

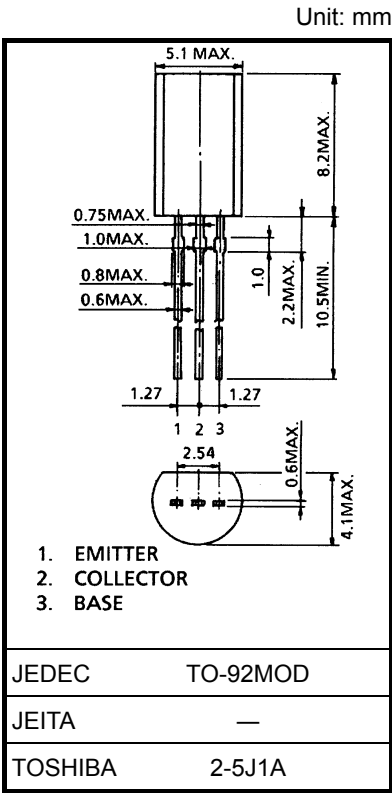
2SD2088

Micro Motor Drive, Hammer Drive Applications  
Switching Applications  
Power Amplifier Applications

- High DC current gain:  $h_{FE} = 2000$  (min) ( $V_{CE} = 2\text{ V}$ ,  $I_C = 1\text{ A}$ )
- Low saturation voltage:  $V_{CE(sat)} = 1.5\text{ V}$  (max) ( $I_C = 1\text{ A}$ ,  $I_B = 1\text{ mA}$ )
- Zener diode included between collector and base

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

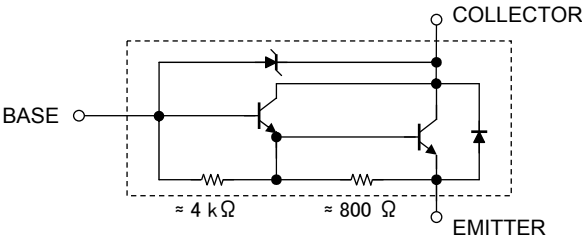
Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	$60 \pm 10$	V
Collector-emitter voltage	$V_{CEO}$	$60 \pm 10$	V
Emitter-base voltage	$V_{EBO}$	8	V
Collector current	$I_C$	2	A
Base current	$I_B$	0.5	A
Collector power dissipation	$P_C$	0.9	W
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature range	$T_{stg}$	$-55$ to $150$	$^\circ\text{C}$



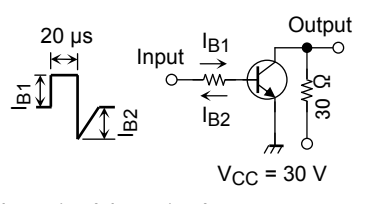
Weight: 0.36 g (typ.)

Note1: 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).

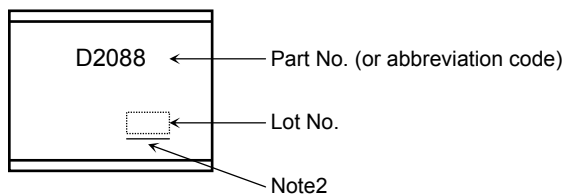
Equivalent Circuit



## Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		$I_{CBO}$	$V_{CB} = 45 \text{ V}, I_E = 0$	—	—	10	$\mu\text{A}$
Emitter cut-off current		$I_{EBO}$	$V_{EB} = 8 \text{ V}, I_C = 0$	—	—	4	$\text{mA}$
Collector-emitter breakdown voltage		$V_{(BR) CEO}$	$I_C = 10 \text{ mA}, I_B = 0$	50	60	70	V
DC current gain		$h_{FE}$	$V_{CE} = 2 \text{ V}, I_C = 1 \text{ A (pulse)}$	2000	—	—	
Collector-emitter saturation voltage		$V_{CE (sat)}$	$I_C = 1 \text{ A}, I_B = 1 \text{ mA (pulse)}$	—	—	1.5	V
Base-emitter saturation voltage		$V_{BE (sat)}$	$I_C = 1 \text{ A}, I_B = 1 \text{ mA (pulse)}$	—	—	2.0	V
Transition frequency		$f_T$	$V_{CE} = 2 \text{ V}, I_C = 0.5 \text{ A (pulse)}$	—	100	—	MHz
Collector output capacitance		$C_{ob}$	$V_{CB} = 10 \text{ V}, I_E = 0, f = 1 \text{ MHz}$	—	20	—	pF
Unclamped inductive load energy		$E_{S/B}$	$L = 10 \text{ mH}, I_C = 1.3 \text{ A}, I_B = \pm 50 \text{ mA}$	8.4	—	—	mJ
Switching time	Turn-on time	$t_{on}$	 <p><math>I_{B1} = 1 \text{ mA}, I_{B2} = 1 \text{ mA}</math> duty cycle <math>\leq 1\%</math></p>	—	0.4	—	$\mu\text{s}$
	Storage time	$t_{stg}$		—	4.0	—	
	Fall time	$t_f$		—	0.6	—	

