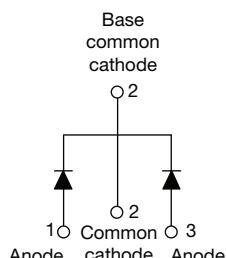


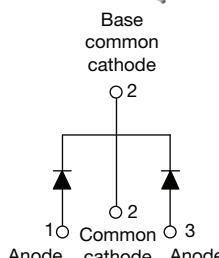
Schottky Rectifier, 2 x 15 A

VS-30CTQ...SPbF



D²PAK

VS-30CTQ...-1PbF



TO-262

FEATURES

- 150 °C T_J operation
- Center tap configuration
- Very 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
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Halogen-free according to IEC 61249-2-21 definition
- Compliant to RoHS directive 2002/95/EC
- AEC-Q101 qualified



RoHS
COMPLIANT
HALOGEN
FREE

DESCRIPTION

This center tap Schottky rectifier has been optimized for very low forward voltage drop, with moderate leakage. 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.

PRODUCT SUMMARY

I _{F(AV)}	2 x 15 A
V _R	50 V/60 V

MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
I _{F(AV)}	Rectangular waveform	30	A
V _{RRM}		50/60	V
I _{FSM}	t _p = 5 µs sine	1000	A
V _F	15 Apk, T _J = 125 °C (per leg)	0.56	V
T _J	Range	- 55 to 150	°C

VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-30CTQ050SPbF VS-30CTQ050-1PbF	VS-30CTQ060SPbF VS-30CTQ060-1PbF	UNITS
Maximum DC reverse voltage	V _R			
Maximum working peak reverse voltage	V _{RWM}	50	60	V

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current per device See fig. 5	I _{F(AV)}	50 % duty cycle at T _C = 105 °C, rectangular waveform	30	A
per leg			15	
Maximum peak one cycle non-repetitive surge current per leg See fig. 7	I _{FSM}	5 µs sine or 3 µs rect. pulse	1000	
		10 ms sine or 6 ms rect. pulse	260	
Non-repetitive avalanche energy per leg	E _{AS}	T _J = 25 °C, I _{AS} = 1.50 A, L = 11.5 mH	13	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 x V _R typical	1.50	A

VS-30CTQ...SPbF, VS-30CTQ...-1PbF Series

Vishay High Power Products

Schottky Rectifier,
2 x 15 A



ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum forward voltage drop per leg See fig. 1	$V_{FM}^{(1)}$	15 A	$T_J = 25 \text{ } ^\circ\text{C}$	0.62	V	
		30 A		0.82		
		15 A	$T_J = 125 \text{ } ^\circ\text{C}$	0.56		
		30 A		0.71		
Maximum reverse leakage current per leg See fig. 2	$I_{RM}^{(1)}$	$T_J = 25 \text{ } ^\circ\text{C}$	$V_R = \text{Rated } V_R$	0.80	mA	
		$T_J = 125 \text{ } ^\circ\text{C}$		45		
Threshold voltage	$V_{F(TO)}$	$T_J = T_J \text{ maximum}$		0.39	V	
Forward slope resistance	r_t			8.47	$\text{m}\Omega$	
Maximum junction capacitance per leg	C_T	$V_R = 5 \text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz), $25 \text{ } ^\circ\text{C}$		720	pF	
Typical series inductance per leg	L_S	Measured lead to lead 5 mm from package body		8.0	nH	
Maximum voltage rate of change	dV/dt	Rated V_R		10 000	$\text{V}/\mu\text{s}$	

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		3.25	$^\circ\text{C}/\text{W}$	
				1.63		
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)	$\text{k}\text{gf} \cdot \text{cm}$ (lbf · in)	
	maximum			12 (10)		
Marking device		Case style D ² PAK		30CTQ060S		
		Case style TO-262		30CTQ060-1		

