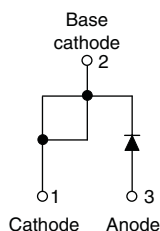


### Schottky Rectifier, 15 A



TO-220AC



#### FEATURES

- 150 °C  $T_J$  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
- Designed and qualified for industrial level

#### DESCRIPTION

The 12TQ... 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.

#### PRODUCT SUMMARY

|             |            |
|-------------|------------|
| $I_{F(AV)}$ | 15 A       |
| $V_R$       | 35 to 45 V |

#### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL      | CHARACTERISTICS             | VALUES      | UNITS      |
|-------------|-----------------------------|-------------|------------|
| $I_{F(AV)}$ | Rectangular waveform        | 15          | A          |
| $V_{RRM}$   | Range                       | 35 to 45    | V          |
| $I_{FSM}$   | $t_p = 5 \mu s$ sine        | 990         | A          |
| $V_F$       | 15 Apk, $T_J = 125^\circ C$ | 0.50        | V          |
| $T_J$       | Range                       | - 55 to 150 | $^\circ C$ |

#### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL    | 12TQ035 | 12TQ040 | 12TQ045 | UNITS |
|--------------------------------------|-----------|---------|---------|---------|-------|
| Maximum DC reverse voltage           | $V_R$     | 35      | 40      | 45      | V     |
| Maximum working peak reverse voltage | $V_{RWM}$ |         |         |         |       |

#### ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                                         | SYMBOL      | TEST CONDITIONS                                                                                                           |                                                                     | VALUES | UNITS |
|-------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|--------|-------|
| Maximum average forward current<br>See fig. 5                     | $I_{F(AV)}$ | 50 % duty cycle at $T_C = 120\text{ }^{\circ}\text{C}$ , rectangular waveform                                             |                                                                     | 15     | A     |
| Maximum peak one cycle non-repetitive surge current<br>See fig. 7 | $I_{FSM}$   | 5 $\mu\text{s}$ sine or 3 $\mu\text{s}$ rect. pulse                                                                       | Following any rated load condition and with rated $V_{RRM}$ applied | 990    |       |
|                                                                   |             | 10 ms sine or 6 ms rect. pulse                                                                                            |                                                                     | 250    |       |
| Non-repetitive avalanche energy                                   | $E_{AS}$    | $T_J = 25\text{ }^{\circ}\text{C}$ , $I_{AS} = 2.4\text{ A}$ , $L = 5.5\text{ mH}$                                        |                                                                     | 16     | mJ    |
| Repetitive avalanche current                                      | $I_{AR}$    | Current decaying linearly to zero in 1 $\mu\text{s}$<br>Frequency limited by $T_J$ maximum $V_A = 1.5 \times V_R$ 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**(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> , 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 TO-220AC               | 12TQ035                              |             |                        |
|                                                |         |                                   | 12TQ040                              |             |                        |
|                                                |         |                                   | 12TQ045                              |             |                        |

