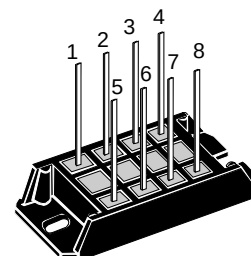
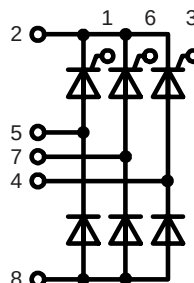


# Three Phase Half Controlled Rectifier Bridge

$$I_{dAVM} = 27 \text{ A}$$

$$V_{RRM} = 1200-1600 \text{ V}$$

| $V_{RSM}$<br>$V_{DSM}$<br>V | $V_{RRM}$<br>$V_{DRM}$<br>V | Type         |
|-----------------------------|-----------------------------|--------------|
| 1300                        | 1200                        | VVZ 24-12io1 |
| 1500                        | 1400                        | VVZ 24-14io1 |
| 1700                        | 1600                        | VVZ 24-16io1 |



| Symbol                                            | Test Conditions                                                                                                                                                 | Maximum Ratings                                                                                                                      |
|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| $I_{dAV}$<br>$I_{dAVM}$<br>$I_{FRMS}^1, I_{TRMS}$ | $T_K = 100^\circ\text{C}$ ; module<br>module<br>per leg                                                                                                         | 21 A<br>27 A<br>16 A                                                                                                                 |
| $I_{FSM}^1, I_{TSM}$                              | $T_{VJ} = 45^\circ\text{C}$ ;<br>$V_R = 0$                                                                                                                      | $t = 10 \text{ ms}$ (50 Hz), sine 300 A<br>$t = 8.3 \text{ ms}$ (60 Hz), sine 320 A                                                  |
|                                                   | $T_{VJ} = T_{VJM}$<br>$V_R = 0$                                                                                                                                 | $t = 10 \text{ ms}$ (50 Hz), sine 270 A<br>$t = 8.3 \text{ ms}$ (60 Hz), sine 290 A                                                  |
| $I^2t$                                            | $T_{VJ} = 45^\circ\text{C}$<br>$V_R = 0$                                                                                                                        | $t = 10 \text{ ms}$ (50 Hz), sine 450 A <sup>2</sup> s<br>$t = 8.3 \text{ ms}$ (60 Hz), sine 430 A <sup>2</sup> s                    |
|                                                   | $T_{VJ} = T_{VJM}$<br>$V_R = 0$                                                                                                                                 | $t = 10 \text{ ms}$ (50 Hz), sine 365 A <sup>2</sup> s<br>$t = 8.3 \text{ ms}$ (60 Hz), sine 350 A <sup>2</sup> s                    |
| $(di/dt)_{cr}$                                    | $T_{VJ} = T_{VJM}$<br>$f = 400 \text{ Hz}$ , $t_p = 200 \mu\text{s}$<br>$V_D = 2/3 V_{DRM}$<br>$I_G = 0.3 \text{ A}$ ,<br>$di_G/dt = 0.3 \text{ A}/\mu\text{s}$ | repetitive, $I_T = 50 \text{ A}$ 150 A/ $\mu\text{s}$<br>non repetitive, $I_T = 1/3 \cdot I_{dAV}$ 500 A/ $\mu\text{s}$              |
| $(dv/dt)_{cr}$                                    | $T_{VJ} = T_{VJM}$ ; $V_{DR} = 2/3 V_{DRM}$<br>$R_{GK} = \infty$ ; method 1 (linear voltage rise)                                                               | 1000 V/ $\mu\text{s}$                                                                                                                |
| $V_{RGM}$                                         |                                                                                                                                                                 | 10 V                                                                                                                                 |
| $P_{GM}$                                          | $T_{VJ} = T_{VJM}$<br>$I_T = I_{TAVM}$                                                                                                                          | $t_p = 30 \mu\text{s}$ $\leq 10 \text{ W}$<br>$t_p = 500 \mu\text{s}$ $\leq 5 \text{ W}$<br>$t_p = 10 \text{ ms}$ $\leq 1 \text{ W}$ |
| $P_{GAVM}$                                        |                                                                                                                                                                 | 0.5 W                                                                                                                                |
| $T_{VJ}$                                          |                                                                                                                                                                 | -40...+125 $^\circ\text{C}$                                                                                                          |
| $T_{VJM}$                                         |                                                                                                                                                                 | 125 $^\circ\text{C}$                                                                                                                 |
| $T_{stg}$                                         |                                                                                                                                                                 | -40...+125 $^\circ\text{C}$                                                                                                          |
| $V_{ISOL}$                                        | 50/60 Hz, RMS<br>$I_{ISOL} \leq 1 \text{ mA}$                                                                                                                   | $t = 1 \text{ min}$ 3000 V~<br>$t = 1 \text{ s}$ 3600 V~                                                                             |
| $M_d$                                             | Mounting torque                                                                                                                                                 | (M5) 2-2.5 Nm<br>(10-32 UNF) 18-22 lb.in.                                                                                            |
| Weight                                            | typ.                                                                                                                                                            | 28 g                                                                                                                                 |

## Features

- Package with DCB ceramic base plate
- Isolation voltage 3600 V~
- Planar passivated chips
- Soldering terminals
- UL registered E 72873

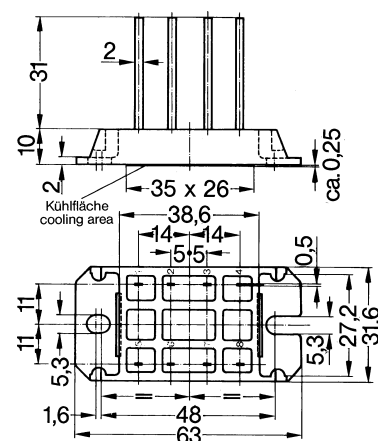
## Applications

- Input rectifier for switch mode power supplies (SMPS)
- Softstart capacitor charging
- Electric drives and auxiliaries

## Advantages

- Easy to mount with two screws
- Space and weight savings
- Improved temperature and power cycling

## Dimensions in mm (1 mm = 0.0394")



Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.  
IXYS reserves the right to change limits, test conditions and dimensions.

| Symbol     | Test Conditions                                                                                                                                                                     | Characteristic Values                                                   |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| $I_R, I_D$ | $V_R = V_{RRM}; V_D = V_{DRM}$<br>$T_{VJ} = T_{VJM}$<br>$T_{VJ} = 25^\circ\text{C}$                                                                                                 | $\leq 5 \text{ mA}$<br>$\leq 0.3 \text{ mA}$                            |
| $V_F, V_T$ | $I_F, I_T = 30 \text{ A}, T_{VJ} = 25^\circ\text{C}$                                                                                                                                | $\leq 1.45 \text{ V}$                                                   |
| $V_{T0}$   | For power-loss calculations only                                                                                                                                                    | 1 V                                                                     |
| $r_T$      | $(T_{VJ} = 125^\circ\text{C})$                                                                                                                                                      | 16 mΩ                                                                   |
| $V_{GT}$   | $V_D = 6 \text{ V};$<br>$T_{VJ} = 25^\circ\text{C}$<br>$T_{VJ} = -40^\circ\text{C}$                                                                                                 | $\leq 1.0 \text{ V}$<br>$\leq 1.2 \text{ V}$                            |
| $I_{GT}$   | $V_D = 6 \text{ V};$<br>$T_{VJ} = 25^\circ\text{C}$<br>$T_{VJ} = -40^\circ\text{C}$<br>$T_{VJ} = 125^\circ\text{C}$                                                                 | $\leq 65 \text{ mA}$<br>$\leq 80 \text{ mA}$<br>$\leq 50 \text{ mA}$    |
| $V_{GD}$   | $T_{VJ} = T_{VJM};$                                                                                                                                                                 | $V_D = 2/3 V_{DRM}$<br>$\leq 0.2 \text{ V}$                             |
