

High Performance Schottky Rectifier, 1.5 A


SMA (DO-214AC)


FEATURES

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



APPLICATIONS

- Switching power supplies
- Meter protection
- Reverse protection for power input to PC board circuits
- Battery isolation and charging
- Low threshold voltage diode
- Freewheeling or by-pass diode
- Low voltage clamp

DESCRIPTION

The VS-15MQ040HM3 Schottky rectifier is designed to be used for low power applications where a reverse voltage of 40 V is encountered and surface mountable is required.

PRIMARY CHARACTERISTICS

$I_{F(AV)}$	1.5 A
V_R	40 V
V_F at I_F	0.34 V
I_{RM}	20 mA at 125 °C
T_J max.	150 °C
E_{AS}	6.0 mJ
Package	SMA (DO-214AC)
Circuit configuration	Single

MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	1.5	A
V_{RRM}		40	V
I_{FSM}	$t_p = 5 \mu s$ sine	330	A
V_F	$2 A_{pk}$, $T_J = 125 \text{ °C}$	0.43	V
T_J	Range	-40 to +150	°C

VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-15MQ040HM3	UNITS
Maximum DC reverse voltage	V_R	40	V
Maximum working peak reverse voltage	V_{RWM}		

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current See fig. 4	$I_{F(AV)}$	50 % duty cycle at $T_L = 105 \text{ °C}$, rectangular waveform On PC board 9 mm ² island (0.013 mm thick copper pad area)	2.1	A
		50 % duty cycle at $T_L = 113 \text{ °C}$, rectangular waveform On PC board 9 mm ² island (0.013 mm thick copper pad area)	1.5	
Maximum peak one cycle non-repetitive surge current See fig. 6	I_{FSM}	5 μs sine or 3 μs rect. pulse	330	A
		10 ms sine or 6 ms rect. pulse	140	
Non-repetitive avalanche energy	E_{AS}	$T_J = 25 \text{ °C}$, $I_{AS} = 1 \text{ A}$, $L = 12 \text{ mH}$	6.0	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	$V_{FM}^{(1)}$	1.5 A	$T_J = 25\text{ }^{\circ}\text{C}$	0.43	V	
		2 A		0.49		
		1.5 A	$T_J = 125\text{ }^{\circ}\text{C}$	0.34		0.43
		2 A				
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	
		$T_J = 125\text{ }^{\circ}\text{C}$		20		
Threshold voltage	$V_{F(TO)}$	$T_J = T_J \text{ maximum}$		0.26	V	
Forward slope resistance	r_t			64.6	mΩ	
Typical junction capacitance	C_T	$V_R = 10\text{ V}_{DC}$, $T_J = 25\text{ }^{\circ}\text{C}$, test signal = 1 MHz		134	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/μs	

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}		-40 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 (DO-214AC)	XF	

