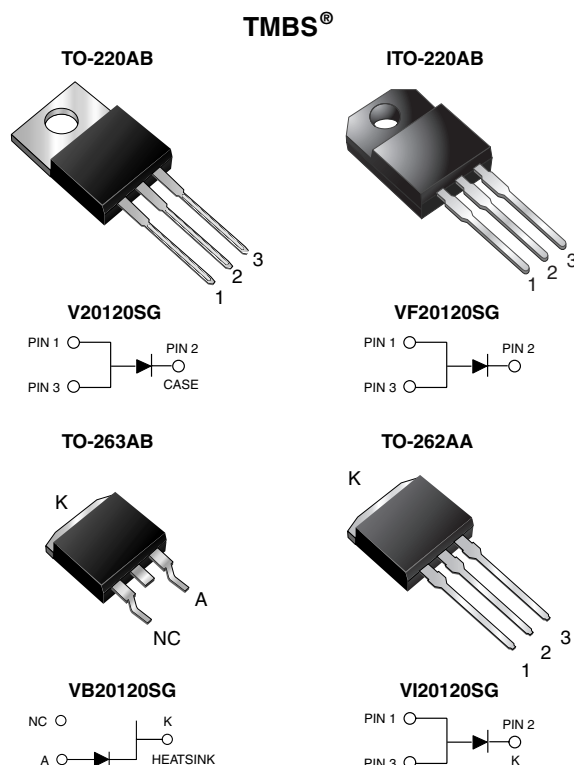




# V20120SG, VF20120SG, VB20120SG & VI20120SG

Vishay General Semiconductor

## High-Voltage Trench MOS Barrier Schottky Rectifier

Ultra Low  $V_F = 0.54 \text{ V}$  at  $I_F = 5 \text{ A}$ 

### FEATURES

- Trench MOS Schottky technology
- Low forward voltage drop, low power losses
- High efficiency operation
- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C (for TO-263AB package)
- Solder bath temperature 275 °C maximum, 10 s, per JESD 22-B106 (for TO-220AB, ITO-220AB, and TO-262AA package)
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC


**RoHS**  
COMPLIANT

### TYPICAL APPLICATIONS

For use in high frequency converters, switching power supplies, freewheeling diodes, OR-ing diode, dc-to-dc converters and reverse battery protection.

### MECHANICAL DATA

**Case:** TO-220AB, ITO-220AB, TO-263AB and TO-262AA

Molding compound meets UL 94 V-0 flammability rating

Base P/N-E3 - RoHS compliant, commercial grade

**Terminals:** Matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

E3 suffix meets JESD 201 class 1A whisker test

**Polarity:** As marked

**Mounting Torque:** 10 in-lbs maximum

### PRIMARY CHARACTERISTICS

|                               |        |
|-------------------------------|--------|
| $I_{F(AV)}$                   | 20 A   |
| $V_{RRM}$                     | 120 V  |
| $I_{FSM}$                     | 150 A  |
| $V_F$ at $I_F = 20 \text{ A}$ | 0.78 V |
| $T_J$ max.                    | 150 °C |

### MAXIMUM RATINGS ( $T_A = 25 \text{ °C}$ unless otherwise noted)

| PARAMETER                                                                                               | SYMBOL         | V20120SG      | VF20120SG | VB20120SG | VI20120SG | UNIT |
|---------------------------------------------------------------------------------------------------------|----------------|---------------|-----------|-----------|-----------|------|
| Maximum repetitive peak reverse voltage                                                                 | $V_{RRM}$      | 120           |           |           |           | V    |
| Maximum average forward rectified current (fig. 1)                                                      | $I_{F(AV)}$    | 20            |           |           |           | A    |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load                      | $I_{FSM}$      | 150           |           |           |           | A    |
| Non-repetitive avalanche energy at $T_J = 25 \text{ °C}$ , $L = 60 \text{ mH}$                          | $E_{AS}$       | 80            |           |           |           | mJ   |
| Peak repetitive reverse current at $t_p = 2 \text{ μs}$ , 1 kHz, $T_J = 38 \text{ °C} \pm 2 \text{ °C}$ | $I_{RRM}$      | 0.5           |           |           |           | A    |
| Voltage rate of change (rated $V_R$ )                                                                   | $dV/dt$        | 10 000        |           |           |           | V/μs |
| Isolation voltage (ITO-220AB only) from terminal to heatsink $t = 1 \text{ min}$                        | $V_{AC}$       | 1500          |           |           |           | V    |
| Operating junction and storage temperature range                                                        | $T_J, T_{STG}$ | - 40 to + 150 |           |           |           | °C   |

