



## VOIDLESS-HERMETICALLY SEALED SURFACE MOUNT FAST RECOVERY GLASS RECTIFIERS

*Qualified per MIL-PRF-19500/411*

Qualified Levels:  
JAN, JANTX, JANTXV  
and JANS

## DESCRIPTION

This “fast recovery” rectifier diode series is military qualified and is ideal for high-reliability applications where a failure cannot be tolerated. These industry-recognized 3.0 amp rated rectifiers for working peak reverse voltages from 50 to 600 volts are hermetically sealed with voidless-glass construction using an internal “*Category 1*” metallurgical bond. These devices are also available in axial-leaded packages for thru-hole mounting. Microsemi also offers numerous other rectifier products to meet higher and lower current ratings with various recovery time speed requirements including fast and ultrafast device types in both through-hole and surface mount packages.

**Important:** For the latest information, visit our website <http://www.microsemi.com>.

## FEATURES

- Surface mount equivalent of JEDEC registered 1N5415 thru 1N5420 series.
- Voidless hermetically sealed glass package.
- Quadruple-layer passivation.
- Internal “*Category 1*” metallurgical bonds.
- Working peak reverse voltage 50 to 600 volts.
- JAN, JANTX, JANTXV and JANS qualifications available per MIL-PRF-19500/411.
- RoHS compliant versions available (commercial grade only).

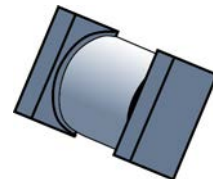
## APPLICATIONS / BENEFITS

- Fast recovery 3 amp 50 to 600 volt rectifiers.
- Military and other high-reliability applications.
- General rectifier applications including bridges, half-bridges, catch diodes, etc.
- High forward surge current capability.
- Extremely robust construction.
- Low thermal resistance.
- Controlled avalanche with peak reverse power capability.
- Inherently radiation hard as described in Microsemi “[MicroNote 050](#)”.

## MAXIMUM RATINGS

| Parameters/Test Conditions   | Symbol                        | Value                                  | Unit                 |
|--|-------------------------------|--|----------------------|
| Junction and Storage Temperature   | $T_J$ and $T_{STG}$           | -65 to +175                            | $^{\circ}\text{C}$   |
| Thermal Resistance Junction-to-End Cap   | $R_{\theta JEC}$              | 6.5                                    | $^{\circ}\text{C/W}$ |
| Forward Surge Current @ 8.3 ms half-sine   | $I_{FSM}$                     | 80                                     | A                    |
| Average Rectified Forward Current <sup>(3)</sup> @ $T_A = +55^{\circ}\text{C}$<br>$^{\circ}\text{C}$ @ $T_A = +100$  | $I_O^{(1, 2)}$<br>$I_O^{(2)}$ | 3<br>2                                 | A                    |
| Working Peak Reverse Voltage<br>1N5415US<br>1N5416US<br>1N5417US<br>1N5418US<br>1N5419US<br>1N5420US                 | $V_{RWM}$                     | 50<br>100<br>200<br>400<br>500<br>600  | V                    |
| Maximum Reverse Recovery Time <sup>(5)</sup><br>1N5415US<br>1N5416US<br>1N5417US<br>1N5418US<br>1N5419US<br>1N5420US | $t_{rr}$                      | 150<br>150<br>150<br>150<br>250<br>400 | ns                   |
| Solder Temperature @ 10 s  | $T_{SP}$                      | 260                                    | $^{\circ}\text{C}$   |

**See notes on next page.**



## “B” SQ-MELF (D-5B) Package

Also available in:

**“B” Package**  
(axial-leaded)



**1N5415 – 1N5420**

## MSC – Lawrence

6 Lake Street,  
Lawrence, MA 01841  
Tel: 1-800-446-1158 or  
(978) 620-2600  
Fax: (978) 689-0803

## MSC – Ireland

**Gort Road Business Park,  
Ennis, Co. Clare, Ireland**  
Tel: +353 (0) 65 6840044  
Fax: +353 (0) 65 6822298

**Website:**

[www.microsemi.com](http://www.microsemi.com)

