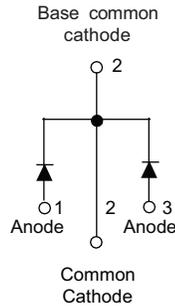


1200 V Gen 4 Power Silicon Carbide Schottky Diode, 2 x 10 A


TO-247AD 3L

FEATURES

- Positive V_F temperature coefficient for easy paralleling
- Virtually no recovery tail and no switching losses
- Temperature invariant switching behavior
- 175 °C maximum operating junction temperature
- Meets JESD 201 class 1A whisker test
- Solder bath temperature 275 °C maximum, 10 s per JESD 22-B106
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
 COMPLIANT
 HALOGEN
FREE
LINKS TO ADDITIONAL RESOURCES


3D Models

| PRIMARY CHARACTERISTICS | |
|-------------------------------|----------------|
| I_F | 2 x 10 A |
| V_R | 1200 V |
| V_F at I_F at 25 °C, typ. | 1.34 V |
| T_J max. | 175 °C |
| I_R at V_R at 175 °C | 162 μ A |
| Q_C ($V_R = 800$ V) | 52 nC |
| Package | TO-247AD 3L |
| Circuit configuration | Common cathode |

DESCRIPTION / APPLICATIONS

Wide band gap SiC based 1200 V Schottky diode, designed for high performance and ruggedness.

Optimized for extreme high speed hard switching across a wide temperature range. This SiC diode is ideal for applications with high dI/dt , such as high efficiency PFC and ultra-high frequency output rectifiers in AC/DC and DC/DC converters.

MECHANICAL DATA

Case: TO-247AD 3L

Molding compound meets UL 94 V-0 flammability rating
 Base P/N-M3 - halogen-free, RoHS-compliant

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

Mounting torque: 10 in-lbs maximum

| MAXIMUM RATINGS ($T_A = 25$ °C unless otherwise specified) | | | | |
|---|----------------------|--|-------------|------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
| Peak repetitive reverse voltage per leg | V_{RRM} | | 1200 | V |
| Continuous forward current per leg | $I_F^{(1)}$ | $T_C = 160$ °C (DC) | 10 | A |
| | | $T_C = 151$ °C (DC) | 10 | A |
| DC blocking voltage per leg | V_{DC} | | 1200 | V |
| Repetitive peak forward current per leg | I_{FRM} | $T_C = 25$ °C, $f = 50$ Hz, square wave, DC = 25 % | 46 | A |
| Non-repetitive peak forward surge current per leg | I_{FSM} | $T_C = 25$ °C, $t_p = 10$ ms, half sine wave | 50 | A |
| | | $T_C = 110$ °C, $t_p = 10$ ms, half sine wave | 45 | |
| Power dissipation per leg | $P_{tot}^{(1)}$ | $T_C = 25$ °C | 187 | W |
| | | $T_C = 110$ °C | 81 | |
| | $P_{tot}^{(2)}$ | $T_C = 25$ °C | 115 | W |
| | | $T_C = 110$ °C | 50 | |
| i^2t value per leg | $\int i^2 dt$ | $T_C = 25$ °C | 12.5 | A ² s |
| | | $T_C = 110$ °C | 10.3 | |
| Operating junction and storage temperatures | $T_J^{(3)}, T_{Stg}$ | | -55 to +175 | °C |

Notes

- (1) Based on typical R_{th}
- (2) Based on maximum R_{th}
- (3) The heat generated must be less than the thermal conductivity from junction-to-ambient: $dP_D/dT_J < 1/R_{\theta JA}$



