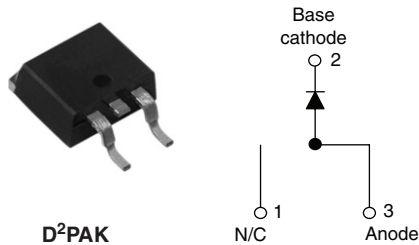


## Schottky Rectifier, 6 A



### FEATURES

- 175 °C  $T_J$  operation
- High frequency operation
- Low forward voltage drop
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Guard ring for enhanced ruggedness and long term reliability
- Lead (Pb)-free ("PbF" suffix)
- Designed and qualified for Q101 level


**RoHS\***  
COMPLIANT

### PRODUCT SUMMARY

|             |            |
|-------------|------------|
| $I_{F(AV)}$ | 6 A        |
| $V_R$       | 35 to 45 V |

### DESCRIPTION

The 6TQ.. Schottky rectifier series has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 175 °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            |
|-------------|---|-------------|------------------|
| $I_{F(AV)}$ | Rectangular waveform                      | 6           | A                |
| $V_{RRM}$   | Range                                     | 35 to 45    | V                |
| $I_{FSM}$   | $t_p = 5 \mu s$ sine                      | 690         | A                |
| $V_F$       | 6 Apk, $T_J = 125 \text{ }^\circ\text{C}$ | 0.53        | V                |
| $T_J$       | Range                                     | - 55 to 175 | $^\circ\text{C}$ |

### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL    | 6TQ035S | 6TQ040S | 6TQ045S | 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 $T_C = 164 \text{ }^\circ\text{C}$ , rectangular waveform  | 6      | A     |
| Maximum peak one cycle<br>non-repetitive surge current<br>See fig. 7 | $I_{FSM}$   | 5 $\mu s$ sine or 3 $\mu s$ rect. pulse   | 690    |       |
|  |             | 10 ms sine or 6 ms rect. pulse  | 140    |       |
| Non-repetitive avalanche energy                                      | $E_{AS}$    | $T_J = 25 \text{ }^\circ\text{C}$ , $I_{AS} = 1.20 \text{ A}$ , $L = 11.10 \text{ mH}$                              | 8      | mJ    |
| Repetitive avalanche current   | $I_{AR}$    | Current decaying linearly to zero in 1 $\mu s$<br>Frequency limited by $T_J$ maximum $V_A = 1.5 \times V_R$ typical | 1.20   | A     |

\* Pb containing terminations are not RoHS compliant, exemptions may apply

| ELECTRICAL SPECIFICATIONS                     |                |   |                                   |        |            |
|---|----------------|---|-----------------------------------|--------|------------|
| PARAMETER                                     | SYMBOL         | TEST CONDITIONS   |                                   | VALUES | UNITS      |
| Maximum forward voltage drop<br>See fig. 1    | $V_{FM}^{(1)}$ | 6 A   | $T_J = 25\text{ }^\circ\text{C}$  | 0.60   | V          |
|   |                | 12 A  |                                   | 0.73   |            |
|   |                | 6 A   | $T_J = 125\text{ }^\circ\text{C}$ | 0.53   |            |
|   |                | 12 A  |                                   | 0.64   |            |
| Maximum reverse leakage current<br>See fig. 2 | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^\circ\text{C}$  | $V_R = \text{Rated } V_R$         | 0.8    | mA         |
|   |                | $T_J = 125\text{ }^\circ\text{C}$   |                                   | 7      |            |
| Threshold voltage                             | $V_{F(TO)}$    | $T_J = T_J \text{ maximum}$   |                                   | 0.35   | V          |
| Forward slope resistance                      | $r_f$          |   |                                   | 18.23  | m $\Omega$ |
| Maximum junction capacitance                  | $C_T$          | $V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$ |                                   | 400    | pF         |
| Typical series inductance                     | $L_S$          | Measured lead to lead 5 mm from package body  |                                   | 8.0    | nH         |
| Maximum voltage rate of change                | dV/dt          | Rated $V_R$   |                                   | 10 000 | V/ $\mu$ s |

**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 | $T_J, T_{Stg}$ |                                      |  | - 55 to 175 | $^\circ\text{C}$       |
| Maximum thermal resistance, junction to case   | $R_{thJC}$     | DC operation<br>See fig. 4           |  | 2.2         | $^\circ\text{C/W}$     |
| Typical thermal resistance, case to heatsink   | $R_{thCS}$     | 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        |  | 6TQ035S     |                        |
|  |                |                                      |  | 6TQ040S     |                        |
|  |                |                                      |  | 6TQ045S     |                        |

