

## Fuji Discrete Package IGBT

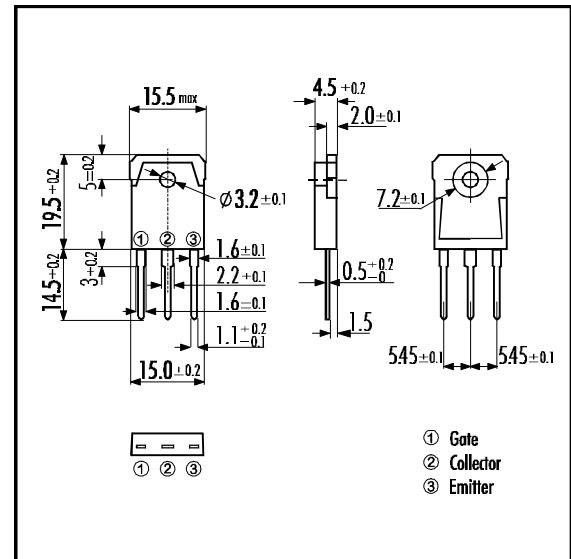
### ■ Features

- 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

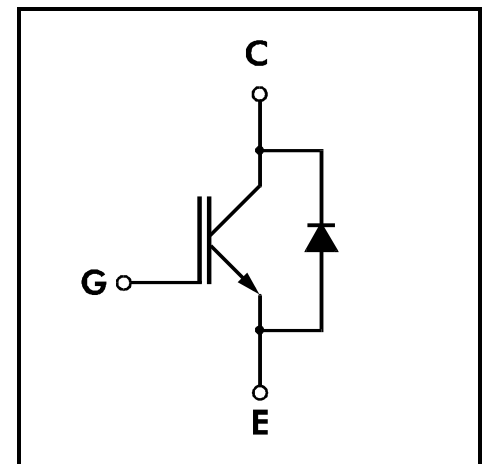


## ■ Maximum Ratings and Characteristics

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

| Items                       | Symbols                   | Ratings              | Units |
|-----------------------------|---------------------------|----------------------|-------|
| Collector-Emitter Voltage   | V <sub>CES</sub>          | 1200                 | V     |
| Gate -Emitter Voltage       | V <sub>GES</sub>          | ± 20                 | V     |
| Collector Current           | DC T <sub>c</sub> = 25°C  | I <sub>C 25</sub>    | 9     |
|                             | DC T <sub>c</sub> =100°C  | I <sub>C 100</sub>   | 5     |
|                             | 1ms T <sub>c</sub> = 25°C | I <sub>C PULSE</sub> | 27    |
| IGBT Max. Power Dissipation | P <sub>C</sub>            | 100                  | W     |
| FWD Max. Power Dissipation  | P <sub>C</sub>            | 60                   | W     |
| Operating Temperature       | T <sub>I</sub>            | +150                 | °C    |
| Storage Temperature         | T <sub>stg</sub>          | -40 ~ +150           | °C    |
| Mounting Screw Torque       |                           | 50                   | Nm    |

## ■ Equivalent Circuit



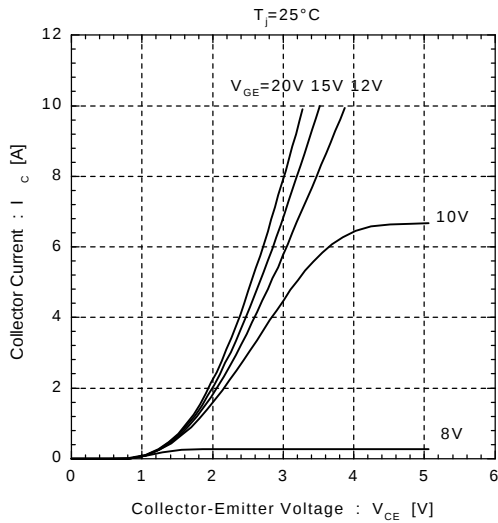
### • Electrical Characteristics (at T<sub>j</sub>=25°C)

