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

RN1901/02/03/04/05/06

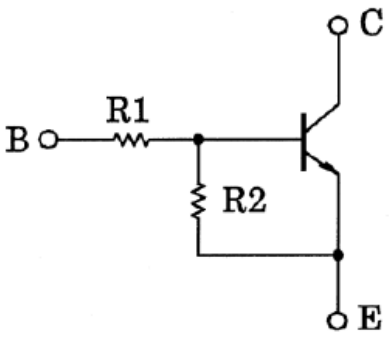
1. Applications

- Switching
- Inverter Circuits
- Interfacing
- Driver Circuits

2. Features

(1) AEC-Q101 qualified (Please see the orderable part number list)
(2) 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 RN2901 to RN2906

3. Equivalent Circuit

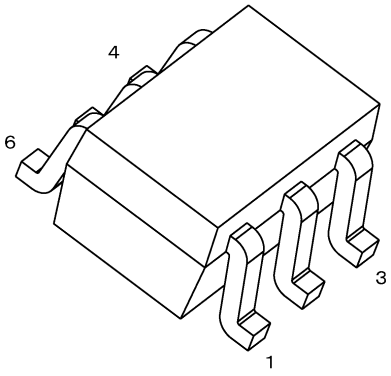


4. Bias Resistor Values

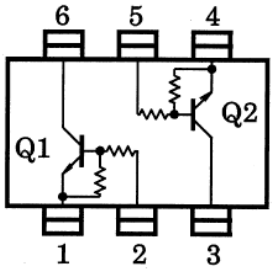
Part No.	R1 (kΩ)	R2 (kΩ)
RN1901	4.7	4.7
RN1902	10	10
RN1903	22	22
RN1904	47	47
RN1905	2.2	47
RN1906	4.7	47

Start of commercial production
1990-12

5. Packaging and Pin Assignment



US6



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

6. Orderable part number

Orderable part number		AEC-Q101		Note	
RN1901	RN1901,LF	—		General Use	
	RN1901,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN1901,LXHF	YES		Automotive Use	
RN1902	RN1902,LF	—		General Use	
	RN1902,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN1902,LXHF	YES		Automotive Use	
RN1903	RN1903,LF	—		General Use	
	RN1903,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN1903,LXHF	YES		Automotive Use	
RN1904	RN1904,LF	—		General Use	
	RN1904,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN1904,LXHF	YES		Automotive Use	
RN1905	RN1905,LF	—		General Use	
	RN1905,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN1905,LXHF	YES		Automotive Use	
RN1906	RN1906,LF	—		General Use	
	RN1906,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN1906,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) (Q1, Q2 Common)

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN1901～RN1906	V_{CBO}	50	V
Collector-emitter voltage		V_{CEO}	50	
Emitter-base voltage	RN1901～RN1904	V_{EBO}	10	
	RN1905,RN1906		5	
Collector current	RN1901～RN1906	I_C	100	mA
Collector power dissipation (Note 1)		P_C	200	mW
Junction temperature		T_j	150	°C
Storage temperature		T_{stg}	-55 ~ 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

