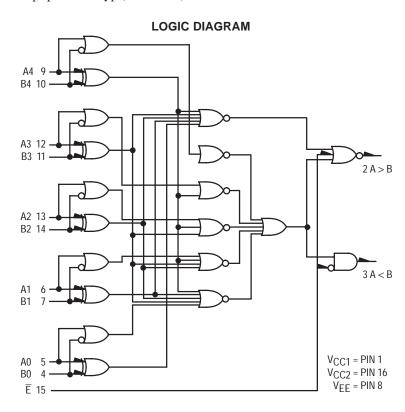
# 5-Bit Magnitude Comparator

The MC10166 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. A = B can be obtained by NORing the two outputs with an additional gate. A high level on the enable function forces both outputs low. Multiple MC10166s may be used for larger word comparisons.

- $P_D = 440 \text{ mW typ/pkg (No Load)}$
- t<sub>pd</sub> =Data to Output 6.0 ns typ
- E to output 2.5 ns typ
- $t_f$ ,  $t_f = 2.0$  ns typ (20%–80%)



#### **TRUTH TABLE**

	Inputs	Outputs		
Ē	Α	B 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



#### ON Semiconductor

http://onsemi.com





CDIP-16 L SUFFIX CASE 620 MC10166L AWLYYWW



PDIP-16 P SUFFIX CASE 648 

PLCC-20 FN SUFFIX CASE 775

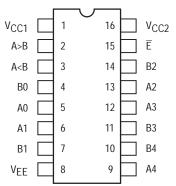


A = Assembly Location

WL = Wafer Lot YY = Year

WW = Work Week

#### **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).

#### **ORDERING INFORMATION**

Device	Package	Shipping		
MC10166L	CDIP-16	25 Units / Rail		
MC10166P	PDIP-16	25 Units / Rail		
MC10166FN	PLCC-20	46 Units / Rail		

## **ELECTRICAL CHARACTERISTICS**

			Test Limits							
		Pin Under		−30°C +25°C			+85°C		1	
Characteristic	Symbol	Test	Min	Max	Min	Тур	Max	Min	Max	Unit
Power Supply Drain Currer	I <sub>E</sub>	8		117		85	106		117	mAdc
Input Current	l <sub>inH</sub>	5		350			220		220	μAdc
	linL	5	0.5		0.5			0.3		μAdc
Output Voltage Logic	1 V <sub>OH</sub>	2 3	-1.060 -1.060	-0.890 -0.890	-0.960 -0.960		-0.810 -0.810	-0.890 -0.890	-0.700 -0.700	Vdc
Output Voltage Logic	0 V <sub>OL</sub>	2 3	-1.890 -1.890	-1.675 -1.675	-1.850 -1.850		-1.650 -1.650	-1.825 -1.825	-1.615 -1.615	Vdc
Threshold Voltage Logic	1 V <sub>OHA</sub>	2 3	-1.080 -1.080		-0.980 -0.980			-0.910 -0.910		Vdc
Threshold Voltage Logic	<sup>0</sup> V <sub>OLA</sub>	2 3		-1.655 -1.655			-1.630 -1.630		-1.595 -1.595	Vdc
Switching Times (50Ω Loa	1)									ns
Propagation Data to Outp Delay	ty+2+ ty-2- t11-2+ t11+2- t7+3+ t7-3-	2 2 2 2 3 3	1.0 1.0 1.0 1.0 1.0	8.0 8.0 8.0 8.0 8.0	1.0 1.0 1.0 1.0 1.0	6.0 6.0 6.0 6.0 6.0	7.6 7.6 7.6 7.6 7.6 7.6	1.0 1.0 1.0 1.0 1.0	8.4 8.4 8.4 8.4 8.4	
Enable to Outp	t t <sub>15-3+</sub>	3 3	1.0 1.0	3.8 3.8	1.0 1.0	2.5 2.5	3.6 3.6	1.0 1.0	4.0 4.0	
Rise Time (20 to 80%	) t <sub>2+</sub>	2	1.0	3.6	1.1	2.0	3.5	1.1	3.8	
Fall Time (20 to 80%	) t <sub>2</sub> _	2	1.0	3.6	1.1	2.0	3.5	1.1	3.8	

