

TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process)

## 2SC4409

Power Amplifier Applications

Power switching applications

- Low collector saturation voltage:  $V_{CE(sat)} = 0.5V$  (max) (at  $I_C = 1A$ )
- High speed switching time:  $t_{stg} = 500ns$  (typ.)
- Small flat package
- $P_C = 1\sim 2$  W (Mounted on a ceramic substrate)
- Complementary to 2SA1681

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

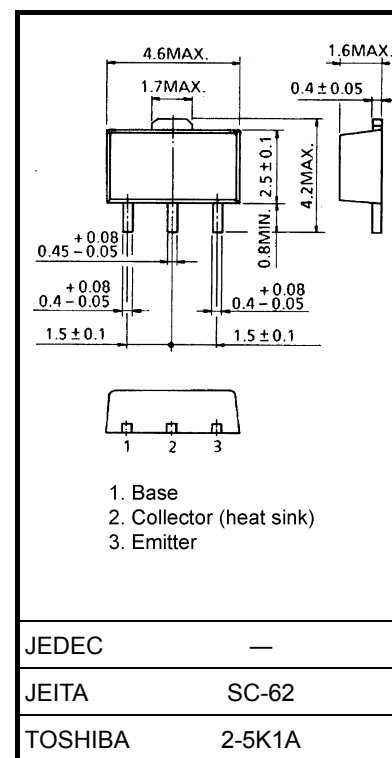
Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	80	V
Collector-emitter voltage	$V_{CEO}$	50	V
Emitter-base voltage	$V_{EBO}$	6	V
Collector current	$I_C$	2	A
Base current	$I_B$	0.2	A
Collector power dissipation	$P_C$	500	mW
Collector power dissipation	$P_C$ (Note 1)	1000	mW
Junction temperature	$T_j$	150	$^\circ C$
Storage temperature range	$T_{stg}$	$-55\sim 150$	$^\circ C$

Note 1: 2SC4409 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.

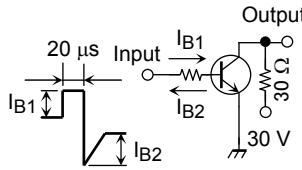
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Unit: mm

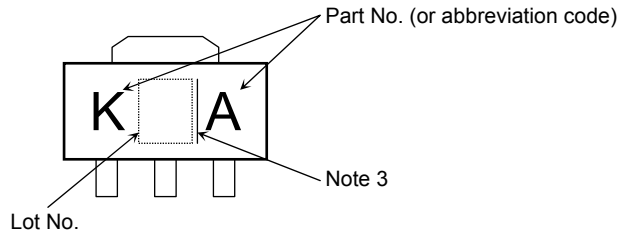


Weight: 0.05 g (typ.)

## Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		$I_{CBO}$	$V_{CB} = 80 \text{ V}, I_E = 0$	—	—	0.1	$\mu\text{A}$
Emitter cut-off current		$I_{EBO}$	$V_{EB} = 6 \text{ V}, I_C = 0$	—	—	0.1	$\mu\text{A}$
Collector-emitter breakdown voltage		$V_{(BR) CEO}$	$I_C = 10 \text{ mA}, I_B = 0$	50	—	—	V
DC current gain		$h_{FE} (1)$	$V_{CE} = 2 \text{ V}, I_C = 100 \text{ mA}$	120	—	400	
		$h_{FE} (2)$	$V_{CE} = 2 \text{ V}, I_C = 1.5 \text{ A}$	40	—	—	
Collector-emitter saturation voltage		$V_{CE (sat)}$	$I_C = 1 \text{ A}, I_B = 0.05 \text{ A}$	—	—	0.5	V
Base-emitter saturation voltage		$V_{BE (sat)}$	$I_C = 1 \text{ A}, I_B = 0.05 \text{ A}$	—	—	1.2	V
Transition frequency		$f_T$	$V_{CE} = 2 \text{ V}, I_C = 100 \text{ mA}$	—	100	—	MHz
Collector output capacitance		$C_{ob}$	$V_{CB} = 10 \text{ V}, I_E = 0, f = 1 \text{ MHz}$	—	14	—	pF
Switching time	Turn-on time	$t_{on}$	 <p><math>I_{B1} = 0.05 \text{ A}, I_{B2} = 0.05 \text{ A}</math> Duty cycle <math>\leq 1\%</math></p>	—	0.1	—	$\mu\text{s}$
	Storage time	$t_{stg}$		—	0.5	—	
	Fall time	$t_f$		—	0.1	—	

