

BTB24C-800xW



THREE-QUADRANTS TRIAC

VOLTAGE: 800 Volts

CURRENT: 25.0 Ampers

Package: TO-220C

FEATURES

- Highly di/dt For High Reliability
- Low Thermal Resistance Increases Carrying Capacity
- Very High Commutation Capability
- Packages Are RoHS (2011/65/EU) Compliant

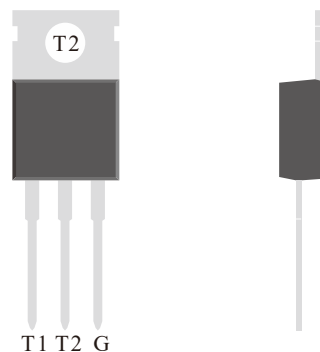
TYPICAL APPLICATIONS

- Phase Control Operation Of Light Dimmers And Motor Speed Controllers
- ON/OFF Control Operation Of Heating Regulation And Induction Motor

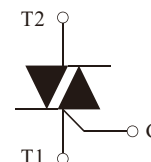
PRODUCT SUMMARY

| Gear                            | TW   | SW | CW | BW | Unit |
|---------------------------------|------|----|----|----|------|
| $I_{GT(I-II-III)} \text{ Max.}$ | 5    | 10 | 35 | 50 | mA   |
| $V_{DRM}/V_{RRM} \text{ Min.}$  | 800  |    |    |    | V    |
| $I_{T(RMS)}$                    | 25.0 |    |    |    | A    |

Diagram:



Polarity:



Absolute Maximum Ratings (Ta=25°C Unless otherwise specified)

| Parameter                                  | Test Conditions                                    | Symbol       | Ratings | Unit             |
|--------------------------------------------|----------------------------------------------------|--------------|---------|------------------|
| Repetitive Peak Off-State Voltage          |                                                    | $V_{DRM}$    | 800     | V                |
| Repetitive Peak Reverse Voltage            |                                                    | $V_{RRM}$    | 800     | V                |
| RMS On-State Current                       | $T_c \leq 86^\circ\text{C}$                        | $I_{T(RMS)}$ | 25.0    | A                |
| Non Repetitive Surge Peak On-State Current | F= 50 Hz, $T_p = 20 \text{ ms}$                    | $I_{TSM}$    | 250     | A                |
|                                            | F= 60 Hz, $T_p = 16.6 \text{ ms}$                  |              | 274     |                  |
| $I^2T$ Value For Fusing                    | $T_p = 10 \text{ ms}$                              | $I^2t$       | 313     | A                |
| Critical Rate Of Rise Of On-State Current  | $I_G = 2 \cdot I_{GT}$ , $t_r \leq 100 \text{ ns}$ | $di/dt$      | 100     | A/ $\mu\text{s}$ |
|                                            | F= 100 Hz, $T_j = 125^\circ\text{C}$               |              |         |                  |
| Peak Gate Current                          | $T_p = 20 \mu\text{s}$ , $T_j = 125^\circ\text{C}$ | $I_{GM}$     | 4.0     | A                |
| Average Gate Power Dissipation             | $T_j = 125^\circ\text{C}$                          | $P_{G(AV)}$  | 0.5     | W                |
| Peak Gate Power Dissipation                |                                                    | $P_{GM}$     | 10.0    | W                |
| Maximum Mounting Torque                    | M3 screw                                           | $T_{MM}$     | 1.1     | N.m              |

Thermal Characteristics (Ta=25°C Unless otherwise specified)

| Parameter                                                   | Test Conditions                                        | Symbol          | Typ.       | Unit |
|-------------------------------------------------------------|--------------------------------------------------------|-----------------|------------|------|
| Operating Junction Temperature Range                        |                                                        | $T_j$           | -40 to 125 | °C   |
| Storage Temperature Range                                   |                                                        | $T_{STD}$       | -40 to 150 |      |
| Thermal Resistance Junction To Ambient<br>With Steady-State | Still Air Environment<br>With $T_a = 25^\circ\text{C}$ | $R_{\theta JA}$ | 60.0       | °C/W |
| Thermal Resistance Junction-Case<br>With Steady-State       | Device Mounted On<br>75mm x 45mm x 2.5mm Alu. Heat.    | $R_{\theta JC}$ | 0.7        |      |

