Surface Mount Ultra Fast Power Rectifier

POWERMITE® Power Surface Mount Package

NHPM120, NRVHPM120

This ultrafast POWERMITE provides soft recovery fast switching performance in a compact thermally efficient package. The advanced packaging techniques provide for a very efficient micro−miniature space−saving surface mount rectifier. With its unique heatsink design, the POWERMITE offers thermal performance similar to the SMA while being 50% smaller in footprint area.

Features

- Fast Soft Switching for Reduced EMI and Higher Efficiency
- Low Profile − Maximum Height of 1.1 mm
- Small Footprint − Footprint Area of 8.45 mm^2
- Supplied in 12 mm Tape and Reel
- Low Thermal Resistance with Direct Thermal Path of Die on Exposed Cathode Heat Sink
- 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

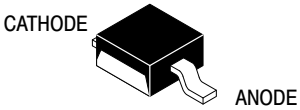
Mechanical Characteristics:

- POWERMITE is JEDEC Registered as D0−216AA
- Case: Molded Epoxy
- Epoxy Meets UL 94 V−0 @ 0.125 in
- Weight: 16.3 mg (Approximately)
- Lead and Mounting Surface Temperature for Soldering Purposes: 260°C Maximum for 10 Seconds
- MSL 1

Applications

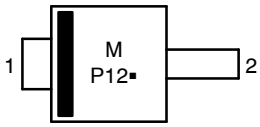
- Automotive LED Lighting
- Engine Control
- Freewheeling Diode Where Space is at a Premium
- Flat Panel Display

ULTRAFAST RECTIFIER
1.0 AMPERE, 200 VOLTS



POWERMITE
CASE 457

MARKING DIAGRAM



M = Date Code
P12 = Device Code
▪ = Pb−Free Package

ORDERING INFORMATION

Device	Package	Shipping†
NRVHPM120T3G	POWERMITE (Pb−Free)	12,000 / Tape & Reel

DISCONTINUED (Note 1)

NHPM120T3G	POWERMITE (Pb−Free)	12,000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

1. **DISCONTINUED:** These devices are not recommended for new design. Please contact your **onsemi** representative for information. The most current information on these devices may be available on www.onsemi.com.

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MAXIMUM RATINGS

Symbol	Rating	Value	Unit
V_{RRM} V_{RWM} V_R	Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	200	V
I_O	Average Rectified Forward Current (T_L = 165°C)	1.0	A
I_{FRM}	Peak Repetitive Forward Current (Rated V_R, Square Wave, 20 kHz) T_L = 165°C	2.0	A
I_{FSM}	Non−Repetitive Peak Surge Current (Surge Applied at Rated Load Conditions Halfwave, Single Phase, 60 Hz)	30	A
T_{stg}, T_J	Storage and Operating Junction Temperature Range (Note 2)	−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.

2. The heat generated must be less than the thermal conductivity from Junction−to−Ambient: $dP_D/dT_J < 1/R_{\theta JA}$.

THERMAL CHARACTERISTICS

Symbol	Characteristic	Value	Unit
Ψ_{JCL}	Thermal Resistance, Junction−to−Lead (Note 3)	12	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction−to−Ambient (Note 3)	75	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction−to−Ambient (Note 4)	260	°C/W

ELECTRICAL CHARACTERISTICS

Symbol	Characteristic	Value	Unit
V_F	Maximum Instantaneous Forward Voltage (Note 5) (I_F = 1.0 A, T_J = 25°C) (I_F = 2.0 A, T_J = 25°C) (I_F = 1.0 A, T_J = 125°C) (I_F = 2.0 A, T_J = 125°C)	 1.0 1.1 0.85 0.95	V
I_R	Maximum Instantaneous Reverse Current (Note 5) (Rated dc Voltage, T_J = 25°C) (Rated dc Voltage, T_J = 125°C)	 0.5 25	μA
t_{rr}	Reverse Recovery Time I_F = 1.0 A, V_R = 30 V, dI/dt = 50 A/μs, T_J = 25°C	25	ns
t_{rr}	Reverse Recovery Time I_F = 1.0 A, V_R = 30 V, dI/dt = 50 A/μs, T_J = 50°C	50	ns

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.

