

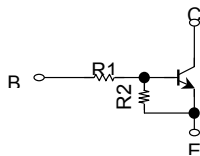
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

## RN1967FS, RN1968FS, RN1969FS

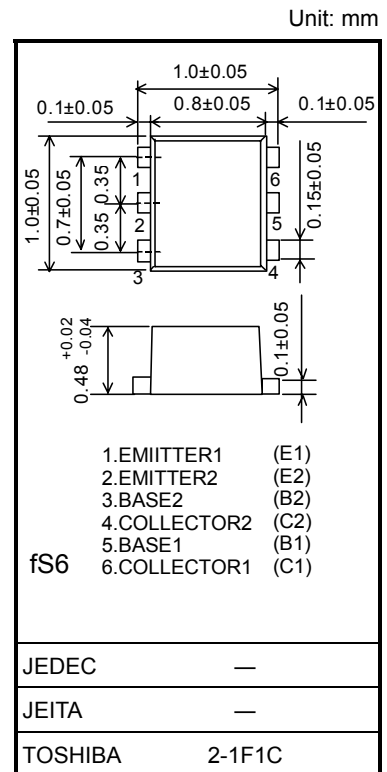
Switching, Inverter Circuit, Interface Circuit and  
Driver Circuit Applications

- 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 RN2967FS~RN2969FS

### Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN1967FS	10	47
RN1968FS	22	47
RN1969FS	47	22



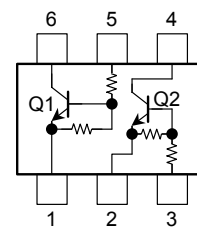
Weight:0.001g (typ.)

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

Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	20	V
Collector-emitter voltage	$V_{CEO}$	20	V
Emitter-base voltage	$V_{EBO}$	6	V
		7	V
		15	V
Collector current	$I_C$	50	mA
Collector power dissipation	$P_C$ (Note)	50	mW
Junction temperature	$T_j$	150	°C
Storage temperature range	$T_{stg}$	-55~150	°C

