

Thyristor Module

$$V_{RRM} = 2 \times 1200 \text{ V}$$

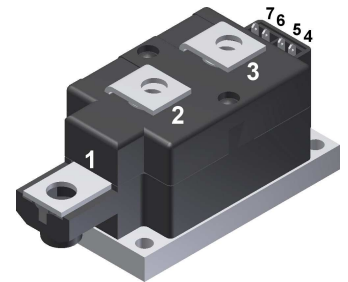
$$I_{TAV} = 220 \text{ A}$$

$$V_T = 1.18 \text{ V}$$


Phase leg

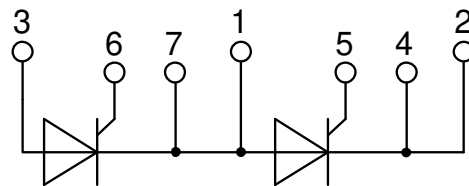
Part number

MCC225-12io1



Backside: isolated

 E72873



Features / Advantages:

- International standard package
- Direct copper bonded Al₂O₃-ceramic with copper base plate
- Planar passivated chip
- Keyed gate/cathode twin pins

Applications:

- Motor control, softstarter
- Power converter
- Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Solid state switches

Package: Y1

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Base plate: Copper internally DCB isolated
- Advanced power cycling

Disclaimer Notice

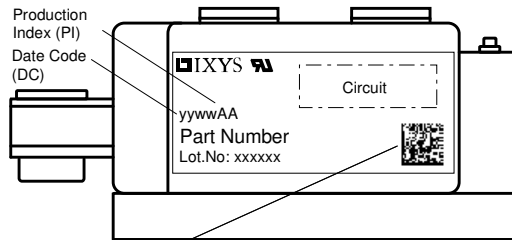
Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.



