

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.

In this document where the previous NXP references remain, please use the new links as shown below.

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Thank you for your cooperation and understanding,

WeEn Semiconductors

DATA SHEET

BTA212B series B Three quadrant triacs high commutation

Product specification

September 1997



Three quadrant triacs high commutation

BTA212B series B

GENERAL DESCRIPTION

Glass passivated high commutation triacs in a plastic envelope suitable for surface mounting intended for use in circuits where high static and dynamic dV/dt and high dI/dt can occur. These devices will commute the full rated rms current at the maximum rated junction temperature, without the aid of a snubber.

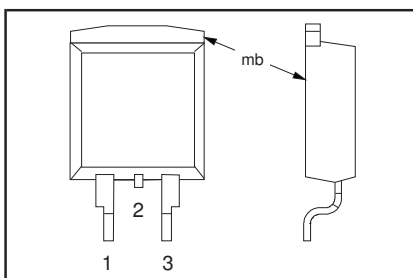
QUICK REFERENCE DATA

| SYMBOL | PARAMETER | MAX. | MAX. | MAX. | UNIT |
|---------------------|---|--------------------|--------------------|--------------------|------|
| V_{DRM} | BTA212B- Repetitive peak off-state voltages | 500B 500 | 600B 600 | 800B 800 | V |
| $I_{\text{T(RMS)}}$ | RMS on-state current | 12 | 12 | 12 | A |
| I_{TSM} | Non-repetitive peak on-state current | 95 | 95 | 95 | A |

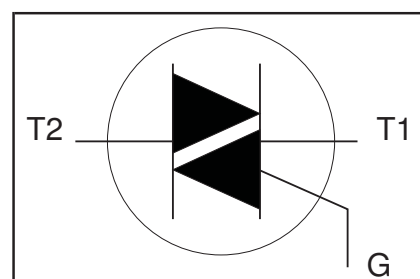
PINNING - SOT404

| PIN | DESCRIPTION |
|-----|-----------------|
| 1 | main terminal 1 |
| 2 | main terminal 2 |
| 3 | gate |
| mb | main terminal 2 |

PIN CONFIGURATION



SYMBOL



LIMITING VALUES

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | | | UNIT |
|---------------------|--|--|------|---------------------------------|---------------------------------|--------------------|------------------|
| V_{DRM} | Repetitive peak off-state voltages | | - | -500 500 ¹ | -600 600 ¹ | -800 800 | V |
| $I_{\text{T(RMS)}}$ | RMS on-state current | full sine wave; $T_{\text{mb}} \leq 99^\circ\text{C}$ | - | 12 | | | A |
| I_{TSM} | Non-repetitive peak on-state current | full sine wave; $T_{\text{j}} = 25^\circ\text{C}$ prior to surge | - | 95 | | | A |
| I^2t | I^2t for fusing | $t = 20\text{ ms}$ | - | 105 | | | A ² s |
| dI_{T}/dt | Repetitive rate of rise of on-state current after triggering | $t = 16.7\text{ ms}$ | - | 45 | | | A/ μs |
| I_{GM} | Peak gate current | $t = 10\text{ ms}$ | - | 100 | | | A |
| V_{GM} | Peak gate voltage | $I_{\text{T}} = 20\text{ A}; I_{\text{G}} = 0.2\text{ A}; dI_{\text{G}}/dt = 0.2\text{ A}/\mu\text{s}$ | - | 2 | | | V |
| P_{GM} | Peak gate power | | - | 5 | | | W |
| $P_{\text{G(AV)}}$ | Average gate power | over any 20 ms period | - | 0.5 | | | W |
| T_{stg} | Storage temperature | | -40 | 150 | | | $^\circ\text{C}$ |
| T_{j} | Operating junction temperature | | - | 125 | | | $^\circ\text{C}$ |

¹ Although not recommended, off-state voltages up to 800V may be applied without damage, but the triac may switch to the on-state. The rate of rise of current should not exceed 15 A/ μs .

Three quadrant triacs high commutation

BTA212B series B

THERMAL RESISTANCES

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|----------------|---|---------------------------|------|------|------|------|
| $R_{th\ j-mb}$ | Thermal resistance junction to mounting base | full cycle | - | - | 1.5 | K/W |
| $R_{th\ j-a}$ | Thermal resistance junction to ambient | half cycle in free air | - | - | 2.0 | K/W |
| | | | - | 60 | - | K/W |

STATIC CHARACTERISTICS

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|----------|-----------------------------------|---|------|------|------|------|
| I_{GT} | Gate trigger current ² | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$ | | | | |
| | | T2+ G+ | 2 | 18 | 50 | mA |
| | | T2+ G- | 2 | 21 | 50 | mA |
| | | T2- G- | 2 | 34 | 50 | mA |
| I_L | Latching current | $V_D = 12\text{ V}$; $I_{GT} = 0.1\text{ A}$ | | | | |
| | | T2+ G+ | - | 31 | 60 | mA |
| | | T2+ G- | - | 34 | 90 | mA |
| | | T2- G- | - | 30 | 60 | mA |
| I_H | Holding current | $V_D = 12\text{ V}$; $I_{GT} = 0.1\text{ A}$ | - | 31 | 60 | mA |
| V_T | On-state voltage | $I_T = 17\text{ A}$ | - | 1.3 | 1.6 | V |
| V_{GT} | Gate trigger voltage | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$ | - | 0.7 | 1.5 | V |
| | | $V_D = 400\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 125\text{ °C}$ | 0.25 | 0.4 | - | V |
| I_D | Off-state leakage current | $V_D = V_{DRM(max)}$; $T_j = 125\text{ °C}$ | - | 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 | 1000 | 4000 | - | V/ μ s |
| dI_{com}/dt | Critical rate of change of commutating current | $V_{DM} = 400\text{ V}$; $T_j = 125\text{ °C}$; $I_{T(RMS)} = 12\text{ A}$; without snubber; gate open circuit | - | 24 | - | A/ms |
| t_{gt} | Gate controlled turn-on time | $I_{TM} = 12\text{ A}$; $V_D = V_{DRM(max)}$; $I_G = 0.1\text{ A}$; $dI_G/dt = 5\text{ A}/\mu$ s | - | 2 | - | μ s |

² Device does not trigger in the T2-, G+ quadrant.

Three quadrant triacs high commutation

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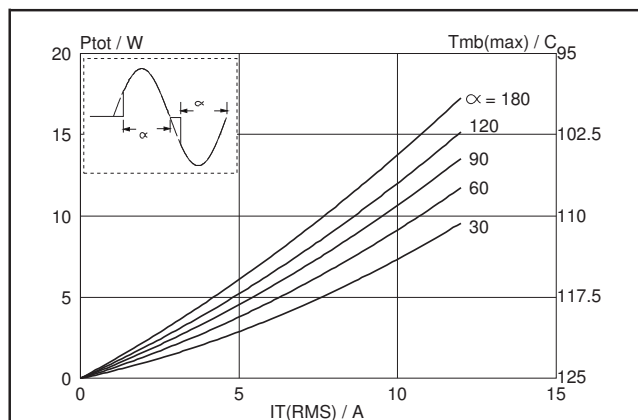


Fig.1. Maximum on-state dissipation, P_{tot} , versus rms on-state current, $I_{T(RMS)}$, where α = conduction angle.

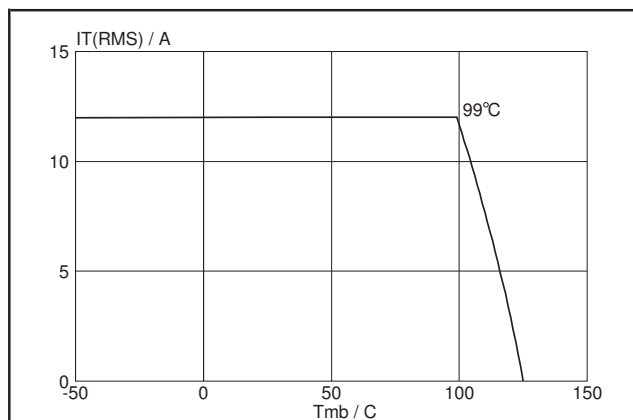


Fig.4. Maximum permissible rms current $I_{T(RMS)}$, versus mounting base temperature T_{mb} .

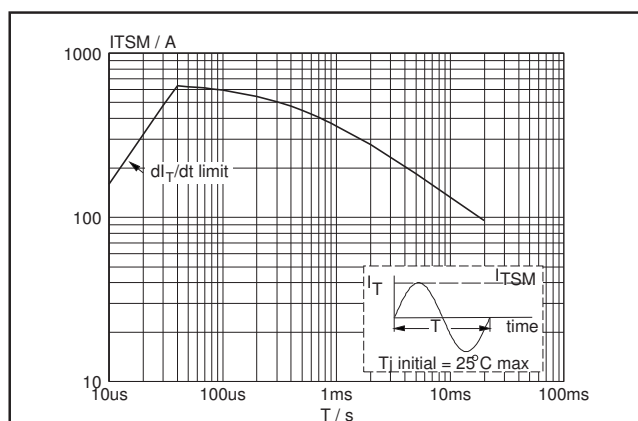


Fig.2. Maximum permissible non-repetitive peak on-state current I_{TSM} , versus pulse width t_p , for sinusoidal currents, $t_p \leq 20ms$.

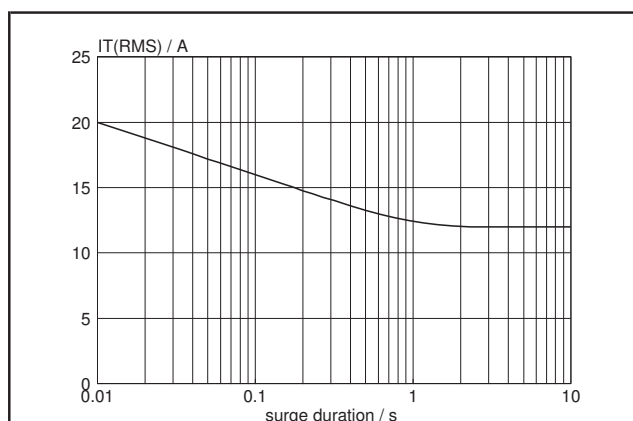


Fig.5. Maximum permissible repetitive rms on-state current $I_{T(RMS)}$, versus surge duration, for sinusoidal currents, $f = 50 Hz$; $T_{mb} \leq 99^\circ C$.

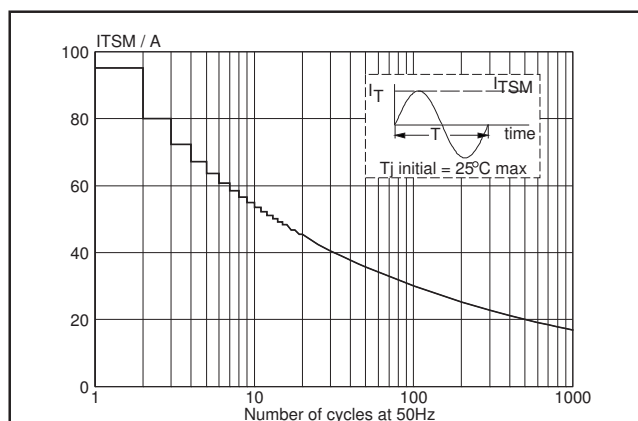


Fig.3. Maximum permissible non-repetitive peak on-state current I_{TSM} , versus number of cycles, for sinusoidal currents, $f = 50 Hz$.

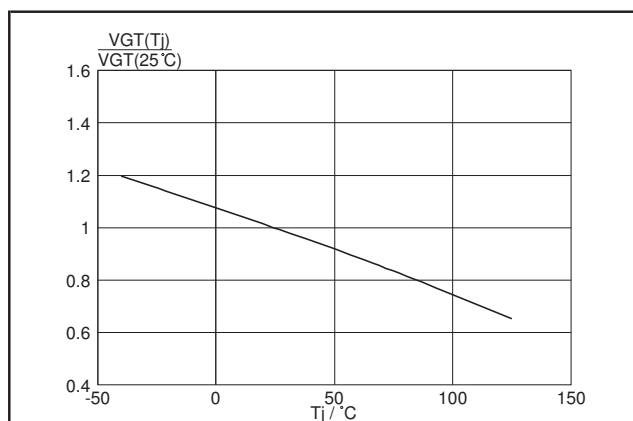


Fig.6. Normalised gate trigger voltage $V_{GT}(T_J)/V_{GT}(25^\circ C)$, versus junction temperature T_J .

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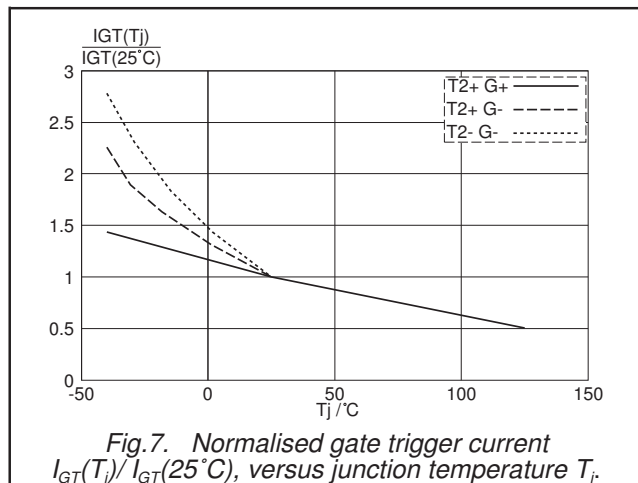


Fig. 7. Normalised gate trigger current $I_{GT}(T_j) / I_{GT}(25^\circ\text{C})$, versus junction temperature T_j .

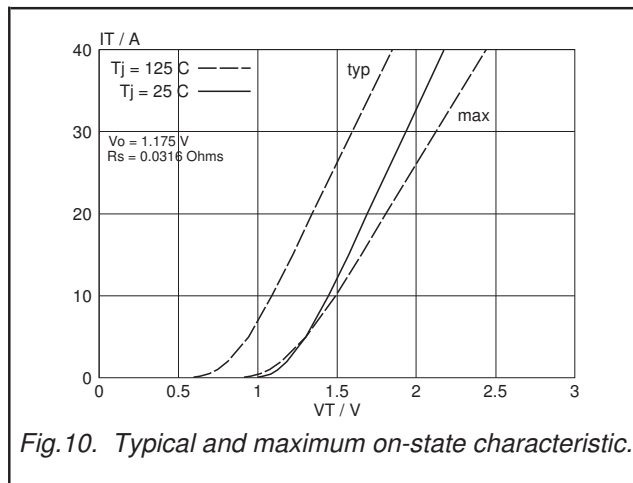


Fig. 10. Typical and maximum on-state characteristic.

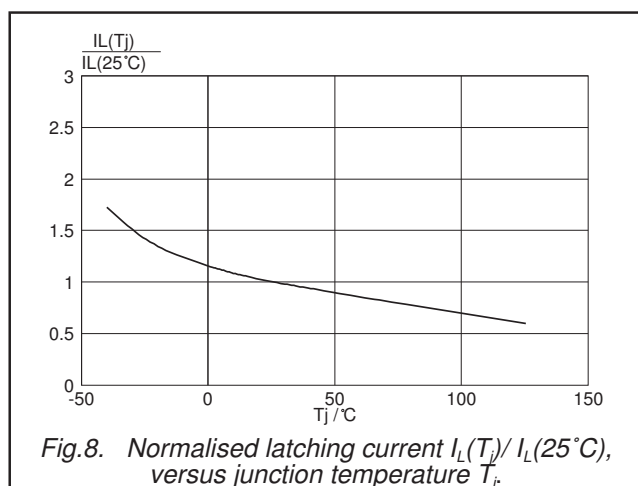


Fig. 8. Normalised latching current $I_L(T_j) / I_L(25^\circ\text{C})$, versus junction temperature T_j .

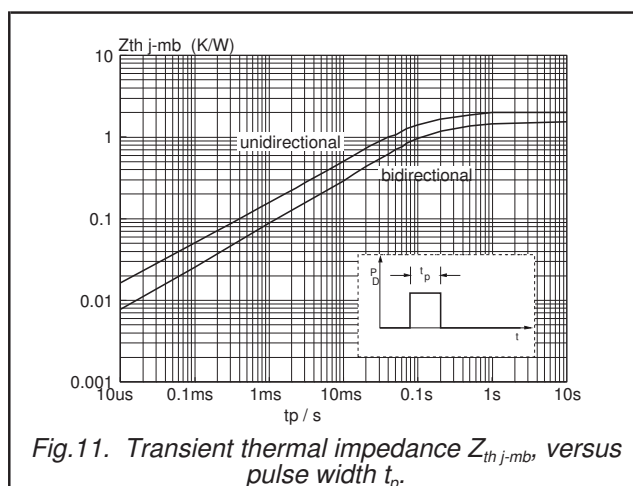


Fig. 11. Transient thermal impedance $Z_{th j-mb}$, versus pulse width t_p .

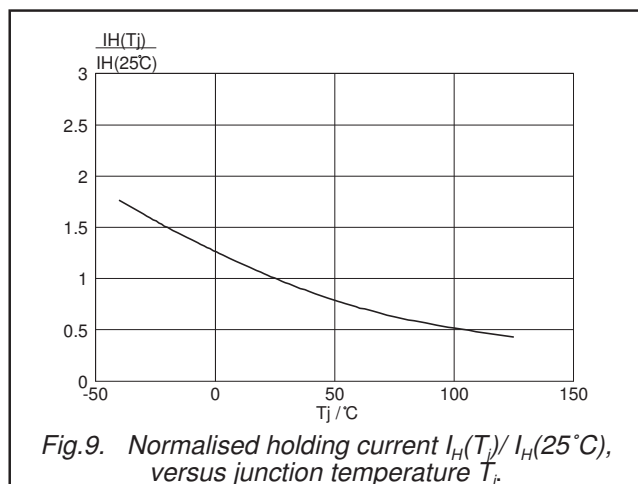


Fig. 9. Normalised holding current $I_H(T_j) / I_H(25^\circ\text{C})$, versus junction temperature T_j .

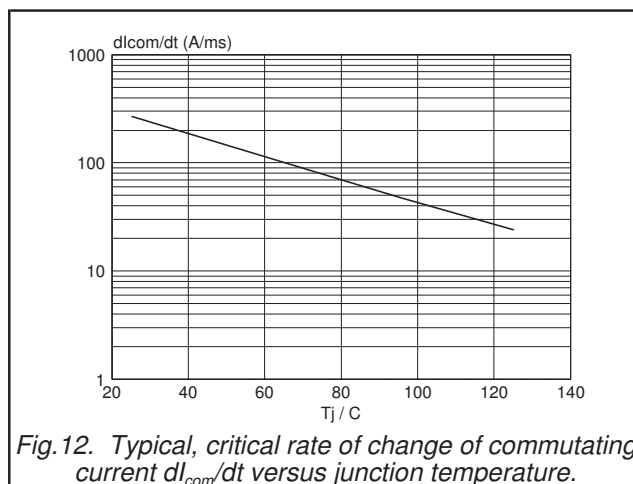


Fig. 12. Typical, critical rate of change of commutating current dl_{com}/dt versus junction temperature.

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MECHANICAL DATA

Dimensions in mm

Net Mass: 1.4 g

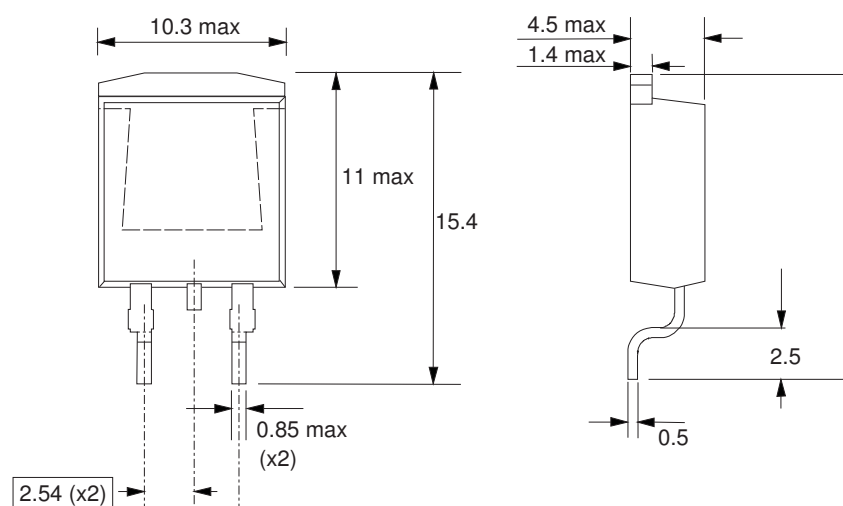


Fig.13. SOT404 : centre pin connected to mounting base.

Notes

1. Epoxy meets UL94 V0 at 1/8".

MOUNTING INSTRUCTIONS

Dimensions in mm

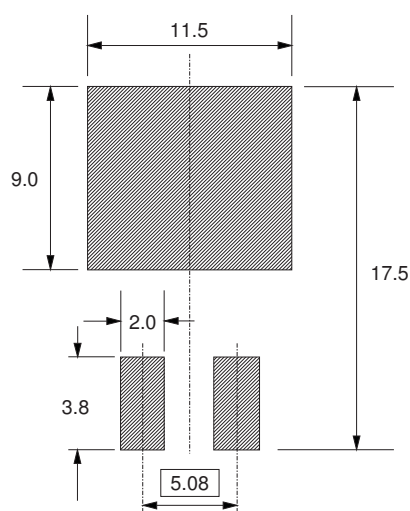


Fig.14. SOT404 : minimum pad sizes for surface mounting.

Notes

1. Plastic meets UL94 V0 at 1/8".

Legal information

DATA SHEET STATUS

| DOCUMENT STATUS ⁽¹⁾ | PRODUCT STATUS ⁽²⁾ | DEFINITION |
|--------------------------------|-------------------------------|---|
| Objective data sheet | Development | This document contains data from the objective specification for product development. |
| Preliminary data sheet | Qualification | This document contains data from the preliminary specification. |
| Product data sheet | Production | This document contains the product specification. |

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