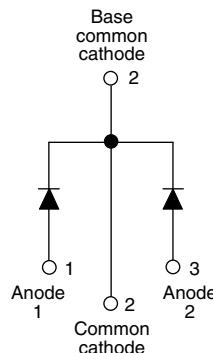


## Schottky Rectifier, 2 x 20 A



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 See fig. 5	$I_{F(AV)}$	50 % duty cycle at $T_C = 122$ °C, rectangular waveform			20	A		
					40			
Maximum peak one cycle non-repetitive surge current per leg See fig. 7	$I_{FSM}$	5 $\mu s$ sine or 3 $\mu s$ rect. pulse	Following any rated load condition and with rated $V_{RRM}$ applied		1240			
		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 $\mu s$ 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/ $\mu$ s	

**Note**

(1) Pulse width < 300  $\mu$ 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	$^\circ\text{C/W}$	
		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		

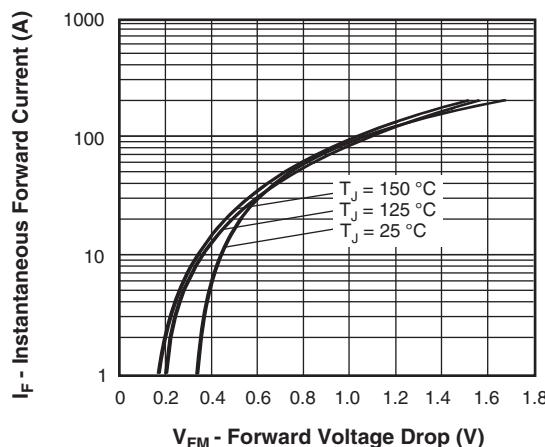


Fig. 1 - Maximum Forward Voltage Drop Characteristics  
(Per Leg)

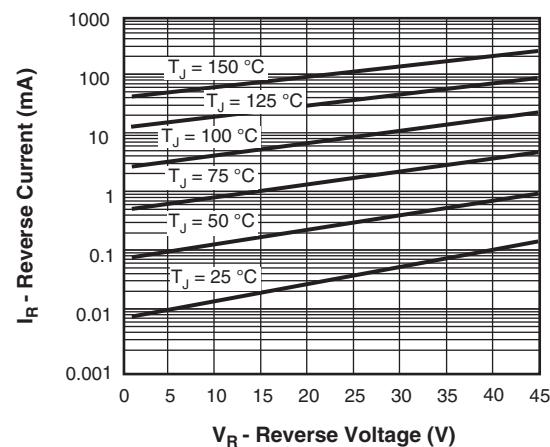


Fig. 2 - Typical Values of Reverse Current vs.  
Reverse Voltage (Per Leg)

