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

RN2310,RN2311

1. Applications

- Switching
- Inverter Circuits
- Interfacing
- Driver Circuits

2. Features

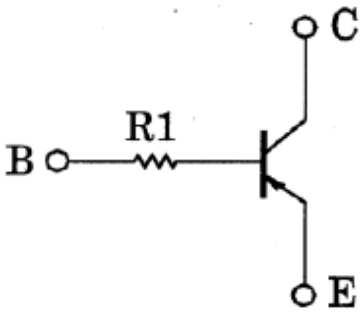
(1) AEC-Q101 qualified (Please see the orderable part number list)

(2) The integrated bias resistor reduces the number of external parts required, making it possible to reduce system size and assembly time.

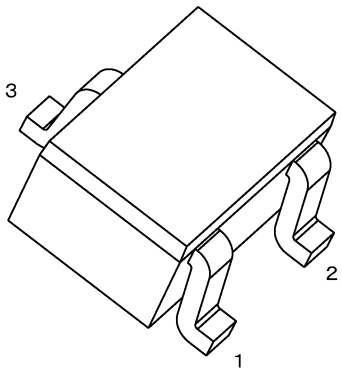
(3) Toshiba offers transistors with a wide range of resistance to accommodate various circuit designs.

(4) Complementary to RN1310 to RN1311

3. Equivalent Circuit



4. Packaging and Pin Assignment



1: Base
2: Emitter
3: Collector

USM

Start of commercial production
1987-07

5. Orderable part number

Orderable part number		AEC-Q101	Note	Note	
RN2310	RN2310,LF	—		General Use	
	RN2310,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN2310,LXHF	YES		Automotive Use	
RN2311	RN2311,LF	—		General Use	
	RN2311,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN2311,LXHF	YES		Automotive Use	

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

6. 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	V_{EBO}	-5	
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).

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		I_{CBO}	V_{CB} = -50 V, I_E = 0 mA	—	—	-100	nA
Emitter cut-off current		I_{EBO}	V_{EB} = -5 V, I_C = 0 mA	—	—	-100	nA
DC current gain		h_{FE}	V_{CE} = -5 V, I_C = -1 mA	120	—	400	—
Collector-emitter saturation voltage		$V_{CE(sat)}$	I_C = -5 mA, I_B = -0.25 mA	—	-0.1	-0.3	V
Transition frequency		f_T	V_{CE} = -10 V, I_C = -5 mA	—	200	—	MHz
Collector output capacitance		C_{ob}	V_{CB} = -10 V, I_E = 0 mA, f = 1 MHz	—	3	6	pF
Input resistance	RN2310	R_1	-	3.29	4.7	6.11	kΩ
	RN2311			7	10	13	

