

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

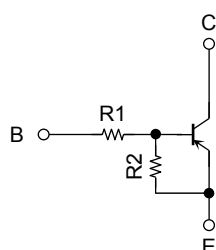
RN2707JE, RN2708JE, RN2709JE

Switching, Inverter Circuit, Interface Circuit and
Driver Circuit Applications

Unit: mm

- Two devices are incorporated into an Extreme-Super-Mini (5 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.
- A wide range of resistor values are available for use in various circuit designs.
- Complementary to RN1707JE to RN1709JE

Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN2707JE	10	47
RN2708JE	22	47
RN2709JE	47	22

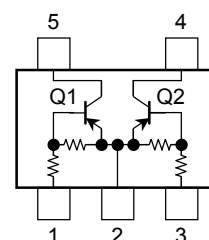
1.BASE1 (B1)	
2.EMITTER (E)	
3.BASE2 (B2)	
4.COLLECTOR2 (C2)	
5.COLLECTOR1 (C1)	
ESV	
JEDEC	—
JEITA	—
TOSHIBA	2-2P1D

Weight: 3 mg (typ.)

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

Characteristics	Symbol	Rating	Unit
Collector-base voltage	RN2707JE to 2709JE V _{CB0}	−50	V
Collector-emitter voltage	V _{CEO}	−50	V
Emitter-base voltage	RN2707JE	−6	V
	RN2708JE	−7	
	RN2709JE	−15	
Collector current	I _C	−100	mA
Collector power dissipation	RN2707JE to 2709JE P _C (Note 1)	100	mW
Junction temperature	T _j	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.

