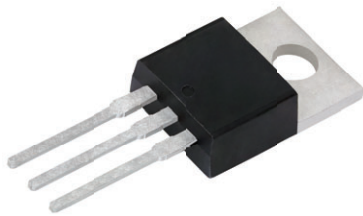
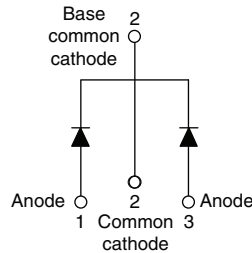


High Performance Schottky Rectifier, 2 x 20 A


3L TO-220AB


FEATURES

- 150 °C T_J operation
- Optimized for 3.3 V application
- Ultralow 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®-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
 COMPLIANT
 HALOGEN
FREE

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	2 x 20 A
V_R	20 V
V_F at I_F	0.34 V
I_{RM} max.	310 mA at 125 °C
T_J max.	150 °C
E_{AS}	18 mJ
Package	3L TO-220AB
Circuit configuration	Common cathode

DESCRIPTION

This center tap Schottky rectifier has been optimized for ultralow forward voltage drop specifically for 3.3 V output power supplies. The proprietary barrier technology allows for reliable operation up to 150 °C junction temperature. Typical applications are in switching power supplies, converters, reverse battery protection, and redundant power subsystems.

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	40	A
V_{RRM}		20	V
I_{FSM}	$t_p = 5 \mu s$ sine	1000	A
V_F	20 A _{pk} , $T_J = 125 \text{ °C}$	0.34	V
T_J		-55 to +150	°C

VOLTAGE RATINGS			
PARAMETER	SYMBOL	VS-47CTQ020-M3	UNITS
Maximum DC reverse voltage	V_R	20	V
Maximum working peak reverse voltage	V_{RWM}		

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current per leg per device	$I_{F(AV)}$	50 % duty cycle at $T_C = 135 \text{ °C}$, rectangular waveform	20	A
			40	
Maximum peak one cycle non-repetitive surge current per leg	I_{FSM}	5 μs sine or 3 μs rect. pulse	1000	
		10 ms sine or 6 ms rect. pulse	250	
Non-repetitive avalanche energy per leg	E_{AS}	$T_J = 25 \text{ °C}$, $I_{AS} = 3 \text{ A}$, $L = 3 \text{ mH}$	18	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	3	A



ELECTRICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop per leg	$V_{FM}^{(1)}$	20 A	$T_J = 25\text{ }^\circ\text{C}$	0.45	V
		40 A		0.51	
		20 A	$T_J = 125\text{ }^\circ\text{C}$	0.34	
		40 A		0.44	
		20 A	$T_J = 150\text{ }^\circ\text{C}$	0.31	
		40 A		0.42	
Maximum reverse leakage current per leg	$I_{RM}^{(1)}$	$T_J = 125\text{ }^\circ\text{C}$	$V_R = 5\text{ V}$	60	mA
			$V_R = 3.3\text{ V}$	45	
		$T_J = 150\text{ }^\circ\text{C}$	$V_R = 10\text{ V}$	306	
		$T_J = 25\text{ }^\circ\text{C}$	$V_R = \text{Rated } V_R$	3	
$T_J = 125\text{ }^\circ\text{C}$	310				
Threshold voltage	$V_{F(TO)}$	$T_J = T_J \text{ maximum}$		0.188	V
Forward slope resistance	r_t			5.9	$\text{m}\Omega$
Maximum junction capacitance per leg	C_T	$V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$		3000	pF
Typical series inductance per leg	L_S	Measured lead to lead 5 mm from package body		5.5	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 150	$^\circ\text{C}$
Maximum thermal resistance, junction to case per leg	R_{thJC}	DC operation		1.5	$^\circ\text{C/W}$
Maximum thermal resistance, junction to case per package				0.75	
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 3L TO-220AB		47CTQ020	

