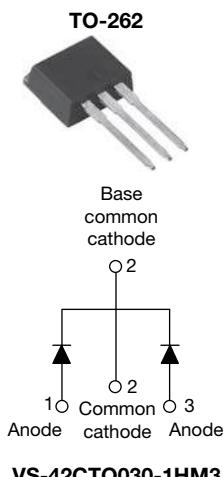
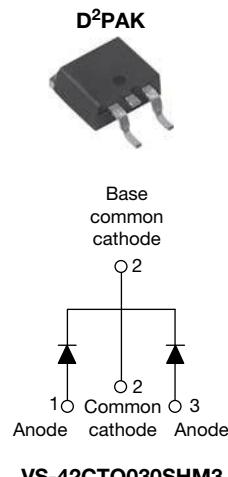


High Performance Schottky Rectifier, 2 x 20 A



FEATURES

- 150 °C T_J operation
- Center tap configuration
- Very low 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
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified meets JESD 201 class 1A whisker test
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

DESCRIPTION

This center tap Schottky rectifier module 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, freewheeling diodes, and reverse battery protection.

PRODUCT SUMMARY	
$I_{F(AV)}$	2 x 20 A
V_R	30 V
V_F at I_F	0.38 V
I_{RM}	183 mA at 125 °C
T_J max.	150 °C
E_{AS}	13 mJ
Package	TO-263AB (D ² PAK), TO-262AA
Diode variation	Common cathode

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	40	A
V_{RRM}		30	V
I_{FSM}	$t_p = 5 \mu s$ sine	1100	A
V_F	20 A _{pk} , $T_J = 125$ °C (per leg)	0.38	V
T_J	Range	-55 to 150	°C

VOLTAGE RATINGS			
PARAMETER	SYMBOL	VS-42CTQ030SHM3 VS-42CTQ030-1HM3	UNITS
Maximum DC reverse voltage	V_R	30	V
Maximum working peak reverse voltage	V_{RWM}		

ABSOLUTE MAXIMUM RATINGS						
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum average forward current per leg See fig. 5	$I_{F(AV)}$	50 % duty cycle at $T_J = 121$ °C, rectangular waveform		20	A	
per device				40		
Maximum peak one cycle non-repetitive surge current per leg See fig. 7	I_{FSM}	5 µs sine or 3 µs rect. pulse	Following any rated load condition and with rated V_{RRM} applied	1100		
		10 ms sine or 6 ms rect. pulse		360		
Non-repetitive avalanche energy per leg	E_{AS}	$T_J = 25$ °C, $I_{AS} = 3$ A, $L = 2.90$ mH		13	mJ	
Repetitive avalanche current per leg	I_{AR}	Current decaying linearly to zero in 1 µs Frequency limited by T_J maximum $V_A = 1.5 \times V_R$ typical		3	A	

ELECTRICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum forward voltage drop per leg See fig. 1	$V_{FM}^{(1)}$	20 A	$T_J = 25$ °C	0.48	V	
		40 A		0.57		
		20 A	$T_J = 125$ °C	0.38		
		40 A		0.51		
Maximum reverse leakage current per leg See fig. 2	$I_{RM}^{(1)}$	$T_J = 25$ °C	$V_R = \text{Rated } V_R$	3	mA	
		$T_J = 125$ °C		183		
Threshold Voltage	$V_{F(TO)}$	$T_J = T_J$ maximum		0.22	V	
Forward slope resistance	r_t			6.76	mΩ	
Maximum junction capacitance per leg	C_T	$V_R = 5$ V _{DC} (test signal range 100 kHz to 1 MHz), 25 °C		2840	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	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	°C	
Maximum thermal resistance, junction to case per leg	R_{thJC}	DC operation		2.0	°C/W	
				1.0		
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 D ² PAK		42CTQ030SH		
		Case style TO-262		42CTQ030-1H		

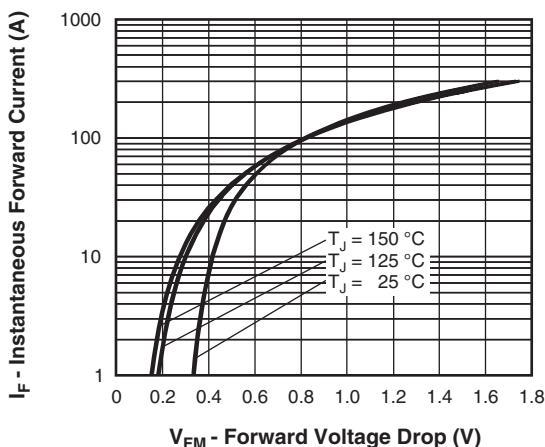


Fig. 1 - Maximum Forward Voltage Drop Characteristics
(Per Leg)

