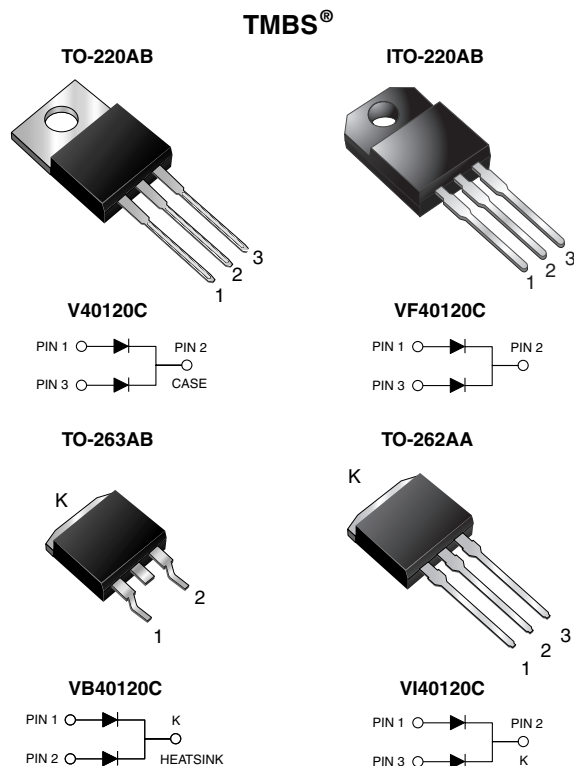


## Dual High-Voltage Trench MOS Barrier Schottky Rectifier

Ultra Low  $V_F = 0.43 \text{ V}$  at  $I_F = 5 \text{ A}$



### PRIMARY CHARACTERISTICS

|                               |          |
|-------------------------------|----------|
| $I_{F(AV)}$                   | 2 x 20 A |
| $V_{RRM}$                     | 120 V    |
| $I_{FSM}$                     | 250 A    |
| $V_F$ at $I_F = 20 \text{ A}$ | 0.63 V   |
| $T_J \text{ max.}$            | 150 °C   |

### 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

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

| PARAMETER                                                                                                                      | SYMBOL         | V40120C       | VF40120C | VB40120C | VI40120C | UNIT             |
|--------------------------------------------------------------------------------------------------------------------------------|----------------|---------------|----------|----------|----------|------------------|
| Maximum repetitive peak reverse voltage                                                                                        | $V_{RRM}$      | 120           |          |          |          | V                |
| Maximum average forward rectified current<br>(fig. 1) per device per diode                                                     | $I_{F(AV)}$    | 40<br>20      |          |          |          | A                |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load per diode                                   | $I_{FSM}$      | 250           |          |          |          | A                |
| Non-repetitive avalanche energy<br>at $T_J = 25 \text{ °C}$ , $L = 100 \text{ mH}$ per diode                                   | $E_{AS}$       | 180           |          |          |          | mJ               |
| Peak repetitive reverse current at $t_p = 2 \text{ } \mu\text{s}$ , 1 kHz,<br>$T_J = 38 \text{ °C} \pm 2 \text{ °C}$ per diode | $I_{RRM}$      | 0.5           |          |          |          | A                |
| Voltage rate of change (rated $V_R$ )                                                                                          | $dV/dt$        | 10 000        |          |          |          | V/ $\mu\text{s}$ |
| Operating junction and storage temperature range                                                                               | $T_J, T_{STG}$ | - 40 to + 150 |          |          |          | °C               |

