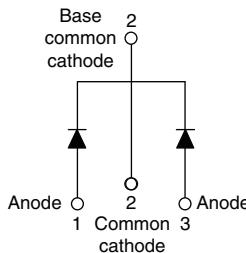


Schottky Rectifier, 2 x 20 A



TO-220AB



RoHS
COMPLIANT
HALOGEN
FREE
Available

FEATURES

- 175 °C T_J operation
- Low forward voltage drop
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Compliant to RoHS Directive 2002/95/EC
- Designed and qualified according to JEDEC-JESD47
- Halogen-free according to IEC 61249-2-21 definition (-N3 only)

DESCRIPTION

This 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.

PRODUCT SUMMARY	
Package	TO-220AB
$I_{F(AV)}$	2 x 20 A
V_R	100 V
V_F at I_F	0.67 V
I_{RM} max.	11 mA at 125 °C
T_J	175 °C
Diode variation	Common cathode
E_{AS}	7.50 mJ

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	40	A
V_{RRM}		100	V
I_{FSM}	$t_p = 5 \mu s$ sine	850	A
V_F	20 A _{pk} , $T_J = 125$ °C (per leg)	0.67	V
T_J	Range	- 55 to 175	°C

VOLTAGE RATINGS				
PARAMETER	SYMBOL	VS-43CTQ100PbF	VS-43CTQ100-N3	UNITS
Maximum DC reverse voltage	V_R	100	100	V
Maximum working peak reverse voltage	V_{RWM}			

ABSOLUTE MAXIMUM RATINGS								
PARAMETER	SYMBOL	TEST CONDITIONS			VALUES	UNITS		
Maximum average forward current per leg See fig. 5	$I_{F(AV)}$	50 % duty cycle at $T_C = 135$ °C, rectangular waveform			20	A		
Maximum peak one cycle non-repetitive surge current per leg See fig. 7					40			
Maximum repetitive avalanche current per leg		5 μs sine or 3 μs rect. pulse	Following any rated load condition and with rated V_{RRM} applied	275	850	A		
		10 ms sine or 6 ms rect. pulse			275			
Non-repetitive avalanche energy per leg	E_{AS}	$T_J = 25$ °C, $I_{AS} = 0.50$ A, $L = 60$ mH			7.50	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			0.50	A		

ELECTRICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum forward voltage drop per leg See fig. 1	$V_{FM}^{(1)}$	20 A	$T_J = 25 \text{ }^\circ\text{C}$	0.81	V	
		40 A		0.98		
		20 A	$T_J = 125 \text{ }^\circ\text{C}$	0.67		
		40 A		0.81		
Maximum reverse leakage current per leg See fig. 2	$I_{RM}^{(1)}$	$T_J = 25 \text{ }^\circ\text{C}$	$V_R = \text{Rated } V_R$	1	mA	
		$T_J = 125 \text{ }^\circ\text{C}$		11		
Threshold voltage	$V_{F(TO)}$	$T_J = T_J \text{ maximum}$		0.71	V	
Forward slope resistance	r_t			0.43	$\text{m}\Omega$	
Maximum junction capacitance per leg	C_T	$V_R = 5 \text{ V}_{\text{DC}}$ (test signal range 100 kHz to 1 MHz) $25 \text{ }^\circ\text{C}$		1480	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/ μ s	

Note

(1) Pulse width < 300 μ 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 175	$^\circ\text{C}$
Maximum thermal resistance, junction to case per leg	R_{thJC}	DC operation	2.0	$^\circ\text{C/W}$
			1.0	
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 maximum		6 (5)	$\text{k}\text{gf} \cdot \text{cm}$ (lbf · in)
			12 (10)	
Marking device		Case style TO-220AB	43CTQ100	