3. Mounted with 700 mm^2 copper pad size (Approximately 1 in^2) 1 oz FR4 Board.
4. Mounted with pad size approximately 20 mm^2 copper, 1 oz FR4 Board.
5. Pulse Test: Pulse Width ≤ 380 μs, Duty Cycle ≤ 2.0%.

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TYPICAL CHARACTERISTICS

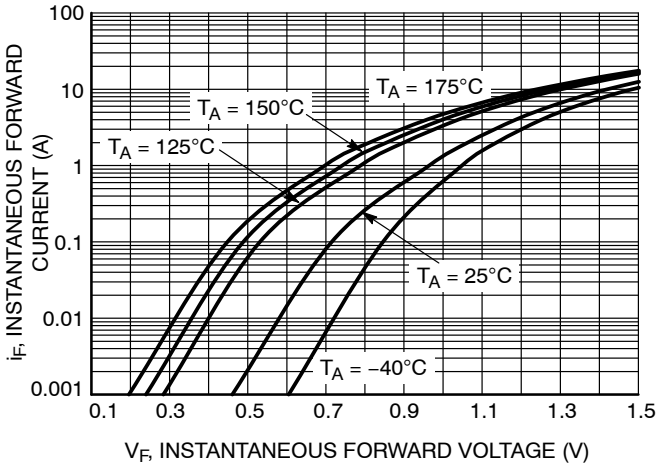

Figure 1. Typical Instantaneous Forward Characteristics

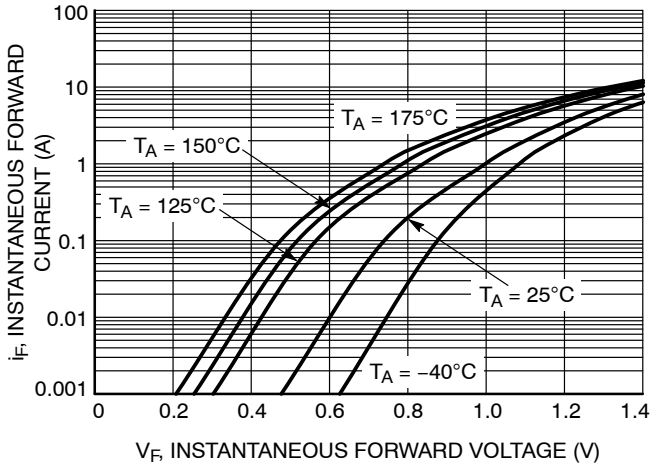

