## GENERAL DESCRIPTION

Glass passivated thyristors in a plastic envelope, intended for use in applications requiring high bidirectional blocking voltage capability and high thermal cycling performance. Typical applications include motor control, industrial and domestic lighting, heating and static switching.

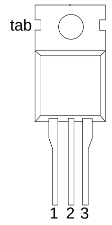
## QUICK REFERENCE DATA

| SYMBOL | PARAMETER | MAX. | MAX. | MAX. | UNIT |
|---|---|---|---|---|---|
| | **BT152-** | **400R** | **600R** | **800R** | |
| $V_{DRM}$, $V_{RRM}$ | Repetitive peak off-state voltages | 450 | 650 | 800 | V |
| $I_{T(AV)}$ | Average on-state current | 13 | 13 | 13 | A |
| $I_{T(RMS)}$ | RMS on-state current | 20 | 20 | 20 | A |
| $I_{TSM}$ | Non-repetitive peak on-state current | 200 | 200 | 200 | A |

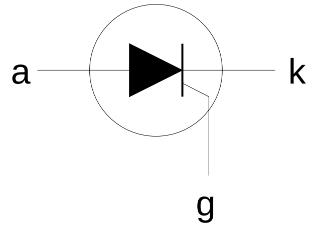
## PINNING - TO220AB

| PIN | DESCRIPTION |
|---|---|
| 1 | cathode |
| 2 | anode |
| 3 | gate |
| tab | anode |

## PIN CONFIGURATION



## SYMBOL



## LIMITING VALUES

Limiting values in accordance with the Absolute Maximum System (IEC 134).

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | | | UNIT |
|---|---|---|---|---|---|---|---|
| | | | | **-400R** | **-600R** | **-800R** | |
| $V_{DRM}$ | Repetitive peak off-state voltages | | - | 450[1] | 650[1] | 800 | V |
| $I_{T(AV)}$ | Average on-state current | half sine wave; $T_{mb} \leq 103$ ˚C | - | 13 | | | A |
| $I_{T(RMS)}$ | RMS on-state current | all conduction angles | - | 20 | | | A |
| $I_{TSM}$ | Non-repetitive peak on-state current | half sine wave; $T_j = 25$ ˚C prior to surge | | | | | |
| | | t = 10 ms | - | 200 | | | A |
| | | t = 8.3 ms | - | 220 | | | A |
| $I^2t$ | $I^2t$ for fusing | t = 10 ms | - | 200 | | | $A^2s$ |
| $dI_T/dt$ | Repetitive rate of rise of on-state current after triggering | $I_{TM} = 50$ A; $I_G = 0.2$ A; $dI_G/dt = 0.2$ A/µs | - | 200 | | | A/µs |
| $I_{GM}$ | Peak gate current | | - | 5 | | | A |
| $V_{GM}$ | Peak gate voltage | | - | 5 | | | V |
| $V_{RGM}$ | Peak reverse gate voltage | | - | 5 | | | V |
| $P_{GM}$ | Peak gate power | | - | 20 | | | W |
| $P_{G(AV)}$ | Average gate power | over any 20 ms period | - | 0.5 | | | W |
| $T_{stg}$ | Storage temperature | | -40 | 150 | | | ˚C |
| $T_j$ | Operating junction temperature | | - | 125 | | | ˚C |

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[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/µs.

## THERMAL RESISTANCES

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $R_{th\ j\text{-}mb}$ | Thermal resistance junction to mounting base | | - | - | 1.1 | K/W |
| $R_{th\ j\text{-}a}$ | Thermal resistance junction to ambient | in free air | - | 60 | - | K/W |

## STATIC CHARACTERISTICS

$T_j$ = 25 ˚C unless otherwise stated

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $I_{GT}$ | Gate trigger current | $V_D$ = 12 V; $I_T$ = 0.1 A | - | 3 | 32 | mA |
| $I_L$ | Latching current | $V_D$ = 12 V; $I_{GT}$ = 0.1 A | - | 25 | 80 | mA |
| $I_H$ | Holding current | $V_D$ = 12 V; $I_{GT}$ = 0.1 A | - | 15 | 60 | mA |
| $V_T$ | On-state voltage | $I_T$ = 40 A | - | 1.4 | 1.75 | V |
| $V_{GT}$ | Gate trigger voltage | $V_D$ = 12 V; $I_T$ = 0.1 A | - | 0.6 | 1.5 | V |
| | | $V_D$ = $V_{DRM(max)}$; $I_T$ = 0.1 A; $T_j$ = 125 ˚C | 0.25 | 0.4 | - | V |
| $I_D$, $I_R$ | Off-state leakage current | $V_D$ = $V_{DRM(max)}$; $V_R$ = $V_{RRM(max)}$; $T_j$ = 125 ˚C | - | 0.2 | 1.0 | mA |