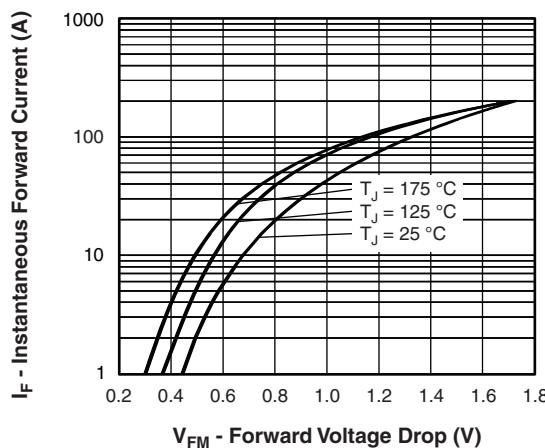


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

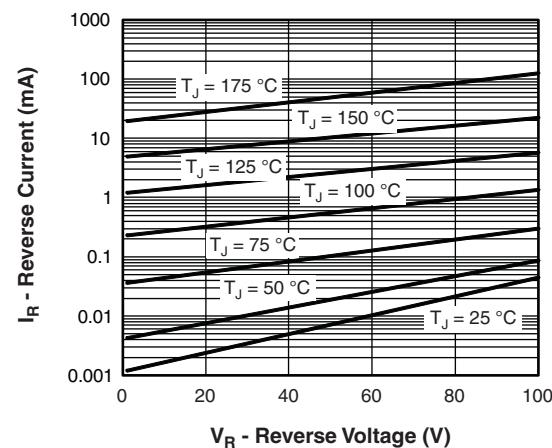


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

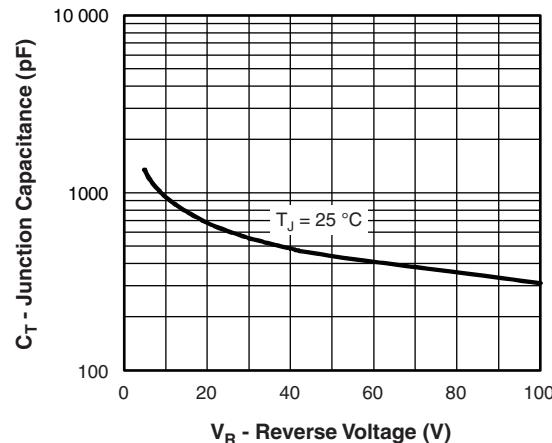


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

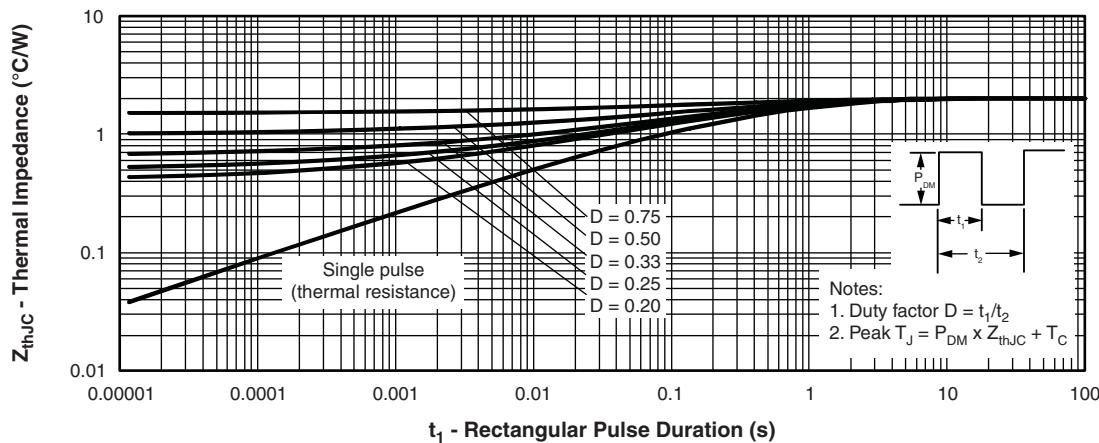


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

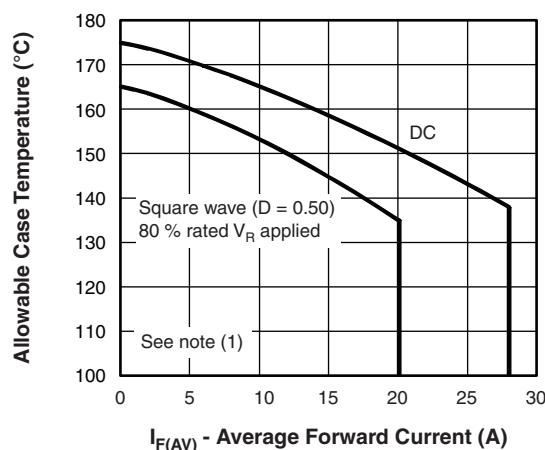


Fig. 5 - Maximum Allowable Case Temperature vs.
Average Forward Current (Per Leg)

