

# MC10H104

## Quad 2-Input AND Gate

### Description

The MC10H104 is a quad 2-input AND gate. One of the gates has both AND/NAND outputs available. This MECL 10H™ part is a functional/pinout duplication of the standard MECL 10K™ family part, with 100% improvement in propagation delay, and no increase in power– supply current.

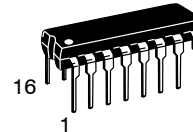
### Features

- Propagation Delay, 1.0 ns Typical
- Power Dissipation 25 mW/Gate (same as MECL 10K)
- Improved Noise Margin 150 mV (Over Operating Voltage and Temperature Range)
- Voltage Compensated
- MECL 10K Compatible
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant

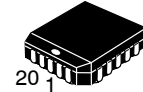


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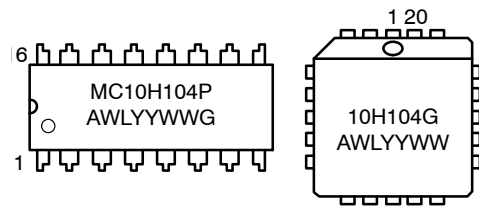


**PDIP-16**  
**P SUFFIX**  
**CASE 648-08**



**PLCC-20**  
**FN SUFFIX**  
**CASE 775-02**

### MARKING DIAGRAMS\*



A = Assembly Location  
WL, L = Wafer Lot  
YY, Y = Year  
WW, W = Work Week  
G = Pb-Free Package

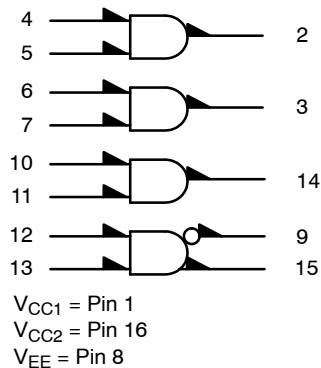
\*For additional marking information, refer to Application Note [AND8002/D](#).

### ORDERING INFORMATION

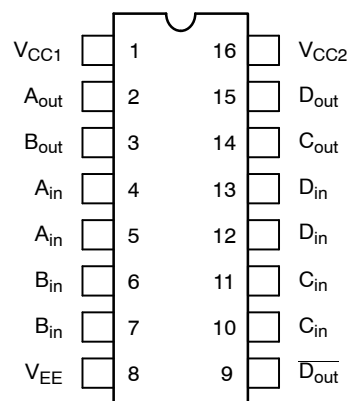
| Device        | Package              | Shipping†       |
|---------------|----------------------|-----------------|
| MC10H104FNG   | PLCC-20<br>(Pb-Free) | 46 Units/Tube   |
| MC10H104FNR2G | PLCC-20<br>(Pb-Free) | 500/Tape & Reel |
| MC10H104PG    | PDIP-16<br>(Pb-Free) | 25 Units/Tube   |

†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](#).

# MC10H104



**Figure 1. Logic Diagram**



Pin assignment is for Dual-in-Line Package.

**Figure 2. Pin Assignment**

**Table 1. MAXIMUM RATINGS**

| Symbol    | Characteristic                                  | Rating                     | Unit |
|-----------|---|----------------------------|------|
| $V_{EE}$  | Power Supply ( $V_{CC} = 0$ )                   | -8.0 to 0                  | Vdc  |
| $V_I$     | Input Voltage ( $V_{CC} = 0$ )                  | 0 to $V_{EE}$              | Vdc  |
| $I_{out}$ | Output Current<br>Continuous<br>Surge           | 50<br>100                  | mA   |
| $T_A$     | Operating Temperature Range                     | 0 to +75                   | °C   |
| $T_{stg}$ | Storage Temperature Range<br>Plastic<br>Ceramic | -55 to +150<br>-55 to +165 | °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.

**Table 2. ELECTRICAL CHARACTERISTICS** ( $V_{EE} = -5.2 \text{ V} \pm 5\%$ ) (Note 1)

| Symbol    | Characteristic       | 0°    |       | 25°   |       | 75°   |        | Unit |
|-----------|----------------------|-------|-------|-------|-------|-------|--------|------|
|           |                      | Min   | Max   | Min   | Max   | Min   | Max    |      |
| $I_E$     | Power Supply Current | -     | 39    | -     | 35    | -     | 39     | mA   |
| $I_{inH}$ | Input Current High   | -     | 425   | -     | 265   | -     | 265    | μA   |
| $I_{inL}$ | Input Current Low    | 0.5   | -     | 0.5   | -     | 0.3   | -      | μA   |
| $V_{OH}$  | High Output Voltage  | -1.02 | -0.84 | -0.98 | -0.81 | -0.92 | -0.735 | Vdc  |
| $V_{OL}$  | Low Output Voltage   | -1.95 | -1.63 | -1.95 | -1.63 | -1.95 | -1.60  | Vdc  |
| $V_{IH}$  | High Input Voltage   | -1.17 | -0.84 | -1.13 | -0.81 | -1.07 | -0.735 | Vdc  |
| $V_{IL}$  | Low Input Voltage    | -1.95 | -1.48 | -1.95 | -1.48 | -1.95 | -1.45  | Vdc  |

- Each MECL 10H series circuit has been designed to meet the dc specifications shown in the test table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfpm is maintained. Outputs are terminated through a 50 Ω resistor to -2.0 V.

# MC10H104

**Table 3. AC PARAMETERS**

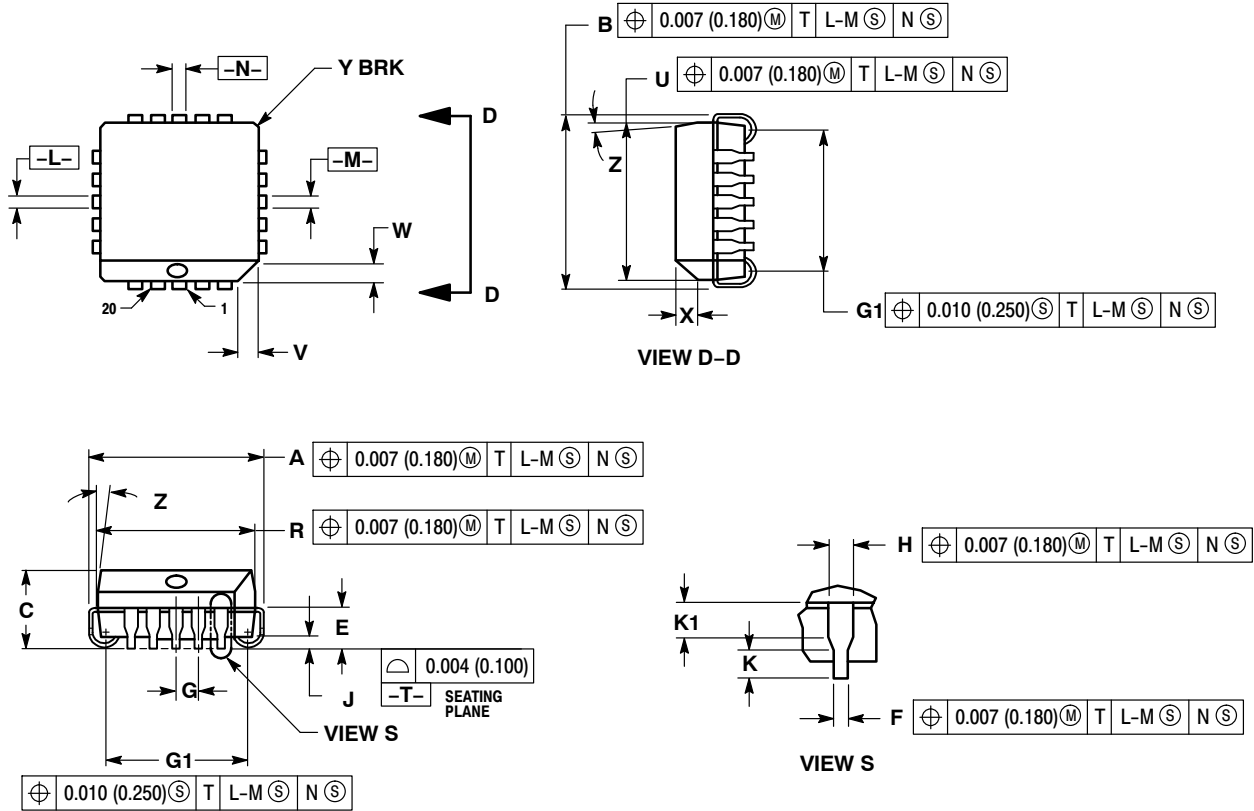
| Symbol   | Characteristic    | 0°  |     | 25°  |      | 75°  |     | Unit |
|----------|-------------------|-----|-----|------|------|------|-----|------|
|          |                   | Min | Max | Min  | Max  | Min  | Max |      |
| $t_{pd}$ | Propagation Delay | 0.4 | 1.6 | 0.45 | 1.75 | 0.45 | 1.9 | ns   |
| $t_r$    | Rise Time         | 0.5 | 1.6 | 0.5  | 1.7  | 0.5  | 1.8 | ns   |
| $t_f$    | Fall Time         | 0.5 | 1.6 | 0.5  | 1.7  | 0.5  | 1.8 | ns   |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

