

BTA201W series E

1 A Three-quadrant triacs high commutation Rev. 03 — 13 March 2008

Product data sheet

Product profile

1.1 General description

Passivated guaranteed commutation triacs in a surface-mounted plastic package, intended for interfacing with low-power drivers, including microcontrollers.

1.2 Features

- Suitable for interfacing with low-power drivers, including microcontrollers
- SOT223 surface mounted

1.3 Applications

Motor control

Solenoid drivers

1.4 Quick reference data

- I_{TSM} \leq 12.5 A
- $I_{T(RMS)} \le 1 A$
- $V_{DRM} \le 600 \text{ V (BTA201W-600E)}$
- $V_{DRM} \le 800 \text{ V (BTA201W-800E)}$
- $I_{GT} \le 10 \text{ mA (BTA201W-600E)}$
- I_{GT} ≤ 10 mA (BTA201W-800E)
- $I_{GT} \ge 1 \text{ mA (BTA201W-600E)}$
- $I_{GT} \ge 1 \text{ mA (BTA201W-800E)}$

Pinning information

Table 1. **Pinning**

| Pin | Description | Simplified outline | Symbol |
|-----|----------------------|--------------------|--------|
| 1 | main terminal 1 (T1) | | N 1 |
| 2 | main terminal 2 (T2) | 4 | T2—T1 |
| 3 | gate (G) | | sym051 |
| 4 | main terminal 2 (T2) | | |
| | | SOT223 | |
| | | | |



3. Ordering information

Table 2. Ordering information

| Type number | Package | | | |
|--------------|---------|--|---------|--|
| | Name | Description | Version | |
| BTA201W-600E | SC-73 | plastic surface-mounted package with increased heatsink; 4 leads | SOT223 | |
| BTA201W-800E | | | | |

4. Limiting values

Table 3. Limiting values

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

| Parameter | Conditions | | Min | Max | Unit |
|--------------------------------------|--|-----|-----|-----------------------------------|--|
| repetitive peak off-state voltage | BTA201W-600E | [1] | - | 600 | V |
| | BTA201W-800E | | - | 800 | V |
| RMS on-state current | full sine wave; $T_{sp} \le 106$ °C; see Figure 4 and 5 | | - | 1 | Α |
| non-repetitive peak on-state current | full sine wave; $T_j = 25$ °C prior to surge; see Figure 2 and 3 | | | | |
| | t = 20 ms | | - | 12.5 | Α |
| | t = 16.7 ms | | - | 13.7 | Α |
| I ² t for fusing | t _p = 10 ms | | - | 0.78 | A ² s |
| rate of rise of on-state current | $I_{TM} = 1.5 \text{ A}; I_G = 0.2 \text{ A};$ $dI_G/dt = 0.2 \text{ A}/\mu\text{s}$ | | - | 100 | A/μs |
| peak gate current | | | - | 2 | Α |
| peak gate power | | | - | 5 | W |
| average gate power | over any 20 ms period | | - | 0.1 | W |
| storage temperature | | | -40 | +150 | °C |
| junction temperature | | | - | 125 | °C |
| | repetitive peak off-state voltage RMS on-state current non-repetitive peak on-state current I²t for fusing rate of rise of on-state current peak gate current peak gate power average gate power storage temperature | | | repetitive peak off-state voltage | repetitive peak off-state voltage $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ |

^[1] Although not recommended, off-state voltages up to 800 V 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.

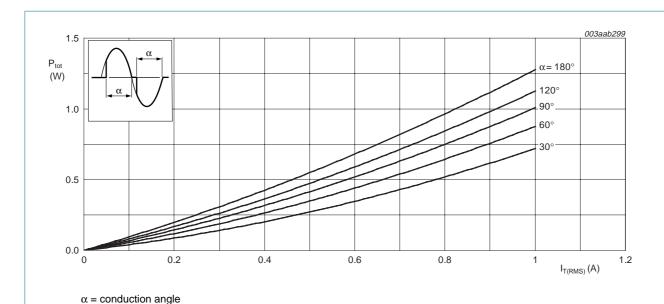


Fig 1. Total power dissipation as a function of RMS on-state current; maximum values

