

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

RN2107/08/09

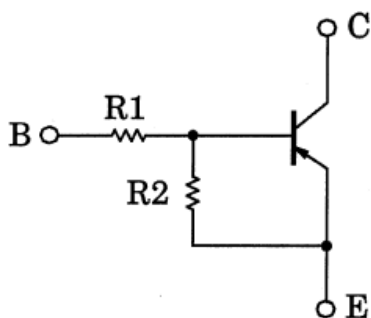
1. Applications

- Switching
- Inverter Circuits
- Interfacing
- Driver Circuits

2. Features

- (1) AEC-Q101 qualified (Please see the orderable part number list)
- (2) The integrated bias resistor reduces the number of external parts required, making it possible to reduce system size and assembly time.
- (3) Toshiba offers transistors with a wide range of resistance to accommodate various circuit designs.
- (4) Complementary to RN1107 to 1109

3. Equivalent Circuit

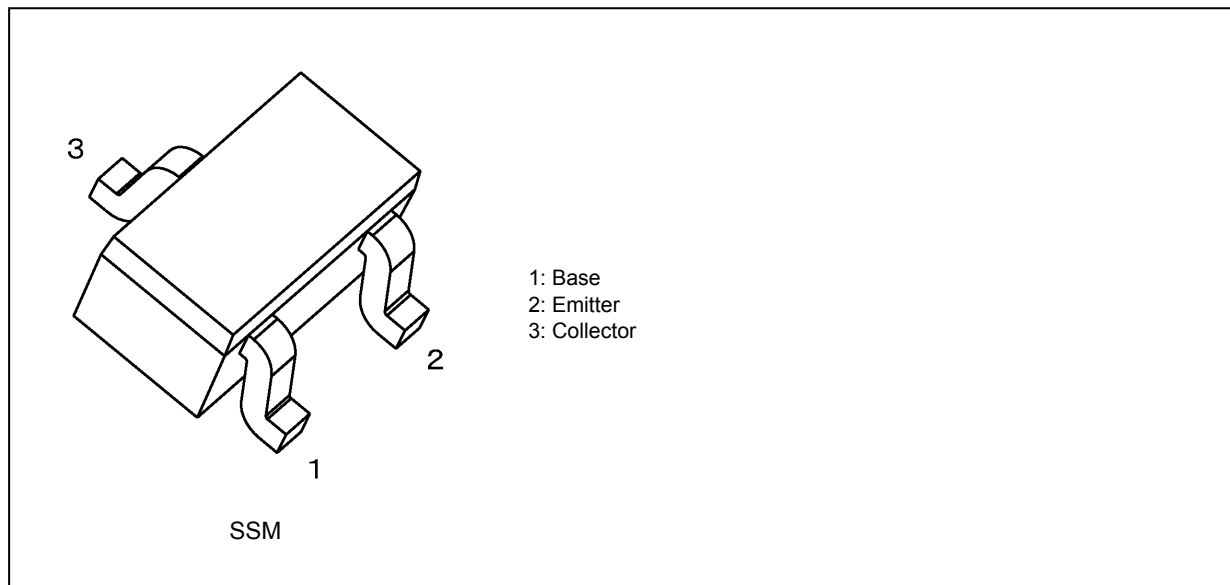


4. Bias Resistor Values

Part No.	R1 (kΩ)	R2 (kΩ)
RN2107	10	47
RN2108	22	47
RN2109	47	22

Start of commercial production
1990-12

5. Packaging and Pin Assignment



6. Orderable part number

Orderable part number		AEC-Q101	Note	Note
RN2107	RN2107,LF	—		General Use
	RN2107,LXGF	YES	(Note 1)	Unintended Use (Note 1)
	RN2107,LXHF	YES		Automotive Use
RN2108	RN2108,LF	—		General Use
	RN2108,LXGF	YES	(Note 1)	Unintended Use (Note 1)
	RN2108,LXHF	YES		Automotive Use
RN2109	RN2109,LF	—		General Use
	RN2109,LXGF	YES	(Note 1)	Unintended Use (Note 1)
	RN2109,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, $T_a = 25\text{ }^{\circ}\text{C}$)

Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	-50	V
Collector-emitter voltage		V_{CEO}	-50	
Emitter-base voltage	RN2107	V_{EBO}	-6	V
	RN2108		-7	
	RN2109		-15	
Collector current		I_C	-100	mA
Collector power dissipation		P_C	100	mW
Junction temperature		T_j	150	$^{\circ}\text{C}$
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).

8. Electrical Characteristics (Unless otherwise specified, $T_a = 25\text{ }^{\circ}\text{C}$)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2107~RN2109	I_{CBO}	$V_{CB} = -50\text{ V}, I_E = 0\text{ mA}$	—	—	-100	nA
		I_{CEO}	$V_{CE} = -50\text{ V}, I_B = 0\text{ mA}$	—	—	-500	
Emitter cut-off current	RN2107	I_{EBO}	$V_{EB} = -6\text{ V}, I_C = 0\text{ mA}$	-0.081	—	-0.15	mA
	RN2108		$V_{EB} = -7\text{ V}, I_C = 0\text{ mA}$	-0.078	—	-0.145	
	RN2109		$V_{EB} = -15\text{ V}, I_C = 0\text{ mA}$	-0.167	—	-0.311	
DC current gain	RN2107	h_{FE}	$V_{CE} = -5\text{ V}, I_C = -10\text{ mA}$	80	—	—	—
	RN2108			80	—	—	
	RN2109			70	—	—	
Collector-emitter saturation voltage	RN2107~RN2109	$V_{CE(sat)}$	$I_C = -5\text{ mA}, I_B = -0.25\text{ mA}$	—	-0.1	-0.3	V
Input voltage (ON)	RN2107	$V_{I(ON)}$	$V_{CE} = -0.2\text{ V}, I_C = -5\text{ mA}$	-0.7	—	-1.8	V
	RN2108			-1.0	—	-2.6	
	RN2109			-2.2	—	-5.8	
Input voltage (OFF)	RN2107	$V_{I(OFF)}$	$V_{CE} = -5\text{ V}, I_C = -0.1\text{ mA}$	-0.5	—	-1.0	V
	RN2108			-0.6	—	-1.16	
	RN2109			-1.5	—	-2.6	
Transition frequency	RN2107~RN2109	f_T	$V_{CE} = -10\text{ V}, I_C = -5\text{ mA}$	—	200	—	MHz
Collector output capacitance	RN2107~RN2109	C_{ob}	$V_{CB} = -10\text{ V}, I_E = 0\text{ mA}, f = 1\text{ MHz}$	—	3	6	pF
Input resistance	RN2107	R_1	-	7	10	13	k Ω
	RN2108			15.4	22	28.6	
	RN2109			32.9	47	61.1	
Resistor ratio	RN2107	R1/R2	-	0.191	0.213	0.232	—
	RN2108			0.421	0.468	0.515	
	RN2109			1.92	2.14	2.35	

