TOSHIBA Insulated Gate Bipolar Transistor Silicon N Channel IGBT

GT40Q323

Voltage Resonance Inverter Switching Application

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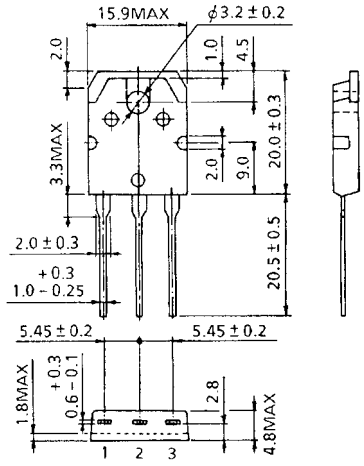
- Enhancement-mode
- High speed: t_f = 0.14 μs (typ.) (I_C = 40A)
- FRD included between emitter and collector
- 4th generation
- TO-3P (N) (Toshiba package name)

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	2-16C1C

Weight: 4.6 g (typ.)

Absolute Maximum Ratings (Ta = 25°C)

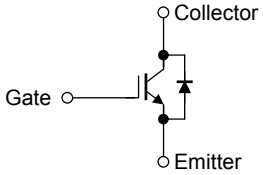
Characteristics		Symbol	Rating	Unit
Collector-emitter voltage		V_{CES}	1200	V
Gate-emitter voltage		V_{GES}	±25	V
Continuous collector current	@ Tc = 100°C	I_C	20	A
	@ Tc = 25°C		39	
Pulsed collector current		I_{CP}	80	A
Diode forward current	DC	I_F	10	A
	Pulsed	I_{FP}	80	
Collector power dissipation	@ Tc = 100°C	P_C	80	W
	@ Tc = 25°C		200	
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

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).

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance (IGBT)	$R_{th\ (j\text{-}c)}$	0.625	°C/W
Thermal resistance (diode)	$R_{th\ (j\text{-}c)}$	1.79	°C/W

Equivalent Circuit



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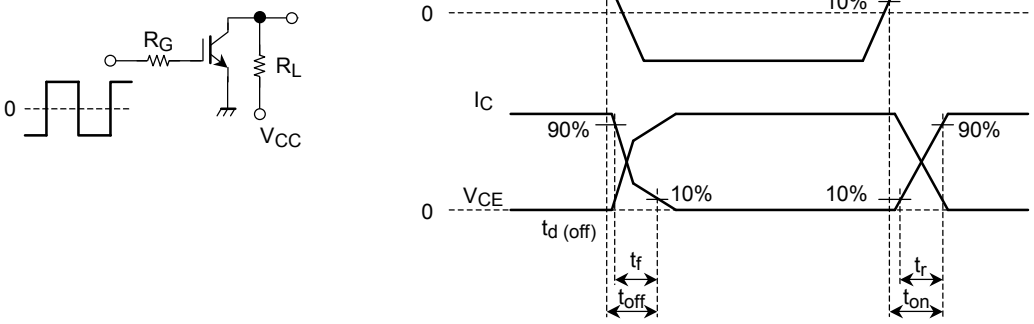
Electrical Characteristics (Ta = 25°C)

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} = 1200 V, V_{GE} = 0	—	—	5.0	mA
Gate-emitter cut-off voltage		$V_{GE\ (OFF)}$	I_C = 40 mA, V_{CE} = 5 V	4.0	—	7.0	V
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	I_C = 40 A, V_{GE} = 15 V	—	3.0	3.7	V
Input capacitance		C_{ies}	V_{CE} = 10 V, V_{GE} = 0, f = 1 MHz	—	5550	—	pF
Switching time	Rise time	t_r	Resistive Load	—	0.18	—	μs
	Turn-on time	t_{on}	V_{CC} = 600 V, I_C = 40 A	—	0.26	—	
	Fall time	t_f	V_{GG} = ±15 V, R_G = 39 Ω	—	0.14	0.21	
	Turn-off time	t_{off}	(Note 1)	—	0.43	—	
Diode forward voltage		V_F	I_F = 10 A, V_{GE} = 0	—	—	2.1	V
Reverse recovery time		t_{rr}	I_F = 10 A, di/dt = −20 A/μs	—	0.4	—	μs

