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FFSP2065A

Silicon Carbide Schottky Diode

650 V, 20 A

Features

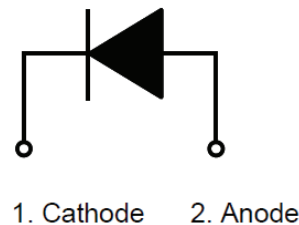
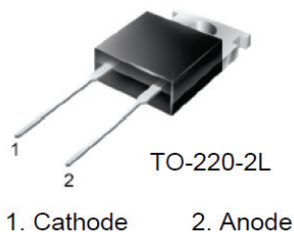
- Max Junction Temperature 175 °C
- Avalanche Rated 95 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery / No Forward Recovery

Applications

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

Description

SiC Schottky Diode has no switching loss, provides improved system efficiency against Si diodes by utilizing new semiconductor material - Silicon Carbide, enables higher operating frequency, and helps increasing power density and reduction of system size/cost. Its high reliability ensures robust operation during surge or over-voltage conditions



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

Symbol	Parameter	FFSP2065A	Unit	
V_{RRM}	Peak Repetitive Reverse Voltage	650	V	
E_{AS}	Single Pulse Avalanche Energy (Note 2)	95	mJ	
I_F	Continuous Rectified Forward Current @ $T_C < 147^\circ\text{C}$	20	A	
	Continuous Rectified Forward Current @ $T_C < 135^\circ\text{C}$	25		
$I_{F, Max}$	Non-Repetitive Peak Forward Surge Current	$T_C = 25^\circ\text{C}$, 10 μs	1225	A
		$T_C = 150^\circ\text{C}$, 10 μs	1000	A
$I_{F, SM}$	Non-Repetitive Forward Surge Current	Half-Sine Pulse, $t_p = 8.3$ ms	105	A
$I_{F, RM}$	Repetitive Forward Surge Current	Half-Sine Pulse, $t_p = 8.3$ ms	58	A
P_{tot}	Power Dissipation	$T_C = 25^\circ\text{C}$	187	W
		$T_C = 150^\circ\text{C}$	31	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +175	$^\circ\text{C}$	
	TO247 Mounting Torque, M3 Screw	60	Ncm	

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max. (Note 1)	0.8	$^\circ\text{C}/\text{W}$

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FFSP2065A	FFSP2065A	TO-220	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	$I_F = 20\text{ A}, T_C = 25^\circ\text{C}$	-	1.5	1.75	V
		$I_F = 20\text{ A}, T_C = 125^\circ\text{C}$	-	1.6	2.0	
		$I_F = 20\text{ A}, T_C = 175^\circ\text{C}$	-	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	$V = 400\text{ V}$	-	64	-	nC
C	Total Capacitance	$V_R = 1\text{ V}, f = 100\text{ kHz}$	-	1085	-	pF
		$V_R = 200\text{ V}, f = 100\text{ kHz}$	-	117	-	
		$V_R = 400\text{ V}, f = 100\text{ kHz}$	-	88	-	

Notes:

- 1: Pulse: Test Pulse width = 300 μs , Duty Cycle = 2%
- 2: EAS of 95mJ is based on starting $T_J = 25^\circ\text{C}$, $L = 0.5\text{ mH}$, $I_{AS} = 19.5\text{ A}$, $V = 50\text{ V}$.

