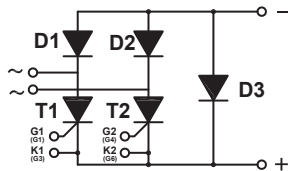
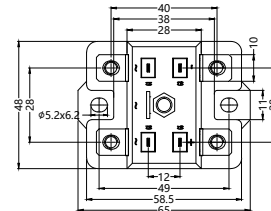
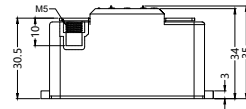


# S1PHB50GK\*\*B

## Single Phase Half Controlled Bridge Modules With Free Wheeling Diode



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                                                         |                                                 | 50<br>50<br>39                  | A           |
| $I_{TSM}, I_{FSM}$                              | $T_{VJ}=45^{\circ}C$<br>$V_R=0$                                                                         | $t=10ms$ (50Hz), sine<br>$t=8.3ms$ (60Hz), sine | 540<br>580                      | A           |
|                                                 | $T_{VJ}=T_{VJM}$<br>$V_R=0$                                                                             | $t=10ms$ (50Hz), sine<br>$t=8.3ms$ (60Hz), sine | 480<br>540                      |             |
| $I^2t$                                          | $T_{VJ}=45^{\circ}C$<br>$V_R=0$                                                                         | $t=10ms$ (50Hz), sine<br>$t=8.3ms$ (60Hz), sine | 1500<br>1500                    | $A^2s$      |
|                                                 | $T_{VJ}=T_{VJM}$<br>$V_R=0$                                                                             | $t=10ms$ (50Hz), sine<br>$t=8.3ms$ (60Hz), sine | 1200<br>1200                    |             |
| $(di/dt)_{cr}$                                  | $T_{VJ}=125^{\circ}C$<br>$f=50Hz, t_p=200\mu s$<br>$V_D=2/3V_{DRM}$<br>$I_G=0.3A$<br>$di/dt=0.3A/\mu s$ | repetitive, $I_T=50A$                           | 150                             | A/ $\mu s$  |
|                                                 |                                                                                                         | non repetitive, $I_T=1/2I_{dAV}$                | 500                             |             |
| $(dv/dt)_{cr}$                                  | $T_{VJ}=T_{VJM}$ ;<br>$R_{GK}=\infty$ ; method 1 (linear voltage rise)                                  | $V_{DR}=2/3V_{DRM}$                             | 1000                            | V/ $\mu s$  |
| $P_{GM}$                                        | $T_{VJ}=T_{VJM}$                                                                                        | $t_p=30\mu s$                                   | 10                              | W           |
|                                                 | $I_T=I_{TAVM}$                                                                                          | $t_p=500\mu s$                                  | 5                               |             |
| $P_{GAVM}$                                      |                                                                                                         |                                                 | 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                                                                                            | $t=1min$                                        | 2500                            | V~          |
|                                                 | $I_{ISOL}\leq 1mA$                                                                                      | $t=1s$                                          | 3000                            |             |
| $M_d$                                           | Mounting torque (M5)                                                                                    |                                                 | 5 $\pm$ 15%                     | Nm          |
|                                                 | Terminal connection torque (M5)                                                                         |                                                 | 5 $\pm$ 15%                     | Nm          |
| Weight                                          | typical                                                                                                 |                                                 | 165                             | g           |

