

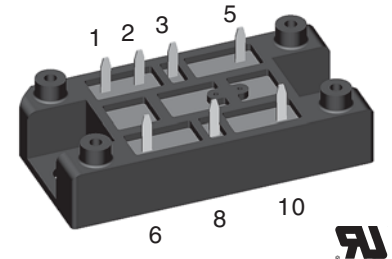
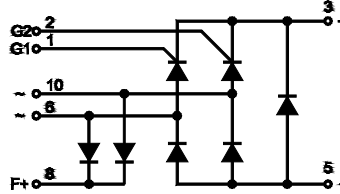
## Half Controlled Single Phase Rectifier Bridge

Including Freewheeling Diode and Field Diodes

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

$$I_{dAVM} = 32 \text{ A}$$

| $V_{RSM}$<br>$V_{DSM}$<br>V | $V_{RRM}$<br>$V_{DRM}$<br>V | Type          |
|-----------------------------|-----------------------------|---------------|
| 900                         | 800                         | VHFD 29-08io1 |
| 1300                        | 1200                        | VHFD 29-12io1 |
| 1700                        | 1600                        | VHFD 29-16io1 |



### Bridge and Freewheeling Diode

| Symbol               | Conditions                                                                                                                                                               | Maximum Ratings                                                                                                                      |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| $I_{dAV}$            | $T_H = 85^\circ\text{C}$ , module                                                                                                                                        | 28 A                                                                                                                                 |
| $I_{dAVM}^*$         | module                                                                                                                                                                   | 32 A                                                                                                                                 |
| $I_{FRMS}, I_{TRMS}$ | per leg                                                                                                                                                                  | 25 A                                                                                                                                 |
| $I_{FSM}, I_{TSM}$   | $T_{VJ} = 45^\circ\text{C}$ ;<br>$V_R = 0 \text{ V}$                                                                                                                     | $t = 10 \text{ ms}$ (50 Hz), sine 300 A<br>$t = 8.3 \text{ ms}$ (60 Hz), sine 330 A                                                  |
|                      | $T_{VJ} = T_{VJM}$<br>$V_R = 0 \text{ V}$                                                                                                                                | $t = 10 \text{ ms}$ (50 Hz), sine 270 A<br>$t = 8.3 \text{ ms}$ (60 Hz), sine 300 A                                                  |
| $I^2t$               | $T_{VJ} = 45^\circ\text{C}$<br>$V_R = 0 \text{ V}$                                                                                                                       | $t = 10 \text{ ms}$ (50 Hz), sine 440 A <sup>2</sup> s<br>$t = 8.3 \text{ ms}$ (60 Hz), sine 455 A <sup>2</sup> s                    |
|                      | $T_{VJ} = T_{VJM}$<br>$V_R = 0 \text{ V}$                                                                                                                                | $t = 10 \text{ ms}$ (50 Hz), sine 365 A <sup>2</sup> s<br>$t = 8.3 \text{ ms}$ (60 Hz), sine 370 A <sup>2</sup> s                    |
| $(di/dt)_{cr}$       | $T_{VJ} = 125^\circ\text{C}$<br>$f = 50 \text{ Hz}$ , $t_p = 200 \mu\text{s}$<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, $I_T = 0.5 I_{dAV}$ 500 A/ $\mu\text{s}$                    |
| $(dv/dt)_{cr}$       | $T_{VJ} = T_{(VJ)m}$ ; $V_{DR} = 2/3 V_{DRM}$<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>$I_T = 0.5 I_{dAVM}$                                                                                                                               | $t_p = 30 \mu\text{s}$ $\leq 10 \text{ W}$<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 °C                                                                                                                        |
| $T_{VJM}$            |                                                                                                                                                                          | 125 °C                                                                                                                               |
| $T_{stg}$            |                                                                                                                                                                          | -40...+125 °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~                                                                             |
| $d_s$                | Creep distance on surface                                                                                                                                                | 12.7 mm                                                                                                                              |
| $d_A$                | Strike distance in air                                                                                                                                                   | 9.4 mm                                                                                                                               |
| $a$                  | Max. allowable acceleration                                                                                                                                              | 50 m/s <sup>2</sup>                                                                                                                  |
| $M_d$                | Mounting torque (M5)<br>(10-32 UNF)                                                                                                                                      | 2-2.5 Nm<br>18-22 lb.in.                                                                                                             |
| Weight               |                                                                                                                                                                          | 35 g                                                                                                                                 |

### Features

- Package with DCB ceramic base plate
- Isolation voltage 3600 V~
- Planar passivated chips
- Blocking voltage up to 1600 V
- Low forward voltage drop
- Leads suitable for PC board soldering
- UL registered E 72873

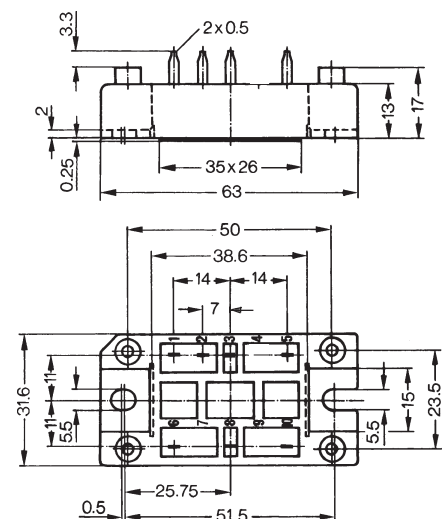
### Applications

- 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")



| Symbol                              | Conditions                                                                                                                     |                                                                                                | Characteristic Values |      |            |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-----------------------|------|------------|
| <b>I<sub>R</sub>, I<sub>D</sub></b> | <b>V<sub>R</sub> = V<sub>RRM</sub>; V<sub>D</sub> = V<sub>DRM</sub></b>                                                        | <b>T<sub>VJ</sub> = T<sub>VJM</sub></b><br><b>T<sub>VJ</sub> = 25°C</b>                        | ≤                     | 5    | <b>mA</b>  |
|                                     |                                                                                                                                |                                                                                                | ≤                     | 0.3  | <b>mA</b>  |
| <b>V<sub>T</sub>, V<sub>F</sub></b> | <b>I<sub>T</sub>, I<sub>F</sub> = 45 A; T<sub>VJ</sub> = 25°C</b>                                                              |                                                                                                | ≤                     | 1.6  | <b>V</b>   |
| <b>V<sub>T0</sub></b>               | For power-loss calculations only (T <sub>VJ</sub> = 125°C)                                                                     |                                                                                                |                       | 0.9  | <b>V</b>   |
| <b>r<sub>T</sub></b>                |                                                                                                                                |                                                                                                |                       | 15   | <b>mΩ</b>  |
| <b>V<sub>GT</sub></b>               | <b>V<sub>D</sub> = 6 V;</b>                                                                                                    | <b>T<sub>VJ</sub> = 25°C</b><br><b>T<sub>VJ</sub> = -40°C</b>                                  | ≤                     | 1.0  | <b>V</b>   |
|                                     |                                                                                                                                |                                                                                                | ≤                     | 1.2  | <b>V</b>   |
| <b>I<sub>GT</sub></b>               | <b>V<sub>D</sub> = 6 V;</b>                                                                                                    | <b>T<sub>VJ</sub> = 25°C</b><br><b>T<sub>VJ</sub> = -40°C</b><br><b>T<sub>VJ</sub> = 125°C</b> | ≤                     | 65   | <b>mA</b>  |
|                                     |                                                                                                                                |                                                                                                | ≤                     | 80   | <b>mA</b>  |
|                                     |                                                                                                                                |                                                                                                | ≤                     | 50   | <b>mA</b>  |
|                                     |                                                                                                                                |                                                                                                |                       |      |            |
| <b>V<sub>GD</sub></b>               | <b>T<sub>VJ</sub> = T<sub>VJM</sub>;</b>                                                                                       | <b>V<sub>D</sub> = 2/3 V<sub>DRM</sub></b>                                                     | ≤                     | 0.2  | <b>V</b>   |
| <b>I<sub>GD</sub></b>               | <b>T<sub>VJ</sub> = T<sub>VJM</sub>;</b>                                                                                       | <b>V<sub>D</sub> = 2/3 V<sub>DRM</sub></b>                                                     | ≤                     | 5    | <b>mA</b>  |
| <b>I<sub>L</sub></b>                | <b>I<sub>G</sub> = 0.3 A; t<sub>G</sub> = 30 μs;</b><br><b>di<sub>G</sub>/dt = 0.3 A/μs;</b>                                   | <b>T<sub>VJ</sub> = 25°C</b><br><b>T<sub>VJ</sub> = -40°C</b><br><b>T<sub>VJ</sub> = 125°C</b> | ≤                     | 150  | <b>mA</b>  |
|                                     |                                                                                                                                |                                                                                                | ≤                     | 200  | <b>mA</b>  |
|                                     |                                                                                                                                |                                                                                                | ≤                     | 100  | <b>mA</b>  |
| <b>I<sub>H</sub></b>                | <b>T<sub>VJ</sub> = 25°C; V<sub>D</sub> = 6 V; R<sub>GK</sub> = ∞</b>                                                          |                                                                                                | ≤                     | 100  | <b>mA</b>  |
| <b>t<sub>gd</sub></b>               | <b>T<sub>VJ</sub> = 25°C; V<sub>D</sub> = 0.5V<sub>DRM</sub></b><br><b>I<sub>G</sub> = 0.3 A; di<sub>G</sub>/dt = 0.3 A/μs</b> |                                                                                                | ≤                     | 2    | <b>μs</b>  |
| <b>t<sub>q</sub></b>                | <b>T<sub>VJ</sub> = 125°C, I<sub>T</sub> = 15 A, t<sub>p</sub> = 300 μs, V<sub>R</sub> = 100 V</b>                             |                                                                                                | typ.                  | 150  | <b>μs</b>  |
| <b>Q<sub>r</sub></b>                | <b>di/dt = -10 A/μs, dv/dt = 20 V/μs, V<sub>D</sub> = 2/3 V<sub>DRM</sub></b>                                                  |                                                                                                |                       | 75   | <b>μC</b>  |
| <b>R<sub>thJC</sub></b>             | per thyristor (diode); DC current                                                                                              |                                                                                                |                       | 1.4  | <b>K/W</b> |
|                                     | per module                                                                                                                     |                                                                                                |                       | 0.35 | <b>K/W</b> |
| <b>R<sub>thJH</sub></b>             | per thyristor (diode); DC current                                                                                              |                                                                                                |                       | 2.0  | <b>K/W</b> |
|                                     | per module                                                                                                                     |                                                                                                |                       | 0.5  | <b>K/W</b> |

