

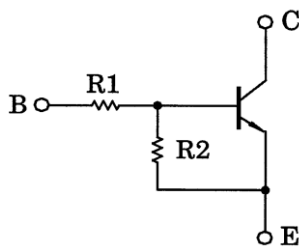
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor)

# RN1707, RN1708, RN1709

Switching, Inverter Circuit,  
Interface Circuit and Driver Circuit

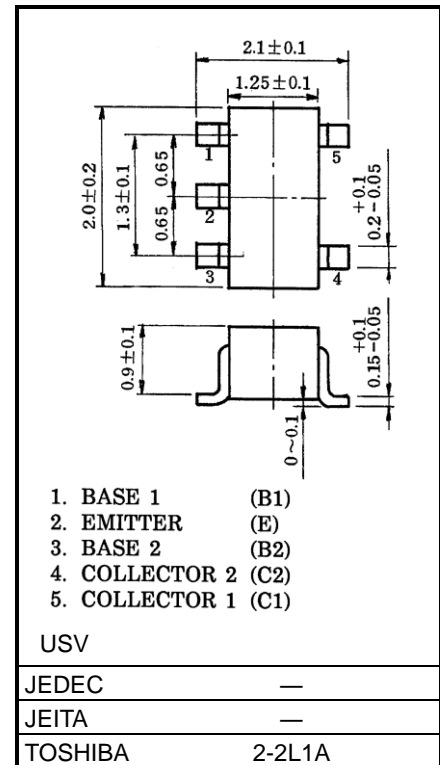
- Including two devices in USV (ultra super mini type with 5 leads)
- With built-in bias resistors
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process and miniaturize equipment.
- Various resistance values are available to suit various circuit designs.
- Complementary to RN2707 to RN2709

### Equivalent Circuit and Bias Resistor Values



Part No.	R1 (kΩ)	R2 (kΩ)
RN1707	10	47
RN1708	22	47
RN1709	47	22

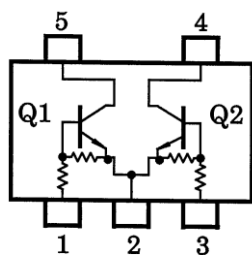
Unit: mm



Weight: 6.2mg (typ.)

Start of commercial production  
1992-01

### Equivalent Circuit(Top View)



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

Characteristic	Symbol	Rating	Unit	
Collector-base voltage	RN1707 to 1709	VCBO	50	V
Collector-emitter voltage		VCEO	50	V
Emitter-base voltage	RN1707	VEBO	6	V
	RN1708		7	
	RN1709		15	
Collector current	RN1707 to 1709	IC	100	mA
Collector power dissipation		PC*	200	mW
Junction temperature		Tj	150	°C
Storage temperature range		Tstg	-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.

