

DATA SHEET

BT151U series C Thyristors

Product specification

August 2018

Thyristors

BT151U series C

GENERAL DESCRIPTION

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.

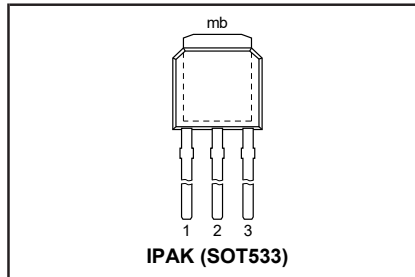
QUICK REFERENCE DATA

| SYMBOL | PARAMETER | MAX. | MAX. | MAX. | UNIT |
|--------------------|--------------------------------------|------|------|------|------|
| | | 500C | 650C | 800C | |
| V_{DRM}, V_{RRM} | Repetitive peak off-state voltages | 500 | 650 | 800 | V |
| $I_{T(AV)}$ | Average on-state current | 7.5 | 7.5 | 7.5 | A |
| $I_{T(RMS)}$ | RMS on-state current | 12 | 12 | 12 | A |
| I_{TSM} | Non-repetitive peak on-state current | 100 | 100 | 100 | A |

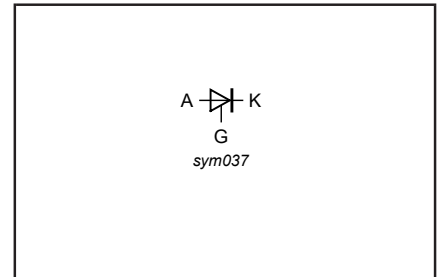
PINNING - SOT533, (I-PAK)

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

PIN CONFIGURATION



SYMBOL



LIMITING VALUES

Limiting values in accordance with the Absolute Maximum System (IEC 60134).

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | | | UNIT |
|--------------------|--|--|------|------------------|------------------|-------|------------------|
| | | | | -500C | -650C | -800C | |
| V_{DRM}, V_{RRM} | Repetitive peak off-state voltages | | - | 500 ¹ | 650 ¹ | 800 | V |
| $I_{T(AV)}$ | Average on-state current | half sine wave; $T_{mb} \leq 104\text{ }^\circ\text{C}$ | - | 7.5 | | | A |
| $I_{T(RMS)}$ | RMS on-state current | all conduction angles | - | 12 | | | A |
| I_{TSM} | Non-repetitive peak on-state current | half sine wave; $T_j = 25\text{ }^\circ\text{C}$ prior to surge | - | 100 | | | A |
| I^2t | I^2t for fusing | $t = 10\text{ ms}$ | - | 110 | | | A |
| di_T/dt | Repetitive rate of rise of on-state current after triggering | $t = 10\text{ ms}$ | - | 50 | | | A ² s |
| I_{GM} | Peak gate current | $I_{TM} = 20\text{ A}; I_G = 50\text{ mA}; di_G/dt = 50\text{ mA}/\mu\text{s}$ | - | 50 | | | A/ μs |
| V_{RGM} | Peak reverse gate voltage | | - | 2 | | | A |
| P_{GM} | Peak gate power | | - | 5 | | | V |
| $P_{G(AV)}$ | Average gate power | over any 20 ms period | - | 5 | | | W |
| T_{stg} | Storage temperature | | -40 | 0.5 | | | W |
| T_j | Junction temperature | | - | 150 | | | $^\circ\text{C}$ |
| | | | | 125 | | | $^\circ\text{C}$ |

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 .

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THERMAL RESISTANCES

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|----------------|--|-------------|------|------|------|------|
| $R_{th\ j-mb}$ | Thermal resistance junction to mounting base | in free air | - | - | 1.3 | K/W |
| $R_{th\ j-a}$ | Thermal resistance junction to ambient | | - | 70 | - | K/W |

