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

RN2707JE, RN2708JE, RN2709JE

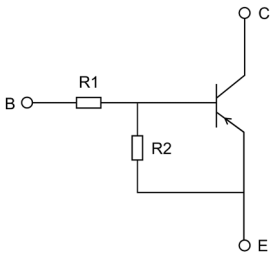
1. Applications

- Switching
- Inverter Circuit,
- Interface Circuit
- Driver Circuit

2. Features

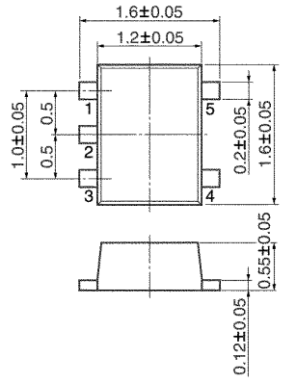
- Two devices are incorporated into an Extreme-Super-Mini (5 pin) package.
- Incorporating a bias resistor into a transistor reduces parts count.
  Reducing the parts count enables the manufacture of ever more compact equipment and lowers assembly cost.
- A wide range of resistor values are available for use in various circuit designs.
- Complementary to RN1707JE to RN1709JE

3. Equivalent Circuit and Bias Resistor Values



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

Unit: mm



1.BASE1 (B1)
2.EMITTER (E)
3.BASE2 (B2)
4.COLLECTOR2 (C2)
5.COLLECTOR1 (C1)

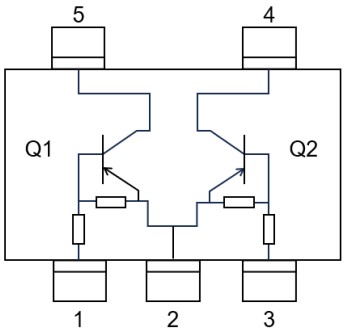
ESV

JEDEC	—
JEITA	—
TOSHIBA	—

Weight: 3 mg (typ.)

Start of commercial production
2000-06

4. Equivalent Circuit (Top View)



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

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN2707JE to 2709JE	V_{CBO}	−50	V
Collector-emitter voltage		V_{CEO}	−50	V
Emitter-base voltage	RN2707JE	V_{EBO}	−6	V
	RN2708JE		−7	
	RN2709JE		−15	
Collector current	RN2707JE to 2709JE	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

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 Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2707JE to RN2709JE	I_{CBO}	V_{CB} = −50 V, I_E = 0	—	—	−100	nA
		I_{CEO}	V_{CE} = −50 V, I_B = 0	—	—	−500	
Emitter cut-off current	RN2707JE	I_{EBO}	V_{EB} = −6 V, I_C = 0	−0.081	—	−0.15	mA
	RN2708JE		V_{EB} = −7 V, I_C = 0	−0.078	—	−0.145	
	RN2709JE		V_{EB} = −15 V, I_C = 0	−0.167	—	−0.311	
DC current gain	RN2707JE	h_{FE}	V_{CE} = −5 V, I_C = −10 mA	80	—	—	—
	RN2708JE			80	—	—	
	RN2709JE			70	—	—	
Collector-emitter saturation voltage	RN2707JE to RN2709JE	$V_{CE(sat)}$	I_C = −5 mA, I_B = −0.25 mA	—	−0.1	−0.3	V
Input voltage (ON)	RN2707JE	$V_{I(ON)}$	V_{CE} = −0.2 V, I_C = −5 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 V, I_C = −0.1 mA	−0.5	—	−1.0	V
	RN2708JE			−0.6	—	−1.16	
	RN2709JE			−1.5	—	−2.6	
Transition frequency	RN2707JE to RN2709JE	f_T	V_{CE} = −10 V, I_C = −5 mA	—	200	—	MHz
Collector output capacitance	RN2707JE to RN2709JE	C_{ob}	V_{CB} = −10 V, I_E = 0, f = 1 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	

