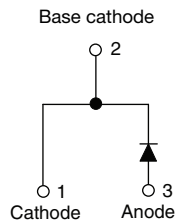


650 V Power SiC Merged PIN Schottky Diode, 10 A


2L TO-220AC


FEATURES

- Majority carrier diode using Schottky technology on SiC wide band gap material
- 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
- MPS structure for high ruggedness to forward current surge events
- 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



Models



Application Notes

| PRIMARY CHARACTERISTICS | |
|--------------------------|-------------|
| $I_{F(AV)}$ | 10 A |
| V_R | 650 V |
| V_F at I_F at 150 °C | 1.75 V |
| T_J max. | 175 °C |
| I_R at V_R at 175 °C | 5 μ A |
| Q_C ($V_R = 400$ V) | 28 nC |
| Package | 2L TO-220AC |
| Circuit configuration | Single |

DESCRIPTION / APPLICATIONS

Wide band gap SiC based 650 V Schottky diode, designed for high performance and ruggedness.

Optimum choice for high speed hard switching and efficient operation over a wide temperature range, it is also recommended for all applications suffering from Silicon ultrafast recovery behavior.

Typical applications include AC/DC PFC and DC/DC ultra high frequency output rectification in FBPS and LLC converters.

MECHANICAL DATA

Case: 2L TO-220AC

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

| ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C unless otherwise specified) | | | | |
|--|----------------------|--|-------------|------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
| Peak repetitive reverse voltage | V_{RRM} | | 650 | V |
| Average rectified forward current | $I_{F(AV)}$ | $T_C = 125$ °C (DC) | 10 | A |
| DC blocking voltage | V_{DC} | | 650 | V |
| Repetitive peak surge current | I_{FRM} | $T_C = 25$ °C, $f = 50$ Hz, square wave, DC = 25 % | 35 | A |
| Non-repetitive peak forward surge current | I_{FSM} | $T_C = 25$ °C, $t_p = 10$ ms, half sine wave | 68 | A |
| | | $T_C = 110$ °C, $t_p = 10$ ms, half sine wave | 60 | |
| Power dissipation | $P_{tot}^{(1)}$ | $T_C = 25$ °C | 60 | W |
| | | $T_C = 110$ °C | 26 | |
| I^2t value | $\int i^2 dt$ | $T_C = 25$ °C | 23 | A ² s |
| | | $T_C = 110$ °C | 18 | |
| Operating junction and storage temperatures | $T_J^{(2)}, T_{Stg}$ | | -55 to +175 | °C |

Notes

(1) Based on maximum R_{th}

(2) The heat generated must be less than the thermal conductivity from junction-to-ambient: $dP_D/dT_J < 1/R_{thJA}$



| ELECTRICAL SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified) | | | | | | |
|---|--------|---|------|------|------|---------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Forward voltage | V_F | $I_F = 10\text{ A}$ | - | 1.50 | 1.80 | V |
| | | $I_F = 10\text{ A}, T_J = 150\text{ }^\circ\text{C}$ | - | 1.75 | 1.95 | |
| | | $I_F = 10\text{ A}, T_J = 175\text{ }^\circ\text{C}$ | - | 1.85 | - | |
| Reverse leakage current | I_R | $V_R = V_R\text{ rated}$ | - | - | 55 | μA |
| | | $V_R = V_R\text{ rated}, T_J = 150\text{ }^\circ\text{C}$ | - | - | 125 | |
| | | $V_R = V_R\text{ rated}, T_J = 175\text{ }^\circ\text{C}$ | - | 5 | - | |
| Total capacitance | C | $V_R = 1\text{ V}, f = 1\text{ MHz}$ | - | 430 | - | pF |
| | | $V_R = 400\text{ V}, f = 1\text{ MHz}$ | - | 45 | - | |
| Total capacitive charge | Q_C | $V_R = 400\text{ V}, f = 1\text{ MHz}$ | - | 28 | - | 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} | | - | 1.8 | 2.5 | $^\circ\text{C/W}$ |
| Marking device | | | C10ET07T | | | |

