

# 6MBI75UC-120



## IGBT Module U-Series 1200V / 75A 6 in one-package

### ■ Features

- High speed switching
- Voltage drive
- Low inductance module structure

### ■ Applications

- Inverter for Motor drive
- AC and DC Servo drive amplifier
- Uninterruptible power supply
- Industrial machines, such as Welding machines

### ■ Maximum ratings and characteristics

#### ● Absolute maximum ratings (at Tc=25°C unless otherwise specified)

| Item                        |                                     | Symbol                | Conditions |                      | Rating      | Unit |
|-----------------------------|-------------------------------------|-----------------------|------------|----------------------|-------------|------|
| Collector-Emitter voltage   |                                     | V <sub>CES</sub>      |            |                      | 1200        | V    |
| Gate-Emitter voltage        |                                     | V <sub>GES</sub>      |            |                      | ±20         | V    |
| Collector current           |                                     | I <sub>c</sub>        | Continuous | T <sub>C</sub> =25°C | 100         | A    |
|                             |                                     |                       |            | T <sub>C</sub> =80°C | 75          |      |
|                             |                                     | I <sub>cp</sub>       | 1ms        | T <sub>C</sub> =25°C | 200         |      |
|                             |                                     |                       |            | T <sub>C</sub> =80°C | 150         |      |
|                             |                                     | -I <sub>c</sub>       |            |                      | 75          |      |
|                             |                                     | -I <sub>c</sub> pulse |            |                      | 150         |      |
| Collector Power Dissipation |                                     | P <sub>c</sub>        | 1 device   |                      | 390         | W    |
| Junction temperature        |                                     | T <sub>j</sub>        |            |                      | +150        | °C   |
| Storage temperature         |                                     | T <sub>stg</sub>      |            |                      | -40 to +125 |      |
| Isolation voltage           | between terminal and copper base *1 | V <sub>iso</sub>      | AC:1min.   |                      | 2500        | VAC  |
| Screw Torque                |                                     | Mounting *2           |            |                      | 3.5         | N·m  |

\*1 : All terminals should be connected together when isolation test will be done.

\*2 : Recommendable value : 2.5 to 3.5 N·m(M5)

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

| Item                                 | Symbols                        | Conditions                                                                                      | Characteristics       |      |      | Unit |
|--------------------------------------|--------------------------------|-------------------------------------------------------------------------------------------------|-----------------------|------|------|------|
|                                      |                                |                                                                                                 | Min.                  | Typ. | Max. |      |
| Zero gate voltage collector current  | I <sub>CES</sub>               | V <sub>GE</sub> =0V, V <sub>CE</sub> =1200V                                                     | —                     | —    | 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> =100mA                                                     | 4.5                   | 6.5  | 8.5  | V    |
| Collector-Emitter saturation voltage | V <sub>CE(sat)</sub><br>(chip) | V <sub>GE</sub> =15V, I <sub>C</sub> =100A                                                      | T <sub>J</sub> =25°C  | 1.75 | 2.10 | V    |
|                                      |                                |                                                                                                 | T <sub>J</sub> =125°C | 2.00 | —    |      |
| Input capacitance                    | C <sub>ies</sub>               | V <sub>CE</sub> =10V, V <sub>GE</sub> =0V, f=1MHz                                               | —                     | 8    | —    | nF   |
| Turn-on time                         | t <sub>on</sub>                | V <sub>CC</sub> =600V<br>I <sub>C</sub> =100A<br>V <sub>GE</sub> =±15V<br>R <sub>G</sub> =5.6 Ω | —                     | 0.36 | 1.20 | μs   |
|                                      | t <sub>r</sub>                 |                                                                                                 | —                     | 0.21 | 0.60 |      |
|                                      | t <sub>r(i)</sub>              |                                                                                                 | —                     | 0.03 | —    |      |
|                                      | t <sub>off</sub>               |                                                                                                 | —                     | 0.37 | 1.00 |      |
| Turn-off time                        | t <sub>off</sub>               | R <sub>G</sub> =5.6 Ω                                                                           | —                     | 0.07 | 0.30 |      |
|                                      | t <sub>r</sub>                 |                                                                                                 | —                     | 0.07 | 0.30 |      |
| Forward on voltage                   | V <sub>F</sub>                 | V <sub>GE</sub> =0V<br>I <sub>F</sub> =100A                                                     | T <sub>J</sub> =25°C  | 1.60 | 1.90 | V    |
|                                      | (chip)                         |                                                                                                 | T <sub>J</sub> =125°C | 1.70 | —    |      |
| Reverse recovery time                | t <sub>rr</sub>                | I <sub>F</sub> =100A                                                                            | —                     | —    | 0.35 | μs   |
| Lead resistance, terminal-chip*3     | R <sub>lead</sub>              | Without shunt resistance                                                                        | —                     | 5.7  | —    | mΩ   |
| Shunt resistance                     | R <sub>shunt</sub>             | Resistance of R1,R2,R3 *4                                                                       | —                     | 2.4  | —    |      |

