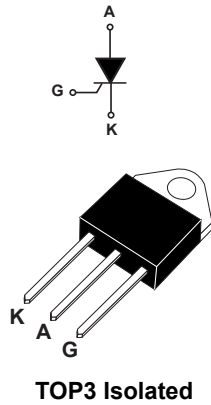


## 50 A 600 V SCR in TOP3 insulated



### Features

- Max. repetitive blocking voltage:  $V_{DRM}, V_{RRM} = 600\text{ V}$
- $I_{GT}$  maximum = 80 mA
- ECOPACK<sup>®2</sup> component (RoHS and HF compliance)
- Complies with UL 1557 standard (File ref : E81734)

### Applications

- Solid state relays
- Welding equipment
- High power motor control
- Heating systems
- Controlled AC/DC bridge

### Description

Available in a high power package TOP3-I, the **BTW69-600** is suitable in applications where power handling and power dissipation are critical, such as solid state relays, welding equipment, high power motor control and power converters.

This device offers a superior performance in surge current handling capabilities, allowing usage in industrial environment.

Thanks to its internal ceramic pad, it provide high voltage insulation (2500V<sub>RMS</sub>), complying with UL standards (file ref: E81734).

#### Product status link

[BTW69-600](#)

#### Product summary

|                   |       |
|-------------------|-------|
| $I_{T(RMS)}$      | 50 A  |
| $V_{DRM}/V_{RRM}$ | 600 V |
| $I_{GT}$          | 80 mA |

# 1 Characteristics

**Table 1. Absolute maximum ratings**

| Symbol       | Parameters  |                                     | Value                 | Unit        |                  |
|--------------|---|-------------------------------------|-----------------------|-------------|------------------|
| $I_{T(RMS)}$ | RMS on-state current (180° conduction angle)  |                                     | $T_C = 75\text{ °C}$  | 50          | A                |
| $I_{T(AV)}$  | Average on-state current (180° conduction angle)  |                                     | $T_C = 75\text{ °C}$  | 32          | A                |
| $I_{TSM}$    | Non repetitive surge peak on-state current (full cycle, $T_j$ initial = 25 °C, $V_R = 0$ V) |                                     | $t_p = 8.3$ ms        | 610         | A                |
|              |   |                                     | $t_p = 10$ ms         | 580         |                  |
| $I^2t$       | $I^2t$ value for fusing   | $t_p = 10$ ms, $T_j = 25\text{ °C}$ |                       | 1680        | A <sup>2</sup> s |
| $di/dt$      | Critical rate of rise of on-state current<br>$I_G = 2 \times I_{GT}$ , $t_r \leq 100$ ns    | $F = 60$ Hz                         | $T_j = 125\text{ °C}$ | 50          | A/ $\mu$ s       |
| $I_{GM}$     | Peak gate current   | $t_p = 20$ $\mu$ s                  | $T_j = 125\text{ °C}$ | 8           | A                |
| $P_{G(AV)}$  | Average gate power dissipation  |                                     | $T_j = 125\text{ °C}$ | 1           | W                |
| $T_{stg}$    | Storage junction temperature range  |                                     |                       | -40 to +150 | °C               |
| $T_j$        | Operating junction temperature range  |                                     |                       | -40 to +125 | °C               |
| $V_{GRM}$    | Maximum peak reverse gate voltage   |                                     |                       | 5           | V                |
| $V_{ins}$    | Insulation RMS voltage, 1 minute  |                                     |                       | 2500        | V                |

