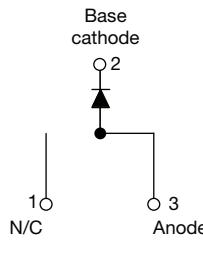


High Performance Schottky Rectifier, 20 A



D²PAK (TO-263AB)



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 245 °C
- Meets JESD 201 class 1A whisker test
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

LINKS TO ADDITIONAL RESOURCES



PRIMARY CHARACTERISTICS

I _{F(AV)}	20 A
V _R	35 V, 40 V, 45 V
V _F at I _F	0.51 V
I _{RMtyp.}	105 mA at 125 °C
T _J max.	150 °C
E _{AS}	27 mJ
Package	D ² PAK (TO-263AB)
Circuit configuration	Single

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.

MECHANICAL DATA

Case: D²PAK (TO-268AB)

Molding compound meets UL 94-V0 flammability rating

Terminals: matte tin plated leads, solderable per J-STD-002

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 µs 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-20TQ035SHM3	VS-20TQ040SHM3	VS-20TQ045SHM3	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 x 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 °C	0.57	V
		40 A		0.73	
		20 A	T _J = 125 °C	0.51	
		40 A		0.67	
Maximum reverse leakage current	I _{RM} ⁽¹⁾	T _J = 25 °C	V _R = Rated V _R	2.7	mA
		T _J = 125 °C		150	
Typical reverse leakage current	I _{RM} ⁽¹⁾	T _J = 125 °C	V _R = Rated V _R	105	mA
Maximum junction capacitance	C _T	V _R = 5 V _{DC} (test signal range 100 kHz to 1 MHz), 25 °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/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	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 D ² PAK (TO-263AB)		20TQ035SH		
				20TQ040SH		
				20TQ045SH		

