

Octal Buffer/Line Driver with 3-State Outputs

74AC240, 74ACT240

General Description

The AC240/ACT240 is an octal buffer and line driver designed to be employed as memory and address driver, clock drivers and bus oriented transmitter or receiver which provides improved PC board density.

Features

- I_{CC} and I_{OZ} Reduced by 50%
- Inverting 3-State Outputs drive Bus Lines or Buffer Memory Address Registers
- Outputs Source/Sink 24 mA
- ACT240 has TTL-compatible Inputs
- These are Pb-Free Devices

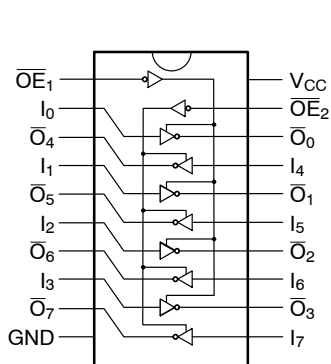


Figure 1. Connection Diagram

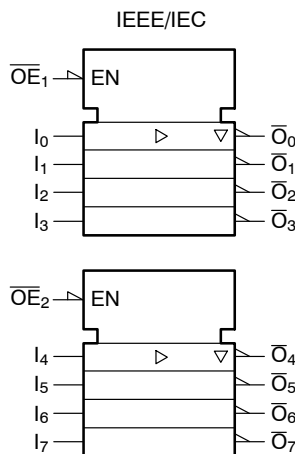
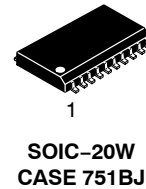
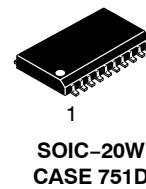
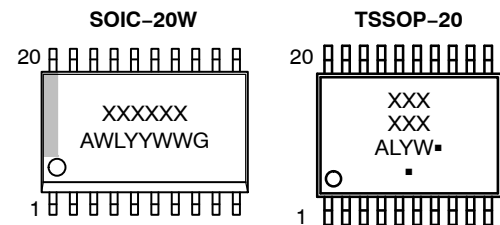


Figure 2. Logic Symbol



MARKING DIAGRAMS



- XXX = Specific Device Code
 - A = Assembly Location
 - WL, L = Wafer Lot
 - YY, Y = Year
 - WW, W = Work Week
 - G or ■ = Pb-Free Package
- (Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

TRUTH TABLES

| Inputs | | Outputs (Pins 12, 14, 16, 18) |
|-------------------|-------|----------------------------------|
| \overline{OE}_1 | I_n | |
| L | L | H |
| L | H | L |
| H | X | Z |

| Inputs | | Outputs (Pins 3, 5, 7, 9) |
|-------------------|-------|------------------------------|
| \overline{OE}_2 | I_n | |
| L | L | H |
| L | H | L |
| H | X | Z |

NOTE: H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial
Z = High Impedance

PIN DESCRIPTION

| Pin Names | Description |
|------------------------------------|------------------------------|
| $\overline{OE}_1, \overline{OE}_2$ | 3-State Output Enable Inputs |
| I_0-I_7 | Inputs |
| $\overline{O}_0-\overline{O}_7$ | Outputs |

