



MX23L3211

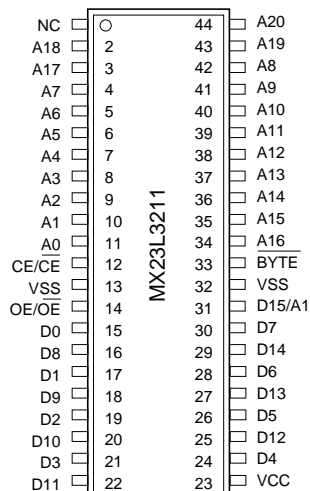
32M-BIT MASK ROM (8/16-BIT OUTPUT)

FEATURES

- Bit organization
 - 4M x 8 (byte mode)
 - 2M x 16 (word mode)
- Fast access time
 - Random access: 70ns (max.)
 - Page access: 25ns (max.)
- Page Size
 - 8 words per page
- Current
 - Operating: 40mA
 - Standby: 5uA
- Supply voltage
 - 3.0V ~ 3.6V for 90ns and 70ns speed grades
 - 2.7V ~ 3.6V for 100ns and 120ns speed grades
- Package
 - 44 pin SOP (500mil)
 - 48 pin TSOP (12mm x 20mm)

PIN CONFIGURATION

44 SOP



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 |

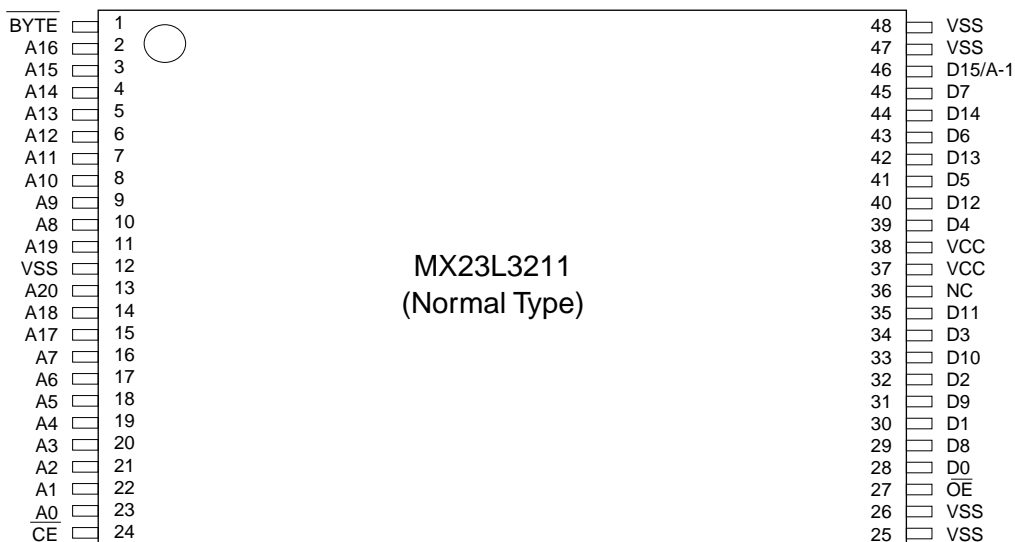
ORDER INFORMATION

| Part No. | Access Time | Page Access Time | Package | Remark |
|-----------------|-------------|------------------|---------------------------|---------|
| MX23L3211MC-70 | 70ns | 25ns | 44 pin SOP | |
| MX23L3211MC-90 | 90ns | 25ns | 44 pin SOP | |
| MX23L3211MC-10 | 100ns | 30ns | 44 pin SOP | |
| MX23L3211MC-12 | 120ns | 50ns | 44 pin SOP | |
| MX23L3211MC-10G | 100ns | 30ns | 44 pin SOP | Pb-free |
| MX23L3211MC-12G | 120ns | 50ns | 44 pin SOP | Pb-free |
| MX23L3211TC-90 | 90ns | 25ns | 48 pin TSOP | |
| MX23L3211TC-10 | 100ns | 30ns | 48 pin TSOP | |
| MX23L3211TC-12 | 120ns | 50ns | 48 pin TSOP | |
| MX23L3211TC-10G | 100ns | 30ns | 48 pin TSOP | Pb-free |
| MX23L3211TC-12G | 120ns | 50ns | 48 pin TSOP | Pb-free |
| MX23L3211RC-90 | 90ns | 25ns | 48 pin TSOP(Reverse type) | |
| MX23L3211RC-10 | 100ns | 30ns | 48 pin TSOP(Reverse type) | |
| MX23L3211RC-12 | 120ns | 50ns | 48 pin TSOP(Reverse type) | |



