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

RN2901/02/03/04/05/06

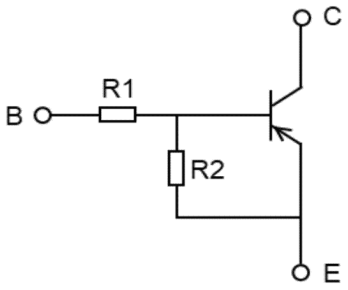
1. Applications

- Switching
- Inverter Circuits
- Interfacing
- Driver Circuits

2. Features

(1) AEC-Q101 qualified
(2) Small package (Dual type)
(3) The integrated bias resistor reduces the number of external parts required, making it possible to reduce system size and assembly time.
(4) Toshiba offers transistors with a wide range of resistance to accommodate various circuit designs.
(5) Complementary to RN1901 to RN1906

3. Equivalent Circuit



4. Bias Resistor Values

Part No.	R1 (kΩ)	R2 (kΩ)
RN2901	4.7	4.7
RN2902	10	10
RN2903	22	22
RN2904	47	47
RN2905	2.2	47
RN2906	4.7	47

Start of commercial production
1990-12

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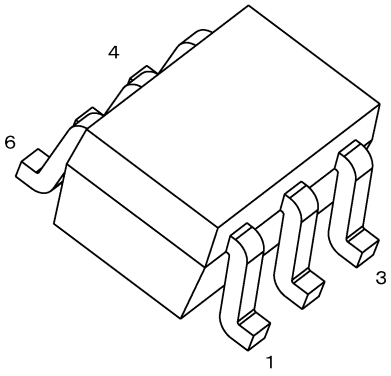
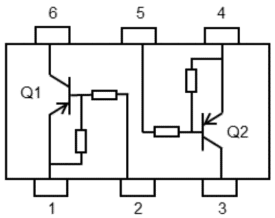
5. Packaging and Pin Assignment



US6



1: Emitter1
2: Base1
3: Collector2
4: Emitter2
5: Base2
6: Collector1

6. Absolute Maximum Ratings (Note) (Unless otherwise specified, T_a = 25 °C) (Q1, Q2 Common)

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN2901 to RN2906	V_{CBO}	-50	V
Collector-emitter voltage		V_{CEO}	-50	
Emitter-base voltage	RN2901 to RN2904	V_{EBO}	-10	V
	RN2905,RN2906		-5	
Collector current	RN2901 to RN2906	I_C	-100	mA
Collector power dissipation (Note 1)		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).

Note 1: Total rating

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7. Electrical Characteristics (Unless otherwise specified, T_a = 25 °C) (Q1, Q2 Common)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2901 to RN2906	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	RN2901	I_{EBO}	V_{EB} = -10 V, I_C = 0 mA	-0.82	—	-1.52	mA
	RN2902			-0.38	—	-0.71	
	RN2903			-0.17	—	-0.33	
	RN2904			-0.082	—	-0.15	
	RN2905		V_{EB} = -5 V, I_C = 0 mA	-0.078	—	-0.145	
	RN2906			-0.074	—	-0.138	
DC current gain	RN2901	h_{FE}	V_{CE} = -5 V, I_C = -10 mA	30	—	—	—
	RN2902			50	—	—	
	RN2903			70	—	—	
	RN2904			80	—	—	
	RN2905			80	—	—	
	RN2906			80	—	—	
Collector-emitter saturation voltage	RN2901 to RN2906	$V_{CE(sat)}$	I_C = -5 mA, I_B = -0.25 mA	—	-0.1	-0.3	V
Input voltage (ON)	RN2901	$V_{I(ON)}$	V_{CE} = -0.2 V, I_C = -5 mA	-1.1	—	-2.0	V
	RN2902			-1.2	—	-2.4	
	RN2903			-1.3	—	-3.0	
	RN2904			-1.5	—	-5.0	
	RN2905			-0.6	—	-1.1	
	RN2906			-0.7	—	-1.3	
Input voltage (OFF)	RN2901 to RN2904	$V_{I(OFF)}$	V_{CE} = -5 V, I_C = -0.1 mA	-1.0	—	-1.5	V
	RN2905, RN2906			-0.5	—	-0.8	
Transition frequency	RN2901 to RN2906	f_T	V_{CE} = -10 V, I_C = -5 mA	—	200	—	MHz
Collector output capacitance	RN2901 to RN2906	C_{ob}	V_{CB} = -10 V, I_E = 0 mA, f = 1 MHz	—	3	6	pF
Input resistance	RN2901	R_1	-	3.29	4.7	6.11	kΩ
	RN2902			7	10	13	
	RN2903			15.4	22	28.6	
	RN2904			32.9	47	61.1	
	RN2905			1.54	2.2	2.86	
	RN2906			3.29	4.7	6.11	
Resistor ratio	RN2901 to RN2904	R1/R2	-	0.9	1.0	1.1	—
	RN2905			0.0421	0.0468	0.0515	
	RN2906			0.09	0.1	0.11	

