

BT16C-800BW



# THREE-QUADRANTS TRIAC

**VOLTAGE:** 800 Volts

**CURRENT:** 16 Ampers

**Package:** TO-220C

## FEATURES

- Highly di/dt For High Reliability
- Low Thermal Resistance Increases Carrying Capacity
- With High Ability To Withstand The Shock Loading Of Large Current
- Packages Are RoHS (2011/65/EU) Compliant

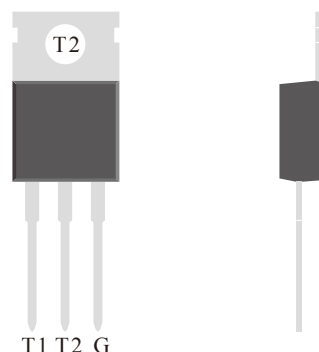
## TYPICAL APPLICATIONS

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

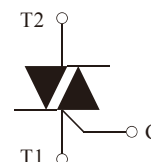
## PRODUCT SUMMARY

| Gear                            | BW  | Unit |
|---------------------------------|-----|------|
| $I_{GT(I-II-III)} \text{ Max.}$ | 50  | mA   |
| $V_{DRM}/V_{RRM} \text{ Min.}$  | 800 | V    |
| $I_{T(RMS)}$                    | 16  | 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                       | $T_c \leq 100^\circ\text{C}$                                                         | $I_{T(RMS)}$ | 16      | A                |
| Non Repetitive Surge Peak On-State Current | F= 50 Hz, $T_p= 20 \text{ ms}$                                                       | $I_{TSM}$    | 160     | A                |
|                                            | F= 50 Hz, $T_p= 16.6 \text{ ms}$                                                     |              | 176     |                  |
| $I^2T$ Value For Fusing                    | $T_p= 10 \text{ ms}$                                                                 | $I^2t$       | 128     | A                |
| Critical Rate Of Rise Of On-State Current  | $I_G=2 \cdot I_{GT}$ , $t_r \leq 100 \text{ ns}$<br>F=100Hz, $T_j=125^\circ\text{C}$ | di/dt        | 50      | A/ $\mu\text{s}$ |
| Peak Gate Current                          | $T_p=20 \mu\text{s}$ , $T_j=125^\circ\text{C}$                                       | $I_{GM}$     | 4       | A                |
| Average Gate Power Dissipation             | $T_j= 125^\circ\text{C}$                                                             | $P_{G(AV)}$  | 1       | W                |
| Peak Gate Power Dissipation                |                                                                                      | $P_{GM}$     | 5       | W                |
| Maximum Mounting Torque                    | M3 srew                                                                              | $T_{MM}$     | 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         | °C/W |
| Thermal Resistance Junction-Case<br>With Steady-State       | Device Mounted On<br>75mm x 45mm x 2.5mm Alu. Heat.  | $R_{\theta JC}$ | 1.2        |      |

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

| Parameter                  | Test Conditions                                      | Symbol   | Quadrant     | Value |      | Unit |
|----------------------------|------------------------------------------------------|----------|--------------|-------|------|------|
| Gate Trigger Current       | $V_D=12V, R_L=33\Omega$                              | $I_{GT}$ | I - II - III | Max.  | 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            | $I_T=500\text{ mA}$                                  | $I_H$    |              | Max.  | 50   | mA   |
| Latching Current           | $I_G=1.2 \cdot I_{GT}$                               | $I_L$    | I - III      | Max.  | 100  | mA   |
|                            |                                                      |          | II           | Max.  | 100  |      |
| Rise Of Off- State Voltage | $V_D=2/3 V_{DRM}, T_j=125^\circ C, \text{Gate Open}$ | $dv/dt$  |              | Min.  | 1000 | V/us |

