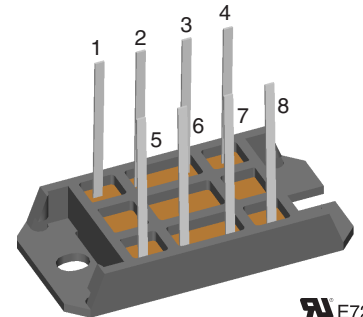
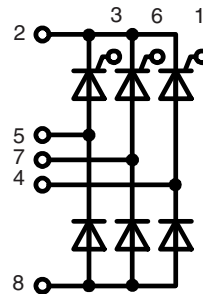


# Three Phase Half Controlled Rectifier Bridge

$I_{dAVM} = 27 \text{ A}$   
 $V_{RRM} = 1200\text{-}1600 \text{ V}$

| $V_{RSM}$<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               | Conditions                                                                                                                                                      | Maximum Ratings                                                                   |                                                              |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------|
| $I_{dAV}$            | $T_K = 100^\circ\text{C}$ ; module                                                                                                                              | 21 A                                                                              |                                                              |
| $I_{dAVM}$           | module                                                                                                                                                          | 27 A                                                                              |                                                              |
| $I_{FRMS}, I_{TRMS}$ | per leg                                                                                                                                                         | 16 A                                                                              |                                                              |
| $I_{FSM}, I_{TSM}$   | $T_{VJ} = 45^\circ\text{C}$ ;<br>$V_R = 0$                                                                                                                      | $t = 10 \text{ ms}$ (50 Hz), sine<br>$t = 8.3 \text{ ms}$ (60 Hz), sine           | 300 A<br>320 A                                               |
|                      | $T_{VJ} = T_{VJM}$<br>$V_R = 0$                                                                                                                                 | $t = 10 \text{ ms}$ (50 Hz), sine<br>$t = 8.3 \text{ ms}$ (60 Hz), sine           | 270 A<br>290 A                                               |
| $I^2t$               | $T_{VJ} = 45^\circ\text{C}$<br>$V_R = 0$                                                                                                                        | $t = 10 \text{ ms}$ (50 Hz), sine<br>$t = 8.3 \text{ ms}$ (60 Hz), sine           | 450 $\text{A}^2\text{s}$<br>430 $\text{A}^2\text{s}$         |
|                      | $T_{VJ} = T_{VJM}$<br>$V_R = 0$                                                                                                                                 | $t = 10 \text{ ms}$ (50 Hz), sine<br>$t = 8.3 \text{ ms}$ (60 Hz), sine           | 365 $\text{A}^2\text{s}$<br>350 $\text{A}^2\text{s}$         |
| $(di/dt)_{cr}$       | $T_{VJ} = T_{VJM}$<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, $I_T = 50 \text{ A}$<br><br>non repetitive, $I_T = 1/3 \cdot I_{dAV}$ | 150 $\text{A}/\mu\text{s}$<br><br>500 $\text{A}/\mu\text{s}$ |
| $(dv/dt)_{cr}$       | $T_{VJ} = T_{VJM}$ ; $V_{DR} = 2/3 V_{DRM}$<br>$R_{GK} = \infty$ ; method 1 (linear voltage rise)                                                               |                                                                                   | 1000 $\text{V}/\mu\text{s}$                                  |
| $V_{RGM}$            |                                                                                                                                                                 |                                                                                   | 10 V                                                         |
| $P_{GM}$             | $T_{VJ} = T_{VJM}$<br>$I_T = I_{TAVM}$                                                                                                                          | $t_p = 30 \mu\text{s}$                                                            | $\leq 10 \text{ W}$                                          |
|                      |                                                                                                                                                                 | $t_p = 500 \mu\text{s}$                                                           | $\leq 5 \text{ W}$                                           |
|                      |                                                                                                                                                                 | $t_p = 10 \text{ ms}$                                                             | $\leq 1 \text{ W}$                                           |
| $P_{GAVM}$           |                                                                                                                                                                 |                                                                                   | 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                                                                                                                                                   | $t = 1 \text{ min}$                                                               | 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               | typ.                                                                                                                                                            |                                                                                   | 28 g                                                         |

