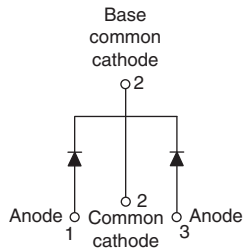




**THE DATASHEET OF
VS-12CTQ045-N3**



High Performance Schottky Rectifier, 2 x 6 A


TO-220AB


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



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

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	35	35	40	40	45	45	V
Maximum working peak reverse voltage	V_{RWM}							

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
			12	
Maximum peak one cycle non-repetitive surge current per leg. See fig. 7	I_{FSM}	5 μs sine or 3 μs rect. pulse	690	A
		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	m Ω
Maximum junction capacitance per leg	C_T	$V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz) 25 $^\circ\text{C}$		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	V/ μs

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	$^\circ\text{C/W}$
Maximum thermal resistance, junction to case per package		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)	kgf · cm (lbf · in)
	maximum			12 (10)	
Marking device			Case style TO-220AB		
			12CTQ035		
			12CTQ040		
		12CTQ045			

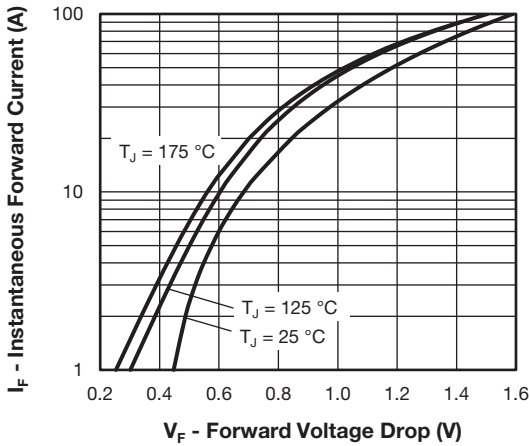


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

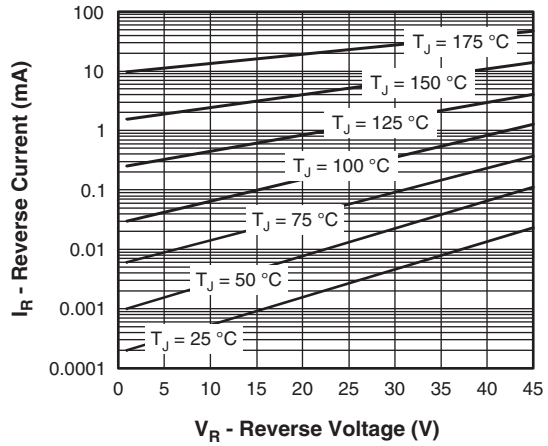