| Rectifier | | | Ratings | | | |
|----------------|--|---|---------------------------|------|-------|-------------------|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit |
| $V_{RSM/DSM}$ | max. non-repetitive reverse/forward blocking voltage | $T_{VJ} = 25^{\circ}C$ | | | 1300 | V |
| $V_{RRM/DRM}$ | max. repetitive reverse/forward blocking voltage | $T_{VJ} = 25^{\circ}C$ | | | 1200 | V |
| I_{RD} | reverse current, drain current | $V_{R/D} = 1200 V$ | $T_{VJ} = 25^{\circ}C$ | | 1 | mA |
| | | $V_{R/D} = 1200 V$ | $T_{VJ} = 125^{\circ}C$ | | 40 | mA |
| V_T | forward voltage drop | $I_T = 200 A$ | $T_{VJ} = 25^{\circ}C$ | | 1.04 | V |
| | | $I_T = 400 A$ | | | 0.97 | V |
| | | $I_T = 200 A$ | $T_{VJ} = 125^{\circ}C$ | | 1.18 | V |
| | | $I_T = 400 A$ | | | 1.14 | V |
| I_{TAV} | average forward current | $T_C = 85^{\circ}C$ | $T_{VJ} = 140^{\circ}C$ | | 220 | A |
| $I_{T(RMS)}$ | RMS forward current | 180° sine | | | 400 | A |
| V_{T0} | threshold voltage | } for power loss calculation only | $T_{VJ} = 140^{\circ}C$ | | 0.79 | V |
| r_T | slope resistance | | | | 0.83 | mΩ |
| R_{thJC} | thermal resistance junction to case | | | | 0.157 | K/W |
| R_{thCH} | thermal resistance case to heatsink | | | 0.04 | | K/W |
| P_{tot} | total power dissipation | | $T_C = 25^{\circ}C$ | | 730 | W |
| I_{TSM} | max. forward surge current | $t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$ | $T_{VJ} = 45^{\circ}C$ | | 8.00 | kA |
| | | $t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$ | $V_R = 0 V$ | | 8.64 | kA |
| | | $t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$ | $T_{VJ} = 140^{\circ}C$ | | 6.80 | kA |
| | | $t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$ | $V_R = 0 V$ | | 7.35 | kA |
| I^2t | value for fusing | $t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$ | $T_{VJ} = 45^{\circ}C$ | | 320.0 | kA ² s |
| | | $t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$ | $V_R = 0 V$ | | 310.5 | kA ² s |
| | | $t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$ | $T_{VJ} = 140^{\circ}C$ | | 231.2 | kA ² s |
| | | $t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$ | $V_R = 0 V$ | | 224.4 | kA ² s |
| C_J | junction capacitance | $V_R = 400 V \quad f = 1 \text{ MHz}$ | $T_{VJ} = 25^{\circ}C$ | | 366 | pF |
| P_{GM} | max. gate power dissipation | $t_p = 30 \mu s$ | $T_C = 140^{\circ}C$ | | 120 | W |
