

# High Performance Schottky Rectifier, 1.5 A


**SMA (DO-214AC)**


## FEATURES

- Extremely low forward voltage drop
- Guard ring for enhanced ruggedness and long term reliability
- Surface mountable
- Compact size
- 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](http://www.vishay.com/doc?99912)


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

## 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-15MQ040-M3 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.

## 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
$V_F$	$2 A_{pk}$ , $T_J = 125^\circ C$	0.43	V
$T_J$	Range	-40 to +150	°C

## VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-15MQ040-M3	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 $T_L = 105^\circ C$ , rectangular waveform On PC board 9 mm <sup>2</sup> island (0.013 mm thick copper pad area)	2.1	A
		50 % duty cycle at $T_L = 113^\circ C$ , rectangular waveform On PC board 9 mm <sup>2</sup> island (0.013 mm thick copper pad area)	1.5	
Maximum peak one cycle non-repetitive surge current See fig. 6	$I_{FSM}$	5 $\mu s$ sine or 3 $\mu s$ rect. pulse	330	A
		10 ms sine or 6 ms rect. pulse	140	
Non-repetitive avalanche energy	$E_{AS}$	$T_J = 25^\circ C$ , $I_{AS} = 1 A$ , $L = 12 mH$	6.0	mJ
Repetitive avalanche current	$I_{AR}$	Current decaying linearly to zero in 1 $\mu s$ 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	
		2 A		0.43	
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**

<sup>(1)</sup> Pulse width = 300  $\mu$ 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	$^{\circ}\text{C/W}$
Approximate weight			0.07	g
			0.002	oz.
Marking device		Case style SMA (DO-214AC)	XF	

