

## 8-Input Priority Encoder

The MC10165 is a device designed to encode eight inputs to a binary coded output. The output code is that of the highest order input. Any input of lower priority is ignored. Each output incorporates a latch allowing synchronous operation. When the clock is low the outputs follow the inputs and latch when the clock goes high. This device is very useful for a variety of applications in checking system status in control processors, peripheral controllers, and testing systems.

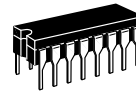
The input is active when high, (e.g., the three binary outputs are low when input D0 is high). The Q3 output is high when any input is high. This allows direct extension into another priority encoder when more than eight inputs are necessary. The MC10165 can also be used to develop binary codes from random logic inputs, for addressing ROMs, RAMs, or for multiplexing data.

$P_D = 545 \text{ mW typ/pkg (No Load)}$   
 $t_{pd} = 4.5 \text{ ns typ (Data to Output)}$   
 $t_r, t_f = 2.0 \text{ ns typ (20\%–80\%)}$

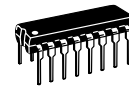
**TRUTH TABLE**

DATA INPUTS								OUTPUTS			
D0	D1	D2	D3	D4	D5	D6	D7	Q3	Q2	Q1	Q0
H	X	X	X	X	X	X	X	H	L	L	L
L	H	X	X	X	X	X	X	H	L	L	H
L	L	H	X	X	X	X	X	H	L	H	L
L	L	L	H	X	X	X	X	H	L	H	H
L	L	L	L	H	X	X	X	H	H	L	L
L	L	L	L	L	H	X	X	H	H	L	H
L	L	L	L	L	L	H	X	H	H	H	L
L	L	L	L	L	L	L	H	H	H	H	H
L	L	L	L	L	L	L	L	L	L	L	L