# MC10H104

## PACKAGE DIMENSIONS

20 LEAD PLLC  
CASE 775-02  
ISSUE F



**NOTES:**

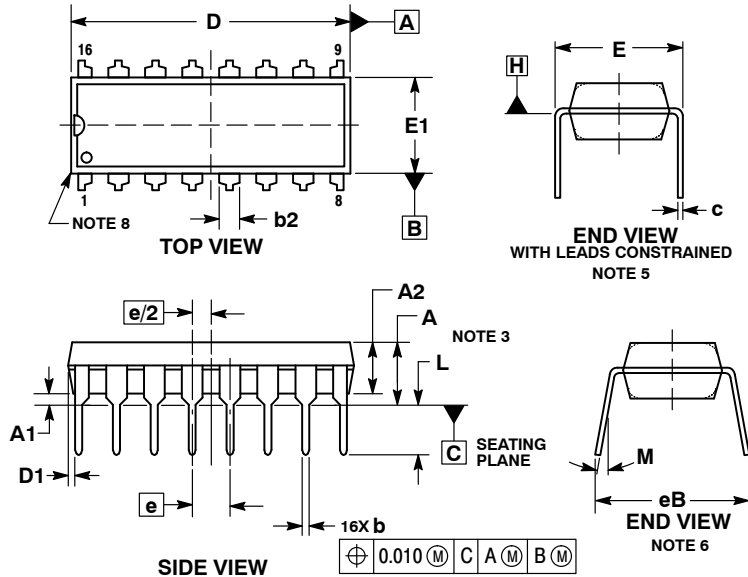
1. DIMENSIONS AND TOLERANCING PER ANSI Y14.5M, 1982.
2. DIMENSIONS IN INCHES.
3. DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
4. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
5. DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
6. DIMENSIONS IN THE PACKAGE TOP MAY BE SMALLER THAN THE PACKAGE BOTTOM BY UP TO 0.012 (0.300). DIMENSIONS R AND U ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
7. DIMENSION H DOES NOT INCLUDE DAMBAR PROTRUSION OR INTRUSION. THE DAMBAR PROTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE GREATER THAN 0.037 (0.940). THE DAMBAR INTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE SMALLER THAN 0.025 (0.635).