**Table 2. Electrical characteristics ( $T_j = 25\text{ °C}$ , unless otherwise specified)**

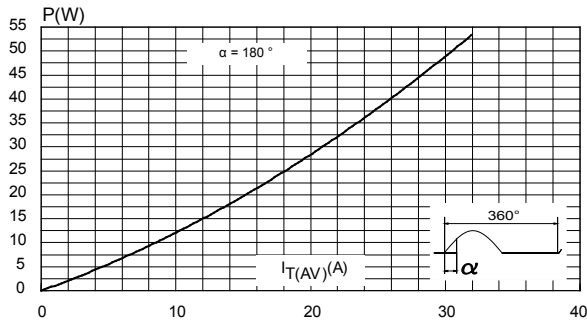
| Symbol            | Test conditions                          | $T_j$  |      | Value | Unit       |
|-------------------|--|--------|------|-------|------------|
| $I_{GT}$          | $V_D = 12$ V, $R_L = 33\ \Omega$         |        | Min. | 8     | mA         |
|                   |  |        | Max  | 80    |            |
| $V_{GT}$          |  |        | Max  | 1.3   | V          |
| $V_{GD}$          | $V_D = V_{DRM}$ , $R_L = 3.3$ k $\Omega$ | 125 °C | Min. | 0.2   | V          |
| $I_H$             | $I_T = 500$ mA, gate open                |        | Max. | 150   | mA         |
| $I_L$             | $I_G = 1.2 \times I_{GT}$                |        | Max. | 200   | mA         |
| $dV/dt$           | $V_D = 67\%$ , $V_{DRM}$ gate open       | 125 °C | Min. | 1000  | V/ $\mu$ s |
| $V_{TM}$          | $I_{TM} = 100$ A, $t_p = 380$ $\mu$ s    |        | Max. | 1.9   | V          |
| $V_{TO}$          | Threshold on-state voltage               | 125 °C | Max. | 1.0   | V          |
| $R_D$             | On-state dynamic resistance              | 125 °C | Max. | 8.5   | m $\Omega$ |
| $I_{DRM}/I_{RRM}$ | $V_D = V_{DRM}$ , $V_R = V_{RRM}$        | 25 °C  | Max. | 10    | $\mu$ A    |
|                   |  | 125 °C |      | 5     | mA         |

**Table 3. Thermal resistance**

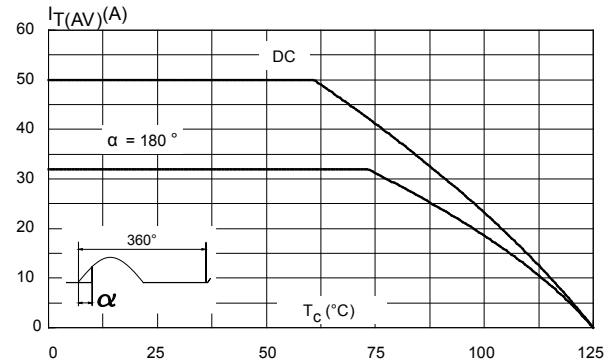
| Symbol        | Parameters                | Value | Unit |
|---------------|---------------------------|-------|------|
| $R_{th(j-c)}$ | Junction to case (D.C)    | 0.9   | °C/W |
| $R_{th(j-a)}$ | Junction to ambient (D.C) | 50    |      |

## 1.1 Characteristics (curves)

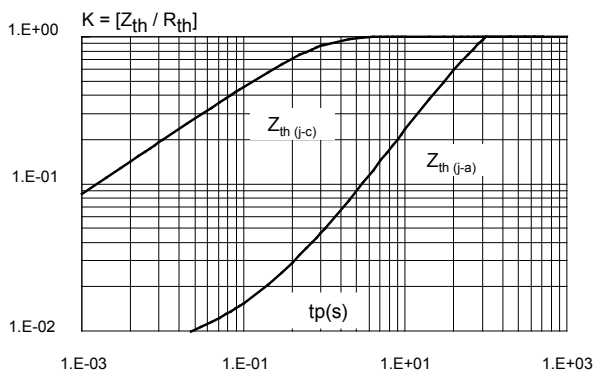
**Figure 1. Maximum average power dissipation versus average on-state current**



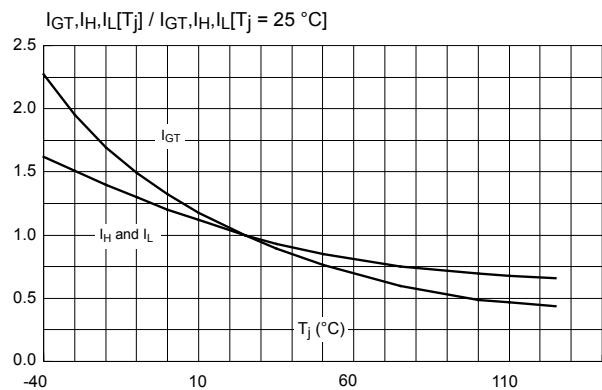
**Figure 2. Average on-state current versus case temperature**



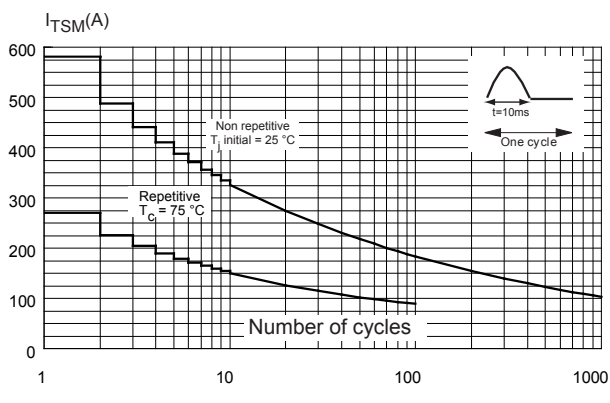
**Figure 3. Relative variation of thermal impedance versus pulse duration**



