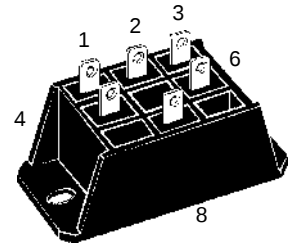
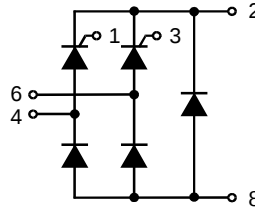


# Half Controlled Single Phase Rectifier Bridge with Freewheeling Diode

$$I_{dAVM} = 40 \text{ A}$$

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

| $V_{RSM}$<br>$V_{DSM}$<br>V | $V_{RRM}$<br>$V_{DRM}$<br>V | Type         |
|-----------------------------|-----------------------------|--------------|
| 900                         | 800                         | VHF 36-08io5 |
| 1300                        | 1200                        | VHF 36-12io5 |
| 1500                        | 1400                        | VHF 36-14io5 |
| 1700                        | 1600                        | VHF 36-16io5 |



| Symbol                                               | Test Conditions                                                                                                                                                                       |                                                                       | Maximum Ratings                                                       |                    |                                      |
|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------|--------------------|--------------------------------------|
| $I_{dAV}$<br>$I_{dAVM}$ ①<br>$I_{FRMS}^1$ $I_{TRMS}$ | $T_K = 85^{\circ}\text{C}$ , module                                                                                                                                                   |                                                                       | 36                                                                    | A                  |                                      |
|                                                      | module                                                                                                                                                                                |                                                                       | 40                                                                    | A                  |                                      |
|                                                      | per leg                                                                                                                                                                               |                                                                       | 28                                                                    | A                  |                                      |
| $I_{FSM}^1$ $I_{TSM}$                                | $T_{VJ} = 45^{\circ}\text{C}$ ;<br>$V_R = 0\text{ V}$                                                                                                                                 | $t = 10\text{ ms}$ (50 Hz), sine<br>$t = 8.3\text{ ms}$ (60 Hz), sine | 320<br>350                                                            | A<br>A             |                                      |
|                                                      | $T_{VJ} = T_{VJM}$<br>$V_R = 0\text{ V}$                                                                                                                                              | $t = 10\text{ ms}$ (50 Hz), sine<br>$t = 8.3\text{ ms}$ (60 Hz), sine | 280<br>310                                                            | A<br>A             |                                      |
|                                                      | $I^2t$                                                                                                                                                                                | $T_{VJ} = 45^{\circ}\text{C}$<br>$V_R = 0\text{ V}$                   | $t = 10\text{ ms}$ (50 Hz), sine<br>$t = 8.3\text{ ms}$ (60 Hz), sine | 500<br>520         | A <sup>2</sup> s<br>A <sup>2</sup> s |
|                                                      |                                                                                                                                                                                       | $T_{VJ} = T_{VJM}$<br>$V_R = 0\text{ V}$                              | $t = 10\text{ ms}$ (50 Hz), sine<br>$t = 8.3\text{ ms}$ (60 Hz), sine | 390<br>400         | A <sup>2</sup> s<br>A <sup>2</sup> s |
| $(di/dt)_{cr}$                                       | $T_{VJ} = 125^{\circ}\text{C}$<br>$f = 50\text{ Hz}$ , $t_p = 200\text{ }\mu\text{s}$<br>$V_D = 2/3\text{ }V_{DRM}$<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/ $\mu\text{s}$   |                                      |
|                                                      |                                                                                                                                                                                       | non repetitive, $I_T = 1/2 \cdot I_{dAV}$                             | 500                                                                   | A/ $\mu\text{s}$   |                                      |
| $(dv/dt)_{cr}$                                       | $T_{VJ} = T_{VJM}$ ; $V_{DR} = 2/3\text{ }V_{DRM}$<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>$I_T = I_{TAVM}$                                                                                                                                                | $t_p = 30\text{ }\mu\text{s}$                                         | $\leq 10$                                                             | W                  |                                      |
|                                                      |                                                                                                                                                                                       | $t_p = 500\text{ }\mu\text{s}$                                        | $\leq 5$                                                              | W                  |                                      |
|                                                      |                                                                                                                                                                                       | $t_p = 10\text{ ms}$                                                  | $\leq 1$                                                              | 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                                                                                                                                                                         | $t = 1\text{ min}$                                                    | 3000                                                                  | V~                 |                                      |
|                                                      | $I_{ISOL} \leq 1\text{ mA}$                                                                                                                                                           | $t = 1\text{ s}$                                                      | 3600                                                                  | V~                 |                                      |
| $M_d$                                                | Mounting torque                                                                                                                                                                       | (M5)                                                                  | 2-2.5                                                                 | Nm                 |                                      |
|                                                      |                                                                                                                                                                                       | (10-32 UNF)                                                           | 18-22                                                                 | lb.in.             |                                      |
| Weight                                               |                                                                                                                                                                                       |                                                                       | 50                                                                    | g                  |                                      |

## Features

- Package with DCB ceramic base plate
- Isolation voltage 3600 V~
- Planar passivated chips
- ¼" fast-on terminals
- UL registered E 72873

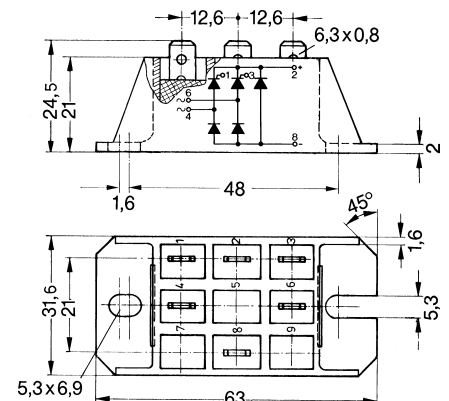
## Applications

- Supply for DC power equipment
- DC motor control

## 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.

① for resistive load

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>$T_{VJ} = 25^\circ\text{C}$                                                                                         | $\leq 5$ mA<br>$\leq 0.3$ mA                    |
| $V_T, V_F$ | $I_T, I_F = 45$ A; $T_{VJ} = 25^\circ\text{C}$                                                                                                                              | $\leq 1.45$ V                                   |
| $V_{T0}$   | For power-loss calculations only ( $T_{VJ} = 125^\circ\text{C}$ )                                                                                                           | 0.85 V                                          |
| $r_T$      |                                                                                                                                                                             | 13 m $\Omega$                                   |
| $V_{GT}$   | $V_D = 6$ V;<br>$T_{VJ} = 25^\circ\text{C}$<br>$T_{VJ} = -40^\circ\text{C}$                                                                                                 | $\leq 1.0$ V<br>$\leq 1.2$ V                    |
| $I_{GT}$   | $V_D = 6$ V;<br>$T_{VJ} = 25^\circ\text{C}$<br>$T_{VJ} = -40^\circ\text{C}$<br>$T_{VJ} = 125^\circ\text{C}$                                                                 | $\leq 65$ mA<br>$\leq 80$ mA<br>$\leq 50$ mA    |
| $V_{GD}$   | $T_{VJ} = T_{VJM}; V_D = 2/3 V_{DRM}$                                                                                                                                       | $\leq 0.2$ V                                    |
| $I_{GD}$   | $T_{VJ} = T_{VJM}; V_D = 2/3 V_{DRM}$                                                                                                                                       | $\leq 5$ mA                                     |
| $I_L$      | $I_G = 0.3$ A; $t_G = 30$ $\mu\text{s}$ ; $di_G/dt = 0.3$ A/ $\mu\text{s}$ ;<br>$T_{VJ} = 25^\circ\text{C}$<br>$T_{VJ} = -40^\circ\text{C}$<br>$T_{VJ} = 125^\circ\text{C}$ | $\leq 150$ mA<br>$\leq 200$ mA<br>$\leq 100$ mA |
| $I_H$      | $T_{VJ} = 25^\circ\text{C}; V_D = 6$ V; $R_{GK} = \infty$                                                                                                                   | $\leq 100$ mA                                   |
| $t_{gd}$   | $T_{VJ} = 25^\circ\text{C}; V_D = 1/2 V_{DRM}$<br>$I_G = 0.3$ A; $di_G/dt = 0.3$ A/ $\mu\text{s}$                                                                           | $\leq 2$ $\mu\text{s}$                          |
| $t_q$      | $T_{VJ} = 125^\circ\text{C}; I_T = 15$ A; $t_p = 300$ $\mu\text{s}$ ; $V_R = 100$ V                                                                                         | typ. 150 $\mu\text{s}$                          |
| $Q_r$      | $di/dt = -10$ A/ $\mu\text{s}$ ; $dv/dt = 20$ V/ $\mu\text{s}$ ; $V_D = 2/3 V_{DRM}$                                                                                        | 75 $\mu\text{C}$                                |
| $R_{thJC}$ | per thyristor (diode); DC current                                                                                                                                           | 1.15 K/W                                        |
|            | per module                                                                                                                                                                  | 0.29 K/W                                        |
| $R_{thJK}$ | per thyristor (diode); DC current                                                                                                                                           | 1.55 K/W                                        |
|            | per module                                                                                                                                                                  | 0.39 K/W                                        |
| $d_s$      | Creeping distance on surface                                                                                                                                                | 12.6 mm                                         |
| $d_A$      | Creepage distance in air                                                                                                                                                    | 6.3 mm                                          |
| $a$        | Max. allowable acceleration                                                                                                                                                 | 50 m/s <sup>2</sup>                             |

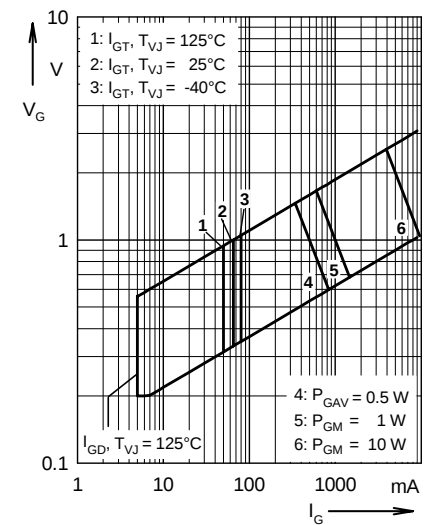
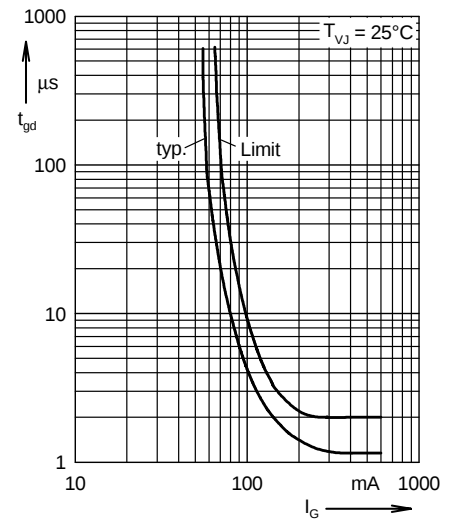