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**THREE-QUADRANTS TRIAC**
**Electrical Characteristics (Ta=25°C Unless otherwise specified )**

| Parameter                  | Test Conditions                                  | Symbol   | Quadrant     | Value |     |     |     |      | Unit |
|----------------------------|--------------------------------------------------|----------|--------------|-------|-----|-----|-----|------|------|
|                            |                                                  |          |              |       | TW  | SW  | CW  | BW   |      |
| Gate Trigger Current       | $V_D=12V, R_L=33\Omega$                          | $I_{GT}$ | I - II - III | Max.  | 5   | 10  | 35  | 50   | mA   |
| Max. Gate Trigger Voltage  | $V_D=12V, R_L=33\Omega$                          | $V_{GT}$ | I - II - III | Max.  | 1.3 |     |     |      | V    |
| Min. Gate Trigger Voltage  | $V_D=V_{DRM}, T_j=125^\circ C, R_L=3.3K\Omega$   | $V_{GD}$ | I - II - III | Min.  | 0.2 |     |     |      | V    |
| Holding Current            | $I_T=100\text{ mA}$                              | $I_H$    |              | Max.  | 15  | 20  | 50  | 75   | mA   |
| Latching Current           | $I_G=1.2 \cdot I_{GT}$                           | $I_L$    | I - III      | Max.  | 20  | 30  | 70  | 80   | mA   |
|                            |                                                  |          | II           | Max.  | 30  | 40  | 80  | 100  |      |
| Rise Of Off- State Voltage | $V_D=V_{DRM}, T_j=125^\circ C, \text{Gate Open}$ | $dv/dt$  |              | Min.  | 80  | 400 | 500 | 1000 | V/us |

**Static Characteristics (Ta=25°C Unless otherwise specified )**

| Parameter                                | Test Conditions                      | Symbol    | $T_j$ | Value |      | Unit |
|------------------------------------------|--------------------------------------|-----------|-------|-------|------|------|
| Peak On-State Voltage                    | $I_T=35\text{ A}, t_p=380\text{ us}$ | $V_{TM}$  | 25°C  | Max.  | 1.5  | V    |
| Threshold Voltage                        |                                      | $V_{TO}$  | 125°C | Max.  | 0.77 | V    |
| Dynamic resistance                       |                                      | $R_D$     | 125°C | Max.  | 18   | mΩ   |
| Peak Repetitive Forward Blocking Current | $V_D=V_{DRM}$                        | $I_{DRM}$ | 25°C  | Max.  | 5    | uA   |
|                                          | $V_D=V_{DRM}$                        |           | 125°C |       | 2.0  | mA   |
| Peak Repetitive Reverse Blocking Current | $V_R=V_{RRM}$                        | $I_{RRM}$ | 25°C  | Max.  | 5    | uA   |
|                                          | $V_R=V_{RRM}$                        |           | 125°C |       | 2.0  | mA   |

**Model and identification instructions**

|                                                   | BT                                           | B                   | 25                  | C                   | - | 800 | xW |
|---------------------------------------------------|----------------------------------------------|---------------------|---------------------|---------------------|---|-----|----|
| Product Type                                      | BT=Triac                                     |                     |                     |                     |   |     |    |
| Insulation Spec.:                                 | A=Ins.=Insulation<br>B=No Ins.=No Insulation |                     |                     |                     |   |     |    |
| $I_{T(RMS)}$ Spec.:                               | 25=25A                                       |                     |                     |                     |   |     |    |
| Package Spec.:                                    | C=TO-220C                                    |                     |                     |                     |   |     |    |
| "-."=Connection Symbol<br>Constant And Unchanging |                                              |                     |                     |                     |   |     |    |
| $V_{DRM}/V_{RRM}$ Spec.                           | 800=800V                                     |                     |                     |                     |   |     |    |
| $I_{GT}$ Spec.                                    | TW:IGTI-II-III=5mA                           | SW:IGTI-II-III=10mA | CW:IGTI-II-III=35mA | BW:IGTI-II-III=50mA |   |     |    |

