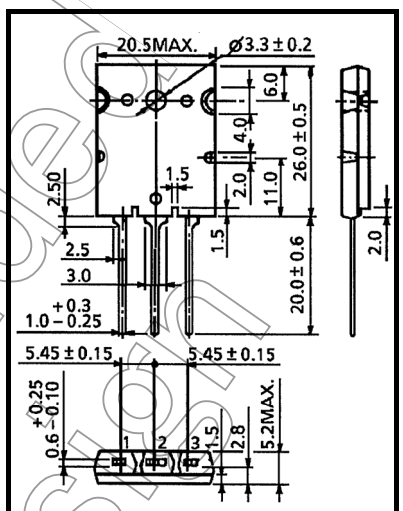
TOSHIBA INSULATED GATE BIPOLAR TRANSISTOR SILICON N CHANNEL IGBT

GT50J301

HIGH POWER SWITCHING APPLICATIONS
MOTOR CONTROL APPLICATIONS

- Third generation IGBT
- Enhancement mode type
- High speed : t_f = 0.30μs (Max.)
- Low saturation voltage : $V_{CE\ (sat)}$ = 2.7V (Max.)
- FRD included between emitter and collector

Unit: mm



1. GATE
2. COLLECTOR (HEAT SINK)
3. EMITTER

JEDEC	—
JEITA	—
TOSHIBA	2-21F2C

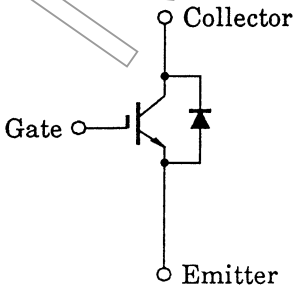
Weight: 9.75 g (typ.)

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

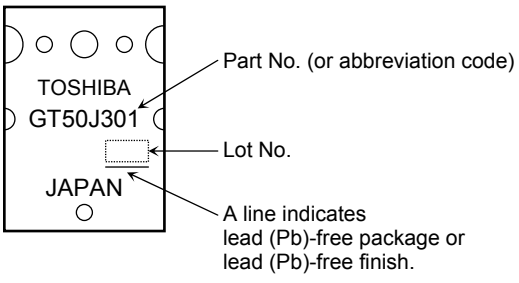
CHARACTERISTIC		SYMBOL	RATING	UNIT
Collector−Emitter Voltage		V_{CES}	600	V
Gate−Emitter Voltage		V_{GES}	±20	V
Collector Current	DC	I_C	50	A
	1ms	I_{CP}	100	
Forward Current	DC	I_F	50	A
	1ms	I_{FM}	100	
Collector Power Dissipation (Tc = 25°C)		P_C	200	W
Junction Temperature		T_j	150	°C
Storage Temperature		T_{stg}	−55~150	°C
Screw Torque		—	0.8	N · m

