

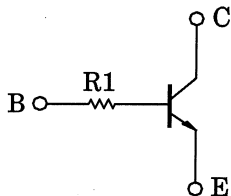
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

RN1970FS,RN1971FS

Switching, Inverter Circuit, Interface Circuit and
Driver Circuit Applications

- Two devices are incorporated into a fine pitch Small Mold (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 RN2970FS, RN2971FS

Equivalent Circuit and Bias Resistor Values



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

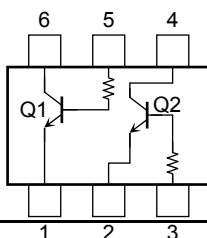
Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	20	V
Collector-emitter voltage	V_{CEO}	20	V
Emitter-base voltage	V_{EBO}	5	V
Collector current	I_C	50	mA
Collector power dissipation	P_C (Note 1)	50	mW
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	-55~150	°C

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.

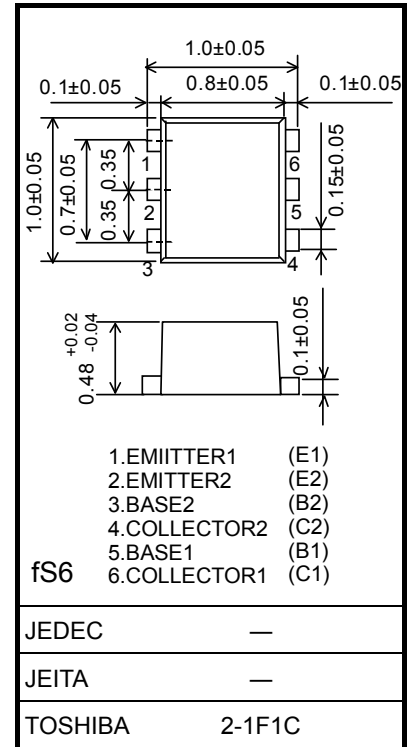
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: Total rating

Equivalent Circuit (top view)



Unit: mm

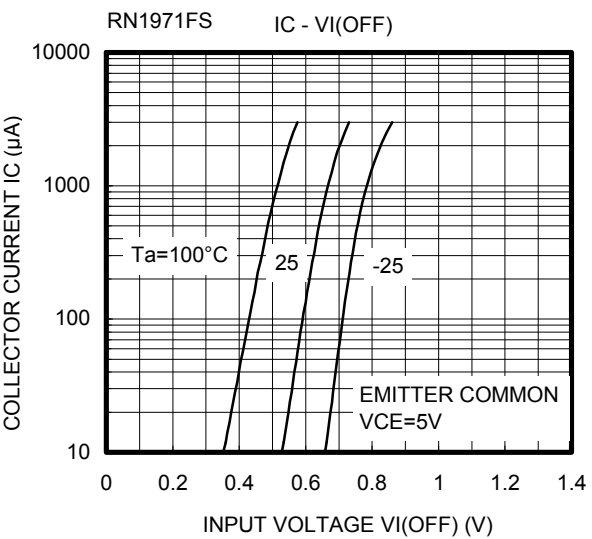
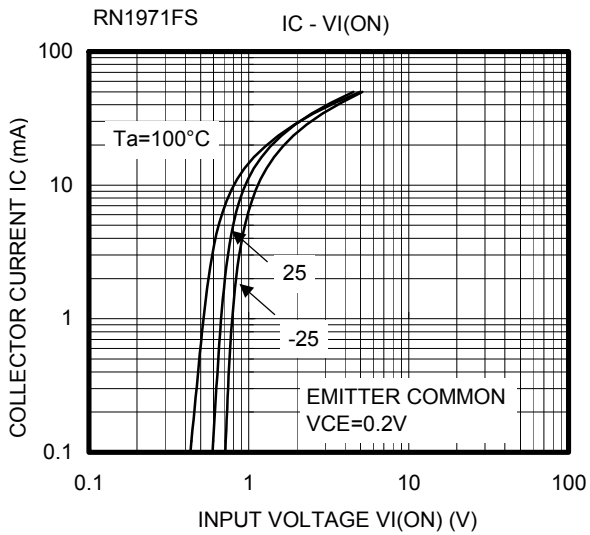
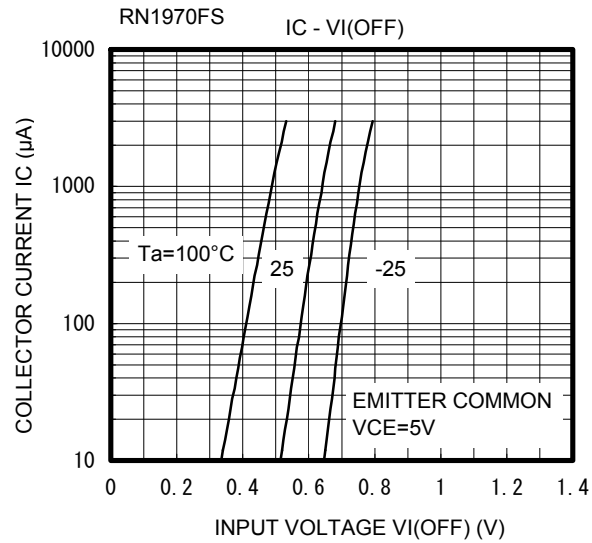
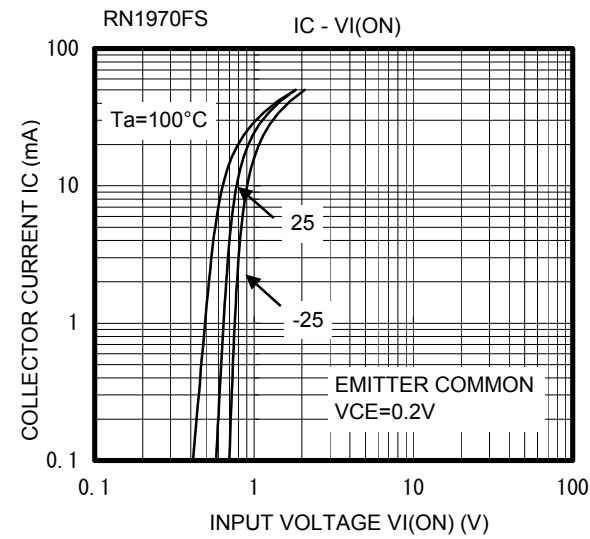


