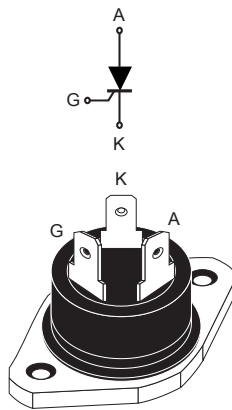


## 50 A, 1000 V SCR thyristor in RD91



RD91

### Features

- High current SCR
- High commutation capability
- Low thermal resistance with clip bonding
- Insulated package RD91 high power:
  - Low thermal resistance with clip bonding
  - Insulated voltage: 2500 V<sub>RMS</sub>
  - Complies with UL 1557 (File ref : E81734)
- RoHS (2002/95/EC) compliant

### Applications

- Solid state relays
- Welding equipment
- High power motor control

### Description

Available in 2500 V insulated high power package, the 50 A and 1000 V SCR BTW67 is suitable in applications where power handling and power dissipation are critical, such as solid state relays, welding equipment and high power motor control.

Based on a clip assembly technology, they offer a superior performance in surge current handling capabilities.

#### Product status link

[BTW67](#)

#### Product summary

|                   |        |
|-------------------|--------|
| $I_{T(RMS)}$      | 50 A   |
| $V_{DRM}/V_{RRM}$ | 1000 V |
| $I_{GT}$          | 80 mA  |

# 1 Characteristics

**Table 1. Absolute maximum ratings**

| Symbol       | Parameters                                                                                      |                                                                      | Value       | Unit             |
|--------------|-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|-------------|------------------|
| $I_{T(RMS)}$ | RMS on-state current (full sine wave)                                                           | $T_c = 70\text{ }^{\circ}\text{C}$                                   | 50          | A                |
| $I_{T(AV)}$  | Average on-state current<br>(180° conduction angle)                                             | $T_c = 70\text{ }^{\circ}\text{C}$                                   | 32          | A                |
| $I_{TSM}$    | Non repetitive surge peak on-state current (full cycle, $T_j$ initial = 25 °C)                  | $t_p = 8.3\text{ ms}$                                                | 610         | A                |
| $I^2t$       | $I^2t$ value for fusing                                                                         | $t_p = 10\text{ ms}$                                                 | 1680        | A <sup>2</sup> s |
| $di/dt$      | Critical rate of rise of on-state current<br>$I_G = 2 \times I_{GT}$ , $t_r \leq 100\text{ ns}$ | $F = 60\text{ Hz}$<br>$T_j = 125\text{ }^{\circ}\text{C}$            | 50          | A/ $\mu$ s       |
| $I_{GM}$     | Peak gate current                                                                               | $t_p = 20\text{ }\mu\text{s}$<br>$T_j = 125\text{ }^{\circ}\text{C}$ | 8           | A                |
| $P_{G(AV)}$  | Average gate power dissipation                                                                  | $T_j = 125\text{ }^{\circ}\text{C}$                                  | 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 ( $T_j = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)**

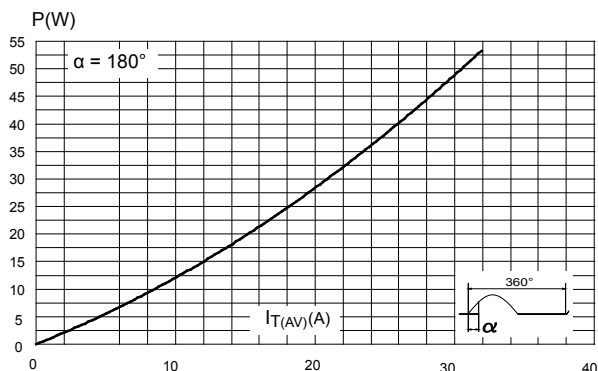
| Symbol            | Test conditions                                          |                                     |      | Value | Unit       |
|-------------------|----------------------------------------------------------|-------------------------------------|------|-------|------------|
| $I_{GT}$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