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



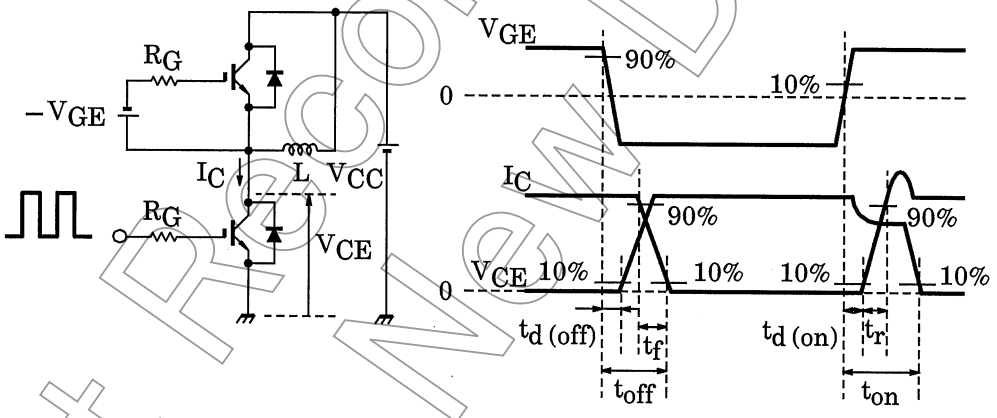
MARKING



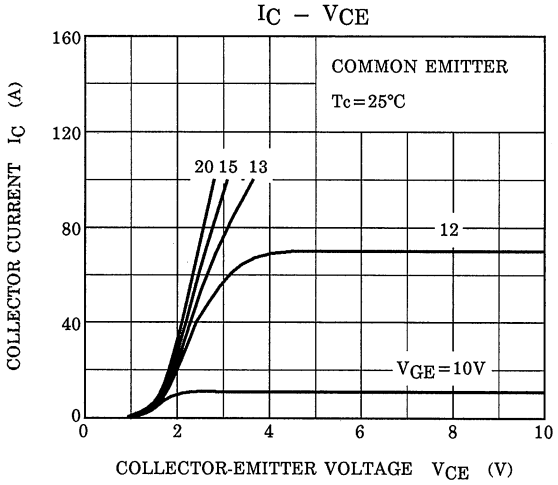
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Gate Leakage Current		I_{GES}	V_{GE} = ±20V, V_{CE} = 0	—	—	±500	nA
Collector Cut−off Current		I_{CES}	V_{CE} = 600V, V_{GE} = 0	—	—	1.0	mA
Gate−Emitter Cut−off Voltage		$V_{GE\ (OFF)}$	I_C = 5mA, V_{CE} = 5V	5.0	7.0	8.0	V
Collector−Emitter Saturation Voltage		$V_{CE\ (sat)}$	I_C = 50A, V_{GE} = 15V	—	2.1	2.7	V
Input Capacitance		C_{ies}	V_{CE} = 10V, V_{GE} = 0 f = 1MHz	—	4500	—	pF
Switching Time	Turn−on delayTime	$t_{d\ (on)}$	Inductive Load V_{CC} = 300V V_{GE} = ±15V I_C = 50A R_G = 24Ω (Note 1)	—	0.08	—	μs
	Rise Time	t_r		—	0.12	—	
	Turn−on Time	t_{on}		—	0.40	—	
	Turn−off delayTime	$t_{d\ (off)}$		—	0.20	—	
	Fall Time	t_f		—	0.15	0.30	
	Turn−off Time	t_{off}		—	0.50	—	
Forward Voltage		V_F	I_F = 50A, V_{GE} = 0	—	2.4	3.5	V
Reverse Recovery Time		t_{rr}	I_F = 50A, V_{GE} = 10V di / dt = 100A / μs	—	0.1	0.2	μs
Thermal Resistance		$R_{th\ (j-c)}$	IGBT	—	—	0.625	°C / W
Thermal Resistance		$R_{th\ (j-c)}$	DIODE	—	—	2.50	°C / W

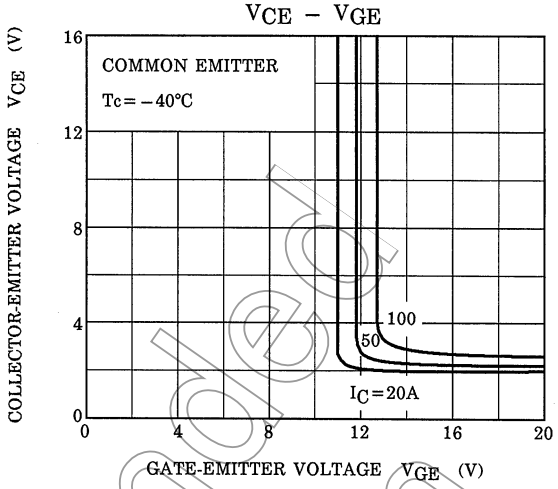
Note 1: Switching time measurement circuit and input / output waveforms



