

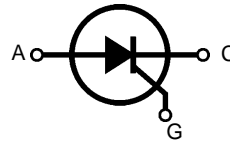
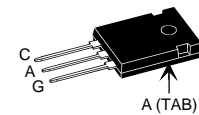
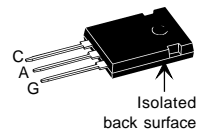
Phase Control Thyristor

$$V_{RRM} = 800-1600 \text{ V}$$

$$I_{T(RMS)} = 75 \text{ A}$$

$$I_{T(AV)M} = 48 \text{ A}$$

| V_{RSM} | V_{RRM} | Type |
|-----------|-----------|--------------------------|
| V_{DSM} | V_{DRM} | |
| V | V | |
| 900 | 800 | CS 45-08io1 |
| 1300 | 1200 | CS 45-12io1 |
| 1700 | 1600 | CS 45-16io1 CS 45-16io1R |


TO-247 AD
Version io1

ISOPLUS 247™
Version io1R


* Patent pending

C = Cathode, A = Anode, G = Gate

| Symbol | Conditions | Maximum Ratings | |
|----------------|---|------------------------------------|-----------------------|
| $I_{T(RMS)}$ | $T_{VJ} = T_{VJM}$ | 75 | A |
| $I_{T(AV)M}$ | $T_C = 75^\circ\text{C}; 180^\circ \text{ sine}$ | 48 | A |
| I_{TSM} | $T_{VJ} = 45^\circ\text{C}$ $V_R = 0 \text{ V}$ | $t = 10 \text{ ms (50 Hz), sine}$ | 520 A |
| | | $t = 8.3 \text{ ms (60 Hz), sine}$ | 560 A |
| I^2t | $T_{VJ} = 45^\circ\text{C}$ $V_R = 0 \text{ V}$ | $t = 10 \text{ ms (50 Hz), sine}$ | 460 A |
| | | $t = 8.3 \text{ ms (60 Hz), sine}$ | 500 A |
| I^2t | $T_{VJ} = T_{VJM}$ $V_R = 0 \text{ V}$ | $t = 10 \text{ ms (50 Hz), sine}$ | 1350 A ² s |
| | | $t = 8.3 \text{ ms (60 Hz), sine}$ | 1300 A ² s |
| $(di/dt)_{cr}$ | $T_{VJ} = T_{VJM}$ $f = 50 \text{ Hz}, t_p = 200 \mu\text{s}$ $V_D = \frac{2}{3} V_{DRM}$ $I_G = 0.3 \text{ A}$ $di_G/dt = 0.3 \text{ A}/\mu\text{s}$ | repetitive, $I_T = 40 \text{ A}$ | 150 A/ μs |
| | | non repetitive, $I_T = I_{T(AV)M}$ | 500 A/ μs |
| $(dv/dt)_{cr}$ | $T_{VJ} = T_{VJM};$ $R_{GK} = \infty;$ method 1 (linear voltage rise) | $V_{DR} = \frac{2}{3} V_{DRM}$ | 1000 V/ μs |
| P_{GM} | $T_{VJ} = T_{VJM}$ $I_T = I_{T(AV)M}$ | $t_p = 30 \mu\text{s}$ | 10 W |
| | | $t_p = 300 \mu\text{s}$ | 5 W |
| $P_{G(AV)}$ | | | 0.5 W |
| V_{RGM} | | | 10 V |
| T_{VJ} | | -40...+140 | °C |
| T_{VJM} | | 140 | °C |
| T_{stg} | | -40...+125 | °C |
| M_d | Version io1: | mounting torque M3 | 0.8...1.2 Nm |
| | Version io1R: | mounting force with clip | 20...120 N |
| V_{ISOL}^* | 50/60 Hz, RMS, $t = 1 \text{ minute, leads-to-tab}$ | 2500 | V~ |
| Weight | | 6 | g |

* Version io1R only

 Data according to IEC 60747
IXYS reserves the right to change limits, test conditions and dimensions

Features

- Thyristor for line frequency
- International standard package JEDEC TO-247
- Planar passivated chip
- Long-term stability of blocking currents and voltages
- Version AR isolated and UL registered E153432
- Epoxy meets UL 94V-0

