



IMPORTANT NOTICE

10 December 2015

1. Global joint venture starts operations as WeEn Semiconductors

Dear customer,

As from November 9th, 2015 NXP Semiconductors N.V. and Beijing JianGuang Asset Management Co. Ltd established Bipolar Power joint venture (JV), **WeEn Semiconductors**, which will be used in future Bipolar Power documents together with new contact details.

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Thank you for your cooperation and understanding,

WeEn Semiconductors





BTA312-800C

3Q Hi-Com Triac

25 July 2014

Product data sheet

1. General description

Planar passivated high commutation three quadrant triac in a SOT78 (TO-220AB) plastic package intended for use in circuits where high static and dynamic dV/dt and high dI/dt can occur. This "series C" triac will commute the full RMS current at the maximum rated junction temperature without the aid of a snubber.

2. Features and benefits

- 3Q technology for improved noise immunity
- High commutation capability with maximum false trigger immunity
- High voltage capability
- Less sensitive gate for high noise immunity
- Planar passivated for voltage ruggedness and reliability
- Triggering in three quadrants only
- Very high immunity to false turn-on by dV/dt

3. Applications

- Electronic thermostats (heating and cooling)
- High power motor controls e.g. washing machines and vacuum cleaners
- Rectifier-fed DC inductive loads e.g. DC motors and solenoids

4. Quick reference data

Table 1. Quick reference data

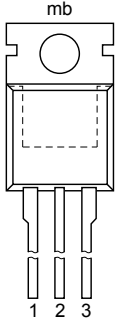

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------------------|--------------------------------------|---|-----|-----|-----|------|
| V_{DRM} | repetitive peak off-state voltage | | - | - | 800 | V |
| I_{TSM} | non-repetitive peak on-state current | full sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5 | - | - | 100 | A |
| $I_{T(RMS)}$ | RMS on-state current | full sine wave; $T_{mb} \leq 100\text{ }^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3 | - | - | 12 | A |
| Static characteristics | | | | | | |
| I_{GT} | gate trigger current | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G+; $T_j = 25\text{ }^{\circ}\text{C}$; Fig. 7 | 2 | - | 35 | mA |
| | | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ }^{\circ}\text{C}$; Fig. 7 | 2 | - | 35 | mA |



| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------|-----------|---|-----|-----|-----|------|
| | | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ }^\circ\text{C}$; Fig. 7 | 2 | - | 35 | mA |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|--------------------------------|--|---|
| 1 | T1 | main terminal 1 |  <p style="text-align: center;">TO-220AB (SOT78)</p> |  |
| 2 | T2 | main terminal 2 | | |
| 3 | G | gate | | |
| mb | T2 | mounting base; main terminal 2 | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|----------------|----------|--|---------|
| | Name | Description | Version |
| BTA312-800C | TO-220AB | plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB | SOT78 |
| BTA312-800C/DG | TO-220AB | plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB | SOT78 |

7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | Min | Max | Unit |
|--------------|--------------------------------------|--|-----|-----|------------------------|
| V_{DRM} | repetitive peak off-state voltage | | - | 800 | V |
| $I_{T(RMS)}$ | RMS on-state current | full sine wave; $T_{mb} \leq 100\text{ }^\circ\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3 | - | 12 | A |
| I_{TSM} | non-repetitive peak on-state current | full sine wave; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5 | - | 100 | A |
| | | full sine wave; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; $t_p = 16.7\text{ ms}$ | - | 110 | A |
| I^2t | I^2t for fusing | $t_p = 10\text{ ms}$; SIN | - | 50 | A^2s |
| di_T/dt | rate of rise of on-state current | $I_T = 20\text{ A}$; $I_G = 0.2\text{ A}$; $di_G/dt = 0.2\text{ A}/\mu\text{s}$ | - | 100 | $\text{A}/\mu\text{s}$ |
| I_{GM} | peak gate current | | - | 2 | A |
| P_{GM} | peak gate power | | - | 5 | W |
| $P_{G(AV)}$ | average gate power | over any 20 ms period | - | 0.5 | W |
| T_{stg} | storage temperature | | -40 | 150 | $^\circ\text{C}$ |
| T_j | junction temperature | | - | 125 | $^\circ\text{C}$ |

