

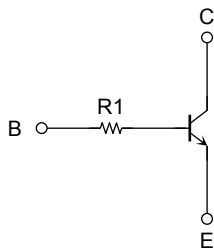
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

RN1970HFE, RN1971HFE

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- Two devices are incorporated into an Extreme-Super-Mini (6 pin) package.
- Incorporating a bias resistor into a transistor reduces parts count. Reducing the parts count enable the manufacture of ever more compact equipment and save assembly cost.
- Complementary to RN2970HFE, RN2971HFE

Equivalent Circuit



Absolute Maximum Ratings (Ta = 25°C) (Q1, Q2 common)

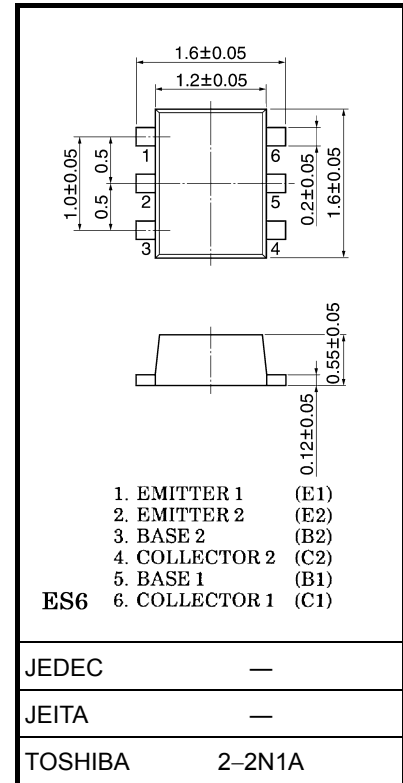
Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	40	V
Collector-emitter voltage	V_{CEO}	40	V
Emitter-base voltage	V_{EBO}	5	V
Collector current	I_C	100	mA
Collector power dissipation	P_C (Note 1)	100	mW
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	-55~150	°C

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).

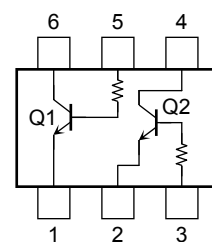
Note 1: Total rating

Unit: mm



Weight: 0.003g (typ.)

