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)

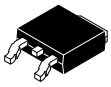
Applications

- 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

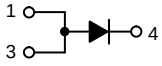
ON Semiconductor®

www.onsemi.com

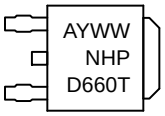
PLANAR ULTRAFAST RECTIFIER
6.0 AMPERES, 600 VOLTS



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.

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°C)	$I_{F(AV)}$	6.0	A
Peak Repetitive Forward Current (Rated V_R, Square Wave, 20 kHz, T_C = 135°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	°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	°C/W
Thermal Resistance − Junction−to−Ambient (Note 1)	$R_{\theta JA}$	95.7	°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 A, T_C = 125°C) (i_F = 6 A, T_C = 25°C)	v_F	1.45 2.4	1.8 3.0	V
Instantaneous Reverse Current (Note 2)	(Rated DC Voltage, T_C = 125°C) (Rated DC Voltage, T_C = 25°C)	i_R	35 0.035	300 30	μA
Reverse Recovery Time	(I_F = 0.5 A, I_{rr} = 0.25 A, I_R = 1 A) (I_F = 1 A, dI_F/dt = −50 A/μs, V_R = 30 V)	t_{rr}	− −	30 50	ns
Reverse Recovery Time Peak Reverse Recovery Current Total Reverse Recovery Charge Softness Factor	(I_F = 6 A, d_{IF}/d_t = −200 A/μs, T_C = 25°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 A, d_{IF}/d_t = −200 A/μs, T_C = 125°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 A, d_{IF}/d_t = 120 A/μs, T_C = 25°C)	t_{fr} V_{FP}	− −	200 6	ns V