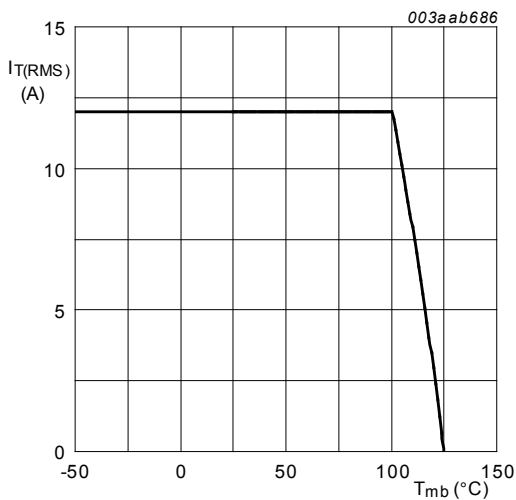
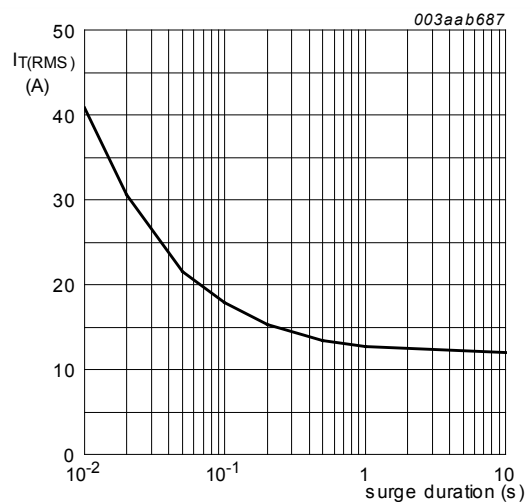


