

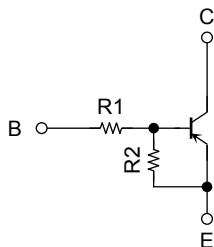
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process) (Bias Resistor Built-in Transistor)

RN2967FE, RN2968FE, RN2969FE

Switching, Inverter Circuit, Interface Circuit and
Driver Circuit Applications

- Two devices are incorporated into an Extreme-Super-Mini (6-pin) package.
- Incorporating a bias resistor into a transistor reduces parts count.
Reducing the parts count enables the manufacture of ever more compact equipment and lowers assembly cost.
- Complementary to RN1967FE to RN1969FE

Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN2967FE	10	47
RN2968FE	22	47
RN2969FE	47	22

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

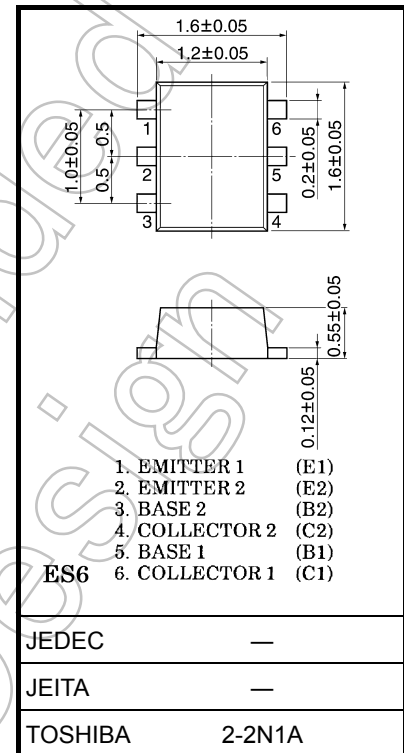
Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	-50	V
Collector-emitter voltage	V_{CEO}	-50	V
Emitter-base voltage	RN2967FE	-6	V
	RN2968FE	-7	
	RN2969FE	-15	
Collector current	I_C	-100	mA
Collector power dissipation	P_C (Note 1)	100	mW
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	-55 to 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).

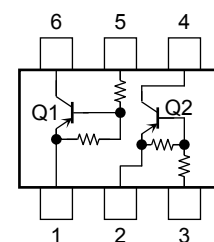
Note 1: Total rating

Unit: mm



Weight: 3 mg (typ.)

Equivalent Circuit (top view)

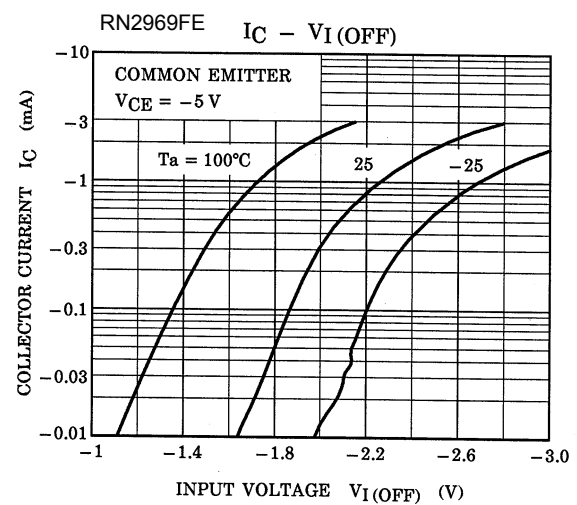
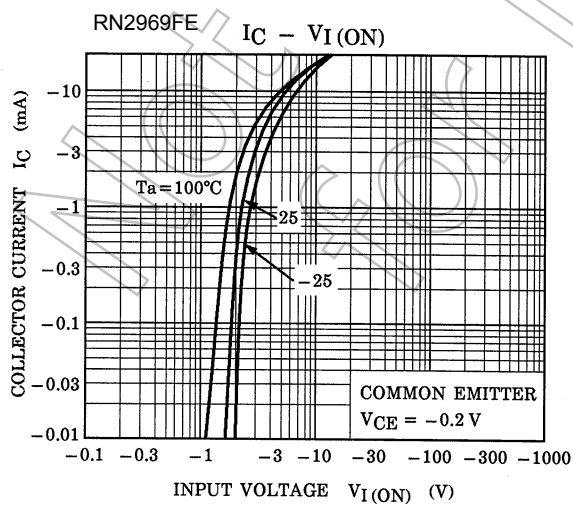
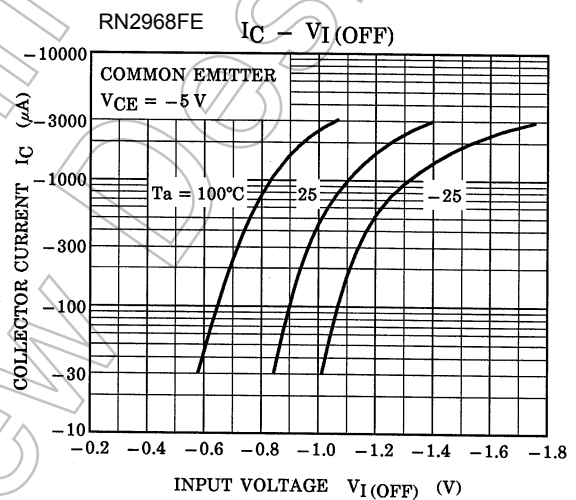
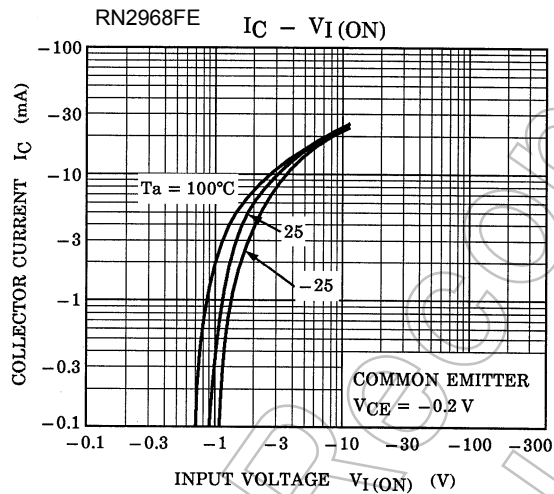
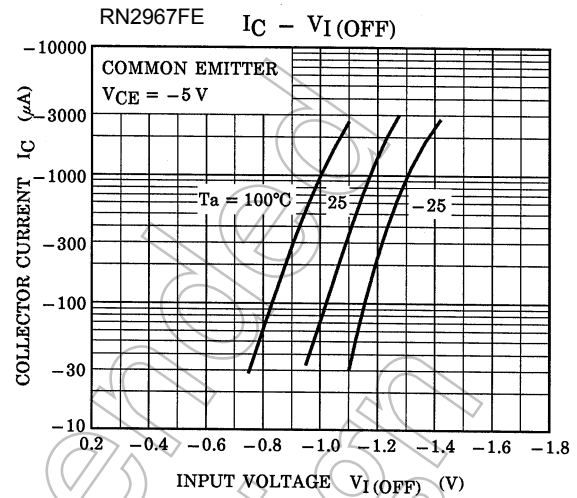
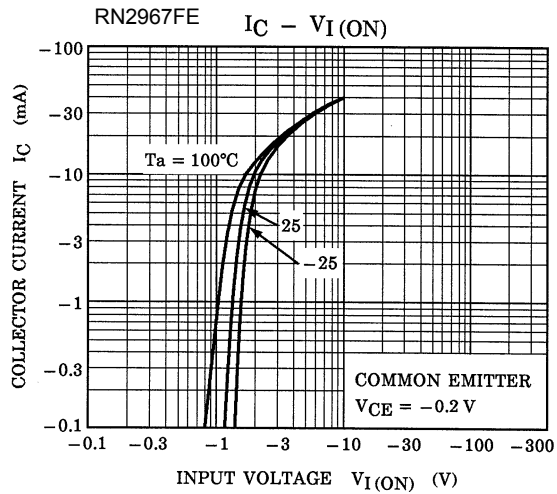