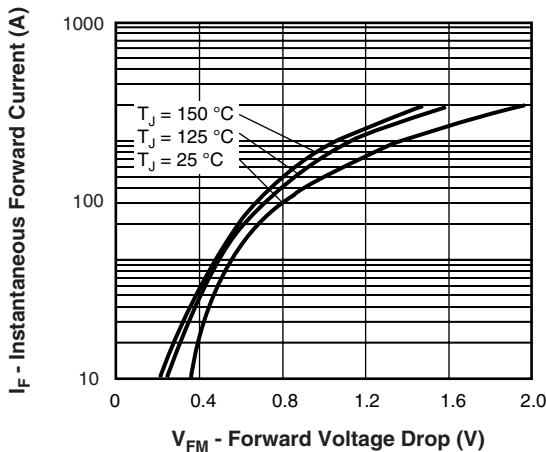


Fig. 1 - Maximum Forward Voltage Drop Characteristics
(Per Leg)

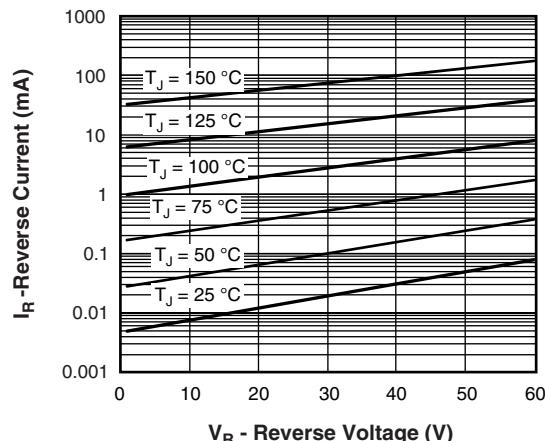


Fig. 2 - Typical Values of Reverse Current vs.
Reverse Voltage (Per Leg)

