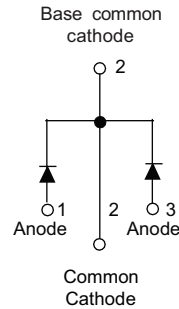
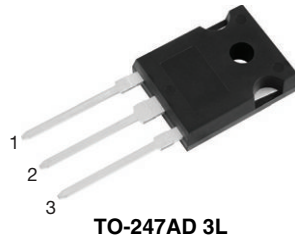


# 650 V Gen 4 Power Silicon Carbide Schottky Diode, 2 x 10 A



## 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 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](http://www.vishay.com/doc?99912)



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

## LINKS TO ADDITIONAL RESOURCES



3D Models

PRIMARY CHARACTERISTICS	
$I_F$	2 x 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	TO-247AD 3L
Circuit configuration	Common cathode

## 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:** TO-247AD 3L

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

MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise specified)				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage per leg	$V_{RRM}$		650	V
Continuous forward current per leg	$I_F^{(1)}$	$T_C = 152$ °C (DC)	10	A
	$I_F^{(2)}$	$T_C = 146$ °C (DC)	10	A
DC blocking voltage per leg	$V_{DC}$		650	V
Repetitive peak forward current per leg	$I_{FRM}$	$T_C = 25$ °C, $f = 50$ Hz, square wave, DC = 25 %	42	A
Non-repetitive peak forward surge current per leg	$I_{FSM}$	$T_C = 25$ °C, $t_p = 10$ ms, half sine wave	60	A
		$T_C = 110$ °C, $t_p = 10$ ms, half sine wave	48	
Power dissipation per leg	$P_{tot}^{(1)}$	$T_C = 25$ °C	101	W
		$T_C = 110$ °C	44	
	$P_{tot}^{(2)}$	$T_C = 25$ °C	79	W
		$T_C = 110$ °C	34	
$I^2t$ value per leg	$\int i^2 dt$	$T_C = 25$ °C	18	A <sup>2</sup> s
		$T_C = 110$ °C	11.5	
Operating junction and storage temperatures	$T_J^{(3)}, T_{Stg}$		-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:  $dP_D/dT_J < 1/R_{\theta JA}$



<b>ELECTRICAL SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Forward voltage per leg	$V_F$	$I_F = 10\text{ A}$	-	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 per leg	$I_R$	$V_R = V_R\text{ rated}$	-	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 per leg	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 per leg	$Q_C$	$V_R = 400\text{ V}, f = 1\text{ MHz}$	-	27	-	nC

<b>THERMAL AND 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-case	per leg	$R_{thJC}$	-	1.5	1.9	$^\circ\text{C/W}$
	per device		-	0.75	0.95	$^\circ\text{C/W}$
Marking device			4C20CP07L			