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



$f = 50\text{ Hz}$; $T_{mb} = 100\text{ }^\circ\text{C}$

Fig. 2. RMS on-state current as a function of surge duration; maximum values

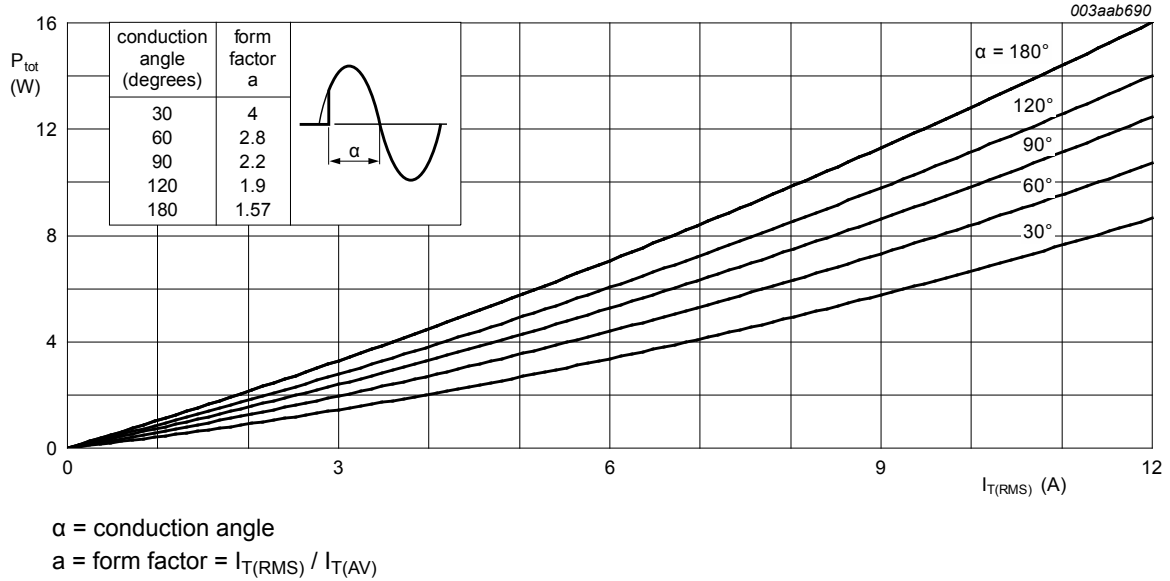


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

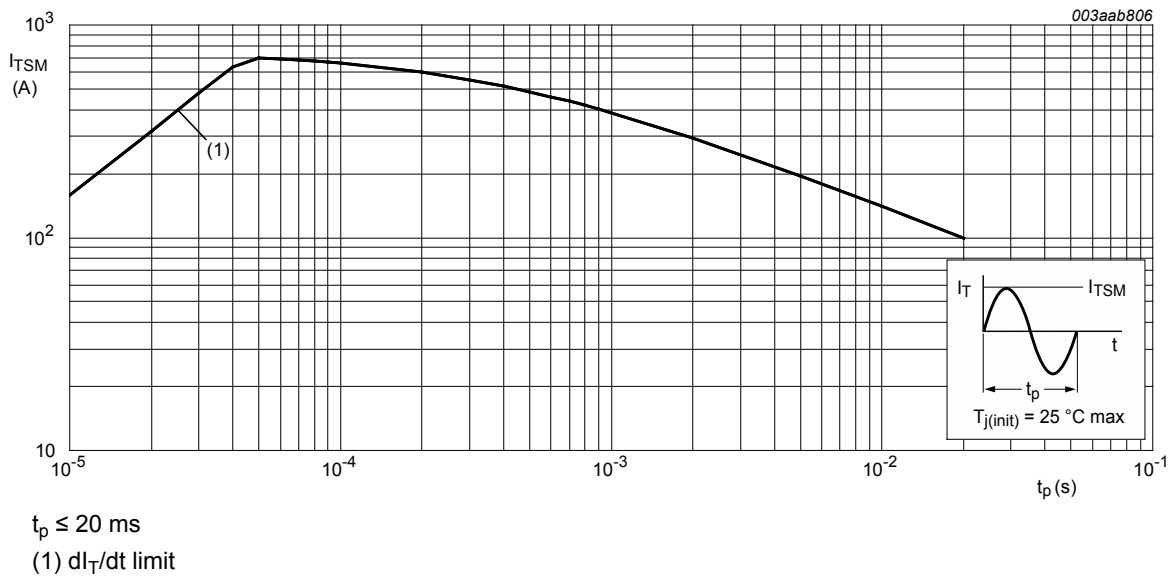
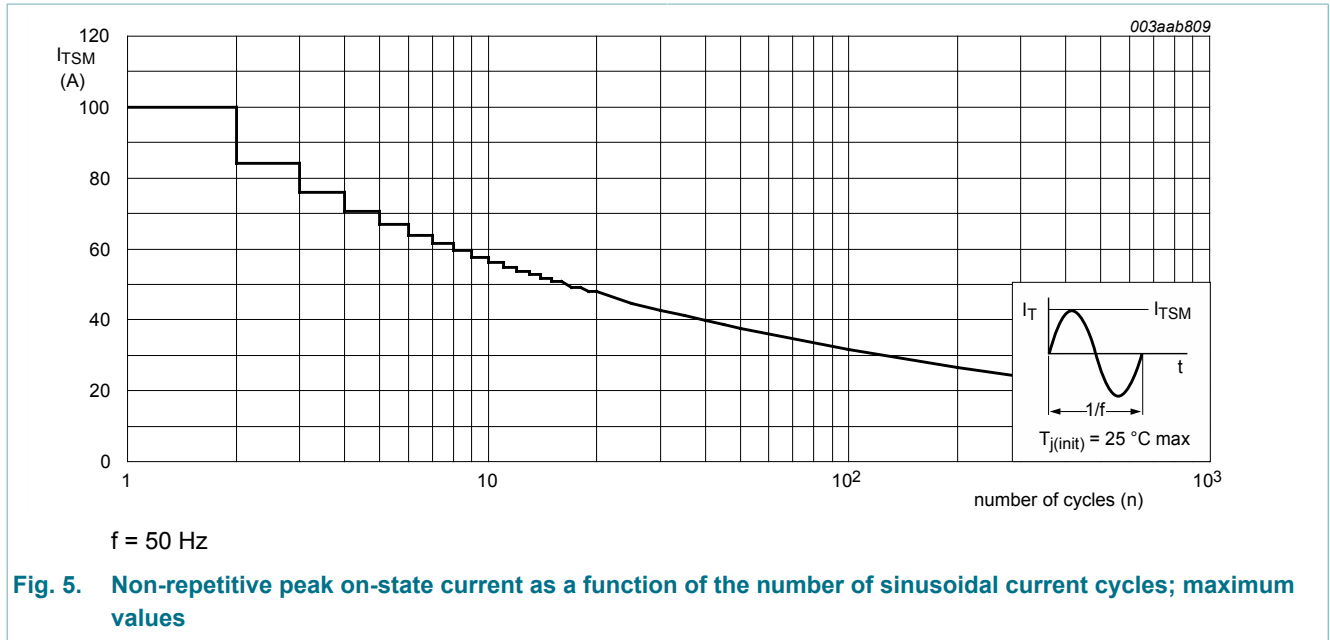


