

## Fuji Discrete Package IGBT

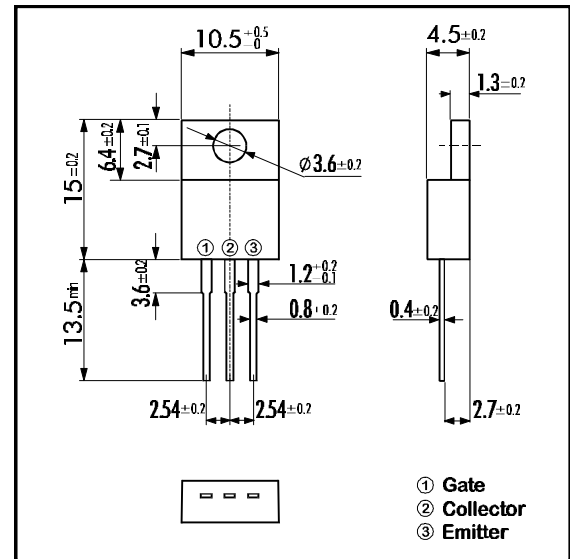
### ■ Features

- Square RBSOA
- Low Saturation Voltage
- Less Total Power Dissipation
- Minimized Internal Stray Inductance

### ■ Applications

- High Power Switching
- A.C. Motor Controls
- D.C. Motor Controls
- Uninterruptible Power Supply

### ■ Outline Drawing

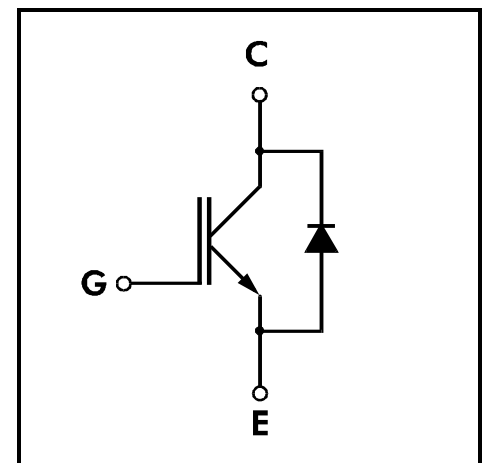


### ■ Maximum Ratings and Characteristics

#### • Absolute Maximum Ratings (T<sub>c</sub>=25°C)

| Items                       | Symbols                   | Ratings              | Units |
|-----------------------------|---------------------------|----------------------|-------|
| Collector-Emitter Voltage   | V <sub>CES</sub>          | 600                  | V     |
| Gate -Emitter Voltage       | V <sub>GES</sub>          | ± 20                 | V     |
| Collector Current           | DC T <sub>c</sub> = 25°C  | I <sub>C 25</sub>    | 20    |
|                             | DC T <sub>c</sub> =100°C  | I <sub>C 100</sub>   | 10    |
|                             | 1ms T <sub>c</sub> = 25°C | I <sub>C PULSE</sub> | 80    |
| IGBT Max. Power Dissipation | P <sub>C</sub>            | 75                   | W     |
| FWD Max. Power Dissipation  | P <sub>C</sub>            | 35                   | W     |
| Operating Temperature       | T <sub>j</sub>            | +150                 | °C    |
| Storage Temperature         | T <sub>stg</sub>          | -40 ~ +125           | °C    |
| Mounting Screw Torque       |                           | 40                   | Nm    |

### ■ Equivalent Circuit



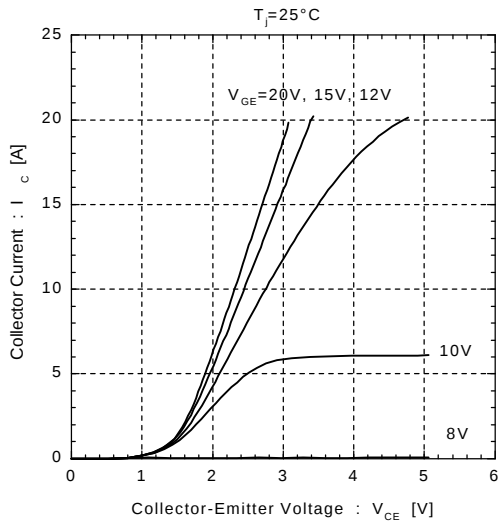
#### • Electrical Characteristics (at T<sub>j</sub>=25°C)