| 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> =1200V               |                       |      | 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> =5mA                 | 5.5                   |      | 8.5  | V     |
| Collector-Emitter Saturation Voltage | V <sub>CE(sat)</sub> | V <sub>GE</sub> =15V I <sub>C</sub> =5A                  |                       |      | 3.5  | V     |
| Input capacitance                    | C <sub>ies</sub>     | V <sub>GE</sub> =0V                                      |                       | 650  |      | pF    |
| Output capacitance                   | C <sub>oes</sub>     | V <sub>CE</sub> =10V                                     |                       | 150  |      |       |
| Reverse Transfer capacitance         | C <sub>res</sub>     | f=1MHz                                                   |                       | 40   |      |       |
| Switching Time                       | Turn-on Time         | t <sub>ON</sub>                                          | V <sub>CC</sub> =600V |      | 1.2  | μs    |
|                                      |                      | t <sub>r</sub>                                           | I <sub>C</sub> =5A    |      | 0.6  |       |
|                                      | Turn-off Time        | t <sub>OFF</sub>                                         | V <sub>GE</sub> =±15V |      | 1.5  |       |
|                                      |                      | t <sub>f</sub>                                           | R <sub>G</sub> =330Ω  |      | 0.5  |       |
|                                      | Turn-on Time         | t <sub>ON</sub>                                          | V <sub>CC</sub> =600V | 0.16 |      | μs    |
|                                      |                      | t <sub>r</sub>                                           | I <sub>C</sub> =5A    | 0.11 |      |       |
|                                      | Turn-off Time        | t <sub>OFF</sub>                                         | V <sub>GE</sub> =+15V | 0.30 |      |       |
|                                      |                      | t <sub>f</sub>                                           | R <sub>G</sub> =33Ω   |      | 0.5  |       |
| Diode Forward On-Voltage             | V <sub>F</sub>       | I <sub>F</sub> =5A V <sub>GE</sub> =0V                   |                       |      | 3.0  | V     |
| Reverse Recovery Time                | t <sub>rr</sub>      | I <sub>F</sub> =5A, V <sub>GE</sub> =-10V, di/dt=100A/μs |                       |      | 350  | ns    |

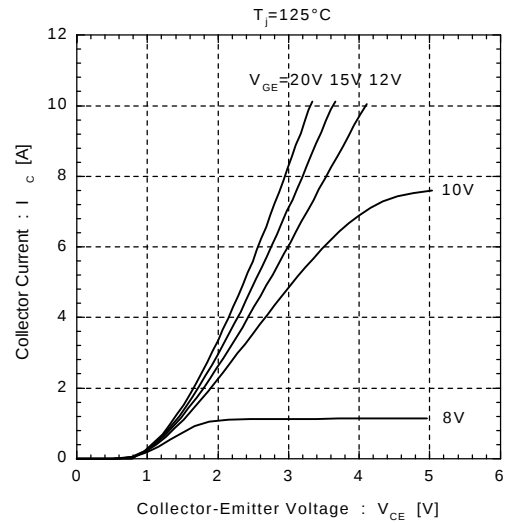
### • Thermal Characteristics

| Items              | Symbols              | Test Conditions | Min. | Typ. | Max. | Units |
|--------------------|----------------------|-----------------|------|------|------|-------|
| Thermal Resistance | R <sub>th(j-c)</sub> | IGBT            |      |      | 1.25 | °C/W  |
|                    | R <sub>th(j-e)</sub> | Diode           |      |      | 2.08 |       |

