

TOSHIBA Insulated Gate Bipolar Transistor Silicon N Channel IGBT

GT40Q323

Voltage Resonance Inverter Switching Application

Unit: mm

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

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

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

1. GATE	
2. COLLECTOR (HEAT SINK)	
3. EMITTER	
JEDEC	—
JEITA	—
TOSHIBA	2-16C1C

Weight: 4.6 g (typ.)

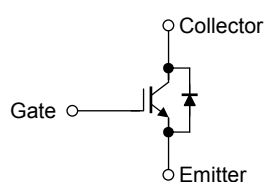
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

Thermal Characteristics

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

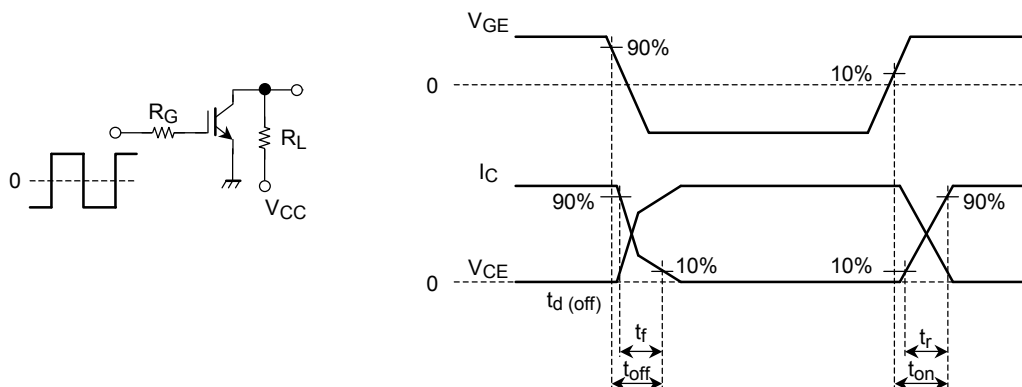
Equivalent Circuit

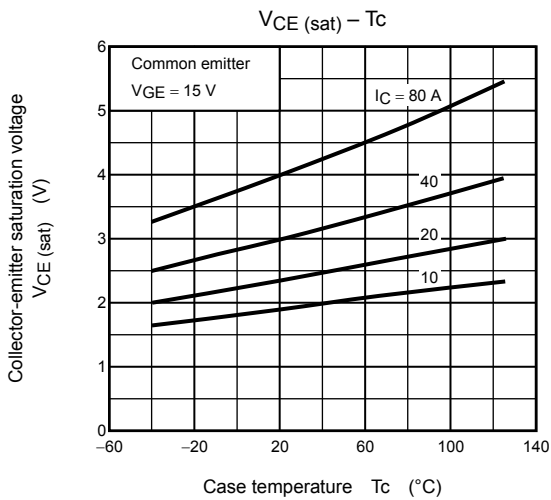
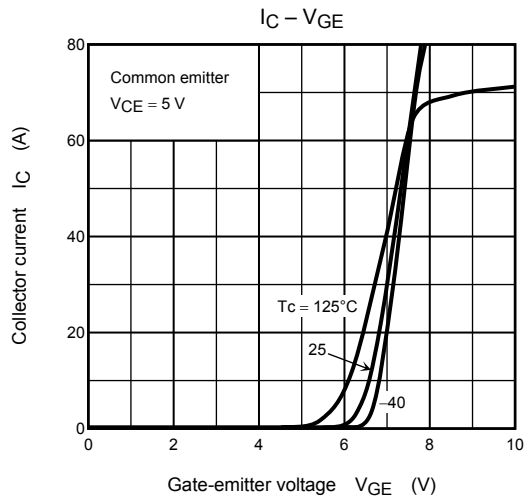
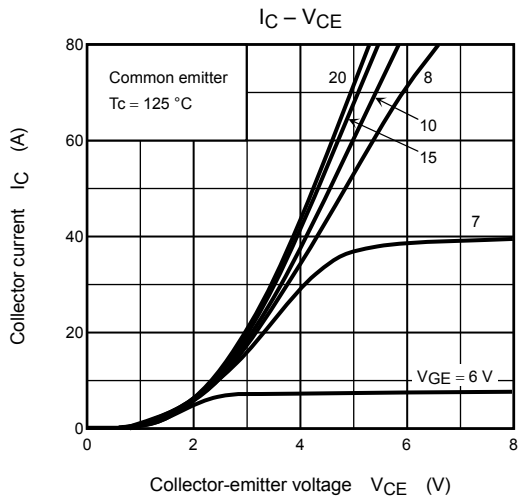
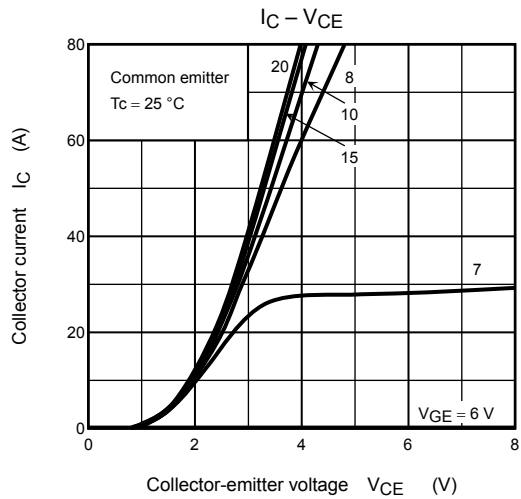
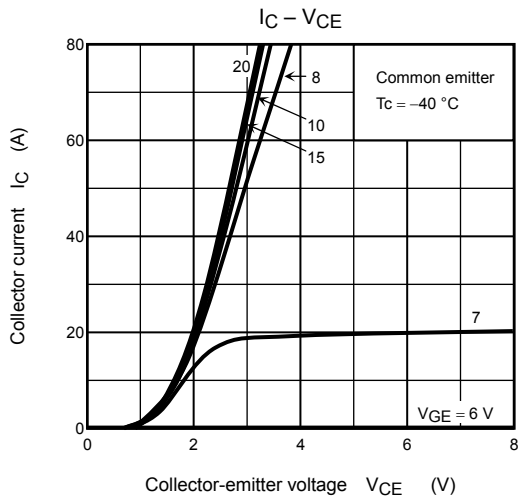


