

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

FEATURES

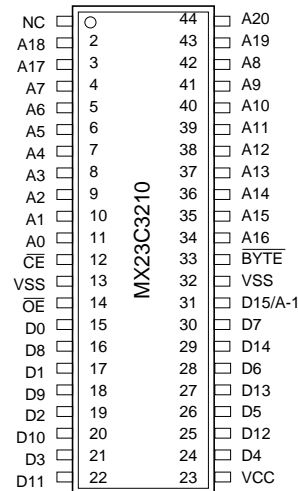
- Bit organization
 - 4M x 8 (byte mode)
 - 2M x 16 (word mode)
- Fast access time
 - Random access: 100ns (max.)
- Current
 - Operating: 60mA
 - Standby: 100uA
- Supply voltage
 - 5V±10%
- Package
 - 44 pin SOP (500mil)
 - 48 pin TSOP (12mm x 20mm)
 - 42 pin DIP (600 mil) (word mode)
 - 44 pin TSOP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

PIN DESCRIPTION

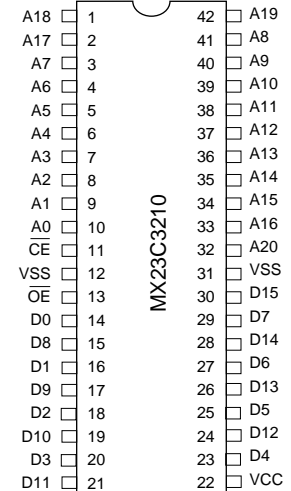
| Symbol | Pin Function |
|---------|--|
| A0~A20 | Address Inputs |
| D0~D14 | Data Outputs |
| D15/A-1 | D15 (Word Mode)/ LSB Address (Byte Mode) |
| CE | Chip Enable Input |
| OE | Output Enable Input |
| Byte | Word/ Byte Mode Selection |
| VCC | Power Supply Pin |
| VSS | Ground Pin |
| NC | No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

PIN CONFIGURATION

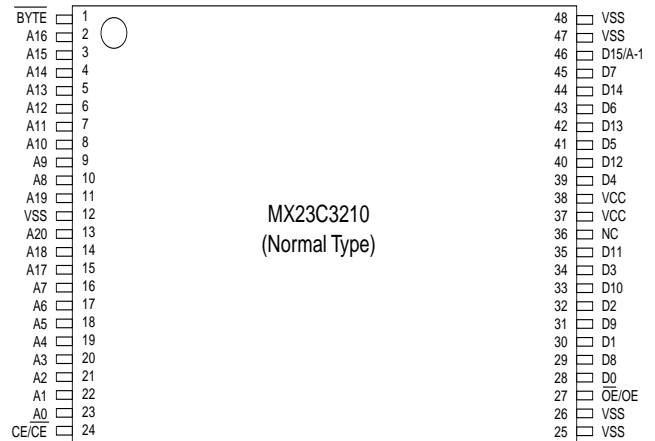
44 SOP/44 TSOP



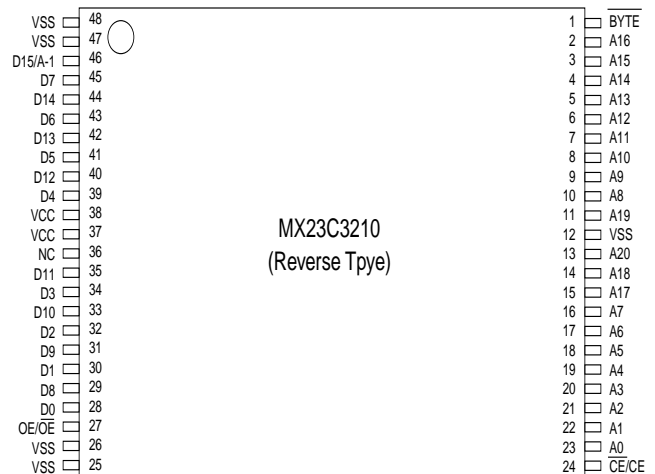
42 DIP (For Word Mode Only)



