



## High Voltage Stack

### DESCRIPTION

This 688 high voltage stack device is constructed utilizing individual voidless glass packages with an epoxy filled plastic casing. Add suffix R for fast recovery trr of 500 ns maximum. Microsemi also offers numerous other products to meet higher and lower power voltage regulation applications.

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

### FEATURES

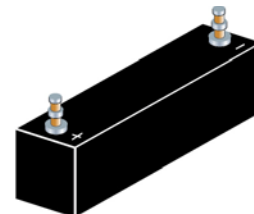
- Current ratings to 0.6 amps
- $V_{RWM}$  from 10 kV to 25 kV (see [part nomenclature](#) for all options)
- 150 °C junction temperature
- Surge ratings to 20 amps
- Bonded plate for maximum heat transfer mounting
- MIL-PRF-19500 similarity
- RoHS compliant versions available

### APPLICATIONS / BENEFITS

- Fused-in voidless glass diode design
- Controlled avalanche characteristics

### MAXIMUM RATINGS

| Parameters/Test Conditions                                    | Symbol              | Value                                        | Unit |
|---------------------------------------------------------------|---------------------|----------------------------------------------|------|
| Junction and Storage Temperature                              | $T_J$ and $T_{STG}$ | -65 to +150                                  | °C   |
| Thermal Resistance Junction-to-Case                           | $R_{\theta JC}$     | 10                                           | °C/W |
| Thermal Resistance Junction-to-Case per package               | $R_{\theta JC}$     | 25                                           | °C/W |
| Forward Surge Current (Peak):<br>@ $T_C = 25\text{ °C}$       | $I_{FSM}$           | 20                                           | A    |
| Maximum Average DC Output Current:<br>@ $T_C = 100\text{ °C}$ | $I_O$               | 0.60<br>0.50<br>0.40<br>0.35<br>0.30<br>0.20 | A    |
| Solder Temperature @ 10 s                                     |                     | 260                                          | °C   |



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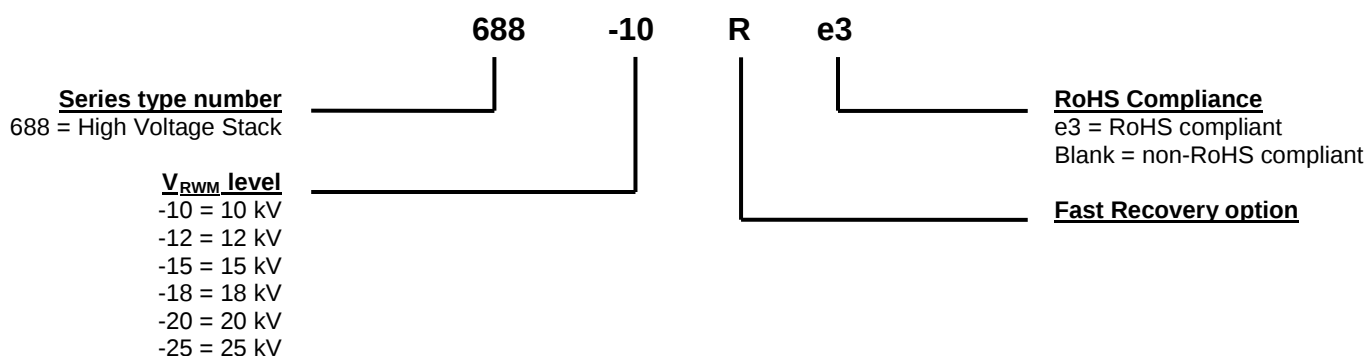
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**MECHANICAL and PACKAGING**

- CASE: Plastic filled with epoxy
- TERMINALS: Gold (Ag) plate over brass with a tin/lead (Sn/Pb) finish or RoHS compliant matte tin
- MARKING: Anode and cathode marked next to terminal along with part number and date code in center of device
- MOUNTING: Taped 10-32 screw inserts on bottom side that are brass
- WEIGHT: 70 grams (typical)
- See [Package Dimensions](#) on last page.