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

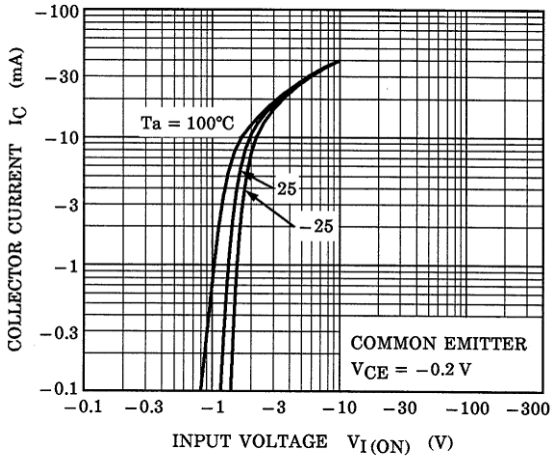


Fig 7.1 RN2707JE $I_C - V_{I(ON)}$

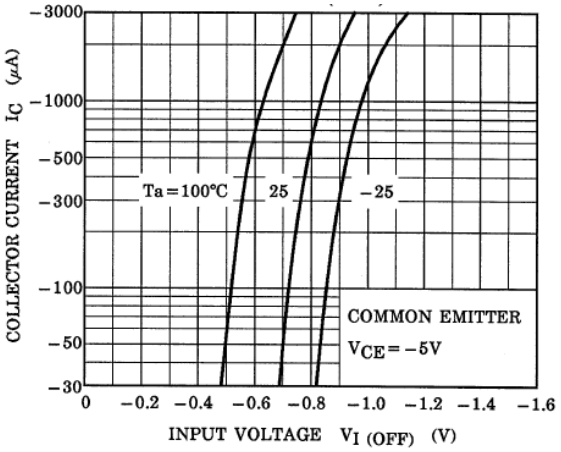


Fig 7.2 RN2707JE $I_C - V_{I(OFF)}$

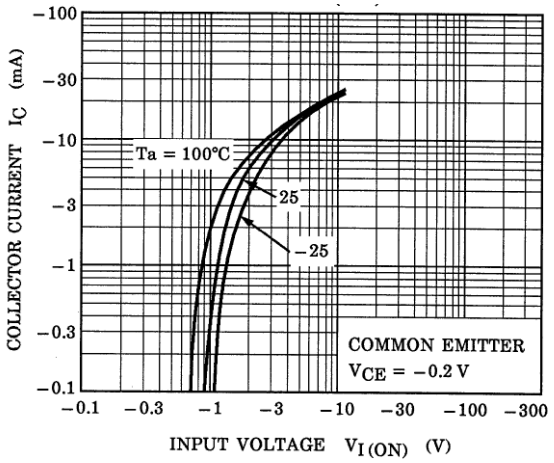


Fig 7.3 RN2708JE $I_C - V_{I(ON)}$

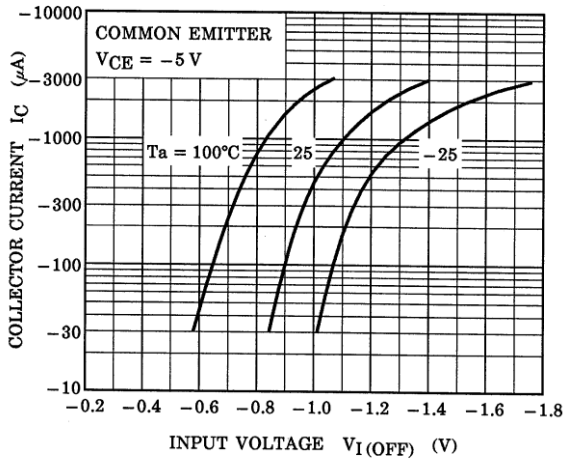


Fig 7.4 RN2708JE $I_C - V_{I(OFF)}$

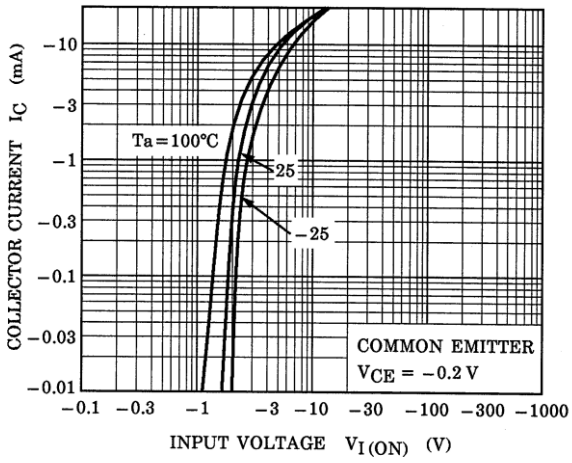