**Table 3. Thermal resistance**

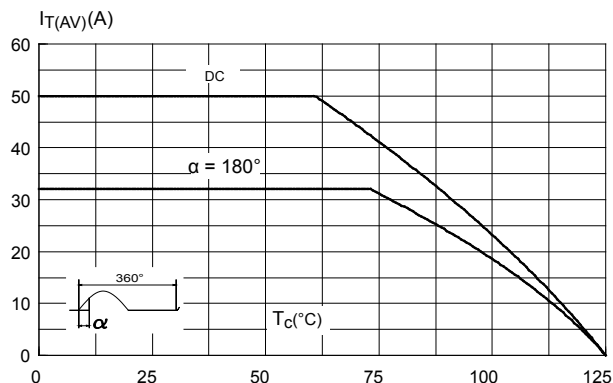
| Symbol        | Parameters             | Value | Unit |
|---------------|------------------------|-------|------|
| $R_{th(j-c)}$ | Junction to case (D.C) | 1.0   | °C/W |

## 1.1 Characteristics curves

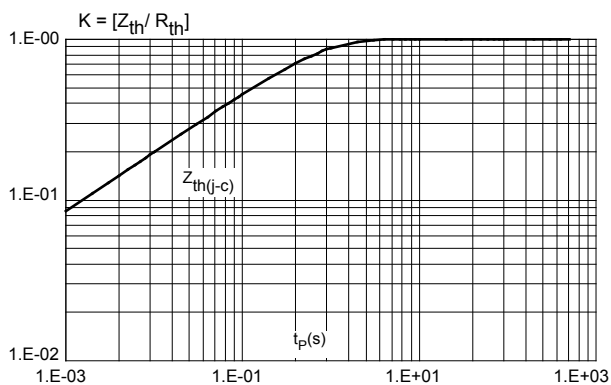
**Figure 1. Maximum average power dissipation versus average on-state current**



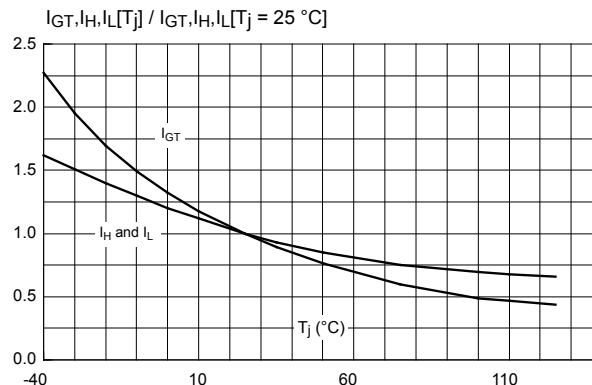
**Figure 2. Average on-state current versus case temperature**



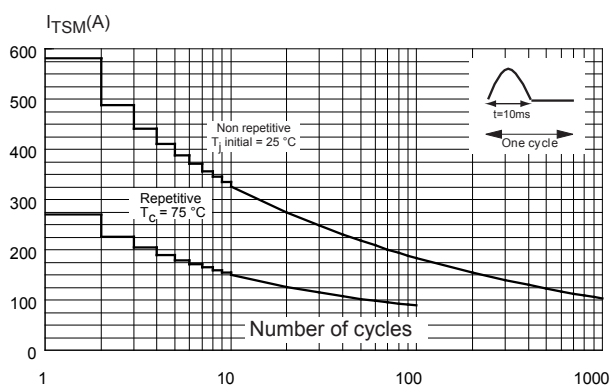
**Figure 3. Relative variation of thermal impedance versus pulse duration**



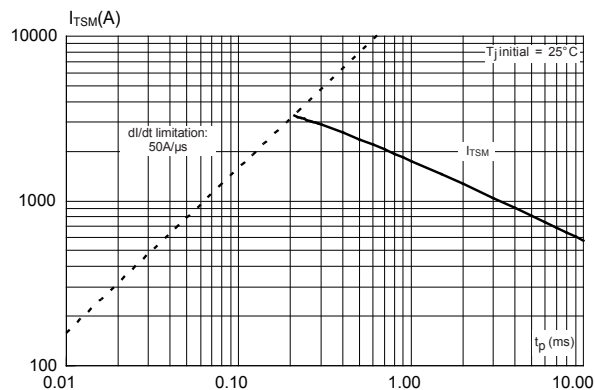
**Figure 4. Relative variation of gate trigger current, holding current and latching current versus junction temperature**