**PART NOMENCLATURE**

**SYMBOLS & DEFINITIONS**

| Symbol    | Definition                                                                                                                                                                                                                      |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $I_{FSM}$ | Maximum Forward Surge Current: The forward current, surge peak or rated forward surge current.                                                                                                                                  |
| $I_O$     | Average Rectified Forward 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.                                                                       |
| $V_{FM}$  | Maximum Forward Voltage: The maximum forward voltage the device will exhibit at a specified current.                                                                                                                            |
| $I_{RM}$  | Maximum Reverse Current: The maximum reverse (leakage) current that will flow at the specified voltage and temperature.                                                                                                         |
| $V_{RWM}$ | Working Peak Reverse Voltage: The peak voltage excluding all transient voltages (ref JESD282-B). Also sometimes known historically as PIV.                                                                                      |
| $t_{rr}$  | 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. |

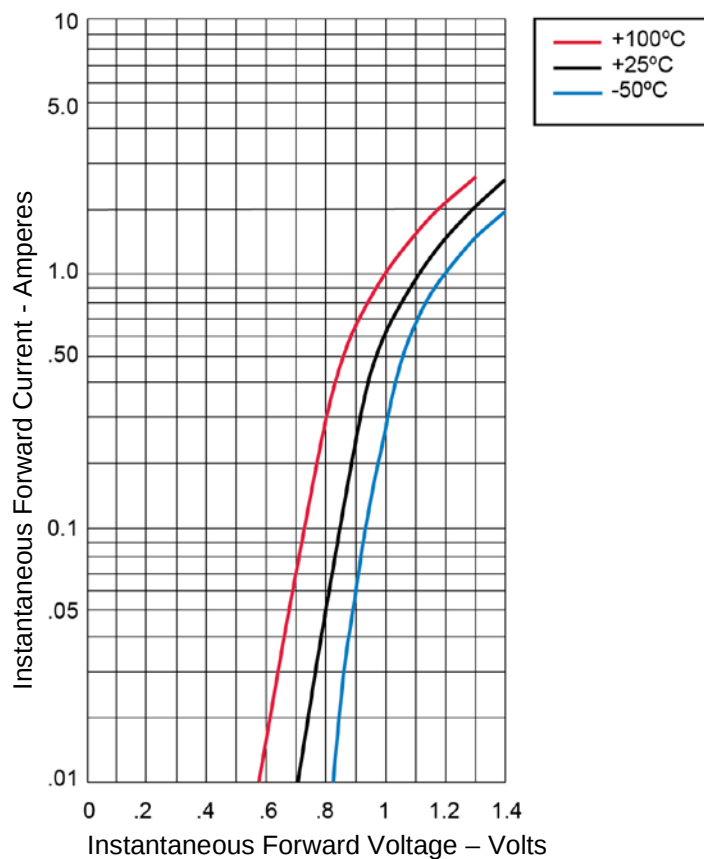
**ELECTRICAL CHARACTERISTICS**

| PART<br>NUMBER<br>(Note 1) | WORKING<br>PEAK<br>REVERSE<br>VOLTAGE<br>$V_{RWM}$ | MINIMUM<br>BREAKDOWN<br>VOLTAGE<br>$V_{(BR)}$ | MAX FORWARD<br>VOLTAGE<br>PER LEG<br>$V_{FM}$<br>(Note 2) | MAX REVERSE<br>PEAK CURRENT<br>$I_{RM}$ @ $V_{RWM}$ |          |
|----------------------------|----------------------------------------------------|-----------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------|----------|
|                            |                                                    |                                               | @ 25 °C                                                   | @ 25 °C                                             | @ 100 °C |
|                            | kV                                                 | kV                                            | Volts                                                     | $\mu A$                                             | $\mu A$  |
| 688-10(R)                  | 10                                                 | 11.0                                          | 17 @ 0.4 A                                                | 2                                                   | 100      |
| 688-12(R)                  | 12                                                 | 13.2                                          | 20 @ 0.4 A                                                | 2                                                   | 100      |
| 688-15(R)                  | 15                                                 | 16.5                                          | 25 @ 0.4 A                                                | 2                                                   | 100      |
| 688-18(R)                  | 18                                                 | 19.8                                          | 30 @ 0.4 A                                                | 2                                                   | 100      |
| 688-20(R)                  | 20                                                 | 22.0                                          | 34 @ 0.4 A                                                | 2                                                   | 100      |
| 688-25(R)                  | 25                                                 | 27.5                                          | 42 @ 0.4 A                                                | 2                                                   | 100      |

