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

RN2101/02/03/04/05/06

1. Applications

- Switching
- Inverter Circuits
- Interfacing
- Driver Circuits

2. Features

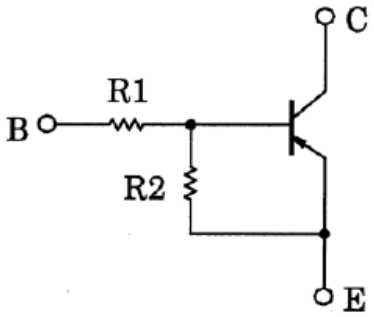
(1) AEC-Q101 qualified (Please see the orderable part number list)

(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 RN1101 to RN1106

3. Equivalent Circuit



4. Bias Resistor Values

Part No.	R1 (kΩ)	R2 (kΩ)
RN2101	4.7	4.7
RN2102	10	10
RN2103	22	22
RN2104	47	47
RN2105	2.2	47
RN2106	4.7	47

Start of commercial production
1990-12

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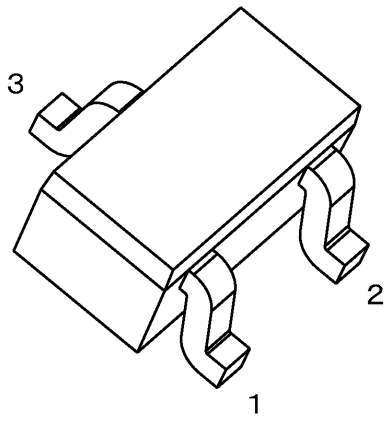
5. Packaging and Pin Assignment



1: Base
2: Emitter
3: Collector

SSM

6. Orderable part number

Orderable part number		AEC-Q101	Note	Note	
RN2101	RN2101,LF	—		General Use	
	RN2101,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN2101,LXHF	YES		Automotive Use	
RN2102	RN2102,LF	—		General Use	
	RN2102,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN2102,LXHF	YES		Automotive Use	
RN2103	RN2103,LF	—		General Use	
	RN2103,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN2103,LXHF	YES		Automotive Use	
RN2104	RN2104,LF	—		General Use	
	RN2104,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN2104,LXHF	YES		Automotive Use	
RN2105	RN2105,LF	—		General Use	
	RN2105,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN2105,LXHF	YES		Automotive Use	
RN2106	RN2106,LF	—		General Use	
	RN2106,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN2106,LXHF	YES		Automotive Use	

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

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7. Absolute Maximum Ratings (Note) (Unless otherwise specified, T_a = 25 °C)

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN2101 to RN2106	V_{CBO}	-50	V
Collector-emitter voltage		V_{CEO}	-50	
Emitter-base voltage	RN2101 to RN2104	V_{EBO}	-10	
	RN2105,RN2106		-5	
Collector current	RN2101 to RN2106	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).

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2101 to RN2106	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	RN2101	I_{EBO}	V_{EB} = -10 V, I_C = 0 mA	-0.82	—	-1.52	mA
	RN2102			-0.38	—	-0.71	
	RN2103			-0.17	—	-0.33	
	RN2104			-0.082	—	-0.15	
	RN2105		V_{EB} = -5 V, I_C = 0 mA	-0.078	—	-0.145	
	RN2106			-0.074	—	-0.138	
DC current gain	RN2101	h_{FE}	V_{CE} = -5 V, I_C = -10 mA	30	—	—	—
	RN2102			50	—	—	
	RN2103			70	—	—	
	RN2104			80	—	—	
	RN2105			80	—	—	
	RN2106			80	—	—	
Collector-emitter saturation voltage	RN2101 to RN2106	$V_{CE(sat)}$	I_C = -5 mA, I_B = -0.25 mA	—	-0.1	-0.3	V
Input voltage (ON)	RN2101	$V_{I(ON)}$	V_{CE} = -0.2 V, I_C = -5 mA	-1.1	—	-2.0	
	RN2102			-1.2	—	-2.4	
	RN2103			-1.3	—	-3.0	
	RN2104			-1.5	—	-5.0	
	RN2105			-0.6	—	-1.1	
	RN2106			-0.7	—	-1.3	
Input voltage (OFF)	RN2101 to RN2104	$V_{I(OFF)}$	V_{CE} = -5 V, I_C = -0.1 mA	-1.0	—	-1.5	
	RN2105,RN2106			-0.5	—	-0.8	
Transition frequency	RN2101 to RN2106	f_T	V_{CE} = -10 V, I_C = -5 mA	—	200	—	MHz
Collector output capacitance	RN2101 to RN2106	C_{ob}	V_{CB} = -10 V, I_E = 0 mA, f = 1 MHz	—	3	6	pF
Input resistance	RN2101	R_1	—	3.29	4.7	6.11	kΩ
	RN2102			7	10	13	
	RN2103			15.4	22	28.6	
	RN2104			32.9	47	61.1	
	RN2105			1.54	2.2	2.86	
	RN2106			3.29	4.7	6.11	
Resistor ratio	RN2101 to RN2104	R1/R2	—	0.9	1.0	1.1	—
	RN2105			0.0421	0.0468	0.0515	
	RN2106			0.09	0.1	0.11	

