

# MC10E101, MC100E101

## 5V ECL Quad 4-Input OR/NOR Gate

### Description

The MC10E/100E101 is a quad 4-input OR/NOR gate. The 100 Series contains temperature compensation.

### Features

- 500 ps Max. Propagation Delay
- PECL Mode Operating Range:  
 $V_{CC} = 4.2\text{ V}$  to  $5.7\text{ V}$  with  $V_{EE} = 0\text{ V}$
- NECL Mode Operating Range:  
 $V_{CC} = 0\text{ V}$  with  $V_{EE} = -4.2\text{ V}$  to  $-5.7\text{ V}$
- Internal Input  $50\text{ k}\Omega$  Pulldown Resistors
- ESD Protection: Human Body Model;  $> 2\text{ kV}$ , Machine Model;  $> 200\text{ V}$
- Meets or Exceeds JEDEC Spec EIA/JESD78 IC Latchup Test
- Moisture Sensitivity Level:  
 $\text{Pb} = 1$   
 $\text{Pb-Free} = 3$
- Flammability Rating: UL 94 V-0 @ 0.125 in,  
Oxygen Index: 28 to 34
- Transistor Count = 115 devices
- Pb-Free Packages are Available\*



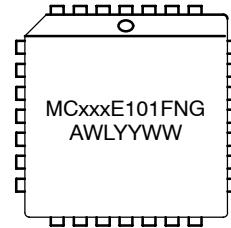
**ON Semiconductor®**

<http://onsemi.com>



PLCC-28  
FN SUFFIX  
CASE 776

### MARKING DIAGRAM\*



xxx	= 10 or 100
A	= Assembly Location
WL	= Wafer Lot
YY	= Year
WW	= Work Week
G	= Pb-Free Package

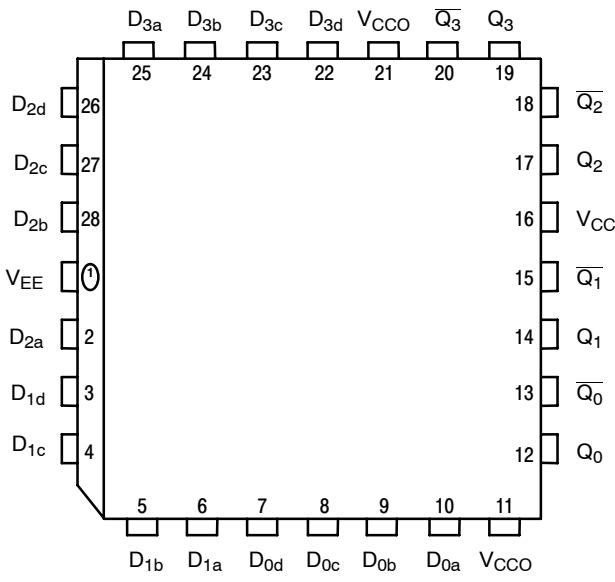
\*For additional marking information, refer to Application Note AND8002/D.

### ORDERING INFORMATION

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

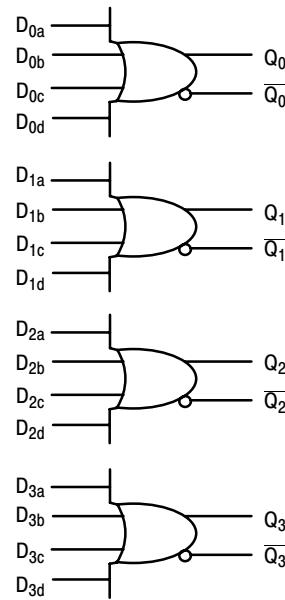
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

# MC10E101, MC100E101



Warning: All V<sub>CC</sub>, V<sub>CCO</sub>, and V<sub>EE</sub> pins must be externally connected to Power Supply to guarantee proper operation.

**Figure 1. 28-Lead Pinout: Assignment (Top View)**



**Figure 2. Logic Diagram**

**Table 1. PIN DESCRIPTION**

Pin	Function
D <sub>0a</sub> – D <sub>3d</sub>	ECL Data Inputs
Q <sub>0</sub> – Q <sub>3</sub> , $\overline{Q}_0$ – $\overline{Q}_3$	ECL Differential Outputs
V <sub>CC</sub> , V <sub>CCO</sub>	Positive Supply
V <sub>EE</sub>	Negative Supply

