

TOSHIBA Insulated Gate Bipolar Transistor Silicon N Channel IGBT

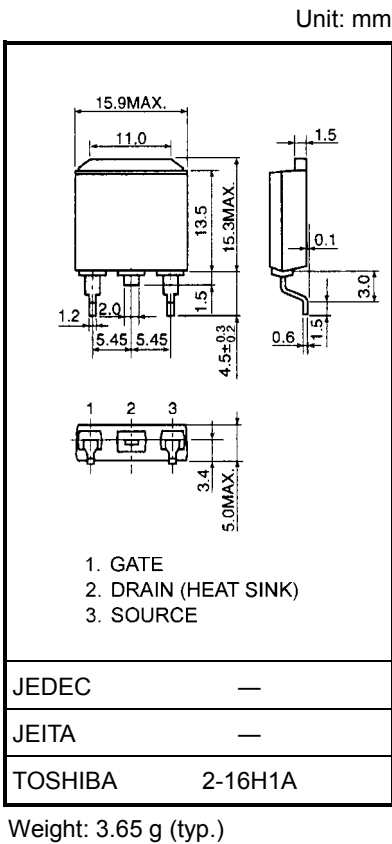
GT15Q311

High Power Switching Applications
Motor Control Applications

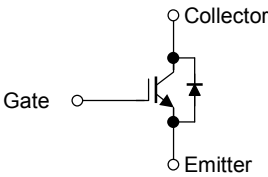
- The 3rd generation
- Enhancement-mode
- High speed: $t_f = 0.32 \mu s$ (max)
- Low saturation voltage: $V_{CE(sat)} = 2.7 V$ (max)
- FRD included between emitter and collector

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



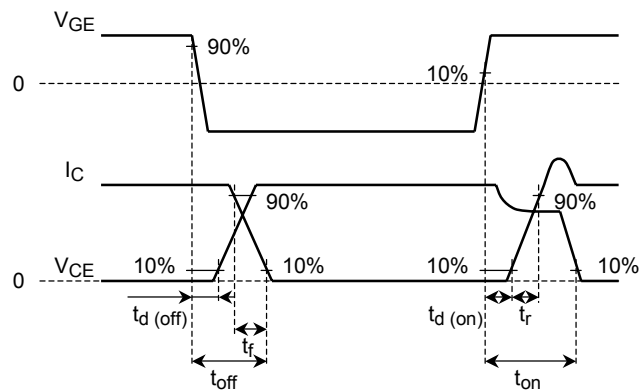
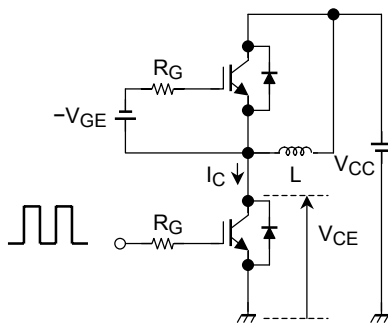
Equivalent Circuit

