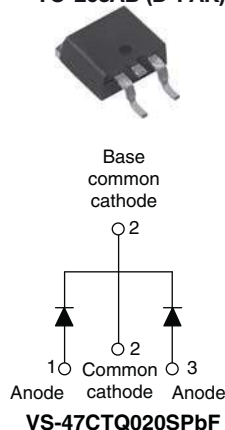
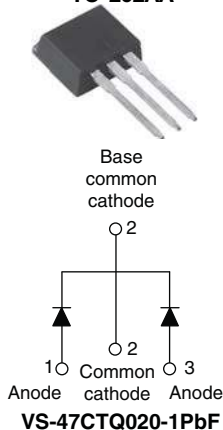




THE DATASHEET OF VS-47CTQ020STRRPBF

High Performance Schottky Rectifier, 2 x 20 A

TO-263AB (D²PAK)

TO-262AA


FEATURES

- 150 °C T_J operation
- Center tap configuration
- Optimized for 3.3 V application
- Ultralow 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
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

PRODUCT SUMMARY

I _{F(AV)}	2 x 20 A
V _R	20 V
V _F at I _F	0.34 V
I _{RM} max.	310 mA at 125 °C
T _J max.	150 °C
E _{AS}	18
Package	TO-263AB (D ² PAK), TO-262AA
Diode variation	Common cathode

DESCRIPTION

This center tap Schottky rectifier module has been optimized for ultralow forward voltage drop specifically for 3.3 V output power supplies. The proprietary barrier technology allows for reliable operation up to 150 °C junction temperature. Typical applications are parallel switching power supplies, converters, reverse battery protection, and redundant power subsystems.

MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
I _{F(AV)}	Rectangular waveform	40	A
V _{RRM}		20	V
I _{FSM}	t _p = 5 μs sine	1000	A
V _F	20 A _{pk} , T _J = 125 °C	0.34	V
T _J		-55 to +150	°C

VOLTAGE RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VS-47CTQ020SPbF VS-47CTQ020-1PbF	UNITS
Maximum DC reverse voltage	V _R	125 °C	20	V
		150 °C	10	

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	I _{F(AV)}	50 % duty cycle at T _C = 135 °C, rectangular waveform	20	A
			40	
Maximum peak one cycle non-repetitive surge current per leg	I _{FSM}	5 μs sine or 3 μs rect. pulse	1000	
		10 ms sine or 6 ms rect. pulse	250	
Non-repetitive avalanche energy per leg	E _{AS}	T _J = 25 °C, I _{AS} = 3 A, L = 3 mH	18	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	3	A



ELECTRICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum forward voltage drop per leg	$V_{\text{FM}}^{(1)}$	20 A	$T_{\text{J}} = 25\text{ }^{\circ}\text{C}$	0.45	V	
		40 A		0.51		
		20 A	$T_{\text{J}} = 125\text{ }^{\circ}\text{C}$	0.34		
		40 A		0.44		
		20 A	$T_{\text{J}} = 150\text{ }^{\circ}\text{C}$	0.31		
		40 A		0.42		
Maximum reverse leakage current per leg	$I_{\text{RM}}^{(1)}$	$T_{\text{J}} = 125\text{ }^{\circ}\text{C}$	$V_{\text{R}} = 5\text{ V}$	60	mA	
			$V_{\text{R}} = 3.3\text{ V}$	45		
		$T_{\text{J}} = 150\text{ }^{\circ}\text{C}$	$V_{\text{R}} = 10\text{ V}$	306		
		$T_{\text{J}} = 25\text{ }^{\circ}\text{C}$	$V_{\text{R}} = \text{Rated } V_{\text{R}}$	3		
		$T_{\text{J}} = 125\text{ }^{\circ}\text{C}$		310		
Threshold voltage	$V_{\text{F(TO)}}$	$T_{\text{J}} = T_{\text{J}}$ maximum		0.188	V	
Forward slope resistance	r_{t}			5.9	mΩ	
Maximum junction capacitance per leg	C_{T}	$V_{\text{R}} = 5\text{ V}_{\text{DC}}$ (test signal range 100 kHz to 1 MHz), $25\text{ }^{\circ}\text{C}$		3000	pF	
Typical series inductance per leg	L_{S}	Measured lead to lead 5 mm from package body		5.5	nH	
Maximum voltage rate of change	dV/dt	Rated V_{R}		10 000	V/μs	

Note(1) Pulse width < 300 μ s, 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	1.5	°C/W
Maximum thermal resistance, junction to case per package			0.75	
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 TO-263AB (D ² PAK)	47CTQ020S	
		Case style TO-262AA	47CTQ020-1	

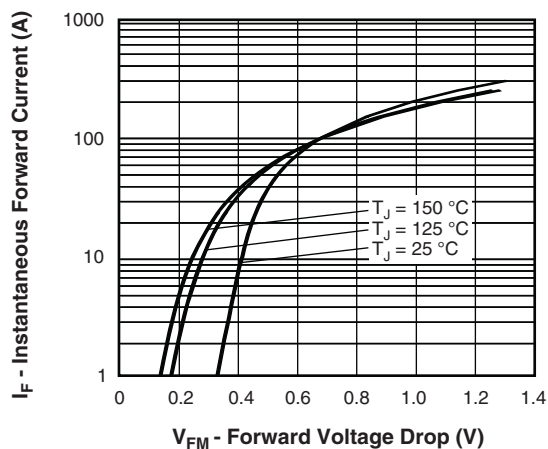


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

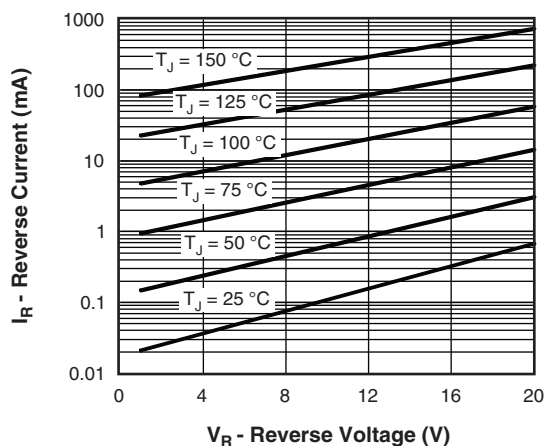


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

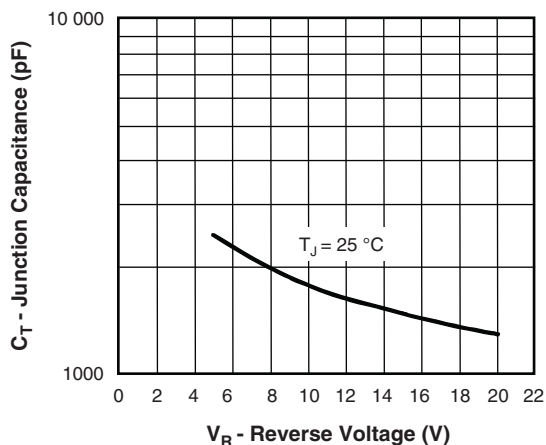


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

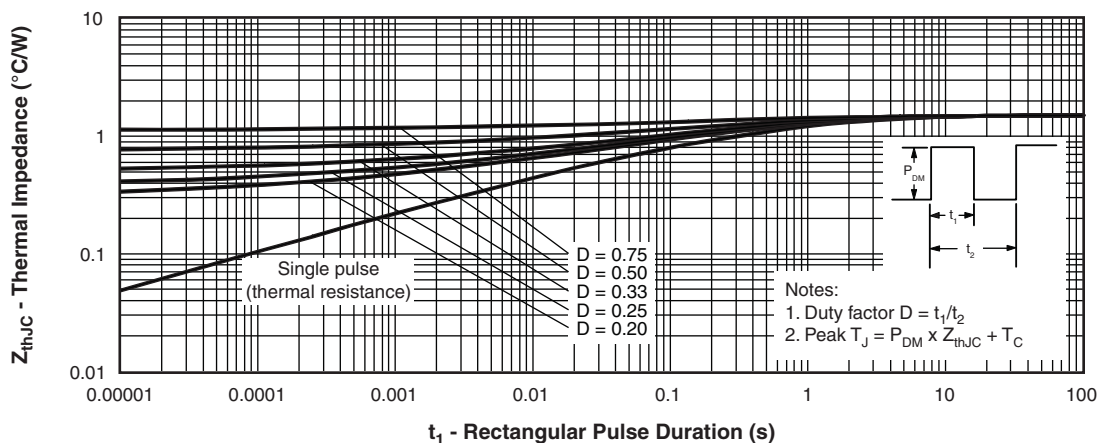


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

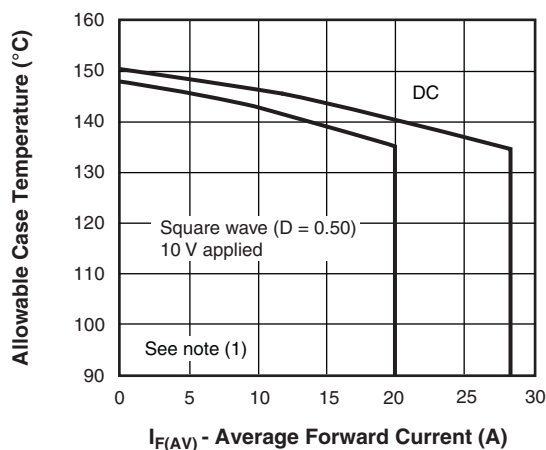


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

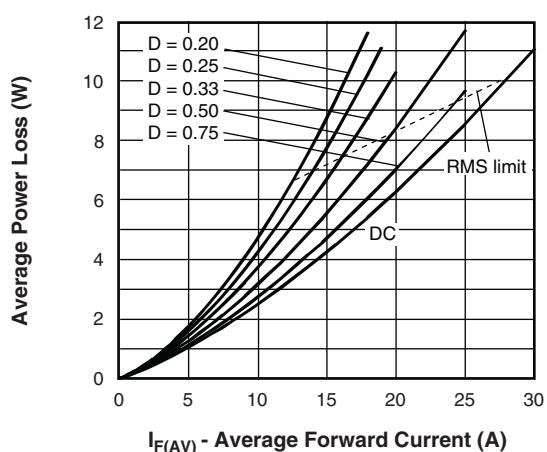


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

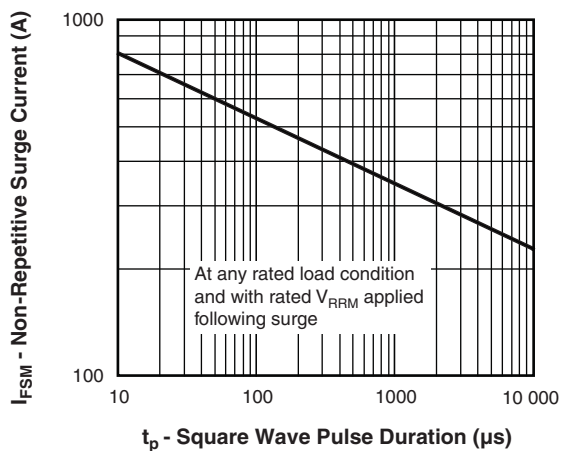


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

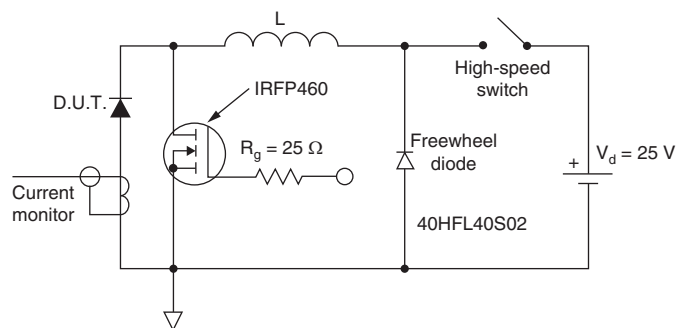


Fig. 8 - Unclamped Inductive Test Circuit

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



Vishay Semiconductors

Device code

VS-	47	C	T	Q	020	S	TRL	PbF
1	2	3	4	5	6	7	8	9

- 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 (020 = 20 V)
- 7 -
 - S = D²PAK
 - -1 = TO-262
- 8 -
 - 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

PREFERRED P/N

PREFERRED P/N	QUANTITY PER REEL	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-42CTQ020SPBF	50	1000	Antistatic plastic tubes
VS-42CTQ020STRRPBF	800	800	13" diameter plastic tape and reel
VS-42CTQ020STRLPBF	800	800	13" diameter plastic tape and reel
VS-42CTQ020-1PBF	50	1000	Antistatic plastic tubes

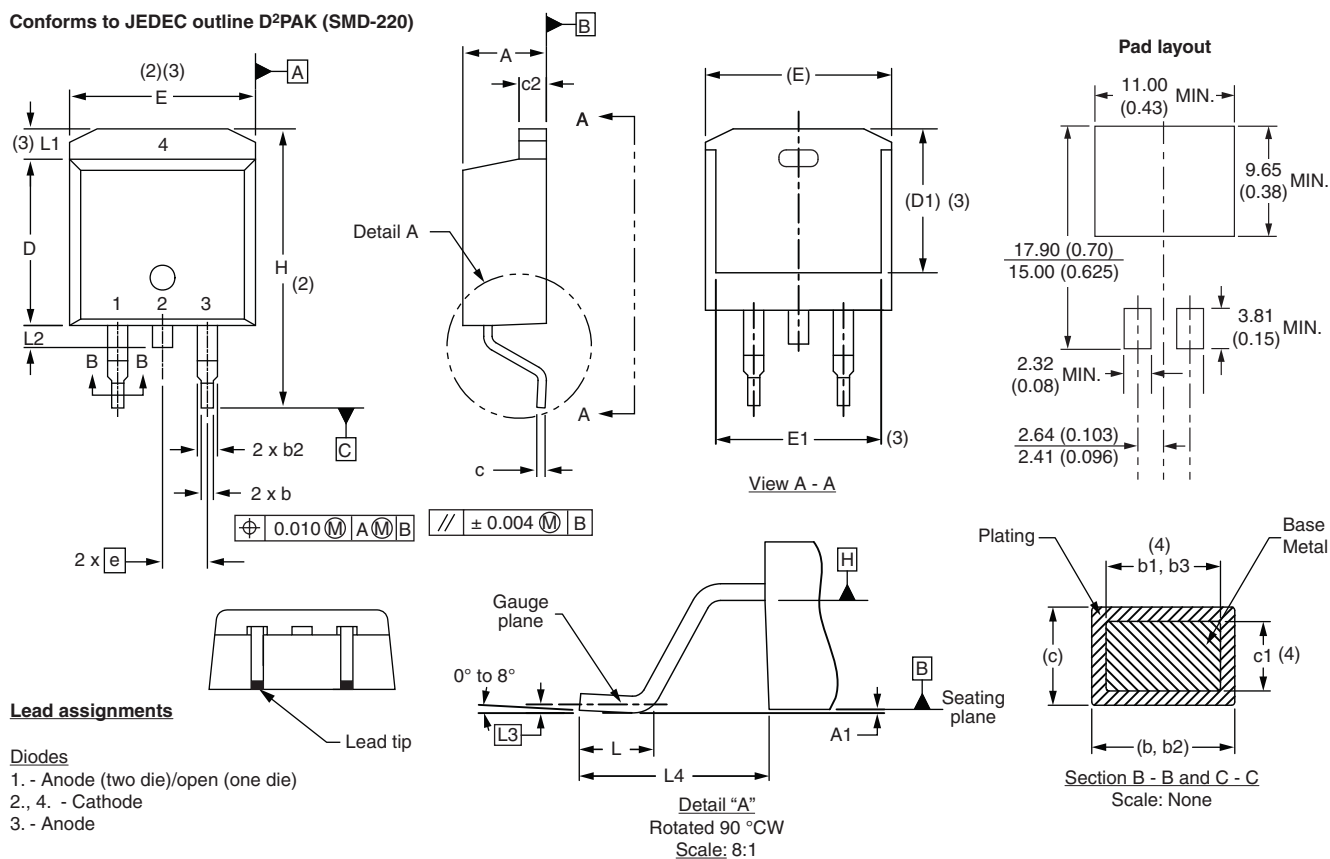
Dimensions

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		www.vishay.com/doc?95008
Packaging information		www.vishay.com/doc?95032

D²PAK, TO-262

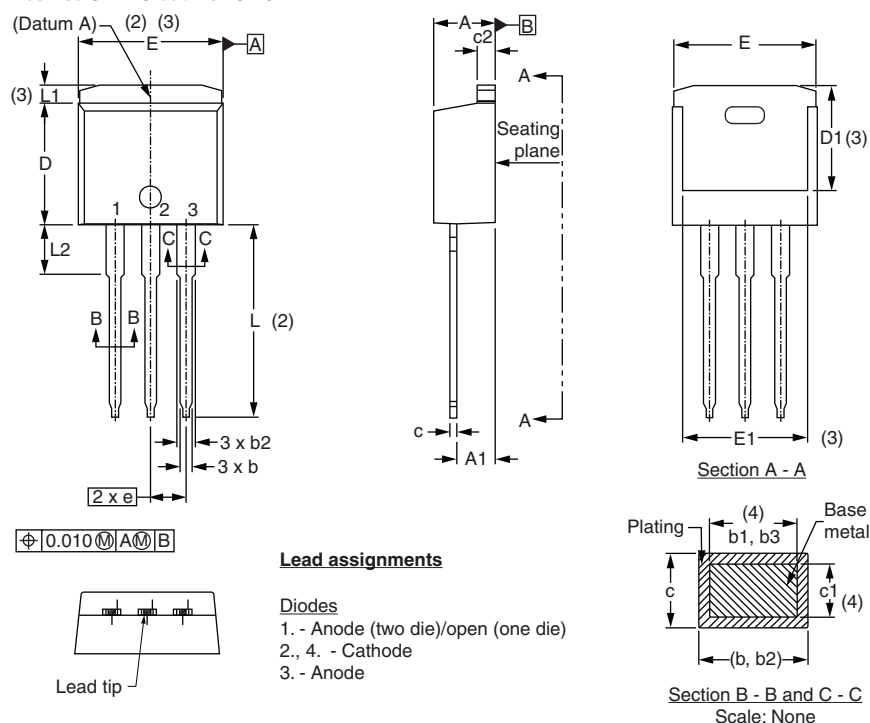
DIMENSIONS - D²PAK in millimeters and inches

Conforms to JEDEC outline D²PAK (SMD-220)



DIMENSIONS - TO-262 in millimeters and inches

Modified JEDEC outline TO-262



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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