## Features

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

## Applications

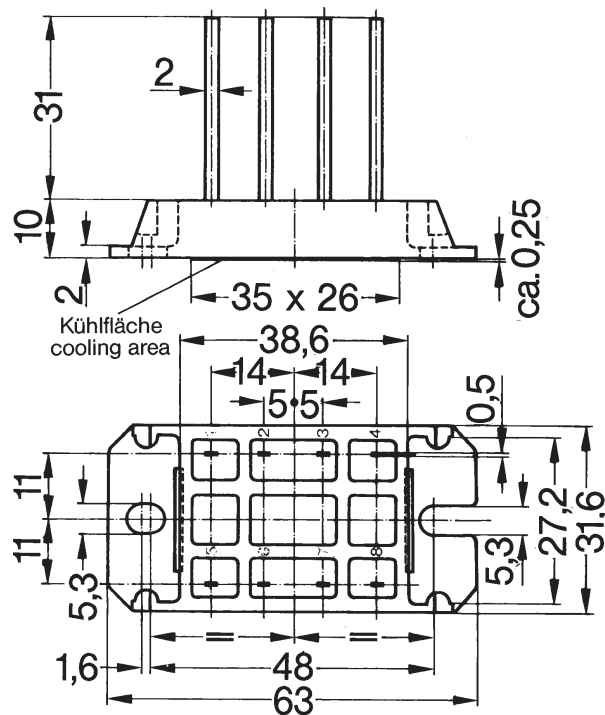
- Input rectifier for switch mode power supplies (SMPS)
- Softstart capacitor charging
- Electric drives and auxiliaries

## Advantages

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

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

| Symbol     | 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                    |
| $V_F, V_T$ | $I_F, I_T = 30$ A, $T_{VJ} = 25^\circ\text{C}$                                                                                                                             | $\leq 1.45$ V                                   |
| $V_{T0}$   | For power-loss calculations only                                                                                                                                           | 1 V                                             |
| $r_T$      | ( $T_{VJ} = 125^\circ\text{C}$ )                                                                                                                                           | 16 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    |
| $V_{GD}$   | $T_{VJ} = T_{VJM};$<br>$T_{VJ} = T_{VJM};$                                                                                                                                 | $\leq 0.2$ V<br>$\leq 5$ mA                     |
| $I_{GD}$   | $V_D = 2/3 V_{DRM}$<br>$V_D = 2/3 V_{DRM}$                                                                                                                                 |                                                 |
| $I_L$      | $I_G = 0.3$ A; $t_G = 30$ $\mu\text{s}$<br>$di_G/dt = 0.3$ 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, $t_p = 300$ $\mu\text{s}$ , $-di/dt = 10$ A/ $\mu\text{s}$                                                                       | typ. 150 $\mu\text{s}$                          |
| $Q_f$      | $V_R = 100$ V, $dv/dt = 20$ V/ $\mu\text{s}$ , $V_D = 2/3 V_{DRM}$                                                                                                         | 75 $\mu\text{C}$                                |
| $R_{thJC}$ | 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>                             |

