

---

Serial Flash PCB Layout Guidelines

---

## Introduction

This document provides information on Winbond's SpiFlash® NOR memory packages and suggested PCB land patterns.

## Content

The following sections contain detailed Package Outline Drawings with mechanical descriptions of Winbond's SpiFlash® packages and the related suggested PCB land patterns.

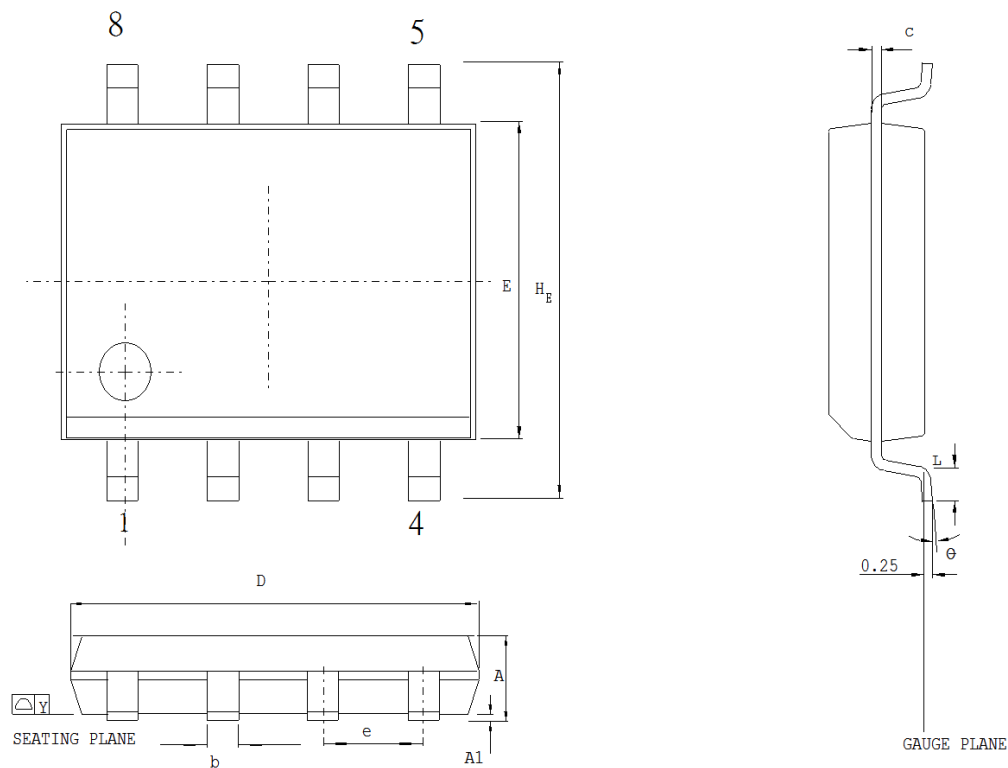
There are three main section SOP, SON and TFBGA.

- SOP Packages; SOP8 150 MIL, VSOP8 150 MIL, SOP8 208 MIL, VSOP8 208 MIL, and SOP16 300 MIL
- SON Packages; USON8 3x2mm, USON8 3x4mm, USON8 4x4mm, WSON8 6x5mm, and WSON8 8x6mm
- BGA Packages; TFBGA24 6x8mm 4x6 matrix and TFBGA24 6x8mm 5x5 matrix

Serial Flash PCB Layout Guidelines

**SOP Packages**

**SOP8 150 MIL**

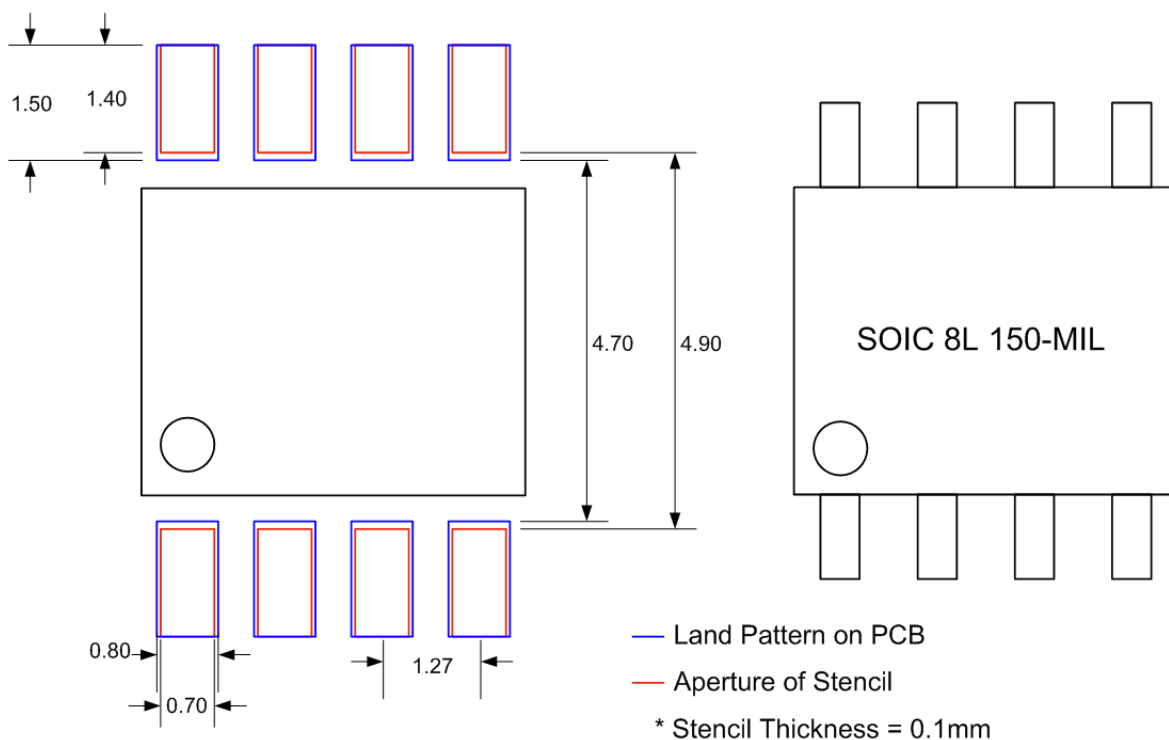


SYMBOL	DIMENSION IN MM		DIMENSION IN INCH	
	MIN.	MAX.	MIN.	MAX.
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
b	0.33	0.51	0.013	0.020
c	0.19	0.25	0.008	0.010
E	3.80	4.00	0.150	0.157
D	4.80	5.00	0.188	0.196
e	1.27 BSC		0.050 BSC	
$H_E$	5.80	6.20	0.228	0.244
Y	<b>—</b>	0.10	<b>—</b>	0.004
L	0.40	1.27	0.016	0.050
$\theta$	0	10	0	10

Serial Flash PCB Layout Guidelines

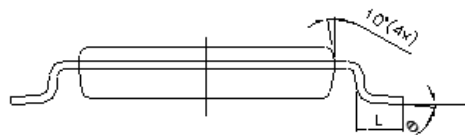
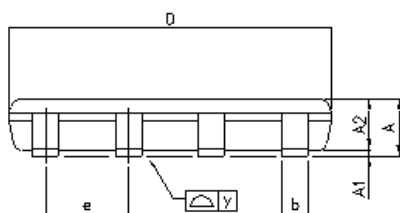
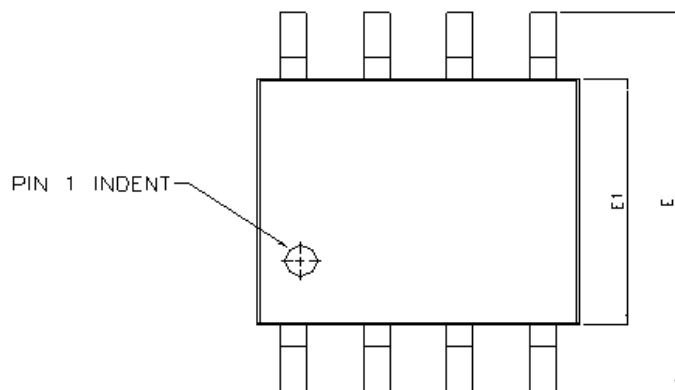
## 8L SOP 150-MIL Land Pattern

