

# TTC13003L

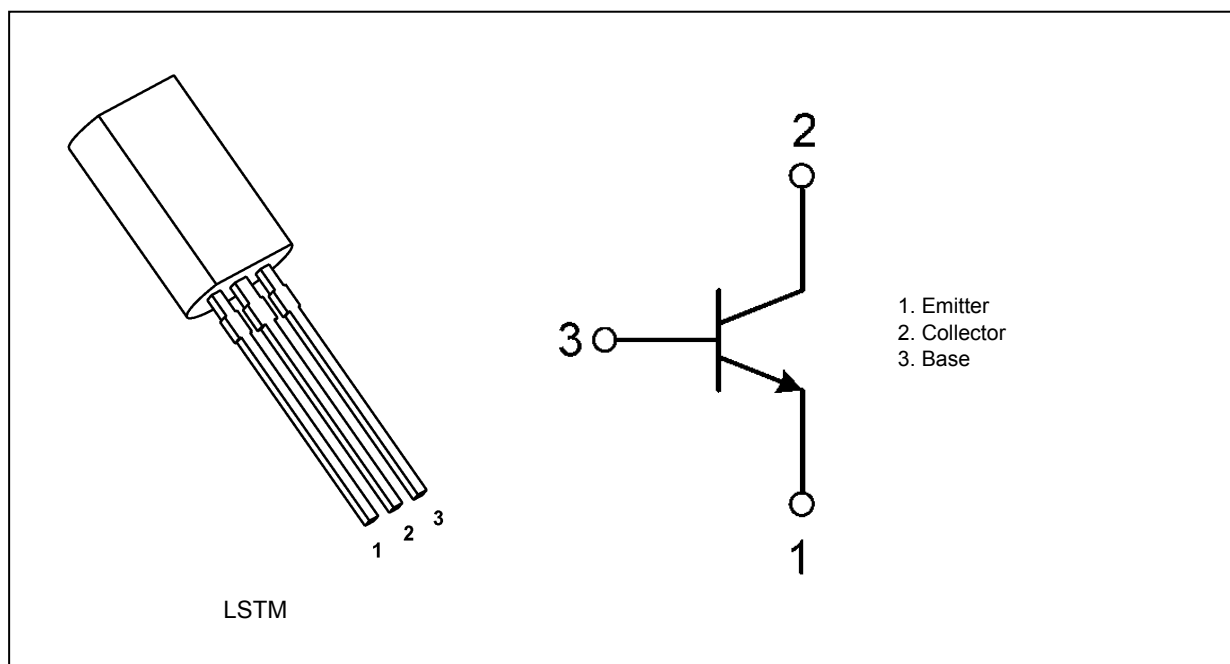
## 1. Applications

- High-Speed Switching for Inverter Lighting Equipment

## 2. Features

- (1) Suitable for RCC circuits.(guaranteed small current  $h_{FE}$ )  
 $h_{FE} = 10(\min)(I_C = 1 \text{ mA})$
- (2) High speed:  $t_f = 0.2 \mu\text{s}(\text{typ.}) (I_C = 0.24 \text{ A})$
- (3) High breakdown voltage:  $V_{CBO} = 600 \text{ V}, V_{CEO} = 400 \text{ V}$

## 3. Packaging and Internal Circuit



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

Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	600	V
Collector-emitter voltage	$V_{CEO}$	400	
Emitter-base voltage	$V_{EBO}$	9	
Collector current (DC) (Note 1)	$I_C$	1.5	A
Collector current (pulsed) ( $t \leq 10 \text{ ms}$ ) (Note 1)	$I_{CP}$	2	
Base current	$I_B$	1.5	
Collector power dissipation	$P_C$	0.9	W
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  $150^\circ\text{C}$ .

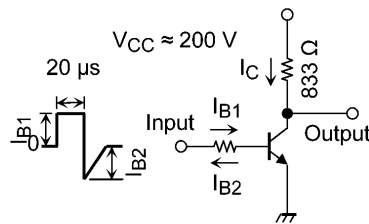
**5. Electrical Characteristics**

**5.1. Static Characteristics (Unless otherwise specified,  $T_a = 25^\circ\text{C}$ )**

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB} = 600\text{ V}, I_E = 0\text{ A}$	—	—	1	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB} = 9\text{ V}, I_C = 0\text{ A}$	—	—	1	
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C = 1\text{ mA}, I_E = 0\text{ A}$	600	—	—	V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 10\text{ mA}, I_B = 0\text{ A}$	400	—	—	
DC current gain	$h_{FE(1)}$	$V_{CE} = 5\text{ V}, I_C = 1\text{ mA}$	10	—	—	—
	$h_{FE(2)}$	$V_{CE} = 5\text{ V}, I_C = 0.04\text{ A}$	15	—	30	
	$h_{FE(3)}$	$V_{CE} = 5\text{ V}, I_C = 0.5\text{ A}$	4	—	—	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 0.2\text{ A}, I_B = 25\text{ mA}$	—	—	1	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C = 0.2\text{ A}, I_B = 25\text{ mA}$	—	—	1.3	

