

TOSHIBA INSULATED GATE BIPOLAR TRANSISTOR SILICON N CHANNEL MOS TYPE

GT60M301

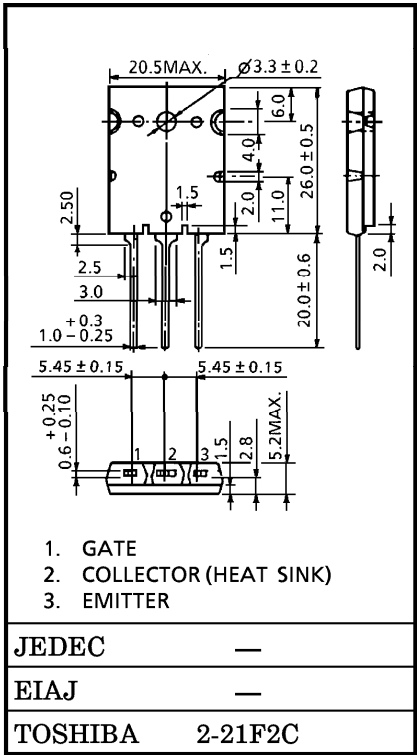
HIGH POWER SWITCHING APPLICATIONS

- The 3rd Generation
- FRD Included Between Emitter and Collector
- Enhancement-Mode
- High Speed
  - $I_{GBT} : t_f = 0.25 \mu s$  (Typ.)
  - $FRD : t_{rr} = 0.7 \mu s$  (Typ.)
- Low Saturation Voltage
  - $V_{CE(sat)} = 3.4V$  (Max.)

MAXIMUM RATINGS (Ta = 25°C)

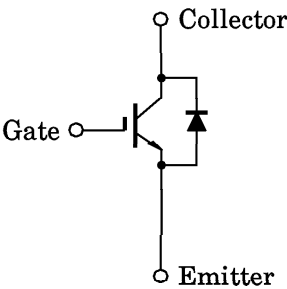
| CHARACTERISTICS                  |     | SYMBOL     | RATINGS  | UNIT |
|----------------------------------|-----|------------|----------|------|
| Collector-Emitter Voltage        |     | $V_{CES}$  | 900      | V    |
| Gate-Emitter Voltage             |     | $V_{GES}$  | $\pm 25$ | V    |
| Collector Current                | DC  | $I_C$      | 60       | A    |
|                                  | 1ms | $I_{CP}$   | 120      |      |
| Emitter-Collector Foward Current | DC  | $I_{ECF}$  | 15       | A    |
|                                  | 1ms | $I_{ECFP}$ | 120      |      |
| Junction Temperature (Tc = 25°C) |     | $P_C$      | 200      | W    |
| Junction Temperature             |     | $T_j$      | 150      | °C   |
| Storage Temperature Range        |     | $T_{stg}$  | -55~150  | °C   |
| Screw Torque                     |     | —          | 0.8      | N·m  |