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| ELECTRICAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted) |                         |                         |                 |               |      |      |
|----------------------------------------------------------------------------|-------------------------|-------------------------|-----------------|---------------|------|------|
| PARAMETER                                                                  | TEST CONDITIONS         |                         | SYMBOL          | TYP.          | MAX. | UNIT |
| Breakdown voltage                                                          | I <sub>R</sub> = 1.0 mA | T <sub>A</sub> = 25 °C  | V <sub>BR</sub> | 120 (minimum) | -    |      |
| Instantaneous forward voltage <sup>(1)</sup>                               | I <sub>F</sub> = 5 A    | T <sub>A</sub> = 25 °C  | V <sub>F</sub>  | 0.62          | -    | V    |
|                                                                            | I <sub>F</sub> = 10 A   |                         |                 | 0.81          | -    |      |
|                                                                            | I <sub>F</sub> = 20 A   |                         |                 | 1.20          | 1.33 |      |
|                                                                            | I <sub>F</sub> = 5 A    | T <sub>A</sub> = 125 °C |                 | 0.54          | -    |      |
| I <sub>F</sub> = 10 A                                                      | 0.65                    |                         | -               |               |      |      |
| I <sub>F</sub> = 20 A                                                      | 0.78                    |                         | 0.88            |               |      |      |
| Reverse current <sup>(2)</sup>                                             | V <sub>R</sub> = 90 V   | T <sub>A</sub> = 25 °C  | I <sub>R</sub>  | 10            | -    | μA   |
|                                                                            |                         | T <sub>A</sub> = 125 °C |                 | 7             | -    | mA   |
|                                                                            | V <sub>R</sub> = 120 V  | T <sub>A</sub> = 25 °C  |                 | -             | 250  | μA   |
|                                                                            |                         | T <sub>A</sub> = 125 °C |                 | 12            | 25   | mA   |

## Notes

<sup>(1)</sup> Pulse test: 300  $\mu\text{s}$  pulse width, 1 % duty cycle<sup>(2)</sup> Pulse test: Pulse width  $\leq 40\text{ ms}$ 

| THERMAL CHARACTERISTICS ( $T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted) |                 |          |           |           |           |                      |
|--------------------------------------------------------------------------------------|-----------------|----------|-----------|-----------|-----------|----------------------|
| PARAMETER                                                                            | SYMBOL          | V20120SG | VF20120SG | VB20120SG | VI20120SG | UNIT                 |
| Typical thermal resistance                                                           | $R_{\theta JC}$ | 2.2      | 4.2       | 2.2       | 2.2       | $^{\circ}\text{C/W}$ |

| ORDERING INFORMATION (Example) |                 |                 |              |               |               |
|--------------------------------|-----------------|-----------------|--------------|---------------|---------------|
| PACKAGE                        | PREFERRED P/N   | UNIT WEIGHT (g) | PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| TO-220AB                       | V20120SG-E3/4W  | 1.88            | 4W           | 50/tube       | Tube          |
| ITO-220AB                      | VF20120SG-E3/4W | 1.75            | 4W           | 50/tube       | Tube          |
| TO-263AB                       | VB20120SG-E3/4W | 1.38            | 4W           | 50/tube       | Tube          |
| TO-263AB                       | VB20120SG-E3/8W | 1.38            | 8W           | 800/reel      | Tape and reel |
| TO-262AA                       | VI20120SG-E3/4W | 1.45            | 4W           | 50/tube       | Tube          |

## RATINGS AND CHARACTERISTICS CURVES

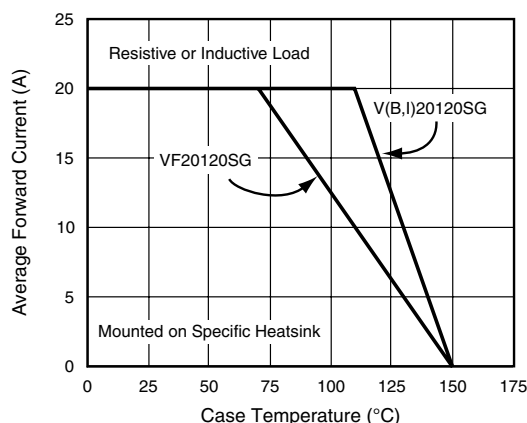
 $(T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)

