MC12095

2.5 GHz Low Power Prescaler With Stand-By Mode

ON Semiconductor™

http://onsemi.com

Description

The MC12095 is a single modulus prescaler for low power frequency division of a 2.5 GHz high frequency input signal. MOSAIC V™ technology is utilized to achieve low power dissipation of 24 mW at a minimum supply voltage of 2.7 V.

On−chip output termination provides output current to drive a 2.0 pF (typical) high impedance load. If additional drive is required for the prescaler output, an external resistor can be added in parallel from the OUT pin to GND to increase the output power. Care must be taken not to exceed the maximum allowable current through the output.

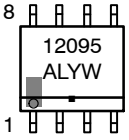
Divide ratio control input (SW) selects the required divide ratio of ÷2 or ÷4. Stand−By mode is available to reduce current drain to 100 μA typical when the standby pin SB is switched LOW disabling the prescaler.

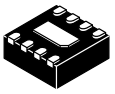
Features

- 2.5 GHz Toggle Frequency
- Supply Voltage 2.7 V to 5.5 Vdc
- Low Power 8.7 mA Typical
- Operating Temperature −40°C to 85°C
- Divide by 2 or 4 Selected by the SW Pin
- Pb−Free Packages are Available

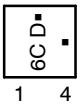
MARKING DIAGRAMS

SO−8
D SUFFIX
CASE 751





DFN8
MN SUFFIX
CASE 506AA



A = Assembly Location
L = Wafer Lot
Y = Year
W = Work Week
▪ = Pb−Free Package
(Note: Microdot may be in either location)

Table 1. FUNCTIONAL TABLE

SW	Divide Ratio
H	2
L	4

1. SW: H = (V_{CC} − 0.4 V) to V_{CC}; L = OPEN
2. SB: H = 2.0 V to V_{CC}; L = GND to 0.8 V

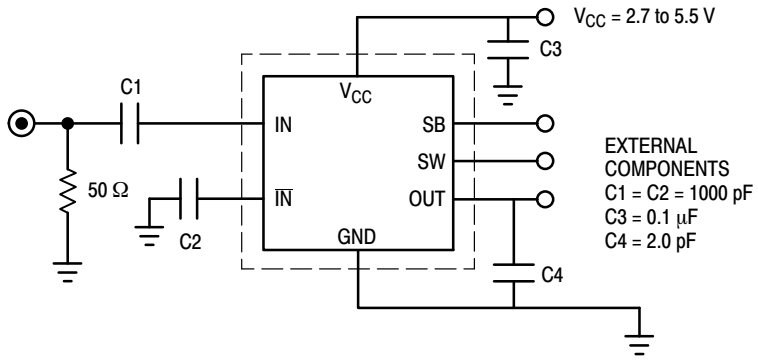
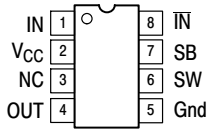


Figure 1. AC Test Circuit

PIN CONNECTIONS



(Top View)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

Table 2. ATTRIBUTES

Characteristics		Value	
Internal Input Pulldown Resistor		N/A	
Internal Input Pullup Resistor		N/A	
ESD Protection	Human Body Model Machine Model Charged Device Model	> 4 kV > 200 V > 2 kV	
Moisture Sensitivity, Indefinite Time Out of Drypack (Note 1)		Pb Pkg	Pb−Free Pkg
	SOIC−8 DFN8	Level 1 Level 1	Level 1 Level 1
Flammability Rating	Oxygen Index: 28 to 34	UL 94 V−0 @ 0.125 in	
Transistor Count		125 Devices	
Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test			

1. For additional information, see Application Note AND8003/D.

Table 3. MAXIMUM RATINGS

Symbol	Rating	Value	Unit
V_{CC}	Power Supply Voltage, Pin 2	−0.5 to 6.0	Vdc
T_A	Operating Temperature Range	−40 to 85	°C
T_{stg}	Storage Temperature Range	−65 to 150	°C
I_O	Maximum Output Current, Pin 4	8.0	mA
θ_{JC}	Thermal Resistance (Junction−to−Case) (Note 2) DFN8	35 to 40	°C/W