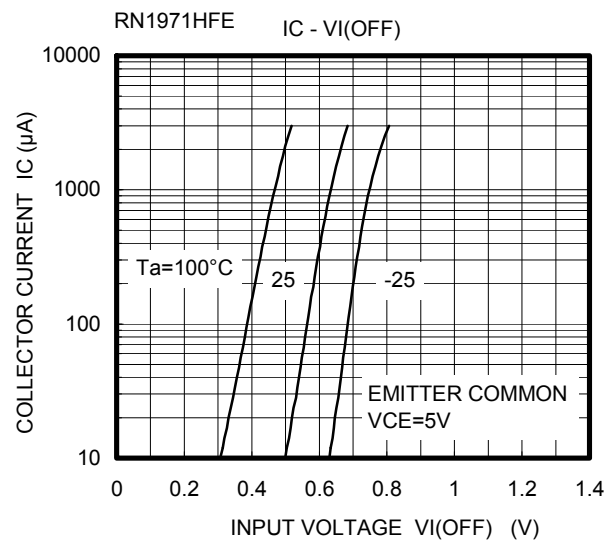
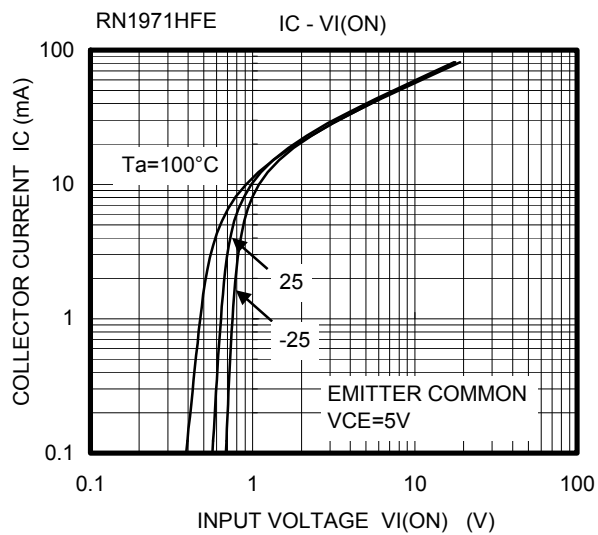
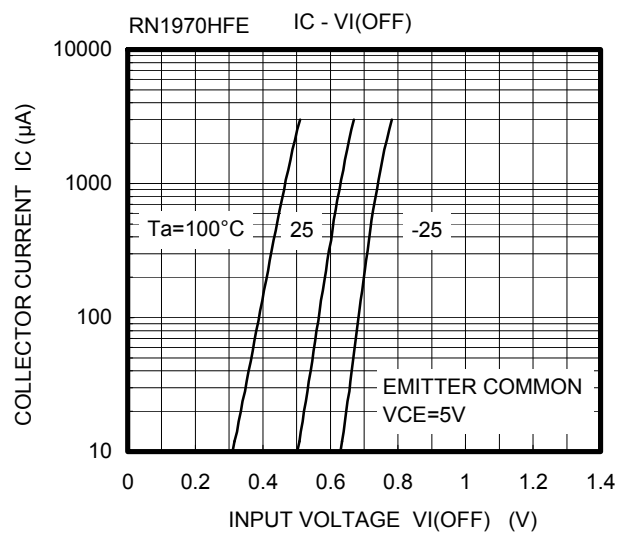
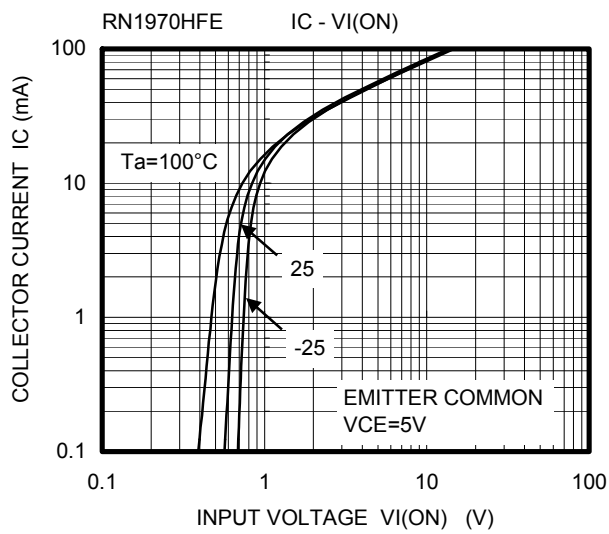
Equivalent Circuit (top view)



