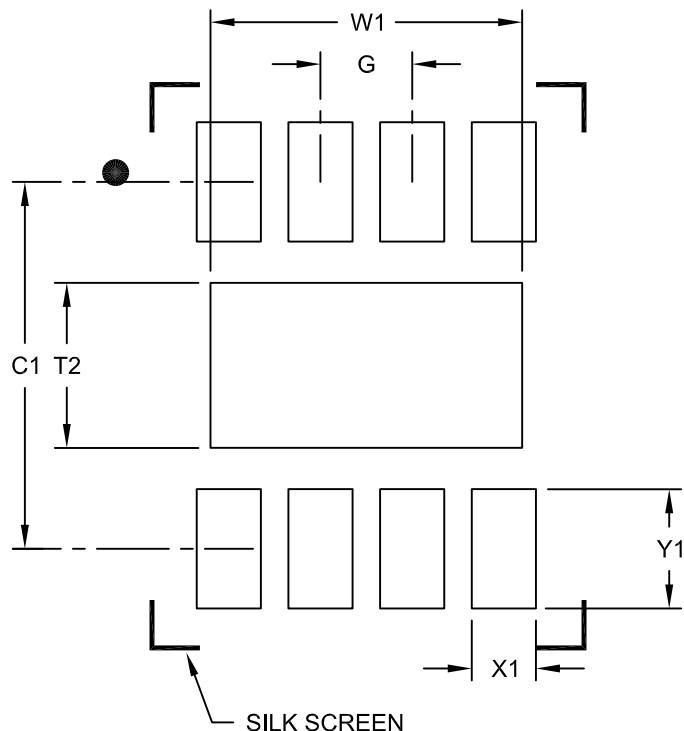
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

**8-Lead Plastic Very Thin Flat, No Lead Package (LZ) - 2x2 mm Body [VDFN]  
With 0.55mm Contact Length**

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at  
<http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	0.50 BSC		
Optional Center Pad Width	W1			1.70
Optional Center Pad Length	T2			0.90
Contact Pad Spacing	C1		2.00	
Contact Pad Width (X28)	X1			0.35
Contact Pad Length (X28)	Y1			0.65
Distance Between Pads	G	0.15		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2198A

## Packaging Diagrams and Parameters

---

---

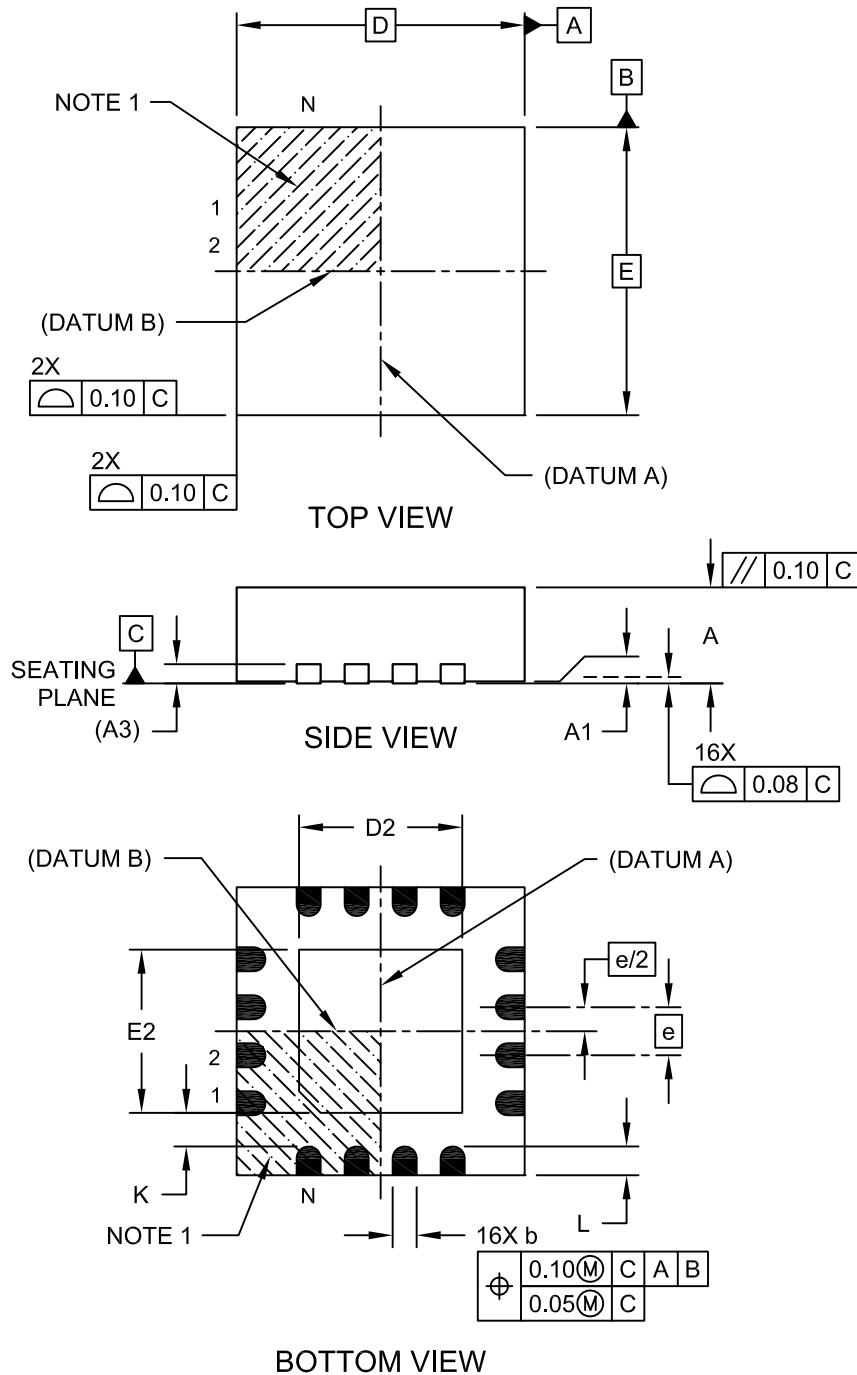
### **QFN Family**

**Quad Flat, No Lead Package**

## Packaging Diagrams and Parameters

### 16-Lead Plastic Quad Flat, No Lead Package (NG) - 3x3x0.9 mm Body [QFN]

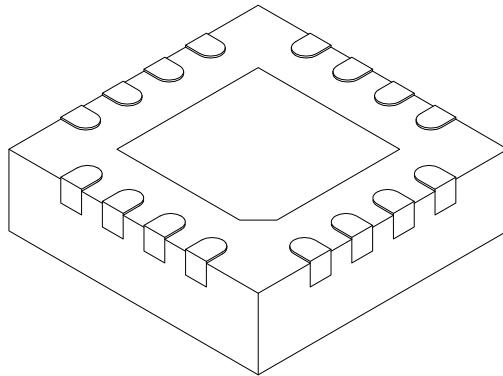
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 16-Lead Plastic Quad Flat, No Lead Package (NG) - 3x3x0.9 mm Body [QFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension	Limits	Units MILLIMETERS		
		MIN	NOM	MAX
Number of Pins	N		16	
Pitch	e		0.50 BSC	
Overall Height	A	0.80	0.90	1.00
Standoff	A1	0.00	0.02	0.05
Terminal Thickness	A3		0.20 REF	
Overall Width	E		3.00 BSC	
Exposed Pad Width	E2	1.55	1.70	1.80
Overall Length	D		3.00 BSC	
Exposed Pad Length	D2	1.55	1.70	1.80
Terminal Width	b	0.18	0.25	0.30
Terminal Length	L	0.20	0.30	0.40
Terminal-to-Exposed Pad	K	0.20	-	-

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.

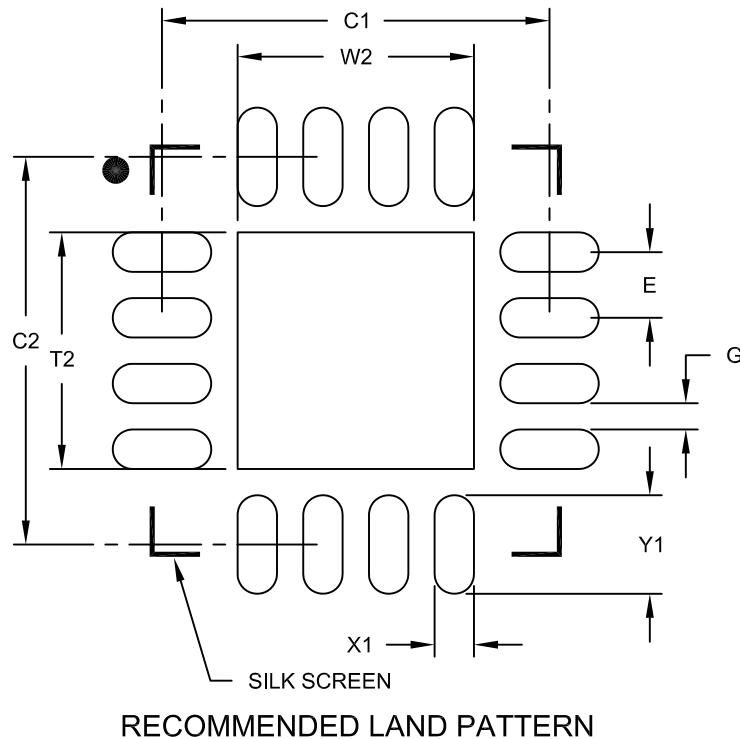
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

16-Lead Plastic Quad Flat, No Lead Package (NG) – 3x3x0.9 mm Body [QFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units			MILLIMETERS		
		Dimension Limits			MIN	NOM	MAX
Contact Pitch	E				0.50	BSC	
Optional Center Pad Width	W2					1.80	
Optional Center Pad Length	T2					1.80	
Contact Pad Spacing	C1				2.95		
Contact Pad Spacing	C2				2.95		
Contact Pad Width (X16)	X1					0.30	
Contact Pad Length (X16)	Y1					0.75	
Distance Between Pads	G	0.20					

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

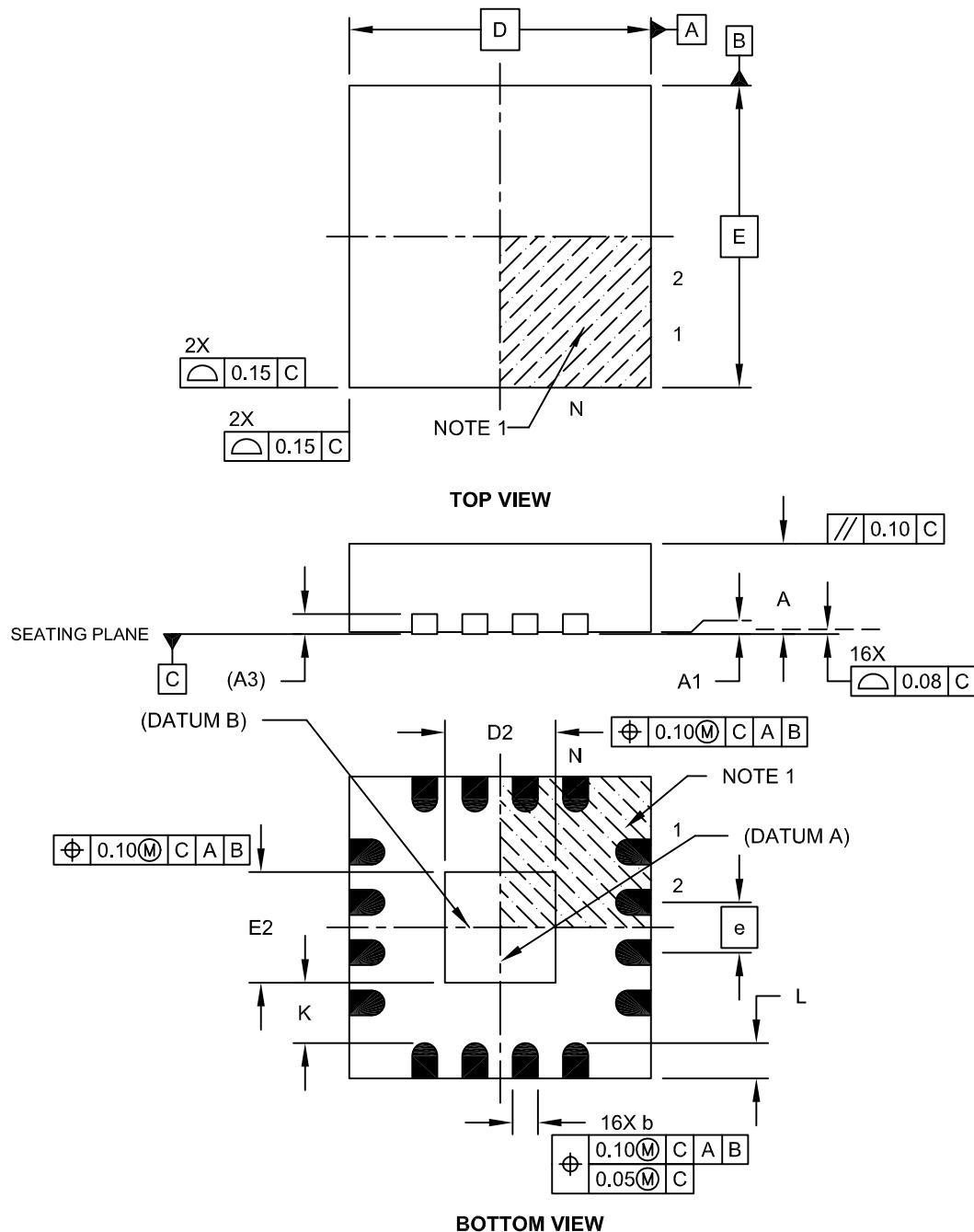
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2197A

## Packaging Diagrams and Parameters

### 16-Lead Plastic Quad Flat, No Lead Package (MG) - 3x3x0.9 mm Body [QFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

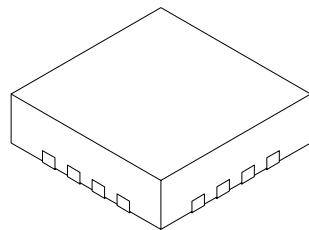


## Packaging Diagrams and Parameters

---

### 16-Lead Plastic Quad Flat, No Lead Package (MG) - 3x3x0.9 mm Body [QFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units			MILLIMETERS		
		Dimension Limits			MIN	NOM	MAX
Number of Pins	N				16		
Pitch	e				0.50	BSC	
Overall Height	A	0.80		0.85		0.90	
Standoff	A1	0.00		0.02		0.05	
Contact Thickness	A3			0.20	REF		
Overall Width	E			3.00	BSC		
Exposed Pad Width	E2	1.00		1.10		1.50	
Overall Length	D			3.00	BSC		
Exposed Pad Length	D2	1.00		1.10		1.50	
Contact Width	b	0.18		0.25		0.30	
Contact Length	L	0.25		0.35		0.45	
Contact-to-Exposed Pad	K	0.20		-		-	

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.

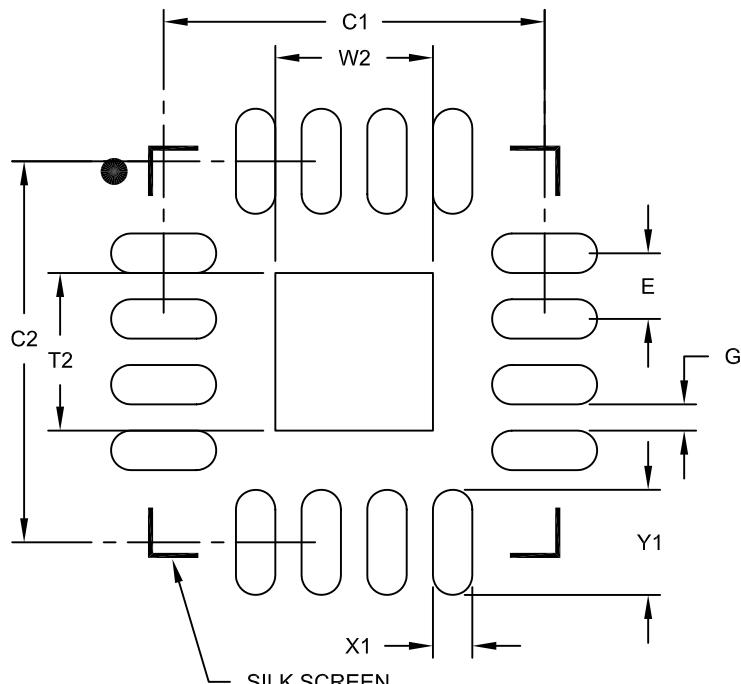
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

16-Lead Plastic Quad Flat, No Lead Package (MG) – 3x3x0.9 mm Body [QFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units			MILLIMETERS		
		Dimension Limits			MIN	NOM	MAX
Contact Pitch		E			0.50 BSC		
Optional Center Pad Width		W2			1.20		
Optional Center Pad Length		T2			1.20		
Contact Pad Spacing		C1			2.90		
Contact Pad Spacing		C2			2.90		
Contact Pad Width (X16)		X1			0.30		
Contact Pad Length (X16)		Y1			0.80		
Distance Between Pads		G			0.20		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

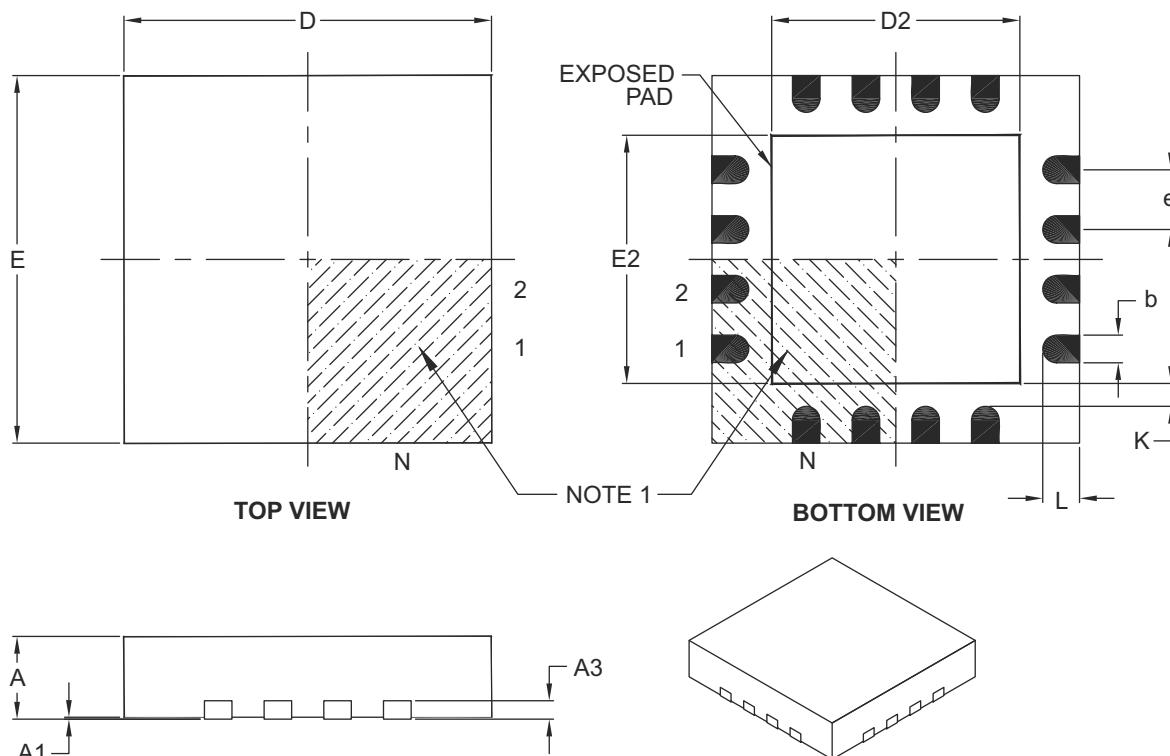
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2142A

## Packaging Diagrams and Parameters

### 16-Lead Plastic Quad Flat, No Lead Package (ML) – 4x4x0.9 mm Body [QFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	<b>N</b>		16		
Pitch	<b>e</b>		0.65	BSC	
Overall Height	<b>A</b>	0.80	0.90	1.00	
Standoff	<b>A1</b>	0.00	0.02	0.05	
Contact Thickness	<b>A3</b>	0.20 REF			
Overall Width	<b>E</b>	4.00 BSC			
Exposed Pad Width	<b>E2</b>	2.50	2.65	2.80	
Overall Length	<b>D</b>	4.00 BSC			
Exposed Pad Length	<b>D2</b>	2.50	2.65	2.80	
Contact Width	<b>b</b>	0.25	0.30	0.35	
Contact Length	<b>L</b>	0.30	0.40	0.50	
Contact-to-Exposed Pad	<b>K</b>	0.20	–	–	

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.

2. Package is saw singulated.

3. Dimensioning and tolerancing per ASME Y14.5M.

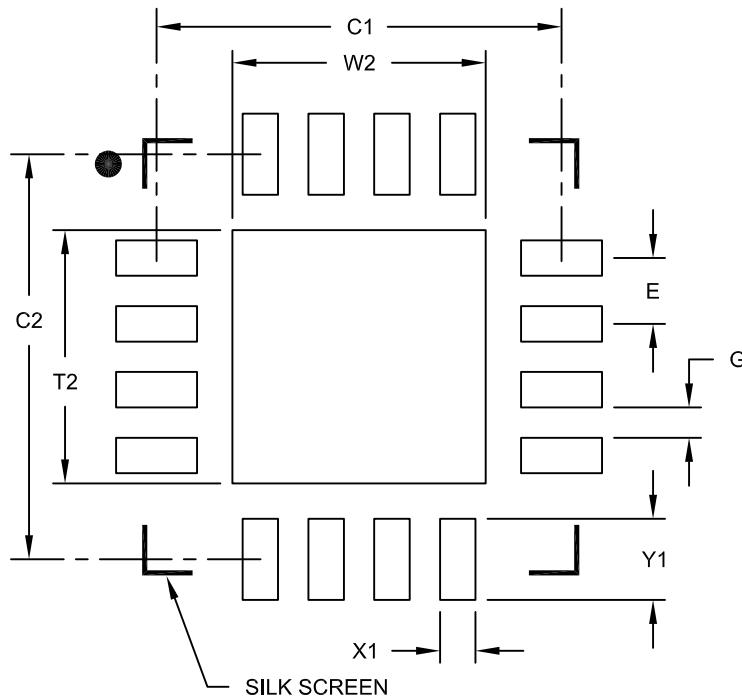
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

### 16-Lead Plastic Quad Flat, No Lead Package (ML) - 4x4x0.9mm Body [QFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension	Limits	MIN	NOM	MAX
Contact Pitch	E	0.65 BSC		
Optional Center Pad Width	W2			2.50
Optional Center Pad Length	T2			2.50
Contact Pad Spacing	C1		4.00	
Contact Pad Spacing	C2		4.00	
Contact Pad Width (X16)	X1			0.35
Contact Pad Length (X16)	Y1			0.80
Distance Between Pads	G	0.30		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

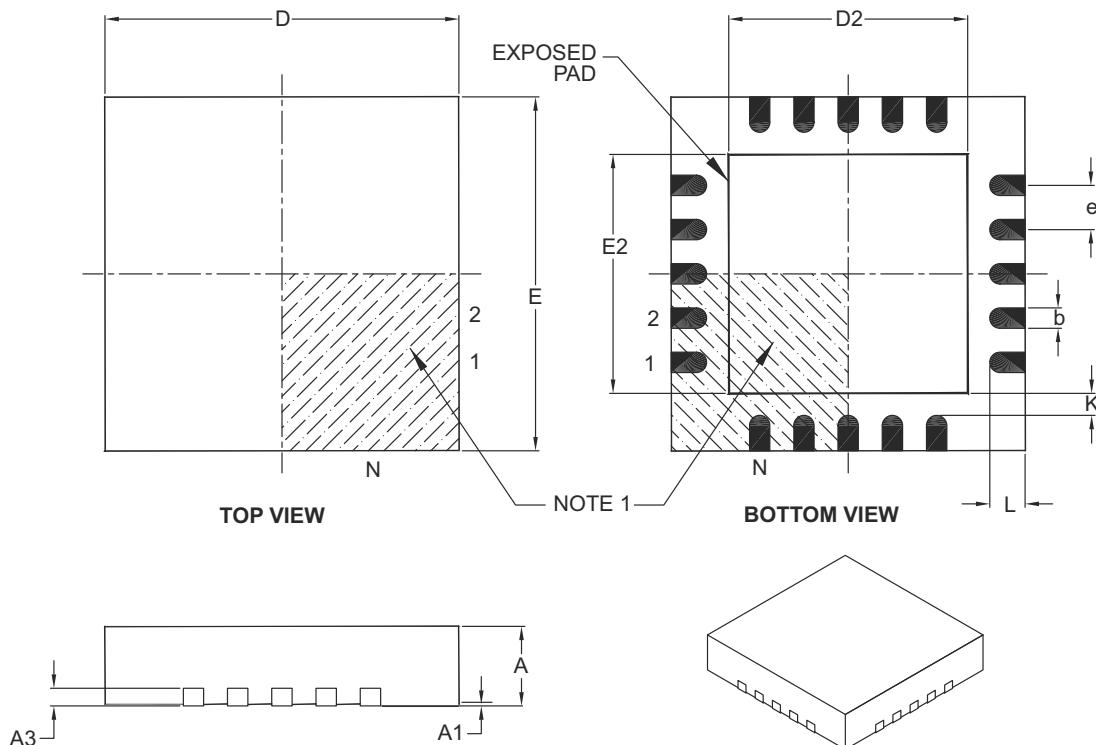
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2127A

## Packaging Diagrams and Parameters

### 20-Lead Plastic Quad Flat, No Lead Package (ML) – 4x4x0.9 mm Body [QFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		UNITS			MILLIMETERS		
		DIMENSION LIMITS			MIN	NOM	MAX
Number of Pins	N				20		
Pitch	e				0.50	BSC	
Overall Height	A	0.80	0.90	1.00			
Standoff	A1	0.00	0.02	0.05			
Contact Thickness	A3	0.20 REF					
Overall Width	E	4.00 BSC					
Exposed Pad Width	E2	2.60	2.70	2.80			
Overall Length	D	4.00 BSC					
Exposed Pad Length	D2	2.60	2.70	2.80			
Contact Width	b	0.18	0.25	0.30			
Contact Length	L	0.30	0.40	0.50			
Contact-to-Exposed Pad	K	0.20	-	-			

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.

2. Package is saw singulated.

3. Dimensioning and tolerancing per ASME Y14.5M.

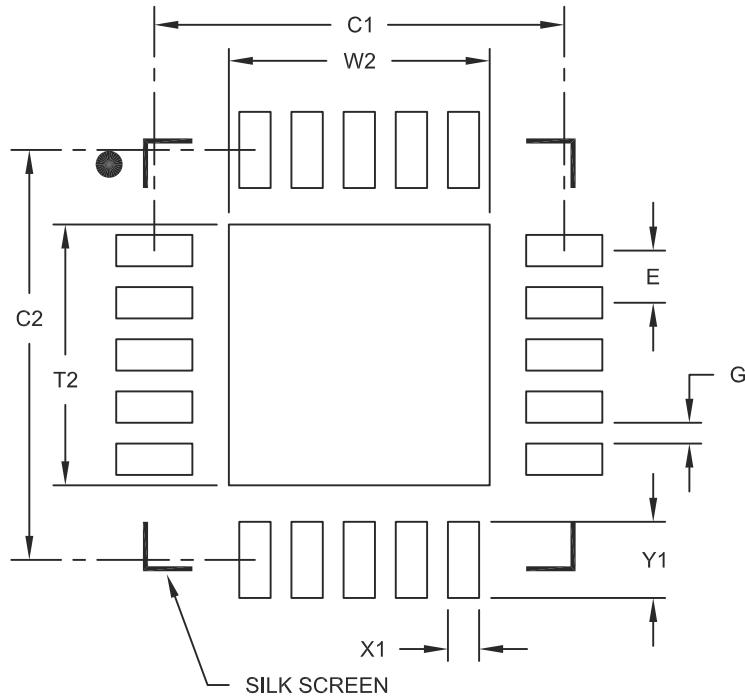
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

20-Lead Plastic Quad Flat, No Lead Package (ML) - 4x4 mm Body [QFN]  
 With 0.40 mm Contact Length

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E		0.50	BSC	
Optional Center Pad Width	W2			2.50	
Optional Center Pad Length	T2			2.50	
Contact Pad Spacing	C1		3.93		
Contact Pad Spacing	C2		3.93		
Contact Pad Width	X1			0.30	
Contact Pad Length	Y1			0.73	
Distance Between Pads	G	0.20			

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

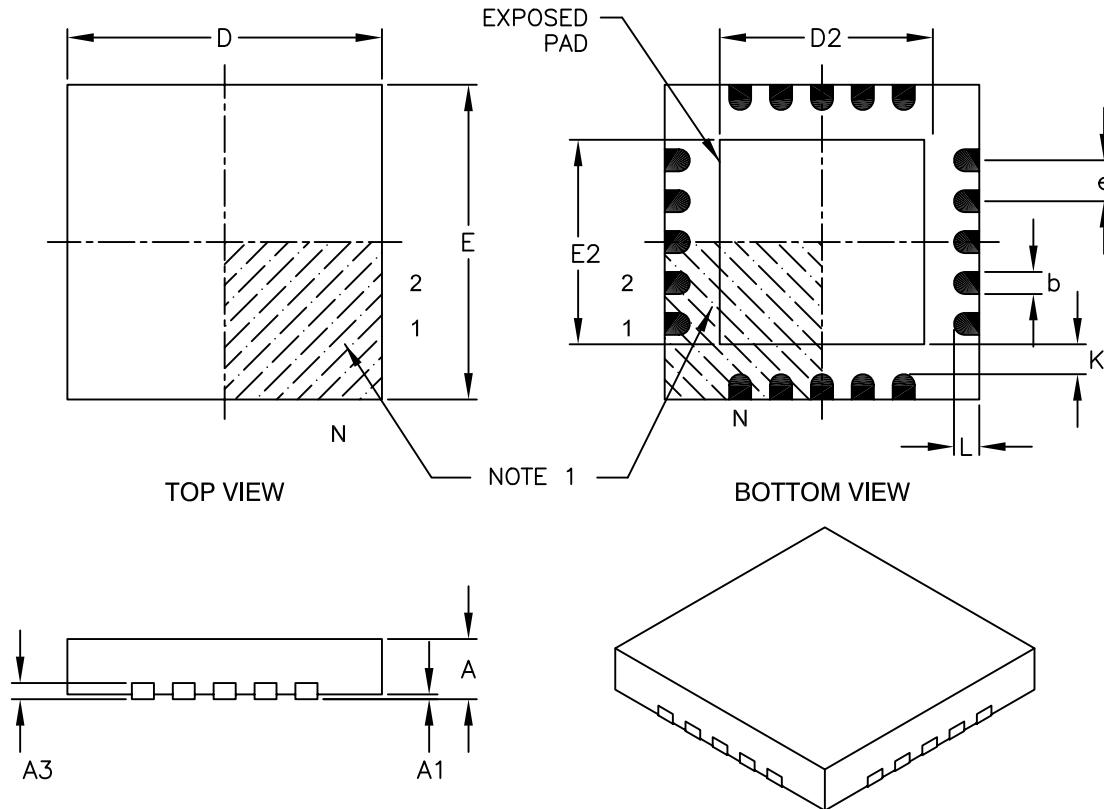
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2126A

## Packaging Diagrams and Parameters

### 20-Lead Plastic Quad Flat, No Lead Package (MQ) – 5x5x0.9 mm Body [QFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension	Limits	MIN	NOM	MAX
Number of Pins	N		20	
Pitch	e		0.65 BSC	
Overall Height	A	0.80	0.90	1.00
Standoff	A1	0.00	0.02	0.05
Contact Thickness	A3		0.20 REF	
Overall Width	E		5.00 BSC	
Exposed Pad Width	E2	3.15	3.25	3.35
Overall Length	D		5.00 BSC	
Exposed Pad Length	D2	3.15	3.25	3.35
Contact Width	b	0.25	0.30	0.35
Contact Length	L	0.35	0.40	0.45
Contact-to-Exposed Pad	K	0.20	-	-

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.

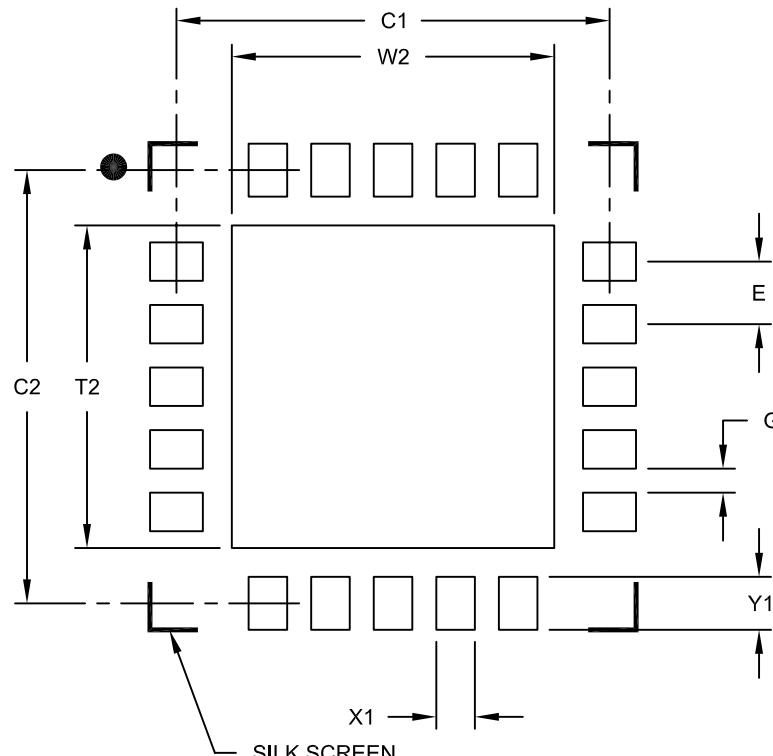
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

20-Lead Plastic Quad Flat, No Lead Package (MQ) - 5x5 mm Body [QFN]  
With 0.40mm Contact Length

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at  
<http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch		0.65 BSC		
Optional Center Pad Width	W2			3.35
Optional Center Pad Length	T2			3.35
Contact Pad Spacing	C1		4.50	
Contact Pad Spacing	C2		4.50	
Contact Pad Width (X20)	X1			0.40
Contact Pad Length (X20)	Y1			0.55
Distance Between Pads	G	0.20		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

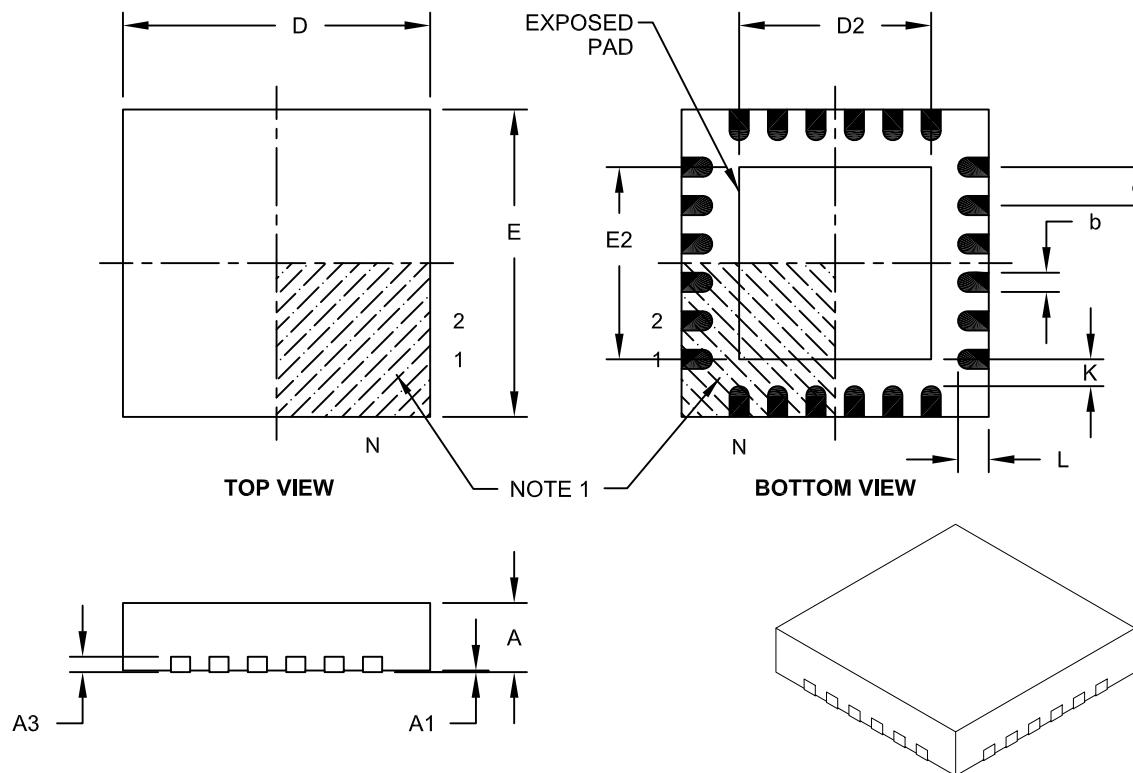
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2139A

## Packaging Diagrams and Parameters

### 24-Lead Plastic Quad Flat, No Lead Package (MJ) – 4x4x0.9 mm Body [QFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N			24	
Pitch	e			0.50 BSC	
Overall Height	A		0.80	0.85	0.90
Standoff	A1		0.00	0.02	0.05
Contact Thickness	A3			0.20 REF	
Overall Width	E			4.00 BSC	
Exposed Pad Width	E2		2.40	2.50	2.60
Overall Length	D			4.00 BSC	
Exposed Pad Length	D2		2.40	2.50	2.60
Contact Width	b		0.20	0.25	0.30
Contact Length	L		0.30	0.40	0.50
Contact-to-Exposed Pad	K		0.20	-	-

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.

2. Package is saw singulated.

3. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

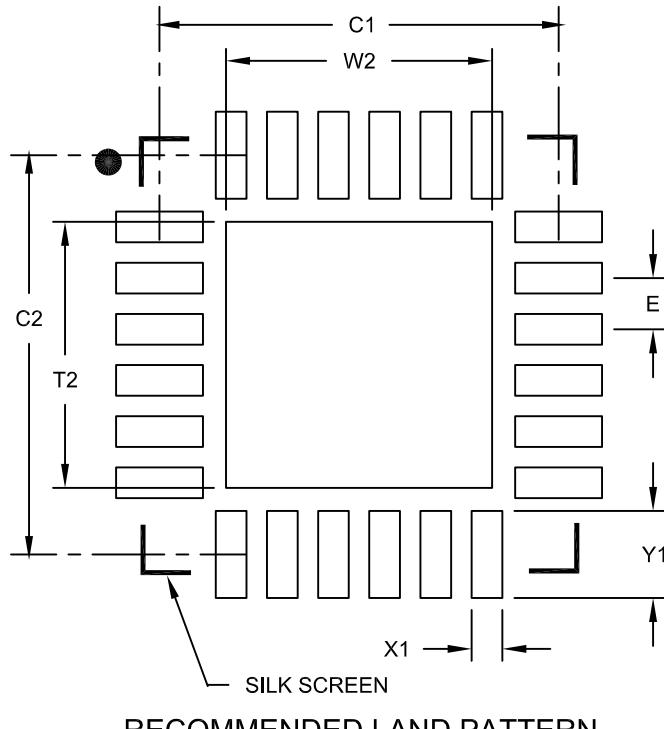
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-143A

## Land Pattern (Footprint)

### 24-Lead Plastic Quad Flat, No Lead Package (MJ) - 4x4 mm Body [QFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units			MILLIMETERS		
		Dimension Limits		MIN	NOM	MAX	
Contact Pitch	E			0.50	BSC		
Optional Center Pad Width	W2				2.60		
Optional Center Pad Length	T2				2.60		
Contact Pad Spacing	C1			3.90			
Contact Pad Spacing	C2			3.90			
Contact Pad Width	X1				0.30		
Contact Pad Length	Y1				0.85		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

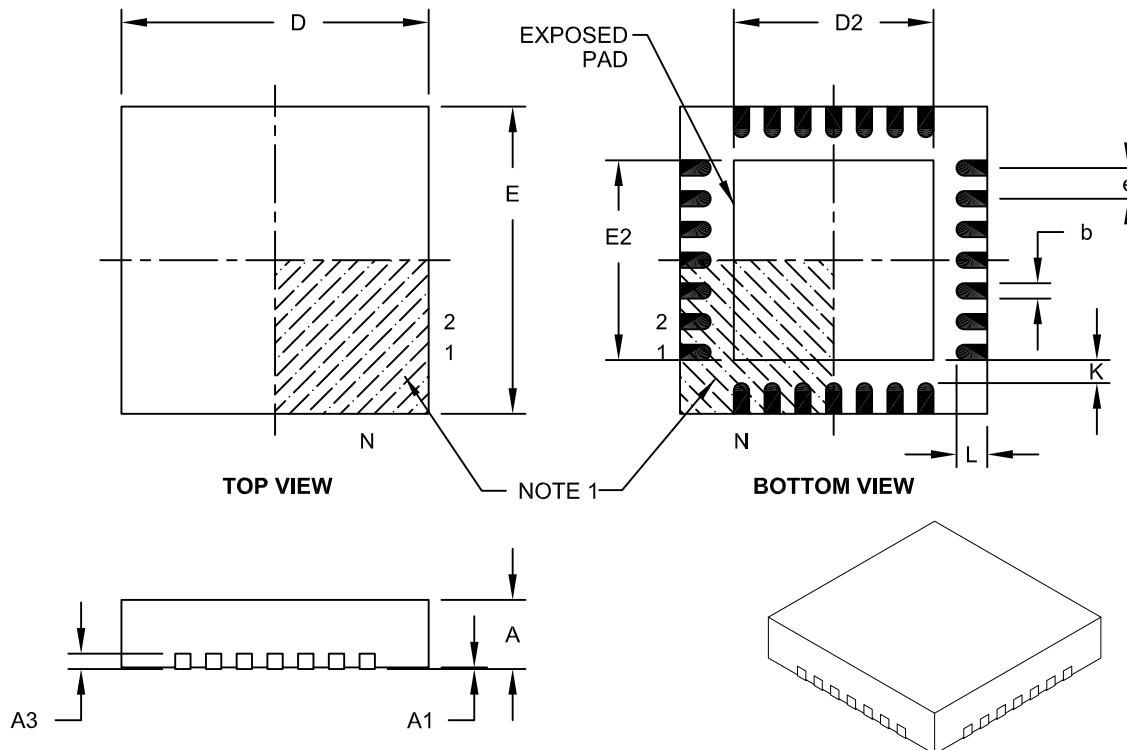
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2143B

## Packaging Diagrams and Parameters

### 28-Lead Plastic Quad Flat, No Lead Package (MK) – 4x4x0.9 mm Body [QFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		28		
Pitch	e		0.40	BSC	
Overall Height	A	0.80	0.85	0.90	
Standoff	A1	0.00	0.02	0.05	
Contact Thickness	A3		0.20	REF	
Overall Width	E		4.00	BSC	
Exposed Pad Width	E2	2.50	2.60	2.70	
Overall Length	D		4.00	BSC	
Exposed Pad Length	D2	2.50	2.60	2.70	
Contact Width	b	0.17	0.20	0.25	
Contact Length	L	0.30	0.40	0.50	
Contact-to-Exposed Pad	K	0.20	-	-	

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

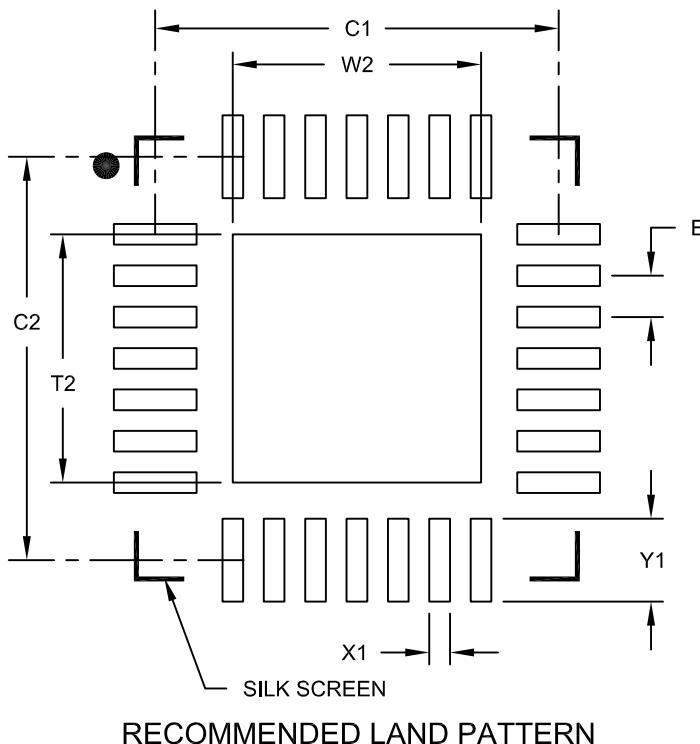
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-144A

## Land Pattern (Footprint)

### 28-Lead Plastic Quad Flat, No Lead Package (MK) – 4x4x0.9 mm Body [QFN] Land Pattern

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		0.40	BSC
Optional Center Pad Width	W2			2.40
Optional Center Pad Length	T2			2.40
Contact Pad Spacing	C1		3.90	
Contact Pad Spacing	C2		3.90	
Contact Pad Width	X1			0.20
Contact Pad Length	Y1			0.80

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

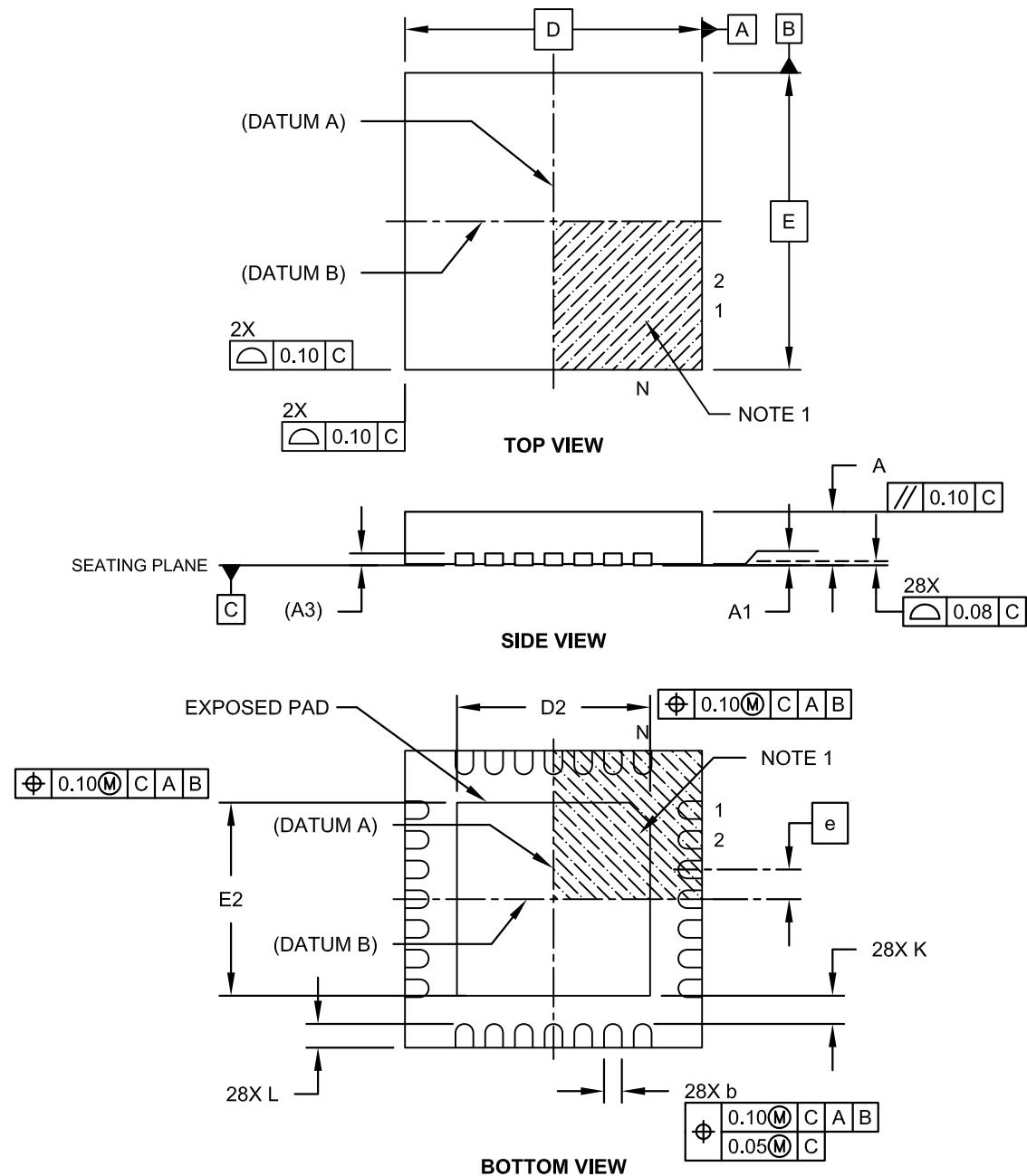
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2144A

## Packaging Diagrams and Parameters

### 28-Lead Plastic Quad Flat, No Lead Package (MQ) – 5x5x0.9 mm Body [QFN]

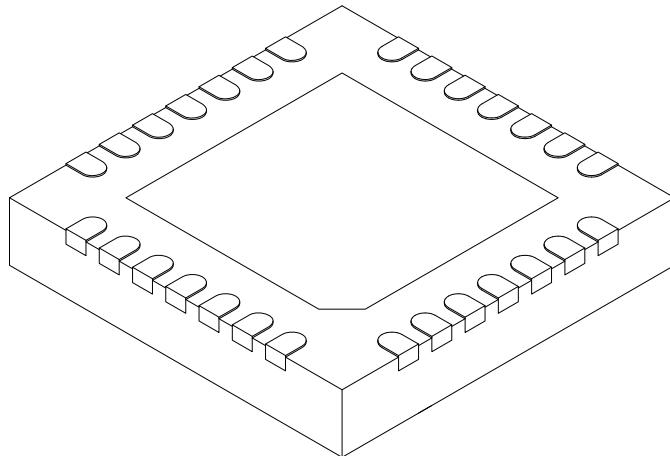
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 28-Lead Plastic Quad Flat, No Lead Package (MQ) – 5x5x0.9 mm Body [QFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		28		
Pitch	e		0.50	BSC	
Overall Height	A	0.80	0.90	1.00	
Standoff	A1	0.00	0.02	0.05	
Contact Thickness	A3		0.20	REF	
Overall Width	E		5.00	BSC	
Exposed Pad Width	E2	3.15	3.25	3.35	
Overall Length	D		5.00	BSC	
Exposed Pad Length	D2	3.15	3.25	3.35	
Contact Width	b	0.18	0.25	0.30	
Contact Length	L	0.35	0.40	0.45	
Contact-to-Exposed Pad	K	0.20	-	-	

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.

