

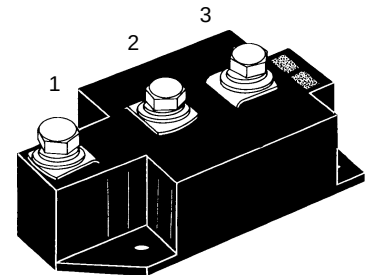
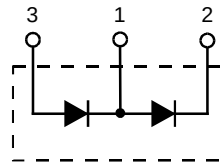
# High Power Diode Modules

$$I_{FRMS} = 2 \times 480 \text{ A}$$

$$I_{FAVM} = 2 \times 305 \text{ A}$$

$$V_{RRM} = 800\text{-}2200 \text{ V}$$

| $V_{RSM}$<br>V | $V_{RRM}$<br>V | Type         |
|----------------|----------------|--------------|
| 900            | 800            | MDD 310-08N1 |
| 1300           | 1200           | MDD 310-12N1 |
| 1500           | 1400           | MDD 310-14N1 |
| 1700           | 1600           | MDD 310-16N1 |
| 2100           | 2000           | MDD 310-20N1 |
| 2300           | 2200           | MDD 310-22N1 |



| Symbol        | Test Conditions                                   | Maximum Ratings          |
|---------------|---------------------------------------------------|--------------------------|
| $I_{FRMS}$    | $T_{VJ} = T_{VJM}$                                | 480 A                    |
| $I_{FAVM}$    | $T_C = 100^\circ\text{C}; 180^\circ \text{ sine}$ | 305 A                    |
| $I_{FSM}$     | $T_{VJ} = 45^\circ\text{C}; V_R = 0$              | 11 500 A                 |
|               | $t = 10 \text{ ms (50 Hz), sine}$                 | 12 200 A                 |
|               | $t = 8.3 \text{ ms (60 Hz), sine}$                | 9 600 A                  |
|               | $T_{VJ} = T_{VJM}; V_R = 0$                       | 10 200 A                 |
|               | $t = 10 \text{ ms (50 Hz), sine}$                 | 662 000 A <sup>2</sup> s |
| $\int i^2 dt$ | $T_{VJ} = 45^\circ\text{C}; V_R = 0$              | 620 000 A <sup>2</sup> s |
|               | $t = 8.3 \text{ ms (60 Hz), sine}$                | 460 000 A <sup>2</sup> s |
|               | $T_{VJ} = T_{VJM}; V_R = 0$                       | 430 000 A <sup>2</sup> s |
| $T_{VJ}$      |                                                   | -40...+150 °C            |
| $T_{VJM}$     |                                                   | 150 °C                   |
| $T_{stg}$     |                                                   | -40...+125 °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)                              | 2.5-5/22-44 Nm/lb.in.    |
|               | Terminal connection torque (M8)                   | 12-15/106-132 Nm/lb.in.  |
| Weight        | Typical including screws                          | 320 g                    |

## Features

- Direct copper bonded  $\text{Al}_2\text{O}_3$  -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873

## Applications

- Supplies for DC power equipment
- DC supply for PWM inverter
- Field supply for DC motors
- Battery DC power supplies

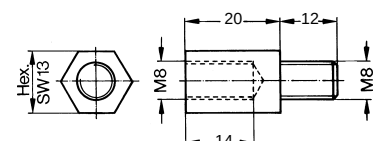
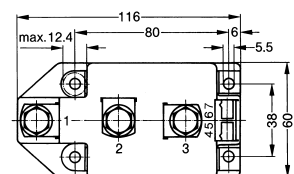
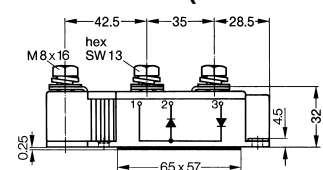
## Advantages

