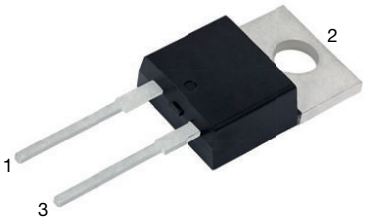
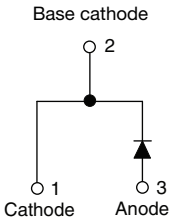
650 V Power SiC Gen 3 Merged PIN Schottky Diode, 10 A



TO-220AC 2L



LINKS TO ADDITIONAL RESOURCES

3D Models

Application Notes

PRIMARY CHARACTERISTICS

$I_{F(AV)}$	10 A
V_R	650 V
V_F at I_F at 25 °C, typ.	1.3 V
T_J max.	175 °C
I_R at V_R at 175 °C	4.5 µA
Q_C (V_R = 400 V)	29 nC
Package	TO-220AC 2L
Circuit configuration	Single

FEATURES

- Majority carrier diode using Schottky technology on SiC wide band gap material
- Improved V_F and efficiency by thin wafer technology
- Positive V_F temperature coefficient for easy paralleling
- Virtually no recovery tail and no switching losses
- Temperature invariant switching behavior
- 175 °C maximum operating junction temperature
- MPS structure for high ruggedness to forward current surge events
- Meets JESD 201 class 2 whisker test
- Solder bath temperature 275 °C maximum, 10 s per JESD 22-B106
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

HALOGEN FREE

DESCRIPTION / APPLICATIONS

Wide band gap SiC based 650 V Schottky diode, designed for high performance and ruggedness.

Optimum choice for high speed hard switching and efficient operation over a wide temperature range, it is also recommended for all applications suffering from Silicon ultrafast recovery behavior.

Typical applications include AC/DC PFC and DC/DC ultra high frequency output rectification in FBPS and LLC converters.

MECHANICAL DATA

Case: TO-220AC 2L

Molding compound meets UL 94 V-0 flammability rating Base P/N-M3 - halogen-free, RoHS-compliant

Terminals: matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

Mounting torque: 10 in-lbs maximum

MAXIMUM RATINGS (T_A = 25 °C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous forward current	I_F (1)	T_C = 140 °C (DC)	10	A
	I_F (2)	T_C = 147 °C (DC)		
DC blocking voltage	V_{DC}		650	V
Repetitive peak forward current	I_{FRM}	T_C = 25 °C, f = 50 Hz, square wave, DC = 25 %	41	A
Non-repetitive peak forward surge current	I_{FSM}	T_C = 25 °C, t_p = 10 ms, half sine wave	60	A
		T_C = 110 °C, t_p = 10 ms, half sine wave	58	
Power dissipation	P_{tot} (1)	T_C = 25 °C	64	W
		T_C = 110 °C	28	
	P_{tot} (2)	T_C = 25 °C	83	
		T_C = 110 °C	36	
I^2t value	$\int i^2 dt$	T_C = 25 °C	18	A^2s
		T_C = 110 °C	17	
Operating junction and storage temperatures	T_J (3), T_{Stg}		-55 to +175	°C

Notes

(1) Based on maximum R_{th}

(2) Based on typical R_{th}

(3) The heat generated must be less than the thermal conductivity from junction-to-ambient: $dP_D/dT_J < 1/R_{\theta JA}$

ELECTRICAL SPECIFICATIONS (T_J = 25 °C unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Forward voltage	V_F	I_F = 10 A	-	1.3	1.5	V
		I_F = 10 A, T_J = 150 °C	-	1.46	1.85	
		I_F = 10 A, T_J = 175 °C	-	1.52	-	
Reverse leakage current	I_R	V_R = V_R rated	-	0.7	55	µA
		V_R = V_R rated, T_J = 150 °C	-	2.8	125	
		V_R = V_R rated, T_J = 175 °C	-	4.5	-	
Total capacitance	C	V_R = 1 V, f = 1 MHz	-	445	-	pF
		V_R = 400 V, f = 1 MHz	-	43	-	
Total capacitive charge	Q_C	V_R = 400 V, f = 1 MHz	-	29	-	nC

THERMAL - MECHANICAL SPECIFICATIONS (T_A = 25 °C unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction-to-case	R_{thJC}		-	1.8	2.3	°C/W
Marking device			3C10ET07T			

