

High Performance Schottky Rectifier, 10 A



PRIMARY CHARACTERISTICS					
I _{F(AV)} 10 A					
V_{R}	45 V				
V _F at I _F	0.53 V				
I _{RM}	15 mA at 125 °C				
T _J max.	175 °C				
E _{AS}	20 mJ				
Package	DPAK (TO-252AA)				
Circuit configuration	Single				

FEATURES

- Low forward voltage drop
- Guard ring for enhanced ruggedness and long term reliability



- · Small foot print, surface mountable
- High frequency operation
- AEC-Q101 qualified
- Meets JESD 201 class 2 whisker test
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



DESCRIPTION

The VS-10WQ045FNHM3 surface mount Schottky rectifier has been designed for applications requiring low forward drop and small foot prints on PC board. Typical applications are in disk drives, switching power supplies, converters, freewheeling diodes, battery charging, and reverse battery protection.

MAJOR RATINGS AND CHARACTERISTICS						
SYMBOL	CHARACTERISTICS	VALUES	UNITS			
I _{F(AV)}	Rectangular waveform	10	Α			
V _{RRM}		45	V			
I _{FSM}	t _p = 5 μs sine	400	Α			
V _F	10 A _{pk} , T _J = 125 °C	0.53	V			
T _J	Range	-40 to +175	°C			

VOLTAGE RATINGS					
PARAMETER SYMBOL VS-10WQ045FNHM3 UNITS					
Maximum DC reverse voltage	V_{R}	45	V		
Maximum working peak reverse voltage	V_{RWM}	45	V		

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDI	VALUES	UNITS	
Maximum average forward current See fig. 5	I _{F(AV)}	50 % duty cycle at T _C = 157 °C, rectangular waveform		10	А
Maximum peak one cycle non-repetitive surge current		5 μs sine or 3 μs rect. pulse	Following any rated	400	А
See fig. 7	IFSM	10 ms sine or 6 ms rect. pulse	rated V _{RRM} applied	75	A
Non-repetitive avalanche energy	E _{AS}	T _J = 25 °C, I _{AS} = 3 A, L = 4.4 mH		20	mJ
Repetitive avalanche current	I _{AR}	Current decaying linearly to zero in 1 μ s Frequency limited by T _J maximum V _A = 1.5 x V _R typical		3.0	Α



ELECTRICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CO	VALUES	UNITS		
		10 A	T 05 00	0.63	V	
Maximum forward voltage drop	V _{FM} ⁽¹⁾	20 A	T _J = 25 °C	0.80		
See fig. 1	VFM (')	10 A	T 405 00	0.53		
		20 A	T _J = 125 °C	0.71		
Maximum reverse leakage current	I _{RM} ⁽¹⁾	$T_J = 25 ^{\circ}\text{C}$ $V_B = \text{rated } V_B$		1	- mA	
See fig. 2	'RM '''	T _J = 125 °C	VR = rated VR	15	IIIA	
Threshold voltage	V _{F(TO)}	$T_{ij} = T_{ij}$ maximum		0.255	V	
Forward slope resistance	r _t	ij = ij maximum		22	mΩ	
Typical junction capacitance	C _T	$V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz), 25 °C		760	pF	
Typical series inductance	L _S	Measured lead to lead 5 r	mm from package body	5.0	nH	

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 ⁽¹⁾ , T _{Stg}		-40 to +175	°C
Maximum thermal resistance, junction to case	R _{thJC}	DC operation See fig. 4	2.0	°C/W
Maximum thermal resistance, junction to ambient	R _{thJA}		50	C/VV
Approximate weight			0.3	g
Approximate weight			0.01	oz.
Marking device		Case style DPAK (TO-252AA)	10WQ0	45FNH

Note

(1)
$$\frac{dP_{tot}}{dT_J} < \frac{1}{R_{thJA}}$$
 thermal runaway condition for a diode on its own heatsink



