

Discrete IGBTs Silicon N-Channel IGBT

# GT5G134

### 1. Applications

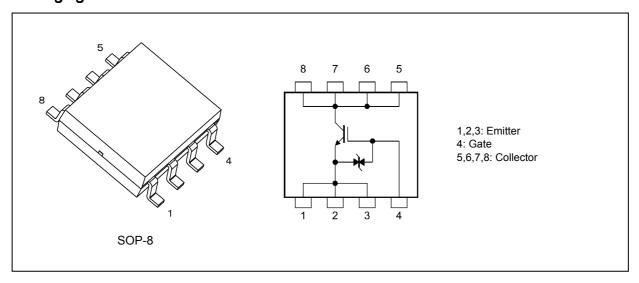
- Dedicated to Photo-Flash Intensity Control Applications
- · Dedicated to High-Speed-Switching Photo Flash Applications

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:  $V_{GE} = 4.0 \text{ V (min)}$  (@ $I_{C} = 110 \text{ A}$ )
- (4) Peak collector current:  $I_{CP} = 110 \text{ A (max)}$
- (5) Built-in zener diode between gate and emitter
- (6) SOP-8 package

### 3. Packaging and Internal Circuit





# 4. Absolute Maximum Ratings (Note) (Ta = 25°C, unless otherwise specified)

Characteristics			Symbol	Rating	Unit
Collector-emitter voltage			V <sub>CES</sub>	400	V
Gate-emitter voltage (DC)			V <sub>GES</sub>	±6	
Gate-emitter voltage (pulsed)				±8	
Collector current (pulsed)		(Note 1)	I <sub>CP</sub>	110	Α
Collector power dissipation	(t = 10 s)	(Note 2)	P <sub>C(1)</sub>	1.9	W
Collector power dissipation	(t = 10 s)	(Note 3)	P <sub>C(2)</sub>	1.0	
Junction temperature			Tj	150	°C
Storage temperature			T <sub>stg</sub>	-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 <sub>th(j-a)(1)</sub>	65.8	°C/W
Junction-to-ambient thermal resistance	(t = 10 s)	(Note 3)	R <sub>th(j-a)(2)</sub>	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

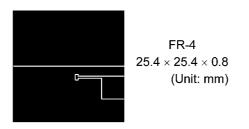


Fig. 5.1 Device Mounted on a Glass-Epoxy Board (a)

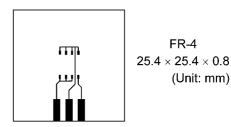


Fig. 5.2 Device Mounted on a Glass-Epoxy Board (b)

#### 6. Electrical Characteristics

# 6.1. Static Characteristics (T<sub>a</sub> = 25°C, unless otherwise specified)

Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Gate leakage current	I <sub>GES</sub>	$V_{GE} = \pm 6 \text{ V}, V_{CE} = 0 \text{ V}$	_		±1.0	μΑ
Collector cut-off current	I <sub>CES</sub>	V <sub>CE</sub> = 400 V, V <sub>GE</sub> = 0 V	_	_	10	
Gate-emitter cut-off voltage	V <sub>GE(OFF)</sub>	I <sub>C</sub> = 1 mA, V <sub>CE</sub> = 5 V	1.4	1.6	2.0	V
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	I <sub>C</sub> = 110 A, V <sub>GE</sub> = 4 V	_	2.2	_	

# 6.2. Dynamic Characteristics (T<sub>a</sub> = 25°C, unless otherwise specified)

Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Input capacitance	C <sub>ies</sub>	V <sub>CE</sub> = 10V, V <sub>GE</sub> = 0V, f = 1MHz	_	3400	_	pF
Switching time (rise time)	t <sub>r</sub>	See Fig. 6.2.1.	_	1.7	_	μS
Switching time (turn-on time)	t <sub>on</sub>	1	_	2.0	_	
Switching time (fall time)	t <sub>f</sub>		_	0.6	1.0	
Switching time (turn-off time)	t <sub>off</sub>	1	_	1.1	_	1

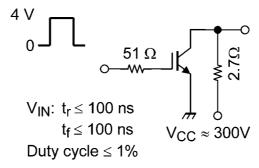
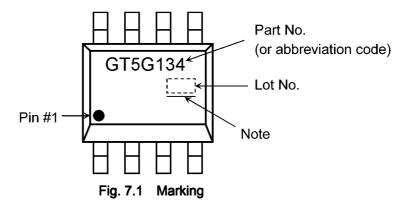


Fig. 6.2.1 Test Circuit of Switching Time

## 7. Marking (Note)



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/ $\mu$ 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  $\Omega$  or greater is recommended.

