TOSHIBA Insulated Gate Bipolar Transistor Silicon N Channel IGBT

# GT5G133

Strobe Flash Applications

- Enhancement-mode
- Low gate drive voltage: $V_{GE}$ = 2.5 V (min) (@$I_C$ = 130 A)
- Peak collector current: $I_C$ = 130 A (max)
- Compact and Thin (TSON-8) package

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

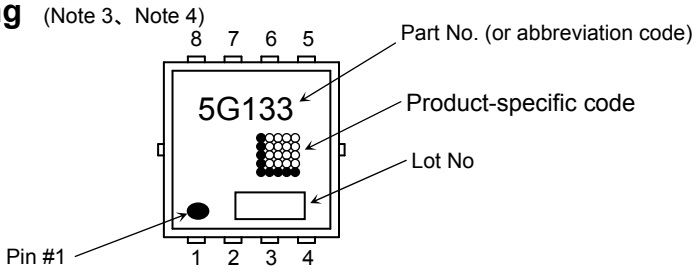
| Characteristics | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Collector-emitter voltage | | $V_{CES}$ | 400 | V |
| Gate-emitter voltage | DC | $V_{GES}$ | ± 4 | V |
| | Pulse | $V_{GES}$ | ± 5 | |
| Collector current | Pulse (Note 1) | $I_{CP}$ | 130 | A |
| Collector power dissipation(t = 10 s) | (Note 2a) | $P_C$ (1) | 0.83 | W |
| | (Note 2b) | $P_C$ (2) | 0.69 | W |
| Junction temperature | | $T_j$ | 150 | °C |
| Storage temperature range | | $T_{stg}$ | −55 to 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).

## Thermal Characteristics

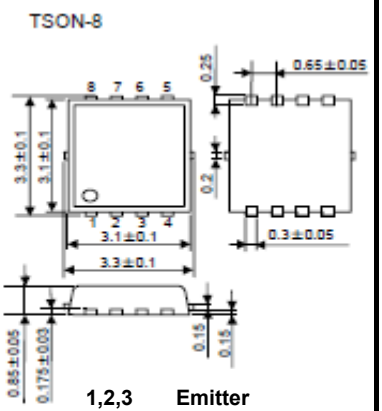
| Characteristics | Symbol | Rating | Unit |
|---|---|---|---|
| Thermal resistance , junction to ambient (t = 10 s) (Note2a) | $R_{th\ (j\text{-}a)\ (1)}$ | 150 | °C/W |
| Thermal resistance , junction to ambient (t = 10 s) (Note2b) | $R_{th\ (j\text{-}a)\ (2)}$ | 180 | °C/W |

## Marking (Note 3、Note 4)




Note : For (Note 1) , (Note 2a) , (Note 2b) , (Note 3) and (Note 4) .

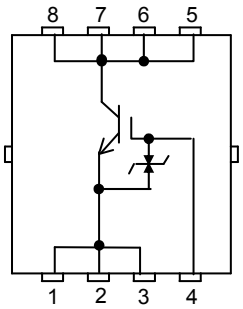
Unit: mm



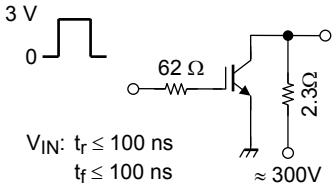

| | |
|---|---|
| JEDEC | — |
| JEITA | — |
| TOSHIBA | 2-3Y1A |

Weight: 0.02 g (Typ.)

## Circuit Configuration



## Electrical Characteristics (Ta = 25°C)

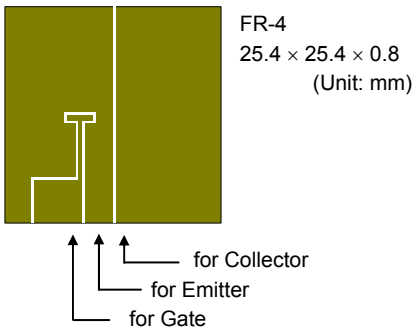
| Characteristics | | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Gate leakage current | | $I_{GES}$ | $V_{GE}$ = ± 4 V, $V_{CE}$ = 0 | — | — | ± 10 | μA |
| Collector cut-off current | | $I_{CES}$ | $V_{CE}$ = 400 V, $V_{GE}$ = 0 | — | — | 10 | μA |
| Gate-emitter cut-off voltage | | $V_{GE\ (OFF)}$ | $I_C$ = 1 mA, $V_{CE}$ = 5 V | 0.55 | — | 1.05 | V |
| Collector-emitter saturation voltage | | $V_{CE\ (sat)}$ | $I_C$ = 130 A, $V_{GE}$ = 2.5 V | — | 3.0 | — | V |
| Input capacitance | | $C_{ies}$ | $V_{CE}$ = 10 V, $V_{GE}$ = 0, f = 1 MHz | — | 2480 | — | pF |
| Switching time | Rise time | $t_r$ |   $V_{IN}$: $t_r \leq 100$ ns, $t_f \leq 100$ ns, Duty cycle ≤ 1% | — | 2.0 | — | μs |
| | Turn-on time | $t_{on}$ | | — | 2.1 | — | |
| | Fall time | $t_f$ | | — | 1.5 | — | |
| | Turn-off time | $t_{off}$ | | — | 2.1 | — | |

## Note

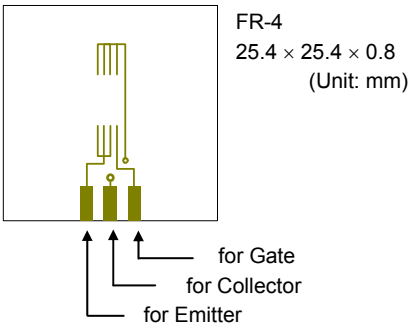
Note 1: Please use devices on condition that the junction temperature is below 150°C.

Repetitive rating: pulse width limited by maximum junction temperature.

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

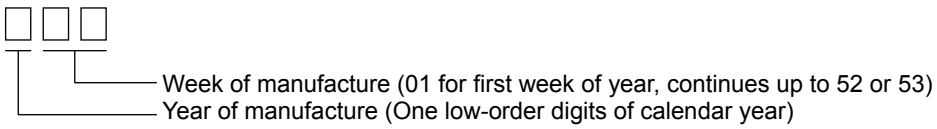



Note 2b : Device mounted on a glass-epoxy board (b)




Note 3: ● on lower right of the marking indicates Pin 1.

* Weekly code: (Three digits)




Note 4: A line under a Lot No. identifies the indication of product Labels.
[[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.

## Caution on handling

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

## Caution in design

●You should be design dV/dt value is under 400V/μs below figure.1.

The slope of $V_{CE}$ from 30v to 90v (attached figure.1)

dv/dt = (90V-30V) / (⊿t)

= 60V / ⊿t

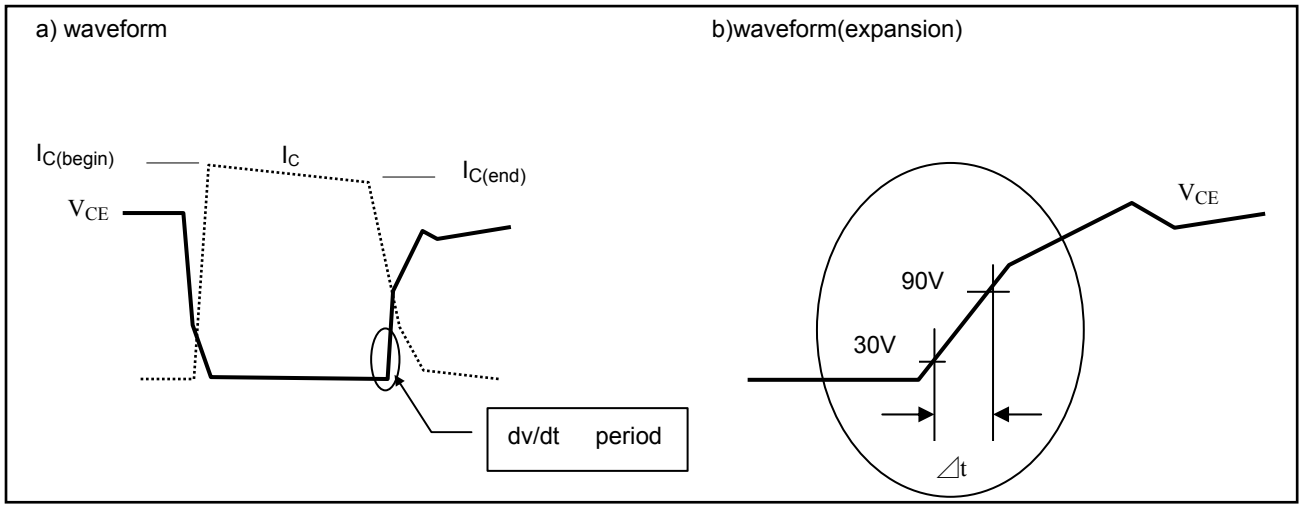
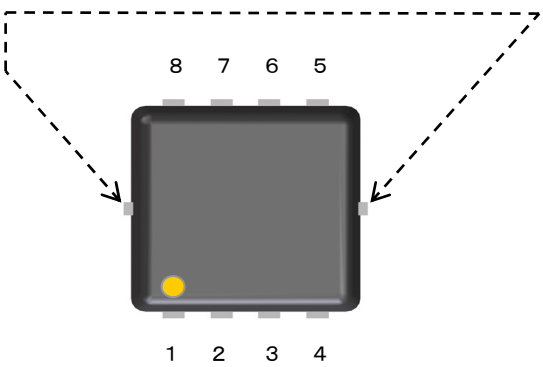



Figure.1 dv / dt

●Outside pin

Outside pin is same collector voltage.

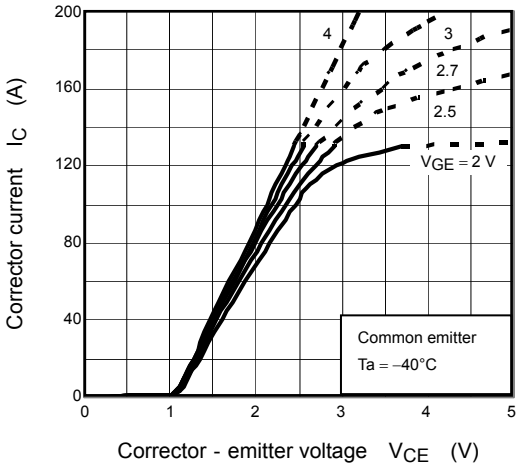



These outside pin are same collector voltage.

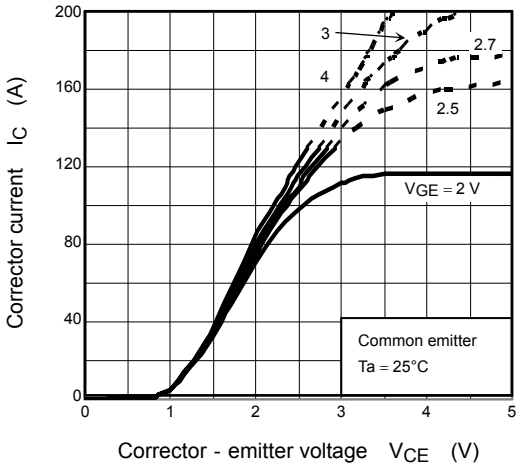
PIN ASSIGNMENT

| | |
|---|---|
| 1, 2, 3 | : Emitter |
| 4 | : Gate |
| 5, 6, 7, 8 | : Collector |

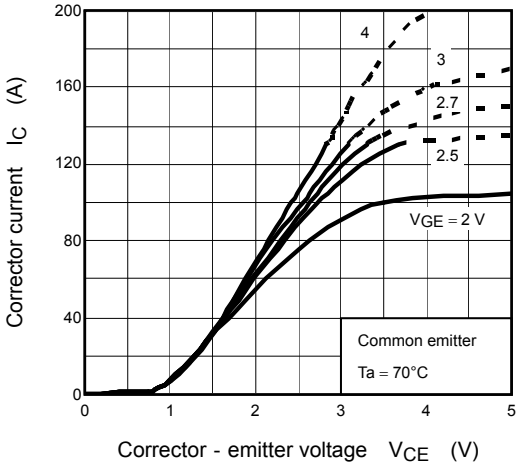
$I_C - V_{CE}$



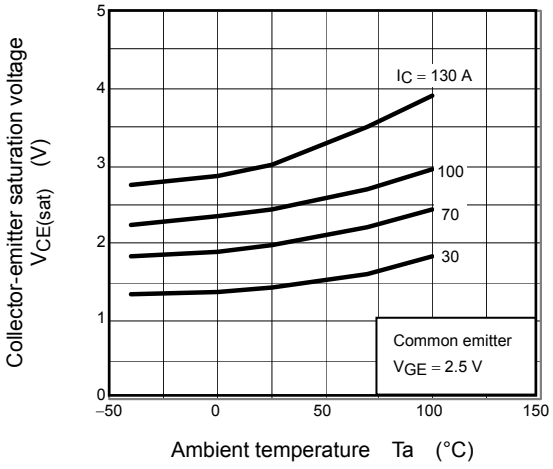

$I_C - V_{CE}$



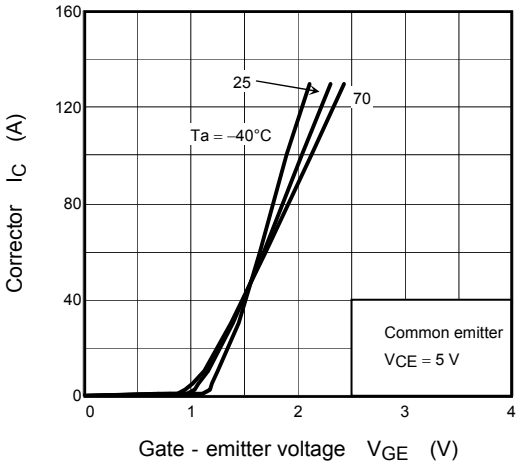

$I_C - V_{CE}$



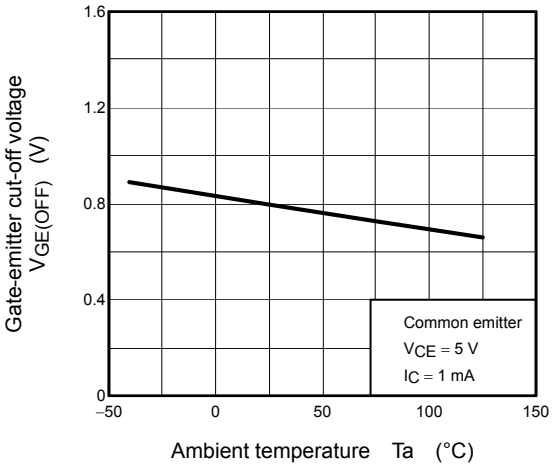

$V_{CE(sat)} - Ta$



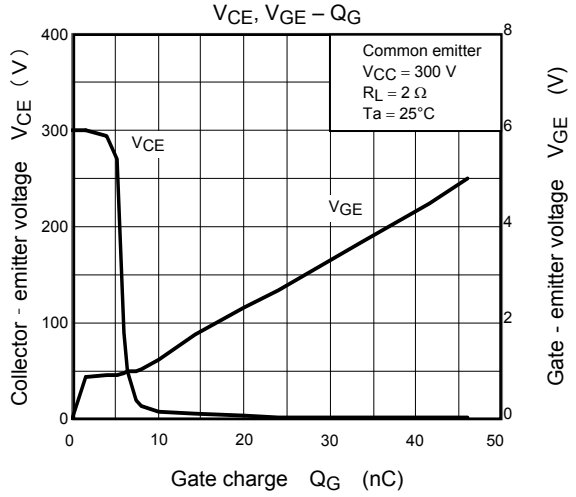

$I_C - V_{GE}$



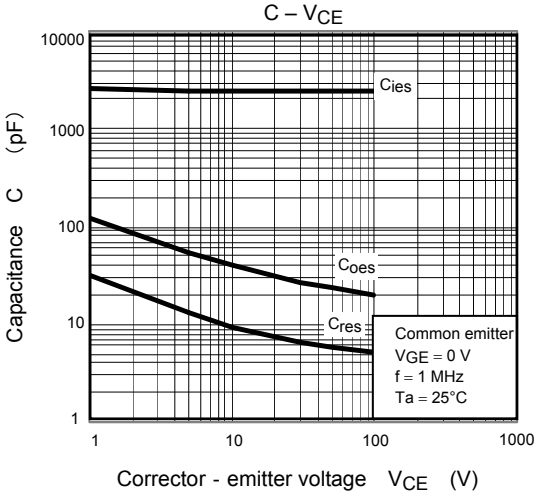

$V_{GE(OFF)} - Ta$



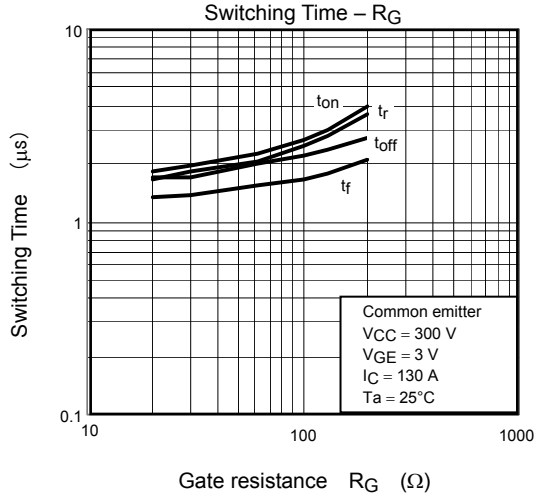
$V_{CE}$, $V_{GE}$ – $Q_G$



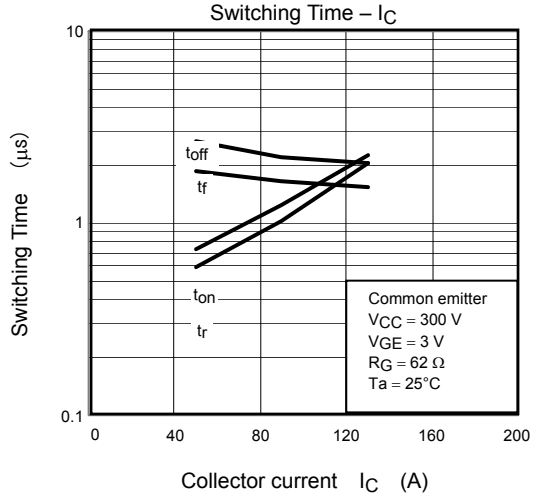

C – $V_{CE}$



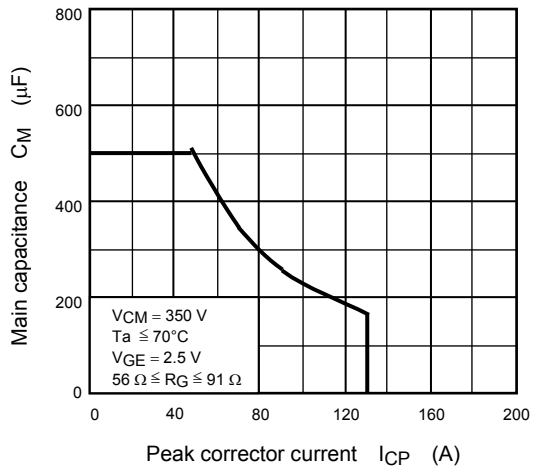

Switching Time – $R_G$



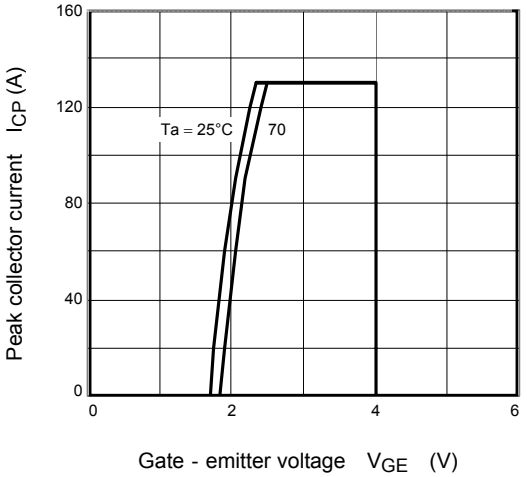

Switching Time – $I_C$




Maximum Operating Area




Minimum Gate Drive Area



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