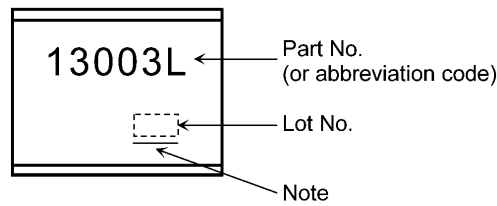
**5.2. Dynamic Characteristics (Unless otherwise specified,  $T_a = 25^\circ\text{C}$ )**

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Switching time (rise time)	$t_r$	See Figure 5.2.1	—	0.4	—	$\mu\text{s}$
Switching time (storage time)	$t_{stg}$	$V_{CC} \approx 200\text{ V}, R_L = 833\ \Omega,$ $I_{B1} = 0.03\text{ A}, I_{B2} = -0.06\text{ A},$	—	1.4	—	
Switching time (fall time)	$t_f$	Duty cycle $\leq 1\%$	—	0.2	—	



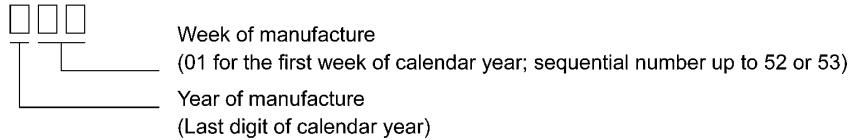
$I_{B1} = 0.03\text{ A}, I_{B2} = -0.06\text{ A},$   
Duty cycle  $\leq 1\%$

**Fig. 5.2.1 Switching Time Test Circuit**

**6. Marking (Note)****Fig. 6.1 Marking**

Lot No. :

Weekly code (Three digits)



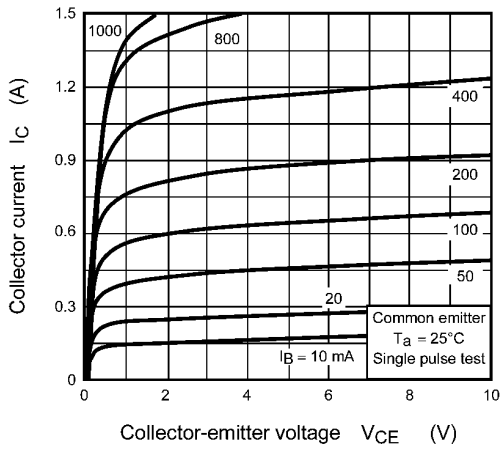
Note: A line under a Lot No. identifies the indication of product Labels.

[[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

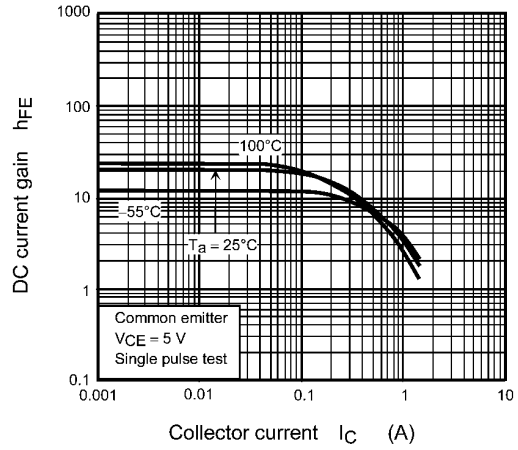
Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product.

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.

