

Thyristor Module

$$V_{RRM} = 1200V$$

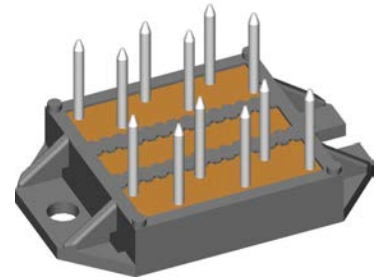
$$I_{TAV} = 16A$$

$$V_T = 1,19V$$

AC Controlling
 3~ full-controlled

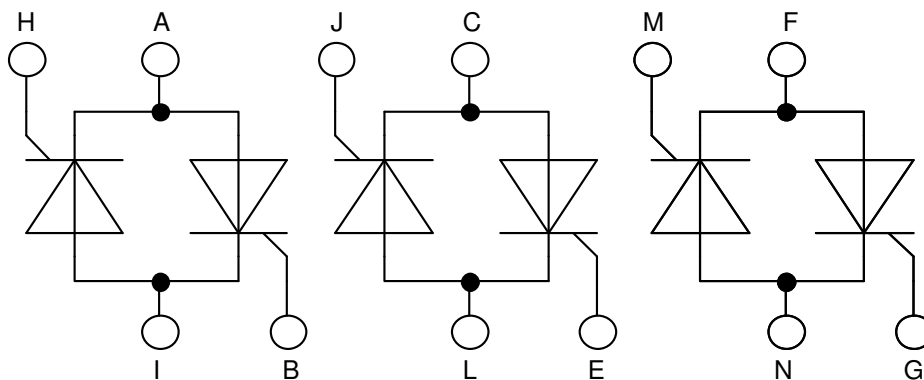
Part number

VWO35-12H07



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: ECO-PAC1

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Height: 9 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

Disclaimer Notice

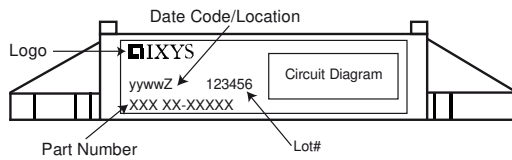
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| Rectifier | | | Ratings | | | |
|----------------|--|--|-------------------------|------|------|------------------|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit |
| $V_{RSM/DSM}$ | max. non-repetitive reverse/forward blocking voltage | $T_{VJ} = 25^{\circ}C$ | | | 1300 | V |
| $V_{RRM/DRM}$ | max. repetitive reverse/forward blocking voltage | $T_{VJ} = 25^{\circ}C$ | | | 1200 | V |
| I_{RD} | reverse current, drain current | $V_{R/D} = 1200 V$ | $T_{VJ} = 25^{\circ}C$ | | 50 | μA |
| | | $V_{R/D} = 1200 V$ | $T_{VJ} = 125^{\circ}C$ | | 2 | mA |
| V_T | forward voltage drop | $I_T = 15 A$ | $T_{VJ} = 25^{\circ}C$ | | 1,23 | V |
| | | $I_T = 30 A$ | | | 1,48 | V |
| | | $I_T = 15 A$ | $T_{VJ} = 125^{\circ}C$ | | 1,19 | V |
| | | $I_T = 30 A$ | | | 1,51 | V |
| I_{TAV} | average forward current | $T_C = 85^{\circ}C$ | $T_{VJ} = 125^{\circ}C$ | | 16 | A |
| I_{RMS} | RMS forward current per phase | 180° sine | | | 35 | A |
| V_{T0} | threshold voltage | } for power loss calculation only | $T_{VJ} = 125^{\circ}C$ | | 0,88 | V |
| r_T | slope resistance | | | | 21 | m Ω |
| R_{thJC} | thermal resistance junction to case | | | | 1,3 | K/W |
| R_{thCH} | thermal resistance case to heatsink | | | 0,5 | | K/W |
| P_{tot} | total power dissipation | | $T_C = 25^{\circ}C$ | | 77 | W |
| I_{TSM} | max. forward surge current | $t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$ | $T_{VJ} = 45^{\circ}C$ | | 200 | A |
| | | $t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$ | $V_R = 0 V$ | | 215 | A |
| | | $t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$ | $T_{VJ} = 125^{\circ}C$ | | 170 | A |
| | | $t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$ | $V_R = 0 V$ | | 185 | A |
| I^2t | value for fusing | $t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$ | $T_{VJ} = 45^{\circ}C$ | | 200 | A ² s |
| | | $t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$ | $V_R = 0 V$ | | 190 | A ² s |
| | | $t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$ | $T_{VJ} = 125^{\circ}C$ | | 145 | A ² s |
| | | $t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$ | $V_R = 0 V$ | | 140 | A ² s |
| C_J | junction capacitance | $V_R = 400V \quad f = 1 \text{ MHz}$ | $T_{VJ} = 25^{\circ}C$ | | 7 | pF |
| P_{GM} | max. gate power dissipation | $t_p = 30 \mu s$ | $T_C = 125^{\circ}C$ | | 5 | W |
| | | $t_p = 300 \mu s$ | | | 2,5 | W |
| P_{GAV} | average gate power dissipation | | | | 0,5 | W |
| $(di/dt)_{cr}$ | critical rate of rise of current | $T_{VJ} = 125^{\circ}C; f = 50 \text{ Hz}$ repetitive, $I_T = 45 A$ | | | 100 | A/ μs |
| | | $t_p = 200 \mu s; di_G/dt = 0,15 A/\mu s;$ $I_G = 0,15A; V_D = \frac{2}{3} V_{DRM}$ non-repet., $I_T = 15 A$ | | | 500 | A/ μs |
| $(dv/dt)_{cr}$ | critical rate of rise of voltage | $V_D = \frac{2}{3} V_{DRM}$ $R_{GK} = \infty$; method 1 (linear voltage rise) | $T_{VJ} = 125^{\circ}C$ | | 500 | V/ μs |
| V_{GT} | gate trigger voltage | $V_D = 6 V$ | $T_{VJ} = 25^{\circ}C$ | | 1,5 | V |
| | | | $T_{VJ} = -40^{\circ}C$ | | 2,5 | V |
| I_{GT} | gate trigger current | $V_D = 6 V$ | $T_{VJ} = 25^{\circ}C$ | | 25 | mA |
| | | | $T_{VJ} = -40^{\circ}C$ | | 50 | mA |
| V_{GD} | gate non-trigger voltage | $V_D = \frac{2}{3} V_{DRM}$ | $T_{VJ} = 125^{\circ}C$ | | 0,2 | V |
| I_{GD} | gate non-trigger current | | | | 3 | mA |
| I_L | latching current | $t_p = 10 \mu s$ | $T_{VJ} = 25^{\circ}C$ | | 75 | mA |
| | | $I_G = 0,1A; di_G/dt = 0,1 A/\mu s$ | | | | |
| I_H | holding current | $V_D = 6 V \quad R_{GK} = \infty$ | $T_{VJ} = 25^{\circ}C$ | | 50 | mA |
| t_{gd} | gate controlled delay time | $V_D = \frac{1}{2} V_{DRM}$ | $T_{VJ} = 25^{\circ}C$ | | 2 | μs |
| | | $I_G = 0,1A; di_G/dt = 0,1 A/\mu s$ | | | | |
| t_q | turn-off time | $V_R = 100 V; I_T = 15A; V_D = \frac{2}{3} V_{DRM}$ $di/dt = 10 A/\mu s; dv/dt = 20 V/\mu s; t_p = 200 \mu s$ | $T_{VJ} = 100^{\circ}C$ | | 150 | μs |



| Package ECO-PAC1 | | Ratings | | | | |
|------------------|--|----------------------|------|------|------|------|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit |
| I_{RMS} | RMS current | per terminal | | | 40 | A |
| T_{VJ} | virtual junction temperature | | -40 | | 125 | °C |
| T_{op} | operation temperature | | -40 | | 100 | °C |
| T_{stg} | storage temperature | | -40 | | 125 | °C |
| Weight | | | | 19 | | g |
| M_D | mounting torque | | 1,4 | | 2 | Nm |
| $d_{Spp/App}$ | creepage distance on surface striking distance through air | terminal to terminal | 6,0 | | | mm |
| $d_{Spb/Apb}$ | | terminal to backside | 10,0 | | | mm |
| V_{ISOL} | isolation voltage | t = 1 second | 3600 | | | V |
| | | t = 1 minute | 3000 | | | V |

