5-Bit Magnitude Comparator

The MC10H166 is a 5-Bit Magnitude Comparator and is a functional/pinout duplication of the standard MECL 10K part with 100% improvement in propagation delay and no increase in power-supply current.

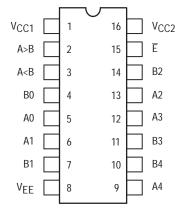
The MC10H166 is a high–speed expandable 5–bit comparator for comparing the magnitude of two binary words. Two outputs are provided: A < B and A > B. The A = B function can be obtained by wire–ORing these outputs (a low level indicates A = B) or by wire–NORing the outputs (a high level indicates A = B). A high level on the enable function forces both outputs low.

- Propagation Delay, Data-to-Output, 2.0 ns Typical
- Power Dissipation 440 mW Typical
- Improved Noise Margin 150 mV (Over Operating Voltage and Temperature Range)
- Voltage Compensated
- MECL 10K-Compatible

TRUTH TABLE

| | Inputs | Outputs | | |
|---|----------|----------|-------|-------|
| Ē | Α | В | A < B | A > B |
| Н | Х | Х | L | L |
| L | WORD A = | = WORD B | L | L |
| L | WORD A | > WORD B | L | Н |
| L | WORD A | < WORD B | Н | L |

DIP PIN ASSIGNMENT



Pin assignment is for Dual–in–Line Package.
For PLCC pin assignment, see the Pin Conversion Tables on page 18 of the ON Semiconductor MECL Data Book (DL122/D).



ON Semiconductor

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MARKING DIAGRAMS

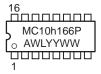


CDIP-16 L SUFFIX CASE 620





PDIP-16 P SUFFIX CASE 648





PLCC-20 FN SUFFIX CASE 775



A = Assembly Location

WL = Wafer Lot YY = Year

WW = Work Week

ORDERING INFORMATION

| Device | Package | Shipping |
|------------|---------|---------------|
| MC10h166L | CDIP-16 | 25 Units/Rail |
| MC10h166P | PDIP-16 | 25 Units/Rail |
| MC10h166FN | PLCC-20 | 46 Units/Rail |

MAXIMUM RATINGS

| Symbol | Characteristic | Rating | Unit |
|------------------|---|----------------------------|------|
| VEE | Power Supply (V _{CC} = 0) | -8.0 to 0 | Vdc |
| VI | Input Voltage (V _{CC} = 0) | 0 to VEE | Vdc |
| l _{out} | Output Current – Continuous – Surge | 50 100 | mA |
| TA | Operating Temperature Range | 0 to +75 | °C |
| T _{stg} | Storage Temperature Range – Plastic – Ceramic | −55 to +150 −55 to +165 | ိ |

ELECTRICAL CHARACTERISTICS ($V_{\mbox{EE}}$ = -5.2 V ±5%) (See Note 1.)

| | | 0 | 0 | 2 | 5° | 7 | 75° | |
|--------|----------------------|-------|-------|-------|-------|-------|--------|------|
| Symbol | Characteristic | Min | Max | Min | Max | Min | Max | Unit |
| ΙE | Power Supply Current | _ | 117 | _ | 106 | - | 117 | mA |
| linH | Input Current High | _ | 350 | _ | 220 | - | 220 | μΑ |
| linL | Input Current Low | 0.5 | _ | 0.5 | _ | 0.3 | - | μΑ |
| Voн | High Output Voltage | -1.02 | -0.84 | -0.98 | -0.81 | -0.92 | -0.735 | Vdc |
| VOL | Low Output Voltage | -1.95 | -1.63 | -1.95 | -1.63 | -1.95 | -1.60 | Vdc |
| VIH | High Input Voltage | -1.17 | -0.84 | -1.13 | -0.81 | -1.07 | -0.735 | Vdc |
| VIL | Low Input Voltage | -1.95 | -1.48 | -1.95 | -1.48 | -1.95 | -1.45 | Vdc |

AC PARAMETERS

| t | pd | Propagation Delay Data-to-Output Enable-to-Output | 1.1 0.6 | 3.5 1.7 | 1.1 0.7 | 3.7 1.7 | 1.2 0.7 | 4.1 1.8 | ns |
|---|----------------|---|------------|------------|------------|------------|------------|------------|----|
| | t _r | Rise Time | 0.6 | 1.5 | 0.6 | 1.6 | 0.6 | 1.7 | ns |
| | t _f | Fall Time | 0.6 | 1.5 | 0.6 | 1.6 | 0.6 | 1.7 | ns |

^{1.} 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–ohm resistor to –2.0 volts.