74AC240, 74ACT240

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Rating | Unit |
|-----------------------|---|------------------------|--------------------|
| V_{CC} | Supply Voltage | -0.5 to +6.5 | V |
| I_{IK} | DC Input Diode Current $V_I = -0.5\text{ V}$ $V_I = V_{CC} + 0.5\text{ V}$ | -20 +20 | mA |
| V_I | DC Input Voltage | -0.5 to $V_{CC} + 0.5$ | V |
| I_{OK} | DC Output Diode Current $V_O = -0.5\text{ V}$ $V_O = V_{CC} + 0.5\text{ V}$ | -20 +20 | mA |
| V_O | DC Output Voltage | -0.5 to $V_{CC} + 0.5$ | V |
| I_O | DC Output Source or Sink Current | ± 50 | mA |
| I_{CC} or I_{GND} | DC V_{CC} or Ground Current per Output Pin | ± 50 | mA |
| T_{STG} | Storage Temperature | -65 to +150 | $^{\circ}\text{C}$ |
| T_J | Junction Temperature | 140 | $^{\circ}\text{C}$ |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Min | Max | Unit |
|---------------------|--|------------|------------|--------------------|
| V_{CC} | Supply Voltage AC ACT | 2.0 4.5 | 6.0 5.5 | V |
| V_I | Input Voltage | 0 | V_{CC} | V |
| V_O | Output Voltage | 0 | V_{CC} | V |
| T_A | Operating Temperature | -40 | 85 | $^{\circ}\text{C}$ |
| $\Delta V/\Delta t$ | Minimum Input Edge Rate, AC Devices: V_{IN} from 30% to 70% V_{CC} , V_{CC} @ 3.3 V, 4.5 V, 5.5 V | 125 | | mV/ns |
| $\Delta V/\Delta t$ | Minimum Input Edge Rate, ACT Devices: V_{IN} from 0.8 V to 2.0 V, V_{CC} @ 4.5 V, 5.5 V | 125 | | mV/ns |

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

74AC240, 74ACT240

DC ELECTRICAL CHARACTERISTICS FOR AC

| Symbol | Parameter | V _{CC} (V) | Conditions | T _A = +25°C | | T _A = -40°C to +85°C | | Unit |
|-----------------------------|---|---------------------|--|------------------------|-------------------|---------------------------------|--|------|
| | | | | Typ | Guaranteed Limits | | | |
| V _{IH} | Minimum HIGH Level Input Voltage | 3.0 | V _{OUT} = 0.1 V or V _{CC} - 0.1 V | 1.5 | 2.1 | 2.1 | | V |
| | | 4.5 | | 2.25 | 3.15 | 3.15 | | |
| | | 5.5 | | 2.75 | 3.85 | 3.85 | | |
| V _{IL} | Maximum LOW Level Input Voltage | 3.0 | V _{OUT} = 0.1 V or V _{CC} - 0.1 V | 1.5 | 0.9 | 0.9 | | V |
| | | 4.5 | | 2.25 | 1.35 | 1.35 | | |
| | | 5.5 | | 2.75 | 1.65 | 1.65 | | |
| V _{OH} | Minimum HIGH Level Output Voltage | 3.0 | I _{OUT} = -50 μA | 2.99 | 2.9 | 2.9 | | V |
| | | 4.5 | | 4.49 | 4.4 | 4.4 | | |
| | | 5.5 | | 5.49 | 5.4 | 5.4 | | |
| | | 3.0 | V _{IN} = V _{IL} or V _{IH} , I _{OH} = -12 mA | | 2.56 | 2.46 | | |
| | | 4.5 | | 3.86 | 3.76 | | | |
| | | 5.5 | | 4.86 | 4.76 | | | |
| V _{OL} | Maximum LOW Level Output Voltage | 3.0 | I _{OUT} = 50 μA | 0.002 | 0.1 | 0.1 | | V |
| | | 4.5 | | 0.001 | 0.1 | 0.1 | | |
| | | 5.5 | | 0.001 | 0.1 | 0.1 | | |
| | | 3.0 | V _{IN} = V _{IL} or V _{IH} , I _{OL} = 12 mA | | 0.36 | 0.44 | | |
| | | 4.5 | | 0.36 | 0.44 | | | |
| | | 5.5 | | 0.36 | 0.44 | | | |
| I _{IN} (Note 2) | Maximum Input Leakage Current | 5.5 | V _I = V _{CC} , GND | | ±0.1 | ±1.0 | | μA |
| I _{OZ} | Maximum 3-STATE Leakage Current | 5.5 | V _I (OE) = V _{IL} , V _{IH} ; V _I = V _{CC} , GND; V _O = V _{CC} , GND | | ±0.25 | ±2.5 | | μA |
| I _{OLD} | Minimum Dynamic Output Current (Note 3) | 5.5 | V _{OLD} = 1.65 V Max. | | | 75 | | mA |
| I _{OHD} | | 5.5 | V _{OHD} = 3.85 V Min. | | | -75 | | mA |
| I _{CC} (Note 2) | Maximum Quiescent Supply Current | 5.5 | V _{IN} = V _{CC} or GND | | 4.0 | 40.0 | | μA |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. All outputs loaded; thresholds on input associated with output under test.
2. I_{IN} and I_{CC} @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V_{CC}.
3. Maximum test duration 2.0 ms, one output loaded at a time.

