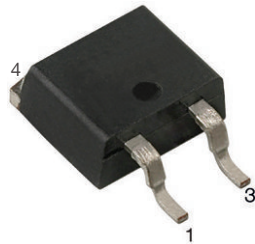
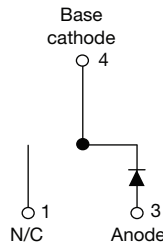


650 V Gen 4 Power Silicon Carbide Schottky Diode, 20 A


D²PAK 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
- AEC-Q101 qualified meets JESD 201 class 2 whisker test
- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


**RoHS
COMPLIANT
HALOGEN
FREE**
LINKS TO ADDITIONAL RESOURCES

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 applications with high di/dt such as high efficiency PFC and ultra-high frequency output rectifiers in AC/DC and DC/DC converters.

MECHANICAL DATA

Case: D²PAK 2L (TO-263AB 2L)

Molding compound meets UL 94 V-0 flammability rating
Base P/NHM3 - halogen-free, RoHS-compliant, and AEC-Q101 qualified

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

PRIMARY CHARACTERISTICS	
I_F	20 A
V_R	650 V
V_F at I_F at 25 °C, typ.	1.33 V
T_J max.	175 °C
I_R at V_R at 175 °C	110 μ A
Q_C ($V_R = 400$ V)	52 nC
Package	D ² PAK 2L (TO-263AB 2L)
Circuit configuration	Single

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	$I_F^{(1)}$	$T_C = 136$ °C (DC)	20	A
	$I_F^{(2)}$	$T_C = 127$ °C (DC)	20	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 %	73	A
Non-repetitive peak forward surge current	I_{FSM}	$T_C = 25$ °C, $t_p = 10$ ms, half sine wave	125	A
		$T_C = 110$ °C, $t_p = 10$ ms, half sine wave	115	
Power dissipation	$P_{tot}^{(1)}$	$T_C = 25$ °C	125	W
		$T_C = 110$ °C	54	
	$P_{tot}^{(2)}$	$T_C = 25$ °C	100	W
		$T_C = 110$ °C	43	
i^2t value	$\int i^2 dt$	$T_C = 25$ °C	78	A ² s
		$T_C = 110$ °C	66	
Operating junction and storage temperatures	$T_J^{(3)}, T_{Stg}$		-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: $dP_D/dT_J < 1/R_{\theta JA}$



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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Forward voltage	V_F	$I_F = 20\text{ A}$	-	1.33	1.5	V
		$I_F = 20\text{ A}, T_J = 150\text{ }^\circ\text{C}$	-	1.5	1.75	
		$I_F = 20\text{ A}, T_J = 175\text{ }^\circ\text{C}$	-	1.6	-	
Reverse leakage current	I_R	$V_R = V_R\text{ rated}$	-	4.5	145	μA
		$V_R = V_R\text{ rated}, T_J = 150\text{ }^\circ\text{C}$	-	55	300	
		$V_R = V_R\text{ rated}, T_J = 175\text{ }^\circ\text{C}$	-	110	-	
Total capacitance	C	$V_R = 1\text{ V}, f = 1\text{ MHz}$	-	860	-	pF
		$V_R = 400\text{ V}, f = 1\text{ MHz}$	-	74	-	
Total capacitive charge	Q_C	$V_R = 400\text{ V}, f = 1\text{ MHz}$	-	52	-	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}		-	1.2	1.5	$^\circ\text{C/W}$
Marking device			4C20ET07S			

