



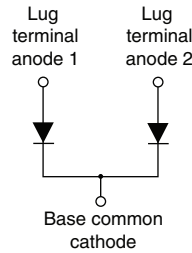
**THE DATASHEET OF  
VS-301CNQ040PBF**



## High Performance Schottky Rectifier, 300 A



TO-244



### FEATURES

- 175 °C  $T_J$  operation
- Center tap module
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- UL approved file E222165
- Designed and qualified for industrial level
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	300 A
$V_R$	40 V, 45 V
Package	TO-244
Circuit configuration	Two diodes common cathode

### DESCRIPTION / APPLICATIONS

The VS-301CNQ... center tap Schottky rectifier module series has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 175 °C junction temperature. Typical applications are in high current switching power supplies, plating power supplies, UPS systems, converters, freewheeling diodes, welding, and reverse battery protection.

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	300	A
$V_{RRM}$	Range	40/45	V
$I_{FSM}$	$t_p = 5 \mu s$ sine	16 000	A
$V_F$	150 A <sub>pk</sub> , $T_J = 125 \text{ }^\circ\text{C}$ (per leg)	0.59	V
$T_J$	Range	-55 to +175	°C

VOLTAGE RATINGS				
PARAMETER	SYMBOL	VS-301CNQ040PbF	VS-301CNQ045PbF	UNITS
Maximum DC reverse voltage	$V_R$	40	45	V
Maximum working peak reverse voltage	$V_{RWM}$			

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 $T_C = 132 \text{ }^\circ\text{C}$ , rectangular waveform		150	A
				300	
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	16 000	
		10 ms sine or 6 ms rect. pulse		3200	
Non-repetitive avalanche energy per leg	$E_{AS}$	$T_J = 25 \text{ }^\circ\text{C}$ , $I_{AS} = 21 \text{ A}$ , $L = 1 \text{ mH}$		202	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		30	A



ELECTRICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop per leg See fig. 1	$V_{FM}^{(1)}$	150 A	$T_J = 25\text{ }^\circ\text{C}$	0.69	V
		300 A		0.90	
		150 A	$T_J = 100\text{ }^\circ\text{C}$	0.59	
		300 A		0.76	
Maximum reverse leakage current per leg See fig. 2	$I_{RM}^{(1)}$	$T_J = 25\text{ }^\circ\text{C}$	$V_R = \text{Rated } V_R$	10	mA
		$T_J = 125\text{ }^\circ\text{C}$		90	
Maximum junction capacitance per leg	$C_T$	$V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$		5200	pF
Typical series inductance per leg	$L_S$	From top of terminal hole to mounting plane		7.0	nH
Maximum voltage rate of change	dV/dt	Rated $V_R$		10 000	V/ $\mu\text{s}$

Note

(1) Pulse width < 300  $\mu\text{s}$ , duty cycle < 2 %

THERMAL - MECHANICAL SPECIFICATIONS					
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	$T_J, T_{Stg}$	-55	-	175	$^\circ\text{C}$
Thermal resistance, junction to case per leg	$R_{thJC}$	-	-	0.28	$^\circ\text{C/W}$
Thermal resistance, junction to case per module		-	-	0.14	
Thermal resistance, case to heatsink	$R_{thCS}$	-	0.10	-	
Weight		-	68	-	g
		-	2.4	-	oz.
Mounting torque		35.4 (4)	-	53.1 (6)	lbf · in (N · m)
Mounting torque center hole		30 (3.4)	-	40 (4.6)	
Terminal torque		30 (3.4)	-	44.2 (5)	
Vertical pull		-	-	80	lbf · in
2" lever pull		-	-	35	