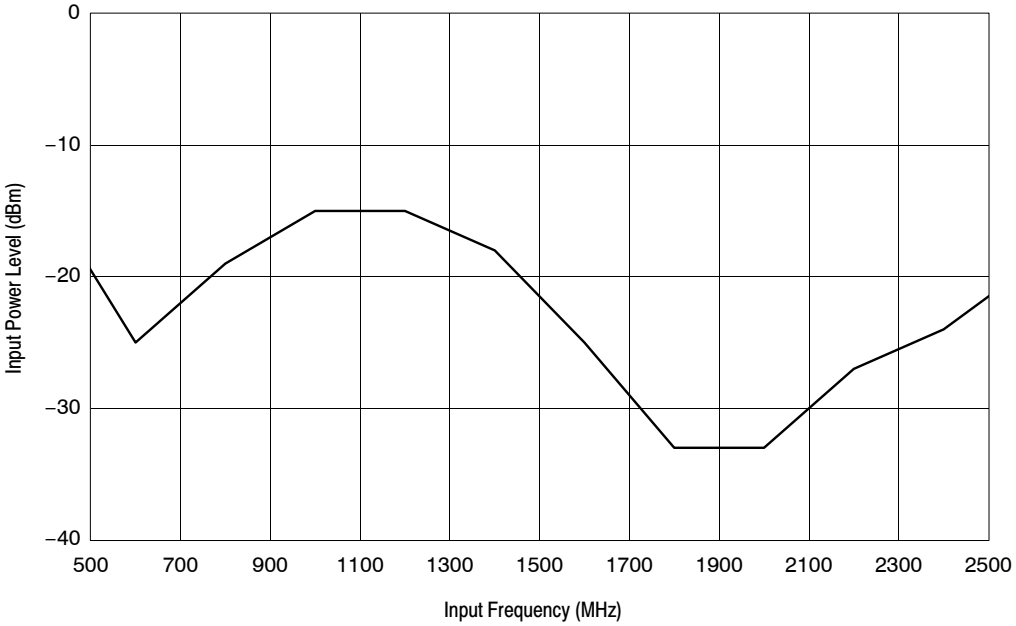
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur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

NOTE: ESD data available upon request.

2. JEDEC standard multilayer board − 2S2P (2 signal, 2 power). For DFN8 only, thermal exposed pad must be connected to a sufficient thermal conduit. Electrically connect to the most negative supply (GND) or leave unconnected, floating open.

Table 4. ELECTRICAL CHARACTERISTICS (V_{CC} = 2.7 to 5.5 V; T_A = −40 to 85°C, unless otherwise noted.)

Symbol	Characteristic		Min	Typ	Max	Unit
f_t	Toggle Frequency (Sine Wave)		500	3.0	2.5	GHz
I_{CC}	Supply Current		−	8.7	14	mA
I_{SB}	Stand−By Current		−	100	200	μA
V_{IH1}	Stand−By Input HIGH (SB)		2.0	−	V_{CC} + 0.5 V	V
V_{IL1}	Stand−By Input LOW (SB)		GND	−	0.8	V
V_{IH2}	Divide Ratio Control Input HIGH (SW)		V_{CC} − 0.4	V_{CC}	V_{CC} + 0.5 V	V
V_{IL2}	Divide Ratio Control Input LOW (SW)		OPEN	OPEN	OPEN	
V_{OUT}	Output Voltage Swing (2pF Load)	500−1000 MHz Input 1000−1500 MHz Input 1500−2500 MHz Input	800 400 200	− 450 250	− − −	mVpp
V_{IN}	Input Voltage Sensitivity		200	−	1000	mVpp



(Divide By 2 Mode, T = 25°C, V_{CC} = 2.7 V)