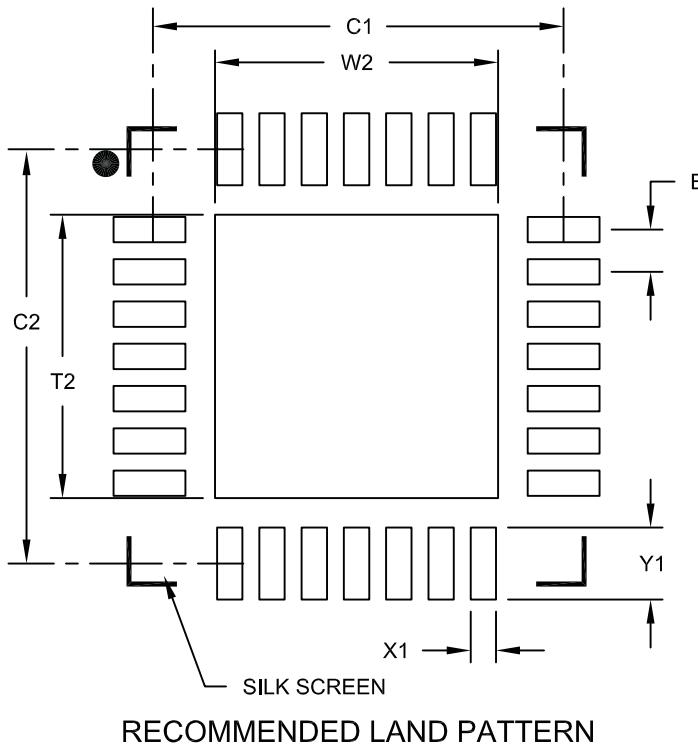
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

**28-Lead Plastic Quad Flat, No Lead Package (MQ) – 5x5 mm Body [QFN] Land Pattern With 0.55 mm Contact Length**

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension Limits		MILLIMETERS		
		MIN	NOM	MAX
Contact Pitch	E	0.50 BSC		
Optional Center Pad Width	W2			3.35
Optional Center Pad Length	T2			3.35
Contact Pad Spacing	C1		4.90	
Contact Pad Spacing	C2		4.90	
Contact Pad Width (X28)	X1			0.30
Contact Pad Length (X28)	Y1			0.85

**Notes:**

1. Dimensioning and tolerancing per ASME Y14.5M

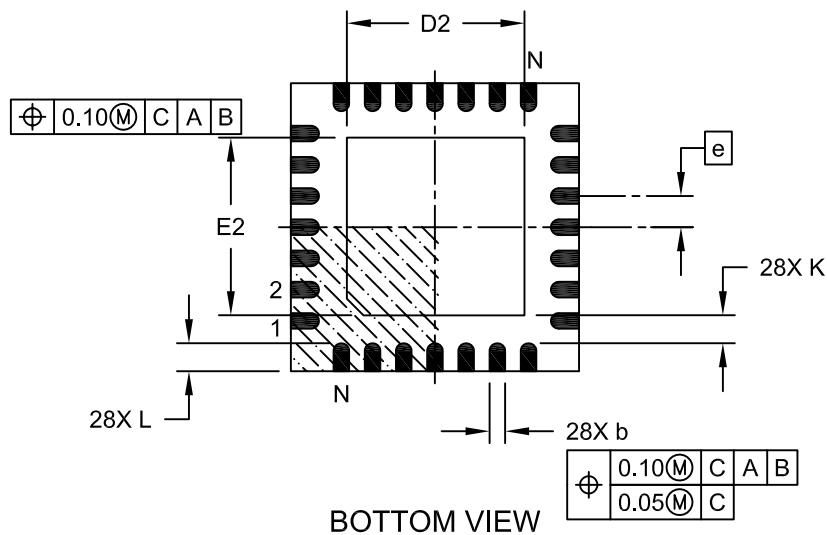
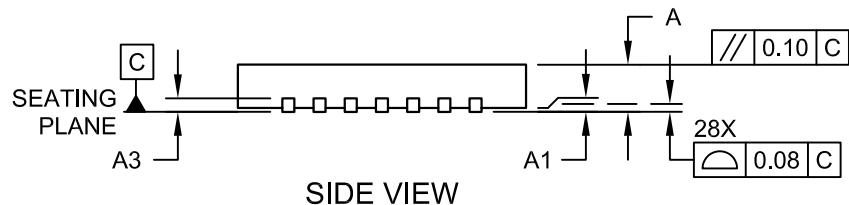
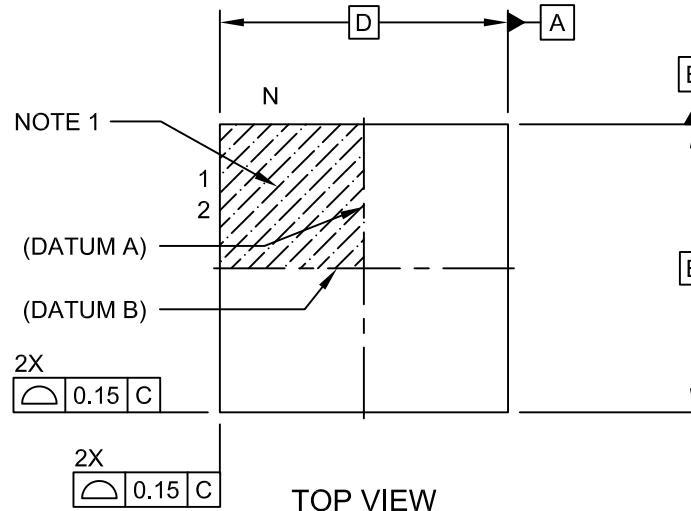
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-2140A

## Packaging Diagrams and Parameters

### 28-Lead Plastic Quad Flat, No Lead Package (ML) - 6x6 mm Body [QFN] With 0.55 mm Terminal Length

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

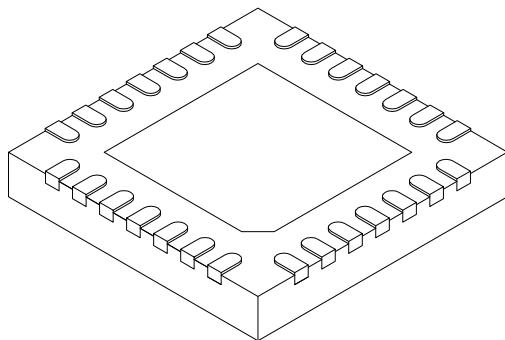


## Packaging Diagrams and Parameters

---

### 28-Lead Plastic Quad Flat, No Lead Package (ML) - 6x6 mm Body [QFN] With 0.55 mm Terminal Length

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



	Units	MILLIMETERS		
Dimension	Limits	MIN	NOM	MAX
Number of Pins	N	28		
Pitch	e	0.65	BSC	
Overall Height	A	0.80	0.90	1.00
Standoff	A1	0.00	0.02	0.05
Terminal Thickness	A3	0.20	REF	
Overall Width	E	6.00	BSC	
Exposed Pad Width	E2	3.65	3.70	4.20
Overall Length	D	6.00	BSC	
Exposed Pad Length	D2	3.65	3.70	4.20
Terminal Width	b	0.23	0.30	0.35
Terminal Length	L	0.50	0.55	0.70
Terminal-to-Exposed Pad	K	0.20	-	-

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated
3. Dimensioning and tolerancing per ASME Y14.5M.

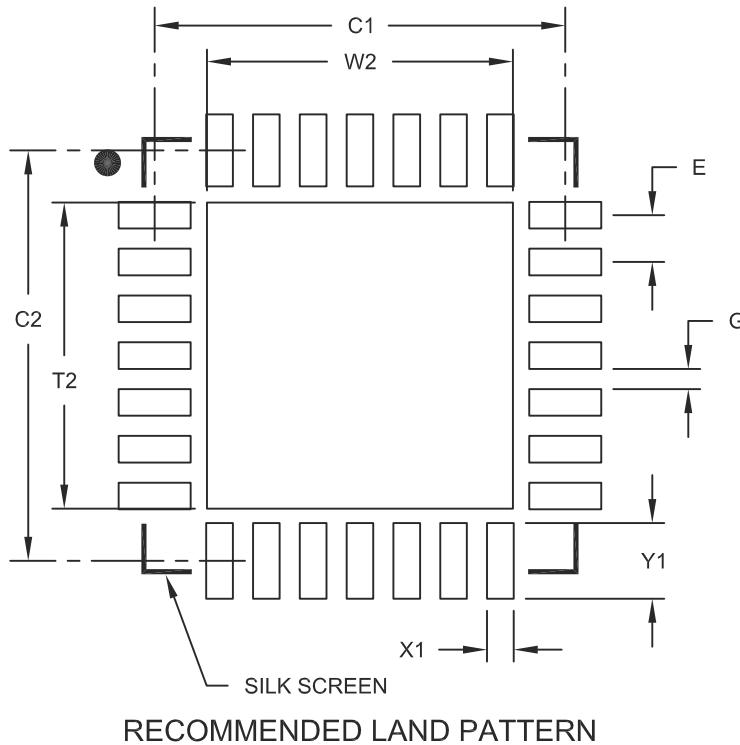
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Packaging Diagrams and Parameters

### 28-Lead Plastic Quad Flat, No Lead Package (ML) – 6x6 mm Body [QFN] with 0.55 mm Contact Length

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units			MILLIMETERS		
		Dimension Limits			MIN	NOM	MAX
Contact Pitch	E	0.65 BSC					
Optional Center Pad Width	W2				4.25		
Optional Center Pad Length	T2				4.25		
Contact Pad Spacing	C1				5.70		
Contact Pad Spacing	C2				5.70		
Contact Pad Width (X28)	X1				0.37		
Contact Pad Length (X28)	Y1				1.00		
Distance Between Pads	G	0.20					

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

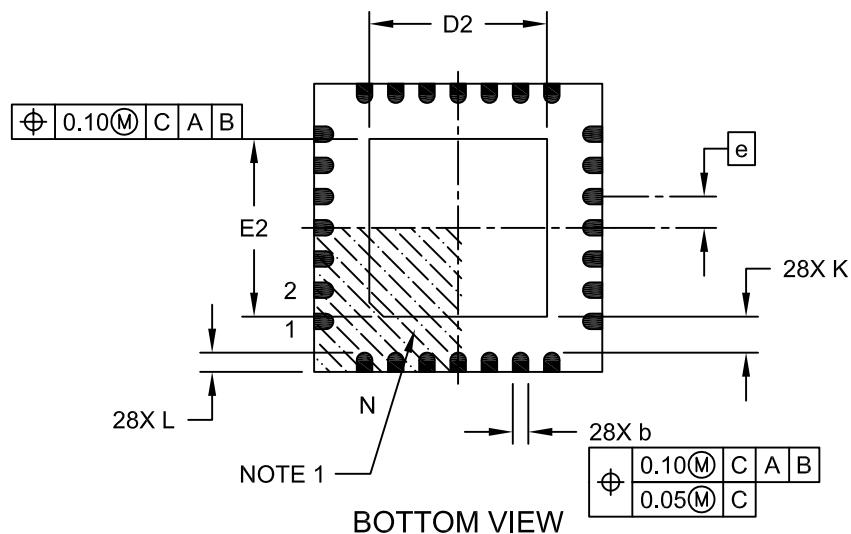
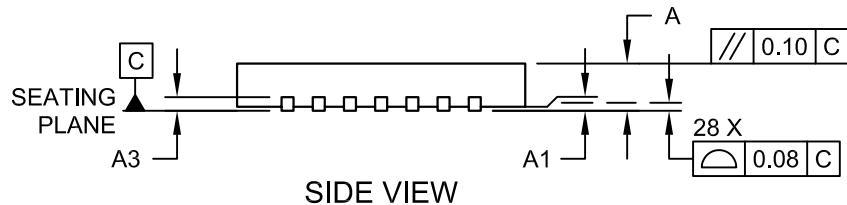
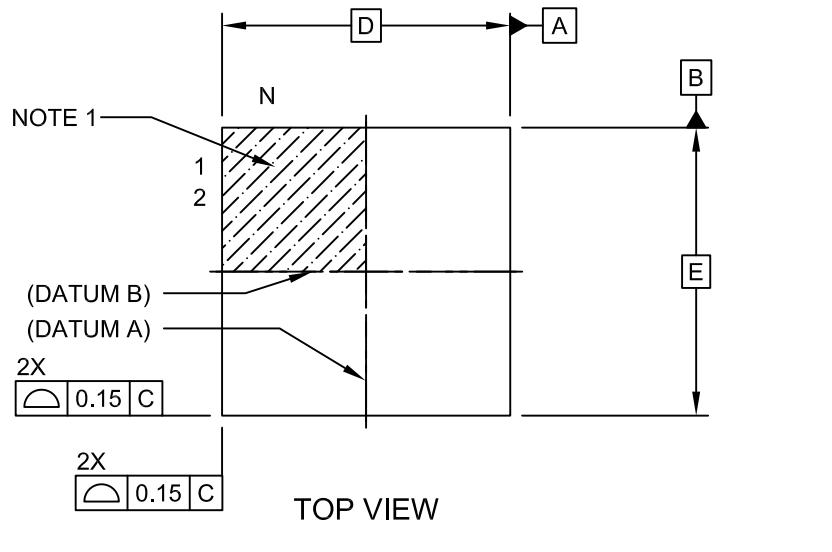
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2105A

## Packaging Diagrams and Parameters

**28-Lead Plastic Quad Flat, No Lead Package (MM) - 6x6x0.9mm Body [QFN-S]  
With 0.40 mm Terminal Length**

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

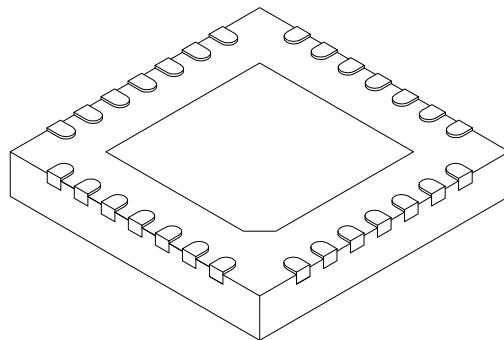


## Packaging Diagrams and Parameters

---

### 28-Lead Plastic Quad Flat, No Lead Package (MM) - 6x6x0.9mm Body [QFN-S] With 0.40 mm Terminal Length

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at  
<http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		28		
Pitch	e		0.65	BSC	
Overall Height	A	0.80	0.90	1.00	
Standoff	A1	0.00	0.02	0.05	
Terminal Thickness	A3		0.20	REF	
Overall Width	E		6.00	BSC	
Exposed Pad Width	E2	3.65	3.70	4.70	
Overall Length	D		6.00	BSC	
Exposed Pad Length	D2	3.65	3.70	4.70	
Terminal Width	b	0.23	0.30	0.35	
Terminal Length	L	0.30	0.40	0.50	
Terminal-to-Exposed Pad	K	0.20	-	-	

Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated
3. Dimensioning and tolerancing per ASME Y14.5M

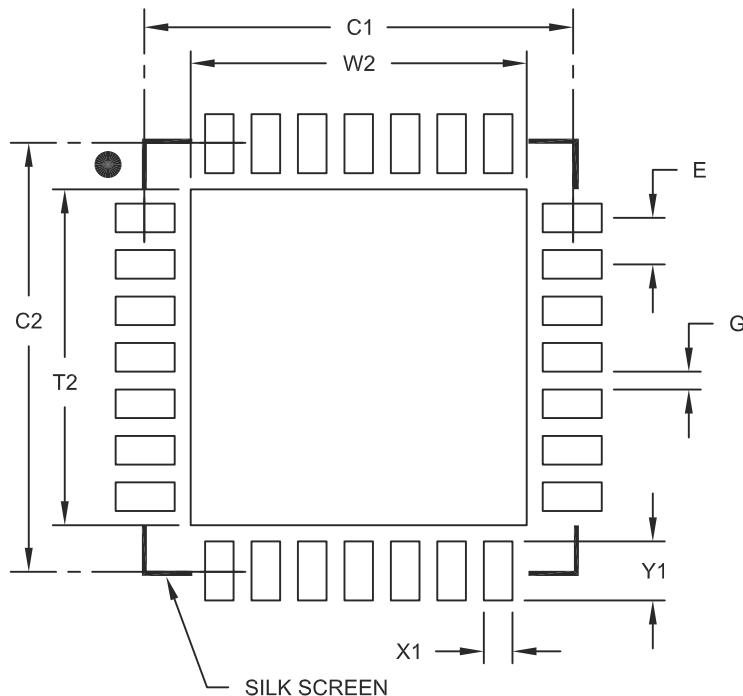
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

**28-Lead Plastic Quad Flat, No Lead Package (MM) – 6x6x0.9 mm Body [QFN-S]  
with 0.40 mm Contact Length**

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at  
<http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		0.65	BSC
Optional Center Pad Width	W2			4.70
Optional Center Pad Length	T2			4.70
Contact Pad Spacing	C1		6.00	
Contact Pad Spacing	C2		6.00	
Contact Pad Width (X28)	X1			0.40
Contact Pad Length (X28)	Y1			0.85
Distance Between Pads	G	0.25		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

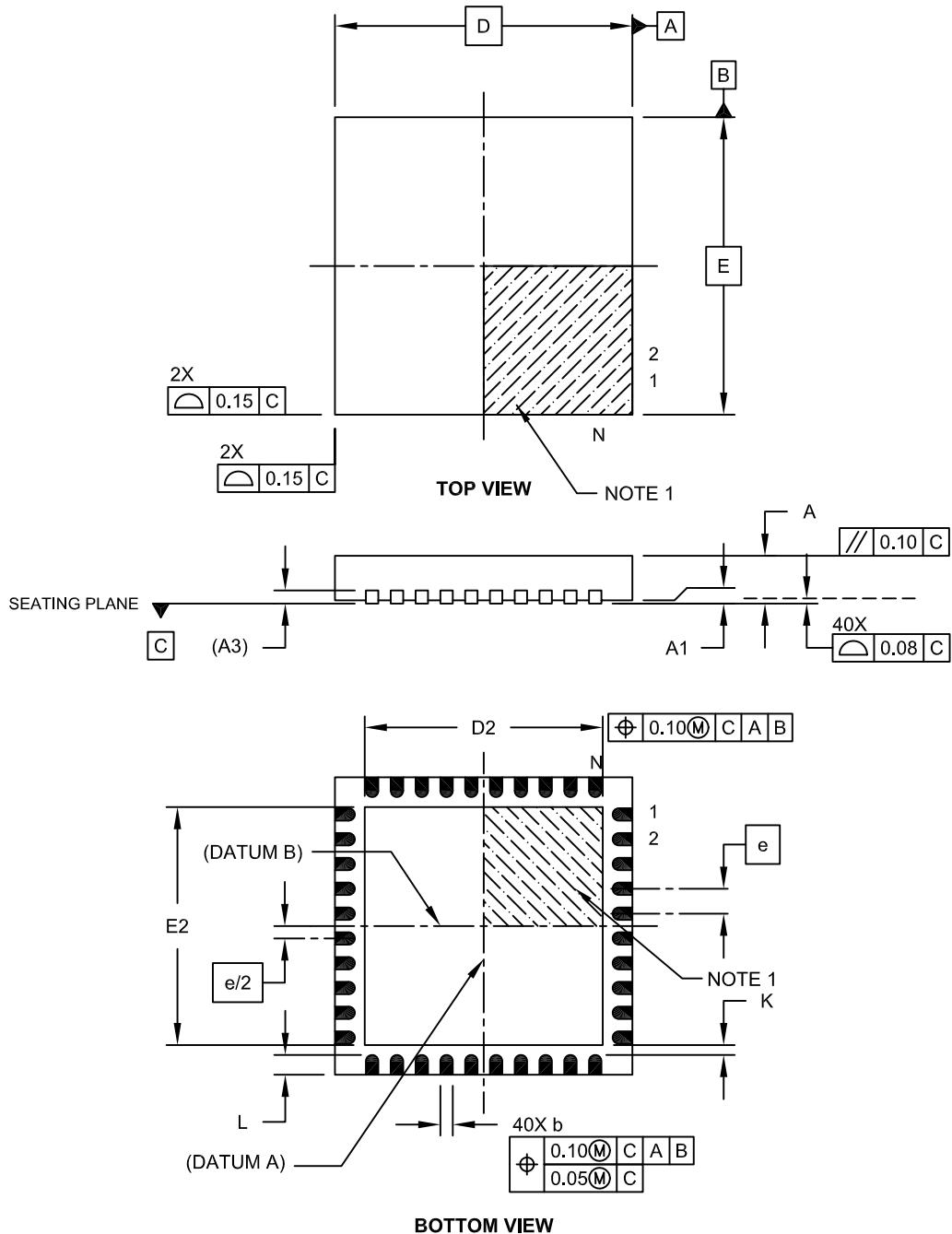
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2124A

## Packaging Diagrams and Parameters

### 40-Lead Plastic Quad Flat, No Lead Package (ML) - 6x6x0.9mm Body [QFN] With 0.40mm Contact Length

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

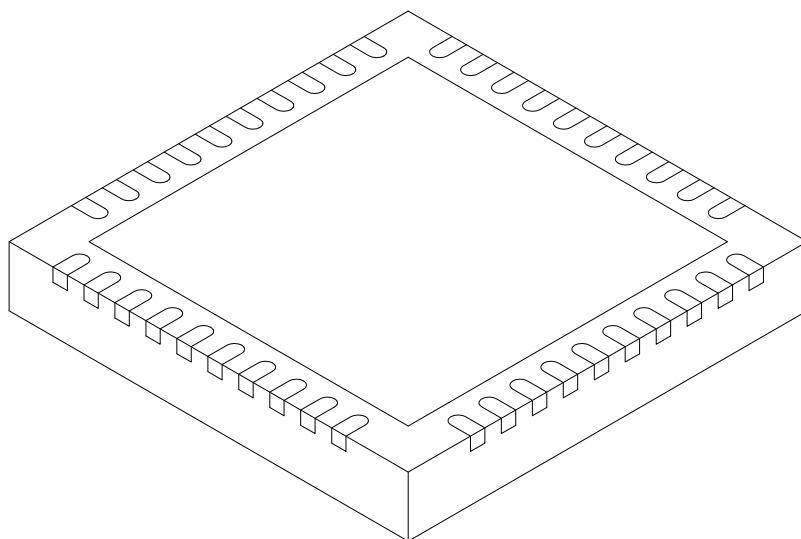


## Packaging Diagrams and Parameters

---

### 40-Lead Plastic Quad Flat, No Lead Package (ML) - 6x6x0.9mm Body [QFN] With 0.40mm Contact Length

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units			MILLIMETERS		
		Dimension Limits			MIN	NOM	MAX
Number of Pins	N				40		
Pitch	e				0.50	BSC	
Overall Height	A	0.80	0.90	1.00			
Standoff	A1	0.00	0.02	0.05			
Contact Thickness	A3	0.20 REF					
Overall Width	E	6.00 BSC					
Exposed Pad Width	E2	4.50	4.65	4.80			
Overall Length	D	6.00 BSC					
Exposed Pad Length	D2	4.50	4.65	4.80			
Contact Width	b	0.18	0.25	0.30			
Contact Length	L	0.30	0.40	0.50			
Contact-to-Exposed Pad	K	0.20	-	-			

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.

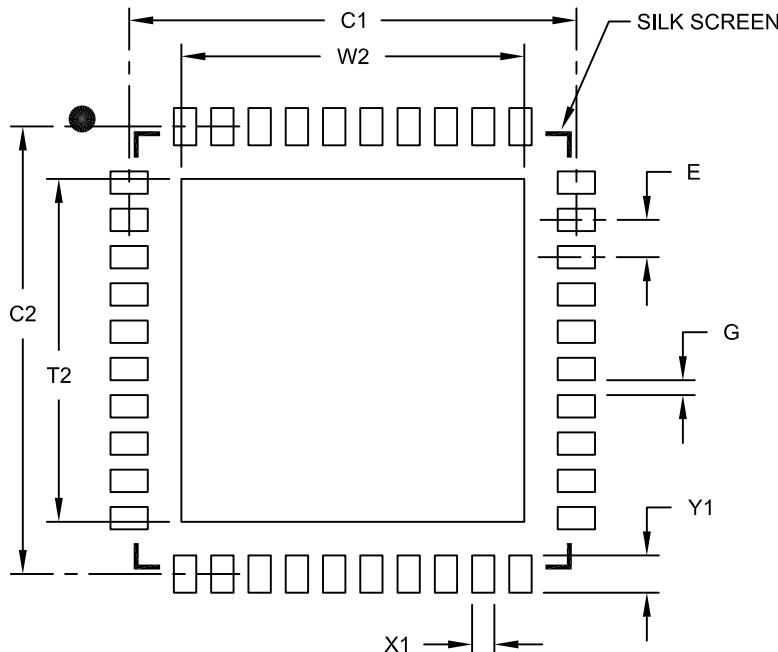
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

40-Lead Plastic Quad Flat, No Lead Package (ML) - 6x6x0.9mm Body [QFN]  
With 0.40mm Contact Length

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at  
<http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch		0.50 BSC		
Optional Center Pad Width	W2			4.60
Optional Center Pad Length	T2			4.60
Contact Pad Spacing	C1		6.00	
Contact Pad Spacing	C2		6.00	
Contact Pad Width (X40)	X1			0.30
Contact Pad Length (X40)	Y1			0.50
Distance Between Pads	G	0.20		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

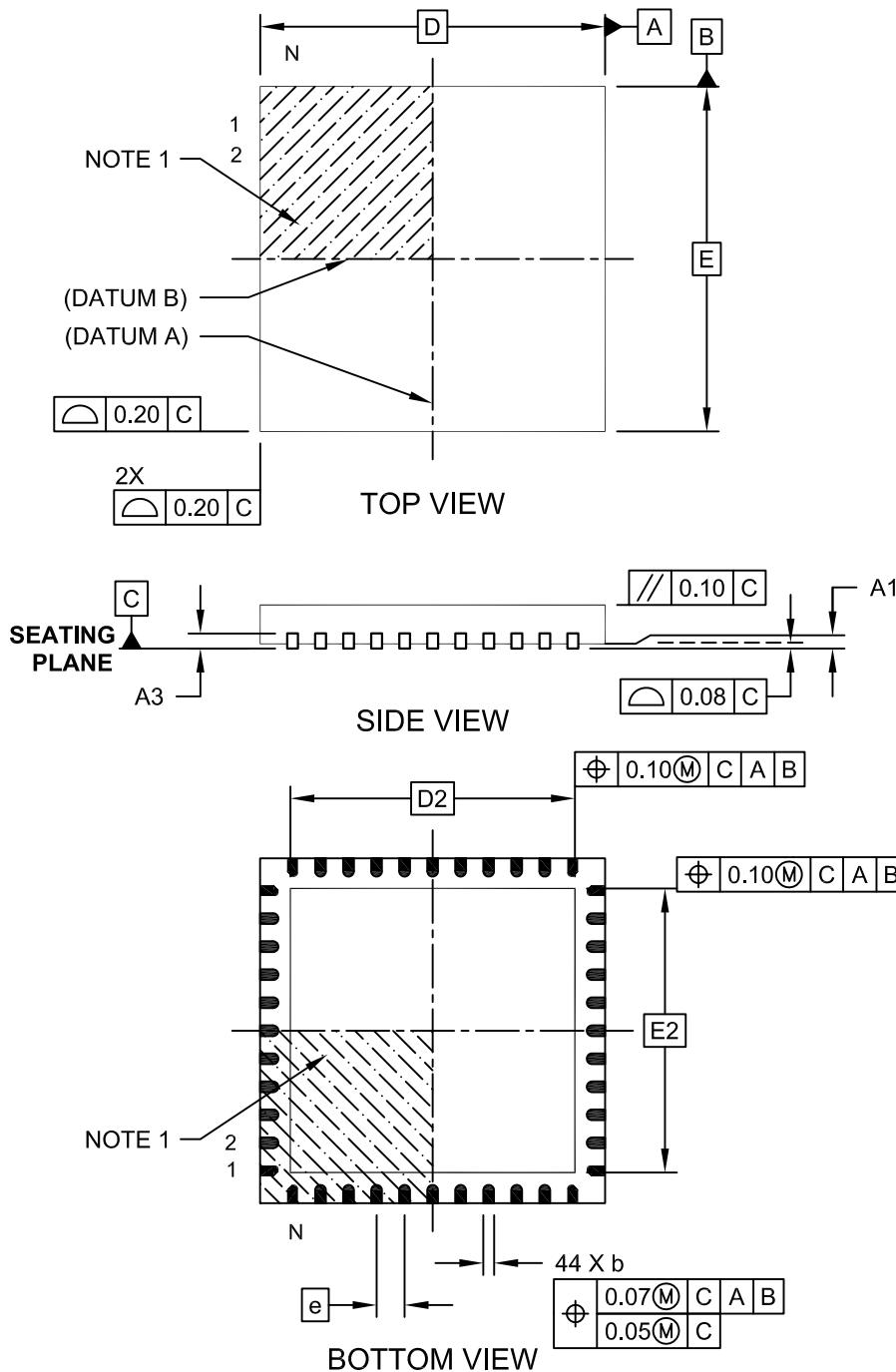
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2118A

## Packaging Diagrams and Parameters

### 44-Lead Plastic Quad Flat, No Lead Package (ML) - 8x8 mm Body [QFN]

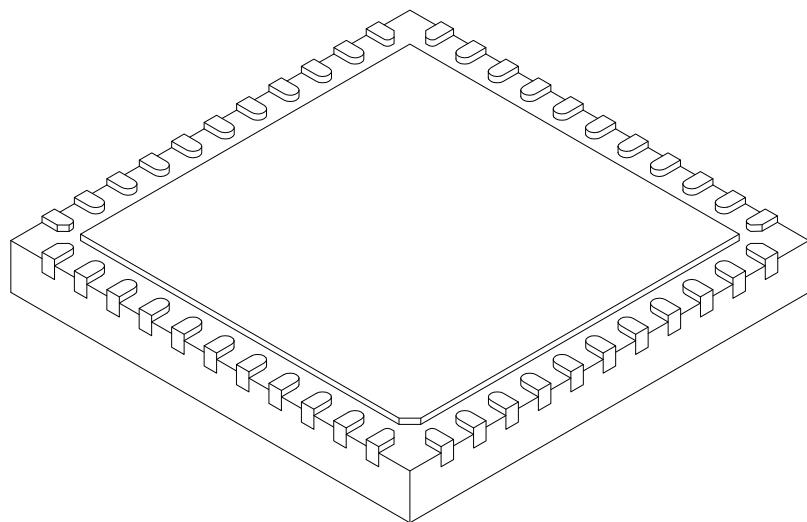
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 44-Lead Plastic Quad Flat, No Lead Package (ML) - 8x8 mm Body [QFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		44		
Pitch	e		0.65	BSC	
Overall Height	A	0.80	0.90	1.00	
Standoff	A1	0.00	0.02	0.05	
Terminal Thickness	A3		0.20	REF	
Overall Width	E		8.00	BSC	
Exposed Pad Width	E2	6.25	6.45	6.60	
Overall Length	D		8.00	BSC	
Exposed Pad Length	D2	6.25	6.45	6.60	
Terminal Width	b	0.20	0.30	0.35	
Terminal Length	L	0.30	0.40	0.50	
Terminal-to-Exposed-Pad	K	0.20	-	-	

Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated
3. Dimensioning and tolerancing per ASME Y14.5M

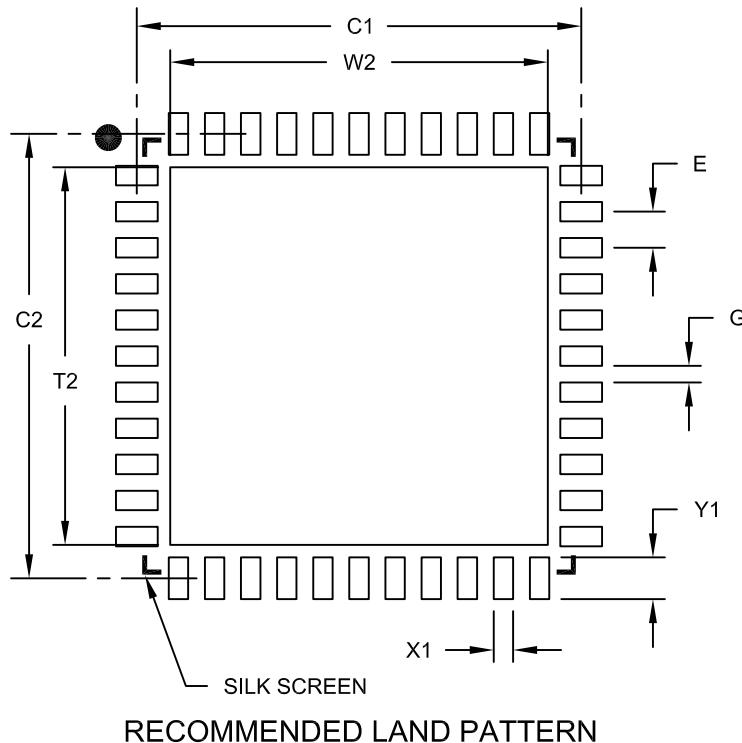
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension. usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

44-Lead Plastic Quad Flat, No Lead Package (ML) - 8x8 mm Body [QFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E		0.65	BSC	
Optional Center Pad Width	W2			6.60	
Optional Center Pad Length	T2			6.60	
Contact Pad Spacing	C1		8.00		
Contact Pad Spacing	C2		8.00		
Contact Pad Width (X44)	X1			0.35	
Contact Pad Length (X44)	Y1			0.85	
Distance Between Pads	G	0.25			

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

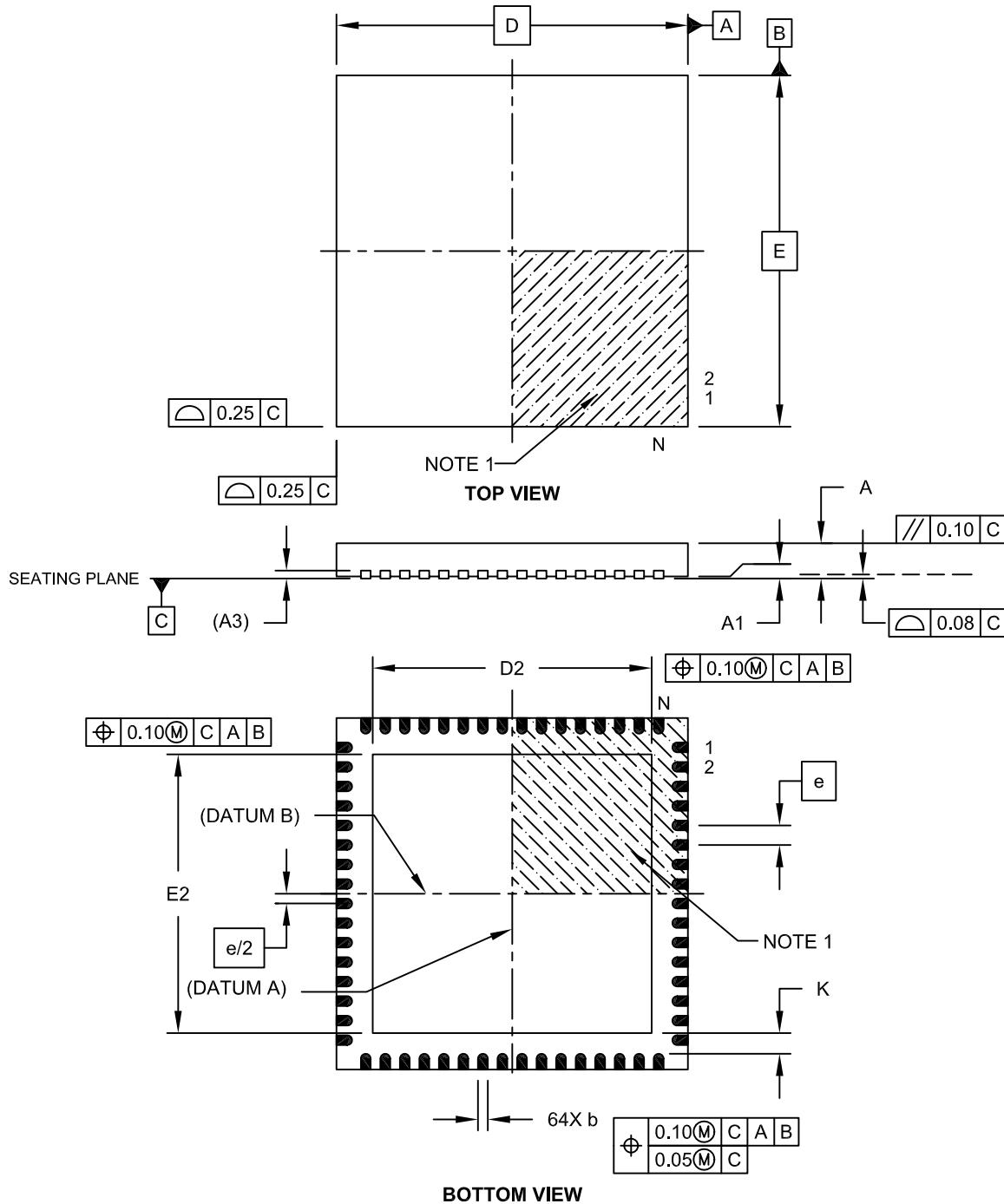
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2103B

## Packaging Diagrams and Parameters

### 64-Lead Plastic Quad Flat, No Lead Package (MR) – 9x9x0.9 mm Body [QFN] With 7.15 x 7.15 Exposed Pad [QFN]

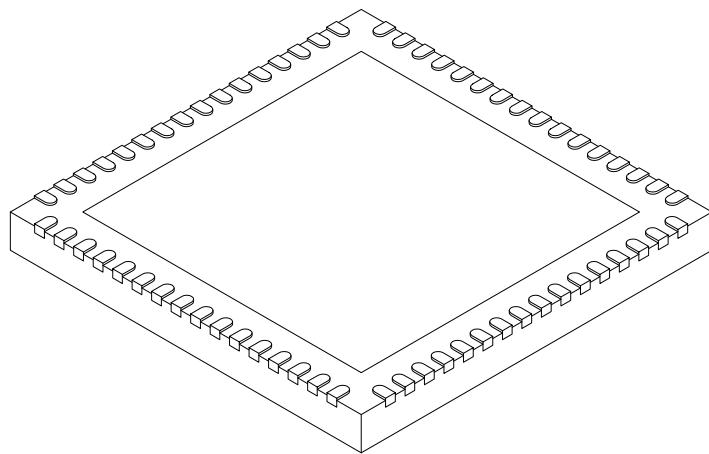
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 64-Lead Plastic Quad Flat, No Lead Package (MR) – 9x9x0.9 mm Body [QFN] With 7.15 x 7.15 Exposed Pad [QFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		64		
Pitch	e		0.50	BSC	
Overall Height	A	0.80	0.90	1.00	
Standoff	A1	0.00	0.02	0.05	
Contact Thickness	A3		0.20	REF	
Overall Width	E		9.00	BSC	
Exposed Pad Width	E2	7.05	7.15	7.50	
Overall Length	D		9.00	BSC	
Exposed Pad Length	D2	7.05	7.15	7.50	
Contact Width	b	0.18	0.25	0.30	
Contact Length	L	0.30	0.40	0.50	
Contact-to-Exposed Pad	K	0.20	-	-	

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.

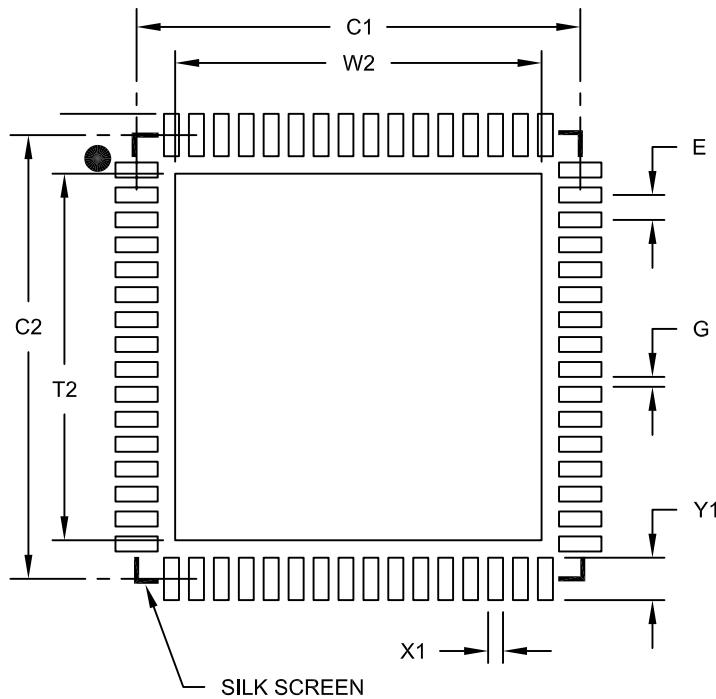
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

64-Lead Plastic Quad Flat, No Lead Package (MR) – 9x9x0.9 mm Body [QFN]  
With 0.40 mm Contact Length

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at  
<http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units			MILLIMETERS		
		Dimension Limits			MIN	NOM	MAX
Contact Pitch	E	0.50 BSC					
Optional Center Pad Width	W2						7.35
Optional Center Pad Length	T2						7.35
Contact Pad Spacing	C1				8.90		
Contact Pad Spacing	C2				8.90		
Contact Pad Width (X64)	X1					0.30	
Contact Pad Length (X64)	Y1						0.85
Distance Between Pads	G	0.20					

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

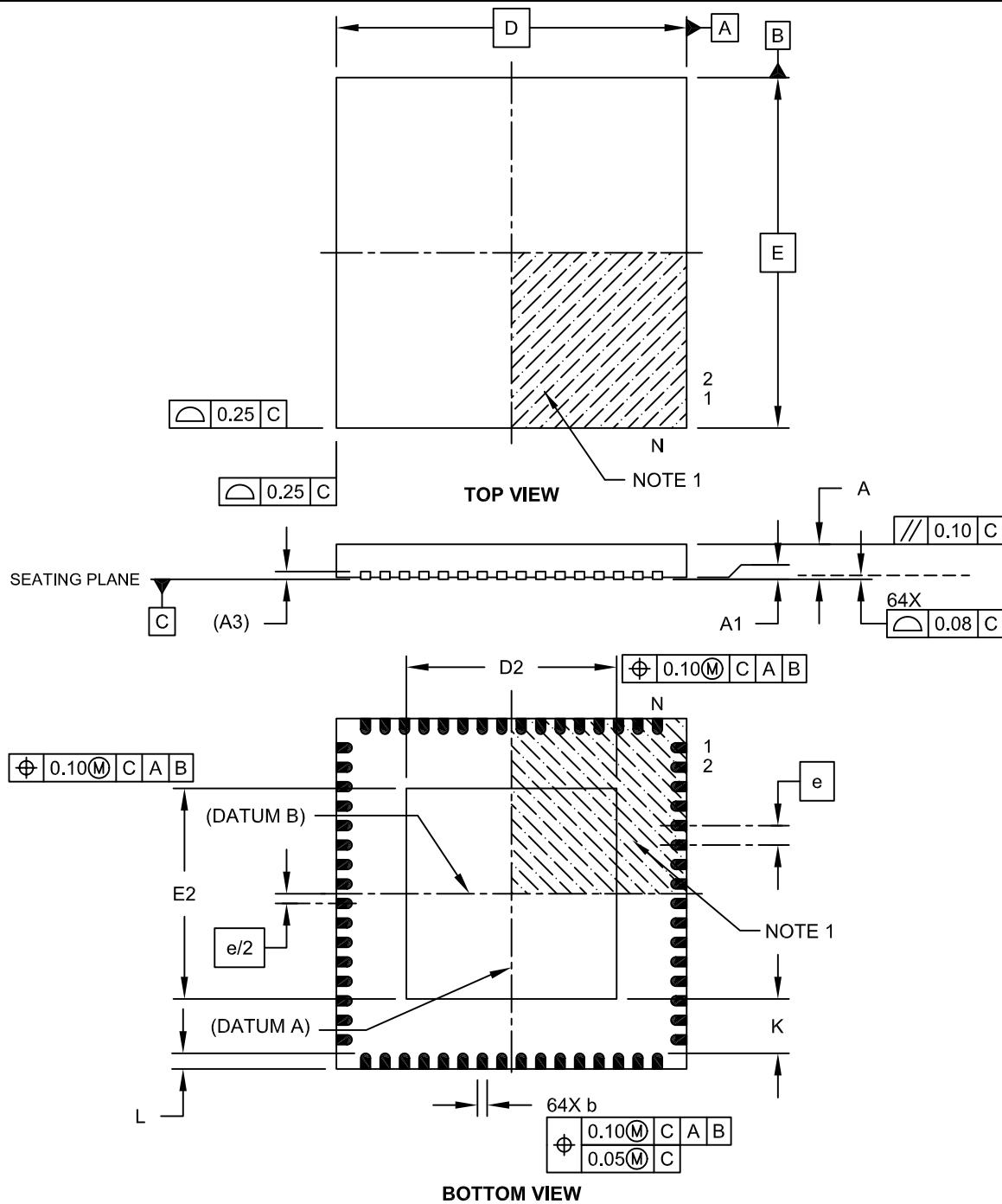
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2149A

## Packaging Diagrams and Parameters

**64-Lead Plastic Quad Flat, No Lead Package (MR) – 9x9x0.9 mm Body  
with 5.40 x 5.40 Exposed Pad [QFN]**

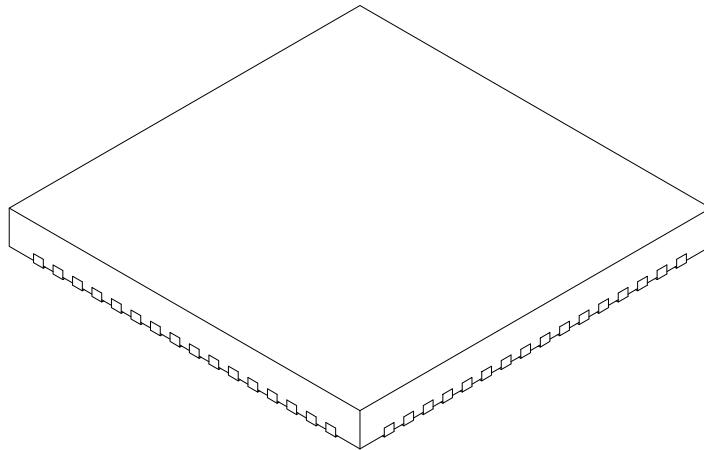
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 64-Lead Plastic Quad Flat, No Lead Package (MR) – 9x9x0.9 mm Body with 5.40 x 5.40 Exposed Pad [QFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		64		
Pitch	e		0.50	BSC	
Overall Height	A	0.80	0.90	1.00	
Standoff	A1	0.00	0.02	0.05	
Contact Thickness	A3		0.20	REF	
Overall Width	E		9.00	BSC	
Exposed Pad Width	E2	5.30	5.40	5.50	
Overall Length	D		9.00	BSC	
Exposed Pad Length	D2	5.30	5.40	5.50	
Contact Width	b	0.20	0.25	0.30	
Contact Length	L	0.30	0.40	0.50	
Contact-to-Exposed Pad	K	0.20	-	-	

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Packaging Diagrams and Parameters

---

---

**NOTES:**

## Packaging Diagrams and Parameters

---

---

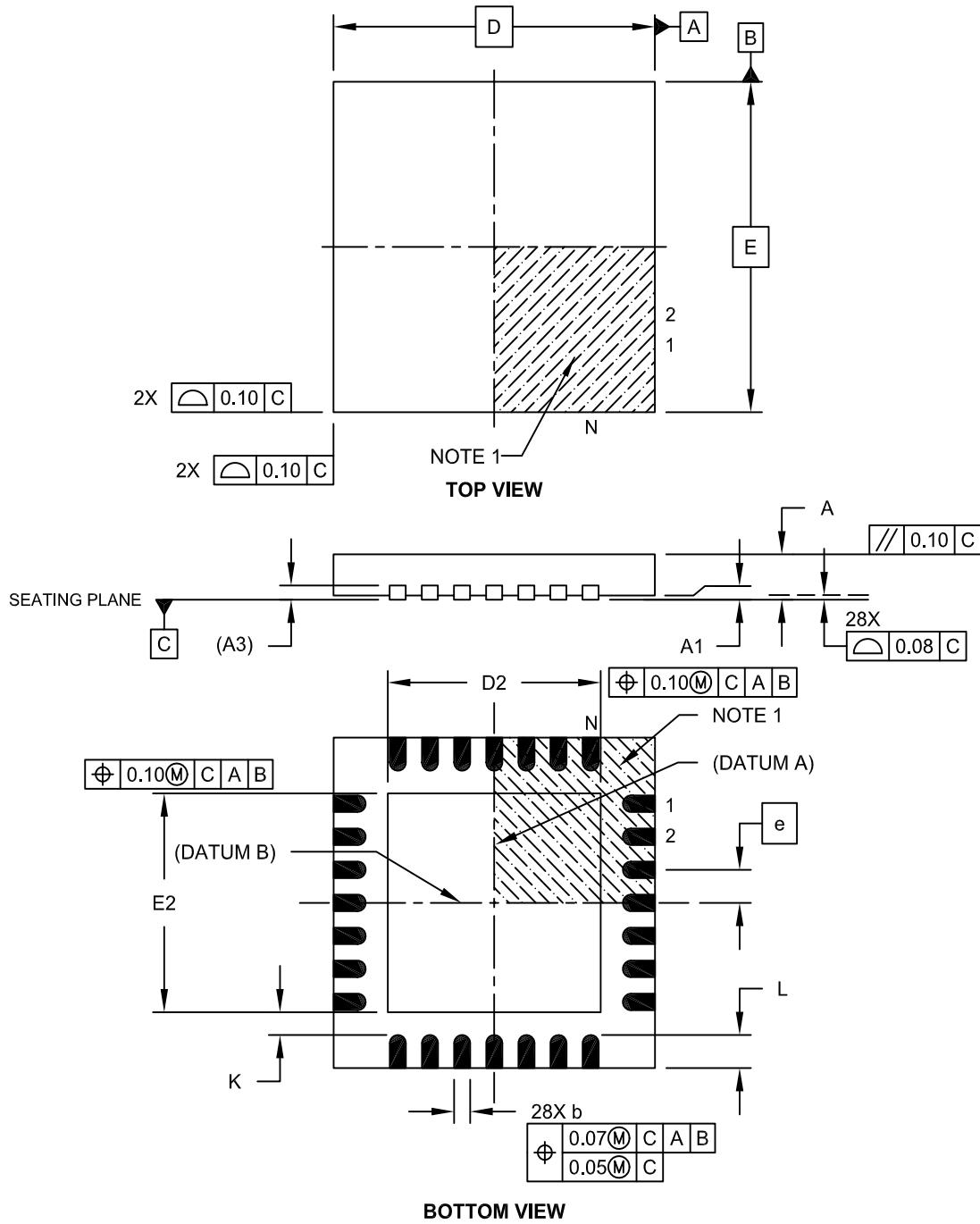
### **UQFN Family**

**Ultra Thin Quad Flat, No Lead Packages**

## Packaging Diagrams and Parameters

### 28-Lead Plastic Ultra Thin Quad Flat, No Lead Package (MV) – 4x4x0.5 mm Body [UQFN]

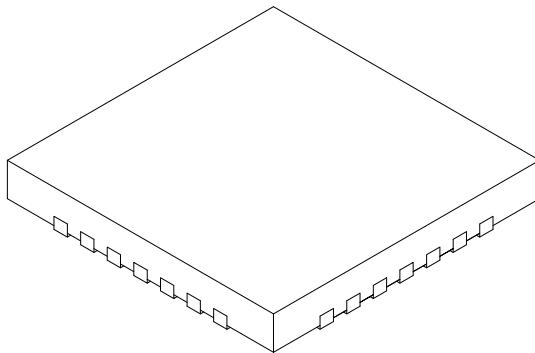
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 28-Lead Plastic Ultra Thin Quad Flat, No Lead Package (MV) – 4x4x0.5 mm Body [UQFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		28		
Pitch	e		0.40	BSC	
Overall Height	A	0.45	0.50	0.55	
Standoff	A1	0.00	0.02	0.05	
Contact Thickness	A3		0.127	REF	
Overall Width	E		4.00	BSC	
Exposed Pad Width	E2	2.55	2.65	2.75	
Overall Length	D		4.00	BSC	
Exposed Pad Length	D2	2.55	2.65	2.75	
Contact Width	b	0.15	0.20	0.25	
Contact Length	L	0.30	0.40	0.50	
Contact-to-Exposed Pad	K	0.20	-	-	

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.