\*3: Biggest internal terminal resistance among arm.

\*4: R1, R2,R3 is shown in equivalent circuit (p5)

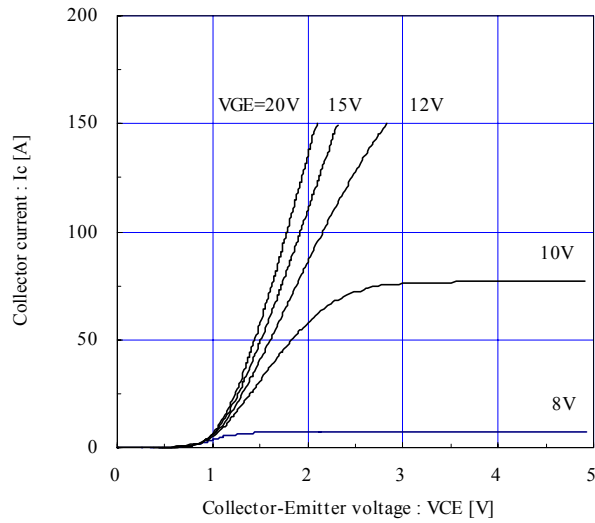
#### ● Thermal resistance characteristics

| Items                      | Symbols                | Conditions            | Characteristics |      |      | Unit |
|----------------------------|------------------------|-----------------------|-----------------|------|------|------|
|                            |                        |                       | Min.            | Typ. | Max. |      |
| Thermal resistance         | R <sub>th(j-c)</sub>   | IGBT                  | —               | —    | 0.32 | °C/W |
|                            | R <sub>th(j-c)</sub>   | FWD                   | —               | —    | 0.49 | °C/W |
| Contact Thermal resistance | R <sub>th(c-f)*5</sub> | With thermal compound | —               | 0.05 | —    | °C/W |

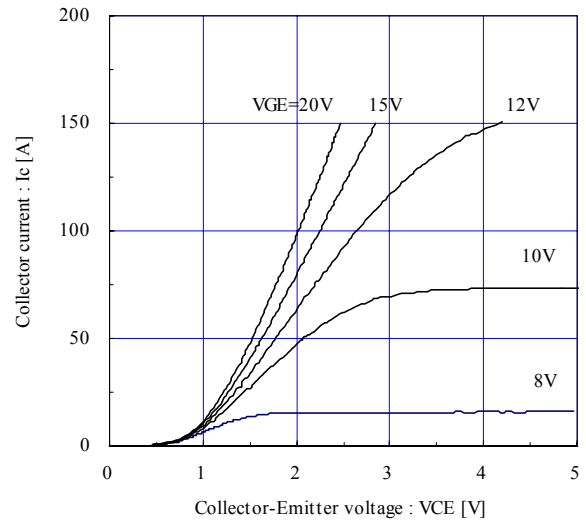
\*5 : This is the value which is defined mounting on the additional cooling fin with thermal compound.