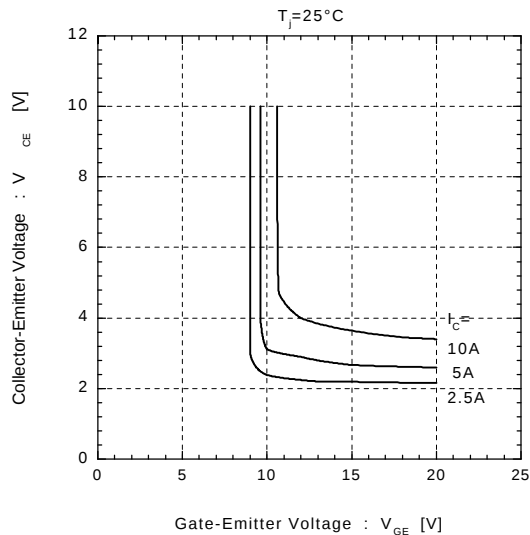
Collector Current vs. Collector-Emittor Voltage



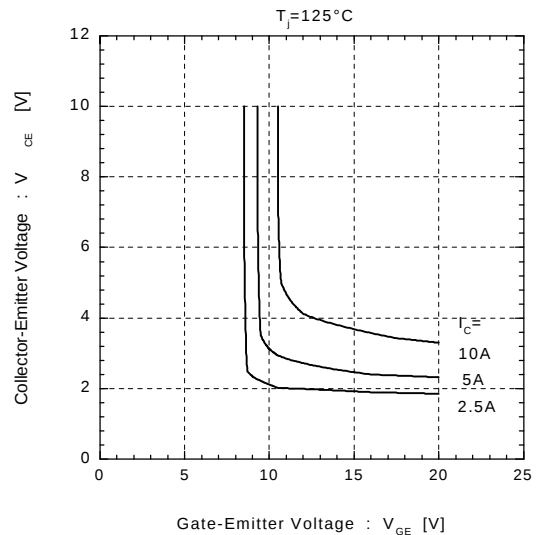
Collector Current vs. Collector-Emittor Voltage



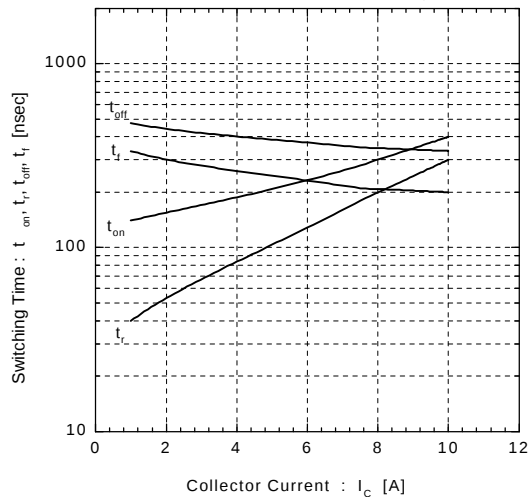
Collector-Emittor Voltage vs. Gate-Emittor Voltage



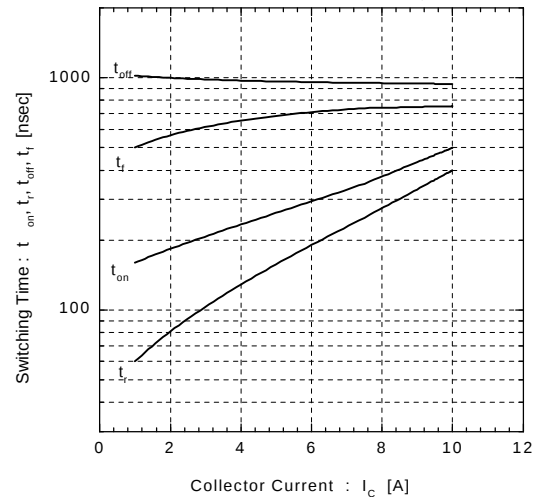
Collector-Emittor Voltage vs. Gate-Emittor Voltage

