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

RN1907/08/09

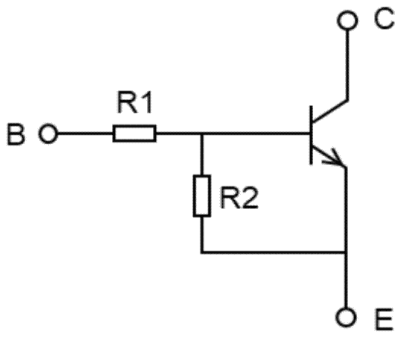
1. Applications

- Switching
- Inverter Circuits
- Interfacing
- Driver Circuits

2. Features

(1) AEC-Q101 qualified (Please see the orderable part number list)
(2) Small package (Dual type)
(3) The integrated bias resistor reduces the number of external parts required, making it possible to reduce system size and assembly time.
(4) Toshiba offers transistors with a wide range of resistance to accommodate various circuit designs.
(5) Complementary to RN2907 to RN2909

3. Equivalent Circuit

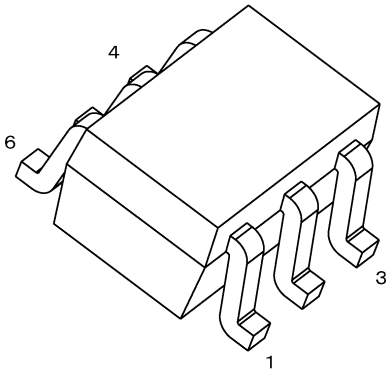


4. Bias Resistor Values

Part No.	R1 (kΩ)	R2 (kΩ)
RN1907	10	47
RN1908	22	47
RN1909	47	22

Start of commercial production
1990-12

5. Packaging and Pin Assignment



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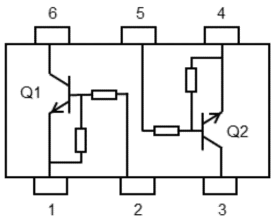


1: Emitter1
2: Base1
3: Collector2
4: Emitter2
5: Base2
6: Collector1

6. Orderable part number

Orderable part number		AEC-Q101	Note
RN1907	RN1907,LF	—	General Use
	RN1907,LXGF	YES (Note 1)	Unintended Use (Note 1)
	RN1907,LXHF	YES	Automotive Use
RN1908	RN1908,LF	—	General Use
	RN1908,LXGF	YES (Note 1)	Unintended Use (Note 1)
	RN1908,LXHF	YES	Automotive Use
RN1909	RN1909,LF	—	General Use
	RN1909,LXGF	YES (Note 1)	Unintended Use (Note 1)
	RN1909,LXHF	YES	Automotive Use

Note 1: For more information, please contact our sales or use the inquiry form on our website.

7. Absolute Maximum Ratings (Note) (Unless otherwise specified, T_a = 25 °C) (Q1, Q2 Common)

Characteristics			Symbol	Rating	Unit
Collector-base voltage		RN1907,RN1909	V_{CBO}	50	V
Collector-emitter voltage			V_{CEO}	50	
Emitter-base voltage		RN1907	V_{EBO}	6	V
		RN1908		7	
		RN1909		15	
Collector current		RN1907,RN1909	I_C	100	mA
Collector power dissipation	(Note 1)		P_C	200	mW
Junction temperature			T_j	150	°C
Storage temperature			T_{stg}	-55 to 150	