8. Marking

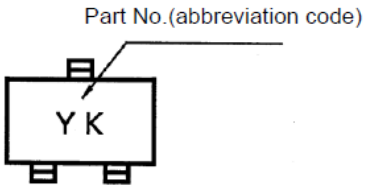


Fig. 8.1 Marking RN2310

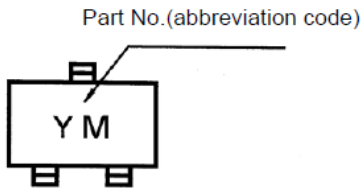


Fig. 8.2 Marking RN2311

9. Characteristics Curves (Note)

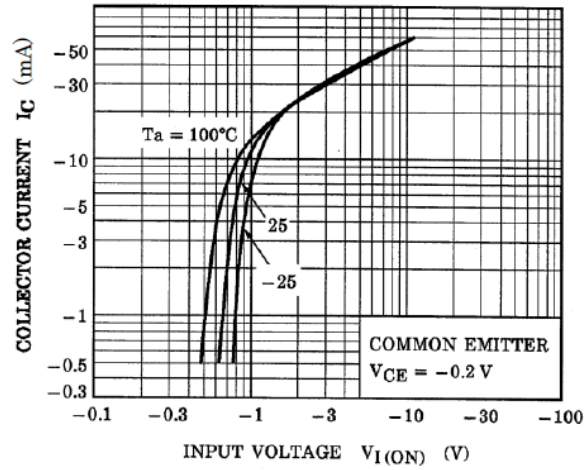


Fig. 9.1 RN2310 I_C-$V_{I(ON)}$

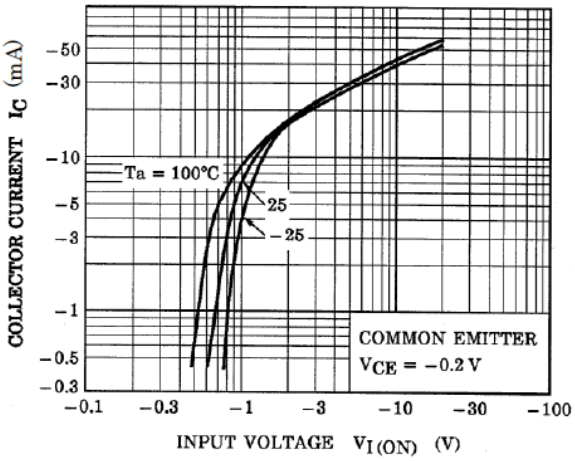


Fig. 9.2 RN2311 I_C-$V_{I(ON)}$

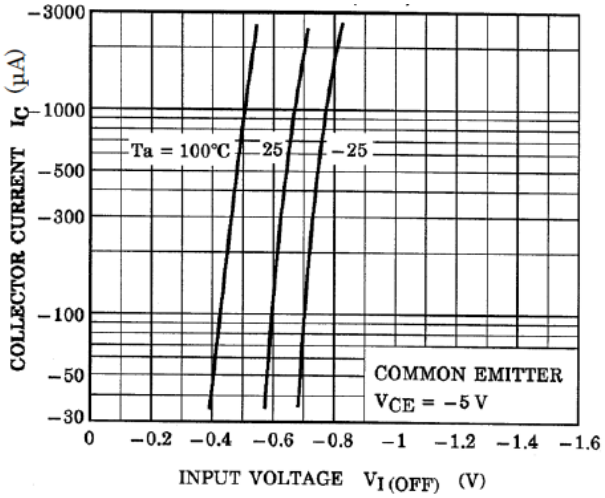


Fig. 9.3 RN2310 I_C-$V_{I(OFF)}$

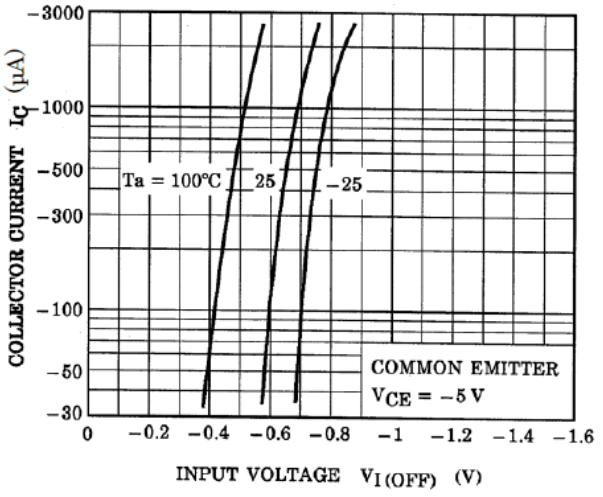