## Field Diodes

| Symbol     | Conditions                                                                                             | Maximum Ratings                            |
|------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------|
| $I_{FAV}$  | $T_H = 85^\circ\text{C}$ , per Diode                                                                   | 4 A                                        |
| $I_{FAVM}$ | per diode                                                                                              | 4 A                                        |
| $I_{FRMS}$ | per diode                                                                                              | 6 A                                        |
| $I_{FSM}$  | $T_{VJ} = 45^\circ\text{C};$<br>$V_R = 0$ V<br>$t = 10$ ms (50 Hz), sine<br>$t = 8.3$ ms (60 Hz), sine | 100 A<br>110 A                             |
|            | $T_{VJ} = T_{VJM}$<br>$V_R = 0$ V<br>$t = 10$ ms (50 Hz), sine<br>$t = 8.3$ ms (60 Hz), sine           | 85 A<br>94 A                               |
| $I^2t$     | $T_{VJ} = 45^\circ\text{C}$<br>$V_R = 0$ V<br>$t = 10$ ms (50 Hz), sine<br>$t = 8.3$ ms (60 Hz), sine  | 50 A <sup>2</sup> s<br>50 A <sup>2</sup> s |
|            | $T_{VJ} = T_{VJM}$<br>$V_R = 0$ V<br>$t = 10$ ms (50 Hz), sine<br>$t = 8.3$ ms (60 Hz), sine           | 36 A <sup>2</sup> s<br>37 A <sup>2</sup> s |
| $I_R$      | $V_R = V_{RRM}$<br>$T_{VJ} = T_{VJM}$<br>$T_{VJ} = 25^\circ\text{C}$                                   | 1 mA<br>0.15 mA                            |
| $V_F$      | $I_F = 21$ A; $T_{VJ} = 25^\circ\text{C}$                                                              | 1.83 V                                     |
| $V_{T0}$   | For power-loss calculations only ( $T_{VJ} = 125^\circ\text{C}$ )                                      | 0.9 V                                      |
| $r_T$      |                                                                                                        | 50 mΩ                                      |
| $R_{thJC}$ | per diode; DC current                                                                                  | 4.4 K/W                                    |
| $R_{thJH}$ | per diode; DC current                                                                                  | 5.2 K/W                                    |

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.

