

TOSHIBA Insulated Gate Bipolar Transistor Silicon N Channel IGBT

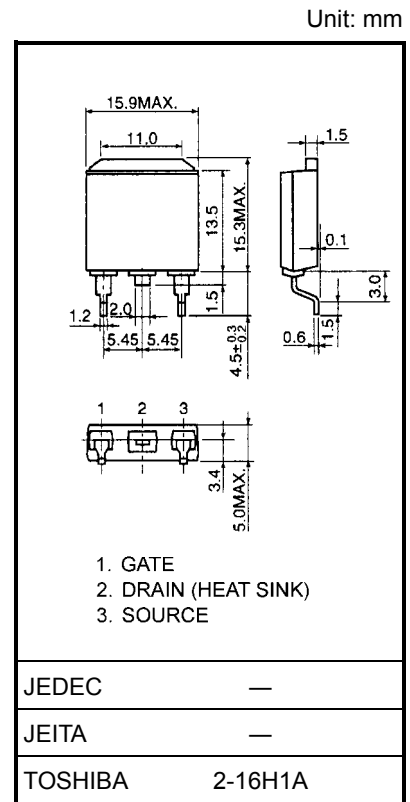
GT15Q311

High Power Switching Applications
 Motor Control Applications

- The 3rd generation
- Enhancement-mode
- High speed: $t_f = 0.32 \mu s$ (max)
- Low saturation voltage: $V_{CE(sat)} = 2.7 V$ (max)
- FRD included between emitter and collector

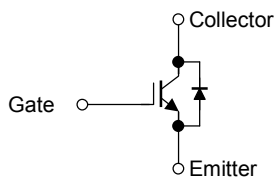
Maximum Ratings (Ta = 25°C)

| Characteristics | | Symbol | Rating | Unit |
|---|------|-----------|------------|------|
| Collector-emitter voltage | | V_{CES} | 1200 | V |
| Gate-emitter voltage | | V_{GES} | ±20 | V |
| Collector current | DC | I_C | 15 | A |
| | 1 ms | I_{CP} | 30 | |
| Emitter-collector forward current | DC | I_F | 15 | A |
| | 1 ms | I_{FM} | 30 | |
| Collector power dissipation (Tc = 25°C) | | P_C | 160 | W |
| Junction temperature | | T_j | 150 | °C |
| Storage temperature range | | T_{stg} | -55 to 150 | °C |



Weight: 3.65 g (typ.)

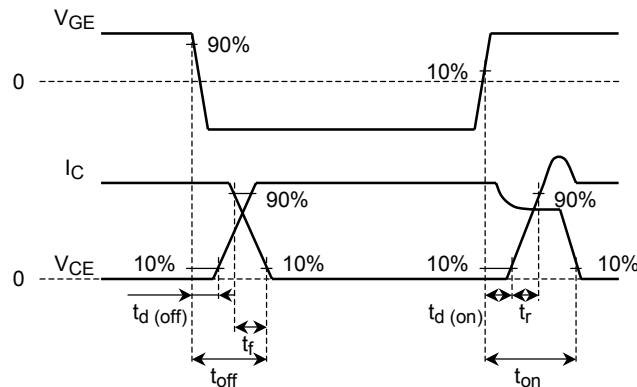
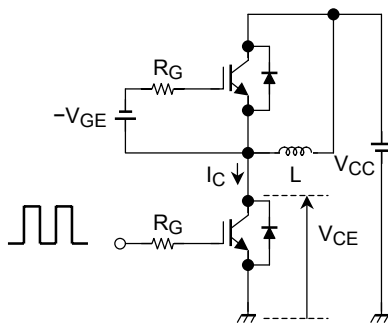
Equivalent Circuit