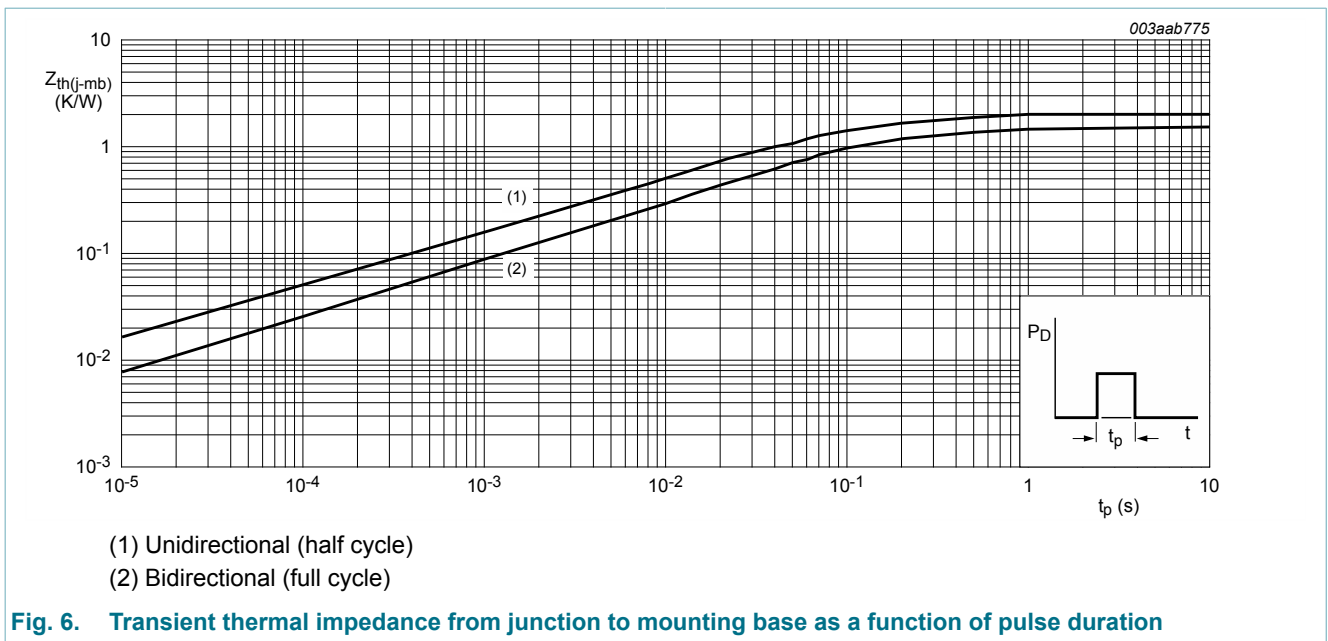
Fig. 4. Non-repetitive peak on-state current as a function of pulse duration; maximum values



8. Thermal characteristics

Table 5. Thermal characteristics

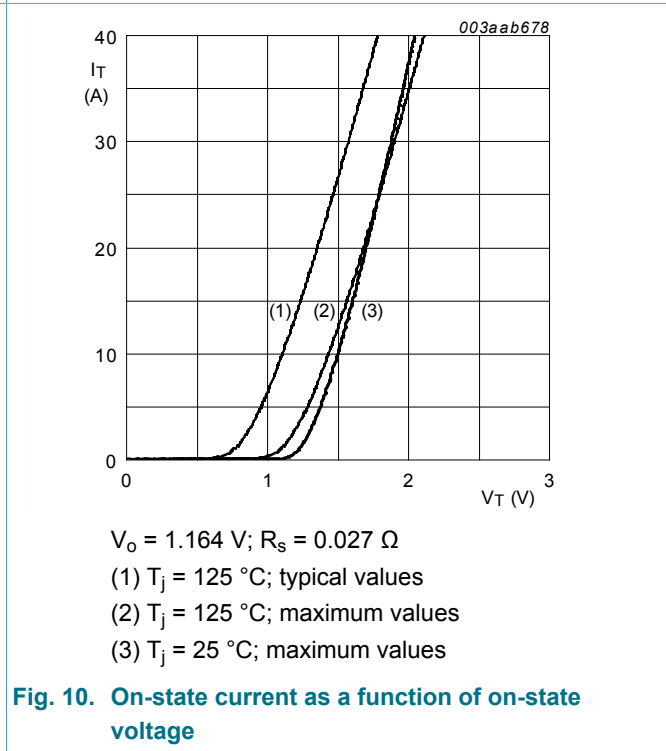
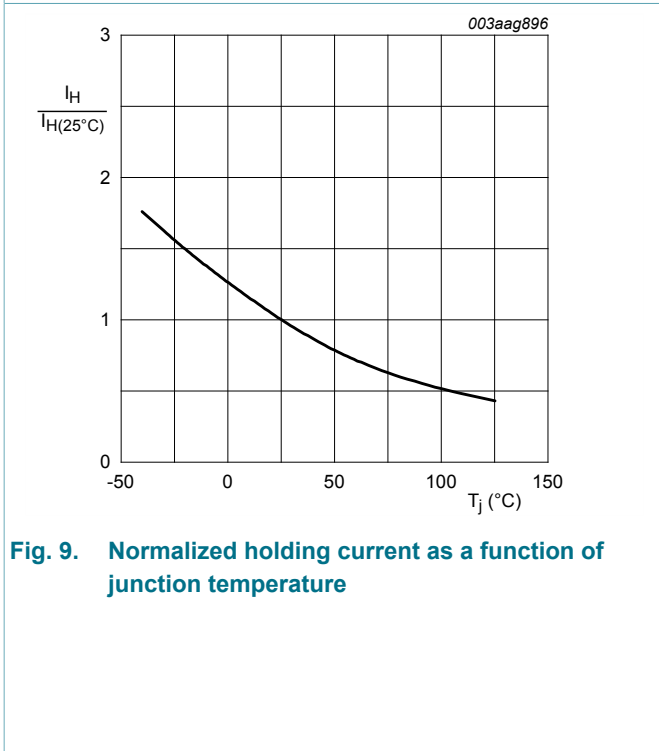
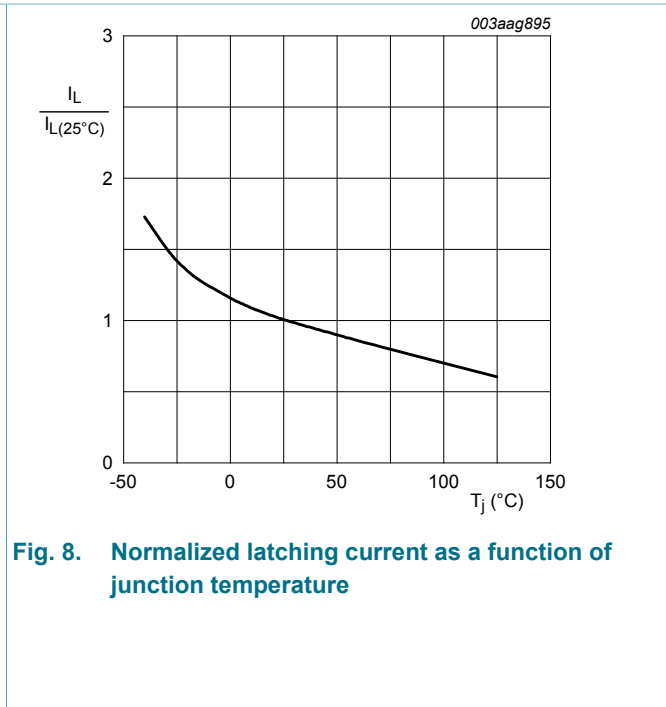
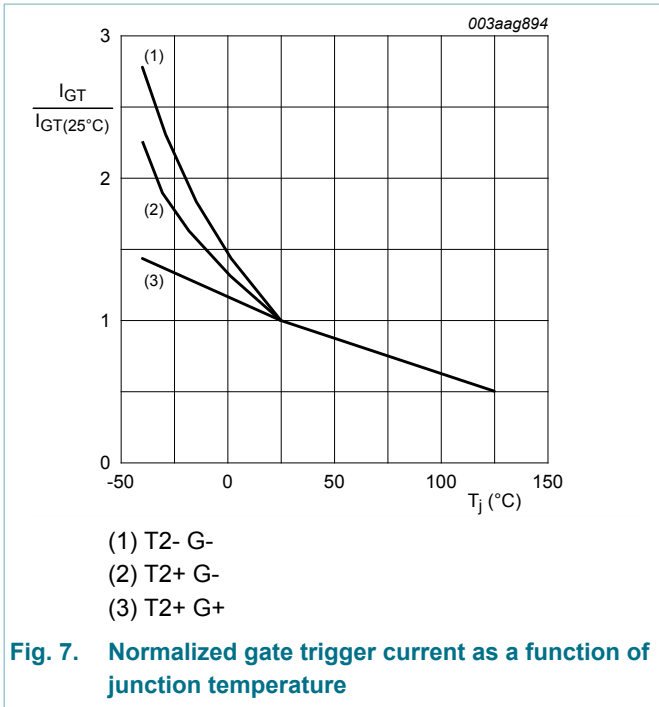
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------------------|---|--------------------|-----|-----|-----|------|
| R _{th(j-mb)} | thermal resistance from junction to mounting base | full cycle; Fig. 6 | - | - | 1.5 | K/W |
| | | half cycle; Fig. 6 | - | - | 2 | K/W |
| R _{th(j-a)} | thermal resistance from junction to ambient | in free air | - | 60 | - | K/W |



