



**THE DATASHEET OF  
MC10H116DG**



# MC10H116

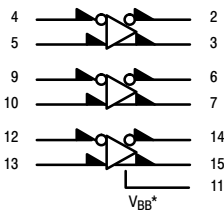
## Triple Line Receiver

### Description

The MC10H116 is a triple differential amplifier designed for use in sensing differential signals over long lines and is a functional/pinout duplication of the MC10116, with 100% improvement in propagation delay and no increase in power supply current. For termination information see [AND8020](#).

### Features

- Propagation Delay, 1.0 ns Typical
- Power Dissipation 85 mW Typ/Pkg (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



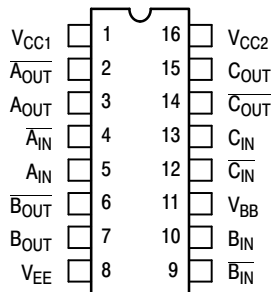
V<sub>CC1</sub> = Pin 1  
V<sub>CC2</sub> = Pin 16  
V<sub>EE</sub> = Pin 8

When input pin with bubble goes positive it's respective output pin with bubble goes positive.

\*V<sub>BB</sub> to be used to supply bias to the MC10H116 only and bypassed (when used) with 0.01 μF to 0.1 μF capacitor to ground (0 V). V<sub>BB</sub> can source < 1.0 mA.  
The MC10H116 is designed to be used in sensing differential signals over long lines. The bias supply (V<sub>BB</sub>) is made available to make the device useful as a Schmitt trigger, or in other applications where a stable reference voltage is necessary.  
Active current sources provide these receivers with excellent common-mode noise rejection. If any amplifier in a package is not used, one input of that amplifier must be connected to V<sub>BB</sub> to prevent unbalancing the current-source bias network.  
The MC10H116 does not have internal-input pull-down resistors. This provides high impedance to the amplifier input and facilitates differential connections.

- Applications:
- Low Level Receiver
  - Schmitt Trigger
  - Voltage Level Interface

Figure 1. Logic Diagram



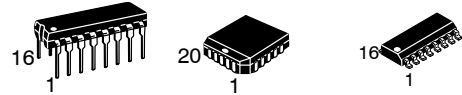
Pin assignment is for Dual-in-Line Package.  
For PLCC pin assignment, see TND309, the Pin Conversion Tables, page 9.

Figure 2. Dip Pin Assignment



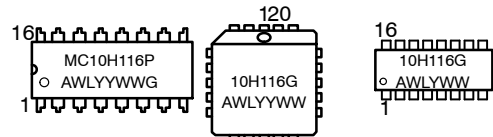
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PDIP-16 P SUFFIX CASE 648-08  
PLCC-20 FN SUFFIX CASE 775-02  
SOIC-16 D SUFFIX CASE 751B-05

### MARKING DIAGRAMS\*



- A = Assembly Location  
WL = Wafer Lot  
YY = Year  
WW = Work Week

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

### ORDERING INFORMATION

Device	Package	Shipping†
MC10H116DG	SOIC-16 (Pb-Free)	48 Units/Tube
MC10H116DR2G	SOIC-16 (Pb-Free)	2500/Tape & Reel
MC10H116FNG	PLCC-20 (Pb-Free)	46 Units/Tube
MC10H116FNR2G	PLCC-20 (Pb-Free)	500/Tape & Reel
MC10H116PG	PDIP-16 (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](#).

# MC10H116

**Table 1. MAXIMUM RATINGS**

Symbol	Characteristic	Rating	Unit
V <sub>EE</sub>	Power Supply (V <sub>CC</sub> = 0)	-8.0 to 0	Vdc
V <sub>I</sub>	Input Voltage (V <sub>CC</sub> = 0)	0 to V <sub>EE</sub>	Vdc
I <sub>out</sub>	Output Current Continuous Surge	50 100	mA
T <sub>A</sub>	Operating Temperature Range	0 to +75	°C
T <sub>stg</sub>	Storage Temperature Range Plastic Ceramic	-55 to +150 -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<sub>EE</sub> = -5.2 V ±5%) (Note 2)