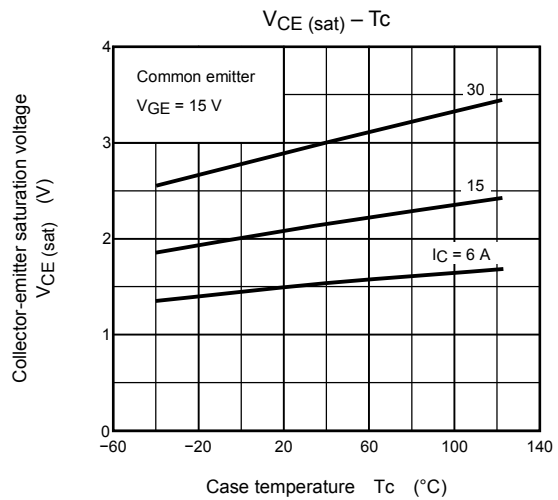
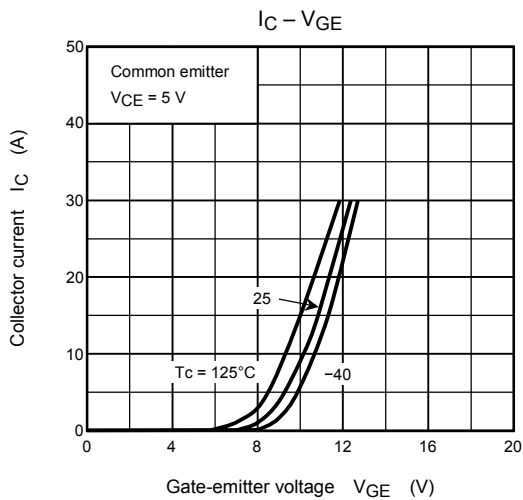
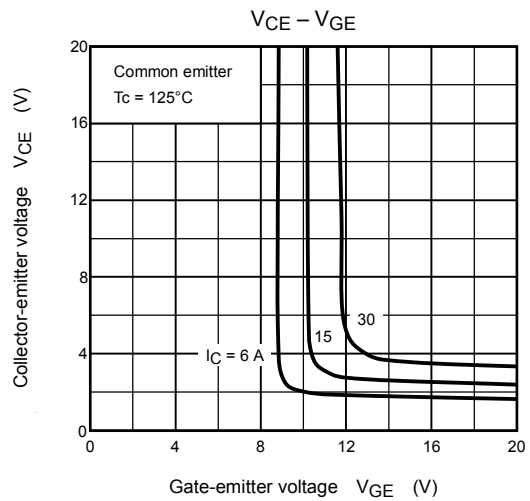
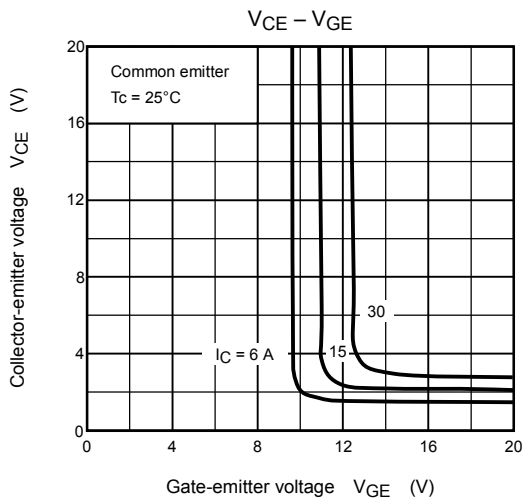
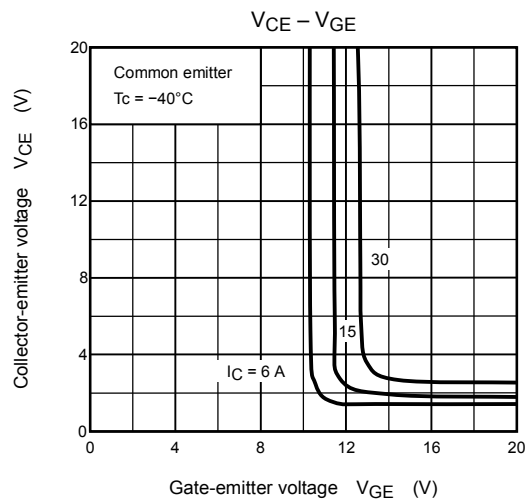
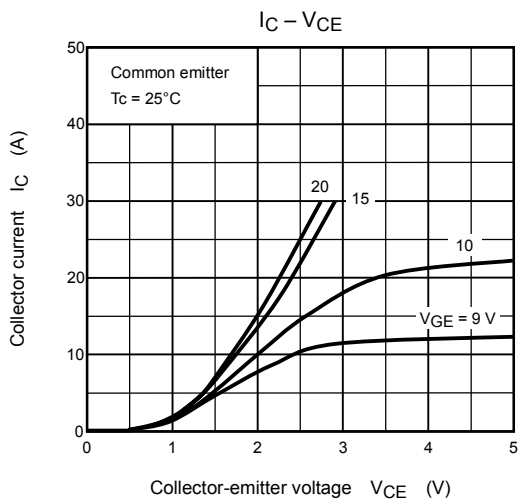