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8. Marking

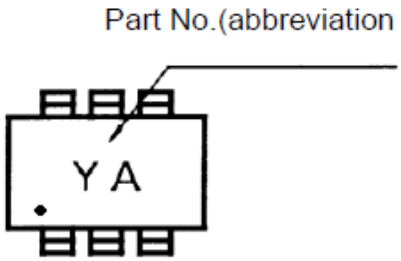

Fig. 8.1 Marking RN2901

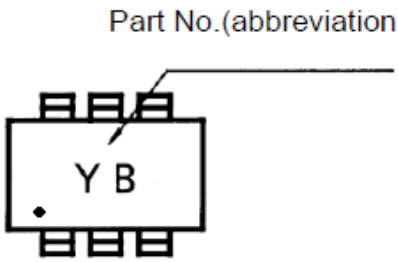

Fig. 8.2 Marking RN2902

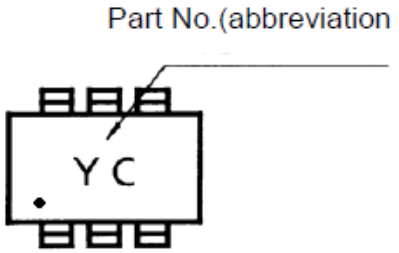

Fig. 8.3 Marking RN2903

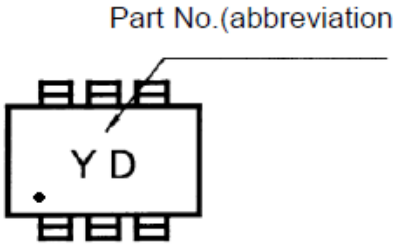

Fig. 8.4 Marking RN2904

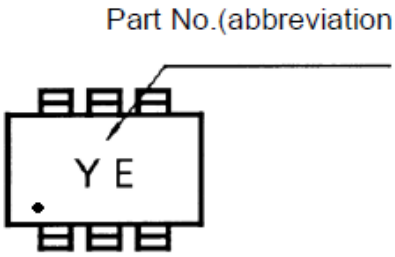

Fig. 8.5 Marking RN2905

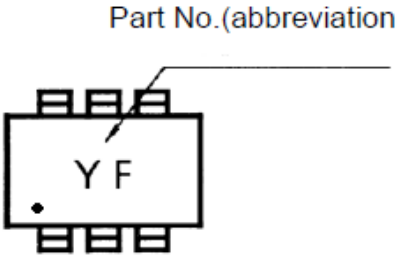

Fig. 8.6 Marking RN2906

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9. Characteristics Curves (Note)(Q1, Q2 Common)