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

Figure 1. Forward Characteristics

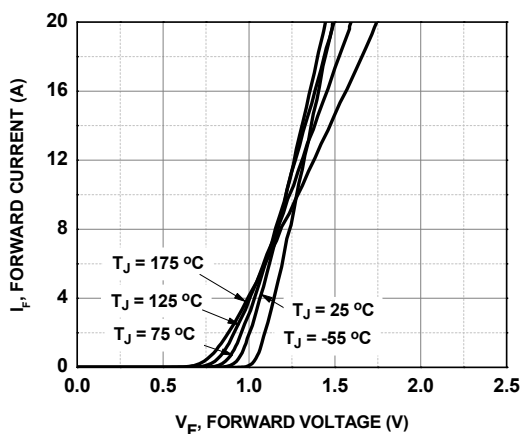


Figure 2. Reverse Characteristics

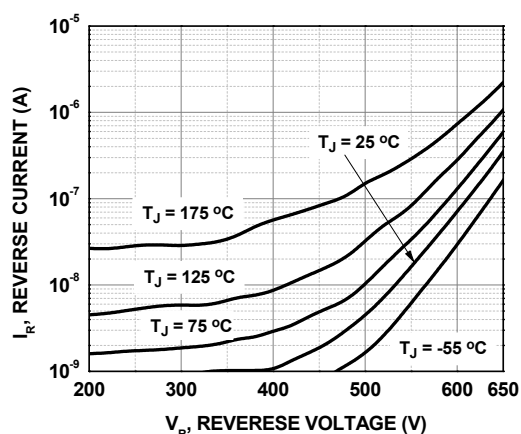


Figure 3. Current Derating

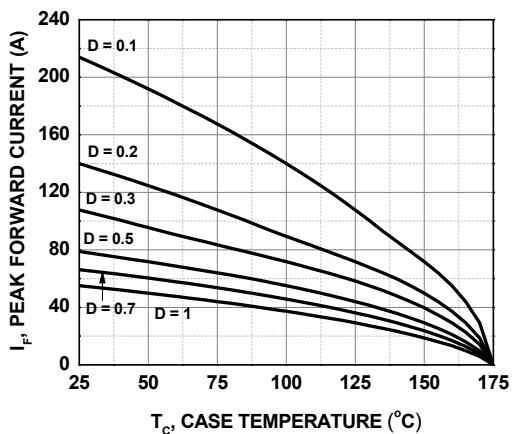
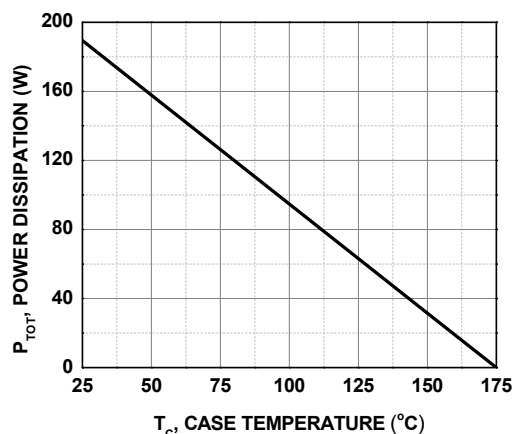


