

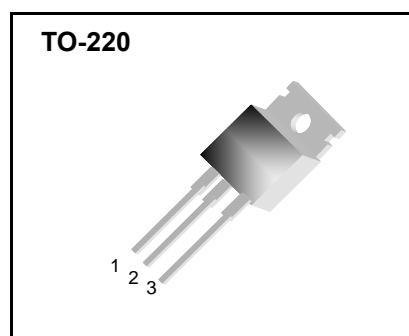
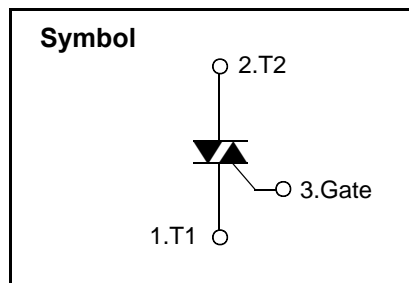
## Bi-Directional Triode Thyristor

### Features

- ◆ Repetitive Peak Off-State Voltage : 600V
- ◆ R.M.S On-State Current (  $I_{T(RMS)} = 12\text{ A}$  )
- ◆ High Commutation  $dv/dt$
- ◆ Non-isolated Type

### General Description

This device is suitable for AC switching application, phase control application such as fan speed and temperature modulation control, lighting control and static switching relay.



### Absolute Maximum Ratings ( $T_J = 25^\circ\text{C}$ unless otherwise specified )

| Symbol       | Parameter                         | Condition                                  | Ratings    | Units                |
|--------------|-----------------------------------|--|------------|----------------------|
| $V_{DRM}$    | Repetitive Peak Off-State Voltage |  | 600        | V                    |
| $I_{T(RMS)}$ | R.M.S On-State Current            | $T_C = 101^\circ\text{C}$                  | 12         | A                    |
| $I_{TSM}$    | Surge On-State Current            | One Cycle, 50Hz/60Hz, Peak, Non-Repetitive | 100/110    | A                    |
| $I^2t$       | $I^2t$ for fusing                 | $t = 10\text{ms}$                          | 50         | $\text{A}^2\text{s}$ |
| $P_{GM}$     | Peak Gate Power Dissipation       |  | 5.0        | W                    |
| $P_{G(AV)}$  | Average Gate Power Dissipation    | Over any 20ms period                       | 0.5        | W                    |
| $I_{GM}$     | Peak Gate Current                 |  | 2.0        | A                    |
| $V_{GM}$     | Peak Gate Voltage                 |  | 10         | V                    |
| $T_J$        | Operating Junction Temperature    |  | - 40 ~ 125 | $^\circ\text{C}$     |
| $T_{STG}$    | Storage Temperature               |  | - 40 ~ 150 | $^\circ\text{C}$     |
|              | Mass                              |  | 2.0        | g                    |

