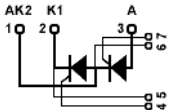


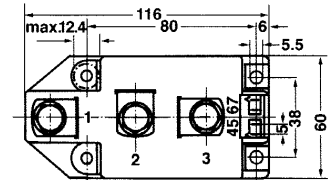
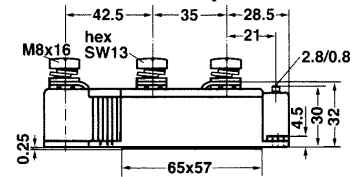
# CTT320

## Thyristor-Thyristor Modules



| Type       | $V_{RSM}$ | $V_{RRM}$ |
|------------|-----------|-----------|
|            | $V_{DSM}$ | $V_{DRM}$ |
|            | V         | V         |
| CTT320GK08 | 900       | 800       |
| CTT320GK12 | 1300      | 1200      |
| CTT320GK14 | 1500      | 1400      |
| CTT320GK16 | 1700      | 1600      |
| CTT320GK18 | 1900      | 1800      |

Dimensions in mm (1mm=0.0394")



| Symbol                                             | Test Conditions                                                                                     |                                                 | Maximum Ratings                 | Unit        |
|----------------------------------------------------|-----------------------------------------------------------------------------------------------------|-------------------------------------------------|---------------------------------|-------------|
| $I_{TRMS}$ , $I_{FRMS}$<br>$I_{TAVM}$ , $I_{FAVM}$ | $T_{VJ}=T_{VJM}$<br>$T_C=85^{\circ}C$ ; 180° sine                                                   |                                                 | 500<br>320                      | A           |
| $I_{TSM}$ , $I_{FSM}$                              | $T_{VJ}=45^{\circ}C$<br>$V_R=0$                                                                     | $t=10ms$ (50Hz), sine<br>$t=8.3ms$ (60Hz), sine | 9200<br>9800                    | A           |
|                                                    | $T_{VJ}=T_{VJM}$<br>$V_R=0$                                                                         | $t=10ms$ (50Hz), sine<br>$t=8.3ms$ (60Hz), sine | 8000<br>8600                    |             |
| $\int i^2 dt$                                      | $T_{VJ}=45^{\circ}C$<br>$V_R=0$                                                                     | $t=10ms$ (50Hz), sine<br>$t=8.3ms$ (60Hz), sine | 420000<br>400000                | $A^2s$      |
|                                                    | $T_{VJ}=T_{VJM}$<br>$V_R=0$                                                                         | $t=10ms$ (50Hz), sine<br>$t=8.3ms$ (60Hz), sine | 320000<br>306000                |             |
| $(di/dt)_{cr}$                                     | $T_{VJ}=T_{VJM}$<br>$f=50Hz$ , $t_p=200\mu s$<br>$V_D=2/3V_{DRM}$<br>$I_G=1A$<br>$di_G/dt=1A/\mu s$ | repetitive, $I_T=960A$                          | 100                             | A/ $\mu s$  |
|                                                    |                                                                                                     | non repetitive, $I_T=320A$                      | 500                             |             |
| $(dv/dt)_{cr}$                                     | $T_{VJ}=T_{VJM}$ ;<br>$R_{GK}=\infty$ ; method 1 (linear voltage rise)                              | $V_{DR}=2/3V_{DRM}$                             | 1000                            | V/ $\mu s$  |
| $P_{GM}$                                           | $T_{VJ}=T_{VJM}$<br>$I_T=I_{TAVM}$                                                                  | $t_p=30\mu s$<br>$t_p=500\mu s$                 | 120<br>60                       | W           |
| $P_{GAV}$                                          |                                                                                                     |                                                 | 20                              | W           |
| $V_{RGM}$                                          |                                                                                                     |                                                 | 10                              | V           |
| $T_{VJ}$<br>$T_{VJM}$<br>$T_{stg}$                 |                                                                                                     |                                                 | -40...+140<br>140<br>-40...+125 | $^{\circ}C$ |
| $V_{ISOL}$                                         | 50/60Hz, RMS<br>$I_{ISOL}\leq 1mA$                                                                  | $t=1min$<br>$t=1s$                              | 3000<br>3600                    | V~          |
| $M_d$                                              | Mounting torque (M5)<br>Terminal connection torque (M8)                                             |                                                 | 2.5-5/22-44<br>12-15/106-132    | Nm/lb.in.   |
| Weight                                             | Typical including screws                                                                            |                                                 | 320                             | g           |

