MX23C3210

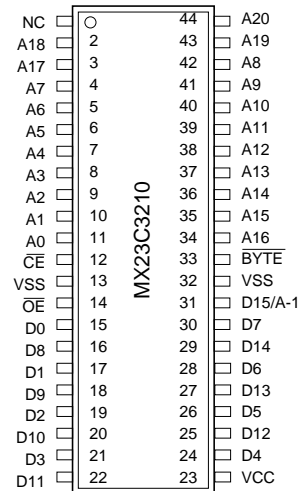## 5 Volt 32-Mbit (4M x 8 / 2M x 16) Mask ROM

FEATURES

- Bit organization
  - 4M x 8 (byte mode)
  - 2M x 16 (word mode)
- Fast access time
  - Random access: 100ns (max.)
- Current
  - Operating:60mA
  - Standby:100uA
- Supply voltage
  - 5V±10%
- Package
  - 44 pin SOP (500mil)
  - 48 pin TSOP (12mm x 20mm)
  - 42 pin DIP (600 mil) (word mode)
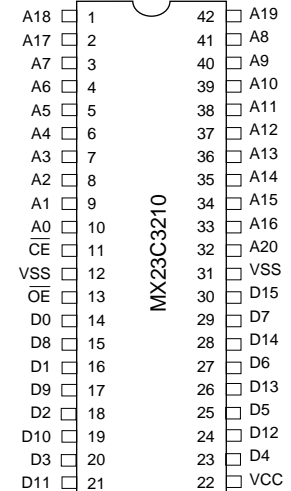 - 44 pin TSOP (Type II)

PIN DESCRIPTION

Symbol	Pin Function
A0~A20	Address Inputs
D0~D14	Data Outputs
D15/A-1	D15 (Word Mode)/ LSB Address (Byte Mode)
$\overline{CE}$	Chip Enable Input
$\overline{OE}$	Output Enable Input
$\overline{Byte}$	Word/ Byte Mode Selection
VCC	Power Supply Pin
VSS	Ground Pin
NC	No Connection

PIN CONFIGURATION

44 SOP/44 TSOP

NC	1	44	A20
A18	2	43	A19
A17	3	42	A8
A7	4	41	A9
A6	5	40	A10
A5	6	39	A11
A4	7	38	A12
A3	8	37	A13
A2	9	36	A14
A1	10	35	A15
A0	11	34	A16
$\overline{CE}$	12	33	$\overline{BYTE}$
VSS	13	32	VSS
$\overline{OE}$	14	31	D15/A-1
D0	15	30	D7
D8	16	29	D14
D1	17	28	D6
D9	18	27	D13
D2	19	26	D5
D10	20	25	D12
D3	21	24	D4
D11	22	23	VCC

42 DIP (For Word Mode Only)

A18	1	42	A19
A17	2	41	A8
A7	3	40	A9
A6	4	39	A10
A5	5	38	A11
A4	6	37	A12
A3	7	36	A13
A2	8	35	A14
A1	9	34	A15
A0	10	33	A16
$\overline{CE}$	11	32	A20
VSS	12	31	VSS
$\overline{OE}$	13	30	D15
D0	14	29	D7
D8	15	28	D14
D1	16	27	D6
D9	17	26	D13
D2	18	25	D5
D10	19	24	D12
D3	20	23	D4
D11	21	22	VCC

48 TSOP (Normal Type)

$\overline{BYTE}$	1	48	VSS
A16	2	47	VSS
A15	3	46	D15/A-1
A14	4	45	D7
A13	5	44	D14
A12	6	43	D6
A11	7	42	D13
A10	8	41	D5
A9	9	40	D12
A8	10	39	D4
A19	11	38	VCC
VSS	12	37	VCC
A20	13	36	NC
A18	14	35	D11
A17	15	34	D3
A7	16	33	D10
A6	17	32	D2
A5	18	31	D9
A4	19	30	D1
A3	20	29	D8
A2	21	28	D0
A1	22	27	$\overline{OE}$/OE
A0	23	26	VSS
CE/$\overline{CE}$	24	25	VSS

MX23C3210 (Normal Type)

48 TSOP (Reverse Type)

VSS	48	1	$\overline{BYTE}$
VSS	47	2	A16
D15/A-1	46	3	A15
D7	45	4	A14
D14	44	5	A13
D6	43	6	A12
D13	42	7	A11
D5	41	8	A10
D12	40	9	A9
D4	39	10	A8
VCC	38	11	A19
VCC	37	12	VSS
NC	36	13	A20
D11	35	14	A18
D3	34	15	A17
D10	33	16	A7
D2	32	17	A6
D9	31	18	A5
D1	30	19	A4
D8	29	20	A3
D0	28	21	A2
OE/$\overline{OE}$	27	22	A1
VSS	26	23	A0
VSS	25	24	$\overline{CE}$/CE

