

High Performance Schottky Rectifier, 1 A



Cathode ————— Anode

DO-214AC (SMA)


RoHS
COMPLIANT
HALOGEN
FREE

FEATURES

- Low forward voltage drop
- Guard ring for enhanced ruggedness and long term reliability
- Small foot print, surface mountable
- High frequency operation
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Meets JESD 201 class 2 whisker test
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

DESCRIPTION

The VS-10MQ040HM3 surface mount Schottky rectifier has been designed for applications requiring low forward drop and very small foot prints on PC boards. Typical applications are in disk drives, switching power supplies, converters, freewheeling diodes, battery charging, and reverse battery protection.

PRODUCT SUMMARY	
Package	DO-214AC (SMA)
$I_{F(AV)}$	1 A
V_R	40 V
V_F at I_F	0.49 V
I_{RM}	26 mA at 125 °C
T_J max.	150 °C
Diode variation	Single die
E_{AS}	3.0 mJ

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	1	A
V_{RRM}		40	V
I_{FSM}	$t_p = 5 \mu s$ sine	120	A
V_F	$1.5 A_{pk}$, $T_J = 125$ °C	0.56	V
T_J	Range	-55 to +150	°C

VOLTAGE RATINGS			
PARAMETER	SYMBOL	VS-10MQ040HM3	UNITS
Maximum DC reverse voltage	V_R		
Maximum working peak reverse voltage	V_{RWM}	40	V

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average forward current See fig. 4	$I_{F(AV)}$	50 % duty cycle at $T_L = 123$ °C, rectangular waveform On PC board 9 mm ² island (0.013 mm thick copper pad area)		1.5	A
		50 % duty cycle at $T_L = 132$ °C, rectangular waveform On PC board 9 mm ² island (0.013 mm thick copper pad area)		1	
Maximum peak one cycle non-repetitive surge current See fig. 6	I_{FSM}	5 μs sine or 3 μs rect. pulse		120	A
		10 ms sine or 6 ms rect. pulse		30	
Non-repetitive avalanche energy	E_{AS}	$T_J = 25$ °C, $I_{AS} = 1$ A, $L = 6$ mH		3.0	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		1.0	A

ELECTRICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum forward voltage drop See fig. 1	$V_{FM}^{(1)}$	1 A	$T_J = 25 \text{ }^\circ\text{C}$	0.54	V	
		1.5 A		0.62		
		1 A	$T_J = 125 \text{ }^\circ\text{C}$	0.49		
		1.5 A		0.56		
Maximum reverse leakage current See fig. 2	I_{RM}	$T_J = 25 \text{ }^\circ\text{C}$	$V_R = \text{Rated } V_R$	0.5	mA	
		$T_J = 125 \text{ }^\circ\text{C}$		26		
Threshold voltage	$V_{F(TO)}$	$T_J = T_J \text{ maximum}$		0.36	V	
Forward slope resistance	r_t			104	$\text{m}\Omega$	
Typical junction capacitance	C_T	$V_R = 10 \text{ V}_{\text{DC}}$, $T_J = 25 \text{ }^\circ\text{C}$, test signal = 1 MHz		38	pF	
Typical series inductance	L_S	Measured lead to lead 5 mm from package body		2.0	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	$T_J^{(1)}$, T_{Stg}			-55 to +150	$^\circ\text{C}$
Maximum thermal resistance, junction to ambient	R_{thJA}	DC operation		80	$^\circ\text{C}/\text{W}$
Approximate weight				0.07	g
				0.002	oz.
Marking device		Case style SMA (similar D-64)		1F	

