

DATA SHEET

BTA216 series D, E and F Three quadrant triacs guaranteed commutation

Product specification

September 2018

Three quadrant triacs guaranteed commutation

BTA216 series D, E and F

GENERAL DESCRIPTION

Passivated guaranteed commutation triacs in a plastic envelope intended for use in motor control circuits or with other highly inductive loads. These devices balance the requirements of commutation performance and gate sensitivity. The "sensitive gate" E series and "logic level" D series are intended for interfacing with low power drivers, including micro controllers.

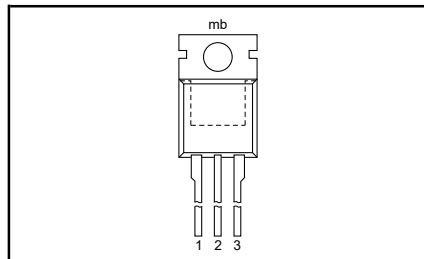
QUICK REFERENCE DATA

| SYMBOL | PARAMETER | MAX. | UNIT |
|--------------|--------------------------------------|-----------------------------|------|
| V_{DRM} | Repetitive peak off-state voltages | 600D 600E 600F 600 | V |
| $I_{T(RMS)}$ | RMS on-state current | 16 | A |
| I_{TSM} | Non-repetitive peak on-state current | 140 | A |

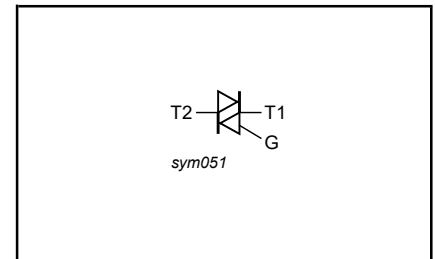
PINNING - TO220AB

| PIN | DESCRIPTION |
|-----|-----------------|
| 1 | main terminal 1 |
| 2 | main terminal 2 |
| 3 | gate |
| tab | 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 | | - | 600 ¹ | V |
| $I_{T(RMS)}$ | RMS on-state current | full sine wave; $T_{mb} \leq 99\text{ }^{\circ}\text{C}$ | - | 16 | A |
| I_{TSM} | Non-repetitive peak on-state current | full sine wave; $T_j = 25\text{ }^{\circ}\text{C}$ prior to surge $t = 20\text{ ms}$ | - | 140 | A |
| I^2t | I^2t for fusing | $t = 16.7\text{ ms}$ | - | 150 | A |
| di_T/dt | Repetitive rate of rise of on-state current after triggering | $t = 10\text{ ms}$ $I_{TM} = 20\text{ A}; I_G = 0.2\text{ A};$ $di_G/dt = 0.2\text{ A}/\mu\text{s}$ | - | 98 | A ² 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 | 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 .

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THERMAL RESISTANCES

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|----------------|---|---------------------------|------|------|------|------|
| $R_{th\ j-mb}$ | Thermal resistance junction to mounting base | full cycle | - | - | 1.2 | K/W |
| $R_{th\ j-a}$ | Thermal resistance junction to ambient | half cycle in free air | - | - | 1.7 | K/W |
| | | | - | 60 | - | K/W |

STATIC CHARACTERISTICS

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | | | UNIT |
|----------|-----------------------------------|---|------|-------------|-------------|-------------|------|
| | | BTA216- | | ...D | ...E | ...F | |
| I_{GT} | Gate trigger current ² | $V_D = 12\text{ V}; I_T = 0.1\text{ A}$ T2+ G+ T2+ G- T2- G- | - | 5 | 10 | 25 | mA |
| I_L | Latching current | $V_D = 12\text{ V}; I_{GT} = 0.1\text{ A}$ T2+ G+ T2+ G- T2- G- | - | 15 | 25 | 30 | mA |
| I_H | Holding current | $V_D = 12\text{ V}; I_{GT} = 0.1\text{ A}$ | - | 15 | 25 | 30 | mA |
| V_T | On-state voltage | $I_T = 20\text{ A}$ | - | 1.5 | | | V |
| V_{GT} | Gate trigger voltage | $V_D = 12\text{ V}; I_T = 0.1\text{ A}$ $V_D = 400\text{ V}; I_T = 0.1\text{ A};$ $T_j = 125\text{ °C}$ | 0.25 | 1.5 | | | V |
| I_D | Off-state leakage current | $V_D = V_{DRM(max)}; T_j = 125\text{ °C}$ | - | 0.5 | | | mA |

