

TOSHIBA Insulated Gate Bipolar Transistor Silicon N Channel IGBT

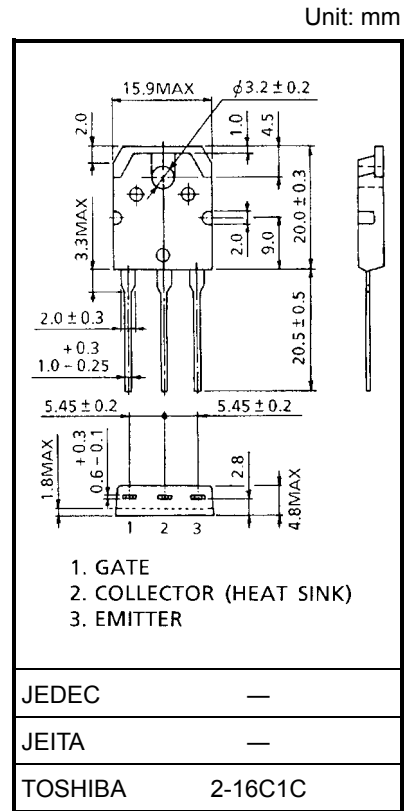
GT10Q301

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

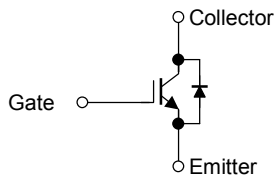
Maximum Ratings (Ta = 25°C)

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



Weight: 4.6 g (typ.)

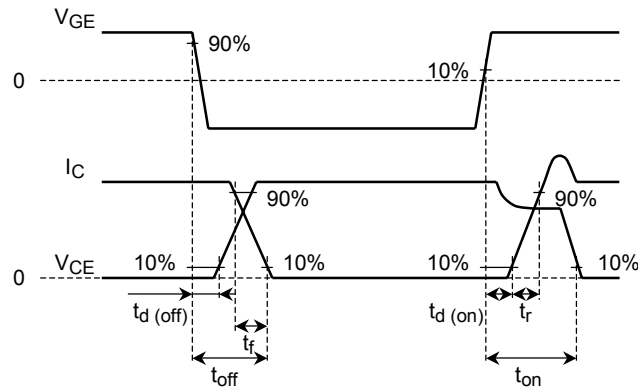
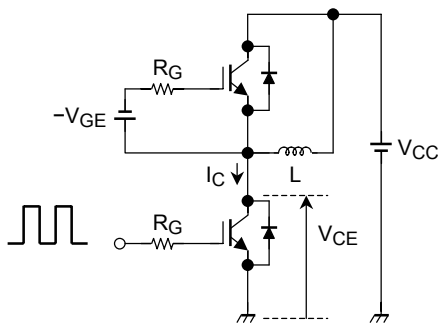
Equivalent Circuit