MX23L3211

48 TSOP (Normal Type)



48 TSOP (Reverse Type)



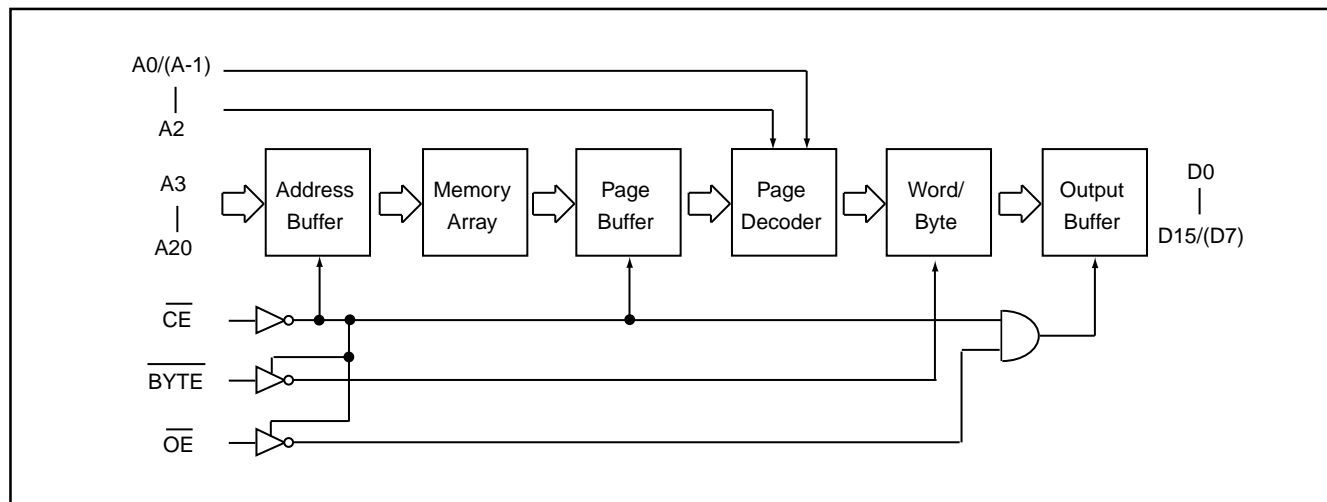
MODE SELECTION

| $\overline{\text{CE}}$ | $\overline{\text{OE}}$ | 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 |



MX23L3211

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

| Item | Symbol | Ratings |
|------------------------------------|------------------|---------------------|
| Supply Voltage Relative to VSS | VCC | -0.3V to 4.3V |
| Voltage on any Pin Relative to VSS | VIN | -0.5V to VCC + 2.0V |
| Ambient Operating Temperature | T _{opr} | 0° C to 70° C |
| Storage Temperature | T _{stg} | -65° C to 125° C |

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

| Item | Symbol | MIN. | MAX. | Conditions |
|------------------------|-------------------|-------|----------|--|
| Output High Voltage | V _{OH} | 2.4V | - | I _{OH} = -400uA |
| Output Low Voltage | V _{OL} | - | 0.4V | I _{OL} = 1.6mA |
| Input High Voltage | V _{IH} | 2.2V | VCC+0.3V | |
| Input Low Voltage | V _{IL} | -0.3V | 0.8V | |
| Input Leakage Current | I _{LI} | - | 5uA | 0V, VCC |
| Output Leakage Current | I _{LO} | - | 5uA | 0V, VCC |
| Operating Current | I _{CC1} | - | 40mA | t _{RC} = 100ns, all output open |
| Standby Current (TTL) | I _{STB1} | - | 1mA | \overline{CE} = V _{IH} |
| Standby Current (CMOS) | I _{STB2} | - | 5uA | \overline{CE} > VCC-0.2V |
| Input Capacitance | C _{IN} | - | 10pF | T _a = 25° C, f = 1MHZ |
| Output Capacitance | C _{OUT} | - | 10pF | T _a = 25° C, f = 1MHZ |



