

# NRTS660MFD, NRVTS660MFD

## Very Low Forward Voltage Trench-based Schottky Rectifier

This trench Schottky rectifier in the dual flag SO-8 flat lead package offers designers a unique degree of versatility and design freedom. The two devices are electrically independent and can be used separately, as common cathode, as common anode or in series as a function of board level layout. The exposed pad design provides low thermal resistance. The clip attach design creates a package with very efficient die size to board area ratio. While thermal performance is nearly the same as the DPAK package height and board footprint are less than half.

Trench Schottky technology provides a superior forward voltage/leakage tradeoff compared to planar Schottky. The reverse switching characteristics are extremely stable over temperature minimizing switching power loss in high frequency applications.

### Features

- New 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 are Pb-Free and Halide-Free Devices

### 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

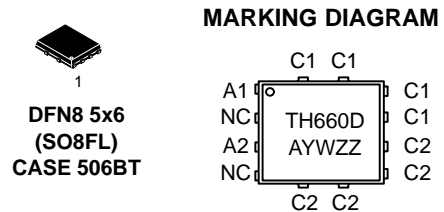
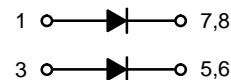
- Excellent Alternative to DPAK in Space-Constrained Automotive Applications
- Output Rectification in Switching Power Supplies
- Freewheeling Diode used with Inductive Loads
- Automotive LED Lighting (Interior and Exterior)



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## TRENCH SCHOTTKY RECTIFIER 6 AMPERES (3x2), 60 VOLTS



TH660D = Specific Device Code  
 A = Assembly Location  
 Y = Year  
 W = Work Week  
 ZZ = Lot Traceability

### ORDERING INFORMATION

Device	Package	Shipping†
NRTS660MFDT1G	DFN8 (Pb-Free)	1500 / Tape & Reel
NRTS660MFDT3G	DFN8 (Pb-Free)	5000 / Tape & Reel
NRVTS660MFDT1G	DFN8 (Pb-Free)	1500 / Tape & Reel
NRVTS660MFDT3G	DFN8 (Pb-Free)	5000 / Tape & Reel
NRVTS660MFDWT3G	DFN8 (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.

# NRTS660MFD, NRVTS660MFD

## MAXIMUM RATINGS (per diode unless noted)

Rating	Symbol	Value	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	$V_{RRM}$ $V_{RWM}$ $V_R$	60	V
Average Rectified Forward Current (Rated $V_R$ , $T_C = 173^\circ\text{C}$ )	$I_{F(AV)}$	3.0	A
Peak Repetitive Forward Current, (Rated $V_R$ , Square Wave, 20 kHz, $T_C = 172^\circ\text{C}$ )	$I_{FRM}$	6.0	A
Non-Repetitive Peak Surge Current (Surge Applied at Rated Load Conditions Halfwave, Single Phase, 60 Hz)	$I_{FSM}$	80	A
Storage Temperature Range	$T_{stg}$	-65 to +175	$^\circ\text{C}$
Operating Junction Temperature	$T_J$	-55 to +175	$^\circ\text{C}$
Unclamped Inductive Switching Energy (10 mH Inductor, Non-repetitive)	$E_{AS}$	10	mJ

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 (per diode unless noted)

Characteristic	Symbol	Typ	Max	Unit
Thermal Resistance, Junction-to-Lead, Steady State (Assumes 650 mm <sup>2</sup> 1 oz. copper bond pad, on a FR4 board)	$\psi_{JCL}$	-	2.1	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient, Steady State (Assumes 650 mm <sup>2</sup> 1 oz. copper bond pad, on a FR4 board)	$R_{\theta JA}$	-	59	$^\circ\text{C}/\text{W}$

