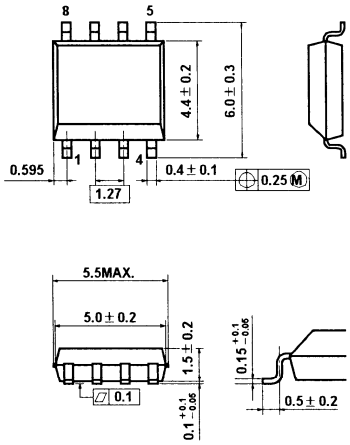
TOSHIBA Insulated Gate Bipolar Transistor Silicon N Channel IGBT

GT10G131

Strobe Flash Applications

- 5th generation (trench gate structure) IGBT
- Enhancement-mode
- 4-V gate drive voltage: V_{GE} = 4.0 V (min) (@I_C = 200 A)
- Peak collector current: I_C = 200 A (max)
- Built-in zener diode between gate and emitter
- SOP-8 package

Unit: mm



1.2.3 Emitter
4 Gate
5.6.7.8 Collector

JEDEC	―
JEITA	―
TOSHIBA	2-6J1C

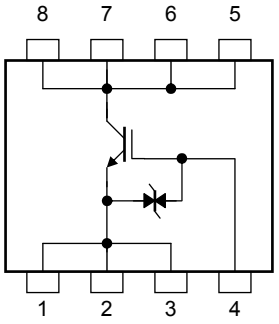
Weight: 0.08 g (typ.)

Absolute Maximum Ratings (Ta = 25℃)

Characteristics		Symbol	Rating	Unit
Collector-emitter voltage		V_{CES}	400	V
Gate-emitter voltage	DC	V_{GES}	± 6	V
	Pulse	V_{GES}	± 8	
Collector current	Pulse (Note 1)	I_{CP}	200	A
Collector power dissipation(t=10 s)	(Note 2a)	P_C (1)	1.9	W
	(Note 2b)	P_C (2)	1.0	W
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55~150	°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).

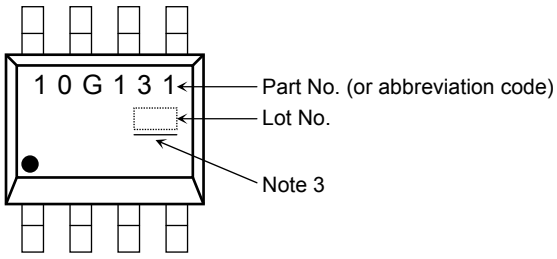
Circuit Configuration



Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Thermal resistance , junction to ambient (t = 10 s) (Note2a)	$R_{th\ (j\text{-}a)}$ (1)	65.8	°C/W
Thermal resistance , junction to ambient (t = 10 s) (Note2b)	$R_{th\ (j\text{-}a)}$ (2)	125	°C/W

Marking (Note 4)

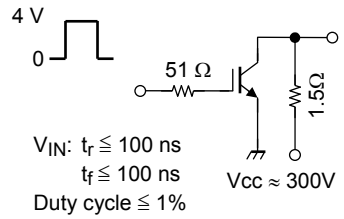


Note 3: A line under a Lot No. identifies the indication of product Labels.
Not underlined : [[Pb]]/INCLUDES > MCV
Underlined : [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product.
The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Note : For (Note 1) , (Note 2a) , (Note 2b) and (Note 4) Please refer to the next page.

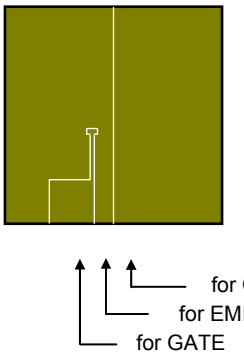
Electrical Characteristics (Ta = 25℃)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GES}	V_{GE} = ± 6 V, V_{CE} = 0 V	—	—	± 10	μA
Collector cut-off current		I_{CES}	V_{CE} = 400 V, V_{GE} = 0 V	—	—	10	μA
Gate-emitter cut-off voltage		$V_{GE\ (OFF)}$	I_C = 1 mA, V_{CE} = 5 V	0.6	0.9	1.2	V
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	I_C = 200 A, V_{GE} = 4 V	—	2.3	—	V
Input capacitance		C_{ies}	V_{CE} = 10 V, V_{GE} = 0 V, f = 1 MHz	—	2800	—	pF
Switching time	Rise time	t_r		—	2.8	—	μs
	Turn-on time	t_{on}		—	3.1	—	
	Fall time	t_f		—	1.8	—	
	Turn-off time	t_{off}		—	2.0	—	