## V40120C, VF40120C, VB40120C &amp; VI40120C

Vishay General Semiconductor

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

| PARAMETER                                              | TEST CONDITIONS       |                                     | SYMBOL   | TYP.             | MAX. | UNIT          |
|--------------------------------------------------------|-----------------------|-------------------------------------|----------|------------------|------|---------------|
| Breakdown voltage                                      | $I_R = 1.0\text{ mA}$ | $T_A = 25\text{ }^{\circ}\text{C}$  | $V_{BR}$ | 120<br>(minimum) | -    | V             |
| Instantaneous forward voltage per diode <sup>(1)</sup> | $I_F = 5\text{ A}$    | $T_A = 25\text{ }^{\circ}\text{C}$  | $V_F$    | 0.50             | -    | V             |
|                                                        | $I_F = 10\text{ A}$   |                                     |          | 0.60             | -    |               |
|                                                        | $I_F = 20\text{ A}$   |                                     |          | 0.78             | 0.88 |               |
|                                                        | $I_F = 5\text{ A}$    | $T_A = 125\text{ }^{\circ}\text{C}$ |          | 0.43             | -    |               |
| Reverse current per diode <sup>(2)</sup>               | $V_R = 90\text{ V}$   | $T_A = 25\text{ }^{\circ}\text{C}$  | $I_R$    | 19               | -    | $\mu\text{A}$ |
|                                                        | $V_R = 90\text{ V}$   | $T_A = 125\text{ }^{\circ}\text{C}$ |          | 10               | -    | $\text{mA}$   |
|                                                        | $V_R = 120\text{ V}$  | $T_A = 25\text{ }^{\circ}\text{C}$  |          | -                | 500  | $\mu\text{A}$ |
|                                                        | $V_R = 120\text{ V}$  | $T_A = 125\text{ }^{\circ}\text{C}$ |          | 22               | 45   | $\text{mA}$   |

**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          | V40120C | VF40120C | VB40120C | VI40120C | UNIT                 |
|--------------------------------------|-----------------|---------|----------|----------|----------|----------------------|
| Typical thermal resistance per diode | $R_{\theta JC}$ | 1.8     | 4.0      | 1.8      | 1.8      | $^{\circ}\text{C/W}$ |

**ORDERING INFORMATION** (Example)

| PACKAGE   | PREFERRED P/N  | UNIT WEIGHT (g) | PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
|-----------|----------------|-----------------|--------------|---------------|---------------|
| TO-220AB  | V40120C-E3/4W  | 1.88            | 4W           | 50/tube       | Tube          |
| ITO-220AB | VF40120C-E3/4W | 1.76            | 4W           | 50/tube       | Tube          |
| TO-263AB  | VB40120C-E3/4W | 1.39            | 4W           | 50/tube       | Tube          |
| TO-263AB  | VB40120C-E3/8W | 1.39            | 8W           | 800/reel      | Tape and reel |
| TO-262AA  | VI40120C-E3/4W | 1.46            | 4W           | 50/tube       | Tube          |

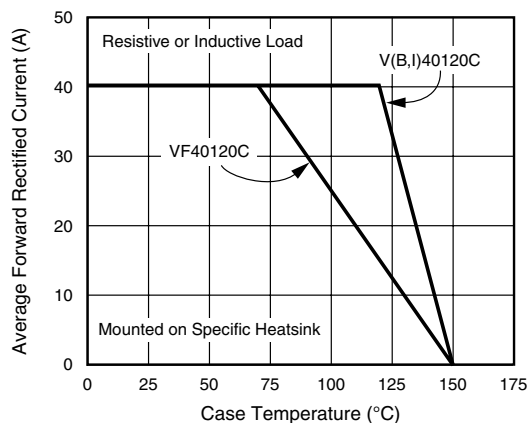
**RATINGS AND CHARACTERISTICS CURVES**( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)