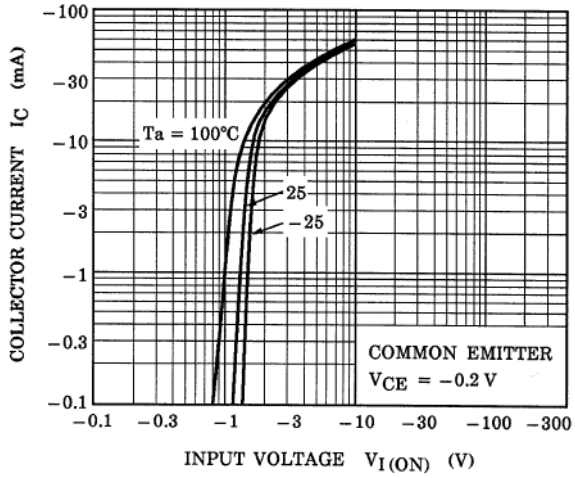

Fig. 9.1 RN2901 I_C-$V_{I(ON)}$

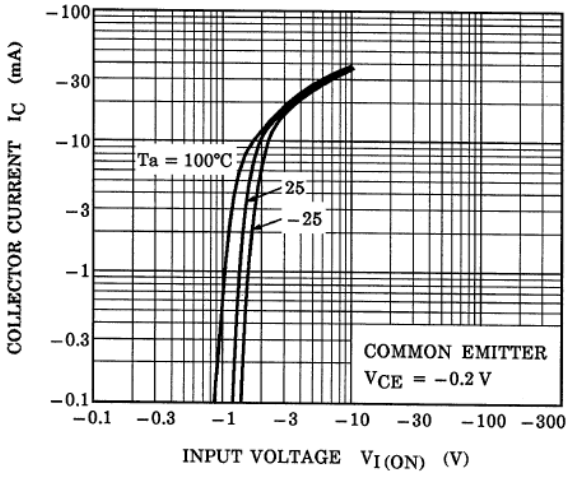

Fig. 9.2 RN2902 I_C-$V_{I(ON)}$

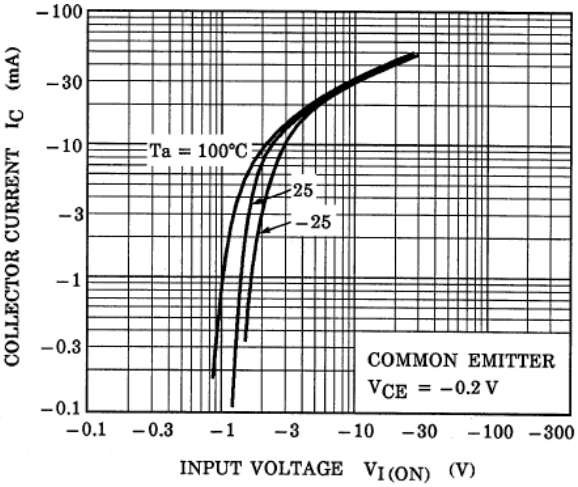

Fig. 9.3 RN2903 I_C-$V_{I(ON)}$

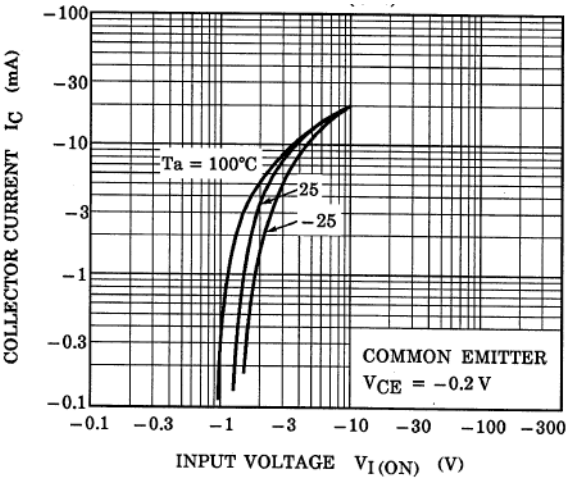

