

NHPD660, NRVHPD660

Switch Mode Power Rectifier

DPAK Surface Mount Package

These state-of-the-art devices are designed for use in switching power supplies, inverters and as free wheeling diodes.

Features

- Ultrafast 30 Nanosecond Recovery Time
- 175°C Operating Junction Temperature
- High Voltage Capability of 600 V
- Low Forward Drop
- Low Leakage Specified @ 125°C Case Temperature
- NRV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Mechanical Characteristics

- Case: Epoxy, Molded
- Weight: 0.4 Gram (Approximately)
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads are Readily Solderable
- Lead and Mounting Surface Temperature for Soldering Purposes: 260°C Max. for 10 Seconds
- ESD Ratings:
 - ♦ Machine Model = C (> 400 V)
 - ♦ Human Body Model = 3B (> 8 kV)

Applications

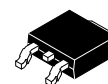
- Boost Rectifier for SMPS PFC Operating in Continuous Conduction Mode (CCM)
- LED Lighting Power Conversion
- Automotive Diesel Piezo Injection
- Thin and Ultra Thin Flat Panel Display
- Output Rectification in High Frequency High Output Voltage Applications



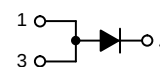
ON Semiconductor®

www.onsemi.com

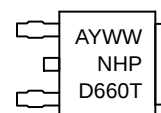
PLANAR ULTRAFAST RECTIFIER 6.0 AMPERES, 600 VOLTS



**DPAK
CASE 369C**



MARKING DIAGRAM



A = Assembly Location
Y = Year
WW = Work Week
G = Pb-Free Package

ORDERING INFORMATION

Device	Package	Shipping [†]
NHPD660T4G	DPAK (Pb-Free)	2,500/Tape & Reel 16 mm
NRVHPD660T4G	DPAK (Pb-Free)	2,500/Tape & Reel 16 mm

[†]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.

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

NHPD660, NRVHPD660

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	V_{RRM} V_{RWM} V_R	600	V
Average Rectified Forward Current (Rated V_R , $T_C = 145^\circ\text{C}$)	$I_{F(AV)}$	6.0	A
Peak Repetitive Forward Current (Rated V_R , Square Wave, 20 kHz, $T_C = 135^\circ\text{C}$)	I_{FRM}	12.0	A
Non-Repetitive Peak Surge Current (Surge Applied at Rated Load Conditions Halfwave, 60 Hz)	I_{FSM}	60	A
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-65 to +175	$^\circ\text{C}$

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.

THERMAL CHARACTERISTICS

Characteristics	Symbol	Value	Unit
Thermal Resistance – Junction-to-Case	$R_{\theta JC}$	4.2	$^\circ\text{C/W}$
Thermal Resistance – Junction-to-Ambient (Note 1)	$R_{\theta JA}$	95.7	$^\circ\text{C/W}$

1. Rating applies when surface mounted on the minimum pad sizes recommended.

ELECTRICAL CHARACTERISTICS

Characteristic	Test Conditions	Symbol	Typ	Max	Unit
Instantaneous Forward Voltage (Note 2)	($I_F = 6\text{ A}$, $T_C = 125^\circ\text{C}$) ($I_F = 6\text{ A}$, $T_C = 25^\circ\text{C}$)	V_F	1.45 2.4	1.8 3.0	V
Instantaneous Reverse Current (Note 2)	(Rated DC Voltage, $T_C = 125^\circ\text{C}$) (Rated DC Voltage, $T_C = 25^\circ\text{C}$)	I_R	35 0.035	300 30	μA
Reverse Recovery Time	($I_F = 0.5\text{ A}$, $I_{rr} = 0.25\text{ A}$, $I_R = 1\text{ A}$) ($I_F = 1\text{ A}$, $dI_F/dt = -50\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$)	t_{rr}	– –	30 50	ns
Reverse Recovery Time Peak Reverse Recovery Current Total Reverse Recovery Charge Softness Factor	($I_F = 6\text{ A}$, $dI_F/dt = -200\text{ A}/\mu\text{s}$, $T_C = 25^\circ\text{C}$)	t_{rr} I_{RM} Q_{rr} S	30 2.3 37 2	50 3 50 –	ns A nC –
Reverse Recovery Time Peak Reverse Recovery Current Total Reverse Recovery Charge Softness Factor	($I_F = 6\text{ A}$, $dI_F/dt = -200\text{ A}/\mu\text{s}$, $T_C = 125^\circ\text{C}$)	t_{rr} I_{RM} Q_{rr} S	45 5.5 150 0.35	– – – –	ns A nC –
Forward Recovery Time Forward Voltage Time	($I_F = 6\text{ A}$, $dI_F/dt = 120\text{ A}/\mu\text{s}$, $T_C = 25^\circ\text{C}$)	t_{fr} V_{FP}	– –	200 6	ns V

