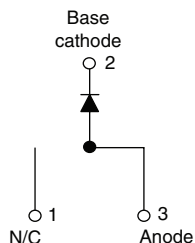


## Schottky Rectifier, 15 A



D<sup>2</sup>PAK



### FEATURES

- 150 °C T<sub>J</sub> operation
- Very low forward voltage drop
- High frequency operation
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Guard ring for enhanced ruggedness and long term reliability
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Halogen-free according to IEC 61249-2-21 definition
- Compliant to RoHS directive 2002/95/EC
- AEC-Q101 qualified



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

### PRODUCT SUMMARY

|                    |              |
|--------------------|--------------|
| I <sub>F(AV)</sub> | 15 A         |
| V <sub>R</sub>     | 35 V to 45 V |

### DESCRIPTION

The VS-12TQ...SPbF Schottky rectifier series has been optimized for very low forward voltage drop, with moderate leakage. The proprietary barrier technology allows for reliable operation up to 150 °C junction temperature. Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection.

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL             | CHARACTERISTICS                 | VALUES      | UNITS |
|--------------------|---------------------------------|-------------|-------|
| I <sub>F(AV)</sub> | Rectangular waveform            | 15          | A     |
| V <sub>RRM</sub>   | Range                           | 35 to 45    | V     |
| I <sub>FSM</sub>   | t <sub>p</sub> = 5 μs sine      | 990         | A     |
| V <sub>F</sub>     | 15 Apk, T <sub>J</sub> = 125 °C | 0.50        | V     |
| T <sub>J</sub>     | Range                           | - 55 to 150 | °C    |

### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL           | VS-12TQ035SPbF | VS-12TQ040SPbF | VS-12TQ045SPbF | UNITS |
|--------------------------------------|------------------|----------------|----------------|----------------|-------|
| Maximum DC reverse voltage           | V <sub>R</sub>   | 35             | 40             | 45             | V     |
| Maximum working peak reverse voltage | V <sub>RWM</sub> |                |                |                |       |

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                                            | SYMBOL             | TEST CONDITIONS                                                                                                                        | VALUES | UNITS |
|----------------------------------------------------------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------|--------|-------|
| Maximum average forward current<br>See fig. 5                        | I <sub>F(AV)</sub> | 50 % duty cycle at T <sub>C</sub> = 120 °C, rectangular waveform                                                                       | 15     | A     |
| Maximum peak one cycle<br>non-repetitive surge current<br>See fig. 7 | I <sub>FSM</sub>   | 5 μs sine or 3 μs rect. pulse                                                                                                          | 990    | A     |
|                                                                      |                    | 10 ms sine or 6 ms rect. pulse                                                                                                         | 250    |       |
| Non-repetitive avalanche energy                                      | E <sub>AS</sub>    | T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 2.4 A, L = 5.5 mH                                                                            | 16     | mJ    |
| Repetitive avalanche current                                         | I <sub>AR</sub>    | Current decaying linearly to zero in 1 μs<br>Frequency limited by T <sub>J</sub> maximum V <sub>A</sub> = 1.5 x V <sub>R</sub> typical | 2.4    | A     |

| ELECTRICAL SPECIFICATIONS                     |                                |                                                                                |                                       |        |       |
|-----------------------------------------------|--------------------------------|--------------------------------------------------------------------------------|---------------------------------------|--------|-------|
| PARAMETER                                     | SYMBOL                         | TEST CONDITIONS                                                                |                                       | VALUES | UNITS |
| Maximum forward voltage drop<br>See fig. 1    | V <sub>FM</sub> <sup>(1)</sup> | 15 A                                                                           | T <sub>J</sub> = 25 °C                | 0.56   | V     |
|                                               |                                | 30 A                                                                           |                                       | 0.71   |       |
|                                               |                                | 15 A                                                                           | T <sub>J</sub> = 125 °C               | 0.50   |       |
|                                               |                                | 30 A                                                                           |                                       | 0.64   |       |
| 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> | 1.75   | mA    |
|                                               |                                | T <sub>J</sub> = 125 °C                                                        |                                       | 70     |       |
| Maximum junction capacitance                  | C <sub>T</sub>                 | V <sub>R</sub> = 5 V <sub>DC</sub> (test signal range 100 kHz to 1 MHz), 25 °C |                                       | 900    | pF    |
| Typical series inductance                     | L <sub>S</sub>                 | Measured lead to lead 5 mm from package body                                   |                                       | 8.0    | nH    |
| Maximum voltage rate of change                | dV/dt                          | Rated V <sub>R</sub>                                                           |                                       | 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 <sub>J</sub> , T <sub>Stg</sub> |                                      | - 55 to 150 | °C                     |
| Maximum thermal resistance, junction to case   | R <sub>thJC</sub>                 | DC operation<br>See fig. 4           | 2.0         | °C/W                   |
| Typical thermal resistance, case to heatsink   | R <sub>thCS</sub>                 | Mounting surface, smooth and greased | 0.50        |                        |
| Approximate weight                             |                                   |                                      | 2           | g                      |
|                                                |                                   |                                      | 0.07        | oz.                    |
| Mounting torque                                | minimum                           |                                      | 6 (5)       | kgf · cm<br>(lbf · in) |
|                                                | maximum                           |                                      | 12 (10)     |                        |
| Marking device                                 |                                   | Case style D <sup>2</sup> PAK        | 12TQ045S    |                        |