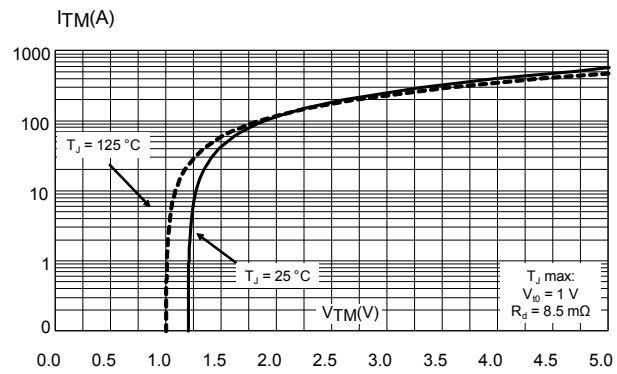
**Figure 5. Surge peak on-state current versus number of cycles**



**Figure 6. Non repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 10ms$**



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



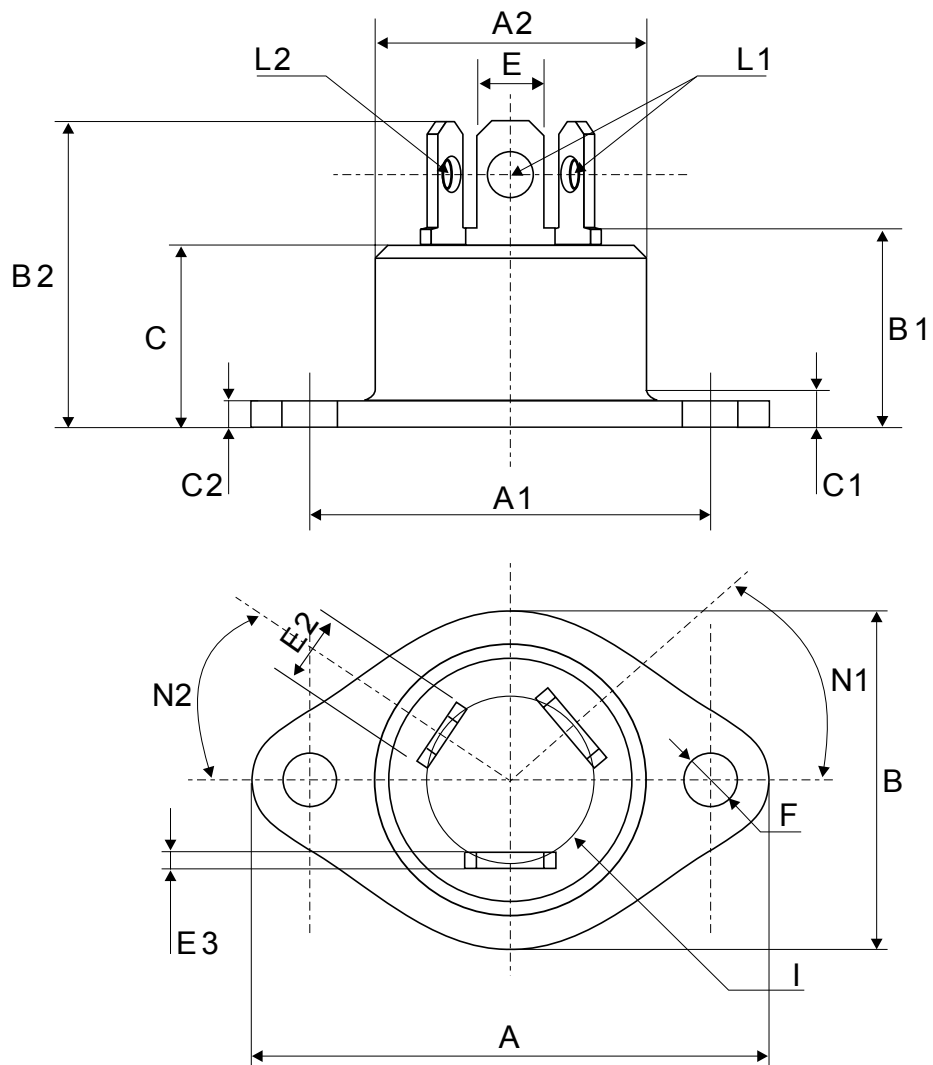
## 2 Package information

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 RD91 package information

- Epoxy meets UL94, V0
- Cooling method: Conduction
- Recommended torque: 0.9 to 1.2 N·m

