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

RN2407/08/09

1. Applications

- Switching
- Inverter Circuits
- Interfacing
- Driver Circuits

2. Features

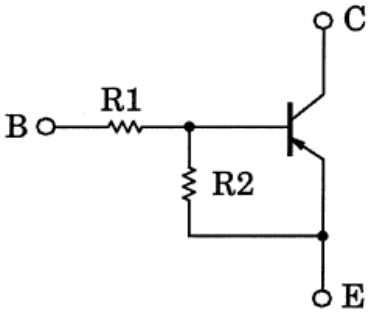
(1) AEC-Q101 qualified (Please see the orderable part number list)

(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 RN1407 to 1409

3. Equivalent Circuit

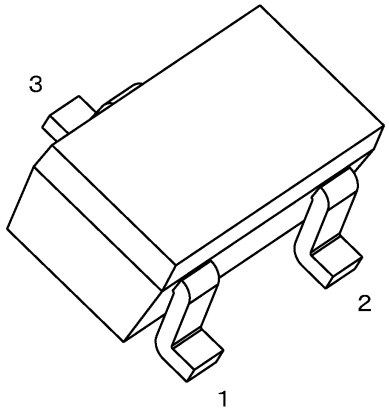


4. Bias Resistor Values

Part No.	R1 (kΩ)	R2 (kΩ)
RN2407	10	47
RN2408	22	47
RN2409	47	22

Start of commercial production
1985-05

5. Packaging and Pin Assignment



1: Base
2: Emitter
3: Collector

S-Mini

6. Orderable part number

Orderable part number		AEC-Q101	Note	Note	
RN2407	RN2407,LF	—		General Use	
	RN2407,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN2407,LXHF	YES		Automotive Use	
RN2408	RN2408,LF	—		General Use	
	RN2408,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN2408,LXHF	YES		Automotive Use	
RN2409	RN2409,LF	—		General Use	
	RN2409,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN2409,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)

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN2407～RN2409	V_{CBO}	-50	V
Collector-emitter voltage		V_{CEO}	-50	
Emitter-base voltage	RN2407	V_{EBO}	-6	V
	RN2408		-7	
	RN2409		-15	
Collector current	RN2407～RN2409	I_C	-100	mA
Collector power dissipation		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).

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2407～RN2409	I_{CBO}	V_{CB} = -50 V, I_E = 0 mA	—	—	-100	nA
		I_{CEO}	V_{CE} = -50 V, I_B = 0 mA	—	—	-500	
Emitter cut-off current	RN2407	I_{EBO}	V_{EB} = -6 V, I_C = 0 mA	-0.081	—	-0.15	mA
	RN2408		V_{EB} = -7 V, I_C = 0 mA	-0.078	—	-0.145	
	RN2409		V_{EB} = -15 V, I_C = 0 mA	-0.167	—	-0.311	
DC current gain	RN2407	h_{FE}	V_{CE} = -5 V, I_C = -10 mA	80	—	—	—
	RN2408			80	—	—	
	RN2409			70	—	—	
Collector-emitter saturation voltage	RN2407～RN2409	$V_{CE(sat)}$	I_C = -5 mA, I_B = -0.25 mA	—	-0.1	-0.3	V
Input voltage (ON)	RN2407	$V_{I(ON)}$	V_{CE} = -0.2 V, I_C = -5 mA	-0.7	—	-1.8	V
	RN2408			-1.0	—	-2.6	
	RN2409			-2.2	—	-5.8	
Input voltage (OFF)	RN2407	$V_{I(OFF)}$	V_{CE} = -5 V, I_C = -0.1 mA	-0.5	—	-1.0	V
	RN2408			-0.6	—	-1.16	
	RN2409			-1.5	—	-2.6	
Transition frequency	RN2407～RN2409	f_T	V_{CE} = -10 V, I_C = -5 mA	—	200	—	MHz
Collector output capacitance	RN2407～RN2409	C_{ob}	V_{CB} = -10 V, I_E = 0 mA, f = 1 MHz	—	3	6	pF
Input resistance	RN2407	R_1	-	7	10	13	kΩ
	RN2408			15.4	22	28.6	
	RN2409			32.9	47	61.1	
Resistor ratio	RN2407	R1/R2	-	0.191	0.213	0.232	—
	RN2408			0.421	0.468	0.515	
	RN2409			1.92	2.14	2.35	

