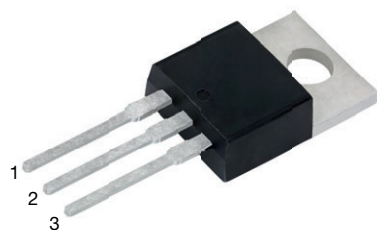
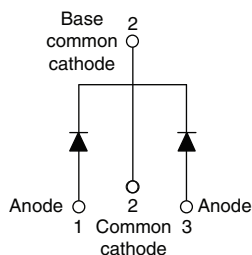




High Performance Schottky Rectifier, 2 x 30 A



TO-220AB 3L



FEATURES

- 150 °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
- 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 30 A
V_R	35 V, 40 V, 45 V
V_F at I_F	0.53 V
I_{RM} max.	250 mA at 125 °C
T_J max.	150 °C
E_{AS}	20 mJ
Package	TO-220AB 3L
Circuit configuration	Common cathode

DESCRIPTION

This center tap Schottky rectifier has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 150 °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
$I_{F(AV)}$	Rectangular waveform (per device)	60	A
V_{RRM}		35 to 45	V
I_{FRM}	$T_C = 113$ °C (per leg)	60	A
I_{FSM}	$t_p = 5$ μ s sine	1500	
V_F	30 A_{pk} , $T_J = 125$ °C	0.53	V
T_J	Range	-65 to +150	°C

VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-60CTQ035-M3	VS-60CTQ040-M3	VS-60CTQ045-M3	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 per leg per device	$I_{F(AV)}$	50 % duty cycle at $T_C = 113$ °C, rectangular waveform	30	A
			60	
Peak repetitive forward current per leg	I_{FRM}	Rated V_R , square wave, 20 kHz, $T_C = 113$ °C	60	
Maximum peak one cycle non-repetitive surge current per leg	I_{FSM}	5 μ s sine or 3 μ s rect. pulse	1500	
		10 ms sine or 6 ms rect. pulse	300	
Non-repetitive avalanche energy per leg	E_{AS}	$T_J = 25$ °C, $I_{AS} = 3$ A, $L = 4.40$ mH	20	mJ
Repetitive avalanche current per leg	I_{AR}	Current decaying linearly to zero in 1 μ s Frequency limited by T_J maximum $V_A = 1.5 \times V_R$ typical	3	A

**ELECTRICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	TYP.	MAX.	UNITS
Maximum forward voltage drop	$V_{FM}^{(1)}$	30 A	0.51	0.56	V
		60 A		0.72	
		30 A	0.48	0.53	
		60 A		0.75	
Maximum instantaneous reverse current	I_{RM}	$T_J = 25\text{ }^{\circ}\text{C}$	0.33	2	mA
		$T_J = 125\text{ }^{\circ}\text{C}$		250	
Maximum junction capacitance	C_T	$V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^{\circ}\text{C}$	2000		pF
Typical series inductance	L_S	Measured from top of terminal to mounting plane	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 temperature range	T _J		-65 to +150	°C
Maximum storage temperature range	T _{Stg}		-65 to +175	
Maximum thermal resistance, junction to case per leg	R _{thJC}	DC operation	1.2	°C/W
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	Non-lubricated threads	6 (5)	kgf · cm (lbf · in)
	maximum		12 (10)	
Marking device		Case style TO-220AB 3L	60CTQ035	
			60CTQ040	
			60CTQ045	