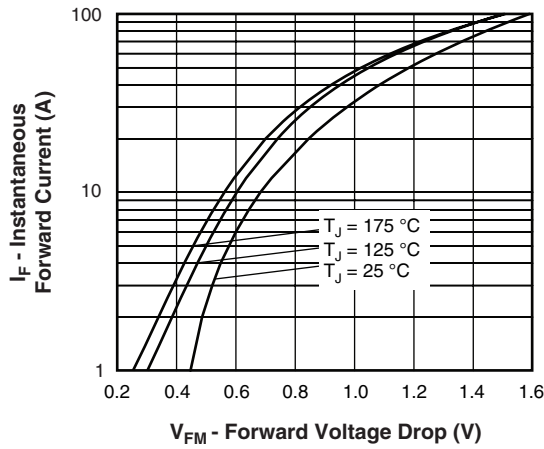


Fig. 1 - Maximum Forward Voltage Drop Characteristics

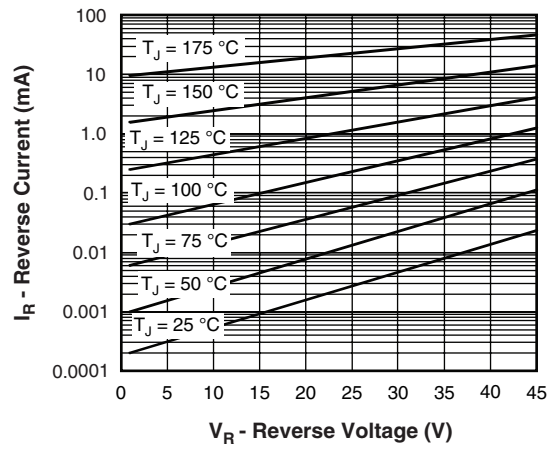


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

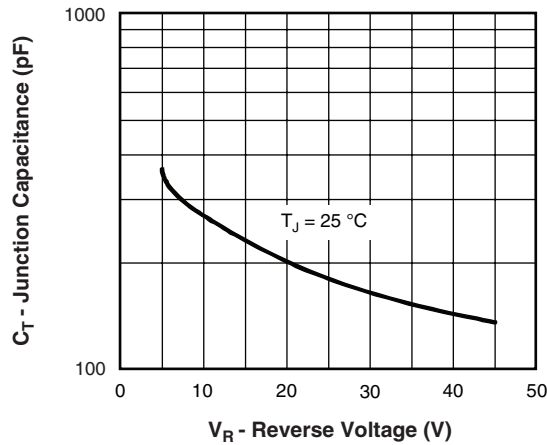
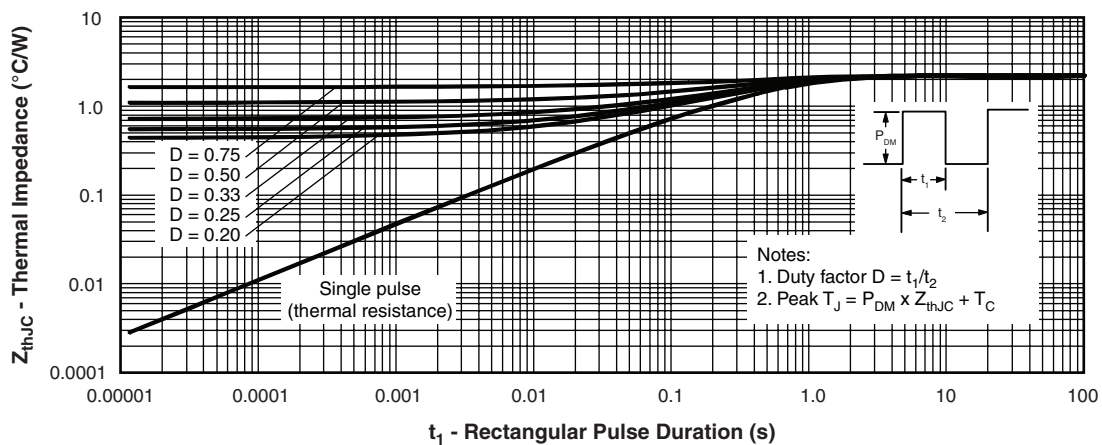


