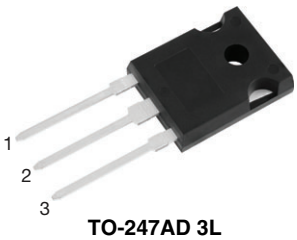
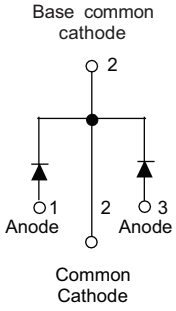
650 V Power SiC Merged PIN Schottky Diode, 2 x 20 A



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

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 µA
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^2s
		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: $dP_D/dT_J < 1/R_{\theta JA}$

ELECTRICAL SPECIFICATIONS (T_J = 25 °C unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Forward voltage, per leg	V_F	I_F = 20 A	-	1.40	1.70	V
		I_F = 20 A, T_J = 150 °C	-	1.55	1.9	
		I_F = 20 A, T_J = 175 °C	-	1.60	-	
Reverse leakage current, per leg	I_R	V_R = V_R rated	-	-	100	µA
		V_R = V_R rated, T_J = 150 °C	-	-	250	
		V_R = V_R rated, T_J = 175 °C	-	35	-	
Total capacitance, per leg	C	V_R = 1 V, f = 1 MHz	-	1040	-	pF
		V_R = 400 V, f = 1 MHz	-	110	-	
Total capacitive charge, per leg	Q_C	V_R = 400 V, f = 1 MHz	-	68	-	nC

THERMAL - MECHANICAL SPECIFICATIONS (T_A = 25 °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			

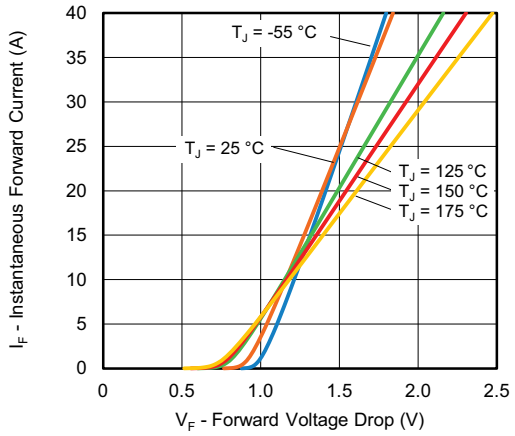


Fig. 1 - Typical Forward Voltage Drop Characteristics, per leg

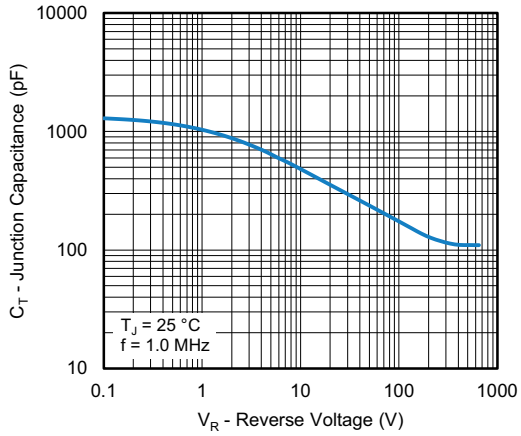


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage, per leg

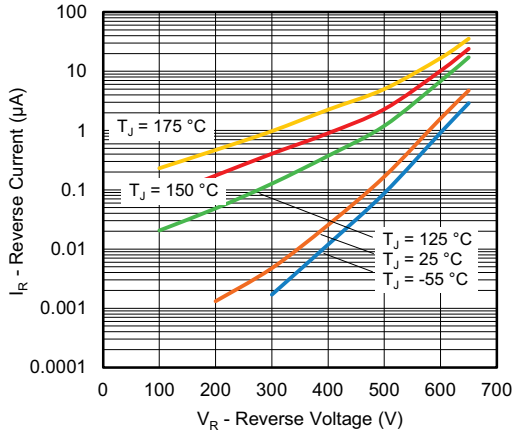


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage, per leg

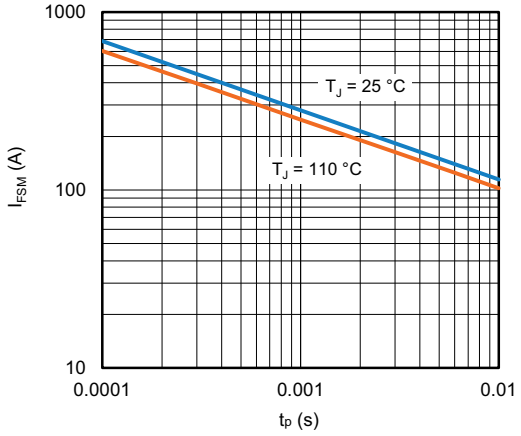


Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration, Per Leg (Square Wave)

