

Description

This MOSFETS use advanced trench technology and design to provide excellent RDS(on) with low gate charge. It can be used in a wide variety of applications.

| SYMBOL | PARAMETER | MAX | MAX | UNIT |
|------------------|---------------------------|------------|------------|------|
| | ----- | BTA04-600B | BTA04-600B | |
| V _{DRM} | Repetitive peak off-state | 600 | 600 | V |
| ID | RMS on-state current | 4 | 4 | A |

Features

- 1) Low gate charge.
- 2) Green device available.
- 3) Advanced high cell density trench technology for ultra RDS(ON)
- 4) Excellent package for good heat dissipation.



TO-220

Thermal Characteristics

| Symbol | Parameter | Ratings | Units |
|------------------|--|---------|-------|
| R _{θJC} | Thermal Resistance ,Junction to Case1 | — | K/W |
| R _{θJA} | Thermal Resistance, Junction to Ambient1 | — | |

Package Marking and Ordering Information

| Part NO. | Marking | Package |
|-------------------|------------|---------|
| <u>BTA04-600B</u> | BTA04-600B | TO-220 |

Notes:

1. The data tested by surface mounted on a 1 inch² FR-4 board 2OZ copper.
2. The data tested by pulse width≤300us,duty cycle≤2%
3. The EAS data shows Max.rating.The test condition is V_{DD}=25v,V_{GS}=10V,L=0.1mH,i_{AS}=17.8A
4. The power dissipation is limited by 150°C junction temperature.

Typical Characteristics T_J=25°C unless otherwise noted

| Symbol | Parameter | | Value | Unit | |
|------------------------------------|---|-----|------------------------|----------------------------|------------------|
| I _{T(RMS)} | RMS on-state current (360° conduction angle) | BTA | T _c = 90°C | 4 | A |
| | | BTB | T _c = 95°C | | |
| I _{TSM} | Non repetitive surge peak on-state current (T _J initial = 25°C) | | t _p = 8.3ms | 42 | A |
| | | | t _p = 10ms | 40 | |
| I ² _t | I ² _t value | | t _p = 10ms | 8 | A ² s |
| dI/dt | Critical rate of rise of on-state current Gate supply: I _G = 50mA dI _G /dt = 0.1A/μs | | Repetitive F = 50Hz | 10 | A/μs |
| | | | Non repetitive | 50 | |
| T _{stg} T _J | Storage and operating junction temperature range | | | -40 to +150 -40 to +110 | °C |
| TI | Maximum lead soldering temperature during 10s at 4.5mm from case | | | 260 | °C |

| Symbol | Parameter | BTA / BTB04- | | | Unit |
|--------------------------------------|--|--------------|-------------|-------------|------|
| | | 400 T/D/S/A | 600 T/D/S/A | 700 T/D/S/A | |
| V _{DRM} V _{RRM} | Repetitive peak off-state voltage T _J = 110°C | 400 | 600 | 700 | V |

THERMAL RESISTANCE

| Symbol | Parameter | | Value | Unit |
|-------------------------|---|-----|-------|------|
| R _{th(j-a)} | Junction to ambient | | 60 | °C/W |
| R _{th(j-c) DC} | Junction to case for DC | BTA | 4.4 | °C/W |
| | | BTB | 3.2 | |
| R _{th(j-c) AC} | Junction to case for 360° conduction angle (F = 50Hz) | BTA | 3.3 | °C/W |
| | | BTB | 2.4 | |

ELECTRICAL CHARACTERISTICS

| Symbol | Test conditions | | Quadrant | | BTA / BTB04 | | | | Unit |
|--------------------------------------|--|------------------------|-------------------|------|-------------|----|----|----|------|
| | | | | | T | D | S | A | |
| I _{GT} | V _D = 12V (DC) R _L = 33Ω | T _J = 25°C | I - II - III | MAX. | 5 | 5 | 10 | 10 | mA |
| | | | IV | MAX. | 5 | 10 | 10 | 25 | |
| V _{GT} | V _D = 12V (DC) R _L = 33Ω | T _J = 25°C | I - II - III - IV | MAX. | 1.5 | | | | V |
| V _{GD} | V _D = V _{DRM} R _L = 3.3kΩ | T _J = 110°C | I - II - III - IV | MIN. | 0.2 | | | | V |
| t _{gt} | V _D = V _{DRM} I _G = 40mA di _G /dt = 0.5A/μs | T _J = 25°C | I - II - III - IV | TYP. | 2 | | | | μs |
| I _L | I _G = 1.2I _{GT} | T _J = 25°C | I - III - IV | TYP. | 10 | 10 | 20 | 20 | mA |
| | | | II | | 20 | 20 | 40 | 40 | |
| I _H * | I _T = 100mA Gate open | T _J = 25°C | | MAX. | 15 | 15 | 25 | 25 | mA |
| V _{TM} * | I _{TM} = 5.5A t _p = 380μs | T _J = 25°C | | MAX. | 1.65 | | | | V |
| I _{DRM} I _{RRM} | V _{DRM} rated V _{RRM} rated | T _J = 25°C | | MAX. | 0.01 | | | | mA |
| | | T _J = 110°C | | MAX. | 0.75 | | | | |
| dV/dt* | Linear slope up to V _D = 67% V _{DRM} gate open | T _J = 110°C | | TYP. | 10 | 10 | - | - | V/μs |
| | | | | MIN. | - | - | 10 | 10 | |
| (di/dt)c* | (di/dt)c = 1.8A/ms | T _J = 110°C | | TYP. | 1 | 1 | 5 | 5 | V/μs |

