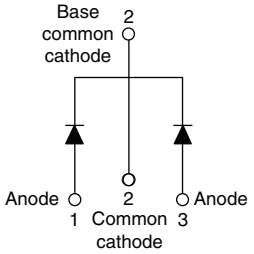
High Performance Schottky Rectifier, 2 x 10 A

TO-220AB



FEATURES

- 175 °C T_J operation
- 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
- AEC-Q101 qualified
- Meets JESD 201 class 2 whisker test
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb-free
e3
RoHS COMPLIANT
HALOGEN FREE

DESCRIPTION

The VS-20CTQ...HN3 Series 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 10 A
V_R	35 V, 40 V, 45 V
V_F at I_F	0.57 V
I_{RM} max.	15 mA at 125 °C
T_J max.	175 °C
Diode variation	Common cathode
E_{AS}	13 mJ

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	20	A
V_{RRM}	Range	35 to 45	V
I_{FSM}	t_p = 5 µs sine	1060	A
V_F	10 A_{pk}, T_J = 125 °C (per leg)	0.57	V
T_J	Range	- 55 to 175	°C

VOLTAGE RATINGS					
PARAMETER	SYMBOL	VS-20CTQ035HN3	VS-20CTQ040HN3	VS-20CTQ045HN3	UNITS
Maximum DC reverse voltage	V_R	35	40	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 = 145 °C, rectangular waveform		20	A
Maximum peak one cycle non-repetitive surge current per leg See fig. 7	I_{FSM}	5 µs sine or 3 µs rect. pulse	Following any rated load condition and with rated V_{RRM} applied	1060	
		10 ms sine or 6 ms rect. pulse		265	
Non-repetitive avalanche energy per leg	E_{AS}	T_J = 25 °C, I_{AS} = 2.0 A, L = 6.5 mH		13	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 x V_R typical		2.0	A

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ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop per leg See fig. 1	V_{FM} (1)	10 A	T_J = 25 °C	0.64	V
		20 A		0.76	
		10 A	T_J = 125 °C	0.57	
		20 A		0.68	
Maximum reverse leakage current per leg See fig. 2	I_{RM} (1)	T_J = 25 °C	V_R = Rated V_R	2	mA
		T_J = 125 °C		15	
Maximum junction capacitance per leg	C_T	V_R = 5 V_{DC} (test signal range 100 kHz to 1 MHz) 25 °C		900	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	°C
Maximum thermal resistance, junction to case per leg		R_{thJC}	DC operation See fig. 4	3.25	°C/W
Maximum thermal resistance, junction to case per package			DC operation	1.63	
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	20CTQ035H	
				20CTQ040H	
				20CTQ045H	

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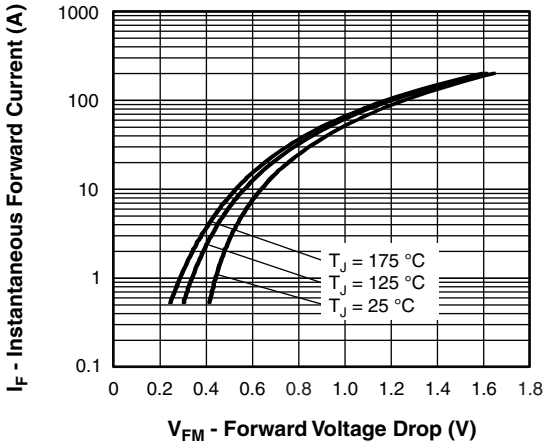

Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

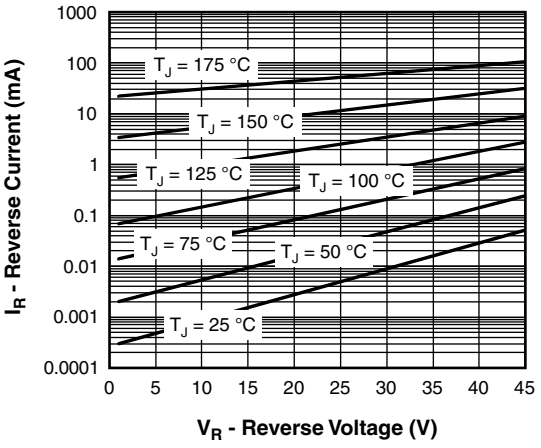

Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

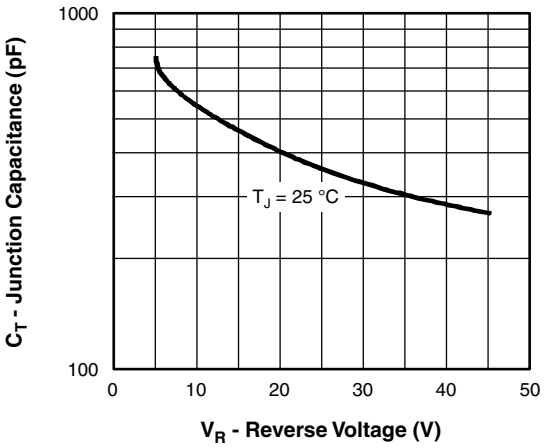

Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

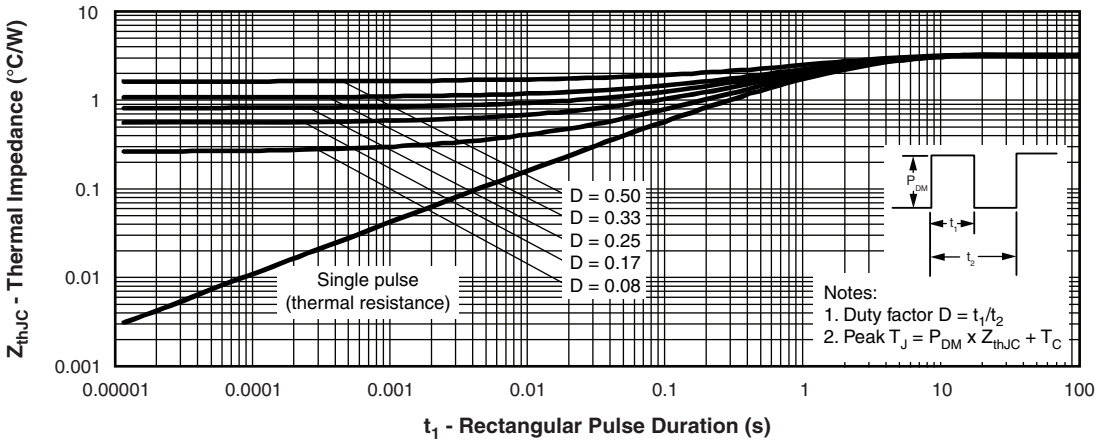

Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

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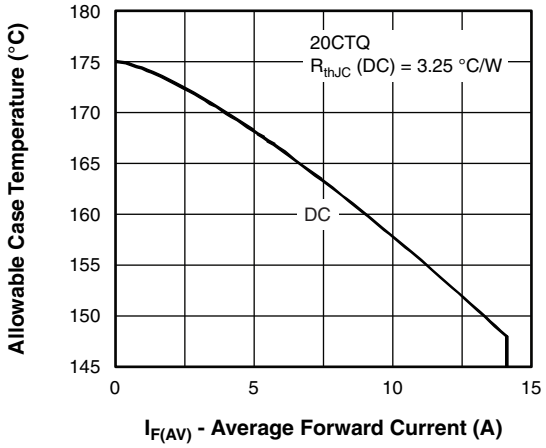

Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

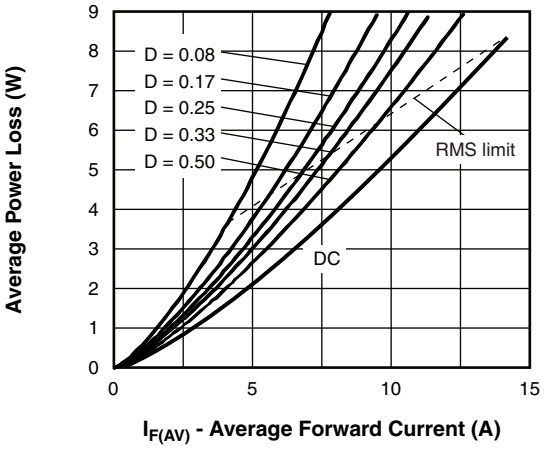

Fig. 6 - Forward Power Loss Characteristics (Per Leg)

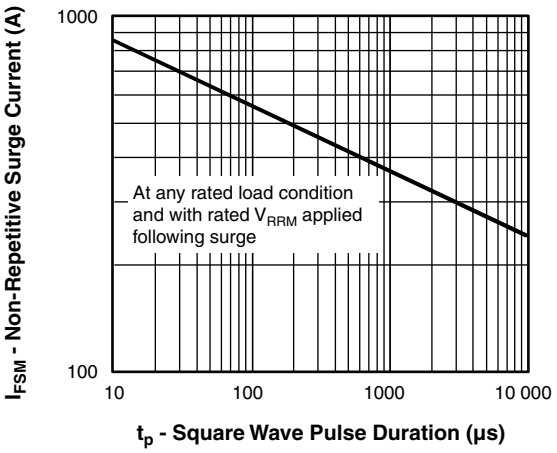

Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

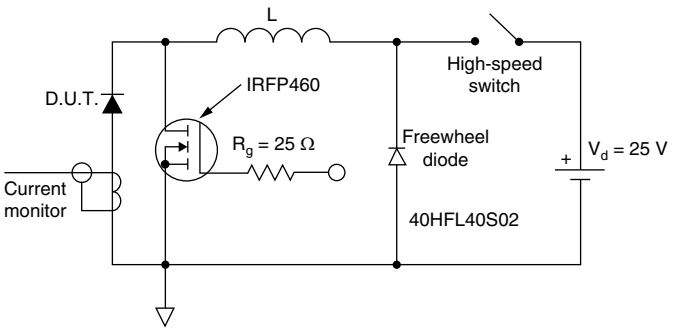

Fig. 8 - Unclamped Inductive Test Circuit

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ORDERING INFORMATION TABLE

Device code

VS-	20	C	T	Q	045	H	N3
1	2	3	4	5	6	7	8

1 - Vishay Semiconductors product

2 - Current rating (20 = 20 A)

3 - Circuit configuration

C = Common cathode

4 - Package

T = TO-220

5 - Schottky “Q” series

6 - Voltage rating — 035 = 35 V, 040 = 40 V, 045 = 45 V

7 - H = AEC-Q101 qualified

8 - Environmental digit:

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-20CTQ035HN3	50	1000	Antistatic plastic tube
VS-20CTQ040HN3	50	1000	Antistatic plastic tube
VS-20CTQ045HN3	50	1000	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS		
Dimensions		www.vishay.com/doc?95222
Part marking information	TO-220AB	www.vishay.com/doc?95028