## DYNAMIC CHARACTERISTICS

$T_j$ = 25 ˚C unless otherwise stated

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $dV_D/dt$ | Critical rate of rise of off-state voltage | $V_{DM}$ = 67% $V_{DRM(max)}$; $T_j$ = 125 ˚C; exponential waveform gate open circuit | 200 | 300 | - | V/µs |
| $t_{gt}$ | Gate controlled turn-on time | $V_D$ = $V_{DRM(max)}$; $I_G$ = 0.1 A; $dI_G/dt$ = 5 A/µs; $I_{TM}$ = 40 A | - | 2 | - | µs |
| $t_q$ | Circuit commutated turn-off time | $V_D$ = 67% $V_{DRM(max)}$; $T_j$ = 125 ˚C; $I_{TM}$ = 50 A; $V_R$ = 25 V; $dI_{TM}/dt$ = 30 A/µs; $dV_D/dt$ = 50 V/µs; $R_{GK}$ = 100 Ω | - | 70 | - | µs |

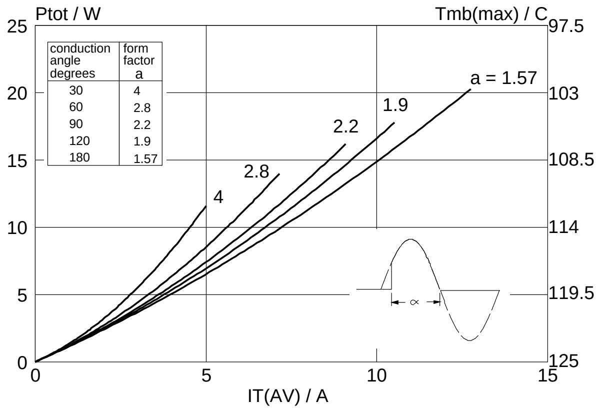

Fig.1. Maximum on-state dissipation, $P_{tot}$, versus average on-state current, $I_{T(AV)}$, where a = form factor = $I_{T(RMS)}$/ $I_{T(AV)}$.

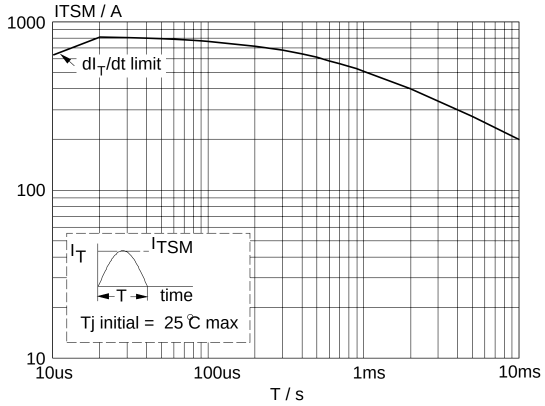

Fig.2. Maximum permissible non-repetitive peak on-state current $I_{TSM}$, versus pulse width $t_p$, for sinusoidal currents, $t_p \leq$ 10ms.

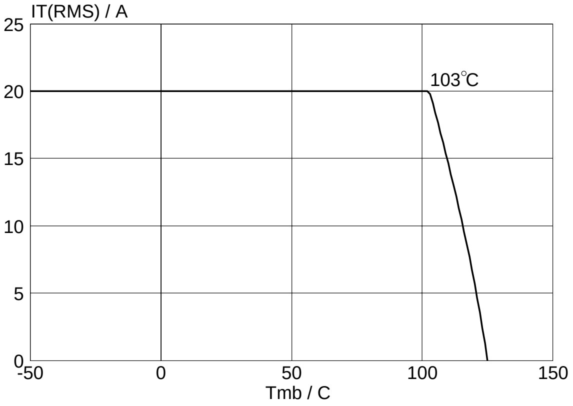

Fig.3. Maximum permissible rms current $I_{T(RMS)}$ , versus mounting base temperature $T_{mb}$.