DYNAMIC CHARACTERISTICS

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | | | MAX. | UNIT |
|---------------|---|--|-------------|-------------|-------------|------|------------|
| | | BTA216- | ...D | ...E | ...F | | |
| dV_D/dt | Critical rate of rise of off-state voltage | $V_{DM} = 67\% V_{DRM(max)};$ $T_j = 110\text{ °C};$ exponential waveform; gate open circuit | 30 | 60 | 70 | - | V/ μ s |
| dI_{com}/dt | Critical rate of change of commutating current | $V_{DM} = 400\text{ V}; T_j = 125\text{ °C};$ $I_{T(RMS)} = 16\text{ A};$ $dV_{com}/dt = 10\text{ V}/\mu\text{s};$ gate open circuit | 2.5 | 6.2 | 18 | - | A/ms |
| dI_{com}/dt | Critical rate of change of commutating current | $V_{DM} = 400\text{ V}; T_j = 125\text{ °C};$ $I_{T(RMS)} = 16\text{ A};$ $dV_{com}/dt = 0.1\text{ V}/\mu\text{s};$ gate open circuit | 12 | 20 | 50 | - | A/ms |

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

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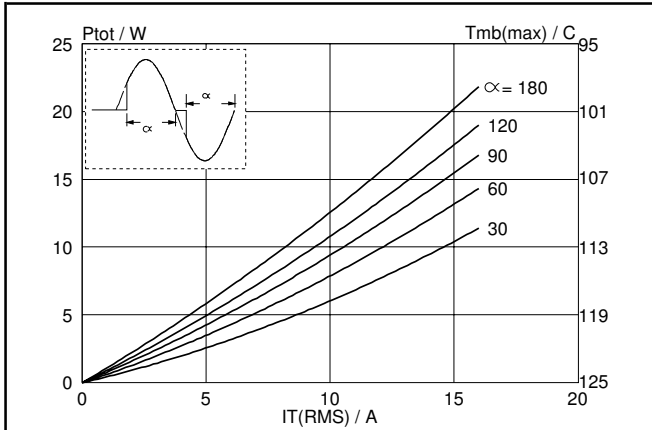


Fig.1. Maximum on-state dissipation, P_{tot} , versus rms on-state current, $I_{T(RMS)}$, where α = conduction angle.

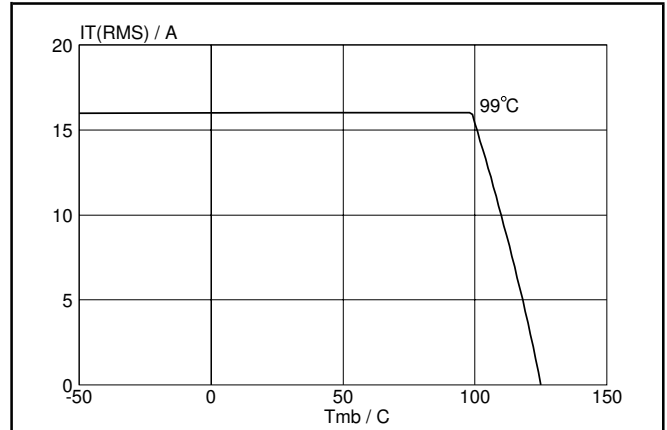


Fig.4. Maximum permissible rms current $I_{T(RMS)}$, versus mounting base temperature T_{mb} .

