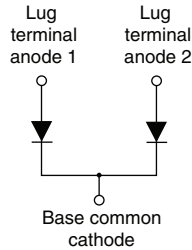


## Gen 2 High Performance Schottky Rectifier Not Insulated TO-244 Power Module 200 V, 400 A


**TO-244**

**FEATURES**

- Max.  $T_J = 175\text{ }^\circ\text{C}$
- Trench MOS Barrier Schottky technology
- Ultra low forward voltage drop
- Easy to use and parallel
- Optimized for power conversion: welding and industrial SMPS applications
- Designed for industrial level
- UL approved file E222165
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**BENEFITS**

- Reduced RFI and EMI
- Higher frequency operation
- Reduced snubbing
- Reduced parts count

**DESCRIPTION / APPLICATIONS**

The VS-402CNQ200PBF not insulated modules integrate two state of the art Trench MOS barrier Schottky technology rectifiers in the compact industry standard TO244 package.

These devices are thus intended for high frequency converters and switching power supplies.

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$ , module - $T_C = 128\text{ }^\circ\text{C}$	400 A
$V_R$	200 V
$Q_{rr}$ (typical)	540 nC
$t_{rr}$	132 ns
Type	Modules - diode, Schottky
Package	TO-244
Circuit configuration	Two diodes common cathode

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Cathode to anode voltage	$V_R$		200	V
Continuous forward current per diode	$I_{F(DC)}$	$T_C = 25\text{ }^\circ\text{C}$	551	A
		$T_C = 85\text{ }^\circ\text{C}$	397	
		$T_C = 143\text{ }^\circ\text{C}$	200	
Single pulse forward current per diode	$I_{FSM}$	$T_C = 175\text{ }^\circ\text{C}$ , $t = 6\text{ ms}$ , square	2100	
Maximum power dissipation	$P_D$	$T_C = 25\text{ }^\circ\text{C}$	789	W
		$T_C = 85\text{ }^\circ\text{C}$	474	
Operating junction temperatures	$T_J$		-40 to +175	$^\circ\text{C}$
Storage temperatures	$T_{Stg}$		-40 to +150	$^\circ\text{C}$

ELECTRICAL SPECIFICATIONS PER LEG ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage	$V_{BR}$	$I_R = 2\text{ mA}$	200	-	-	V
Forward voltage	$V_{FM}$	$I_F = 200\text{ A}$	-	0.845	1.045	
		$I_F = 400\text{ A}$	-	0.958	1.358	
		$I_F = 200\text{ A}$ , $T_J = 125\text{ }^\circ\text{C}$	-	0.715	-	
		$I_F = 400\text{ A}$ , $T_J = 125\text{ }^\circ\text{C}$	-	0.850	-	
Reverse leakage current	$I_{RM}$	$T_J = 25\text{ }^\circ\text{C}$ , $V_R = 200\text{ V}$	-	50	200	$\mu\text{A}$
	$I_{RM}$	$T_J = 175\text{ }^\circ\text{C}$ , $V_R = 200\text{ V}$	-	198	500	mA
Maximum junction capacitance per leg	$C_T$	$V_{DC} = 5\text{ V}$ , $f = 1\text{ MHz}$ , $25\text{ }^\circ\text{C}$	-	-	20	nF
Series inductance	$L_S$	From top of terminal hole to mounting plane	-	5	-	nH



<b>DYNAMIC RECOVERY CHARACTERISTICS</b> ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)								
PARAMETER	SYMBOL	TEST CONDITIONS			MIN.	TYP.	MAX.	UNITS
Reverse recovery time	$t_{rr}$	$T_J = 25\text{ }^\circ\text{C}$	$I_F = 50\text{ A,}$ $di_F/dt = 100\text{ A}/\mu\text{s,}$ $V_R = 100\text{ V}$	-	132	-	ns	
		$T_J = 125\text{ }^\circ\text{C}$		-	155	-		
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^\circ\text{C}$		-	6	-	A	
		$T_J = 125\text{ }^\circ\text{C}$		-	8	-		
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^\circ\text{C}$		-	540	-	nC	
		$T_J = 125\text{ }^\circ\text{C}$		-	840	-		

<b>THERMAL - MECHANICAL SPECIFICATIONS</b>						
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	
Thermal resistance, junction to case	per leg	-	-	0.19	°C/W	
	per module	-	-	0.095		
Thermal resistance, case to heatsink	$R_{thCS}$	-	0.10	-		
Weight		-	68	-	g	
		-	2.4	-	oz.	
Mounting torque		30 (3.4)	-	40 (4.6)	lbf · in (N · m)	
Mounting torque center hole		12 (1.4)	-	18 (2.1)		
Terminal torque		30 (3.4)	-	40 (4.6)		
Vertical pull		-	-	80	lbf · in	
2" lever pull		-	-	35		
Case style		TO-244				

