# DATA SHEET

## BTA204W series B and C
Three quadrant triacs
high commutation

Product specification

December 1998

# Three quadrant triacs high commutation

# BTA204W series B and C

## GENERAL DESCRIPTION

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 commutate the full rated rms current at the maximum rated junction temperature without the aid of a snubber.

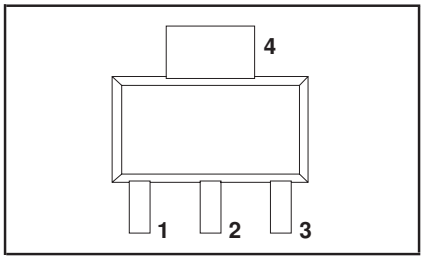
## QUICK REFERENCE DATA

| SYMBOL | PARAMETER | MAX. | MAX. | MAX. | UNIT |
|---|---|---|---|---|---|
| | **BTA204W-** | **500B** | **600B** | **800B** | |
| | **BTA204W-** | **500C** | **600C** | **800C** | |
| $V_{DRM}$ | Repetitive peak off-state voltages | 500 | 600 | 800 | V |
| $I_{T(RMS)}$ | RMS on-state current | 1 | 1 | 1 | A |
| $I_{TSM}$ | Non-repetitive peak on-state current | 10 | 10 | 10 | A |

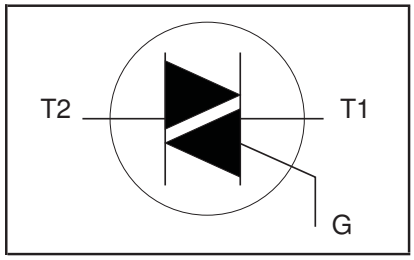
## PINNING - SOT223

| 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 |
|---|---|---|---|---|---|---|---|
| | | | | **-500** | **-600** | **-800** | |
| $V_{DRM}$ | Repetitive peak off-state voltages | | - | 500[1] | 600[1] | 800 | V |
| $I_{T(RMS)}$ | RMS on-state current | full sine wave; $T_{sp} \leq 108$ ˚C | - | 1 | | | A |
| $I_{TSM}$ | Non-repetitive peak on-state current | full sine wave; $T_j = 25$ ˚C prior to surge | | | | | |
| | | t = 20 ms | - | 10 | | | A |
| | | t = 16.7 ms | - | 11 | | | A |
| $I^2t$ | $I^2t$ for fusing | t = 10 ms | - | 0.5 | | | $A^2s$ |
| $dI_T/dt$ | Repetitive rate of rise of on-state current after triggering | $I_{TM} = 1.5$ A; $I_G = 0.2$ A; $dI_G/dt = 0.2$ A/µs | | 100 | | | A/µs |
| $I_{GM}$ | Peak gate current | | - | 2 | | | A |
| $V_{GM}$ | Peak gate voltage | | - | 5 | | | V |
| $P_{GM}$ | 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 | | | ˚C |
| $T_j$ | Operating junction temperature | | - | 125 | | | ˚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 6 A/µs.

## THERMAL RESISTANCES

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $R_{th\ j\text{-}sp}$ | Thermal resistance junction to solder point | full or half cycle | - | - | 15 | K/W |
| $R_{th\ j\text{-}a}$ | Thermal resistance junction to ambient | pcb mounted; minimum footprint | - | 156 | - | K/W |
| | | pcb mounted; pad area as in fig:2 | - | 70 | - | K/W |

