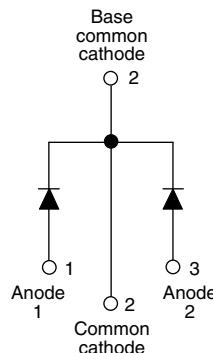


Schottky Rectifier, 2 x 20 A



TO-247AC



RoHS
COMPLIANT
HALOGEN
FREE
Available

FEATURES

- 150 °C T_J operation
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Very low forward voltage drop
- High frequency operation
- 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)

DESCRIPTION

The VS-40L...CW... 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 parallel switching power supplies.

PRODUCT SUMMARY	
Package	TO-247AC
$I_{F(AV)}$	2 x 20 A
V_R	40 V, 45 V
V_F at I_F	0.49 V
I_{RM} max.	80 mA at 100 °C
T_J max.	150 °C
Diode variation	Common cathode
E_{AS}	20 mJ

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	40	A
V_{RRM}		40/45	V
I_{FSM}	$t_p = 5 \mu s$ sine	1240	A
V_F	20 Apk, $T_J = 125$ °C (per leg, typical)	0.42	V
T_J		- 55 to 150	°C

VOLTAGE RATINGS						
PARAMETER	SYMBOL	VS-40L40CWPbF	VS-40L40CW-N3	VS-40L45CWPbF	VS-40L45CW-N3	UNITS
Maximum DC reverse voltage	V_R					
Maximum working peak reverse voltage	V_{RWM}	40	40	45	45	V

ABSOLUTE MAXIMUM RATINGS								
PARAMETER	SYMBOL	TEST CONDITIONS			VALUES	UNITS		
Maximum average forward current per leg	$I_{F(AV)}$	50 % duty cycle at $T_C = 122$ °C, rectangular waveform			20	A		
See fig. 5					40			
Maximum peak one cycle non-repetitive surge current per leg	I_{FSM}	5 μs sine or 3 μs rect. pulse	Following any rated load condition and with rated V_{RRM} applied		1240			
See fig. 7		10 ms sine or 6 ms rect. pulse			350			
Non-repetitive avalanche energy per leg	E_{AS}	$T_J = 25$ °C, $I_{AS} = 3$ A, $L = 4.4$ mH			20	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			3	A		

ELECTRICAL SPECIFICATIONS							
PARAMETER	SYMBOL	TEST CONDITIONS		TYP.	MAX.	UNITS	
Maximum forward voltage drop per leg See fig. 1	$V_{FM}^{(1)}$	20 A	$T_J = 25 \text{ }^\circ\text{C}$	0.48	0.53	V	
		40 A		0.61	0.69		
		20 A	$T_J = 125 \text{ }^\circ\text{C}$	0.42	0.49		
		40 A		0.60	0.70		
Reverse leakage current per leg See fig. 2	$I_{RM}^{(1)}$	$T_J = 25 \text{ }^\circ\text{C}$	$V_R = \text{Rated } V_R$	-	1.5	mA	
		$T_J = 100 \text{ }^\circ\text{C}$		20	80		
Threshold voltage	$V_{F(TO)}$	$T_J = T_J \text{ maximum}$		0.27		V	
Forward slope resistance	r_t			8.72		$\text{m}\Omega$	
Maximum junction capacitance per leg	C_T	$V_R = 5 \text{ V}_{\text{DC}}$ (test signal range 100 kHz to 1 MHz) 25 $^\circ\text{C}$		-	1500	pF	
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	$^\circ\text{C}$	
Maximum thermal resistance, junction to case per leg	R_{thJC}	DC operation See fig. 4		1.6	$^\circ\text{C}/\text{W}$	
		DC operation		0.8		
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)	$\text{k}\text{gf} \cdot \text{cm}$ (lbf · in)	
				12 (10)		
Marking device		Case style TO-247AC (JEDEC)		40L40CW		
				40L45CW		

