

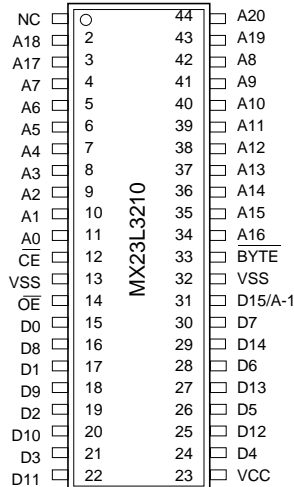
## 32M-BIT (4M x 8 / 2M x 16) Mask ROM

### FEATURES

- Bit organization
  - 4M x 8 (byte mode)
  - 2M x 16 (word mode)
- Fast access time
  - Random access:70ns (max.) for 3.0V~3.6V  
90ns (max.) for 2.7V~3.6V
- Current
  - Operating:40mA
  - Standby:15uA
- Supply voltage
  - 2.7V~3.6V
- Package
  - 44 pin SOP (500mil)
  - 48 pin TSOP (12mm x 20mm)
  - 44 pin TSOP (Type II)

### PIN CONFIGURATION

#### 44 SOP/ 44 TSOP



### ORDER INFORMATION

Part No.	Access Time	Package
MX23L3210MC-10	100ns	44 pin SOP
MX23L3210MC-12	120ns	44 pin SOP
MX23L3210MC-15	150ns	44 pin SOP
MX23L3210TC-70	70ns	48 pin TSOP
MX23L3210TC-90	90ns	48 pin TSOP
MX23L3210TC-10	100ns	48 pin TSOP
MX23L3210TC-12	120ns	48 pin TSOP
MX23L3210TC-15	150ns	48 pin TSOP
MX23L3210RC-70	70ns	48 pin TSOP (Reverse type)
MX23L3210RC-90	90ns	48 pin TSOP (Reverse type)
MX23L3210RC-10	100ns	48 pin TSOP (Reverse type)
MX23L3210RC-12	120ns	48 pin TSOP (Reverse type)
MX23L3210RC-15	150ns	48 pin TSOP (Reverse type)
MX23L3210YC-10	100ns	44 pin TSOP
MX23L3210YC-12	120ns	44 pin TSOP

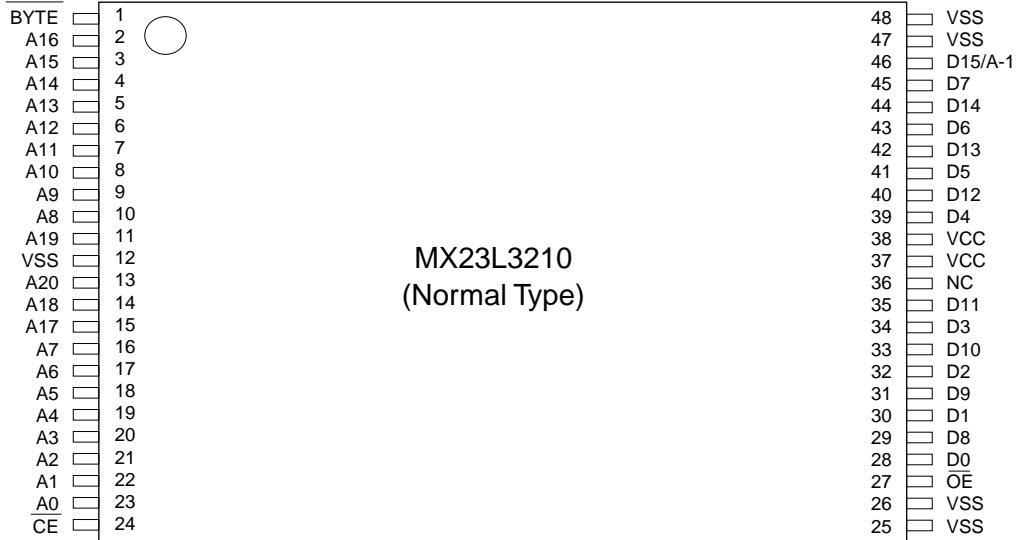
### PIN DESCRIPTION

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
Byte	Word/ Byte Mode Selection
VCC	Power Supply Pin
VSS	Ground Pin
NC	No Connection

