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FFSP05120A

Silicon Carbide Schottky Diode

1200 V, 5 A

Features

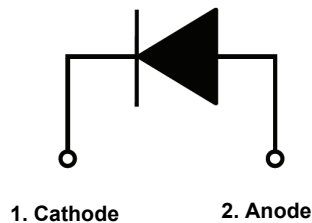
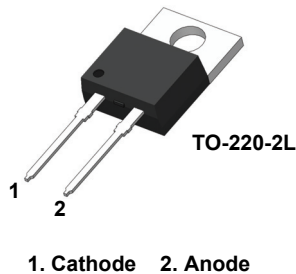
- Max Junction Temperature 175 °C
- Avalanche Rated 55 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery / No Forward Recovery

Applications

- General Purpose
- SMPS, Solar Inverter, UPS
- Power Switching Circuits

Description

Silicon Carbide (SiC) Schottky Diodes use a completely new technology that provides superior switching performance and higher reliability compared to Silicon. No reverse recovery current, temperature independent switching characteristics, and excellent thermal performance sets Silicon Carbide as the next generation of power semiconductor. System benefits include highest efficiency, faster operating frequency, increased power density, reduced EMI, and reduced system size & cost.



Absolute Maximum Ratings $T_C = 25\text{ }^\circ\text{C}$ unless otherwise noted.

| Symbol | Parameter | FFSP05120A | Unit | |
|----------------|--|--|------------------|---|
| V_{RRM} | Peak Repetitive Reverse Voltage | 1200 | V | |
| E_{AS} | Single Pulse Avalanche Energy (Note 1) | 55 | mJ | |
| I_F | Continuous Rectified Forward Current @ $T_C < 160\text{ }^\circ\text{C}$ | 5 | A | |
| | Continuous Rectified Forward Current @ $T_C < 135\text{ }^\circ\text{C}$ | 9.2 | A | |
| $I_{F, Max}$ | Non-Repetitive Peak Forward Surge Current | $T_C = 25\text{ }^\circ\text{C}$, 10 μs | 380 | A |
| | | $T_C = 150\text{ }^\circ\text{C}$, 10 μs | 330 | A |
| $I_{F, SM}$ | Non-Repetitive Forward Surge Current | Half-Sine Pulse, $t_p = 8.3\text{ ms}$ | 42 | A |
| $I_{F, RM}$ | Repetitive Forward Surge Current | Half-Sine Pulse, $t_p = 8.3\text{ ms}$ | 21 | A |
| P_{tot} | Power Dissipation | $T_C = 25\text{ }^\circ\text{C}$ | 94 | W |
| | | $T_C = 150\text{ }^\circ\text{C}$ | 16 | W |
| T_J, T_{STG} | Operating and Storage Temperature Range | -55 to +175 | $^\circ\text{C}$ | |

Thermal Characteristic

| Symbol | Parameter | FFSP05120A | Unit |
|-----------------|---|------------|--------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case, Max | 1.6 | $^\circ\text{C/W}$ |

Package Marking and Ordering Information

| Part Number | Top Mark | Package | Packing Method | Reel Size | Tape Width | Quantity |
|-------------|------------|-----------|----------------|-----------|------------|----------|
| FFSP05120A | FFSP05120A | TO-220-2L | Tube | N/A | N/A | 50 units |

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted.

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------|-------------------------|--|------|------|------|---------------|
| V_F | Forward Voltage | $I_F = 5\text{ A}, T_C = 25^\circ\text{C}$ | - | 1.45 | 1.75 | V |
| | | $I_F = 5\text{ A}, T_C = 125^\circ\text{C}$ | - | 1.7 | 2 | |
| | | $I_F = 5\text{ A}, T_C = 175^\circ\text{C}$ | - | 2 | 2.4 | |
| I_R | Reverse Current | $V_R = 1200\text{ V}, T_C = 25^\circ\text{C}$ | - | - | 200 | μA |
| | | $V_R = 1200\text{ V}, T_C = 125^\circ\text{C}$ | - | - | 300 | |
| | | $V_R = 1200\text{ V}, T_C = 175^\circ\text{C}$ | - | - | 400 | |
| Q_C | Total Capacitive Charge | $V = 800\text{ V}$ | - | 37 | - | nC |
| C | Total Capacitance | $V_R = 1\text{ V}, f = 100\text{ kHz}$ | - | 337 | - | pF |
| | | $V_R = 400\text{ V}, f = 100\text{ kHz}$ | - | 33 | - | |
| | | $V_R = 800\text{ V}, f = 100\text{ kHz}$ | - | 26 | - | |

Notes:

1: EAS of 55 mJ is based on starting $T_J = 25^\circ\text{C}$, $L = 0.5\text{ mH}$, $I_{AS} = 15\text{ A}$, $V = 50\text{ V}$.