| | | $t_p = 500 \mu s$ | | | 60 | W |
| P_{GAV} | average gate power dissipation | | | | 20 | W |
| $(di/dt)_{cr}$ | critical rate of rise of current | $T_{VJ} = 140^{\circ}C; f = 50 \text{ Hz}$ | repetitive, $I_T = 660 A$ | | 100 | A/μs |
| | | $t_p = 200 \mu s; di_G/dt = 1 A/\mu s;$ | non-repet., $I_T = 220 A$ | | 500 | A/μs |
| $(dv/dt)_{cr}$ | critical rate of rise of voltage | $V = \frac{2}{3} V_{DRM}$ | $T_{VJ} = 140^{\circ}C$ | | 1000 | V/μs |
| | | $R_{GK} = \infty; \text{method 1 (linear voltage rise)}$ | | | | |
| V_{GT} | gate trigger voltage | $V_D = 6 V$ | $T_{VJ} = 25^{\circ}C$ | | 2 | V |
| | | | $T_{VJ} = -40^{\circ}C$ | | 3 | V |
| I_{GT} | gate trigger current | $V_D = 6 V$ | $T_{VJ} = 25^{\circ}C$ | | 150 | mA |
| | | | $T_{VJ} = -40^{\circ}C$ | | 220 | mA |
| V_{GD} | gate non-trigger voltage | $V_D = \frac{2}{3} V_{DRM}$ | $T_{VJ} = 140^{\circ}C$ | | 0.25 | V |
| I_{GD} | gate non-trigger current | | | | 10 | mA |
| I_L | latching current | $t_p = 30 \mu s$ | $T_{VJ} = 25^{\circ}C$ | | 200 | mA |
| | | $I_G = 0.45 A; di_G/dt = 0.45 A/\mu s$ | | | | |
| I_H | holding current | $V_D = 6 V \quad R_{GK} = \infty$ | $T_{VJ} = 25^{\circ}C$ | | 150 | mA |
| t_{gd} | gate controlled delay time | $V_D = \frac{1}{2} V_{DRM}$ | $T_{VJ} = 25^{\circ}C$ | | 2 | μs |
| | | $I_G = 1 A; di_G/dt = 1 A/\mu s$ | | | | |
| t_q | turn-off time | $V_R = 100 V; I_T = 220 A; V = \frac{2}{3} V_{DRM}$ | $T_{VJ} = 125^{\circ}C$ | | 200 | μs |
| | | $di/dt = 10 A/\mu s \quad dv/dt = 50 V/\mu s \quad t_p = 200 \mu s$ | | | | |



| Package Y1 | | | Ratings | | | |
|---------------|--|----------------------|---------|------|------|------|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit |
| I_{RMS} | RMS current | per terminal | | | 600 | A |
| T_{VJ} | virtual junction temperature | | -40 | | 140 | °C |
| T_{op} | operation temperature | | -40 | | 125 | °C |
| T_{stg} | storage temperature | | -40 | | 125 | °C |
| Weight | | | | 680 | | g |
| M_D | mounting torque | | 4.5 | | 7 | Nm |
| M_T | terminal torque | | 11 | | 13 | Nm |
| $d_{Spp/App}$ | creepage distance on surface striking distance through air | terminal to terminal | 16.0 | | | mm |
| $d_{Spb/Apb}$ | | terminal to backside | 16.0 | | | mm |
| V_{ISOL} | isolation voltage | t = 1 second | 3600 | | | V |
| | | t = 1 minute | 3000 | | | V |