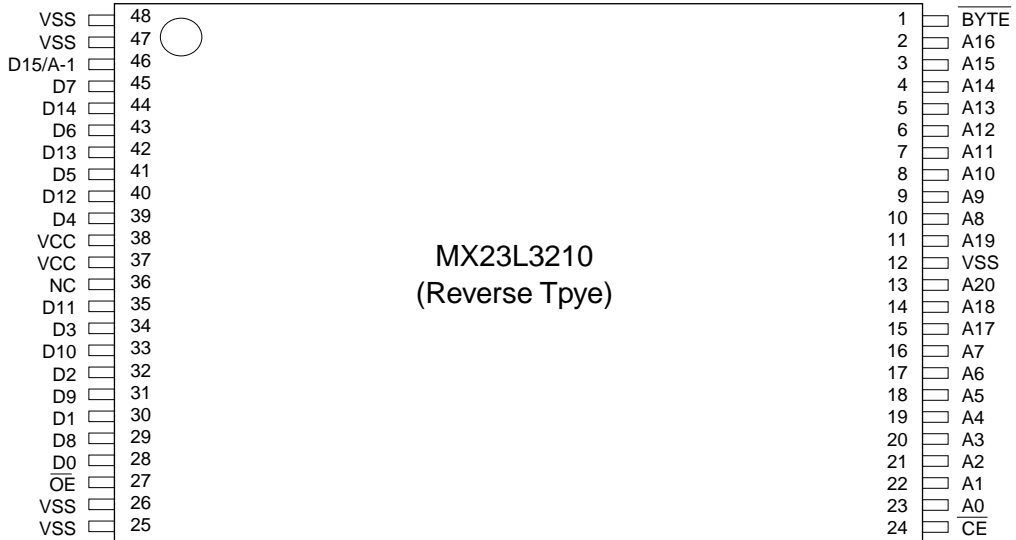
### MODE SELECTION

$\overline{CE}$	$\overline{OE}$	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

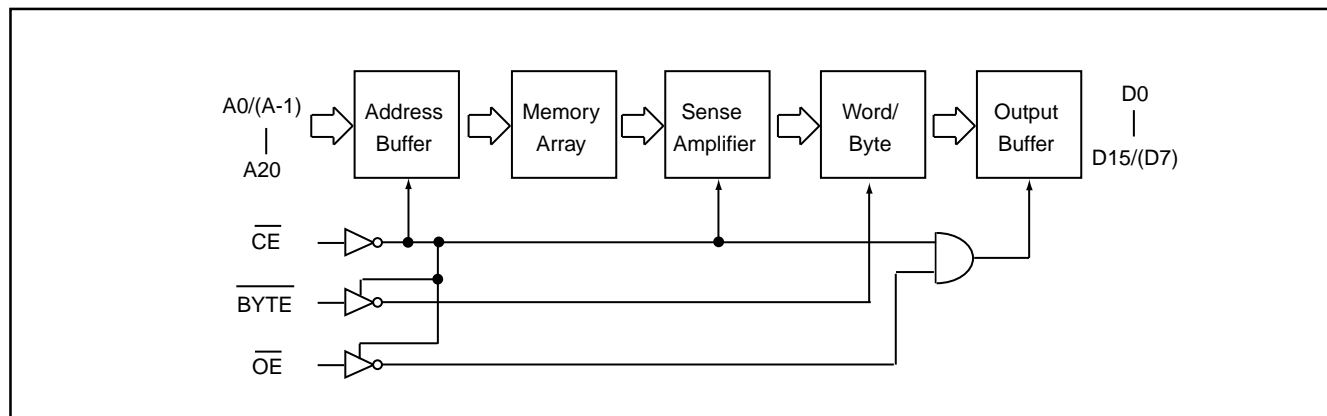
### 48 TSOP (Normal Type)



