



FFSP2065A

Silicon Carbide Schottky Diode

650 V, 20 A

Features

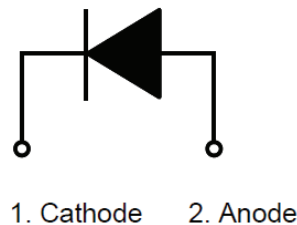
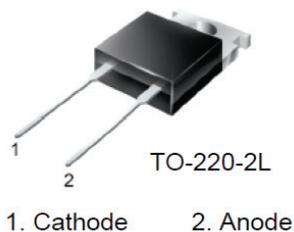
- Max Junction Temperature 175 °C
- Avalanche Rated 95 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery / No Forward Recovery

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F = 20\text{ A}, T_C = 25\text{ }^\circ\text{C}$	-	1.5	1.75	V
		$I_F = 20\text{ A}, T_C = 125\text{ }^\circ\text{C}$	-	1.6	2.0	
		$I_F = 20\text{ A}, T_C = 175\text{ }^\circ\text{C}$	-	1.72	2.4	
I_R	Reverse Current	$V_R = 650\text{ V}, T_C = 25\text{ }^\circ\text{C}$	-	-	200	μA
		$V_R = 650\text{ V}, T_C = 125\text{ }^\circ\text{C}$	-	-	400	
		$V_R = 650\text{ V}, T_C = 175\text{ }^\circ\text{C}$	-	-	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 $T_J = 25\text{ }^\circ\text{C}$, $L = 0.5\text{ mH}$, $I_{AS} = 19.5\text{ A}$, $V = 50\text{ V}$.

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

Figure 1. Forward Characteristics

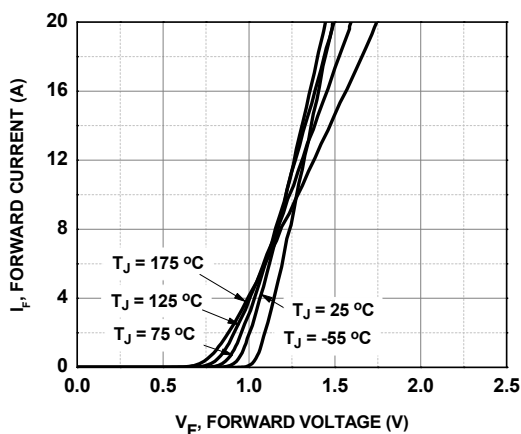


Figure 2. Reverse Characteristics

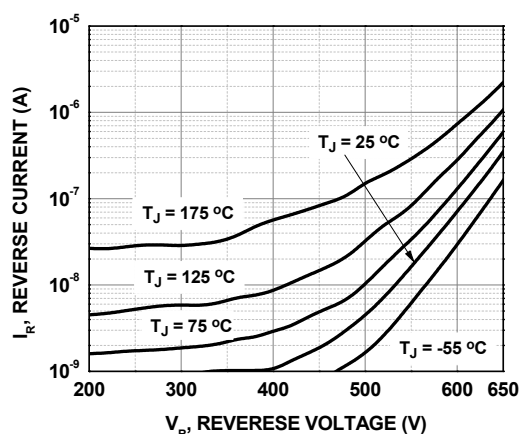


Figure 3. Current Derating

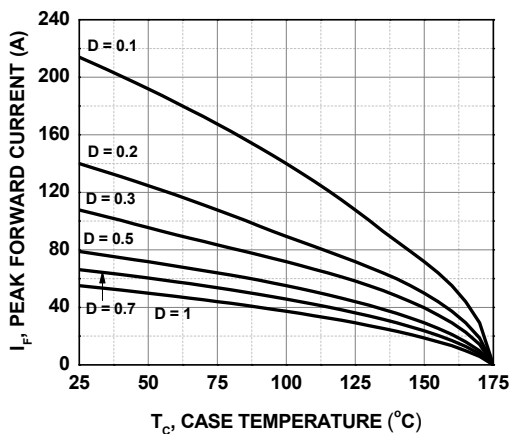
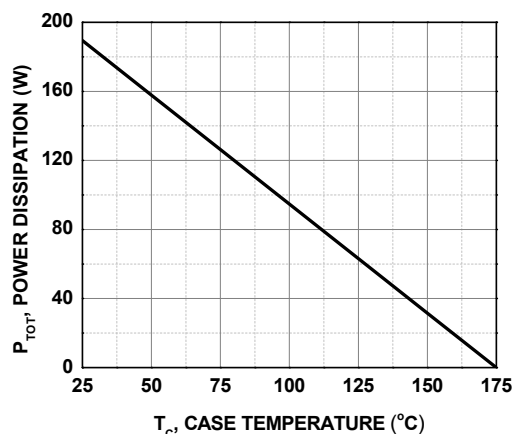