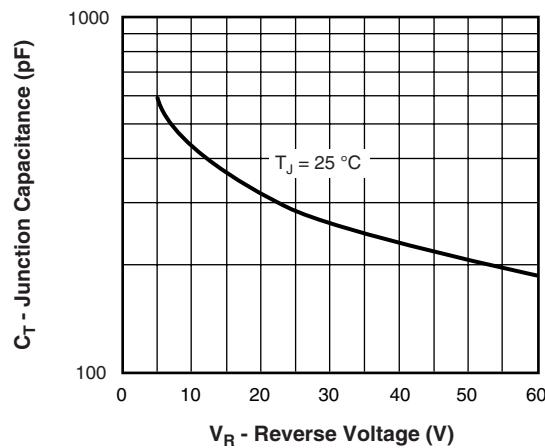


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

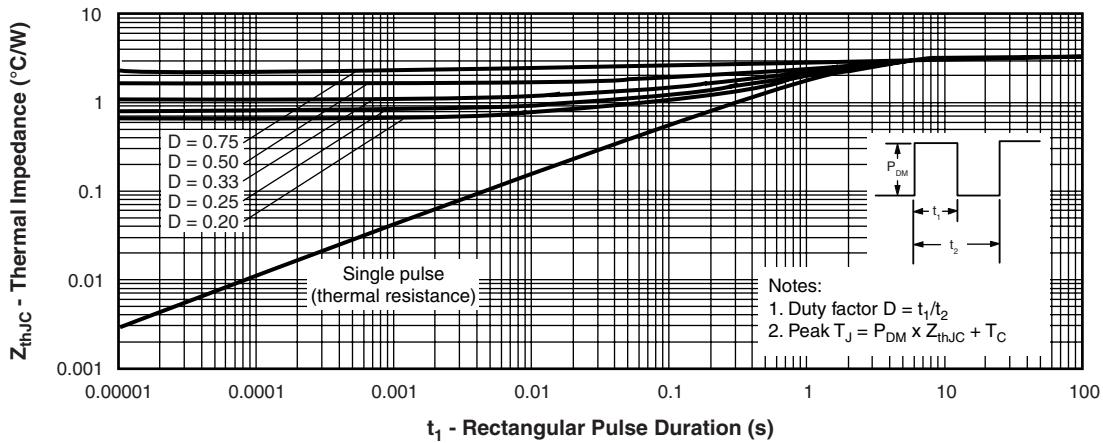


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

VS-30CTQ...SPbF, VS-30CTQ...-1PbF Series



Vishay High Power Products

Schottky Rectifier,
2 x 15 A

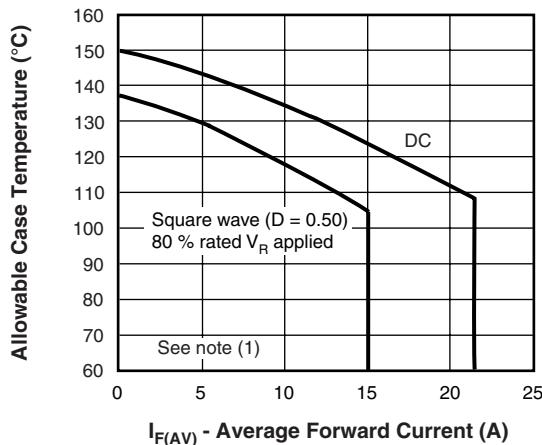


Fig. 5 - Maximum Allowable Case Temperature vs.
Average Forward Current (Per Leg)

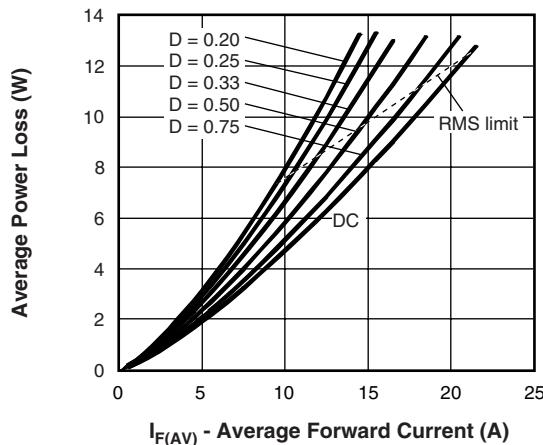


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

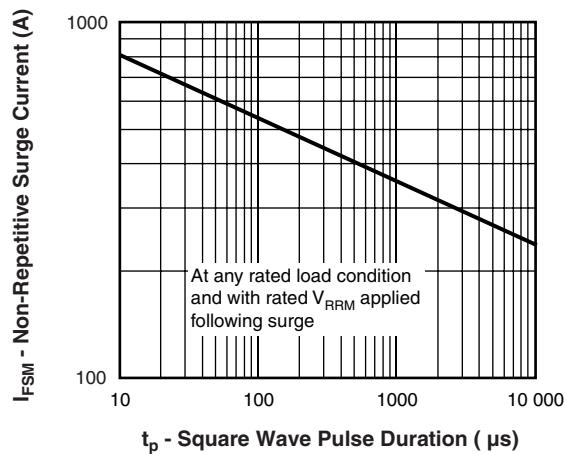


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

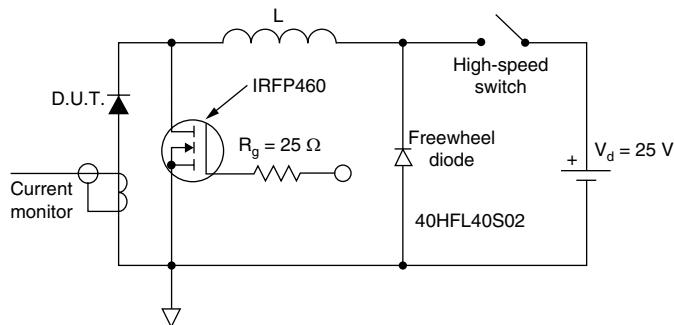


Fig. 8 - Unclamped Inductive Test Circuit

Note

(1) Formula used: $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$;
 $P_d = \text{Forward power loss} = I_{F(AV)} \times V_{FM} \text{ at } (I_{F(AV)}/D) \text{ (see fig. 6);}$
 $P_{dREV} = \text{Inverse power loss} = V_{R1} \times I_R (1 - D); I_R \text{ at } V_{R1} = 10 V$