### 48 TSOP (Reverse Type)



**BLOCK DIAGRAM**



**ABSOLUTE MAXIMUM RATINGS**

Item	Symbol	Ratings
Voltage on any Pin Relative to VSS	VIN	-0.3V to 3.9V
Ambient Operating Temperature	Topr	0°C to 70°C
Storage Temperature	Tstg	-65°C to 125°C

**DC CHARACTERISTICS** (Ta = 0°C ~ 70°C, VCC = 2.7V~3.6V)

Item	Symbol	MIN.	MAX.	Conditions
Output High Voltage	VOH	2.3V	-	IOH = -0.4mA
Output Low Voltage	VOL	-	0.4V	IOL = 1.6mA
Input High Voltage	VIH	2.1V	VCC+0.3V	
Input Low Voltage	VIL	-0.3V	0.2xVCC	
Input Leakage Current	ILI	-	5uA	0V, VCC
Output Leakage Current	ILO	-	5uA	0V, VCC
Operating Current	ICC1	-	40mA	tRC = 120ns, all output open
Standby Current (TTL)	ISTB1	-	1mA	CE = VIH
Standby Current (CMOS)	ISTB2	-	15uA	CE > VCC-0.2V
Input Capacitance	CIN	-	10pF	Ta = 25°C, f = 1MHZ
Output Capacitance	COUT	-	10pF	Ta = 25°C, f = 1MHZ

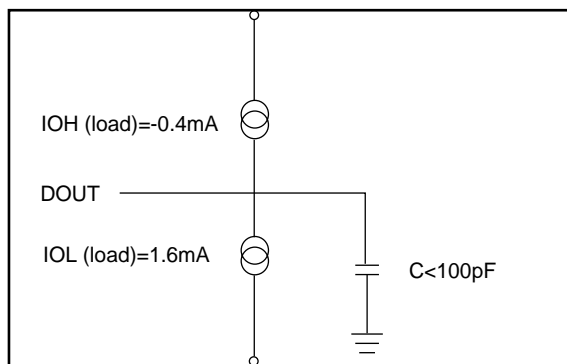
## AC CHARACTERISTICS (Ta = 0°C ~ 70°C, VCC = 3.0V~3.6V)

Item	Symbol	23L3210-70		23L3210-90		23L3210-10		23L3210-12		23L3210-15	
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
Read Cycle Time	tRC	70ns	-	90ns	-	100ns	-	120ns	-	150ns	-
Address Access Time	tAA	-	70ns	-	90ns	-	100ns	-	120ns	-	150ns
Chip Enable Access Time	tACE	-	70ns	-	90ns	-	100ns	-	120ns	-	150ns
Output Enable Time	tOE	-	35ns	-	45ns	-	50ns	-	60ns	-	70ns
Output Hold After Address	tOH	0ns	-	0ns	-	0ns	-	0ns	-	0ns	-
Output High Z Delay	tHZ	-	20ns	-	20ns	-	20ns	-	20ns	-	20ns

Note: Output high-impedance delay (tHZ) is measured from OE 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	1.4V
Output Timing Level	1.4
Output Load	See Figure



