

TOSHIBA Insulated Gate Bipolar Transistor Silicon N Channel IGBT

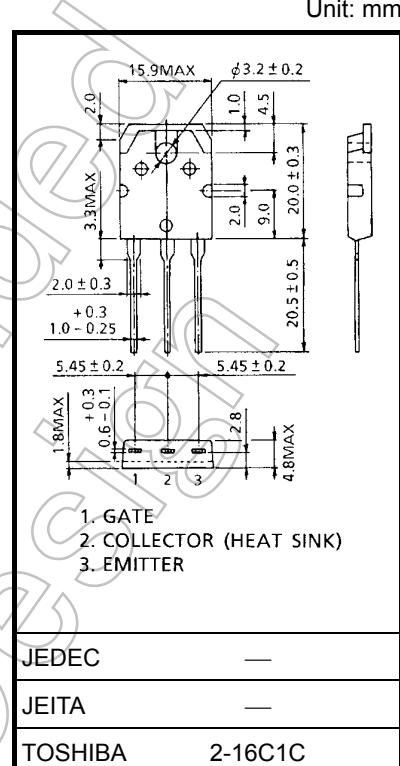
# GT40J321

## Current Resonance Inverter Switching Application

- FRD included between emitter and collector
- Enhancement mode type
- High-speed IGBT:  $t_f = 0.11 \mu\text{s}$  (typ.) ( $I_C = 40 \text{ A}$ )
- Low saturation voltage:  $V_{CE}(\text{sat}) = 2.0 \text{ V}$  (typ.) ( $I_C = 40 \text{ A}$ )

## Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

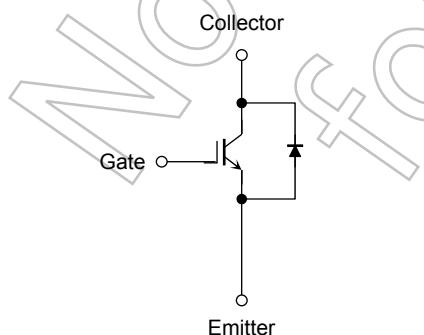
Characteristics	Symbol	Rating	Unit
Collector-emitter voltage	$V_{CES}$	600	V
Gate-emitter voltage	$V_{GES}$	$\pm 25$	V
Collector current	DC $I_C$	40	A
	1ms $I_{CP}$	100	
Diode forward current	DC $I_F$	30	A
	1ms $I_{FP}$	60	
Collector power dissipation ( $T_c = 25^\circ\text{C}$ )	$P_c$	120	W
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to 150	$^\circ\text{C}$



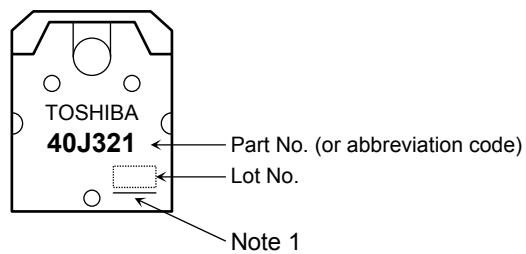
Weight: 4.6 g (typ.)

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.).

