TOSHIBA INSULATED GATE BIPOLAR TRANSISTOR SILICON N CHANNEL IGBT

## GT30J301

# HIGH POWER SWITCHING APPLICATIONS MOTOR CONTROL APPLICATIONS

• The 3rd Generation

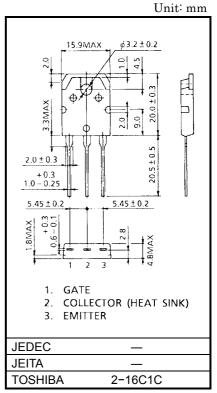
• Enhancement-Mode

• High Speed :  $t_f = 0.30 \mu s$  (Max.) • Low Saturation Voltage :  $V_{CE (sat)} = 2.7 V$  (Max.)

• FRD included between Emitter and Collector

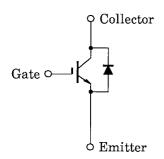
#### **MAXIMUM RATINGS (Ta = 25°C)**

| CHARACTERISTIC                          |     | SYMBOL           | RATING  | UNIT |  |
|---|-----|------------------|---------|------|--|
| Collector-Emitter Voltage               |     | V <sub>CES</sub> | 600     | V    |  |
| Gate-Emitter Voltage                    |     | V <sub>GES</sub> | ±20     | V    |  |
| Collector Current                       | DC  | Ic               | 30      | Α    |  |
|   | 1ms | I <sub>CP</sub>  | 60      | Α    |  |
| Emitter-Collector Forward<br>Current    | DC  | I <sub>F</sub>   | 30      | Α    |  |
|   | 1ms | I <sub>FM</sub>  | 60      | Α    |  |
| Collector Power Dissipation (Tc = 25°C) |     | PC               | 155     | W    |  |
| Junction Temperature                    |     | Tj               | 150     | °C   |  |
| Storage Temperature Range               |     | T <sub>stg</sub> | -55~150 | °C   |  |



Weight: 4.6g

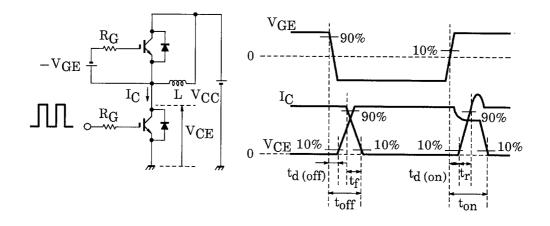
#### **EQUIVALENT CIRCUIT**



### **ELECTRICAL CHARACTERISTICS (Ta = 25°C)**

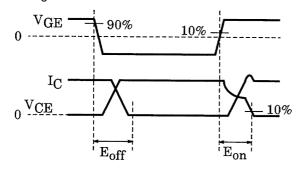
| CHARACTERISTIC                       |               | SYMBOL                | TEST CONDITION  | MIN | TYP. | MAX  | UNIT |
|--------------------------------------|---------------|-----------------------|---|-----|------|------|------|
| Gate Leakage Current                 |               | I <sub>GES</sub>      | V <sub>GE</sub> = ±20V, V <sub>CE</sub> = 0   | _   | _    | ±500 | nA   |
| Collector Cut-Off Current            |               | I <sub>CES</sub>      | V <sub>CE</sub> = 600V, V <sub>GE</sub> = 0   | _   | _    | 1.0  | mA   |
| Gate-Emitter Cut-Off Voltage         |               | V <sub>GE</sub> (OFF) | I <sub>C</sub> = 3mA, V <sub>CE</sub> = 5V  | 5.0 | _    | 8.0  | V    |
| Collector-Emitter Saturation Voltage |               | V <sub>CE</sub> (sat) | I <sub>C</sub> = 30A, V <sub>GE</sub> = 15V   | _   | 2.1  | 2.7  | V    |
| Input Capacitance                    |               | C <sub>ies</sub>      | V <sub>CE</sub> = 20V, V <sub>GE</sub> = 0, f = 1MHz  | _   | 2200 | _    | pF   |
| Switching Time                       | Rise Time     | t <sub>r</sub>        | Inductive Load $V_{CC}$ = 300V, $I_{C}$ = 30A $V_{GG}$ = ±15V, $R_{G}$ = 43 $\Omega$ (Note) | _   | 0.12 | _    | - µs |
|                                      | Turn-On Time  | t <sub>on</sub>       |   | _   | 0.40 | _    |      |
|                                      | Fall Time     | t <sub>f</sub>        |   | _   | 0.15 | 0.30 |      |
|                                      | Turn-Off Time | t <sub>off</sub>      |   | _   | 0.70 | _    |      |
| Peak Forward Voltage                 |               | V <sub>F</sub>        | I <sub>F</sub> = 30A, V <sub>GE</sub> = 0   | _   | _    | 2.0  | V    |
| Reverse Recovery Time                |               | t <sub>rr</sub>       | I <sub>F</sub> = 30A, di / dt = -100A / μs  | _   | _    | 200  | ns   |
| Thermal Resistance (IGBT)            |               | R <sub>th (j-c)</sub> | _   | _   | _    | 0.81 | °C/W |
| Thermal Resistance (Diode)           |               | R <sub>th (j-c)</sub> | _   | _   | _    | 2.0  | °C/W |

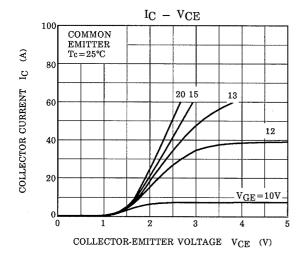
Note: Switching time measurement circuit and input / output waveforms