| Items                                | Symbols              | Test Conditions                                           | Min. | Typ. | Max. | Units |
|--------------------------------------|----------------------|-----------------------------------------------------------|------|------|------|-------|
| Zero Gate Voltage Collector Current  | I <sub>CES</sub>     | V <sub>GE</sub> =0V V <sub>CE</sub> =600V                 |      |      | 1.0  | mA    |
| Gate-Emitter Leakage Current         | I <sub>GES</sub>     | V <sub>CE</sub> =0V V <sub>GE</sub> =± 20V                |      |      | 20   | μA    |
| Gate-Emitter Threshold Voltage       | V <sub>GE(th)</sub>  | V <sub>GE</sub> =20V I <sub>C</sub> =10mA                 | 5.5  |      | 8.5  | V     |
| Collector-Emitter Saturation Voltage | V <sub>CE(sat)</sub> | V <sub>GE</sub> =15V I <sub>C</sub> =10A                  |      |      | 3.0  | V     |
| Input capacitance                    | C <sub>ies</sub>     | V <sub>GE</sub> =0V                                       |      | 700  |      | pF    |
| Output capacitance                   | C <sub>oes</sub>     | V <sub>CE</sub> =10V                                      |      | 150  |      |       |
| Reverse Transfer capacitance         | C <sub>res</sub>     | f=1MHz                                                    |      | 20   |      |       |
| Switching Time                       | Turn-on Time         | t <sub>ON</sub>                                           |      |      | 1.2  | μs    |
|                                      |                      | t <sub>r</sub>                                            |      |      | 0.6  |       |
|                                      | Turn-off Time        | t <sub>OFF</sub>                                          |      |      | 1.0  |       |
|                                      |                      | t <sub>f</sub>                                            |      |      | 0.35 |       |
|                                      | Turn-on Time         | t <sub>ON</sub>                                           |      | 0.16 |      | μs    |
|                                      |                      | t <sub>r</sub>                                            |      | 0.11 |      |       |
|                                      | Turn-off Time        | t <sub>OFF</sub>                                          |      | 0.30 |      |       |
|                                      |                      | t <sub>f</sub>                                            |      |      | 0.35 |       |
| Diode Forward On-Voltage             | V <sub>F</sub>       | I <sub>F</sub> =10A V <sub>GE</sub> =0V                   |      |      | 3.0  | V     |
| Reverse Recovery Time                | t <sub>rr</sub>      | I <sub>F</sub> =10A, V <sub>GE</sub> =-10V, di/dt=100A/μs |      |      | 300  | ns    |

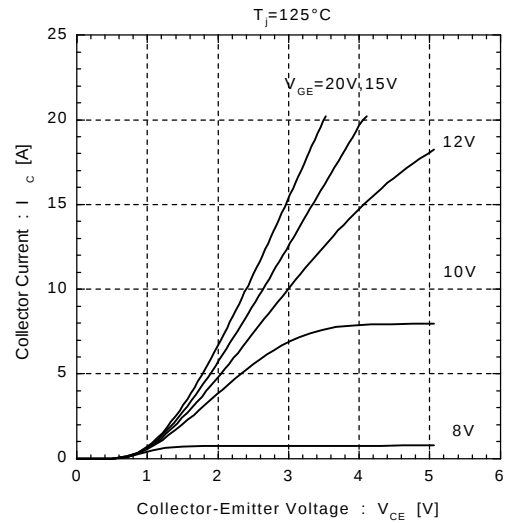
#### • Thermal Characteristics

| Items              | Symbols              | Test Conditions | Min. | Typ. | Max. | Units |
|--------------------|----------------------|-----------------|------|------|------|-------|
| Thermal Resistance | R <sub>th(j-c)</sub> | IGBT            |      |      | 1.66 | °C/W  |
|                    | R <sub>th(j-e)</sub> | Diode           |      |      | 3.57 |       |