## ELECTRICAL CHARACTERISTICS (per diode unless noted)

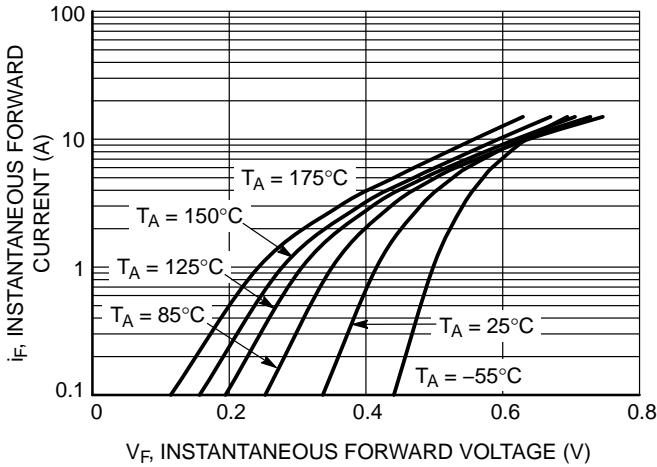
Instantaneous Forward Voltage (Note 1) ( $i_F = 3.0$ Amps, $T_J = 125^\circ\text{C}$ ) ( $i_F = 3.0$ Amps, $T_J = 25^\circ\text{C}$ ) ( $i_F = 6.0$ Amps, $T_J = 125^\circ\text{C}$ ) ( $i_F = 6.0$ Amps, $T_J = 25^\circ\text{C}$ )	$V_F$	0.41	0.56	V
		0.48	0.63	
		0.52	0.72	
		0.55	0.75	
Instantaneous Reverse Current (Note 1) (Rated dc Voltage, $T_J = 125^\circ\text{C}$ ) (Rated dc Voltage, $T_J = 25^\circ\text{C}$ )	$i_R$	3.0	8	mA
		6.2	55	

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.

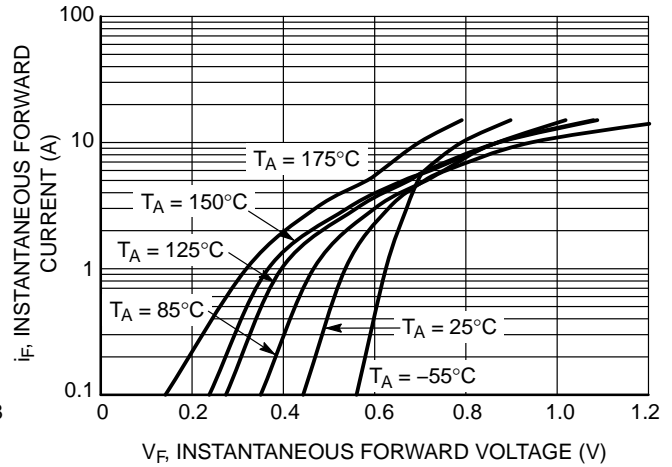
1. Pulse Test: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

# NRTS660MFD, NRVTS660MFD

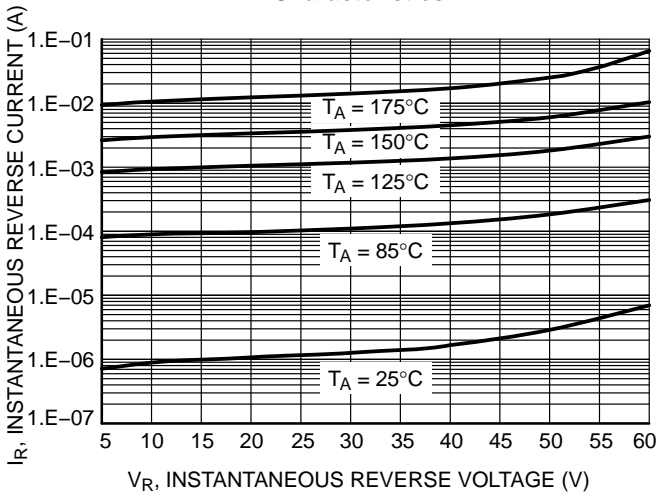
## TYPICAL CHARACTERISTICS



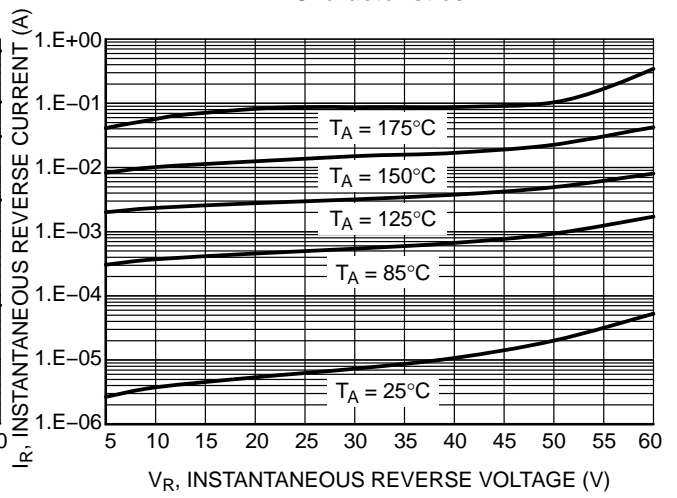
**Figure 1. Typical Instantaneous Forward Characteristics**



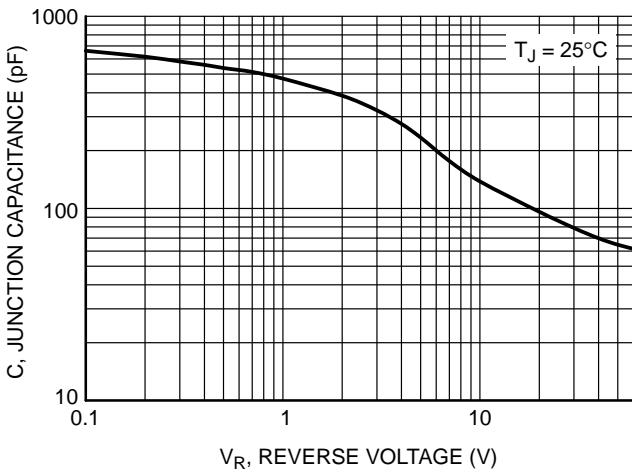
**Figure 2. Maximum Instantaneous Forward Characteristics**



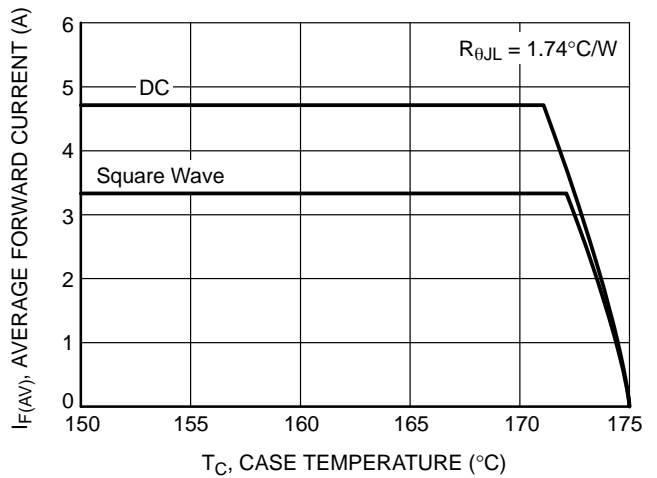
**Figure 3. Typical Reverse Characteristics**



**Figure 4. Maximum Reverse Characteristics**



**Figure 5. Typical Junction Capacitance**



**Figure 6. Current Derating, Per Diode**

# NRTS660MFD, NRVT5660MFD

## TYPICAL CHARACTERISTICS

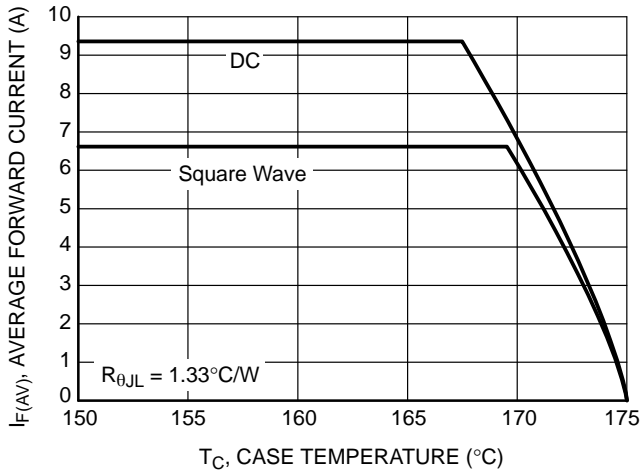


Figure 7. Current Derating, Per Device

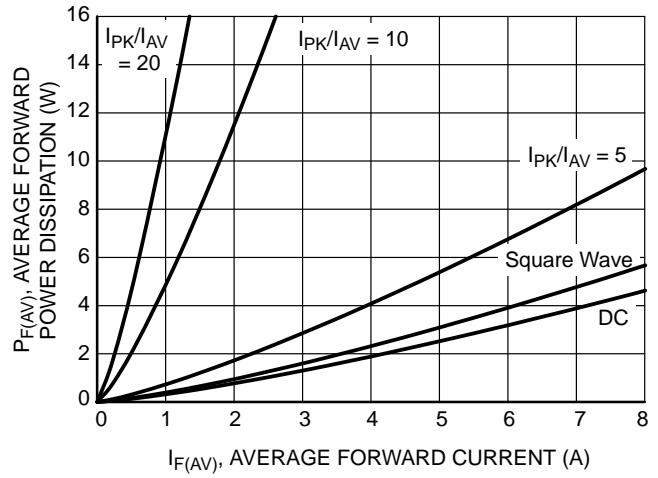


Figure 8. Forward Power Dissipation

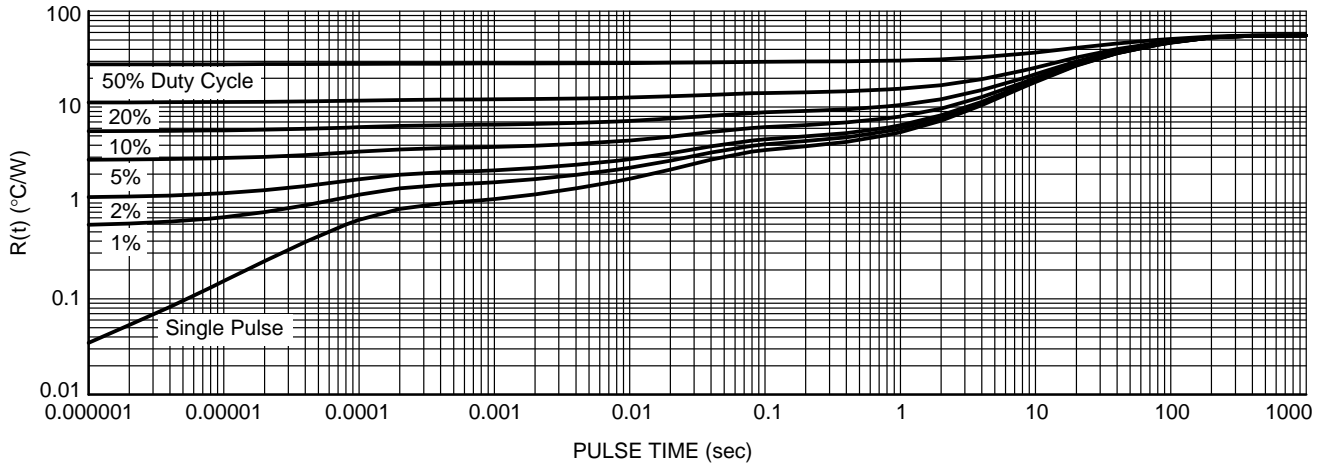
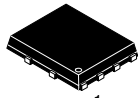