Data Matrix: part no. (1-19), DC + PI (20-25), lot.no.# (26-31), blank (32), serial no.# (33-36)

| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | MCC225-12io1 | MCC225-12io1 | Box | 3 | 463280 |

Equivalent Circuits for Simulation

* on die level

$T_{VJ} = 140^{\circ}C$

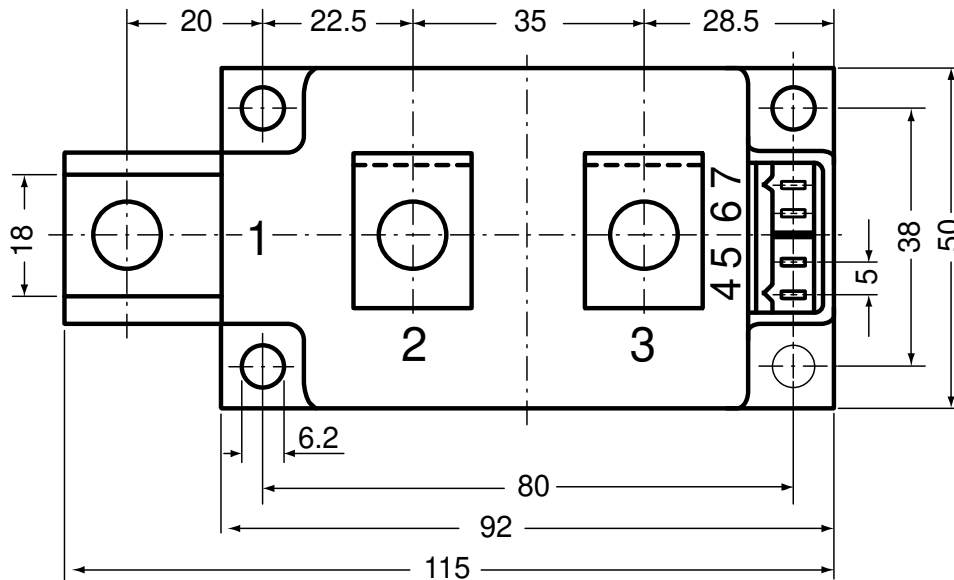
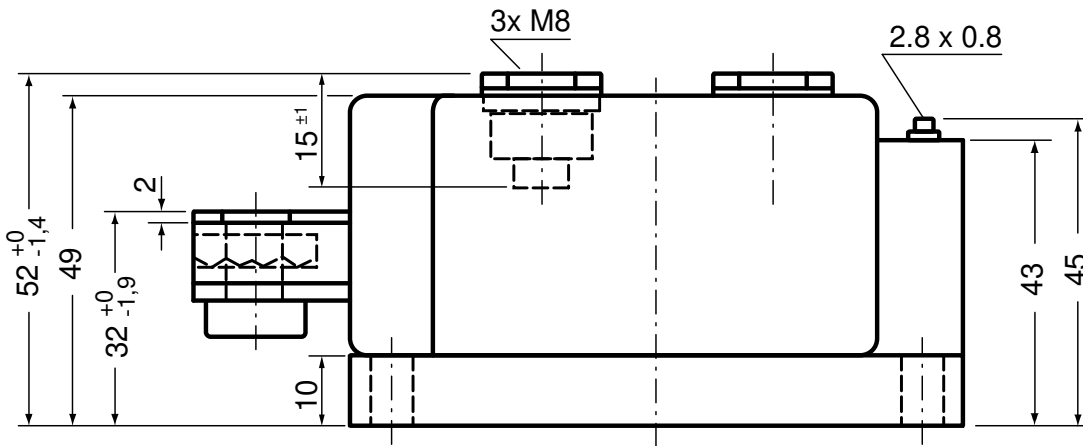


Thyristor

| | | | |
|--------------|--------------------|------|----|
| $V_{0\ max}$ | threshold voltage | 0.79 | V |
| $R_{0\ max}$ | slope resistance * | 0.64 | mΩ |



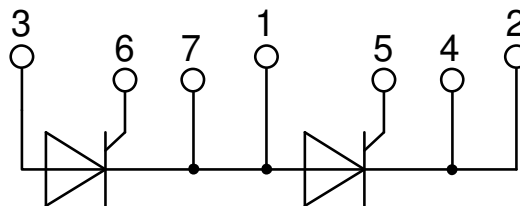
Outlines Y1



Optional accessories for modules

Keyed gate/cathode twin plugs with wire length = 350 mm, gate = white, cathode = red

Type ZY 180L (L = Left for pin pair 4/5)
Type ZY 180R (R = Right for pin pair 6/7) } UL 758, style 3751



Thyristor

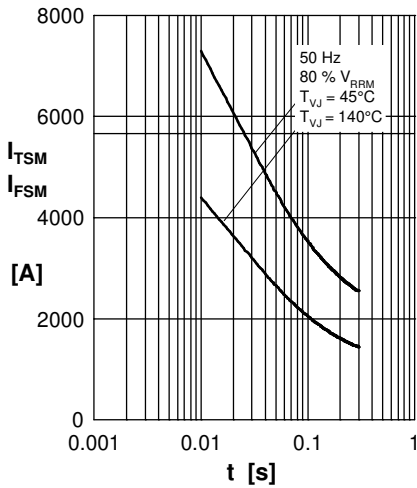


Fig. 1 Surge overload current
 $I_{TSM/FSM}$: Crest value, t : duration

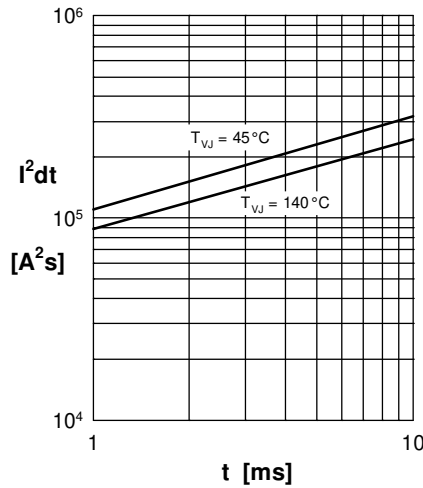


Fig. 2 I^2dt versus time

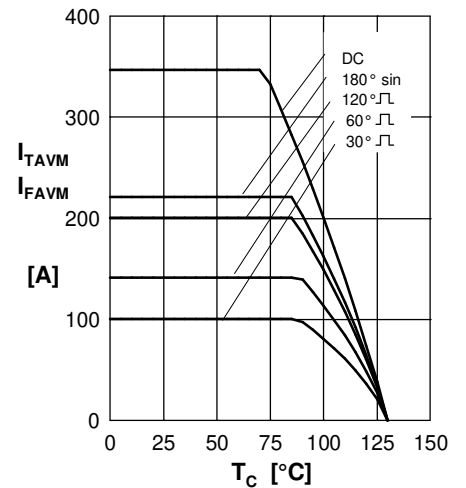


Fig. 3 Max. forward current at case temperature

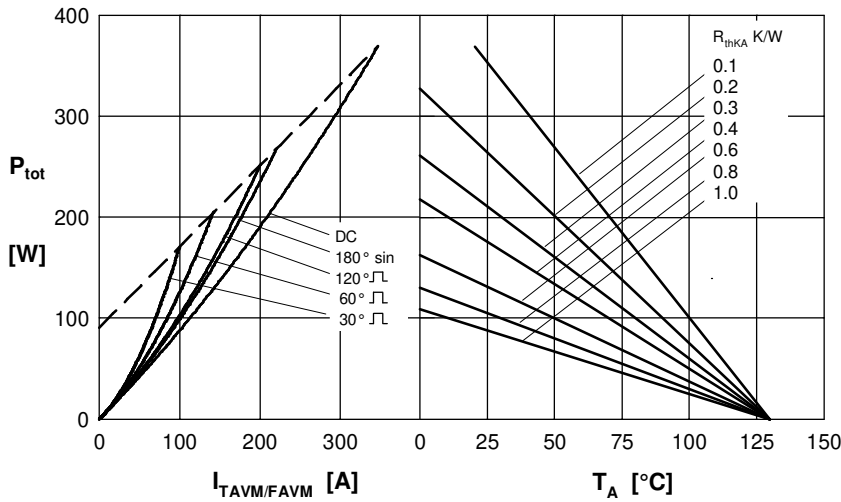


Fig. 4 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

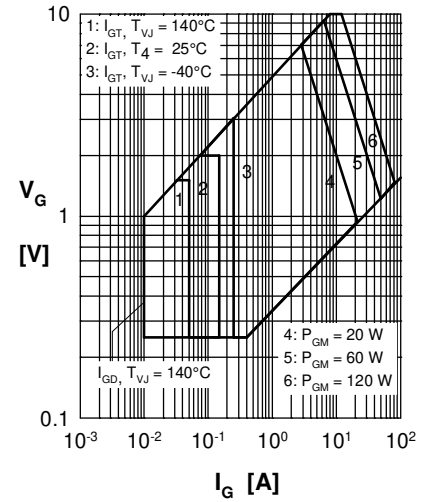


Fig. 5 Gate voltage and current

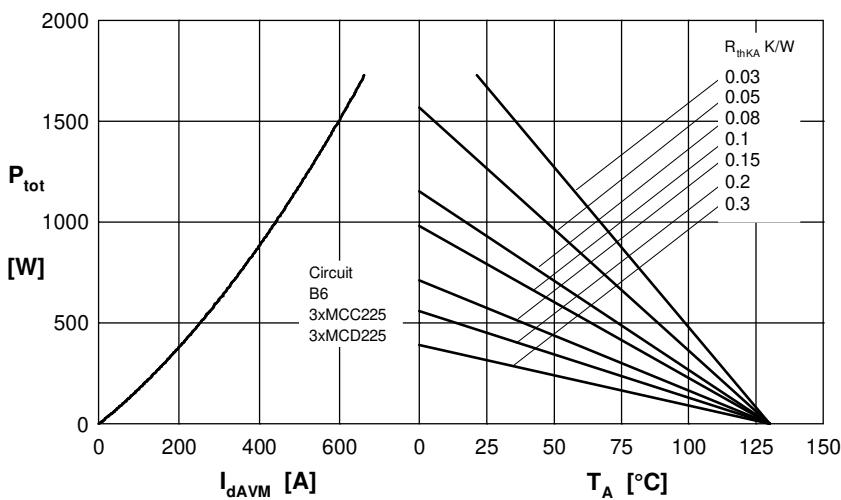


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

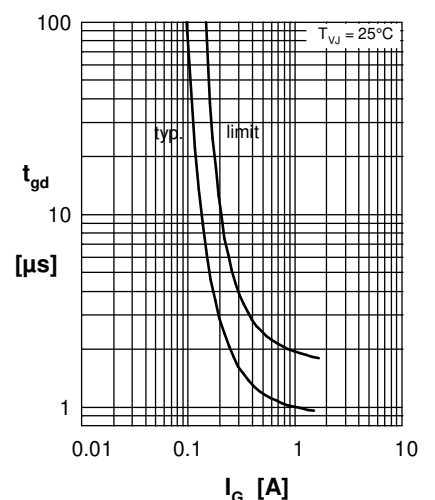


Fig. 7 Gate trigger characteristics

Rectifier

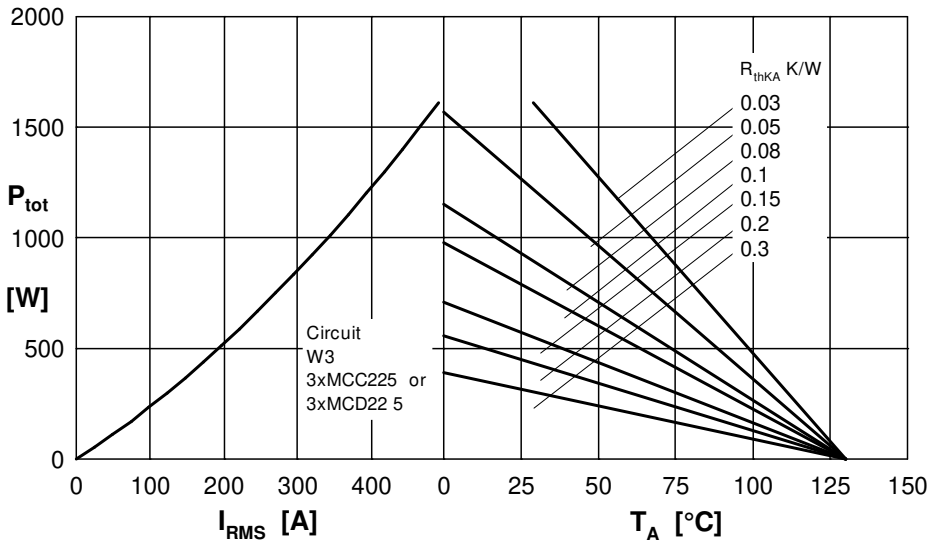


Fig. 8 Three phase AC-controller: Power dissipation versus R_{MS} output current and ambient temperature