9. Marking

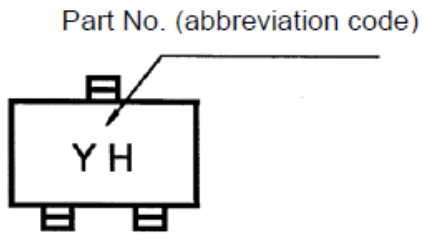


Fig. 9.1 Marking RN2407

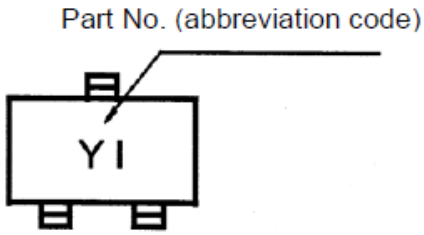


Fig. 9.2 Marking RN2408

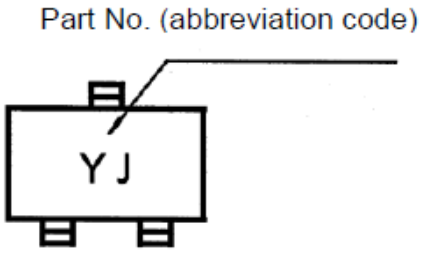


Fig. 9.3 Marking RN2409

10. Characteristics Curves (Note)

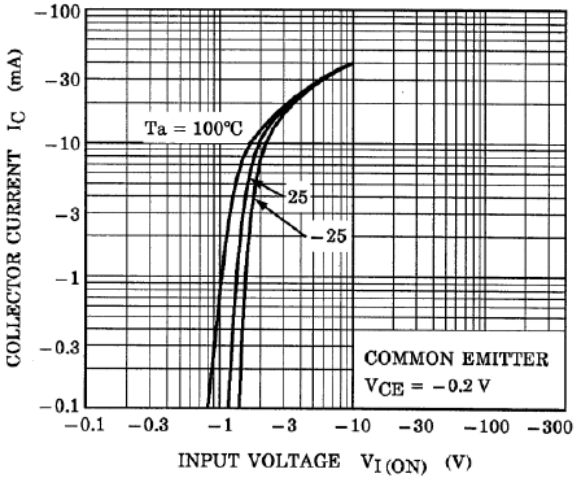


Fig. 10.1 RN2407 I_C-$V_{I(ON)}$

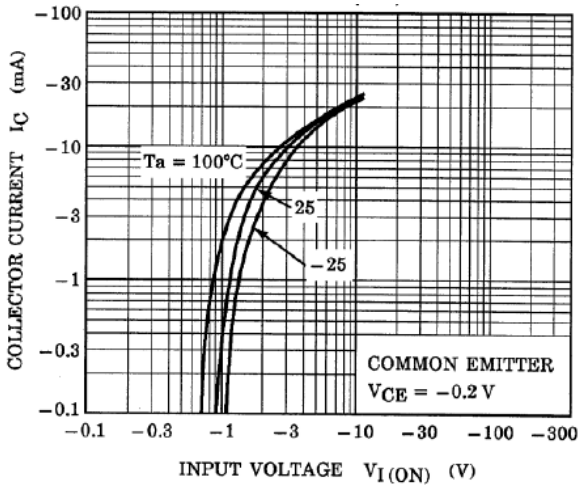


