Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!


## Contact us


Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

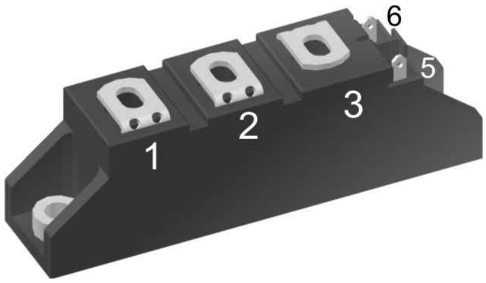
# Thyristor Module

| | | |
|---|---|---|
| $V_{RRM}$ | = 2x | 800 V |
| $I_{TAV}$ | = | 18 A |
| $V_T$ | = | 1.57 V |

Phase leg

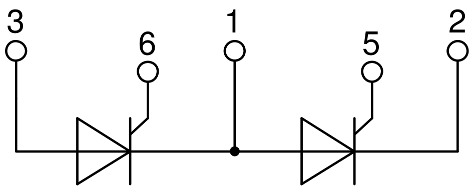
**Part number**

**MCC19-08io8B**




Backside: isolated

E72873




**Features / Advantages:**

- Thyristor for line frequency
- Planar passivated chip
- Long-term stability
- Direct Copper Bonded Al2O3-ceramic

**Applications:**

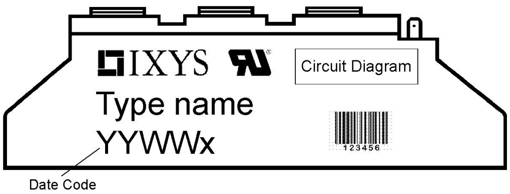
- Line rectifying 50/60 Hz
- Softstart AC motor control
- DC Motor control
- Power converter
- AC power control
- Lighting and temperature control