## Characteristics (Representative)

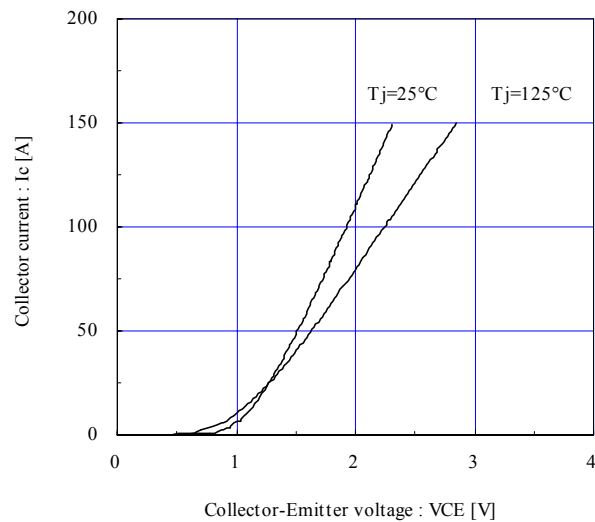
Collector current vs. Collector-Emitter voltage (typ.)

 $T_j = 25^\circ\text{C}$  / chip

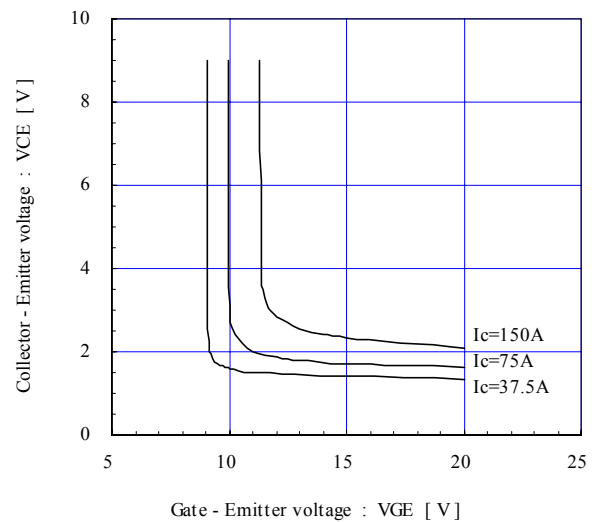
Collector current vs. Collector-Emitter voltage (typ.)

 $T_j = 125^\circ\text{C}$  / chip

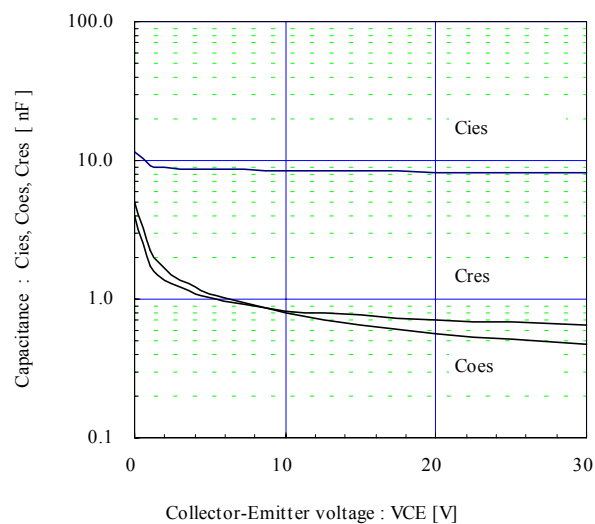
Collector current vs. Collector-Emitter voltage (typ.)

