

# ON Semiconductor

## Is Now

The logo for onsemi, featuring the word "onsemi" in a dark teal, lowercase, sans-serif font. The letter "i" is stylized with a white dot and a teal vertical bar. A small orange triangle is positioned above the top right of the "i". A trademark symbol (TM) is located to the right of the logo.

To learn more about onsemi™, please visit our website at  
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# Schottky Barrier Rectifier

## MBR8170TFS

This Schottky rectifier is high performance device in  $\mu 8$ -FL package. The lower forward voltage, less leakage current, and small junction capacitance are suitable to high switching frequency high density DC to DC conversion application. Offering higher avalanche energy capability for Oring or reverse protection application. The  $\mu 8$ -FL package provides an excellent thermal performance, less land area of board space, and low profile.

### Features

- Lower Forward Voltage Drop
- Less Leakage Current in High Temperature
- Small Junction Capacitance for High Switching Frequency
- Higher Avalanche Energy Capability
- 175°C Operating Junction Temperature
- Good Alternative Solution of SMA and SMB Package
- Small Footprint – Land Area: 12.5 mm<sup>2</sup>
- Low Profile – Maximum Height of 1.1 mm
- 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

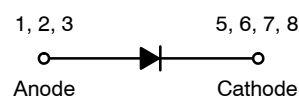
- High Switching Frequency DC/DC Converter
- 2<sup>nd</sup> Rectifier
- Freewheeling Diode used with Inductive Load
- Oring / Reverse Protection



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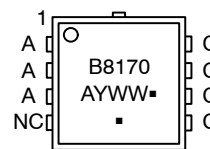
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## SCHOTTKY RECTIFIER 8 AMPERE 170 VOLTS



**WDFN8**  
( $\mu 8$ FL)  
CASE 511AB  
FLAT LEAD

### MARKING DIAGRAM



B8170 = 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 <sup>†</sup>                |
|---------------|--------------------|--------------------------------------|
| MBR8170TFSTAG | WDFN8<br>(Pb-Free) | 1500/Tape & Reel<br>Pin1 Upper Left  |
| MBR8170TFSTWG | WDFN8<br>(Pb-Free) | 5000/Tape & Reel<br>Pin1 Upper Left  |
| MBR8170TFSTBG | WDFN8<br>(Pb-Free) | 1500/Tape & Reel<br>Pin1 Upper Right |
| MBR8170TFSTXG | WDFN8<br>(Pb-Free) | 5000/Tape & Reel<br>Pin1 Upper Right |

<sup>†</sup>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.

# MBR8170TFS

## 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>$V_R$ | 170         | V                |
| Continuous Forward Current ( $T_C = 162^\circ\text{C}$ , DC)                           | $I_{F(DC)}$                     | 8           | A                |
| Peak Repetitive Forward Current ( $T_C = 159^\circ\text{C}$ , Square Wave, Duty = 0.5) | $I_{FRM}$                       | 16          | A                |
| Non-Repetitive Peak Surge Current  | Sinusoidal Halfwave, 8.3 ms     | $I_{FSM}$   | 140              |
|  | Square wave, 1 ms               |             | 200              |
|  | Square wave, 100 $\mu\text{s}$  |             | 330              |
| Non-Repetitive Avalanche Energy ( $T_J = 25^\circ\text{C}$ )                           | $E_{AS}$                        | 72          | mJ               |
| Storage Temperature Range  | $T_{stg}$                       | -65 to +175 | $^\circ\text{C}$ |
| Operating Junction Temperature Range (Note 1)  | $T_J$                           | -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.

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

The reliability may be affected by leakage current when device operates near to rated voltage and maximum junction temperature.

## THERMAL CHARACTERISTICS

| Characteristic   | Symbol           | Max | Unit                      |
|--|------------------|-----|---------------------------|
| Thermal Resistance, Junction-to-Ambient (Note 2)               | $R_{\theta JA}$  | 70  | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Case Bottom (Note 2)           | $R_{\theta JCB}$ | 2.4 | $^\circ\text{C}/\text{W}$ |
| Thermal Characterization, Junction-to-Case Top (Note 2)        | $\psi_{JCT}$     | 4.3 | $^\circ\text{C}/\text{W}$ |
| Thermal Characterization, Junction-to-Lead of Cathode (Note 2) | $\psi_{JLC}$     | 2.5 | $^\circ\text{C}/\text{W}$ |