**BTB24C-800xW**



**THREE-QUADRANTS TRIAC**

**Typical Characteristics Curves**

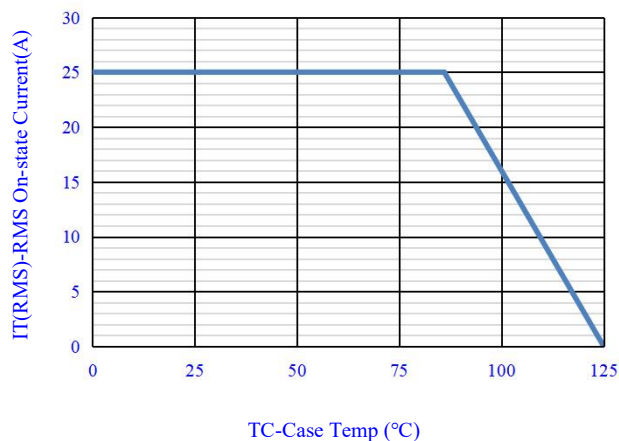


Fig.1-RMS on-state current vs. case temperature

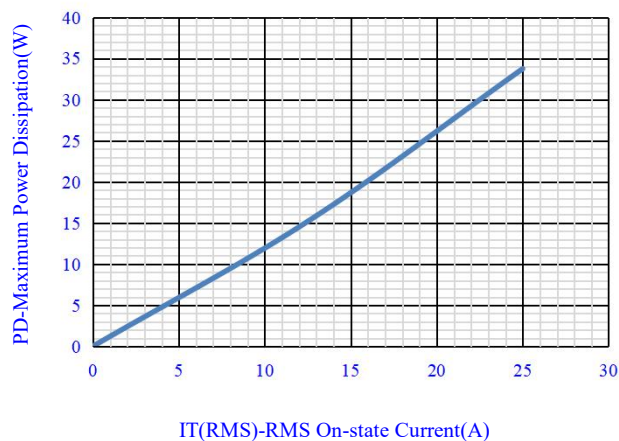


Fig.2- Maximum Power Dissipation Vs. on-state current

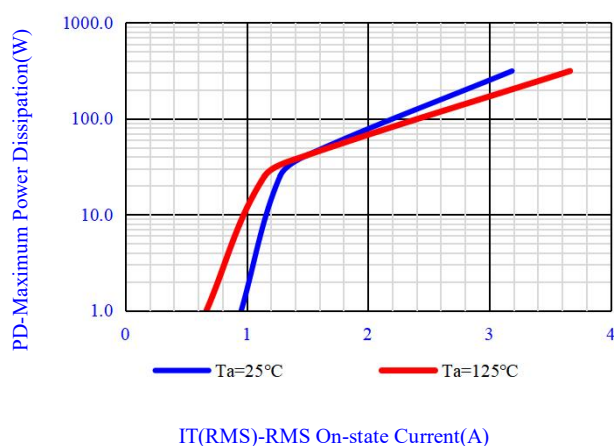


Fig.3- Maximum Power Dissipation Vs. on-state current