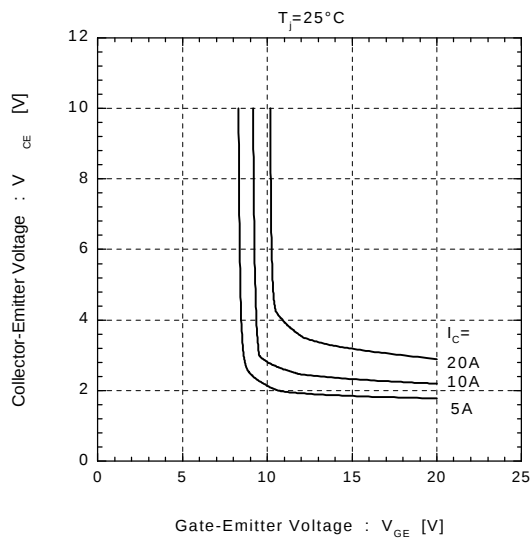
Collector Current vs. Collector-Emitter Voltage



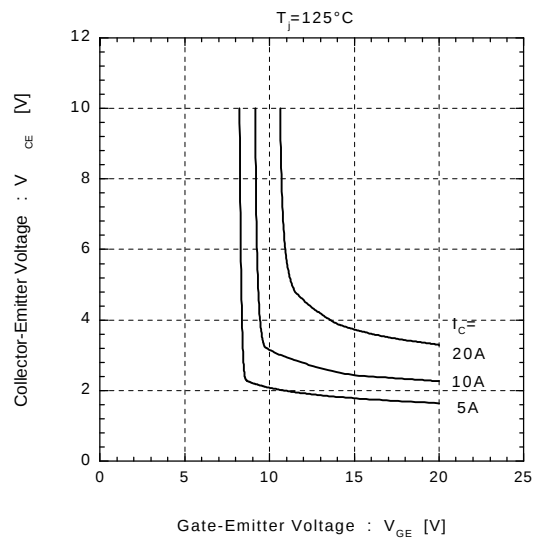
Collector Current vs. Collector-Emitter Voltage



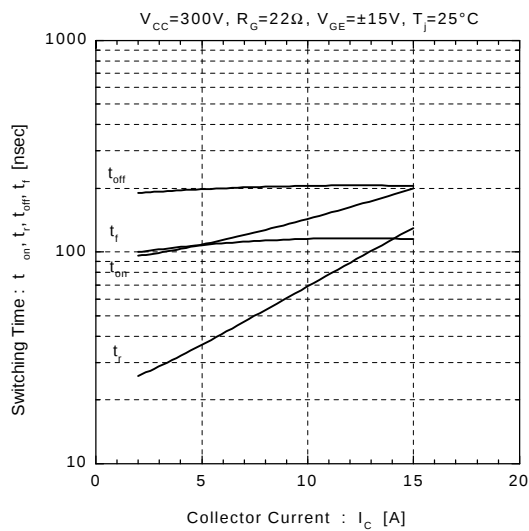
Collector-Emitter Voltage vs. Gate-Emitter Voltage



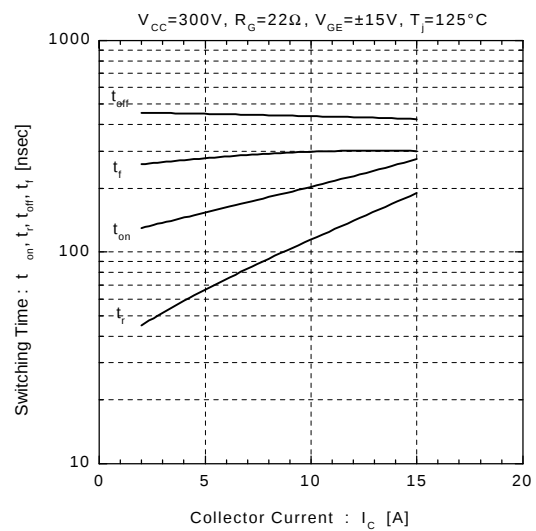
Collector-Emitter Voltage vs. Gate-Emitter Voltage

