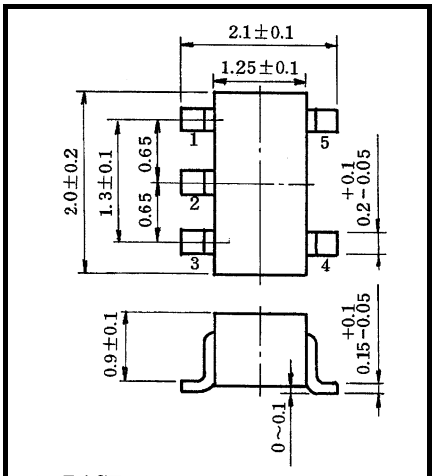
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor)

RN2707, RN2708, RN2709

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- 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
- Complementary to RN1707 to RN1709

Unit: mm



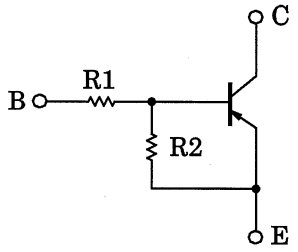
1. BASE 1 (B1)
2. EMITTER (E)
3. BASE 2 (B2)
4. COLLECTOR 2 (C2)
5. COLLECTOR 1 (C1)

USV

JEDEC	—
JEITA	—
TOSHIBA	2-2L1A

Weight: 6.2 mg (typ.)

Equivalent Circuit and Bias Resistor Values

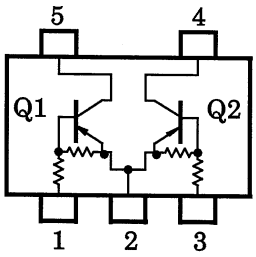


Type No.	R1 (kΩ)	R2 (kΩ)
RN2707	10	47
RN2708	22	47
RN2709	47	22

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

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN2707 to 2709	V_{CBO}	−50	V
Collector-emitter voltage		V_{CEO}	−50	V
Emitter-base voltage	RN2707	V_{EBO}	−6	V
	RN2708		−7	
	RN2709		−15	
Collector current	RN2707 to 2709	I_C	−100	mA
Collector power dissipation		P_C*	200	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).

* Total rating

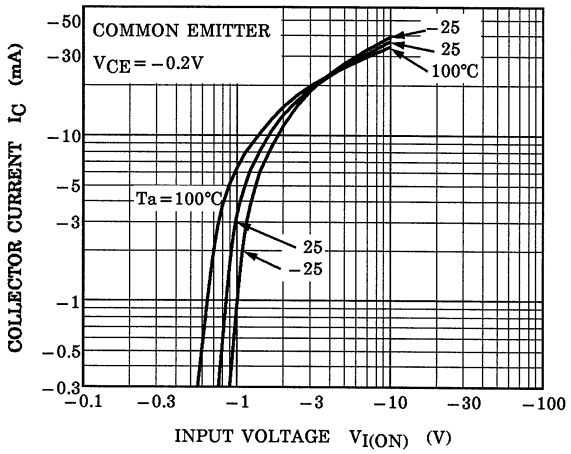
Start of commercial production
1998-02

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

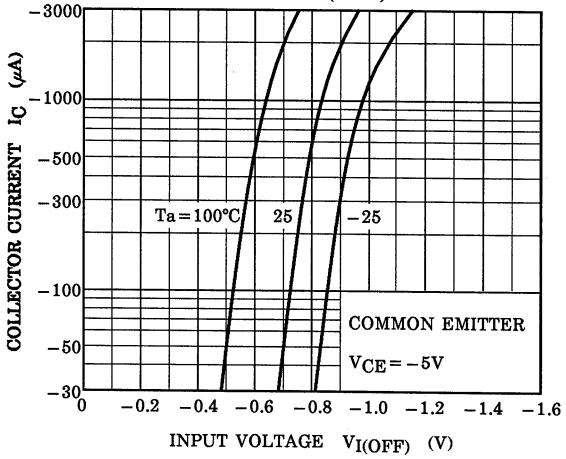
Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2707 to 2709	I_{CBO}	—	V_{CB} = −50V, I_E = 0	—	—	−100	nA
		I_{CEO}	—	V_{CE} = −50V, I_B = 0	—	—	−500	nA
Emitter cut-off current	RN2707	I_{EBO}	—	V_{EB} = −6V, I_C = 0	−0.081	—	−0.15	mA
	RN2708		—	V_{EB} = −7V, I_C = 0	−0.078	—	−0.145	
	RN2709		—	V_{EB} = −15V, I_C = 0	−0.167	—	−0.311	
DC current gain	RN2707	h_{FE}	—	V_{CE} = −5V, I_C = −10mA	80	—	—	—
	RN2708		—		80	—	—	
	RN2709		—		70	—	—	
Collector-emitter saturation voltage	RN2707 to 2709	$V_{CE\ (sat)}$	—	I_C = −5mA, I_B = −0.25mA	—	−0.1	−0.3	V
Input voltage (ON)	RN2707	$V_{I\ (ON)}$	—	V_{CE} = −0.2V, I_C = −5mA	−0.7	—	−1.8	V
	RN2708		—		−1.0	—	−2.6	
	RN2709		—		−2.2	—	−5.8	
Input voltage (OFF)	RN2707	$V_{I\ (OFF)}$	—	V_{CE} = −5V, I_C = −0.1mA	−0.5	—	−1.0	V
	RN2708		—		−0.6	—	−1.16	
	RN2709		—		−1.5	—	−2.6	
Transition frequency	RN2707 to 2709	f_T	—	V_{CE} = −10V, I_C = −5mA	—	200	—	MHz
Collector output capacitance	RN2707 to 2709	C_{ob}	—	V_{CB} = −10V, I_E = 0, f = 1MHz	—	3	6	pF
Input resistor	RN2707	R1	—	—	7	10	13	kΩ
	RN2708		—		15.4	22	28.6	
	RN2709		—		32.9	47	61.1	
Resistor ratio	RN2707	R1/R2	—	—	0.191	0.213	0.232	—
	RN2708		—		0.421	0.468	0.515	
	RN2709		—		1.92	2.14	2.35	