Figure 1. Maximum Forward Current Derating Curve

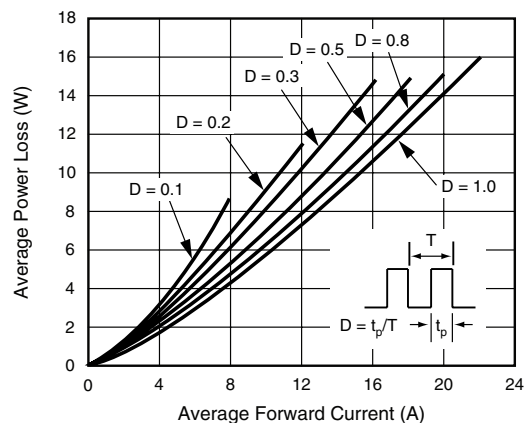


Figure 2. Forward Power Loss Characteristics Per Diode

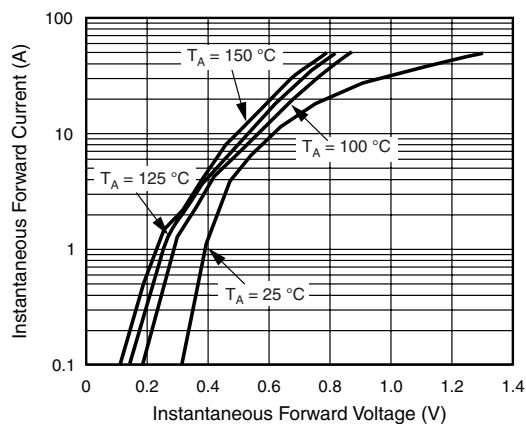


Figure 3. Typical Instantaneous Forward Characteristics Per Diode

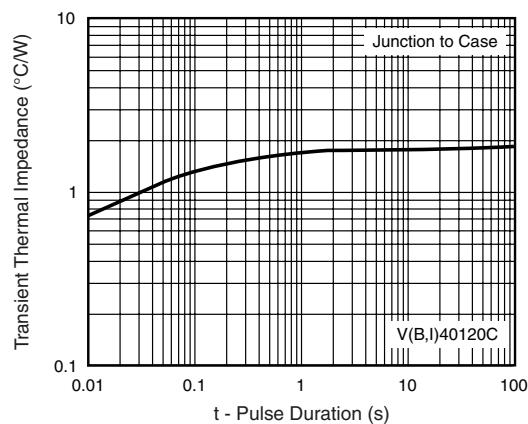


Figure 6. Typical Transient Thermal Impedance Per Diode

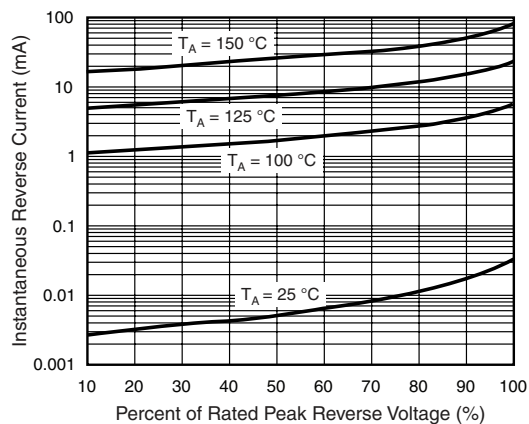


Figure 4. Typical Reverse Characteristics Per Diode

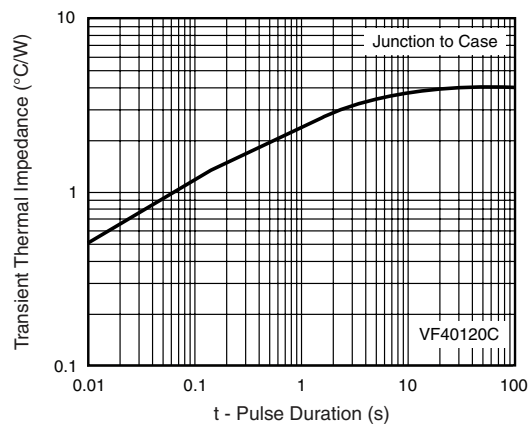


Figure 7. Typical Transient Thermal Impedance Per Diode