2. Pulse Test: Pulse Width = 300 μs , Duty Cycle $\leq 2.0\%$.

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

TYPICAL CHARACTERISTICS

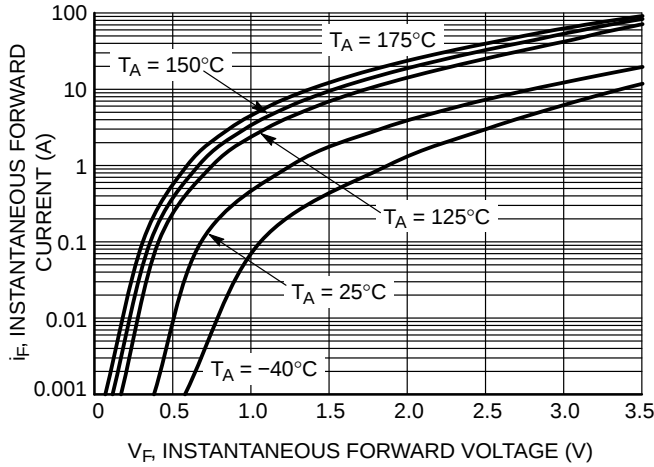


Figure 1. Typical Instantaneous Forward Characteristics

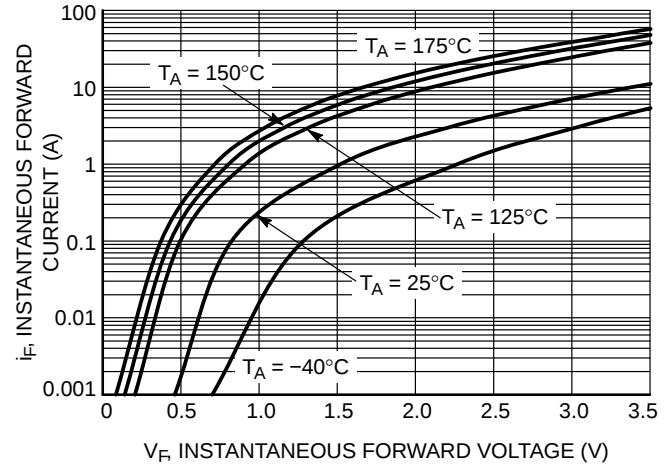


Figure 2. Maximum Instantaneous Forward Characteristics