**Note**

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

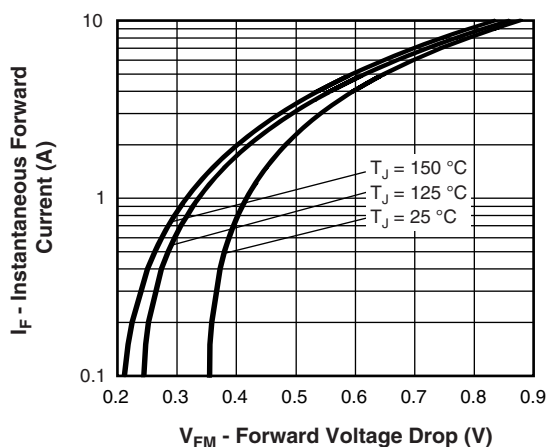


Fig. 1 - Maximum Forward Voltage Drop Characteristics

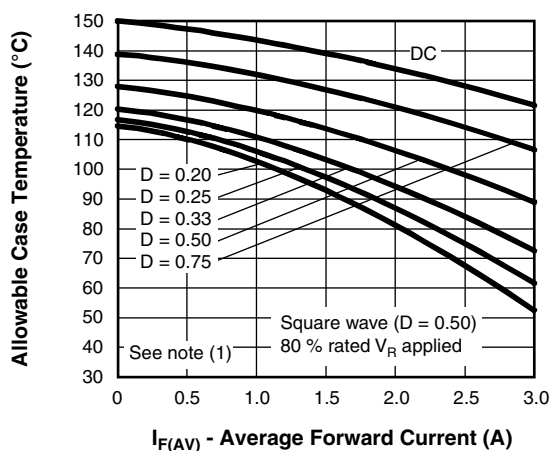


Fig. 4 - Maximum Average Forward Current vs. Allowable Lead Temperature

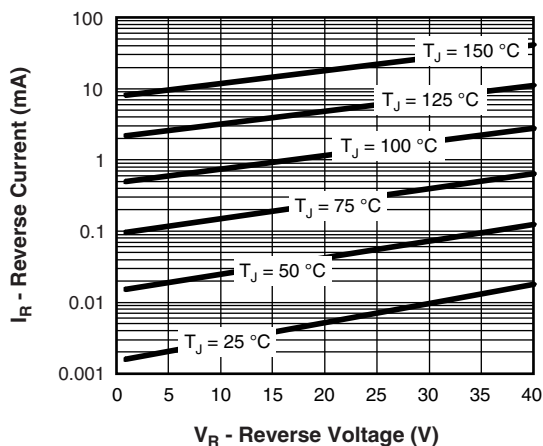


Fig. 2 - Typical Peak Reverse Current vs. Reverse Voltage

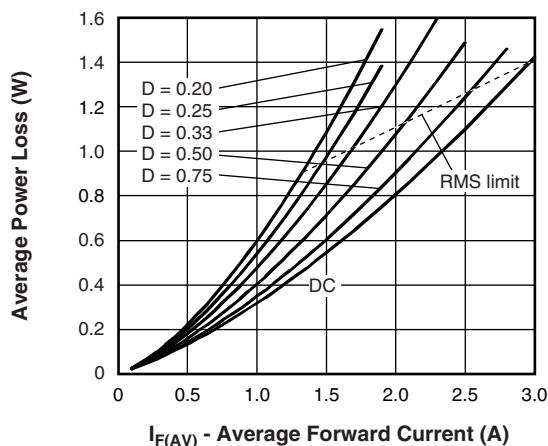


Fig. 5 - Maximum Average Forward Dissipation vs. Average Forward Current

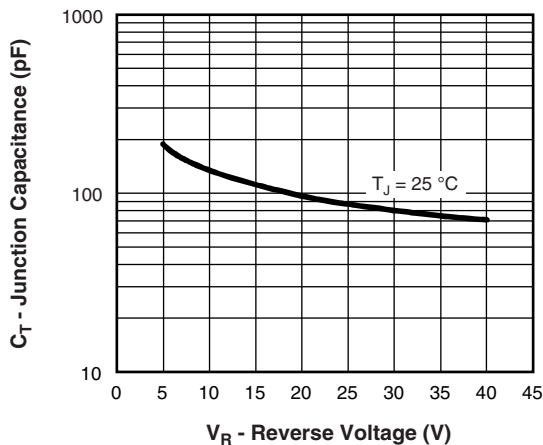


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

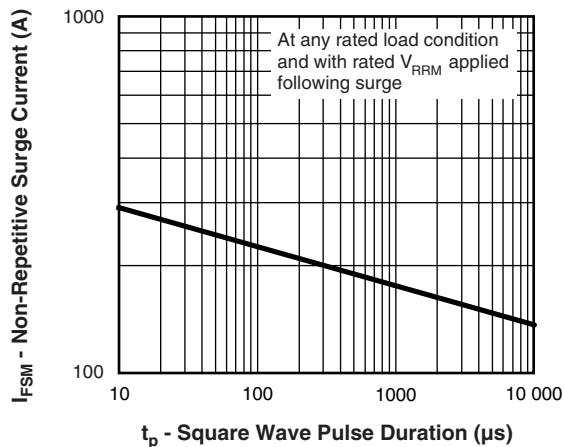


Fig. 6 - Maximum Peak Surge Forward Current vs. Pulse Duration

#### 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	-M3
	1	2	3	4	5	6

- 1** - Vishay Semiconductors product
- 2** - Current rating
- 3** - M = SMA
- 4** - Q = Schottky "Q" series
- 5** - Voltage rating (040 = 40 V)
- 6** - 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-15MQ040-M3/5AT	5AT	7500	13" diameter plastic tape and reel

### LINKS TO RELATED DOCUMENTS

Dimensions	<a href="http://www.vishay.com/doc?95400">www.vishay.com/doc?95400</a>
Part marking information	<a href="http://www.vishay.com/doc?95403">www.vishay.com/doc?95403</a>
Packaging information	<a href="http://www.vishay.com/doc?95404">www.vishay.com/doc?95404</a>

## SMA

**DIMENSIONS** in inches (millimeters)

**DO-214AC (SMA)**



**Mounting Pad Layout**





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