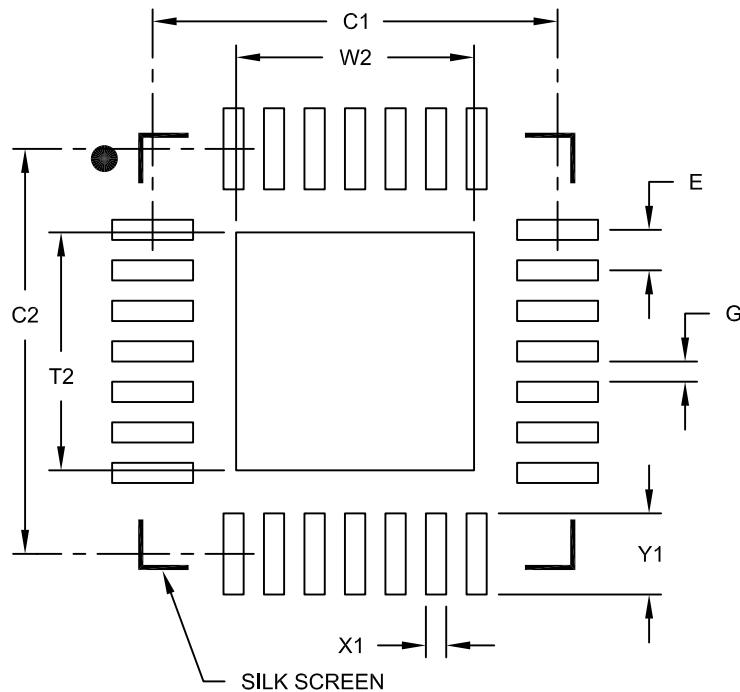
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

28-Lead Ultra Thin Plastic Quad Flat, No Lead Package (MV) - 4x4 mm Body [UQFN]  
With 0.40 mm Contact Length

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at  
<http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	0.40 BSC		
Optional Center Pad Width	W2			2.35
Optional Center Pad Length	T2			2.35
Contact Pad Spacing	C1		4.00	
Contact Pad Spacing	C2		4.00	
Contact Pad Width (X28)	X1			0.20
Contact Pad Length (X28)	Y1			0.80
Distance Between Pads	G	0.20		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

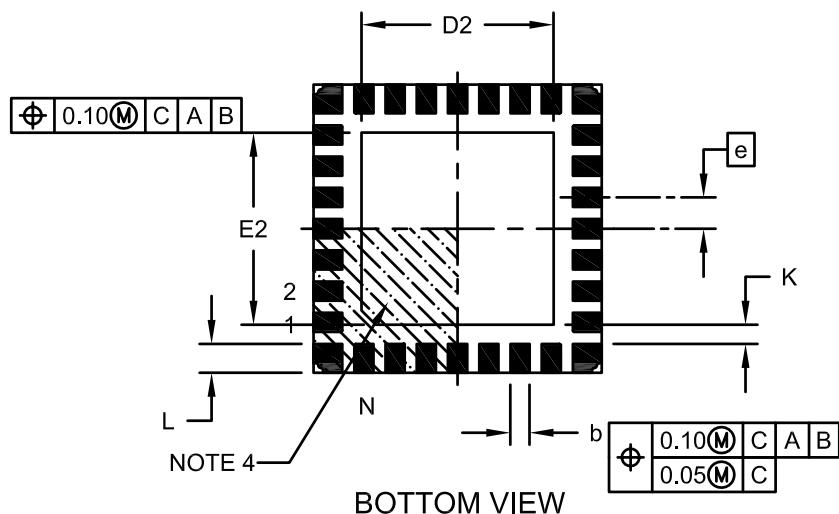
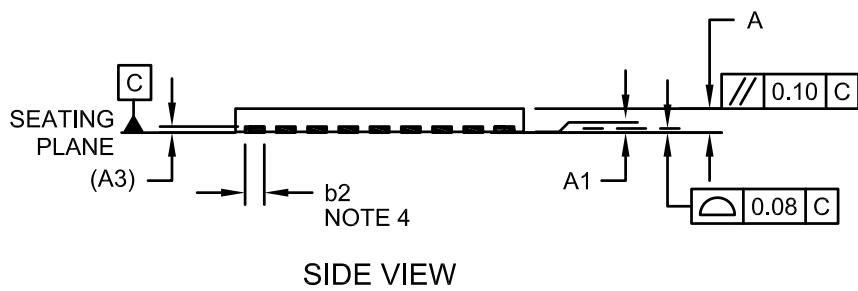
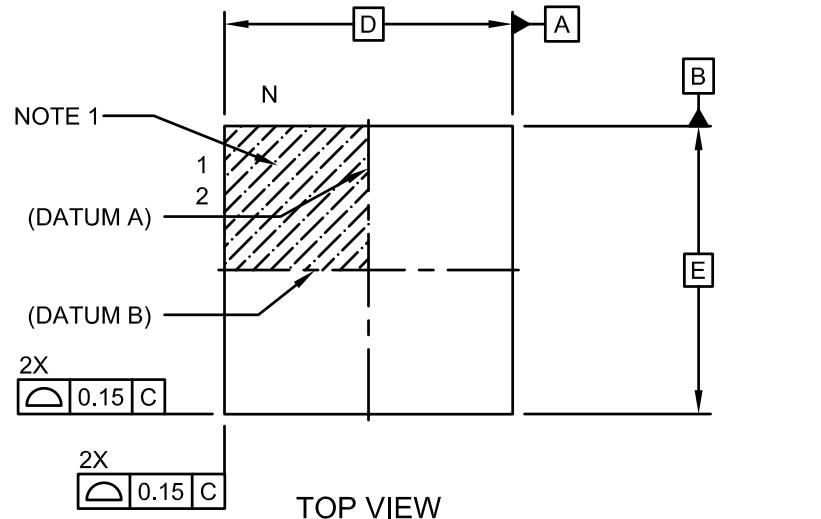
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2152A

## Packaging Diagrams and Parameters

**28-Lead Plastic Quad Flat, No Lead Package (MV) - 6x6x0.5mm Body [UQFN]  
Ultra-Thin with 0.40 x 0.60 mm Terminal Width/Length + Corner Anchors**

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

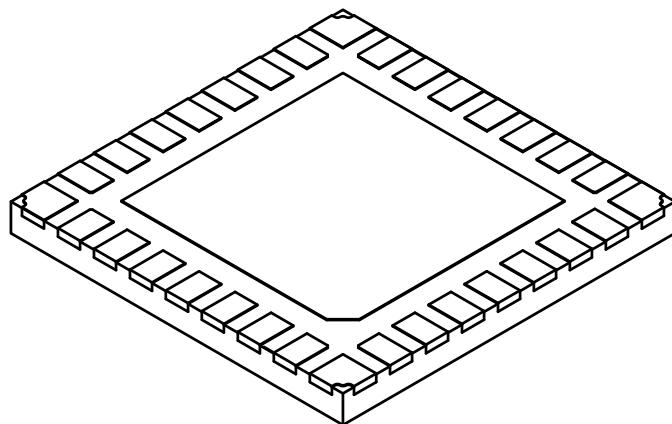


## Packaging Diagrams and Parameters

---

**28-Lead Plastic Quad Flat, No Lead Package (MV) - 6x6x0.5mm Body [UQFN]  
Ultra-Thin with 0.40 x 0.60 mm Terminal Width/Length + Corner Anchors**

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		28	
Pitch	e		0.65 BSC	
Overall Height	A	0.40	0.50	0.60
Standoff	A1	0.00	0.02	0.05
Terminal Thickness	(A3)		0.127 REF	
Overall Width	E		6.00 BSC	
Exposed Pad Width	E2		4.00	
Overall Length	D		6.00 BSC	
Exposed Pad Length	D2		4.00	
Terminal Width	b	0.35	0.40	0.45
Corner Pad	b2	0.25	0.40	0.45
Terminal Length	L	0.55	0.60	0.65
Terminal-to-Exposed Pad	K	0.20	-	-

Notes:

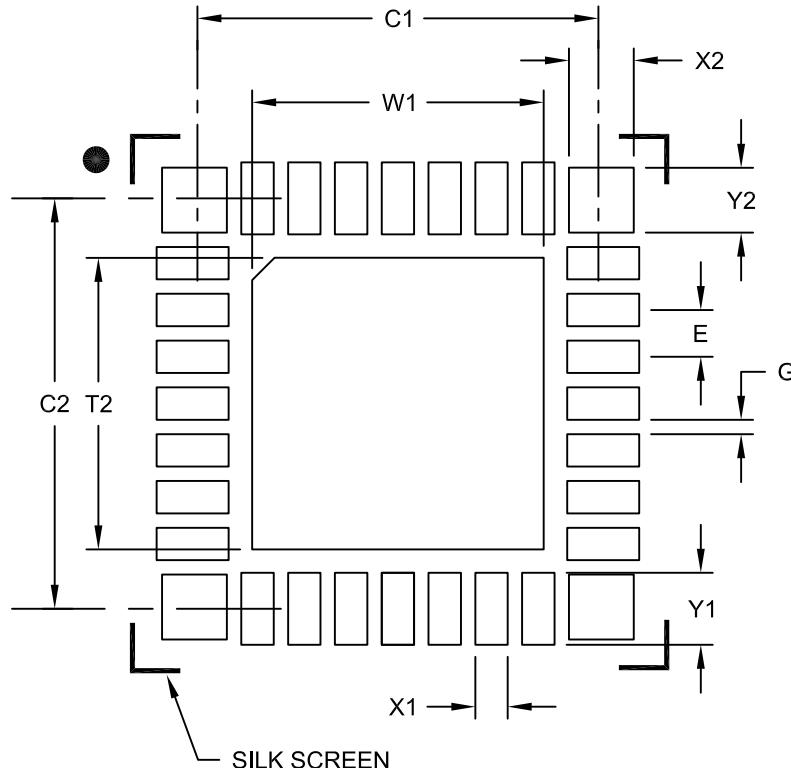
1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated
3. Dimensioning and tolerancing per ASME Y14.5M
 

BSC: Basic Dimension. Theoretically exact value shown without tolerances.  
REF: Reference Dimension, usually without tolerance, for information purposes only.
4. Outermost portions of corner structures may vary slightly.

## Land Pattern (Footprint)

**28-Lead Plastic Quad Flat, No Lead Package (MV) - 6x6 mm Body [UQFN]  
With 0.60mm Contact Length And Corner Anchors**

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Contact Pitch	E		0.65 BSC	
Optional Center Pad Width	W1			4.05
Optional Center Pad Length	T2			4.05
Contact Pad Spacing	C1		5.70	
Contact Pad Spacing	C2		5.70	
Contact Pad Width (X28)	X1			0.45
Contact Pad Length (X28)	Y1			1.00
Corner Pad Width (X4)	X2			0.90
Corner Pad Length (X4)	Y2			0.90
Distance Between Pads	G	0.20		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

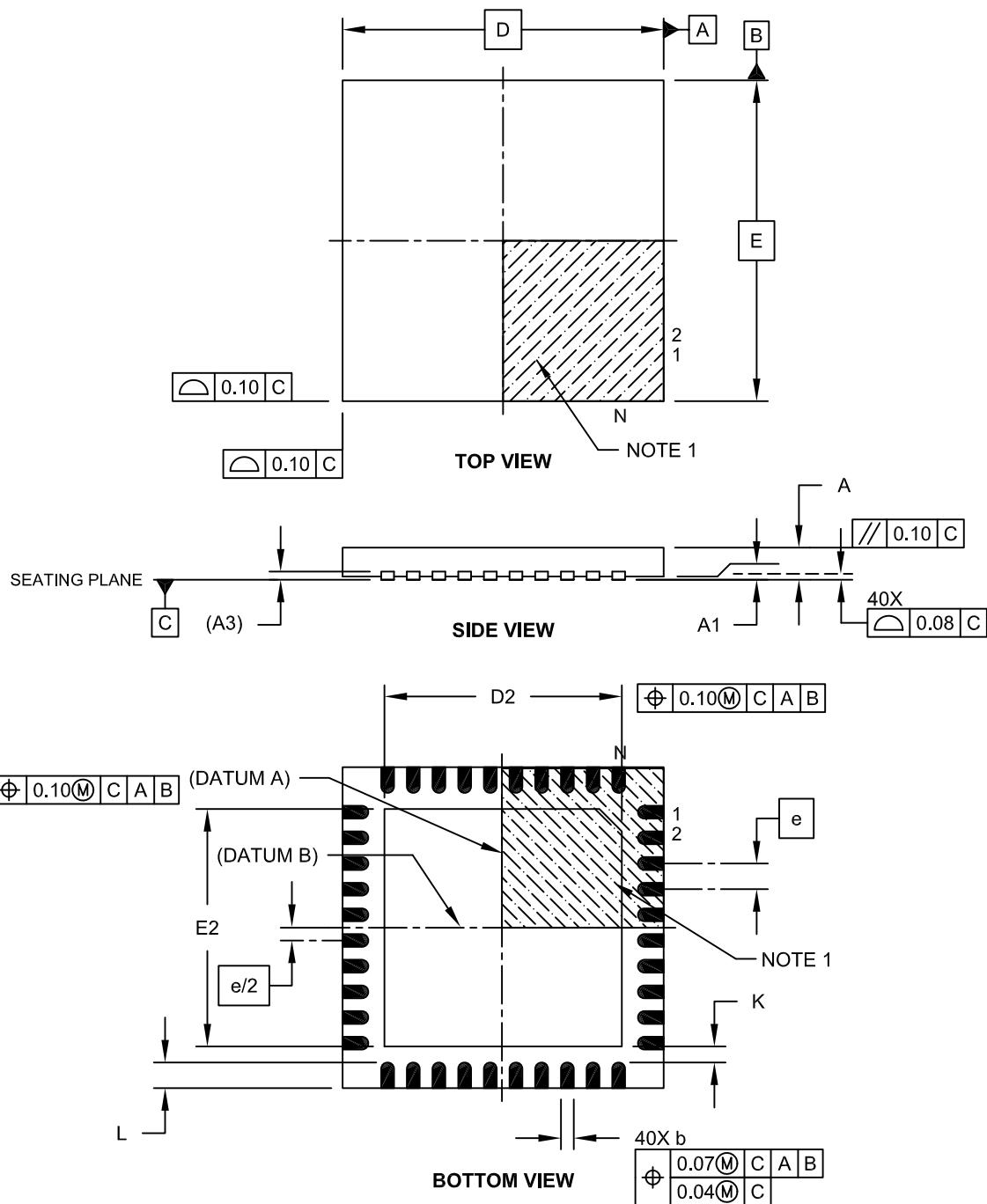
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2209A

## Packaging Diagrams and Parameters

### 40-Lead Ultra Thin Plastic Quad Flat, No Lead Package (MV) – 5x5x0.5 mm Body [UQFN]

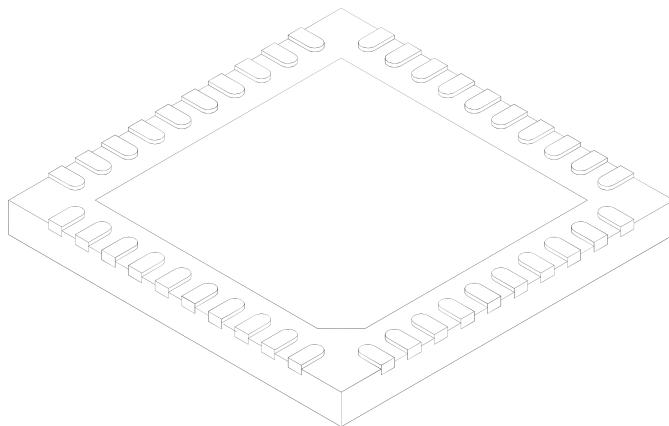
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 40-Lead Ultra Thin Plastic Quad Flat, No Lead Package (MV) – 5x5x0.5 mm Body [UQFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		40		
Pitch	e		0.40	BSC	
Overall Height	A	0.45	0.50	0.55	
Standoff	A1	0.00	0.02	0.05	
Contact Thickness	A3		0.127	REF	
Overall Width	E		5.00	BSC	
Exposed Pad Width	E2	3.60	3.70	3.80	
Overall Length	D		5.00	BSC	
Exposed Pad Length	D2	3.60	3.70	3.80	
Contact Width	b	0.15	0.20	0.25	
Contact Length	L	0.30	0.40	0.50	
Contact-to-Exposed Pad	K	0.20	-	-	

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.

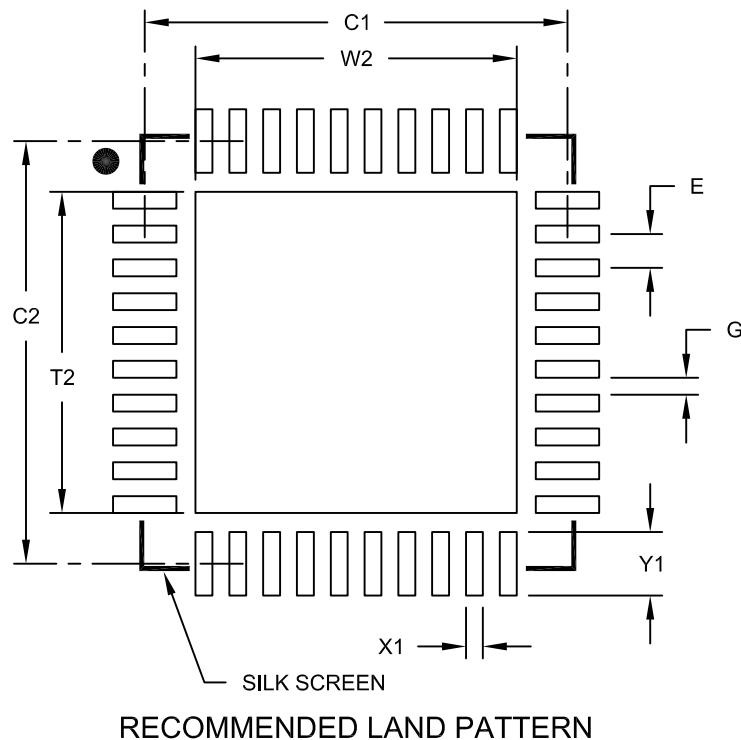
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Packaging Diagrams and Parameters

### 40-Lead Plastic Ultra Thin Quad Flat, No Lead Package (MV) - 5x5 mm Body [UQFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units			MILLIMETERS		
		Dimension Limits			MIN	NOM	MAX
Contact Pitch	E	0.40 BSC					
Optional Center Pad Width	W2				3.80		
Optional Center Pad Length	T2				3.80		
Contact Pad Spacing	C1			5.00			
Contact Pad Spacing	C2			5.00			
Contact Pad Width (X40)	X1				0.20		
Contact Pad Length (X40)	Y1					0.75	
Distance Between Pads	G	0.20					

**Notes:**

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2156B

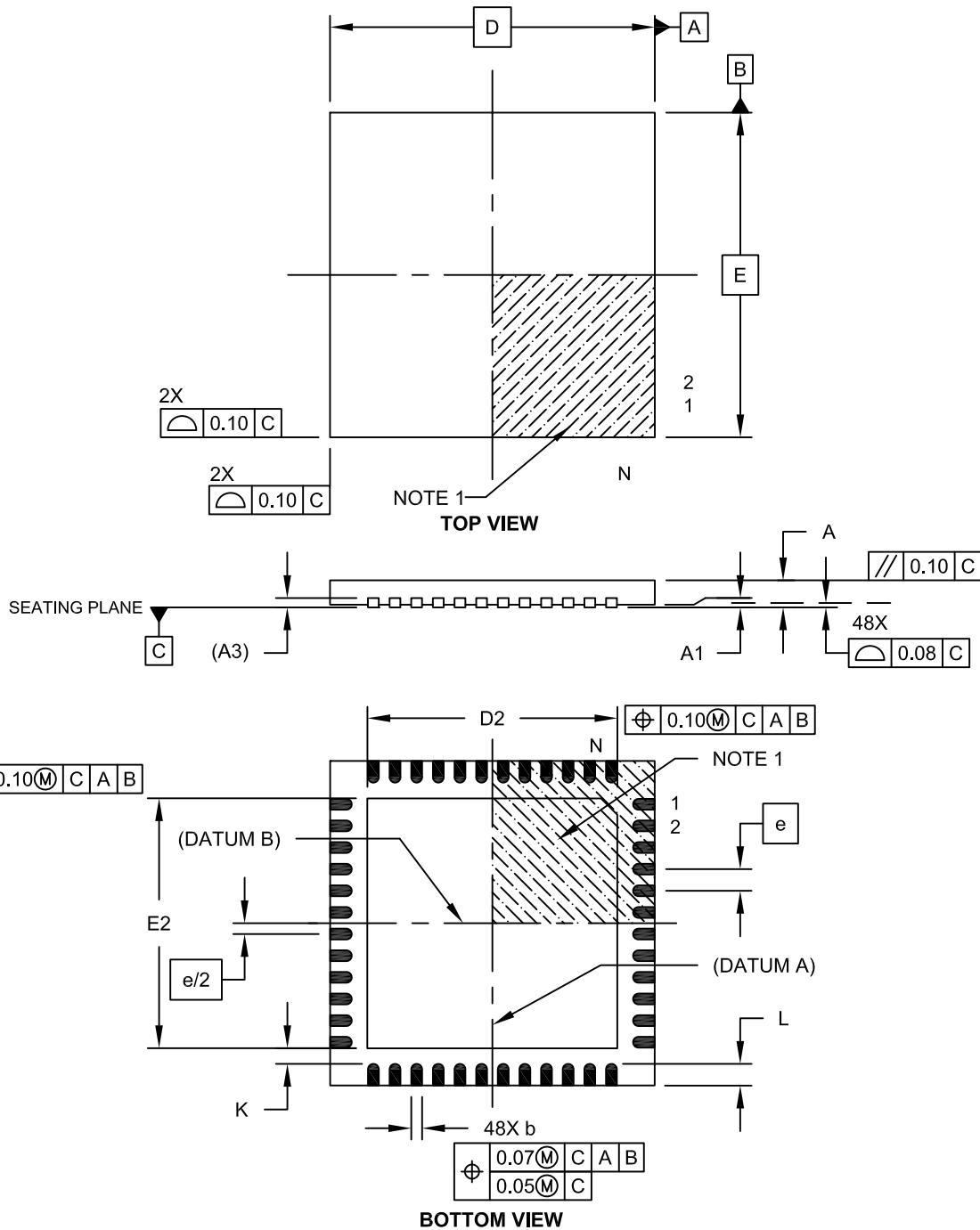
## Packaging Diagrams and Parameters

---

### 48-Lead Plastic Ultra Thin Quad Flat, No Lead Package (MV) – 6x6x0.5 mm Body [UQFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

---

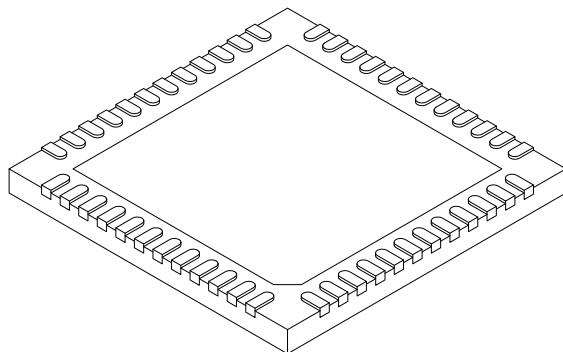


## Packaging Diagrams and Parameters

---

### 48-Lead Plastic Ultra Thin Quad Flat, No Lead Package (MV) – 6x6x0.5 mm Body [UQFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		48	
Pitch	e		0.40 BSC	
Overall Height	A	0.45	0.50	0.55
Standoff	A1	0.00	0.02	0.05
Contact Thickness	A3		0.127 REF	
Overall Width	E		6.00 BSC	
Exposed Pad Width	E2	4.45	4.60	4.75
Overall Length	D		6.00 BSC	
Exposed Pad Length	D2	4.45	4.60	4.75
Contact Width	b	0.15	0.20	0.25
Contact Length	L	0.30	0.40	0.50
Contact-to-Exposed Pad	K	0.20	-	-

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.

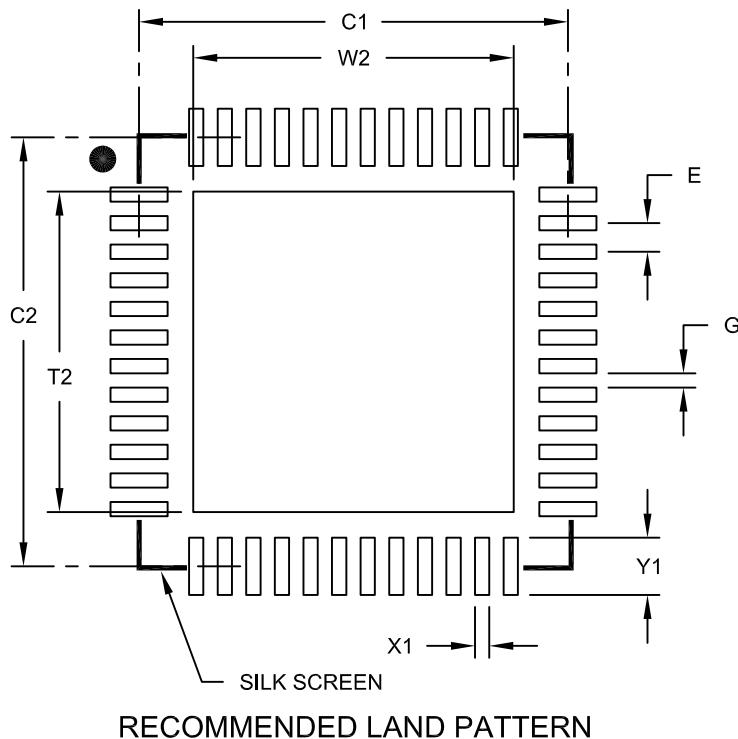
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

48-Lead Ultra Thin Plastic Quad Flat, No Lead Package (MV) - 6x6 mm Body [UQFN]  
With 0.40 mm Contact Length

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at  
<http://www.microchip.com/packaging>



Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Contact Pitch	E		0.40	BSC
Optional Center Pad Width	W2			4.45
Optional Center Pad Length	T2			4.45
Contact Pad Spacing	C1		6.00	
Contact Pad Spacing	C2		6.00	
Contact Pad Width (X28)	X1			0.20
Contact Pad Length (X28)	Y1			0.80
Distance Between Pads	G	0.20		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2153A

## Packaging Diagrams and Parameters

---

---

**NOTES:**

## Packaging Diagrams and Parameters

---

---

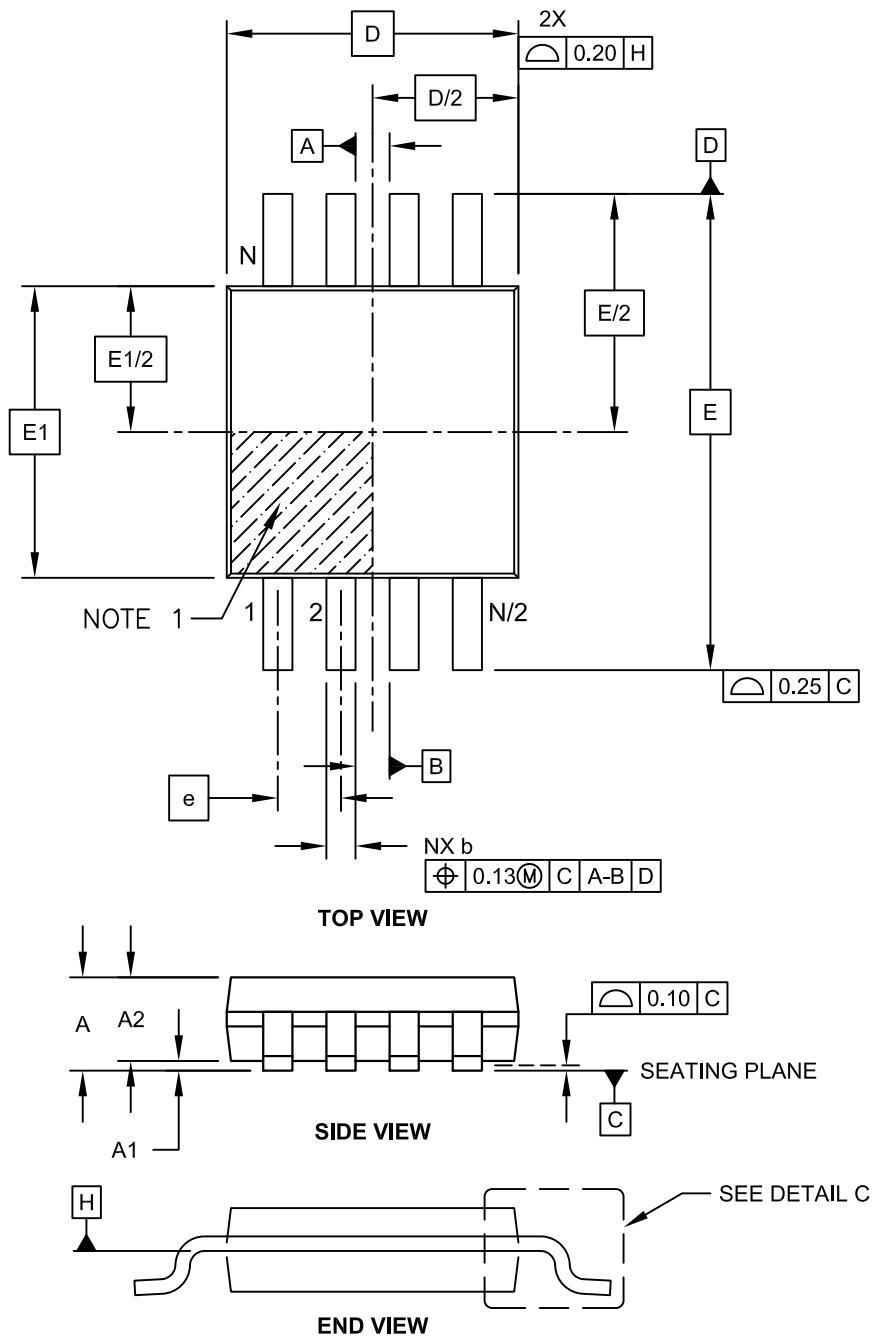
### **MSOP Family**

#### **Micro Small Outline Packages**

## Packaging Diagrams and Parameters

### 8-Lead Plastic Micro Small Outline Package (MS) [MSOP]

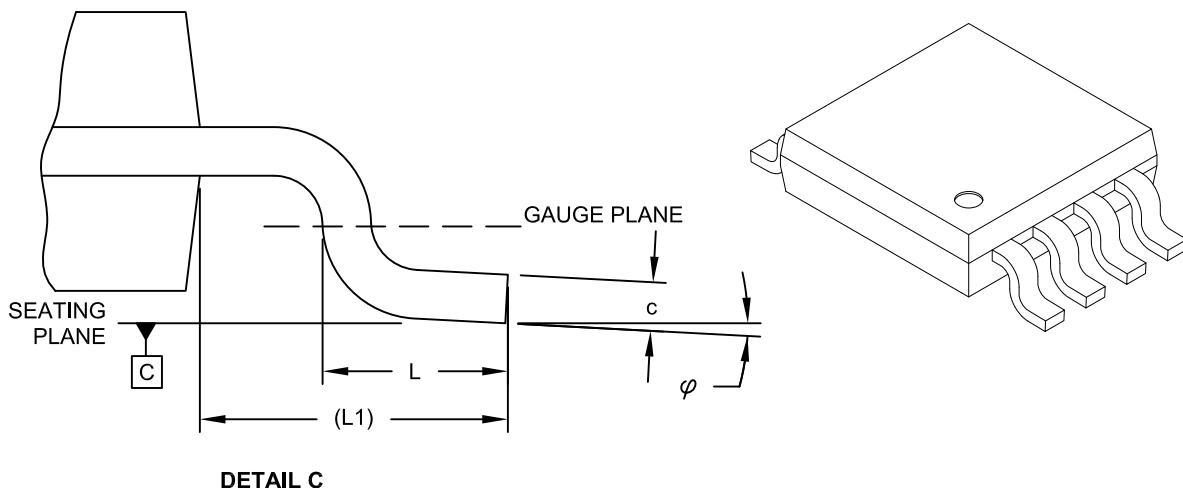
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 8-Lead Plastic Micro Small Outline Package (MS) [MSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N			8	
Pitch	e		0.65 BSC		
Overall Height	A		-	-	1.10
Molded Package Thickness	A2		0.75	0.85	0.95
Standoff	A1		0.00	-	0.15
Overall Width	E		4.90 BSC		
Molded Package Width	E1		3.00 BSC		
Overall Length	D		3.00 BSC		
Foot Length	L		0.40	0.60	0.80
Footprint	L1		0.95 REF		
Foot Angle	φ		0°	-	8°
Lead Thickness	c		0.08	-	0.23
Lead Width	b		0.22	-	0.40

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm per side.
3. Dimensioning and tolerancing per ASME Y14.5M.

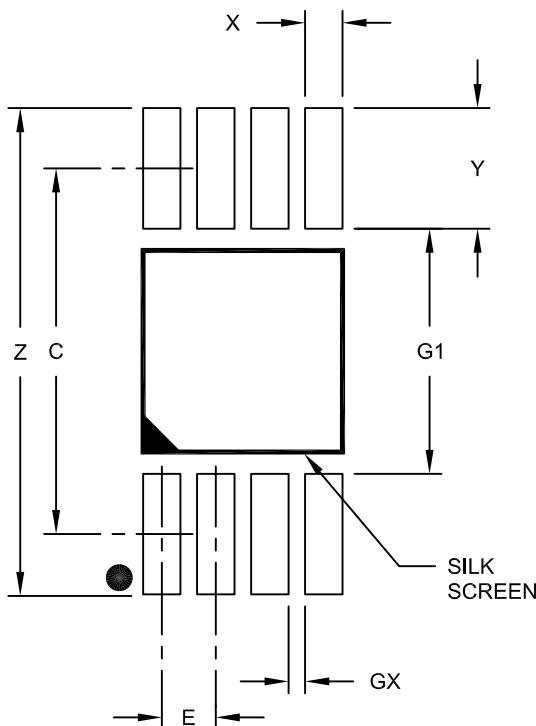
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

8-Lead Plastic Micro Small Outline Package (MS) [MSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E		0.65	BSC	
Contact Pad Spacing	C		4.40		
Overall Width	Z			5.85	
Contact Pad Width (X8)	X1			0.45	
Contact Pad Length (X8)	Y1			1.45	
Distance Between Pads	G1	2.95			
Distance Between Pads	GX	0.20			

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

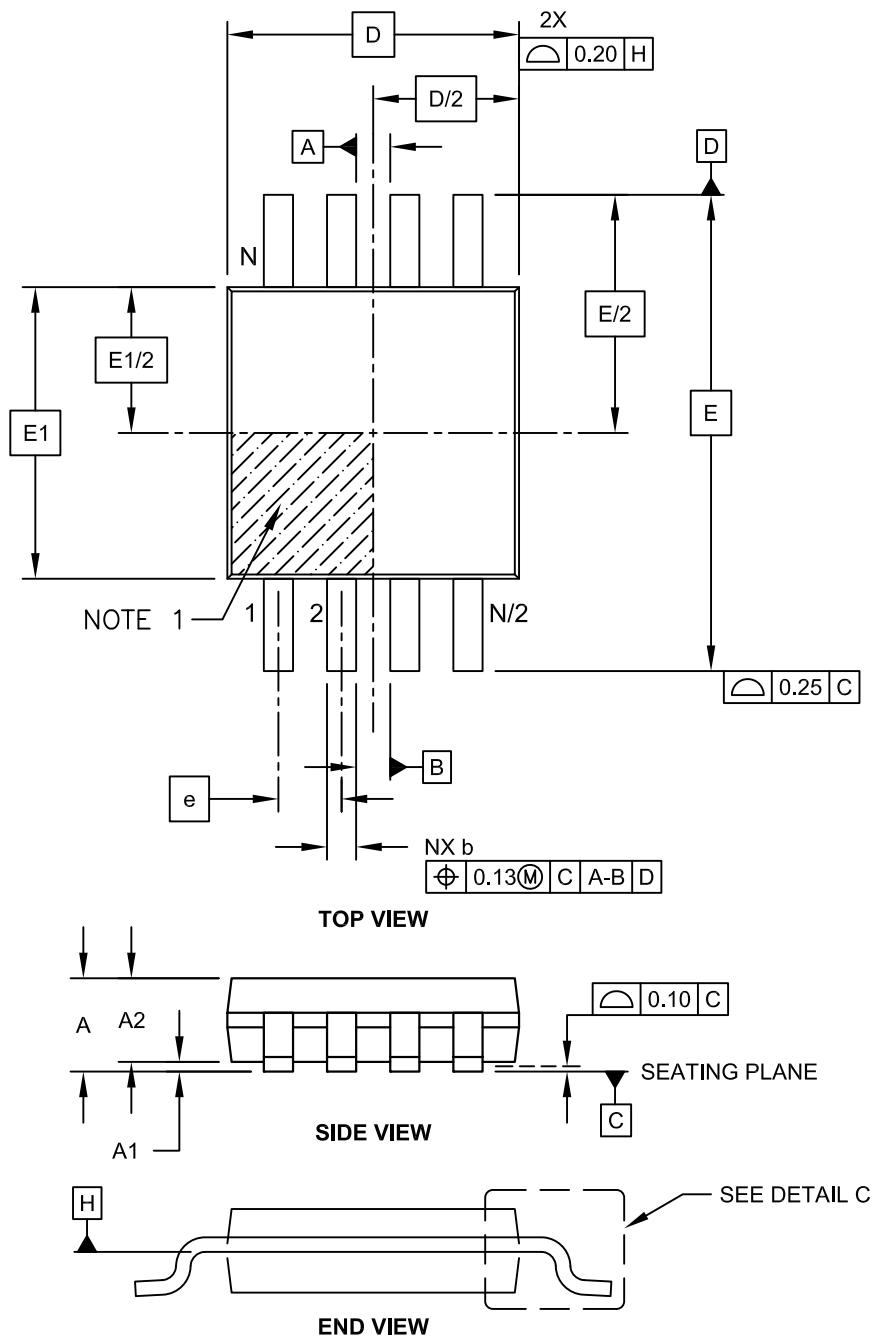
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2111A

## Packaging Diagrams and Parameters

### 8-Lead Plastic Micro Small Outline Package (UA) [MSOP]

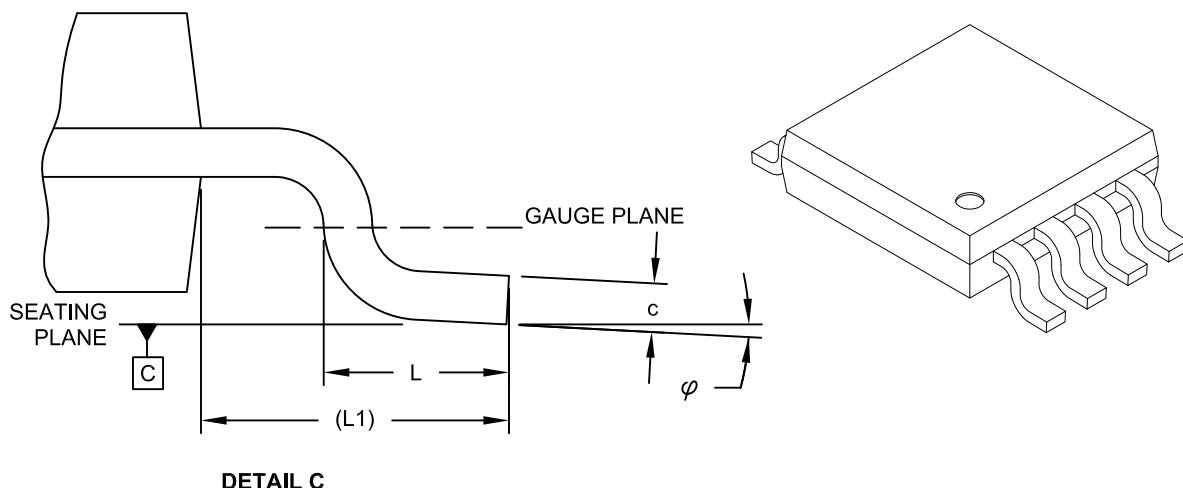
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 8-Lead Plastic Micro Small Outline Package (UA) [MSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		8	
Pitch	e		0.65 BSC	
Overall Height	A	-	-	1.10
Molded Package Thickness	A2	0.75	0.85	0.95
Standoff	A1	0.00	-	0.15
Overall Width	E	4.90 BSC		
Molded Package Width	E1	3.00 BSC		
Overall Length	D	3.00 BSC		
Foot Length	L	0.40	0.60	0.80
Footprint	L1	0.95 REF		
Foot Angle	φ	0°	-	8°
Lead Thickness	c	0.08	-	0.23
Lead Width	b	0.22	-	0.40

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm per side.
3. Dimensioning and tolerancing per ASME Y14.5M.

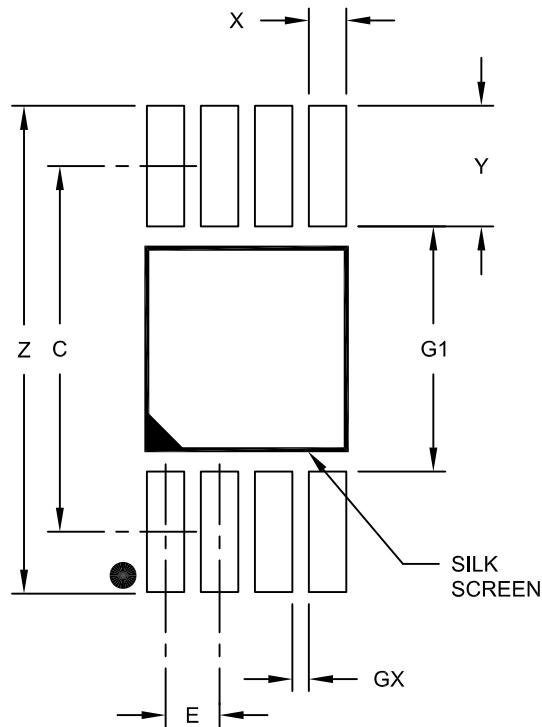
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

### 8-Lead Plastic Micro Small Outline Package (UA) [MSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



**RECOMMENDED LAND PATTERN**

		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E		0.65	BSC	
Contact Pad Spacing	C		4.40		
Overall Width	Z			5.85	
Contact Pad Width (X8)	X1			0.45	
Contact Pad Length (X8)	Y1			1.45	
Distance Between Pads	G1	2.95			
Distance Between Pads	GX	0.20			

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

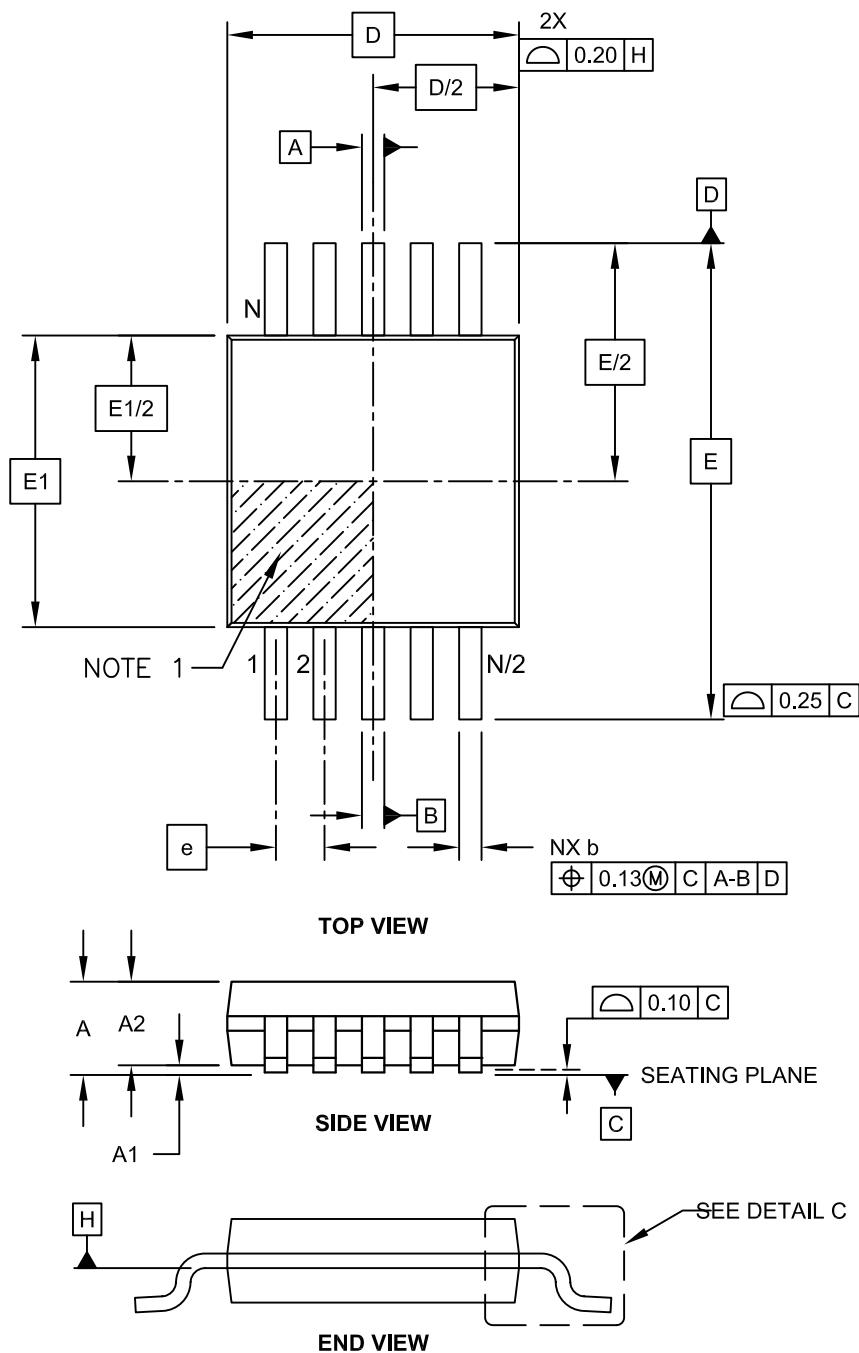
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2111A

## Packaging Diagrams and Parameters

### 10-Lead Plastic Micro Small Outline Package (MS) [MSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

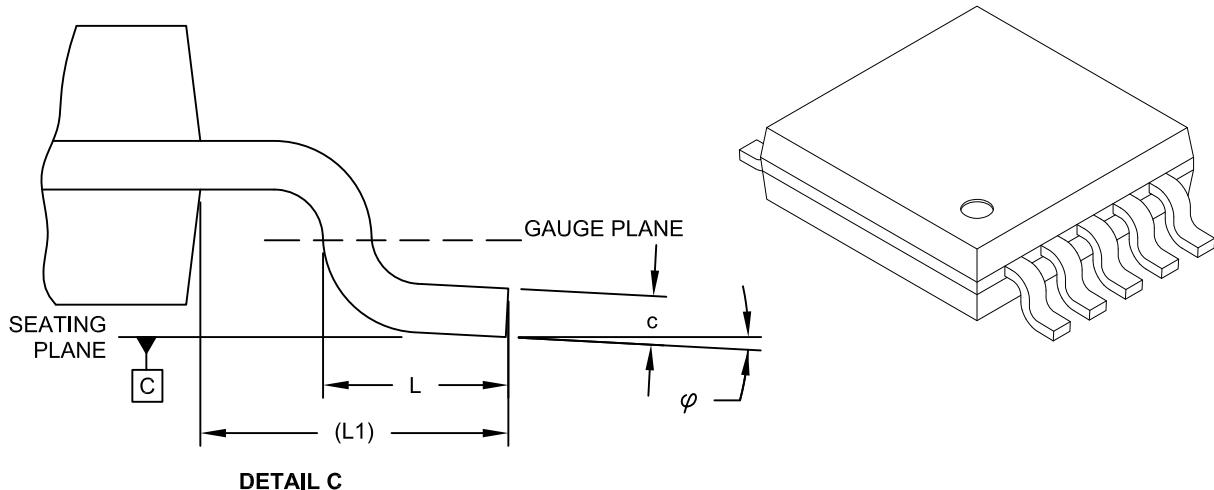


Microchip Technology Drawing C04-021C Sheet 1 of 2

## Packaging Diagrams and Parameters

### 10-Lead Plastic Micro Small Outline Package (MS) [MSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		10		
Pitch	e		0.50	BSC	
Overall Height	A	-	-	1.10	
Molded Package Thickness	A2	0.75	0.85	0.95	
Standoff	A1	0.00	-	0.15	
Overall Width	E	4.90 BSC			
Molded Package Width	E1	3.00 BSC			
Overall Length	D	3.00 BSC			
Foot Length	L	0.40	0.60	0.80	
Footprint	L1	0.95 REF			
Foot Angle	φ	0°	-	8°	
Lead Thickness	c	0.08	-	0.23	
Lead Width	b	0.15	-	0.33	

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.

2. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm per side.

3. Dimensioning and tolerancing per ASME Y14.5M.

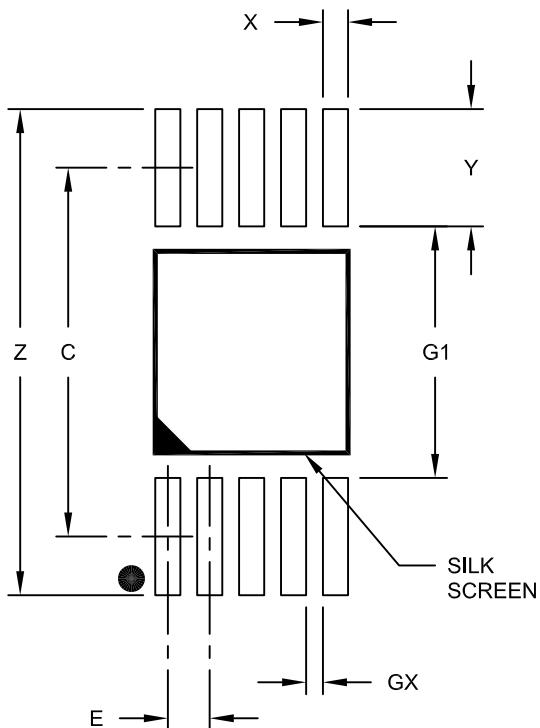
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

10-Lead Plastic Micro Small Outline Package (MS) [MSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	0.50	BSC	
Contact Pad Spacing	C	4.40		
Overall Width	Z		5.80	
Contact Pad Width (X10)	X1		0.30	
Contact Pad Length (X10)	Y1			1.40
Distance Between Pads	G1	3.00		
Distance Between Pads	GX	0.20		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

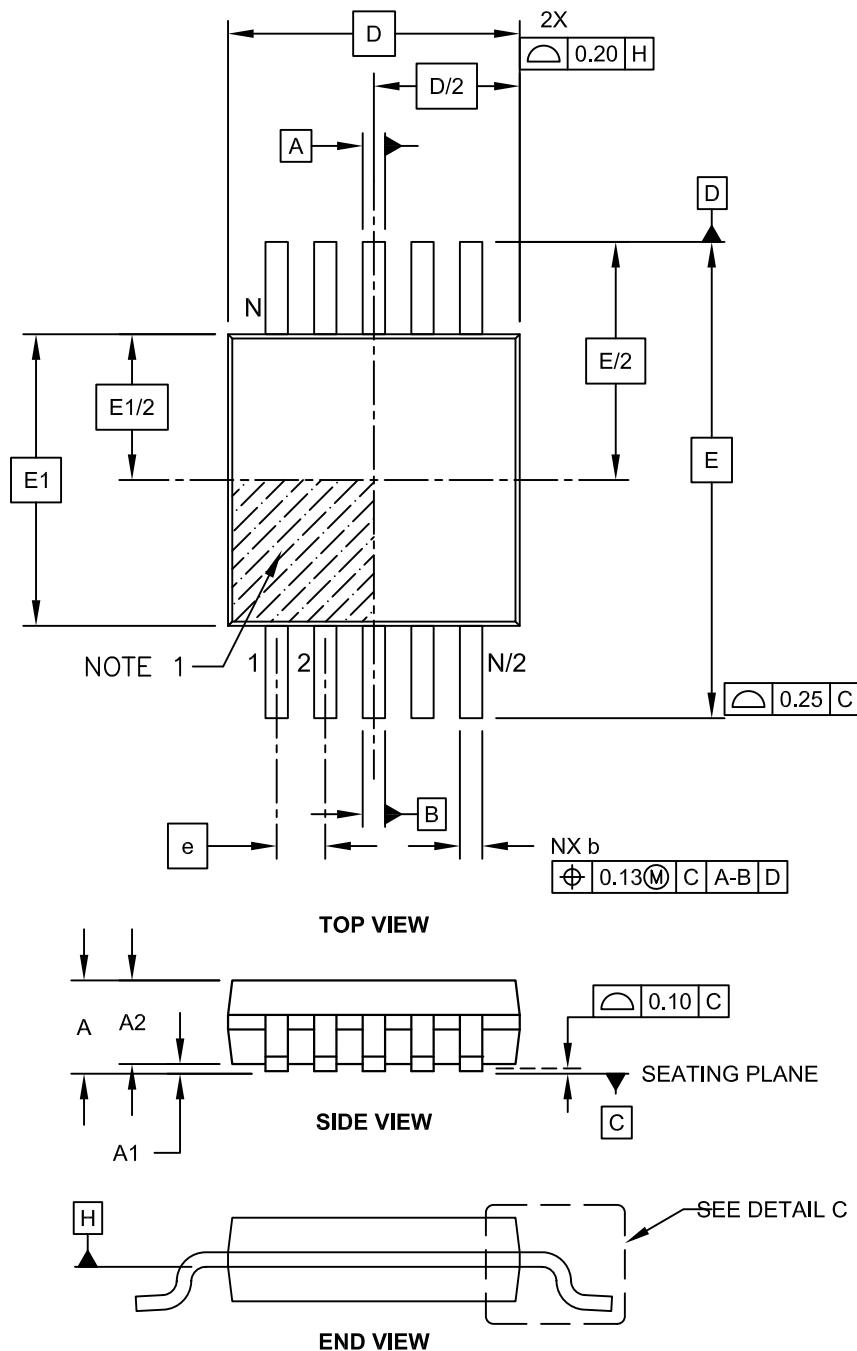
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2021A

## Packaging Diagrams and Parameters

### 10-Lead Plastic Micro Small Outline Package (UN) [MSOP]

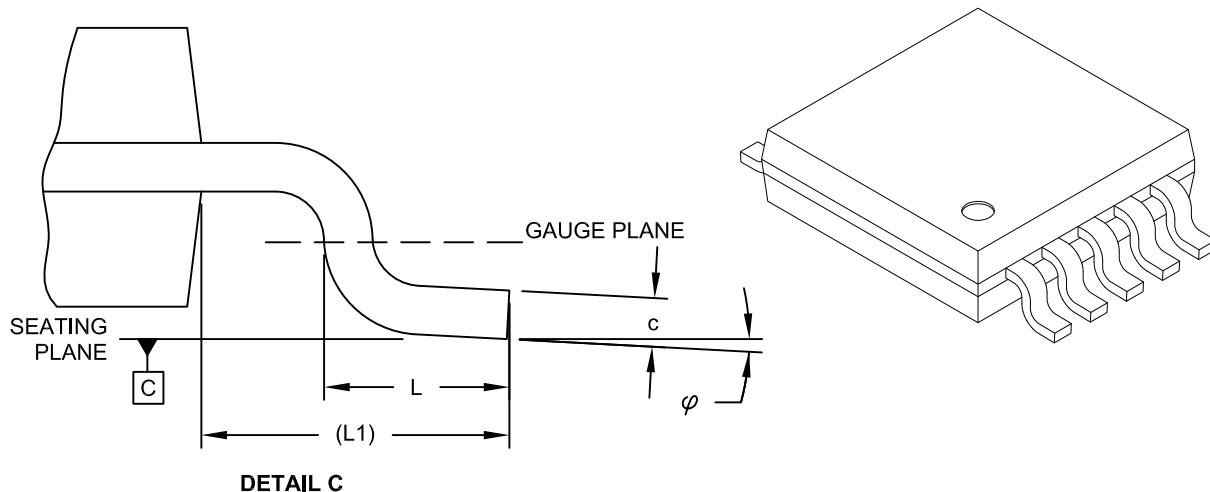
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 10-Lead Plastic Micro Small Outline Package (UN) [MSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		10		
Pitch	e		0.50	BSC	
Overall Height	A	-	-	1.10	
Molded Package Thickness	A2	0.75	0.85	0.95	
Standoff	A1	0.00	-	0.15	
Overall Width	E	4.90 BSC			
Molded Package Width	E1	3.00 BSC			
Overall Length	D	3.00 BSC			
Foot Length	L	0.40	0.60	0.80	
Footprint	L1	0.95 REF			
Foot Angle	φ	0°	-	8°	
Lead Thickness	c	0.08	-	0.23	
Lead Width	b	0.15	-	0.33	

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm per side.
3. Dimensioning and tolerancing per ASME Y14.5M.

