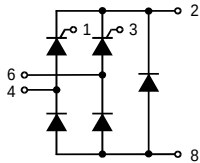


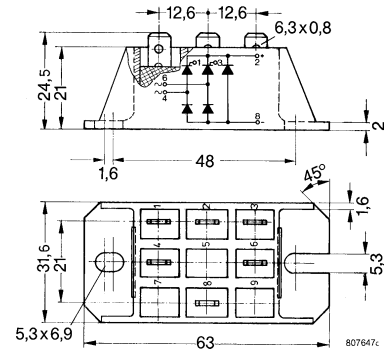
# S1PHB36

## Single Phase Half Controlled Bridge With Free Wheeling Diode



| Type       | $V_{RSM}$<br>$V_{DSM}$<br>V | $V_{RRM}$<br>$V_{DRM}$<br>V |
|------------|-----------------------------|-----------------------------|
| S1PHB36-08 | 900                         | 800                         |
| S1PHB36-12 | 1300                        | 1200                        |
| S1PHB36-14 | 1500                        | 1400                        |
| S1PHB36-16 | 1700                        | 1600                        |
| S1PHB36-18 | 1900                        | 1800                        |

Dimensions in mm (1mm=0.0394")



| Symbol                                          | Test Conditions                                                                                                                                                           | Maximum Ratings                 | Unit             |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|------------------|
| $I_{dAV}$<br>$I_{dAVM}$<br>$I_{FRMS}, I_{TRMS}$ | $T_K=85^{\circ}C$ , module<br>module<br>per leg                                                                                                                           | 36<br>40<br>28                  | A                |
| $I_{TSM}, I_{FSM}$                              | $T_{VJ}=45^{\circ}C$<br>$V_R=0$<br>$t=10ms$ (50Hz), sine<br>$t=8.3ms$ (60Hz), sine<br>$T_{VJ}=T_{VJM}$<br>$V_R=0$<br>$t=10ms$ (50Hz), sine<br>$t=8.3ms$ (60Hz), sine      | 320<br>350<br>280<br>310        | A                |
| $I^2t$                                          | $T_{VJ}=45^{\circ}C$<br>$V_R=0$<br>$t=10ms$ (50Hz), sine<br>$t=8.3ms$ (60Hz), sine<br>$T_{VJ}=T_{VJM}$<br>$V_R=0$<br>$t=10ms$ (50Hz), sine<br>$t=8.3ms$ (60Hz), sine      | 500<br>520<br>390<br>400        | A <sup>2</sup> s |
| $(di/dt)_{cr}$                                  | $T_{VJ}=125^{\circ}C$<br>$f=50Hz$ , $t_p=200\mu s$<br>$V_D=2/3V_{DRM}$<br>$I_G=0.3A$<br>$di_G/dt=0.3A/\mu s$<br>repetitive, $I_T=50A$<br>non repetitive, $I_T=1/2I_{dAV}$ | 150<br>500                      | A/ $\mu s$       |
| $(dv/dt)_{cr}$                                  | $T_{VJ}=T_{VJM}$ ; $V_{DR}=2/3V_{DRM}$<br>$R_{GK}=\infty$ ; method 1 (linear voltage rise)                                                                                | 1000                            | V/ $\mu s$       |
| $P_{GM}$                                        | $T_{VJ}=T_{VJM}$<br>$I_T=I_{TAVM}$<br>$t_p=30\mu s$<br>$t_p=500\mu s$                                                                                                     | 10<br>5                         | W                |
| $P_{GAVM}$                                      |                                                                                                                                                                           | 0.5                             | W                |
| $V_{RGM}$                                       |                                                                                                                                                                           | 10                              | V                |
| $T_{VJ}$<br>$T_{VJM}$<br>$T_{stg}$              |                                                                                                                                                                           | -40...+125<br>125<br>-40...+125 | $^{\circ}C$      |
| $V_{ISOL}$                                      | 50/60Hz, RMS<br>$I_{ISOL}\leq 1mA$<br>$t=1min$<br>$t=1s$                                                                                                                  | 3000<br>3600                    | V~               |
| $M_d$                                           | Mounting torque (M5)<br>(10-32 UNF)                                                                                                                                       | 2-2.5<br>18-22                  | Nm<br>lb.in.     |
| Weight                                          |                                                                                                                                                                           | 50                              | g                |

