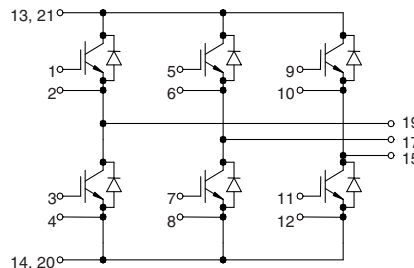


# IGBT Modules

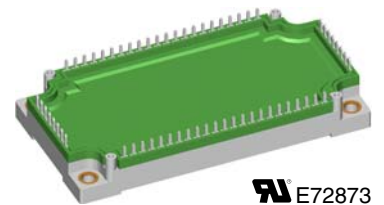
## Sixpack

Short Circuit SOA Capability  
Square RBSOA

Preliminary data



$I_{C25} = 130 \text{ A}$   
 $V_{CES} = 600 \text{ V}$   
 $V_{CE(sat) \text{ typ.}} = 2.0 \text{ V}$



**IXYS** E72873

See outline drawing for pin arrangement

### 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             |
| $I_{C25}$                  | $T_C = 25^{\circ}\text{C}$   | 130                                      | A             |
| $I_{C80}$                  | $T_C = 80^{\circ}\text{C}$   | 88                                       | A             |
| <b>RBSOA</b>               | $V_{GE} = \pm 15 \text{ V}$ ; $R_G = 2.2 \Omega$ ; $T_{VJ} = 125^{\circ}\text{C}$<br>Clamped inductive load; $L = 100 \mu\text{H}$ | $I_{CM} = 200$<br>$V_{CEK} \leq V_{CES}$ | A             |
| $t_{SC}$<br><b>(SCSOA)</b> | $V_{CE} = V_{CES}$ ; $V_{GE} = \pm 15 \text{ V}$ ; $R_G = 2.2 \Omega$ ; $T_{VJ} = 125^{\circ}\text{C}$<br>non-repetitive           | 10                                       | $\mu\text{s}$ |
| $P_{tot}$                  | $T_C = 25^{\circ}\text{C}$   | 410                                      | W             |

### Features

- €NPT IGBT technology
- €low saturation voltage
- €low switching losses
- €switching frequency up to 30 kHz
- €square RBSOA, no latch up
- €high short circuit capability
- €positive temperature coefficient for easy paralleling
- €MOS input, voltage controlled
- €ultra fast free wheeling diodes
- €solderable pins for PCB mounting
- €package with copper base plate

### Advantages

- €space savings
- €reduced protection circuits
- €package designed for wave soldering

### Typical Applications

- €AC motor control
- €AC servo and robot drives
- €power supplies

| Symbol   | Conditions   | Characteristic Values<br>( $T_{VJ} = 25^{\circ}\text{C}$ , unless otherwise specified) |                                     |                                  |     |
|--|--|--|-------------------------------------|----------------------------------|-----|
|  |  | min.   | typ.                                | max.                             |     |
| $V_{CE(sat)}$  | $I_C = 100 \text{ A}$ ; $V_{GE} = 15 \text{ V}$ ; $T_{VJ} = 25^{\circ}\text{C}$<br>$T_{VJ} = 125^{\circ}\text{C}$                                      |  | 2.0<br>2.3                          | V<br>V                           |     |
| $V_{GE(th)}$   | $I_C = 1.5 \text{ mA}$ ; $V_{GE} = V_{CE}$   | 4.5  |                                     | 6.5 V                            |     |
| $I_{CES}$  | $V_{CE} = V_{CES}$ ; $V_{GE} = 0 \text{ V}$ ; $T_{VJ} = 25^{\circ}\text{C}$<br>$T_{VJ} = 125^{\circ}\text{C}$  |  | 0.9                                 | 1.2 mA<br>mA                     |     |
| $I_{GES}$  | $V_{CE} = 0 \text{ V}$ ; $V_{GE} = \pm 20 \text{ V}$   |  |                                     | 400 nA                           |     |
| $t_{d(on)}$<br>$t_r$<br>$t_{d(off)}$<br>$t_f$<br>$E_{on}$<br>$E_{off}$ | Inductive load, $T_{VJ} = 125^{\circ}\text{C}$<br>$V_{CE} = 300 \text{ V}$ ; $I_C = 100 \text{ A}$<br>$V_{GE} = \pm 15 \text{ V}$ ; $R_G = 2.2 \Omega$ |  | 25<br>11<br>150<br>30<br>1.0<br>2.9 | ns<br>ns<br>ns<br>ns<br>mJ<br>mJ |     |
| $C_{ies}$  |  | $V_{CE} = 25 \text{ V}$ ; $V_{GE} = 0 \text{ V}$ ; $f = 1 \text{ MHz}$                 | 4.3                                 | nF                               |     |
| $Q_{Gon}$  |  | $V_{CE} = 300 \text{ V}$ ; $V_{GE} = 15 \text{ V}$ ; $I_C = 125 \text{ A}$             | 340                                 | nC                               |     |
| $R_{thJC}$   |  | (per IGBT)   |                                     | 0.3                              | K/W |

