

TOSHIBA Insulated Gate Bipolar Transistor Silicon N Channel IGBT

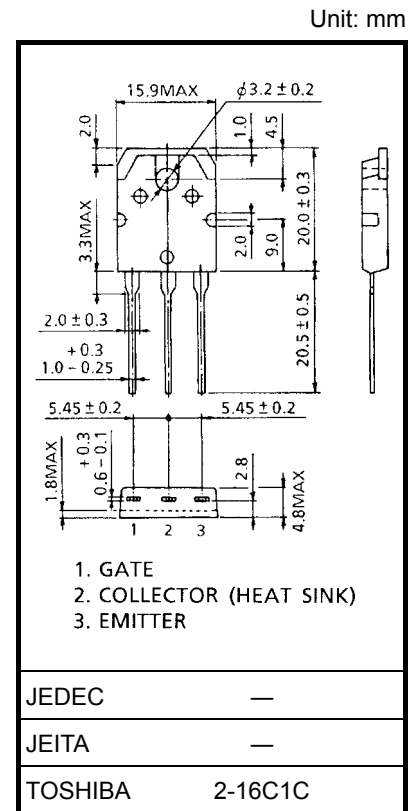
GT10Q301

High Power Switching Applications
Motor Control Applications

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

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

Characteristics		Symbol	Rating	Unit
Collector-emitter voltage		V_{CES}	1200	V
Gate-emitter voltage		V_{GES}	± 20	V
Collector current	DC	I_C	10	A
	1 ms	I_{CP}	20	
Emitter-collector forward current	DC	I_F	10	A
	1 ms	I_{FM}	20	
Collector power dissipation ($T_c = 25^\circ\text{C}$)		P_C	140	W
Junction temperature		T_j	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55 to 150	$^\circ\text{C}$

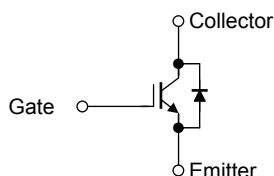


Weight: 4.6 g (typ.)

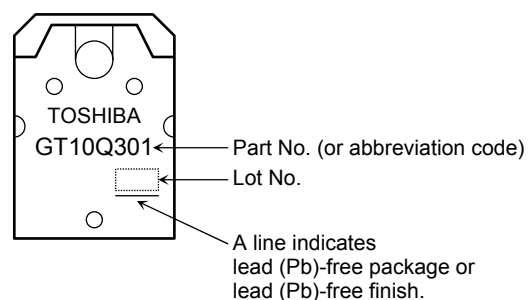
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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



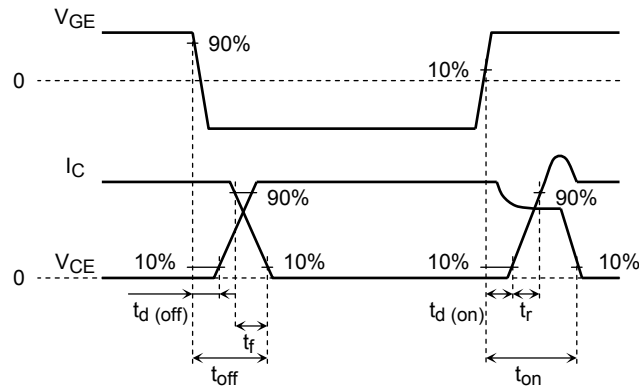
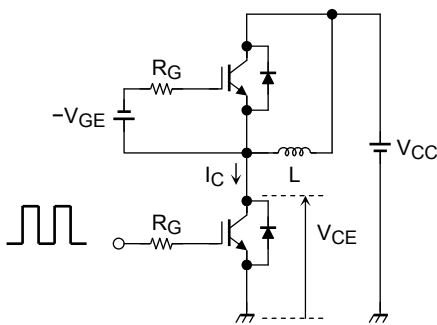
Marking

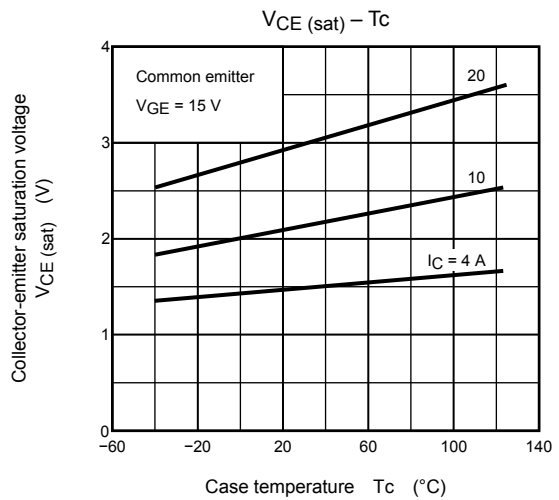
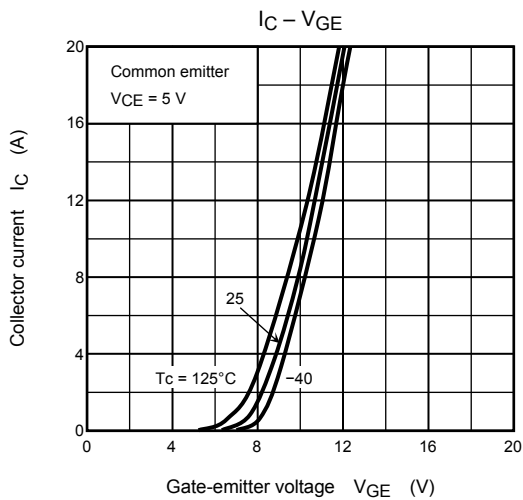
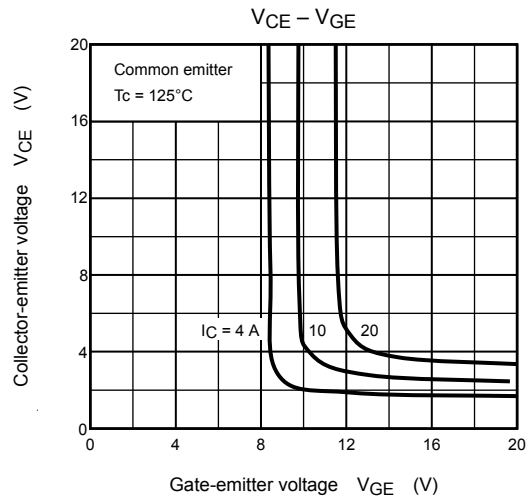
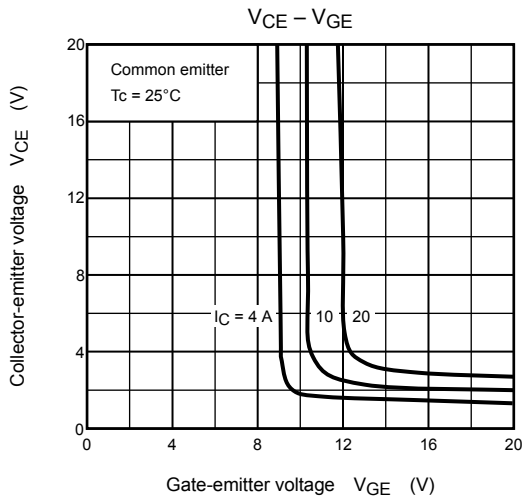
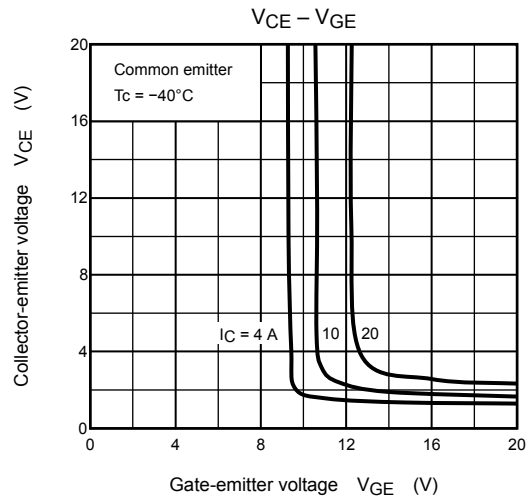
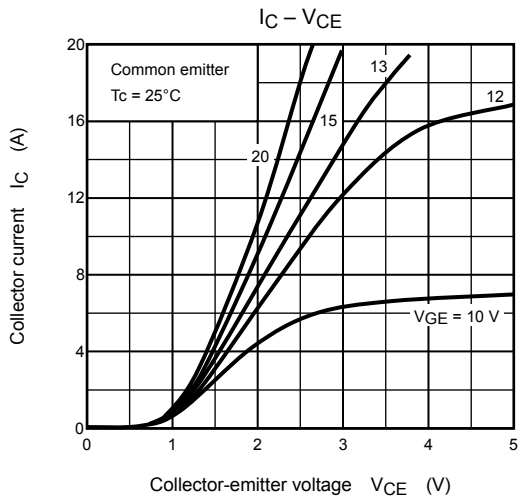