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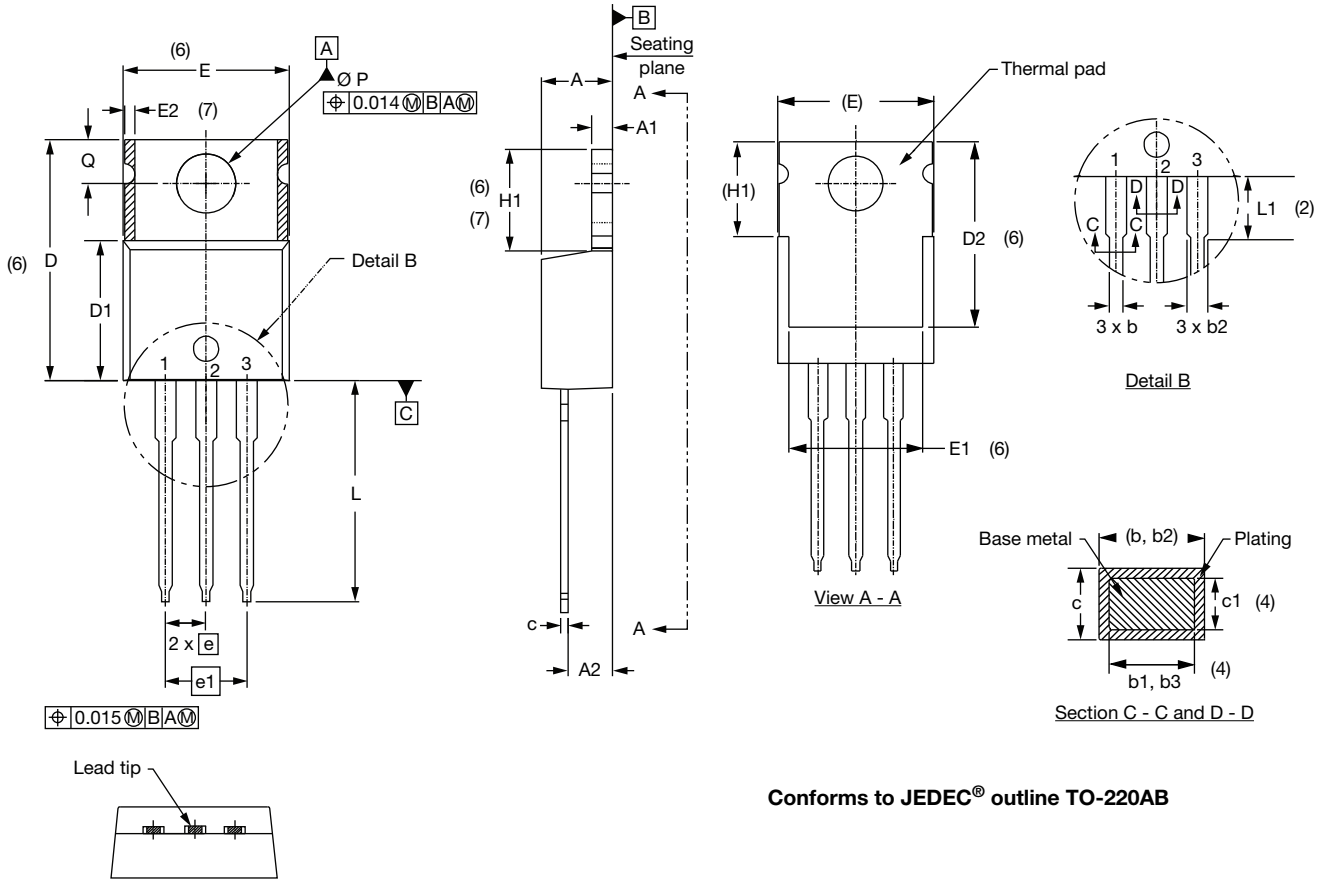
TO-220AB

DIMENSIONS in millimeters and inches



Conforms to JEDEC® outline TO-220AB

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	

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D2	11.68	12.88	0.460	0.507	6
E	10.11	10.51	0.398	0.414	3, 6
E1	6.86	8.89	0.270	0.350	6
E2	-	0.76	-	0.030	7
e	2.41	2.67	0.095	0.105	
e1	4.88	5.28	0.192	0.208	
H1	5.84	6.86	0.230	0.270	6, 7
L	13.52	14.02	0.532	0.552	
L1	3.32	3.82	0.131	0.150	2
Ø P	3.54	3.73	0.139	0.147	
Q	2.60	3.00	0.102	0.118	

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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