

TOSHIBA Transistor Silicon PNP Triple Diffused Type

# 2SB1411

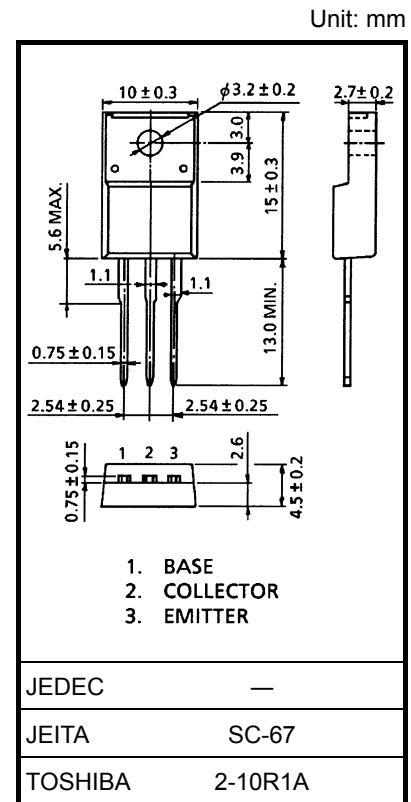
## Switching Applications

Hammer Drive, Pulse Motor Drive Applications

- High DC current gain:  $h_{FE} = 1500$  (min) ( $V_{CE} = -3$  V,  $I_C = -1$  A)
- Low saturation voltage:  $V_{CE(sat)} = -1.5$  V (max) ( $I_C = -1$  A)

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

Characteristics		Symbol	Rating	Unit
Collector-base voltage		$V_{CBO}$	-100	V
Collector-emitter voltage		$V_{CEO}$	-100	V
Emitter-base voltage		$V_{EBO}$	-7	V
Collector current	DC	$I_C$	-2	A
	Peak	$I_{CP}$	-3	
Base current		$I_B$	-0.5	A
Collector power dissipation	$T_a = 25^\circ\text{C}$	$P_C$	2.0	W
	$T_c = 25^\circ\text{C}$		20	
Junction temperature		$T_j$	150	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-55 to 150	$^\circ\text{C}$

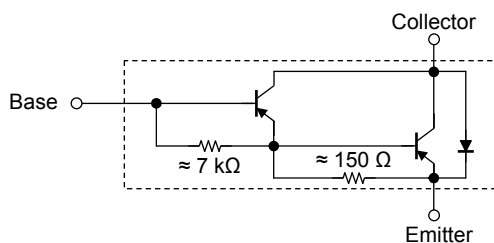


Weight: 1.7 g (typ.)

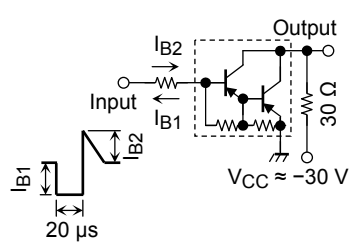
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