## STATIC CHARACTERISTICS

$T_j$ = 25 ˚C unless otherwise stated

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | | UNIT |
|---|---|---|---|---|---|---|---|
| | | BTA204W- | | | ...B | ...C | |
| $I_{GT}$ | Gate trigger current[2] | $V_D$ = 12 V; $I_T$ = 0.1 A | | | | | |
| | | T2+ G+ | - | - | 50 | 35 | mA |
| | | T2+ G- | - | - | 50 | 35 | mA |
| | | T2- G- | - | - | 50 | 35 | mA |
| $I_L$ | Latching current | $V_D$ = 12 V; $I_{GT}$ = 0.1 A | | | | | |
| | | T2+ G+ | - | - | 30 | 20 | mA |
| | | T2+ G- | - | - | 45 | 30 | mA |
| | | T2- G- | - | - | 30 | 20 | mA |
| $I_H$ | Holding current | $V_D$ = 12 V; $I_{GT}$ = 0.1 A | - | - | 30 | 20 | mA |
| $V_T$ | On-state voltage | $I_T$ = 2 A | - | 1.2 | 1.5 | | V |
| $V_{GT}$ | Gate trigger voltage | $V_D$ = 12 V; $I_T$ = 0.1 A | - | 0.7 | 1.5 | | V |
| | | $V_D$ = 400 V; $I_T$ = 0.1 A; $T_j$ = 125 ˚C | 0.25 | 0.4 | - | | V |
| $I_D$ | Off-state leakage current | $V_D$ = $V_{DRM(max)}$; $T_j$ = 125 ˚C | - | 0.1 | 0.5 | | mA |

## DYNAMIC CHARACTERISTICS

$T_j$ = 25 ˚C unless otherwise stated

| SYMBOL | PARAMETER | CONDITIONS | MIN. | | TYP. | UNIT |
|---|---|---|---|---|---|---|
| | | BTA204W- | ...B | ...C | | |
| $dV_D/dt$ | Critical rate of rise of off-state voltage | $V_{DM}$ = 67% $V_{DRM(max)}$; $T_j$ = 125 ˚C; exponential waveform; gate open circuit | 1000 | 1000 | - | V/µs |
| $dI_{com}/dt$ | Critical rate of change of commutating current | $V_{DM}$ = 400 V; $T_j$ = 125 ˚C; $I_{T(RMS)}$ = 1 A; $dV_{com}/dt$ = 20V/µs; gate open circuit | 6 | 3 | - | A/ms |
| $t_{gt}$ | Gate controlled turn-on time | $I_{TM}$ = 12 A; $V_D$ = $V_{DRM(max)}$; $I_G$ = 0.1 A; $dI_G/dt$ = 5 A/µs | - | - | 2 | µs |

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

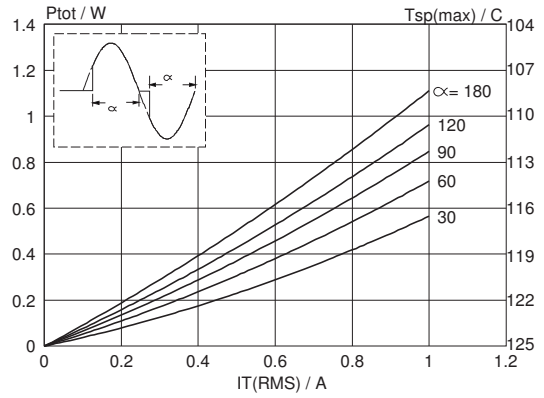



*Fig.1. Maximum on-state dissipation, $P_{tot}$, versus rms on-state current, $I_{T(RMS)}$, where α = conduction angle.*

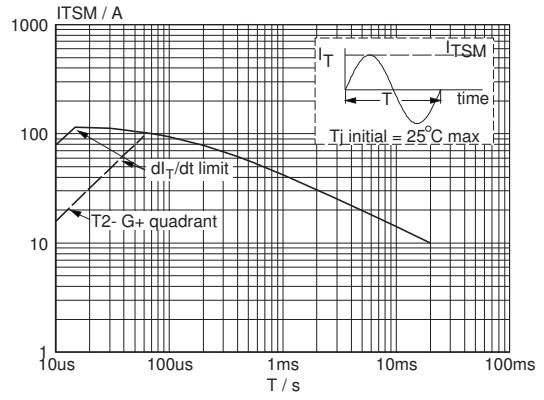



*Fig.2. Maximum permissible non-repetitive peak on-state current $I_{TSM}$, versus pulse width $t_p$, for sinusoidal currents, $t_p \leq 20ms$.*