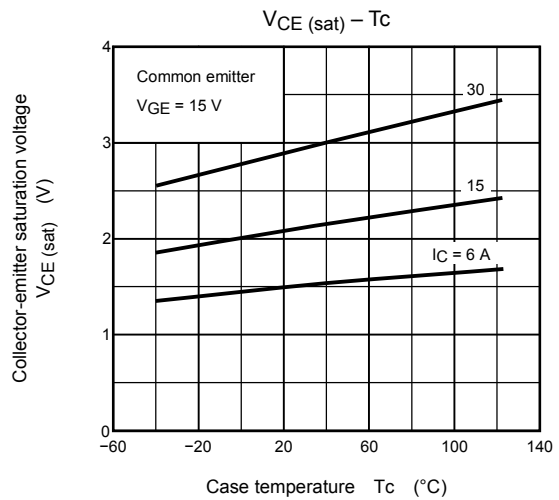
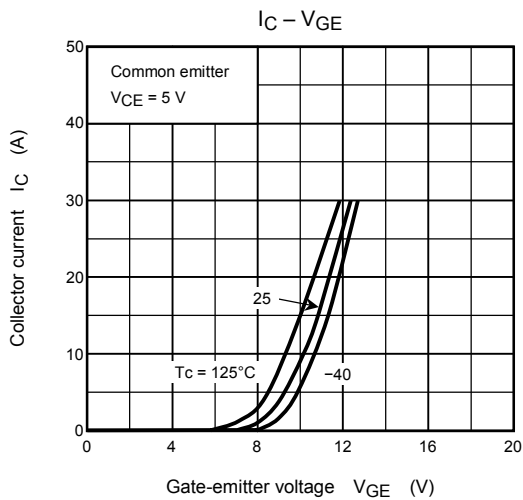
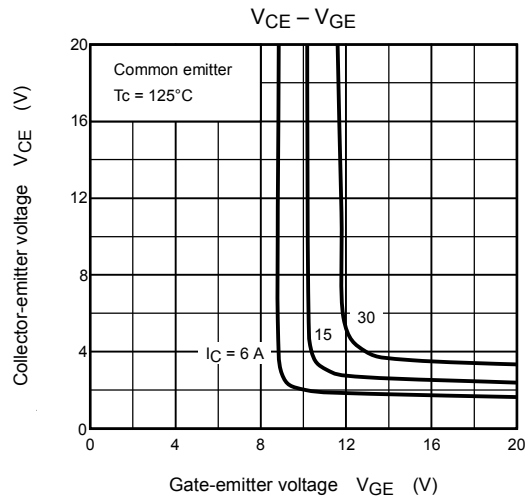
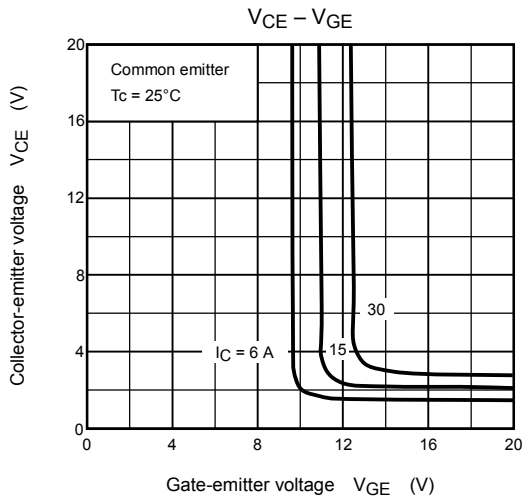
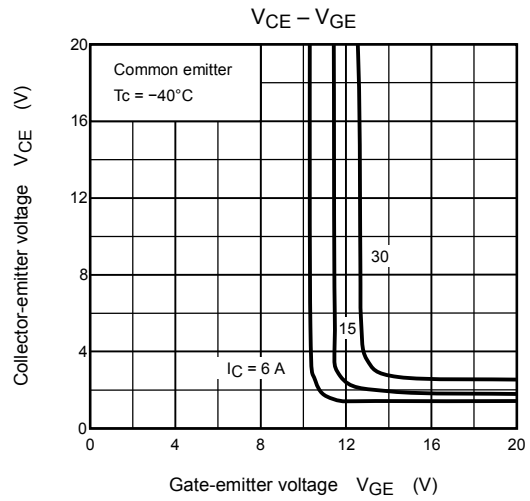
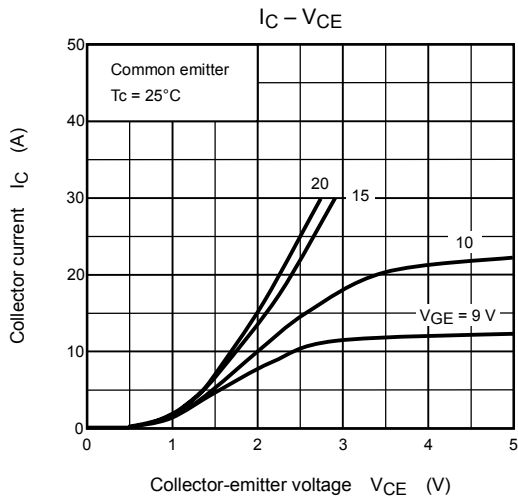


