



FFSP1665A

Silicon Carbide Schottky Diode

650 V, 16 A

Features

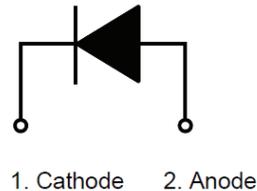
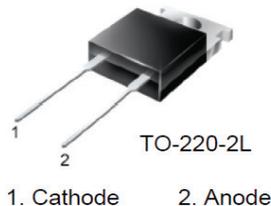
- Max Junction Temperature 175 °C
- Avalanche Rated 81 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery / No Forward Recovery

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 and cost.



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

Symbol	Parameter	FFSP1665A	Unit	
V_{RRM}	Peak Repetitive Reverse Voltage	650	V	
E_{AS}	Single Pulse Avalanche Energy (Note 1)	81	mJ	
I_F	Continuous Rectified Forward Current @ $T_C < 135^\circ\text{C}$	16	A	
$I_{F, Max}$	Non-Repetitive Peak Forward Surge Current	$T_C = 25^\circ\text{C}, 10 \mu\text{s}$	1130	A
		$T_C = 150^\circ\text{C}, 10 \mu\text{s}$	980	A
$I_{F, SM}$	Non-Repetitive Forward Surge Current	Half-Sine Pulse, $t_p = 8.3 \text{ ms}$	90	A
$I_{F, RM}$	Repetitive Forward Surge Current	Half-Sine Pulse, $t_p = 8.3 \text{ ms}$	50	A
P_{tot}	Power Dissipation	$T_C = 25^\circ\text{C}$	150	W
		$T_C = 150^\circ\text{C}$	25	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +175	$^\circ\text{C}$	

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	1.0	$^\circ\text{C/W}$

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FFSP1665A	FFSP1665A	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	$I_F = 16\text{ A}, T_C = 25^\circ\text{C}$	-	1.50	1.75	V
		$I_F = 16\text{ A}, T_C = 125^\circ\text{C}$	-	1.6	2.0	
		$I_F = 16\text{ A}, T_C = 175^\circ\text{C}$	-	1.72	2.4	
I_R	Reverse Current	$V_R = 650\text{ V}, T_C = 25^\circ\text{C}$	-	-	200	μA
		$V_R = 650\text{ V}, T_C = 125^\circ\text{C}$	-	-	400	
		$V_R = 650\text{ V}, T_C = 175^\circ\text{C}$	-	-	600	
Q_C	Total Capacitive Charge	$V = 400\text{ V}$	-	52	-	nC
C	Total Capacitance	$V_R = 1\text{ V}, f = 100\text{ kHz}$	-	887	-	pF
		$V_R = 200\text{ V}, f = 100\text{ kHz}$	-	95	-	
		$V_R = 400\text{ V}, f = 100\text{ kHz}$	-	72	-	

Notes:

- 1: Pulse: Test Pulse width = 300 μs , Duty Cycle = 2%
- 2: E_{AS} of 81 mJ is based on starting $T_J = 25^\circ\text{C}$, $L = 0.5\text{ mH}$, $I_{AS} = 18\text{ A}$, $V = 50\text{ V}$.

