

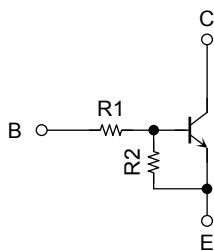
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process) (Bias Resistor Built-in Transistor)

RN1907FE, RN1908FE, RN1909FE

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

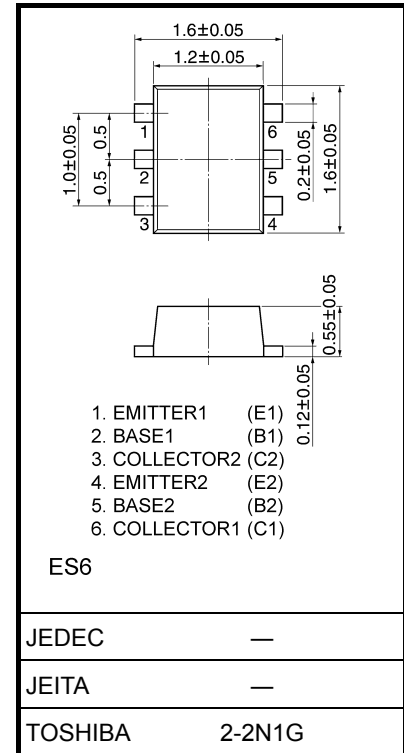
- Two devices are incorporated into an Extreme-Super-Mini (6-pin) package.
- Incorporating a bias resistor into a transistor reduces parts count. Reducing the parts count enables the manufacture of ever more compact equipment and lowers assembly cost.
- Complementary to RN2907FE to RN2909FE

Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN1907FE	10	47
RN1908FE	22	47
RN1909FE	47	22

Unit: mm

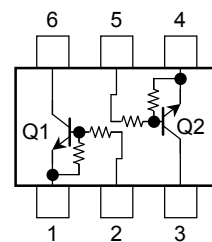


Weight: 0.003 g (typ.)

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

Characteristics	Symbol	Rating	Unit	
Collector-base voltage	RN1907FE to 1909FE	V_{CB0}	50	V
Collector-emitter voltage		V_{CEO}	50	V
Emitter-base voltage	RN1907FE	V_{EBO}	6	V
	RN1908FE		7	
	RN1909FE		15	
Collector current	RN1907FE to 1909FE	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

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.).