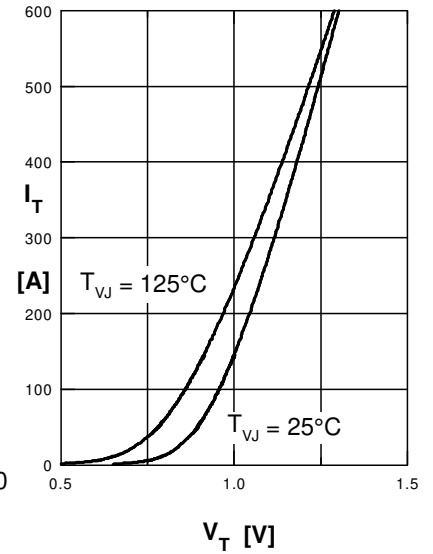


Fig. 9 Forward characteristics

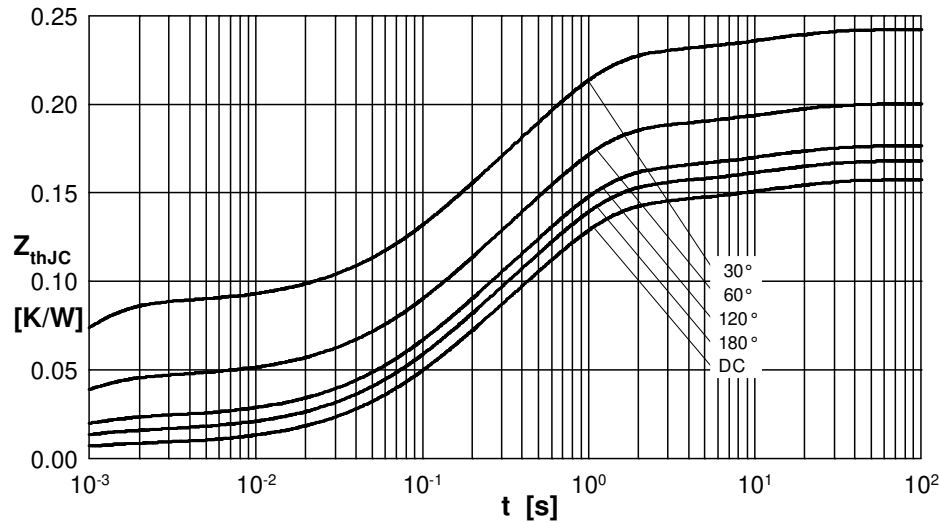


Fig. 10 Transient thermal impedance junction to case (per thyristor/diode)

R_{thJC} for various conduct. angles d:

| d | R_{thJC} (K/W) |
|------|------------------|
| DC | 0.157 |
| 180° | 0.168 |
| 120° | 0.177 |
| 60° | 0.200 |
| 30° | 0.243 |

Constants for Z_{thJC} calculation:

| i | R_{th} (K/W) | t (s) |
|---|----------------|---------|
| 1 | 0.0076 | 0.00054 |
| 2 | 0.0406 | 0.09800 |
| 3 | 0.0944 | 0.54000 |
| 4 | 0.0147 | 12.0000 |

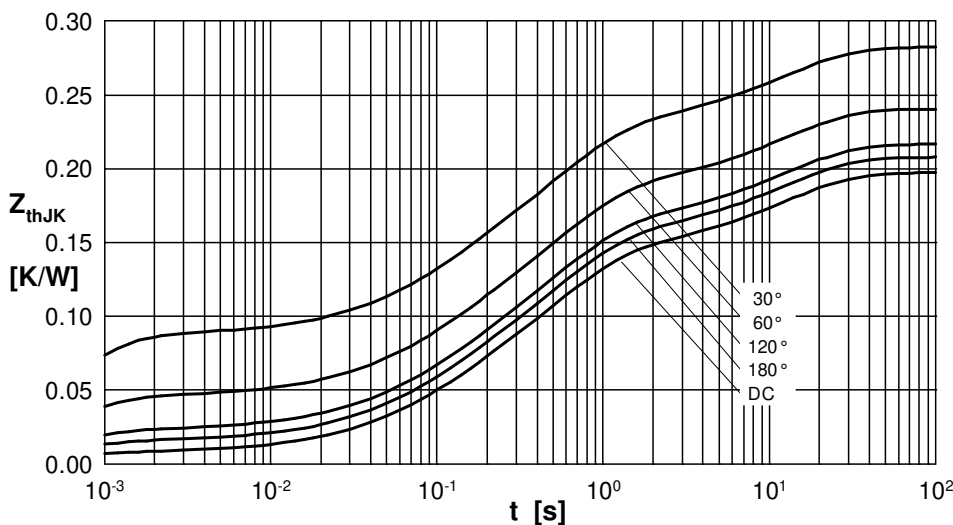


Fig. 11 Transient thermal impedance junction to heatsink (per thyristor/diode)

R_{thJK} for various conduct. angles d:

| d | R_{thJK} (K/W) |
|------|------------------|
| DC | 0.197 |
| 180° | 0.208 |
| 120° | 0.217 |
| 60° | 0.240 |
| 30° | 0.283 |

Constants for Z_{thJK} calculation:

| i | R_{th} (K/W) | t (s) |
|---|----------------|---------|
| 1 | 0.0076 | 0.00054 |
| 2 | 0.0406 | 0.09800 |
| 3 | 0.0944 | 0.54000 |
| 4 | 0.0147 | 12.0000 |
| 5 | 0.0400 | 12.0000 |

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: ocean@oceanchips.ru

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А