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

| Parameter                                | Test Conditions     | Symbol    | $T_j$ | Value |      | Unit |
|------------------------------------------|---------------------|-----------|-------|-------|------|------|
| Peak On-State Voltage                    | $I_T=22.5\text{ A}$ | $V_{TM}$  | 25°C  | Max.  | 1.55 | V    |
| Threshold Voltage                        |                     | $V_{TO}$  | 125°C | Max.  | 0.77 | V    |
| Dynamic resistance                       |                     | $R_D$     | 125°C | Max.  | 30   | mΩ   |
| Peak Repetitive Forward Blocking Current | $V_D=V_{DRM}$       | $I_{DRM}$ | 25°C  | Max.  | 5    | uA   |
|                                          | $V_D=V_{DRM}$       |           | 125°C |       | 2    | mA   |
| Peak Repetitive Reverse Blocking Current | $V_R=V_{RRM}$       | $I_{RRM}$ | 25°C  | Max.  | 5    | uA   |
|                                          | $V_R=V_{RRM}$       |           | 125°C |       | 2    | mA   |

**Model and identification instructions**

|                                 |    |    |   |   |     |    |
|---------------------------------|----|----|---|---|-----|----|
| Product Type                    | BT | 16 | C | - | 800 | BW |
| BT=TRIAC                        |    |    |   |   |     |    |
| Insulation Spec.:               |    |    |   |   |     |    |
| A=Ins.=Insulation               |    |    |   |   |     |    |
| Empty=No Ins.=No Insulation     |    |    |   |   |     |    |
| $I_{T(RMS)}$ Spec.:             |    |    |   |   |     |    |
| 16=16A                          |    |    |   |   |     |    |
| Package Spec.:                  |    |    |   |   |     |    |
| C=TO-220C                       |    |    |   |   |     |    |
| "- "=Connection Symbol          |    |    |   |   |     |    |
| Constant And Unchanging         |    |    |   |   |     |    |
| $V_{DRM}/V_{RRM}$ Spec.         |    |    |   |   |     |    |
| 800 $\cong$ 800V                |    |    |   |   |     |    |
| $I_{GT}$ Spec.                  |    |    |   |   |     |    |
| BW:IGT I - II - III $\leq$ 50mA |    |    |   |   |     |    |
| Temperature Spec.:              |    |    |   |   |     |    |
| Empty=Standard Temperature      |    |    |   |   |     |    |
| H=high temperature              |    |    |   |   |     |    |

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### Typical Characteristics Curves