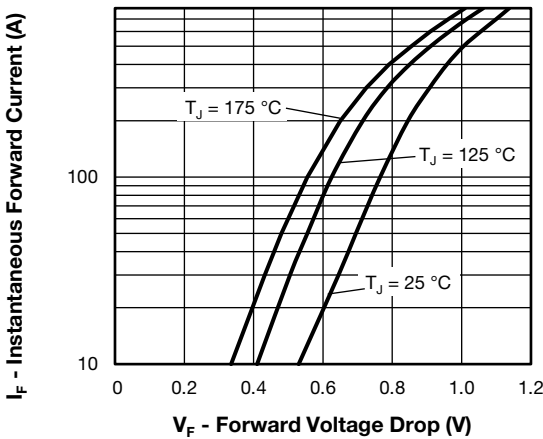


Fig. 1 - Typical Forward Voltage Drop vs. Instantaneous Forward Current (Per Diode)

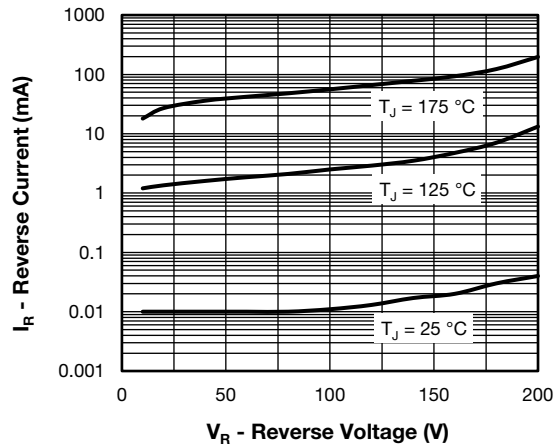


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Diode)

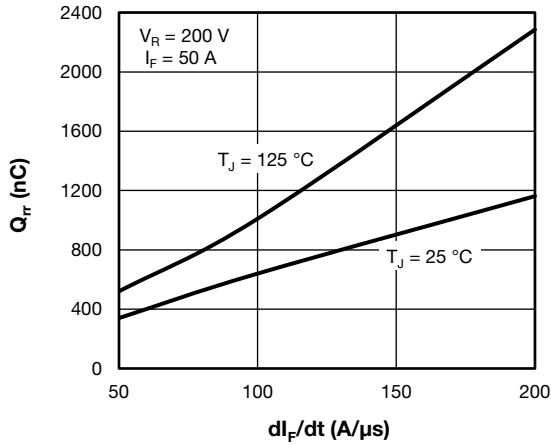


Fig. 3 - Typical Reverse Recovery Charge vs.  $dI_F/dt$  (Per Diode)

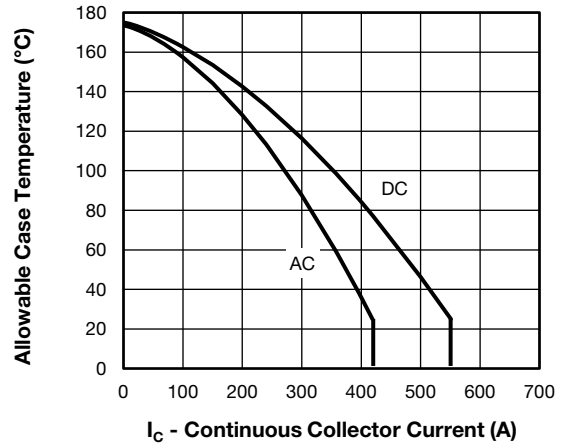


Fig. 6 - Maximum Continuous Forward Current vs. Case Temperature

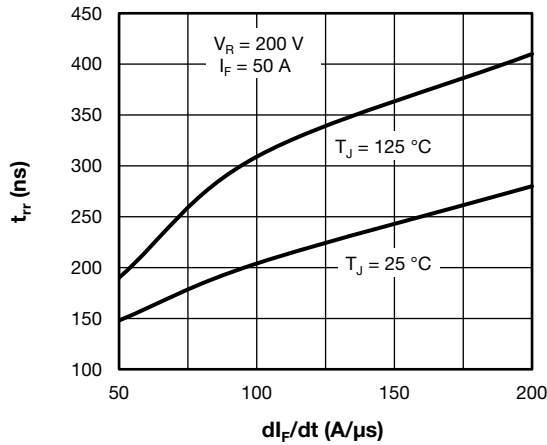


Fig. 4 - Typical Reverse Recovery Time vs  $dI_F/dt$  (Per Diode)

