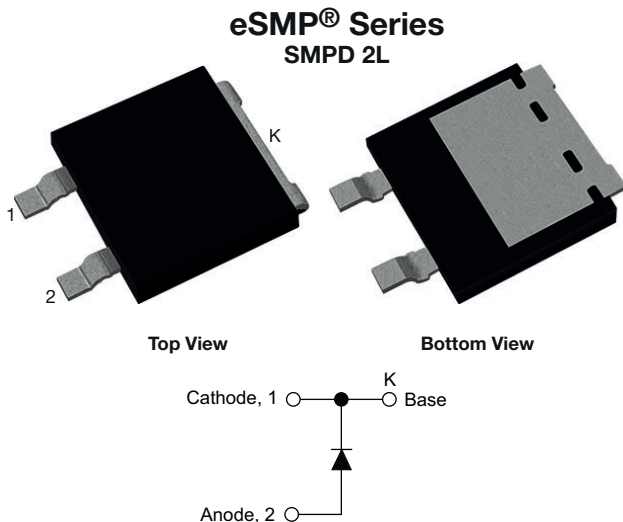


# 650 V Power SiC Gen 3 Merged PIN Schottky Diode, 10 A



## LINKS TO ADDITIONAL RESOURCES



PRIMARY CHARACTERISTICS	
$I_F$	10 A
$V_R$	650 V
$V_F$ at $I_F$ at 25 °C, typ.	1.30 V
$T_J$ max.	175 °C
$I_R$ at $V_R$ at 175 °C	19 $\mu$ A
$Q_C$ ( $V_R = 400$ V)	29 nC
Package	SMPD 2L
Circuit configuration	Single

## FEATURES

- Creepage and clearance distance 3.6 mm minimum
- Very low profile – typical height of 1.7mm
- 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
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://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:** SMPD 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

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	$I_F$	$T_M = 147$ °C (DC)	10	A
DC blocking voltage	$V_{DC}$		650	V
Repetitive peak surge current	$I_{FRM}$	$T_M = 25$ °C, $f = 50$ Hz, square wave, DC = 25 %	49	A
Non-repetitive peak forward surge current	$I_{FSM}$	$T_M = 25$ °C, $t_p = 10$ ms, half sine wave	60	A
		$T_M = 110$ °C, $t_p = 10$ ms, half sine wave	58	
Power dissipation	$P_{tot}^{(1)}$	$T_M = 25$ °C	81	W
		$T_M = 110$ °C	35	
	$P_{tot}^{(2)}$	$T_M = 25$ °C	106	W
		$T_M = 110$ °C	46	
$I^2t$ value	$\int i^2 dt$	$T_M = 25$ °C	18	A <sup>2</sup> s
		$T_M = 110$ °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:  $dP_D/dT_J < 1/R_{\theta JA}$



<b>ELECTRICAL SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Forward voltage	$V_F$	$I_F = 10\text{ A}$	-	1.3	1.5	V
		$I_F = 10\text{ A}, T_J = 150\text{ }^\circ\text{C}$	-	1.46	1.85	
		$I_F = 10\text{ A}, T_J = 175\text{ }^\circ\text{C}$	-	1.52	-	
Reverse leakage current	$I_R$	$V_R = V_R\text{ rated}$	-	0.7	55	$\mu\text{A}$
		$V_R = V_R\text{ rated}, T_J = 150\text{ }^\circ\text{C}$	-	11	125	
		$V_R = V_R\text{ rated}, T_J = 175\text{ }^\circ\text{C}$	-	19	-	
Total capacitance	C	$V_R = 1\text{ V}, f = 1\text{ MHz}$	-	445	-	pF
		$V_R = 400\text{ V}, f = 1\text{ MHz}$	-	43	-	
Total capacitive charge	$Q_C$	$V_R = 400\text{ V}, f = 1\text{ MHz}$	-	29	-	nC

<b>THERMAL - MECHANICAL SPECIFICATIONS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction-to-mount	$R_{thJM}$		-	1.4	1.8	$^\circ\text{C/W}$
Marking device			3C10ED07T			