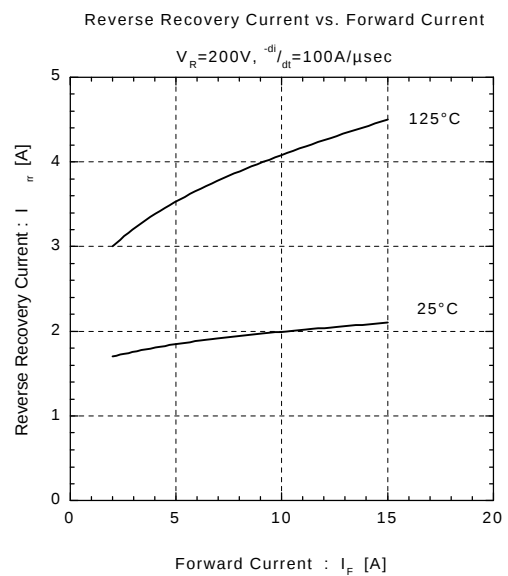
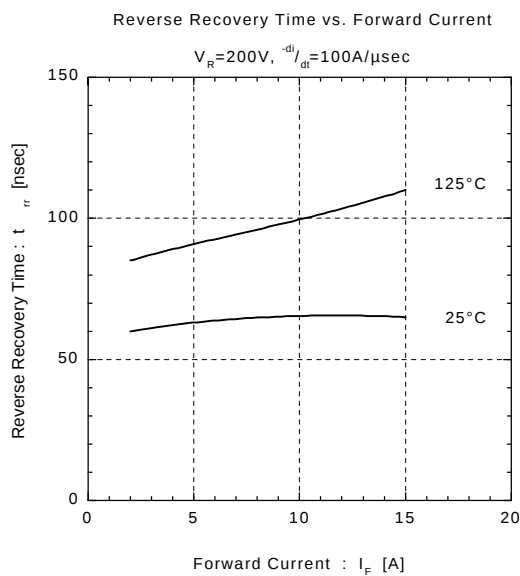
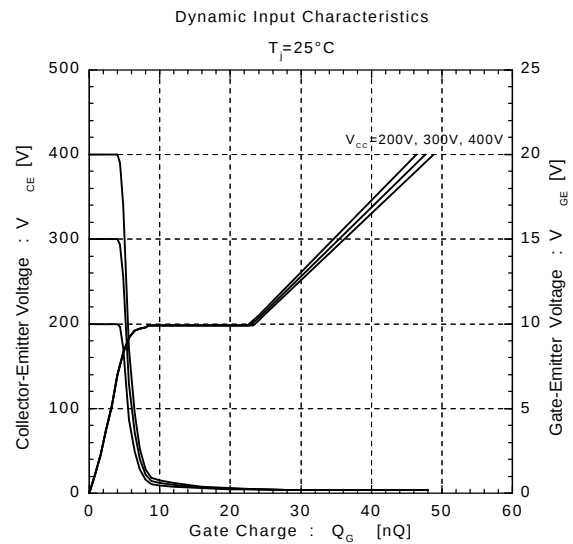