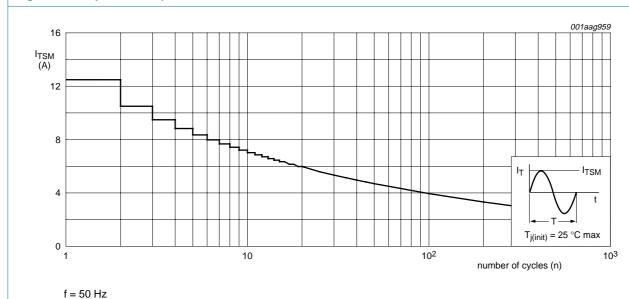


Fig 2. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

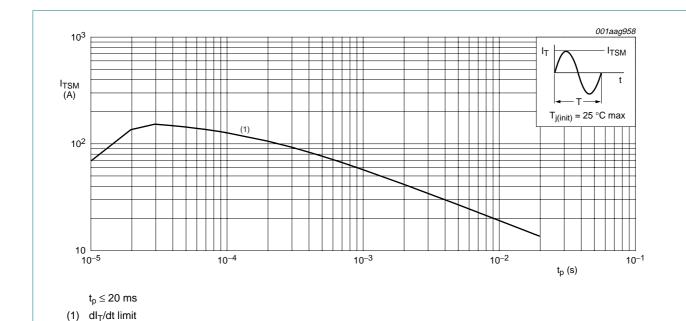


Fig 3. Non-repetitive peak on-state current as a function of pulse width; maximum values

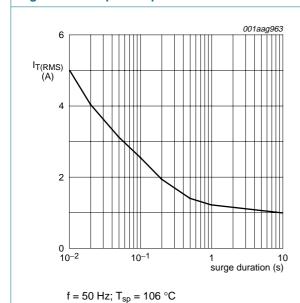


Fig 4. RMS on-state current as a function of surge duration; maximum values

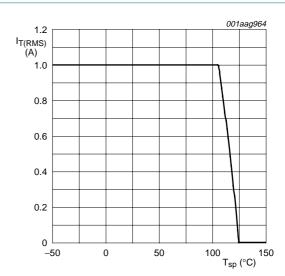


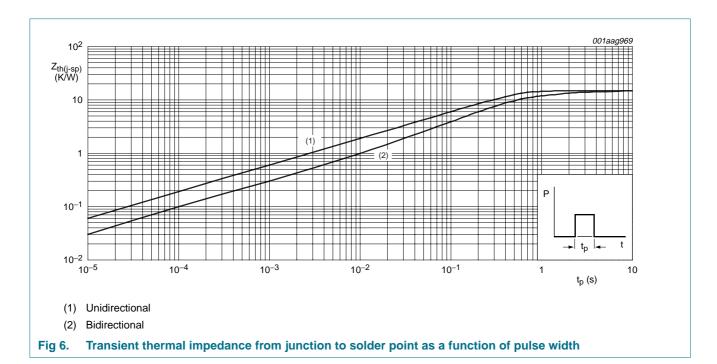
Fig 5. RMS on-state current as a function of solder point temperature; maximum values

5. Thermal characteristics

Table 4. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Тур | Max | Unit |
|----------------|--|----------------------------------|--------------|-----|-----|------|
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | see Figure 6 | - | - | 15 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | minimum footprint; see Figure 14 | <u>[1]</u> _ | 156 | - | K/W |
| | | for pad area; see Figure 15 | <u>[1]</u> - | 70 | - | K/W |

[1] Mounted on a printed-circuit board.



6. Static characteristics

Table 5. Static characteristics

 $T_i = 25 \,^{\circ}C$ unless otherwise specified.

| , , , , , , , , , , , , , , , , , , , | • | | | | | |
|---------------------------------------|-----------------------|---|-----|-----|-----|------|
| Symbol | Parameter | Conditions | Min | Тур | Max | Unit |
| BTA201W- | 600E and BTA201W-800E | | | | | |
| I _{GT} | gate trigger current | $V_D = 12 \text{ V; } I_T = 0.1 \text{ A; see } \frac{\text{Figure 8}}{}$ | | | | |
| | | T2+ G+ | 1 | - | 10 | mA |
| | | T2+ G- | 1 | - | 10 | mA |
| | | T2- G- | 1 | - | 10 | mA |
| I _L latching current | | $V_D = 12 \text{ V}; I_G = 0.1 \text{ A}; \text{ see } \frac{\text{Figure 10}}{\text{Figure 10}}$ | | | | |
| | | T2+ G+ | - | - | 12 | mA |
| | | T2+ G- | - | - | 20 | mA |
| | | T2- G- | - | - | 12 | mA |
| I _H | holding current | $V_D = 12 \text{ V}; I_G = 0.1 \text{ A}; \text{ see } \frac{\text{Figure } 11}{}$ | - | - | 12 | mA |
| V_{T} | on-state voltage | I _T = 1.4 A; see <u>Figure 9</u> | - | 1.2 | 1.5 | V |
| V_{GT} | gate trigger voltage | $V_D = 12 \text{ V; } I_T = 0.1 \text{ A; see } \frac{\text{Figure 7}}{}$ | - | 0.7 | 1.5 | V |
| | | $V_D = 400 \text{ V}; I_T = 0.1 \text{ A}; T_j = 125 ^{\circ}\text{C}$ | 0.2 | 0.3 | - | V |
| I _D | off-state current | $V_D = V_{DRM(max)}$; $T_j = 125 ^{\circ}C$ | - | 0.1 | 0.5 | mA |
| | | | | | | |