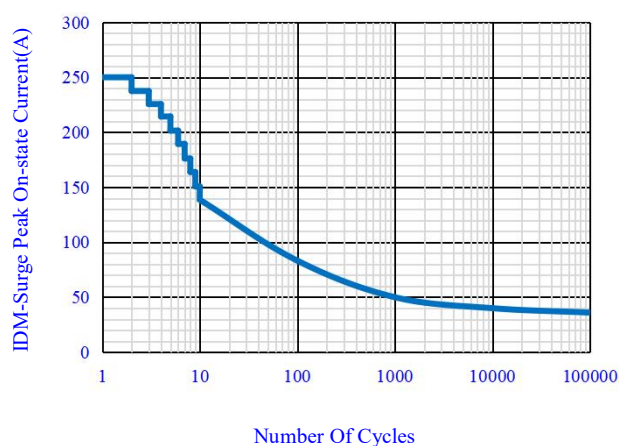


Fig.4- Surge Peak On-state Current Vs. Number Cycles

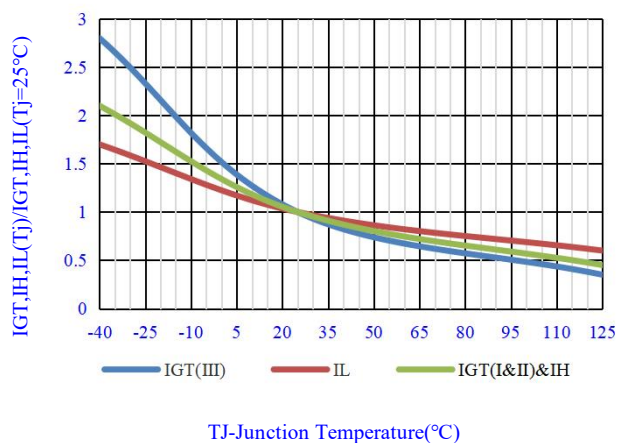


Fig.5- Relative Variation Of Gate Trigger Current , Holding Current And Latching Current Versus Junction Temperature (Typical Value)

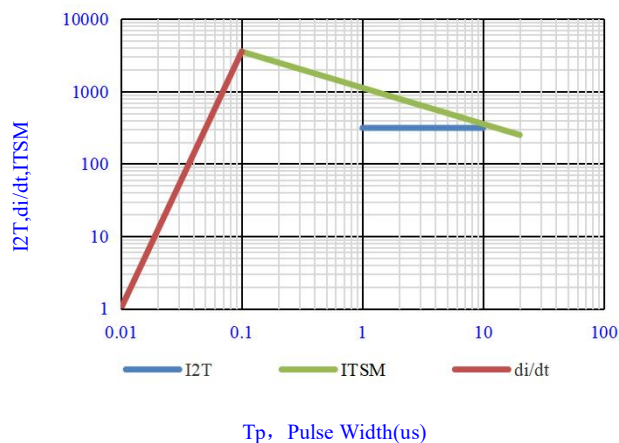
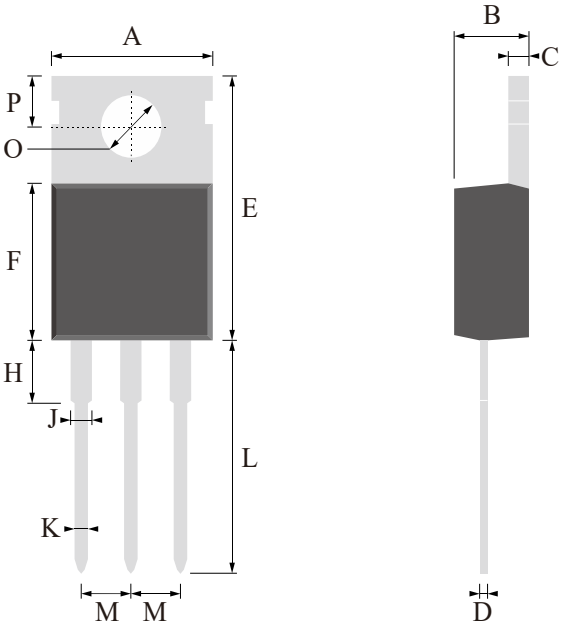


