



## Applications

- Phase Control
- Static Switching
- Light Dimming
- Motor Speed Control
- Kitchen Equipment
- Power Tools
- Solenoid Valve Controls:
  - Dishwashers
  - Washing Machines

- Suitable for General Purpose AC Switching
- Alternistor/No Snubber Versions for Inductive Loads
- Logic Level Available for Use with Microcontrollers and Low Level Devices
- IGT Range 5-50 mA (Q1)
- $V_{DRM}/V_{RMM}$  400, 600, 800, 1000V

## Absolute Maximum Ratings

|                                                                                                                  | CONDITIONS                                             | SYMBOL                                   | RATING             |
|------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|------------------------------------------|--------------------|
| RMS On-State Current (full sine wave)                                                                            | $T_c = 110^\circ\text{C}$<br>$T_c = 105^\circ\text{C}$ | TO-220AB<br>TO-220AB Iso<br>$I_{T(RMS)}$ | 6A                 |
| Non Repetitive Surge Peak On-State Current (Full Cycle, $T_j$ Initial = $25^\circ\text{C}$ )                     | F = 50 Hz<br>F = 60 Hz                                 | $I_{TSM}$                                | 60A<br>63A         |
| $I^2t$ Value for fusing                                                                                          | $t_p = 10$ ms                                          | $I^2t$                                   | 21A <sup>2</sup> s |
| Critical rate of rise of on-state current<br>$I_G = 2 \times I_{GT}$ , $t_r < 100$ ns, $T_j = 125^\circ\text{C}$ | F = 120 Hz                                             | $di/dt$                                  | 100A/ $\mu$ s      |
| Peak Gate Current @ $T_j = 125^\circ\text{C}$                                                                    | $t_p = 20$ $\mu$ s                                     | $I_{GM}$                                 | 4A                 |
| Average Gate Power Dissipation @ $T_j = 125^\circ\text{C}$                                                       |                                                        | $P_{G(AV)}$                              | 1W                 |
| Storage Temperature Range                                                                                        |                                                        | $T_{stg}$                                | -40 to +150°C      |
| Operating Junction Temperature Range                                                                             |                                                        | $T_j$                                    | -40 to +125°C      |
| Isolation Voltage (CTA Series only)                                                                              |                                                        | $V_{ISO}$                                | 2500 $V_{RMS}$     |

## Electrical Characteristics

### ALTERNISTOR/NO SNUBBER AND LOGIC LEVEL (3 Quadrants)

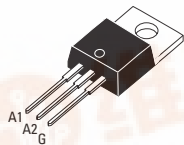
|                                                                                |           | TW           | SW           | CW            | BW             |
|--------------------------------------------------------------------------------|-----------|--------------|--------------|---------------|----------------|
| $I_{GT}$ MAX @ $V_D = 12$ V, $R_L = 30\Omega$ NOTE 1                           | QI-II-III | 5mA          | 10mA         | 35mA          | 50mA           |
| $V_{GT}$ MAX @ $V_D = 12$ V, $R_L = 30\Omega$                                  | QI-II-III | 1.3V         | 1.3V         | 1.3V          | 1.3V           |
| $V_{GD}$ MIN @ $V_D = V_{DRM}$ , $R_L = 3.3k\Omega$ $T_j = 125^\circ\text{C}$  | QI-II-III | 0.2V         | 0.2V         | 0.2V          | 0.2V           |
| $I_H$ MAX @ $I_T = 500$ mA NOTE 2                                              |           | 10mA         | 15mA         | 35mA          | 50mA           |
| $I_L$ MAX @ $I_G = 1.2 I_{GT}$                                                 | QI-III    | 10mA         | 25mA         | 50mA          | 70mA           |
| $I_L$ MAX @ $I_G = 1.2 I_{GT}$                                                 | Q-II      | 15mA         | 30mA         | 60mA          | 80mA           |
| $dv/dt$ MIN @ $V_D = 67\%V_{DRM}$ (gate open) NOTE 2 $T_j = 125^\circ\text{C}$ |           | 20V/ $\mu$ s | 40V/ $\mu$ s | 400V/ $\mu$ s | 1000V/ $\mu$ s |
| $(di/dt)_c$ MIN @ $(dv/dt)_c = 0.1$ V/ms NOTE 2 $T_j = 125^\circ\text{C}$      |           | 2.7A/ms      | 3.5A/ms      |               |                |
| $(di/dt)_c$ MIN @ $(dv/dt)_c = 10$ V/ms NOTE 2 $T_j = 125^\circ\text{C}$       |           | 1.2A/ms      | 2.4A/ms      |               |                |
| $(di/dt)_c$ MIN without Snubber NOTE 2 & 4 $T_j = 125^\circ\text{C}$           |           |              |              | 3.5A/ms       | 5.3A/ms        |