Fig 7.5 RN2709JE $I_C - V_{I(ON)}$

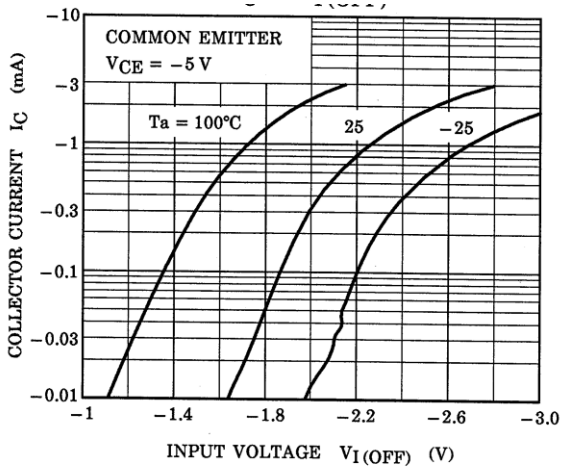


Fig 7.6 RN2709JE $I_C - V_{I(OFF)}$

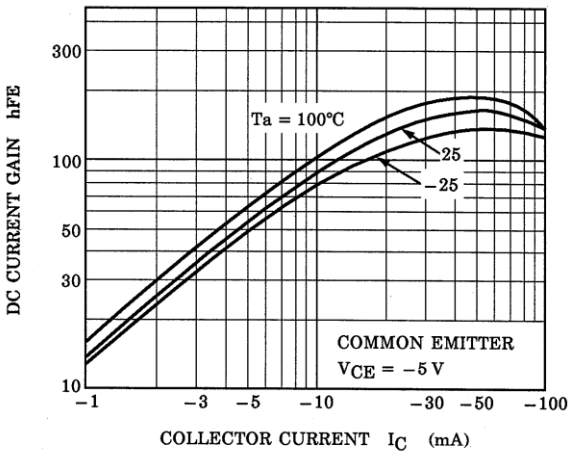


Fig 7.7 RN2707JE $h_{FE} - I_C$

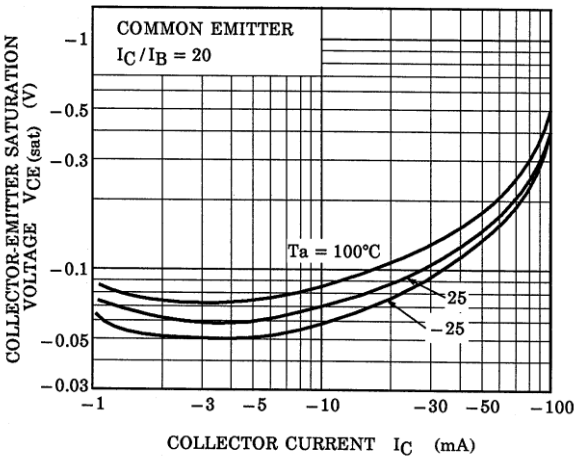


Fig 7.8 RN2707JE $V_{CE(sat)} - I_C$

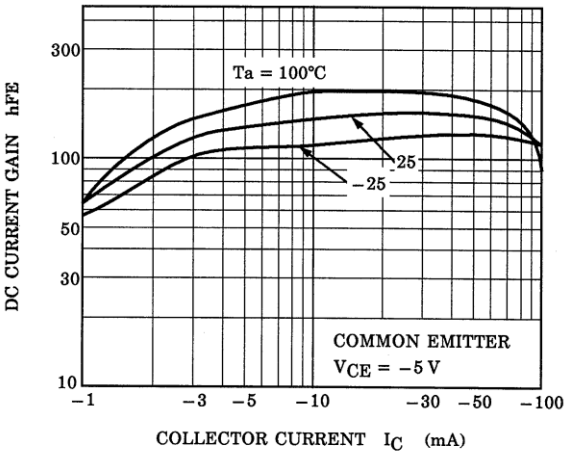


Fig 7.9 RN2708JE $h_{FE} - I_C$

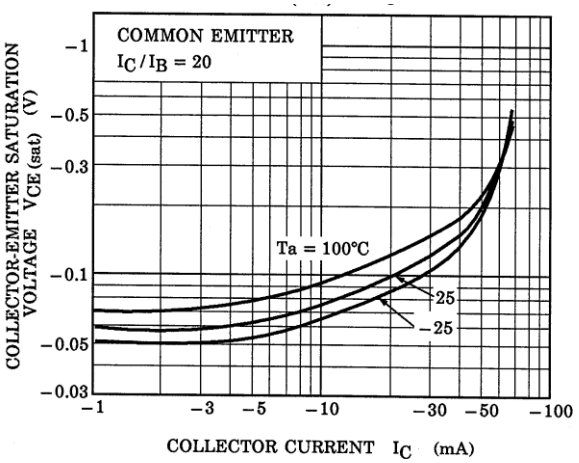


Fig 7.10 RN2708JE $V_{CE(sat)} - I_C$