**Table 2. MAXIMUM RATINGS**

Symbol	Parameter	Condition 1	Condition 2	Rating	Unit
V <sub>CC</sub>	PECL Mode Power Supply	V <sub>EE</sub> = 0 V		8	V
V <sub>EE</sub>	NECL Mode Power Supply	V <sub>CC</sub> = 0 V		-6	V
V <sub>I</sub>	PECL Mode Input Voltage NECL Mode Input Voltage	V <sub>EE</sub> = 0 V V <sub>CC</sub> = 0 V	V <sub>I</sub> $\leq$ V <sub>CC</sub> V <sub>I</sub> $\geq$ V <sub>EE</sub>	6 -6	V
I <sub>out</sub>	Output Current	Continuous Surge		50 100	mA mA
T <sub>A</sub>	Operating Temperature Range			0 to +85	°C
T <sub>stg</sub>	Storage Temperature Range			-65 to +150	°C
$\theta_{JA}$	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	PLCC-28 PLCC-28	63.5 43.5	°C/W °C/W
$\theta_{JC}$	Thermal Resistance (Junction-to-Case)	Standard Board	PLCC-28	22 to 26	°C/W
T <sub>sol</sub>	Wave Solder Pb-Free			265 265	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

# MC10E101, MC100E101

**Table 3. 10E SERIES PECL DC CHARACTERISTICS**  $V_{CC} = 5.0$  V,  $V_{EE} = 0.0$  V (Note 1)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_{EE}$	Power Supply Current	23	30	40	23	30	40	23	30	40	mA
$I_{EE}$	Power Supply Current		30	36		30	36		30	36	mA
$V_{OH}$	Output HIGH Voltage (Note 2)	3980	4070	4160	4020	4105	4190	4090	4185	4280	mV
$V_{OL}$	Output LOW Voltage (Note 2)	3050	3210	3370	3050	3210	3370	3050	3227	3405	mV
$V_{IH}$	Input HIGH Voltage	3830	3995	4160	3870	4030	4190	3940	4110	4280	mV
$V_{IL}$	Input LOW Voltage	3050	3285	3520	3050	3285	3520	3050	3302	3555	mV
$I_{IH}$	Input HIGH Current			150			150			150	µA
$I_{IL}$	Input LOW Current	0.5	0.3		0.5	0.25		0.3	0.2		µA

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.

1. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary -0.46 V / +0.06 V.
2. Outputs are terminated through a 50 Ω resistor to  $V_{CC}$  - 2.0 V.

**Table 4. 10E SERIES NECL DC CHARACTERISTICS**  $V_{CCx} = 0.0$  V;  $V_{EE} = -5.0$  V (Note 3)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_{EE}$	Power Supply Current		30	36		30	36		30	36	mA
$V_{OH}$	Output HIGH Voltage (Note 4)	-1020	-930	-840	-980	-895	-810	-910	-815	-720	mV
$V_{OL}$	Output LOW Voltage (Note 4)	-1950	-1790	-1630	-1950	-1790	-1630	-1950	-1773	-1595	mV
$V_{IH}$	Input HIGH Voltage	-1170	-1005	-840	-1130	-970	-810	-1060	-890	-720	mV
$V_{IL}$	Input LOW Voltage	-1950	-1715	-1480	-1950	-1715	-1480	-1950	-1698	-1445	mV
$I_{IH}$	Input HIGH Current			150			150			150	µA
$I_{IL}$	Input LOW Current	0.5	0.3		0.5	0.065		0.3	0.2		µA

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.

3. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary -0.46 V / +0.06 V.
4. Outputs are terminated through a 50 Ω resistor to  $V_{CC}$  - 2.0 V.

**Table 5. 100E SERIES PECL DC CHARACTERISTICS**  $V_{CCx} = 5.0$  V;  $V_{EE} = 0.0$  V (Note 5)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_{EE}$	Power Supply Current		30	36		30	36		35	42	mA
$V_{OH}$	Output HIGH Voltage (Note 6)	3975	4050	4120	3975	4050	4120	3975	4050	4120	mV
$V_{OL}$	Output LOW Voltage (Note 6)	3190	3295	3380	3190	3255	3380	3190	3260	3380	mV
$V_{IH}$	Input HIGH Voltage	3835	3975	4120	3835	3975	4120	3835	3975	4120	mV
$V_{IL}$	Input LOW Voltage	3190	3355	3525	3190	3355	3525	3190	3355	3525	mV
$I_{IH}$	Input HIGH Current			150			150			150	µA
$I_{IL}$	Input LOW Current	0.5	0.3		0.5	0.25		0.5	0.2		µA

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.

5. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary -0.46 V / +0.8 V.
6. Outputs are terminated through a 50 Ω resistor to  $V_{CC}$  - 2.0 V.