## MC10165

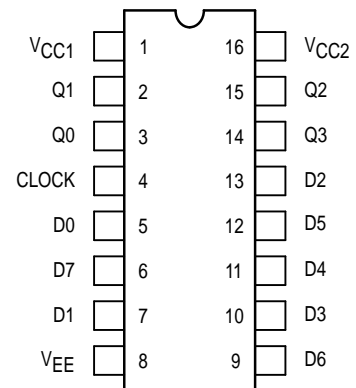


**L SUFFIX**  
CERAMIC PACKAGE  
CASE 620-10

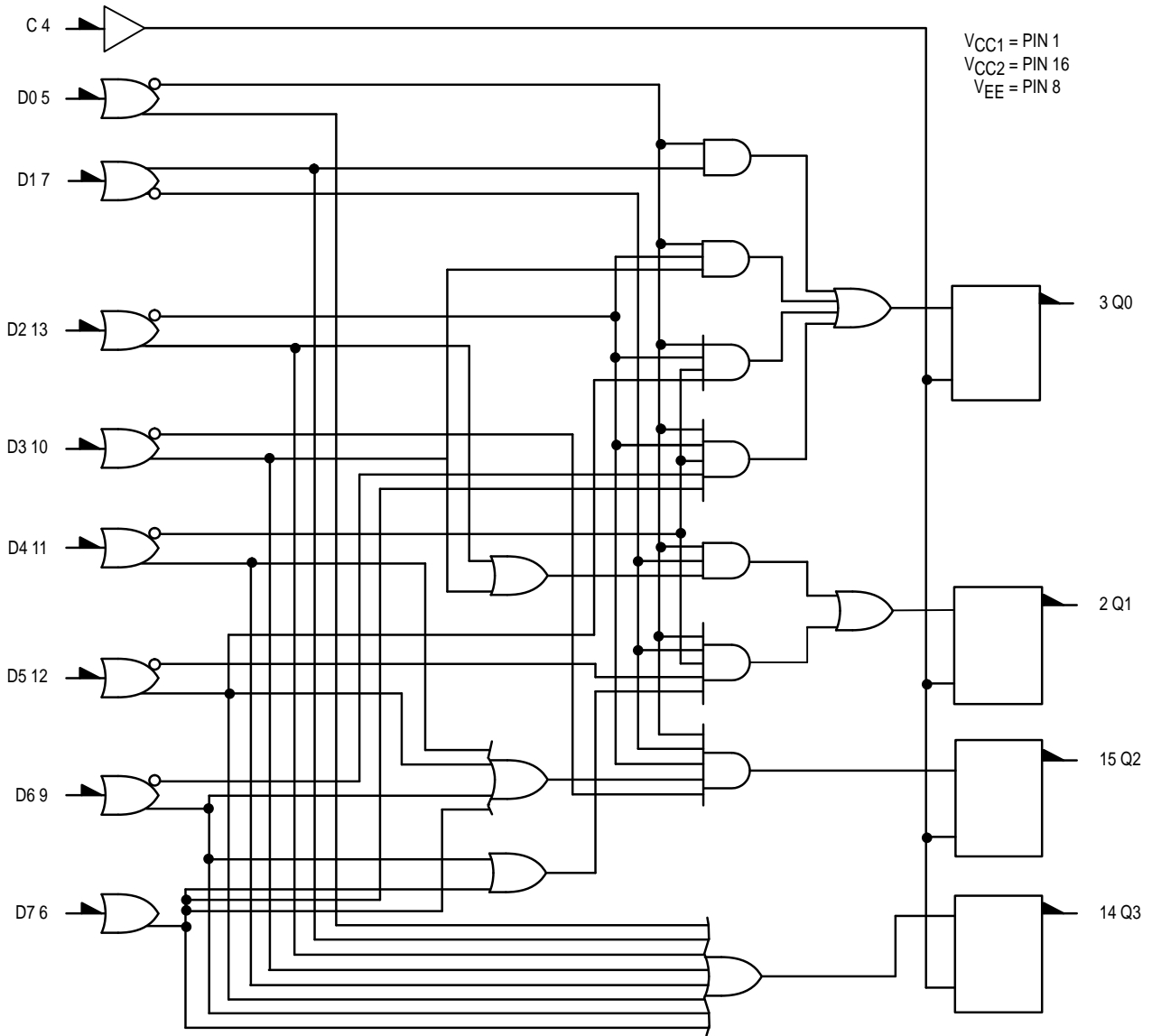


**P SUFFIX**  
PLASTIC PACKAGE  
CASE 648-08

### PIN ASSIGNMENT



LOGIC DIAGRAM



## ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Pin Under Test	Test Limits						Unit	
			-30°C		+25°C		+85°C			
			Min	Max	Min	Typ	Max	Min		Max
Power Supply Drain Current	$I_E$	8		144		105	131		144	mAdc
Input Current	$I_{inH}$	4		390			245		245	$\mu$ Adc
		5		350			220		220	
	$I_{inL}$	4	0.5		0.5			0.3		$\mu$ Adc
		5	0.5		0.5			0.3		
Output Voltage Logic 1	$V_{OH}$	2	-1.060	-0.890	-0.960		-0.810	-0.890	-0.700	Vdc
		3	-1.060	-0.890	-0.960		-0.810	-0.890	-0.700	
		14	-1.060	-0.890	-0.960		-0.810	-0.890	-0.700	
		15	-1.060	-0.890	-0.960		-0.810	-0.890	-0.700	
Output Voltage Logic 0	$V_{OL}$	2	-1.890	-1.675	-1.850		-1.650	-1.825	-1.615	Vdc
		3	-1.890	-1.675	-1.850		-1.650	-1.825	-1.615	
		14	-1.890	-1.675	-1.850		-1.650	-1.825	-1.615	
		15	-1.890	-1.675	-1.850		-1.650	-1.825	-1.615	
Threshold Voltage Logic 1	$V_{OHA}$	2	-1.080		-0.980			-0.910		Vdc
		3	-1.080		-0.980			-0.910		
		14	-1.080		-0.980			-0.910		
		15	-1.080		-0.980			-0.910		
Threshold Voltage Logic 0	$V_{OLA}$	2		-1.655			-1.630		-1.595	Vdc
		3		-1.655			-1.630		-1.595	
		14		-1.655			-1.630		-1.595	
		15		-1.655			-1.630		-1.595	
Switching Times (50 $\Omega$ Load)									ns	
Propagation Delay Data Input	$t_{5+14+}$ $t_{5-14-}$ $t_{7+3+}$ $t_{11+15+}$ $t_{13+2+}$	14	2.0	7.0	3.0		7.0	2.0	8.0	
		14	2.0	7.0	3.0		7.0	2.0	8.0	
		3	2.0	7.0	3.0		7.0	2.0	8.0	
		15	2.0	7.0	3.0		7.0	2.0	8.0	
		2	2.0	7.0	3.0		7.0	2.0	8.0	
Clock Input	$t_{4-3+}$ $t_{4-3-}$ $t_{4-14+}$ $t_{4-14-}$	3 (2.)	1.5	4.5	2.0		4.0	1.5	4.5	
		3 (3.)	1.5	4.5	2.0		4.0	1.5	4.5	
		14 (2.)	1.5	4.5	2.0		4.0	1.5	4.5	
		14 (3.)	1.5	4.5	2.0		4.0	1.5	4.5	
Setup Time	$t_{setupH}$ $t_{setupL}$	3	6.0		6.0	3.4		6.0		
		3	6.0		6.0	3.0		6.0		
Hold Time	$t_{holdH}$ $t_{holdL}$	3	1.0		1.0	-2.3		1.0		
		3	1.0		1.0	-2.7		1.0		
Rise Time (20 to 80%)	$t_{3+}$	3	1.1	3.5	1.1	2.0	3.3	1.1	3.5	
Fall Time (20 to 80%)	$t_{3-}$	3	1.1	3.5	1.1	2.0	3.3	1.1	3.5	

