

# NHPAF220, NRVHPAF220

## Surface Mount Ultrafast Power Rectifier

This SMA flat lead ultrafast rectifier provides fast switching performance with soft recovery in a compact thermally efficient package. Its compact footprint makes it ideally suited to portable and automotive applications where board space is at a premium. Its low profile makes it a good option for flat panel display and other applications with limited vertical clearance. The device offers low leakage over temperature making it a good match for applications requiring low quiescent current.

### Features

- Fast Soft Switching for Reduced EMI and Higher Efficiency
- Low Profile – Maximum Height of 1.1 mm
- Small Footprint – Footprint Area of 13.5 mm<sup>2</sup>
- 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: Molded Epoxy
- Epoxy Meets UL 94 V-0 @ 0.125 in
- Weight: 95 mg (Approximately)
- Lead and Mounting Surface Temperature for Soldering Purposes: 260°C Maximum for 10 Seconds
- MSL 1

### Applications

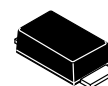
- Switching Power Supplies including Mini-adapters and Displays
- Instrumentation
- Engine Control Recirculation Diodes
- Freewheeling Diode Where Space is at a Premium



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## ULTRAFAST RECTIFIER 2.0 AMPERE 200 VOLTS



**SMA-FL  
CASE 403AA  
STYLE 6**

### MARKING DIAGRAM



P22 = Specific Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

Device	Package	Shipping†
NHPAF220T3G	SMA-FL (Pb-Free)	5000 / Tape & Reel
NRVHPAF220T3G	SMA-FL (Pb-Free)	5000 / 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.

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## MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	$V_{RRM}$ $V_{RWM}$ $V_R$	200	V
Average Rectified Forward Current ( $T_L = 130^\circ\text{C}$ )	$I_O$	2.0	A
Peak Repetitive Forward Current (Rated $V_R$ , Square Wave, 20 kHz) $T_L = 125^\circ\text{C}$	$I_{FRM}$	4.0	A
Non-Repetitive Peak Surge Current (Surge Applied at Rated Load Conditions Halfwave, Single Phase, 60 Hz)	$I_{FSM}$	60	A
Storage Temperature Range	$T_{stg}$	-65 to +175	$^\circ\text{C}$
Operating Junction Temperature	$T_J$	-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

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction-to-Lead (Note 1)	$\Psi_{JCL}$	29	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient (Note 1)	$R_{\theta JA}$	80	$^\circ\text{C}/\text{W}$

1. 1 inch square pad size (1 × 0.5 inch) for each lead on FR4 board.

## ELECTRICAL CHARACTERISTICS

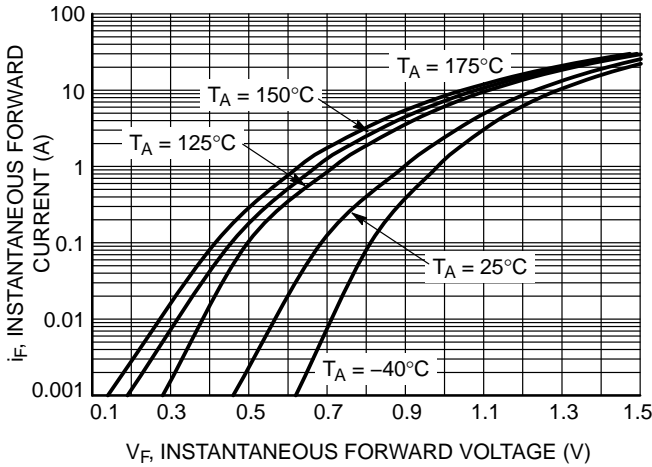
Characteristic	Symbol	Value		Unit
		$T_J = 25^\circ\text{C}$	$T_J = 125^\circ\text{C}$	
Maximum Instantaneous Forward Voltage (Note 2) ( $I_F = 2.0\text{ A}$ )	$V_F$	1.00	0.85	V
Maximum Instantaneous Reverse Current (Note 2) ( $V_R = 200\text{ V}$ )	$I_R$	0.5	35	$\mu\text{A}$
Reverse Recovery Time $I_F = 2.0\text{ A}$ , $V_R = 30\text{ V}$ , $di/dt = 50\text{ A}/\mu\text{s}$ , $T_J = 25^\circ\text{C}$	$t_{rr}$	30		ns
Reverse Recovery Time $I_F = 2.0\text{ A}$ , $V_R = 30\text{ V}$ , $di/dt = 50\text{ A}/\mu\text{s}$ , $T_J = 125^\circ\text{C}$	$t_{rr}$	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.

