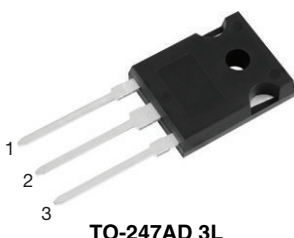
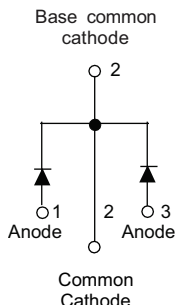


650 V Power SiC Merged PIN Schottky Diode, 2 x 20 A



TO-247AD 3L



FEATURES

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



SPICE Models



Application Notes

PRIMARY CHARACTERISTICS

$I_{F(AV)}$	2 x 20 A
V_R	650 V
V_F at I_F at 150 °C	1.55 V
T_J max.	175 °C
I_R at V_R at 175 °C	35 μ A
Q_C ($V_R = 400$ V)	68 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

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	V_{RRM}		650	V
Average rectified forward current, per leg	$I_{F(AV)}$	$T_C = 140$ °C (DC)	20	A
DC blocking voltage	V_{DC}		650	V
Repetitive peak surge current, per leg	I_{FRM}	$T_C = 25$ °C, $f = 50$ Hz, square wave, DC = 25 %	92	A
Non-repetitive peak forward surge current, per leg	I_{FSM}	$T_C = 25$ °C, $t_p = 10$ ms, half sine wave	160	A
		$T_C = 110$ °C, $t_p = 10$ ms, half sine wave	140	
Power dissipation, per leg	$P_{tot}^{(1)}$	$T_C = 25$ °C	170	W
		$T_C = 110$ °C	74	
I^2t value, per leg	$\int i^2 dt$	$T_C = 25$ °C	128	A ² s
		$T_C = 110$ °C	98	
Operating junction and storage temperatures	$T_J^{(2)}, T_{Stg}$		-55 to +175	°C

Notes

(1) Based on maximum R_{th}

(2) 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, per leg	V_F	$I_F = 20\text{ A}$	-	1.40	1.70	V
		$I_F = 20\text{ A}, T_J = 150\text{ }^{\circ}\text{C}$	-	1.55	1.9	
		$I_F = 20\text{ A}, T_J = 175\text{ }^{\circ}\text{C}$	-	1.60	-	
Reverse leakage current, per leg	I_R	$V_R = V_R\text{ rated}$	-	-	100	μA
		$V_R = V_R\text{ rated}, T_J = 150\text{ }^{\circ}\text{C}$	-	-	250	
		$V_R = V_R\text{ rated}, T_J = 175\text{ }^{\circ}\text{C}$	-	35	-	
Total capacitance, per leg	C	$V_R = 1\text{ V}, f = 1\text{ MHz}$	-	1040	-	pF
		$V_R = 400\text{ V}, f = 1\text{ MHz}$	-	110	-	
Total capacitive charge, per leg	Q_C	$V_R = 400\text{ V}, f = 1\text{ MHz}$	-	68	-	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}		-	0.63	0.88	°C/W
	per device			-	0.38	0.53	
Marking device				C40CP07L			