MX23L3211

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

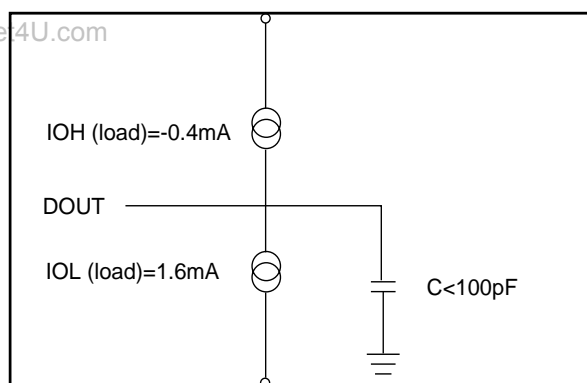
| Item | Symbol | 23L3211-70* | | 23L3211-90 | | 23L3211-10 | | 23L3211-12 | |
|---------------------------|--------|-------------|------|------------|------|------------|-------|------------|-------|
| | | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. |
| Read Cycle Time | tRC | 70ns | - | 90ns | - | 100ns | - | 120ns | - |
| Address Access Time | tAA | - | 70ns | - | 90ns | - | 100ns | - | 120ns |
| Chip Enable Access Time | tACE | - | 70ns | - | 90ns | - | 100ns | - | 120ns |
| Page Mode Access Time | tPA | - | 25ns | - | 25ns | - | 30ns | - | 50ns |
| Output Enable Time | tOE | - | 25ns | - | 25ns | - | 30ns | - | 50ns |
| Output Hold After Address | tOH | 0ns | - | 0ns | - | 0ns | - | 0ns | - |
| Output High Z Delay | tHZ* | - | 20ns | - | 20ns | - | 20ns | - | 20ns |

Note:

- Output high-impedance delay (tHZ) is measured from \overline{OE} or \overline{CE} going high, and this parameter guaranteed by design over the full voltage and temperature operating range - not tested.
- For 70ns speed grade, the VCC range is 3.0~3.6V, operating temperature 0~55° C, and output load is 30pF.

AC Test Conditions

| | |
|---------------------------|------------|
| Input Pulse Levels | 0.4V~ 2.6V |
| Input Rise and Fall Times | 10ns |
| Input Timing Level | 1.4V |
| Output Timing Level | 1.4V |
| Output Load | See Figure |



Note:

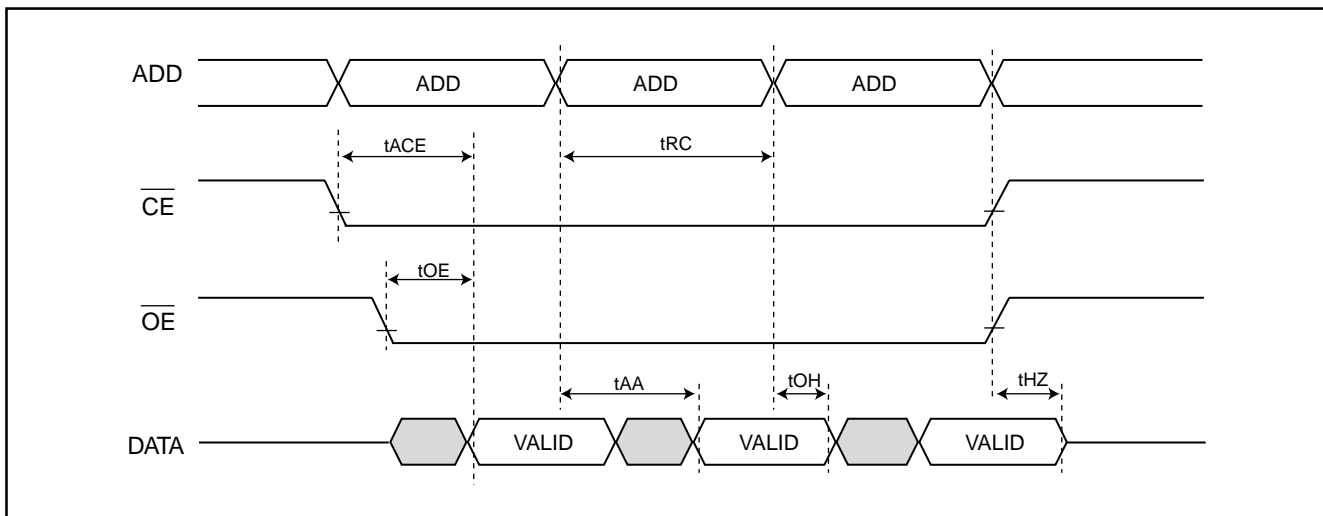
- No output loading is present in tester load board.
- Active loading is used and under software programming control.
- Output loading capacitance includes load board's and all stray capacitance.



