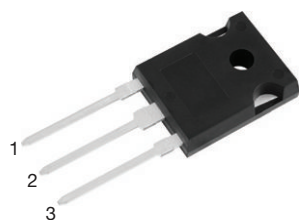
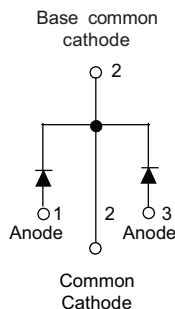


650 V Power SiC Gen 3 Merged PIN Schottky Diode, 2 x 10 A



TO-247AD 3L



FEATURES

- 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 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



RoHS
COMPLIANT
HALOGEN
FREE

LINKS TO ADDITIONAL RESOURCES



3D Models



Application Notes

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	4.5 μ A
Q_C ($V_R = 400$ V)	29 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.

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

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, per leg	$I_F^{(1)}$	$T_C = 146$ °C (DC)	10	A
	$I_F^{(2)}$	$T_C = 154$ °C (DC)		
DC blocking voltage	V_{DC}		650	V
Repetitive peak forward current	I_{FRM}	$T_C = 25$ °C, $f = 50$ Hz, square wave, DC = 25 %	41	A
Non-repetitive peak forward surge current, per leg	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	58	
Power dissipation, per leg	$P_{tot}^{(1)}$	$T_C = 25$ °C	79	W
		$T_C = 110$ °C	34	
	$P_{tot}^{(2)}$	$T_C = 25$ °C	107	W
		$T_C = 110$ °C	46	
I^2t value, per leg	$\int i^2 dt$	$T_C = 25$ °C	18	A ² s
		$T_C = 110$ °C	17	
Operating junction and storage temperatures	$T_J^{(2)}$, 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** ($T_J = 25\text{ }^{\circ}\text{C}$ 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
		$I_F = 10\text{ A}, T_J = 150\text{ }^{\circ}\text{C}$	-	1.46	1.85	
		$I_F = 10\text{ A}, T_J = 175\text{ }^{\circ}\text{C}$	-	1.52	-	
Reverse leakage current, per leg	I_R	$V_R = V_R\text{ rated}$	-	0.7	55	μA
		$V_R = V_R\text{ rated}, T_J = 150\text{ }^{\circ}\text{C}$	-	2.8	125	
		$V_R = V_R\text{ rated}, T_J = 175\text{ }^{\circ}\text{C}$	-	4.5	-	
Total capacitance, per leg	C	$V_R = 1\text{ V}, f = 1\text{ MHz}$	-	445	-	pF
		$V_R = 400\text{ V}, f = 1\text{ MHz}$	-	43	-	
Total capacitive charge, per leg	Q_C	$V_R = 400\text{ V}, f = 1\text{ MHz}$	-	29	-	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	per leg	R_{thJC}		-	1.4	1.9	$^{\circ}\text{C/W}$
	per device			-	0.8	1	$^{\circ}\text{C/W}$
Marking device				3C20CP07L			