74AC240, 74ACT240

DC ELECTRICAL CHARACTERISTICS FOR ACT

| Symbol | Parameter | V _{CC} (V) | Conditions | T _A = +25°C | | T _A = -40°C to +85°C | | Unit |
|------------------|---|---------------------|---|--|-------------------|---------------------------------|------|------|
| | | | | Typ | Guaranteed Limits | | | |
| V _{IH} | Minimum HIGH Level Input Voltage | 4.5 | V _{OUT} = 0.1 V or V _{CC} - 0.1 V | 1.5 | 2.0 | 2.0 | | V |
| | | 5.5 | | 1.5 | 2.0 | 2.0 | | |
| V _{IL} | Maximum LOW Level Input Voltage | 4.5 | V _{OUT} = 0.1 V or V _{CC} - 0.1 V | 1.5 | 0.8 | 0.8 | | V |
| | | 5.5 | | 1.5 | 0.8 | 0.8 | | |
| V _{OH} | Minimum HIGH Level Output Voltage | 4.5 | I _{OUT} = -50 μA | 4.49 | 4.4 | 4.4 | | V |
| | | 5.5 | | 5.49 | 5.4 | 5.4 | | |
| | | 4.5 | V _{IN} = V _{IL} or V _{IH} , I _{OH} = -24 mA | | 3.86 | 3.76 | | |
| | | 5.5 | | V _{IN} = V _{IL} or V _{IH} , I _{OH} = -24 mA (Note 4) | | 4.86 | 4.76 | |
| V _{OL} | Maximum LOW Level Output Voltage | 4.5 | I _{OUT} = 50 μA | 0.001 | 0.1 | 0.1 | | V |
| | | 5.5 | | 0.001 | 0.1 | 0.1 | | |
| | | 4.5 | V _{IN} = V _{IL} or V _{IH} , I _{OL} = 24 mA | | 0.36 | 0.44 | | |
| | | 5.5 | | V _{IN} = V _{IL} or V _{IH} , I _{OL} = 24 mA (Note 4) | | 0.36 | 0.44 | |
| I _{IN} | Maximum Input Leakage Current | 5.5 | V _I = V _{CC} , GND | | ±0.1 | ±1.0 | | μA |
| I _{OZ} | Maximum 3-STATE Leakage Current | 5.5 | V _I = V _{IL} , V _{IH} , V _O = V _{CC} , GND | | ±0.25 | ±2.5 | | μA |
| I _{CCT} | Maximum I _{CC} /Input | 5.5 | V _I = V _{CC} - 2.1 V | 0.6 | | 1.5 | | mA |
| I _{OLD} | Minimum Dynamic Output Current (Note 5) | 5.5 | V _{OLD} = 1.65 V Max. | | | 75 | | mA |
| I _{OHD} | | 5.5 | V _{OHD} = 3.85 V Min. | | | -75 | | mA |
| I _{CC} | Maximum Quiescent Supply Current | 5.5 | V _{IN} = V _{CC} or GND | | 4.0 | 40.0 | | μA |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. All outputs loaded; thresholds on input associated with output under test.
5. Maximum test duration 2.0 ms, one output loaded at a time.