MX23C3210 (Reverse Tpye)
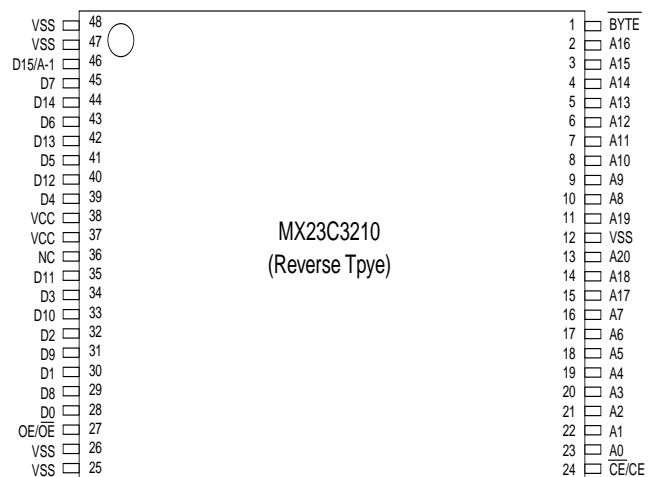
ORDER INFORMATION

Part No.	Access	Package	Remark
MX23C3210MC-10	100ns	44 pin SOP	
MX23C3210MC-12	120ns	44 pin SOP	
MX23C3210MC-15	150ns	44 pin SOP	
MX23C3210TC-10	100ns	48 pin TSOP	
MX23C3210TC-12	120ns	48 pin TSOP	
MX23C3210TC-15	150ns	48 pin TSOP	
MX23C3210RC-10	100ns	48 pin TSOP (Reverse type)	
MX23C3210RC-12	120ns	48 pin TSOP (Reverse type)	
MX23C3210RC-15	150ns	48 pin TSOP (Reverse type)	
MX23C3210PC-10	100ns	42 pin DIP	
MX23C3210PC-12	120ns	42 pin DIP	
MX23C3210PC-15	150ns	42 pin DIP	
MX23C3210YC-10	100ns	44 pin TSOP	
MX23C3210YC-12	120ns	44 pin TSOP	
MX23C3210YC-15	150ns	44 pin TSOP	
MX23C3210TI-10*	100ns	48 pin TSOP	
MX23C3210TI-12*	120ns	48 pin TSOP	
MX23C3210MC-10G	100ns	44 pin SOP	Pb-free
MX23C3210MC-12G	120ns	44 pin SOP	Pb-free
MX23C3210PC-10G	100ns	42 pin DIP	Pb-free
MX23C3210PC-12G	120ns	42 pin DIP	Pb-free
MX23C3210TC-10G	100ns	48 pin TSOP	Pb-free
MX23C3210TC-12G	120ns	48 pin TSOP	Pb-free

*Note: Temperature:-40°C~85°C

MODE SELECTION

$\overline{CE}$	$\overline{OE}$	$\overline{Byte}$	D15/A-1	D0~D7	D8~D15	Mode	Power
H	X	X	X	High Z	High Z	-	Stand-by
L	H	X	X	High Z	High Z	-	Active
L	L	H	Output	D0~D7	D8~D15	Word	Active
L	L	L	Input	D0~D7	High Z	Byte	Active

