# Schottky Rectifier, 3.0 A

SMC


## FEATURES

- Small foot print, surface mountable
- Very 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
- Compliant to RoHS directive 2002/95/EC
- Designed and qualified for industrial level

RoHS COMPLIANT

## DESCRIPTION

The VS-30BQ060PbF surface mount Schottky rectifier has been designed for applications requiring low forward drop and 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 | |
|---|---|
| $I_{F(AV)}$ | 3.0 A |
| $V_R$ | 60 V |

| MAJOR RATINGS AND CHARACTERISTICS | | | |
|---|---|---|---|
| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
| $I_{F(AV)}$ | Rectangular waveform | 3.0 | A |
| $V_{RRM}$ | | 60 | V |
| $I_{FSM}$ | $t_p$ = 5 µs sine | 1200 | A |
| $V_F$ | 3.0 Apk, $T_J$ = 125 °C | 0.52 | V |
| $T_J$ | Range | - 55 to 150 | °C |

| VOLTAGE RATINGS | | | |
|---|---|---|---|
| PARAMETER | SYMBOL | VS-30BQ060PbF | 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 | $I_{F(AV)}$ | 50 % duty cycle at $T_L$ = 123 °C, rectangular waveform | | 3.0 | A |
| | | 50 % duty cycle at $T_L$ = 113 °C, rectangular waveform | | 4.0 | |
| Maximum peak one cycle non-repetitive surge current at $T_C$ = 25 °C | $I_{FSM}$ | 5 µs sine or 3 µs rect. pulse | Following any rated load condition and with rated $V_{RRM}$ applied | 1200 | |
| | | 10 ms sine or 6 ms rect. pulse | | 130 | |
| Non-repetitive avalanche energy | $E_{AS}$ | $T_J$ = 25 °C, $I_{AS}$ = 1.0 A, L = 10 mH | | 5.0 | mJ |
| Repetitive avalanche current | $I_{AR}$ | Current decaying linearly to zero in 1 µs<br>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 | $V_{FM}$ (1) | 3 A | $T_J$ = 25 °C | 0.58 | V |
| | | 6 A | | 0.76 | |
| | | 3 A | $T_J$ = 125 °C | 0.52 | |
| | | 6 A | | 0.66 | |
| Maximum reverse leakage current | $I_{RM}$ (1) | $T_J$ = 25 °C | $V_R$ = Rated $V_R$ | 0.5 | mA |
| | | $T_J$ = 125 °C | | 20 | |
| Maximum junction capacitance | $C_T$ | $V_R$ = 5 $V_{DC}$ (test signal range 100 kHz to1 MHz), 25 °C | | 180 | pF |
| Typical series inductance | $L_S$ | Measured lead to lead 5 mm from package body | | 3.0 | 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 temperature range | $T_J$ (1) | | - 55 to 150 | °C |
| Maximum storage temperature range | $T_{Stg}$ | | | |
| Maximum thermal resistance, junction to lead | $R_{thJL}$ (2) | DC operation | 12 | °C/W |
| Maximum thermal resistance, junction to ambient | $R_{thJA}$ | | 46 | |
| Approximate weight | | | 0.24 | g |
| | | | 0.008 | oz. |
| Marking device | | Case style SMC (similar to DO-214AB) | V3H | |

**Notes**

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

(2) Mounted 1" square PCB




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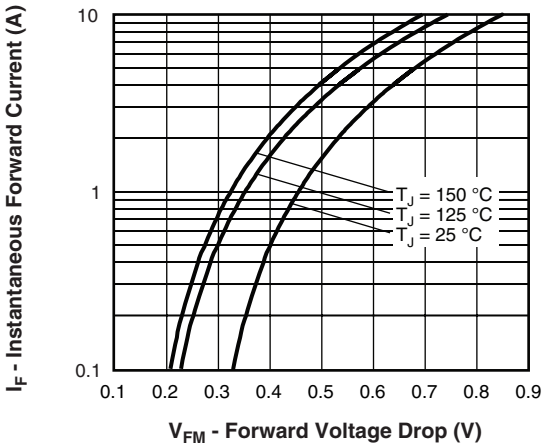