Unit of Measurement: mm



Serial Flash PCB Layout Guidelines

**VSOP8 150 MIL**

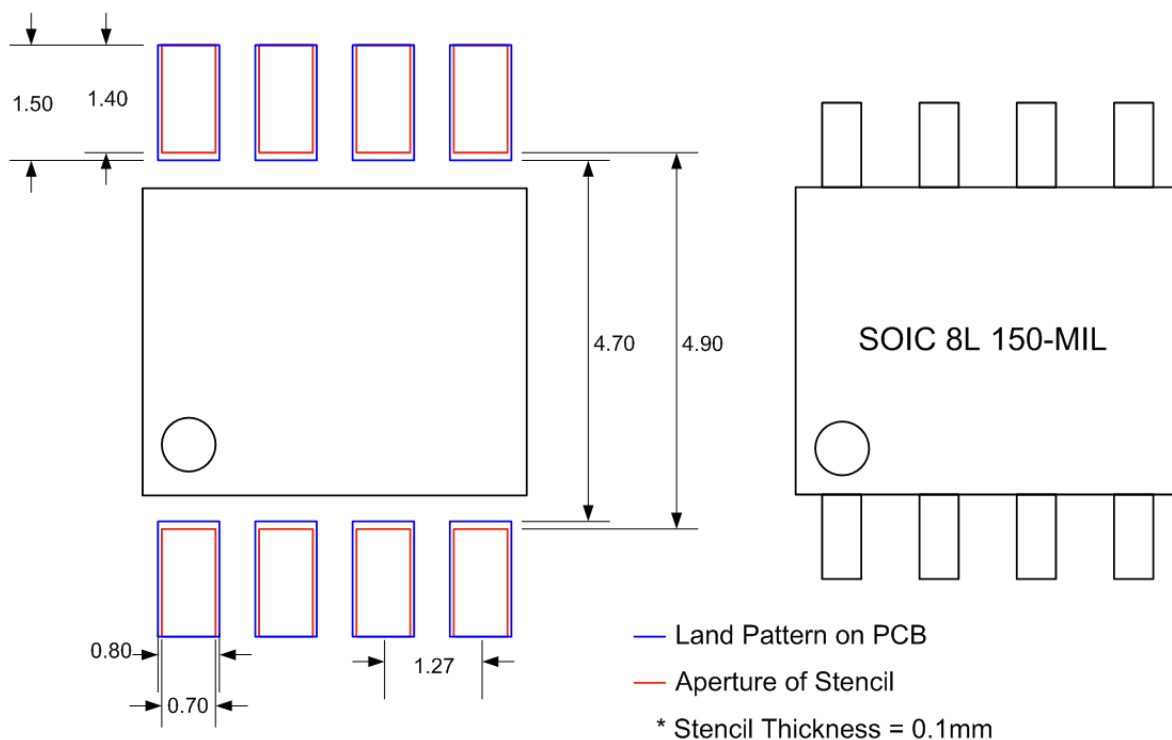


SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	0.75	0.85	0.90
A1	0.01	0.05	—
A2	—	0.80	—
b	0.33	—	0.51
c	0.125 BSC		
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27 BSC		
L	0.40	0.71	1.27
y	—	—	0.10
θ	0°	—	10°

Serial Flash PCB Layout Guidelines

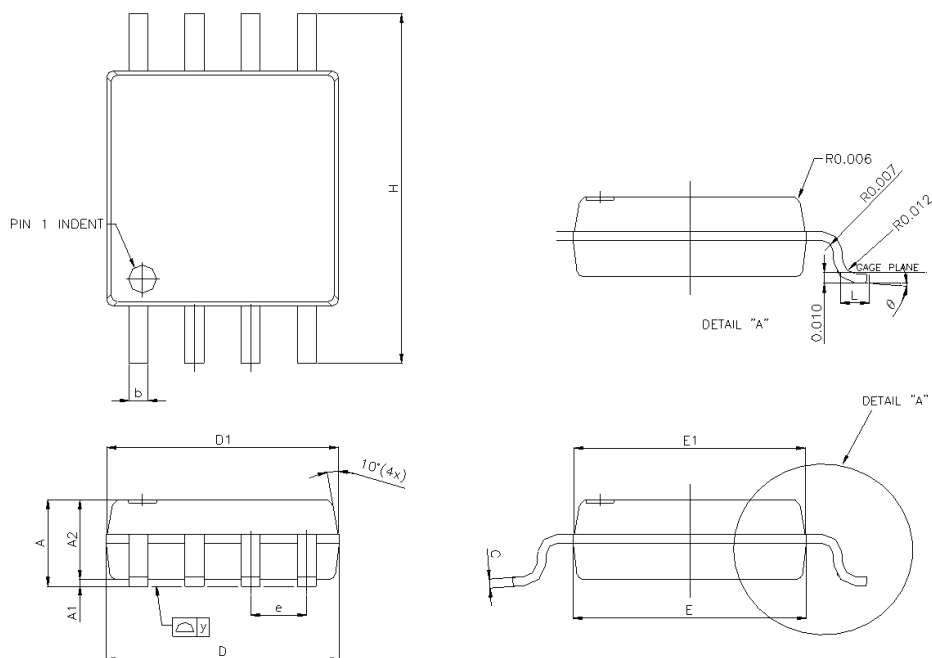
## 8L SOP 150-MIL Land Pattern

Unit of Measurement: mm



Serial Flash PCB Layout Guidelines

**SOP8 208 MIL**

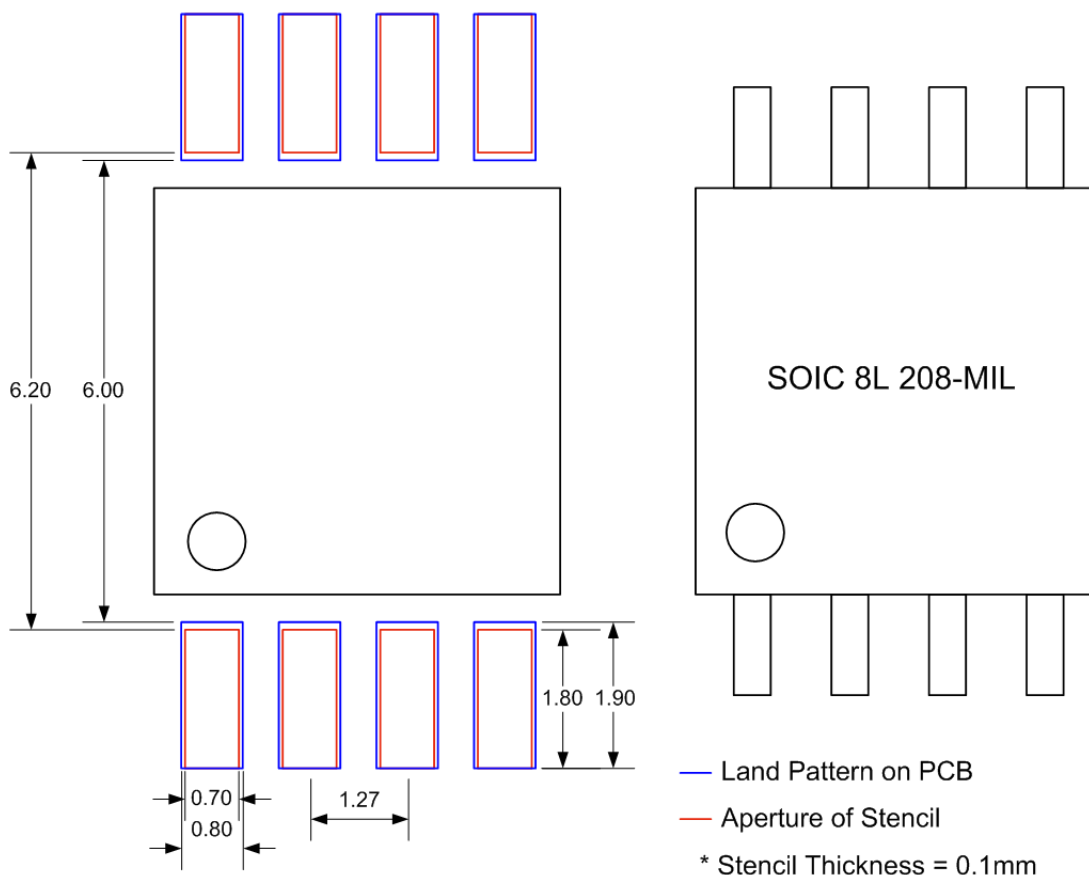


SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.75	1.95	2.16	0.069	0.077	0.085
A1	0.05	0.15	0.25	0.002	0.006	0.010
A2	1.70	1.80	1.91	0.067	0.071	0.075
b	0.35	0.42	0.48	0.014	0.017	0.019
C	0.19	0.20	0.25	0.007	0.008	0.010
D	5.18	5.28	5.38	0.204	0.208	0.212
D1	5.13	5.23	5.33	0.202	0.206	0.210
E	5.18	5.28	5.38	0.204	0.208	0.212
E1	5.13	5.23	5.33	0.202	0.206	0.210
e	—	1.27	—	—	0.050	—
H	7.70	7.90	8.10	0.303	0.311	0.319
L	0.50	0.65	0.80	0.020	0.026	0.031
y	—	—	0.10	—	—	0.004
$\theta$	0°	—	8°	0°	—	8°