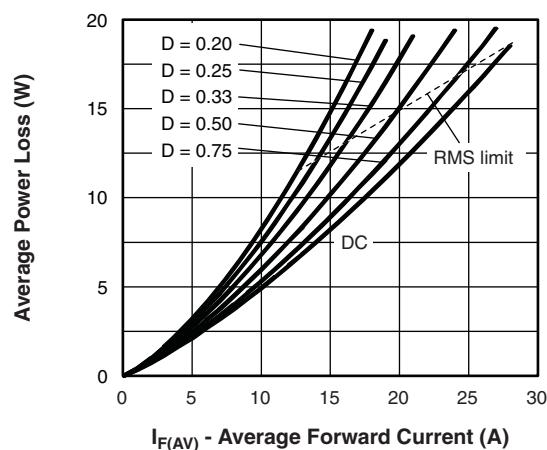


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

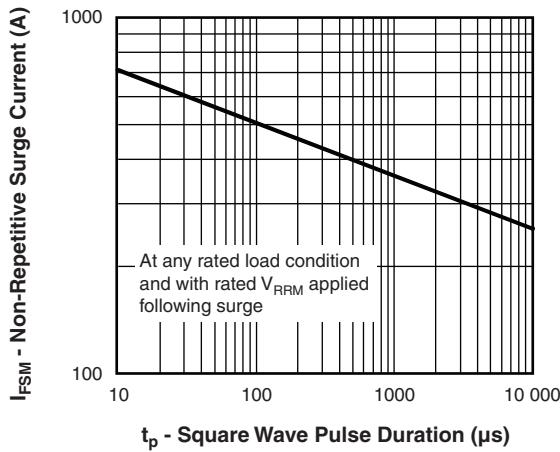


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

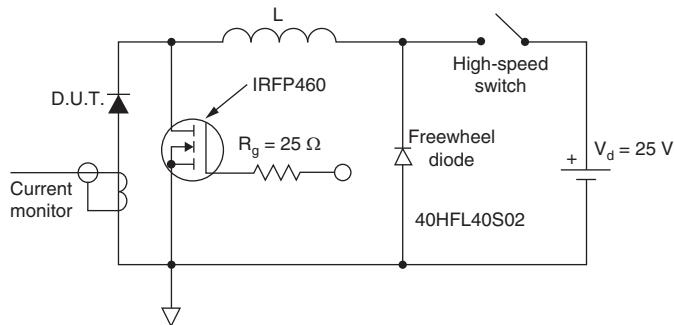


Fig. 8 - Unclamped Inductive Test Circuit

Note

⁽¹⁾ Formula used: $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$
 $P_d = \text{Forward power loss} = I_{F(AV)} \times V_{FM}$ at $(I_{F(AV)}/D)$ (see fig. 6);
 $P_{dREV} = \text{Inverse power loss} = V_{R1} \times I_R (1 - D)$; I_R at $V_{R1} = 10 V$

