

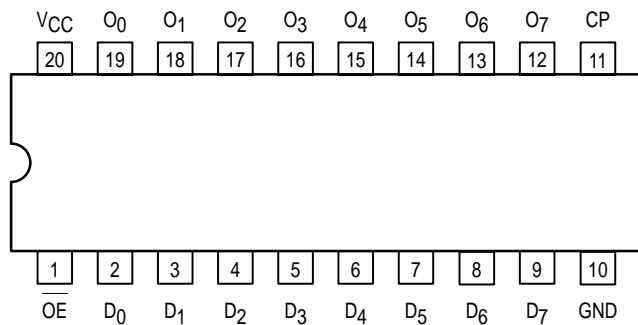


Octal D-Type Flip-Flop with 3-State Outputs

The MC74AC574/74ACT574 is a high-speed, low power octal flip-flop with a buffered common Clock (CP) and a buffered common Output Enable (OE). The information presented to the D inputs is stored in the flip-flops on the LOW-to-HIGH Clock (CP) transition.

The MC74AC574/74ACT574 is functionally identical to the MC74AC374/74ACT374 except for the pinouts.

- Inputs and Outputs on Opposite Sides of Package
Allowing Easy Interface with Microprocessors
- Useful as Input or Output Port for Microprocessors
- Functionally Identical to MC74AC374/74ACT374
- 3-State Outputs for Bus-Oriented Applications
- Outputs Source/Sink 24 mA
- 'ACT574 Has TTL Compatible Inputs

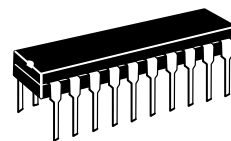


PIN NAMES

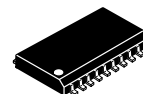
| | |
|--------------------------------|-----------------------------|
| D ₀ -D ₇ | Data Inputs |
| CP | Clock Pulse Input |
| OE | 3-State Output Enable Input |
| O ₀ -O ₇ | 3-State Outputs |

MC74AC57
MC74ACT574

OCTAL D-TYPE
FLIP-FLOP WITH
3-STATE OUTPUTS

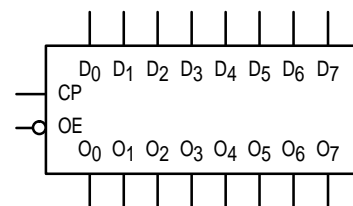


N SUFFIX
CASE 738-03
PLASTIC



DW SUFFIX
CASE 751D-04
PLASTIC

LOGIC SYMBOL



MC74AC57 MC74ACT574

FUNCTIONAL DESCRIPTION

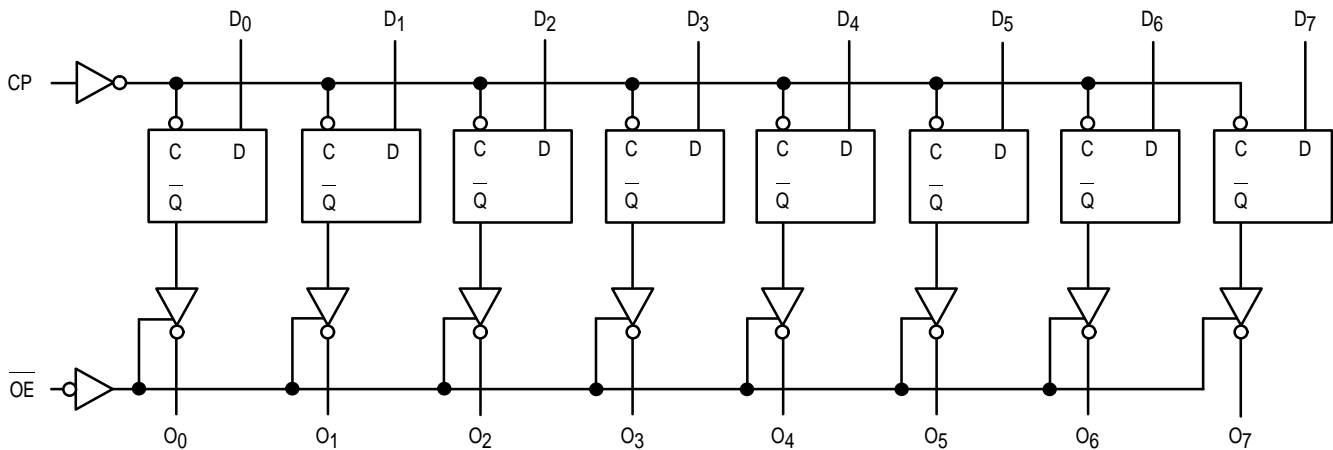
The MC74AC574/74ACT574 consists of eight edge-triggered flip-flops with individual D-type inputs and 3-state true outputs. The buffered clock and buffered Output Enable are common to all flip-flops. The eight flip-flops will store the state of their individual D inputs that meet the setup and hold time requirements on the LOW-to-HIGH Clock (CP) transition. With the Output Enable (OE) LOW, the contents of the eight flip-flops are available at the outputs. When OE is HIGH, the outputs go to the high impedance state. Operation of the OE input does not affect the state of the flip-flops.