9. Characteristics

Table 6. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|---------------------------------------|--|------|-----|-----|------|
| Static characteristics | | | | | | |
| I _{GT} | gate trigger current | V _D = 12 V; I _T = 0.1 A; T2+ G+; T _j = 25 °C; Fig. 7 | 2 | - | 35 | mA |
| | | V _D = 12 V; I _T = 0.1 A; T2+ G-; T _j = 25 °C; Fig. 7 | 2 | - | 35 | mA |
| | | V _D = 12 V; I _T = 0.1 A; T2- G-; T _j = 25 °C; Fig. 7 | 2 | - | 35 | mA |
| I _L | latching current | V _D = 12 V; I _G = 0.1 A; T2+ G+; T _j = 25 °C; Fig. 8 | - | - | 50 | mA |
| | | V _D = 12 V; I _G = 0.1 A; T2+ G-; T _j = 25 °C; Fig. 8 | - | - | 60 | mA |
| | | V _D = 12 V; I _G = 0.1 A; T2- G-; T _j = 25 °C; Fig. 8 | - | - | 50 | mA |
| I _H | holding current | V _D = 12 V; T _j = 25 °C; Fig. 9 | - | - | 35 | mA |
| V _T | on-state voltage | I _T = 15 A; T _j = 25 °C; Fig. 10 | - | 1.3 | 1.6 | V |
| V _{GT} | gate trigger voltage | V _D = 12 V; I _T = 0.1 A; T _j = 25 °C; Fig. 11 | - | 0.8 | 1 | V |
| | | V _D = 400 V; I _T = 0.1 A; T _j = 125 °C; Fig. 11 | 0.25 | 0.4 | - | V |
| I _D | off-state current | V _D = 800 V; T _j = 125 °C | - | 0.1 | 0.5 | mA |
| Dynamic characteristics | | | | | | |
| dV _D /dt | rate of rise of off-state voltage | V _{DM} = 536 V; T _j = 125 °C; (V _{DM} = 67% of V _{DRM}); exponential waveform; gate open circuit | 500 | - | - | V/μs |
| di _{com} /dt | rate of change of commutating current | V _D = 400 V; T _j = 125 °C; I _{T(RMS)} = 12 A; dV _{com} /dt = 20 V/μs; (snubberless condition); gate open circuit | 20 | - | - | A/ms |



