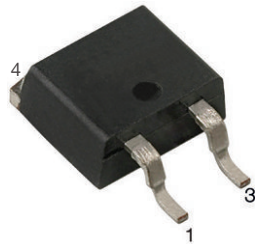
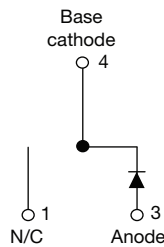


# 650 V Gen 4 Power Silicon Carbide Schottky Diode, 10 A


**D<sup>2</sup>PAK 2L (TO-263AB 2L)**


## FEATURES

- 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
- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C
- AEC-Q101 qualified, meets JESD 201 class 2 whisker test
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## LINKS TO ADDITIONAL RESOURCES



3D Models

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	50 $\mu$ A
$Q_C$ ( $V_R = 400$ V)	27 nC
Package	D <sup>2</sup> PAK 2L (TO-263AB 2L)
Circuit configuration	Single

## DESCRIPTION / APPLICATIONS

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

Optimized for extreme high-speed hard switching across a wide temperature range. This SiC diode is ideal for demanding applications such as high efficiency PFC diodes and ultra-high frequency output rectifiers in AC/DC and DC/DC converters.

## MECHANICAL DATA

**Case:** D<sup>2</sup>PAK 2L (TO-263AB 2L)

Molding compound meets UL 94 V-0 flammability rating

Base P/N-HM3 - halogen-free, RoHS-compliant, and AEC-Q101 qualified

**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	$I_F^{(1)}$	$T_C = 145$ °C (DC)	10	A
	$I_F^{(2)}$	$T_C = 138$ °C (DC)	10	A
DC blocking voltage	$V_{DC}$		650	V
Repetitive peak forward 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	60	
		$T_C = 110$ °C, $t_p = 10$ ms, half sine wave	48	
Power dissipation	$P_{tot}^{(1)}$	$T_C = 25$ °C	79	W
		$T_C = 110$ °C	34	
	$P_{tot}^{(2)}$	$T_C = 25$ °C	62.5	W
		$T_C = 110$ °C	27	
$I^2t$ value	$\int i^2 dt$	$T_C = 25$ °C	18	A <sup>2</sup> s
		$T_C = 110$ °C	11.5	
Operating junction and storage temperatures	$T_J^{(2)}$ , $T_{Stg}$		-55 to +175	°C

## Notes

(1) Based on typical  $R_{th}$

(2) Based on maximum  $R_{th}$

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

**ELECTRICAL SPECIFICATIONS** ( $T_J = 25\text{ }^{\circ}\text{C}$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Forward voltage	$V_F$	$I_F = 10\text{ A}$	-	1.3	1.5	V
		$I_F = 10\text{ A}, T_J = 150\text{ }^{\circ}\text{C}$	-	1.45	1.75	
		$I_F = 10\text{ A}, T_J = 175\text{ }^{\circ}\text{C}$	-	1.55	-	
Reverse leakage current	$I_R$	$V_R = V_R\text{ rated}$	-	2	80	$\mu\text{A}$
		$V_R = V_R\text{ rated}, T_J = 150\text{ }^{\circ}\text{C}$	-	23	160	
		$V_R = V_R\text{ rated}, T_J = 175\text{ }^{\circ}\text{C}$	-	50	-	
Total capacitance	C	$V_R = 1\text{ V}, f = 1\text{ MHz}$	-	440	-	pF
		$V_R = 400\text{ V}, f = 1\text{ MHz}$	-	38	-	
Total capacitive charge	$Q_C$	$V_R = 400\text{ V}, f = 1\text{ MHz}$	-	27	-	nC

**THERMAL AND 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	$R_{thJC}$		-	1.9	2.4	$^{\circ}\text{C/W}$
Marking device			4C10ET07S			

