MC10H165

8-Input Priority Encoder

Description

The MC10H165 is an 8−Input Priority Encoder. This 10H part is a functional/pinout duplication of the standard MECL 10K™ family part, with 100% improvement in propagation delay, and no increases in power−supply current.
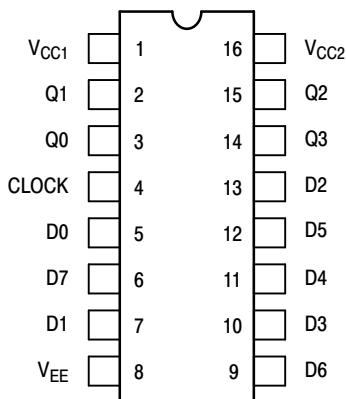
Features

- Propagation Delay, Data−to−Output, 2.2 ns Typical
- Improved Noise Margin 150 mV (Over Operating Voltage and Temperature Range)
- Voltage Compensated
- MECL 10K Compatible
- Pb−Free Packages are Available*

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

DIP PIN ASSIGNMENT

V_{CC1}	1	16	V_{CC2}

V_{CC1} — 1 | 16 — V_{CC2}
$Q1$ — 2 | 15 — $Q2$
$Q0$ — 3 | 14 — $Q3$
CLOCK — 4 | 13 — $D2$
$D0$ — 5 | 12 — $D5$
$D7$ — 6 | 11 — $D4$
$D1$ — 7 | 10 — $D3$
V_{EE} — 8 | 9 — $D6$

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).
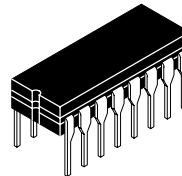
*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.
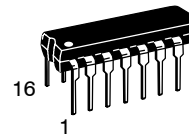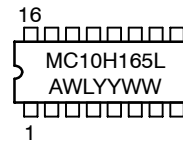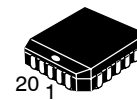
MARKING DIAGRAMS*

CDIP−16
L SUFFIX
CASE 620A

16
MC10H165L
AWLYYWW
1

PDIP−16
P SUFFIX
CASE 648

16
MC10H165P
AWLYYWWG
1

PLLC−20
FN SUFFIX
CASE 775

1 20
10H165G
AWLYYWW
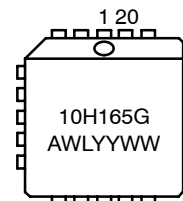
A	= Assembly Location
WL, L	= Wafer Lot
YY, Y	= Year
WW, W	= Work Week
G	= Pb−Free Package

*For additional marking information, refer to Application Note AND8002/D.

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

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 – Continuous – Surge	50 100	mA
T_A	Operating Temperature Range	0 to +75	°C
T_{stg}	Storage Temperature Range – Plastic – Ceramic	−55 to +150 −55 to +165	°C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

Table 2. ELECTRICAL CHARACTERISTICS (V_{EE} = − 5.2 V ±5%) (Note 1)

Symbol	Characteristic	0° Min	0° Max	25° Min	25° Max	75° Min	75° Max	Unit
I_E	Power Supply Current	–	144	–	131	–	144	mA

I_{inH}	Input Current High
	         Pin 4
	         Data Inputs
		
		–
		–
			
			510
			600
				
				–
				–
					
					320
					370
						
						–
						–
							
							320
							370
								µAdc

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

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 Ω resistor to −2.0 V.

Table 3. AC PARAMETERS

Symbol	Characteristic	0° Min	0° Max	25° Min	25° Max	75° Min	75° Max	Unit

t_{pd}	Propagation Delay
	        Data Input → Output
	        Clock Input → Output
		
