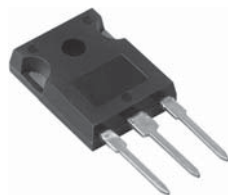
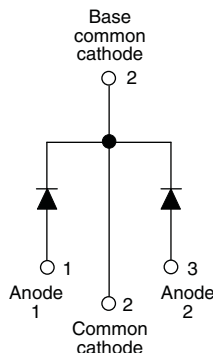


## Schottky Rectifier, 2 x 20 A



TO-247AC



### FEATURES

- 150 °C T<sub>J</sub> operation
- Very low forward voltage drop
- High frequency operation
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Guard ring for enhanced ruggedness and long term reliability
- Compliant to RoHS Directive 2002/95/EC
- Designed and qualified according to JEDEC-JESD47
- Halogen-free according to IEC 61249-2-21 definition (-N3 only)



### PRODUCT SUMMARY

Package	TO-247AC
I <sub>F(AV)</sub>	2 x 20 A
V <sub>R</sub>	50 V, 60 V
V <sub>F</sub> at I <sub>F</sub>	0.49 V
I <sub>RM</sub> max.	96 mA at 125 °C
T <sub>J</sub> max.	150 °C
Diode variation	Common cathode
E <sub>AS</sub>	18 mJ

### DESCRIPTION

The VS-40CPQ... 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	A
V <sub>R</sub>		50/60	V
I <sub>FSM</sub>	t <sub>p</sub> = 5 μs sine	3200	A
V <sub>F</sub>	20 Apk, T <sub>J</sub> = 125 °C (per leg)	0.49	V
T <sub>J</sub>		- 55 to 150	°C

### VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-40CPQ050PbF	VS-40CPQ050-N3	VS-40CPQ060PbF	VS-40CPQ060-N3	UNITS
Maximum DC reverse voltage	V <sub>R</sub>	50	50	60	60	V
Maximum working peak reverse voltage	V <sub>RWM</sub>					

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	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	A
Maximum peak one cycle non-repetitive surge current per leg See fig. 7	I <sub>FSM</sub>	5 μs sine or 3 μs rect. pulse	3200	
		10 ms sine or 6 ms rect. pulse	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 μs Frequency limited by T <sub>J</sub> maximum V <sub>A</sub> = 1.5 x V <sub>R</sub> typical	2	A



ELECTRICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum forward voltage drop per leg See fig. 1	$V_{FM}^{(1)}$	20 A	$T_J = 25\text{ }^{\circ}\text{C}$	0.53	V	
		40 A		0.68		
		20 A	$T_J = 125\text{ }^{\circ}\text{C}$	0.49		
		40 A		0.64		
Maximum reverse leakage current per leg See fig. 2	$I_{RM}^{(1)}$	$T_J = 25\text{ }^{\circ}\text{C}$	$V_R = \text{Rated } V_R$	1.7	mA	
		$T_J = 125\text{ }^{\circ}\text{C}$		96		
Maximum junction capacitance per leg	$C_T$	$V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^{\circ}\text{C}$		1600	pF	
Typical series inductance per leg	$L_S$	Measured lead to lead 5 mm from package body		7.5	nH	
Maximum voltage rate of change	dV/dt	Rated $V_R$		10 000	V/ $\mu$ s	

**Note**
<sup>(1)</sup> Pulse width < 300  $\mu$ s, 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	R <sub>thJC</sub>	DC operation See fig. 4	1.25	°C/W
Maximum thermal resistance, junction to case per package		DC operation	0.63	
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 (lbf · in)
	maximum		12 (10)	
Marking device		Case style TO-247AC (JEDEC)	40CPQ050	
			40CPQ060	