Applications

- Motor control
- Power converter
- AC power controller
- Switch-mode and resonant mode power supplies
- Light and temperature control

Advantages

- Easy to mount with 1 screw (isolated mounting screw hole)
- Space and weight savings
- Simple mounting
- Improved temperature and power cycling

| Symbol | Conditions | Characteristic Values | |
|------------|--|-----------------------|---------------------|
| I_R, I_D | $T_{VJ} = T_{VJM}; V_R = V_{RRM}; V_D = V_{DRM}$ | \leq | 5 mA |
| V_T | $I_T = 80 \text{ A}; T_{VJ} = 25^\circ\text{C}$ | \leq | 1.64 V |
| V_{T0} | For power-loss calculations only ($T_{VJ} = 125^\circ\text{C}$) | | 0.85 V |
| r_T | | | 11 mΩ |
| V_{GT} | $V_D = 6 \text{ V}; T_{VJ} = 25^\circ\text{C}$ | \leq | 1.5 V |
| | $T_{VJ} = -40^\circ\text{C}$ | \leq | 1.6 V |
| I_{GT} | $V_D = 6 \text{ V}; T_{VJ} = 25^\circ\text{C}$ | \leq | 100 mA |
| | $T_{VJ} = -40^\circ\text{C}$ | \leq | 200 mA |
| V_{GD} | $T_{VJ} = T_{VJM}; V_D = \frac{2}{3} V_{DRM}$ | \leq | 0.2 V |
| I_{GD} | | \leq | 10 mA |
| I_L | $T_{VJ} = 25^\circ\text{C}; t_p = 10 \mu\text{s}$ $I_G = 0.3 \text{ A}; di_G/dt = 0.3 \text{ A}/\mu\text{s}$ | \leq | 150 mA |
| I_H | $T_{VJ} = 25^\circ\text{C}; V_D = 6 \text{ V}; R_{GK} = \infty$ | \leq | 100 mA |
| t_{gd} | $T_{VJ} = 25^\circ\text{C}; V_D = \frac{1}{2} V_{DRM}$ $I_G = 0.3 \text{ A}; di_G/dt = 0.3 \text{ A}/\mu\text{s}$ | \leq | 2 μs |
| R_{thJC} | DC current | | 0.62 K/W |
| R_{thJH} | DC current | | 0.82 K/W |
| a | Max. acceleration, 50 Hz | | 50 m/s ² |

