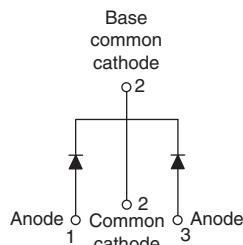


High Performance Schottky Rectifier, 2 x 6 A


TO-220AB


PRODUCT SUMMARY

Package	TO-220AB
$I_{F(AV)}$	2 x 6 A
V_R	35 V, 40 V, 45 V
V_F at I_F	0.53 V
I_{RM} max.	7 mA at 125 °C
T_J max.	175 °C
Diode variation	Common cathode
E_{AS}	8 mJ

FEATURES

- 175 °C T_J operation
- Center tap TO-220 package
- 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 according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE
Available

DESCRIPTION

The VS-12CTQ... center tap Schottky rectifier 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 switching power supplies, converters, freewheeling diodes, and reverse battery protection.

MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	12	A
V_{RRM}	Range	35 to 45	V
I_{FSM}	$t_p = 5 \mu s$ sine	690	A
V_F	6 A _{pk} , $T_J = 125$ °C (per leg)	0.53	V
T_J	Range	-55 to +175	°C

VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-12CTQ035PbF	VS-12CTQ035-N3	VS-12CTQ040PbF	VS-12CTQ040-N3	VS-12CTQ045PbF	VS-12CTQ045-N3	UNITS
Maximum DC reverse voltage	V_R							
Maximum working peak reverse voltage	V_{RWM}	35	35	40	40	45	45	V

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum average forward current. See fig. 5	$I_{F(AV)}$	50 % duty cycle at $T_C = 160$ °C, rectangular waveform		6	A	
per leg				12		
per device	I_{FSM}	5 μs sine or 3 μs rect. pulse	Following any rated load condition and with rated V_{RRM} applied	690	A	
Maximum peak one cycle non-repetitive surge current per leg. See fig. 7		10 ms sine or 6 ms rect. pulse		140		
Non-repetitive avalanche energy per leg	E_{AS}	$T_J = 25$ °C, $I_{AS} = 1.20$ A, $L = 11.10$ mH		8	mJ	
Repetitive avalanche current per leg	I_{AR}	Current decaying linearly to zero in 1 μs Frequency limited by T_J maximum $V_A = 1.5 \times V_R$ typical		1.20	A	

ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum forward voltage drop per leg See fig. 1	$V_{FM}^{(1)}$	6 A	$T_J = 25 \text{ }^\circ\text{C}$	0.60	V	
		12 A		0.73		
		6 A	$T_J = 125 \text{ }^\circ\text{C}$	0.53		
		12 A		0.64		
Maximum reverse leakage current per leg See fig. 2	$I_{RM}^{(1)}$	$T_J = 25 \text{ }^\circ\text{C}$	$V_R = \text{Rated } V_R$	0.8	mA	
		$T_J = 125 \text{ }^\circ\text{C}$		7.0		
Threshold voltage	$V_{F(TO)}$	$T_J = T_J \text{ maximum}$		0.35	V	
Forward slope resistance	r_f			18.23	$\text{m}\Omega$	
Maximum junction capacitance per leg	C_T	$V_R = 5 \text{ V}_{\text{DC}}$ (test signal range 100 kHz to 1 MHz) $25 \text{ }^\circ\text{C}$		400	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	$\text{V}/\mu\text{s}$	

Note

(1) Pulse width < 300 μs , duty cycle < 2 %

THERMAL - MECHANICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum junction and storage temperature range	T_J, T_{Stg}			-55 to +175	$^\circ\text{C}$	
Maximum thermal resistance, junction to case per leg	R_{thJC}	DC operation See fig. 4		3.50	$^\circ\text{C}/\text{W}$	
		DC operation		1.75		
Typical thermal resistance, case to heatsink	R_{thCS}	Mounting surface, smooth and greased		0.50		
Approximate weight				2	g	
				0.07	oz.	
Mounting torque	minimum			6 (5)	$\text{k}\text{gf} \cdot \text{cm}$ (lbf · in)	
	maximum			12 (10)		
Marking device		Case style TO-220AB		12CTQ035		
				12CTQ040		
				12CTQ045		