2. Pulse Test: Pulse Width = 300 μs, Duty Cycle ≤ 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

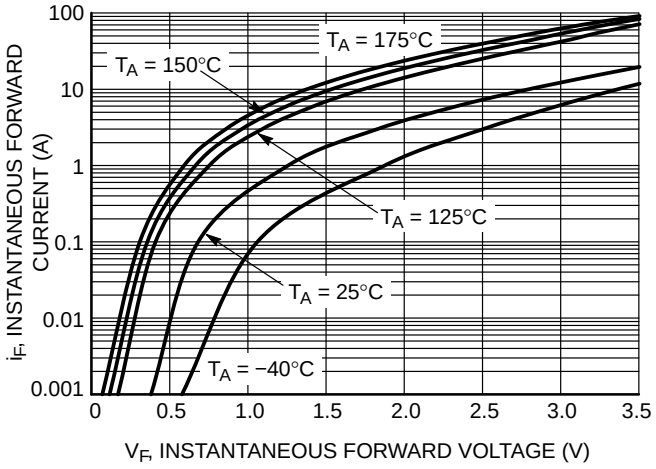


Figure 1. Typical Instantaneous Forward Characteristics

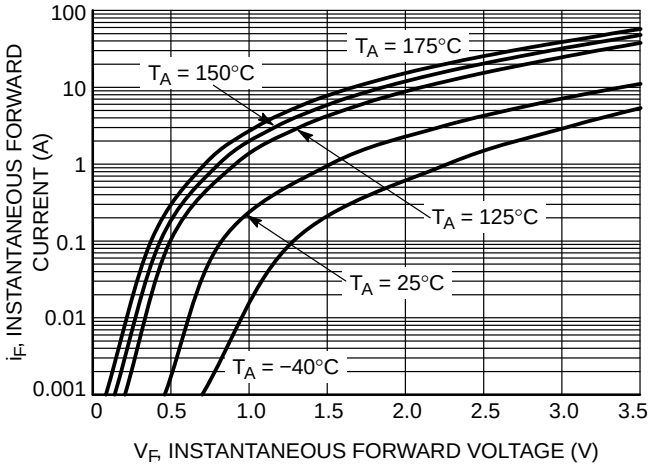


Figure 2. Maximum Instantaneous Forward Characteristics

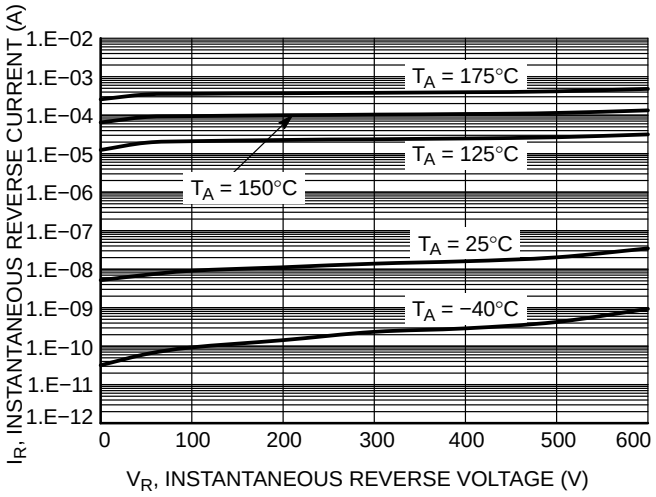


Figure 3. Typical Reverse Characteristics

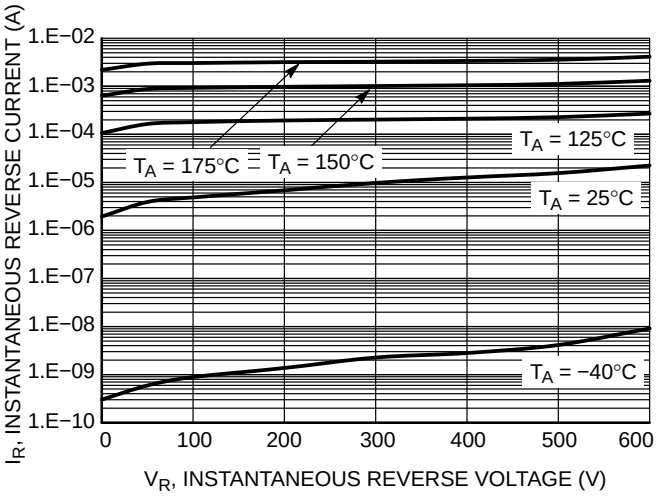


