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

RN2707, RN2708, RN2709

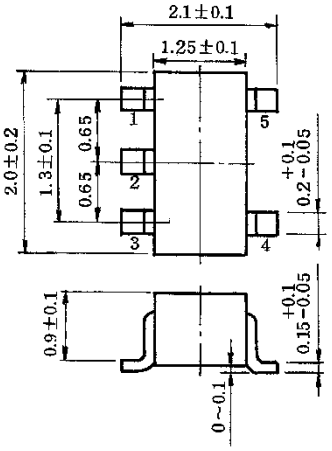
1. Applications

- Switching
- Inverter Circuit
- Interface Circuit
- Driver Circuit

2. Features

- 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 RN1707 to RN1709

Unit: mm



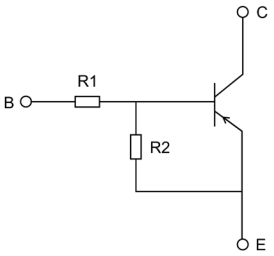
1. BASE 1 (B1)
2. EMITTER (E)
3. BASE 2 (B2)
4. COLLECTOR 2 (C2)
5. COLLECTOR 1 (C1)

USV

JEDEC	—
JEITA	—
TOSHIBA	—

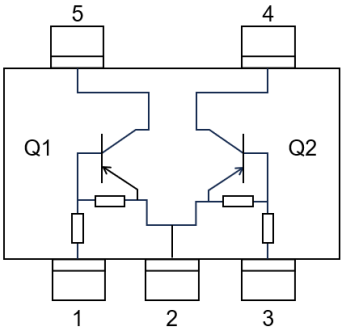
Weight: 6.2 mg (typ.)

3. Equivalent Circuit and Bias Resistor Values



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

4. Equivalent Circuit (Top View)



Start of commercial production
1998-02

5. Absolute Maximum Ratings (Note) (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 (Note 1)	200	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.

6. 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} = −50 V, I_E = 0 mA	—	—	−100	nA
		I_{CEO}	—	V_{CE} = −50 V, I_B = 0 mA	—	—	−500	nA
Emitter cut-off current	RN2707	I_{EBO}	—	V_{EB} = −6 V, I_C = 0 mA	−0.081	—	−0.15	mA
	RN2708		—	V_{EB} = −7 V, I_C = 0 mA	−0.078	—	−0.145	
	RN2709		—	V_{EB} = −15 V, I_C = 0 mA	−0.167	—	−0.311	
DC current gain	RN2707	h_{FE}	—	V_{CE} = −5 V, I_C = −10 mA	80	—	—	—
	RN2708		—		80	—	—	
	RN2709		—		70	—	—	
Collector-emitter saturation voltage	RN2707 to 2709	$V_{CE(sat)}$	—	I_C = −5 mA, I_B = −0.25 mA	—	−0.1	−0.3	V
Input voltage (ON)	RN2707	$V_{I(ON)}$	—	V_{CE} = −0.2 V, I_C = −5 mA	−0.7	—	−1.8	V
	RN2708		—		−1.0	—	−2.6	
	RN2709		—		−2.2	—	−5.8	
Input voltage (OFF)	RN2707	$V_{I(OFF)}$	—	V_{CE} = −5 V, I_C = −0.1 mA	−0.5	—	−1.0	V
	RN2708		—		−0.6	—	−1.16	
	RN2709		—		−1.5	—	−2.6	
Transition frequency	RN2707 to 2709	f_T	—	V_{CE} = −10 V, I_C = −5 mA	—	200	—	MHz
Collector output capacitance	RN2707 to 2709	C_{ob}	—	V_{CB} = −10 V, I_E = 0 mA, f = 1 MHz	—	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	