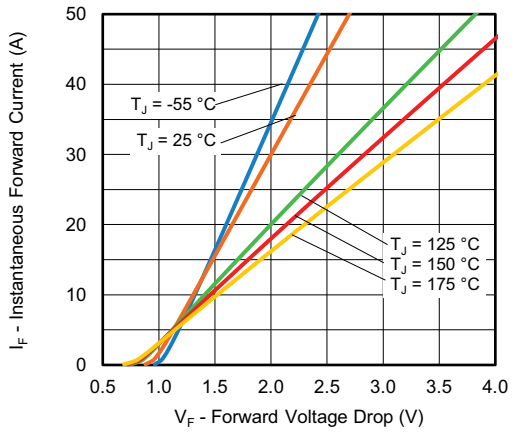


Fig. 1 - Typical Forward Voltage Drop Characteristics

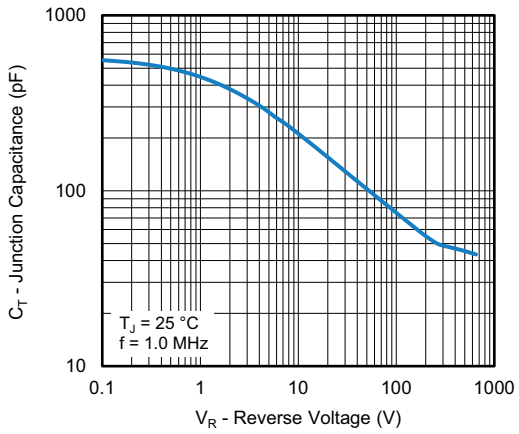


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

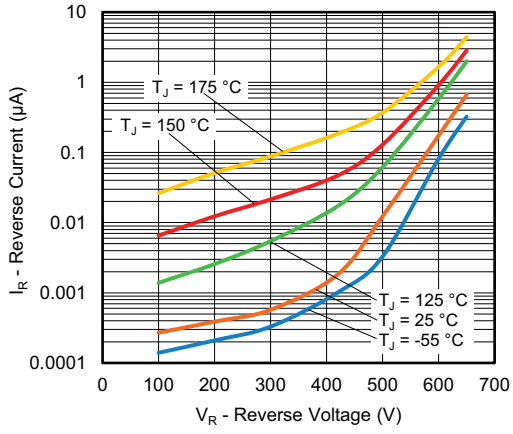


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

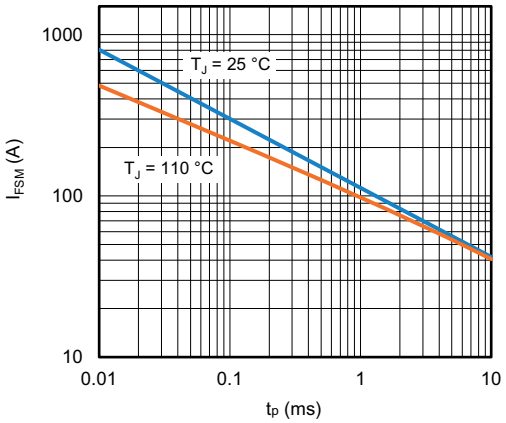


Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration (Square Wave)