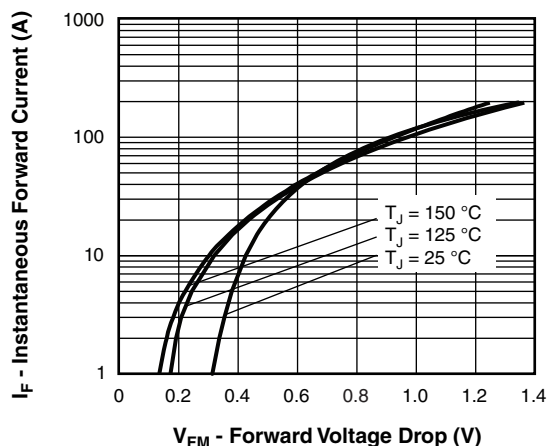


Fig. 1 - Maximum Forward Voltage Drop Characteristics

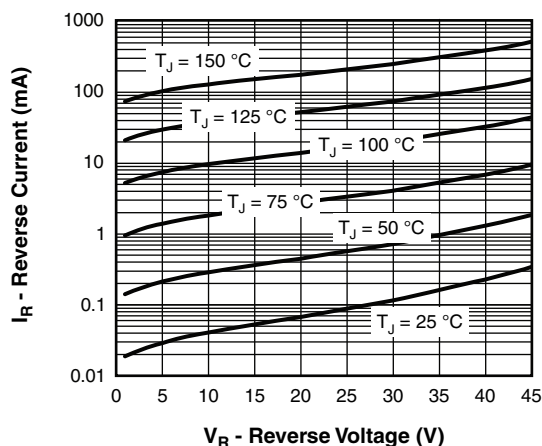


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

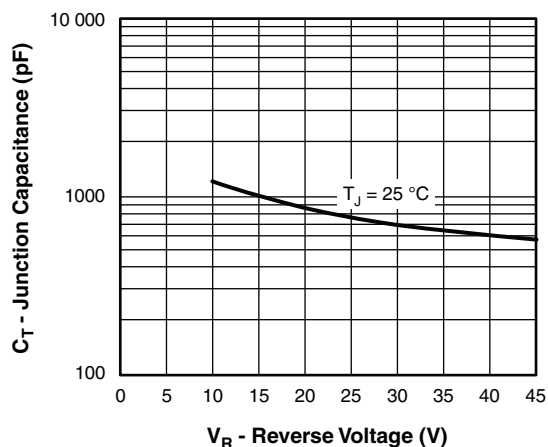
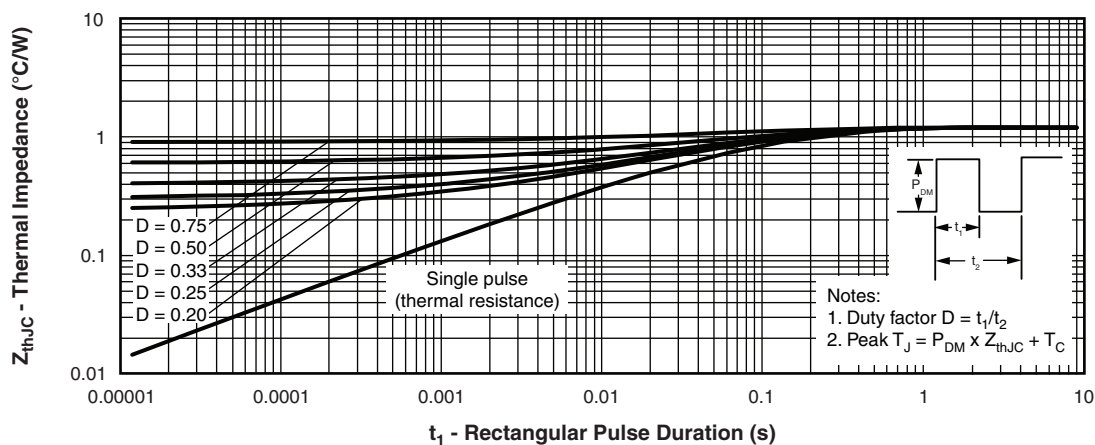


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


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

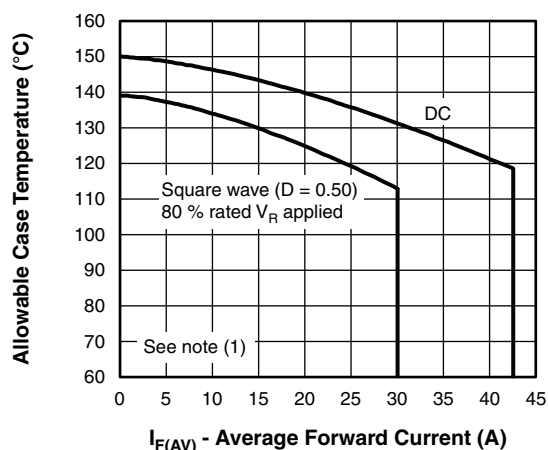


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

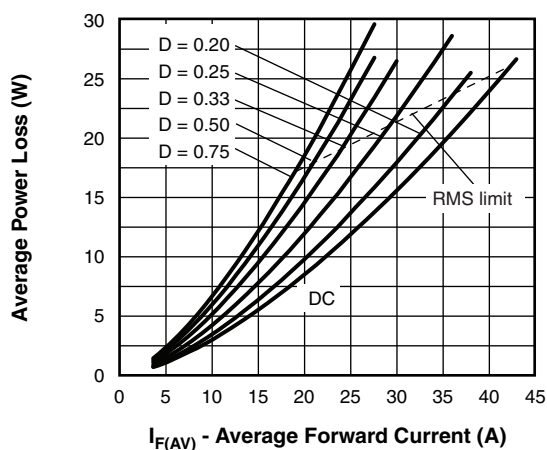


Fig. 6 - Forward Power Loss Characteristics

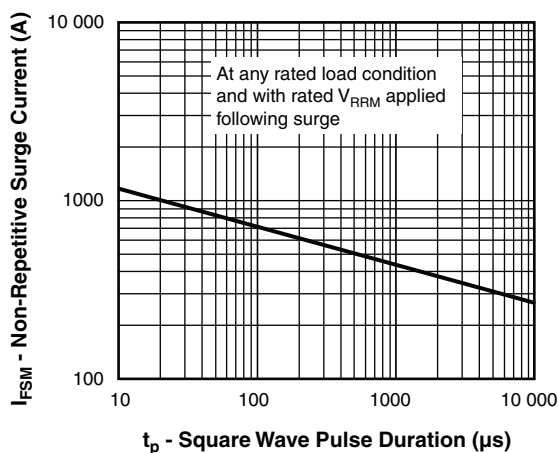


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

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 $V_{R1} = 80\%$ rated V_R



ORDERING INFORMATION TABLE

Device code	VS-	60	C	T	Q	045	-M3
	1	2	3	4	5	6	7
1	-	Vishay Semiconductors product					
2	-	Current rating (60 = 60 A)					
3	-	Circuit configuration					
		C = common cathode					
4	-	Package					
		T = TO-220					
5	-	Schottky "Q" series					
6	-	Voltage ratings					
7	-	Environmental digit					
						035 = 35 V 040 = 40 V 045 = 45 V	
							-M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

ORDERING INFORMATION (Example)		
PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION
VS-60CTQ035-M3	50	Antistatic plastic tubes
VS-60CTQ040-M3	50	Antistatic plastic tubes
VS-60CTQ045-M3	50	Antistatic plastic tubes

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



TO-220AB 3L

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	
D2	11.68	13.30	0.460	0.524	6, 7
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
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



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