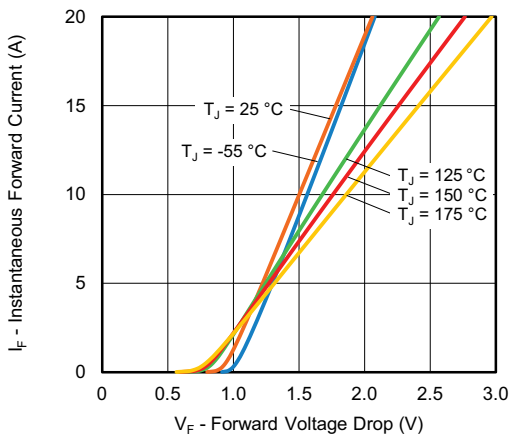


Fig. 1 - Typical Forward Voltage Drop Characteristics

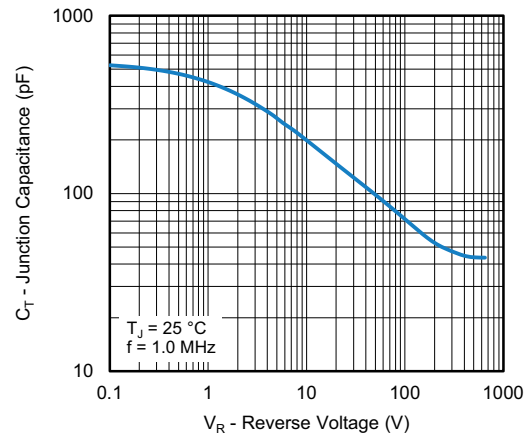


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

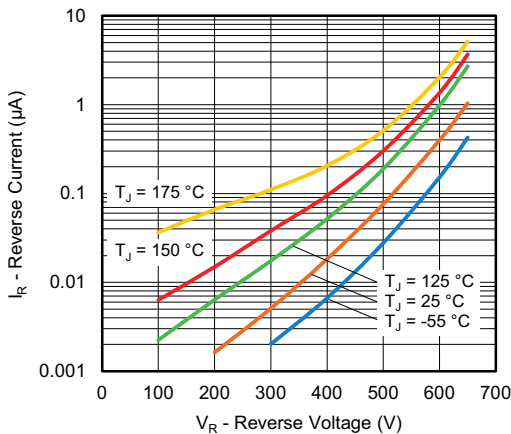


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

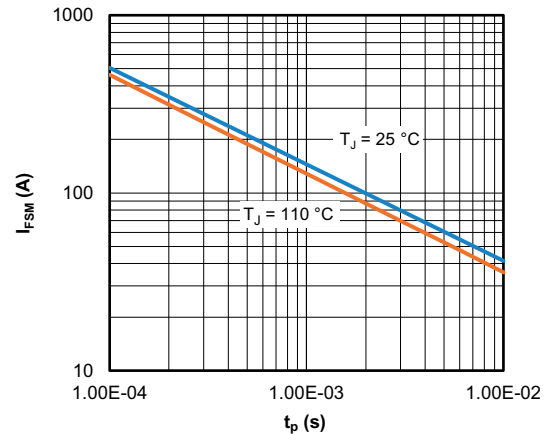


Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration (Square Wave)