Note 1: Switching time measurement circuit and input/output waveforms



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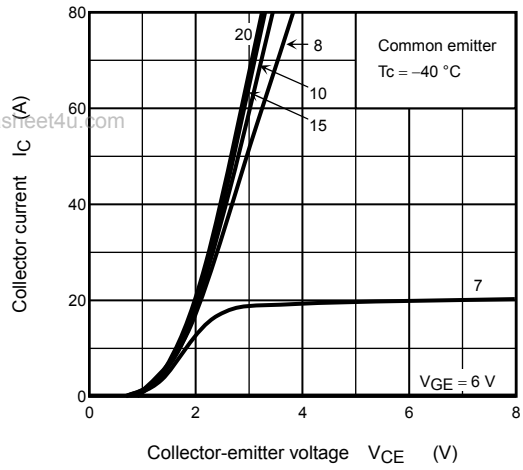
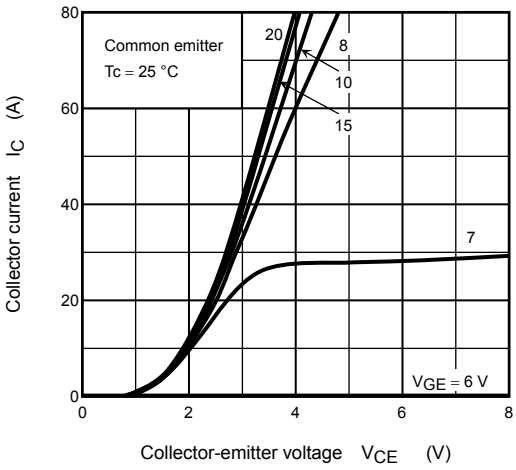
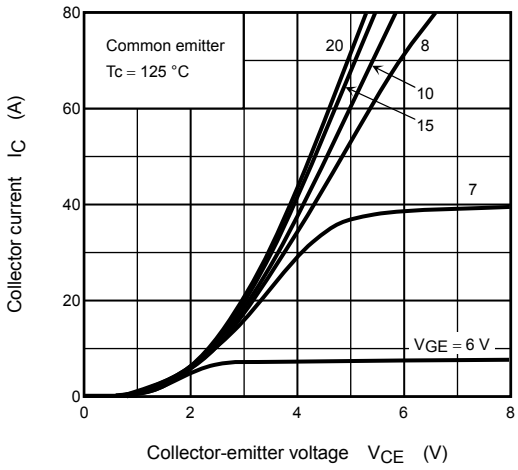
$I_C - V_{CE}$