## MAXIMUM RATINGS

- Notes:**
1. Derate linearly at 22 mA/°C for  $55^{\circ}\text{C} \leq T_A \leq 100^{\circ}\text{C}$ .
  2. Above  $T_A = 100^{\circ}\text{C}$ , derate linearly at 26.7 mA/°C to zero at  $T_A = 175^{\circ}\text{C}$ .
  3. These ambient ratings are for PC boards where thermal resistance from mounting point to ambient is sufficiently controlled where  $T_{J(\text{max})}$  does not exceed  $175^{\circ}\text{C}$ .

## MECHANICAL and PACKAGING

- CASE: Hermetically sealed voidless hard glass with tungsten slugs.
- TERMINALS: End caps are copper with tin/lead (Sn/Pb) finish. Note: Previous inventory had solid silver with tin/lead (Sn/Pb) finish. RoHS compliant matte-tin is available for commercial grade only.
- MARKING: Cathode band only.
- POLARITY: Cathode indicated by band.
- TAPE & REEL option: Standard per EIA-481-B. Contact factory for quantities.
- WEIGHT: 539 milligrams.
- See [Package Dimensions](#) and recommended [Pad Layout](#) on last page.

## PART NOMENCLATURE

**JAN 1N5415 US (e3)**

### Reliability Level

JAN = JAN Level  
JANTX = JANTX Level  
JANTXV = JANTXV Level  
JANS = JANS Level  
Blank = commercial

### JEDEC type number

See [Electrical Characteristics](#) table

### RoHS Compliance

e3 = RoHS compliant ([available on commercial grade only](#))  
Blank = non-RoHS compliant

### MELF Package

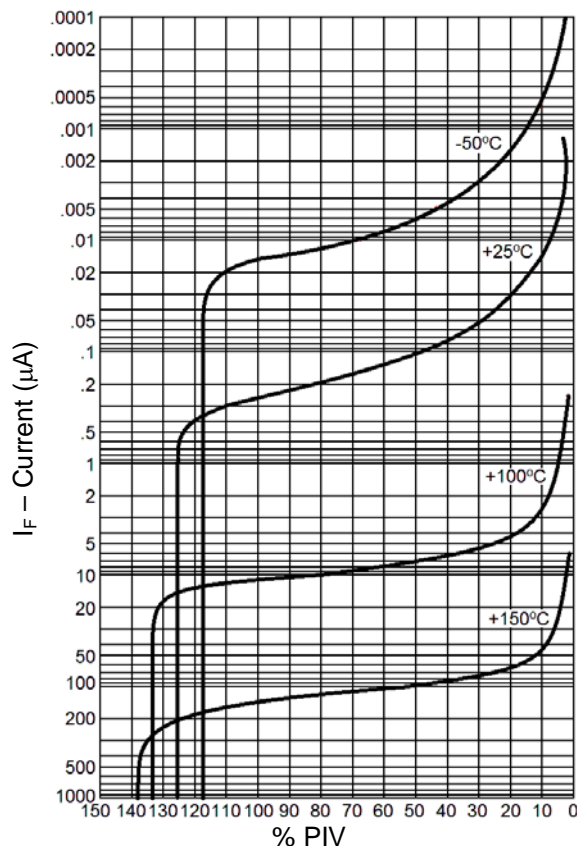
## SYMBOLS & DEFINITIONS

| Symbol    | Definition  |
|-----------|---|
| $V_{BR}$  | Minimum Breakdown Voltage: The minimum voltage the device will exhibit at a specified current.  |
| $V_{RWM}$ | Working Peak Reverse Voltage: The maximum peak voltage that can be applied over the operating temperature range excluding all transient voltages (ref JESD282-B).   |
| $I_O$     | Average Rectified Output Current: The Output Current averaged over a full cycle with a 50 Hz or 60 Hz sine-wave input and a 180 degree conduction angle.  |
| $V_F$     | Maximum Forward Voltage: The maximum forward voltage the device will exhibit at a specified current.  |
| $I_R$     | Maximum Reverse Current: The maximum reverse (leakage) current that will flow at the specified voltage and temperature.   |
| $t_{rr}$  | Reverse Recovery Time: The time interval between the instant the current passes through zero when changing from the forward direction to the reverse direction and a specified decay point after a peak reverse current occurs. |

