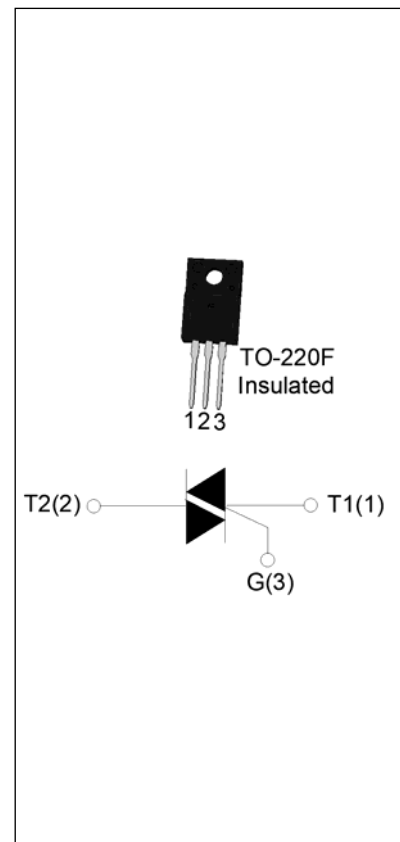


### DESCRIPTION:

The BTA416X-800CT triac is suitable for general purpose AC switching. It can be used as an ON/OFF function in applications such as heating regulation, induction motor starting circuits, for phase control operation in light dimmers, motor speed controllers. Compared to traditional triacs, BTA416X-800CT provides a very high switching capability up to junction temperatures of 150°C. By using an external plastic package, BTA416X-800CT provides a rated insulation voltage of 2000 VRMS, complying with UL standards (File ref: E252906). Package TO-220F is RoHS compliant.

### MAIN FEATURES

| Symbol             | Value    | Unit |
|--------------------|----------|------|
| $I_{T(RMS)}$       | 16       | A    |
| $V_{DRM}/V_{RRM}$  | 800      | V    |
| $I_{GT\ I/II/III}$ | 35/35/35 | mA   |



### ABSOLUTE MAXIMUM RATINGS

| Parameter                                                                                                        | Symbol       | Value   | Unit                   |
|------------------------------------------------------------------------------------------------------------------|--------------|---------|------------------------|
| Storage junction temperature range                                                                               | $T_{stg}$    | -40-150 | °C                     |
| Operating junction temperature range                                                                             | $T_j$        | -40-150 | °C                     |
| Repetitive peak off-state voltage ( $T_j=25^\circ\text{C}$ )                                                     | $V_{DRM}$    | 800     | V                      |
| Repetitive peak reverse voltage ( $T_j=25^\circ\text{C}$ )                                                       | $V_{RRM}$    | 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 (full cycle , $t_p=20\text{ms}$ , $T_j=25^\circ\text{C}$ )            | $I_{TSM}$    | 160     | A                      |
| Non repetitive surge peak on-state current (full cycle , $t_p=16.6\text{ms}$ , $T_j=25^\circ\text{C}$ )          |              | 176     |                        |
| $I^2t$ value for fusing ( $t_p=10\text{ms}$ , $T_j=25^\circ\text{C}$ )                                           | $I^2t$       | 128     | $\text{A}^2\text{s}$   |
| Critical rate of rise of on-state current ( $I_G=2 \times I_{GT}$ , $f=100\text{Hz}$ , $T_j=150^\circ\text{C}$ ) | $di/dt$      | 100     | $\text{A}/\mu\text{s}$ |
| Peak gate current ( $t_p=20\mu\text{s}$ , $T_j=150^\circ\text{C}$ )                                              | $I_{GM}$     | 4       | A                      |

|                                                                                      |             |    |    |
|--------------------------------------------------------------------------------------|-------------|----|----|
| Average gate power dissipation ( $T_J=150^{\circ}\text{C}$ )                         | $P_{G(AV)}$ | 1  | W  |
| Peak gate power                                                                      | $P_{GM}$    | 10 | W  |
| Peak pulse voltage<br>( $T_J=25^{\circ}\text{C}$ ; non-repetitive, off-state; FIG.7) | $V_{pp}$    | 4  | kV |