Fig. 9.4 RN2904 I_C-$V_{I(ON)}$

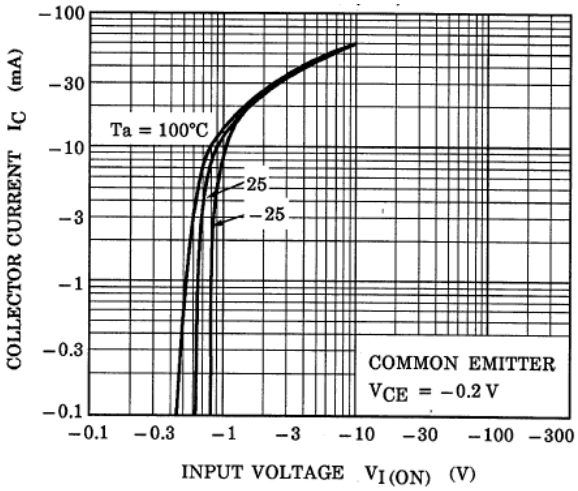

Fig. 9.5 RN2905 I_C-$V_{I(ON)}$

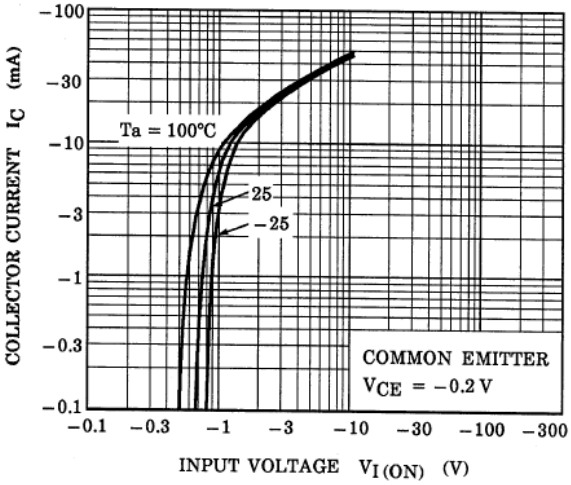

Fig. 9.6 RN2906 I_C-$V_{I(ON)}$

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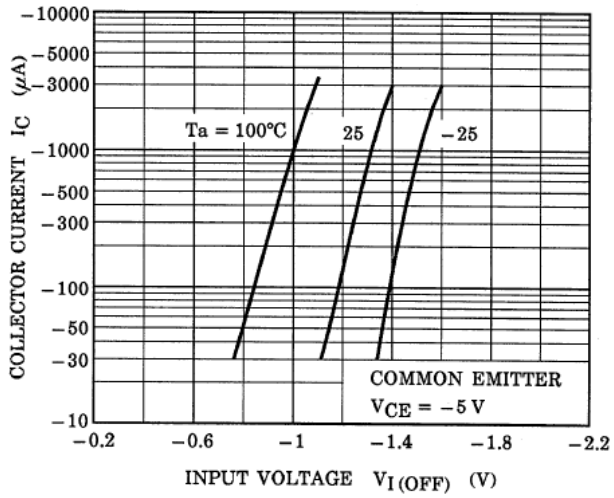