Figure 9. Thermal Response

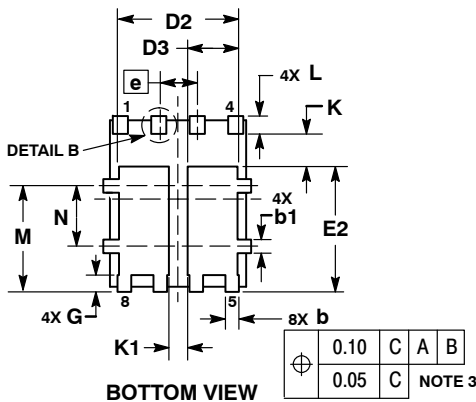
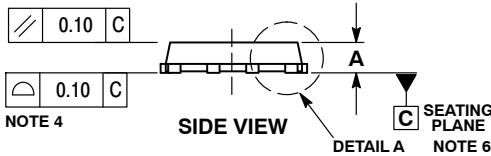
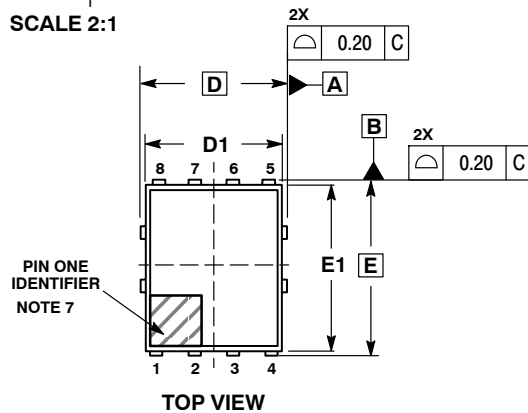
# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



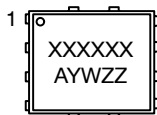
SCALE 2:1

## DFN8 5x6, 1.27P Dual Flag (SO8FL-Dual) CASE 506BT ISSUE F

DATE 23 NOV 2021



### GENERIC MARKING DIAGRAM\*

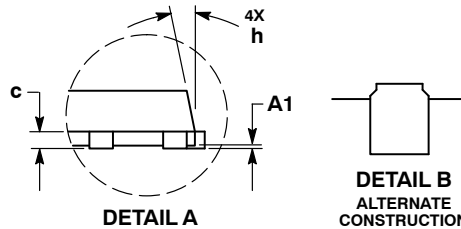


XXXXXX = Specific Device Code  
A = Assembly Location  
Y = Year  
W = Work Week  
ZZ = Lot Traceability

\*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.

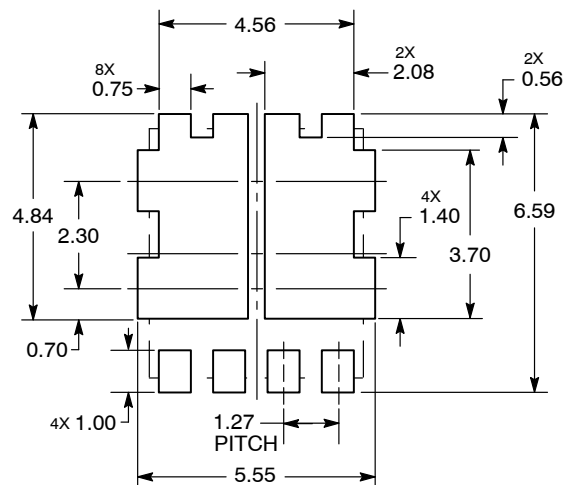
#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 MM FROM THE TERMINAL TIP.
4. PROFILE TOLERANCE APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.
5. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
6. SEATING PLANE IS DEFINED BY THE TERMINALS. A1 IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.
7. A VISUAL INDICATOR FOR PIN 1 MUST BE LOCATED IN THIS AREA.



DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.90	---	1.10
A1	---	---	0.05
b	0.33	0.42	0.51
b1	0.33	0.42	0.51
c	0.20	---	0.33
D	5.15 BSC		
D1	4.70	4.90	5.10
D2	3.90	4.10	4.30
D3	1.50	1.70	1.90
E	6.15 BSC		
E1	5.70	5.90	6.10
E2	3.90	4.15	4.40
e	1.27 BSC		
G	0.45	0.55	0.65
h	---	---	12 °
K	0.51	---	---
K1	0.56	---	---
L	0.48	0.61	0.71
M	3.25	3.50	3.75
N	1.80	2.00	2.20

### SOLDERING FOOTPRINT\*



DIMENSION: MILLIMETERS

\*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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DESCRIPTION:	DFN8 5X6, 1.27P DUAL FLAG (SO8FL-DUAL)	PAGE 1 OF 1

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