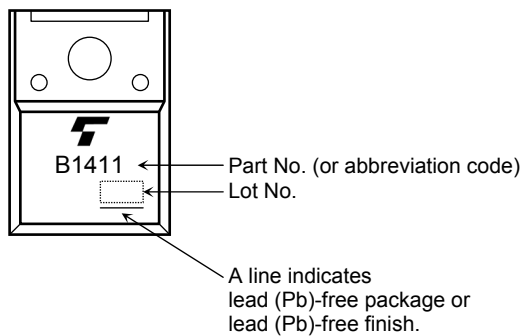
## Equivalent Circuit

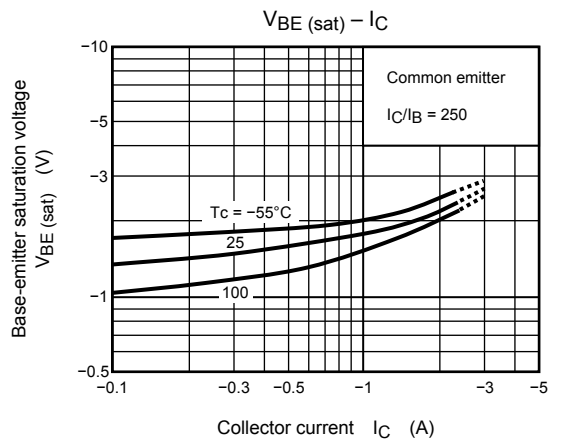
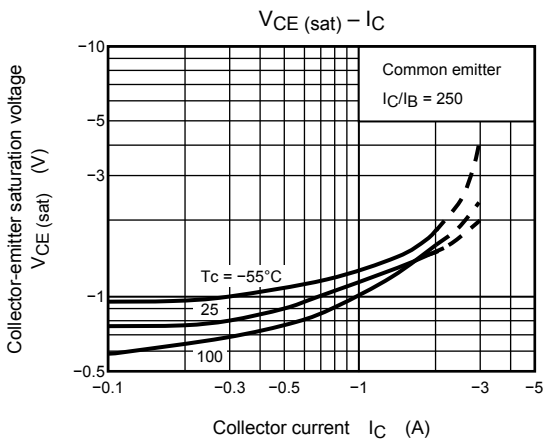
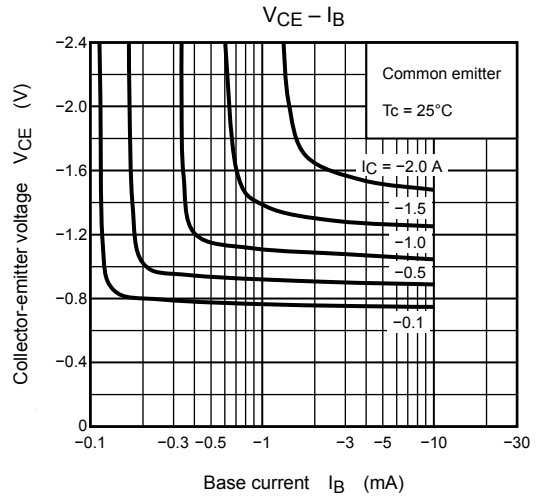
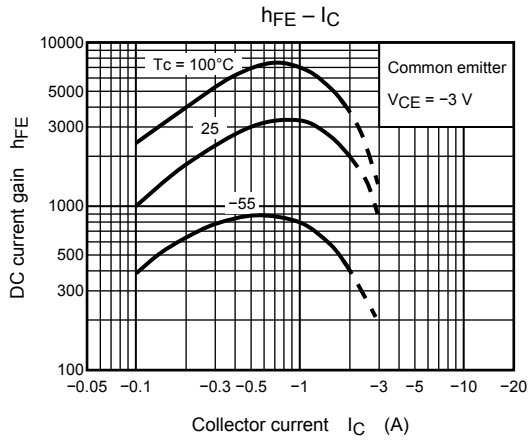
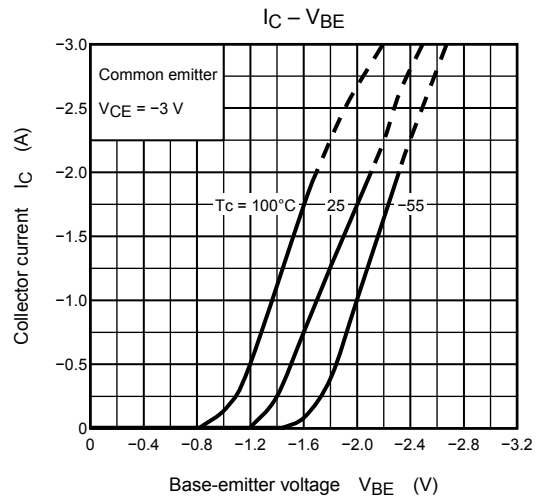
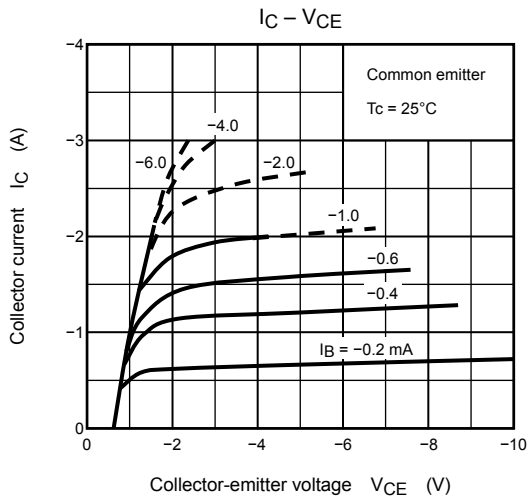