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1901～RN1906	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	RN1901	I_{EBO}	V_{EB} = 10 V, I_C = 0 mA	0.82	—	1.52	mA
	RN1902			0.38	—	0.71	
	RN1903			0.17	—	0.33	
	RN1904			0.082	—	0.15	
	RN1905		V_{EB} = 5 V, I_C = 0 mA	0.078	—	0.145	
	RN1906			0.074	—	0.138	
DC current gain	RN1901	h_{FE}	V_{CE} = 5 V, I_C = 10 mA	30	—	—	—
	RN1902			50	—	—	
	RN1903			70	—	—	
	RN1904			80	—	—	
	RN1905			80	—	—	
	RN1906			80	—	—	
Collector-emitter saturation voltage	RN1901～RN1906	$V_{CE(sat)}$	I_C = 5 mA, I_B = 0.25 mA	—	0.1	0.3	V
Input voltage (ON)	RN1901	$V_{I(ON)}$	V_{CE} = 0.2 V, I_C = 5 mA	1.1	—	2.0	
	RN1902			1.2	—	2.4	
	RN1903			1.3	—	3.0	
	RN1904			1.5	—	5.0	
	RN1905			0.6	—	1.1	
	RN1906			0.7	—	1.3	
Input voltage (OFF)	RN1901～RN1904	$V_{I(OFF)}$	V_{CE} = 5 V, I_C = 0.1 mA	1.0	—	1.5	
	RN1905, RN1906			0.5	—	0.8	
Transition frequency	RN1901～RN1906	f_T	V_{CE} = 10 V, I_C = 5 mA	—	250	—	MHz
Collector output capacitance	RN1901～RN1906	C_{ob}	V_{CB} = 10 V, I_E = 0 mA, f = 1 MHz	—	3	6	pF
Input resistance	RN1901	R_1	-	3.29	4.7	6.11	kΩ
	RN1902			7	10	13	
	RN1903			15.4	22	28.6	
	RN1904			32.9	47	61.1	
	RN1905			1.54	2.2	2.86	
	RN1906			3.29	4.7	6.11	
Resistor ratio	RN1901～RN1904	R1/R2	-	0.9	1.0	1.1	—
	RN1905			0.0421	0.0468	0.0515	
	RN1906			0.09	0.1	0.11	

9. Marking

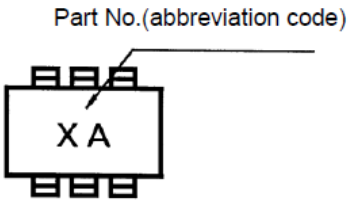


Fig. 9.1 Mraking RN1901

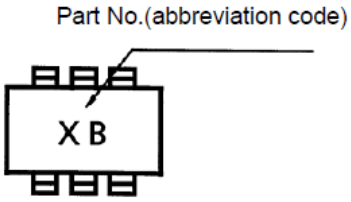


Fig. 9.2 Mraking RN1902

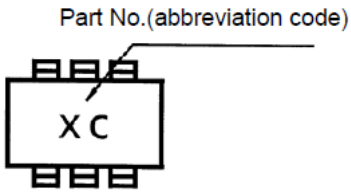


Fig. 9.3 Mraking RN1903

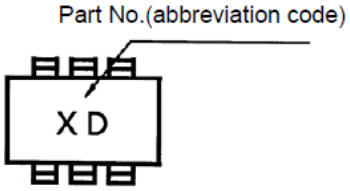


Fig. 9.4 Mraking RN1904

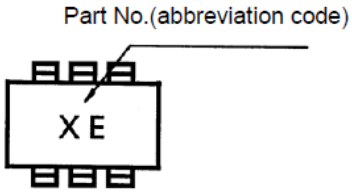


Fig. 9.5 Mraking RN1905

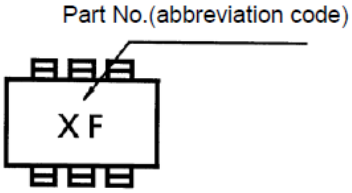