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9. Marking

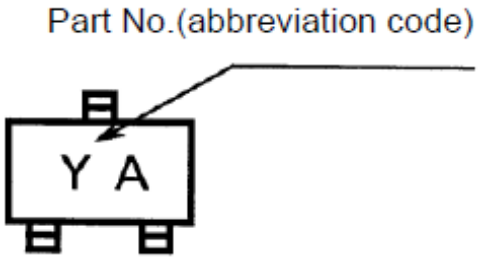

Fig. 9.1 Marking RN2101

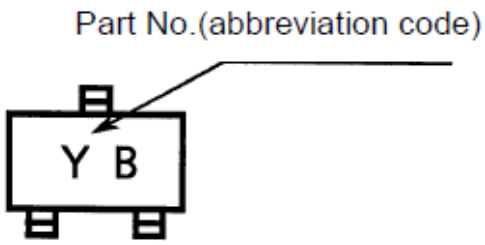

Fig. 9.2 Marking RN2102

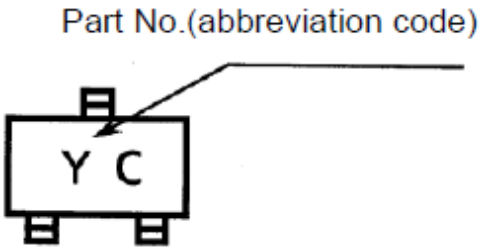

Fig. 9.3 Marking RN2103

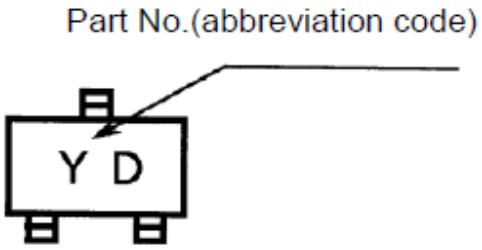

Fig. 9.4 Marking RN2104

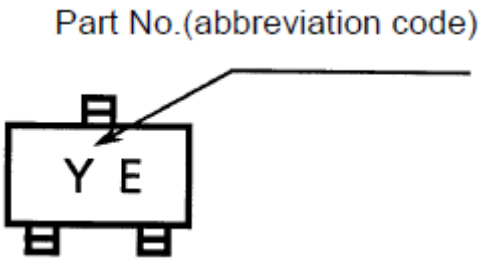

Fig. 9.5 Marking RN2105

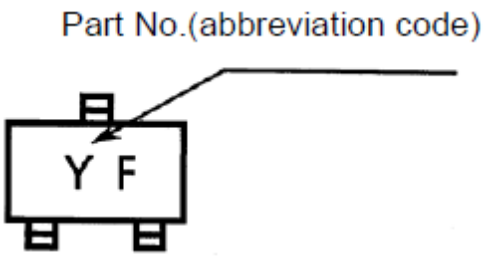

Fig. 9.6 Marking RN2106

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10. Characteristics Curves (Note)