Note

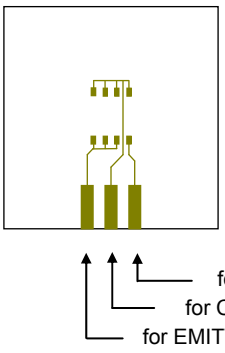
Note 1: Please use devices on condition that the junction temperature is below 150°C.
Repetitive rating: pulse width limited by maximum junction temperature.

Note 2a : Device mounted on a glass-epoxy board (a)



FR-4
25.4 × 25.4 × 0.8
(Unit: mm)

Note 2b : Device mounted on a glass-epoxy board (b)



FR-4
25.4 × 25.4 × 0.8
(Unit: mm)

Note 4: ○ on lower right of the marking indicates Pin 1.

※ Weekly code: (Three digits)

□□□
Week of manufacture
(01 for first week of year, continues up to 52 or 53)
Year of manufacture
(One low-order digits of calendar year)

※ [[G]]/RoHS [[Pb]] :
It is marking about an underline to a week of manufacture mark.

□□□

Caution on handling

This device is MOS gate type. Therefore , please care of a protection from ESD in your handling .

Caution in design

The slope of the collector-emitter voltage, dv/dt, during turn-off should be kept below 400 V/μs. There is no limit to the slope of the collector-emitter voltage during turn-on. If there is a gate resistor, $R_{G(ON)}$, that controls the gate current, ensure that it will not exceed the gate driver's current capability.
In cases where both gate turn-on and turn-off are controlled with a single gate resistor, use of a resistor of 51 Ω or greater is recommended.

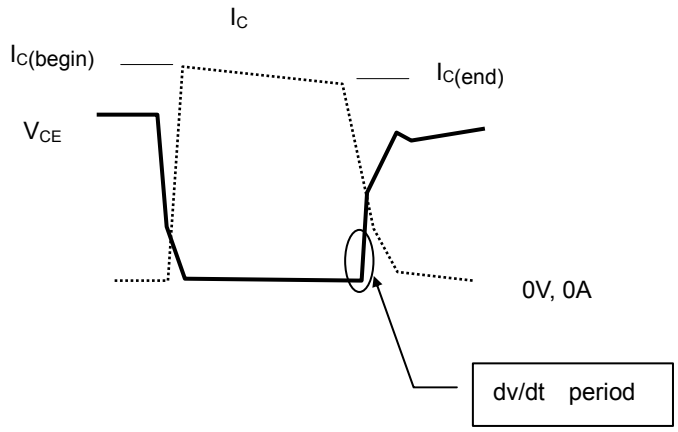
●definition of dv/dt

The slope of vce from 30v to 90v (attached figure.1)

