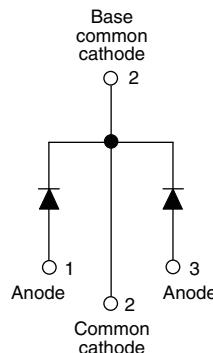


High Performance Schottky Rectifier, 2 x 20 A



FEATURES

- 150 °C T_J 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
- Designed and qualified according to JEDEC®-JESD47
- Halogen-free (-N3 only)
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912



PRODUCT SUMMARY

Package	TO-247AC
$I_{F(AV)}$	2 x 20 A
V_R	35 V to 45 V
V_F at I_F	0.43 V
I_{RM} max.	150 mA at 125 °C
T_J max.	150 °C
Diode variation	Common cathode
E_{AS}	27 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
$I_{F(AV)}$	Rectangular waveform	40	A
V_{RRM}		35 to 45	V
I_{FSM}	$t_p = 5 \mu s$ sine	3500	A
V_F	20 A _{pk} , $T_J = 125$ °C (per leg)	0.43	V
T_J		-55 to 150	°C

VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-40CPQ035PbF	VS-40CPQ035-N3	VS-40CPQ040PbF	VS-40CPQ040-N3	VS-40CPQ045PbF	VS-40CPQ045-N3	UNITS
Maximum DC reverse voltage	V_R	35	35	40	40	45	45	V
Maximum working peak reverse voltage	V_{RWM}							

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average forward current See fig. 5	$I_{F(AV)}$	50 % duty cycle at $T_C = 120$ °C, rectangular waveform		40	A
Maximum peak one cycle non-repetitive surge current per leg See fig. 7	I_{FSM}	5 μs sine or 3 μs rect. pulse	Following any rated load condition and with rated V_{RRM} applied	3500	
		10 ms sine or 6 ms rect. pulse		430	
Non-repetitive avalanche energy per leg	E_{AS}	$T_J = 25$ °C, $I_{AS} = 4$ A, $L = 3.4$ mH		27	mJ
Repetitive avalanche current per leg	I_{AR}	Current decaying linearly to zero in 1 μs Frequency limited by T_J maximum $V_A = 1.5 \times V_R$ typical		4	A

ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum forward voltage drop per leg See fig. 1	$V_{FM}^{(1)}$	20 A	$T_J = 25^\circ C$	0.49	V	
		40 A		0.59		
		20 A	$T_J = 125^\circ C$	0.43		
		40 A		0.56		
Maximum reverse leakage current per leg See fig. 2	$I_{RM}^{(1)}$	$T_J = 25^\circ C$	$V_R = \text{Rated } V_R$	4	mA	
		$T_J = 125^\circ C$		150		
Maximum junction capacitance per leg	C_T	$V_R = 5 \text{ V}_DC$ (test signal range 100 kHz to 1 MHz) $25^\circ C$		1850	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/ μ s	

Note

(1) Pulse width < 300 μ s, duty cycle < 2 %

THERMAL - MECHANICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum junction and storage temperature range	T_J, T_{Stg}			-55 to 150	°C
Maximum thermal resistance, junction to case per leg	R_{thJC}	DC operation See fig. 4		1.25	°C/W
		DC operation		0.63	
Typical thermal resistance, case to heatsink	R_{thCS}	Mounting surface, smooth and greased		0.24	
Approximate weight				6	g
				0.21	oz.
Mounting torque	minimum maximum	Non-lubricated threads		6 (5)	kgf · cm (lbf · in)
				12 (10)	
Marking device		Case style TO-247AC (JEDEC)		40CPQ035	
				40CPQ040	
				40CPQ045	