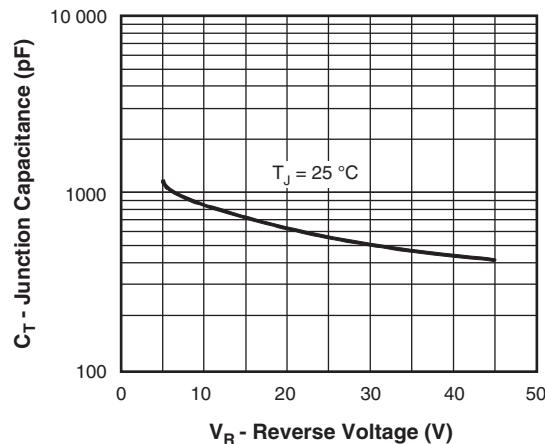


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

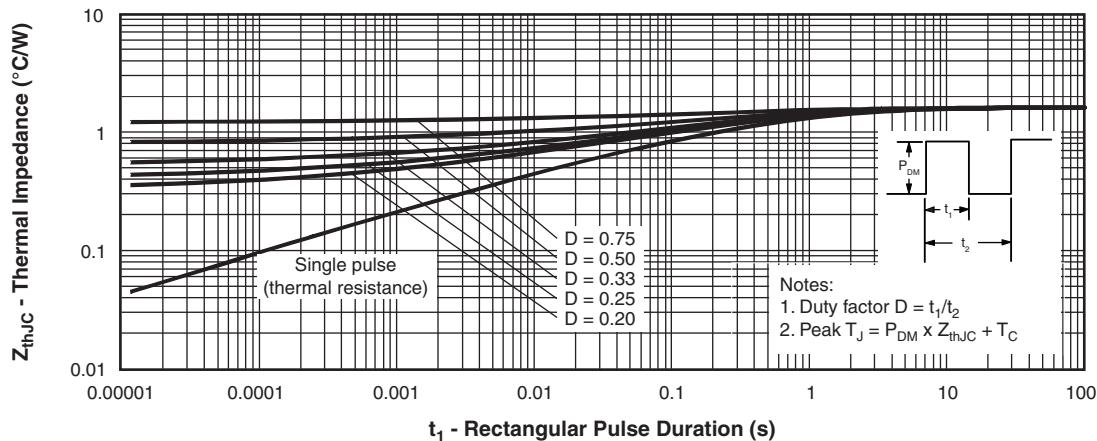


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

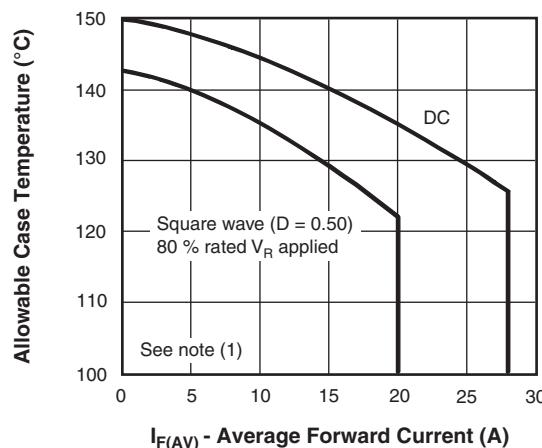


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

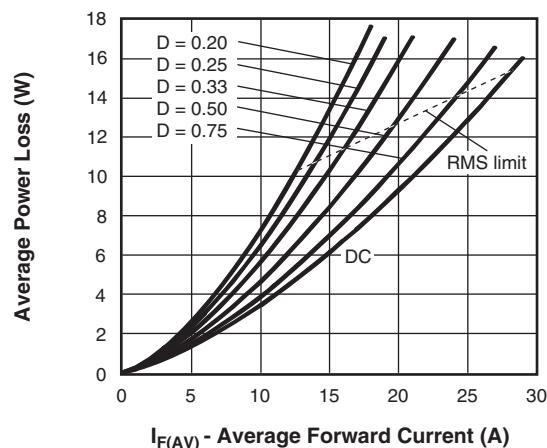


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

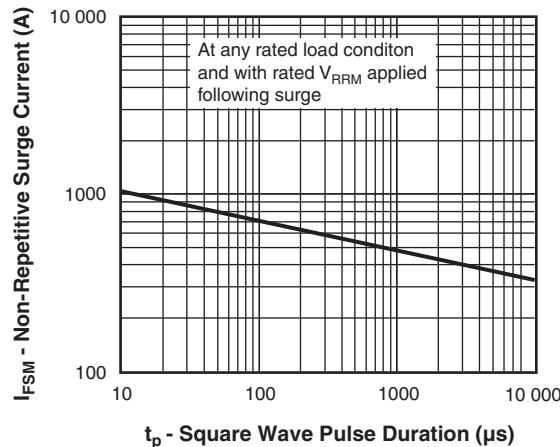


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

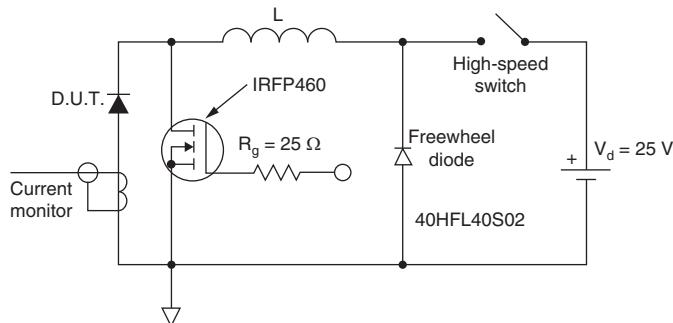


Fig. 8 - Unclamped Inductive Test Circuit

#### Note

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

**ORDERING INFORMATION TABLE**

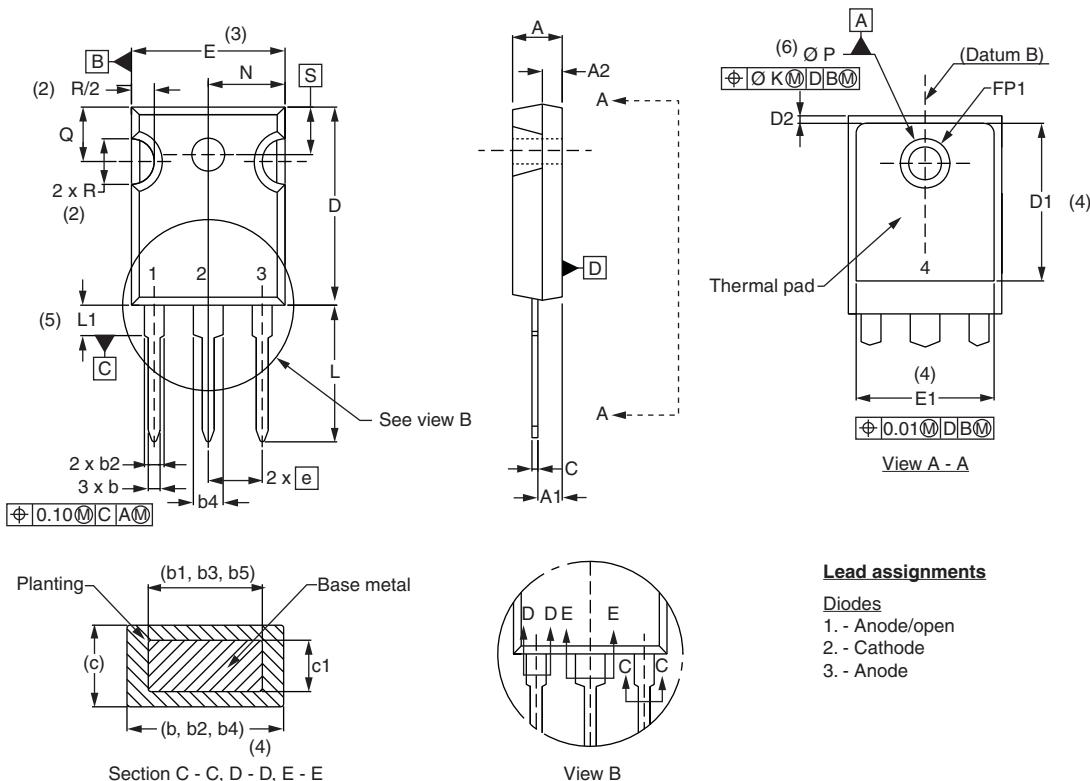
Device code	VS-	40	L	45	C	W	PbF
	1	2	3	4	5	6	7

<b>1</b>	- Vishay Semiconductors product	
<b>2</b>	- Current rating (40 = 40 A)	
<b>3</b>	- Schottky "L" series	
<b>4</b>	- Voltage code	40 = 40 V 45 = 45 V
<b>5</b>	- Circuit configuration: C = Common cathode	
<b>6</b>	- Package: W = TO-247	
<b>7</b>	- Environmental digit	<ul style="list-style-type: none"> <li>• PbF = Lead (Pb)-free and RoHS compliant</li> <li>• -N3 = Halogen-free, RoHS compliant, and totally lead (Pb)-free</li> </ul>

<b>ORDERING INFORMATION</b> (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		<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



#### Lead assignments

**Diodes**  
 1. - Anode/open  
 2. - Cathode  
 3. - Anode

SYMBOL	MILLIMETERS		INCHES		NOTES	View A - A	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			FK	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	2.37	0.065	0.094			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			ΦP	3.56	3.66	0.14	0.144	
c	0.38	0.86	0.015	0.034			ΦP1	-	6.98	-	0.275	
c1	0.38	0.76	0.015	0.030			Q	5.31	5.69	0.209	0.224	
D	19.71	20.70	0.776	0.815	3		R	4.52	5.49	1.78	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

## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk and agree to fully indemnify and hold Vishay and its distributors harmless from and against any and all claims, liabilities, expenses and damages arising or resulting in connection with such use or sale, including attorneys fees, even if such claim alleges that Vishay or its distributor was negligent regarding the design or manufacture of the part. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

## Material Category Policy

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Vishay](#):

[40L40CW](#) [40L45CW](#) [VS-40L45CWPBF](#)