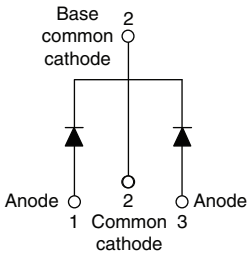
Schottky Rectifier, 2 x 20 A

TO-220AB



FEATURES

- 125 °C T_J operation (V_R < 5 V)
- Optimized for OR-ing applications
- Ultra low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- 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)

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE Available

DESCRIPTION

The center tap Schottky rectifier module has been optimized for ultra low forward voltage drop specifically for the OR-ing of parallel power supplies. The proprietary barrier technology allows for reliable operation up to 125 °C junction temperature. Typical applications are in parallel switching power supplies, converters, reverse battery protection, and redundant power subsystems.

PRODUCT SUMMARY	
Package	TO-220AB
$I_{F(AV)}$	2 x 20 A
V_R	15 V
V_F at I_F	See Electrical table
I_{RM} max.	600 mA at 100 °C
T_J max.	125 °C
Diode variation	Common cathode
E_{AS}	10 mJ

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	40	A
V_{RRM}		15	V
I_{FSM}	t_p = 5 µs sine	700	A
V_F	19 A_{pk}, T_J = 125 °C (per leg, typical)	0.25	V
T_J		- 55 to 125	°C

VOLTAGE RATINGS				
PARAMETER	SYMBOL	VS-STPS40L15CTPbF	VS-STPS40L15CT-N3	UNITS
Maximum DC reverse voltage	V_R	15	15	V
Maximum working peak reverse voltage	V_{RWM}			

ABSOLUTE MAXIMUM RATINGS						
PARAMETER		SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average forward current See fig. 5	per leg	$I_{F(AV)}$	50 % duty cycle at T_C = 85 °C, rectangular waveform		20	A
	per device				40	
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	700	
			10 ms sine or 6 ms rect. pulse		330	
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	
Non-repetitive avalanche energy per leg		E_{AS}	T_J = 25 °C, I_{AS} = 2 A, L = 6 mH		10	mJ

ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS		TYP.	MAX.	UNITS
Forward voltage drop per leg See fig. 1	V_{FM} (1)	19 A	T_J = 25 °C	-	0.41	V
		40 A		-	0.52	
		19 A	T_J = 125 °C	0.25	0.33	
		40 A		0.37	0.50	
Reverse leakage current per leg See fig. 2	I_{RM} (1)	T_J = 25 °C	V_R = Rated V_R	-	10	mA
		T_J = 100 °C		-	600	
Threshold voltage	$V_{F(TO)}$	T_J = T_J maximum		0.182		V
Forward slope resistance	r_t			7.6		mΩ
Maximum junction capacitance per leg	C_T	V_R = 5 V_{DC} (test signal range 100 kHz to 1 MHz) 25 °C		-	2000	pF
Typical series inductance per leg	L_S	Measured lead to lead 5 mm from package body		8	-	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 temperature range		T_J		- 55 to 125	°C
Maximum storage temperature range		T_{Stg}		- 55 to 150	
Maximum thermal resistance, junction to case per leg		R_{thJC}	DC operation See fig. 4	1.5	°C/W
Typical thermal resistance, case to heatsink		R_{thCS}	Mounting surface, smooth and greased (only for TO-220)	0.50	
Maximum thermal resistance, junction to ambient		R_{thJA}	DC operation (for D^2PAK and TO-262)	40	
Approximate weight				2	g
				0.07	oz.
Mounting torque	minimum		Non-lubricated threads	6 (5)	kgf · cm (lbf · in)
	maximum			12 (10)	
Marking device			Case style TO-220AB	STPS40L15CT	