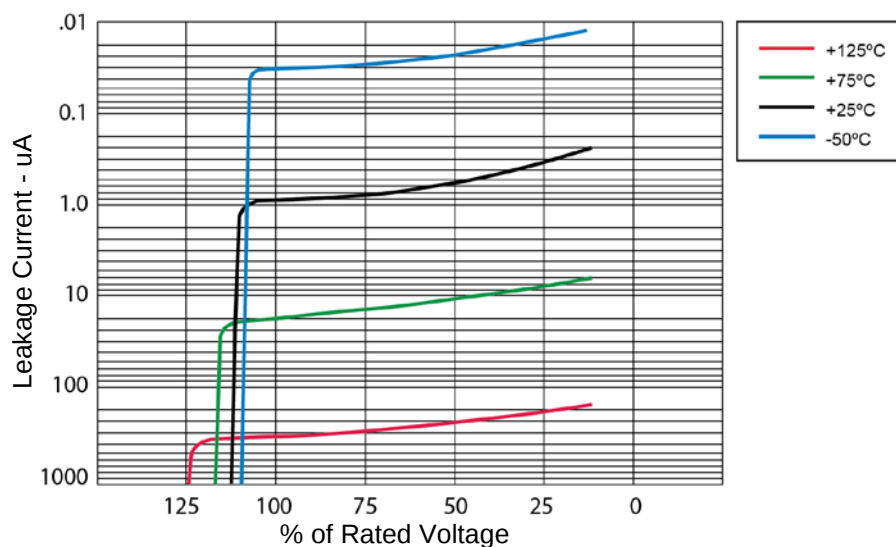
**NOTES:** 1. Add suffix R for fast recovery with a  $t_{rr}$  of 500 ns maximum (test conditions of  $I_F = 10$  mA,  $I_{RM} = 10$  mA,  $I_{R(REC)} = 5$  mA).