Unit in mm

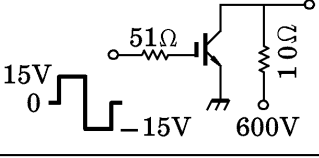


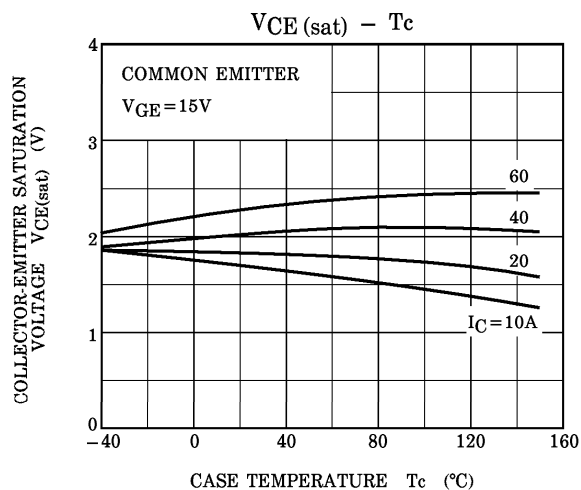
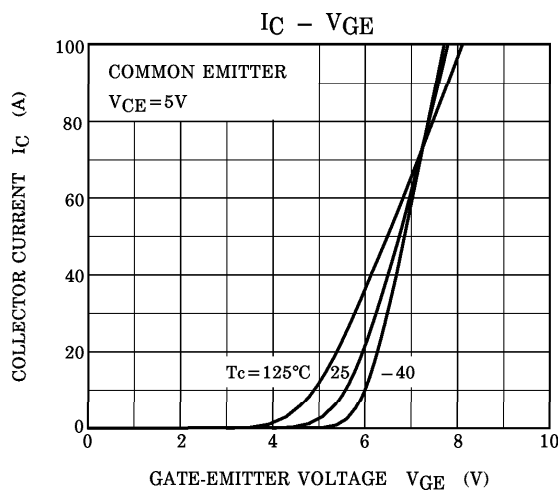
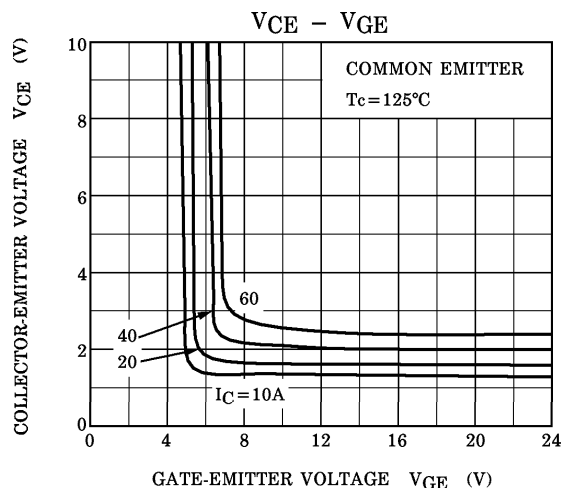
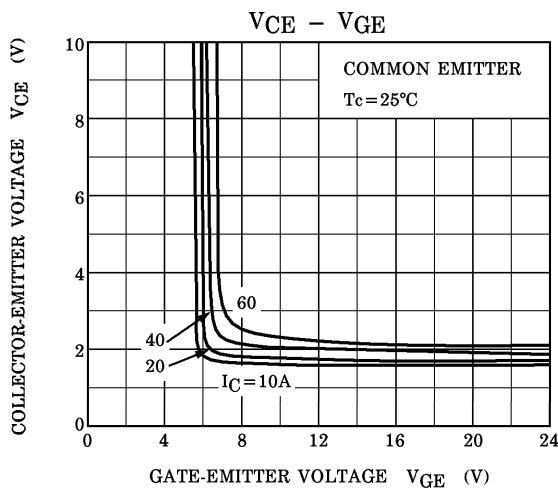
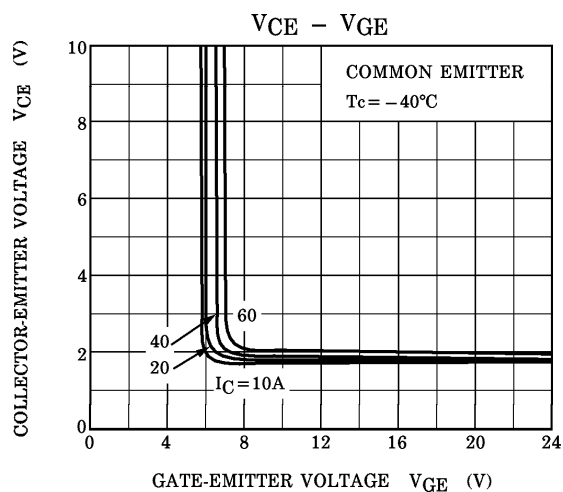
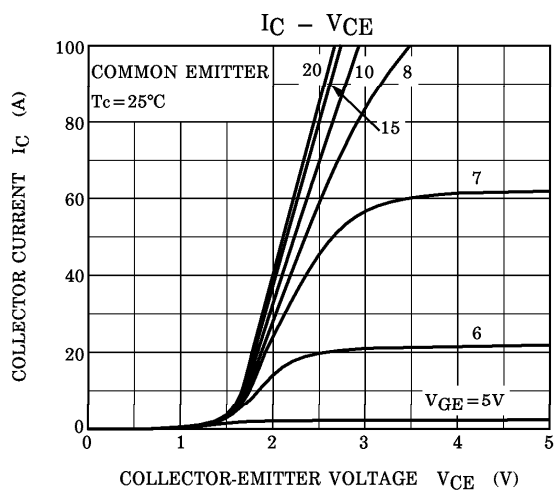
Weight : 9.75g