Fig. 9.7 RN2901 I_C-$V_{I(OFF)}$

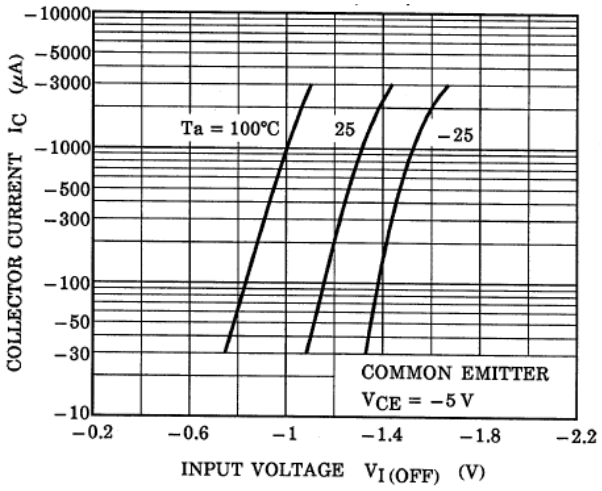

Fig. 9.8 RN2902 I_C-$V_{I(OFF)}$

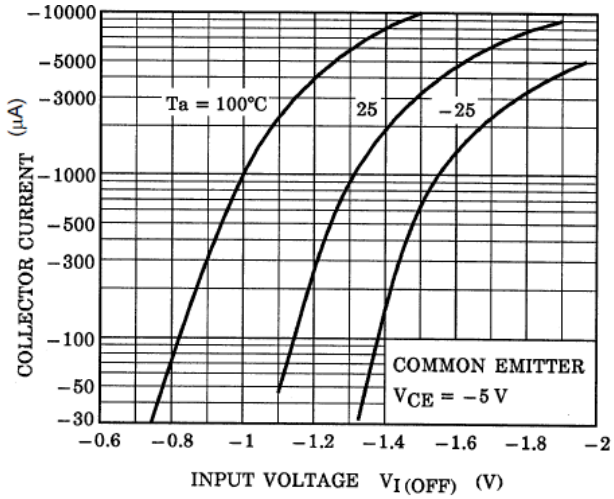

Fig. 9.9 RN2903 I_C-$V_{I(OFF)}$

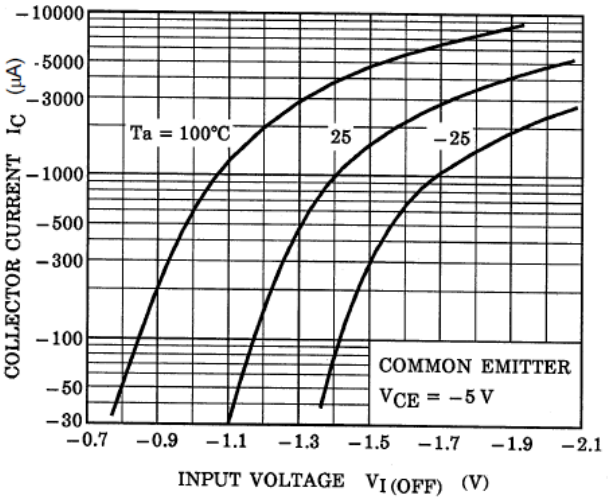

Fig. 9.10 RN2904 I_C-$V_{I(OFF)}$

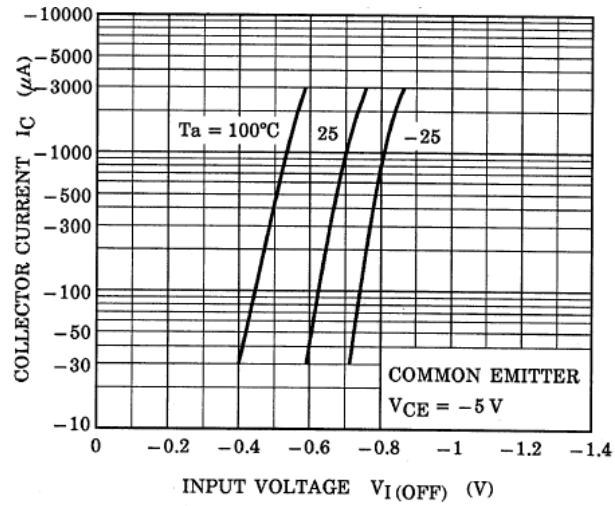

Fig. 9.11 RN2905 I_C-$V_{I(OFF)}$

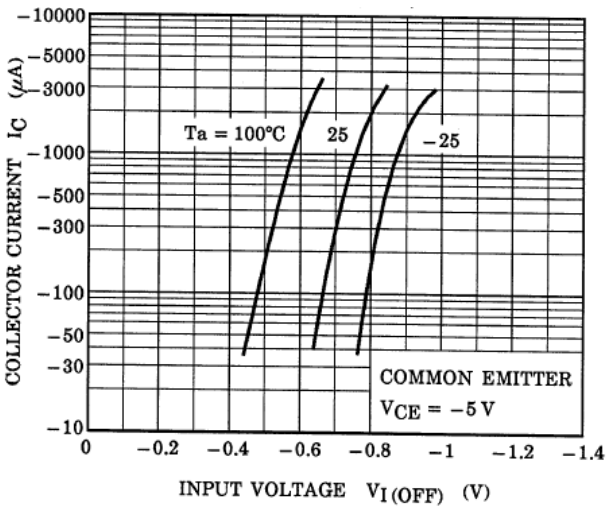

Fig. 9.12 RN2906 I_C-$V_{I(OFF)}$

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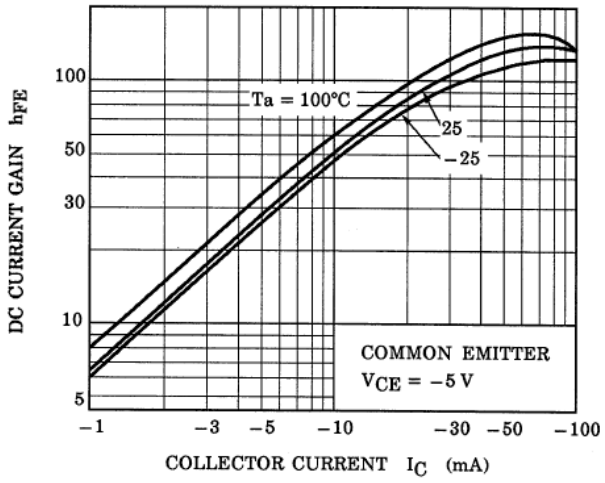