STATIC CHARACTERISTICS $T_j = 25\text{ °C}$ unless otherwise stated

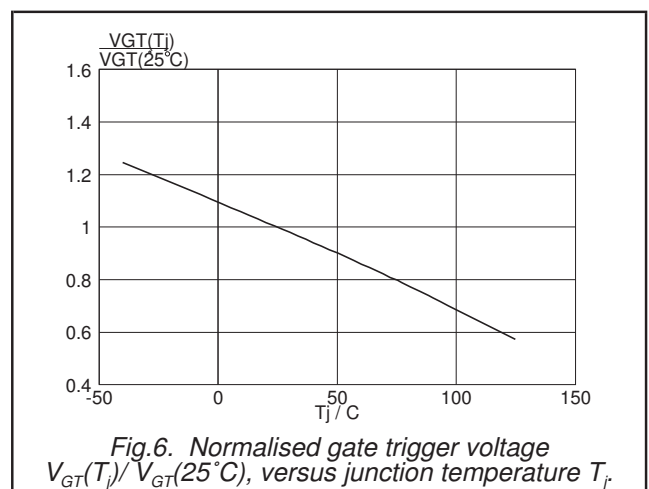
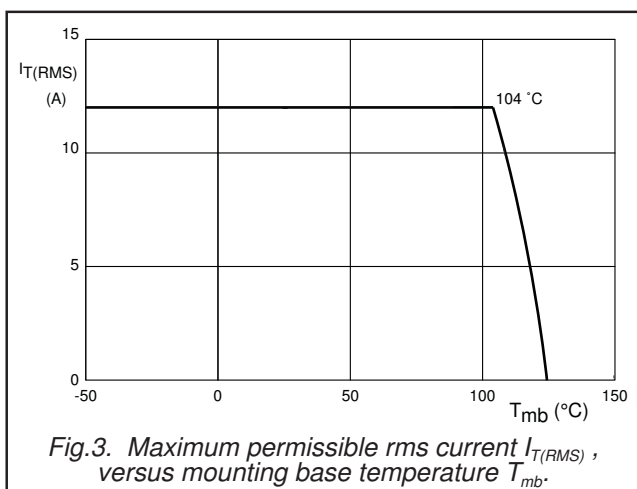
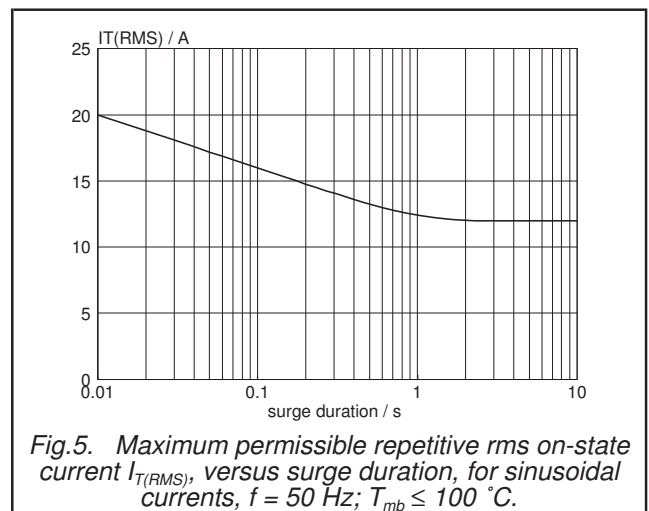
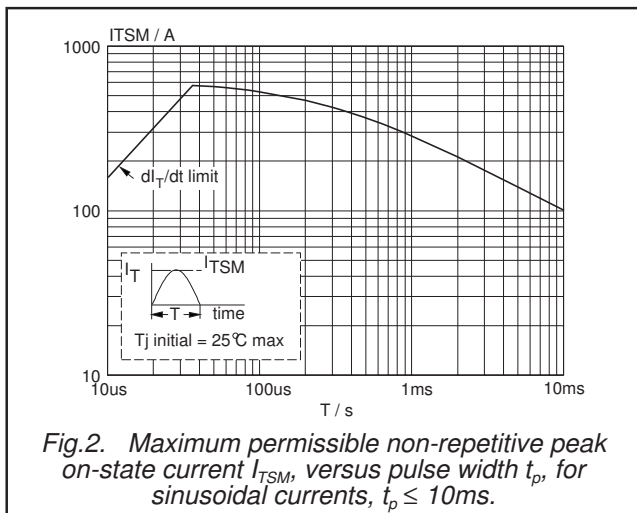
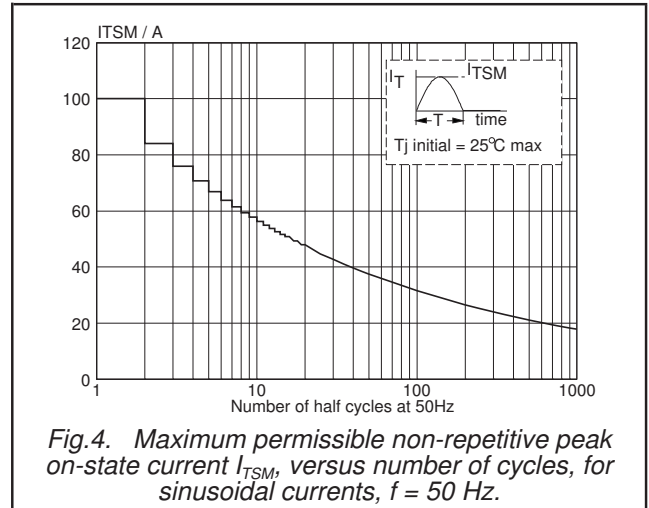
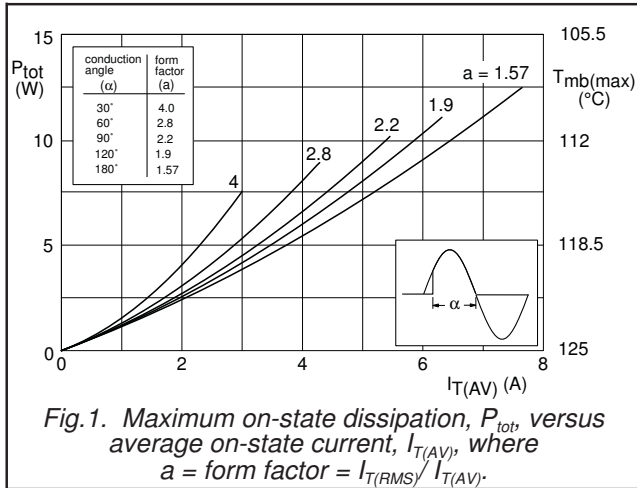
| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|------------|---------------------------|---|------|------|------|------|
| I_{GT} | Gate trigger current | $V_D = 12\text{ V}; I_T = 0.1\text{ A}$ | - | 2 | 15 | mA |
| I_L | Latching current | $V_D = 12\text{ V}; I_{GT} = 0.1\text{ A}$ | - | 10 | 40 | mA |
| I_H | Holding current | $V_D = 12\text{ V}; I_{GT} = 0.1\text{ A}$ | - | 7 | 20 | mA |
| V_T | On-state voltage | $I_T = 23\text{ A}$ | - | 1.44 | 1.75 | V |
| V_{GT} | Gate trigger voltage | $V_D = 12\text{ V}; I_T = 0.1\text{ A}$ | - | 0.6 | 1.5 | V |
| I_D, I_R | Off-state leakage current | $V_D = V_{DRM(max)}; I_T = 0.1\text{ A}; T_j = 125\text{ °C}$ | 0.25 | 0.4 | - | V |
| | | $V_D = V_{DRM(max)}; V_R = V_{RRM(max)}; T_j = 125\text{ °C}$ | - | 0.1 | 0.5 | mA |