9. Marking

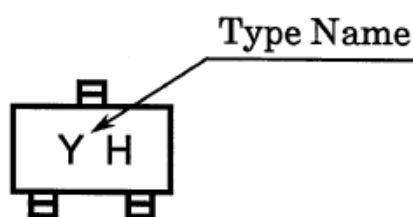


Fig. 9.1 Marking RN2107

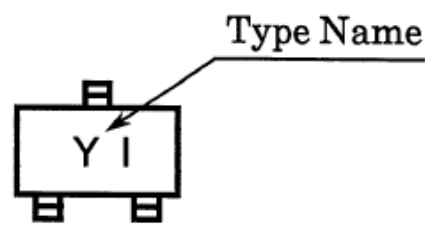


Fig. 9.2 Marking RN2108

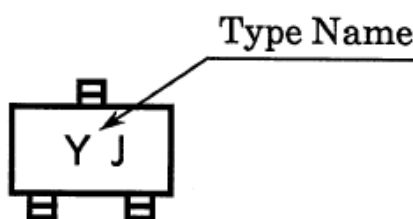


Fig. 9.3 Marking RN2109

10. Characteristics Curves (Note)

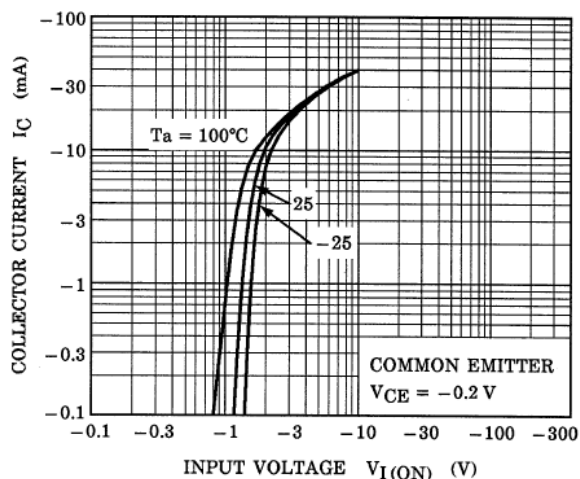


Fig. 10.1 RN2107 I_C - $V_{I(ON)}$

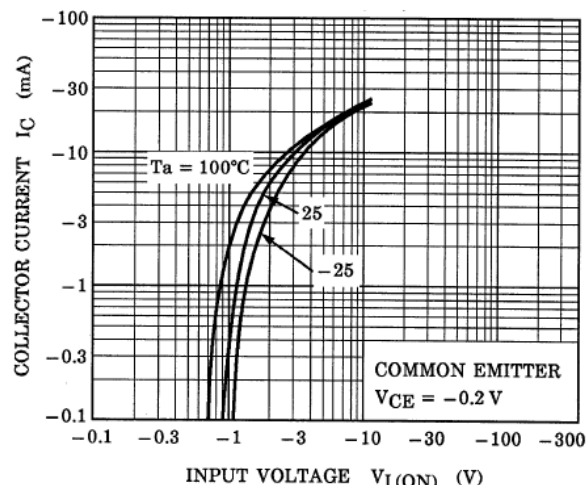


