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

RN2307/08/09

1. Applications

- Switching
- Inverter Circuits
- Interfacing
- Driver Circuits

2. Features

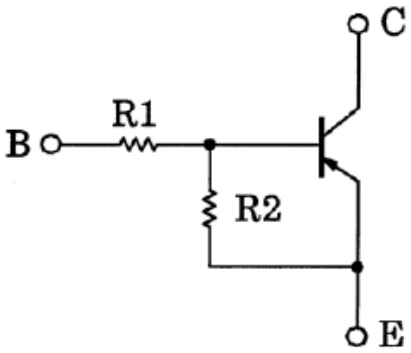
(1) AEC-Q101 qualified (Please see the orderable part number list)

(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 RN1307 to RN1309

3. Equivalent Circuit

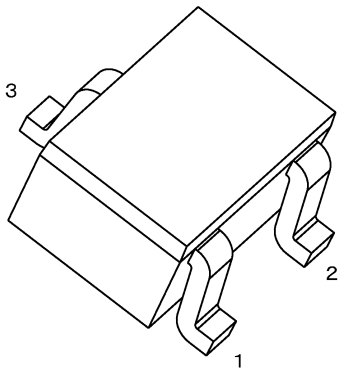


4. Bias Resistor Values

Part No.	R1 (kΩ)	R2 (kΩ)
RN2307	10	47
RN2308	22	47
RN2309	47	22

Start of commercial production
1988-04

5. Packaging and Pin Assignment



1: Base
2: Emitter
3: Collector

USM

6. Orderable part number

Orderable part number		AEC-Q101	Note	Note	
RN2307	RN2307,LF	—		General Use	
	RN2307,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN2307,LXHF	YES		Automotive Use	
RN2308	RN2308,LF	—		General Use	
	RN2308,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN2308,LXHF	YES		Automotive Use	
RN2309	RN2309,LF	—		General Use	
	RN2309,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN2309,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		V_{CBO}	-50	V
Collector-emitter voltage		V_{CEO}	-50	
Emitter-base voltage	RN2307	V_{EBO}	-6	V
	RN2308		-7	
	RN2309		-15	
Collector current		I_C	-100	mA
Collector power dissipation		P_C	100	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	RN2307～RN2309	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	RN2307	I_{EBO}	V_{EB} = -6 V, I_C = 0 mA	-0.081	—	-0.15	mA
	RN2308		V_{EB} = -7 V, I_C = 0 mA	-0.078	—	-0.145	
	RN2309		V_{EB} = -15 V, I_C = 0 mA	-0.167	—	-0.311	
DC current gain	RN2307	h_{FE}	V_{CE} = -5 V, I_C = -10 mA	80	—	—	—
	RN2308			80	—	—	
	RN2309			70	—	—	
Collector-emitter saturation voltage	RN2307～RN2309	$V_{CE(sat)}$	I_C = -5 mA, I_B = -0.25 mA	—	-0.1	-0.3	V
Input voltage (ON)	RN2307	$V_{I(ON)}$	V_{CE} = -0.2 V, I_C = -5 mA	-0.7	—	-1.8	V
	RN2308			-1.0	—	-2.6	
	RN2309			-2.2	—	-5.8	
Input voltage (OFF)	RN2307	$V_{I(OFF)}$	V_{CE} = -5 V, I_C = -0.1 mA	-0.5	—	-1.0	V
	RN2308			-0.6	—	-1.16	
	RN2309			-1.5	—	-2.6	
Transition frequency	RN2307～RN2309	f_T	V_{CE} = -10 V, I_C = -5 mA	—	200	—	MHz
Collector output capacitance	RN2307～RN2309	C_{ob}	V_{CB} = -10 V, I_E = 0 mA, f = 1 MHz	—	3	6	pF
Input resistance	RN2307	R_1	-	7	10	13	kΩ
	RN2308			15.4	22	28.6	
	RN2309			32.9	47	61.1	
Resistor ratio	RN2307	R1/R2	-	0.191	0.213	0.232	—
	RN2308			0.421	0.468	0.515	
	RN2309			1.92	2.14	2.35	