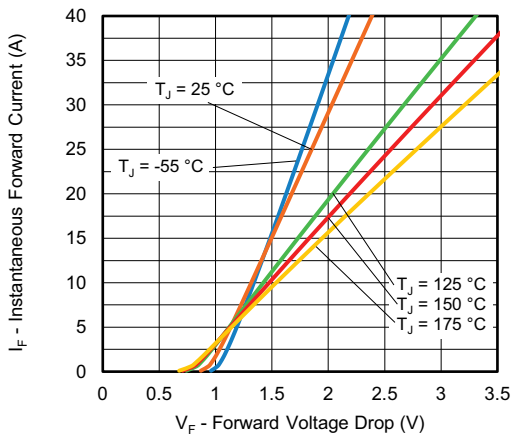


Fig. 1 - Typical Forward Voltage Drop Characteristics Per Leg

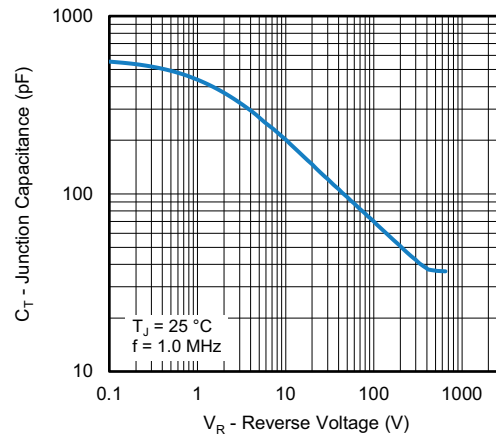


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage Per Leg

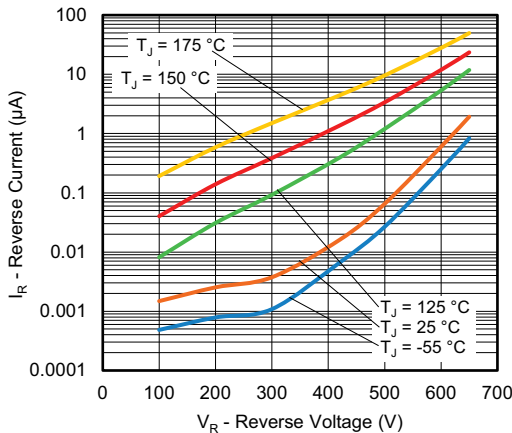


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage Per Leg

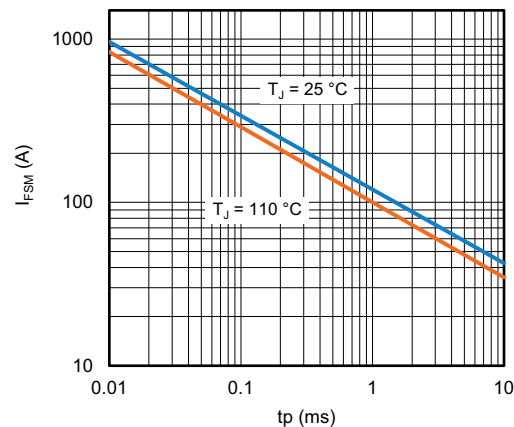


Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration (Square Wave), Per Leg