**Package:** TO-240AA

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

| Thyristor | | | | Ratings | | | |
|---|---|---|---|---|---|---|---|
| **Symbol** | **Definition** | **Conditions** | | **min.** | **typ.** | **max.** | **Unit** |
| $V_{RSM/DSM}$ | *max. non-repetitive reverse/forward blocking voltage* | | $T_{VJ}$ = 25°C | | | 900 | V |
| $V_{RRM/DRM}$ | *max. repetitive reverse/forward blocking voltage* | | $T_{VJ}$ = 25°C | | | 800 | V |
| $I_{R/D}$ | *reverse current, drain current* | $V_{R/D}$ = 800 V | $T_{VJ}$ = 25°C | | | 100 | µA |
| | | $V_{R/D}$ = 800 V | $T_{VJ}$ = 125°C | | | 3 | mA |
| $V_T$ | *forward voltage drop* | $I_T$ = 40 A | $T_{VJ}$ = 25°C | | | 1.56 | V |
| | | $I_T$ = 80 A | | | | 2.05 | V |
| | | $I_T$ = 40 A | $T_{VJ}$ = 125°C | | | 1.57 | V |
| | | $I_T$ = 80 A | | | | 2.29 | V |
| $I_{TAV}$ | *average forward current* | $T_C$ = 85°C | $T_{VJ}$ = 125°C | | | 18 | A |
| $I_{T(RMS)}$ | *RMS forward current* | 180° sine | | | | 28 | A |
| $V_{T0}$ | *threshold voltage* | *for power loss calculation only* | $T_{VJ}$ = 125°C | | | 0.85 | V |
| $r_T$ | *slope resistance* | | | | | 18 | mΩ |
| $R_{thJC}$ | *thermal resistance junction to case* | | | | | 1.3 | K/W |
| $R_{thCH}$ | *thermal resistance case to heatsink* | | | | 0.20 | | K/W |
| $P_{tot}$ | *total power dissipation* | | $T_C$ = 25°C | | | 77 | W |
| $I_{TSM}$ | *max. forward surge current* | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 45°C | | | 400 | A |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 430 | A |
| | | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 125°C | | | 340 | A |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 365 | A |
| $I^2t$ | *value for fusing* | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 45°C | | | 800 | $A^2s$ |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 770 | $A^2s$ |
| | | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 125°C | | | 580 | $A^2s$ |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 555 | $A^2s$ |
| $C_J$ | *junction capacitance* | $V_R$ = 400 V f = 1 MHz | $T_{VJ}$ = 25°C | | 22 | | pF |
| $P_{GM}$ | *max. gate power dissipation* | $t_P$ = 30 µs | $T_C$ = 125°C | | | 10 | W |
| | | $t_P$ = 300 µs | | | | 5 | W |
| $P_{GAV}$ | *average gate power dissipation* | | | | | 0.5 | W |
| $(di/dt)_{cr}$ | *critical rate of rise of current* | $T_{VJ}$ = 125°C; f = 50 Hz | repetitive, $I_T$ = 45 A | | | 150 | A/µs |
| | | $t_P$ = 200 µs; $di_G/dt$ = 0.45 A/µs; | | | | | |
| | | $I_G$ = 0.45 A; V = ⅔ $V_{DRM}$ | non-repet., $I_T$ = 18 A | | | 500 | A/µs |
| $(dv/dt)_{cr}$ | *critical rate of rise of voltage* | V = ⅔ $V_{DRM}$ | $T_{VJ}$ = 125°C | | | 1000 | V/µs |
| | | $R_{GK}$ = ∞; method 1 (linear voltage rise) | | | | | |
| $V_{GT}$ | *gate trigger voltage* | $V_D$ = 6 V | $T_{VJ}$ = 25°C | | | 1.5 | V |
| | | | $T_{VJ}$ = -40°C | | | 1.6 | V |
| $I_{GT}$ | *gate trigger current* | $V_D$ = 6 V | $T_{VJ}$ = 25°C | | | 100 | mA |
| | | | $T_{VJ}$ = -40°C | | | 200 | mA |
| $V_{GD}$ | *gate non-trigger voltage* | $V_D$ = ⅔ $V_{DRM}$ | $T_{VJ}$ = 125°C | | | 0.2 | V |
| $I_{GD}$ | *gate non-trigger current* | | | | | 5 | mA |
| $I_L$ | *latching current* | $t_p$ = 10 µs | $T_{VJ}$ = 25°C | | | 450 | mA |
| | | $I_G$ = 0.45 A; $di_G/dt$ = 0.45 A/µs | | | | | |
| $I_H$ | *holding current* | $V_D$ = 6 V $R_{GK}$ = ∞ | $T_{VJ}$ = 25°C | | | 200 | mA |
| $t_{gd}$ | *gate controlled delay time* | $V_D$ = ½ $V_{DRM}$ | $T_{VJ}$ = 25°C | | | 2 | µs |
| | | $I_G$ = 0.45 A; $di_G/dt$ = 0.45 A/µs | | | | | |
| $t_q$ | *turn-off time* | $V_R$ = 100 V; $I_T$ = 20 A; V = ⅔ $V_{DRM}$ | $T_{VJ}$ = 100 °C | | 150 | | µs |
| | | di/dt = 10 A/µs dv/dt = 20 V/µs $t_p$ = 200 µs | | | | | |

| Package TO-240AA | | | | | Ratings | | |
|---|---|---|---|---|---|---|---|
| **Symbol** | **Definition** | **Conditions** | | **min.** | **typ.** | **max.** | **Unit** |
| $I_{RMS}$ | *RMS current* | per terminal | | | | 200 | A |
| $T_{VJ}$ | *virtual junction temperature* | | | -40 | | 125 | °C |
| $T_{op}$ | *operation temperature* | | | -40 | | 100 | °C |
| $T_{stg}$ | *storage temperature* | | | -40 | | 125 | °C |
| **Weight** | | | | | 81 | | g |
| $M_D$ | *mounting torque* | | | 2.5 | | 4 | Nm |
| $M_T$ | *terminal torque* | | | 2.5 | | 4 | Nm |
| $d_{Spp/App}$ | *creepage distance on surface \| striking distance through air* | *terminal to terminal* | 13.0 | 9.7 | | | mm |
| $d_{Spb/Apb}$ | | *terminal to backside* | 16.0 | 16.0 | | | mm |
| $V_{ISOL}$ | *isolation voltage* | t = 1 second; 50/60 Hz, RMS; $I_{ISOL} \le 1$ mA | | 3600 | | | V |
| | | t = 1 minute | | 3000 | | | V |

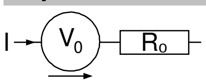



| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|---|---|---|---|---|---|
| Standard | MCC19-08io8B | MCC19-08io8B | Box | 36 | 457779 |

| Similar Part | Package | Voltage class |
|---|---|---|
| MCMA25P1200TA | TO-240AA-1B | 1200 |
| MCMA35P1200TA | TO-240AA-1B | 1200 |

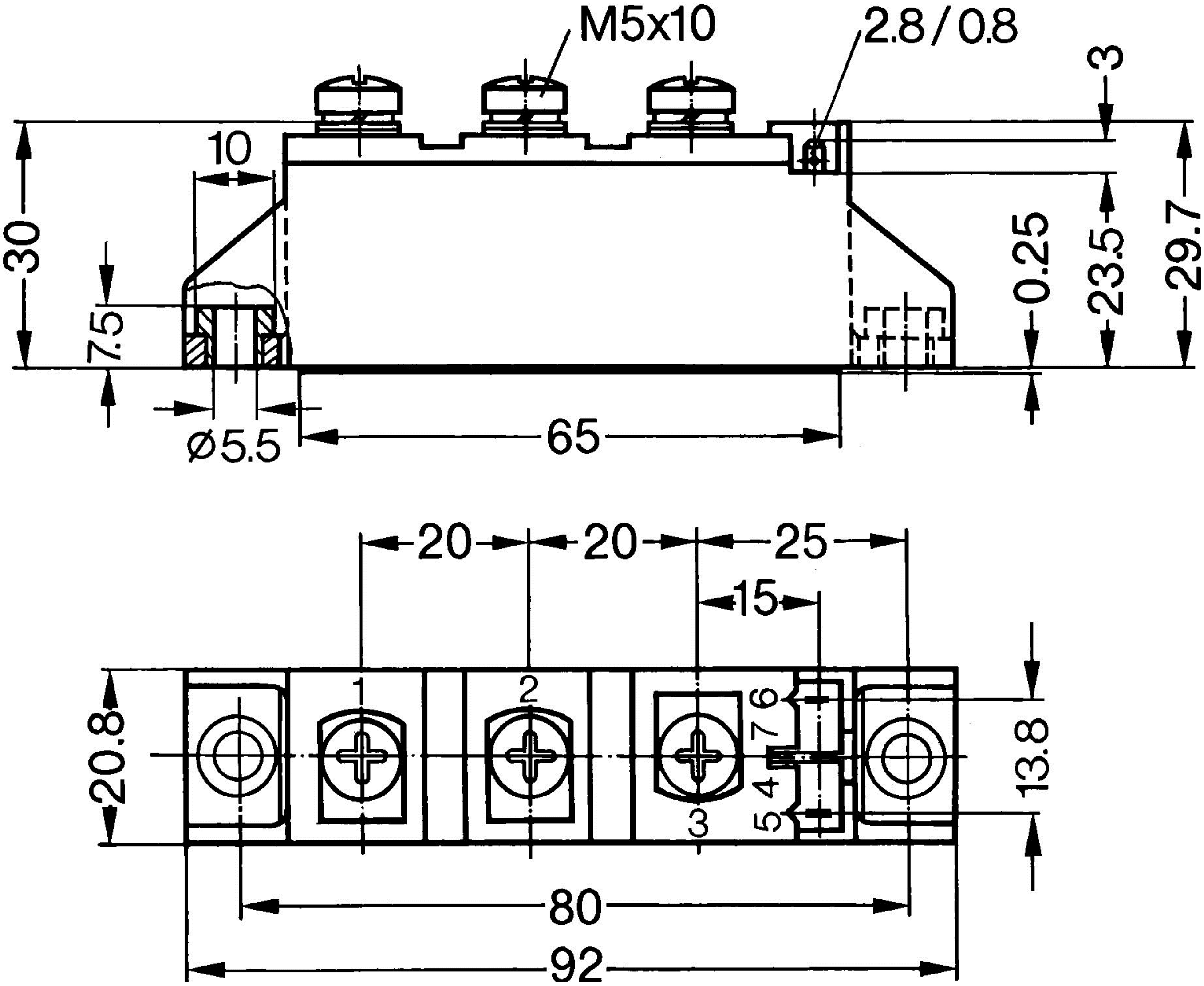
## Equivalent Circuits for Simulation

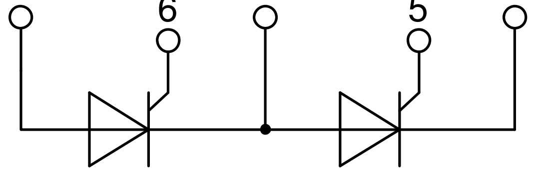
** on die level* $T_{VJ} = 125\,°C$




| | | Thyristor | |
|---|---|---|---|
| $V_{0\,max}$ | *threshold voltage* | 0.85 | V |
| $R_{0\,max}$ | *slope resistance ** | 16.8 | mΩ |