Fig. 9.6 Mraking RN1906

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

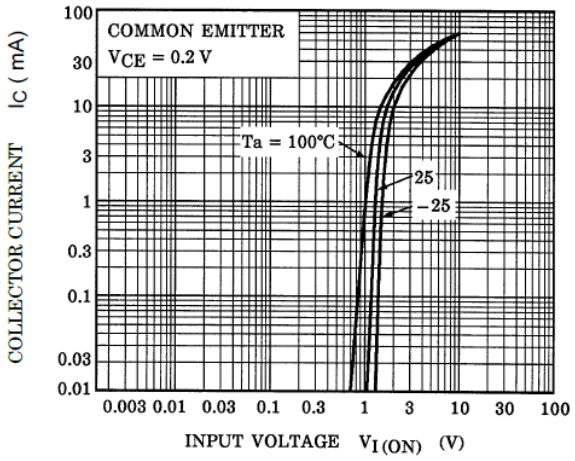


Fig. 10.1 RN1901 I_C-$V_{I(ON)}$

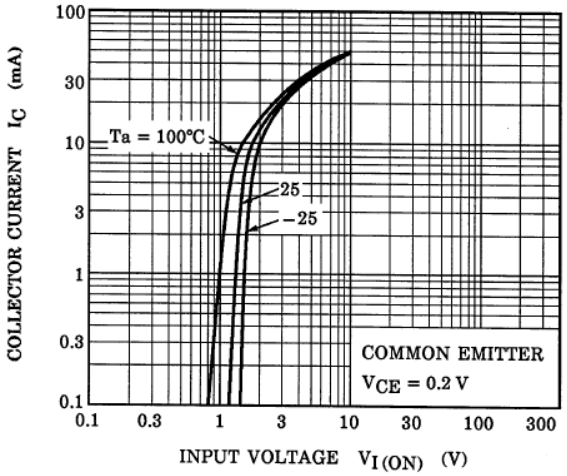


Fig. 10.2 RN1902 I_C-$V_{I(ON)}$

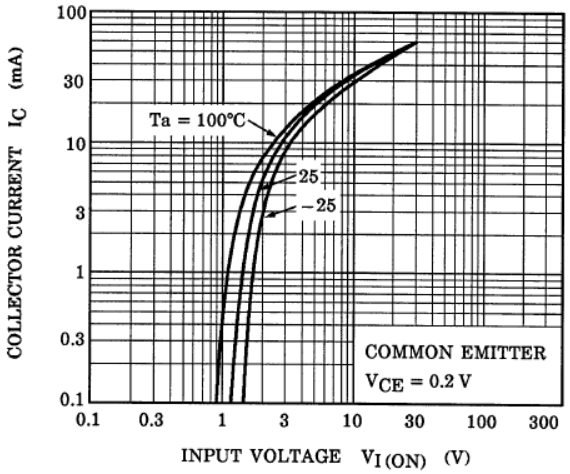


Fig. 10.3 RN1903 I_C-$V_{I(ON)}$

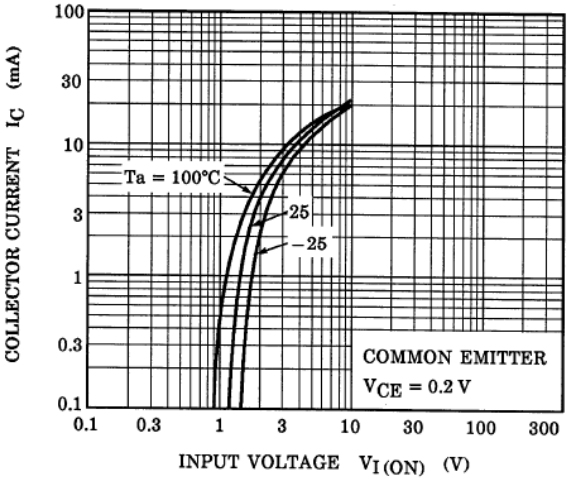


Fig. 10.4 RN1904 I_C-$V_{I(ON)}$

