# **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  $10K^{\text{TM}}$  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

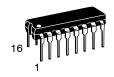
# **Applications**

- Low Level Receiver
- Voltage Level Interface
- Schmitt Trigger
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant



# ON Semiconductor®

www.onsemi.com

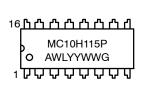


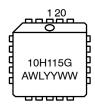


PDIP-16 P SUFFIX CASE 648-08

PLLC-20 FN SUFFIX CASE 775-02

#### **MARKING DIAGRAMS\***





PDIP-16

PLLC-20

A = Assembly Location

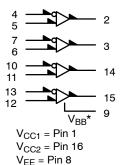
WL, L = Wafer Lot
 YY, Y = Year
 WW, W = Work Week
 G = Pb-Free Package

## **ORDERING INFORMATION**

Device	Package	Shipping†
MC10H115FNG	PLLC-20 (Pb-Free)	46 Units / Tube
MC10H115FNR2G	PLLC-20 (Pb-Free)	500 Tape & Reel
MC10H115PG	PDIP-16 (Pb-Free)	25 Units / Tube

<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.

<sup>\*</sup>For additional marking information, refer to Application Note <u>AND8002/D</u>.



 $^*V_{BB}$  to be used to supply bias to the MC10H115 only and bypassed (when used) with 0.01 μF to 0.1 μF 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.

 VCC1
 1
 16
 VCC2

 Aout
 2
 15
 Dout

 Bout
 3
 14
 Cout

 Ain
 4
 13
 Din

 Ain
 5
 12
 Din

 Bin
 6
 11
 Cin

 Bin
 7
 10
 Cin

 VEE
 8
 9
 VBB

Pin assignment is for Dual-in-Line Package.

Figure 2. Pin Assignment

Figure 1. Logic Diagram

**Table 1. MAXIMUM RATINGS** 

Symbol	Characteristic	Rating	Unit
V <sub>EE</sub>	Power Supply (V <sub>CC</sub> = 0)	-8.0 to 0	Vdc
VI	Input Voltage (V <sub>CC</sub> = 0)	0 to V <sub>EE</sub>	Vdc
l <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 ( $V_{EE}$  = -5.2 V  $\pm$ 5%) (Note 2)

		0	0	25	5°	7	75°	
Symbol	Characteristic	Min	Max	Min	Max	Min	Max	Unit
ΙE	Power Supply Current	-	29	-	26	-	29	mA
I <sub>inH</sub>	Input Current High	-	150	-	95	-	95	μΑ
I <sub>CBO</sub>	Input Leakage Current	-	1.5	-	1.0	-	1.0	μΑ
$V_{BB}$	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 3)	_	-	−2.85 t	to -0.8	-	-	Vdc
$V_{PP}$	Input Sensitivity (Note 4)	-	-	150	typ	-	-	$mV_{PP}$

<sup>1.</sup> 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 Ω resistor to −2.0 V.

<sup>3.</sup> Differential input not to exceed 1.0 Vdc.

<sup>4.</sup>  $150 \text{ mV}_{p-p}$  differential input required to obtain full logic swing on output.

**Table 3. AC PARAMETERS** 

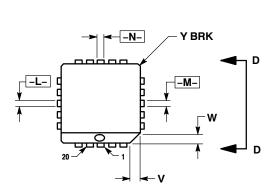
		0	0	25	5°	7	75°	
Symbol	Characteristic	Min	Max	Min	Max	Min	Max	Unit
t <sub>pd</sub>	Propagation Delay	0.4	1.3	0.4	1.3	0.45	1.45	ns
t <sub>r</sub>	Rise Time	0.5	1.4	0.5	1.5	0.5	1.6	ns
t <sub>f</sub>	Fall Time	0.5	1.4	0.5	1.5	0.5	1.6	ns

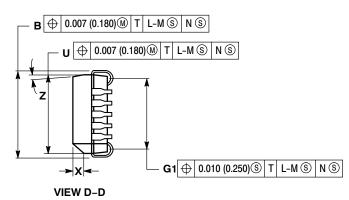
NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional 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.

