

# GT50J121

High Power Switching Applications

Fast Switching Applications

- Fourth-generation IGBT
- Enhancement mode type
- Fast switching (FS): Operating frequency up to 50 kHz (reference)
  - High speed:  $t_f = 0.05 \mu s$  (typ.)
  - Low switching loss:  $E_{on} = 1.30 \text{ mJ}$  (typ.)  
:  $E_{off} = 1.34 \text{ mJ}$  (typ.)
- Low saturation Voltage:  $V_{CE(sat)} = 2.0 \text{ V}$  (typ.)

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

Characteristics		Symbol	Rating	Unit
Collector-emitter voltage		$V_{CES}$	600	V
Gate-emitter voltage		$V_{GES}$	$\pm 20$	V
Collector current	DC	$I_C$	50	A
	1 ms	$I_{CP}$	100	
Collector power dissipation ( $T_c = 25^\circ C$ )		$P_C$	240	W
Junction temperature		$T_j$	150	$^\circ C$
Storage temperature range		$T_{stg}$	-55 to 150	$^\circ C$

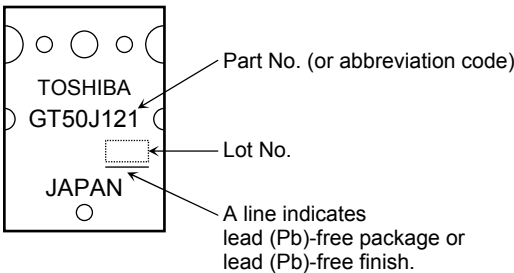
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

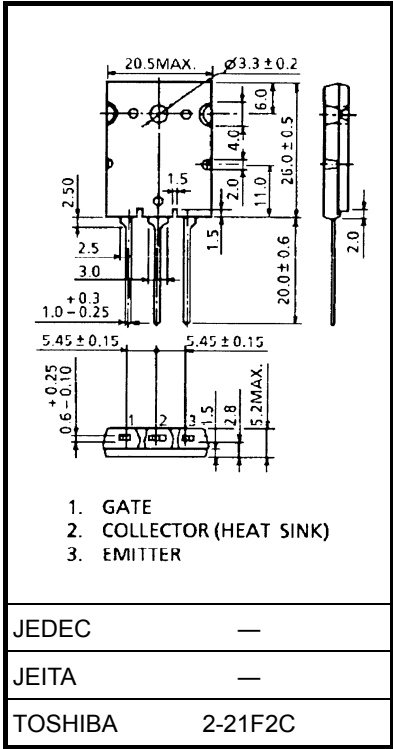
## Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance	$R_{th(j-c)}$	0.521	$^\circ C/W$

## Marking



Unit: mm

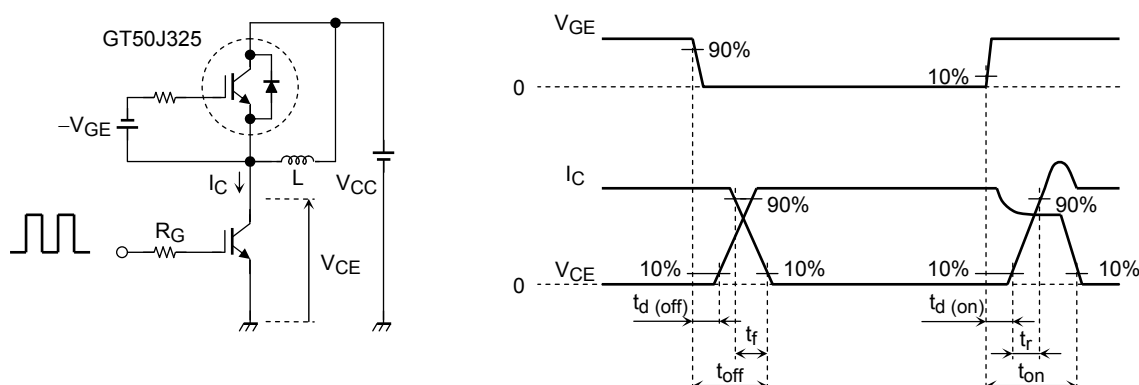


Weight: 9.75 g

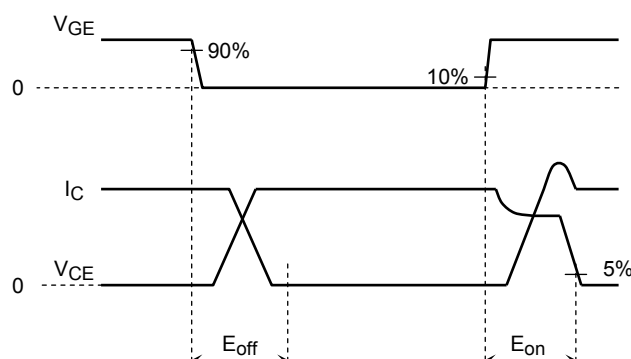
## Electrical Characteristics (Ta = 25°C)