#### ELECTRICAL CHARACTERISTICS ( $T_J=25^{\circ}\text{C}$ unless otherwise specified)

| Symbol      | Test Condition                                                                   | Quadrant    | Value |      | Unit             |
|-------------|----------------------------------------------------------------------------------|-------------|-------|------|------------------|
| $I_{GT}$    | $V_D=12\text{V } R_L=33\Omega$                                                   | I - II -III | MAX.  | 35   | mA               |
| $V_{GT}$    |                                                                                  | I - II -III | MAX.  | 1    | V                |
| $V_{GD}$    | $V_D=V_{DRM} T_J=150^{\circ}\text{C}$<br>$R_L=3.3\text{k}\Omega$                 | I - II -III | MIN.  | 0.2  | V                |
| $I_L$       | $I_G=1.2I_{GT}$                                                                  | I -III      | MAX.  | 50   | mA               |
|             |                                                                                  | II          |       | 70   |                  |
| $I_H$       | $I_T=500\text{mA}$                                                               |             | MAX.  | 35   | mA               |
| $dV/dt$     | $V_D=540\text{V}$ Gate Open $T_J=150^{\circ}\text{C}$                            |             | MIN.  | 1200 | V/ $\mu\text{s}$ |
| $(dI/dt)_c$ | $(dV/dt)_c=20\text{V}/\mu\text{s}$ , $T_J=150^{\circ}\text{C}$                   |             | MIN.  | 15   | A/ms             |
| $t_{on}$    | $I_G=40\text{mA } I_A=200\text{mA } I_R=20\text{mA}$<br>$T_J=25^{\circ}\text{C}$ |             | TYP.  | 8    | $\mu\text{s}$    |
| $t_{off}$   |                                                                                  |             |       | 60   |                  |

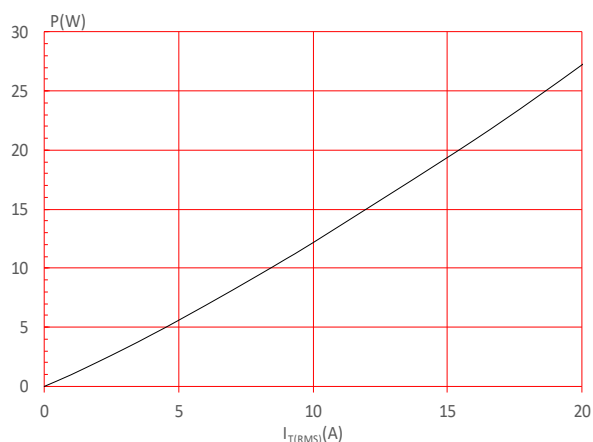
#### STATIC CHARACTERISTICS

| Symbol    | Parameter                                 |                           | Value(MAX.) | Unit             |
|-----------|-------------------------------------------|---------------------------|-------------|------------------|
| $V_{TM}$  | $I_{TM}=22.5\text{A } t_p=380\mu\text{s}$ | $T_J=25^{\circ}\text{C}$  | 1.4         | V                |
| $V_{TO}$  | Threshold voltage                         | $T_J=150^{\circ}\text{C}$ | 0.75        | V                |
| $R_D$     | Dynamic resistance                        | $T_J=150^{\circ}\text{C}$ | 27          | $\text{m}\Omega$ |
| $I_{DRM}$ | $V_D=V_{DRM} V_R=V_{RRM}$                 | $T_J=25^{\circ}\text{C}$  | 5           | $\mu\text{A}$    |
| $I_{RRM}$ |                                           | $T_J=150^{\circ}\text{C}$ | 2           | mA               |