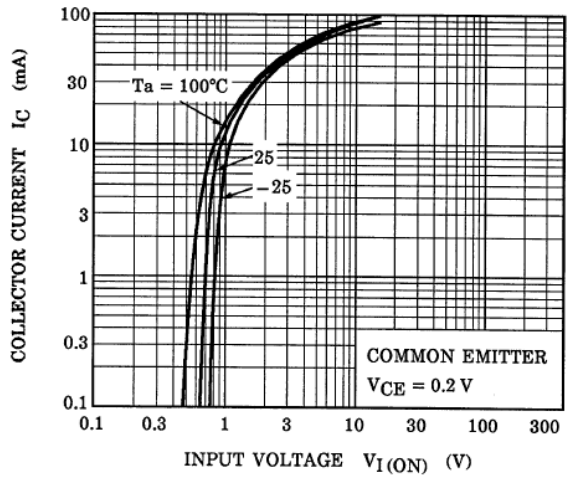


Fig. 10.5 RN1905 I_C-$V_{I(ON)}$

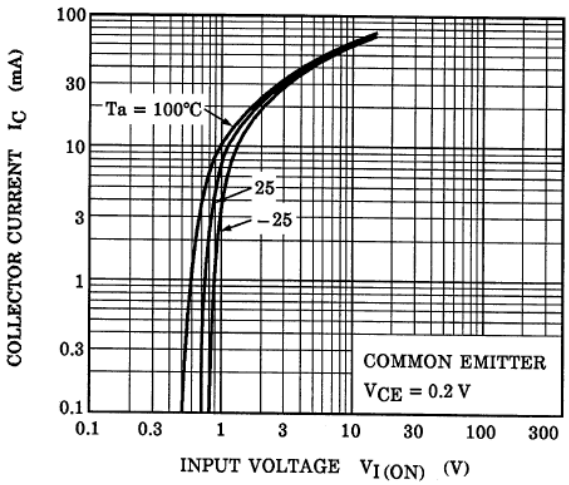


Fig. 10.6 RN1906 I_C-$V_{I(ON)}$

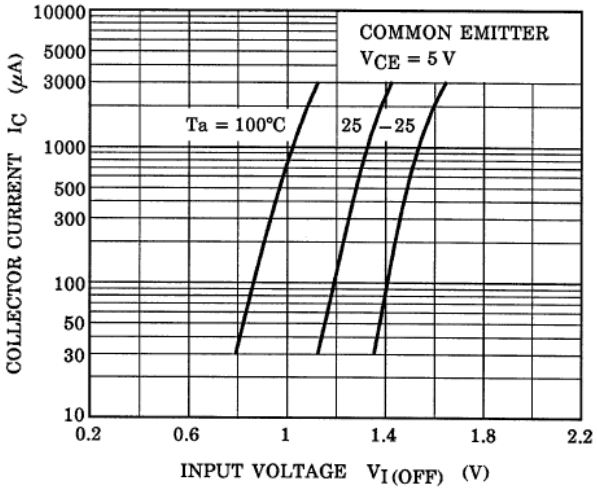


Fig. 10.7 RN1901 I_C-$V_{I(OFF)}$

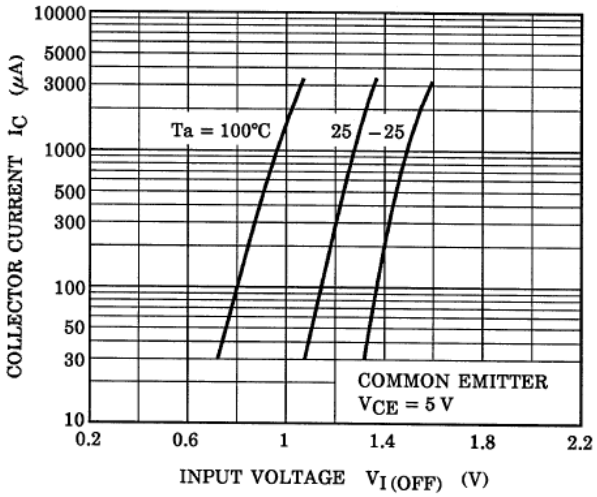


Fig. 10.8 RN1902 I_C-$V_{I(OFF)}$

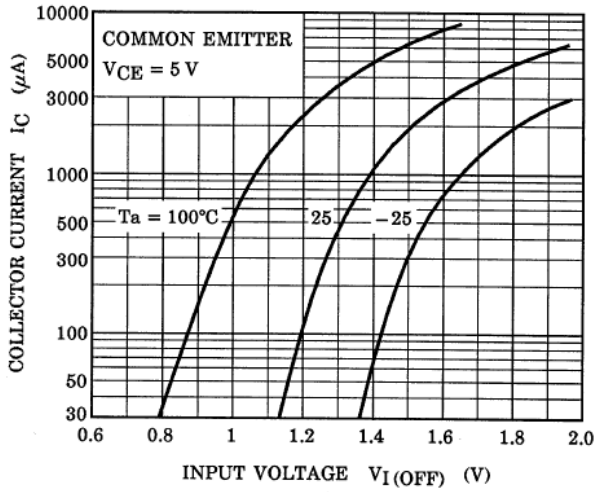


Fig. 10.9 RN1903 I_C-$V_{I(OFF)}$

