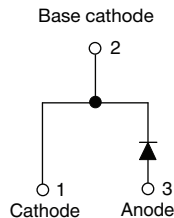


650 V Power SiC Merged PIN Schottky Diode, 12 A


RoHS
 COMPLIANT
 HALOGEN
FREE

FEATURES

- Majority carrier diode using Schottky technology on SiC wide band gap material
- 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 1A 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

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: 2L TO-220AC

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

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	12 A
V_R	650 V
V_F at I_F at 150 °C	1.65 V
T_J max.	175 °C
I_R at V_R at 175 °C	10 μ A
Q_C ($V_R = 400$ V)	33 nC
Package	2L TO-220AC
Circuit configuration	Single

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C unless otherwise specified)				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	V_{RRM}		650	V
Average rectified forward current	$I_{F(AV)}$	$T_C = 122$ °C (DC)	12	A
DC blocking voltage	V_{DC}		650	V
Repetitive peak surge current	I_{FRM}	$T_C = 25$ °C, $f = 50$ Hz, square wave, DC = 25 %	42	A
Non-repetitive peak forward surge current	I_{FSM}	$T_C = 25$ °C, $t_p = 10$ ms, half sine wave	80	
		$T_C = 110$ °C, $t_p = 10$ ms, half sine wave	73	
Power dissipation	$P_{tot}^{(1)}$	$T_C = 25$ °C	68	W
		$T_C = 110$ °C	29	
I^2t value	$\int i^2 dt$	$T_C = 25$ °C	32	A ² s
		$T_C = 110$ °C	27	
Operating junction and storage temperatures	$T_J^{(2)}, T_{Stg}$		-55 to +175	°C

Notes

(1) Based on maximum R_{th}

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



ELECTRICAL SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Forward voltage	V_F	$I_F = 12\text{ A}$	-	1.45	1.7	V
		$I_F = 12\text{ A}, T_J = 150\text{ }^\circ\text{C}$	-	1.65	1.95	
		$I_F = 12\text{ A}, T_J = 175\text{ }^\circ\text{C}$	-	1.75	-	
Reverse leakage current	I_R	$V_R = V_R\text{ rated}$	-	-	65	μA
		$V_R = V_R\text{ rated}, T_J = 150\text{ }^\circ\text{C}$	-	-	150	
		$V_R = V_R\text{ rated}, T_J = 175\text{ }^\circ\text{C}$	-	10	-	
Total capacitance	C	$V_R = 1\text{ V}, f = 1\text{ MHz}$	-	515	-	pF
		$V_R = 400\text{ V}, f = 1\text{ MHz}$	-	53	-	
Total capacitive charge	Q_C	$V_R = 400\text{ V}, f = 1\text{ MHz}$	-	33	-	nC

THERMAL - MECHANICAL SPECIFICATIONS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction-to-case	R_{thJC}		-	1.7	2.2	$^\circ\text{C/W}$
Marking device			C12ET07T			