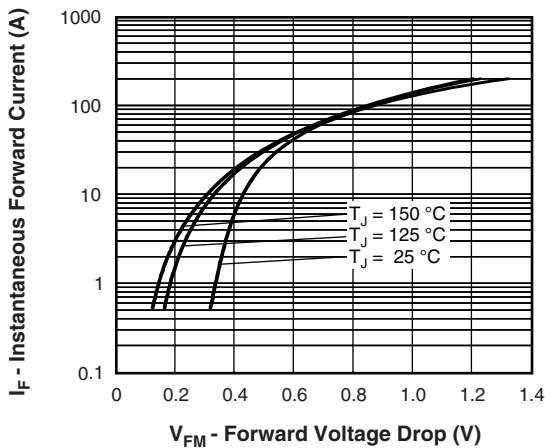


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

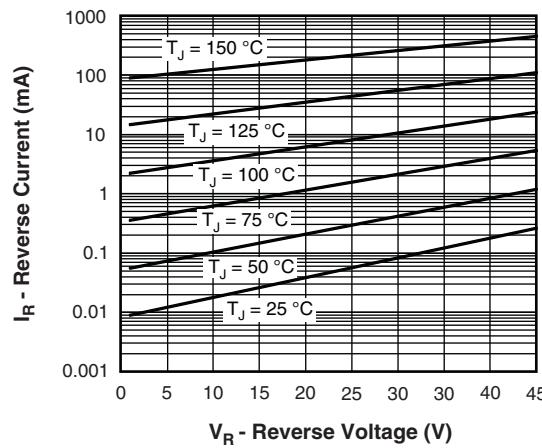


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

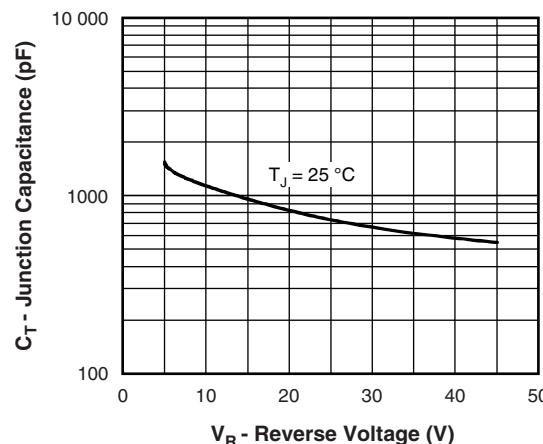


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

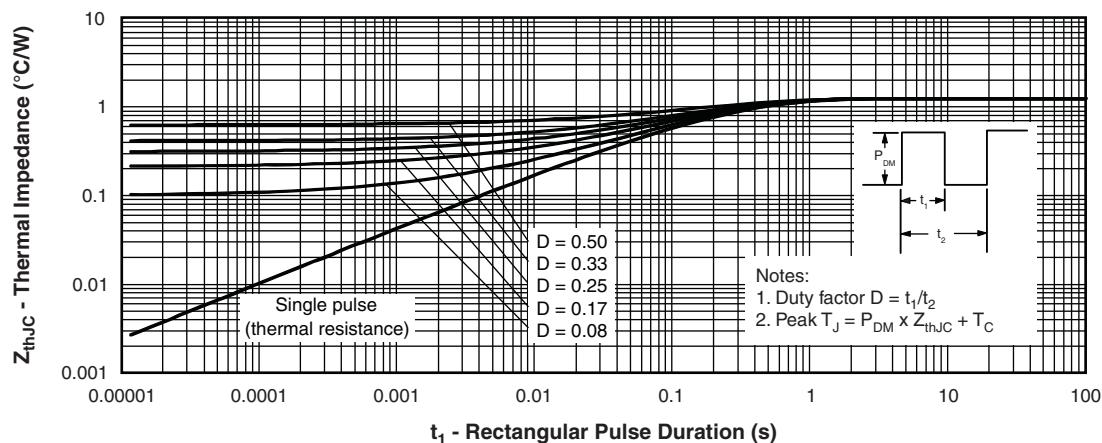


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

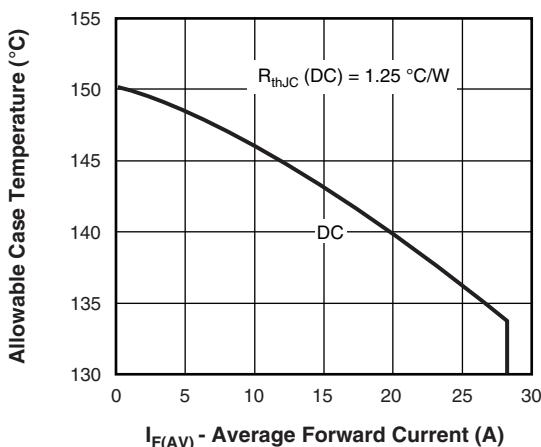


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

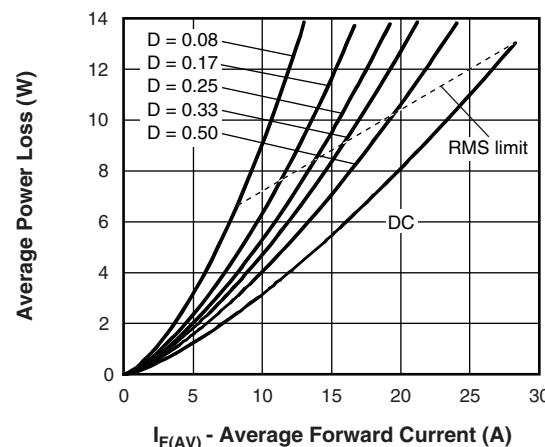


