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July 2016

FFSP3065A

Silicon Carbide Schottky Diode

650 V, 30 A

Features

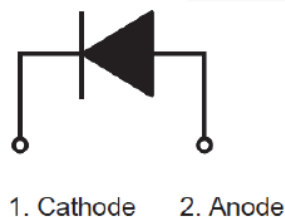
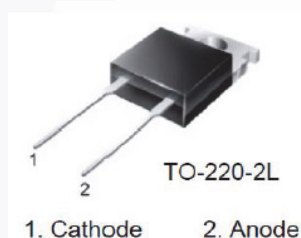
- Max Junction Temperature 175 °C
- Avalanche Rated 180 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery / No Forward Recovery

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

Symbol	Parameter	FFSP3065A	Unit
V_{RRM}	Peak Repetitive Reverse Voltage	650	V
E_{AS}	Single Pulse Avalanche Energy (Note 1)	180	mJ
I_F	Continuous Rectified Forward Current @ $T_C < 148\text{ }^{\circ}\text{C}$	30	A
$I_{F, Max}$	Non-Repetitive Peak Forward Surge Current	$T_C = 25\text{ }^{\circ}\text{C}$, 10 μs	1125
		$T_C = 150\text{ }^{\circ}\text{C}$, 10 μs	1040
$I_{F, SM}$	Non-Repetitive Forward Surge Current	Half-Sine Pulse, $t_p = 8.3\text{ ms}$	150
$I_{F, RM}$	Repetitive Forward Surge Current	Half-Sine Pulse, $t_p = 8.3\text{ ms}$	75
P_{tot}	Power Dissipation	$T_C = 25\text{ }^{\circ}\text{C}$	240
		$T_C = 150\text{ }^{\circ}\text{C}$	40
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +175	$^{\circ}\text{C}$

Thermal Characteristics

Symbol	Parameter	FFSP3065A	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.62	$^{\circ}\text{C/W}$

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FFSP3065A	FFSP3065A	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	$I_F = 30\text{ A}, T_C = 25^\circ\text{C}$	-	1.50	1.75	V
		$I_F = 30\text{ A}, T_C = 125^\circ\text{C}$	-	1.60	2.0	
		$I_F = 30\text{ A}, T_C = 175^\circ\text{C}$	-	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	$V = 400\text{ V}$	-	100	-	nC
C	Total Capacitance	$V_R = 1\text{ V}, f = 100\text{ kHz}$	-	1705	-	pF
		$V_R = 200\text{ V}, f = 100\text{ kHz}$	-	180	-	
		$V_R = 400\text{ V}, f = 100\text{ kHz}$	-	130	-	

Notes:

1: EAS of 180 mJ is based on starting $T_J = 25^\circ\text{C}$, $L = 0.5\text{ mH}$, $I_{AS} = 27\text{ A}$, $V = 50\text{ V}$.

