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

RN1410,RN1411

1. Applications

- Switching
- Inverter Circuits
- Interfacing
- Driver Circuits

2. Features

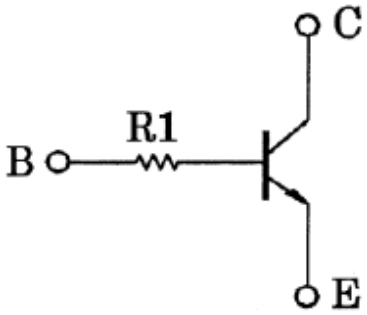
(1) AEC-Q101 qualified (Please see the orderable part number list)

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

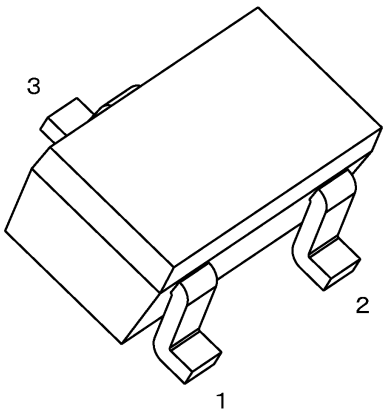
(3) Toshiba offers transistors with a wide range of resistance to accommodate various circuit designs.

(4) Complementary to RN2410,RN2411

3. Equivalent Circuit



4. Packaging and Pin Assignment



1: Base
2: Emitter
3: Collector

S-Mini

Start of commercial production
1985-05

5. Orderable part number

Orderable part number		AEC-Q101	Note	Note	
RN1410	RN1410,LF	—		General Use	
	RN1410,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN1410,LXHF	YES		Automotive Use	
RN1411	RN1411,LF	—		General Use	
	RN1411,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN1411LXHF	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	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).

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	
DC current gain		h_{FE}	V_{CE} = 5 V, I_C = 1 mA	120	—	700	—
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	—	250	—	MHz
Collector output capacitance		C_{ob}	V_{CB} = 10 V, I_E = 0 mA, f = 1 MHz	—	3	6	pF
Input resistance	RN1410	R_1	-	3.29	4.7	6.11	kΩ
	RN1411			7	10	13	