2. Pulse test: Pulse width 300  $\mu$ sec, duty cycle 2%.

# GRAPHS

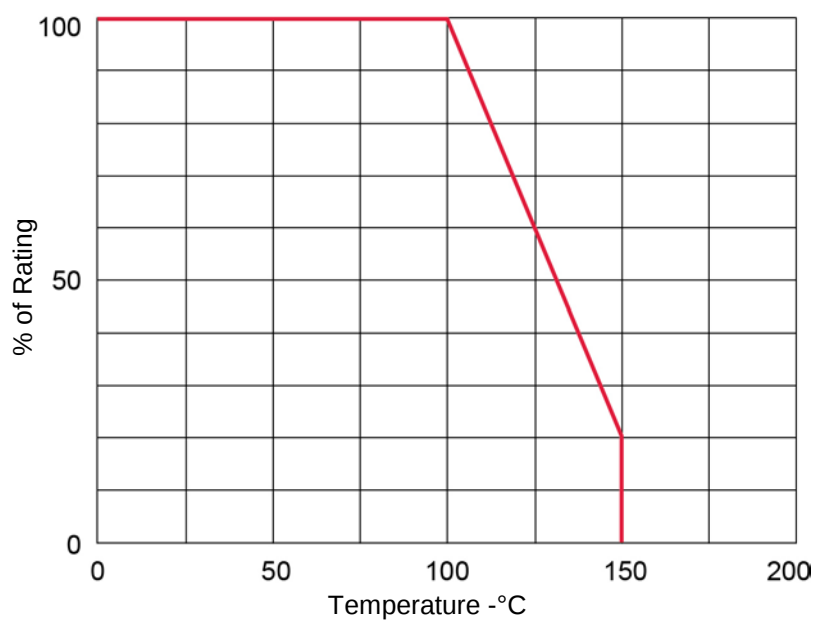


**FIGURE 1**  
Thermal Impedance

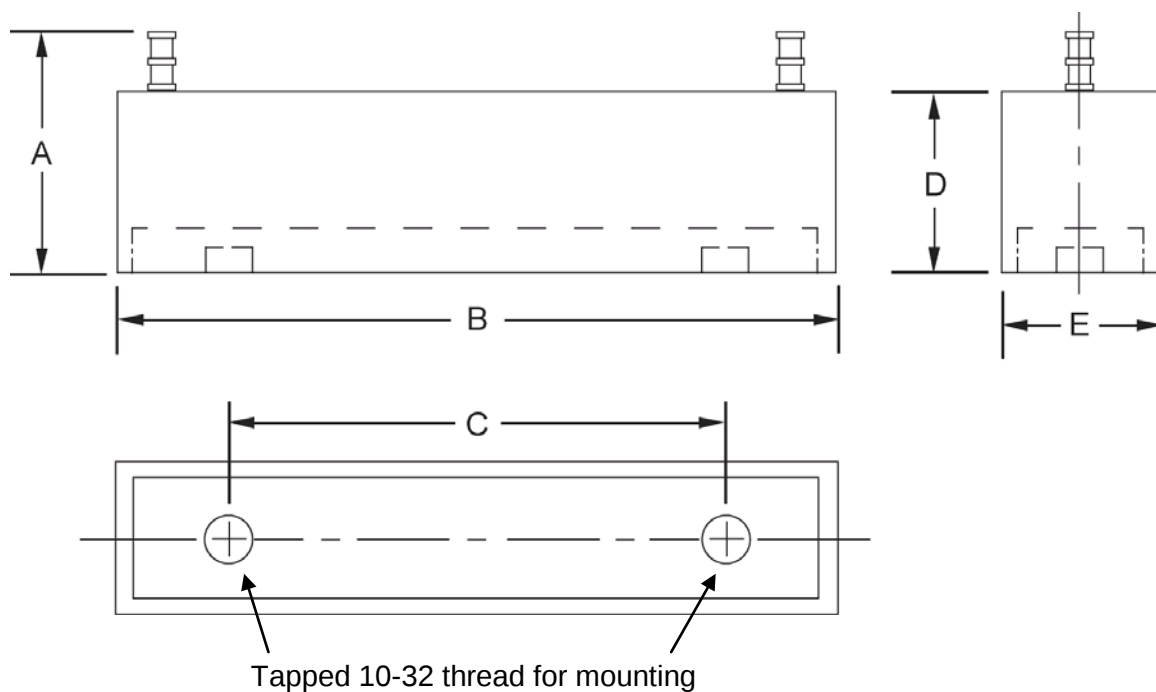


**FIGURE 2**  
Typical Reverse Leakage Current

## GRAPHS (continued)



**FIGURE 3**  
Current Derating

**PACKAGE DIMENSIONS**


| Ltr | Dimensions |       |             |       |
|-----|------------|-------|-------------|-------|
|     | Inches     |       | Millimeters |       |
|     | Min        | Max   | Min         | Max   |
| A   | -          | 1.140 | -           | 28.96 |
| B   | 2.985      | 3.015 | 75.82       | 76.58 |
| C   | 2.110      | 2.140 | 53.59       | 54.36 |
| D   | 0.740      | 0.770 | 18.80       | 19.56 |
| E   | 0.720      | 0.750 | 18.29       | 19.05 |