Figure 4. Power Derating



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

Figure 5. Capacitive Charge vs. Reverse Voltage

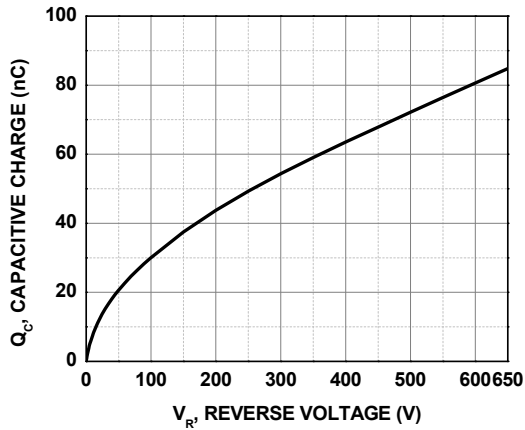


Figure 6. Capacitance vs. Reverse Voltage

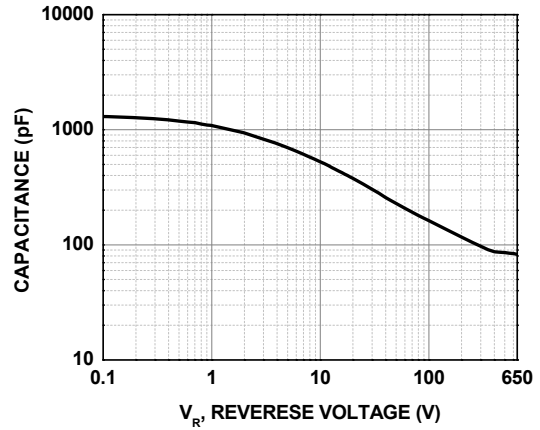


Figure 7. Capacitance Stored Energy

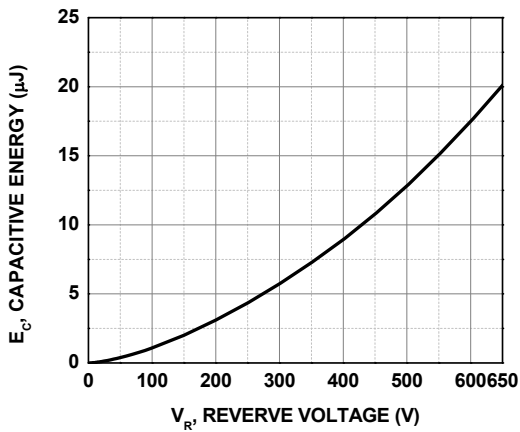
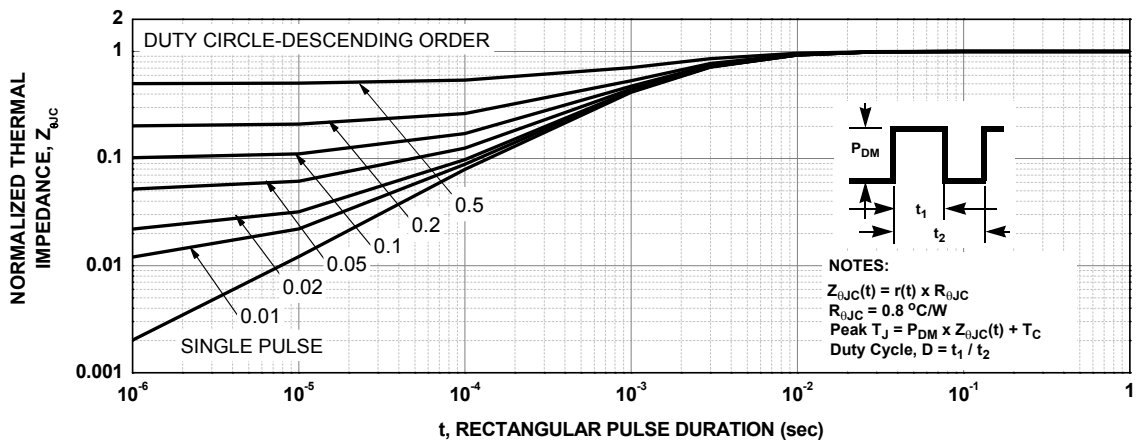


Figure 8. Junction-to-Case Transient Thermal Response Curve



Test Circuit and Waveforms

Figure 9. Unclamped Inductive Switching Test Circuit & Waveform

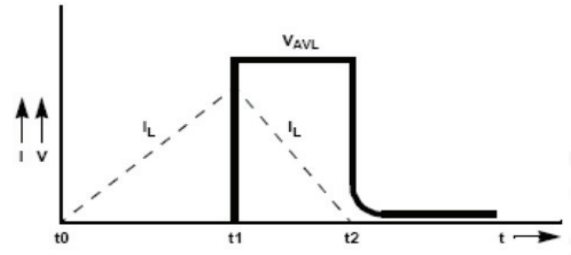
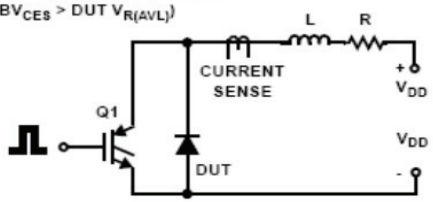
$L = 0.5\text{mH}$

