



## Features

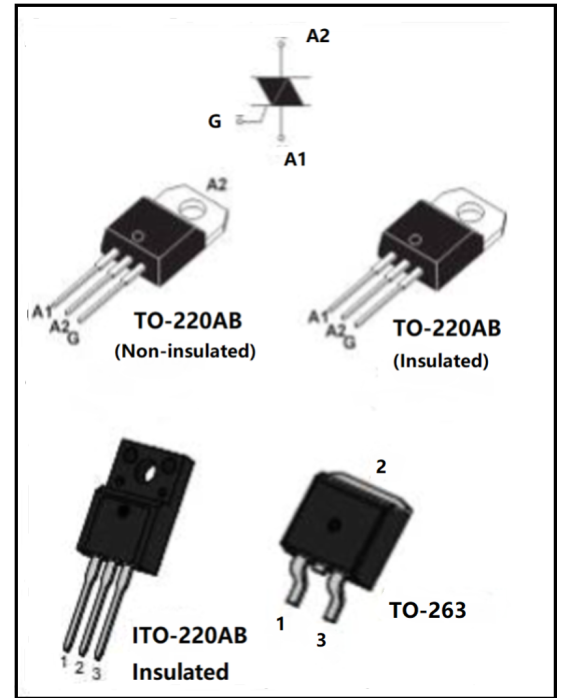
- ◇ The LGE BT139, 16A III & IV quadrants series triacs, which can be operated in III & IV quadrants. As silicon bidirectional device, with NPNPN five-layer structure; singlesided trenching technology, mesa glass passivation process;
- ◇ multi-layer metallized electrode on the back side;
- ◇ High blocking voltage and high temperature stability.

## Applications

The LGE BT139 is suitable for inductive load switching operations, also can be used in ON/OFF function applications such as washing machine, induction motor starting circuits, vacuum cleaners, power tools and other motors such as speed control maker; heating regulation, solid state relay; phases control circuit; AC motor speed regulation, and so on.

## Mechanical Data

- ◇ Moisture Sensitivity: MSL Level 1, per J-STD-020
- ◇ Terminals: Matte Tin Finish.  
Solderable per MIL-STD-202 Method 208
- ◇ Case Material: Molded Plastic;
- ◇ Molding compound meet UL Flammability  
Classification Rating 94V-0
- ◇ Case: JEDEC TO-220AB, ITO-20AB, TO-263



## MAXIMUM RATING

Ratings at 25°C ambient temperature unless otherwise specified.

| PARAMETER                                                                                 |                    |          | SYMBOL                             | VALUE                                   | UNITS            |
|-------------------------------------------------------------------------------------------|--------------------|----------|------------------------------------|-----------------------------------------|------------------|
| R.M.S. On-State Current                                                                   | BT139              | Tc=110℃  | I <sub>T(RMS)</sub>                | 16                                      | A                |
| Non-Repetitive Surge Peak On-State Current(fFull Cycle,Tj initial=25℃)                    | F=50HZ             | T=20ms   | I <sub>TSM</sub>                   | 160                                     | A                |
|                                                                                           | F=60HZ             | T=16.7ms |                                    | 168                                     |                  |
| I <sup>2</sup> t Value for Fusing                                                         | tp=10ms            |          | I <sup>2</sup> t                   | 144                                     | A <sup>2</sup> s |
| Critical Rate of Rise of On-State Current<br>I <sub>G</sub> =2×I <sub>GT</sub> , tr≤100ns | F=120HZ            | Tj=125℃  | di/dt                              | 50                                      | A/ μ s           |
| Repetitive peak Off-State voltage                                                         |                    | Tj=25℃   | V <sub>DRM</sub> /V <sub>RRM</sub> | 600/800                                 | V                |
| Non repetitive surge peak off-state voltage                                               | tp=10ms            | Tj=25℃   | V <sub>DSM</sub> /V <sub>RSM</sub> | V <sub>DRM</sub> /V <sub>RRM</sub> +100 | V                |
| Peak Gate Current                                                                         | tp=20μs            | Tj=125℃  | I <sub>GM</sub>                    | 4                                       | A                |
| Average Gate Power Dissipation                                                            |                    | Tj=125℃  | P <sub>G(AV)</sub>                 | 1                                       | W                |
| Typical Thermal Resistance<br>(Junction to Ambient)                                       | TO-220AB/TO-263    |          | R <sub>θJA</sub>                   | 60                                      | ℃/W              |
|                                                                                           | TO-220AB Insulated |          |                                    | 55                                      |                  |
|                                                                                           | TO-220F Insulated  |          |                                    | 60                                      |                  |
| Typical Thermal Resistance(Junction to Case (AC))                                         | TO-220AB/TO-263    |          | R <sub>θJC</sub>                   | 1.2                                     | ℃/W              |
|                                                                                           | TO-220AB Insulated |          |                                    | 2.1                                     |                  |
|                                                                                           | TO-220F Insulated  |          |                                    | 2.5                                     |                  |
| Maximum Operating Junction temperature                                                    |                    |          | T <sub>J</sub>                     | -40~+125                                | ℃                |
| Storage temperature range                                                                 |                    |          | T <sub>STG</sub>                   | -40~+150                                | ℃                |



