

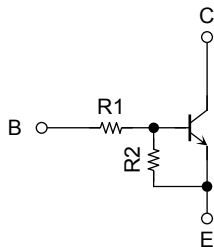
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

## RN2967FS, RN2968FS, RN2969FS

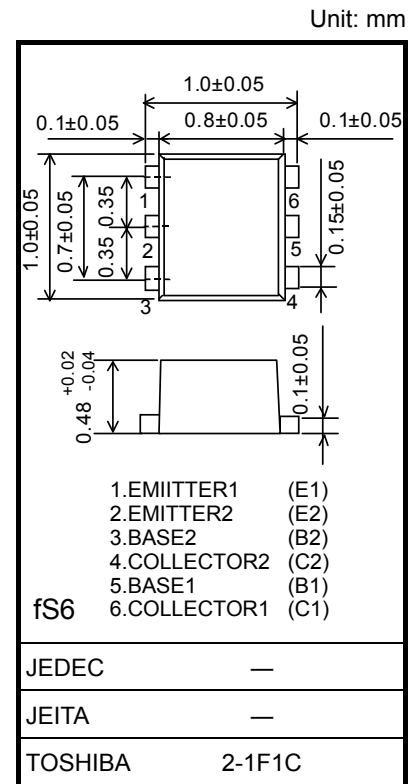
Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- 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 RN1967FS~RN1969FS

### Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN2967FS	10	47
RN2968FS	22	47
RN2969FS	47	22

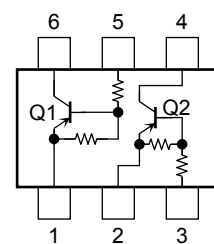


Weight: 0.001 g (typ.)

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

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN2967FS~RN2969FS	V <sub>CBO</sub>	-20	V
Collector-emitter voltage	RN2967FS~RN2969FS	V <sub>CEO</sub>	-20	V
Emitter-base voltage	RN2967FS	V <sub>EBO</sub>	-6	V
	RN2968FS		-7	
	RN2969FS		-15	
Collector current		I <sub>C</sub>	-50	mA
Collector power dissipation	RN2967FS~RN2969FS	P <sub>C</sub> (Note 1)	50	mW
Junction temperature		T <sub>j</sub>	150	°C
Storage temperature range		T <sub>stg</sub>	-55~150	°C

### Equivalent Circuit (top view)



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.