9. Marking

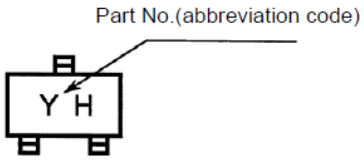


Fig. 9.1 Marking RN2307

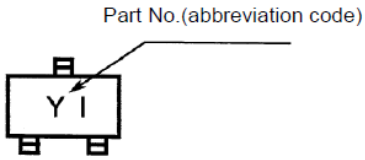


Fig. 9.2 Marking RN2308

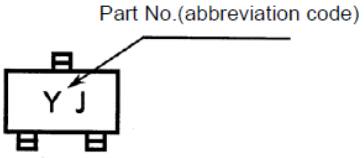


Fig. 9.3 Marking RN2309

10. Characteristics Curves (Note)

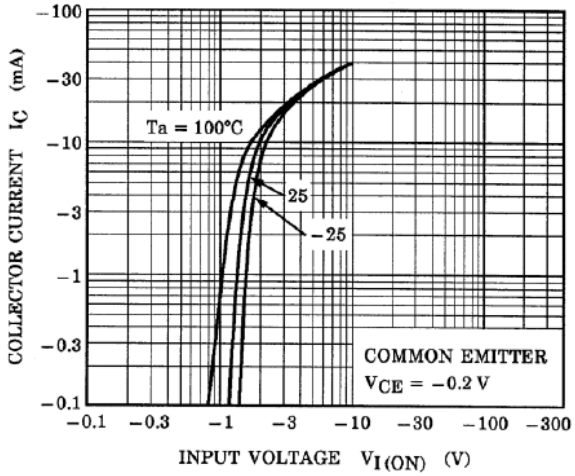


Fig. 10.1 RN2307 I_C-$V_{I(ON)}$

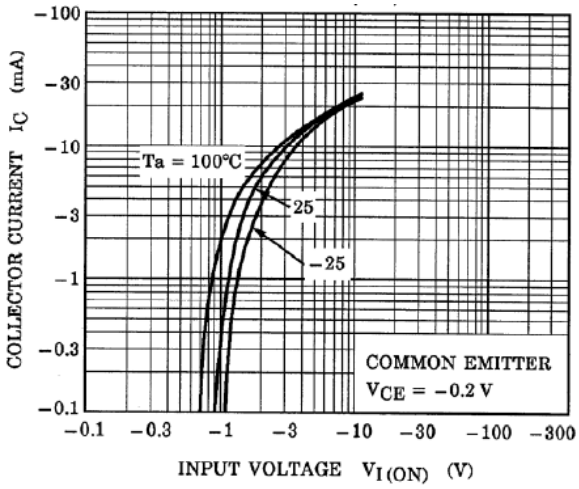