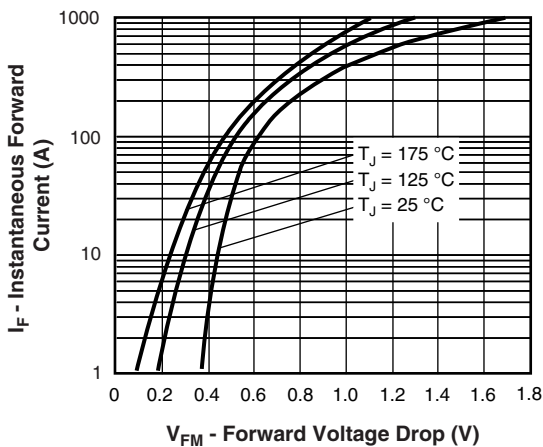


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

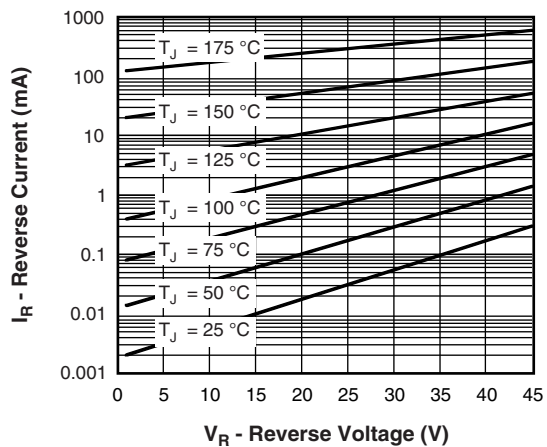


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

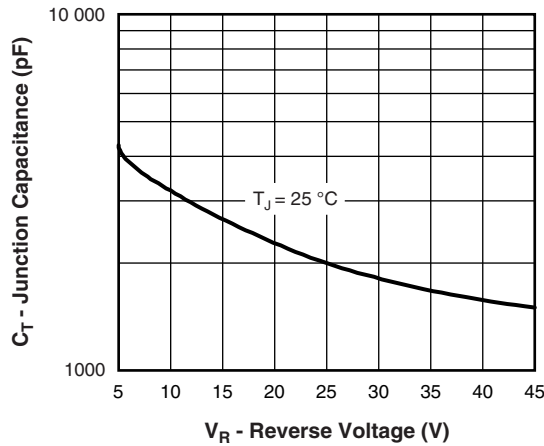


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

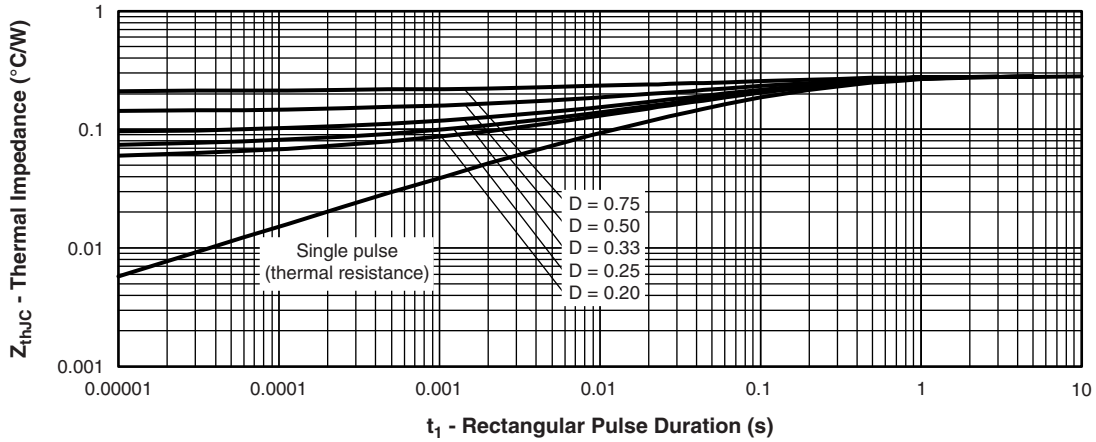


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

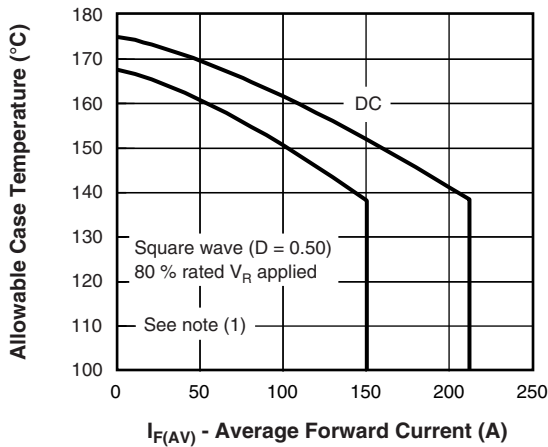


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

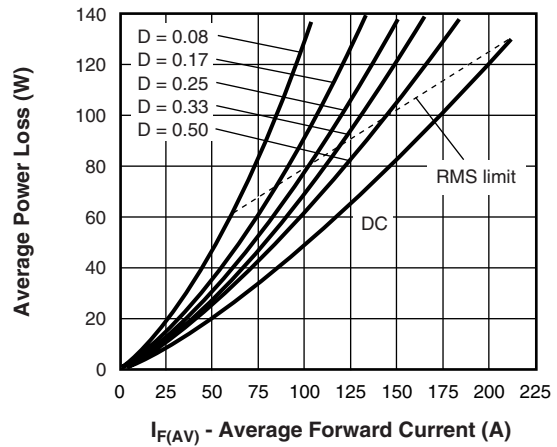


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

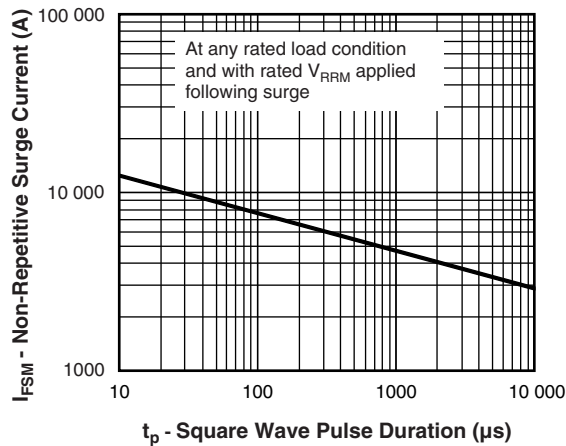