Serial Flash PCB Layout Guidelines

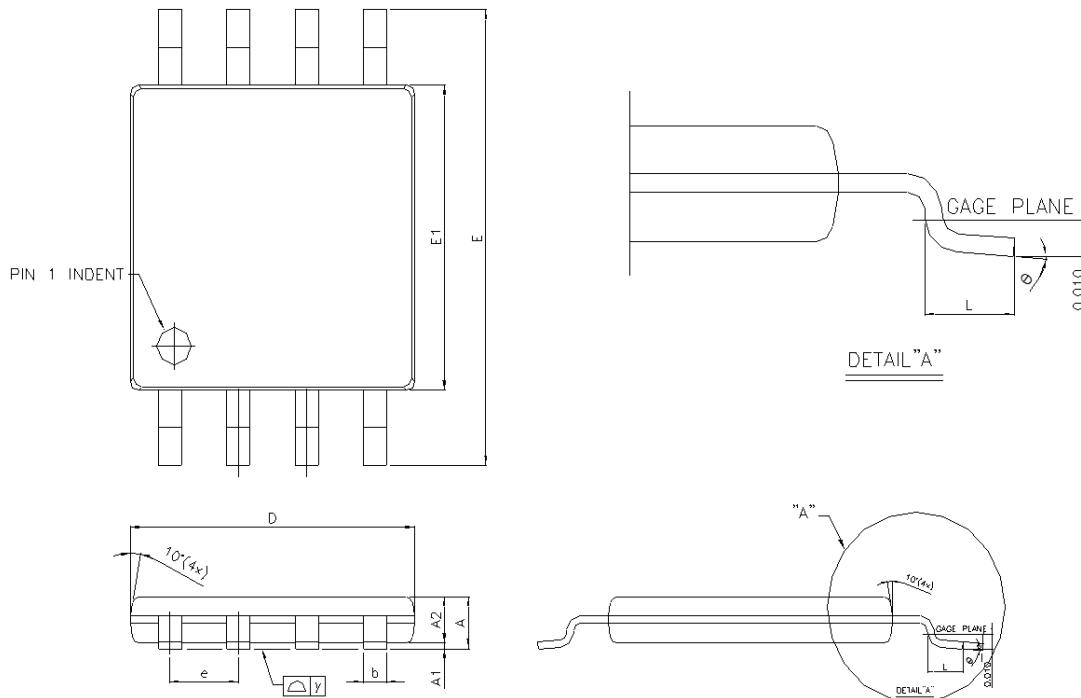
## 8L SOP 208-MIL Land Pattern

Unit of Measurement: mm



Serial Flash PCB Layout Guidelines

**VSOP8 208 MIL**



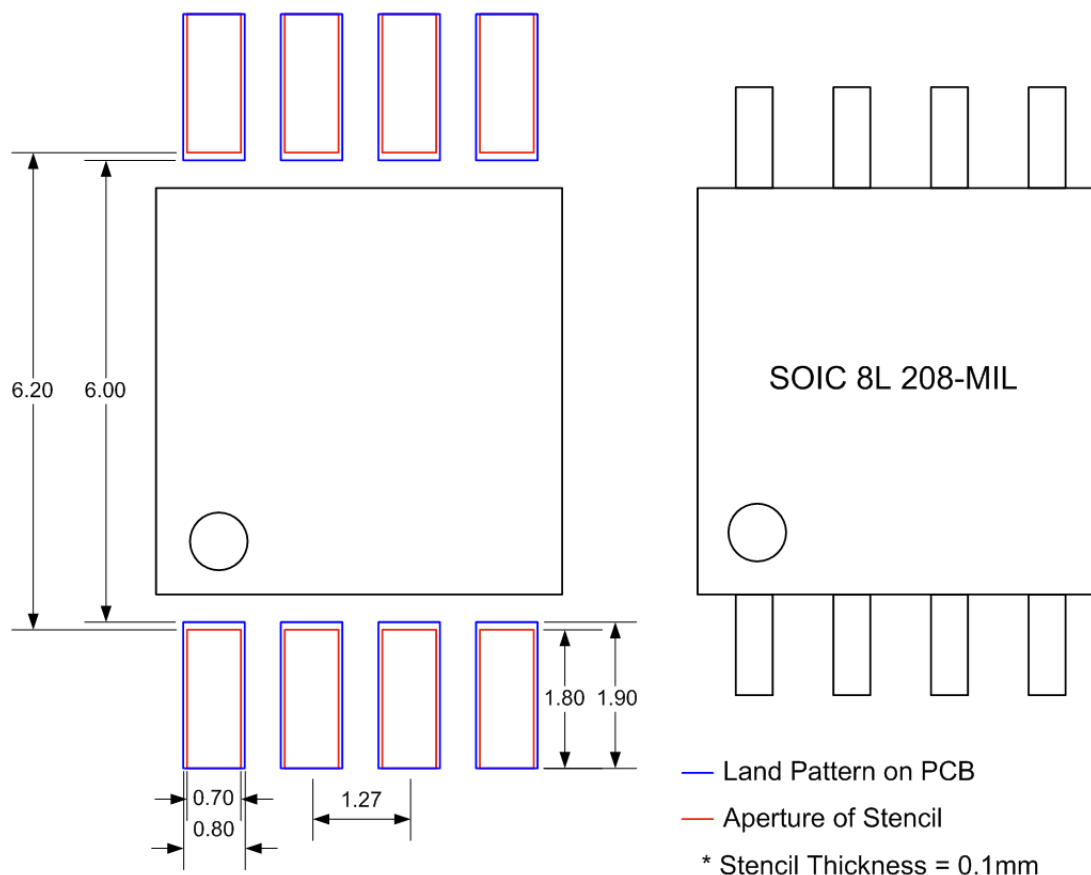
SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	—	—	1.00	—	—	0.039
A1	0.05	0.10	0.15	0.002	0.004	0.006
A2	0.75	0.80	0.85	0.030	0.031	0.033
b	0.35	0.42	0.48	0.014	0.017	0.019
c	0.127 REF.			0.005 REF.		
D	5.18	5.28	5.38	0.204	0.208	0.212
E	7.70	7.90	8.10	0.303	0.311	0.319
E1	5.18	5.28	5.38	0.204	0.208	0.212
e	—	1.27	—	—	0.050	—
L	0.50	0.65	0.80	0.020	0.026	0.031
y	—	—	0.10	—	—	0.004
θ	0°	—	8°	0°	—	8°



Serial Flash PCB Layout Guidelines

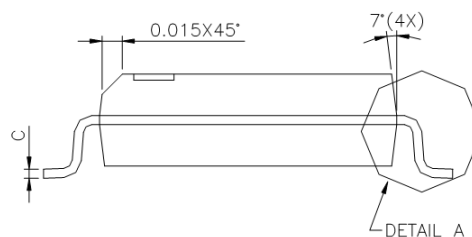
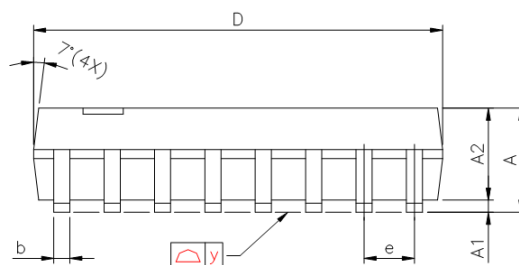
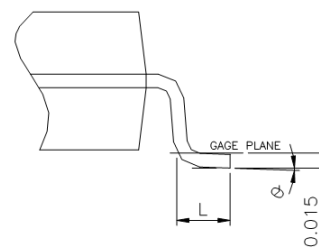
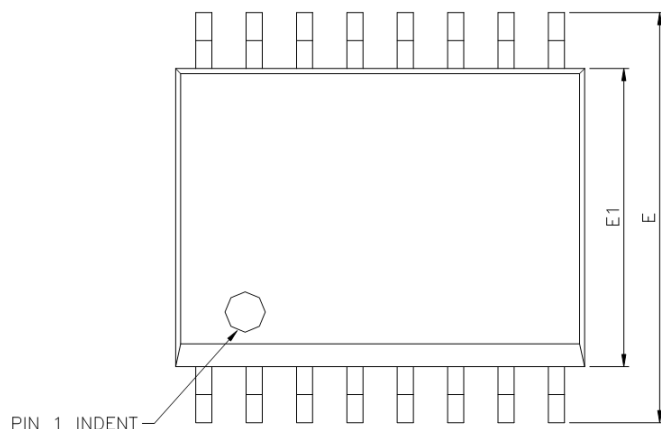
## 8L SOP 208-MIL Land Pattern

