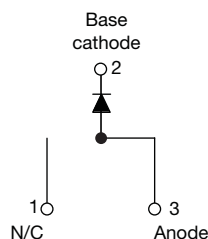




High Performance Schottky Rectifier, 20 A



TO-263AB (D²PAK)



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
- 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

Package	TO-263AB (D²PAK)
$I_{F(AV)}$	20 A
V_R	35 V, 40 V, 45 V
V_F at I_F	0.51 V
I_{RM}	105 mA at 125 °C
T_J max.	150 °C
Diode variation	Single die
E_{AS}	27 mJ

DESCRIPTION

The VS-20TQ... Schottky rectifier series 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.

MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	20	A
V_{RRM}	Range	35 to 45	V
I_{FSM}	$t_p = 5 \mu s$ sine	1800	A
V_F	20 A _{pk} , $T_J = 125$ °C	0.51	V
T_J	Range	-55 to +150	°C

VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-20TQ035SPbF	VS-20TQ040SPbF	VS-20TQ045SPbF	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, see fig. 5	$I_{F(AV)}$	50 % duty cycle at $T_C = 116$ °C, rectangular waveform	20	A
Maximum peak one cycle non-repetitive surge current, see fig. 7	I_{FSM}	5 μs sine or 3 μs rect. pulse	1800	
		10 ms sine or 6 ms rect. pulse	400	
Non-repetitive avalanche energy	E_{AS}	$T_J = 25$ °C, $I_{AS} = 4$ A, $L = 3.40$ mH	27	mJ
Repetitive avalanche current	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		VALUES	UNITS	
Maximum forward voltage drop See fig. 1	$V_{FM}^{(1)}$	20 A	$T_J = 25\text{ }^{\circ}\text{C}$	0.57	V	
		40 A		0.73		
		20 A	$T_J = 125\text{ }^{\circ}\text{C}$	0.51		
		40 A		0.67		
Maximum reverse leakage current See fig. 2	$I_{RM}^{(1)}$	$T_J = 25\text{ }^{\circ}\text{C}$	$V_R = \text{Rated } V_R$	2.7	mA	
		$T_J = 125\text{ }^{\circ}\text{C}$		105		
Maximum junction capacitance	C_T	$V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz), $25\text{ }^{\circ}\text{C}$		1400	pF	
Typical series inductance	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/ μ s	

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	R _{thJC}	DC operation See fig. 4	1.50	°C/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		6 (5)	kgf · cm (lbf · in)
	maximum		12 (10)	
Marking device		Case style TO-263AB (D ² PAK)	20TQ045S	