LOGIC DIAGRAM

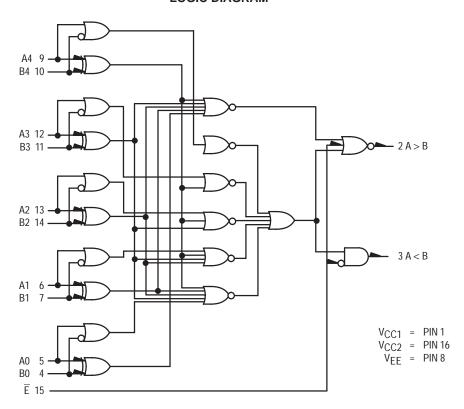
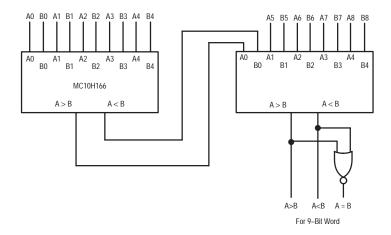


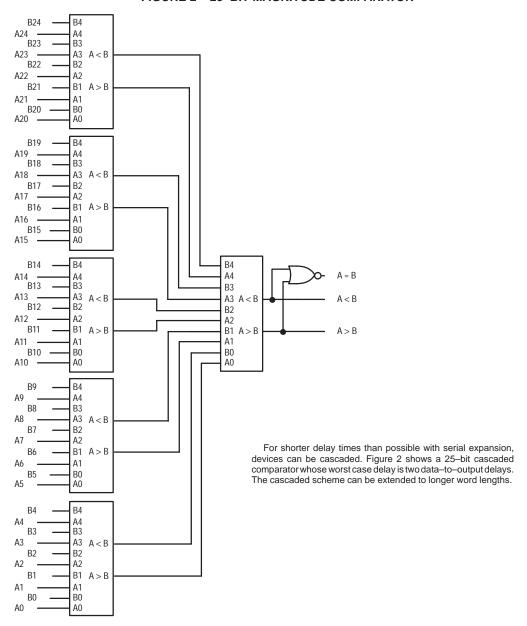
FIGURE 1 - 9-BIT MAGNITUDE COMPARATOR



For longer word lengths, the MC10H166 can be serially expanded or cascaded. Figure 1 shows two devices in a serial expansion for a 9-bit word length. The A>B and A<B outputs are fed to the A0 and B0 inputs respectively

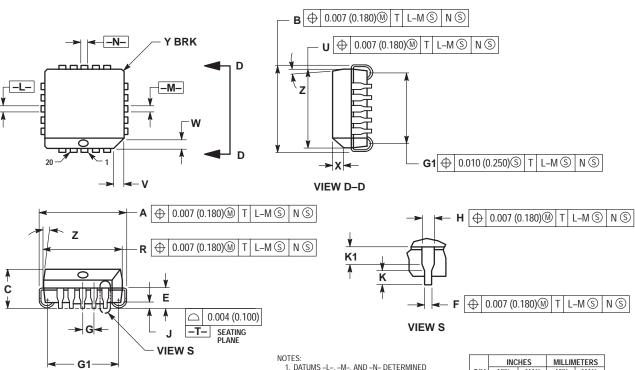
of the next device. The connection for an A=B output is also shown. The worst case delay time of serial expansion is equal to the number of comparators times the data—to—output delay.

FIGURE 2 – 25-BIT MAGNITUDE COMPARATOR



PACKAGE DIMENSIONS

PLCC-20 **FN SUFFIX** PLASTIC PLCC PACKAGE CASE 775-02 **ISSUE C**



- WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
- 2. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.

