

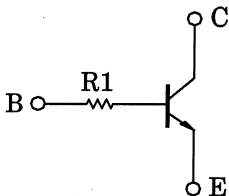
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

## 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)

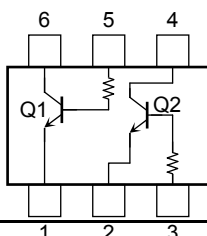
Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	20	V
Collector-emitter voltage	$V_{CEO}$	20	V
Emitter-base voltage	$V_{EBO}$	5	V
Collector current	$I_C$	50	mA
Collector power dissipation	$P_C$ (Note 1)	50	mW
Junction temperature	$T_j$	150	°C
Storage temperature range	$T_{stg}$	-55~150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

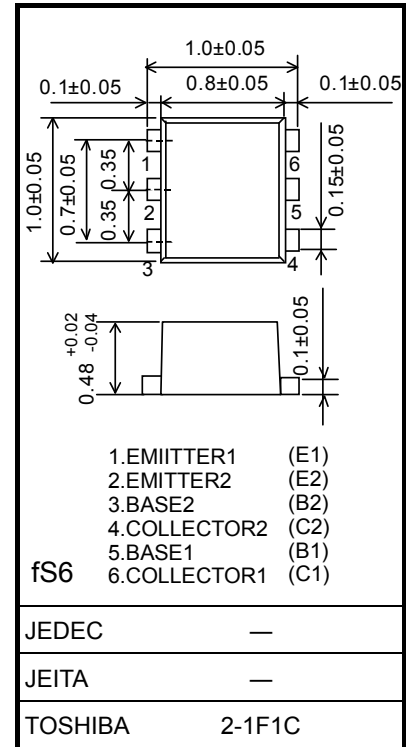
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: Total rating

### Equivalent Circuit (top view)



Unit: mm

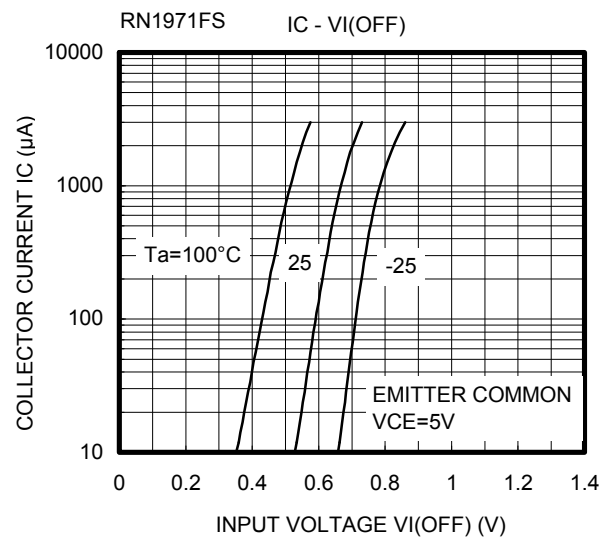
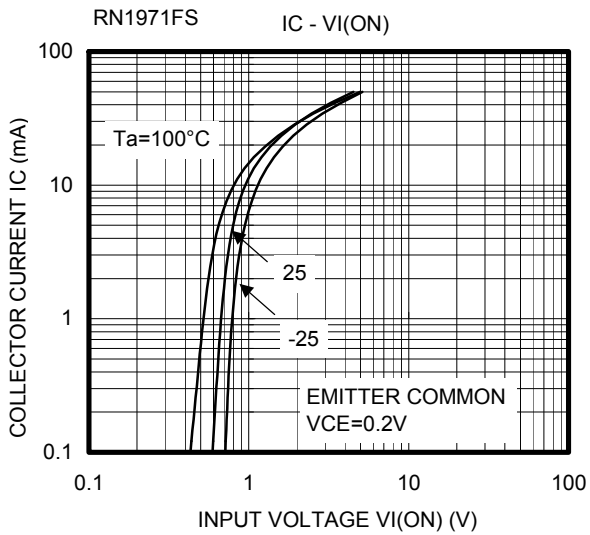
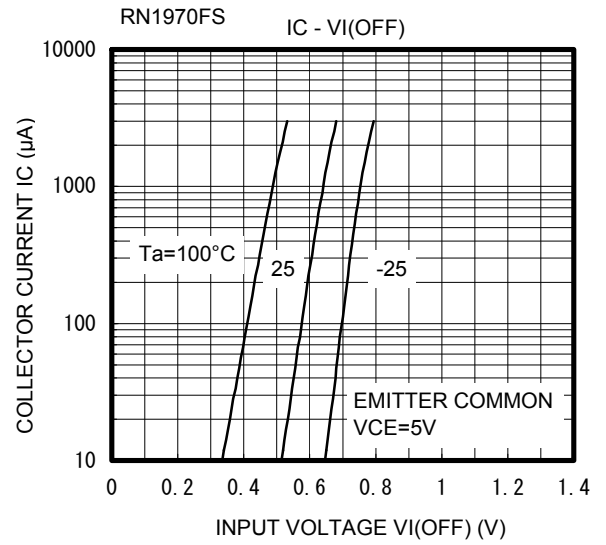
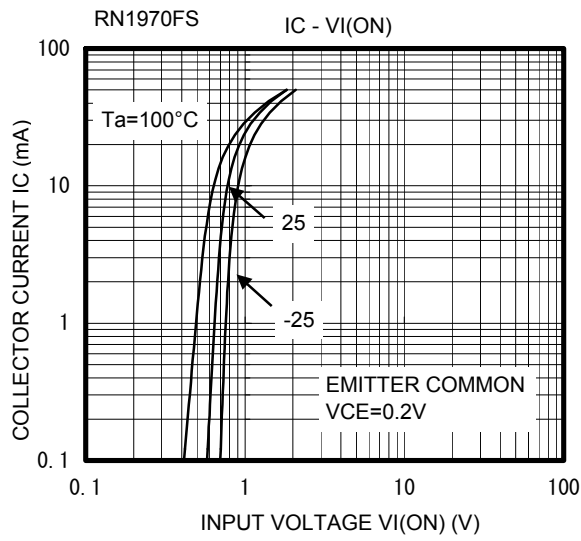