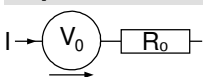


| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | VWO35-12ho7 | VWO35-12ho7 | Box | 25 | 479667 |

Equivalent Circuits for Simulation

* on die level

$T_{VJ} = 125^{\circ}C$

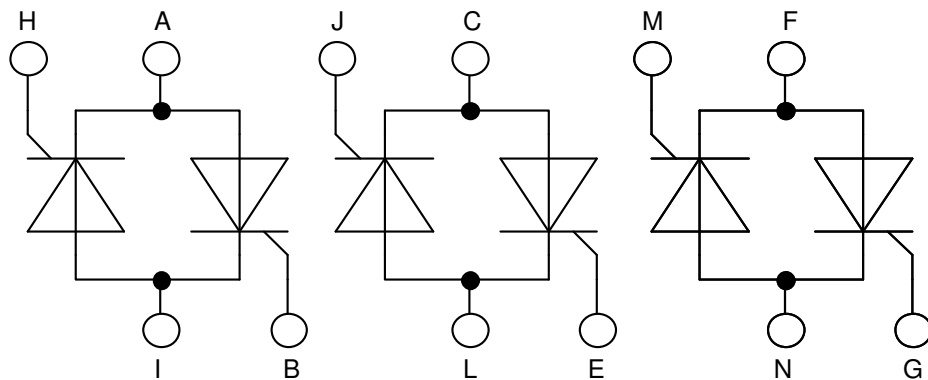
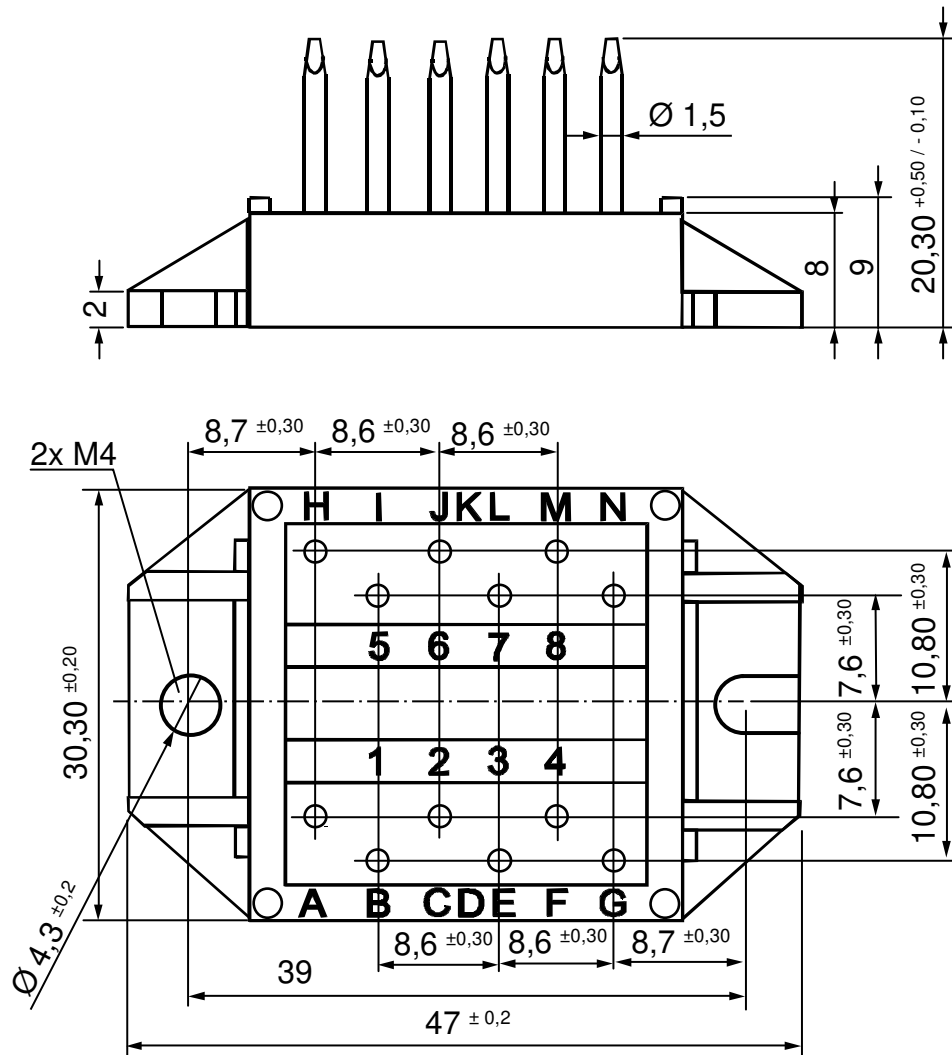


Thyristor

| | | | |
|--------------|--------------------|------|----|
| $V_{0\ max}$ | threshold voltage | 0,88 | V |
| $R_{0\ max}$ | slope resistance * | 18 | mΩ |



Outlines ECO-PAC1



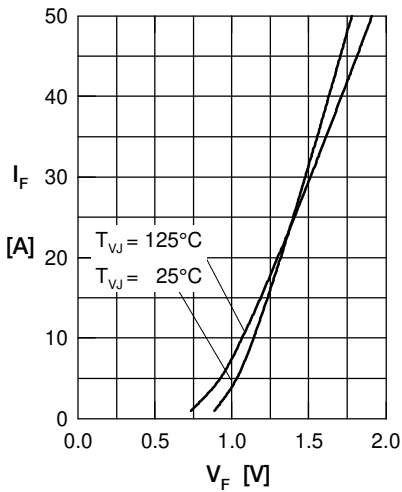
Thyristor


Fig. 1 Forward current vs. voltage drop per thyristor

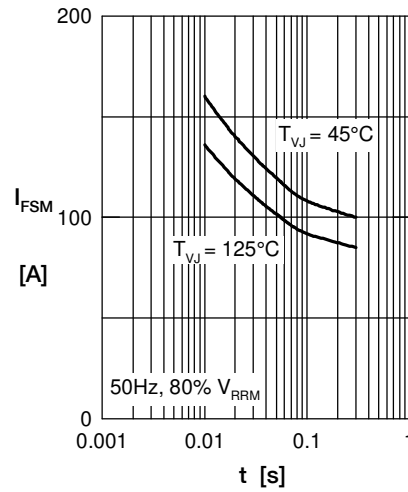


Fig. 2 Surge overload current vs. time per thyristor

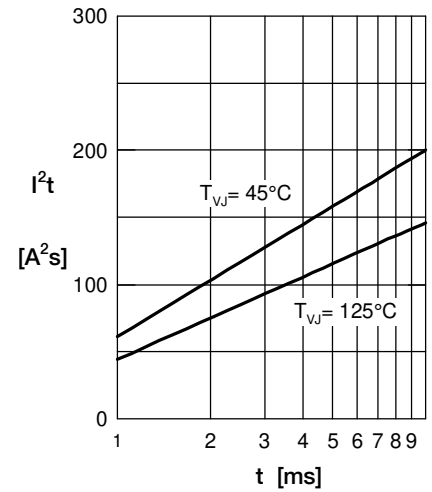
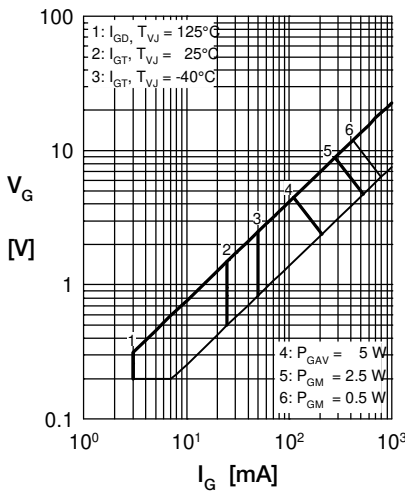