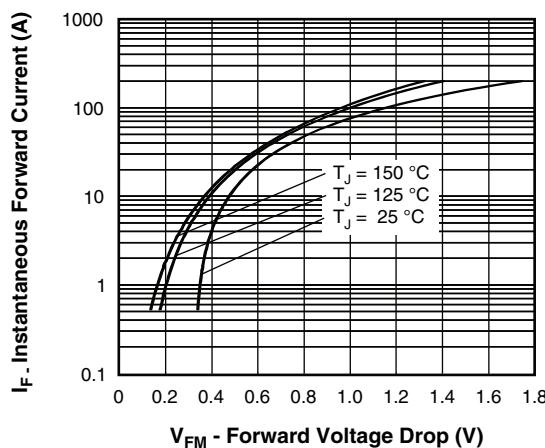


Fig. 1 - Maximum Forward Voltage Drop Characteristics

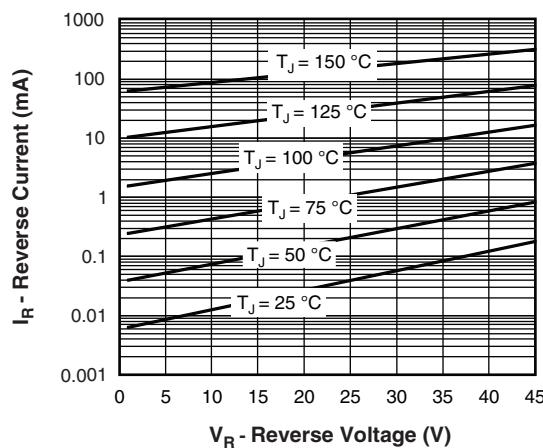


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

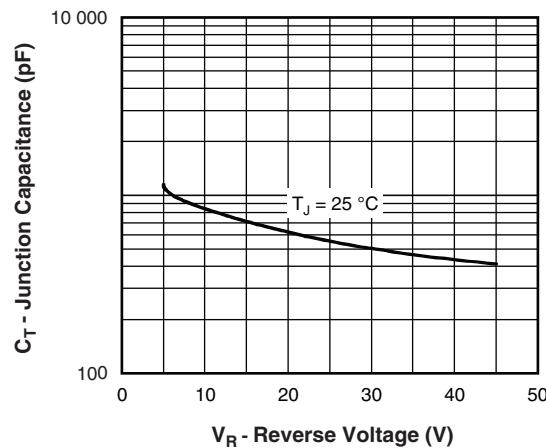


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

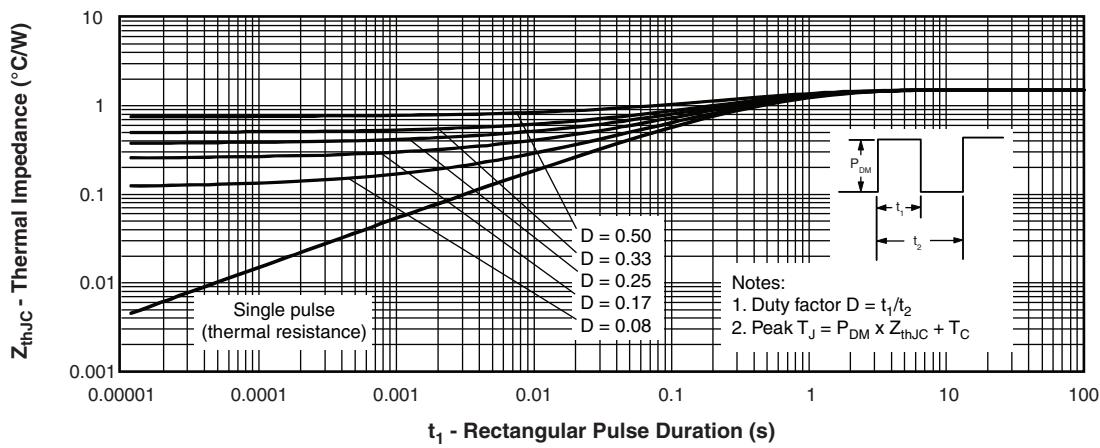


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

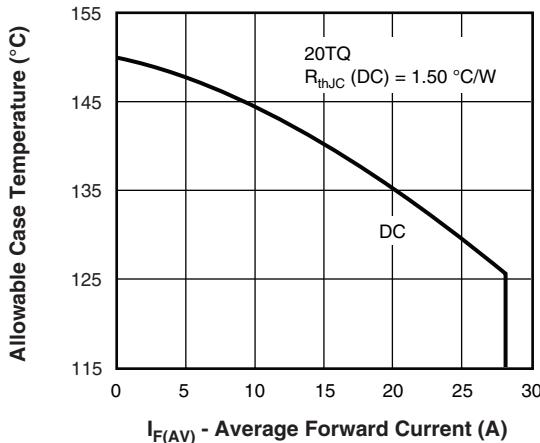


Fig. 5 - Maximum Allowable Case Temperature vs.
Average Forward Current

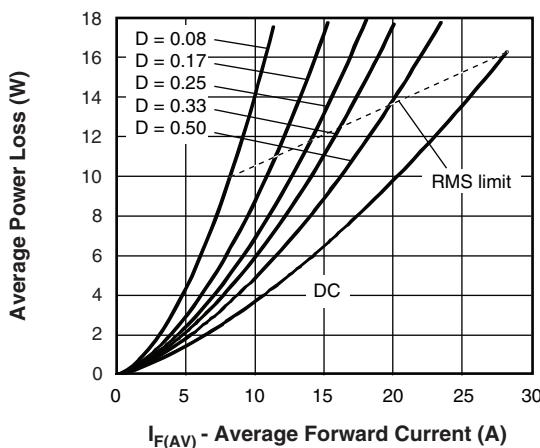


Fig. 6 - Forward Power Loss Characteristics

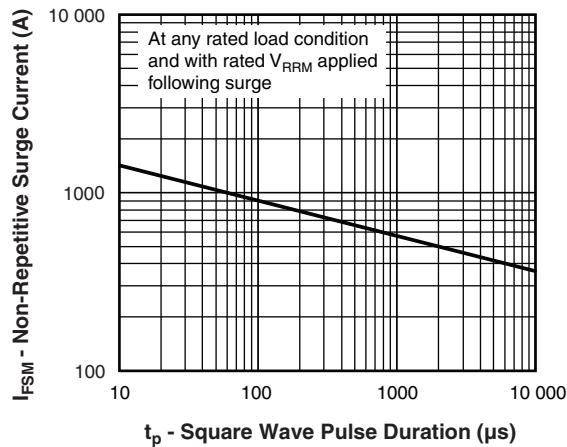


Fig. 7 - Maximum Non-Repetitive Surge Current

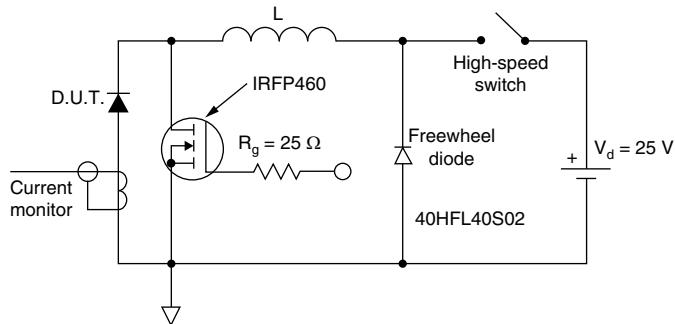


Fig. 8 - Unclamped Inductive Test Circuit

ORDERING INFORMATION TABLE

Device code	VS-	20	T	Q	045	S	TRL	H	M3
	1	2	3	4	5	6	7	8	9

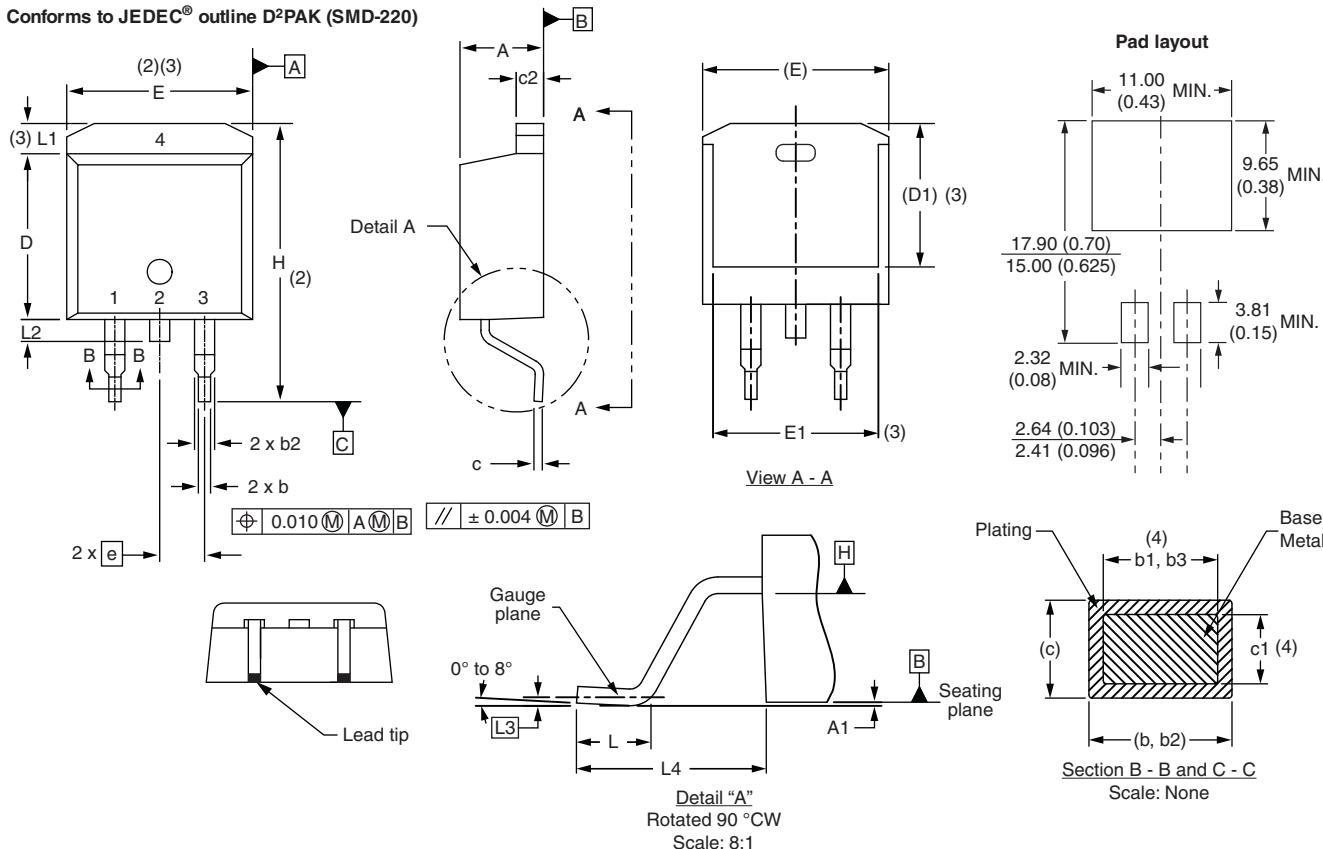
- 1** - Vishay Semiconductors product
- 2** - Current rating (20 A)
- 3** - Package: T = TO-220
- 4** - Schottky "Q" series
- 5** - Voltage ratings
 - 035 = 35 V
 - 040 = 40 V
 - 045 = 45 V
- 6** - S = D²PAK
- 7** - • None = tube (50 pieces)
 - TRL = tape and reel (left oriented)
 - TRR = tape and reel (right oriented)
- 8** - H = AEC-Q101 qualified
- 9** - M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER REEL	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-20TQ035SHM3	50	1000	Antistatic plastic tubes
VS-20TQ035STRRRHM3	800	800	13" diameter plastic tape and reel
VS-20TQ035STRLHM3	800	800	13" diameter plastic tape and reel
VS-20TQ040SHM3	50	1000	Antistatic plastic tubes
VS-20TQ040STRRRHM3	800	800	13" diameter plastic tape and reel
VS-20TQ040STRLHM3	800	800	13" diameter plastic tape and reel
VS-20TQ045SHM3	50	1000	Antistatic plastic tubes
VS-20TQ045STRRRHM3	800	800	13" diameter plastic tape and reel
VS-20TQ045STRLHM3	800	800	13" diameter plastic tape and reel

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95046
Part marking information	www.vishay.com/doc?95444
Packaging information	www.vishay.com/doc?95032
SPICE model	www.vishay.com/doc?96917

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

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