

TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process)

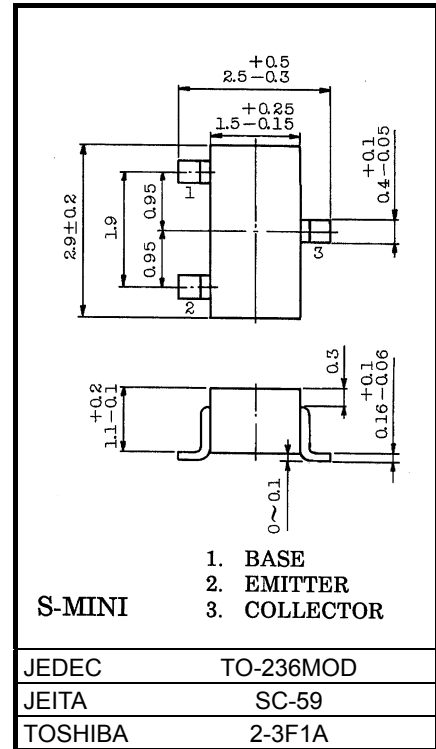
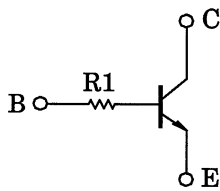
# RN1412, RN1413

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

Unit: mm

- With built-in bias resistors
- Simplified circuit design
- Reduce a quantity of parts and manufacturing process
- Complementary to RN2412, RN2413

## Equivalent Circuit



Weight: 0.012g (typ.)

## Absolute Maximum Ratings (Ta = 25°C)

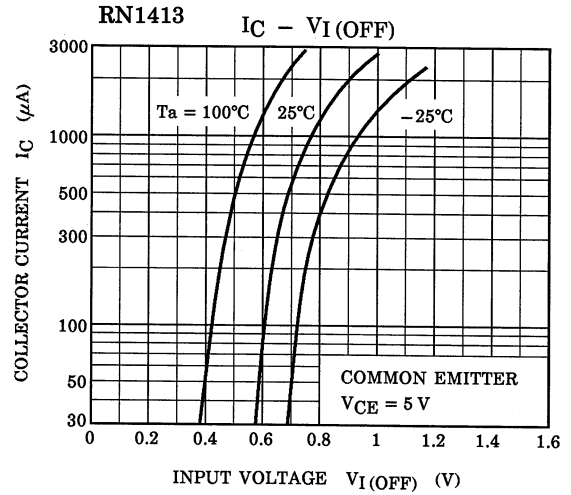
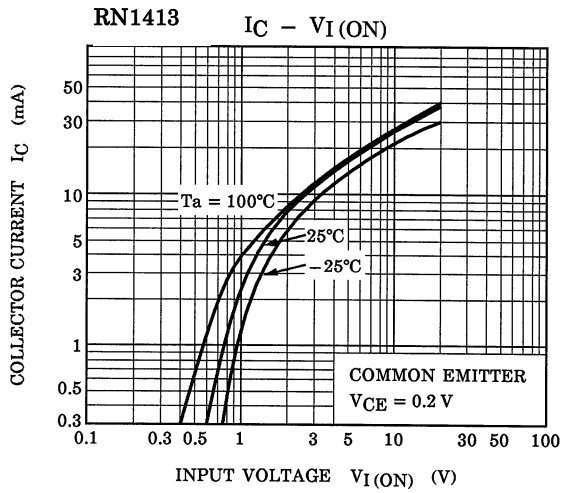
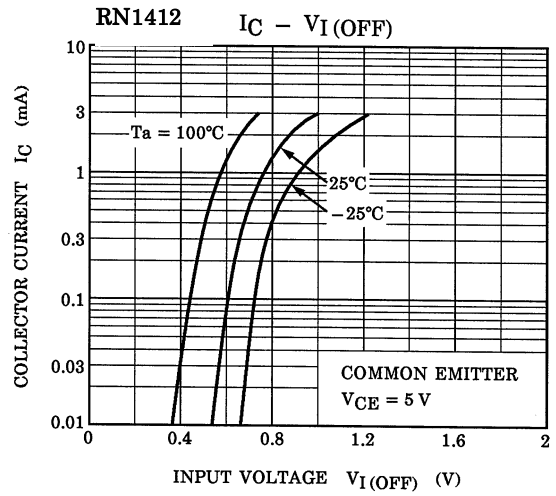
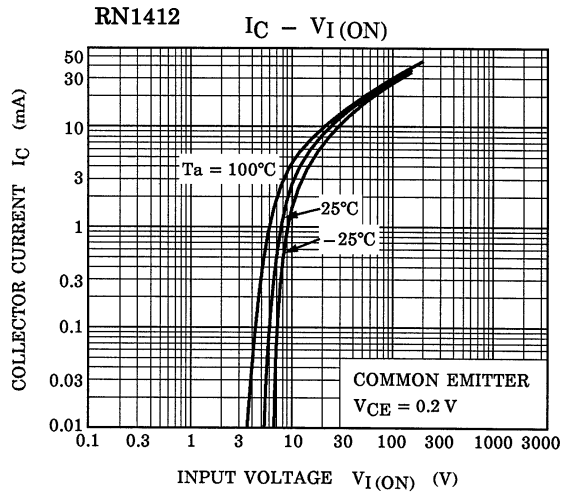
Characteristic	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	50	V
Collector-emitter voltage	$V_{CEO}$	50	V
Emitter-base voltage	$V_{EBO}$	5	V
Collector current	$I_C$	100	mA
Collector power dissipation	$P_C$	200	mW
Junction temperature	$T_j$	150	°C
Storage temperature range	$T_{stg}$	-55~125	°C

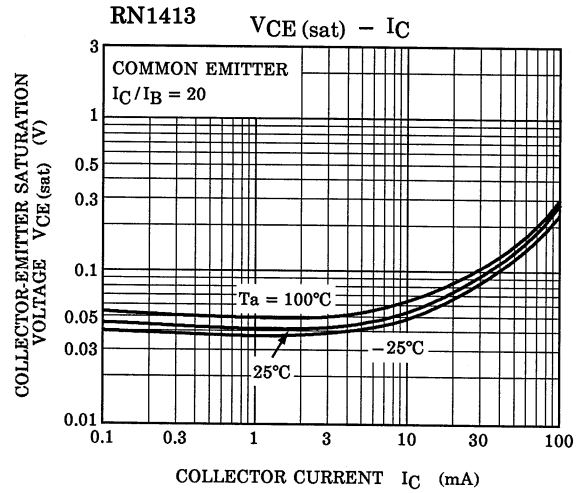
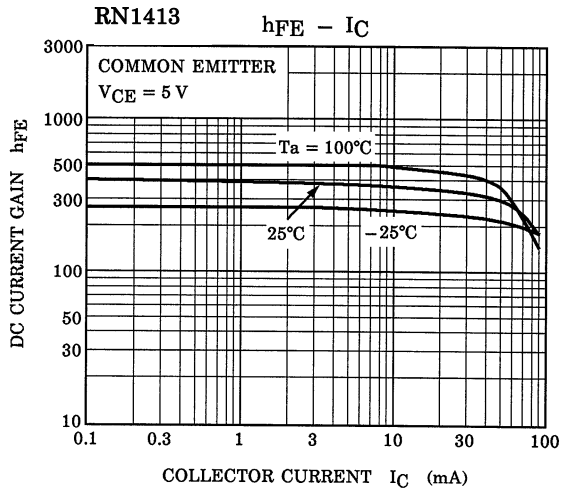
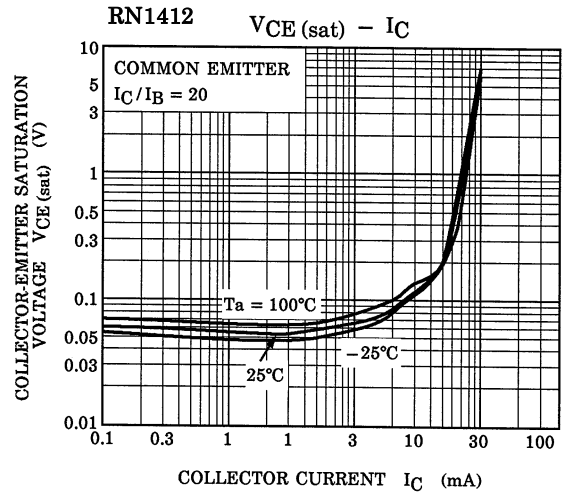
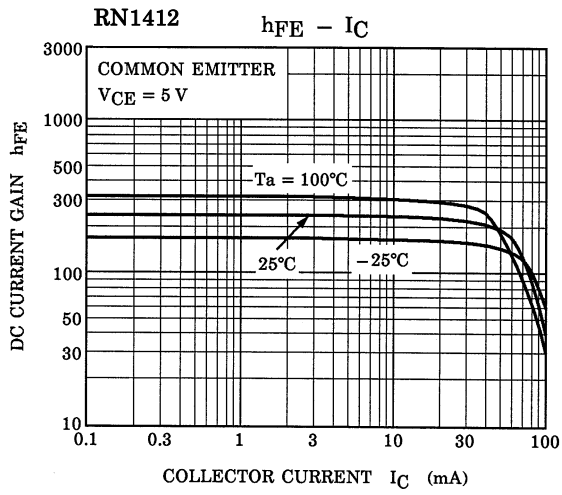
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

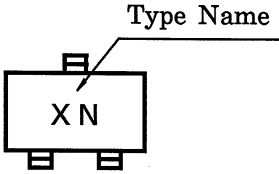
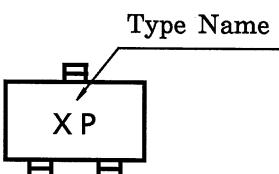
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

## Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	—	$V_{CB} = 50\text{ V}, I_E = 0$	—	—	100	nA
Emitter cut-off current	$I_{EBO}$	—	$V_{EB} = 5\text{ V}, I_C = 0$	—	—	100	nA
DC current gain	$h_{FE}$ (note)	—	$V_{CE} = 5\text{ V}, I_C = 1\text{ mA}$	120	—	700	
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	$I_C = 5\text{ mA}, I_B = 0.25\text{ mA}$	—	0.1	0.3	V
Transition frequency	$f_T$	—	$V_{CE} = 10\text{ V}, I_C = 5\text{ mA}$	—	250	—	MHz
Collector output capacitance	$C_{ob}$	—	$V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	3	6	pF
Input resistor	RN1412	R1	—	15.4	22	28.6	kΩ
	RN1413			32.9	47	61.1	





Type Name	Marking
RN1412	 <p>The diagram shows a rectangular component with a small square protrusion on top and two small square protrusions on the bottom. The letters 'X N' are printed inside the rectangle. A line points from the text 'Type Name' to the top protrusion.</p>
RN1413	 <p>The diagram shows a rectangular component with a small square protrusion on top and two small square protrusions on the bottom. The letters 'X P' are printed inside the rectangle. A line points from the text 'Type Name' to the top protrusion.</p>

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