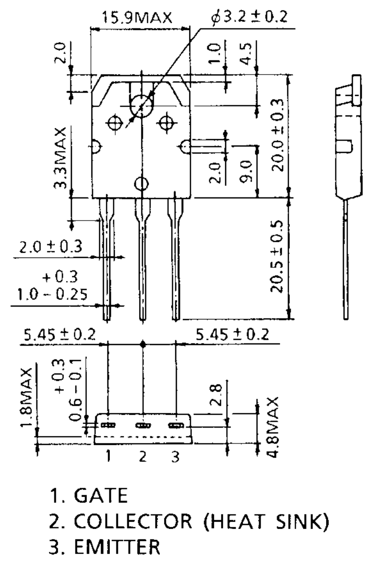
TOSHIBA Injection Enhanced Gate Transistor Silicon N Channel IEGT

GT40Q321

Voltage Resonance Inverter Switching Application

- The 5th generation
- Enhancement-mode
- High speed : t_f = 0.41 μs (typ.) (I_C = 40A)
- Low saturation voltage: $V_{CE\ (sat)}$ = 2.8 V (typ.) (I_C = 40A)
- FRD included between emitter and collector

Unit: mm



JEDEC	―
JEITA	―
TOSHIBA	2-16C1C

Weight: 4.6 g (typ.)

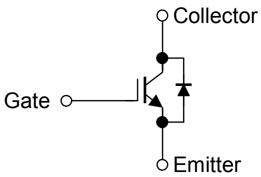
Maximum Ratings (Ta = 25°C)

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	23	A
	@ Tc = 25°C		42	
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	68	W
	@ Tc = 25°C		170	W
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance (IGBT)	$R_{th\ (j-c)}$	0.74	°C/W
Thermal resistance (diode)	$R_{th\ (j-c)}$	1.79	°C/W

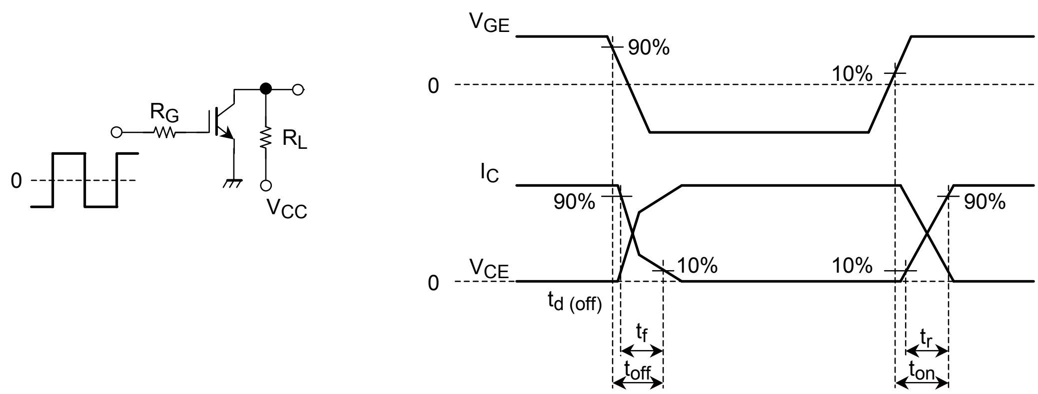
Equivalent Circuit



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	—	2.8	3.6	V
Input capacitance		C_{ies}	V_{CE} = 10 V, V_{GE} = 0, f = 1 MHz	—	3200	—	pF
Switching time	Rise time	t_r	Resistive Load	—	0.19	—	μs
	Turn-on time	t_{on}	V_{CC} = 600 V, I_C = 40 A	—	0.25	—	
	Fall time	t_f	V_{GG} = ±15 V, R_G = 39 Ω	—	0.41	0.72	
	Turn-off time	t_{off}	(Note 1)	—	0.57	—	
Diode forward voltage		V_F	I_F = 10 A, V_{GE} = 0	—	—	2.0	V
Reverse recovery time		t_{rr}	I_F = 10 A, di/dt = −20 A/μs	—	0.6	—	μs