Fig. 10.2 RN2108 I_C - $V_{I(ON)}$

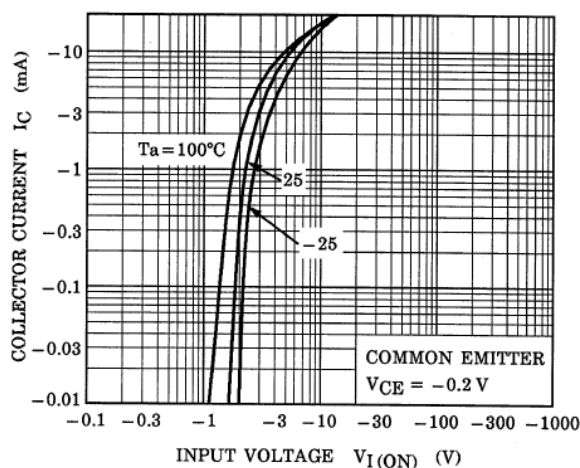


Fig. 10.3 RN2109 I_C - $V_{I(ON)}$

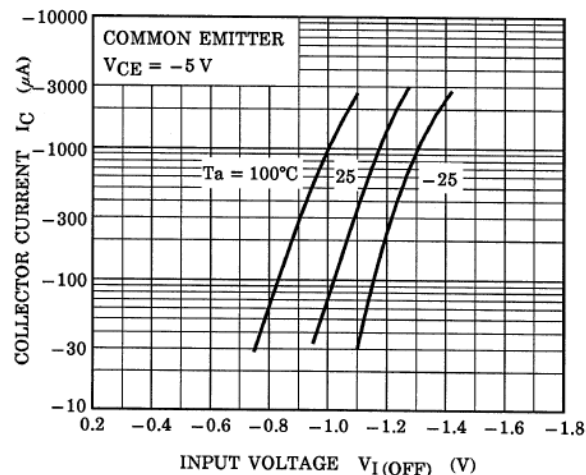


Fig. 10.4 RN2107 I_C - $V_{I(OFF)}$

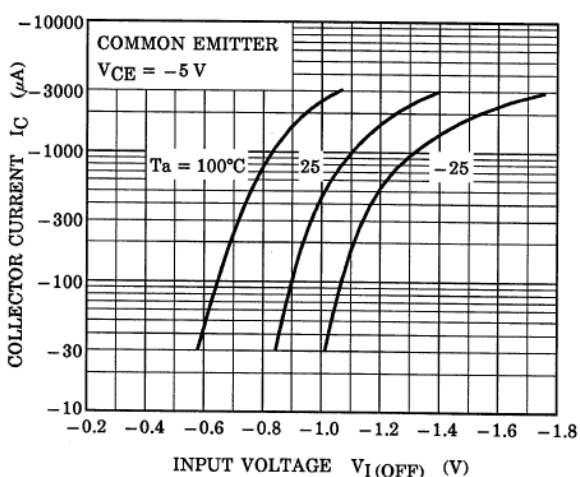


Fig. 10.5 RN2108 I_C - $V_{I(OFF)}$

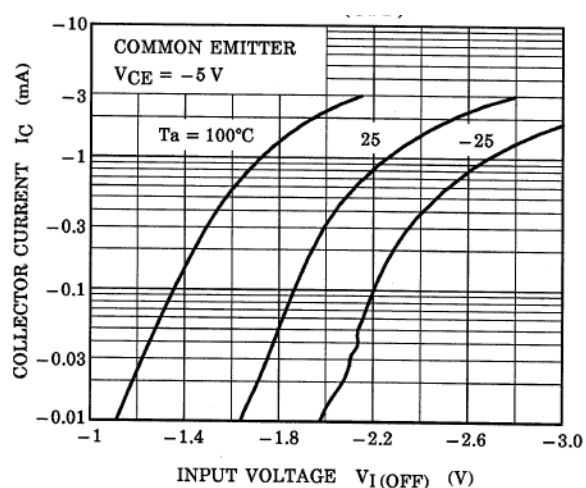


Fig. 10.6 RN2109 I_C - $V_{I(OFF)}$

