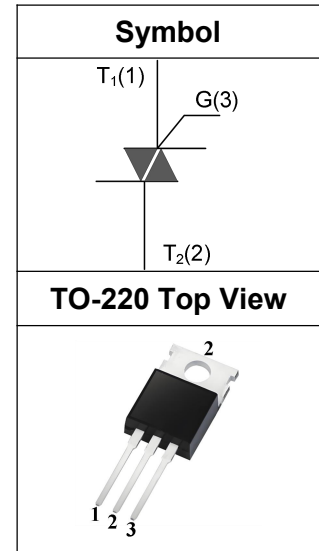


### Features

- ◆ Five-layer NPNPN-Structured Silicon Bidirectional Device
- ◆ Single-Side Trenching Technology and Mesa Glass Passivation Process
- ◆ Backside Multilayer Metallized Electrode
- ◆ High Blocking Voltage and Superior Temperature Stability

### Application

- ◆ Solid State Relay
- ◆ Heating Controller (Temperature Adjustment)
- ◆ Motor Speed Controllers for Vacuum Cleaners, Power Tools, and Similar Applications



### Product Summary:

| Symbol              | Value | Unit |
|---------------------|-------|------|
| I <sub>T(RMS)</sub> | 2.0   | A    |
| V <sub>DRM</sub>    | 800   | V    |
| V <sub>RRM</sub>    | 800   |      |

### ■ Absolute Maximum Ratings

| Symbol                         | Parameter                                  | Test Condition                                | Value      | Unit             |
|--------------------------------|--------------------------------------------|-----------------------------------------------|------------|------------------|
| I <sub>T(RMS)</sub>            | RMS On-State Current                       | T <sub>C</sub> = 90°C                         | 2.0        | A                |
| I <sub>TSM</sub>               | Non-Repetitive Surge Peak On-State Current | F = 50Hz, t = 20ms                            | 20         |                  |
| I <sup>2</sup> t               | I <sup>2</sup> t Value for Fusing          | t <sub>p</sub> = 10ms                         | 3.0        | A <sup>2</sup> s |
| d <sub>i</sub> /d <sub>t</sub> | Critical Rate of Rise of On-State Current  | T <sub>J</sub> = 125°C                        | 50         | A/μs             |
| V <sub>DRM</sub>               | Repetitive Peak Off-State Voltage          | T <sub>J</sub> = 25°C                         | 800        | V                |
| V <sub>RRM</sub>               | Repetitive Peak Reverse Voltage            | T <sub>J</sub> = 25°C                         | 800        |                  |
| I <sub>GM</sub>                | Peak Gate Current                          | t <sub>p</sub> = 20μs, T <sub>J</sub> = 125°C | 4.0        | A                |
| P <sub>G(AV)</sub>             | Average Gate Power Dissipation             | T <sub>J</sub> = 125°C                        | 0.5        | W                |
| T <sub>stg</sub>               | Storage Junction Temperature Range         | -                                             | -40 to 150 | °C               |
| T <sub>J</sub>                 | Operating Junction Temperature Range       | -                                             | -40 to 125 |                  |



# BT02C80X(W)

## 2A Bidirectional Thyristor

### ■ Thermal Characteristics

| Symbol               | Parameter             | Test Condition | Value(Max) | Unit |
|----------------------|-----------------------|----------------|------------|------|
| R <sub>th(j-c)</sub> | Junction to Case (AC) | Insulated      | 2.05       | °C/W |
|                      |                       | Non-Insulated  | 1.25       |      |

### ■ Electrical Characteristics (3 Quadrants)

| Symbol                                         | Parameter                                    | Test Condition                                                | Quadrant | Value |     | Unit |
|------------------------------------------------|----------------------------------------------|---------------------------------------------------------------|----------|-------|-----|------|
| I <sub>GT</sub>                                | Gate Trigger Current                         | V <sub>D</sub> = 12V,<br>R <sub>L</sub> = 100Ω                | I-II-III | Max   | 15  | mA   |
| V <sub>GT</sub>                                | Gate Trigger Voltage                         |                                                               |          |       | 1.5 |      |
| V <sub>GD</sub>                                | Gate Non-Trigger Voltage                     | T <sub>J</sub> = 125°C                                        |          | Min   | 0.2 |      |
| I <sub>H</sub>                                 | Holding Current                              | I <sub>T</sub> = 0.5A                                         |          | Max   | 60  | mA   |
| I <sub>L</sub>                                 | Latching Current                             | I <sub>G</sub> = 1.2I <sub>GT</sub>                           | I-III    |       | 60  |      |
|                                                |                                              |                                                               | II       |       | 100 |      |
| d <sub>V</sub> /d <sub>t</sub>                 | Critical Rate-of-Rise of Off-Stage Voltage   | V <sub>D</sub> = 2/3V <sub>DRM</sub> , T <sub>J</sub> = 125°C |          | Min   | 500 | V/μs |
| (d <sub>V</sub> /d <sub>t</sub> ) <sub>c</sub> | Critical Rate-of-Rise of Commutation Voltage | T <sub>J</sub> = 125°C                                        |          |       | 10  |      |

### ■ Electrical Characteristics (4 Quadrants)

| Symbol                                         | Parameter                                    | Test Condition                                                | Quadrant    | Value |     | Unit |
|------------------------------------------------|----------------------------------------------|---------------------------------------------------------------|-------------|-------|-----|------|
| I <sub>GT</sub>                                | Gate Trigger Current                         | V <sub>D</sub> = 12V,<br>R <sub>L</sub> = 100Ω                | I-II-III    | Max   | 15  | mA   |
|                                                |                                              |                                                               | IV          |       | 35  |      |
| V <sub>GT</sub>                                | Gate Trigger Voltage                         | T <sub>J</sub> = 125°C                                        | I-II-III-IV | Min   | 1.5 | V    |
| V <sub>GD</sub>                                | Gate Non-Trigger Voltage                     |                                                               |             |       | 0.2 |      |
| I <sub>H</sub>                                 | Holding Current                              | I <sub>T</sub> = 0.5A                                         |             | Max   | 30  | mA   |
| I <sub>L</sub>                                 | Latching Current                             | I <sub>G</sub> = 1.2I <sub>GT</sub>                           | I-III-IV    |       | 25  |      |
|                                                |                                              |                                                               | II          |       | 50  |      |
| d <sub>V</sub> /d <sub>t</sub>                 | Critical Rate-of-Rise of Off-Stage Voltage   | V <sub>D</sub> = 2/3V <sub>DRM</sub> , T <sub>J</sub> = 125°C |             | Min   | 500 | V/μs |
| (d <sub>V</sub> /d <sub>t</sub> ) <sub>c</sub> | Critical Rate-of-Rise of Commutation Voltage | T <sub>J</sub> = 125°C                                        |             |       | 10  |      |

### ■ Static Characteristics

| Symbol           | Parameter                         | Test Condition                                                                                    | Value(Max) | Unit |
|------------------|-----------------------------------|---------------------------------------------------------------------------------------------------|------------|------|
| V <sub>TM</sub>  | Peak ON-State Voltage             | I <sub>TM</sub> = 4.0A, T <sub>J</sub> = 25°C                                                     | 1.5        | V    |
| V <sub>TO</sub>  | Threshold Voltage                 | T <sub>J</sub> = 125°C                                                                            | 0.92       |      |
| R <sub>D</sub>   | Dynamic Resistance                | T <sub>J</sub> = 125°C                                                                            | 36.8       | mΩ   |
| I <sub>DRM</sub> | Repetitive Peak Off-State Current | V <sub>D</sub> = V <sub>DRM</sub> , V <sub>R</sub> = V <sub>R</sub> RM,<br>T <sub>J</sub> = 25°C  | 5.0        | μA   |
| I <sub>RRM</sub> | Repetitive Peak Reverse Current   | V <sub>D</sub> = V <sub>DRM</sub> , V <sub>R</sub> = V <sub>R</sub> RM,<br>T <sub>J</sub> = 125°C | 1.0        | mA   |