# CTT320

## Thyristor-Thyristor Modules

| Symbol                              | Test Conditions                                                                                                | Characteristic Values | Unit             |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------|-----------------------|------------------|
| <b>I<sub>RRM</sub></b>              | $T_{VJ}=T_{VJM}; V_R=V_{RRM}; V_D=V_{DRM}$                                                                     | 70                    | mA               |
| <b>I<sub>DRM</sub></b>              |                                                                                                                | 40                    | mA               |
| <b>V<sub>T</sub>, V<sub>F</sub></b> | $I_T, I_F=600A; T_{VJ}=25^{\circ}C$                                                                            | 1.32                  | V                |
| <b>V<sub>TO</sub></b>               | For power-loss calculations only ( $T_{VJ}=140^{\circ}C$ )                                                     | 0.8                   | V                |
| <b>r<sub>T</sub></b>                |                                                                                                                | 0.82                  | m $\Omega$       |
| <b>V<sub>GT</sub></b>               | $V_D=6V; T_{VJ}=25^{\circ}C$<br>$T_{VJ}=-40^{\circ}C$                                                          | 2<br>3                | V                |
| <b>I<sub>GT</sub></b>               | $V_D=6V; T_{VJ}=25^{\circ}C$<br>$T_{VJ}=-40^{\circ}C$                                                          | 150<br>200            | mA               |
| <b>V<sub>GD</sub></b>               | $T_{VJ}=T_{VJM}; V_D=2/3V_{DRM}$                                                                               | 0.25                  | V                |
| <b>I<sub>GD</sub></b>               |                                                                                                                | 10                    | mA               |
| <b>I<sub>L</sub></b>                | $T_{VJ}=25^{\circ}C; t_p=30\mu s; V_D=6V$<br>$I_G=0.45A; di_G/dt=0.45A/\mu s$                                  | 200                   | mA               |
| <b>I<sub>H</sub></b>                | $T_{VJ}=25^{\circ}C; V_D=6V; R_{GK}=\infty$                                                                    | 150                   | mA               |
| <b>t<sub>gd</sub></b>               | $T_{VJ}=25^{\circ}C; V_D=1/2V_{DRM}$<br>$I_G=1A; di_G/dt=1A/\mu s$                                             | 2                     | $\mu s$          |
| <b>t<sub>q</sub></b>                | $T_{VJ}=T_{VJM}; I_T=300A; t_p=200\mu s; -di/dt=10A/\mu s$<br>$V_R=100V; dv/dt=50V/\mu s; V_D=2/3V_{DRM}$ typ. | 200                   | $\mu s$          |
| <b>Q<sub>s</sub></b>                | $T_{VJ}=125^{\circ}C; I_T, I_F=400A; -di/dt=50A/\mu s$                                                         | 760                   | $\mu C$          |
| <b>I<sub>RM</sub></b>               |                                                                                                                | 275                   | A                |
| <b>R<sub>thJC</sub></b>             | per thyristor/diode; DC current<br>per module                                                                  | 0.112<br>0.056        | K/W              |
| <b>R<sub>thJK</sub></b>             | per thyristor/diode; DC current<br>per module                                                                  | 0.152<br>0.076        | K/W              |
| <b>d<sub>s</sub></b>                | Creeping distance on surface                                                                                   | 12.7                  | mm               |
| <b>d<sub>A</sub></b>                | Strike distance through air                                                                                    | 9.6                   | mm               |
| <b>a</b>                            | Maximum allowable acceleration                                                                                 | 50                    | m/s <sup>2</sup> |