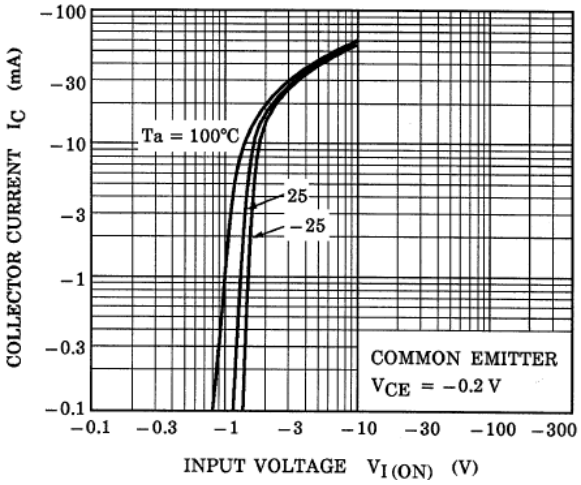

Fig. 10.1 RN2101 I_C-$V_{I(ON)}$

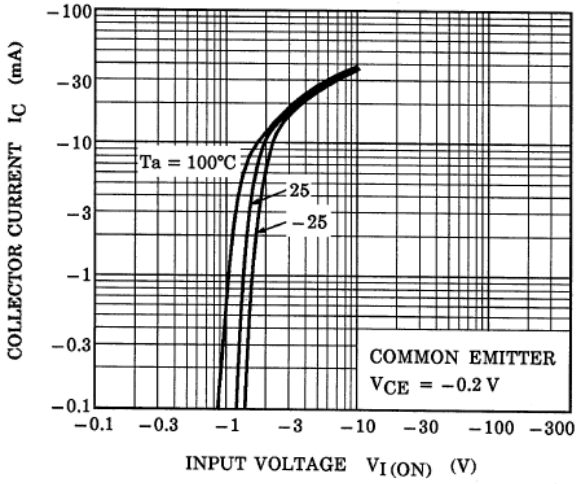

Fig. 10.2 RN2102 I_C-$V_{I(ON)}$

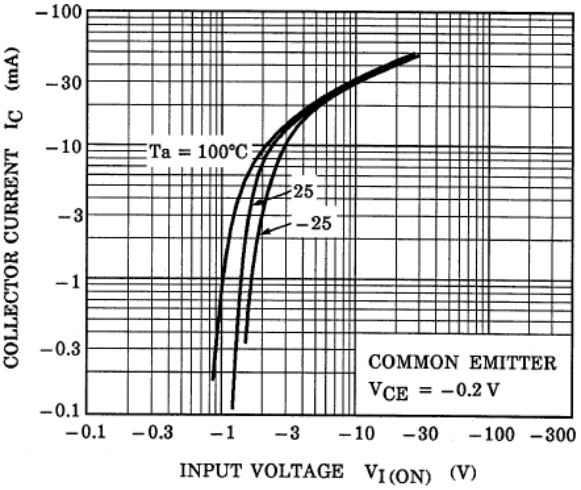

Fig. 10.3 RN2103 I_C-$V_{I(ON)}$

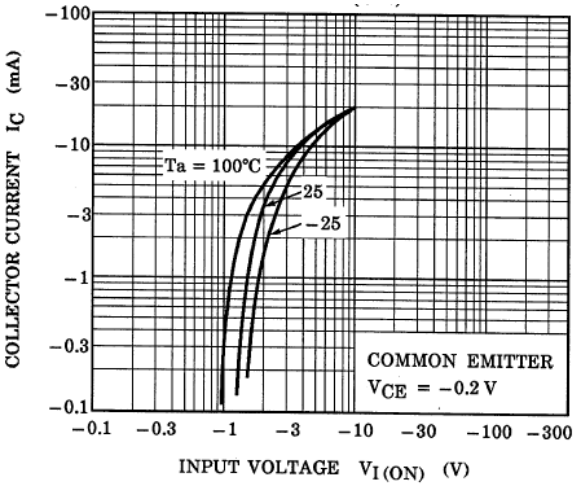