 Fig. 3 I^2t vs. time per thyristor


Fig. 4 Gate trigger characteristics

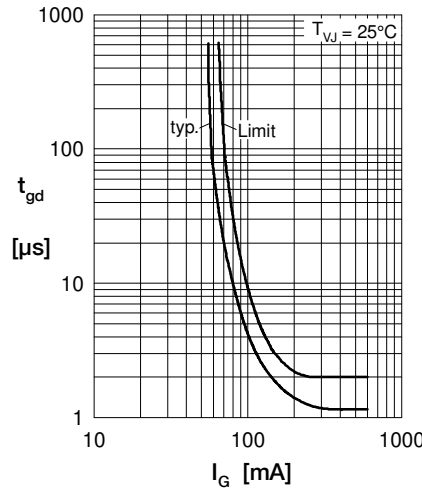


Fig. 5 Gate trigger delay time

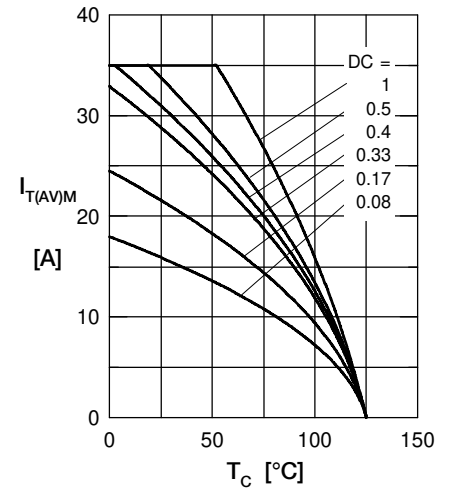


Fig. 5 Max. forward current vs. case temperature per thyristor

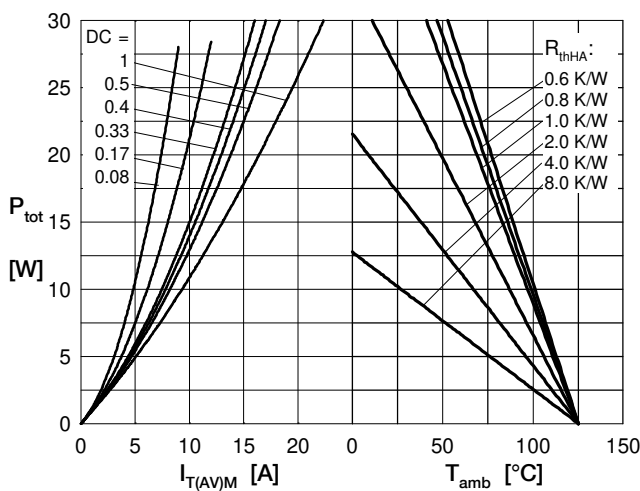


Fig. 4 Power dissipation vs. forward current and ambient temperature per thyristor

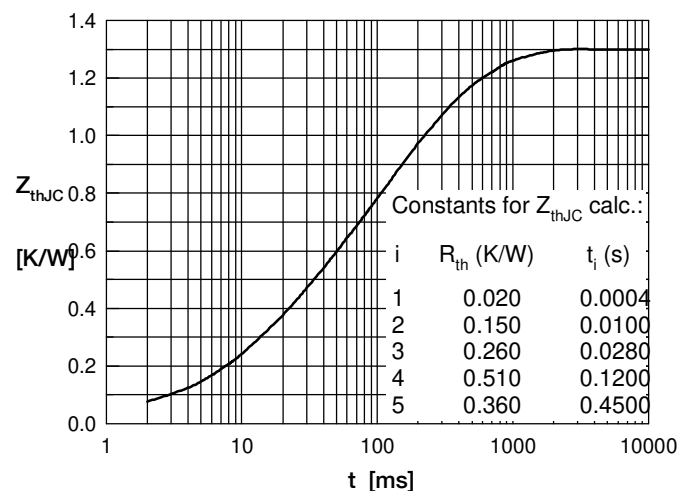


Fig. 6 Transient thermal impedance junction to case vs. time per thyristor