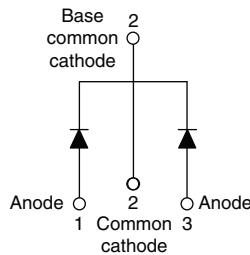


## Schottky Rectifier, 2 x 30 A



TO-220AB



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
Available

### FEATURES

- 175 °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
- 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)

### 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 175 °C junction temperature. Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection.

PRODUCT SUMMARY	
Package	TO-220AB
$I_{F(AV)}$	2 x 30 A
$V_R$	35 V, 40 V, 45 V
$V_F$ at $I_F$	0.57 V
$I_{RM}$ max.	40 mA at 125 °C
$T_J$ max.	175 °C
Diode variation	Common cathode
$E_{AS}$	27 mJ

MAJOR RATINGS AND CHARACTERISTICS				
SYMBOL	CHARACTERISTICS		VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform (per device)		60	A
$V_{RRM}$			35 to 45	V
$I_{FRM}$	$T_C = 142$ °C (per leg)		60	A
$I_{FSM}$	$t_p = 5$ µs sine		2600	
$V_F$	30 A <sub>pk</sub> , $T_J = 125$ °C		0.57	V
$T_J$	Range		- 65 to 175	°C

VOLTAGE RATINGS								
PARAMETER	SYMBOL	VS-61CTQ035PbF	VS-61CTQ035-N3	VS-61CTQ040PbF	VS-61CTQ040-N3	VS-61CTQ045PbF	VS-61CTQ045-N3	UNITS
Maximum DC reverse voltage	$V_R$							
Maximum working peak reverse voltage	$V_{RWM}$	35	35	40	40	45	45	V

ABSOLUTE MAXIMUM RATINGS							
PARAMETER	SYMBOL	TEST CONDITIONS			VALUES	UNITS	
Maximum average forward current per leg	$I_{F(AV)}$	$T_C = 142$ °C, rated $V_R$			30	A	
Maximum average forward current per device					60		
Peak repetitive forward current per leg	$I_{FRM}$	Rated $V_R$ , square wave, 20 kHz, $T_C = 142$ °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	2600		
			10 ms sine or 6 ms rect. pulse		350		
Non-repetitive avalanche energy per leg	$E_{AS}$	$T_J = 25$ °C, $I_{AS} = 4$ A, $L = 3.4$ mH			27	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			4	A	

**ELECTRICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS		TYP.	MAX.	UNITS	
Maximum forward voltage drop	$V_{FM}^{(1)}$	30 A	$T_J = 25 \text{ }^\circ\text{C}$	0.57	0.61	V	
		60 A		0.72	0.76		
		30 A	$T_J = 125 \text{ }^\circ\text{C}$	0.53	0.57		
		60 A		0.70	0.74		
Maximum instantaneous reverse current	$I_{RM}$	$T_J = 25 \text{ }^\circ\text{C}$	Rated DC voltage	0.06	1	mA	
		$T_J = 125 \text{ }^\circ\text{C}$		21	40		
Maximum junction capacitance	$C_T$	$V_R = 5 \text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz) $25 \text{ }^\circ\text{C}$		1900		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 and storage temperature range	$T_J, T_{Stg}$		- 65 to 175	$^\circ\text{C}$	
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	$R_{thCS}$	Mounting surface, smooth and greased	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	61CTQ035		
			61CTQ040		
			61CTQ045		