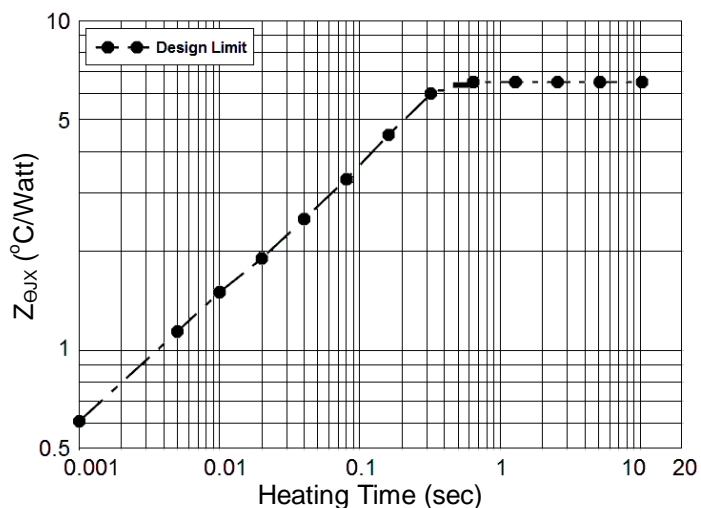
**ELECTRICAL CHARACTERISTICS**

| TYPE     | MINIMUM<br>BREAKDOWN<br>VOLTAGE | FORWARD<br>VOLTAGE |               | MAXIMUM<br>REVERSE<br>CURRENT |                   | CAPACITANCE<br>C |
|----------|---------------------------------|--------------------|---------------|-------------------------------|-------------------|------------------|
|          | $V_{BR} @ 50 \mu A$             | $V_F @ 9 A$        |               | $I_R @ V_{RWM}$               |                   | $V_R @ 4 V$      |
|          | Volts                           | MIN.<br>Volts      | MAX.<br>Volts | 25 °C<br>$\mu A$              | 100 °C<br>$\mu A$ | pF               |
| 1N5415US | 55                              | 0.6                | 1.5           | 1.0                           | 20                | 550              |
| 1N5416US | 110                             | 0.6                | 1.5           | 1.0                           | 20                | 430              |
| 1N5417US | 220                             | 0.6                | 1.5           | 1.0                           | 20                | 250              |
| 1N5418US | 440                             | 0.6                | 1.5           | 1.0                           | 20                | 165              |
| 1N5419US | 550                             | 0.6                | 1.5           | 1.0                           | 20                | 140              |
| 1N5420US | 660                             | 0.6                | 1.5           | 1.0                           | 20                | 120              |

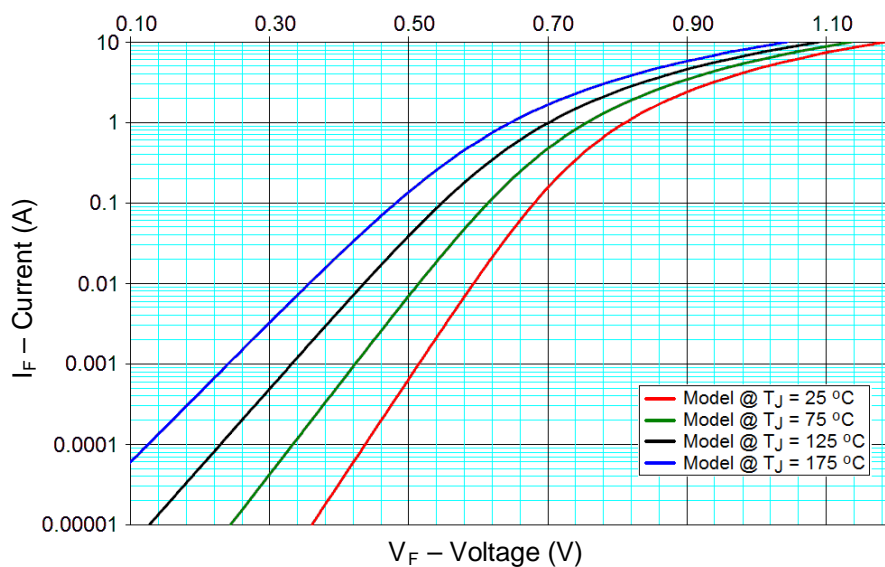
**NOTE 1:**  $I_F = 0.5 A$ ,  $I_{RM} = 1 A$ ,  $I_{R(REC)} = 0.250 A$ .