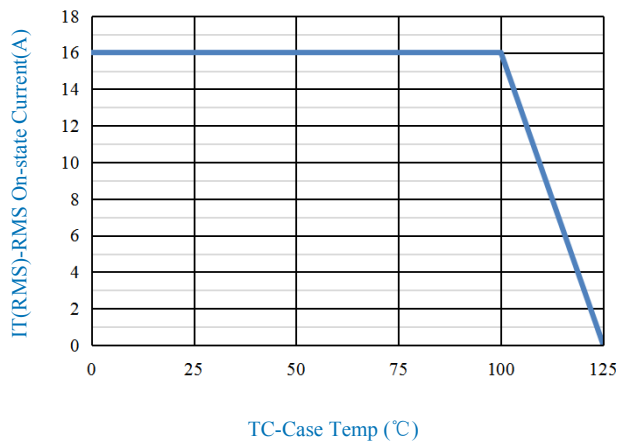


Fig.1-RMS on-state current vs. case temperature

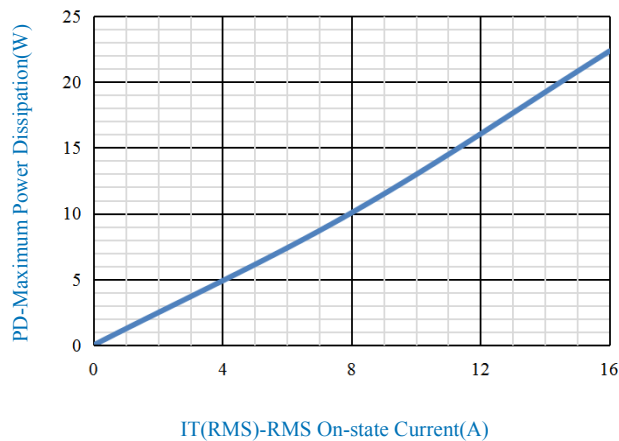


Fig.2- Maximum Power Dissipation Vs. on-state current

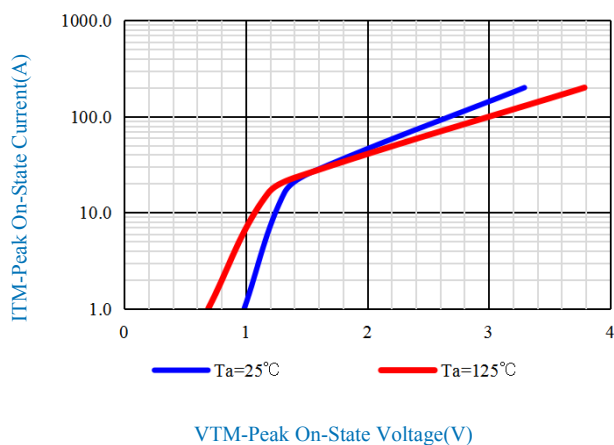


Fig.3-On-State Characteristics

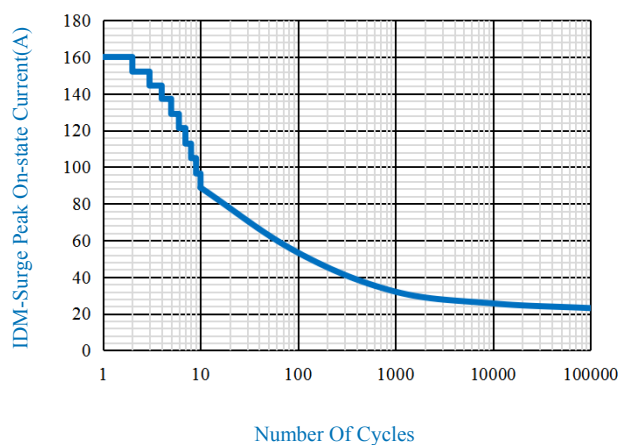


Fig.4- Surge Peak On-state Current Vs. Number Cycles

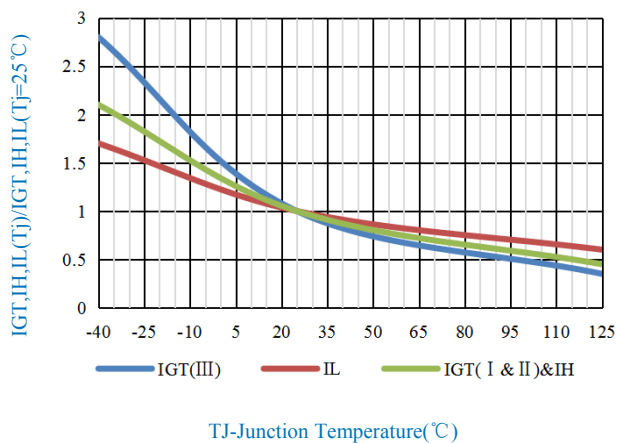


Fig.5- Relative Variation Of Gate Trigger Current, Holding Current And Latching Current Versus Junction Temperature (Typical Value)