ELECTRICAL SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|---------------------------------|--------|---|------|------|------|---------------|
| Forward voltage per leg | V_F | $I_F = 10\text{ A}$ | - | 1.34 | 1.6 | V |
| | | $I_F = 10\text{ A}, T_J = 150\text{ }^\circ\text{C}$ | - | 1.70 | 2.10 | |
| | | $I_F = 10\text{ A}, T_J = 175\text{ }^\circ\text{C}$ | - | 1.85 | - | |
| Reverse leakage current per leg | I_R | $V_R = V_R\text{ rated}$ | - | 5.4 | 80 | μA |
| | | $V_R = V_R\text{ rated}, T_J = 150\text{ }^\circ\text{C}$ | - | 72 | 500 | |
| | | $V_R = V_R\text{ rated}, T_J = 175\text{ }^\circ\text{C}$ | - | 162 | - | |
| Total capacitance per leg | C | $V_R = 1\text{ V}, f = 1\text{ MHz}$ | - | 590 | - | pF |
| | | $V_R = 800\text{ V}, f = 1\text{ MHz}$ | - | 36 | - | |
| Total capacitive charge per leg | Q_C | $V_R = 800\text{ V}, f = 1\text{ MHz}$ | - | 52 | - | nC |

THERMAL - MECHANICAL SPECIFICATIONS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|--------------------------------------|------------|-----------------|------|-----------|------|--------------------|
| Thermal resistance, junction-to-case | R_{thJC} | per leg | - | 0.8 | 1.3 | $^\circ\text{C/W}$ |
| | | per device | - | 0.4 | 0.65 | |
| Marking device | | | | 4C20CP12L | | |

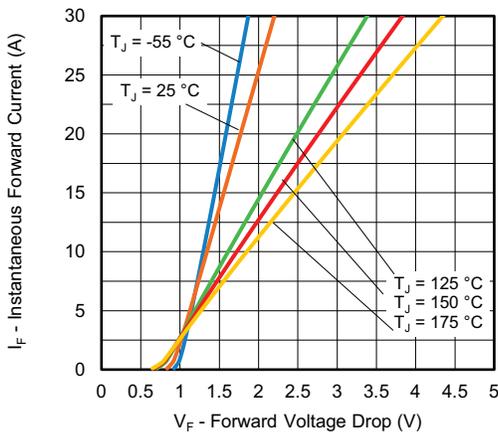


Fig. 1 - Typical Forward Voltage Drop Characteristics Per Leg

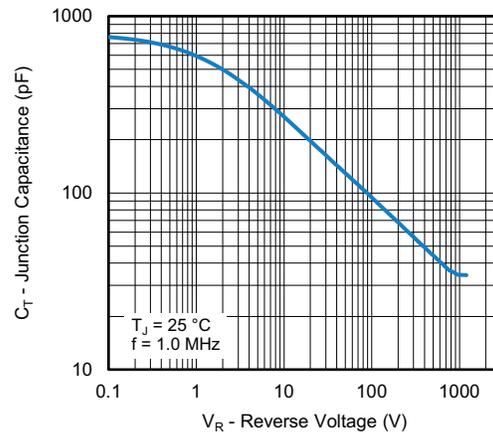


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage Per Leg

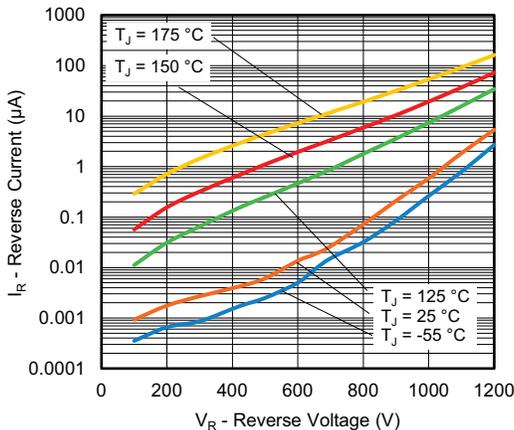


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage Per Leg

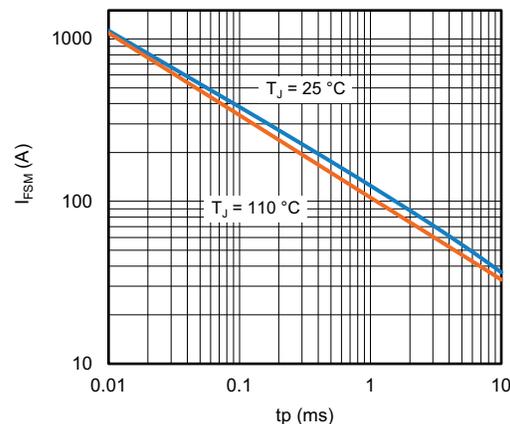


Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration (Square Wave) Per Leg