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

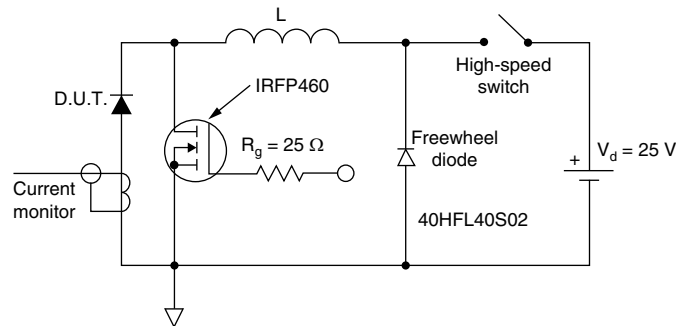


Fig. 8 - Unclamped Inductive Test Circuit

**Note**

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

**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>30</b>	<b>1</b>	<b>C</b>	<b>N</b>	<b>Q</b>	<b>045</b>	<b>PbF</b>
	①	②	③	④	⑤	⑥	⑦	⑧

- 1** - Vishay Semiconductors product
- 2** - Average current rating (x 10)
- 3** - Product silicon identification
- 4** - C = circuit configuration
- 5** - N = not isolated
- 6** - Q = Schottky rectifier diode
- 7** - Voltage ratings ————— 040 = 40 V  
045 = 45 V
- 8** - Lead (Pb)-free