Figure 4. Maximum Reverse Characteristics

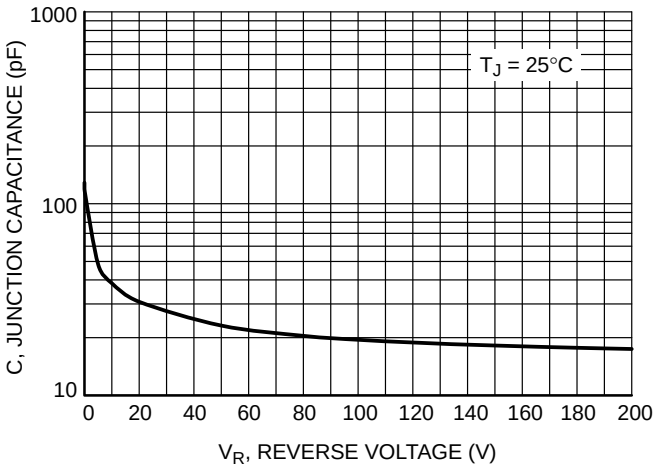


Figure 5. Typical Junction Capacitance

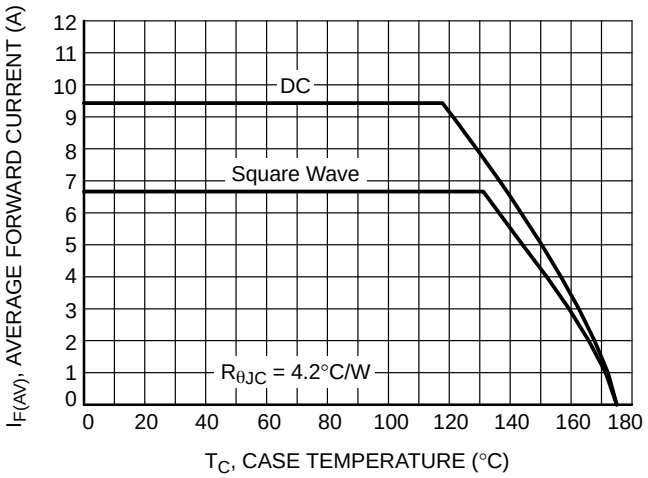


Figure 6. Current Derating

TYPICAL CHARACTERISTICS

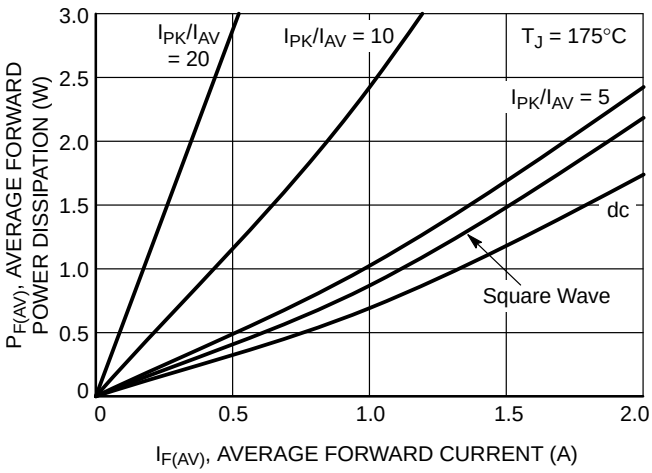


Figure 7. Forward Power Dissipation

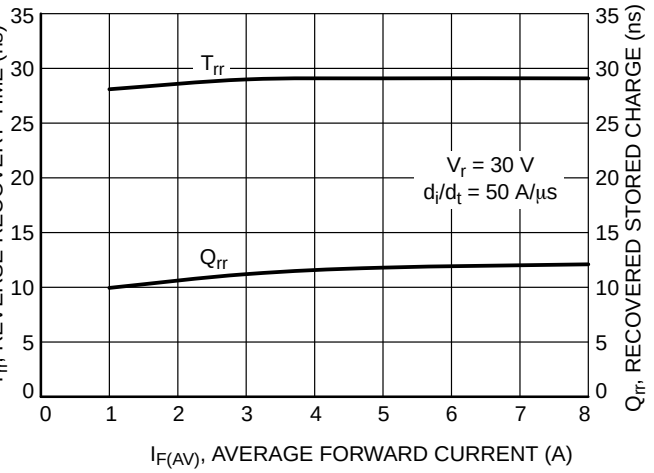


Figure 8. Typical Recovery Characteristics

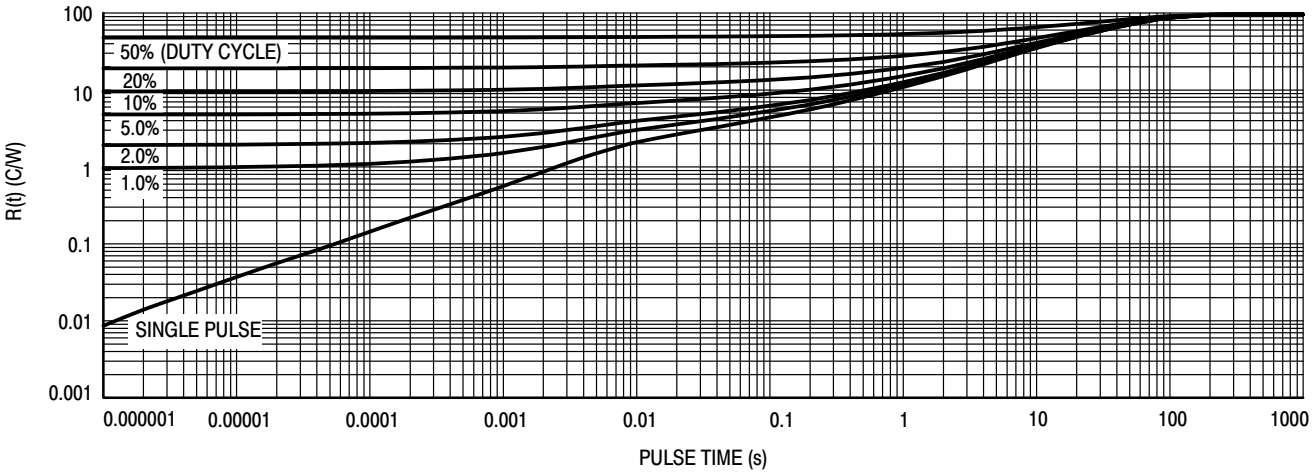
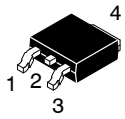