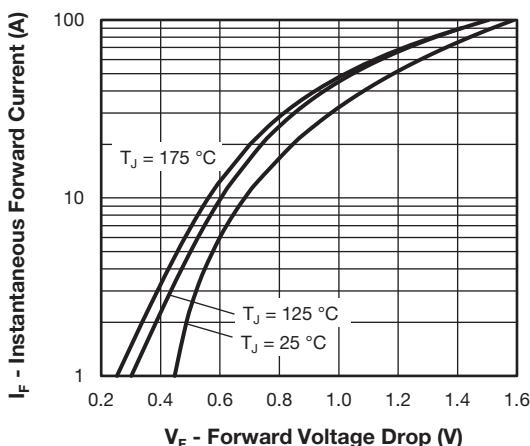


Fig. 1 - Maximum Forward Voltage Drop Characteristics
(Per Leg)

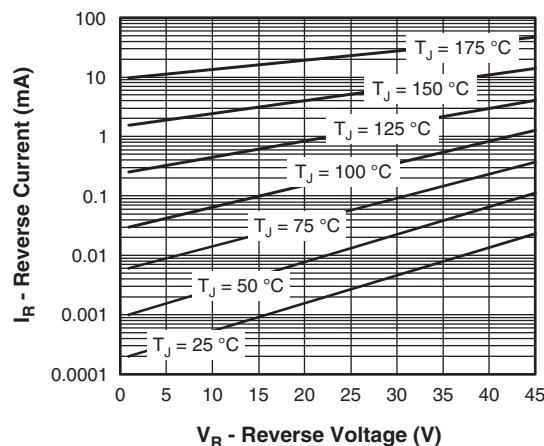


Fig. 2 - Typical Values of Reverse Current vs.
Reverse Voltage (Per Leg)

