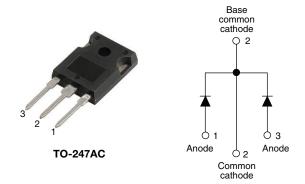


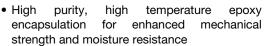
# High Performance Schottky Rectifier, 2 x 20 A



PRIMARY CHARACTERISTICS					
I <sub>F(AV)</sub>	2 x 20 A				
$V_R$	60 V				
V <sub>F</sub> at I <sub>F</sub>	0.49 V				
I <sub>RM</sub> typ.	96 mA at 125 °C				
T <sub>J</sub> max.	150 °C				
E <sub>AS</sub>	18 mJ				
Package	TO-247AC				
Circuit configuration	Common cathode				

#### **FEATURES**

- 150 °C T<sub>J</sub> operation
- · Very low forward voltage drop
- High frequency operation





- Guard ring for enhanced ruggedness and long term reliability
- AEC-Q101 qualified
- Meets JESD-201 class 1A whisker test
- Material categorization: for definitions of compliance please see <a href="https://www.vishay.com/doc?99912"><u>www.vishay.com/doc?99912</u></a>

### **DESCRIPTION**

The VS-40CPQ060HN3 center tap Schottky rectifier has been optimized for very low forward voltage drop with moderate leakage. The proprietary barrier technology allows for reliable operation up to 150 °C junction temperature. Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection.

MAJOR RATINGS AND CHARACTERISTICS							
SYMBOL	CHARACTERISTICS	VALUES	UNITS				
I <sub>F(AV)</sub>	Rectangular waveform	40	Α				
$V_{RRM}$		60	V				
I <sub>FSM</sub>	$t_p = 5 \mu s sine$	3200	А				
V <sub>F</sub>	20 A <sub>pk</sub> , T <sub>J</sub> = 125 °C (per leg)	0.49	V				
T <sub>J</sub>		-55 to +150	°C				

VOLTAGE RATINGS					
PARAMETER	SYMBOL	VS-40CPQ060HN3	UNITS		
Maximum DC reverse voltage	$V_R$	60	W		
Maximum working peak reverse voltage	$V_{RWM}$	60	V		

ABSOLUTE MAXIMUM RATINGS						
PARAMETER	SYMBOL	TEST COND	VALUES	UNITS		
Maximum average forward current See fig. 5	I <sub>F(AV)</sub> 50 % duty cycle at T <sub>C</sub> = 120 °C, rectangular waveform		40			
Maximum peak one cycle non-repetitive surge current per leg	I <sub>FSM</sub>	5 µs sine or 3 µs rect. pulse	Following any rated load condition and with rated	3200	Α	
See fig. 7		10 ms sine or 6 ms rect. pulse	V <sub>RRM</sub> applied	320		
Non-repetitive avalanche energy per leg	E <sub>AS</sub>	T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 2 A, L = 9.0 mH		18	mJ	
Repetitive avalanche current per leg	I <sub>AR</sub>	Current decaying linearly to zero in 1 $\mu$ s Frequency limited by T <sub>J</sub> maximum V <sub>A</sub> = 1.5 x V <sub>R</sub> typical		2	Α	

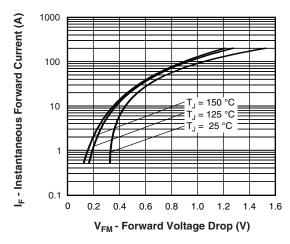


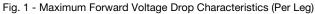
ELECTRICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
		20 A	T <sub>.1</sub> = 25 °C	0.53	V	
Maximum forward voltage drop per leg	V <sub>FM</sub> <sup>(1)</sup>	40 A	11 = 23 0	0.68		
See fig. 1	VFM (1)	20 A	T <sub>J</sub> = 125 °C	0.49		
		40 A	1J=125 C	0.64		
Maximum reverse leakage current per leg	I <sub>RM</sub> <sup>(1)</sup>	T <sub>J</sub> = 25 °C	V <sub>B</sub> = rated V <sub>B</sub>	1.7	mA	
Maximum reverse leakage current per leg		T <sub>J</sub> = 125 °C	v <sub>R</sub> = rated v <sub>R</sub>	180		
Typical reverse leakage current per leg	I <sub>RM</sub> <sup>(1)</sup>	T <sub>J</sub> = 125 °C	V <sub>R</sub> = rated V <sub>R</sub>	96	mA	
Maximum junction capacitance per leg	C <sub>T</sub>	$V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz) 25 °C		1600	pF	
Typical series inductance per leg	L <sub>S</sub>	Measured lead to lead 5 mm from package body		7.5	nΗ	
Maximum voltage rate of change	dV/dt	Rated V <sub>R</sub> 10 000		V/µs		

