

## BT169

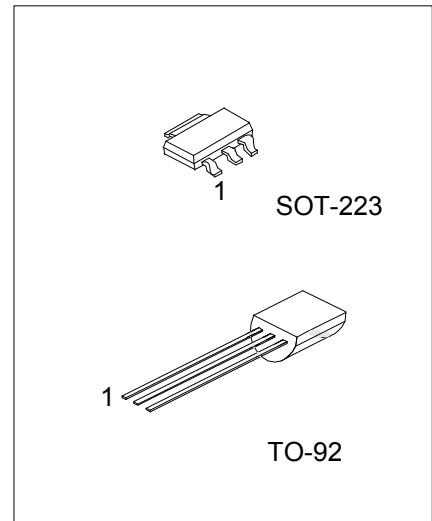
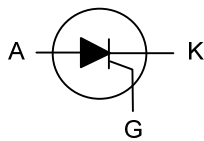
SCR

### SCRS

#### DESCRIPTION

Passivated, sensitive gate thyristors in a plastic envelope, intended for use in general purpose switching and phase control applications. These devices are intended to be interfaced directly to microcontrollers, logic integrated circuits and other low power gate trigger circuits.

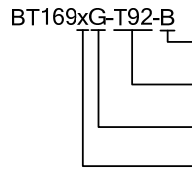
#### SYMBOL



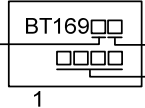
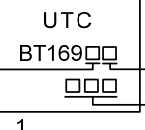
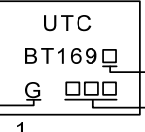
#### ORDERING INFORMATION

| Ordering Number |               | Package | Pin Assignment |   |   | Packing   |
|-----------------|---------------|---------|----------------|---|---|-----------|
| Lead Free       | Halogen Free  |         | 1              | 2 | 3 |           |
| BT169BL-T92-B   | BT169BG-T92-B | TO-92   | K              | G | A | Tape Box  |
| BT169BL-T92-K   | BT169BG-T92-K | TO-92   | K              | G | A | Bulk      |
| BT169DL-T92-B   | BT169DG-T92-B | TO-92   | K              | G | A | Tape Box  |
| BT169DL-T92-K   | BT169DG-T92-K | TO-92   | K              | G | A | Bulk      |
| BT169EL-T92-B   | BT169EG-T92-B | TO-92   | K              | G | A | Tape Box  |
| BT169EL-92-K    | BT169EG-T92-K | TO-92   | K              | G | A | Bulk      |
| BT169GL-T92-B   | BT169GP-T92-B | TO-92   | K              | G | A | Tape Box  |
| BT169GL-T92-K   | BT169GP-T92-K | TO-92   | K              | G | A | Bulk      |
| BT169HL-AA3-R   | BT169HG-AA3-R | SOT-223 | K              | A | G | Tape Reel |
| BT169HL-T92-B   | BT169HG-T92-B | TO-92   | K              | G | A | Tape Box  |
| BT169HL-T92-K   | BT169HG-T92-K | TO-92   | K              | G | A | Bulk      |

Note: Pin Assignment: K: Cathode G: Gate A: Anode

|  |   |
|--|---|
| <p>BT169xG-T92-B</p>  <p>(1) Packing Type<br/>(2) Package Type<br/>(3) Green Package<br/>(4) Repetitive Peak Off-State Voltages</p> | <p>(1) B: Tape Box, K: Bulk, R: Tape Reel<br/>(2) AA3: SOT-223, T92: TO-92<br/>(3) G: Halogen Free and Lead Free, L: Lead Free<br/>P: Halogen Free(for BT169G)<br/>(4) x: refer to Quick Reference data</p> |
|--|---|

■ MARKING

| Package               | MARKING   |
|-----------------------|---|
| SOT-223               |  <p>Repetitive Peak Off-State Voltages ← BT169 □ □ □ → L: Lead Free<br/>                     G: Halogen Free<br/>                     □ □ □ → Date Code<br/>                     1</p>  |
| TO-92                 |  <p>Repetitive Peak Off-State Voltages ← UTC<br/>                     BT169 □ □ □ → L: Lead Free<br/>                     G: Halogen Free<br/>                     □ □ □ → Date Code<br/>                     1</p>           |
| TO-92<br>(For BT169G) |  <p>Repetitive Peak Off-State Voltages ← UTC<br/>                     BT169 □ □ □ → L: Lead Free<br/>                     G □ □ □ → P: Halogen Free<br/>                     □ □ □ → Date Code<br/>                     1</p> |

## ■ QUICK REFERENCE DATA

| PARAMETER                            | SYMBOL             | BT169B | BT169D | BT169E | BT169G | BT169H | UNIT |
|--------------------------------------|--------------------|--------|--------|--------|--------|--------|------|
|                                      |                    | MAX    | MAX    | MAX    | MAX    | MAX    | MAX  |
| Repetitive Peak Off-State Voltages   | $V_{DRM}, V_{RRM}$ | 200    | 400    | 500    | 600    | 800    | V    |
| Average On-State Current             | $I_{T(AV)}$        | 0.5    | 0.5    | 0.5    | 0.5    | 0.5    | A    |
| RMS On-State Current                 | $I_{T(RMS)}$       | 0.8    | 0.8    | 0.8    | 0.8    | 0.8    | A    |
| Non-Repetitive Peak On-State Current | $I_{TSM}$          | 8      | 8      | 8      | 8      | 8      | A    |

## ■ ABSOLUTE MAXIMUM RATINGS

| PARAMETER  |           | SYMBOL             | RATINGS    | UNIT        |
|--|-----------|--------------------|------------|-------------|
| Repetitive Peak Off-State Voltages(Note 2)   | BT169B    | $V_{DRM}, V_{RRM}$ | 200        | V           |
|  | BT169D    |                    | 400        |             |
|  | BT169E    |                    | 500        |             |
|  | BT169G    |                    | 600        |             |
|  | BT169H    |                    | 800        |             |
| Peak Gate Voltage  |           | $V_{GM}$           | 5          | V           |
| Peak Reverse Gate Voltage  |           | $V_{RGM}$          | 5          | V           |
| Peak Gate Current  |           | $I_{GM}$           | 1          | A           |
| Average On-State Current<br>(Half Sine Wave, $T_{LEAD} \leq 83^{\circ}C$ )                                     |           | $I_{T(AV)}$        | 0.5        | A           |
| RMS On-State Current (All Conduction Angles)   |           | $I_{T(RMS)}$       | 0.8        | A           |
| Non-Repetitive Peak On-State Current<br>(Half Sine Wave, $T_J=25^{\circ}C$ Prior to Surge)                     | $t=10ms$  | $I_{TSM}$          | 8          | A           |
|  | $t=8.3ms$ |                    | 9          | A           |
| $I^2t$ For Fusing ( $t=10ms$ )   |           | $I^2t$             | 0.32       | $A^2S$      |
| Repetitive Rate of Rise of On-State Current After Triggering<br>( $I_{TM}=2A, I_G=10mA, dI_G/dt=100mA/\mu s$ ) |           | $dI_T/dt$          | 50         | $A/\mu s$   |
| Peak Gate Power  |           | $P_{GM}$           | 2          | W           |
| Average Gate Power (Over any 20 ms period)   |           | $P_{G(AV)}$        | 0.1        | W           |
| Junction Temperature   |           | $T_J$              | +125       | $^{\circ}C$ |
| Storage Temperature  |           | $T_{STG}$          | -40 ~ +150 | $^{\circ}C$ |

Note: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. 1 Although not recommended, off-state voltages up to 800V may be applied without damage, but the thyristor may switch to the on-state. The rate of rise of current should not exceed 15 A/ $\mu s$ .

## ■ THERMAL DATA

| PARAMETER  |         | SYMBOL        | RATINGS | UNIT          |
|--|---------|---------------|---------|---------------|
| Thermal Resistance Junction to Ambient<br>(typ.) | SOT-223 | $\theta_{JA}$ | 150     | $^{\circ}C/W$ |
|  | TO-92   |               | 180     | $^{\circ}C/W$ |

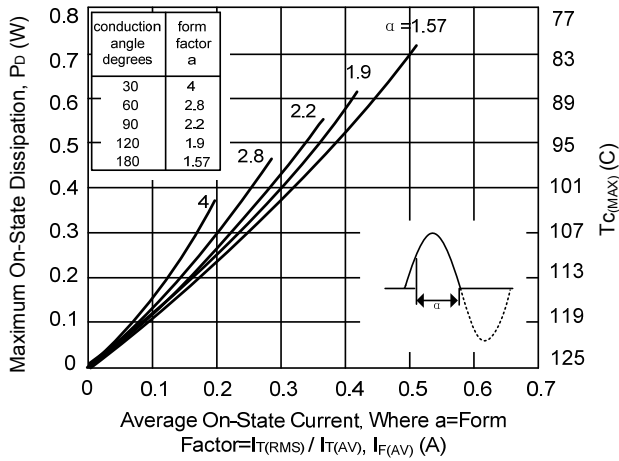
Note: pcb mounted, lead length=4mm

■ ELECTRICAL CHARACTERISTICS ( $T_J=25^\circ\text{C}$ , unless otherwise specified)

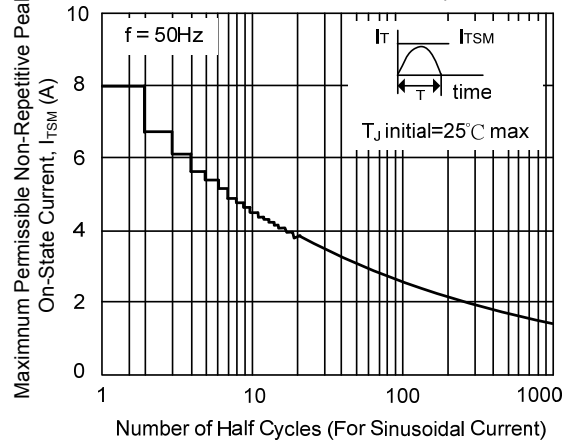
| PARAMETER                                  | SYMBOL     | TSET CONDITIONS  | MIN | TYP        | MAX  | UNIT                   |
|--|------------|--|-----|------------|------|------------------------|
| <b>STATIC CHARACTERISTICS</b>              |            |  |     |            |      |                        |
| Gate Trigger Current                       | $I_{GT}$   | $V_D=12\text{V}$ , $I_T=10\text{ mA}$ , gate open circuit  | 25  |            | 200  | $\mu\text{A}$          |
| Latching Current                           | $I_L$      | $V_D=12\text{V}$ , $I_{GT}=0.5\text{mA}$ , $R_{GK}=1\text{k}\Omega$  |     | 2          | 6    | mA                     |
| Holding Current                            | $I_H$      | $V_D=12\text{V}$ , $I_{GT}=0.5\text{mA}$ , $R_{GK}=1\text{k}\Omega$  |     | 2          | 5    | mA                     |
| On-State Voltage                           | $V_T$      | $I_T=1\text{A}$  |     | 1.2        | 1.35 | V                      |
| Gate Trigger Voltage                       | $V_{GT}$   | $V_D=12\text{V}$ , $I_T=10\text{mA}$ , gate open circuit<br>$V_D=V_{DRM(\text{MAX})}$ , $I_T=10\text{mA}$ , $T_J=125^\circ\text{C}$ , gate open circuit  | 0.2 | 0.5<br>0.3 | 0.8  | V                      |
| Off-State Leakage Current                  | $I_D, I_R$ | $V_D=V_{DRM(\text{MAX})}$ , $V_R=V_{RRM(\text{MAX})}$ ,<br>$T_J=125^\circ\text{C}$ , $R_{GK}=1\text{k}\Omega$  |     | 0.05       | 0.1  | mA                     |
| <b>DYNAMIC CHARACTERISTICS</b>             |            |  |     |            |      |                        |
| Critical Rate of Rise of Off-State Voltage | $dV_D/dt$  | $V_{DM}=67\% V_{DRM(\text{MAX})}$ , $T_J=125^\circ\text{C}$ ,<br>exponential waveform, $R_{GK}=1\text{k}\Omega$  | 500 | 800        |      | $\text{V}/\mu\text{s}$ |
| Gate Controlled Turn-On Time               | $t_{gt}$   | $I_{TM}=2\text{A}$ , $V_D=V_{DRM(\text{MAX})}$ , $I_G=10\text{mA}$ ,<br>$dI_G/dt=0.1\text{A}/\mu\text{s}$  |     | 2          |      | $\mu\text{s}$          |
| Circuit Commutated Turn-Off Time           | $t_q$      | $V_D=67\% V_{DRM(\text{MAX})}$ , $T_J=125^\circ\text{C}$ ,<br>$I_{TM}=1.6\text{A}$ , $V_R=35\text{V}$ , $dI_{TM}/dt=30\text{A}/\mu\text{s}$ ,<br>$V_D/dt=2\text{V}/\mu\text{s}$ , $R_{GK}=1\text{k}\Omega$ |     | 100        |      | $\mu\text{s}$          |

■ TYPICAL CHARACTERISTICS

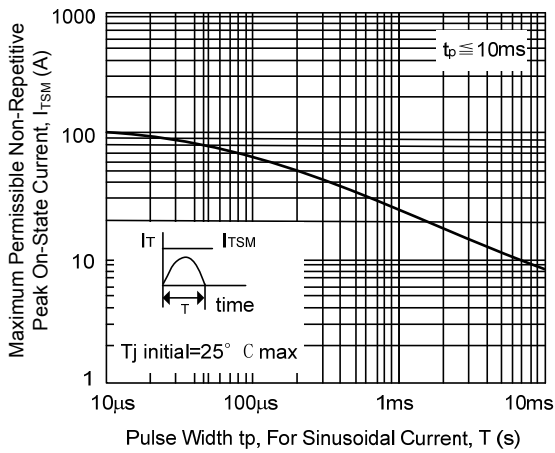
Maximum On-State Dissipation vs. Average On-State Current



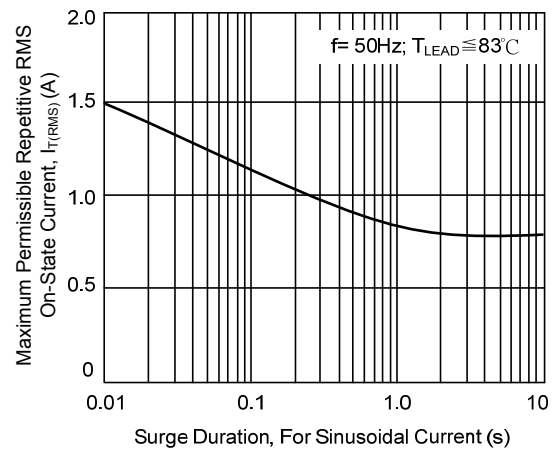
Maximum Permissible Non-Repetitive Peak On-State Current vs. Number Of Cycles



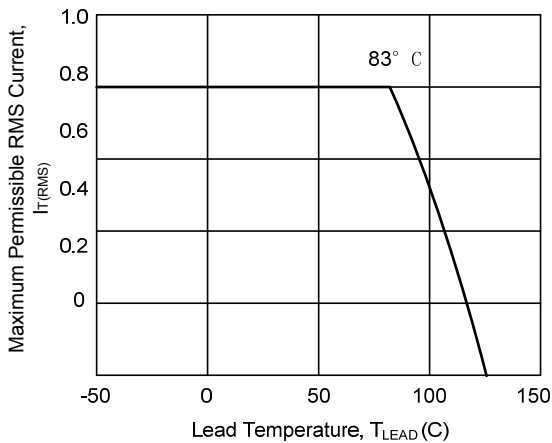
Maximum Permissible Non-Repetitive Peak On-State Current vs. Pulse Width tp, For Sinusoidal Current



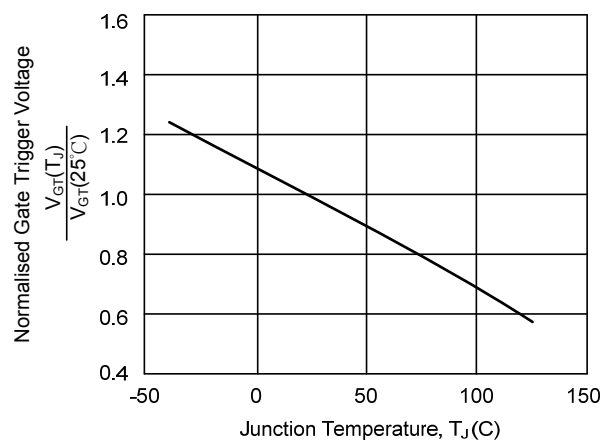
Maximum Permissible Repetitive RMS On-State Current vs. Surge Duration, For Sinusoidal Currents



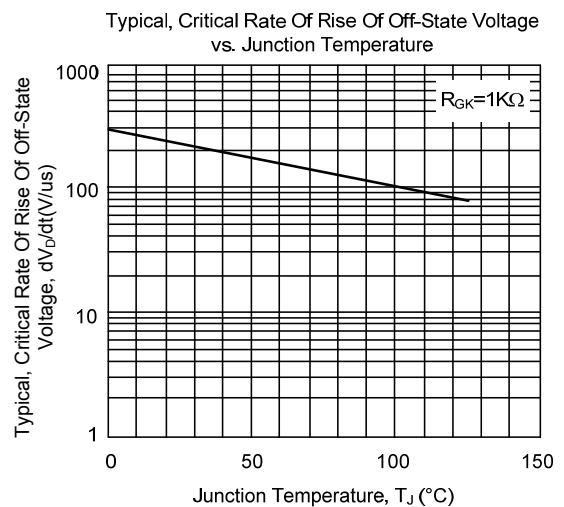
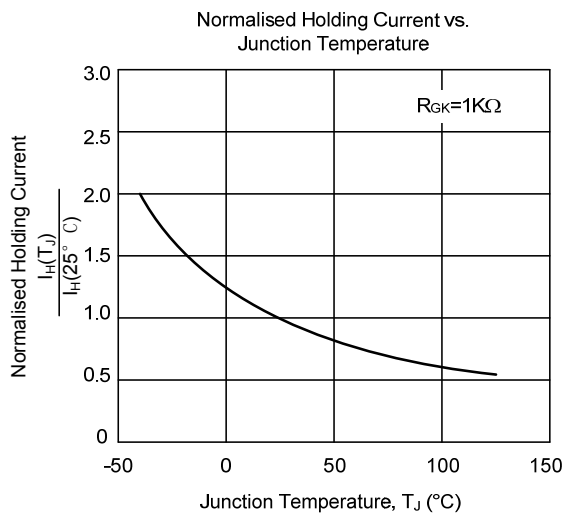
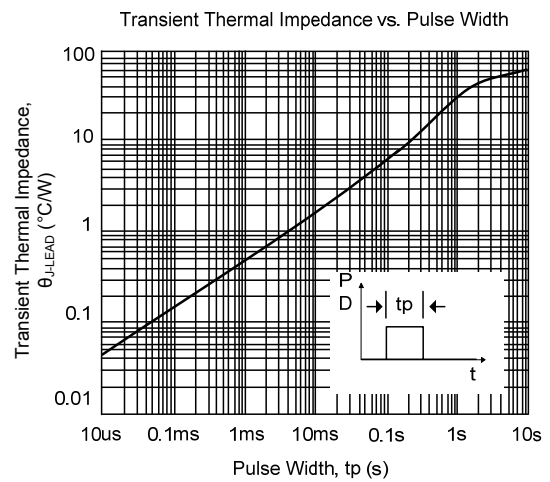
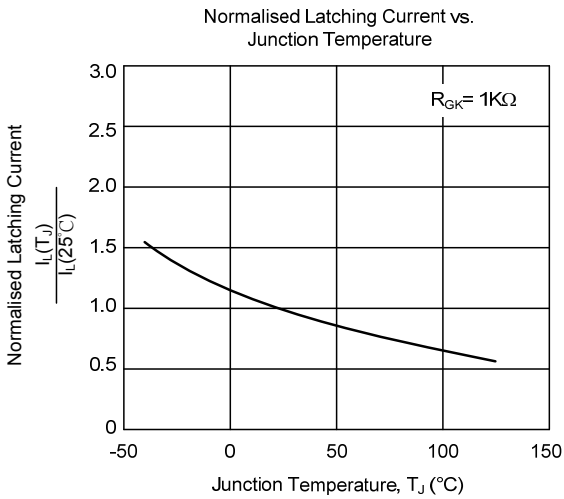
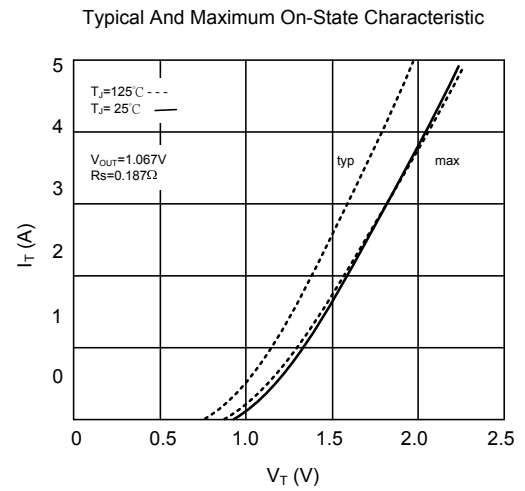
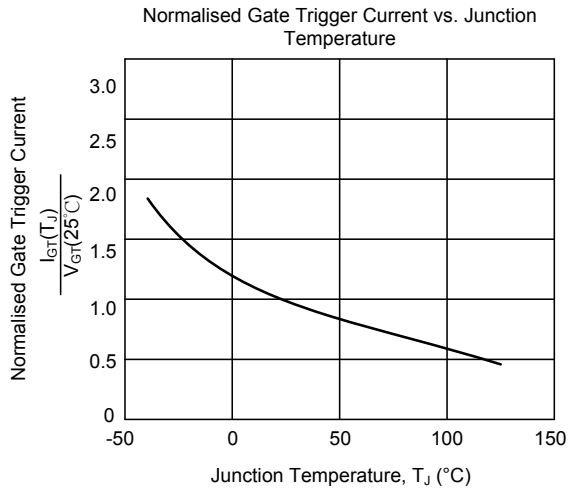
Maximum Permissible RMS Current vs. Lead Temperature



Normalised Gate Trigger Voltage vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)



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