 3. DIMENSIONS R AND U DO NOT INCLUDE MOLD.
- FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE. 4. DIMENSIONING AND TOLERANCING PER ANSI
- 4. DIMENSIONING AND TOLERANCING FER ANSI Y14.5M, 1982. 5. CONTROLLING DIMENSION: INCH. 6. THE PACKAGE TOP MAY BE SMALLER THAN THE

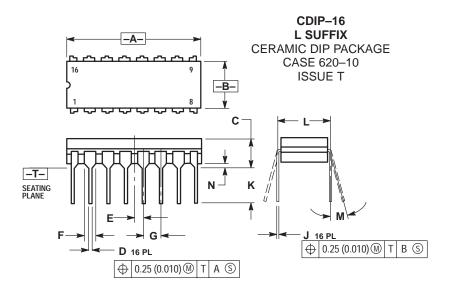
⊕ 0.010 (0.250)⑤ T L-M ⑤ N ⑥

- 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
- INCLUDING ANY MISMAICH BE I WEEN 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).

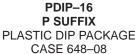
| | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|-------|
| DIM | MIN | MAX | MIN | MAX |
| Α | 0.385 | 0.395 | 9.78 | 10.03 |
| В | 0.385 | 0.395 | 9.78 | 10.03 |
| С | 0.165 | 0.180 | 4.20 | 4.57 |
| Ε | 0.090 | 0.110 | 2.29 | 2.79 |
| F | 0.013 | 0.019 | 0.33 | 0.48 |
| G | 0.050 | BSC | 1.27 | BSC |
| Н | 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 |
| Χ | 0.042 | 0.056 | 1.07 | 1.42 |
| Υ | | 0.020 | | 0.50 |
| Z | 2° | 10° | 2 ° | 10 ° |
| G1 | 0.310 | 0.330 | 7.88 | 8.38 |
| K1 | 0.040 | | 1.02 | |

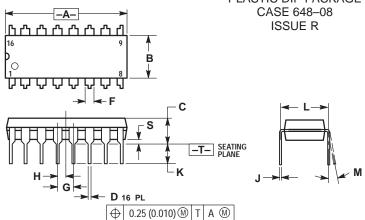
PACKAGE DIMENSIONS



- 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 F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.

| | INC | HES | MILLIMETERS | | |
|-----|-----------|-------|-------------|-------|--|
| DIM | MIN | MAX | MIN | MAX | |
| Α | 0.750 | 0.785 | 19.05 | 19.93 | |
| В | 0.240 | 0.295 | 6.10 | 7.49 | |
| С | | 0.200 | | 5.08 | |
| D | 0.015 | 0.020 | 0.39 | 0.50 | |
| Ε | 0.050 | BSC | 1.27 BSC | | |
| F | 0.055 | 0.065 | 1.40 | 1.65 | |
| G | 0.100 | BSC | 2.54 BSC | | |
| Н | 0.008 | 0.015 | 0.21 | 0.38 | |
| K | 0.125 | 0.170 | 3.18 | 4.31 | |
| L | 0.300 BSC | | 7.62 | BSC | |
| M | 0° | 15° | 0 ° | 15° | |
| N | 0.020 | 0.040 | 0.51 | 1.01 | |





- NOTES:

 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

 2. CONTROLLING DIMENSION: INCH.

 3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.

 4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.

 5. ROUNDED CORNERS OPTIONAL.

| | INC | HES | MILLIN | IETERS | |
|-----|-------|-------|--------|--------|--|
| DIM | MIN | MAX | MIN | MAX | |
| Α | 0.740 | 0.770 | 18.80 | 19.55 | |
| В | 0.250 | 0.270 | 6.35 | 6.85 | |
| С | 0.145 | 0.175 | 3.69 | 4.44 | |
| D | 0.015 | 0.021 | 0.39 | 0.53 | |
| F | 0.040 | 0.70 | 1.02 | 1.77 | |
| G | 0.100 | BSC | 2.54 | BSC | |
| Н | 0.050 | BSC | 1.27 | BSC | |
| J | 0.008 | 0.015 | 0.21 | 0.38 | |
| K | 0.110 | 0.130 | 2.80 | 3.30 | |
| L | 0.295 | 0.305 | 7.50 | 7.74 | |
| M | 0° | 10° | 0 ° | 10 ° | |
| S | 0.020 | 0.040 | 0.51 | 1.01 | |

Notes

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