

TOSHIBA INSULATED GATE BIPOLAR TRANSISTOR
SILICON N CHANNEL IGBT

GT5J311, GT5J311(SM)

HIGH POWER SWITCHING APPLICATIONS
MOTOR CONTROL APPLICATIONS

- Third-generation IGBT
- Enhancement mode type
- High speed : $t_f = 0.30\mu s$ (Max.) ($I_C = 5A$)
- Low saturation voltage : $V_{CE(sat)} = 2.7V$ (Max.) ($I_C = 5A$)
- FRD included between emitter and collector

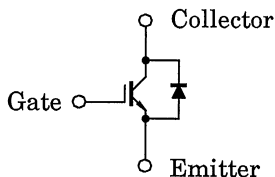
Absolute Maximum Ratings ($T_a = 25^\circ C$)

| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|--|-----------|----------|------------|
| Collector-Emitter Voltage | V_{CES} | 600 | V |
| Gate-Emitter Voltage | V_{GES} | ± 20 | V |
| Collector Current | DC | I_C | 5 A |
| | 1ms | I_{CP} | 10 A |
| Emitter-Collector Forward Current | DC | I_F | 5 A |
| | 1ms | I_{FM} | 10 A |
| Collector Power Dissipation ($T_c = 25^\circ C$) | P_C | 45 | W |
| Junction Temperature | T_j | 150 | $^\circ C$ |
| Storage Temperature Range | T_{stg} | -55~150 | $^\circ C$ |

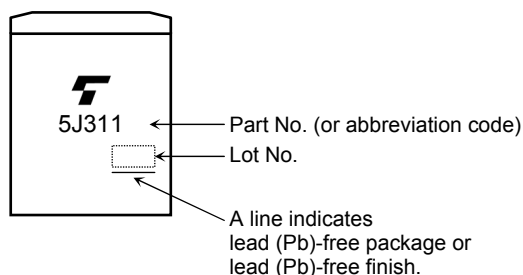
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

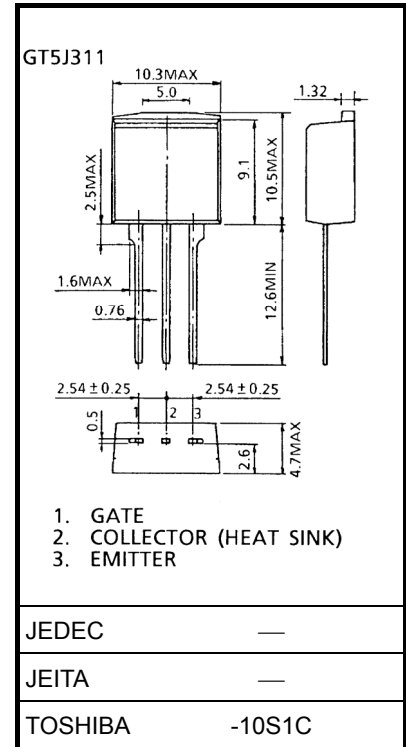
Equivalent Circuit



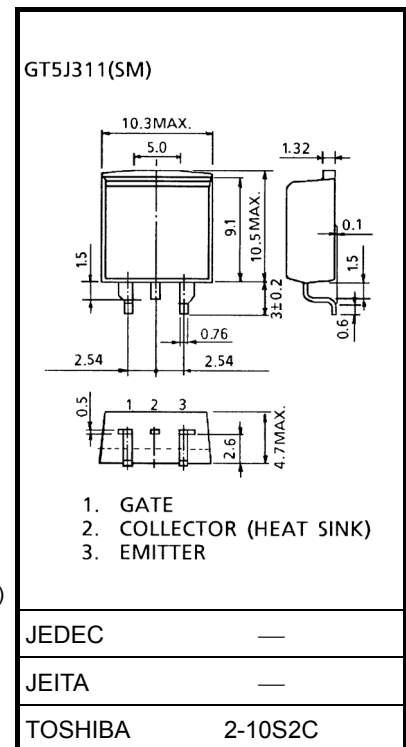
Marking



Unit: mm



Weight: 1.5 g (typ.)