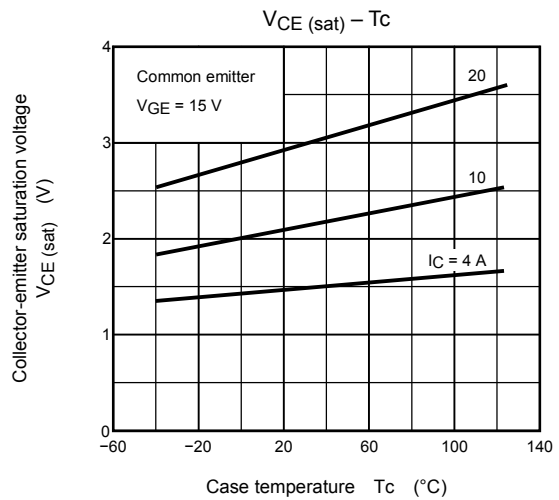
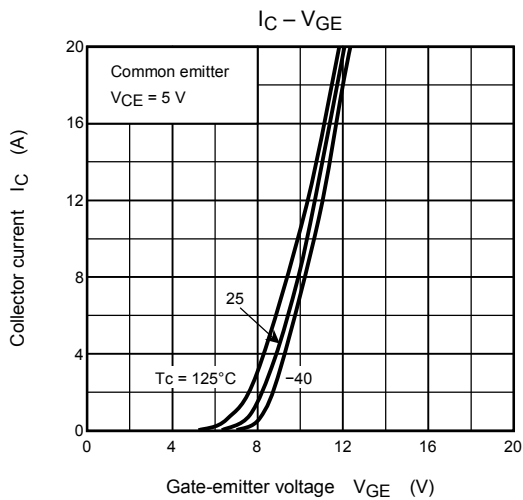
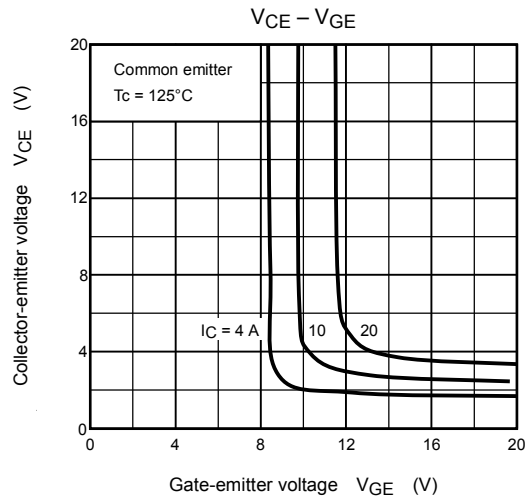
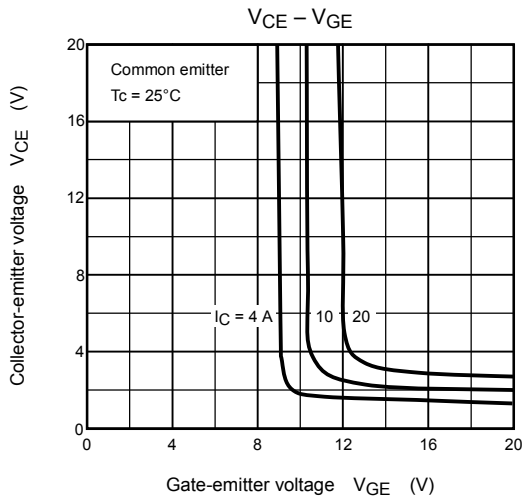
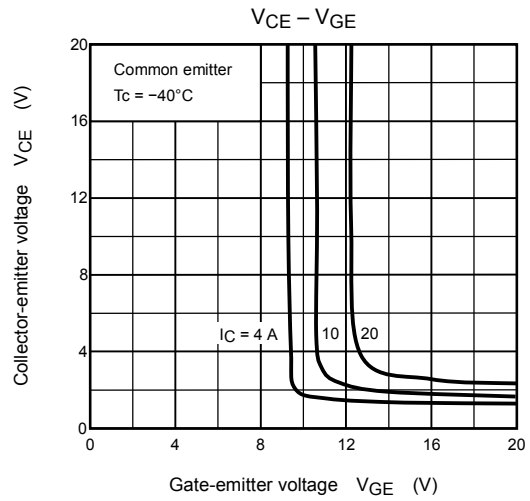
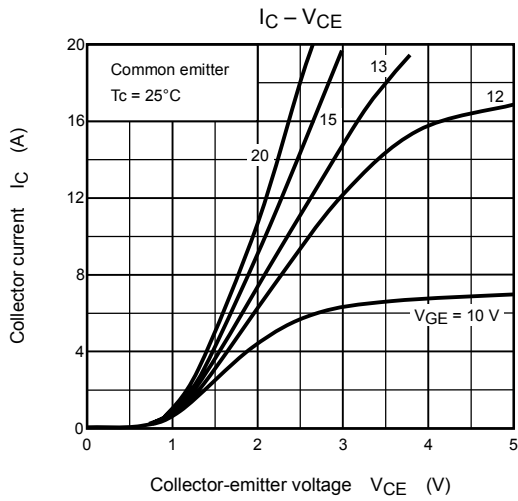