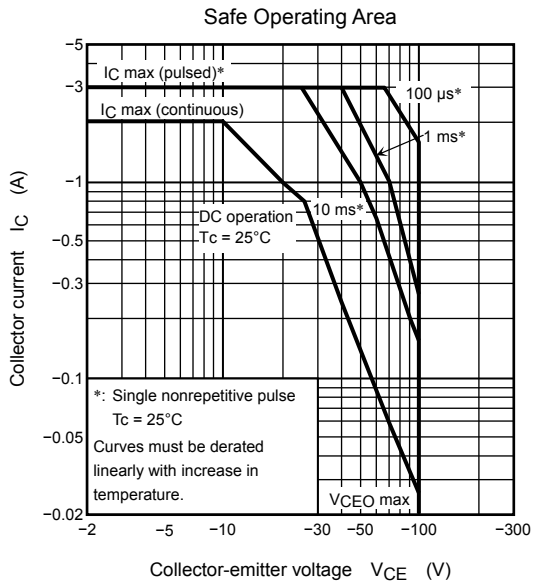
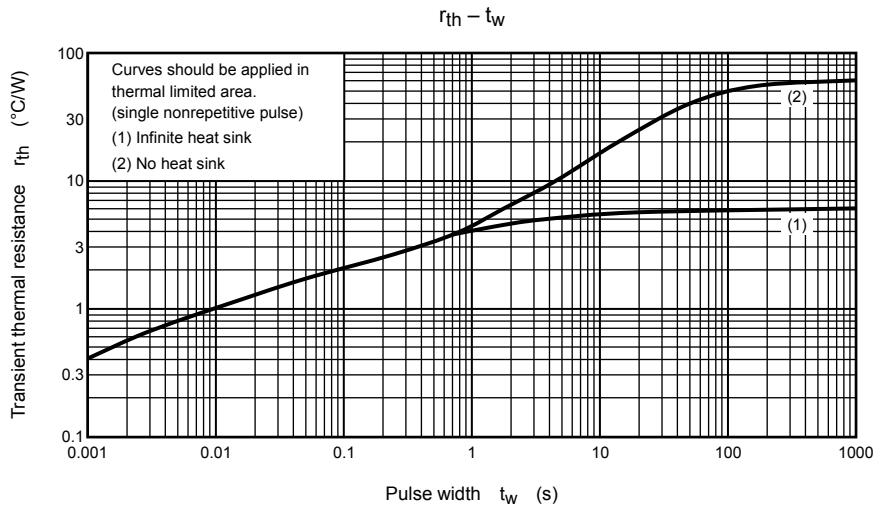
## Electrical Characteristics (Tc = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		$I_{CBO}$	$V_{CB} = -100\text{ V}, I_E = 0$	—	—	-100	$\mu\text{A}$
Emitter cut-off current		$I_{EBO}$	$V_{EB} = -6\text{ V}, I_C = 0$	—	—	-2.5	$\text{mA}$
Collector-emitter breakdown voltage		$V_{(BR) CEO}$	$I_C = -30\text{ mA}, I_B = 0$	-100	—	—	$\text{V}$
DC current gain		$h_{FE} (1)$	$V_{CE} = -3\text{ V}, I_C = -1\text{ A}$	1500	—	15000	
		$h_{FE} (2)$	$V_{CE} = -3\text{ V}, I_C = -2\text{ A}$	1000	—	—	
Collector-emitter saturation voltage		$V_{CE (sat) (1)}$	$I_C = -1\text{ A}, I_B = -2\text{ mA}$	—	—	-1.5	$\text{V}$
		$V_{CE (sat) (2)}$	$I_C = -2\text{ A}, I_B = -8\text{ mA}$	—	—	-2.5	
Base-emitter saturation voltage		$V_{BE (sat)}$	$I_C = -1\text{ A}, I_B = -2\text{ mA}$	—	—	-2.2	$\text{V}$
Switching time	Turn-on time	$t_{on}$	 <p style="text-align: center;"><math>-I_{B1} = I_{B2} = 2\text{ mA}, \text{duty cycle} \leq 1\%</math></p>	—	1.0	—	$\mu\text{s}$
	Storage time	$t_{stg}$		—	3.0	—	
	Fall time	$t_f$		—	2.0	—	

## Marking







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