BLOCK DIAGRAM
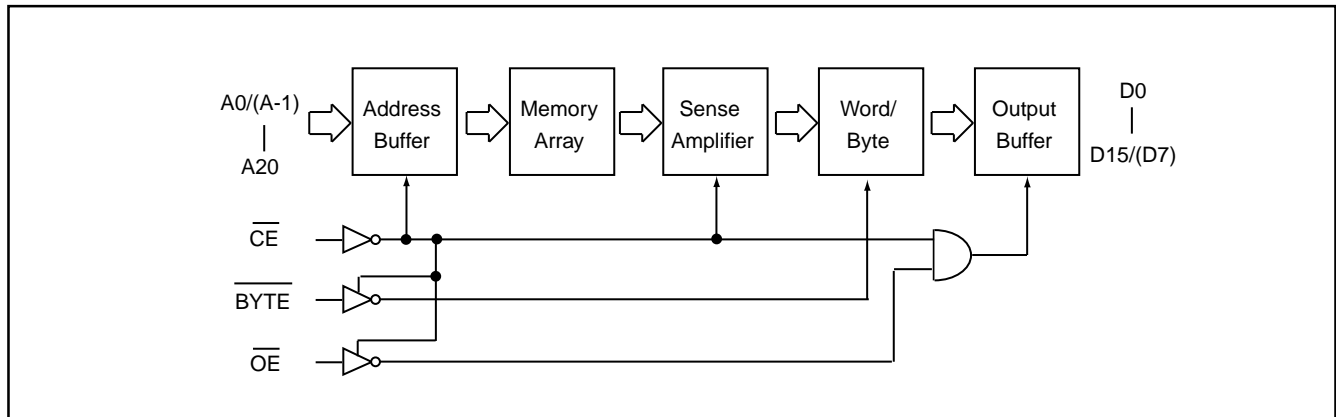
ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Ratings
Voltage on any Pin Relative to VSS	VIN	-0.5V to 7.0V
Ambient Operating Temperature	Topr	-40°C to 85°C
Storage Temperature	Tstg	-65°C to 125°C

DC CHARACTERISTICS (Ta = -40°C ~ 85°C, VCC = 5V±10%)

Item	Symbol	MIN.	MAX.	Conditions
Output High Voltage	VOH	2.4V	-	IOH = -1.0mA
Output Low Voltage	VOL	-	0.4V	IOL = 2.1mA
Input High Voltage	VIH	2.2V	VCC+0.3V	
Input Low Voltage	VIL	-0.3V	0.8V	
Input Leakage Current	ILI	-	5uA	0V, VCC
Output Leakage Current	ILO	-	5uA	0V, VCC
Operating Current	ICC1	-	60mA	tRC = 100ns, all output open
Standby Current (TTL)	ISTB1	-	1mA	$\overline{CE}$ = VIH
Standby Current (cmos)	ISTB2	-	100uA	$\overline{CE}$>VCC-0.2V
Input Capacitance	CIN	-	10pF	Ta = 25°C, f = 1MHZ
Output Capacitance	COUT	-	10pF	Ta = 25°C, f = 1MHZ

AC CHARACTERISTICS (Ta = -40°C ~ 85°C, VCC = 5V±10%)

Item	Symbol	23C3210-10		23C3210-12		23C3210-15	
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
Read Cycle Time	tRC	100ns	-	120ns	-	150ns	-
Address Access Time	tAA	-	100ns	-	120ns	-	150ns
Chip Enable Access Time	tACE	-	100ns	-	120ns	-	150ns
Output Enable Time	tOE	-	50ns	-	60ns	-	70ns
Output Hold After Address	tOH	0ns	-	0ns	-	0ns	-
Output High Z Delay	tHZ	-	20ns	-	20ns	-	20ns

Note:Output high-impedance delay (tHZ) is measured from OE̅ going high, and this parameter guaranteed by design over the full voltage and temperature operating range - not tested.

AC Test Conditions

Input Pulse Levels	0.4V~2.4V
Input Rise and Fall Times	10ns
Input Timing Level	1.5V
Output Timing Level	0.8V and 2.0V
Output Load	See Figure
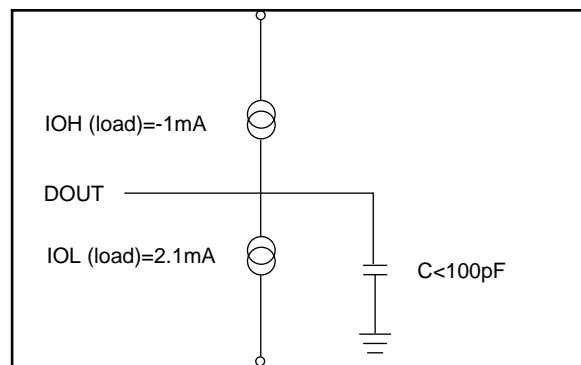
Note:

No output loading is present in tester load board.

Active loading is used and under software programming control.