- Space and weight savings
- Simple mounting
- Improved temperature and power cycling
- Reduced protection circuits

| Symbol     | Test Conditions                                                                      | Characteristic Values |
|------------|--------------------------------------------------------------------------------------|-----------------------|
| $I_{RRM}$  | $T_{VJ} = T_{VJM}; V_R = V_{RRM}$                                                    | 40 mA                 |
| $V_F$      | $I_F = 600 \text{ A}; T_{VJ} = 25^\circ\text{C}$                                     | 1.2 V                 |
| $V_{T0}$   | For power-loss calculations only                                                     | 0.75 V                |
| $r_T$      | $T_{VJ} = T_{VJM}$                                                                   | 0.63 mΩ               |
| $R_{thJC}$ | per diode; DC current                                                                | 0.129 K/W             |
| $R_{thJK}$ | per module                                                                           | 0.065 K/W             |
|            | per diode; DC current                                                                | 0.169 K/W             |
|            | per module                                                                           | 0.0845 K/W            |
| $Q_S$      | $T_{VJ} = 125^\circ\text{C}; I_F = 400 \text{ A}; -di/dt = 50 \text{ A}/\mu\text{s}$ | 760 μC                |
| $I_{RM}$   |                                                                                      | 275 A                 |
| $d_s$      | Creepage distance on surface                                                         | 12.7 mm               |
| $d_A$      | Strike distance through air                                                          | 9.6 mm                |
| $a$        | Maximum allowable acceleration                                                       | 50 m/s <sup>2</sup>   |

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

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



Threaded spacer for higher Anode/Cathode construction: Type **ZY 250**, material brass

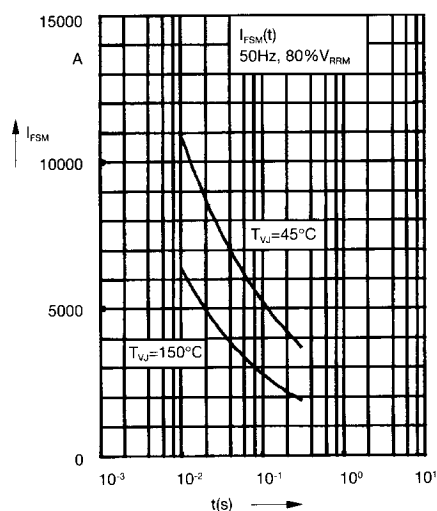


Fig. 1 Surge overload current  
 $I_{FSM}$ : Crest value,  $t$ : duration

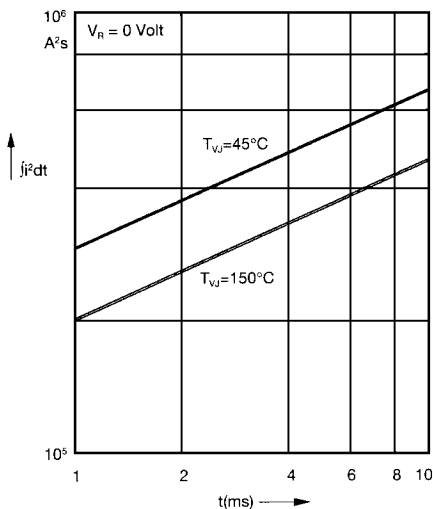


Fig. 2  $j_i^2 dt$  versus time (1-10 ms)