 $V_{GE} = 15\text{V}$  / chip

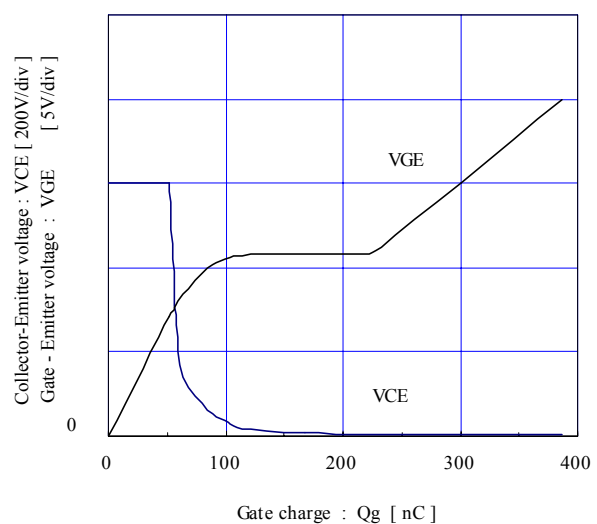
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)

 $T_j = 25^\circ\text{C}$  / chip

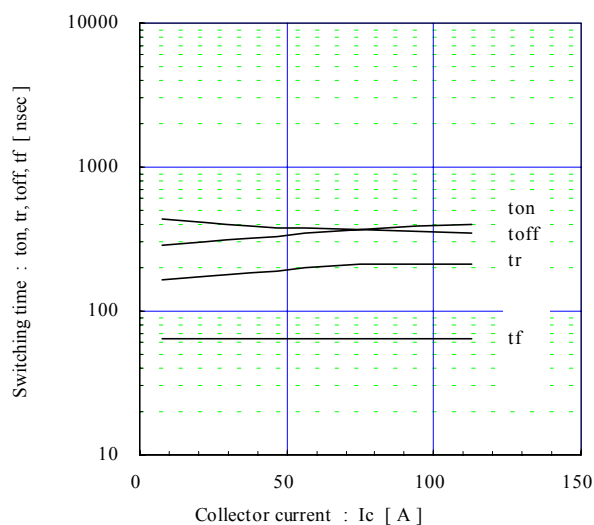
Capacitance vs. Collector-Emitter voltage (typ.)

 $V_{GE} = 0\text{V}$ ,  $f = 1\text{MHz}$ ,  $T_j = 25^\circ\text{C}$ 

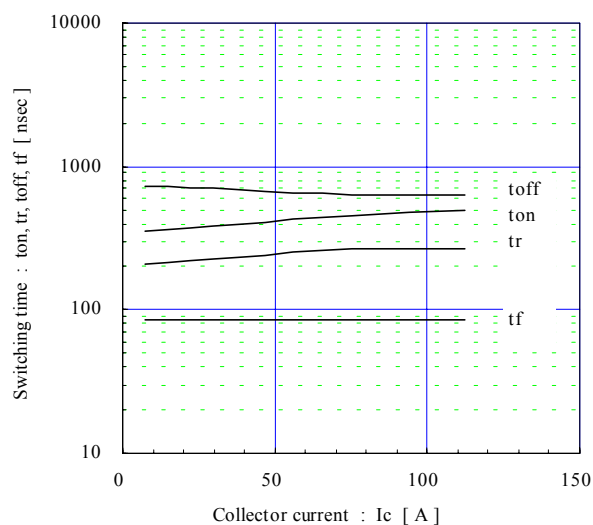
Dynamic Gate charge (typ.)

 $V_{cc} = 600\text{V}$ ,  $I_c = 75\text{A}$ ,  $T_j = 25^\circ\text{C}$ 

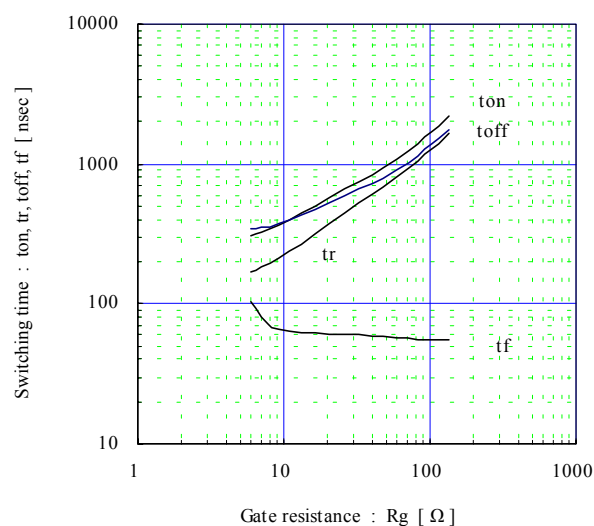
Switching time vs. Collector current (typ.)