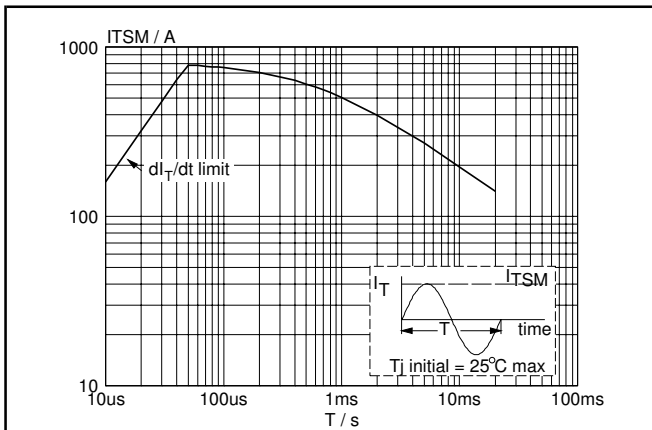


Fig.2. Maximum permissible non-repetitive peak on-state current I_{TSM} , versus pulse width t_p , for sinusoidal currents, $t_p \leq 20\text{ms}$.

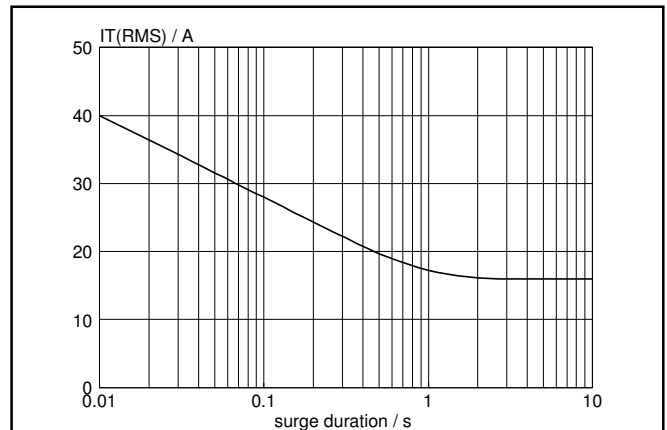


Fig.5. Maximum permissible repetitive rms on-state current $I_{T(RMS)}$, versus surge duration, for sinusoidal currents, $f = 50\text{ Hz}$; $T_{mb} \leq 99^\circ\text{C}$.

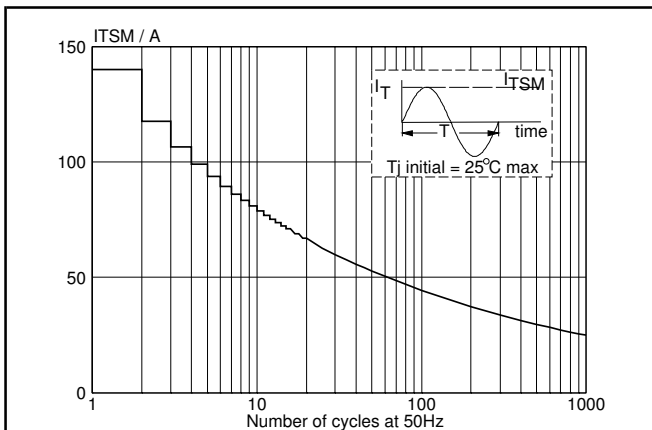


Fig.3. Maximum permissible non-repetitive peak on-state current I_{TSM} , versus number of cycles, for sinusoidal currents, $f = 50\text{ Hz}$.

