

GT5G134

1. Applications

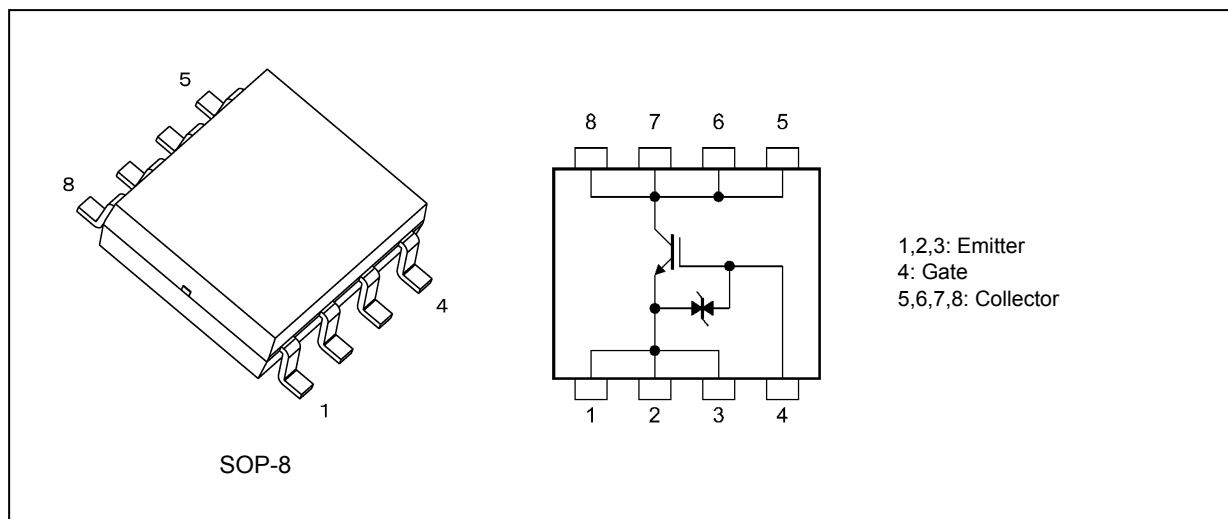
- Dedicated to Photo-Flash Intensity Control Applications
- Dedicated to High-Speed-Switching Photo Flash Applications

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



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

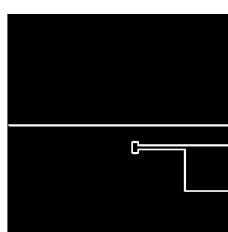
Note 3: Device mounted on a glass-epoxy board (b), Figure 5.2

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 | |

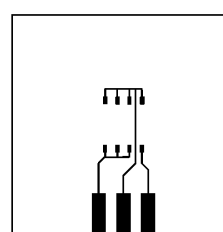
Note 2: Device mounted on a glass-epoxy board (a), Figure 5.1

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 | — | |

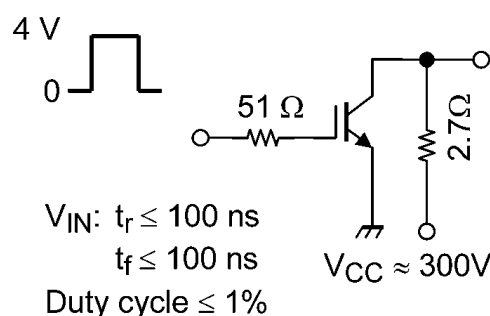


Fig. 6.2.1 Test Circuit of Switching Time

7. Marking (Note)

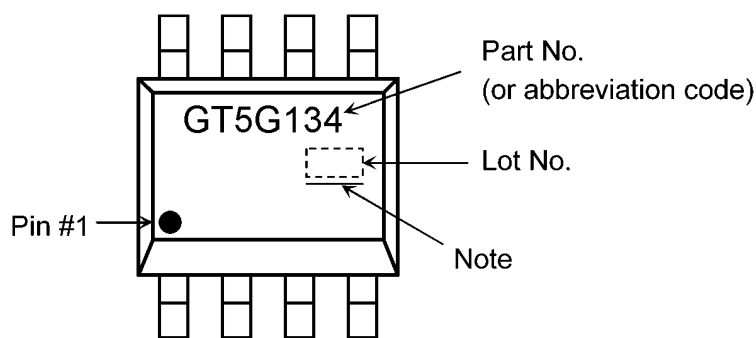


Fig. 7.1 Marking

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 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.