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

Figure 1. Forward Characteristics

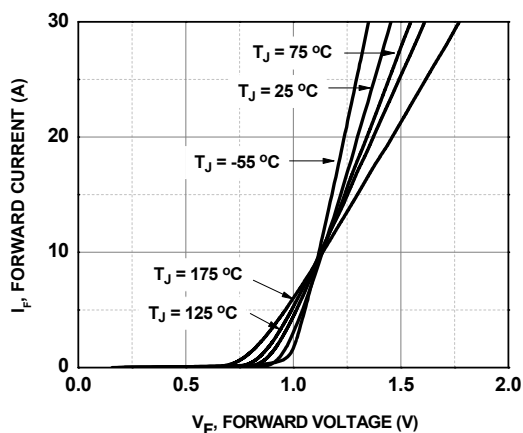


Figure 2. Reverse Characteristics

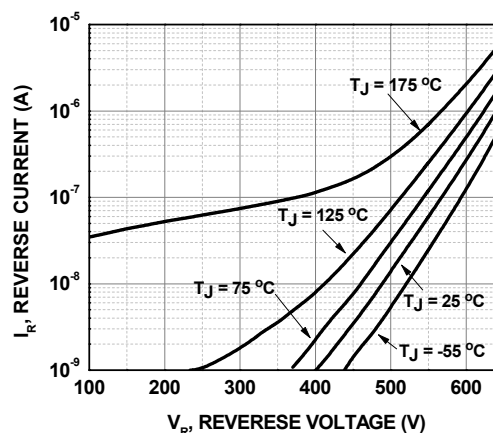


Figure 3. Current Derating

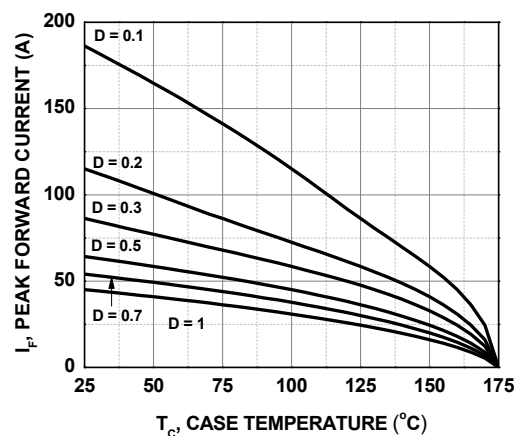
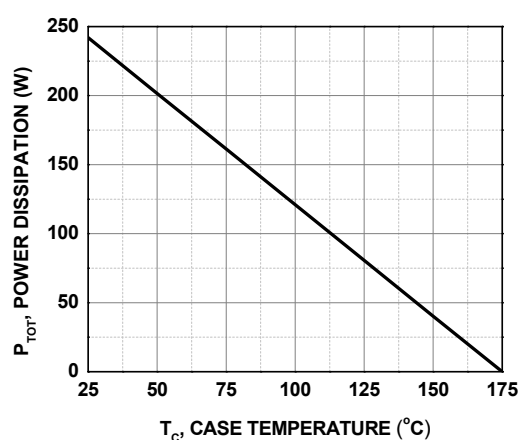


Figure 4. Power Derating



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

Figure 5. Capacitive Charge vs. Reverse Voltage

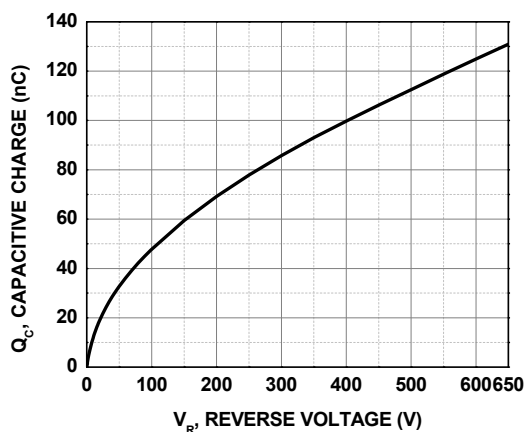


Figure 6. Capacitance vs. Reverse Voltage

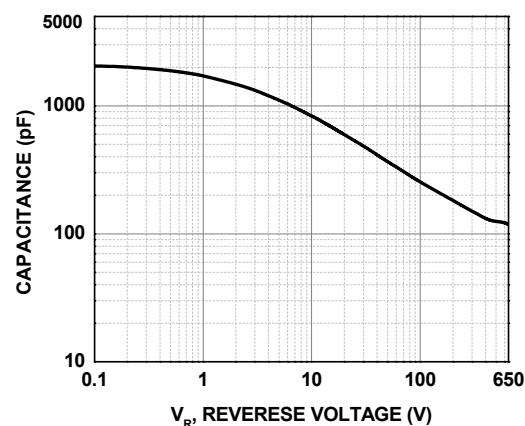


Figure 7. Capacitance Stored Energy

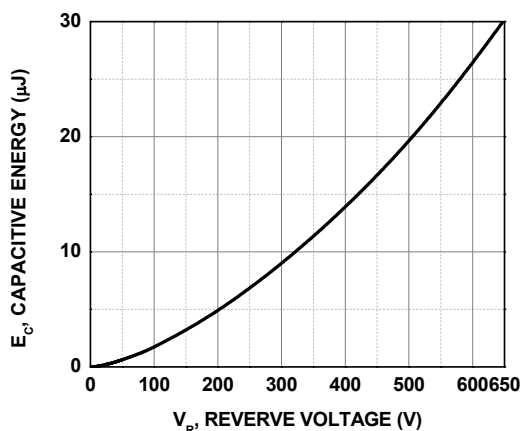
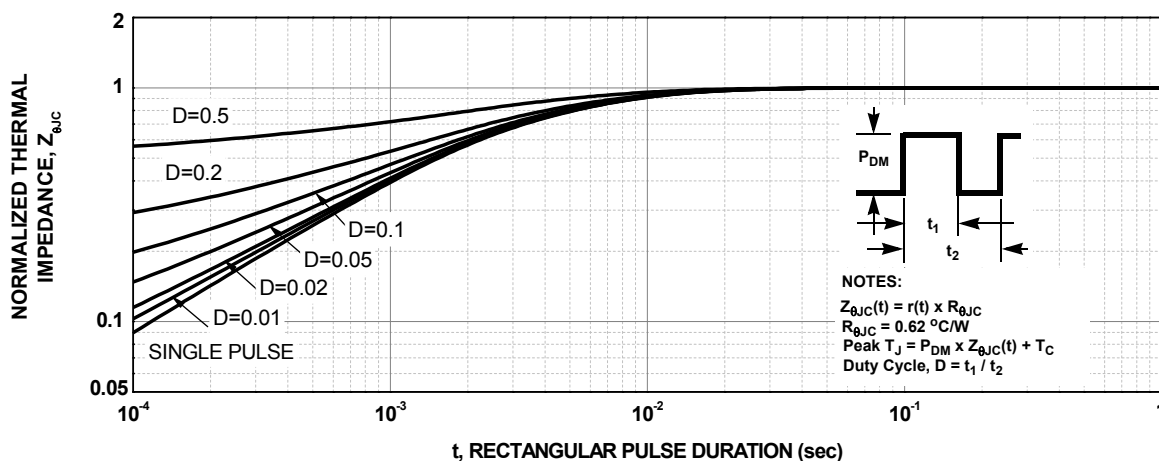