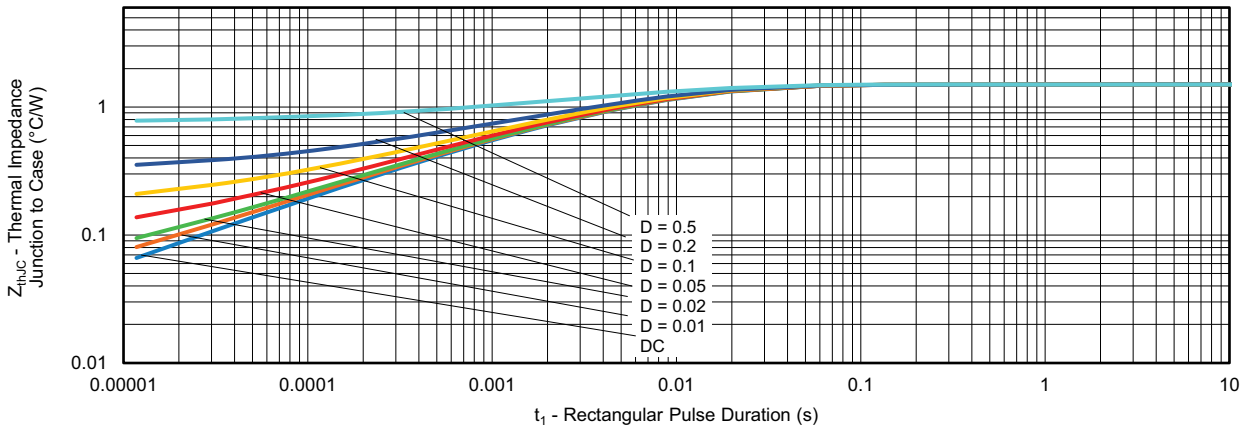


Fig. 5 - Typical Thermal Impedance  $Z_{thJC}$  - Characteristics Per Leg

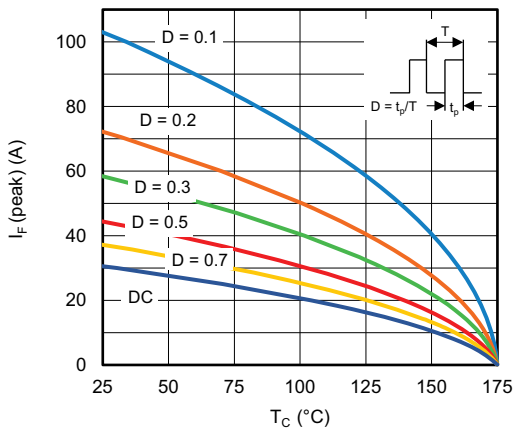


Fig. 6 - Peak Forward Current vs. Maximum Allowable Case Temperature Per Leg

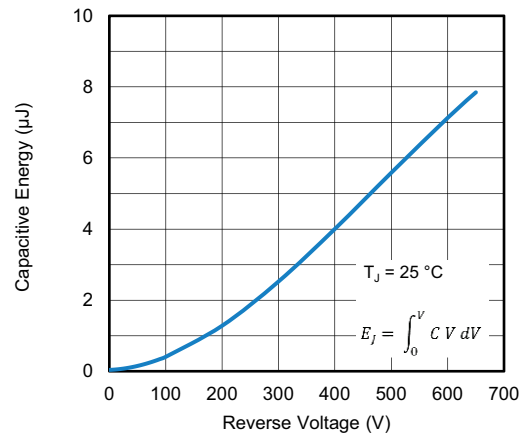


Fig. 8 - Typical Capacitive Energy vs. Reverse Voltage Per Leg

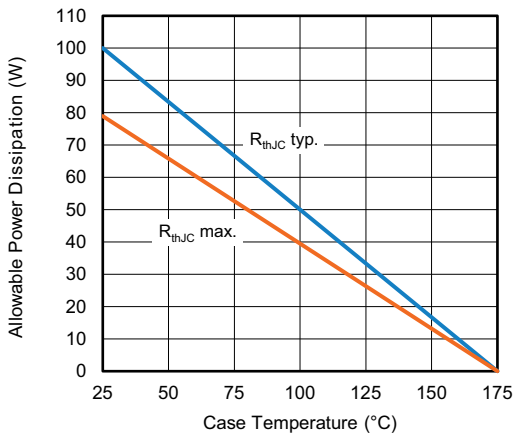


Fig. 7 - Forward Power Loss Characteristics Per Leg

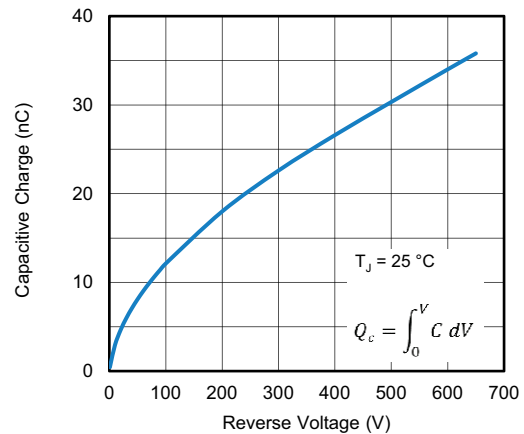
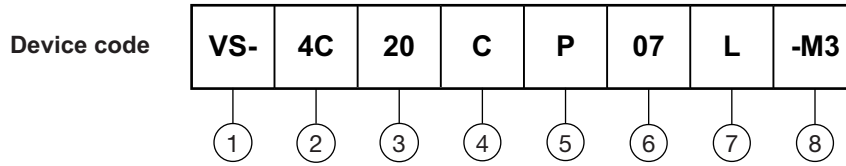


