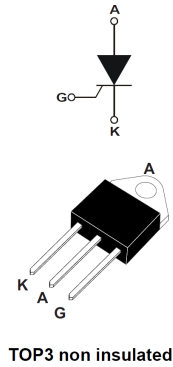


50 A – 1200 V non insulated SCR thyristor



Features

- On-state rms current: 50 A
- Blocking voltage: 1200 V
- Gate current: 50 mA

Application

- Solid state relays
- Battery charging system
- Uninterruptible power supply
- Variable speed motor drive
- Industrial welding systems
- By pass AC switch

Product status link

[BTW69-1200N](#)

Product summary

| | |
|-------------------|--------|
| $I_{T(RMS)}$ | 50 A |
| V_{DRM}/V_{RRM} | 1200 V |
| I_{GT} | 50 mA |

Description

Available in non insulated TOP3 high power package, the **BTW69-1200N** is suitable for applications where power switching and power dissipation are critical, such as by-pass switch, controlled AC rectifier bridge, in solid state relay, battery charger, uninterruptible power supply, welding equipment and motor driver applications.

Based on a clip assembly technology, the BTW69-1200N offers a superior performance in surge current handling and thermal cooling capabilities.

1 Characteristics

Table 1. Absolute maximum ratings

| Symbol | Parameters | Value | Unit |
|--------------|--|---|-----------------------|
| $I_{T(RMS)}$ | RMS on-state current (180° conduction angle) | $T_c = 102\text{ °C}$ | 50 A |
| $I_{T(AV)}$ | Average on-state current (180° conduction angle) | $T_c = 102\text{ °C}$ | 31 A |
| I_{TSM} | Non repetitive surge peak on-state current (full cycle, T_j initial = 25 °C, $V_R = 0\text{ V}$) | $t_p = 8.3\text{ ms}$ | 763 A |
| | | $t_p = 10\text{ ms}$ | 700 A |
| I^2t | I^2t value for fusing | $t_p = 10\text{ ms}$, $T_j = 25\text{ °C}$ | 2450 A ² s |
| di/dt | Critical rate of rise of on-state current Gate supply: $I_G = 100\text{ mA}$, $di_G/dt = 1\text{ A}/\mu\text{s}$ | | 100 A/ μs |
| I_{GM} | Peak gate current | $t_p = 20\text{ }\mu\text{s}$, $T_j = 125\text{ °C}$ | 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 |

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

| Symbol | Test conditions | T_j | Value | Unit |
|-------------------|--|-----------------------|-------|-----------------------|
| I_{GT} | $V_D = 12\text{ V}$, $R_L = 33\text{ }\Omega$ | | Min. | 8 mA |
| | | | Max. | 50 mA |
| V_{GT} | | | Max. | 1.3 V |
| V_{GD} | $V_D = V_{DRM}$, $R_L = 3.3\text{ k}\Omega$ | $T_j = 125\text{ °C}$ | Min. | 0.2 V |
| I_H | $I_T = 500\text{ mA}$, gate open | | Max. | 100 mA |
| I_L | $I_G = 1.2 \times I_{GT}$ | | Max. | 125 mA |
| t_{gt} | $I_T = 50\text{ A}$, $V_D = V_{DRM}$, $I_G = 200\text{ mA}$, $di_G/dt = 0.2\text{ A}/\mu\text{s}$ | | Typ. | 2 μs |
| dV/dt | $V_D = 67\%$, V_{DRM} gate open | $T_j = 125\text{ °C}$ | Min. | 1000 V/ μs |
| t_q | $V_D = 800\text{ V}$, $I_{TM} = 50\text{ A}$, $V_R = 75\text{ V}$, $t_p = 100\text{ }\mu\text{s}$, $dI_{TM}/dt = 30\text{ A}/\mu\text{s}$, $dV_D/dt = 20\text{ V}/\mu\text{s}$ | $T_j = 125\text{ °C}$ | Typ. | 100 μs |
| V_{TM} | $I_{TM} = 100\text{ A}$, $t_p = 380\text{ }\mu\text{s}$ | $T_j = 125\text{ °C}$ | Max. | 1.6 V |
| V_{TO} | Threshold on-state voltage | $T_j = 125\text{ °C}$ | Max. | 0.9 V |
| R_D | On-state dynamic resistance | $T_j = 125\text{ °C}$ | Max. | 8.5 m Ω |
| I_{DRM}/I_{RRM} | $V_D = V_{DRM}$, $V_R = V_{RRM}$ | $T_j = 25\text{ °C}$ | Max. | 10 μA |
| | | $T_j = 125\text{ °C}$ | | 5 mA |