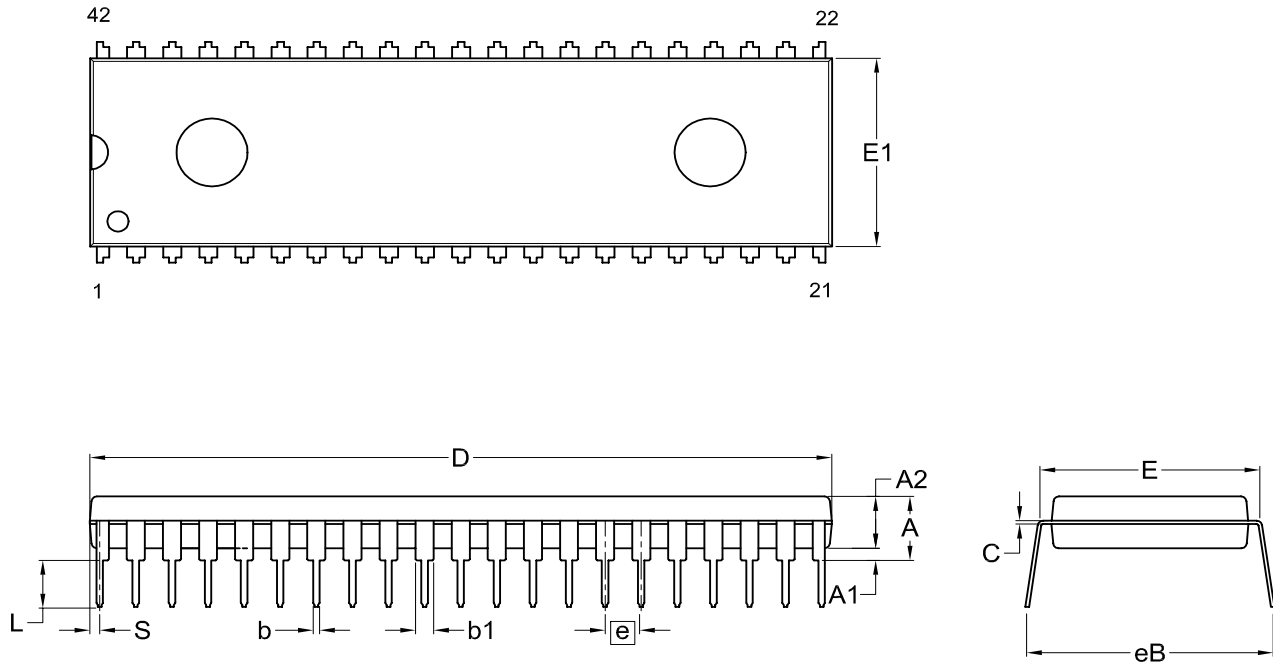Output loading capacitance includes load board's and all stray capacitance.

TIMING DIAGRAM

RANDOM READ
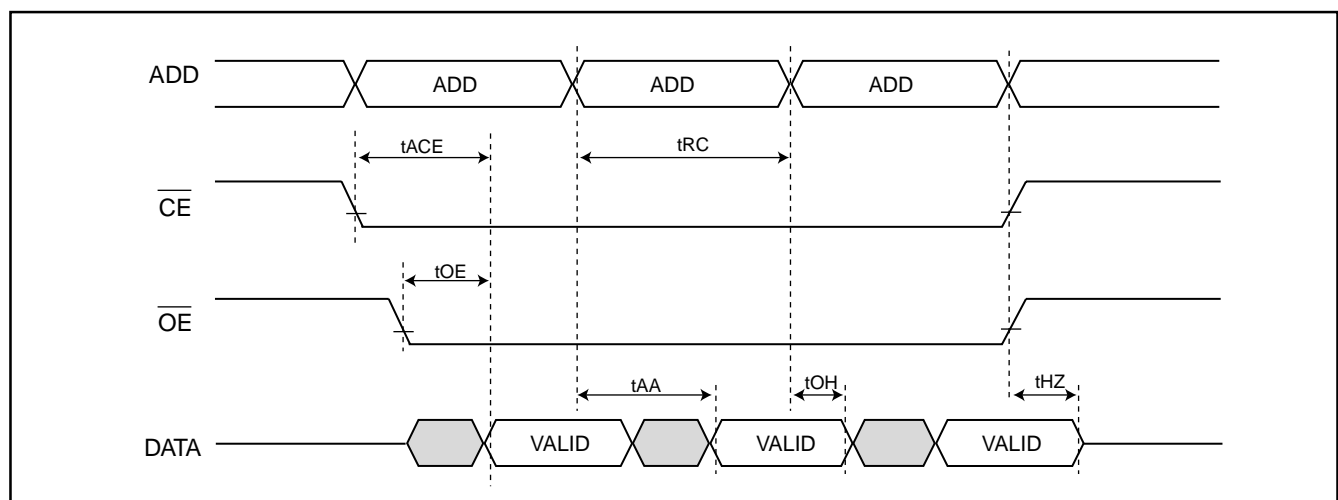
PACKAGE INFORMATION

**Title:** **Package Outline for PDIP 42L (600MIL)**

Dimensions (inch dimensions are derived from the original mm dimensions)