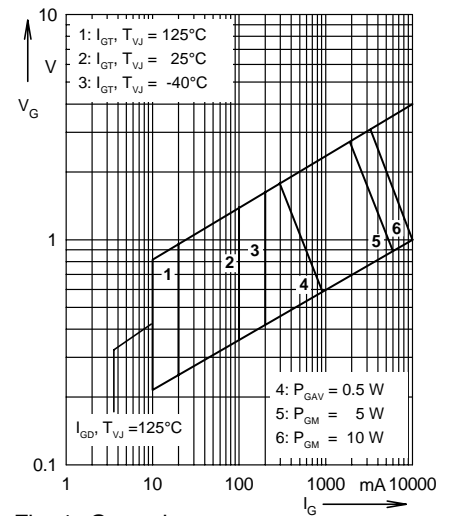


Fig. 1 Gate trigger range

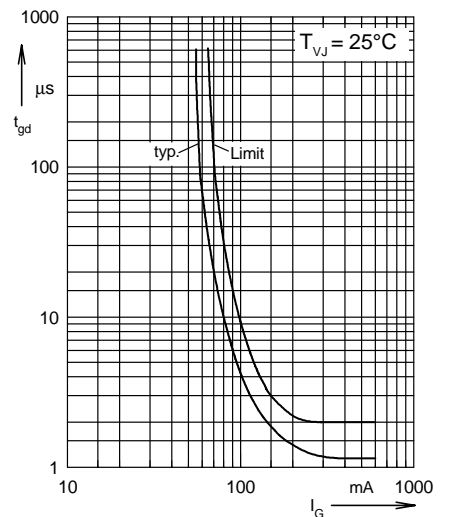


Fig. 2 Gate controlled delay time t_{gd}

TO-247 AD and ISOPLUS 247™

| Dim. | Millimeter | | Inches | |
|------|------------|-------|--------|-------|
| | Min. | Max. | Min. | Max. |
| A | 19.81 | 20.32 | 0.780 | 0.800 |
| B | 20.80 | 21.46 | 0.819 | 0.845 |
| C | 15.75 | 16.26 | 0.610 | 0.640 |
| D* | 3.55 | 3.65 | 0.140 | 0.144 |
| E | 4.32 | 5.49 | 0.170 | 0.216 |
| F | 5.4 | 6.2 | 0.212 | 0.244 |
| G | 1.65 | 2.13 | 0.065 | 0.084 |
| H | - | 4.5 | - | 0.177 |
| J | 1.0 | 1.4 | 0.040 | 0.055 |
| K | 10.8 | 11.0 | 0.426 | 0.433 |
| L | 4.7 | 5.3 | 0.185 | 0.209 |
| M | 0.4 | 0.8 | 0.016 | 0.031 |
| N | 1.5 | 2.49 | 0.087 | 0.102 |

* ISOPLUS 247™ without hole

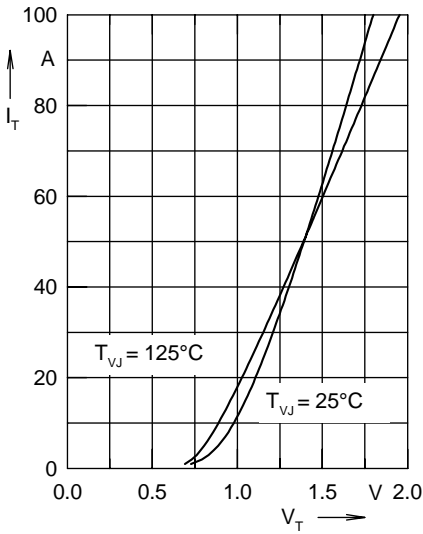


Fig. 3 Forward characteristics

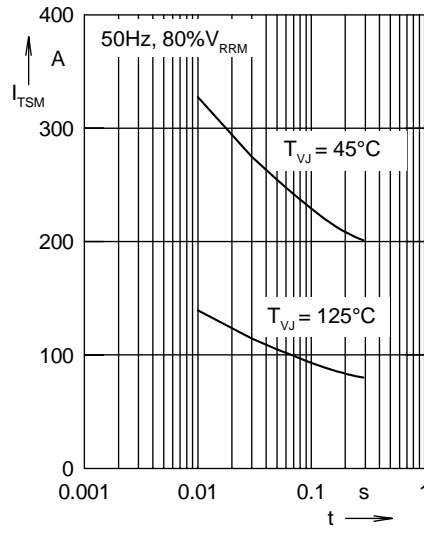


Fig. 4 Surge overload current
 I_{TSM} : crest value, t: duration

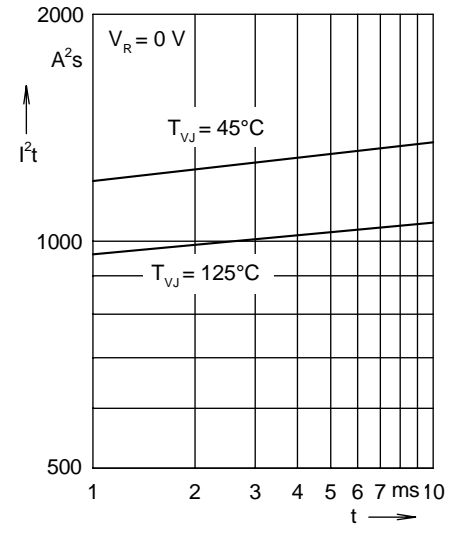


Fig. 5 I^2t versus time (1-10 ms)

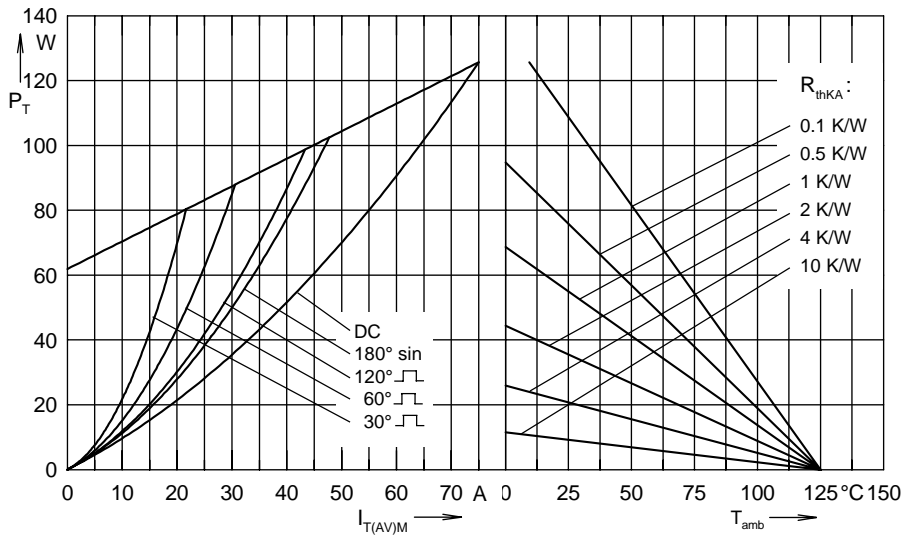


Fig. 6 Power dissipation versus forward current and ambient temperature

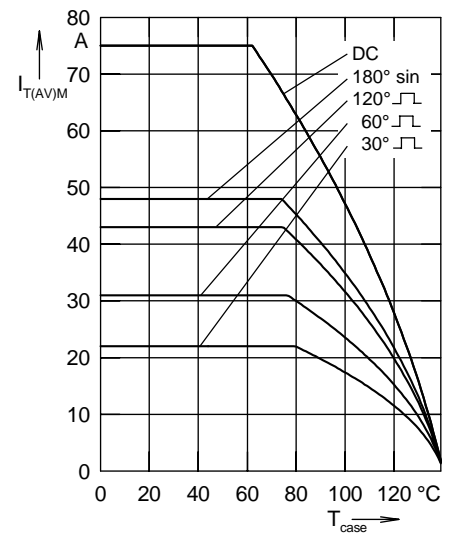


Fig. 7 Max. forward current at case temperature

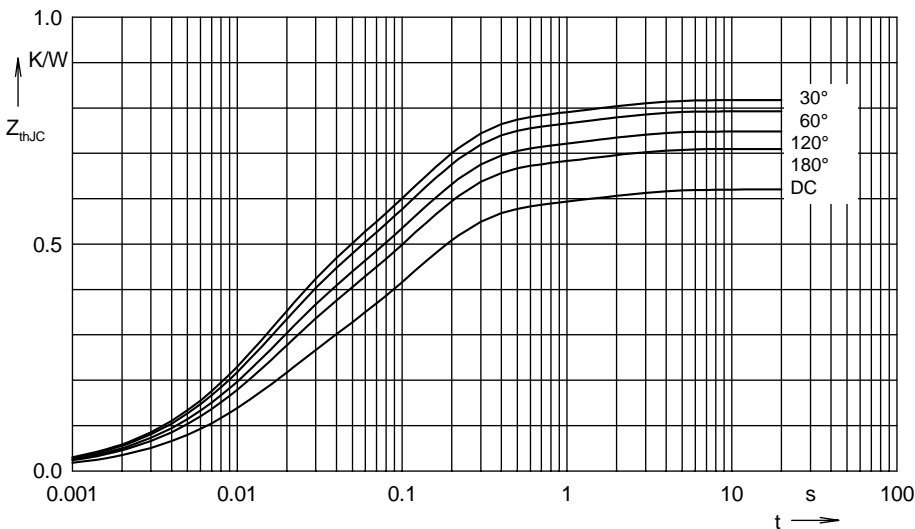


Fig. 8 Transient thermal impedance junction to case

R_{thJC} for various conduction angles d:

| d | R_{thJC} (K/W) |
|------|------------------|
| DC | 0.62 |
| 180° | 0.71 |
| 120° | 0.748 |
| 60° | 0.793 |
| 30° | 0.817 |

Constants for Z_{thJC} calculation:

| i | R_{thi} (K/W) | t_i (s) |
|---|-----------------|-----------|
| 1 | 0.206 | 0.013 |
| 2 | 0.362 | 0.118 |
| 3 | 0.052 | 1.488 |