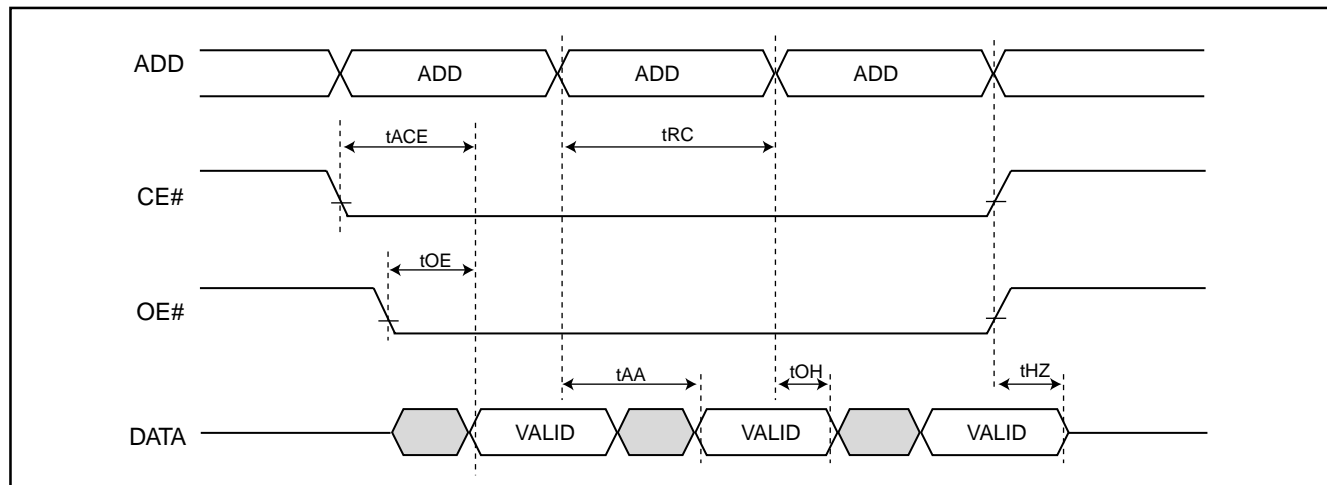
Note: No output loading is present in tester load board.

Active loading is used and under software programming control.