\* for resistive load

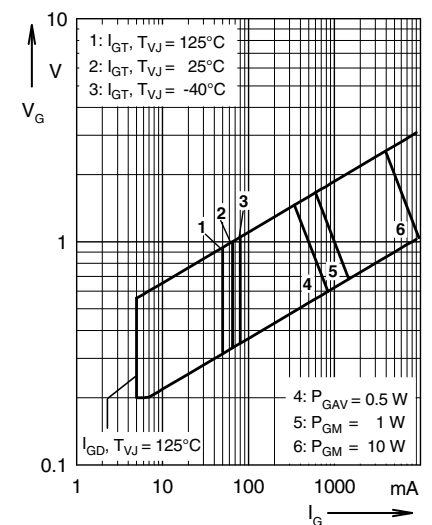


Fig. 1 Gate trigger range

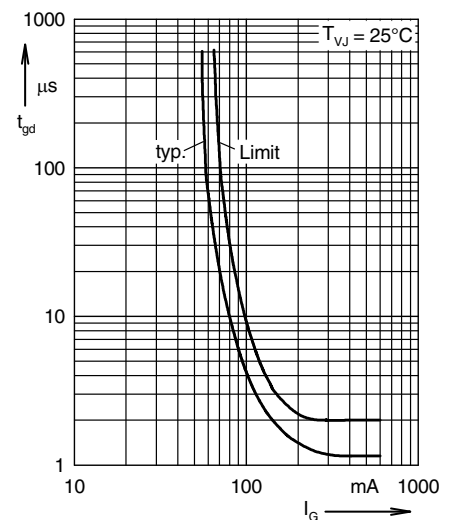


Fig. 2 Gate controlled delay time  $t_{gd}$

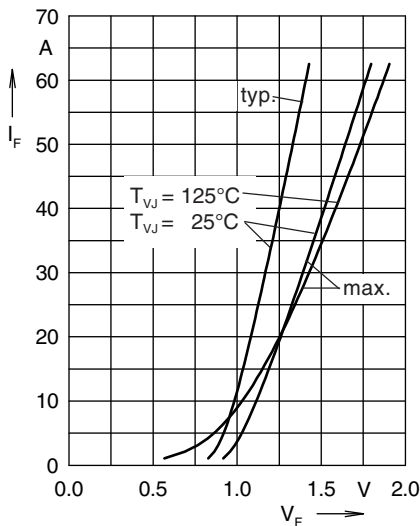


Fig. 3 Forward current vs. voltage drop per diode

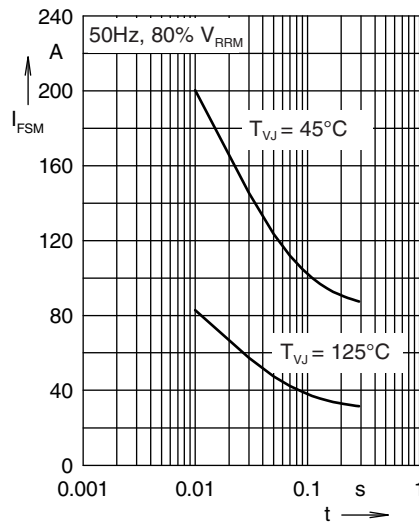


Fig. 4 Surge overload current

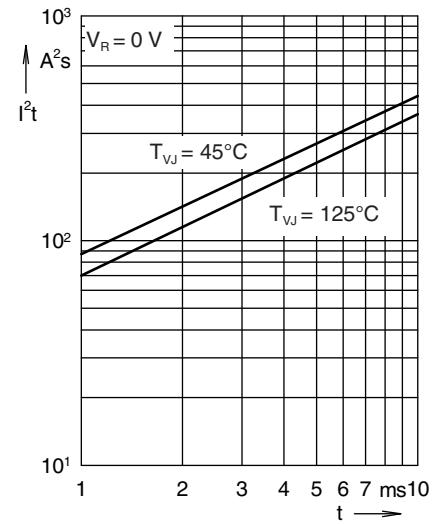


Fig. 5  $I^2t$  versus time per diode

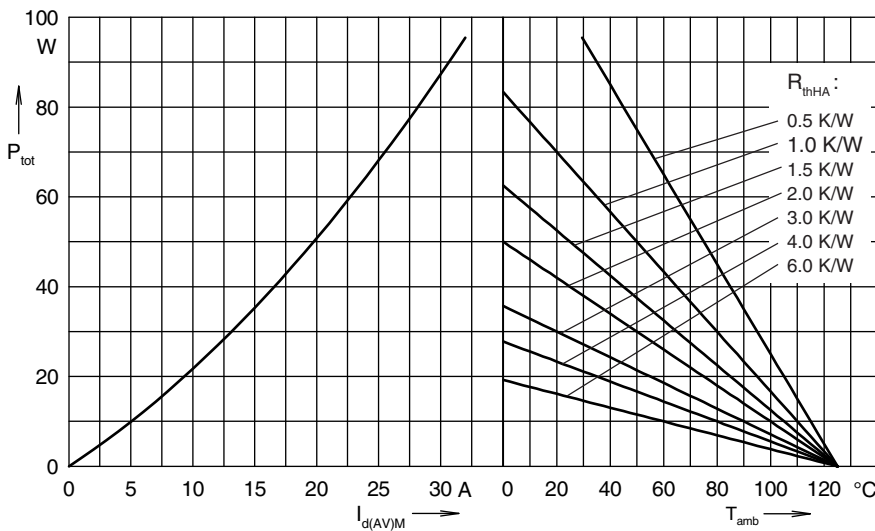