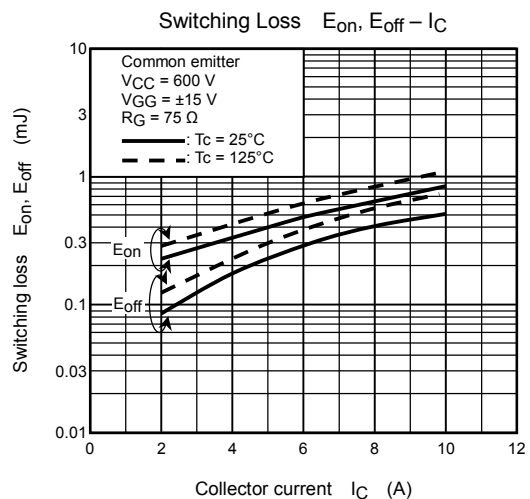
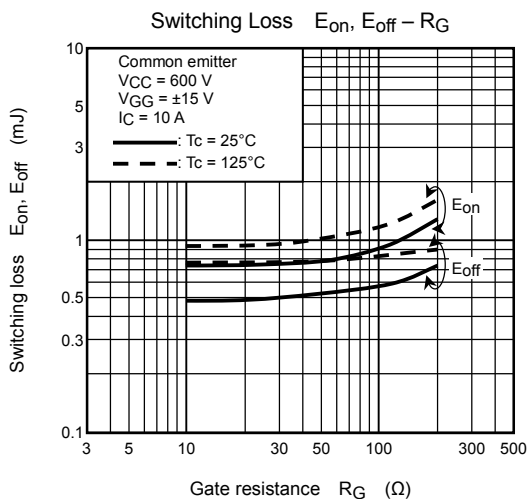
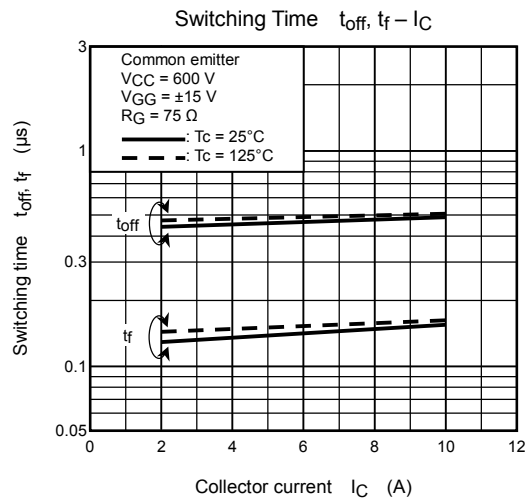
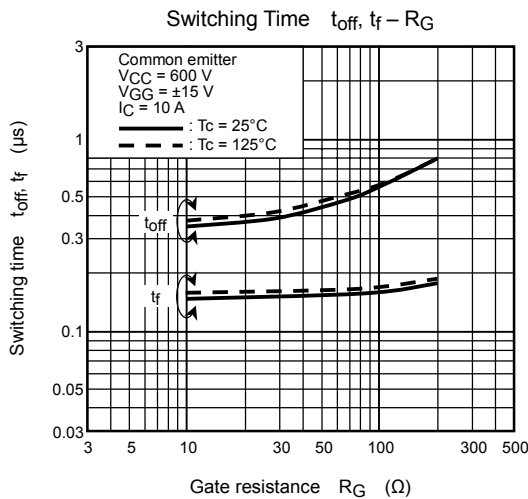
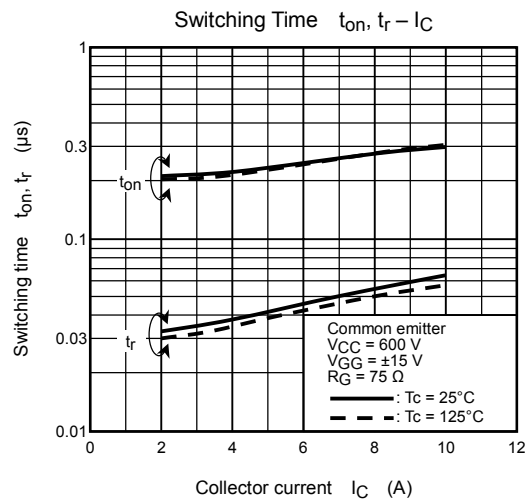
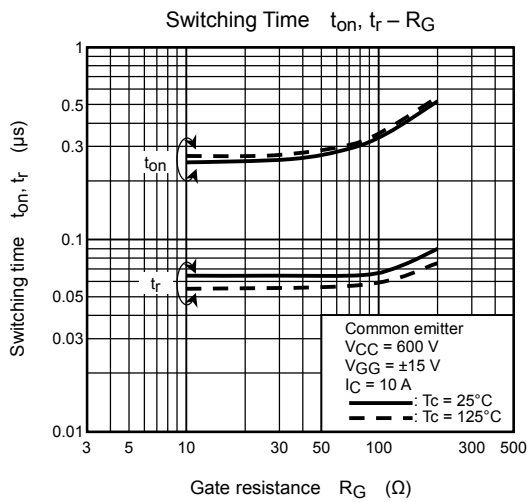
Electrical Characteristics (Ta = 25°C)

