

TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT process)

# 2SA1213

Power Amplifier Applications

Power Switching Applications

- Low saturation voltage:  $V_{CE(sat)} = -0.5 \text{ V (max)}$  ( $I_C = -1 \text{ A}$ )
- High speed switching time:  $t_{stg} = 1.0 \mu\text{s (typ.)}$
- Small flat package
- $P_C = 1.0 \text{ to } 2.0 \text{ W}$  (mounted on a ceramic substrate)
- Complementary to 2SC2873

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

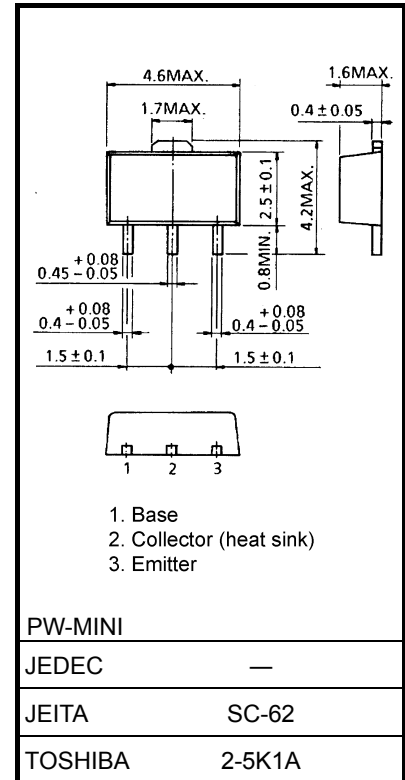
Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	-50	V
Collector-emitter voltage	$V_{CEO}$	-50	V
Emitter-base voltage	$V_{EBO}$	-5	V
Collector current	$I_C$	-2	A
Base current	$I_B$	-0.4	A
Collector power dissipation	$P_C$	500	mW
	$P_C$ (Note 1)	1000	
Junction temperature	$T_j$	150	$^\circ\text{C}$
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.

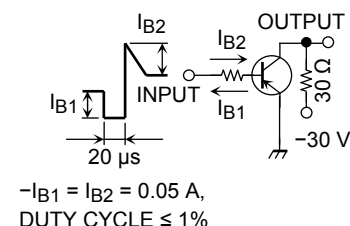
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Unit: mm



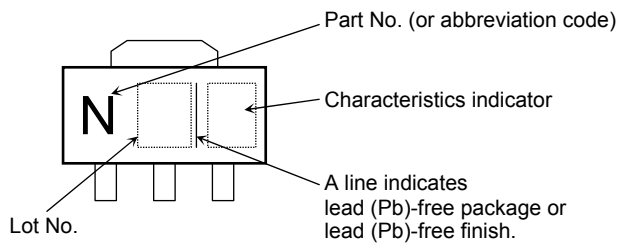
Weight: 0.05 g (typ.)