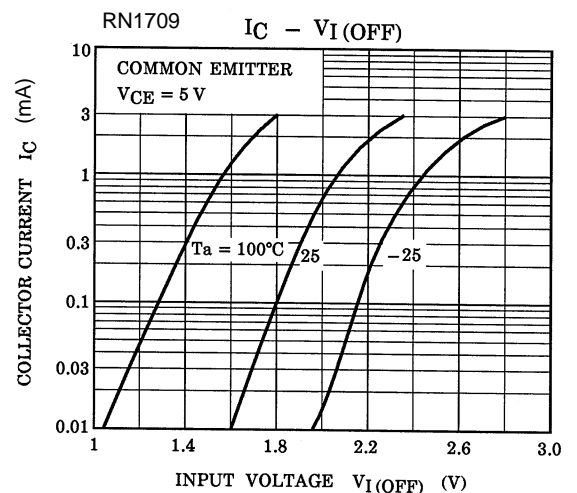
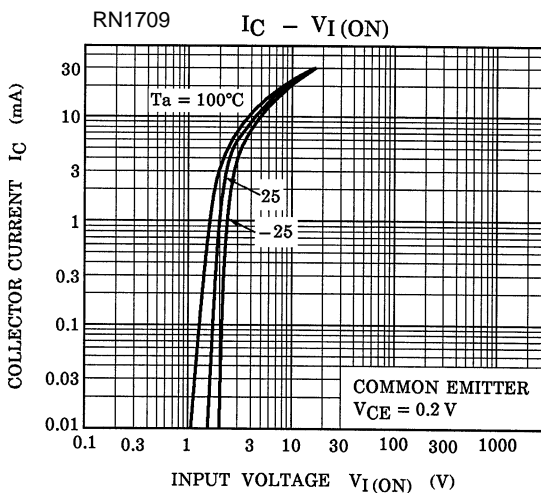
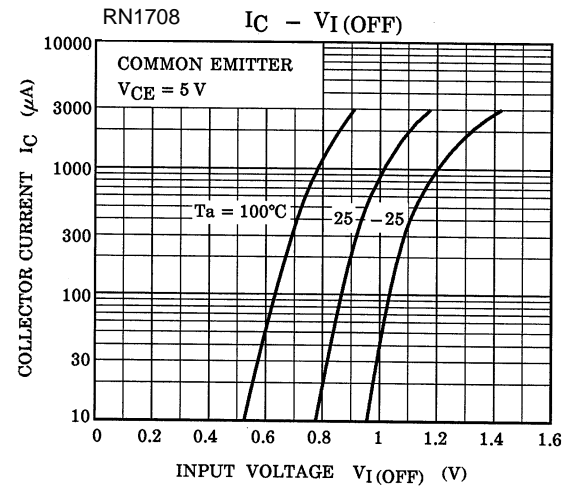
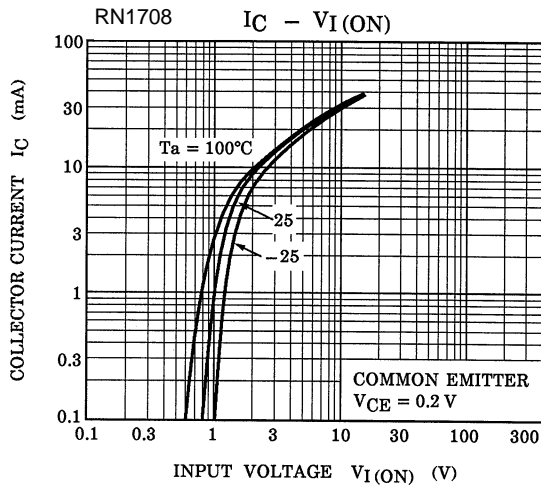
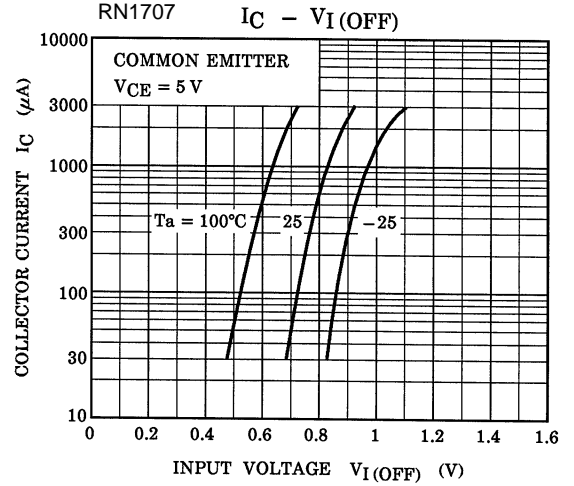
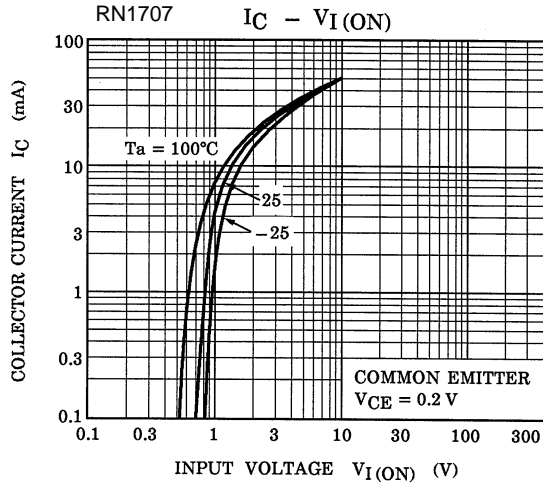
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