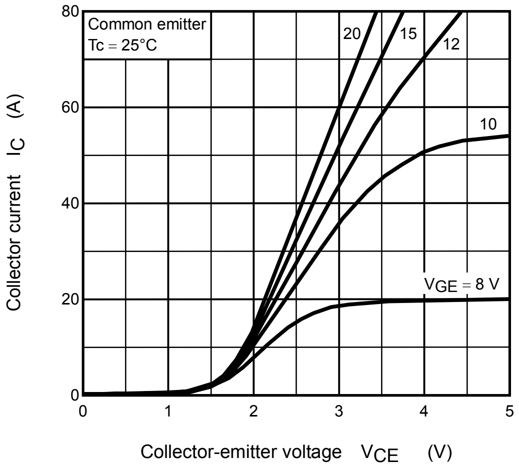
Note 1: Switching time measurement circuit and input/output waveforms



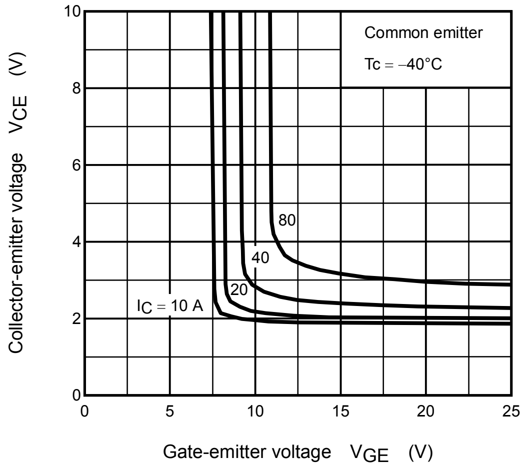
General Safety Precautions and Usage Considerations

- The GT40Q321 is only intended for single-transistor voltage resonant circuits in induction heating (IH) equipment. For other applications, please contact your nearest Toshiba sales office.
- Do not use devices under conditions in which their maximum ratings will be exceeded. A device may break down or its performance may be degraded, causing it to catch fire or explode resulting in injury to the user. It is therefore necessary to incorporate device derating into circuit design.
- In all IGBT devices, maximum collector-emitter voltage (V_{CES}) decreases when the junction temperature becomes low. It is therefore necessary to incorporate device derating into circuit design.
- Maximum collector current is calculated from Tj MAX.(150°C), the thermal resistance and DC forward power dissipation. However it’s limited in real application by another factors such as switching loss, limitation of the inner bonding wires and so on.

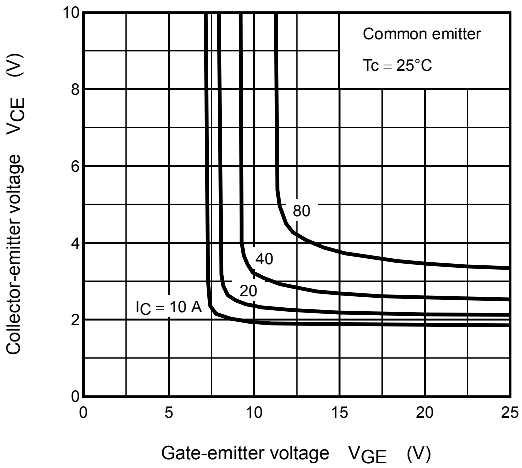
$I_C – V_{CE}$



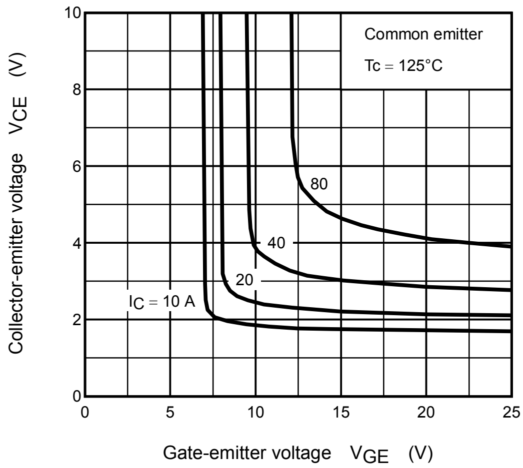
$V_{CE} – V_{GE}$



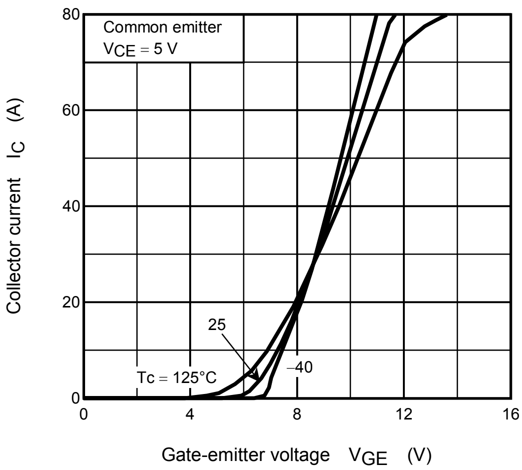
$V_{CE} – V_{GE}$



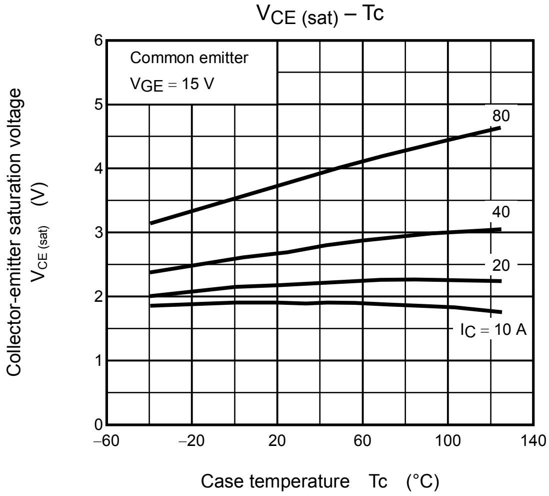
$V_{CE} – V_{GE}$



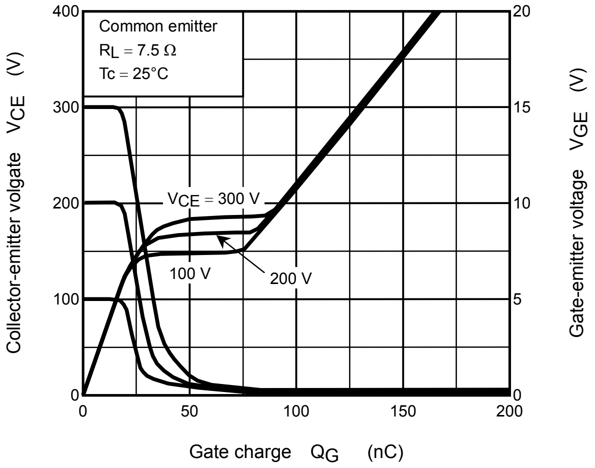
$I_C – V_{GE}$



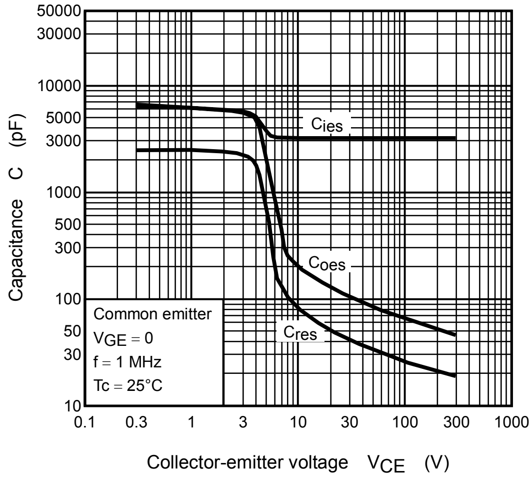
$V_{CE\ (sat)} – Tc$



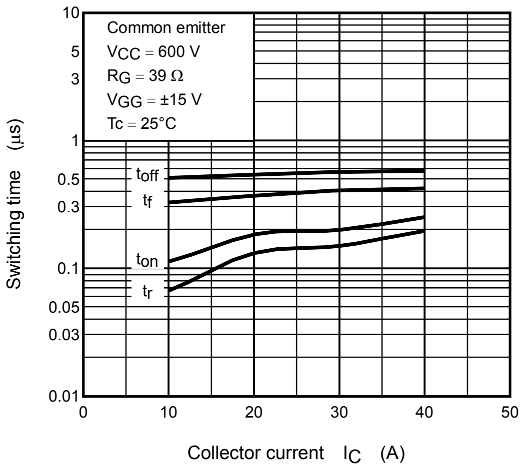
V_{CE}, V_{GE} – Q_G



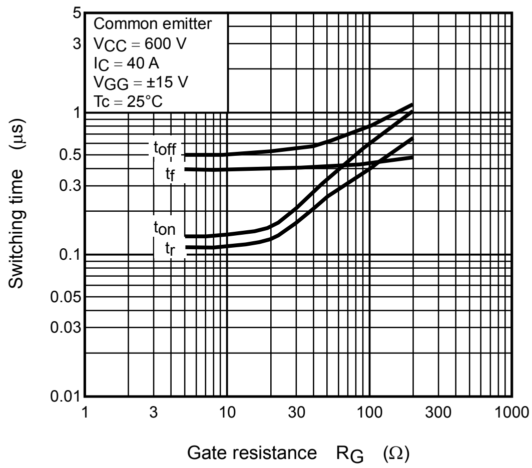
C – V_{CE}



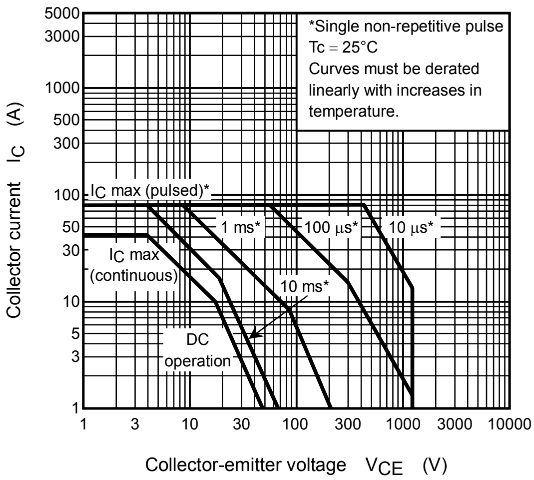
Switching time – I_C



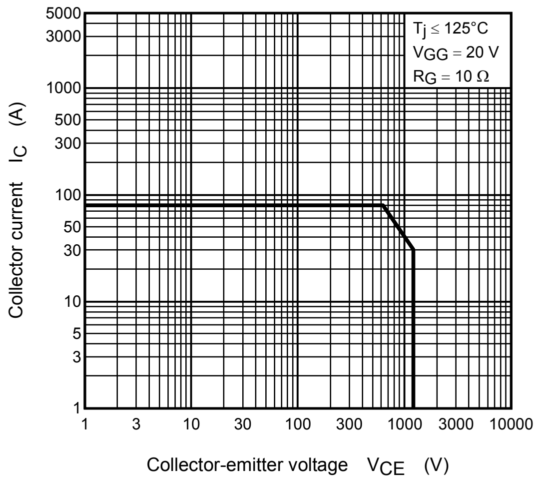
Switching time – R_G



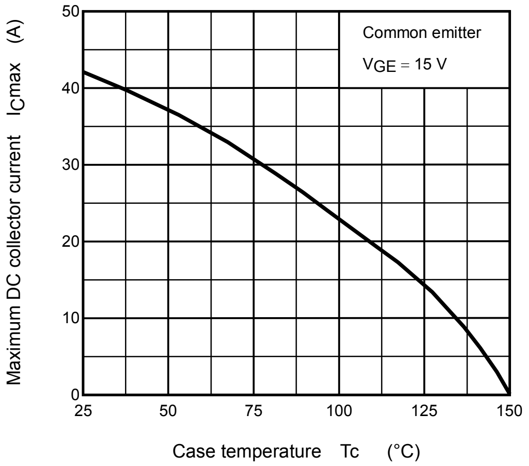
Safe operating area