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

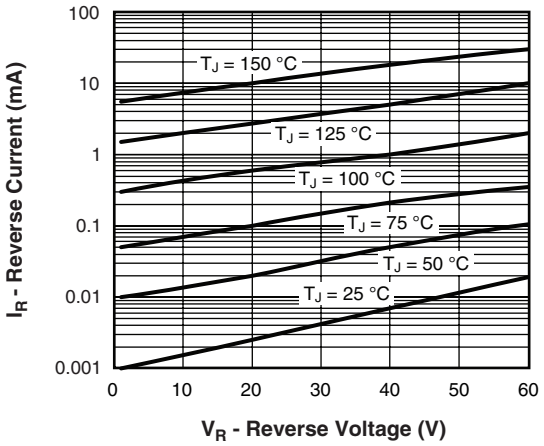


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

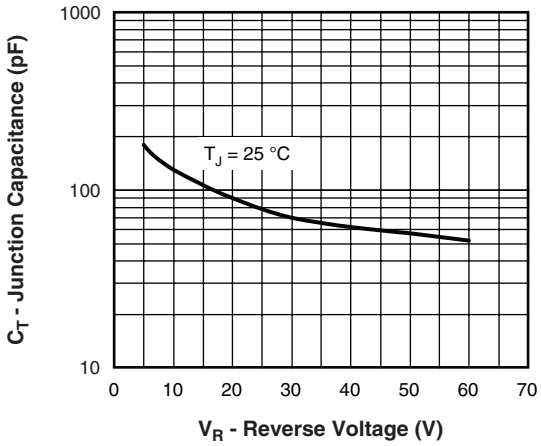


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

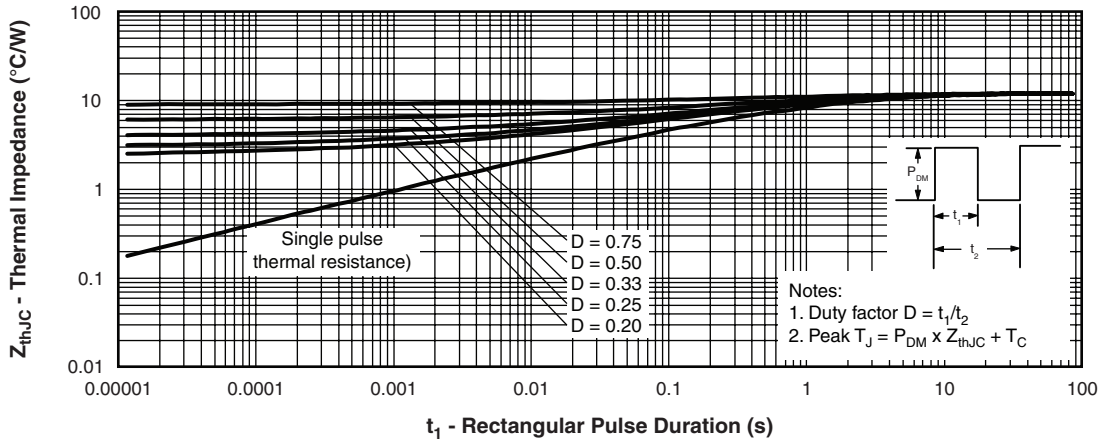


Fig. 4 - Maximum Thermal Impedance $Z_{thJC}$ Characteristics (Per Leg)



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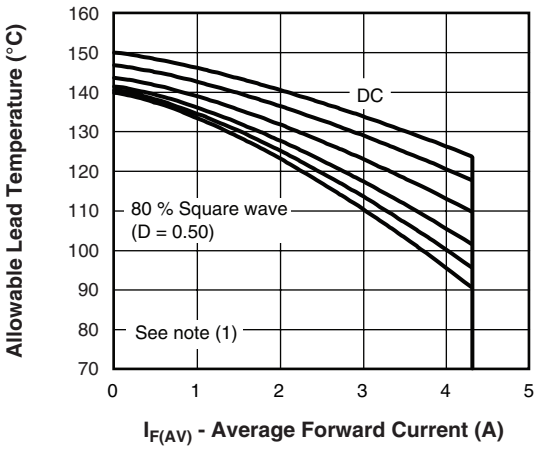


Fig. 5 - Maximum Average Forward Current vs. Allowable Lead Temperature

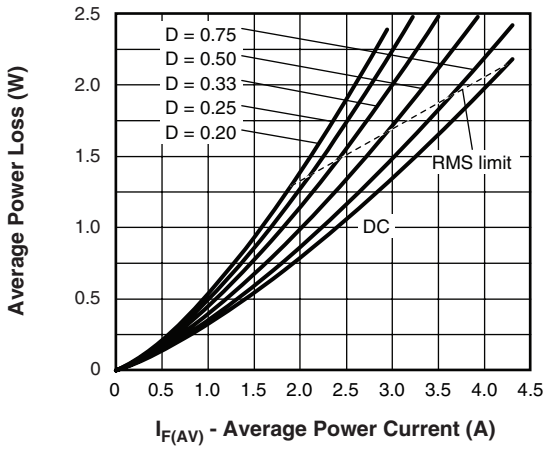


Fig. 6 - Maximum Average Forward Dissipation vs. Average Forward Current

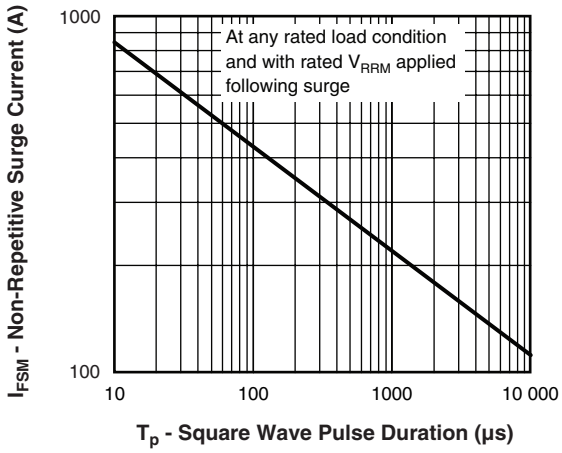


Fig. 7 - Maximum Peak Surge Forward Current vs. Pulse Duration

**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- | 30 | B | Q | 060 | TR | PbF |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

1 - HPP product suffix
2 - Current rating
3 - B = Single lead diode
4 - Q = Schottky “Q” series
5 - Voltage rating (060 = 60 V)
6 - • None = Box (1000 pieces)
• TR = Tape and reel (3000 pieces)
7 - PbF = Lead (Pb)-free

| LINKS TO RELATED DOCUMENTS | | |
|---|---|---|
| Dimensions | | www.vishay.com/doc?95023 |
| Part marking information | | www.vishay.com/doc?95029 |
| Packaging information | Tape and reel | www.vishay.com/doc?95034 |
| | Bulk | www.vishay.com/doc?95397 |



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