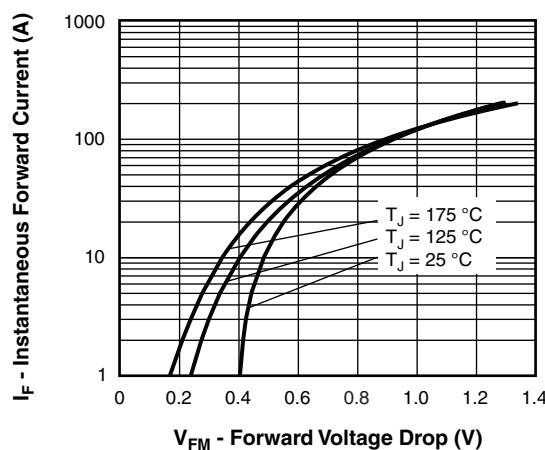


Fig. 1 - Maximum Forward Voltage Drop Characteristics

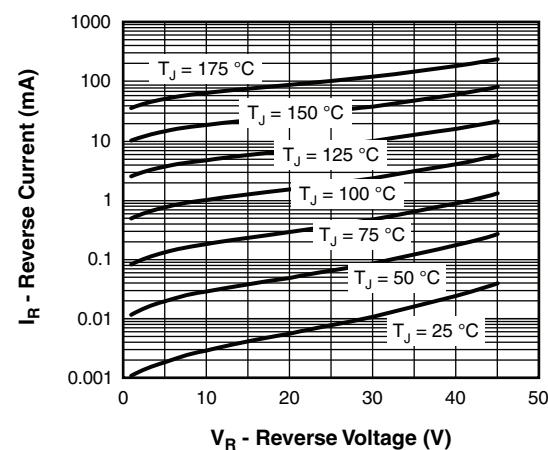


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

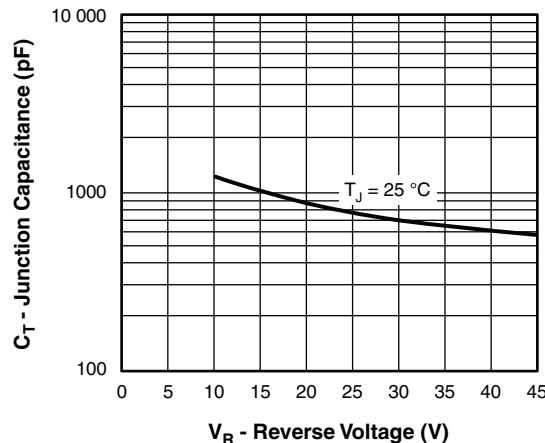


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

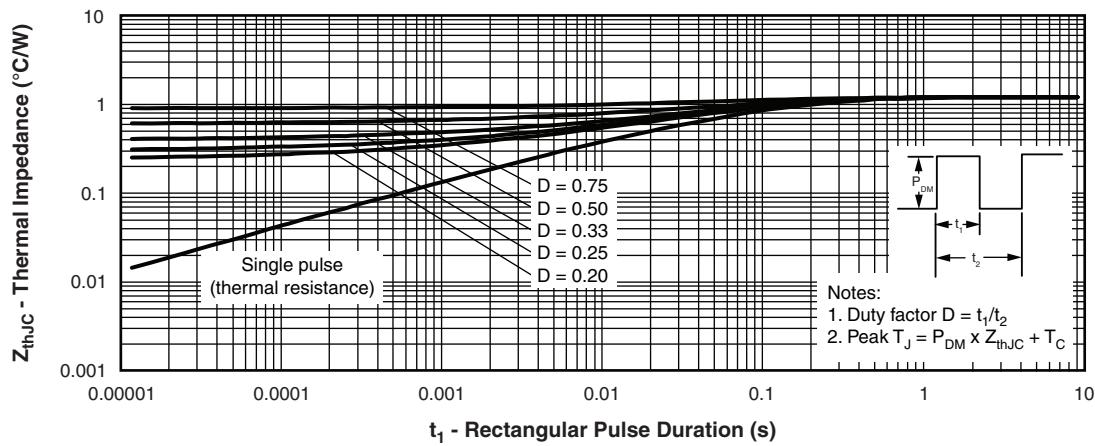


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

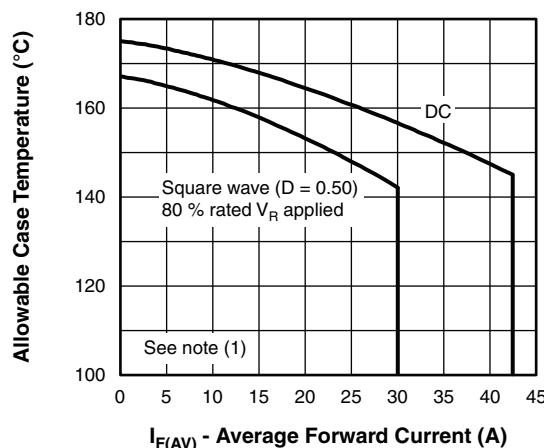


Fig. 5 - Maximum Allowable Case Temperature vs.  
Average Forward Current

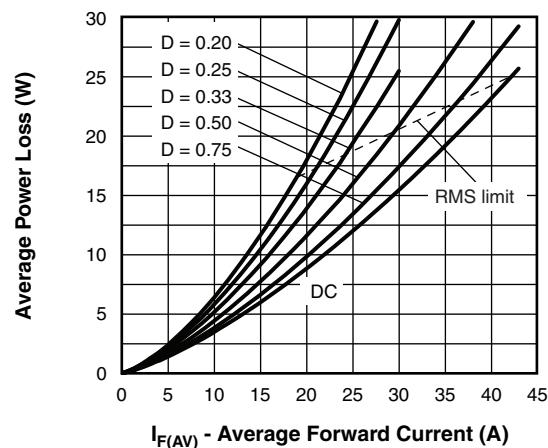


Fig. 6 - Forward Power Loss Characteristics

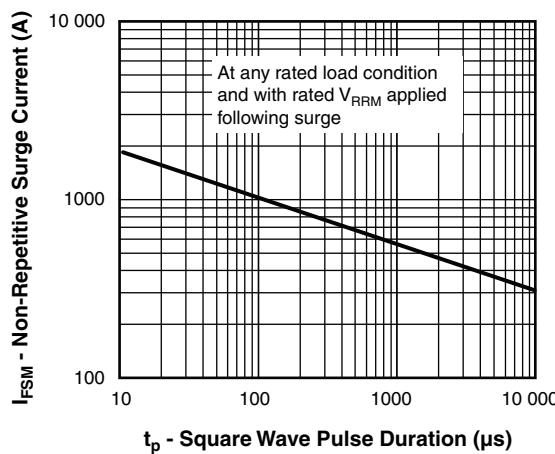


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

#### Note

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

**ORDERING INFORMATION TABLE**

Device code	VS-	61	C	T	Q	045	PbF
	1	2	3	4	5	6	7

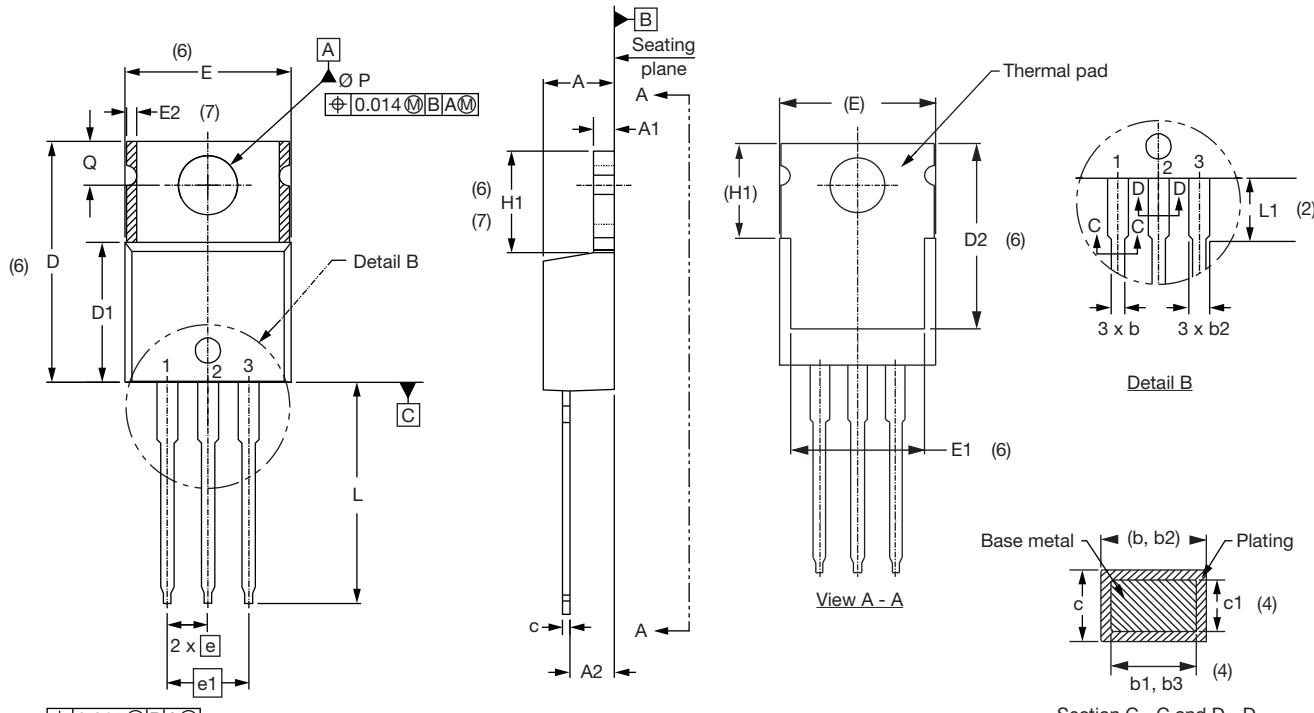
- 1** - Vishay Semiconductors product
- 2** - Current rating (60 = 60 A)
- 3** - Circuit configuration  
C = Common cathode
- 4** - Package  
T = TO-220
- 5** - Schottky "Q" series
- 6** - Voltage ratings
  - 035 = 35 V
