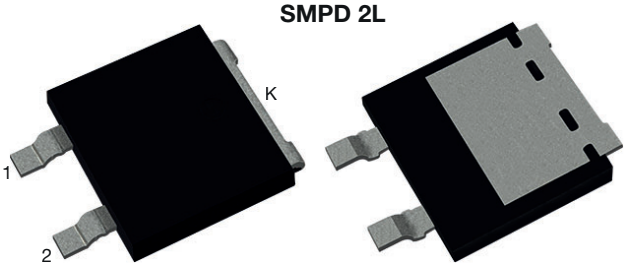
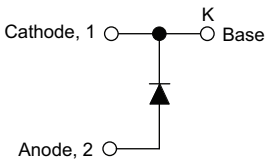
650 V Power SiC Gen 3 Merged PIN Schottky Diode, 16 A

eSMP® Series
SMPD 2L



Top View | Bottom View



LINKS TO ADDITIONAL RESOURCES

Ultra Librarian EDA / CAD

PRIMARY CHARACTERISTICS	
I_F	16 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	25 µA
Q_C (V_R = 400 V)	44 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

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	NOTES / TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous forward current	I_F	T_M = 141 °C (DC)	16	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 %	71	A
Non-repetitive peak forward surge current	I_{FSM}	T_M = 25 °C, t_p = 10 ms, half sine wave	104	A
		T_M = 110 °C, t_p = 10 ms, half sine wave	95	
Power dissipation	P_{tot} (1)	T_M = 25 °C	111	W
		T_M = 110 °C	48	
	P_{tot} (2)	T_M = 25 °C	143	W
		T_M = 110 °C	62	
I^2t value	$\int i^2 dt$	T_M = 25 °C	54	A^2s
		T_M = 110 °C	46	
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 = 16 A	-	1.3	1.5	V
		I_F = 16 A, T_J = 150 °C	-	1.5	1.80	
		I_F = 16 A, T_J = 175 °C	-	1.58	-	
Reverse leakage current	I_R	V_R = V_R rated	-	1.0	85	µA
		V_R = V_R rated, T_J = 150 °C	-	14	200	
		V_R = V_R rated, T_J = 175 °C	-	25	-	
Total capacitance	C	V_R = 1 V, f = 1 MHz	-	700	-	pF
		V_R = 400 V, f = 1 MHz	-	70	-	
Total capacitive charge	Q_C	V_R = 400 V, f = 1 MHz	-	44	-	nC

THERMAL - MECHANICAL SPECIFICATIONS (T_A = 25 °C unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction-to-mount	R_{thJM}		-	1.05	1.35	°C/W
Marking device			3C16ED07T			

