High Performance Schottky Rectifier, 2 A

DO-214AC (SMA)

FEATURES

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

RoHS COMPLIANT

DESCRIPTION

The VS-20MQ040NPbF 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)
$I_{F(AV)}$	2 A
V_R	40 V
V_F at I_F	0.63 V
I_{RM} max.	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	2	A
V_{RRM}		40	V
I_{FSM}	t_p = 5 µs sine	120	A
V_F	2 A_{pk}, T_J = 125 °C	0.63	V
T_J	Range	-55 to +150	°C

VOLTAGE RATINGS			
PARAMETER	SYMBOL	VS-20MQ040NPbF	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_C = 110 °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_C = 112 °C, rectangular waveform On PC board 9 mm^2 island (0.013 mm thick copper pad area)		2	
Maximum peak one cycle non-repetitive surge current See fig. 6	I_{FSM}	5 µs sine or 3 µs rect. pulse	Following any rated load condition and with rated V_{RRM} applied	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	mJ
Repetitive avalanche current	I_{AR}	Current decaying linearly to zero in 1 µs Frequency limited by T_J maximum V_A = 1.5 x V_R typical		1.0	A

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ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop See fig. 1	V_{FM} (1)	2 A	T_J = 25 °C	0.69	V
		1.5 A		0.62	
		1 A		0.54	
		2 A	T_J = 125 °C	0.63	
		1.5 A		0.56	
		1 A		0.49	
Maximum reverse leakage current See fig. 2	I_{RM} (1)	T_J = 25 °C	V_R = Rated V_R	0.5	mA
		T_J = 125 °C		26	
Threshold voltage	$V_{F(TO)}$	T_J = T_J maximum		0.36	V
Forward slope resistance	r_t			104	mΩ
Typical junction capacitance	C_T	V_R = 10 V_{DC}, T_J = 25 °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/µs

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}		-55 to +150	°C
Maximum thermal resistance, junction to ambient	R_{thJA}	DC operation	80	°C/W
Approximate weight			0.07	g
			0.002	oz.
Marking device		Case style SMA (similar D-64)	2F	

Note

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

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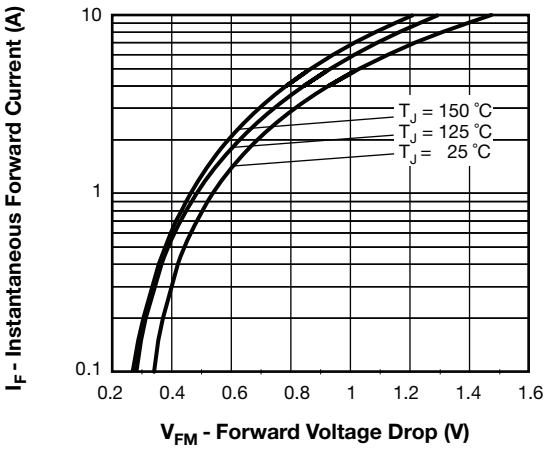

