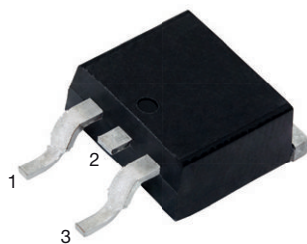
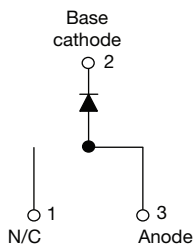


# High Performance Schottky Rectifier, 10 A


**D<sup>2</sup>PAK (TO-263AB)**


## FEATURES

- 175 °C T<sub>J</sub> 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
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## DESCRIPTION

The VS-10TQ...S-M3 Schottky rectifier series has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 175 °C junction temperature. Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection.

## PRIMARY CHARACTERISTICS

I <sub>F(AV)</sub>	10 A
V <sub>R</sub>	35 V, 45 V
V <sub>F</sub> at I <sub>F</sub>	0.49 V
I <sub>RM</sub> max.	15 mA at 125 °C
T <sub>J</sub> max.	175 °C
E <sub>AS</sub>	13 mJ
Package	D <sup>2</sup> PAK (TO-263AB)
Circuit configuration	Single

## MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
I <sub>F(AV)</sub>	Rectangular waveform	10	A
V <sub>RRM</sub>		35/45	V
I <sub>FSM</sub>	t <sub>p</sub> = 5 µs sine	1050	A
V <sub>F</sub>	10 A <sub>pk</sub> , T <sub>J</sub> = 125 °C	0.49	V
T <sub>J</sub>	Range	-55 to +175	°C

## VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-10TQ035S-M3	VS-10TQ045S-M3	UNITS
Maximum DC reverse voltage	V <sub>R</sub>	35	45	V
Maximum working peak reverse voltage	V <sub>RWM</sub>			

## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current See fig. 5	I <sub>F(AV)</sub>	50 % duty cycle at T <sub>C</sub> = 151 °C, rectangular waveform	10	A
Maximum peak one cycle non-repetitive surge current See fig. 7	I <sub>FSM</sub>	5 µs sine or 3 µs rect. pulse	1050	A
		10 ms sine or 6 ms rect. pulse	280	
Non-repetitive avalanche energy	E <sub>AS</sub>	T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 2 A, L = 6.5 mH	13	mJ
Repetitive avalanche current	I <sub>AR</sub>	Current decaying linearly to zero in 1 µs Frequency limited by T <sub>J</sub> maximum V <sub>A</sub> = 1.5 x V <sub>R</sub> typical	2	A

**ELECTRICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum forward voltage drop See fig. 1	$V_{FM}^{(1)}$	10 A	$T_J = 25\text{ }^{\circ}\text{C}$	0.57	V	
		20 A		0.67		
		10 A	$T_J = 125\text{ }^{\circ}\text{C}$	0.49		
		20 A		0.61		
Maximum reverse leakage current See fig. 2	$I_{RM}^{(1)}$	$T_J = 25\text{ }^{\circ}\text{C}$	$V_R = \text{Rated } V_R$	2	mA	
		$T_J = 125\text{ }^{\circ}\text{C}$		15		
Maximum junction capacitance	$C_T$	$V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz), $25\text{ }^{\circ}\text{C}$		900	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/ $\mu$ s	

**Note**(1) Pulse width < 300  $\mu$ s, duty cycle < 2 %**THERMAL - MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range	T <sub>J</sub> , T <sub>Stg</sub>		-55 to 175	°C
Maximum thermal resistance, junction to case	R <sub>thJC</sub>	DC operation See fig. 4	2.0	°C/W
Typical thermal resistance, case to heatsink	R <sub>thCS</sub>	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 <sup>2</sup> PAK (TO-263AB)	10TQ035S 10TQ045S	