8. Marking

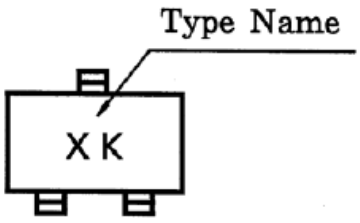


Fig. 8.1 Marking RN1410

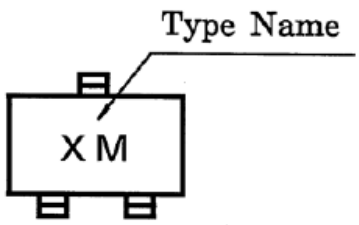


Fig. 8.2 Marking RN1411

9. Characteristics Curves (Note)

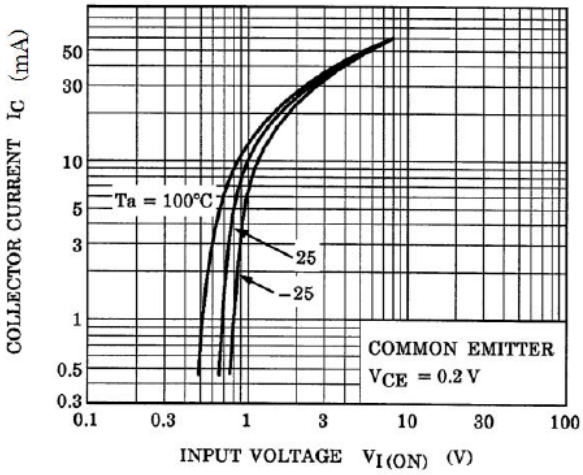


Fig. 9.1 RN1410 I_C-$V_{I(ON)}$

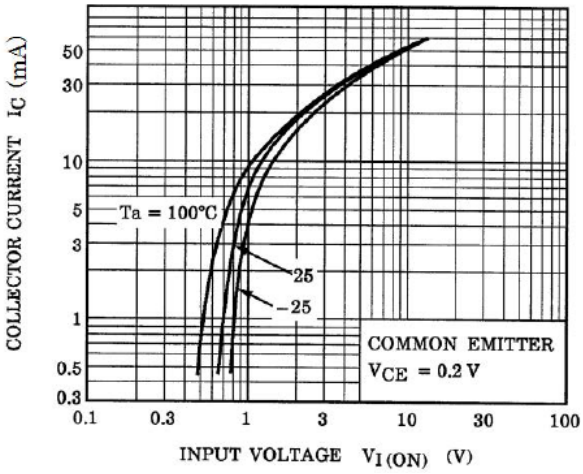


Fig. 9.2 RN1411 I_C-$V_{I(ON)}$

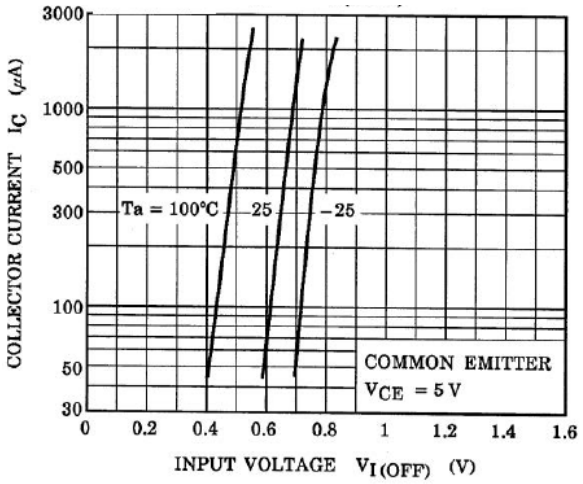


Fig. 9.3 RN1410 I_C-$V_{I(OFF)}$

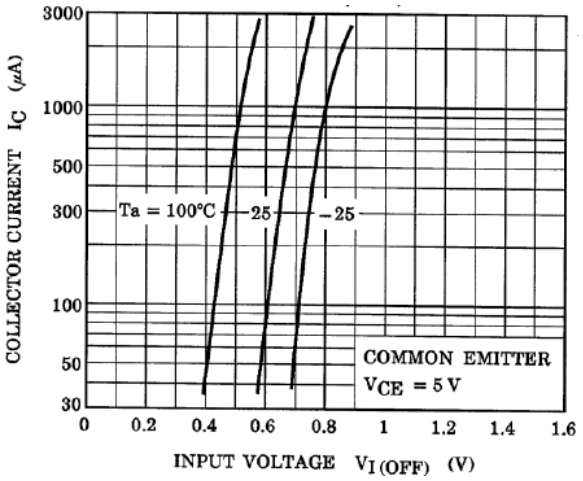