Fig. 10.4 RN2104 I_C-$V_{I(ON)}$

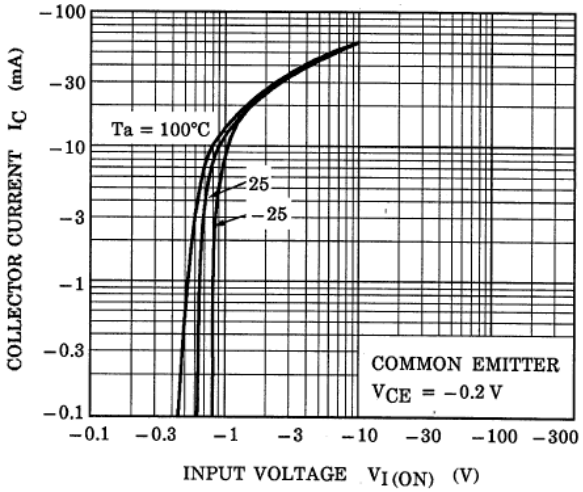

Fig. 10.5 RN2105 I_C-$V_{I(ON)}$

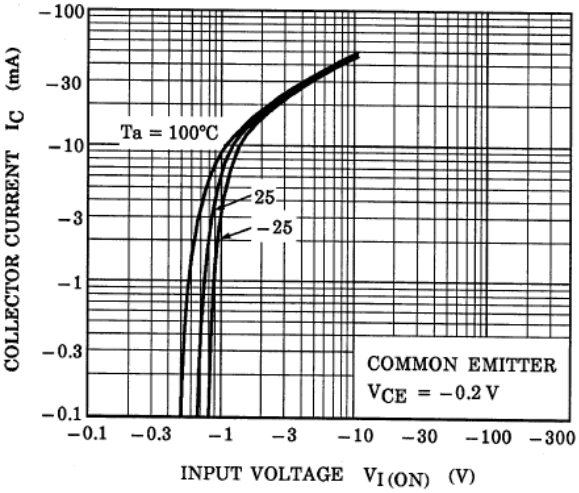

Fig. 10.6 RN2106 I_C-$V_{I(ON)}$

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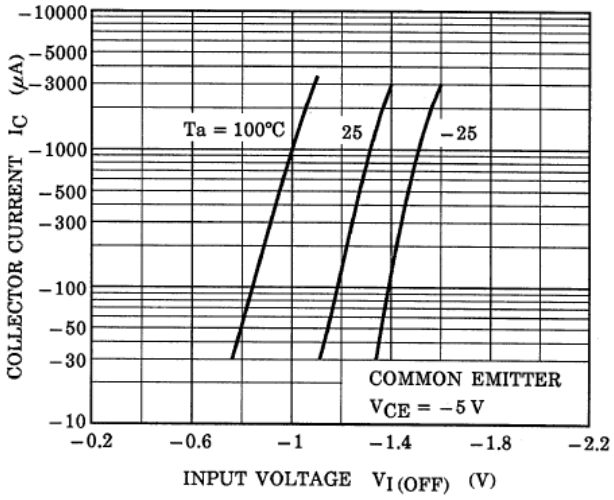