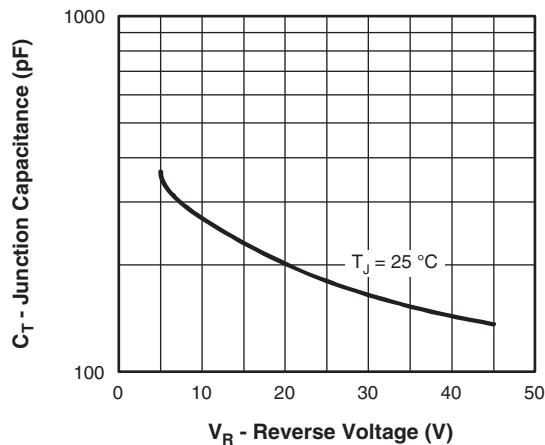


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

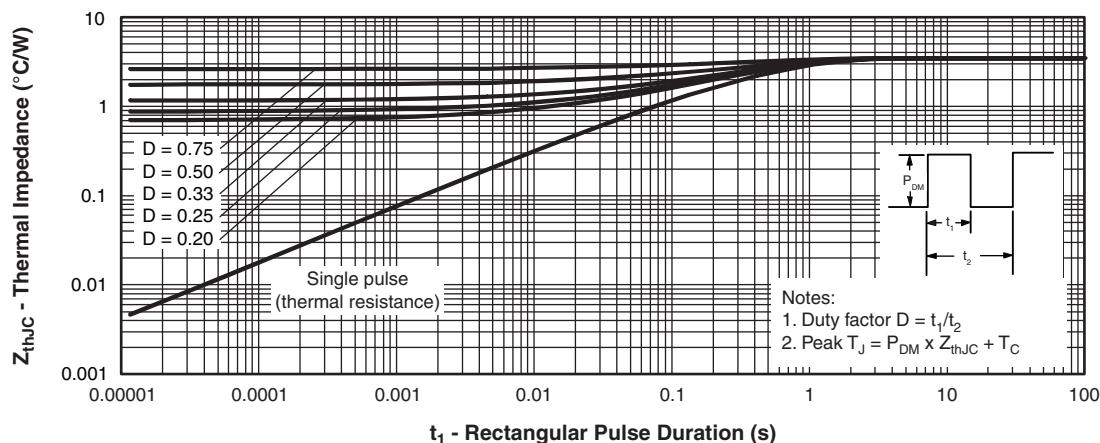


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

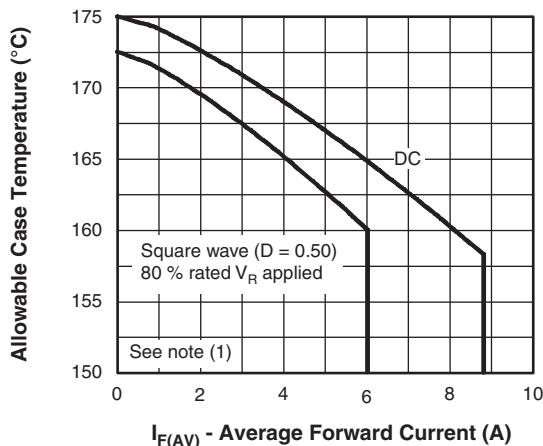


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

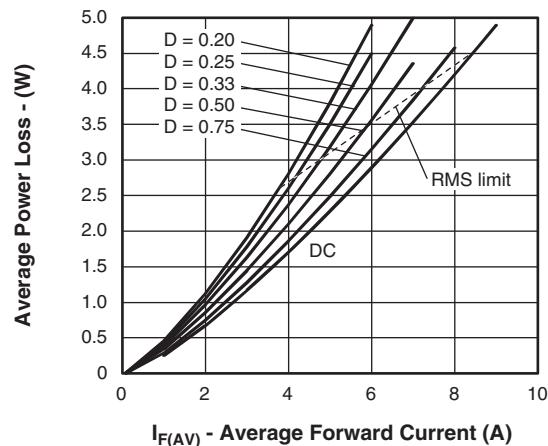


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

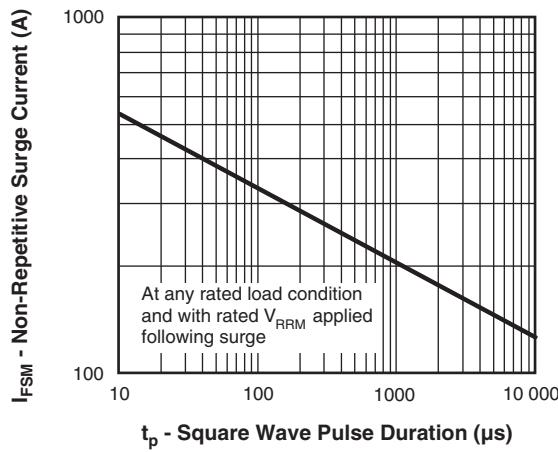


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

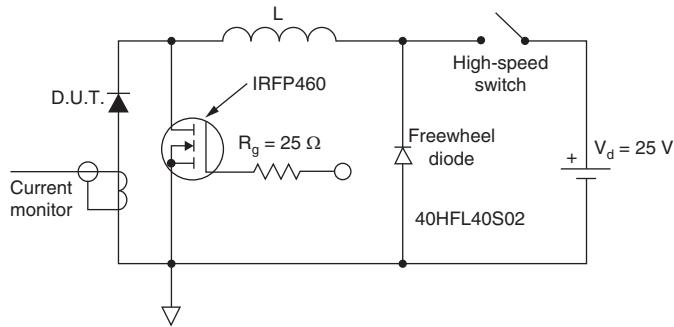
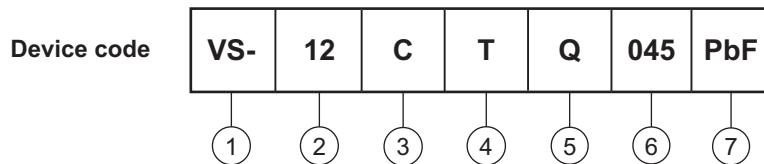


Fig. 8 - Unclamped Inductive Test Circuit

Note

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

ORDERING INFORMATION TABLE


1	- Vishay Semiconductors product	
2	- Current rating (12 = 12 A)	
3	- Circuit configuration: C = Common cathode	
4	- Package: T = TO-220	
5	- Schottky "Q" series	035 = 35 V 040 = 40 V 045 = 45 V
6	- Voltage ratings	035 = 35 V 040 = 40 V 045 = 45 V
7	- Environmental digit <ul style="list-style-type: none"> • PbF = Lead (Pb)-free and RoHS compliant • -N3 = Halogen-free, RoHS compliant, and totally lead (Pb)-free 	

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-12CTQ035PbF	50	1000	Antistatic plastic tube
VS-12CTQ035-N3	50	1000	Antistatic plastic tube
VS-12CTQ040PbF	50	1000	Antistatic plastic tube
VS-12CTQ040-N3	50	1000	Antistatic plastic tube
VS-12CTQ045PbF	50	1000	Antistatic plastic tube
VS-12CTQ045-N3	50	1000	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95222
Part marking information	www.vishay.com/doc?95225
	www.vishay.com/doc?95028
SPICE model	www.vishay.com/doc?95629

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