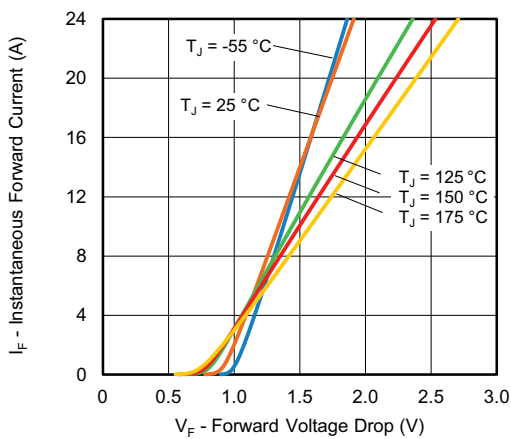


Fig. 1 - Typical Forward Voltage Drop Characteristics

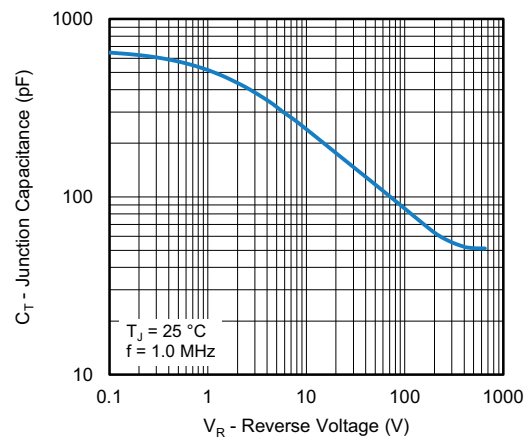


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

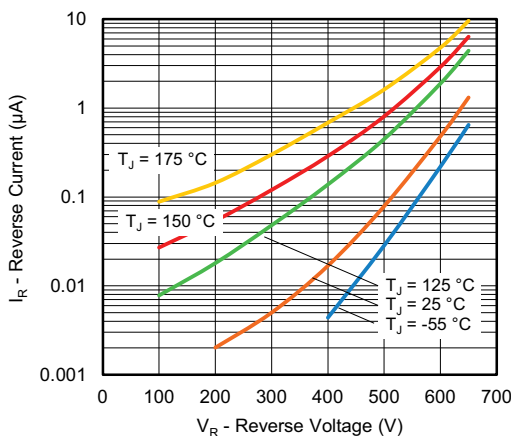


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

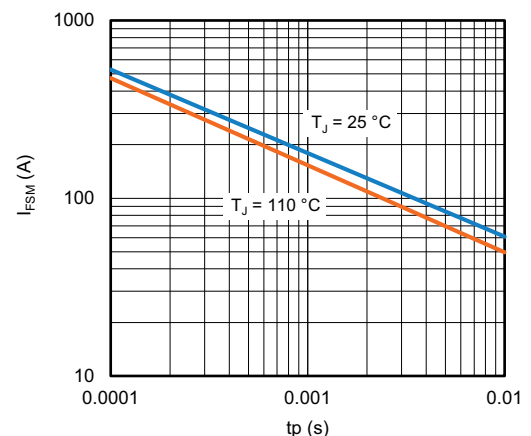


Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration (Square Wave)

