



## BT152

SCR

### ■ GENERAL DESCRIPTION

The BT152 is a thyristor, it uses our advanced technology to provide customers with high bidirectional blocking voltage capability and high thermal cycling performance, etc. The BT152 is suitable for motor control, industrial, static switching, heating and domestic lighting, etc.

### ■ FEATURES

- \* High bidirectional blocking voltage capability
- \* High thermal cycling performance

### ■ MARKING



: HY LOGO

BT152=Device Code

800E:VDRM/VRRM=800V

XXXX=Date Code

Solid Dot=Green molding compound



Pin1:K (Cathode)

Pin2:A (Anode)

Pin3:G (Gate)

### ■ ABSOLUTE MAXIMUM RATINGS (TC=25°C, unless otherwise specified)

| SYMBOL              | PARAMETER                                                                                                            |         | TEST CONDITION       | VALUE       | UNIT             |
|---------------------|----------------------------------------------------------------------------------------------------------------------|---------|----------------------|-------------|------------------|
| V <sub>DRM</sub>    | Repetitive Peak off-state voltage                                                                                    | BT152-4 | T <sub>J</sub> =25℃  | 450         | V                |
|                     |                                                                                                                      | BT152-6 |                      | 650         |                  |
|                     |                                                                                                                      | BT152-8 |                      | 800         |                  |
| I <sub>T(AV)</sub>  | Average On-State Current（half sine wave;T <sub>c</sub> ≤103℃）                                                        |         |                      | 13          | A                |
| I <sub>T(RMS)</sub> | RMS On-State Current（All Conduction Angles）                                                                          |         |                      | 20          | A                |
| I <sub>TSM</sub>    | Non-repetitive peak on-state current<br>(half sine wave;T <sub>J</sub> =25℃ prior to surge)                          | t=10ms  |                      | 200         | A                |
|                     |                                                                                                                      | t=8.3ms |                      | 220         |                  |
| I <sup>2</sup> t    | I <sup>2</sup> t for fusing                                                                                          | t=10ms  |                      | 200         | A <sup>2</sup> S |
| dl/dt               | Critical rate of rise of on-state current, I <sub>TM</sub> = 50A; I <sub>G</sub> =0.2A; dl <sub>G</sub> /dt =0.2A/μs |         |                      | 200         | A/μs             |
| I <sub>GM</sub>     | Peak gate current                                                                                                    |         |                      | 5           | A                |
| V <sub>GM</sub>     | Peak gate voltage                                                                                                    |         |                      | 5           | V                |
| V <sub>RGM</sub>    | Peak Reverse Gate Voltage                                                                                            |         |                      | 5           | V                |
| P <sub>GM</sub>     | Peak gate Power                                                                                                      |         |                      | 20          | W                |
| P <sub>G(AV)</sub>  | Average gate Power Dissipation (over any 20ms period)                                                                |         | T <sub>J</sub> =125℃ | 0.5         | W                |
| T <sub>J</sub>      | Operating Junction Temperature                                                                                       |         |                      | 125         | ℃                |
| T <sub>stg</sub>    | Storage Temperature                                                                                                  |         |                      | -40 to +150 | ℃                |

Notes: 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.



## BT152

SCR

### ■ THERMAL RESISTANCES

| PARAMETER           |         | SYMBOL          | RATINGS | UNIT                        |
|---------------------|---------|-----------------|---------|-----------------------------|
| Junction to Ambient | TO-220F | $R_{\theta JA}$ | 62.5    | $^{\circ}\text{C}/\text{W}$ |
| Junction to Case    | TO-220F | $R_{\theta JC}$ | 3.31    | $^{\circ}\text{C}/\text{W}$ |

### ■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, unless otherwise specified)

| PARAMETER                                  | SYMBOL              | TEST CONDITIONS                                                                                                              | MIN  | TYP | MAX  | UNIT |
|--------------------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------|------|-----|------|------|
| STATIC CHARACTERISTICS                     |                     |                                                                                                                              |      |     |      |      |
| Gate trigger current                       | I <sub>GT</sub>     | V <sub>D</sub> =12V;I <sub>T</sub> =0.1A                                                                                     |      | 3   | 32   | mA   |
| Gate trigger voltage                       | I <sub>L</sub>      | V <sup>D</sup> =12V;I <sub>GT</sub> =0.1A                                                                                    |      | 25  | 80   | mA   |
| Holding current                            | I <sub>H</sub>      | V <sup>D</sup> =12V;I <sub>GT</sub> =0.1A                                                                                    |      | 15  | 60   | mA   |
| On-State Voltage                           | V <sub>T</sub>      | I <sub>T</sub> =40A                                                                                                          |      | 1.4 | 1.75 | V    |
| Gate Trigger Voltage                       | V <sub>GT</sub>     | V <sup>D</sup> =12V;I <sub>T</sub> =0.1A                                                                                     |      | 0.6 | 1.5  | V    |
|                                            |                     | V <sub>D</sub> =V <sub>DRM(max)</sub> ,I <sub>T</sub> =0.1A,T <sub>J</sub> =125°C                                            | 0.25 | 0.4 |      |      |
| Off-State Leakage Current                  | I <sub>DRM</sub>    | V <sub>D</sub> =V <sub>DRM(max)</sub> ,V <sub>R</sub> =V <sub>RRM(max)</sub> ,                                               |      | 0.2 | 1.0  | mA   |
|                                            | I <sub>RRM</sub>    | T <sub>J</sub> =125°C                                                                                                        |      | 0.2 | 1.0  |      |
| DYNAMIC CHARACTERISTICS                    |                     |                                                                                                                              |      |     |      |      |
| Critical Rate of Rise of off-state Voltage | dV <sub>D</sub> /dt | V <sub>DM</sub> =67%V <sub>DRM(max)</sub> , T <sub>J</sub> =125°C,<br>Exponential Waveform Gate Open<br>Circuit              | 200  | 300 |      | V/μs |
| Gate Controlled Turn-on Time               | t <sub>gt</sub>     | V <sub>D</sub> =V <sub>DRM(max)</sub> , I <sub>G</sub> =0.1A<br>dI <sub>G</sub> /dt=5A/μs, I <sub>TM</sub> =40A              |      | 2   |      | μs   |
| Circuit Commutated Turn-Off Time           | t <sub>Q</sub>      | I <sub>TM</sub> =50A, V <sub>R</sub> =25V, R <sub>GK</sub> =100Ω<br>dI <sub>TM</sub> /dt=30A/μs, dV <sub>D</sub> /dt=50V/μs, |      | 70  |      | μs   |

### ■ TYPICAL CHARACTERISTICS (1)

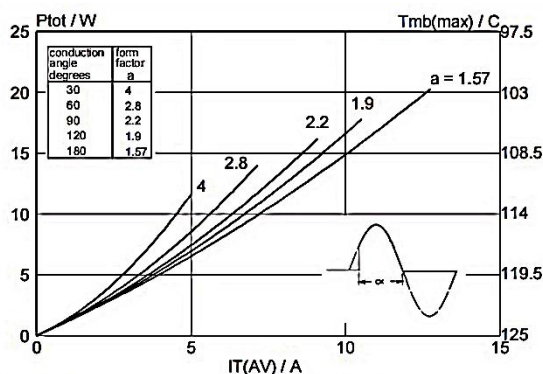


Fig. 1. Maximum on-state dissipation,  $P_{tot}$ , versus average on-state current,  $I_{T(AV)}$ , where  $a = \text{form factor} = I_{T(RMS)} / I_{T(AV)}$ .

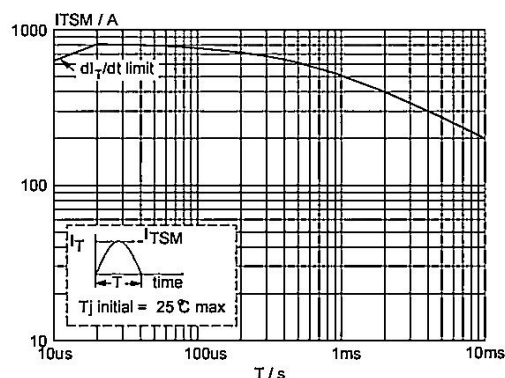


Fig. 2. Maximum permissible non-repetitive peak on-state current  $I_{TSM}$ , versus pulse width  $t_p$ , for sinusoidal currents,  $t_p \leq 10\text{ms}$ .



## BT152

SCR

### ■ TYPICAL CHARACTERISTICS (2)

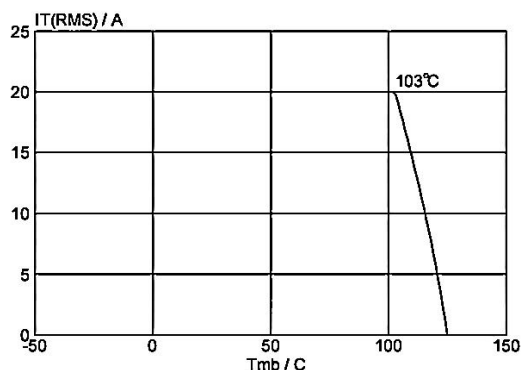


Fig.3. Maximum permissible rms current  $I_{T(RMS)}$ , versus mounting base temperature  $T_{mb}$ .

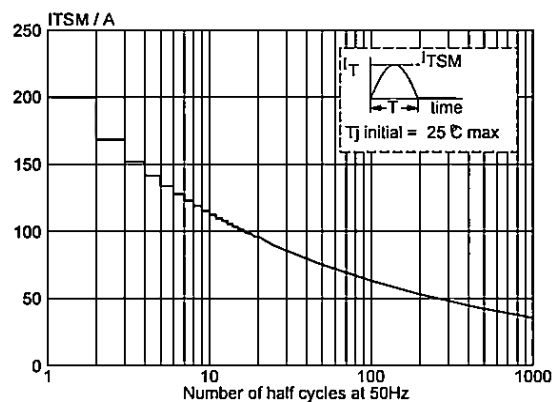


Fig.4. Maximum permissible non-repetitive peak on-state current  $I_{TSM}$ , versus number of cycles, for sinusoidal currents,  $f = 50 \text{ Hz}$ .

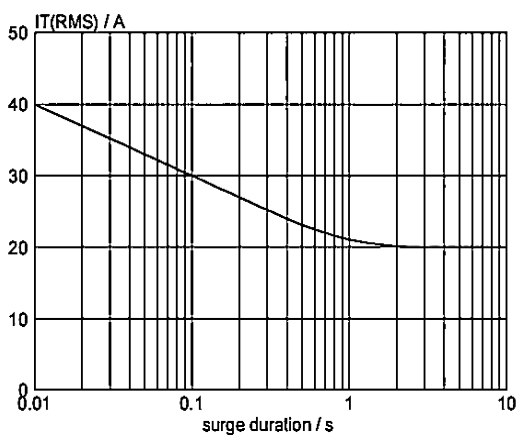


Fig.5. Maximum permissible repetitive rms on-state current  $I_{T(RMS)}$ , versus surge duration, for sinusoidal currents,  $f = 50 \text{ Hz}$ ;  $T_{mb} \leq 103^\circ\text{C}$ .

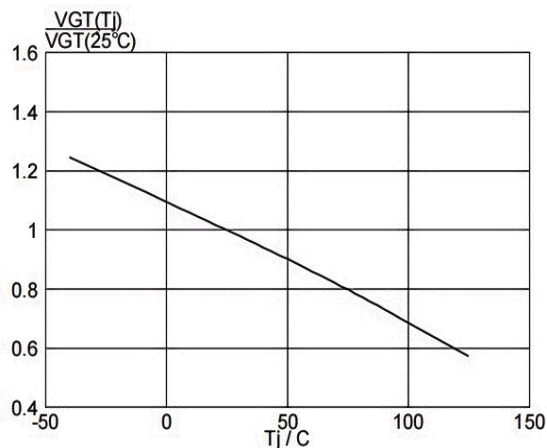


Fig.6. Normalised gate trigger voltage  $V_{GT}(T_J) / V_{GT}(25^\circ\text{C})$ , versus junction temperature  $T_J$ .

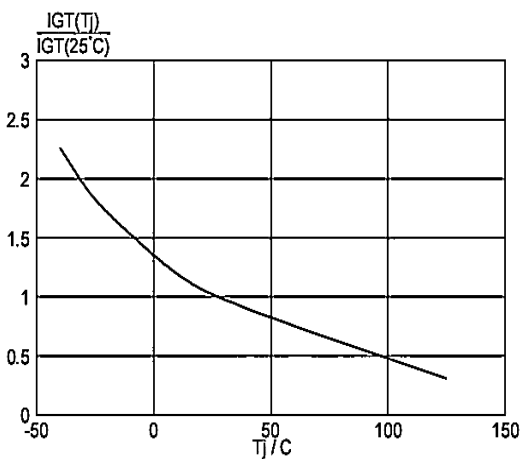


Fig.7. Normalised gate trigger current  $I_{GT}(T_J) / I_{GT}(25^\circ\text{C})$ , versus junction temperature  $T_J$ .

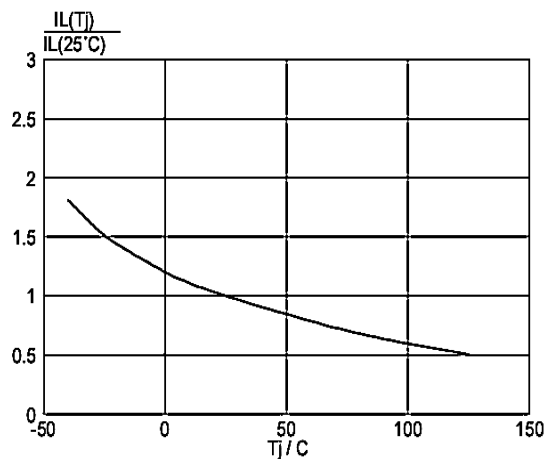


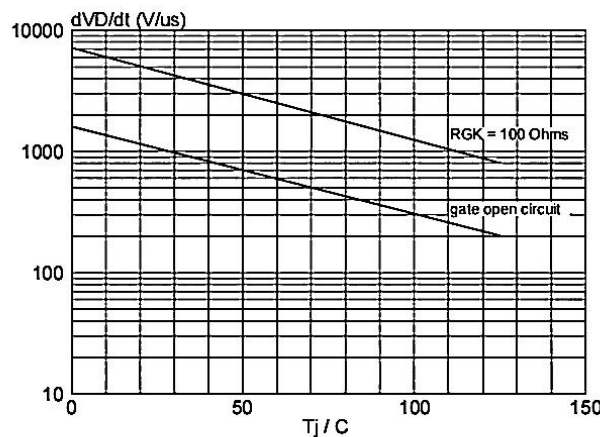
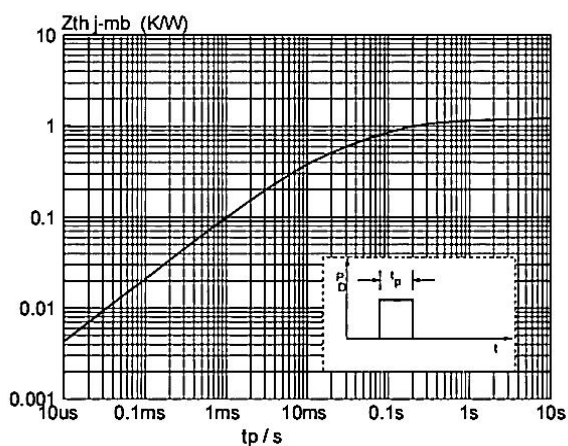
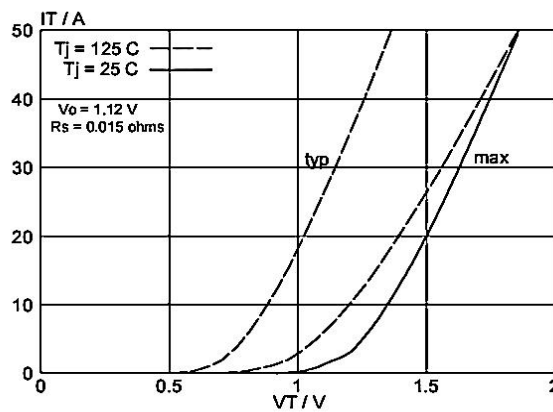
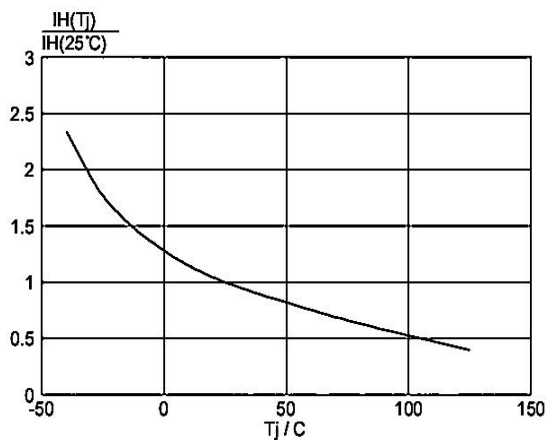
Fig.8. Normalised latching current  $I_L(T_J) / I_L(25^\circ\text{C})$ , versus junction temperature  $T_J$ .