Figure 2. Typical Minimum Input Sensitivity versus Input Frequency

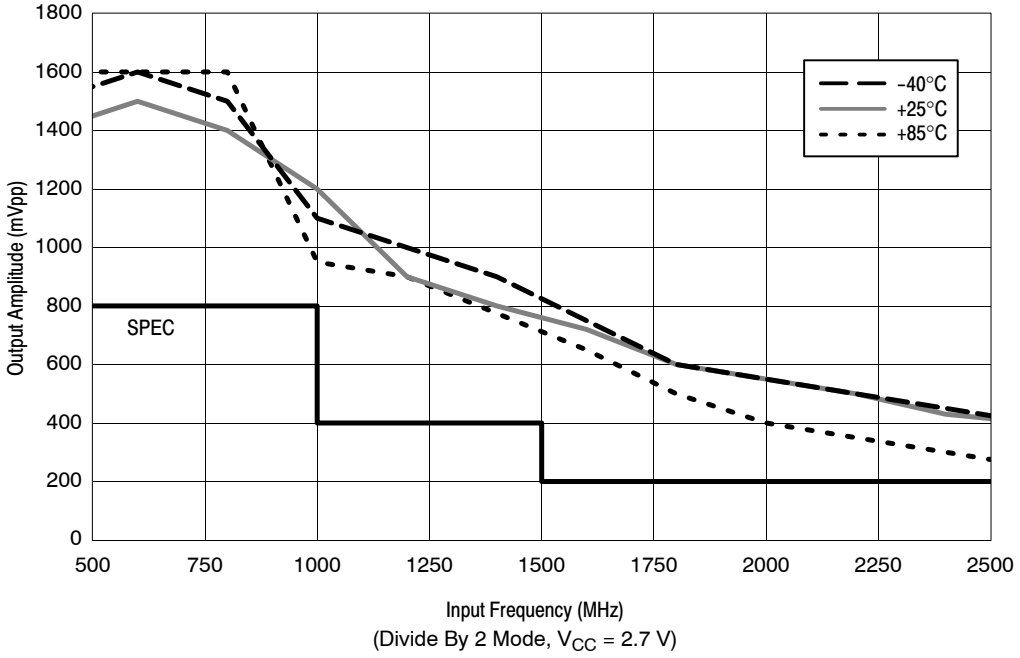


Figure 3. Typical Output Amplitude versus Frequency Over Temperature

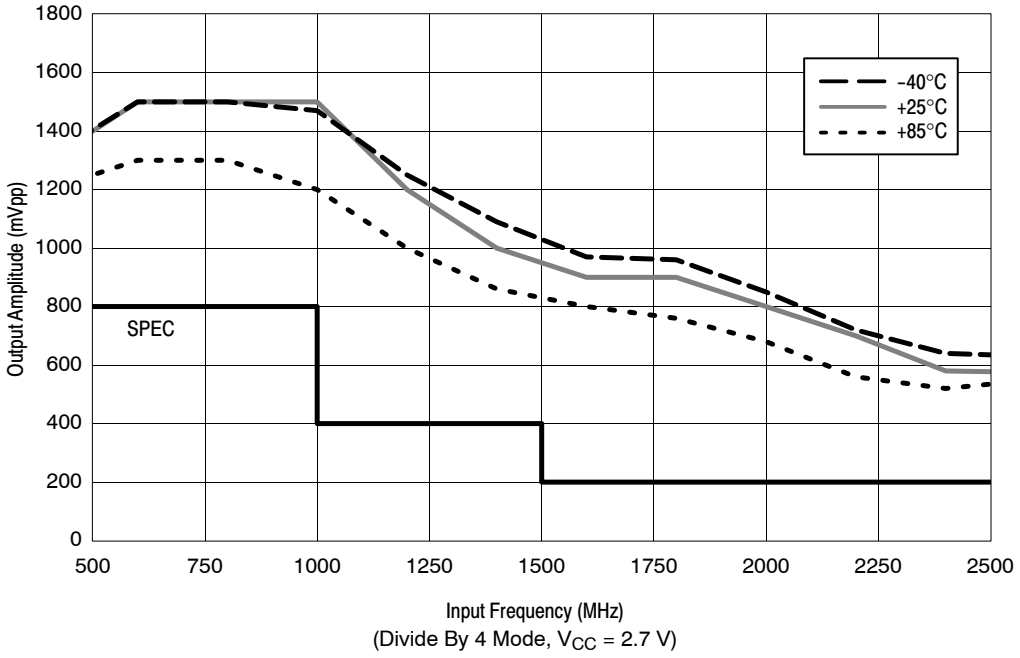


Figure 4. Typical Output Amplitude versus Frequency Over Temperature

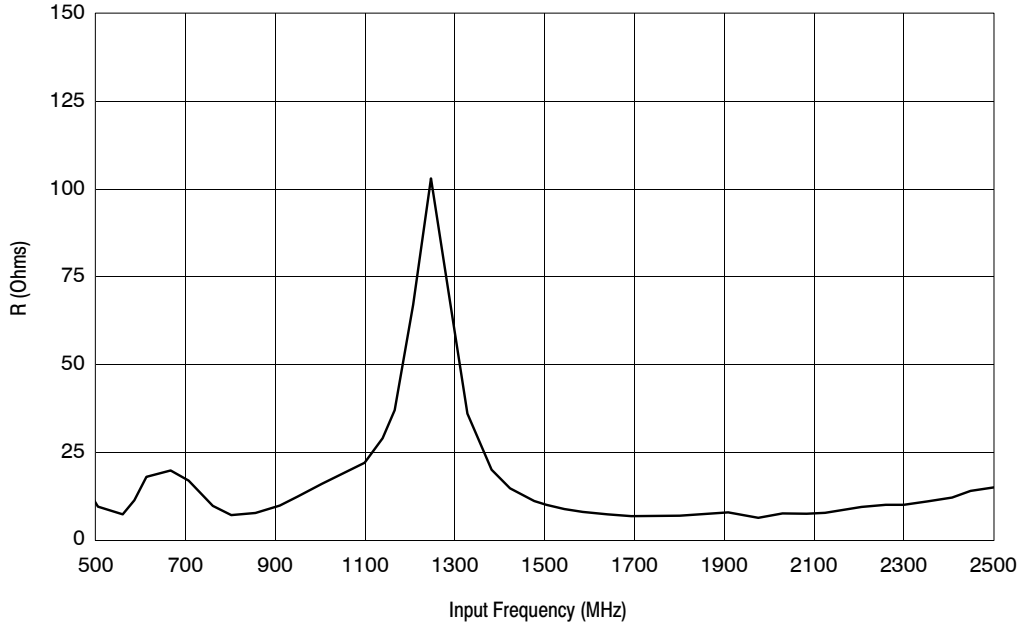


Figure 5. Input Impedance versus Frequency