48 TSOP (Normal Type)



48 TSOP (Reverse Type)



ORDER INFORMATION

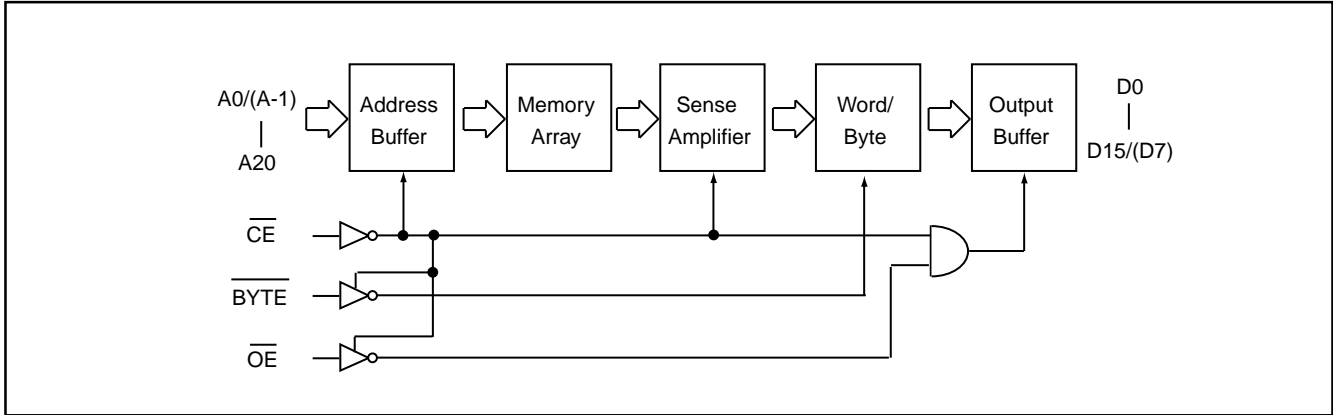
| Part No. | Access | Package | Remark |
|-----------------|--------|----------------------------|---------|
| MX23C3210MC-10 | 100ns | 44 pin SOP | |
| MX23C3210MC-12 | 120ns | 44 pin SOP | |
| MX23C3210MC-15 | 150ns | 44 pin SOP | |
| MX23C3210TC-10 | 100ns | 48 pin TSOP | |
| MX23C3210TC-12 | 120ns | 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 | T _{opr} | -40°C to 85°C |
| Storage Temperature | T _{stg} | -65°C to 125°C |

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

| Item | Symbol | MIN. | MAX. | Conditions |
|------------------------|--------|-------|----------|--|
| Output High Voltage | VOH | 2.4V | - | I _{OH} = -1.0mA |
| Output Low Voltage | VOL | - | 0.4V | I _{OL} = 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 | t _{RC} = 100ns, all output open |
| Standby Current (TTL) | ISTB1 | - | 1mA | CE = VIH |
| Standby Current (cmos) | ISTB2 | - | 100uA | CE > VCC-0.2V |
| Input Capacitance | CIN | - | 10pF | T _a = 25°C, f = 1MHZ |
| Output Capacitance | COUT | - | 10pF | T _a = 25°C, f = 1MHZ |

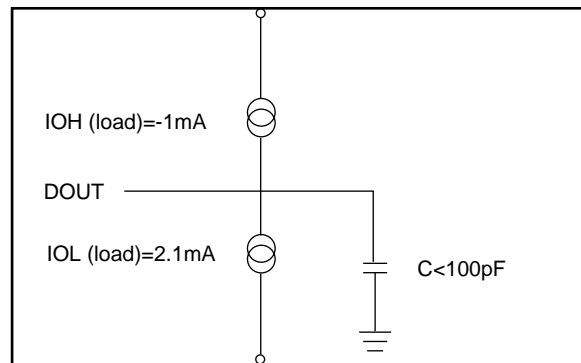
AC CHARACTERISTICS (Ta = -40°C ~ 85°C, VCC = 5V±10%)

| 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 \overline{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 | 1.5V |
| Output Timing Level | 0.8V and 2.0V |
| Output Load | See Figure |



Note:

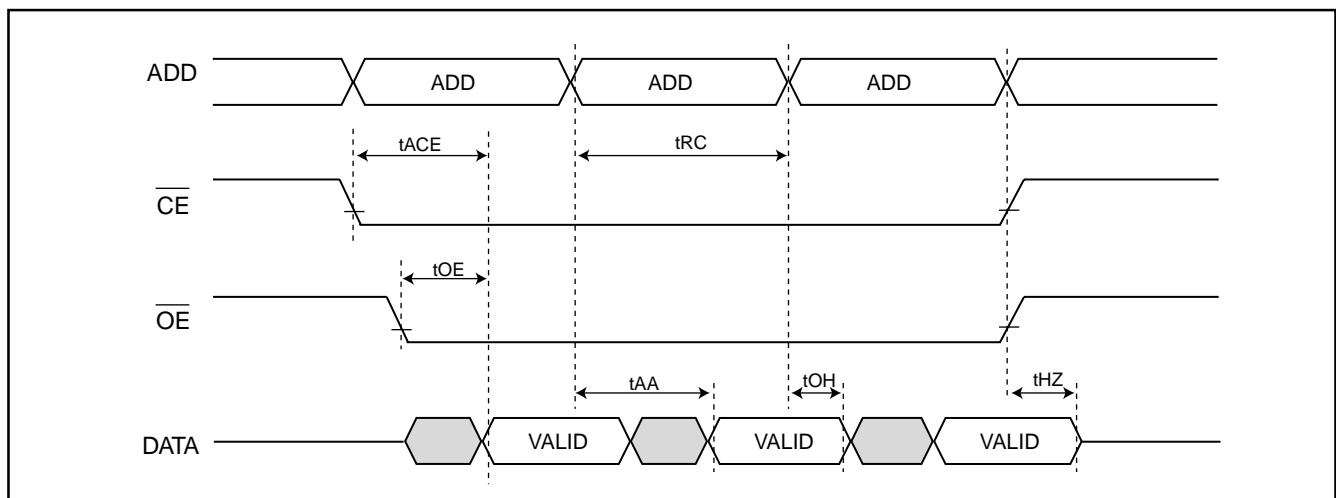
No output loading is present in tester load board.

Active loading is used and under software programming control.