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted.

Figure 1. Forward Characteristics

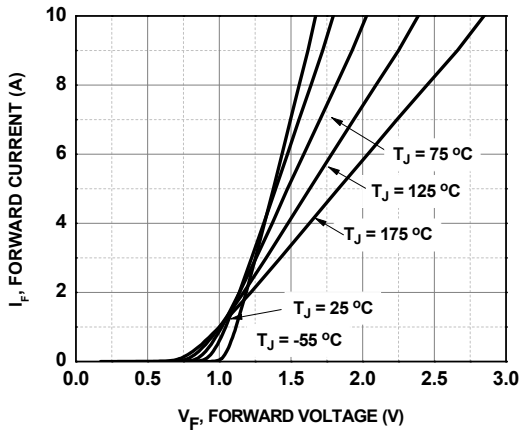


Figure 2. Reverse Characteristics

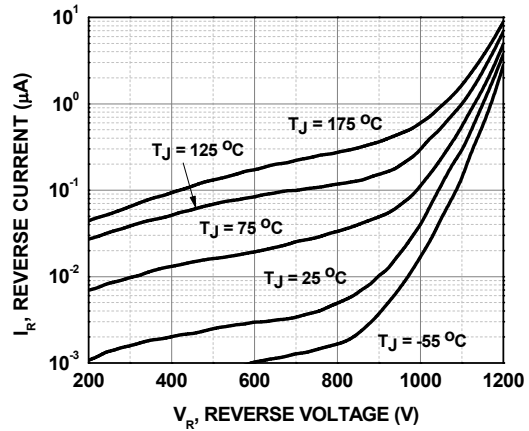


Figure 3. Current Derating

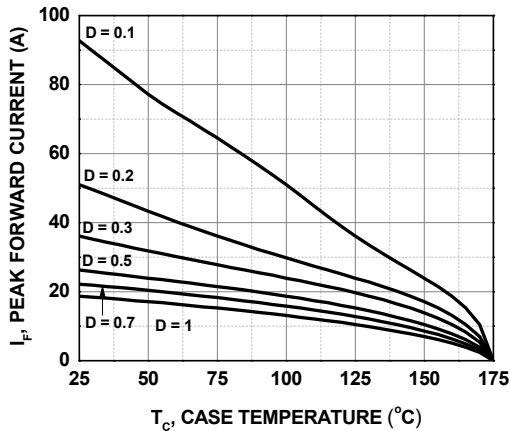
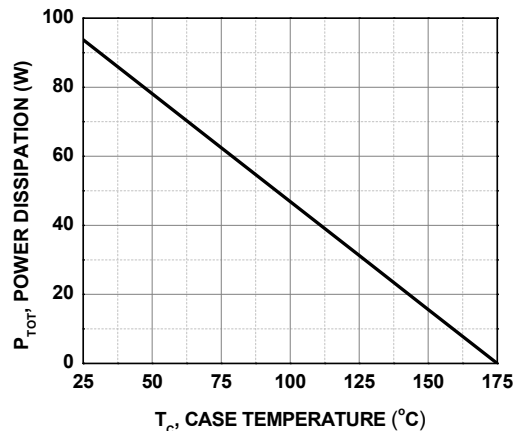


Figure 4. Power Derating



Typical Characteristics $T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted.