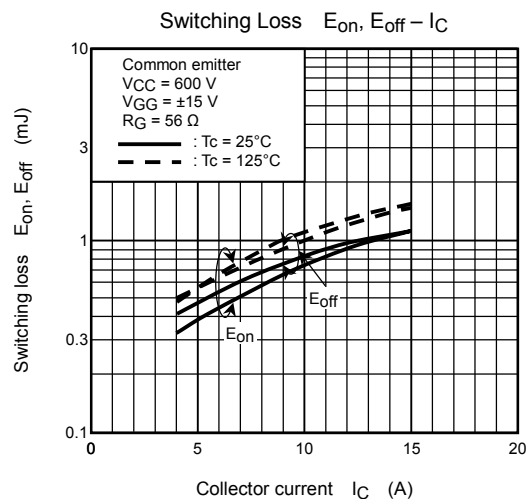
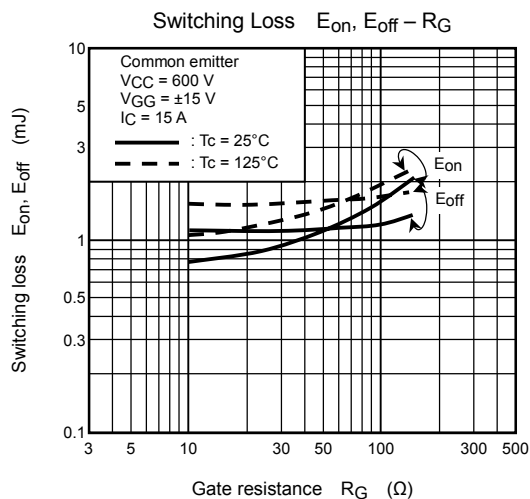
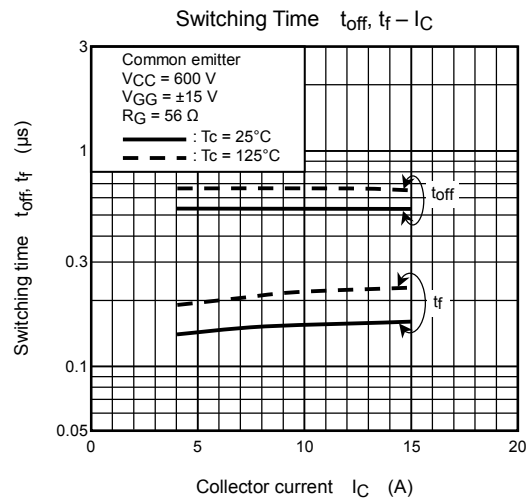
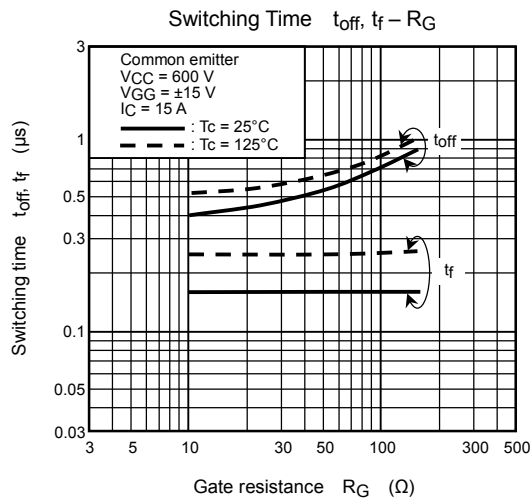
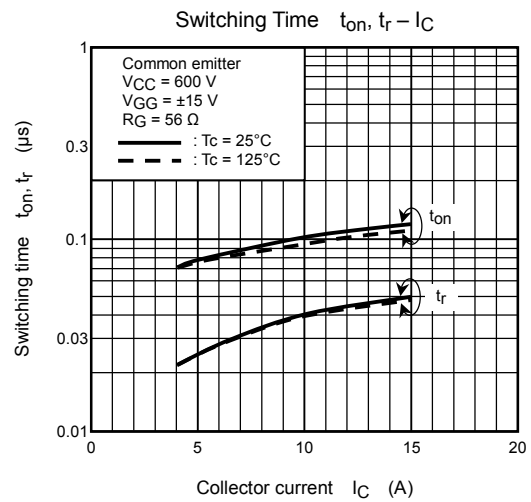
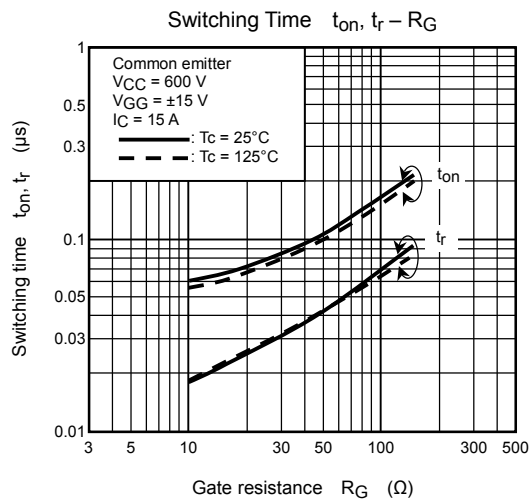
Electrical Characteristics (Ta = 25°C)