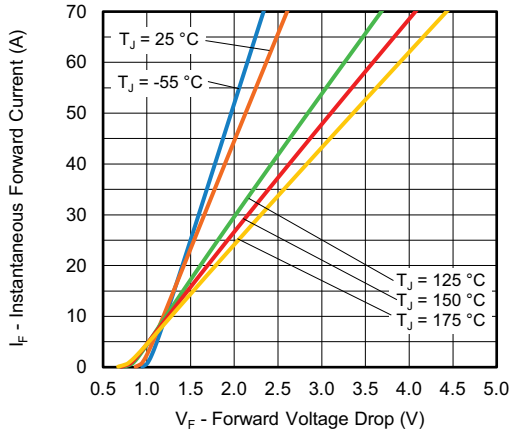


Fig. 1 - Typical Forward Voltage Drop Characteristics

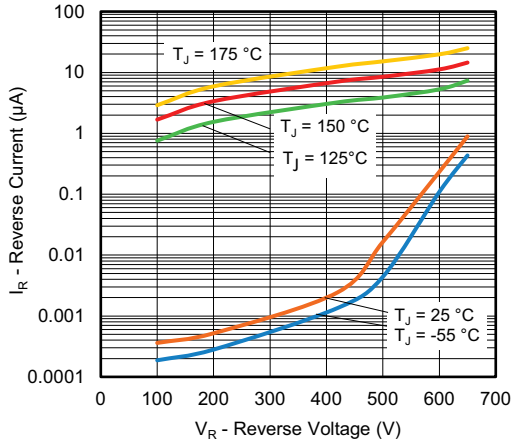


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

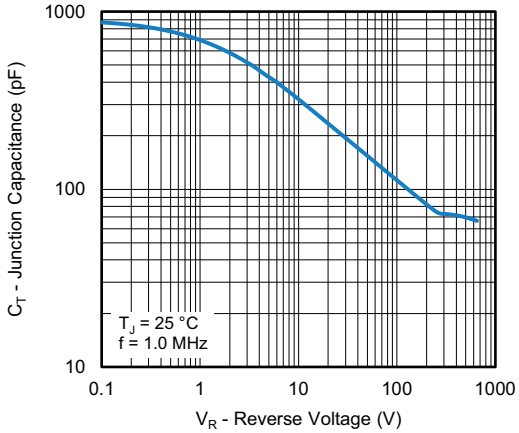


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

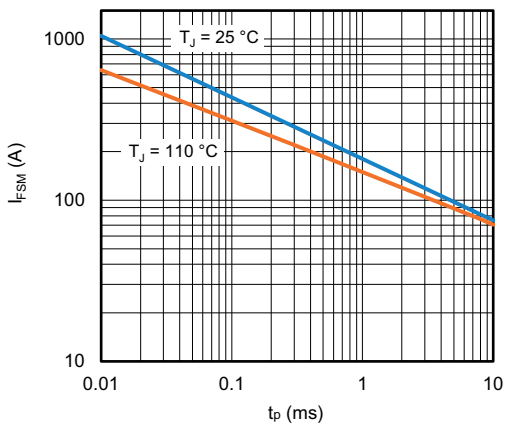


Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration (Square Wave)