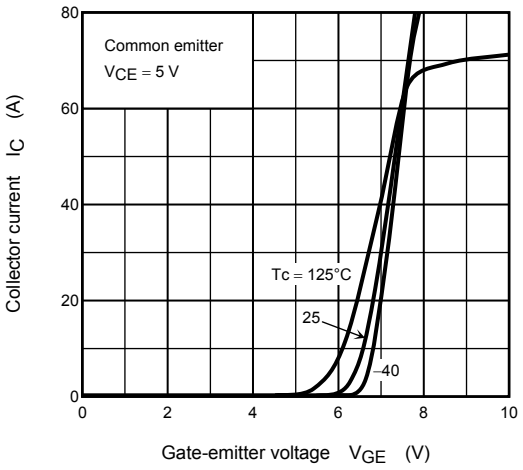
$I_C - V_{CE}$



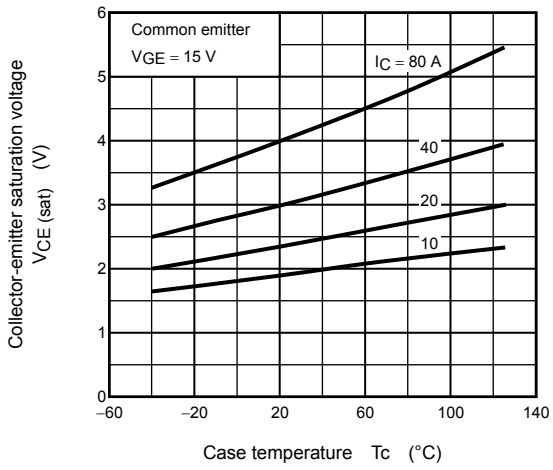
$I_C - V_{CE}$



$I_C - V_{GE}$



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



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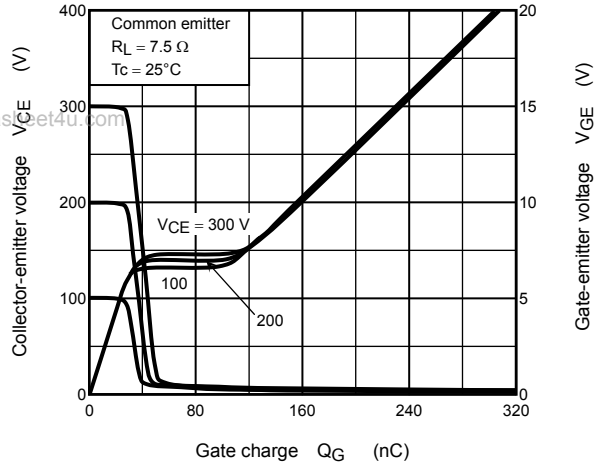
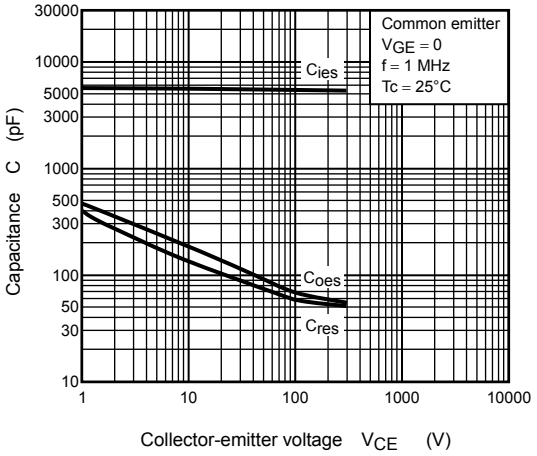
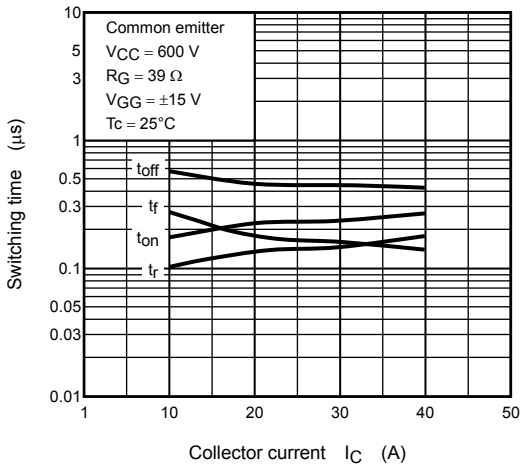
V_{CE}, V_{GE} – Q_G