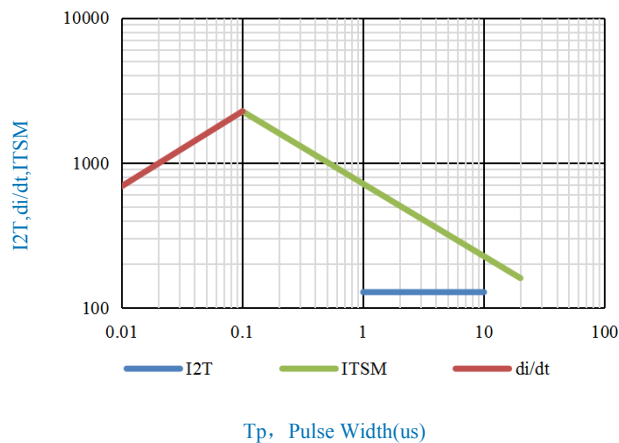


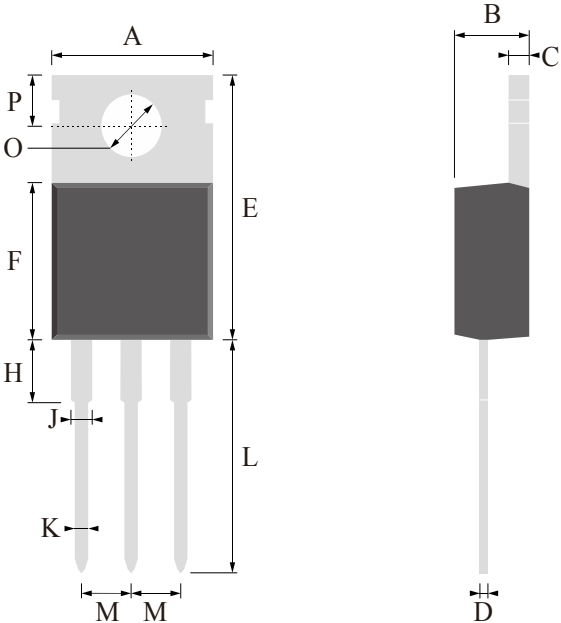
Fig.6- Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 20\text{ms}$ , and corresponding value of  $I_2t$  ( $dI/dt < 50\text{A}/\mu\text{s}$ )

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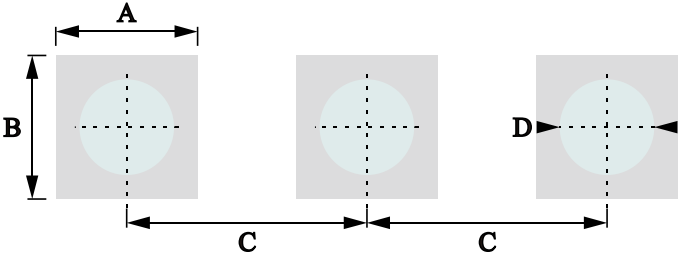
OUTLINE DRAWINGS



TO-220C

| OUTLINE DIMENSIONS |            |      |       |        |      |        |
|--------------------|------------|------|-------|--------|------|--------|
| Dim.               | Milimeters |      |       | Inches |      |        |
|                    | Min.       | Typ. | Max.  | Min.   | Typ. | Max.   |
| A                  | 9.25       | -    | 10.75 | 0.3642 | -    | 0.4232 |
| B                  | 4.15       | -    | 4.95  | 0.1634 | -    | 0.1949 |
| C                  | 1.10       | -    | 1.65  | 0.0433 | -    | 0.0650 |
| 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

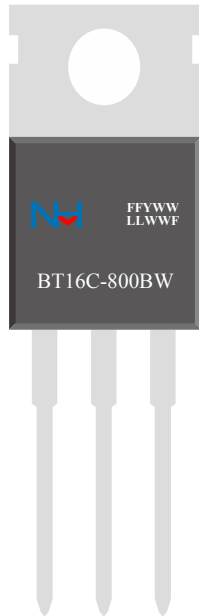
| OUTLINE DIMENSIONS |            |      |      |        |        |      |
|--------------------|------------|------|------|--------|--------|------|
| Dim.               | Milimeters |      |      | Inches |        |      |
|                    | Min.       | Typ. | Max. | Min.   | Typ.   | Max. |
|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

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#### MARKING INFORMATION



#### MARKING INSTRUCTIONS

NH=Niuhan Trademark  
FF=Product Line Code,According To Actual Changes  
YWW=Date Code,According To Actual Changes  
LLWWF=Inernal Code,According To Actual Changes  
BT16C-800BW=Model

#### PACKING INFORMATION

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

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### 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 (T <sub>smax</sub> to T <sub>p</sub> )                                                                              | 3°C/second max.                  | 3°C/second max.                  |
|  | Preheat-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 temperature (t <sub>p</sub> )                                                                             | 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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Specification Revision History

| Rev.        | Date       | Changed Items | Pre-Changed Content | Changed Content |
|-------------|------------|---------------|---------------------|-----------------|
| A/1         | 2014-10-20 | First Issue   |                     |                 |
| Blank Below |            |               |                     |                 |