7. Dynamic characteristics

Table 6. Dynamic characteristics

| Symbol | Parameter | Conditions | Min | Тур | Max | Unit |
|-----------------------|---------------------------------------|--|-----|-----|-----|------|
| BTA201W | -600E and BTA201W-800 | E | | | | |
| dV _D /dt | rate of rise of off-state voltage | $V_{DM} = 0.67 V_{DRM(max)}; T_j = 125 ^{\circ}C;$ exponential waveform; gate open circuit | 600 | - | - | V/μs |
| dl _{com} /dt | rate of change of commutating current | V_{DM} = 400 V; T_j = 125 °C; $I_{T(RMS)}$ = 4 A; gate open circuit | | | | |
| | | $dV_{com}/dt = 20 V/\mu s$ | 2.5 | - | - | A/ms |
| | | $dV_{com}/dt = 10 V/\mu s$ | 3.5 | - | - | A/ms |
| t _{gt} | gate-controlled turn-on time | $I_{TM} = 20 \text{ A}; V_D = V_{DRM(max)}; I_G = 0.1 \text{ A};$ $dI_G/dt = 5 \text{ A}/\mu\text{s}$ | - | 2 | - | μs |

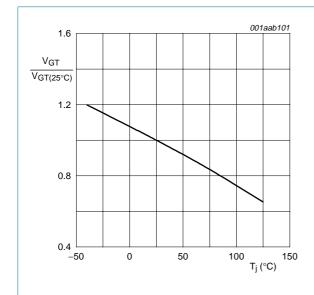
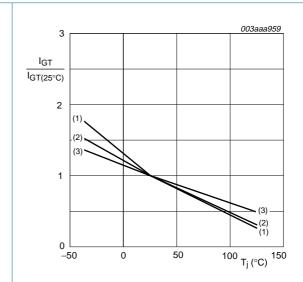


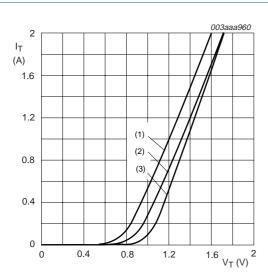
Fig 7. Normalized gate trigger voltage as a function of junction temperature



- (1) T2-G-
- (2) T2+ G-
- (3) T2+ G+

Fig 8. Normalized gate trigger current as a function of junction temperature

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 $V_0 = 1.02 \text{ V}; R_s = 358 \text{ m}\Omega$

- (1) $T_j = 125$ °C; typical values
- (2) $T_i = 125 \,^{\circ}C$; maximum values
- (3) $T_i = 25 \,^{\circ}C$; maximum values

Fig 9. On-state current as a function of on-state voltage

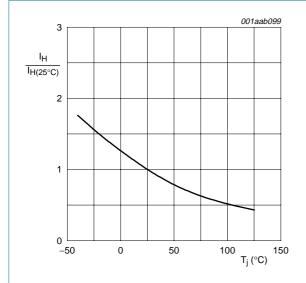


Fig 11. Normalized holding current as a function of junction temperature

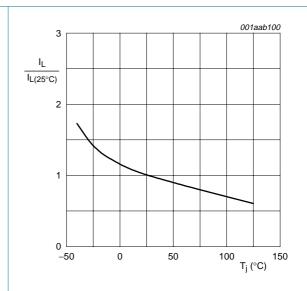
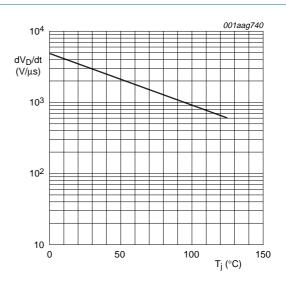


Fig 10. Normalized latching current as a function of junction temperature



Gate open circuit

Fig 12. Critical rate of rise of off-state voltage as a function of junction temperature; minimum values