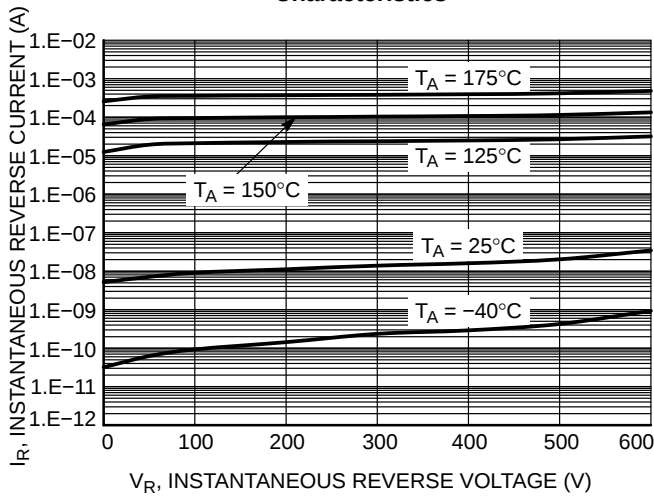


Figure 3. Typical Reverse Characteristics

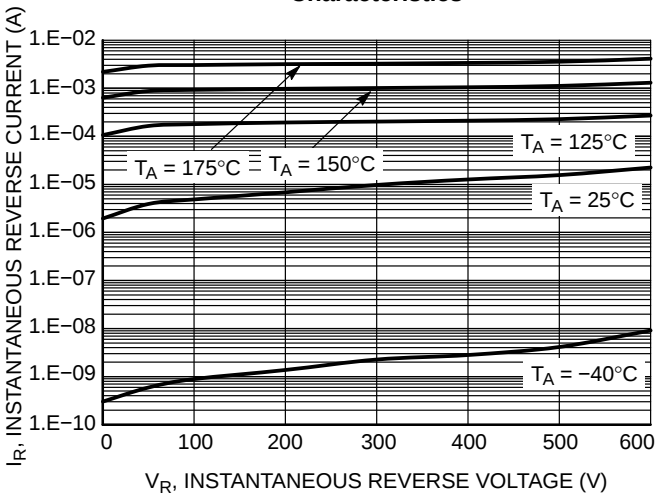


Figure 4. Maximum Reverse Characteristics

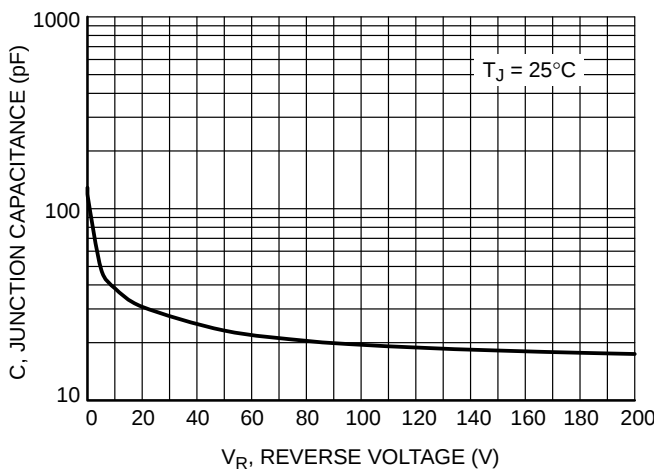


Figure 5. Typical Junction Capacitance

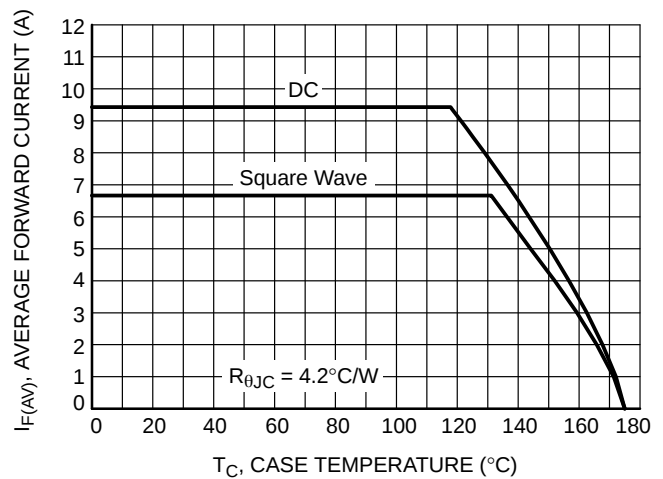


