

TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process) (Darlington)

# 2SD1223

## Switching Applications

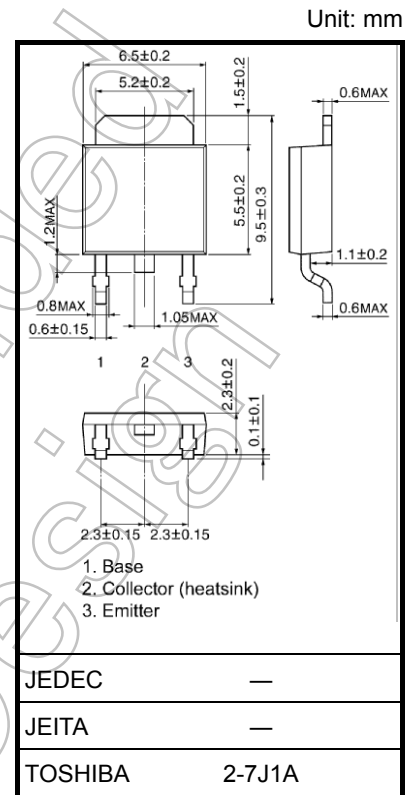
Hammer Drive, Pulse Motor Drive Applications

Power Amplifier Applications

- High DC current gain:  $h_{FE} = 2000$  (min) ( $V_{CE} = 2$  V,  $I_C = 1$  A)
- Low saturation voltage:  $V_{CE(sat)} = 1.5$  V (max) ( $I_C = 3$  A)
- Complementary to 2SB908.

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

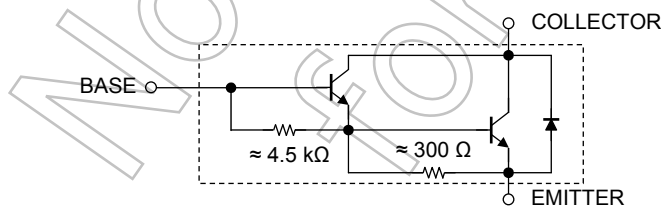
Characteristics		Symbol	Rating	Unit
Collector-base voltage		$V_{CBO}$	100	V
Collector-emitter voltage		$V_{CEO}$	80	V
Emitter-base voltage		$V_{EBO}$	5	V
Collector current		$I_C$	4	A
Base current		$I_B$	0.4	A
Collector power dissipation	$T_a = 25^\circ\text{C}$	$P_C$	1.0	W
	$T_c = 25^\circ\text{C}$		15	
Junction temperature		$T_j$	150	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-55 to 150	$^\circ\text{C}$



Weight: 0.36 g (typ.)

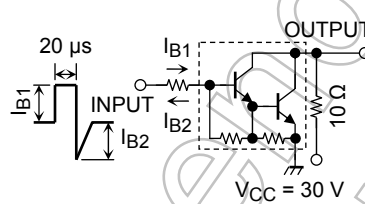
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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).