Unit of Measurement: mm



Serial Flash PCB Layout Guidelines

**SOP16 300 MIL**

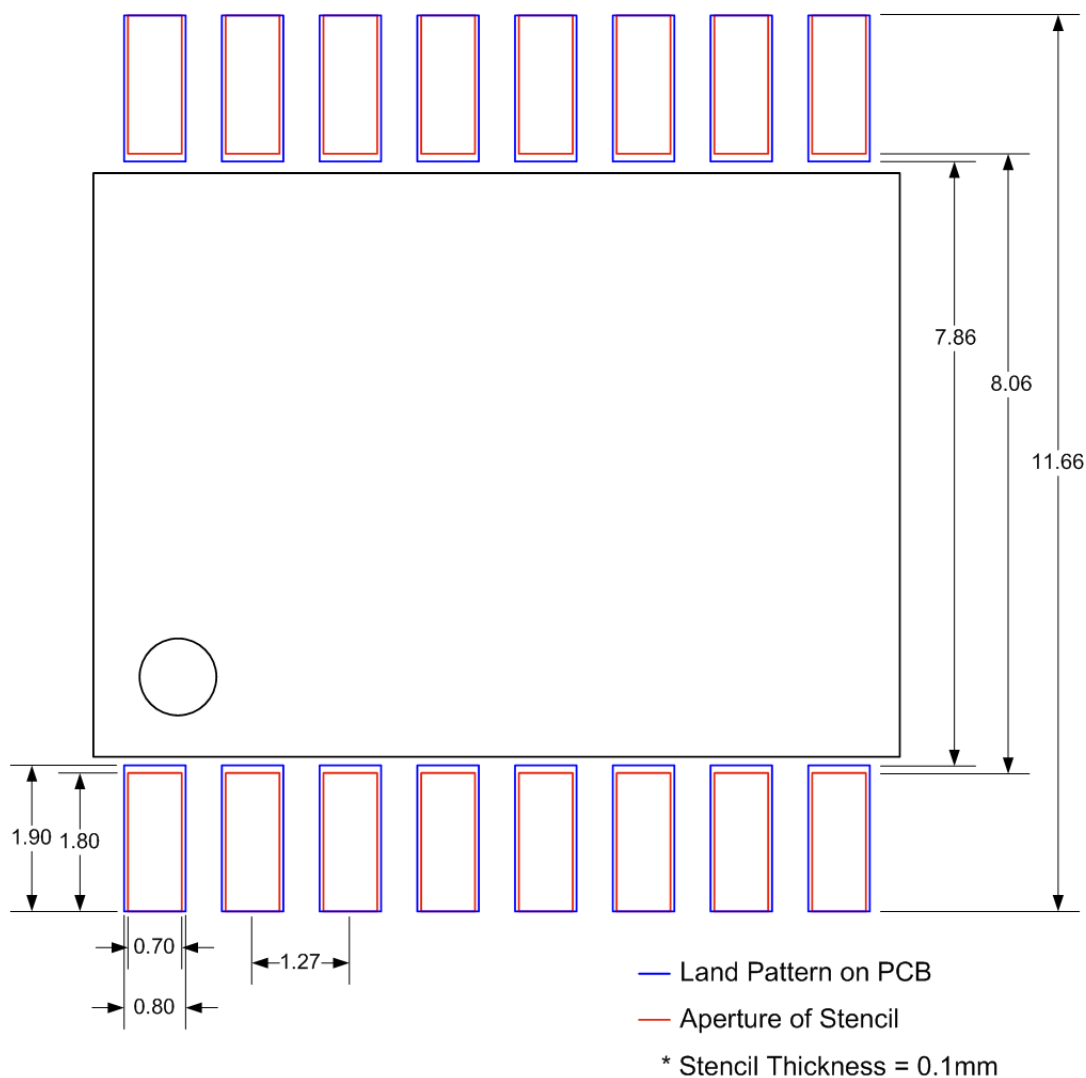


SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	2.36	2.49	2.64	0.093	0.098	0.104
A1	0.10	—	0.30	0.004	—	0.012
A2	—	2.31	—	—	0.091	—
b	0.33	0.41	0.51	0.013	0.016	0.020
C	0.18	0.23	0.28	0.007	0.009	0.011
D	10.08	10.31	10.49	0.397	0.406	0.413
E	10.01	10.31	10.64	0.394	0.406	0.419
E1	7.39	7.49	7.59	0.291	0.295	0.299
e	—	1.27	—	—	0.050	—
L	0.38	0.81	1.27	0.015	0.032	0.050
y	—	—	0.076	—	—	0.003
Ø	0°	—	8°	0°	—	8°

Serial Flash PCB Layout Guidelines

## 16L SOP 300-MIL Land Pattern

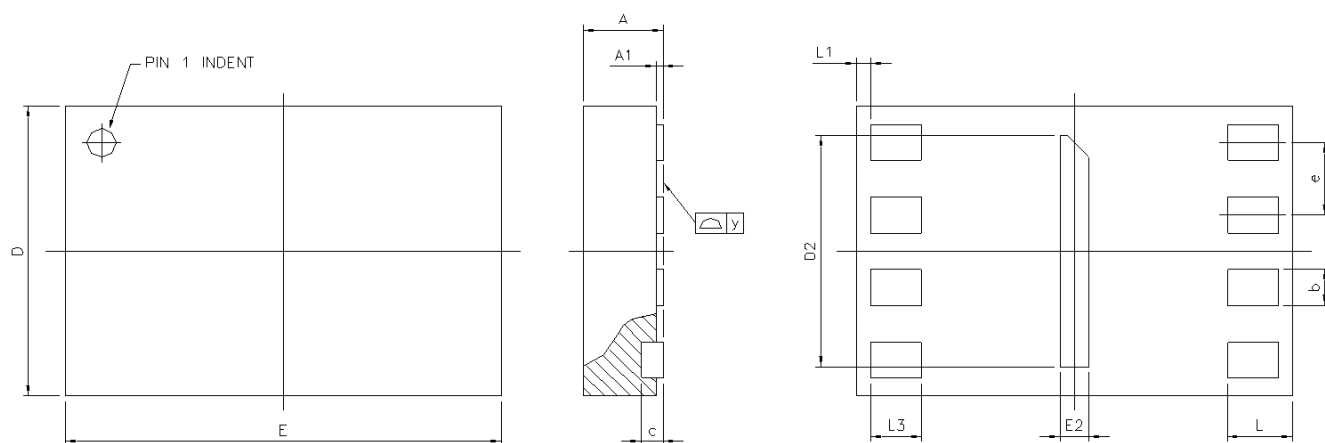
Unit of Measurement: mm



Serial Flash PCB Layout Guidelines

**SON Packages**

**USON8 3x2mm**



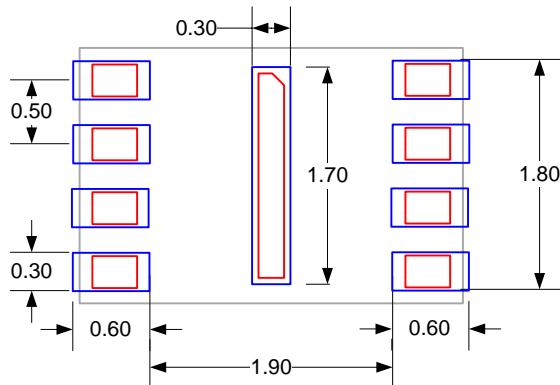
SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	0.50	0.55	0.60
A1	0.00	0.02	0.05
b	0.20	0.25	0.30
C	—	0.15 REF.	—
D	1.90	2.00	2.10
D2	1.55	1.60	1.65
E	2.90	3.00	3.10
E2	0.15	0.20	0.25
e	—	0.50	—
L	0.40	0.45	0.50
L1	—	0.10	—
L3	0.30	0.35	0.40
y	0.00	—	0.075

Serial Flash PCB Layout Guidelines

## USON8 3x2MM Land Pattern

Unit of Measurement: mm

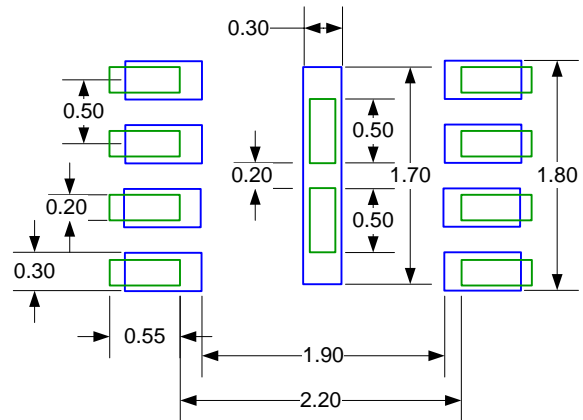
Resist opening in motherboard



Red color is the IC lead and exposed pads  
Blue color is the mother's pad

Tolerance:  $\pm 0.05\text{mm}$

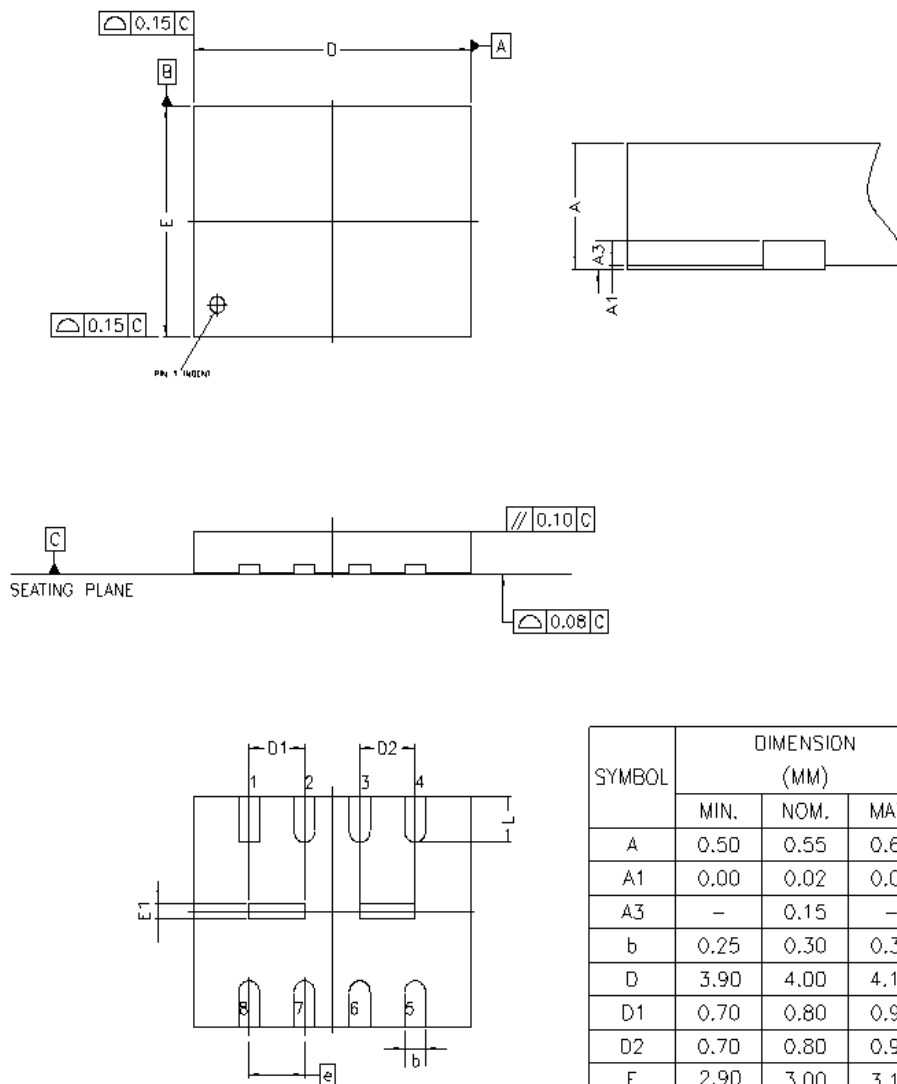
Pad dimension (XxY) and position in the metal mask



