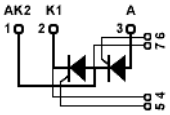
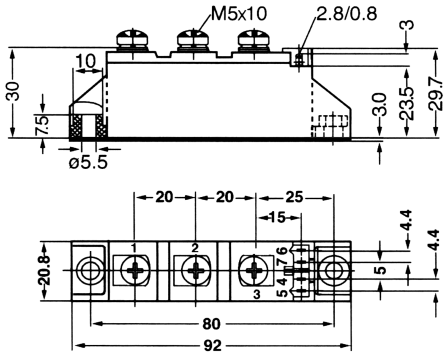
# STT70

## Thyristor-Thyristor Modules




| Type | $V_{RSM}$ $V_{DSM}$ V | $V_{RRM}$ $V_{DRM}$ V |
|---|---|---|
| **STT70GK08** | 900 | 800 |
| **STT70GK12** | 1300 | 1200 |
| **STT70GK14** | 1500 | 1400 |
| **STT70GK16** | 1700 | 1600 |
| **STT70GK18** | 1900 | 1800 |
| **STT70GK20** | 2100 | 2000 |
| **STT70GK22** | 2300 | 2200 |
| **STT70GK24** | 2500 | 2400 |

**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>$T_C=85^oC$; 180° sine | | 180<br>70 | A |
| $I_{TSM}$, $I_{FSM}$ | $T_{VJ}=45^oC$<br>$V_R=0$ | t=10ms (50Hz), sine<br>t=8.3ms (60Hz), sine | 1600<br>1700 | A |
| | $T_{VJ}=T_{VJM}$<br>$V_R=0$ | t=10ms(50Hz), sine<br>t=8.3ms(60Hz), sine | 1450<br>1550 | |
| $\int i^2dt$ | $T_{VJ}=45^oC$<br>$V_R=0$ | t=10ms (50Hz), sine<br>t=8.3ms (60Hz), sine | 13500<br>12600 | $A^2s$ |
| | $T_{VJ}=T_{VJM}$<br>$V_R=0$ | t=10ms(50Hz), sine<br>t=8.3ms(60Hz), sine | 10600<br>10250 | |
| $(di/dt)_{cr}$ | $T_{VJ}=T_{VJM}$<br>f=50Hz, $t_P$=200us<br>$V_D=2/3V_{DRM}$<br>$I_G$=0.45A<br>$di_G/dt$=0.45A/us | repetitive, $I_T=250A$<br><br><br>non repetitive, $I_T=I_{TAVM}$ | 150<br><br><br>500 | A/us |
| $(dv/dt)_{cr}$ | $T_{VJ}=T_{VJM}$; $V_{DR}=2/3V_{DRM}$<br>$R_{GK}=\infty$; method 1 (linear voltage rise) | | 1000 | V/us |
| $P_{GM}$ | $T_{VJ}=T_{VJM}$<br>$I_T=I_{TAVM}$ | $t_P$=30us<br>$t_P$=300us | 10<br>5 | W |
| $P_{GAV}$ | | | 0.5 | W |
| $V_{RGM}$ | | | 10 | V |
| $T_{VJ}$<br>$T_{VJM}$<br>$T_{stg}$ | | | -40...+125<br>125<br>-40...+125 | °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 (M5) | | 2.5-4.0/22-35<br>2.5-4.0/22-35 | Nm/lb.in. |
| **Weight** | Typical including screws | | 90 | g |

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| Symbol | Test Conditions | Characteristic Values | Unit |
|---|---|---|---|
| $I_{RRM}$, $I_{DRM}$ | $T_{VJ}=T_{VJM}$; $V_R=V_{RRM}$; $V_D=V_{DRM}$ | 5 | mA |
| $V_T$, $V_F$ | $I_T$, $I_F$=320A; $T_{VJ}=25^oC$ | 1.65 | V |
| $V_{TO}$ | For power-loss calculations only ($T_{VJ}=125^oC$) | 0.85 | V |
| $r_T$ | | 3.2 | mΩ |
| $V_{GT}$ | $V_D$=6V; $T_{VJ}=25^oC$<br>$T_{VJ}=-40^oC$ | 1.5<br>1.6 | V |
| $I_{GT}$ | $V_D$=6V; $T_{VJ}=25^oC$<br>$T_{VJ}=-40^oC$ | 100<br>200 | mA |
| $V_{GD}$ | $T_{VJ}=T_{VJM}$; $V_D=2/3V_{DRM}$ | 0.2 | V |
| $I_{GD}$ | | 10 | mA |
| $I_L$ | $T_{VJ}=25^oC$; $t_p$=10us; $V_D$=6V<br>$I_G$=0.45A; $di_G/dt$=0.45A/us | 450 | mA |
| $I_H$ | $T_{VJ}=25^oC$; $V_D$=6V; $R_{GK}=\infty$ | 200 | mA |
| $t_{gd}$ | $T_{VJ}=25^oC$; $V_D=1/2V_{DRM}$<br>$I_G$=0.45A; $di_G/dt$=0.45A/us | 2 | us |
| $t_q$ | $T_{VJ}=T_{VJM}$; $I_T$=150A; $t_p$=200us; -di/dt=10A/us typ.<br>$V_R$=100V; dv/dt=20V/us; $V_D=2/3V_{DRM}$ | 185 | us |
| $Q_S$ | $T_{VJ}=T_{VJM}$; $I_T$, $I_F$=50A; -di/dt=6A/us | 170 | uC |
| $I_{RM}$ | | 45 | A |
| $R_{thJC}$ | per thyristor/diode; DC current<br>per module | 0.3<br>0.15 | K/W |
| $R_{thJK}$ | per thyristor/diode; DC current<br>per module | 0.5<br>0.25 | K/W |
| $d_S$ | Creeping distance on surface | 12.7 | mm |
| $d_A$ | Strike distance through air | 9.6 | mm |
| a | Maximum allowable acceleration | 50 | $m/s^2$ |

### *FEATURES*
* International standard package
* Copper base plate
* Planar passivated chips
* Isolation voltage 3600 V~

### *APPLICATIONS*
* DC motor control
* Softstart AC motor controller
* Light, heat and temperature control

### *ADVANTAGES*
* Space and weight savings
* Simple mounting with two screws
* Improved temperature and power cycling
* Reduced protection circuits

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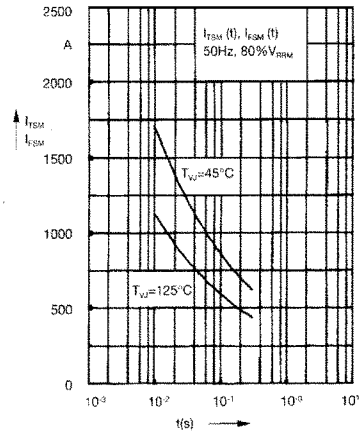


Fig. 1 Surge overload current
$I_{TSM}$, $I_{FSM}$: Crest value, t: duration

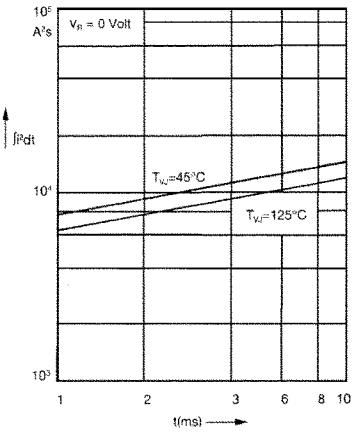


Fig. 2 $\int i^2dt$ versus time (1-10 ms)

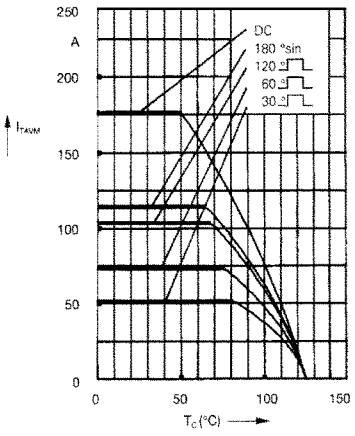


Fig. 2a Maximum forward current at case temperature

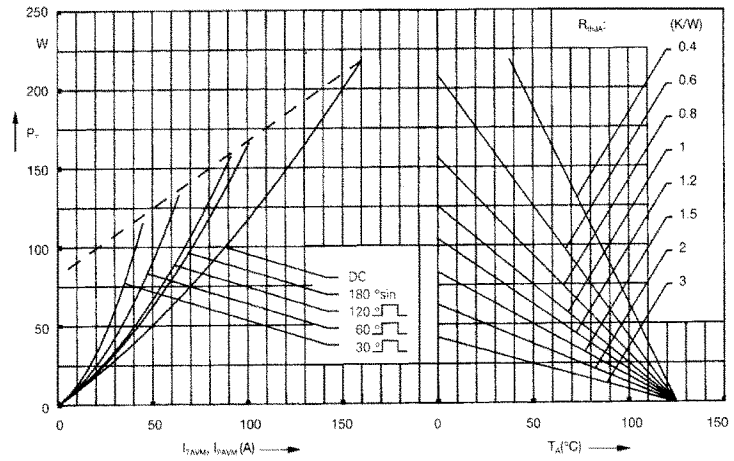


Fig. 3 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

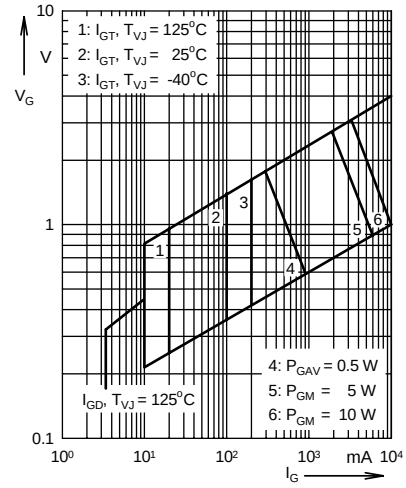


Fig. 4 Gate trigger characteristics

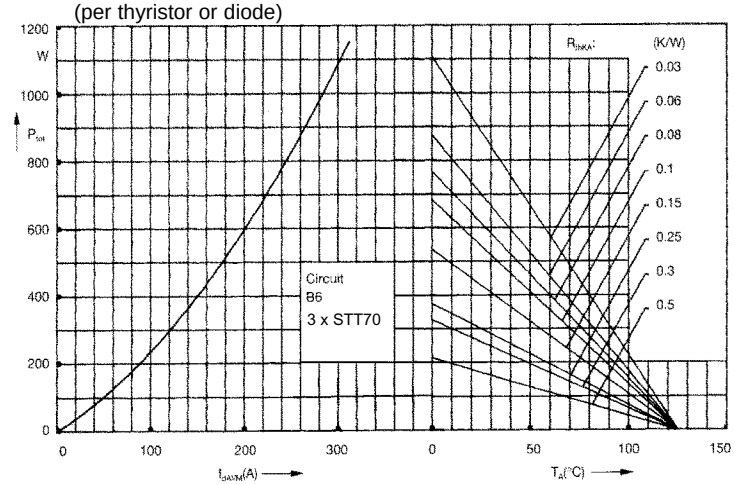


Fig. 5 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

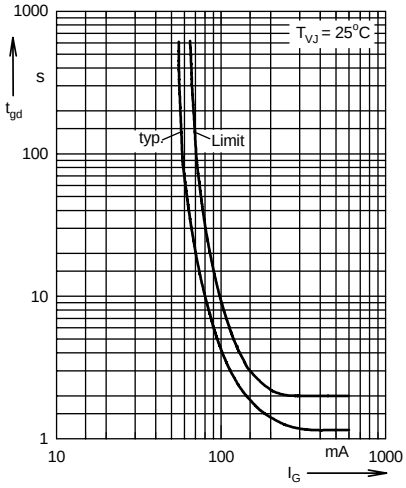


Fig. 6 Gate trigger delay time

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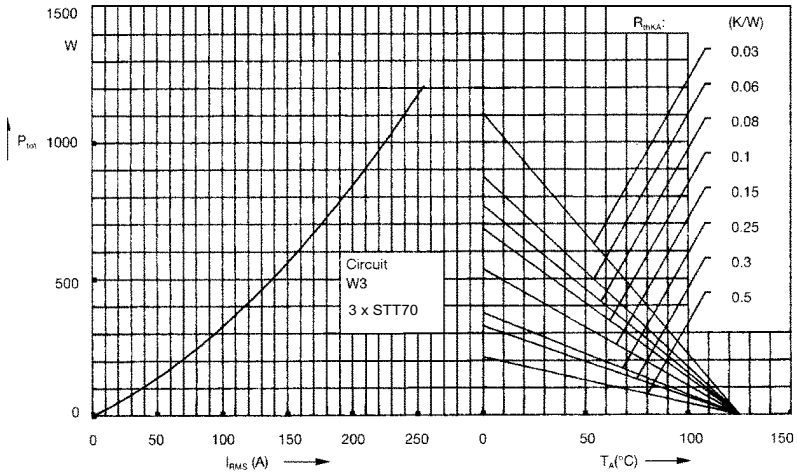


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

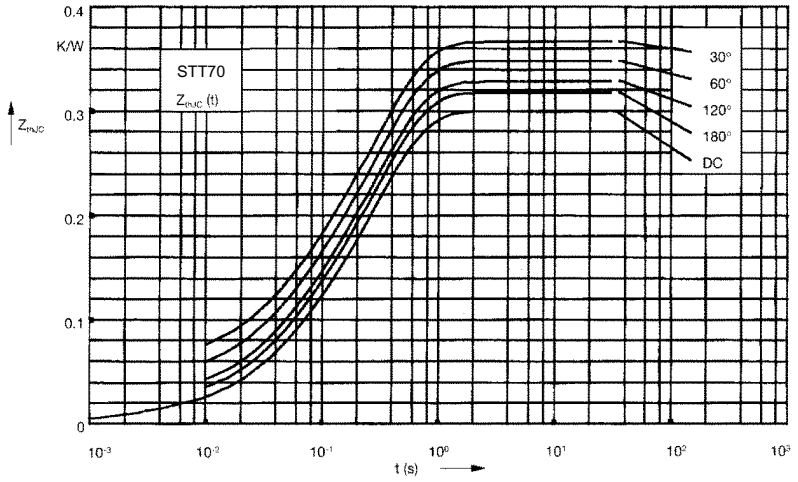


Fig. 8 Transient thermal impedance junction to case (per thyristor or diode)

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

| d | $R_{thJC}$ (K/W) |
|---|---|
| DC | 0.3 |
| 180°C | 0.31 |
| 120°C | 0.33 |
| 60°C | 0.35 |
| 30°C | 0.37 |

Constants for $Z_{thJC}$ calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|---|---|
| 1 | 0.008 | 0.0019 |
| 2 | 0.054 | 0.047 |
| 3 | 0.238 | 0.3 |

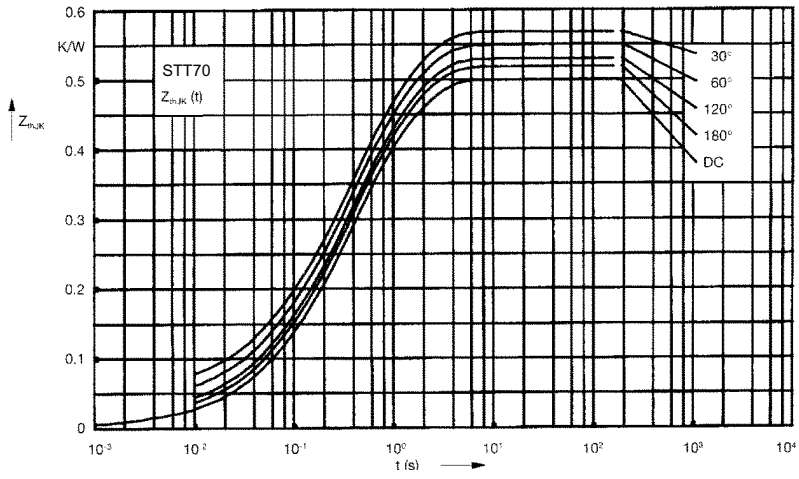


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor or diode)

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

| d | $R_{thJK}$ (K/W) |
|---|---|
| DC | 0.5 |
| 180°C | 0.51 |
| 120°C | 0.53 |
| 60°C | 0.55 |
| 30°C | 0.57 |

Constants for $Z_{thJK}$ calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|---|---|
| 1 | 0.008 | 0.0019 |
| 2 | 0.054 | 0.047 |
| 3 | 0.238 | 0.3 |
| 4 | 0.2 | 1.25 |