FUNCTION TABLE

| Inputs | | | Internal | Outputs | Function |
|--------|----|---|----------|----------------|-------------------|
| OE | CP | D | Q | O _n | |
| H | H | L | NC | Z | Hold |
| H | H | H | NC | Z | Hold |
| H | ┐ | L | L | Z | Load |
| H | ┐ | H | H | Z | Load |
| L | ┐ | L | L | L | Data Available |
| L | ┐ | H | H | H | Data Available |
| L | H | L | NC | NC | No Change in Data |
| L | H | H | NC | NC | No Change in Data |

H = HIGH Voltage Level
 L = LOW Voltage Level
 X = Immaterial
 Z = High Impedance
 ┐ = LOW-to-HIGH Clock Transition
 NC = No Change

LOGIC DIAGRAM



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

MC74AC57 MC74ACT574

MAXIMUM RATINGS*

| Symbol | Parameter | Value | Unit |
|-----------|---|------------------------|--------------------|
| V_{CC} | DC Supply Voltage (Referenced to GND) | -0.5 to +7.0 | V |
| V_{in} | DC Input Voltage (Referenced to GND) | -0.5 to $V_{CC} + 0.5$ | V |
| V_{out} | DC Output Voltage (Referenced to GND) | -0.5 to $V_{CC} + 0.5$ | V |
| I_{in} | DC Input Current, per Pin | ± 20 | mA |
| I_{out} | DC Output Sink/Source Current, per Pin | ± 50 | mA |
| I_{CC} | DC V_{CC} or GND Current per Output Pin | ± 50 | mA |
| T_{stg} | Storage Temperature | -65 to +150 | $^{\circ}\text{C}$ |

* Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the Recommended Operating Conditions.

RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Min | Typ | Max | Unit | |
|-------------------|---|------------------|-----|----------|--------------------|------|
| V_{CC} | Supply Voltage | 'AC | 2.0 | 5.0 | 6.0 | V |
| | | 'ACT | 4.5 | 5.0 | 5.5 | |
| V_{in}, V_{out} | DC Input Voltage, Output Voltage (Ref. to GND) | 0 | | V_{CC} | V | |
| t_r, t_f | Input Rise and Fall Time (Note 1) 'AC Devices except Schmitt Inputs | V_{CC} @ 3.0 V | | 150 | | ns/V |
| | | V_{CC} @ 4.5 V | | 40 | | |
| | | V_{CC} @ 5.5 V | | 25 | | |
| t_r, t_f | Input Rise and Fall Time (Note 2) 'ACT Devices except Schmitt Inputs | V_{CC} @ 4.5 V | | 10 | | ns/V |
| | | V_{CC} @ 5.5 V | | 8.0 | | |
| T_J | Junction Temperature (PDIP) | | | 140 | $^{\circ}\text{C}$ | |
| T_A | Operating Ambient Temperature Range | -40 | 25 | 85 | $^{\circ}\text{C}$ | |
| I_{OH} | Output Current — High | | | -24 | mA | |
| I_{OL} | Output Current — Low | | | 24 | mA | |

1. V_{in} from 30% to 70% V_{CC} ; see individual Data Sheets for devices that differ from the typical input rise and fall times.