Fig. 10.2 RN2408 I_C-$V_{I(ON)}$

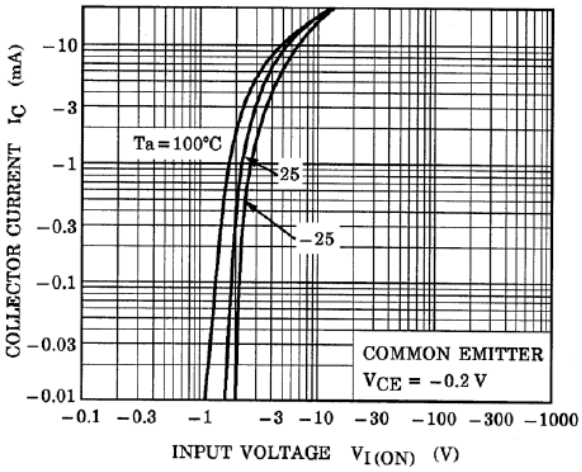


Fig. 10.3 RN2409 I_C-$V_{I(ON)}$

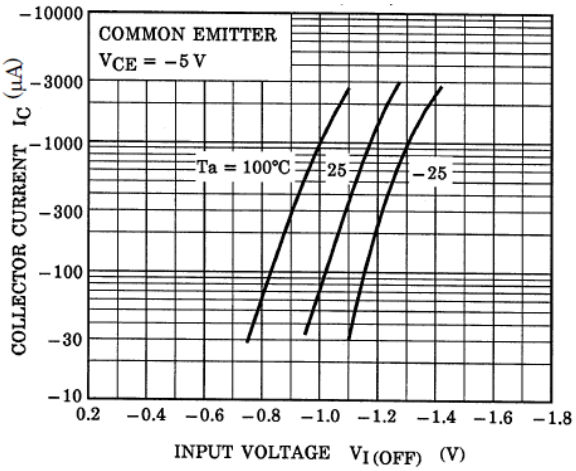


Fig. 10.4 RN2407 I_C-$V_{I(OFF)}$

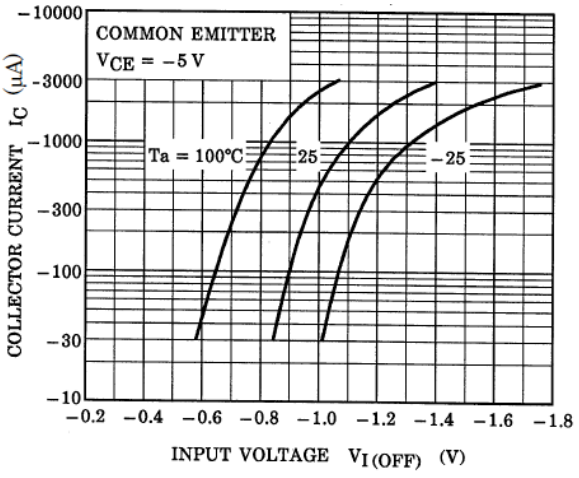


Fig. 10.5 RN2408 I_C-$V_{I(OFF)}$

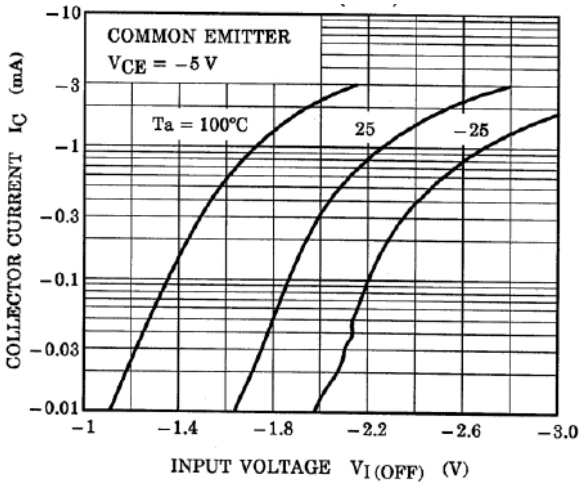


Fig. 10.6 RN2409 I_C-$V_{I(OFF)}$