Note: Total rating

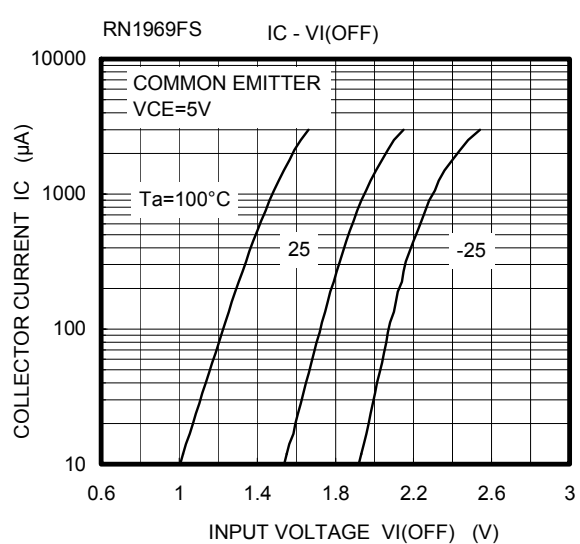
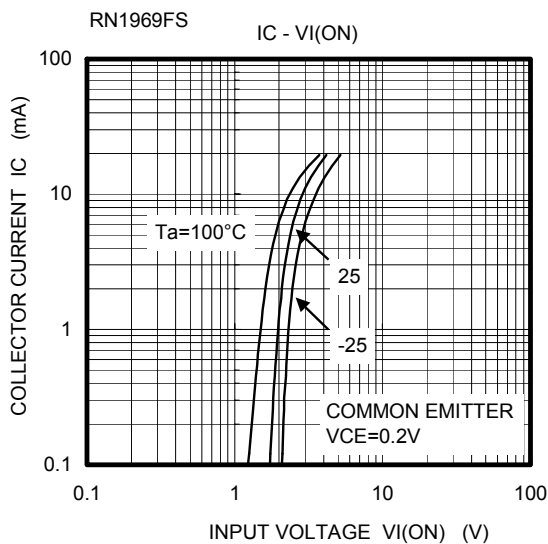
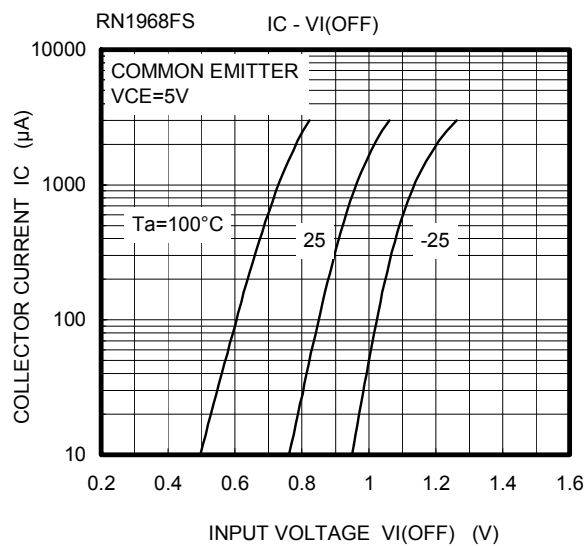
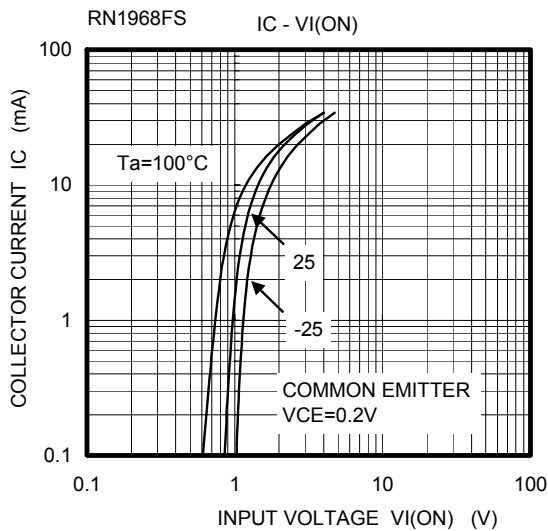
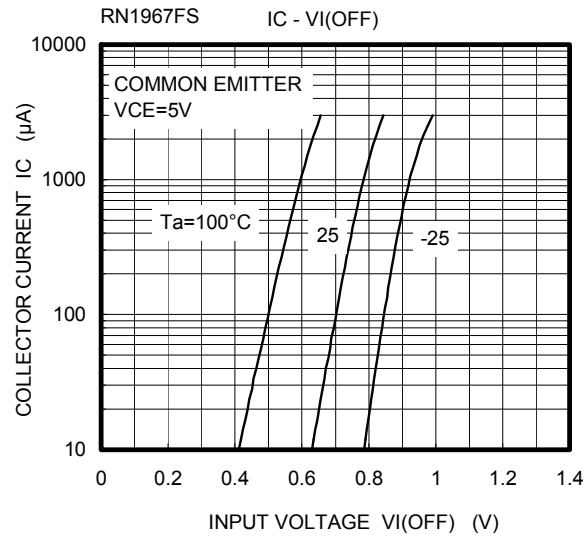
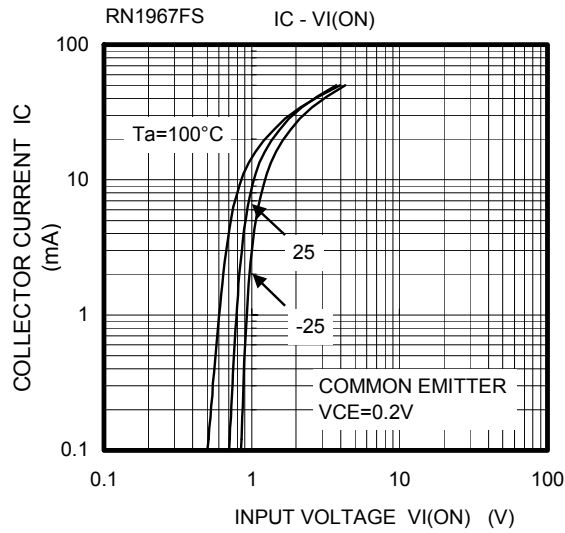
### Equivalent Circuit (top view)