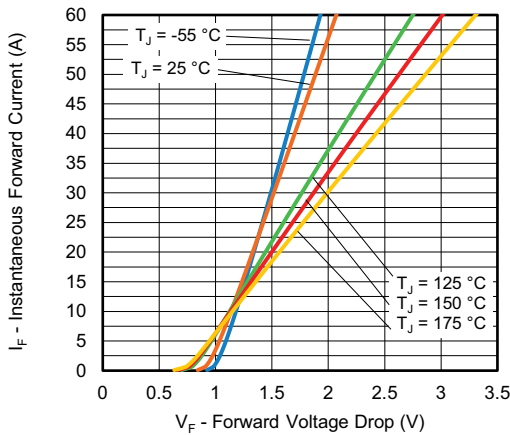


Fig. 1 - Typical Forward Voltage Drop Characteristics

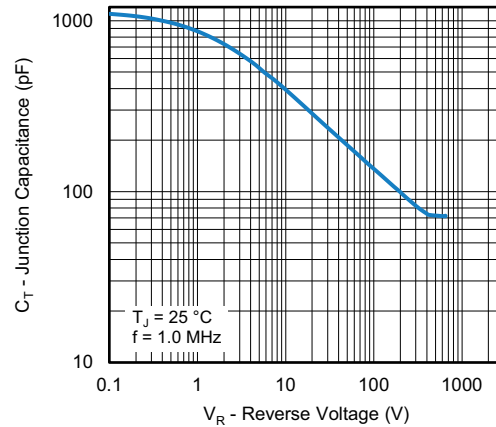


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

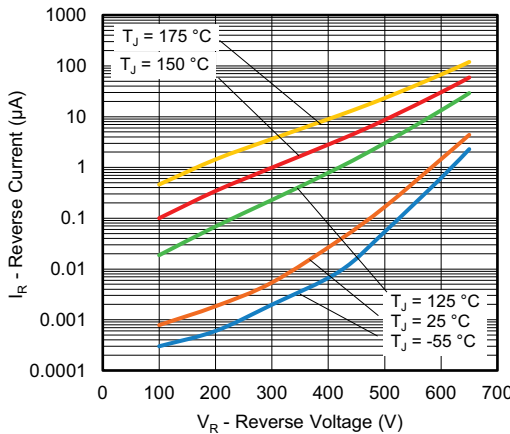


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

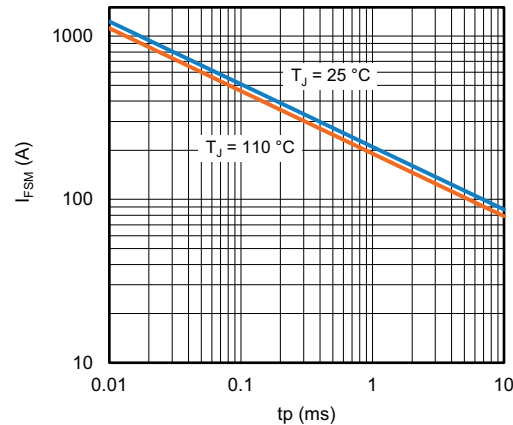


Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration (Square Wave)