Figure 6. Current Derating

NHPD660, NRVHPD660

TYPICAL CHARACTERISTICS

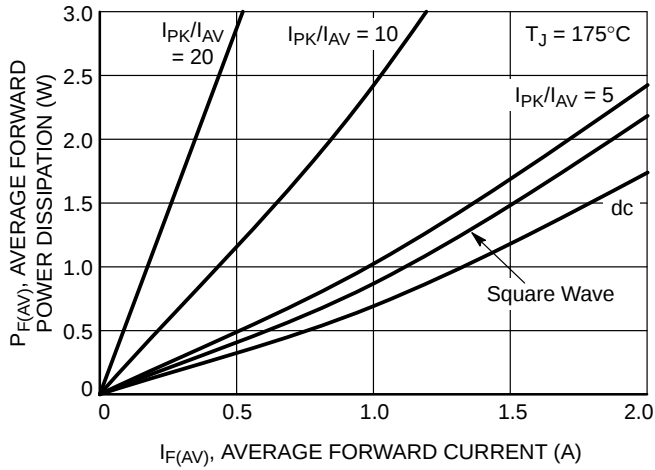


Figure 7. Forward Power Dissipation

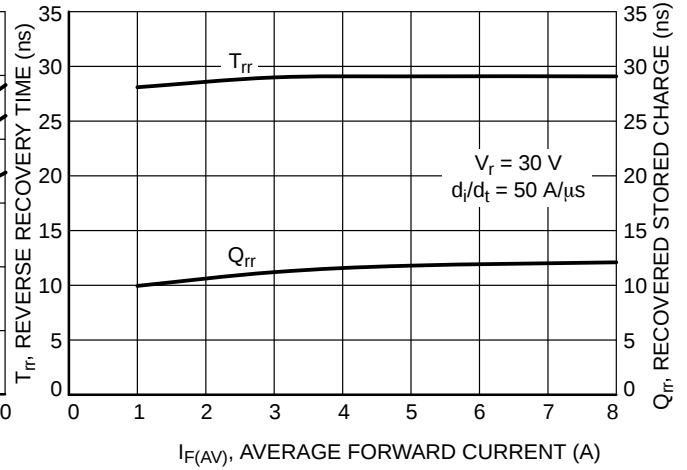


Figure 8. Typical Recovery Characteristics

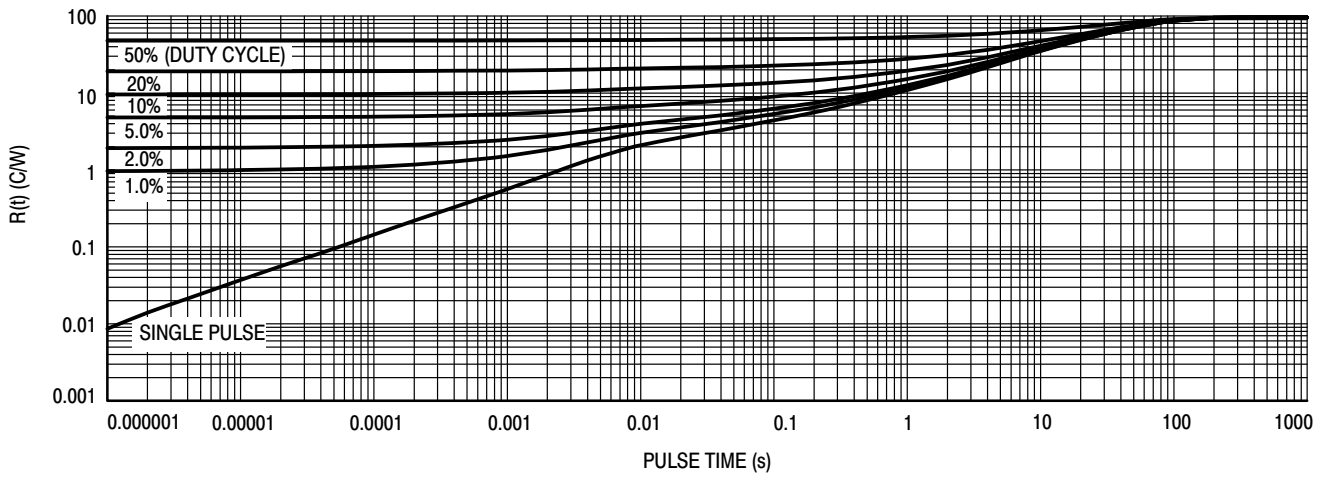
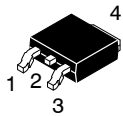


