

TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process)

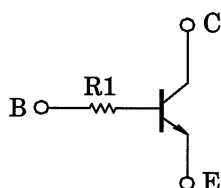
RN1412, RN1413

Switching, Inverter Circuit, Interface Circuit
and Driver Circuit Applications

Unit: mm

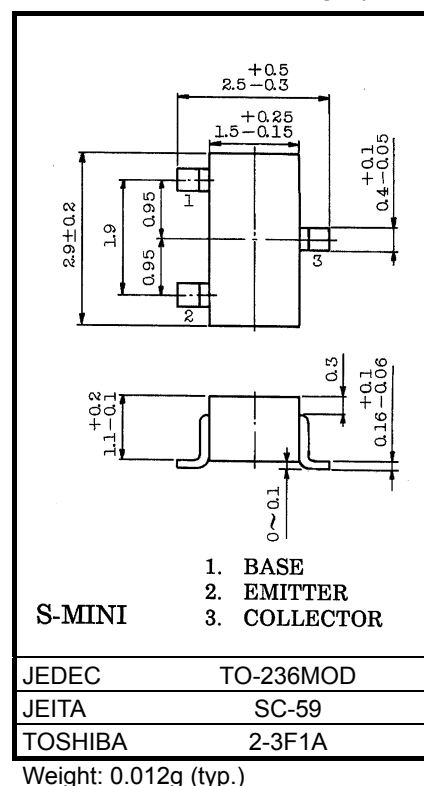
- With built-in bias resistors
- Simplified circuit design
- Reduce a quantity of parts and manufacturing process
- Complementary to RN2412, RN2413

Equivalent Circuit



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

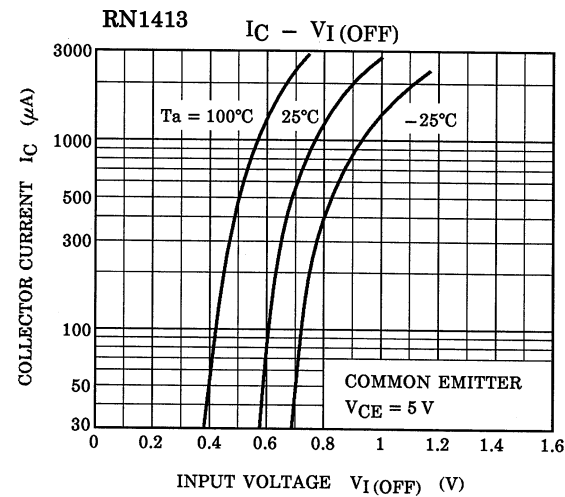
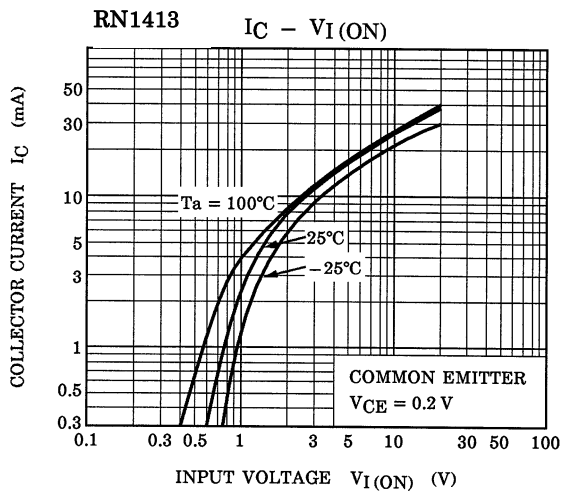
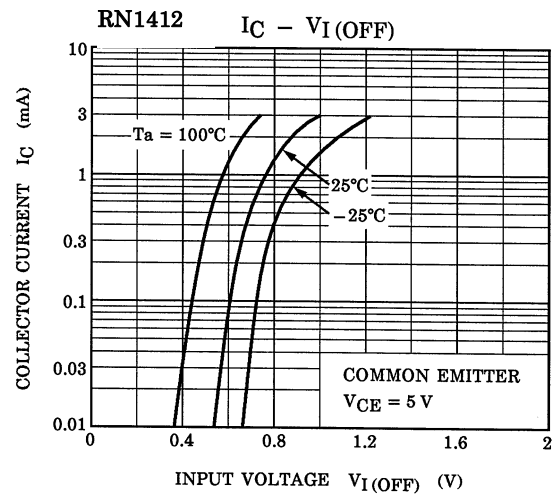
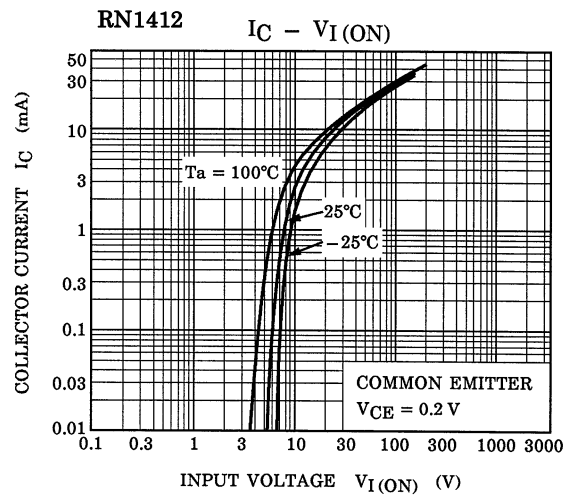