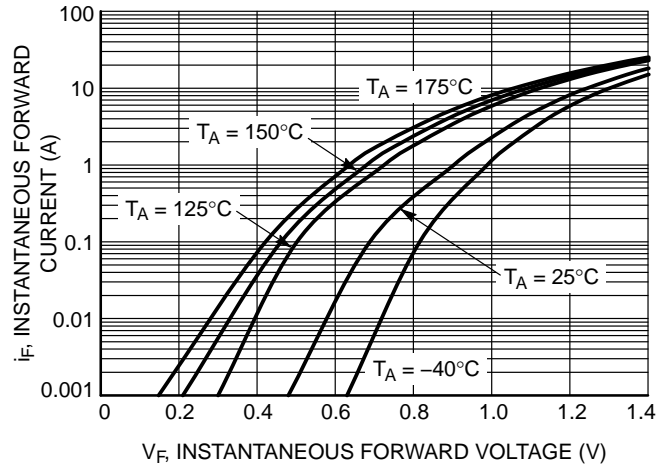
2. Pulse Test: Pulse Width  $\leq 380\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

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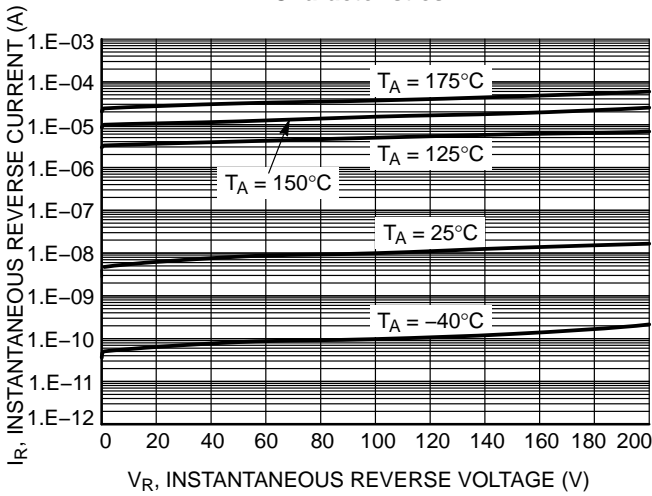
## TYPICAL CHARACTERISTICS



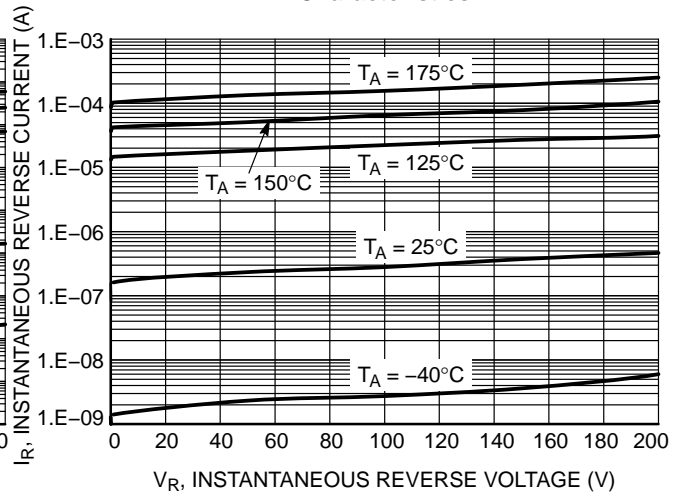
**Figure 1. Typical Instantaneous Forward Characteristics**



