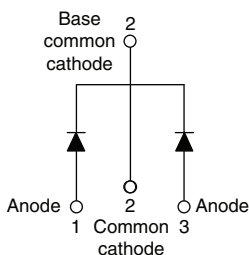
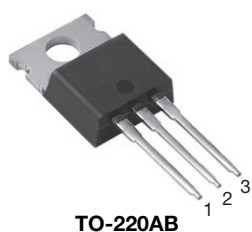


# High Performance Schottky Rectifier, 2 x 20 A



## FEATURES

- 175 °C T<sub>J</sub> 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
- AEC-Q101 qualified
- Meets JESD 201 class 2 whisker test
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## PRODUCT SUMMARY

Package	TO-220AB
I <sub>F(AV)</sub>	2 x 20 A
V <sub>R</sub>	100 V
V <sub>F</sub> at I <sub>F</sub>	0.67 V
I <sub>RM</sub> max.	11 mA at 125 °C
T <sub>J</sub> max.	175 °C
Diode variation	Common cathode
E <sub>AS</sub>	7.50 mJ

## 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.

## MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
I <sub>F(AV)</sub>	Rectangular waveform	40	A
V <sub>RRM</sub>		100	V
I <sub>FSM</sub>	t <sub>p</sub> = 5 μs sine	850	A
V <sub>F</sub>	20 A <sub>pk</sub> , T <sub>J</sub> = 125 °C (per leg)	0.67	V
T <sub>J</sub>	Range	- 55 to 175	°C

## VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-43CTQ100HN3	UNITS
Maximum DC reverse voltage	V <sub>R</sub>	100	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> = 135 °C, rectangular waveform	20	A
per leg			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	850	
		10 ms sine or 6 ms rect. pulse	275	
Non-repetitive avalanche energy per leg	E <sub>AS</sub>	T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 0.50 A, L = 60 mH	7.50	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	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	mΩ
Maximum junction capacitance per leg	$C_T$	$V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz) 25 °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/μs

**Note**

<sup>(1)</sup> Pulse width < 300  $\mu$ 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	$^{\circ}\text{C/W}$
Maximum thermal resistance, junction to case per package			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		6 (5)	kgf · cm
	maximum		12 (10)	(lbf · in)
Marking device		Case style TO-220AB	43CTQ100H	