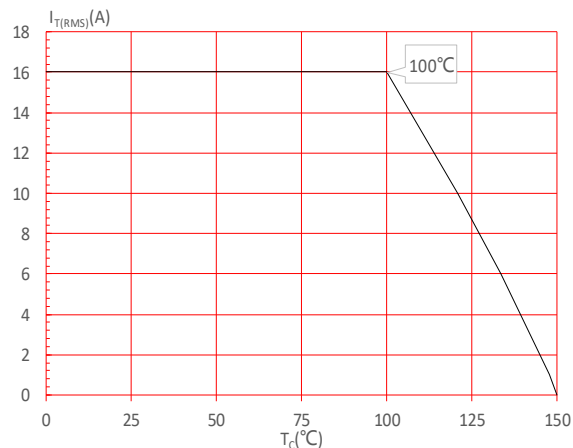
#### THERMAL RESISTANCES

| Symbol        | Parameter                | Value | Unit                        |
|---------------|--------------------------|-------|-----------------------------|
| $R_{th(j-c)}$ | junction to case (AC)    | 2.4   | $^{\circ}\text{C}/\text{W}$ |
| $R_{th(j-a)}$ | junction to ambient (AC) | 60    | $^{\circ}\text{C}/\text{W}$ |

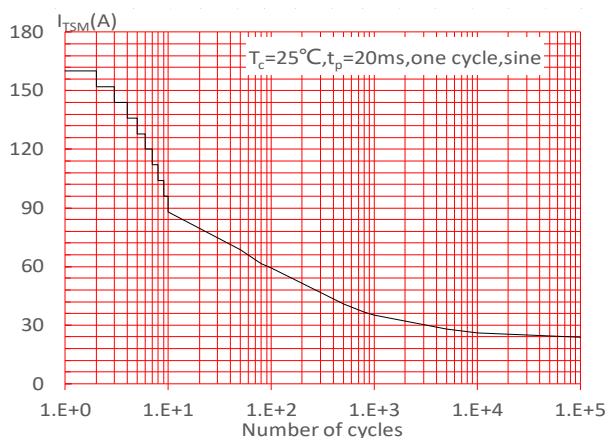
**FIG.1:** Maximum power dissipation versus RMS on-state current



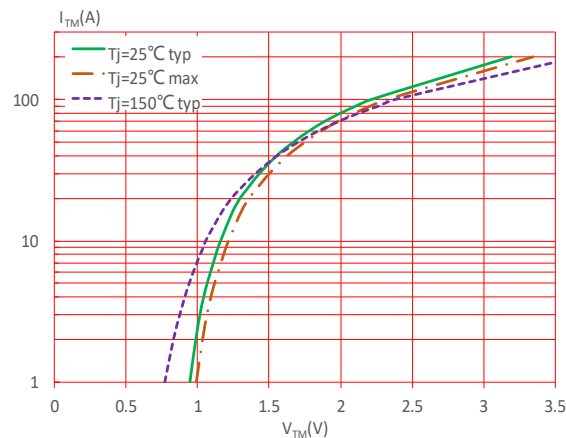
**FIG.2:** RMS on-state current versus case temperature



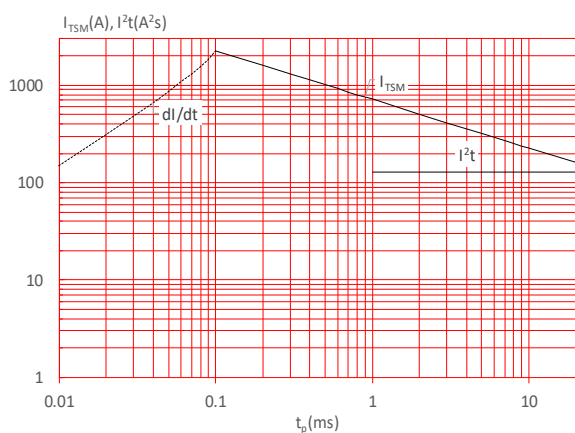
**FIG.3:** Surge peak on-state current versus number of cycles