2. V_{in} from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

MC74AC57 MC74ACT574

DC CHARACTERISTICS

| Symbol | Parameter | V _{CC} (V) | 74AC | | 74AC | | Unit | Conditions |
|------------------|--------------------------------------|------------------------|------------------------|-------------------|------------------------------------|----|---|------------|
| | | | T _A = +25°C | | T _A = -40°C to +85°C | | | |
| | | | Typ | Guaranteed Limits | | | | |
| V _{IH} | Minimum High Level Input Voltage | 3.0 | 1.5 | 2.1 | 2.1 | V | V _{OUT} = 0.1 V or V _{CC} - 0.1 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 | 1.5 | 0.9 | 0.9 | V | V _{OUT} = 0.1 V or V _{CC} - 0.1 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 | 2.99 | 2.9 | 2.9 | V | I _{OUT} = -50 μA | |
| | | 4.5 | 4.49 | 4.4 | 4.4 | | | |
| | | 5.5 | 5.49 | 5.4 | 5.4 | | | |
| | | 3.0 | | 2.56 | 2.46 | V | *V _{IN} = V _{IL} or V _{IH} -12 mA I _{OH} -24 mA -24 mA | |
| | | 4.5 | | 3.86 | 3.76 | | | |
| | | 5.5 | | 4.86 | 4.76 | | | |
| V _{OL} | Maximum Low Level Output Voltage | 3.0 | 0.002 | 0.1 | 0.1 | V | I _{OUT} = 50 μA | |
| | | 4.5 | 0.001 | 0.1 | 0.1 | | | |
| | | 5.5 | 0.001 | 0.1 | 0.1 | | | |
| | | 3.0 | | 0.36 | 0.44 | V | *V _{IN} = V _{IL} or V _{IH} 12 mA I _{OL} 24 mA 24 mA | |
| | | 4.5 | | 0.36 | 0.44 | | | |
| | | 5.5 | | 0.36 | 0.44 | | | |
| I _{IN} | Maximum Input Leakage Current | 5.5 | | ±0.1 | ±1.0 | μA | V _I = V _{CC} , GND | |
| I _{OZ} | Maximum 3-State Current | 5.5 | | ±0.5 | ±5.0 | μA | V _I (OE) = V _{IL} , V _{IH} V _I = V _{CC} , GND V _O = V _{CC} , GND | |
| I _{OLD} | †Minimum Dynamic Output Current | 5.5 | | | 75 | mA | V _{OLD} = 1.65 V Max | |
| I _{OHD} | | 5.5 | | | -75 | mA | V _{OHD} = 3.85 V Min | |
| I _{CC} | Maximum Quiescent Supply Current | 5.5 | | 8.0 | 80 | μA | V _{IN} = V _{CC} or GND | |

* All outputs loaded; thresholds on input associated with output under test.

† Maximum test duration 2.0 ms, one output loaded at a time.

Note: 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}.

MC74AC57 MC74ACT574

AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

| Symbol | Parameter | V _{CC} * (V) | 74AC | | | 74AC | | Unit | Fig. No. |
|------------------|---|--------------------------|--|-----|-------------|--|-------------|------|----------|
| | | | T _A = +25°C C _L = 50 pF | | | T _A = -40°C to +85°C C _L = 50 pF | | | |
| | | | Min | Typ | Max | Min | Max | | |
| f _{max} | Maximum Clock Frequency | 3.3 5.0 | 75 95 | | | 60 85 | | MHz | 3-3 |
| t _{PLH} | Propagation Delay CP to O _n | 3.3 5.0 | 3.5 2.0 | | 13.5 9.5 | 3.5 2.0 | 15 11 | ns | 3-6 |
| t _{PHL} | Propagation Delay CP to O _n | 3.3 5.0 | 3.5 2.0 | | 12 8.5 | 3.5 2.0 | 13.5 9.5 | ns | 3-6 |
| t _{pZH} | Output Enable Time | 3.3 5.0 | 2.5 2.0 | | 11 8.5 | 2.5 2.0 | 12 9.0 | ns | 3-7 |
| t _{pZL} | Output Enable Time | 3.3 5.0 | 3.0 1.5 | | 10.5 8.0 | 3.5 2.0 | 11.5 9.0 | ns | 3-8 |
| t _{PHZ} | Output Disable Time | 3.3 5.0 | 4.0 2.0 | | 12 9.5 | 4.5 2.0 | 13 10.5 | ns | 3-7 |
| t _{PLZ} | Output Disable Time | 3.3 5.0 | 2.0 1.5 | | 9.0 7.5 | 2.5 1.5 | 10 8.5 | ns | 3-8 |

* Voltage Range 3.3 V is 3.3 V ±0.3 V.