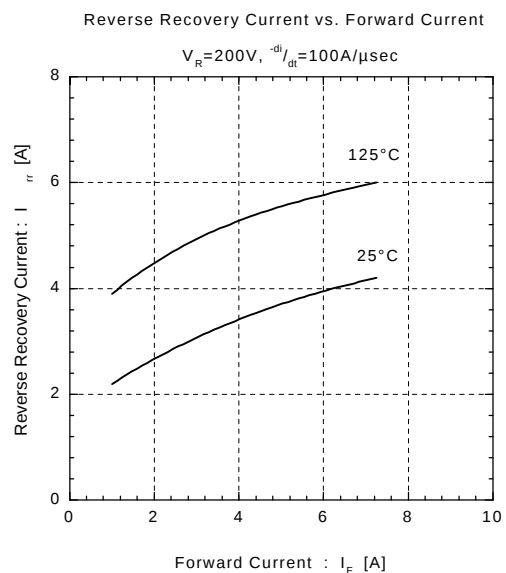
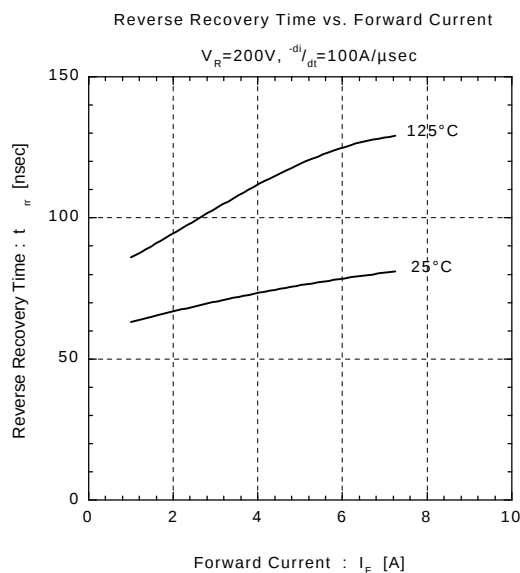
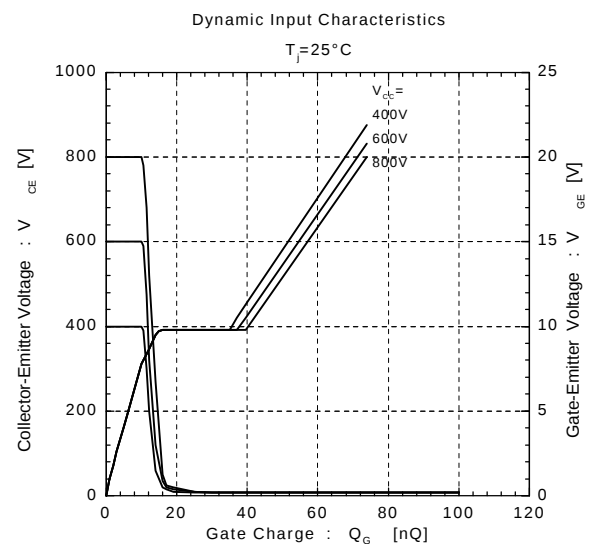
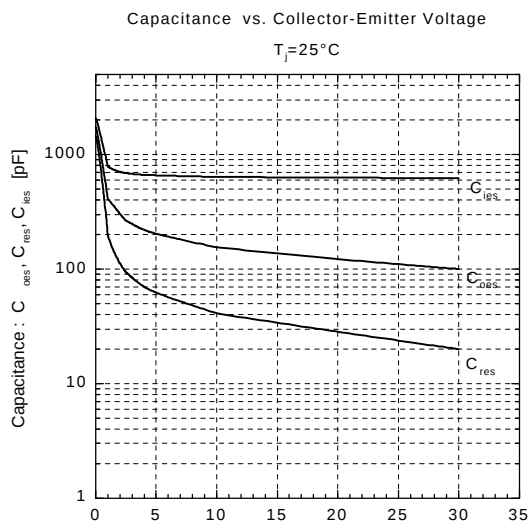
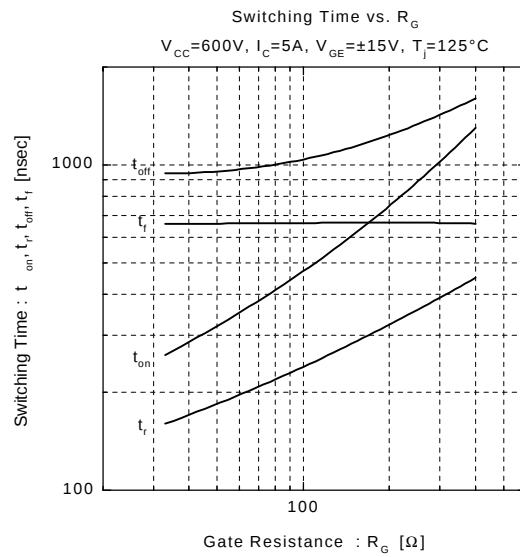
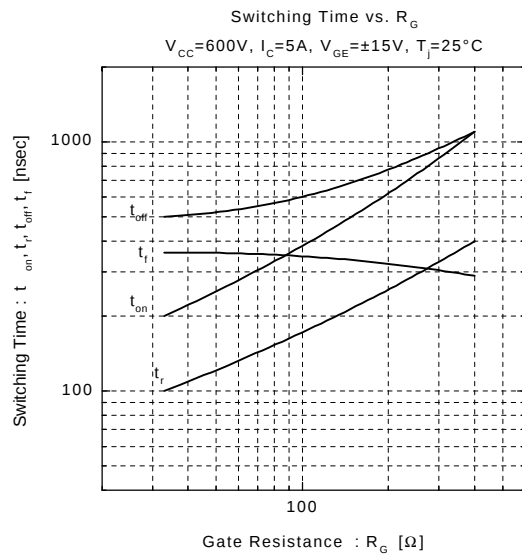