Figure 5. Capacitive Charge vs. Reverse Voltage

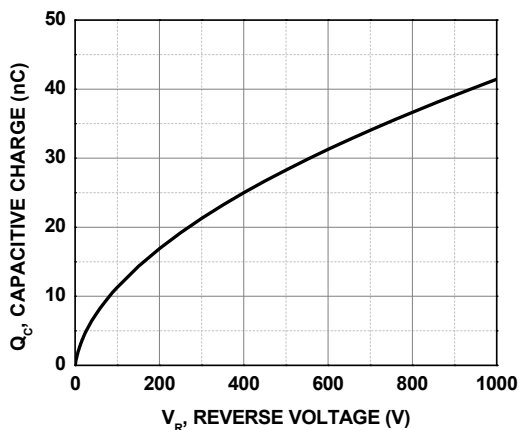


Figure 6. Capacitance vs. Reverse Voltage

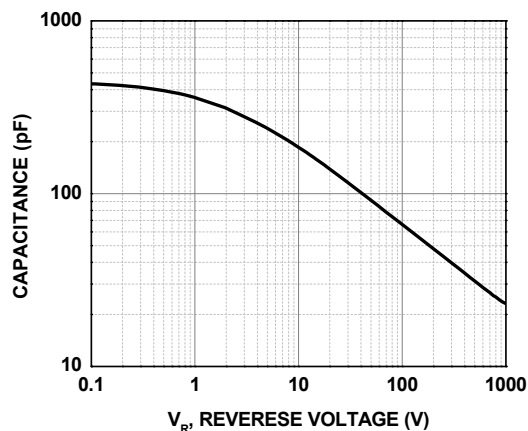


Figure 7. Capacitance Stored Energy

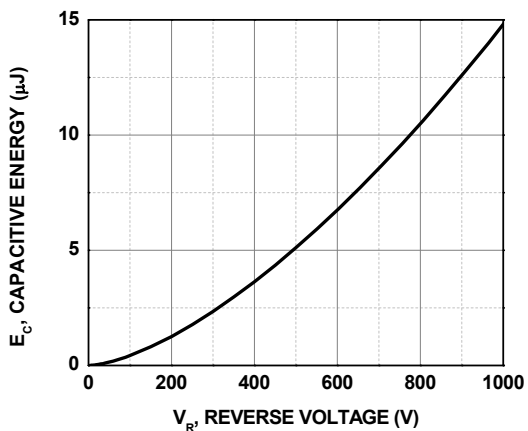
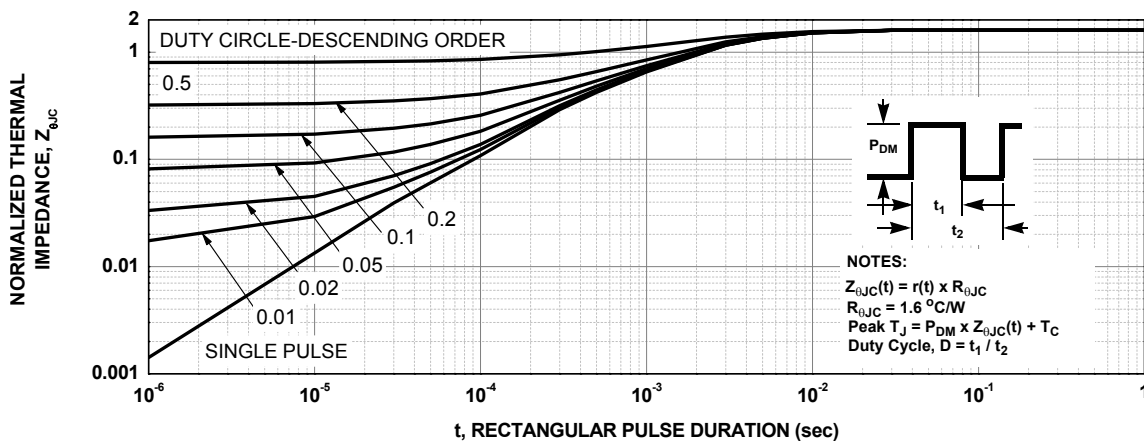


Figure 8. Junction-to-Case Transient Thermal Response Curve



Test Circuit and Waveforms

Figure 9. Unclamped Inductive Switching Test Circuit & Waveform

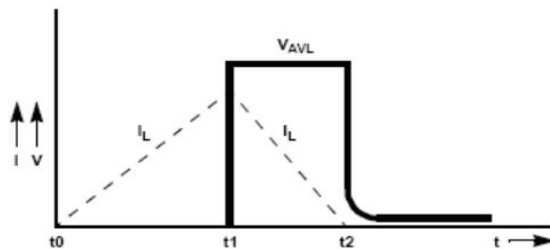
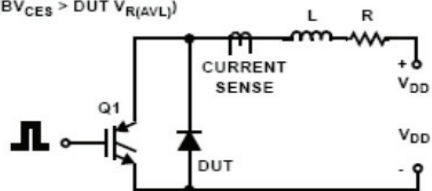
$L = 0.5\text{mH}$