| $I_{GD}$   | $T_{VJ} = T_{VJM};$<br>$V_D = 2/3 V_{DRM}$                                                                                                                                          | $\leq 5 \text{ mA}$                                                     |
| $I_L$      | $I_G = 0.3 \text{ A}; t_G = 30 \mu\text{s}$<br>$di_G/dt = 0.3 \text{ A}/\mu\text{s}$<br>$T_{VJ} = 25^\circ\text{C}$<br>$T_{VJ} = -40^\circ\text{C}$<br>$T_{VJ} = 125^\circ\text{C}$ | $\leq 150 \text{ mA}$<br>$\leq 200 \text{ mA}$<br>$\leq 100 \text{ mA}$ |
| $I_H$      | $T_{VJ} = 25^\circ\text{C}; V_D = 6 \text{ V}; R_{GK} = \infty$                                                                                                                     | $\leq 100 \text{ mA}$                                                   |
| $t_{gd}$   | $T_{VJ} = 25^\circ\text{C}; V_D = 1/2 V_{DRM}$<br>$I_G = 0.3 \text{ A}; di_G/dt = 0.3 \text{ A}/\mu\text{s}$                                                                        | $\leq 2 \mu\text{s}$                                                    |
| $t_q$      | $T_{VJ} = 125^\circ\text{C}; I_T = 15 \text{ A}, t_p = 300 \mu\text{s}, -di/dt = 10 \text{ A}/\mu\text{s}$                                                                          | typ. 150 μs                                                             |
| $Q_r$      | $V_R = 100 \text{ V}, dv/dt = 20 \text{ V}/\mu\text{s}, V_D = 2/3 V_{DRM}$                                                                                                          | 75 μC                                                                   |
| $R_{thJC}$ | per thyristor (diode); DC current<br>per module                                                                                                                                     | 2.1 K/W<br>0.35 K/W                                                     |
| $R_{thJH}$ | per thyristor (diode); DC current<br>per module                                                                                                                                     | 2.7 K/W<br>0.45 K/W                                                     |
| $d_s$      | Creeping distance on surface                                                                                                                                                        | 7 mm                                                                    |
| $d_A$      | Creepage distance in air                                                                                                                                                            | 7 mm                                                                    |
| $a$        | Max. allowable acceleration                                                                                                                                                         | 50 m/s <sup>2</sup>                                                     |

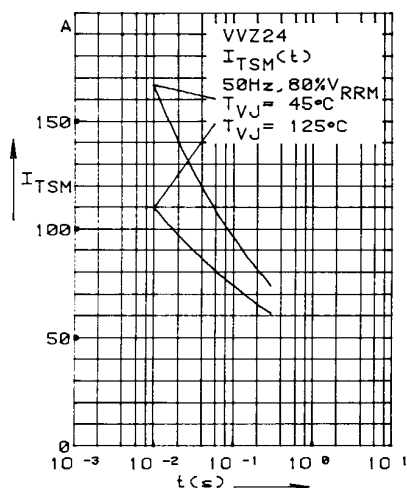


Fig. 1 Surge overload current per chip  
 $I_{FSM}$ : Crest value,  $t$ : duration