Weight: 0.001 g (typ.)

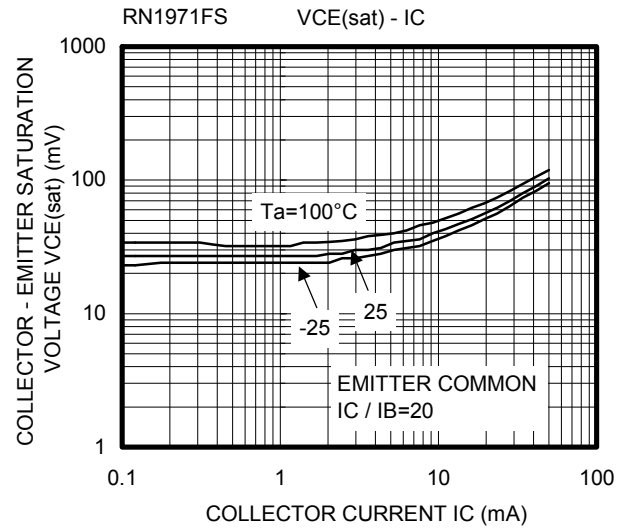
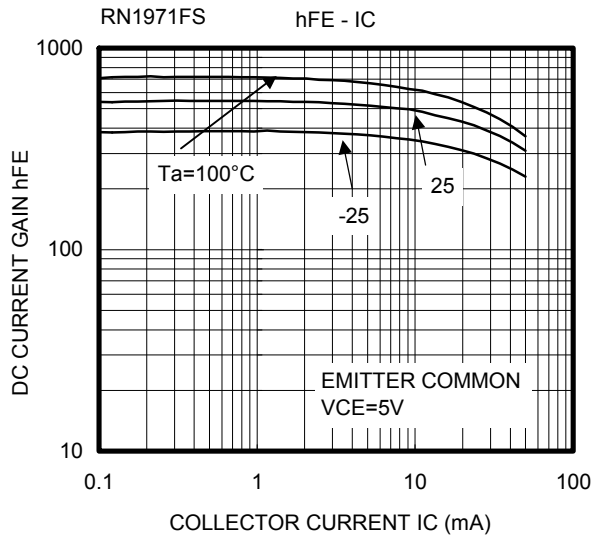
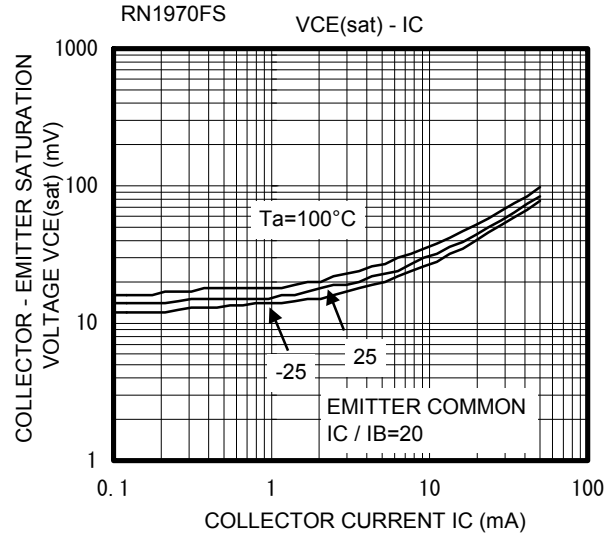
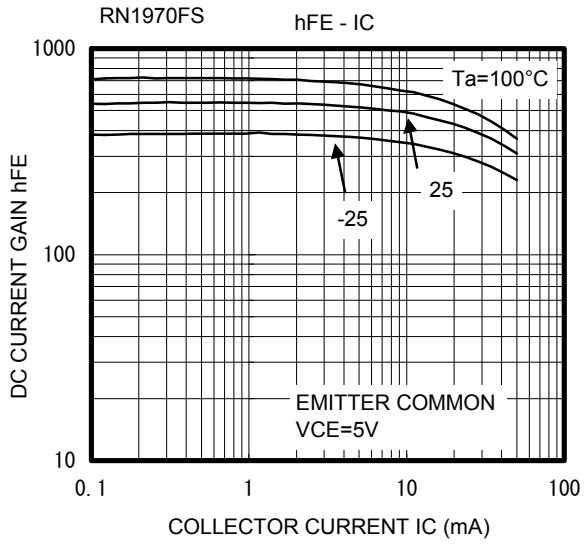
## Electrical Characteristics (Ta = 25°C) (Q1,Q2 common)

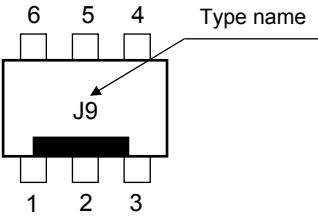
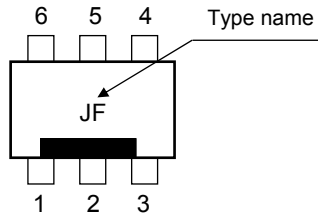
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		$I_{CBO}$	$V_{CB} = 20\text{ V}, I_E = 0$	—	—	100	nA
Emitter cut-off current		$I_{EBO}$	$V_{EB} = 5\text{ V}, I_C = 0$	—	—	100	nA
DC current gain		$h_{FE}$	$V_{CE} = 5\text{ V}, I_C = 1\text{ mA}$	300	—	—	
Collector-emitter 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	kΩ
	RN1971FS			8	10	12	

(Q1, Q2 common)



(Q1, Q2 common)



Type Name	Marking
RN1970FS	 <p>The diagram shows a rectangular component with six pins. The top three pins are labeled 6, 5, and 4 from left to right. The bottom three pins are labeled 1, 2, and 3 from left to right. A black bar is located between the top and bottom pins. The marking 'J9' is printed in the center of the component. An arrow labeled 'Type name' points to the 'J9' marking.</p>
RN1971FS	 <p>The diagram shows a rectangular component with six pins. The top three pins are labeled 6, 5, and 4 from left to right. The bottom three pins are labeled 1, 2, and 3 from left to right. A black bar is located between the top and bottom pins. The marking 'JF' is printed in the center of the component. An arrow labeled 'Type name' points to the 'JF' marking.</p>

## 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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