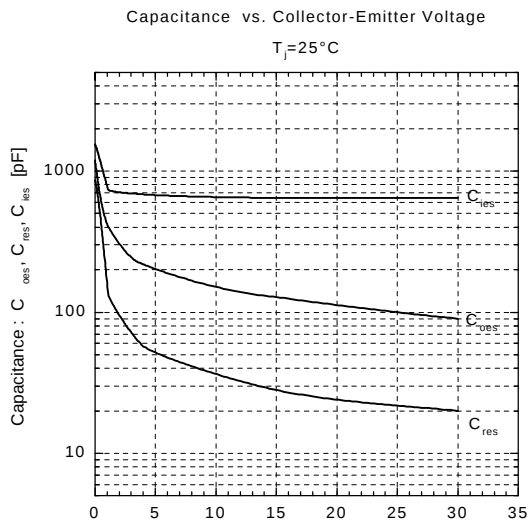
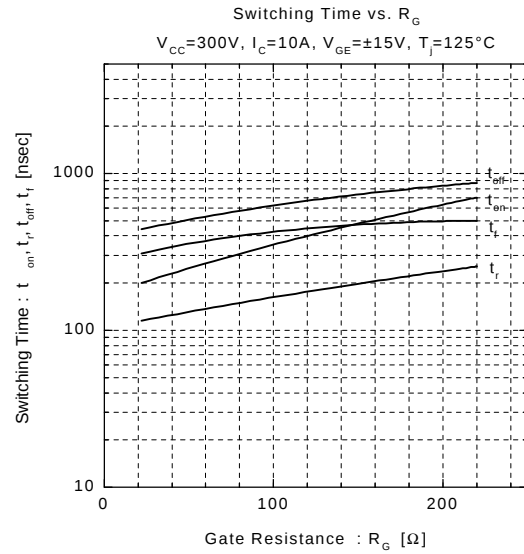
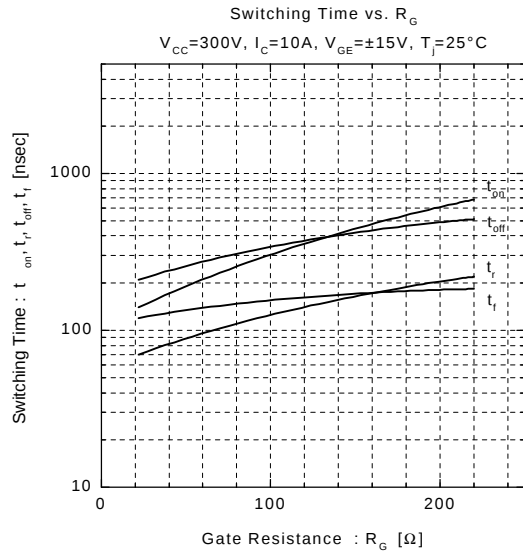