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

8. Electrical Characteristics (Unless otherwise specified, T_a = 25 °C) (Q1, Q2 Common)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1907, RN1909	I_{CBO}	V_{CB} = 50 V, I_E = 0 mA	—	—	100	nA
Collector cut-off current		I_{CEO}	V_{CE} = 50 V, I_B = 0 mA	—	—	500	
Emitter cut-off current	RN1907	I_{EBO}	V_{EB} = 6 V, I_C = 0 mA	0.081	—	0.15	mA
	RN1908		V_{EB} = 7 V, I_C = 0 mA	0.078	—	0.145	
	RN1909		V_{EB} = 15 V, I_C = 0 mA	0.167	—	0.311	
DC current gain	RN1907	h_{FE}	V_{CE} = 5 V, I_C = 10 mA	80	—	—	—
	RN1908			80	—	—	
	RN1909			70	—	—	
Collector-emitter saturation voltage	RN1907, RN1909	$V_{CE(sat)}$	I_C = 5 mA, I_B = 0.25 mA	—	0.1	0.3	V
Input voltage (ON)	RN1907	$V_{I(ON)}$	V_{CE} = 0.2 V, I_C = 5 mA	0.7	—	1.8	V
	RN1908			1.0	—	2.6	
	RN1909			2.2	—	5.8	
Input voltage (OFF)	RN1907	$V_{I(OFF)}$	V_{CE} = 5 V, I_C = 0.1 mA	0.5	—	1.0	V
	RN1908			0.6	—	1.16	
	RN1909			1.5	—	2.6	
Transition frequency	RN1907, RN1909	f_T	V_{CE} = 10 V, I_C = 5 mA	—	250	—	MHz
Collector output capacitance	RN1907, RN1909	C_{ob}	V_{CB} = 10 V, I_E = 0 mA, f = 1 MHz	—	3	6	pF
Input resistance	RN1907	R_1	-	7	10	13	kΩ
	RN1908			15.4	22	28.6	
	RN1909			32.9	47	61.1	
Resistor ratio	RN1907	R1/R2	-	0.191	0.213	0.232	—
	RN1908			0.421	0.468	0.515	
	RN1909			1.92	2.14	2.35	