2. Assume 600 mm<sup>2</sup>, 1 oz. copper bond pad on a FR4 board.

## ELECTRICAL CHARACTERISTICS

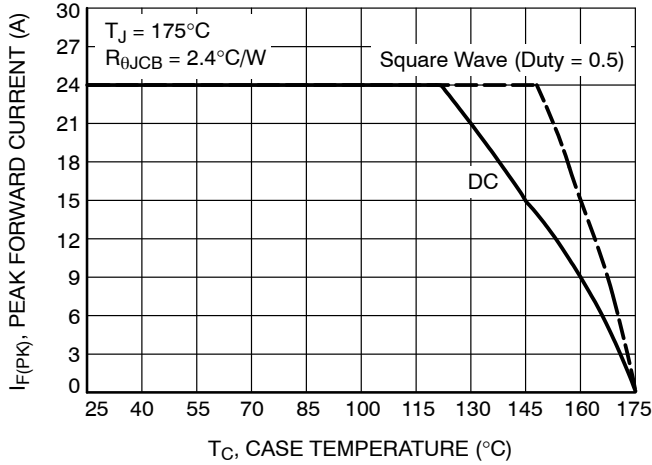
| Characteristic  | Symbol | Typ  | Max  | Unit          |
|---|--------|------|------|---------------|
| Instantaneous Forward Voltage<br>( $I_F = 4\text{ A}$ , $T_J = 25^\circ\text{C}$ )<br>( $I_F = 4\text{ A}$ , $T_J = 125^\circ\text{C}$ )<br>( $I_F = 8\text{ A}$ , $T_J = 25^\circ\text{C}$ )<br>( $I_F = 8\text{ A}$ , $T_J = 125^\circ\text{C}$ ) | $V_F$  | 0.76 | -    | V             |
|   |        | 0.61 | -    |               |
|   |        | 0.82 | 0.89 |               |
|   |        | 0.68 | 0.73 |               |
| Instantaneous Reverse Current<br>( $V_R = \text{Rated DC Voltage}$ , $T_J = 25^\circ\text{C}$ )<br>( $V_R = \text{Rated DC Voltage}$ , $T_J = 125^\circ\text{C}$ )  | $I_R$  | 0.2  | 30   | $\mu\text{A}$ |
|   |        | 0.3  | 2    | mA            |
| Junction Capacitance<br>( $V_R = 1\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ )  | $C_J$  | 237  | -    | 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.

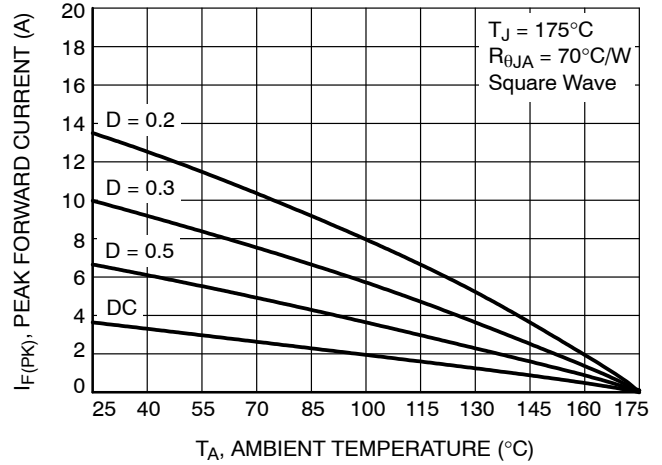
3. Pulse Test: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