**FIG.4:** On-state characteristics



**FIG.5:** Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 20ms$ , and corresponding value of  $I^2t$  ( $di/dt < 100A/\mu s$ )



**FIG.6:** Relative variations of gate trigger current, holding current and latching current versus junction temperature

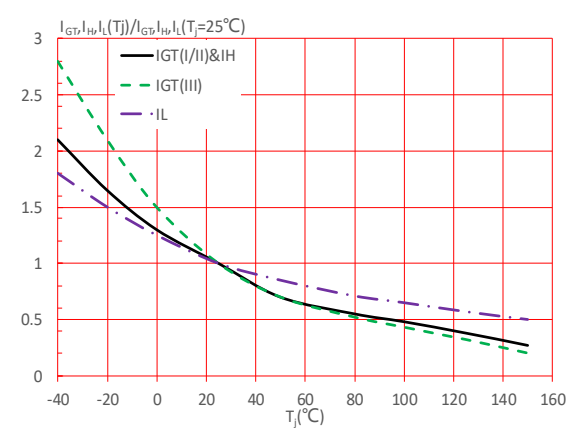
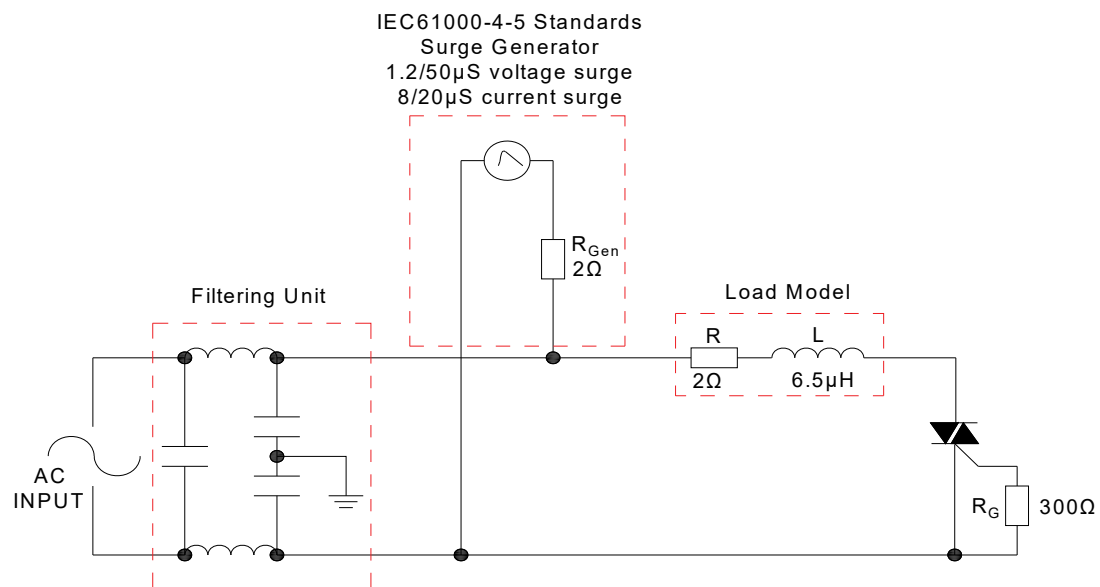
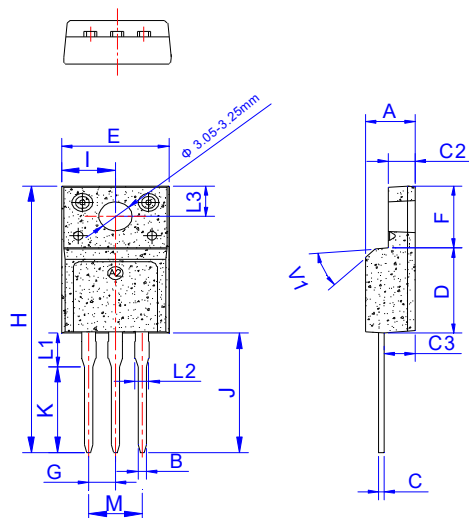