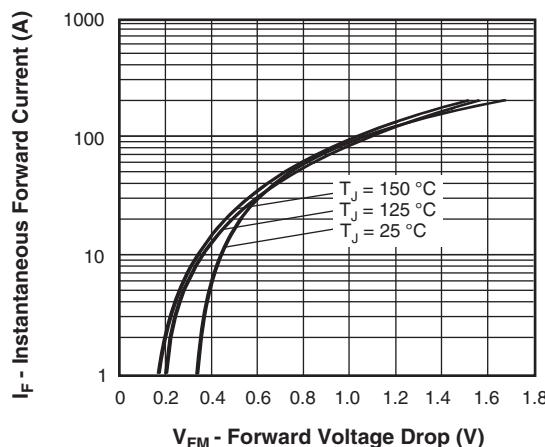


Fig. 1 - Maximum Forward Voltage Drop Characteristics
(Per Leg)

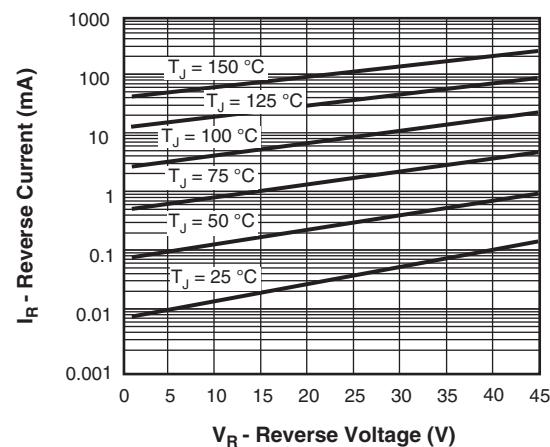


Fig. 2 - Typical Values of Reverse Current vs.
Reverse Voltage (Per Leg)