 $V_{cc}=600V$ ,  $V_{GE}=\pm 15V$ ,  $R_g=9.1\Omega$ ,  $T_j=25^\circ C$ 

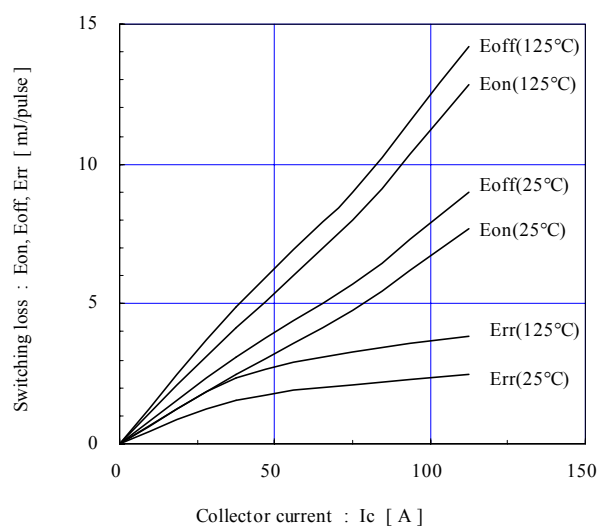
Switching time vs. Collector current (typ.)

 $V_{cc}=600V$ ,  $V_{GE}=\pm 15V$ ,  $R_g=9.1\Omega$ ,  $T_j=125^\circ C$ 

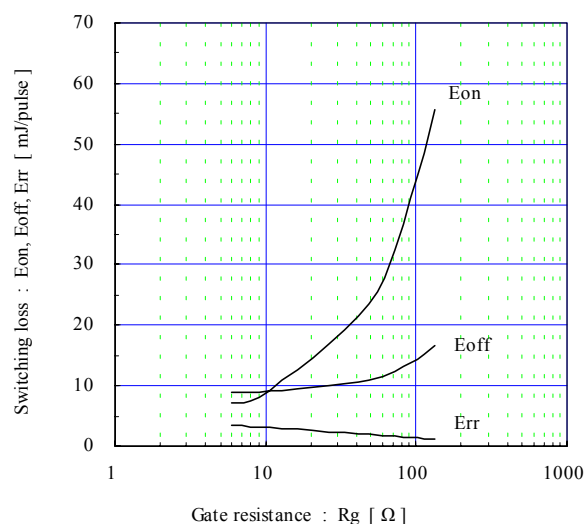
Switching time vs. Gate resistance (typ.)

 $V_{cc}=600V$ ,  $I_c=75A$ ,  $V_{GE}=\pm 15V$ ,  $T_j=25^\circ C$ 

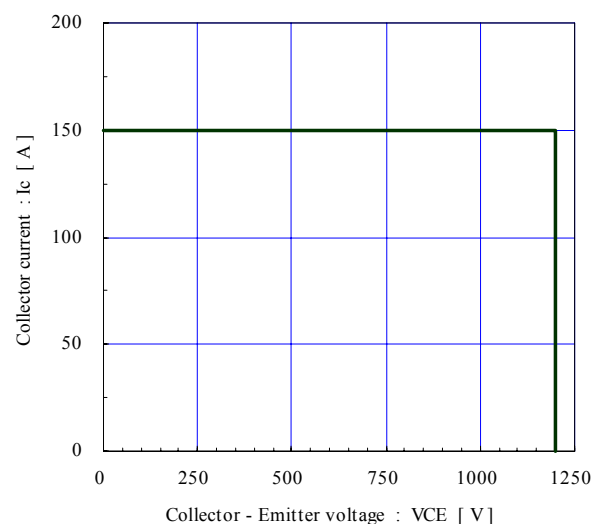
Switching loss vs. Collector current (typ.)