9. Marking

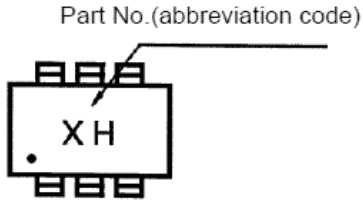


Fig. 9.1 Marking RN1907

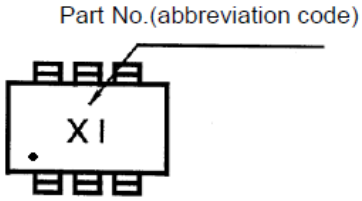


Fig. 9.2 Marking RN1908

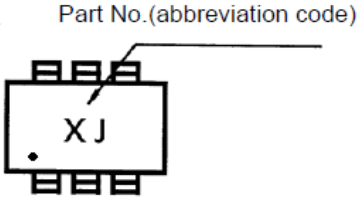


Fig. 9.3 Marking RN1909

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

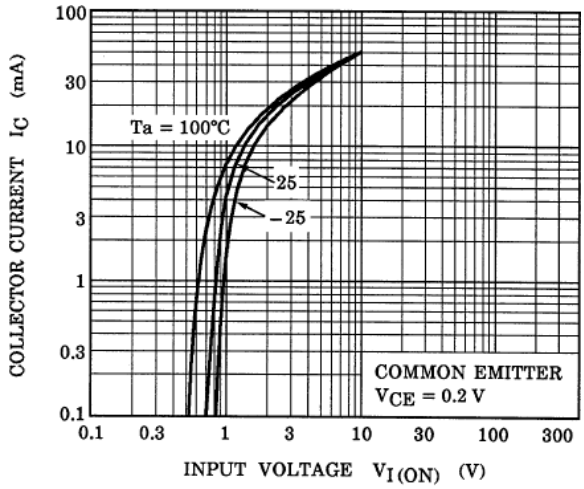


Fig. 10.1 RN1907 I_C-$V_{I(ON)}$

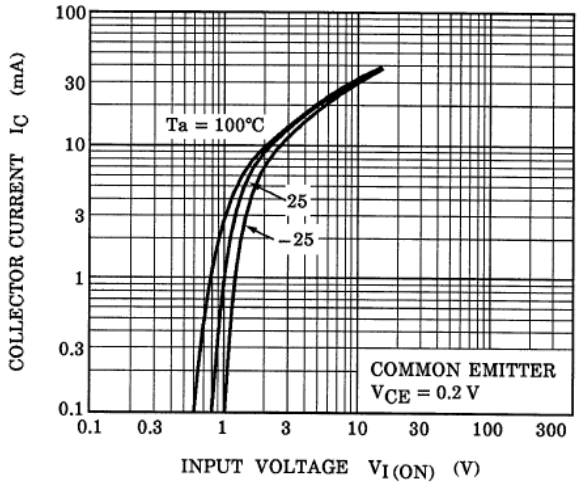