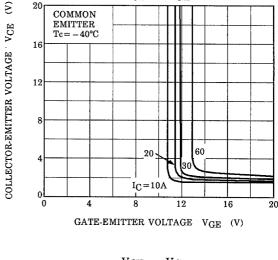


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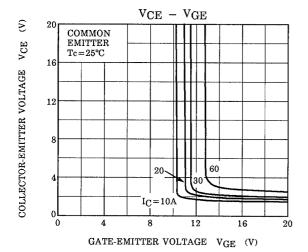
Switching loss measurement waveforms

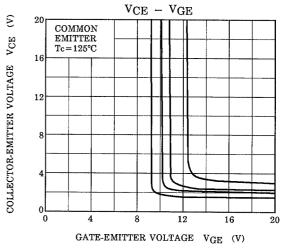


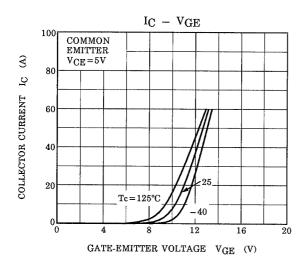


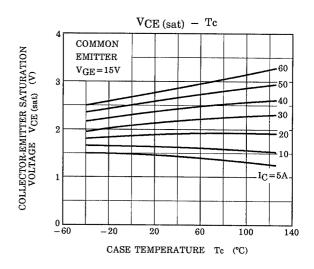


 $V_{CE} - V_{GE}$ 

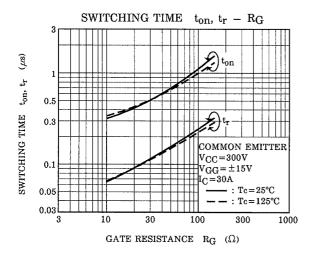


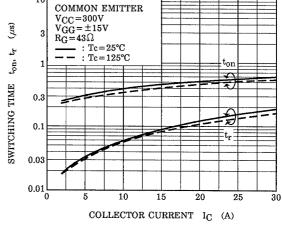




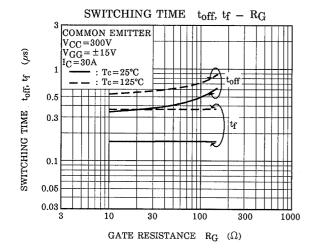


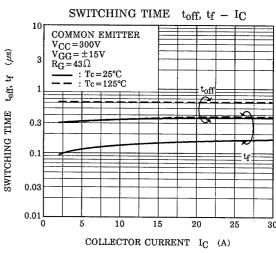
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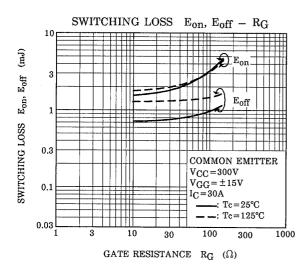


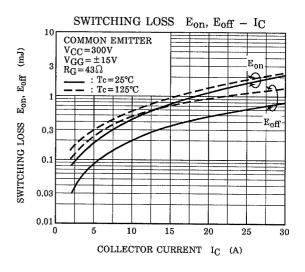


SWITCHING TIME  $t_{on}$ ,  $t_{r}$  –  $I_{C}$ 

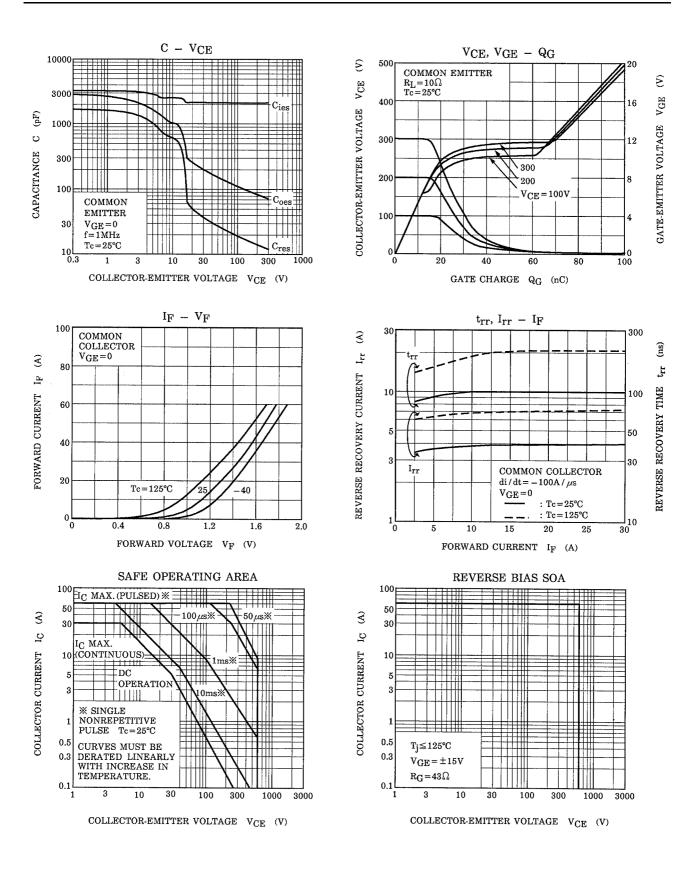


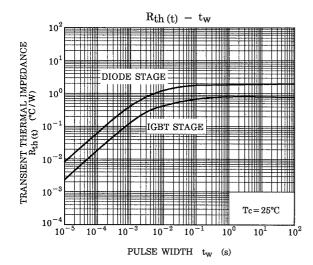






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