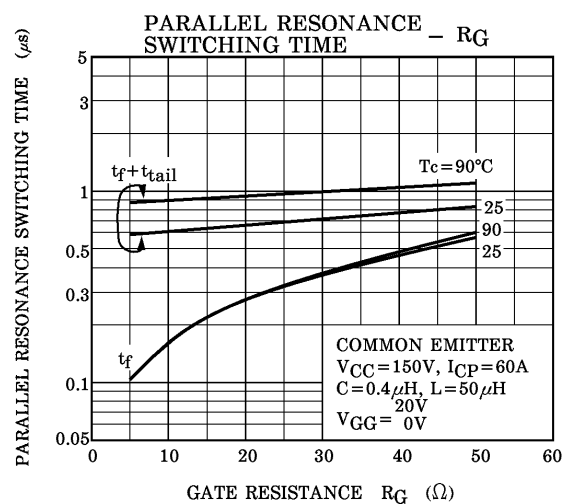
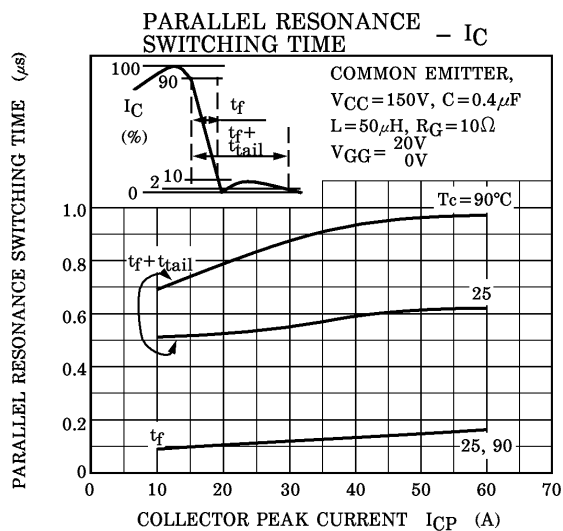
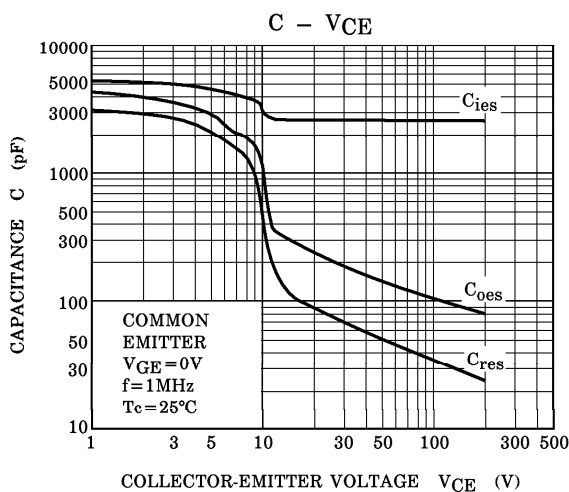
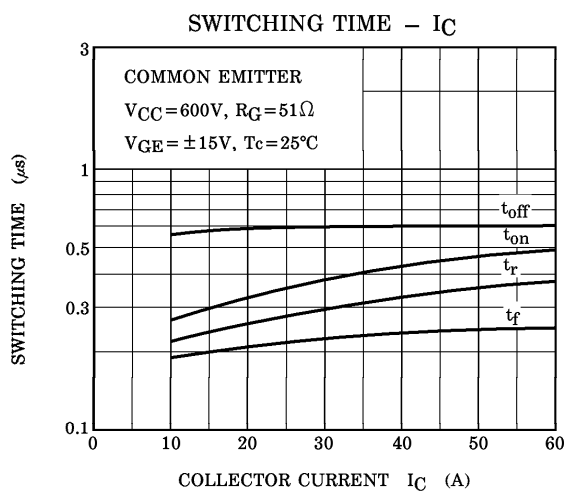
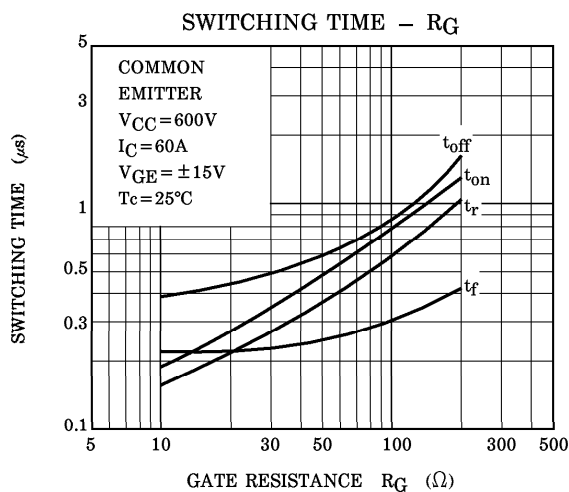
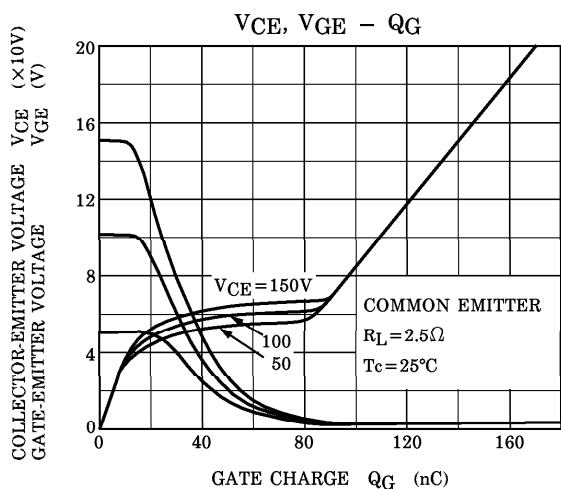
EQUIVALENT CIRCUIT