8. Design Considerations

8.1. Gate resistor selection

The slope of the collector-emitter voltage, dv/dt , during turn-off should be kept below $700 \text{ V}/\mu\text{s}$. 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 51Ω or greater is recommended.

8.2. dv/dt Definition

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

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

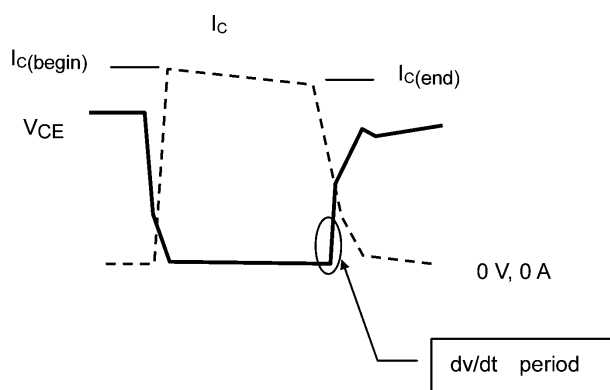


Fig. 8.2.1 Waveform

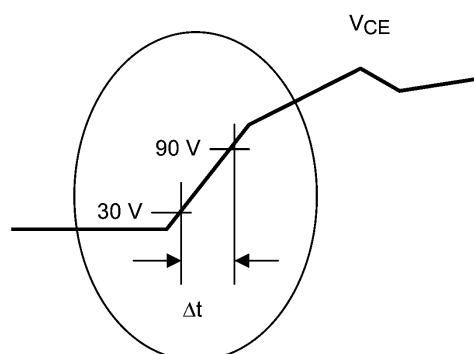


Fig. 8.2.2 Waveform
(Expanded View of the dv/dt Period)