### STANDARD (4 Quadrants)

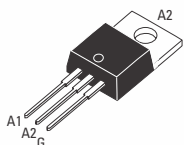
|                                                                                |           | C             | B             |
|--------------------------------------------------------------------------------|-----------|---------------|---------------|
| $I_{GT}$ MAX @ $V_D = 12$ V, $R_L = 30\Omega$ NOTE 1                           | QI-II-III | 25mA          | 50mA          |
| $I_{GT}$ MAX @ $V_D = 12$ V, $R_L = 30\Omega$ NOTE 1                           | QIV       | 50mA          | 100mA         |
| $V_{GT}$ MAX @ $V_D = 12$ V, $R_L = 30\Omega$                                  | Q-All     | 1.3V          |               |
| $V_{GD}$ MIN @ $V_D = V_{DRM}$ , $R_L = 3.3k\Omega$ $T_j = 125^\circ\text{C}$  | Q-All     | 0.2V          |               |
| $I_H$ MAX @ $I_T = 500$ mA NOTE 2                                              |           | 25mA          | 50mA          |
| $I_L$ MAX @ $I_G = 1.2 I_{GT}$                                                 | QI-III-IV | 40mA          | 50mA          |
| $I_L$ MAX @ $I_G = 1.2 I_{GT}$                                                 | Q-II      | 80mA          | 100mA         |
| $dv/dt$ MIN @ $V_D = 67\%V_{DRM}$ (gate open) NOTE 2 $T_j = 125^\circ\text{C}$ |           | 200V/ $\mu$ s | 400V/ $\mu$ s |
| $(dv/dt)_c$ MIN @ $(di/dt)_c = 2.7$ A/ms NOTE 2 & 4 $T_j = 125^\circ\text{C}$  |           | 5V/ $\mu$ s   | 10V/ $\mu$ s  |

### GENERAL NOTES

1. Minimum IGT is guaranteed at 5% of IGT max.
2. For both polarities of A2 referenced to A1
3. All parameters at 25 degrees C unless otherwise specified.
4. Commutating  $dv/dt = 50V/\mu$ sec (exponential to 200Vpk)



TO-220AB Isolated (CTA06)



TO-220AB Non-Isolated (CTB06)

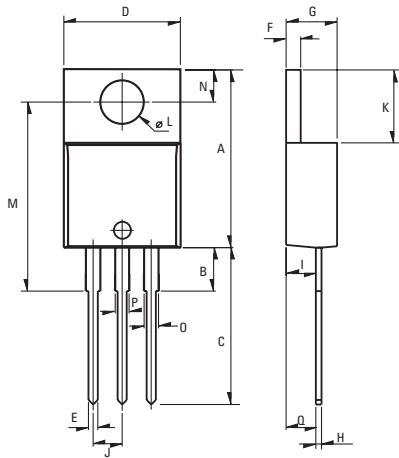


## Static Characteristics

|                                                       |                     |              |
|-------------------------------------------------------|---------------------|--------------|
| $V_T$ MAX @ $I_{TM} = 5.5$ A, $t_p = 380\mu s$ NOTE 2 | $T_J = 25^\circ C$  | 1.55V        |
| $V_{TO}$ MAX @ Threshold Voltage NOTE 2               | $T_J = 125^\circ C$ | 0.85V        |
| $R_d$ MAX @ Dynamic Resistance NOTE 2                 | $T_J = 125^\circ C$ | 60m $\Omega$ |
| $I_{DRM}$ MAX @ $V_{DRM} = V_{RRM}$                   | $T_J = 25^\circ C$  | 5 $\mu$ A    |
| $I_{RRM}$ MAX @ $V_{DRM} = V_{RRM}$                   | $T_J = 125^\circ C$ | 1mA          |

## Thermal Resistances

|                       |                   | SYMBOL        | RATING  |
|-----------------------|-------------------|---------------|---------|
| Junction to Case (AC) | TO-220AB          | $R_{th(j-c)}$ | 1.8°C/W |
| Junction to Case (AC) | TO-220AB Isolated | $R_{th(j-c)}$ | 2.7°C/W |
| Junction to Ambient   | TO-220AB          | $R_{th(j-a)}$ | 60°C/W  |
| Junction to Ambient   | TO-220AB Isolated | $R_{th(j-a)}$ | 60°C/W  |



Weight: 2.3g (0.08 oz)