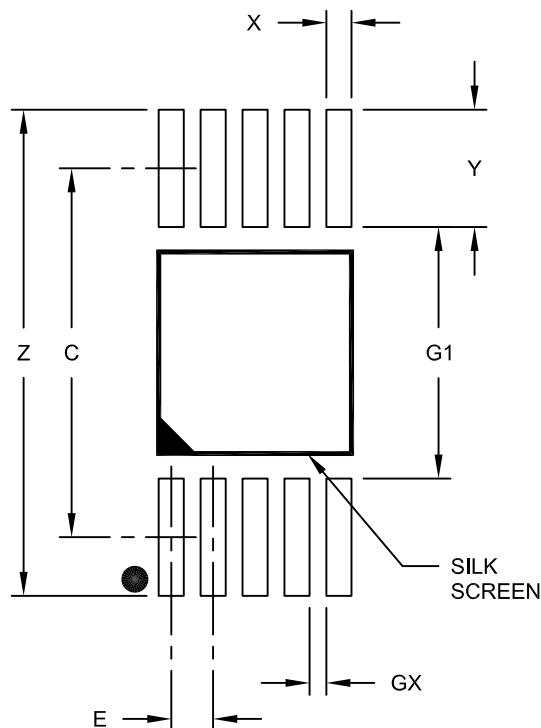
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

### 10-Lead Plastic Micro Small Outline Package (UN) [MSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	0.50	BSC	
Contact Pad Spacing	C		4.40	
Overall Width	Z			5.80
Contact Pad Width (X10)	X1			0.30
Contact Pad Length (X10)	Y1			1.40
Distance Between Pads	G1	3.00		
Distance Between Pads	GX	0.20		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

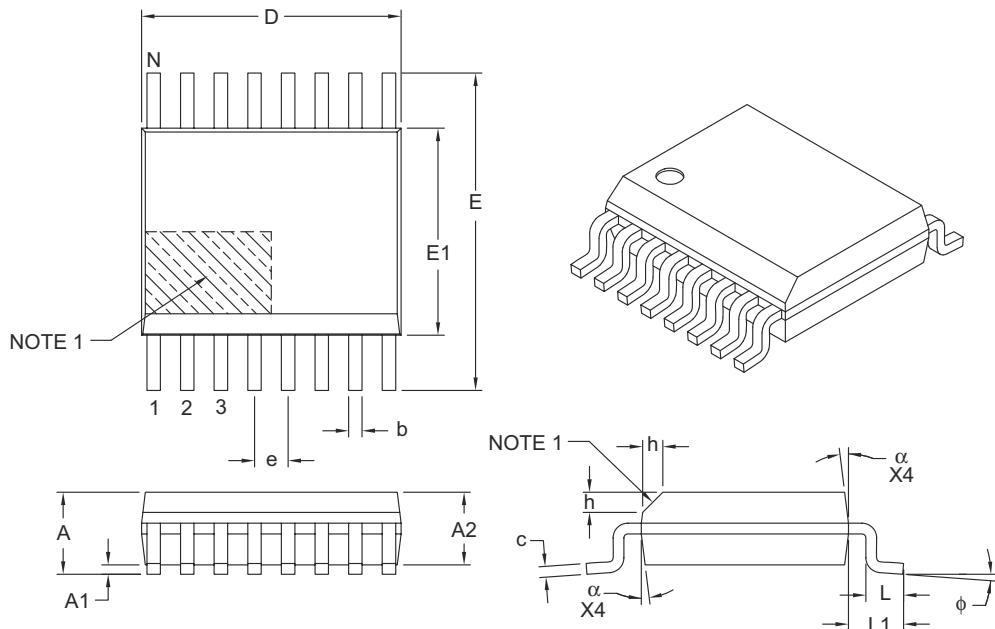
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2021A

## Packaging Diagrams and Parameters

### 16-Lead Plastic Shrink Small Outline Narrow Body (QR) – .150" Body [QSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	INCHES		
		Dimension Limits	MIN	NOM	MAX
Number of Pins	N			16	
Pitch	e			.025 BSC	
Overall Height	A	—	—	.069	
Standoff §	A1	.004	—	.010	
Molded Package Height	A2	.049	—	—	
Overall Width	E	.236 BSC			
Molded Package Width	E1	.154 BSC			
Overall Length	D	.193 BSC			
Chamfer Distance	h	.010	—	.020	
Lead Thickness	c	.006	—	.010	
Lead Width	b	.008	—	.012	
Footprint	L1	.041 REF			
Foot Length	L	.016	—	.050	
Foot Angle	phi	0°	—	8°	
Molded Draft Angle	alpha	5°	—	15°	

**Notes:**

1. Chamfer feature is optional. If it is not present, then a Pin 1 visual index feature must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .006" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

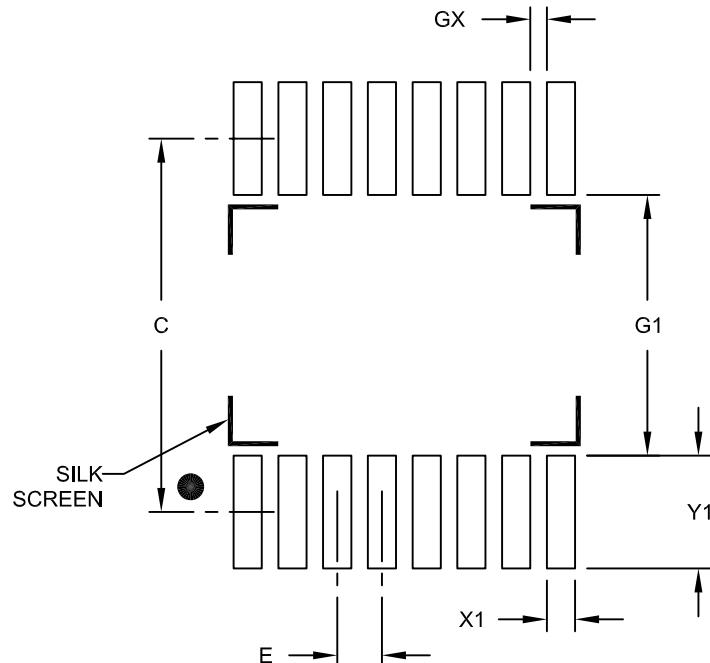
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

16-Lead Plastic Shrink Small Outline Narrow Body (QR) - .150" Body [QSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		.025	BSC
Contact Pad Spacing	C		.209	
Contact Pad Width (X16)	X1			.016
Contact Pad Length (X16)	Y1			.063
Distance Between Pads	GX	.009		
Distance Between Pads	G1	.146		

**Notes:**

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2024A

## Packaging Diagrams and Parameters

---

---

**NOTES:**

## Packaging Diagrams and Parameters

---

---

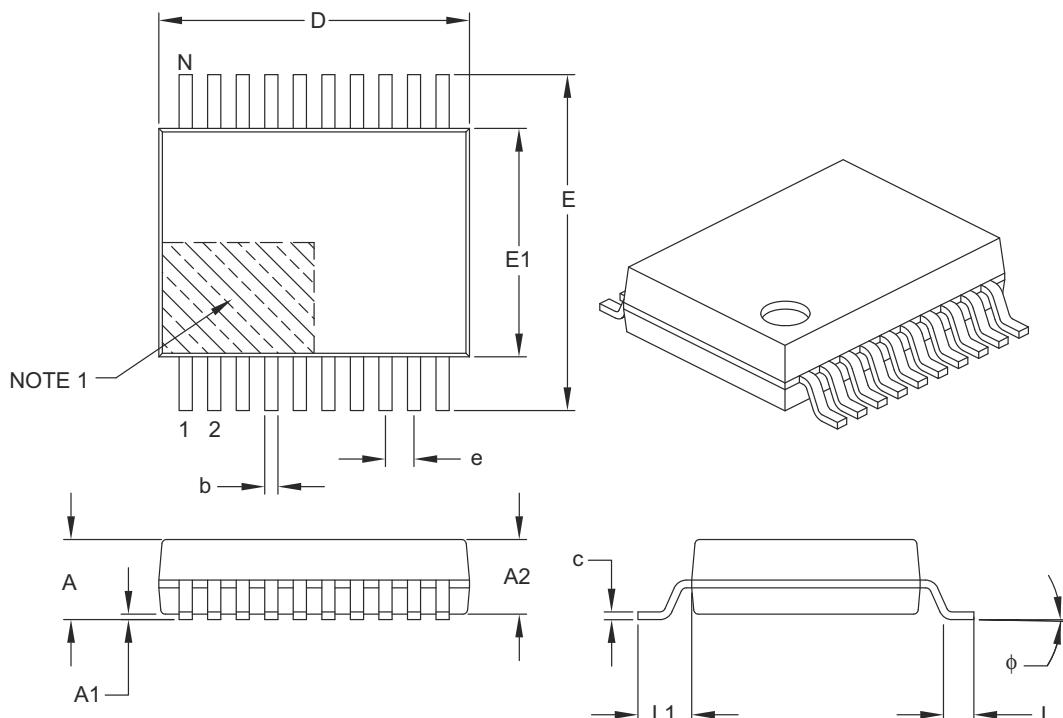
### **SSOP Family**

#### **Shrink Small Outline Packages**

## Packaging Diagrams and Parameters

### 20-Lead Plastic Shrink Small Outline (SS) – 5.30 mm Body [SSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		20		
Pitch	e		0.65	BSC	
Overall Height	A	–	–	2.00	
Molded Package Thickness	A2	1.65	1.75	1.85	
Standoff	A1	0.05	–	–	
Overall Width	E	7.40	7.80	8.20	
Molded Package Width	E1	5.00	5.30	5.60	
Overall Length	D	6.90	7.20	7.50	
Foot Length	L	0.55	0.75	0.95	
Footprint	L1	1.25 REF			
Lead Thickness	c	0.09	–	0.25	
Foot Angle	phi	0°	4°	8°	
Lead Width	b	0.22	–	0.38	

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.20 mm per side.
3. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

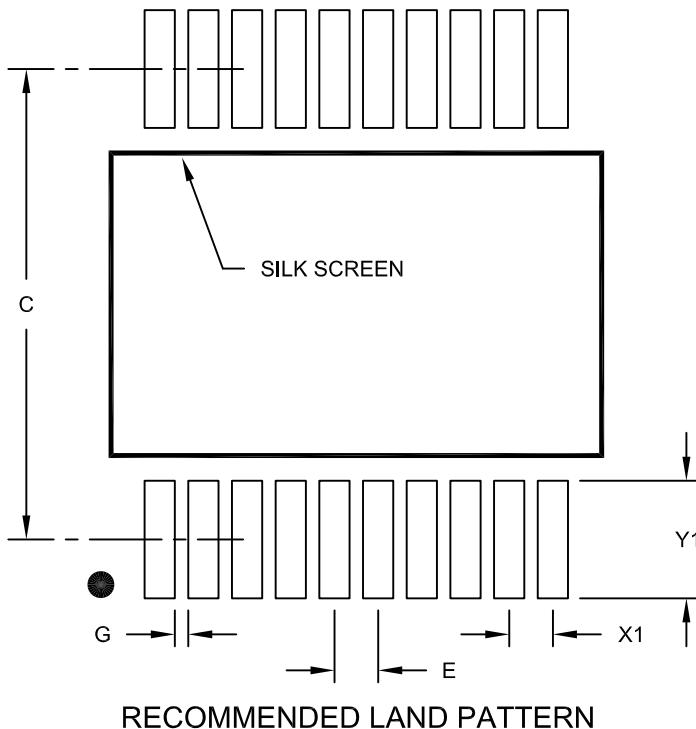
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-072B

## Land Pattern (Footprint)

20-Lead Plastic Shrink Small Outline (SS) - 5.30 mm Body [SSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		0.65 BSC	
Contact Pad Spacing	C		7.20	
Contact Pad Width (X20)	X1			0.45
Contact Pad Length (X20)	Y1			1.75
Distance Between Pads	G	0.20		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

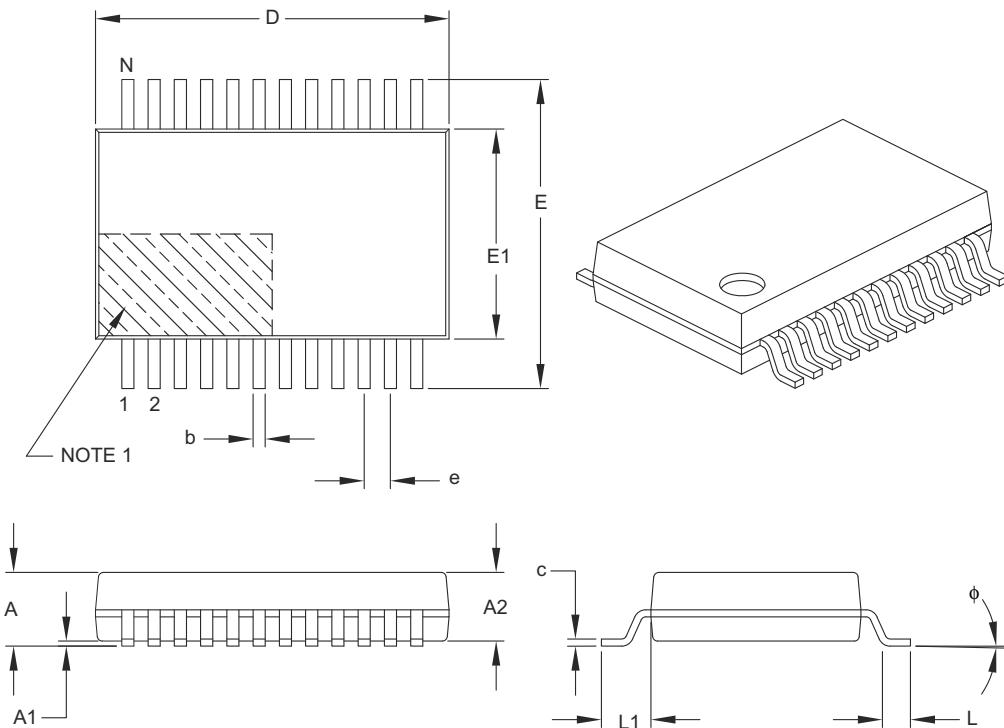
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2072A

## Packaging Diagrams and Parameters

### 24-Lead Plastic Shrink Small Outline (SS) – 5.30 mm Body [SSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		UNITS			MILLIMETERS		
		DIMENSION LIMITS			MIN	NOM	MAX
Number of Pins	N				24		
Pitch	e				0.65	BSC	
Overall Height	A		—	—	2.00		
Molded Package Thickness	A2	1.65	1.75	1.85			
Standoff	A1	0.05	—	—			
Overall Width	E	7.40	7.80	8.20			
Molded Package Width	E1	5.00	5.30	5.60			
Overall Length	D	7.90	8.20	8.50			
Foot Length	L	0.55	0.75	0.95			
Footprint	L1	1.25 REF					
Lead Thickness	c	0.09	—	0.25			
Foot Angle	ϕ	0°	4°	8°			
Lead Width	b	0.22	—	0.38			

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.20 mm per side.
3. Dimensioning and tolerancing per ASME Y14.5M.

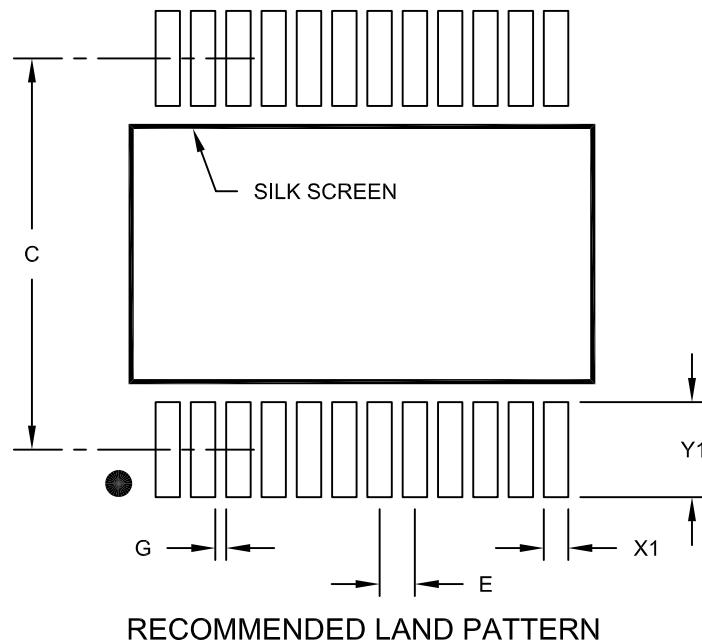
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

24 Lead Plastic Shrink Small Outline (SS) - 5.30 mm Body [SSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units			MILLIMETERS		
		Dimension Limits			MIN	NOM	MAX
Contact Pitch	E				0.65	BSC	
Contact Pad Spacing	C				7.20		
Contact Pad Width (X24)	X1				0.45		
Contact Pad Length (X24)	Y1				1.75		
Distance Between Pads	G	0.20					

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

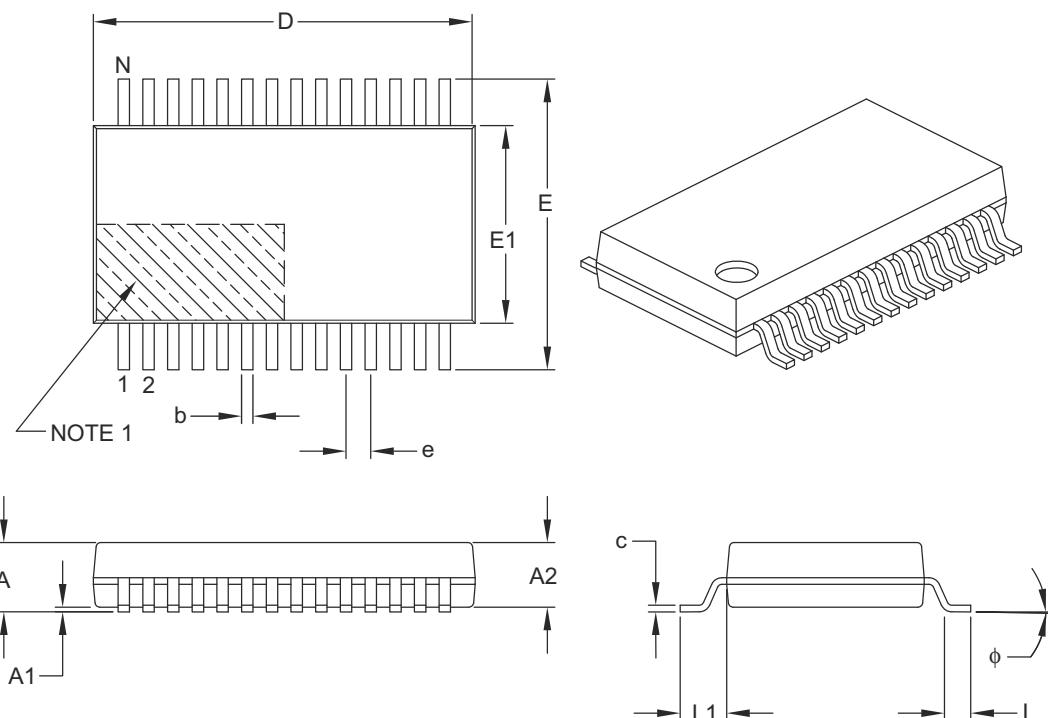
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2132A

## Packaging Diagrams and Parameters

### 28-Lead Plastic Shrink Small Outline (SS) – 5.30 mm Body [SSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
		Dimension Limits	MIN	NOM	MAX
Number of Pins		N	28		
Pitch		e	0.65 BSC		
Overall Height		A	–	–	2.00
Molded Package Thickness		A2	1.65	1.75	1.85
Standoff		A1	0.05	–	–
Overall Width		E	7.40	7.80	8.20
Molded Package Width		E1	5.00	5.30	5.60
Overall Length		D	9.90	10.20	10.50
Foot Length		L	0.55	0.75	0.95
Footprint		L1	1.25 REF		
Lead Thickness		c	0.09	–	0.25
Foot Angle		ϕ	0°	4°	8°
Lead Width		b	0.22	–	0.38

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.20 mm per side.
3. Dimensioning and tolerancing per ASME Y14.5M.

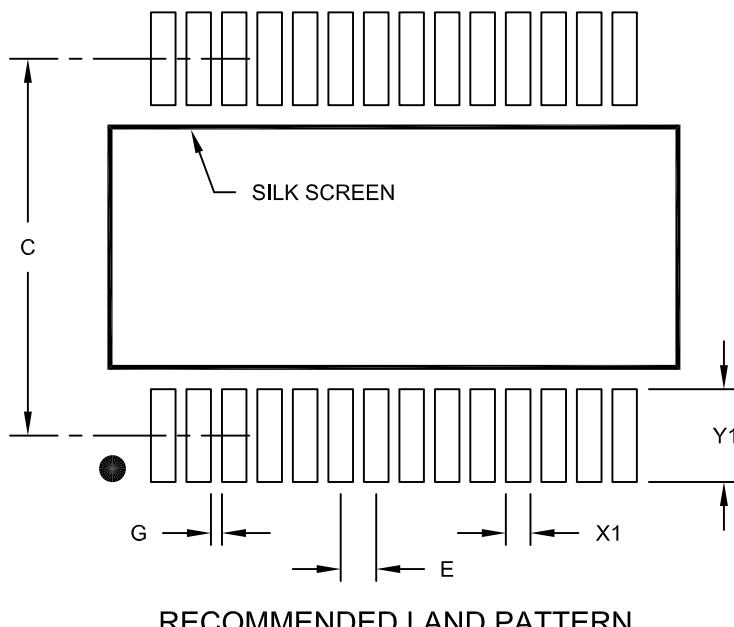
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

28-Lead Plastic Shrink Small Outline (SS) - 5.30 mm Body [SSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units			MILLIMETERS		
		Dimension Limits			MIN	NOM	MAX
Contact Pitch	E	0.65 BSC					
Contact Pad Spacing	C			7.20			
Contact Pad Width (X28)	X1				0.45		
Contact Pad Length (X28)	Y1					1.75	
Distance Between Pads	G	0.20					

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2073A

## Packaging Diagrams and Parameters

---

---

**NOTES:**

## Packaging Diagrams and Parameters

---

---

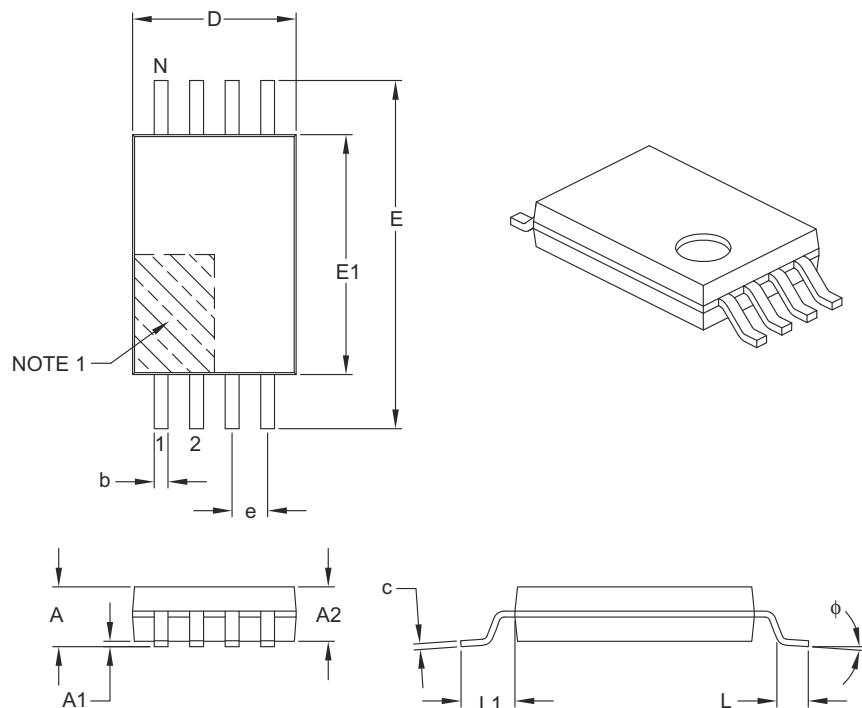
### TSSOP Family

#### Thin Shrink Small Outline Packages

## Packaging Diagrams and Parameters

### 8-Lead Plastic Thin Shrink Small Outline (ST) – 4.4 mm Body [TSSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins		N		
Pitch		e		
Overall Height		A		
Molded Package Thickness		A2		
Standoff		A1		
Overall Width		E		
Molded Package Width		E1		
Molded Package Length		D		
Foot Length		L		
Footprint		L1		
Foot Angle		$\phi$		
Lead Thickness		c		
Lead Width		b		

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15 mm per side.
3. Dimensioning and tolerancing per ASME Y14.5M.

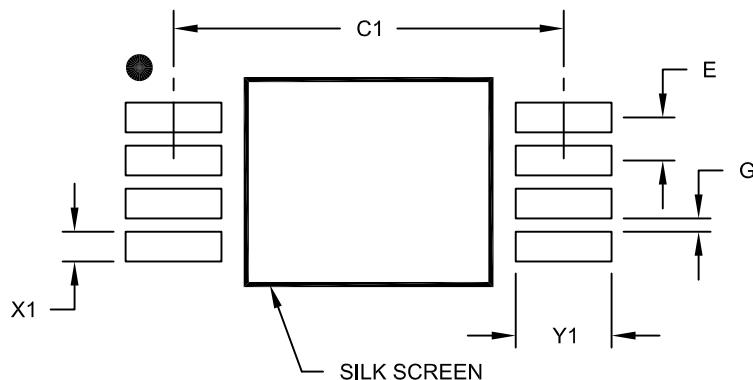
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

8-Lead Plastic Thin Shrink Small Outline (ST) - 4.4 mm Body [TSSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Dimension Limits	UNITS MILLIMETERS		
	MIN	NOM	MAX
Contact Pitch	E	0.65	BSC
Contact Pad Spacing	C1	5.90	
Contact Pad Width (X8)	X1		0.45
Contact Pad Length (X8)	Y1		1.45
Distance Between Pads	G	0.20	

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

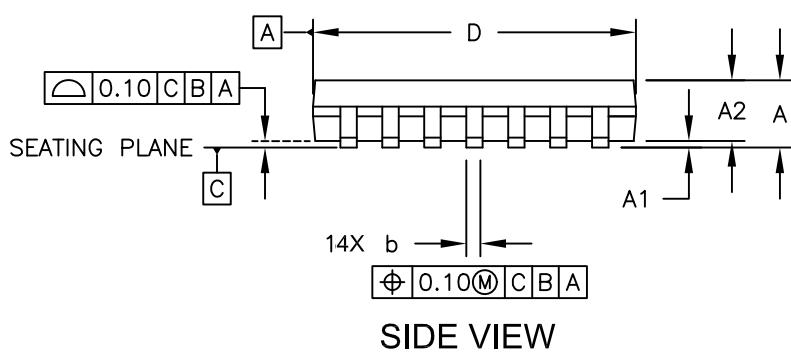
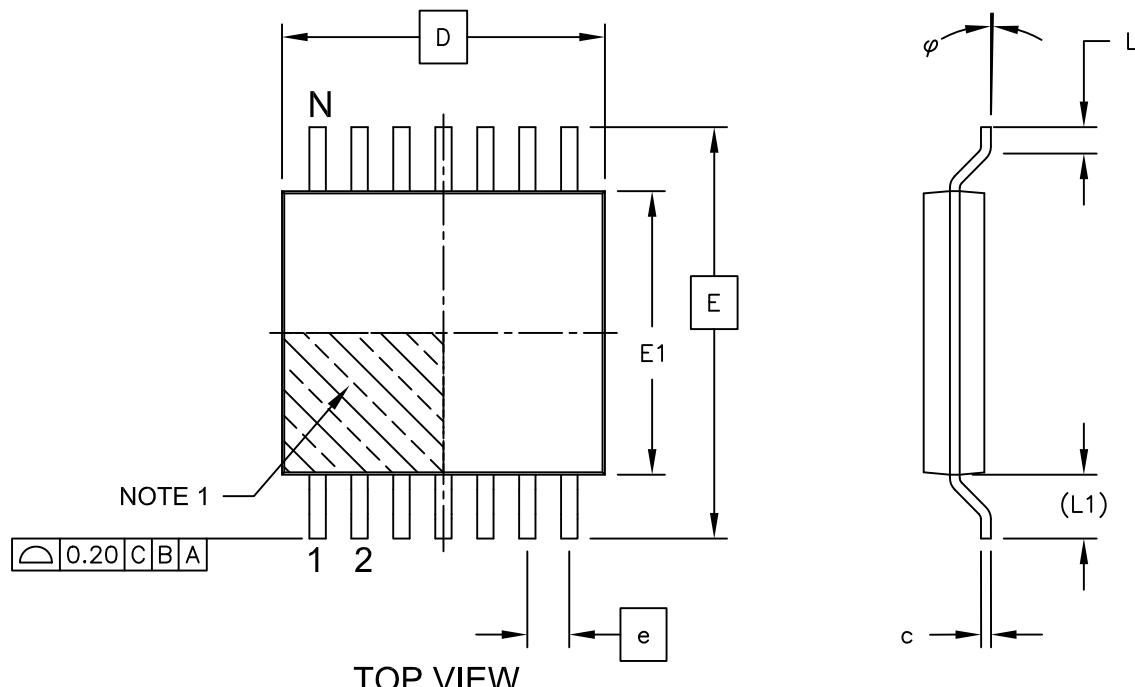
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2086A

## Packaging Diagrams and Parameters

### 14-Lead Plastic Thin Shrink Small Outline (ST) - 4.4 mm Body [TSSOP]

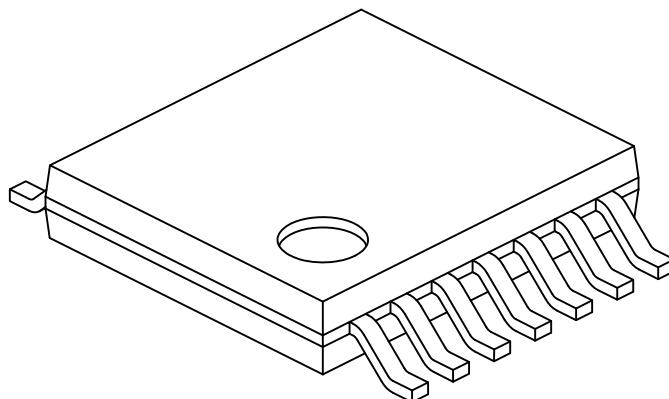
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 14-Lead Plastic Thin Shrink Small Outline (ST) - 4.4 mm Body [TSSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		14		
Pitch	e		0.65	BSC	
Overall Height	A	-	-	1.20	
Molded Package Thickness	A2	0.80	1.00	1.05	
Standoff	A1	0.05	-	0.15	
Overall Width	E	6.40 BSC			
Molded Package Width	E1	4.30	4.40	4.50	
Molded Package Length	D	4.90	5.00	5.10	
Foot Length	L	0.45	0.60	0.75	
Footprint	(L1)	1.00 REF			
Foot Angle	$\varphi$	0°	-	8°	
Lead Thickness	c	0.09	-	0.20	
Lead Width	b	0.19	-	0.30	

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm per side.
3. Dimensioning and tolerancing per ASME Y14.5M

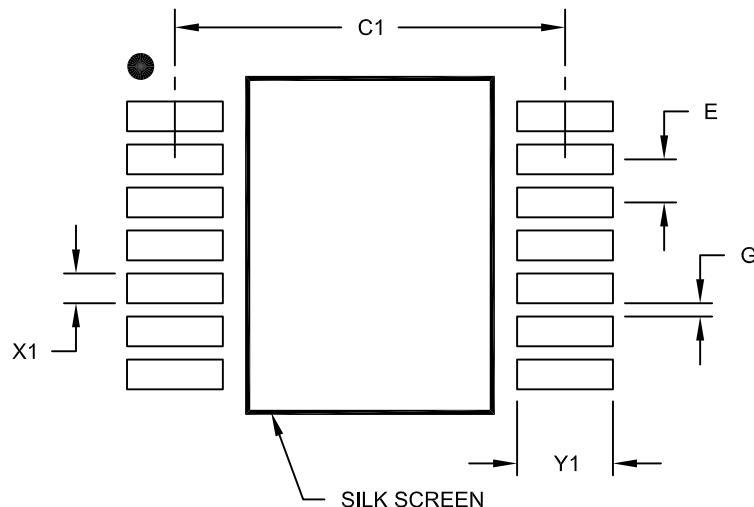
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

### 14-Lead Plastic Thin Shrink Small Outline (ST) - 4.4 mm Body [TSSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units			MILLIMETERS		
Dimension		Limits			MIN	NOM	MAX
Contact Pitch					0.65 BSC		
Contact Pad Spacing	E						
Contact Pad Width (X14)	C1				5.90		
Contact Pad Length (X14)	X1					0.45	
Distance Between Pads	Y1					1.45	
	G	0.20					

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

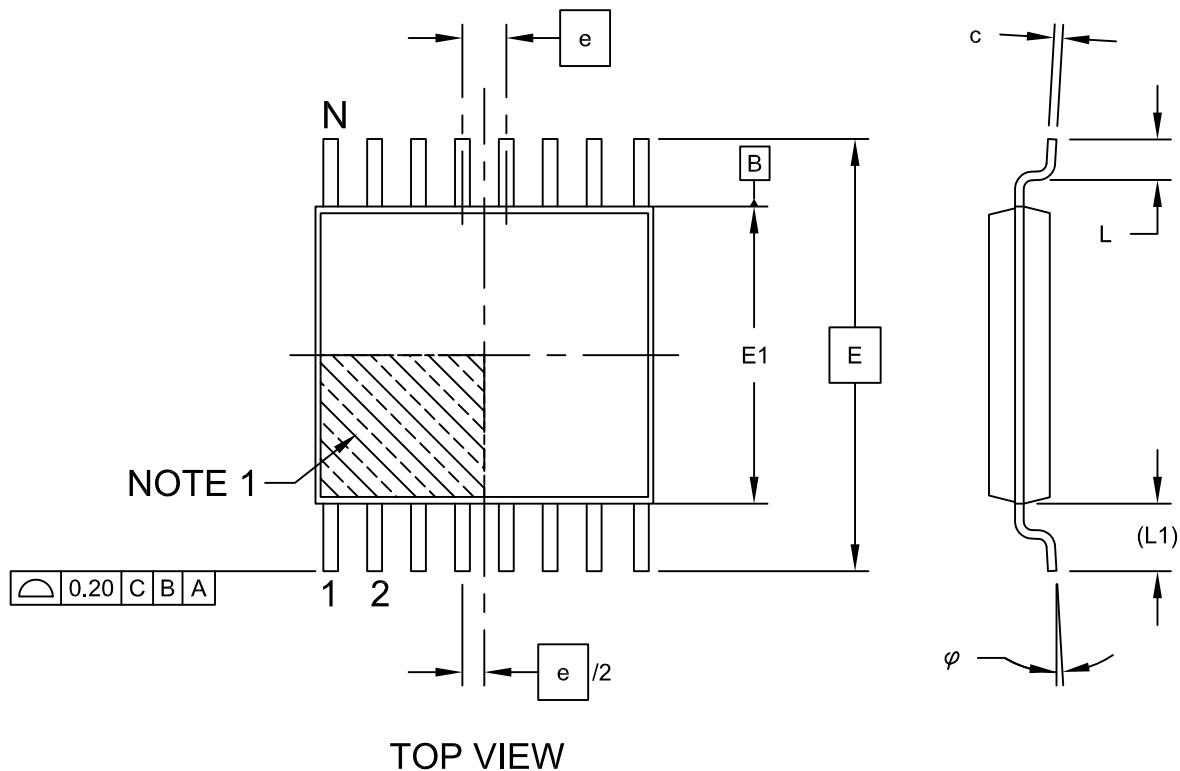
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2087A

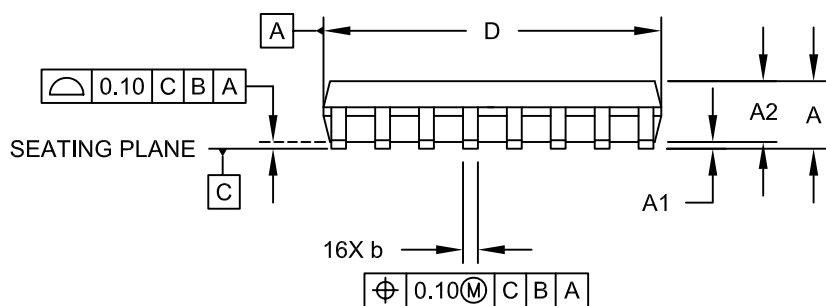
## Packaging Diagrams and Parameters

### 16-Lead Plastic Thin Shrink Small Outline (ST) – 4.4 mm Body [TSSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



TOP VIEW

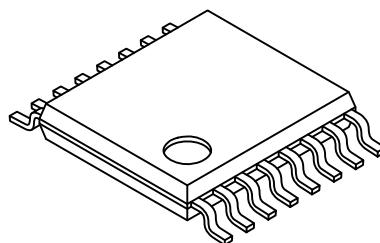


## Packaging Diagrams and Parameters

---

### 16-Lead Plastic Thin Shrink Small Outline (ST) – 4.4 mm Body [TSSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		16		
Pitch	e		0.65	BSC	
Overall Height	A	-	-	1.20	
Molded Package Thickness	A2	0.80	1.00	1.05	
Standoff	A1	0.05	-	0.15	
Overall Width	E		6.40	BSC	
Molded Package Width	E1	4.30	4.40	4.50	
Molded Package Length	D	4.90	5.00	5.10	
Foot Length	L	0.45	0.60	0.75	
Footprint	(L1)		1.00	REF	
Foot Angle	$\varphi$	0°	-	8°	
Lead Thickness	c	0.09	-	0.20	
Lead Width	b	0.19	-	0.30	

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm per side.
3. Dimensioning and tolerancing per ASME Y14.5M

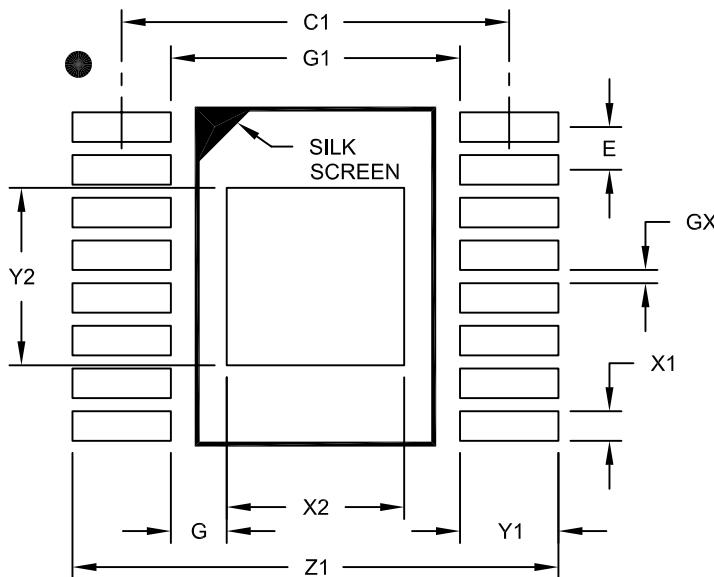
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

### 16-Lead Plastic Thin Shrink Small Outline (ST) – 4.4 mm Body [TSSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E		0.65	BSC	
Optional Center Pad Length	Y2				2.70
Optional Center Pad Width	X2				2.70
Clearance Between Contact Pads	G1	4.40			
Contact Pad To Center Pad	G	0.73			
Contact Pad Spacing	C1		5.90		
Contact Pad Width (X16)	X1			0.45	
Contact Pad Length (X16)	Y1				1.50
Distance Between Pads	GX	0.20			
Overall Width	Z1				7.40

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

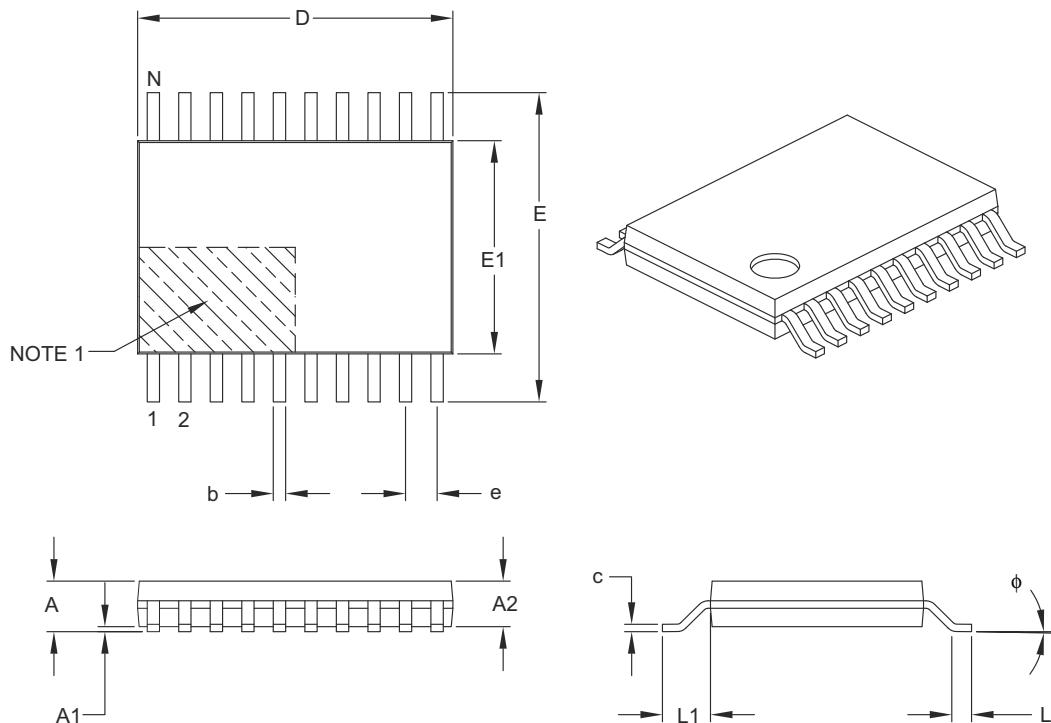
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2068A

## Packaging Diagrams and Parameters

### 20-Lead Plastic Thin Shrink Small Outline (ST) – 4.4 mm Body [TSSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		20	
Pitch	e		0.65 BSC	
Overall Height	A	–	–	1.20
Molded Package Thickness	A2	0.80	1.00	1.05
Standoff	A1	0.05	–	0.15
Overall Width	E	6.40 BSC		
Molded Package Width	E1	4.30	4.40	4.50
Molded Package Length	D	6.40	6.50	6.60
Foot Length	L	0.45	0.60	0.75
Footprint	L1	1.00 REF		
Foot Angle	ϕ	0°	–	8°
Lead Thickness	c	0.09	–	0.20
Lead Width	b	0.19	–	0.30

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15 mm per side.
3. Dimensioning and tolerancing per ASME Y14.5M.

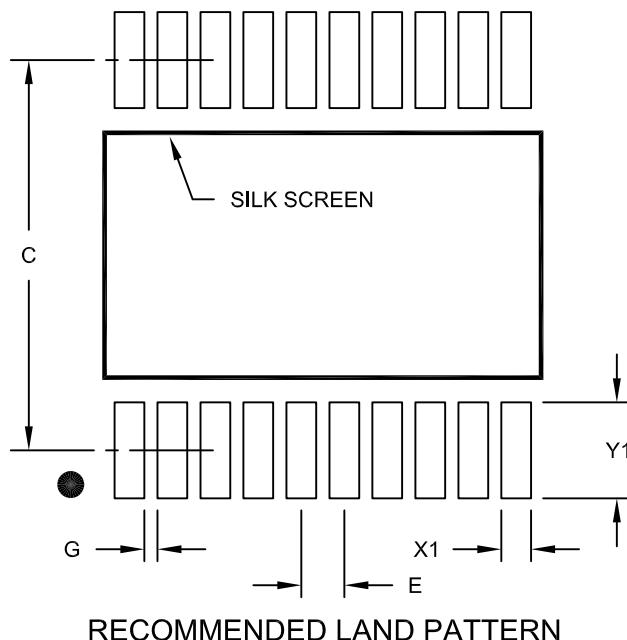
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

### 20-Lead Plastic Thin Shrink Small Outline (ST) - 4.4 mm Body [TSSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
		Dimension Limits	MIN	NOM	MAX
Contact Pitch	E		0.65	BSC	
Contact Pad Spacing	C		5.90		
Contact Pad Width (X20)	X1			0.45	
Contact Pad Length (X20)	Y1				1.45
Distance Between Pads	G	0.20			

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2088A

## Packaging Diagrams and Parameters

---

---

**NOTES:**

## Packaging Diagrams and Parameters

---

---

### **TSOP Family**

**Thin Small Outline Package**

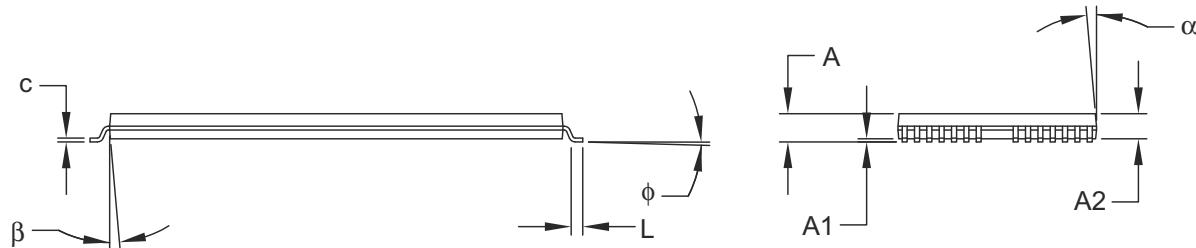
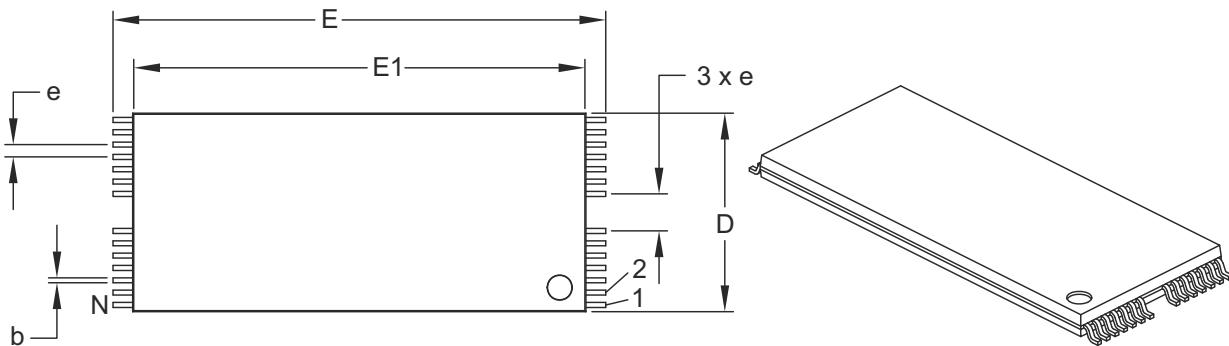
### **VSOP Family**

**Very Small Outline Package**

## Packaging Diagrams and Parameters

### 28-Lead Plastic Thin Small Outline (TS) – 8x20 mm [TSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		28	
Pitch	e		0.50	
Overall Height	A	0.99	1.14	1.30
Molded Package Thickness	A2	0.95	1.00	1.05
Standoff §	A1	0.05	0.15	0.25
Overall Width	E	19.80	20.00	20.20
Molded Package Width	E1	18.30	18.40	18.50
Molded Package Length	D	7.80	8.00	8.20
Foot Length	L	0.50	0.60	0.70
Foot Angle	phi	0°	4°	8°
Lead Thickness	c	0.10	0.15	0.20
Lead Width	b	0.15	0.20	0.25
Mold Draft Angle Top	alpha	0°	5°	10°
Mold Draft Angle Bottom	beta	0°	5°	10°

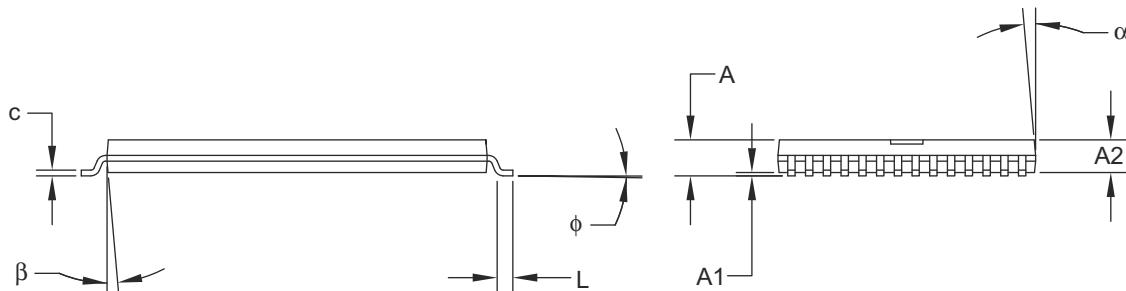
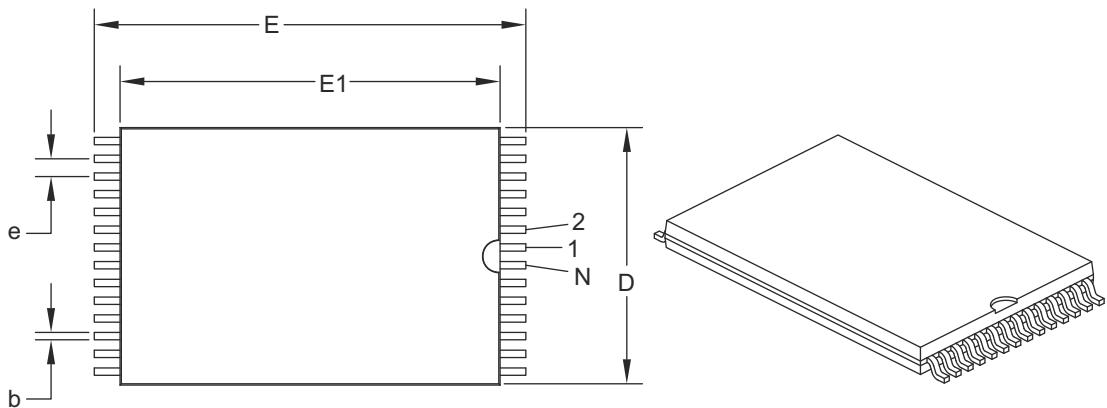
#### Notes:

- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.127 mm per side.
- § Significant Characteristic.

## Packaging Diagrams and Parameters

### 28-Lead Plastic Very Small Outline (VS) – 8x13.4 mm Body [VSOP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension	Units	MILLIMETERS		
		MIN	NOM	MAX
Number of Pins	N	28		
Pitch	e	0.55		
Overall Height	A	0.99	1.14	1.29
Molded Package Thickness	A2	0.95	1.00	1.05
Standoff §	A1	0.05	0.13	0.25
Overall Width	E	13.20	13.40	13.60
Molded Package Width	E1	11.70	11.80	11.90
Molded Package Length	D	7.90	8.00	8.10
Foot Length	L	0.30	0.50	0.70
Foot Angle	phi	0°	3°	5°
Lead Thickness	c	0.14	0.15	0.16
Lead Width	b	0.17	0.20	0.23
Mold Draft Angle Top	alpha	0°	5°	10°
Mold Draft Angle Bottom	beta	0°	5°	10°

**Notes:**

1. § Significant Characteristic.
2. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.127 mm per side.