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# S1PHB50GK\*\*B

## Single Phase Half Controlled Bridge Modules With Free Wheeling Diode

| Symbol     | Test Conditions                                                                                               | Characteristic Values | Unit             |
|------------|---------------------------------------------------------------------------------------------------------------|-----------------------|------------------|
| $I_R, I_D$ | $T_{VJ}=T_{VJM}; V_R=V_{RRM}; V_D=V_{DRM}$                                                                    | 5                     | mA               |
| $V_T$      | $I_T=78A; T_{VJ}=25^{\circ}C$                                                                                 | 1.64                  | V                |
| $V_{TO}$   | For power-loss calculations only                                                                              | 0.85                  | V                |
| $r_T$      |                                                                                                               | 11                    | m $\Omega$       |
| $V_{GT}$   | $V_D=6V; T_{VJ}=25^{\circ}C$<br>$T_{VJ}=-40^{\circ}C$                                                         | 1.5<br>1.6            | V                |
| $I_{GT}$   | $V_D=6V; T_{VJ}=25^{\circ}C$<br>$T_{VJ}=-40^{\circ}C$                                                         | 100<br>200            | mA               |
| $V_{GD}$   | $T_{VJ}=T_{VJM}; V_D=2/3V_{DRM}$                                                                              | 0.2                   | V                |
| $I_{GD}$   |                                                                                                               | 5                     | mA               |
| $I_L$      | $t_p=10\mu s; I_G=0.45A; T_{VJ}=25^{\circ}C$<br>$di_G/dt=0.45A/\mu s$                                         | 450                   | mA               |
| $I_H$      | $T_{VJ}=25^{\circ}C; V_D=6V; R_{GK}=\infty$                                                                   | 200                   | mA               |
| $t_{gd}$   | $T_{VJ}=25^{\circ}C; V_D=1/2V_{DRM}$<br>$I_G=0.45A; di_G/dt=0.45A/\mu s$                                      | 2                     | $\mu s$          |
| $t_q$      | $T_{VJ}=T_{VJM}; I_T=20A; t_p=200\mu s; V_R=100V$<br>$V_D=2/3V_{DRM}; dv/dt=15V/\mu s; di/dt=-10A/\mu s$ typ. | 250                   | $\mu s$          |
| $R_{thJC}$ | per thyristor/Diode; DC<br>per module                                                                         | 0.9<br>0.18           | K/W              |
| $R_{thJK}$ | per thyristor/Diode; DC<br>per module                                                                         | 1.1<br>0.22           | K/W              |
| $ds$       | Creeping distance on surface                                                                                  | 16.1                  | mm               |
| $da$       | Creepage distance in air                                                                                      | 7.1                   | mm               |
| $a$        | Maximum allowable acceleration                                                                                | 50                    | m/s <sup>2</sup> |