Figure 1. Forward Current Derating Curve

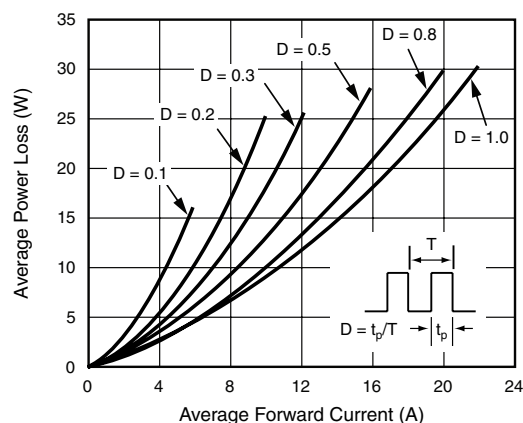


Figure 2. Forward Power Loss Characteristics

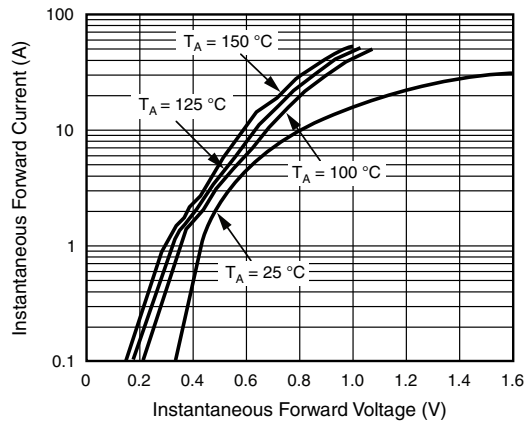


Figure 3. Typical Instantaneous Forward Characteristics

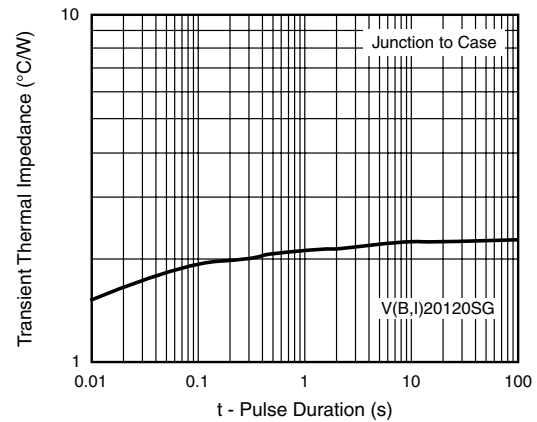


Figure 6. Typical Transient Thermal Impedance

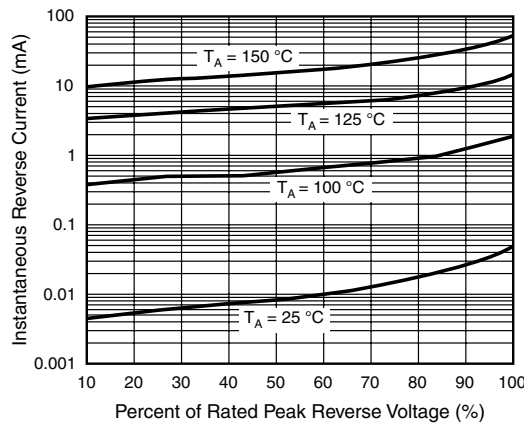


Figure 4. Typical Reverse Characteristics

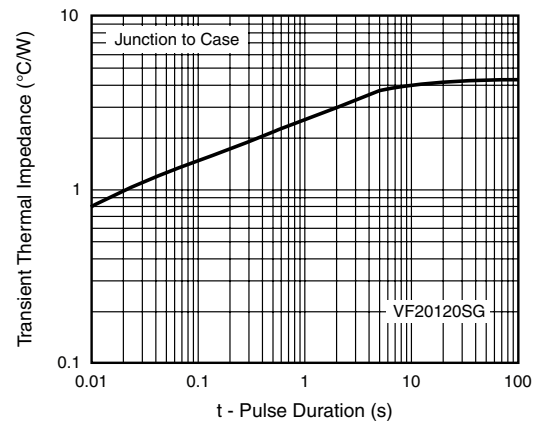


Figure 7. Typical Transient Thermal Impedance