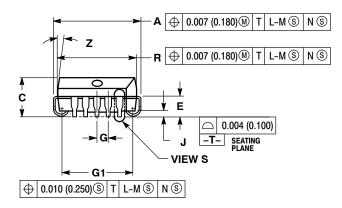
### PACKAGE DIMENSIONS

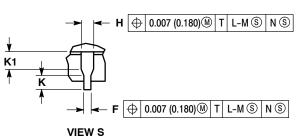
# **20 LEAD PLLC FN SUFFIX**

CASE 775-02 **ISSUE F** 









- 1. DIMENSIONS AND TOLERANCING PER ANSI Y14.5M,
- 2. DIMENSIONS IN INCHES.
  3. DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD

  OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.

- PARTING LINE.

  4. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.

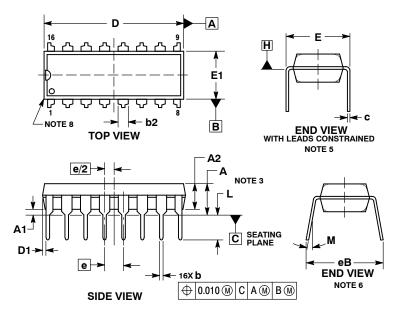
  5. DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.

  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 DIMENSION OF INTRUSION. THE 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	MILLIMETERS		
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	
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	
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	
Х	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

# PDIP-16 **P SUFFIX** CASE 648-08 ISSUE V



#### NOTES

- 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M. 1994.
- CONTROLLING DIMENSION: INCHES.
- DIMENSIONS A, A1 AND L ARE MEASURED WITH THE PACKAGE SEATED IN JEDEC SEATING PLANE GAUGE GS-3.

  DIMENSIONS D, D1 AND E1 DO NOT INCLUDE MOLD FLASH
- OR PROTRUSIONS. MOLD FLASH OR PROTRUSIONS ARE NOT TO EXCEED 0.10 INCH.
  DIMENSION E IS MEASURED AT A POINT 0.015 BELOW DATUM
- PLANE H WITH THE LEADS CONSTRAINED PERPENDICULAR TO DATUM C.
- DIMENSION OR IS MEASURED AT THE LEAD TIPS WITH THE LEADS UNCONSTRAINED.
- DATUM PLANE H IS COINCIDENT WITH THE BOTTOM OF THE LEADS, WHERE THE LEADS EXIT THE BODY. PACKAGE CONTOUR IS OPTIONAL (ROUNDED OR SQUARE
- CORNERS)

	INCHES		MILLIMETERS		
DIM	MIN	MAX	MIN	MAX	
Α		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		
С	0.008	0.014	0.20	0.36	
D	0.735	0.775	18.67	19.69	
D1	0.005		0.13		
Е	0.300	0.325	7.62	8.26	
E1	0.240	0.280	6.10	7.11	
е	0.100 BSC		2.54 BSC		
eВ		0.430		10.92	
L	0.115	0.150	2.92	3.81	
М		10°		10°	

STYLE 1	:	STYLE 2	STYLE 2:			
PIN 1.	CATHODE	PIN 1.	COMMON DRAIN			
2.	CATHODE	2.	COMMON DRAIN			
3.	CATHODE	3.	COMMON DRAIN			
4.	CATHODE	4.	COMMON DRAIN			
5.	CATHODE	5.	COMMON DRAIN			
6.	CATHODE	6.	COMMON DRAIN			
7.	CATHODE	7.	COMMON DRAIN			
8.	CATHODE	8.	COMMON DRAIN			
9.	ANODE	9.	GATE			
10.	ANODE	10.	SOURCE			
11.	ANODE	11.	GATE			
12.	ANODE	12.	SOURCE			
13.	ANODE	13.	GATE			
14.	ANODE	14.	SOURCE			
15.	ANODE	15.	GATE			
16.	ANODE	16.	SOURCE			

MECL is trademark of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries.

ON Semiconductor and in are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at <a href="https://www.onsemi.com/site/pdf/Patent-Marking.pdf">www.onsemi.com/site/pdf/Patent-Marking.pdf</a>. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability on semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, not does on semiconductor assume any individual arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

# **PUBLICATION ORDERING INFORMATION**

#### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor 19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free USA/Canada

Europe, Middle East and Africa Technical Support: Phone: 421 33 790 2910

Japan Customer Focus Center Phone: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative