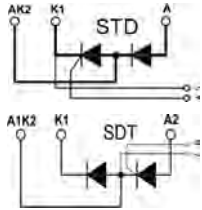


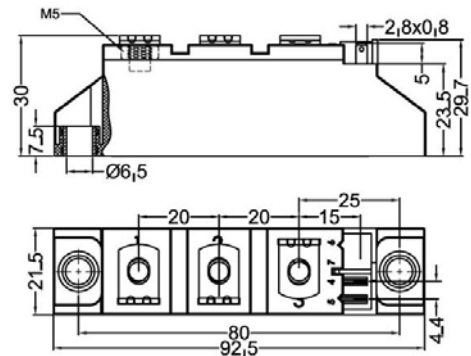
# STD116GKXX

## Thyristor-Diode Modules



| Type       | V <sub>RSM</sub><br>V <sub>DSM</sub><br>V | V <sub>RRM</sub><br>V <sub>DRM</sub><br>V |
|------------|---|---|
| STD116GK08 | 900                                       | 800                                       |
| STD116GK12 | 1300                                      | 1200                                      |
| STD116GK14 | 1500                                      | 1400                                      |
| STD116GK16 | 1700                                      | 1600                                      |
| STD116GK18 | 1900                                      | 1800                                      |

Dimensions in mm (1mm=0.0394")



| Symbol   | Test Conditions  | Maximum Ratings  | Unit             |
|--|--|--|------------------|
| I <sub>TRMS</sub> , I <sub>FRMS</sub><br>I <sub>TAVM</sub> , I <sub>FAVM</sub> | T <sub>VJ</sub> =T <sub>VJM</sub><br>T <sub>C</sub> =85°C; 180° sine   | 180<br>116   | A                |
| I <sub>TSM</sub> , I <sub>FSM</sub>  | T <sub>VJ</sub> =45°C<br>V <sub>R</sub> =0<br>t=10ms (50Hz), sine<br>t=8.3ms (60Hz), sine  | 2250<br>2400   | A                |
|  | T <sub>VJ</sub> =T <sub>VJM</sub><br>V <sub>R</sub> =0<br>t=10ms(50Hz), sine<br>t=8.3ms(60Hz), sine  | 2000<br>2150   |                  |
| ∫i <sup>2</sup> dt   | T <sub>VJ</sub> =45°C<br>V <sub>R</sub> =0<br>t=10ms (50Hz), sine<br>t=8.3ms (60Hz), sine  | 25300<br>23900   | A <sup>2</sup> s |
|  | T <sub>VJ</sub> =T <sub>VJM</sub><br>V <sub>R</sub> =0<br>t=10ms(50Hz), sine<br>t=8.3ms(60Hz), sine  | 20000<br>19100   |                  |
| (di/dt) <sub>cr</sub>  | T <sub>VJ</sub> =T <sub>VJM</sub><br>f=50Hz, t <sub>p</sub> =200us<br>V <sub>D</sub> =2/3V <sub>DRM</sub><br>I <sub>G</sub> =0.45A<br>di <sub>G</sub> /dt=0.45A/us | repetitive, I <sub>T</sub> =250A<br>150                  | A/us             |
|  |  | non repetitive, I <sub>T</sub> =I <sub>TAVM</sub><br>500 |                  |
| (dv/dt) <sub>cr</sub>  | T <sub>VJ</sub> =T <sub>VJM</sub> ;<br>R <sub>GK</sub> =∞; method 1 (linear voltage rise)  | V <sub>DR</sub> =2/3V <sub>DRM</sub><br>1000             | V/us             |
| P <sub>GM</sub>  | T <sub>VJ</sub> =T <sub>VJM</sub><br>I <sub>T</sub> =I <sub>TAVM</sub><br>t <sub>p</sub> =30us<br>t <sub>p</sub> =300us  | 10<br>5  | W                |
| P <sub>GAV</sub>   |  | 0.5  | W                |
| V <sub>RGM</sub>   |  | 10   | V                |
| T <sub>VJ</sub><br>T <sub>VJM</sub><br>T <sub>stg</sub>                        |  | -40...+125<br>125<br>-40...+125                          | °C               |
| V <sub>ISOL</sub>  | 50/60Hz, RMS<br>I <sub>ISOL</sub> ≤1mA<br>t=1min<br>t=1s   | 3000<br>3600   | V~               |
| M <sub>d</sub>   | 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  | 78   | g                |



# STD116GKXX

## Thyristor-Diode Modules

| Symbol             | Test Conditions   | Characteristic Values | Unit      |
|--------------------|---|-----------------------|-----------|
| $I_{RRM}, I_{DRM}$ | $T_{VJ}=T_{VJM}; V_R=V_{RRM}; V_D=V_{DRM}$  | 5                     | mA        |
| $V_T, V_F$         | $I_T, I_F=300A; T_{VJ}=25^{\circ}C$   | 1.5                   | V         |
| $V_{TO}$           | For power-loss calculations only ( $T_{VJ}=125^{\circ}C$ )  | 0.8                   | V         |
| $r_T$              |   | 2.4                   | $m\Omega$ |
| $V_{GT}$           | $V_D=6V;$<br>$T_{VJ}=25^{\circ}C$<br>$T_{VJ}=-40^{\circ}C$  | 2.5<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        |
| $V_{GD}$           | $T_{VJ}=T_{VJM};$<br>$V_D=2/3V_{DRM}$   | 0.2                   | V         |
| $I_{GD}$           |   | 10                    | mA        |
| $I_L$              | $T_{VJ}=25^{\circ}C; t_p=10\mu s; V_D=6V$<br>$I_G=0.45A; di_G/dt=0.45A/\mu s$                             | 450                   | mA        |
| $I_H$              | $T_{VJ}=25^{\circ}C; V_D=6V; R_{GK}=\infty$   | 200                   | mA        |
| $t_{gd}$           | $T_{VJ}=25^{\circ}C; V_D=1/2V_{DRM}$<br>$I_G=0.45A; di_G/dt=0.45A/\mu s$                                  | 2                     | $\mu s$   |
| $t_q$              | $T_{VJ}=T_{VJM}; I_T=150A; t_p=200\mu s; -di/dt=10A/\mu s$<br>$V_R=100V; dv/dt=20V/\mu s; V_D=2/3V_{DRM}$ | 185                   | $\mu s$   |
| $Q_S$              | $T_{VJ}=T_{VJM}; I_T, I_F=50A; -di/dt=6A/\mu s$   | 170                   | $\mu C$   |
| $I_{RM}$           |   | 45                    | A         |
| $R_{thJC}$         | per thyristor/diode; DC current<br>per module   | 0.22<br>0.11          | K/W       |
| $R_{thJK}$         | per thyristor/diode; DC current<br>per module   | 0.42<br>0.21          | 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
- \* DCB base plate
- \* Glass passivated chips
- \* Isolation voltage 3600 V~
- \* UL File NO.E310749
- \* RoHS compliant

### 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



# STD116GKXX

## Thyristor-Diode Modules

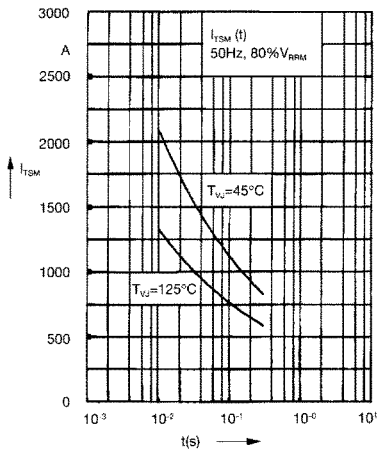


Fig. 1 Surge overload current  
 $I_{TSM}$ ,  $I_{FSM}$ : Crest value, t: duration

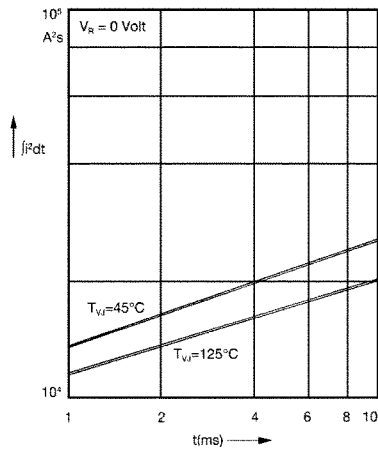


Fig. 2  $\int i^2 dt$  versus time (1-10 ms)