#### Note

 $^{(1)}\,$  Pulse width < 300 µs, duty cycle < 2 %

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER		SYMBOL	TEST CONDITIONS	VALUES	UNITS	
Maximum junction and storage temperature range		T <sub>J</sub> , T <sub>Stg</sub>		-55 to 150	°C	
Maximum thermal resistance, junction to case per leg		В	DC operation See fig. 4	1.25		
Maximum thermal resistance, junction to case per package		R <sub>thJC</sub>	DC operation	0.63	°C/W	
Typical thermal resistance, case to heatsink		R <sub>thCS</sub>	Mounting surface, smooth and greased	0.24		
Approximate weight				6	g	
				0.21	oz.	
Mounting torque —	minimum		Non-lubricated threads	6 (5)	kgf · cm	
	maximum		Non-iubilicated tilleads	12 (10)	(lbf · in)	
Marking device			Case style TO-247AC	40CP0	Q060H	





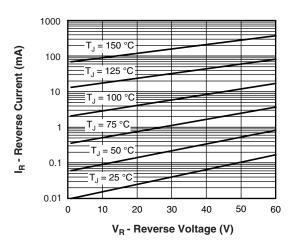


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

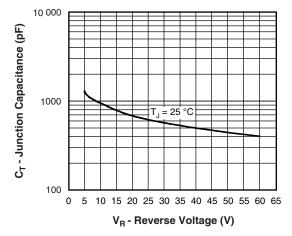


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

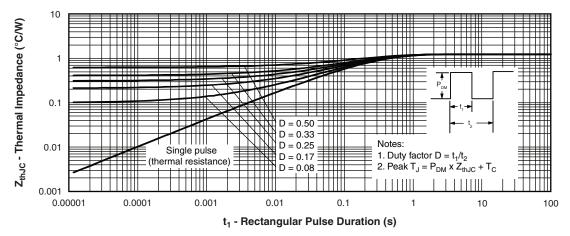


Fig. 4 - Maximum Thermal Impedance ZthJC Characteristics (Per Leg)

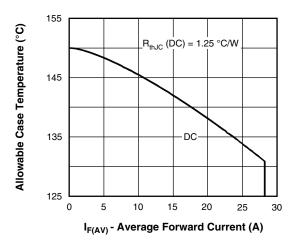


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

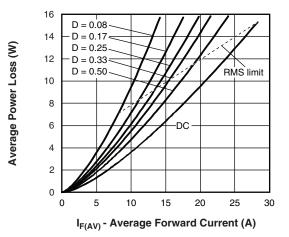


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

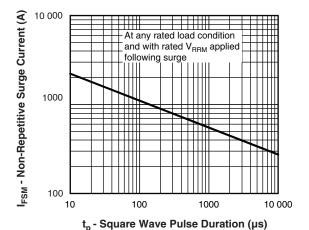


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

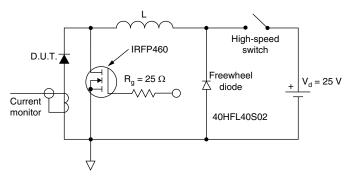
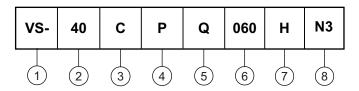


Fig. 8 - Unclamped Inductive Test Circuit



### **ORDERING INFORMATION TABLE**

**Device code** 



- 1 Vishay Semiconductors product
- **2** Current rating (40 = 40 A)
- 3 Circuit configuration:

C = common cathode

4 - Package:

P = TO-247AC

- 5 Schottky "Q" series
- 6 Voltage code 060 = 60 V
- 7 H = AEC-Q101 qualified
- 8 Environmental digit

N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free

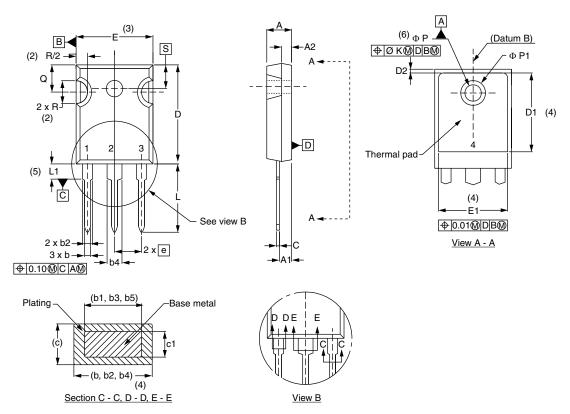
ORDERING INFORMATION (Example)					
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION		
VS-40CPQ060HN3	25	500	Antistatic plastic tube		

LINKS TO RELATED DOCUMENTS				
Dimensions <u>www.vishay.com/doc?95223</u>				
Part marking information	www.vishay.com/doc?95007			



### **TO-247AC**

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



SYMBOL	MILLIM	IETERS	INC	HES	NOTES
STMBOL	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

SYMBOL	MILLIN	IETERS	INC	HES	NOTES
STWIBOL	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	-	0.530	-	
е	5.46	BSC	0.215	BSC	
ØK	0.254		0.0	)10	
L	14.20	16.10	0.559	0.634	
L1	3.71	4.29	0.146	0.169	
ØΡ	3.56	3.66	0.14	0.144	
Ø P1	ı	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. Mold flash shall not exceed 0.127 mm (0.005") per side. 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 c



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