(Q1, Q2 Common)

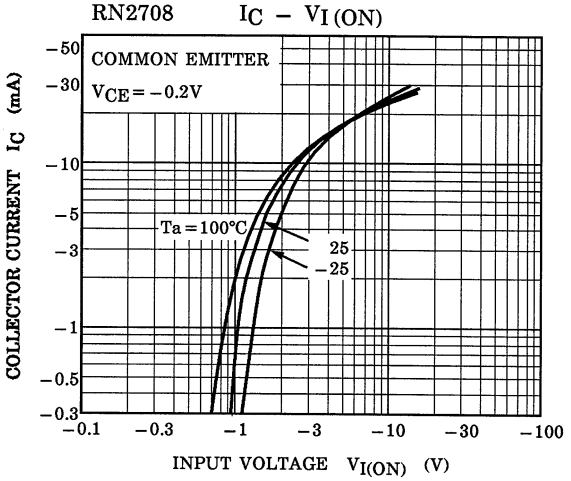
RN2707 I_C – $V_{I\,(ON)}$



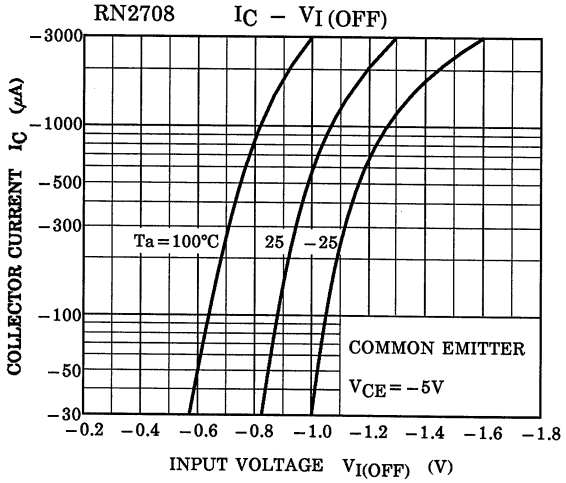
RN2707 I_C – $V_{I\,(OFF)}$



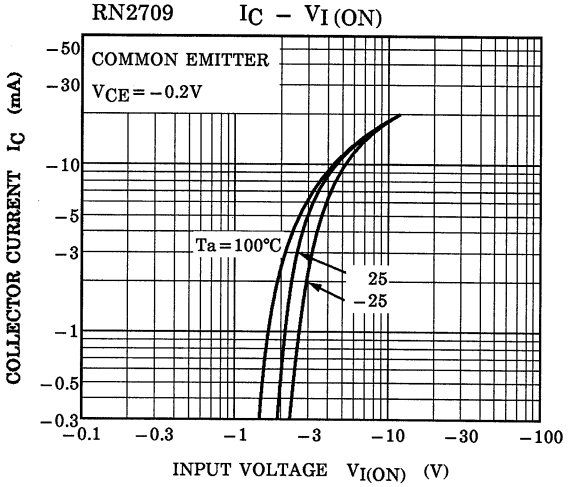
RN2708 I_C – $V_{I\,(ON)}$



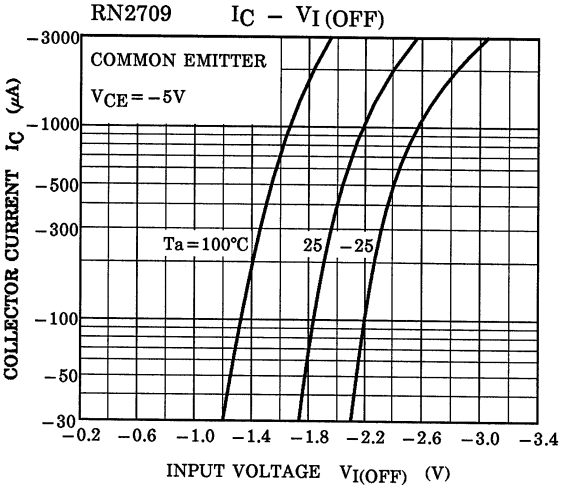
RN2708 I_C – $V_{I\,(OFF)}$



RN2709 I_C – $V_{I\,(ON)}$

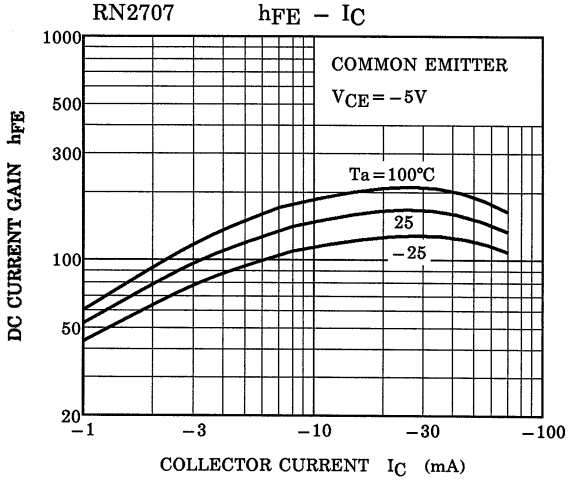


RN2709 I_C – $V_{I\,(OFF)}$