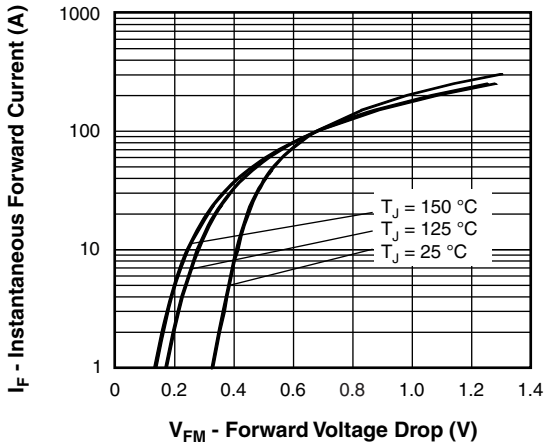


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

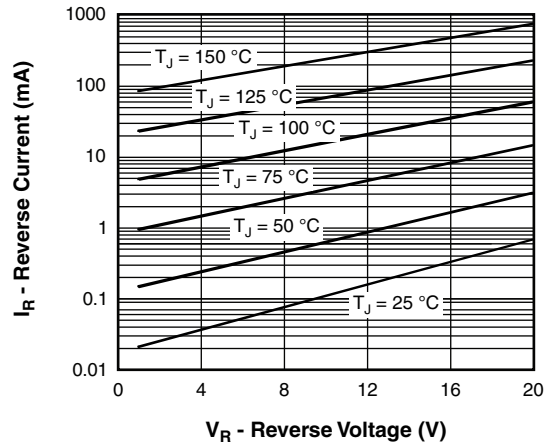


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

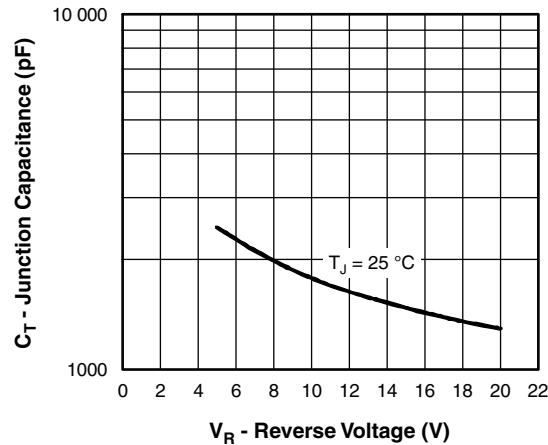


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

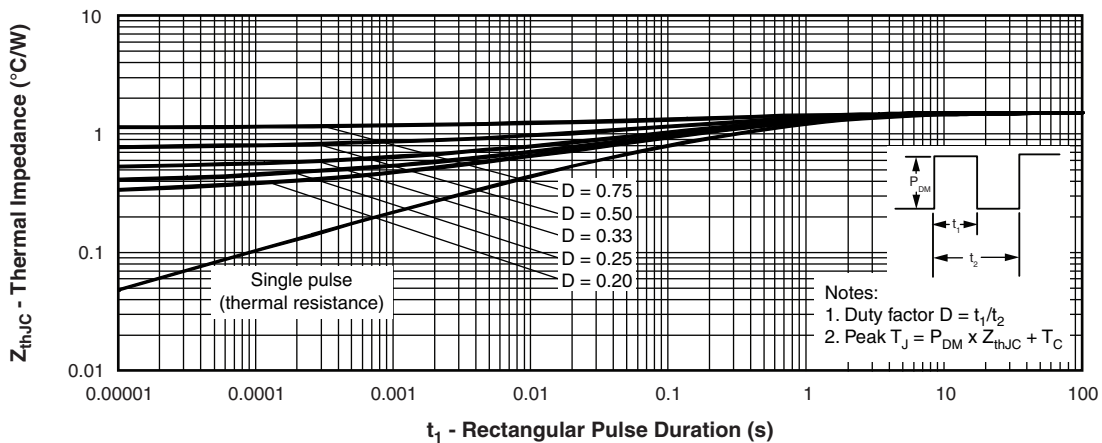


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

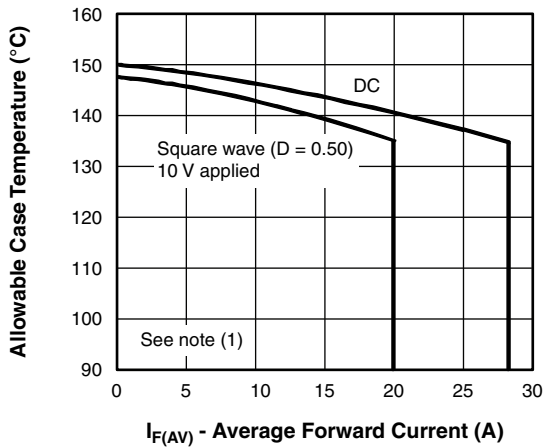


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

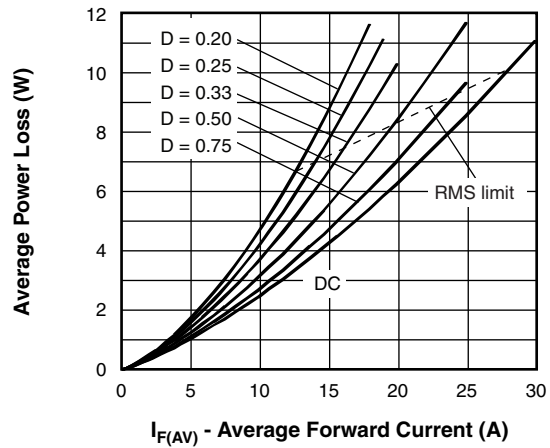


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