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


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

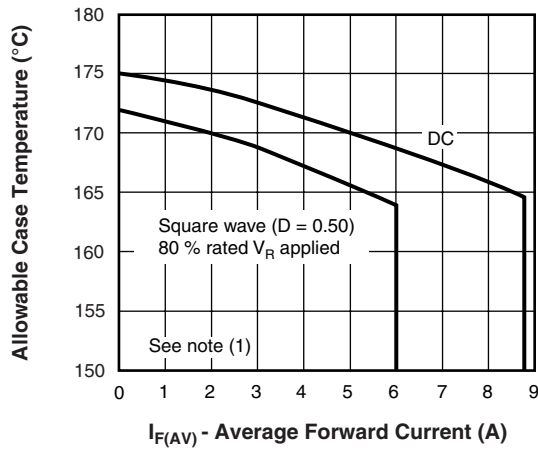


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

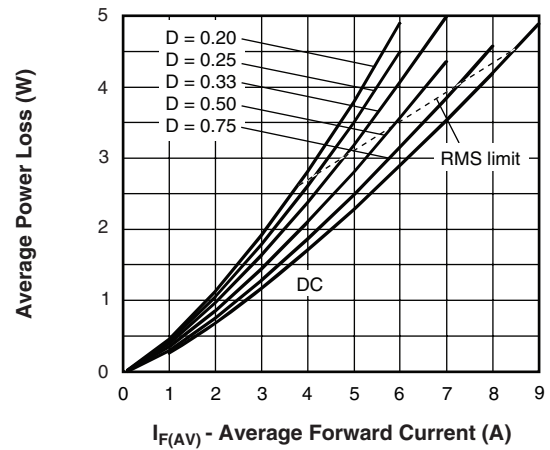


Fig. 6 - Forward Power Loss Characteristics

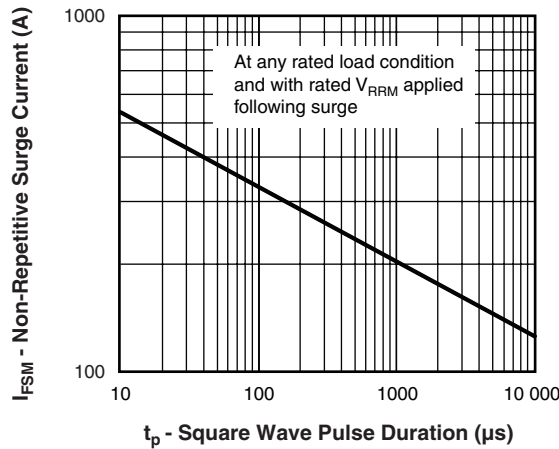


Fig. 7 - Maximum Non-Repetitive Surge Current

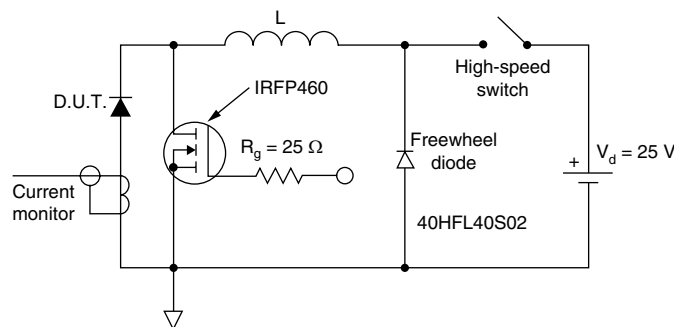


Fig. 8 - Unclamped Inductive Test Circuit

**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  $V_R$



**ORDERING INFORMATION TABLE**

|             |          |          |          |            |          |            |            |
|-------------|----------|----------|----------|------------|----------|------------|------------|
| Device code | <b>6</b> | <b>T</b> | <b>Q</b> | <b>045</b> | <b>S</b> | <b>TRL</b> | <b>PbF</b> |
|             | ①        | ②        | ③        | ④          | ⑤        | ⑥          | ⑦          |

|          |   |  |  |
|----------|---|--|--|
| <b>1</b> | - | Current rating (6 A)   |  |
| <b>2</b> | - | Package:<br>T = TO-220   |  |
| <b>3</b> | - | Schottky "Q" series  |  |
| <b>4</b> | - | Voltage ratings  | 035 = 35 V<br>040 = 40 V<br>045 = 45 V |
| <b>5</b> | - | S = D <sup>2</sup> PAK   |  |
| <b>6</b> | - | <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> |  |
| <b>7</b> | - | <ul style="list-style-type: none"><li>• None = Standard production</li><li>• PbF = Lead (Pb)-free</li></ul>  |  |

| LINKS TO RELATED DOCUMENTS |   |
|----------------------------|---|
| Dimensions                 | <a href="http://www.vishay.com/doc?95046">http://www.vishay.com/doc?95046</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95054">http://www.vishay.com/doc?95054</a> |
| Packaging information      | <a href="http://www.vishay.com/doc?95032">http://www.vishay.com/doc?95032</a> |



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