Table 3. Thermal resistance

| Symbol | Parameters | Value | Unit |
|---------------|------------------------------|-------|------|
| $R_{th(j-c)}$ | Junction to case (D.C, typ.) | 0.45 | °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

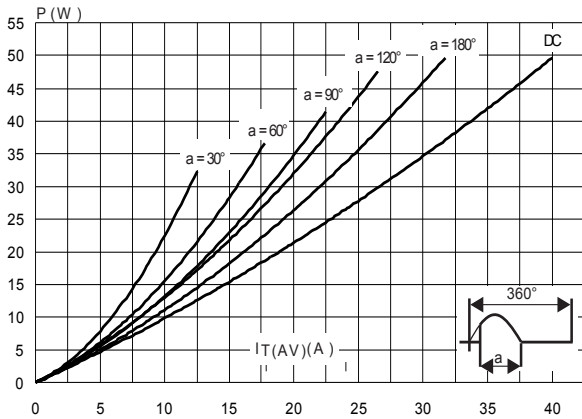


Figure 2. Correlation between maximum average power dissipation and maximum allowable temperatures

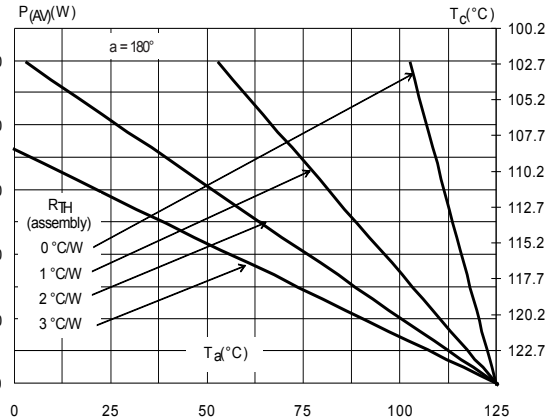


Figure 3. Average and DC on-state current versus case temperature

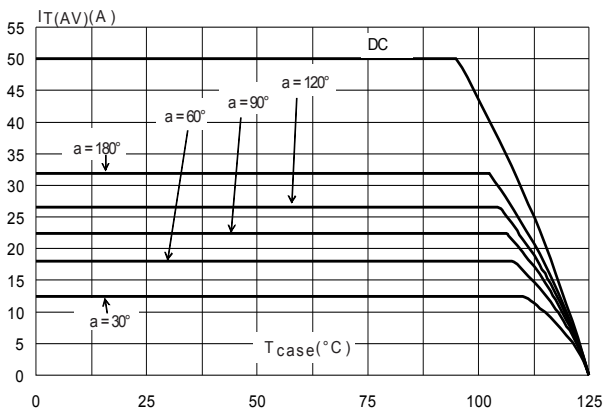


Figure 4. Average and DC on-state current versus ambient temperature

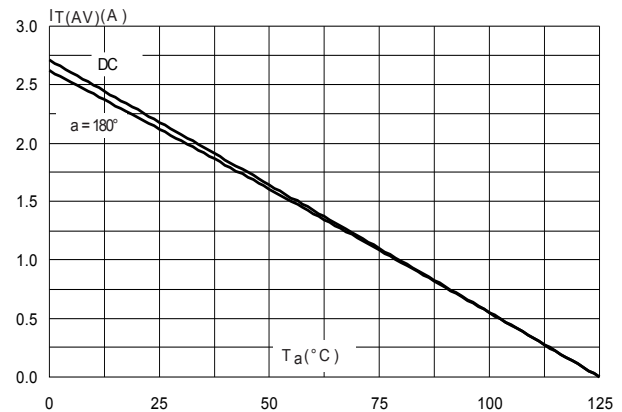


Figure 5. Relative variation of thermal impedance versus pulse duration