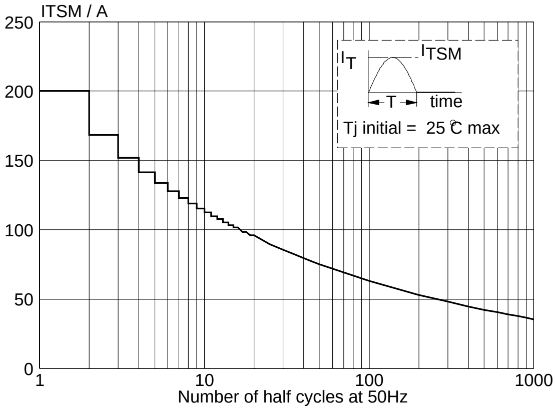

Fig.4. Maximum permissible non-repetitive peak on-state current $I_{TSM}$, versus number of cycles, for sinusoidal currents, f = 50 Hz.

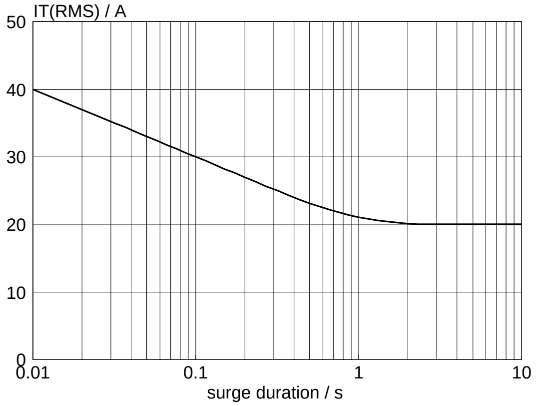

Fig.5. Maximum permissible repetitive rms on-state current $I_{T(RMS)}$, versus surge duration, for sinusoidal currents, f = 50 Hz; $T_{mb} \leq 103^\circ C$.

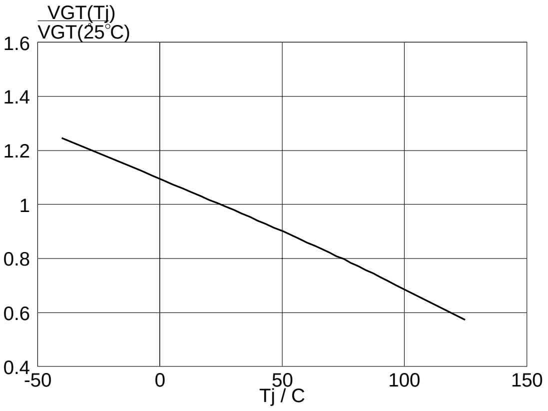

Fig.6. Normalised gate trigger voltage $V_{GT}(T_j)$/ $V_{GT}(25^\circ C)$, versus junction temperature $T_j$.

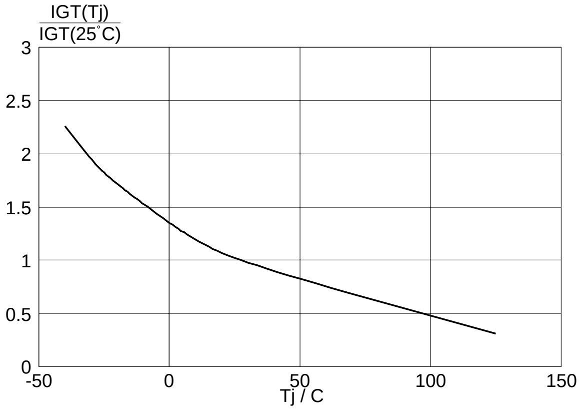

Fig.7. Normalised gate trigger current $I_{GT}(T_j)/\ I_{GT}(25˚C)$, versus junction temperature $T_j$.

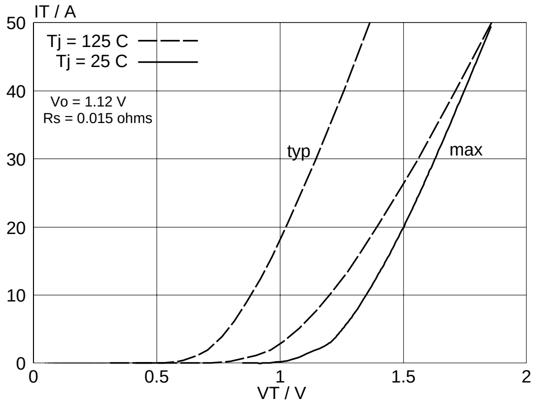

Fig.10. Typical and maximum on-state characteristic.

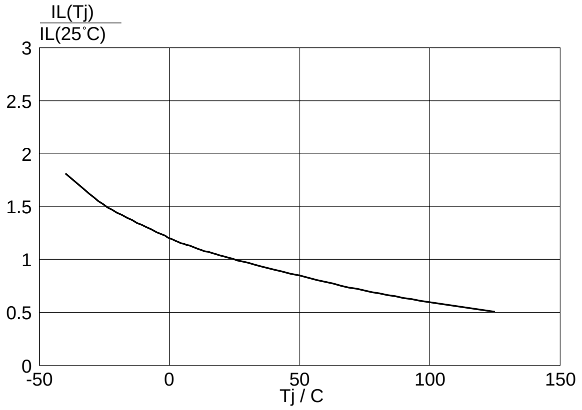

Fig.8. Normalised latching current $I_L(T_j)/\ I_L(25˚C)$, versus junction temperature $T_j$.

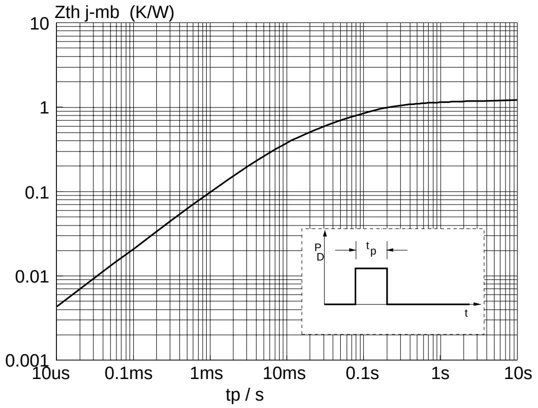

Fig.11. Transient thermal impedance $Z_{th\ j\text{-}mb}$, versus pulse width $t_p$.

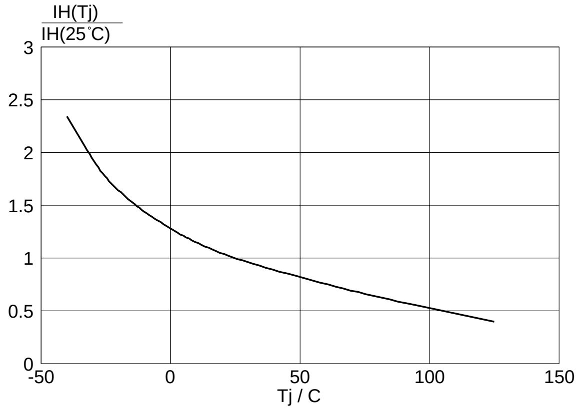

Fig.9. Normalised holding current $I_H(T_j)/\ I_H(25˚C)$, versus junction temperature $T_j$.

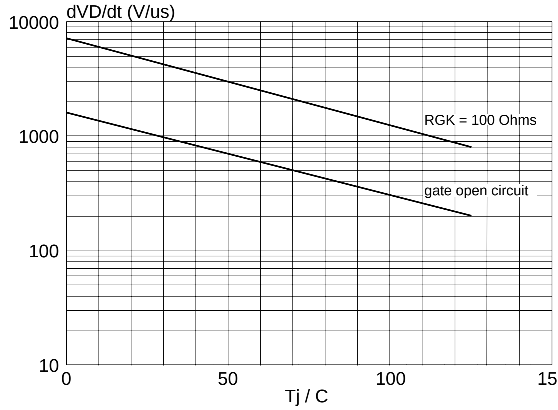

Fig.12. Typical, critical rate of rise of off-state voltage, $dV_D/dt$ versus junction temperature $T_j$.