Fig. 10.7 RN2101 I_C-$V_{I(OFF)}$

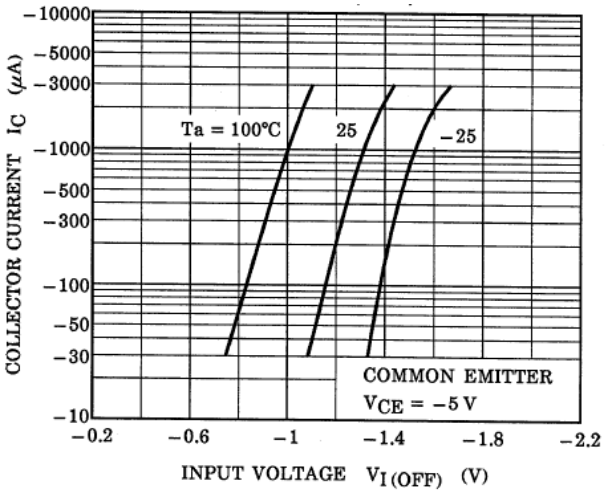

Fig. 10.8 RN2102 I_C-$V_{I(OFF)}$

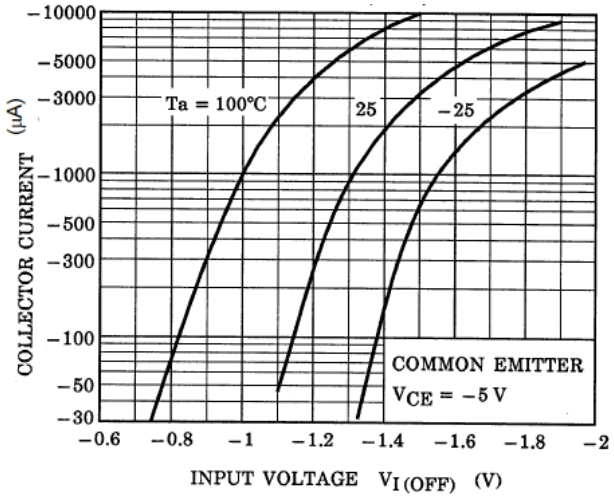

Fig. 10.9 RN2103 I_C-$V_{I(OFF)}$

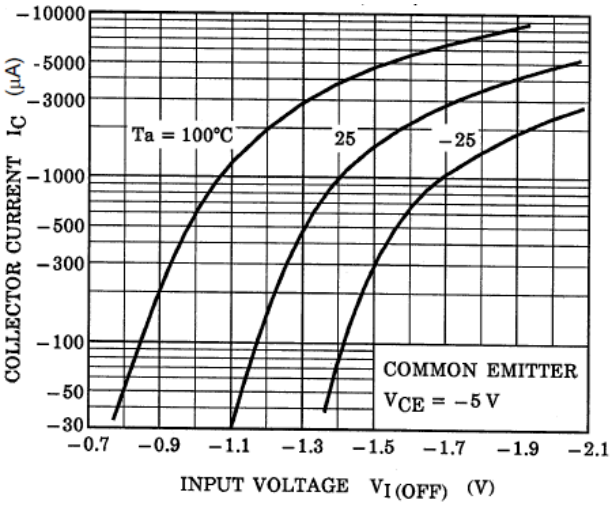

Fig. 10.10 RN2104 I_C-$V_{I(OFF)}$

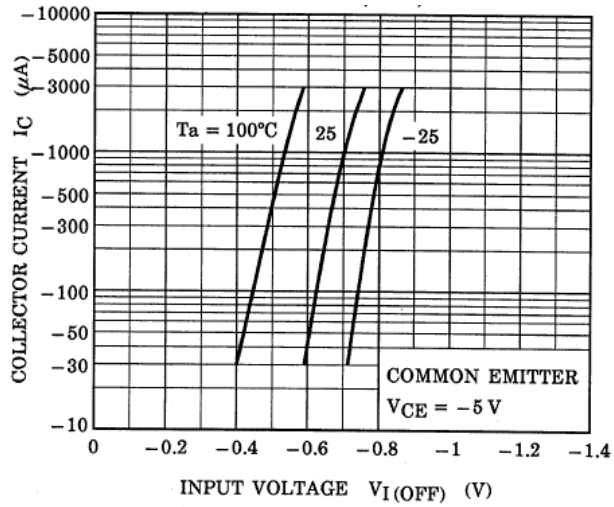

Fig. 10.11 RN2105 I_C-$V_{I(OFF)}$

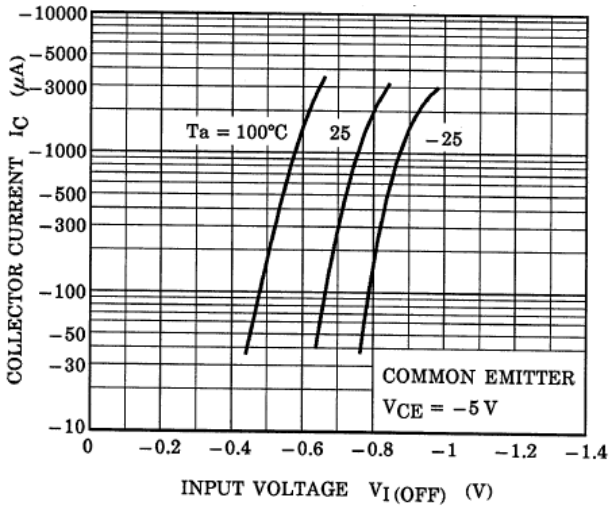

Fig. 10.12 RN2106 I_C-$V_{I(OFF)}$

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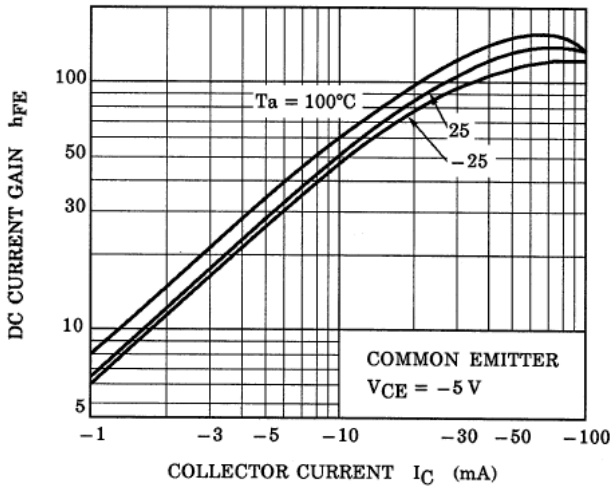

