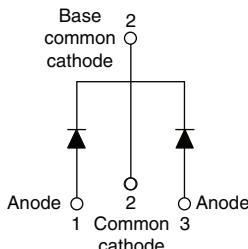


High Performance Schottky Rectifier, 2 x 20 A


3L 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
- Designed and qualified according to JEDEC®-JESD47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT
HALOGEN
FREE

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.

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	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
E_{AS}	10 mJ
Package	3L TO-220AB
Circuit configuration	Common cathode

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-STPS40L15CT-M3	UNITS
Maximum DC reverse voltage	V_R	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	$I_{F(AV)}$	50 % duty cycle at $T_C = 85$ °C, rectangular waveform		20	A	
per leg				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		
per device		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 $V_A = 1.5 \times V_R$ 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	$T_J = 25 \text{ }^\circ\text{C}$	-	0.41	V	
		40 A		-	0.52		
		19 A	$T_J = 125 \text{ }^\circ\text{C}$	0.25	0.33		
		40 A		0.37	0.50		
Reverse leakage current per leg See fig. 2	$I_{RM}^{(1)}$	$T_J = 25 \text{ }^\circ\text{C}$	$V_R = \text{Rated } V_R$	-	10	mA	
		$T_J = 100 \text{ }^\circ\text{C}$		-	600		
Threshold voltage	$V_{F(TO)}$	$T_J = T_J \text{ maximum}$		0.182		V	
Forward slope resistance	r_t			7.6		$\text{m}\Omega$	
Maximum junction capacitance per leg	C_T	$V_R = 5 \text{ V}_{\text{DC}}$ (test signal range 100 kHz to 1 MHz) 25 $^\circ\text{C}$		-	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/ μ s	

Note

(1) Pulse width < 300 μ s, duty cycle < 2 %

THERMAL - MECHANICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum junction temperature range	T_J			-55 to +125	$^\circ\text{C}$
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	$^\circ\text{C/W}$
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 ² PAK and TO-262)		40	
Approximate weight				2	g
				0.07	
Mounting torque	minimum	Non-lubricated threads		6 (5)	kgf · cm (lbf · in)
	maximum			12 (10)	
Marking device		Case style 3L TO-220AB		STPS40L15CT	