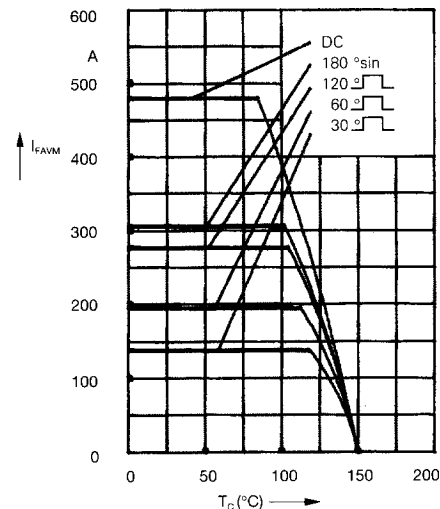


Fig. 2a Maximum forward current  
 at case temperature

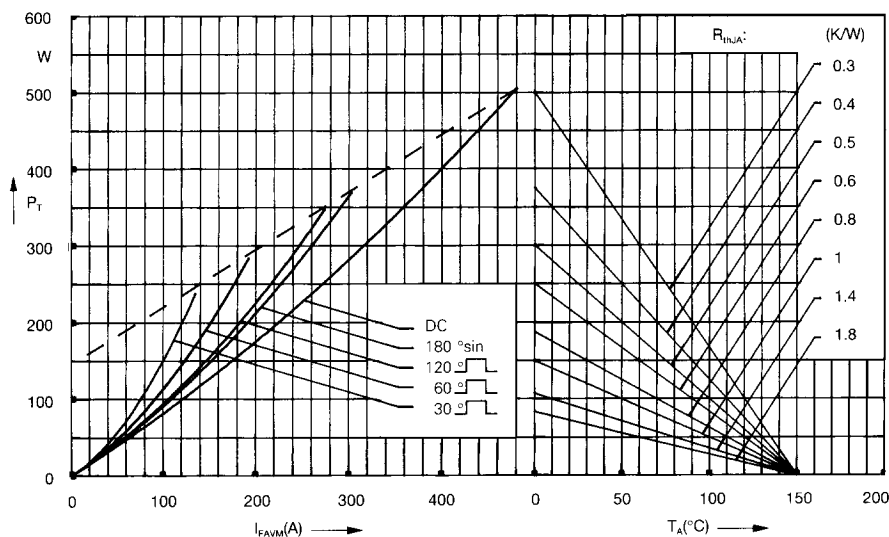


Fig. 3 Power dissipation versus  
 forward current and ambient  
 temperature (per diode)

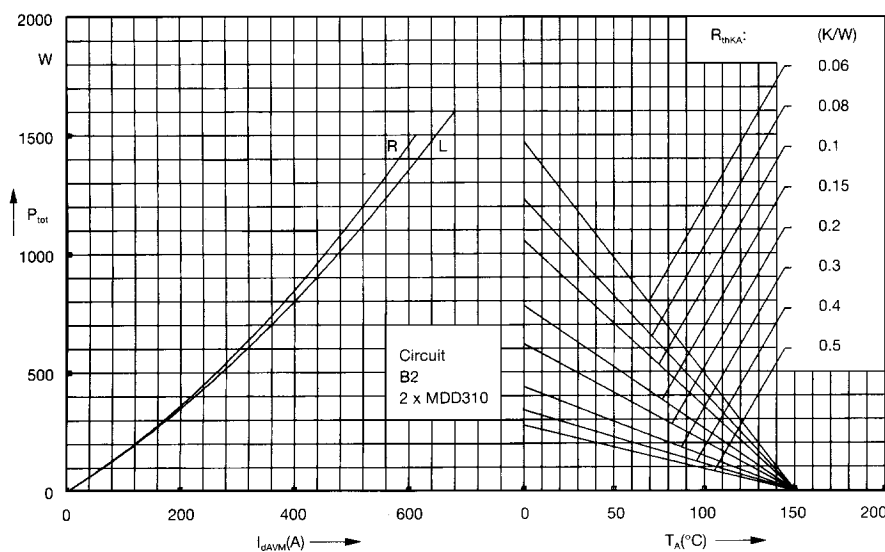


Fig. 4 Single phase rectifier bridge:  
 Power dissipation versus direct  
 output current and ambient  
 temperature  
 R = resistive load  
 L = inductive load