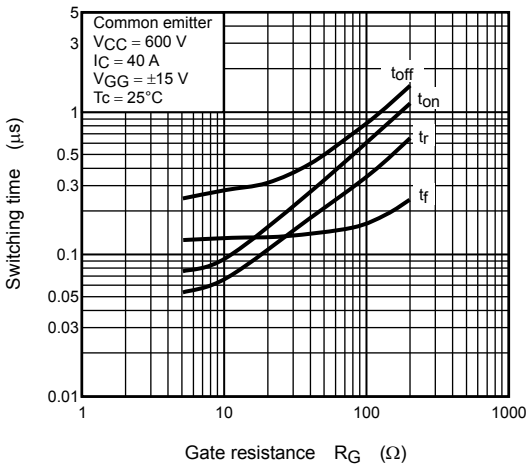
C – V_{CE}



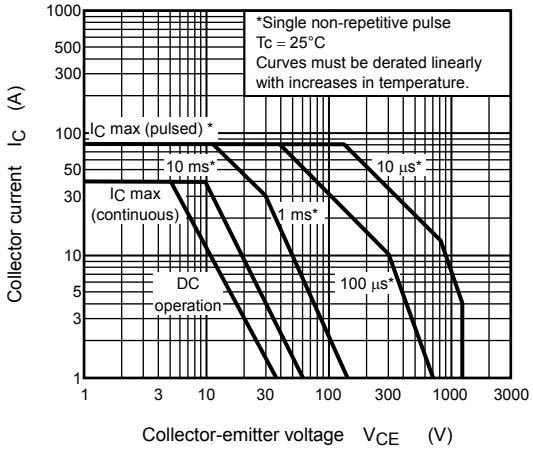
Switching time – I_C



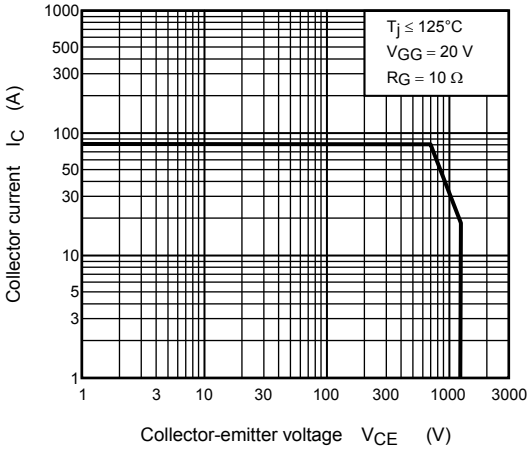
Switching time – R_G



Safe operating area



Reverse bias SOA



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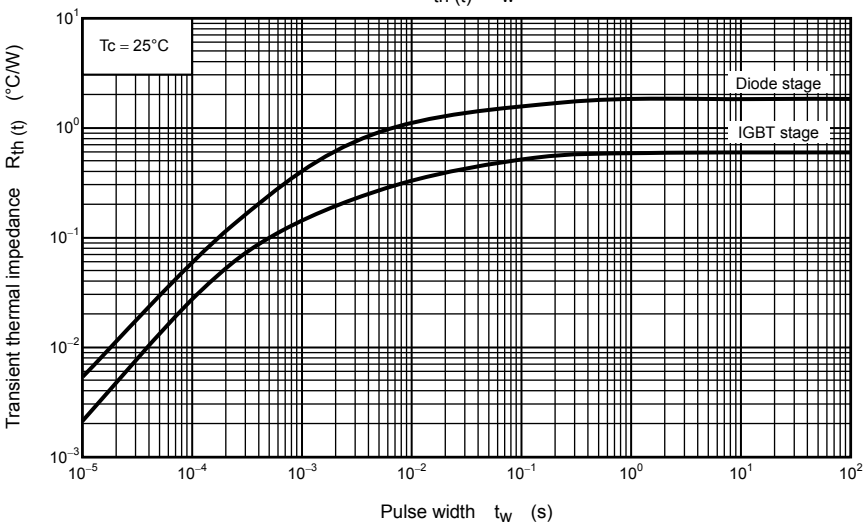
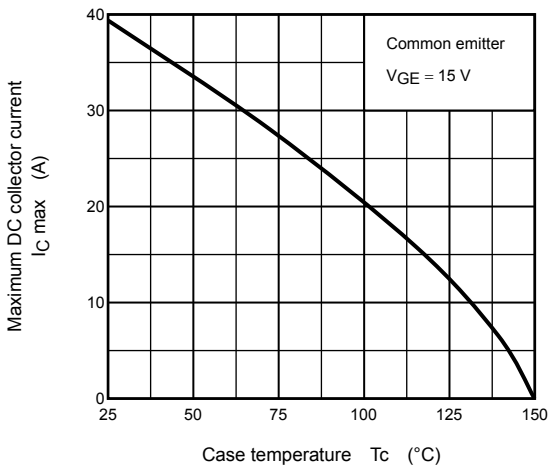
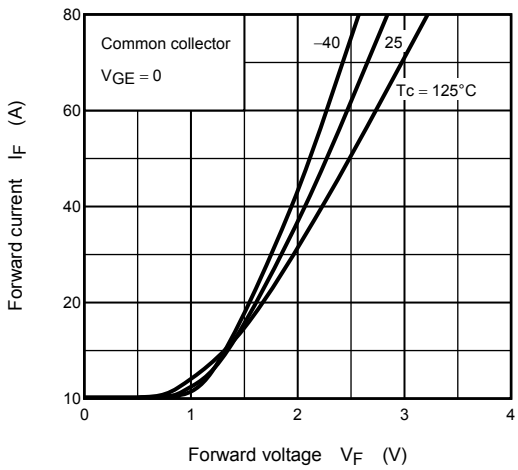
$R_{th\ (t)} - t_w$



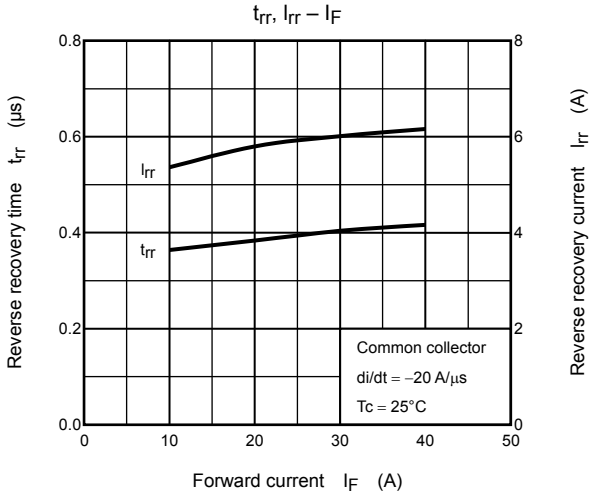
I_C max – Tc



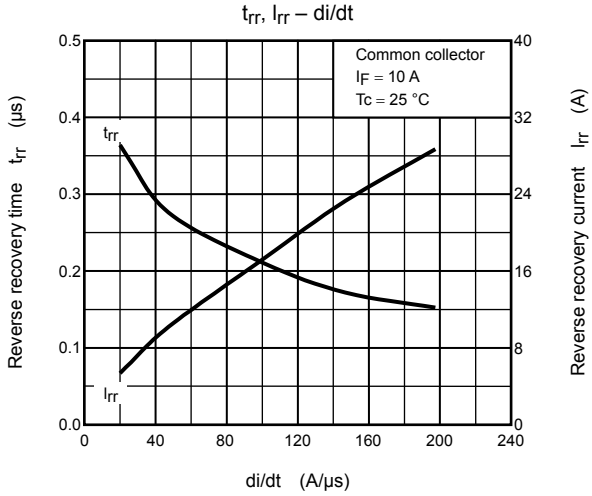
$I_F - V_F$



t_{rr}, I_{rr} – I_F



t_{rr}, I_{rr} – di/dt



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