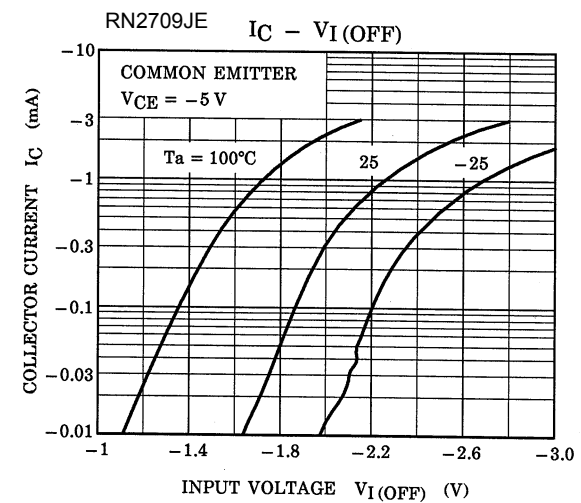
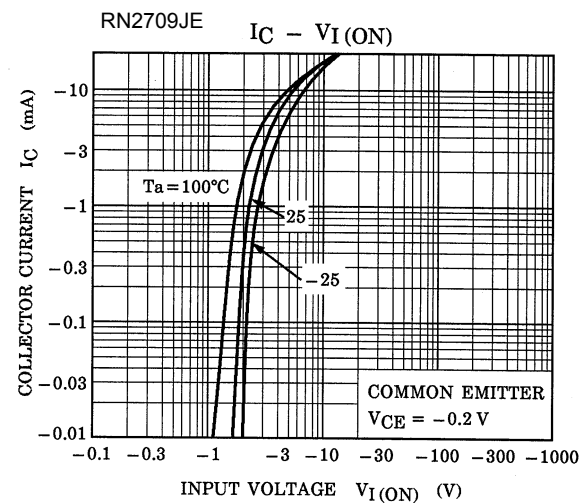
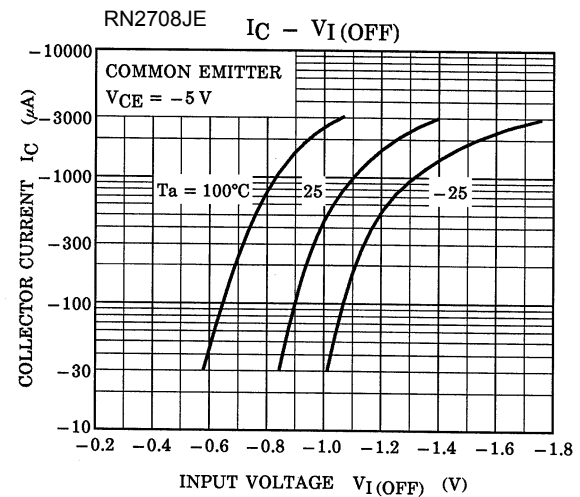
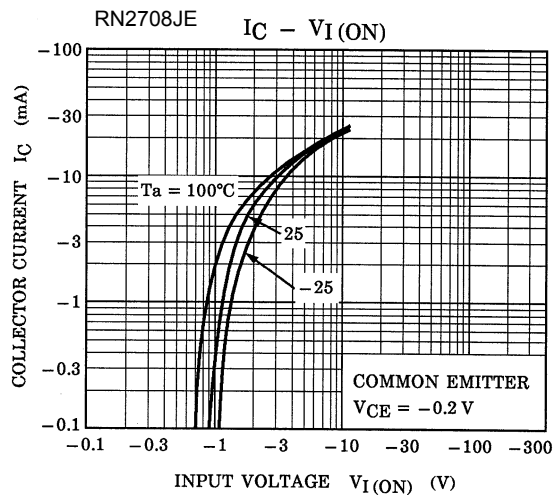
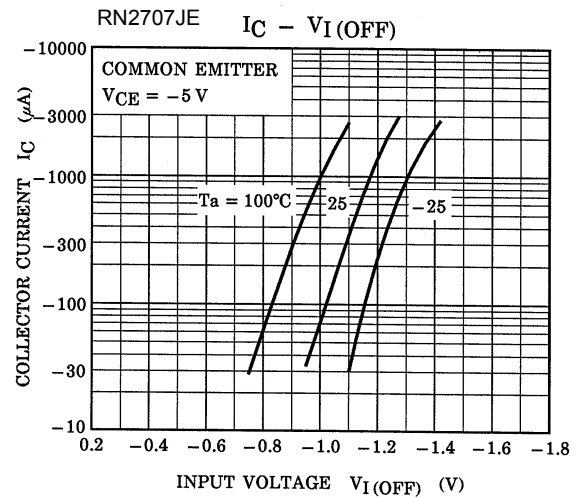
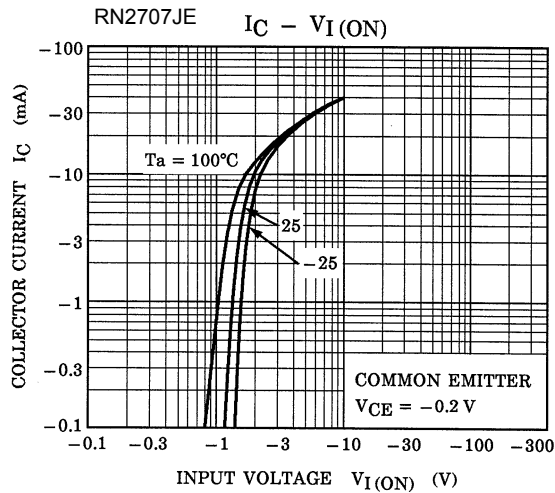
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: Total rating