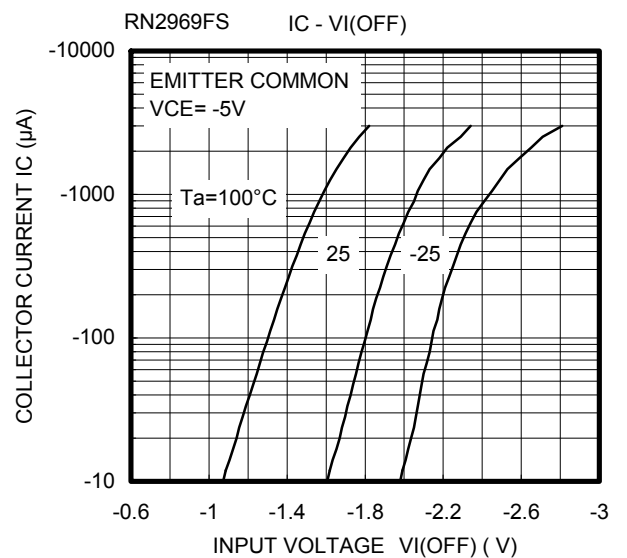
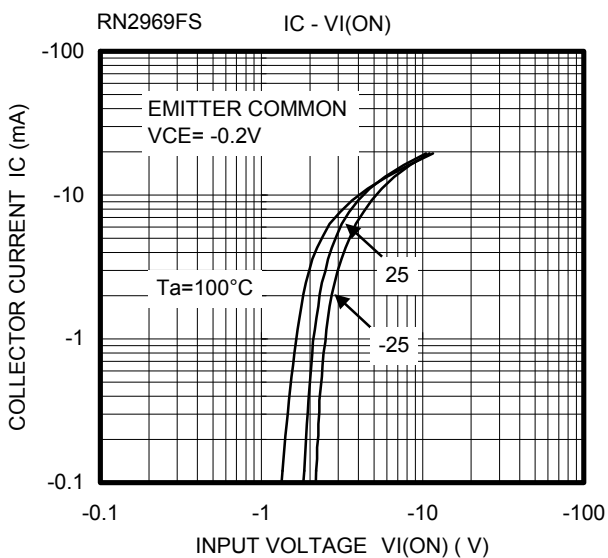
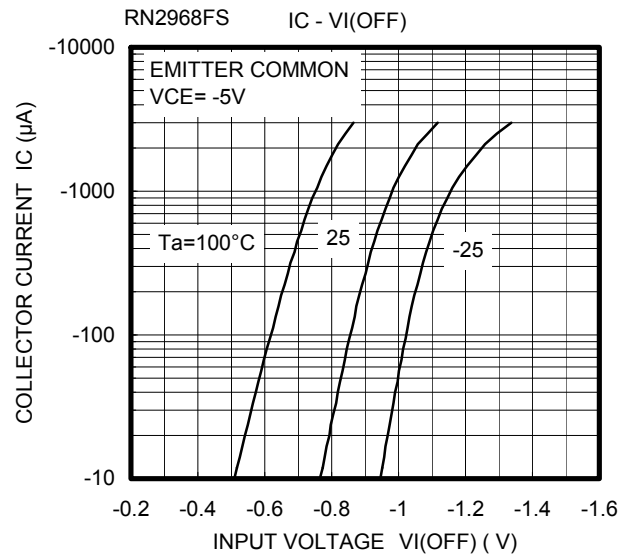
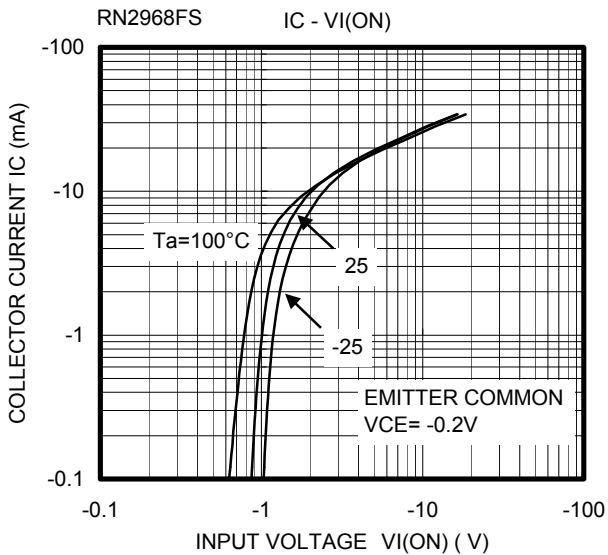
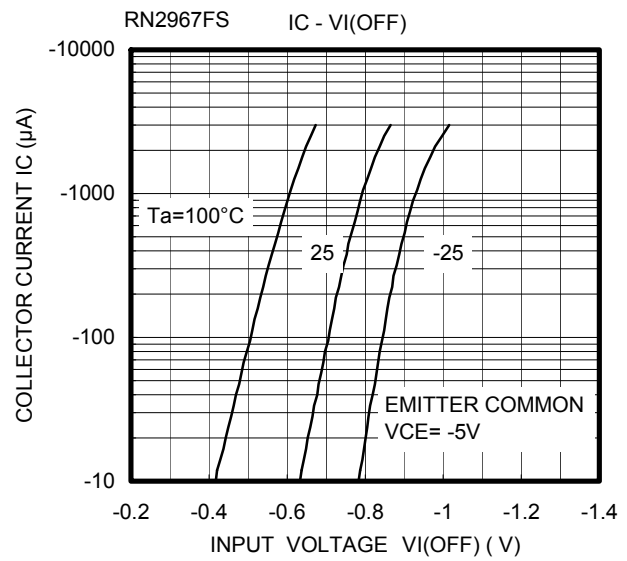
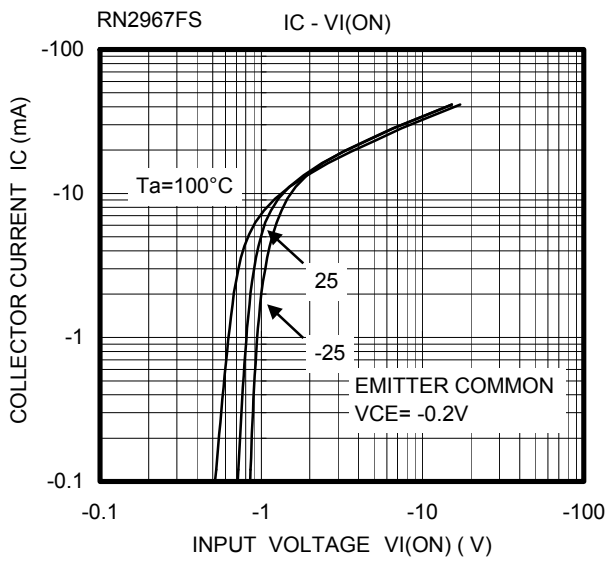
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: Total rating

