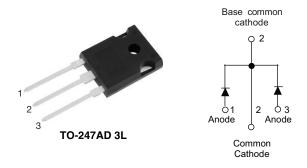


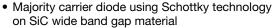
### Vishay Semiconductors

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



PRIMARY CHARACTERISTICS				
I <sub>F(AV)</sub>	2 x 20 A			
$V_{R}$	650 V			
V <sub>F</sub> at I <sub>F</sub> at 150 °C	1.55 V			
T <sub>J</sub> max.	175 °C			
I <sub>R</sub> at V <sub>R</sub> at 175 °C	35 μΑ			
Q <sub>C</sub> (V <sub>R</sub> = 400 V)	68 nC			
Package	TO-247AD 3L			
Circuit configuration	Common cathode			

#### **FEATURES**





- 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">www.vishav.com/doc?99912</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

<b>ABSOLUTE MAXIMUM RATINGS</b> (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 <sub>C</sub> = 140 °C (DC)	20	Α	
DC blocking voltage	$V_{DC}$		650	V	
Repetitive peak surge current, per leg	I <sub>FRM</sub>	$T_C$ = 25 °C, f = 50 Hz, square wave, DC = 25 %	92	Α	
Non-repetitive peak forward surge current, per leg		$T_C = 25$ °C, $t_p = 10$ ms, half sine wave	160	Α	
Non-repetitive peak forward surge current, per leg	I <sub>FSM</sub>	$T_C = 110 ^{\circ}\text{C}$ , $t_p = 10 \text{ms}$ , half sine wave	140	Α	
Dower discination, per les	P <sub>tot</sub> (1)	T <sub>C</sub> = 25°C	170	W	
Power dissipation, per leg	Ftot \''	T <sub>C</sub> = 110 °C	74	] vv	
l <sup>2</sup> t value, per leg	6.2	T <sub>C</sub> = 25°C	128	A <sup>2</sup> s	
	∫i <sup>2</sup> dt	T <sub>C</sub> = 110 °C	98	A-5	
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:  $dP_D/dT_J < 1/R_{\theta JA}$ 



## Vishay Semiconductors

<b>ELECTRICAL SPECIFICATIONS</b> (T <sub>J</sub> = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Forward voltage, per leg	$V_{F}$	I <sub>F</sub> = 20 A	-	1.40	1.70		
		I <sub>F</sub> = 20 A, T <sub>J</sub> = 150 °C	-	1.55	1.9	V	
		I <sub>F</sub> = 20 A, T <sub>J</sub> = 175 °C	-	1.60	-		
Reverse leakage current, per leg I <sub>R</sub>	I <sub>R</sub>	$V_R = V_R$ rated	-	-	100	μΑ	
		V <sub>R</sub> = V <sub>R</sub> rated, T <sub>J</sub> = 150 °C	-	-	250		
		V <sub>R</sub> = V <sub>R</sub> rated, T <sub>J</sub> = 175 °C	-	35	-		
Total capacitance, per leg C	0	V <sub>R</sub> = 1 V, f = 1 MHz	-	1040	-	nE.	
	C	V <sub>R</sub> = 400 V, f = 1 MHz	-	110	-	pF	
Total capacitive charge, per leg	Q <sub>C</sub>	V <sub>R</sub> = 400 V, f = 1 MHz	-	68	-	nC	

THERMAL - MECHANICAL SPECIFICATIONS (T <sub>A</sub> = 25 °C unless otherwise specified)							
PARAMETER		SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal variations is mation to acco	per leg	Russo		-	0.63	0.88	°C/W
Thermal resistance, junction-to-case	per device			-	0.38	0.53	3
Marking device					C40C	P07L	

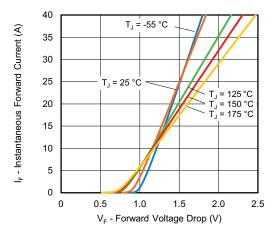


Fig. 1 - Typical Forward Voltage Drop Characteristics, per leg

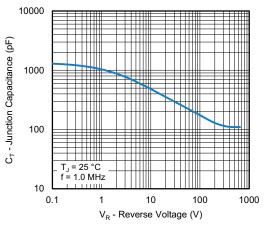


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage, per leg

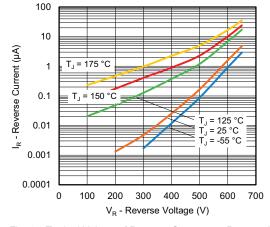


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage, per leg

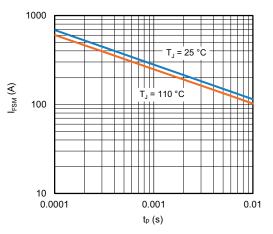
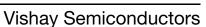


Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration, Per Leg (Square Wave)





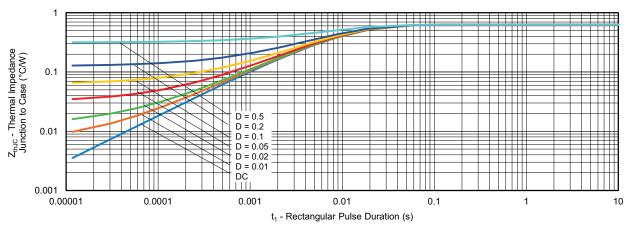


Fig. 5 - Typical Thermal Impedance Z<sub>thJC</sub> Characteristics, per leg

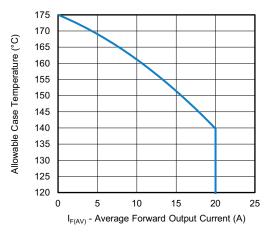


Fig. 6 - Maximum Allowable Case Temperature vs. Average Forward Current, per leg

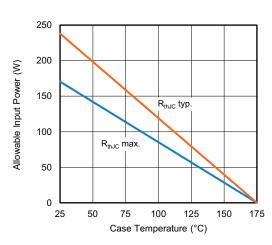


Fig. 7 - Forward Power Loss Characteristics, per leg

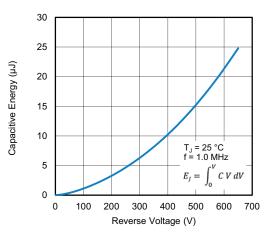


Fig. 8 - Typical Capacitive Energy vs. Reverse Voltage, per leg

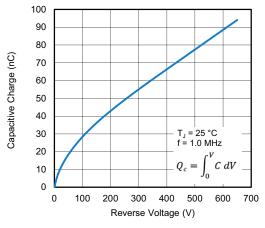


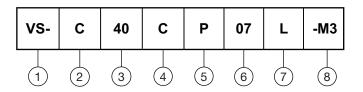
Fig. 9 - Typical Capacitive Charge vs. Reverse Voltage, per leg



# Vishay Semiconductors

### **ORDERING INFORMATION TABLE**

**Device code** 



- 1 Vishay Semiconductors product
- **2** C = SiC diode
- 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 <u>www.vishay.com/doc?95626</u>				
Part marking information	www.vishay.com/doc?95007			



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