ORDERING INFORMATION TABLE

Device code	VS-	43	C	T	Q	100	PbF
	1	2	3	4	5	6	7

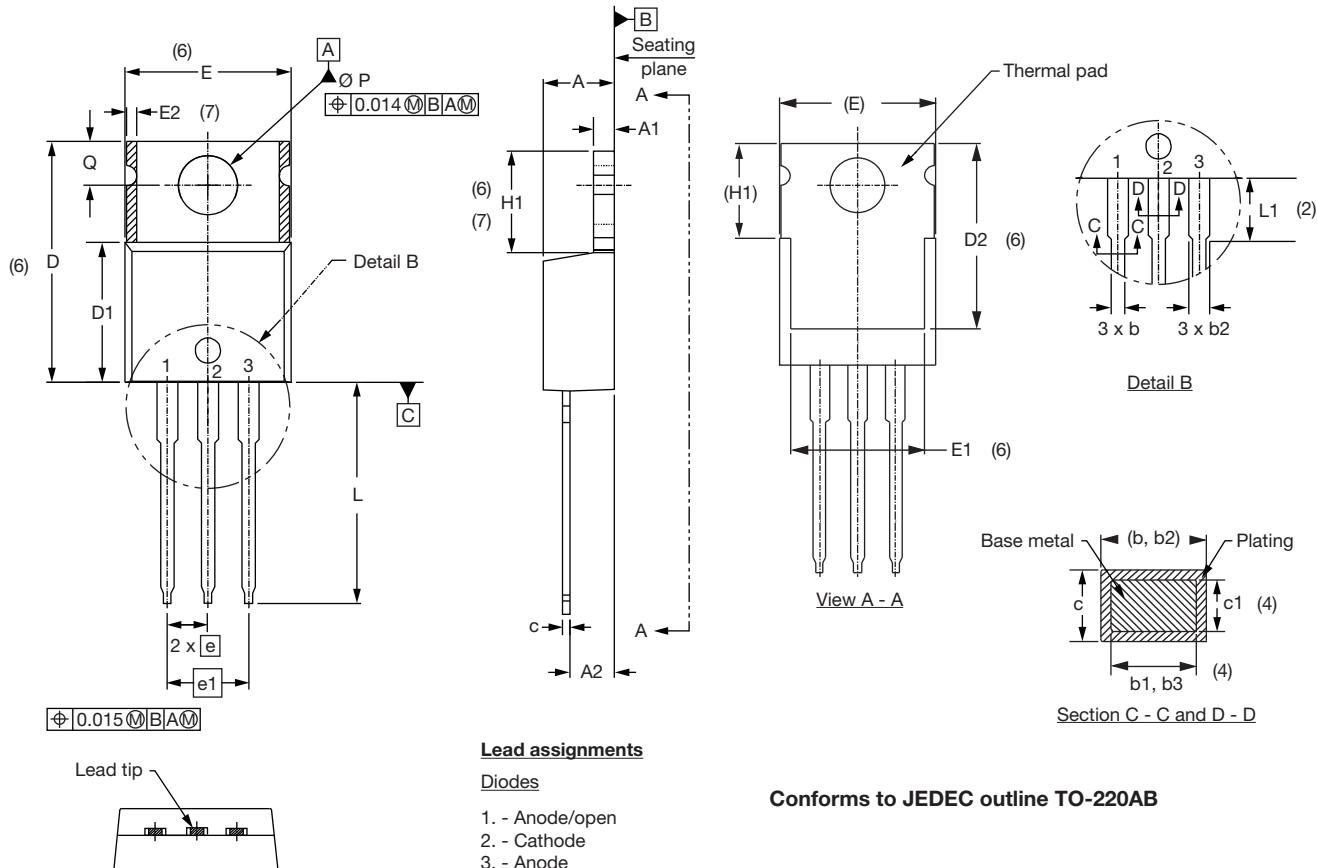
1	- Vishay Semiconductors product
2	- Current rating (40 A)
3	- Circuit configuration C = Common cathode
4	- Package T = TO-220
5	- Schottky "Q" series
6	- Voltage rating (100 = 100 V)
7	- Environmental digit <ul style="list-style-type: none"> • PbF = Lead (Pb)-free and RoHS compliant • -N3 = Halogen-free, RoHS compliant, and totally lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-43CTQ100PbF	50	1000	Antistatic plastic tube
VS-43CTQ100-N3	50	1000	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS		
Dimensions		www.vishay.com/doc?95222
Part marking information	TO-220ABPbF	www.vishay.com/doc?95225
	TO-220AB-N3	www.vishay.com/doc?95028
SPICE model		www.vishay.com/doc?95065

TO-220AB

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.25	4.65	0.167	0.183	
A1	1.14	1.40	0.045	0.055	
A2	2.56	2.92	0.101	0.115	
b	0.69	1.01	0.027	0.040	
b1	0.38	0.97	0.015	0.038	4
b2	1.20	1.73	0.047	0.068	
b3	1.14	1.73	0.045	0.068	4
c	0.36	0.61	0.014	0.024	
c1	0.36	0.56	0.014	0.022	4
D	14.85	15.25	0.585	0.600	3
D1	8.38	9.02	0.330	0.355	
D2	11.68	12.88	0.460	0.507	6

Notes

- (1) Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) Lead dimension and finish uncontrolled in L1
- (3) Dimension D, D1 and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outermost extremes of the plastic body
- (4) Dimension b1, b3 and c1 apply to base metal only
- (5) Controlling dimensions: inches
- (6) Thermal pad contour optional within dimensions E, H1, D2 and E1

(7) Dimensions E2 x H1 define a zone where stamping and singulation irregularities are allowed

(8) Outline conforms to JEDEC TO-220, except A2 (maximum) and D2 (minimum) where dimensions are derived from the actual package outline

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