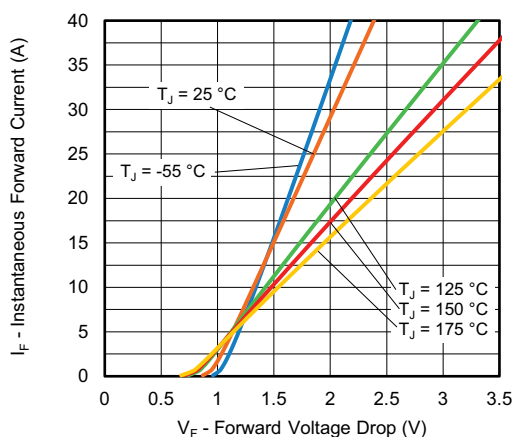


Fig. 1 - Typical Forward Voltage Drop Characteristics

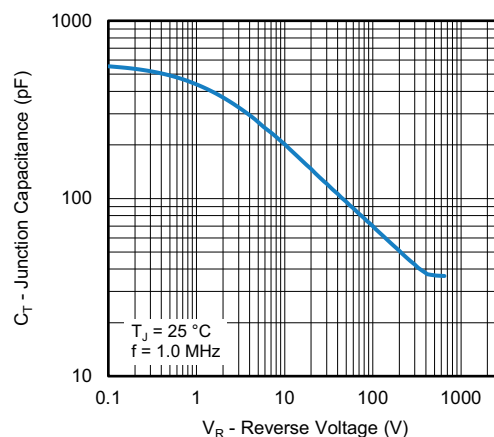


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

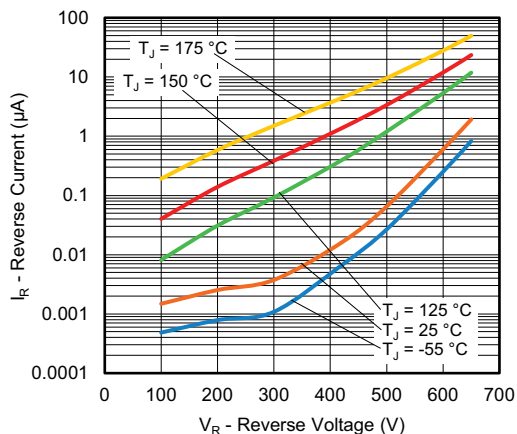


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

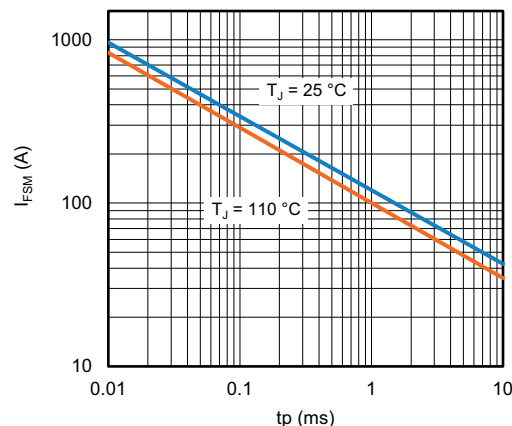


Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration (Square Wave)

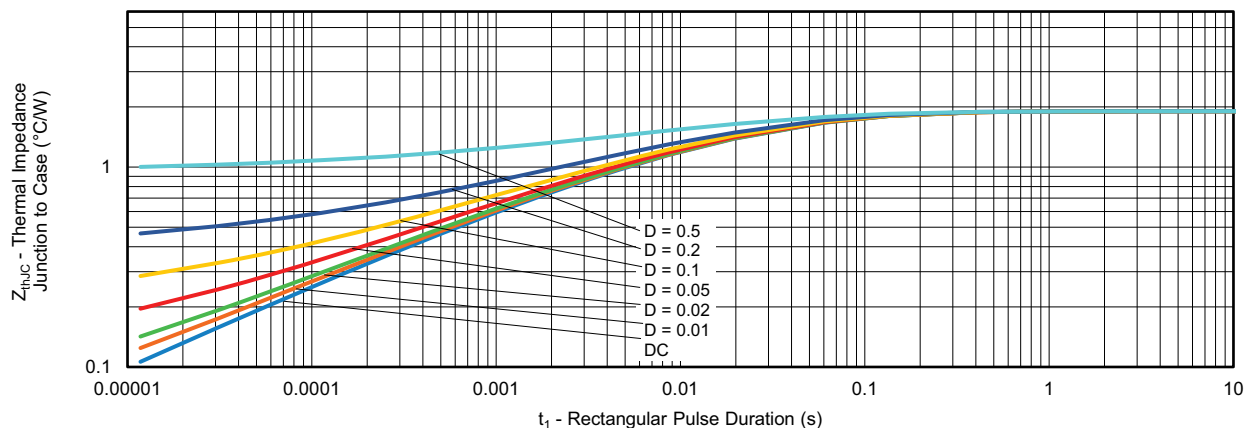
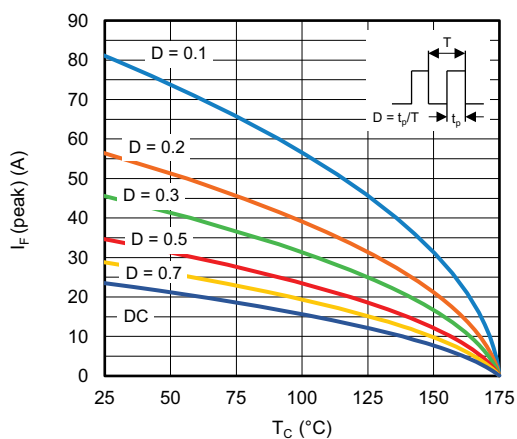