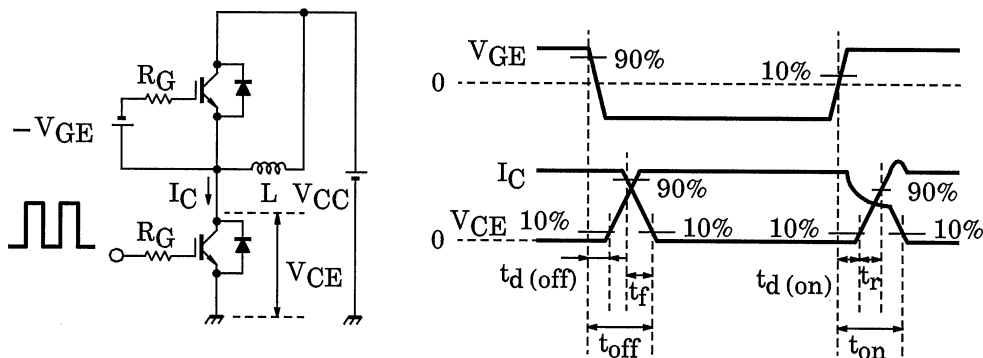


Weight: 1.4 g (typ.)

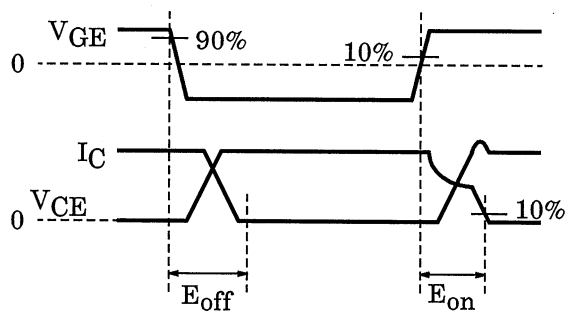
Electrical Characteristics (Ta = 25°C)

