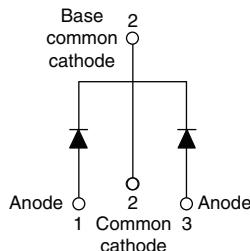


## High Performance Schottky Rectifier, 2 x 30 A



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

### 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](http://www.vishay.com/doc?99912)



RoHS  
COMPLIANT  
HALOGEN  
FREE

### 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
$I_{FSM}$	$t_p = 5$ µs sine	1500	
$V_F$	30 A <sub>pk</sub> , $T_J = 125$ °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	$I_{F(AV)}$	50 % duty cycle at $T_C = 113$ °C, rectangular waveform		30	A	
per device				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 µs sine or 3 µs rect. pulse	Following any rated load condition and with rated $V_{RRM}$ applied	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 µs 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	$T_J = 25 \text{ } ^\circ\text{C}$	0.51	0.56	V	
		60 A		0.66	0.72		
		30 A	$T_J = 125 \text{ } ^\circ\text{C}$	0.48	0.53		
		60 A		0.68	0.75		
Maximum instantaneous reverse current	$I_{RM}$	$T_J = 25 \text{ } ^\circ\text{C}$	Rated DC voltage	0.33	2	mA	
		$T_J = 125 \text{ } ^\circ\text{C}$		145	250		
Maximum junction capacitance	$C_T$	$V_R = 5 \text{ V}_\text{DC}$ (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/ $\mu$ s	

**Note**

<sup>(1)</sup> Pulse width < 300  $\mu$ s, duty cycle < 2 %

**THERMAL - MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS	
Maximum junction temperature range	$T_J$		-65 to +150	$^\circ\text{C}$	
Maximum storage temperature range	$T_{Stg}$		-65 to +175		
Maximum thermal resistance, junction to case per leg	$R_{thJC}$	DC operation	1.2	$^\circ\text{C}/\text{W}$	
Typical thermal resistance, case to heatsink	$R_{thCS}$		0.50		
Approximate weight			2	g	
			0.07	oz.	
Mounting torque	minimum maximum	Non-lubricated threads	6 (5)	kgf · cm (lbf · in)	
			12 (10)		
Marking device		Case style TO-220AB 3L	60CTQ035		
			60CTQ040		
			60CTQ045		