Fig. 10.2 RN1908 I_C-$V_{I(ON)}$

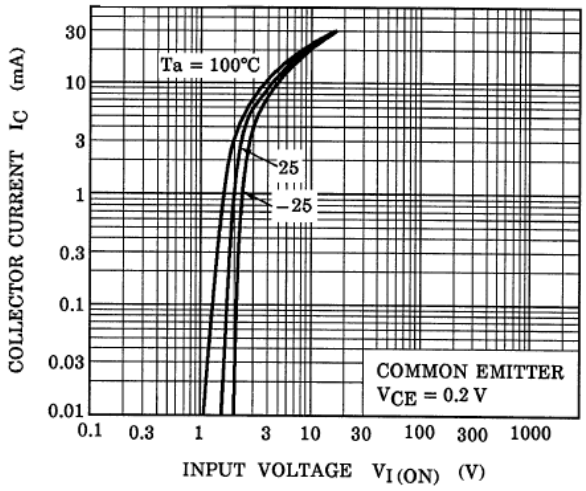


Fig. 10.3 RN1909 I_C-$V_{I(ON)}$

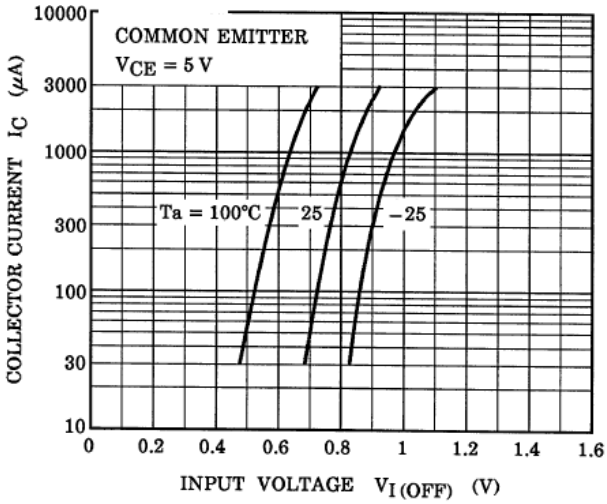


Fig. 10.4 RN1907 I_C-$V_{I(OFF)}$

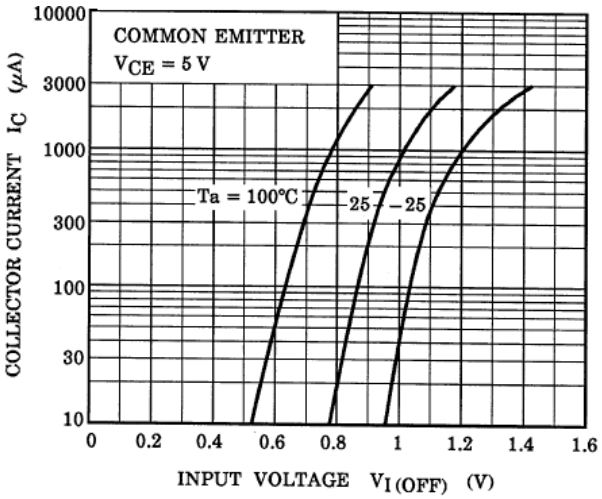


Fig. 10.5 RN1908 I_C-$V_{I(OFF)}$

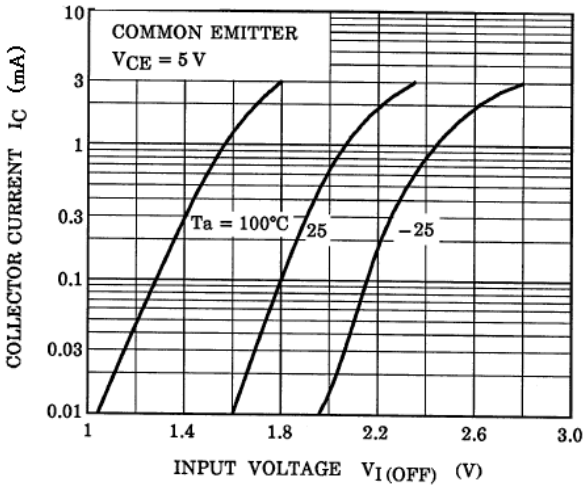


Fig. 10.6 RN1909 I_C-$V_{I(OFF)}$

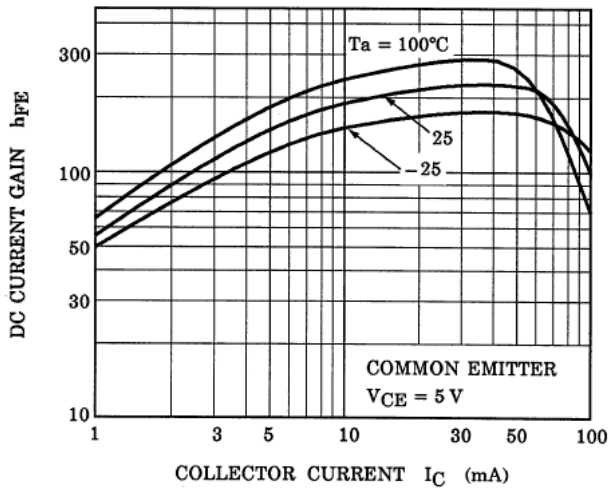


Fig. 10.7 RN1907 h_{FE}-I_C

