TOSHIBA Insulated Gate Bipolar Transistor Silicon N Channel IGBT

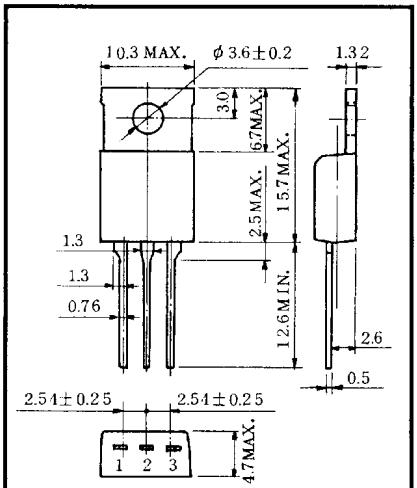
G T 4 0 G 1 2 1

The 4th Generation

Current Resonance Inverter Switching Applications

- Enhancement-mode
- High speed: t_f = 0.30 μs (Typ.) (I_C = 60 A)
- Low saturation voltage: $V_{CE\ (sat)}$ = 1.8 V (Typ.) (I_C = 60 A)

Unit: mm



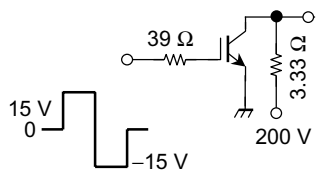
1. GATE
2. COLLECTOR (HEAT SINK)
3. EMITTER

JEDEC	TO-220AB
EIAJ	—
TOSHIBA	2-10P1C

Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Collector-emitter voltage		V_{CES}	400	V
Gate-emitter voltage		V_{GES}	±25	V
Collector current	DC	I_C	40	A
	1 ms	I_{CP}	100	
Collector power dissipation (Tc = 25°C)		P_C	100	W
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55~150	°C

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GES}	V_{GE} = ±25 V, V_{CE} = 0	—	—	±500	nA
Collector cut-off current		I_{CES}	V_{CE} = 400 V, V_{GE} = 0	—	—	1.0	mA
Gate-emitter cut-off voltage		$V_{GE\ (OFF)}$	I_C = 60 mA, V_{CE} = 5 V	3.0	—	6.0	V
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	I_C = 60 A, V_{GE} = 15 V	—	1.8	2.5	V
Input capacitance		C_{ies}	V_{CE} = 10 V, V_{GE} = 0, f = 1 MHz	—	3900	—	pF
Switching time	Rise time	t_r		—	0.33	—	μs
	Turn-on time	t_{on}		—	0.43	—	
	Fall time	t_f		—	0.30	0.40	
	Turn-off time	t_{off}		—	0.54	—	
Thermal resistance		$R_{th(j-c)}$	—	—	—	1.25	°C/W

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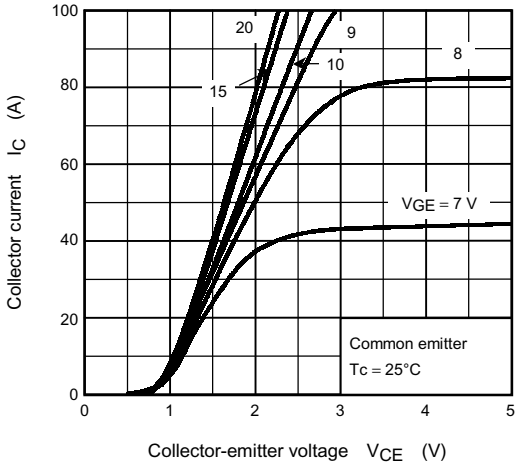
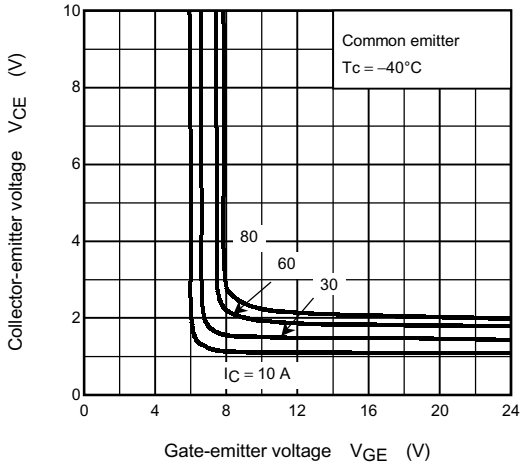
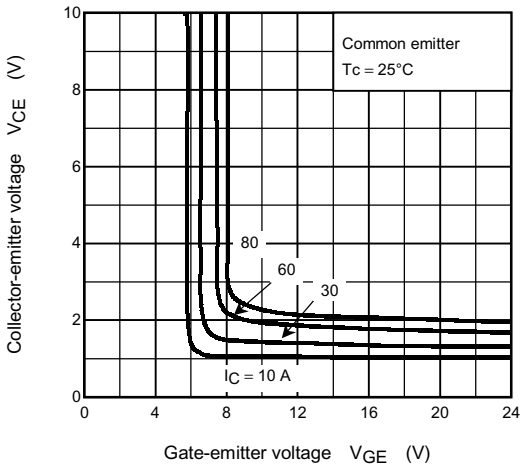
$I_C - V_{CE}$