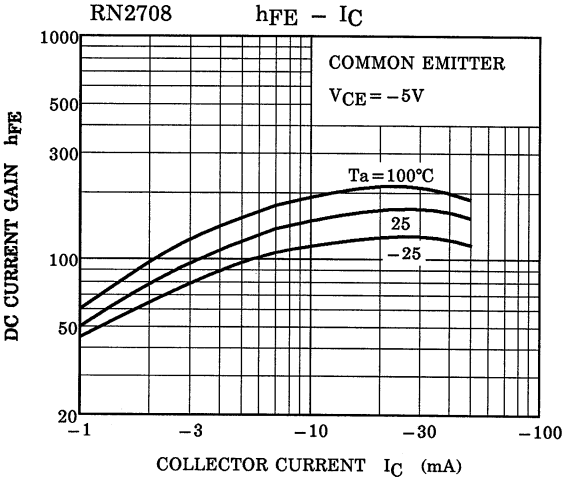


(Q1, Q2 Common)

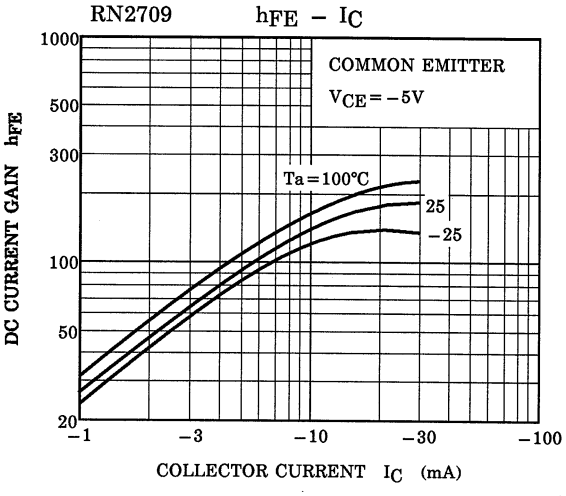
RN2707 h_{FE} – I_C



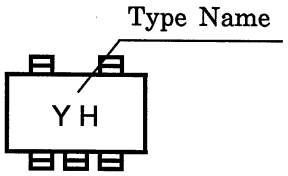
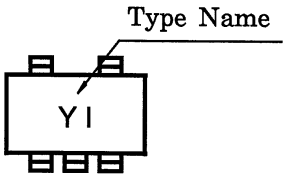
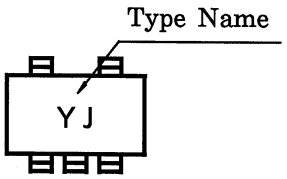
RN2708 h_{FE} – I_C



RN2709 h_{FE} – I_C



Marking

Type Name	Marking
RN2707	
RN2708	
RN2709	

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