### ELECTRICAL CHARACTERISTICS(III QUADRANTS)

| PARAMETER                                                                       | TEST CONDITIONS                        | SYMBOL      | VALUES |     |     |      | UNITS      |
|---------------------------------------------------------------------------------|----------------------------------------|-------------|--------|-----|-----|------|------------|
|                                                                                 |                                        |             |        | SW  | CW  | BW   |            |
| Gate Trigger Current                                                            | $V_D=12V, R_L=100\Omega$               | $I_{GT}$    | MAX    | 10  | 35  | 50   | mA         |
| Gate Trigger Voltage                                                            | ( I II III quadrant)                   | $V_{GT}$    | MAX    | 1.5 |     |      | V          |
| Gate Non-Trigger Voltage                                                        | $T_j=125^\circ C$ ( I II III quadrant) | $V_{GD}$    | MIN    | 0.2 |     |      | V          |
| Holding Current $I_T=0.5A$                                                      |                                        | $I_H$       | MAX    | 10  | 35  | 50   | mA         |
| Latching Current $I_G=1.2I_{GT}$                                                | I III quadrant                         | $I_L$       | MAX    | 25  | 50  | 70   | mA         |
|                                                                                 | II quadrant                            |             | MAX    | 30  | 60  | 80   |            |
| Critical Rate of Rise of Off-State Voltage<br>$V_D=2/3V_{DRM}, T_j=125^\circ C$ |                                        | $dv/dt$     | MIN    | 40  | 500 | 1000 | V/ $\mu s$ |
| Critical Rate of Rise of Off-State Voltage at Commutation, $T_j=125^\circ C$    |                                        | $(dv/dt)_c$ | MIN    | 10  | 10  | 10   | V/ $\mu s$ |

### ELECTRICAL CHARACTERISTICS(IV QUADRANTS)

| PARAMETER                                                                       | TEST CONDITIONS                                     |          | SYMBOL      | VALUE |     |    |    |     | UNIT       |
|---------------------------------------------------------------------------------|-----------------------------------------------------|----------|-------------|-------|-----|----|----|-----|------------|
|                                                                                 |                                                     |          |             |       | D   | E  | F  | G   |            |
| Gate Trigger Current                                                            | $V_D=12V, R_L=100\Omega$<br>( I II III IV quadrant) | I II III | $I_{GT}$    | MAX   | 5   | 10 | 25 | 50  | mA         |
|                                                                                 |                                                     | IV       |             | MAX   | 10  | 25 | 70 | 100 |            |
| Gate Trigger Voltage                                                            |                                                     | All      | $V_{GT}$    | MAX   | 1.3 |    |    |     | V          |
| Gate Non-Trigger Voltage                                                        | $T_j=125^\circ C$ ( I II III quadrant)              |          | $V_{GD}$    | MIN   | 0.2 |    |    |     | V          |
| Holding Current $I_T=0.5A$                                                      |                                                     |          | $I_H$       | MAX   | 10  | 25 | 30 | 60  | mA         |
| Latching Current $=1.2I_{GT}$                                                   | I III IV quadrant                                   |          | $I_L$       | MAX   | 15  | 30 | 40 | 60  | mA         |
|                                                                                 | II quadrant                                         |          |             | MAX   | 20  | 40 | 60 | 90  |            |
| Critical Rate of Rise of Off-State Voltage<br>$V_D=2/3V_{DRM}, T_j=125^\circ C$ |                                                     |          | $dv/dt$     | MIN   | 5   | 10 | 50 | 200 | V/ $\mu s$ |
| Critical Rate of Rise of Off-State Voltage at Commutation, $T_j=125^\circ C$    |                                                     |          | $(dv/dt)_c$ | MIN   | 1   | 2  | 5  | 10  | V/ $\mu s$ |

### STATIC CHARACTERISTICS

| PARAMETER                                              | TEST CONDITIONS              | SYMBOL    |     | VALUE | UNITS      |
|--------------------------------------------------------|------------------------------|-----------|-----|-------|------------|
| Peak On-State Voltage                                  | $I_{TM}=32A, T_j=25^\circ C$ | $V_{TM}$  | MAX | 1.55  | V          |
| Threshold Voltage                                      | $T_j=125^\circ C$            | $V_{TO}$  | MAX | 0.87  | V          |
| Dynamic Resistance                                     | $T_j=125^\circ C$            | $R_d$     | MAX | 14.6  | m $\Omega$ |
| Repetitive Peak Off-Statte Curren<br>$V_{DRM}=V_{RRM}$ | $T_j=25^\circ C$             | $I_{DRM}$ | MAX | 5     | $\mu A$    |
|                                                        | $T_j=125^\circ C$            | $I_{RRM}$ | MAX | 2     | mA         |



## RATING AND CHARACTERISTICS CURVES

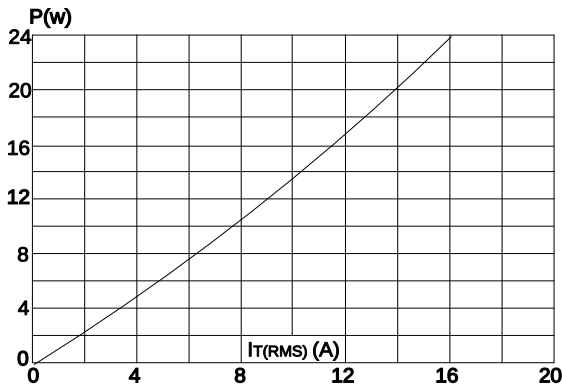


**FIG.1:** Maximum power dissipation versus RMS on-state current

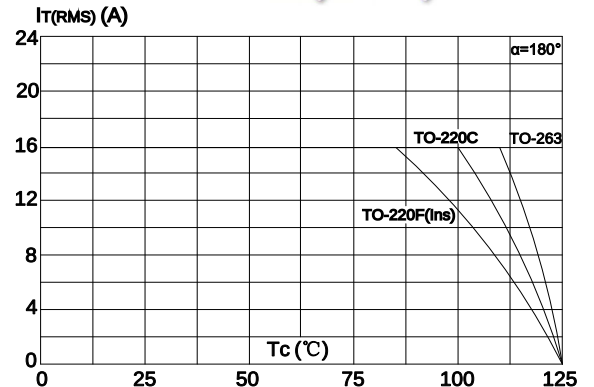


**FIG.2:** RMS on-state current versus case temperature

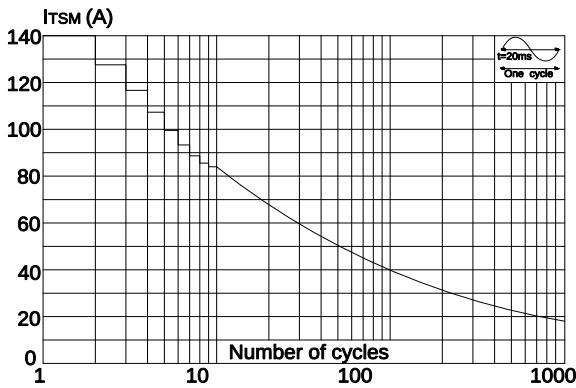


**FIG.3:** Surge peak on-state current versus number of cycles

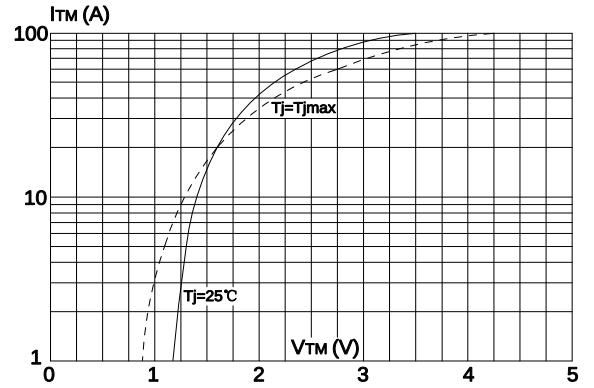


**FIG.4:** On-state characteristics (maximum values)

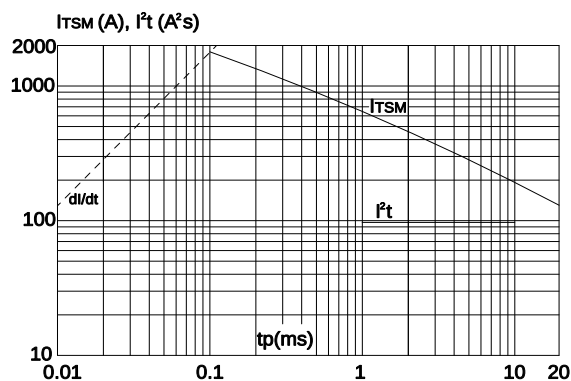


**FIG.5:** Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 20\text{ms}$ , and corresponding value of  $I^2t$  ( $di/dt < 100\text{A}/\mu\text{s}$ )

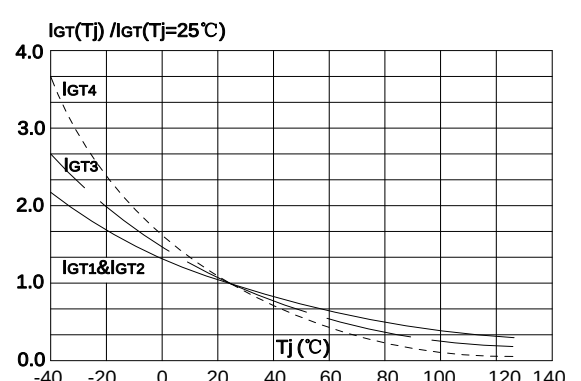


**FIG.6:** Relative variations of gate trigger current, holding current and latching current versus junction temperature

## RATING AND CHARACTERISTICS CURVES

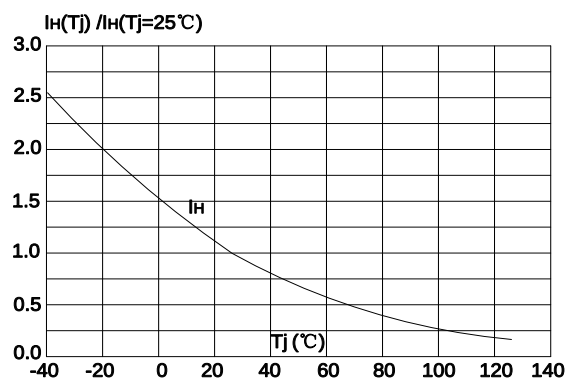


**FIG.7:** Relative variations of holding current versus junction temperature

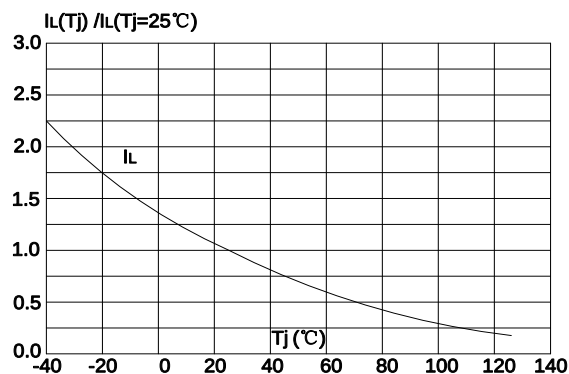
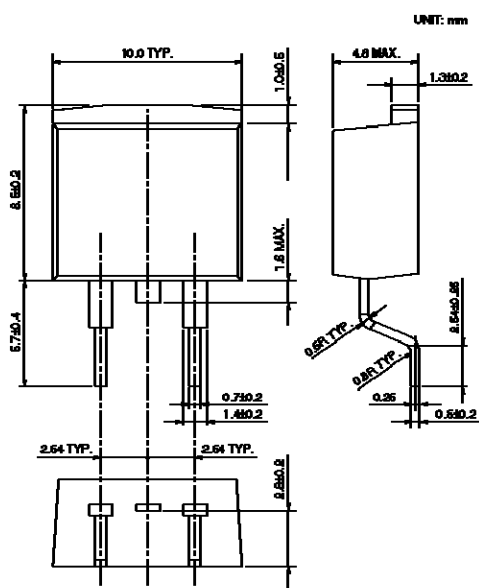


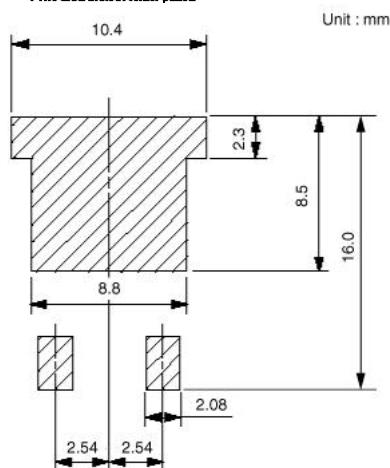
**FIG.8:** Relative variations of latching current versus junction temperature

## PACKAGE OUTLINE DIMENSIONS

**TO-263**      **units:mm( $\pm 0.10$ )**

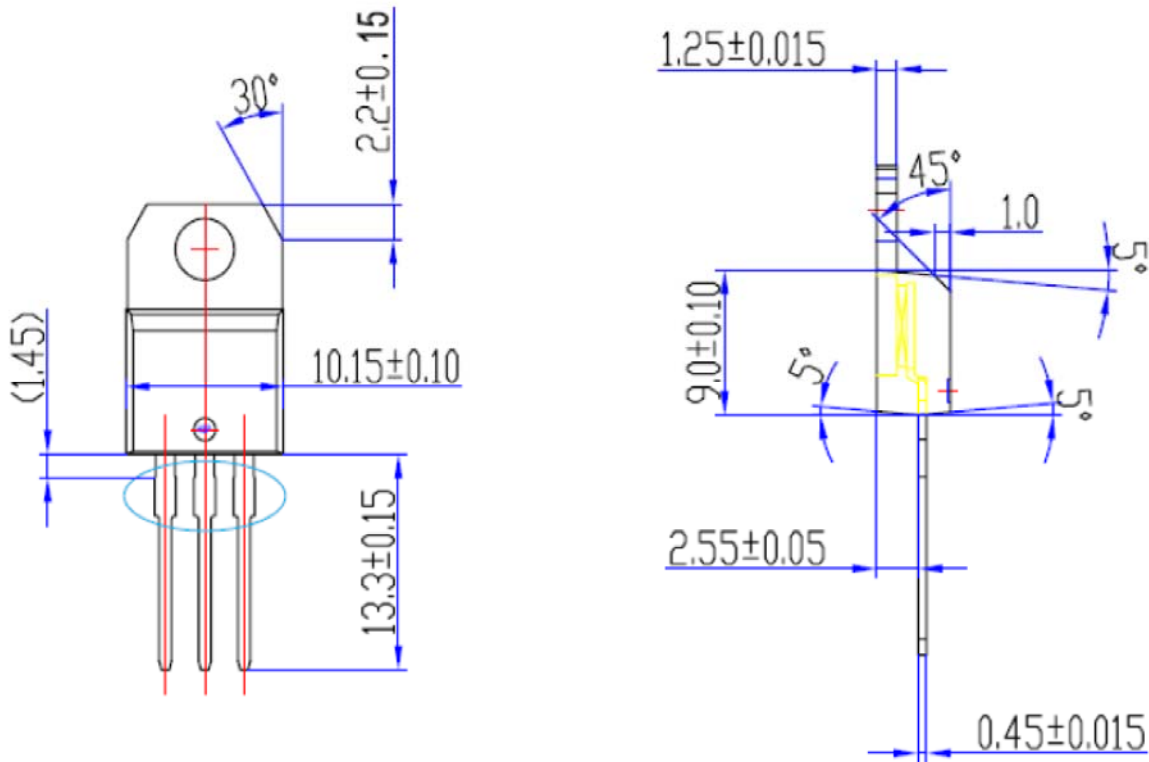


: The area without solder plated

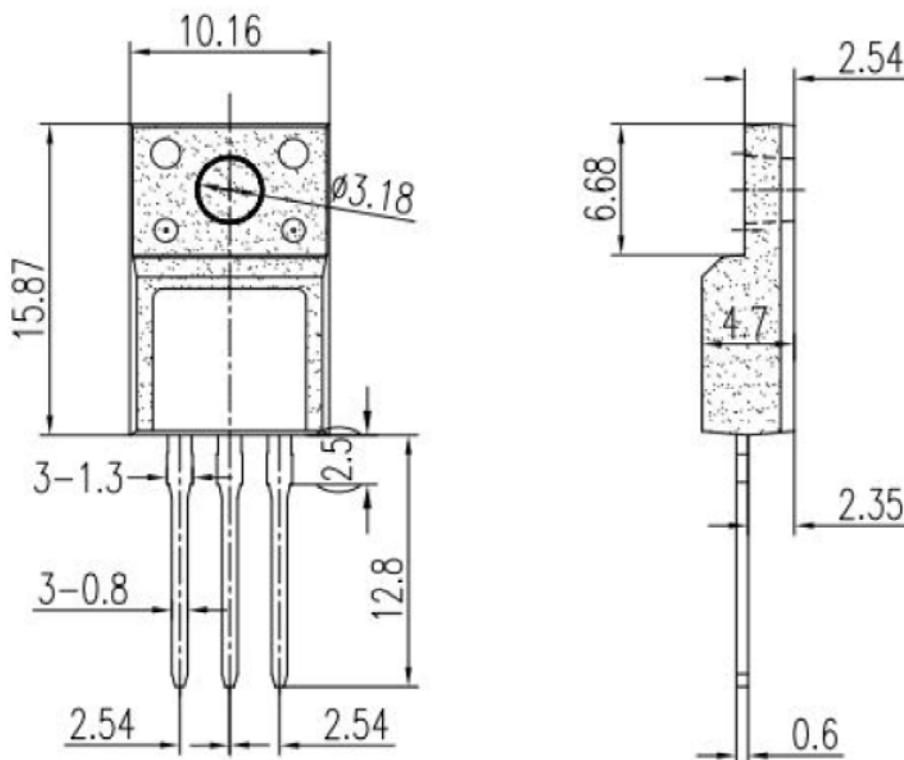


## PACKAGE OUTLINE DIMENSIONS

**TO-220AB units:mm**



**ITO-220AB/TO-220F units:mm( $\pm 0.10$ )**





## ORDERING INFORMATION