Voltage Range 5.0 V is 5.0 V ±0.5 V.

AC OPERATING REQUIREMENTS

| Symbol | Parameter | V _{CC} * (V) | 74AC | | 74AC | | Unit | Fig. No. |
|----------------|---|--------------------------|--|--------------------|--|--|------|----------|
| | | | T _A = +25°C C _L = 50 pF | | T _A = -40°C to +85°C C _L = 50 pF | | | |
| | | | Typ | Guaranteed Minimum | | | | |
| t _s | Setup Time, HIGH or LOW D _n to CP | 3.3 5.0 | | 2.5 1.5 | 3.0 2.0 | | ns | 3-9 |
| t _h | Hold Time, HIGH or LOW D _n to CP | 3.3 5.0 | | 1.5 1.5 | 1.5 1.5 | | ns | 3-9 |
| t _w | CP Pulse Width HIGH or LOW | 3.3 5.0 | | 6.0 4.0 | 7.0 5.0 | | ns | 3-6 |

* Voltage Range 3.3 V is 3.3 V ±0.3 V.

Voltage Range 5.0 V is 5.0 V ±0.5 V.

MC74AC57 MC74ACT574

DC CHARACTERISTICS

| Symbol | Parameter | V _{CC} (V) | 74ACT | | 74ACT | | Unit | Conditions |
|-------------------|--|------------------------|------------------------|-------------------|------------------------------------|----|---|------------|
| | | | T _A = +25°C | | T _A = -40°C to +85°C | | | |
| | | | Typ | Guaranteed Limits | | | | |
| V _{IH} | Minimum High Level Input Voltage | 4.5 | 1.5 | 2.0 | 2.0 | V | V _{OUT} = 0.1 V or V _{CC} - 0.1 V | |
| | | 5.5 | 1.5 | 2.0 | 2.0 | | | |
| V _{IL} | Maximum Low Level Input Voltage | 4.5 | 1.5 | 0.8 | 0.8 | V | V _{OUT} = 0.1 V or V _{CC} - 0.1 V | |
| | | 5.5 | 1.5 | 0.8 | 0.8 | | | |
| V _{OH} | Minimum High Level Output Voltage | 4.5 | 4.49 | 4.4 | 4.4 | V | I _{OUT} = -50 μA | |
| | | 5.5 | 5.49 | 5.4 | 5.4 | | | |
| | | 4.5 | | 3.86 | 3.76 | V | *V _{IN} = V _{IL} or V _{IH} -24 mA I _{OH} -24 mA | |
| 5.5 | | 4.86 | 4.76 | | | | | |
| V _{OL} | Maximum Low Level Output Voltage | 4.5 | 0.001 | 0.1 | 0.1 | V | I _{OUT} = 50 μA | |
| | | 5.5 | 0.001 | 0.1 | 0.1 | | | |
| | | 4.5 | | 0.36 | 0.44 | V | *V _{IN} = V _{IL} or V _{IH} 24 mA I _{OL} 24 mA | |
| 5.5 | | 0.36 | 0.44 | | | | | |
| I _{IN} | Maximum Input Leakage Current | 5.5 | | ±0.1 | ±1.0 | μA | V _I = V _{CC} , GND | |
| ΔI _{CCT} | Additional Max. I _{CC} /Input | 5.5 | 0.6 | | 1.5 | mA | V _I = V _{CC} - 2.1 V | |
| I _{OZ} | Maximum 3-State Current | 5.5 | | ±0.5 | ±5.0 | μA | V _I (OE) = V _{IL} , V _{IH} V _I = V _{CC} , GND V _O = V _{CC} , GND | |
| I _{OLD} | †Minimum Dynamic Output Current | 5.5 | | | 75 | mA | V _{OLD} = 1.65 V Max | |
| I _{OHD} | | 5.5 | | | -75 | mA | V _{OHD} = 3.85 V Min | |
| I _{CC} | Maximum Quiescent Supply Current | 5.5 | | 8.0 | 80 | μA | V _{IN} = V _{CC} or GND | |

* All outputs loaded; thresholds on input associated with output under test.