 $V_{cc}=600V$ ,  $V_{GE}=\pm 15V$ ,  $R_g=9.1\Omega$ 

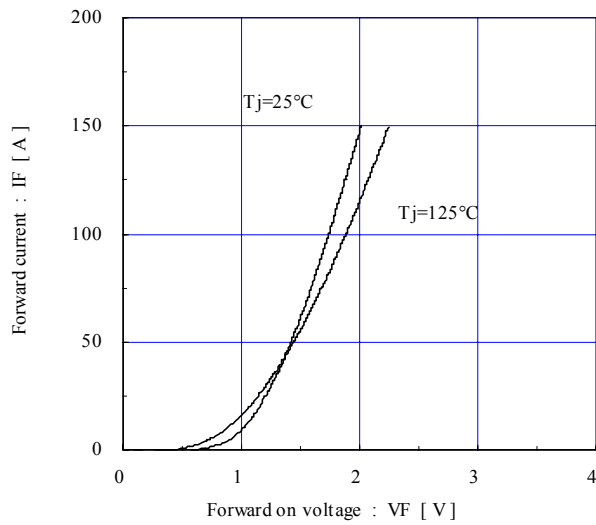
Switching loss vs. Gate resistance (typ.)

 $V_{cc}=600V$ ,  $I_c=75A$ ,  $V_{GE}=\pm 15V$ ,  $T_j=125^\circ C$ 

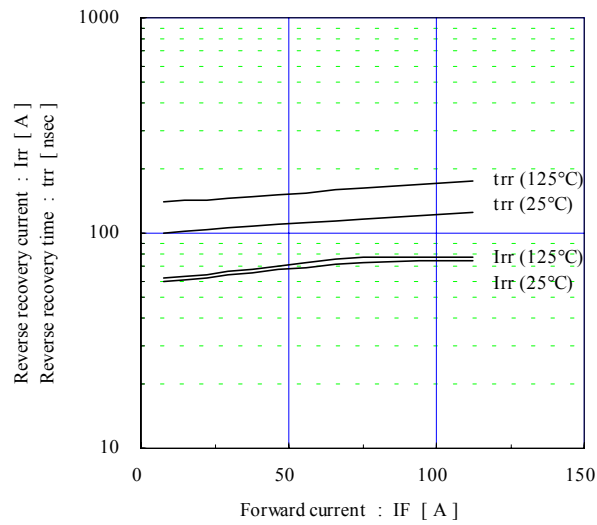
Reverse bias safe operating area (max.)

 $+V_{GE}=15V$ ,  $-V_{GE} \leq 15V$ ,  $R_g \geq 9.1\Omega$ ,  $T_j \leq 125^\circ C$ 

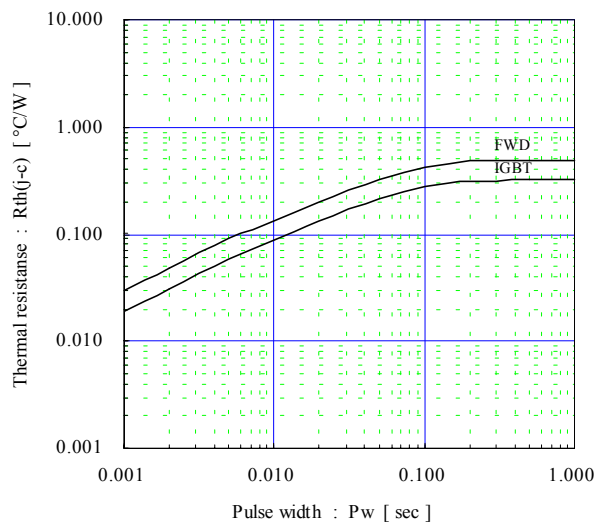
Forward current vs. Forward on voltage (typ.)  
chip