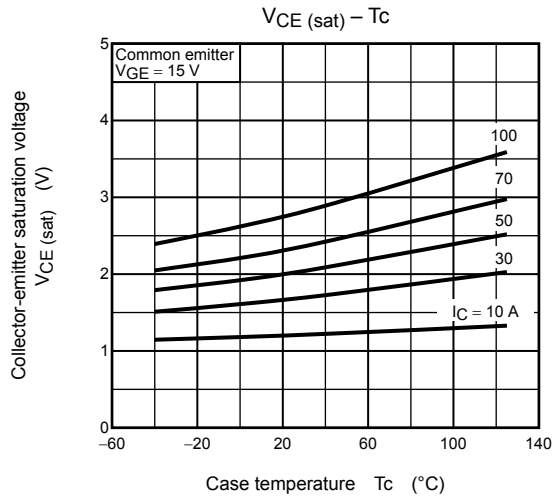
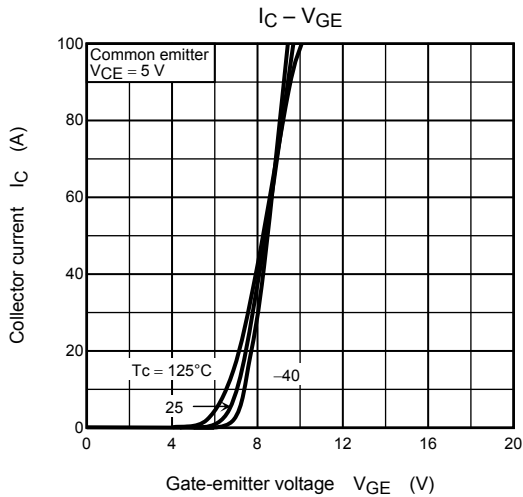
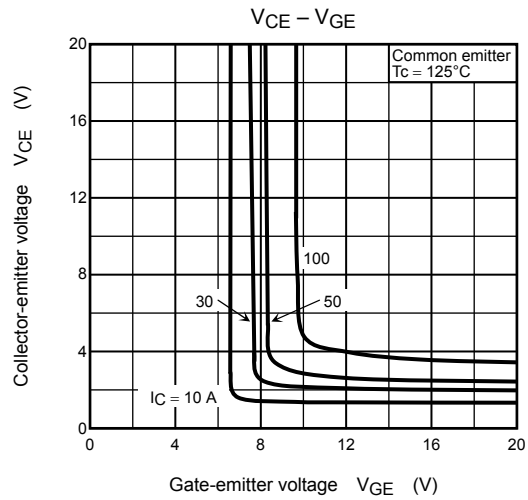
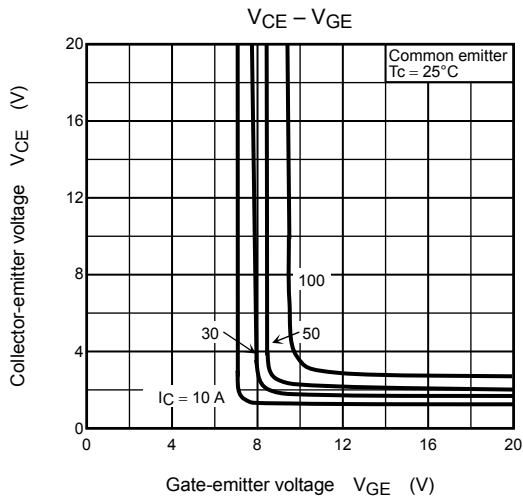
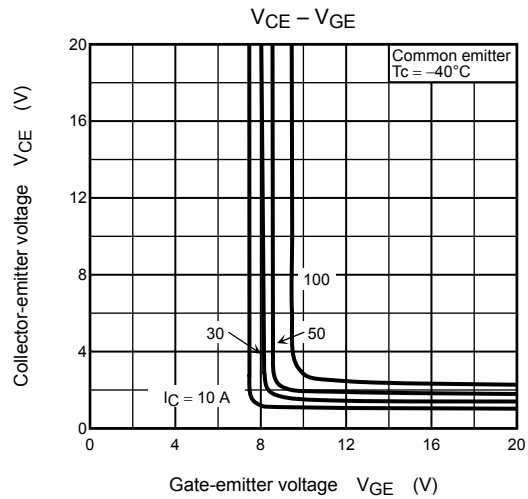
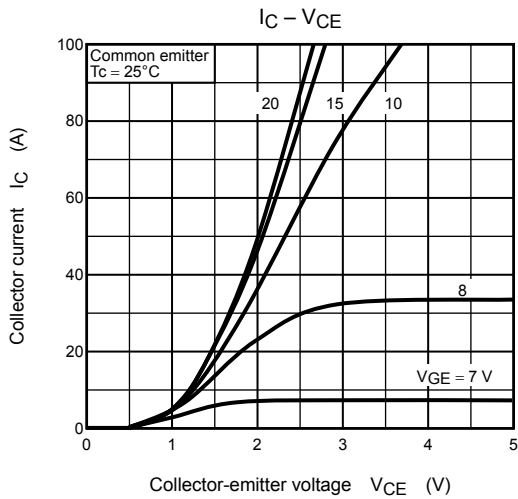
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GES}$	$V_{GE} = \pm 20 \text{ V}, V_{CE} = 0$	—	—	$\pm 500$	nA
Collector cut-off current		$I_{CES}$	$V_{CE} = 600 \text{ V}, V_{GE} = 0$	—	—	1.0	mA
Gate-emitter cut-off voltage		$V_{GE}(\text{OFF})$	$I_C = 5 \text{ mA}, V_{CE} = 5 \text{ V}$	3.5	—	6.5	V
Collector-emitter saturation voltage		$V_{CE}(\text{sat})$	$I_C = 50 \text{ A}, V_{GE} = 15 \text{ V}$	—	2.0	2.45	V
Input capacitance		$C_{ies}$	$V_{CE} = 10 \text{ V}, V_{GE} = 0, f = 1 \text{ MHz}$	—	7900	—	pF
Switching time	Turn-on delay time	$t_d(\text{on})$	Inductive load $V_{CC} = 300 \text{ V}, I_C = 50 \text{ A}$ $V_{GG} = +15 \text{ V}, R_G = 13 \Omega$  (Note 1) (Note 2)	—	0.09	—	$\mu\text{s}$
	Rise time	$t_r$		—	0.07	—	
	Turn-on time	$t_{on}$		—	0.24	—	
	Turn-off delay time	$t_d(\text{off})$		—	0.30	—	
	Fall time	$t_f$		—	0.05	—	
	Turn-off time	$t_{off}$		—	0.43	—	
Switching loss	Turn-on switching loss	$E_{on}$		—	1.30	—	mJ
	Turn-off switching loss	$E_{off}$		—	1.34	—	

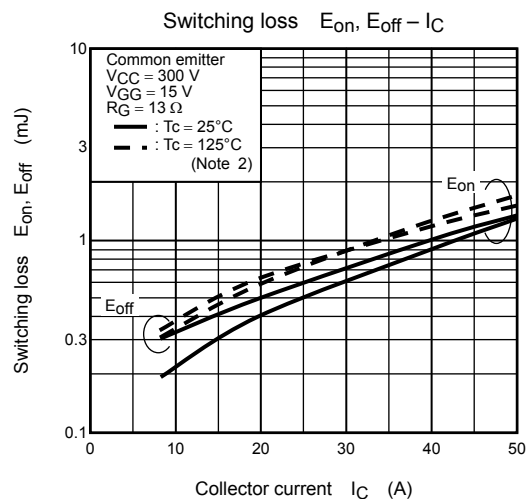
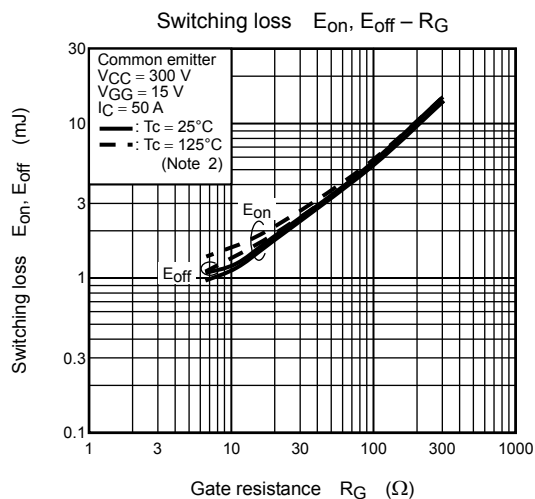
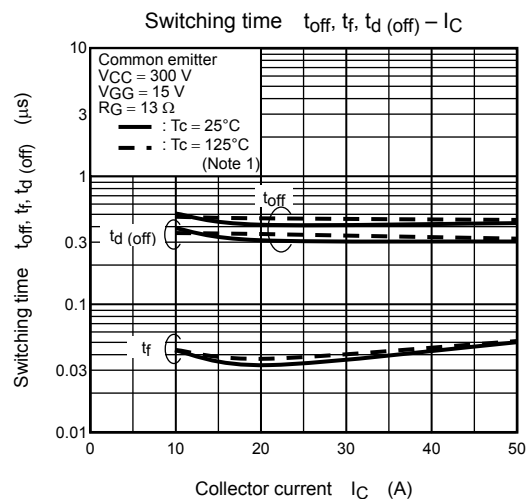
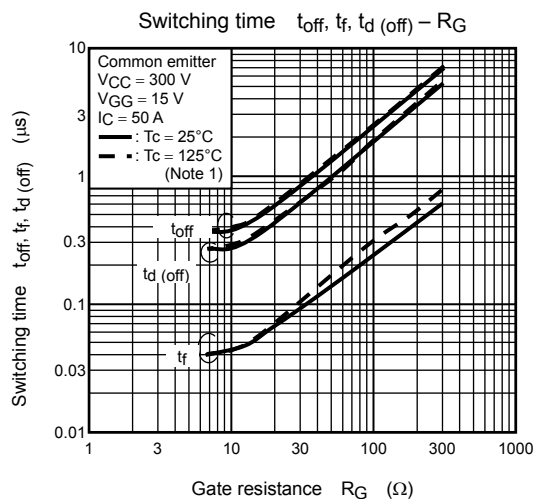
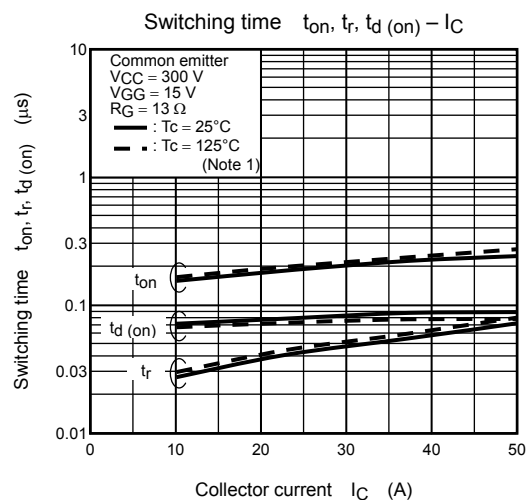
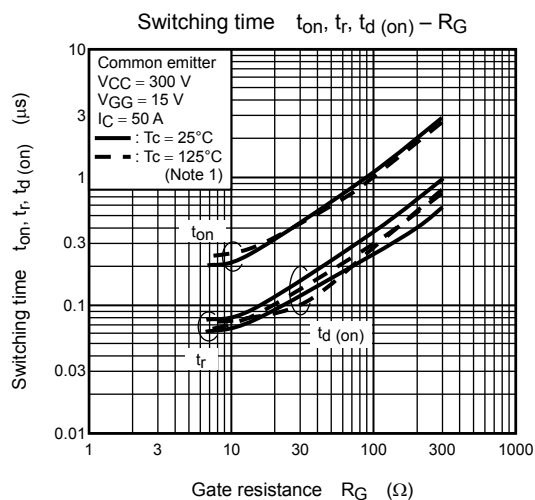
Note 1: Switching time measurement circuit and input/output waveforms

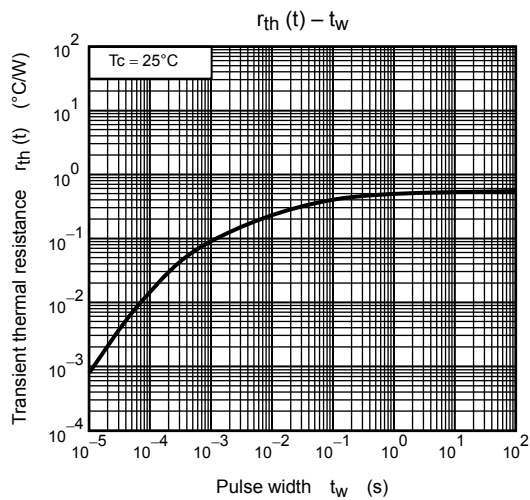
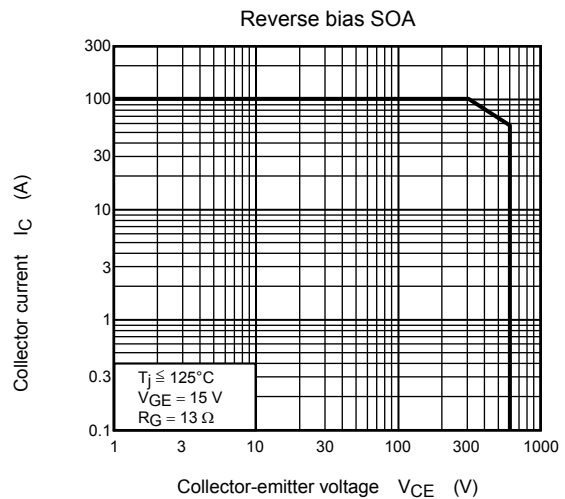
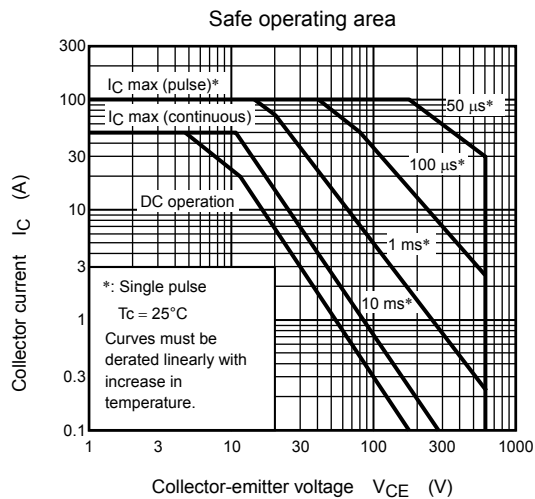
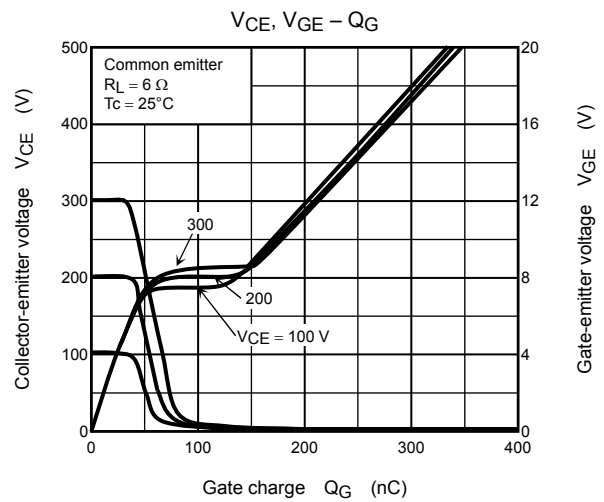
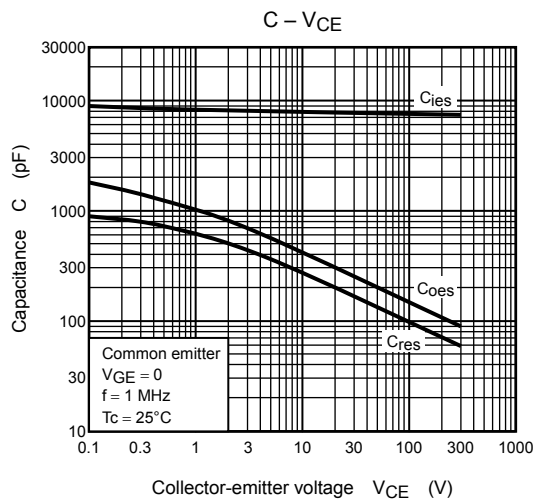


Note 2: Switching loss measurement waveforms









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