Fig. 9.13 RN2901 h_{FE}-I_C

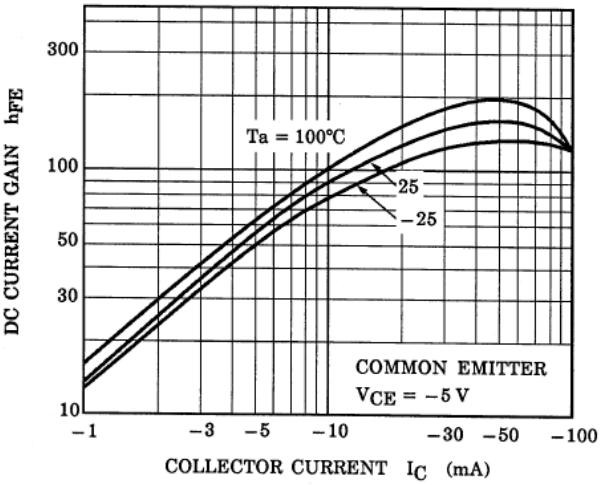

Fig. 9.14 RN2902 h_{FE}-I_C

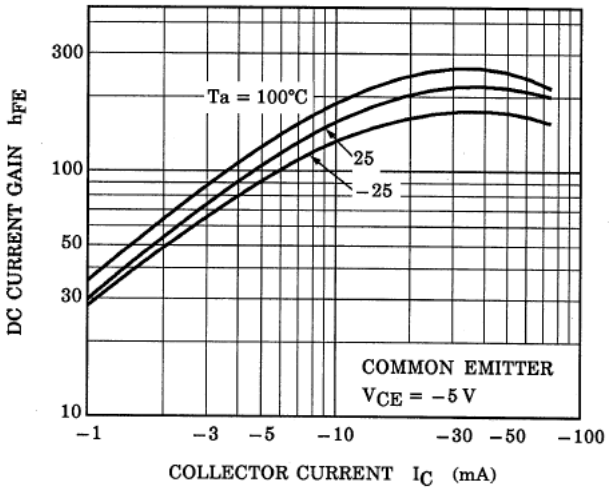

Fig. 9.15 RN2903 h_{FE}-I_C

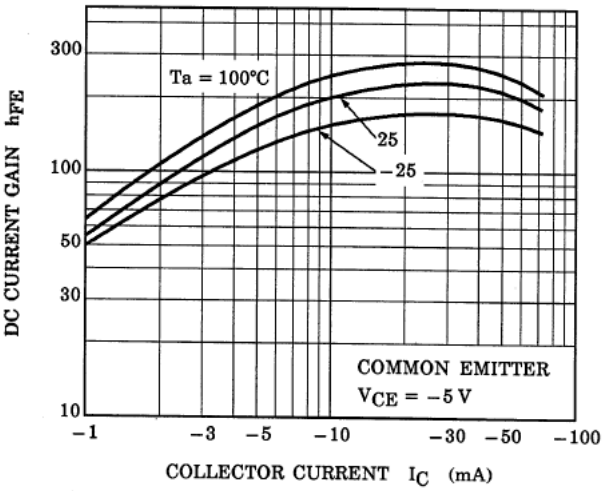

Fig. 9.16 RN2904 h_{FE}-I_C

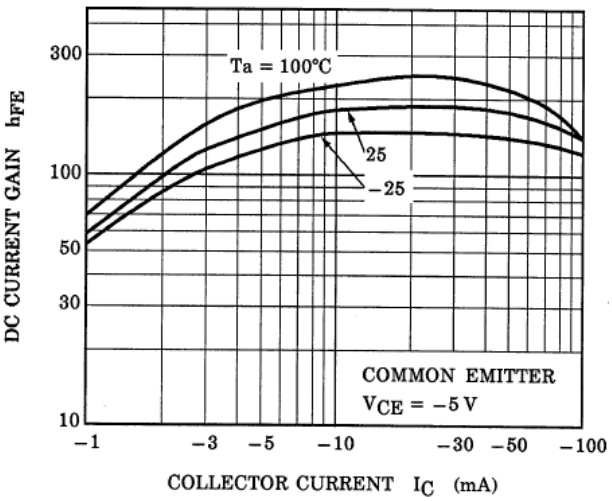

Fig. 9.17 RN2905 h_{FE}-I_C

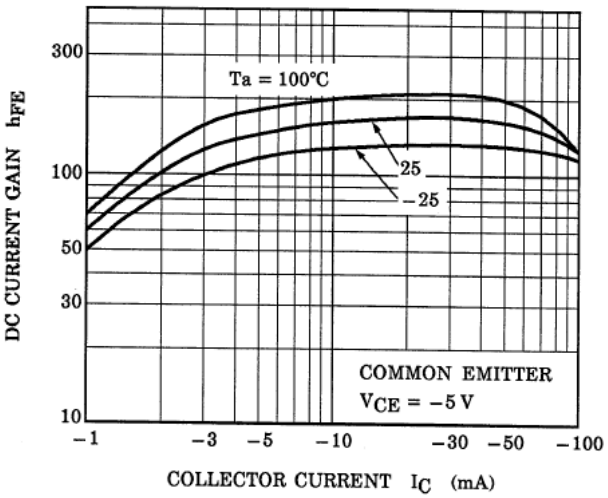

Fig. 9.18 RN2906 h_{FE}-I_C

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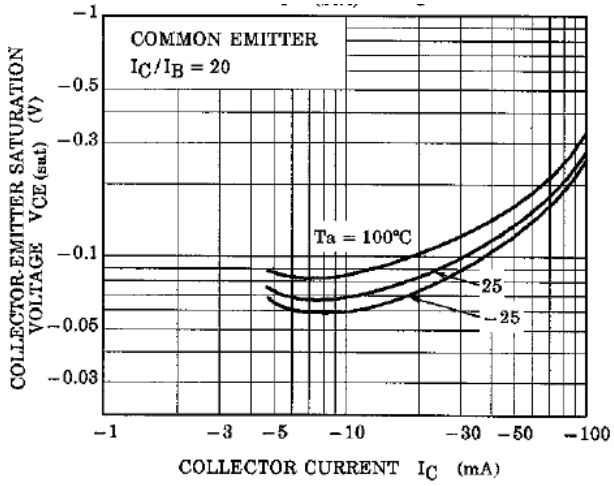