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

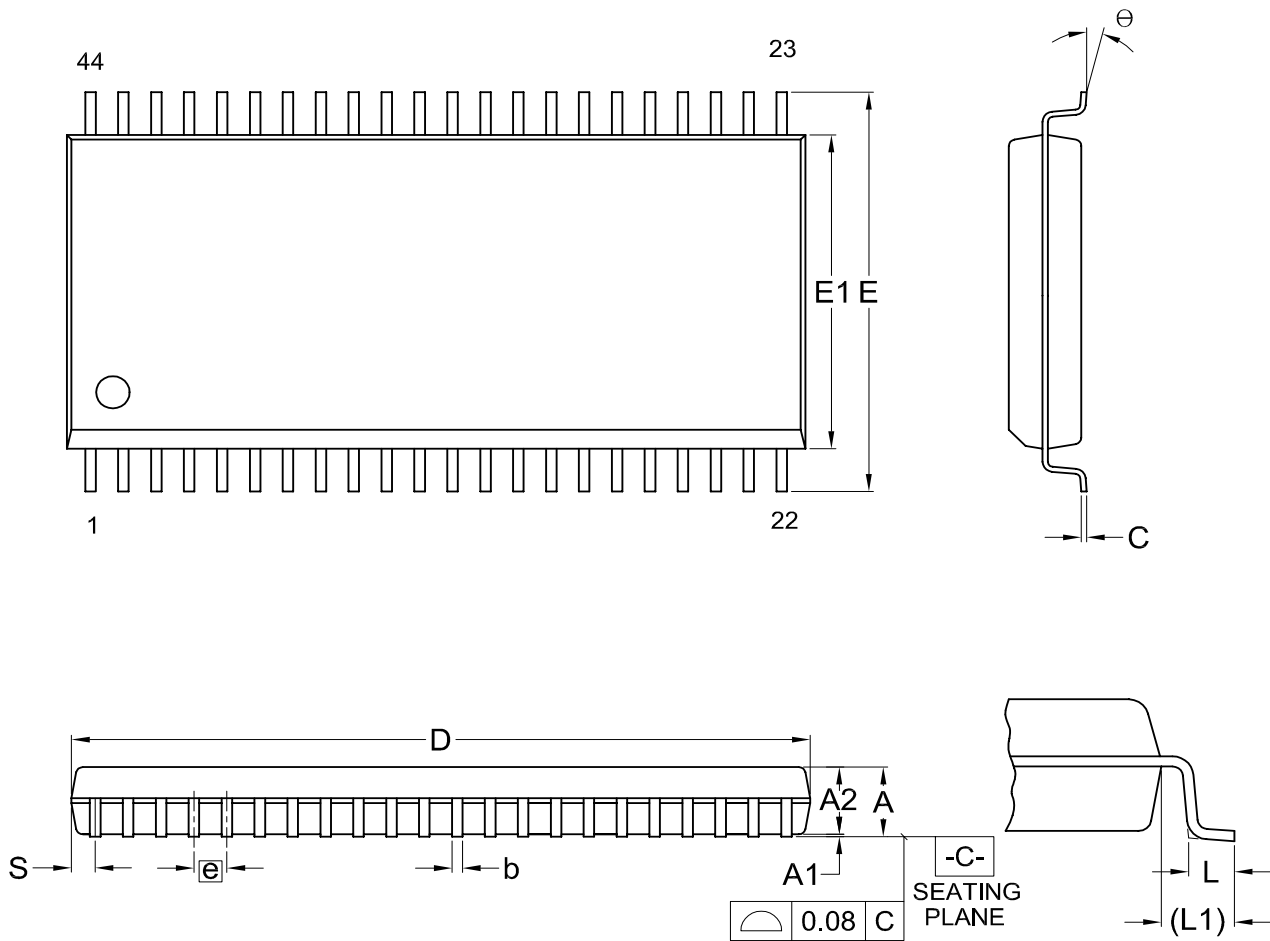
## TIMING DIAGRAM

### RANDOM READ



**PACKAGE INFORMATION**

Title: Package Outline for SOP 44L (500MIL)