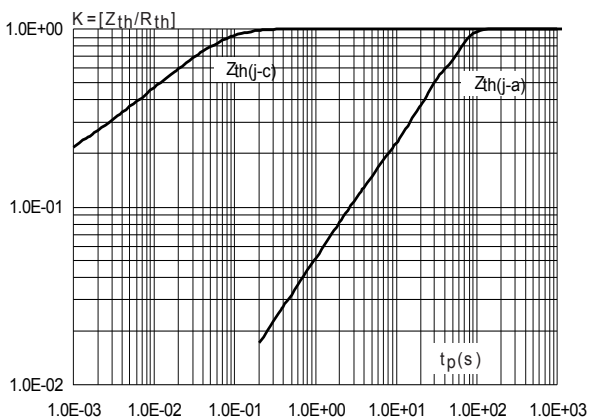


Figure 6. Relative variation of gate trigger current and gate trigger voltage versus junction temperature (typical value)

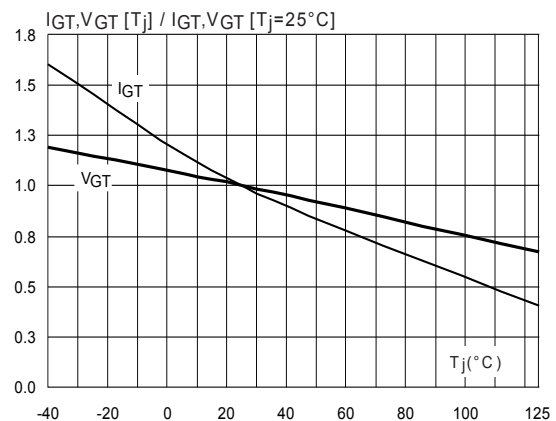


Figure 7. Relative variation of holding, and latching currents versus junction temperature (typical values)

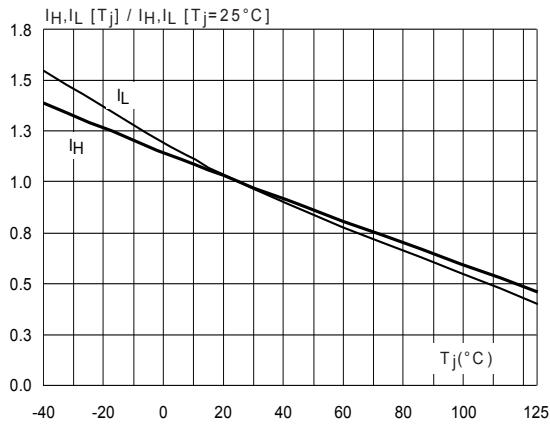


Figure 8. Surge peak on-state current versus number of cycles

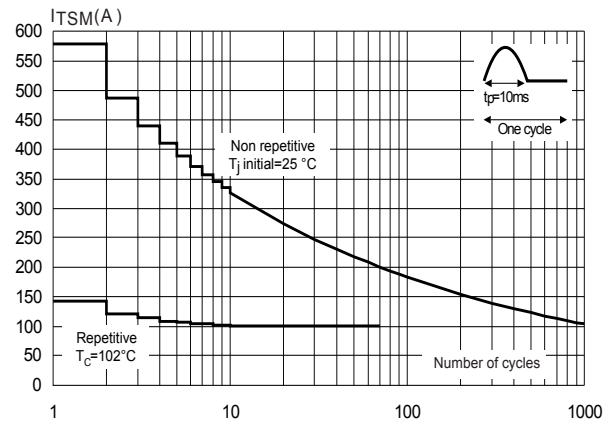


Figure 9. Non repetitive surge peak on-state current for a sinusoidal pulse with width $t_p < 10$ ms, and corresponding value of I^2t

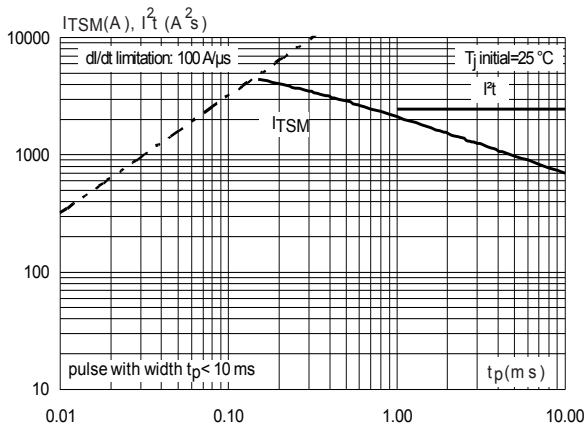


Figure 10. On-state characteristics (maximum values)

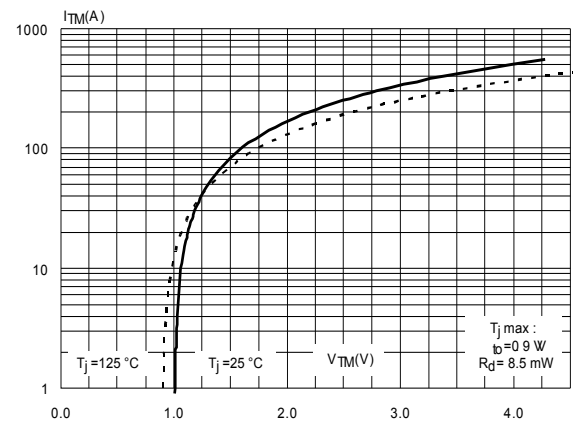


Figure 11. Relative variation of leakage current versus junction temperature for different values of blocking voltage (600 and 800 V)

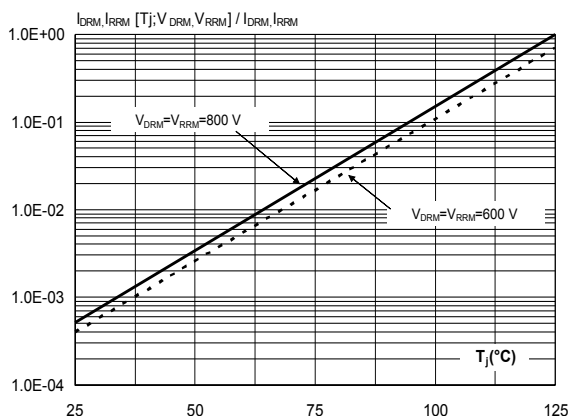
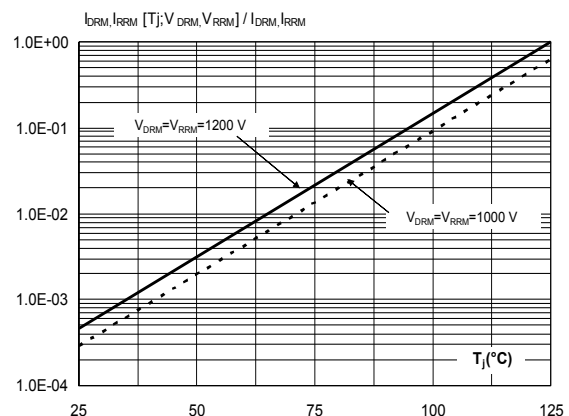


Figure 12. Relative variation of leakage current versus junction temperature for different values of blocking voltage (1000 and 1200 V)



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. ECOPACK is an ST trademark.

2.1 TOP3 Ins. package information

- Epoxy meets UL94, V0
- Lead-free packages
- Recommended torque: 1.05 N·m (max. torque: 1.2 N·m)