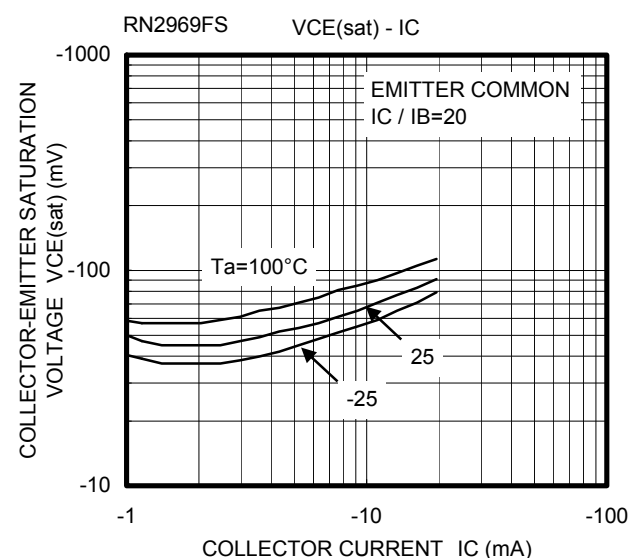
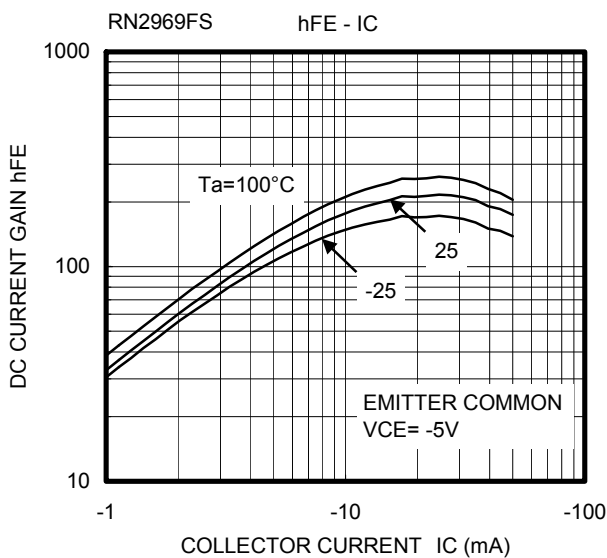
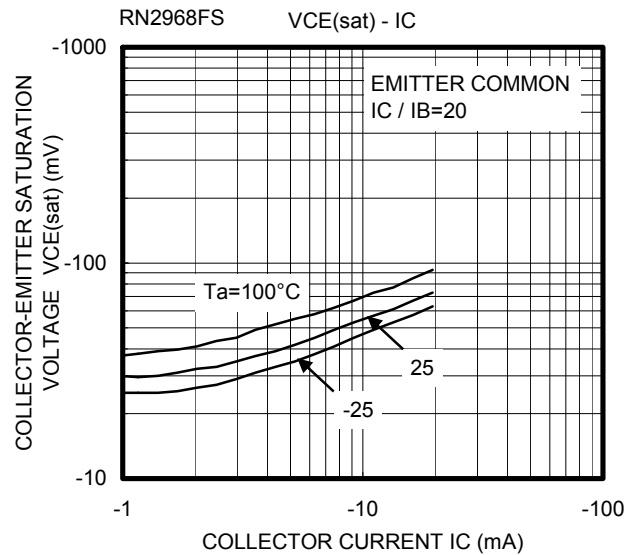
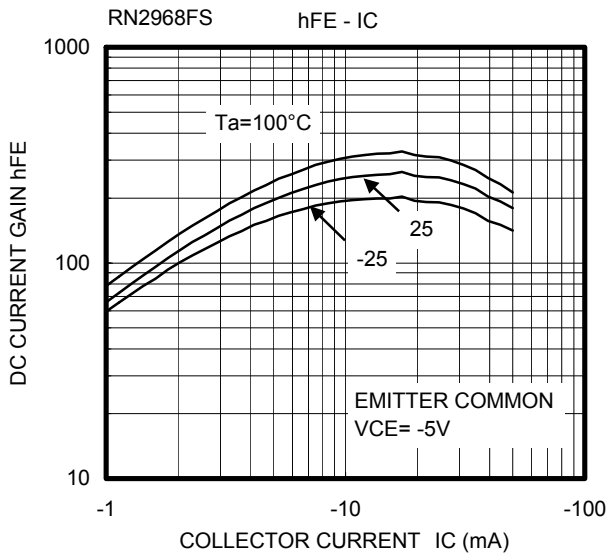
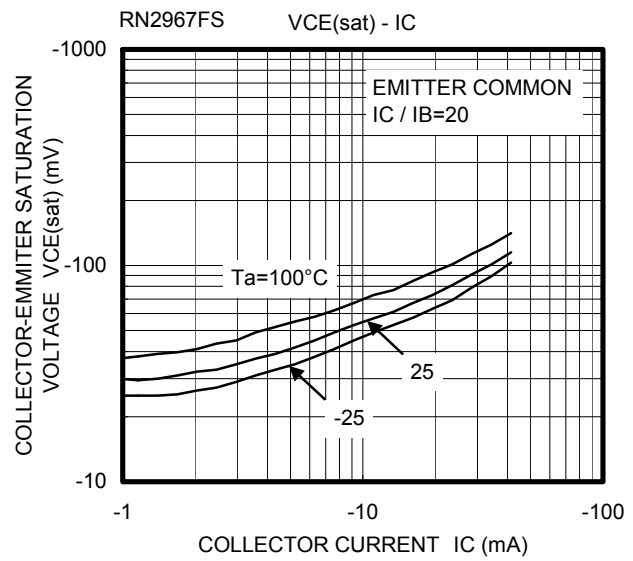
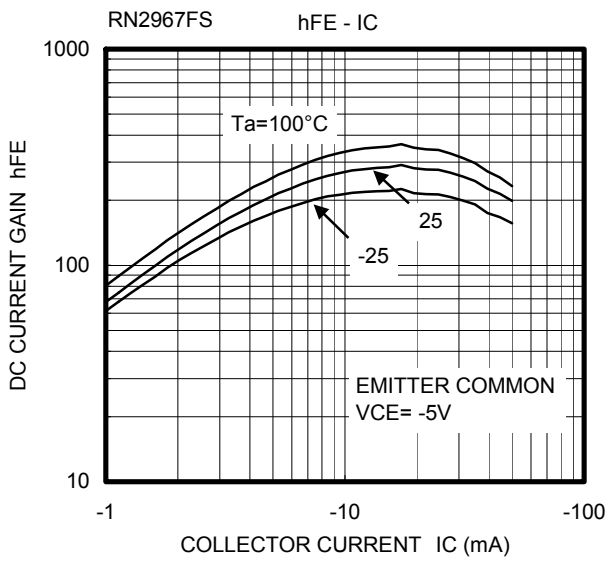
## Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