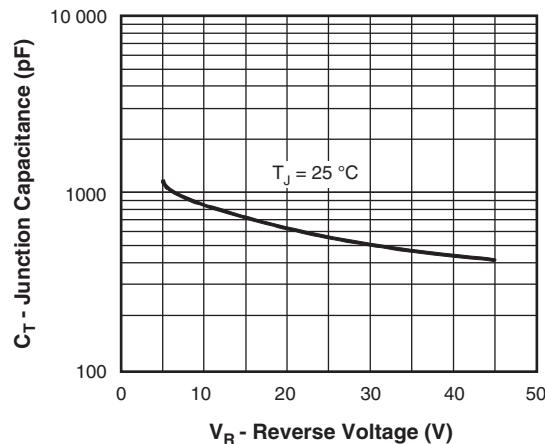


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

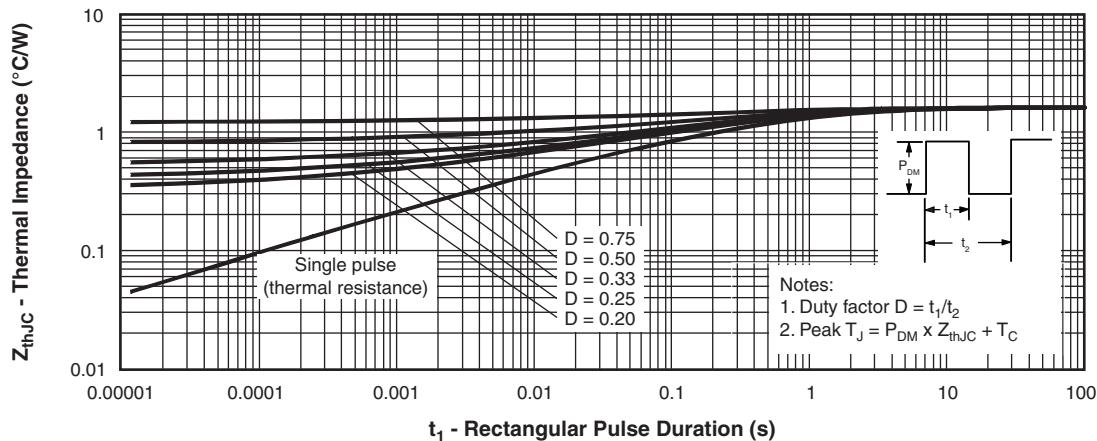


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

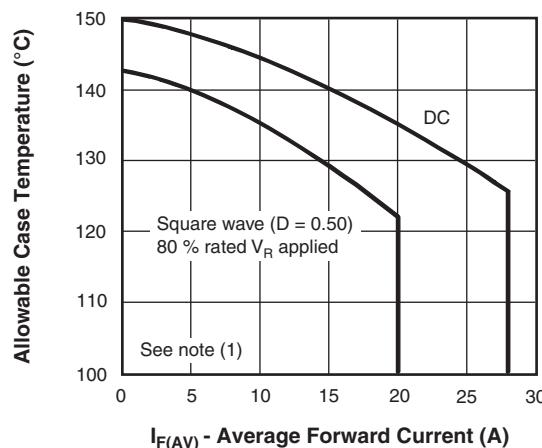


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

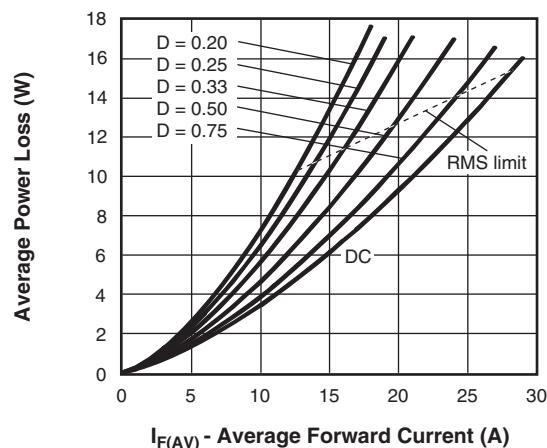


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

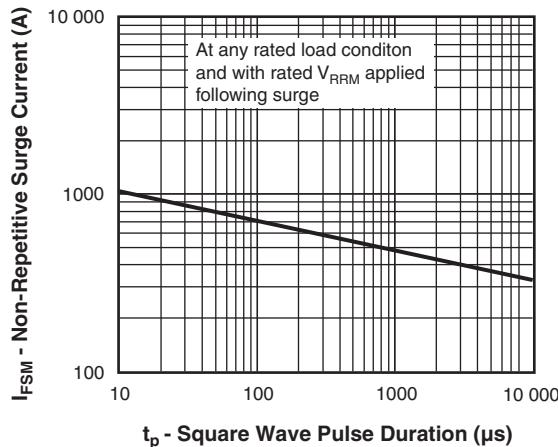


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

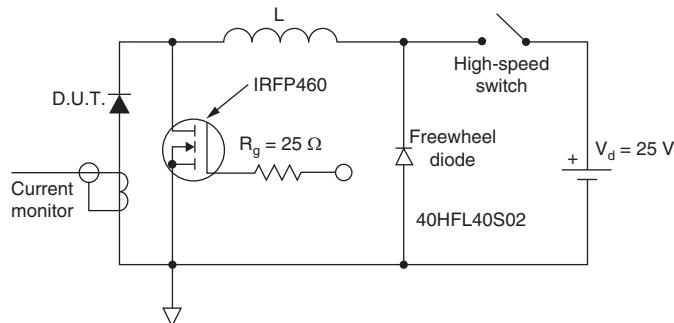


Fig. 8 - Unclamped Inductive Test Circuit

Note

(1) Formula used: $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$;
 P_d = Forward power loss = $I_{F(AV)} \times V_{FM}$ at $(I_{F(AV)}/D)$ (see fig. 6);
 P_{dREV} = Inverse power loss = $V_{R1} \times I_R (1 - D)$; I_R at $V_{R1} = 80\%$ rated V_R