SYMBOL / UNIT		A	A1	A2	b	b1	C	D	E	E1	e	eB	L	S
mm	Min.	---	0.25	3.73	0.38	1.14	0.20	51.31	15.11	13.84		15.75	2.92	0.38
	Nom.	---	---	3.94	0.46	1.27	0.25	51.94	15.24	13.97	2.54	16.51	3.30	0.64
	Max.	4.90	0.76	4.14	0.53	1.40	0.30	52.57	15.37	14.10		17.27	3.68	0.89
Inch	Min.	—	0.010	0.147	0.015	0.045	0.008	2.020	0.595	0.545		0.620	0.115	0.015
	Nom.	—	—	0.155	0.018	0.050	0.010	2.045	0.600	0.550	0.100	0.650	0.130	0.025
	Max.	0.193	0.030	0.163	0.021	0.055	0.012	2.070	0.605	0.555		0.680	0.145	0.035

DWG.NO.	REVISION	REFERENCE			ISSUE DATE
		JEDEC	EIAJ		
6110-0202.5	8				11-24-'03

Title: **Package Outline for SOP 44L (500MIL)**
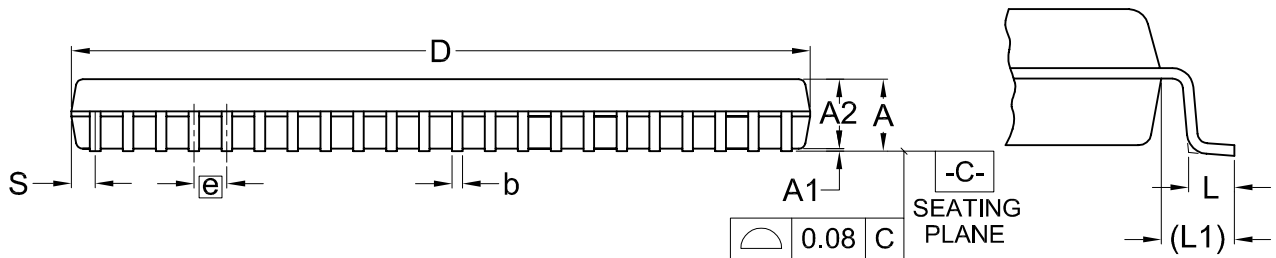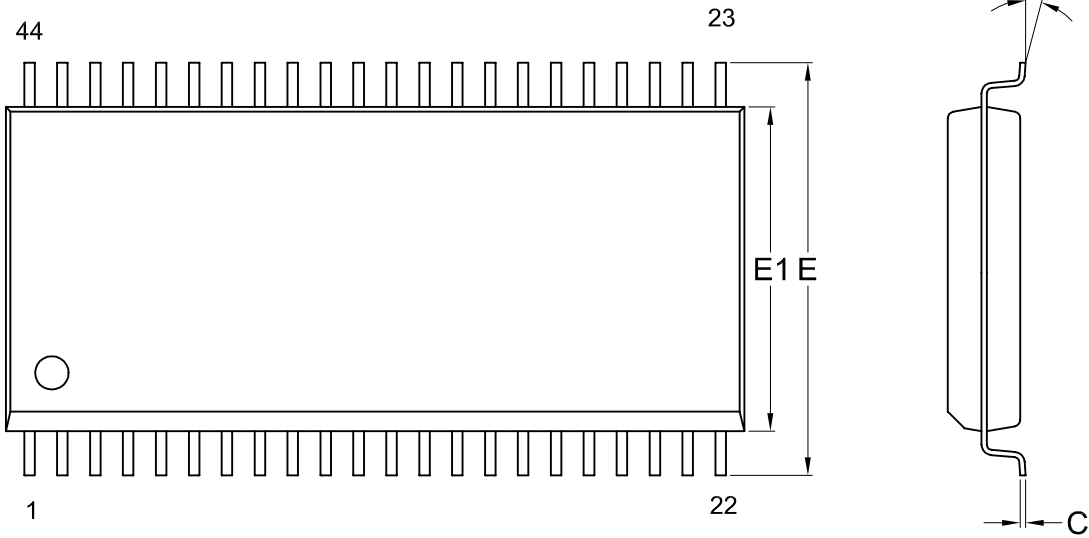
Dimensions (inch dimensions are derived from the original mm dimensions)