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.385     | 0.395 | 9.78        | 10.03 |
| B   | 0.385     | 0.395 | 9.78        | 10.03 |
| C   | 0.165     | 0.180 | 4.20        | 4.57  |
| E   | 0.090     | 0.110 | 2.29        | 2.79  |
| F   | 0.013     | 0.021 | 0.33        | 0.53  |
| G   | 0.050 BSC |       | 1.27 BSC    |       |
| H   | 0.026     | 0.032 | 0.66        | 0.81  |
| J   | 0.020     | ----  | 0.51        | ----  |
| K   | 0.025     | ----  | 0.64        | ----  |
| R   | 0.350     | 0.356 | 8.89        | 9.04  |
| U   | 0.350     | 0.356 | 8.89        | 9.04  |
| V   | 0.042     | 0.048 | 1.07        | 1.21  |
| W   | 0.042     | 0.048 | 1.07        | 1.21  |
| X   | 0.042     | 0.056 | 1.07        | 1.42  |
| Y   | ----      | 0.020 | ----        | 0.50  |
| Z   | 2° 10°    |       | 2° 10°      |       |
| G1  | 0.310     | 0.330 | 7.88        | 8.38  |
| K1  | 0.040     | ----  | 1.02        | ----  |

# MC10H104

## PACKAGE DIMENSIONS

PDIP-16  
CASE 648-08  
ISSUE V



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. DIMENSIONS A, A1 AND L ARE MEASURED WITH THE PACKAGE SEATED IN JEDEC SEATING PLANE GAUGE GS-3.
4. DIMENSIONS D, D1 AND E1 DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS. MOLD FLASH OR PROTRUSIONS ARE NOT TO EXCEED 0.10 INCH.
5. DIMENSION E IS MEASURED AT A POINT 0.015 BELOW DATUM PLANE H WITH THE LEADS CONSTRAINED PERPENDICULAR TO DATUM C.
6. DIMENSION eB IS MEASURED AT THE LEAD TIPS WITH THE LEADS UNCONSTRAINED.
7. DATUM PLANE H IS COINCIDENT WITH THE BOTTOM OF THE LEADS, WHERE THE LEADS EXIT THE BODY.
8. PACKAGE CONTOUR IS OPTIONAL (ROUNDED OR SQUARE CORNERS).

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | ---       | 0.210 | ---         | 5.33  |
| A1  | 0.015     | ---   | 0.38        | ---   |
| A2  | 0.115     | 0.195 | 2.92        | 4.95  |
| b   | 0.014     | 0.022 | 0.35        | 0.56  |
| b2  | 0.060 TYP |       | 1.52 TYP    |       |
| C   | 0.008     | 0.014 | 0.20        | 0.36  |
| D   | 0.735     | 0.775 | 18.67       | 19.69 |
| D1  | 0.005     | ---   | 0.13        | ---   |
| E   | 0.300     | 0.325 | 7.62        | 8.26  |
| E1  | 0.240     | 0.280 | 6.10        | 7.11  |
| e   | 0.100 BSC |       | 2.54 BSC    |       |
| eB  | ---       | 0.430 | ---         | 10.92 |
| L   | 0.115     | 0.150 | 2.92        | 3.81  |
| M   | ---       | 10°   | ---         | 10°   |

STYLE 1:

- PIN 1. CATHODE
- CATHODE
- CATHODE
- CATHODE
- CATHODE
- CATHODE
- CATHODE
- CATHODE
- ANODE
- ANODE
- ANODE
- ANODE
- ANODE
- ANODE
- ANODE
- ANODE

STYLE 2:

- PIN 1. COMMON DRAIN
- COMMON DRAIN
- COMMON DRAIN
- COMMON DRAIN
- COMMON DRAIN
- COMMON DRAIN
- COMMON DRAIN
- COMMON DRAIN
- GATE
- SOURCE
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