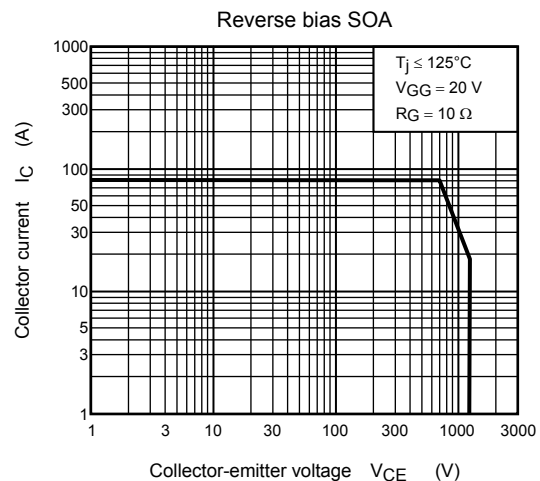
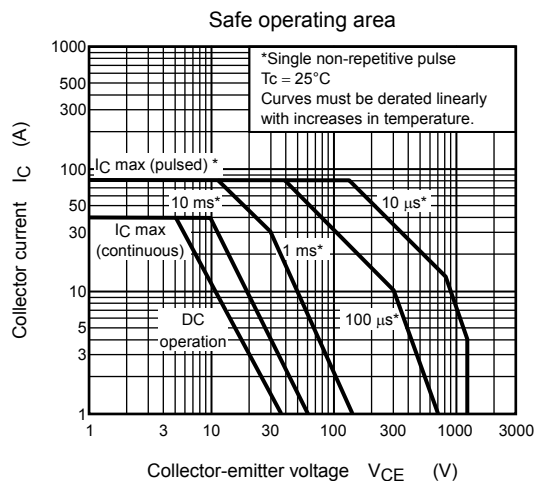
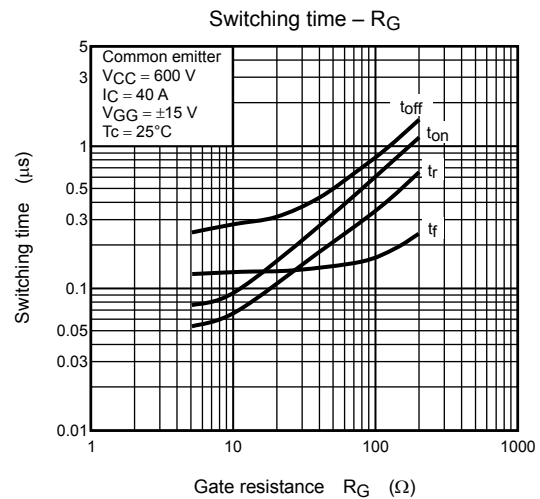
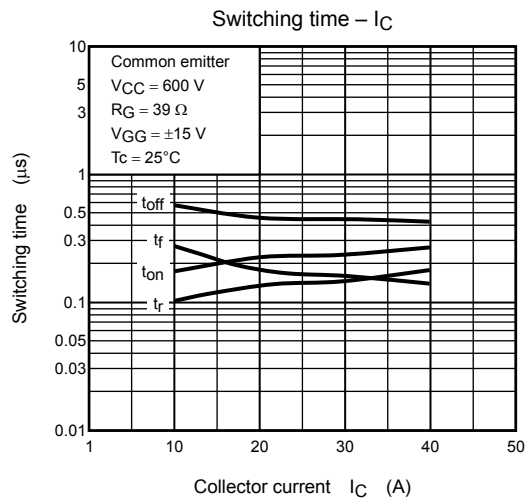
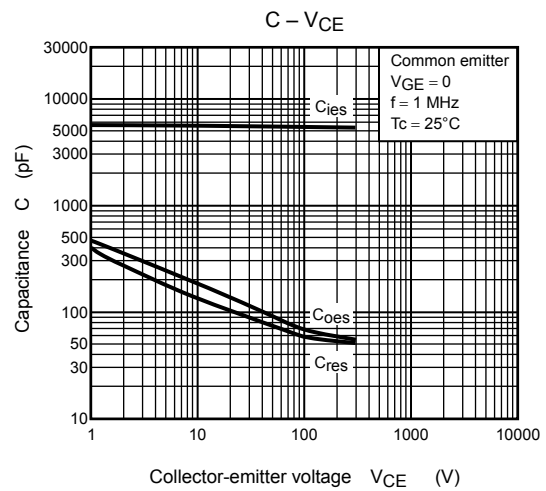
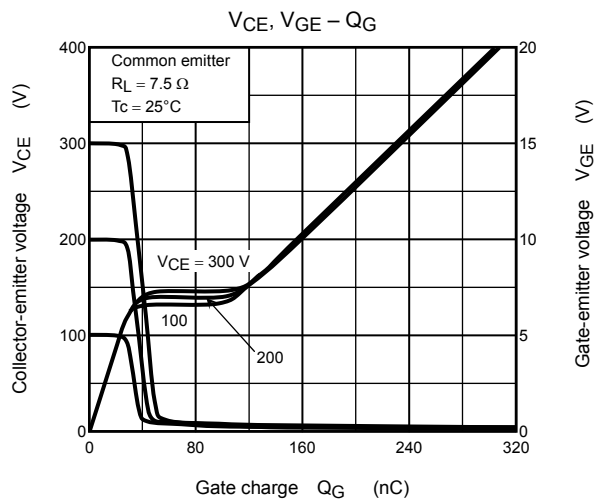
Electrical Characteristics (Ta = 25°C)