Figure 13. TOP3 insulated and non-insulated package outline

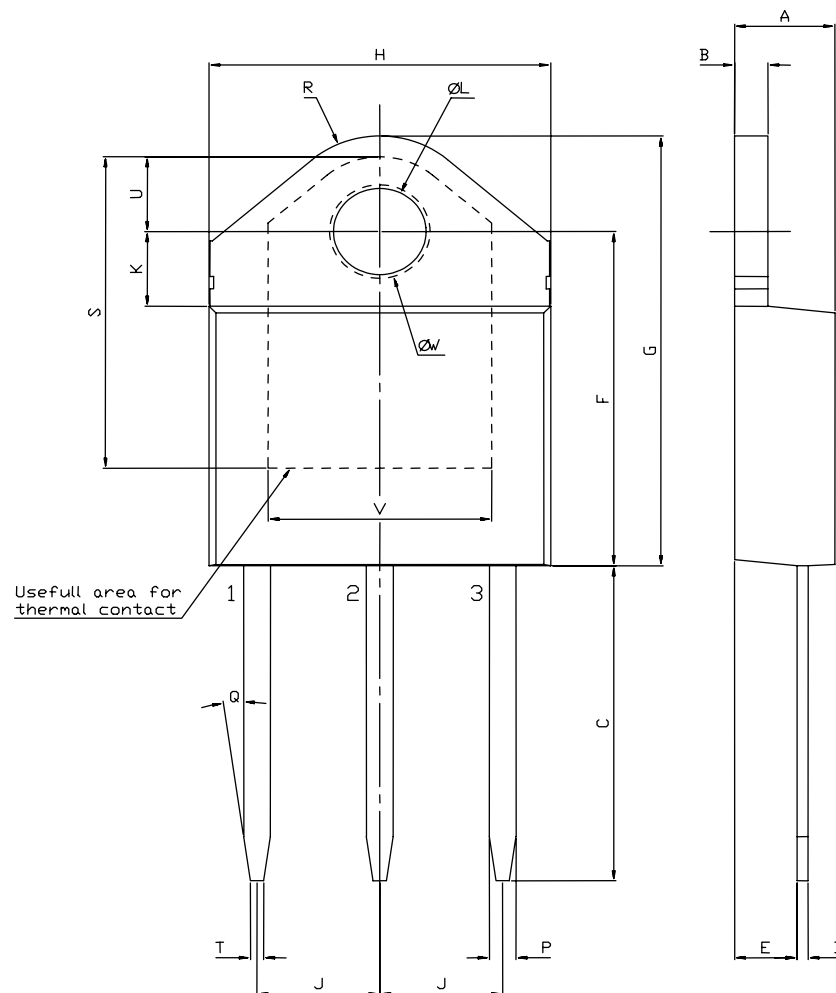


Table 4. TOP3 insulated and non-insulated mechanical data

| Ref. | Dimensions | | | | | |
|------|------------|------|-------|-----------------------|--------|--------|
| | mm | | | Inches ⁽¹⁾ | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 4.40 | | 4.60 | 0.1732 | | 0.1812 |
| B | 1.45 | | 1.55 | 0.0570 | | 0.0611 |
| C | 14.35 | | 15.60 | 0.5649 | | 0.6142 |
| D | 0.50 | | 0.70 | 0.0196 | | 0.0276 |
| E | 2.70 | | 2.90 | 0.1062 | | 0.1142 |
| F | 15.80 | | 16.50 | 0.6220 | | 0.6497 |
| G | 20.40 | | 21.10 | 0.8031 | | 0.8308 |
| H | 15.10 | | 15.50 | 0.5944 | | 0.6103 |
| J | 5.40 | | 5.65 | 0.2125 | | 0.2225 |
| K | 3.40 | | 3.65 | 0.1338 | | 0.1438 |
| 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 14. Ordering information scheme

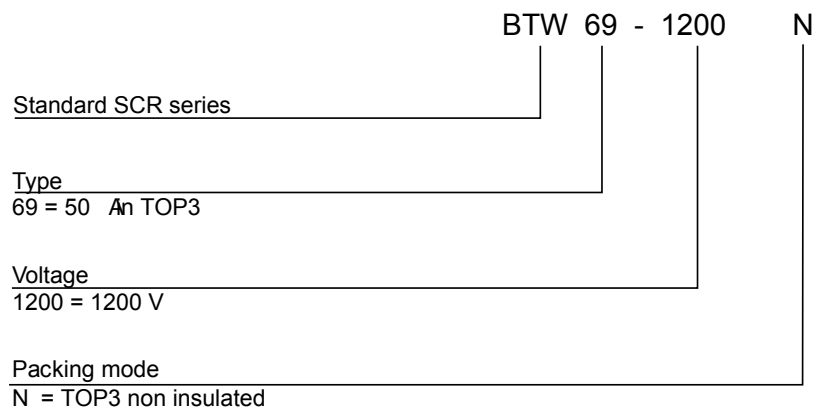


Table 5. Ordering information

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|-------------|------------|---------|--------|-----------|---------------|
| BTW69-1200N | BTW691200N | TOP3 | 4.5 g | 30 | Tube |

Revision history

Table 6. Document revision history

| Date | Revision | Changes |
|-------------|----------|-----------------------------------|
| 14-Jun-2013 | 1 | Initial release. |
| 13-Jul-2023 | 2 | Updated Table 4 . |

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