Fig. 9 - Typical Capacitive Charge vs. Reverse Voltage Per Leg



## ORDERING INFORMATION TABLE



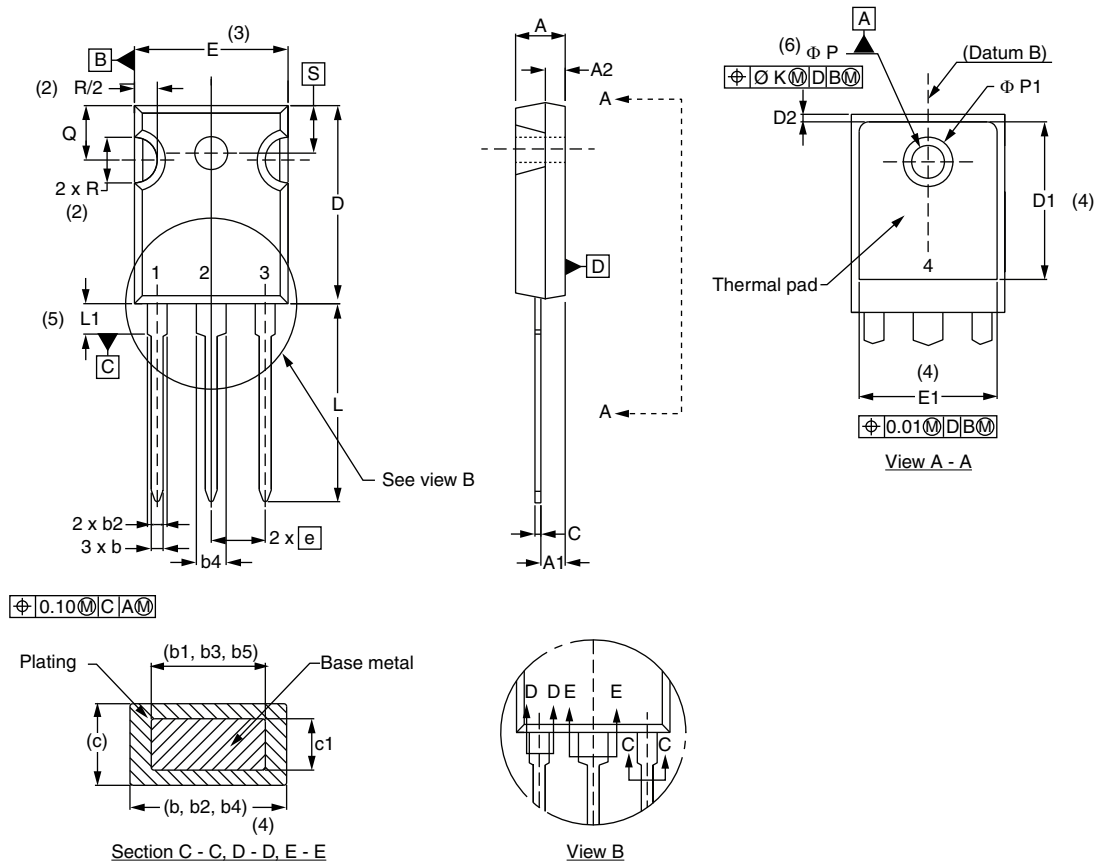
- 1** - Vishay Semiconductors product
- 2** - 4C = SiC diode, Generation 4
- 3** - Current rating (20 = 20 A)
- 4** - C = common cathode
- 5** - P = package TO-247
- 6** - Voltage rating: 07 = 650 V
- 7** - L = long lead
- 8** - Environmental digit:  
-M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

ORDERING INFORMATION			
PREFERRED P/N	UNIT WEIGHT	BASE QUANTITY	PACKAGING DESCRIPTION
VS-4C20CP07L-M3	5.5 g	25 / tube	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95626">www.vishay.com/doc?95626</a>
Part marking information	<a href="http://www.vishay.com/doc?95007">www.vishay.com/doc?95007</a>
SPICE model	<a href="http://www.vishay.com/doc?97493">www.vishay.com/doc?97493</a>

### TO-247AD 3L

**DIMENSIONS** in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES	SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.			MIN.	MAX.	MIN.	MAX.	
A	4.65	5.31	0.183	0.209		D2	0.51	1.30	0.020	0.051	
A1	2.21	2.59	0.087	0.102		E	15.29	15.87	0.602	0.625	3
A2	1.50	2.49	0.059	0.098		E1	13.46	-	0.53	-	
b	0.99	1.40	0.039	0.055		e	5.46 BSC		0.215 BSC		
b1	0.99	1.35	0.039	0.053		Ø K	0.254		0.010		
b2	1.65	2.39	0.065	0.094		L	19.81	20.32	0.780	0.800	
b3	1.65	2.34	0.065	0.092		L1	3.71	4.29	0.146	0.169	
b4	2.59	3.43	0.102	0.135		Ø P	3.56	3.66	0.14	0.144	
b5	2.59	3.38	0.102	0.133		Ø P1	-	6.98	-	0.275	
c	0.38	0.89	0.015	0.035		Q	5.31	5.69	0.209	0.224	
c1	0.38	0.84	0.015	0.033		R	4.52	5.49	0.178	0.216	
D	19.71	20.70	0.776	0.815	3	S	5.51 BSC		0.217 BSC		
D1	13.08	-	0.515	-	4						

**Notes**

- (1) Dimensioning and tolerancing per ASME Y14.5M-1994
- (2) Contour of slot optional
- (3) Dimension D and E do not include mold flash. These dimensions are measured at the outermost extremes of the plastic body
- (4) Thermal pad contour optional with dimensions D1 and E1
- (5) Lead finish uncontrolled in L1
- (6) Ø P to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")
- (7) Outline conforms to JEDEC® outline TO-247 with exception of dimension A min., D, E min., Q min., S, and note 4



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