DYNAMIC CHARACTERISTICS $T_j = 25\text{ °C}$ unless otherwise stated

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|-----------|--|--|------|------|------|------------|
| dV_D/dt | Critical rate of rise of off-state voltage | $V_{DM} = 67\% V_{DRM(max)}; T_j = 125\text{ °C};$ exponential waveform | | | | |
| | | Gate open circuit $R_{GK} = 100\ \Omega$ | 50 | 130 | - | V/ μ s |
| t_{gt} | Gate controlled turn-on time | $I_{TM} = 40\text{ A}; V_D = V_{DRM(max)}; I_G = 0.1\text{ A};$ $dI_G/dt = 5\text{ A}/\mu\text{s}$ | 200 | 1000 | - | V/ μ s |
| t_q | Circuit commutated turn-off time | $V_D = 67\% V_{DRM(max)}; T_j = 125\text{ °C};$ $I_{TM} = 20\text{ A}; V_R = 25\text{ V}; dI_{TM}/dt = 30\text{ A}/\mu\text{s};$ $dV_D/dt = 50\text{ V}/\mu\text{s}; R_{GK} = 100\ \Omega$ | - | 70 | - | μ s |

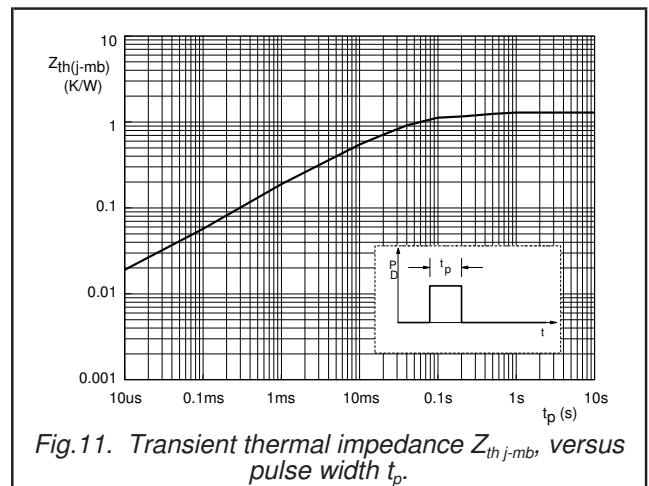
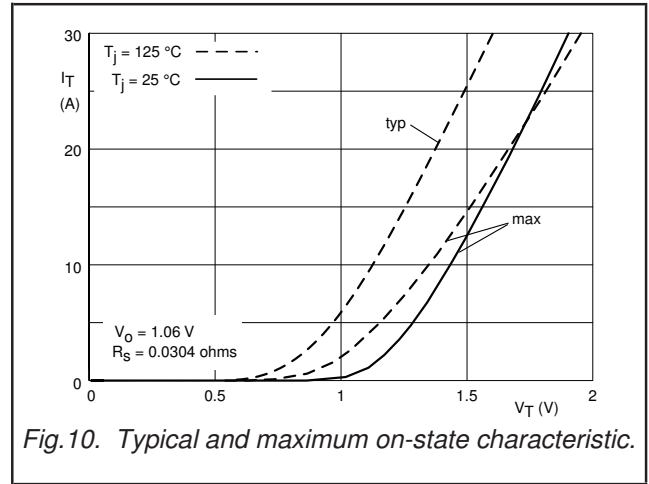
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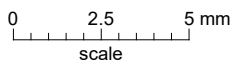
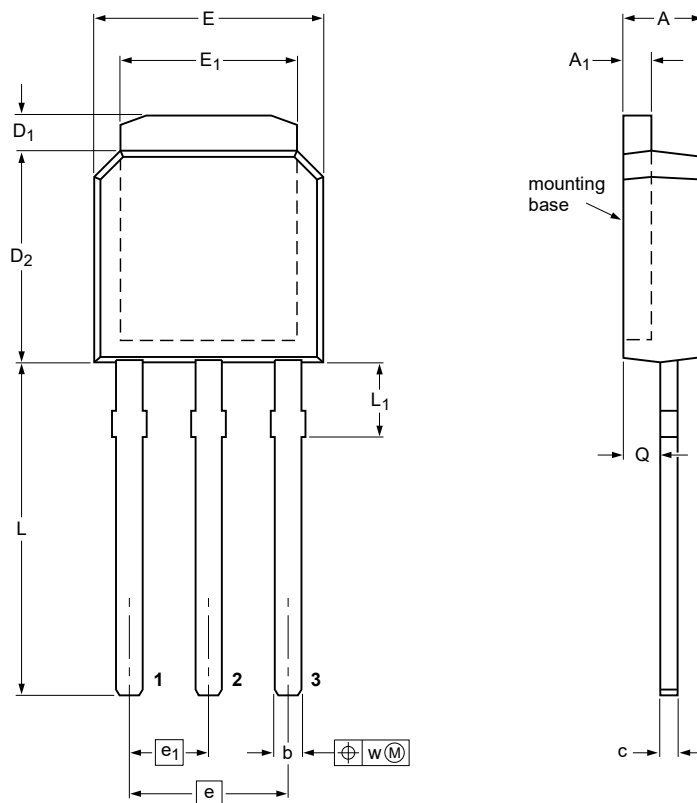
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MECHANICAL DATA

Plastic single-ended package (IPAK); 3 leads (in-line)

SOT533



DIMENSIONS (mm are the original dimensions)

| UNIT | A | A ₁ | b | c | D ₁ | D ₂ | E | E ₁ | e | e ₁ | L | L ₁ ⁽²⁾ max | Q | w |
|------|--------------|----------------|--------------|--------------|----------------|----------------|--------------|----------------|----------------------------|-----------------------------|------------|--------------------------------------|------------|-----|
| mm | 2.38 2.22 | 0.93 0.46 | 0.89 0.71 | 0.56 0.46 | 1.10 0.96 | 6.22 5.98 | 6.73 6.47 | 5.21 5.00 | 4.57 BSC ⁽¹⁾ | 2.285 BSC ⁽¹⁾ | 9.6 9.2 | 2.7 | 1.1 1.0 | 0.3 |

Notes

1. Basic spacing between centers.
2. Terminal dimensions are uncontrolled within zone L₁.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|--------------------|------------|--------|-------|--|------------------------|------------------------|
| | IEC | JEDEC | JEITA | | | |
| SOT533 | | TO-251 | | | | -05-02-11- 06-02-14 |

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| Document status [1][2] | Product status [3] | Definition |
|--------------------------------|--------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
| Product [short] data sheet | Production | This document contains the product specification. |

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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