Fig. 1 - Maximum Forward Voltage Drop Characteristics

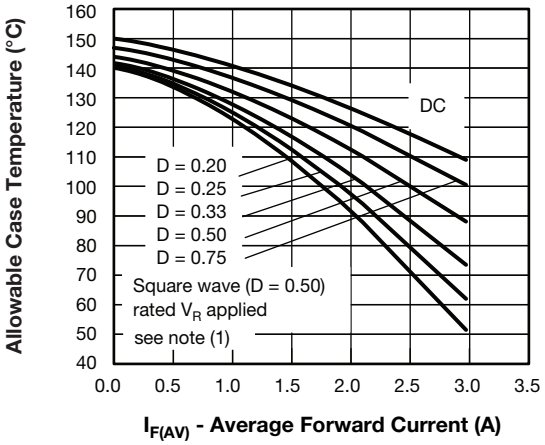

Fig. 4 - Maximum Average Forward Current vs. Allowable Lead Temperature

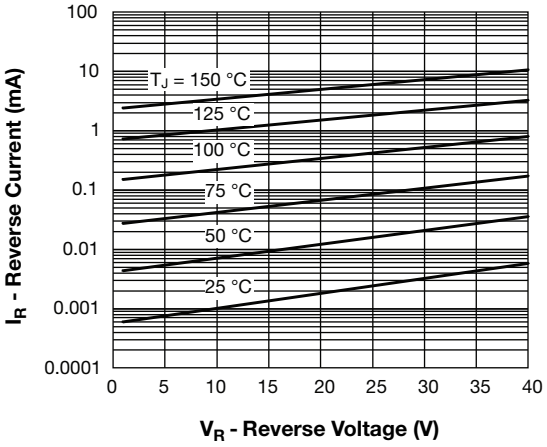

Fig. 2 - Typical Peak Reverse Current vs. Reverse Voltage

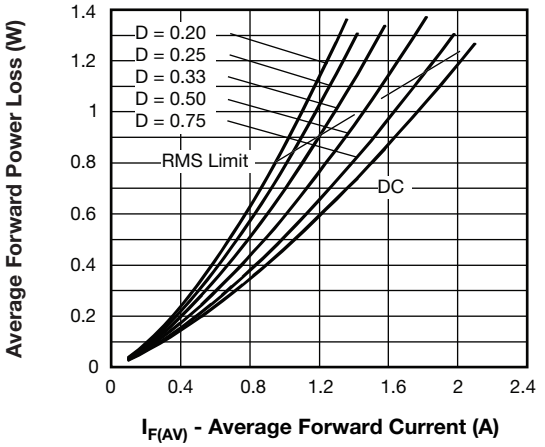

Fig. 5 - Maximum Average Forward Dissipation vs. Average Forward Current

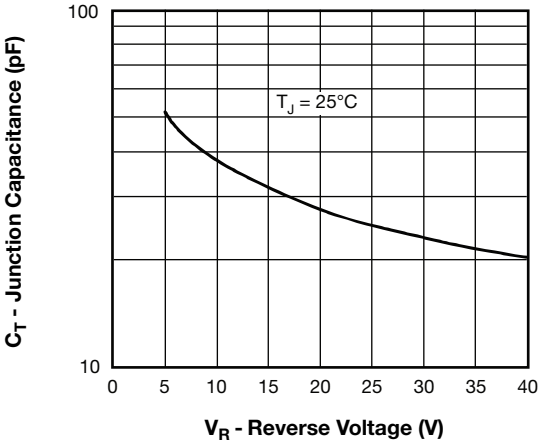

Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

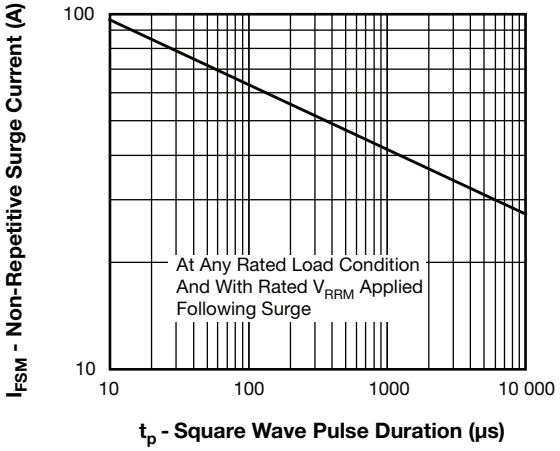

Fig. 6 - Maximum Peak Surge Forward Current vs. Pulse Duration

Note

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

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ORDERING INFORMATION TABLE

Device code

VS-	20	M	Q	040	N	TR	PbF
1	2	3	4	5	6	7	8

1 - Vishay Semiconductors product
2 - Current rating
3 - M = SMA
4 - Q = Schottky “Q” series
5 - Voltage rating (040 = 40 V)
6 - N = new SMA
7 - TR = tape and reel
8 - PbF = lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	**PREFERRED PACKAGE CODE**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-20MQ040NTRPbF	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?96006

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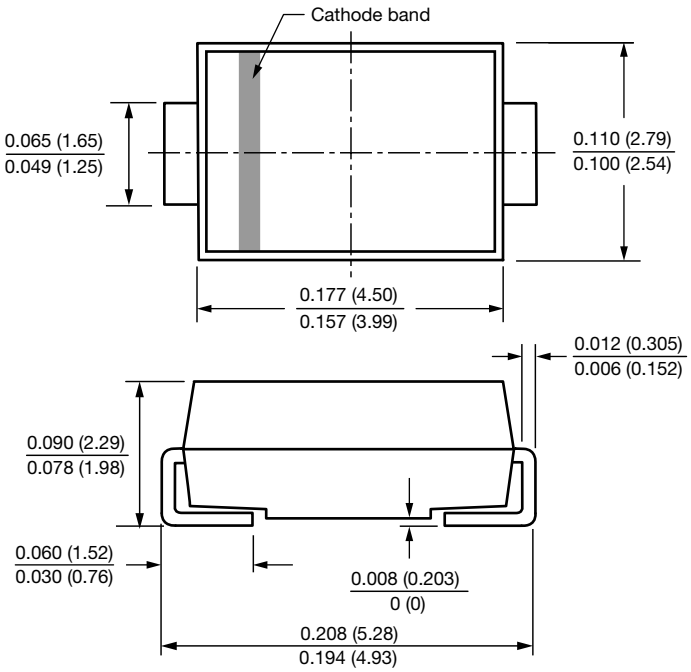
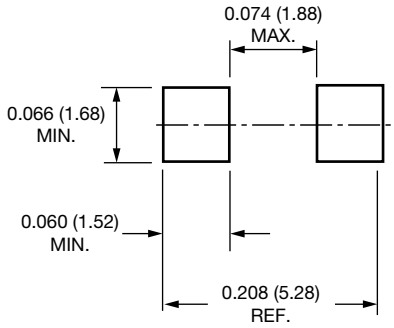
SMA

DIMENSIONS in inches (millimeters)

DO-214AC (SMA)



Mounting Pad Layout



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