74AC240, 74ACT240

AC ELECTRICAL CHARACTERISTICS FOR AC

| Symbol | Parameter | V _{CC} (V) (Note 6) | T _A = +25°C, C _L = 50 pF | | | T _A = -40°C to +85°C, C _L = 50 pF | | Unit |
|------------------|-----------------------------------|---------------------------------|--|-----|------|---|------|------|
| | | | Min | Typ | Max | Min | Max | |
| t _{PLH} | Propagation Delay, Data to Output | 3.3 | 1.5 | 6.0 | 8.0 | 1.0 | 9.0 | ns |
| | | 5.0 | 1.5 | 4.5 | 6.5 | 1.0 | 7.0 | |
| t _{PHL} | Propagation Delay, Data to Output | 3.3 | 1.5 | 5.5 | 8.0 | 1.0 | 8.5 | ns |
| | | 5.0 | 1.5 | 4.5 | 6.0 | 1.0 | 6.5 | |
| t _{PZH} | Output Enable Time | 3.3 | 1.5 | 6.0 | 10.5 | 1.0 | 11.0 | ns |
| | | 5.0 | 1.5 | 5.0 | 7.0 | 1.0 | 8.0 | |
| t _{PZL} | Output Enable Time | 3.3 | 1.5 | 7.0 | 10.0 | 1.0 | 11.0 | ns |
| | | 5.0 | 1.5 | 5.5 | 8.0 | 1.0 | 8.5 | |
| t _{PHZ} | Output Disable Time | 3.3 | 1.5 | 7.0 | 10.0 | 1.0 | 10.5 | ns |
| | | 5.0 | 1.5 | 6.5 | 9.0 | 1.0 | 9.5 | |
| t _{PLZ} | Output Disable Time | 3.3 | 1.5 | 7.5 | 10.5 | 1.0 | 11.5 | ns |
| | | 5.0 | 1.5 | 6.5 | 9.0 | 1.0 | 9.5 | |

6. Voltage range 3.3 is 3.3 V ± 0.3 V. Voltage range 5.0 is 5.0 V ± 0.5 V.

AC ELECTRICAL CHARACTERISTICS FOR ACT

| Symbol | Parameter | V _{CC} (V) (Note 7) | T _A = +25°C, C _L = 50 pF | | | T _A = -40°C to +85°C, C _L = 50 pF | | Unit |
|------------------|-----------------------------------|---------------------------------|--|-----|------|---|------|------|
| | | | Min | Typ | Max | Min | Max | |
| t _{PLH} | Propagation Delay, Data to Output | 5.0 | 1.5 | 6.0 | 8.5 | 1.5 | 9.5 | ns |
| t _{PHL} | Propagation Delay, Data to Output | 5.0 | 1.5 | 5.5 | 7.5 | 1.5 | 8.5 | ns |
| t _{PZH} | Output Enable Time | 5.0 | 1.5 | 7.0 | 8.5 | 1.0 | 9.5 | ns |
| t _{PZL} | Output Enable Time | 5.0 | 2.0 | 7.0 | 9.5 | 1.5 | 10.5 | ns |
| t _{PHZ} | Output Disable Time | 5.0 | 2.0 | 8.0 | 9.5 | 2.0 | 10.5 | ns |
| t _{PLZ} | Output Disable Time | 5.0 | 2.5 | 6.5 | 10.0 | 2.0 | 10.5 | ns |

7. Voltage range 5.0 is 5.0 V ± 0.5 V.

CAPACITANCE

| Symbol | Parameter | Conditions | Typ | Unit |
|-----------------|-------------------------------|-------------------------|------|------|
| C _{IN} | Input Capacitance | V _{CC} = OPEN | 4.5 | pF |
| C _{PD} | Power Dissipation Capacitance | V _{CC} = 5.0 V | 45.0 | pF |

74AC240, 74ACT240

ORDERING INFORMATION

| Device | Device Marking | Package | Shipping [†] |
|--------------|----------------|-----------------------------------|-----------------------|
| 74AC240SCX | AC240 | SOIC-20W, case 751BJ (Pb-Free) | 1000 / Tape & Reel |
| 74ACT240SCX | ACT240 | SOIC-20W, case 751BJ (Pb-Free) | 1000 / Tape & Reel |
| 74ACT240MTC | ACT 240 | TSSOP-20, case 948E (Pb-Free) | 75 Units / Tube |
| 74ACT240MTCX | ACT 240 | TSSOP-20, case 948AQ (Pb-Free) | 2500 / Tape & Reel |

