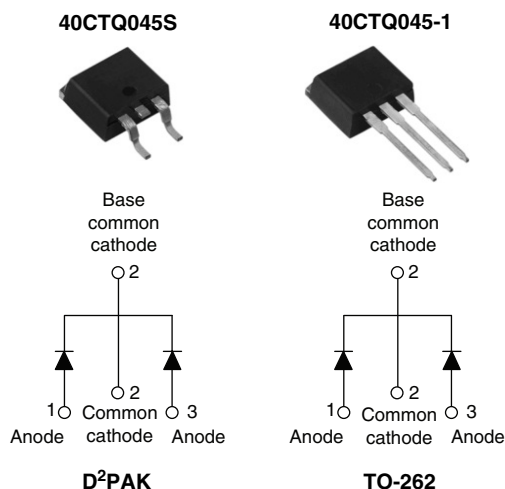


## Schottky Rectifier, 2 x 20 A



### FEATURES

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

### DESCRIPTION

This 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 switching power supplies, converters, freewheeling diodes, and reverse battery protection.

### PRODUCT SUMMARY

I <sub>F(AV)</sub>	2 x 20 A
V <sub>R</sub>	45 V

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
I <sub>F(AV)</sub>	Rectangular waveform	40	A
V <sub>RRM</sub>		45	V
I <sub>FSM</sub>	t <sub>p</sub> = 5 μs sine	1240	A
V <sub>F</sub>	20 Apk, T <sub>J</sub> = 125 °C (per leg)	0.48	V
T <sub>J</sub>	Range	- 55 to 150	°C

### VOLTAGE RATINGS

PARAMETER	SYMBOL	40CTQ045S 40CTQ045-1	UNITS
Maximum DC reverse voltage	V <sub>R</sub>	45	V
Maximum working peak reverse voltage	V <sub>RWM</sub>		

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current See fig. 5	I <sub>F(AV)</sub>	50 % duty cycle at T <sub>C</sub> = 116 °C, rectangular waveform	20	A
			40	
Maximum peak one cycle non-repetitive surge current per leg See fig. 7	I <sub>FSM</sub>	5 μs sine or 3 μs rect. pulse	1240	
		10 ms sine or 6 ms rect. pulse	350	
Non-repetitive avalanche energy per leg	E <sub>AS</sub>	T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 3 A, L = 4.40 mH	20	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 See fig. 1	$V_{FM}^{(1)}$	20 A	$T_J = 25\text{ }^{\circ}\text{C}$	0.53	V	
		40 A		0.68		
		20 A	$T_J = 125\text{ }^{\circ}\text{C}$	0.48		
		40 A		0.67		
Maximum reverse leakage current per leg See fig. 2	$I_{RM}^{(1)}$	$T_J = 25\text{ }^{\circ}\text{C}$	$V_R = \text{Rated } V_R$	3	mA	
		$T_J = 125\text{ }^{\circ}\text{C}$		115		
Threshold voltage	$V_{F(TO)}$	$T_J = T_J \text{ maximum}$		0.27	V	
Forward slope resistance	$r_t$			8.72	mΩ	
Maximum junction capacitance per leg	$C_T$	$V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz) 25 °C		2800	pF	
Typical series inductance per leg	$L_S$	Measured lead to lead 5 mm from package body		8.0	nH	
Maximum voltage rate of change	dV/dt	Rated $V_R$		10 000	V/μs	

**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	2.0	$^{\circ}\text{C/W}$
Maximum thermal resistance, junction to case per package			1.0	
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)	kgf · cm
	maximum		12 (10)	(lbf · in)
Marking device		Case style D <sup>2</sup> PAK	40CTQ045S	
		Case style TO-262	40CTQ045-1	