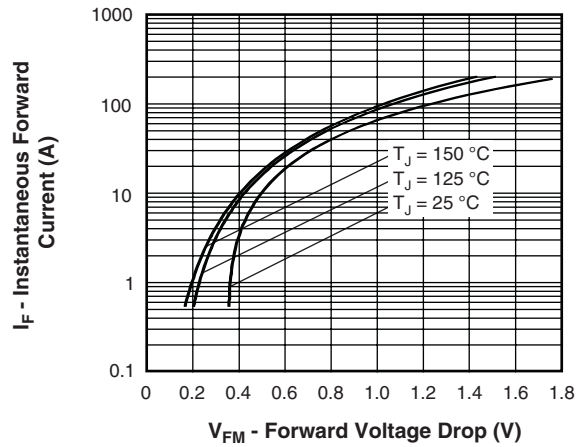


Fig. 1 - Maximum Forward Voltage Drop Characteristics

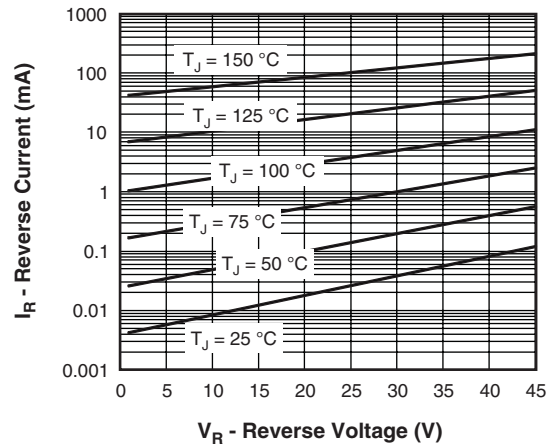


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

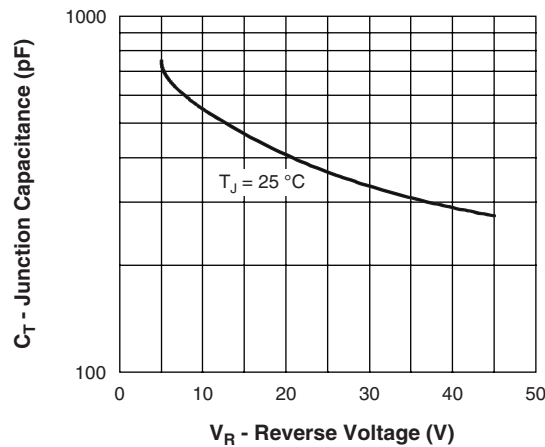


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

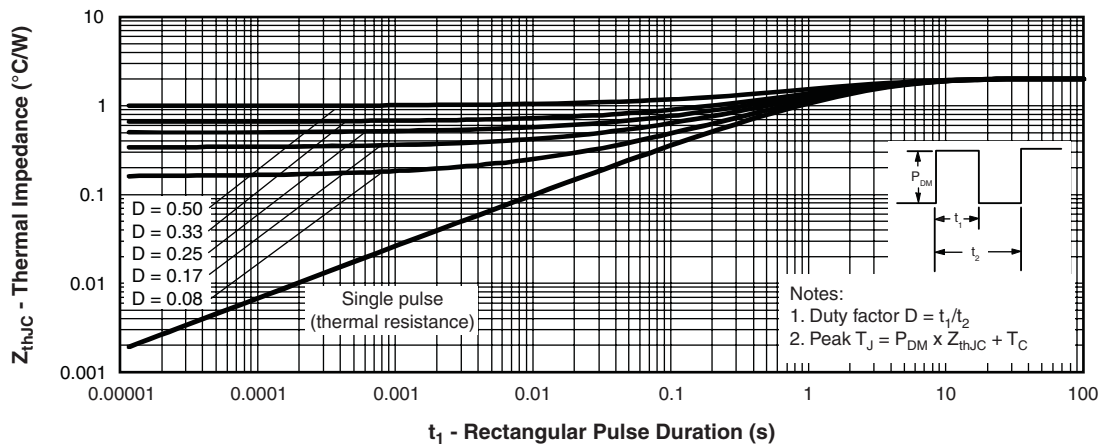


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

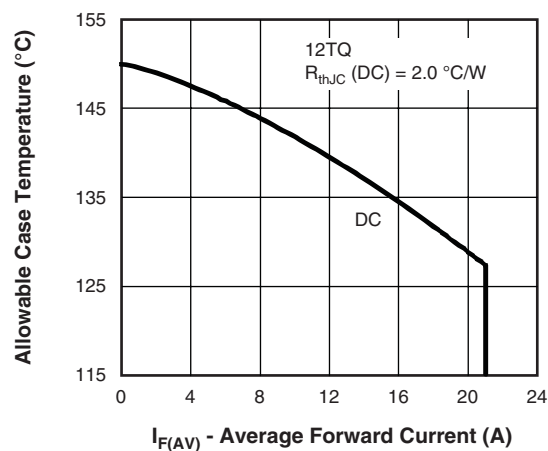


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

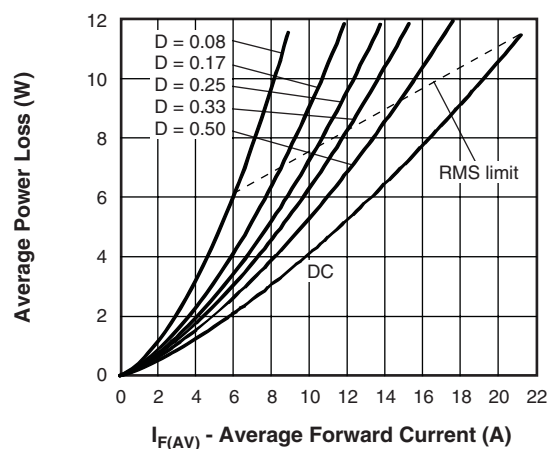


Fig. 6 - Forward Power Loss Characteristics

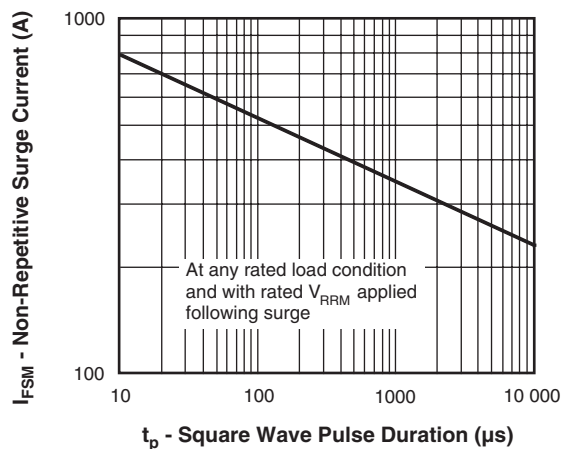


Fig. 7 - Maximum Non-Repetitive Surge Current

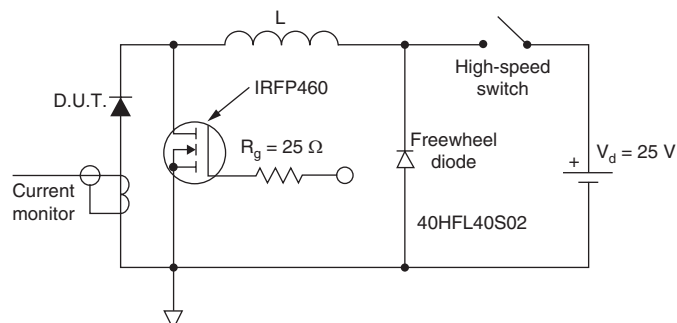


Fig. 8 - Unclamped Inductive Test Circuit



### ORDERING INFORMATION TABLE

|             |    |   |                              |     |   |
|-------------|----|---|------------------------------|-----|---|
| Device code | 12 | T | Q                            | 045 | - |
|             | ①  | ② | ③                            | ④   | ⑤ |
|             | 1  | - | Current rating (15 A)        |     |   |
|             | 2  | - | Package:                     |     |   |
|             |    |   | T = TO-220                   |     |   |
|             | 3  | - | Schottky "Q" series          |     |   |
|             | 4  | - | Voltage ratings              |     |   |
|             | 5  | - | • None = Standard production |     |   |
|             |    |   | • PbF = Lead (Pb)-free       |     |   |

035 = 35 V  
040 = 40 V  
045 = 45 V

Tube standard pack quantity: 50 pieces

| LINKS TO RELATED DOCUMENTS |                                                                               |
|----------------------------|-------------------------------------------------------------------------------|
| Dimensions                 | <a href="http://www.vishay.com/doc?95221">http://www.vishay.com/doc?95221</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95224">http://www.vishay.com/doc?95224</a> |



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