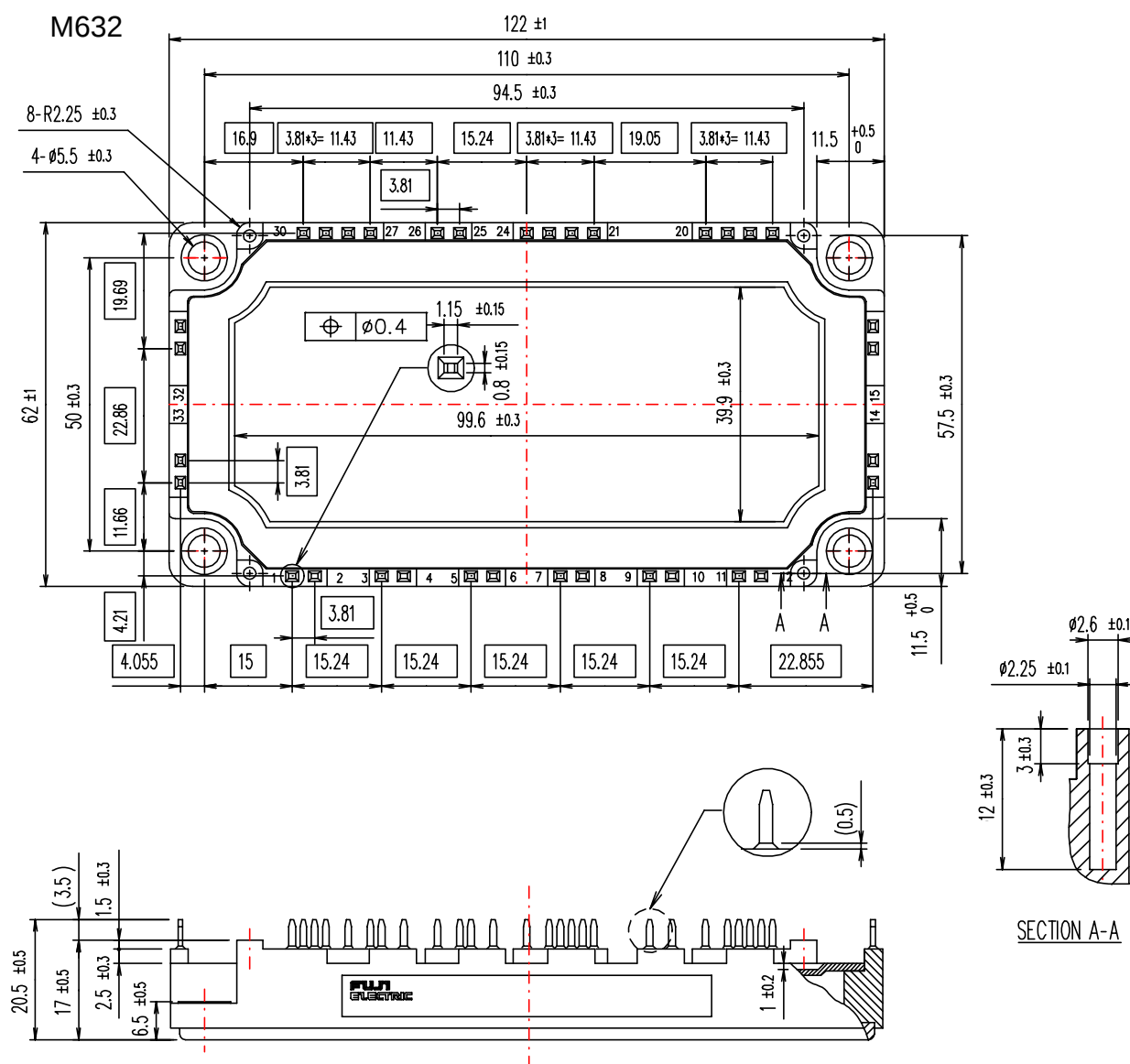
Reverse recovery characteristics (typ.)  
 $V_{ce}=600\text{V}$ ,  $V_{GE}=\pm 15\text{V}$ ,  $R_g=9.1\Omega$



Transient thermal resistance (max.)



## Outline Drawings, mm



□ shows theoretical dimension.  
( ) shows reference dimension.

## Equivalent Circuit Schematic

