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# MC10H115

## Quad Line Receiver

### Description

The MC10H115 is a quad differential amplifier designed for use in sensing differential signals over long lines. This 10H part is a functional/ pinout duplication of the standard MECL 10K™ family part, with 100% improvement in counting frequency and no increase in power supply current.

The base bias supply ( $V_{BB}$ ) is made available at Pin 9 to make the device useful as a Schmitt trigger, or in other applications where a stable reference voltage is necessary. Active current sources provide the MC10H115 with excellent common mode rejection. If any amplifier in a package is not used, one input of that amplifier must be connected to  $V_{BB}$  (Pin 9) to prevent upsetting the current source bias network.

The MC10H115 is designed to be used in sensing differential signals over long lines. The bias supply ( $V_{BB}$ ) 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  $V_{BB}$  to prevent unbalancing the current source bias network.

The MC10H115 does not have internal input pulldown resistors. This provides high impedance to the amplifier input and facilitates differential connections.

### Features

- Propagation Delay, 1.0 ns Typical
- Power Dissipation 110 mW Typ/Pkg (No Load)
- Improved Noise Margin 150 mV (Over Operating Voltage and Temperature Range)
- Voltage Compensated
- MECL 10K Compatible

### Applications

- Low Level Receiver
- Voltage Level Interface
- Schmitt Trigger
- Pb-Free Packages are Available\*

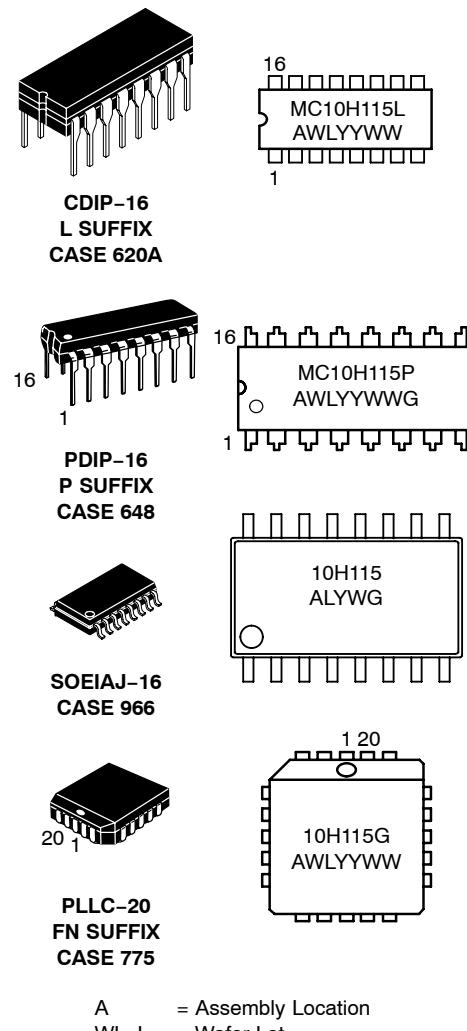
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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### MARKING DIAGRAMS\*



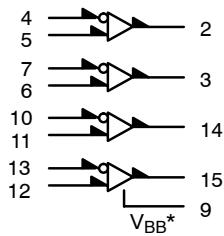
A = Assembly Location  
 WL, L = Wafer Lot  
 YY, Y = Year  
 WW, W = Work Week  
 G = Pb-Free Package

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

### ORDERING INFORMATION

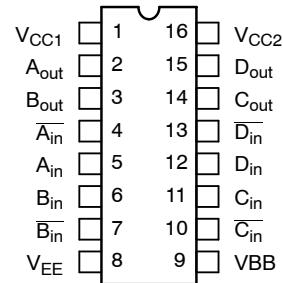
See detailed ordering and shipping information in the package dimensions section on page 3 of this data sheet.