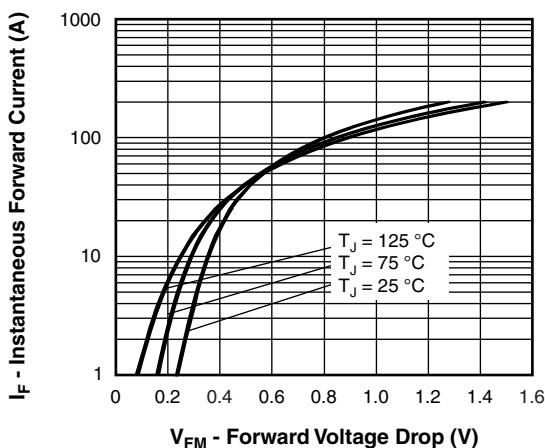


Fig. 1 - Maximum Forward Voltage Drop Characteristics

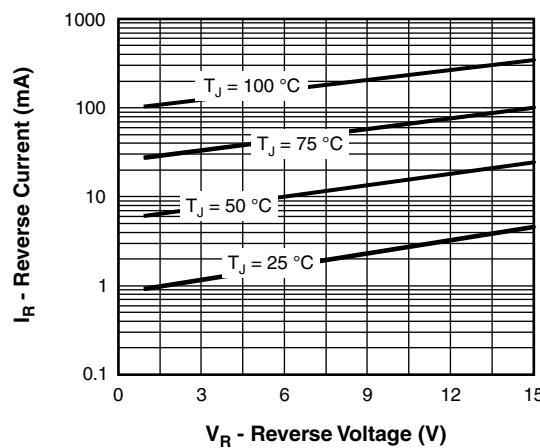


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

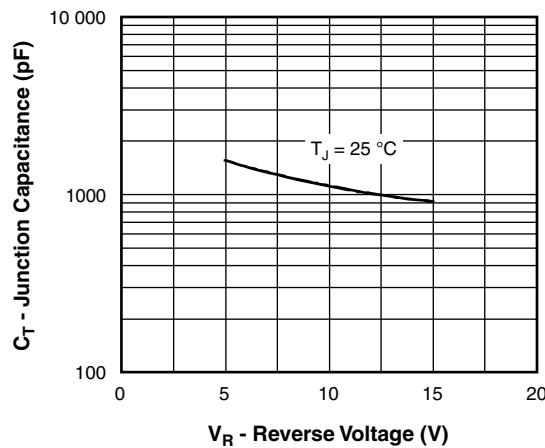


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

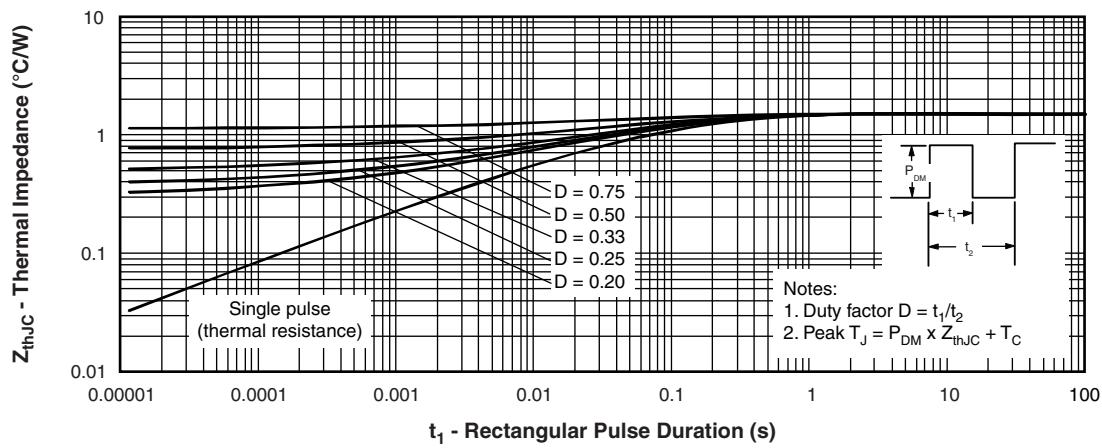


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

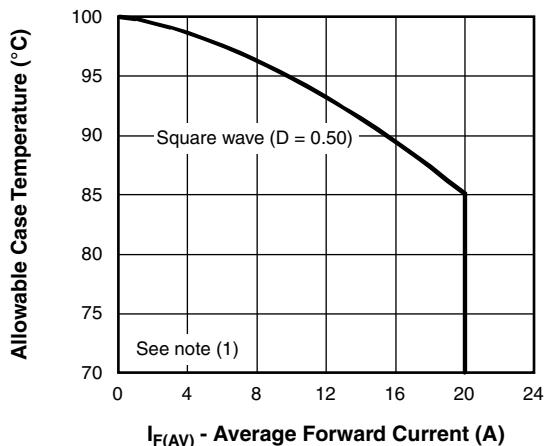


Fig. 5 - Maximum Allowable Case Temperature vs.
Average Forward Current

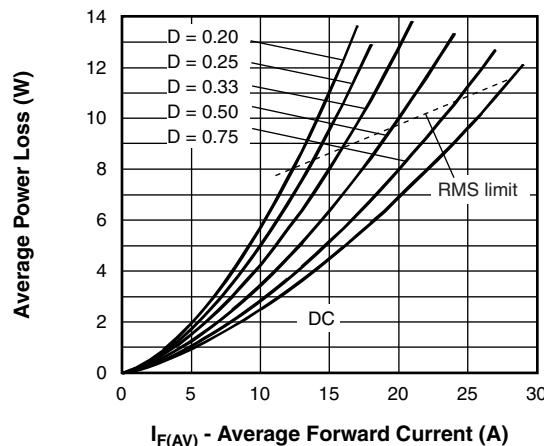


Fig. 6 - Forward Power Loss Characteristics

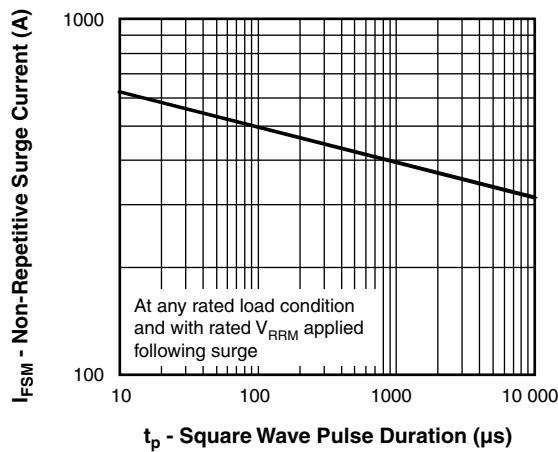


Fig. 7 - Maximum Non-Repetitive Surge Current

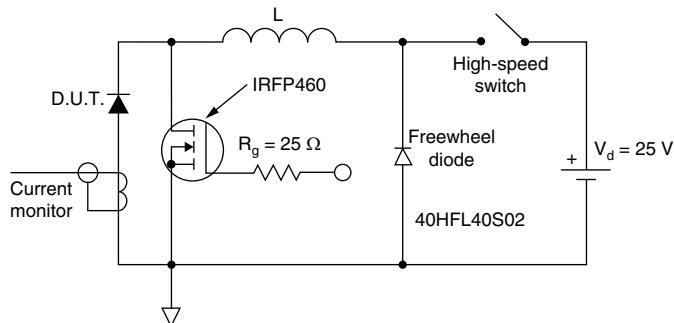


Fig. 8 - Unclamped Inductive Test Circuit

Note

- (1) Formula used: $T_C = T_J - (P_d + P_{d,REV}) \times R_{th,JC}$;
 $P_d = \text{forward power loss} = I_{F(AV)} \times V_{FM}$ at $(I_{F(AV)}/D)$ (see fig. 6);
 $P_{d,REV} = \text{inverse power loss} = V_{R1} \times I_R (1 - D)$; I_R at $V_{R1} = 80\%$ rated V_R