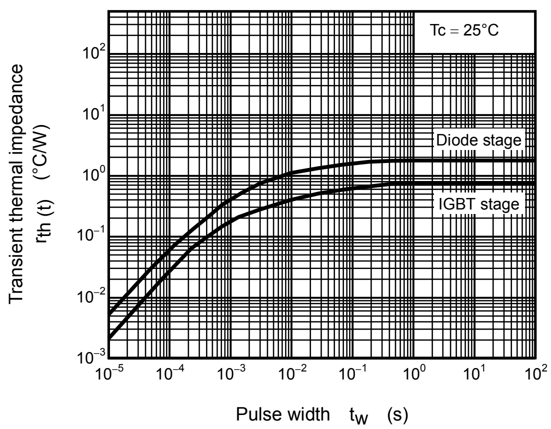
Reverse bias SOA



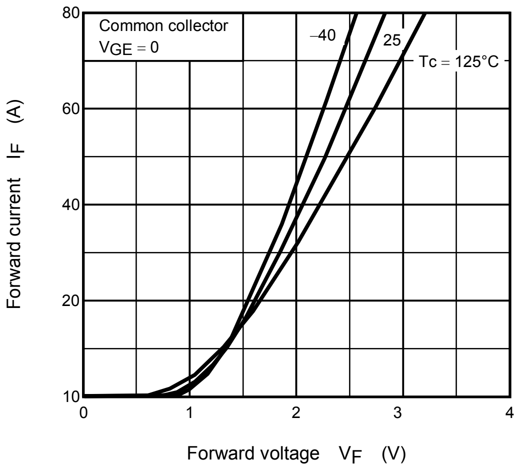
$I_C max – Tc$



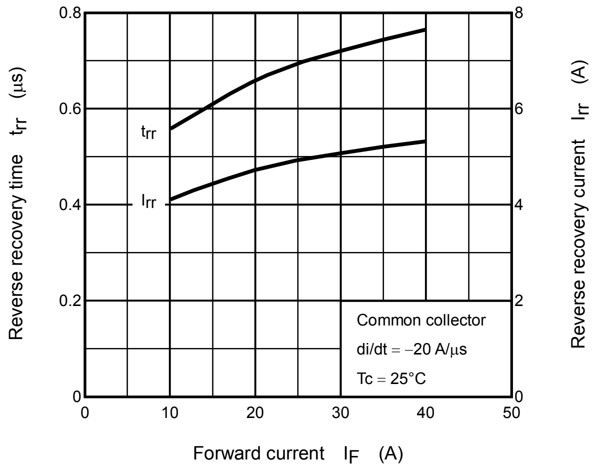
$r_{th (t)} – t_w$



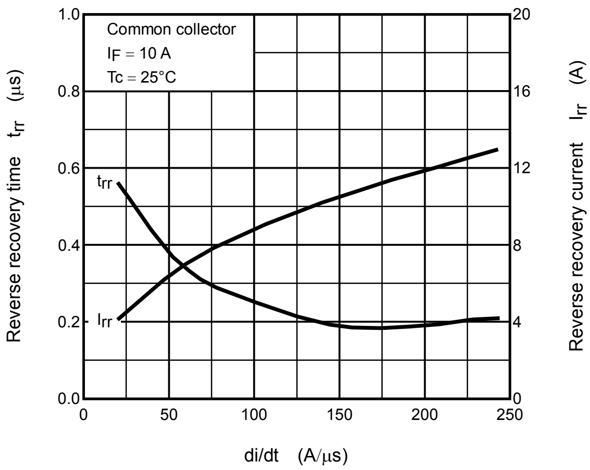
$I_F – V_F$



$t_{rr}, I_{rr} – I_F$



$t_{rr}, I_{rr} – di/dt$



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