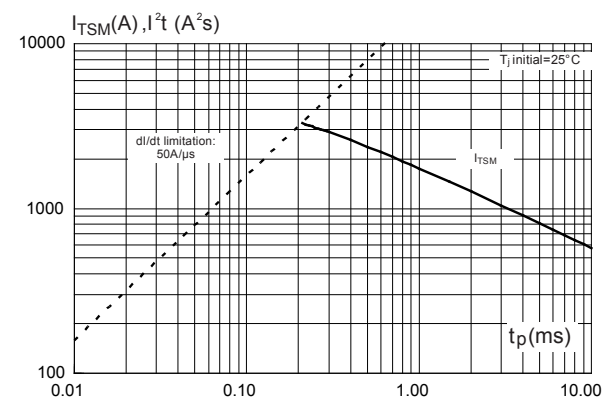
**Figure 4. Relative variation of gate trigger current, holding current and latching current versus junction temperature**



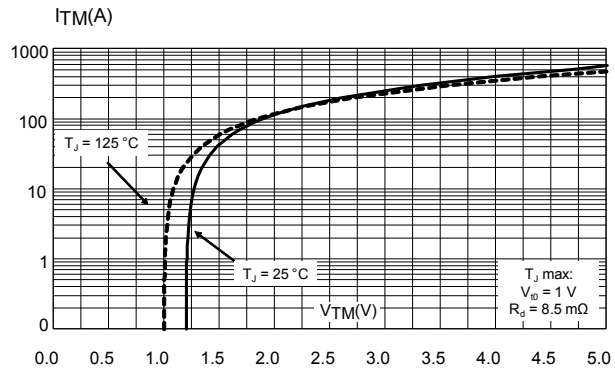
**Figure 5. Surge peak on-state current versus number of cycles ( $V_R = 0$  V)**



**Figure 6. Non repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 10$  ms, and corresponding value of  $I^2t$  ( $V_R = 0$  V)**



**Figure 7. On-state characteristics (maximum values)**



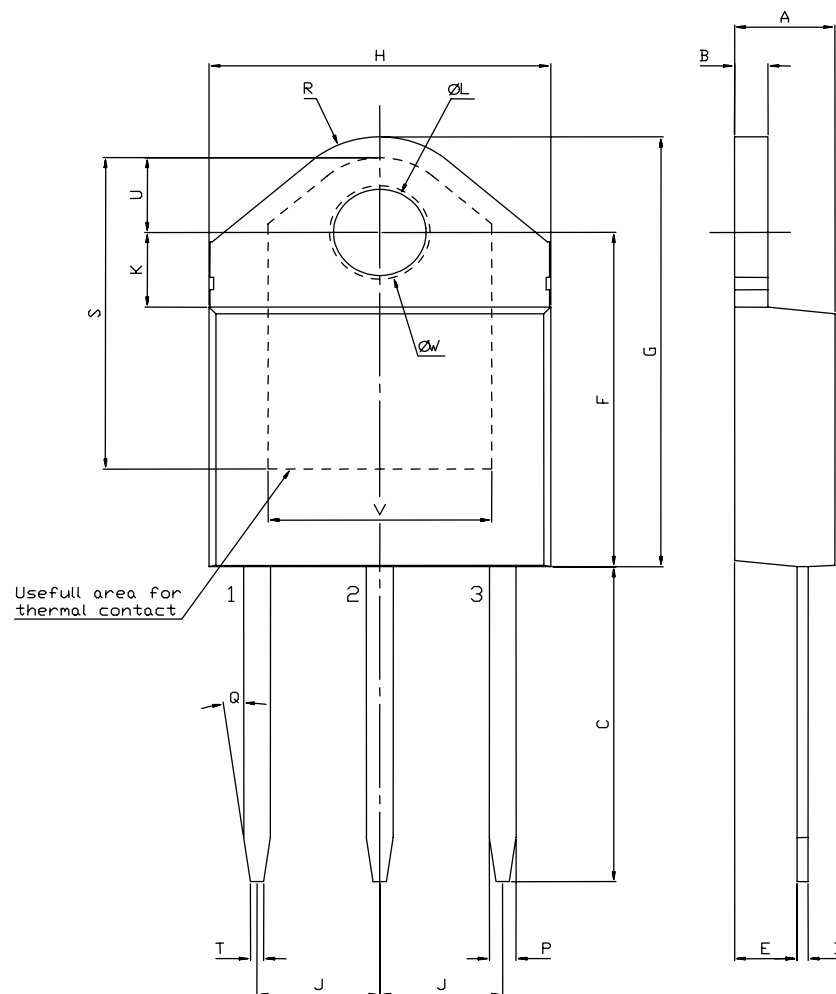
## 2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of **ECOPACK** packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK is an ST trademark.