Figure 9. Thermal Response

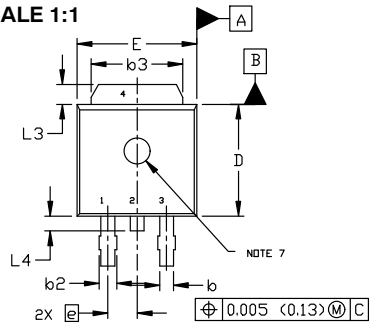
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS



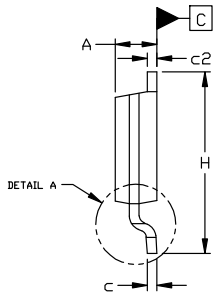
DPAK (SINGLE GAUGE)
CASE 369C
ISSUE G

DATE 31 MAY 2023

SCALE 1:1



TOP VIEW

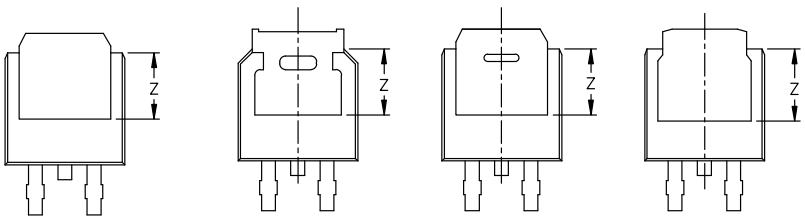


SIDE VIEW

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.

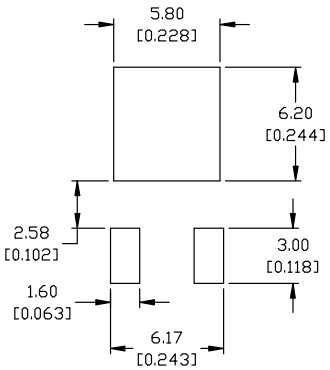
DIM	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.086	0.094	2.18	2.38
A1	0.000	0.005	0.00	0.13
b	0.025	0.035	0.63	0.89
b2	0.028	0.045	0.72	1.14
b3	0.180	0.215	4.57	5.46
c	0.018	0.024	0.46	0.61
c2	0.018	0.024	0.46	0.61
D	0.235	0.245	5.97	6.22
E	0.250	0.265	6.35	6.73
e	0.090 BSC		2.29 BSC	
H	0.370	0.410	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	---



BOTTOM VIEW

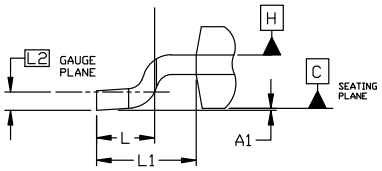
BOTTOM VIEW

ALTERNATE CONSTRUCTIONS



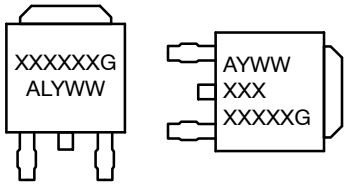
RECOMMENDED MOUNTING FOOTPRINT*

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



DETAIL A
ROTATED 90° CW

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.

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

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**

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