# MBR8170TFS

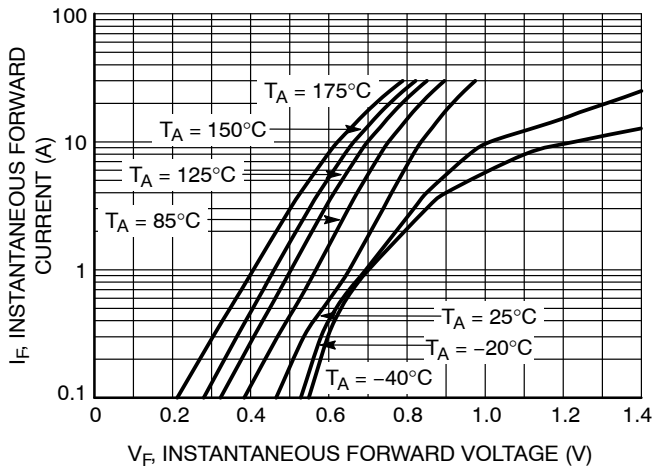
## TYPICAL CHARACTERISTICS



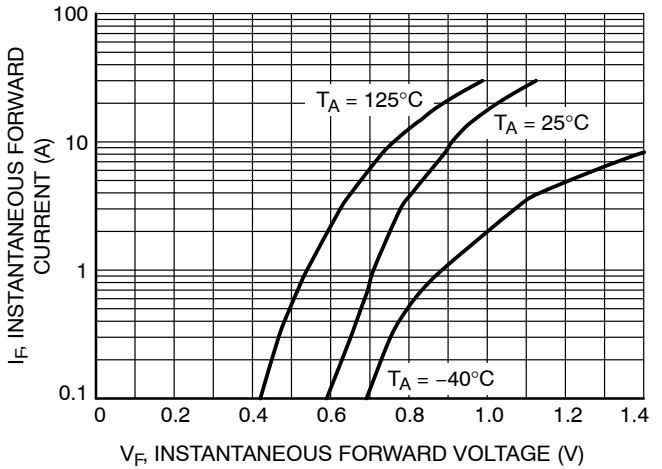
**Figure 1. Forward Current Derating of Case Temperature**



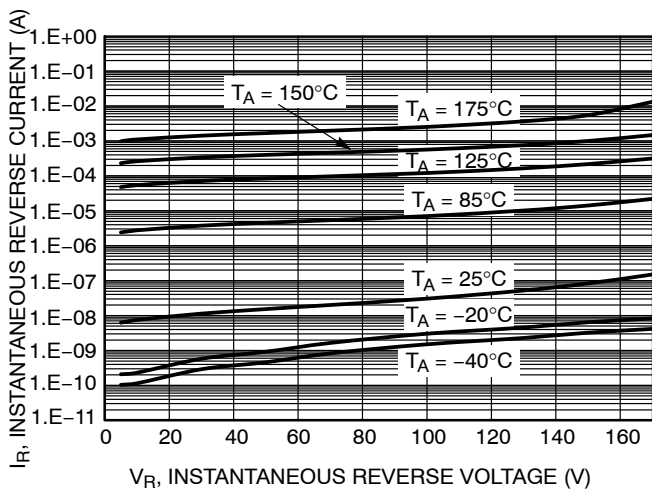
**Figure 2. Forward Current Derating of Ambient Temperature**



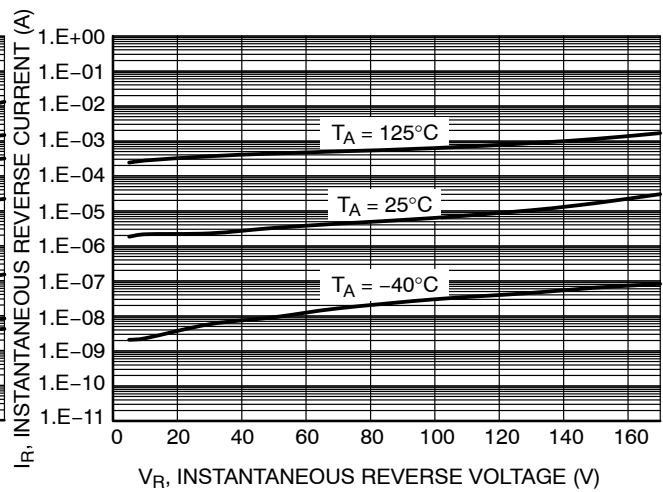
**Figure 3. Typical Forward Characteristics**



