

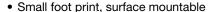
High Performance Schottky Rectifier, 1 A

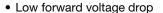


DO-214AC (SMA)

| PRODUCT SUMMARY | | | |
|----------------------------------|-----------------|--|--|
| Package DO-214AC (SMA) | | | |
| I _{F(AV)} | 1 A | | |
| V_{R} | 40 V | | |
| V _F at I _F | 0.54 V | | |
| I _{RM} | 26 mA at 125 °C | | |
| T _J max. | 150 °C | | |
| Diode variation | Single die | | |
| E _{AS} | 3.0 mJ | | |

FEATURES







- 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 <u>www.vishay.com/doc?99912</u>

DESCRIPTION

The VS-10MQ040NPbF 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.

| MAJOR RATINGS AND CHARACTERISTICS | | | | |
|-----------------------------------|---|-------------|-------|--|
| SYMBOL | CHARACTERISTICS | VALUES | UNITS | |
| I _{F(AV)} | Rectangular waveform | 1 | Α | |
| V _{RRM} | | 40 | V | |
| I _{FSM} | $t_p = 5 \mu s sine$ | 120 | Α | |
| V _F | 1.5 A _{pk} , T _J = 125 °C | 0.56 | V | |
| TJ | Range | -55 to +150 | °C | |

| VOLTAGE RATINGS | | | |
|--------------------------------------|-----------|----------------|-------|
| PARAMETER | SYMBOL | VS-10MQ040NPbF | UNITS |
| Maximum DC reverse voltage | V_{R} | 40 | V |
| Maximum working peak reverse voltage | V_{RWM} | 40 | V |

| ABSOLUTE MAXIMUM RATINGS | | | | | |
|--|--------------------|--|---|--------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| Maximum average forward current | | 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 | А |
| See fig. 4 | I _{F(AV)} | $50~\%$ duty cycle at $T_L = 132~^{\circ}$ C, rectangular waveform On PC board $9~\text{mm}^2$ island (0.013 mm thick copper pad area) | | 1 A | |
| Maximum peak one cycle | | 5 μs sine or 3 μs rect. pulse | Following any rated load | 120 | |
| non-repetitive surge current See fig. 6 | I _{FSM} | 10 ms sine or 6 ms rect. pulse | condition and with rated V _{RRM} applied | 30 | Α |
| Non-repetitive avalanche energy | E _{AS} | $T_J = 25 ^{\circ}\text{C}, I_{AS} = 1 \text{A}, L = 6 \text{mH}$ | | 3.0 | mJ |
| Repetitive avalanche current | I _{AR} | Current decaying linearly to zero in 1 μ s Frequency limited by T_J maximum $V_A = 1.5 \times V_R$ typical | | Α | |



| ELECTRICAL SPECIFICATIONS | | | | | |
|---------------------------------|--------------------------------|--|---------------------------------------|--------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| | | 1 A | T _{.1} = 25 °C | 0.54 | V |
| Maximum forward voltage drop | V (1) | 1.5 A | - IJ=25 C | 0.62 | |
| See fig. 1 | V _{FM} ⁽¹⁾ | 1 A | T _J = 125 °C | 0.49 | |
| | | 1.5 A | | 0.56 | |
| Maximum reverse leakage current | e leakage current | T _J = 25 °C | V _R = Rated V _R | 0.5 | - mA |
| See fig. 2 | I _{RM} ⁽¹⁾ | T _J = 125 °C | | 26 | |
| Threshold voltage | V _{F(TO)} | $T_{J} = T_{J} \text{ maximum} $ 0.36 104 | | 0.36 | V |
| Forward slope resistance | r _t | | | 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 | | nH | |
| Maximum voltage rate of change | dV/dt | Rated V _R 10 000 V/ _L | | V/µs | |

Note

 $^{^{(1)}\,}$ 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} | | -55 to +150 | °C |
| Maximum thermal resistance, junction to ambient | R _{thJA} | DC operation | 80 | °C/W |
| Approximate weight | | | 0.07 | g |
| Approximate weight | | | 0.002 | OZ. |
| Marking device | | Case style SMA (similar D-64) | 1 | F |

Note

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

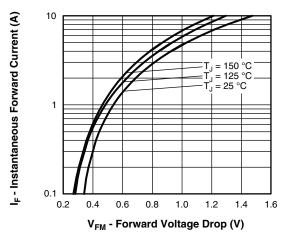


Fig. 1 - Maximum Forward Voltage Drop Characteristics

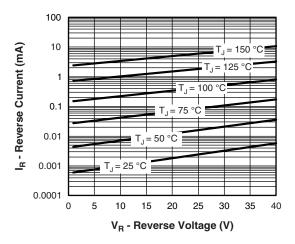


Fig. 2 - Typical Peak Reverse Current vs. Reverse Voltage

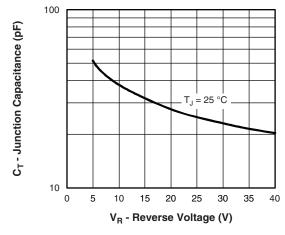
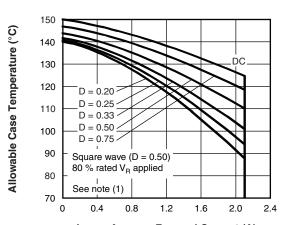


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage



 $I_{F(AV)}$ - Average Forward Current (A)

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

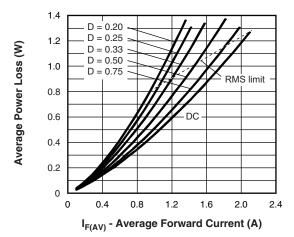


Fig. 5 - Maximum Average Forward Dissipation vs. Average Forward Current

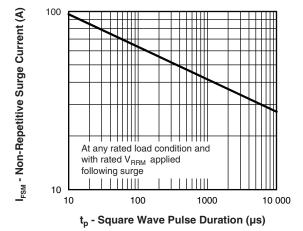


Fig. 6 - Maximum Peak Surge Forward Current vs. Pulse Duration

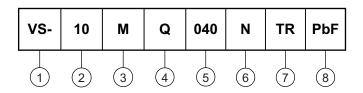
Note

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



ORDERING INFORMATION TABLE

Device code



1 - Vishay Semiconductors product

2 - Current rating (10 = 1 A)

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-10MQ040NTRPbF | 5AT | 7500 | 13" diameter plastic tape and reel | | |

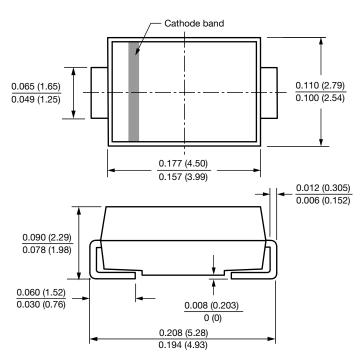
| LINKS TO RELATED DOCUMENTS | | | | |
|--|--------------------------|--|--|--|
| Dimensions <u>www.vishay.com/doc?95400</u> | | | | |
| Part marking information | www.vishay.com/doc?95403 | | | |
| Packaging information | www.vishay.com/doc?95404 | | | |
| SPICE model | www.vishay.com/doc?95277 | | | |
| SPICE model | www.vishay.com/doc?96007 | | | |



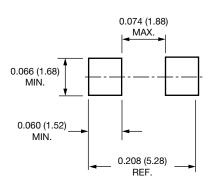
SMA

DIMENSIONS in inches (millimeters)

DO-214AC (SMA)



Mounting Pad Layout





Legal Disclaimer Notice

Vishay

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