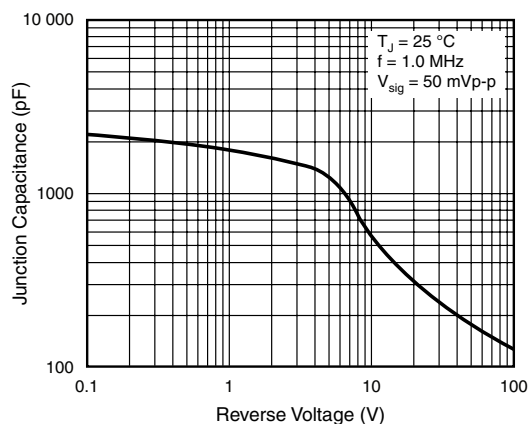


Figure 5. Typical Junction Capacitance Per Diode

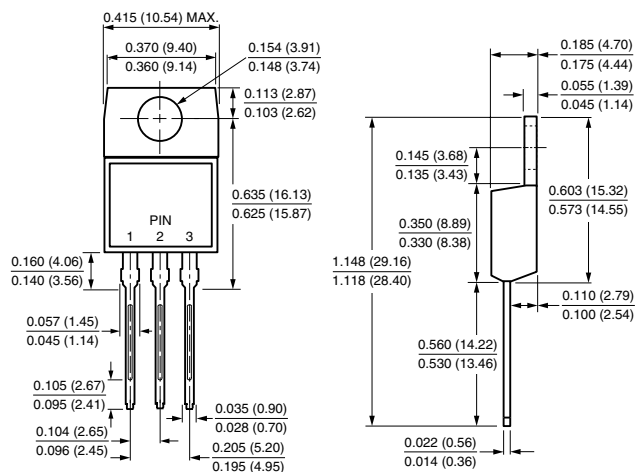
## V40120C, VF40120C, VB40120C &amp; VI40120C

Vishay General Semiconductor

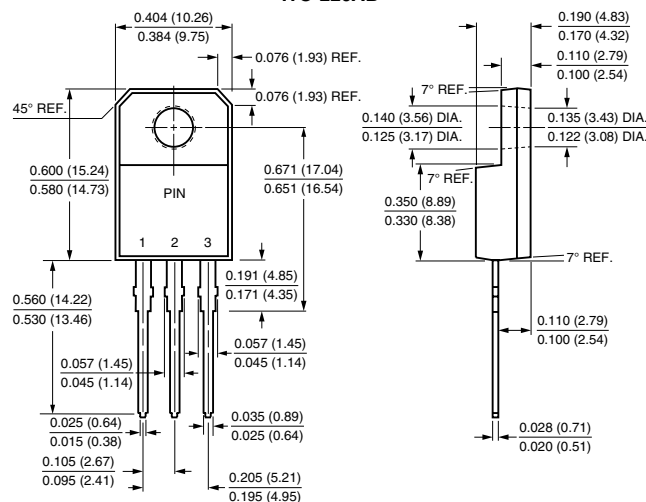


## PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

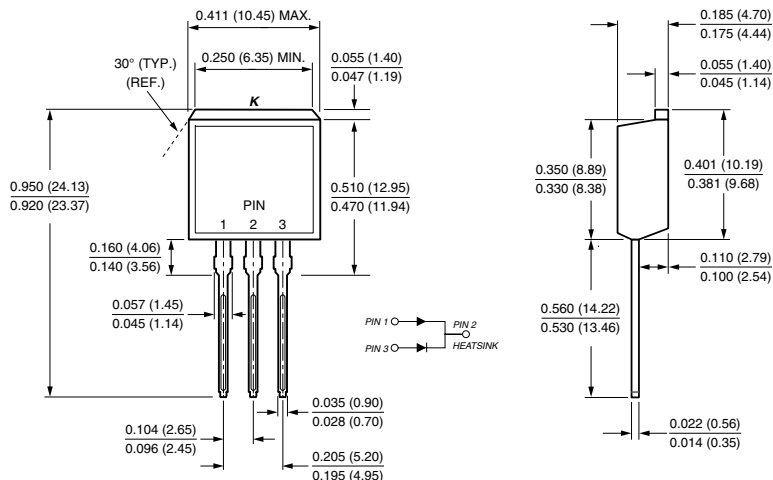
TO-220AB



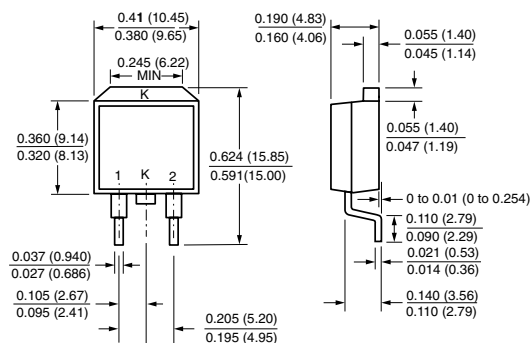
ITO-220AB



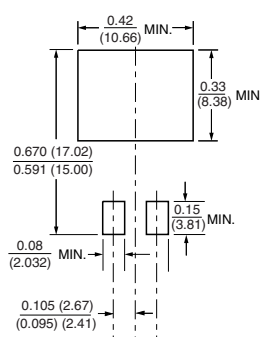
TO-262AA



TO-263AB



Mounting Pad Layout





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