ORDERING INFORMATION TABLE

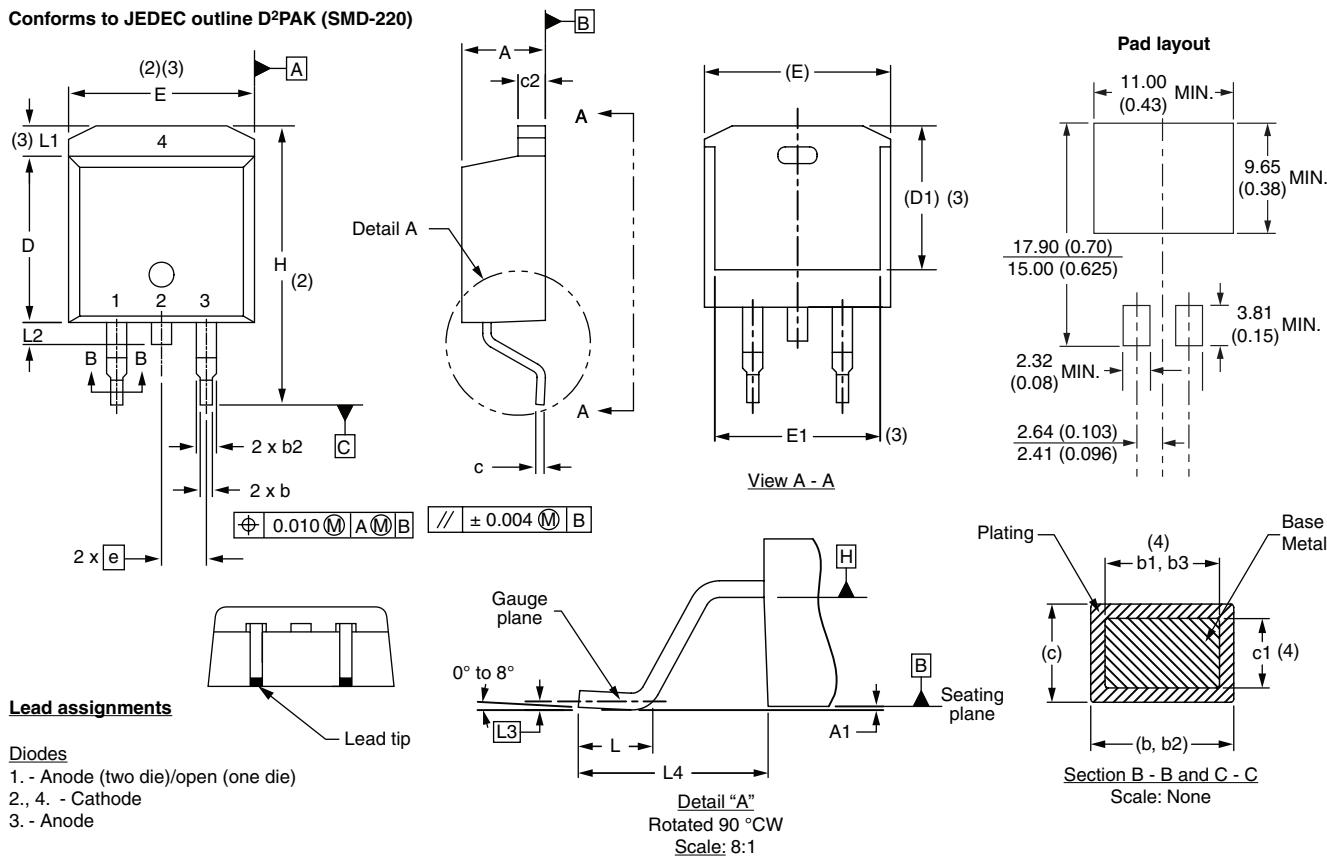
Device code	VS-	30	C	T	Q	060	S	TRL	PbF
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	- HPP product suffix								
2	- Current rating (30 A)								
3	- Circuit configuration: C = Common cathode								
4	- T = TO-220								
5	- Schottky "Q" series								
6	- Voltage ratings				050 = 50 V	060 = 60 V			
7	<ul style="list-style-type: none"> • S = D²PAK • -1 = TO-262 								
8	<ul style="list-style-type: none"> • None = Tube (50 pieces) • TRL = Tape and reel (left oriented - for D²PAK only) • TRR = Tape and reel (right oriented - for D²PAK only) 								
9	- PbF = Lead (Pb)-free								

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95014
Part marking information	www.vishay.com/doc?95008
Packaging information	www.vishay.com/doc?95032

D²PAK, TO-262

DIMENSIONS FOR D²PAK in millimeters and inches

Conforms to JEDEC outline D²PAK (SMD-220)