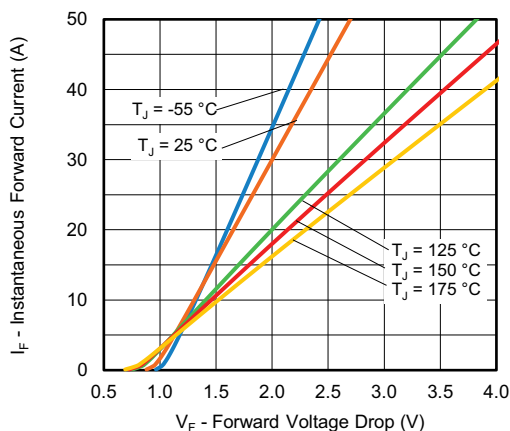


Fig. 1 - Typical Forward Voltage Drop Characteristics, Per Leg

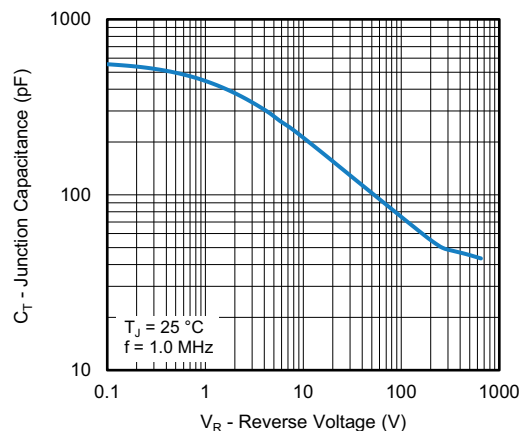


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage, Per Leg

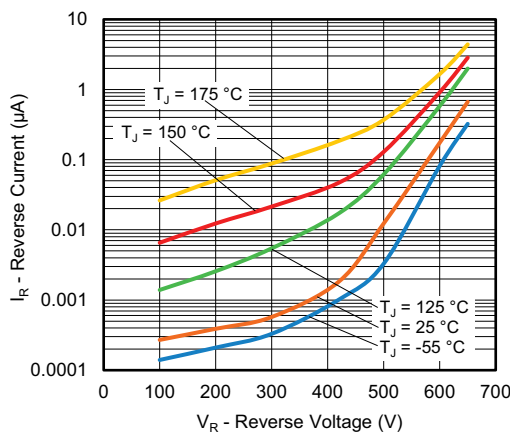


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage, Per Leg

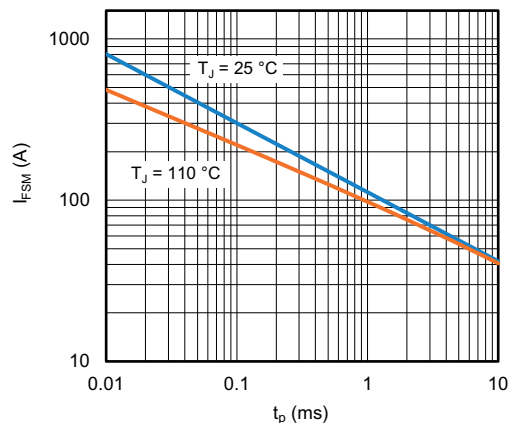


Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration, Per Leg (Square Wave)

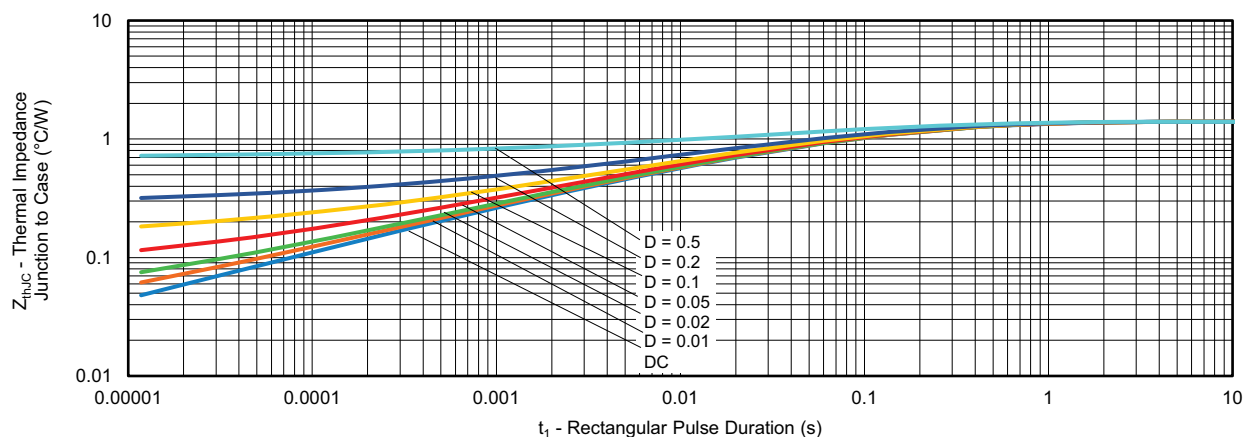
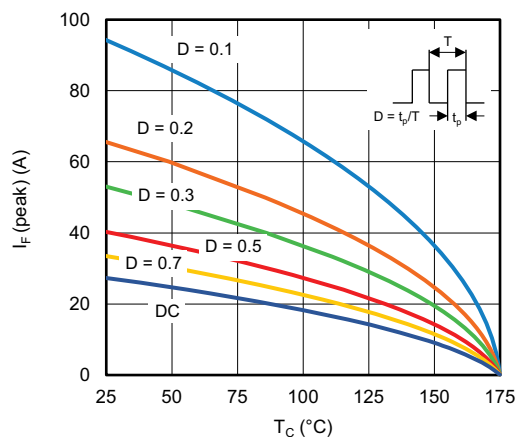