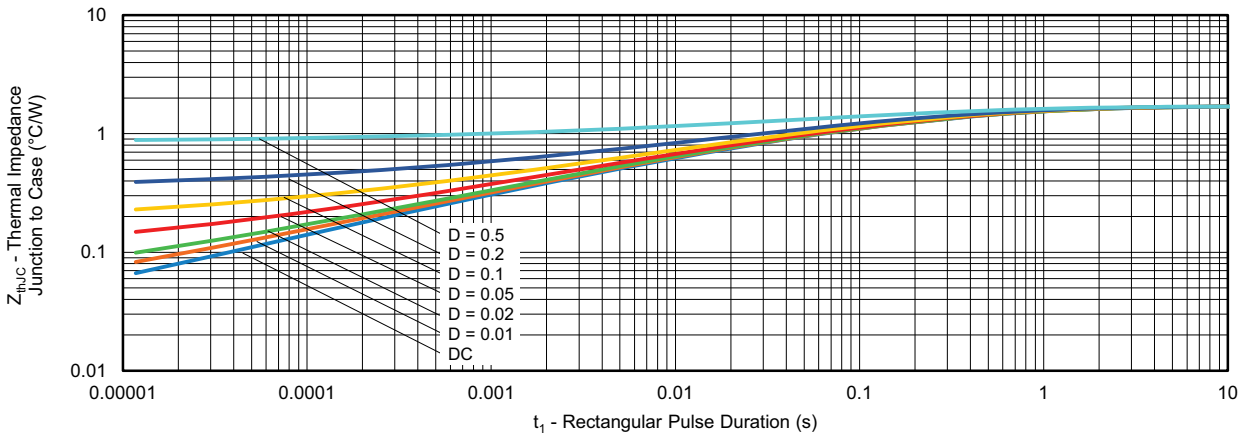


Fig. 5 - Typical Thermal Impedance Z_{thJC} Characteristics

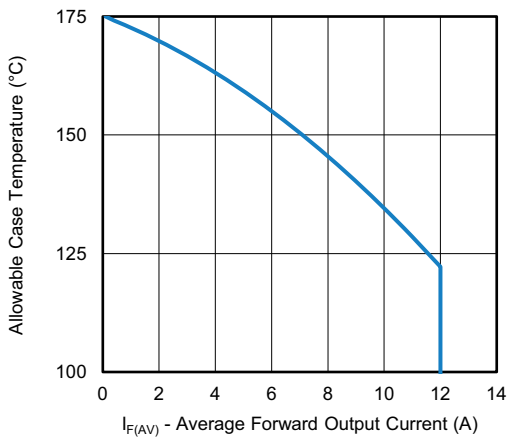


Fig. 6 - Maximum Allowable Case Temperature vs. Average Forward Current

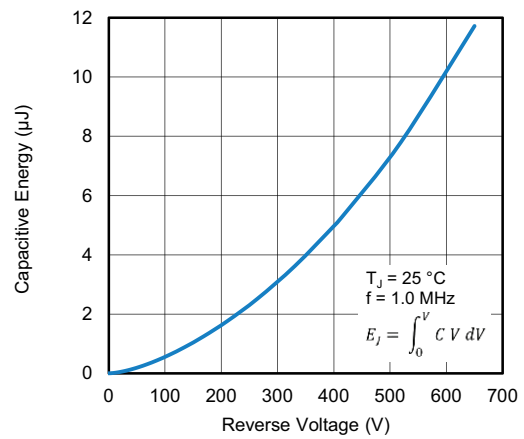


Fig. 8 - Typical Capacitive Energy vs. Reverse Voltage

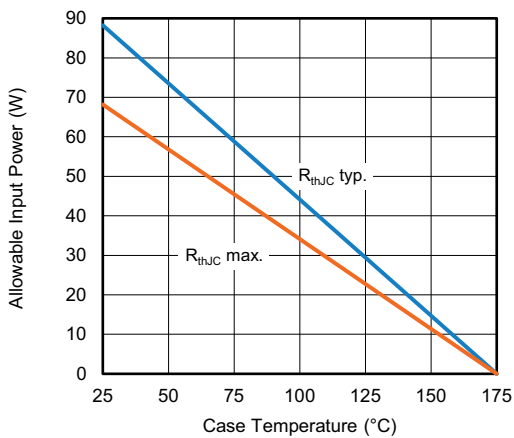


Fig. 7 - Forward Power Loss Characteristics

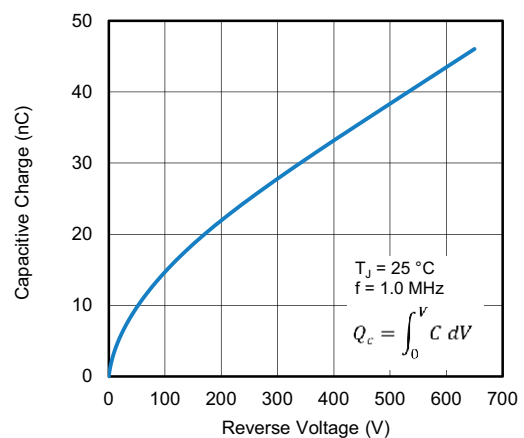
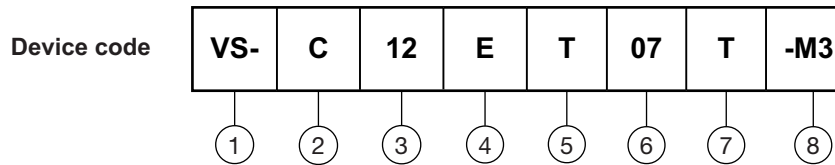


Fig. 9 - Typical Capacitive Charge vs. Reverse Voltage



ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - C = SiC diode
- 3** - Current rating (12 = 12 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	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-C12ET07T-M3	50/tube	1000	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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