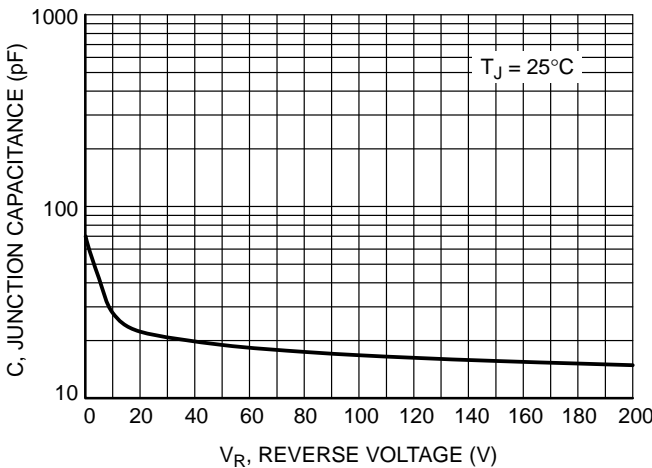
**Figure 2. Maximum Instantaneous Forward Characteristics**



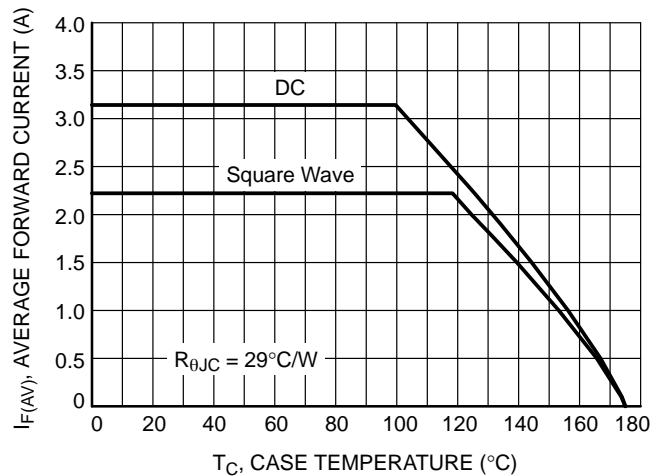
**Figure 3. Typical Reverse Characteristics**