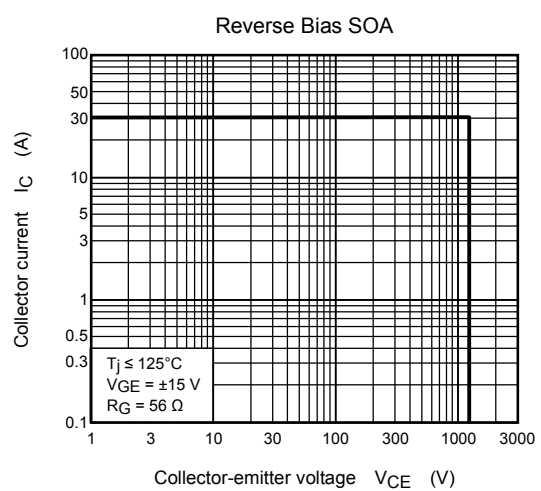
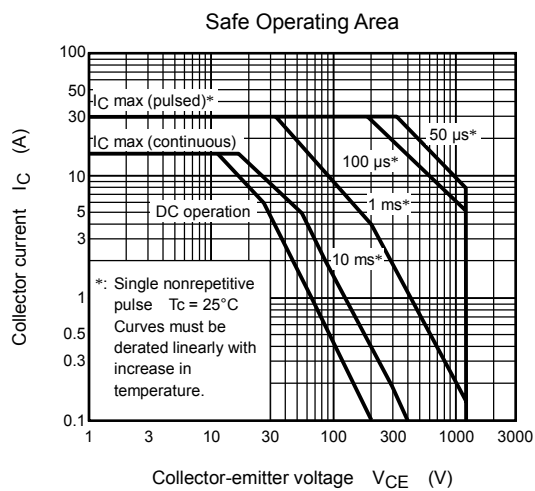
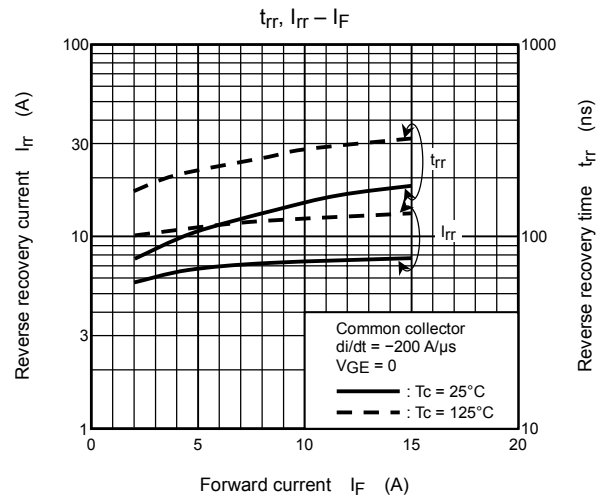
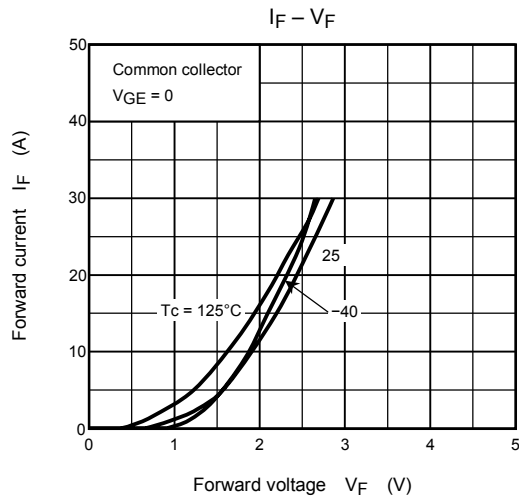
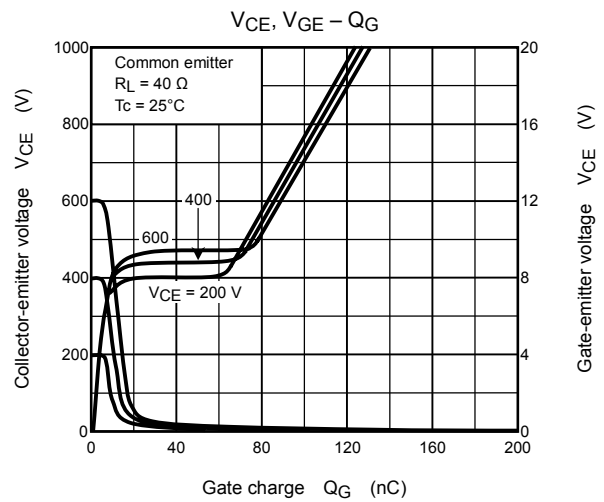
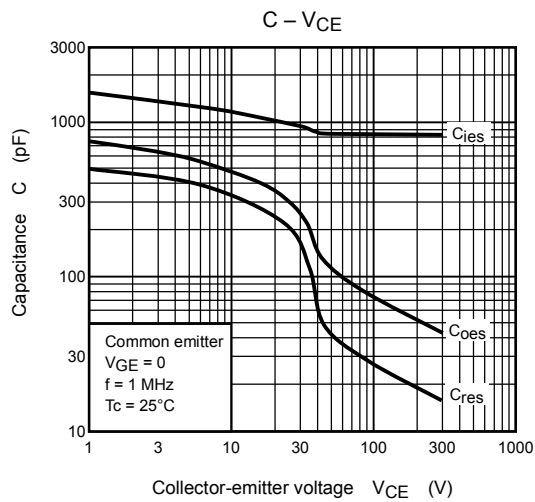
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GES}	$V_{GE} = \pm 20 \text{ V}, V_{CE} = 0$	—	—	± 500	nA
Collector cut-off current		I_{CES}	$V_{CE} = 1200 \text{ V}, V_{GE} = 0$	—	—	1.0	mA
Gate-emitter cut-off voltage		$V_{GE}(\text{OFF})$	$I_C = 1.5 \text{ mA}, V_{CE} = 5 \text{ V}$	4.0	—	7.0	V