## Packaging Diagrams and Parameters

---

---

**NOTES:**

## Packaging Diagrams and Parameters

---

---

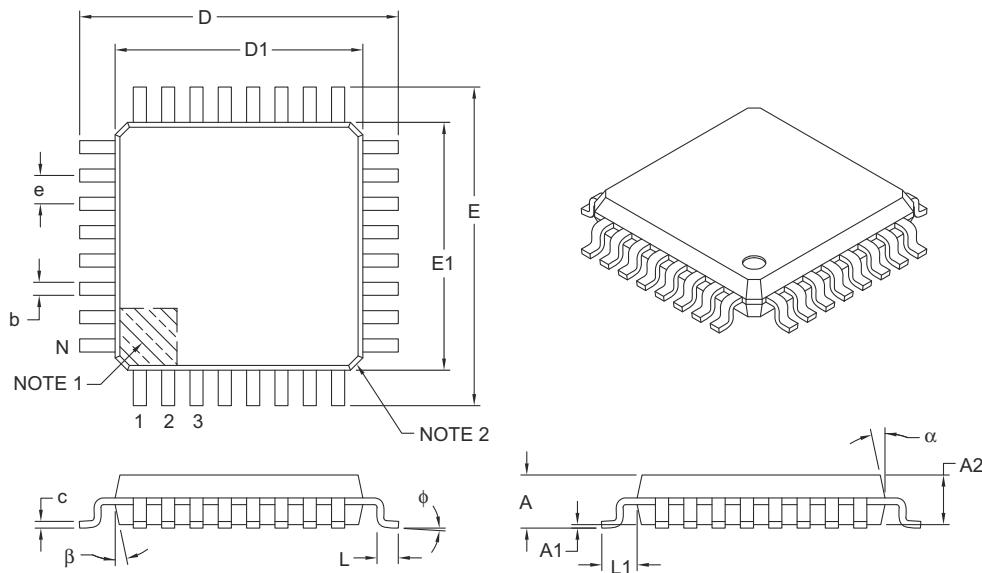
### LQFP Family

#### Low Profile Quad Flat Packages

## Packaging Diagrams and Parameters

### 32-Lead Plastic Low-Profile Quad Flatpack (PL) – 7x7x1.4 mm Body, 2.0 mm [LQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Leads	N		32		
Lead Pitch	e		0.80	BSC	
Overall Height	A	—	—	1.60	
Molded Package Thickness	A2	1.35	1.40	1.45	
Standoff	A1	0.05	—	0.15	
Foot Length	L	0.45	0.60	0.75	
Footprint	L1	1.00 REF			
Foot Angle	φ	0°	3.5°	7°	
Overall Width	E	9.00 BSC			
Overall Length	D	9.00 BSC			
Molded Package Width	E1	7.00 BSC			
Molded Package Length	D1	7.00 BSC			
Lead Thickness	c	0.09	—	0.20	
Lead Width	b	0.30	0.37	0.45	
Mold Draft Angle Top	α	11°	12°	13°	
Mold Draft Angle Bottom	β	11°	12°	13°	

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Chamfers at corners are optional; size may vary.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

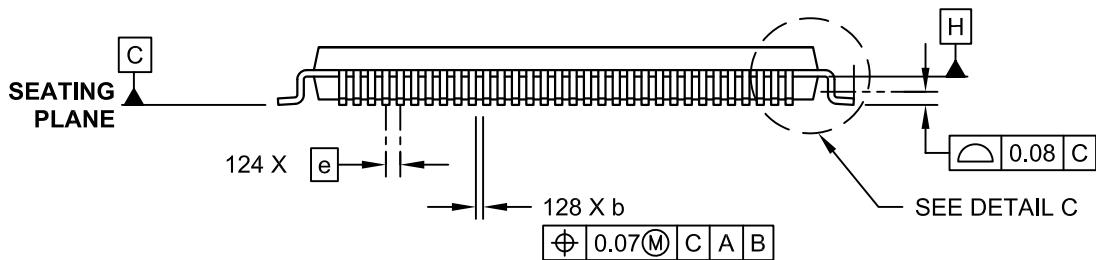
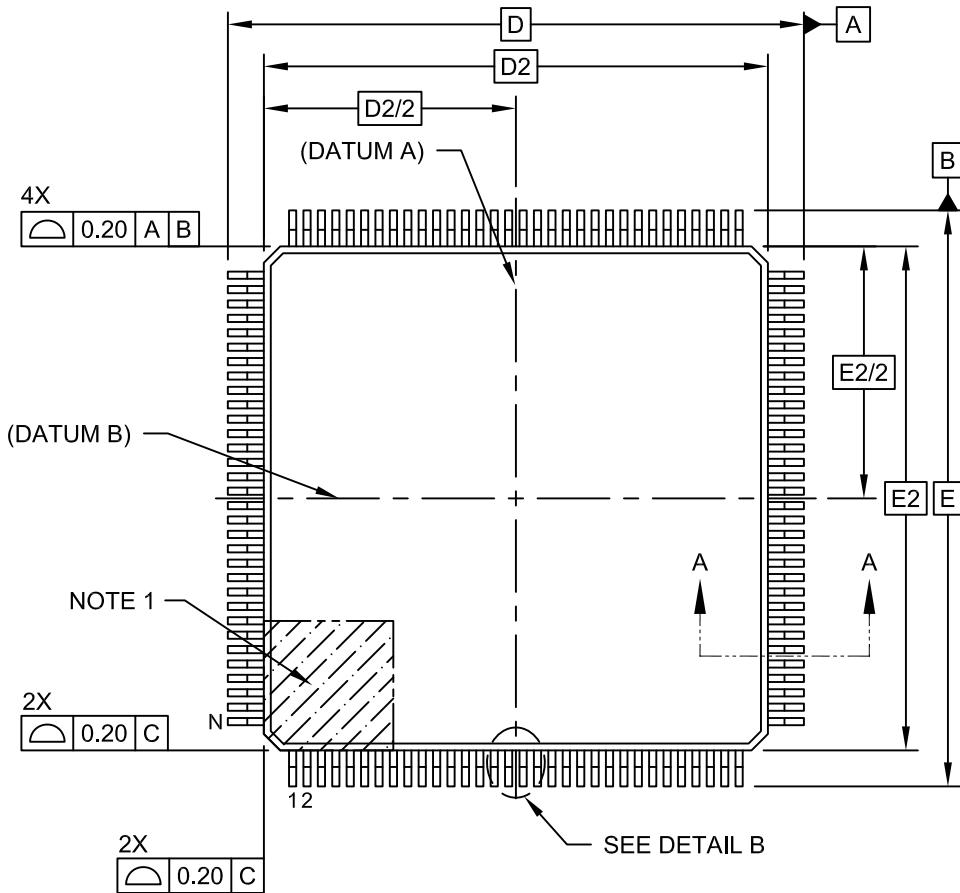
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Packaging Diagrams and Parameters

### 128-Lead Low Profile Plastic Quad Flat Pack (PT) – 14x14x1.4 mm Body [LQFP]

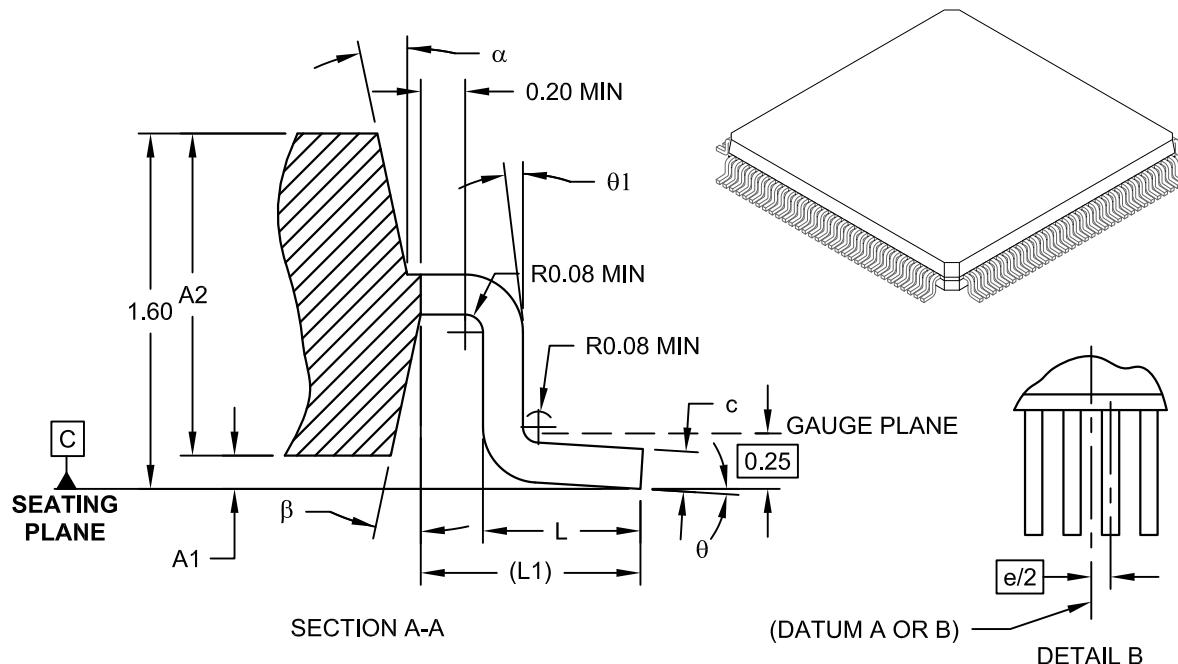
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 128-Lead Low Profile Plastic Quad Flat Pack (PT) – 14x14x1.4 mm Body [LQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension	Units	MILLIMETERS		
		MIN	NOM	MAX
Number of Pins	N	128		
Pitch	e	0.40	BSC	
Overall Height	A	-	-	1.60
Molded Package Thickness	A2	1.35	1.40	1.45
Standoff	A1	0.05	-	0.15
Foot Length	L	0.45	0.60	0.75
Footprint	L1	1.00	REF	
Lead Angle	$\theta$	0°	-	-
Foot Angle	$\beta$	0°	3.5°	7°
Overall Width	D	16.00	BSC	
Overall Length	E	16.00	BSC	
Molded Body Width	D1	14.00	BSC	
Molded Body Length	E1	14.00	BSC	
Lead Thickness	c	0.09	-	0.20
Foot Angle	$\theta$	0°	-	-
Mold Draft Angle Top	$\alpha$	-	-	-
Mold Draft Angle Bottom	$\beta$	-	-	-

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Exact shape at each corner may vary.
3. Dimensioning and tolerancing per ASME Y14.5M.

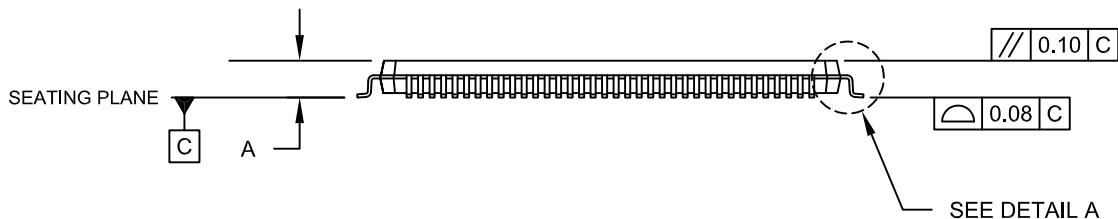
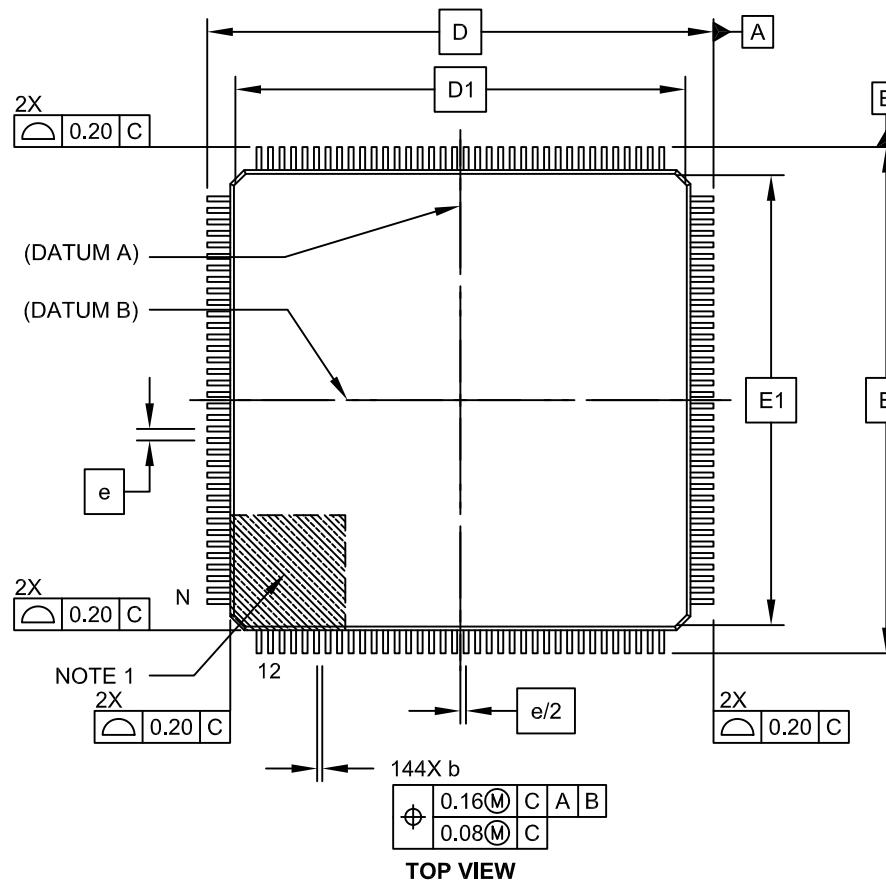
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Packaging Diagrams and Parameters

**144-Lead Plastic Low Profile Quad Flatpack (PL) – 20x20x1.40 mm Body, with 2.00 mm Footprint [LQFP]**

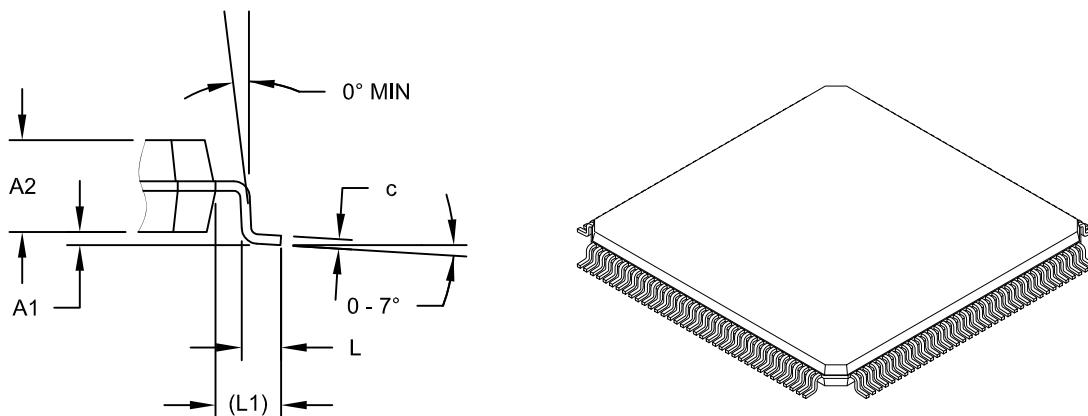
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 144-Lead Plastic Low Profile Quad Flatpack (PL) – 20x20x1.40 mm Body, with 2.00 mm Footprint [LQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



**DETAIL A**

	Units	MILLIMETERS		
	Dimension Limits	MIN	NOM	MAX
Number of Leads	N		144	
Lead Pitch	e		0.50 BSC	
Overall Height	A	-	-	1.60
Molded Package Height	A2	1.35	1.40	1.45
Standoff	A1	0.05	-	0.15
Foot Length	L	0.45	0.60	0.75
Footprint	L1	1.00 (REF)		
Overall Width	E	22.00 BSC		
Overall Length	D	22.00 BSC		
Molded Body Width	E1	20.00 BSC		
Molded Body Length	D1	20.00 BSC		
Lead Thickness	c	0.09	-	0.20
Lead Width	b	0.17	0.22	0.27

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.

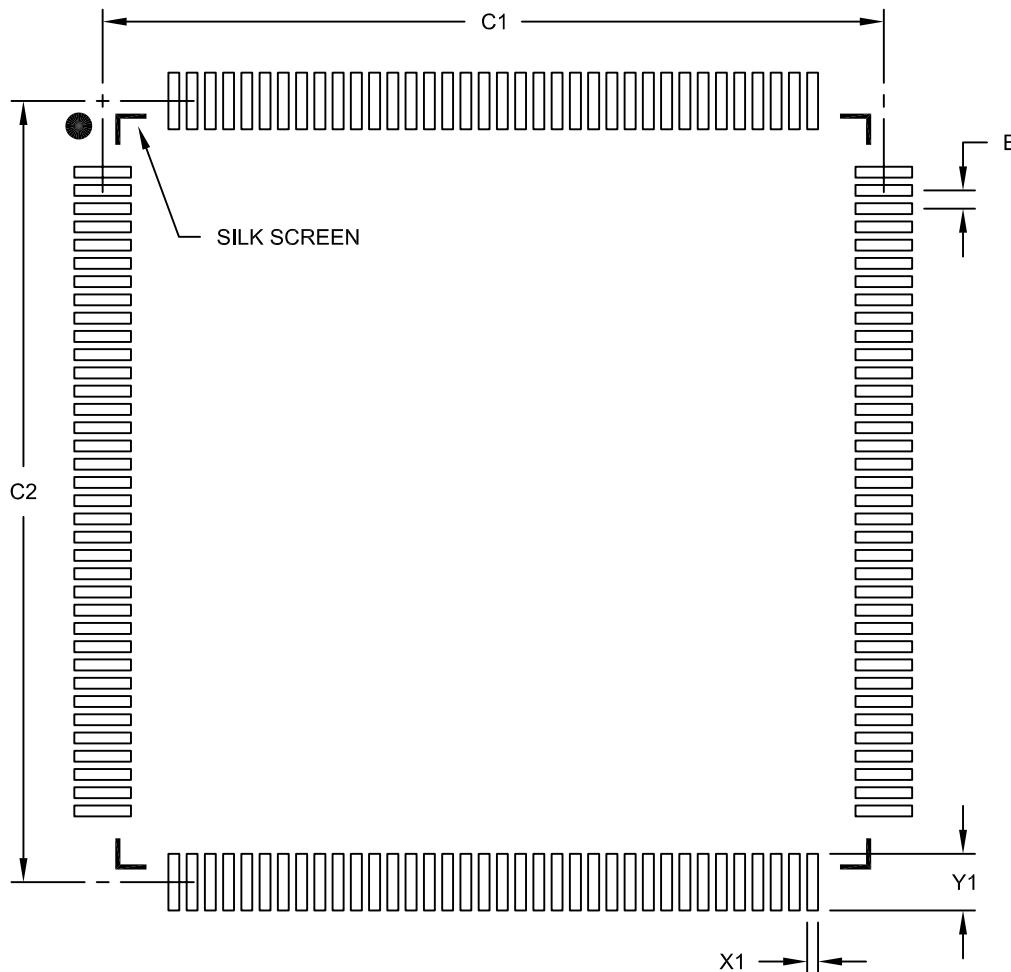
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

144-Lead Plastic Low Profile Quad Flatpack (PL) - 20x20x1.40 mm Body [LQFP]  
 2.00 mm Footprint

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at  
<http://www.microchip.com/packaging>



### RECOMMENDED LAND PATTERN

		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E		0.50	BSC	
Contact Pad Spacing	C1			21.40	
Contact Pad Spacing	C2			21.40	
Contact Pad Width (X144)	X1				0.30
Contact Pad Length (X144)	Y1				1.55

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2044B

## Packaging Diagrams and Parameters

---

---

**NOTES:**

## Packaging Diagrams and Parameters

---

---

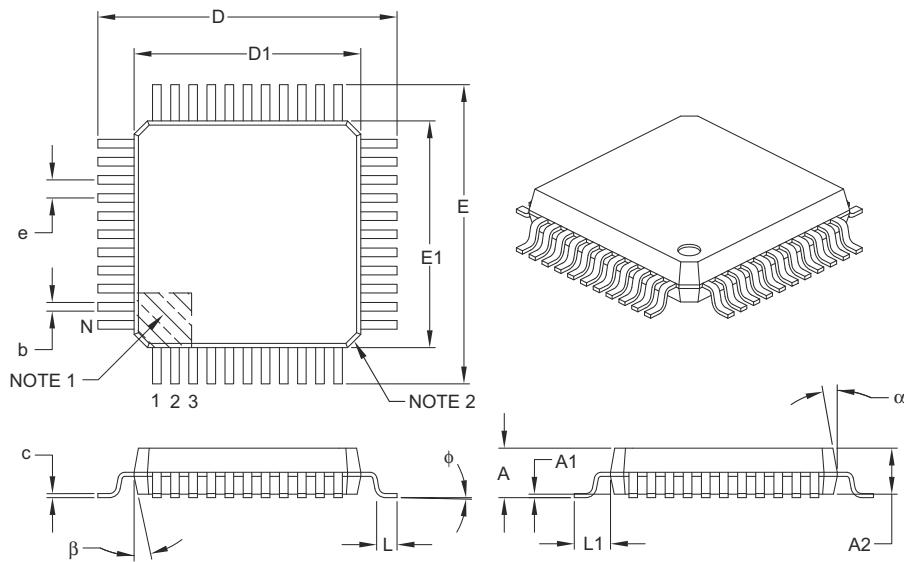
### **MQFP Family**

#### **Metric Quad Flat Packages**

## Packaging Diagrams and Parameters

### 44-Lead Plastic Metric Quad Flatpack (KW) – 10x10x2 mm Body, 3.20 mm [MQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
		Dimension Limits	MIN	NOM	MAX
Number of Leads		N	44		
Lead Pitch		e	0.80 BSC		
Overall Height		A	–	–	2.45
Molded Package Thickness		A2	1.80	2.00	2.20
Standoff §		A1	0.00	–	0.25
Foot Length		L	0.73	0.88	1.03
Footprint		L1	1.60 REF		
Foot Angle		phi	0°	–	7°
Overall Width		E	13.20 BSC		
Overall Length		D	13.20 BSC		
Molded Package Width		E1	10.00 BSC		
Molded Package Length		D1	10.00 BSC		
Lead Thickness		c	0.11	–	0.23
Lead Width		b	0.29	–	0.45
Mold Draft Angle Top		alpha	5°	–	16°
Mold Draft Angle Bottom		beta	5°	–	16°

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Chamfers at corners are optional; size may vary.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

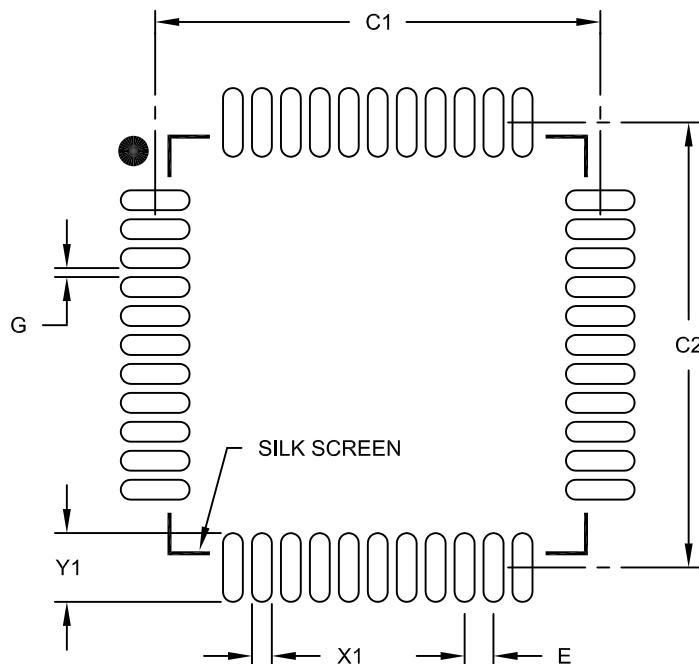
5. § Significant Characteristic.

## Land Pattern (Footprint)

---

44-Lead Plastic Metric Quad Flatpack (KW) - 10x10x2 mm Body, 3.20 mm Footprint [MQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E		0.80	BSC	
Contact Pad Spacing	C1			12.30	
Contact Pad Spacing	C2			12.30	
Contact Pad Width (X44)	X1				0.55
Contact Pad Length (X44)	Y1				1.90
Distance Between Pads	G	0.25			

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

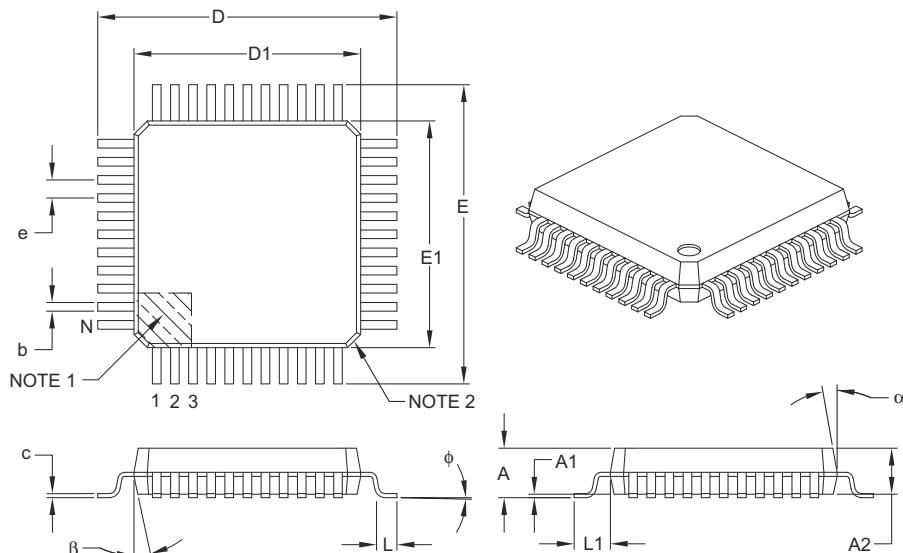
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2071B

## Packaging Diagrams and Parameters

### 44-Lead Plastic Metric Quad Flatpack (PQ) – 10x10x2 mm Body, 3.20 mm [MQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Leads		N		
Lead Pitch		e		
Overall Height		A		
Molded Package Thickness		A2		
Standoff §		A1		
Foot Length		L		
Footprint		L1		
Foot Angle		φ		
Overall Width		E		
Overall Length		D		
Molded Package Width		E1		
Molded Package Length		D1		
Lead Thickness		c		
Lead Width		b		
Mold Draft Angle Top		α		
Mold Draft Angle Bottom		β		

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Chamfers at corners are optional; size may vary.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

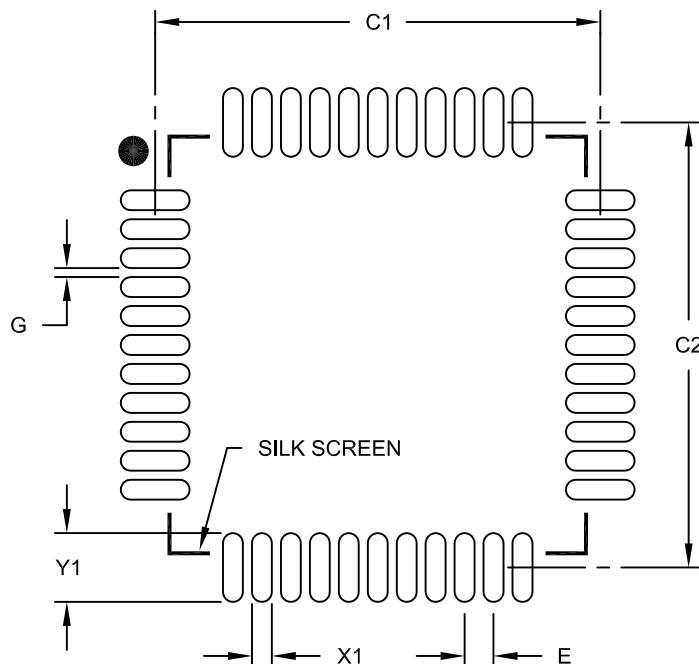
REF: Reference Dimension, usually without tolerance, for information purposes only.

5. § Significant Characteristic.

## Land Pattern (Footprint)

**44-Lead Plastic Metric Quad Flatpack (PQ) - 10x10x2 mm Body, 3.20 mm Footprint [MQFP]**

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E		0.80	BSC	
Contact Pad Spacing	C1			12.30	
Contact Pad Spacing	C2			12.30	
Contact Pad Width (X44)	X1				0.55
Contact Pad Length (X44)	Y1				1.90
Distance Between Pads	G	0.25			

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

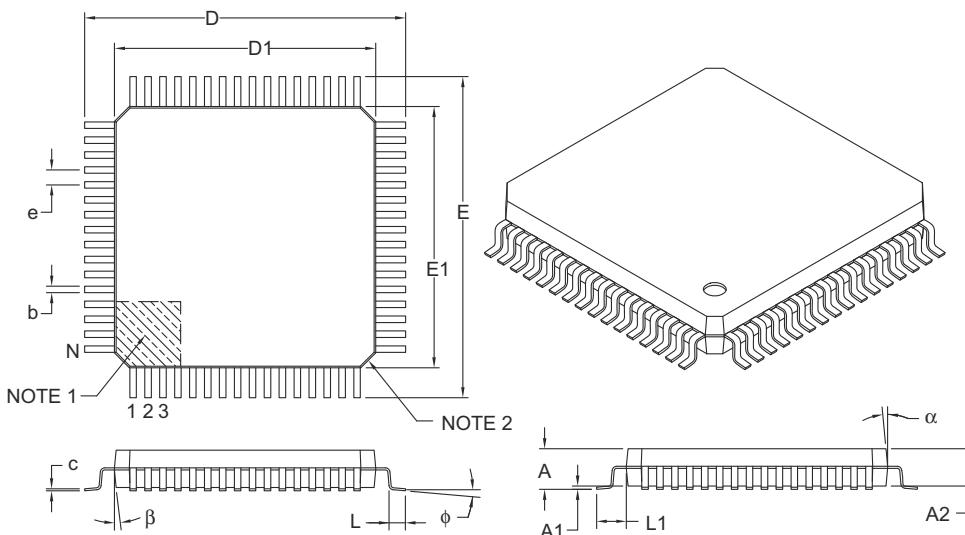
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2071B

## Packaging Diagrams and Parameters

### 64-Lead Plastic Metric Quad Flatpack (BU) – 14x14x2.7 mm Body, 3.20 mm [MQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Leads		64		
Lead Pitch		0.80 BSC		
Overall Height		A	–	3.15
Molded Package Thickness		A2	2.50	2.70
Standoff §		A1	0.00	–
Overall Width		E	17.20 BSC	
Molded Package Width		E1	14.00 BSC	
Overall Length		D	17.20 BSC	
Molded Package Length		D1	14.00 BSC	
Foot Length		L	0.73	0.88
Footprint		L1	1.60 REF	
Foot Angle		phi	0°	–
Lead Thickness		c	0.11	–
Lead Width		b	0.29	–
Mold Draft Angle Top		alpha	5°	–
Mold Draft Angle Bottom		beta	5°	16°

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Chamfers at corners are optional; size may vary.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

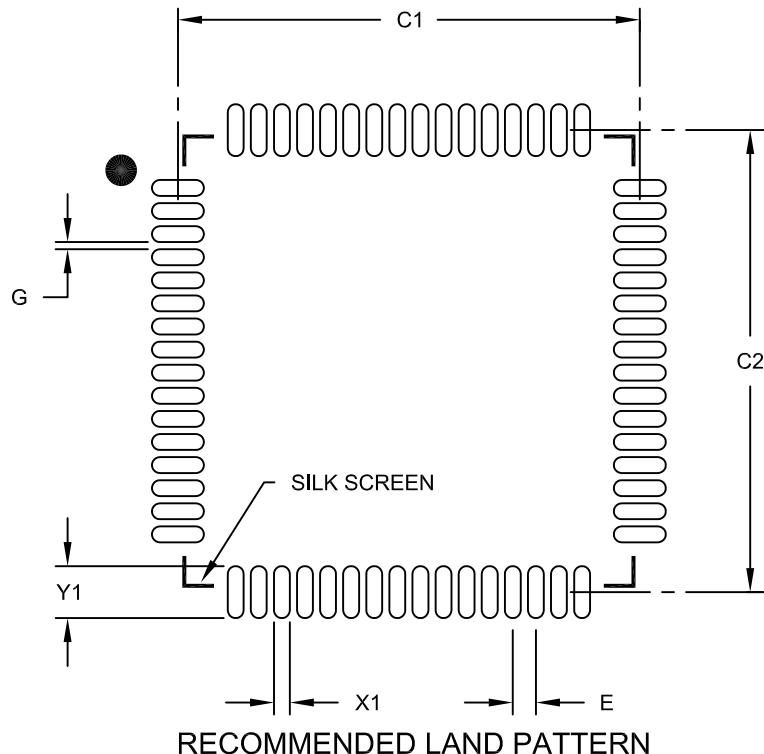
5. § Significant Characteristic.

6. Formerly TelCom PQFP package.

## Land Pattern (Footprint)

64-Lead Plastic Metric Quad FlatPack (BU) - 14x14x2.7 mm Body 3.20 mm Footprint [MQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units			MILLIMETERS		
		Dimension Limits			MIN	NOM	MAX
Contact Pitch	E				0.80	BSC	
Contact Pad Spacing	C1				16.10		
Contact Pad Spacing	C2				16.10		
Contact Pad Width (X64)	X1					0.55	
Contact Pad Length (X64)	Y1					1.80	
Distance Between Pads	G	0.25					

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

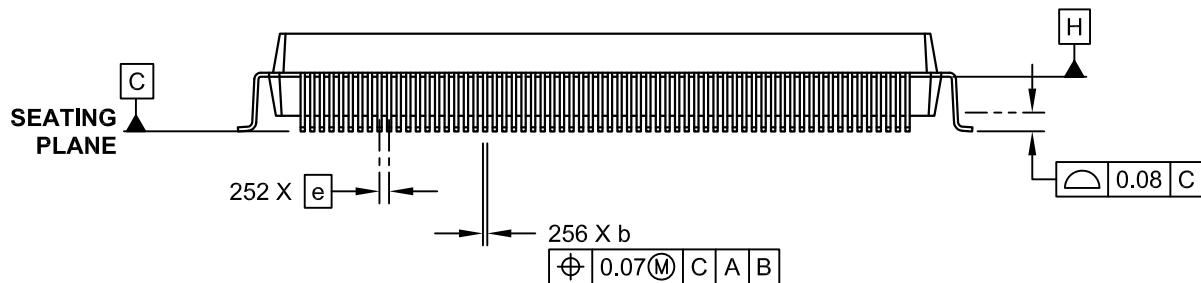
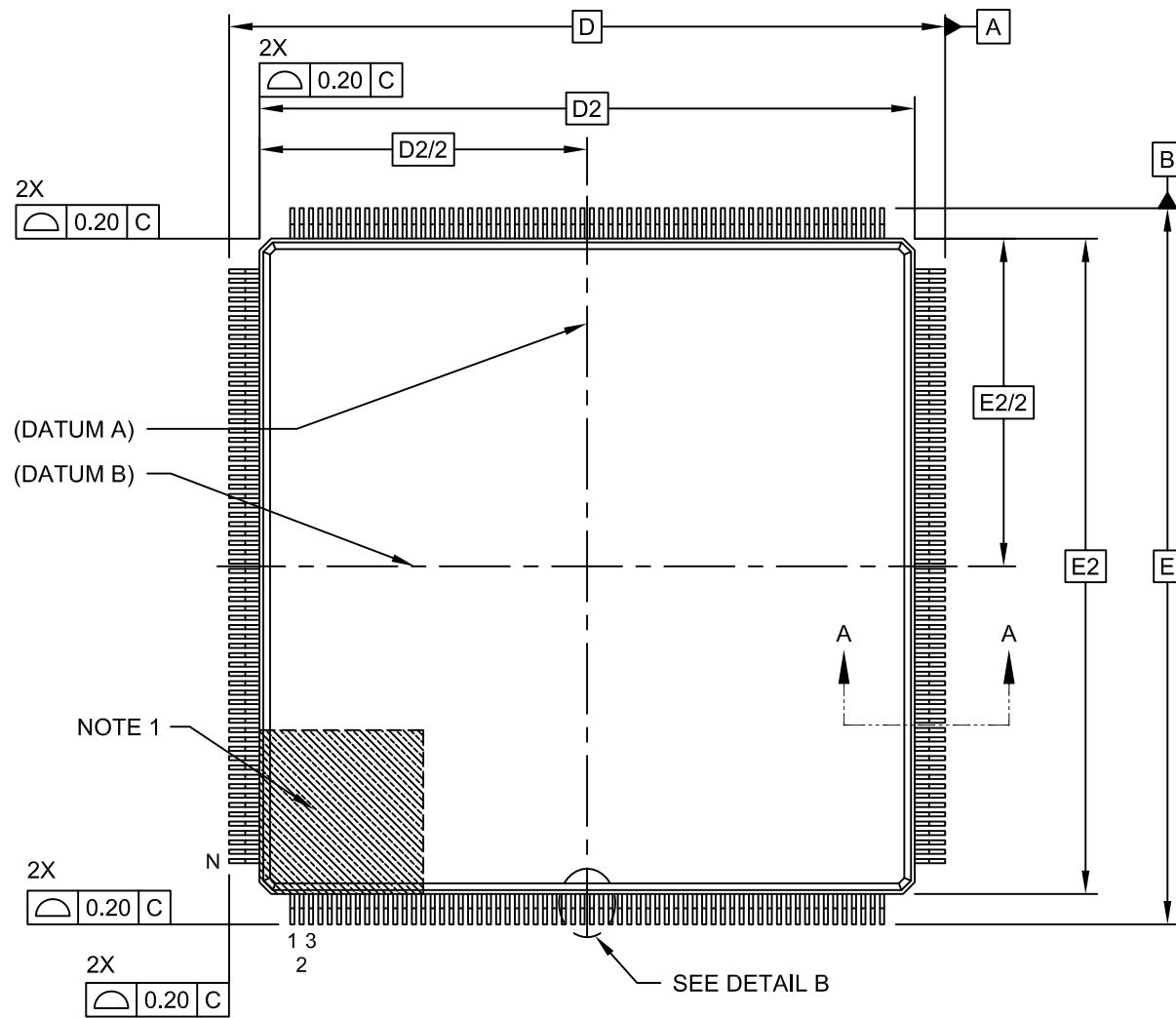
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2022B

## Packaging Diagrams and Parameters

### 256-Lead Plastic Metric Quat Flatpack (PQ) - 28x28x3.40 mm Body [MQFP] 2.60 mm Footprint

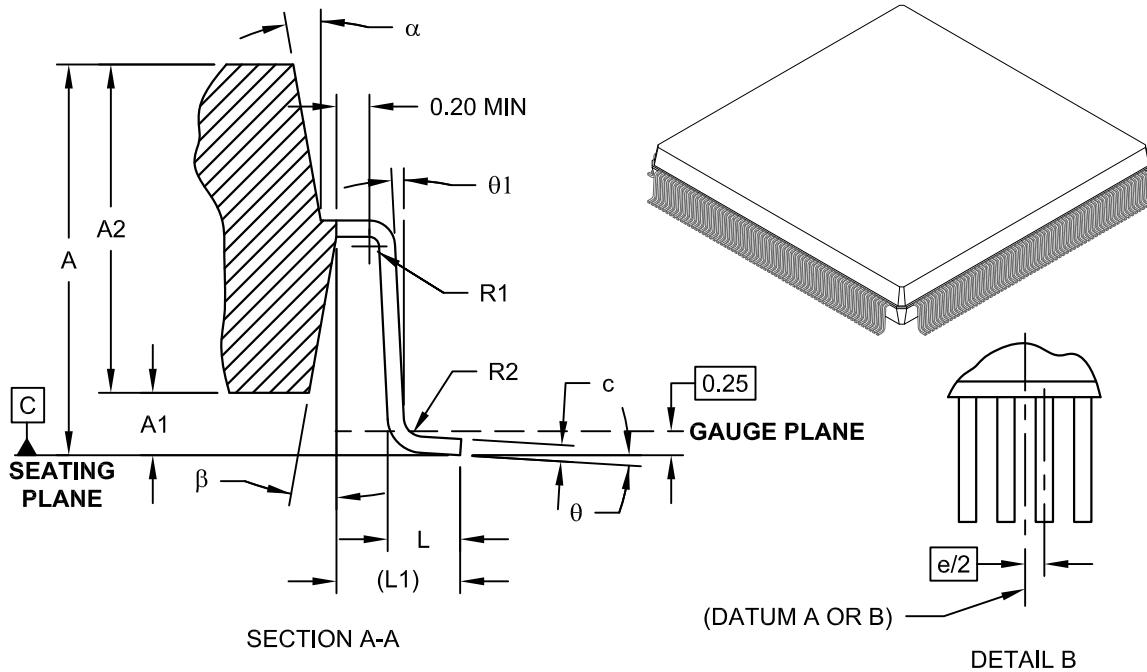
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 256-Lead Plastic Metric Quat Flatpack (PQ) - 28x28x3.40 mm Body [MQFP] 2.60 mm Footprint

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Number of Leads	N	256		
Lead Pitch	e	0.40	BSC	
Overall Height	A	-	-	4.07
Molded Package Height	A2	3.20	3.40	3.60
Standoff	A1	0.15	0.25	0.35
Foot Length	L	0.45	0.60	0.75
Footprint	L1	1.30 (REF)		
Lead Angle	$\phi$	0°	3.5°	7°
Foot Angle	$\phi 1$	0°	-	-
Overall Width	E	30.60 BSC		
Overall Length	D	30.60 BSC		
Molded Body Width	E1	28.00 BSC		
Molded Body Length	D1	28.00 BSC		
Lead Thickness	c	0.09	-	0.20
Lead Width	b	0.13	-	0.23
Bend Radius	R1	0.08	-	-
Bend Radius	R2	0.25 TYP		
Mold Draft Angle Top	$\alpha$	9°	-	11°
Mold Draft Angle Bottom	$\beta$	9°	-	11°

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Packaging Diagrams and Parameters

---

---

**NOTES:**

## Packaging Diagrams and Parameters

---

---

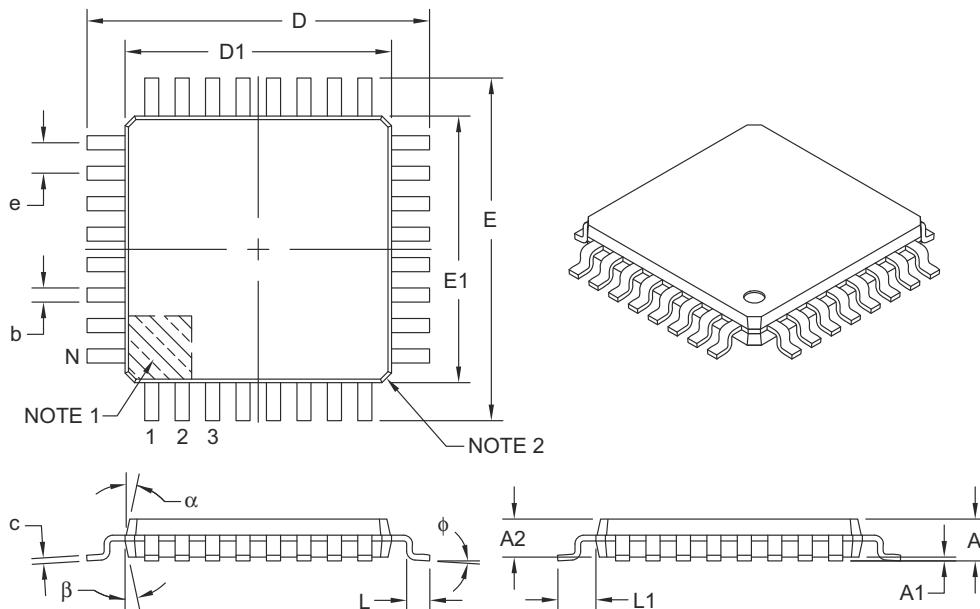
### TQFP Family

#### Thin Quad Flat Packages

## Packaging Diagrams and Parameters

### 32-Lead Plastic Thin Quad Flatpack (PT) – 7x7x1.0 mm Body, 2.00 mm [TQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		UNITS			MILLIMETERS		
		DIMENSION LIMITS			MIN	NOM	MAX
Number of Leads	N				32		
Lead Pitch	e				0.80 BSC		
Overall Height	A		—	—	1.20		
Standoff	A1		0.05	—	0.15		
Molded Package Thickness	A2		0.95	1.00	1.05		
Foot Length	L		0.45	0.60	0.75		
Footprint	L1		1.00 REF				
Foot Angle	ϕ		0°	3.5°	7°		
Overall Width	E		9.00 BSC				
Overall Length	D		9.00 BSC				
Molded Package Width	E1		7.00 BSC				
Molded Package Length	D1		7.00 BSC				
Lead Thickness	c		0.09	—	0.20		
Lead Width	b		0.30	0.37	0.45		
Mold Draft Angle Top	α		11°	12°	13°		
Mold Draft Angle Bottom	β		11°	12°	13°		

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Chamfers at corners are optional; size may vary.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

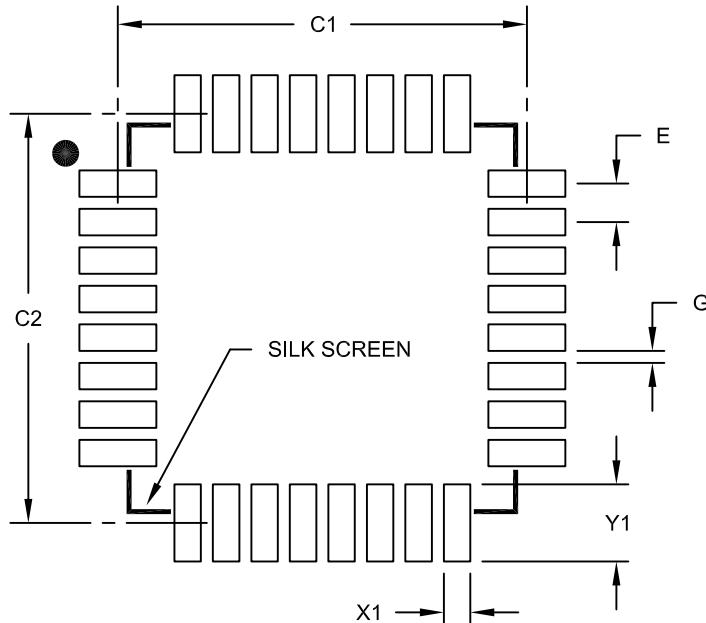
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-074B

## Land Pattern (Footprint)

32-Lead Plastic Thin Quad Flatpack (PT) - 7x7x1.0 mm Body, 2.00 mm Footprint [TQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E		0.80	BSC	
Contact Pad Spacing	C1		8.50		
Contact Pad Spacing	C2		8.50		
Contact Pad Width (X28)	X1			0.55	
Contact Pad Length (X28)	Y1				1.60
Distance Between Pads	G	0.25			

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

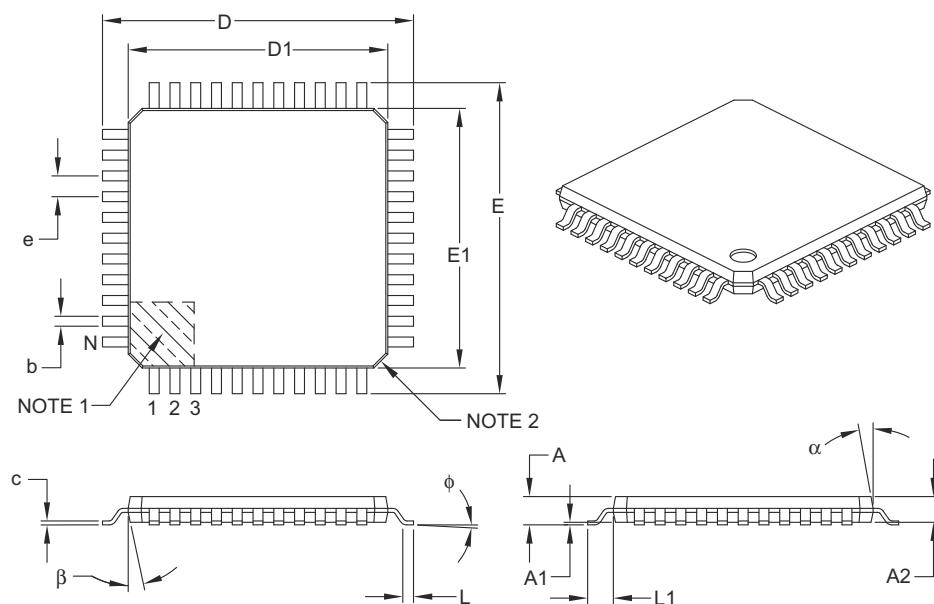
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2074B

## Packaging Diagrams and Parameters

### 44-Lead Plastic Thin Quad Flatpack (PT) – 10x10x1 mm Body, 2.00 mm [TQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Leads		N		
Lead Pitch		e		
Overall Height		A		
Molded Package Thickness		A2		
Standoff		A1		
Foot Length		L		
Footprint		L1		
Foot Angle		$\phi$		
Overall Width		E		
Overall Length		D		
Molded Package Width		E1		
Molded Package Length		D1		
Lead Thickness		c		
Lead Width		b		
Mold Draft Angle Top		$\alpha$		
Mold Draft Angle Bottom		$\beta$		

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Chamfers at corners are optional; size may vary.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

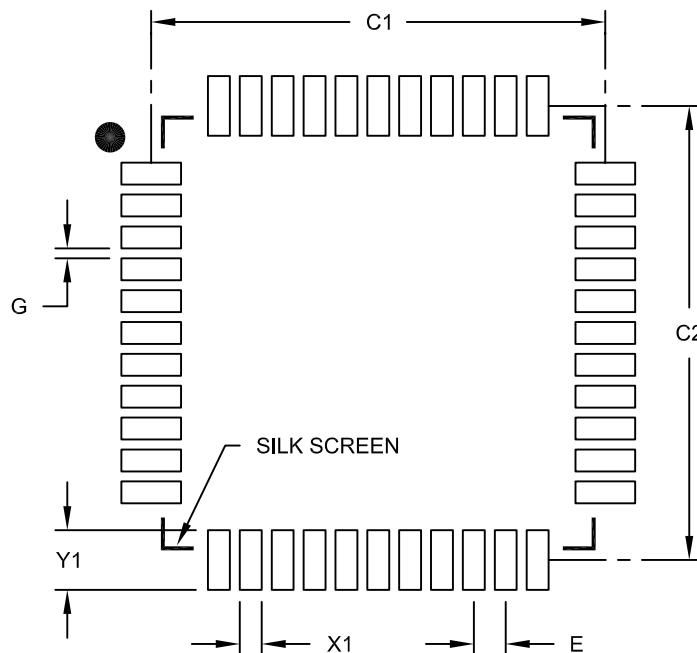
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-076B

## Land Pattern (Footprint)

44-Lead Plastic Thin Quad Flatpack (PT) 10X10X1 mm Body, 2.00 mm Footprint [TQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		UNITS			MILLIMETERS		
Dimension		Limits	MIN	NOM	MAX		
Contact Pitch	E		0.80	BSC			
Contact Pad Spacing	C1		11.40				
Contact Pad Spacing	C2		11.40				
Contact Pad Width (X44)	X1				0.55		
Contact Pad Length (X44)	Y1				1.50		
Distance Between Pads	G	0.25					

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

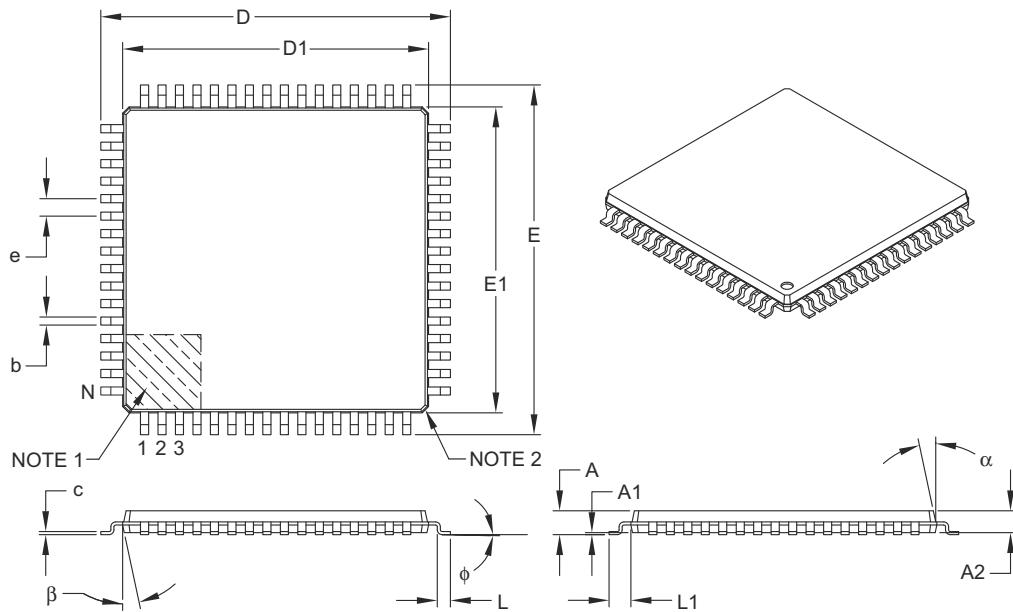
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2076B

## Packaging Diagrams and Parameters

### 64-Lead Plastic Thin Quad Flatpack (PF) – 14x14x1 mm Body, 2.00 mm [TQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Leads	N		64		
Lead Pitch	e		0.80	BSC	
Overall Height	A	—	—	1.20	
Molded Package Thickness	A2	0.95	1.00	1.05	
Standoff	A1	0.05	—	0.15	
Foot Length	L	0.45	0.60	0.75	
Footprint	L1	1.00 REF			
Foot Angle	phi	0°	3.5°	7°	
Overall Width	E	16.00 BSC			
Overall Length	D	16.00 BSC			
Molded Package Width	E1	14.00 BSC			
Molded Package Length	D1	14.00 BSC			
Lead Thickness	c	0.09	—	0.20	
Lead Width	b	0.30	0.37	0.45	
Mold Draft Angle Top	alpha	11°	12°	13°	
Mold Draft Angle Bottom	beta	11°	12°	13°	

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Chamfers at corners are optional; size may vary.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

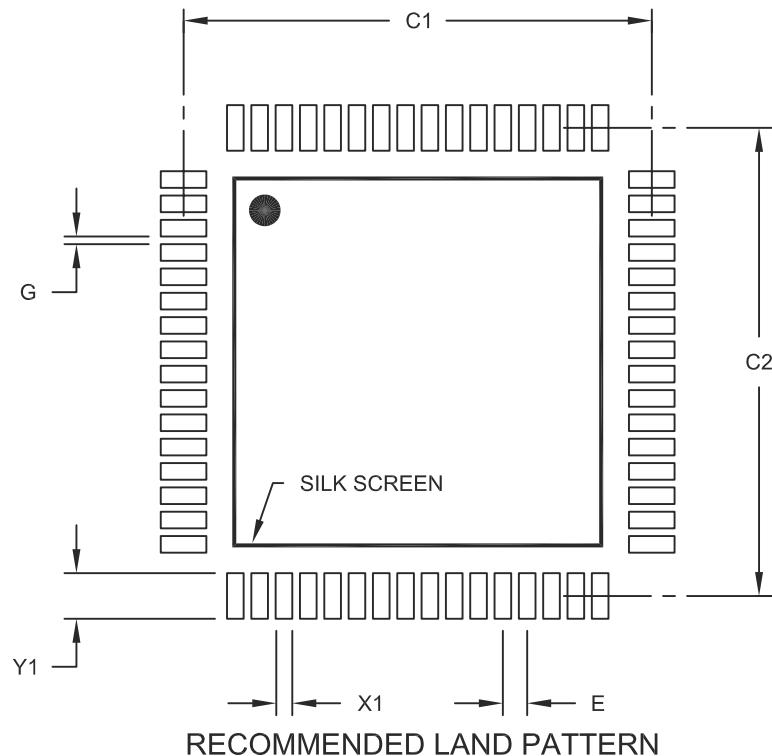
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-066B