### 2.1 TOP3 Ins. package information

- **ECOPACK** (lead-free plating and halogen free package compliance)
- Lead-free package leads finishing
- Halogen-free molding compound resin meets UL94 standard level V0
- Recommended torque: 1.05 N·m (max. torque: 1.2 N·m)

**Figure 8. Package outline**



**Table 4. Mechanical data**

| Ref. | Dimensions |      |       |                       |        |        |
|------|------------|------|-------|-----------------------|--------|--------|
|      | mm         |      |       | Inches <sup>(1)</sup> |        |        |
|      | Min.       | Typ. | Max.  | Min.                  | Typ.   | Max.   |
| A    | 4.40       |      | 4.60  | 0.1732                |        | 0.1811 |
| B    | 1.45       |      | 1.55  | 0.0571                |        | 0.0610 |
| C    | 14.35      |      | 15.60 | 0.5650                |        | 0.6142 |
| D    | 0.50       |      | 0.70  | 0.0197                |        | 0.0276 |
| E    | 2.70       |      | 2.90  | 0.1063                |        | 0.1142 |
| F    | 15.80      |      | 16.50 | 0.6220                |        | 0.6496 |
| G    | 20.40      |      | 21.10 | 0.8031                |        | 0.8307 |
| H    | 15.10      |      | 15.50 | 0.5945                |        | 0.6102 |
| J    | 5.40       |      | 5.65  | 0.2126                |        | 0.2224 |
| K    | 3.40       |      | 3.65  | 0.1339                |        | 0.1437 |
| L    | 4.08       |      | 4.17  | 0.1606                |        | 0.1642 |
| P    | 1.10       |      | 1.30  | 0.0430                |        | 0.0510 |
| R    |            | 4.60 |       |                       | 0.1811 |        |

1. Inches given for reference only

### 3 Ordering information

Figure 9. Ordering information scheme

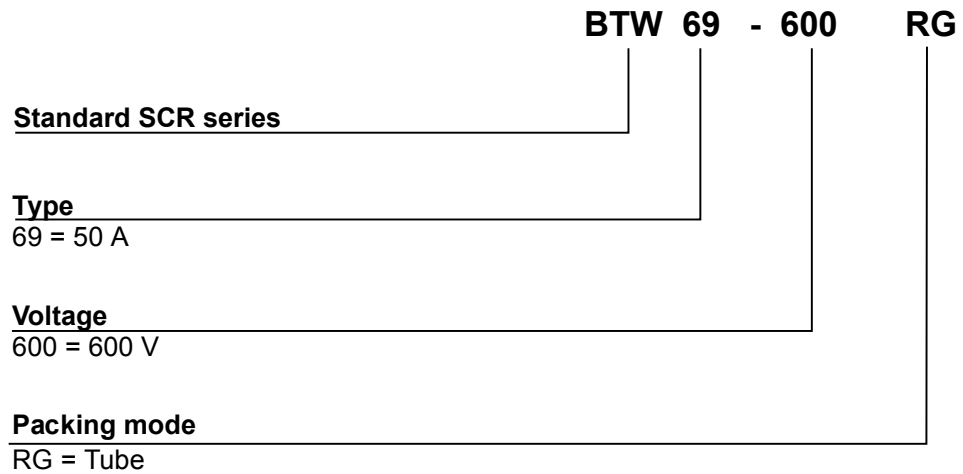


Table 5. Ordering information

| Order code  | Marking  | Package   | Weight | Base qty. | Delivery mode |
|-------------|----------|-----------|--------|-----------|---------------|
| BTW69-600RG | BTW69600 | TOP3 Ins. | 4.5 g  | 30        | Tube          |

## Revision history

**Table 6. Document revision history**

| Date        | Revision | Changes  |
|-------------|----------|--|
| 09-Sep-2019 | 1        | Initial release.                                   |
| 27-Jul-2023 | 2        | Updated <a href="#">Table 4</a> . Mechanical data. |



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