# VS-12TQ035SPbF, VS-12TQ040SPbF, VS-12TQ045SPbF

Schottky Rectifier, 15 A Vishay High Power Products

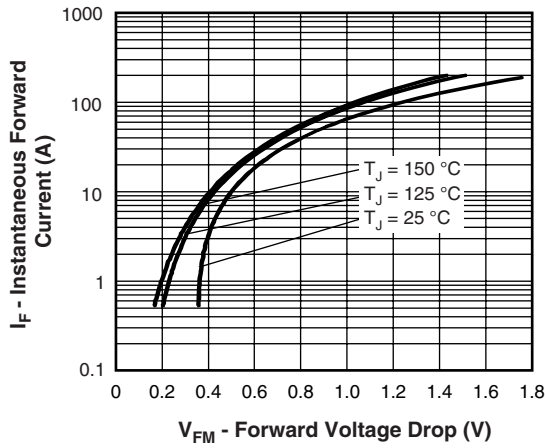


Fig. 1 - Maximum Forward Voltage Drop Characteristics

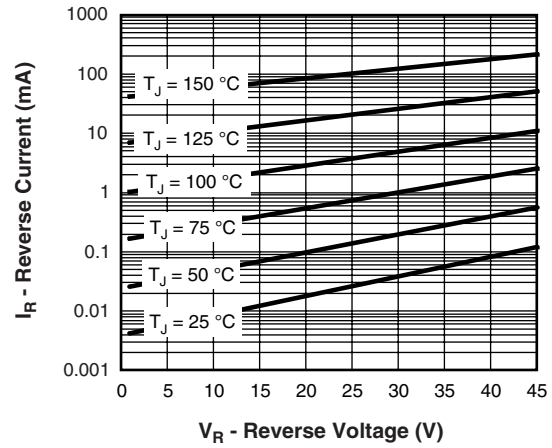


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

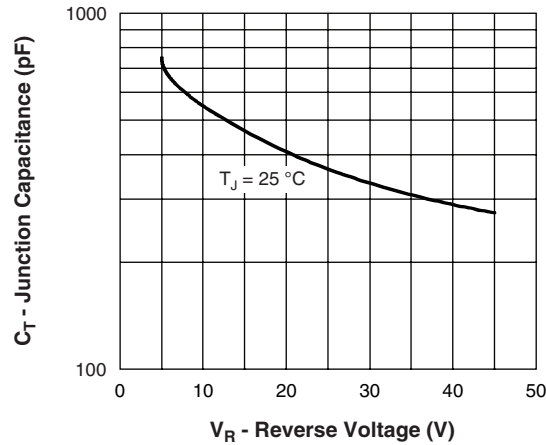


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

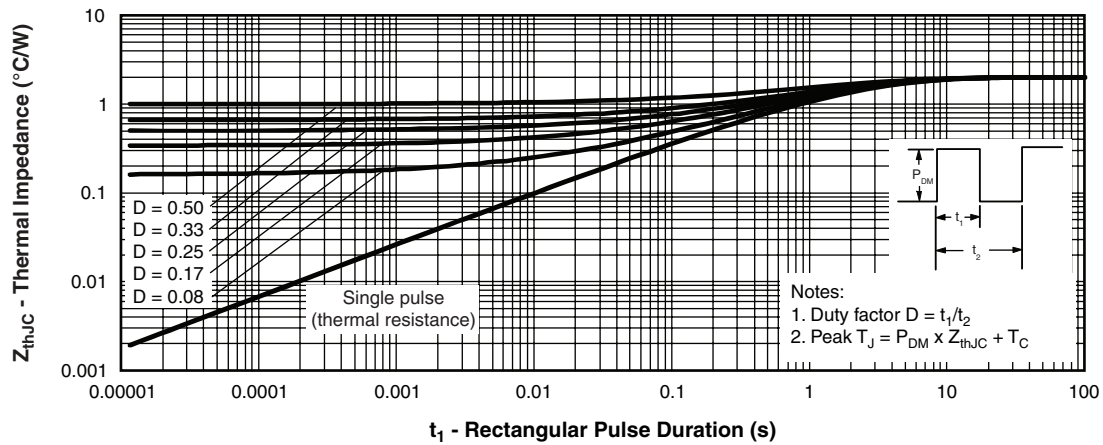


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

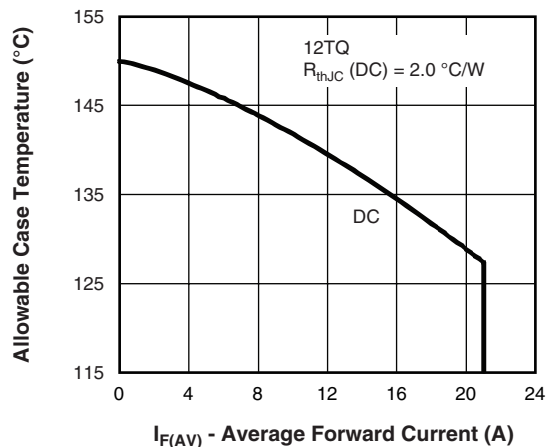


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

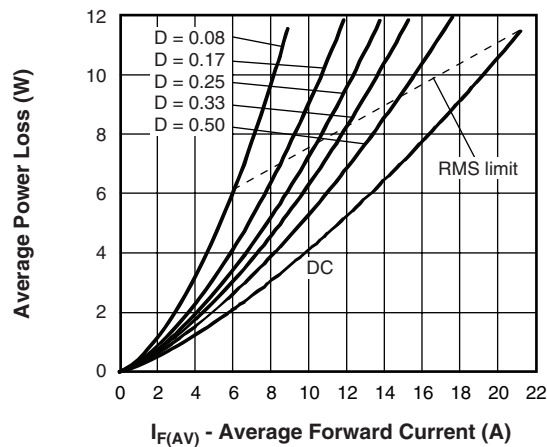


Fig. 6 - Forward Power Loss Characteristics

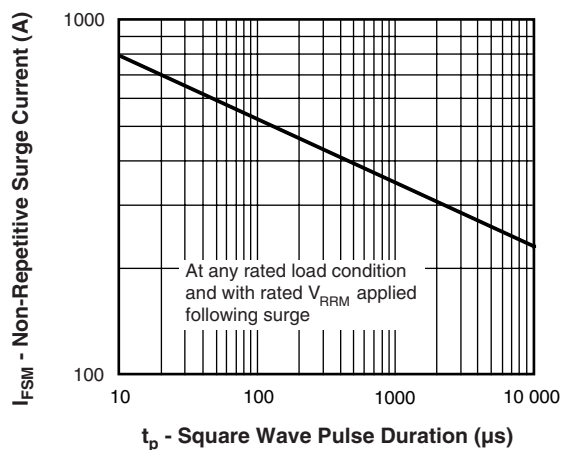


Fig. 7 - Maximum Non-Repetitive Surge Current

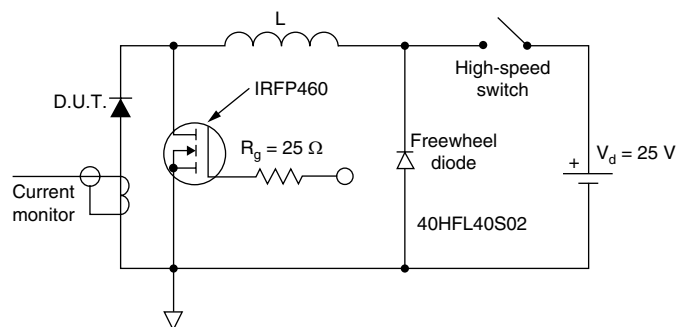


Fig. 8 - Unclamped Inductive Test Circuit



# VS-12TQ035SPbF, VS-12TQ040SPbF, VS-12TQ045SPbF

Schottky Rectifier, 15 A Vishay High Power Products

## ORDERING INFORMATION TABLE

|             |     |    |   |   |     |   |     |     |
|-------------|-----|----|---|---|-----|---|-----|-----|
| Device code | VS- | 12 | T | Q | 045 | S | TRL | PbF |
|             | 1   | 2  | 3 | 4 | 5   | 6 | 7   | 8   |

- |   |   |                                                                                                                                                                        |
|---|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | - | HPP product suffix                                                                                                                                                     |
| 2 | - | Current rating                                                                                                                                                         |
| 3 | - | Package: T = TO-220                                                                                                                                                    |
| 4 | - | Schottky "Q" series                                                                                                                                                    |
| 5 | - | Voltage ratings                                                                                                                                                        |
| 6 | - | S = D <sup>2</sup> PAK                                                                                                                                                 |
| 7 | - | <ul style="list-style-type: none"><li>• None = Tube (50 pieces)</li><li>• TRL = Tape and reel (left oriented)</li><li>• TRR = Tape and reel (right oriented)</li></ul> |
| 8 | - | PbF = Lead (Pb)-free                                                                                                                                                   |
- 035 = 35 V

040 = 40 V

045 = 45 V

| LINKS TO RELATED DOCUMENTS |                                                                        |
|----------------------------|------------------------------------------------------------------------|
| Dimensions                 | <a href="http://www.vishay.com/doc?95014">www.vishay.com/doc?95014</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95008">www.vishay.com/doc?95008</a> |
| Packaging information      | <a href="http://www.vishay.com/doc?95032">www.vishay.com/doc?95032</a> |



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