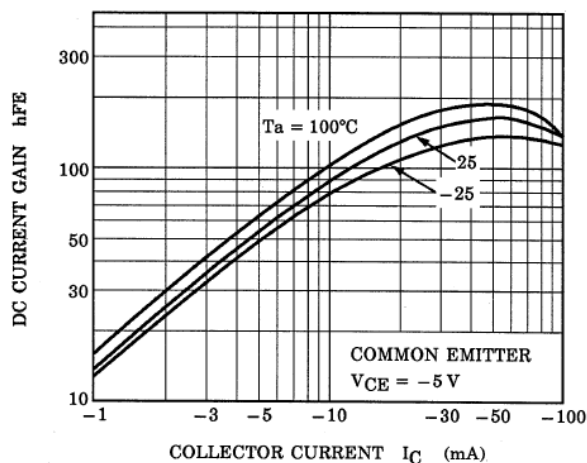


Fig. 10.7 RN2107 h_{FE} - I_C

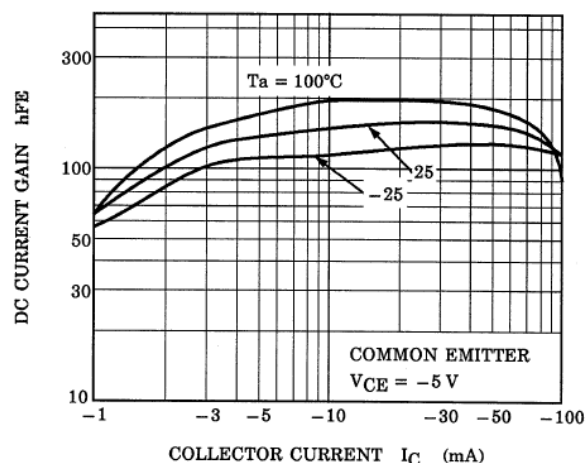


Fig. 10.8 RN2108 h_{FE} - I_C

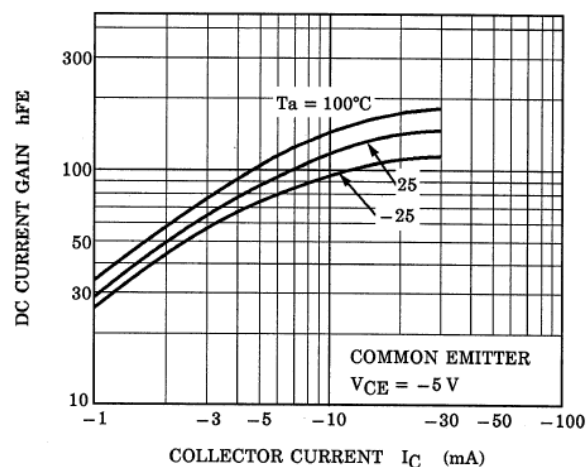


Fig. 10.9 RN2109 h_{FE} - I_C

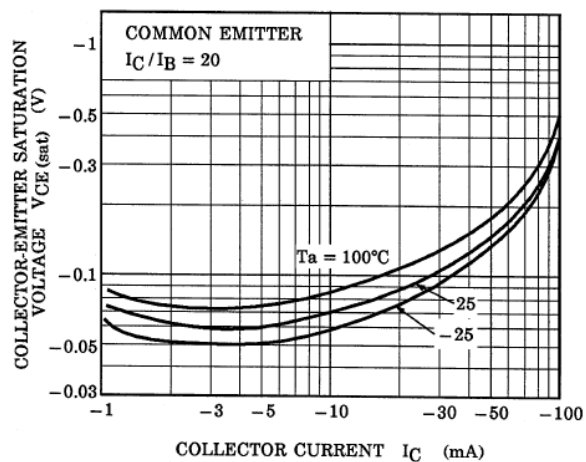


Fig. 10.10 RN2107 $V_{CE(sat)}$ - I_C

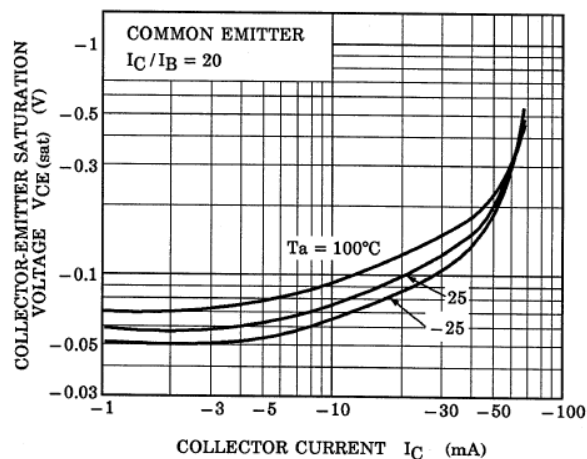