Fig. 10.13 RN2101 h_{FE}-I_C

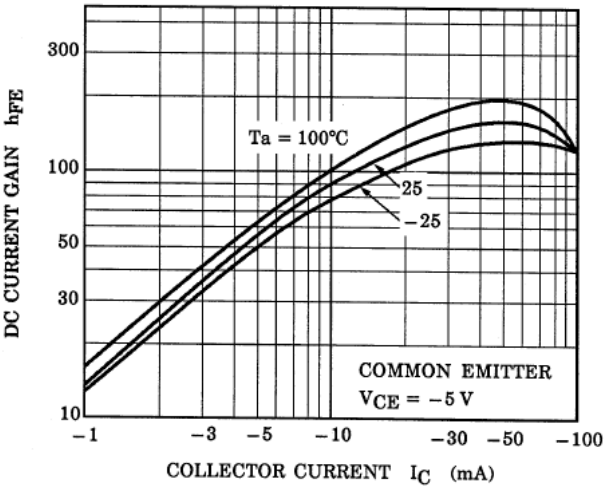

Fig. 10.14 RN2102 h_{FE}-I_C

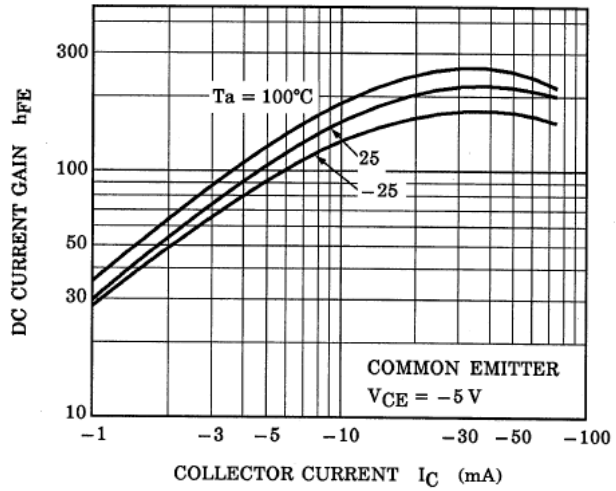

Fig. 10.15 RN2103 h_{FE}-I_C

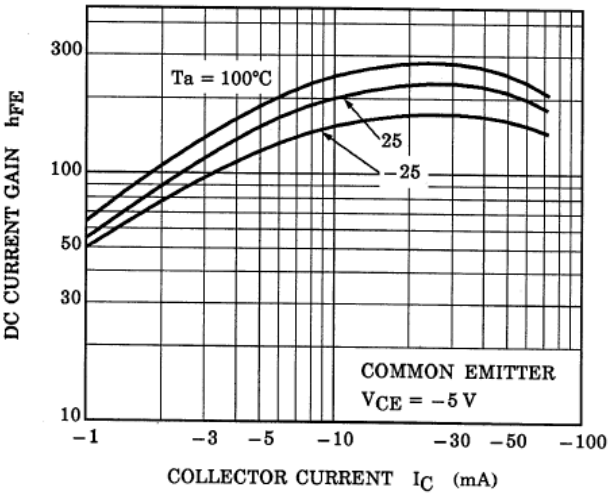

Fig. 10.16 RN2104 h_{FE}-I_C

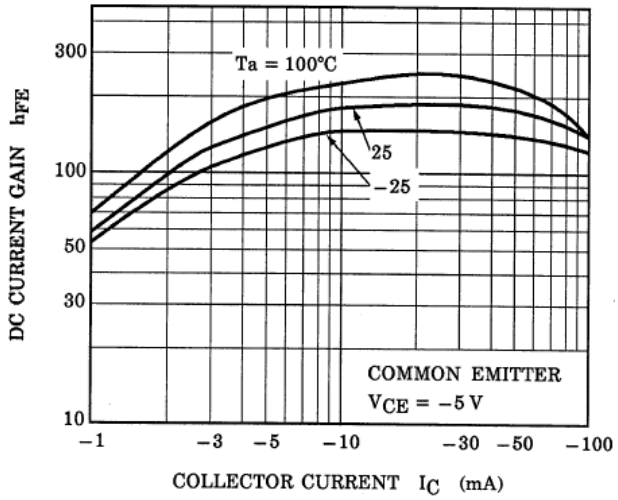

Fig. 10.17 RN2105 h_{FE}-I_C

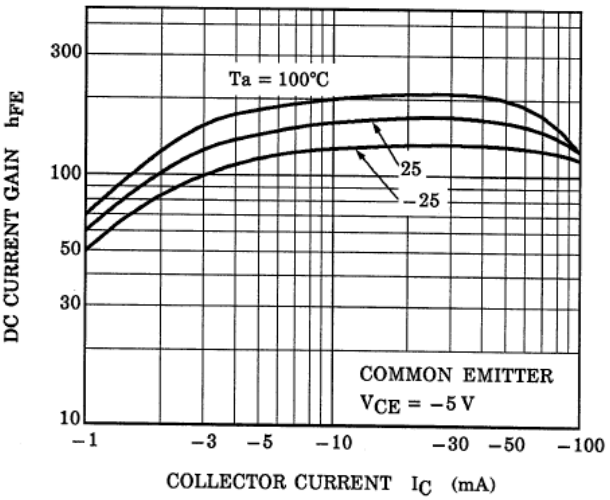

Fig. 10.18 RN2106 h_{FE}-I_C

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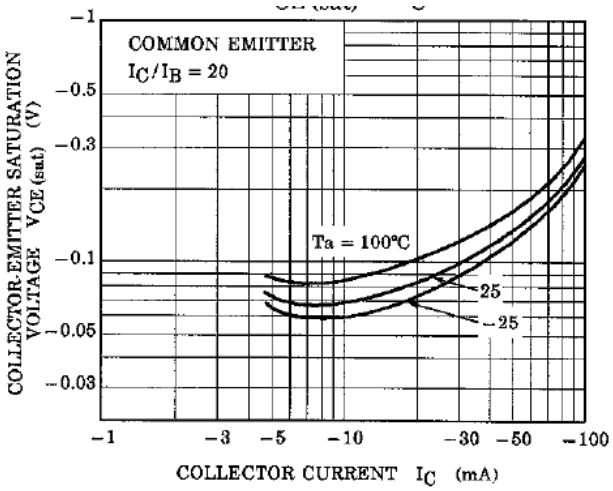