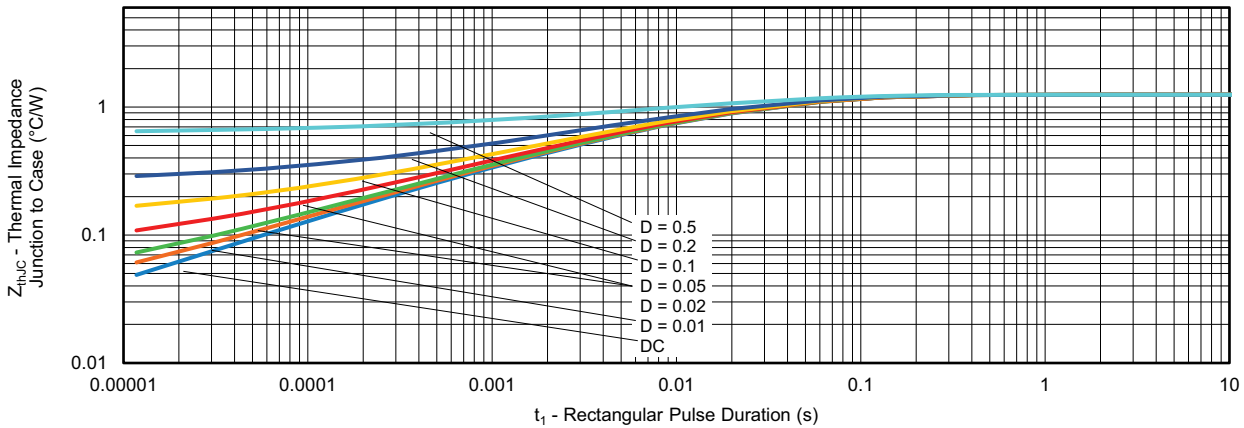


Fig. 5 - Typical Thermal Impedance Z_{thJC} - Characteristics

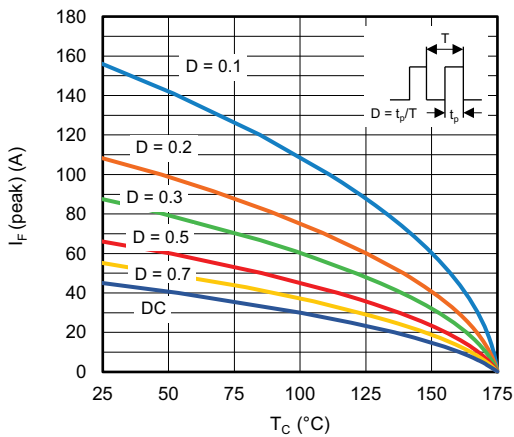


Fig. 6 - Peak Forward Current vs. Maximum Allowable Case Temperature

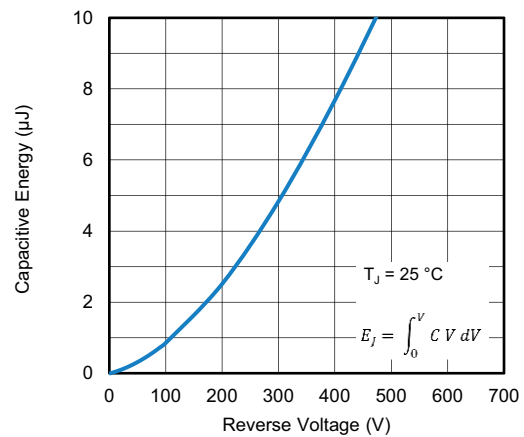


Fig. 8 - Typical Capacitive Energy vs. Reverse Voltage

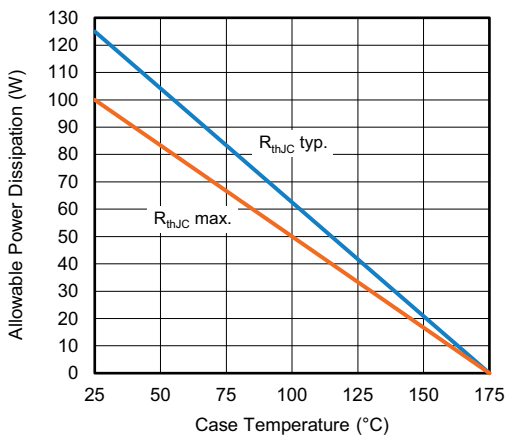


Fig. 7 - Forward Power Loss Characteristics

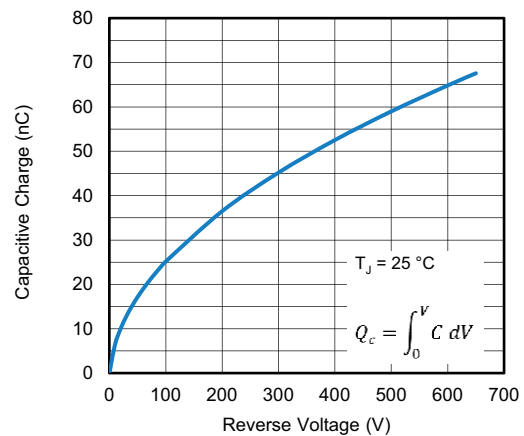
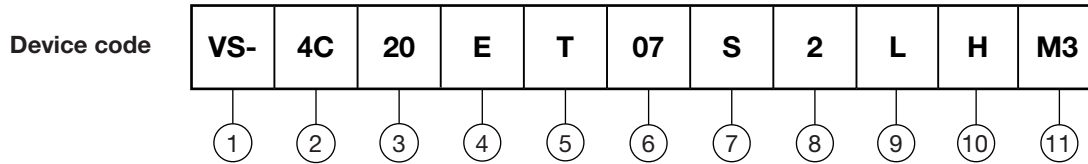


Fig. 9 - Typical Capacitive Charge vs. Reverse Voltage



ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - 4C = SiC diode, generation 4
- 3** - Current rating (20 = 20 A)
- 4** - E = single diode
- 5** - T = D²PAK package
- 6** - Voltage rating: (07 = 650 V)
- 7** - S = surface mountable
- 8** - 2 = true 2 pin D²PAK
- 9** - L = tape and reel (left oriented)
- 10** - H = AEC-Q101 qualified
- 11** - Environmental digit:
M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

