

# IGBT Module

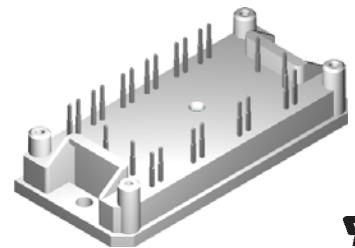
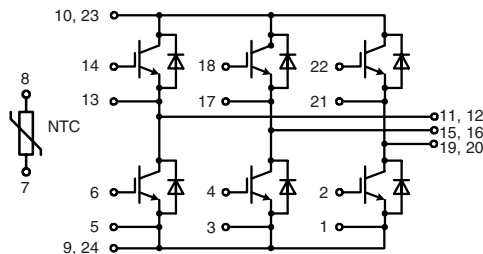
## Sixpack

Square RBSOA

$$I_{C25} = 60 \text{ A}$$

$$V_{CES} = 600 \text{ V}$$

$$V_{CE(sat) \text{ typ.}} = 2.3 \text{ V}$$



### IGBTs

| Symbol    | Conditions                                                                 | Maximum Ratings |   |
|-----------|----------------------------------------------------------------------------|-----------------|---|
| $V_{CES}$ | $T_{VJ} = 25^{\circ}\text{C to } 150^{\circ}\text{C}$                      | 600             | V |
| $V_{GES}$ |                                                                            | $\pm 20$        | V |
| $I_{C25}$ | $T_C = 25^{\circ}\text{C}$                                                 | 60              | A |
| $I_{C80}$ | $T_C = 80^{\circ}\text{C}$                                                 | 41              | A |
| $I_{CM}$  | $V_{GE} = \pm 15 \text{ V}; R_G = 10 \Omega; T_{VJ} = 125^{\circ}\text{C}$ | 80              | A |
| $V_{CEK}$ | RBSOA; clamped inductive load; $L = 100 \mu\text{H}$                       | $V_{CES}$       |   |
| $P_{tot}$ | $T_C = 25^{\circ}\text{C}$                                                 | 180             | W |

| Symbol        | Conditions                                                                                                                                    | Characteristic Values<br>( $T_{VJ} = 25^{\circ}\text{C}$ , unless otherwise specified) |            |              |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|------------|--------------|
|               |                                                                                                                                               | min.                                                                                   | typ.       | max.         |
| $V_{CE(sat)}$ | $I_C = 30 \text{ A}; V_{GE} = 15 \text{ V}; T_{VJ} = 25^{\circ}\text{C}$<br>$T_{VJ} = 125^{\circ}\text{C}$                                    |                                                                                        | 2.3<br>2.0 | 2.8<br>V     |
| $V_{GE(th)}$  | $I_C = 0.25 \text{ mA}; V_{GE} = V_{CE}$                                                                                                      | 3                                                                                      |            | 5 V          |
| $I_{CES}$     | $V_{CE} = V_{CES}; V_{GE} = 0 \text{ V}; T_{VJ} = 25^{\circ}\text{C}$<br>$T_{VJ} = 125^{\circ}\text{C}$                                       |                                                                                        | 1.2        | 0.2 mA<br>mA |
| $I_{GES}$     | $V_{CE} = 0 \text{ V}; V_{GE} = \pm 20 \text{ V}$                                                                                             |                                                                                        |            | 100 nA       |
| $t_{d(on)}$   | Inductive load, $T_{VJ} = 125^{\circ}\text{C}$<br>$V_{CE} = 400 \text{ V}; I_C = 30 \text{ A}$<br>$V_{GE} = \pm 15 \text{ V}; R_G = 3 \Omega$ |                                                                                        | 20         | ns           |
| $t_r$         |                                                                                                                                               |                                                                                        | 20         | ns           |
| $t_{d(off)}$  |                                                                                                                                               |                                                                                        | 130        | ns           |
| $t_f$         |                                                                                                                                               |                                                                                        | 80         | ns           |
| $E_{on}$      |                                                                                                                                               |                                                                                        | 0.6        | mJ           |
| $E_{off}$     |                                                                                                                                               |                                                                                        | 0.5        | mJ           |
| $C_{ies}$     | $V_{CE} = 25 \text{ V}; V_{GE} = 0 \text{ V}; f = 1 \text{ MHz}$                                                                              |                                                                                        | 2500       | pF           |
| $Q_{Gon}$     | $V_{CE} = 300 \text{ V}; V_{GE} = 15 \text{ V}; I_C = 30 \text{ A}$                                                                           |                                                                                        | 95         | nC           |
| $R_{thJC}$    | (per IGBT)                                                                                                                                    |                                                                                        |            | 0.7 K/W      |
| $R_{thCH}$    |                                                                                                                                               | 0.25                                                                                   |            | K/W          |

### Features

- IGBTs
  - low saturation voltage
  - fast switching
  - short tail current for optimized performance also in resonant circuits
- HiPerFRED™ diode:
  - fast reverse recovery
  - low operating forward voltage
  - low leakage current
- Industry Standard Package
  - solderable pins for PCB mounting
  - isolated copper base plate
- UL registered E72873

### Typical Applications

- AC drives

### Diodes

| Symbol    | Conditions               | Maximum Ratings |   |
|-----------|--------------------------|-----------------|---|
| $I_{F25}$ | $T_C = 25^\circ\text{C}$ | 48              | A |
| $I_{F80}$ | $T_C = 80^\circ\text{C}$ | 33              | A |

| Symbol                   | Conditions                                                                                                                        | Characteristic Values |      |                   |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-------------------|
|                          |                                                                                                                                   | min.                  | typ. | max.              |
| $V_F$                    | $I_F = 30\text{ A}; V_{GE} = 0\text{ V}; T_{VJ} = 25^\circ\text{C}$<br>$T_{VJ} = 125^\circ\text{C}$                               | 2.2                   | 1.7  | 2.6               |
| $I_{RM}$<br>$t_{rr}$     | $I_F = 30\text{ A}; di_F/dt = -400\text{ A}/\mu\text{s}; T_{VJ} = 100^\circ\text{C}$<br>$V_R = 300\text{ V}; V_{GE} = 0\text{ V}$ | 5                     | 65   | A<br>ns           |
| $R_{thJC}$<br>$R_{thCH}$ | (per Diode)                                                                                                                       | 0.3                   |      | 0.9<br>K/W<br>K/W |

### Temperature Sensor NTC

| Symbol                  | Conditions             | Characteristic Values |             |          |
|-------------------------|------------------------|-----------------------|-------------|----------|
|                         |                        | min.                  | typ.        | max.     |
| $R_{25}$<br>$B_{25/85}$ | $T = 25^\circ\text{C}$ | 4.45                  | 4.7<br>3510 | 5.0<br>K |

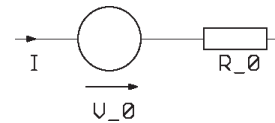
### Module

| Symbol     | Conditions                                   | Maximum Ratings |                  |
|------------|----------------------------------------------|-----------------|------------------|
| $T_{VJ}$   | operating                                    | -40...+125      | $^\circ\text{C}$ |
| $T_{VJM}$  |                                              | -40...+150      | $^\circ\text{C}$ |
| $T_{stg}$  |                                              | -40...+125      | $^\circ\text{C}$ |
| $V_{ISOL}$ | $I_{ISOL} \leq 1\text{ mA}; 50/60\text{ Hz}$ | 2500            | V~               |
| $M_d$      | Mounting torque (M4)                         | 2.0 - 2.2       | Nm               |

| Symbol | Conditions                   | Characteristic Values |      |      |
|--------|------------------------------|-----------------------|------|------|
|        |                              | min.                  | typ. | max. |
| $d_s$  | Creepage distance on surface | 12.7                  |      | mm   |
| $d_A$  | Strike distance in air       | 12.7                  |      | mm   |
| Weight |                              | 40                    |      | g    |

### Equivalent Circuits for Simulation

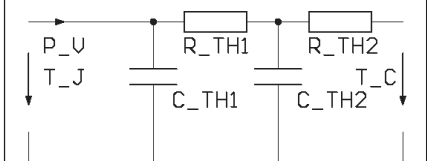
#### Conduction



IGBT (typ. at  $V_{GE} = 15\text{ V}; T_J = 125^\circ\text{C}$ )  
 $V_0 = 1.1\text{ V}; R_0 = 21.5\text{ m}\Omega$

Free Wheeling Diode (typ. at  $T_J = 125^\circ\text{C}$ )  
 $V_0 = 1.20\text{ V}; R_0 = 19\text{ m}\Omega$

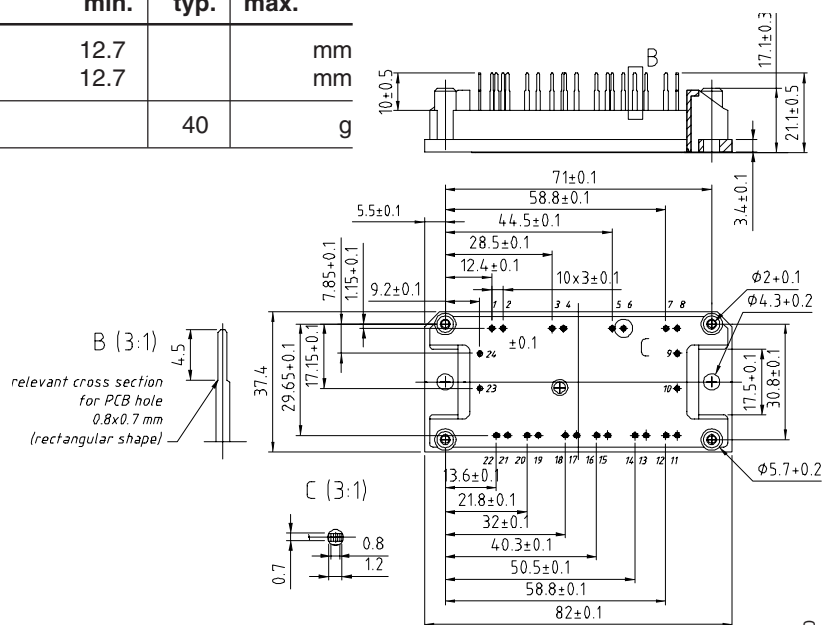
#### Thermal Response



IGBT (typ.)  
 $C_{th1} = tbd\text{ J/K}; R_{th1} = tbd\text{ K/W}$   
 $C_{th2} = tbd\text{ J/K}; R_{th2} = tbd\text{ K/W}$

Free Wheeling Diode (typ.)  
 $C_{th1} = tbd\text{ J/K}; R_{th1} = tbd\text{ K/W}$   
 $C_{th2} = tbd\text{ J/K}; R_{th2} = tbd\text{ K/W}$

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



IXYS reserves the right to change limits, test conditions and dimensions.

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