## **ELECTRICAL CHARACTERISTICS** (continued)

					TEST VOL	ΓAGE VALUI	ES (Volts)		
@ Test Temperature -30°C			V <sub>IHmax</sub>	V <sub>ILmin</sub>	VIHAmin	V <sub>ILAmax</sub>	VEE		
			-0.890	-1.890	-1.205	-1.500	-5.2		
+25°C			-0.810	-1.850	-1.105	-1.475	-5.2		
			+85°C	-0.700	-1.825	-1.035	-1.440	-5.2	
			Pin	TEST VOLTAGE APPLIED TO PINS LISTED BELOW					<i>(M)</i>
Characte	eristic	Symbol	Under Test	V <sub>IHmax</sub>	V <sub>ILmin</sub>	VIHAmin	V <sub>ILAmax</sub>	VEE	(VCC)
Power Supply Dra	in Current	ΙΕ	8		4,7,10,11,14			8	1, 16
Input Current		linH	5	5				8	1, 16
		l <sub>inL</sub>	5		5			8	1, 16
Output Voltage	Logic 1	Voн	2 3	5 4				8 8	1, 16 1, 16
Output Voltage	Logic 0	VOL	2 3	5, 15 4, 15				8 8	1, 16 1, 16
Threshold Voltage	Logic 1	Vона	2 3	5 4			15 15	8 8	1, 16 1, 16
Threshold Voltage	Logic 0	VOLA	2 3	5 4		15 15		8 8	1, 16 1, 16
Switching Times	(50Ω Load)			+1.11V		Pulse In	Pulse Out	-3.2 V	+2.0
Propagation Delay	y Data to Output	t9+2+ t9-2- t11-2+ t11+2- t7+3+ t7-3-	2 2 2 2 2 3 3	12 12 6 6		9 9 11 11 7 7	2 2 2 2 3 3	8 8 8 8 8	1, 16 1, 16 1, 16 1, 16 1, 16 1, 16
E	Enable to Output	t <sub>15</sub> –3+ t <sub>15+3</sub> –	3 3	10 10		15 15	3 3	8 8	1, 16 1, 16
Rise Time	(20 to 80%)	t <sub>2+</sub>	2			9	2	8	1, 16
Fall Time	(20 to 80%)	t <sub>2</sub> _	2			9	2	8	1, 16

Each MECL 10,000 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 linear fpm is maintained. Outputs are terminated through a 50-ohm resistor to -2.0 volts. Test procedures are shown for only one gate. The other gates are tested in the same manner.

#### **APPLICATION INFORMATION**

# FIGURE 1 — 9-BIT MAGNITUDE COMPARATOR

B7 A8

B3 B4

A < B

MC10166

B1 B2

A > B

A>B A<B A=B

For 9-Bit Word

RΛ

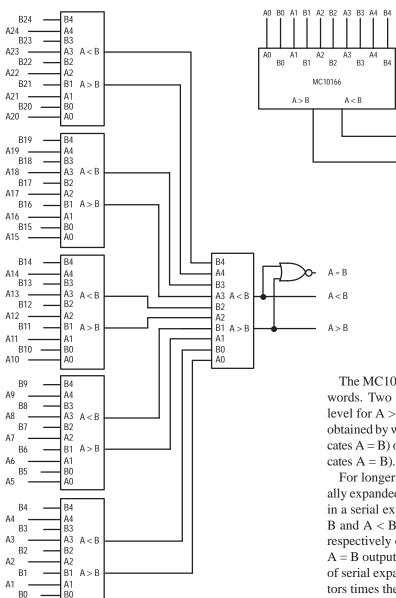


FIGURE 2 — 25-BIT MAGNITUDE COMPARATOR

Α0

Α0

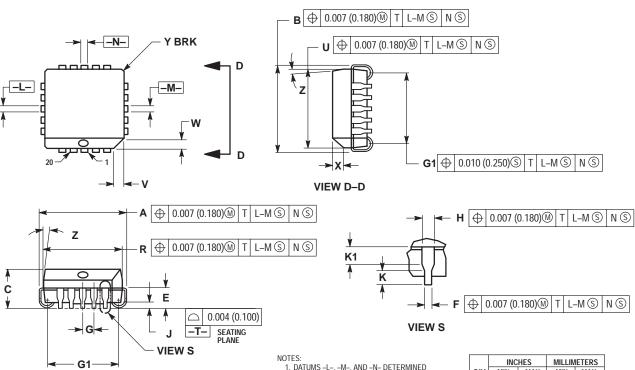
The MC10166 compares the magnitude of two 5-bit words. Two outputs are provided which give a high level for A > B and A < B. The A = B function can be obtained by wire–ORing these outputs (a low level indicates A = B) or by NORing the outputs (a high level indicates A = B).

For longer word lengths, the MC10166 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.

For shorter delay times than possible with serial expansion, devices can be cascaded. Figure 2 shows a 25-bit cascaded comparator whose worst case delay is two data-to-output delays. The cascaded scheme can be extended to longer word lengths.

#### PACKAGE DIMENSIONS

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



⊕ 0.010 (0.250)⑤ T L-M ⑤ N ⑥

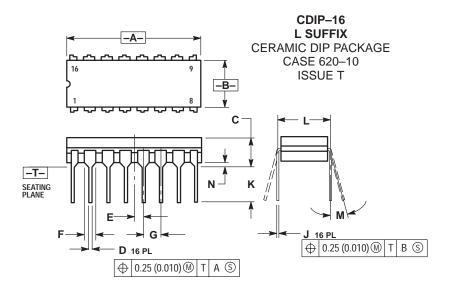
- WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
- 2. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.

  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
- 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).

	INC	HES	MILLIN	IETERS
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**

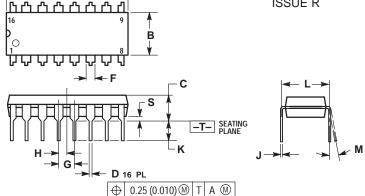


- NOTES:
  1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
  4. DIMENSION F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.

	INC	HES	MILLIN	IETERS		
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		
E	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		

# PDIP-16 **P SUFFIX**





- 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	MILLIMETERS		
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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