Note

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

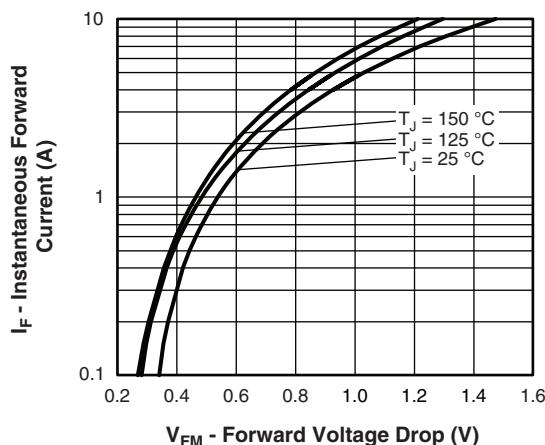


Fig. 1 - Maximum Forward Voltage Drop Characteristics

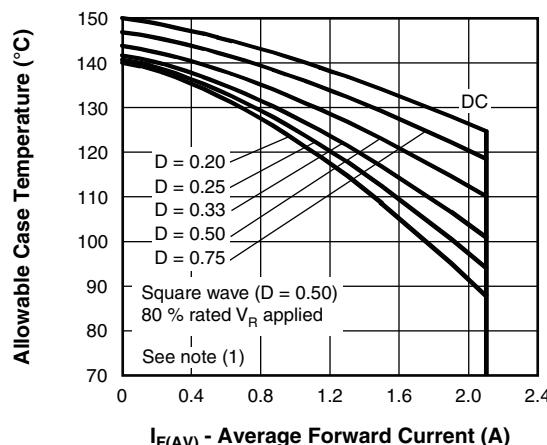


Fig. 4 - Maximum Average Forward Current vs. Allowable Lead Temperature

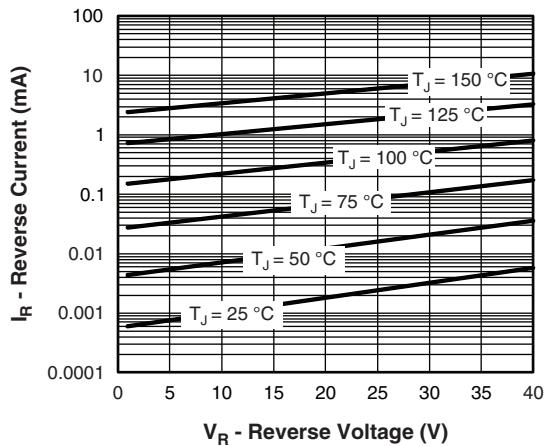


Fig. 2 - Typical Peak Reverse Current vs. Reverse Voltage

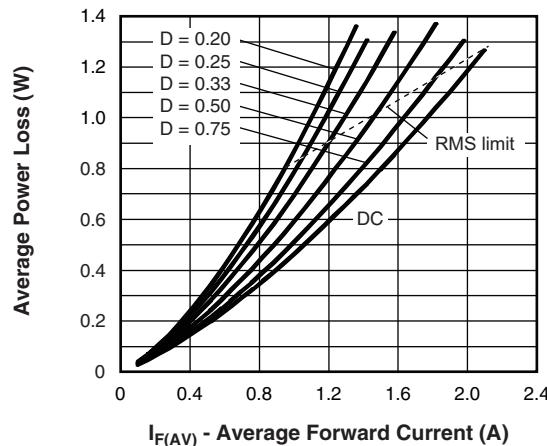


Fig. 5 - Maximum Average Forward Dissipation vs. Average Forward Current

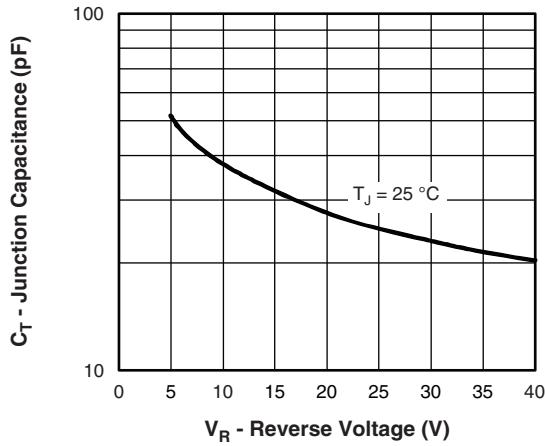


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

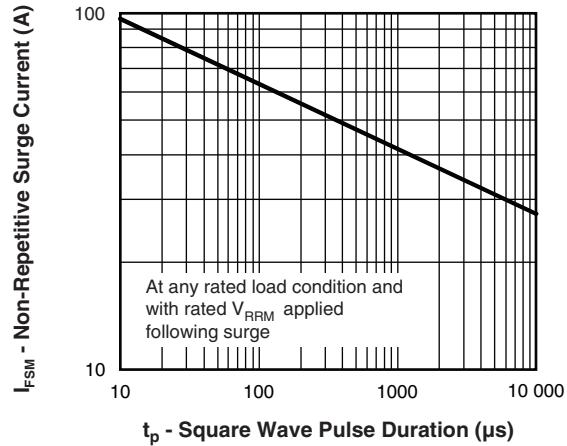


Fig. 6 - Maximum Peak Surge Forward Current vs. Pulse Duration

Note

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

ORDERING INFORMATION TABLE

Device code	VS-	10	M	Q	040	H	M3
	(1)	(2)	(3)	(4)	(5)	(6)	(7)