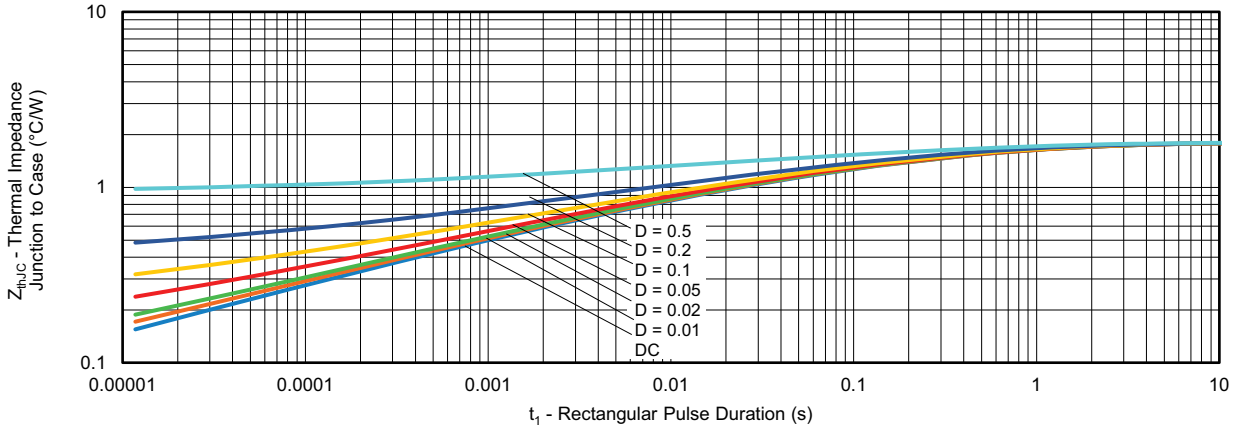


Fig. 5 - Typical Thermal Impedance Z_{thJC} Characteristics

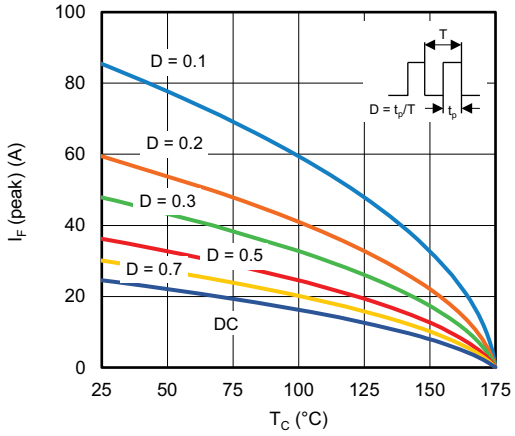


Fig. 6 - Peak Forward Current vs. Maximum Allowable Case Temperature

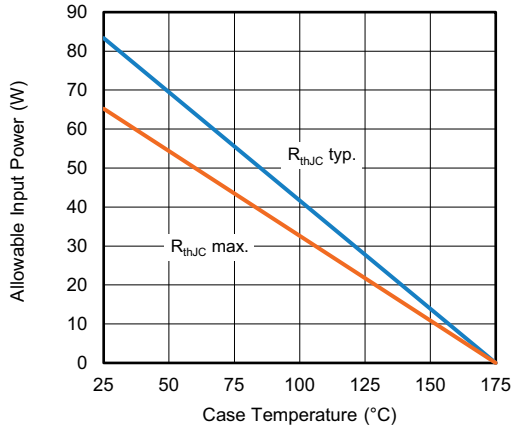


Fig. 7 - Forward Power Loss Characteristics

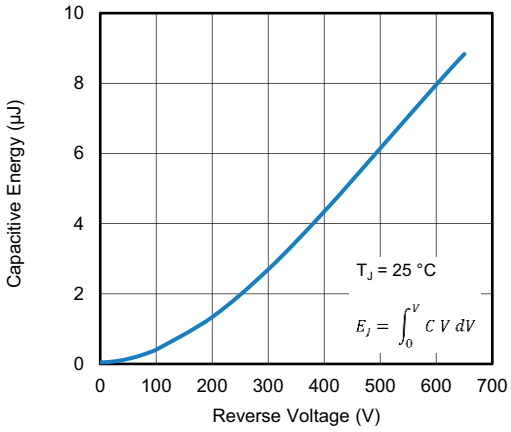


Fig. 8 - Typical Capacitive Energy vs. Reverse Voltage

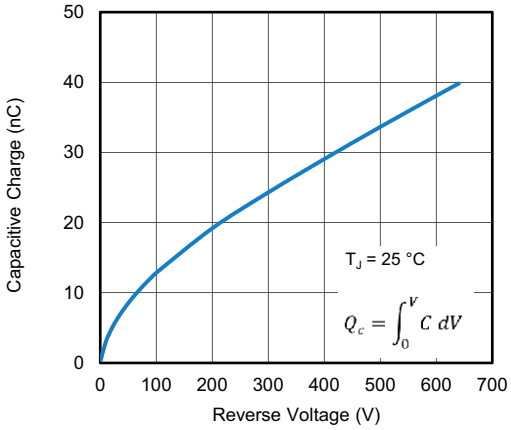
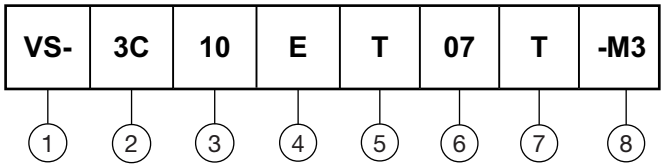


Fig. 9 - Typical Capacitive Charge vs. Reverse Voltage

ORDERING INFORMATION TABLE

Device code



1 - Vishay Semiconductors product
2 - 3C = SiC diode, Generation 3
3 - Current rating (10 = 10 A)
4 - E = single diode
5 - Package TO-220
6 - Voltage rating: (07 = 650 V)
7 - T = true 2 pin
8 - Environmental digit:
-M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

ORDERING INFORMATION		
PREFERRED P/N	**BASE QUANTITY**	**PACKAGING DESCRIPTION**
VS-3C10ET07T-M3	50 / tube	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?96069
Part marking information	www.vishay.com/doc?95391

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