

### IGBT MODULE (U series) 600V / 75A / PIM



#### ■ Features

- Low  $V_{CE(sat)}$
- Compact Package
- P.C. Board Mount Module
- Converter Diode Bridge Dynamic Brake Circuit

#### ■ Applications

- Inverter for Motoe Drive
- AC and DC Servo Drive Amplifier
- Uninterruptible Power Supply

#### ■ Maximum ratings and characteristics

● Absolute maximum ratings ( $T_c=25^\circ\text{C}$  unless otherwise specified)

| Item                           |                                     | Symbol                       | Condition                   | Rating      | Unit             |
|--------------------------------|-------------------------------------|------------------------------|-----------------------------|-------------|------------------|
| Inverter                       | Collector-Emitter voltage           | V <sub>CES</sub>             |                             | 600         | V                |
|                                | Gate-Emitter voltage                | V <sub>GES</sub>             |                             | ±20         | V                |
|                                | Collector current                   | I <sub>C</sub>               | Continuous                  | 75          | A                |
|                                |                                     | I <sub>CP</sub>              | 1ms                         | 150         |                  |
|                                |                                     | -I <sub>C</sub>              |                             | 75          |                  |
|                                |                                     | -I <sub>C</sub> pulse        | 1ms                         | 150         |                  |
| Collector power dissipation    | P <sub>C</sub>                      | 1 device                     | 255                         | W           |                  |
| Brake                          | Collector-Emitter voltage           | V <sub>CES</sub>             |                             | 600         | V                |
|                                | Gate-Emitter voltage                | V <sub>GES</sub>             |                             | ±20         | V                |
|                                | Collector current                   | I <sub>C</sub>               | Continuous                  | 30          | A                |
|                                |                                     | I <sub>CP</sub>              | 1ms                         | 60          | A                |
|                                | Collector power dissipation         | P <sub>C</sub>               | 1 device                    | 133         | W                |
|                                | Repetitive peak reverse voltage     | V <sub>R<sub>RRM</sub></sub> |                             | 600         | V                |
| Converter                      | Repetitive peak reverse voltage     | V <sub>R<sub>RRM</sub></sub> |                             | 800         | V                |
|                                | Average output current              | I <sub>O</sub>               | 50Hz/60Hz sine wave         | 75          | A                |
|                                | Surge current (Non-Repetitive)      | I <sub>FSM</sub>             | T <sub>J</sub> =150°C, 10ms | 525         | A                |
|                                | I <sup>2</sup> t (Non-Repetitive)   | P <sub>t</sub>               | half sine wave              | 1378        | A <sup>2</sup> s |
| Operating junction temperature |                                     | T <sub>J</sub>               |                             | +150        | °C               |
| Storage temperature            |                                     | T <sub>slg</sub>             |                             | -40 to +125 | °C               |
| Isolation voltage              | between terminal and copper base *2 | V <sub>iso</sub>             | AC : 1 minute               | AC 2500     | V                |
|                                | between thermistor and others *3    |                              |                             | AC 2500     | V                |
| Mounting screw torque          |                                     |                              |                             | 3.5 *1      | N·m              |

\*1 Recommendable value : 2.5 to 3.5 N·m (M5)

\*2 All terminals should be connected together when isolation test will be done.

\*3 Two thermistor terminals should be connected together, each other terminals should be connected together and shorted to base plate when isolation test will be done.

● Electrical characteristics (T<sub>j</sub>=25°C unless otherwise specified)