† Maximum test duration 2.0 ms, one output loaded at a time.

AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

| Symbol | Parameter | V _{CC} * (V) | 74ACT | | | 74ACT | | Unit | Fig. No. |
|------------------|--|--------------------------|--|-----|------|--|------|------|----------|
| | | | T _A = +25°C C _L = 50 pF | | | T _A = -40°C to +85°C C _L = 50 pF | | | |
| | | | Min | Typ | Max | Min | Max | | |
| f _{max} | Maximum Clock Frequency | 5.0 | 100 | | | 85 | | ns | 3-3 |
| t _{PLH} | Propagation Delay CP to O _n | 5.0 | 2.5 | | 11 | 2.0 | 12 | ns | 3-6 |
| t _{PHL} | Propagation Delay CP to O _n | 5.0 | 2.0 | | 10 | 1.5 | 11 | ns | 3-6 |
| t _{PZH} | Output Enable Time | 5.0 | 2.0 | | 9.5 | 1.5 | 10 | ns | 3-7 |
| t _{PZL} | Output Enable Time | 5.0 | 2.0 | | 9.0 | 1.5 | 10 | ns | 3-8 |
| t _{PHZ} | Output Disable Time | 5.0 | 2.0 | | 10.5 | 1.5 | 11.5 | ns | 3-7 |
| t _{PLZ} | Output Disable Time | 5.0 | 2.0 | | 8.5 | 1.5 | 9.0 | ns | 3-8 |

* Voltage Range 5.0 V is 5.0 V ±0.5 V.

MC74AC57 MC74ACT574

AC OPERATING REQUIREMENTS

| Symbol | Parameter | V _{CC} * (V) | 74ACT | | Unit | Fig. No. | |
|----------------|---|--------------------------|--|--------------------|------|-------------|--|
| | | | T _A = +25°C C _L = 50 pF | | | | T _A = -40°C to +85°C C _L = 50 pF |
| | | | Typ | Guaranteed Minimum | | | |
| t _s | Setup Time, HIGH or LOW D _n to CP | 5.0 | | 2.5 | 2.5 | ns | 3-9 |
| t _h | Hold Time, HIGH or LOW D _n to CP | 5.0 | | 1.0 | 1.0 | ns | 3-9 |
| t _w | CP Pulse Width HIGH or LOW | 5.0 | | 3.0 | 4.0 | ns | 3-6 |

* Voltage Range 3.3 V is 3.3 V ± 0.3 V.

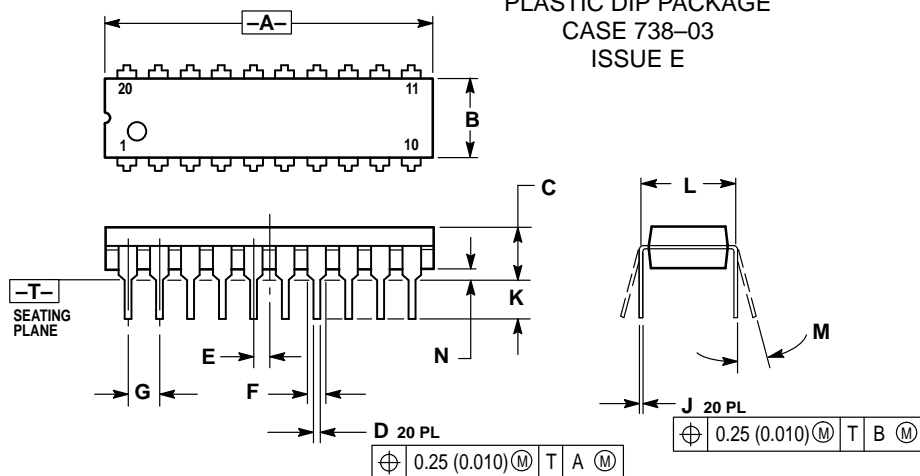
* Voltage Range 5.0 V is 5.0 V ± 0.5 V.