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

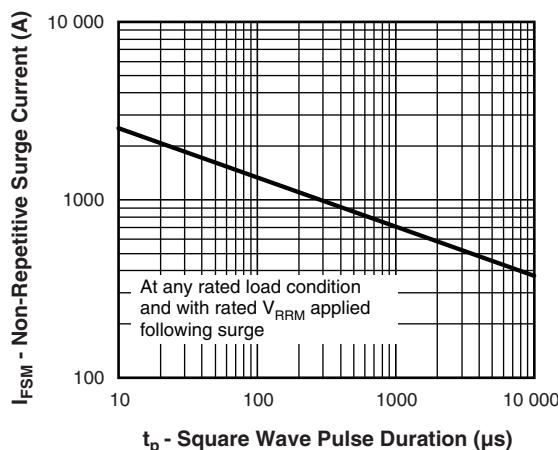


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

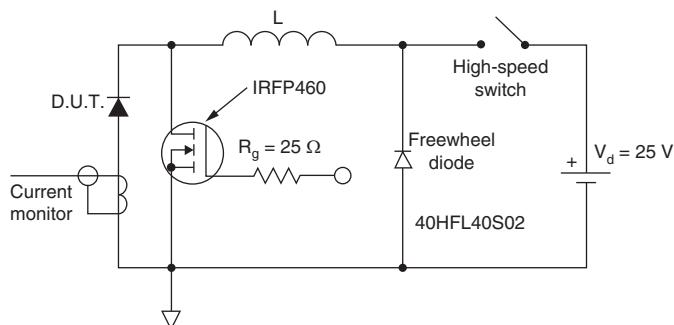


Fig. 8 - Unclamped Inductive Test Circuit

ORDERING INFORMATION TABLE

Device code	VS-	40	C	P	Q	045	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	035 = 35 V
6	- Voltage code	040 = 40 V
7	- Environmental digit	045 = 45 V

- PbF = Lead (Pb)-free and RoHS compliant
- -N3 = Halogen-free, RoHS compliant, and totally lead (Pb)-free