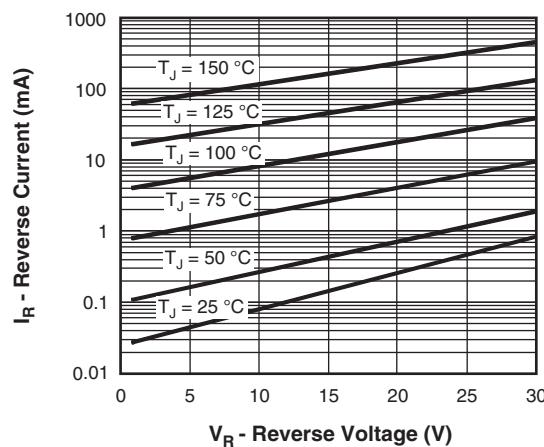


Fig. 2 - Typical Values of Reverse Current vs.
Reverse Voltage (Per Leg)

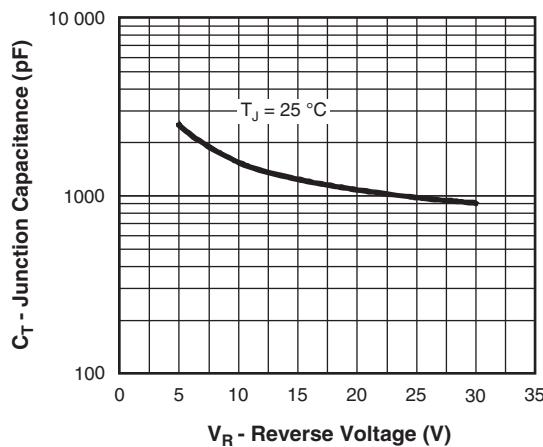


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

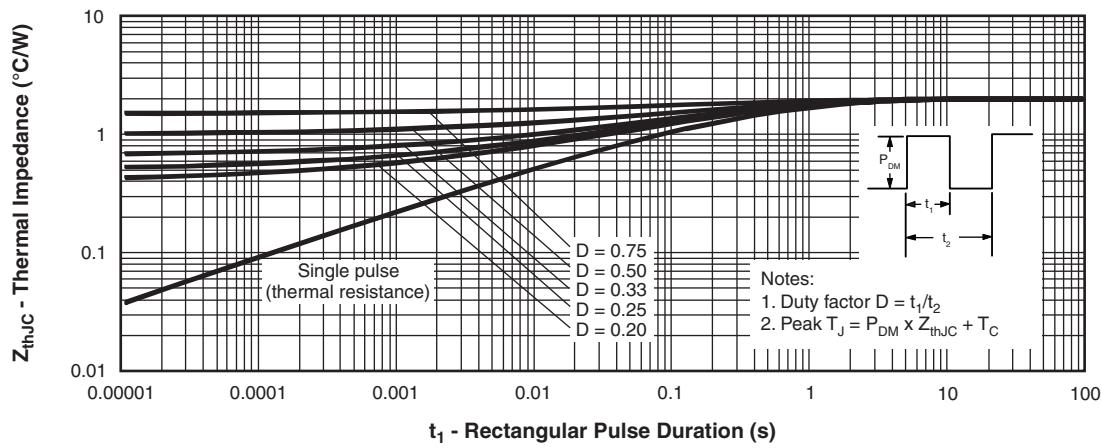


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

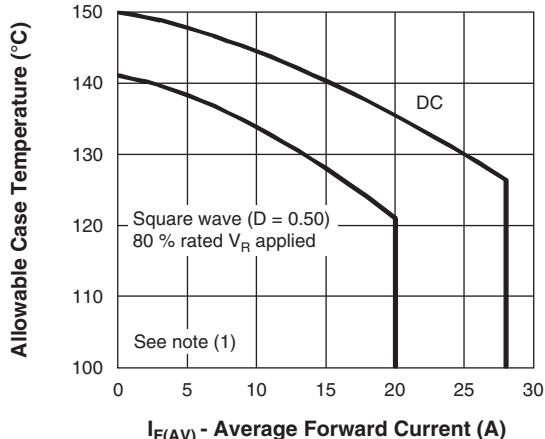


Fig. 5 - Maximum Allowable Case Temperature vs.
Average Forward Current (Per Leg)