CAPACITANCE

| Symbol | Parameter | Value Typ | Unit | Test Conditions |
|-----------------|-------------------------------|--------------|------|-------------------------|
| C _{IN} | Input Capacitance | 4.5 | pF | V _{CC} = 5.0 V |
| C _{PD} | Power Dissipation Capacitance | 40 | pF | V _{CC} = 5.0 V |

MC74AC57 MC74ACT574

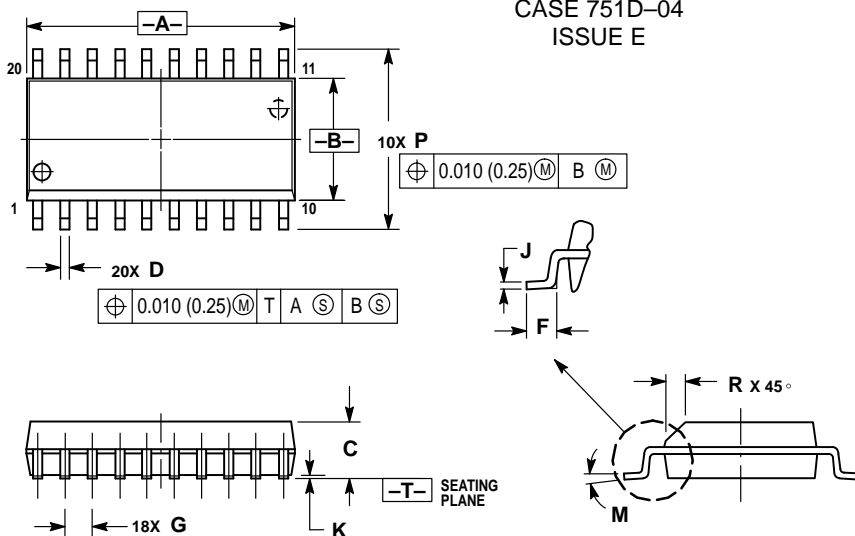
OUTLINE DIMENSIONS

N SUFFIX
 PLASTIC DIP PACKAGE
 CASE 738-03
 ISSUE E


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 1.010 | 1.070 | 25.66 | 27.17 |
| B | 0.240 | 0.260 | 6.10 | 6.60 |
| C | 0.150 | 0.180 | 3.81 | 4.57 |
| D | 0.015 | 0.022 | 0.39 | 0.55 |
| E | 0.050 BSC | | 1.27 BSC | |
| F | 0.050 | 0.070 | 1.27 | 1.77 |
| G | 0.100 BSC | | 2.54 BSC | |
| J | 0.008 | 0.015 | 0.21 | 0.38 |
| K | 0.110 | 0.140 | 2.80 | 3.55 |
| L | 0.300 BSC | | 7.62 BSC | |
| M | 0° | 15° | 0° | 15° |
| N | 0.020 | 0.040 | 0.51 | 1.01 |

DW SUFFIX
 PLASTIC SOIC PACKAGE
 CASE 751D-04
 ISSUE E


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.150 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.13 (0.005) TOTAL IN EXCESS OF D DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 12.65 | 12.95 | 0.499 | 0.510 |
| B | 7.40 | 7.60 | 0.292 | 0.299 |
| C | 2.35 | 2.65 | 0.093 | 0.104 |
| D | 0.35 | 0.49 | 0.014 | 0.019 |
| F | 0.50 | 0.90 | 0.020 | 0.035 |
| G | 1.27 BSC | | 0.050 BSC | |
| J | 0.25 | 0.32 | 0.010 | 0.012 |
| K | 0.10 | 0.25 | 0.004 | 0.009 |
| M | 0° | 7° | 0° | 7° |
| P | 10.05 | 10.55 | 0.395 | 0.415 |
| R | 0.25 | 0.75 | 0.010 | 0.029 |

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How to reach us:

USA/EUROPE: Motorola Literature Distribution;
P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447

JAPAN: Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, Toshikatsu Otsuka,
6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-3521-8315

MFAX: RMFA00@email.sps.mot.com -TOUCHTONE (602) 244-6609
INTERNET: http://Design-NET.com

HONG KONG: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