8. Package outline

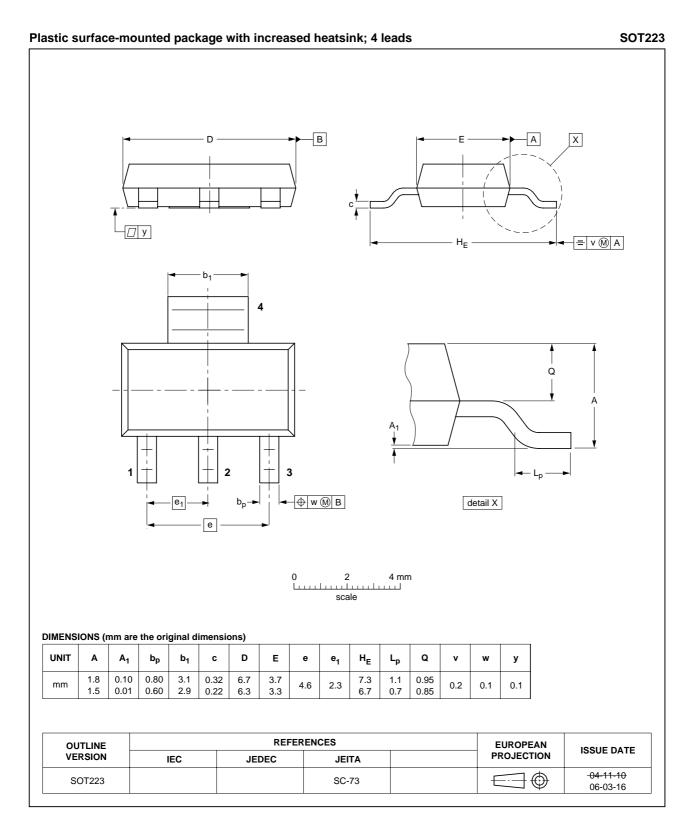
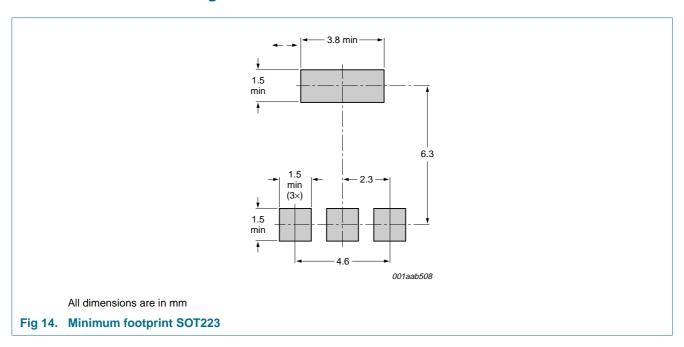


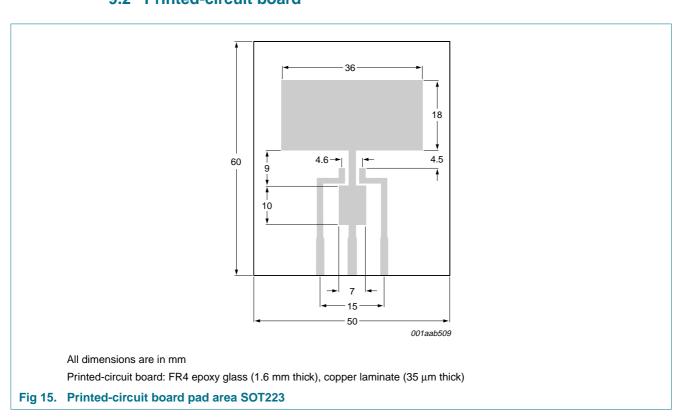
Fig 13. Package outline SOT223

9. Mounting

9.1 Mounting instructions



9.2 Printed-circuit board



10. Revision history

Table 7. **Revision history**

| | _ | | | |
|-----------------|--|---|---|------------------|
| Document ID | Release date | Data sheet status | Change notice | Supersedes |
| BTA201W_SER_E_3 | 20080313 | Product data sheet | - | BTA201W_SER_E_2 |
| Modifications: | • Table 3 "Lin | "Quick reference data" on niting values" on page 2: I ² atic characteristics" on page | t condition, t _p ; symbol up | odate. |
| BTA201W_SER_E_2 | 20070917 | Product data sheet | - | BTA201W_SER_E_1 |
| Modifications: | guidelines of Legal texts Legal texts Descriptive Table 3 "Lin Table 6 "Dy Figure "Cri | of this data sheet has beer of NXP Semiconductors. have been adapted to the utitles have been corrected. niting values" on page 2: dl namic characteristics" on ptical rate of rise of off-state alues" on page 8: graph up | new company name when $_{\rm T}$ /dt uprated bage 7: dV $_{\rm D}$ /dt uprated voltage as a function of | ere appropriate. |
| BTA201W_SER_E_1 | 20060207 | Product data sheet | - | - |
| | | | | |

BTA201W series E

1 A Three-quadrant triacs high commutation

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| Document status[1][2] | Product status[3] | Definition |
|--------------------------------|-------------------|---|
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BTA201W series E

1 A Three-quadrant triacs high commutation

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