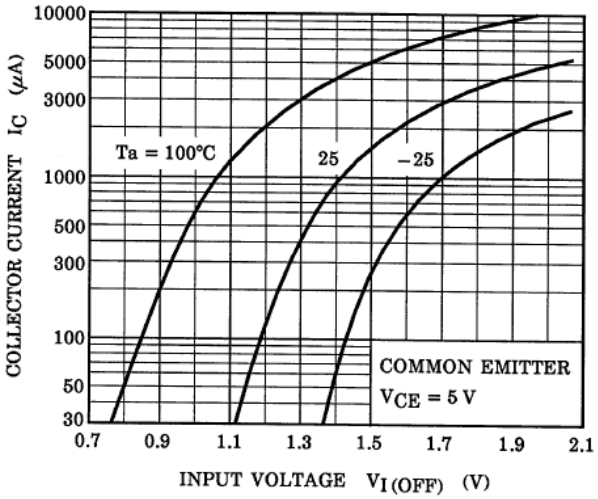


Fig. 10.10 RN1904 I_C-$V_{I(OFF)}$

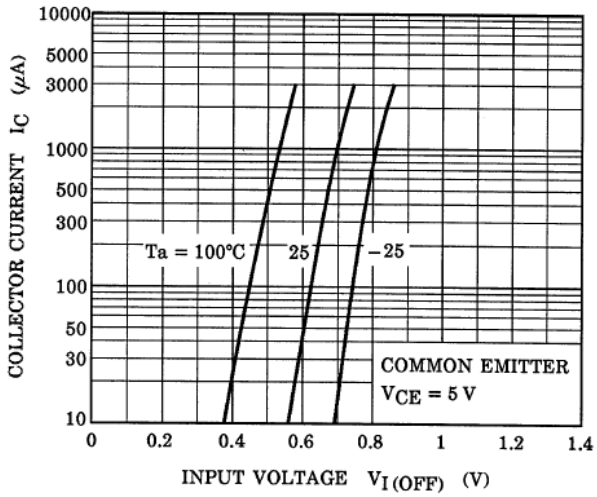


Fig. 10.11 RN1905 I_C-$V_{I(OFF)}$

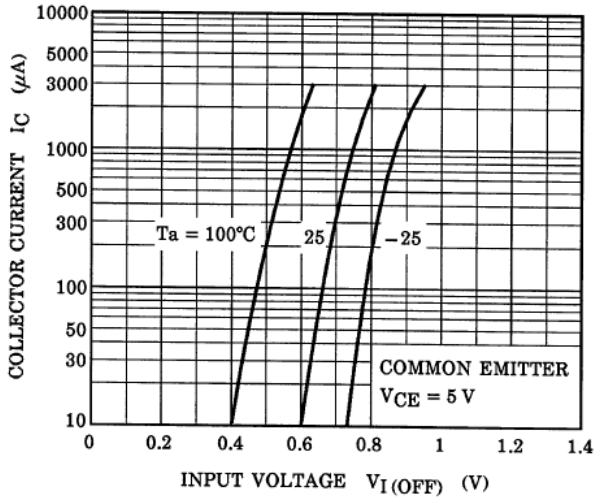


Fig. 10.12 RN1906 I_C-$V_{I(OFF)}$

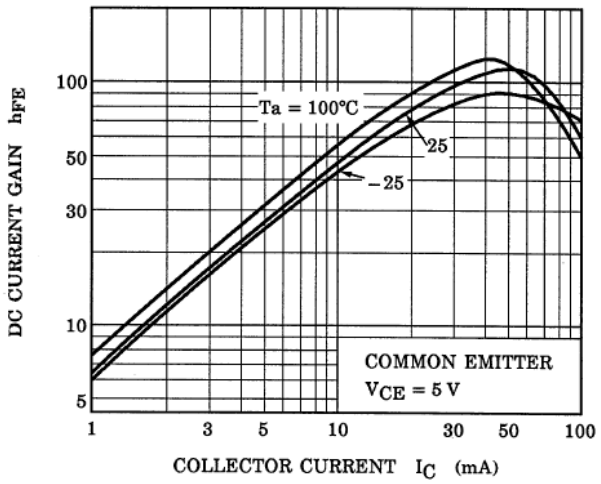


Fig. 10.13 RN1901 h_{FE}-I_C

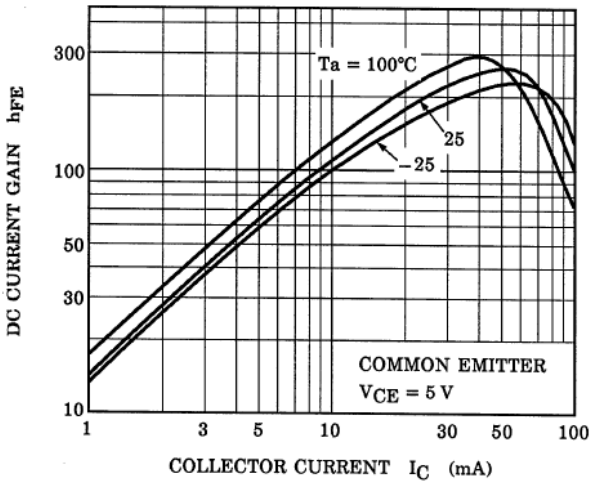


Fig. 10.14 RN1902 h_{FE}-I_C