**Figure 8. RD91 package outline**



**Table 4. RD91 mechanical data**

| Ref. | Dimensions |      |       |                       |      |       |
|------|------------|------|-------|-----------------------|------|-------|
|      | mm         |      |       | Inches <sup>(1)</sup> |      |       |
|      | Min.       | Typ. | Max.  | Min.                  | Typ. | Max.  |
| A    |            |      | 40.00 |                       |      | 1.575 |
| A1   | 30.10      |      | 30.30 | 1.185                 |      | 1.193 |
| A2   |            |      | 22.00 |                       |      | 0.867 |
| B    |            |      | 27.00 |                       |      | 1.063 |
| B1   | 13.50      |      | 16.50 | 0.531                 |      | 0.650 |
| B2   |            |      | 24.00 |                       |      | 0.945 |
| C    |            |      | 14.00 |                       |      | 0.552 |
| C1   |            |      | 3.50  |                       |      | 0.138 |
| C2   | 1.90       |      | 2.10  | 0.074                 |      | 0.083 |
| E    | 6.10       |      | 6.50  | 0.240                 |      | 0.256 |
| E2   | 4.80       |      | 5.20  | 0.188                 |      | 0.205 |
| E3   | 0.70       |      | 0.90  | 0.027                 |      | 0.036 |
| F    | 4.00       |      | 4.30  | 0.157                 |      | 0.170 |
| I    | 11.20      |      | 13.60 | 0.440                 |      | 0.536 |
| L1   | 3.10       |      | 3.50  | 0.122                 |      | 0.138 |
| L2   | 1.70       |      | 1.90  | 0.066                 |      | 0.075 |
| N1   | 33°        |      | 43°   | 33°                   |      | 43°   |
| N2   | 28°        |      | 38°   | 28°                   |      | 38°   |

1. Inches given for reference only

### 3 Ordering information

Figure 9. Ordering information scheme

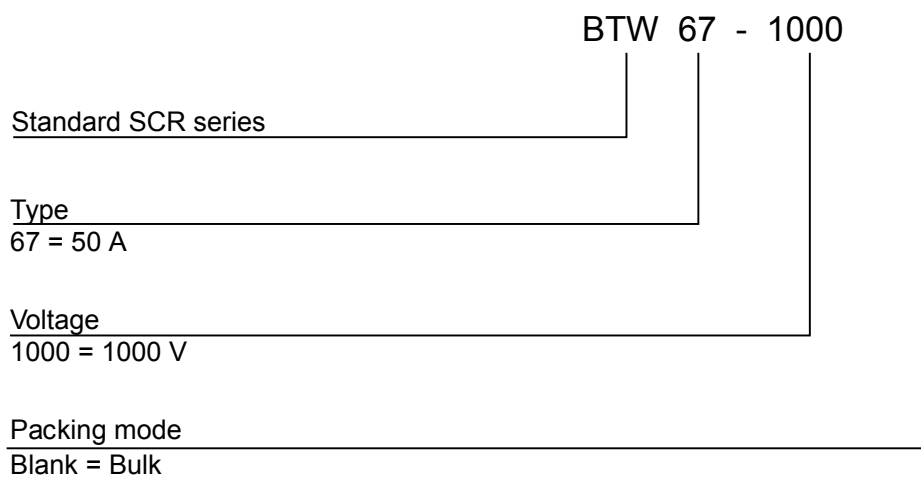


Table 5. Ordering information

| Order code | Marking   | Package | Weight | Base qty. | Delivery mode |
|------------|-----------|---------|--------|-----------|---------------|
| BTW67-1000 | BTW671000 | RD91    | 20 g   | 25        | Bulk          |

## Revision history

**Table 6. Document revision history**

| Date        | Revision | Changes                                                                             |
|-------------|----------|-------------------------------------------------------------------------------------|
| Apr-2001    | 4A       | Last update.                                                                        |
| 13-Feb-2006 | 5        | TOP3 Insulated delivery mode changed from bulk to tube.<br>ECOPACK statement added. |
| 26-Jun-2019 | 6        | Removed TOP3 Ins. package information. Minor text changed.                          |
| 27-Feb-2023 | 7        | Updated package pinout.                                                             |
| 15-Jul-2024 | 8        | Updated package pinout, <a href="#">Figure 6</a> , and <a href="#">Table 4</a> .    |

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