SYMBOL	MILLIMETERS		INCHES		NOTES		SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.				MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190			D1	6.86	8.00	0.270	0.315	3
A1	0.00	0.254	0.000	0.010			E	9.65	10.67	0.380	0.420	2, 3
b	0.51	0.99	0.020	0.039			E1	7.90	8.80	0.311	0.346	3
b1	0.51	0.89	0.020	0.035	4		e	2.54 BSC		0.100 BSC		
b2	1.14	1.78	0.045	0.070			H	14.61	15.88	0.575	0.625	
b3	1.14	1.73	0.045	0.068	4		L	1.78	2.79	0.070	0.110	
c	0.38	0.74	0.015	0.029			L1	-	1.65	-	0.066	3
c1	0.38	0.58	0.015	0.023	4		L2	1.27	1.78	0.050	0.070	
c2	1.14	1.65	0.045	0.065			L3	0.25 BSC		0.010 BSC		
D	8.51	9.65	0.335	0.380	2		L4	4.78	5.28	0.188	0.208	

Notes

- (1) Dimensioning and tolerancing per ASME Y14.5 M-1994
- (2) Dimension D 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 outmost extremes of the plastic body
- (3) Thermal pad contour optional within dimension E, L1, D1 and E1
- (4) Dimension b1 and c1 apply to base metal only
- (5) Datum A and B to be determined at datum plane H
- (6) Controlling dimension: inch

(7) Outline conforms to JEDEC outline TO-263AB

Outline Dimensions

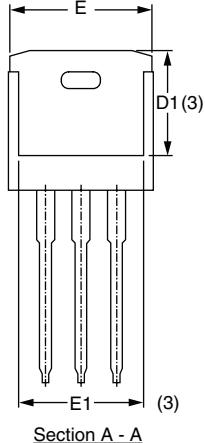
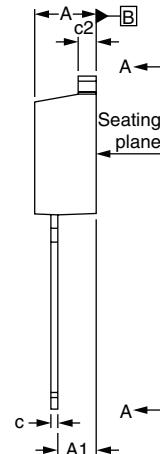
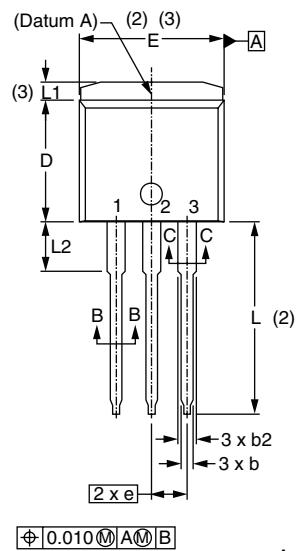
Vishay High Power Products

D²PAK, TO-262

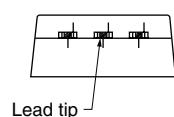


DIMENSIONS FOR TO-262 in millimeters and inches

Modified JEDEC outline TO-262



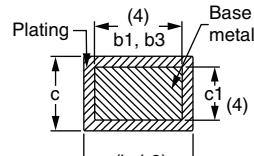
Section A - A



Lead assignments

Diodes

1. - Anode (two die)/open (one die)
- 2., 4. - Cathode
3. - Anode



Section B - B and C - C

Scale: None

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190	
A1	2.03	3.02	0.080	0.119	
b	0.51	0.99	0.020	0.039	
b1	0.51	0.89	0.020	0.035	4
b2	1.14	1.78	0.045	0.070	
b3	1.14	1.73	0.045	0.068	4
c	0.38	0.74	0.015	0.029	
c1	0.38	0.58	0.015	0.023	4
c2	1.14	1.65	0.045	0.065	
D	8.51	9.65	0.335	0.380	2
D1	6.86	8.00	0.270	0.315	3
E	9.65	10.67	0.380	0.420	2, 3
E1	7.90	8.80	0.311	0.346	3
e	2.54 BSC		0.100 BSC		
L	13.46	14.10	0.530	0.555	
L1	-	1.65	-	0.065	3
L2	3.56	3.71	0.140	0.146	

Notes

- (1) Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) Dimension D 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 outmost extremes of the plastic body
- (3) Thermal pad contour optional within dimension E, L1, D1 and E1
- (4) Dimension b1 and c1 apply to base metal only
- (5) Controlling dimension: inches

- (6) Outline conform to JEDEC TO-262 except A1 (maximum), b (minimum) and D1 (minimum) where dimensions derived the actual package outline

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