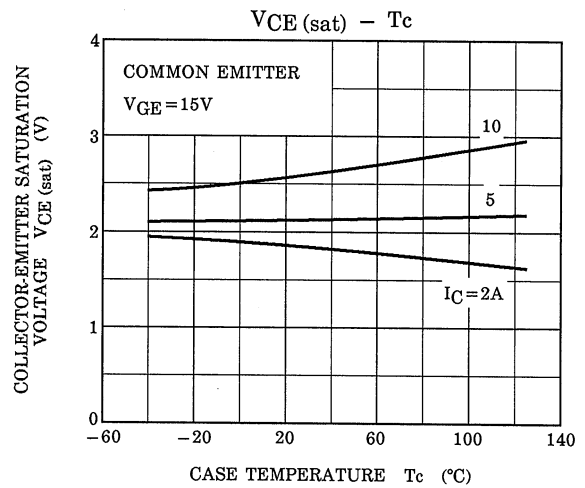
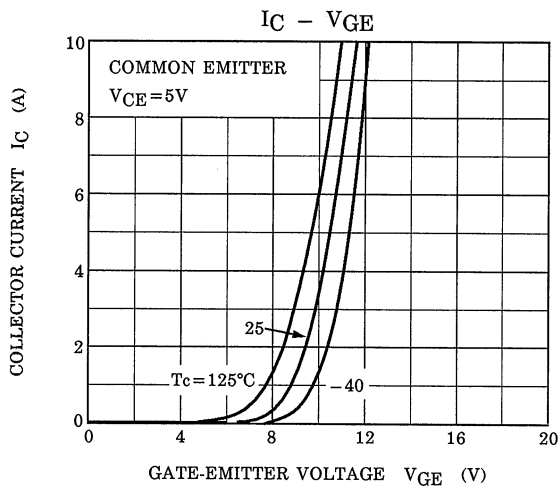
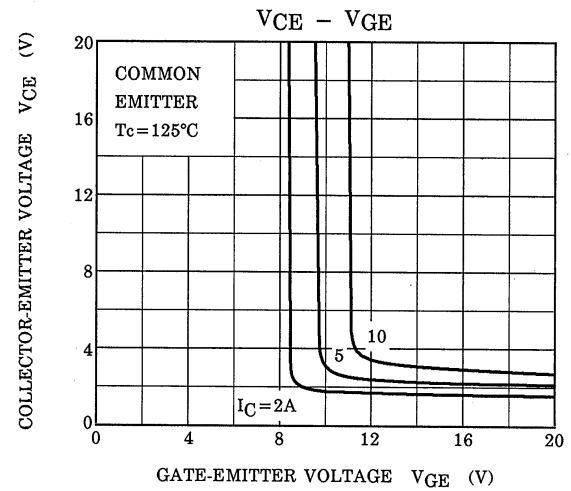
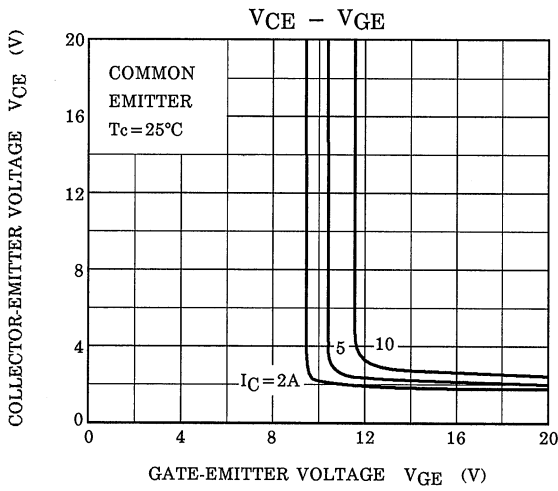
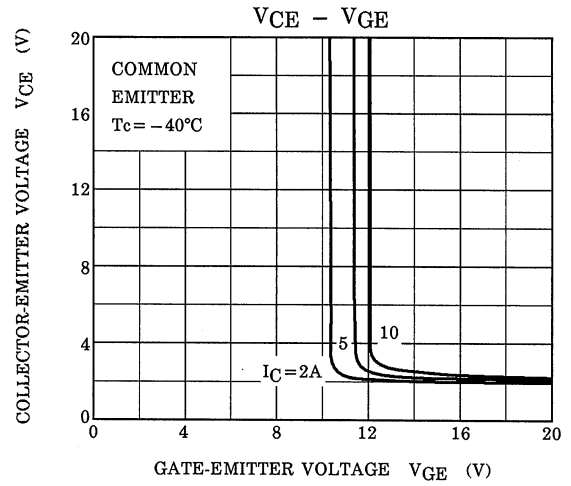
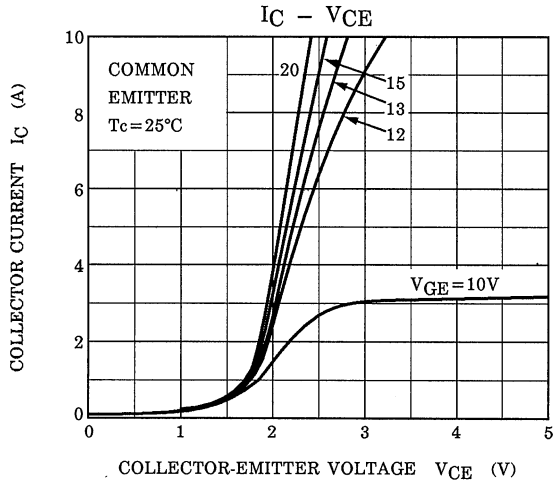
| CHARACTERISTIC | | SYMBOL | TEST CONDITION | MIN | TYP. | MAX | UNIT |
|--------------------------------------|---------------|---------------|--|-----|------|-----------|---------|
| Gate Leakage Current | | I_{GES} | $V_{GE} = \pm 20V, V_{CE} = 0$ | — | — | ± 500 | nA |
| Collector Cut-Off Current | | I_{CES} | $V_{CE} = 600V, V_{GE} = 0$ | — | — | 1.0 | mA |
| Gate-Emitter Cut-Off Voltage | | $V_{GE(OFF)}$ | $I_C = 0.5mA, V_{CE} = 5V$ | 5.0 | — | 8.0 | V |