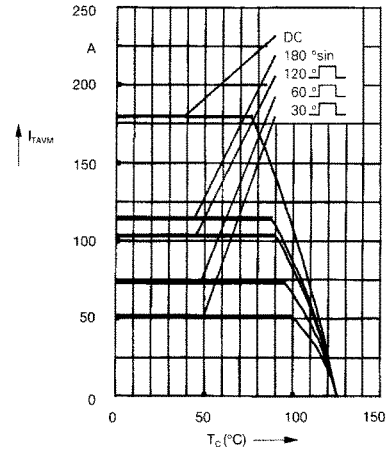


Fig. 2a Maximum forward current at case temperature

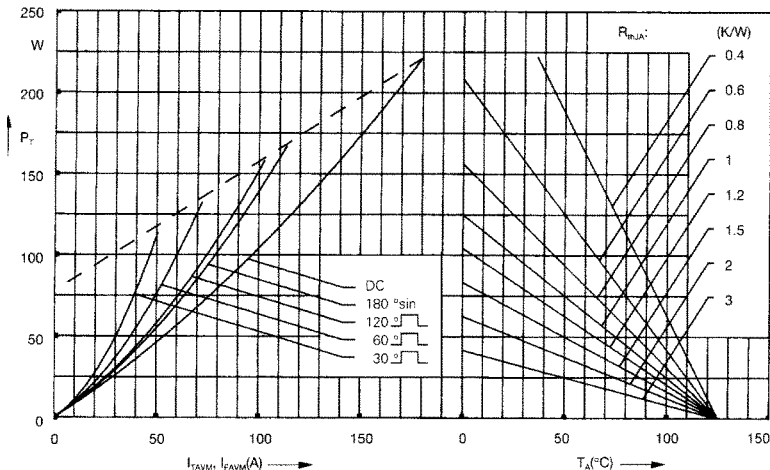


Fig. 3 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

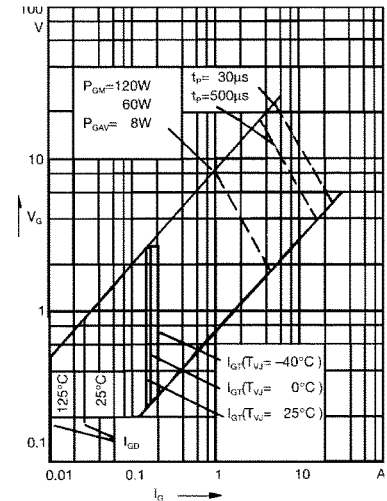


Fig. 4 Gate trigger characteristics

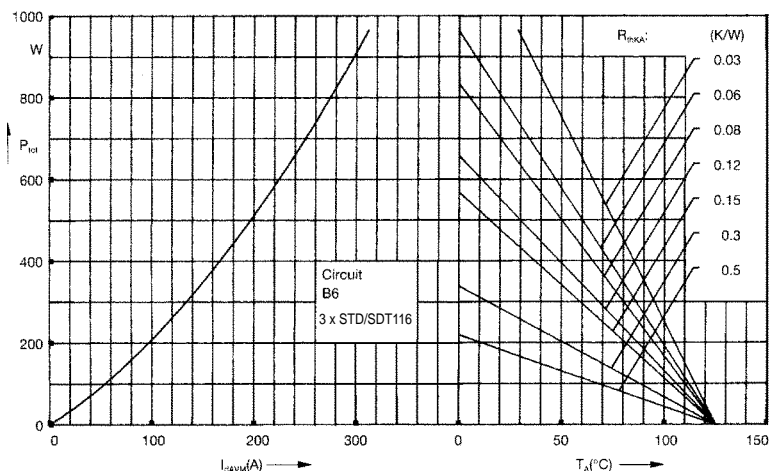


Fig. 5 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

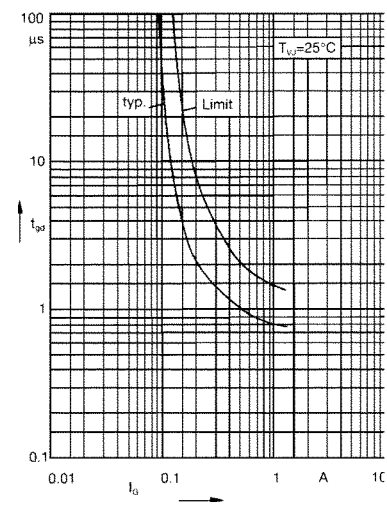


Fig. 6 Gate trigger delay time



# STD116GKXX

## Thyristor-Diode Modules

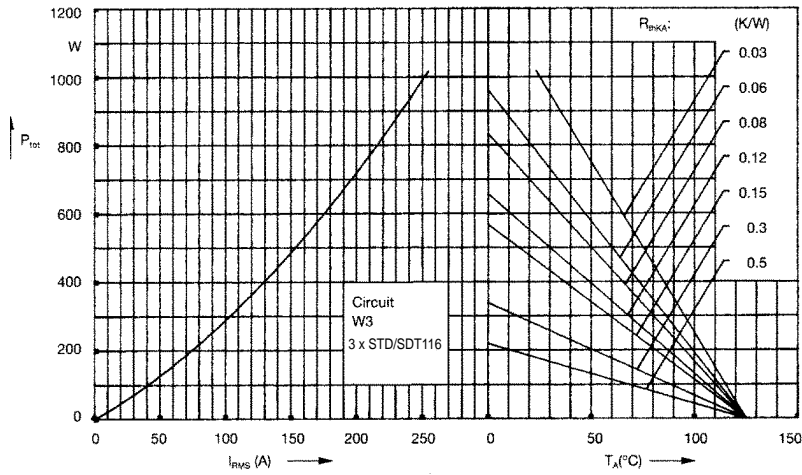


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

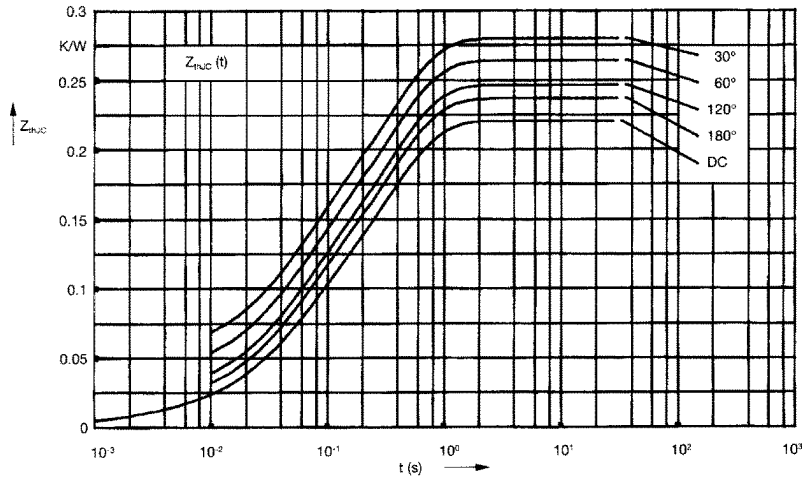


Fig. 8 Transient thermal impedance junction to case (per thyristor or diode)

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

| d     | $R_{thJC}$ (K/W) |
|-------|------------------|
| DC    | 0.22             |
| 180°C | 0.23             |
| 120°C | 0.25             |
| 60°C  | 0.27             |
| 30°C  | 0.28             |

Constants for  $Z_{thJC}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.0066          | 0.0019    |
| 2 | 0.0678          | 0.0477    |
| 3 | 0.1456          | 0.344     |

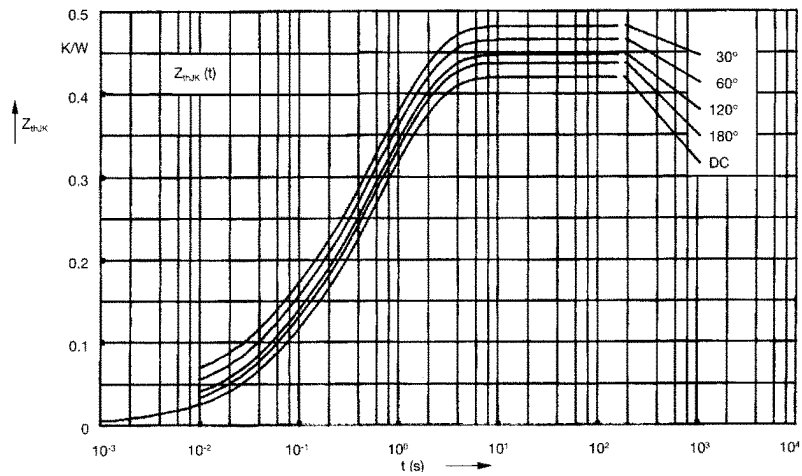


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor or diode)

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

| d     | $R_{thJK}$ (K/W) |
|-------|------------------|
| DC    | 0.42             |
| 180°C | 0.43             |
| 120°C | 0.45             |
| 60°C  | 0.47             |
| 30°C  | 0.48             |

Constants for  $Z_{thJK}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.0066          | 0.0019    |
| 2 | 0.0678          | 0.0477    |
| 3 | 0.1456          | 0.344     |
| 4 | 0.2             | 1.32      |