## BT152

SCR

### ■ TYPICAL CHARACTERISTICS (3)

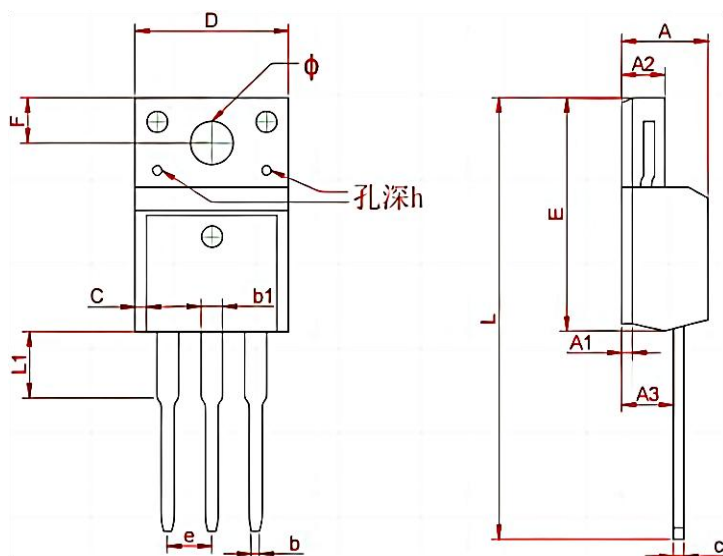




## BT152

SCR

### TO-220F PACKAGE OUTLINE DIMENSIONS



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max    | Min                  | Max   |
| A      | 4.300                     | 4.750  | 0.169                | 0.185 |
| A1     | 1.830 REF                 |        | 0.072 REF            |       |
| A2     | 2.300                     | 2.850  | 0.090                | 0.112 |
| A3     | 2.500                     | 2.900  | 0.098                | 0.114 |
| b      | 0.400                     | 0.420  | 0.016                | 0.016 |
| b1     | 1.220                     | 1.280  | 0.048                | 0.050 |
| C      | 0.690                     | 0.720  | 0.027                | 0.028 |
| c      | 0.490                     | 0.510  | 0.019                | 0.020 |
| D      | 9.960                     | 10.200 | 0.392                | 0.400 |
| E      | 15.000                    | 15.950 | 0.588                | 0.625 |
| e      | 2.574 TYP                 |        | 0.101TYP             |       |
| F      | 3.470 REF                 |        | 0.136 REF            |       |
| y      | 3.200 REF                 |        | 0.125 REF            |       |
| h      | 0.000                     | 0.300  | 0.000                | 0.012 |
| L      | 28.780                    | 28.900 | 1.128                | 1.133 |
| L1     | 2.990                     | 3.100  | 0.117                | 0.122 |

### TO - 220F PACKING INFORMATION



50PCS



20 Tube



Outer Box

5 Inner  
Box



Inner Box

| Package version | Tube dimensions<br>LxWxH<br>(mm) | Per Tube<br>(pcs) | Tube per box | Inner box dimensions<br>LxWxH<br>(mm) | PCS/<br>Inner<br>box | Outer box dimensions<br>LxWxH(mm) | PCS/<br>Outer<br>box |
|-----------------|----------------------------------|-------------------|--------------|---------------------------------------|----------------------|-----------------------------------|----------------------|
| TO-220F         | 530*32*7                         | 50                | 20           | 580*155*50                            | 1000                 | 602*277*188                       | 5000                 |