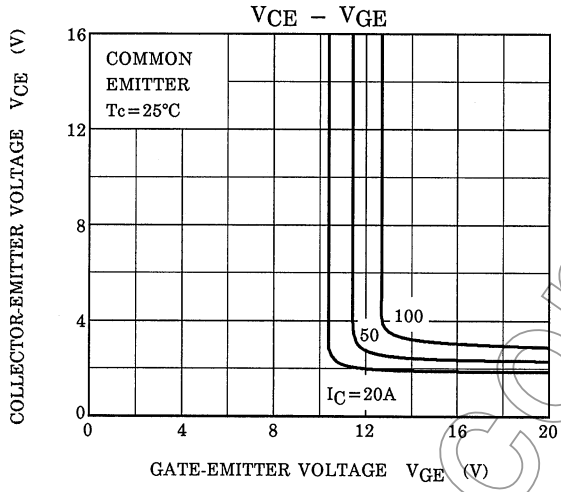
I_C – V_{CE}



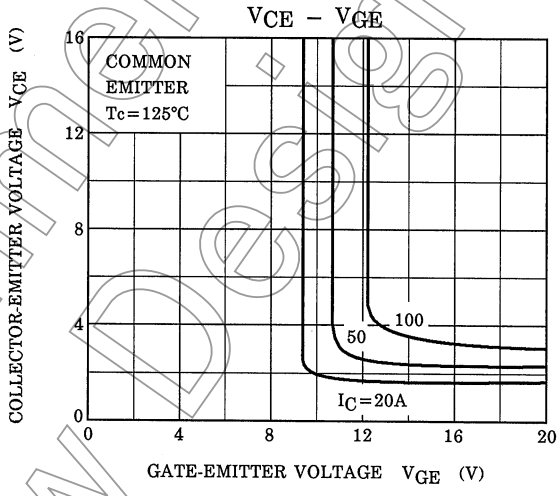
V_{CE} – V_{GE}



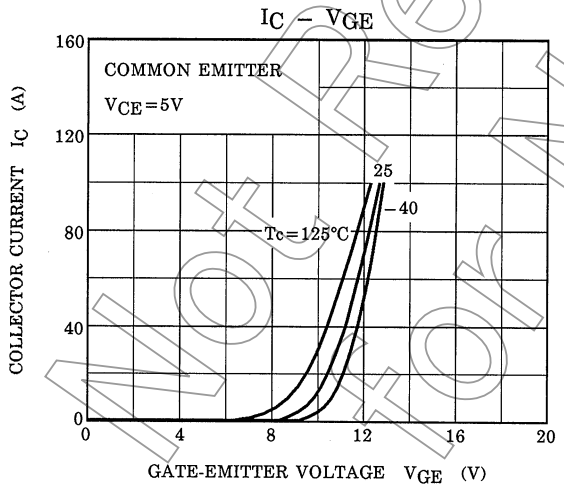
V_{CE} – V_{GE}



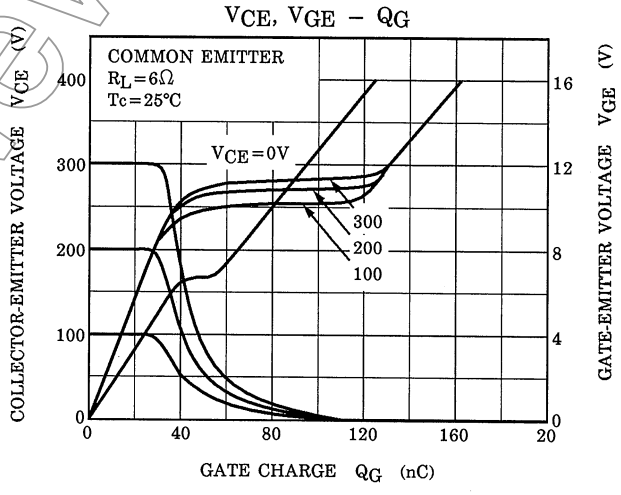
V_{CE} – V_{GE}



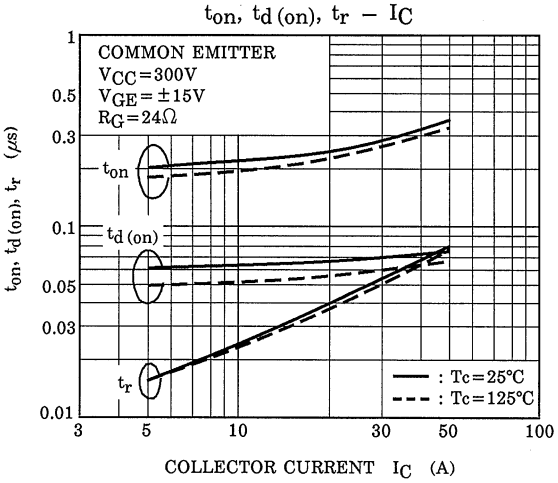
I_C – V_{GE}



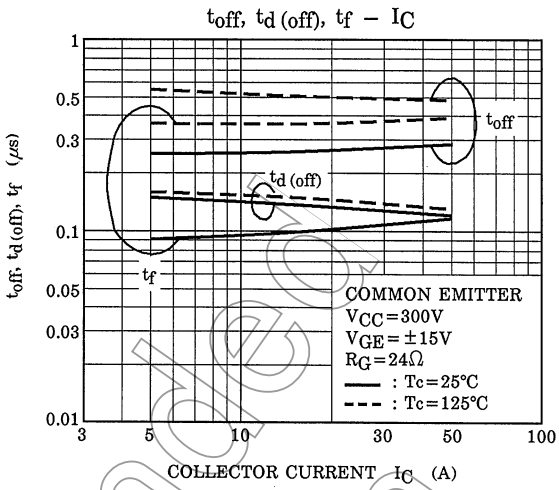
V_{CE}, V_{GE} – Q_G



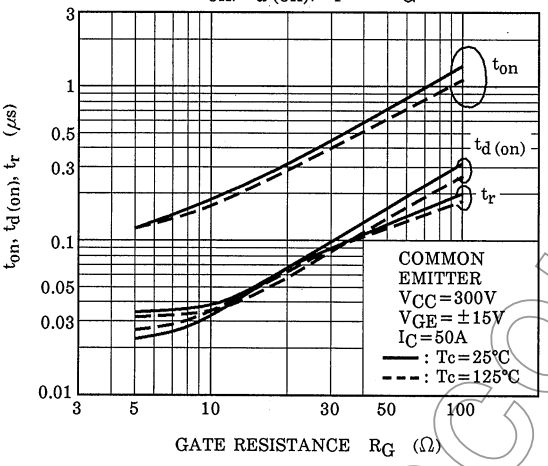
t_{on}, $t_{d(on)}$, t_r – I_C



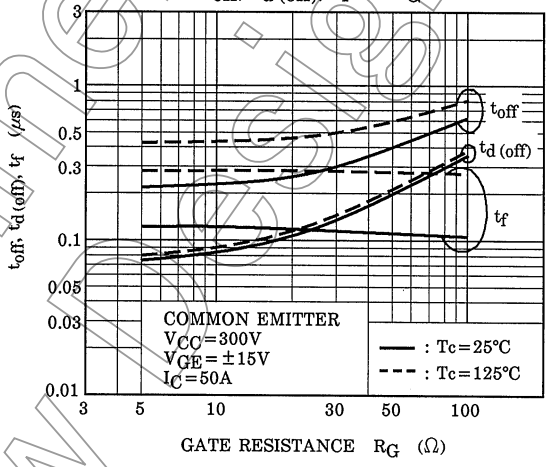
t_{off}, $t_{d(off)}$, t_f – I_C



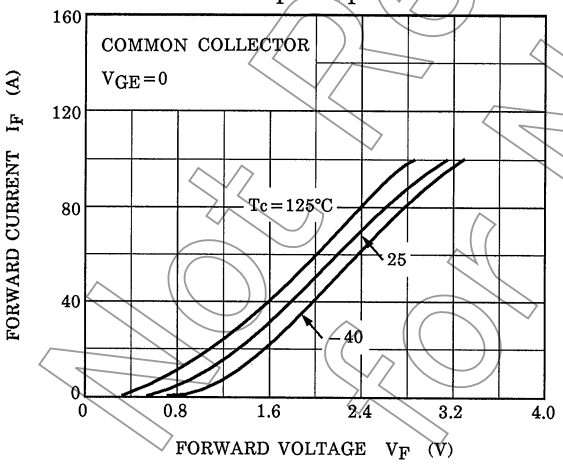
t_{on}, $t_{d(on)}$, t_r – R_G



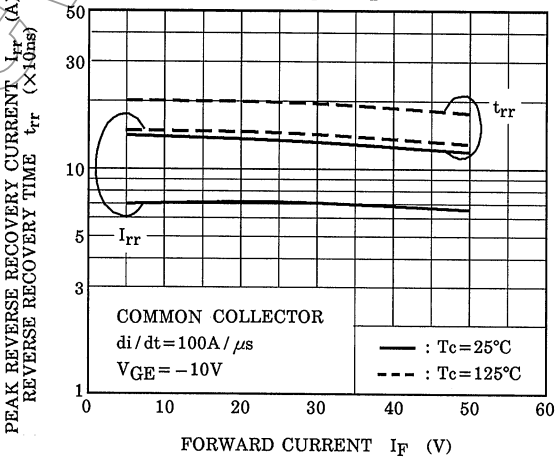
t_{off}, $t_{d(off)}$, t_f – R_G



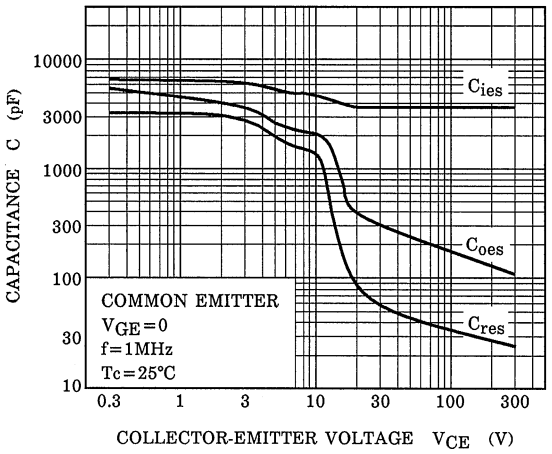
I_F – V_F



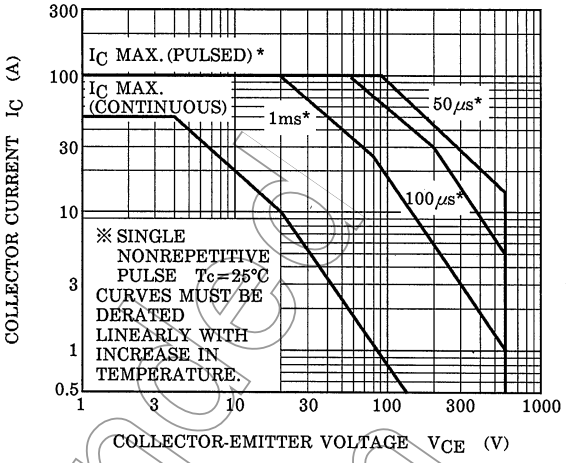
t_{rr}, I_{rr} – I_F



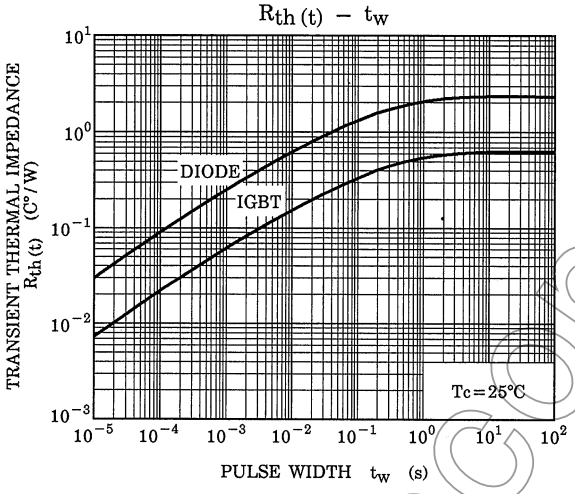
C – V_{CE}



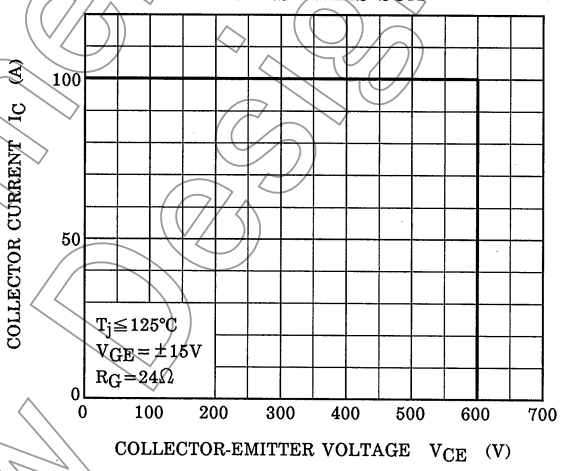
SAFE OPERATING AREA



R_{th} (t) – t_w



REVERSE BIAS SOA



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20070701-EN

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