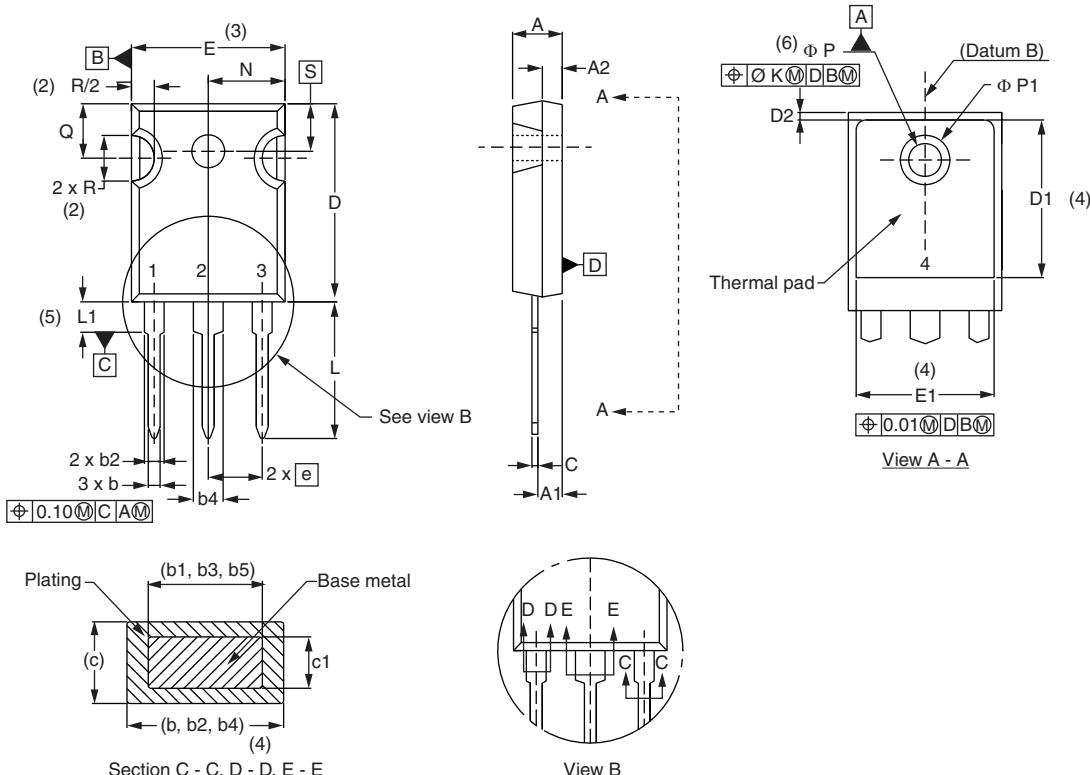


ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-40CPQ035PbF	25	500	Antistatic plastic tube
VS-40CPQ035-N3	25	500	Antistatic plastic tube
VS-40CPQ040PbF	25	500	Antistatic plastic tube
VS-40CPQ040-N3	25	500	Antistatic plastic tube
VS-40CPQ045PbF	25	500	Antistatic plastic tube
VS-40CPQ045-N3	25	500	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95542
Part marking information	www.vishay.com/doc?95226
	www.vishay.com/doc?95007

TO-247

DIMENSIONS in millimeters and inches



Symbol	Millimeters		Inches		Notes		Symbol	Millimeters		Inches		Notes
	Min.	Max.	Min.	Max.				Min.	Max.	Min.	Max.	
A	4.65	5.31	0.183	0.209			D2	0.51	1.30	0.020	0.051	
A1	2.21	2.59	0.087	0.102			E	15.29	15.87	0.602	0.625	3
A2	1.50	2.49	0.059	0.098			E1	13.72	-	0.540	-	
b	0.99	1.40	0.039	0.055			e	5.46 BSC		0.215 BSC		
b1	0.99	1.35	0.039	0.053			Ø K	2.54		0.010		
b2	1.65	2.39	0.065	0.094			L	14.20	16.10	0.559	0.634	
b3	1.65	2.34	0.065	0.092			L1	3.71	4.29	0.146	0.169	
b4	2.59	3.43	0.102	0.135			N	7.62 BSC		0.3		
b5	2.59	3.38	0.102	0.133			Ø P	3.56	3.66	0.14	0.144	
c	0.38	0.89	0.015	0.035			Ø P1	-	6.98	-	0.275	
c1	0.38	0.84	0.015	0.033			Q	5.31	5.69	0.209	0.224	
D	19.71	20.70	0.776	0.815	3		R	4.52	5.49	0.178	0.216	
D1	13.08	-	0.515	-	4		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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