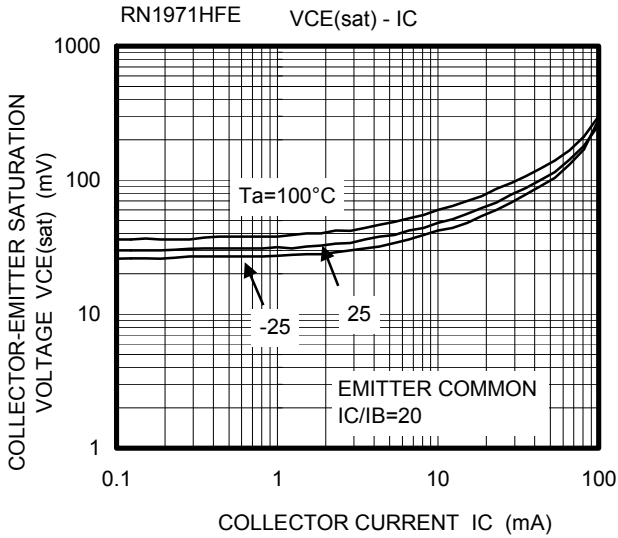
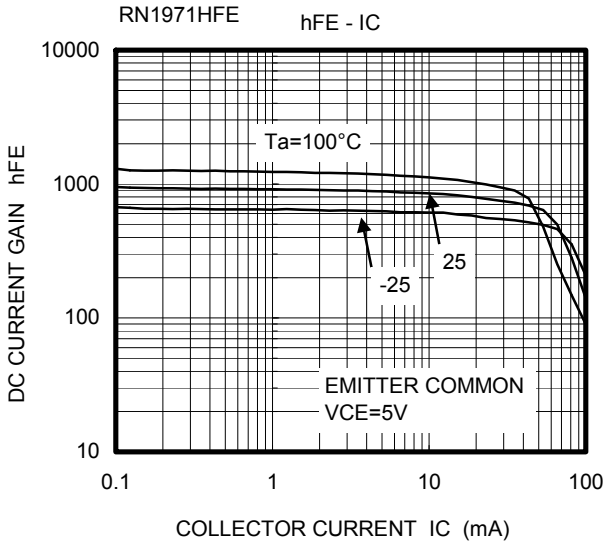
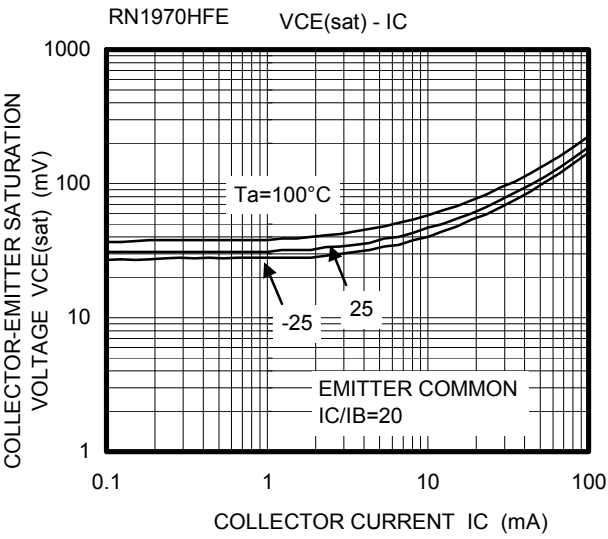
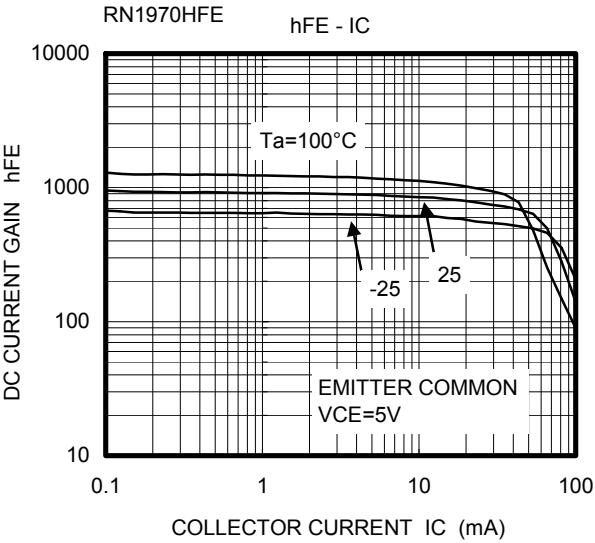
Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

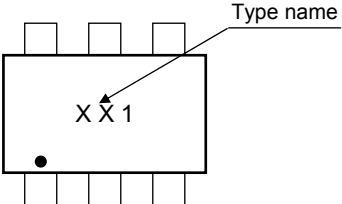
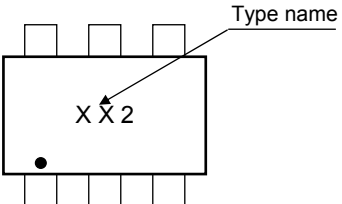
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		I_{CBO}	$V_{CB} = 40\text{ V}, I_E = 0$	—	—	100	nA
Emitter cut-off current		I_{EBO}	$V_{EB} = 5\text{ V}, I_C = 0$	—	—	100	nA
DC current gain		h_{FE}	$V_{CE} = 5\text{ V}, I_C = 1\text{ mA}$	300	—	—	
Collector-emitter saturation voltage		$V_{CE(sat)}$	$I_C = 5\text{ mA}, I_B = 0.25\text{ mA}$	—	0.06	0.15	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	—	pF
Input resistor	RN1970HFE	R1	—	3.76	4.7	5.64	kΩ
	RN1971HFE			8	10	12	

Q1, Q2 Common



Q1,Q2 Common



Type Name	Marking
RN1970HFE	 <p>The diagram shows a rectangular component with six pins (three on top, three on bottom). Inside the rectangle, the text 'X X 1' is printed. A small black dot is located at the bottom-left corner of the rectangle. An arrow points from the text 'Type name' to the 'X' characters.</p>
RN1971HFE	 <p>The diagram shows a rectangular component with six pins (three on top, three on bottom). Inside the rectangle, the text 'X X 2' is printed. A small black dot is located at the bottom-left corner of the rectangle. An arrow points from the text 'Type name' to the 'X' characters.</p>

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20070701-EN GENERAL

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