Note

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

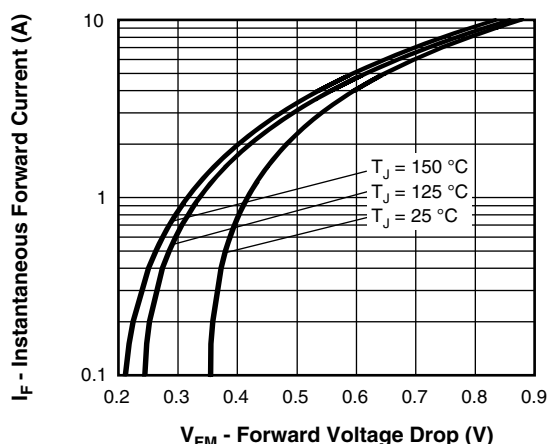


Fig. 1 - Maximum Forward Voltage Drop Characteristics

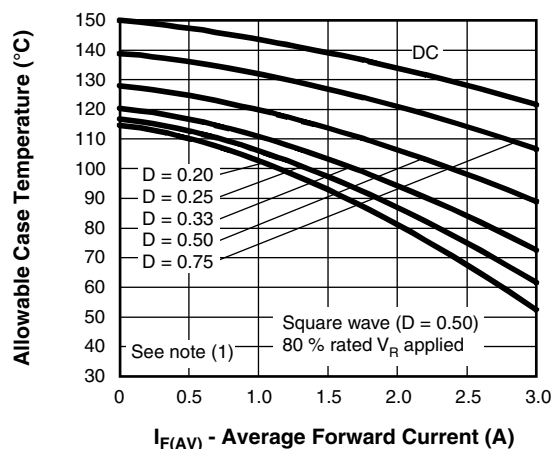


Fig. 4 - Maximum Average Forward Current vs. Allowable Lead Temperature

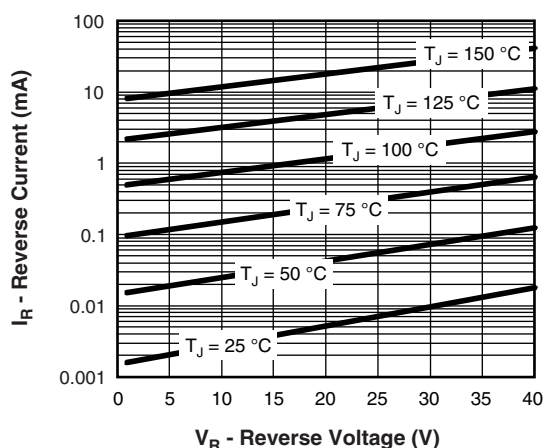


Fig. 2 - Typical Peak Reverse Current vs. Reverse Voltage

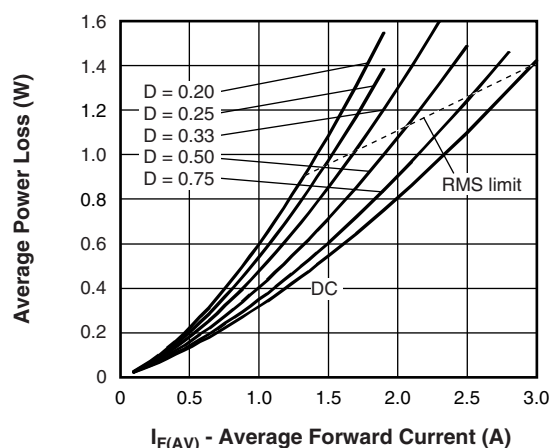


Fig. 5 - Maximum Average Forward Dissipation vs. Average Forward Current

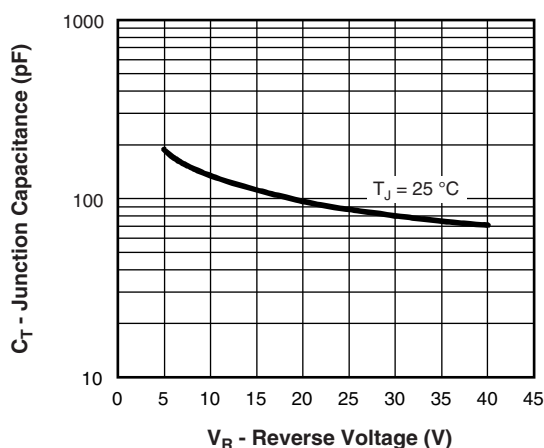


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

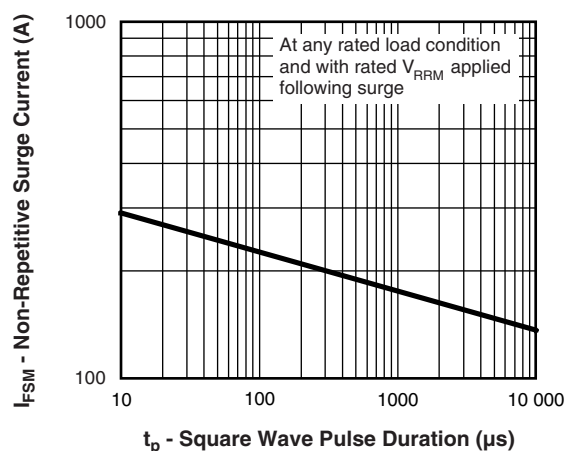


Fig. 6 - Maximum Peak Surge Forward Current vs. Pulse Duration

Note

- (1) Formula used: $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$;
 P_d = Forward power loss = $I_{F(AV)} \times V_{FM}$ at $(I_{F(AV)}/D)$ (see fig. 6);
 P_{dREV} = 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-	15	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-15MQ040HM3/5AT	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

SMA

DIMENSIONS in inches (millimeters)

DO-214AC (SMA)



Mounting Pad Layout





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