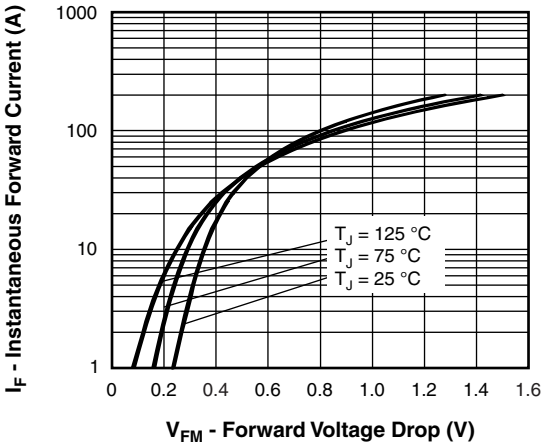


Fig. 1 - Maximum Forward Voltage Drop Characteristics

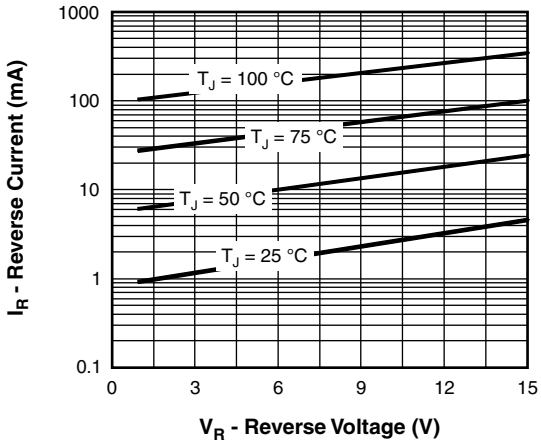


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

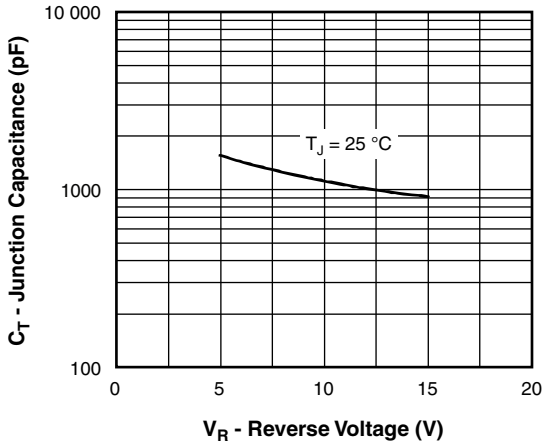


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

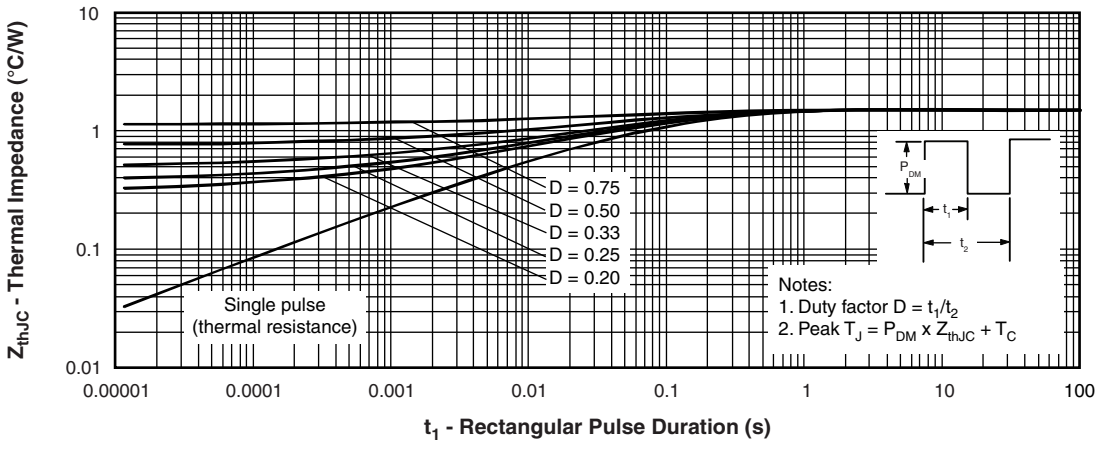


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