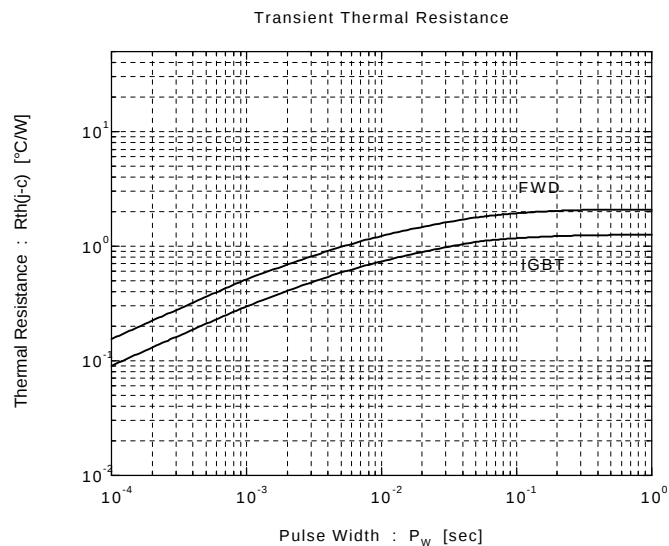
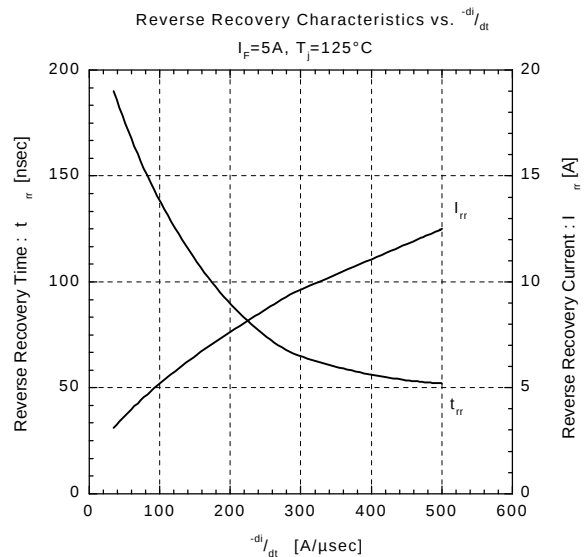
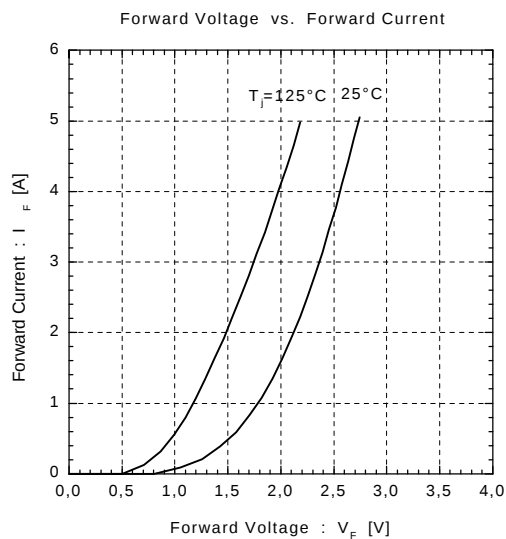
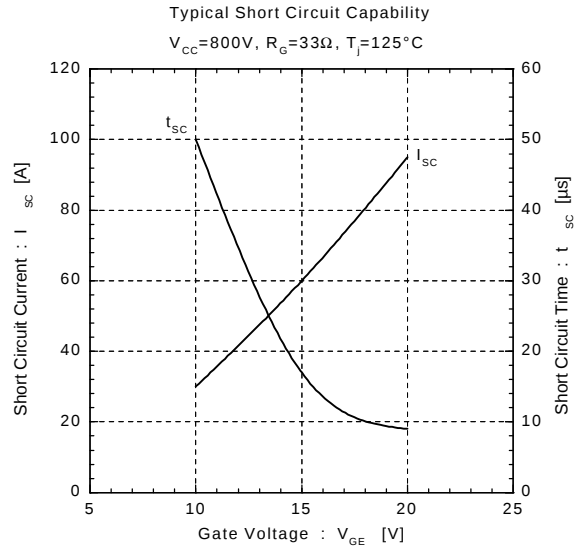
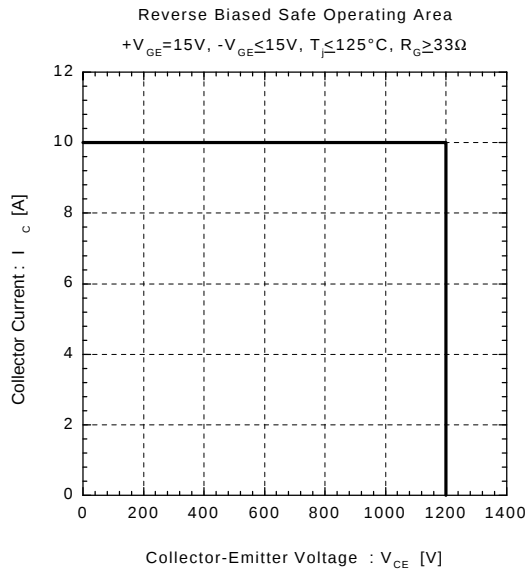
Switching Time vs. Collector Current  
 $V_{CC} = 600V, R_G = 33\Omega, V_{GE} = \pm 15V, T_J = 25^\circ\text{C}$