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

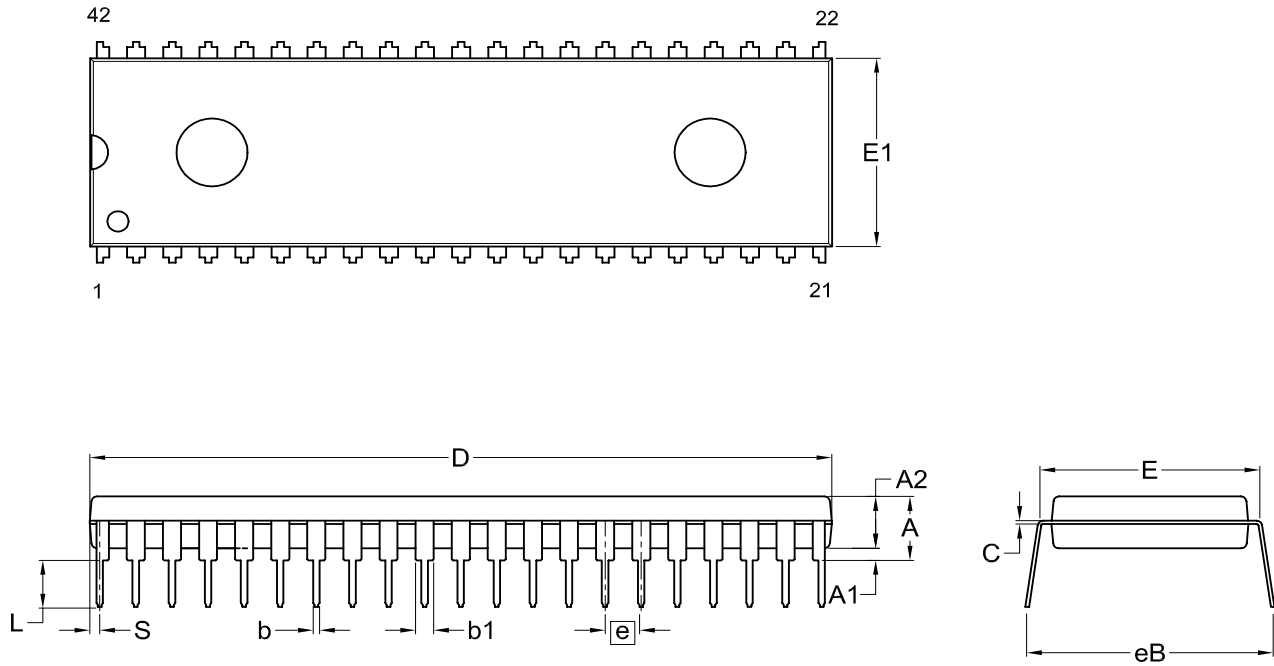
TIMING DIAGRAM

RANDOM READ



PACKAGE INFORMATION

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

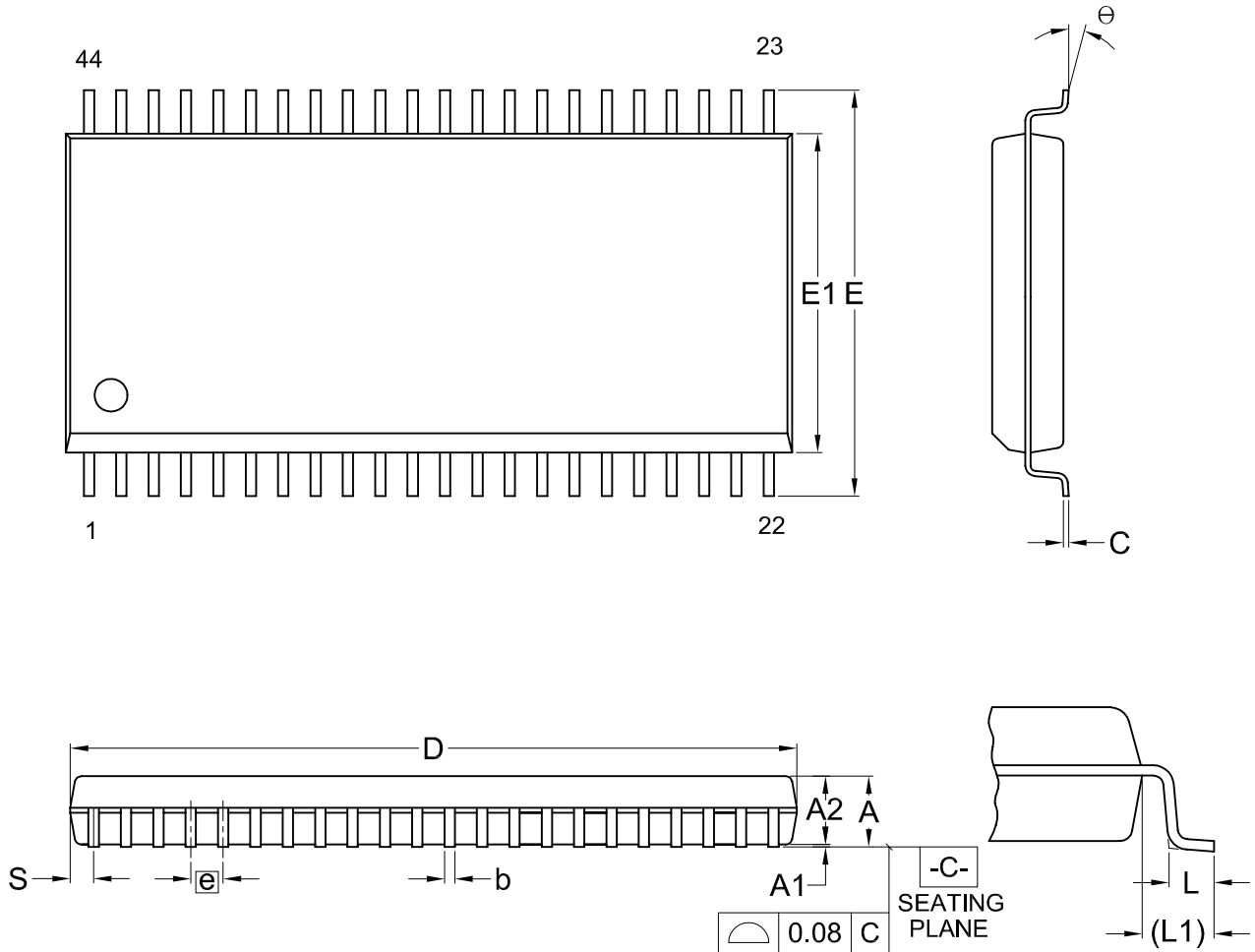


Dimensions (inch dimensions are derived from the original mm dimensions)

| SYMBOL | | A | A1 | A2 | b | b1 | C | D | E | E1 | e | eB | L | S |
|--------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| UNIT | | | | | | | | | | | | | | |
| 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)