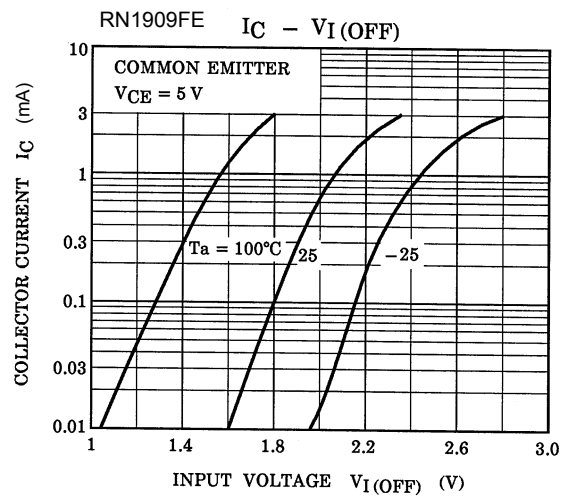
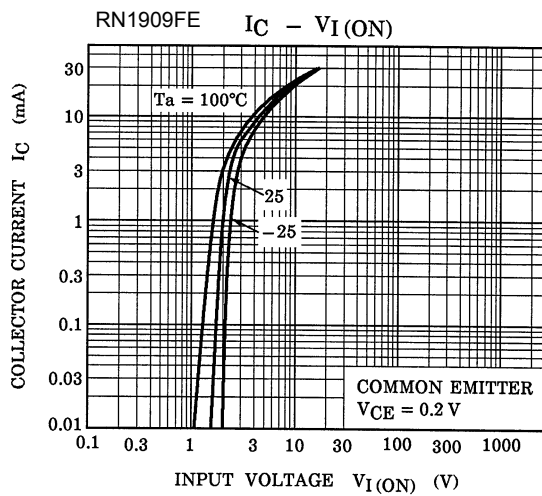
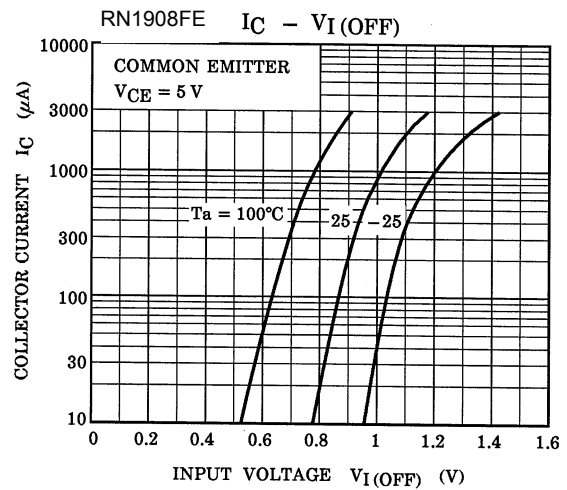
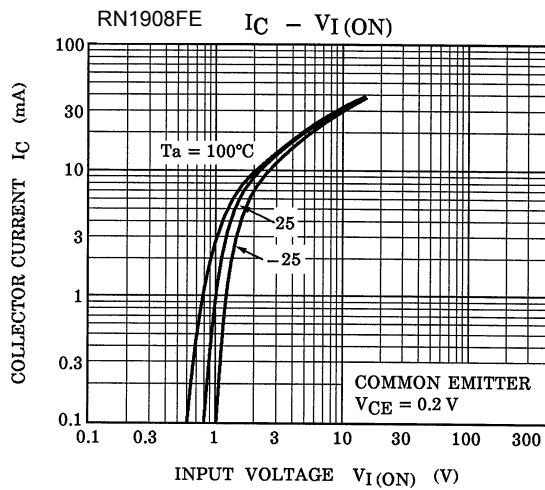
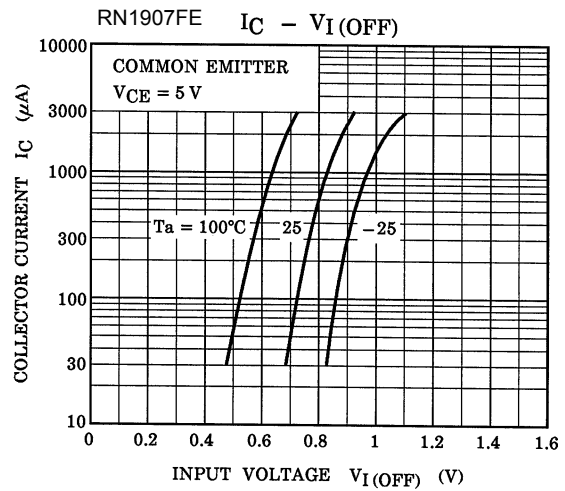
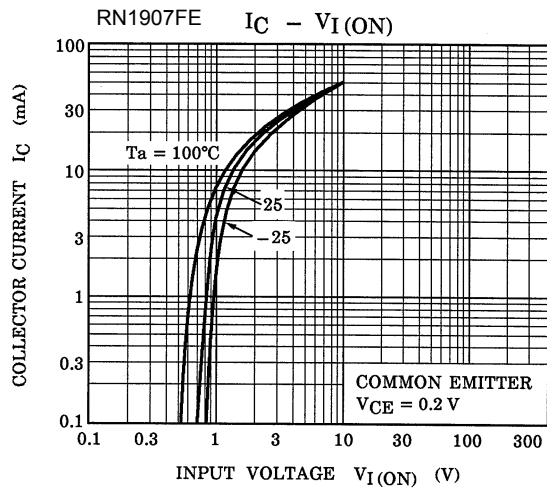
Note 1: Total rating