1. The same limit applies for all D type input pins. To test input currents for other D inputs, individually apply proper voltage to pin under test.

2. Output latched to low state prior to test.

3. Output latched to high state prior to test.

\* To preserve reliable performance, the MC10165P (plastic packaged device only) is to be operated in ambient temperatures above 70°C only when 500 lpm blown air or equivalent heat sinking is provided.

MC10165

ELECTRICAL CHARACTERISTICS (continued)

			TEST VOLTAGE VALUES (Volts)							
			V <sub>IHmax</sub>	V <sub>ILmin</sub>	V <sub>IHAmin</sub>	V <sub>ILAmx</sub>	V <sub>EE</sub>			
@ Test Temperature										
			-30°C	-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		
Characteristic	Symbol	Pin Under Test	TEST VOLTAGE APPLIED TO PINS LISTED BELOW					(V <sub>CC</sub> ) Gnd		
			V <sub>IHmax</sub>	V <sub>ILmin</sub>	V <sub>IHAmin</sub>	V <sub>ILAmx</sub>	V <sub>EE</sub>			
Power Supply Drain Current	I <sub>E</sub>	8					8	1, 16		
Input Current	I <sub>inH</sub>	4	4				8	1, 16		
		5	5 (1.)				8	1, 16		
	I <sub>inL</sub>	4		4			8	1, 16		
		5		5 (1.)			8	1, 16		
Output Voltage Logic 1	V <sub>OH</sub>	2	6	4			8	1, 16		
		3	6	4			8	1, 16		
		14	6	4			8	1, 16		
		15	6	4			8	1, 16		
Output Voltage Logic 0	V <sub>OL</sub>	2		4			8	1, 16		
		3		4			8	1, 16		
		14		4			8	1, 16		
		15		4			8	1, 16		
Threshold Voltage Logic 1	V <sub>OHA</sub>	2		4	6		8	1, 16		
		3		4	6		8	1, 16		
		14		4	6		8	1, 16		
		15		4	6		8	1, 16		
Threshold Voltage Logic 0	V <sub>OLA</sub>	2		4		6	8	1, 16		
		3		4		6	8	1, 16		
		14		4		6	8	1, 16		
		15		4		6	8	1, 16		
Switching Times (50Ω Load)										
Propagation Delay	Data Input	t <sub>5+14+</sub>	14		+1.11V	+0.31V	Pulse In	Pulse Out	-3.2 V	+2.0
		t <sub>5-14-</sub>	14			4	5	14	8	1, 16
		t <sub>7+3+</sub>	3			4	5	14	8	1, 16
		t <sub>11+15+</sub>	15			4	7	3	8	1, 16
		t <sub>11+15+</sub>	15			4	11	15	8	1, 16
		t <sub>13+2+</sub>	2			4	13	2	8	1, 16
Clock Input		t <sub>4-3+</sub>	3 (2.)	7		4	3	8	1, 16	
		t <sub>4-3-</sub>	3 (3.)			4	3	8	1, 16	
		t <sub>4-14+</sub>	14 (2.)	7		4	14	8	1, 16	
		t <sub>4-14-</sub>	14 (3.)			4	14	8	1, 16	
Setup Time		t <sub>setupH</sub>	3			4,7	3	8	1, 16	
		t <sub>setupL</sub>	3			4,7	3	8	1, 16	
Hold Time		t <sub>holdH</sub>	3			4,7	3	8	1, 16	
		t <sub>holdL</sub>	3			4,7	3	8	1, 16	
Rise Time (20 to 80%)		t <sub>3+</sub>	3			4	7	3	8	1, 16
Fall Time (20 to 80%)		t <sub>3-</sub>	3			4	7	3	8	1, 16