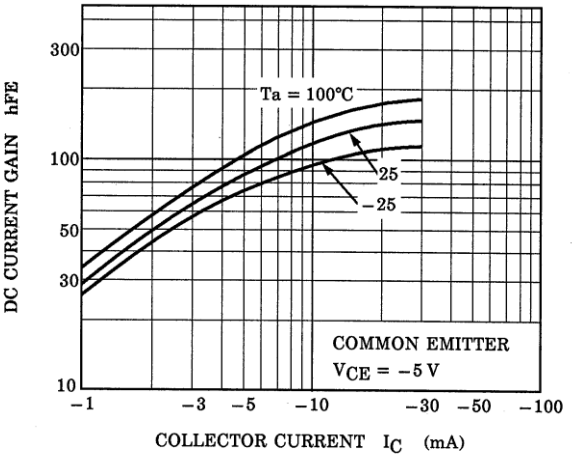


Fig 7.11 RN2709JE $h_{FE} - I_C$

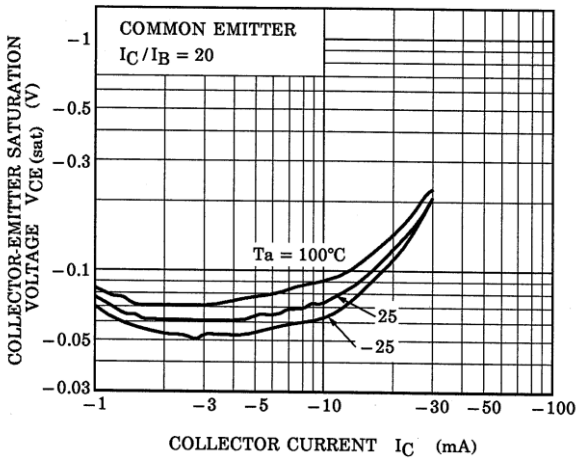
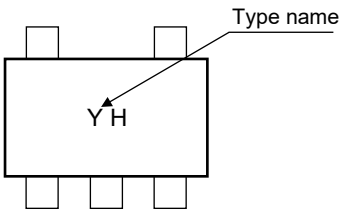
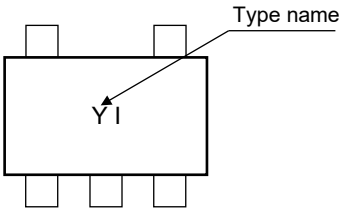
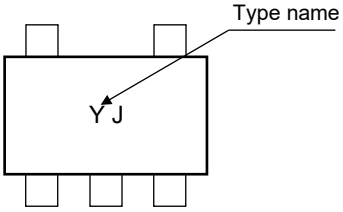


Fig 7.12 RN2709JE $V_{CE(sat)} - I_C$

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

8. Marking

Type Name	Marking
RN2707JE	
RN2708JE	
RN2709JE	

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