Figure 4. Power Derating



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

Figure 5. Capacitive Charge vs. Reverse Voltage

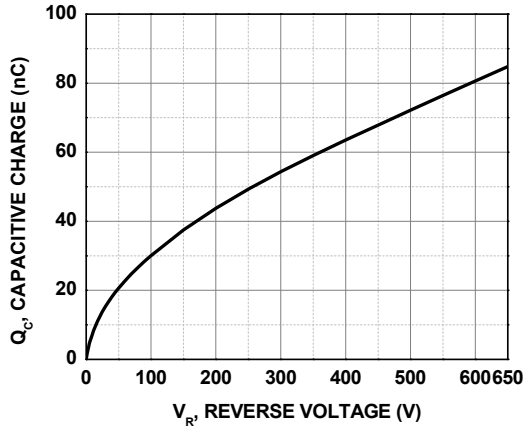


Figure 6. Capacitance vs. Reverse Voltage

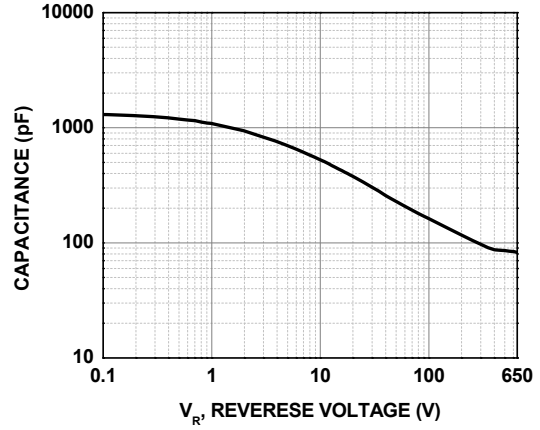


Figure 7. Capacitance Stored Energy

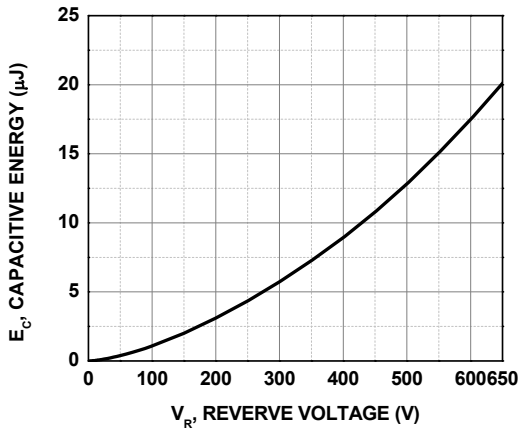
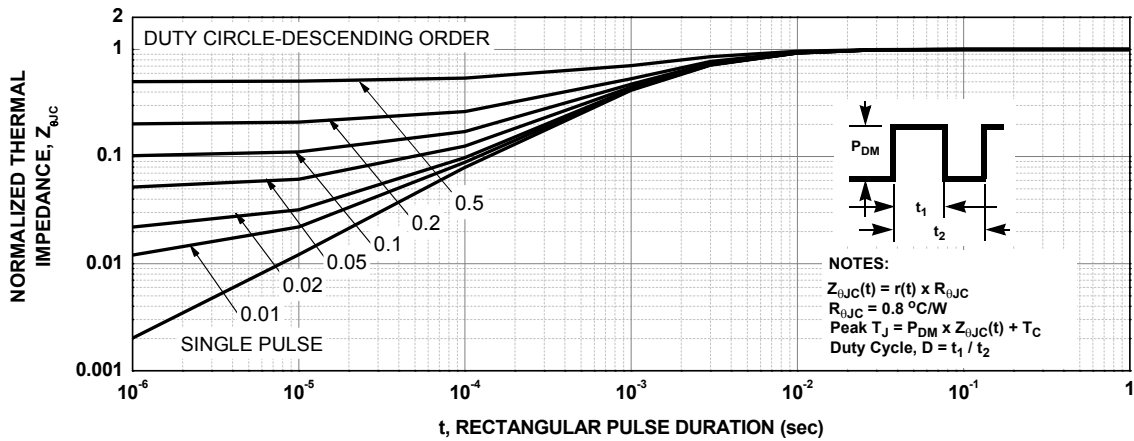