Symbol	Characteristic	0°		25°		75°		Unit
		Min	Max	Min	Max	Min	Max	
I <sub>E</sub>	Power Supply Current	-	23	-	21	-	23	mA
I <sub>inH</sub>	Input Current High	-	150	-	95	-	95	μA
I <sub>CBO</sub>	Input Leakage Current	-	1.5	-	1.0	-	1.0	μA
V <sub>BB</sub>	Reference Voltage	-1.38	-1.27	-1.35	-1.25	-1.31	-1.19	Vdc
V <sub>OH</sub>	High Output Voltage	-1.02	-0.84	-0.98	-0.81	-0.92	-0.735	Vdc
V <sub>OL</sub>	Low Output Voltage	-1.95	-1.63	-1.95	-1.63	-1.95	-1.60	Vdc
V <sub>IH</sub>	High Input Voltage (Note 1)	-1.17	-0.84	-1.13	-0.81	-1.07	-0.735	Vdc
V <sub>IL</sub>	Low Input Voltage (Note 1)	-1.95	-1.48	-1.95	-1.48	-1.95	-1.45	Vdc
V <sub>CMR</sub>	Common Mode Range (Note 4)	-	-	-2.85 to -0.8		-	-	Vdc
V <sub>PP</sub>	Input Sensitivity (Note 3)	-	-	150 typ		-	-	mV <sub>PP</sub>

1. When V<sub>BB</sub> is used as the reference voltage.
2. Each MECL 10H™ series circuit has been designed to meet the 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 V.
3. Differential input not to exceed 1.0 Vdc.
4. 150 mV<sub>p-p</sub> differential input required to obtain full logic swing on output.

**Table 3. AC CHARACTERISTICS**

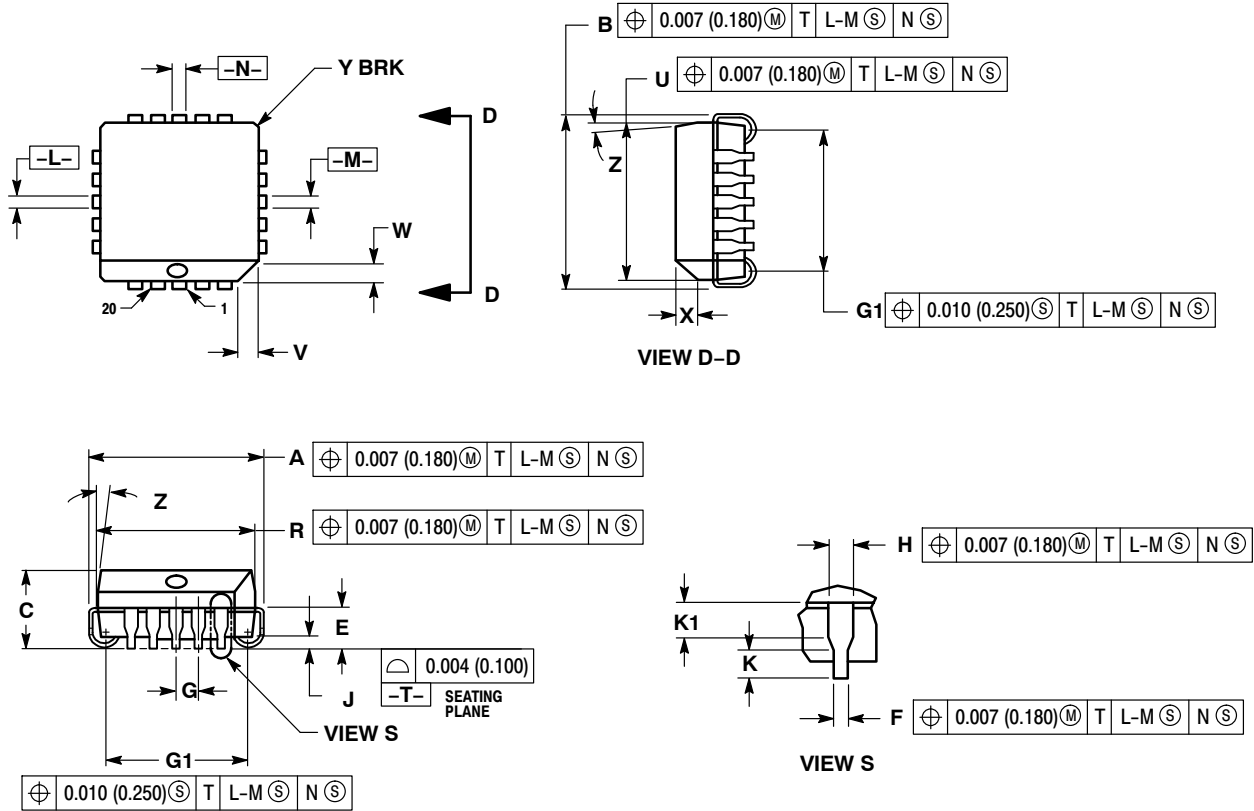
Symbol	Characteristic	0°		25°		75°		Unit
		Min	Max	Min	Max	Min	Max	
t <sub>pd</sub>	Propagation Delay	0.4	1.3	0.4	1.3	0.45	1.45	ns
t <sub>r</sub>	Rise Time	0.5	1.5	0.5	1.6	0.5	1.7	ns
t <sub>f</sub>	Fall Time	0.5	1.5	0.5	1.6	0.5	1.7	ns