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

Figure 1. Forward Characteristics

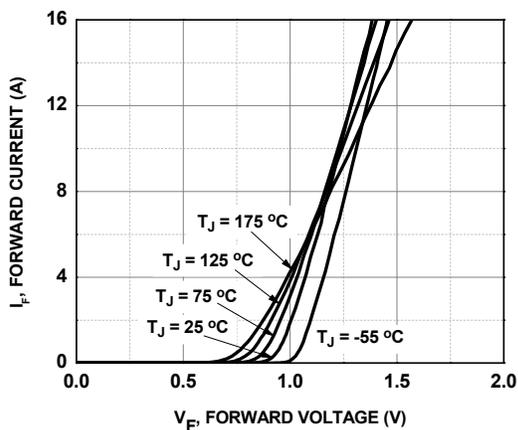


Figure 2. Reverse Characteristics

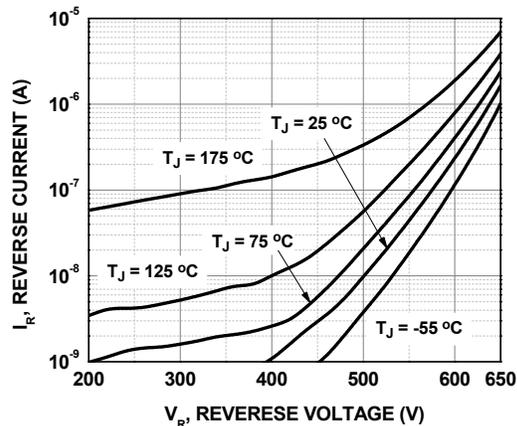


Figure 3. Current Derating

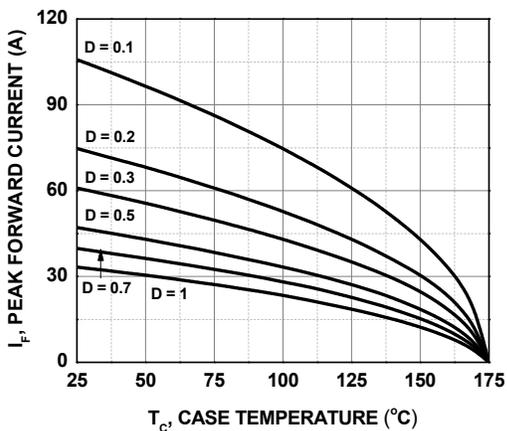
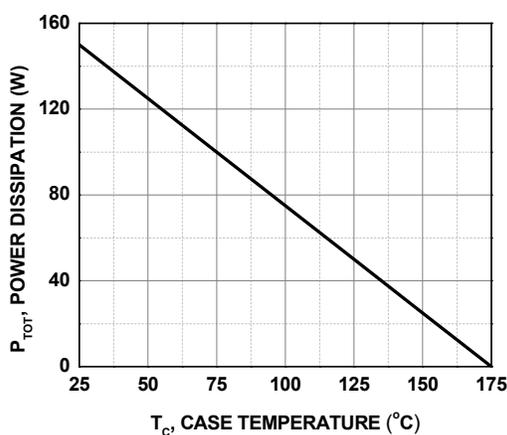


Figure 4. Power Derating



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

Figure 5. Capacitive Charge vs. Reverse Voltage

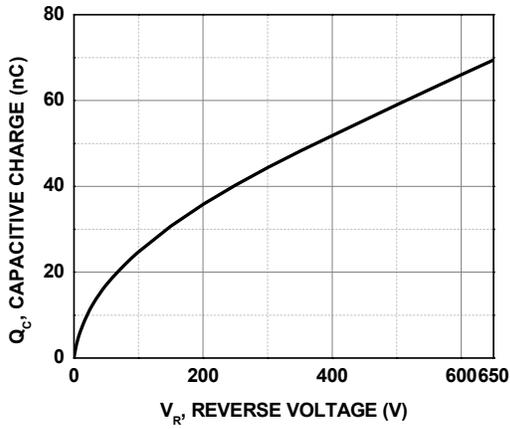


Figure 6. Capacitance vs. Reverse Voltage

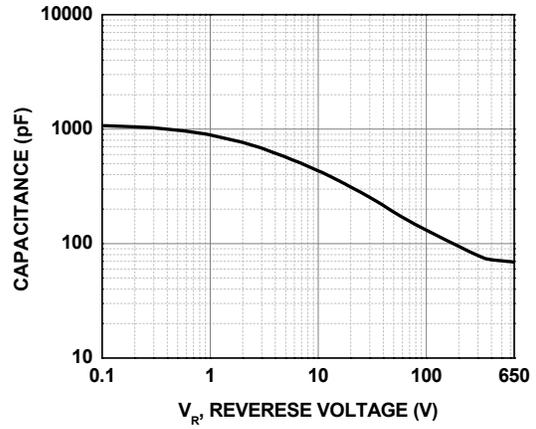


Figure 7. Capacitance Stored Energy

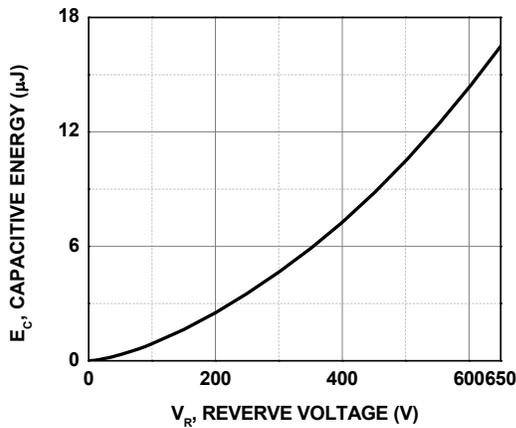
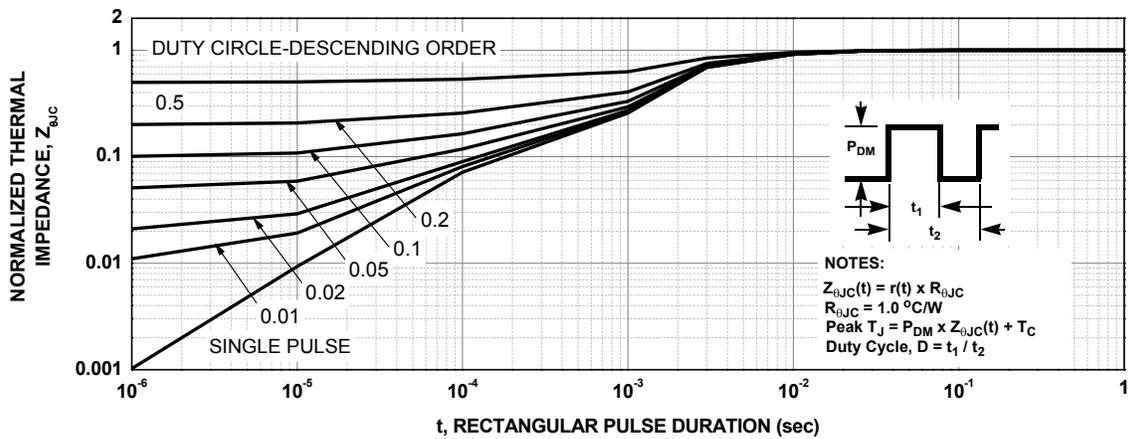