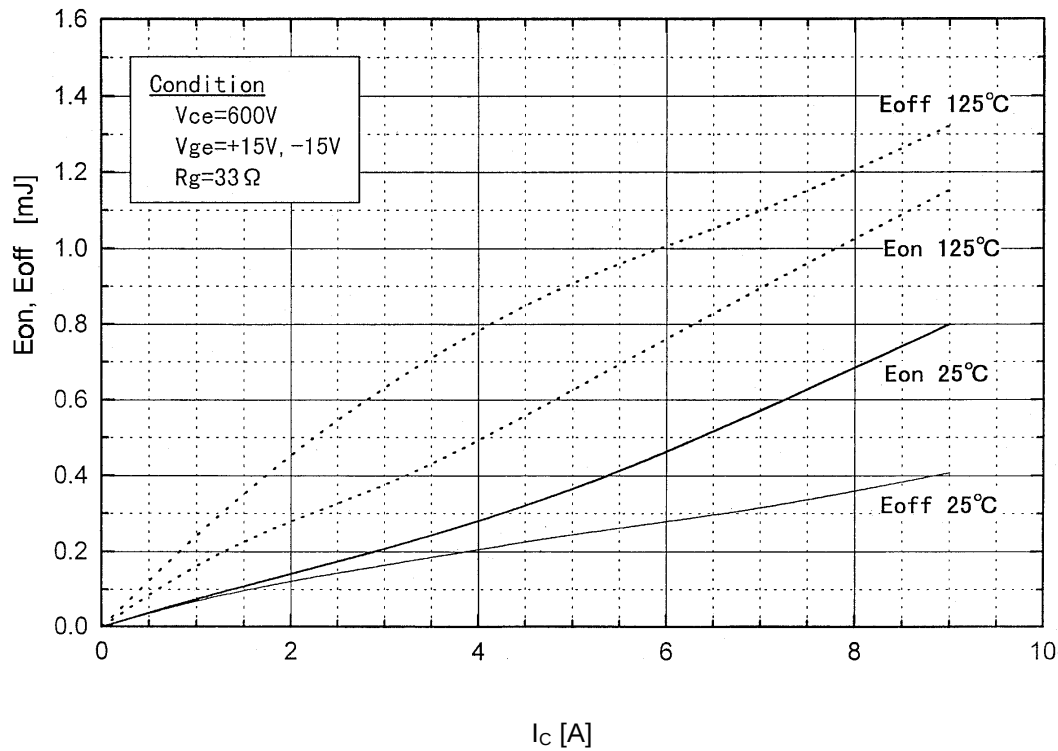
Switching Time vs. Collector Current  
 $V_{CC} = 600V, R_G = 33\Omega, V_{GE} = \pm 15V, T_J = 125^\circ\text{C}$