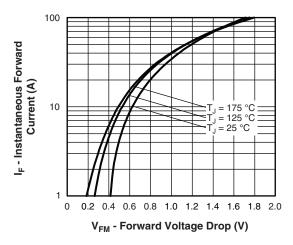


Fig. 1 - Maximum Forward Voltage Drop Characteristics

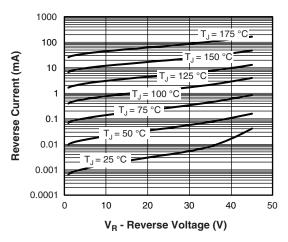


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

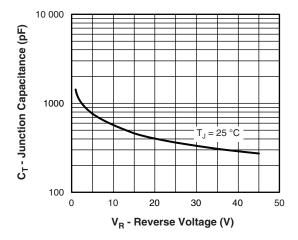


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

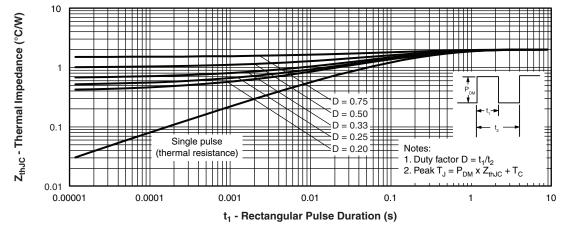
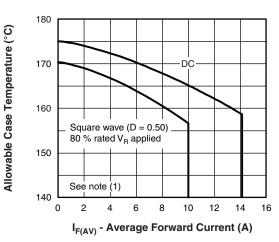


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics



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

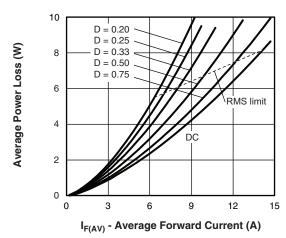


Fig. 6 - Forward Power Loss Characteristics

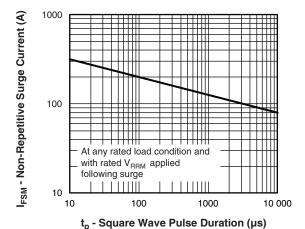


Fig. 7 - Maximum Non-Repetitive Surge Current

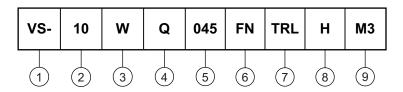
Note

 $\begin{array}{ll} \text{(1)} & \text{Formula used: } T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}; \\ Pd = \text{forward power loss} = I_{F(AV)} \times V_{FM} \text{ at } (I_{F(AV)}/D) \text{ (see fig. 6)}; \\ Pd_{REV} = \text{inverse power loss} = V_{R1} \times I_R \text{ (1 - D); } I_R \text{ at } V_{R1} = 80 \text{ \% rated } V_R \\ \end{array}$



ORDERING INFORMATION TABLE

Device code



1 - Vishay Semiconductors product

Current rating (10 A)

Package identifier:

W = DPAK

4 - Schottky "Q" series

5 - Voltage rating (045 = 45 V)

6 - FN = TO-252AA (DPAK)

7 - • None = Tube

• TR = Tape and reel

• TRL = Tape and reel (left oriented)

• TRR = Tape and reel (right oriented)

8 - H = AEC-Q101 qualified

9 - Environmental digit:

M3 = Halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)					
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION		
VS-10WQ045FNHM3	75	3000	Antistatic plastic tube		
VS-10WQ045FNTRHM3	2000	2000	13" diameter reel		
VS-10WQ045FNTRRHM3	3000	3000	13" diameter reel		
VS-10WQ045FNTRLHM3	3000	3000	13" diameter reel		

LINKS TO RELATED DOCUMENTS				
Dimensions	www.vishay.com/doc?95519			
Part marking information	www.vishay.com/doc?95518			
Packaging information	www.vishay.com/doc?95033			
SPICE model	www.vishay.com/doc?96555			



DPAK (TO-252AA)



SYMBOL	MILLIN	IETERS	INC	HES	NOTES
STMBOL	MIN.	MAX.	MIN.	MAX.	NOTES
Α	2.18	2.39	0.086	0.094	
A1	1	0.13	-	0.005	
b	0.64	0.89	0.025	0.035	
b2	0.76	1.14	0.030	0.045	
b3	4.95	5.46	0.195	0.215	3
С	0.46	0.61	0.018	0.024	
c2	0.46	0.89	0.018	0.035	
D	5.97	6.22	0.235	0.245	5
D1	4.93	-	0.194	-	3
Е	6.35	6.73	0.250	0.265	5
E1	4.32	-	0.170	-	3

SYMBOL	MILLIN	IETERS	INC	HES	NOTES
STIVIBOL	MIN.	MAX.	MIN.	MAX.	NOTES
е	2.29 BSC		0.090	BSC	
Н	9.40	10.41	0.370	0.410	
L	1.40	1.78	0.055	0.070	
L1	2.74 BSC		0.108	REF.	
L2	0.51 BSC		0.020	BSC	
L3	0.89	1.27	0.035	0.050	3
L4	-	1.02	-	0.040	
L5	1.14	1.52	0.045	0.060	2
	•	•		•	

Notes

- (1) Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) Lead dimension uncontrolled in L5
- (3) Dimension D1, E1, L3 and b3 establish a minimum mounting surface for thermal pad
- (4) Dimensions 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 outermost extremes of the plastic body
- (5) Outline conforms to JEDEC® outline TO-252AA, except for D1 dimension



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