**Diodes**

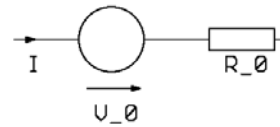
| Symbol    | Conditions               | Maximum Ratings |   |
|-----------|--------------------------|-----------------|---|
| $I_{F25}$ | $T_C = 25^\circ\text{C}$ | 140             | A |
| $I_{F80}$ | $T_C = 80^\circ\text{C}$ | 88              | A |

| Symbol               | Conditions  | Characteristic Values |      |          |
|----------------------|---|-----------------------|------|----------|
|                      |   | min.                  | typ. | max.     |
| $V_F$                | $I_F = 100\text{ A}; V_{GE} = 0\text{ V}; T_{VJ} = 25^\circ\text{C}$<br>$T_{VJ} = 125^\circ\text{C}$                              | 1.9                   | 2.1  | V        |
| $I_{RM}$<br>$t_{rr}$ | $I_F = 60\text{ A}; di_F/dt = -500\text{ A}/\mu\text{s}; T_{VJ} = 125^\circ\text{C}$<br>$V_R = 300\text{ V}; V_{GE} = 0\text{ V}$ | 28                    |      | A        |
|                      |   | 100                   |      | ns       |
| $R_{thJC}$           | (per diode)   |                       |      | 0.61 K/W |

**Module**

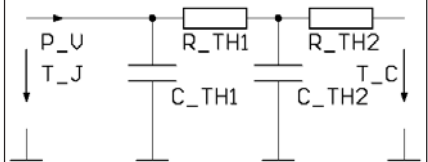
| Symbol     | Conditions                                   | Maximum Ratings |                  |
|------------|--|-----------------|------------------|
| $T_{VJ}$   | operating                                    | -40...+125      | $^\circ\text{C}$ |
| $T_{JM}$   |  | +150            | $^\circ\text{C}$ |
| $T_{stg}$  |  | -40...+125      | $^\circ\text{C}$ |
| $V_{ISOL}$ | $I_{ISOL} \leq 1\text{ mA}; 50/60\text{ Hz}$ | 2500            | V~               |
| $M_d$      | Mounting torque (M5)                         | 3 - 6           | Nm               |

| Symbol         | Conditions                   | Characteristic Values |      |           |
|----------------|------------------------------|-----------------------|------|-----------|
|                |                              | min.                  | typ. | max.      |
| $R_{pin-chip}$ |                              |                       | 1.8  | $m\Omega$ |
| $d_s$          | Creepage distance on surface | 10                    |      | mm        |
| $d_A$          | Strike distance in air       | 10                    |      | mm        |
| $R_{thCH}$     | with heatsink compound       |                       | 0.01 | K/W       |
| <b>Weight</b>  |                              |                       | 300  | g         |

**Equivalent Circuits for Simulation**
**Conduction**


IGBT (typ. at  $V_{GE} = 15\text{ V}; T_J = 125^\circ\text{C}$ )  
 $V_0 = 1.1\text{ V}; R_0 = 12\text{ m}\Omega$

Free Wheeling Diode (typ. at  $T_J = 125^\circ\text{C}$ )  
 $V_0 = 1.15\text{ V}; R_0 = 2.5\text{ m}\Omega$

**Thermal Response**


IGBT (typ.)

$C_{th1} = 0.232\text{ J/K}; R_{th1} = 0.223\text{ K/W}$   
 $C_{th2} = 1.504\text{ J/K}; R_{th2} = 0.077\text{ K/W}$

Free Wheeling Diode (typ.)

$C_{th1} = 0.138\text{ J/K}; R_{th1} = 0.48\text{ K/W}$   
 $C_{th2} = 0.957\text{ J/K}; R_{th2} = 0.13\text{ K/W}$

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