Figure 2. Maximum Instantaneous Forward Characteristics

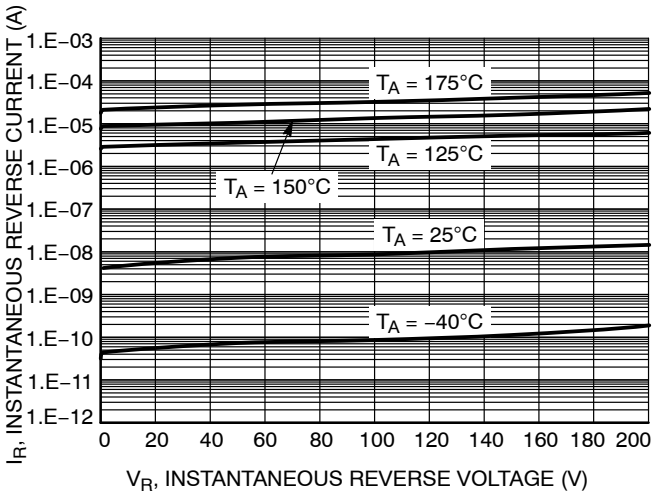

Figure 3. Typical Reverse Characteristics

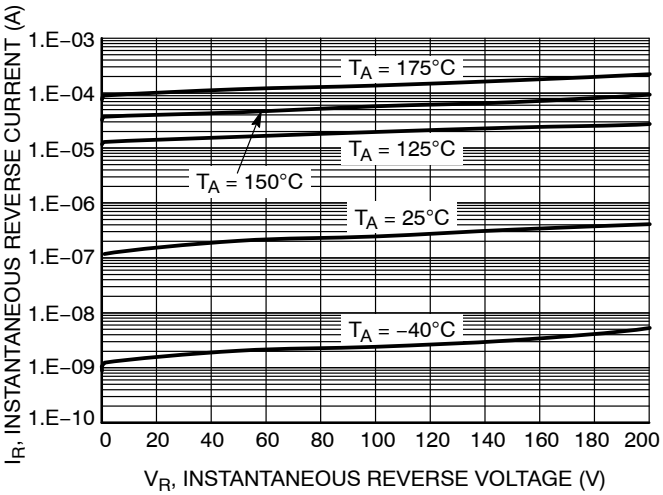

Figure 4. Maximum Reverse Characteristics

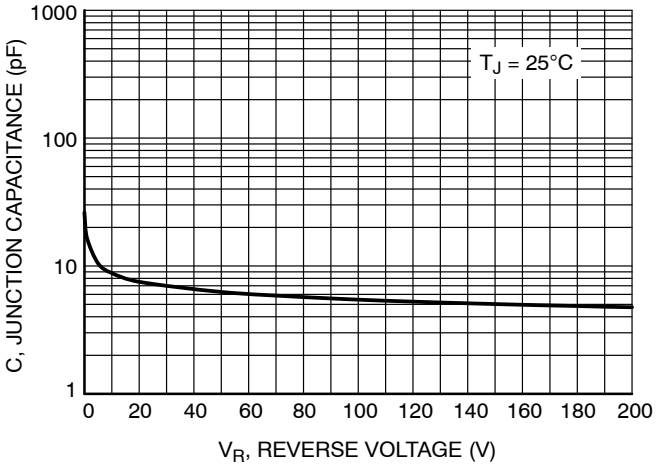

Figure 5. Typical Junction Capacitance

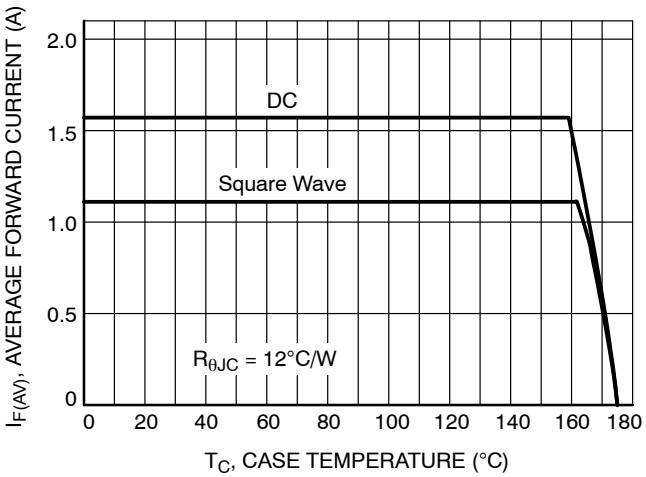

Figure 6. Current Derating

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TYPICAL CHARACTERISTICS (continued)

