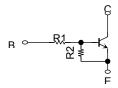
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

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

0.1±0.05 0.1±0.05 0.1±0.05 0.1±0.05 0.1±0.05 0.1±0.05 0.1±0.05 0.1±0.05 0.1±0.05 0.1±0.05 0.1±0.05

2.EMITTER2

6.COLLECTOR1

3.BASE2 4.COLLECTOR2

5.BASE1

fS6

JEDEC JEITA

TOSHIBA

(E2)

(B2)

(C2)

(B1)

2-1F1C

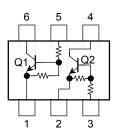
Unit: mm

Weight: 0.001 g (typ.)

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

Characteristics		Symbol	Rating	Unit	
Collector-base voltage	RN1967FS~	V_{CBO}	20	V	
Collector-emitter voltage	1969FS	V _{CEO}	20 V		
Emitter-base voltage	RN1967FS		6	V	
	RN1968FS	V_{EBO}	7		
	RN1969FS		15		
Collector current		Ic	50	mA	
Collector power dissipation	RN1967FS~	P _C (Note 1)	50	mW	
Junction temperature	RN1969FS	Tj	150	°C	
Storage temperature range		T _{stg}	-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

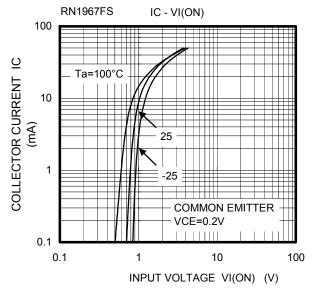


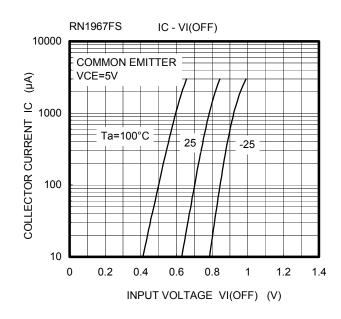
Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

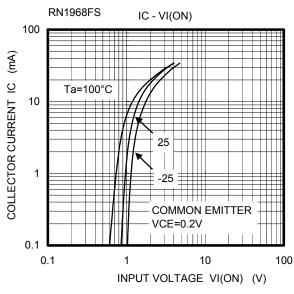
Characteristics		Symbol	Test Condition	Min	Тур.	Max	Unit
Collector cut-off current	RN1967FS~1969FS	I _{CBO}	$V_{CB} = 20 \text{ V}, I_E = 0$	_	_	100	nA
		I _{CEO}	V _{CE} = 20 V, I _B = 0	_	_	500	
Emitter cut-off current	RN1967FS	I _{EBO}	V _{EB} = 6V, I _C = 0	0.088	_	0.131	
	RN1968FS		$V_{EB} = 7V, I_{C} = 0$	0.085	_	0.126	mA
	RN1969FS		$V_{EB} = 15V, I_{C} = 0$	0.182	_	0.271	
DC current gain	RN1967FS	h _{FE}	V _{CE} = 5 V, I _C = 10 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	٧
Input voltage (ON)	RN1967FS	V _{I (ON)}	$V_{CE} = 0.2 \text{ V}, I_{C} = 5 \text{ mA}$	0.7	_	1.5	
	RN1968FS			0.8	_	2.2	٧
	RN1969FS			1.6	_	5.0	
Input voltage (OFF)	RN1967FS	VI (OFF)	V _{CE} = 5 V, I _C = 0.1 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 MHz	_	1.2	_	pF
Input resistor	RN1967FS	R1	_	8	10	12	
	RN1968FS			17.6	22	26.4	kΩ
	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	

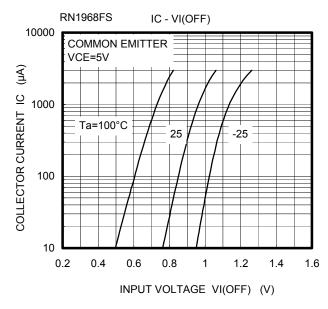
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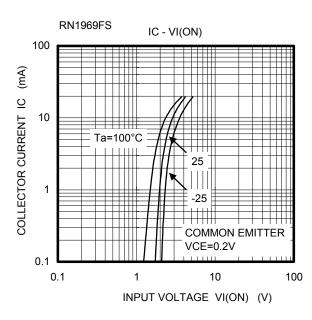
(Q1,Q2 common)

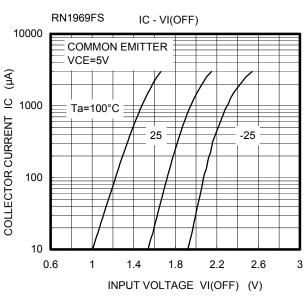




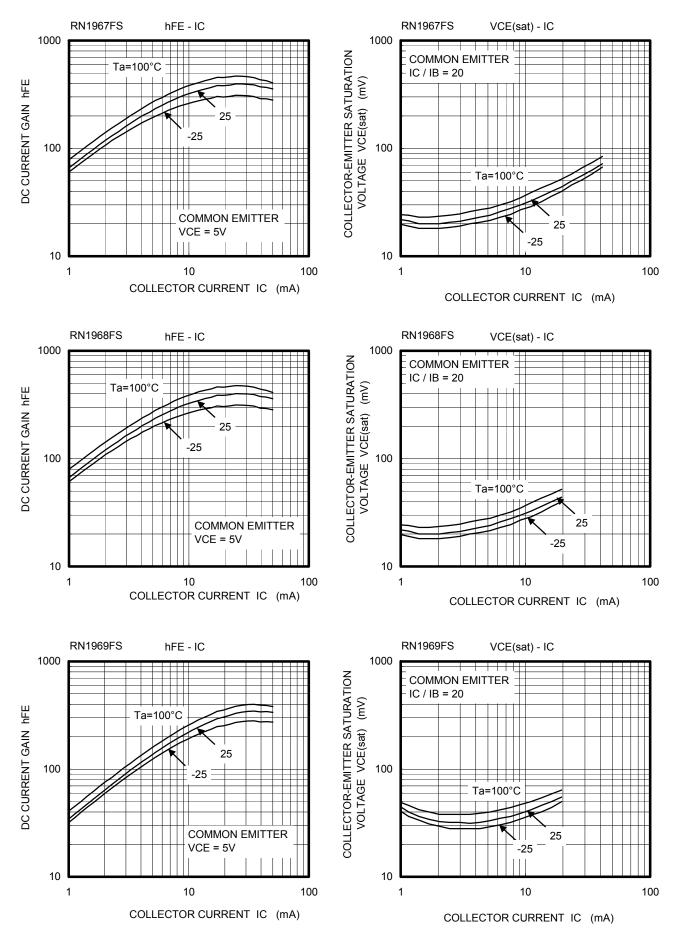


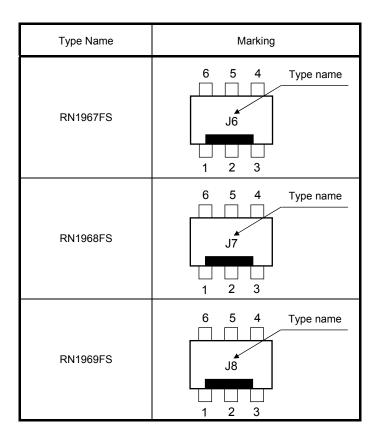






(Q1,Q2 common)





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.

5

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