Weight: 0.001 g (typ.)

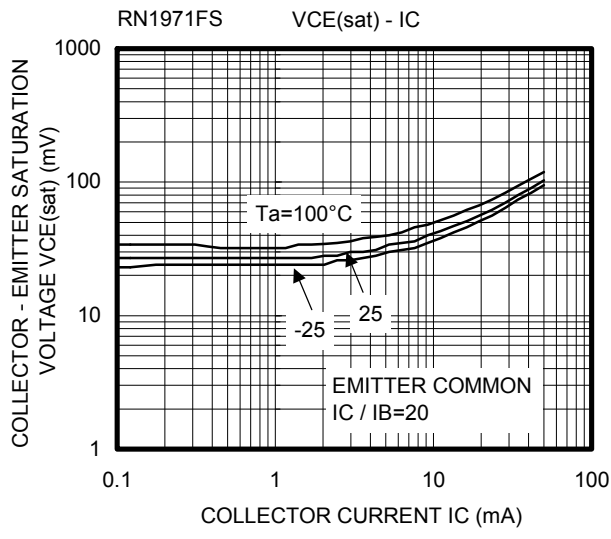
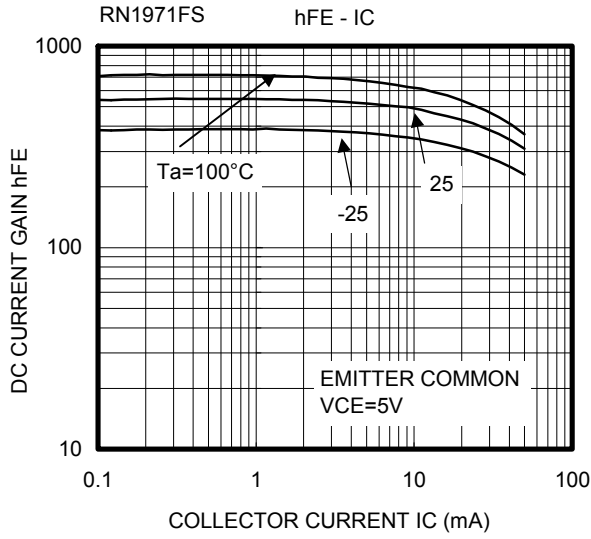
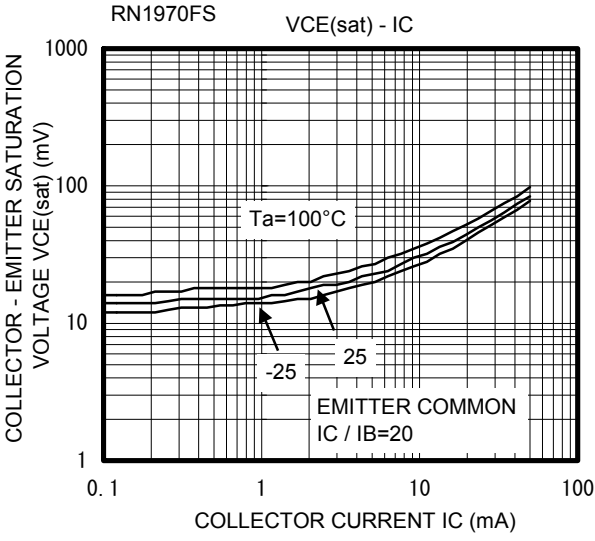
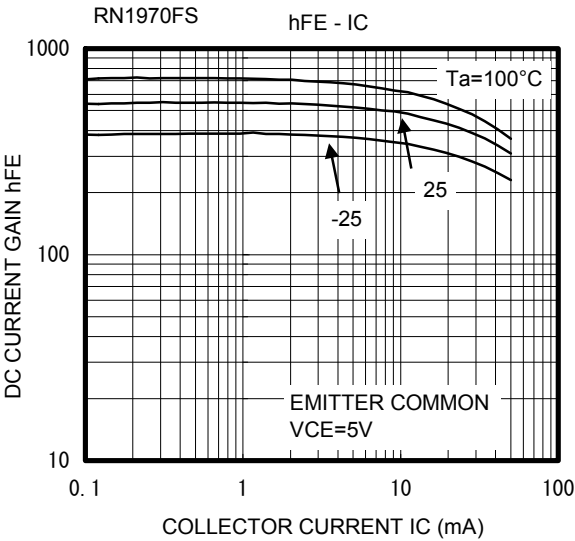
Electrical Characteristics (Ta = 25°C) (Q1,Q2 common)