Start of commercial production
2000-05

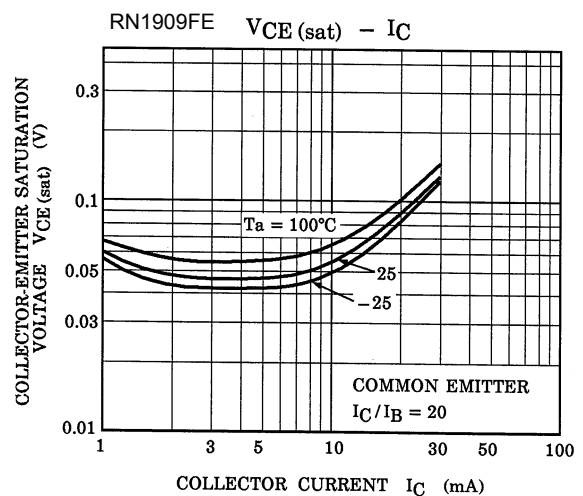
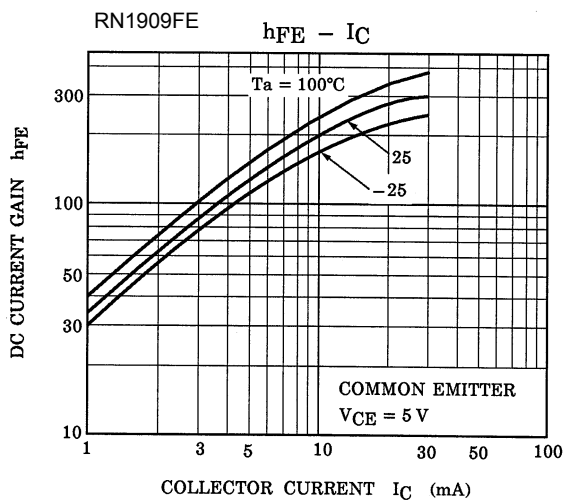
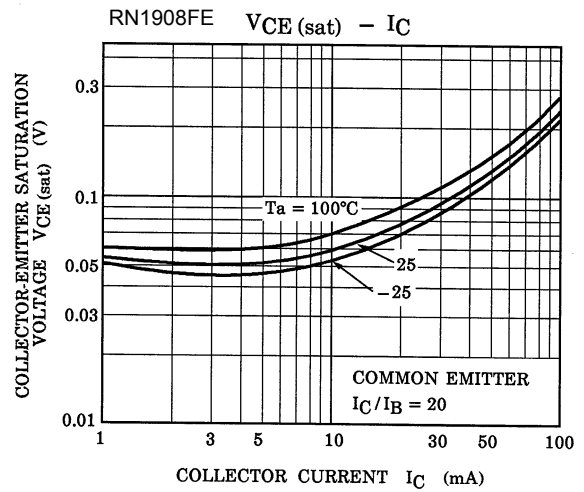
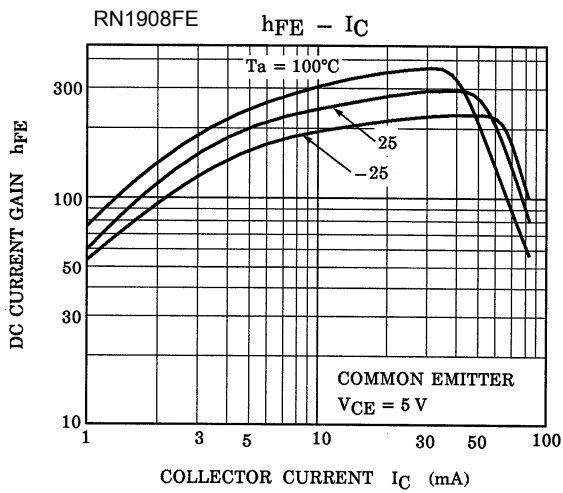
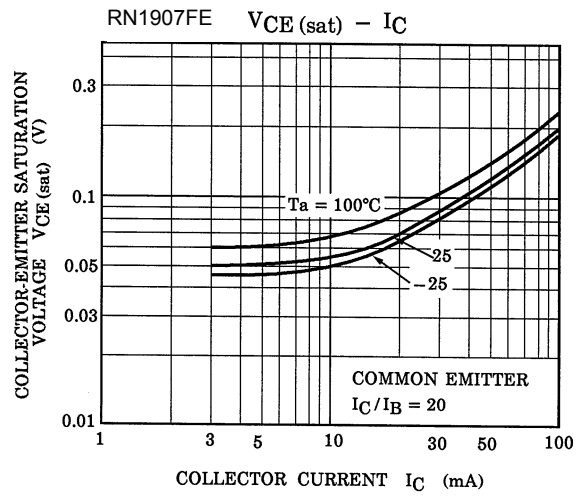
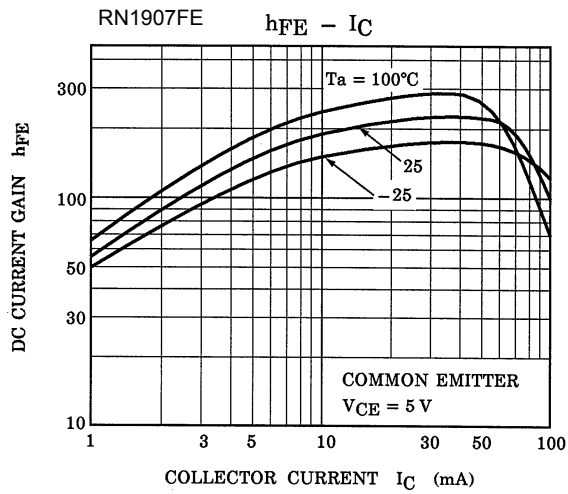
Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

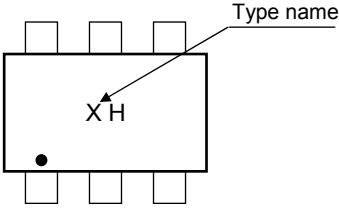
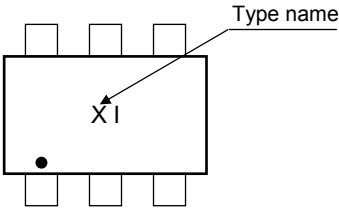
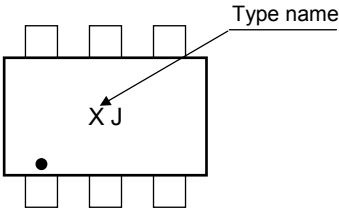
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1907FE to RN1909FE	I_{CBO}	$V_{CB} = 50\text{ V}, I_E = 0$	—	—	100	nA
		I_{CEO}	$V_{CE} = 50\text{ V}, I_B = 0$	—	—	500	
Emitter cut-off current	RN1907FE	I_{EBO}	$V_{EB} = 6\text{ V}, I_C = 0$	0.081	—	0.15	mA
	RN1908FE		$V_{EB} = 7\text{ V}, I_C = 0$	0.078	—	0.145	
	RN1909FE		$V_{EB} = 15\text{ V}, I_C = 0$	0.167	—	0.311	
DC current gain	RN1907FE	h_{FE}	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$	80	—	—	
	RN1908FE			80	—	—	
	RN1909FE			70	—	—	
Collector-emitter saturation voltage	RN1907FE to RN1909FE	$V_{CE(sat)}$	$I_C = 5\text{ mA}, I_B = 0.25\text{ mA}$	—	0.1	0.3	V
Input voltage (ON)	RN1907FE	$V_I(ON)$	$V_{CE} = 0.2\text{ V}, I_C = 5\text{ mA}$	0.7	—	1.8	V
	RN1908FE			1.0	—	2.6	
	RN1909FE			2.2	—	5.8	
Input voltage (OFF)	RN1907FE	$V_I(OFF)$	$V_{CE} = 5\text{ V}, I_C = 0.1\text{ mA}$	0.5	—	1	V
	RN1908FE			0.6	—	1.16	
	RN1909FE			1.5	—	2.6	
Transition frequency	RN1907FE to RN1909FE	f_T	$V_{CE} = 10\text{ V}, I_C = 5\text{ mA}$	—	250	—	MHz
Collector output capacitance	RN1907FE to RN1909FE	C_{ob}	$V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	3	6	pF
Input resistor	RN1907FE	R1	—	7	10	13	k Ω
	RN1908FE			15.4	22	28.6	
	RN1909FE			32.9	47	61.1	
Resistor ratio	RN1907FE	R1/R2	—	0.191	0.213	0.232	
	RN1908FE			0.421	0.468	0.515	
	RN1909FE			1.92	2.14	2.35	

Q1, Q2 Common



Q1, Q2 Common



Type Name	Marking
RN1907FE	 <p>The diagram shows a rectangular component with six pins (three on top, three on bottom). A small black dot is located on the left side of the component. The marking 'XH' is printed in the center. An arrow points from the text 'Type name' to the 'H' in 'XH'.</p>
RN1908FE	 <p>The diagram shows a rectangular component with six pins (three on top, three on bottom). A small black dot is located on the left side of the component. The marking 'XI' is printed in the center. An arrow points from the text 'Type name' to the 'I' in 'XI'.</p>
RN1909FE	 <p>The diagram shows a rectangular component with six pins (three on top, three on bottom). A small black dot is located on the left side of the component. The marking 'XJ' is printed in the center. An arrow points from the text 'Type name' to the 'J' in 'XJ'.</p>

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