## Equivalent Circuit

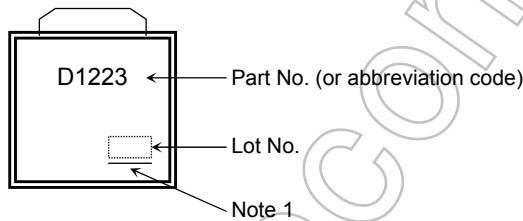


Start of commercial production  
1981-09

## Electrical Characteristics (Ta = 25°C)

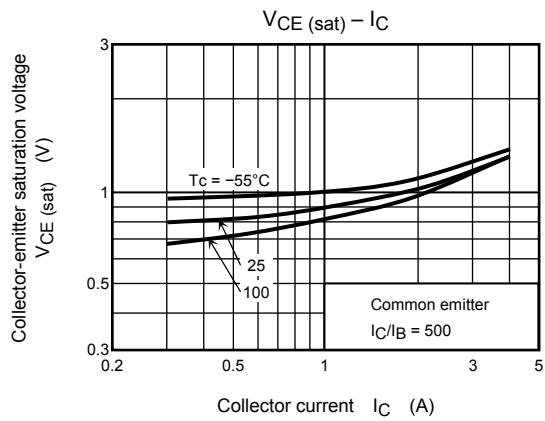
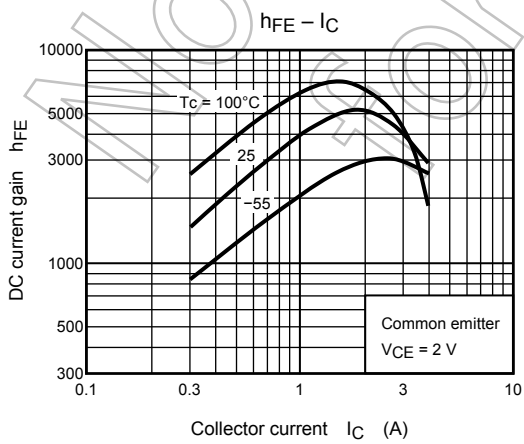
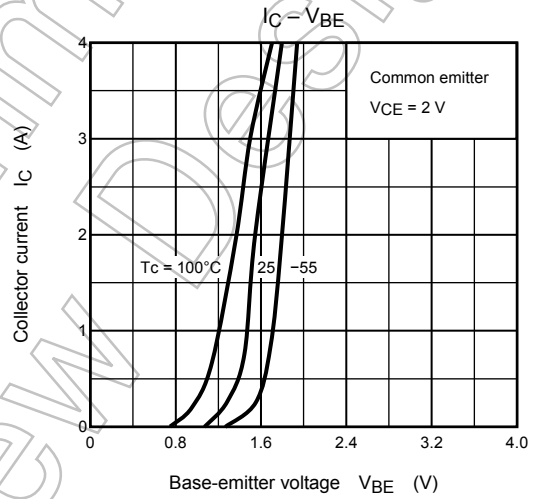
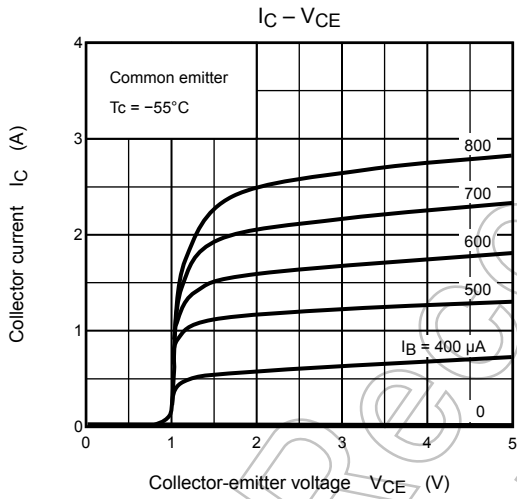
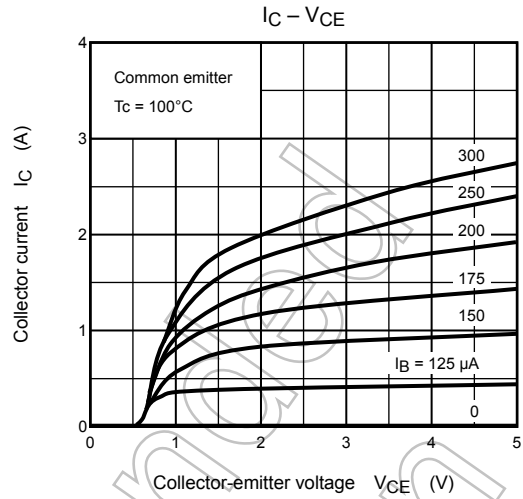
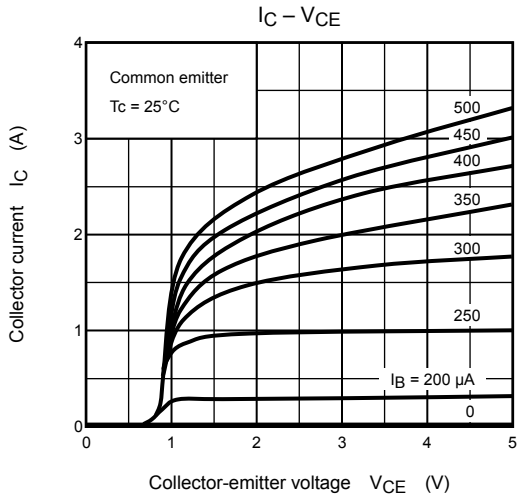
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		$I_{CBO}$	$V_{CB} = 100\text{ V}, I_E = 0$	—	—	20	$\mu\text{A}$
Emitter cut-off current		$I_{EBO}$	$V_{EB} = 5\text{ V}, I_C = 0$	—	—	2.5	$\text{mA}$
Collector-emitter breakdown voltage		$V_{(BR) CEO}$	$I_C = 10\text{ mA}, I_B = 0$	80	—	—	$\text{V}$
DC current gain		$h_{FE} (1)$	$V_{CE} = 2\text{ V}, I_C = 1\text{ A}$	2000	—	—	
		$h_{FE} (2)$	$V_{CE} = 2\text{ V}, I_C = 3\text{ A}$	1000	—	—	
Collector-emitter saturation voltage		$V_{CE (sat)}$	$I_C = 3\text{ A}, I_B = 6\text{ mA}$	—	—	1.5	$\text{V}$
Base-emitter saturation voltage		$V_{BE (sat)}$	$I_C = 3\text{ A}, I_B = 6\text{ mA}$	—	—	2.0	$\text{V}$
Switching time	Turn-on time	$t_{on}$	 <p><math>I_{B1} = -I_{B2} = 6\text{ mA}, \text{DUTY CYCLE} \leq 1\%</math></p>	—	0.2	—	$\mu\text{s}$
	Storage time	$t_{stg}$		—	1.5	—	
	Fall time	$t_f$		—	0.6	—	

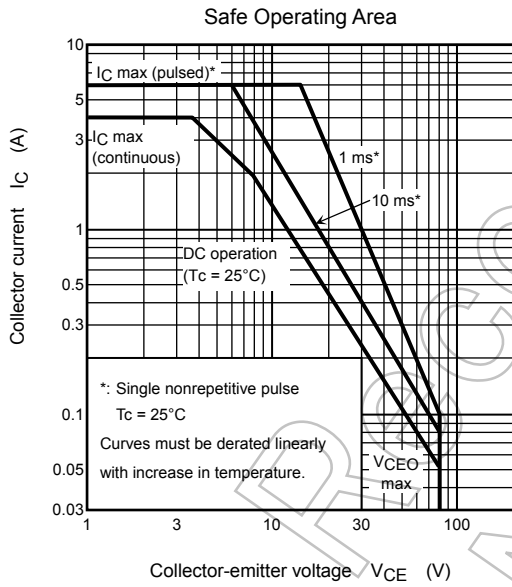
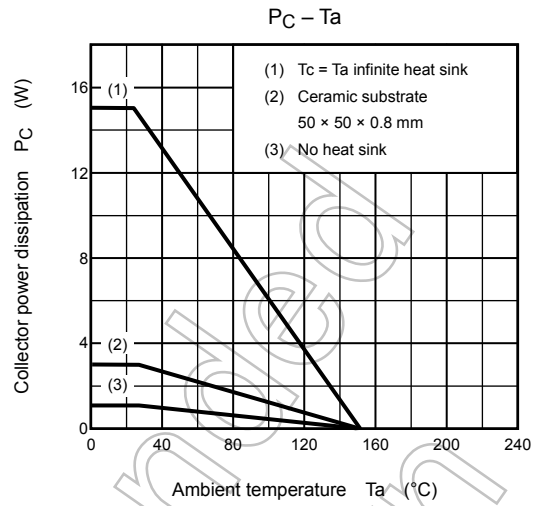
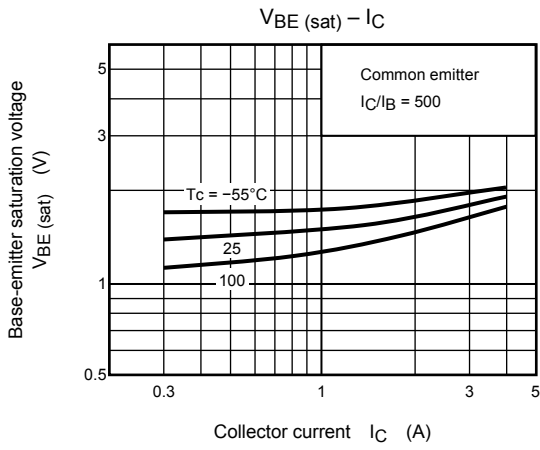
## Marking



Note 1: A line under a Lot No. identifies the indication of product Labels.  
 Not underlined: [[Pb]]/INCLUDES > MCV  
 Underlined: [[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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