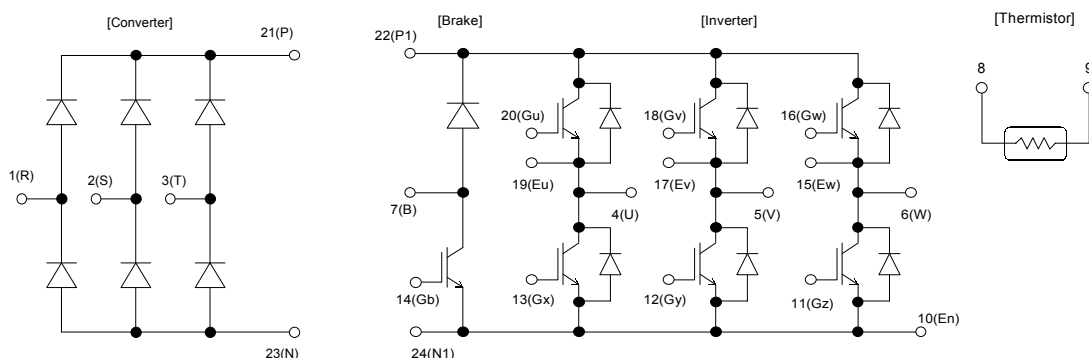
| Item       | Symbol                               | Condition                                                                         | Characteristics                                   |          |      | Unit |
|------------|--------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------|----------|------|------|
|            |                                      |                                                                                   | Min.                                              | Typ.     | Max. |      |
| Inverter   | Zero gate voltage collector current  | I <sub>CES</sub>                                                                  | V <sub>CE</sub> =600V, V <sub>GE</sub> =0V        |          | 1.0  | mA   |
|            | Gate-Emitter leakage current         | I <sub>GES</sub>                                                                  | V <sub>CE</sub> =0V, V <sub>GE</sub> =±20V        |          | 200  | nA   |
|            | Gate-Emitter threshold voltage       | V <sub>GE(th)</sub>                                                               | V <sub>CE</sub> =20V, I <sub>C</sub> =75mA        |          | 6.2  | V    |
|            | Collector-Emitter saturation voltage | V <sub>CE(sat)</sub><br>(terminal)<br>I <sub>C</sub> =75A                         | T <sub>j</sub> =25°C                              | 2.20     | 2.50 | V    |
|            |                                      |                                                                                   | T <sub>j</sub> =125°C                             | 2.40     | -    |      |
|            |                                      |                                                                                   | T <sub>j</sub> =25°C                              | 1.85     | -    |      |
|            |                                      |                                                                                   | T <sub>j</sub> =125°C                             | 2.15     | -    |      |
|            | Input capacitance                    | C <sub>ies</sub>                                                                  | V <sub>GE</sub> =0V, V <sub>CE</sub> =10V, f=1MHz |          | 5.4  | nF   |
|            | Turn-on time                         | t <sub>on</sub>                                                                   | V <sub>CC</sub> =300V                             |          | 0.42 | μs   |
|            |                                      | t <sub>r</sub>                                                                    | I <sub>C</sub> =75A                               |          | 0.24 |      |
|            |                                      | t <sub>r(i)</sub>                                                                 | V <sub>GE</sub> =±15V                             |          | 0.05 |      |
|            | Turn-off time                        | t <sub>off</sub>                                                                  | R <sub>G</sub> =47Ω                               |          | 0.42 | μs   |
|            |                                      | t <sub>f</sub>                                                                    |                                                   |          | 0.03 |      |
|            | Forward on voltage                   | V <sub>F</sub><br>(terminal)<br>I <sub>F</sub> =75A                               | T <sub>j</sub> =25°C                              | 1.95     | 2.30 | V    |
|            |                                      |                                                                                   | T <sub>j</sub> =125°C                             | 2.00     | -    |      |
|            |                                      |                                                                                   | T <sub>j</sub> =25°C                              | 1.60     | -    |      |
|            |                                      |                                                                                   | T <sub>j</sub> =125°C                             | 1.65     | -    |      |
| Brake      | Reverse recovery time                | t <sub>rr</sub>                                                                   | I <sub>F</sub> =75A                               |          | 0.35 | μs   |
|            | Zero gate voltage collector current  | I <sub>CES</sub>                                                                  | V <sub>CE</sub> =600V, V <sub>GE</sub> =0V        |          | 1.0  | mA   |
|            | Gate-Emitter leakage current         | I <sub>GES</sub>                                                                  | V <sub>CE</sub> =0V, V <sub>GE</sub> =±20V        |          | 200  | nA   |
|            | Collector-Emitter saturation voltage | V <sub>CE(sat)</sub><br>(terminal)<br>I <sub>C</sub> =30A<br>V <sub>GE</sub> =15V | T <sub>j</sub> =25°C                              | 2.00     | 2.30 | V    |
|            |                                      |                                                                                   | T <sub>j</sub> =125°C                             | 2.30     | -    |      |
|            |                                      |                                                                                   | T <sub>j</sub> =25°C                              | 1.85     | -    |      |
|            |                                      |                                                                                   | T <sub>j</sub> =125°C                             | 2.15     | -    |      |
|            | Turn-on time                         | t <sub>on</sub>                                                                   | V <sub>CC</sub> =300V                             |          | 0.42 | μs   |
|            |                                      | t <sub>r</sub>                                                                    | I <sub>C</sub> =30A                               |          | 0.24 |      |
|            |                                      | t <sub>off</sub>                                                                  | V <sub>GE</sub> =±15V                             |          | 0.42 |      |
|            | Turn-off time                        | t <sub>f</sub>                                                                    | R <sub>G</sub> =120Ω                              |          | 0.03 | μs   |
|            |                                      |                                                                                   |                                                   |          | 0.45 |      |
|            | Reverse current                      | I <sub>RRM</sub>                                                                  | V <sub>R</sub> =600V                              |          | 1.0  | mA   |
| Converter  | Forward on voltage                   | V <sub>FM</sub>                                                                   | I <sub>F</sub> =75A                               | terminal | 1.20 | V    |
|            |                                      |                                                                                   | V <sub>GE</sub> =0V                               | chip     | 1.10 |      |
|            | Reverse current                      | I <sub>RRM</sub>                                                                  | V <sub>R</sub> =800V                              |          | 1.0  | mA   |
| Thermistor | Resistance                           | R                                                                                 | T=25°C                                            |          | 5000 | Ω    |
|            |                                      |                                                                                   | T=100°C                                           |          | 465  |      |
|            | B value                              | B                                                                                 | T=25/50°C                                         |          | 3305 | K    |

● Thermal resistance Characteristics

| Item                            | Symbol               | Condition             | Characteristics |      |      | Unit |
|---------------------------------|----------------------|-----------------------|-----------------|------|------|------|
|                                 |                      |                       | Min.            | Typ. | Max. |      |
| Thermal resistance ( 1 device ) | R <sub>th(j-c)</sub> | Inverter IGBT         | -               | -    | 0.49 | °C/W |
|                                 |                      | Inverter FWD          | -               | -    | 0.79 |      |
|                                 |                      | Brake IGBT            | -               | -    | 0.94 |      |
|                                 |                      | Converter Diode       | -               | -    | 0.66 |      |
|                                 |                      |                       | -               | -    | -    |      |
| Contact thermal resistance *    | R <sub>th(c-f)</sub> | With thermal compound | -               | 0.05 | -    |      |

\* This is the value which is defined mounting on the additional cooling fin with thermal compound

■ Equivalent Circuit Schematic



## ■ Characteristics (Representative)