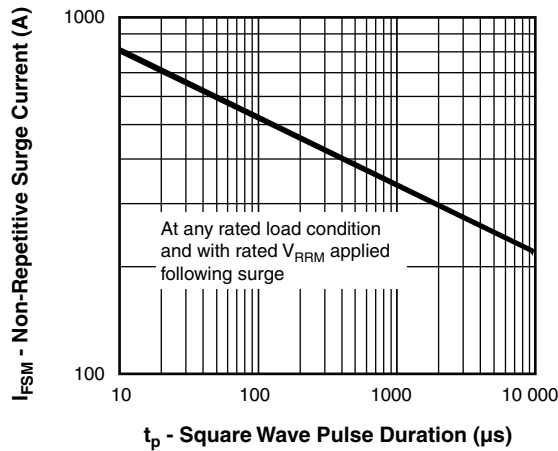


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

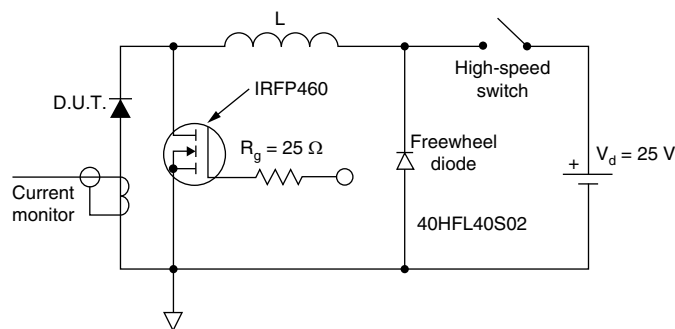


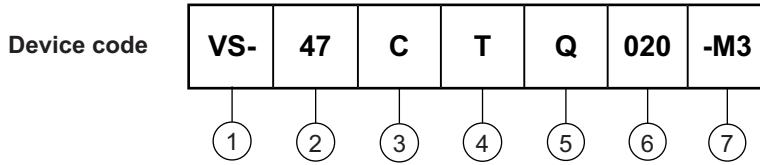
Fig. 8 - Unclamped Inductive Test Circuit

Note

- (1) Formula used: $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$;
 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 $V_{R1} = 10\text{ V}$



ORDERING INFORMATION TABLE



- 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 (020 = 20 V)
- 7** - Environmental digit
-M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