Fig. 9.19 RN2901 $V_{CE(sat)}$-I_C

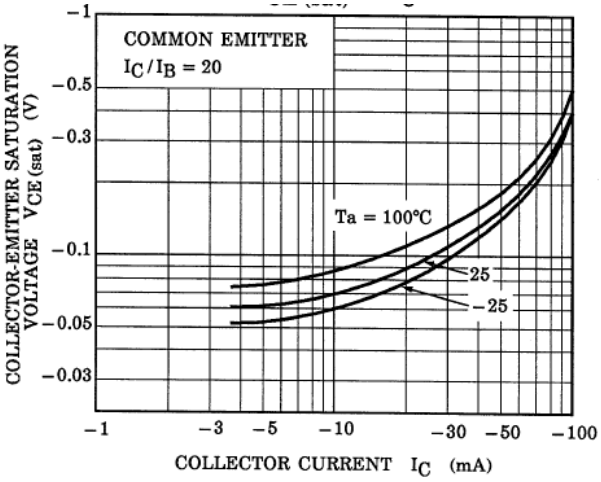

Fig. 9.20 RN2902 $V_{CE(sat)}$-I_C

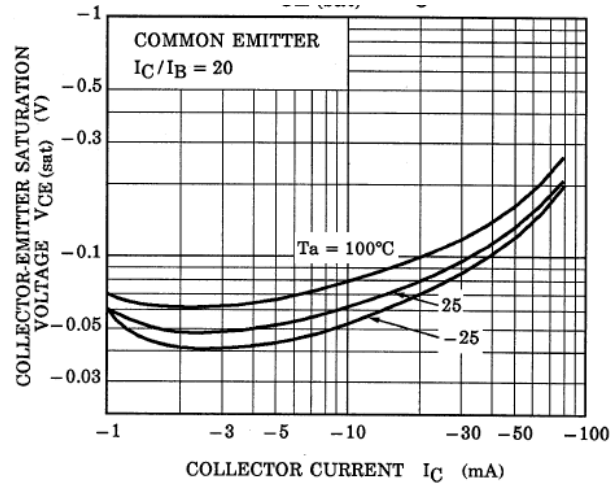

Fig. 9.21 RN2903 $V_{CE(sat)}$-I_C

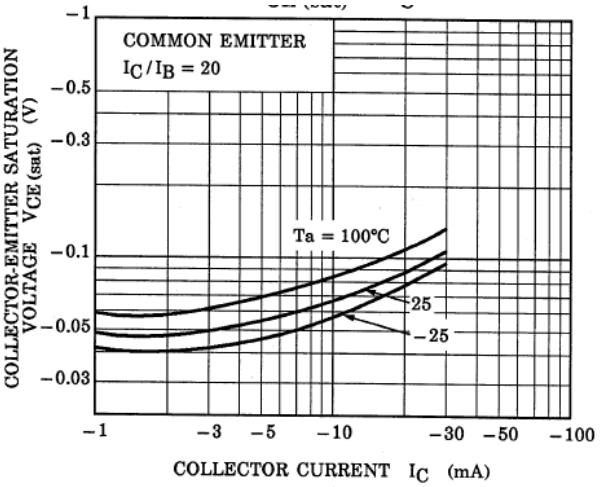

Fig. 9.22 RN2904 $V_{CE(sat)}$-I_C

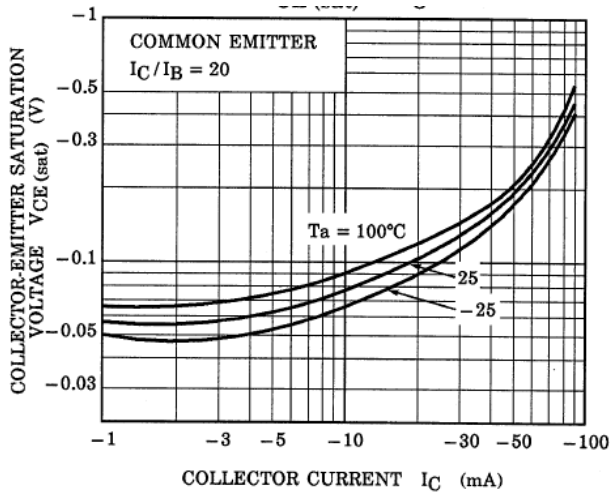

Fig. 9.23 RN2905 $V_{CE(sat)}$-I_C