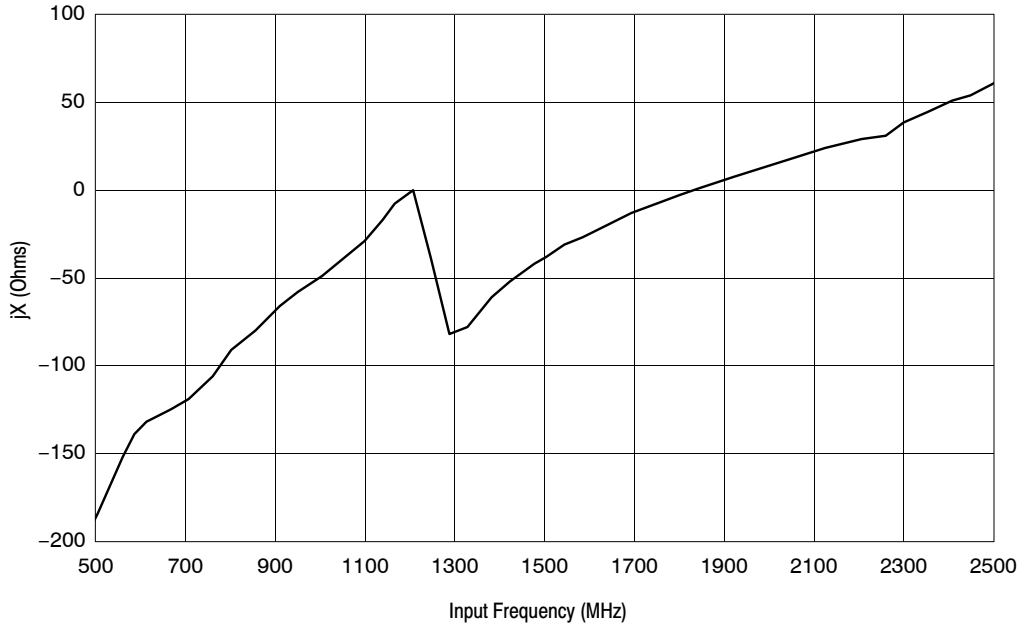


Figure 6. Input Impedance versus Frequency

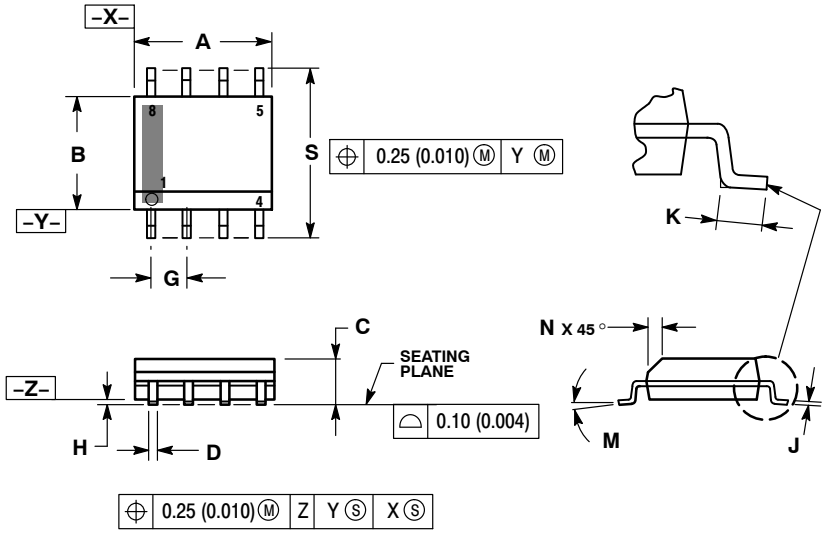
ORDERING INFORMATION

Device	Package	Shipping†
MC12095D	SOIC−8	98 Units / Rail
MC12095DG	SOIC−8 (Pb−Free)	98 Units / Rail
MC12095DR2	SOIC−8	98 Units / Rail
MC12095DR2G	SOIC−8 (Pb−Free)	98 Units / Rail
MC12095MNR4	DFN8	1000 / Tape & Reel
MC12095MNR4G	DFN8 (Pb−Free)	1000 / Tape & Reel