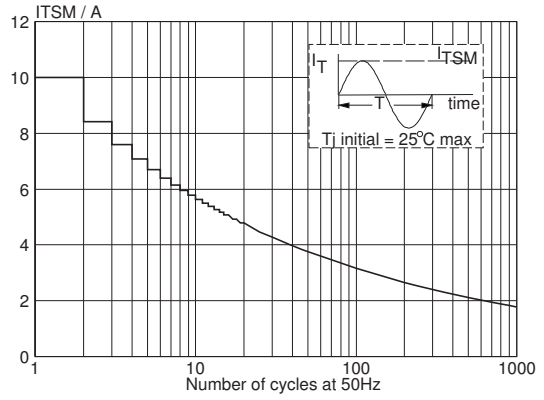



*Fig.3. Maximum permissible non-repetitive peak on-state current $I_{TSM}$, versus number of cycles, for sinusoidal currents, f = 50 Hz.*

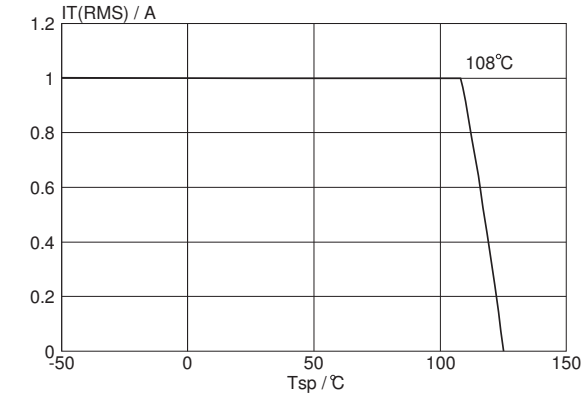



*Fig.4. Maximum permissible rms current $I_{T(RMS)}$, versus solder point temperature $T_{sp}$.*

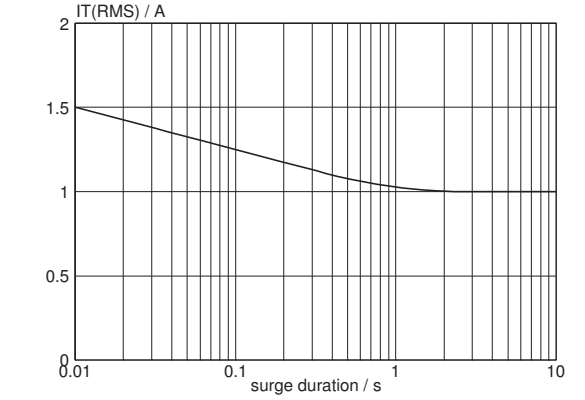



*Fig.5. Maximum permissible repetitive rms on-state current $I_{T(RMS)}$, versus surge duration, for sinusoidal currents, f = 50 Hz; $T_{sp} \leq 108˚C$.*

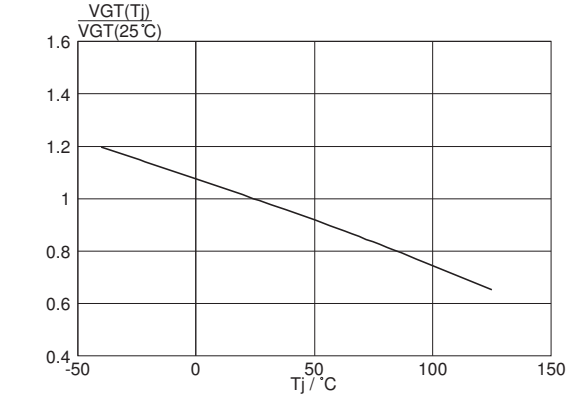



*Fig.6. Normalised gate trigger voltage $V_{GT}(T_j)/ V_{GT}(25˚C)$, versus junction temperature $T_j$.*