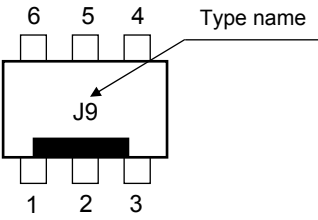
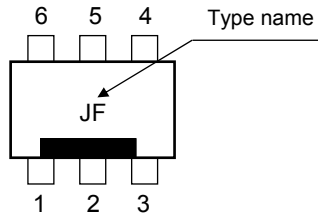
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		I_{CBO}	$V_{CB} = 20\text{ V}, I_E = 0$	—	—	100	nA
Emitter cut-off current		I_{EBO}	$V_{EB} = 5\text{ V}, I_C = 0$	—	—	100	nA
DC current gain		h_{FE}	$V_{CE} = 5\text{ V}, I_C = 1\text{ mA}$	300	—	—	
Collector-emitter saturation voltage		$V_{CE(sat)}$	$I_C = 5\text{ mA}, I_B = 0.25\text{ mA}$	—	—	0.15	V
Collector output capacitance		C_{ob}	$V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	1.2	—	pF
Input resistor	RN1970FS	R1	—	3.76	4.7	5.64	$k\Omega$
	RN1971FS			8	10	12	

(Q1,Q2 common)



(Q1,Q2 common)



Type Name	Marking
RN1970FS	 The diagram shows a rectangular component with six pins. Pins 1, 2, and 3 are at the bottom, and pins 4, 5, and 6 are at the top. A black rectangular marking is located between pins 1 and 2. An arrow points from the text 'J9' to this marking. Another arrow points from the text 'Type name' to the top right corner of the component.
RN1971FS	 The diagram shows a rectangular component with six pins. Pins 1, 2, and 3 are at the bottom, and pins 4, 5, and 6 are at the top. A black rectangular marking is located between pins 1 and 2. An arrow points from the text 'JF' to this marking. Another arrow points from the text 'Type name' to the top right corner of the component.

Handling Precaution

When handling individual devices (which are not yet mounted on a circuit board), be sure that the environment is protected against electrostatic electricity. Operators should wear anti-static clothing, and containers and other objects that come into direct contact with devices should be made of anti-static materials.

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