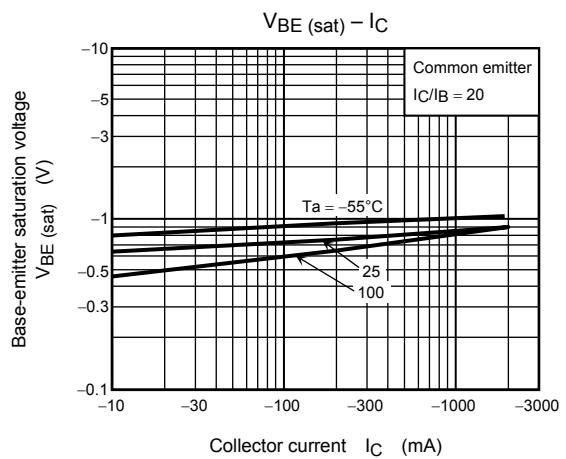
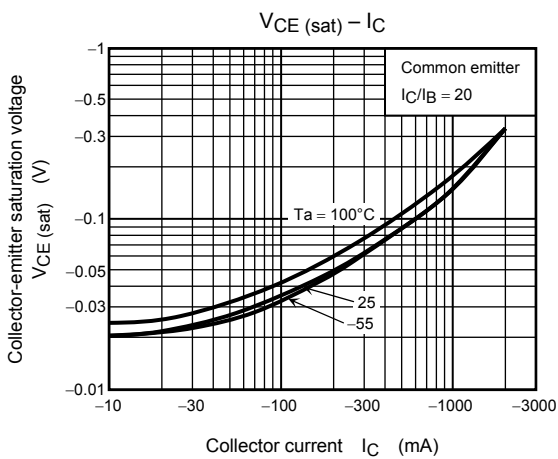
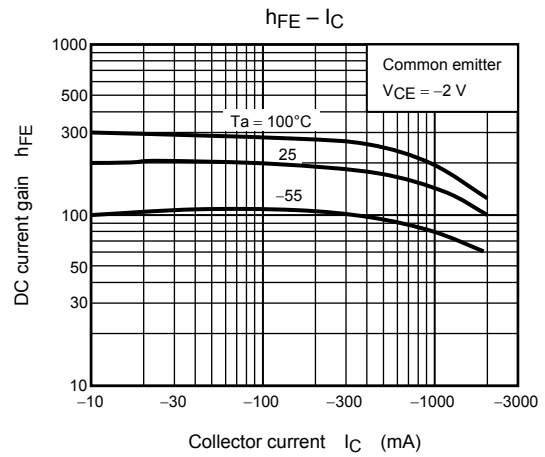
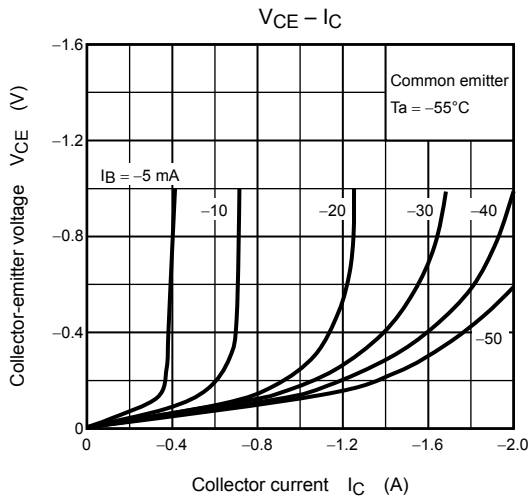
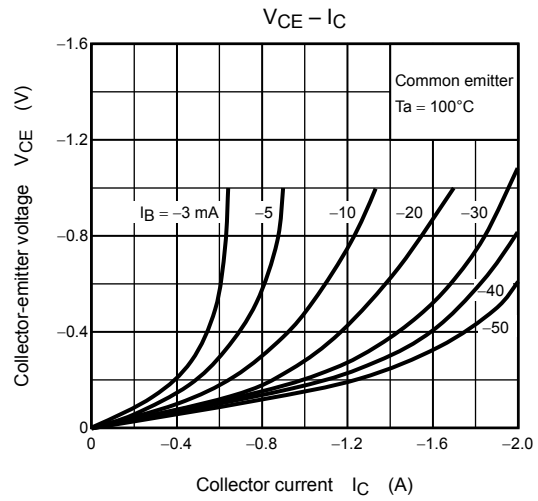
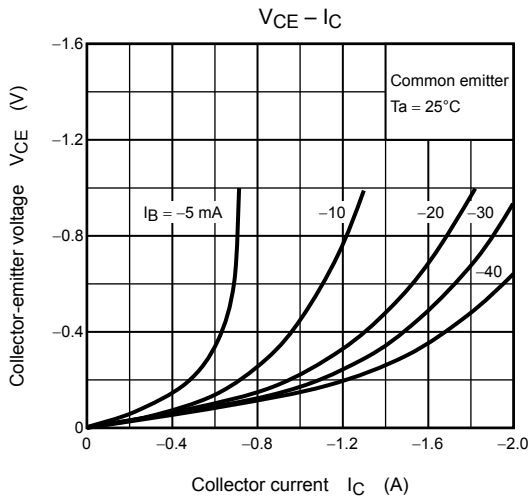
## Electrical Characteristics (Ta = 25°C)