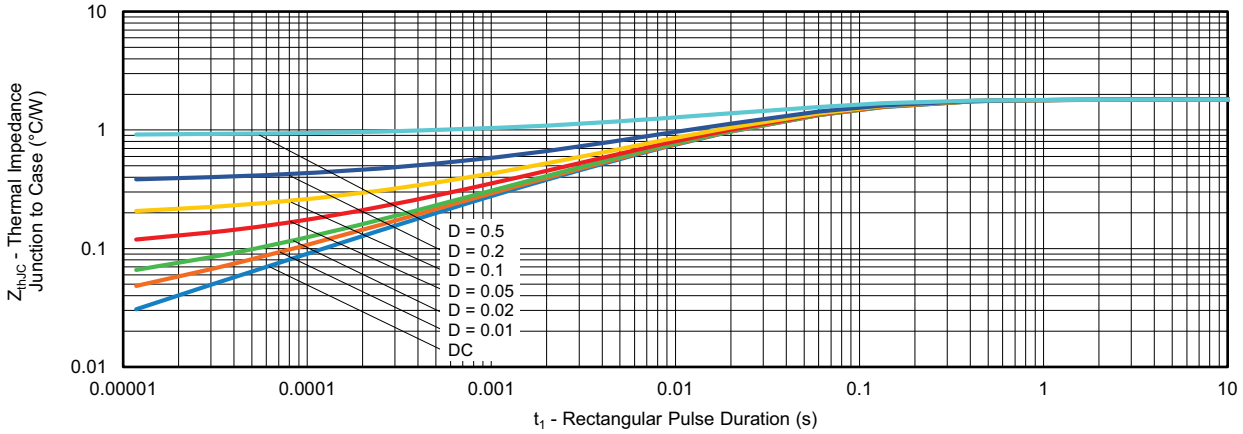


Fig. 5 - Typical Thermal Impedance Z_{thJC} Characteristics

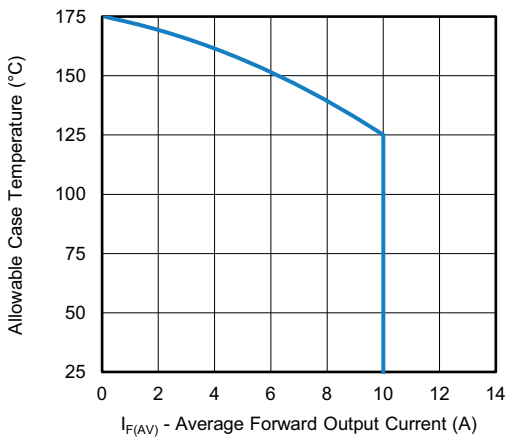


Fig. 6 - Maximum Allowable Case Temperature vs. Average Forward Current

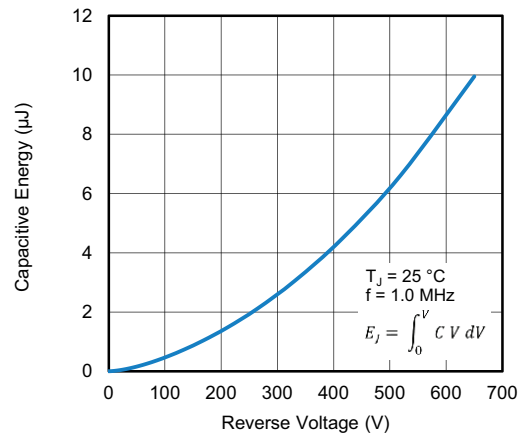


Fig. 8 - Typical Capacitive Energy vs. Reverse Voltage

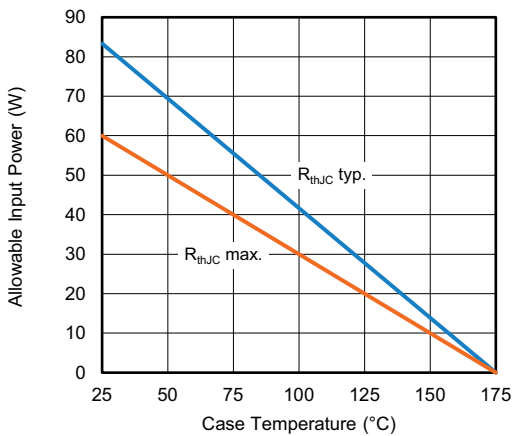


Fig. 7 - Forward Power Loss Characteristics

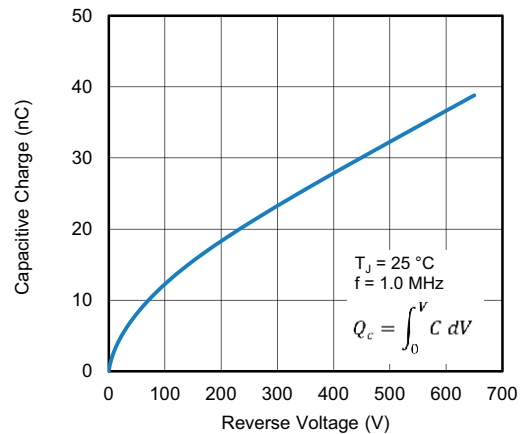
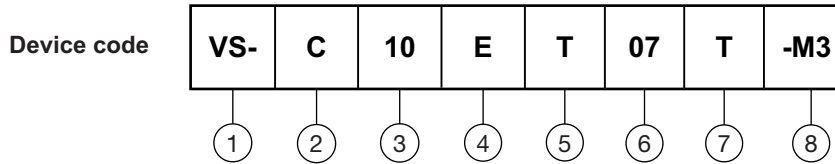


Fig. 9 - Typical Capacitive Charge vs. Reverse Voltage



ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - C = SiC diode
- 3** - Current rating (10 = 10 A)
- 4** - E = single diode
- 5** - Package TO-220
- 6** - Voltage rating: (07 = 650 V)
- 7** - T = true 2 pin
- 8** - Environmental digit:
-M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

| ORDERING INFORMATION | | | |
|----------------------|---------------|------------------------|--------------------------|
| PREFERRED P/N | BASE QUANTITY | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION |
| VS-C10ET07T-M3 | 50/tube | 1000 | Antistatic plastic tubes |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?96069 |
| Part marking information | www.vishay.com/doc?95391 |
| SPICE model | www.vishay.com/doc?96832 |



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