**GRAPHS**


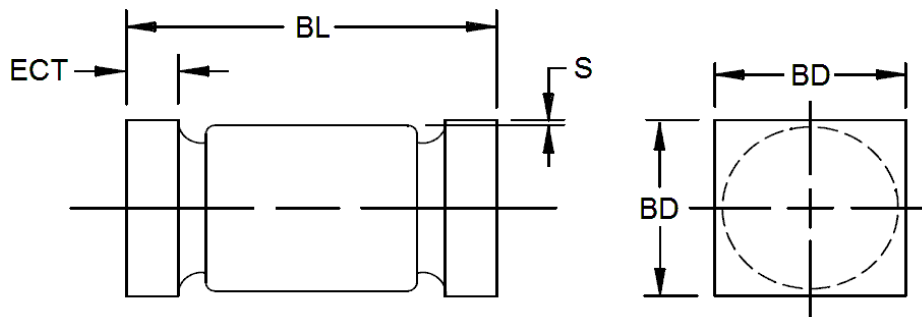
**FIGURE 1**  
Typical Reverse Current vs. PIV



**FIGURE 2**  
Maximum Thermal Impedance



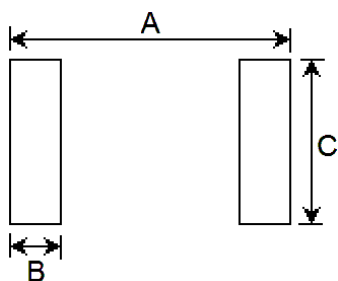
**FIGURE 3**  
Typical Forward Current vs. Forward Voltage

**PACKAGE DIMENSIONS**


|            | INCH  |       | MILLIMETERS |      |
|------------|-------|-------|-------------|------|
|            | MIN   | MAX   | MIN         | MAX  |
| <b>BL</b>  | 0.200 | 0.225 | 5.08        | 5.72 |
| <b>BD</b>  | 0.137 | 0.148 | 3.48        | 3.76 |
| <b>ECT</b> | 0.019 | 0.028 | 0.48        | 0.71 |
| <b>S</b>   | 0.003 | ---   | 0.08        | ---  |

**NOTES:**

1. Dimensions are in inches.
2. Millimeter equivalents are given for general information only.
3. Dimensions are pre-solder dip.
4. Minimum clearance of glass body to mounting surface on all orientations.
5. In accordance with ASME Y14.5M, diameters are equivalent to  $\Phi$ x symbology.
6. This package outline has also previously been identified as "D-5B".

**PAD LAYOUT**


|          | INCH  | MILLIMETERS |
|----------|-------|-------------|
| <b>A</b> | 0.288 | 7.32        |
| <b>B</b> | 0.070 | 1.78        |
| <b>C</b> | 0.155 | 3.94        |

**Note:** If mounting requires adhesive separate from the solder, an additional 0.080 inch diameter contact may be placed in the center between the pads as an optional spot for cement.

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[JANTX1N5415US](#) [1N5416US](#) [JANTX1N5419US](#) [JANTX1N5417US](#) [JANTXV1N5415US](#) [JAN1N5415US/TR](#)  
[JAN1N5419US/TR](#) [JANTXV1N5418US/TR](#) [JAN1N5418US/TR](#) [JANTXV1N5417US/TR](#) [JANS1N5415US/TR](#)  
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