MX23L3211

TIMING DIAGRAM

RANDOM READ

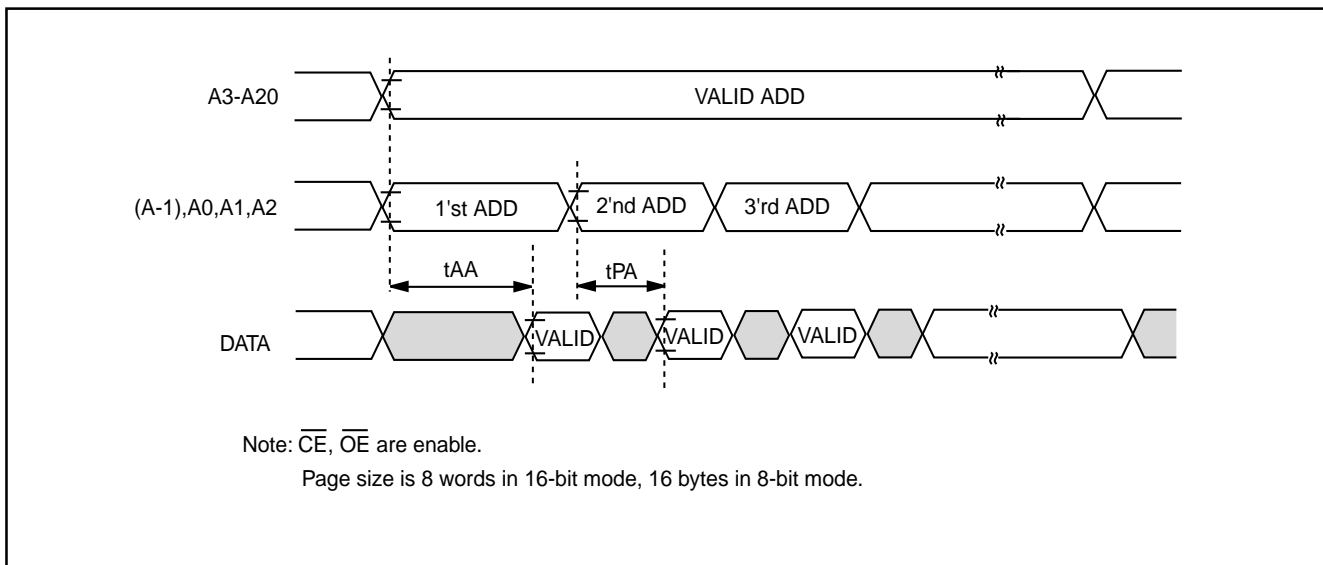


et4U.com

DataShee

PAGE READ

DataSheet4U.com

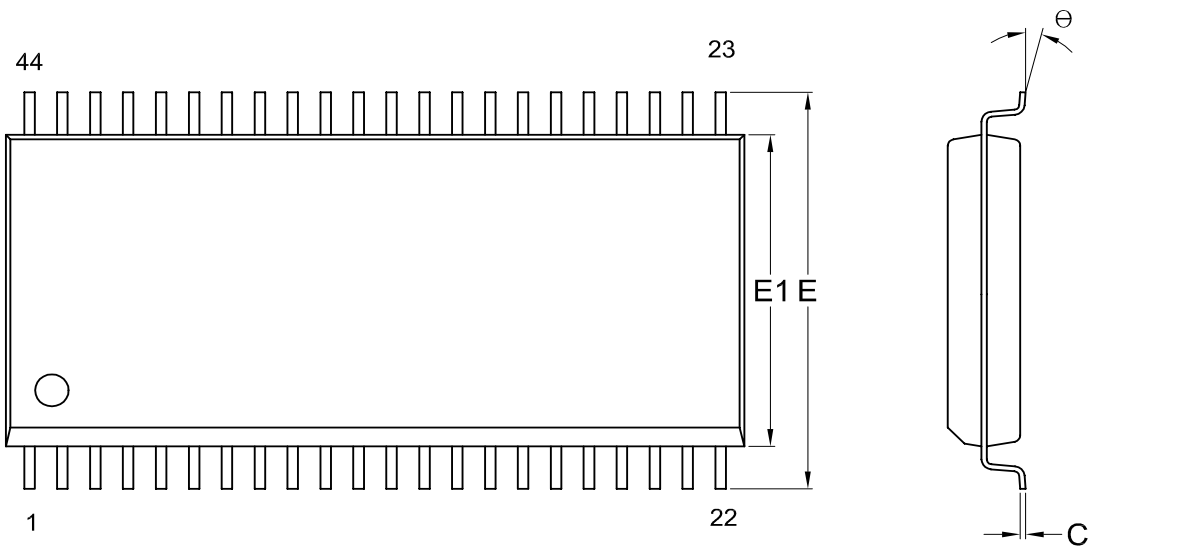




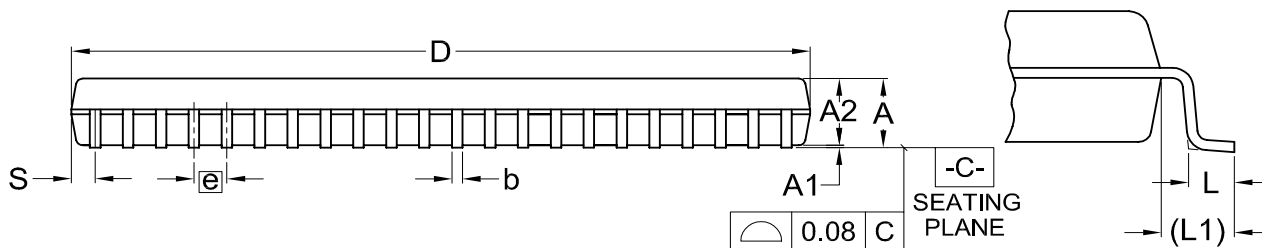
MX23L3211

PACKAGE INFORMATION

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



DataSheet4U.com



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