## Land Pattern (Footprint)

### 64-Lead Plastic Thin Quad Flatpack (PF) – 14x14x1 mm Body, 2.00 mm [TQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E		0.80	BSC	
Contact Pad Spacing	C1			15.40	
Contact Pad Spacing	C2			15.40	
Contact Pad Width (X64)	X1				0.55
Contact Pad Length (X64)	Y1				1.50
Distance Between Pads	G	0.25			

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

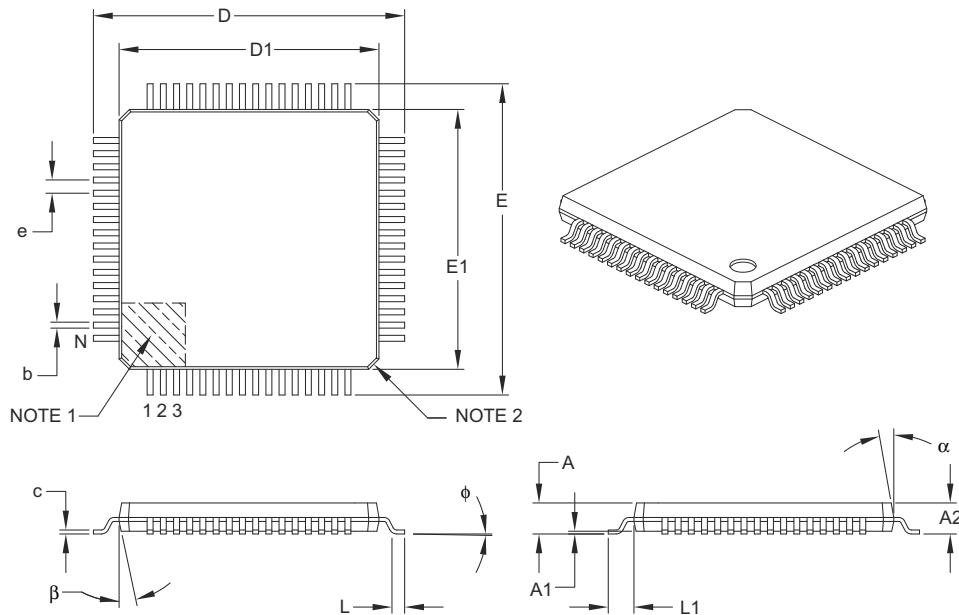
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2066A

## Packaging Diagrams and Parameters

### 64-Lead Plastic Thin Quad Flatpack (PT) – 10x10x1 mm Body, 2.00 mm [TQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
		Dimension Limits	MIN	NOM	MAX
Number of Leads		N	64		
Lead Pitch		e	0.50 BSC		
Overall Height		A	–	–	1.20
Molded Package Thickness		A2	0.95	1.00	1.05
Standoff		A1	0.05	–	0.15
Foot Length		L	0.45	0.60	0.75
Footprint		L1	1.00 REF		
Foot Angle		phi	0°	3.5°	7°
Overall Width		E	12.00 BSC		
Overall Length		D	12.00 BSC		
Molded Package Width		E1	10.00 BSC		
Molded Package Length		D1	10.00 BSC		
Lead Thickness		c	0.09	–	0.20
Lead Width		b	0.17	0.22	0.27
Mold Draft Angle Top		alpha	11°	12°	13°
Mold Draft Angle Bottom		beta	11°	12°	13°

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Chamfers at corners are optional; size may vary.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

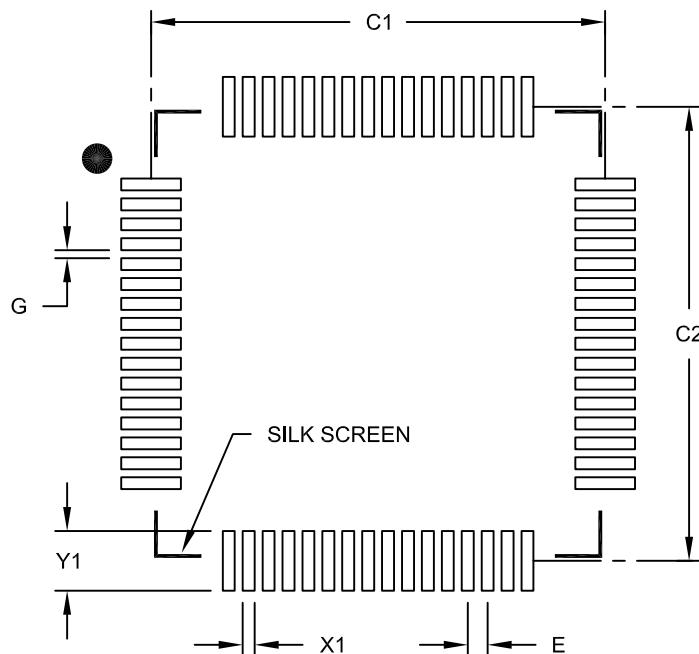
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-085B

## Land Pattern (Footprint)

64-Lead Plastic Thin Quad Flatpack (PT) 10x10x1 mm Body, 2.00 mm Footprint [TQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units			MILLIMETERS		
Dimension Limits		MIN	NOM	MAX			
Contact Pitch	E		0.50	BSC			
Contact Pad Spacing	C1		11.40				
Contact Pad Spacing	C2		11.40				
Contact Pad Width (X64)	X1			0.30			
Contact Pad Length (X64)	Y1			1.50			
Distance Between Pads	G	0.20					

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

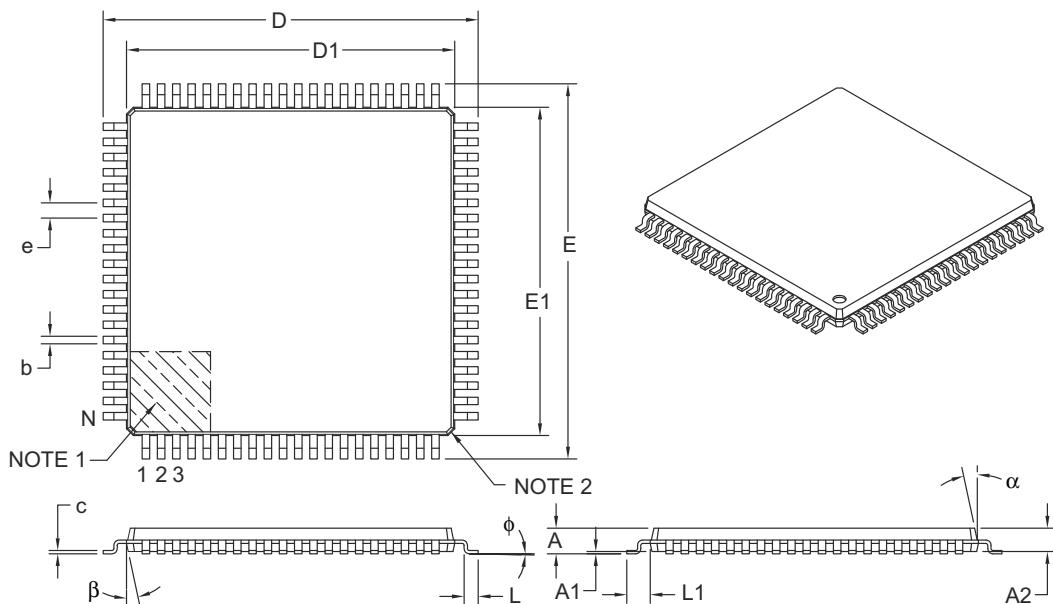
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2085B

## Packaging Diagrams and Parameters

### 80-Lead Plastic Thin Quad Flatpack (PF) – 14x14x1 mm Body, 2.00 mm [TQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Leads	N	80		
Lead Pitch	e	0.65	BSC	
Overall Height	A	–	–	1.20
Molded Package Thickness	A2	0.95	1.00	1.05
Standoff	A1	0.05	–	0.15
Foot Length	L	0.45	0.60	0.75
Footprint	L1	1.00 REF		
Foot Angle	phi	0°	3.5°	7°
Overall Width	E	16.00	BSC	
Overall Length	D	16.00	BSC	
Molded Package Width	E1	14.00	BSC	
Molded Package Length	D1	14.00	BSC	
Lead Thickness	c	0.09	–	0.20
Lead Width	b	0.22	0.32	0.38
Mold Draft Angle Top	alpha	11°	12°	13°
Mold Draft Angle Bottom	beta	11°	12°	13°

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Chamfers at corners are optional; size may vary.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

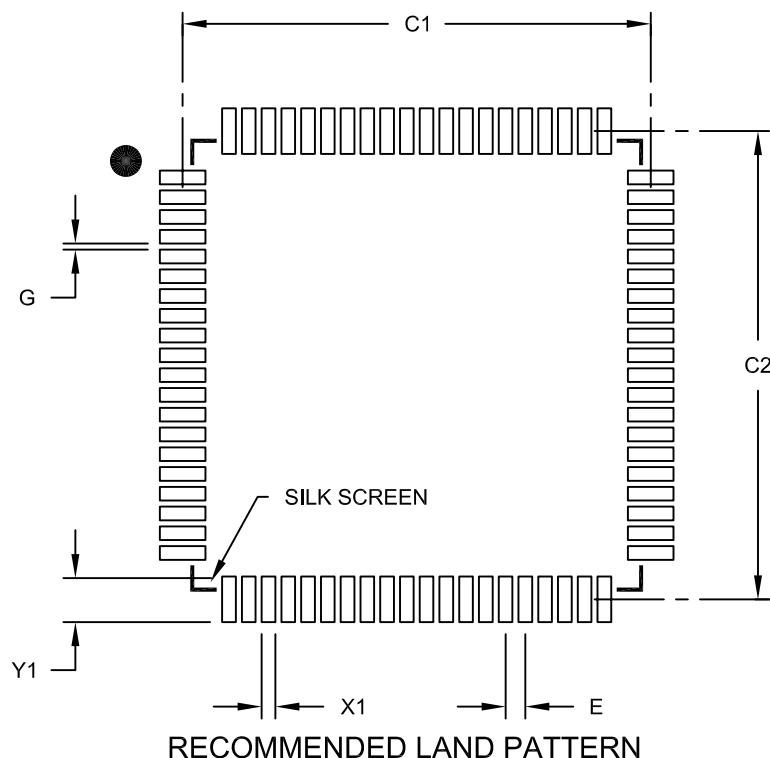
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-116B

## Land Pattern (Footprint)

80-Lead Plastic Thin Quad Flatpack (PF) 14x14x1mm Body, 2.00 mm Footprint [TQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		0.65 BSC	
Contact Pad Spacing	C1		15.40	
Contact Pad Spacing	C2		15.40	
Contact Pad Width (X80)	X1			0.45
Contact Pad Length (X80)	Y1			1.50
Distance Between Pads	G	0.20		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

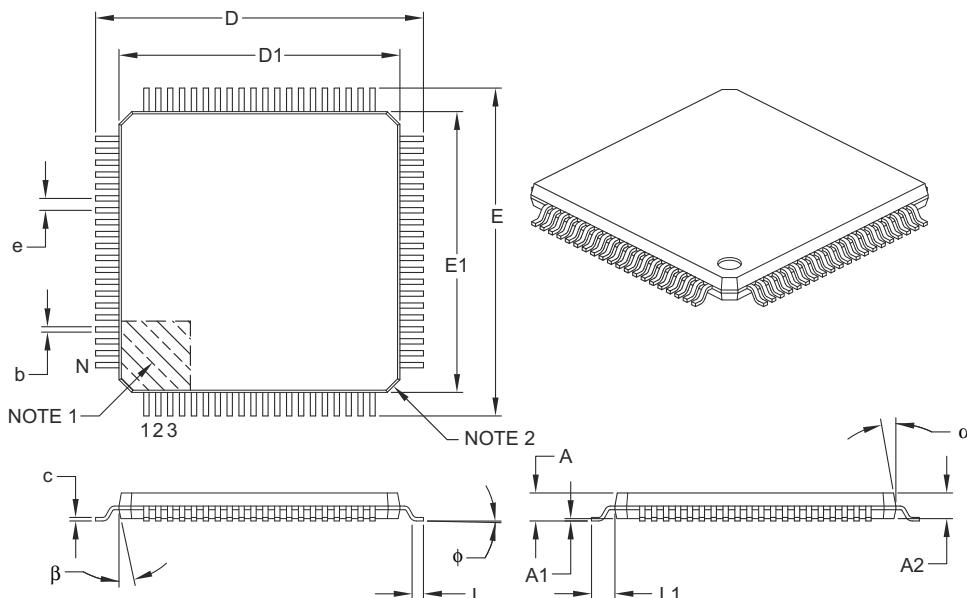
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2116C

## Packaging Diagrams and Parameters

### 80-Lead Plastic Thin Quad Flatpack (PT) – 12x12x1 mm Body, 2.00 mm [TQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension Limits		MILLIMETERS		
		MIN	NOM	MAX
Number of Leads	N	80		
Lead Pitch	e	0.50 BSC		
Overall Height	A	–	–	1.20
Molded Package Thickness	A2	0.95	1.00	1.05
Standoff	A1	0.05	–	0.15
Foot Length	L	0.45	0.60	0.75
Footprint	L1	1.00 REF		
Foot Angle	ϕ	0°	3.5°	7°
Overall Width	E	14.00 BSC		
Overall Length	D	14.00 BSC		
Molded Package Width	E1	12.00 BSC		
Molded Package Length	D1	12.00 BSC		
Lead Thickness	c	0.09	–	0.20
Lead Width	b	0.17	0.22	0.27
Mold Draft Angle Top	α	11°	12°	13°
Mold Draft Angle Bottom	β	11°	12°	13°

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Chamfers at corners are optional; size may vary.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

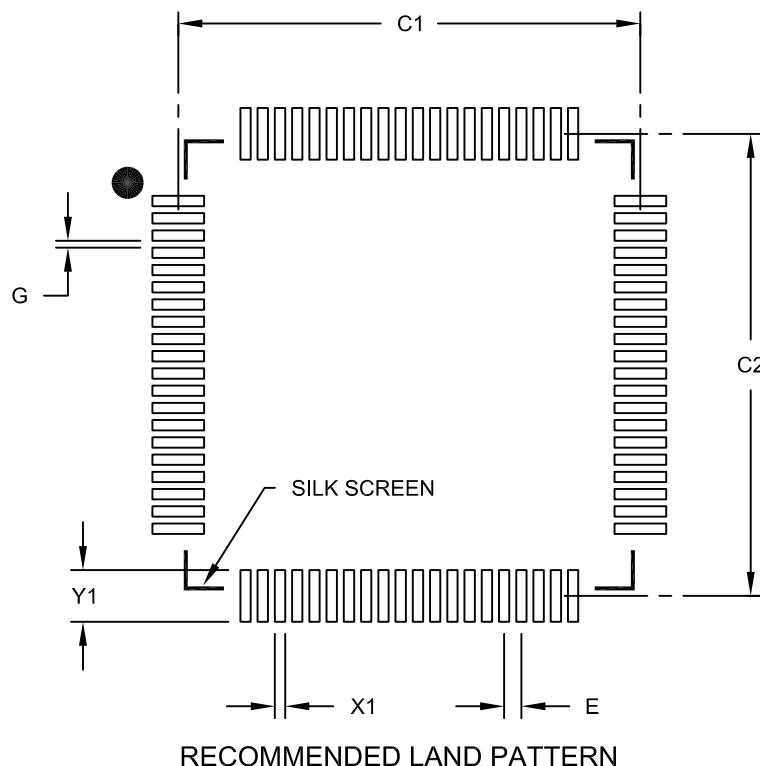
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

80-Lead Plastic Thin Quad Flatpack (PT)-12x12x1mm Body, 2.00 mm Footprint [TQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		0.50	BSC
Contact Pad Spacing	C1		13.40	
Contact Pad Spacing	C2		13.40	
Contact Pad Width (X80)	X1			0.30
Contact Pad Length (X80)	Y1			1.50
Distance Between Pads	G	0.20		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

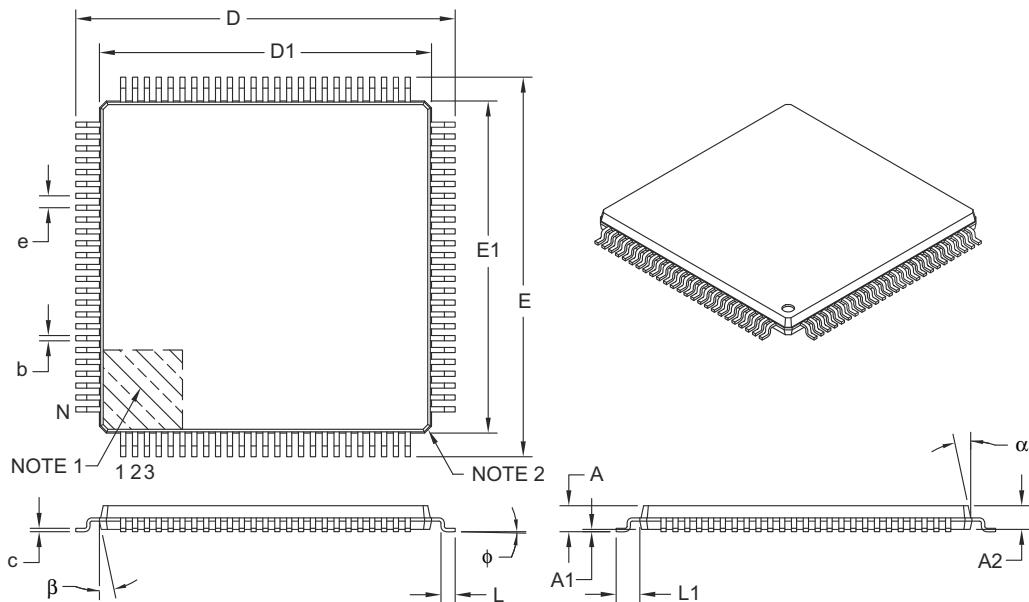
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2092B

## Packaging Diagrams and Parameters

### 100-Lead Plastic Thin Quad Flatpack (PF) – 14x14x1 mm Body, 2.00 mm [TQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Leads	N		100		
Lead Pitch	e		0.50	BSC	
Overall Height	A	–	–	1.20	
Molded Package Thickness	A2	0.95	1.00	1.05	
Standoff	A1	0.05	–	0.15	
Foot Length	L	0.45	0.60	0.75	
Footprint	L1	1.00 REF			
Foot Angle	ϕ	0°	3.5°	7°	
Overall Width	E	16.00 BSC			
Overall Length	D	16.00 BSC			
Molded Package Width	E1	14.00 BSC			
Molded Package Length	D1	14.00 BSC			
Lead Thickness	c	0.09	–	0.20	
Lead Width	b	0.17	0.22	0.27	
Mold Draft Angle Top	α	11°	12°	13°	
Mold Draft Angle Bottom	β	11°	12°	13°	

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Chamfers at corners are optional; size may vary.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

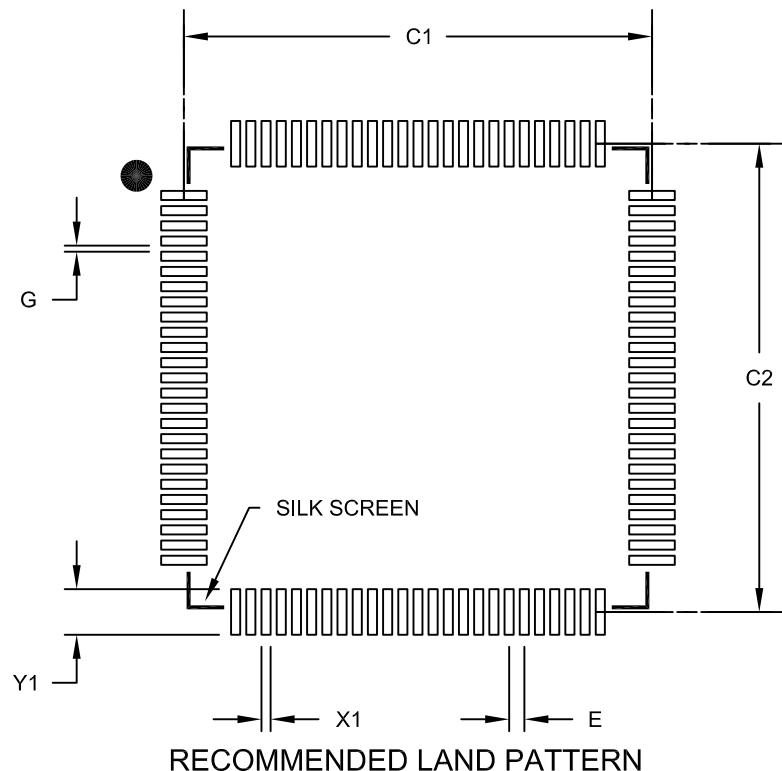
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

100-Lead Plastic Thin Quad Flatpack (PF) - 14x14x1 mm Body 2.00 mm Footprint [TQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		0.50	BSC
Contact Pad Spacing	C1		15.40	
Contact Pad Spacing	C2		15.40	
Contact Pad Width (X100)	X1			0.30
Contact Pad Length (Y100)	Y1			1.50
Distance Between Pads	G	0.20		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

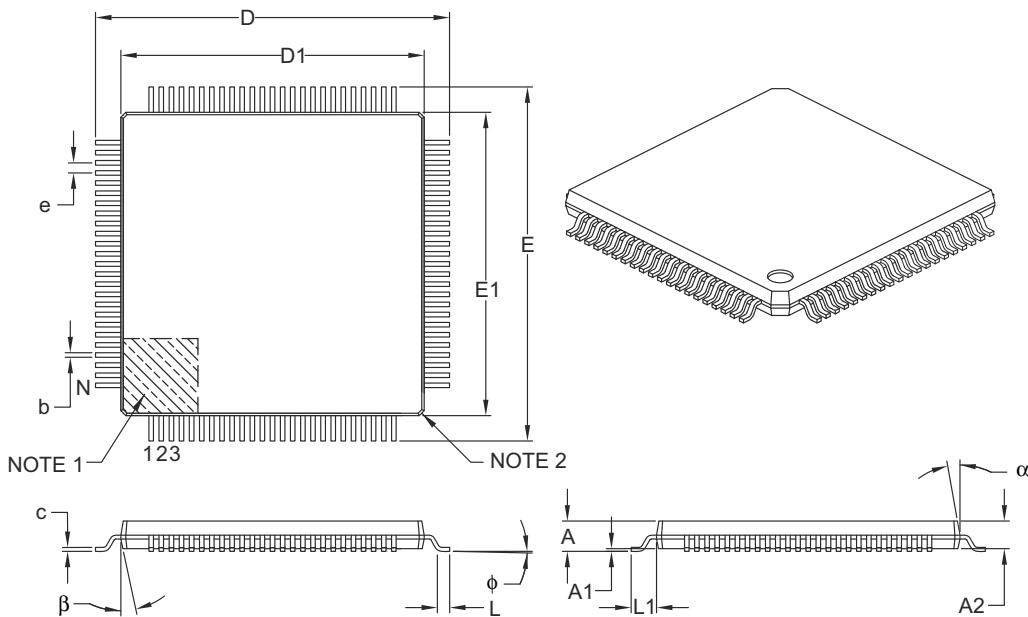
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2110B

## Packaging Diagrams and Parameters

### 100-Lead Plastic Thin Quad Flatpack (PT) – 12x12x1 mm Body, 2.00 mm [TQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Leads		100		
Lead Pitch		e      0.40 BSC		
Overall Height		A      –      –      1.20		
Molded Package Thickness		A2     0.95     1.00     1.05		
Standoff		A1     0.05     –     0.15		
Foot Length		L      0.45      0.60      0.75		
Footprint		L1     1.00 REF		
Foot Angle		phi    0°    3.5°    7°		
Overall Width		E      14.00 BSC		
Overall Length		D      14.00 BSC		
Molded Package Width		E1     12.00 BSC		
Molded Package Length		D1     12.00 BSC		
Lead Thickness		c      0.09      –      0.20		
Lead Width		b      0.13      0.18      0.23		
Mold Draft Angle Top		alpha    11°    12°    13°		
Mold Draft Angle Bottom		beta    11°    12°    13°		

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Chamfers at corners are optional; size may vary.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

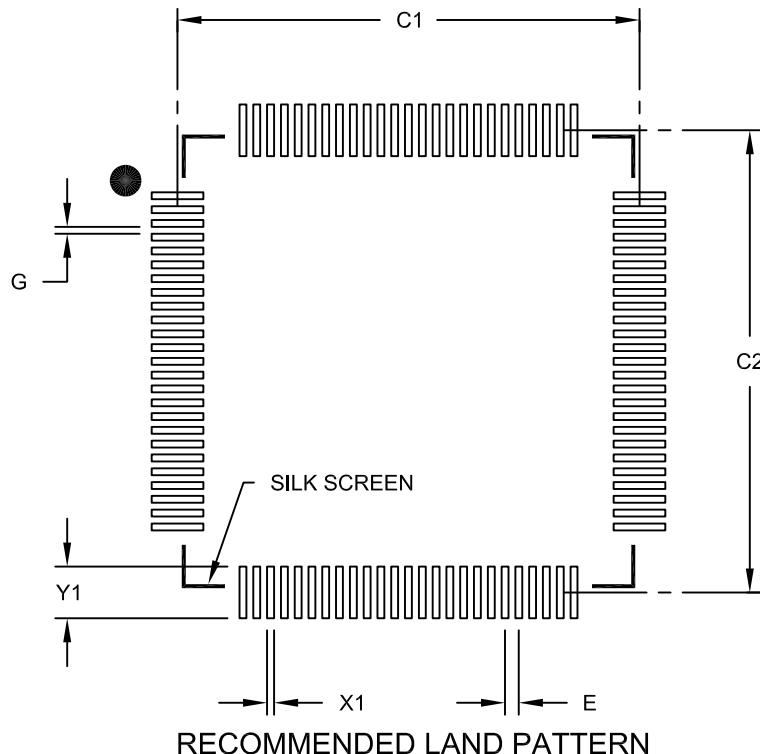
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-100B

## Land Pattern (Footprint)

100-Lead Plastic Thin Quad Flatpack (PT)-12x12x1mm Body, 2.00 mm Footprint [TQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		UNITS					MILLIMETERS	
Dimension Limits		MIN	NOM	MAX				
Contact Pitch	E	0.40	BSC					
Contact Pad Spacing	C1		13.40					
Contact Pad Spacing	C2		13.40					
Contact Pad Width (X100)	X1			0.20				
Contact Pad Length (Y100)	Y1			1.50				
Distance Between Pads	G	0.20						

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

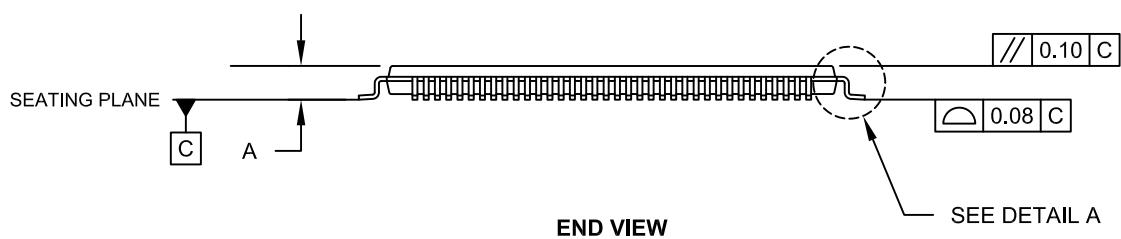
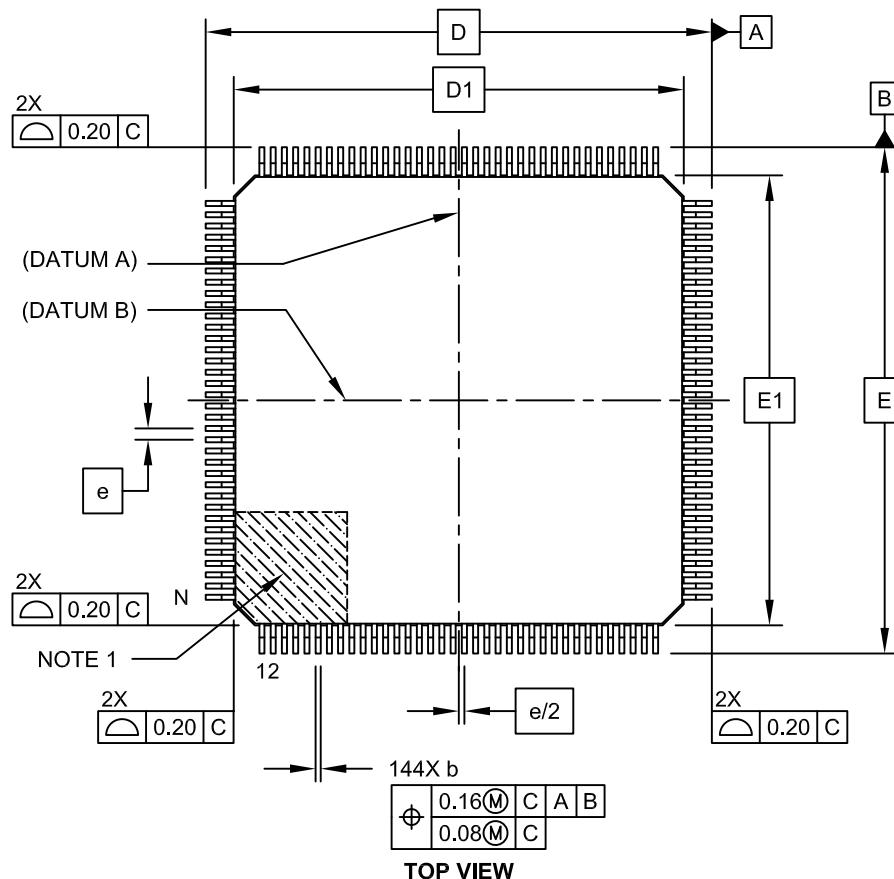
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2100B

## Packaging Diagrams and Parameters

### 144-Lead Plastic Thin Quad Flatpack (PH)-16x16x1mm Body, 2.00 mm Footprint [TQFP]

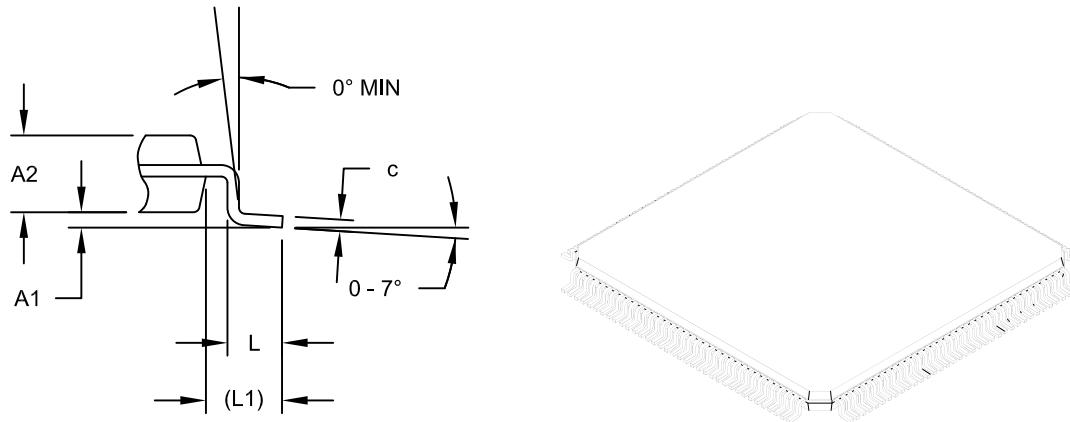
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 144-Lead Plastic Thin Quad Flatpack (PH)-16x16x1mm Body, 2.00 mm Footprint [TQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



DETAIL A

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins		N		
Lead Pitch		e		
Overall Height		A		
Molded PackageThickness		A2		
Standoff		A1		
Foot Length		L		
Footprint		L1		
Overall Width		D		
Overall Length		E		
Molded Body Width		D1		
Molded Body Length		E1		
Lead Thickness		c		
Lead Width		b		

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.

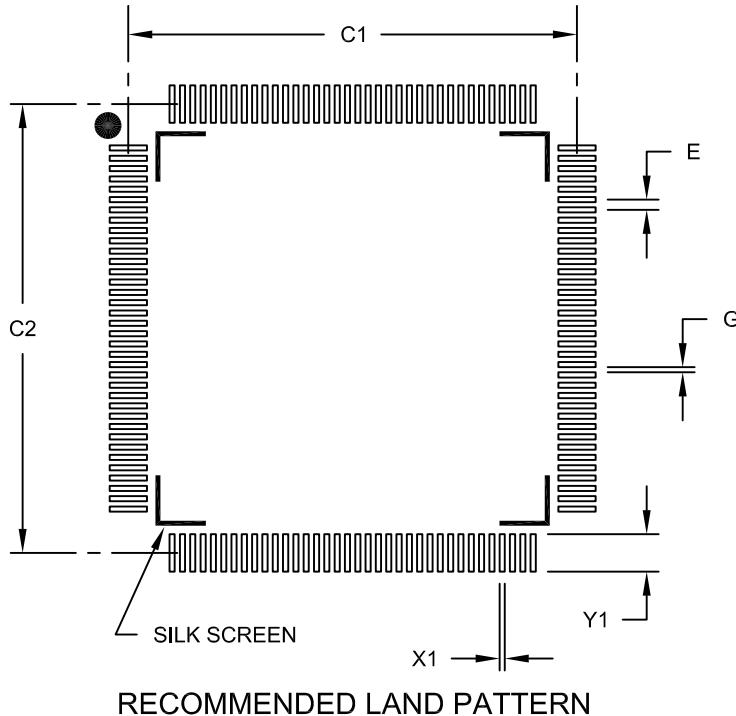
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Land Pattern (Footprint)

144-Lead Plastic Thin Quad Flat Pack (PH) - 16x16 mm Body, 2.00 mm Footprint [TQFP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units			MILLIMETERS		
Dimension Limits		MIN		NOM	MAX		
Contact Pitch	E			0.40	BSC		
Contact Pad Spacing	C1			17.40			
Contact Pad Spacing	C2			17.40			
Contact Pad Width (X144)	X1				0.20		
Contact Pad Length (X144)	Y1					1.45	
Distance Between Pads	G	0.20					

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2155B

## Packaging Diagrams and Parameters

---

---

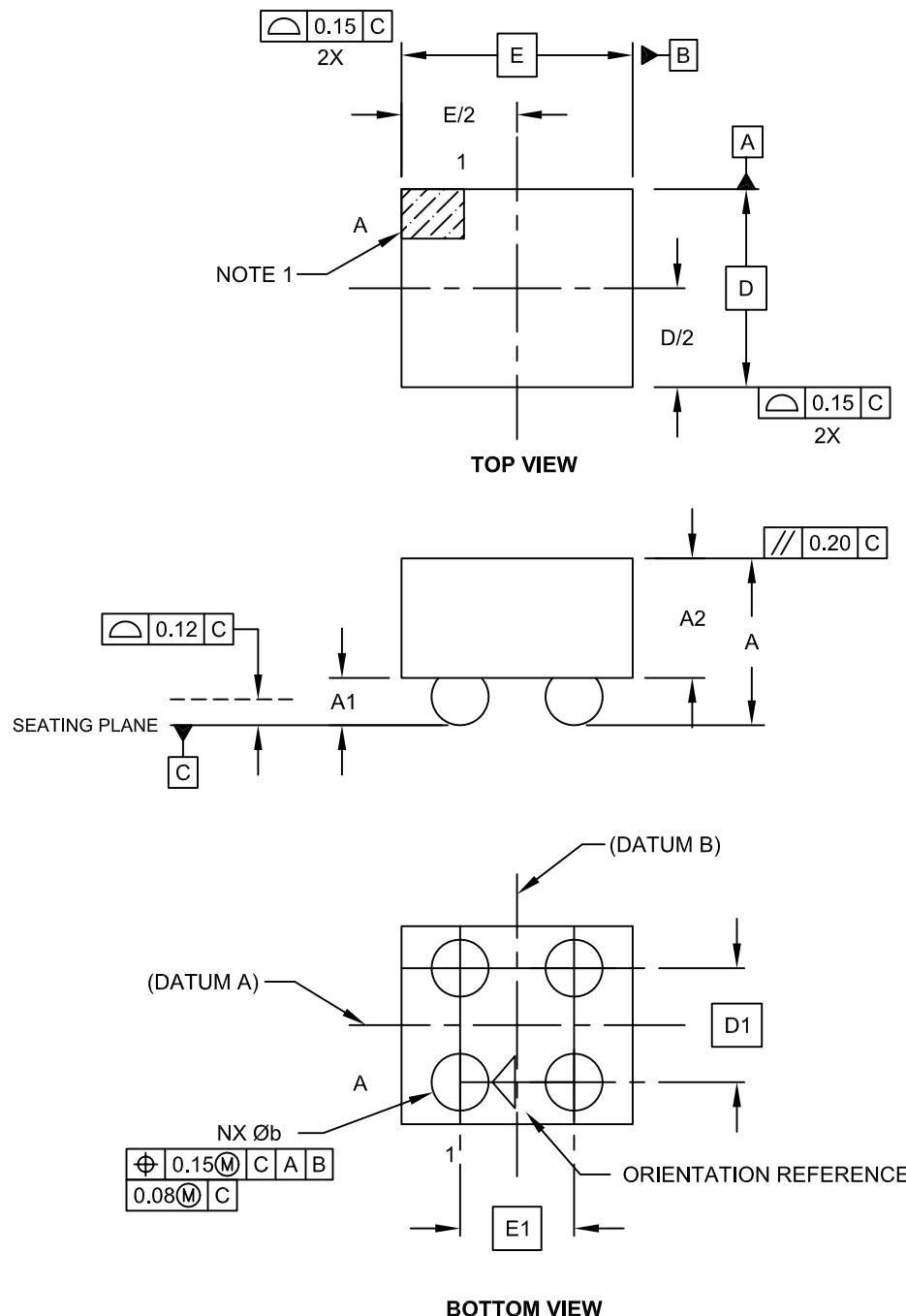
**CSP Family**

**Chip Scale Packages**

## Packaging Diagrams and Parameters

### 4-Lead Chip Scale Package (CS) - [CSP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



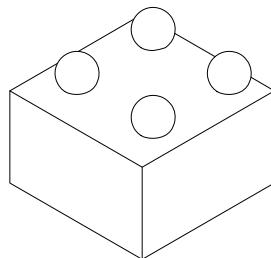
---

## Packaging Diagrams and Parameters

---

### 4-Lead Chip Scale Package (CS) - [CSP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Contacts	N			4	
Adjacent Column X-Pitch	E1		0.400	BSC	
Adjacent Row Y-Pitch	D1		0.400	BSC	
Overall Height	A	0.47	0.51	0.55	
Die Height	A2	0.33	0.35	0.37	
Bump Height	A1	0.14	0.16	0.18	
Overall Length	E	NOTE 4			
Overall Width	D	NOTE 4			
Ball Diameter	b	0.18	0.200	0.22	

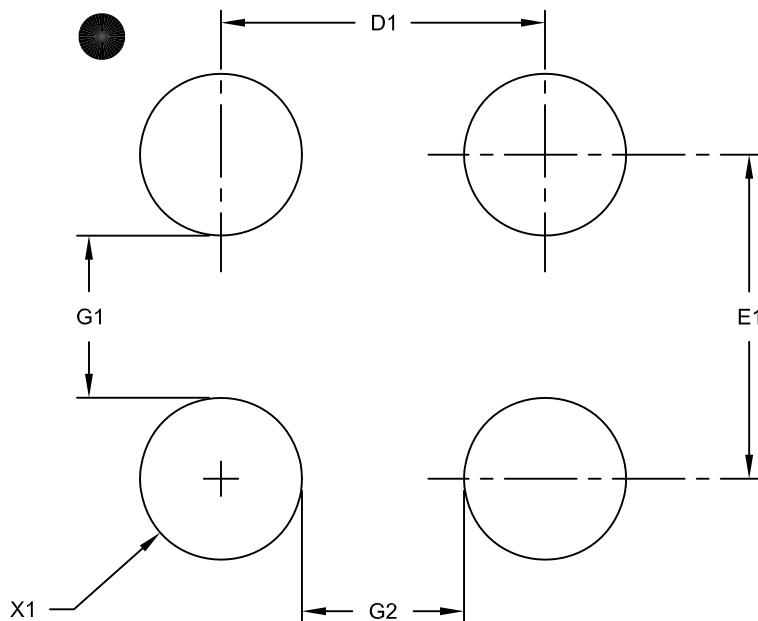
**Notes:**

1. Orientation reference feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.  
BSC: Basic Dimension. Theoretically exact value shown without tolerances.  
REF: Reference Dimension, usually without tolerance, for information purposes only.
4. Package size varies with specific devices. Please contact our local Microchip representative for specific details.

## Land Pattern (Footprint)

### 4-Lead Chip Scale Package (CS) - [CSP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Contacts	N		4	
Contact Pad Spacing	E1		0.40	
Contact Pad Spacing	D1		0.40	
Contact Pad Diameter (X4)	X1			0.20
Distance Between Pads	G1	0.24		
Distance Between Pads	G2	0.24		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

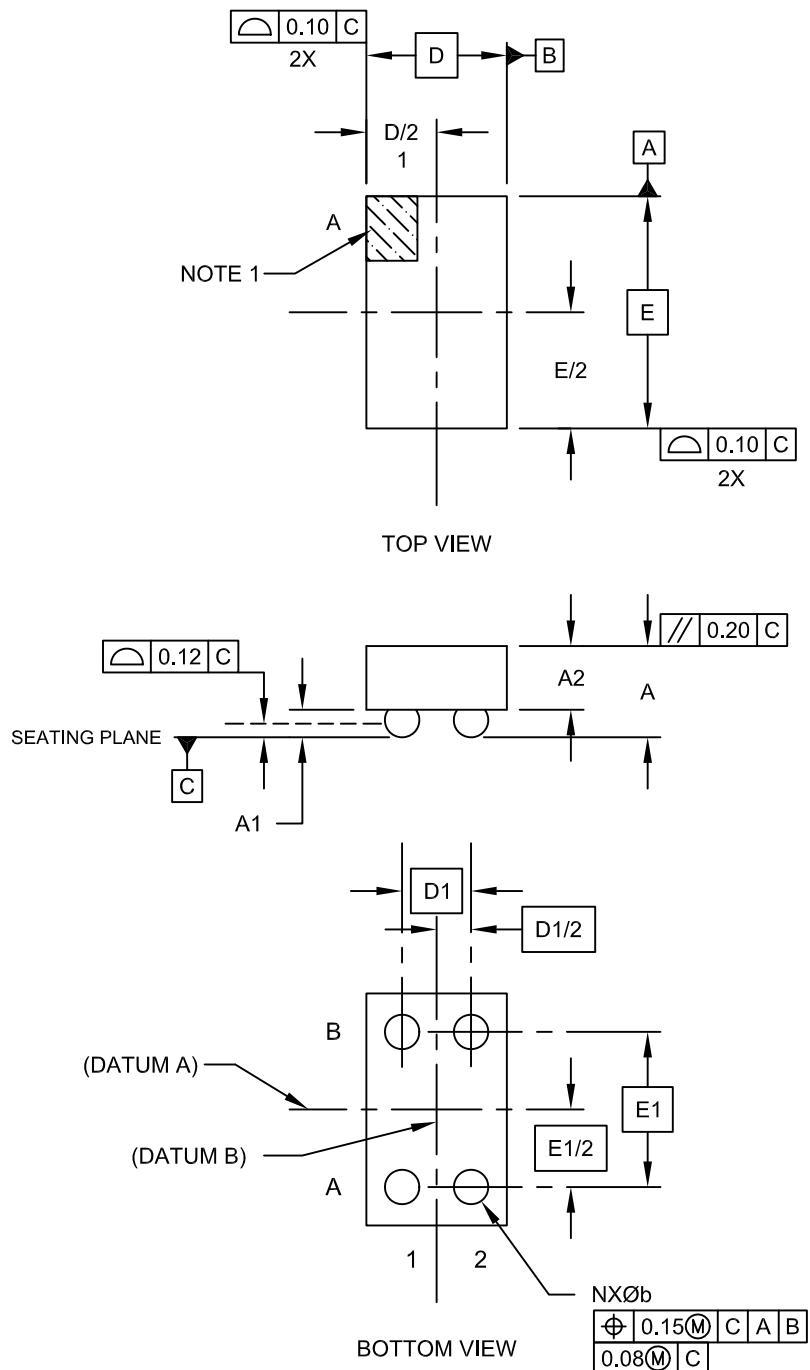
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-8005A

## Packaging Diagrams and Parameters

### 4-Lead Chip Scale Package (CS) - [CSP]

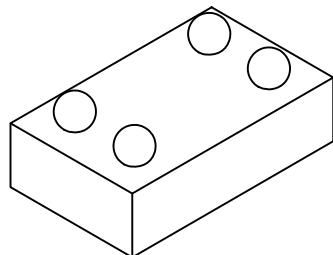
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 4-Lead Chip Scale Package (CS) - [CSP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Contacts	N		4	
Adjacent Column X-Pitch	D1	0.400 BSC		
Adjacent Row Y-Pitch	E1	0.900 BSC		
Overall Height	A	0.47	0.51	0.55
Die Height	A2	0.33	0.35	0.37
Bump Height	A1	0.14	0.16	0.18
Overall Width	D	NOTE 4		
Overall Length	E	NOTE 4		
Ball Diameter	b	0.18	0.20	0.22

Notes:

1. Orientation reference feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

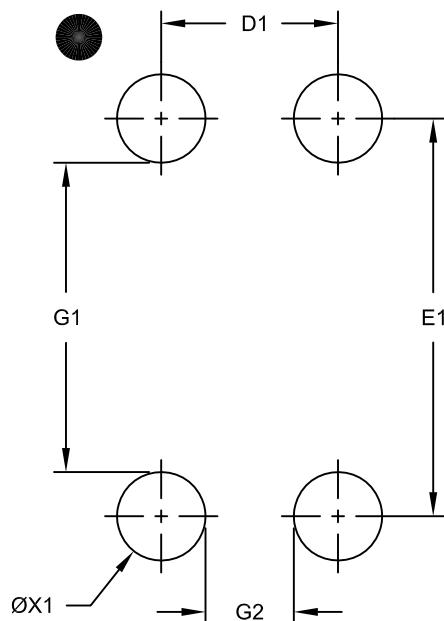
REF: Reference Dimension, usually without tolerance, for information purposes only.

4. Package size varies with specific devices. Please see the specific Product Data Sheet.

## Land Pattern (Footprint)

### 4-Lead Chip Scale Package (CS) - [CSP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Contacts	N		4		
Contact Pad Spacing	D1		0.40		
Contact Pad Spacing	E1		0.90		
Contact Pad Diameter (X4)	ØX1		0.20		
Distance Between Pads	G1		0.70		
Distance Between Pads	G2		0.20		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

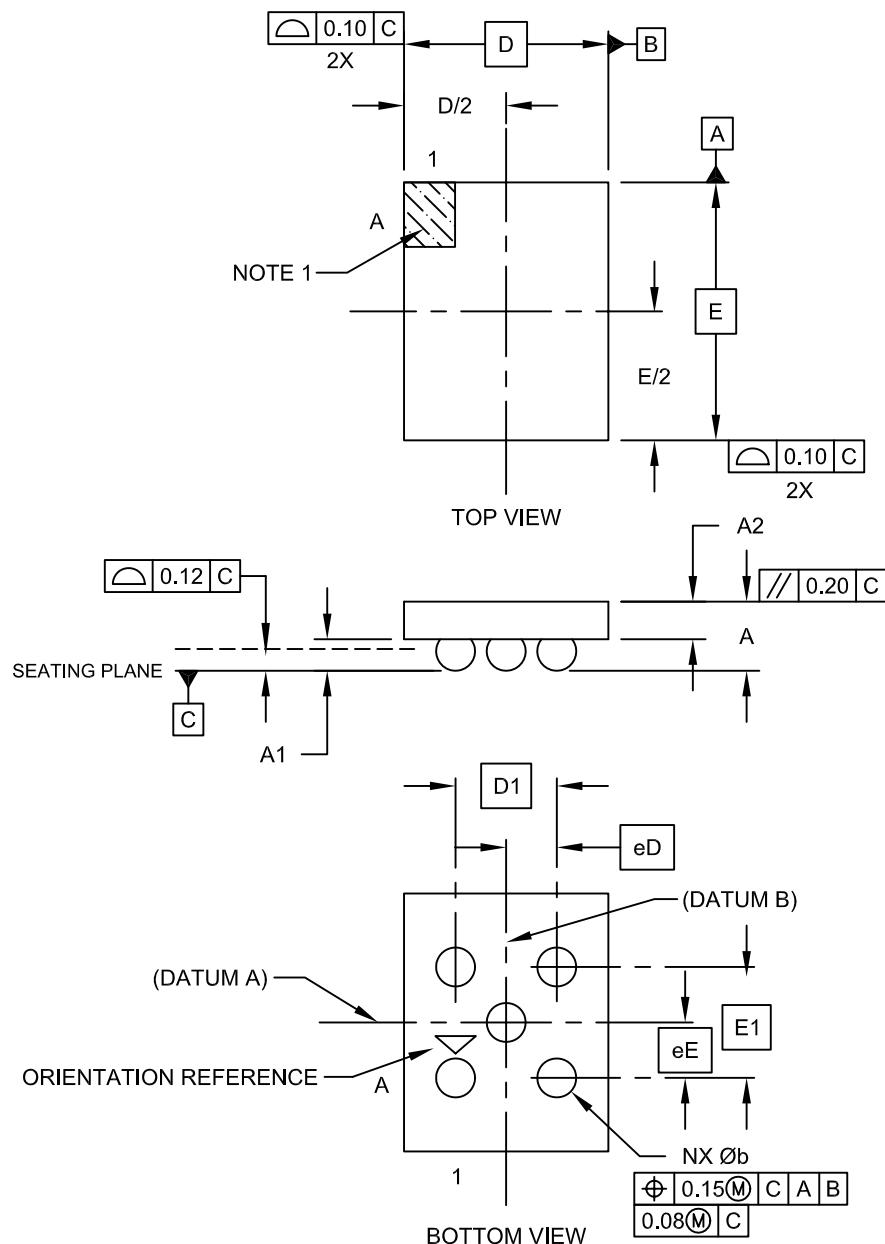
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-8008A

## Packaging Diagrams and Parameters

### 5-Lead Chip Scale Package (CS) - [CSP]

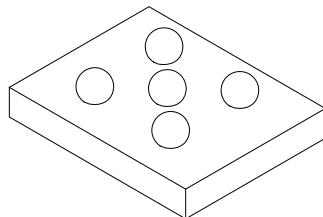
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 5-Lead Chip Scale Package (CS) - [CSP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension	Limits	Units MILLIMETERS		
		MIN	NOM	MAX
Number of Contacts	N		5	
Adjacent Column X-Pitch	E1	0.570	BSC	
Adjacent Row Y-Pitch	D1	0.520	BSC	
Adjacent Column X-Pitch	eE	0.285	BSC	
Adjacent Row Y-Pitch	eD	0.260	BSC	
Overall Height	A	0.47	0.51	0.55
Die Height	A2	0.33	0.35	0.37
Bump Height	A1	0.14	0.16	0.18
Overall Length	E	NOTE 4		
Overall Width	D	NOTE 4		
Ball Diameter	b	0.18	0.20	0.22

#### Notes:

1. Orientation reference feature may vary, but must be located within the hatched area.

2. Package is saw singulated.

3. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

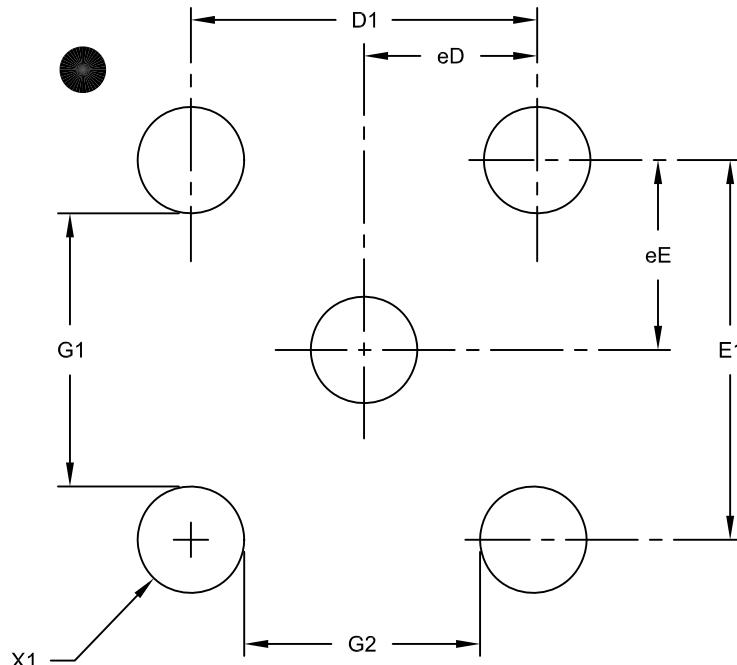
REF: Reference Dimension, usually without tolerance, for information purposes only.