## Equivalent Circuit



## Marking

Start of commercial production  
2008-09

## Electrical Characteristics (Ta = 25°C)

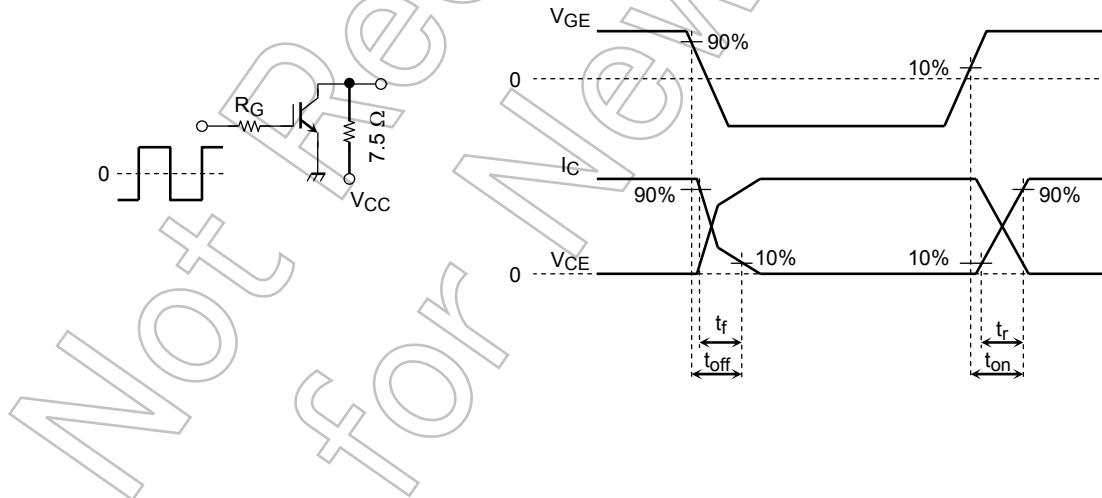
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I <sub>GES</sub>	V <sub>GE</sub> = ±25 V, V <sub>CE</sub> = 0	—	—	± 500	nA
Collector cut-off current	I <sub>CES</sub>	V <sub>CE</sub> = 600 V, V <sub>GE</sub> = 0	—	—	1.0	mA
Gate-emitter cut-off voltage	V <sub>GE</sub> (OFF)	I <sub>C</sub> = 40 mA, V <sub>CE</sub> = 5 V	3.0	—	6.0	V
Collector-emitter saturation voltage	V <sub>CE</sub> (sat)	I <sub>C</sub> = 40 A, V <sub>GE</sub> = 15 V	—	2.0	2.9	V
Input capacitance	C <sub>ies</sub>	V <sub>CE</sub> = 10 V, V <sub>GE</sub> = 0, f = 1 MHz	—	2500	—	pF
Switching time	Rise time	t <sub>r</sub>	Resistive Load V <sub>CC</sub> = 300 V, I <sub>C</sub> = 40 A V <sub>GG</sub> = ±15 V, R <sub>G</sub> = 39 Ω (Note 2)	0.20	—	μs
	Turn-on time	t <sub>on</sub>		0.30	—	
	Fall time	t <sub>f</sub>		0.11	0.21	
	Turn-off time	t <sub>off</sub>		0.40	—	
Diode forward voltage	V <sub>F</sub>	I <sub>F</sub> = 30 A, V <sub>GE</sub> = 0	—	1.4	2.0	V
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 30 A, V <sub>GE</sub> = 0, di/dt = -100 A/μs	—	—	0.2	μs
Thermal Resistance (IGBT)	R <sub>th(j-c)</sub>		—	—	1.04	°C/W
Thermal Resistance (Diode)	R <sub>th(j-c)</sub>		—	—	2.0	°C/W