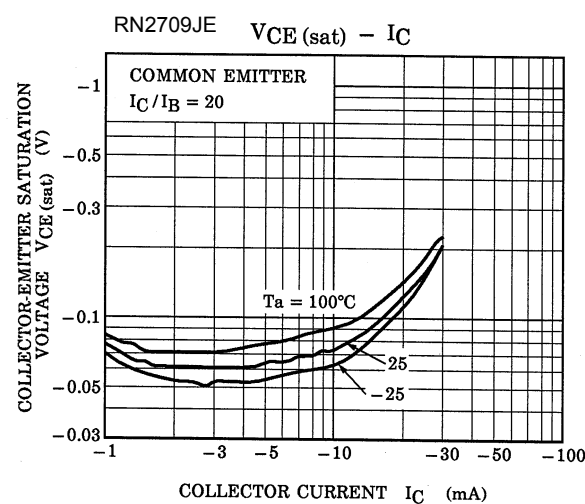
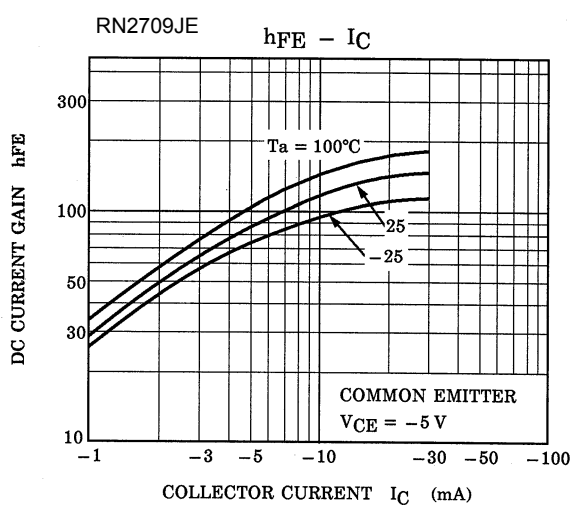
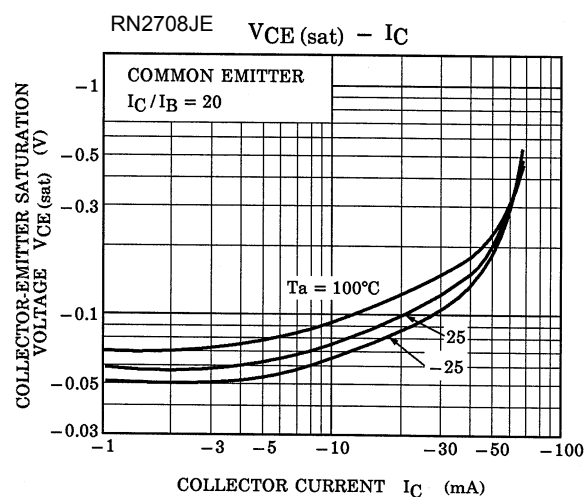
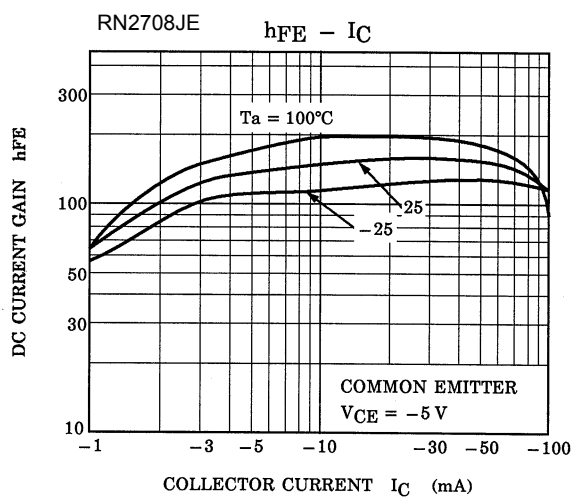
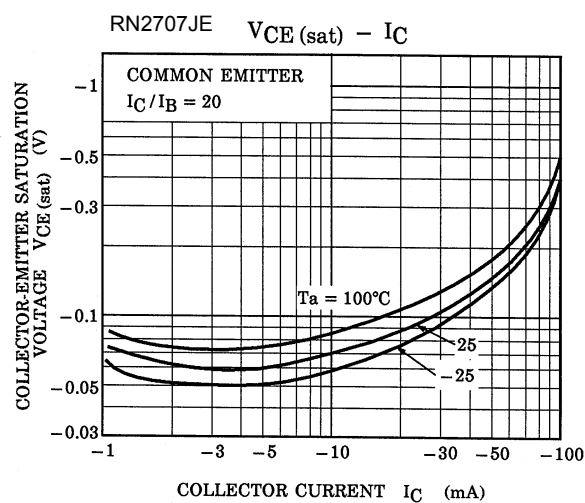
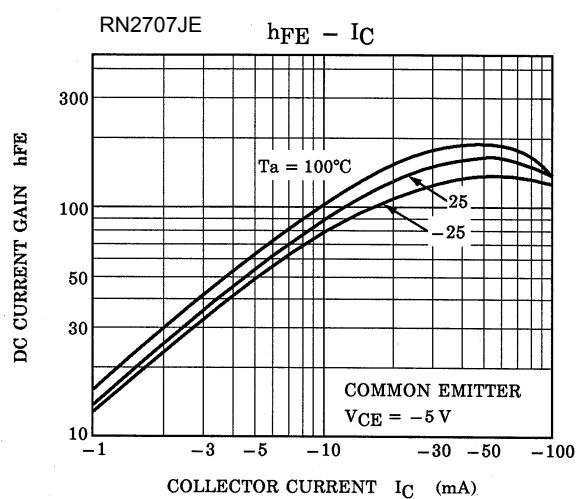
Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2707JE to 2709JE	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	RN2707JE	I_{EBO}	$V_{EB} = -6\text{ V}, I_C = 0$	-0.081	—	-0.15	mA
	RN2708JE		$V_{EB} = -7\text{ V}, I_C = 0$	-0.078	—	-0.145	
	RN2709JE		$V_{EB} = -15\text{ V}, I_C = 0$	-0.167	—	-0.311	
DC current gain	RN2707JE	h_{FE}	$V_{CE} = -5\text{ V}, I_C = -10\text{ mA}$	80	—	—	—
	RN2708JE			80	—	—	
	RN2709JE			70	—	—	
Collector-emitter saturation voltage	RN2707JE to 2709JE	$V_{CE(sat)}$	$I_C = -5\text{ mA}, I_B = -0.25\text{ mA}$	—	-0.1	-0.3	V
Input voltage (ON)	RN2707JE	$V_I(ON)$	$V_{CE} = -0.2\text{ V}, I_C = -5\text{ mA}$	-0.7	—	-1.8	V
	RN2708JE			-1.0	—	-2.6	
	RN2709JE			-2.2	—	-5.8	
Input voltage (OFF)	RN2707JE	$V_I(OFF)$	$V_{CE} = -5\text{ V}, I_C = -0.1\text{ mA}$	-0.5	—	-1.0	V
	RN2708JE			-0.6	—	-1.16	
	RN2709JE			-1.5	—	-2.6	
Transition frequency	RN2707JE to 2709JE	f_T	$V_{CE} = -10\text{ V}, I_C = -5\text{ mA}$	—	200	—	MHz
Collector output capacitance	RN2707JE to 2709JE	C_{ob}	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	3	6	pF
Input resistor	RN2707JE	R1	—	7	10	13	kΩ
	RN2708JE			15.4	22	28.6	
	RN2709JE			32.9	47	61.1	
Resistor ratio	RN2707JE	R1/R2	—	0.191	0.213	0.232	—
	RN2708JE			0.421	0.468	0.515	
	RN2709JE			1.92	2.14	2.35	