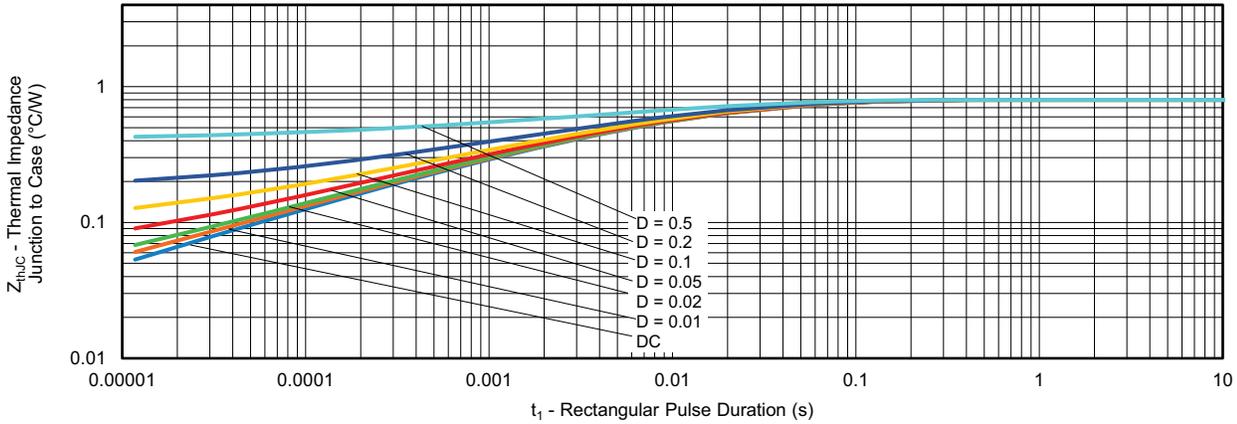


Fig. 5 - Typical Thermal Impedance Z_{thJC} - Characteristics Per Leg

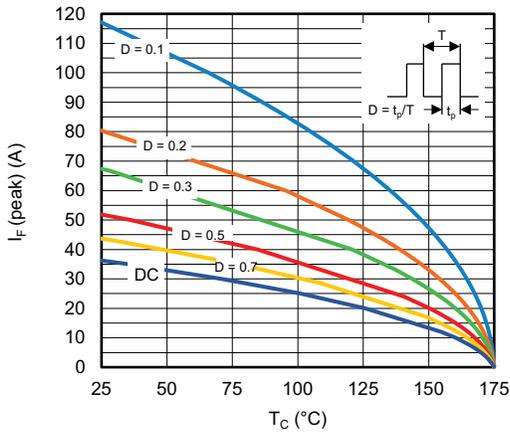


Fig. 6 - Peak Forward Current vs. Maximum Allowable Case Temperature Per Leg

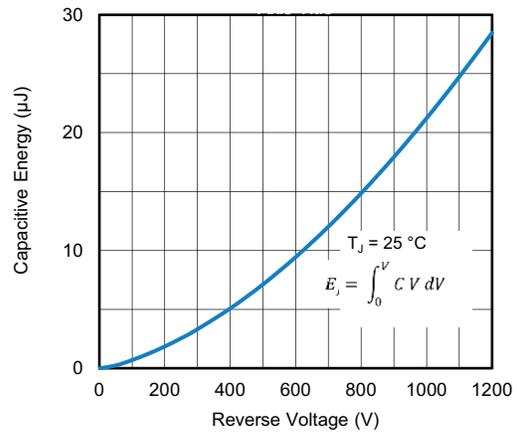


Fig. 8 - Typical Capacitive Energy vs. Reverse Voltage Per Leg

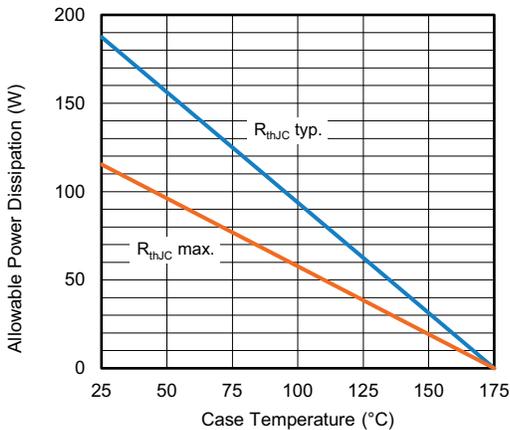


Fig. 7 - Forward Power Loss Characteristics Per Leg

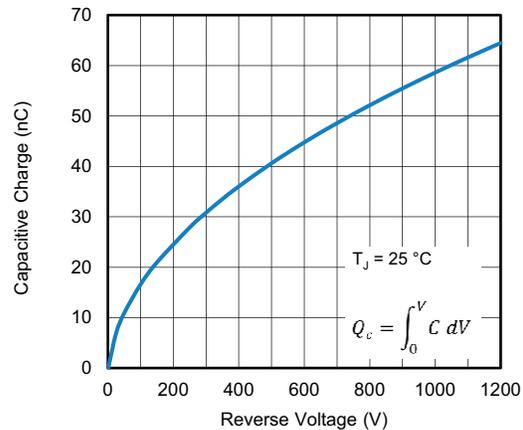