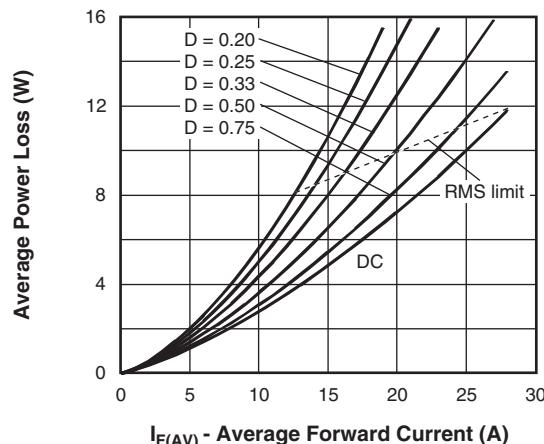


Fig. 6 - Forward Power Loss Characteristics
(Per Leg)

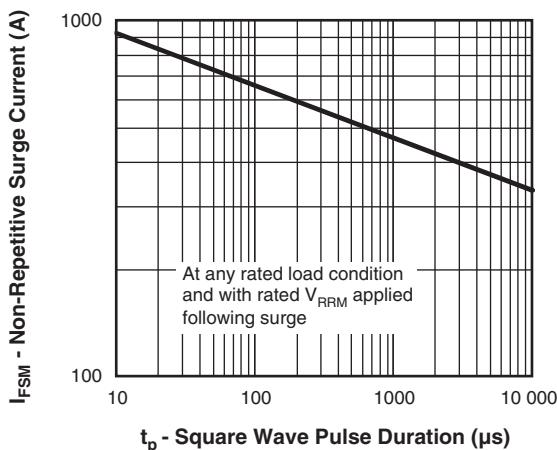


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

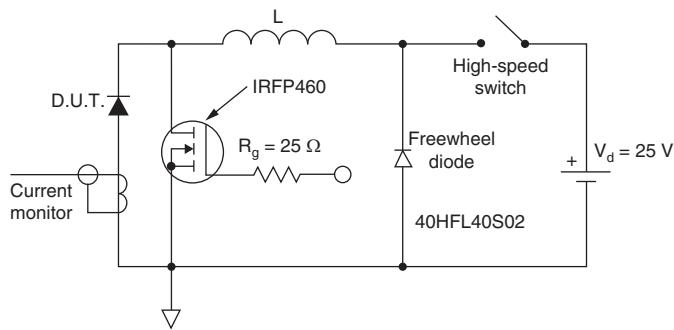


Fig. 8 - Unclamped Inductive Test Circuit

Note

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

ORDERING INFORMATION TABLE

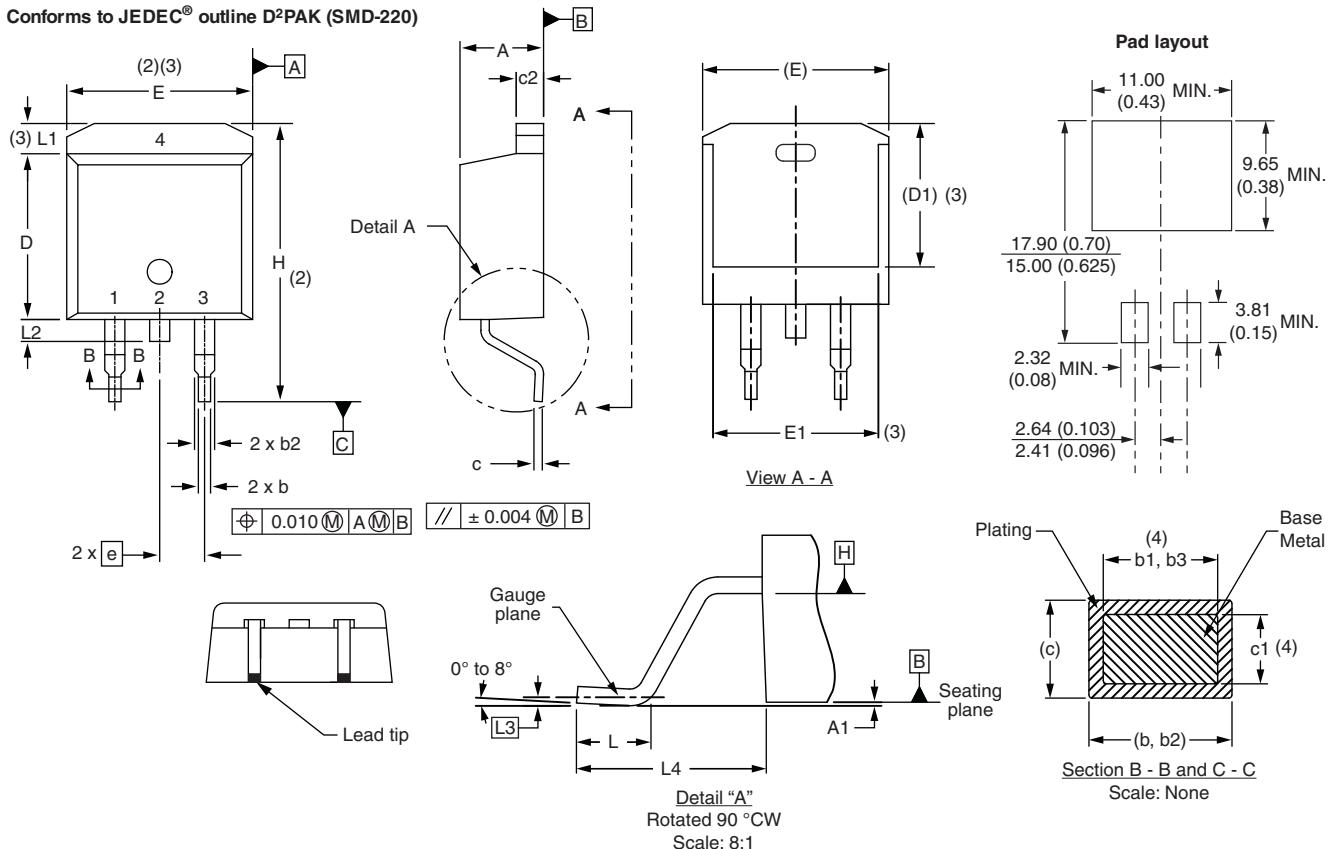
Device code	VS-	42	C	T	Q	030	S	TRL	H	M3
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	-	Vishay Semiconductors product								
2	-	Current rating (40 A)								
3	-	Circuit configuration: C = Common cathode								
4	-	T = TO-220								
5	-	Schottky "Q" series								
6	-	Voltage rating (030 = 30 V)								
7	-	<ul style="list-style-type: none"> • S = D²PAK • -1 = TO-262 								
8	-	<ul style="list-style-type: none"> • None = Tube • TRL = Tape and reel (left oriented - for D²PAK only) • TRR = Tape and reel (right oriented - for D²PAK only) 								
9	-	H = AEC-Q101 qualified								
10	-	M3 = Halogen-free, RoHS-compliant and termination lead (Pb)-free								

ORDERING INFORMATION			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-42CTQ030SHM3	50	1000	Antistatic plastic tubes