Figure 8. Junction-to-Case Transient Thermal Response Curve



Test Circuit and Waveforms

Figure 9. Unclamped Inductive Switching Test Circuit & Waveform

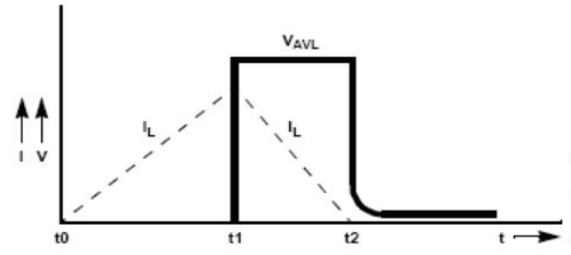
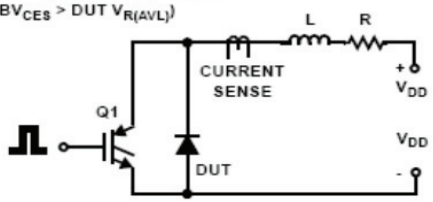
$L = 0.5\text{mH}$

$R < 0.1\Omega$

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

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

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



Mechanical Dimensions

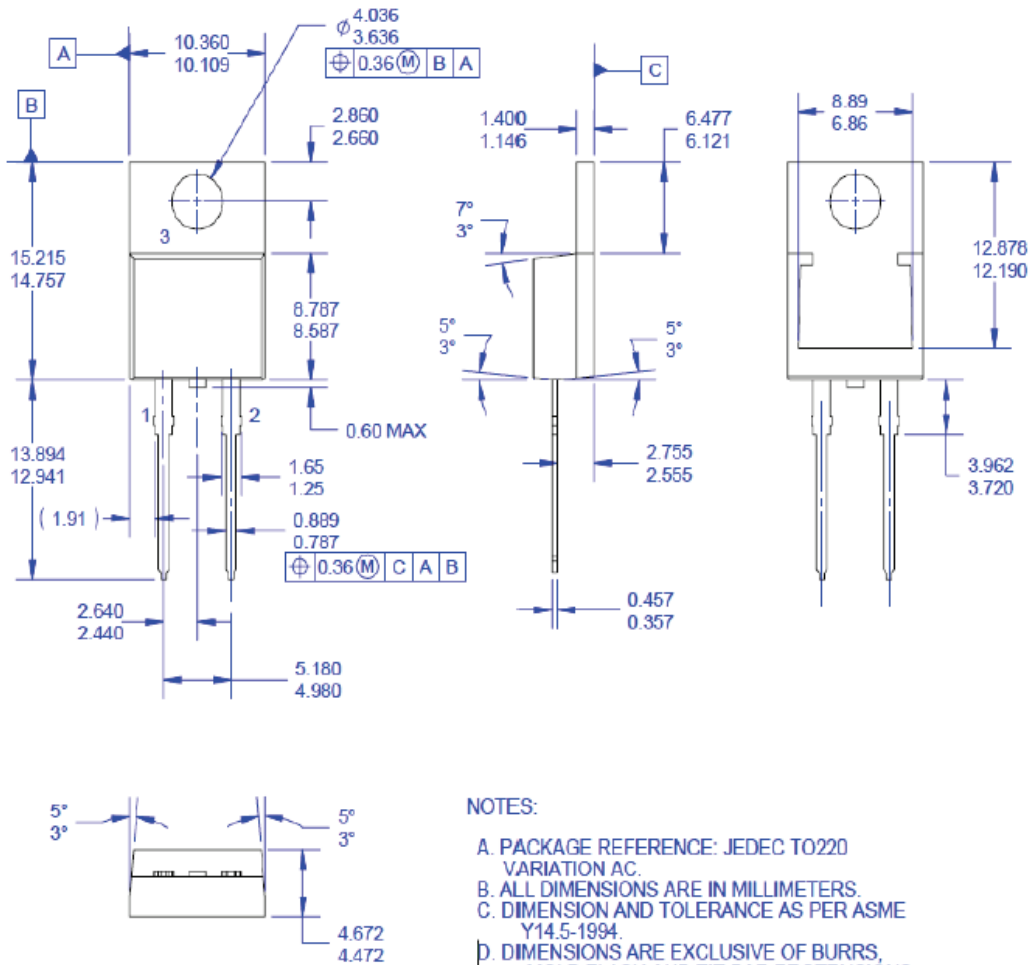


Figure 10. TO-220 2L - TO-220, MOLDED, 2LD

ON Semiconductor and the ON Logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries.

ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein.

ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor.

"Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.