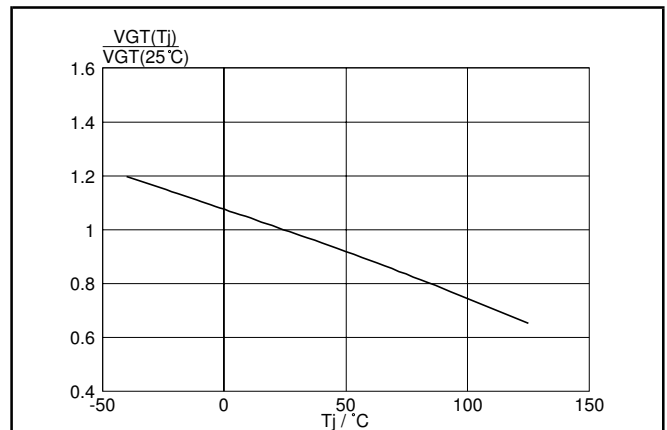
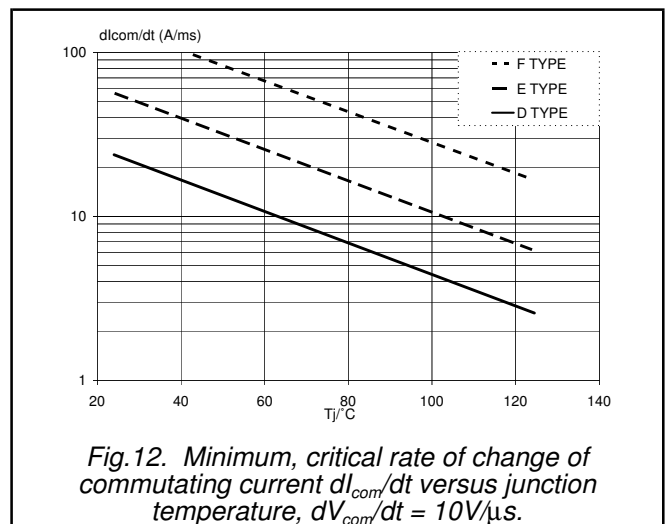
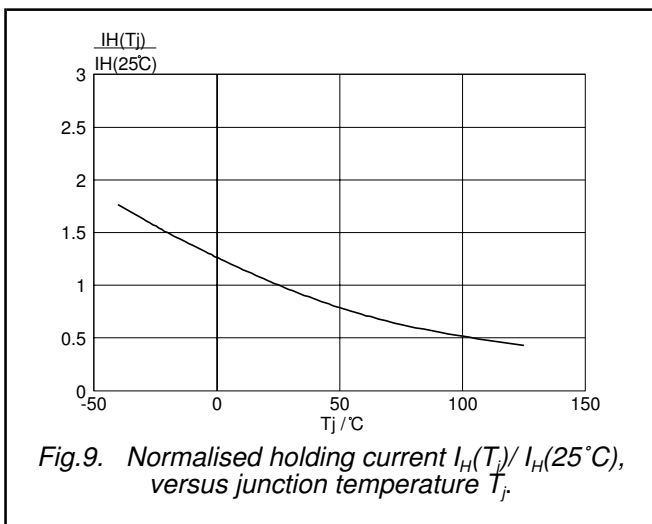
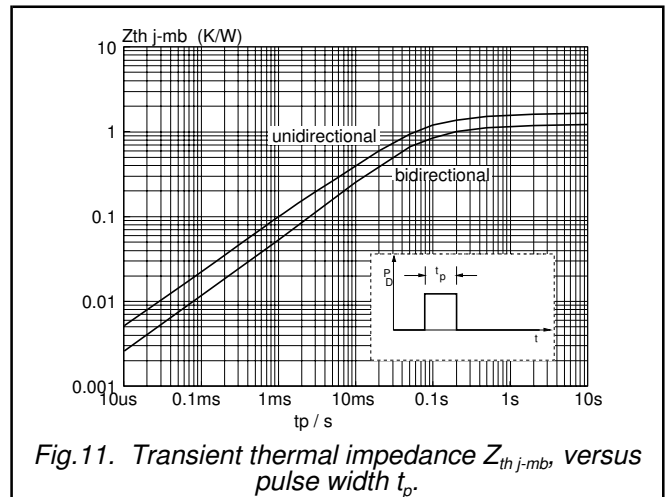
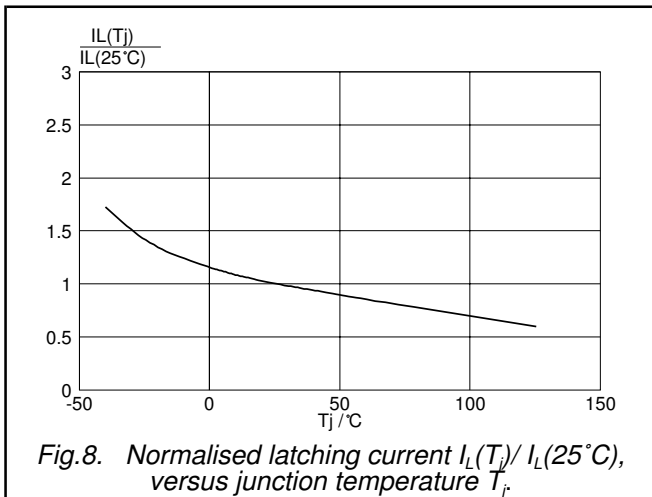
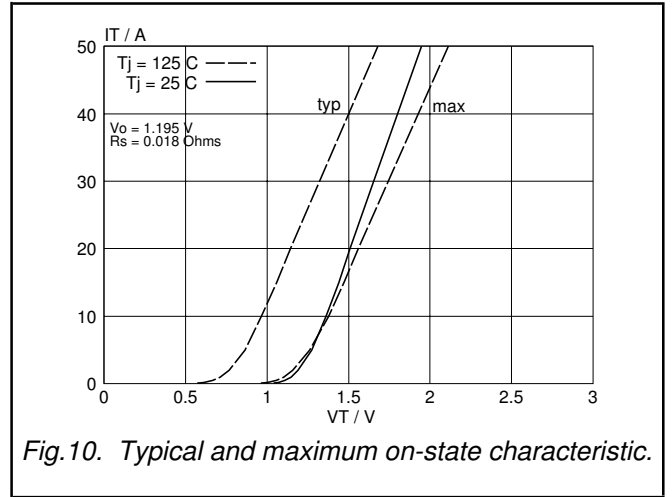
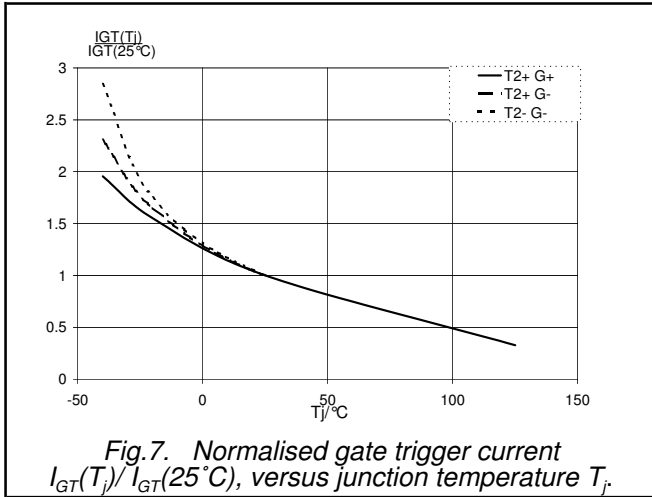


