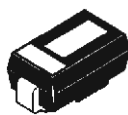


## Schottky Rectifier, 2.1 A



SMA



### FEATURES

- Small foot print, surface mountable
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Lead (Pb)-free ("PbF" suffix)
- Designed and qualified for industrial level


RoHS  
COMPLIANT

### PRODUCT SUMMARY

|             |       |
|-------------|-------|
| $I_{F(AV)}$ | 2.1 A |
| $V_R$       | 60 V  |

### DESCRIPTION

The 20MQ060NPbF 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       | 2.1         | A          |
| $V_{RRM}$   |                            | 60          | V          |
| $I_{FSM}$   | $t_p = 5 \mu s$ sine       | 40          | A          |
| $V_F$       | 2 Apk, $T_J = 125^\circ C$ | 0.68        | V          |
| $T_J$       | Range                      | - 55 to 150 | $^\circ C$ |

### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL    | 20MQ060NPbF | UNITS |
|--------------------------------------|-----------|-------------|-------|
| Maximum DC reverse voltage           | $V_R$     | 60          | V     |
| Maximum working peak reverse voltage | $V_{RWM}$ |             |       |

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                                            | SYMBOL      | TEST CONDITIONS                                                                                                                        | VALUES | UNITS |
|----------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------|--------|-------|
| Maximum average forward current<br>See fig. 4                        | $I_{F(AV)}$ | 50 % duty cycle at $T_C = 107^\circ C$ , rectangular waveform<br>On PC board 9 mm <sup>2</sup> island (0.013 mm thick copper pad area) | 2.1    | A     |
| Maximum peak one cycle<br>non-repetitive surge current<br>See fig. 6 | $I_{FSM}$   | 5 $\mu s$ sine or 3 $\mu s$ rect. pulse                                                                                                | 40     | A     |
|                                                                      |             | 10 ms sine or 6 ms rect. pulse                                                                                                         | 10     |       |
| Non-repetitive avalanche energy                                      | $E_{AS}$    | $T_J = 25^\circ C$ , $I_{AS} = 1 A$ , $L = 4 mH$                                                                                       | 2.0    | mJ    |
| Repetitive avalanche current                                         | $I_{AR}$    |                                                                                                                                        | 1.0    | A     |

| ELECTRICAL SPECIFICATIONS                     |                                |                                                                                   |                                       |        |       |
|-----------------------------------------------|--------------------------------|-----------------------------------------------------------------------------------|---------------------------------------|--------|-------|
| PARAMETER                                     | SYMBOL                         | TEST CONDITIONS                                                                   |                                       | VALUES | UNITS |
| Maximum forward voltage drop<br>See fig. 1    | V <sub>FM</sub> <sup>(1)</sup> | 2 A                                                                               | T <sub>J</sub> = 25 °C                | 0.78   | V     |
|                                               |                                | 1.5 A                                                                             |                                       | 0.71   |       |
|                                               |                                | 1 A                                                                               |                                       | 0.63   |       |
|                                               |                                | 2 A                                                                               | T <sub>J</sub> = 125 °C               | 0.68   |       |
|                                               |                                | 1.5 A                                                                             |                                       | 0.63   |       |
|                                               |                                | 1 A                                                                               |                                       | 0.57   |       |
| Maximum reverse leakage current<br>See fig. 2 | I <sub>RM</sub> <sup>(1)</sup> | T <sub>J</sub> = 25 °C                                                            | V <sub>R</sub> = Rated V <sub>R</sub> | 0.5    | mA    |
|                                               |                                | T <sub>J</sub> = 125 °C                                                           |                                       | 7.5    |       |
| Threshold voltage                             | V <sub>F(TO)</sub>             | T <sub>J</sub> = T <sub>J</sub> maximum                                           |                                       | 0.45   | V     |
| Forward slope resistance                      | r <sub>t</sub>                 |                                                                                   |                                       | 86.8   | mΩ    |
| Typical junction capacitance                  | C <sub>T</sub>                 | V <sub>R</sub> = 10 V <sub>DC</sub> , T <sub>J</sub> = 25 °C, test signal = 1 MHz |                                       | 31     | pF    |
| Typical series inductance                     | L <sub>S</sub>                 | Measured lead to lead 5 mm from package body                                      |                                       | 2.0    | nH    |
| Maximum voltage rate of change                | dV/dt                          | Rated V <sub>R</sub>                                                              |                                       | 10 000 | 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 <sub>J</sub> <sup>(1)</sup> , T <sub>Stg</sub> |                               | - 55 to 150 | °C    |
| Maximum thermal resistance, junction to ambient | R <sub>thJA</sub>                                | DC operation                  | 80          | °C/W  |
| Approximate weight                              |                                                  |                               | 0.07        | g     |
|                                                 |                                                  |                               | 0.002       | oz.   |
| Marking device                                  |                                                  | Case style SMA (similar D-64) | V2H         |       |