  - 040 = 40 V
  - 045 = 45 V
- 7** - Environmental digit
  - PbF = Lead (Pb)-free and RoHS compliant
  - -N3 = Halogen-free, RoHS compliant, and totally lead (Pb)-free

<b>ORDERING INFORMATION</b> (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-61CTQ035PbF	50	1000	Antistatic plastic tube
VS-61CTQ035-N3	50	1000	Antistatic plastic tube
VS-61CTQ040PbF	50	1000	Antistatic plastic tube
VS-61CTQ040-N3	50	1000	Antistatic plastic tube
VS-61CTQ045PbF	50	1000	Antistatic plastic tube
VS-61CTQ045-N3	50	1000	Antistatic plastic tube

<b>LINKS TO RELATED DOCUMENTS</b>	
Dimensions	<a href="http://www.vishay.com/doc?95222">www.vishay.com/doc?95222</a>
Part marking information	<a href="http://www.vishay.com/doc?95225">www.vishay.com/doc?95225</a>
	<a href="http://www.vishay.com/doc?95028">www.vishay.com/doc?95028</a>

### TO-220AB

#### DIMENSIONS in millimeters and inches

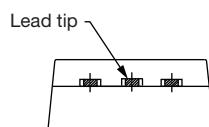


#### Lead assignments

##### 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

#### 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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