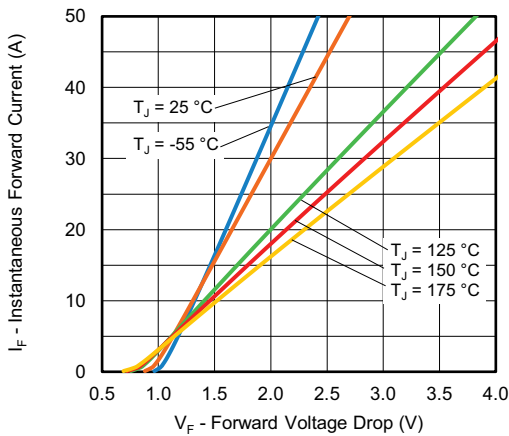


Fig. 1 - Typical Forward Voltage Drop Characteristics

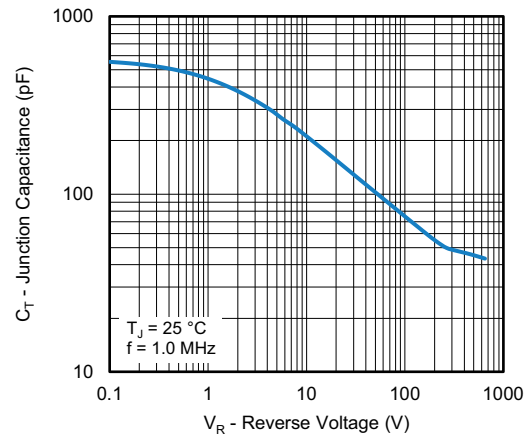


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

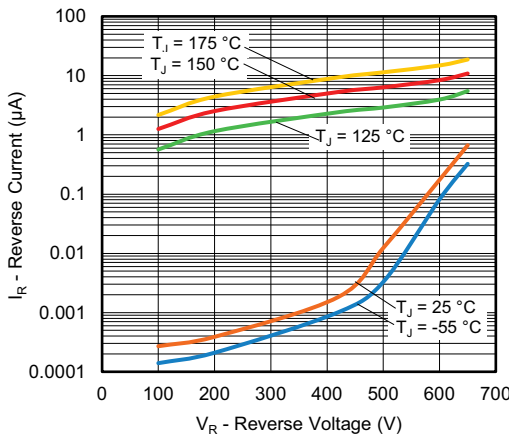


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

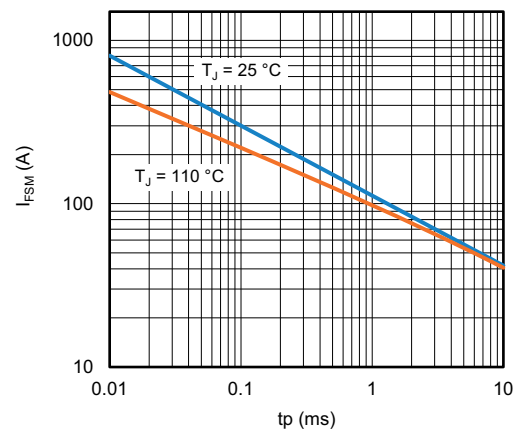


Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration (Square Wave)