## Outlines TO-240AA



## Thyristor

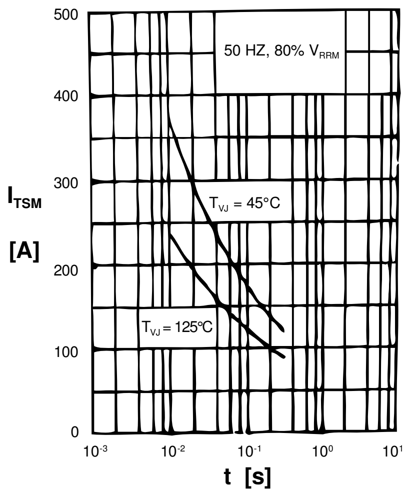



Fig. 1 Surge overload current
$I_{TSM}$: Crest value, t: duration

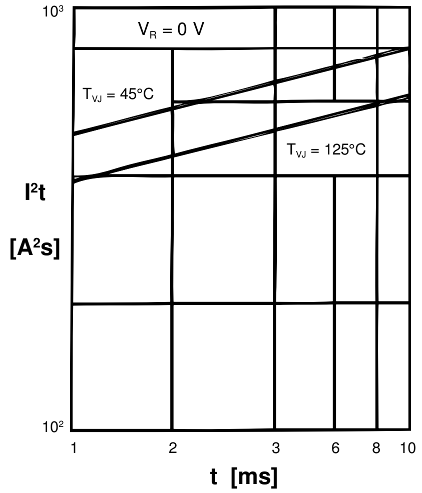



Fig. 2 $I^2t$ versus time (1-10 ms)

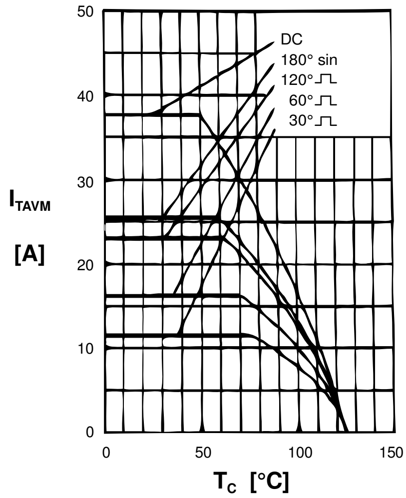



Fig. 3 Max. forward current
at case temperature

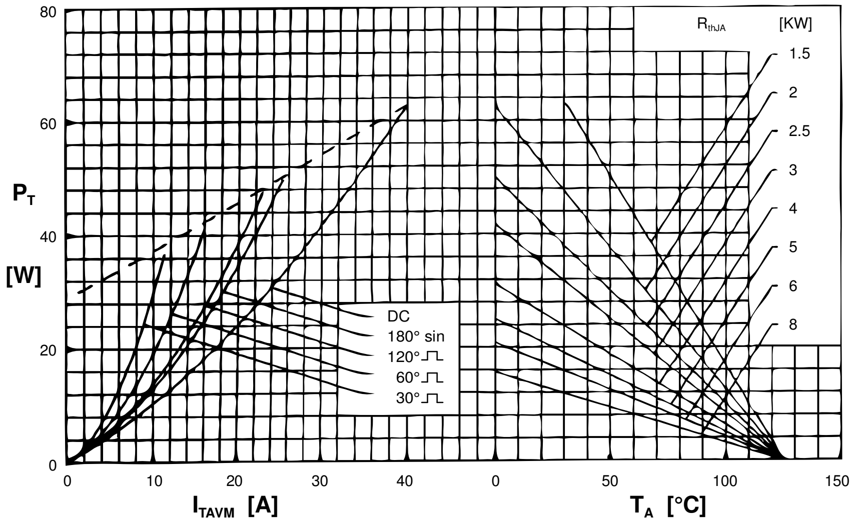



Fig. 4 Power dissipation versus onstate current & ambient temp. (per thyristor)

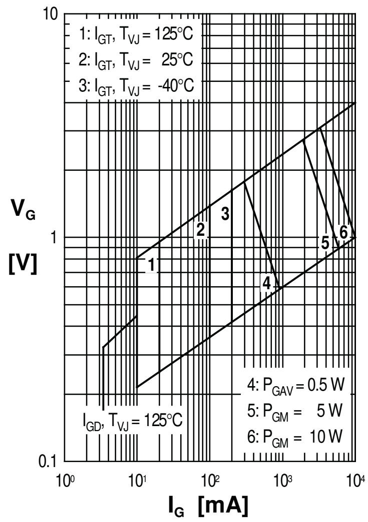



Fig. 5 Gate trigger charact.

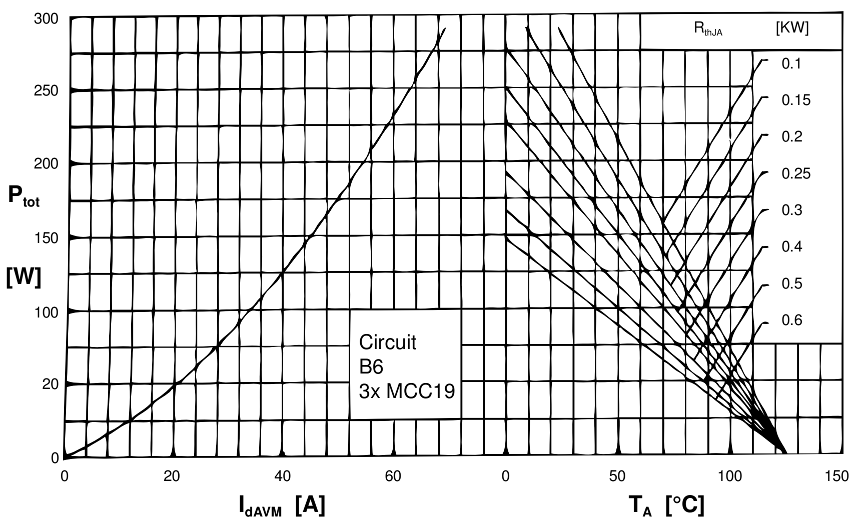



Fig. 6 Three phase rectifier bridge: Power dissipation versus direct
output current and ambient temperature

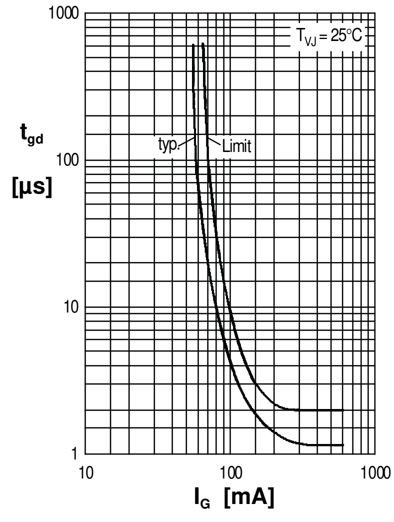



Fig. 7 Gate trigger delay time

## Thyristor

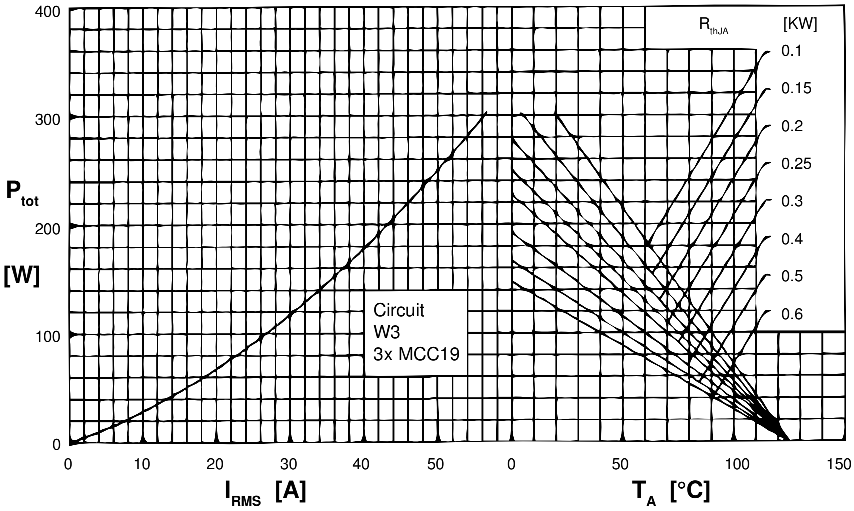



Fig. 8 Three phase AC-controller: Power dissipation vs. RMS output current and ambient temperature