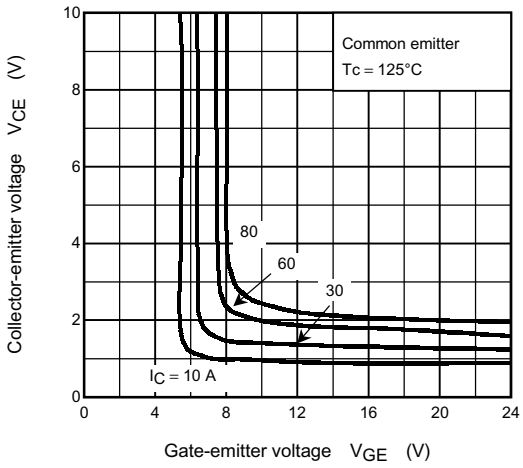
$V_{CE} - V_{GE}$



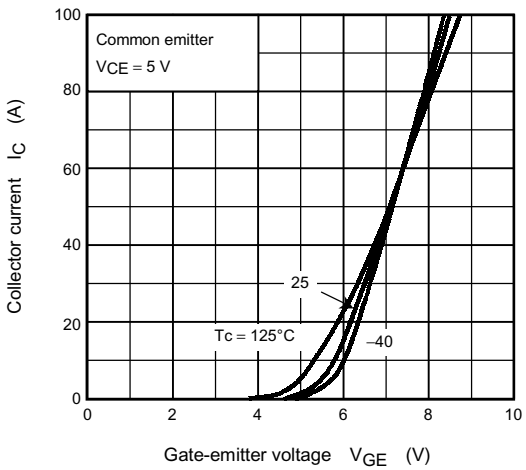
$V_{CE} - V_{GE}$



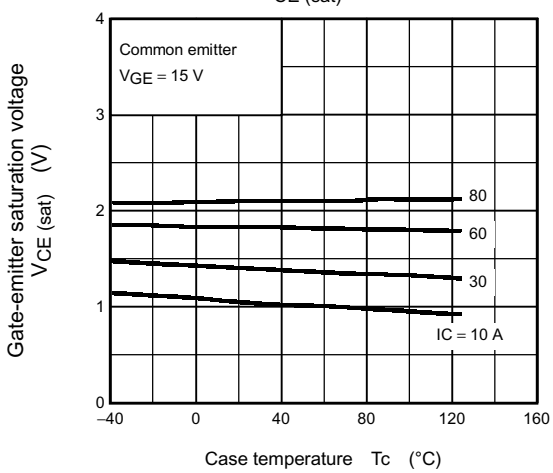
$V_{CE} - V_{GE}$



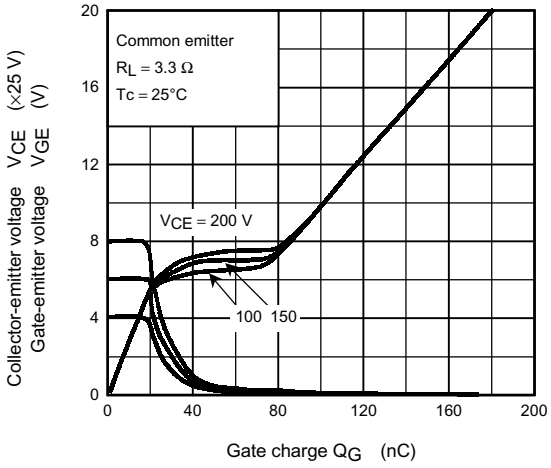
$I_C - V_{GE}$



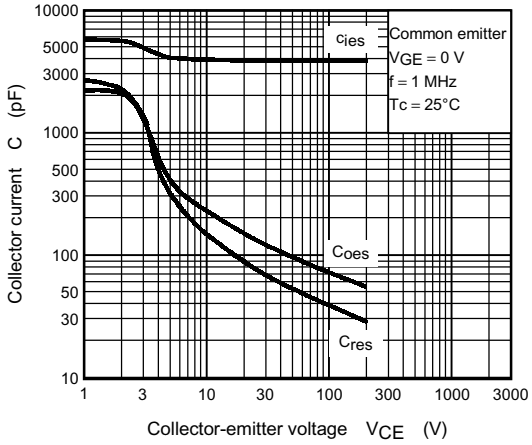
$V_{CE\ (sat)} - Tc$