1. The same limit applies for all D type input pins. To test input currents for other D inputs, individually apply proper voltage to pin under test.
  2. Output latched to low state prior to test.
  3. Output latched to high state prior to test.
- \* To preserve reliable performance, the MC10165P (plastic packaged device only) is to be operated in ambient temperatures above 70°C only when 500 fpm blown air or equivalent heat sinking is provided.

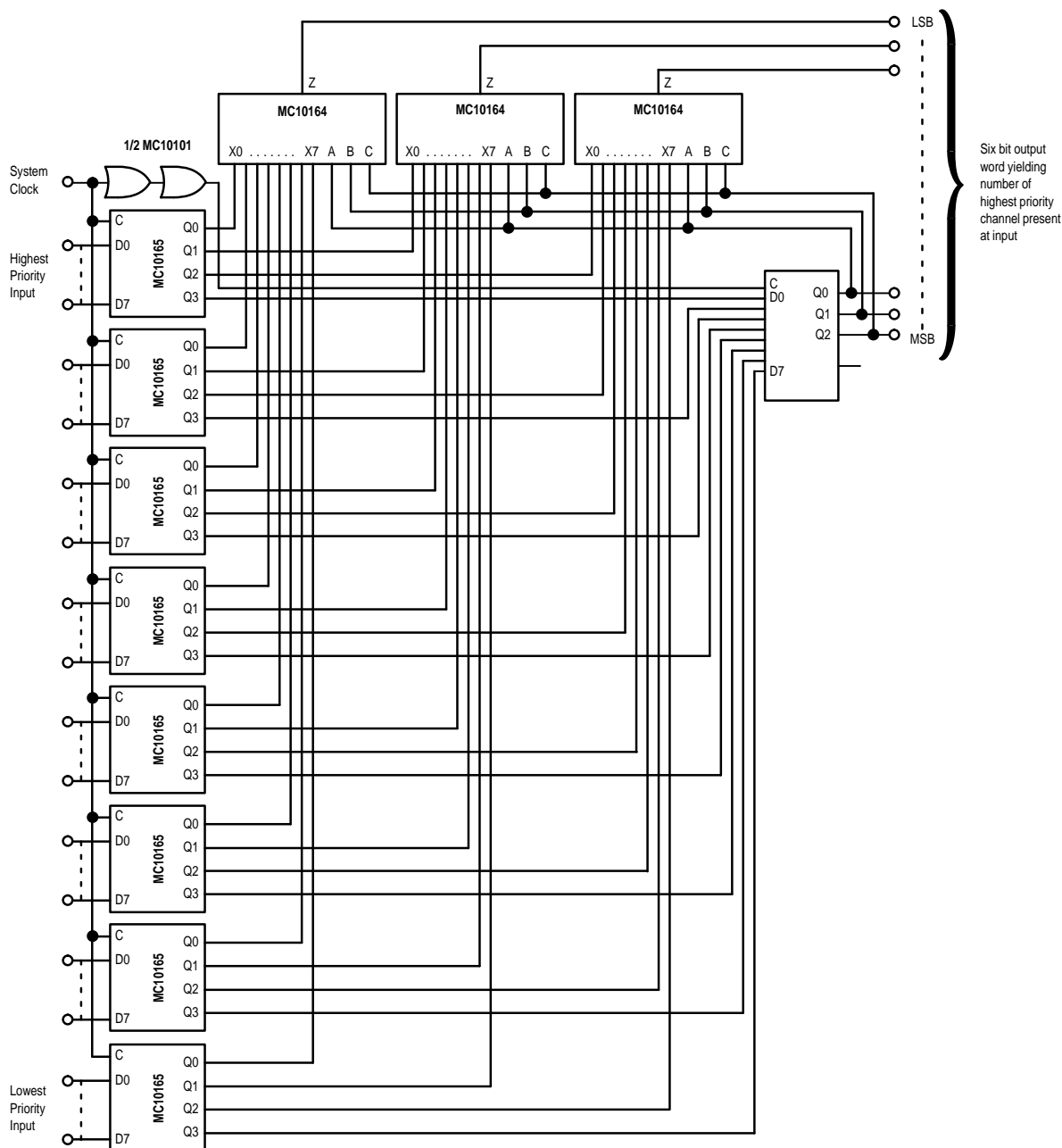
Each MECL 10,000 series circuit has been designed to meet the dc specifications shown in the test table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 linear fpm is maintained. Outputs are 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**