VS-42CTQ030STRRRHM3	800	800	13" diameter reel
VS-42CTQ030STRLHM3	800	800	13" diameter reel
VS-42CTQ030-1HM3	50	1000	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS		
Dimensions	TO-263AB (D ² PAK)	www.vishay.com/doc?95046
	TO-262AA	www.vishay.com/doc?95419
Part marking information	TO-263AB (D ² PAK)	www.vishay.com/doc?95444
	TO-262AA	www.vishay.com/doc?95443
Packaging information		www.vishay.com/doc?95032

D²PAK

DIMENSIONS 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	

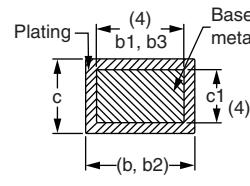
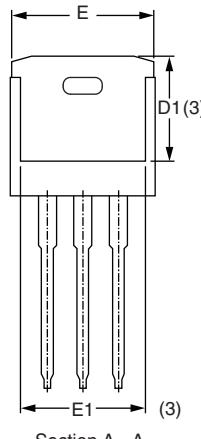
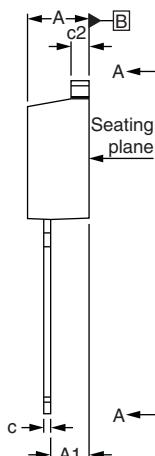
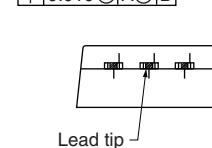
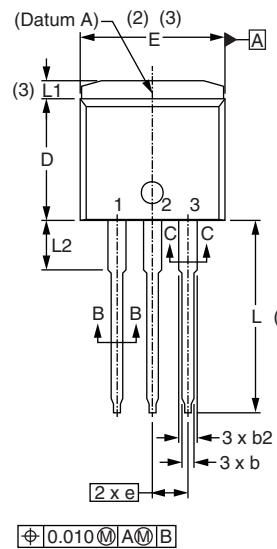
Notes

- (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

TO-262

DIMENSIONS in millimeters and inches

Modified JEDEC® outline TO-262



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	3.36	3.71	0.132	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), D1 (minimum) and L2 where dimensions derived from the actual package outline

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