

MJL3281A (NPN) MJL1302A (PNP)

Complementary Bipolar Power Transistors

Features

- Exceptional Safe Operating Area
- NPN/PNP Gain Matching within 10% from 50 mA to 5 A
- Excellent Gain Linearity
- High BVCEO
- High Frequency
- These Devices are Pb-Free and are RoHS Compliant*

Benefits

- Reliable Performance at Higher Powers
- Symmetrical Characteristics in Complementary Configurations
- Accurate Reproduction of Input Signal
- Greater Dynamic Range
- High Amplifier Bandwidth

Applications

- High-End Consumer Audio Products
 - ◆ Home Amplifiers
 - ◆ Home Receivers
- Professional Audio Amplifiers
 - ◆ Theater and Stadium Sound Systems
 - ◆ Public Address Systems (PAs)

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	260	Vdc
Collector-Base Voltage	V_{CBO}	260	Vdc
Emitter-Base Voltage	V_{EBO}	5.0	Vdc
Collector-Emitter Voltage – 1.5 V	V_{CEX}	260	Vdc
Collector Current – Continuous	I_C	15	Adc
Collector Current – Peak (Note 1)	I_{CM}	25	Adc
Base Current – Continuous	I_B	1.5	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate Above 25°C	P_D	200 1.43	Watts W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	- 65 to +150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.625	$^\circ\text{C}/\text{W}$

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.

1. Pulse Test: Pulse Width = 5 ms, Duty Cycle < 10%.

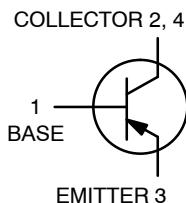


ON Semiconductor®

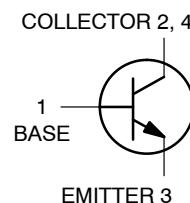
<http://onsemi.com>

**15 AMPERES
COMPLEMENTARY
SILICON POWER
TRANSISTORS
260 VOLTS
200 WATTS**

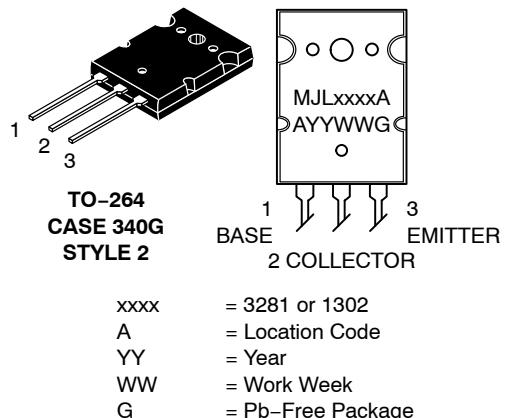
PNP



NPN



MARKING DIAGRAM



ORDERING INFORMATION

Device	Package	Shipping
MJL3281AG	TO-264 (Pb-Free)	25 Units/Rail
MJL1302AG	TO-264 (Pb-Free)	25 Units/Rail

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

MJL3281A (NPN) MJL1302A (PNP)

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage ($I_C = 100 \text{ mA}_\text{dc}$, $I_B = 0$)	$V_{CEO(\text{sus})}$	260	–	V_dc
Collector Cutoff Current ($V_{CB} = 260 \text{ V}_\text{dc}$, $I_E = 0$)	I_{CBO}	–	50	μA_dc
Emitter Cutoff Current ($V_{EB} = 5 \text{ V}_\text{dc}$, $I_C = 0$)	I_{EBO}	–	5	μA_dc
SECOND BREAKDOWN				
Second Breakdown Collector with Base Forward Biased ($V_{CE} = 50 \text{ V}_\text{dc}$, $t = 1 \text{ s}$ (non-repetitive)) ($V_{CE} = 100 \text{ V}_\text{dc}$, $t = 1 \text{ s}$ (non-repetitive))	$I_{S/b}$	4 1	– –	A_dc
ON CHARACTERISTICS				
DC Current Gain ($I_C = 500 \text{ mA}_\text{dc}$, $V_{CE} = 5 \text{ V}_\text{dc}$) ($I_C = 1 \text{ A}_\text{dc}$, $V_{CE} = 5 \text{ V}_\text{dc}$) ($I_C = 3 \text{ A}_\text{dc}$, $V_{CE} = 5 \text{ V}_\text{dc}$) ($I_C = 5 \text{ A}_\text{dc}$, $V_{CE} = 5 \text{ V}_\text{dc}$) ($I_C = 8 \text{ A}_\text{dc}$, $V_{CE} = 5 \text{ V}_\text{dc}$)	h_{FE}	75 75 75 75 45	150 150 150 150 –	
Collector-Emitter Saturation Voltage ($I_C = 10 \text{ A}_\text{dc}$, $I_B = 1 \text{ A}_\text{dc}$)	$V_{CE(\text{sat})}$	–	3	V_dc
DYNAMIC CHARACTERISTICS				
Current-Gain – Bandwidth Product ($I_C = 1 \text{ A}_\text{dc}$, $V_{CE} = 5 \text{ V}_\text{dc}$, $f_{\text{test}} = 1 \text{ MHz}$)	f_T	30	–	MHz
Output Capacitance ($V_{CB} = 10 \text{ V}_\text{dc}$, $I_E = 0$, $f_{\text{test}} = 1 \text{ MHz}$)	C_{ob}	–	600	pF