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


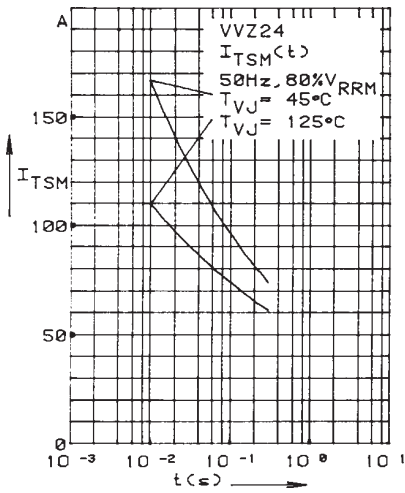


Fig. 1 Surge overload current per chip  
 $I_{FSM}$ : Crest value, t: duration

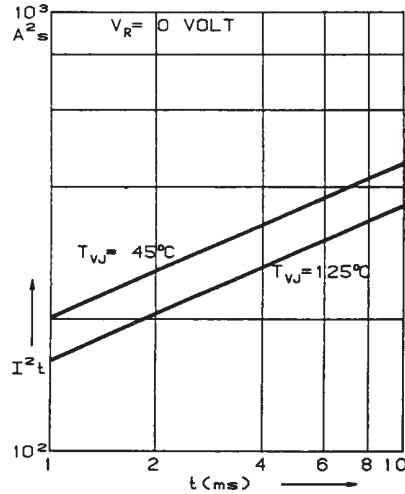


Fig. 2  $I^2t$  versus time (1-10 ms) per chip

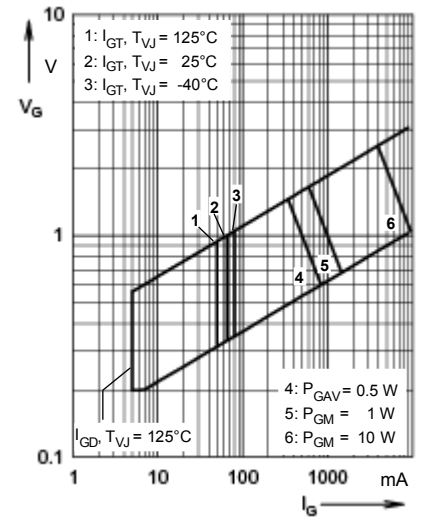


Fig. 3 Gate trigger characteristics  
 Triggering

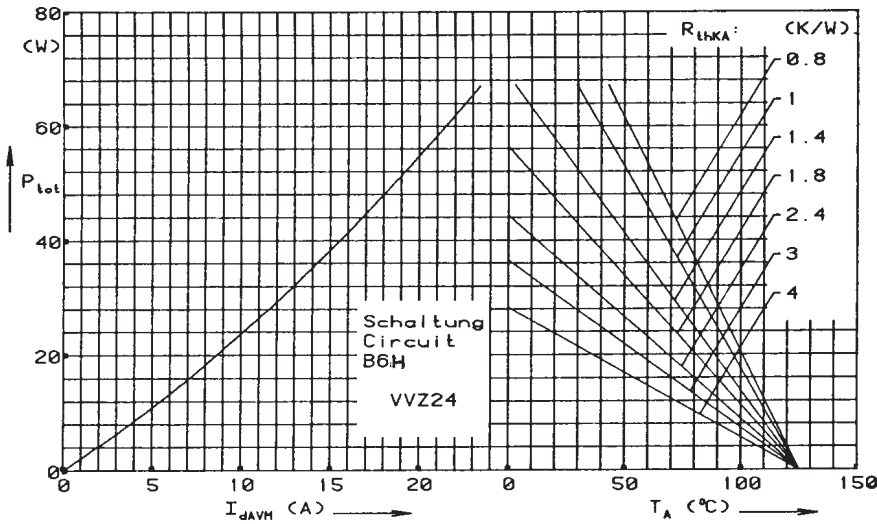


Fig. 4 Power dissipation versus direct output current and ambient temperature

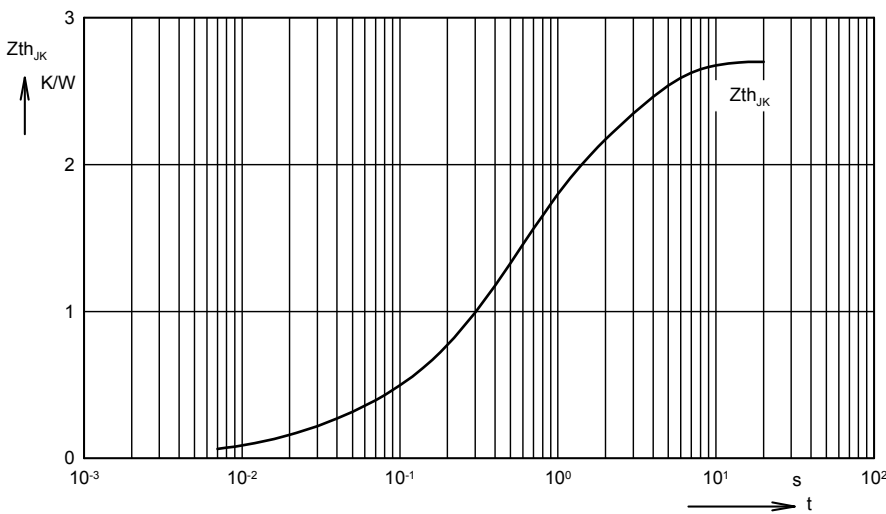


Fig. 5 Transient thermal impedance junction to heatsink

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       |

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