Green color is the stencil opening  
Blue color is the motherboard's pads

Serial Flash PCB Layout Guidelines

**USON8 3x4mm**



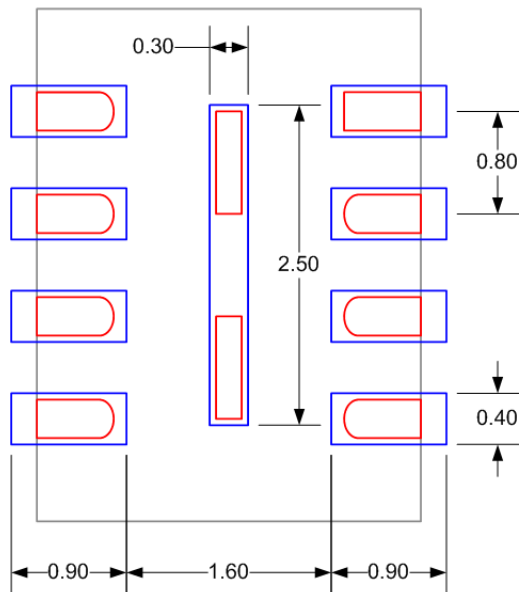
SYMBOL	DIMENSION (MM)			DIMENSION (MIL)		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.50	0.55	0.60	20	22	24
A1	0.00	0.02	0.05	0	1	2
A3	—	0.15	—	—	6	—
b	0.25	0.30	0.35	10	12	14
D	3.90	4.00	4.10	153	157	161
D1	0.70	0.80	0.90	27	31	35
D2	0.70	0.80	0.90	27	31	35
E	2.90	3.00	3.10	114	118	122
E1	0.10	0.20	0.30	4	8	12
e	0.80 BSC			31 BSC		
L	0.55	0.60	0.65	22	24	26

Serial Flash PCB Layout Guidelines

## USON8 4X3MM Land Pattern

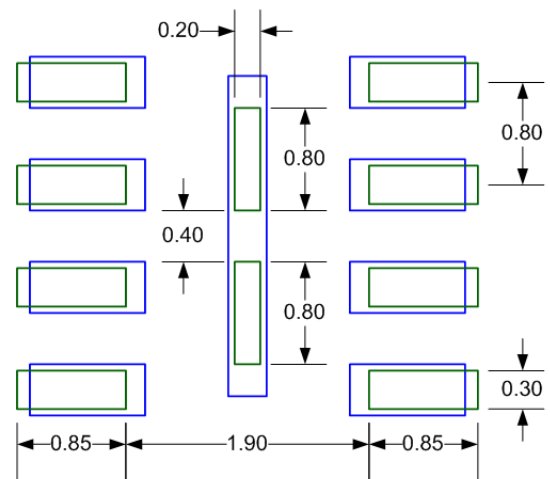
Unit of Measurement: mm

Resist opening in motherboard



Red color is the IC lead and exposed pads  
Blue color is the mother's pad

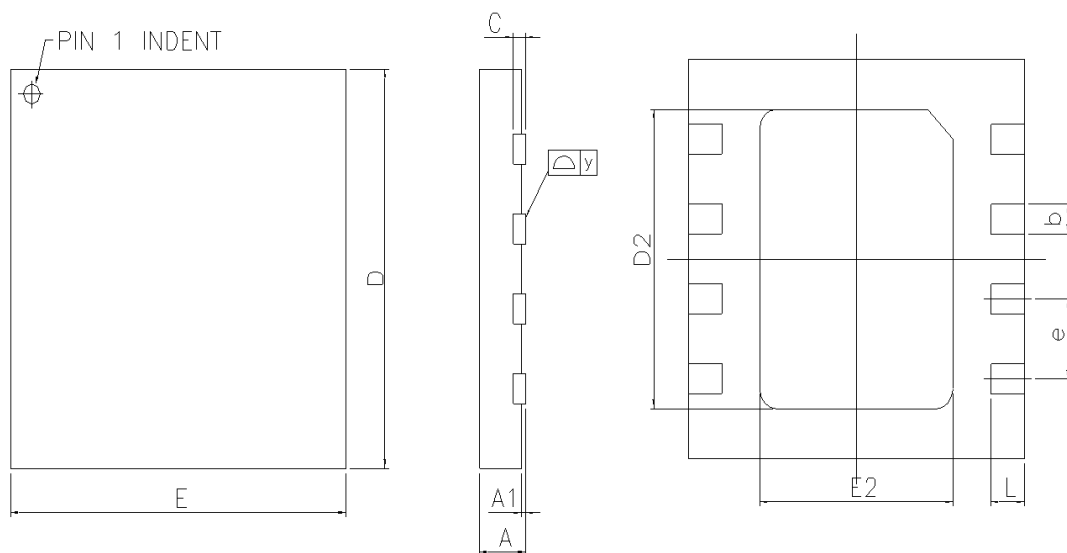
Pad dimension (XxY) and position in the metal mask



Green color is the stencil opening  
Blue color is the motherboard's pads

Serial Flash PCB Layout Guidelines

**USON8 4x4mm**



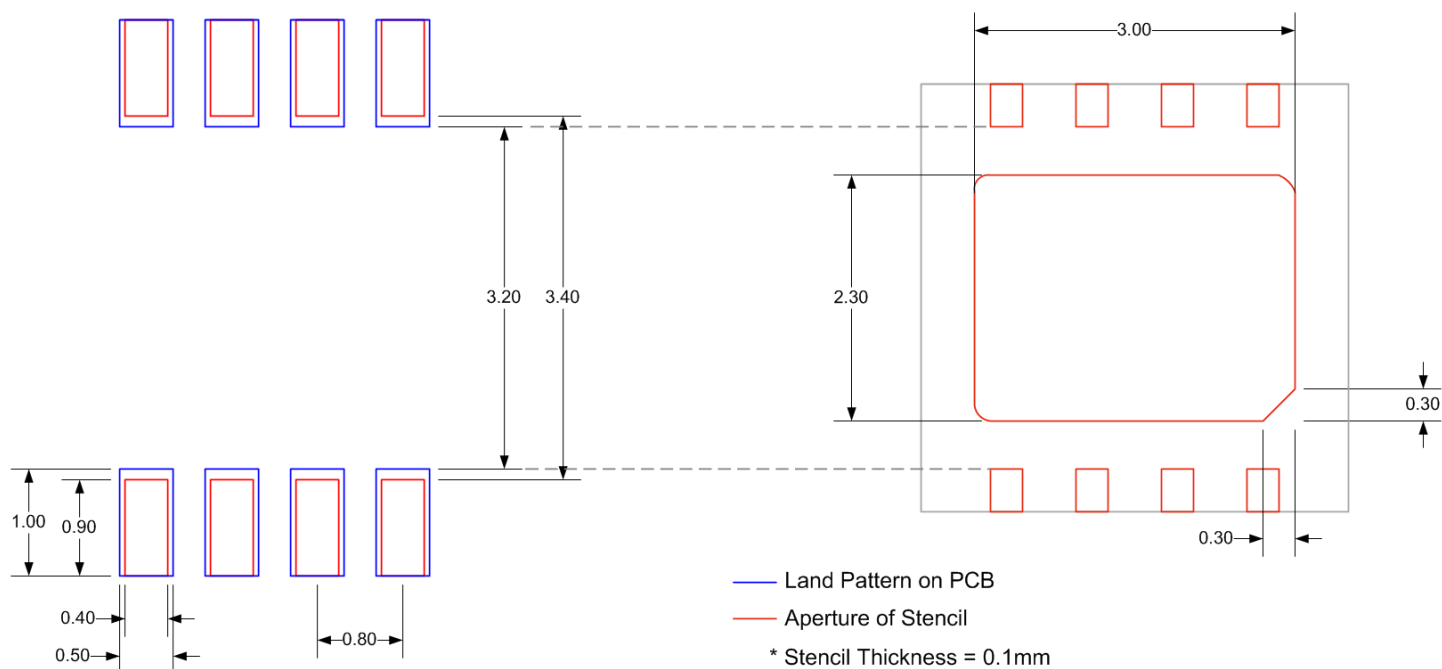
SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	0.50	0.55	0.60
A1	0.00	0.02	0.05
b	0.25	0.30	0.35
C	—	0.15 REF.	—
D	3.90	4.00	4.10
D2	2.95	3.00	3.05
E	3.90	4.00	4.10
E2	2.25	2.30	2.35
e	—	0.80	—
L	0.35	0.40	0.45
y	0.00	—	0.075