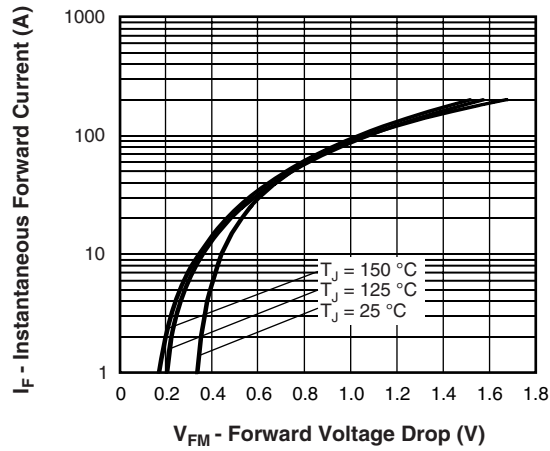


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

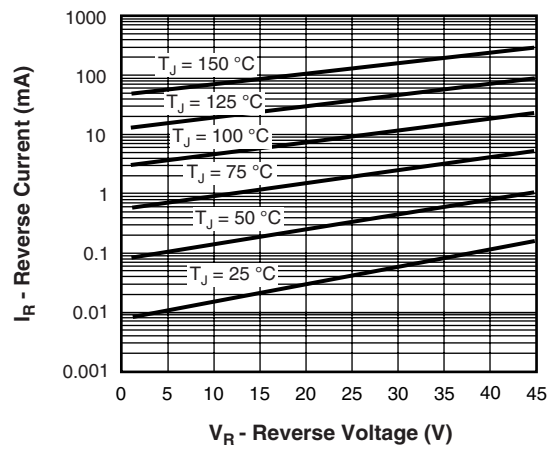


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

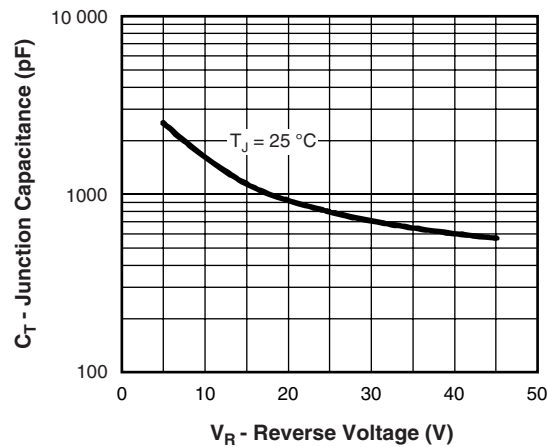


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

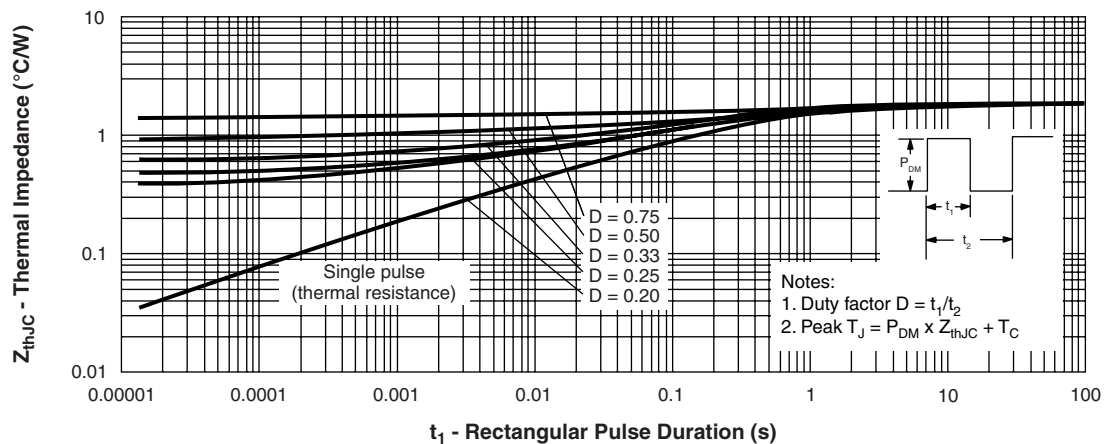


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

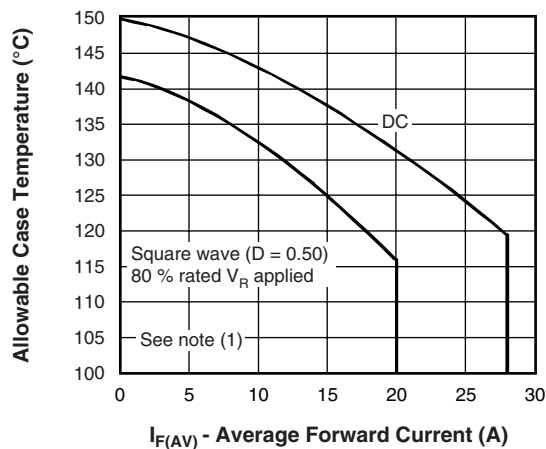


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

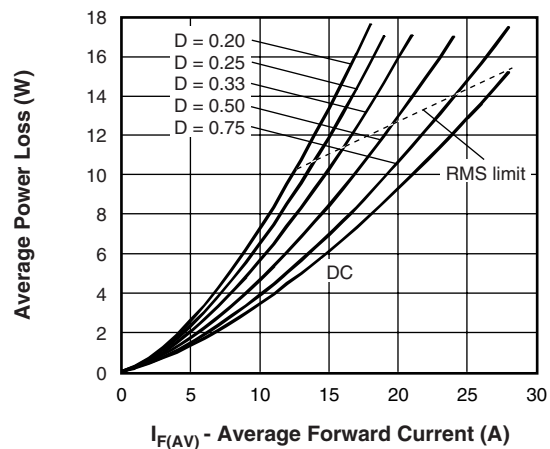


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

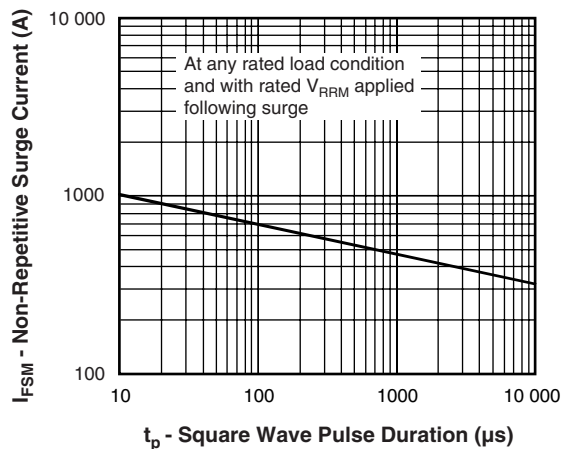


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)



Fig. 8 - Unclamped Inductive Test Circuit

### Note

- (1) Formula used:  $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$ ;  
 $P_d$  = 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  $V_{R1} = 10\text{ V}$

**ORDERING INFORMATION TABLE**

Device code	40	C	T	Q	045	S	TRL	-
	1	2	3	4	5	6	7	8

- |          |   |  |
|----------|---|--|
| <b>1</b> | - | Current rating (40 A)  |
| <b>2</b> | - | Circuit configuration:<br>C = Common cathode   |
| <b>3</b> | - | T = TO-220   |
| <b>4</b> | - | Schottky "Q" series  |
| <b>5</b> | - | Voltage rating (045 = 45 V)  |
| <b>6</b> | - | • S = D <sup>2</sup> PAK<br>• -1 = TO-262  |
| <b>7</b> | - | • None = Tube (50 pieces)<br>• TRL = Tape and reel (left oriented - for D <sup>2</sup> PAK only)<br>• TRR = Tape and reel (right oriented - for D <sup>2</sup> PAK only) |
| <b>8</b> | - | • None = Standard production<br>• 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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