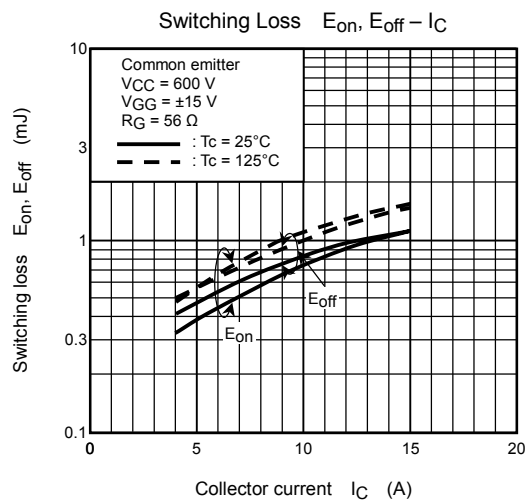
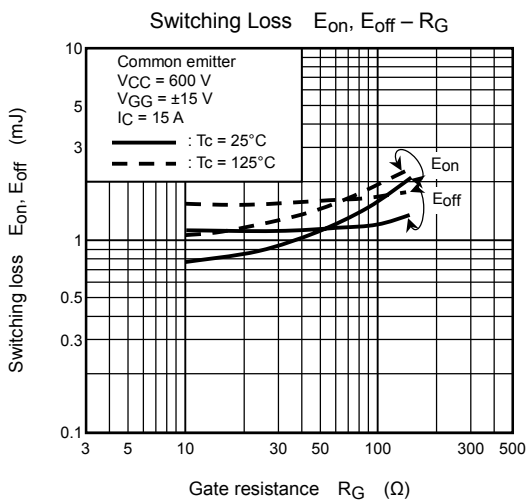
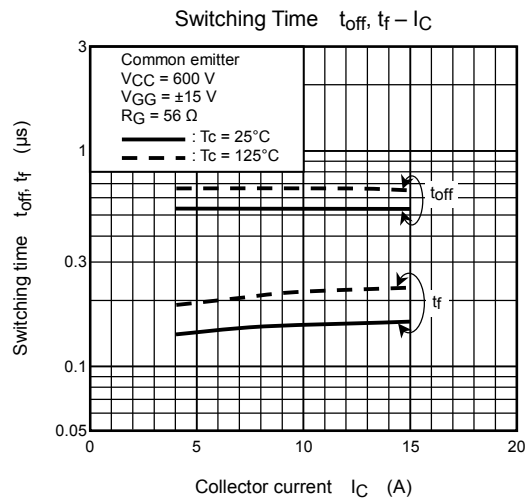
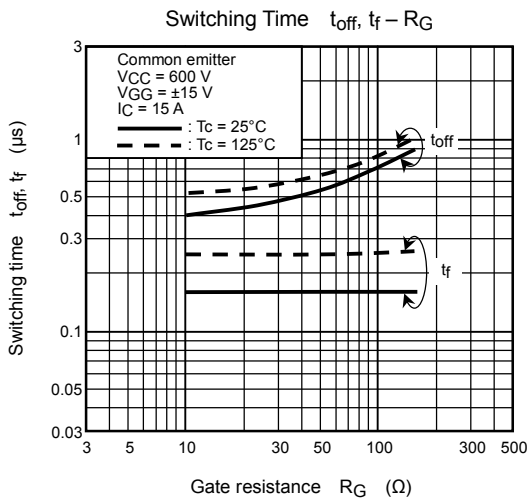
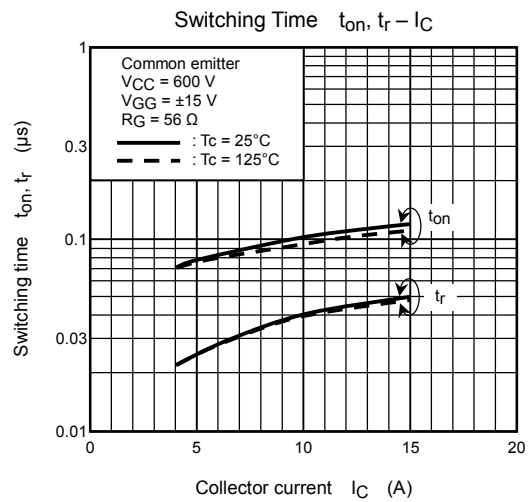
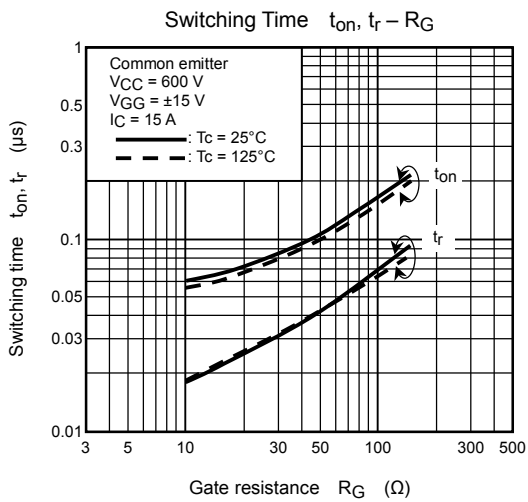
Electrical Characteristics (Ta = 25°C)