7. Characteristics Curves (Note) (Q1, Q2 Common)

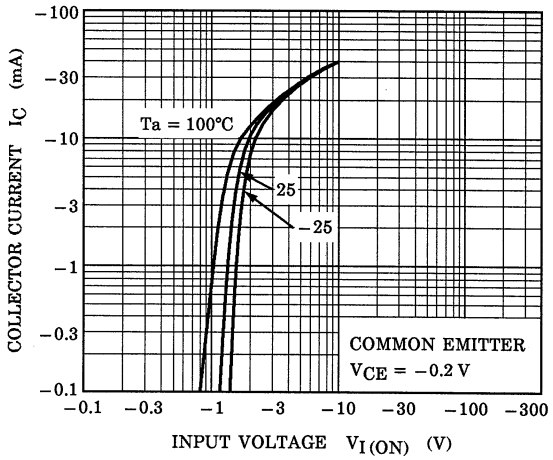


Fig 7.1 RN2707 $I_C - V_{I(ON)}$

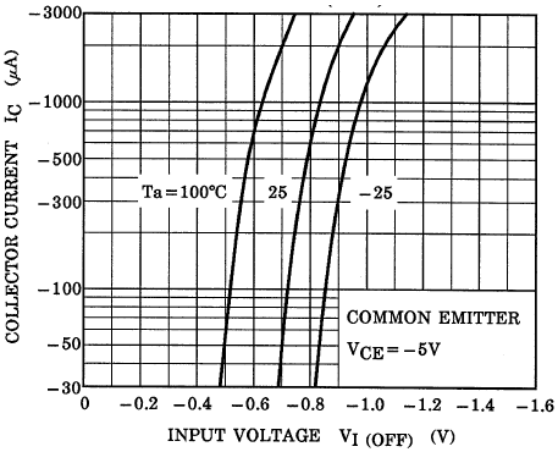


Fig 7.2 RN2707 $I_C - V_{I(OFF)}$

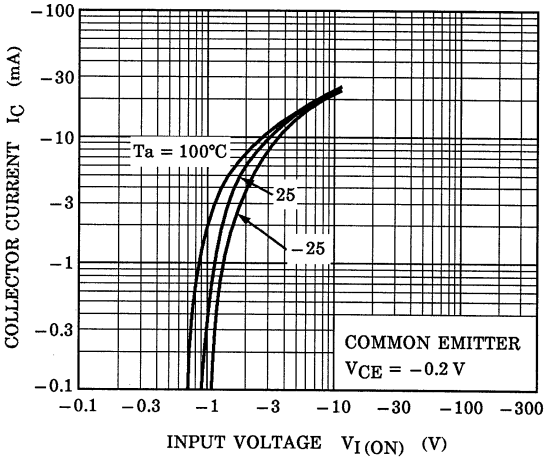


Fig 7.3 RN2708 $I_C - V_{I(ON)}$

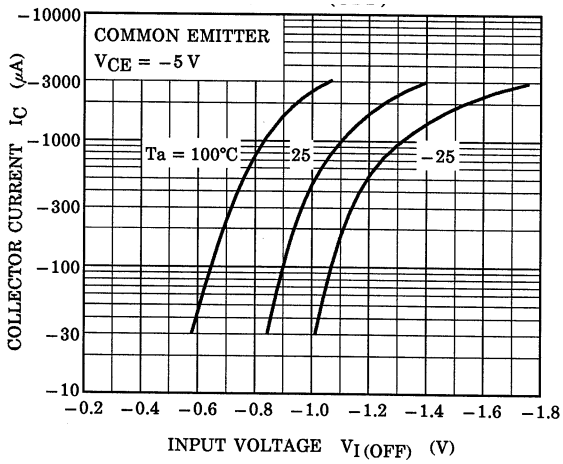


Fig 7.4 RN2708 $I_C - V_{I(OFF)}$

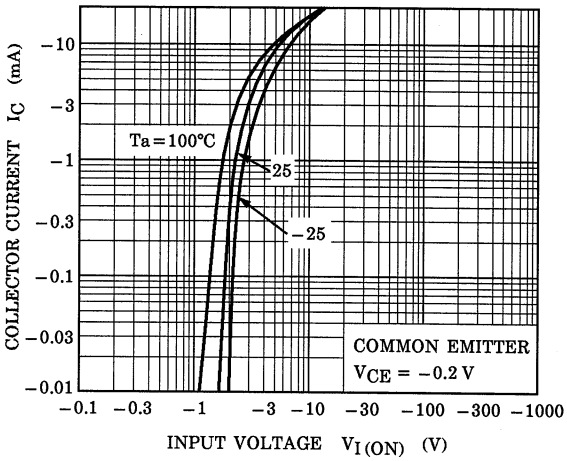


Fig 7.5 RN2709 $I_C - V_{I(ON)}$

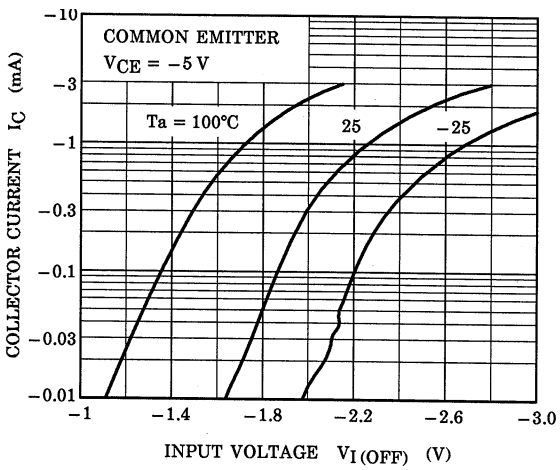


Fig 7.6 RN2709 $I_C - V_{I(OFF)}$

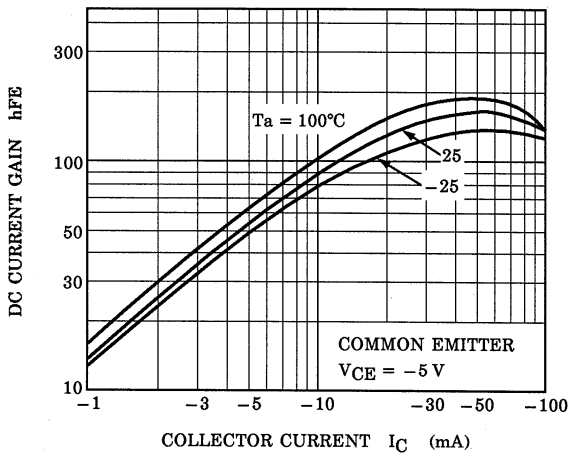