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

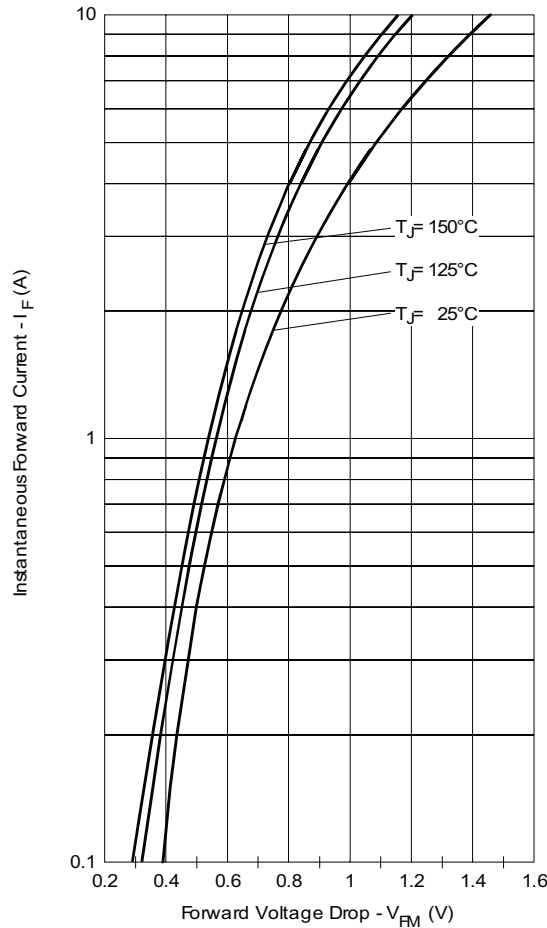


Fig. 1 - Maximum Forward Voltage Drop Characteristics

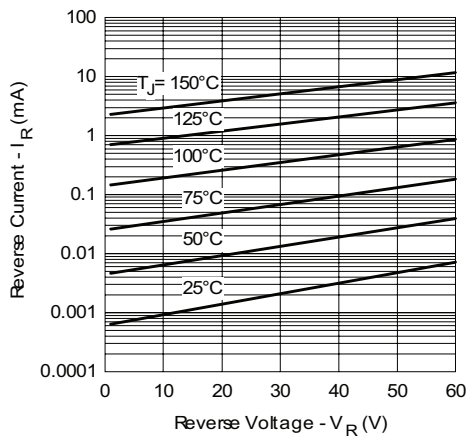


Fig. 2 - Typical Peak Reverse Current vs. Reverse Voltage

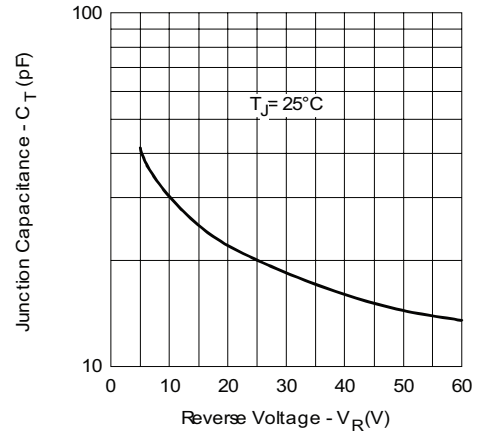


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

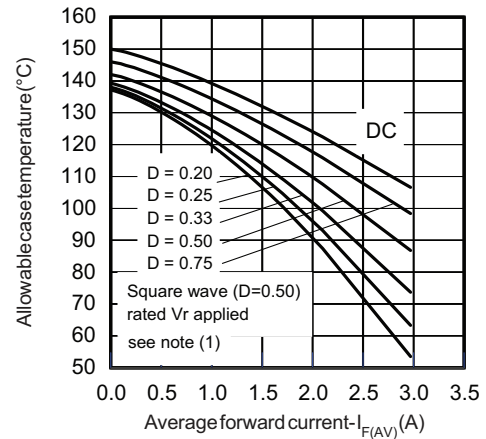


Fig. 4 - Maximum Average Forward Current vs. Allowable Lead Temperature

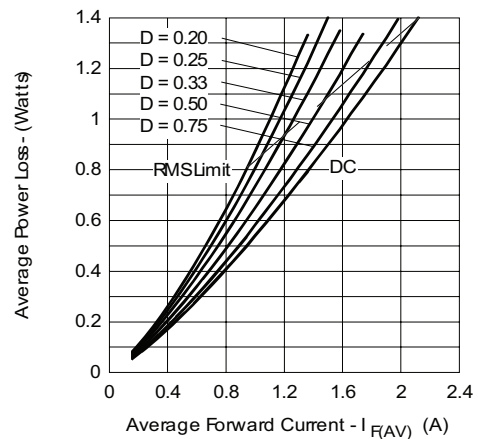


Fig. 5 - Maximum Average Forward Dissipation vs. Average Forward Current

#### Note

(1) Formula used:  $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$ ;

$P_d$  = Forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 6);  $P_{d_{REV}}$  = Inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1} = 80\%$  rated  $V_R$

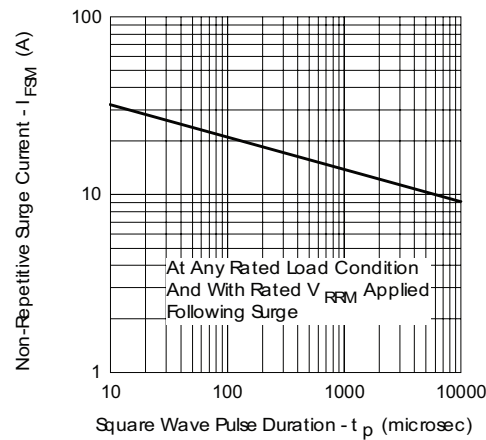


Fig. 6 - Maximum Peak Surge Forward Current vs. Pulse Duration

ORDERING INFORMATION TABLE

|             |    |   |   |     |   |    |     |
|-------------|----|---|---|-----|---|----|-----|
| Device code | 20 | M | Q | 060 | N | TR | PbF |
|             | 1  | 2 | 3 | 4   | 5 | 6  | 7   |

- 1 - Current rating
- 2 - M = SMA
- 3 - Q = Schottky “Q” series
- 4 - Voltage rating (060 = 60 V)
- 5 - N = New SMA
- 6 -
  - None = Box (1000 pieces)
  - TR = Tape and reel (7500 pieces)
- 7 - PbF = Lead (Pb)-free

| LINKS TO RELATED DOCUMENTS |                                                                               |
|----------------------------|-------------------------------------------------------------------------------|
| Dimensions                 | <a href="http://www.vishay.com/doc?95018">http://www.vishay.com/doc?95018</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95029">http://www.vishay.com/doc?95029</a> |
| Packaging information      | <a href="http://www.vishay.com/doc?95034">http://www.vishay.com/doc?95034</a> |



### Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.