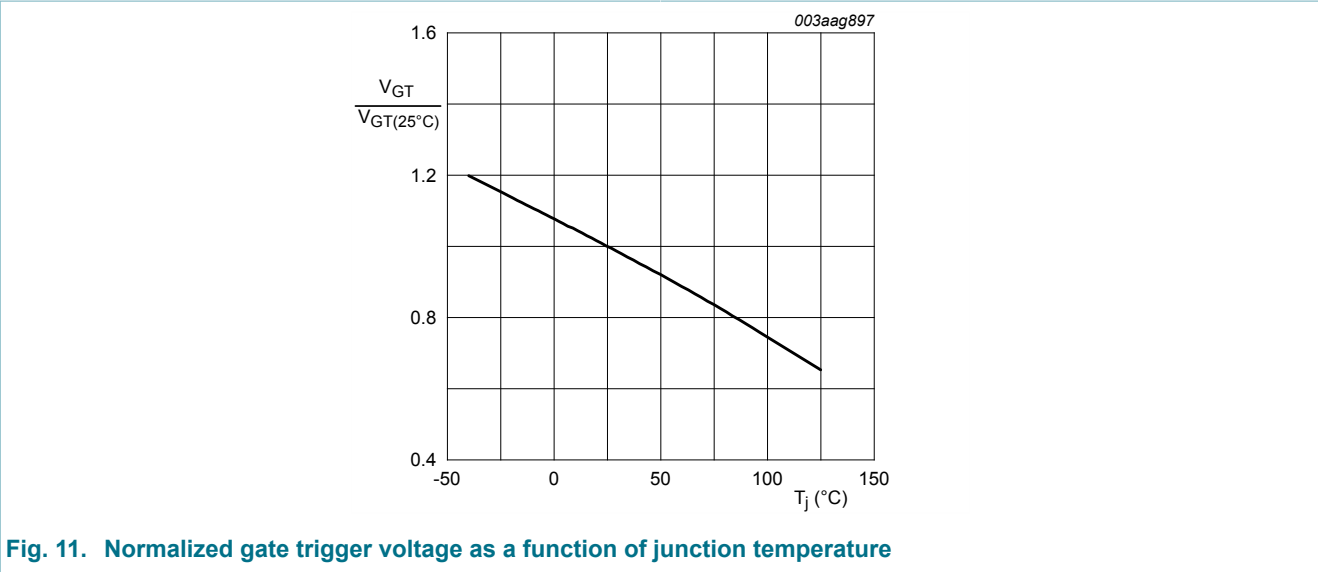
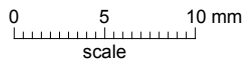


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

10. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB

SOT78



DIMENSIONS (mm are the original dimensions)

| UNIT | A | A ₁ | b | b ₁ (2) | b ₂ (2) | c | D | D ₁ | E | e | L | L ₁ (1) | L ₂ (1) max. | p | q | Q |
|------|------------|----------------|------------|--------------------|--------------------|------------|--------------|----------------|-------------|------|--------------|--------------------|----------------------------|------------|------------|------------|
| mm | 4.7 4.1 | 1.40 1.25 | 0.9 0.6 | 1.6 1.0 | 1.3 1.0 | 0.7 0.4 | 16.0 15.2 | 6.6 5.9 | 10.3 9.7 | 2.54 | 15.0 12.8 | 3.30 2.79 | 3.0 | 3.8 3.5 | 3.0 2.7 | 2.6 2.2 |

Notes

- 1. Lead shoulder designs may vary.
- 2. Dimension includes excess dambar.

| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-----------------|-------|---------------------|----------------------|
| | IEC | JEDEC | JEITA | | |
| SOT78 | | 3-lead TO-220AB | SC-46 | | 08-04-23 08-06-13 |

Fig. 12. Package outline TO-220AB (SOT78)

11. Legal information

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|--------------------------------|--------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
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- [2] The term 'short data sheet' is explained in section "Definitions".
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