Fig. 10.11 RN2108 $V_{CE(sat)}$ - I_C

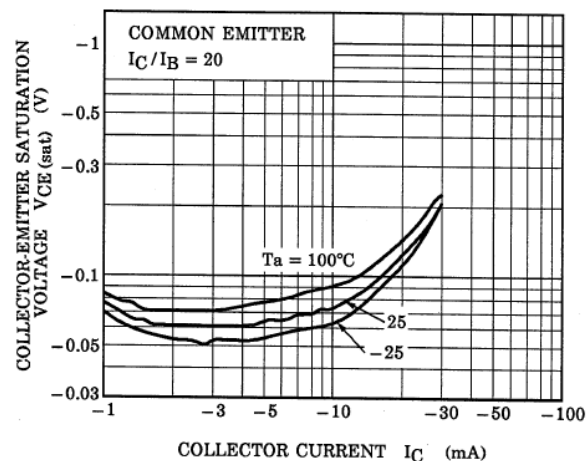
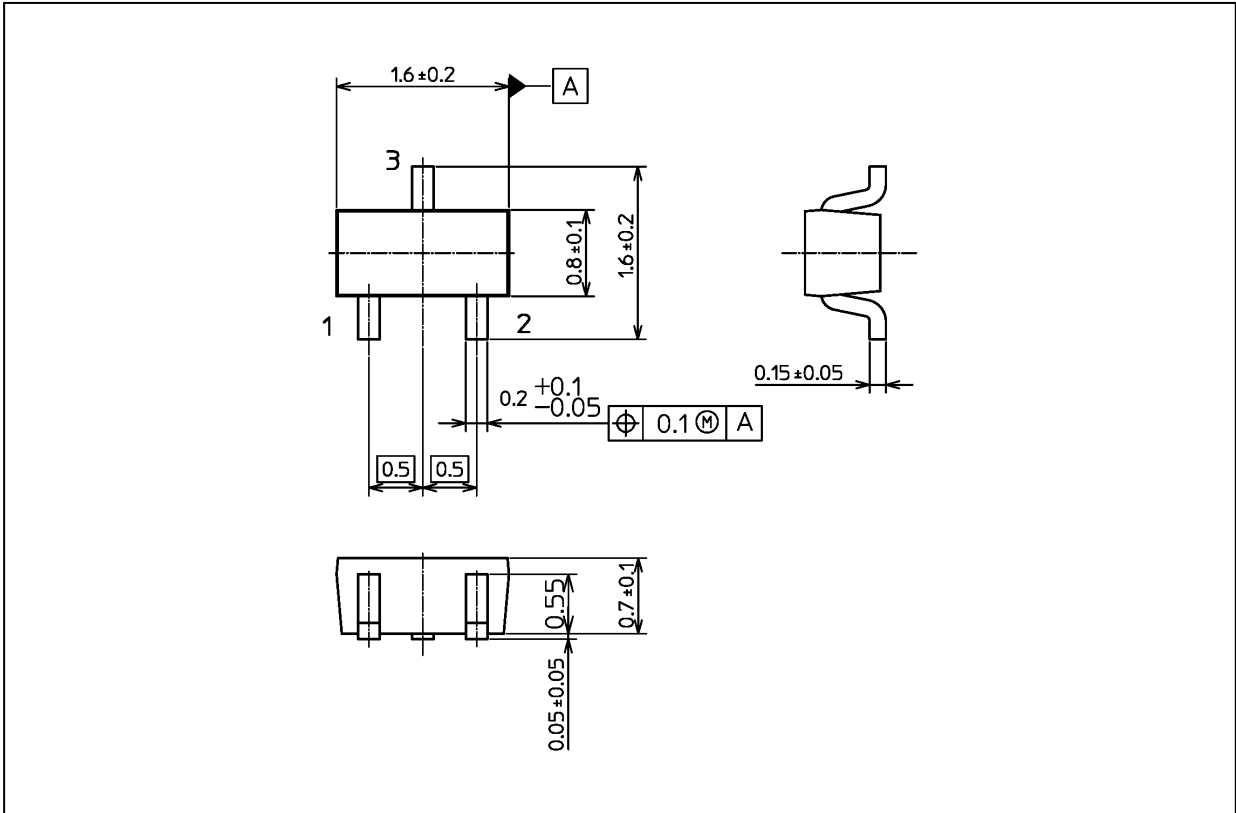


Fig. 10.12 RN2109 $V_{CE(sat)}$ - I_C

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

Package Dimensions

Unit: mm



Weight: 2.4 mg (typ.)

Package Name(s)
TOSHIBA: 2-2H1S
Nickname: SSM

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