# MC10E101, MC100E101

**Table 6. 100E SERIES NECL DC CHARACTERISTICS**  $V_{CCx} = 0.0$  V;  $V_{EE} = -5.0$  V (Note 7)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_{EE}$	Power Supply Current		30	36		30	36		35	42	mA
$V_{OH}$	Output HIGH Voltage (Note 8)	-1025	-950	-880	-1025	-950	-880	-1025	-950	-880	mV
$V_{OL}$	Output LOW Voltage (Note 8)	-1810	-1705	-1620	-1810	-1745	-1620	-1810	-1740	-1620	mV
$V_{IH}$	Input HIGH Voltage	-1165	-1025	-880	-1165	-1025	-880	-1165	-1025	-880	mV
$V_{IL}$	Input LOW Voltage	-1810	-1645	-1475	-1810	-1645	-1475	-1810	-1645	-1475	mV
$I_{IH}$	Input HIGH Current			150			150			150	$\mu$ A
$I_{IL}$	Input LOW Current	0.5	0.3		0.5	0.25		0.5	0.2		$\mu$ A

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 lpm. 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.

7. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary -0.46 V / +0.8 V.

8. Outputs are terminated through a 50  $\Omega$  resistor to  $V_{CC} - 2.0$  V.

**Table 7. AC CHARACTERISTICS**  $V_{CCx} = 5.0$  V;  $V_{EE} = 0.0$  V or  $V_{CCx} = 0.0$  V;  $V_{EE} = -5.0$  V (Note 9)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$f_{MAX}$	Maximum Toggle Frequency		700			700			700		MHz
$t_{PLH}$ $t_{PHL}$	Propagation Delay to Output D to Q	300	450	600	300	450	600	300	450	600	ps
$t_{SKEW}$	Within-Device Skew (Note 10) Within-Gate Skew (Note 11)		50 25			50 25			50 25		ps
$t_{JITTER}$	Random Clock Jitter (RMS)		< 1			< 1			< 1		ps
$t_r$ $t_f$	Rise/Fall Time (20 - 80%)	275	380	575	300	380	575	275	380	575	ps

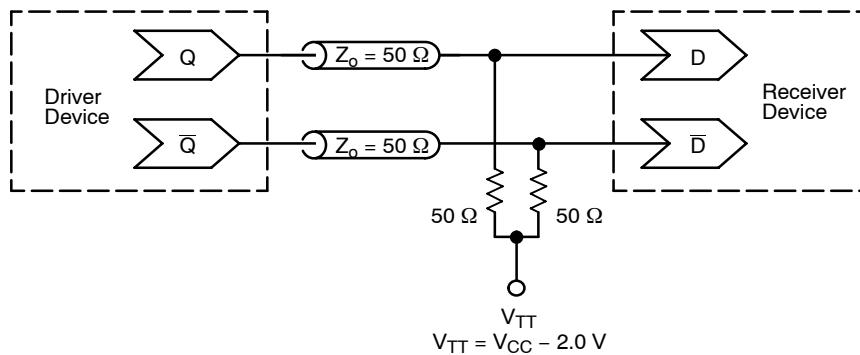
NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional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

9. 10 Series:  $V_{EE}$  can vary -0.46 V / +0.06 V.

100 Series:  $V_{EE}$  can vary -0.46 V / +0.8 V.

10. Within-device skew is defined as identical transitions on similar paths through a device.

11. Within-gate skew is defined as the variation in propagation delays of a gate when driven from its different inputs.



**Figure 3. Typical Termination for Output Driver and Device Evaluation**  
(See Application Note AND8020/D – Termination of ECL Logic Devices.)

# MC10E101, MC100E101

## ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
MC10E101FN	PLCC-28	37 Units / Rail
MC10E101FNG	PLCC-28 (Pb-Free)	37 Units / Rail
MC10E101FNR2	PLCC-28	500 / Tape & Reel
MC10E101FNR2G	PLCC-28 (Pb-Free)	500 / Tape & Reel
MC100E101FN	PLCC-28	37 Units / Rail
MC100E101FNG	PLCC-28 (Pb-Free)	37 Units / Rail
MC100E101FNR2	PLCC-28	500 / Tape & Reel
MC100E101FNR2G	PLCC-28 (Pb-Free)	500 / Tape & Reel

<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.