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

9. Characteristics Curves (Note)

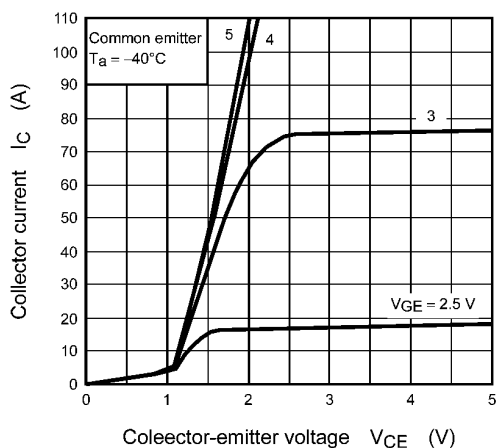


Fig. 9.1 $I_C - V_{CE}$

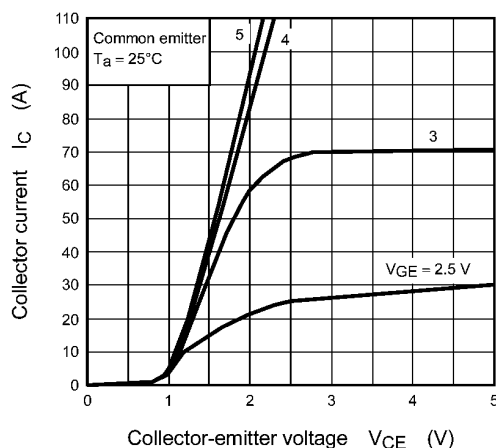


Fig. 9.2 $I_C - V_{CE}$

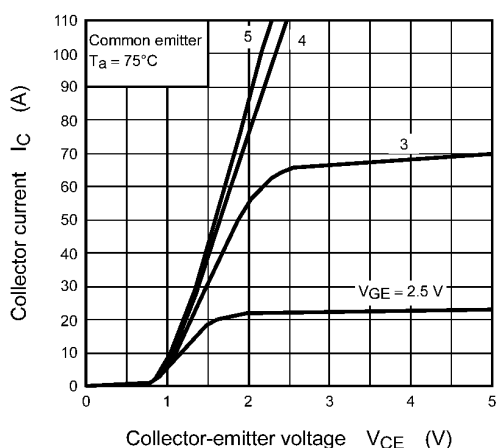


Fig. 9.3 $I_C - V_{CE}$

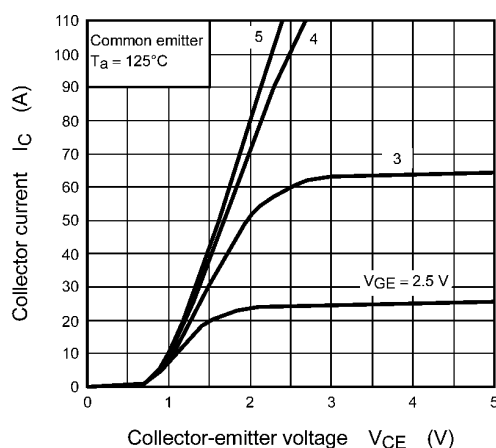


Fig. 9.4 $I_C - V_{CE}$