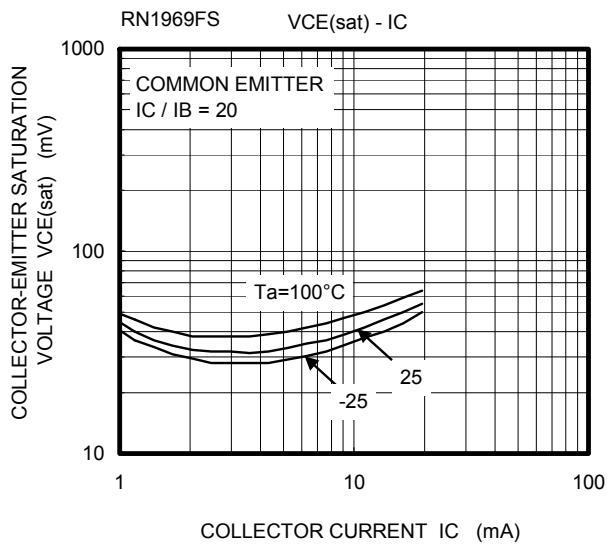
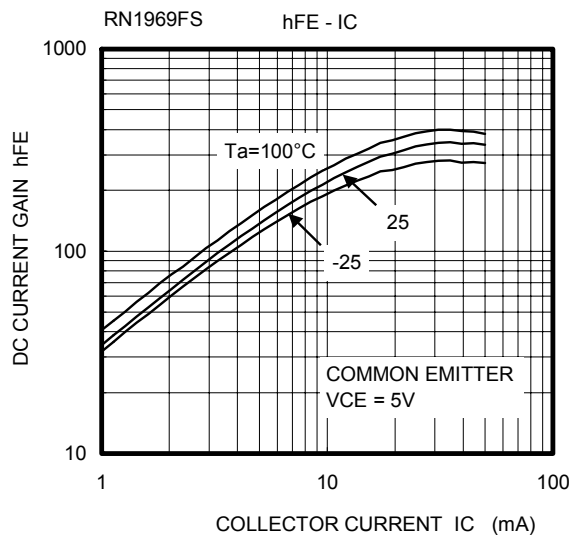
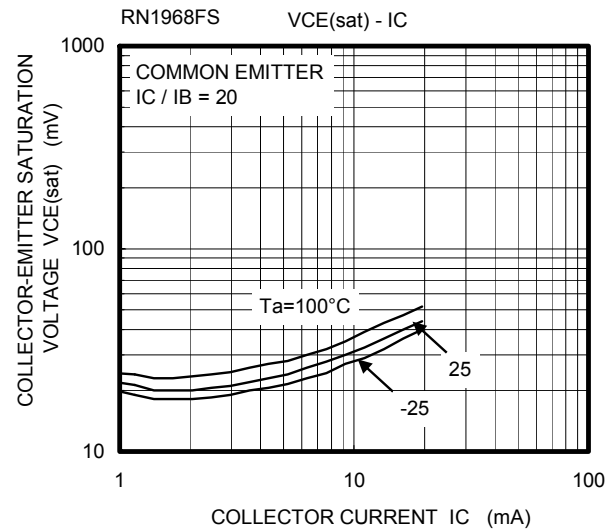
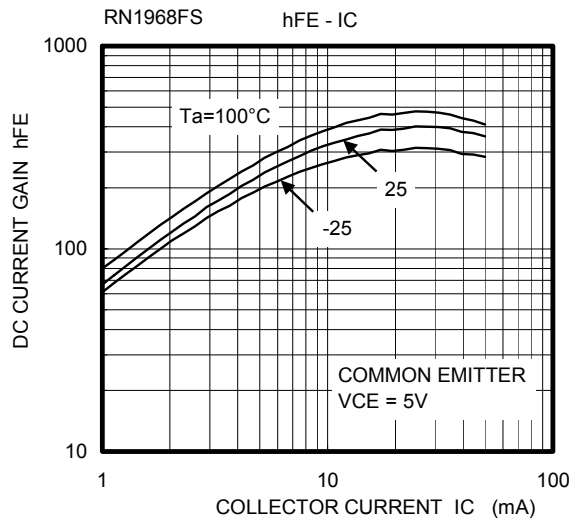
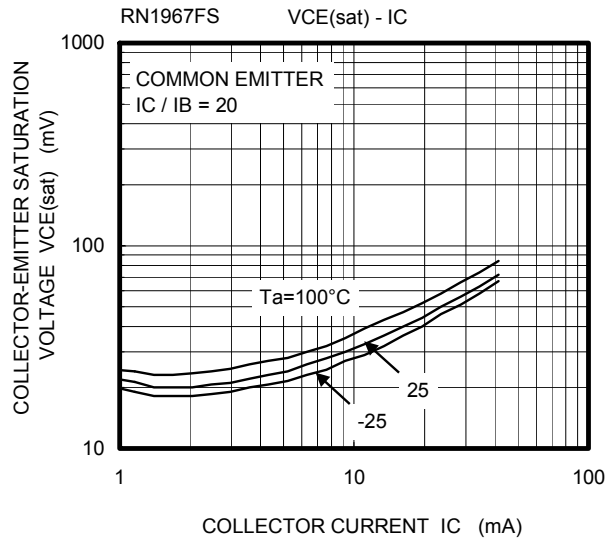
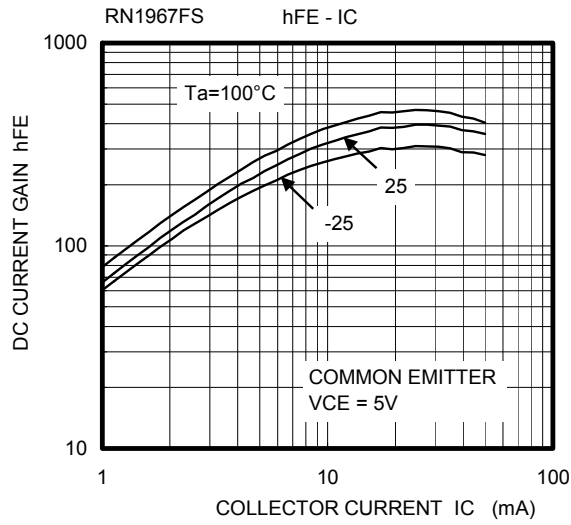
**Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)**