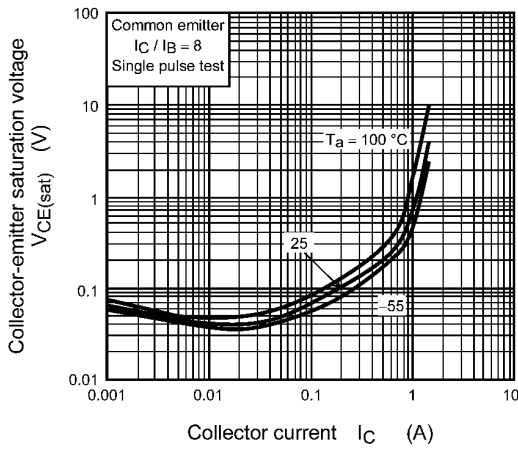
**7. Characteristics Curves (Note)**



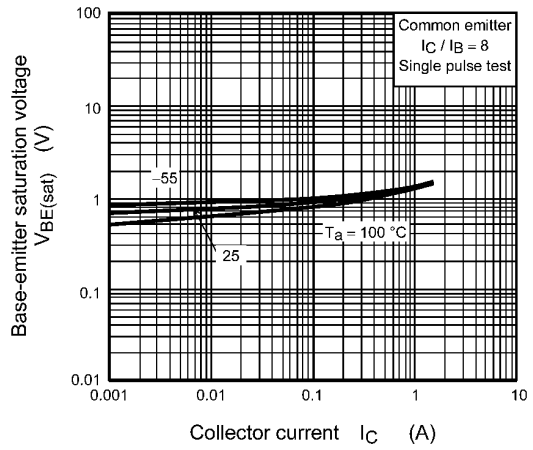
**Fig. 7.1  $I_C - V_{CE}$**



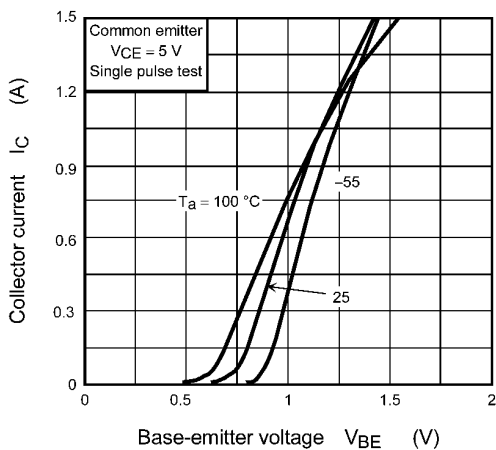
**Fig. 7.2  $h_{FE} - I_C$**



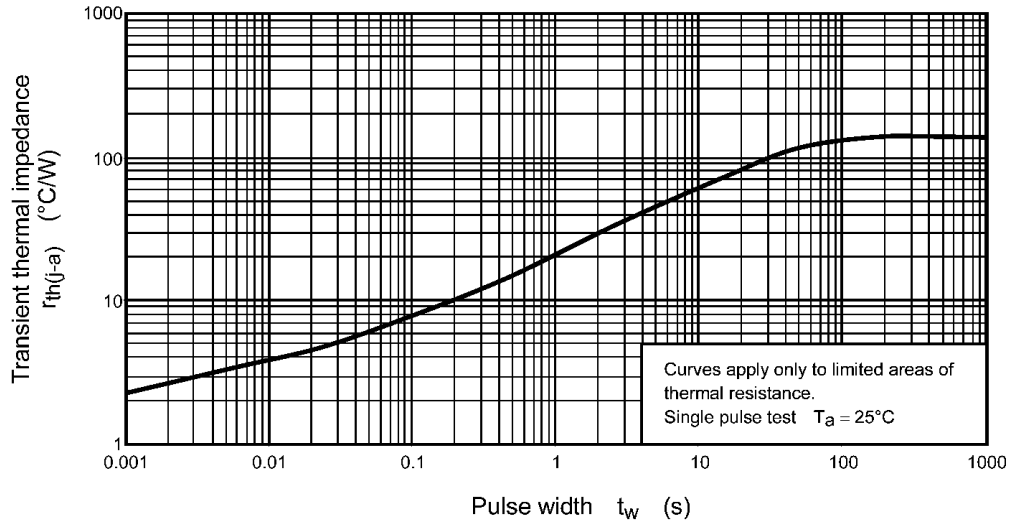
**Fig. 7.3  $V_{CE(sat)} - I_C$**



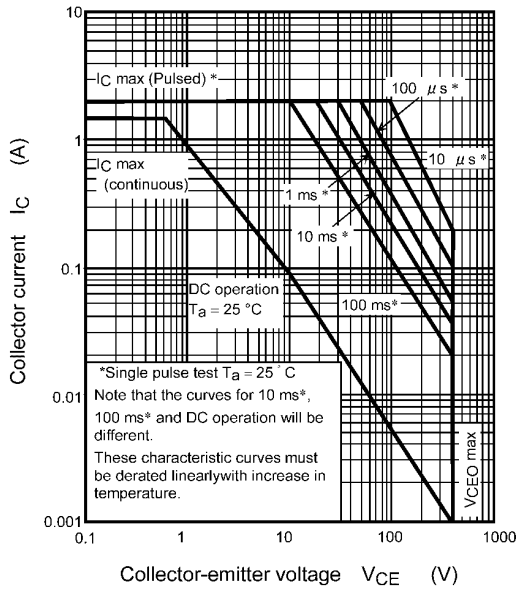