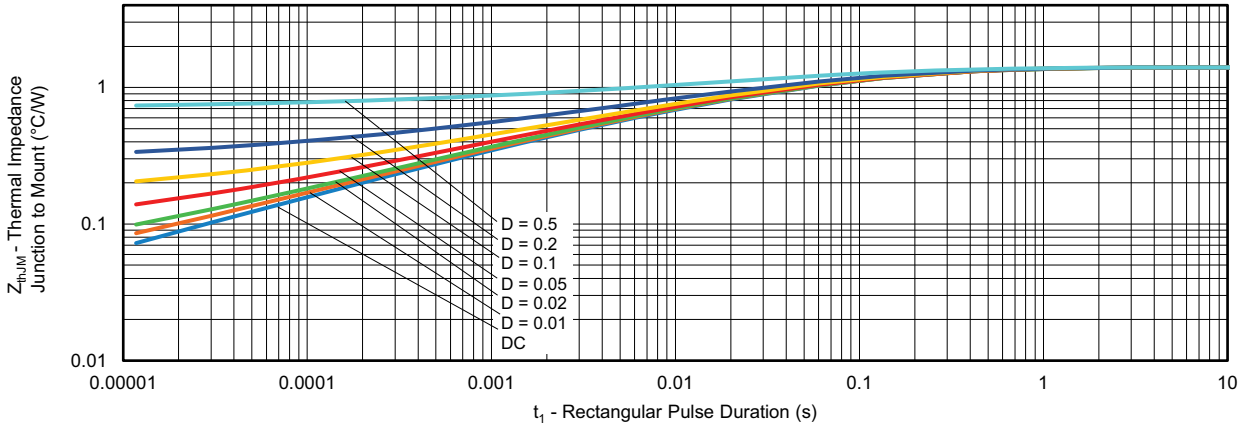


Fig. 5 - Typical Thermal Impedance  $Z_{thJM}$  Characteristics

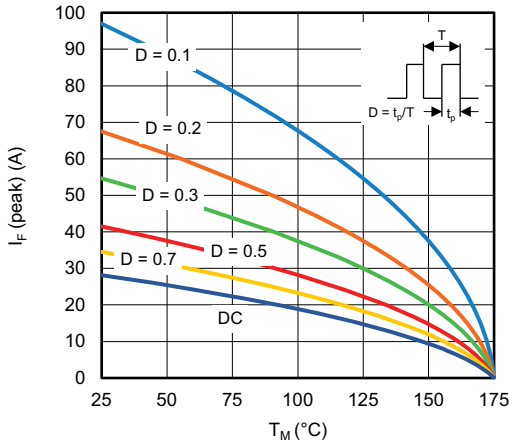


Fig. 6 - Peak Forward Current vs. Maximum Allowable Mount Temperature

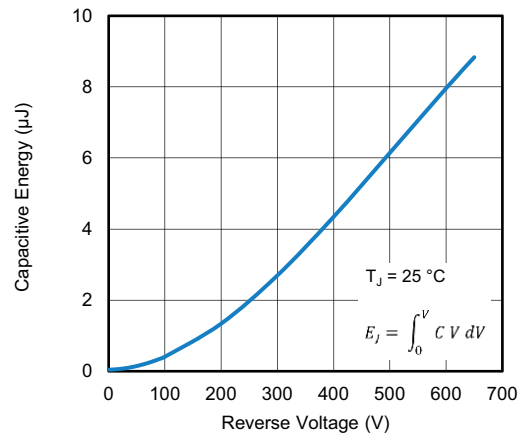


Fig. 8 - Typical Capacitive Energy vs. Reverse Voltage

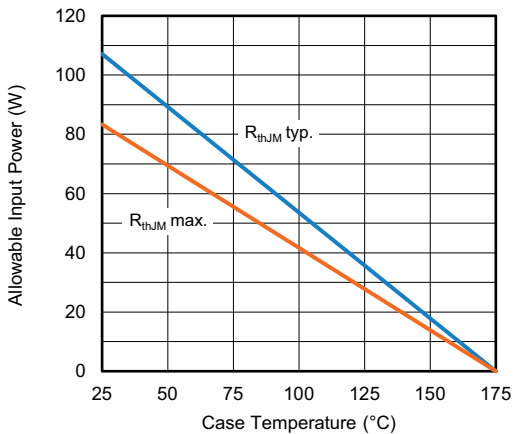


Fig. 7 - Forward Power Loss Characteristics

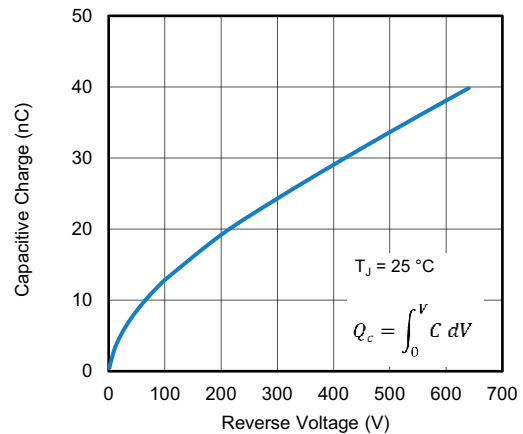
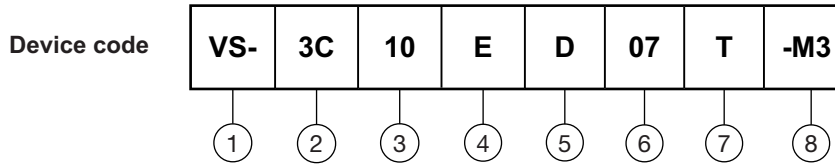


Fig. 9 - Typical Capacitive Charge vs. Reverse Voltage



### ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - 3C = SiC diode, Generation 3
- 3** - Current rating (10 = 10 A)
- 4** - E = single diode
- 5** - Package SMPD 2L
- 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				
ORDERING P/N	UNIT WEIGHT	PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
VS-3C10ED07T-M3/I	0.52 g	I	2000/reel	13" diameter plastic tape and reel

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?97059">www.vishay.com/doc?97059</a>
Part marking information	<a href="http://www.vishay.com/doc?97105">www.vishay.com/doc?97105</a>
Packaging information	<a href="http://www.vishay.com/doc?88869">www.vishay.com/doc?88869</a>



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