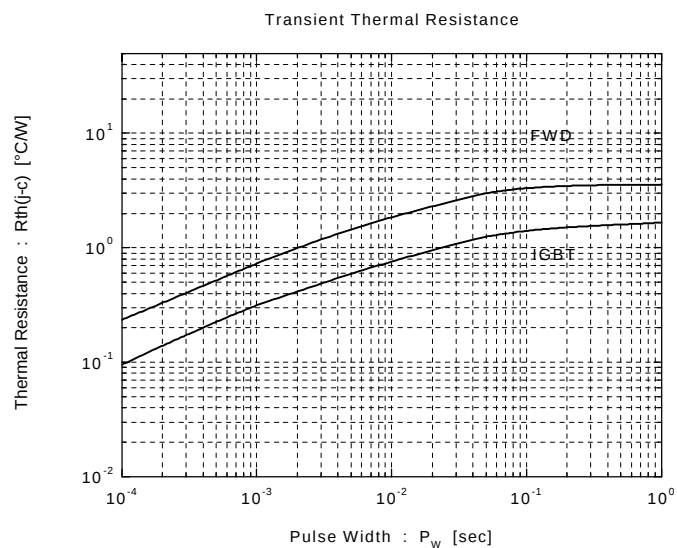
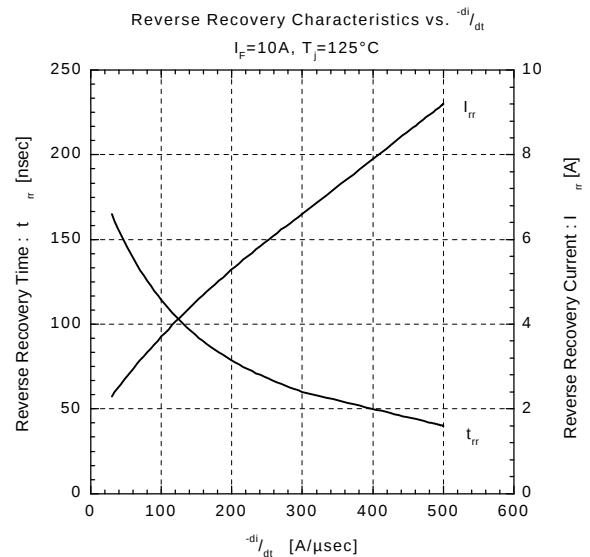
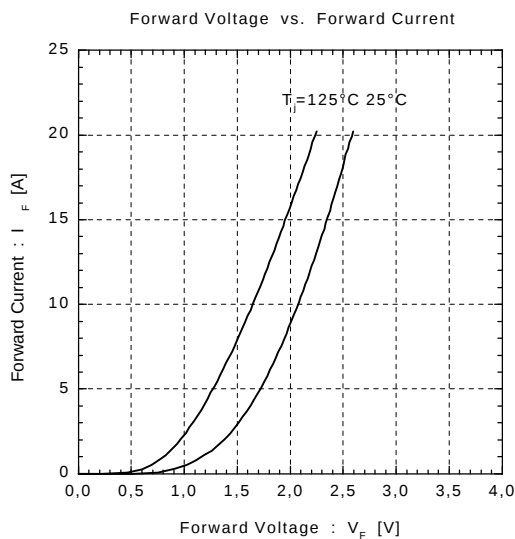
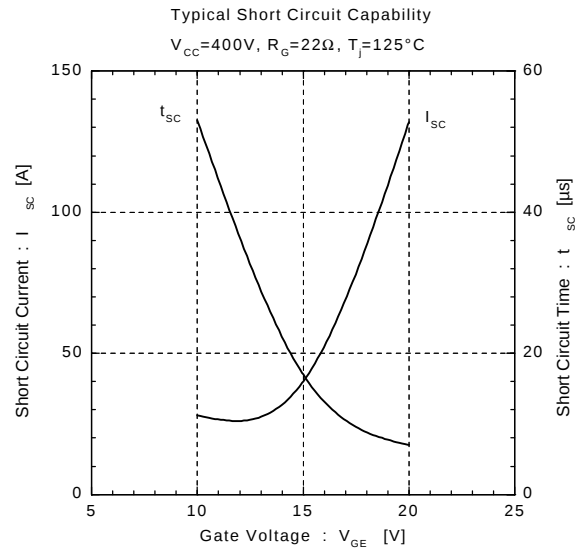
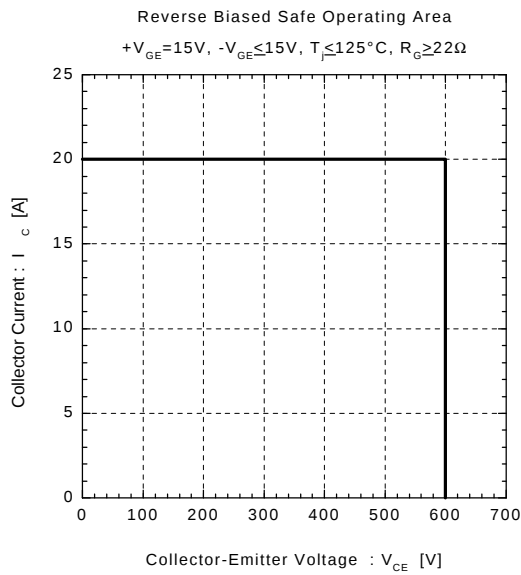
Switching Time vs. Collector Current