## MC10H115



$V_{CC1}$  = Pin 1  
 $V_{CC2}$  = Pin 16  
 $V_{EE}$  = Pin 8

$*V_{BB}$  to be used to supply bias to the MC10H115 only and bypassed (when used) with 0.01  $\mu$ F to 0.1  $\mu$ F capacitor to ground (0 V).  $V_{BB}$  can source < 1.0 mA.  
 When input pin with bubble goes positive its respective output pin with bubble goes positive.



Pin assignment is for Dual-in-Line Package.

**Figure 1. Logic Diagram**

**Figure 2. Pin Assignment**

**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 °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  $\pm 5\%$ ) (Note 2)**

Symbol	Characteristic	0°		25°		75°		Unit
		Min	Max	Min	Max	Min	Max	
$I_E$	Power Supply Current	-	29	-	26	-	29	mA
$I_{inH}$	Input Current High	-	150	-	95	-	95	$\mu$ A
$I_{CBO}$	Input Leakage Current	-	1.5	-	1.0	-	1.0	$\mu$ A
$V_{BB}$	Reference Voltage	-1.38	-1.27	-1.35	-1.25	-1.31	-1.19	Vdc
$V_{OH}$	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 (Note 1)	-1.17	-0.84	-1.13	-0.81	-1.07	-0.735	Vdc
$V_{IL}$	Low Input Voltage (Note 1)	-1.95	-1.48	-1.95	-1.48	-1.95	-1.45	Vdc
$V_{CMR}$	Common Mode Range (Note 3)	-	-	-2.85 to -0.8		-	-	Vdc
$V_{PP}$	Input Sensitivity (Note 4)	-	-	150 typ		-	-	mV <sub>PP</sub>

- When  $V_{BB}$  is used as the reference voltage.
- 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 linear fpm is maintained. Outputs are terminated through a 50  $\Omega$  resistor to -2.0 V.
- Differential input not to exceed 1.0 Vdc.
- 150 mV<sub>p-p</sub> differential input required to obtain full logic swing on output.

## MC10H115

**Table 3. AC PARAMETERS**

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	1.4	0.5	1.5	0.5	1.6	ns
t <sub>f</sub>	Fall Time	0.5	1.4	0.5	1.5	0.5	1.6	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 lfm. 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.