Fig. 10.2 RN2308 I_C-$V_{I(ON)}$

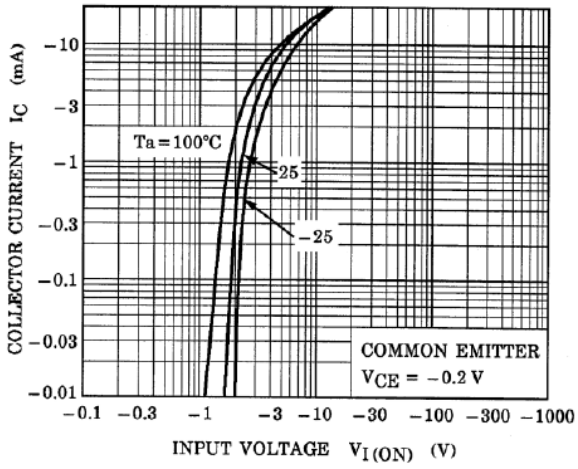


Fig. 10.3 RN2309 I_C-$V_{I(ON)}$

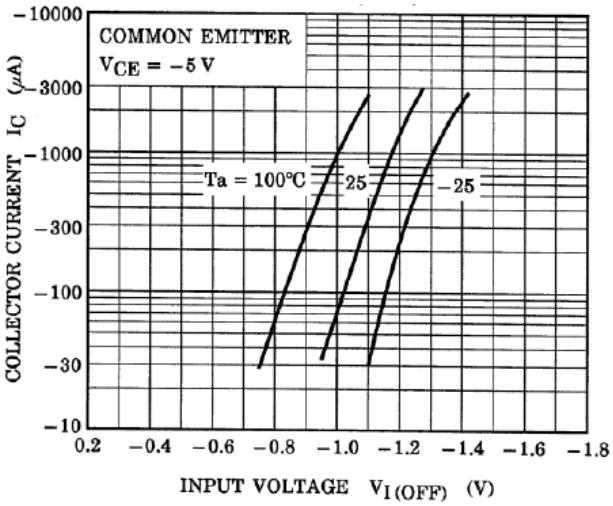


Fig. 10.4 RN2307 I_C-$V_{I(OFF)}$

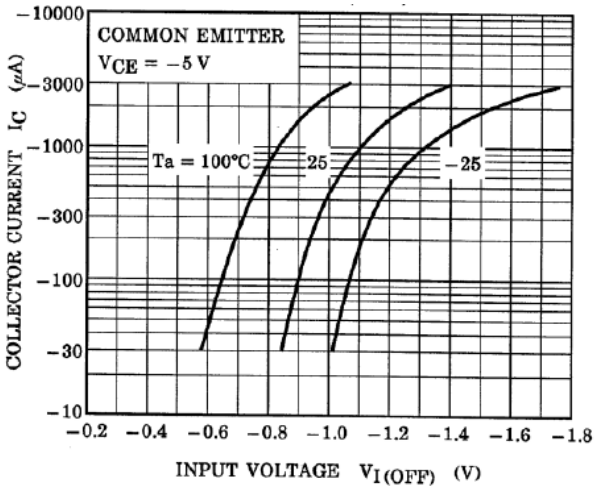


Fig. 10.5 RN2308 I_C-$V_{I(OFF)}$

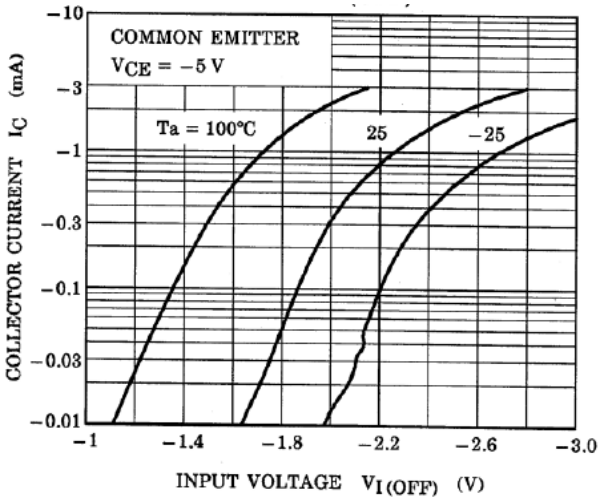


Fig. 10.6 RN2309 I_C-$V_{I(OFF)}$