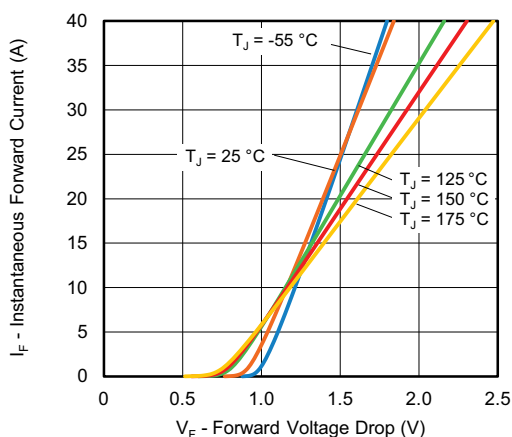


Fig. 1 - Typical Forward Voltage Drop Characteristics, per leg

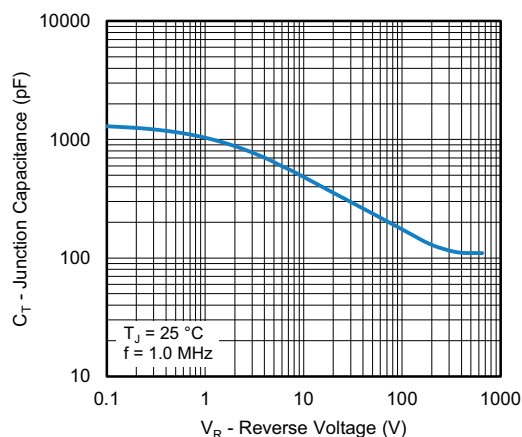


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage, per leg

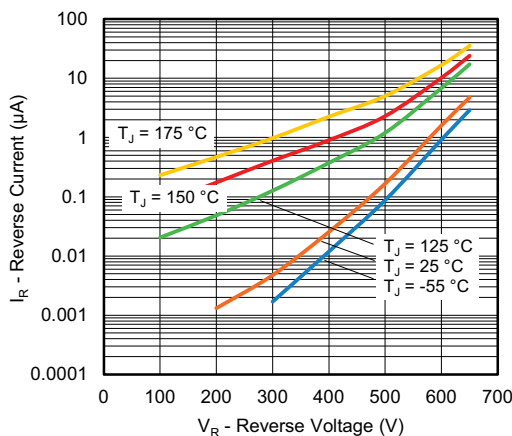


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage, per leg

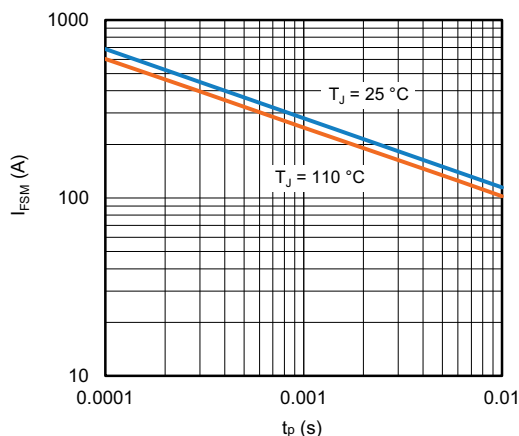


Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration, Per Leg (Square Wave)

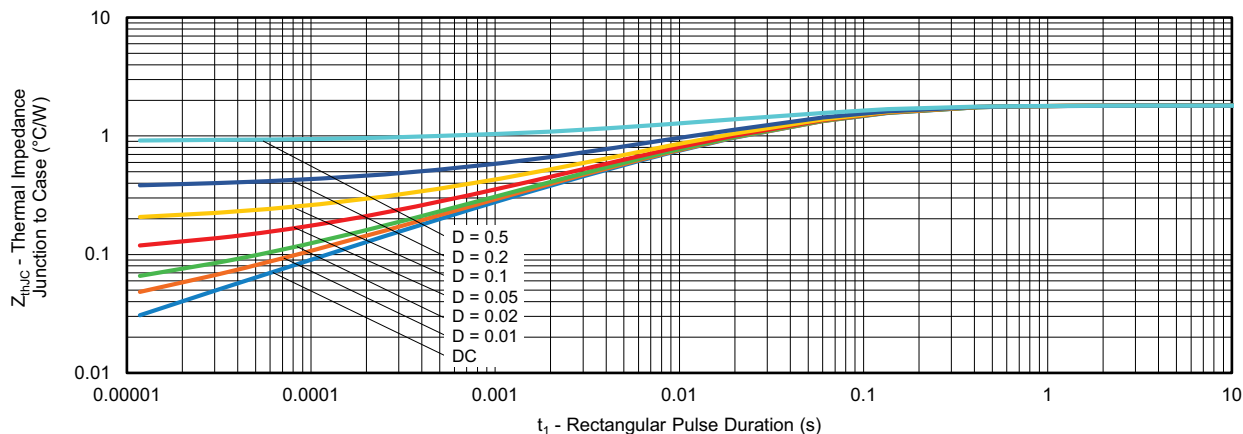
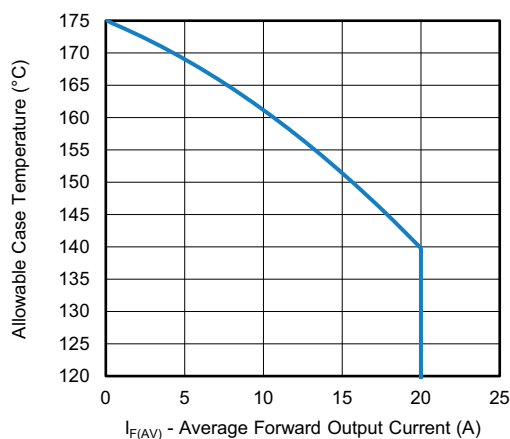