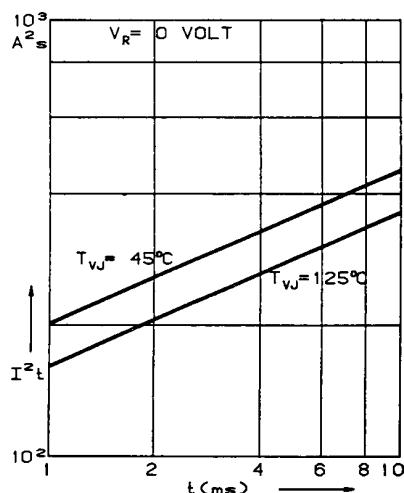


Fig. 2  $I^2t$  versus time (1-10 ms)  
per chip

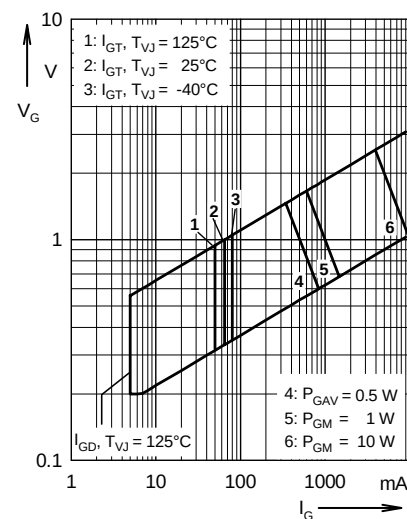


Fig. 3 Gate trigger characteristics  
Triggering:

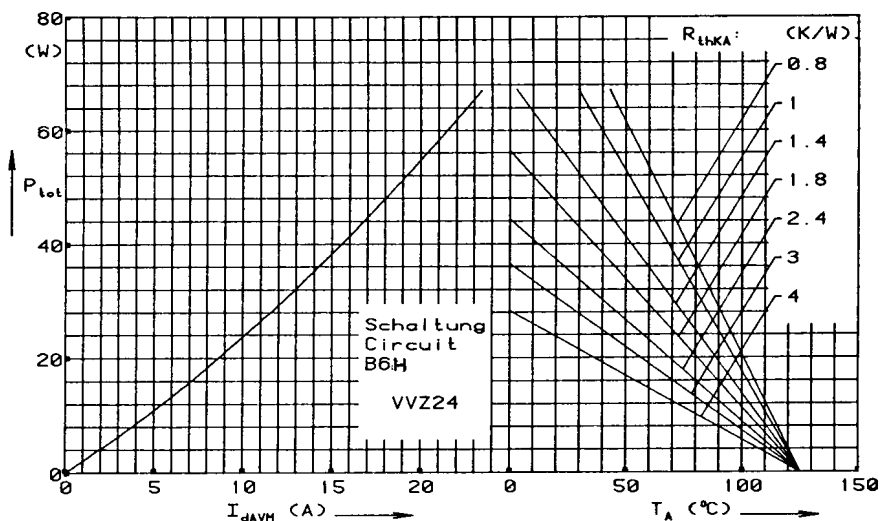


Fig. 4 Power dissipation versus direct output current and ambient temperature

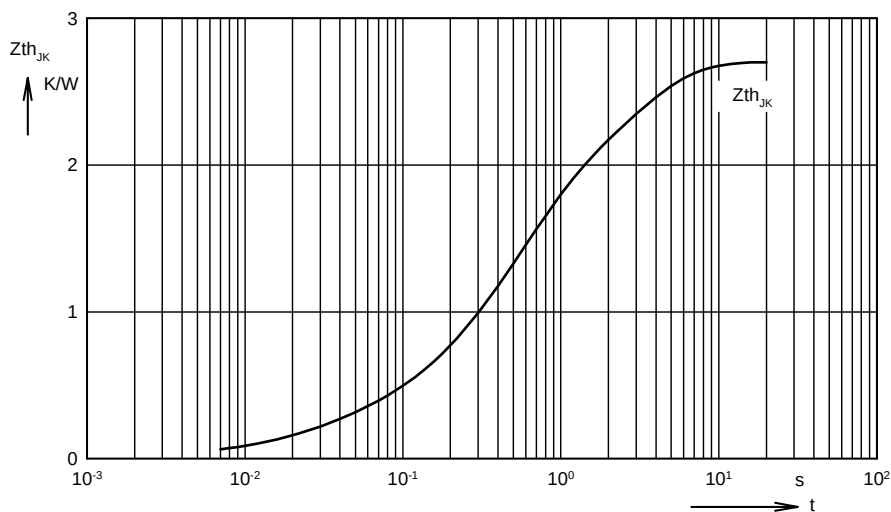


Fig. 5 Transient thermal impedance junction to heatsink

Constants for  $Z_{thJK}$  calculation

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.17            | 0.028     |
| 2 | 1.4             | 0.44      |
| 3 | 1.1             | 2.6       |