

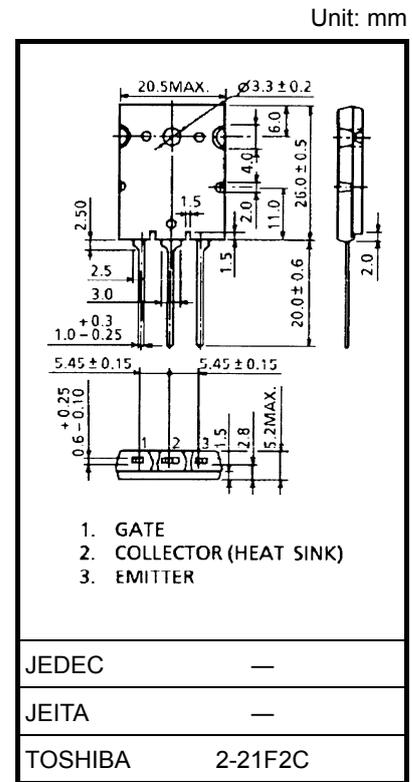
# GT60N321

High-Power Switching Applications  
Fourth Generation IGBT

- FRD included between emitter and collector
- Enhancement mode type
- High speed IGBT :  $t_f = 0.25 \mu s$  (typ.) ( $I_C = 60 A$ )  
FRD :  $t_{rr} = 0.8 \mu s$  (typ.) ( $di/dt = -20 A/\mu s$ )
- Low saturation voltage:  $V_{CE(sat)} = 2.3 V$  (typ.) ( $I_C = 60 A$ )

## Absolute Maximum Ratings (Ta = 25°C)

Characteristics	symbol	Rating	Unit
Collector-Emitter Voltage	$V_{CES}$	1000	V
Gate-Emitter Voltage	$V_{GES}$	$\pm 25$	V
Collector Current	DC	$I_C$	60
	1 ms	$I_{CP}$	120
Emitter-Collector Forward Current	DC	$I_{ECF}$	15
	1 ms	$I_{ECFP}$	120
Collector Power Dissipation (Tc = 25°C)	$P_C$	170	W
Junction Temperature	$T_j$	150	°C
Storage Temperature	$T_{stg}$	-55 to 150	°C
Screw Torque	—	0.8	N·m

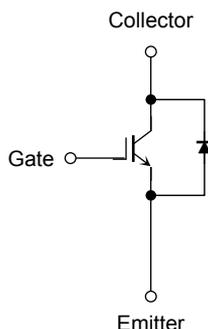


Weight: 9.75 g (typ.)

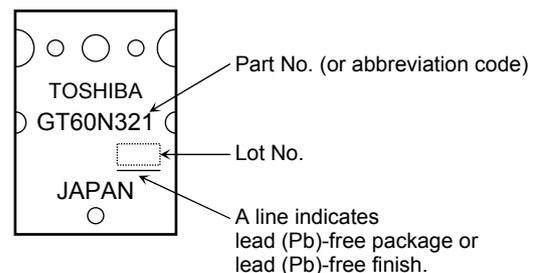
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

## Equivalent Circuit

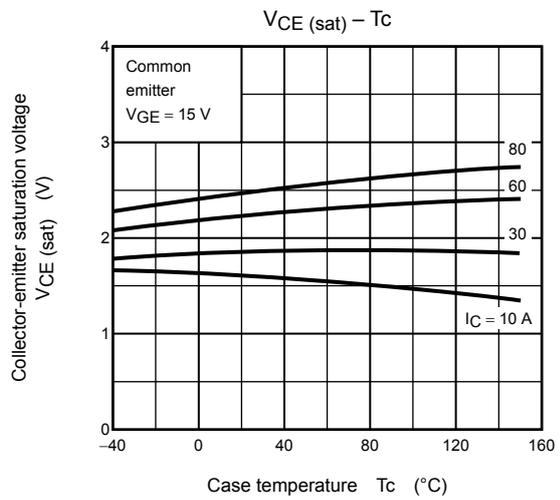
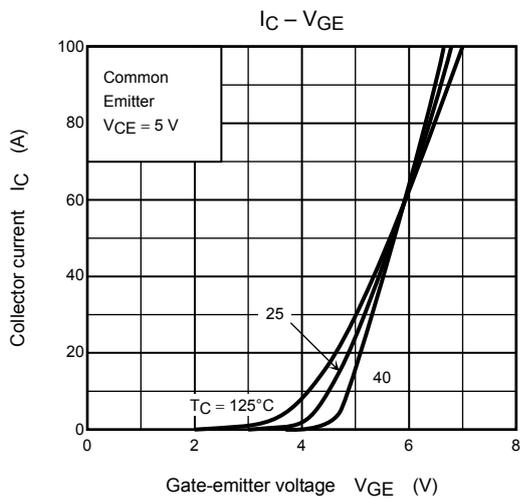
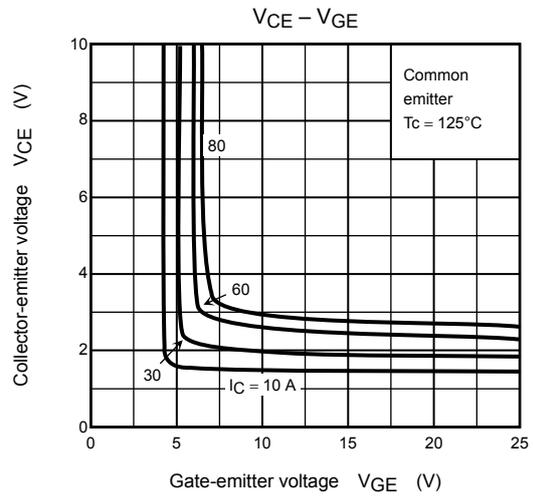
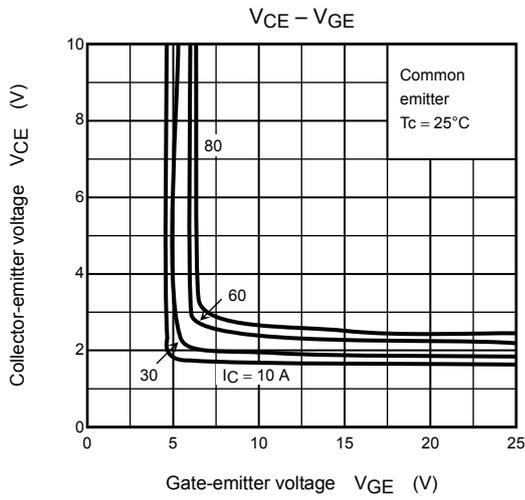
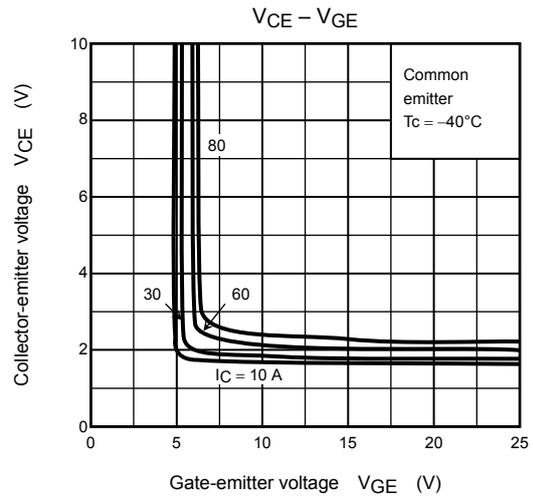
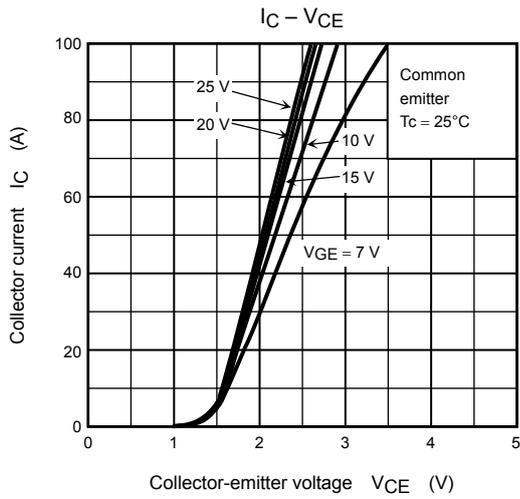


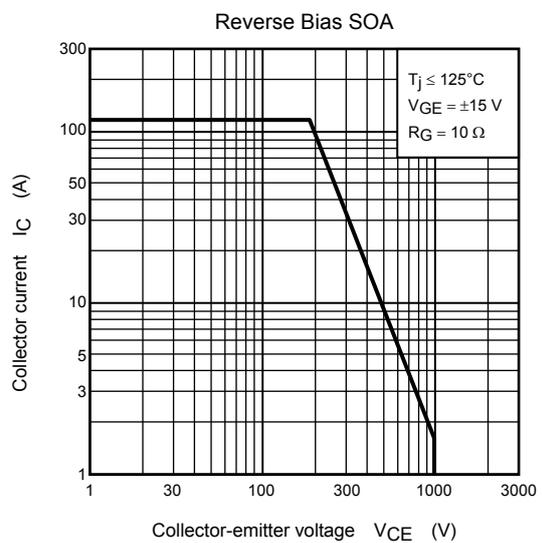
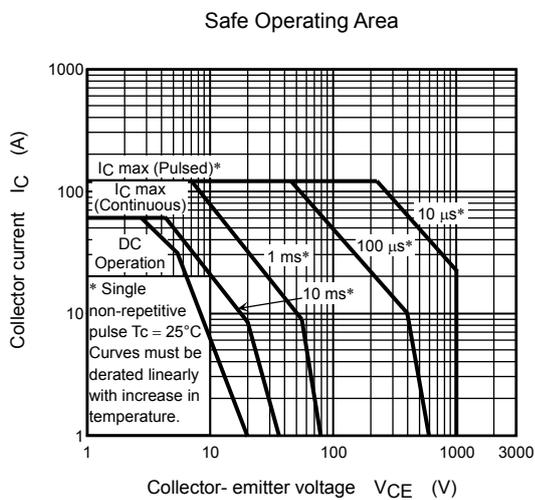
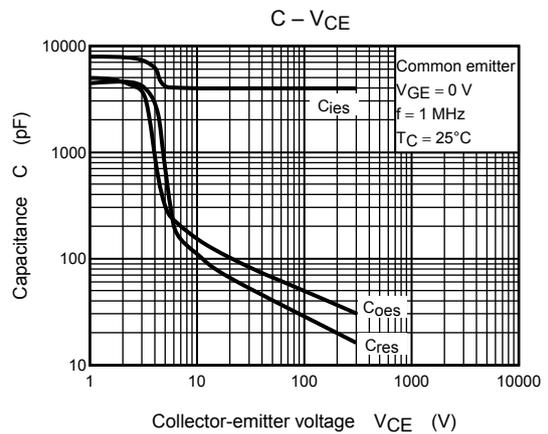
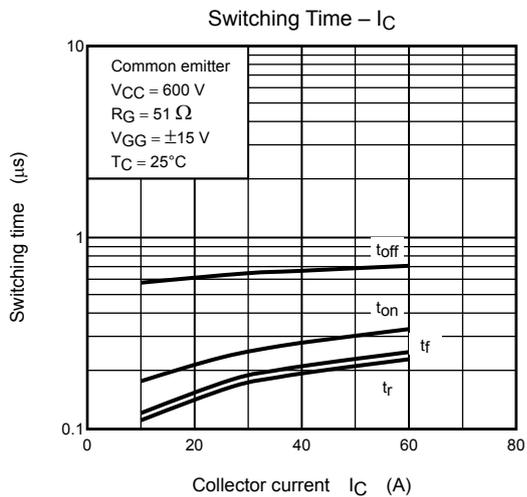
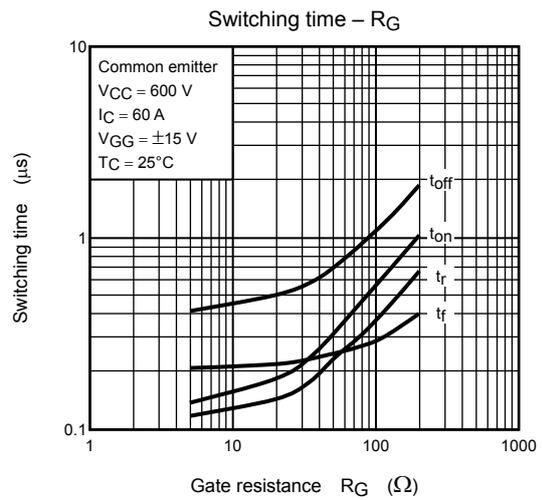
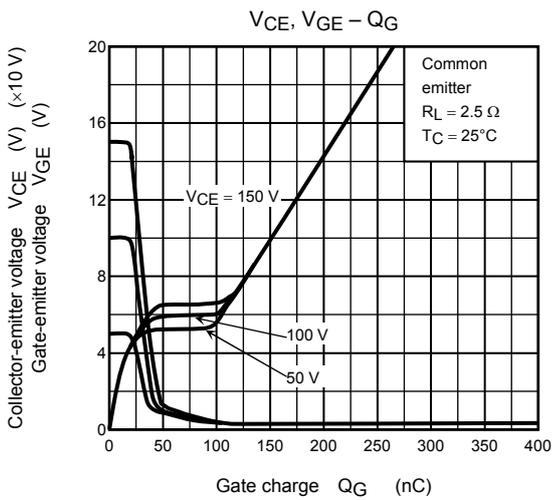
## Marking

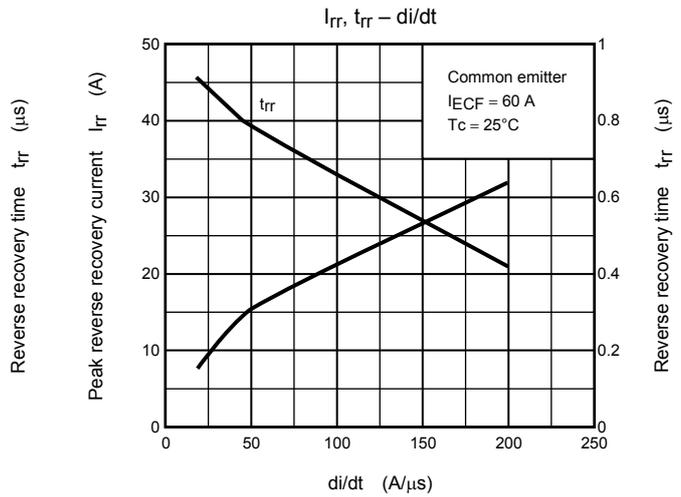
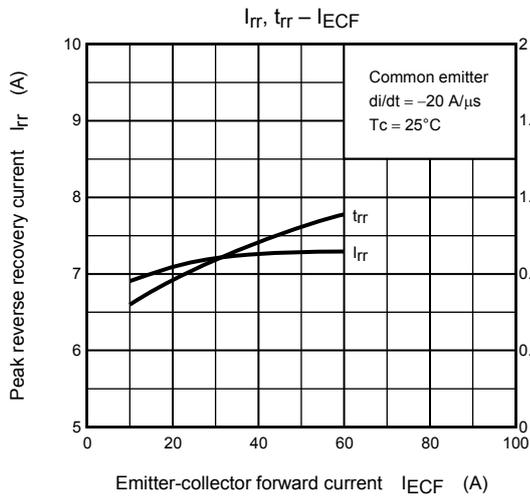
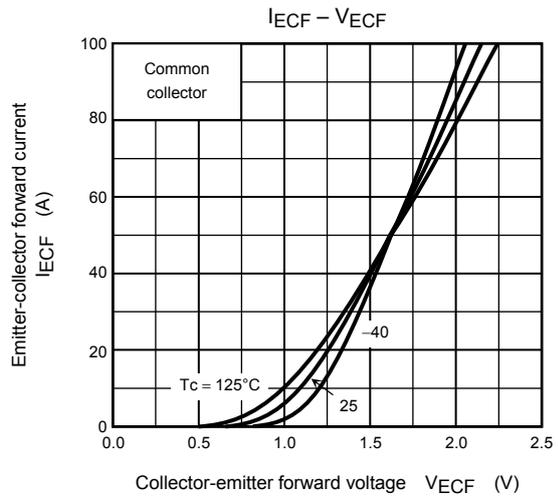
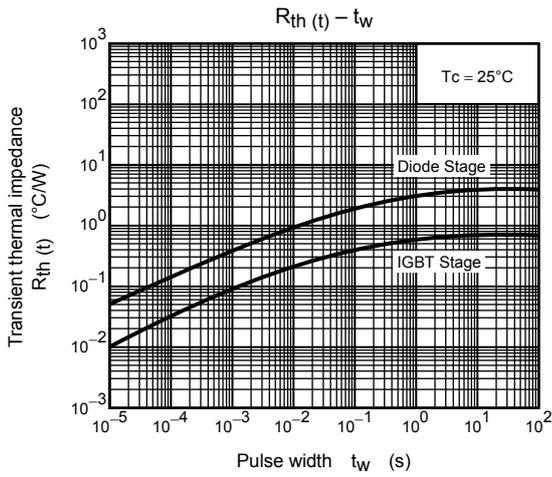


## Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate Leakage Current		$I_{GES}$	$V_{GE} = \pm 25 \text{ V}, V_{CE} = 0$	—	—	$\pm 500$	nA
Collector Cut-off Current		$I_{CES}$	$V_{CE} = 1000 \text{ V}, V_{GE} = 0$	—	—	1.0	mA
Gate-Emitter Cut-off Voltage		$V_{GE (OFF)}$	$I_C = 60 \text{ mA}, V_{CE} = 5 \text{ V}$	3.0	—	6.0	V
Collector-Emitter Saturation Voltage		$V_{CE (sat) (1)}$	$I_C = 10 \text{ A}, V_{GE} = 15 \text{ V}$	—	1.6	2.3	V
Collector-Emitter Saturation Voltage		$V_{CE (sat) (2)}$	$I_C = 60 \text{ A}, V_{GE} = 15 \text{ V}$	—	2.3	2.8	V
Input Capacitance		$C_{ies}$	$V_{CE} = 10 \text{ V}, V_{GE} = 0, f = 1 \text{ MHz}$	—	4000	—	pF
Switching Time	Rise Time	$t_r$		—	0.23	—	$\mu\text{s}$
	Turn-on Time	$t_{on}$		—	0.33	—	
	Fall Time	$t_f$		—	0.25	0.40	
	Turn-off Time	$t_{off}$		—	0.70	—	
Emitter-Collector Forward Voltage		$V_{ECF}$	$I_{EC} = 15 \text{ A}, V_{GE} = 0$	—	1.2	1.9	V
Reverse Recovery Time		$t_{rr}$	$I_F = 15 \text{ A}, V_{GE} = 0, di/dt = -20 \text{ A}/\mu\text{s}$	—	0.8	2.5	$\mu\text{s}$
Thermal Resistance (IGBT)		$R_{th(j-c)}$	—	—	—	0.74	$^{\circ}\text{C}/\text{W}$
Thermal Resistance (Diode)		$R_{th(j-c)}$	—	—	—	4.0	$^{\circ}\text{C}/\text{W}$







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