Collector-emitter saturation voltage		$V_{CE}(\text{sat})$	$I_C = 15 \text{ A}, V_{GE} = 15 \text{ V}$	—	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	$^{\circ}\text{C}/\text{W}$
Thermal resistance (diode)		$R_{th(j-c)}$	—	—	—	1.60	$^{\circ}\text{C}/\text{W}$

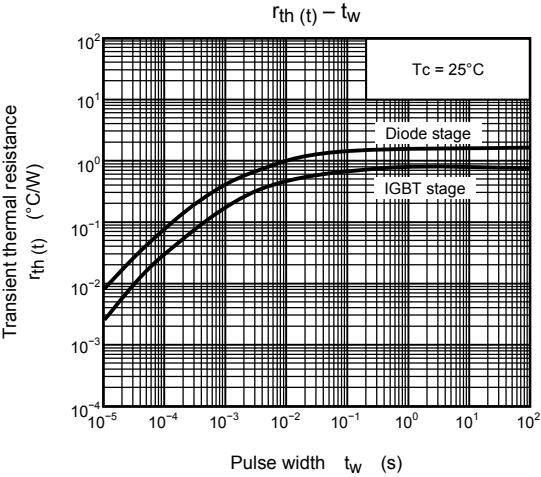
Note: Switching time measurement circuit and input/output waveforms











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