## ORDERING INFORMATION

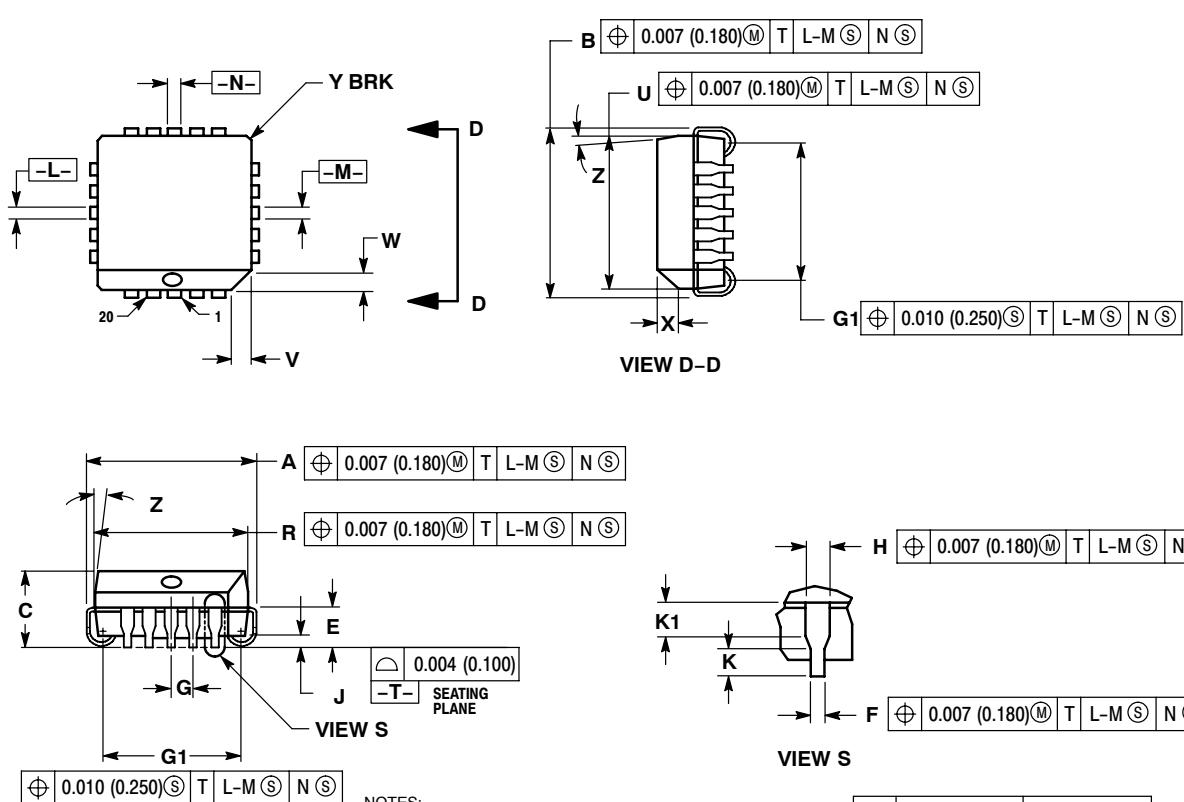
Device	Package	Shipping <sup>†</sup>
MC10H115FN	PLLC-20	46 Units / Rail
MC10H115FNG	PLLC-20 (Pb-Free)	46 Units / Rail
MC10H115FNR2	PLLC-20	500 / Tape & Reel
MC10H115FNR2G	PLLC-20 (Pb-Free)	500 / Tape & Reel
MC10H115L	CDIP-16	25 Unit / Rail
MC10H115M	SOEIAJ-16	50 Unit / Rail
MC10H115MG	SOEIAJ-16 (Pb-Free)	50 Unit / Rail
MC10H115MEL	SOEIAJ-16	2000 / Tape & Reel
MC10H115MELG	SOEIAJ-16 (Pb-Free)	2000 / Tape & Reel
MC10H115P	PDIP-16	25 Unit / Rail
MC10H115PG	PDIP-16 (Pb-Free)	25 Unit / Rail

<sup>†</sup>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.

## MC10H115

### PACKAGE DIMENSIONS

**20 LEAD PLCC**  
CASE 775-02  
ISSUE E



NOTES:

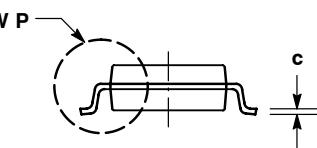
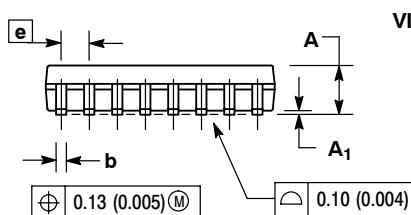
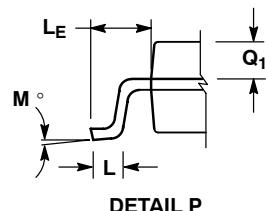
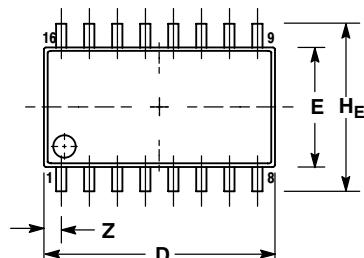
1. DIMENSIONS AND TOLERANCING PER ANSI Y14.5M, 1982.
2. DIMENSIONS IN INCHES.
3. DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
4. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
5. DIMENSIONS R AND U DO NOT INCLUDE MOLD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