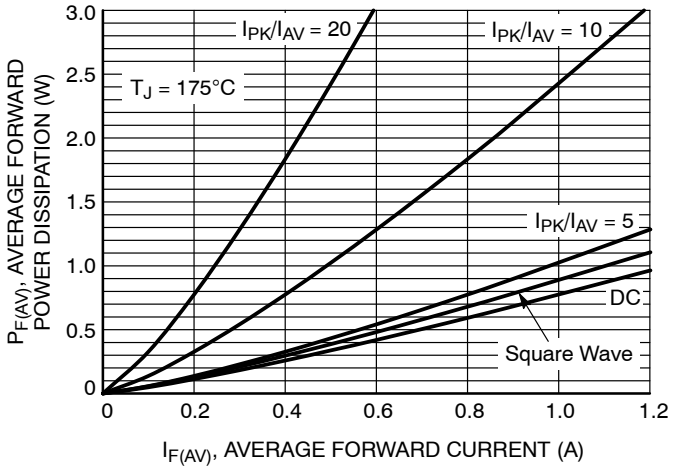

Figure 7. Forward Power Dissipation

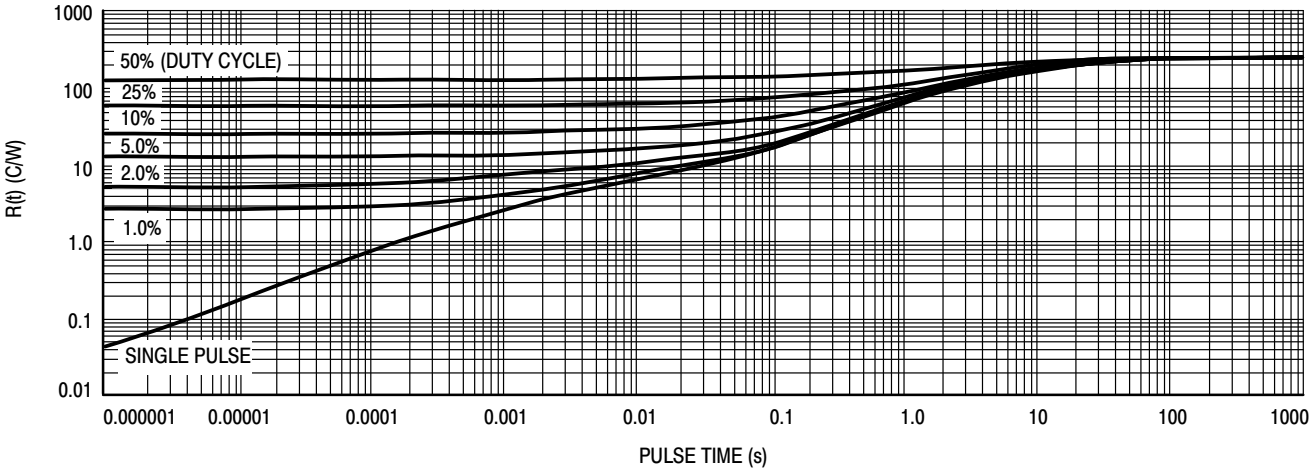

Figure 8. Thermal Response, Junction−to−Ambient (20 mm^2 pad)

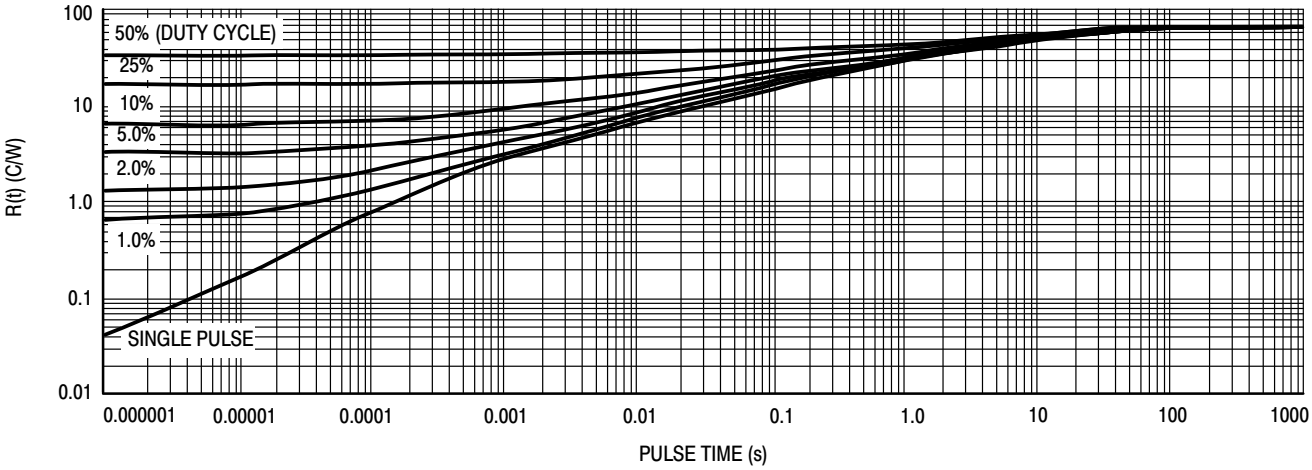

Figure 9. Thermal Response, Junction−to−Ambient (1 in^2 pad)