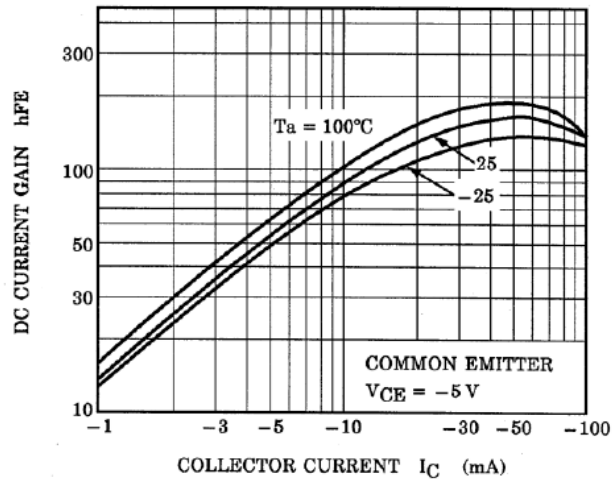


Fig. 10.7 RN2307 h_{FE}-I_C

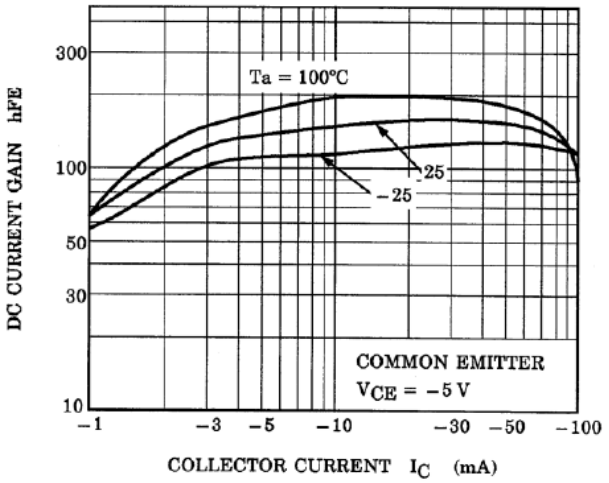


Fig. 10.8 RN2308 h_{FE}-I_C

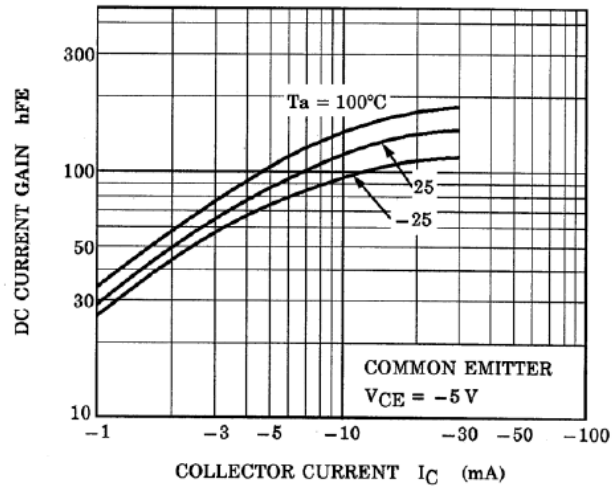


Fig. 10.9 RN2309 h_{FE}-I_C

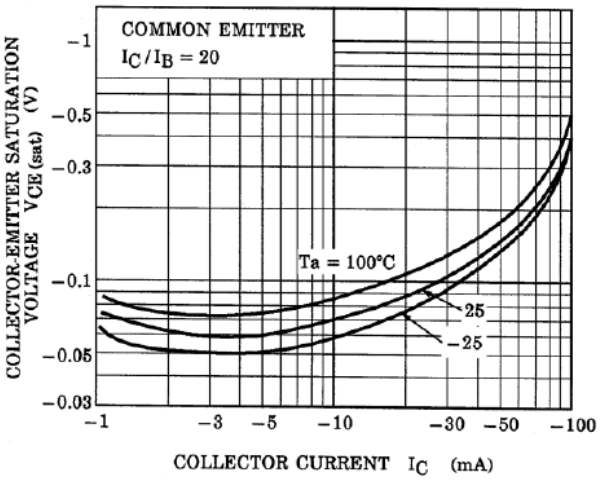


Fig. 10.10 RN2307 $V_{CE(sat)}$-I_C

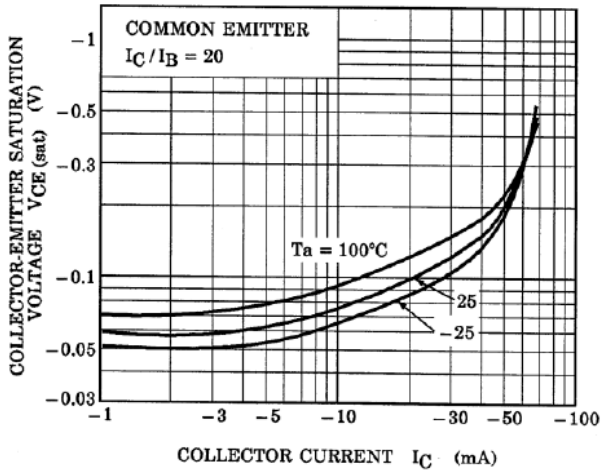