$R < 0.1\Omega$

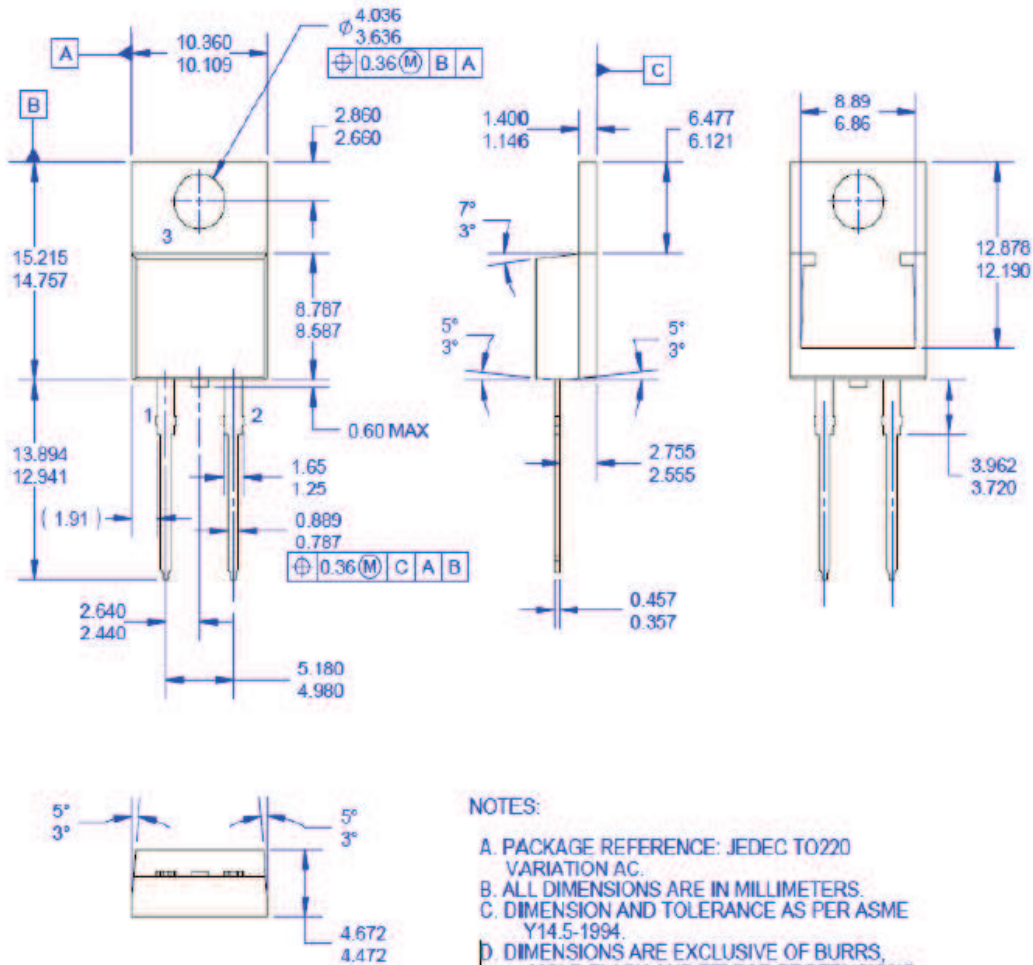
$V_{DD} = 50\text{V}$

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

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



Mechanical Dimensions



NOTES:

- A. PACKAGE REFERENCE: JEDEC TO220 VARIATION AC.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSION AND TOLERANCE AS PER ASME Y14.5-1994.
- D. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND THE BAR PROTRUSIONS.
- E. THIS PACKAGE IS FSSZ INTERNAL PRODUCTION AND INTENDED FOR DELTA CUSTOMER ONLY.
- F. DRAWING FILE NAME: T0220B02REV4

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

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