\*: Total rating

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

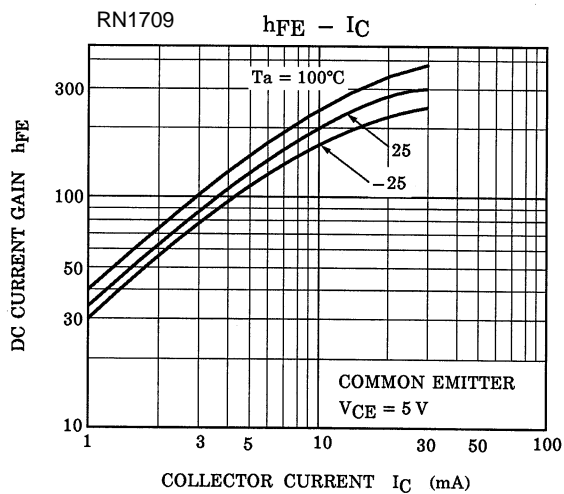
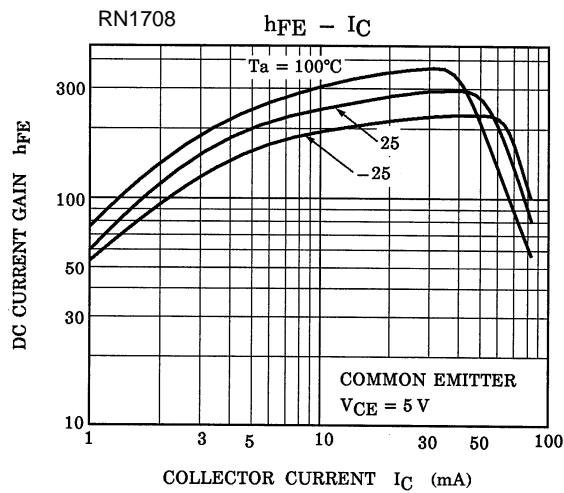
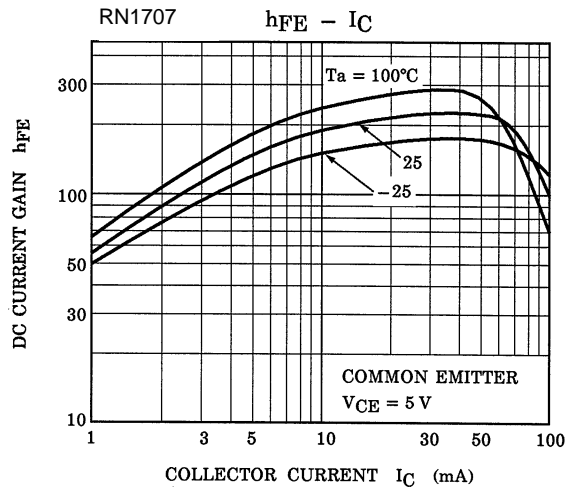
Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1707 to 1709	ICBO	—	V <sub>CB</sub> = 50 V, I <sub>E</sub> = 0 mA	—	—	100	nA
		ICEO	—	V <sub>CE</sub> = 50 V, I <sub>B</sub> = 0 mA	—	—	500	nA
Emitter cut-off current	RN1707	IEBO	—	V <sub>EB</sub> = 6 V, I <sub>C</sub> = 0 mA	0.081	—	0.15	mA
	RN1708		—	V <sub>EB</sub> = 7 V, I <sub>C</sub> = 0 mA	0.078	—	0.145	
	RN1709		—	V <sub>EB</sub> = 15 V, I <sub>C</sub> = 0 mA	0.167	—	0.311	
DC current gain	RN1707	h <sub>FE</sub>	—	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 10 mA	80	—	—	—
	RN1708		—		80	—	—	
	RN1709		—		70	—	—	
Collector-emitter saturation voltage	RN1707 to 1709	V <sub>CE(sat)</sub>	—	I <sub>C</sub> = 5 mA, I <sub>B</sub> = 0.25 mA	—	0.1	0.3	V
Input voltage (ON)	RN1707	V <sub>I(ON)</sub>	—	V <sub>CE</sub> = 0.2 V, I <sub>C</sub> = 5 mA	0.7	—	1.8	V
	RN1708		—		1.0	—	2.6	
	RN1709		—		2.2	—	5.8	
Input voltage (OFF)	RN1707	V <sub>I(OFF)</sub>	—	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 0.1 mA	0.5	—	1.0	V
	RN1708		—		0.6	—	1.16	
	RN1709		—		1.5	—	2.6	
Transition frequency	RN1707 to 1709	f <sub>T</sub>	—	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 5 mA	—	250	—	MHz
Collector output capacitance	RN1707 to 1709	C <sub>ob</sub>	—	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0 mA, f = 1 MHz	—	3	6	pF
Input resistance	RN1707	R <sub>1</sub>	—	—	7	10	13	kΩ
	RN1708		—		15.4	22	28.6	
	RN1709		—		32.9	47	61.1	
Resistance ratio	RN1707	R <sub>1/R2</sub>	—	—	0.191	0.213	0.232	—
	RN1708		—		0.421	0.468	0.515	
	RN1709		—		1.92	2.14	2.35	

(Q1, Q2 Common)



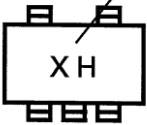
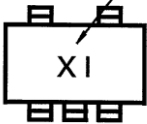
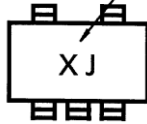
The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

(Q1, Q2 Common)



The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

## Marking

Part No.	Marking
RN1707	<p data-bbox="571 297 831 322">Part No.(abbreviation code)</p> 
RN1708	<p data-bbox="571 539 831 564">Part No.(abbreviation code)</p> 
RN1709	<p data-bbox="571 763 831 788">Part No.(abbreviation code)</p> 

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