Fig.6- Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 20\text{ms}$ , and corresponding value of  $I_2t$  ( $di/dt < 50\text{A}/\mu\text{s}$ )

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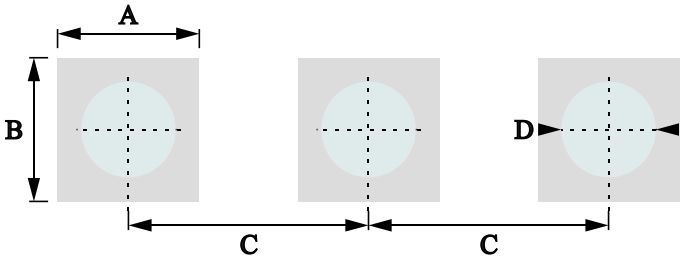
OUTLINE DRAWINGS



TO-220C

| OUTLINE DIMENSIONS |            |      |       |        |      |        |
|--------------------|------------|------|-------|--------|------|--------|
| Dim.               | Milimeters |      |       | Inches |      |        |
|                    | Min.       | Typ. | Max.  | Min.   | Typ. | Max.   |
| A                  | 9.25       | -    | 10.75 | 0.3642 | -    | 0.4232 |
| B                  | 1.10       | -    | 1.65  | 0.0433 | -    | 0.0650 |
| C                  | 4.15       | -    | 4.95  | 0.1634 | -    | 0.1949 |
| D                  | 0.25       | -    | 0.65  | 0.0098 | -    | 0.0256 |
| E                  | 14.50      | -    | 16.70 | 0.5709 | -    | 0.6575 |
| F                  | 8.40       | -    | 9.95  | 0.3307 | -    | 0.3917 |
| L                  | 12.15      | -    | 14.30 | 0.4783 | -    | 0.5630 |
| H                  | 3.00       | -    | 3.80  | 0.1181 | -    | 0.1496 |
| J                  | 1.05       | -    | 1.60  | 0.0413 | -    | 0.0630 |
| K                  | 0.65       | -    | 0.95  | 0.0256 | -    | 0.0374 |
| M                  | 2.10       | -    | 2.90  | 0.0827 | -    | 0.1142 |
| O                  | 3.20       | -    | 4.10  | 0.1260 | -    | 0.1614 |
| P                  | 2.45       | -    | 3.10  | 0.0965 | -    | 0.1220 |

RECOMMEDND LAYOUT DRAWINGS



TO-220C

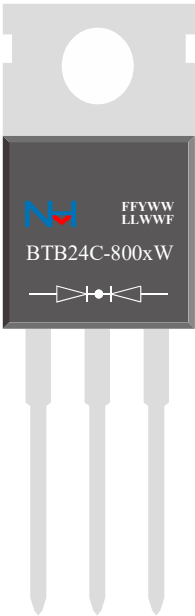
| OUTLINE DIMENSIONS |            |      |      |        |        |      |
|--------------------|------------|------|------|--------|--------|------|
| Dim.               | Milimeters |      |      | Inches |        |      |
|                    | Min.       | Typ. | Max. | Min.   | Typ.   | Max. |
| A                  | -          | 1.60 | -    | -      | 0.0630 | -    |
| B                  | -          | 1.60 | -    | -      | 0.0630 | -    |
| C                  | -          | 2.54 | -    | -      | 0.1000 | -    |
| D                  | -          | 1.00 | -    | -      | 0.0394 | -    |

BTB24C-800xW

THREE-QUADRANTS TRIAC



MARKING INFORMATION



MARKING INSTRUCTIONS

NH=Niuhang Trademark  
FF=Product Line Code,According To Actual Changes  
YWW=Date Code,According To Actual Changes  
LLWWF=Inernal Code,According To Actual Changes  
BTB24C-800xW=Model,x=T,S,C,B