Serial Flash PCB Layout Guidelines

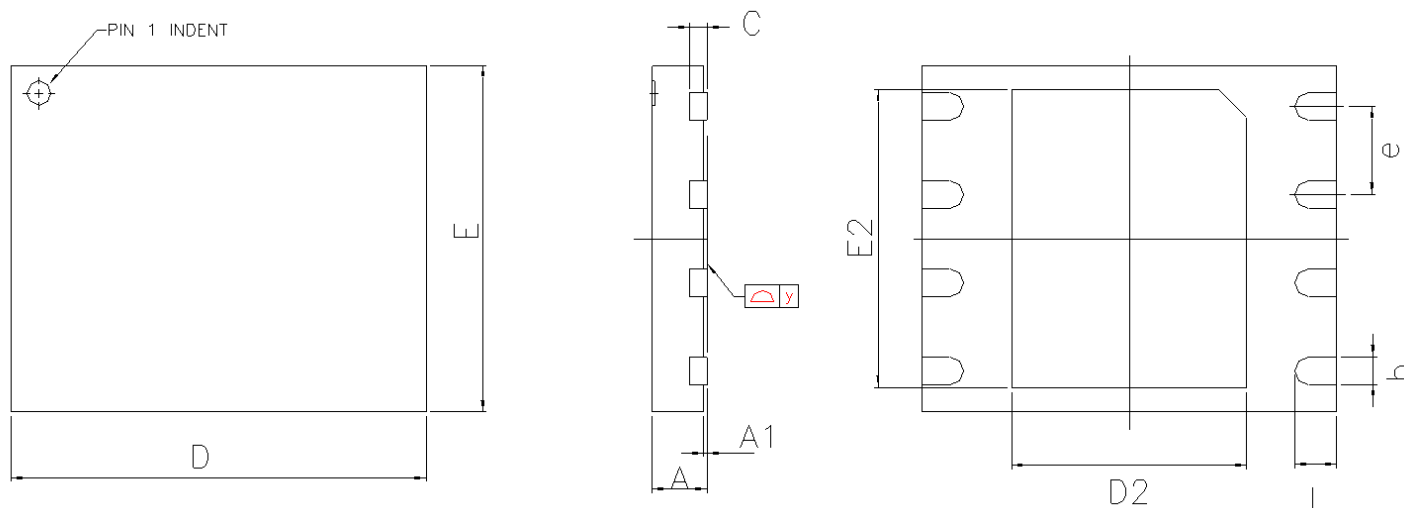
**USON8 4x4mm Land Pattern**

Unit of Measurement: mm



Serial Flash PCB Layout Guidelines

**WS0N8 6x5mm**

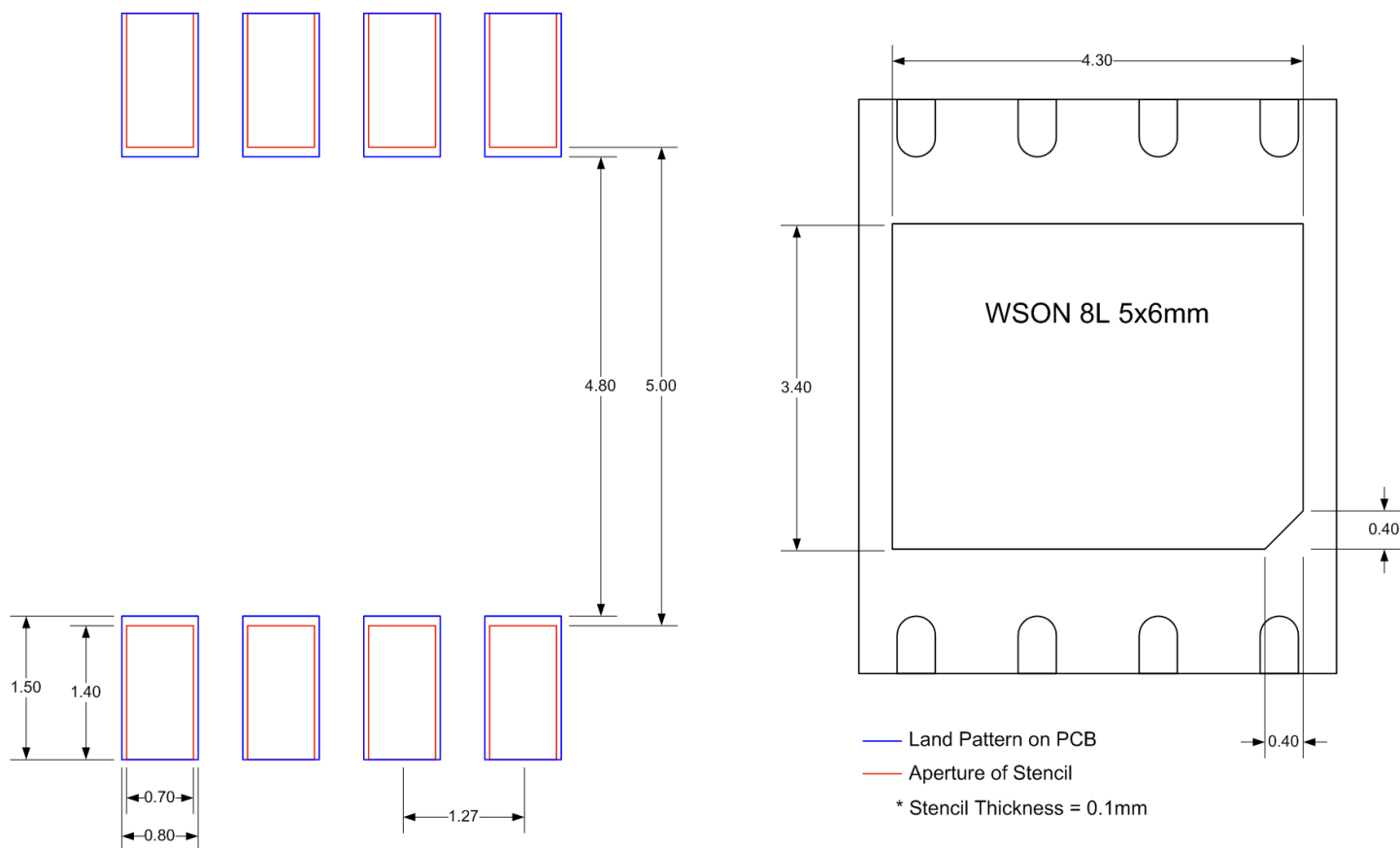


SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN Inch		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.75	0.80	0.0275	0.0295	0.0314
A1	0.00	0.02	0.05	0.0000	0.0007	0.0019
b	0.35	0.40	0.48	0.0137	0.0157	0.0188
C	—	0.20 REF.	—	—	0.0078REF.	—
D	5.90	6.00	6.10	0.2322	0.2362	0.2401
D2	3.35	3.40	3.45	0.1318	0.1338	0.1358
E	4.90	5.00	5.10	0.1929	0.1968	0.2007
E2	4.25	4.30	4.35	0.1673	0.1692	0.1712
e	—	1.27	—	—	0.05	—
L	0.55	0.60	0.65	0.0216	0.0236	0.0255
y	0.00	—	0.075	0.0000	—	0.0029

