

TOSHIBA Transistor Silicon PNP Triple Diffused Type

# 2SA1971

## High-Voltage Switching Applications

- High breakdown voltage:  $V_{CEO} = -400\text{ V}$

### Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

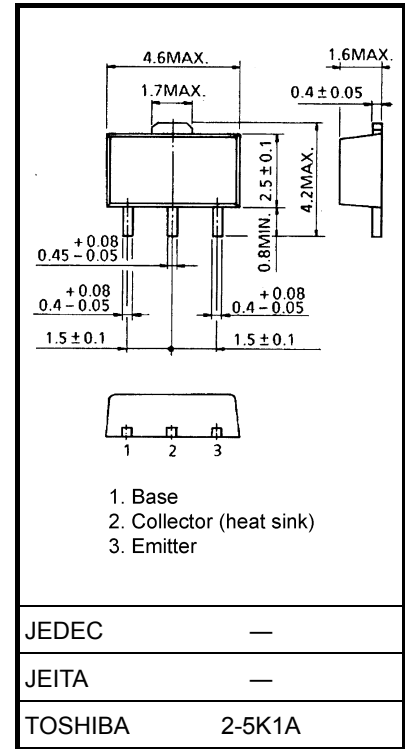
Characteristics		Symbol	Rating	Unit
Collector-base voltage		$V_{CBO}$	-400	V
Collector-emitter voltage		$V_{CEO}$	-400	V
Emitter-base voltage		$V_{EBO}$	-7	V
Collector current	DC	$I_C$	-0.5	A
	Pulse	$I_{CP}$	-1	
Base current		$I_B$	-0.25	A
Collector power dissipation	$T_a = 25^\circ\text{C}$	$P_C$	500	mW
	$T_a = 25^\circ\text{C}$ (Note 1)		1000	
Junction temperature		$T_j$	150	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-55 to 150	$^\circ\text{C}$

Note 1: Mounted on a ceramic substrate  $250\text{ mm}^2 \times 0.8\text{ t}$

Note 2: 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).

Unit: mm



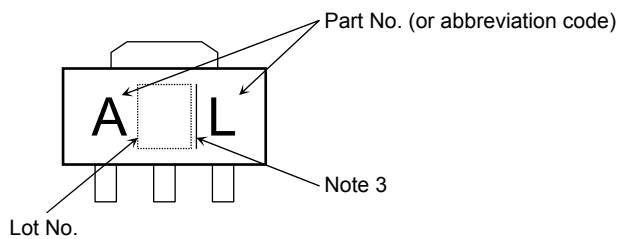
Weight: 0.05 g (typ.)

Start of commercial production  
1995-07

## Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		$I_{CBO}$	$V_{CB} = -400\text{ V}, I_E = 0$	—	—	-10	$\mu\text{A}$
Emitter cut-off current		$I_{EBO}$	$V_{EB} = -7\text{ V}, I_C = 0$	—	—	-1	$\mu\text{A}$
Collector-emitter breakdown voltage		$V_{(BR) CEO}$	$I_C = -10\text{ mA}, I_B = 0$	-400	—	—	V
DC current gain		$h_{FE} (1)$	$V_{CE} = -5\text{ V}, I_C = -20\text{ mA}$	140	—	450	
		$h_{FE} (2)$	$V_{CE} = -5\text{ V}, I_C = -100\text{ mA}$	140	—	400	
Collector-emitter saturation voltage		$V_{CE (sat)}$	$I_C = -100\text{ mA}, I_B = -10\text{ mA}$	—	-0.4	-1.0	V
Base-emitter saturation voltage		$V_{BE (sat)}$	$I_C = -100\text{ mA}, I_B = -10\text{ mA}$	—	-0.76	-0.9	V
Transition frequency		$f_T$	$V_{CE} = -5\text{ V}, I_C = -50\text{ mA}$	—	35	—	MHz
Collector output capacitance		$C_{ob}$	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	18	—	pF
Switching time	Turn-on time	$t_{on}$	<p><math>I_{B1} = 10\text{ mA}, I_{B2} = 20\text{ mA},</math> duty cycle <math>\leq 1\%</math></p>	—	0.2	—	$\mu\text{s}$
	Storage time	$t_{stg}$		—	2.3	—	
	Fall time	$t_f$		—	0.2	—	