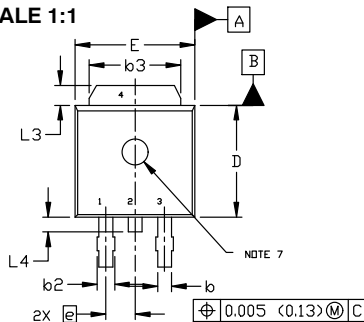
Figure 9. Thermal Response



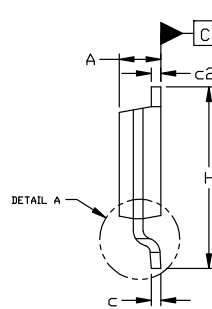
DPAK (SINGLE GAUGE)
CASE 369C
ISSUE G

DATE 31 MAY 2023

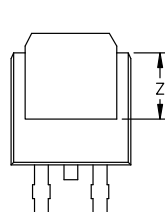
SCALE 1:1



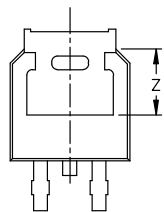
TOP VIEW



SIDE VIEW

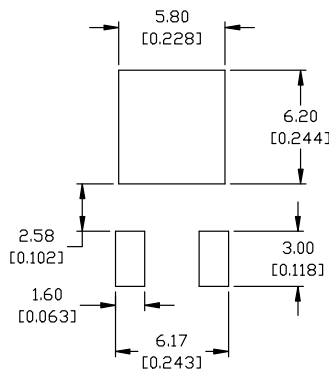


BOTTOM VIEW



BOTTOM VIEW

ALTERNATE
CONSTRUCTIONS



RECOMMENDED MOUNTING FOOTPRINT*

*FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

STYLE 1:

PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 2:

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

STYLE 3:

PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE

STYLE 4:

PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

STYLE 5:

PIN 1. GATE
2. ANODE
3. CATHODE
4. ANODE

STYLE 6:

PIN 1. MT1
2. MT2
3. GATE
4. MT2

STYLE 7:

PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 8:

PIN 1. N/C
2. CATHODE
3. ANODE
4. CATHODE

STYLE 9:

PIN 1. ANODE
2. CATHODE
3. RESISTOR ADJUST
4. CATHODE

STYLE 10:

PIN 1. CATHODE
2. ANODE
3. CATHODE
4. ANODE

NOTES:

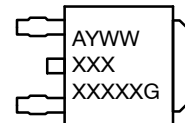
1. DIMENSIONING AND TOLERANCING ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3, AND Z.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.006 INCHES PER SIDE.
5. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
6. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.
7. OPTIONAL MOLD FEATURE.

DIM	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.086	0.094	2.18	2.38
A1	0.000	0.005	0.00	0.13
b	0.025	0.035	0.63	0.89
b2	0.028	0.045	0.72	1.14
b3	0.180	0.215	4.57	5.46
c	0.018	0.024	0.46	0.61
c2	0.018	0.024	0.46	0.61
D	0.235	0.245	5.97	6.22
E	0.250	0.265	6.35	6.73
e	0.090	BSC	2.29	BSC
H	0.370	0.410	9.40	10.41
L	0.055	0.070	1.40	1.78
L1	0.114	REF	2.90	REF
L2	0.020	BSC	0.51	BSC
L3	0.035	0.050	0.89	1.27
L4	----	0.040	---	1.01
Z	0.155	----	3.93	---

GENERIC
MARKING DIAGRAM*



IC



Discrete

XXXXXX = Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
WW = Work Week
G = Pb-Free Package

*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. Some products may not follow the Generic Marking.

DOCUMENT NUMBER:	98AON10527D	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	DPAK (SINGLE GAUGE)	PAGE 1 OF 1

onsemi and Onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the 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. onsemi 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.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales