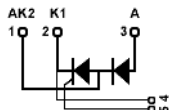
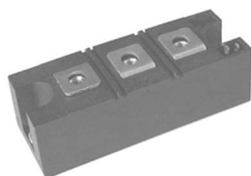


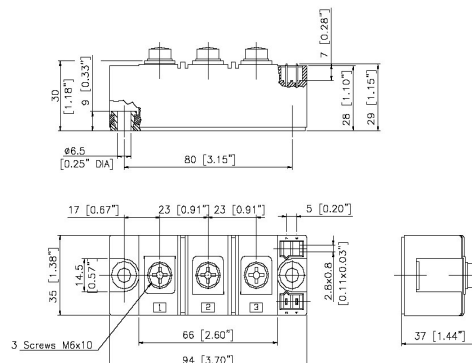
# STD/STD165

## Thyristor-Diode Modules, Diode-Thyristor Modules



| Type           | $V_{RSM}$<br>$V_{DSM}$<br>V | $V_{RRM}$<br>$V_{DRM}$<br>V |
|----------------|-----------------------------|-----------------------------|
| STD/STD165GK08 | 900                         | 800                         |
| STD/STD165GK12 | 1300                        | 1200                        |
| STD/STD165GK14 | 1500                        | 1400                        |
| STD/STD165GK16 | 1700                        | 1600                        |
| STD/STD165GK18 | 1900                        | 1800                        |
| STD/STD165GK20 | 2100                        | 2000                        |
| STD/STD165GK22 | 2300                        | 2200                        |

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                                                                                 | 300<br>165                       | A                |
| $I_{TSM}$ , $I_{FSM}$                              | $T_{VJ}=45^{\circ}C$<br>$V_R=0$<br>$t=10ms$ (50Hz), sine<br>$t=8.3ms$ (60Hz), sine                                                | 6000<br>6400                     | A                |
|                                                    | $T_{VJ}=T_{VJM}$<br>$V_R=0$<br>$t=10ms$ (50Hz), sine<br>$t=8.3ms$ (60Hz), sine                                                    | 5250<br>5600                     |                  |
| $\int i^2 dt$                                      | $T_{VJ}=45^{\circ}C$<br>$V_R=0$<br>$t=10ms$ (50Hz), sine<br>$t=8.3ms$ (60Hz), sine                                                | 180000<br>170000                 | A <sup>2</sup> s |
|                                                    | $T_{VJ}=T_{VJM}$<br>$V_R=0$<br>$t=10ms$ (50Hz), sine<br>$t=8.3ms$ (60Hz), sine                                                    | 137000<br>128000                 |                  |
| $(di/dt)_{cr}$                                     | $T_{VJ}=T_{VJM}$<br>$f=50Hz$ , $t_p=200\mu s$<br>$V_D=2/3V_{DRM}$<br>$I_G=0.5A$<br>$di_G/dt=0.5A/\mu s$<br>repetitive, $I_T=500A$ | 150                              | A/ $\mu s$       |
|                                                    | non repetitive, $I_T=I_{TAVM}$                                                                                                    | 500                              |                  |
| $(dv/dt)_{cr}$                                     | $T_{VJ}=T_{VJM}$ ; $V_{DR}=2/3V_{DRM}$<br>$R_{GK}=\infty$ ; method 1 (linear voltage rise)                                        | 1000                             | V/ $\mu s$       |
| $P_{GM}$                                           | $T_{VJ}=T_{VJM}$<br>$I_T=I_{TAVM}$<br>$t_p=30\mu s$<br>$t_p=500\mu s$                                                             | 120<br>60                        | W                |
| $P_{GAV}$                                          |                                                                                                                                   | 8                                | W                |
| $V_{RGM}$                                          |                                                                                                                                   | 10                               | V                |
| $T_{VJ}$<br>$T_{VJM}$<br>$T_{stg}$                 |                                                                                                                                   | -40...+125<br>125<br>-40...+125  | $^{\circ}C$      |
| $V_{ISOL}$                                         | 50/60Hz, RMS<br>$I_{ISOL}\leq 1mA$<br>$t=1min$<br>$t=1s$                                                                          | 3000<br>3600                     | V~               |
| $M_d$                                              | Mounting torque (M6)<br>Terminal connection torque (M6)                                                                           | 2.25-2.75/20-25<br>4.5-5.5/40-48 | Nm/lb.in.        |
| Weight                                             | Typical including screws                                                                                                          | 125                              | g                |

## Thyristor-Diode Modules, Diode-Thyristor Modules

| Symbol             | Test Conditions                                                                                           | Characteristic Values | Unit             |
|--------------------|-----------------------------------------------------------------------------------------------------------|-----------------------|------------------|
| $I_{RRM}, I_{DRM}$ | $T_{VJ}=T_{VJM}; V_R=V_{RRM}; V_D=V_{DRM}$                                                                | 40                    | mA               |
| $V_T, V_F$         | $I_T, I_F=300A; T_{VJ}=25^{\circ}C$                                                                       | 1.36                  | V                |
| $V_{TO}$           | For power-loss calculations only ( $T_{VJ}=T_{VJM}$ )                                                     | 0.8                   | V                |
| $r_T$              |                                                                                                           | 1.6                   | m $\Omega$       |
| $V_{GT}$           | $V_D=6V;$<br>$T_{VJ}=25^{\circ}C$<br>$T_{VJ}=-40^{\circ}C$                                                | 2<br>2.6              | V                |
| $I_{GT}$           | $V_D=6V;$<br>$T_{VJ}=25^{\circ}C$<br>$T_{VJ}=-40^{\circ}C$                                                | 150<br>200            | mA               |
| $V_{GD}$           | $T_{VJ}=T_{VJM}; V_D=2/3V_{DRM}$                                                                          | 0.25                  | V                |
| $I_{GD}$           | $T_{VJ}=T_{VJM}; V_D=2/3V_{DRM}$                                                                          | 10                    | mA               |
| $I_L$              | $T_{VJ}=25^{\circ}C; t_p=30\mu s; V_D=6V$<br>$I_G=0.45A; di_G/dt=0.45A/\mu s$                             | 200                   | mA               |
| $I_H$              | $T_{VJ}=25^{\circ}C; V_D=6V; R_{GK}=\infty$                                                               | 150                   | mA               |
| $t_{gd}$           | $T_{VJ}=25^{\circ}C; V_D=1/2V_{DRM}$<br>$I_G=0.5A; di_G/dt=0.5A/\mu s$                                    | 2                     | $\mu s$          |
| $t_q$              | $T_{VJ}=T_{VJM}; I_T=160A; t_p=200\mu s; -di/dt=10A/\mu s$<br>$V_R=100V; dv/dt=20V/\mu s; V_D=2/3V_{DRM}$ | typ.<br>150           | $\mu s$          |
| $Q_s$              | $T_{VJ}=T_{VJM}; I_T, I_F=300A; -di/dt=50A/\mu s$                                                         | 550                   | $\mu C$          |
| $I_{RM}$           |                                                                                                           | 235                   | A                |
| $R_{thJC}$         | per thyristor/diode; DC current<br>per module                                                             | 0.155<br>0.0775       | K/W              |
| $R_{thJK}$         | per thyristor/diode; DC current<br>per module                                                             | 0.225<br>0.1125       | K/W              |
| $d_s$              | Creeping distance on surface                                                                              | 12.7                  | mm               |
| $d_A$              | Creepage distance in air                                                                                  | 9.6                   | mm               |
| $a$                | Maximum allowable acceleration                                                                            | 50                    | m/s <sup>2</sup> |

### FEATURES

- \* International standard package
- \* Copper base plate
- \* Planar passivated chips
- \* Isolation voltage 3600 V~

### 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

## Thyristor-Diode Modules, Diode-Thyristor Modules

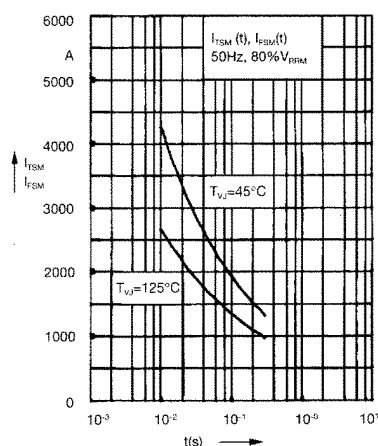


Fig. 1 Surge overload current  
 $I_{TSM}$ ,  $I_{FSM}$ : Crest value,  $t$ : duration

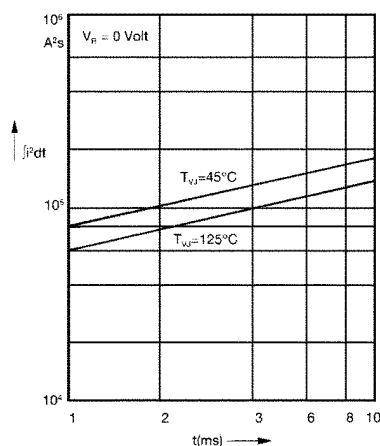


Fig. 2  $I^2t$  versus time (1-10 ms)

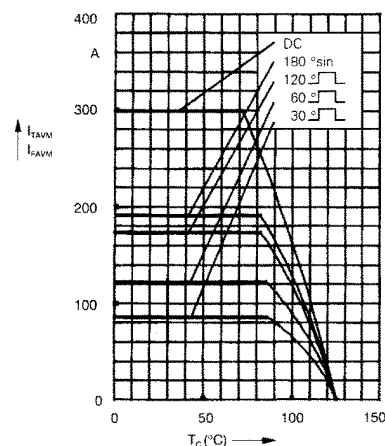


Fig. 2a Maximum forward current  
at case temperature

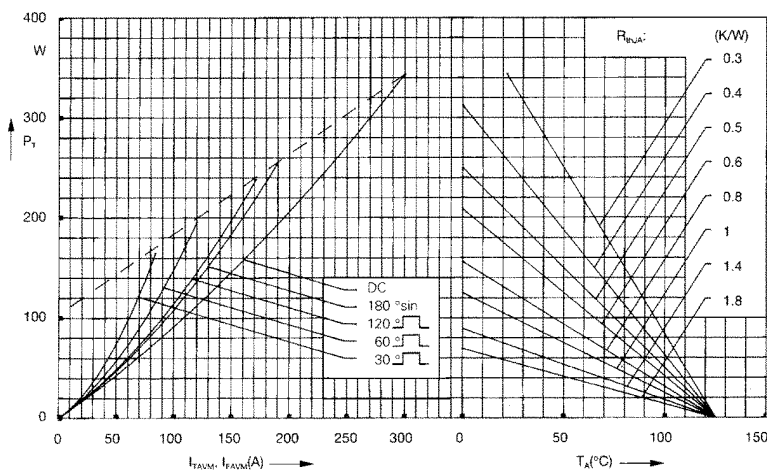


Fig. 3 Power dissipation versus on-state current and ambient temperature  
(per thyristor or diode)

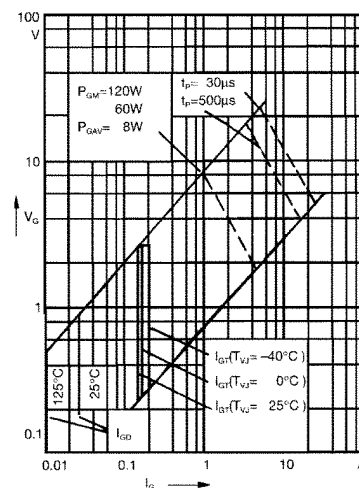


Fig. 4 Gate trigger characteristics

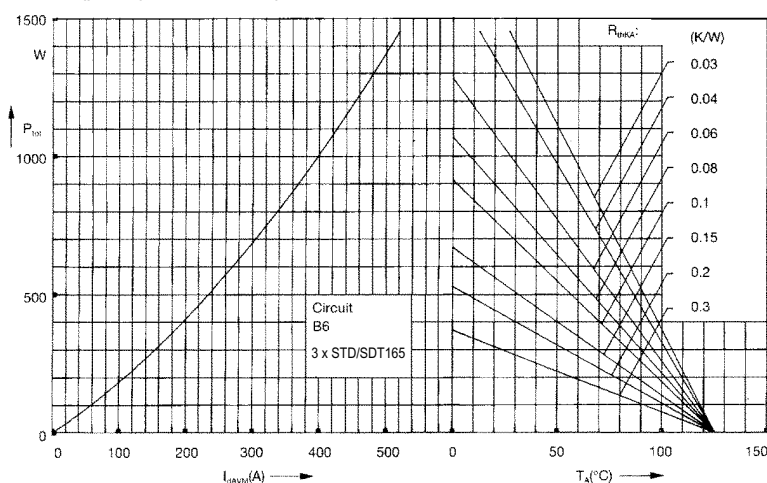


Fig. 5 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

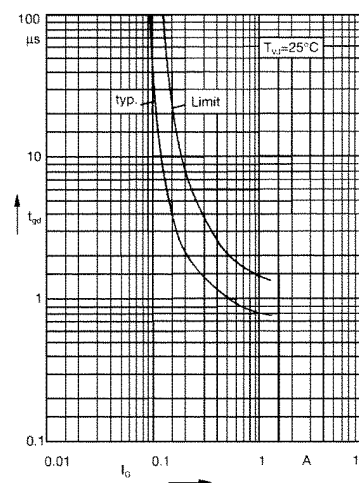


Fig. 6 Gate trigger delay time

## Thyristor-Diode Modules, Diode-Thyristor Modules

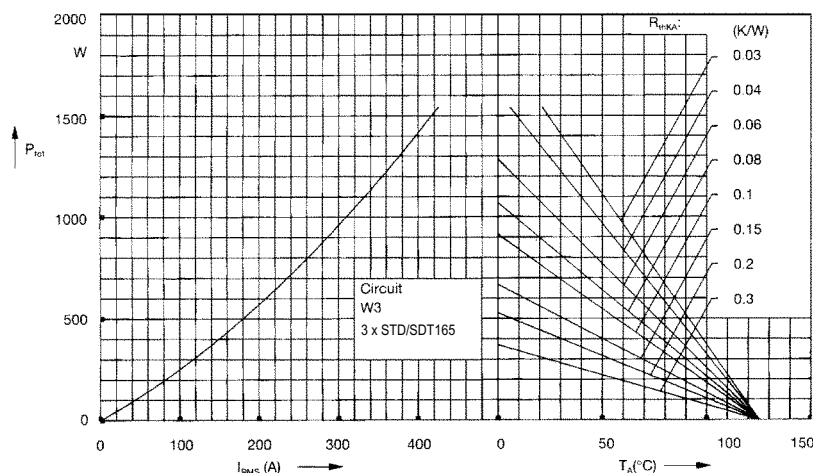


Fig. 7 Three phase AC-controller:  
Power dissipation versus RMS  
output current and ambient  
temperature

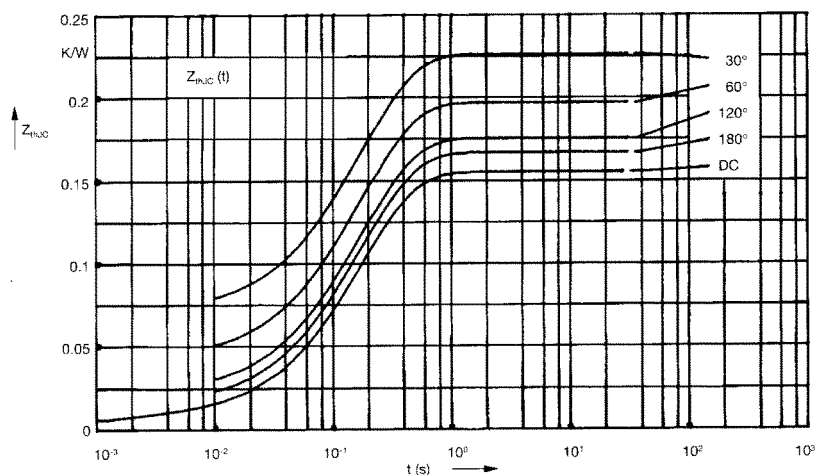


Fig. 8 Transient thermal impedance  
junction to case (per thyristor or  
diode)

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

| d    | $R_{thJC}$ (K/W) |
|------|------------------|
| DC   | 0.155            |
| 180° | 0.167            |
| 120° | 0.175            |
| 60°  | 0.197            |
| 30°  | 0.226            |

Constants for  $Z_{thJC}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.0072          | 0.001     |
| 2 | 0.0188          | 0.08      |
| 3 | 0.129           | 0.2       |

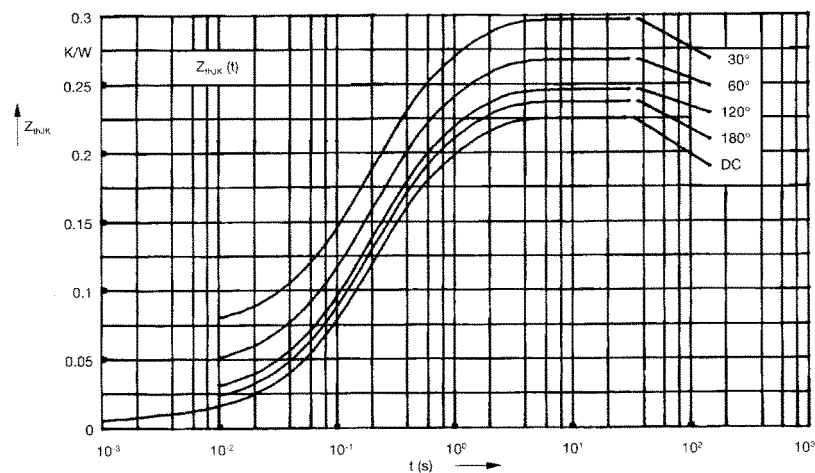


Fig. 9 Transient thermal impedance  
junction to heatsink (per thyristor  
or diode)

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

| d    | $R_{thJK}$ (K/W) |
|------|------------------|
| DC   | 0.225            |
| 180° | 0.237            |
| 120° | 0.245            |
| 60°  | 0.262            |
| 30°  | 0.296            |

Constants for  $Z_{thJK}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.0072          | 0.001     |
| 2 | 0.0188          | 0.08      |
| 3 | 0.129           | 0.2       |
| 4 | 0.07            | 1.0       |