		0.7
		0.7
			
			3.4
			2.2
				
				0.7
				0.7
					
					3.4
					2.2
						
						0.7
						0.7
							
							3.4
							2.2
								ns

t_{set}	Set−up Time	3.0	–	3.0	–	3.0	–	ns
t_{hold}	Hold Time	0.5	–	0.5	–	0.5	–	ns
t_r	Rise Time	0.5	2.4	0.5	2.4	0.5	2.4	ns
t_f	Fall Time	0.5	2.4	0.5	2.4	0.5	2.4	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 lfpm. 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.
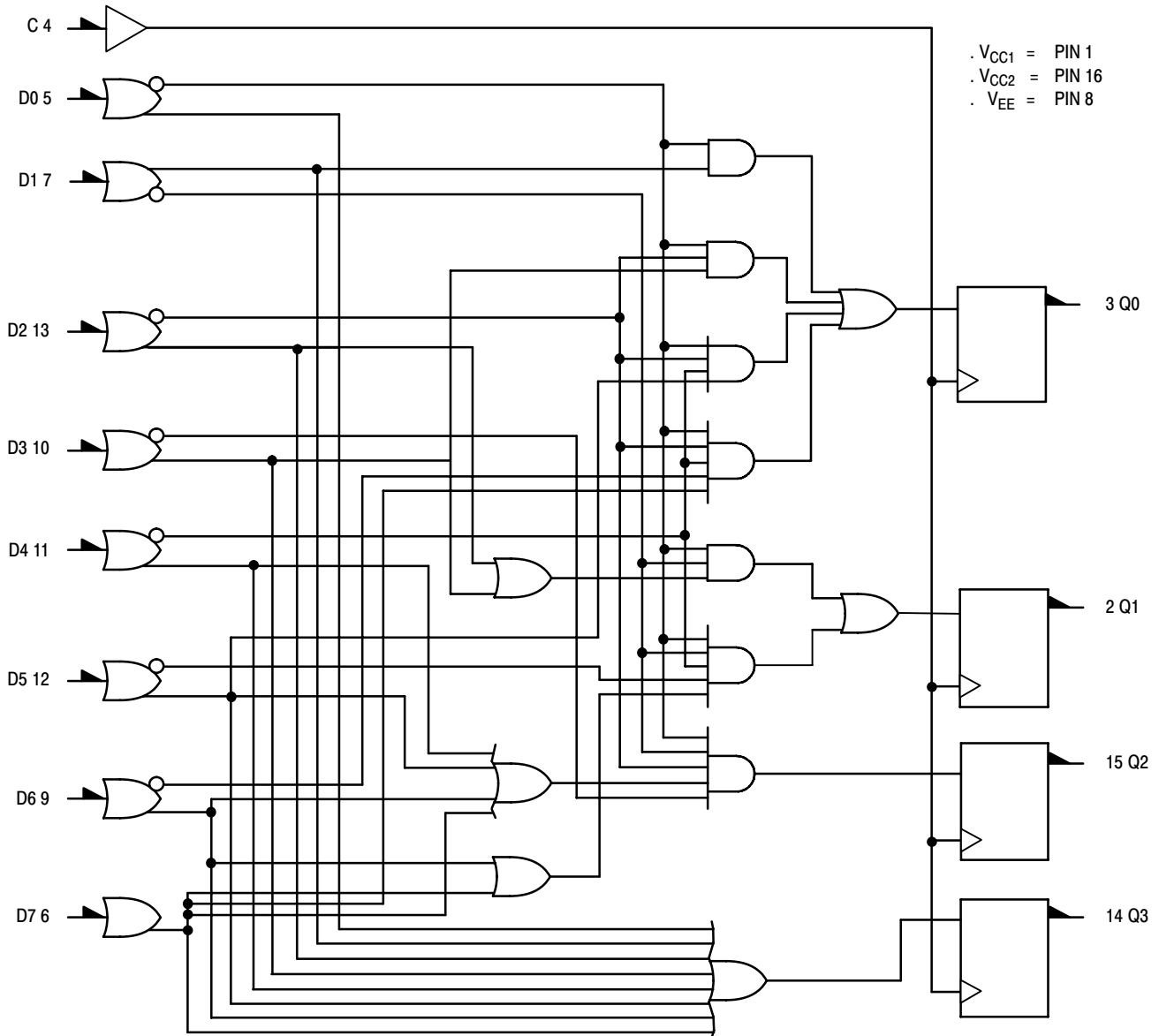
MC10H165

8−INPUT PRIORITY ENCODER

The MC10H165 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 MC10H165 can also be used to develop binary codes from random logic inputs, for addressing ROMs, RAMs, or for multiplexing data.

