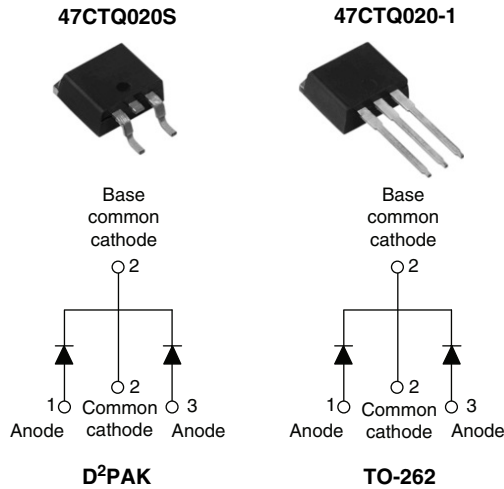


## Schottky Rectifier, 2 x 20 A



### FEATURES

- 150 °C T<sub>J</sub> operation
- Center tap configuration
- Optimized for 3.3 V application
- Ultralow forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Designed and qualified for Q101 level

### DESCRIPTION

This center tap Schottky rectifier module has been optimized for ultralow forward voltage drop specifically for 3.3 V output power supplies. The proprietary barrier technology allows for reliable operation up to 150 °C junction temperature. Typical applications are parallel switching power supplies, converters, reverse battery protection, and redundant power subsystems.

### PRODUCT SUMMARY

I <sub>F(AV)</sub>	2 x 20 A
V <sub>R</sub>	20 V
I <sub>RM</sub>	310 mA at 125 °C

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
I <sub>F(AV)</sub>	Rectangular waveform	40	A
V <sub>R</sub>		20	V
I <sub>FSM</sub>	t <sub>p</sub> = 5 μs sine	1000	A
V <sub>F</sub>	20 Apk, T <sub>J</sub> = 125 °C	0.34	V
T <sub>J</sub>		- 55 to 150	°C

### VOLTAGE RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	47CTQ020S 47CTQ020-1	UNITS
Maximum DC reverse voltage	V <sub>R</sub>	125 °C	20	V
		150 °C	10	

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current per leg per device	I <sub>F(AV)</sub>	50 % duty cycle at T <sub>C</sub> = 135 °C, rectangular waveform	20	A
			40	
Maximum peak one cycle non-repetitive surge current per leg	I <sub>FSM</sub>	5 μs sine or 3 μs rect. pulse	1000	A
		10 ms sine or 6 ms rect. pulse	250	
Non-repetitive avalanche energy per leg	E <sub>AS</sub>	T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 3 A, L = 3 mH	18	mJ
Repetitive avalanche current per leg	I <sub>AR</sub>	Current decaying linearly to zero in 1 μs Frequency limited by T <sub>J</sub> maximum V <sub>A</sub> = 1.5 x V <sub>R</sub> typical	3	A

ELECTRICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop per leg	$V_{FM}^{(1)}$	20 A	$T_J = 25\text{ }^\circ\text{C}$	0.45	V
		40 A		0.51	
		20 A	$T_J = 125\text{ }^\circ\text{C}$	0.34	
		40 A		0.44	
		20 A	$T_J = 150\text{ }^\circ\text{C}$	0.31	
		40 A		0.42	
Maximum reverse leakage current per leg	$I_{RM}^{(1)}$	$T_J = 125\text{ }^\circ\text{C}$	$V_R = 5\text{ V}$	60	mA
			$V_R = 3.3\text{ V}$	45	
		$T_J = 150\text{ }^\circ\text{C}$	$V_R = 10\text{ V}$	306	
		$T_J = 25\text{ }^\circ\text{C}$	$V_R = \text{Rated } V_R$	3	
$T_J = 125\text{ }^\circ\text{C}$	310				
Threshold voltage	$V_{F(TO)}$	$T_J = T_J \text{ maximum}$		0.188	V
Forward slope resistance	$r_t$			5.9	$m\Omega$
Maximum junction capacitance per leg	$C_T$	$V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$		3000	pF
Typical series inductance per leg	$L_S$	Measured lead to lead 5 mm from package body		5.5	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	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		1.5	$^\circ\text{C/W}$
Maximum thermal resistance, junction to case per package				0.75	
Typical thermal resistance, case to heatsink	$R_{thCS}$	Mounting surface, smooth and greased (Only for TO-262)		0.50	
Approximate weight				2	g
				0.07	oz.
Mounting torque	minimum			6 (5)	$\text{kgf} \cdot \text{cm}$
	maximum			12 (10)	$(\text{lbf} \cdot \text{in})$
Marking device		Case style D <sup>2</sup> PAK		47CTQ020S	
		Case style TO-262		47CTQ020-1	