MJL3281A (NPN) MJL1302A (PNP)

TYPICAL CHARACTERISTICS

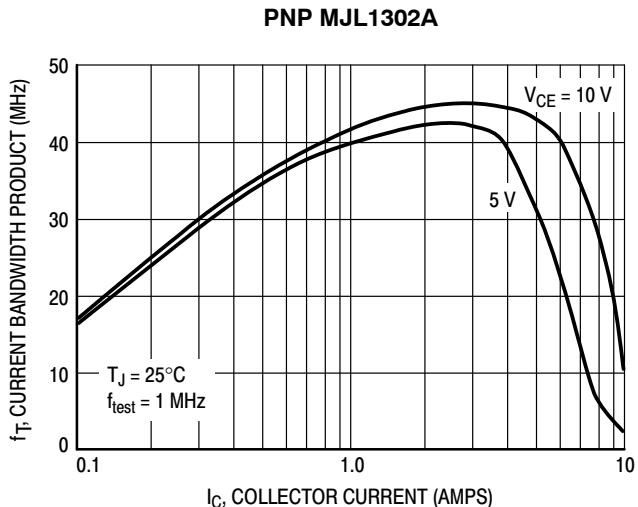


Figure 1. Typical Current Gain Bandwidth Product

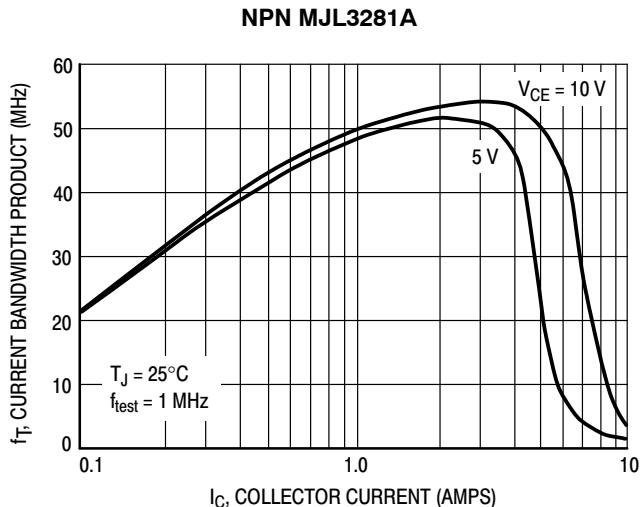


Figure 2. Typical Current Gain Bandwidth Product

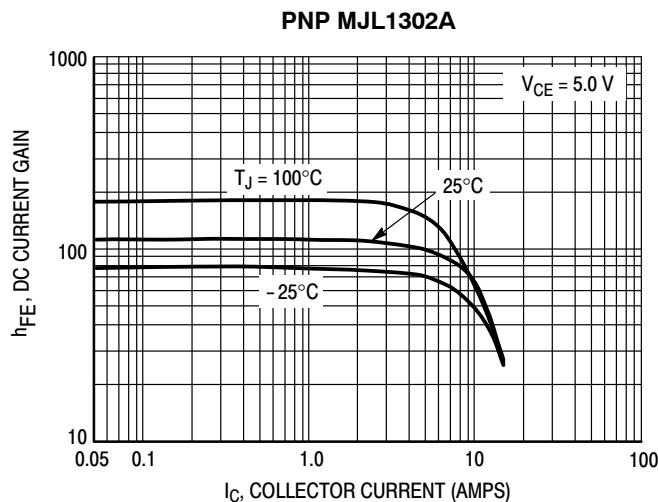