**Figure 4. Maximum Forward Characteristics**



**Figure 5. Typical Reverse Characteristics**



**Figure 6. Maximum Reverse Characteristics**

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## TYPICAL CHARACTERISTICS

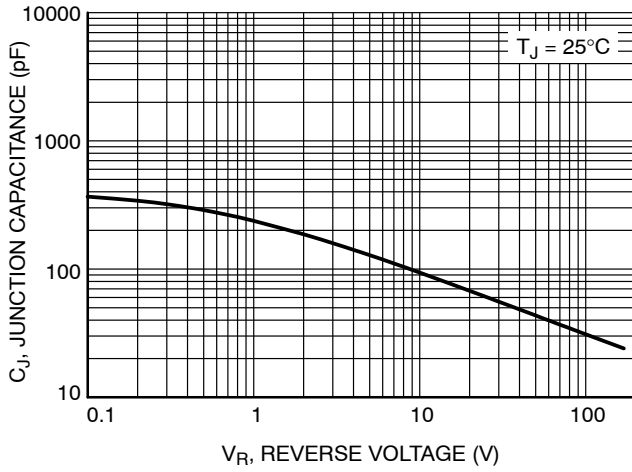


Figure 7. Typical Junction Capacitance

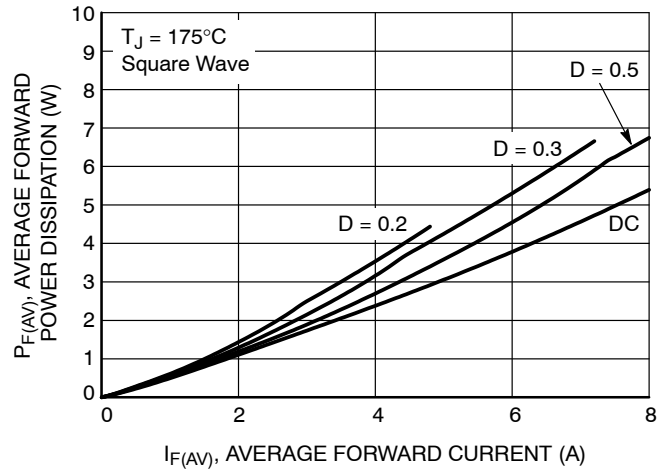


Figure 8. Average Forward Power Dissipation

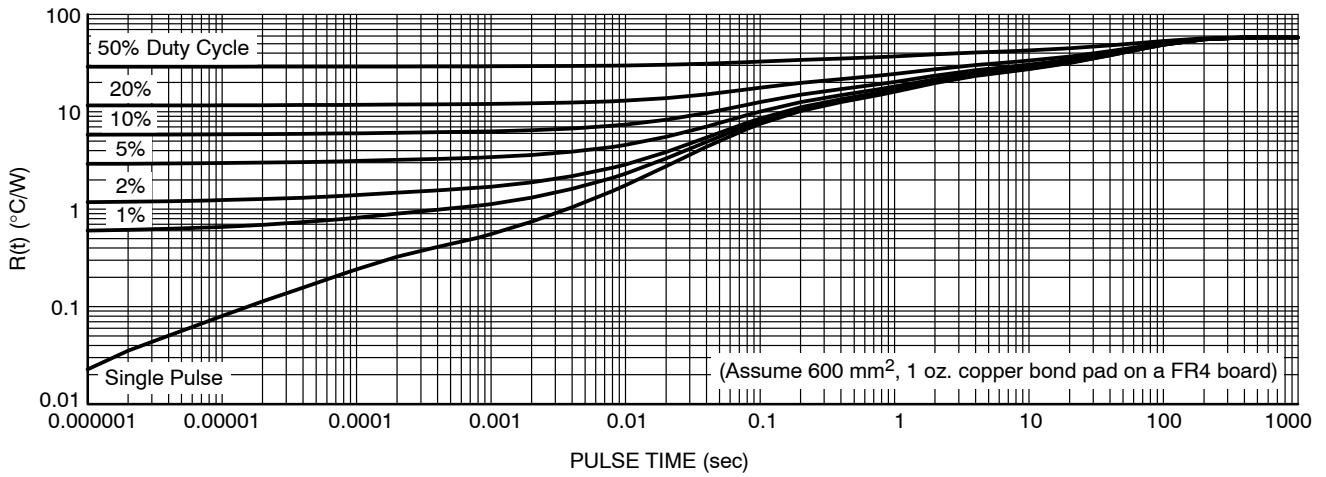
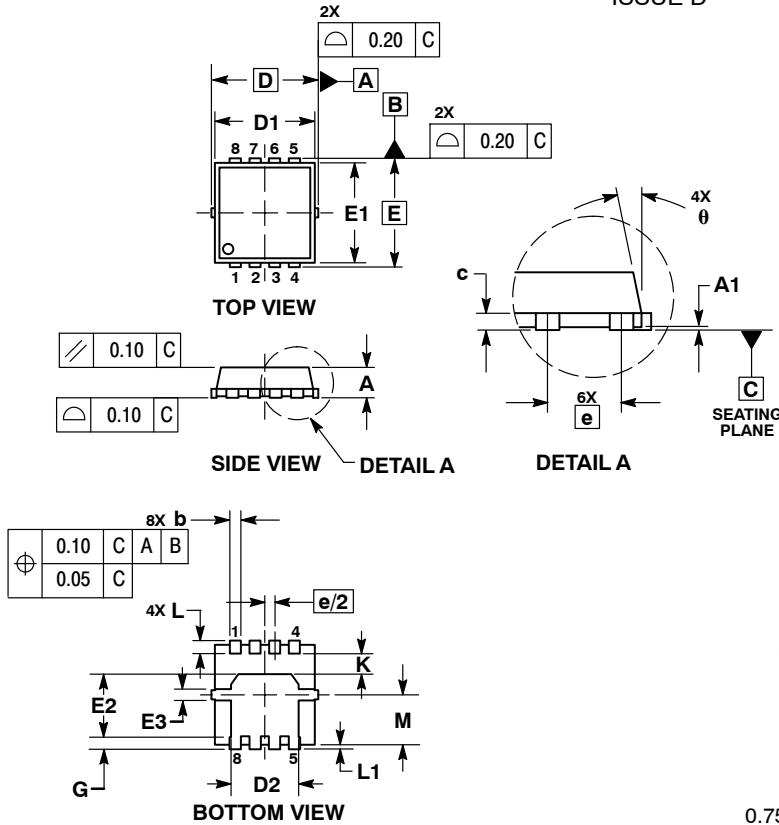