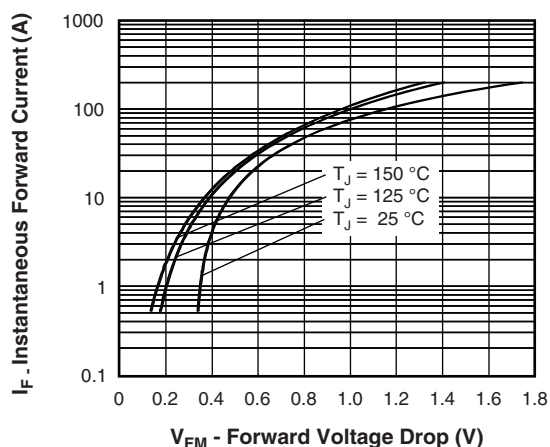


Fig. 1 - Maximum Forward Voltage Drop Characteristics

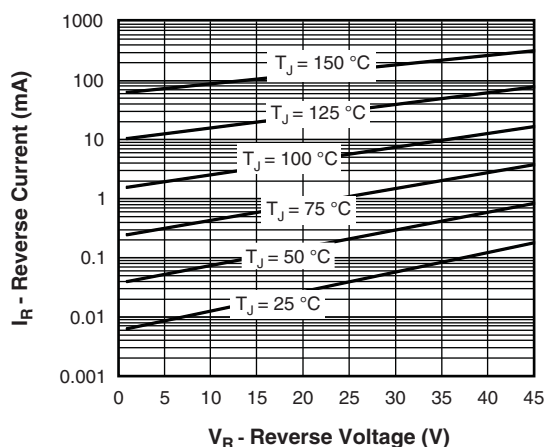


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

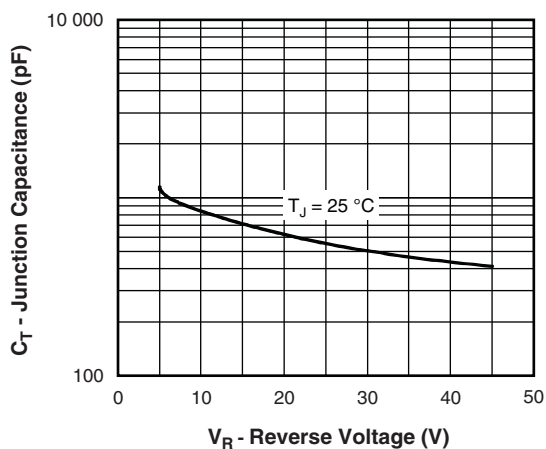


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

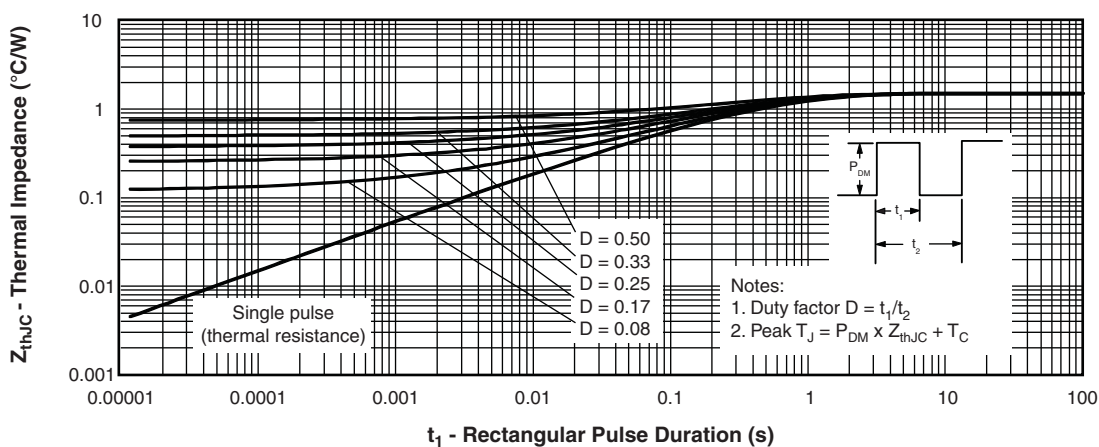


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

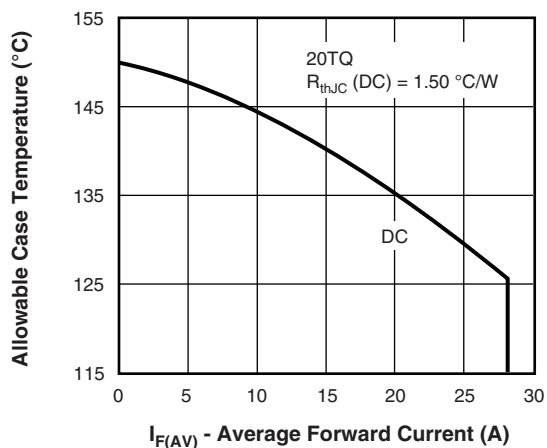


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

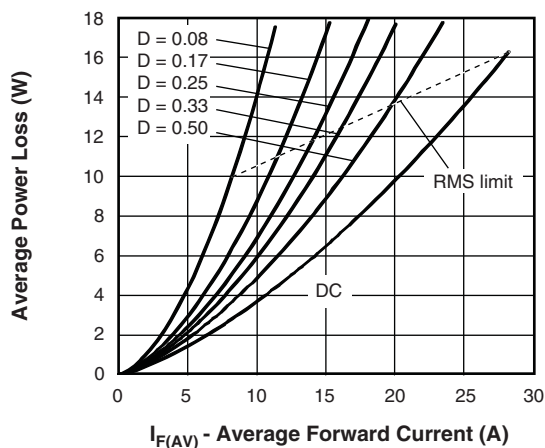


Fig. 6 - Forward Power Loss Characteristics

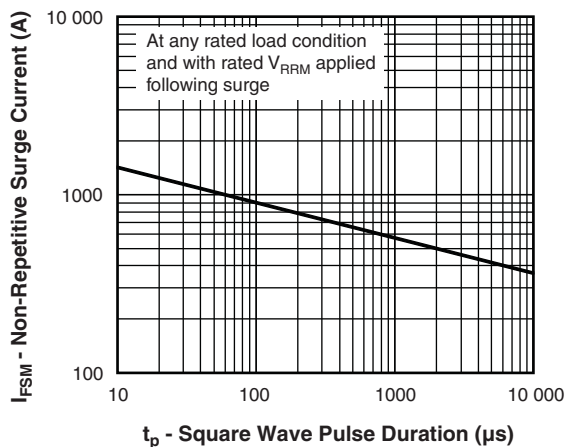


Fig. 7 - Maximum Non-Repetitive Surge Current

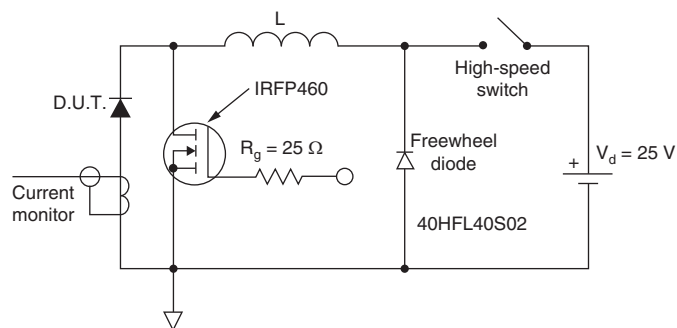


Fig. 8 - Unclamped Inductive Test Circuit



ORDERING INFORMATION TABLE

Device code	VS-	20	T	Q	045	S	TRL	PbF
	1	2	3	4	5	6	7	8
1	Vishay Semiconductors product							
2	Current rating (20 A)							
3	Package: T = TO-220							
4	Schottky "Q" series							
5	Voltage ratings							
6	S = D ² PAK							
7	• None = tube (50 pieces) • TRL = tape and reel (left oriented) • TRR = tape and reel (right oriented)							
8	PbF = lead (Pb)-free							

035 = 35 V
040 = 40 V
045 = 45 V

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER REEL	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-20TQ035SPBF	50	1000	Antistatic plastic tubes
VS-20TQ035STRRPBF	800	800	13" diameter plastic tape and reel
VS-20TQ035STRLPBF	800	800	13" diameter plastic tape and reel
VS-20TQ035-1PBF	50	1000	Antistatic plastic tubes
VS-20TQ040SPBF	50	1000	Antistatic plastic tubes
VS-20TQ040STRRPBF	800	800	13" diameter plastic tape and reel
VS-20TQ040STRLPBF	800	800	13" diameter plastic tape and reel
VS-20TQ040-1PBF	50	1000	Antistatic plastic tubes
VS-20TQ045SPBF	50	1000	Antistatic plastic tubes
VS-20TQ045STRRPBF	800	800	13" diameter plastic tape and reel
VS-20TQ045STRLPBF	800	800	13" diameter plastic tape and reel
VS-20TQ045-1PBF	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?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)



DIMENSIONS FOR TO-262 in millimeters and inches



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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