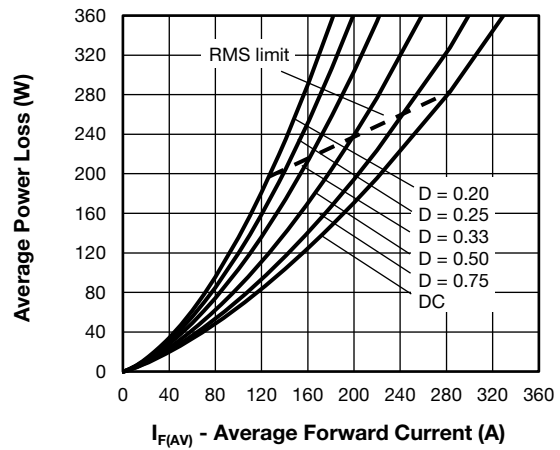


Fig. 7 - Average Power Loss vs Average Forward Current (Forward Power Loss Characteristics)

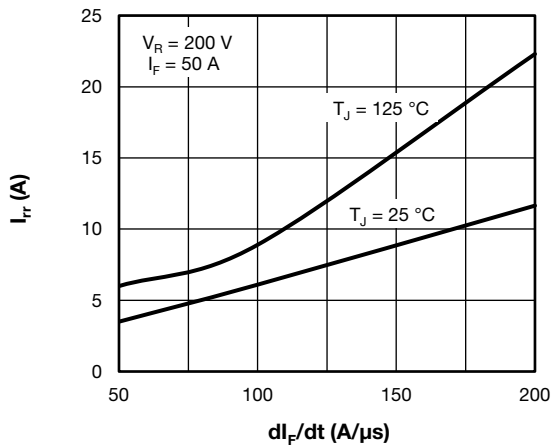


Fig. 5 - Typical Reverse Recovery Current vs.  $dI_F/dt$  (Per Diode)

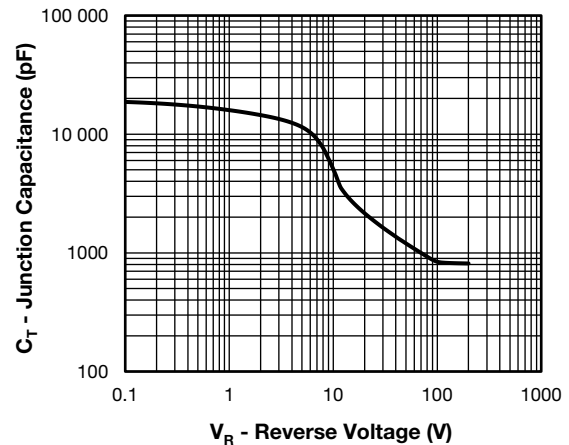
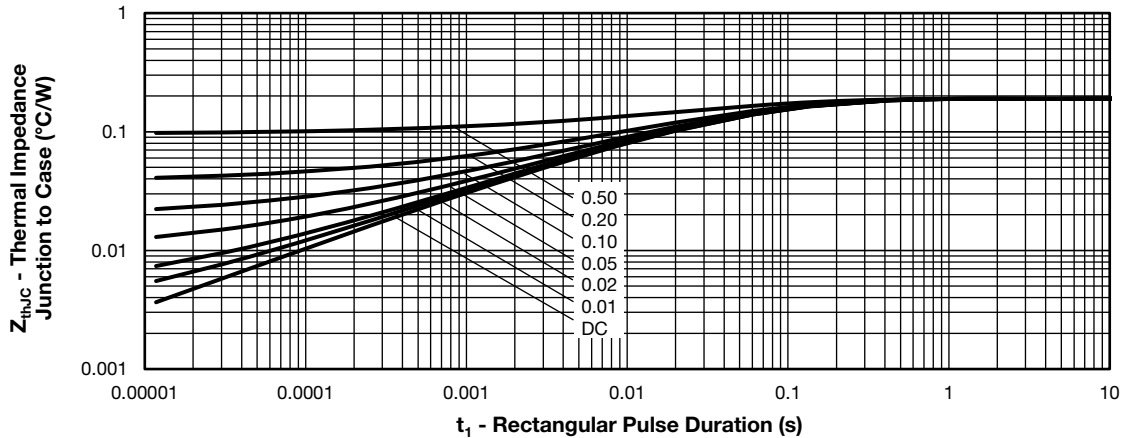


Fig. 8 - Typical Junction Capacitance vs. Reverse Voltage


 Fig. 9 -  $Z_{thJC}$  Maximum Thermal Impedance Junction to Case vs.  $t_1$  Rectangular Pulse Duration

**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>40</b>	<b>2</b>	<b>C</b>	<b>N</b>	<b>Q</b>	<b>200</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** - Circuit configuration:  
C = two diodes common cathode
- 5** - N = not isolated
- 6** - Q = Schottky rectifier diode
- 7** - 200 = 200 V
- 8** - PbF = lead (Pb)-free

CIRCUIT CONFIGURATION		
CIRCUIT	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Two diodes common cathode	C	

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95021">www.vishay.com/doc?95021</a>



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