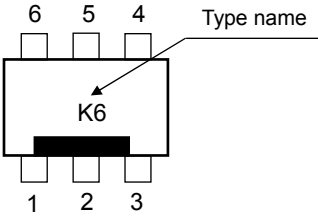
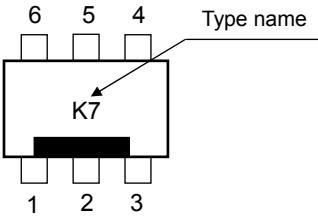
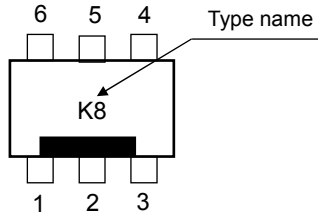
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2967FS~2969FS	$I_{CBO}$	$V_{CB} = -20\text{ V}, I_E = 0$	—	—	-100	nA
		$I_{CEO}$	$V_{CE} = -20\text{ V}, I_B = 0$	—	—	-500	
Emitter cut-off current	RN2967FS	$I_{EBO}$	$V_{EB} = -6\text{ V}, I_C = 0$	-0.088	—	-0.131	mA
	RN2968FS		$V_{EB} = -7\text{ V}, I_C = 0$	-0.085	—	-0.126	
	RN2969FS		$V_{EB} = -15\text{ V}, I_C = 0$	-0.182	—	-0.271	
DC current gain	RN2967FS	$h_{FE}$	$V_{CE} = -5\text{ V},$ $I_C = -10\text{ mA}$	120	—	—	
	RN2968FS			120	—	—	
	RN2969FS			100	—	—	
Collector-emitter saturation voltage	RN2967FS~2969FS	$V_{CE(sat)}$	$I_C = -5\text{ mA},$ $I_B = -0.25\text{ mA}$	—	—	-0.15	V
Input voltage (ON)	RN2967FS	$V_I(ON)$	$V_{CE} = -0.2\text{ V},$ $I_C = -5\text{ mA}$	-0.7	—	-1.5	V
	RN2968FS			-0.8	—	-2.2	
	RN2969FS			-1.6	—	-5.0	
Input voltage (OFF)	RN2967FS	$V_I(OFF)$	$V_{CE} = -5\text{ V},$ $I_C = -0.1\text{ mA},$	-0.5	—	-1.0	V
	RN2968FS			-0.6	—	-1.1	
	RN2969FS			-1.3	—	-2.6	
Collector output capacitance	RN2967FS~2969FS	$C_{ob}$	$V_{CB} = -10\text{ V}, I_E = 0,$ $f = 1\text{ MHz}$	—	1.2	—	pF
Input resistor	RN2967FS	R1	—	8	10	12	k $\Omega$
	RN2968FS			17.6	22	26.4	
	RN2969FS			37.6	47	56.4	
Resistor ratio	RN2967FS	R1/R2	—	0.17	0.213	0.255	
	RN2968FS			0.374	0.468	0.562	
	RN2969FS			1.71	2.14	2.56	

(Q1,Q2 common)



(Q1,Q2 common)



Type Name	Marking
RN2967FS	
RN2968FS	
RN2969FS	

**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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