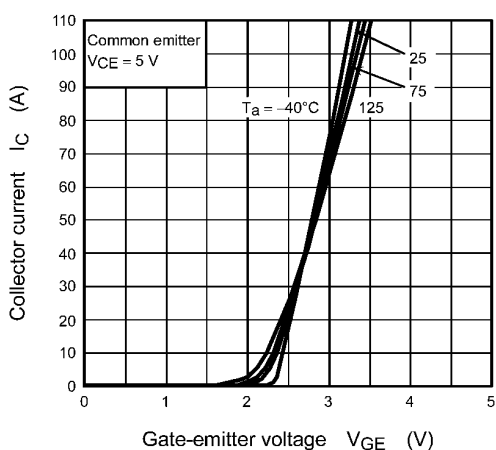


Fig. 9.5 $I_C - V_{GE}$

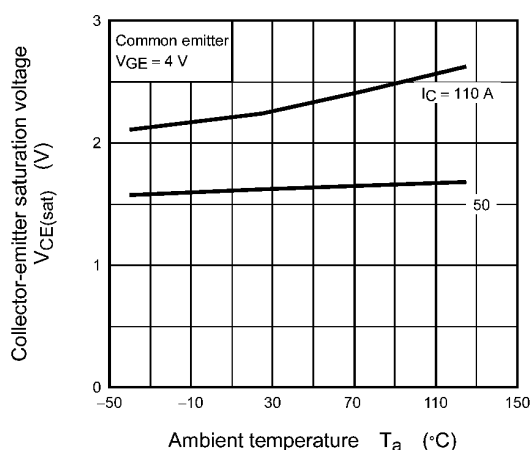


Fig. 9.6 $V_{CE(sat)} - T_a$

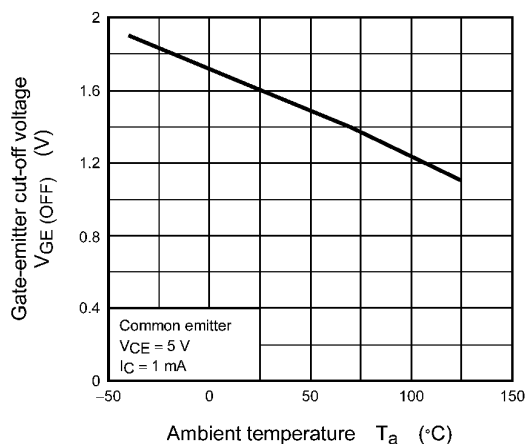


Fig. 9.7 $V_{GE(OFF)} - T_a$

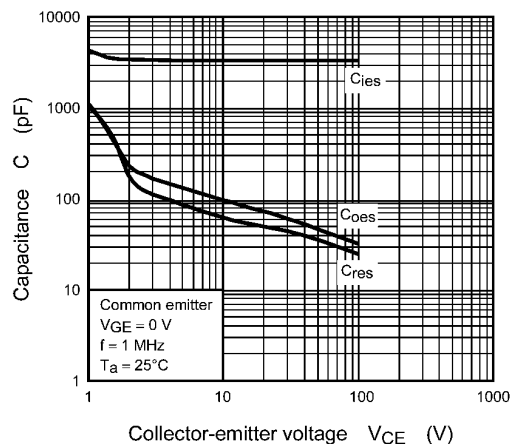


Fig. 9.8 $C - V_{CE}$

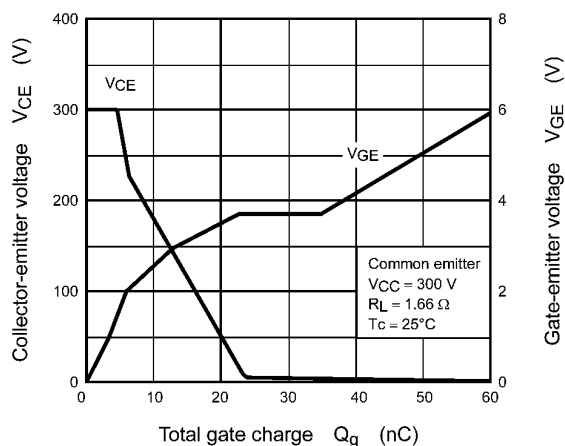


Fig. 9.9 $V_{CE}, V_{GE} - Q_g$