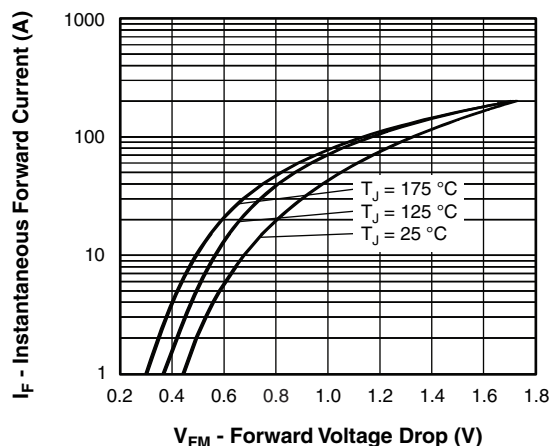


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

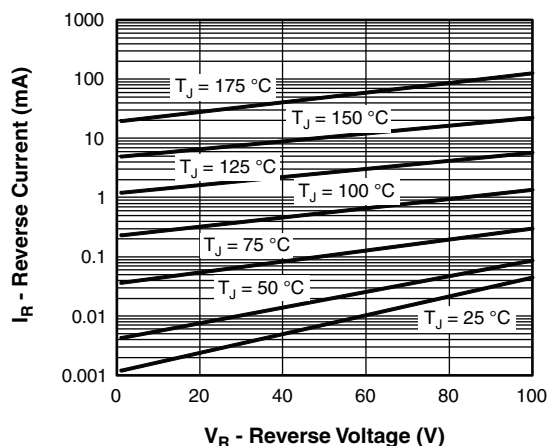


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

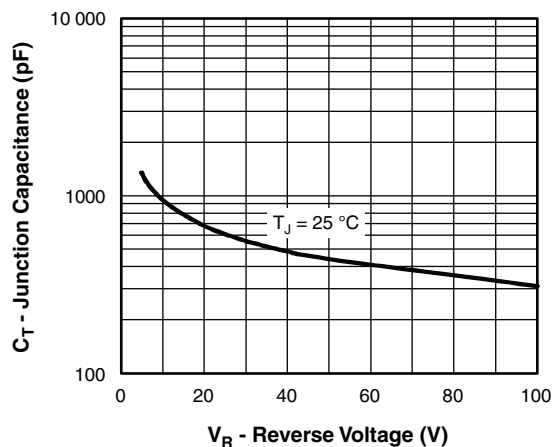


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

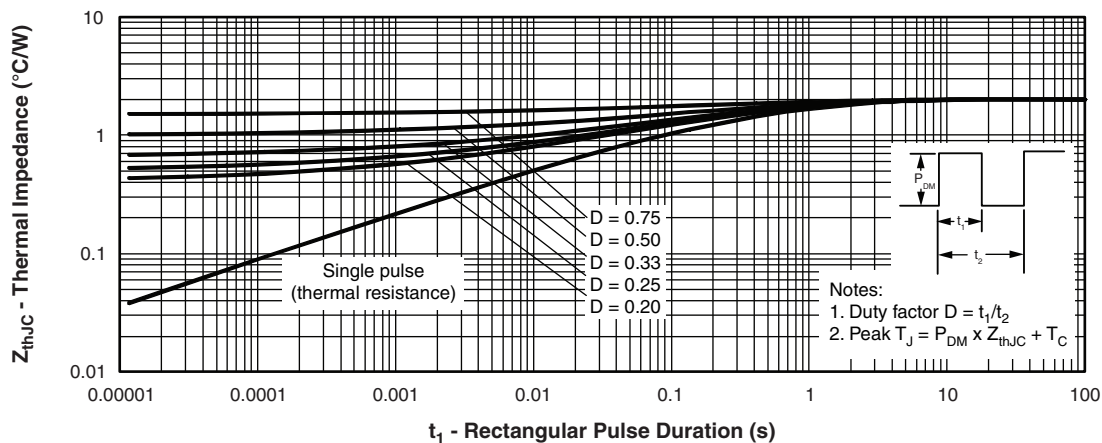


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

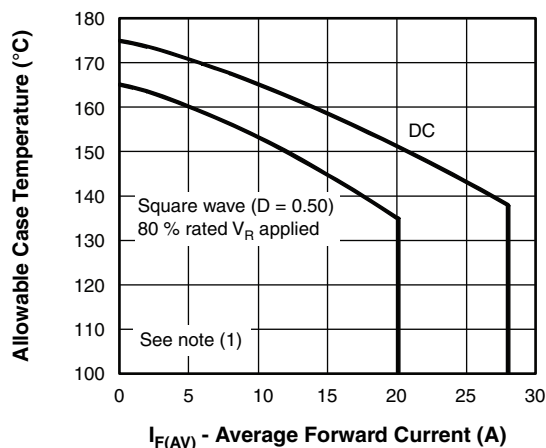


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

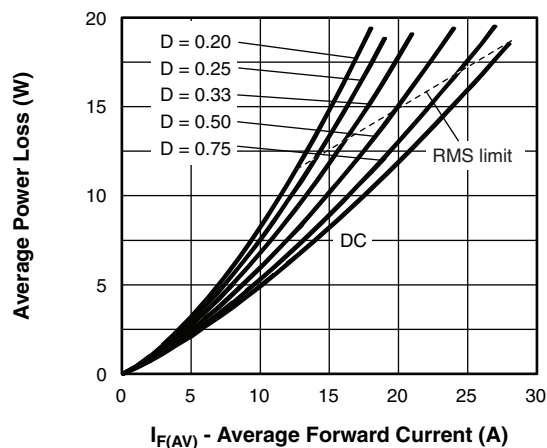


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

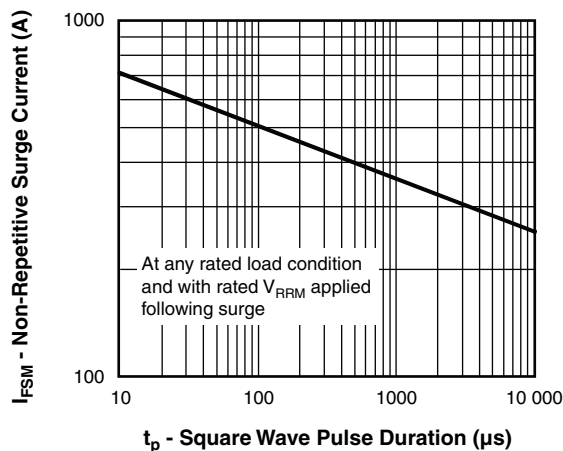


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

#### 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  $V_{R1} = 10$  V

**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>43</b>	<b>C</b>	<b>T</b>	<b>Q</b>	<b>100</b>	<b>H</b>	<b>N3</b>
	1	2	3	4	5	6	7	8

- |          |   |  |
|----------|---|--|
| <b>1</b> | - | Vishay Semiconductors product  |
| <b>2</b> | - | Current rating (40 A)  |
| <b>3</b> | - | Circuit configuration<br>C = Common cathode  |
| <b>4</b> | - | Package<br>T = TO-220  |
| <b>5</b> | - | Schottky "Q" series  |
| <b>6</b> | - | Voltage rating (100 = 100 V)   |
| <b>7</b> | - | H = AEC-Q101 qualified   |
| <b>8</b> | - | Environmental digit<br>• N3 = Halogen-free, RoHS-compliant, and totally lead (Pb)-free |