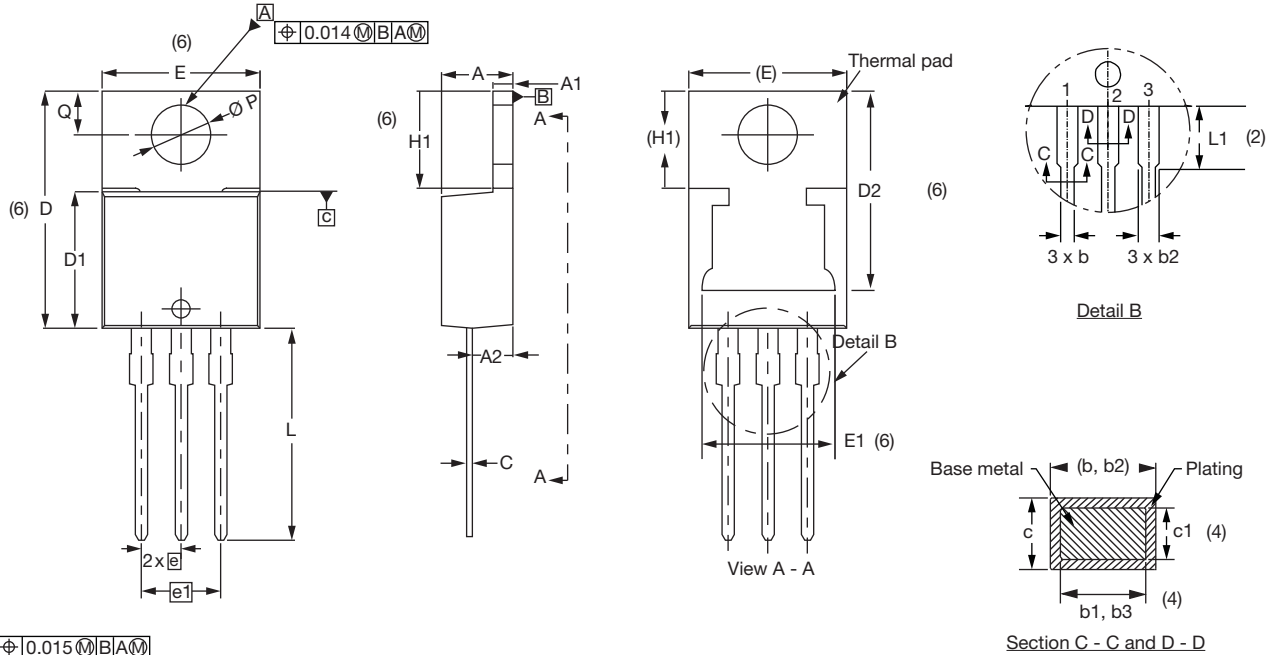
ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-47CTQ020-M3	50	1000	Antistatic plastic tube

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



Conforms to JEDEC® outline TO-220AB

SYMBOL	MILLIMETERS		INCHES		NOTES	SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.			MIN.	MAX.	MIN.	MAX.	
A	4.25	4.65	0.167	0.183		D2	11.68	13.30	0.460	0.524	6, 7
A1	1.14	1.40	0.045	0.055		E	10.11	10.51	0.398	0.414	3, 6
A2	2.50	2.92	0.098	0.115		E1	6.86	8.89	0.270	0.350	6
b	0.69	1.01	0.027	0.040		e	2.41	2.67	0.095	0.105	
b1	0.38	0.97	0.015	0.038	4	e1	4.88	5.28	0.192	0.208	
b2	1.20	1.73	0.047	0.068		H1	6.09	6.48	0.240	0.255	6
b3	1.14	1.73	0.045	0.068	4	L	13.52	14.02	0.532	0.552	
c	0.36	0.61	0.014	0.024		L1	3.32	3.82	0.131	0.150	2
c1	0.36	0.56	0.014	0.022	4	∅ P	3.54	3.91	0.139	0.154	
D	14.85	15.35	0.585	0.604	3	Q	2.60	3.00	0.102	0.118	
D1	8.38	9.02	0.330	0.355							

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



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