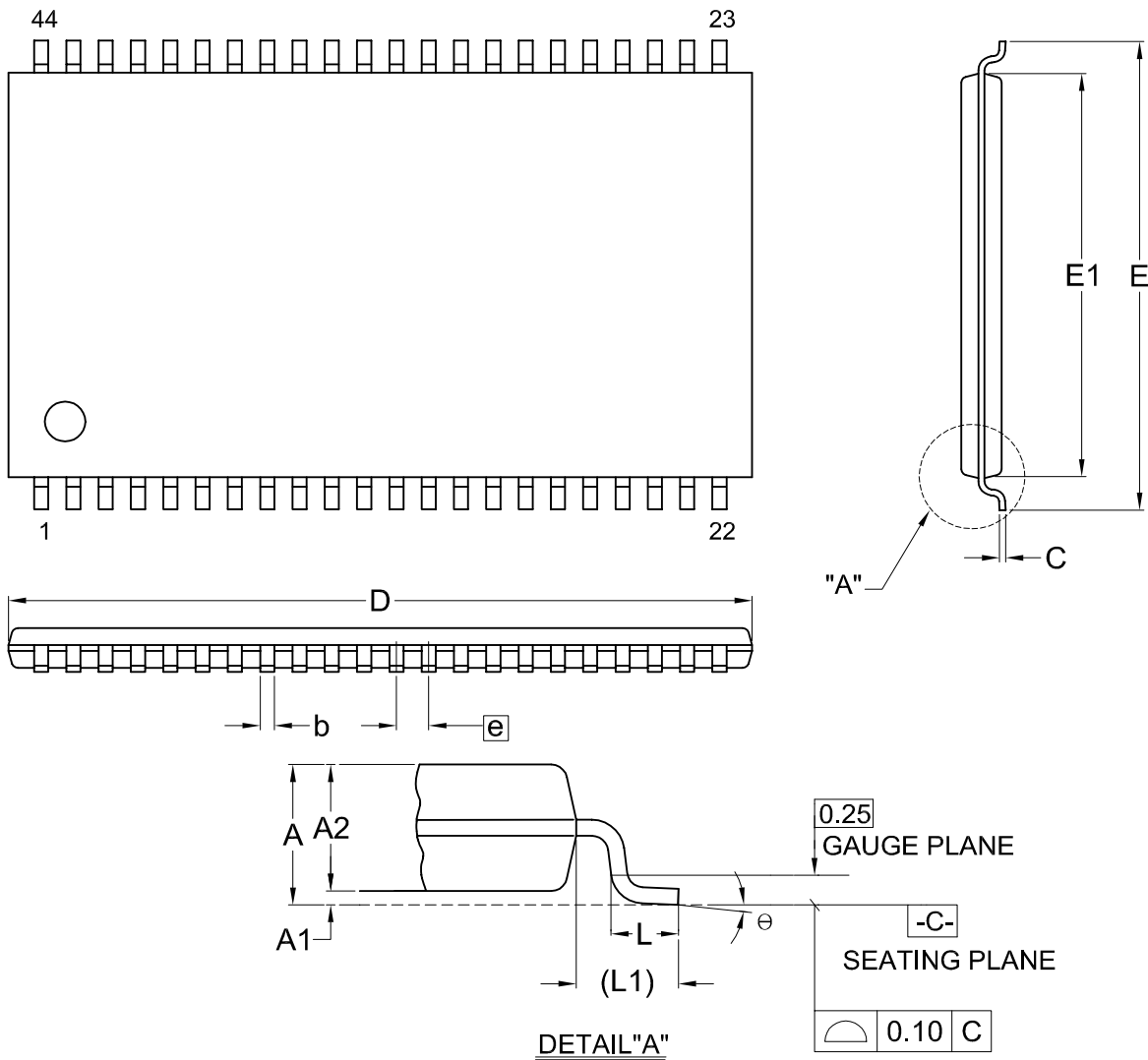


Dimensions (inch dimensions are derived from the original mm dimensions)

| SYMBOL | | 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)

