

# Schottky Barrier Rectifier, Trench-based

## NRTS1060PFS, NRVTS1060PFS

This TO-277 trench Schottky rectifier provides fast switching performance in a compact thermally efficient package. The TO-277 package provides an excellent alternative to the DPAK, offering thermal performance nearly as good in a package occupying less than half the board space. 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

- Package Provides Capability of Inspection and Probe After Board Mounting
- Low Forward Voltage Drop
- 175°C Operating Junction 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
- Epoxy Meets Flammability Rating UL 94-0 @ 0.125 in.
- Lead Finish: 100% Matte Sn (Tin)
- Lead and Mounting Surface Temperature for Soldering Purposes: 260°C Max. for 10 Seconds
- Device Meets MSL 1 Requirements

### Applications

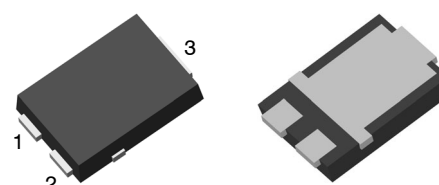
- Excellent Alternative to DPAK in Space-Constrained Automotive Applications
- Low Leakage for Higher Temperature Operation
- Output Rectification in Compact Portable Consumer Applications
- Freewheeling Diode used with Inductive Loads



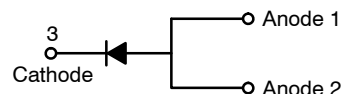
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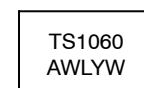
## SCHOTTKY BARRIER RECTIFIER, 10 AMPERES 60 VOLTS



TO-277-3LD  
CASE 340CZ



### MARKING DIAGRAM



TS1060 = Specific Device Code  
A = Assembly Location  
Y = Year  
W = Work Week  
WL = Wafer Lot

### ORDERING INFORMATION

| Device          | Package             | Shipping†             |
|-----------------|---------------------|-----------------------|
| NRTS1060PFST3G  | TO-277<br>(Pb-Free) | 1500 /<br>Tape & Reel |
| NRVTS1060PFST3G | TO-277<br>(Pb-Free) | 1500 /<br>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.

# NRTS1060PFS, NRVTS1060PFS

## 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>$V_R$ | 60          | V                |
| Average Rectified Forward Current<br>( $T_C = 163^\circ\text{C}$ )                                          | $I_{F(AV)}$                     | 10          | A                |
| Peak Repetitive Forward Current,<br>( $T_C = 160^\circ\text{C}$ , Square Wave, Duty = 0.5)                  | $I_{FRM}$                       | 20          | A                |
| Non-Repetitive Peak Surge Current<br>(Surge Applied at Rated Load Conditions Halfwave, Single Phase, 60 Hz) | $I_{FSM}$                       | 150         | A                |
| Storage Temperature Range                                                                                   | $T_{stg}$                       | -65 to +175 | $^\circ\text{C}$ |
| Operating Junction Temperature                                                                              | $T_J$                           | -55 to +175 | $^\circ\text{C}$ |
| ESD Rating (Human Body Model)                                                                               |                                 | 3B          |                  |
| ESD Rating (Machine Model)                                                                                  |                                 | M4          |                  |

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           | Max | Unit               |
|----------------------------------------------------------------------------------------------------------------------|------------------|-----|--------------------|
| Thermal Resistance, Junction-to-Ambient<br>(Assumes 600 mm <sup>2</sup> , 1 oz. copper bond pad on a FR4 board)      | $R_{\theta JA}$  | 69  | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Case, Top<br>(Assumes 600 mm <sup>2</sup> , 1 oz. copper bond pad on a FR4 board)    | $R_{\theta JCT}$ | 61  | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Case, Bottom<br>(Assumes 600 mm <sup>2</sup> , 1 oz. copper bond pad on a FR4 board) | $R_{\theta JCB}$ | 2.0 | $^\circ\text{C/W}$ |

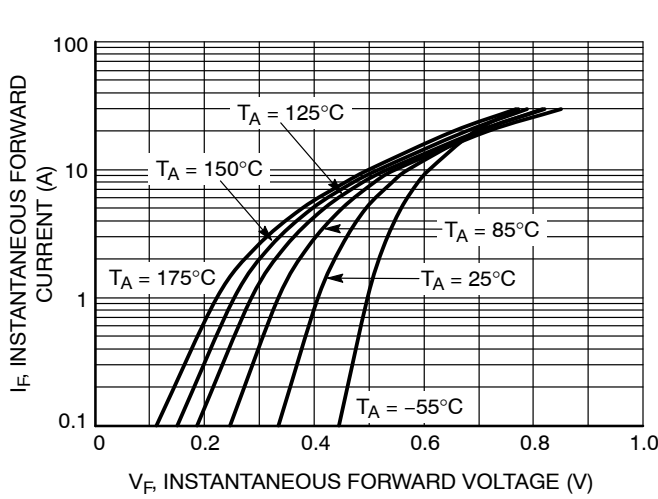
## ELECTRICAL CHARACTERISTICS

| Characteristic                                                                                                                                                                                                                                                 | Symbol | Typ                          | Max                    | Unit                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------------------------------|------------------------|---------------------|
| Instantaneous Forward Voltage (Note 1)<br>( $I_F = 5\text{ A}$ , $T_J = 25^\circ\text{C}$ )<br>( $I_F = 5\text{ A}$ , $T_J = 125^\circ\text{C}$ )<br>( $I_F = 10\text{ A}$ , $T_J = 25^\circ\text{C}$ )<br>( $I_F = 10\text{ A}$ , $T_J = 125^\circ\text{C}$ ) | $V_F$  | 0.49<br>0.42<br>0.57<br>0.53 | –<br>–<br>0.66<br>0.65 | V                   |
| Instantaneous Reverse Current (Note 1)<br>(Rated dc Voltage, $T_J = 25^\circ\text{C}$ )<br>(Rated dc Voltage, $T_J = 125^\circ\text{C}$ )                                                                                                                      | $i_R$  | 7<br>4.2                     | 350<br>50              | $\mu\text{A}$<br>mA |
| Junction Capacitance<br>( $V_R = 1\text{ V}$ , $T_J = 25^\circ\text{C}$ , 1 MHz)                                                                                                                                                                               | $C_J$  | 1023                         | –                      | pF                  |

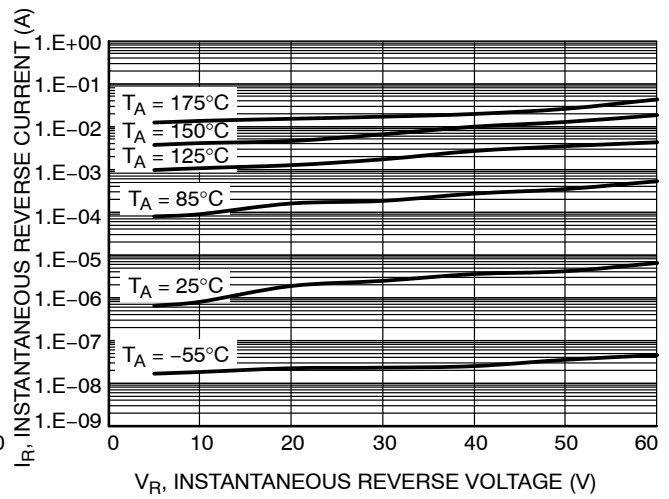
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. Pulse Test: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

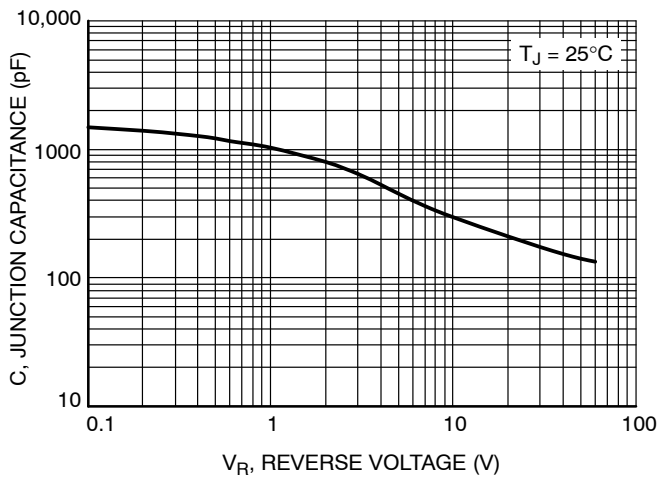
TYPICAL CHARACTERISTICS



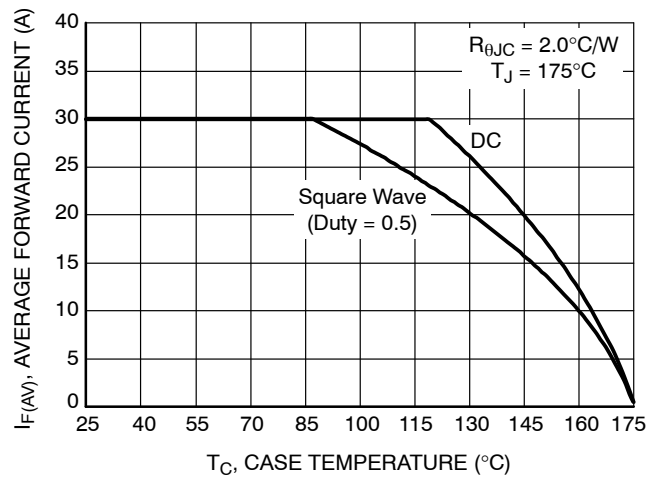
**Figure 1. Typical Instantaneous Forward Characteristics**



**Figure 2. Typical Reverse Characteristics**



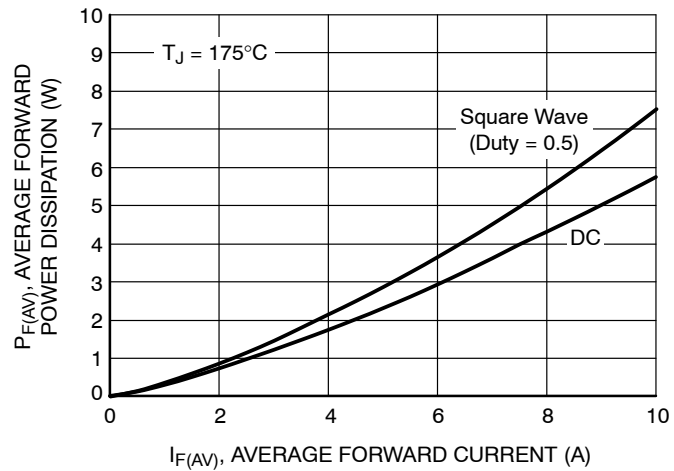
**Figure 3. Typical Junction Capacitance**



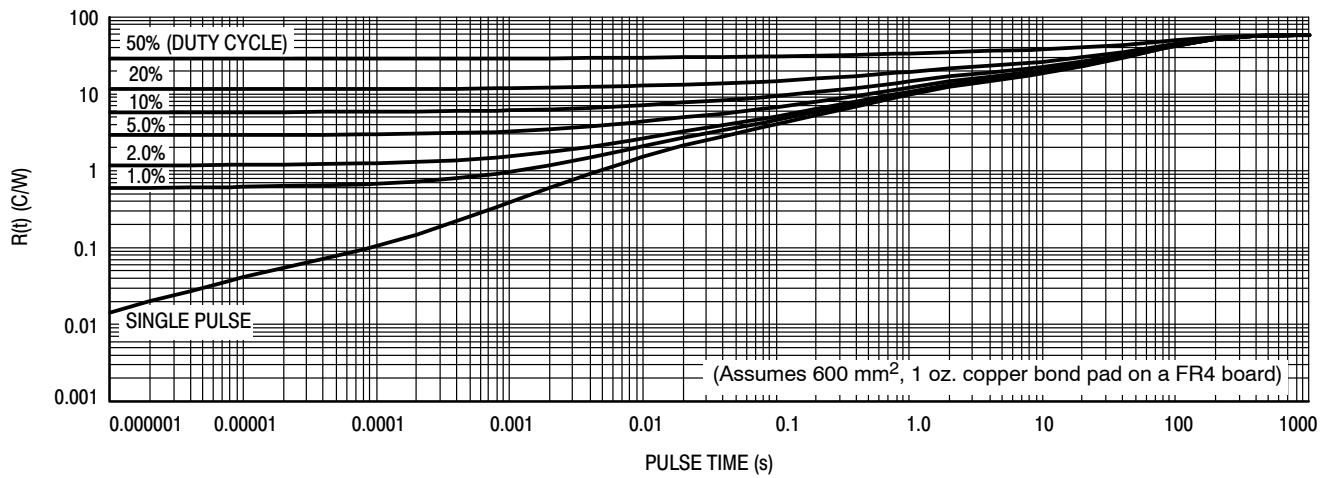
**Figure 4. Current Derating**

# NRTS1060PFS, NRVTS1060PFS

## TYPICAL CHARACTERISTICS



**Figure 5. Forward Power Dissipation**



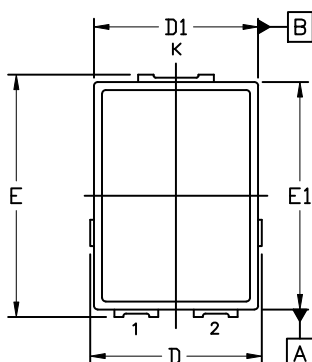
**Figure 6. Typical Thermal Characteristics, Junction-to-Ambient**

### TO-277-3LD CASE 340CZ ISSUE A

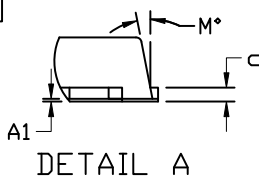
DATE 14 FEB 2020

#### NOTES:

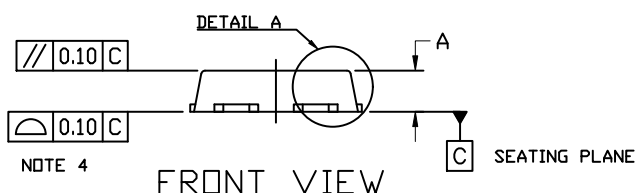
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS b, b1, b2, b3, b6 AND c TO BE MEASURED ON FLAT SECTION OF THE LEAD, BETWEEN 0.13 AND 0.25mm FROM LEAD TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.
5. POSITIONAL TOLERANCE APPLIES TO THE TERMINALS AND EXPOSED PAD.
6. A1 IS DEFINED AS THE VERTICAL DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.
7. DIMENSIONS D AND E TO BE DETERMINED AT DATUM PLANE C.



TOP VIEW

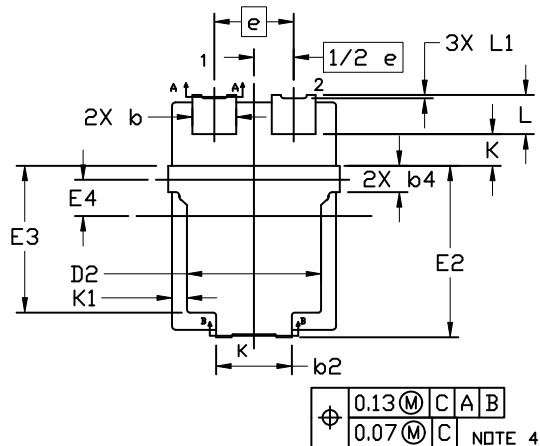


DETAIL A



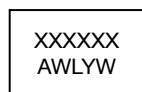
NOTE 4

FRONT VIEW



BOTTOM VIEW

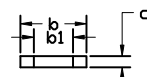
#### GENERIC MARKING DIAGRAM\*



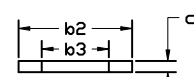
XXXXXX = Specific Device Code  
A = Assembly Location  
Y = Year  
W = Work Week  
WL = Wafer Lot

| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN.        | NDM. | MAX. |
| A   | 1.00        | 1.10 | 1.20 |
| A1  | ---         | 0.01 | 0.05 |
| b   | 1.13        | 1.18 | 1.28 |
| b1  | 0.70 REF    |      |      |
| b2  | 1.98        | 2.03 | 2.13 |
| b3  | 1.20 REF    |      |      |
| b4  | 0.71 REF    |      |      |
| c   | 0.20 REF    |      |      |
| D   | 4.45        | 4.60 | 4.75 |
| D1  | 4.35        | 4.40 | 4.45 |
| D2  | 3.50        | 3.60 | 3.70 |

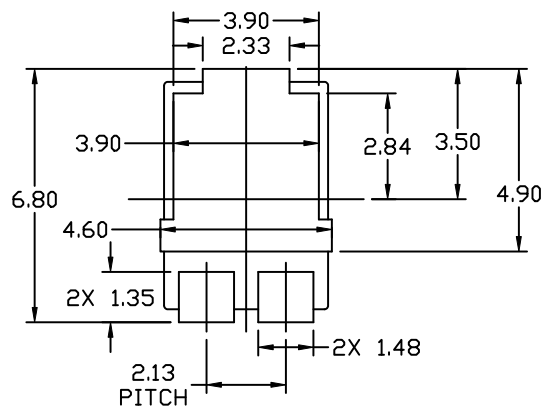
| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN.        | NDM. | MAX. |
| E   | 6.35        | 6.50 | 6.65 |
| E1  | 6.05        | 6.10 | 6.15 |
| E2  | 4.50        | 4.60 | 4.70 |
| E3  | 3.84        | 3.94 | 4.04 |
| E4  | 0.98 REF    |      |      |
| e   | 2.13 BSC    |      |      |
| K   | 0.85 REF    |      |      |
| K1  | 0.40 REF    |      |      |
| L   | 0.90        | 1.05 | 1.20 |
| L1  | 0.02        | ---  | ---  |
| M   | ---         | ---  | 12°  |



SECTION A-A



SECTION B-B



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, SOLDERM/D.

\*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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