ORDERING INFORMATION TABLE

Device code	VS-	STPS	40	L	15	CT	-M3
	(1)	(2)	(3)	(4)	(5)	(6)	(7)

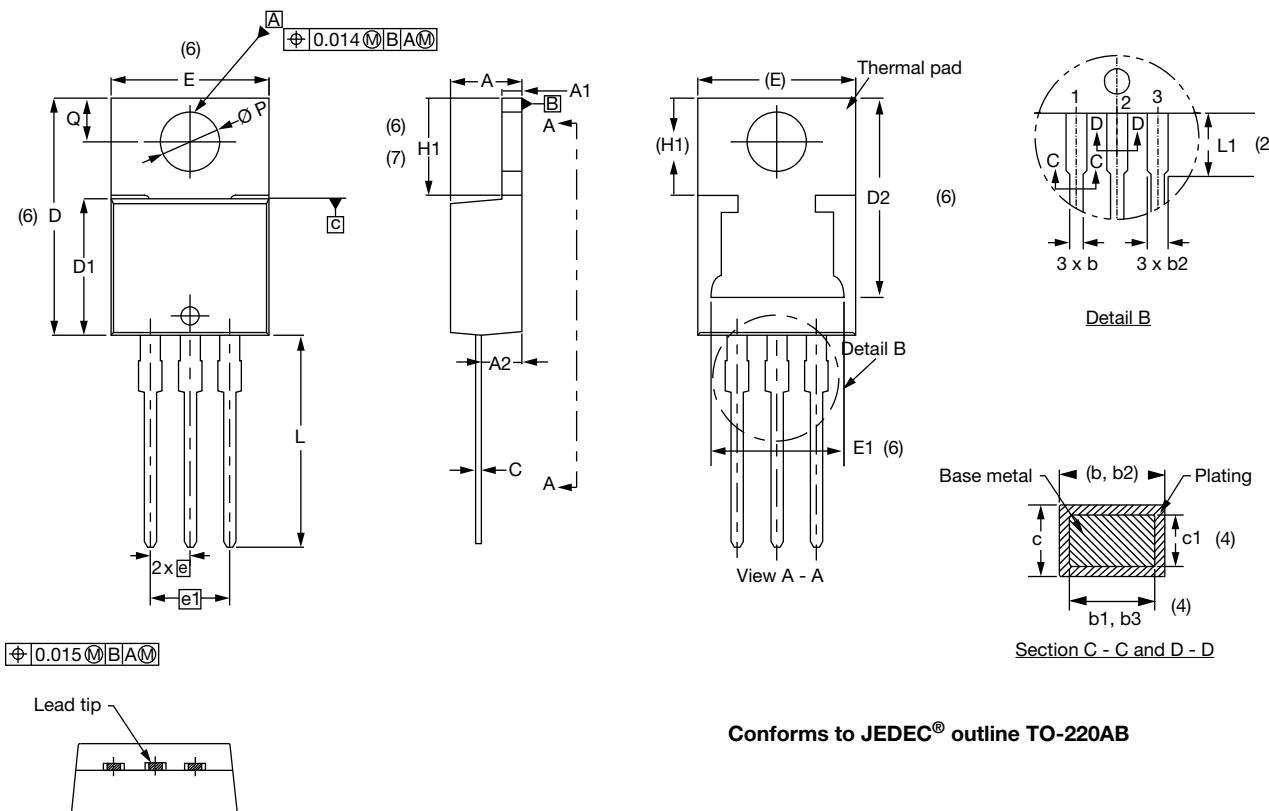
- | | |
|---|---------------------------------|
| 1 | - Vishay Semiconductors product |
| 2 | - Schottky STPS series |
| 3 | - Current rating (40 = 40 A) |
| 4 | - L = Low voltage drop |
| 5 | - Voltage rating (15 = 15 V) |
| 6 | - CT = essential part number |
| 7 | - Environmental digit |
- M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-STPS40L15CT-M3	50	1000	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?96154
Part marking information	www.vishay.com/doc?95028

3L 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	2.50	2.92	0.098	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	15.35	0.585	0.604	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
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	3.91	0.139	0.154	
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) Outline conforms to JEDEC® TO-220, except D2 (minimum)

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