#### 8.2. dv/dt Definition

The slope of  $V_{CE}$  from 30 V to 90 V dv/dt = (90 V-30 V)/ $\Delta t$ ) = 60 V/ $\Delta t$ 

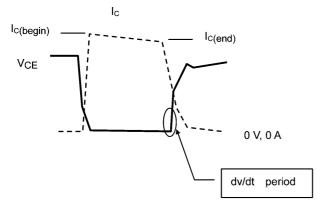


Fig. 8.2.1 Waveform

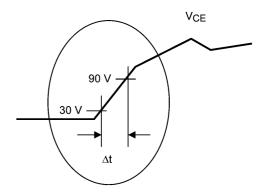
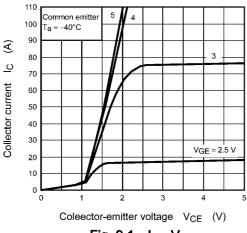


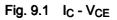
Fig. 8.2.2 Waveform (Expanded View of the dv/dt Period)

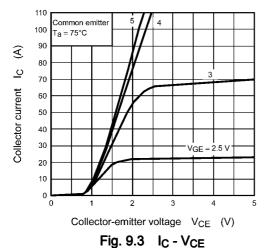
Note: This transistor is sensitive to electrostatic discharge and should be handled with care.

Rev.2.0

### 9. Characteristics Curves (Note)







110

100

Common emitte

VCE = 5 V

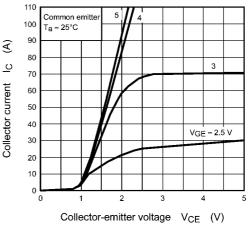


Fig. 9.2 I<sub>C</sub> - V<sub>CE</sub>

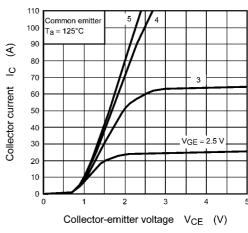


Fig. 9.4 I<sub>C</sub> - V<sub>CE</sub>

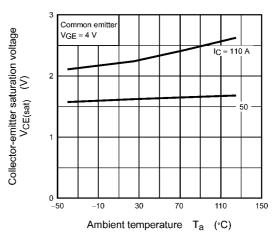
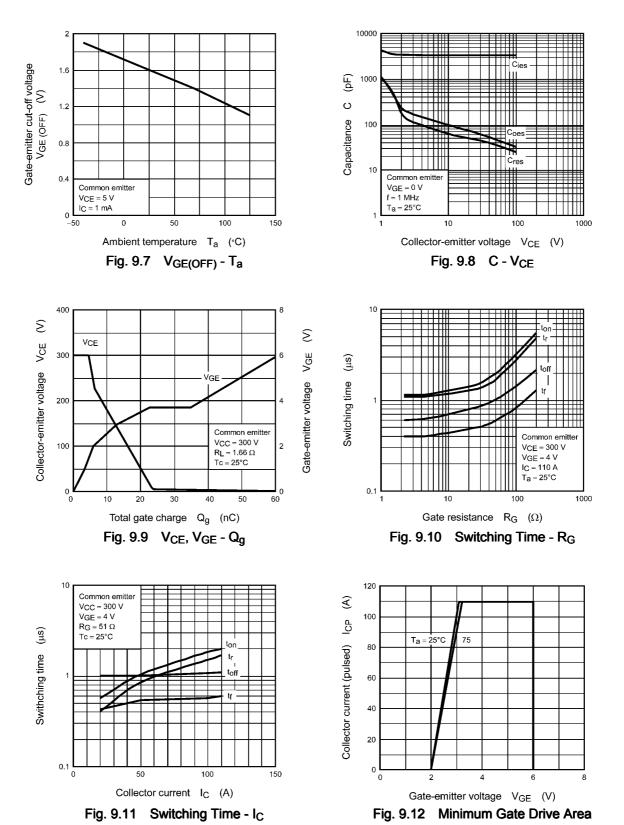


Fig. 9.6 V<sub>CE(sat)</sub> - T<sub>a</sub>

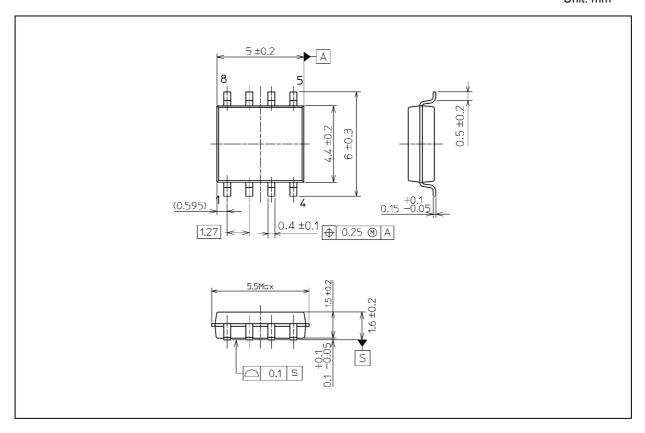


Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



# **Package Dimensions**

Unit: mm



Weight: 0.085 g (typ.)

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



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