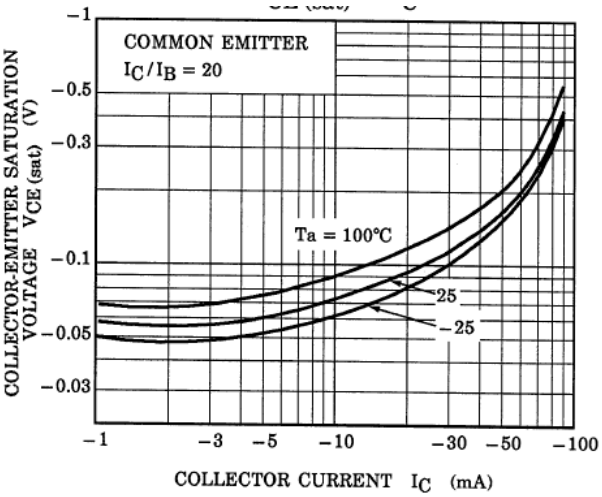

Fig. 9.24 RN1206 $V_{CE(sat)}$-I_C

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

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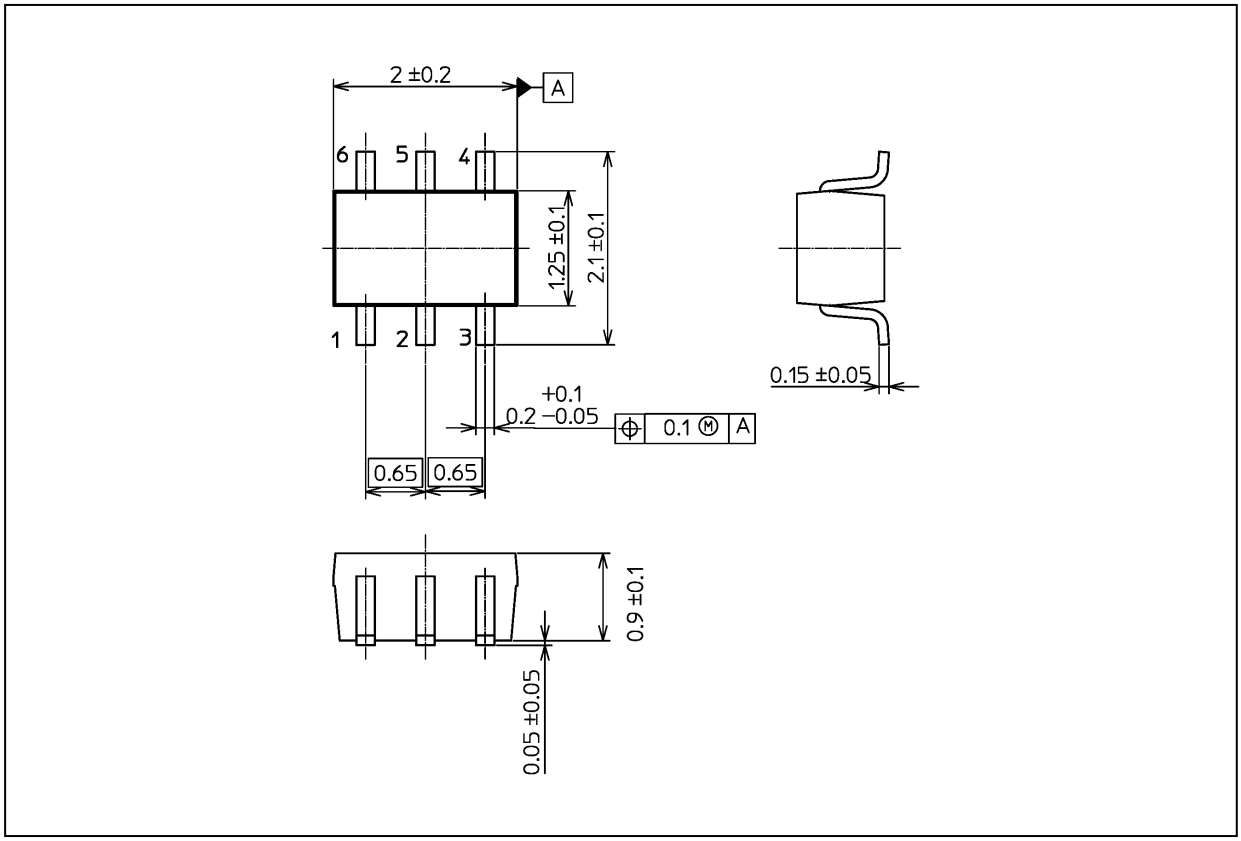
Package Dimensions

Unit: mm



Weight: 6.8 mg (typ.)

Package Name(s)
Nickname: US6

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