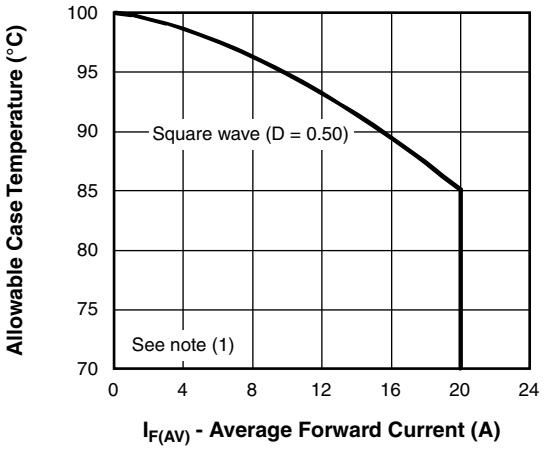


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

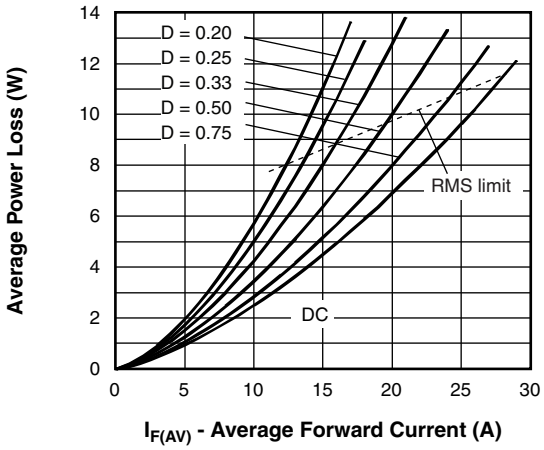


Fig. 6 - Forward Power Loss Characteristics

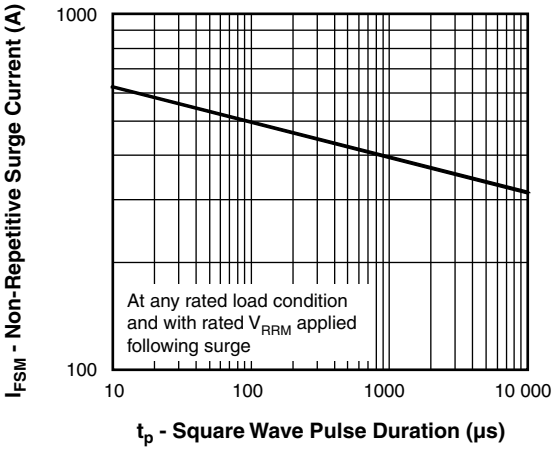


Fig. 7 - Maximum Non-Repetitive Surge Current

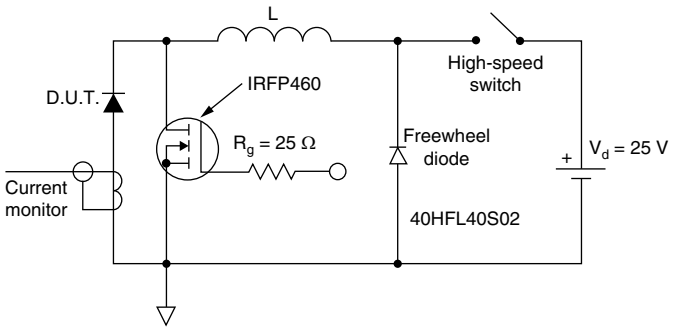


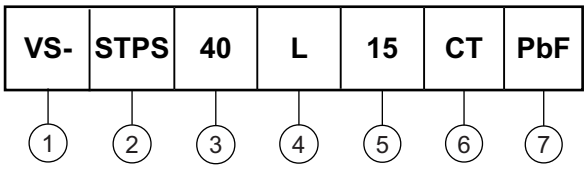
Fig. 8 - Unclamped Inductive Test Circuit