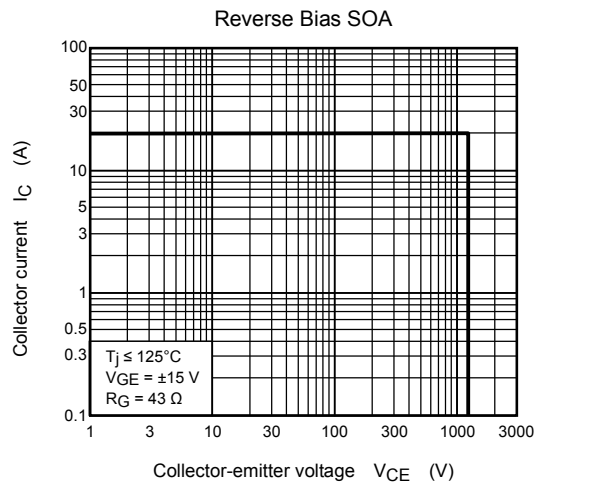
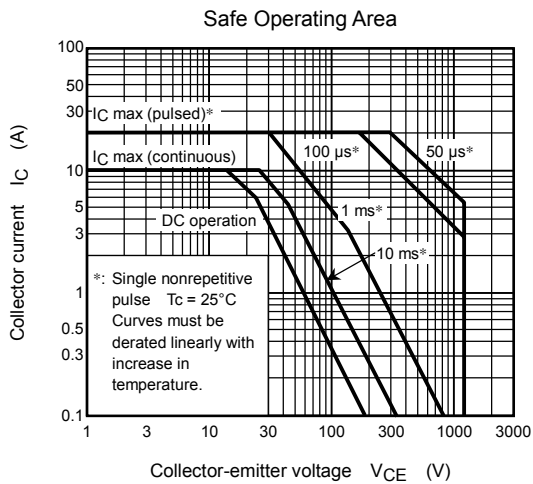
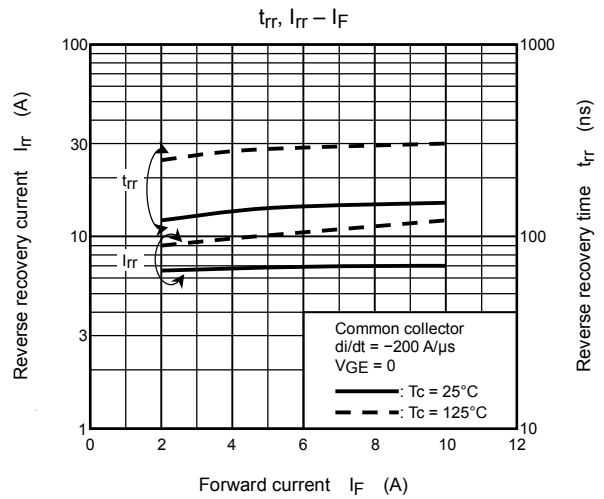
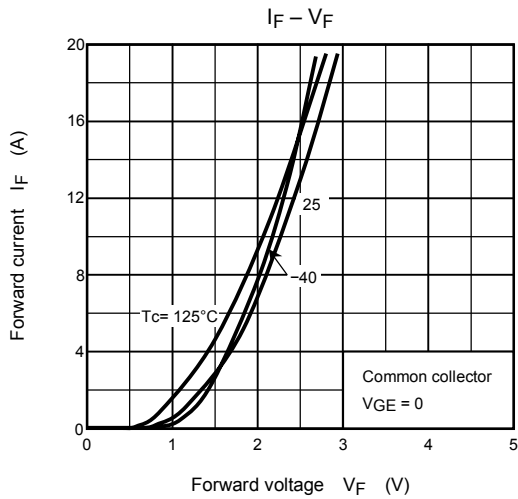
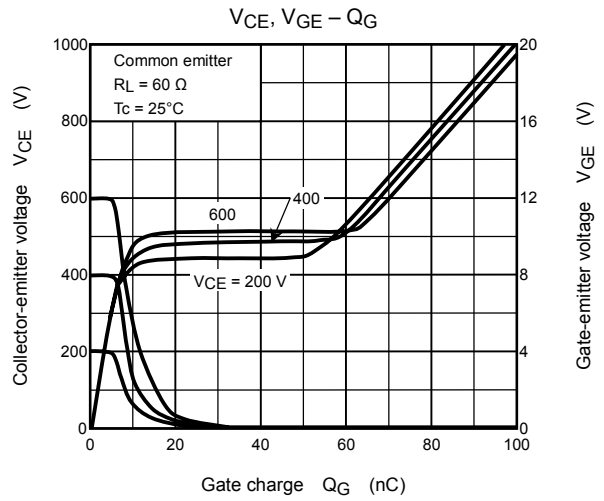
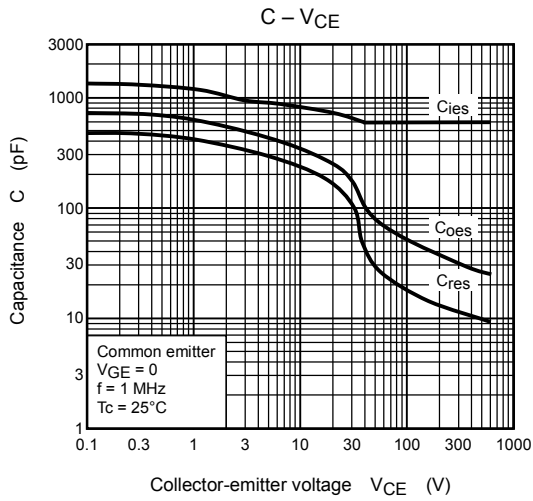
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GES}	$V_{GE} = \pm 20\text{ V}, V_{CE} = 0$	—	—	± 500	nA
Collector cut-off current		I_{CES}	$V_{CE} = 1200\text{ V}, V_{GE} = 0$	—	—	1.0	mA
Gate-emitter cut-off voltage		$V_{GE (OFF)}$	$I_C = 1\text{ mA}, V_{CE} = 5\text{ V}$	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

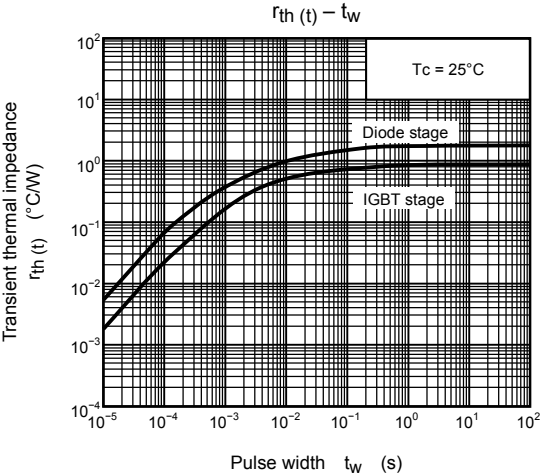
Note: Switching time measurement circuit and input/output waveforms











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