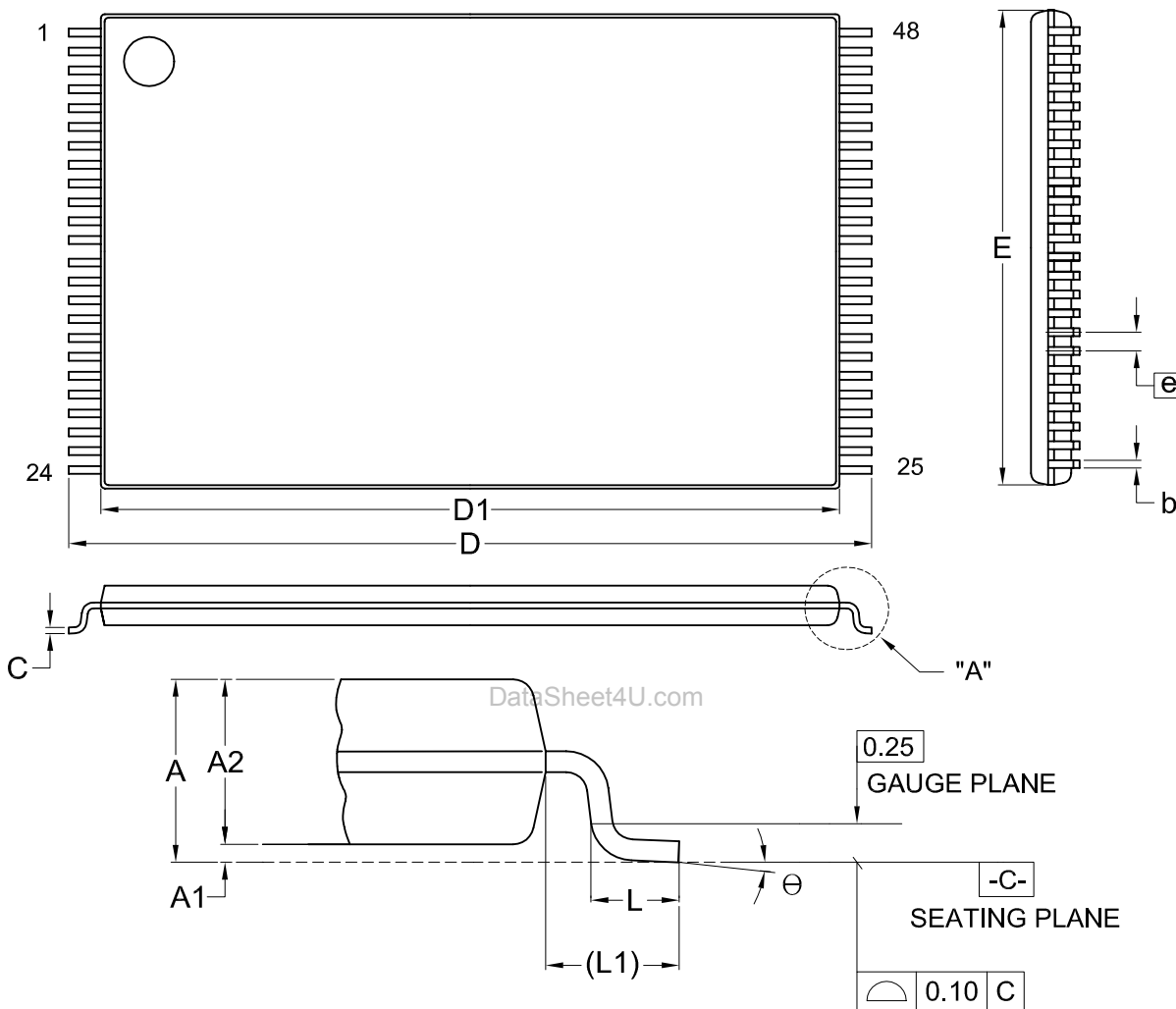
| SYMBOL | | A | A1 | A2 | b | C | D | E | E1 | e | L | L1 | S | θ |
|--------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----|
| UNIT | | | | | | | | | | | | | | |
| mm | Min. | --- | 0.10 | 2.59 | 0.36 | 0.15 | 28.37 | 15.83 | 12.47 | | 0.56 | 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 |