## Marking

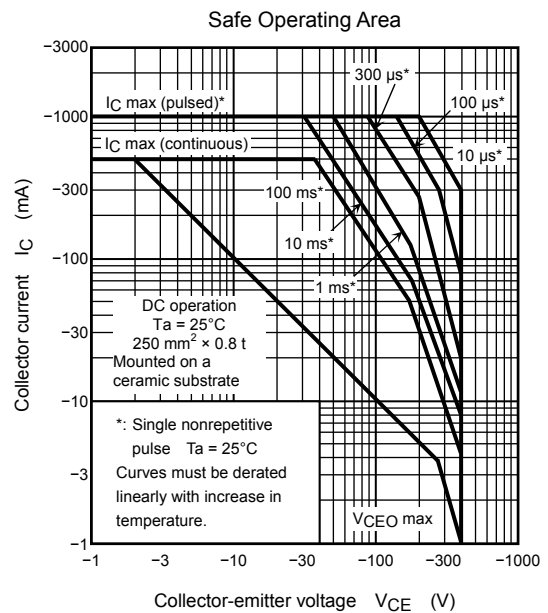
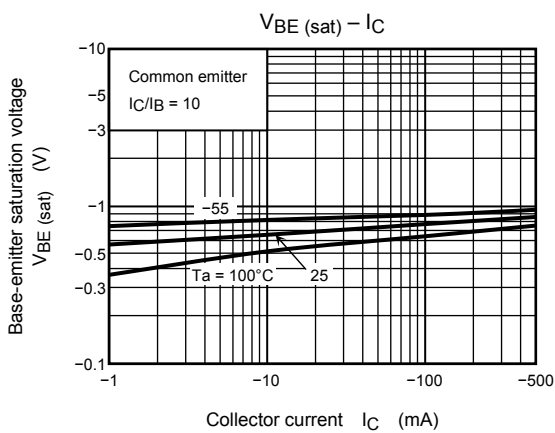
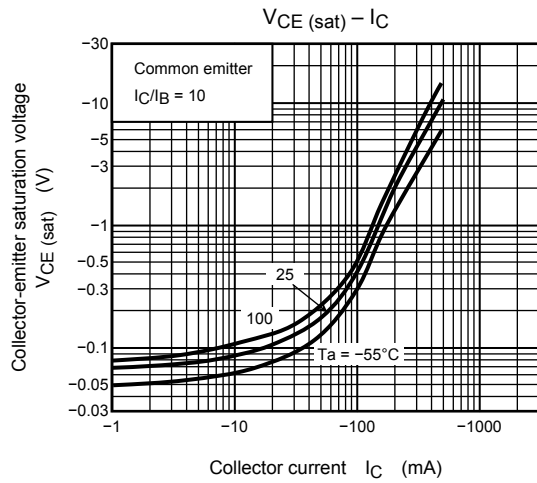
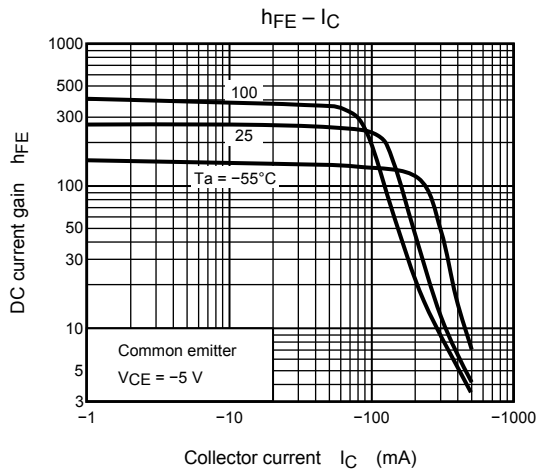
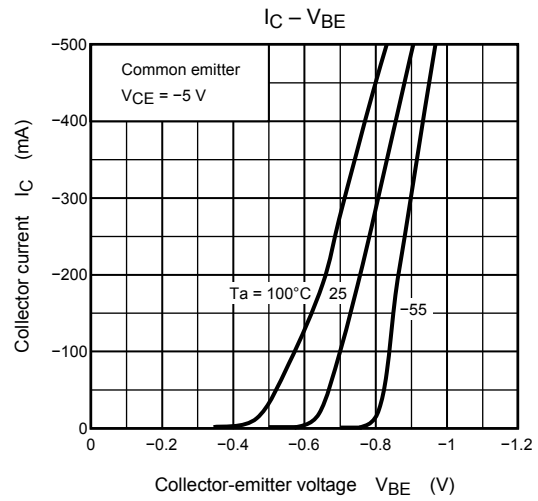
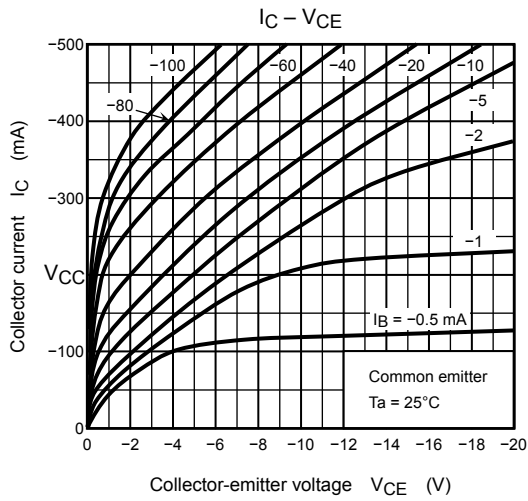


Note 3: A line to the right of a Lot No. identifies the indication of product Labels.

Without a line:  $[[Pb]]/INCLUDES > MCV$

With a line:  $[[G]]/RoHS COMPATIBLE$  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.



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