PACKING INFORMATION

| Package Type | Package Code | Product Weight<br>Approx(g/Pcs) | Package Method | Quantity<br>(Pcs/Min. Pack.) | Quantity<br>(Pcs/Inner Box) | Quantity<br>(Pcs/Carton) |
|--------------|--------------|---------------------------------|----------------|------------------------------|-----------------------------|--------------------------|
| TO-220C      | P1           | 2.057                           | Tube           | 50                           | 1000                        | 5000                     |

**BTB24C-800xW**

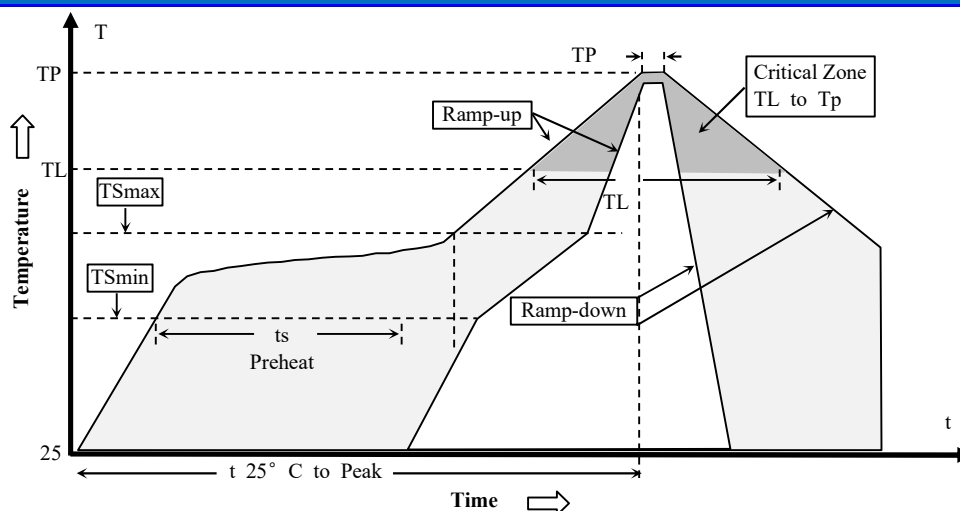


**THREE-QUADRANTS TRIAC**

**Recommended wave soldering condition**

| Product         | Peak Temperature | Soldering Time  |
|-----------------|------------------|-----------------|
| Pb-free devices | 260 +0/-5 °C     | 5 +1/-1 seconds |

**Recommended temperature profile for IR reflow**



| Profile feature                                                                                                                            | Sn-Pb eutectic Assembly          | Pb-free Assembly                 |
|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|----------------------------------|
| Average ramp-up rate<br>(T <sub>smax</sub> to T <sub>p</sub> )                                                                             | 3°C/second max.                  | 3°C/second max.                  |
| Preheat<br>-Temperature Min(T <sub>S</sub> min)<br>-Temperature Max(T <sub>S</sub> max)<br>-Time(t <sub>s</sub> min to t <sub>s</sub> max) | 100°C<br>150°C<br>60-120 seconds | 150°C<br>200°C<br>60-180 seconds |
| Time maintained above:<br>-Temperature (T <sub>L</sub> )<br>- Time (t <sub>L</sub> )                                                       | 183°C<br>60-150 seconds          | 217°C<br>60-150 seconds          |
| Peak Temperature(T <sub>P</sub> )                                                                                                          | 240 +0/-5 °C                     | 260 +0/-5 °C                     |
| Time within 5°C of actual peak<br>temperature(tp)                                                                                          | 10-30 seconds                    | 20-40 seconds                    |
| Ramp down rate                                                                                                                             | 6°C/second max.                  | 6°C/second max.                  |
| Time 25 °C to peak temperature                                                                                                             | 6 minutes max.                   | 8 minutes max.                   |

Note : All temperatures refer to topside of the package, measured on the package body surface.

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