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# S1PHB50GK\*\*B

## Single Phase Half Controlled Bridge Modules With Free Wheeling Diode

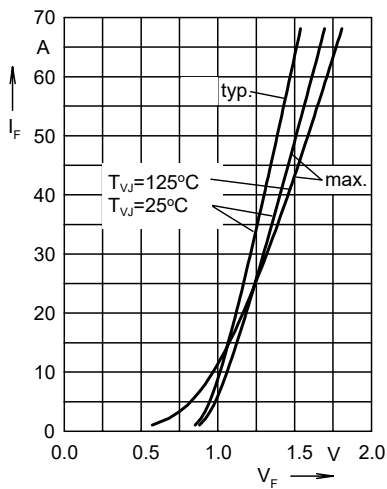


Fig. 3 Forward current versus voltage drop per diode

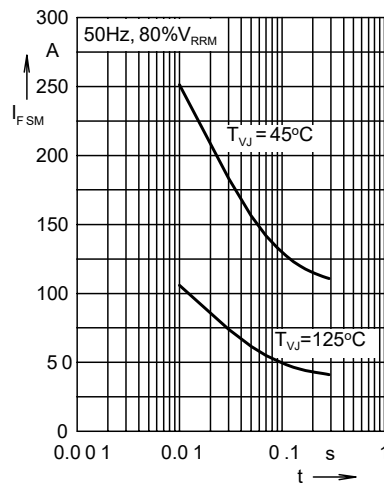


Fig. 4 Surge overload current

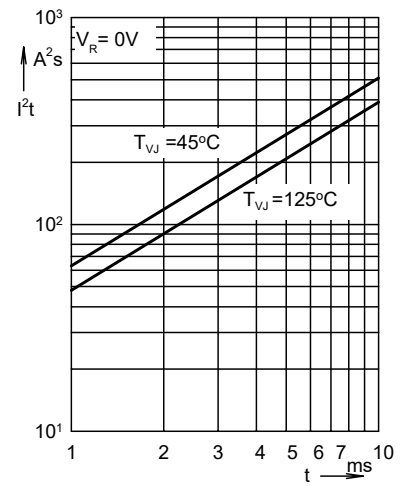


Fig. 5  $I^2t$  versus time per diode

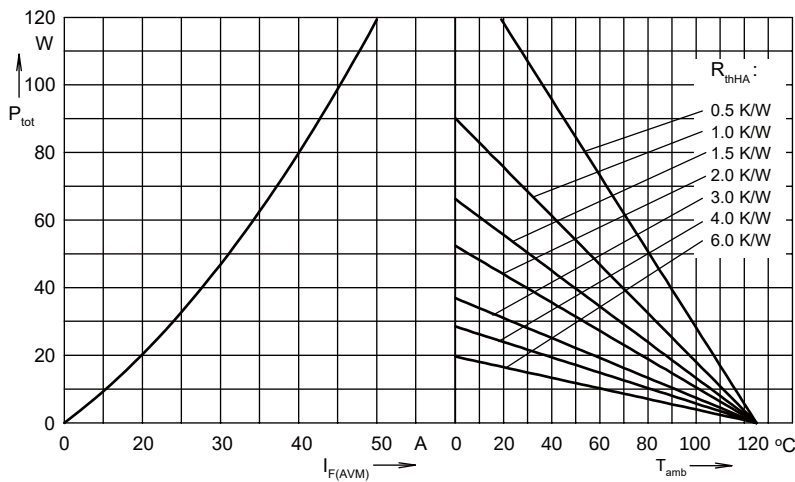


Fig. 6 Power dissipation versus direct output current and ambient temperature

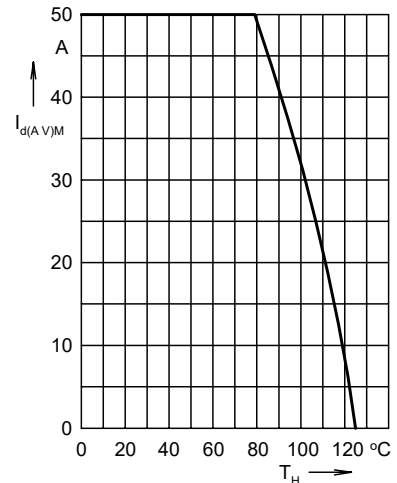


Fig. 7 Max. forward current versus heatsink temperature

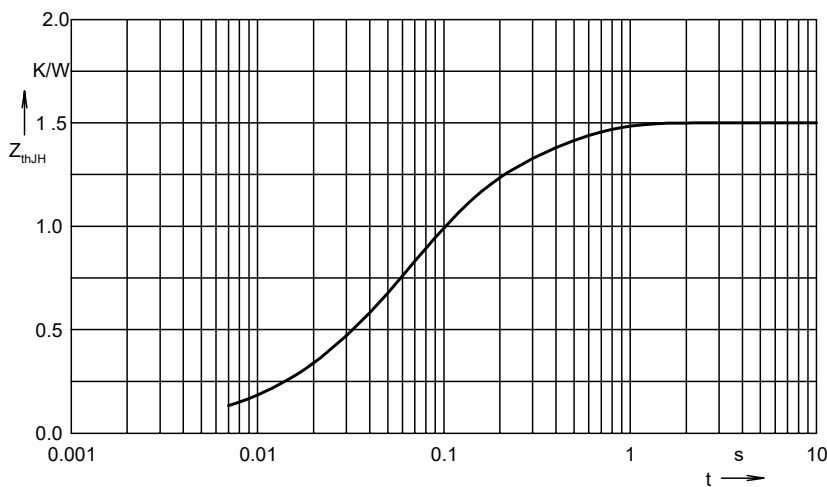


Fig. 8 Transient thermal impedance junction to heatsink

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      |