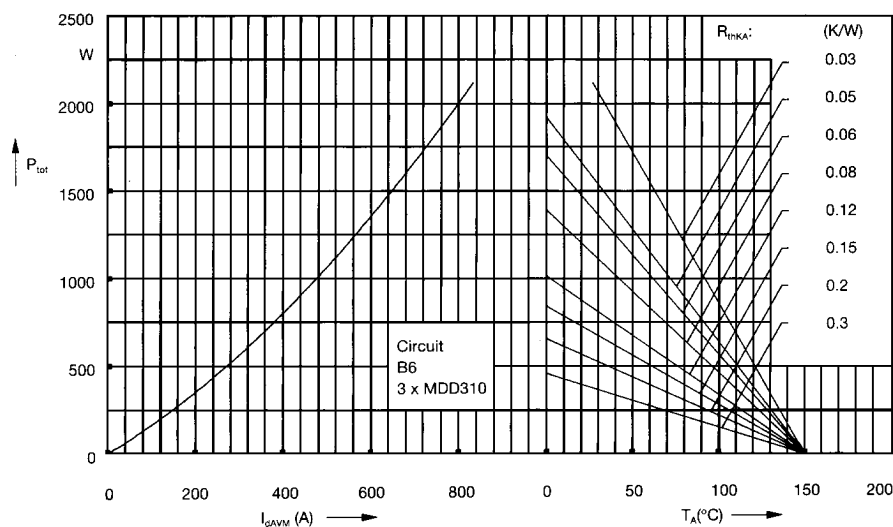


Fig. 5 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

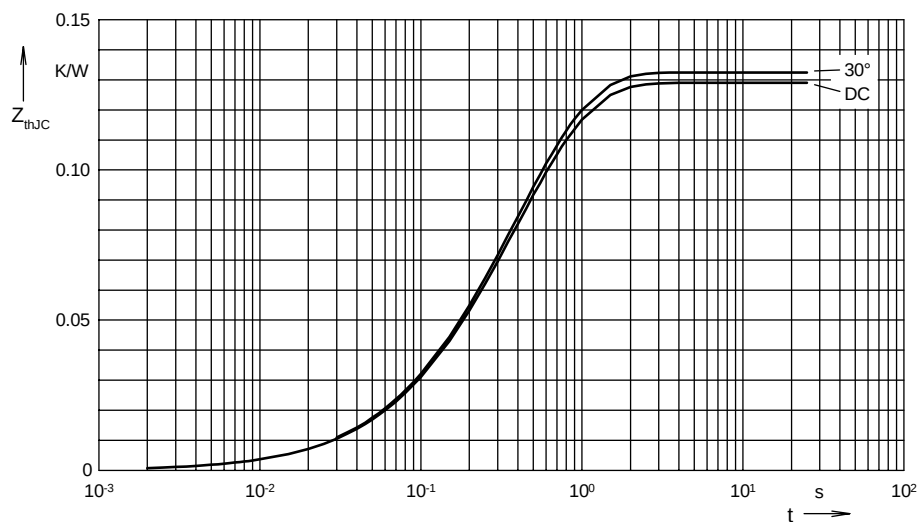


Fig. 6 Transient thermal impedance junction to case (per diode)

$R_{thJC}$  for various conduction angles  $d$ :

| $d$  | $R_{thJC}$ (K/W) |
|------|------------------|
| DC   | 0.129            |
| 180° | 0.131            |
| 120° | 0.132            |
| 60°  | 0.132            |
| 30°  | 0.133            |

Constants for  $Z_{thJC}$  calculation:

| $i$ | $R_{thi}$ (K/W) | $t_i$ (s) |
|-----|-----------------|-----------|
| 1   | 0.0035          | 0.0099    |
| 2   | 0.0165          | 0.168     |
| 3   | 0.1091          | 0.456     |

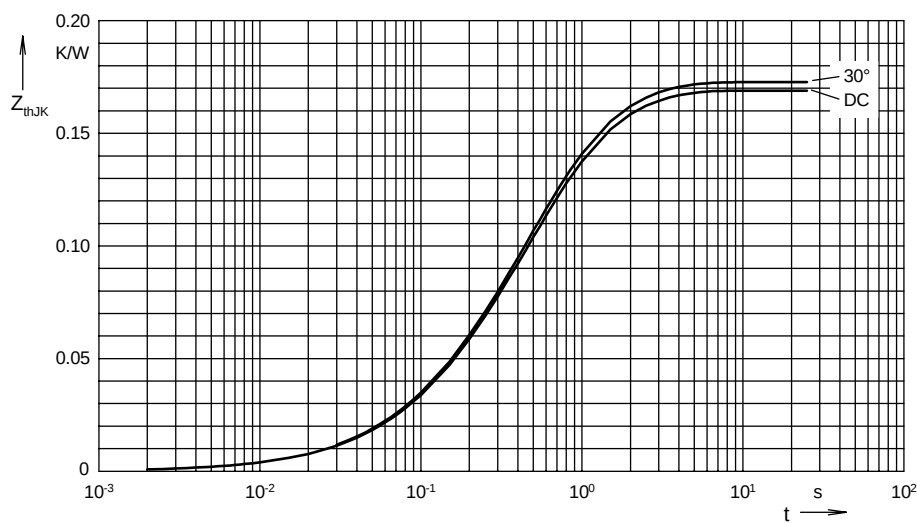


Fig. 7 Transient thermal impedance junction to heatsink (per diode)

$R_{thJK}$  for various conduction angles  $d$ :

| $d$  | $R_{thJK}$ (K/W) |
|------|------------------|
| DC   | 0.169            |
| 180° | 0.171            |
| 120° | 0.172            |
| 60°  | 0.172            |
| 30°  | 0.173            |

Constants for  $Z_{thJK}$  calculation:

| $i$ | $R_{thi}$ (K/W) | $t_i$ (s) |
|-----|-----------------|-----------|
| 1   | 0.0035          | 0.0099    |
| 2   | 0.0165          | 0.168     |
| 3   | 0.1091          | 0.456     |
| 4   | 0.04            | 1.36      |