| Collector-Emitter Saturation Voltage | | $V_{CE(sat)}$ | $I_C = 5A, V_{GE} = 15V$ | — | 2.1 | 2.7 | V |
| Input Capacitance | | C_{ies} | $V_{CE} = 20V, V_{GE} = 0, f = 1MHz$ | — | 650 | — | pF |
| Switching Time | Rise Time | t_r | Inductive Load $V_{CC} = 300V, I_C = 5A$ $V_{GG} = \pm 15V, R_G = 180\Omega$ (Note 1) | — | 0.12 | — | μs |
| | Turn-On Time | t_{on} | | — | 0.40 | — | |
| | Fall Time | t_f | | — | 0.15 | 0.30 | |
| | Turn-Off Time | t_{off} | | — | 0.50 | — | |
| Peak Forward Voltage | | V_F | $I_F = 5A, V_{GE} = 0$ | — | — | 1.8 | V |
| Reverse Recovery Time | | t_{rr} | $I_F = 5A, di/dt = -100A/\mu s$ | — | — | 200 | ns |
| Thermal Resistance (IGBT) | | $R_{th(j-c)}$ | — | — | — | 2.8 | °C/W |
| Thermal Resistance (Diode) | | $R_{th(j-c)}$ | — | — | — | 3.76 | °C/W |