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

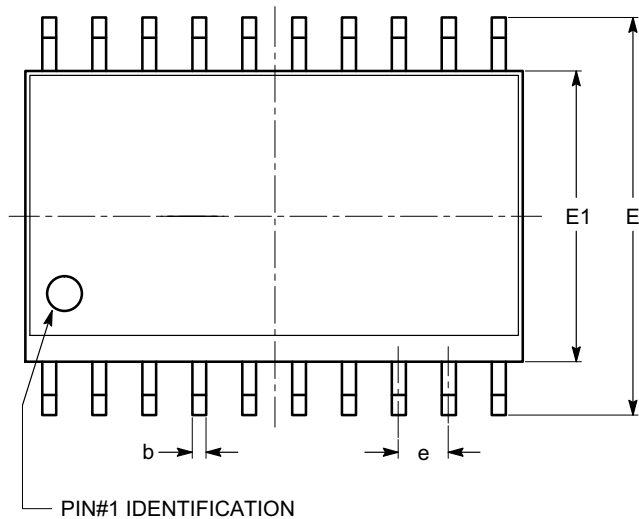
NOTE: All packages are Pb-Free per JEDEC: J-STD-020B standard.

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS



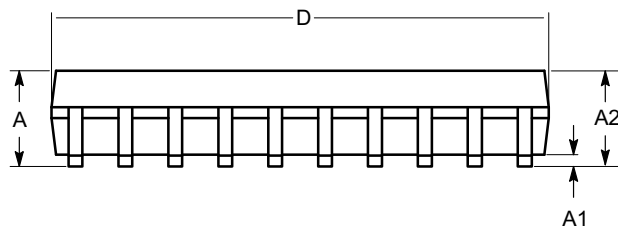
SOIC-20, 300 mils
CASE 751BJ
ISSUE O

DATE 19 DEC 2008

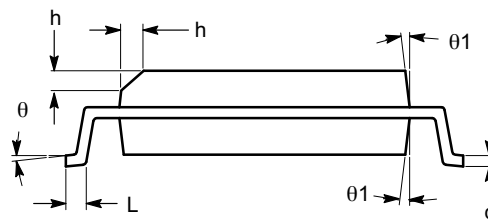


TOP VIEW

| SYMBOL | MIN | NOM | MAX |
|------------|----------|-------|-------|
| A | 2.36 | 2.49 | 2.64 |
| A1 | 0.10 | | 0.30 |
| A2 | 2.05 | | 2.55 |
| b | 0.31 | 0.41 | 0.51 |
| c | 0.20 | 0.27 | 0.33 |
| D | 12.60 | 12.80 | 13.00 |
| E | 10.01 | 10.30 | 10.64 |
| E1 | 7.40 | 7.50 | 7.60 |
| e | 1.27 BSC | | |
| h | 0.25 | | 0.75 |
| L | 0.40 | 0.81 | 1.27 |
| θ | 0° | | 8° |
| $\theta 1$ | 5° | | 15° |



SIDE VIEW



END VIEW

Notes:

- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Complies with JEDEC MS-013.

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MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SCALE 1:1

SOIC-20 WB
CASE 751D-05
ISSUE H

DATE 22 APR 2015



NOTES:

1. DIMENSIONS ARE IN MILLIMETERS.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF B DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS | |
|-----|-------------|-------|
| | MIN | MAX |
| A | 2.35 | 2.65 |
| A1 | 0.10 | 0.25 |
| b | 0.35 | 0.49 |
| c | 0.23 | 0.32 |
| D | 12.65 | 12.95 |
| E | 7.40 | 7.60 |
| e | 1.27 BSC | |
| H | 10.05 | 10.55 |
| h | 0.25 | 0.75 |
| L | 0.50 | 0.90 |
| θ | 0° | 7° |

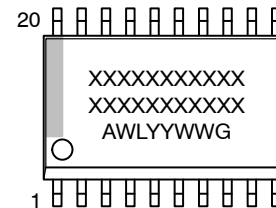
RECOMMENDED
SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

GENERIC
MARKING DIAGRAM*



- XXXXXX = Specific Device Code
- A = Assembly Location
- WL = Wafer Lot
- YY = Year
- WW = Work Week
- G = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

| | | |
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MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