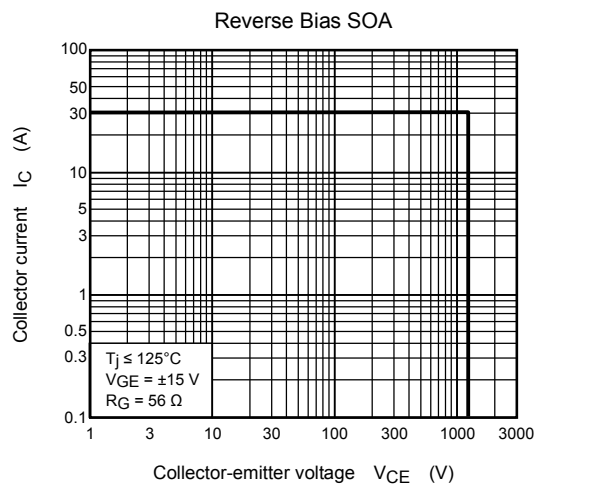
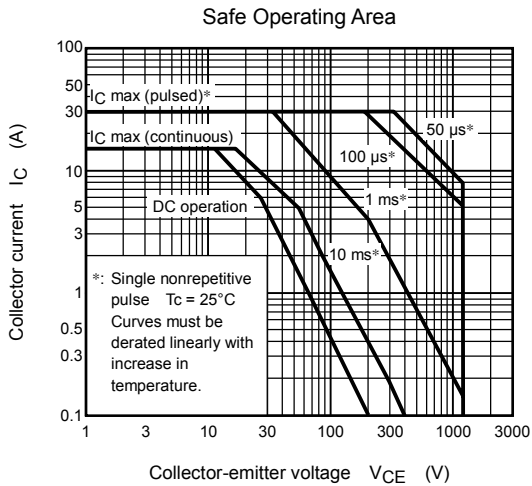
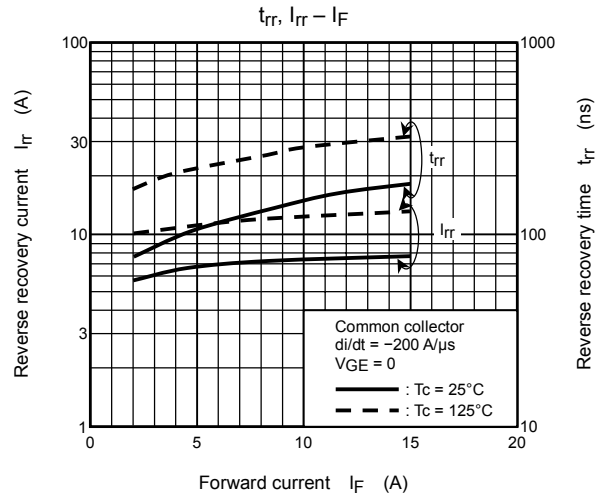
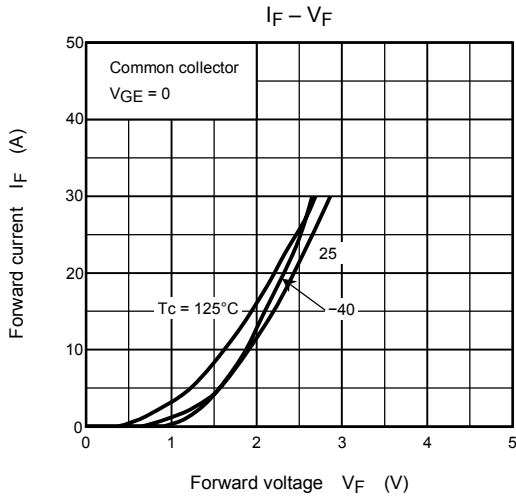
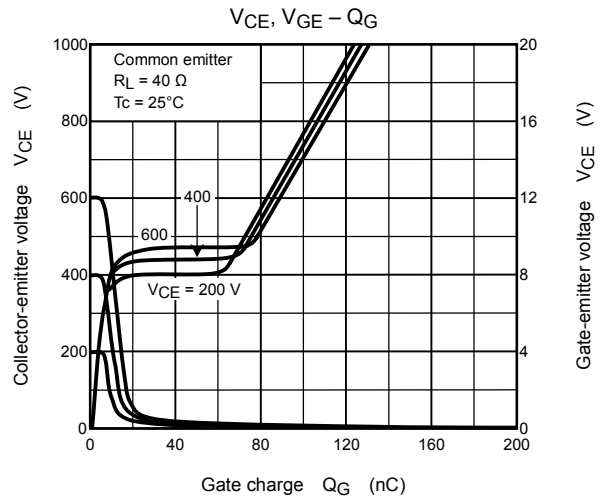
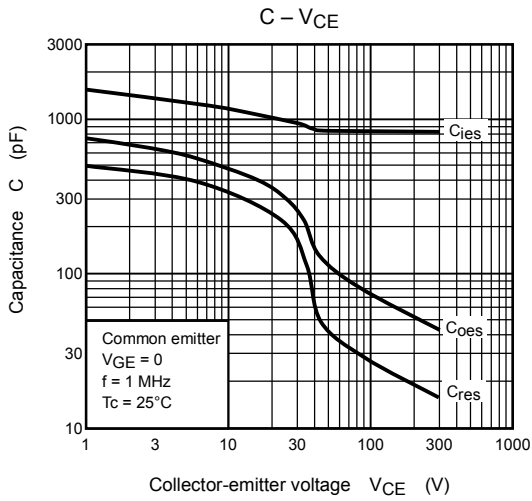
| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|---------------|---------------|---|-----|------|-----------|---------------|
| Gate leakage current | | I_{GES} | $V_{GE} = \pm 20\text{ V}, V_{CE} = 0$ | — | — | ± 500 | nA |
| Collector cut-off current | | I_{CES} | $V_{CE} = 1200\text{ V}, V_{GE} = 0$ | — | — | 1.0 | mA |
| Gate-emitter cut-off voltage | | $V_{GE(OFF)}$ | $I_C = 1.5\text{ mA}, V_{CE} = 5\text{ V}$ | 4.0 | — | 7.0 | V |
| Collector-emitter saturation voltage | | $V_{CE(sat)}$ | $I_C = 15\text{ A}, V_{GE} = 15\text{ V}$ | — | 2.1 | 2.7 | V |
| Input capacitance | | C_{ies} | $V_{CE} = 50\text{ V}, V_{GE} = 0, f = 1\text{ MHz}$ | — | 950 | — | pF |