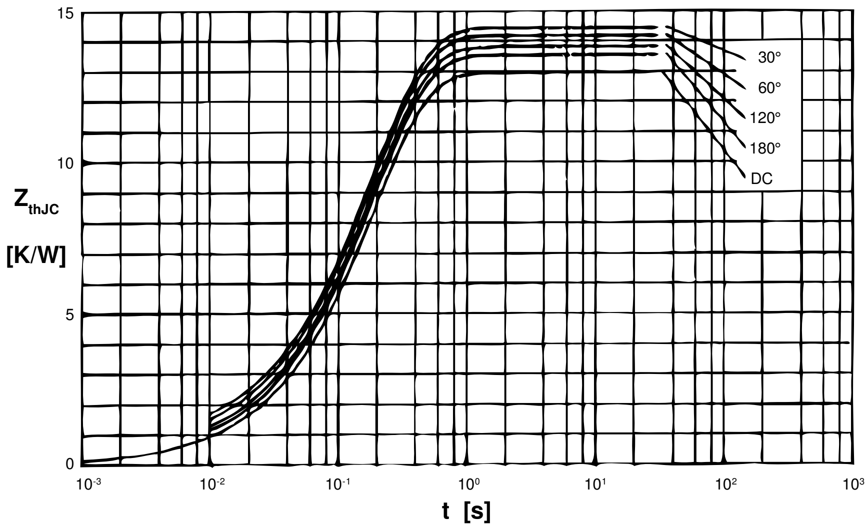



Fig. 9 Transient thermal impedance junction to case (per thyristor)

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

| d | $R_{thJC}$ [K/W] |
|---|---|
| DC | 1.30 |
| 180° | 1.35 |
| 120° | 1.39 |
| 60° | 1.42 |
| 30° | 1.45 |

Constants for $Z_{thJC}$ calculation:

| i | $R_{thi}$ [K/W] | $t_i$ [s] |
|---|---|---|
| 1 | 0.018 | 0.0033 |
| 2 | 0.041 | 0.0216 |
| 3 | 1.241 | 0.1910 |

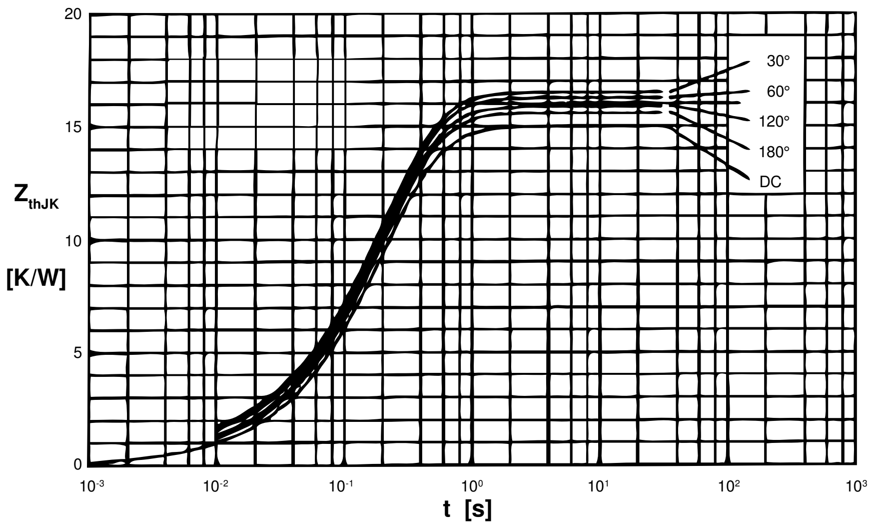



Fig. 10 Transient thermal impedance junction to heatsink (per thyristor)

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

| d | $R_{thJK}$ [K/W] |
|---|---|
| DC | 1.50 |
| 180° | 1.55 |
| 120° | 1.59 |
| 60° | 1.62 |
| 30° | 1.65 |

Constants for $Z_{thJK}$ calculation:

| i | $R_{thi}$ [K/W] | $t_i$ [s] |
|---|---|---|
| 1 | 0.018 | 0.0033 |
| 2 | 0.041 | 0.0216 |
| 3 | 1.241 | 0.1910 |
| 4 | 0.200 | 0.4600 |