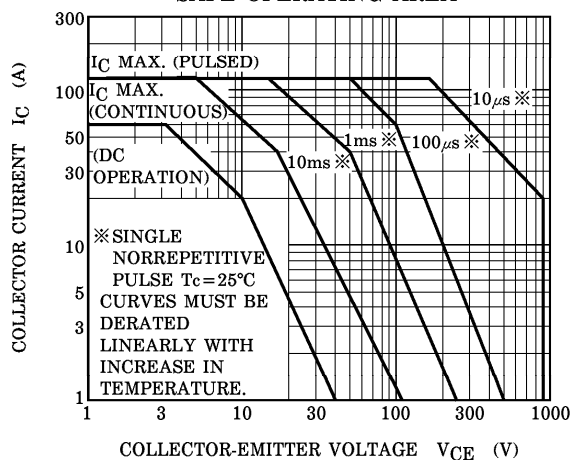
## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC                       |               | SYMBOL             | TEST CONDITION                                                                     | MIN. | TYP. | MAX.      | UNIT          |
|--------------------------------------|---------------|--------------------|------------------------------------------------------------------------------------|------|------|-----------|---------------|
| Gate Leakage Current                 |               | $I_{GES}$          | $V_{GE} = \pm 25V, V_{CE} = 0$                                                     | —    | —    | $\pm 500$ | nA            |
| Collector Cut-off Current            |               | $I_{CES}$          | $V_{CE} = 900V, V_{GE} = 0$                                                        | —    | —    | 1.0       | mA            |
| Gate-Emitter Cut-off Voltage         |               | $V_{GE} (OFF)$     | $I_C = 60mA, V_{CE} = 5V$                                                          | 3.0  | —    | 6.0       | V             |
| Collector-Emitter Saturation Voltage |               | $V_{CE} (sat) (1)$ | $I_C = 10A, V_{GE} = 15V$                                                          | —    | 1.8  | 2.4       | V             |
| Collector-Emitter Saturation Voltage |               | $V_{CE} (sat) (2)$ | $I_C = 60A, V_{GE} = 15V$                                                          | —    | 2.3  | 3.4       | V             |
| Input Capacitance                    |               | $C_{ies}$          | $V_{CE} = 30V, V_{GE} = 0$<br>$f = 1MHz$                                           | —    | 2700 | —         | pF            |
| Switching Time                       | Rise Time     | $t_r$              |  | —    | 0.25 | 0.60      | $\mu s$       |
|                                      | Turn-on Time  | $t_{on}$           |                                                                                    | —    | 0.35 | 0.80      |               |
|                                      | Fall Time     | $t_f$              |                                                                                    | —    | 0.25 | 0.40      |               |
|                                      | Turn-off Time | $t_{off}$          |                                                                                    | —    | 0.50 | 1.00      |               |
| Emitter-Collector Forward Voltage    |               | $V_{ECF}$          | $I_{EC} = 15A, V_{GE} = 0$                                                         | —    | 1.5  | 2.0       | V             |
| Reverse Recovery Time                |               | $t_{rr}$           | $I_F = 15A, di/dt = -20A$                                                          | —    | 0.7  | 2.5       | $\mu s$       |
| Thermal Resistance                   |               | $R_{th(j-c)}$      | IGBT                                                                               | —    | —    | 0.625     | $^{\circ}C/W$ |
| Thermal Resistance                   |               | $R_{th(j-c)}$      | Diode                                                                              | —    | —    | 4.0       | $^{\circ}C/W$ |