Serial Flash PCB Layout Guidelines

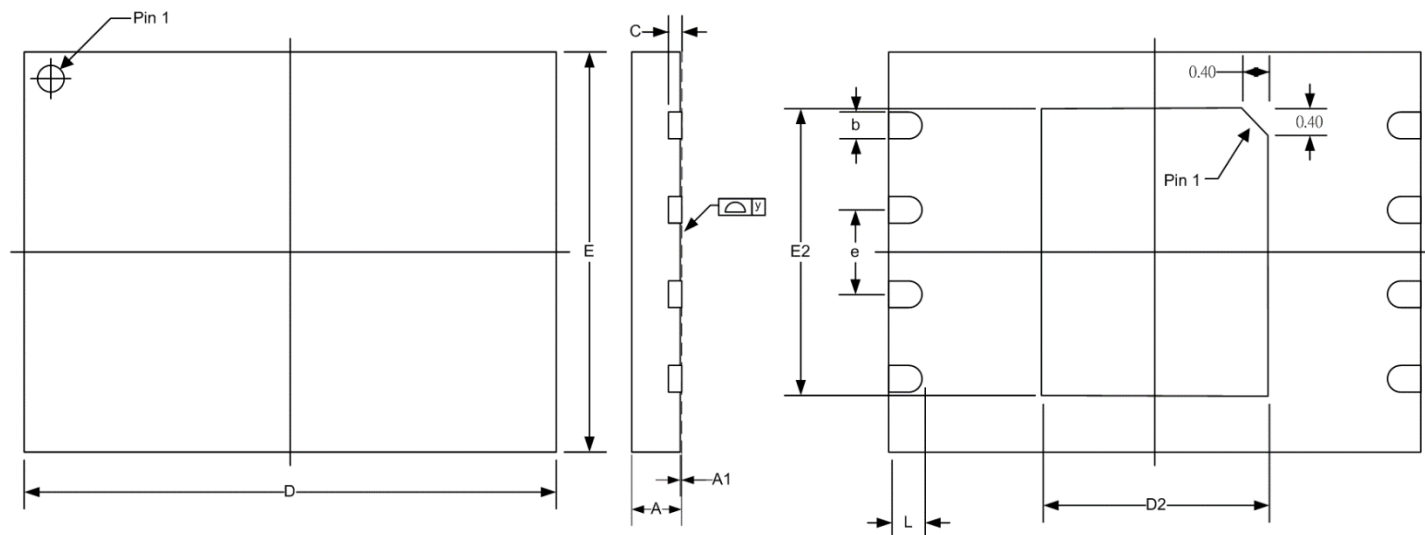
## WSO8 8L 5x6mm Land Pattern

Unit of Measurement: mm



Serial Flash PCB Layout Guidelines

**WS0N8 8x6mm**

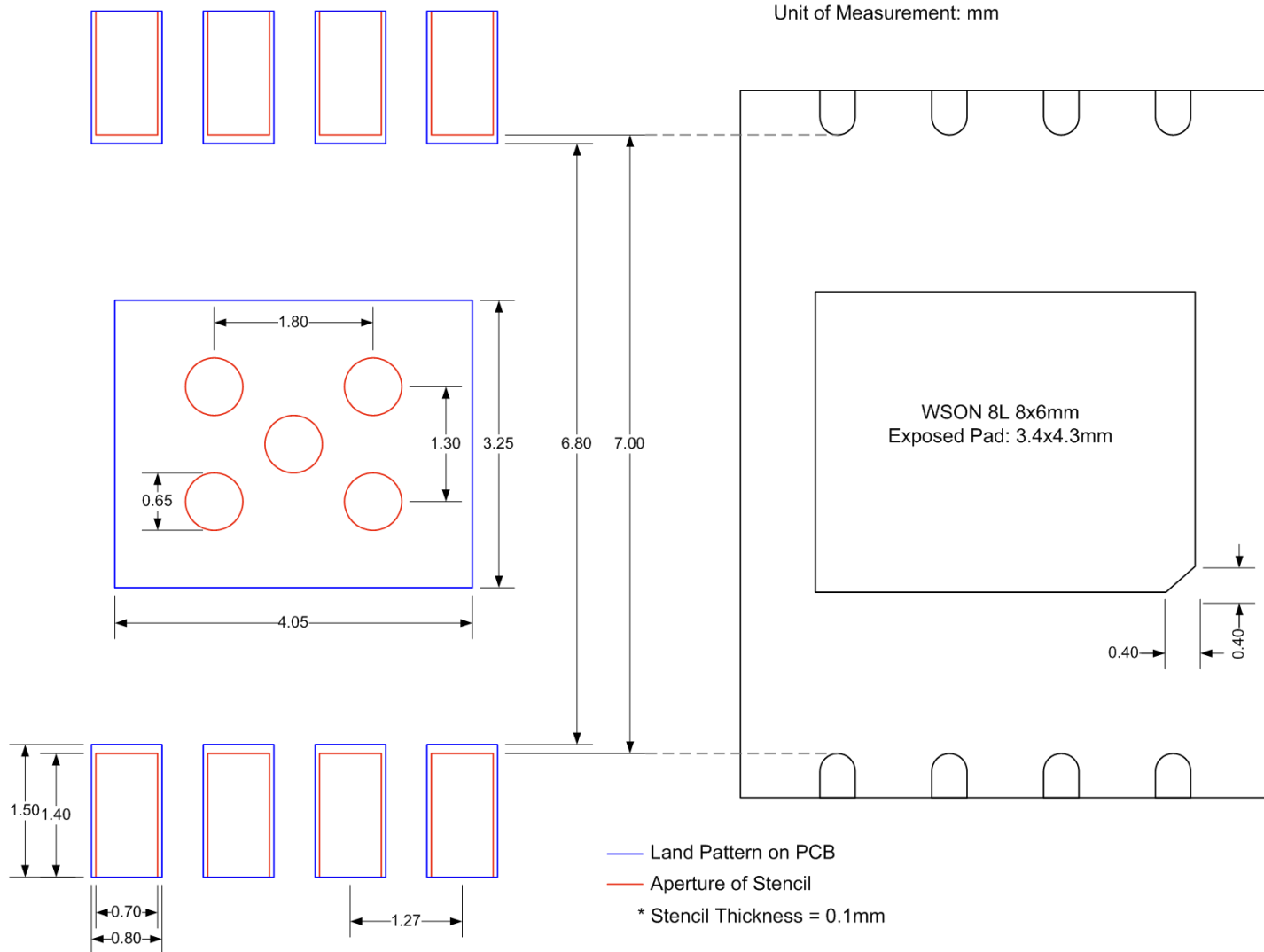


SYMBOL	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
A	0.70	0.75	0.80	0.028	0.030	0.031
A1	0.00	0.02	0.05	0.000	0.001	0.002
b	0.35	0.40	0.48	0.014	0.016	0.019
C	---	0.20 Ref.	---	---	0.008 Ref.	---
D	7.90	8.00	8.10	0.311	0.315	0.319
D2	3.35	3.40	3.45	0.132	0.134	0.136
E	5.90	6.00	6.10	0.232	0.236	0.240
E2	4.25	4.30	4.35	0.167	0.169	0.171
e	1.27 BSC			0.050 BSC		
L	0.45	0.50	0.55	0.018	0.020	0.022
y	0.00	---	0.05	0.000	---	0.002

Serial Flash PCB Layout Guidelines

## WSON 8L 8x6mm Land Pattern

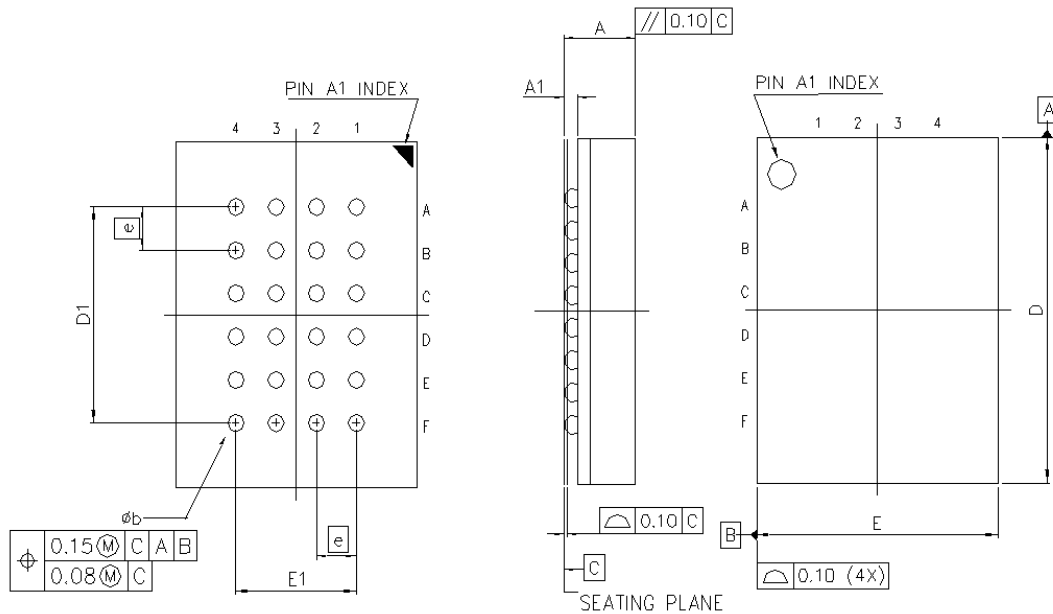
Unit of Measurement: mm



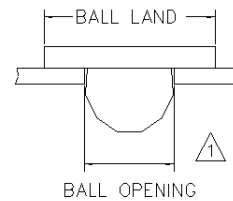
Serial Flash PCB Layout Guidelines

**BGA Packages**

**TFBGA24 6x8mm 4x6 matrix**



SYM.	DIMENSION (mm)			DIMENSION (inch)		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	—	—	1.20	—	—	0.047
A1	0.25	0.30	0.35	0.010	0.012	0.014
b	0.35	0.40	0.45	0.014	0.016	0.018
D	7.95	8.00	8.05	0.313	0.315	0.317
D1	5.00 BSC			0.197 BSC		
E	5.95	6.00	6.05	0.234	0.236	0.238
E1	3.00 BSC			0.118 BSC		
E	1.00 BSC			0.039 BSC		

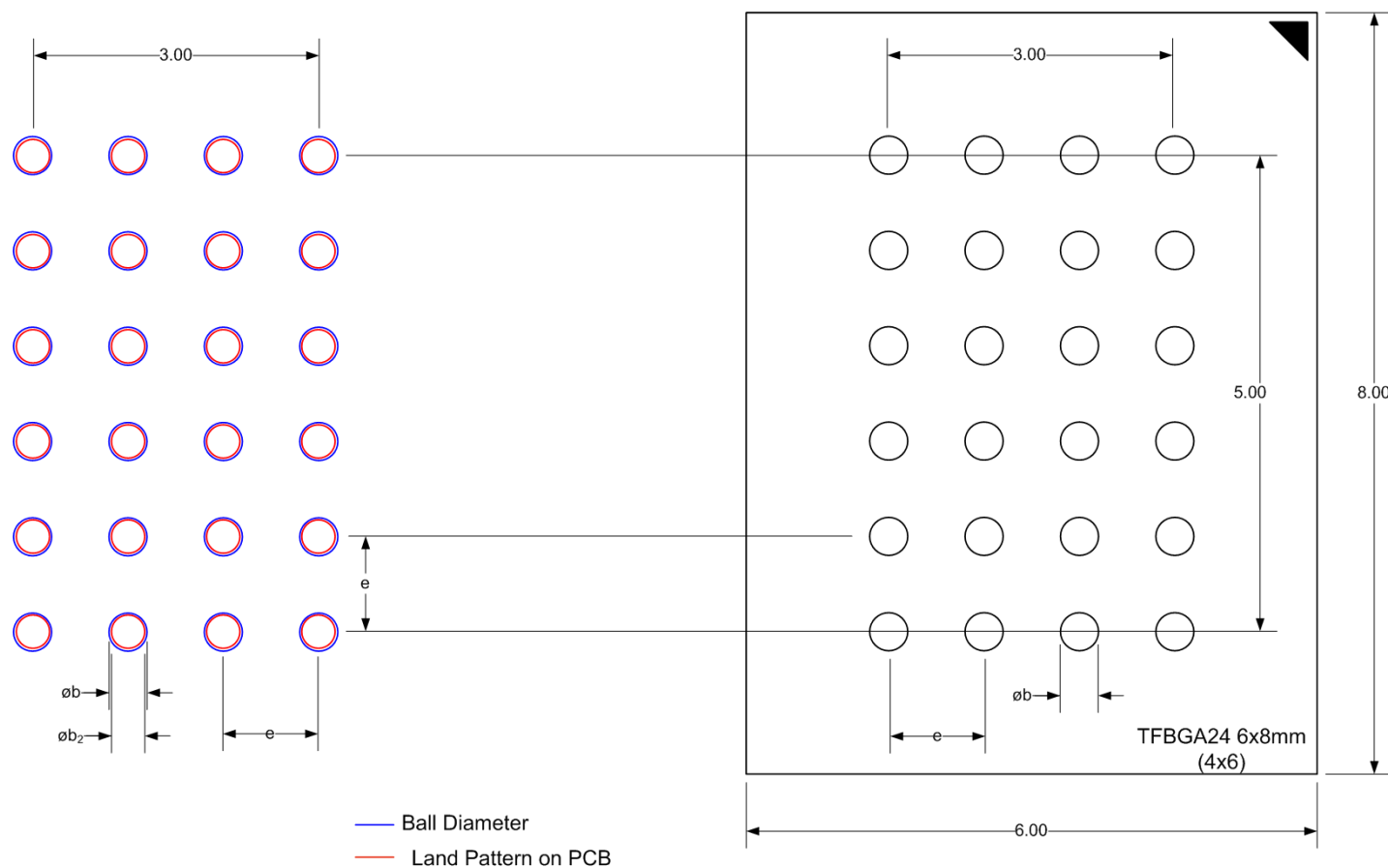


Note:  
1. Ball land:0.45mm. Ball opening:0.35mm.  
PCB ball land suggested <=0.35 mm