Fig. 5 - Typical Thermal Impedance  $Z_{thJC}$  Characteristics


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

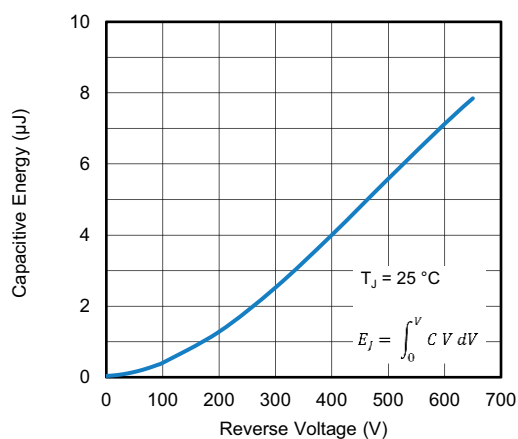


Fig. 8 - Typical Capacitive Energy vs. Reverse Voltage

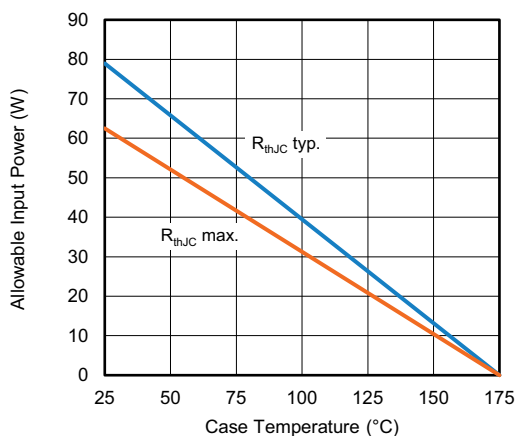


Fig. 7 - Forward Power Loss Characteristics

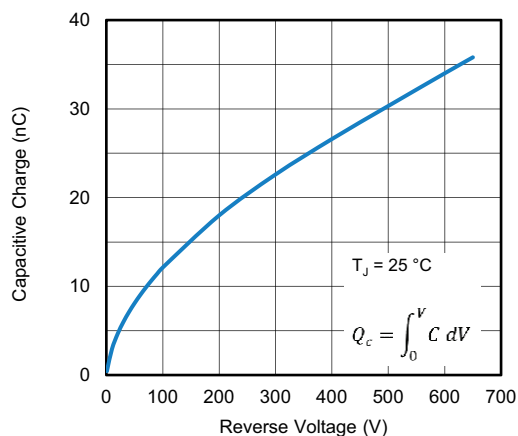


Fig. 9 - Typical Capacitive Charge vs. Reverse Voltage

**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>4C</b>	<b>10</b>	<b>E</b>	<b>T</b>	<b>07</b>	<b>S</b>	<b>2</b>	<b>L</b>	<b>H</b>	<b>M3</b>
	1	2	3	4	5	6	7	8	9	10	11

- |           |   |   |
|-----------|---|---|
| <b>1</b>  | - | Vishay Semiconductors product   |
| <b>2</b>  | - | 4C = SiC diode, generation 4  |
| <b>3</b>  | - | Current rating (10 = 10 A)  |
| <b>4</b>  | - | E = single diode  |
| <b>5</b>  | - | T = D <sup>2</sup> PAK package  |
| <b>6</b>  | - | Voltage rating: (07 = 650 V)  |
| <b>7</b>  | - | S = surface mountable   |
| <b>8</b>  | - | 2 = true 2 pin D <sup>2</sup> PAK   |
| <b>9</b>  | - | L = tape and reel (left oriented)   |
| <b>10</b> | - | H = AEC-Q101 qualified  |
| <b>11</b> | - | Environmental digit:<br>M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free |

**ORDERING INFORMATION**

PREFERRED P/N	UNIT WEIGHT	BASE QUANTITY	PACKAGING DESCRIPTION
VS-4C10ET07S2LHM3	2 g	800 per reel	13" diameter reel