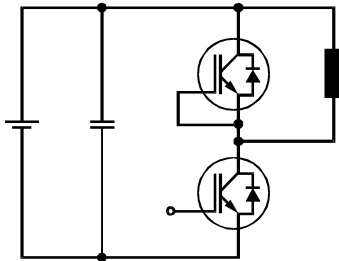




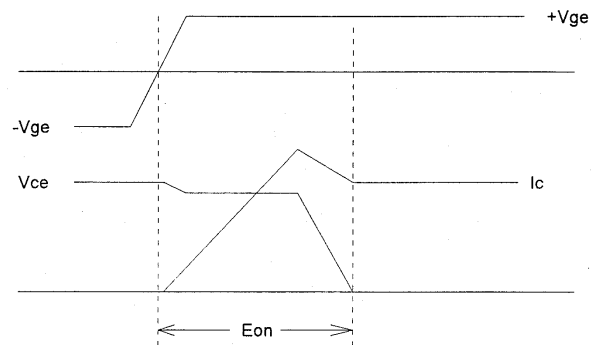
## Switching losses ( $E_{on}$ , $E_{off}$ vs. $I_c$ )



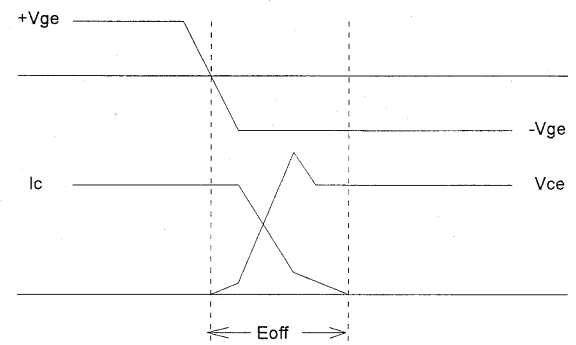
## Test Circuit



## Switching waveforms



Turn-on Waveforms



Turn-off Waveforms