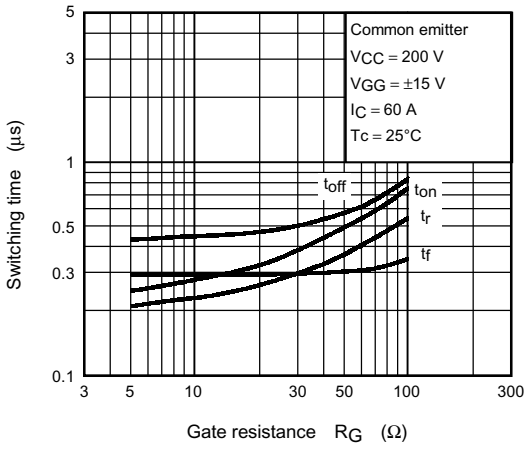
V_{CE}, V_{GE} – Q_G



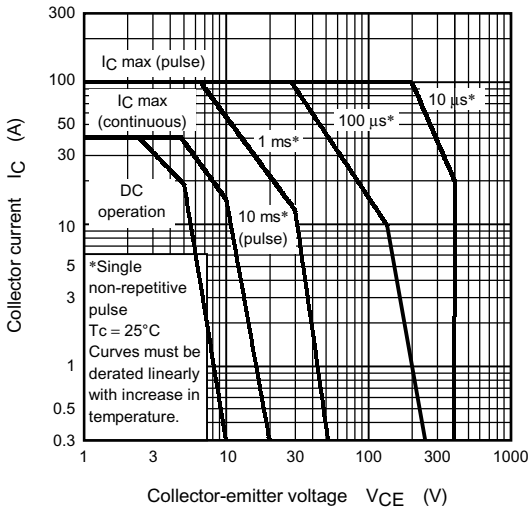
C – V_{CE}



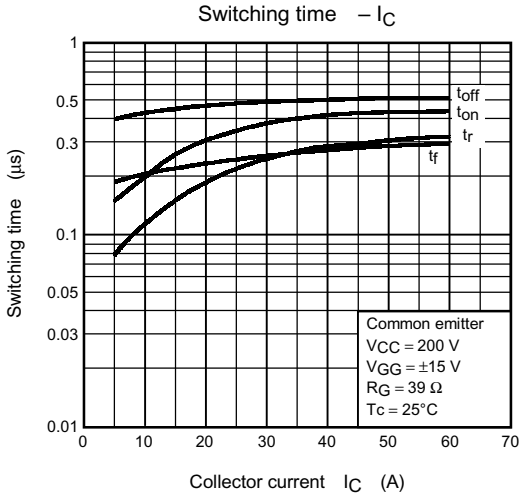
Switching time – R_G



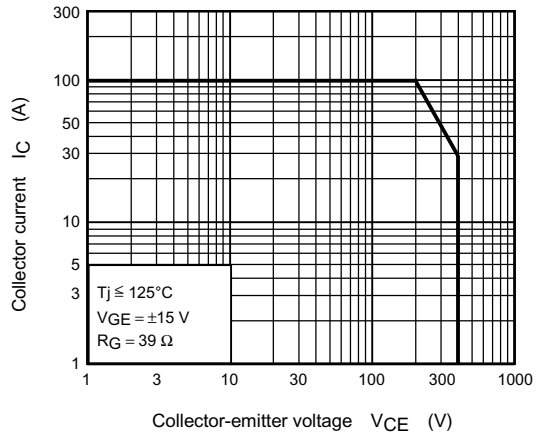
Safe operating area



Switching time – I_C



Reverse bias safe operating area



$r_{th\ (t)}$ – tw