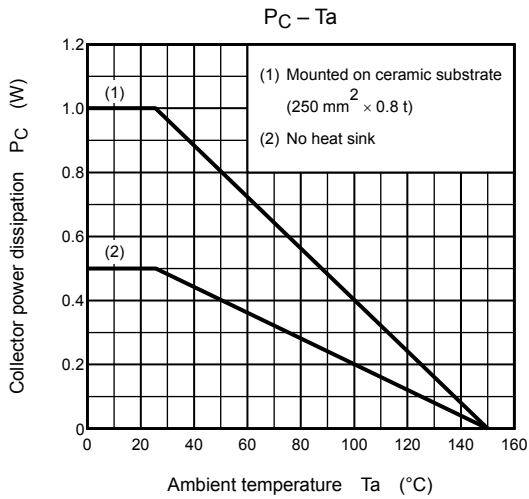
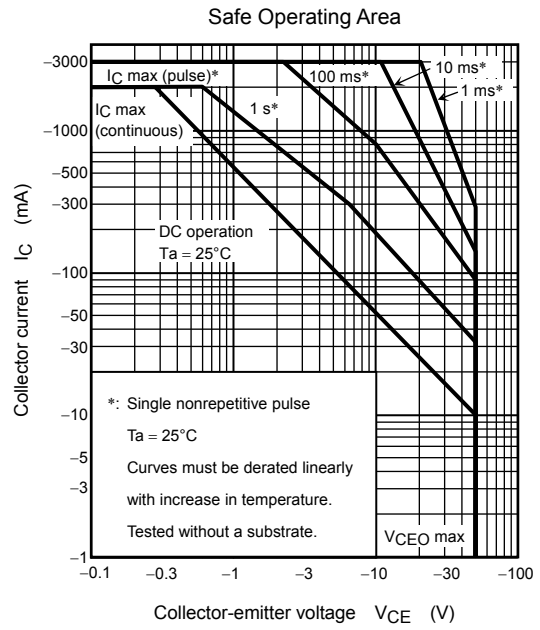
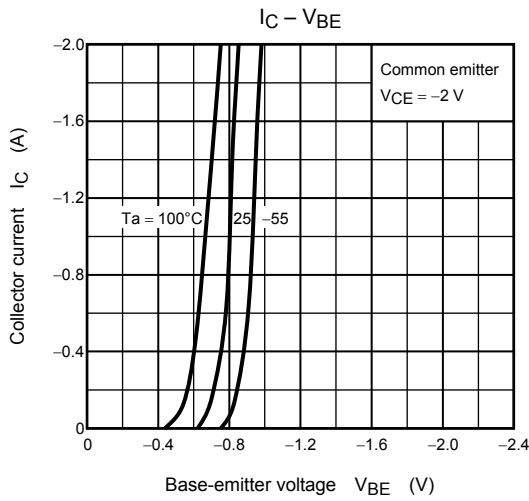
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		$I_{CBO}$	$V_{CB} = -50\text{ V}, I_E = 0$	—	—	-0.1	$\mu\text{A}$
Emitter cut-off current		$I_{EBO}$	$V_{EB} = -5\text{ V}, I_C = 0$	—	—	-0.1	$\mu\text{A}$
Collector-emitter breakdown voltage		$V_{(BR)CEO}$	$I_C = -10\text{ mA}, I_B = 0$	-50	—	—	V
DC current gain	$h_{FE(1)}$ (Note 3)		$V_{CE} = -2\text{ V}, I_C = -0.5\text{ A}$	70	—	240	
	$h_{FE(2)}$						
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		$f_T$	$V_{CE} = -2\text{ V}, I_C = -0.5\text{ A}$	—	120	—	MHz
Collector output capacitance		$C_{ob}$	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	40	—	pF
Switching time	Turn-on time	$t_{on}$	 <p><math>-I_{B1} = I_{B2} = 0.05\text{ A},</math> <math>DUTY\ CYCLE \leq 1\%</math></p>	—	0.1	—	$\mu\text{s}$
	Storage time	$t_{stg}$		—	1.0	—	
	Fall time	$t_f$		—	0.1	—	

Note 3:  $h_{FE(1)}$  classification O: 70 to 140, Y: 120 to 240

## Marking







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