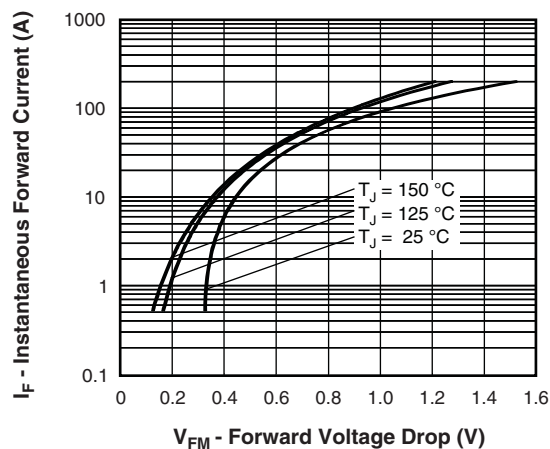


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

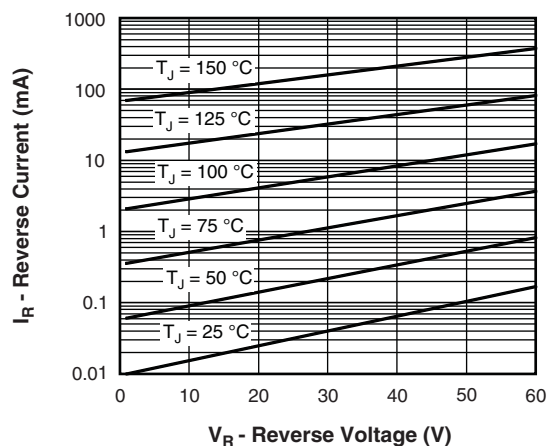


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

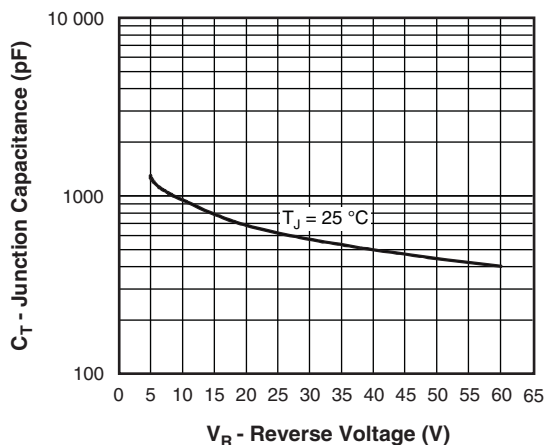


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

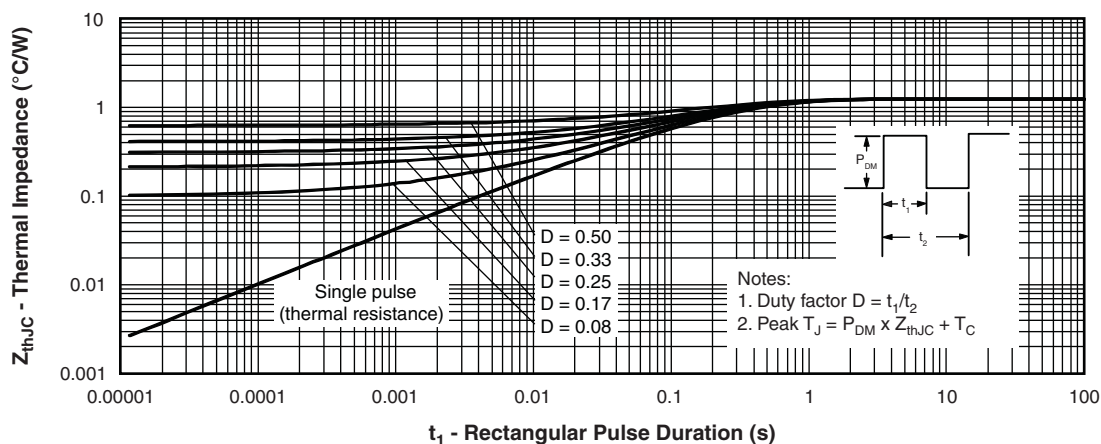


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

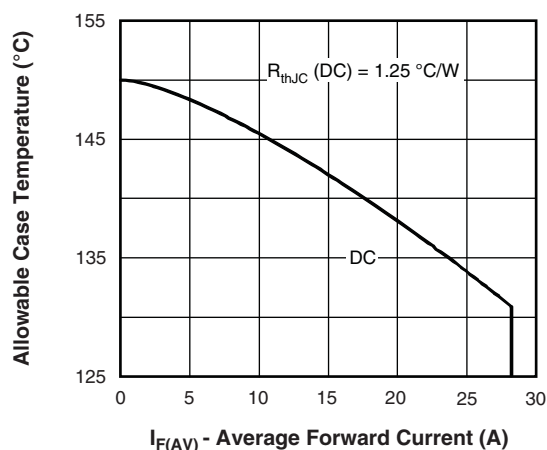


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

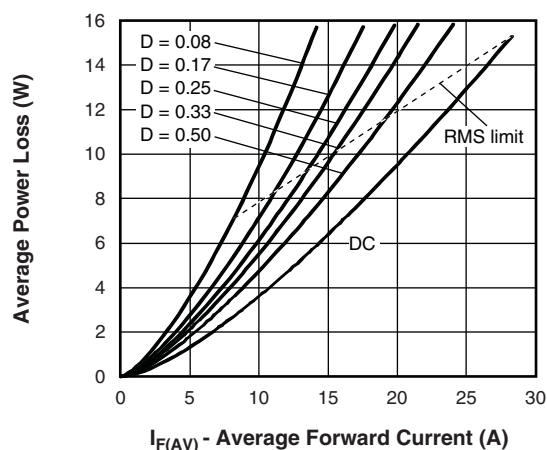


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

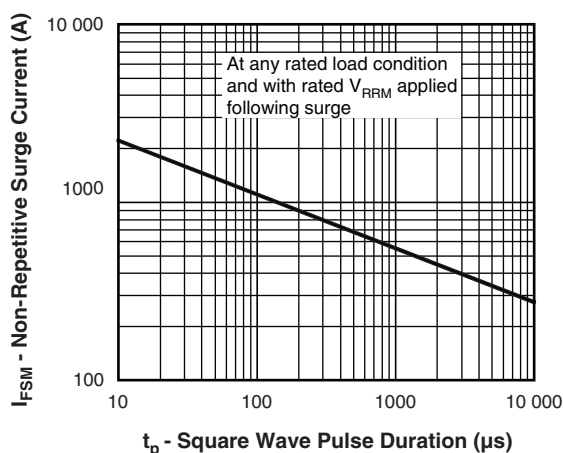


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

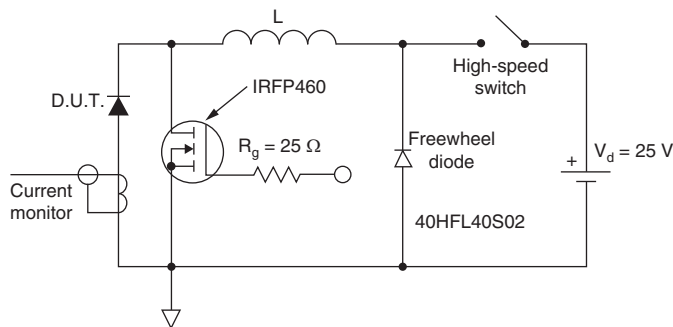


Fig. 8 - Unclamped Inductive Test Circuit



## ORDERING INFORMATION TABLE

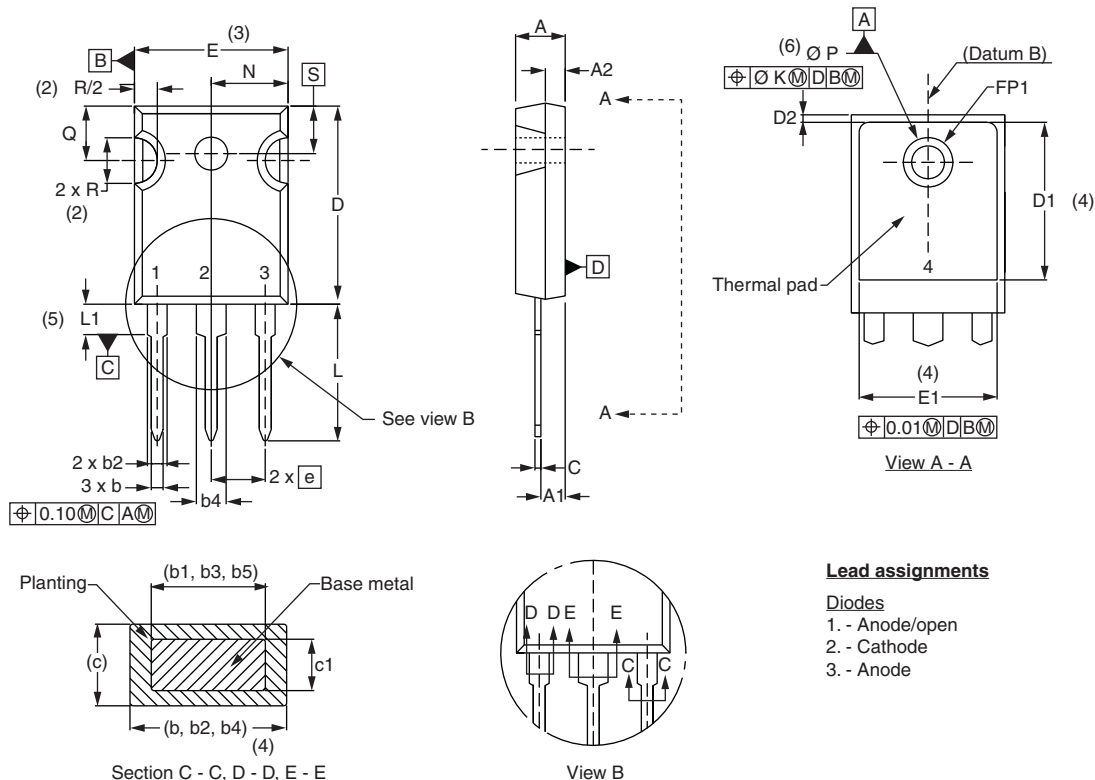
Device code	VS-	40	C	P	Q	060	PbF
	1	2	3	4	5	6	7