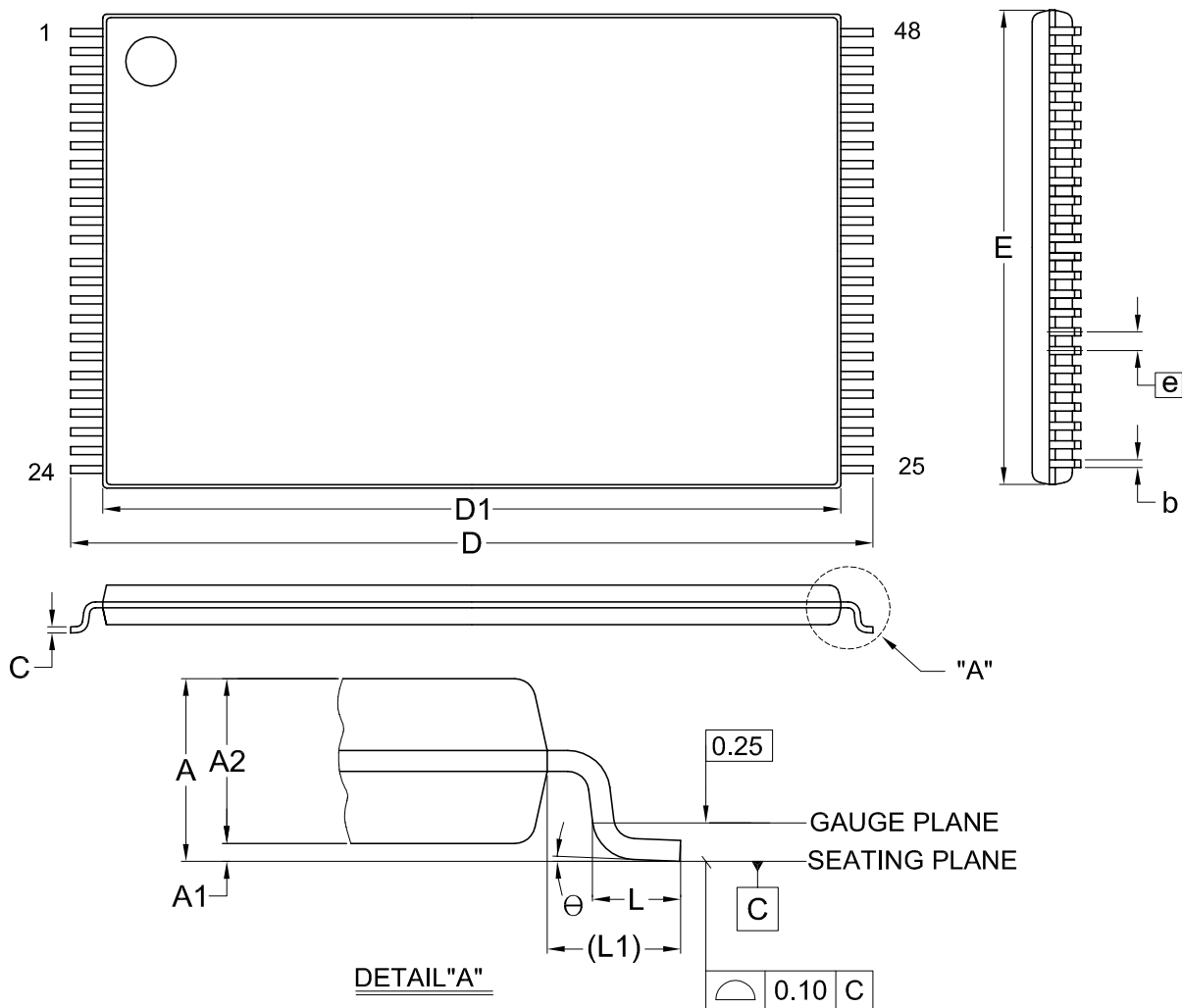


Dimensions (inch dimensions are derived from the original mm dimensions)

| SYMBOL | | A | A1 | A2 | b | C | D | E | E1 | e | L | L1 | θ |
|--------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| 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