ON Semiconductor®



TSSOP-20 WB
CASE 948E
ISSUE D

DATE 17 FEB 2016

SCALE 2:1



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 6.40 | 6.60 | 0.252 | 0.260 |
| B | 4.30 | 4.50 | 0.169 | 0.177 |
| C | --- | 1.20 | --- | 0.047 |
| D | 0.05 | 0.15 | 0.002 | 0.006 |
| F | 0.50 | 0.75 | 0.020 | 0.030 |
| G | 0.65 BSC | | 0.026 BSC | |
| H | 0.27 | 0.37 | 0.011 | 0.015 |
| J | 0.09 | 0.20 | 0.004 | 0.008 |
| J1 | 0.09 | 0.16 | 0.004 | 0.006 |
| K | 0.19 | 0.30 | 0.007 | 0.012 |
| K1 | 0.19 | 0.25 | 0.007 | 0.010 |
| L | 6.40 BSC | | 0.252 BSC | |
| M | 0° | 8° | 0° | 8° |



SOLDERING FOOTPRINT



GENERIC MARKING DIAGRAM*



- A = Assembly Location
- L = Wafer Lot
- Y = Year
- W = Work Week
- = Pb-Free Package

(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present.

| | | |
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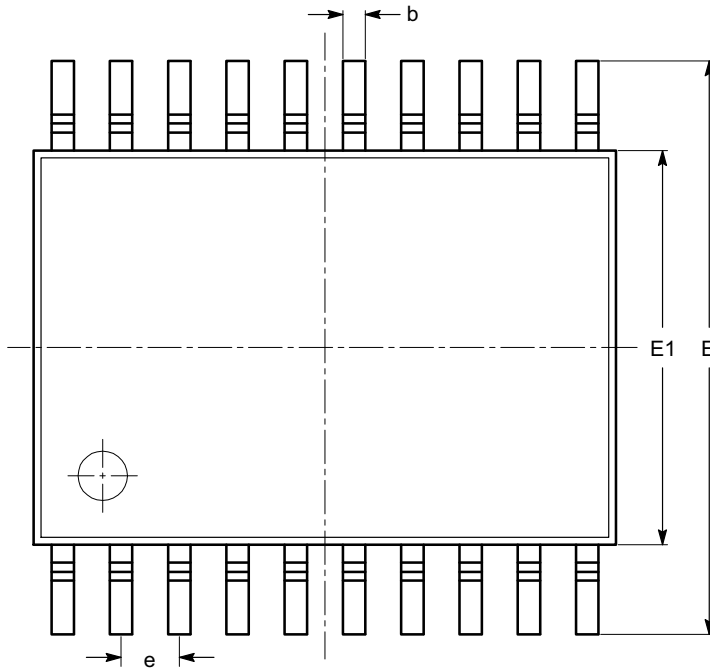
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MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS



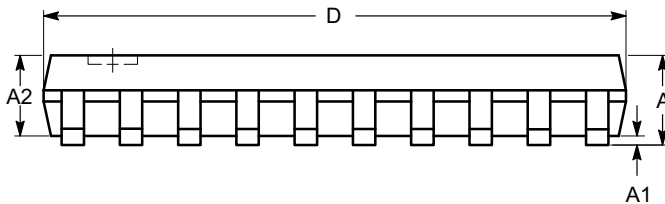
TSSOP20, 4.4x6.5
CASE 948AQ
ISSUE A

DATE 19 MAR 2009

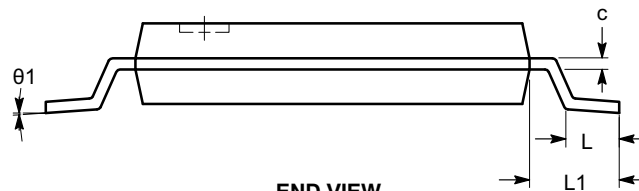


TOP VIEW

| SYMBOL | MIN | NOM | MAX |
|----------|----------|------|------|
| A | | | 1.20 |
| A1 | 0.05 | | 0.15 |
| A2 | 0.80 | | 1.05 |
| b | 0.19 | | 0.30 |
| c | 0.09 | | 0.20 |
| D | 6.40 | 6.50 | 6.60 |
| E | 6.30 | 6.40 | 6.50 |
| E1 | 4.30 | 4.40 | 4.50 |
| e | 0.65 BSC | | |
| L | 0.45 | 0.60 | 0.75 |
| L1 | 1.00 REF | | |
| θ | 0° | | 8° |



SIDE VIEW



END VIEW

Notes:

- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Complies with JEDEC MO-153.

| | | |
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