Figure 8. Junction-to-Case Transient Thermal Response Curve



Test Circuit and Waveforms

Figure 9. Unclamped Inductive Switching Test Circuit & Waveform

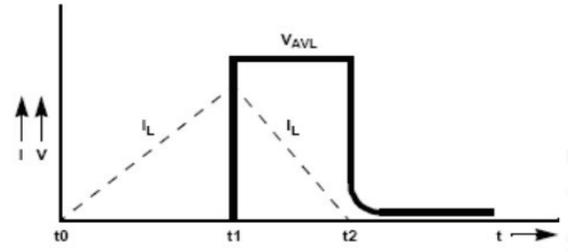
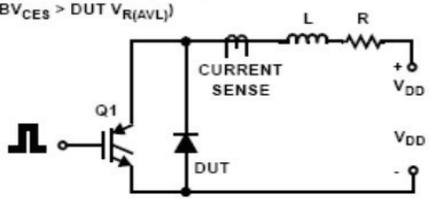
$L = 0.5\text{mH}$

$R < 0.1\Omega$

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

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

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



Mechanical Dimensions

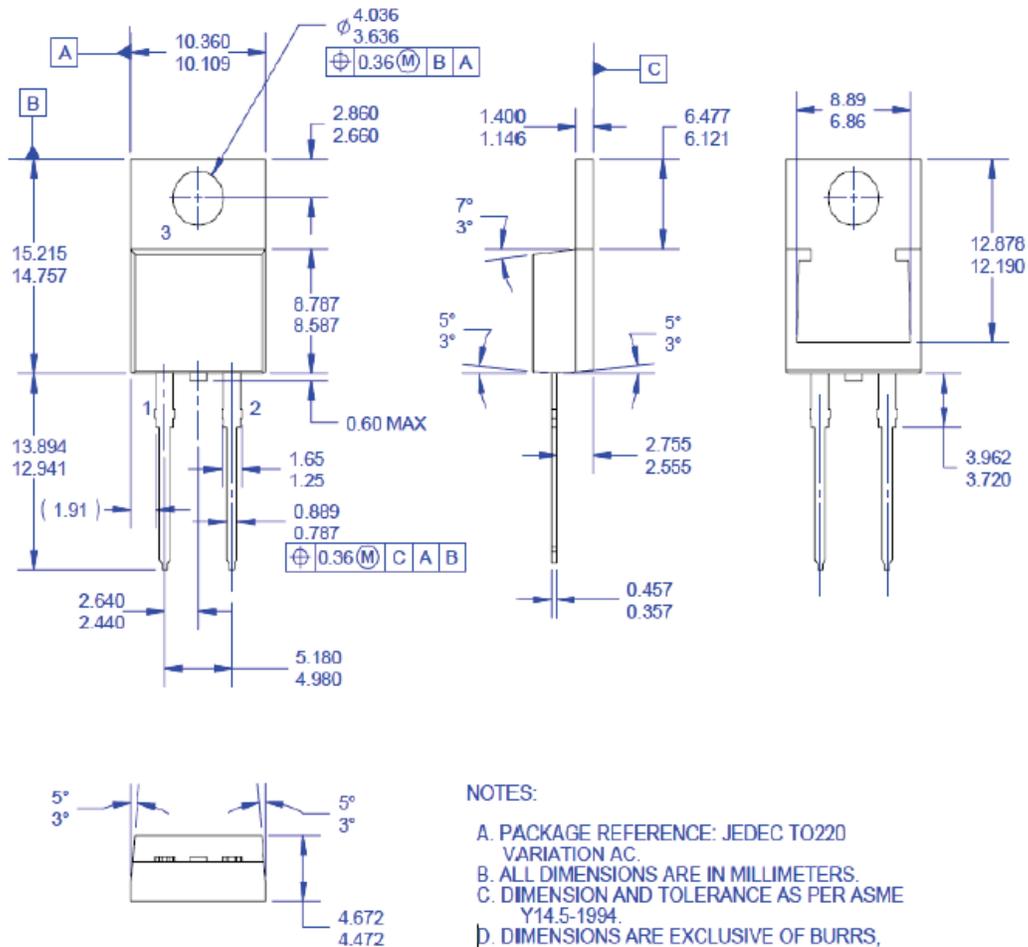


Figure 10. TO-220 2L - TO-220, MOLDED, 2LD

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