**ORDERING INFORMATION** (Example)

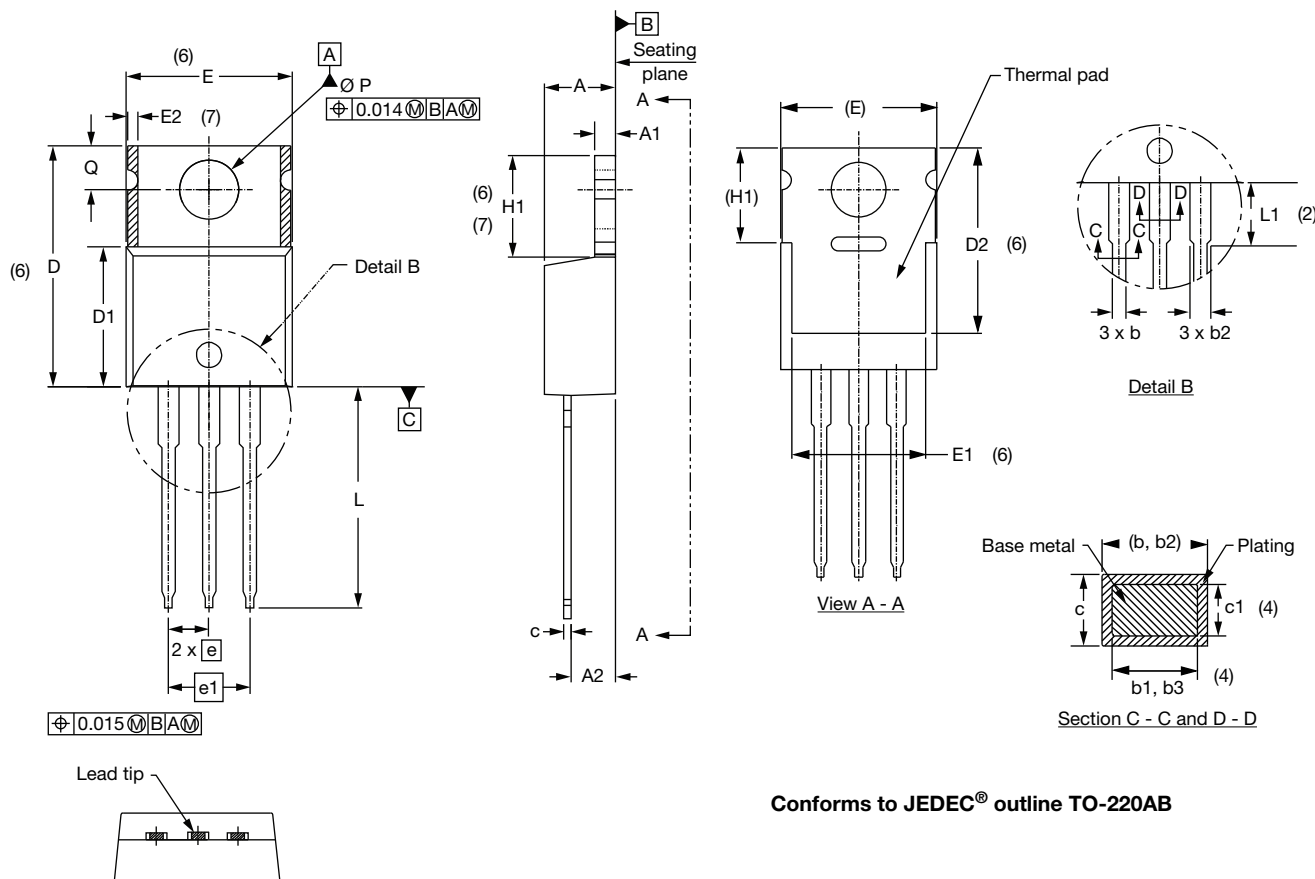
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-43CTQ100HN3	50	1000	Antistatic plastic tube

**LINKS TO RELATED DOCUMENTS**

Dimensions	<a href="http://www.vishay.com/doc?95222">www.vishay.com/doc?95222</a>
Part marking information	TO-220AB-N3 <a href="http://www.vishay.com/doc?95028">www.vishay.com/doc?95028</a>
SPIICE model	<a href="http://www.vishay.com/doc?95065">www.vishay.com/doc?95065</a>

# TO-220AB

**DIMENSIONS** in millimeters and inches



**Conforms to JEDEC® outline TO-220AB**

SYMBOL	MILLIMETERS		INCHES		NOTES		SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.				MIN.	MAX.			
A	4.25	4.65	0.167	0.183			D2	11.68	12.88	0.460	0.507	6
A1	1.14	1.40	0.045	0.055			E	10.11	10.51	0.398	0.414	3, 6
A2	2.56	2.92	0.101	0.115			E1	6.86	8.89	0.270	0.350	6
b	0.69	1.01	0.027	0.040			E2	-	0.76	-	0.030	7
b1	0.38	0.97	0.015	0.038	4		e	2.41	2.67	0.095	0.105	
b2	1.20	1.73	0.047	0.068			e1	4.88	5.28	0.192	0.208	
b3	1.14	1.73	0.045	0.068	4		H1	5.84	6.86	0.230	0.270	6, 7
c	0.36	0.61	0.014	0.024			L	13.52	14.02	0.532	0.552	
c1	0.36	0.56	0.014	0.022	4		L1	3.32	3.82	0.131	0.150	2
D	14.85	15.25	0.585	0.600	3		Ø P	3.54	3.73	0.139	0.147	
D1	8.38	9.02	0.330	0.355			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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