A typical application of the MC10165 is the decoding of system status on a priority basis. A 64 line priority encoder is shown in the figure below. System status lines are

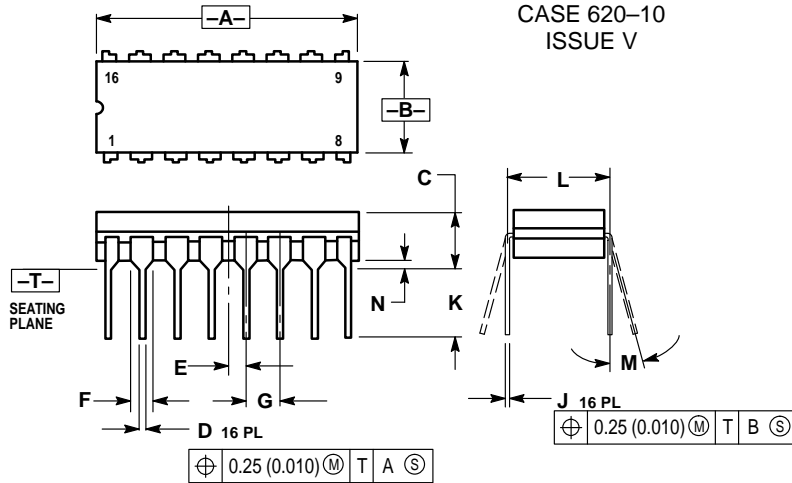
connected to this encoder such that, when a given condition exists, the respective input will be at a logic high level. This scheme will select the one of 64 different system conditions, as represented at the encoder inputs, which has priority in determining the next system operation to be performed. The binary code showing the address of the highest priority input present will appear at the encoder outputs to control other system logic functions.

**64-LINE PRIORITY ENCODER**



OUTLINE DIMENSIONS

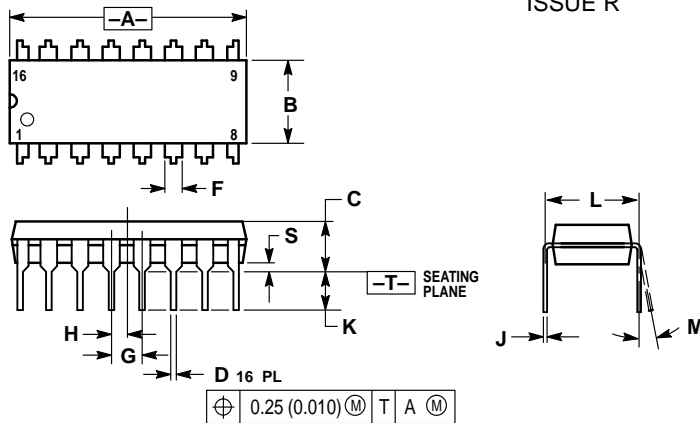
L SUFFIX  
CERAMIC DIP PACKAGE  
CASE 620-10  
ISSUE V



- 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.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.750	0.785	19.05	19.93
B	0.240	0.295	6.10	7.49
C	—	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	
H	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

P SUFFIX  
PLASTIC DIP PACKAGE  
CASE 648-08  
ISSUE R



- 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.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.740	0.770	18.80	19.55
B	0.250	0.270	6.35	6.85
C	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	
H	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

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