Fig. 10.11 RN2308 $V_{CE(sat)}$-I_C

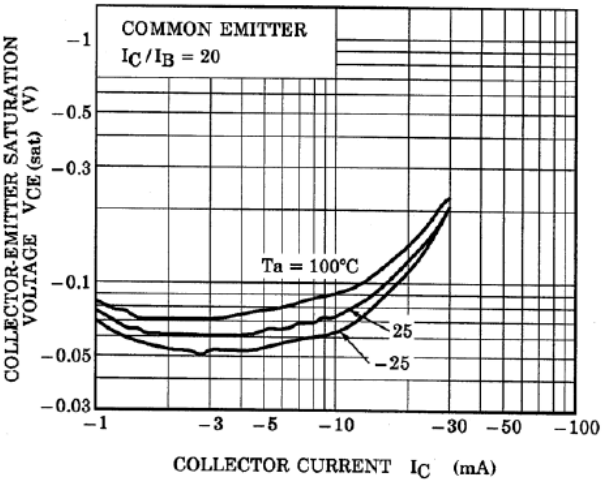
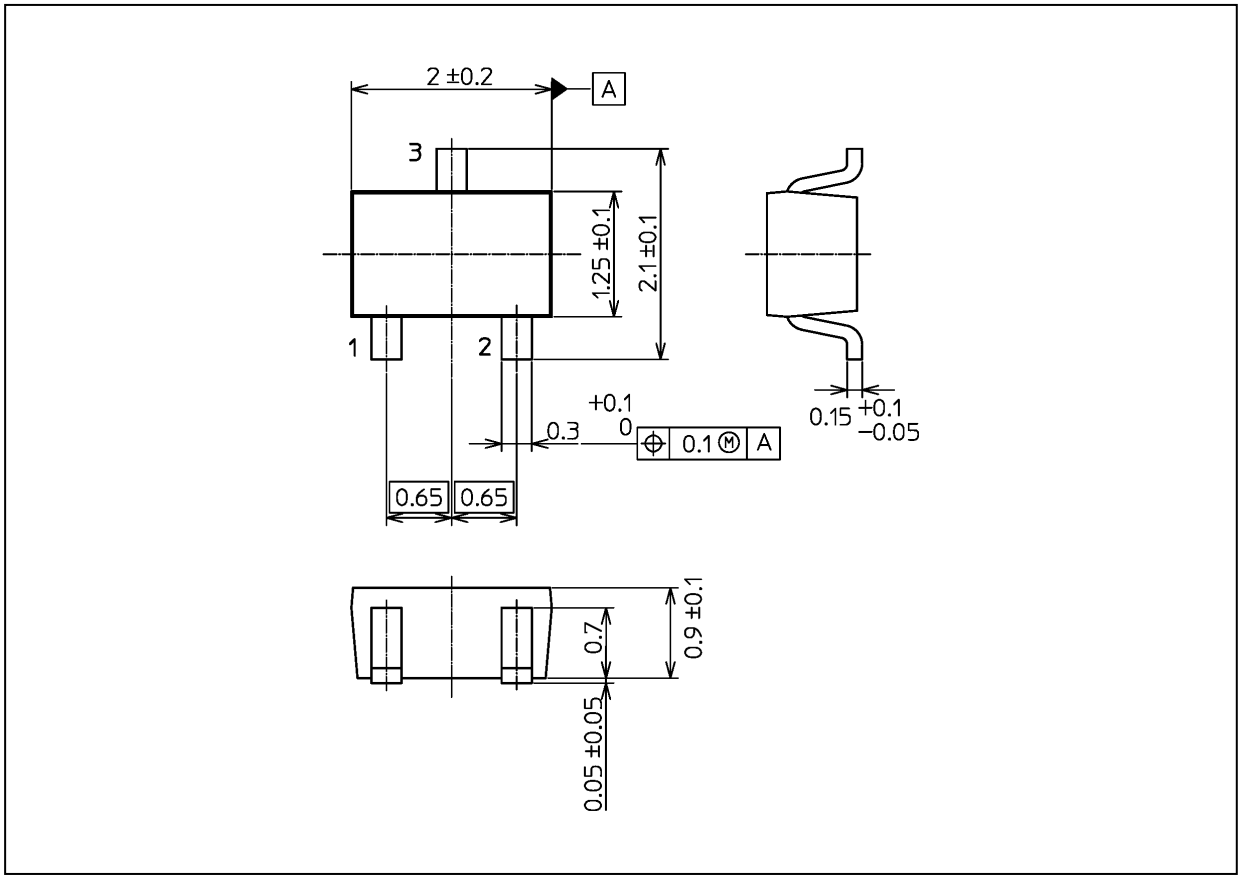


Fig. 10.12 RN2309 $V_{CE(sat)}$-I_C

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

Package Dimensions

Unit: mm



Weight: 6.0 mg (typ.)

Package Name(s)
TOSHIBA: 2-2E1S
Nickname: USM

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