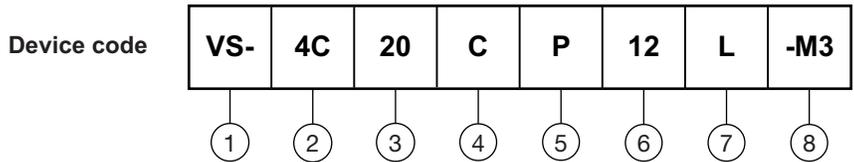


Fig. 9 - Typical Capacitive Charge vs. Reverse Voltage Per Leg



ORDERING INFORMATION TABLE



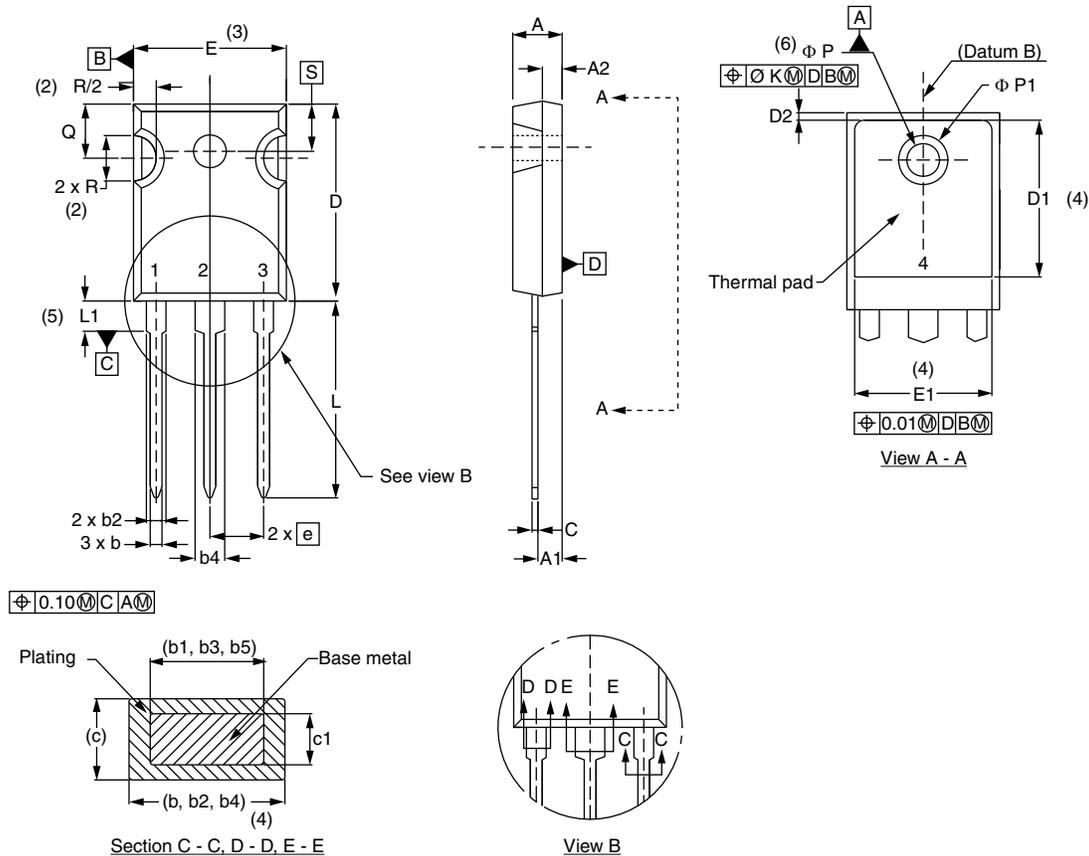
- 1** - Vishay Semiconductors product
- 2** - 4C = SiC diode, Generation 4
- 3** - Current rating (20 = 20 A)
- 4** - C = common cathode
- 5** - P = package TO-247
- 6** - Voltage rating: 12 = 1200 V
- 7** - L = long lead
- 8** - Environmental digit:
M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