MX23L3211

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



DETAIL "A"

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

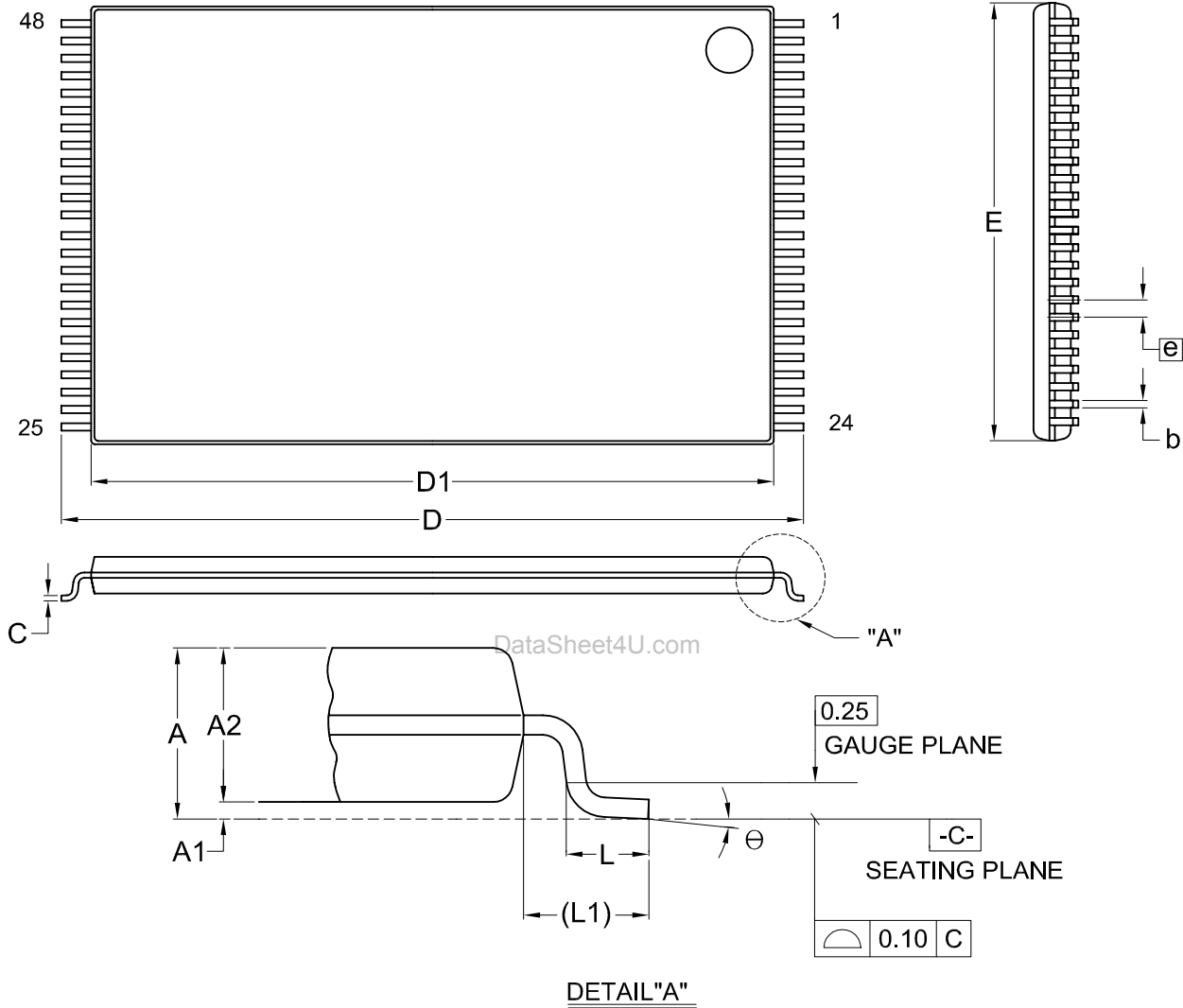
| SYMBOL | | A | A1 | A2 | b | C | D | D1 | E | e | L | L1 | θ |
|--------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|
| UNIT | | | | | | | | | | | | | |
| mm | Min. | --- | 0.05 | 0.95 | 0.17 | 0.10 | 19.80 | 18.30 | 11.90 | | 0.50 | 0.70 | 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 | 7 | MO-142 | | | 12-01-'03 |