SYMBOL UNIT		A	A1	A2	b	C	D	E	E1	e	L	L1	S	Θ
mm	Min.	---	0.10	2.59	0.36	0.15	28.37	15.83	12.47		0.56	1.51	0.78	0
	Nom.	---	0.15	2.69	0.41	0.20	28.50	16.03	12.60	1.27	0.76	1.71	0.91	5
	Max.	3.00	0.20	2.80	0.51	0.25	28.63	16.23	12.73		0.96	1.91	1.04	10
Inch	Min.	---	0.004	0.102	0.014	0.006	1.117	0.623	0.491		0.022	0.059	0.031	0
	Nom.	---	0.006	0.106	0.016	0.008	1.122	0.631	0.496	0.050	0.030	0.067	0.036	5
	Max.	0.118	0.008	0.110	0.020	0.010	1.127	0.639	0.501		0.038	0.075	0.041	10

DWG.NO.	REVISION	REFERENCE			ISSUE DATE
		JEDEC	EIAJ		
6110-1405	6	MO-175			11-26-'03

Title: Package Outline for TSOP(II) 44L (400MIL)
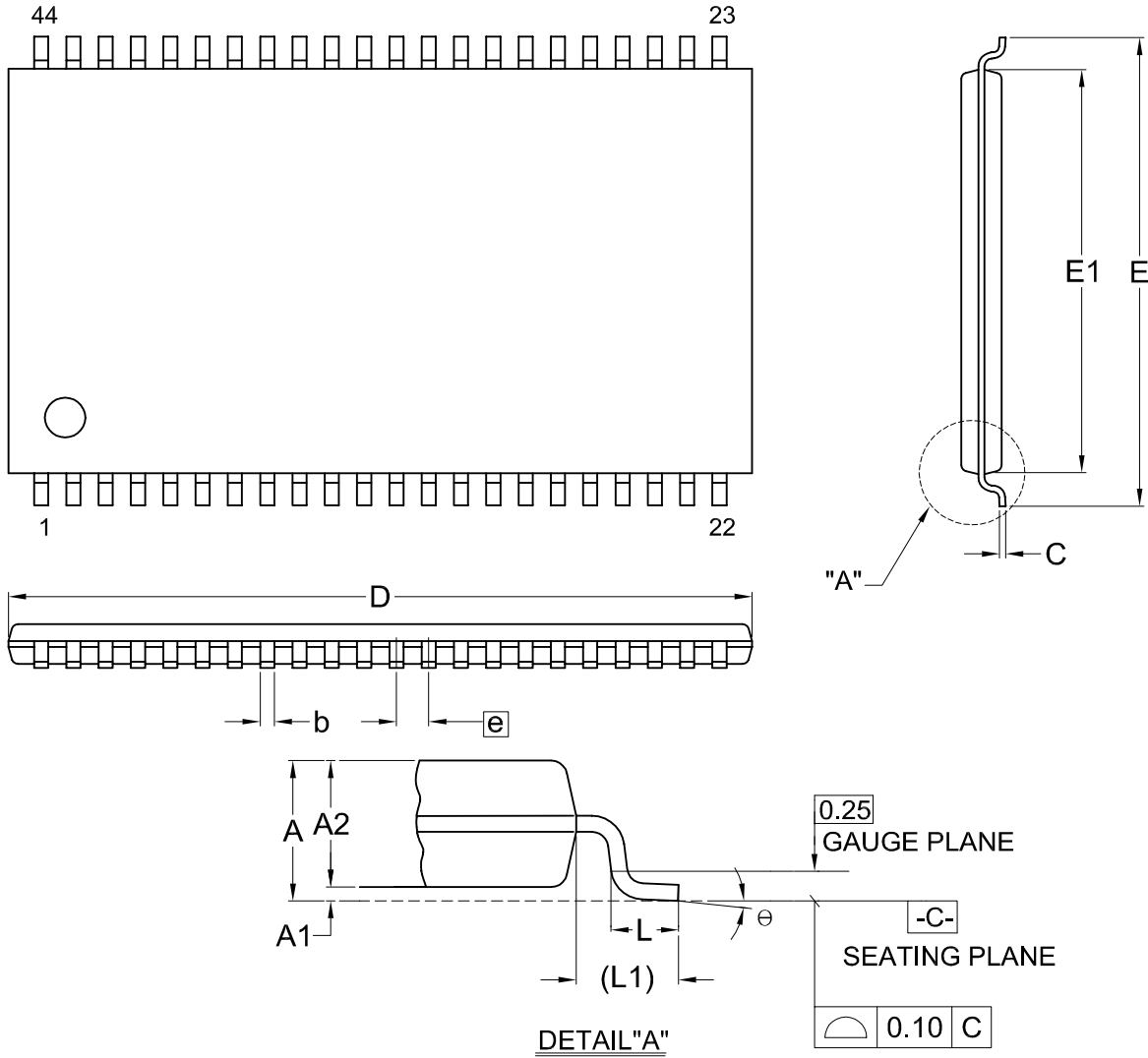
DETAIL"A"

Dimensions (inch dimensions are derived from the original mm dimensions)

SYMBOL UNIT		A	A1	A2	b	C	D	E	E1	e	L	L1	Θ
mm	Min.	---	0.05	0.95	0.30	0.12	18.31	11.56	10.06		0.40	0.70	0
	Nom.	---	0.10	1.00	0.35	0.15	18.41	11.76	10.16	0.80	0.50	0.80	5
	Max.	1.20	0.15	1.05	0.45	0.21	18.51	11.96	10.26		0.60	0.90	8
Inch	Min.	---	0.002	0.037	0.012	0.005	0.721	0.455	0.396		0.016	0.028	0
	Nom.	---	0.004	0.039	0.014	0.006	0.725	0.463	0.400	0.031	0.020	0.031	5
	Max.	0.047	0.006	0.041	0.018	0.008	0.729	0.471	0.404		0.024	0.035	8

DWG.NO.	REVISION	REFERENCE			ISSUE DATE
		JEDEC	EIAJ		
6110-1701	6	MS-024			12-01-'03

Title: Package Outline for TSOP(I) 48L (12X20mm)NORMAL FORM
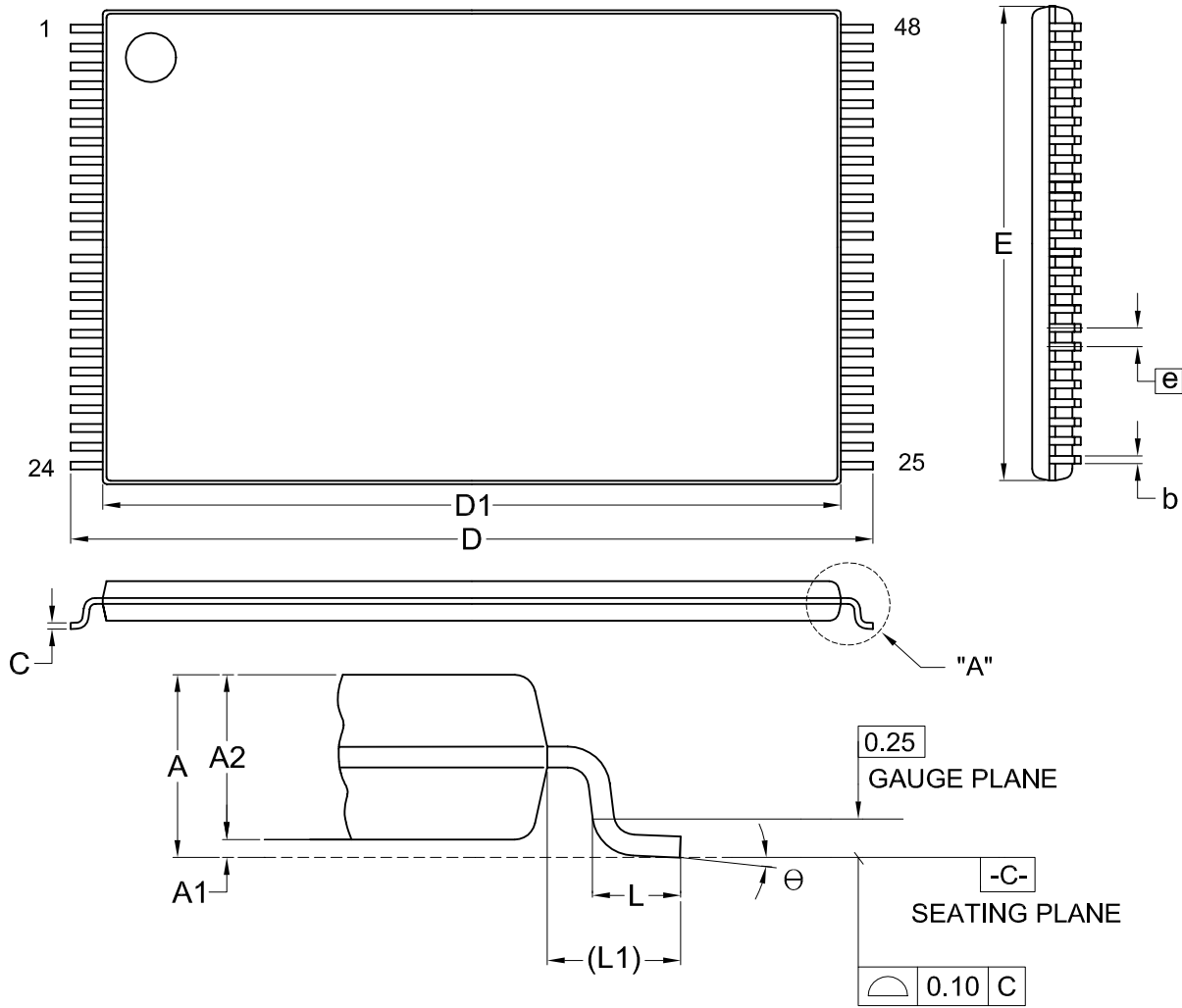
DETAIL"A"

Dimensions (inch dimensions are derived from the original mm dimensions)

UNIT	SYMBOL	A	A1	A2	b	C	D	D1	E	e	L	L1	Θ
mm	Min.	---	0.05	0.95	0.17	0.10	19.80	18.30	11.90		0.50	0.70	0
	Nom.	---	0.10	1.00	0.20	0.13	20.00	18.40	12.00	0.50	0.60	0.80	5
	Max.	1.20	0.15	1.05	0.27	0.21	20.20	18.50	12.10		0.70	0.90	8
Inch	Min.	---	0.002	0.037	0.007	0.004	0.780	0.720	0.469		0.020	0.028	0
	Nom.	---	0.004	0.039	0.008	0.005	0.787	0.724	0.472	0.020	0.024	0.031	5
	Max.	0.047	0.006	0.041	0.011	0.008	0.795	0.728	0.476		0.028	0.035	8

DWG.NO.	REVISION	REFERENCE			ISSUE DATE
		JEDEC	EIAJ		
6110-1607	7	MO-142			12-01-'03

Title: Package Outline for TSOP(I) 48L (12X20mm)REVERSE FORM

DETAIL"A"

Dimensions (inch dimensions are derived from the original mm dimensions)

SYMBOL UNIT		A	A1	A2	b	C	D	D1	E	e	L	L1	Θ
mm	Min.	---	0.05	0.95	0.17	0.10	19.80	18.30	11.90		0.50	0.70	0
	Nom.	—	0.10	1.00	0.20	0.13	20.00	18.40	12.00	0.50	0.60	0.80	5
	Max.	1.20	0.15	1.05	0.27	0.21	20.20	18.50	12.10		0.70	0.90	8
Inch	Min.	—	0.002	0.037	0.007	0.004	0.780	0.720	0.469		0.020	0.028	0
	Nom.	---	0.004	0.039	0.008	0.005	0.787	0.724	0.472	0.020	0.024	0.031	5
	Max.	0.047	0.006	0.041	0.011	0.008	0.795	0.728	0.476		0.028	0.035	8

DWG.NO.	REVISION	REFERENCE			ISSUE DATE
		JEDEC	EIAJ		
6110-1607.1	7	MO-142			12-01-'03

REVISION HISTORY

Revision	Description	Page	Date
2.6	DC Characteristics: The input leakage current (ILI) is changed as 5uA instead of 10uA.		
	The output leakage current (ILO) is changed as 5uA instead 10uA.		
	The power down supply current (ISTB2) is changed as 100uA instead of 5uA.		
2.7	AC Characteristics: Added 100ns grade item, deleted 200ns grade item.		MAR/25/1998
	The output enable time (tOE) is changed as 60ns instead of 70ns in 120ns grade item, and 70ns instead of 80ns grade item.		
	The output high Z delay is changed as 20ns instead of 70ns.		
2.8	AC Characteristics: tOH 10ns --> 0ns	P3	FEB/01/1999
2.9	Typing error correction	P1	JAN/18/2000
3.0	Modify Package Information	P5~7	JUL/17/2001
	Added 44-pin TSOP(Type II) Package	P1,8	
3.1	Added MX23C3210TI-10 & MX23C3210TI-12 in Order Information	P1	JUL/31/2001
3.2	Change Ambient Operating Temperature:0° C to 70° C-->-40° C to 85° C	P3	SEP/04/2001
3.3	Modify Package Information	P5~9	NOV/21/2002
3.4	Modify 42-PDIP Package Information	P5	JUN/20/2003
3.5	1. Add Pb-free in ordering information	P2	JUN/30/2004

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