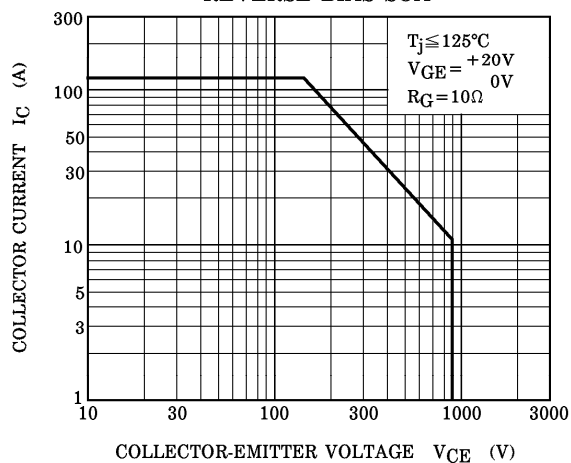
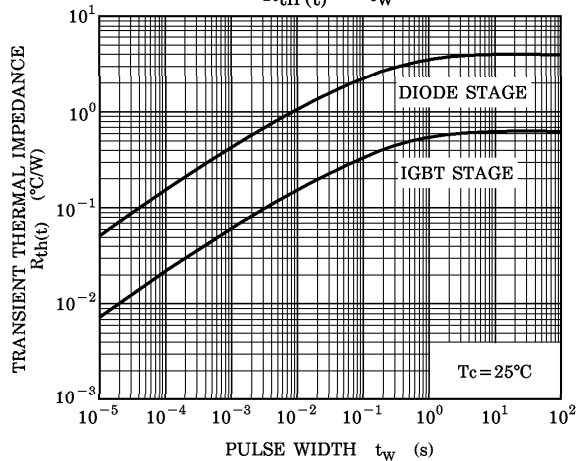
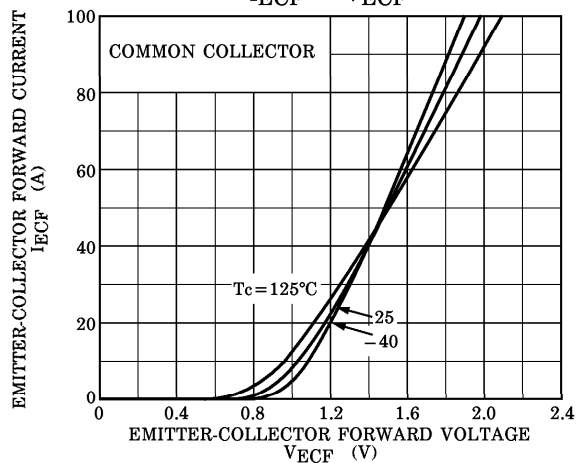
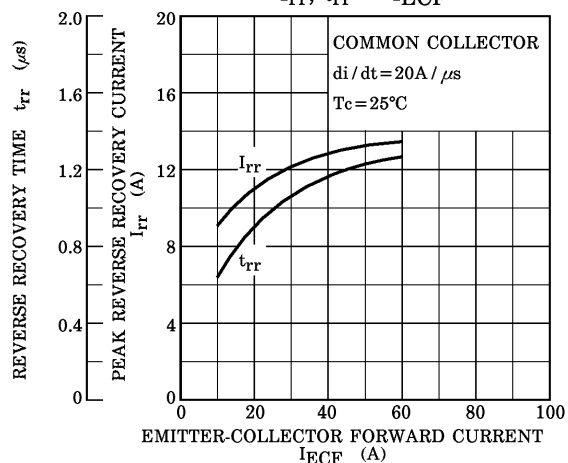
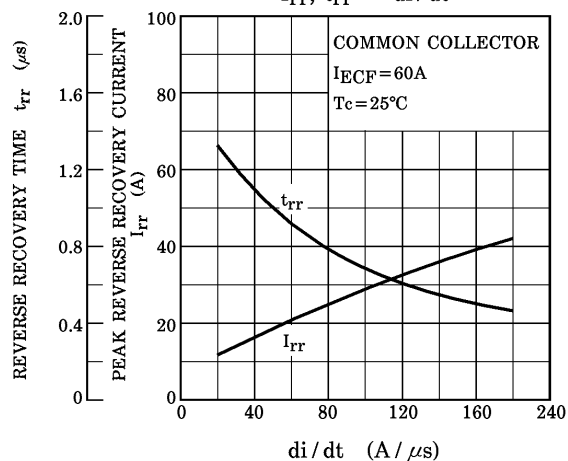




SAFE OPERATING AREA



REVERSE BIAS SOA

 $R_{th}(t) - t_w$  $I_{ECF} - V_{ECF}$  $I_{rr}, t_{rr} - I_{ECF}$  $I_{rr}, t_{rr} - di/dt$ 

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