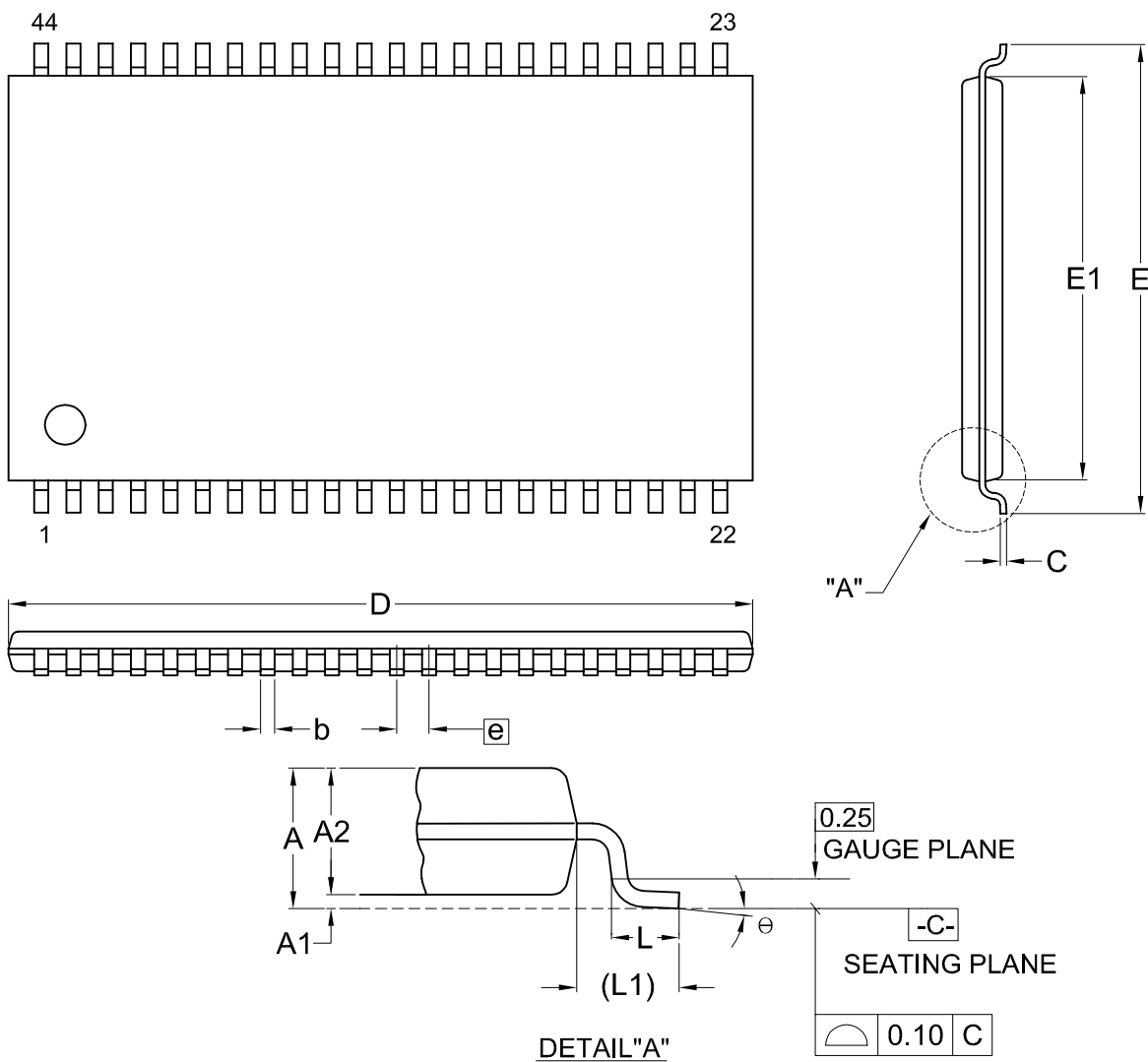


Dimensions (inch dimensions are derived from the original mm dimensions)

SYMBOL		A	A1	A2	b	C	D	E	E1	e	L	L1	S	θ
UNIT														
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)**