1	- Vishay Semiconductors product
2	- Current rating
3	- M = SMA
4	- Q = Schottky "Q" series
5	- Voltage rating (040 = 40 V)
6	- H = AEC-Q101 qualified
7	- Environmental digit:

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

ORDERING INFORMATION (Example)

PREFERRED P/N	PREFERRED PACKAGE CODE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-10MQ040HM3/5AT	5AT	7500	13" diameter plastic tape and reel

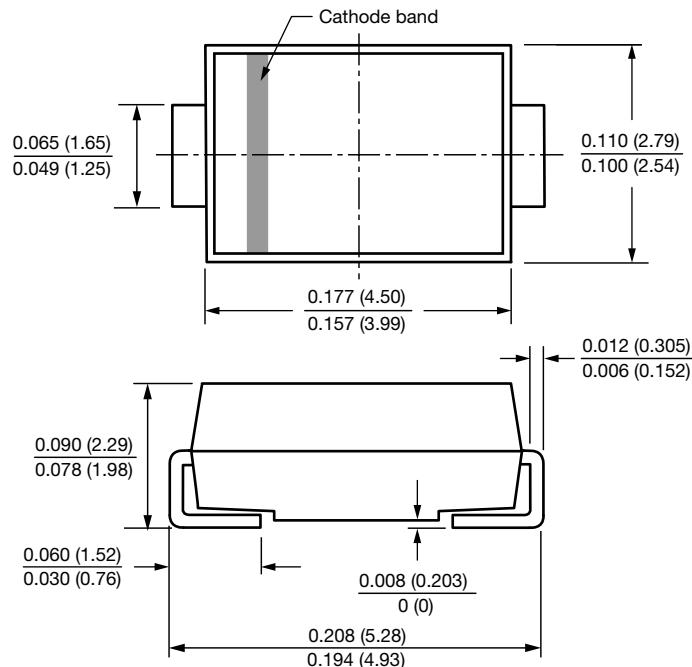
LINKS TO RELATED DOCUMENTS

Dimensions	www.vishay.com/doc?95400
Part marking information	www.vishay.com/doc?95403
Packaging information	www.vishay.com/doc?95404
SPICE model	www.vishay.com/doc?96007

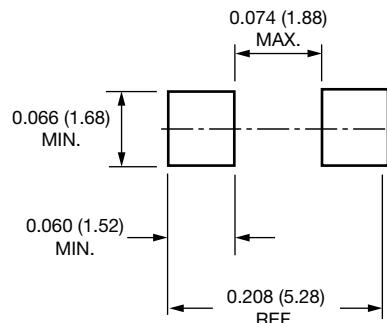
SMA

DIMENSIONS in inches (millimeters)

DO-214AC (SMA)



Mounting Pad Layout



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