Fig 7.7 RN2707 $h_{FE} - I_C$

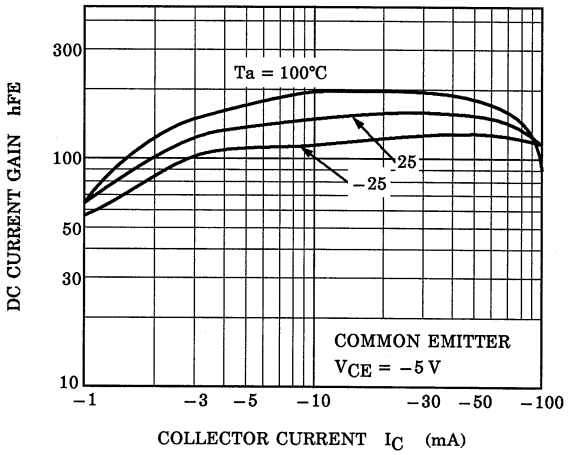


Fig 7.8 RN2708 $h_{FE} - I_C$

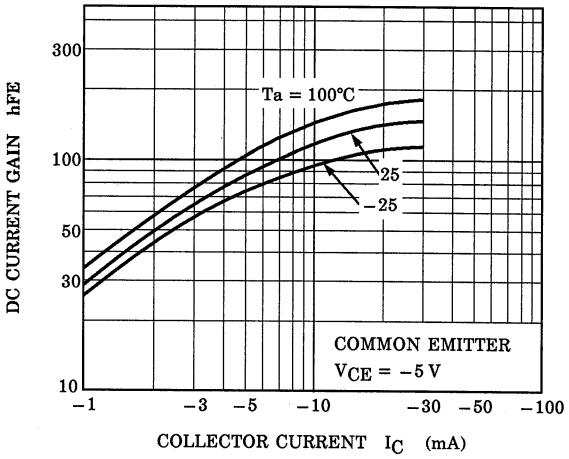
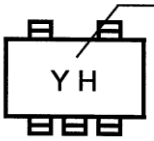
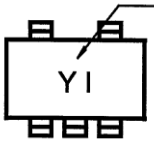
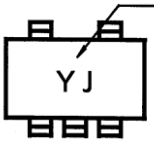


Fig 7.9 RN2709 $h_{FE} - I_C$

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

8. Marking

Part No.	Marking
RN2707	Part No.(abbreviation code) 
RN2708	Part No.(abbreviation code) 
RN2709	Part No.(abbreviation code) 

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