$R < 0.1\Omega$

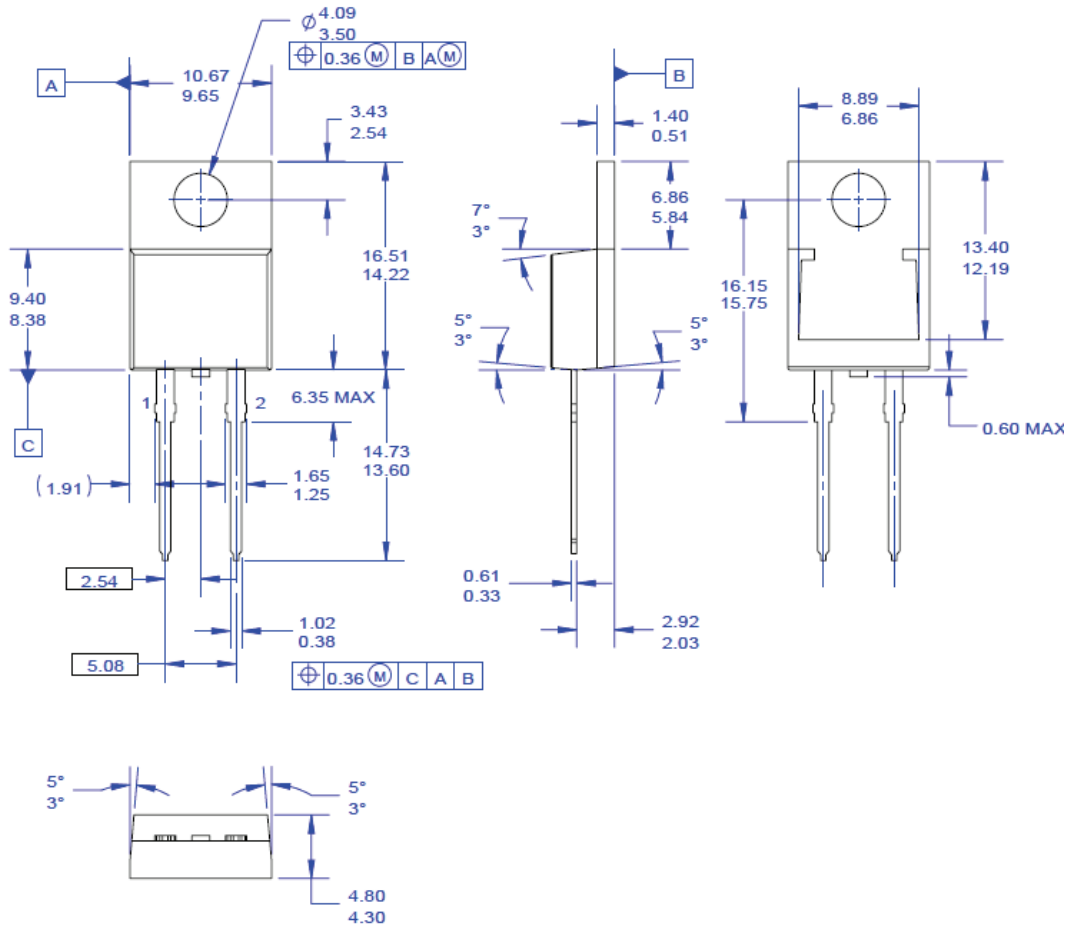
$V_{DD} = 50\text{V}$

$E_{AVL} = 1/2 L I^2 [V_{R(AVL)} / (V_{R(AVL)} - V_{DD})]$

$Q1 = \text{IGBT (} BV_{CES} > DUT V_{R(AVL)} \text{)}$



Mechanical Dimensions



NOTES:

- A. PACKAGE REFERENCE: JEDEC TO220, ISSUE K, VARIATION AC, DATED APRIL 2002.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSION AND TOLERANCE AS PER ASME Y14.5-2009.
- D. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.
- E. DRAWING FILE NAME: TO220A02REV5

Figure 10. TO-220 2L - TO-220, MOLDED, 2LD

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