Figure 3. DC Current Gain

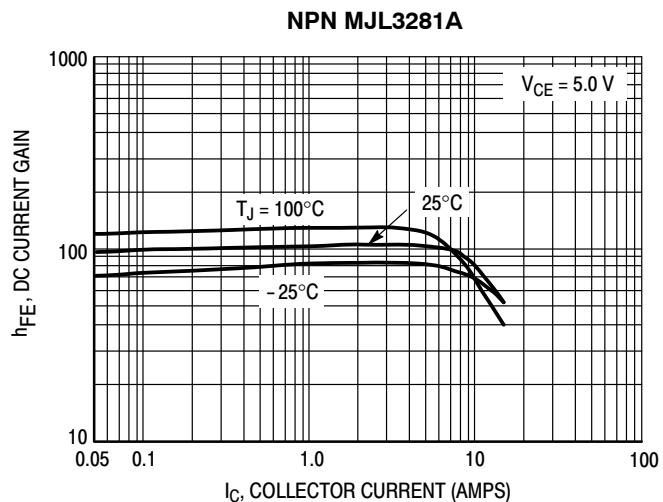


Figure 4. DC Current Gain

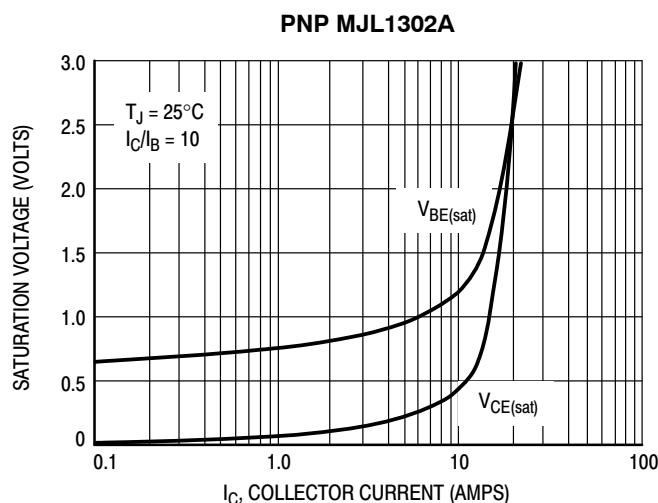


Figure 5. Typical Saturation Voltages

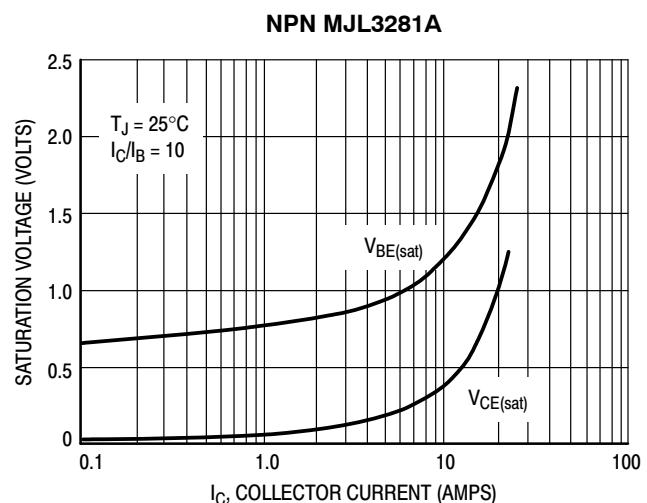


Figure 6. Typical Saturation Voltages

MJL3281A (NPN) MJL1302A (PNP)