4. Package size varies with specific devices. Please see the specific Product Data Sheet.

## Land Pattern (Footprint)

### 5-Lead Chip Scale Package (CS) - [CSP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Contacts	N		5		
Contact Pitch Y	eE		0.285		
Contact Pitch X	eD		0.260		
Contact Pad Spacing	E1		0.570		
Contact Pad Spacing	D1		0.520		
Contact Pad Diameter (X5)	X1			0.20	
Distance Between Pads	G1	0.41			
Distance Between Pads	G2	0.36			

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

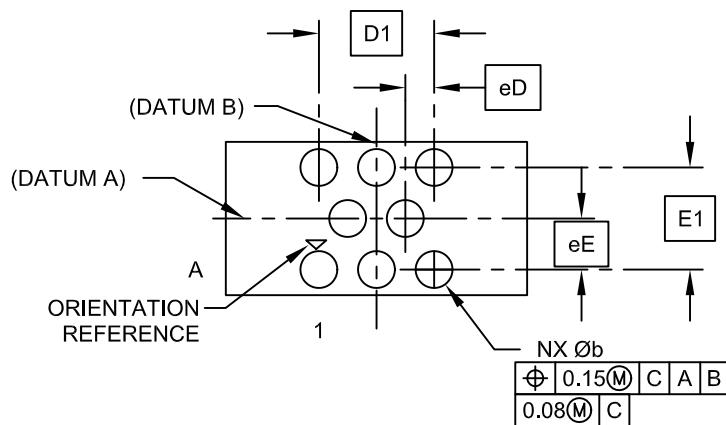
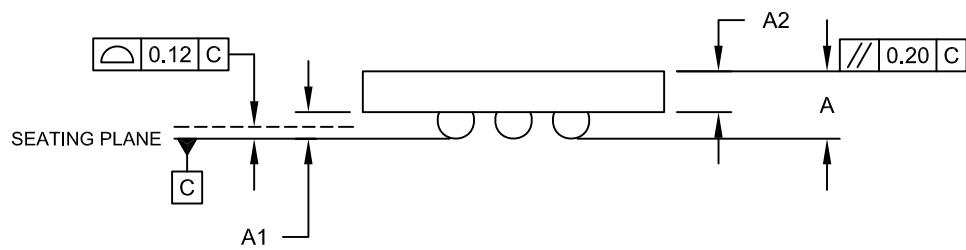
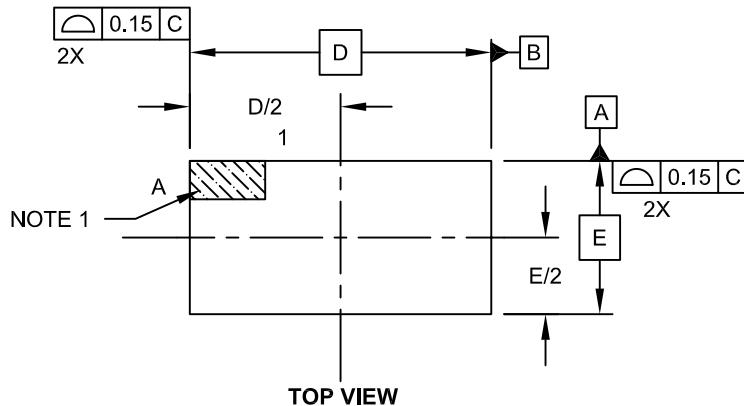
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-8004A

## Packaging Diagrams and Parameters

### 8-Lead Chip Scale Package (CS) - [CSP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



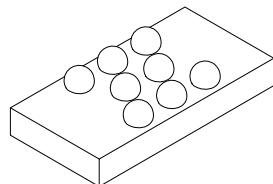
**BOTTOM VIEW**

## Packaging Diagrams and Parameters

---

### 8-Lead Chip Scale Package (CS) - [CSP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Contacts	N		8	
Overall Grid X-Pitch	E1		0.886 BSC	
Overall Grid Y-Pitch	D1		1.00 BSC	
Adjacent Column X-Pitch	eE		0.443 BSC	
Adjacent Row Y-Pitch	eD		0.25 BSC	
Overall Height	A	0.53	0.59	0.64
Die Height	A2	0.33	0.36	0.38
Bump Height	A1	0.20	0.23	0.26
Overall Width	E	NOTE 4		
Overall Length	D	NOTE 4		
Ball Diameter	b	0.30	0.32	0.34

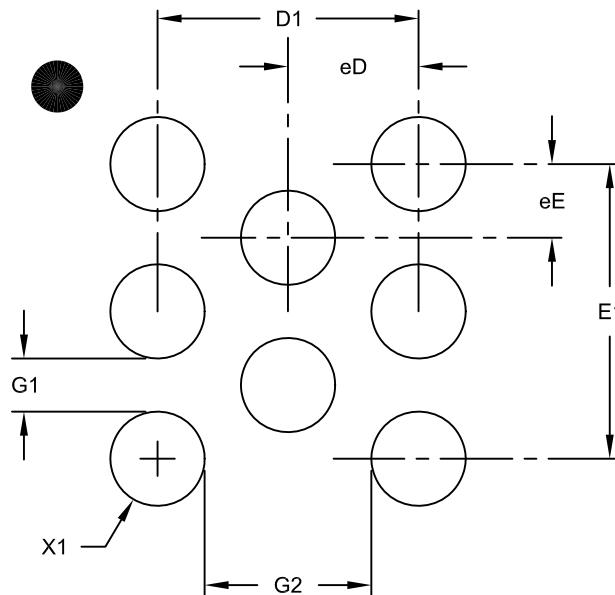
**Notes:**

1. Orientation reference feature may vary, but must be located within the hatched area.
  2. Package is saw singulated.
  3. Dimensioning and tolerancing per ASME Y14.5M.
- BSC: Basic Dimension. Theoretically exact value shown without tolerances.  
 REF: Reference Dimension, usually without tolerance, for information purposes only.
4. Package size varies with specific devices. Please contact your local Microchip representative for specific details

## Land Pattern (Footprint)

8-Lead Chip Scale Package (CS) - [CSP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units	MILLIMETERS		
Dimension		Limits	MIN	NOM	MAX
Number of Contacts	N			8	
Contact Pitch Y	eE			0.25	
Contact Pitch X	eD			0.443	
Contact Pad Spacing	E1			1.00	
Contact Pad Spacing	D1			0.886	
Contact Pad Diameter (X8)	X1				0.32
Distance Between Pads	G1	0.18			
Distance Between Pads	G2	0.56			

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

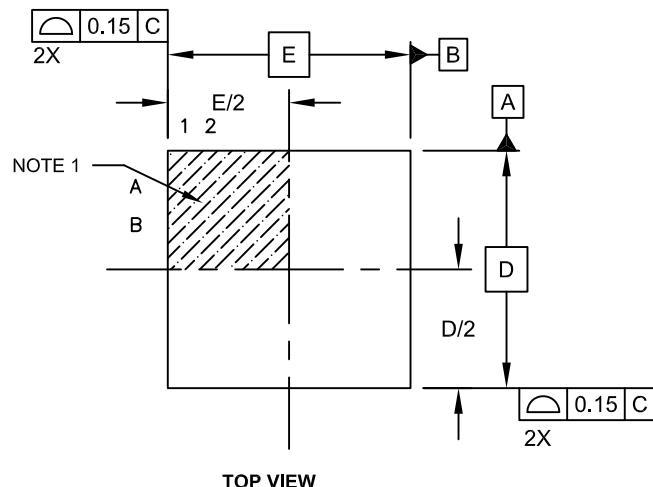
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-8001A

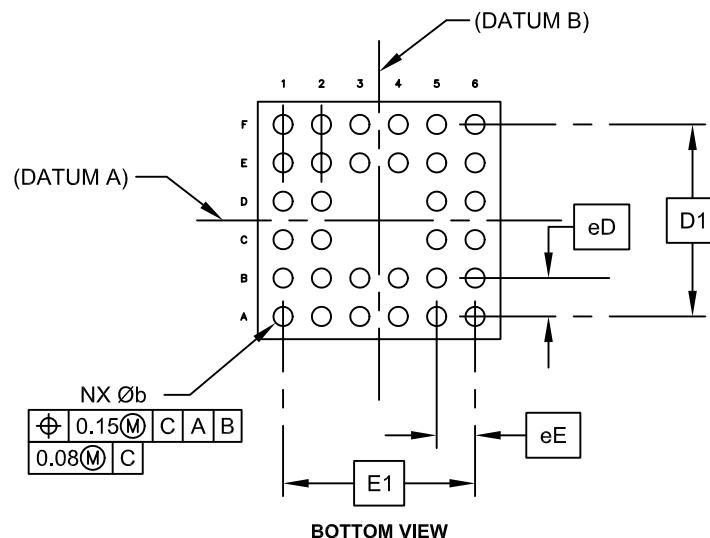
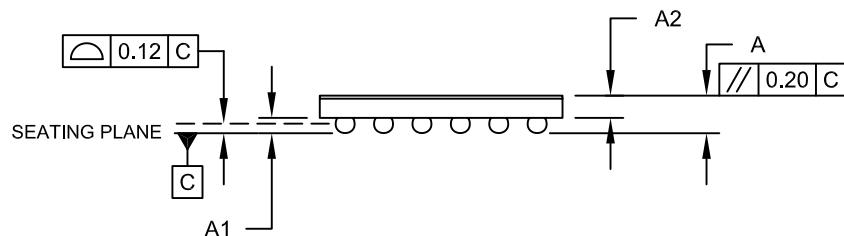
## Packaging Diagrams and Parameters

### 32-Lead Chip Scale Package (CS) - [CSP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



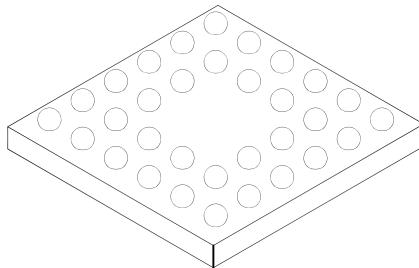
TOP VIEW



## Packaging Diagrams and Parameters

### 32-Lead Chip Scale Package (CS) - [CSP]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Number of Balls	N		32	
Overall Grid X-Pitch	E1	2.50	BSC	
Overall Grid Y-Pitch	D1	2.50	BSC	
Adjacent Column X-Pitch	eE	0.50	BSC	
Adjacent Row Y-Pitch	eD	0.50	BSC	
Overall Height	A	0.45	0.49	0.53
Bump Height	A1	0.18	0.20	0.22
Die Height	A2	0.27	0.29	0.31
Overall Width	E	NOTE 4		
Overall Length	D	NOTE 4		
Contact Diameter	b	0.23	0.25	0.27

**Notes:**

1. Orientation reference feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.  
BSC: Basic Dimension. Theoretically exact value shown without tolerances.  
REF: Reference Dimension, usually without tolerance, for information purposes only.
4. Package size varies with specific devices. Please see the specific Product Data Sheet.

## Packaging Diagrams and Parameters

---

---

**NOTES:**

## Packaging Diagrams and Parameters

---

---

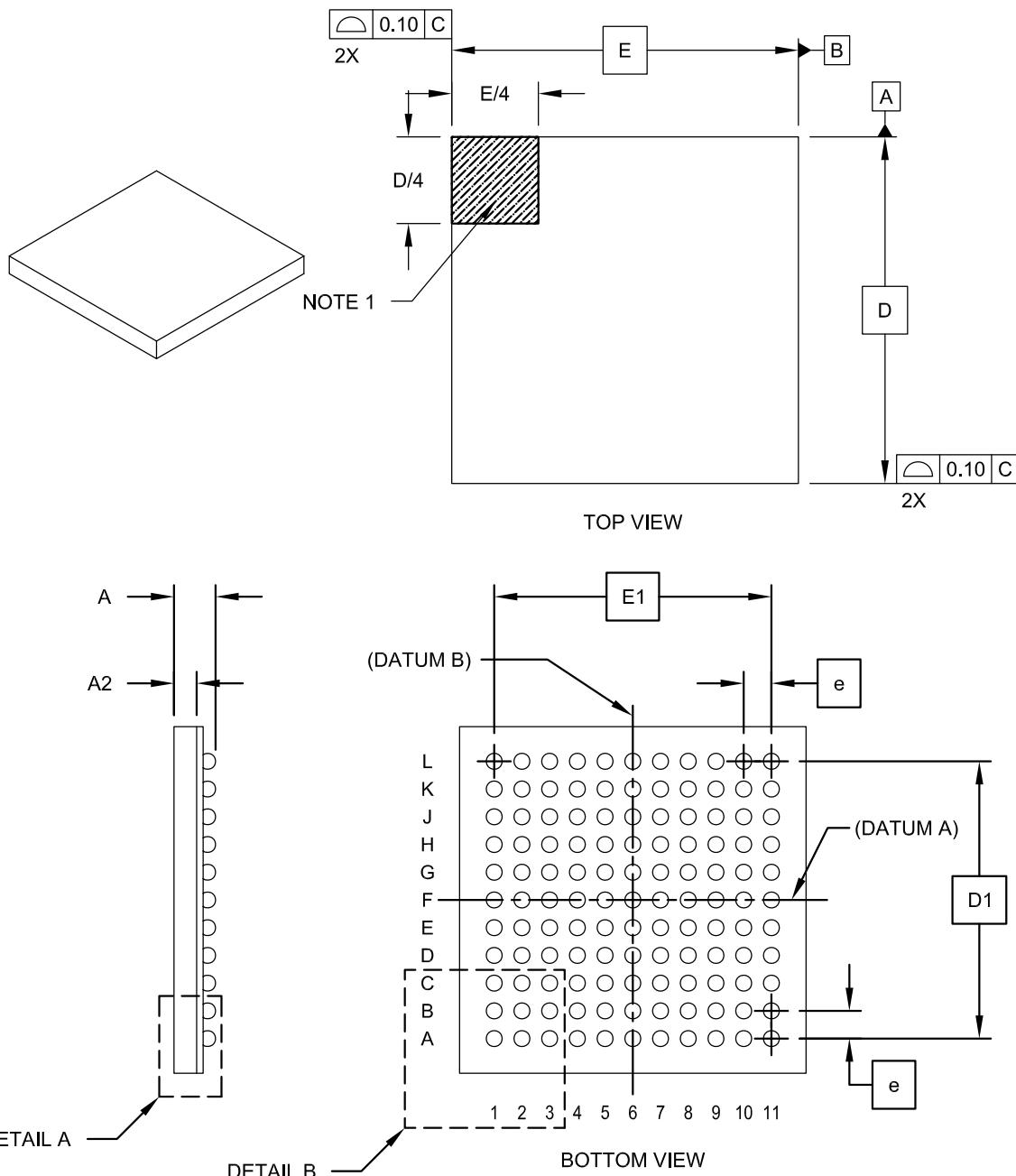
**TFBGA Family**  
(Formerly XBGA Family)

**Plastic Thin Profile Ball Grid Array Package**

## Packaging Diagrams and Parameters

**121-Lead Plastic Thin Profile Ball Grid Array (BG) - 10x10x1.10 mm Body [TFBGA--Formerly XBGA]**

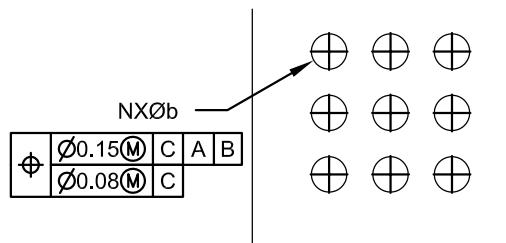
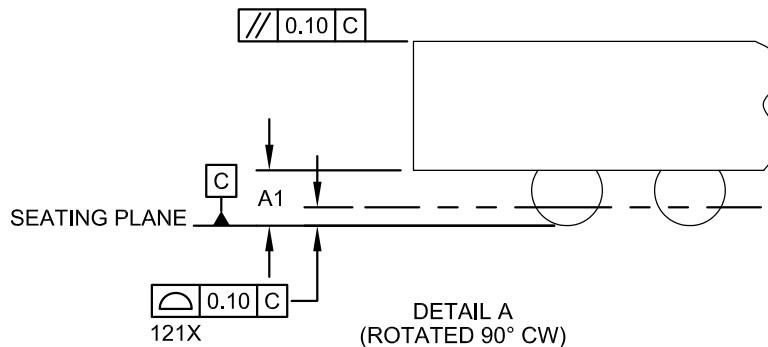
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 121-Lead Plastic Thin Profile Ball Grid Array (BG) - 10x10x1.10 mm Body [TFBGA—Formerly XBGA]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension		Limits	MIN	NOM	MAX
Number of Contacts		N	121		
Contact Pitch		e	0.80 BSC		
Overall Height		A	1.00	1.10	1.20
Standoff		A1	0.25	0.30	0.35
Molded Package Thickness		A2	0.55	0.60	0.65
Overall Width		E	10.00 BSC		
Array Width		E1	8.00 BSC		
Overall Length		D	10.00 BSC		
Array Length		D1	8.00 BSC		
Contact Diameter		b	0.40 TYP		

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

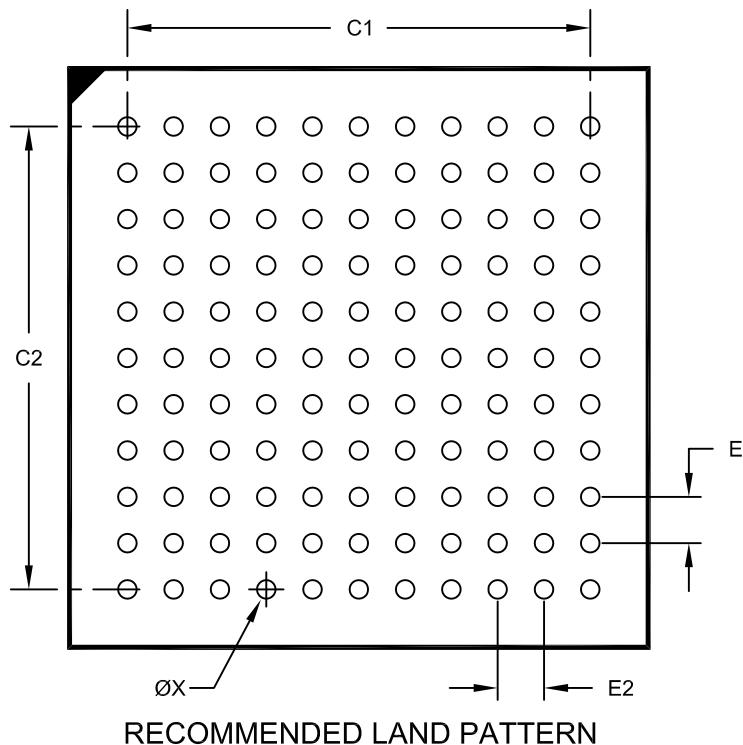
REF: Reference Dimension, usually without tolerance, for information purposes only.

3. The outer rows and columns of balls are located with respect to datums A and B.

## Land Pattern (Footprint)

**121-Lead Plastic Thin Profile Ball Grid Array (BG) - 10x10x1.10 mm Body  
[TFBGA--Formerly XBGA]**

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E1	0.80 BSC		
Contact Pitch	E2	0.80 BSC		
Contact Pad Spacing	C1		8.00	
Contact Pad Spacing	C2		8.00	
Contact Pad Diameter (X121)	X			0.32

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2148 Rev D

## Packaging Diagrams and Parameters

---

---

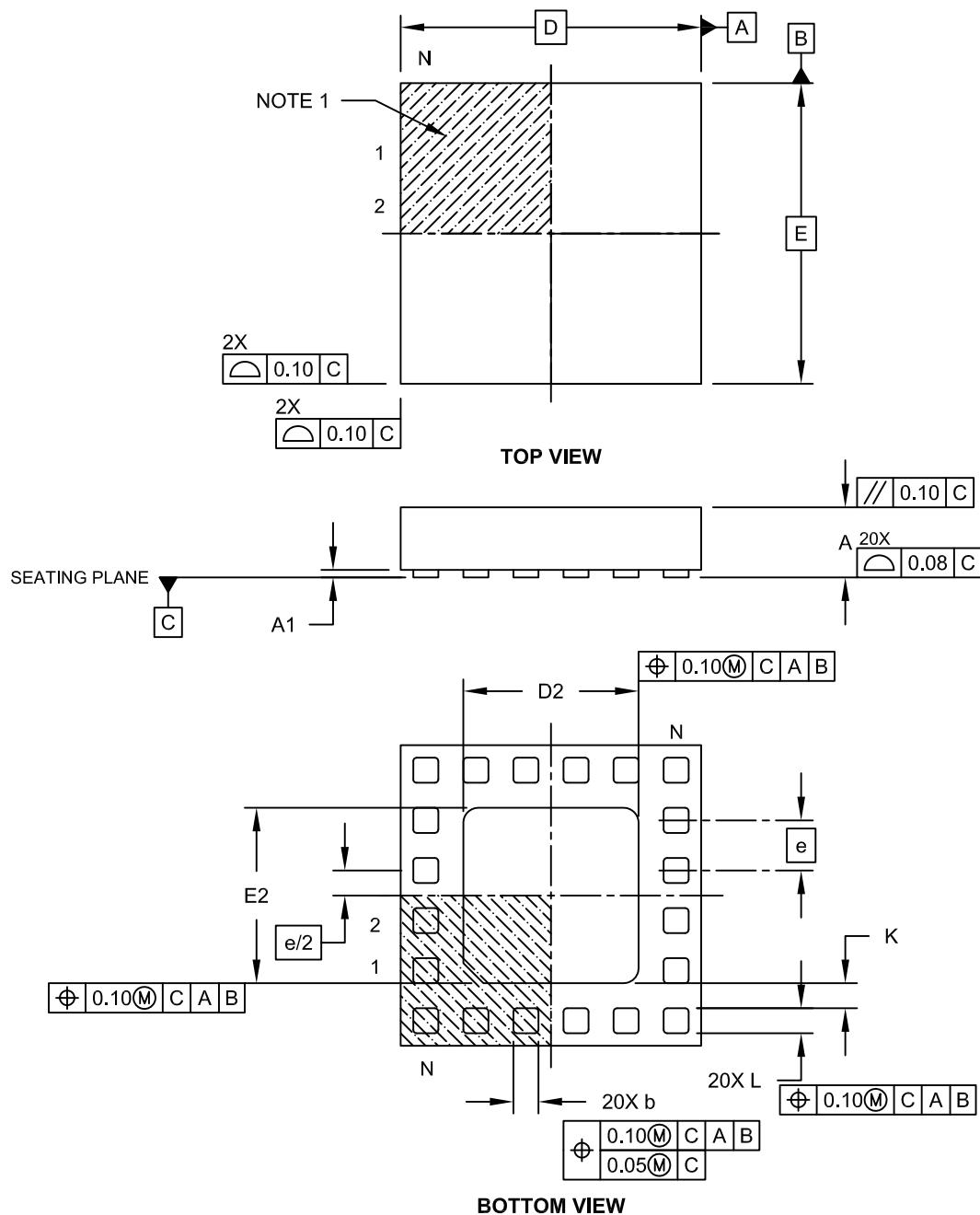
### **TLA Family**

#### **Thermal Leadless Array Packages**

## Packaging Diagrams and Parameters

### 20-Terminal Very, Very Thin Leadless Array Package (TW) – 3x3x0.7 mm Body With Exposed Pad [WTLA]

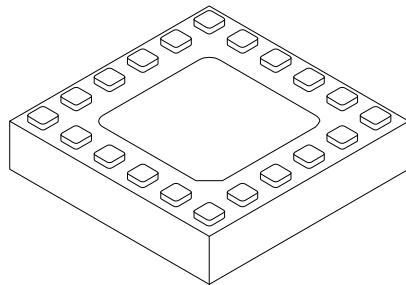
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 20-Terminal Very, Very Thin Leadless Array Package (TW) – 3x3x0.7 mm Body With Exposed Pad [WTLA]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension	Units	MILLIMETERS		
		MIN	NOM	MAX
Number of Pins	N	20		
Pitch	e	0.50	BSC	
Overall Height	A	0.60	-	0.70
Standoff	A1	0.025	-	0.075
Overall Width	E	3.00	BSC	
Exposed Pad Width	E2	1.60	1.75	1.90
Overall Length	D	3.00	BSC	
Exposed Pad Length	D2	1.60	1.75	1.90
Contact Width	b	0.20	0.25	0.30
Contact Length	L	0.20	0.25	0.30
Contact-to-Exposed Pad	K	0.20	-	-

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.

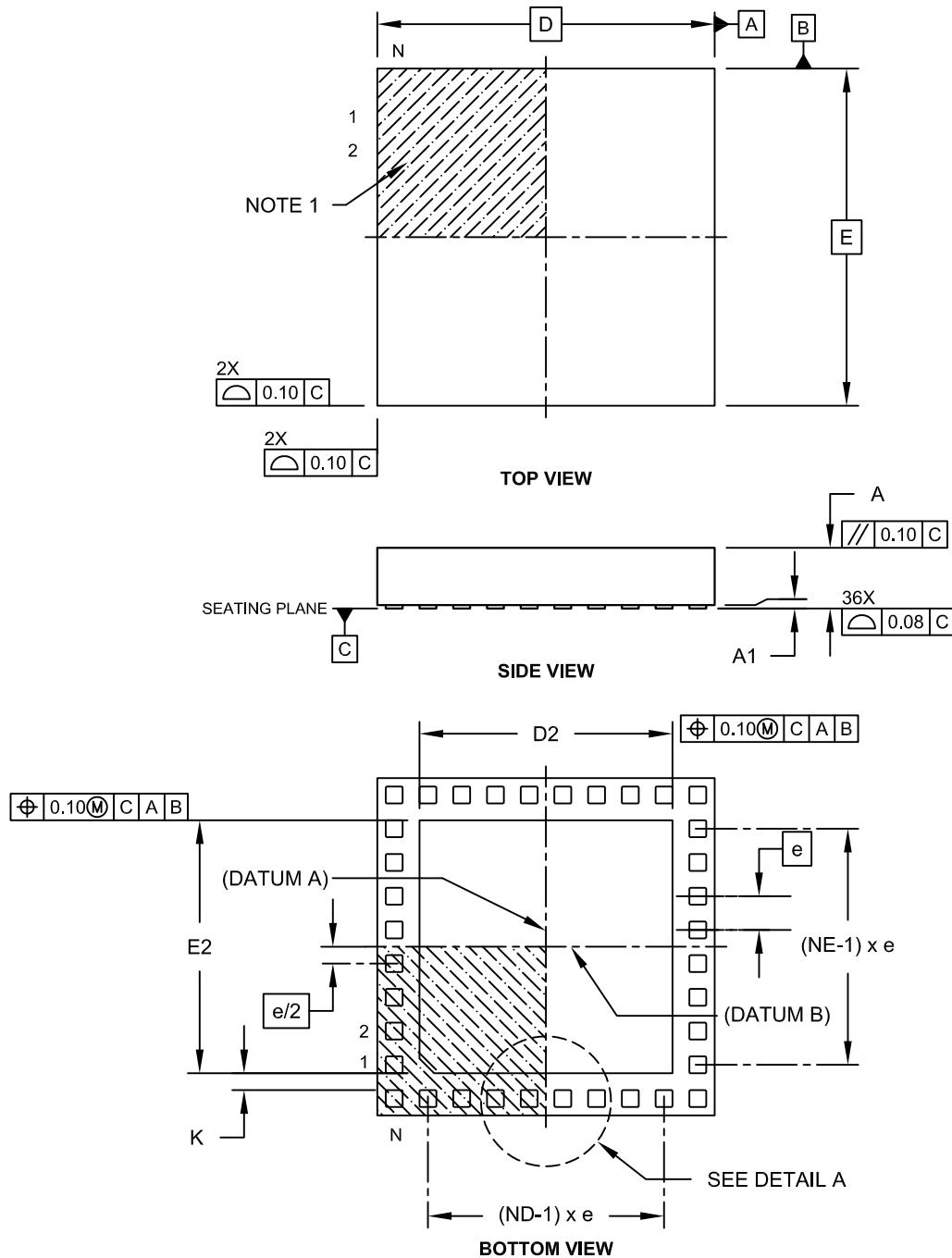
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Packaging Diagrams and Parameters

**36-Terminal Very Thin Thermal Leadless Array Package (TL) – 5x5x0.9 mm Body with Exposed Pad [VTLA]**

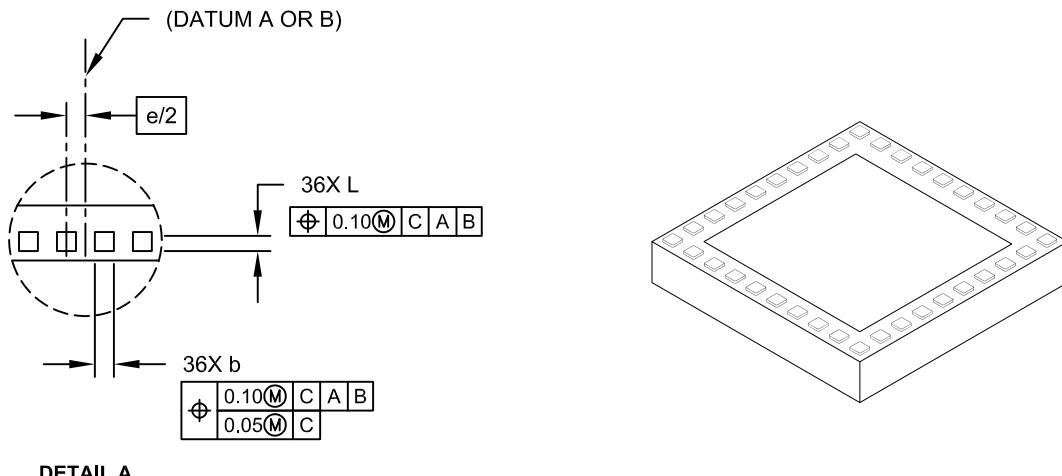
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 36-Terminal Very Thin Thermal Leadless Array Package (TL) – 5x5x0.9 mm Body with Exposed Pad [VTLA]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



DETAIL A

Dimension	Units	MILLIMETERS		
		MIN	NOM	MAX
Number of Pins	N		36	
Number of Pins per Side	ND		10	
Number of Pins per Side	NE		8	
Pitch	e		0.50 BSC	
Overall Height	A	0.80	0.90	1.00
Standoff	A1	0.025	-	0.075
Overall Width	E		5.00 BSC	
Exposed Pad Width	E2	3.60	3.75	3.90
Overall Length	D		5.00 BSC	
Exposed Pad Length	D2	3.60	3.75	3.90
Contact Width	b	0.20	0.25	0.30
Contact Length	L	0.20	0.25	0.30
Contact-to-Exposed Pad	K	0.20	-	-

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.

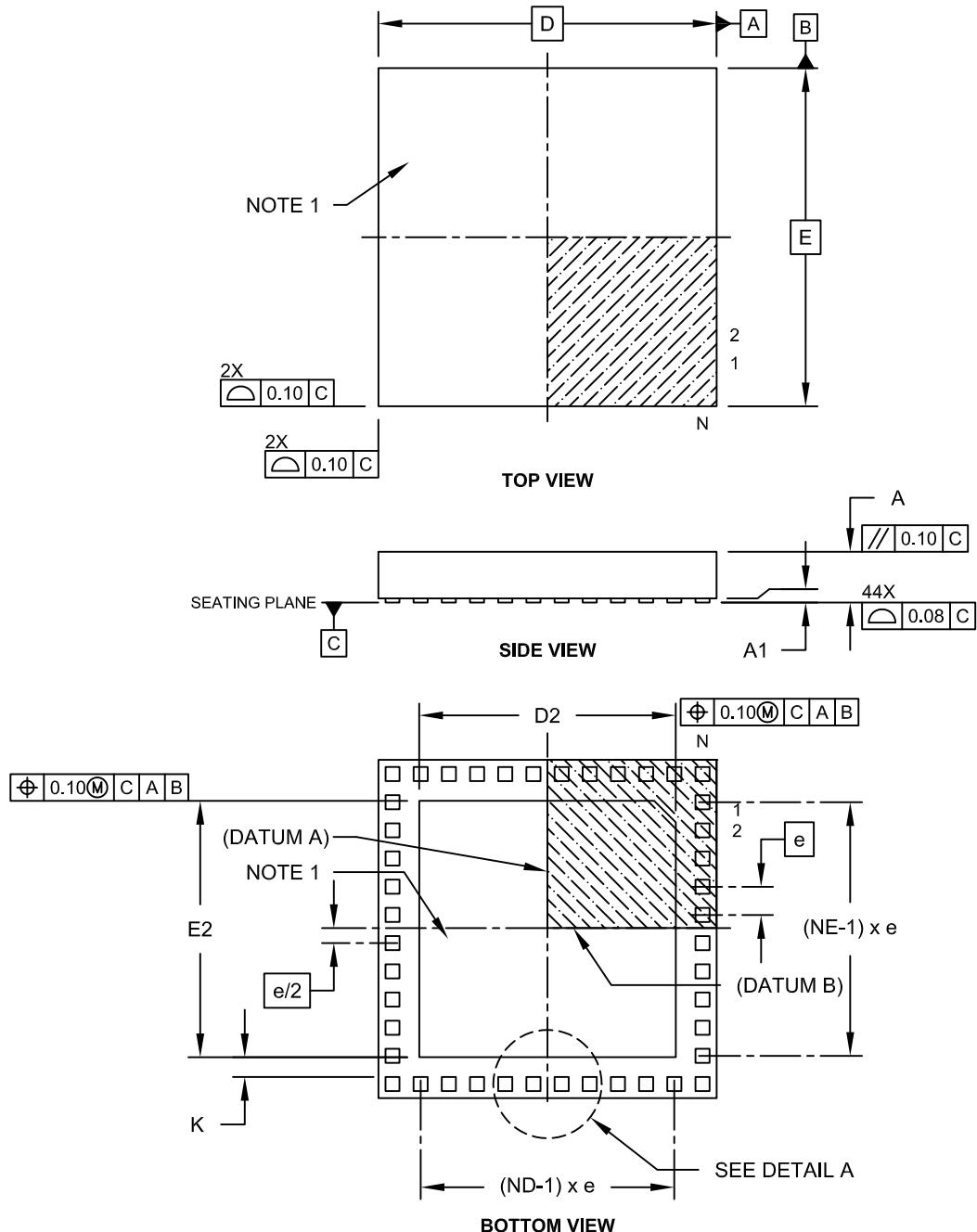
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Packaging Diagrams and Parameters

### 44-Terminal Very Thin Leadless Array Package (TL) – 6x6x0.9 mm Body With Exposed Pad [VTLA]

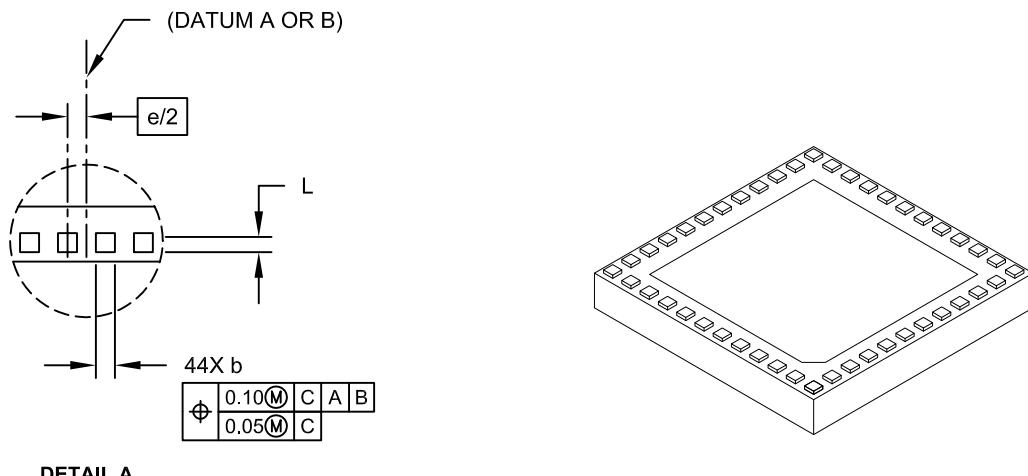
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 44-Terminal Very Thin Leadless Array Package (TL) – 6x6x0.9 mm Body With Exposed Pad [VTLA]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



DETAIL A

Dimension	Units	MILLIMETERS		
		MIN	NOM	MAX
Number of Pins	N		44	
Number of Pins per Side	ND		12	
Number of Pins per Side	NE		10	
Pitch	e		0.50 BSC	
Overall Height	A	0.80	0.90	1.00
Standoff	A1	0.025	-	0.075
Overall Width	E		6.00 BSC	
Exposed Pad Width	E2	4.40	4.55	4.70
Overall Length	D		6.00 BSC	
Exposed Pad Length	D2	4.40	4.55	4.70
Contact Width	b	0.20	0.25	0.30
Contact Length	L	0.20	0.25	0.30
Contact-to-Exposed Pad	K	0.20	-	-

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.

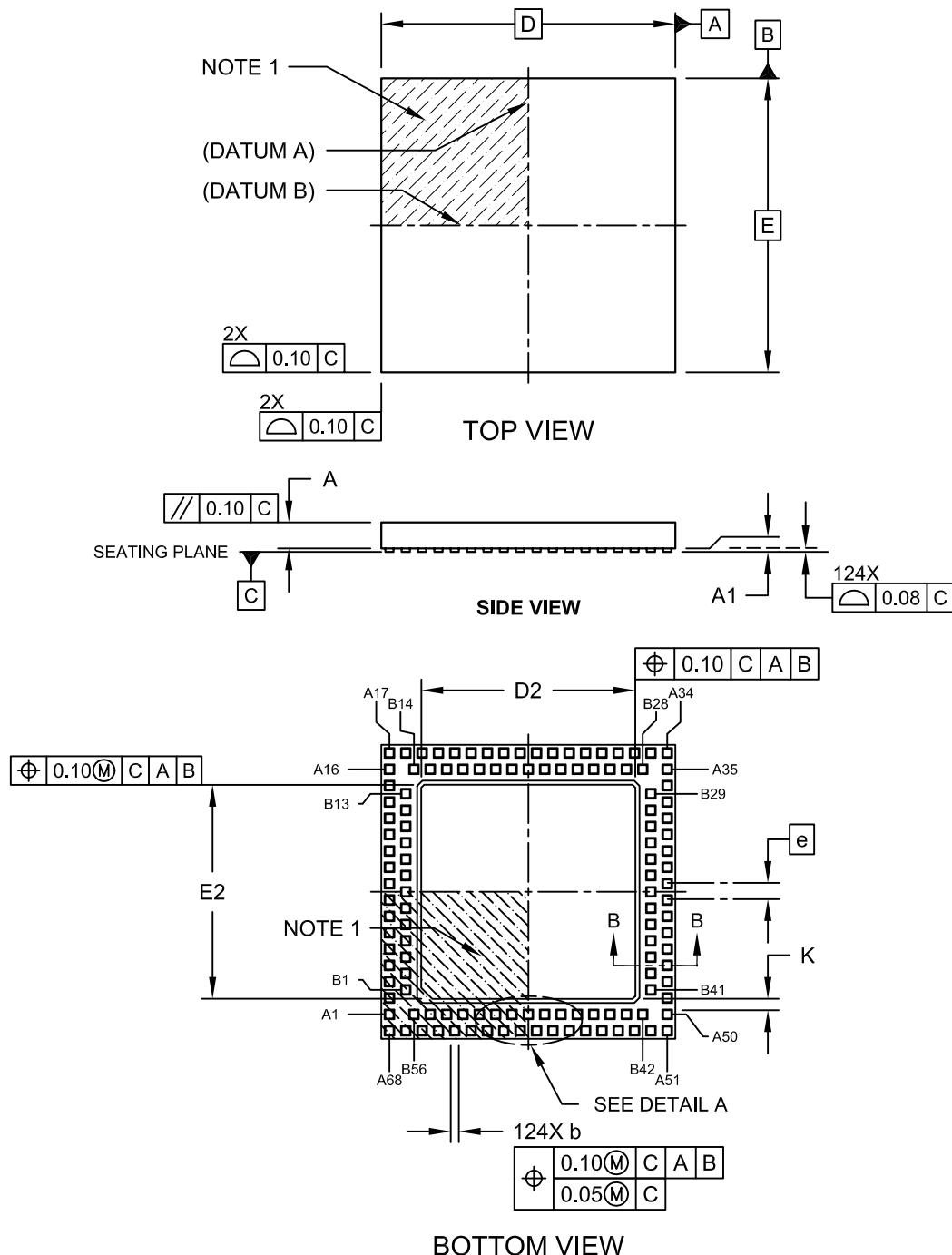
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Packaging Diagrams and Parameters

### 124-Terminal Very Thin Leadless Array Package (TL) – 9x9x0.9 mm Body [VTLA]

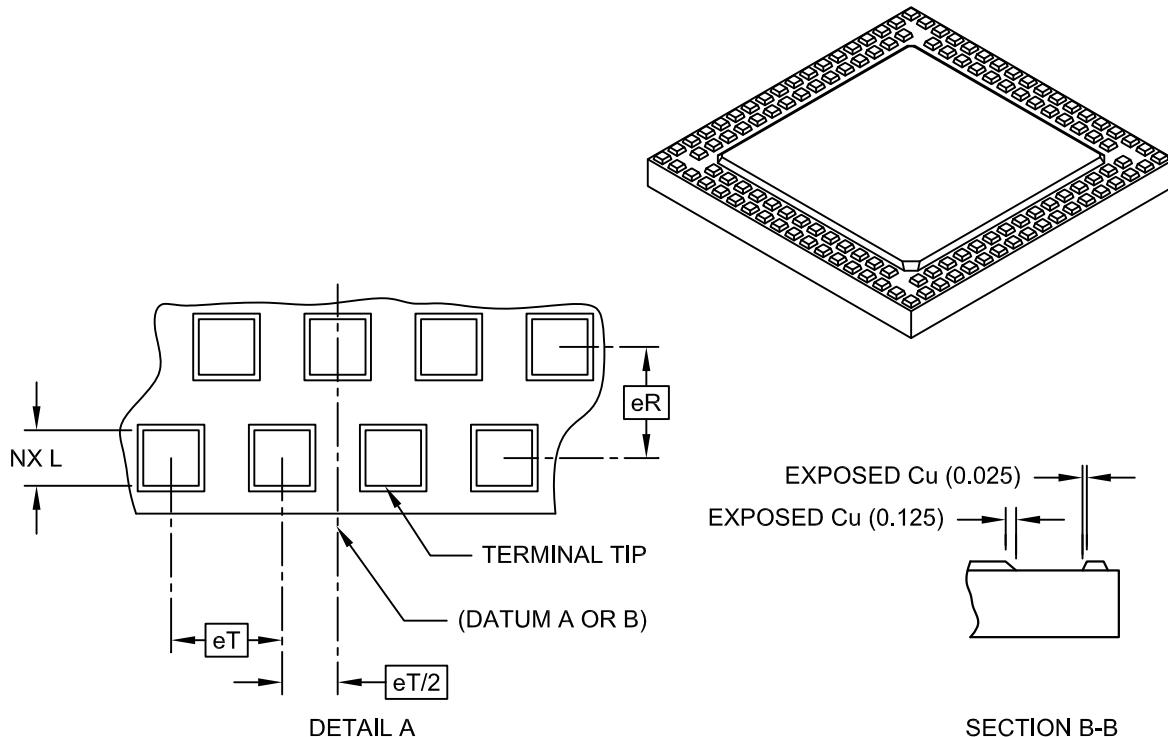
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



## Packaging Diagrams and Parameters

### 124-Terminal Very Thin Leadless Array Package (TL) – 9x9x0.9 mm Body [VTLA]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		124		
Pitch	eT		0.50	BSC	
Pitch (Inner to outer terminal ring)	eR		0.50	BSC	
Overall Height	A	0.80	0.85	0.90	
Standoff	A1	0.00	-	0.05	
Overall Width	E	9.00 BSC			
Exposed Pad Width	E2	6.40	6.55	6.70	
Overall Length	D	9.00 BSC			
Exposed Pad Length	D2	6.40	6.55	6.70	
Contact Width	b	0.20	0.25	0.30	
Contact Length	L	0.20	0.25	0.30	
Contact-to-Exposed Pad	K	0.20	-	-	

#### Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerance, for information purposes only.

## Packaging Diagrams and Parameters

---

---

**NOTES:**

## APPENDIX A: REVISION HISTORY

### Revision AE (September 2005)

The following is the list of modifications:

1. Added **Appendix A: Revision History**.
2. Revised dimensions D2 and E2 in the 8-Lead Plastic, No Lead (MC) 2x3x0.9 mm body (DFN) – Saw Singulated package diagram
3. Corrected graphic format in all packaging diagrams.
4. Added the following Packages:
  - 16-Lead Plastic Small Outline Narrow Body (QSOP)
  - 4-Lead Plastic Small Outline Transistor (SOT-143)
  - 3-Lead Plastic Small Outline Transistor (SOT-223)
  - 32-Lead Thin Quad Flatpack 7x7x1mm Body 1.0/0.10 Lead Form (TQFP)
  - 3-Lead SC-70 package diagram corrected.
5. The following package diagrams were replaced:
  - Drawing C04-142 replaced by C04-128 (5-Lead Small Outline Transistor) (TSOT)
  - Drawing C04-300 replaced by C04-132 (24-Lead Plastic Shrink Small Outline) (SSOP)
6. Added Part Number Designators DB, RC and QR to Part Number Suffix Designations table.

### Revision AF (January 2006)

The following is the list of modifications:

1. Revised 28-Lead Plastic Shrink Small Outline (SS) – 209 mil body, 5.30 mm (SSOP)
2. Revised 28-Lead Plastic Quad Flat No Lead (MM) 6x6x0.9 mm body (QFN-S) with 0.40 mm Contact Length (Saw Singulated)

### Revision AG (July 2006)

The following is the list of modifications:

1. Revised 8-Lead Plastic Thin Shrink Small Outline (ST) – 4.4 mm (TSSOP)
2. Added 40-Lead Plastic Quad Flat, No Lead (MM) 6x6x0.9 mm Body (QFN) with 0.40 mm Contact Length (Saw Singulated)
3. Added 3-Lead Plastic Transistor Outline (AB) (TO-220)
4. Removed Drawing No. C04-300 as it does not exist.
5. Revised 28-Lead Plastic Shrink Small Outline (SS) – 209 mil Body, 5.30 mm (SSOP)
6. Revised 20-Lead Plastic Shrink Small Outline (SS) – 209 mil Body, 5.30 mm (SSOP)

7. Revised 14-Lead Plastic Small Outline (SL) – Narrow, 150 mil (SOIC)
8. Revised 64-Lead Plastic Thin Quad Flatpack (PF) – 14x14x1 mm Body, 1.0/0.10 mm Lead Form (TQFP)
9. Revised 80-Lead Plastic Thin Quad Flatpack (PF) – 14x14x1 mm Body, 1.0/0.10 mm Lead Form (TQFP)
10. Revised Part Number Suffix Designations

### Revision AH (August 2006)

The following is the list of modifications:

1. Revised 28-Lead Plastic Quad Flat No Lead (ML) 6x6 mm Body (QFN) with 0.55 mm Contact Length (Saw Singulated)

### Revision AJ (September 2006)

The following is the list of modifications:

1. Revised 8-Lead Plastic Dual Flat, No Lead Package (MC) - 2x3x0.9 mm Body [DFN]
2. Revised 8-Lead Plastic Dual Flat, No Lead Package (MF) - 6x5 mm Body (DFN-S) – Punch Singulated
3. Revised 8-Lead Plastic Dual Flat, No Lead Package (MF) - 3x3x0.9 mm Body [DFN]
4. Revised 8-Lead Plastic Dual Flat, No Lead Package (MD) - 4x4x0.9 mm Body [DFN]
5. Revised 8-Lead Plastic Dual Flat, No Lead Package (MF) - 6x5 mm Body [DFN-S]
6. Revised 10-Lead Plastic Dual Flat, No Lead Package (MF) - 3x3x0.9 mm Body [DFN]
7. Revised 16-Lead Plastic Quad Flat, No Lead Package (ML) - 4x4x0.9 mm Body [QFN]
8. Revised 20-Lead Plastic Quad Flat, No Lead Package (ML) - 4x4x0.9 mm Body [QFN]
9. Revised 28-Lead Plastic Quad Flat, No Lead Package (ML) - 6x6 mm Body [QFN] With 0.55 mm Contact Length
10. Revised 28-Lead Plastic Quad Flat, No Lead Package (MM) - 6x6x0.9 mm Body [QFN-S] With 0.40 mm Contact Length
11. Revised 40-Lead Plastic Quad Flat, No Lead Package (MM) 6x6x0.9 mm Body [QFN] With 0.40 mm Contact Length
12. Revised 44-Lead Plastic Quad Flat, No Lead Package (ML) - 8x8 mm Body [QFN]
13. Revised 8-Lead Plastic Micro Small Outline Package (MS) [MSOP]
14. Revised 10-Lead Plastic Micro Small Outline Package (MS) [MSOP]

### Revision AK (January 2007)

The entire Packaging Specification has been updated.

# Packaging

---

## Revision AL (February 2007)

Packages were revised. Telcom package designators were added where the designators vary from Microchip designators.

1. Revised 3-Lead Plastic Transistor Outline (TO or ZB) [TO-92]
2. Revised 3-Lead Plastic Small Outline Transistor (TT or NB) [SOT-23]
3. Revised 3-Lead Plastic Small Outline Transistor (CB or NB) [SOT-23A]
4. Revised 3-Lead Plastic Small Outline Transistor (DB) [SOT-223]
5. Revised 5-Lead Plastic Small Outline Transistor (DB) [SOT-223]
6. Revised 4-Lead Plastic Small Outline Transistor (RC) [SOT-143]
7. Revised 5-Lead Plastic Small Outline Transistor (OT or CT) [SOT-23]
8. Revised 6-Lead Plastic Small Outline Transistor (CH) [SOT-23]
9. Revised 8-Lead Plastic Dual In-Line (P or PA) 300 mil Body [PDIP]
10. Revised 14-Lead Plastic Dual In-Line (P or PD) 300 mil Body [PDIP]
11. Revised 16-Lead Plastic Dual In-Line (P or PE) 300 mil Body [PDIP]
12. Revised 24-Lead Plastic Dual In-Line (P or PG) 600 mil Body [PDIP]
13. Revised 24-Lead Skinny Plastic Dual In-Line (SP or PF) 300 mil Body [SPDIP]
14. Revised 28-Lead Skinny Plastic Dual In-Line (SP or PJ) 300 mil Body [SPDIP]
15. Revised 28-Lead Plastic Dual In-Line (P or PI) 600 mil Body [PDIP]
16. Revised 40-Lead Plastic Dual In-Line (P or PL) 600 mil Body [PDIP]
17. Revised 20-Lead Plastic Leaded Chip Carrier (L) Square [PLCC]
18. Revised 28-Lead Plastic Leaded Chip Carrier (L or LI) Square [PLCC]
19. Revised 32-Lead Plastic Leaded Chip Carrier (L) Rectangle [PLCC]
20. Revised 44-Lead Plastic Leaded Chip Carrier (L or LW) Square [PLCC]
21. Revised 68-Lead Plastic Leaded Chip Carrier (L or LS) Square [PLCC]
22. Revised 84-Lead Plastic Leaded Chip Carrier (L) Square [PLCC]
23. Revised 8-Lead Plastic Small Outline (SN or OA) Narrow, 3.90 mm Body [SOIC]
24. Revised 14-Lead Plastic Small Outline (SL or OD) Narrow, 3.90 mm Body [SOIC]
25. Revised 16-Lead Plastic Small Outline (SL) Narrow, 3.90 mm Body [SOIC]

26. Revised 8-Lead Plastic Small Outline (SM) Medium, 5.28 mm Body [SOIJ]
27. Revised 16-Lead Plastic Small Outline (SO or OE) Wide, 7.50 mm Body [SOIC]
28. Revised 18-Lead Plastic Small Outline (SO) Wide, 7.50 mm Body [SOIC]
29. Revised 20-Lead Plastic Small Outline (SO) Wide, 7.50 mm Body [SOIC]
30. Revised 24-Lead Plastic Small Outline (SO or PF) Wide, 7.50 mm Body [SOIC]
31. Revised 28-Lead Plastic Small Outline (SO or OI) Wide, 7.50 mm Body [SOIC]
32. Revised 8-Lead Plastic Micro Small Outline Package (MS or UA) [MSOP]
33. Revised 10-Lead Plastic Micro Small Outline Package (MS or UN) [MSOP]
34. Revised 16-Lead Plastic Shrink Small Outline Narrow Body (QR).150" Body [QSOP]
35. Revised 64-Lead Plastic Metric Quad Flatpack (KU) 14x14x2.7 mm Body, 3.20 mm Footprint [MQFP]
36. Revised 44-Lead Plastic Metric Quad Flatpack (KW) 10x10x2.0 mm Body, 3.9 mm Footprint [PQFP]

## Revision AM (March 2007)

Four Microchip and Telcom package designators were corrected and one package was removed.

1. Revised 6-Lead Plastic Small Outline Transistor (CH) [SOT-23] to (CH or OT)
2. Revised 3-Lead Plastic Small Outline Transistor (CB or NB) [SOT-23A] to (CB)
3. Revised 44-Lead Plastic Metric Quad Flatpack (PQ) [MQFP] to (PQ or KW)
4. Revised 64-Lead Plastic Metric Quad Flatpack (KU) [MQFP] to (BU)
5. Deleted 44-Lead Plastic Metric Quad Flatpack (KW) – 10x10x2.0 mm Body, 3.9 mm Footprint [PQFP]

## Revision AN (March 2007)

16-Lead Plastic Shrink Small Outline Narrow Body (QR) .150" Body [QSOP]: the nominal pitch value for the package is corrected to ".025." This correction revises MCHP Drawing C04-024B to C04-024C.

Packages with a Microchip and a Telcom designator are represented on separate pages, rather than having both designators on a single page.

## Revision AP (April 2007)

Revised 40-Lead Ceramic Dual In-Line with Window (JW) .600" Body [CERDIP]. The E-1 MAX dimension has changed from ".540" to ".583". This correction revises MCHP Drawing C04-014B to C04-014C.

## Revision AQ (July 2007)

Revised 5-Lead Plastic Small Outline Transistor [SOT-223] package designator from (DB) to (DC). This correction revises MCHP Drawing C04-137A to C04-137B.

## Revision AR (September 2007)

Land patterns have been added for the following 13 packages:

8-Lead Plastic Small Outline (SN) – Narrow, 3.90 mm Body [SOIC]

28-Lead Plastic Quad Flat, No Lead Package (ML) – 6x6 mm Body [QFN]  
with 0.55 mm Contact Length

28-Lead Plastic Quad Flat, No Lead Package (MM) – 6x6x0.9 mm Body [QFN-S]  
with 0.40 mm Contact Length

44-Lead Plastic Quad Flat, No Lead Package (ML) – 8x8 mm Body [QFN]

44-Lead Plastic Metric Quad Flatpack (PQ) – 10x10x2 mm Body, 3.20 mm [MQFP]

64-Lead Plastic Metric Quad Flatpack (BU) – 14x14x2.7 mm Body, 3.20 mm [MQFP]

44-Lead Plastic Thin Quad Flatpack (PT) – 10x10x1 mm Body, 2.00 mm [TQFP]

64-Lead Plastic Thin Quad Flatpack (PT) – 10x10x1 mm Body, 2.00 mm [TQFP]

64-Lead Plastic Thin Quad Flatpack (PF) – 14x14x1 mm Body, 2.00 mm [TQFP]

80-Lead Plastic Thin Quad Flatpack (PT) – 12x12x1 mm Body, 2.00 mm [TQFP]

80-Lead Plastic Thin Quad Flatpack (PF) – 14x14x1 mm Body, 2.00 mm [TQFP]

100-Lead Plastic Thin Quad Flatpack (PT) – 12x12x1 mm Body, 2.00 mm [TQFP]

100-Lead Plastic Thin Quad Flatpack (PF) – 14x14x1 mm Body, 2.00 mm [TQFP]

Please refer to the Packaging Index for page numbers.

**Notes:** Packaging outline drawings and land pattern drawings appear on facing pages.

The last three digits of a package outline drawing number will always correspond to the last three digits of the land pattern drawing number.

The Microchip drawing number for any land pattern begins with the following characters: C04-xxxx.

## Revision AS (January 2008)

The following packages are new:

- Drawing 0129B, 8-Lead Plastic Dual Flat, No Lead Package (MN) - 2x3x0.75 mm Body [TDFN] on page 156.
- Drawing 136B, 8-Lead Plastic Dual Flat, No Lead Package (MU) - 2x3x0.5 mm Body [UDFN] on page 158.

Land patterns have been added for the following packages:

- Drawing 2032A, 3-Lead Plastic Small Outline Transistor (DB) Footprint [SOT-223] on page 33.
- Drawing 2137A, 5-Lead Plastic Small Outline Transistor (DC) Footprint [SOT-223] on page 35.
- Drawing 2031A, 4-Lead Plastic Small Outline Transistor (RC) Footprint [SOT-143] on page 37.
- Drawing 2057A, 8-Lead Plastic Small Outline (SN) Narrow, 3.90 mm Body Footprint [SOIC] on page 79.
- Drawing 2057A, 8-Lead Plastic Small Outline (OA) Narrow, 3.90 mm Body Footprint [SOIC] on page 81.
- Drawing 2056A, 8-Lead Plastic Small Outline (SM) Medium, 5.28 mm Body Footprint [SOIJ] on page 86.
- Drawing 2123A, 8-Lead Plastic Dual Flat, No Lead Package (MC) 2x3x0.9 mm Body Footprint [DFN] on page 99.
- Drawing 2062A, 8-Lead Plastic Dual Flat, No Lead Package (MF) - 3x3x0.9 mm Body Footprint [DFN] on page 103.
- Drawing 2131A, 8-Lead Plastic Dual Flat, No Lead Package (MD) 4x4x0.9 mm Body Footprint [DFN] on page 105.
- Drawing 2063A, 10-Lead Plastic Dual Flat, No Lead Package (MF) 3x3x0.9 mm Body Footprint [DFN] on page 109.
- Drawing 2129A, 8-Lead Plastic Dual Flat, No Lead Package (MN) - 2x3x0.75 mm Body Footprint [TDFN] on page 157.
- Drawing 2136A, 8-Lead Plastic Dual Flat, No Lead Package (MU) - 2x3x0.5 mm Body Footprint [UDFN] on page 159.

Corrections have been made to the following packages:

- Drawing 123C, 8-Lead Plastic Dual Flat, No Lead Package (MC) 2x3x0.9 mm Body [DFN] on page 98.
- Drawing 131D, 8-Lead Plastic Dual Flat, No Lead Package (MD) 4x4x0.9 mm Body [DFN] on page 104.
- Drawing 2116A, 80-Lead Plastic Thin Quad Flatpack (PF) 14x14x1 mm Body, 2.00 mm Footprint [TQFP] on page 151.

# Packaging

---

## Revision AT (June 2008)

Revised 24-Lead Plastic Small Outline [SOIC], Wide, 7.50 mm Body package designator from (PF) to (OG) on page 104.

The following packages are new:

- Drawing 0143A, 24-Lead Plastic Quad Flat, No Lead Package (MJ) 4x4 mm Body [QFN] on page 130.
- Drawing 0144A, 28-Lead Plastic Quad Flat, No Lead Package (MK) 4x4 mm Body [QFN] on page 132.
- Drawing 0140A, 28-Lead Plastic Quad Flat, No Lead Package (MQ) 5x5 mm Body [QFN] on page 134.
- Drawing 0145A, 8-Lead Chip Scale Package (CS) 3x2x3 Ball Pattern [CSP] on page 182.

Land patterns have been added for the following packages:

- Drawing 2060A, 3-Lead Plastic Small Outline Transistor (LB) Footprint [SC70] on page 43.
- Drawing 2061A, 5-Lead Plastic Small Outline Transistor (LT) Footprint [SC70] on page 45.
- Drawing 2015A, 7-Lead Plastic (EK) Footprint [DDPAK] on page 51.
- Drawing 2065A, 14-Lead Plastic Small Outline (SL) Narrow, 3.90 mm Body Footprint [SOIC] on page 89.
- Drawing 2065A, 14-Lead Plastic Small Outline (OD) Narrow, 3.90 mm Body Footprint [SOIC] on page 91.
- Drawing 2108A, 16-Lead Plastic Small Outline (SL) Narrow, 3.90 mm Body Footprint [SOIC] on page 93.
- Drawing 2102A, 16-Lead Plastic Small Outline (SO) Wide, 7.50 mm Body Footprint [SOIC] on page 97.
- Drawing 2102A, 16-Lead Plastic Small Outline (OE) Wide, 7.50 mm Body Footprint [SOIC] on page 99.
- Drawing 2051A, 18-Lead Plastic Small Outline (SO) Wide, 7.50 mm Body Footprint [SOIC] on page 101.
- Drawing 2122A, 8-Lead Plastic Dual Flat, No Lead Package (MF) 6x5 mm Body Footprint [DFN-S] on page 119.
- Drawing 2127A, 16-Lead Plastic Quad Flat, No Lead Package (ML) 4x4x0.9 mm Body Footprint [QFN] on page 127.
- Drawing 2126A, 20-Lead Plastic Quad Flat, No Lead Package (ML) 4x4x0.9 mm Body Footprint [QFN] on page 129.
- Drawing 2143A, 24-Lead Plastic Quad Flat, No Lead Package (MJ) 4x4 mm Body Footprint [QFN] on page 131.

- Drawing 2144A, 28-Lead Plastic Quad Flat, No Lead Package (MK) 4x4 mm Body Footprint [QFN] on page 133.
- Drawing 2140A, 28-Lead Plastic Quad Flat, No Lead Package (MQ) 5x5 mm Body Footprint [QFN] on page 135.

## Revision AU (June 2008)

Updated 8-Lead Plastic Small Outline (SM) Medium 5.28 mm Body Footprint [SOIJ] on page 95.

## Revision AV (September 2008)

Added Drawing 0139A, 20-Lead Plastic Quad Flat, No Lead Package (MQ) 5x5x0.9 mm Body [QFN] on page 124.

## Revision AW (October 2008)

Revised 40-Lead Plastic Quad Flat, No Lead Package (MM) 6x6x0.9 mm Body [QFN] on page 136, correcting the package designator from (MM) to (ML).

## Revision AX (January 2009)

Added Drawing 149A, 64-Lead Plastic Quad Flat, No Lead Package (ML) 6x6x0.9 mm Body [QFN] on page 140. This package is presented on 2 pages to facilitate a more explicit specification through the addition of geometric dimensioning and tolerancing (GD&T) information. GD&T symbols and rules are described and defined in the ASME Y14.5M-1994 standard ([www.asme.org](http://www.asme.org)).

## Revision AY (March 2009)

Revised Drawing 0131E, 8-Lead Plastic Dual Flat, No Lead Package (MD) 4x4x0.9 mm Body [DFN] to the new two-page format. It is shown on pages 115-116.

Also revised Drawing 149B, 64-Lead Plastic Quad Flat No Lead Package (MR) 9x9x0.9 mm Body [QFN] on pages 147-148. A corresponding land pattern (2149A), in the list below, was added.

The following packages are new:

- Drawing 151A, 6-Lead Plastic Small Outline Transistor (LT) [SC70] on pages 45-46.
- Drawing 2151A, 6-Lead Plastic Small Outline Transistor (LT) Footprint [SC70] on page 47.
- Drawing 2149A, 64-Lead Plastic Quad Flat, No Lead Package (MR) 9x9x0.9 mm Body Footprint [QFN] on page 149.
- Drawing 068A, 16-Lead Plastic Thin Shrink Small Outline (ST) 4.4 mm Body [TSSOP] on page 161-162.
- Drawing 2068A, 16-Lead Plastic Thin Shrink Small Outline (ST) 4.4 mm Body Footprint [TSSOP] on page 163.

- Drawing 6005A, 4-Lead Chip Scale Package (CS) 2x2 Ball Pattern [CSP] on pages 191-192.
- Drawing 8005A, 4-Lead Chip Scale Package (CS) 2x2 Ball Pattern Footprint [CSP] on page 193.
- Drawing 6004A, 5-Lead Chip Scale Package (CS) 2x1x2 Ball Pattern [CSP] on pages 195-196.
- Drawing 8004A, 5-Lead Chip Scale Package (CS) 2x1x2 Ball Pattern Footprint [CSP] on page 197.
- Drawing 6001A, 8-Lead Chip Scale Package (CS) 3x2x3 Ball Pattern [CSP] on pages 199-200. This package was designated Drawing 145A in the last version of the packaging specification (00049AX).
- Drawing 8001A, 8-Lead Chip Scale Package (CS) 3x2x3 Ball Pattern Footprint [CSP] on page 201.
- Drawing 6003A, 20-Lead Chip Scale Package (CS) 4x5 Special Array Pattern [CSP] on pages 203-204.
- Drawing 8003A, 20-Lead Chip Scale Package (CS) 4x5 Special Array Pattern Footprint [CSP] on page 205.
- Drawing 6002A, 28-Lead Chip Scale Package (CS) 7-6-7-6-7 [CSP] on pages 207-208.
- Drawing 8002A, 28-Lead Chip Scale Package (CS) 7-6-7-6-7 Footprint [CSP] on page 209.
- Appendix B: Control Dimensions (inspection information) on page 217.

## Revision AZ (April 2009)

The following drawings were removed:

- Drawing 6003A, 20-Lead Chip Scale Package (CS) 4x5 Special Array Pattern [CSP] on pages 203-204.
- Drawing 8003A, 20-Lead Chip Scale Package (CS) 4x5 Special Array Pattern Footprint [CSP] on page 205.
- Drawing 6002A, 28-Lead Chip Scale Package (CS) 7-6-7-6-7 [CSP] on pages 207-208.
- Drawing 8002A, 28-Lead Chip Scale Package (CS) 7-6-7-6-7 Footprint [CSP] on page 209.

**Appendix B: “Control Dimensions”** was modified to include the item “Foot Angle” under **B.1 “On Surface Mount Devices (SMD)”** on page 405.

## Revision BA (April 2009)

The following drawing is new:

- Drawing 142A, 16-Lead Plastic Quad Flat, No Lead Package (MG) 3x3x0.9 mm Body [QFN] on pages 126-127.

The following drawing was corrected:

- Drawing 2051A, 18-Lead Plastic Small Outline (SO) Wide, 7.50 mm Body Footprint [SOIC] on page 99. The second page of this drawing was incorrectly labeled as Drawing 2015A.

Note 4 on the following drawings has been modified to refer interested parties to a Microchip representative, instead of a data sheet, for details about the package:

- Drawing 6005A, 4-Lead Chip Scale Package (CS) 2x2 Ball Pattern [CSP] on page 194.
- Drawing 6004A, 5-Lead Chip Scale Package (CS) 2x1x2 Ball Pattern [CSP] on page 198.
- Drawing 6001A, 8-Lead Chip Scale Package (CS) 3x2x3 Ball Pattern [CSP] on page 202.

## Revision BB (August 2009)

The following drawings are new:

- Drawing 0154A, 64-Lead Plastic Quad Flat, No Lead Package (MR) 9x9x0.9 mm Body with 5.40x5.40 Exposed Pad [QFN] on pages 152-153.
- Drawing 0152A, 28-Lead Plastic Ultra Thin Quad Flat, No Lead Package (MV) 4x4x0.5 mm Body [UQFN] on pages 154-155.
- Drawing 2111A, 8-Lead Plastic Micro Small Outline Package (MS) Footprint [MSOP] on page 157.
- Drawing 2021A, 10-Lead Plastic Micro Small Outline Package (MS) Footprint [MSOP] on page 161.
- Drawing 2086A, 8-Lead Plastic Thin Shrink Small Outline (ST) 4.4 mm Body Footprint [TSSOP] on page 169.
- Drawing 2087A, 14-Lead Plastic Thin Shrink Small Outline (ST) 4.4 mm Body Footprint [TSSOP] on page 171.
- Drawing 2088A, 20-Lead Plastic Thin Shrink Small Outline (ST) 4.4 mm Body Footprint [TSSOP] on page 177.
- Drawing 148A, 121-Lead Plastic Thin Profile Ball Grid Array (BG) 10x10x1.10 mm Body [XBGA] on pages 216-217.

## Revision BC (January 2010)

The following drawings are new or corrected:

- Drawing 2097A, 68-Lead Ceramic Leaded (CL) Chip Carrier w/Window Square Footprint [CER-QUAD] on page 31.
- Drawing 2112A, 84-Lead Ceramic Leaded (CL) Chip Carrier w/Window Square Footprint [CER-QUAD] on page 33.
- Drawing 2104A, 3-Lead Plastic Small Outline Transistor (NB) Footprint [SOT-23] on page 44.
- Drawing 2104A, 3-Lead Plastic Small Outline Transistor (TT) Footprint [SOT-23] on page 46.
- Drawing 2091A, 5-Lead Plastic Small Outline Transistor (CT) Footprint [SOT-23] on page 48.
- Drawing 2091A, 5-Lead Plastic Small Outline Transistor (OT) Footprint [SOT-23] on page 50.
- Drawing 2028A, 6-Lead Plastic Small Outline Transistor (CH) Footprint [SOT-23] on page 52.

# Packaging

---

- Drawing 2028A, 6-Lead Plastic Small Outline Transistor (OT) Footprint [SOT-23] on page 54.
- Drawing 2130A, 3-Lead Plastic Small Outline Transistor (CB) Footprint [SOT-23A] on page 56.
- Drawing 2029A, 3-Lead Plastic Small Outline Transistor Header (MB) Footprint [SOT-89] on page 58.
- Drawing 2030A, 5-Lead Plastic Small Outline Transistor Header (MT) Footprint [SOT-89] on page 60.
- Drawing 2128A, 5-Lead Plastic Thin Small Outline Transistor (OS) Footprint [TSOT] on page 73.
- Drawing 2011A, 3-Lead Plastic (EB) Footprint [DDPAK] on page 77.
- Drawing 2012A, 5-Lead Plastic (ET) Footprint [DDPAK] on page 79.
- Drawing 2064A, 20-Lead Plastic Leaded Chip Carrier (L) Square Footprint [PLCC] on page 105.
- Drawing 2026A, 28-Lead Plastic Leaded Chip Carrier (L) Square Footprint [PLCC] on page 107.
- Drawing 2026A, 28-Lead Plastic Leaded Chip Carrier (LI) Square Footprint [PLCC] on page 109.
- Drawing 2023A, 32-Lead Plastic Leaded Chip Carrier (L) Rectangle Footprint [PLCC] on page 111.
- Drawing 2048A, 44-Lead Plastic Leaded Chip Carrier (L) Square Footprint [PLCC] on page 113.
- Drawing 2048A, 44-Lead Plastic Leaded Chip Carrier (LW) Square Footprint [PLCC] on page 115.
- Drawing 2049A, 68-Lead Plastic Leaded Chip Carrier (L) Square Footprint [PLCC] on page 117.
- Drawing 2049A, 68-Lead Plastic Leaded Chip Carrier (LS) Square Footprint [PLCC] on page 119.
- Drawing 2093A, 84-Lead Plastic Leaded Chip Carrier (L) Square Footprint [PLCC] on page 121.
- Drawing 056C, 8-Lead Plastic Small Outline (SM) Medium, 5.28 mm Body [SOIJ] on pages 134-135.
- Drawing 2094A, 20-Lead Plastic Small Outline (SO) Wide, 7.50 mm Body Footprint [SOIC] on page 144.
- Drawing 2025A, 24-Lead Plastic Small Outline (OG) Wide, 7.50 mm Body Footprint [SOIC] on page 146.
- Drawing 2025A, 24-Lead Plastic Small Outline (SO) Wide, 7.50 mm Body Footprint [SOIC] on page 148.
- Drawing 2052A, 28-Lead Plastic Small Outline (OI) Wide, 7.50 mm Body Footprint [SOIC] on page 150.
- Drawing 2052A, 28-Lead Plastic Small Outline (SO) Wide, 7.50 mm Body Footprint [SOIC] on page 152.
- Drawing 062C, 8-Lead Plastic Dual Flat, No Lead Package (MF) 3x3x0.9 mm Body [DFN] on pages 159-160.
- Drawing 2131C, 8-Lead Plastic Dual Flat, No Lead Package (MD) 4x4x0.9 mm Body Footprint [DFN] on page 164.
- Drawing 0129C, 8-Lead Plastic Dual Flat, No Lead Package (MN) - 2x3x0.75 mm Body [TDFN] on pages 168-169.
- Drawing 2142A, 16-Lead Plastic Quad Flat, No Lead Package (MG) 3x3x0.9 mm Body Footprint [QFN] on page 177.
- Drawing 2139A, 20-Lead Plastic Quad Flat, No Lead Package (MQ) 5x5x0.9 mm Body Footprint [QFN] on page 183.
- Drawing 118D, 40-Lead Plastic Quad Flat, No Lead Package (ML) 6x6x0.9 mm Body [QFN] on pages 194-195.
- Drawing 2118A, 40-Lead Plastic Quad Flat, No Lead Package (ML) 6x6x0.9 mm Body Footprint [QFN] on page 196.
- Drawing 2111A, 8-Lead Plastic Micro Small Outline Package (UA) Footprint [MSOP] on page 211.
- Drawing 2021A, 10-Lead Plastic Micro Small Outline Package (UN) Footprint [MSOP] on page 215.
- Drawing 2024A, 16-Lead Plastic Shrink Small Outline Narrow Body (QR) .150" Body Footprint [QSOP] on page 217.
- Drawing 2072A, 20-Lead Plastic Shrink Small Outline (SS) 5.30 mm Body Footprint [SSOP] on page 221.
- Drawing 2132A, 24-Lead Plastic Shrink Small Outline (SS) 5.30 mm Body Footprint [SSOP] on page 223.
- Drawing 2073A, 28-Lead Plastic Shrink Small Outline (SS) 5.30 mm Body Footprint [SSOP] on page 225.
- Drawing 2086A, 8-Lead Plastic Thin Shrink Small Outline (ST) 4.4 mm Body Footprint [TSSOP] on page 229.
- Drawing 044A, 144-Lead Plastic Low Profile Quad Flatpack (PL) 20x20x1.40 mm Body, 2.0 mm [LQFP] on pages 243-244.
- Drawing 2044A, 144-Lead Plastic Low Profile Quad Flatpack (PL) 20x20x1.40 mm Body, 2.0 mm Footprint [LQFP] on page 245.
- Drawing 2071A, 44-Lead Plastic Metric Quad Flatpack (KW) 10x10x2 mm Body, 3.20 mm Footprint [MQFP] on page 249.
- Drawing 2074A, 32-Lead Plastic Thin Quad Flatpack (PT) 7x7x1.0 mm Body, 2.00 mm Footprint [TQFP] on page 257.
- Drawing 155A, 144-Lead Plastic Thin Quad Flatpack (PH) 16x16x1 mm Body, 2.00 mm [TQFP] on pages 272-273.

- Drawing 2155A, 144-Lead Plastic Thin Quad Flatpack (PH) 16x16x1 mm Body, 2.00 mm Footprint [TQFP] on page 274.
- Drawing 6005D, 4-Lead Chip Scale Package (CS) 2x2 Ball Pattern [CSP] on pages 276-277.
- Drawing 8005A, 4-Lead Chip Scale Package (CS) 2x2 Ball Pattern Footprint [CSP] on page 276.
- Drawing 6004D, 5-Lead Chip Scale Package (CS) 2x1x2 Ball Pattern [CSP] on pages 279-280.
- Drawing 6001C, 8-Lead Chip Scale Package (CS) 3x2x3 Ball Pattern [CSP] on pages 282-283.
- Drawing 148A, 121-Lead Plastic Thin Profile Ball Grid Array (BG) 10x10x1.10 mm Body [XBGA] on pages 286-287.
- Drawing 2148A, 121-Lead Plastic Thin Profile Ball Grid Array (BG) 10x10x1.10 mm Body Footprint [XBGA] on page 288.

## Revision BD (February 2010)

The following drawings are new:

Drawings 6008A (2) and 8008A, 4-Lead Chip Scale Package (CS) Package Code AL [CSP] on pages 279-282.

## Revision BE (June 2010)

The following drawings are new:

- Drawing 162A, 8-Lead Thermally Enhanced Plastic Small Outline (SE) Narrow, 3.90 mm Body w/exposed heat slug [SOIC] on pages 130-131.
- Drawing 2162A, 8-Lead Thermally Enhanced Plastic Small Outline (SE) Narrow, 3.90 mm Body Footprint [SOIC] on page 132.
- Drawing 120B (Sheet 2), 6-Lead Plastic Dual Flat, No Lead Package (MA) 2x2x0.9 mm Body [DFN] on page 161.
- Drawing 2120A, 6-Lead Plastic Dual Flat, No Lead Package (MA) 2x2x0.9 mm Body Footprint [DFN] on page 162.
- Drawing 2143B, 24-Lead Plastic Quad Flat, No Lead Package (MJ) 4x4 mm Body Footprint [QFN] on page 193.
- Drawing 156A, 40-Lead Plastic Ultra Thin Quad Flat No Lead Package (MV) 5x5 mm Body [UQFN] on pages 214-215.
- Drawing 2156A, 40-Lead Plastic Ultra Thin Quad Flat No Lead Package (MV) 5x5 mm Body Footprint [UQFN] on page 216.
- Drawing 087C (Sheet 2), 14-Lead Plastic Thin Shrink Small Outline (ST) 4.4 mm Body [TSSOP] on page 241.
- Drawing 2044A, 144-Lead Plastic Low Profile Quad Flatpack (PL) 20x20x1.40 mm Body, 2.0 mm Footprint [LQFP] on page 257.

The following drawings have been revised:

- Drawing 2030C 5-Lead Plastic Small Outline Transistor Header (MT) Footprint [SOT-89] on page 60.
- Drawing 057C 8-Lead Plastic Small Outline (SN) Narrow, 3.90 mm Body [SOIC] on pages 124-125.
- Drawing 057C 8-Lead Plastic Small Outline (OA) Narrow, 3.90 mm Body [SOIC] on pages 124-125.
- Drawing 120B 6-Lead Plastic Dual Flat, No Lead Package (MA) 2x2x0.9 mm Body [DFN] on page 160.
- Drawing 0129C 8-Lead Plastic Dual Flat, No Lead Package (MN) - 2x3x0.75 mm Body [TDFN] on page 176-177.
- Drawing 087C 14-Lead Plastic Thin Shrink Small Outline (ST) 4.4 mm Body [TSSOP] on page 240.
- Drawing 044B 144-Lead Plastic Low Profile Quad Flatpack (PL) 20x20x1.40 mm Body, 2.0 mm [LQFP] on page 255-256.
- Drawing 008A 4-Lead Chip Scale (CS) [CSP] on page 291.
- Drawing 6008A 4-Lead Chip Scale Package PkgCode\_AL (continued) (CS) 2x2 Ball Pattern [CSP] on page 292.
- Drawing 148B 121-Lead Plastic Thin Profile Ball Grid Array (BG) 10x10x1.10 mm Body [XBGA] on pages 302-303.
- Drawing 2148B 121-Lead Plastic Thin Profile Ball Grid Array (BG) 10x10x1.10 mm Body Footprint [XBGA] on page 304.

## Revision BF (July 2010)

Drawings C04-028A and C04-2028A with CHY package designators have been added for the 6-Lead Plastic Small Outline Transistor (CHY) [SOT-23] package and associated land pattern. The drawings appear on pages 53 and 54.

## Revision BG (March 2011)

The following drawings are new:

- Drawing 065C, 14-Lead Plastic Small Outline (SL) Narrow, 3.90 mm Body [SOIC] on page 136.
- Drawing 065C, 14-Lead Plastic Small Outline (sheet 2) (OD) Narrow, 3.90 mm Body [SOIC] on page 139.
- Drawing 108C, 16-Lead Plastic Small Outline (sheet 2) (SL) Narrow, 3.90 mm Body [SOIC] on page 142.
- Drawing 102C, 16-Lead Plastic Small Outline (sheet 2) (SO) Wide, 7.50 mm Body [SOIC] on page 148.

# Packaging

---

- Drawing 102C, 16-Lead Plastic Small Outline (sheet 2) (OE) Wide, 7.50 mm Body [SOIC] on page 151.
  - Drawing 051C, 18-Lead Plastic Small Outline (sheet 2) (SO) Wide, 7.50 mm Body [SOIC] on page 154.
  - Drawing 094C, 20-Lead Plastic Small Outline (sheet 2) (SO) Wide, 7.50 mm Body [SOIC] on page 157.
  - Drawing 025C, 24-Lead Plastic Small Outline (sheet 2) (SO) Wide, 7.50 mm Body [SOIC] on page 160.
  - Drawing 025C, 24-Lead Plastic Small Outline (sheet 2) (OG) Wide, 7.50 mm Body [SOIC] on page 163.
  - Drawing 052C, 28-Lead Plastic Small Outline (sheet 2) (SO) Wide, 7.50 mm Body [SOIC] on page 166.
  - Drawing 052C, 28-Lead Plastic Small Outline (sheet 2) (OI) Wide, 7.50 mm Body [SOIC] on page 169.
  - Drawing 078A, 6-Lead Plastic Dual Flat, No Lead Package (MY) 2x2x0.8 mm Body [TDFN] on pages 188-189.
  - Drawing 185A, 10-Lead Plastic Dual Flat, No Lead Package (MN) 3x3x0.8 mm Body [TDFN] on pages 193-194.
  - Drawing 063C, 10-Lead Plastic Dual Flat, No Lead Package (sheet 2) (MF) 3x3x0.9 mm Body [DFN] on page 198.
  - Drawing 2063B, 10-Lead Plastic Dual Flat, No Lead Package (MF) 3x3x0.9 mm Body Footprint [DFN] on page 199.
  - Drawing 140B, 28-Lead Plastic Quad Flat, No Lead Package (sheet 2) (MQ) 5x5x0.9 mm Body [QFN] on page 214.
  - Drawing 153A, 48-Lead Plastic Ultra Thin Quad Flat No Lead Package (MV) 6x6x0.5 mm Body [UQFN] on pages 235-236.
  - Drawing 184A, 20-Lead Thermal Leadless Array Package (TL) 3x3x0.7 Exposed Pad [UQFN] on pages 326-327.
  - Drawing 187B, 36-Lead Thermal Leadless Array Package (TL) 5x5x0.9 Exposed Pad [TLA] on pages 328-329.
  - Drawing 157B, 44-Lead Thermal Leadless Array Package (TL) 6x6x0.9 Exposed Pad [TLA] on pages 330-331.
- Drawing 099C, 14-Lead Ceramic Dual In-Line w/Window (JW) .300" Body [CERDIP] on page 19.
  - Drawing 003C, 16-Lead Ceramic Dual In-Line w/Window (JE) .300" Body [CERDIP] on page 20.
  - Drawing 010C, 18-Lead Ceramic Dual In-Line (JW) .300" Body [CERDIP] on page 21.
  - Drawing 115C, 20-Lead Ceramic Dual In-Line w/Window (JW) .300" Body [CERDIP] on page 22.
  - Drawing 004C, 24-Lead Ceramic Dual In-Line (JG) .600" Body [CERDIP] on page 23.
  - Drawing 006C, 28-Lead Ceramic Dual In-Line (JN) .600" Body [CERDIP] on page 24.
  - Drawing 080C, 28-Lead Ceramic Dual In-Line w/Window (JW) .300" Body [CERDIP] on page 25.
  - Drawing 013C, 28-Lead Ceramic Dual In-Line w/Window (JW) .600" Body [CERDIP] on page 26.
  - Drawing 008C, 40-Lead Ceramic Dual In-Line (JK) .600" Body [CERDIP] on page 27.
  - Drawing 014C, 40-Lead Ceramic Dual In-Line w/Window (JW) .600" Body [CERDIP] on page 28.
  - Drawing 162B, 8-Lead Thermally Enhanced Plastic Small Outline (SE) Narrow, 3.90 mm Body [SOIC] on page 132.
  - Drawing 162B, 8-Lead Thermally Enhanced Plastic Small Outline w/exposed heat slug (sheet 2) (SE) Narrow, 3.90 mm Body [SOIC] on page 133.
  - Drawing 065C, 14-Lead Plastic Small Outline (SL) Narrow, 3.90 mm Body [SOIC] on page 135.
  - Drawing 065C, 14-Lead Plastic Small Outline (OD) Narrow, 3.90 mm Body [SOIC] on page 138.
  - Drawing 108C, 16-Lead Plastic Small Outline (SL) Narrow, 3.90 mm Body [SOIC] on page 141.
  - Drawing 102C, 16-Lead Plastic Small Outline (SO) Wide, 7.50 mm Body [SOIC] on page 147.
  - Drawing 102C, 16-Lead Plastic Small Outline (OE) Wide, 7.50 mm Body [SOIC] on page 150.
  - Drawing 051C, 18-Lead Plastic Small Outline (SO) Wide, 7.50 mm Body [SOIC] on page 153.
  - Drawing 094C, 20-Lead Plastic Small Outline (SO) Wide, 7.50 mm Body [SOIC] on page 156.
  - Drawing 025C, 24-Lead Plastic Small Outline (SO) Wide, 7.50 mm Body [SOIC] on page 159.
  - Drawing 025C, 24-Lead Plastic Small Outline (OG) Wide, 7.50 mm Body [SOIC] on page 162.
  - Drawing 052C, 28-Lead Plastic Small Outline (SO) Wide, 7.50 mm Body [SOIC] on page 165.
  - Drawing 052C, 28-Lead Plastic Small Outline (OI) Wide, 7.50 mm Body [SOIC] on page 168.

The following drawings have been revised:

- Drawing 001C, 8-Lead Ceramic Dual In-Line w/Window (JA) .300" Body [CERDIP] on page 16.
- Drawing 027C, 8-Lead Ceramic Dual In-Line (JW) .300" Body [CERDIP] on page 17.
- Drawing 002C, 14-Lead Ceramic Dual In-Line (JD) .300" Body [CERDIP] on page 18.

- Drawing 2123B, 8-Lead Plastic Dual Flat, No Lead Package (MC) 2x3x0.9 mm Body Footprint [DFN] on page 178.
- Drawing 2062B, 8-Lead Plastic Dual Flat, No Lead Package (MF) 3x3x0.9 mm Body Footprint [DFN] on page 181.
- Drawing 063C, 10-Lead Plastic Dual Flat, No Lead Package (MF) 3x3x0.9 mm Body [DFN] on page 197.
- Drawing 140B, 28-Lead Plastic Quad Flat, No Lead Package (MQ) 5x5x0.9 mm Body [QFN] on page 213.
- Drawing 149C, 64-Lead Plastic Quad Flat No Lead Package (MR) 9x9x0.9 mm Body w/7.15x7.15 exposed pad [QFN] on page 225-226.
- Drawing 2156B, 40-Lead Plastic Ultra Thin Quad Flat No Lead Package (MV) 5x5 mm Body Footprint [UQFN] on page 234.
- Drawing 2044B, 144-Lead Plastic Low Profile Quad Flatpack (PL) 20x20x1.40 mm Body, 2.0 mm Footprint [LQFP] on page 277.
- Drawing 2071B, 44-Lead Plastic Metric Quad Flatpack (KW) 10x10x2 mm Body, 3.20 mm Footprint [MQFP] on page 281.
- Drawing 2071B, 44-Lead Plastic Metric Quad Flatpack (PQ) 10x10x2 mm Body, 3.20 mm Footprint [MQFP] on page 283.
- Drawing 2022B, 64-Lead Plastic Metric Quad Flatpack (BU) 14x14x2.7 mm Body, 3.20 mm Footprint [MQFP] on page 285.
- Drawing 2074B, 32-Lead Plastic Thin Quad Flatpack (PT) 7x7x1.0 mm Body, 2.00 mm Footprint [TQFP] on page 289.
- Drawing 2076B, 44-Lead Plastic Thin Quad Flatpack (PT) 10x10x1 mm Body, 2.00 mm Footprint [TQFP] on page 291.
- Drawing 2085B, 64-Lead Plastic Thin Quad Flatpack (PT) 10x10x1 mm Body, 2.00 mm Footprint [TQFP] on page 293.
- Drawing 2116C, 80-Lead Plastic Thin Quad Flatpack (PF) 14x14x1 mm Body, 2.00 mm Footprint [TQFP] on page 297.
- Drawing 2092B, 80-Lead Plastic Thin Quad Flatpack (PT) 12x12x1 mm Body, 2.00 mm Footprint [TQFP] on page 299.
- Drawing 2110B, 100-Lead Plastic Thin Quad Flatpack (PF) 14x14x1 mm Body, 2.00 mm Footprint [TQFP] on page 301.
- Drawing 2100B, 100-Lead Plastic Thin Quad Flatpack (PT) 12x12x1 mm Body, 2.00 mm Footprint [TQFP] on page 303.
- Drawing 155B, 144-Lead Plastic Thin Quad Flatpack (PH) 16x16x1 mm Body, 2.00 mm [TQFP] on page 304.

- Drawing 155B, 144-Lead Plastic Thin Quad Flatpack (sheet 2) (PH) 16x16x1 mm Body, 2.00 mm [TQFP] on page 305.
- Drawing 2155B, 144-Lead Plastic Thin Quad Flatpack (PH) 16x16x1 mm Body, 2.00 mm Footprint [TQFP] on page 306.

## Revision BH (November 2011)

The following drawings are new:

- Drawing 121A, 8-Lead Thermally Enhanced Plastic Outline Body (SE) Narrow 3.90 Body on pages 130-131.
- Drawing 2121A, 8-Lead Thermally Enhanced Plastic Outline Body (SE) Narrow 3.90 Body Footprint on page 132.
- Drawing 194A, 10-Lead Plastic Ultra Thin Dual Flat No Lead (NA[Y]) 3x3x05 mm Body [UDFN] on pages 342-343.
- Drawing 2148D, 121-Lead Plastic Thin Profile Ball Grid Array (BG) 10x10x1.10 mm Body Footprint [TFBGA] on page 344.

The following drawings have been revised:

- Drawing 111C, 8-Lead Plastic Micro Small Outline Package (MS) [MSOP] on pages 254-255.
- Drawing 111C, 8-Lead Plastic Micro Small Outline Package (UA) [MSOP] on pages 257-258.
- Drawing 021C, 10-Lead Plastic Micro Small Outline Package (MS) [MSOP] on pages 260-261.
- Drawing 021C, 10-Lead Plastic Micro Small Outline Package (UN) [MSOP] on pages 263-264.
- Drawing 148D, 121-Lead Plastic Thin Profile Ball Grid Array (BG) 10x10x1.10 mm Body [TFBGA] on pages 342-343.
- Drawing 2148D, 121-Lead Plastic Thin Profile Ball Grid Array (BG) 10x10x1.10 mm Body Footprint [TFBGA] on page 344.

## Revision BJ (December 2011)

The following drawings are new:

- Drawing 188A, 8-Lead High Power Dual Flat, No Lead Package (MF) 5x6x1.0 mm Body [PDFN] on pages 200-201.
- Drawing 197A, 16-Lead Plastic Quad Flat, No Lead Package (NG) 3x3x0.9 mm Body [QFN] on pages 216-217.
- Drawing 2197A, 16-Lead Plastic Quad Flat, No Lead Package (NG) 3x3x0.9 mm Body Footprint [QFN] on page 220.

The following drawing has been revised:

- Drawing 120C, 6-Lead Plastic Dual Flat, No Lead Package (MA[Y]) 2x2x0.9 mm Body [DFN] on pages 180-181.

# Packaging

---

## Revision BK (June 2012)

The following drawings are new:

- Drawing 141A, 6-Lead Plastic Thin Small Outline Transistor (OS) [TSOT] on pages 78-79.
- Drawing 2188B, 8-Lead Plastic Dual Flat No Lead Package (MF) 5x6x1.0 mm Body Footprint [PDFN] on page 204
- Drawing 195A, 8-Lead Plastic Dual Flat No Lead Package (LC) 3.3x3.3x1.0 mm Body [PDFN] on pages 205-206.
- Drawing 2195A, 8-Lead Plastic Dual Flat No Lead Package (LC) 3.3x3.3x1.0 mm Body Footprint [PDFN] on page 207.
- Drawing 078A, 6-Lead Plastic Dual Flat, No Lead Package (MYY) 2x2x0.8 mm Body [TDFN] on pages 212-213.
- Drawing 198A, 8-Lead Plastic Dual Flat No Lead Package (LZ) 2x2x0.9 mm Body [VDFN] on pages 226-227.
- Drawing 2198A, 8-Lead Plastic Dual Flat No Lead Package (LZ) 2x2x0.9 mm Body Footprint [VDFN] on page 228.
- Drawing 2153A, 48-Lead Plastic Ultra Thin Quad Flat No Lead Package (MV) 6x6x0.5 mm Body Footprint [UQFN] on page 273.
- Drawing 058A, 128-Lead Plastic Low Profile Quad Flatpack (PT) 14x14x1.4 mm Body [LQFP] on pages 317-318.
- Drawing 133A, 256-Lead Plastic Metric Quad Flatpack (PQ) 28x28x3.40 mm Body [MQFP] on pages 330-331.
- Drawing 193A, 124-Terminal Very Thin Leadless Array (TL) 9x9x0.9 mm Body [VTLA] on pages 378-379.

The following drawings have been revised:

- Drawing 188B, 8-Lead Plastic Dual Flat No Lead Package (MF) 5x6x1.0 mm Body [PDFN] on pages 202-203.
- Drawing 105C, 28-Lead Plastic Quad Flat, No Lead Package (ML) 6x6 mm Body [QFN] on pages 249-250.
- Drawing 124C, 28-Lead Plastic Quad Flat, No Lead Package (MM) 6x6x0.9 mm Body [QFN-S] on pages 252-253.
- Drawing 184B, 20-Terminal Very, Very Thin Thermal Leadless Array (TL) 3x3x0.7 mm Body [WTLA] on pages 372-373.
- Drawing 187C, 36-Terminal Very Thin Thermal Leadless Array (TL) 5x5x0.9 mm Body [VTLA] on pages 374-375.
- Drawing 157C, 44-Terminal Very Thin Thermal Leadless Array (TL) 6x6x0.9 mm Body [VTLA] on pages 376-377.

## Revision BL (September 2012)

The following drawings are new:

- Drawing 061B, 5-Lead Plastic Small Outline Transistor (LTY) [SC70] on page 46.
- Drawing 2061B, 5-Lead Plastic Small Outline Transistor (LTY) Footprint [SC70] on page 47.
- Drawing 103C, 44-Lead Plastic Quad Flat, No Lead Package (ML) 8x8 mm Body [QFN], sheet 2 was added on page 265.
- Drawing 2152A, 28-Lead Plastic Ultra Thin Quad Flat No Lead Package (MV) 4x4x0.5 mm Body Footprint [UQFN] on page 276.
- Drawing 209A, 28-Lead Plastic Quad Flat No Lead Package (MV) 6x6x0.5 mm Body Footprint [UQFN] on pages 277 and 278.
- Drawing 2209A, 28-Lead Plastic Quad Flat No Lead Package (MV) 6x6x0.5 mm Body Footprint [UQFN] on pages 279.
- Drawing 6014B, 32-Lead Chip Scale Package (CS) [CSP] on pages 378 and 379.

The following drawings have been revised:

- Drawing 103C, 44-Lead Plastic Quad Flat, No Lead Package (ML) 8x8 mm Body [QFN], sheet 1 on page 264.
- Drawing 2103C, 44-Lead Plastic Quad Flat, No Lead Package (ML) 8x8 mm Body Footprint [QFN] on page 266.

## APPENDIX B: CONTROL DIMENSIONS

Microchip inspects the first lot of every new package. Thereafter, one lot of each package, from each assembly site, shall be inspected yearly.

The following dimensions shall be inspected on all types of packages:

- Package Length
- Package Width
- Package Height
- Lead or Contact Width
- Lead or Contact Pitch

The following packages contain dimensions that shall be added to the inspection described above.

### B.1 On Surface Mount Devices (SMD)

- § Lead Coplanarity<sup>1</sup>
- § Standoff\*
- Molded Package Length (if different from overall package length)
- Side Flash
- Foot Angle

### B.2 Through-Hole

- § Lead Span\*

### B.3 Surface Mount Devices And Through-Hole

- Molded Package Width
- Molded Package Thickness

### B.4 DFN and QFN Only

- Contact Length
- Contact to Exposed Pad
- Exposed Pad Length
- Exposed Pad Width

---

<sup>1</sup> The § symbol denotes a significant characteristic specified in the control plan.

# Packaging

---

---

## NOTES:



# MICROCHIP

## Overview of Microchip Die/Wafer Support

### INTRODUCTION

In addition to packaged devices, Microchip Technology Inc. devices are available in wafer and die form. All products sold in die or wafers have been characterized and qualified according to the requirements of Microchip Technology Inc. Specifications SPI-41014, "Characterization and Qualification of Integrated Circuits" and QCI-39000, "Worldwide Quality Conformance Requirements".

### PRODUCT INTEGRITY

Product supplied in die or wafer form is fully tested and characterized. Die and wafers are inspected to Microchip Technology Inc. Specification, QCI-30014.

#### CAUTION

Some EEPROM devices use EEPROM cells for device configuration. Exposure to ultraviolet light must be avoided. Exposure to ultraviolet light may cause the device to operate improperly.

Extreme care is urged in the handling and assembly of these products since they are susceptible to damage from electro-static discharge.

### PACKAGING OPTIONS

Die/wafer products are available as individual Die in Waffle Pack, Whole Wafers or as Sawn Wafer on Frame. As a standard, all die on a wafer are tested and Ink Dots are used to indicate the bad die on a wafer. Inkless wafers with electronic wafer maps are also available upon request. To acquire individual electronic wafer maps, customers can request a password-protected account on a Microchip FTP site where their wafer maps are stored and easily downloaded.

Various wafer thicknesses are available, which include 8, 11, 15 and 29 mils for unground wafers. Standard wafer thickness varies from product to product, so contact your Microchip Sales Office for details.

### ORDERING INFORMATION

Die sales must be initiated by contacting your Microchip Sales Office. To order or to obtain information (on pricing or delivery) for a specific device, use one of the following part numbers.

#### Standard Thickness Die/Wafer

DEVICE_NUMBER/S	Die in Waffle Pack
DEVICE_NUMBER/W	Whole Wafers
DEVICE_NUMBER/WF	Sawn Wafer on Frame

#### EEPROM Examples

24LC01B-I/S
24LC01B-I/W
24LC01B-I/WF

#### No Backgrind Wafers

DEVICE_NUMBER/WN BG	Whole Wafers with Ink	24LC01B-I/WN BG
DEVICE_NUMBER/WN BI	Whole Wafers without Ink	24LC01B-I/WN BI

#### Standard Die/Wafers with Manufacturing Process Included in Part Number

DEVICE_NUMBER/SXXX	Die in Waffle Pack	24LC01B-I/S15K
DEVICE_NUMBER/WXXX	Whole Wafers	24LC01B-I/W15K
DEVICE_NUMBER/WFXXX	Sawn Wafer on Frame	24LC01B-I/WF15K

DEVICE\_NUMBER is the base part number of the device that you require, the S specifies Die in Waffle Pack, a W specifies a Whole Wafer and WF specifies Sawn Wafer on Frame. Whole wafers specified as NBG are shipped as inked wafers with no backgrind (29 mils) and those specified as NBI are shipped with no backgrind and without Ink.

As further clarification, the manufacturing process is sometimes indicated with a three digit suffix added at the end of the part number. For example, a wafer from the 160K process will use the suffix 16K, one from the 150K process will use 15K and one from the 121K process will use 12K.

# Overview of Microchip Die/Wafer Support

## ELECTRICAL SPECIFICATIONS

The functional and electrical specifications of Microchip devices in die form are identical to those of a packaged version. Please refer to individual data sheets for complete details.

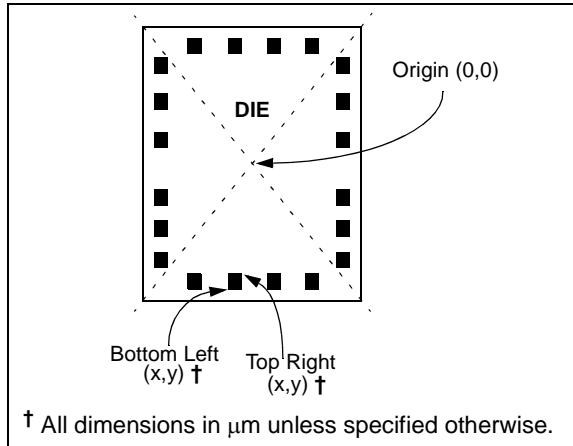
## DIE MECHANICAL SPECIFICATIONS

Refer to the individual data sheet for these specifications.

## BOND PAD COORDINATES

The die figures have associated bond pad coordinates. These coordinates assist in the attaching of the bond wire to the die. All the dimensions of these coordinates are in micrometers ( $\mu\text{m}$ ) unless otherwise specified. The origin for the coordinates is the center of the die, as shown in Figure 1. Refer to the specific die data sheet for each device for openings and pitch.

**FIGURE 1: DIE COORDINATE ORIGIN**



The die is capable of thermosonic gold or ultrasonic wire bonding. Die meet the minimum conditions of MIL-STD 883, Method 2011 on "Bond Strength (Destructive Bond Pull Test)". The Bond Pad metallization is silicon doped aluminum.

## SUBSTRATE BONDING

Substrate bonding may be required on certain product families. For more information, refer to the specific die data sheet for that product.

## SHIPPING OPTIONS

### Die Form (/S)

Microchip product in die form can be shipped in waffle pack. The waffle pack has sufficient cavity area to restrain the die, while maintaining their orientation. Lint free paper inserts are placed over the waffle packs, and each pack is secured with a plastic locking clip. Groups of waffle packs are assembled into sets for shipment. A label with lot number, quantity and part number is attached.

These waffle packs are hermetically sealed in bags.

### Wafer Form (/W)

Products may also be shipped in wafer form (see ordering information). Wafers are uncut and shipped in a wafer tub. The tub is padded with non-conductive foam. Lint free paper inserts are placed around each wafer. A label with lot number, quantity and part number is attached.

### Sawn Wafer on Frames (/WF)

Products may also be shipped on wafer frames. Wafers are mounted on plastic frames and 100% sawn through. Sawn wafer on frames may be shipped in bulk (25 wafers per carrier) or as a single wafer in a carrier. A label with lot number, quantity and part number is attached with each shipment.

### Storage Procedures

Temperature and humidity greatly affect the storage life of die. It is recommended that the die be used as soon as possible after receipt.

Upon receipt, the sealed bags should be stored in a cool and dry environment (25°C and 25% relative humidity). In these conditions, sealed bags have a shelf life of 12 months. Temperatures or humidities greater than these will reduce the storage life.

Once a bag containing waffle packs has been opened, the devices should be assembled and encapsulated within 48 hours (assuming 25°C and 25% humidity).

# **Overview of Microchip Die/Wafer Support**

---

---

**NOTES:**



**MICROCHIP**

## Worldwide Sales and Service

### AMERICAS

**Corporate Office**  
2355 West Chandler Blvd.  
Chandler, AZ 85224-6199  
Tel: 480-792-7200  
Fax: 480-792-7277  
Technical Support:  
<http://www.microchip.com/support>  
Web Address:  
[www.microchip.com](http://www.microchip.com)

**Atlanta**

Duluth, GA  
Tel: 678-957-9614  
Fax: 678-957-1455

**Boston**

Westborough, MA  
Tel: 774-760-0087  
Fax: 774-760-0088

**Chicago**

Itasca, IL  
Tel: 630-285-0071  
Fax: 630-285-0075

**Cleveland**

Independence, OH  
Tel: 216-447-0464  
Fax: 216-447-0643

**Dallas**

Addison, TX  
Tel: 972-818-7423  
Fax: 972-818-2924

**Detroit**

Farmington Hills, MI  
Tel: 248-538-2250  
Fax: 248-538-2260

**Indianapolis**

Noblesville, IN  
Tel: 317-773-8323  
Fax: 317-773-5453

**Los Angeles**

Mission Viejo, CA  
Tel: 949-462-9523  
Fax: 949-462-9608

**Santa Clara**

Santa Clara, CA  
Tel: 408-961-6444  
Fax: 408-961-6445

**Toronto**

Mississauga, Ontario,  
Canada  
Tel: 905-673-0699  
Fax: 905-673-6509

### ASIA/PACIFIC

**Asia Pacific Office**  
Suites 3707-14, 37th Floor  
Tower 6, The Gateway  
Harbour City, Kowloon  
Hong Kong  
Tel: 852-2401-1200  
Fax: 852-2401-3431

**Australia - Sydney**

Tel: 61-2-9868-6733

Fax: 61-2-9868-6755

**China - Beijing**  
Tel: 86-10-8569-7000  
Fax: 86-10-8528-2104

**China - Chengdu**

Tel: 86-28-8665-5511  
Fax: 86-28-8665-7889

**China - Chongqing**  
Tel: 86-23-8980-9588  
Fax: 86-23-8980-9500

**China - Hangzhou**

Tel: 86-571-2819-3187  
Fax: 86-571-2819-3189

**China - Hong Kong SAR**  
Tel: 852-2401-1200  
Fax: 852-2401-3431

**China - Nanjing**  
Tel: 86-25-8473-2460  
Fax: 86-25-8473-2470

**China - Qingdao**  
Tel: 86-532-8502-7355  
Fax: 86-532-8502-7205

**China - Shanghai**  
Tel: 86-21-5407-5533  
Fax: 86-21-5407-5066

**China - Shenyang**  
Tel: 86-24-2334-2829  
Fax: 86-24-2334-2393

**China - Shenzhen**  
Tel: 86-755-8203-2660  
Fax: 86-755-8203-1760

**China - Wuhan**  
Tel: 86-27-5980-5300  
Fax: 86-27-5980-5118

**China - Xian**  
Tel: 86-29-8833-7252  
Fax: 86-29-8833-7256

**China - Xiamen**  
Tel: 86-592-2388138  
Fax: 86-592-2388130

**China - Zhuhai**  
Tel: 86-756-3210040  
Fax: 86-756-3210049

### ASIA/PACIFIC

**India - Bangalore**  
Tel: 91-80-3090-4444  
Fax: 91-80-3090-4123

**India - New Delhi**  
Tel: 91-11-4160-8631  
Fax: 91-11-4160-8632

**India - Pune**  
Tel: 91-20-2566-1512  
Fax: 91-20-2566-1513

**Japan - Osaka**  
Tel: 81-66-152-7160  
Fax: 81-66-152-9310

**Japan - Yokohama**  
Tel: 81-45-471-6166  
Fax: 81-45-471-6122

**Korea - Daegu**  
Tel: 82-53-744-4301  
Fax: 82-53-744-4302

**Korea - Seoul**  
Tel: 82-2-554-7200  
Fax: 82-2-558-5932 or  
82-2-558-5934

**Malaysia - Kuala Lumpur**  
Tel: 60-3-6201-9857  
Fax: 60-3-6201-9859

**Malaysia - Penang**  
Tel: 60-4-227-8870  
Fax: 60-4-227-4068

**Philippines - Manila**  
Tel: 63-2-634-9065  
Fax: 63-2-634-9069

**Singapore**  
Tel: 65-6334-8870  
Fax: 65-6334-8850

**Taiwan - Hsin Chu**  
Tel: 886-3-5778-366  
Fax: 886-3-5770-955

**Taiwan - Kaohsiung**  
Tel: 886-7-536-4818  
Fax: 886-7-330-9305

**Taiwan - Taipei**  
Tel: 886-2-2500-6610  
Fax: 886-2-2508-0102

**Thailand - Bangkok**  
Tel: 66-2-694-1351  
Fax: 66-2-694-1350

### EUROPE

**Austria - Wels**  
Tel: 43-7242-2244-39  
Fax: 43-7242-2244-393

**Denmark - Copenhagen**  
Tel: 45-4450-2828  
Fax: 45-4485-2829

**France - Paris**  
Tel: 33-1-69-53-63-20  
Fax: 33-1-69-30-90-79

**Germany - Munich**  
Tel: 49-89-627-144-0  
Fax: 49-89-627-144-44

**Italy - Milan**  
Tel: 39-0331-742611  
Fax: 39-0331-466781

**Netherlands - Drunen**  
Tel: 31-416-690399  
Fax: 31-416-690340

**Spain - Madrid**  
Tel: 34-91-708-08-90  
Fax: 34-91-708-08-91

**UK - Wokingham**  
Tel: 44-118-921-5869  
Fax: 44-118-921-5820