Serial Flash PCB Layout Guidelines

# TFBGA24 6x8mm 4x6 matrix Land Pattern

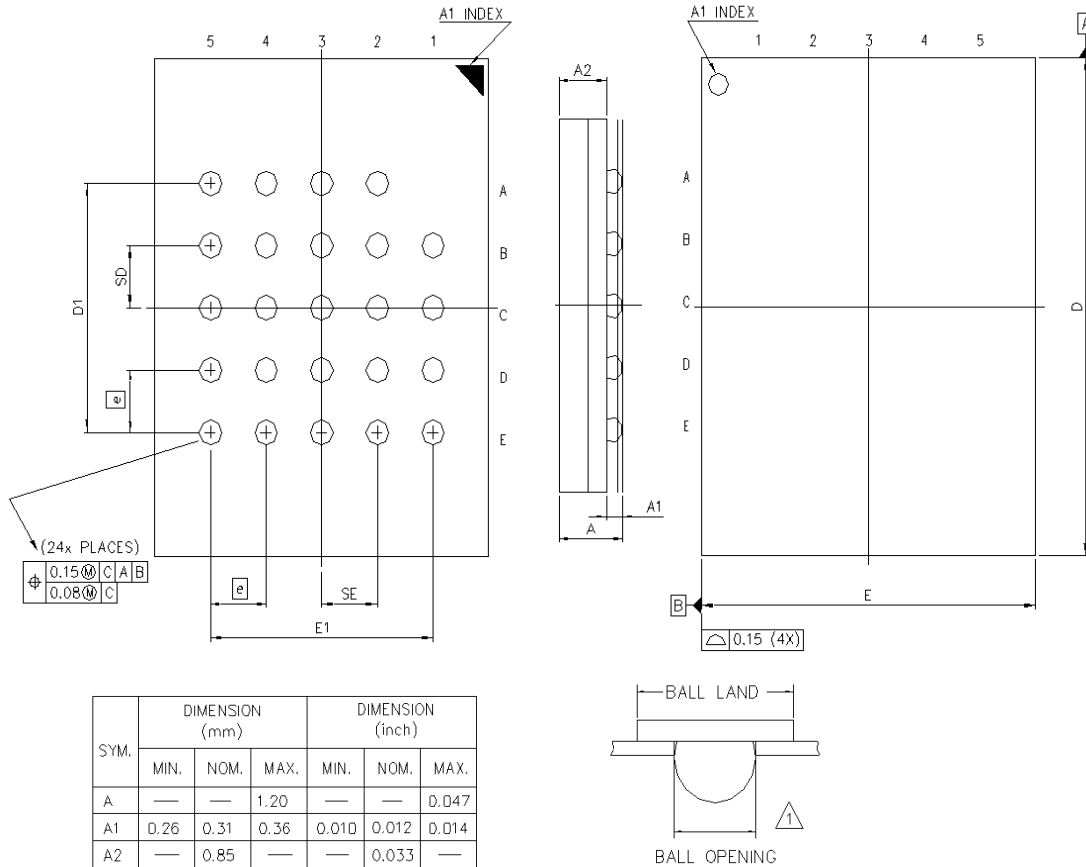
Unit of Measurement: mm



Symbol	Millimeters	Remarks
e	1.0	Pitch
øb	0.4	Ball Size
øb <sub>2</sub>	0.35	Land Diameter

Serial Flash PCB Layout Guidelines

**TFBGA24 6x8mm 5x5 matrix**



Note:

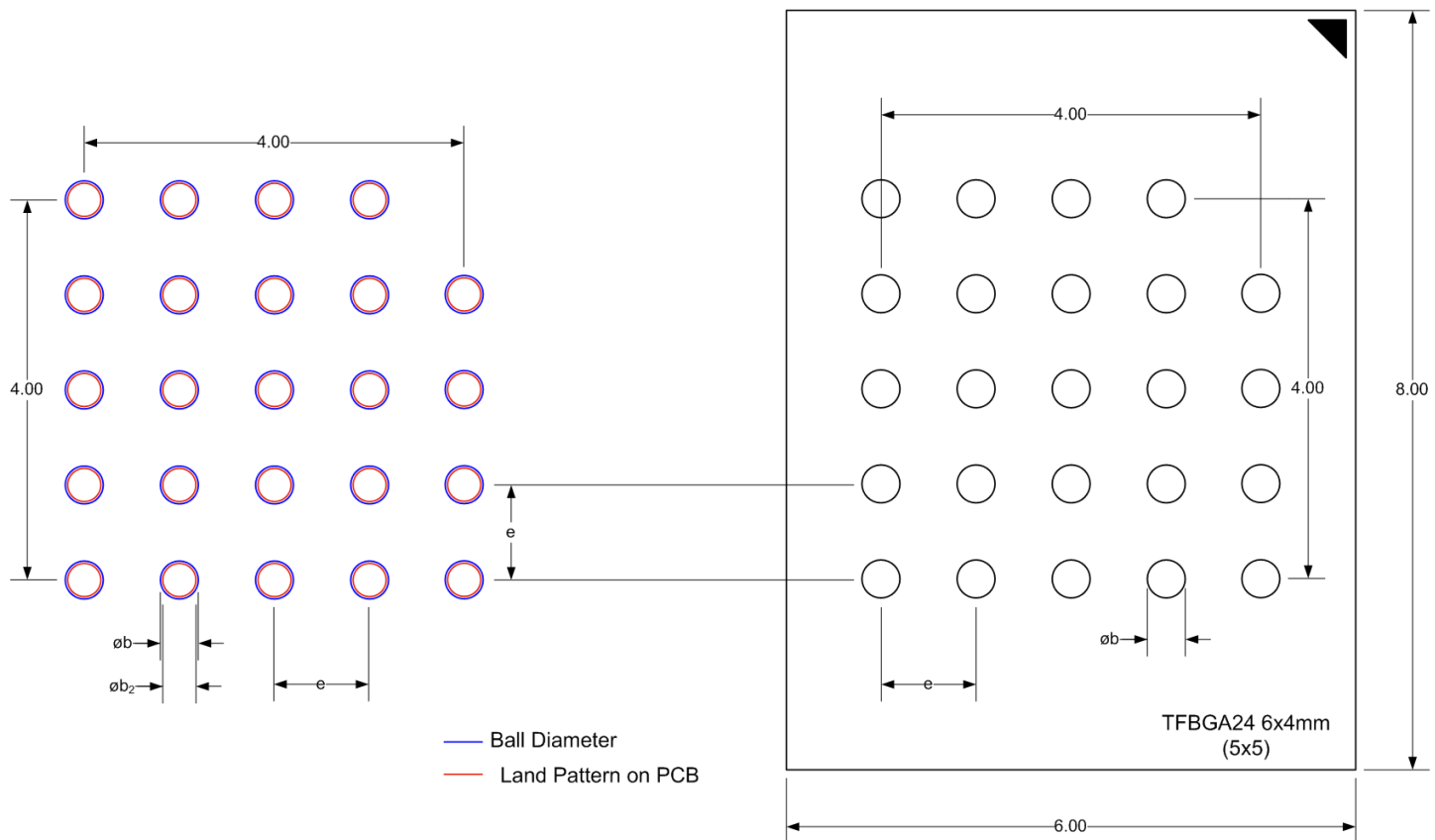
1. Ball land: 0.45mm. Ball opening: 0.35mm.  
PCB ball land suggested  $\leq 0.35$  mm



Serial Flash PCB Layout Guidelines

# TFBGA24 6x8mm 5x5 matrix Land Pattern

Unit of Measurement: mm



Symbol	Millimeters	Remarks
e	1.0	Pitch
øb	0.4	Ball Size
øb <sub>2</sub>	0.35	Land Diameter

---

Serial Flash PCB Layout Guidelines

---

**Revision History**

Version	Date	Page	Description
1.0	11/15/2015	NA	Original AN-SF1006
2.0	09/25/2017	NA	Convert t 2017 App Note Template
2.1	06/13/2018	13	3x2mm USON missing pad width dimension

**Trademarks**

*Winbond*, *SpiFlash* and *SpiStack* are trademarks of Winbond Electronics Corporation.  
All other marks are the property of their respective owner.

**Important Notice**

*Winbond* products are not designed, intended, authorized or warranted for use as components in systems or equipment intended for surgical implantation, atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, or for other applications intended to support or sustain life. Furthermore, *Winbond* products are not intended for applications wherein failure of *Winbond* products could result or lead to a situation wherein personal injury, death or severe property or environmental damage could occur. *Winbond* customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify *Winbond* for any damages resulting from such improper use or sales.

**Information in this document is provided solely in connection with Winbond products. Winbond reserves the right to make changes, corrections, modifications or improvements to this document and the products and services described herein at any time, without notice.**