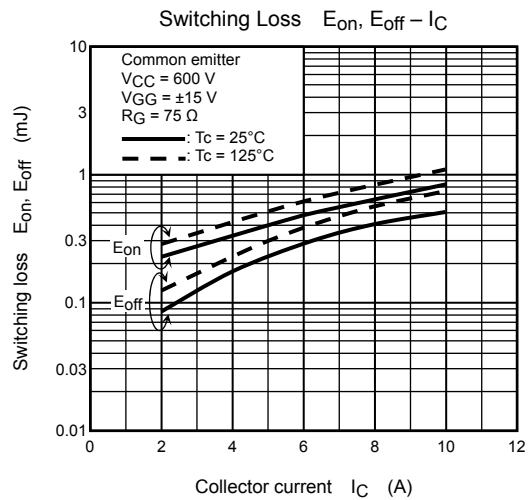
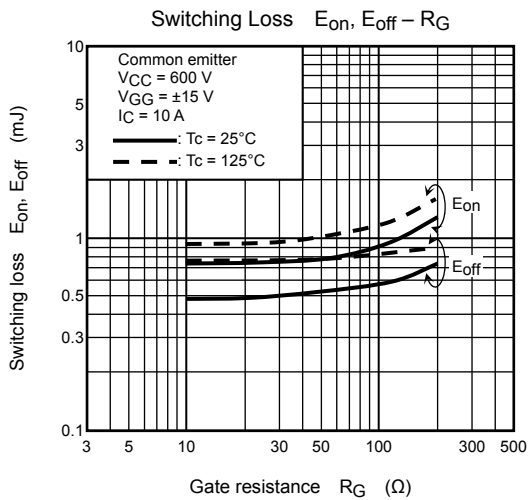
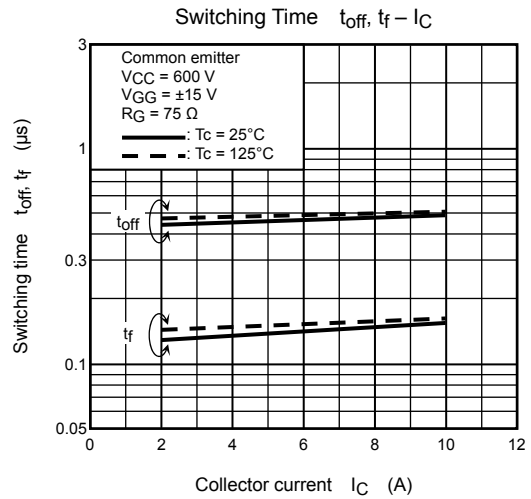
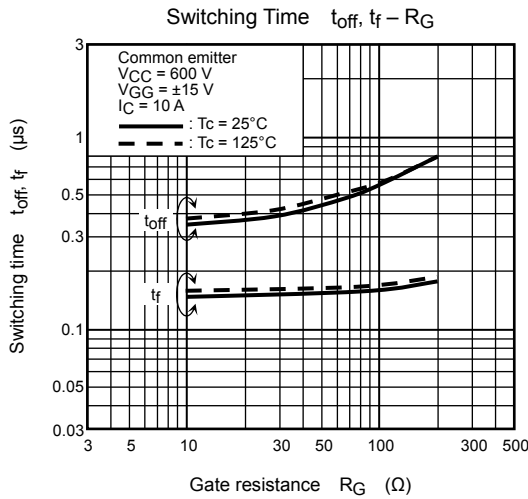
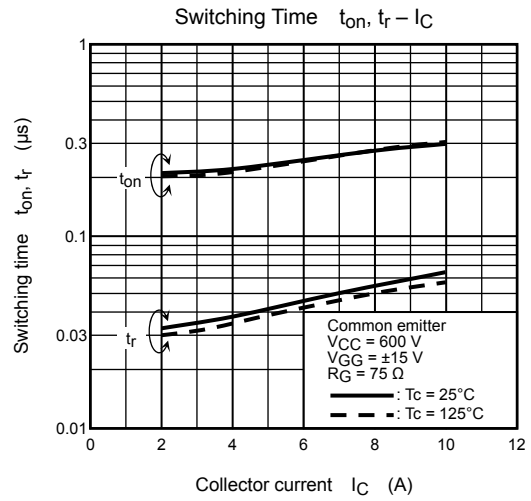
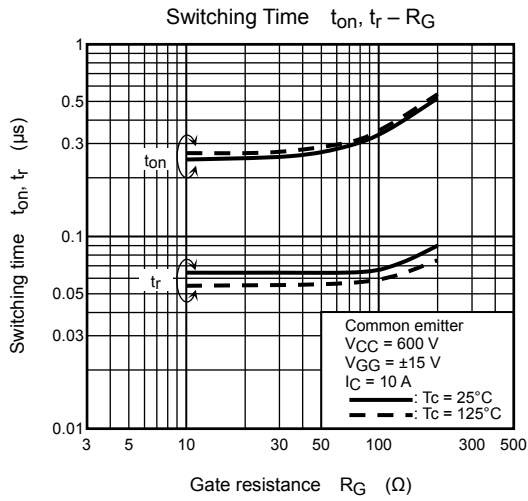
Electrical Characteristics (Ta = 25°C)