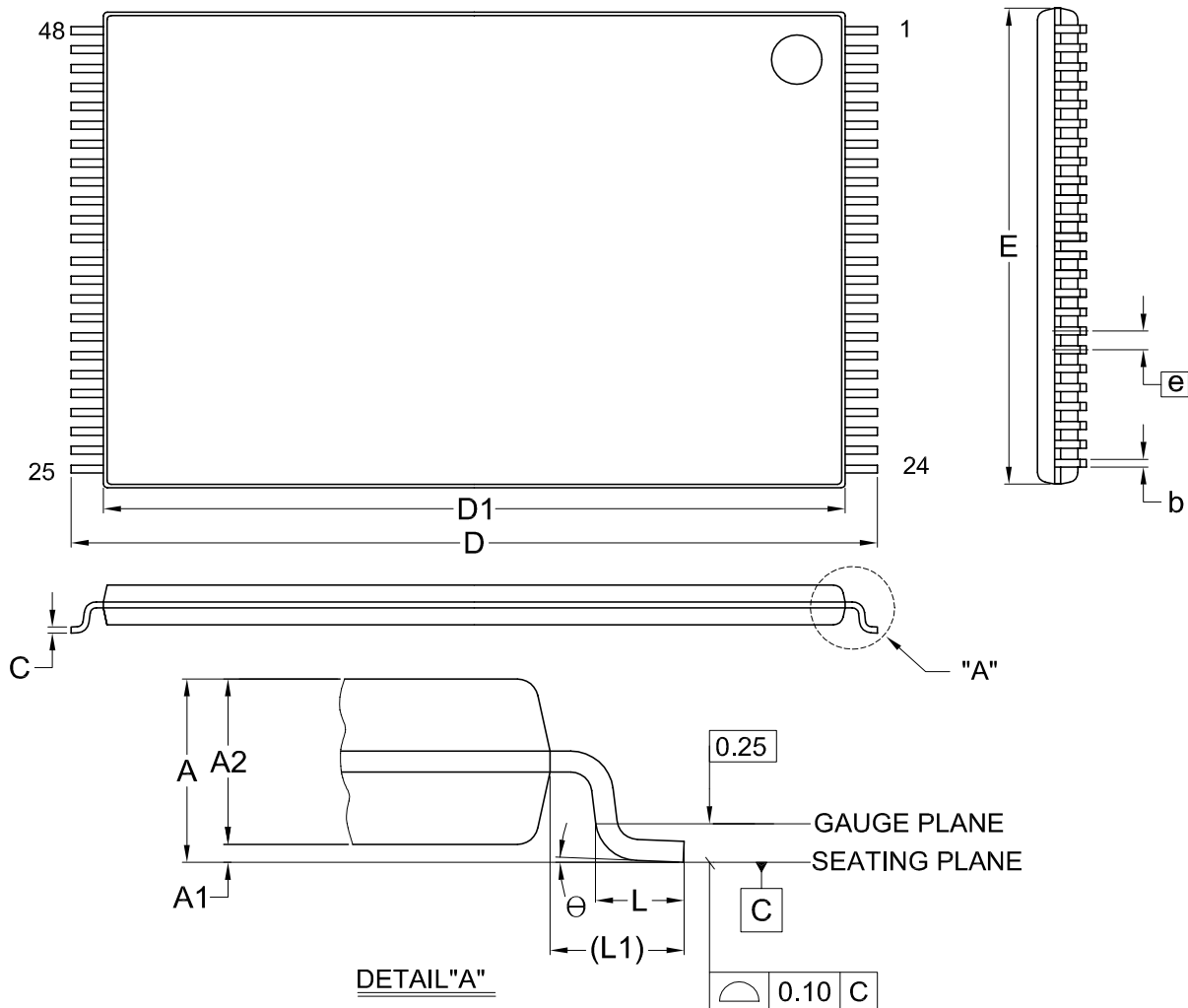


Dimensions (inch dimensions are derived from the original mm dimensions)

| SYMBOL | | A | A1 | A2 | b | C | D | D1 | E | e | L | L1 | 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 | 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

| 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. 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. | | MAR/25/1998 |
| 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 Added 44-pin TSOP(Type II) Package | P5~7 P1,8 | JUL/17/2001 |
| 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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MX23C3210

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