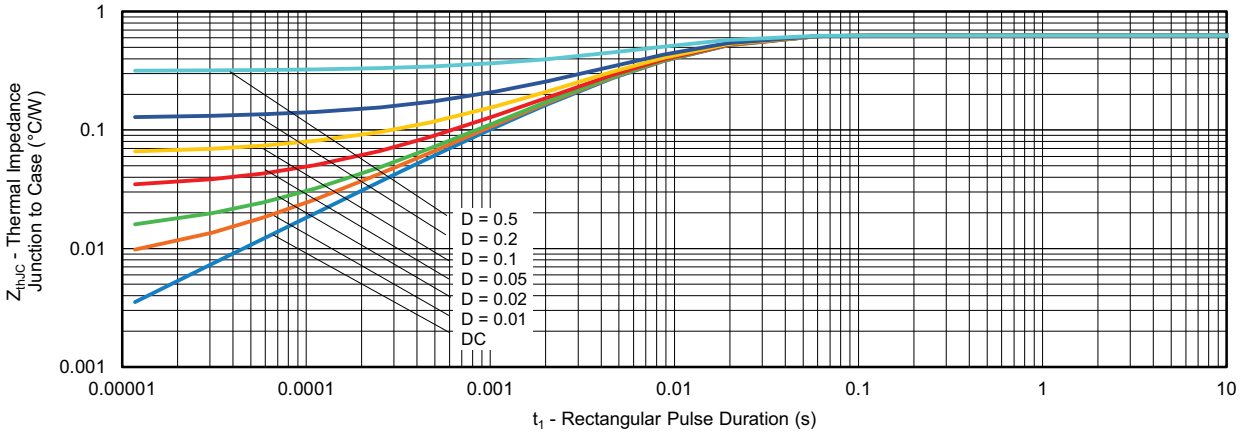


Fig. 5 - Typical Thermal Impedance Z_{thJC} Characteristics, per leg

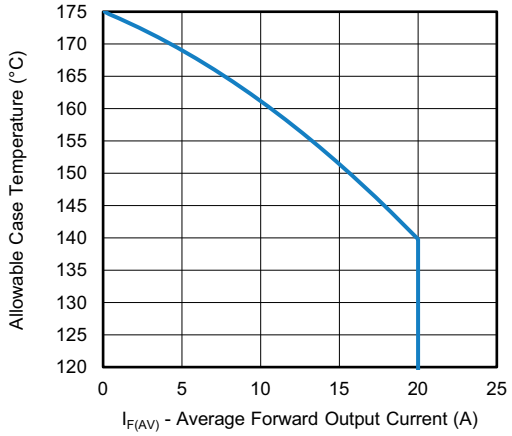


Fig. 6 - Maximum Allowable Case Temperature vs. Average Forward Current, per leg

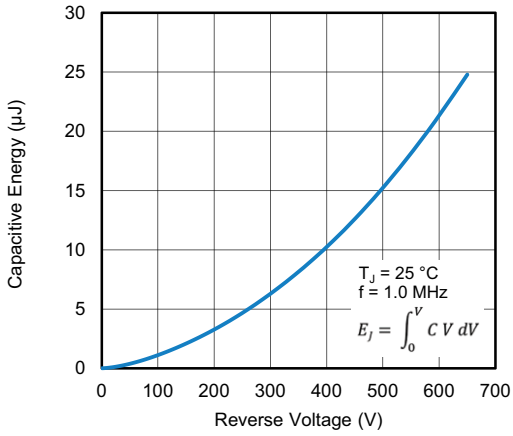


Fig. 8 - Typical Capacitive Energy vs. Reverse Voltage, per leg

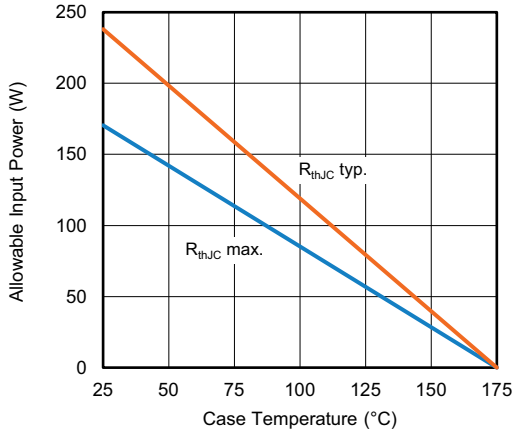


Fig. 7 - Forward Power Loss Characteristics, per leg

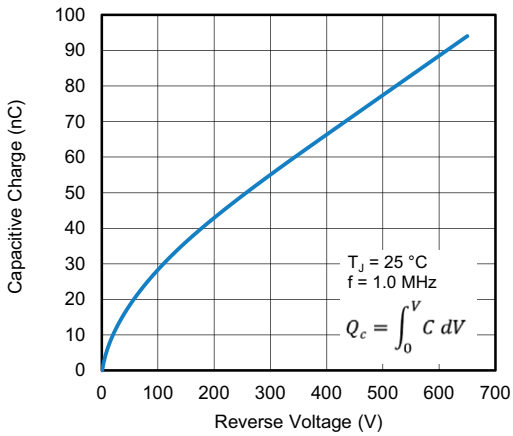
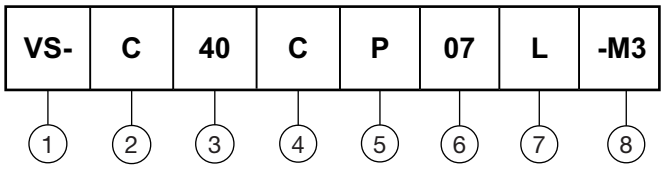


Fig. 9 - Typical Capacitive Charge vs. Reverse Voltage, per leg

ORDERING INFORMATION TABLE

Device code



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

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