Fig. 5 - Typical Thermal Impedance Z_{thJC} Characteristics, per leg


Fig. 6 - Maximum Allowable Case Temperature vs. Average Forward Current, per leg

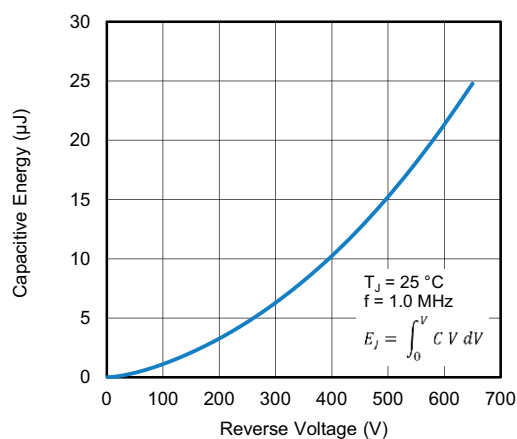


Fig. 8 - Typical Capacitive Energy vs. Reverse Voltage, per leg

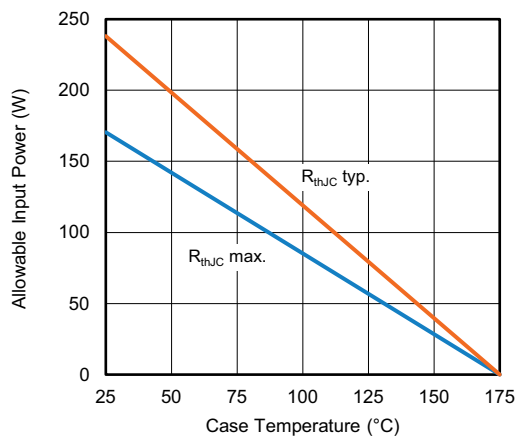


Fig. 7 - Forward Power Loss Characteristics, per leg

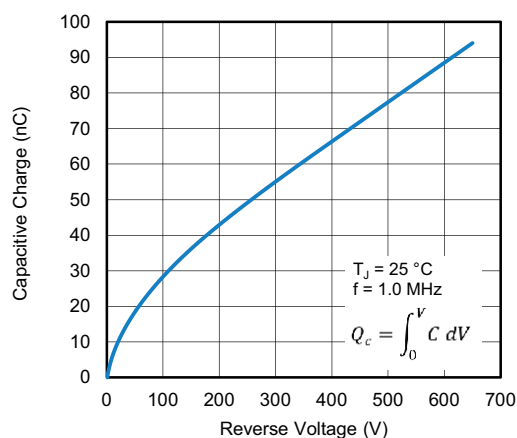


Fig. 9 - Typical Capacitive Charge vs. Reverse Voltage, per leg



ORDERING INFORMATION TABLE

Device code	VS-	C	40	C	P	07	L	-M3
	1	2	3	4	5	6	7	8
1	- Vishay Semiconductors product							
2	- C = SiC diode							
3	- Current rating (40 = 40 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	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-C40CP07L-M3	25/tube	500	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS

Dimensions	www.vishay.com/doc?95626
Part marking information	www.vishay.com/doc?95007
SPICE model	www.vishay.com/doc?96888



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