* For either polarity of electrode A₂ voltage with reference to electrode A₁

Fig. 1: Maximum RMS power dissipation versus RMS on-state current ($F = 50\text{Hz}$). (Curves are cut off by $(di/dt)_c$ limitation)

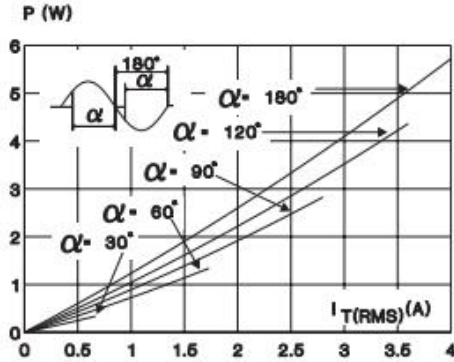


Fig. 2: Correlation between maximum RMS power dissipation and maximum allowable temperature (T_{amb} and T_{case}) for different thermal resistances heatsink + contact (BTA).

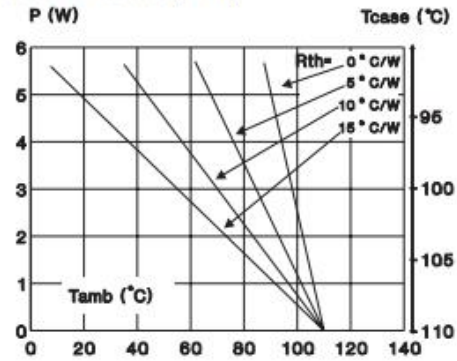


Fig. 3: Correlation between maximum RMS power dissipation and maximum allowable temperature (T_{amb} and T_{case}) for different thermal resistances heatsink + contact (BTB).

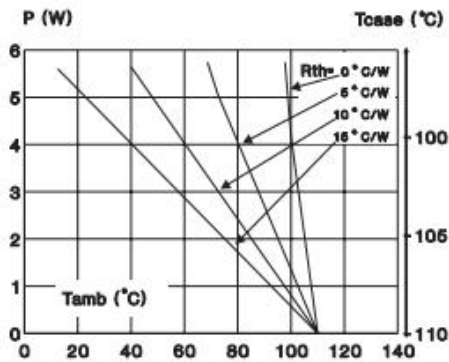


Fig. 4: RMS on-state current versus case temperature.

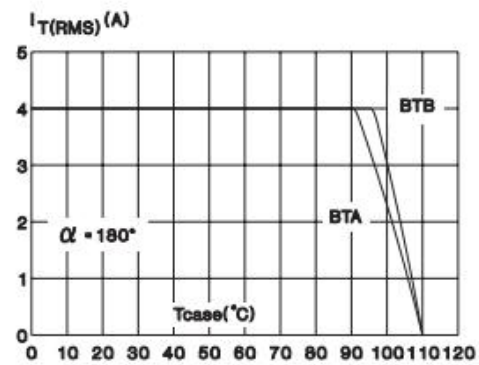


Fig. 5: Relative variation of thermal impedance versus pulse duration.

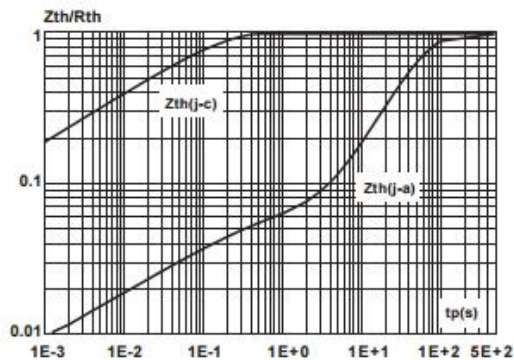


Fig. 6: Relative variation of gate trigger current and holding current versus junction temperature.

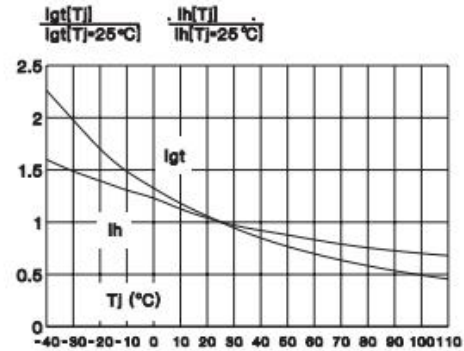


Fig. 7: Non repetitive surge peak on-state current versus number of cycles.

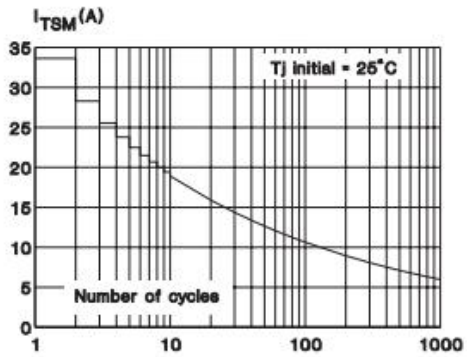


Fig. 8: Non repetitive surge peak on-state current for a sinusoidal pulse with width: $t \leq 10$ ms, and corresponding value of I^2t .

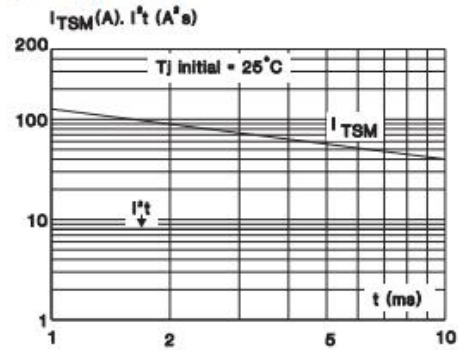


Fig. 9: On-state characteristics (maximum values).