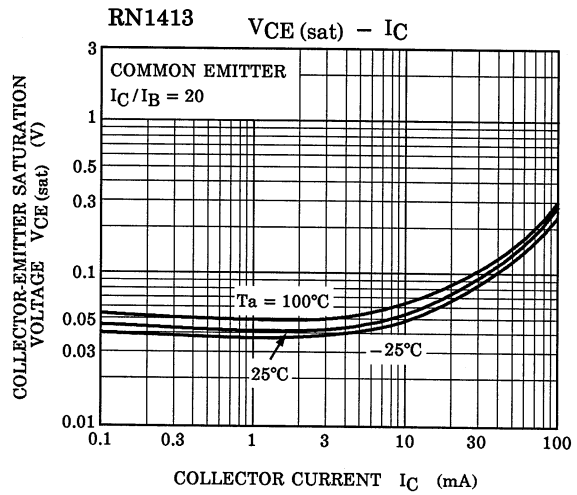
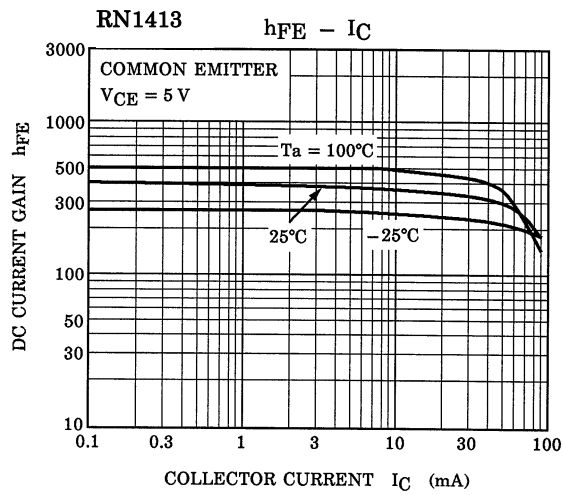
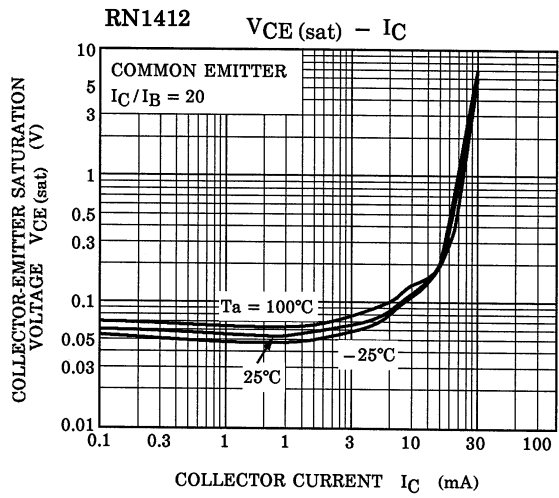
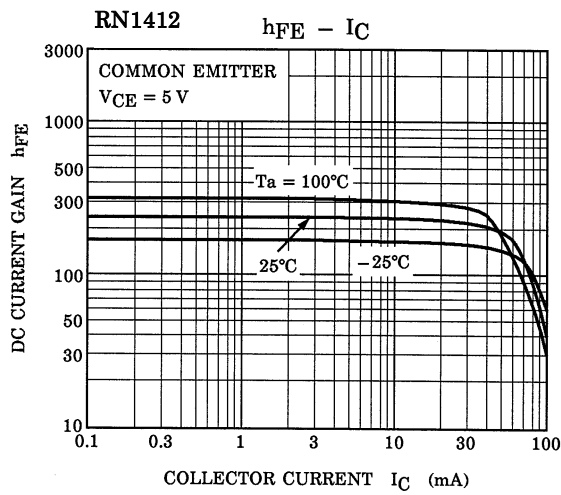
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

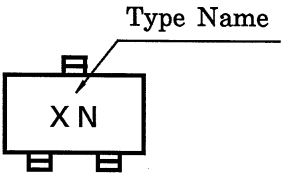
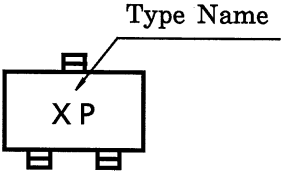
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

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	$h_{FE} \text{ (note)}$	—	$V_{CE} = 5 \text{ V}, I_C = 1 \text{ mA}$	120	—	700	
Collector-emitter saturation voltage	$V_{CE} \text{ (sat)}$	—	$I_C = 5 \text{ mA}, I_B = 0.25 \text{ mA}$	—	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	 The diagram shows a rectangular component with three pins: one on the top edge and two on the bottom edge. Inside the rectangle, the text "X N" is printed. A leader line points from the text "Type Name" to the top pin.
RN1413	 The diagram shows a rectangular component with three pins: one on the top edge and two on the bottom edge. Inside the rectangle, the text "X P" is printed. A leader line points from the text "Type Name" to the top pin.

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