Start of commercial production
2000-05

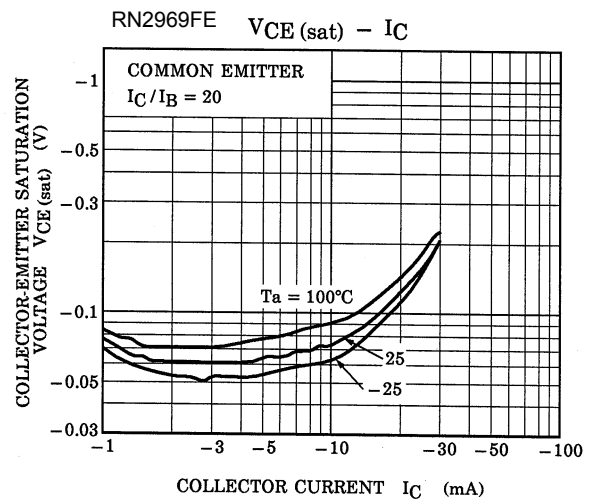
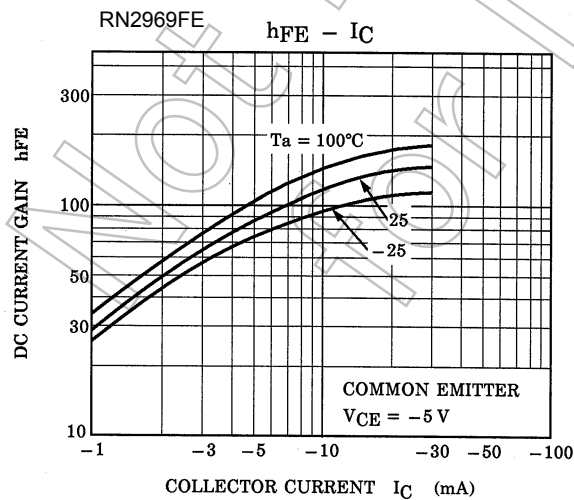
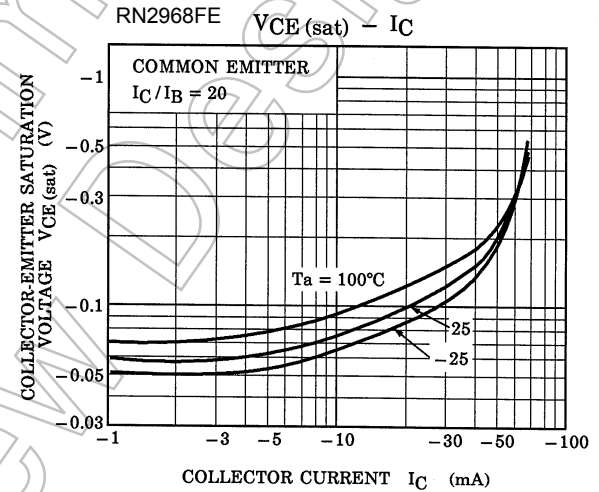
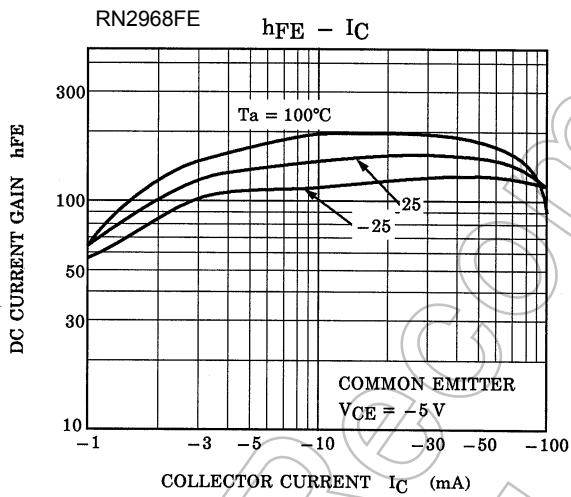
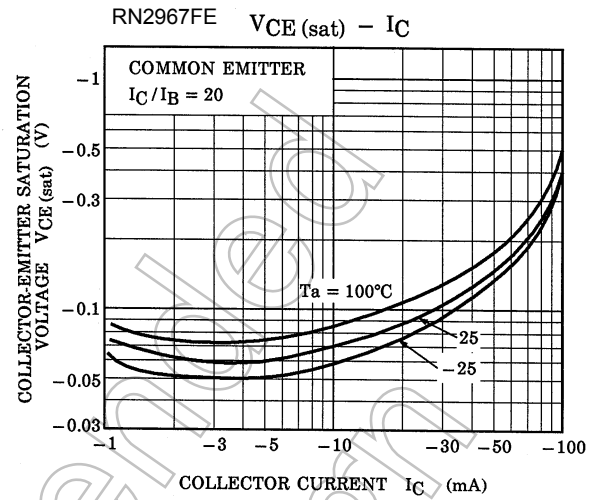
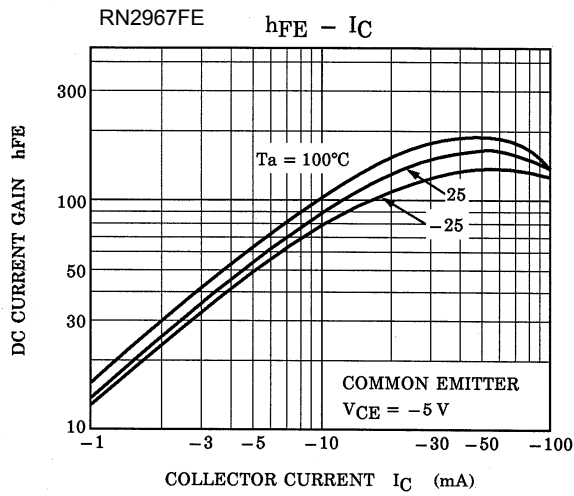
Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2967FE to RN2969FE	I_{CBO}	$V_{CB} = -50\text{ V}, I_E = 0$	—	—	-100	nA
		I_{CEO}	$V_{CE} = -50\text{ V}, I_B = 0$	—	—	-500	
Emitter cut-off current	RN2967FE	I_{EBO}	$V_{EB} = -6\text{ V}, I_C = 0$	-0.081	—	-0.15	mA
	RN2968FE		$V_{EB} = -7\text{ V}, I_C = 0$	-0.078	—	-0.145	
	RN2969FE		$V_{EB} = -15\text{ V}, I_C = 0$	-0.167	—	-0.311	
DC current gain	RN2967FE	h_{FE}	$V_{CE} = -5\text{ V}, I_C = -10\text{ mA}$	80	—	—	
	RN2968FE			80	—	—	
	RN2969FE			70	—	—	
Collector-emitter saturation voltage	RN2967FE to RN2969FE	$V_{CE(sat)}$	$I_C = -5\text{ mA}, I_B = -0.25\text{ mA}$	—	-0.1	-0.3	V
Input voltage (ON)	RN2967FE	$V_I(ON)$	$V_{CE} = -0.2\text{ V}, I_C = -5\text{ mA}$	-0.7	—	-1.8	V
	RN2968FE			-1.0	—	-2.6	
	RN2969FE			-2.2	—	-5.8	
Input voltage (OFF)	RN2967FE	$V_I(OFF)$	$V_{CE} = -5\text{ V}, I_C = -0.1\text{ mA}$	-0.5	—	-1.0	V
	RN2968FE			-0.6	—	-1.16	
	RN2969FE			-1.5	—	-2.6	
Transition frequency	RN2967FE to RN2969FE	f_T	$V_{CE} = -10\text{ V}, I_C = -5\text{ mA}$	—	200	—	MHz
Collector output capacitance	RN2967FE to RN2969FE	C_{ob}	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	3	6	pF
Input resistor	RN2967FE	R1	—	7	10	13	kΩ
	RN2968FE			15.4	22	28.6	
	RN2969FE			32.9	47	61.1	
Resistor ratio	RN2967FE	R1/R2	—	0.191	0.213	0.232	
	RN2968FE			0.421	0.468	0.515	
	RN2969FE			1.92	2.14	2.35	