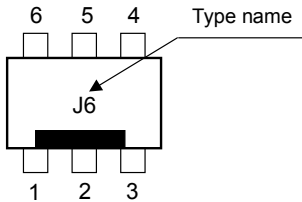
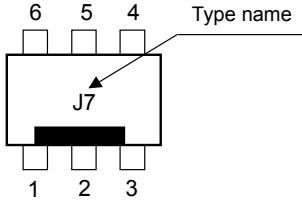
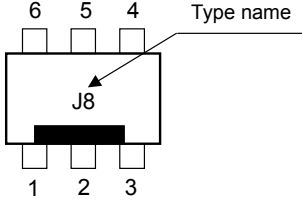
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1967FS~1969FS	$I_{CBO}$	$V_{CB} = 20\text{ V}, I_E = 0$	—	—	100	nA
		$I_{CEO}$	$V_{CE} = 20\text{ V}, I_B = 0$	—	—	500	
Emitter cut-off current	RN1967FS	$I_{EBO}$	$V_{EB} = 6\text{ V}, I_C = 0$	0.088	—	0.131	mA
	RN1968FS		$V_{EB} = 7\text{ V}, I_C = 0$	0.085	—	0.126	
	RN1969FS		$V_{EB} = 15\text{ V}, I_C = 0$	0.182	—	0.271	
DC current gain	RN1967FS	$h_{FE}$	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$	120	—	—	
	RN1968FS			120	—	—	
	RN1969FS			100	—	—	
Collector-emitter saturation voltage	RN1967FS~1969FS	$V_{CE(sat)}$	$I_C = 5\text{ mA}, I_B = 0.25\text{ mA}$	—	—	0.15	V
Input voltage (ON)	RN1967FS	$V_{I(ON)}$	$V_{CE} = 0.2\text{ V}, I_C = 5\text{ mA}$	0.7	—	1.5	V
	RN1968FS			0.8	—	2.2	
	RN1969FS			1.6	—	5.0	
Input voltage (OFF)	RN1967FS	$V_{I(OFF)}$	$V_{CE} = 5\text{ V}, I_C = 0.1\text{ mA}$	0.5	—	1.0	V
	RN1968FS			0.6	—	1.1	
	RN1969FS			1.3	—	2.6	
Collector output capacitance	RN1967FS~1969FS	$C_{ob}$	$V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	1.2	—	pF
Input resistor	RN1967FS	R1	—	8	10	12	kΩ
	RN1968FS			17.6	22	26.4	
	RN1969FS			37.6	47	56.4	
Resistor ratio	RN1967FS	R1/R2	—	0.17	0.213	0.255	
	RN1968FS			0.374	0.468	0.562	
	RN1969FS			1.71	2.14	2.56	

(Q1,Q2 common)



(Q1,Q2 common)



Type Name	Marking
RN1967FS	 <p>Diagram showing the marking for RN1967FS. The device is a rectangular component with six pins. Pins 1, 2, and 3 are on the bottom edge, and pins 4, 5, and 6 are on the top edge. A black rectangular marking is located on the bottom edge, between pins 1 and 3. An arrow points from the text 'J6' to this marking. Another arrow points from the text 'Type name' to the top edge of the component, between pins 4 and 6.</p>
RN1968FS	 <p>Diagram showing the marking for RN1968FS. The device is a rectangular component with six pins. Pins 1, 2, and 3 are on the bottom edge, and pins 4, 5, and 6 are on the top edge. A black rectangular marking is located on the bottom edge, between pins 1 and 3. An arrow points from the text 'J7' to this marking. Another arrow points from the text 'Type name' to the top edge of the component, between pins 4 and 6.</p>
RN1969FS	 <p>Diagram showing the marking for RN1969FS. The device is a rectangular component with six pins. Pins 1, 2, and 3 are on the bottom edge, and pins 4, 5, and 6 are on the top edge. A black rectangular marking is located on the bottom edge, between pins 1 and 3. An arrow points from the text 'J8' to this marking. Another arrow points from the text 'Type name' to the top edge of the component, between pins 4 and 6.</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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