Fig. 9.4 RN1411 I_C-$V_{I(OFF)}$

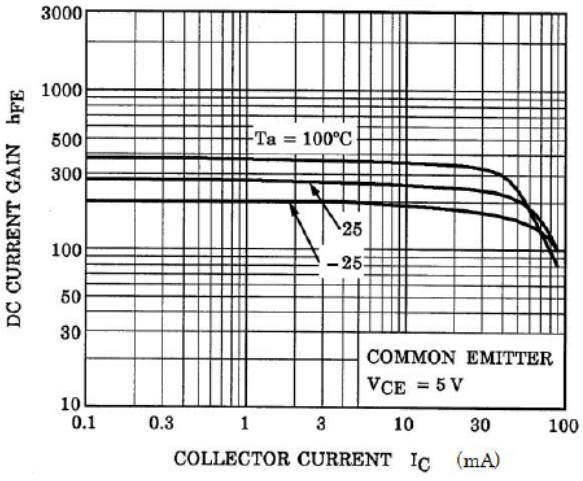


Fig. 9.5 RN1410 h_{FE}-I_C

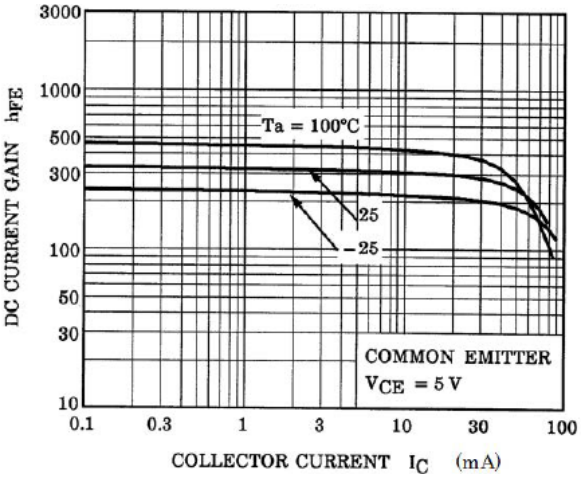


Fig. 9.6 RN1411 h_{FE}-I_C

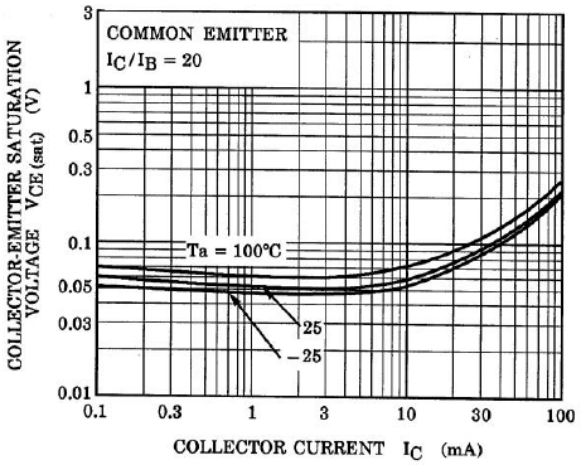


Fig. 9.7 RN1410 $V_{CE(sat)}$-I_C

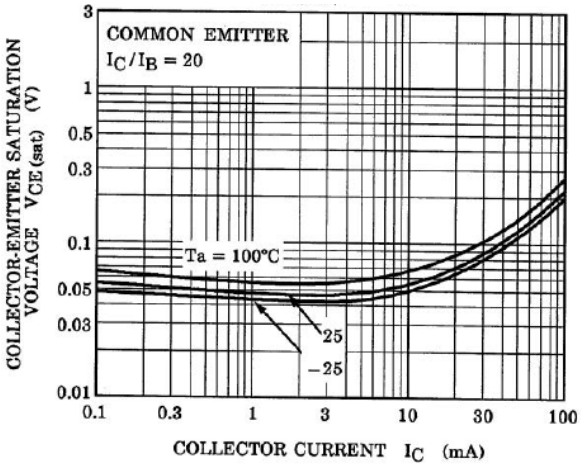
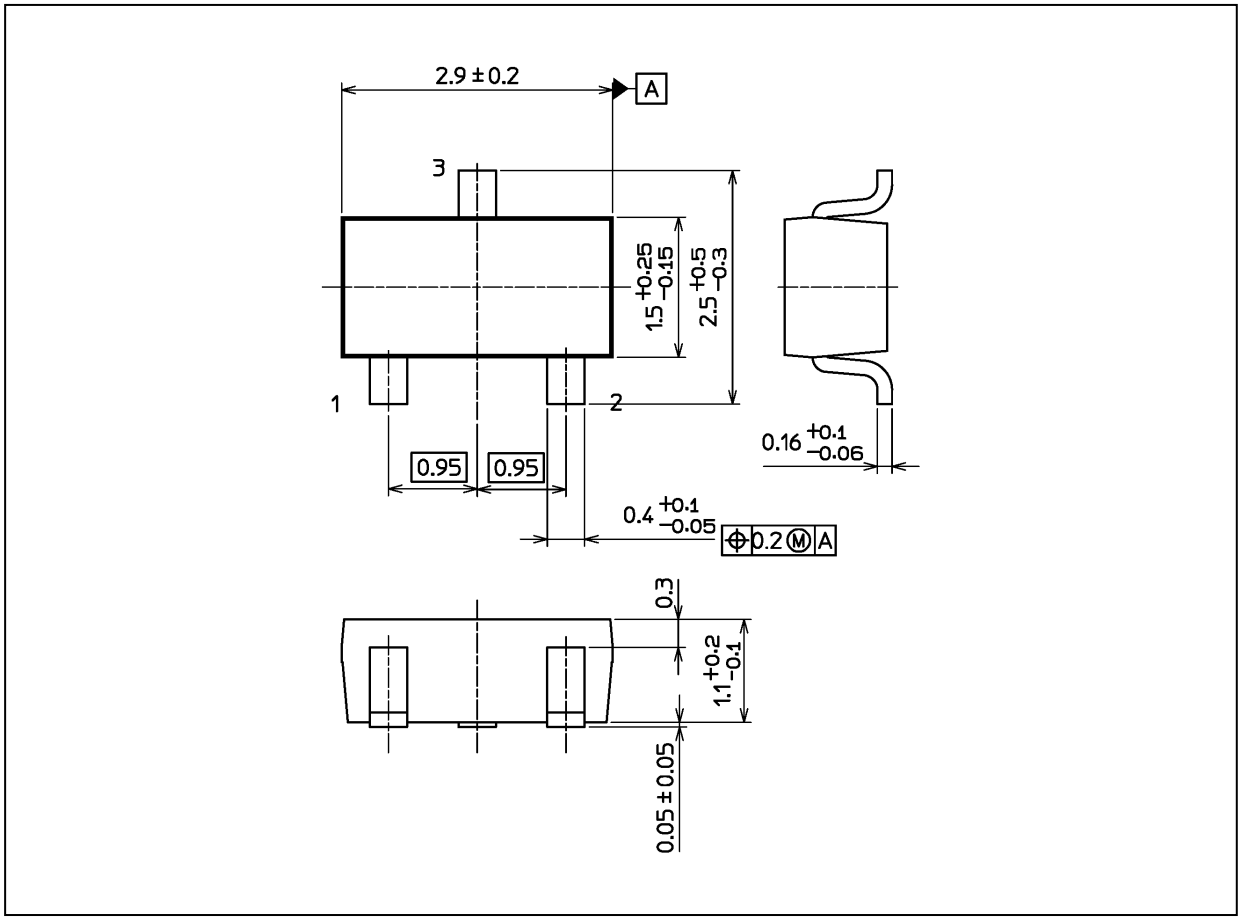


Fig. 9.8 RN1411 $V_{CE(sat)}$-I_C

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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