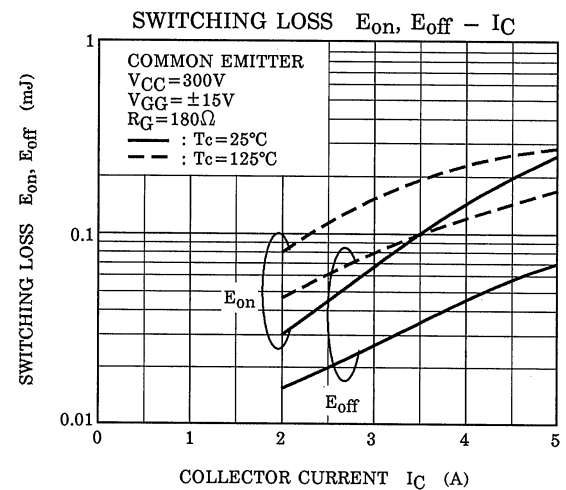
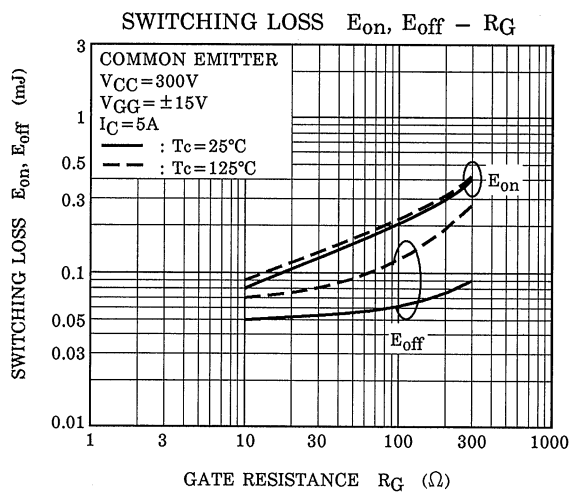
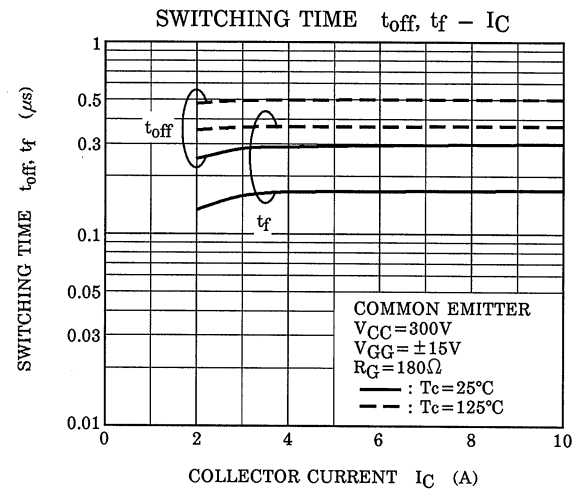
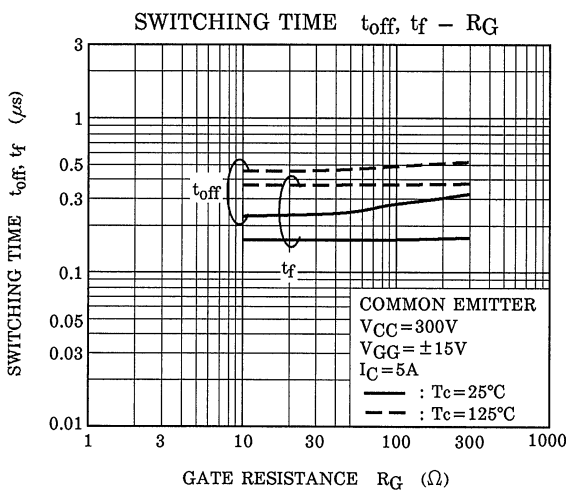
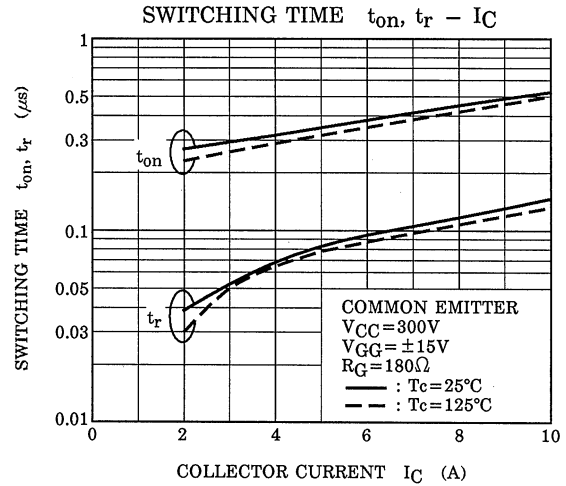
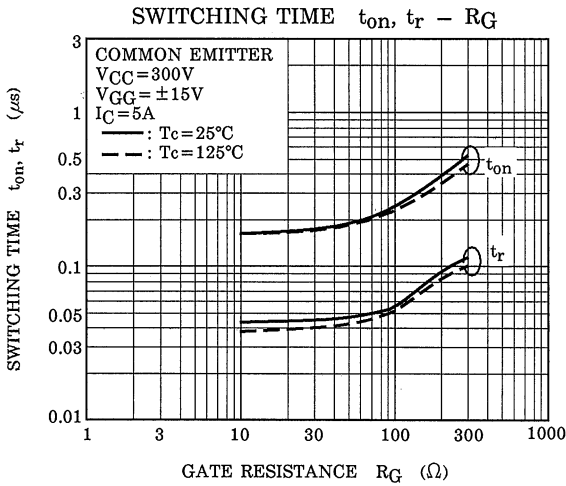
Note 1: Switching time measurement circuit and input / output waveforms