## MECHANICAL DATA

*Dimensions in mm*

*Net Mass: 2 g*

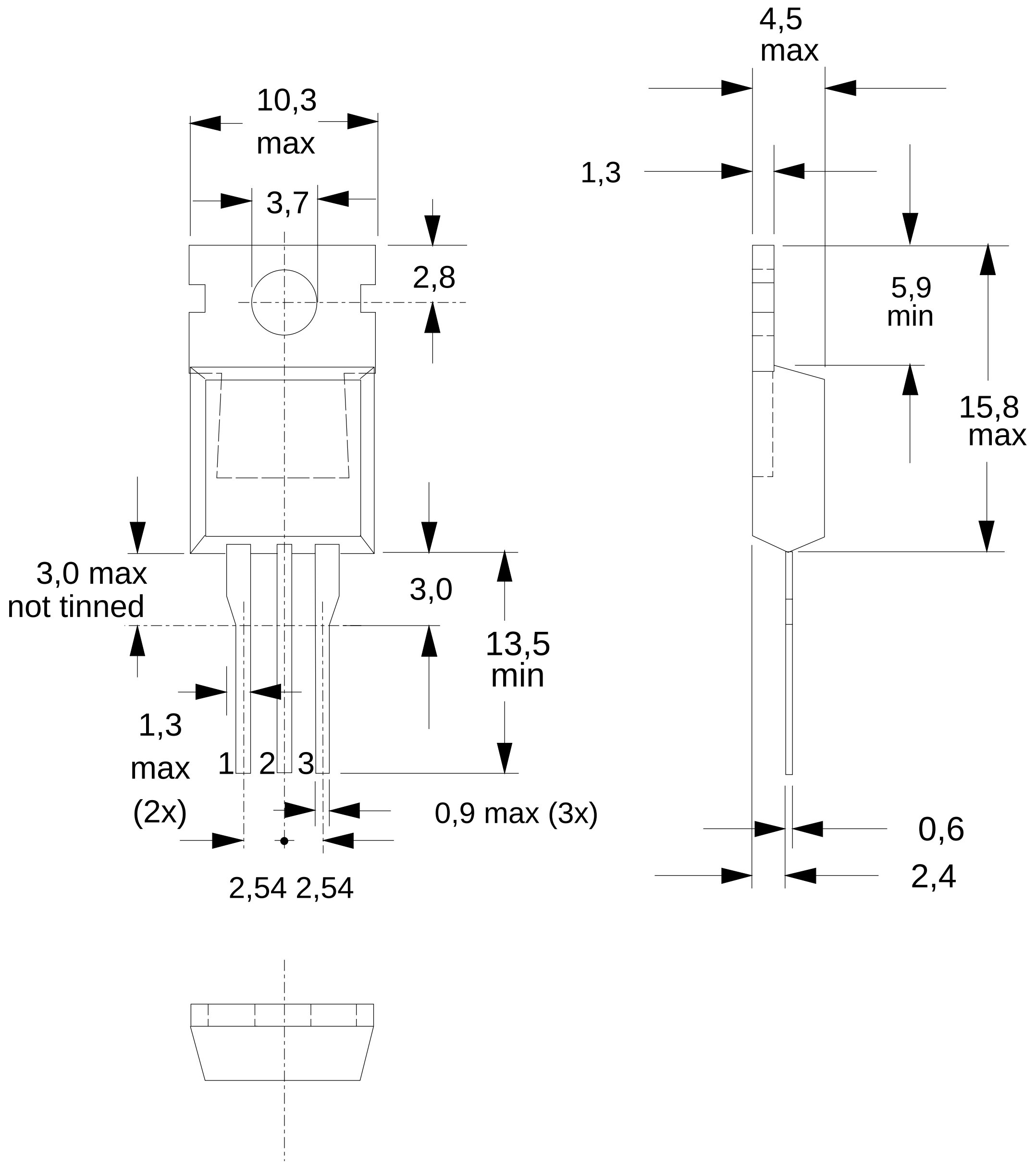

*Fig.13. TO220AB; pin 2 connected to mounting base.*

**Notes**
1. Refer to mounting instructions for TO220 envelopes.
2. Epoxy meets UL94 V0 at 1/8".