## Marking

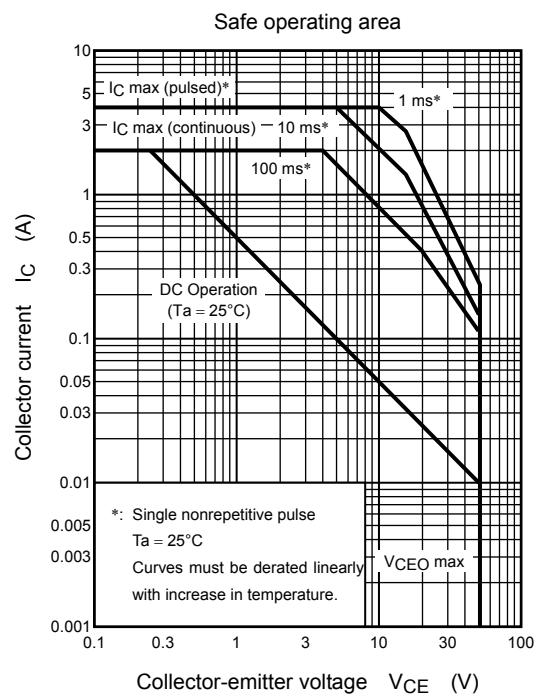
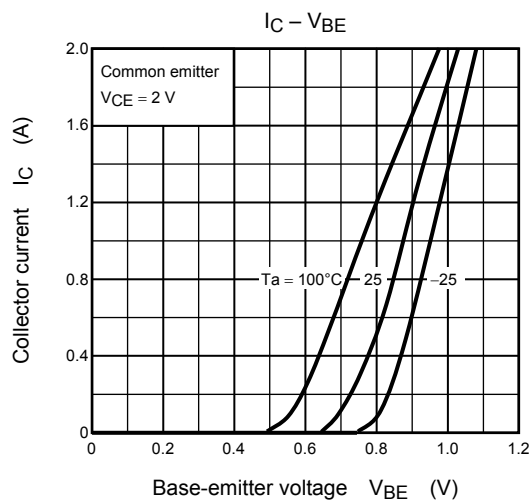
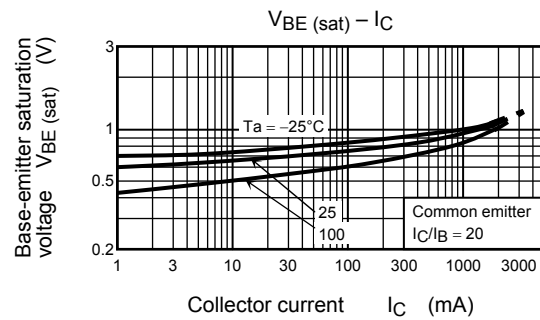
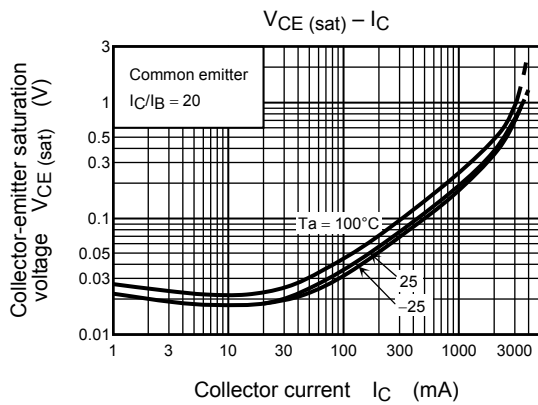
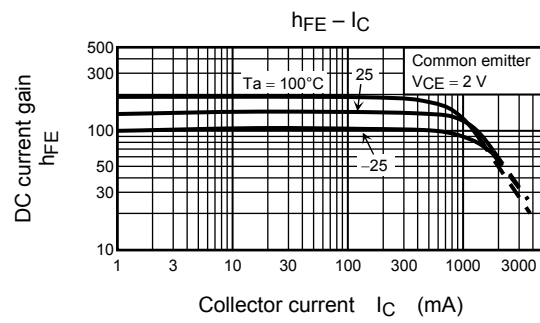
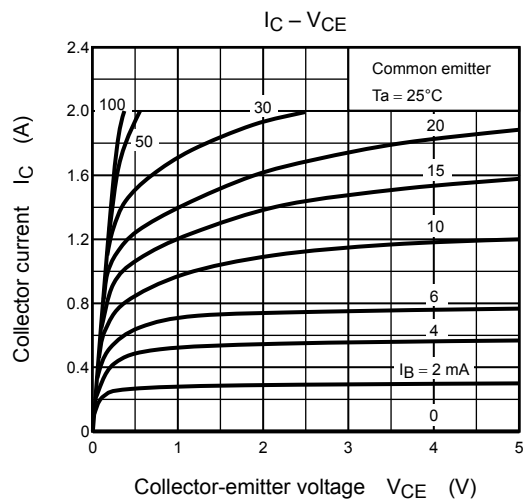


Note 3: A line to the right of a Lot No. identifies the indication of product Labels.

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 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.



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