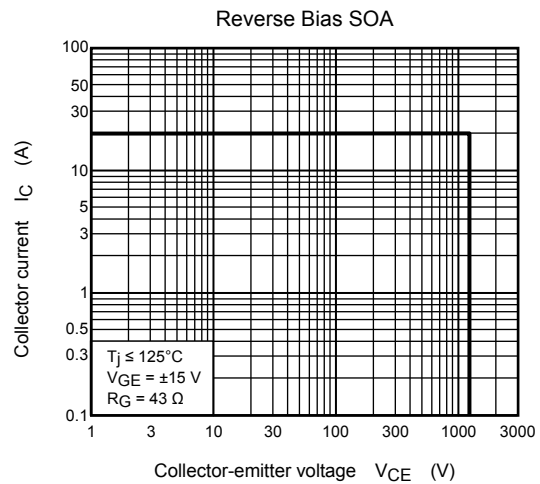
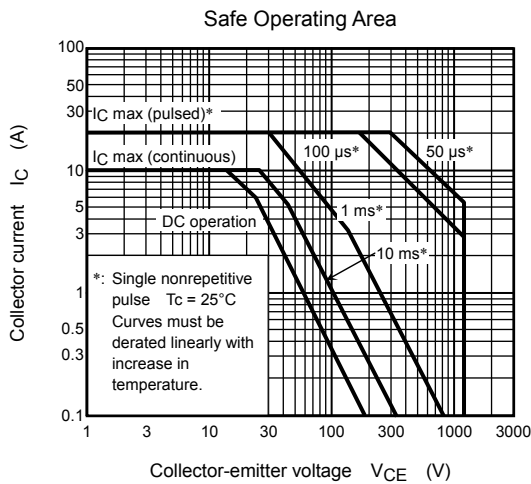
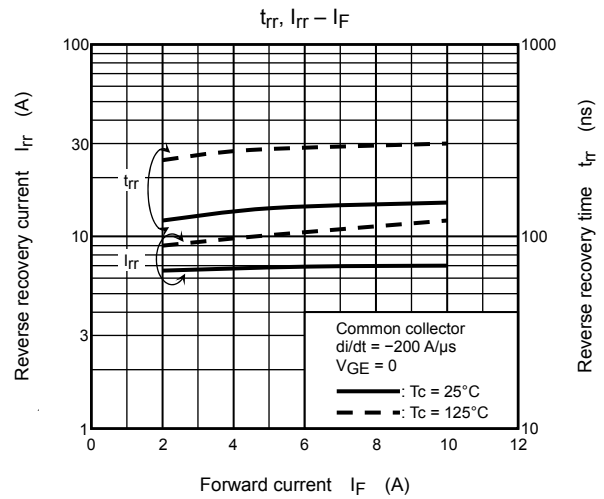
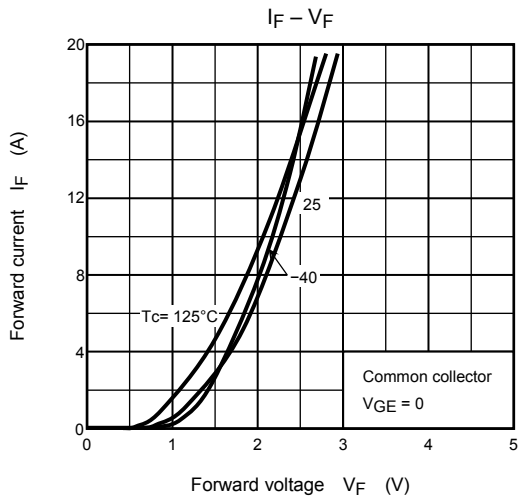
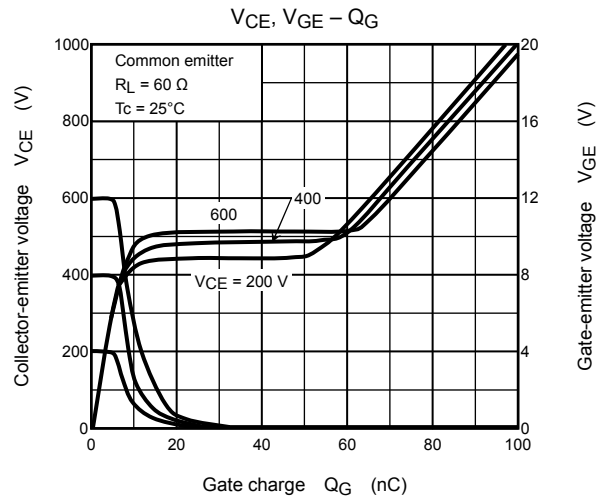
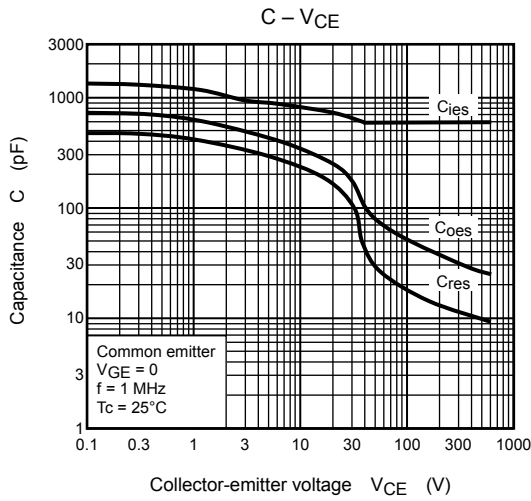
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GES}	$V_{GE} = \pm 20\text{ V}, V_{CE} = 0$	—	—	± 500	nA
Collector cut-off current		I_{CES}	$V_{CE} = 1200\text{ V}, V_{GE} = 0$	—	—	1.0	mA
Gate-emitter cut-off voltage		$V_{GE (OFF)}$	$I_C = 1\text{ mA}, V_{CE} = 5\text{ V}$	4.0	—	7.0	V
Collector-emitter saturation voltage		$V_{CE (sat)}$	$I_C = 10\text{ A}, V_{GE} = 15\text{ V}$	—	2.1	2.7	V
Input capacitance		C_{ies}	$V_{CE} = 50\text{ V}, V_{GE} = 0, f = 1\text{ MHz}$	—	600	—	pF