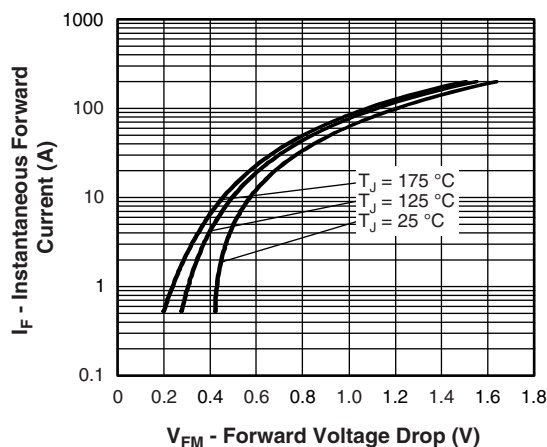


Fig. 1 - Maximum Forward Voltage Drop Characteristics

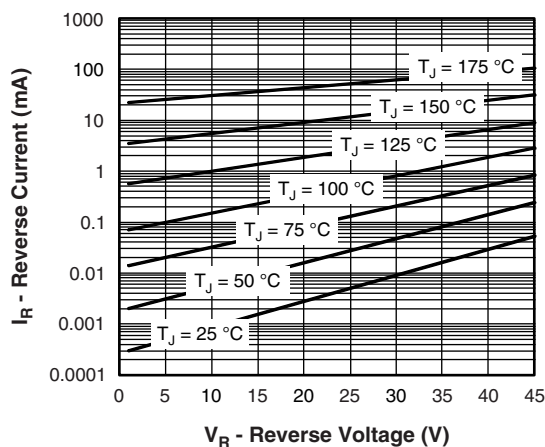


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

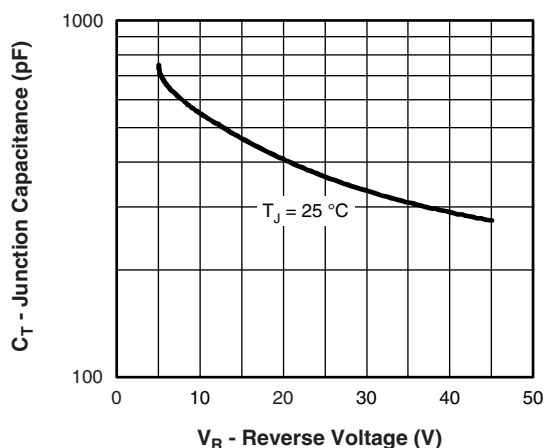


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

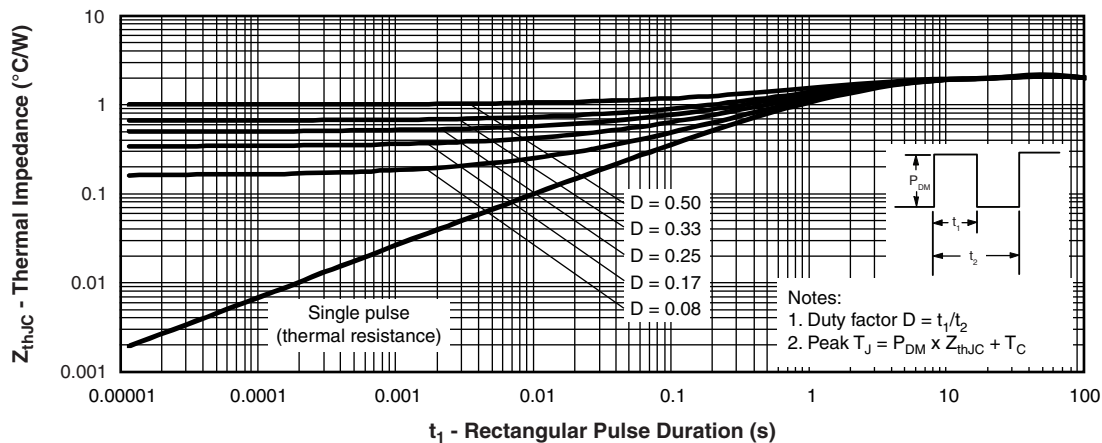
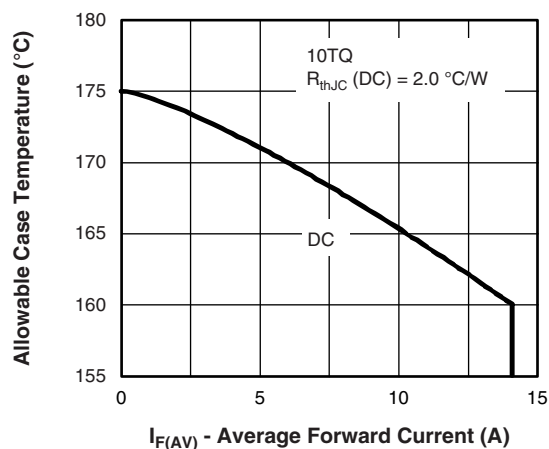

Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics


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

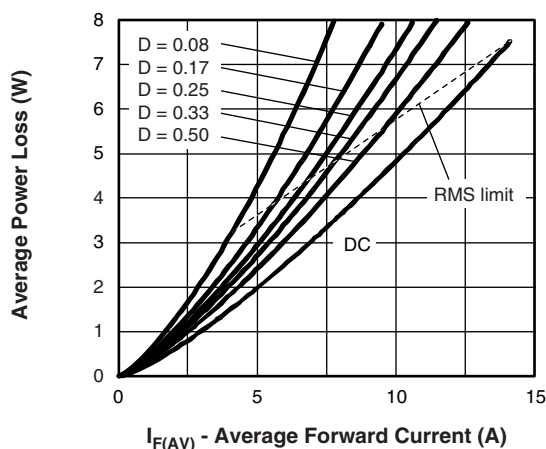


Fig. 6 - Forward Power Loss Characteristics

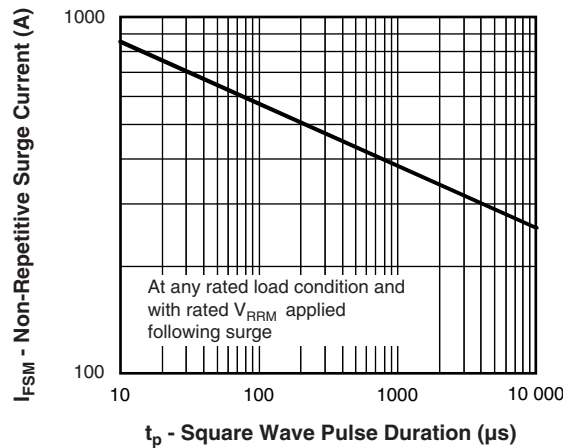


Fig. 7 - Maximum Non-Repetitive Surge Current

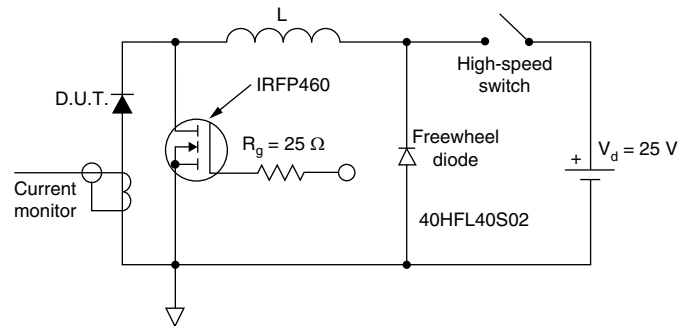


Fig. 8 - Unclamped Inductive Test Circuit

## ORDERING INFORMATION TABLE

Device code	VS-	10	T	Q	045	S	TRL	-M3
	①	②	③	④	⑤	⑥	⑦	⑧
①	- Vishay Semiconductors product							
②	- Current rating (10 A)							
③	- Circuit configuration: T = TO-220							
④	- Schottky "Q" series							
⑤	- Voltage ratings							
⑥	- S = D <sup>2</sup> PAK (TO-263AB)							
⑦	<ul style="list-style-type: none"> <li>• None = tube</li> <li>• TRL = tape and reel (left oriented)</li> <li>• TRR = tape and reel (right oriented)</li> </ul>							
⑧	- -M3 = halogen-free, RoHS-compliant and termination lead (Pb)-free							

**ORDERING INFORMATION**

PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION
VS-10TQ035S-M3	50	Antistatic plastic tubes
VS-10TQ035STRR-M3	800	13" diameter plastic tape and reel
VS-10TQ035STRL-M3	800	13" diameter plastic tape and reel
VS-10TQ045S-M3	50	Antistatic plastic tubes
VS-10TQ045STRR-M3	800	13" diameter plastic tape and reel
VS-10TQ045STRL-M3	800	13" diameter plastic tape and reel

**LINKS TO RELATED DOCUMENTS**

Dimensions	<a href="http://www.vishay.com/doc?96164">www.vishay.com/doc?96164</a>
Part marking information	<a href="http://www.vishay.com/doc?95444">www.vishay.com/doc?95444</a>
Packaging information	<a href="http://www.vishay.com/doc?96424">www.vishay.com/doc?96424</a>

### D<sup>2</sup>PAK

#### DIMENSIONS in millimeters and inches

Conforms to JEDEC® outline D<sup>2</sup>PAK (SMD-220)



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190	
A1	0.00	0.254	0.000	0.010	
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

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
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		
H	14.61	15.88	0.575	0.625	
L	1.78	2.79	0.070	0.110	
L1	-	1.65	-	0.066	3
L2	1.27	1.78	0.050	0.070	
L3	0.25 BSC		0.010 BSC		
L4	4.78	5.28	0.188	0.208	

#### Notes

- Dimensioning and tolerancing per ASME Y14.5 M-1994
- 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
- Thermal pad contour optional within dimension E, L1, D1 and E1
- Dimension b1 and c1 apply to base metal only
- Datum A and B to be determined at datum plane H
- Controlling dimension: inch
- Outline conforms to JEDEC® outline TO-263AB



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