## Marking

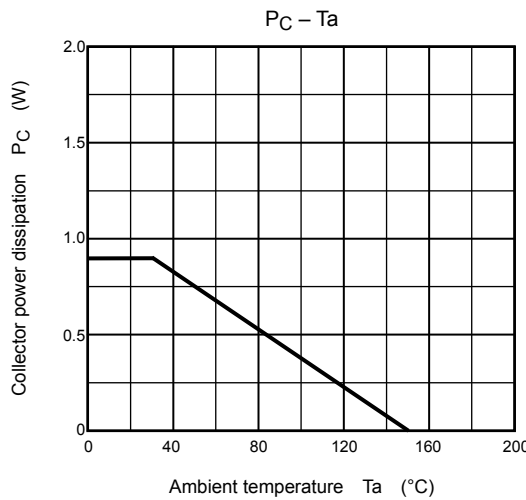
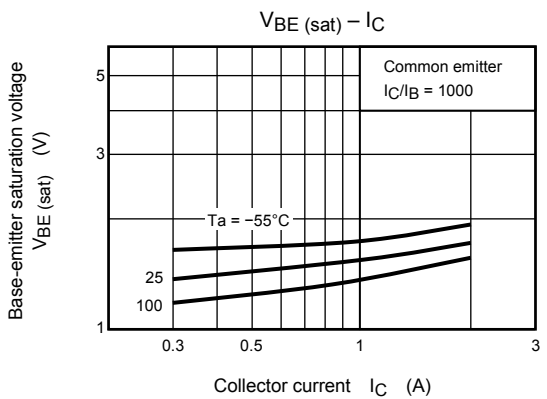
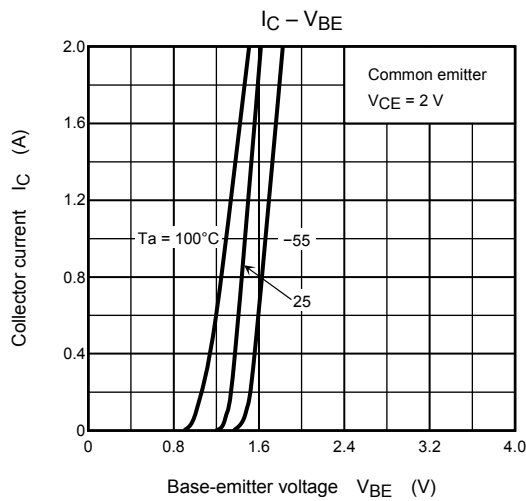
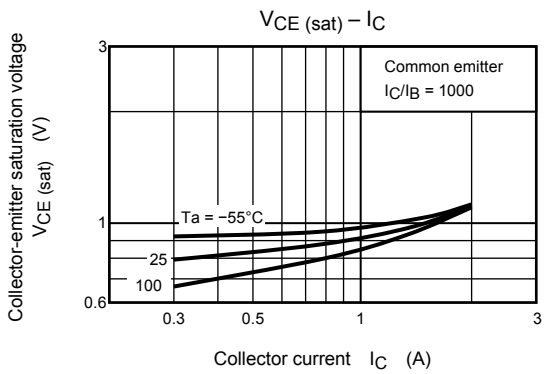
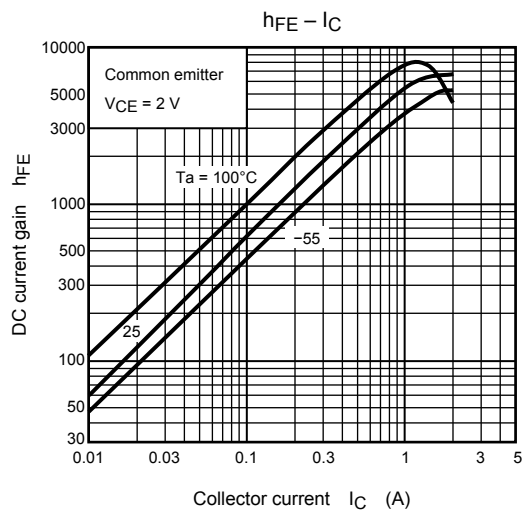
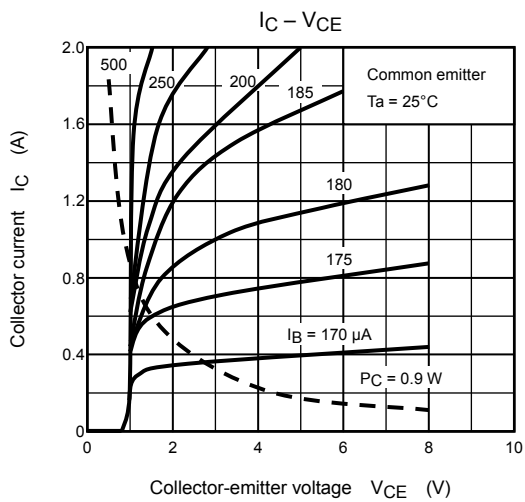


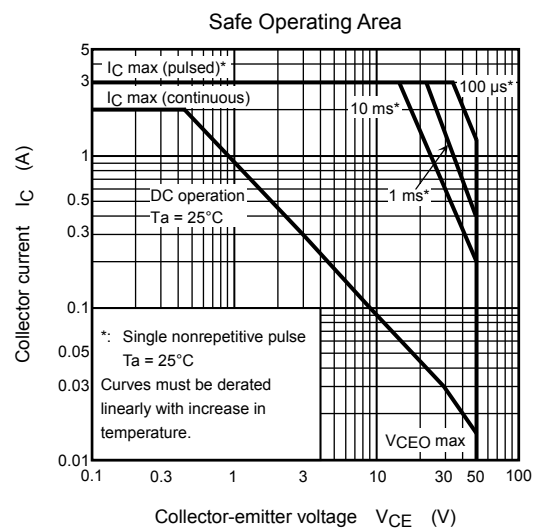
Note2: A line under a Lot No. identifies the indication of product Labels.

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 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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