Switching time	Rise time	t_r	Inductive load $V_{CC} = 600\text{ V}, I_C = 10\text{ A}$ $V_{GG} = \pm 15\text{ V}, R_G = 75\ \Omega$ (Note)	—	0.07	—	μs
	Turn-on time	t_{on}		—	0.30	—	
	Fall time	t_f		—	0.16	0.32	
	Turn-off time	t_{off}		—	0.50	—	
Peak forward voltage		V_F	$I_F = 10\text{ A}, V_{GE} = 0$	—	—	3.0	V
Reverse recovery time		t_{rr}	$I_F = 10\text{ A}, di/dt = -200\text{ A}/\mu\text{s}$	—	—	350	ns
Thermal resistance (IGBT)		$R_{th (j-c)}$	—	—	—	0.89	°C/W
Thermal resistance (diode)		$R_{th (j-c)}$	—	—	—	1.79	°C/W

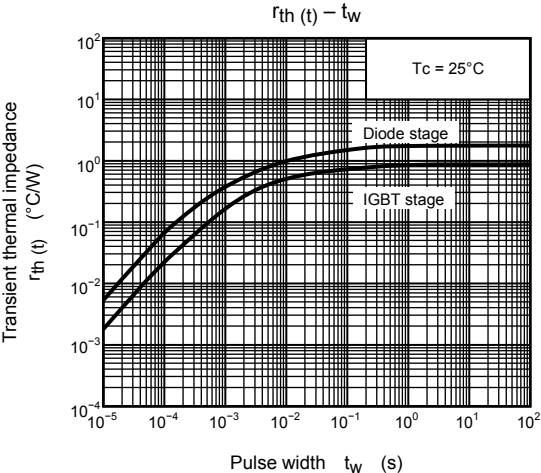
Note: Switching time measurement circuit and input/output waveforms











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