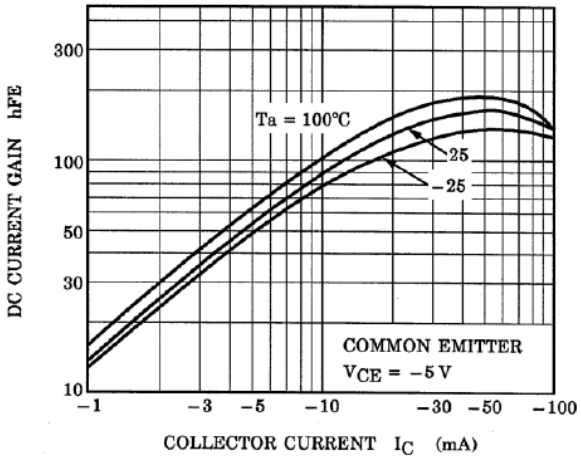


Fig. 10.7 RN2407 h_{FE}-I_C

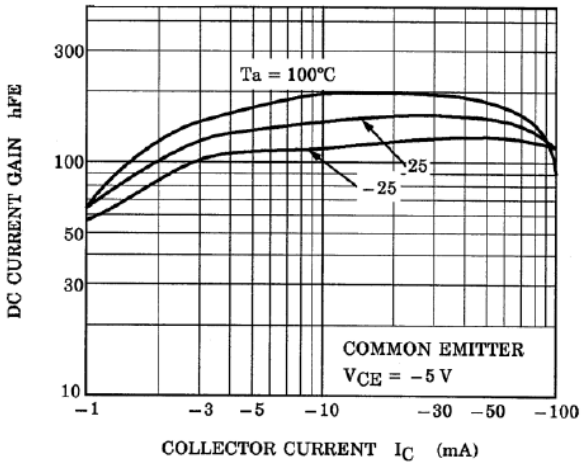


Fig. 10.8 RN2408 h_{FE}-I_C

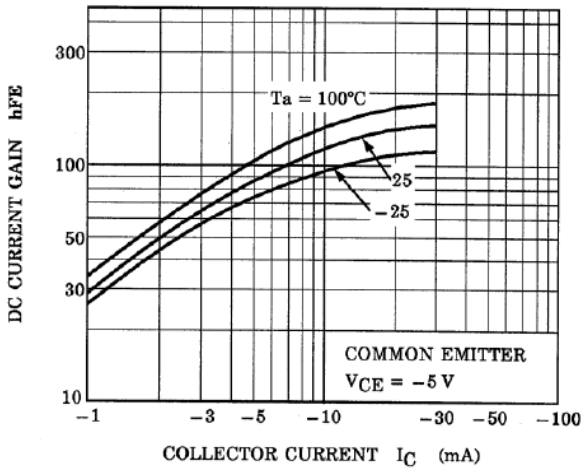


Fig. 10.9 RN2409 h_{FE}-I_C

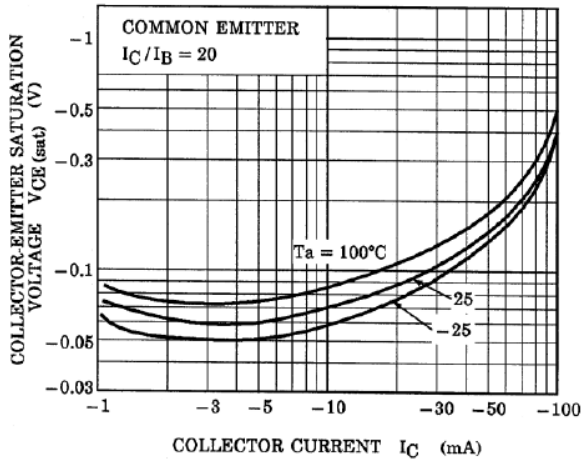


Fig. 10.10 RN2407 $V_{CE(sat)}$-I_C

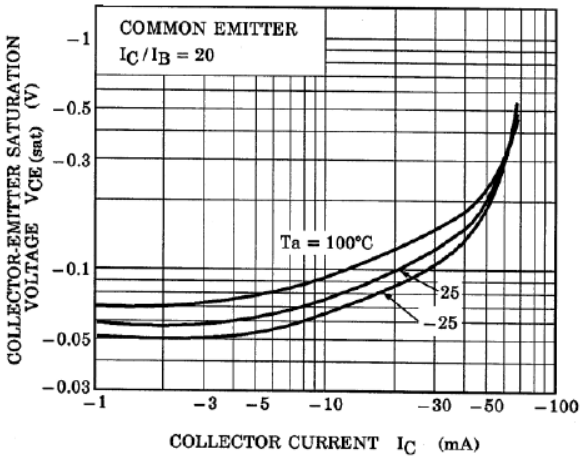


