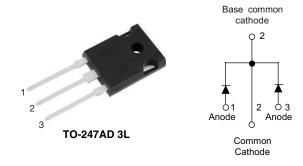


# 650 V Power SiC Gen 3 Merged PIN Schottky Diode, 2 x 8 A



### **LINKS TO ADDITIONAL RESOURCES**

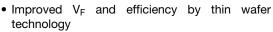




PRIMARY CHARACTERISTICS						
I <sub>F(AV)</sub> 2 x 8 A						
V <sub>R</sub>	650 V					
V <sub>F</sub> at I <sub>F</sub> at 150 °C	1.5 V					
T <sub>J</sub> max.	175 °C					
I <sub>R</sub> at V <sub>R</sub> at 175 °C	1.9 µA					
Q <sub>C</sub> (V <sub>R</sub> = 400 V)	22 nC					
Package	TO-247AD 3L					
Circuit configuration	Common cathode					

### **FEATURES**

 Majority carrier diode using Schottky technology on SiC wide band gap material





- Positive V<sub>F</sub> 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 1A whisker test
- Solder Bath temperature 275 °C maximum, 10 s per JESD 22-B106
- Material categorization: for definitions of compliance please see <a href="https://www.vishav.com/doc?99912"><u>www.vishav.com/doc?99912</u></a>

### **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: 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

ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25 °C unless otherwise specified)						
PARAMETER SYMBOL TEST CONDITIONS		VALUES	UNITS			
Peak repetitive reverse voltage	$V_{RRM}$		650	V		
Average rectified forward current, per leg	I <sub>F(AV)</sub>	$T_C = 135  ^{\circ}C  (DC)$	8	Α		
DC blocking voltage	$V_{DC}$		650	V		
Repetitive peak forward current	I <sub>FRM</sub>	$T_C$ = 25 °C, f = 50 Hz, square wave, DC = 25 %	35			
Non-months and formed and an arrangement	I <sub>FSM</sub>	$T_C = 25$ °C, $t_p = 10$ ms, half sine wave	54	Α		
Non-repetitive peak forward surge current, per leg		$T_C$ = 110 °C, $t_p$ = 10 ms, half sine wave	52	]		
Power dissipation, per leg	P <sub>tot</sub> (1)	$T_C = 25  ^{\circ}C$	58	W		
Fower dissipation, per leg		T <sub>C</sub> = 110 °C	25	VV		
l <sup>2</sup> t value, per leg	∫i <sup>2</sup> dt	T <sub>C</sub> = 25 °C	13.5	A <sup>2</sup> s		
int value, per leg		T <sub>C</sub> = 110 °C	12.5	A-8		
Operating junction and storage temperatures	T <sub>J</sub> <sup>(2)</sup> , T <sub>Stg</sub>		-55 to +175	°C		

#### Notes

<sup>(1)</sup> Based on maximum Rth

<sup>(2)</sup> 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 <sub>J</sub> = 25 °C unless otherwise specified)							
PARAMETER SYMBOL		TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
		I <sub>F</sub> = 8 A	-	1.3	1.5		
Forward voltage, per leg	$V_{F}$	I <sub>F</sub> = 8 A, T <sub>J</sub> = 150 °C	-	1.5	1.8	V	
		I <sub>F</sub> = 8 A, T <sub>J</sub> = 175 °C	-	1.58	-		
	I <sub>R</sub>	$V_R = V_R$ rated	-	0.25	45	μΑ	
Reverse leakage current, per leg		$V_R = V_R$ rated, $T_J = 150$ °C	-	1.1	100		
		$V_R = V_R$ rated, $T_J = 175$ °C	-	1.9	-		
Total capacitance, per leg	С	$V_{R} = 1 \text{ V, f} = 1 \text{ MHz}$ - 3-		340	-	nΕ	
Total capacitatice, per leg		V <sub>R</sub> = 400 V, f = 1 MHz	-	34	-	pF	
Total capacitive charge, per leg	$Q_{C}$	V <sub>R</sub> = 400 V, f = 1 MHz	-	22	=.	nC	

THERMAL - MECHANICAL SPECIFICATIONS (T <sub>A</sub> = 25 °C unless otherwise specified)							
PARAMETER SYMBOL TEST CONDITIONS MIN. TYP. MAX. UNITS							UNITS
Thermal variations in nation to acco	per leg	- R. I.C		-	2.0	2.6	°C/W
Thermal resistance, junction-to-case	per device			-	1.0	1.3	°C/W
Marking device		3C16CP07L			-		

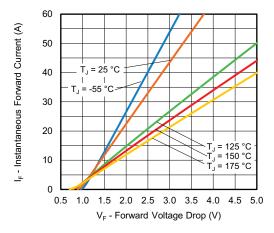
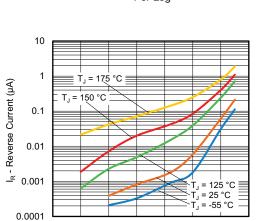


Fig. 1 - Typical Forward Voltage Drop Characteristics, Per Leg



100

200

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

V<sub>R</sub> - Reverse Voltage (V)