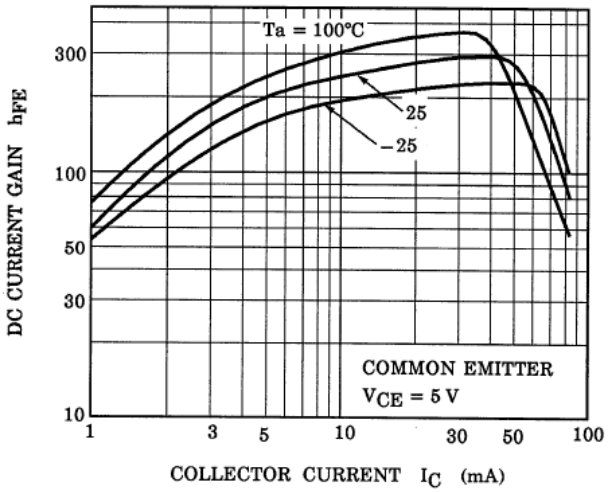


Fig. 10.8 RN1908 h_{FE}-I_C

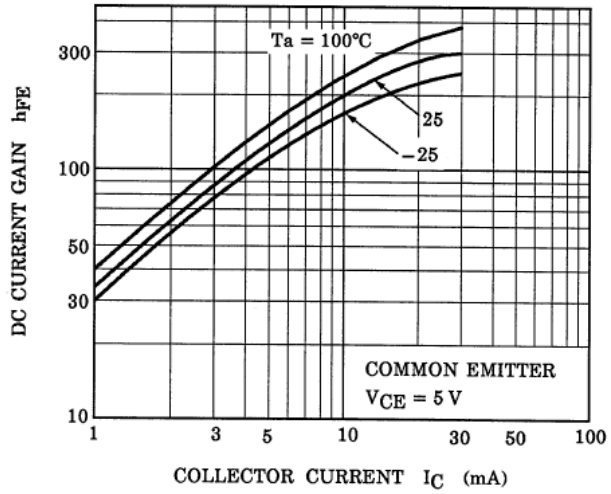
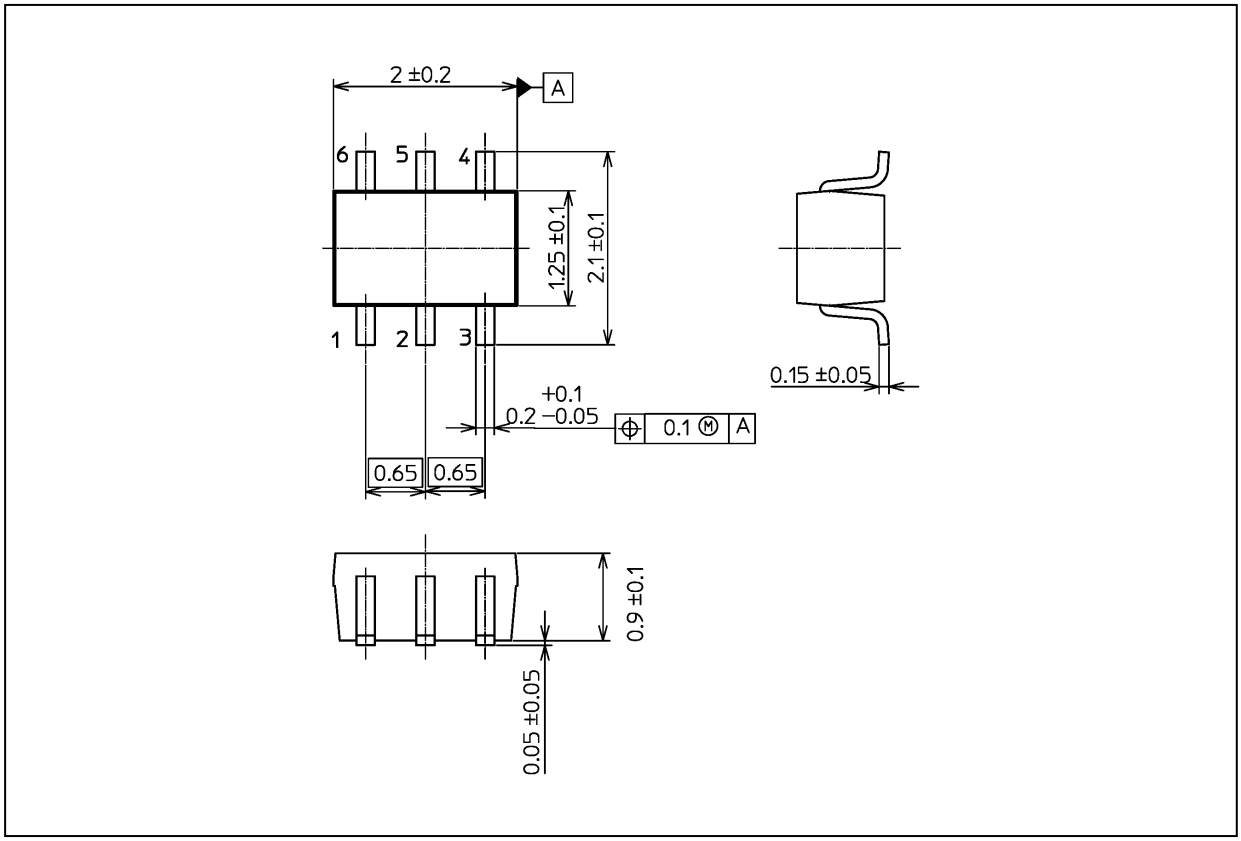


Fig. 10.9 RN1909 h_{FE}-I_C

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

Package Dimensions

Unit: mm



Weight: 6.8 mg (typ.)

Package Name(s)
TOSHIBA: 1-2T1S
Nickname: US6

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