**Fig. 7.4  $V_{BE(sat)} - I_C$**



**Fig. 7.5  $I_C - V_{BE}$**



**Fig. 7.6  $r_{th(j-a)} - t_w$   
(Guaranteed Maximum)**

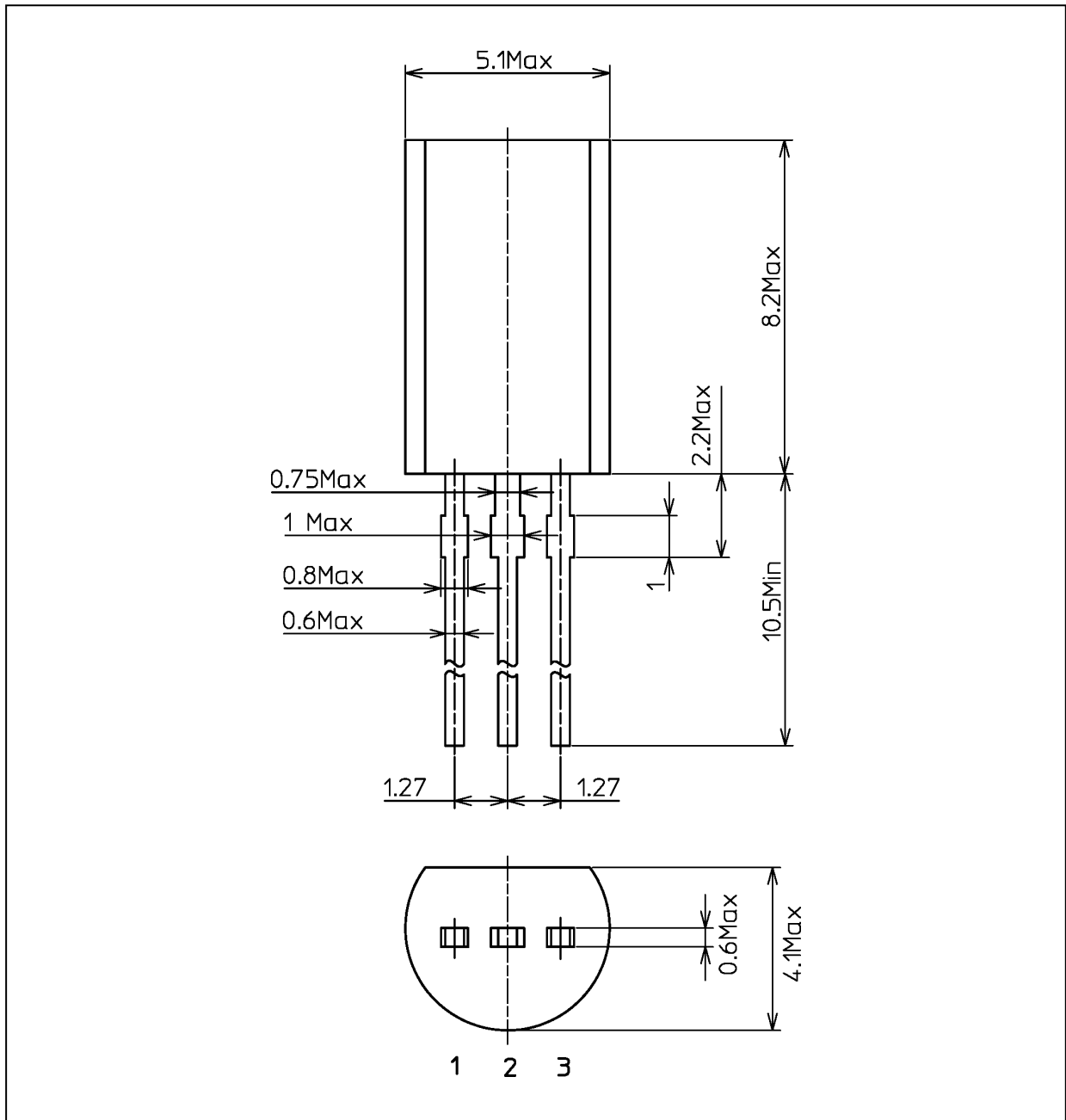


**Fig. 7.7 Safe Operating Area  
(Guaranteed Maximum)**

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

Package Dimensions

Unit: mm



Weight: 0.36 g (typ.)

Package Name(s)
Nickname: LSTM

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