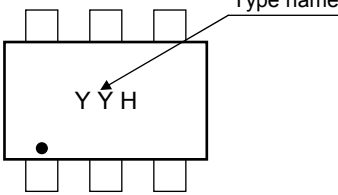
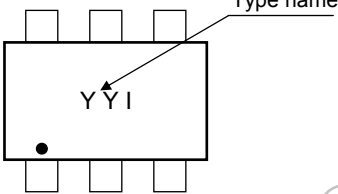
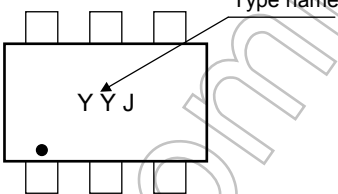
Q1, Q2 Common



Q1, Q2 Common



Marking

Type Name	Marking
RN2967FE	 The diagram shows a rectangular component with pins on all four sides. The marking 'Y Y H' is printed in the center. A dot is located at the bottom-left corner. An arrow points from the text 'Type name' to the second 'Y'.
RN2968FE	 The diagram shows a rectangular component with pins on all four sides. The marking 'Y Y I' is printed in the center. A dot is located at the bottom-left corner. An arrow points from the text 'Type name' to the second 'Y'.
RN2969FE	 The diagram shows a rectangular component with pins on all four sides. The marking 'Y Y J' is printed in the center. A dot is located at the bottom-left corner. An arrow points from the text 'Type name' to the second 'Y'.

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