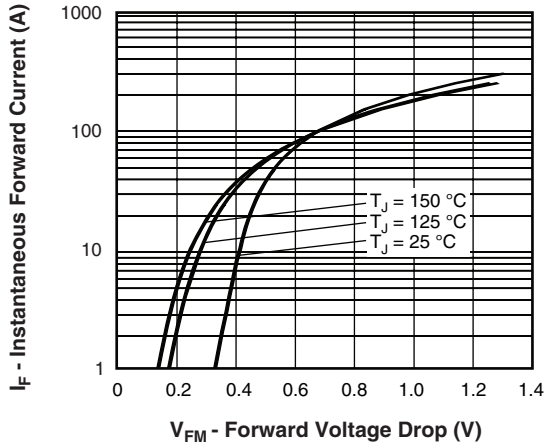


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

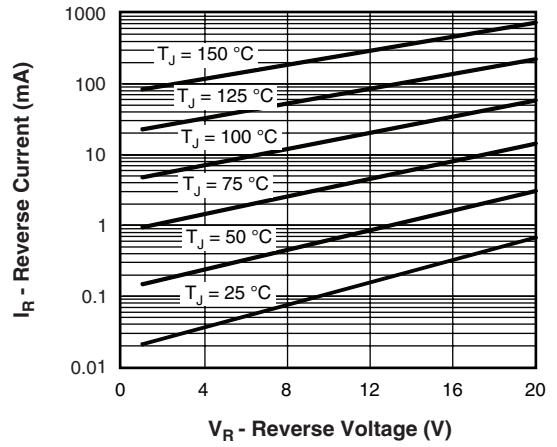


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

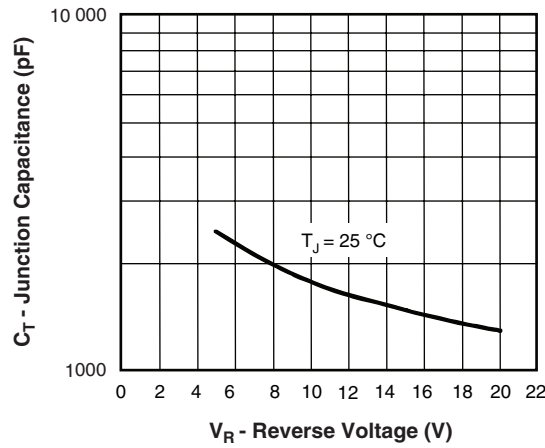


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

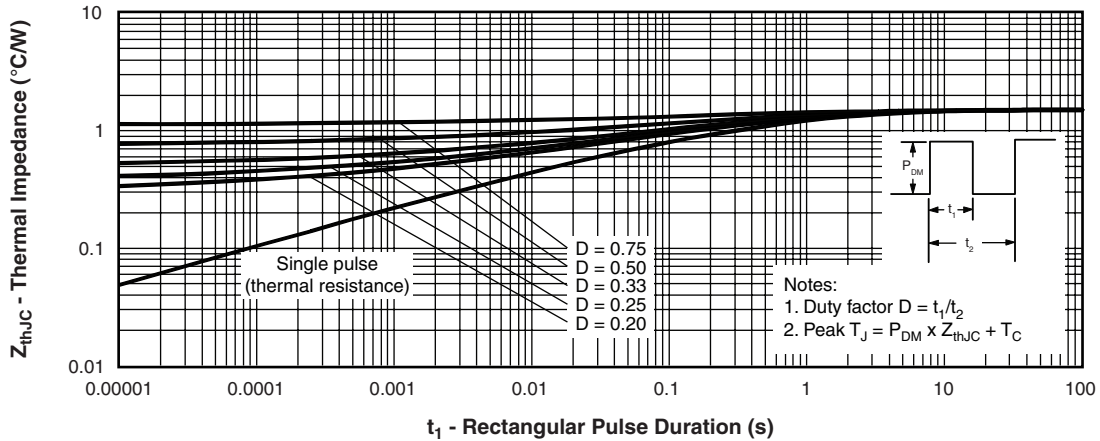


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

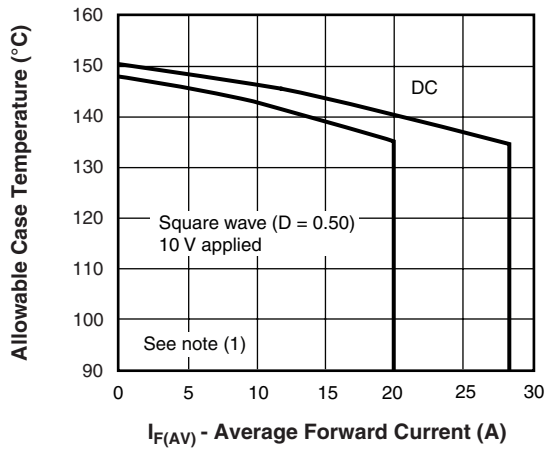


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

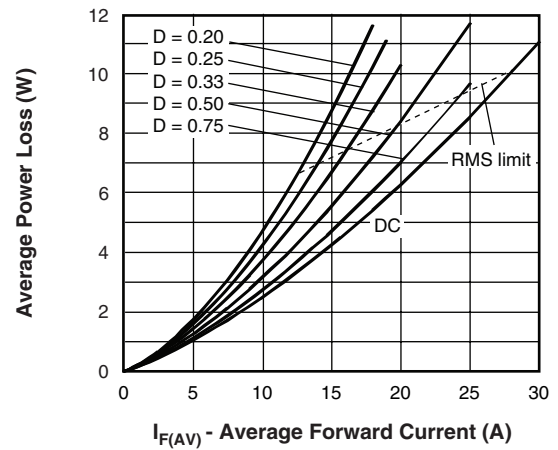


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

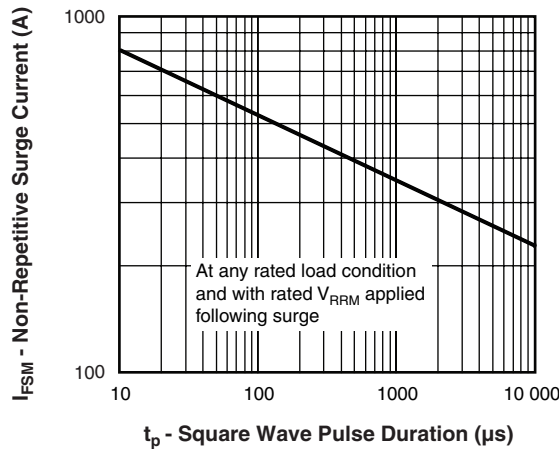


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

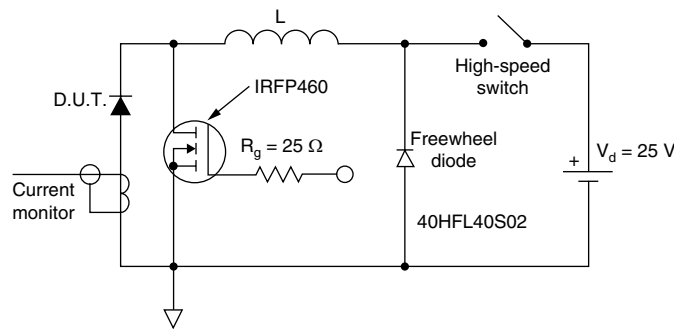


Fig. 8 - Unclamped Inductive Test Circuit

**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  $V_{R1} = 10 V$



## ORDERING INFORMATION TABLE

Device code	<b>47</b>	<b>C</b>	<b>T</b>	<b>Q</b>	<b>020</b>	<b>S</b>	<b>TRL</b>	<b>-</b>
	①	②	③	④	⑤	⑥	⑦	⑧

- 1** - Current rating (40 A)
- 2** - Circuit configuration:
  - C = Common cathode
- 3** - T = TO-220
- 4** - Schottky "Q" series
- 5** - Voltage rating (020 = 20 V)
- 6** -
  - S = D<sup>2</sup>PAK
  - -1 = TO-262
- 7** -
  - None = Tube (50 pieces)
  - TRL = Tape and reel (left oriented - for D<sup>2</sup>PAK only)
  - TRR = Tape and reel (right oriented - for D<sup>2</sup>PAK only)
- 8** -
  - None = Standard production
  - PbF = Lead (Pb)-free

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95014">http://www.vishay.com/doc?95014</a>
Part marking information	<a href="http://www.vishay.com/doc?95008">http://www.vishay.com/doc?95008</a>
Packaging information	<a href="http://www.vishay.com/doc?95032">http://www.vishay.com/doc?95032</a>



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