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

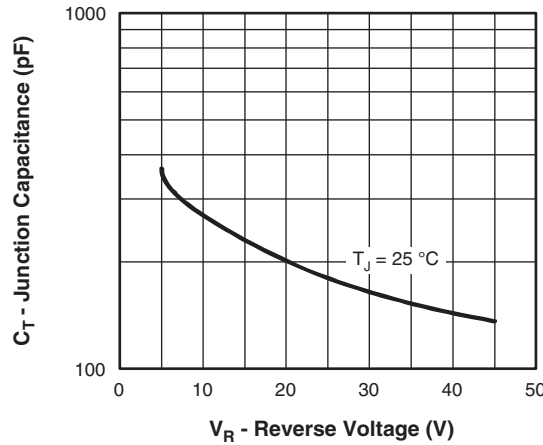


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

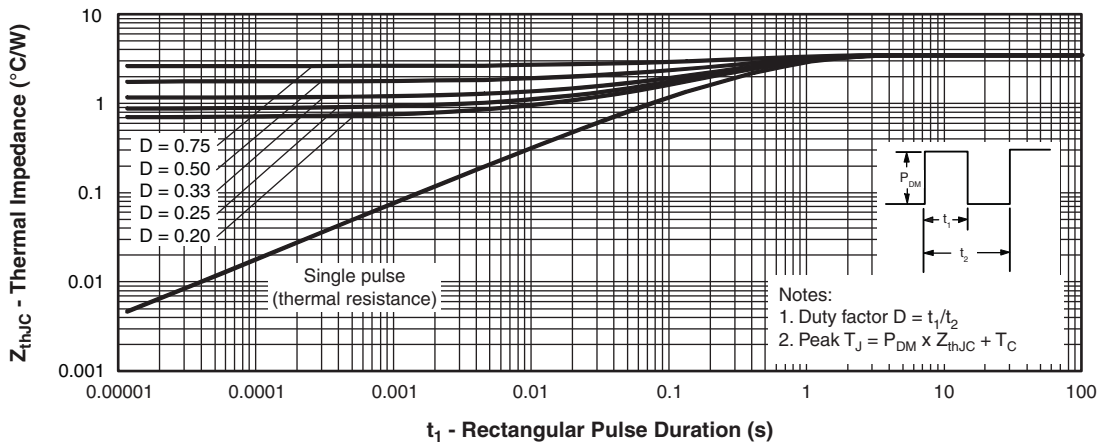


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

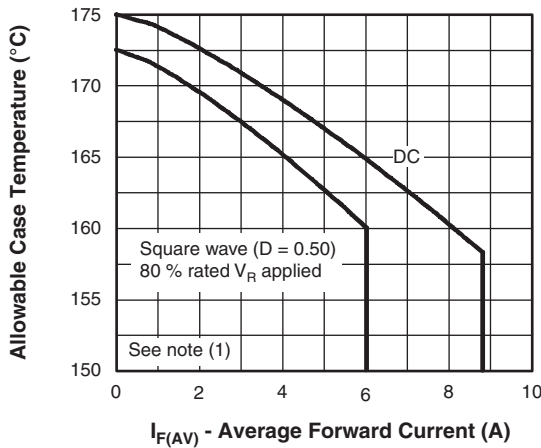


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

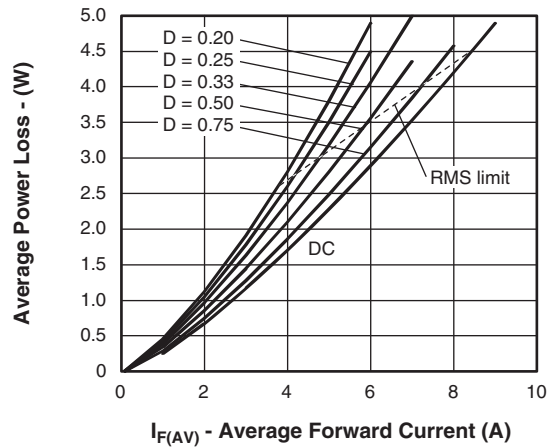


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

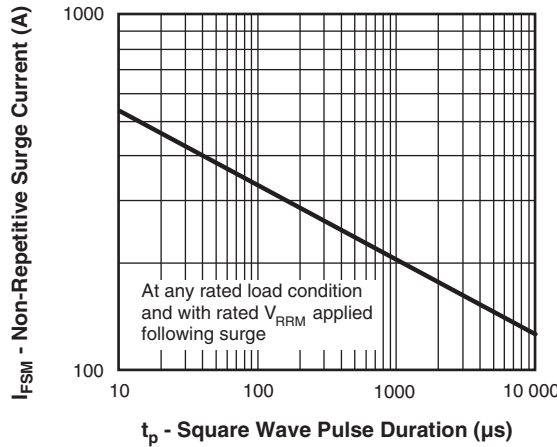


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

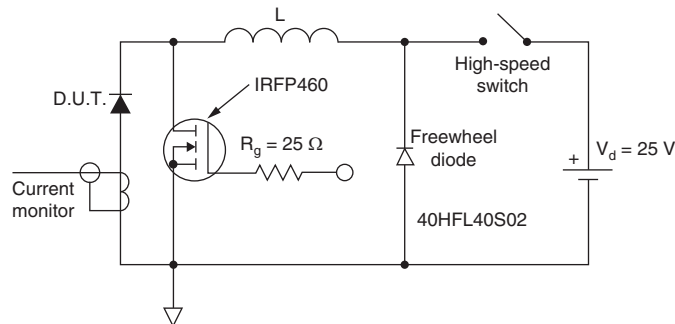


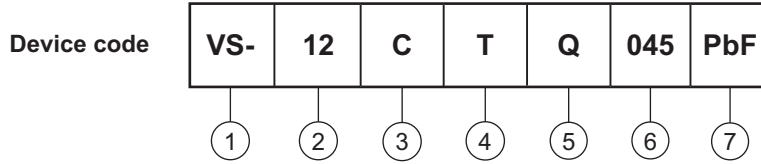
Fig. 8 - Unclamped Inductive Test Circuit

Note

- (1) Formula used: $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$;
- 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



- 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
- 6** - Voltage ratings
- 7** - Environmental digit
 - PbF = Lead (Pb)-free and RoHS compliant
 - -N3 = Halogen-free, RoHS compliant, and totally lead (Pb)-free

035 = 35 V
040 = 40 V
045 = 45 V

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	TO-220AB PbF www.vishay.com/doc?95225
	TO-220AB -N3 www.vishay.com/doc?95028
SPIICE model	www.vishay.com/doc?95629



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