400

500

600

300

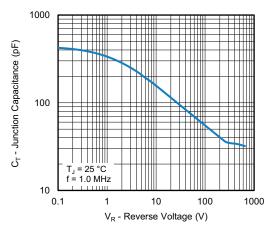


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage, Per Leg

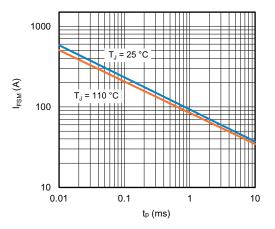


Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration, Per Leg (Square Wave)



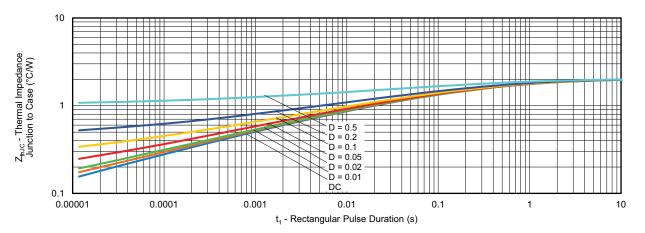


Fig. 5 - Typical Thermal Impedance  $Z_{thJC}$  Characteristics, Per Leg

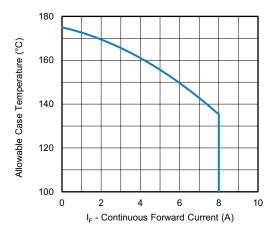


Fig. 6 - Maximum Allowable Case Temperature vs. Average Forward Current, Per Leg

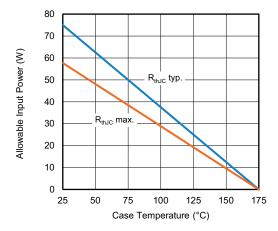


Fig. 7 - Forward Power Loss Characteristics, Per Leg

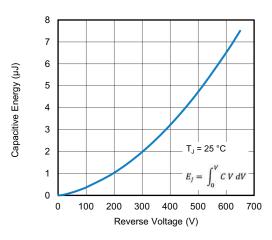


Fig. 8 - Typical Capacitive Energy vs. Reverse Voltage, Per Leg

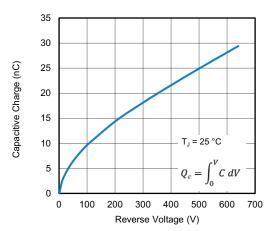
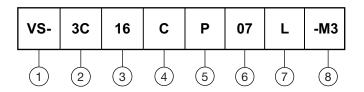


Fig. 9 - Typical Capacitive Charge vs. Reverse Voltage, Per Leg



### **ORDERING INFORMATION TABLE**

**Device code** 



1 - Vishay Semiconductors product

**2** - 3C = SiC diode, Generation 3

Current rating (16 = 16 A)

4 - C = common cathode

- P = package TO-247

- Voltage rating: (07 = 650 V)

7 - L = long lead

8 - Environmental digit:

-M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

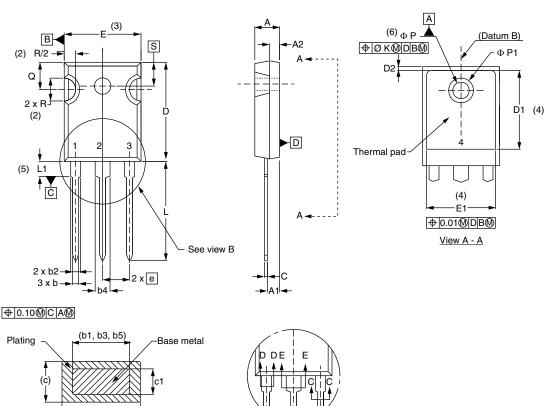
ORDERING INFORMATION		
PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION
VS-3C16CP07L-M3	25/tube	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS				
Dimensions <u>www.vishay.com/doc?95626</u>				
Part marking information	www.vishay.com/doc?95007			



## **TO-247AD 3L**

### **DIMENSIONS** in millimeters and inches



View B

0)/14001	MILLIMETERS		INC	NOTEO	
SYMBOL	MIN.	MAX.	MIN.	MAX.	NOTES
Α	4.65	5.31	0.183	0.209	
A1	2.21	2.59	0.087	0.102	
A2	1.50	2.49	0.059	0.098	
b	0.99	1.40	0.039	0.055	
b1	0.99	1.35	0.039	0.053	
b2	1.65	2.39	0.065	0.094	
b3	1.65	2.34	0.065	0.092	
b4	2.59	3.43	0.102	0.135	
b5	2.59	3.38	0.102	0.133	
С	0.38	0.89	0.015	0.035	
c1	0.38	0.84	0.015	0.033	
D	19.71	20.70	0.776	0.815	3
D1	13.08	-	0.515	-	4

Section C - C, D - D, E - E

SYMBOL	MILLIMETERS		INC	NOTES	
STWIDOL	MIN.	MAX.	MIN.	MAX.	NOTES
D2	0.51	1.30	0.020	0.051	
E	15.29	15.87	0.602	0.625	3
E1	13.46	-	0.53	-	
е	5.46	5.46 BSC 0.215		BSC	
ØΚ	0.2	0.254		)10	
L	19.81	20.32	0.780	0.800	
L1	3.71	4.29	0.146	0.169	
ØΡ	3.56	3.66	0.14	0.144	
Ø P1	-	6.98	-	0.275	
Q	5.31	5.69	0.209	0.224	
R	4.52	5.49	0.178	0.216	
S	5.51 BSC		0.217	BSC	
		•	•		

#### 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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