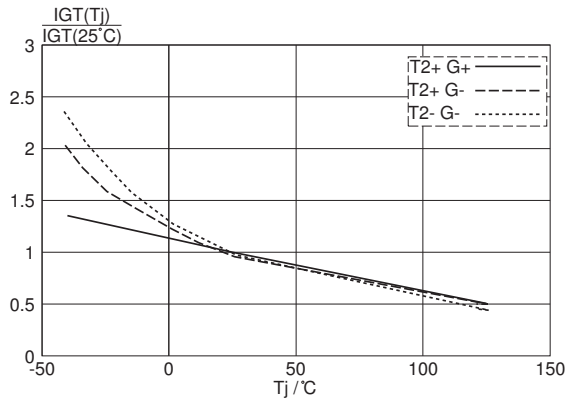



*Fig.7. Normalised gate trigger current $I_{GT}(T_j)/ I_{GT}(25˚C)$, versus junction temperature $T_j$.*

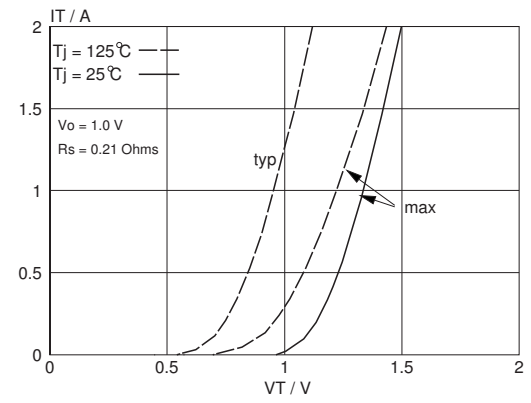



*Fig.10. Typical and maximum on-state characteristic.*

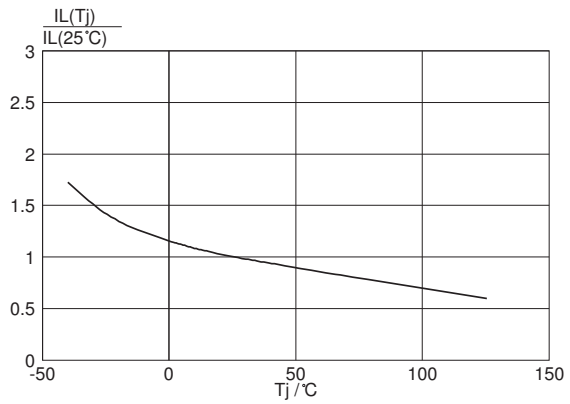



*Fig.8. Normalised latching current $I_L(T_j)/ I_L(25˚C)$, versus junction temperature $T_j$.*

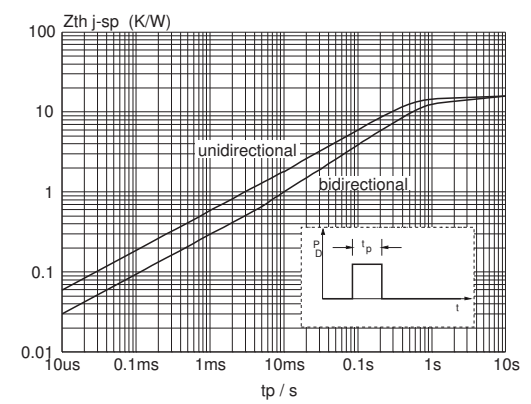



*Fig.11. Transient thermal impedance $Z_{th\ j\text{-}sp}$, versus pulse width $t_p$.*