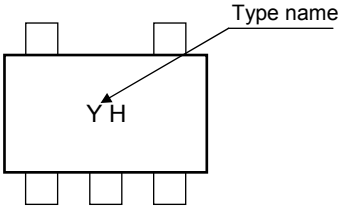
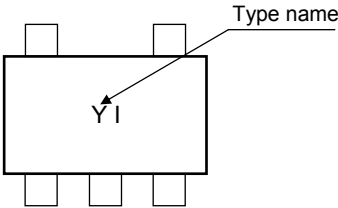
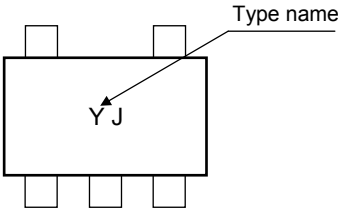
Q1, Q2 Common



Q1, Q2 Common



Marking

Type Name	Marking
RN2707JE	 The diagram shows a rectangular component with four pins on the top and three on the bottom. An arrow points from the text 'Type name' to the marking 'YH' on the component.
RN2708JE	 The diagram shows a rectangular component with four pins on the top and three on the bottom. An arrow points from the text 'Type name' to the marking 'YI' on the component.
RN2709JE	 The diagram shows a rectangular component with four pins on the top and three on the bottom. An arrow points from the text 'Type name' to the marking 'YJ' on the component.

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