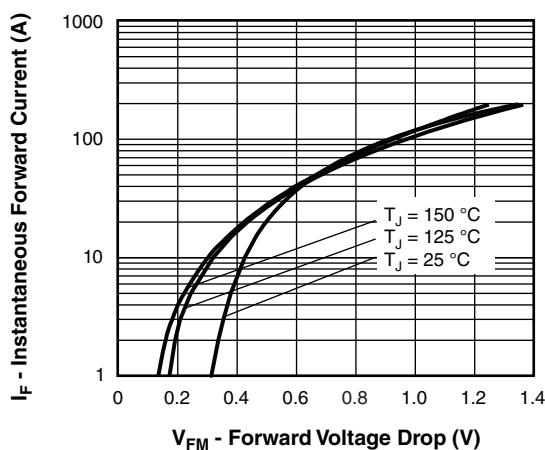


Fig. 1 - Maximum Forward Voltage Drop Characteristics

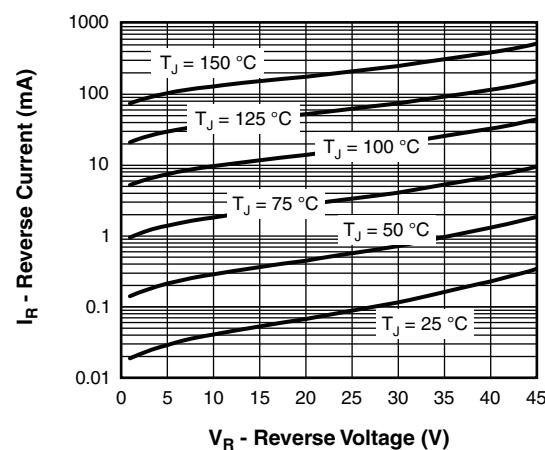


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

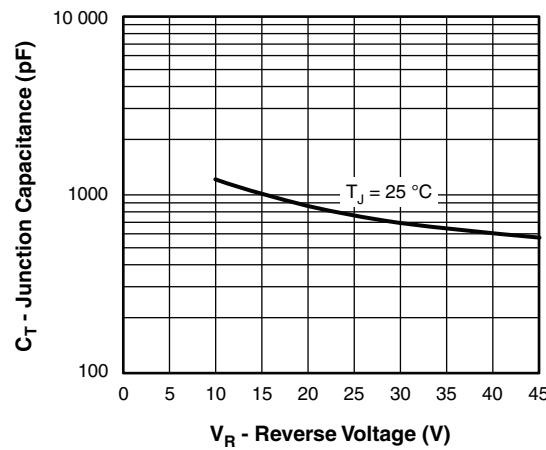


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

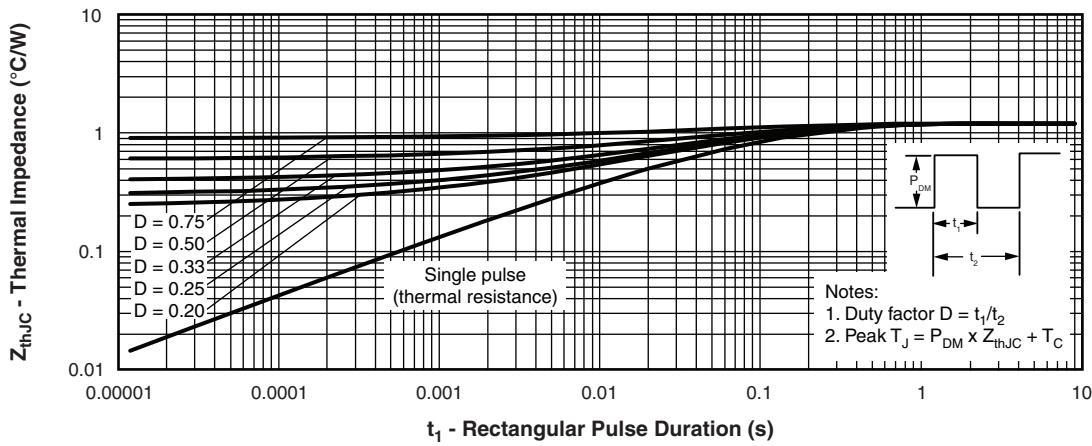


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

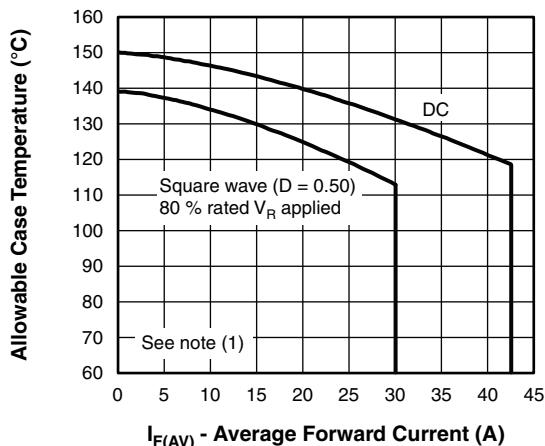


Fig. 5 - Maximum Allowable Case Temperature vs.  
Average Forward Current

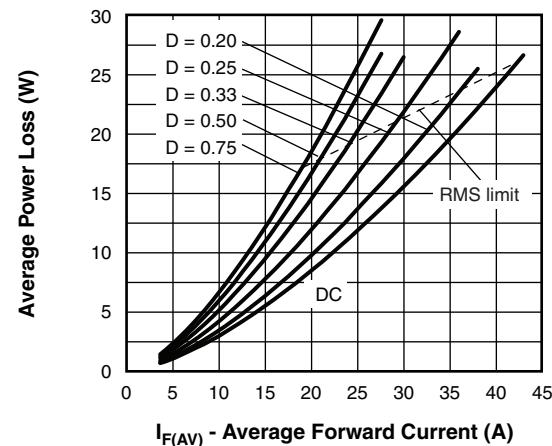


Fig. 6 - Forward Power Loss Characteristics

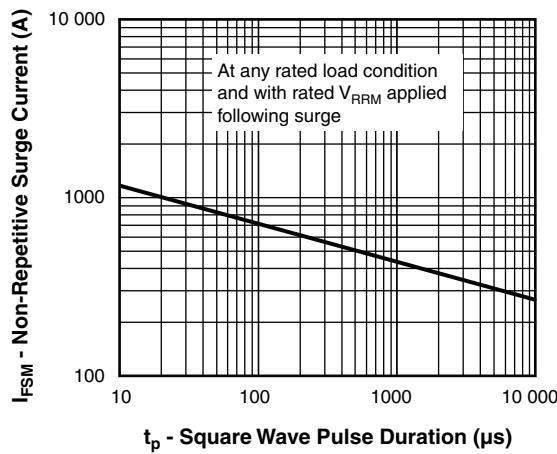


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

#### Note

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