LOGIC DIAGRAM

V_{CC1} = PIN 1
V_{CC2} = PIN 16
V_{EE} = PIN 8

Numbers at ends of terminals denote pin numbers for L and P packages.

MC10H165

APPLICATION INFORMATION

A typical application of the MC10H165 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
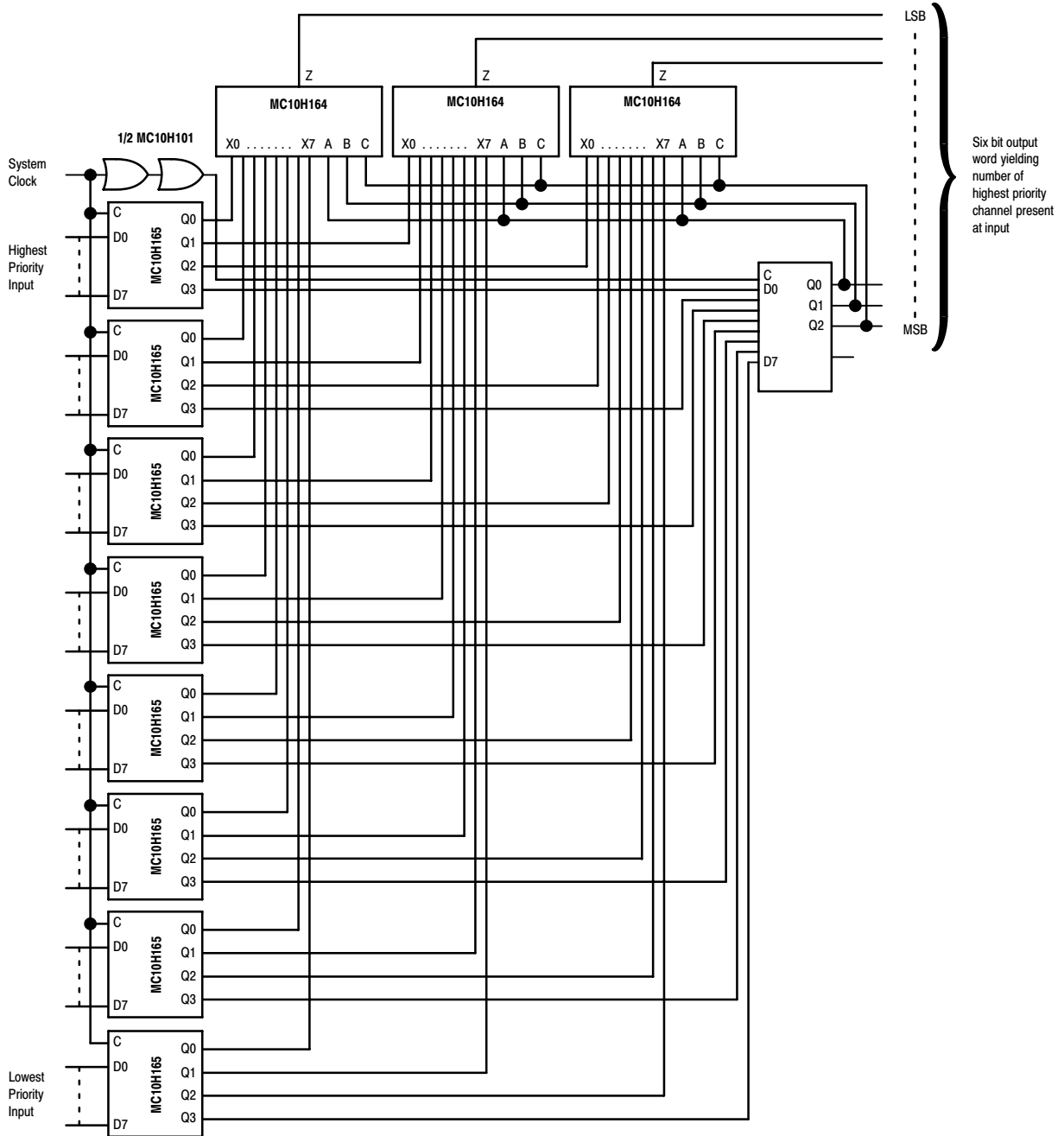
MC10H165