Fig. 10.11 RN2408 $V_{CE(sat)}$-I_C

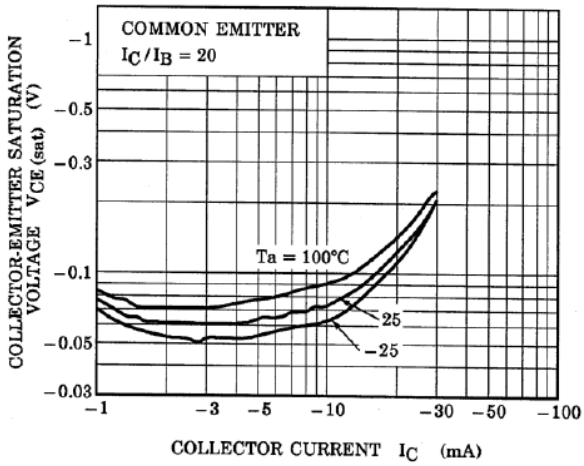
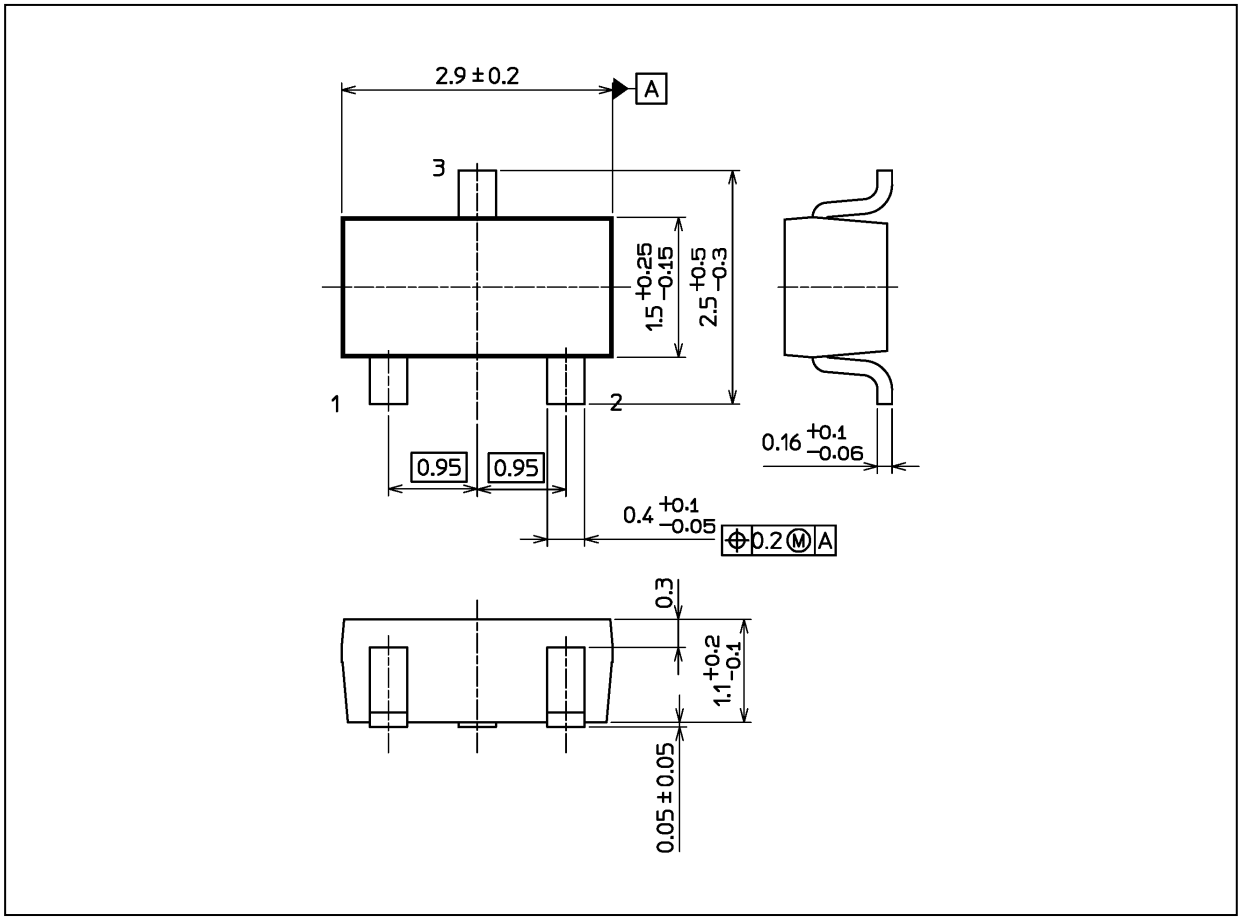


Fig. 10.12 RN2409 $V_{CE(sat)}$-I_C

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

Package Dimensions

Unit: mm



Weight: 12 mg (typ.)

Package Name(s)
TOSHIBA: 2-3F1S
Nickname: S-Mini

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