Fig. 5 - Typical Thermal Impedance Z_{thJC} Characteristics, Per Leg


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

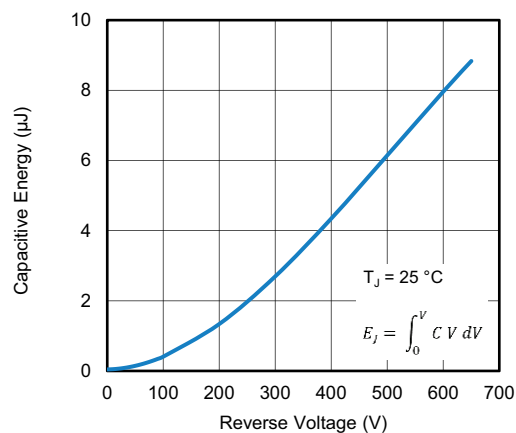


Fig. 8 - Typical Capacitive Energy vs. Reverse Voltage, Per Leg

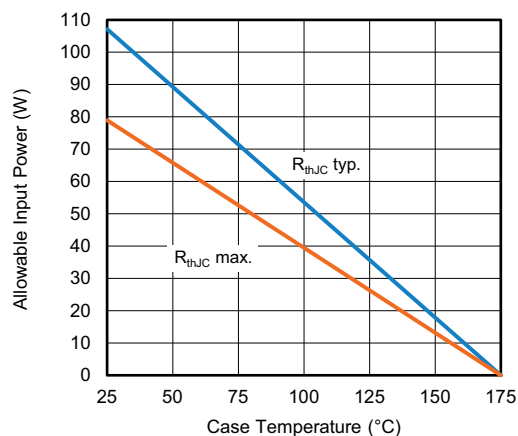


Fig. 7 - Forward Power Loss Characteristics, Per Leg

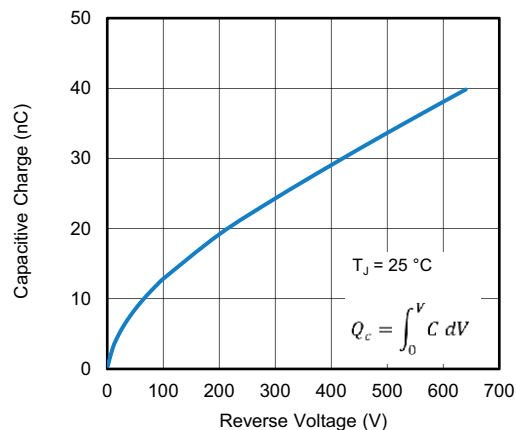


Fig. 9 - Typical Capacitive Charge vs. Reverse Voltage, Per Leg



ORDERING INFORMATION TABLE

Device code	VS-	3C	20	C	P	07	L	-M3
	1	2	3	4	5	6	7	8

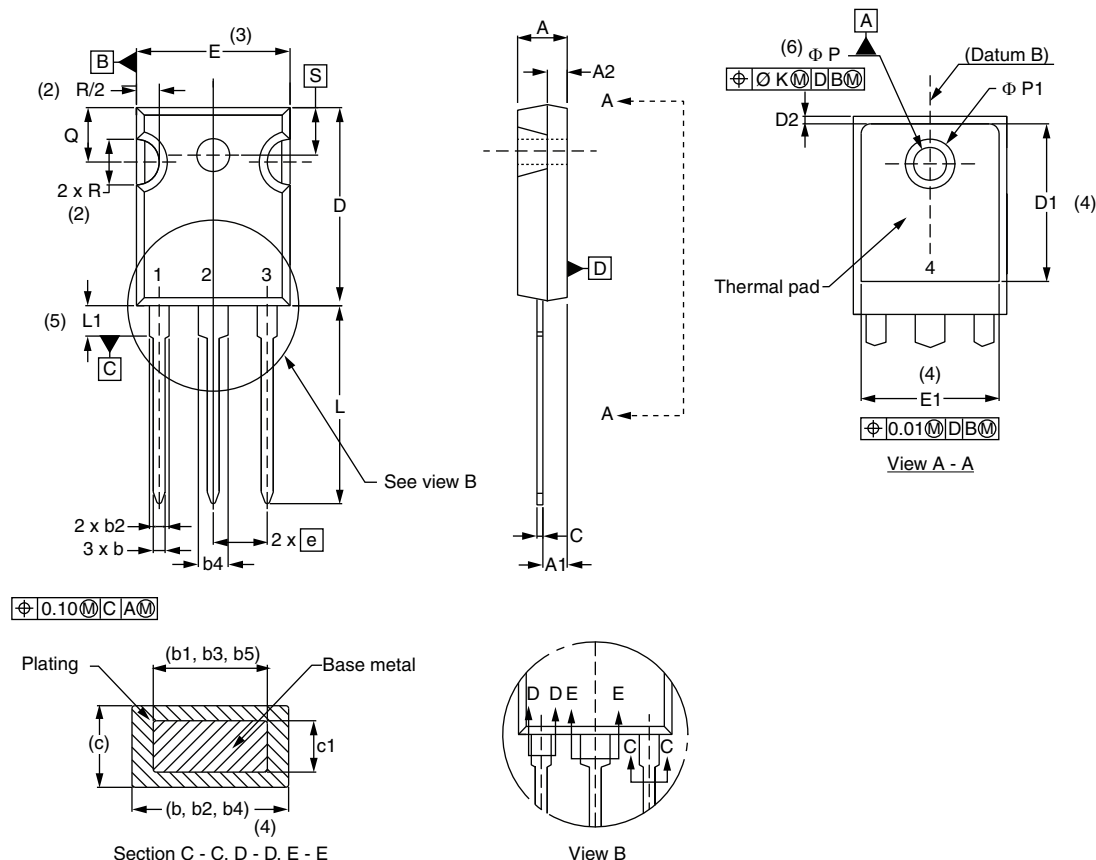
- | | | |
|---|---|--|
| 1 | - | Vishay Semiconductors product |
| 2 | - | 3C = SiC diode, Generation 3 |
| 3 | - | Current rating (20 = 20 A) |
| 4 | - | C = common cathode |
| 5 | - | P = package TO-247 |
| 6 | - | Voltage rating: (07 = 650 V) |
| 7 | - | L = long lead |
| 8 | - | Environmental digit: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

ORDERING INFORMATION		
PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION
VS-3C20CP07L-M3	25/tube	Antistatic plastic tubes

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

TO-247AD 3L

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	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	
c	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

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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