MX23L3211

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 | 7 | MO-142 | | | 12-01-08 |



REVISION HISTORY

| REVISION | DESCRIPTION | PAGE | DATE |
|----------|---|----------|-------------|
| 2.0 | Output hold after address (tOH) spec is revised as 0ns(min.) 120ns speed grade's voltage range is revised as 2.7V~3.6V | P4 P1 | JAN/22/1999 |
| 2.1 | Modify Package Information | P6~7 | JUL/17/2001 |
| 2.2 | 1. Add supply voltage relative to VSS 2. Change voltage on any pin relative to VSS:-0.5V to VCC+2.0 | P3 P3 | JUL/25/2002 |
| 2.3 | 1. Supply voltage change to 2.7V ~ 3.6V | P1 | JUL/26/2002 |
| 2.4 | 1. Modify VIN : -0.5V to VCC + 2V --> -0.5V to VCC + 2.0V 2. Add 48-TSOP reverse type package information | P3 P8 | AUG/21/2002 |
| 2.5 | To modify Package Information | P6~8 | NOV/21/2002 |
| 2.6 | 1. Add access time:70ns, 90ns | P1,4 | JAN/20/2003 |
| 2.7 | 1. Add MX23L3211MC-90 in Order Information | P1 | JAN/22/2003 |
| 2.8 | 1. Modify Timing Diagram--Page Read | P5 | JAN/23/2003 |
| 2.9 | 1. Add Pb-free package in order information | P1 | MAY/11/2004 |



MX23L3211

et4U.com

DataSheet4U.com

MACRONIX INTERNATIONAL Co., LTD.

HEADQUARTERS:

TEL:+886-3-578-6688

FAX:+886-3-563-2888

EUROPE OFFICE:

TEL:+32-2-456-8020

FAX:+32-2-456-8021

JAPAN OFFICE:

TEL:+81-44-246-9100

FAX:+81-44-246-9105

SINGAPORE OFFICE:

TEL:+65-348-8385

FAX:+65-348-8096

TAIPEI OFFICE:

TEL:+886-2-2509-3300

FAX:+886-2-2509-2200

MACRONIX AMERICA, INC.

TEL:+1-408-453-8088

FAX:+1-408-453-8488

CHICAGO OFFICE:

TEL:+1-847-963-1900

FAX:+1-847-963-1909

DataSheet4U.com [http : //www.macronix.com](http://www.macronix.com)

www.DataSheet4U.com