**ORDERING INFORMATION TABLE**

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

**ORDERING INFORMATION (Example)**

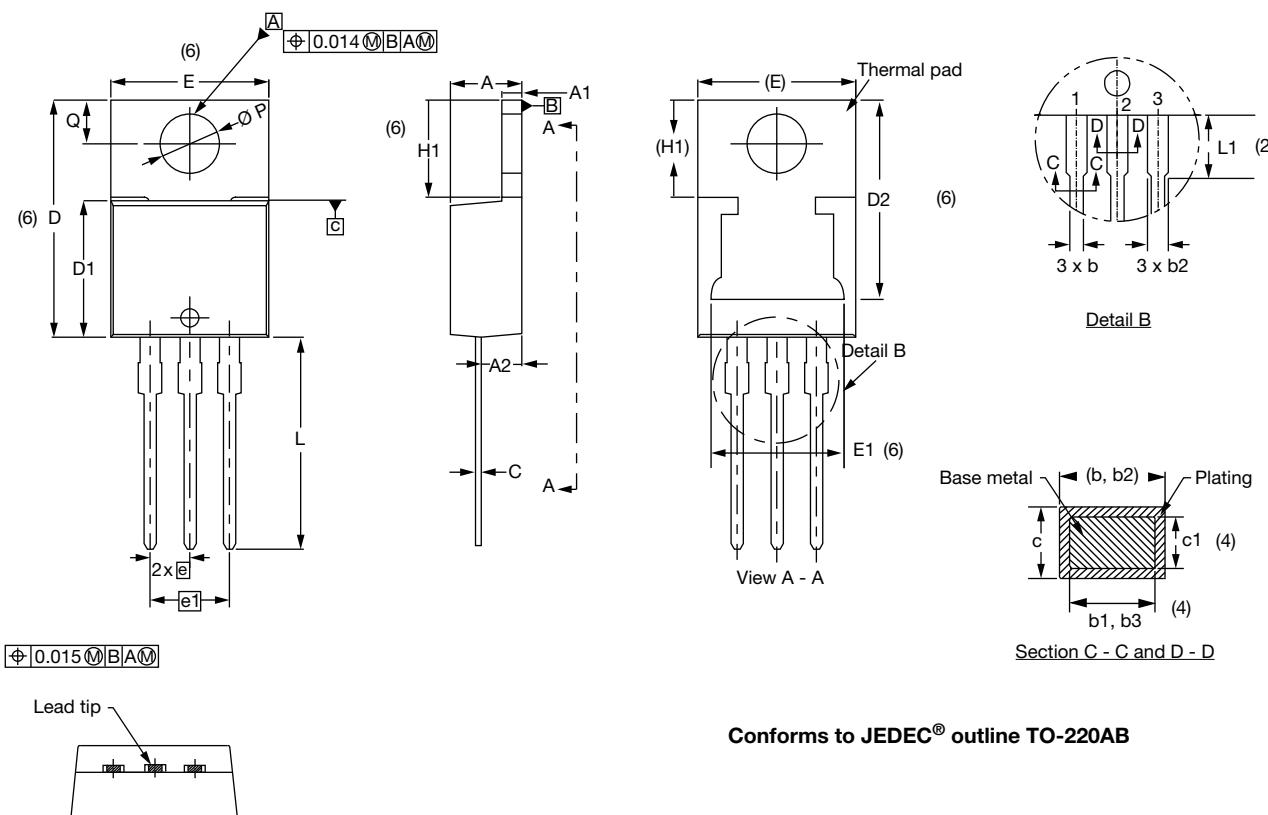
PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION
VS-60CTQ035-M3	50	Antistatic plastic tubes
VS-60CTQ040-M3	50	Antistatic plastic tubes
VS-60CTQ045-M3	50	Antistatic plastic tubes

**LINKS TO RELATED DOCUMENTS**

Dimensions	<a href="http://www.vishay.com/doc?96154">www.vishay.com/doc?96154</a>
Part marking information	<a href="http://www.vishay.com/doc?95028">www.vishay.com/doc?95028</a>

## TO-220AB 3L

**DIMENSIONS** in millimeters and inches



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		Ø 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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