FIG.7: Test circuit for inductive and resistive loads to IEC-61000-4-5 standards

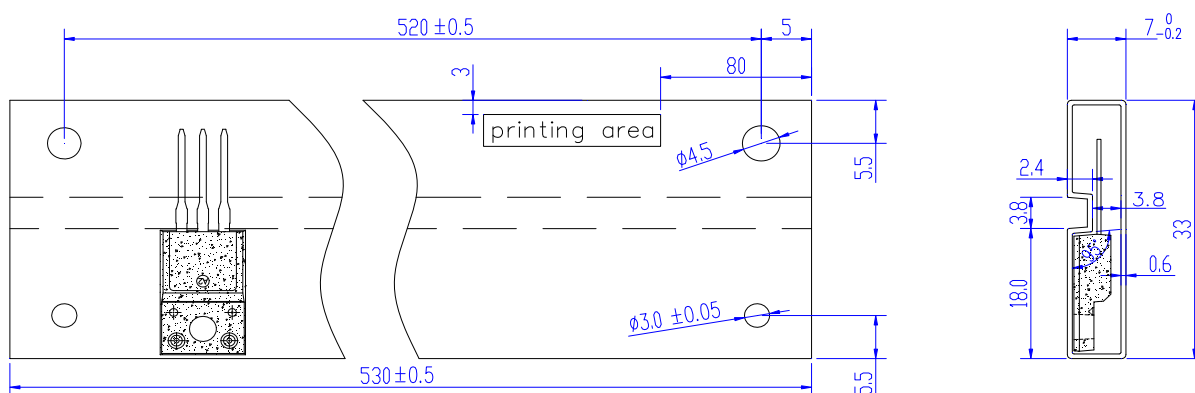


### PACKAGE MECHANICAL DATA



| Ref. | Dimensions  |      |       |        |       |       |
|------|-------------|------|-------|--------|-------|-------|
|      | Millimeters |      |       | Inches |       |       |
|      | Min.        | Typ. | Max.  | Min.   | Typ.  | Max.  |
| A    | 4.50        |      | 4.90  | 0.177  |       | 0.193 |
| B    | 0.74        | 0.80 | 0.83  | 0.029  | 0.031 | 0.033 |
| C    | 0.47        |      | 0.65  | 0.019  |       | 0.026 |
| C2   | 2.45        |      | 2.75  | 0.096  |       | 0.108 |
| C3   | 2.60        |      | 3.00  | 0.102  |       | 0.118 |
| D    | 8.80        |      | 9.30  | 0.346  |       | 0.366 |
| E    | 9.80        |      | 10.4  | 0.386  |       | 0.410 |
| F    | 6.40        |      | 6.80  | 0.252  |       | 0.268 |
| G    | 2.40        |      | 2.70  | 0.094  |       | 0.106 |
| H    | 28.0        |      | 29.8  | 1.102  |       | 1.173 |
| I    | 4.80        |      | 5.20  | 0.189  |       | 0.205 |
| J    | 12.60       |      | 13.00 | 0.496  |       | 0.512 |
| K    | 9.60        |      | 10.00 | 0.378  |       | 0.394 |
| L1   | 3.20        |      | 3.80  | 0.126  |       | 0.150 |
| L2   | 1.14        |      | 1.70  | 0.045  |       | 0.067 |
| L3   | 3.20        |      | 3.60  | 0.126  |       | 0.142 |
| M    | 4.80        |      | 5.20  | 0.189  |       | 0.205 |
| V1   |             | 45°  |       |        | 45°   |       |

### DELIVERY MODE



| PACKAGE | OUTLINE | TUBE (PCS) | INNER BOX (PCS) | PER CARTON |
|---------|---------|------------|-----------------|------------|
| TO-220F | TUBE    | 50         | 1,000           | 5,000      |