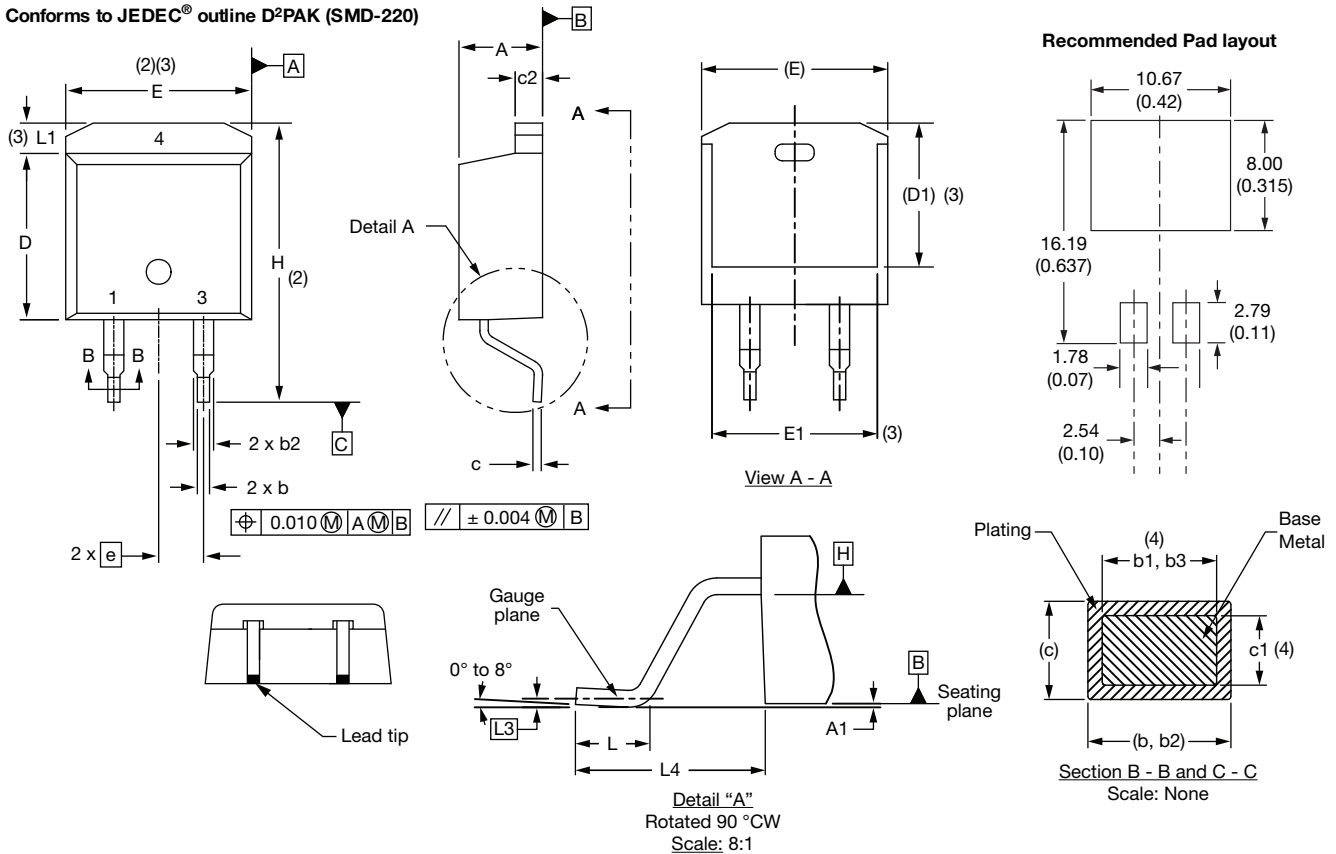
ORDERING INFORMATION			
PREFERRED P/N	UNIT WEIGHT	BASE QUANTITY	PACKAGING DESCRIPTION
VS-4C20ET07S2LHM3	2 g	800 per reel	13" diameter reel

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?96683
Part marking information	www.vishay.com/doc?96693
Packaging information	www.vishay.com/doc?95032
SPIICE model	www.vishay.com/doc?97485

D²PAK 2L (TO-263AB 2L)

DIMENSIONS in millimeters and inches

Conforms to JEDEC® outline D²PAK (SMD-220)



SYMBOL	MILLIMETERS		INCHES		NOTES	SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.			MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190		D1	6.86	8.00	0.270	0.315	3
A1	0.00	0.254	0.000	0.010		E	9.65	10.67	0.380	0.420	2, 3
b	0.51	0.99	0.020	0.039		E1	7.90	8.80	0.311	0.346	3
b1	0.51	0.89	0.020	0.035	4	e	2.54 BSC		0.100 BSC		
b2	1.14	1.78	0.045	0.070		H	14.61	15.88	0.575	0.625	
b3	1.14	1.73	0.045	0.068	4	L	1.78	2.79	0.070	0.110	
c	0.38	0.74	0.015	0.029		L1	-	1.65	-	0.066	3
c1	0.38	0.58	0.015	0.023	4	L3	0.25 BSC		0.010 BSC		
c2	1.14	1.65	0.045	0.065		L4	4.78	5.28	0.188	0.208	
D	8.51	9.65	0.335	0.380	2						

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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