Fig. 9.4 RN2311 I_C-$V_{I(OFF)}$

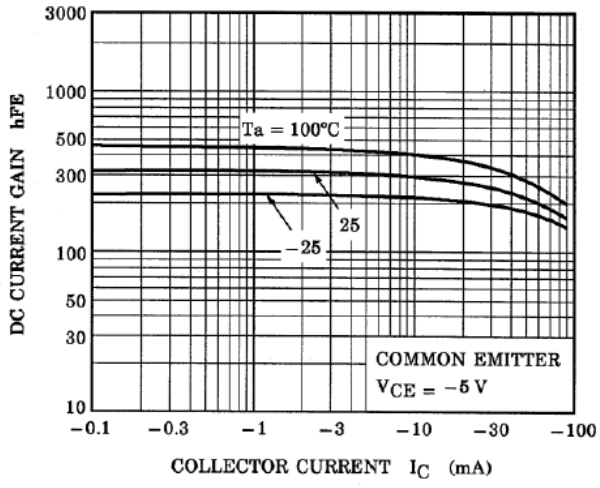


Fig. 9.5 RN2310 h_{FE}-I_C

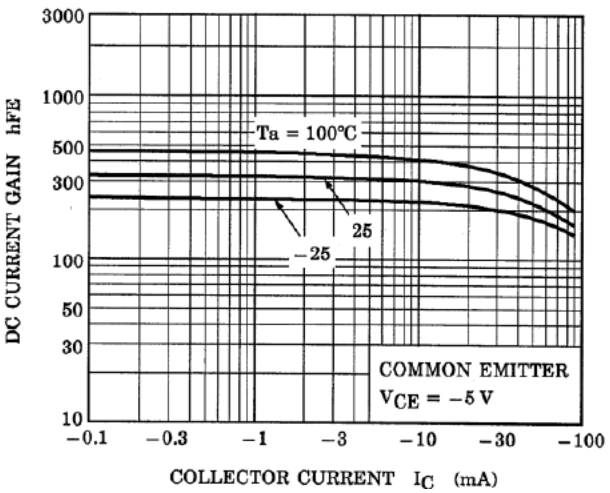


Fig. 9.6 RN2311 h_{FE}-I_C

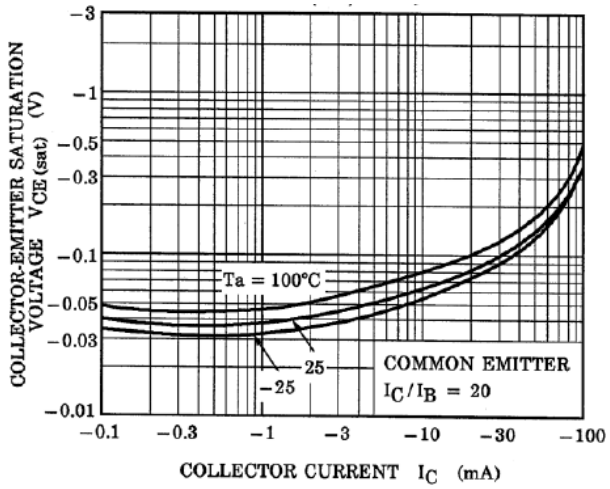


Fig. 9.7 RN2310 $V_{CE(sat)}$-I_C

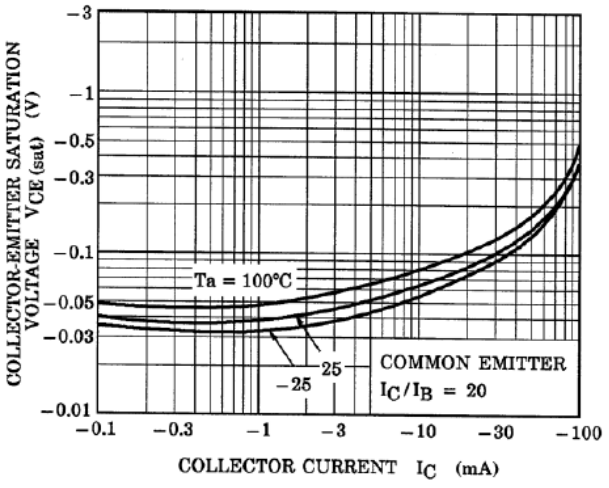
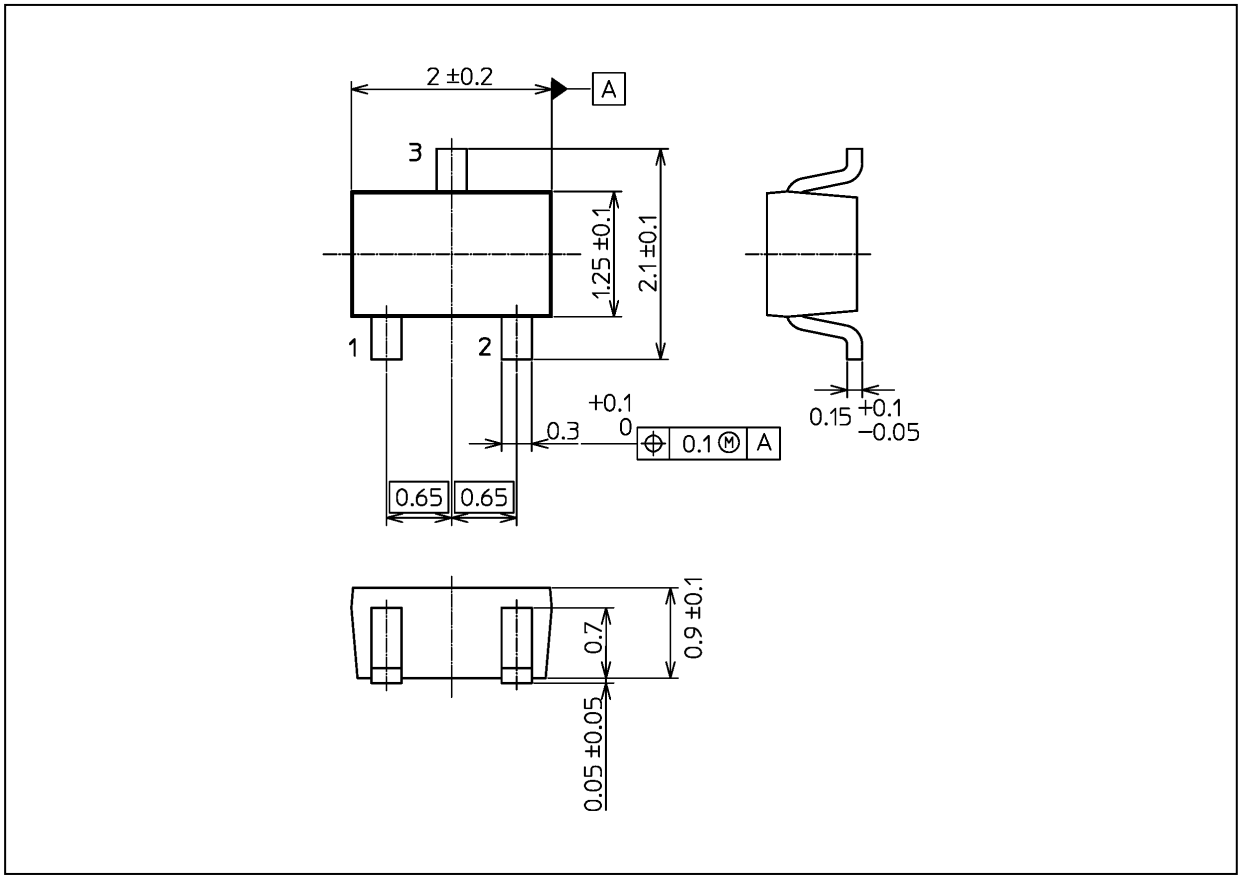


Fig. 9.8 RN2311 $V_{CE(sat)}$-I_C

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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