### FEATURES

- \* International standard package
- \* Direct copper bonded Al<sub>2</sub>O<sub>3</sub>-ceramic base plate
- \* Planar passivated chips
- \* Isolation voltage 3600 V~
- \* UL registered, E 72873
- \* Keyed gate/cathode twin pins

### APPLICATIONS

- \* Motor control
- \* Power converter
- \* Heat and temperature control for industrial furnaces and chemical processes
- \* Lighting control
- \* Contactless switches

### ADVANTAGES

- \* Space and weight savings
- \* Simple mounting
- \* Improved temperature and power cycling
- \* Reduced protection circuits

# CTT320

## Thyristor-Thyristor Modules

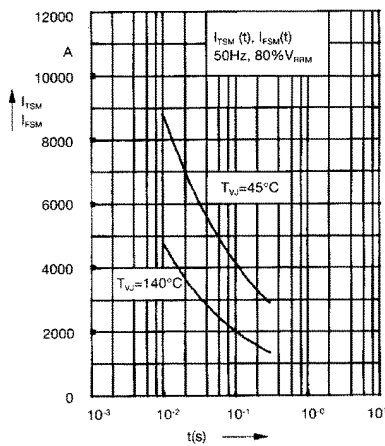


Fig. 1 Surge overload current  
 $I_{TSM}, I_{FSM}$ : Crest value,  $t$ : duration

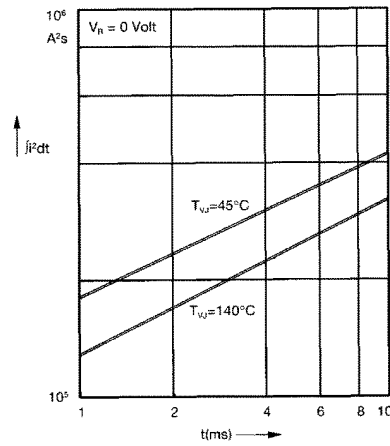


Fig. 2  $\int i^2 dt$  versus time (1-10 ms)

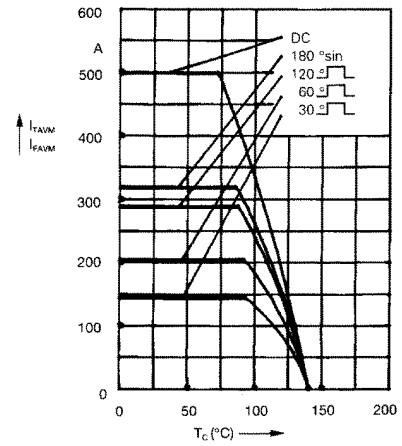


Fig. 2a Maximum forward current at case temperature

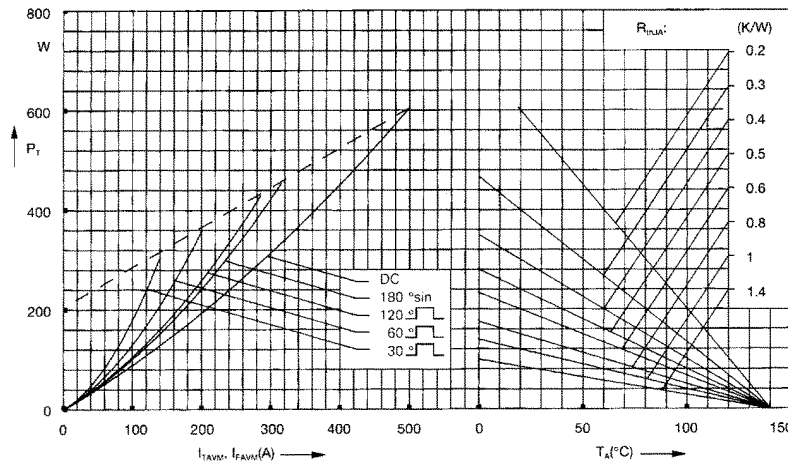


Fig. 3 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

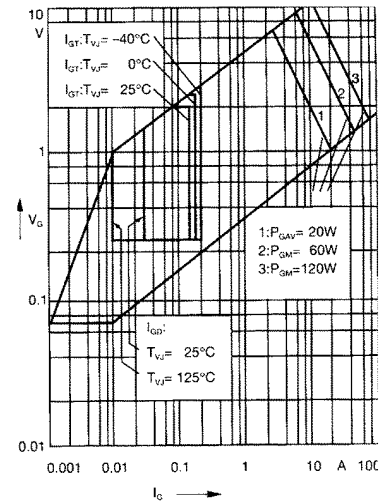


Fig. 4 Gate trigger characteristics

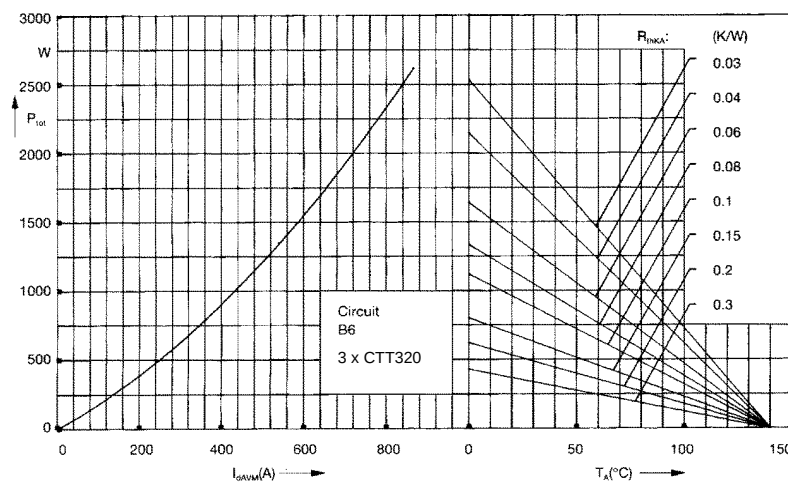


Fig. 5 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

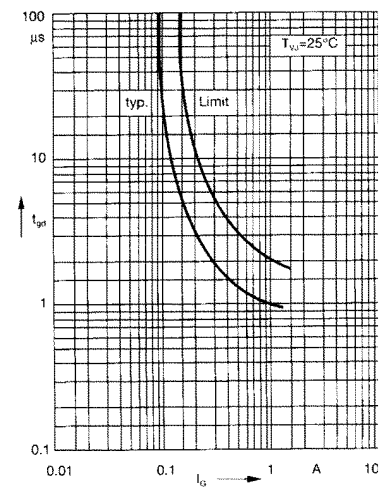


Fig. 6 Gate trigger delay time

# CTT320

## Thyristor-Thyristor Modules

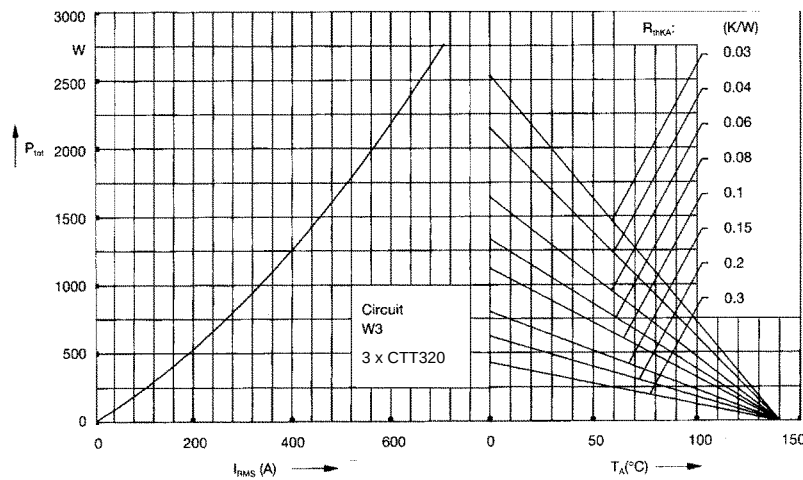


Fig. 7 Three phase AC-controller:  
Power dissipation versus RMS  
output current and ambient  
temperature