| Switching time | Rise time | t_r | Inductive load $V_{CC} = 600\text{ V}, I_C = 15\text{ A}$ $V_{GG} = \pm 15\text{ V}, R_G = 56\ \Omega$ (Note) | — | 0.05 | — | μs |
| | Turn-on time | t_{on} | | — | 0.12 | — | |
| | Fall time | t_f | | — | 0.16 | 0.40 | |
| | Turn-off time | t_{off} | | — | 0.56 | — | |
| Peak forward voltage | | V_F | $I_F = 15\text{ A}, V_{GE} = 0$ | — | — | 3.0 | V |
| Reverse recovery time | | t_{rr} | $I_F = 15\text{ A}, di/dt = -200\text{ A}/\mu\text{s}$ | — | — | 350 | ns |
| Thermal resistance (IGBT) | | $R_{th(j-c)}$ | — | — | — | 0.78 | °C/W |
| Thermal resistance (diode) | | $R_{th(j-c)}$ | — | — | — | 1.60 | °C/W |

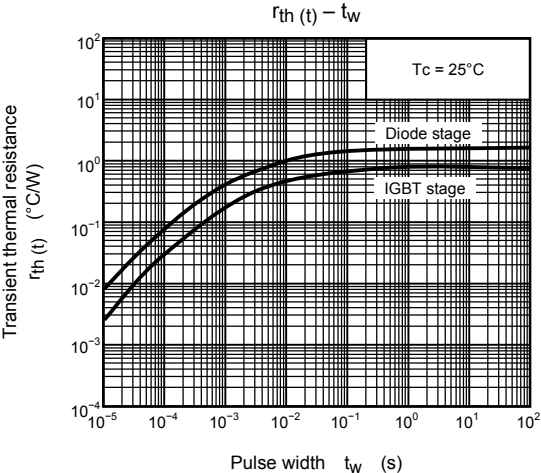
Note: Switching time measurement circuit and input/output waveforms











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