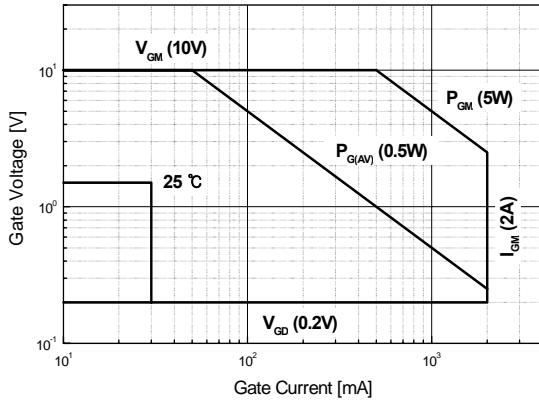
# BT138-600

## Electrical Characteristics

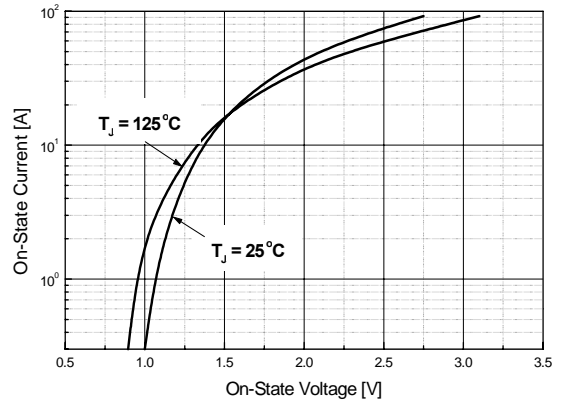
| Symbol               | Items  |                      | Conditions  | Ratings |      |      | Unit               |
|----------------------|--|----------------------|---|---------|------|------|--------------------|
|                      |  |                      |   | Min.    | Typ. | Max. |                    |
| $I_{DRM}$            | Repetitive Peak Off-State Current                      |                      | $V_D = V_{DRM}$ , Single Phase, Half Wave<br>$T_J = 125\text{ }^\circ\text{C}$              | —       | —    | 2.0  | mA                 |
| $V_{TM}$             | Peak On-State Voltage                                  |                      | $I_T = 15\text{ A}$ , Inst. Measurement   | —       | —    | 1.65 | V                  |
| $I_{GT1}^+$          | I  | Gate Trigger Current | $V_D = 6\text{ V}$ , $R_L = 10\text{ }\Omega$   | —       | —    | 25   | mA                 |
| $I_{GT1}^-$          | II   |                      |   | —       | —    | 25   |                    |
| $I_{GT3}^-$          | III  |                      |   | —       | —    | 25   |                    |
| $V_{GT1}^+$          | I  | Gate Trigger Voltage | $V_D = 6\text{ V}$ , $R_L = 10\text{ }\Omega$   | —       | —    | 1.5  | V                  |
| $V_{GT1}^-$          | II   |                      |   | —       | —    | 1.5  |                    |
| $V_{GT3}$            | III  |                      |   | —       | —    | 1.5  |                    |
| $V_{GD}$             | Non-Trigger Gate Voltage                               |                      | $T_J = 125\text{ }^\circ\text{C}$ , $V_D = 1/2 V_{DRM}$                                     | 0.2     | —    | —    | V                  |
| (dv/dt) <sub>c</sub> | Critical Rate of Rise Off-State Voltage at Commutation |                      | $T_J = 125\text{ }^\circ\text{C}$ , $[di/dt]_c = -4.0\text{ A/ms}$ ,<br>$V_D = 2/3 V_{DRM}$ | 10      | —    | —    | V/ $\mu\text{s}$   |
| $I_H$                | Holding Current  |                      |   | —       | 15   | —    | mA                 |
| $R_{th(j-c)}$        | Thermal Impedance                                      |                      | Junction to case  | —       | —    | 1.5  | $^\circ\text{C/W}$ |



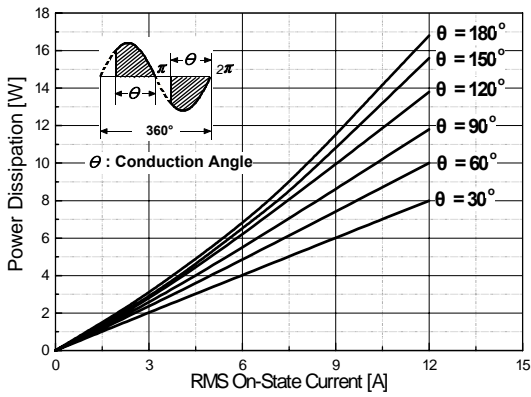
**Fig 1. Gate Characteristics**



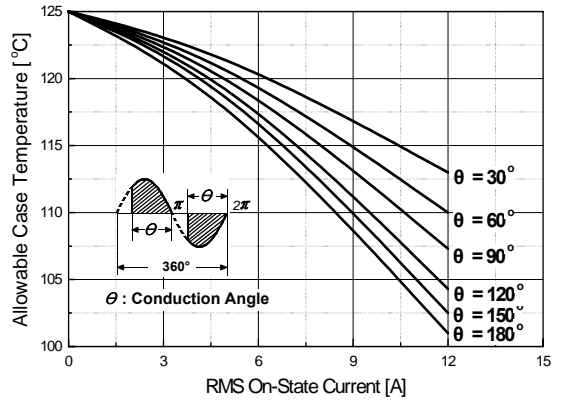
**Fig 2. On-State Voltage**



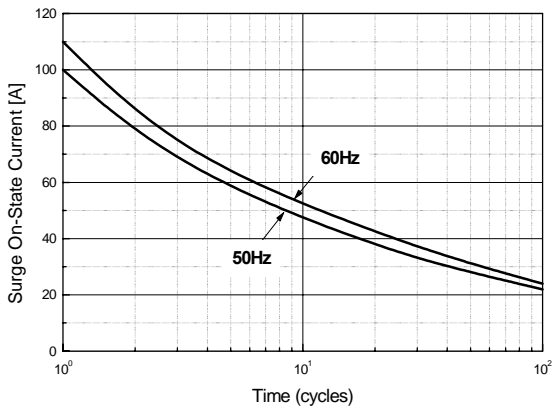
**Fig 3. On State Current vs. Maximum Power Dissipation**



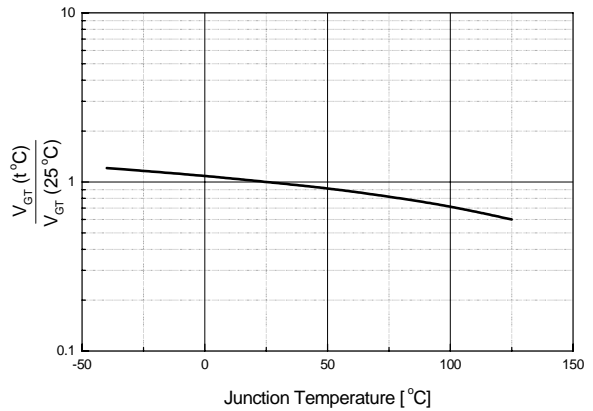
**Fig 4. On State Current vs. Allowable Case Temperature**



**Fig 5. Surge On-State Current Rating ( Non-Repetitive )**

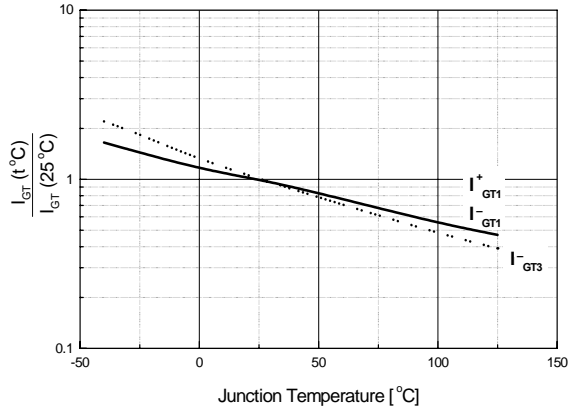


**Fig 6. Gate Trigger Voltage vs. Junction Temperature**

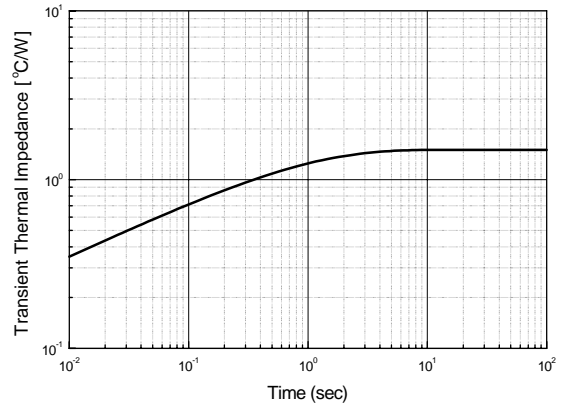


# BT138-600

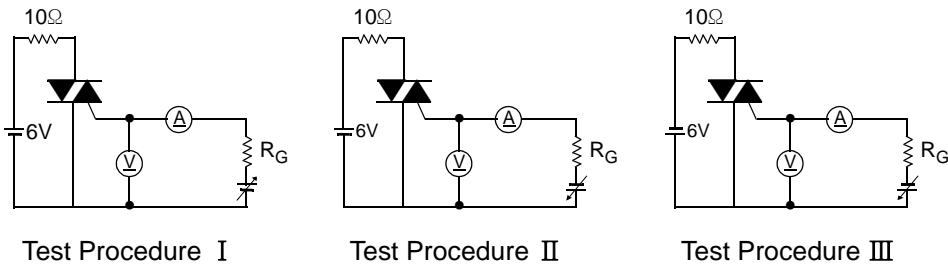
**Fig 7. Gate Trigger Current vs. Junction Temperature**



**Fig 8. Transient Thermal Impedance**



**Fig 9. Gate Trigger Characteristics Test Circuit**



## TO-220 Package Dimension

| Dim.   | mm   |      |      | Inch  |       |       |
|--------|------|------|------|-------|-------|-------|
|        | Min. | Typ. | Max. | Min.  | Typ.  | Max.  |
| A      | 9.7  |      | 10.1 | 0.382 |       | 0.398 |
| B      | 6.3  |      | 6.7  | 0.248 |       | 0.264 |
| C      | 9.0  |      | 9.47 | 0.354 |       | 0.373 |
| D      | 12.8 |      | 13.3 | 0.504 |       | 0.524 |
| E      | 1.2  |      | 1.4  | 0.047 |       | 0.055 |
| F      |      | 1.7  |      |       | 0.067 |       |
| G      |      | 2.5  |      |       | 0.098 |       |
| H      | 3.0  |      | 3.4  | 0.118 |       | 0.134 |
| I      | 1.25 |      | 1.4  | 0.049 |       | 0.055 |
| J      | 2.4  |      | 2.7  | 0.094 |       | 0.106 |
| K      | 5.0  |      | 5.15 | 0.197 |       | 0.203 |
| L      | 2.2  |      | 2.6  | 0.087 |       | 0.102 |
| M      | 1.25 |      | 1.55 | 0.049 |       | 0.061 |
| N      | 0.45 |      | 0.6  | 0.018 |       | 0.024 |
| O      | 0.6  |      | 1.0  | 0.024 |       | 0.039 |
| $\phi$ |      | 3.6  |      |       | 0.142 |       |