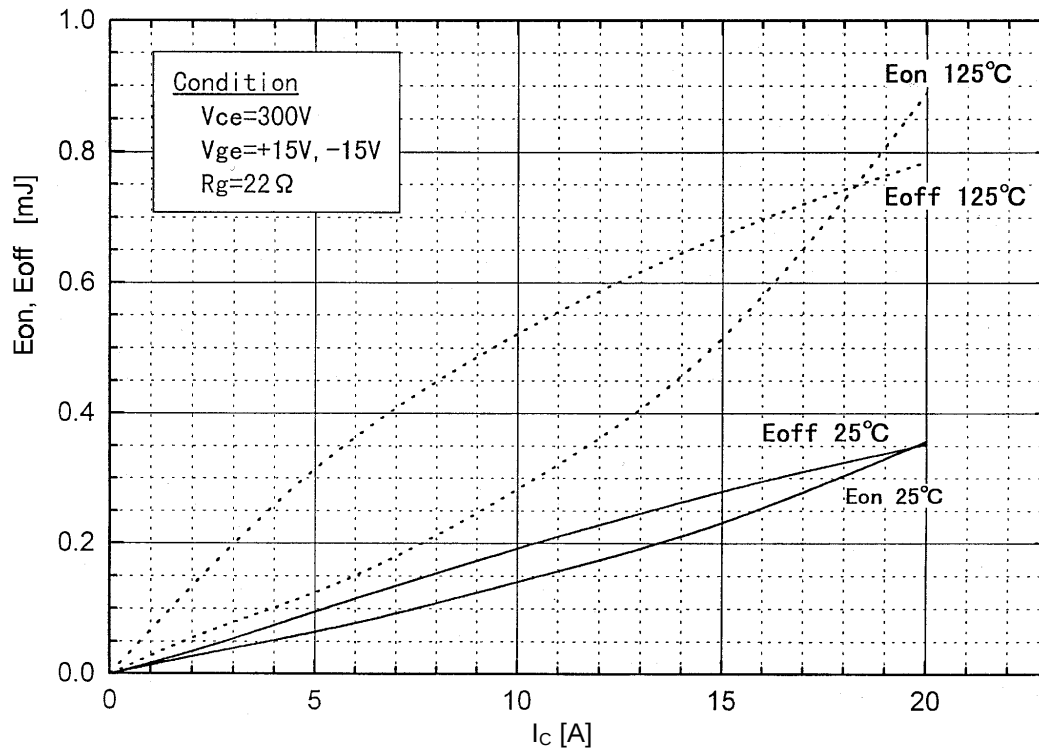
Switching Time vs. Collector Current



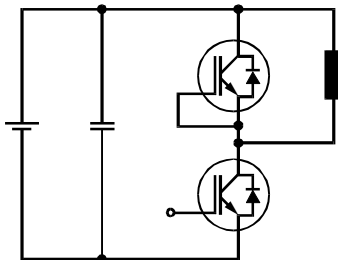




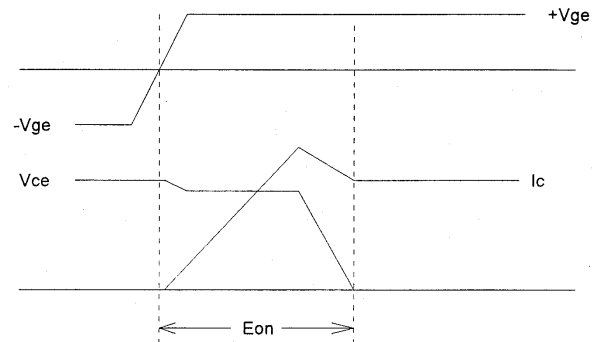
## Switching losses ( $E_{on}$ , $E_{off}$ vs. $I_c$ )



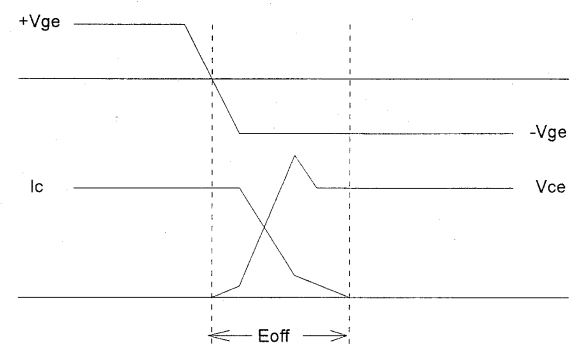
## Test Circuit



## Switching waveforms



Turn-on Waveforms



Turn-off Waveforms