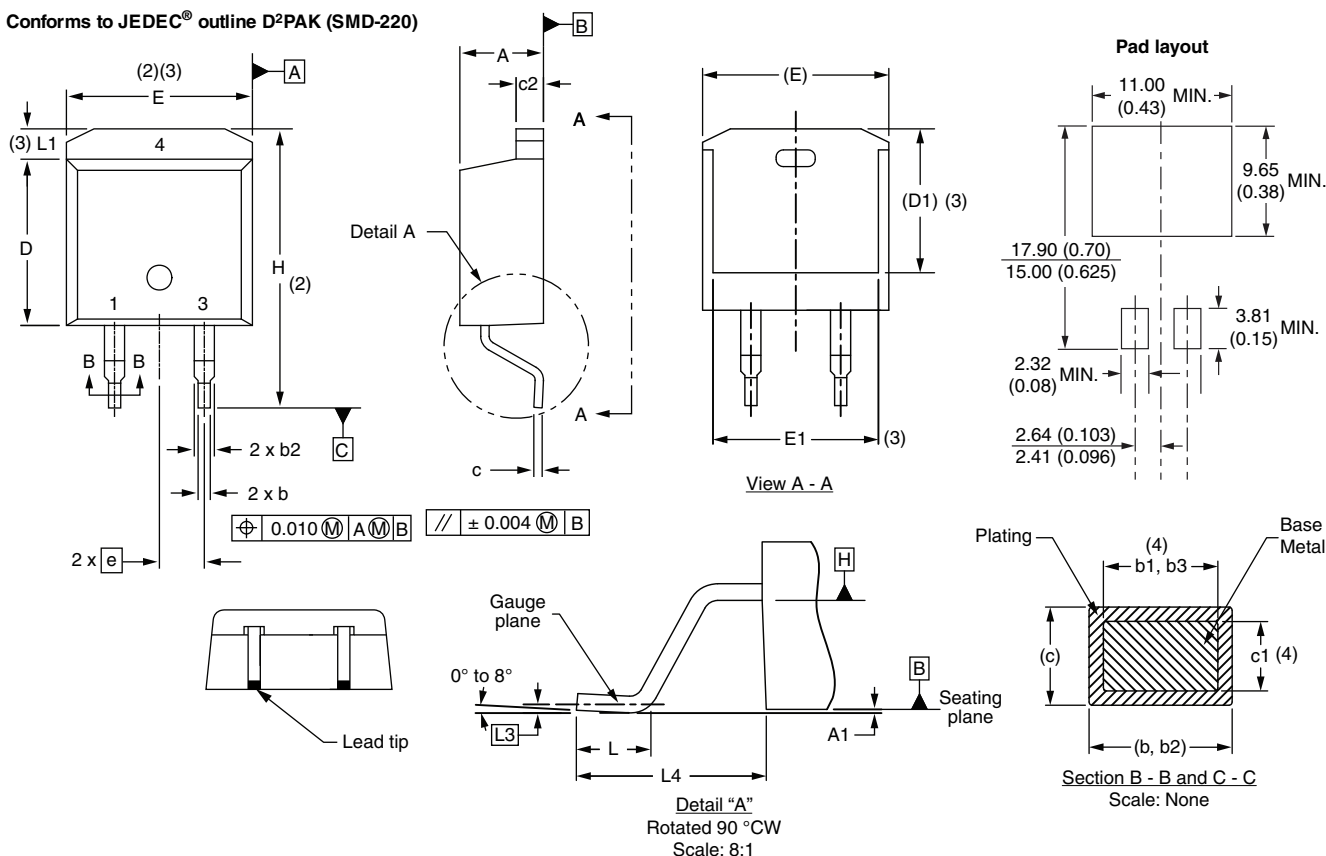
**LINKS TO RELATED DOCUMENTS**

Dimensions	<a href="http://www.vishay.com/doc?96683">www.vishay.com/doc?96683</a>
Part marking information	<a href="http://www.vishay.com/doc?96693">www.vishay.com/doc?96693</a>
Packaging information	<a href="http://www.vishay.com/doc?95032">www.vishay.com/doc?95032</a>

### D<sup>2</sup>PAK 2L (TO-263AB 2L)

#### DIMENSIONS in millimeters and inches

Conforms to JEDEC® outline D<sup>2</sup>PAK (SMD-220)



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190	
A1	0.00	0.254	0.000	0.010	
b	0.51	0.99	0.020	0.039	
b1	0.51	0.89	0.020	0.035	4
b2	1.14	1.78	0.045	0.070	
b3	1.14	1.73	0.045	0.068	4
c	0.38	0.74	0.015	0.029	
c1	0.38	0.58	0.015	0.023	4
c2	1.14	1.65	0.045	0.065	
D	8.51	9.65	0.335	0.380	2

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D1	6.86	8.00	0.270	0.315	3
E	9.65	10.67	0.380	0.420	2, 3
E1	7.90	8.80	0.311	0.346	3
e	2.54 BSC		0.100 BSC		
H	14.61	15.88	0.575	0.625	
L	1.78	2.79	0.070	0.110	
L1	-	1.65	-	0.066	3
L3	0.25 BSC		0.010 BSC		
L4	4.78	5.28	0.188	0.208	

#### Notes

- Dimensioning and tolerancing per ASME Y14.5 M-1994
- Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body
- Thermal pad contour optional within dimension E, L1, D1 and E1
- Dimension b1 and c1 apply to base metal only
- Datum A and B to be determined at datum plane H
- Controlling dimension: inch
- Outline conforms to JEDEC® outline TO-263AB



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