Fig.6. Normalised gate trigger voltage $V_{GT}(T_j) / V_{GT}(25^\circ\text{C})$, versus junction temperature T_j .

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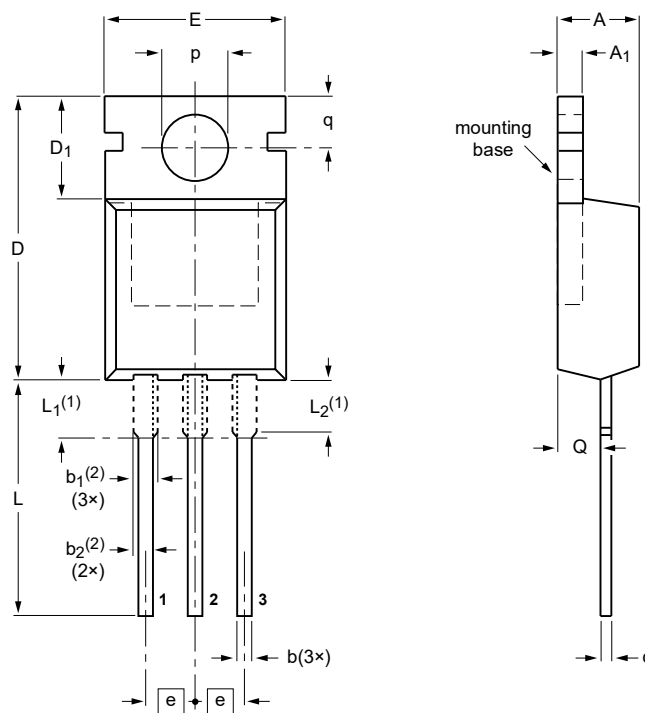
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MECHANICAL DATA

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 |

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|--------------------------------|--------------------|---|
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