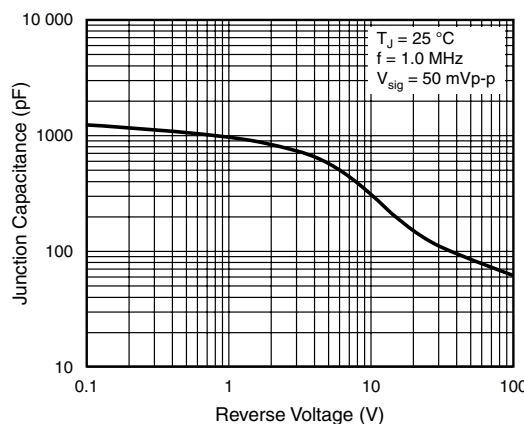


Figure 5. Typical Junction Capacitance

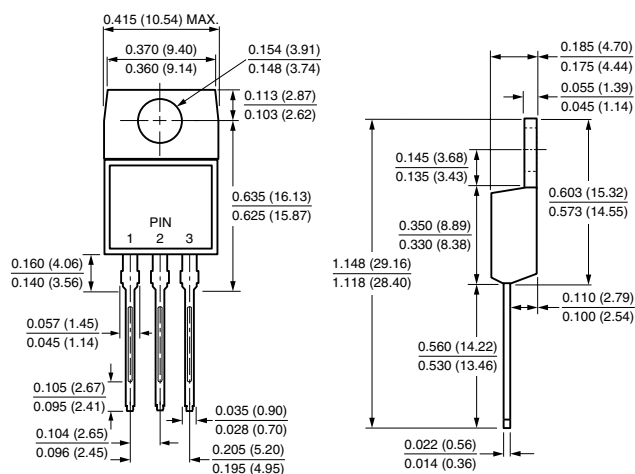
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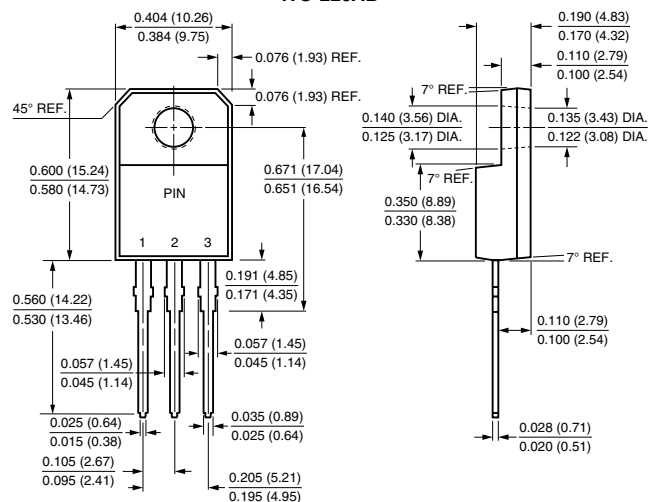


## PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

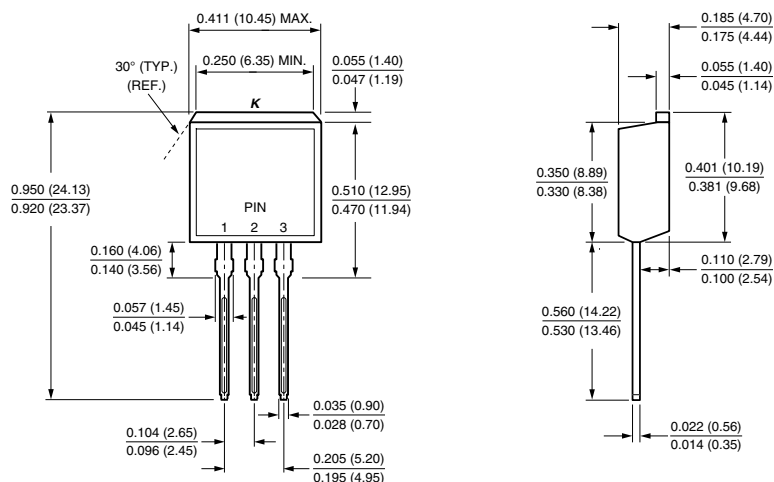
TO-220AB



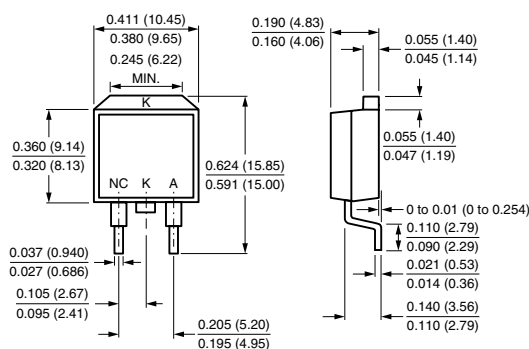
ITO-220AB



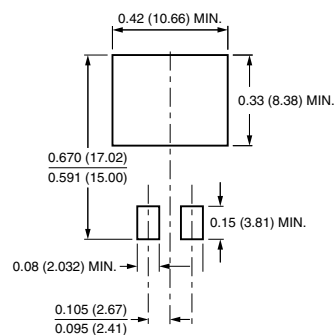
TO-262AA



TO-263AB



Mounting Pad Layout





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