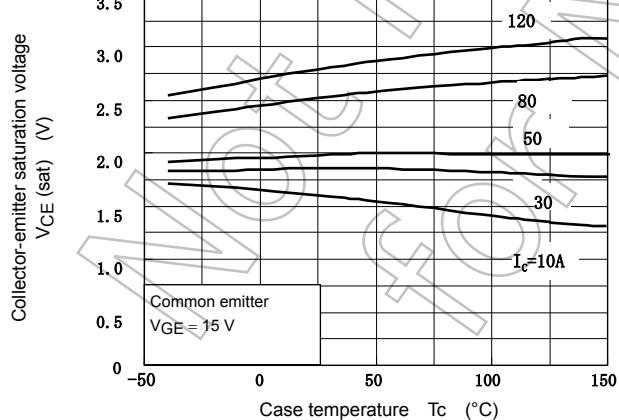
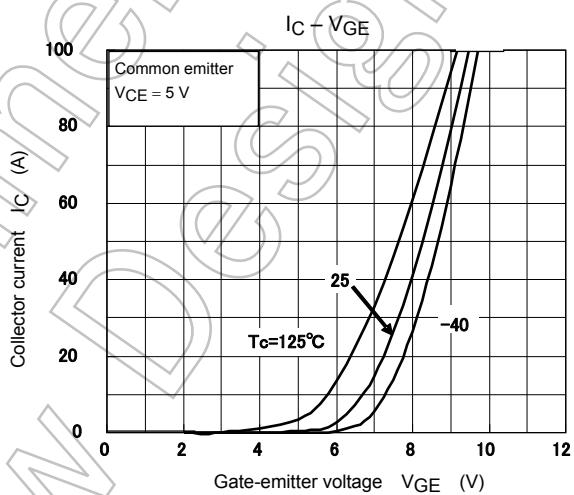
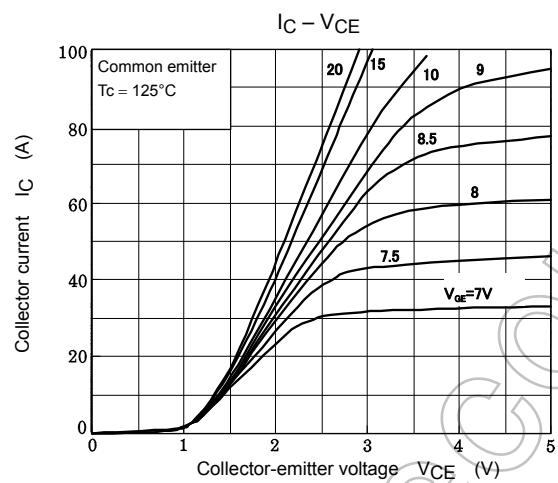
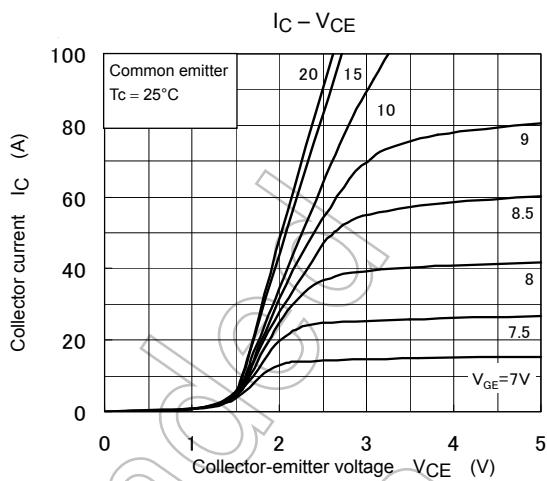
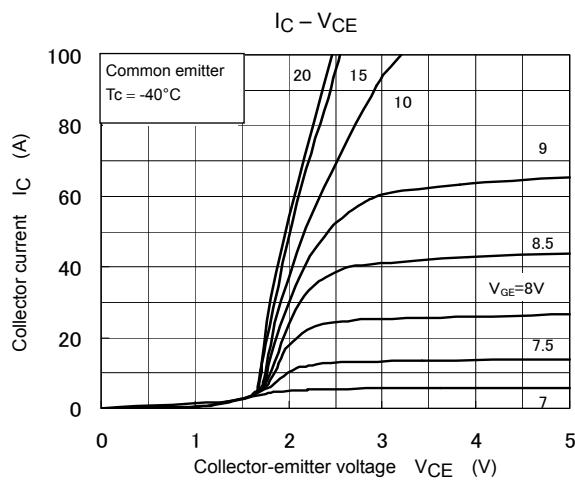
Note 1: A line under a Lot No. identifies the indication of product Labels  
[[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

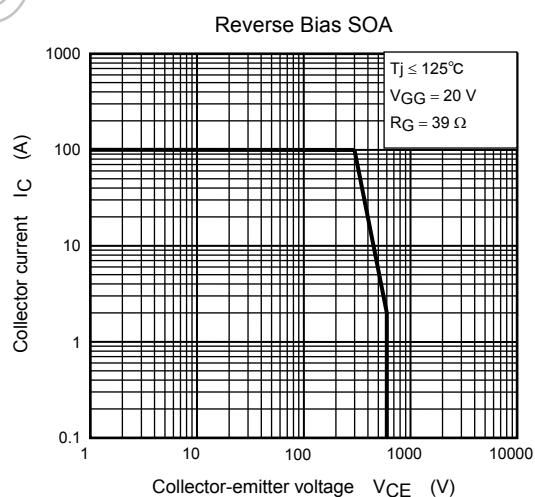
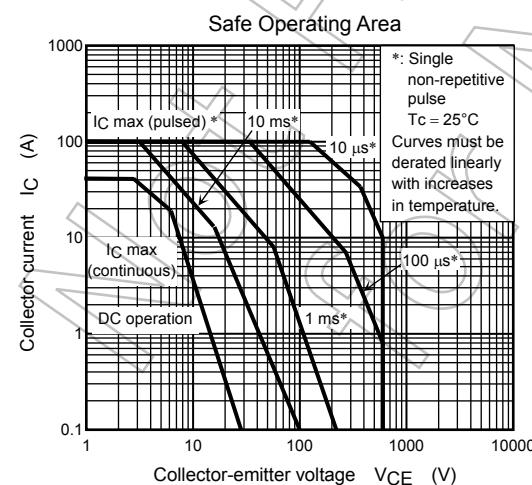
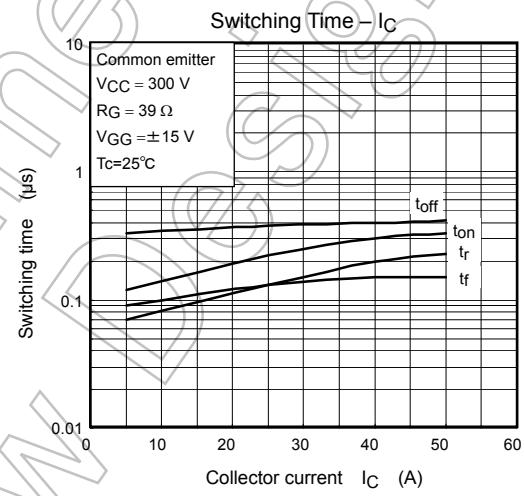
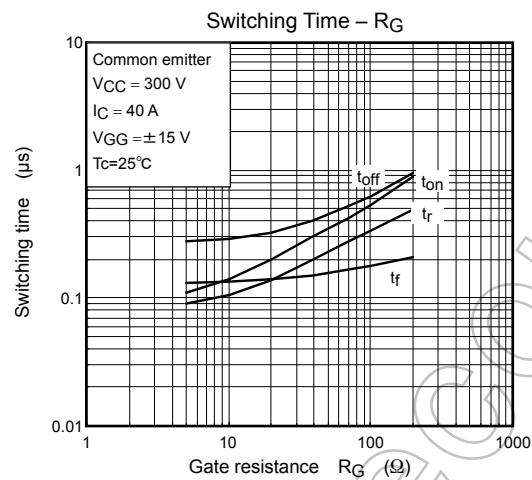
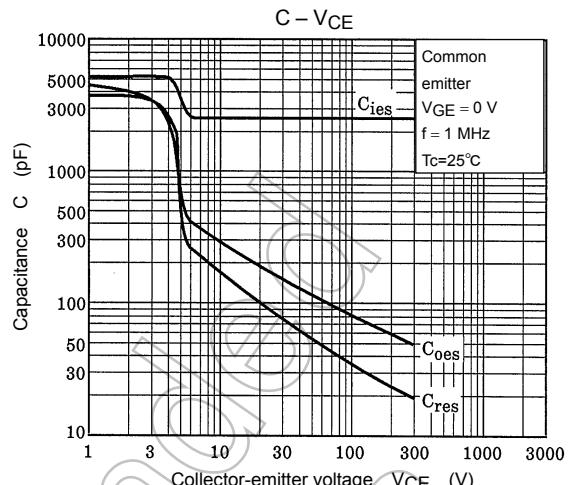
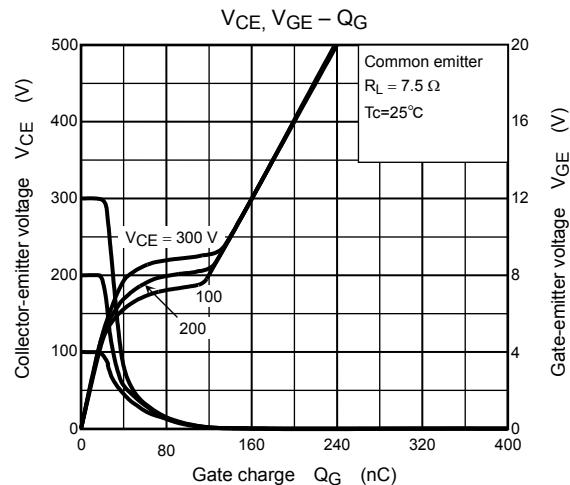
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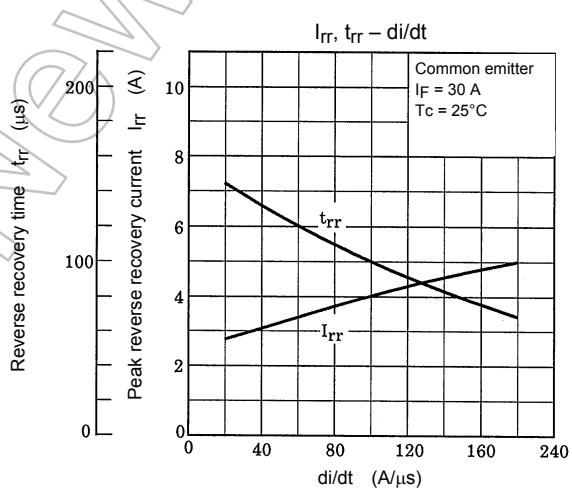
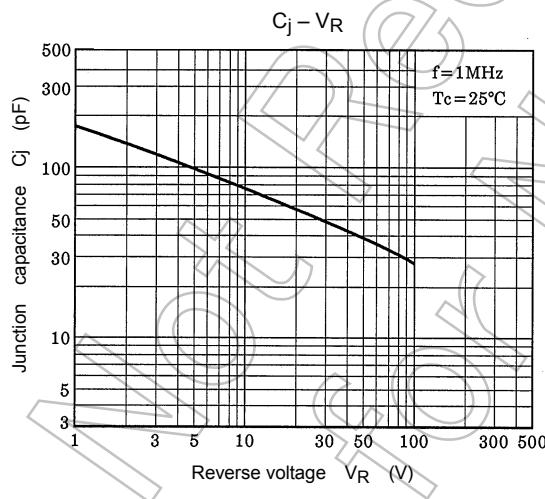
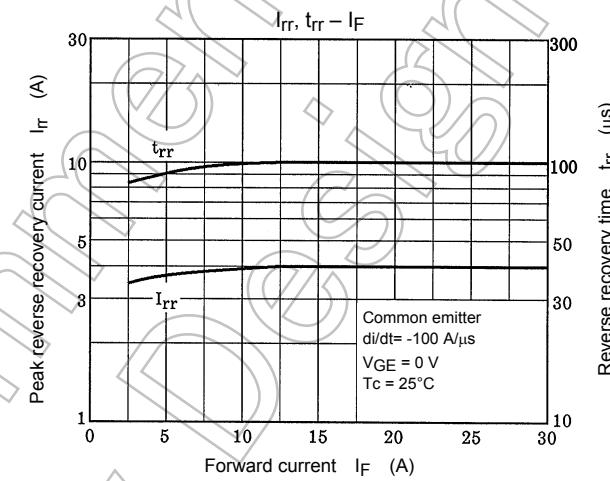
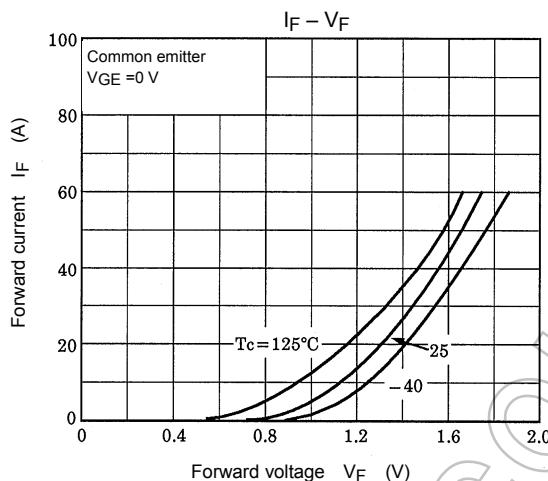
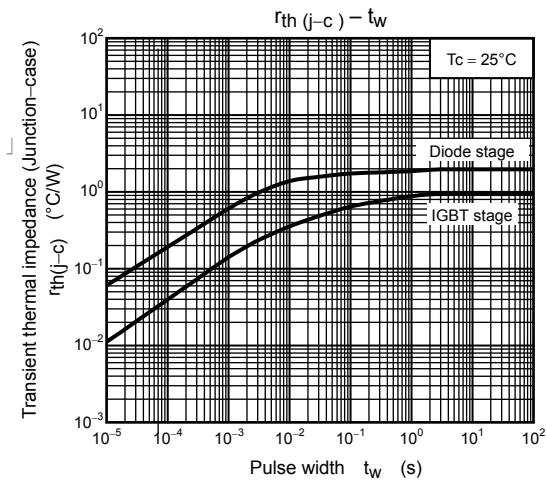
The RoHS is Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

Note 2: Switching time measurement circuit and input/output waveforms









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