Figure 9. Typical Thermal Characteristics, Junction-to-Ambient

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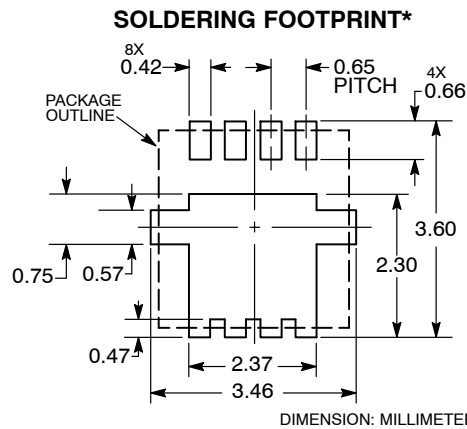
## PACKAGE DIMENSIONS

WDFN8 3.3x3.3, 0.65P  
CASE 511AB  
ISSUE D



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
  2. CONTROLLING DIMENSION: MILLIMETERS.
  3. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

| DIM | MILLIMETERS |      |      | INCHES    |       |       |
|-----|-------------|------|------|-----------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN       | NOM   | MAX   |
| A   | 0.70        | 0.75 | 0.80 | 0.028     | 0.030 | 0.031 |
| A1  | 0.00        | ---  | 0.05 | 0.000     | ---   | 0.002 |
| b   | 0.23        | 0.30 | 0.40 | 0.009     | 0.012 | 0.016 |
| c   | 0.15        | 0.20 | 0.25 | 0.006     | 0.008 | 0.010 |
| D   | 3.30 BSC    |      |      | 0.130 BSC |       |       |
| D1  | 2.95        | 3.05 | 3.15 | 0.116     | 0.120 | 0.124 |
| D2  | 1.98        | 2.11 | 2.24 | 0.078     | 0.083 | 0.088 |
| E   | 3.30 BSC    |      |      | 0.130 BSC |       |       |
| E1  | 2.95        | 3.05 | 3.15 | 0.116     | 0.120 | 0.124 |
| E2  | 1.47        | 1.60 | 1.73 | 0.058     | 0.063 | 0.068 |
| E3  | 0.23        | 0.30 | 0.40 | 0.009     | 0.012 | 0.016 |
| e   | 0.65 BSC    |      |      | 0.026 BSC |       |       |
| G   | 0.30        | 0.41 | 0.51 | 0.012     | 0.016 | 0.020 |
| K   | 0.65        | 0.80 | 0.95 | 0.026     | 0.032 | 0.037 |
| L   | 0.30        | 0.43 | 0.56 | 0.012     | 0.017 | 0.022 |
| L1  | 0.06        | 0.13 | 0.20 | 0.002     | 0.005 | 0.008 |
| M   | 1.40        | 1.50 | 1.60 | 0.055     | 0.059 | 0.063 |
| θ   | 0 °         | ---  | 12 ° | 0 °       | ---   | 12 °  |



\*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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