Figure 8. Junction-to-Case Transient Thermal Response Curve



Test Circuit and Waveforms

Figure 9. Unclamped Inductive Switching Test Circuit & Waveform

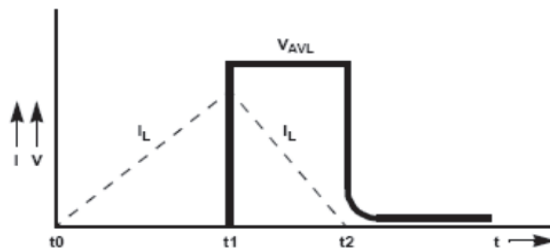
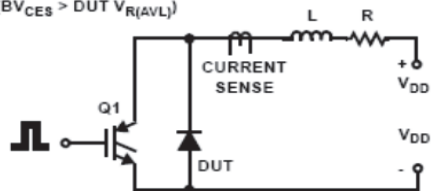
$L = 0.5\text{mH}$

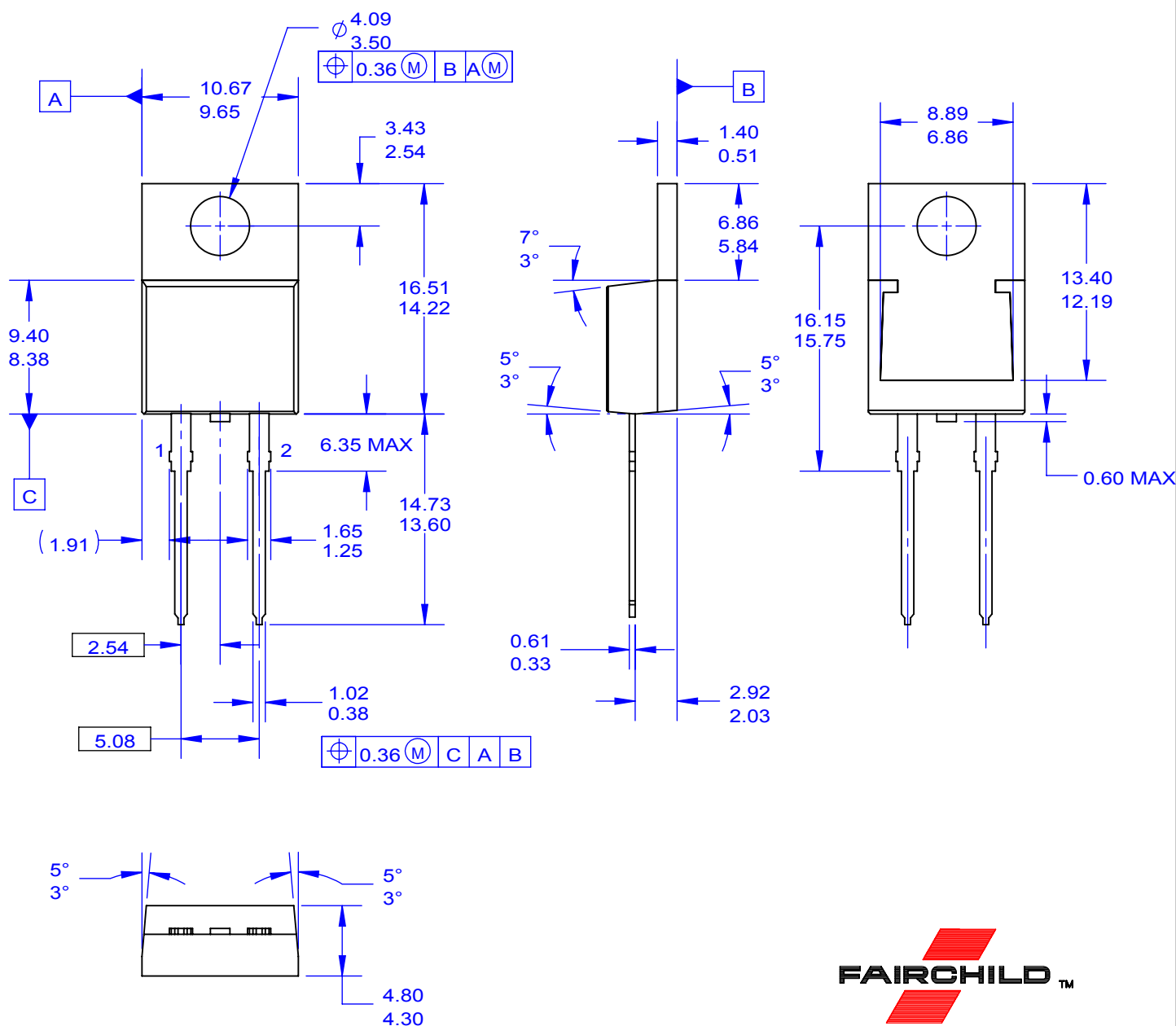
$R < 0.1\Omega$

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

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

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





NOTES:

- A. PACKAGE REFERENCE: JEDEC TO220,ISSUE K, VARIATION AC,DATED APRIL 2002.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
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