ORDERING INFORMATION

Device	Package	Shipping†
MC10H165FN	PLLC–20	46 Units / Rail
MC10H165FNG	PLLC–20 (Pb–Free)	46 Units / Rail
MC10H165FNR2	PLLC–20	500 / Tape & Reel
MC10H165FNR2G	PLLC–20 (Pb–Free)	500 / Tape & Reel
MC10H165L	CDIP–16	25 Unit / Rail
MC10H165P	PDIP–16	25 Unit / Rail
MC10H165PG	PDIP–16 (Pb–Free)	25 Unit / Rail

†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.

PACKAGE DIMENSIONS

20 LEAD PLLC
CASE 775–02
ISSUE E

VIEW D–D

VIEW S

VIEW S
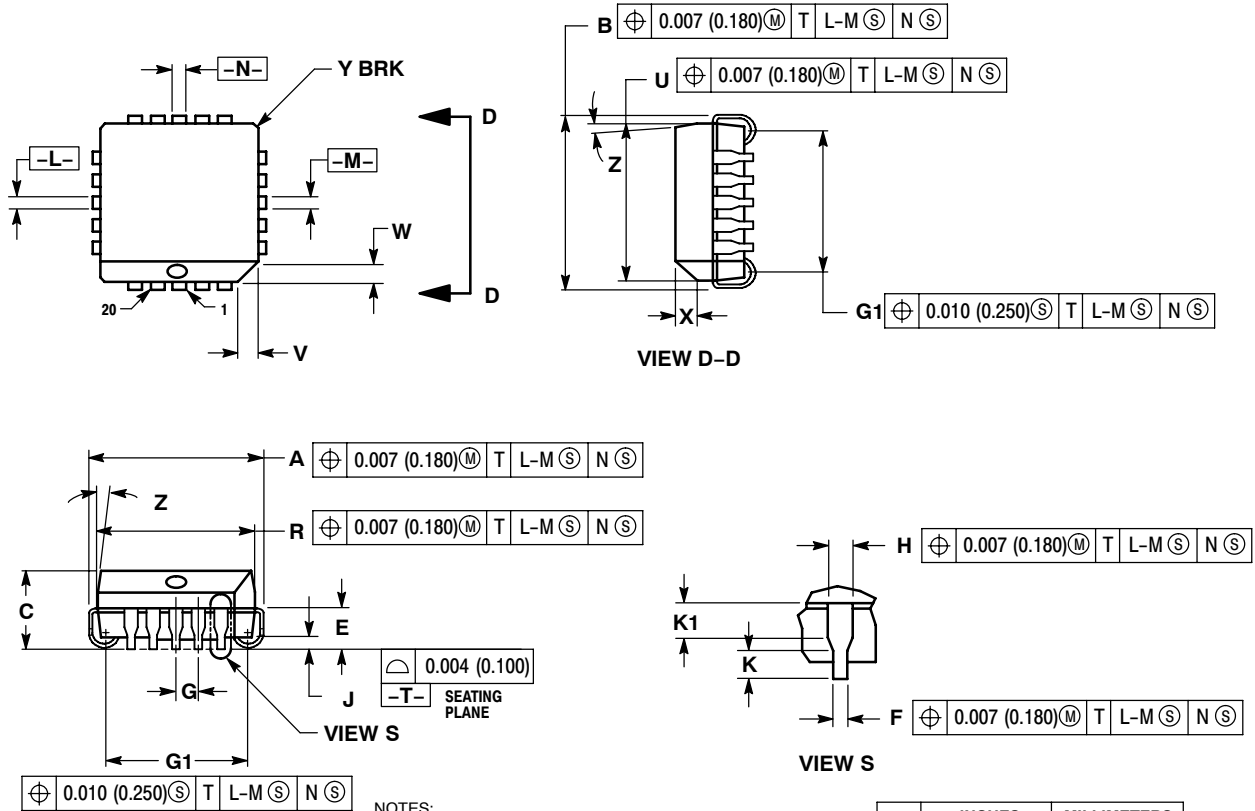
NOTES:
1. DIMENSIONS AND TOLERANCING PER ANSI Y14.5M, 1982.
2. DIMENSIONS IN INCHES.
3. DATUMS –L–, –M–, AND –N– DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
4. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM –T–, SEATING PLANE.
5. DIMENSIONS R AND U DO NOT INCLUDE 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 MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS 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	0.019	0.33	0.48
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	---