## MC10H115

### PACKAGE DIMENSIONS

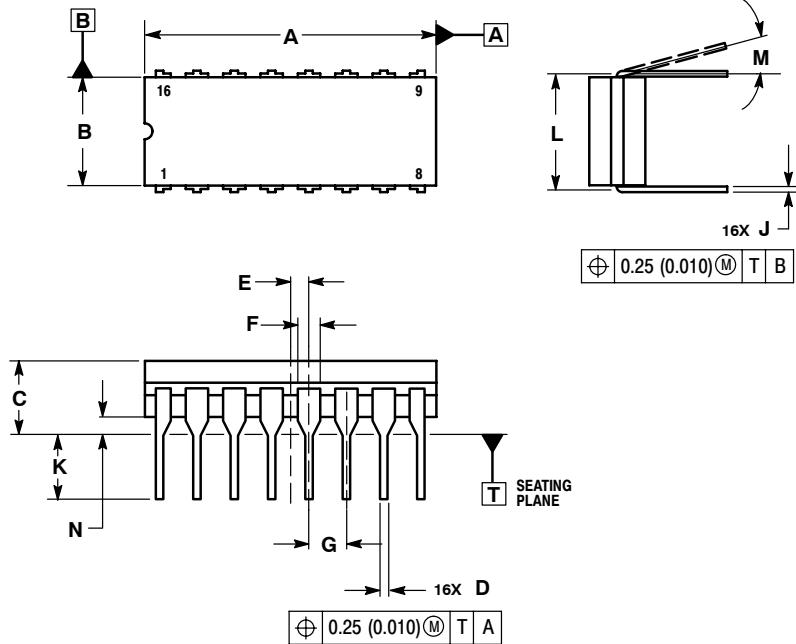
**SOEIAJ-16**  
CASE 966-01  
ISSUE A



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS AND ARE MEASURED AT THE PARTING LINE. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
  4. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
  5. THE LEAD WIDTH DIMENSION (b) DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE LEAD WIDTH DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN PROTRUSIONS AND ADJACENT LEAD TO BE 0.46 (0.018).

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	---	2.05	---	0.081
A <sub>1</sub>	0.05	0.20	0.002	0.008
b	0.35	0.50	0.014	0.020
c	0.10	0.20	0.007	0.011
D	9.90	10.50	0.390	0.413
E	5.10	5.45	0.201	0.215
e	1.27 BSC		0.050 BSC	
H <sub>E</sub>	7.40	8.20	0.291	0.323
L	0.50	0.85	0.020	0.033
L <sub>E</sub>	1.10	1.50	0.043	0.059
M	0 °	10 °	0 °	10 °
Q <sub>1</sub>	0.70	0.90	0.028	0.035
Z	---	0.78	---	0.031

**CDIP-16**  
L SUFFIX  
CERAMIC DIP PACKAGE  
CASE 620A-01  
ISSUE O

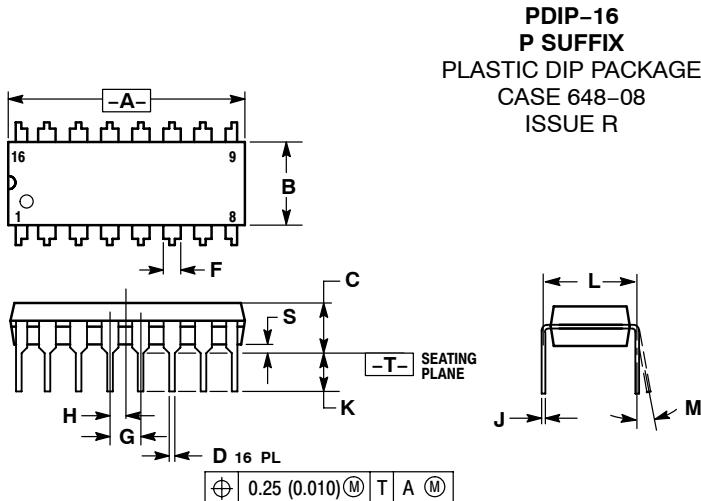


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
  4. DIMENSION F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.
  5. THIS DRAWING REPLACES OBSOLETE CASE OUTLINE 620-10.

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

## MC10H115

### 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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