# S1PHB36

## Single Phase Half Controlled Bridge With Free Wheeling Diode

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

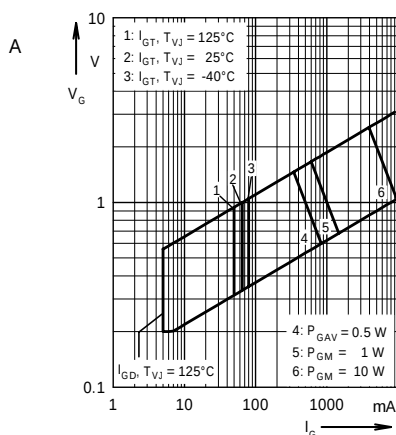


Fig. 1 Gate trigger range

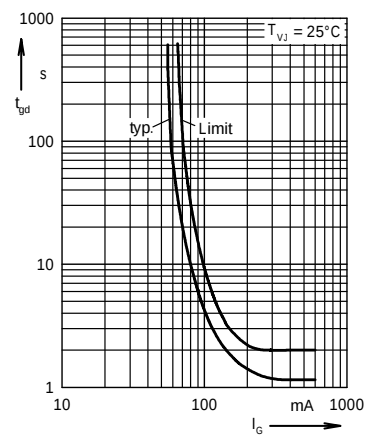


Fig. 2 Gate controlled delay time  $t_{gd}$

# S1PHB36

## Single Phase Half Controlled Bridge With Free Wheeling Diode

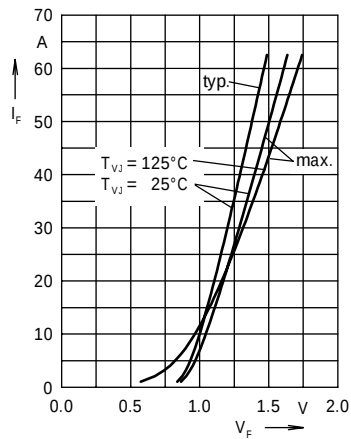


Fig. 3 Forward current versus voltage drop per diode

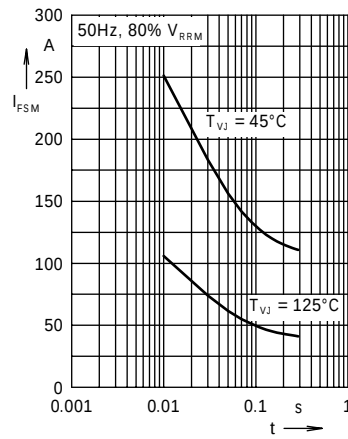


Fig. 4 Surge overload current

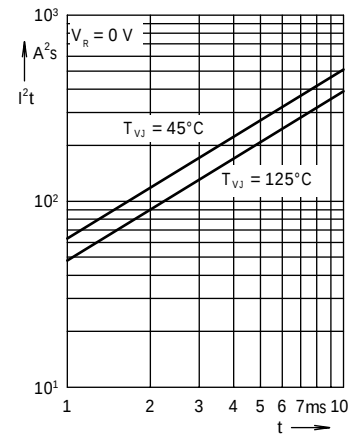


Fig. 5  $I^2t$  versus time per diode

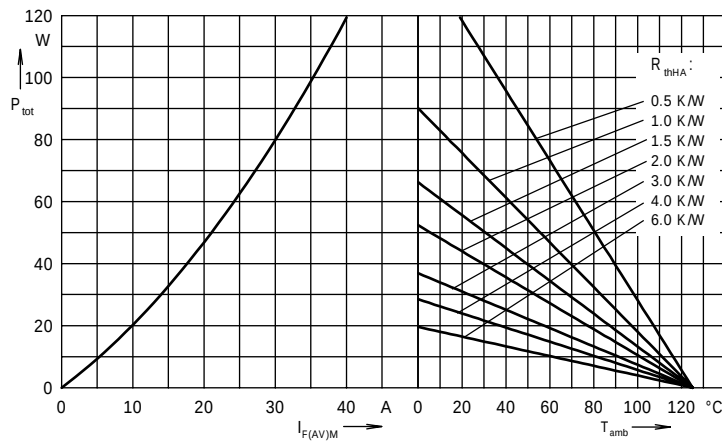


Fig. 6 Power dissipation versus direct output current and ambient temperature

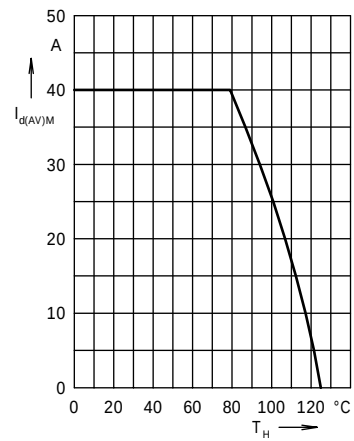


Fig. 7 Max. forward current versus heatsink temperature

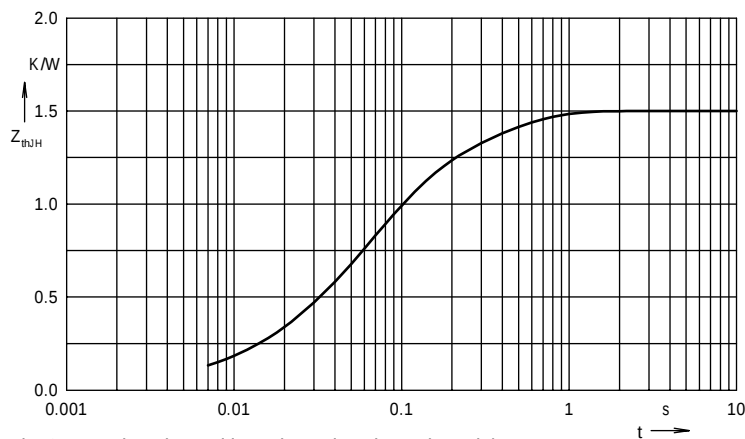


Fig. 8 Transient thermal impedance junction to heatsink

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      |