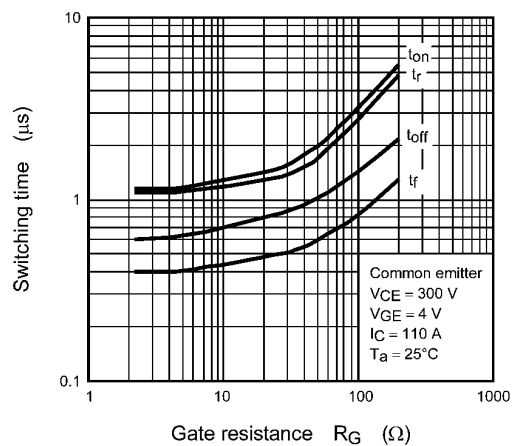


Fig. 9.10 Switching Time - R_G

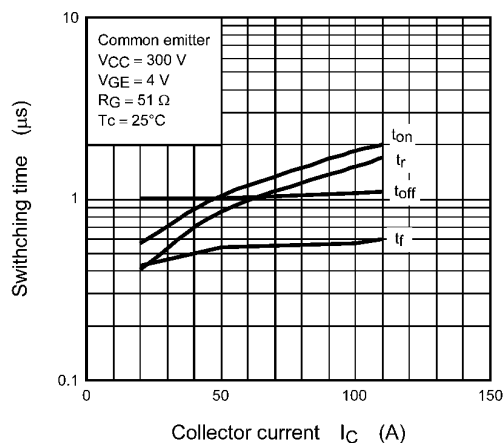


Fig. 9.11 Switching Time - I_C

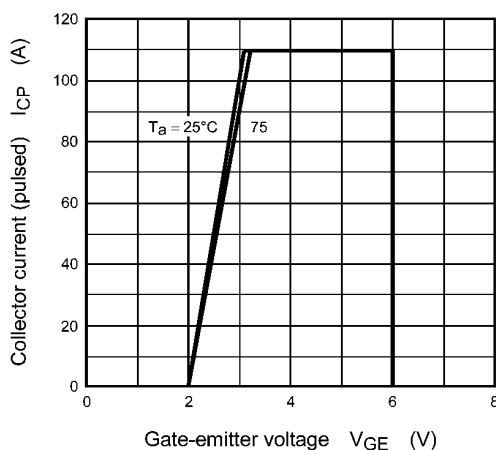
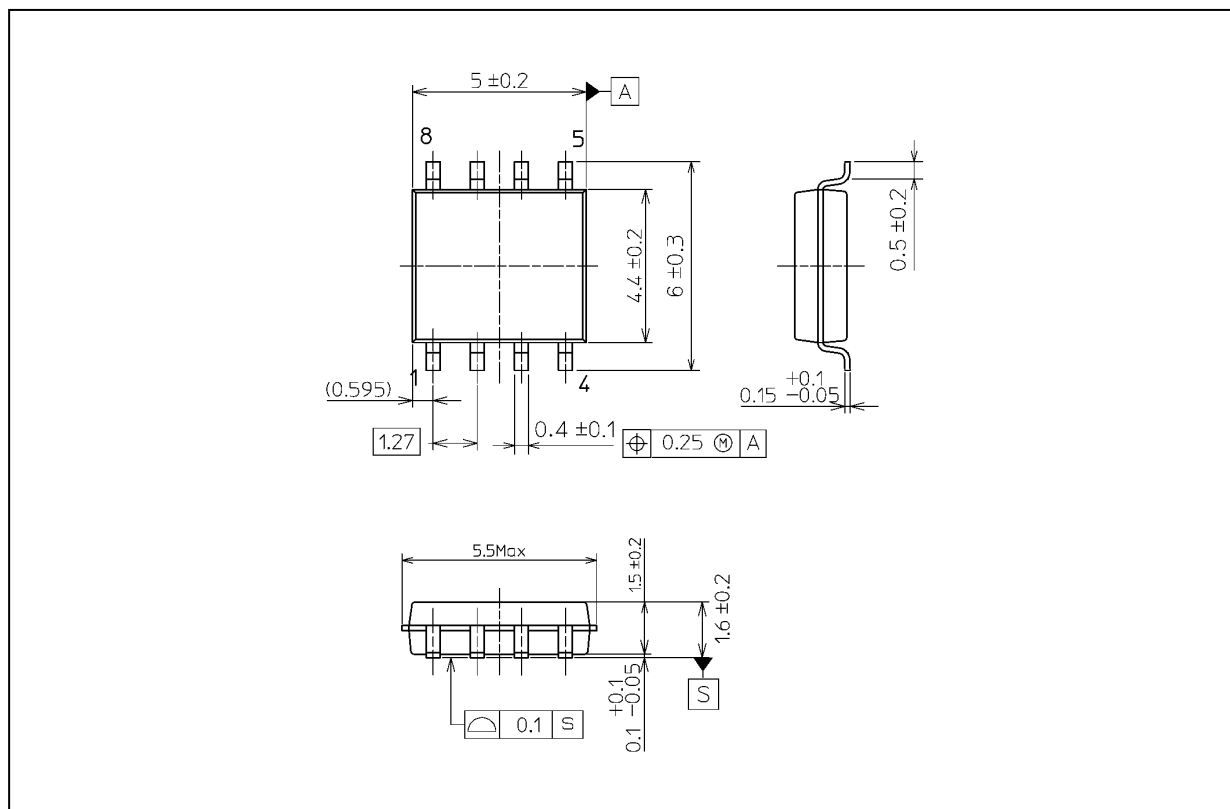


Fig. 9.12 Minimum Gate Drive Area

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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