Fig. 10.19 RN2101 $V_{CE(sat)}$-I_C

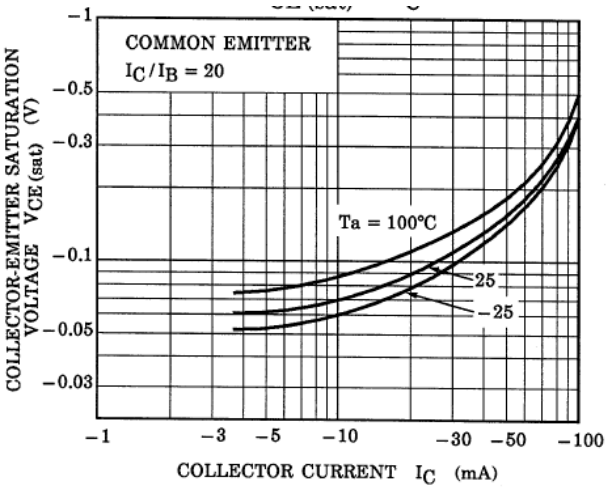

Fig. 10.20 RN2102 $V_{CE(sat)}$-I_C

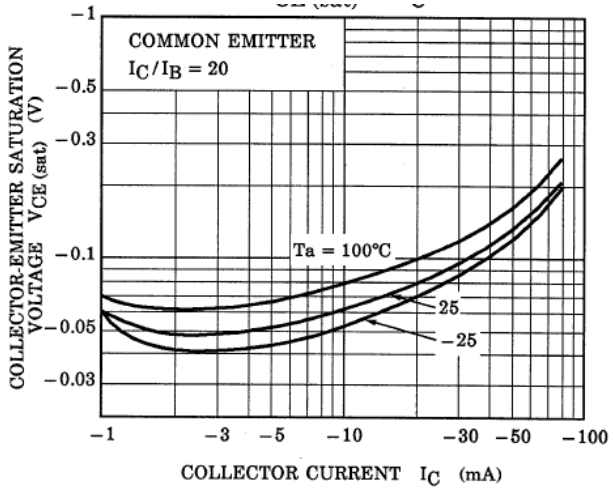

Fig. 10.21 RN2103 $V_{CE(sat)}$-I_C

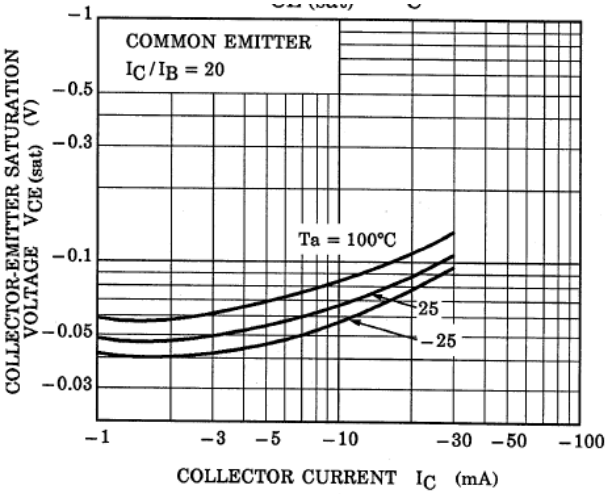

Fig. 10.22 RN2104 $V_{CE(sat)}$-I_C

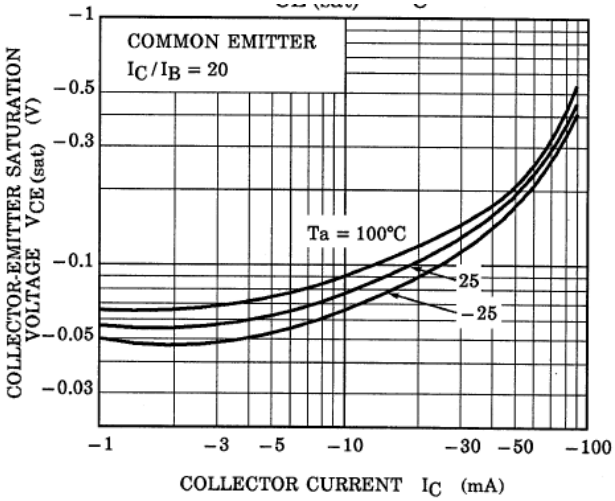

Fig. 10.23 RN2105 $V_{CE(sat)}$-I_C