1	Vishay Semiconductors product						
2	Current rating (40 = 40 A)						
3	Circuit configuration: C = Common cathode						
4	Package: P = TO-247						
5	Schottky "Q" series						
6	Voltage code					050 = 50 V 060 = 60 V	
7	Environmental digit						
	• PbF = Lead (Pb)-free and RoHS compliant						
	• -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-40CPQ050PbF	25	500	Antistatic plastic tube
VS-40CPQ050-N3	25	500	Antistatic plastic tube
VS-40CPQ060PbF	25	500	Antistatic plastic tube
VS-40CPQ060-N3	25	500	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95223">www.vishay.com/doc?95223</a>
Part marking information	TO-247AC PbF <a href="http://www.vishay.com/doc?95226">www.vishay.com/doc?95226</a>
	TO-247AC -N3 <a href="http://www.vishay.com/doc?95007">www.vishay.com/doc?95007</a>



**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	2.37	0.065	0.094	
b4	2.59	3.43	0.102	0.135	
b5	2.59	3.38	0.102	0.133	
c	0.38	0.86	0.015	0.034	
c1	0.38	0.76	0.015	0.030	
D	19.71	20.70	0.776	0.815	3
D1	13.08	-	0.515	-	4

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D2	0.51	1.30	0.020	0.051	
E	15.29	15.87	0.602	0.625	3
E1	13.72	-	0.540	-	
e	5.46 BSC		0.215 BSC		
FK	2.54		0.010		
L	14.20	16.10	0.559	0.634	
L1	3.71	4.29	0.146	0.169	
N	7.62 BSC		0.3		
$\Phi P$	3.56	3.66	0.14	0.144	
$\Phi P1$	-	6.98	-	0.275	
Q	5.31	5.69	0.209	0.224	
R	4.52	5.49	1.78	0.216	
S	5.51 BSC		0.217 BSC		

### Notes

- Dimensioning and tolerancing per ASME Y14.5M-1994
- Contour of slot optional
- 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
- Thermal pad contour optional with dimensions D1 and E1
- Lead finish uncontrolled in L1
- $\Phi P$  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")
- Outline conforms to JEDEC outline TO-247 with exception of dimension c



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