ORDERING INFORMATION TABLE

Device code	VS-	40	L	45	C	W	PbF
	1	2	3	4	5	6	7

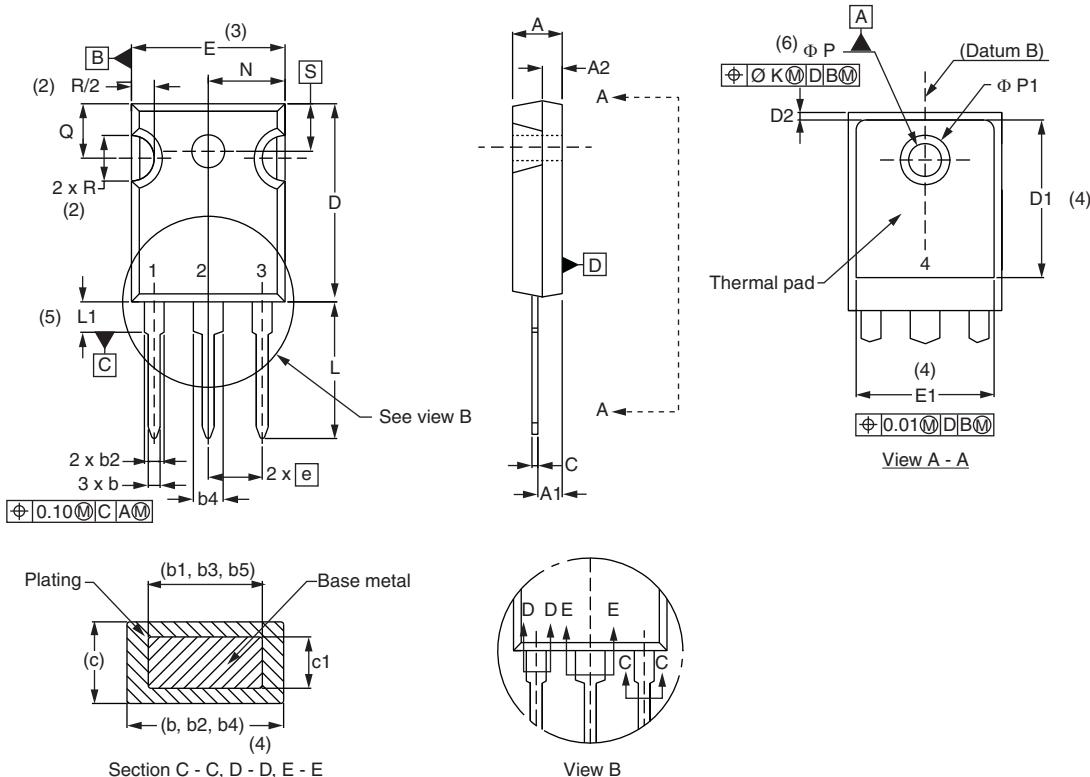
1	- Vishay Semiconductors product	
2	- Current rating (40 = 40 A)	
3	- Schottky "L" series	
4	- Voltage code	40 = 40 V 45 = 45 V
5	- Circuit configuration: C = Common cathode	
6	- Package: W = TO-247	
7	- Environmental digit	<ul style="list-style-type: none"> • PbF = Lead (Pb)-free and RoHS compliant • -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-40L40CWPbF	25	500	Antistatic plastic tube
VS-40L40CW-N3	25	500	Antistatic plastic tube
VS-40L45CWPbF	25	500	Antistatic plastic tube
VS-40L45CW-N3	25	500	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS		
Dimensions		www.vishay.com/doc?95223
Part marking information	TO-247AC PbF	www.vishay.com/doc?95226
	TO-247AC -N3	www.vishay.com/doc?95007

TO-247

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES	See view B	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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