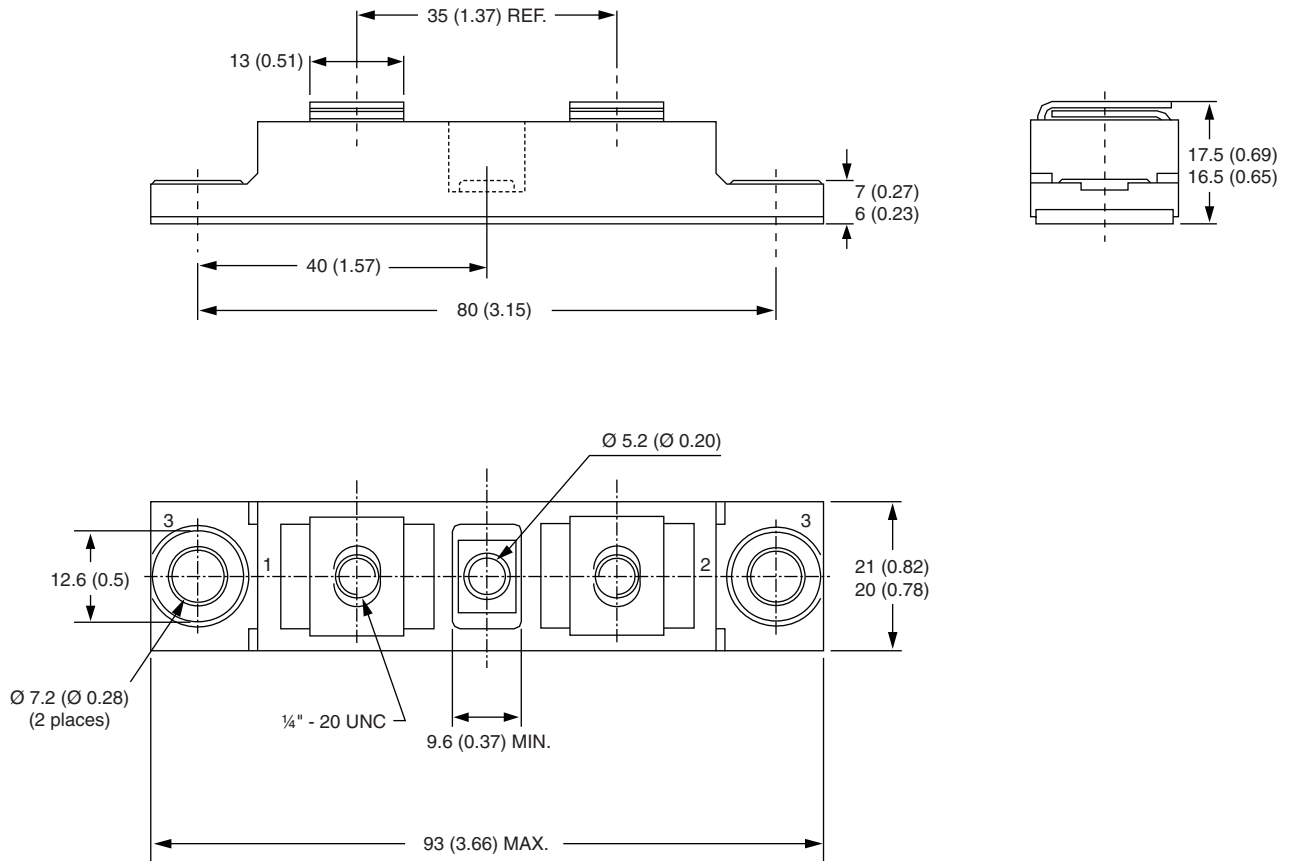
**LINKS TO RELATED DOCUMENTS**

Dimensions	<a href="http://www.vishay.com/doc?95021">www.vishay.com/doc?95021</a>
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## TO-244

**DIMENSIONS** in millimeters (inches)





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