

# NRVTSM245E

## Surface Mount Trench Schottky Power Rectifier

### POWERMITE® Power Surface Mount Package

#### Features

- Low Profile – Maximum Height of 1.1 mm
- Small Footprint – Footprint Area of 8.45 mm<sup>2</sup>
- Supplied in 12 mm Tape and Reel
- Low Thermal Resistance with Direct Thermal Path of Die on Exposed Cathode Heat Sink
- Fine Lithography Trench-based Schottky Technology for Very Low Forward Voltage and Low Leakage
- Fast Switching with Exceptional Temperature Stability
- Low Power Loss and Lower Operating Temperature
- Higher Efficiency for Achieving Regulatory Compliance
- High Surge Capability
- NRV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These are Pb-Free and Halide-Free Devices

#### Typical Applications

- Switching Power Supplies including Adapters & Flat Panel Displays
- High Frequency and DC-DC Converters
- Freewheeling and OR-ing diodes
- Reverse Battery Protection
- Instrumentation

#### Mechanical Characteristics:

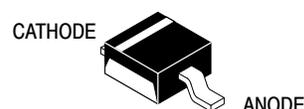
- Powermite is JEDEC Registered as D0-216AA
- Case: Molded Epoxy
- Epoxy Meets UL 94 V-0 @ 0.125 in
- Weight: 16.3 mg (Approximately)
- Lead and Mounting Surface Temperature for Soldering Purposes: 260°C Maximum for 10 Seconds



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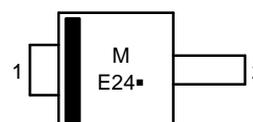
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### SCHOTTKY TRENCH RECTIFIER 2.0 AMPERES, 45 VOLTS



POWERMITE  
CASE 457

#### MARKING DIAGRAM



M = Date Code  
E24 = Device Code  
■ = Pb-Free Package (Marking Style 1)

#### ORDERING INFORMATION

| Device        | Package             | Shipping†           |
|---------------|---------------------|---------------------|
| NRVTSM245ET1G | Powermite (Pb-Free) | 3000 / Tape & Reel  |
| NRVTSM245ET3G | Powermite (Pb-Free) | 12000 / Tape & Reel |

†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.

# NRVTSM245E

## MAXIMUM RATINGS

| Rating  | Symbol                          | Value       | Unit             |
|---|---------------------------------|-------------|------------------|
| Peak Repetitive Reverse Voltage<br>Working Peak Reverse Voltage<br>DC Blocking Voltage                      | $V_{RRM}$<br>$V_{RWM}$<br>$V_R$ | 45          | V                |
| Average Rectified Forward Current<br>( $T_L = 168^\circ\text{C}$ )  | $I_O$                           | 2.0         | A                |
| Peak Repetitive Forward Current<br>(Square Wave, 20 kHz, $T_L = 167^\circ\text{C}$ )                        | $I_{FRM}$                       | 4.0         | A                |
| Non-Repetitive Peak Surge Current<br>(Surge Applied at Rated Load Conditions Halfwave, Single Phase, 60 Hz) | $I_{FSM}$                       | 50          | A                |
| Storage and Operating Junction Temperature Range (Note 1)   | $T_{stg}, T_J$                  | -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.

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

## THERMAL CHARACTERISTICS

| Characteristic                                   | Symbol          | Value | Unit               |
|--|-----------------|-------|--------------------|
| Thermal Resistance, Junction-to-Lead (Note 2)    | $\Psi_{JCL}$    | 6.3   | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 82    | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient (Note 3) | $R_{\theta JA}$ | 200   | $^\circ\text{C/W}$ |

## ELECTRICAL CHARACTERISTICS

| Characteristic  | Symbol | Value            | Unit                |
|---|--------|------------------|---------------------|
| Maximum Instantaneous Forward Voltage (Note 4)<br>( $I_F = 2\text{ A}$ , $T_J = 25^\circ\text{C}$ )<br><br>( $I_F = 2\text{ A}$ , $T_J = 125^\circ\text{C}$ ) | $V_F$  | 0.65<br><br>0.58 | V                   |
| Maximum Instantaneous Reverse Current (Note 4)<br>(Rated dc Voltage, $T_J = 25^\circ\text{C}$ )<br>(Rated dc Voltage, $T_J = 125^\circ\text{C}$ )             | $I_R$  | 75<br>3          | $\mu\text{A}$<br>mA |

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.

- Mounted with 700 mm<sup>2</sup> copper pad size (Approximately 1 in<sup>2</sup>) 1 oz FR4 Board.
- Mounted with pad size approximately 20 mm<sup>2</sup> copper, 1 oz FR4 Board.
- Pulse Test: Pulse Width  $\leq 380\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

TYPICAL CHARACTERISTICS

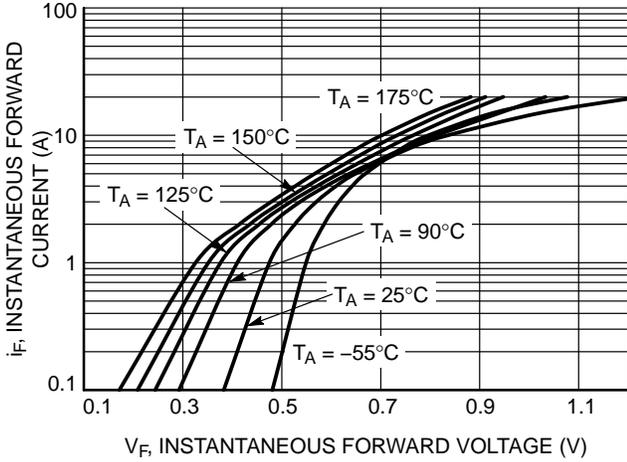


Figure 1. Typical Instantaneous Forward Characteristics

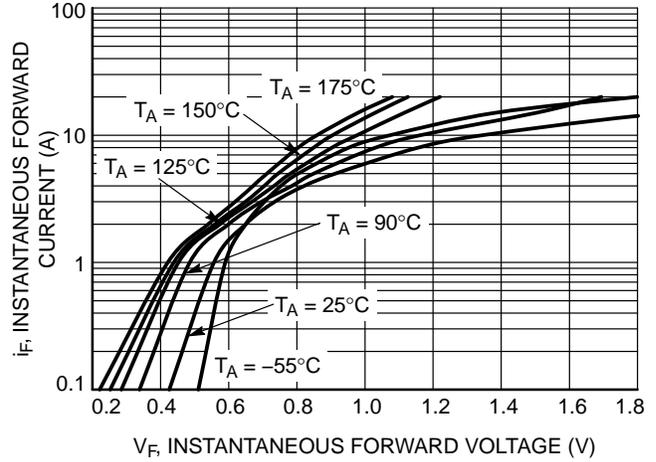


Figure 2. Maximum Instantaneous Forward Characteristics

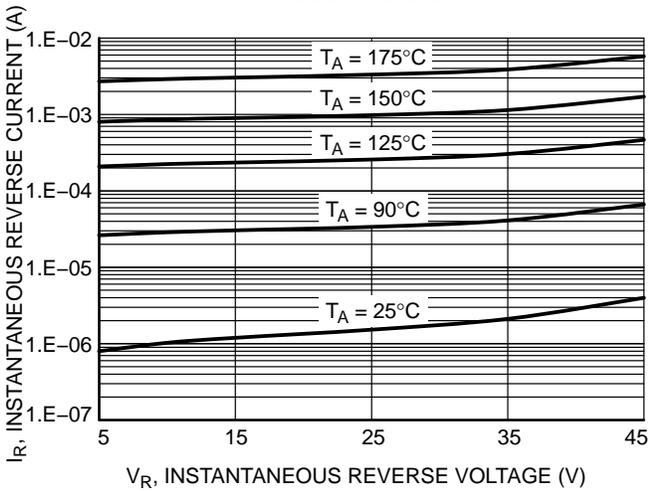


Figure 3. Typical Reverse Characteristics

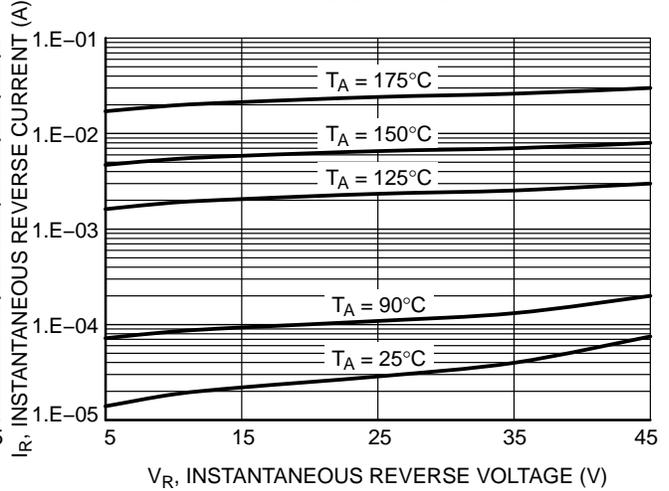


Figure 4. Maximum Reverse Characteristics

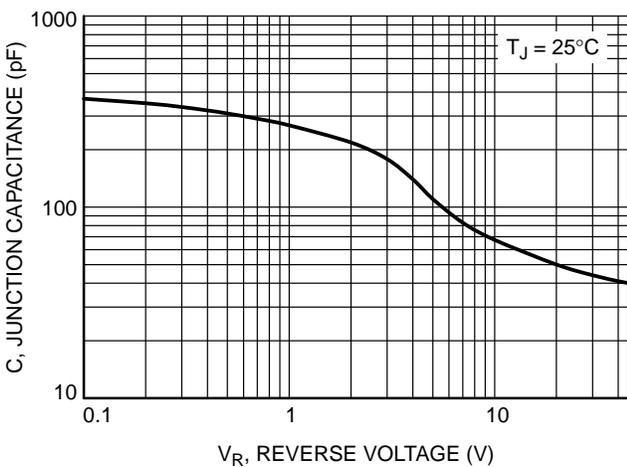


Figure 5. Typical Junction Capacitance

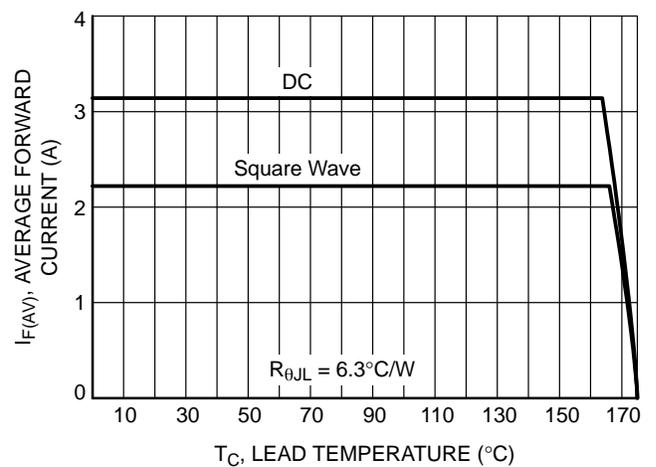


Figure 6. Current Derating

# NRVTSM245E

## TYPICAL CHARACTERISTICS

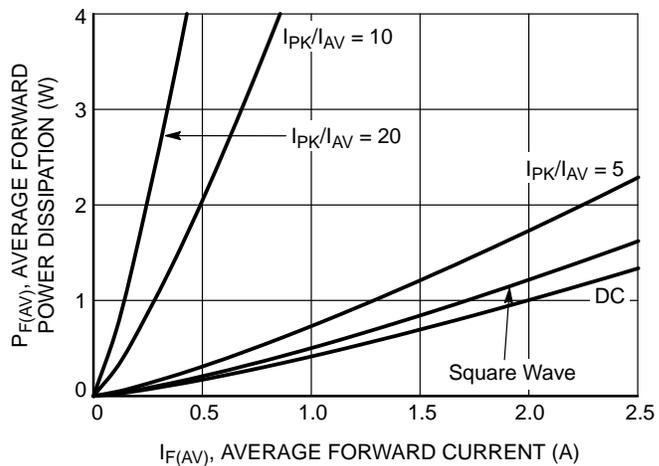


Figure 7. Forward Power Dissipation

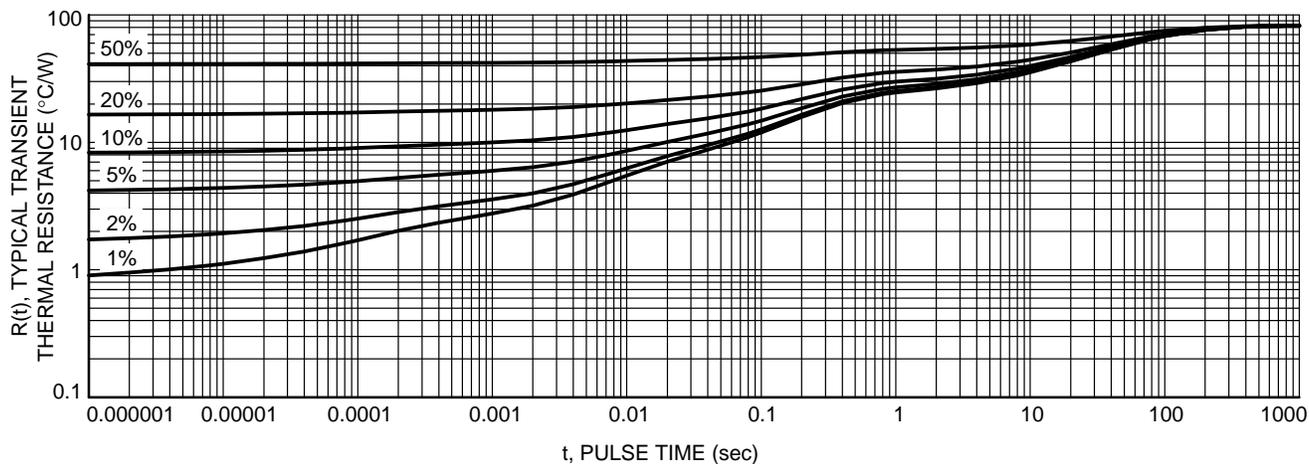
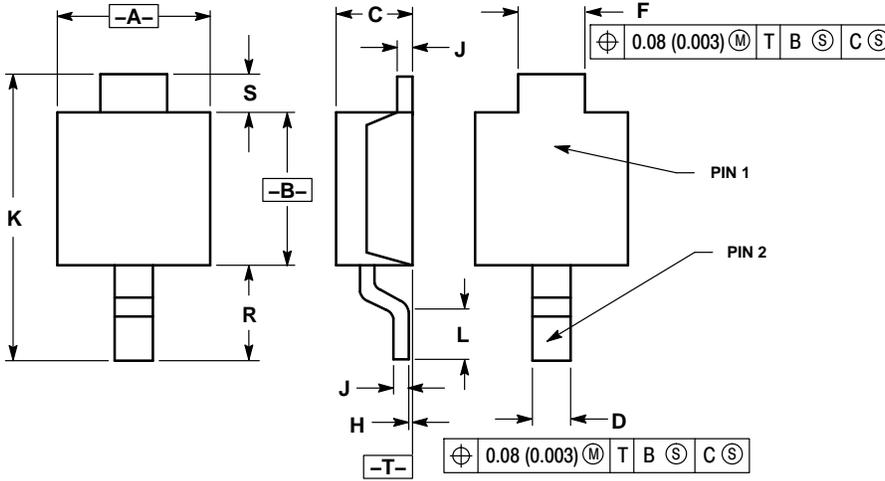


Figure 8. Thermal Response, Junction-to-Ambient

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## PACKAGE DIMENSIONS

### POWERMITE CASE 457-04 ISSUE F

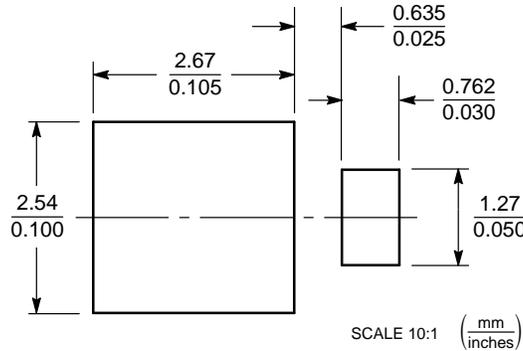


**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.

| DIM | MILLIMETERS |       | INCHES    |        |
|-----|-------------|-------|-----------|--------|
|     | MIN         | MAX   | MIN       | MAX    |
| A   | 1.75        | 2.05  | 0.069     | 0.081  |
| B   | 1.75        | 2.18  | 0.069     | 0.086  |
| C   | 0.85        | 1.15  | 0.033     | 0.045  |
| D   | 0.40        | 0.69  | 0.016     | 0.027  |
| F   | 0.70        | 1.00  | 0.028     | 0.039  |
| H   | -0.05       | +0.10 | -0.002    | +0.004 |
| J   | 0.10        | 0.25  | 0.004     | 0.010  |
| K   | 3.60        | 3.90  | 0.142     | 0.154  |
| L   | 0.50        | 0.80  | 0.020     | 0.031  |
| R   | 1.20        | 1.50  | 0.047     | 0.059  |
| S   | 0.50 REF    |       | 0.019 REF |        |

### SOLDERING 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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