TYPICAL CHARACTERISTICS

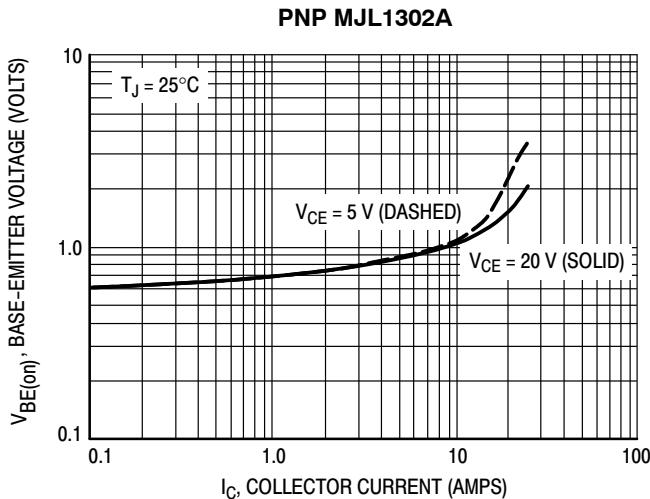


Figure 7. Typical Base–Emitter Voltage

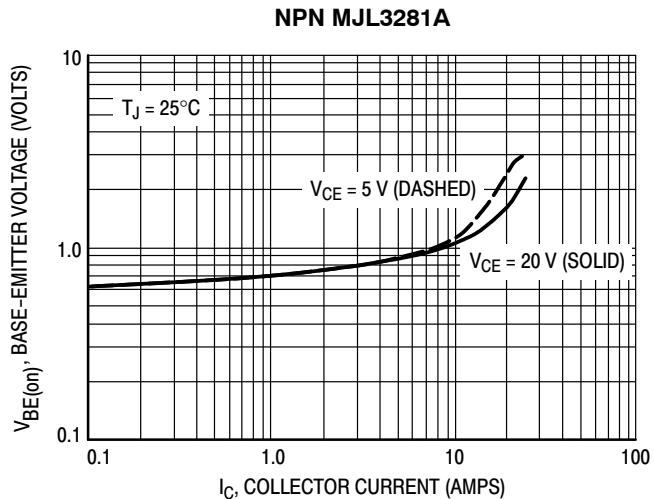


Figure 8. Typical Base–Emitter Voltage

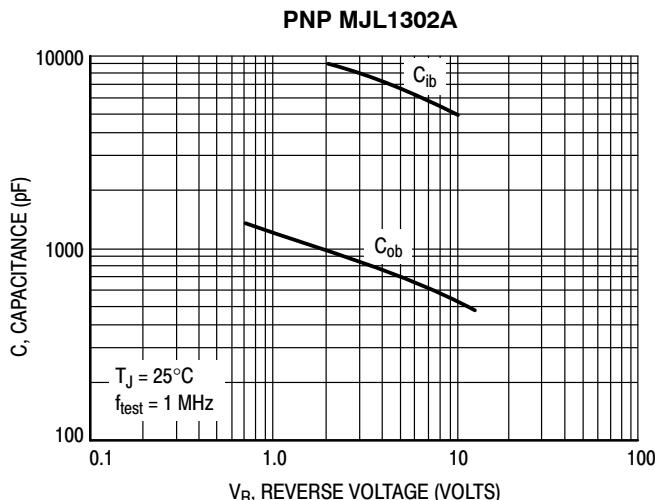


Figure 9. MJL1302A Typical Capacitance

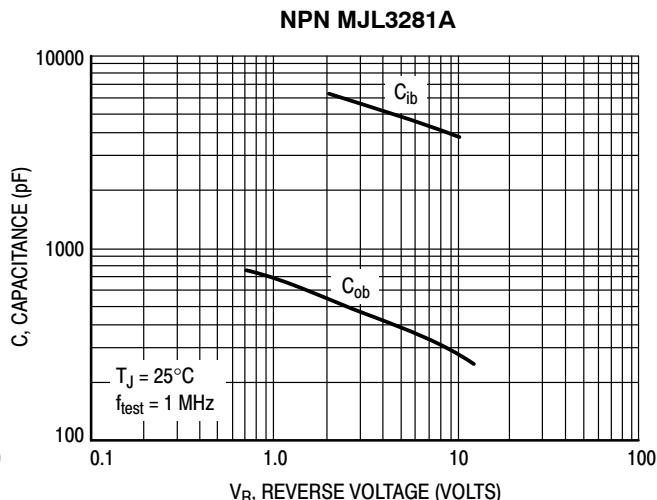


Figure 10. MJL3281A Typical Capacitance

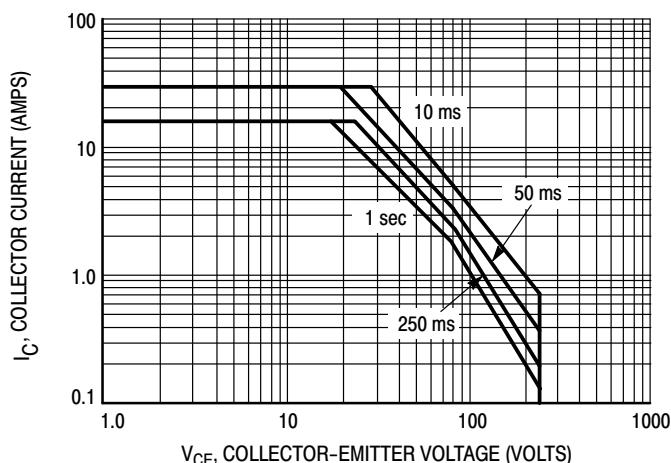


Figure 11. Active Region Safe Operating Area

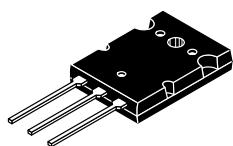
There are two limitations on the power handling ability of a transistor; average junction temperature and secondary breakdown. Safe operating area curves indicate $I_C - V_{CE}$ limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 11 is based on $T_{J(pk)} = 150^\circ\text{C}$; T_C is variable depending on conditions. At high case temperatures, thermal limitations will reduce the power than can be handled to values less than the limitations imposed by second breakdown.

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

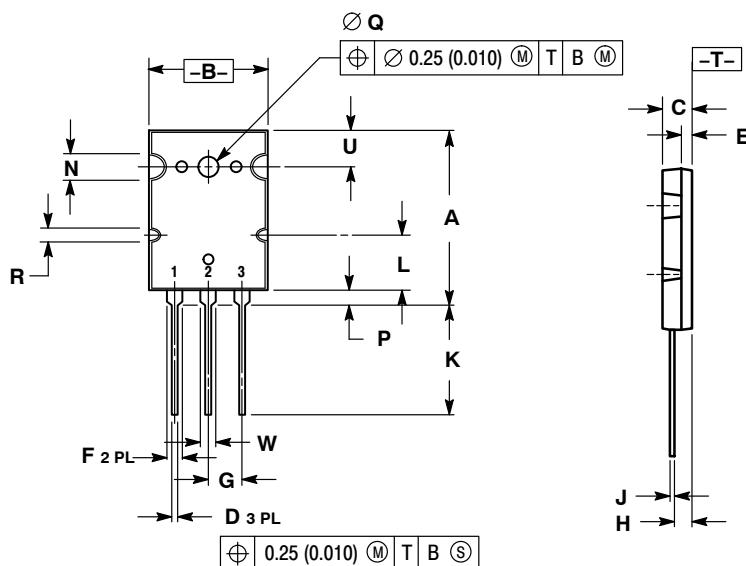
ON Semiconductor®



TO-3BPL (TO-264)
CASE 340G-02
ISSUE J

DATE 17 DEC 2004

SCALE 1:2



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	28.0	29.0	1.102	1.142
B	19.3	20.3	0.760	0.800
C	4.7	5.3	0.185	0.209
D	0.93	1.48	0.037	0.058
E	1.9	2.1	0.075	0.083
F	2.2	2.4	0.087	0.102
G	5.45 BSC		0.215 BSC	
H	2.6	3.0	0.102	0.118
J	0.43	0.78	0.017	0.031
K	17.6	18.8	0.693	0.740
L	11.2 REF		0.411 REF	
N	4.35 REF		0.172 REF	
P	2.2	2.6	0.087	0.102
Q	3.1	3.5	0.122	0.137
R	2.25 REF		0.089 REF	
U	6.3 REF		0.248 REF	
W	2.8	3.2	0.110	0.125

**GENERIC
MARKING DIAGRAM***

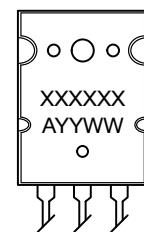
STYLE 1:
PIN 1. GATE
2. DRAIN
3. SOURCE

STYLE 2:
PIN 1. BASE
2. COLLECTOR
3. Emitter

STYLE 3:
PIN 1. GATE
2. SOURCE
3. DRAIN

STYLE 4:
PIN 1. DRAIN
2. SOURCE
3. GATE

STYLE 5:
PIN 1. GATE
2. COLLECTOR
3. Emitter



XXXXXX = Specific Device Code

A = Location Code

YY = Year

WW = Work Week

*This information is generic. Please refer to device data sheet for actual part marking.
Pb-Free indicator, "G" or microdot "■", may or may not be present.

DOCUMENT NUMBER:	98ASB42780B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	TO-3BPL (TO-264)	PAGE 1 OF 1

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. 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 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

onsemi, **ONSEMI**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi's** product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** 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. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** 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. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** 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 **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** 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 **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** 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:

Email Requests to: orderlit@onsemi.com

TECHNICAL SUPPORT

North American Technical Support:

Voice Mail: 1 800-282-9855 Toll Free USA/Canada

Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative