

GT5G134

1. Applications

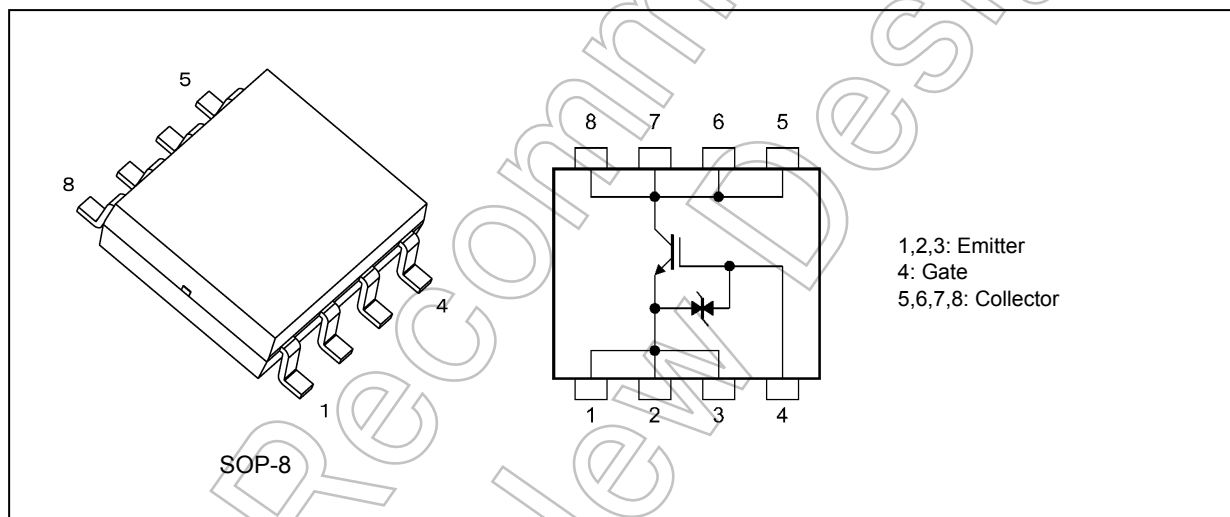
- Dedicated to Photo-Flash Intensity Control Applications
- Dedicated to High-Speed-Switching Photo Flash Applications

Note: The product(s) described herein should not be used for any other application.

2. Features

- (1) Enhancement mode
- (2) High-speed switching: $t_f = 0.6 \mu s$ (typ.) ($I_C = 110 A$)
- (3) 4-V gate drive voltage: $V_{GE} = 4.0 V$ (min) (@ $I_C = 110 A$)
- (4) Peak collector current: $I_{CP} = 110 A$ (max)
- (5) Built-in zener diode between gate and emitter
- (6) SOP-8 package

3. Packaging and Internal Circuit



Start of commercial production

2012-07

4. Absolute Maximum Ratings (Note) ($T_a = 25^\circ\text{C}$, unless otherwise specified)

Characteristics	Symbol	Rating	Unit
Collector-emitter voltage	V_{CES}	400	V
Gate-emitter voltage (DC)	V_{GES}	± 6	
Gate-emitter voltage (pulsed)		± 8	
Collector current (pulsed) (Note 1)	I_{CP}	110	A
Collector power dissipation (t = 10 s) (Note 2)	$P_{C(1)}$	1.9	W
Collector power dissipation (t = 10 s) (Note 3)	$P_{C(2)}$	1.0	
Junction temperature	T_j	150	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 to 150	

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.).

Note 1: Ensure that the junction temperature does not exceed 150°C . Repetitive rating; pulse width limited by maximum channel temperature.

Note 2: Device mounted on a glass-epoxy board (a), Figure 5.1

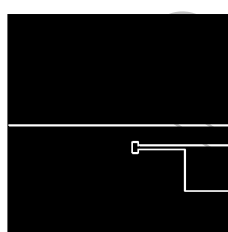
Note 3: Device mounted on a glass-epoxy board (b), Figure 5.2

5. Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Junction-to-ambient thermal resistance (t = 10 s) (Note 2)	$R_{th(j-a)(1)}$	65.8	$^\circ\text{C/W}$
Junction-to-ambient thermal resistance (t = 10 s) (Note 3)	$R_{th(j-a)(2)}$	125	

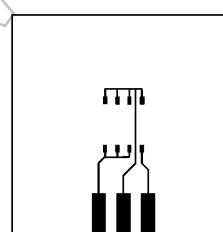
Note 2: Device mounted on a glass-epoxy board (a), Figure 5.1

Note 3: Device mounted on a glass-epoxy board (b), Figure 5.2



FR-4
25.4 × 25.4 × 0.8
(Unit: mm)

Fig. 5.1 Device Mounted on a Glass-Epoxy Board (a)



FR-4
25.4 × 25.4 × 0.8
(Unit: mm)

Fig. 5.2 Device Mounted on a Glass-Epoxy Board (b)

6. Electrical Characteristics

6.1. Static Characteristics ($T_a = 25^\circ\text{C}$, unless otherwise specified)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I_{GES}	$V_{GE} = \pm 6\text{ V}$, $V_{CE} = 0\text{ V}$	—	—	± 1.0	μA
Collector cut-off current	I_{CES}	$V_{CE} = 400\text{ V}$, $V_{GE} = 0\text{ V}$	—	—	10	
Gate-emitter cut-off voltage	$V_{GE(OFF)}$	$I_C = 1\text{ mA}$, $V_{CE} = 5\text{ V}$	1.4	1.6	2.0	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 110\text{ A}$, $V_{GE} = 4\text{ V}$	—	2.2	—	

6.2. Dynamic Characteristics ($T_a = 25^\circ\text{C}$, unless otherwise specified)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Input capacitance	C_{ies}	$V_{CE} = 10\text{ V}$, $V_{GE} = 0\text{ V}$, $f = 1\text{ MHz}$	—	3400	—	pF
Switching time (rise time)	t_r	See Fig. 6.2.1.	—	1.7	—	μs
Switching time (turn-on time)	t_{on}		—	2.0	—	
Switching time (fall time)	t_f		—	0.6	1.0	
Switching time (turn-off time)	t_{off}		—	1.1	—	

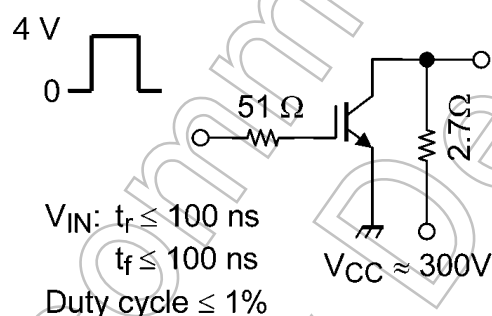


Fig. 6.2.1 Test Circuit of Switching Time

7. Marking (Note)

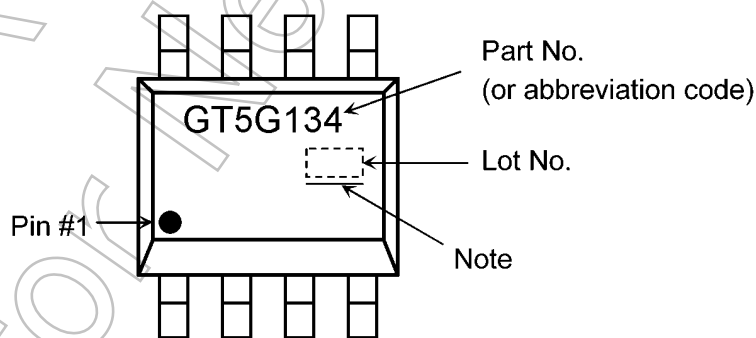


Fig. 7.1 Marking

Note: 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 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.

8. Design Considerations

8.1. Gate resistor selection

The slope of the collector-emitter voltage, dv/dt , during turn-off should be kept below 700 V/ μ s. 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.

8.2. dv/dt Definition

The slope of V_{CE} from 30 V to 90 V

$$dv/dt = (90 \text{ V} - 30 \text{ V})/\Delta t = 60 \text{ V}/\Delta t$$

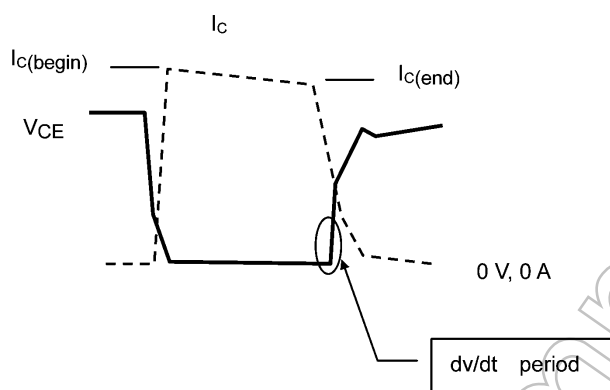


Fig. 8.2.1 Waveform

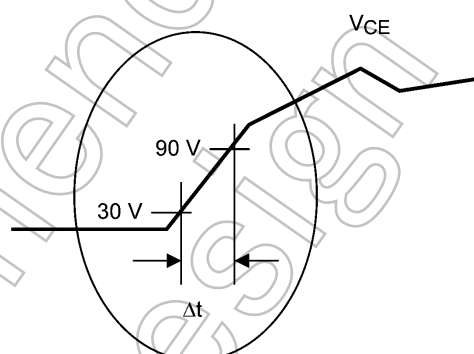


Fig. 8.2.2 Waveform
(Expanded View of the dv/dt Period)

Note: This transistor is sensitive to electrostatic discharge and should be handled with care.

9. Characteristics Curves (Note)

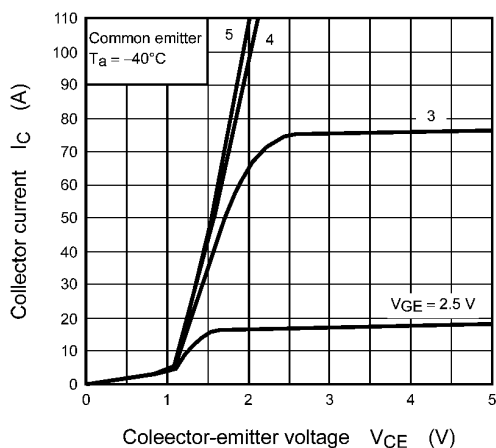


Fig. 9.1 $I_C - V_{CE}$

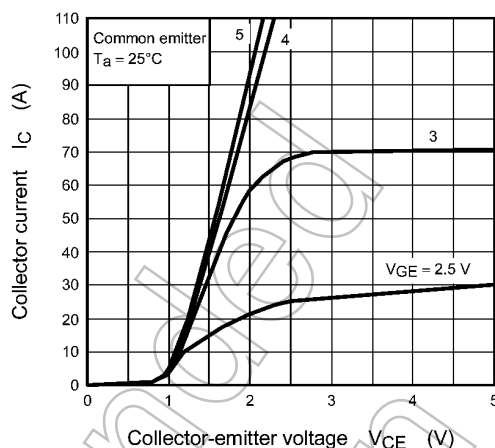


Fig. 9.2 $I_C - V_{CE}$

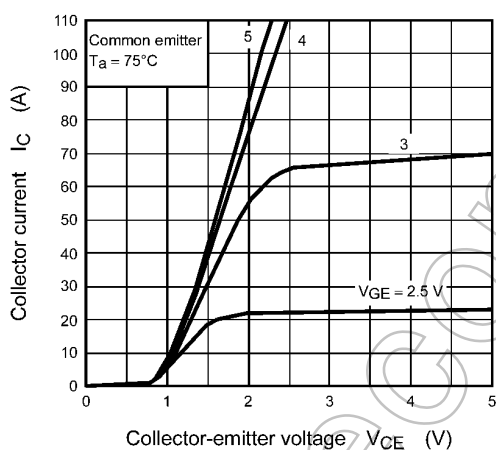


Fig. 9.3 $I_C - V_{CE}$

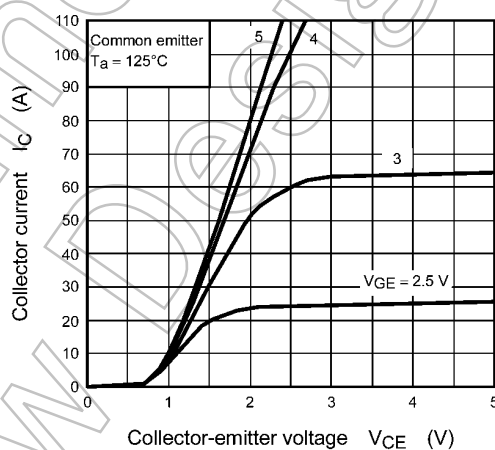


Fig. 9.4 $I_C - V_{CE}$

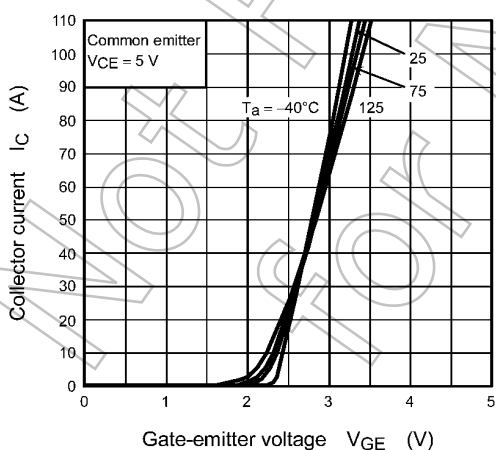


Fig. 9.5 $I_C - V_{GE}$

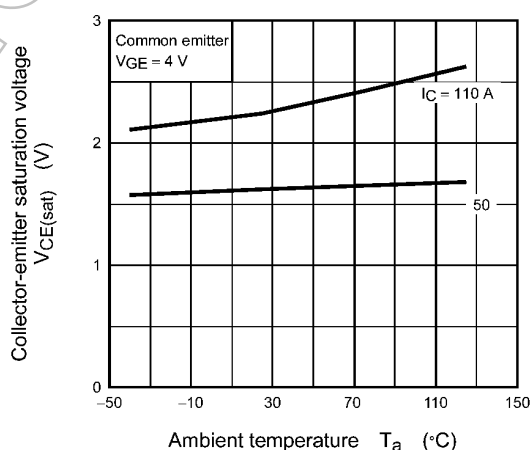


Fig. 9.6 $V_{CE(sat)} - T_a$

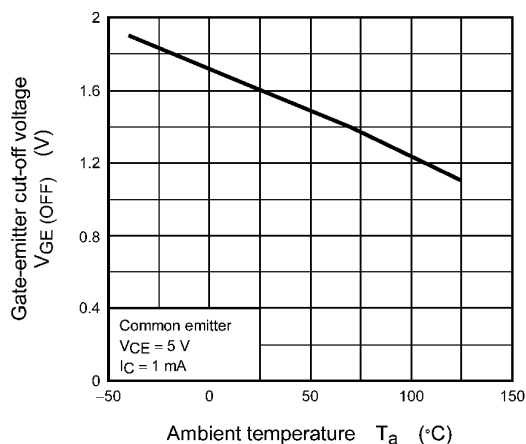


Fig. 9.7 $V_{GE(OFF)} - T_a$

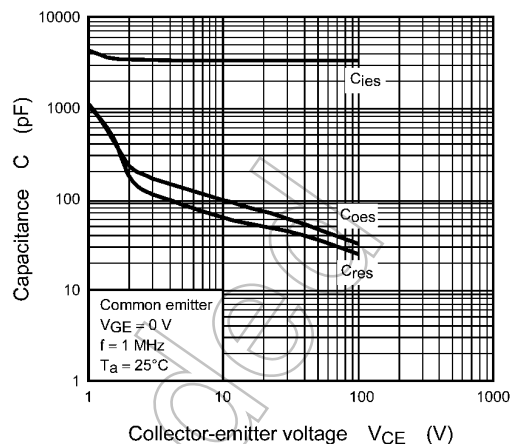


Fig. 9.8 $C - V_{CE}$

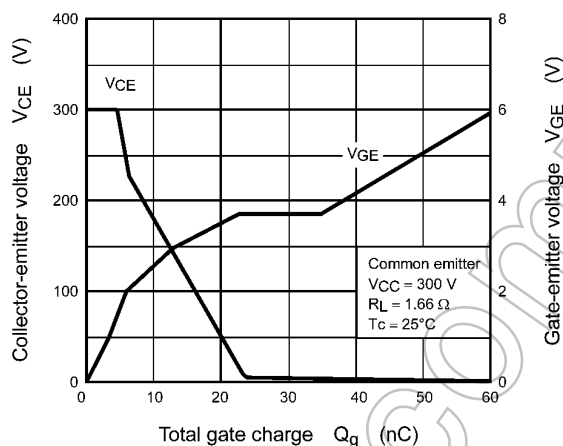


Fig. 9.9 $V_{CE}, V_{GE} - Q_g$

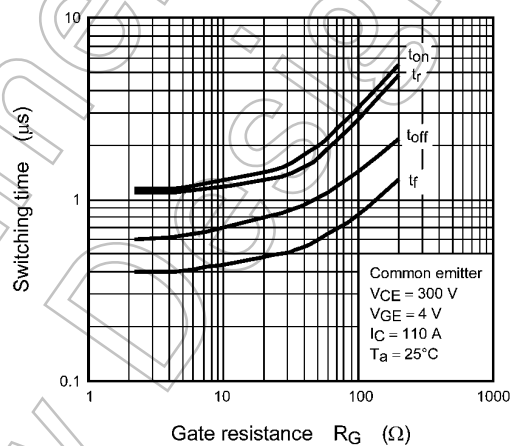


Fig. 9.10 Switching Time - R_G

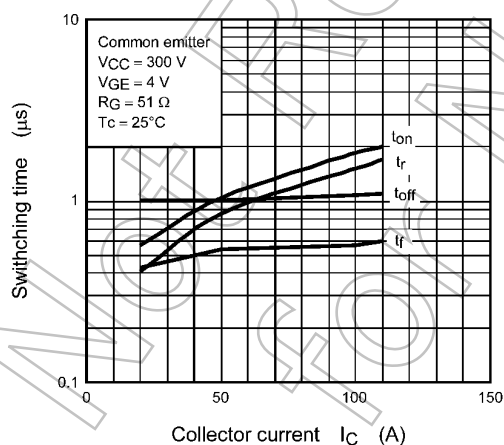


Fig. 9.11 Switching Time - I_C

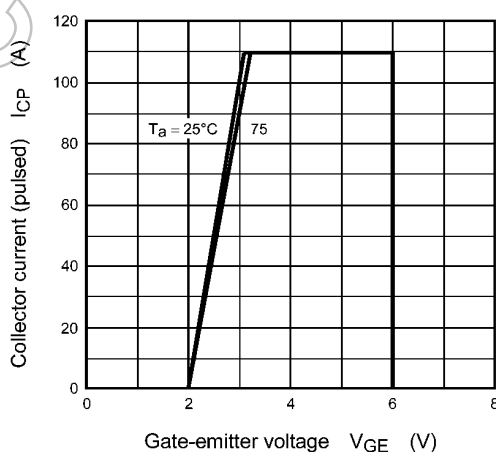
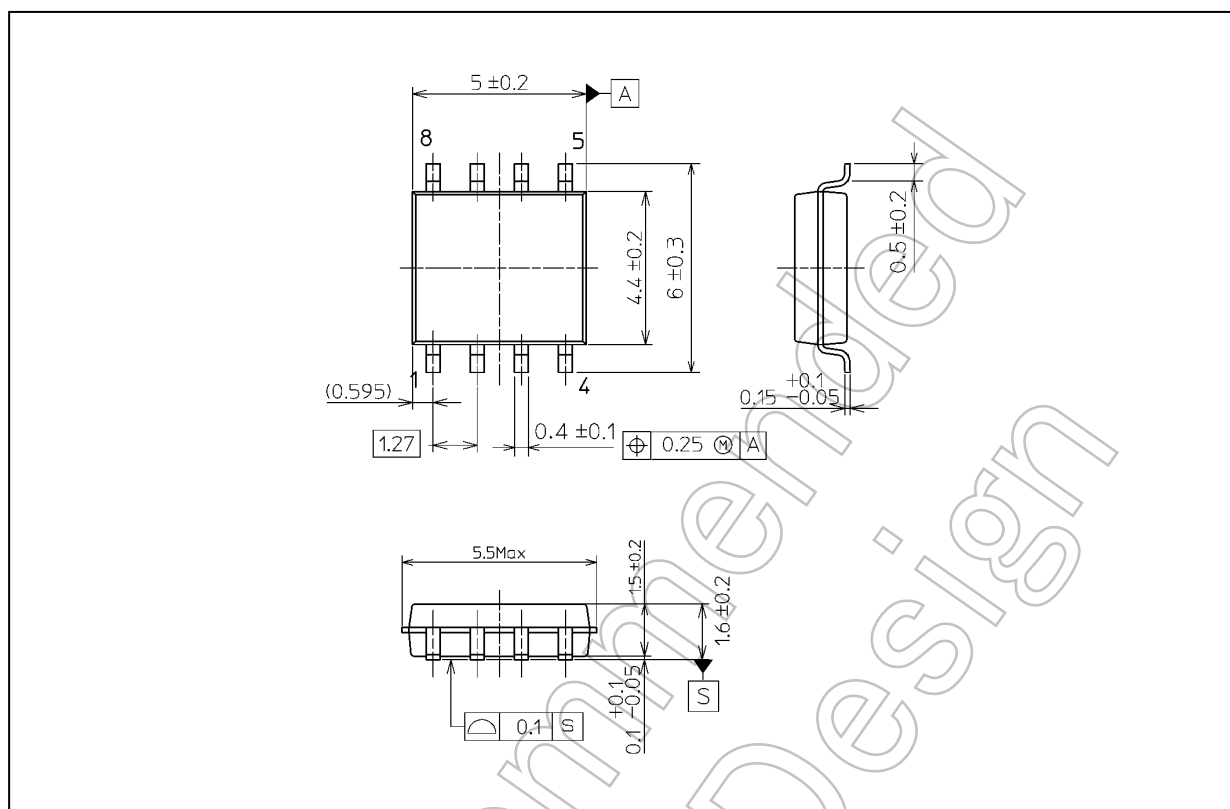


Fig. 9.12 Minimum Gate Drive Area

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

Package Dimensions

Unit: mm



Weight: 0.085 g (typ.)

Package Name(s)
TOSHIBA: 2-6J1S
Nickname: SOP-8

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