### ■ Characteristic Curve

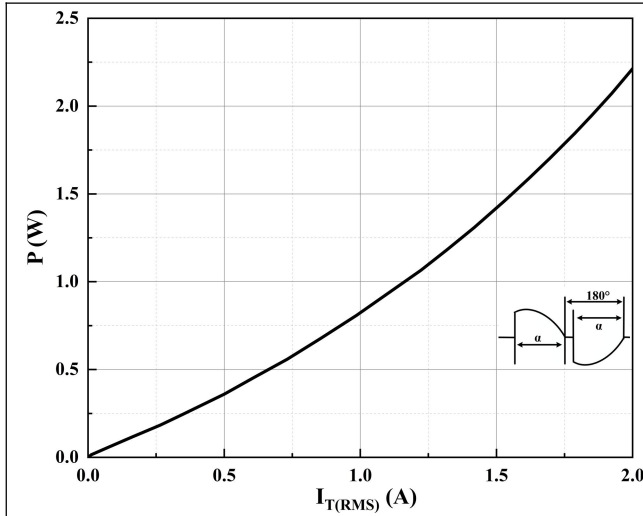


Figure 1. Power Dissipation vs. RMS On-State Current

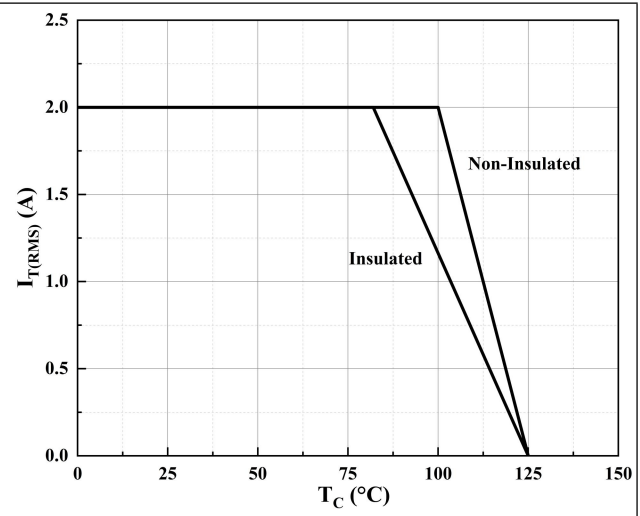


Figure 2. RMS On-State Current vs. Case Temperature

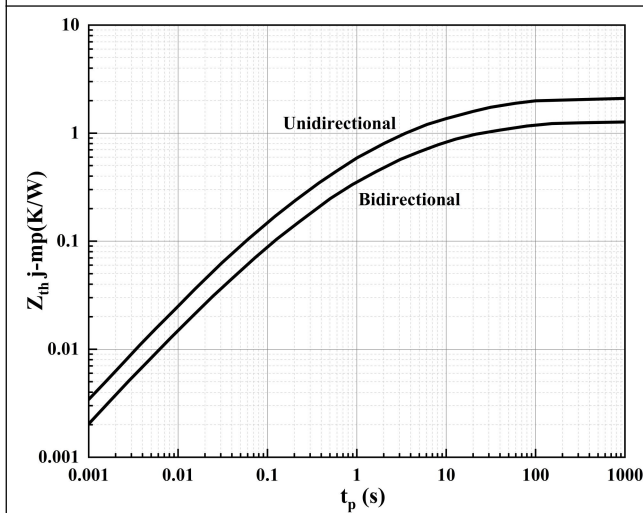


Figure 3. Relative Variation of Thermal Impedance Junction to Case vs. Pulse Duration

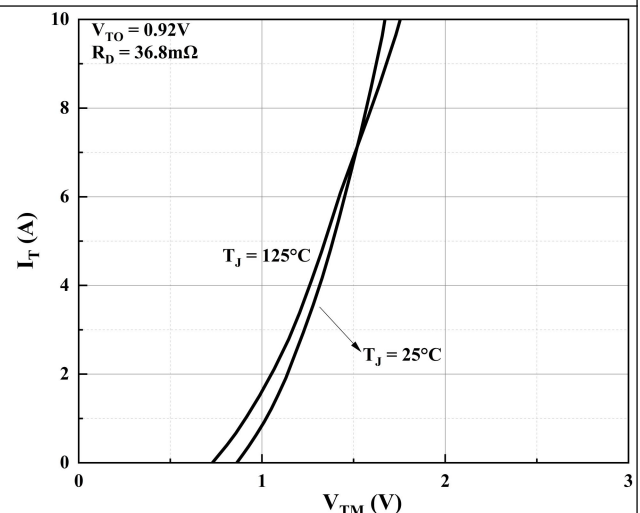


Figure 4. On-State Current vs. Peak ON-State Voltage

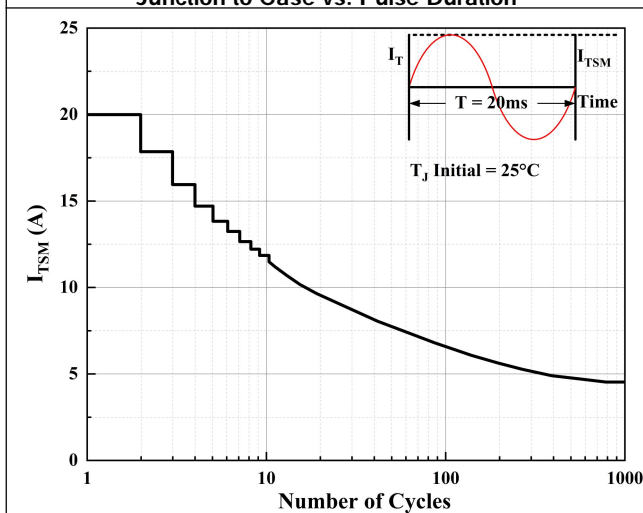


Figure 5. Surge Peak On-State Current vs. Number of Cycles

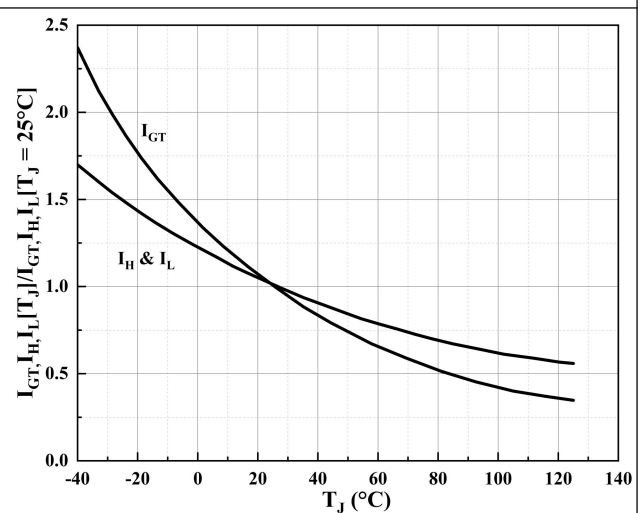


Figure 6. Gate Trigger Current, Holding Current and Latching Current vs. Junction Temperature

### ■ Characteristic Curve

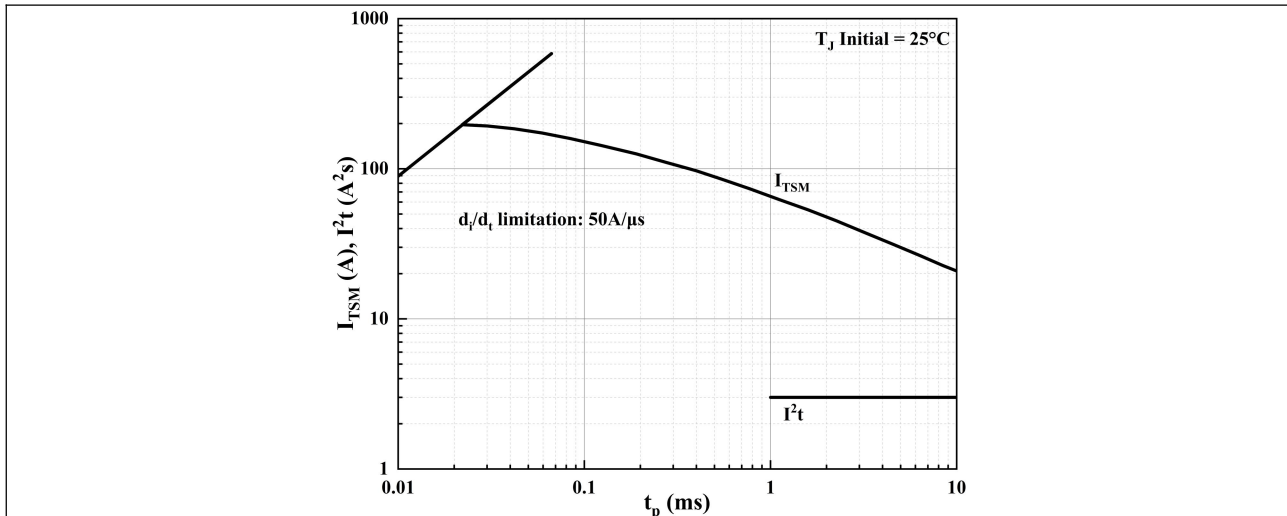


Figure 7. Non-Repetitive Surge Peak On-State Current for a Sinusoidal Pulse with Width  $t_p < 10\text{ms}$  and Corresponding Value of  $I^2t$  ( $d_i/d_t < 50\text{A}/\mu\text{s}$ )

### ■ Ordering Information

|           |                                     |                         |          |                                                          |                                                                                                                                                                                                    |                                     |                                                                 |
|-----------|-------------------------------------|-------------------------|----------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-----------------------------------------------------------------|
| <b>BT</b> | <b>(A)</b>                          | <b>02</b>               | <b>C</b> | <b>80</b>                                                | <b>X</b>                                                                                                                                                                                           | <b>(W)</b>                          | <b>(H)</b>                                                      |
| Triacs    | A: Insulated<br>None: Non-insulated | $I_{T(RMS)}: 2\text{A}$ | TO-220   | $V_{DRM} \geq 800\text{V}$<br>$V_{RRM} \geq 800\text{V}$ | E: $I_{GT1-3} \leq 10\text{mA}$<br>C: $I_{GT1-3} \leq 15\text{mA}$<br>E: $I_{GT1-3} \leq 10\text{mA}$ , $I_{GT4} \leq 25\text{mA}$<br>C: $I_{GT1-3} \leq 15\text{mA}$ , $I_{GT4} \leq 35\text{mA}$ | W: 3 Quadrants<br>None: 4 Quadrants | None: $T_J = 125^\circ\text{C}$<br>H: $T_J = 150^\circ\text{C}$ |

**BT02C80X(W)**  
2A Bidirectional Thyristor