Fig. 6 Power dissipation vs. direct output current and ambient temperature

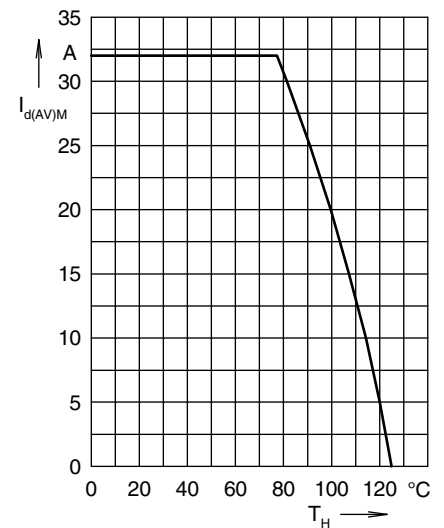


Fig. 7 Max. forward current vs. heatsink temperature

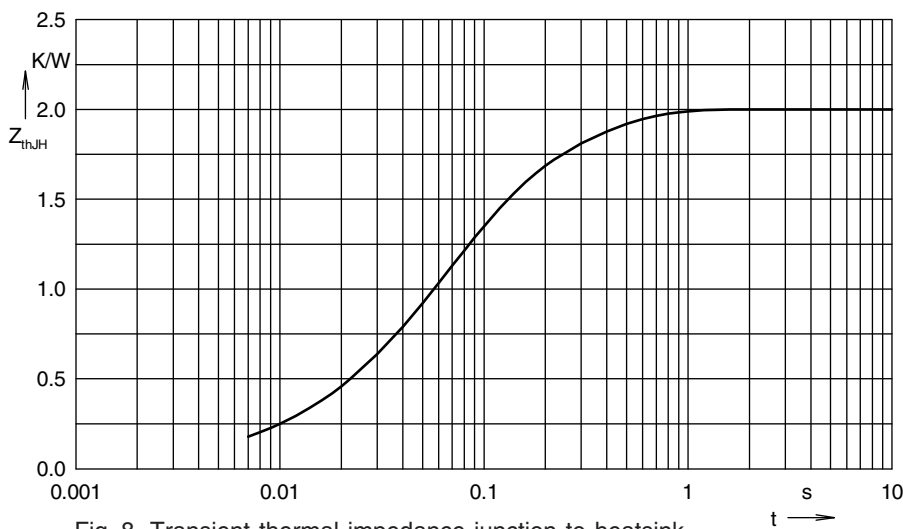


Fig. 8 Transient thermal impedance junction to heatsink

Constants for  $Z_{thJH}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.007           | 0.008     |
| 2 | 0.266           | 0.05      |
| 3 | 1.127           | 0.06      |
| 4 | 0.6             | 0.25      |