**Figure 4. Maximum Reverse Characteristics**



**Figure 5. Typical Junction Capacitance**



**Figure 6. Current Derating**

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## TYPICAL CHARACTERISTICS

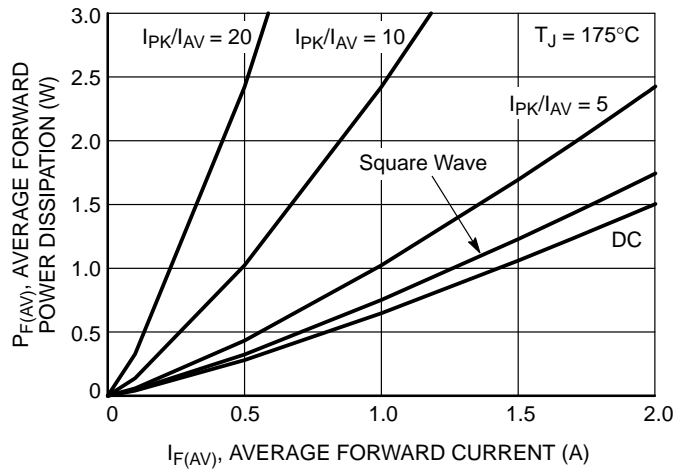


Figure 7. Forward Power Dissipation

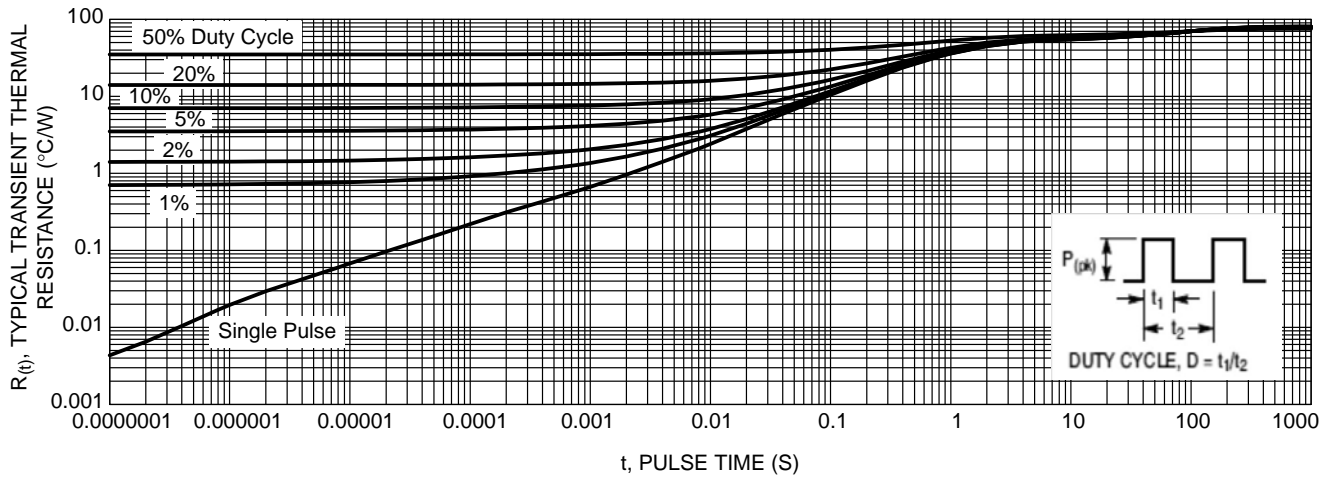
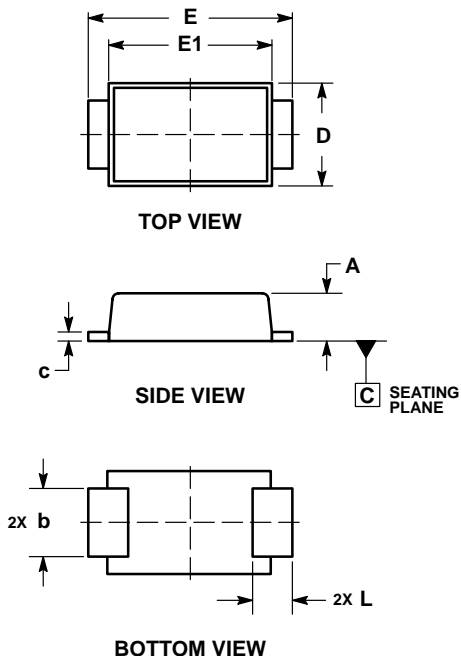


Figure 8. Typical Transient Thermal Response, Junction-to-Ambient

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## PACKAGE DIMENSIONS

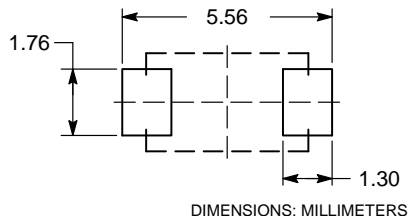
SMA-FL  
CASE 403AA  
ISSUE O




- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
  2. CONTROLLING DIMENSION: MILLIMETERS.

MILLIMETERS		
DIM	MIN	MAX
A	0.90	1.10
b	1.25	1.65
c	0.15	0.30
D	2.40	2.80
E	4.80	5.40
E1	4.00	4.60
L	0.70	1.10

### RECOMMENDED SOLDER 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.

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