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.

# MC10H116

## PACKAGE DIMENSIONS

20 LEAD PLLC  
CASE 775-02  
ISSUE F



**NOTES:**

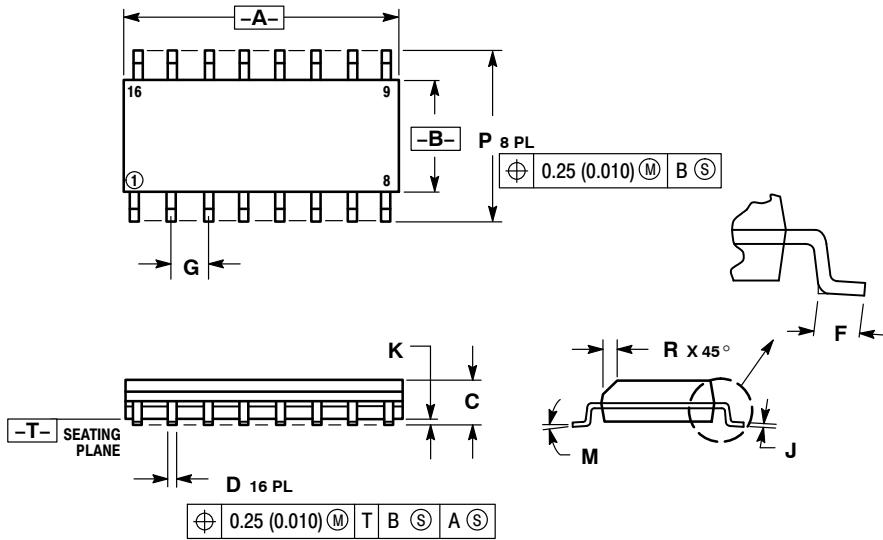
1. DIMENSIONS AND TOLERANCING PER ANSI Y14.5M, 1982.
2. DIMENSIONS IN INCHES.
3. DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
4. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
5. DIMENSIONS R AND U DO NOT INCLUDE MOLD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

# MC10H116

## PACKAGE DIMENSIONS

SOIC-16  
CASE 751B-05  
ISSUE K



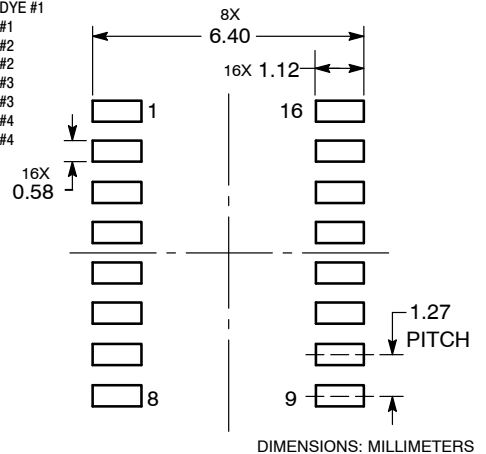
**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0° - 7°		0° - 7°	
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