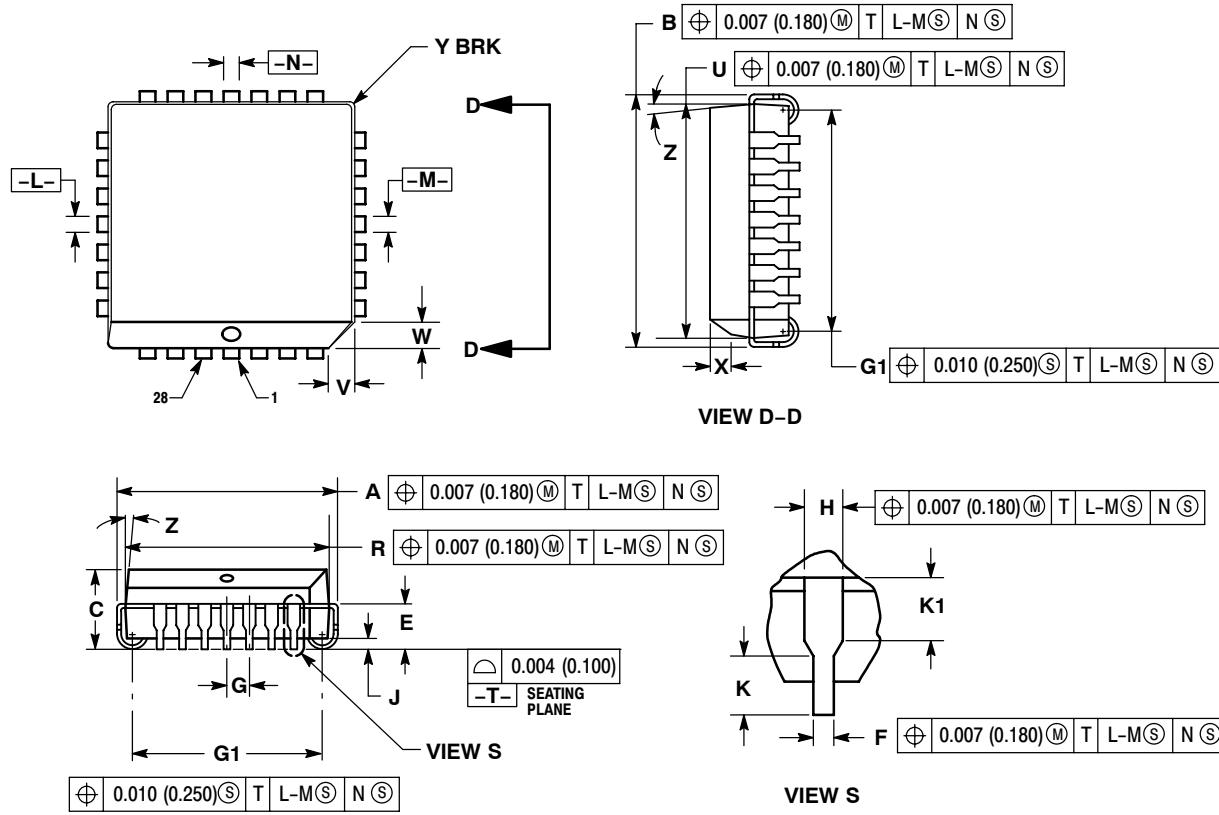
## Resource Reference of Application Notes

- AN1405/D** – ECL Clock Distribution Techniques
- AN1406/D** – Designing with PECL (ECL at +5.0 V)
- AN1503/D** – ECLinPS™ I/O SPiCE Modeling Kit
- AN1504/D** – Metastability and the ECLinPS Family
- AN1568/D** – Interfacing Between LVDS and ECL
- AN1672/D** – The ECL Translator Guide
- AND8001/D** – Odd Number Counters Design
- AND8002/D** – Marking and Date Codes
- AND8020/D** – Termination of ECL Logic Devices
- AND8066/D** – Interfacing with ECLinPS
- AND8090/D** – AC Characteristics of ECL Devices

## MC10E101, MC100E101

## PACKAGE DIMENSIONS

**PLCC-28  
FN SUFFIX  
PLASTIC PLCC PACKAGE  
CASE 776-02  
ISSUE E**



## NOTES:

1. DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
  2. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
  3. DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
  4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  5. CONTROLLING DIMENSION: INCH.
  6. 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	0.485	0.495	12.32	12.57
B	0.485	0.495	12.32	12.57
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	0.450	0.456	11.43	11.58
U	0.450	0.456	11.43	11.58
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	0.410	0.430	10.42	10.92
K1	0.040	---	1.02	---

ECLinPS is a trademark of Semiconductor Components Industries, LLC (SCILLC).

**ON Semiconductor** and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC 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. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC 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 SCILLC was negligent regarding the design or manufacture of the part. SCILLC 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  
P.O. Box 5163, Denver, Colorado 80217 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](mailto: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: 81-3-5773-3850

### ON Semiconductor Website: [www.onsemi.com](http://www.onsemi.com)

### Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local  
Sales Representative