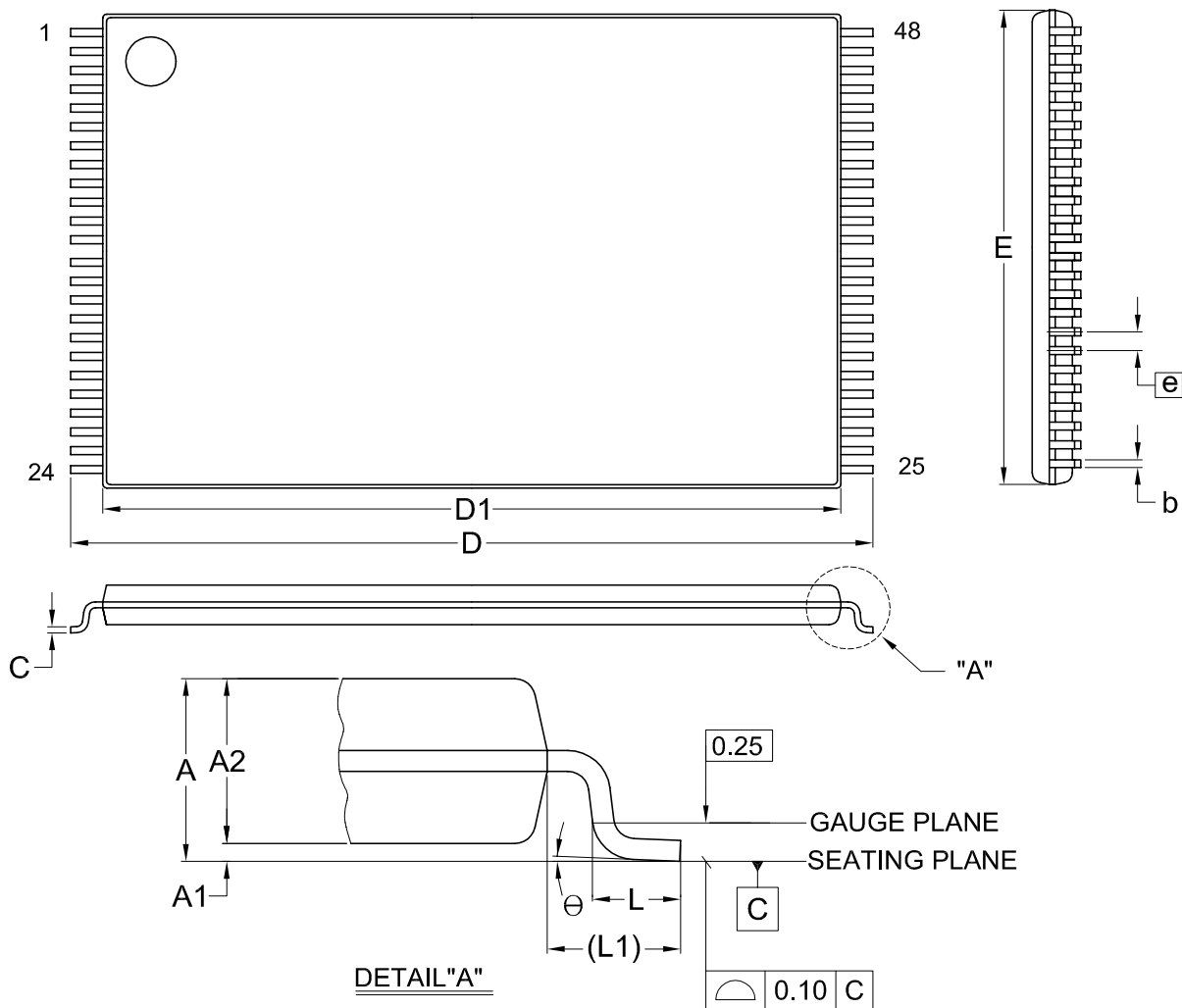


Dimensions (inch dimensions are derived from the original mm dimensions)

SYMBOL		A	A1	A2	b	C	D	E	E1	e	L	L1	θ
UNIT													
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**