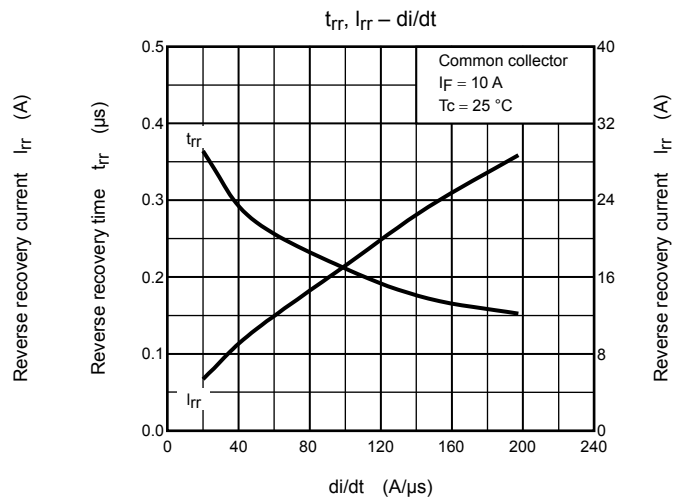
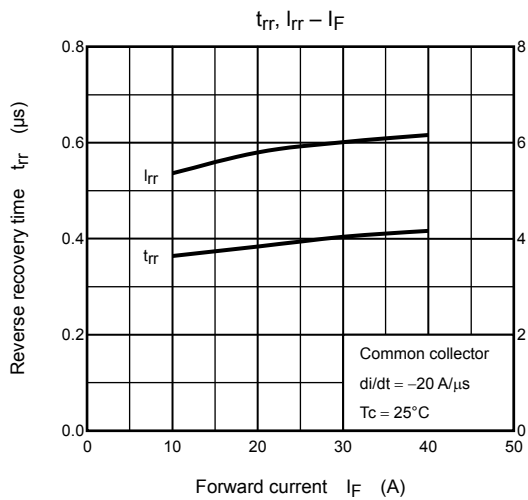
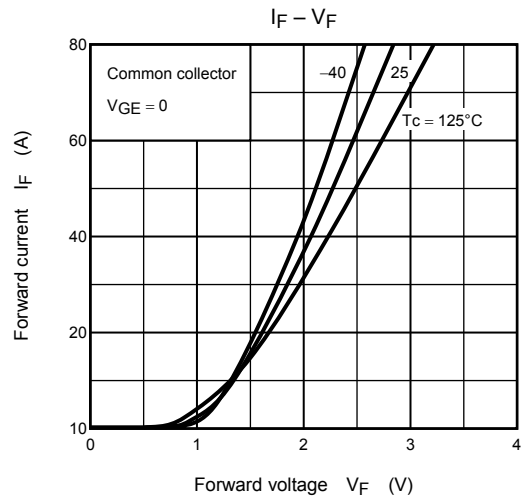
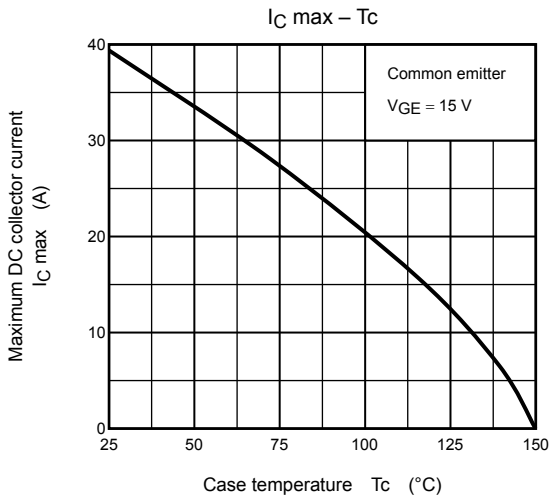
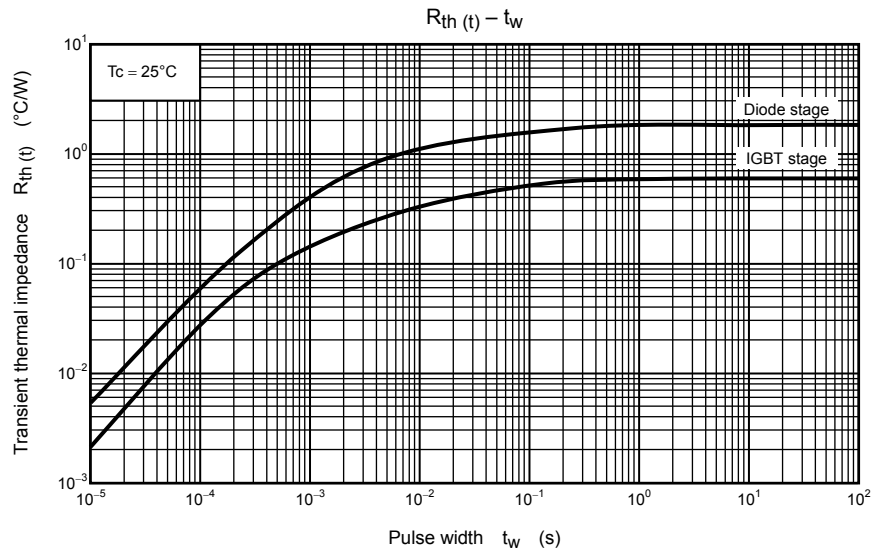
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GES}	$V_{GE} = \pm 25 \text{ V}, V_{CE} = 0$	—	—	± 500	nA
Collector cut-off current		I_{CES}	$V_{CE} = 1200 \text{ V}, V_{GE} = 0$	—	—	5.0	mA
Gate-emitter cut-off voltage		$V_{GE}(\text{OFF})$	$I_C = 40 \text{ mA}, V_{CE} = 5 \text{ V}$	4.0	—	7.0	V
Collector-emitter saturation voltage		$V_{CE}(\text{sat})$	$I_C = 40 \text{ A}, V_{GE} = 15 \text{ V}$	—	3.0	3.7	V
Input capacitance		C_{ies}	$V_{CE} = 10 \text{ V}, V_{GE} = 0, f = 1 \text{ MHz}$	—	5550	—	pF
Switching time	Rise time	t_r	Resistive Load $V_{CC} = 600 \text{ V}, I_C = 40 \text{ A}$ $V_{GG} = \pm 15 \text{ V}, R_G = 39 \Omega$ (Note 1)	—	0.18	—	μs
	Turn-on time	t_{on}		—	0.26	—	
	Fall time	t_f		—	0.14	0.21	
	Turn-off time	t_{off}		—	0.43	—	
Diode forward voltage		V_F	$I_F = 10 \text{ A}, V_{GE} = 0$	—	—	2.1	V
Reverse recovery time		t_{rr}	$I_F = 10 \text{ A}, di/dt = -20 \text{ A}/\mu\text{s}$	—	0.4	—	μs

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









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