| ORDERING INFORMATION | | | |
|----------------------|-------------|---------------|--------------------------|
| PREFERRED P/N | UNIT WEIGHT | BASE QUANTITY | PACKAGING DESCRIPTION |
| VS-4C20CP12L-M3 | 5.5 g | 25 / tube | Antistatic plastic tubes |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?95626 |
| Part marking information | www.vishay.com/doc?95007 |

TO-247AD 3L

DIMENSIONS in millimeters and inches



| SYMBOL | MILLIMETERS | | INCHES | | NOTES | SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|--------|-------|-------|--------|-------------|-------|-----------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | | | MIN. | MAX. | MIN. | MAX. | |
| A | 4.65 | 5.31 | 0.183 | 0.209 | | D2 | 0.51 | 1.30 | 0.020 | 0.051 | |
| A1 | 2.21 | 2.59 | 0.087 | 0.102 | | E | 15.29 | 15.87 | 0.602 | 0.625 | 3 |
| A2 | 1.50 | 2.49 | 0.059 | 0.098 | | E1 | 13.46 | - | 0.53 | - | |
| b | 0.99 | 1.40 | 0.039 | 0.055 | | e | 5.46 BSC | | 0.215 BSC | | |
| b1 | 0.99 | 1.35 | 0.039 | 0.053 | | Ø K | 0.254 | | 0.010 | | |
| b2 | 1.65 | 2.39 | 0.065 | 0.094 | | L | 19.81 | 20.32 | 0.780 | 0.800 | |
| b3 | 1.65 | 2.34 | 0.065 | 0.092 | | L1 | 3.71 | 4.29 | 0.146 | 0.169 | |
| b4 | 2.59 | 3.43 | 0.102 | 0.135 | | Ø P | 3.56 | 3.66 | 0.14 | 0.144 | |
| b5 | 2.59 | 3.38 | 0.102 | 0.133 | | Ø P1 | - | 6.98 | - | 0.275 | |
| c | 0.38 | 0.89 | 0.015 | 0.035 | | Q | 5.31 | 5.69 | 0.209 | 0.224 | |
| c1 | 0.38 | 0.84 | 0.015 | 0.033 | | R | 4.52 | 5.49 | 0.178 | 0.216 | |
| D | 19.71 | 20.70 | 0.776 | 0.815 | 3 | S | 5.51 BSC | | 0.217 BSC | | |
| D1 | 13.08 | - | 0.515 | - | 4 | | | | | | |

Notes

- (1) Dimensioning and tolerancing per ASME Y14.5M-1994
- (2) Contour of slot optional
- (3) Dimension D and E do not include mold flash. These dimensions are measured at the outermost extremes of the plastic body
- (4) Thermal pad contour optional with dimensions D1 and E1
- (5) Lead finish uncontrolled in L1
- (6) Ø P to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")
- (7) Outline conforms to JEDEC® outline TO-247 with exception of dimension A min., D, E min., Q min., S, and note 4



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