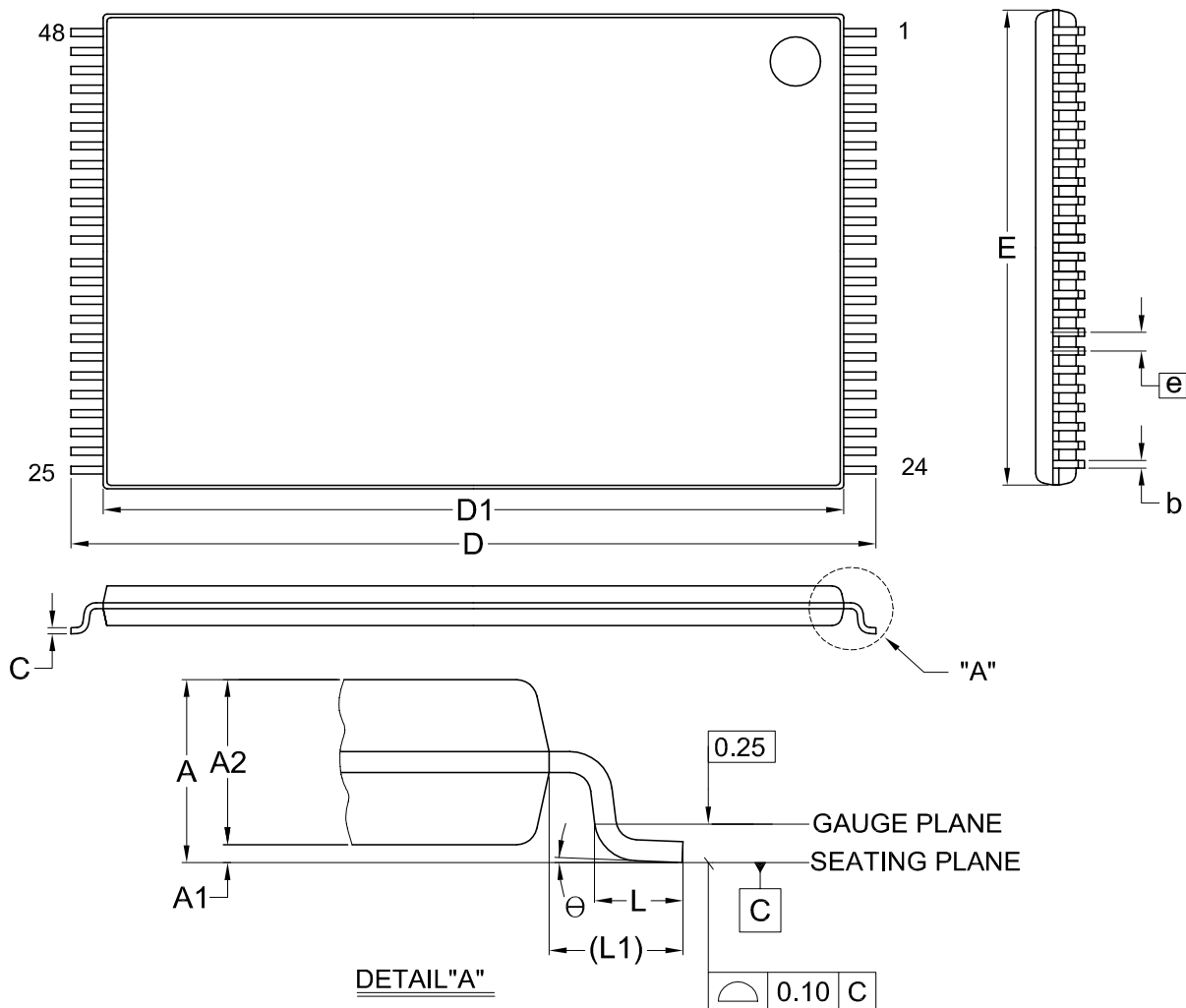


Dimensions (inch dimensions are derived from the original mm dimensions)

SYMBOL		A	A1	A2	b	C	D	D1	E	e	L	L1	$\theta$
UNIT													
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	8	MO-142			2007/08/03

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



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

SYMBOL		A	A1	A2	b	C	D	D1	E	e	L	L1	θ
UNIT													
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	9	MO-142			2007/08/07





**REVISION HISTORY**

<b>REVISION</b>	<b>DESCRIPTION</b>	<b>PAGE</b>	<b>DATE</b>
2.5	AC CHARACTERISTICS tOH 10ns-->0ns	P4	JAN/29/1999
2.6	Add 120ns (max.) for 3.0V~3.6V ; 150ns(max.) for 2.7V~3.6V DC characteristics Standby current (ISTB2):5uA-->15uA AC characteristics 120ns for 3.0V~3.6V	P1, P1,3 P4	Dec/24/1999
2.7	1. Added access time:100ns 2. Modify Package Information	P1,4 P5,6	JUN/28/2001
2.8	1. Added 44-pin TSOP(II)	P1,7	JUL/17/2001
2.9	1. Added access time:70ns & 90ns	P1,4	MAY/14/2002
3.0	Modify Package Information	P5~8	NOV/21/2002
3.1	Change 2.7~3.6V 150ns-->2.7~3.6V 90ns	P1	MAY/19/2004
3.2	1. Added statement	P10	NOV/07/2006



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**MX23L3210**

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