†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

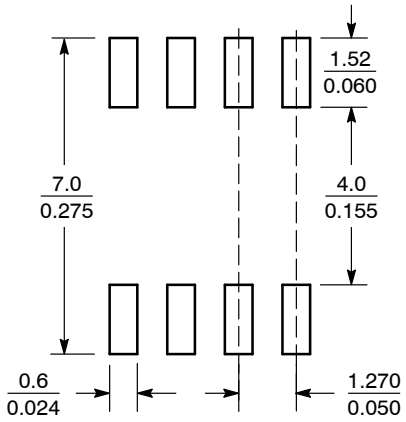
SOIC−8 NB
CASE 751−07
ISSUE AG



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION 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.
6. 751−01 THRU 751−06 ARE OBSOLETE. NEW STANDARD IS 751−07.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0 °	8 °	0 °	8 °
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

SOLDERING FOOTPRINT*

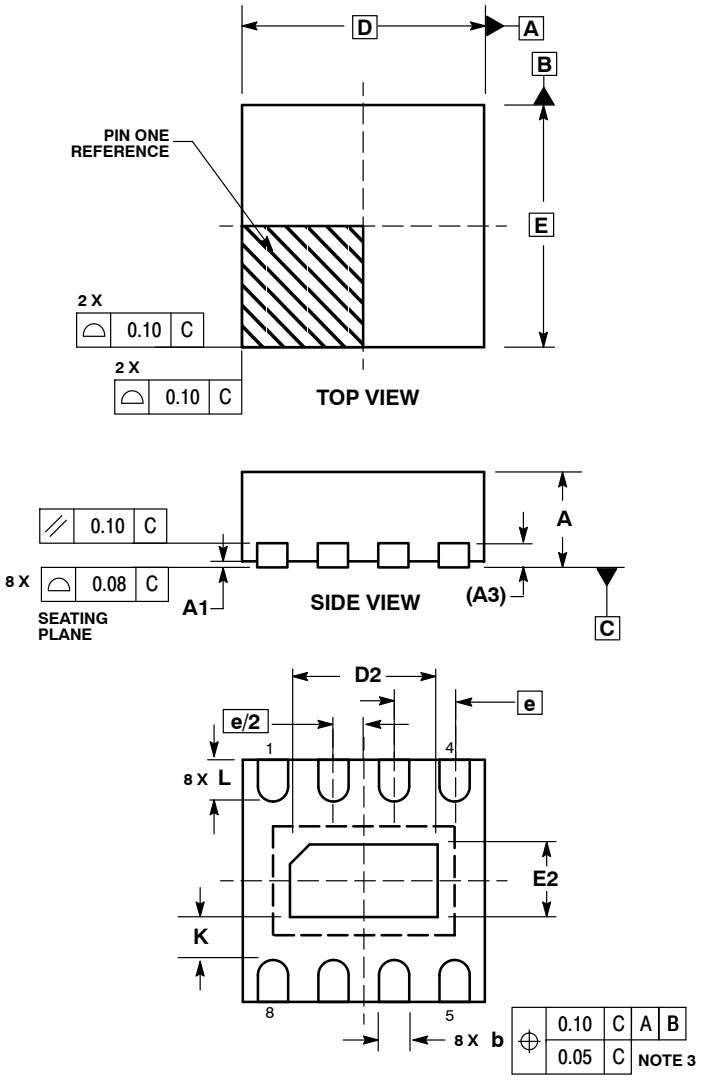


SCALE 6:1 (mm / inches)

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

PACKAGE DIMENSIONS

DFN8
CASE 506AA−01
ISSUE C



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994 .
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.25 AND 0.30 MM FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

	MILLIMETERS	
DIM	MIN	MAX
A	0.80	1.00
A1	0.00	0.05
A3	0.20 REF	
b	0.20	0.30
D	2.00 BSC	
D2	1.10	1.30
E	2.00 BSC	
E2	0.70	0.90
e	0.50 BSC	
K	0.20	−−−
L	0.25	0.35

MOSAIC V is a trademark of Motorola, Inc.

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

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**

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

For additional information, please contact your local Sales Representative