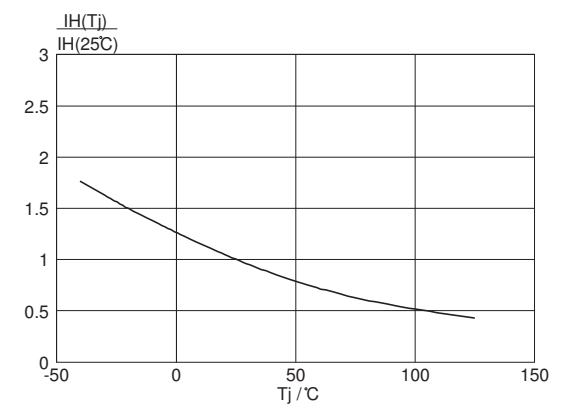



*Fig.9. Normalised holding current $I_H(T_j)/ I_H(25˚C)$, versus junction temperature $T_j$.*

## MOUNTING INSTRUCTIONS

*Dimensions in mm.*

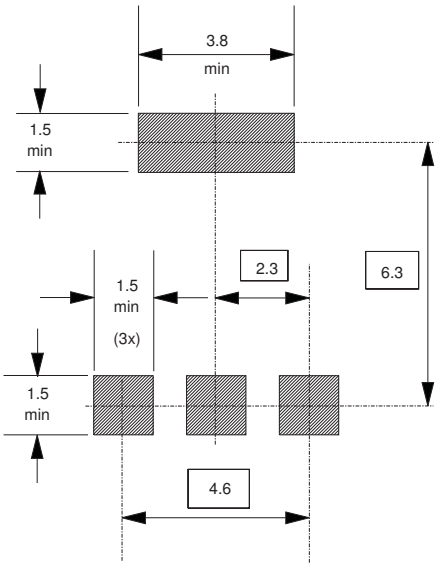



*Fig.12. soldering pattern for surface mounting SOT223.*

## MECHANICAL DATA

*Dimensions in mm*

*Net Mass: 0.11 g*

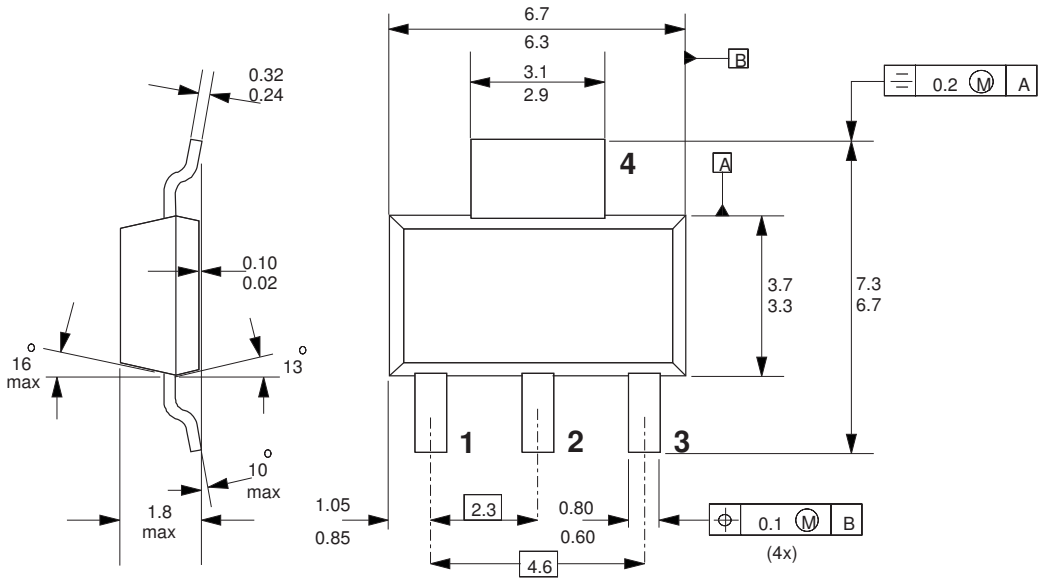



*Fig.13. SOT223 surface mounting package.*

**Notes**

1. For further information, refer to Philips publication SC18 " SMD Footprint Design and Soldering Guidelines". Order code: 9397 750 00505.
2. Epoxy meets UL94 V0 at 1/8".

# Legal information

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