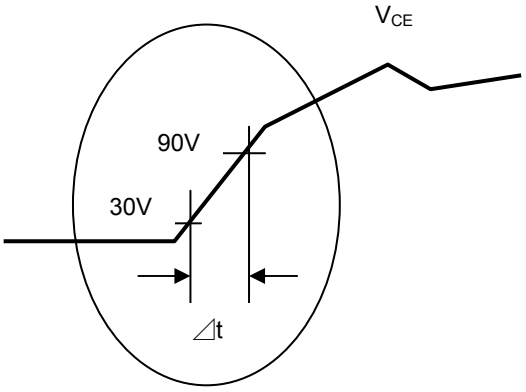
$$dv/dt = (90V-30V) / (\Delta t)$$

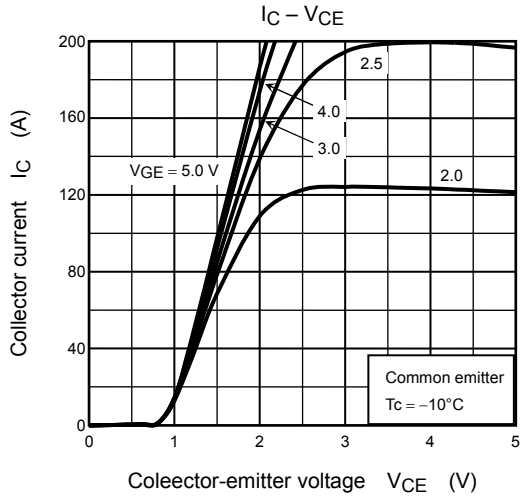
$$= 60V / \Delta t$$

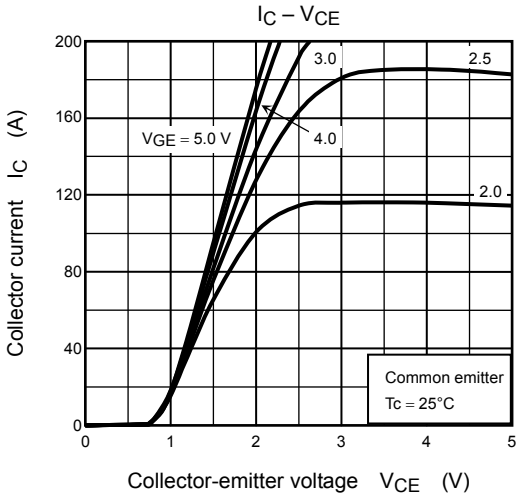
●waveform

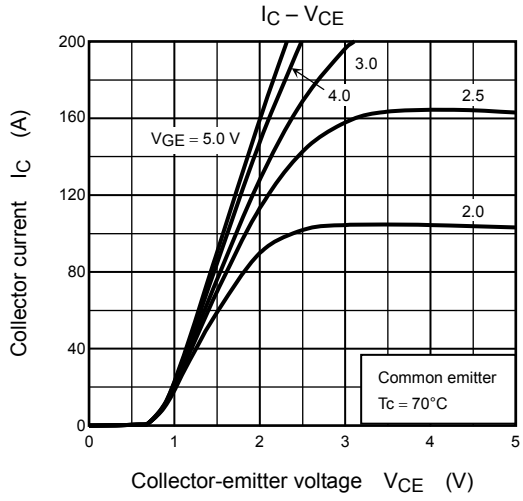


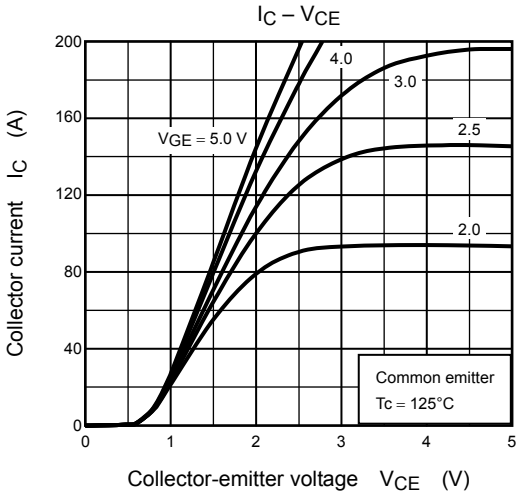
●waveform (Expanded View of the dv/dt Period)

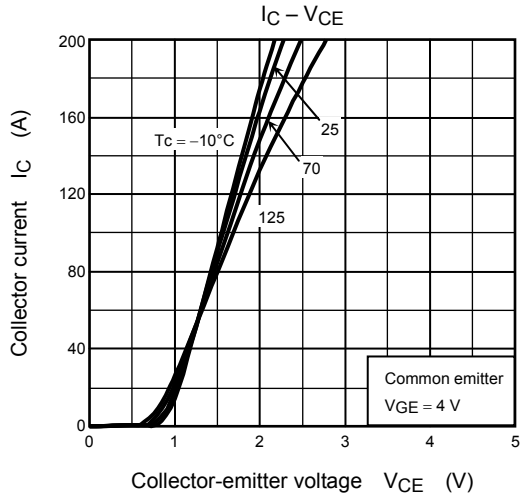


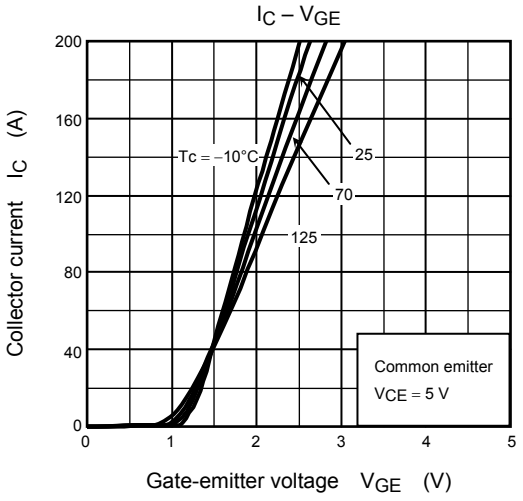

$I_C - V_{CE}$
Collector current I_C (A)
Coleector-emitter voltage V_{CE} (V)
V_{GE} = 5.0 V
2.5
4.0
3.0
2.0
Common emitter
Tc = −10°C


$I_C - V_{CE}$
Collector current I_C (A)
Collector-emitter voltage V_{CE} (V)
V_{GE} = 5.0 V
3.0
2.5
4.0
2.0
Common emitter
Tc = 25°C

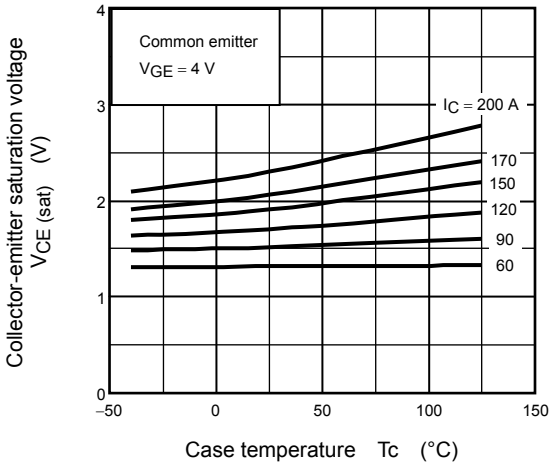

$I_C - V_{CE}$
Collector current I_C (A)
Collector-emitter voltage V_{CE} (V)
V_{GE} = 5.0 V
3.0
4.0
2.5
2.0
Common emitter
Tc = 70°C


$I_C - V_{CE}$
Collector current I_C (A)
Collector-emitter voltage V_{CE} (V)
V_{GE} = 5.0 V
4.0
3.0
2.5
2.0
Common emitter
Tc = 125°C

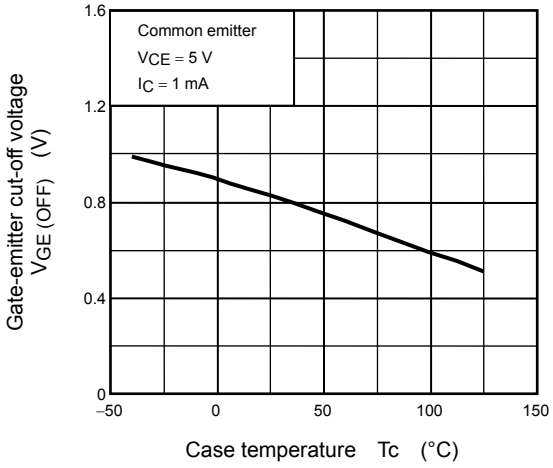

$I_C - V_{CE}$
Collector current I_C (A)
Collector-emitter voltage V_{CE} (V)
Tc = −10°C
25
70
125
Common emitter
V_{GE} = 4 V


$I_C - V_{GE}$
Collector current I_C (A)
Gate-emitter voltage V_{GE} (V)
Tc = −10°C
25
70
125
Common emitter
V_{CE} = 5 V

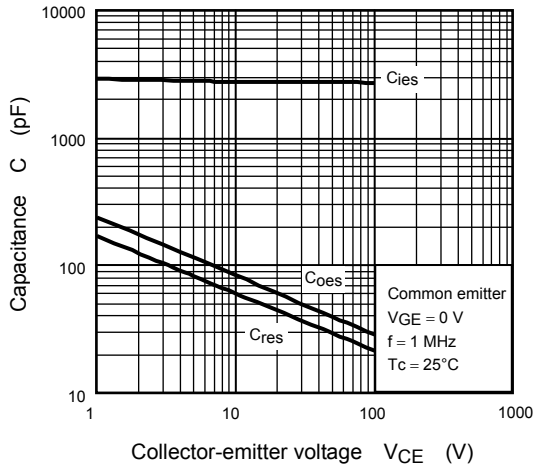
$V_{CE\ (sat)}$ – Tc



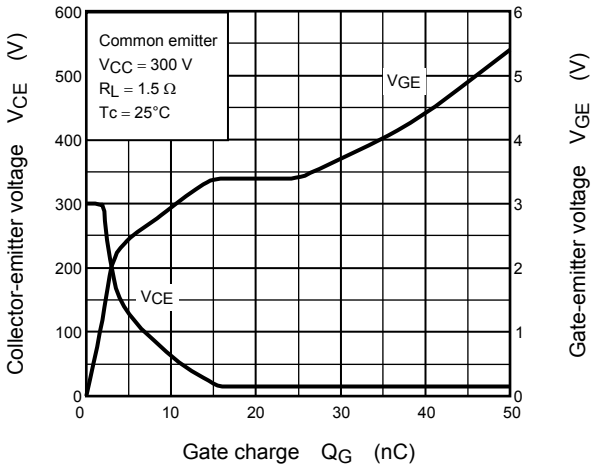
$V_{GE\ (OFF)}$ – Tc



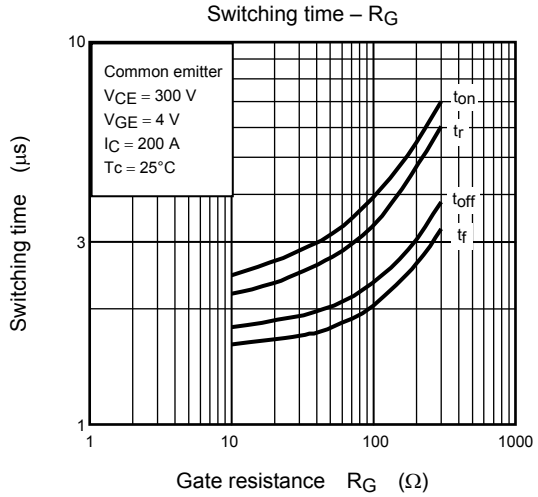
C – V_{CE}



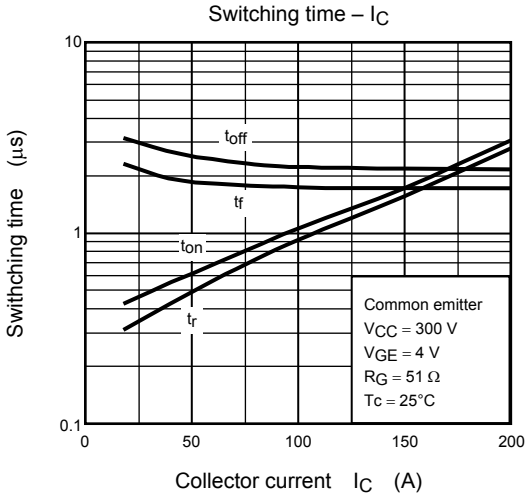
V_{CE}, V_{GE} – Q_G



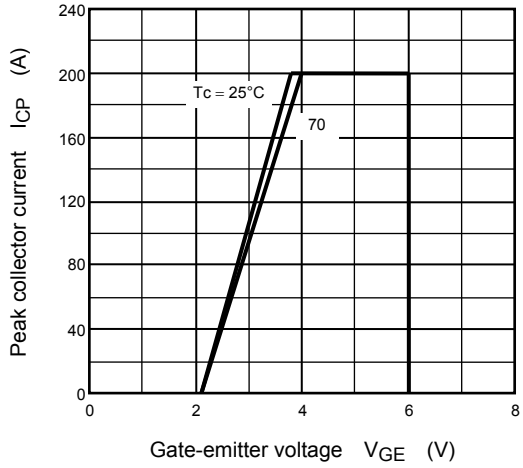
Switching time – R_G



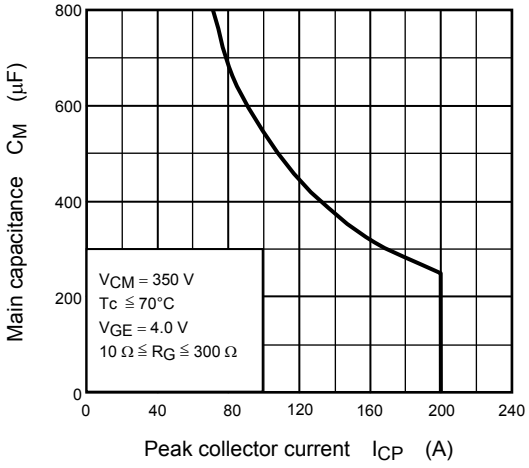
Switching time – I_C



Minimum gate drive area



Maximum operating area



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