- |  |  |  |  |
|--|--|--|--|
| <p><b>STYLE 1:</b></p> <p>PIN 1. COLLECTOR<br/>2. BASE<br/>3. EMITTER<br/>4. NO CONNECTION<br/>5. EMITTER<br/>6. BASE<br/>7. COLLECTOR<br/>8. COLLECTOR<br/>9. BASE<br/>10. EMITTER<br/>11. NO CONNECTION<br/>12. EMITTER<br/>13. BASE<br/>14. COLLECTOR<br/>15. EMITTER<br/>16. COLLECTOR</p>                           | <p><b>STYLE 2:</b></p> <p>PIN 1. CATHODE<br/>2. ANODE<br/>3. NO CONNECTION<br/>4. CATHODE<br/>5. ANODE<br/>6. NO CONNECTION<br/>7. ANODE<br/>8. CATHODE<br/>9. CATHODE<br/>10. ANODE<br/>11. NO CONNECTION<br/>12. CATHODE<br/>13. CATHODE<br/>14. NO CONNECTION<br/>15. ANODE<br/>16. CATHODE</p> | <p><b>STYLE 3:</b></p> <p>PIN 1. COLLECTOR, DYE #1<br/>2. BASE, #1<br/>3. EMITTER, #1<br/>4. COLLECTOR, #1<br/>5. COLLECTOR, #2<br/>6. BASE, #2<br/>7. EMITTER, #2<br/>8. COLLECTOR, #2<br/>9. COLLECTOR, #3<br/>10. BASE, #3<br/>11. EMITTER, #3<br/>12. COLLECTOR, #3<br/>13. COLLECTOR, #4<br/>14. BASE, #4<br/>15. EMITTER, #4<br/>16. COLLECTOR, #4</p>   | <p><b>STYLE 4:</b></p> <p>PIN 1. COLLECTOR, DYE #1<br/>2. COLLECTOR, #1<br/>3. COLLECTOR, #2<br/>4. COLLECTOR, #3<br/>5. COLLECTOR, #4<br/>6. COLLECTOR, #3<br/>7. COLLECTOR, #4<br/>8. COLLECTOR, #4<br/>9. BASE, #4<br/>10. EMITTER, #4<br/>11. BASE, #3<br/>12. EMITTER, #3<br/>13. BASE, #2<br/>14. EMITTER, #2<br/>15. BASE, #1<br/>16. EMITTER, #1</p> |
| <p><b>STYLE 5:</b></p> <p>PIN 1. DRAIN, DYE #1<br/>2. DRAIN, #1<br/>3. DRAIN, #2<br/>4. DRAIN, #2<br/>5. DRAIN, #3<br/>6. DRAIN, #3<br/>7. DRAIN, #4<br/>8. DRAIN, #4<br/>9. GATE, #4<br/>10. SOURCE, #4<br/>11. GATE, #3<br/>12. SOURCE, #3<br/>13. GATE, #2<br/>14. SOURCE, #2<br/>15. GATE, #1<br/>16. SOURCE, #1</p> | <p><b>STYLE 6:</b></p> <p>PIN 1. CATHODE<br/>2. CATHODE<br/>3. CATHODE<br/>4. CATHODE<br/>5. CATHODE<br/>6. CATHODE<br/>7. CATHODE<br/>8. CATHODE<br/>9. ANODE<br/>10. ANODE<br/>11. ANODE<br/>12. ANODE<br/>13. ANODE<br/>14. ANODE<br/>15. ANODE<br/>16. ANODE</p>                               | <p><b>STYLE 7:</b></p> <p>PIN 1. SOURCE N-CH<br/>2. COMMON DRAIN (OUTPUT)<br/>3. COMMON DRAIN (OUTPUT)<br/>4. GATE P-CH<br/>5. COMMON DRAIN (OUTPUT)<br/>6. COMMON DRAIN (OUTPUT)<br/>7. COMMON DRAIN (OUTPUT)<br/>8. SOURCE P-CH<br/>9. SOURCE P-CH<br/>10. COMMON DRAIN (OUTPUT)<br/>11. COMMON DRAIN (OUTPUT)<br/>12. COMMON DRAIN (OUTPUT)<br/>13. GATE N-CH<br/>14. COMMON DRAIN (OUTPUT)<br/>15. COMMON DRAIN (OUTPUT)<br/>16. SOURCE N-CH</p> |  |

### SOLDERING FOOTPRINT



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, [SOLDERRM/D](http://www.onsemi.com/SOLDERRM/D).

# MC10H116

## 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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- SOURCE

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