## Dimensions

| REF. | Millimeters |      |       | Inches |       |       |
|------|-------------|------|-------|--------|-------|-------|
|      | Min.        | Typ. | Max.  | Min.   | Typ.  | Max.  |
| A    | 15.24       |      | 15.75 | 0.6    |       | 0.62  |
| B    |             | 3.23 |       |        | 0.127 |       |
| C    | 12.78       |      | 13.79 | 0.503  |       | 0.543 |
| D    | 9.96        |      | 10.36 | 0.392  |       | 0.408 |
| E    | 0.69        |      | 0.94  | 0.027  |       | 0.037 |
| F    | 1.22        |      | 1.32  | 0.048  |       | 0.052 |
| G    | 4.62        |      | 4.83  | 0.182  |       | 0.19  |
| H    | 0.46        |      | 0.61  | 0.018  |       | 0.024 |
| I    | 2.49        |      | 2.84  | 0.098  |       | 0.112 |
| J    | 2.39        |      | 2.69  | 0.094  |       | 0.106 |
| K    | 6.48        |      | 6.88  | 0.255  |       | 0.271 |
| L    | 3.78        |      | 3.89  | 0.149  |       | 0.153 |
| M    | 15.49       | 16   | 16.51 | 0.61   | 0.63  | 0.65  |
| N    | 2.59        |      | 2.9   | 0.102  |       | 0.114 |
| O    | 0.99        |      | 1.55  | 0.039  |       | 0.061 |
| P    | 0.99        |      | 1.55  | 0.039  |       | 0.061 |
| Q    |             | 2.67 |       |        | 0.105 |       |

## Part Number Selection

| Part Number     | Voltage [Vpk]       | $I_{GT}$ [mA] | Type                   | Package  |
|-----------------|---------------------|---------------|------------------------|----------|
| CTA/CTB06-xxxB  | 400, 600, 800, 1000 | 50mA          | Standard               | TO-220AB |
| CTA/CTB06-xxxBW | 400, 600, 800, 1000 | 50mA          | Alternistor/No Snubber | TO-220AB |
| CTA/CTB06-xxxC  | 400, 600, 800, 1000 | 25mA          | Standard               | TO-220AB |
| CTA/CTB06-xxxCW | 400, 600, 800, 1000 | 35mA          | Alternistor/No Snubber | TO-220AB |
| CTA/CTB06-xxxSW | 400, 600, 800, 1000 | 10mA          | Logic Level            | TO-220AB |
| CTA/CTB06-xxxTW | 400, 600, 800, 1000 | 5mA           | Logic Level            | TO-220AB |

## Part Number Designation

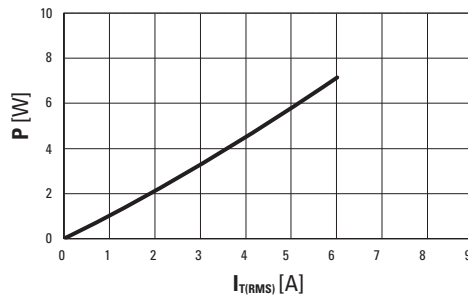
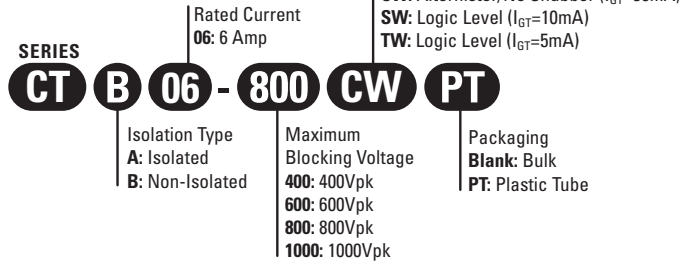


Fig. 1: Power dissipation versus RMS on-state current (full cycle).

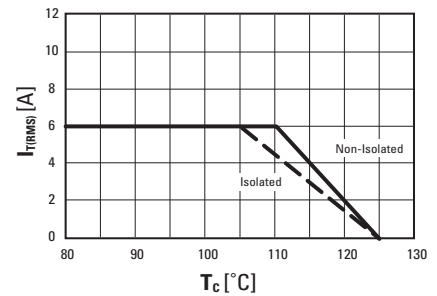


Fig. 2: RMS on-state current versus case temperature (full cycle)

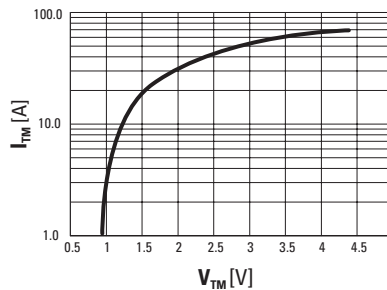


Fig. 3: On-state current versus on-state voltage (instantaneous values)

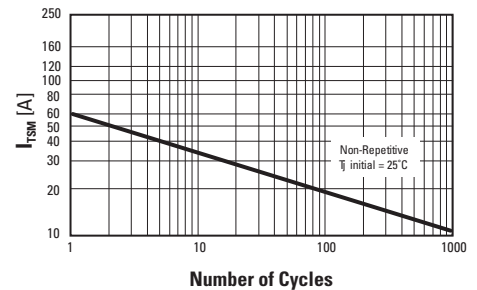


Fig. 4: Non-repetitive surge peak on-state current versus number of cycles.

ISO9001 CERTIFIED

## Approvals

UL Recognized Component - E72445 (CTA Series)

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