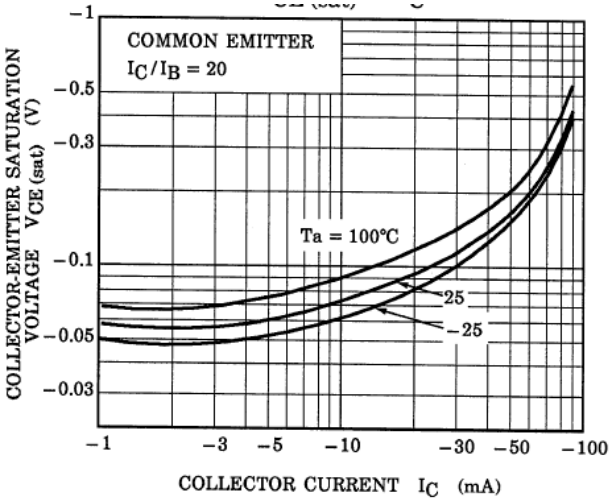

Fig. 10.24 RN2106 $V_{CE(sat)}$-I_C

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

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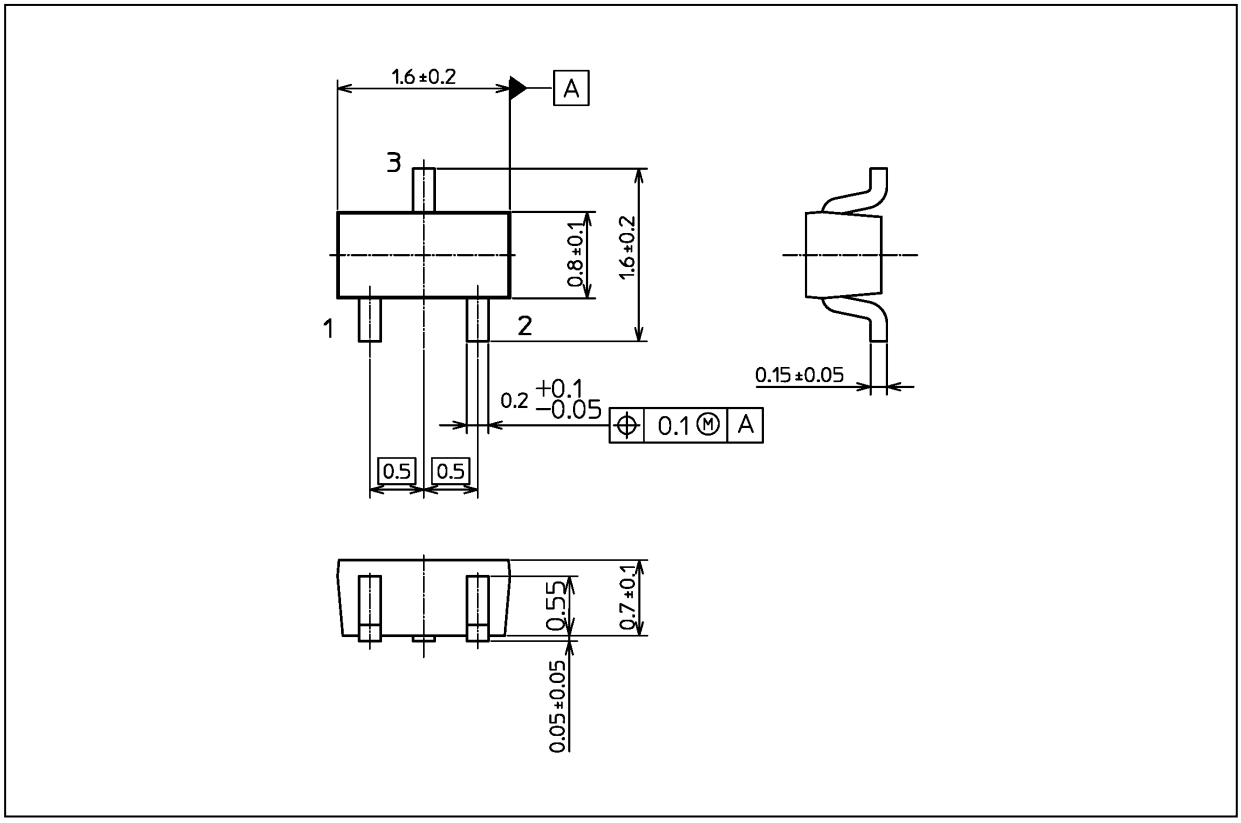
Package Dimensions

Unit: mm



Weight: 2.4 mg (typ.)

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

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