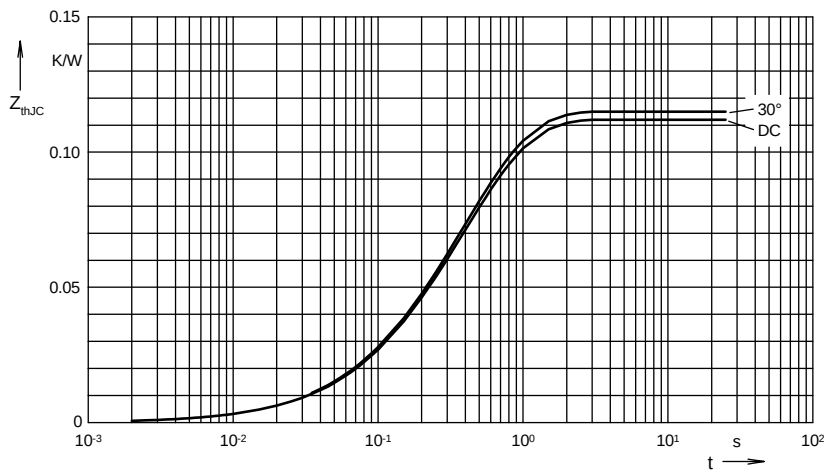


Fig. 8 Transient thermal impedance  
junction to case (per thyristor or  
diode)

$R_{thJC}$  for various conduction angles d:

| d    | $R_{thJC}$ (K/W) |
|------|------------------|
| DC   | 0.112            |
| 180° | 0.113            |
| 120° | 0.114            |
| 60°  | 0.115            |
| 30°  | 0.115            |

Constants for  $Z_{thJC}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.003           | 0.099     |
| 2 | 0.0143          | 0.168     |
| 3 | 0.0947          | 0.456     |

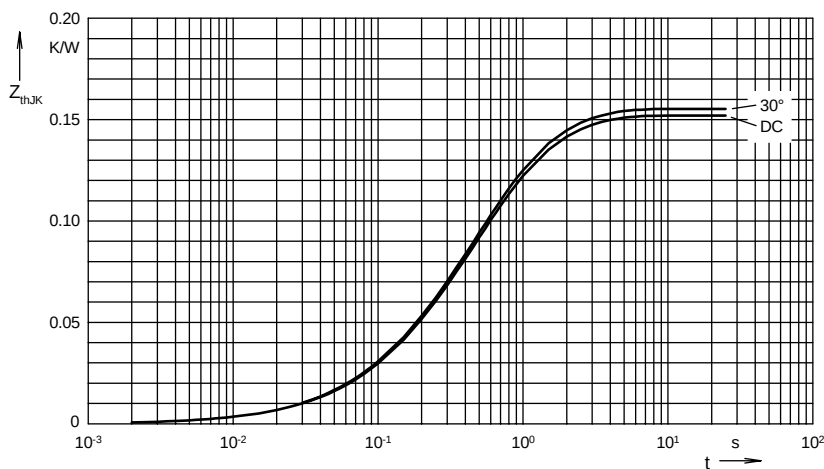


Fig. 9 Transient thermal impedance  
junction to heatsink (per thyristor  
or diode)

$R_{thJK}$  for various conduction angles d:

| d    | $R_{thJK}$ (K/W) |
|------|------------------|
| DC   | 0.152            |
| 180° | 0.154            |
| 120° | 0.154            |
| 60°  | 0.155            |
| 30°  | 0.155            |

Constants for  $Z_{thJK}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.003           | 0.099     |
| 2 | 0.0143          | 0.168     |
| 3 | 0.0947          | 0.456     |
| 4 | 0.04            | 1.36      |