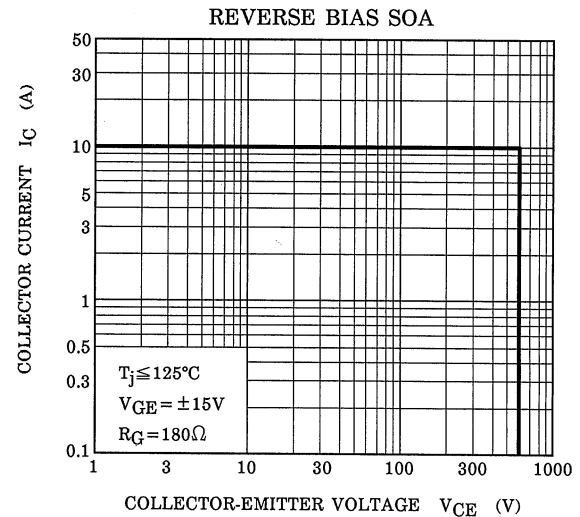
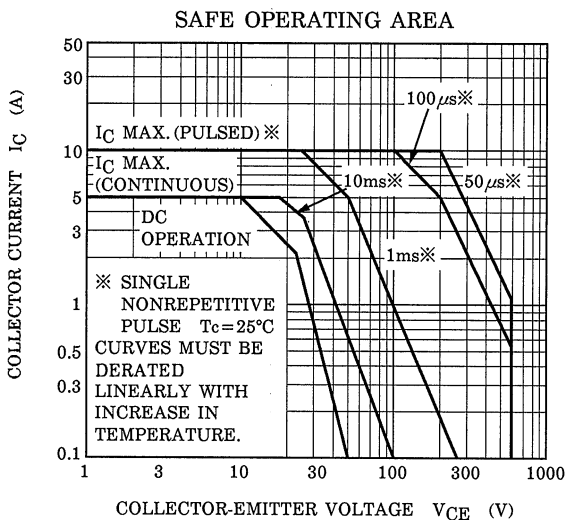
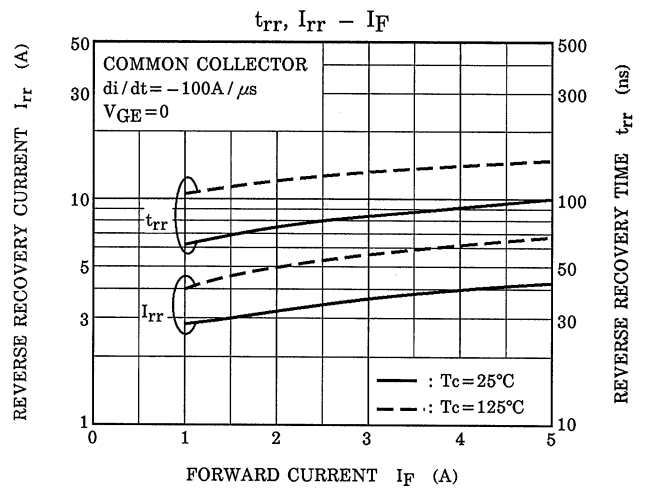
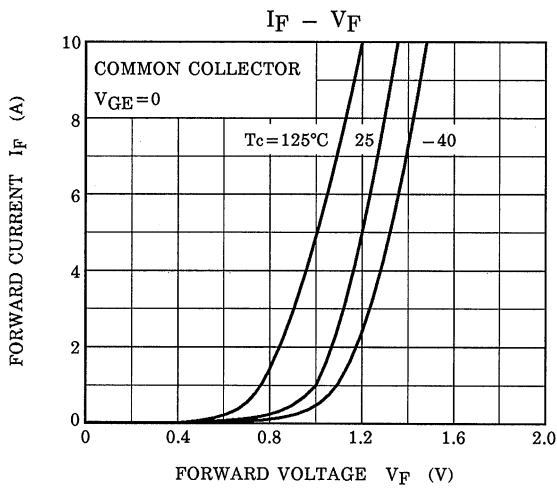
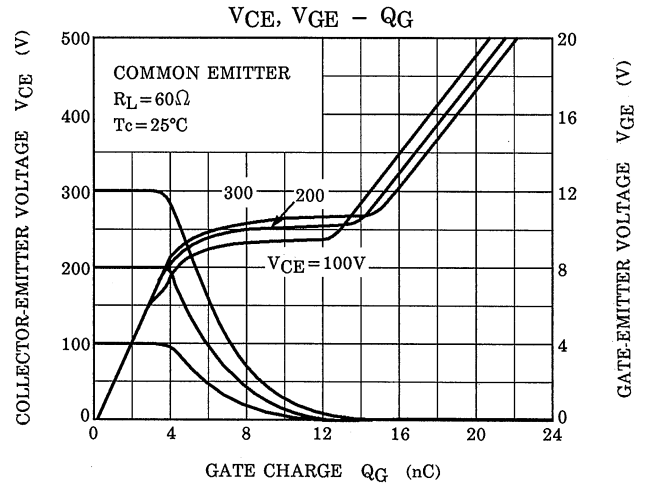
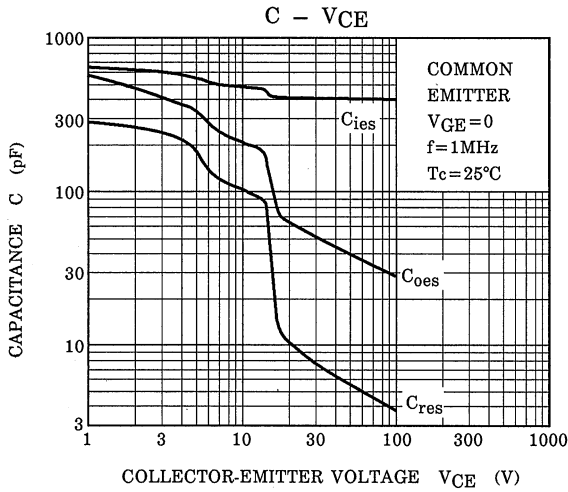


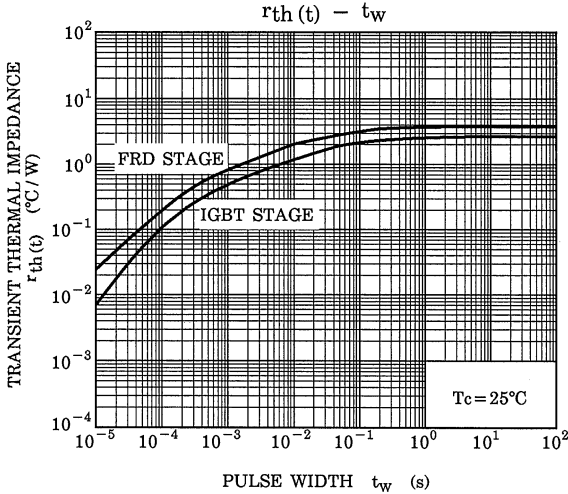
Switching loss measurement waveforms











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