Note

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

ORDERING INFORMATION TABLE

Device code



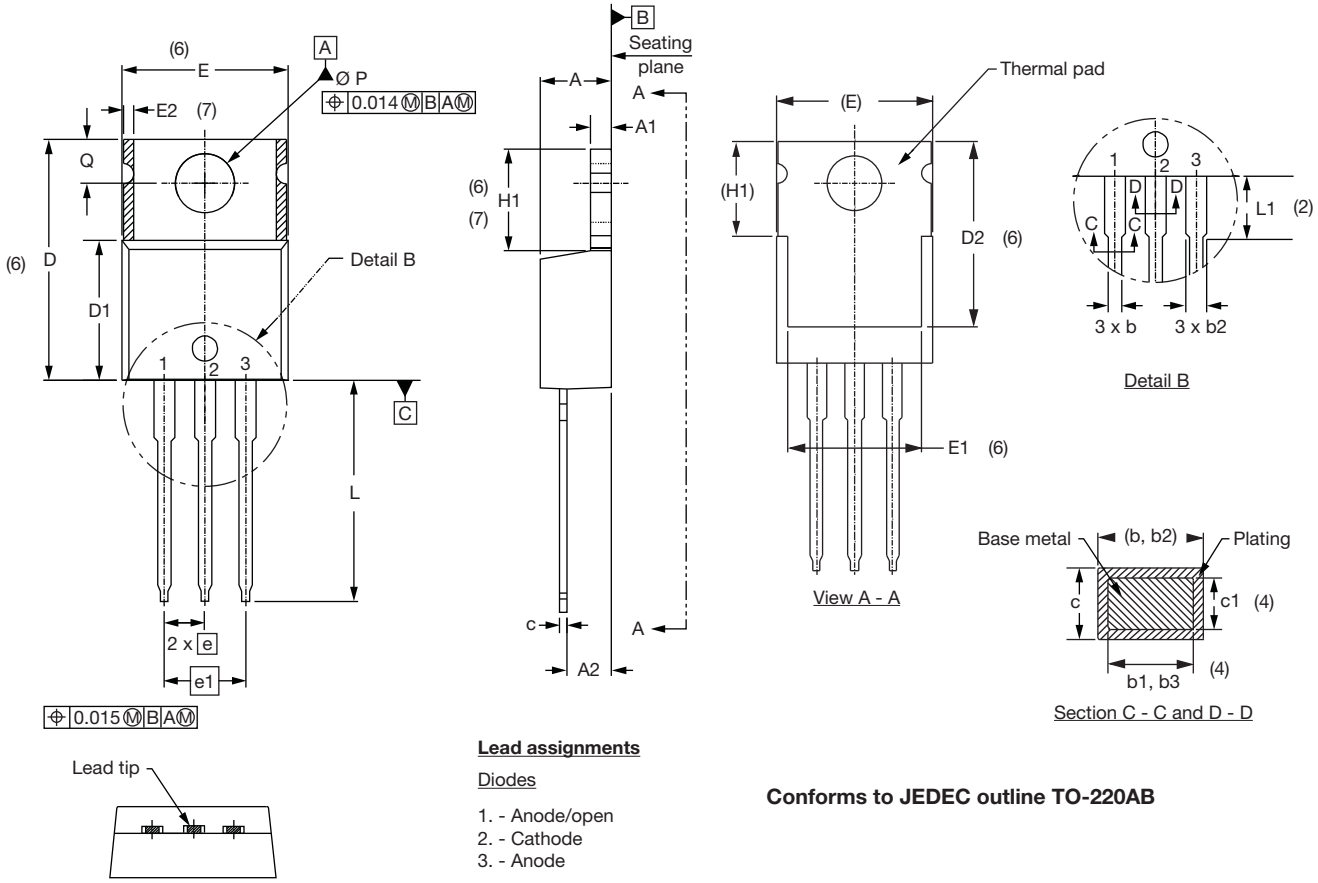
1 - Vishay Semiconductors product
2 - Schottky STPS series
3 - Current rating (40 = 40 A)
4 - L = Low voltage drop
5 - Voltage rating (15 = 15 V)
6 - CT = Essential part number
7 - Environmental digit
- PbF = Lead (Pb)-free and RoHS compliant
- -N3 = Halogen-free, RoHS compliant, and totally lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	**QUANTITY PER T/R**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-STPS40L15CTPbF	50	1000	Antistatic plastic tube
VS-STPS40L15CT-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

TO-220AB

DIMENSIONS in millimeters and inches



Lead tip

Lead assignments

Diodes

1. - Anode/open
2. - Cathode
3. - Anode

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	
D2	11.68	12.88	0.460	0.507	6

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
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	6.09	6.48	0.240	0.255	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	
θ	90° to 93°		90° to 93°		

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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