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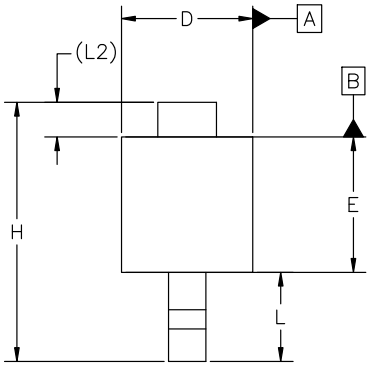
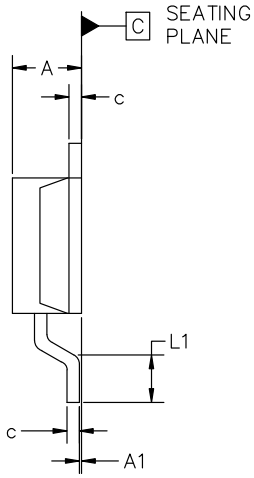
CASE 457
ISSUE H

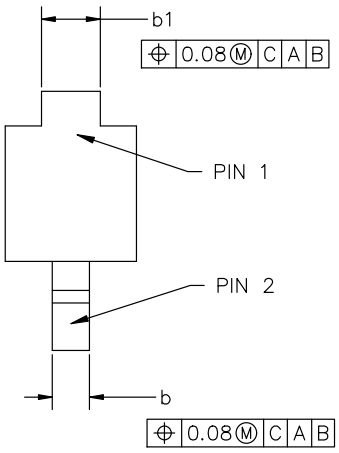
DATE 16 MAY 2025



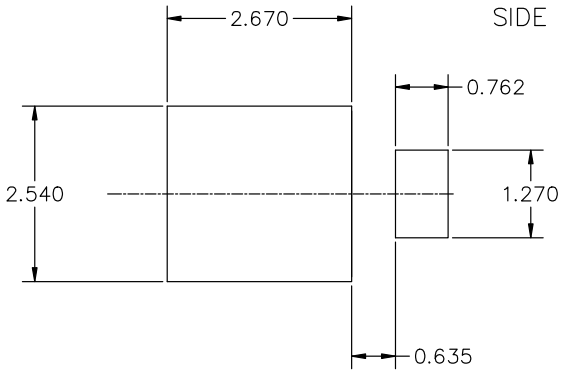
TOP VIEW



SIDE VIEW



BOTTOM VIEW



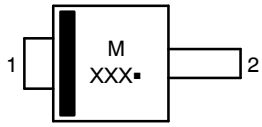
RECOMMENDED MOUNTING FOOTPRINT

*For additional information on our Pb−Free Strategy and Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

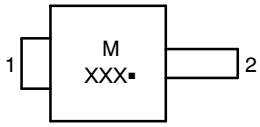
MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.85	1.00	1.15
A1	0.00	0.05	0.10
b	0.40	0.55	0.69
b1	0.70	0.85	1.00
c	0.10	0.18	0.25
D	1.75	1.90	2.05
E	1.75	1.96	2.18
H	3.60	3.75	3.90
L	1.20	1.35	1.50
L1	0.50	0.65	0.80
L2	0.50 REF		

NOTES:
1. DIMENSIONING AND TOLERANCING AS PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

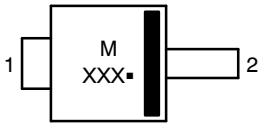
GENERIC MARKING DIAGRAMS*



STYLE 1



STYLE 2



STYLE 3

XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

STYLE 1:
PIN 1. CATHODE
2. ANODE

STYLE 2:
PIN 1. ANODE OR CATHODE
2. CATHODE OR ANODE (BI−DIRECTIONAL)

STYLE 3:
PIN 1. ANODE
2. CATHODE

*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.

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