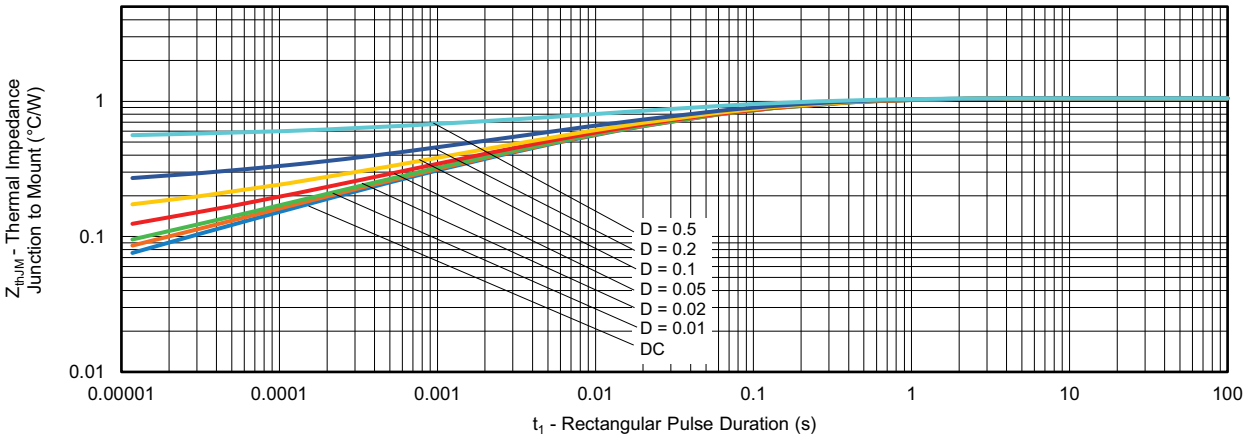


Fig. 5 - Typical Thermal Impedance Z_{thJM} Characteristics

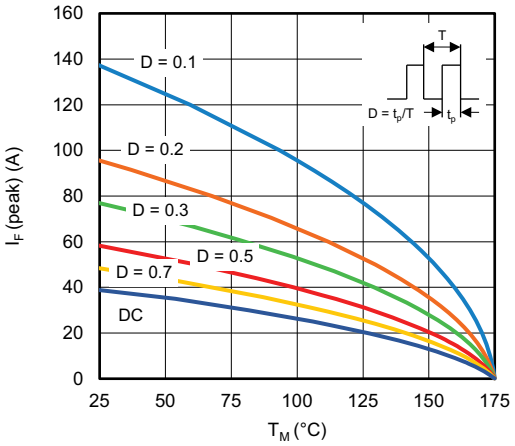


Fig. 6 - Peak Forward Current vs. Maximum Allowable Mount Temperature

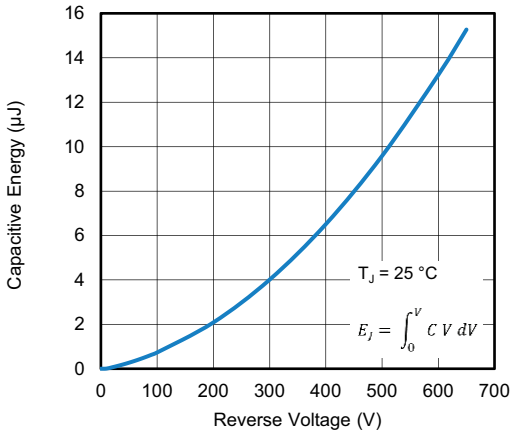


Fig. 8 - Typical Capacitive Energy vs. Reverse Voltage

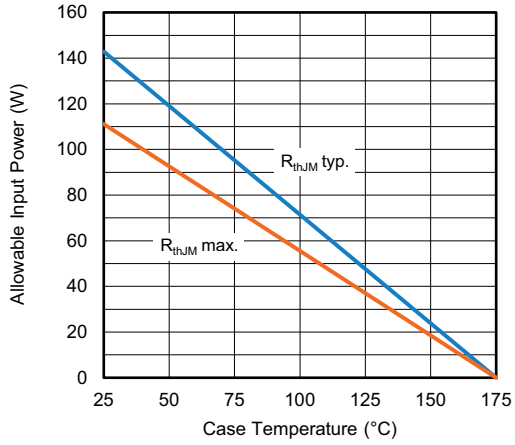


Fig. 7 - Forward Power Loss Characteristics

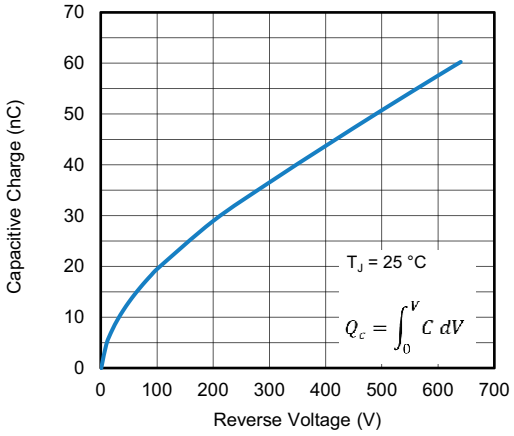
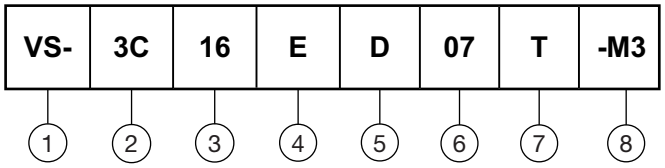


Fig. 9 - Typical Capacitive Charge vs. Reverse Voltage

ORDERING INFORMATION TABLE

Device code



1 - Vishay Semiconductors product
2 - 3C = SiC diode, Generation 3
3 - Current rating (16 = 16 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-3C16ED07T-M3/I	0.52 g	I	2000/reel	13" diameter plastic tape and reel

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?97059
Part marking information	www.vishay.com/doc?97105
Packaging information	www.vishay.com/doc?88869

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