Fig. 1 Gate trigger range


Fig. 2 Gate controlled delay time  $t_{gd}$

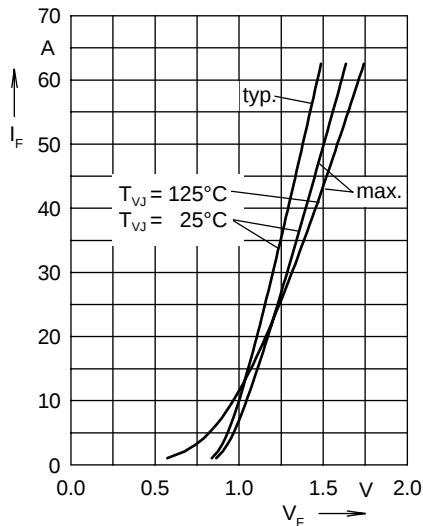


Fig. 3 Forward current versus voltage drop per diode

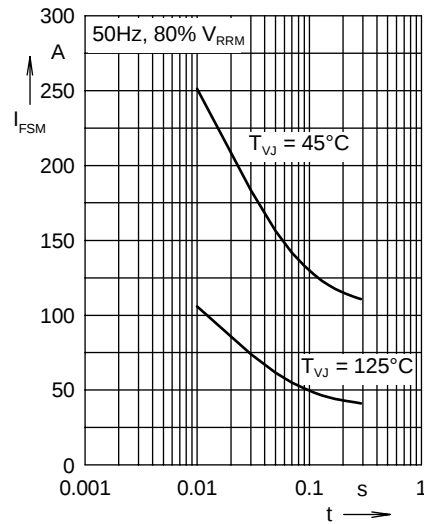


Fig. 4 Surge overload current

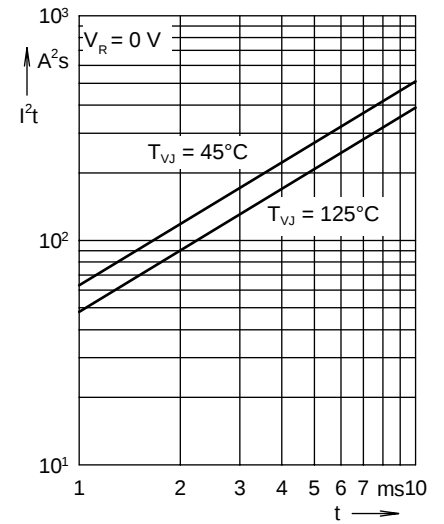


Fig. 5  $I^2t$  versus time per diode

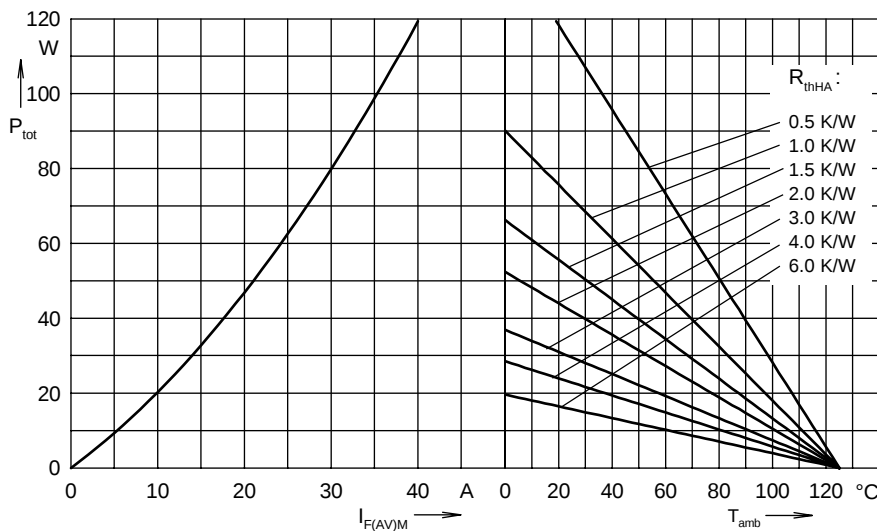


Fig. 6 Power dissipation versus direct output current and ambient temperature

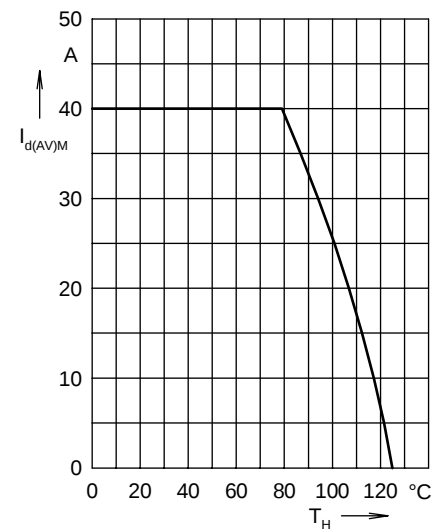


Fig. 7 Max. forward current versus heatsink temperature

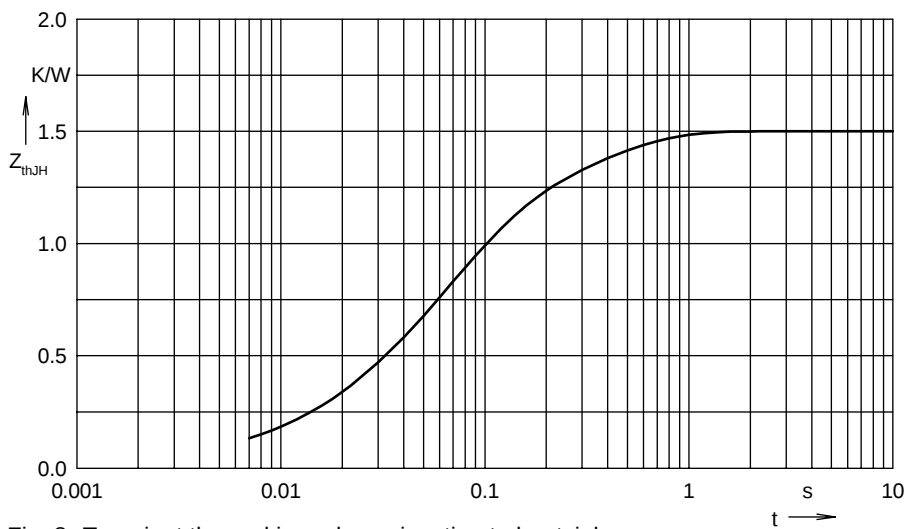


Fig. 8 Transient thermal impedance junction to heatsink

Constants for  $Z_{thJH}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.005           | 0.008     |
| 2 | 0.2             | 0.05      |
| 3 | 0.875           | 0.06      |
| 4 | 0.47            | 0.25      |