PACKAGE DIMENSIONS

CDIP–16
L SUFFIX
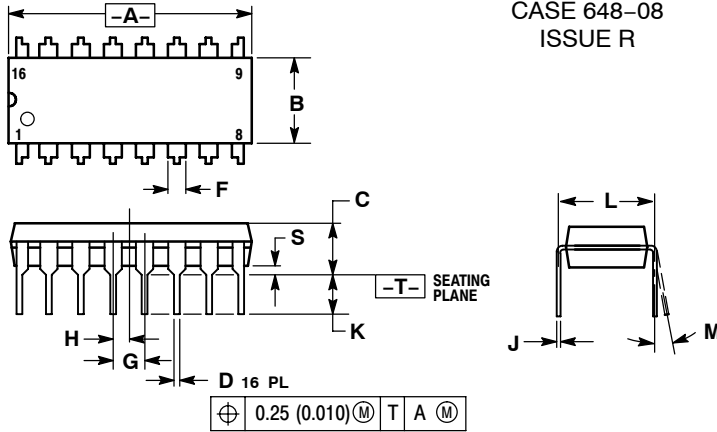CERAMIC DIP PACKAGE
CASE 620A–01
ISSUE O
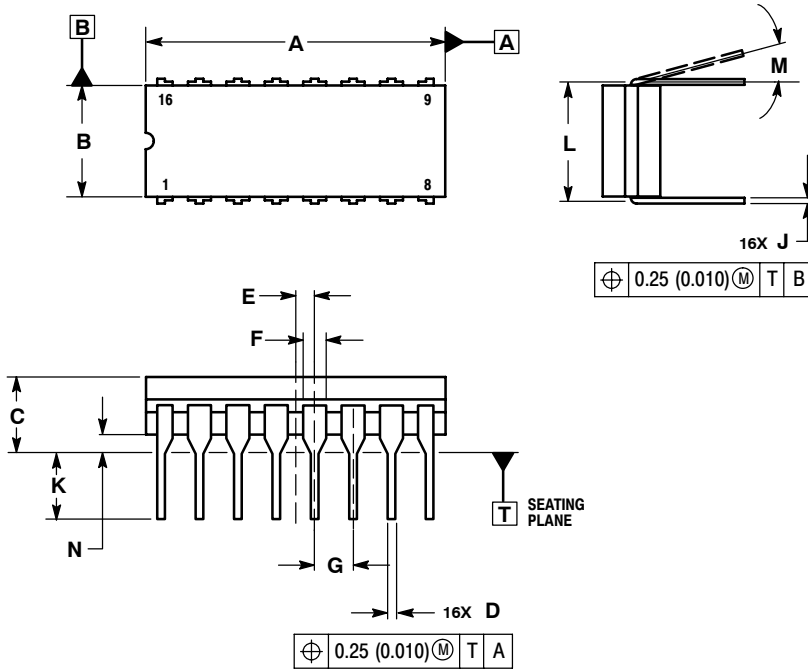
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
4. DIMENSION F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.
5. THIS DRAWING REPLACES OBSOLETE CASE OUTLINE 620–10.

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

⊕ 0.25 (0.010) Ⓜ T B

⊕ 0.25 (0.010) Ⓜ T A

SEATING PLANE

MC10H165

PACKAGE DIMENSIONS

PDIP-16
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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PUBLICATION ORDERING INFORMATION