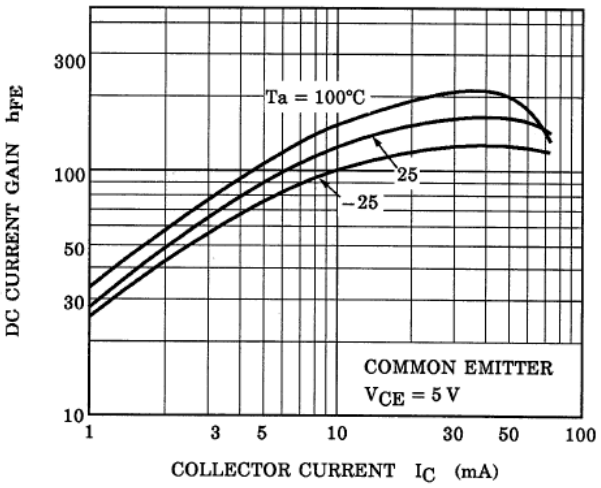


Fig. 10.15 RN1903 h_{FE}-I_C

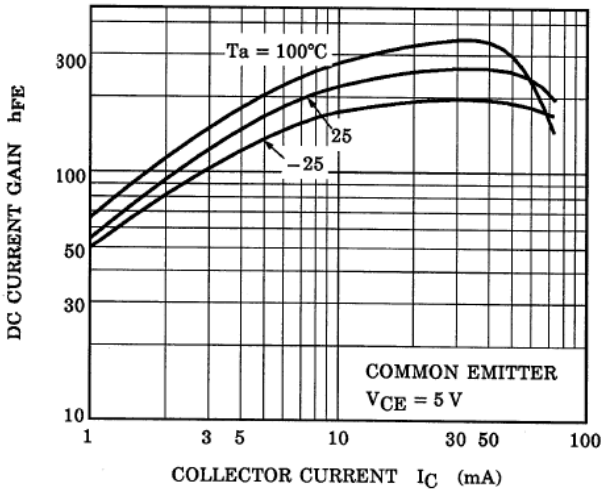


Fig. 10.16 RN1904 h_{FE}-I_C

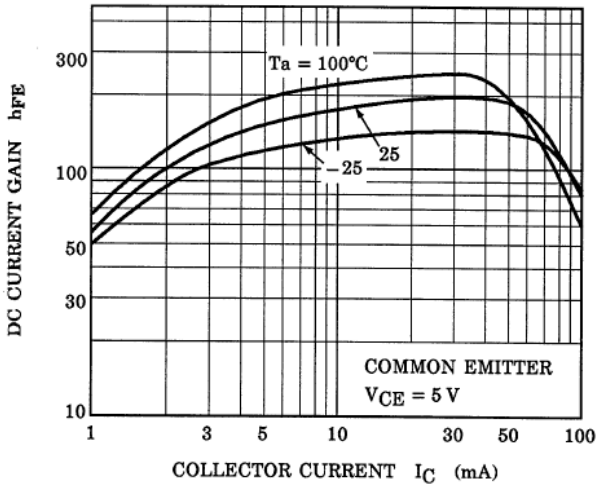


Fig. 10.17 RN1905 h_{FE}-I_C

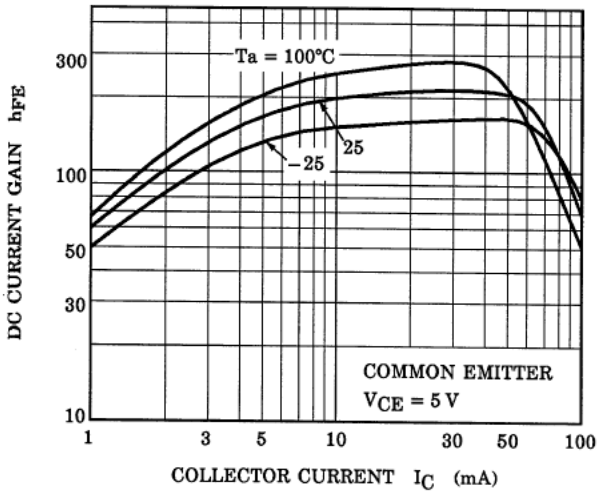


Fig. 10.18 RN1906 h_{FE}-I_C

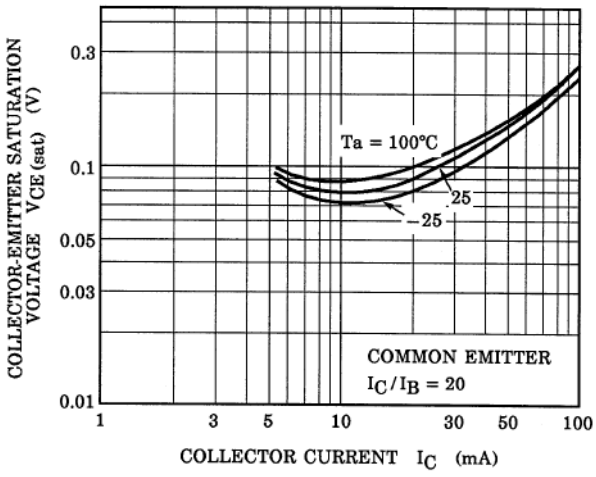


Fig. 10.19 RN1901 $V_{CE(sat)}$-I_C

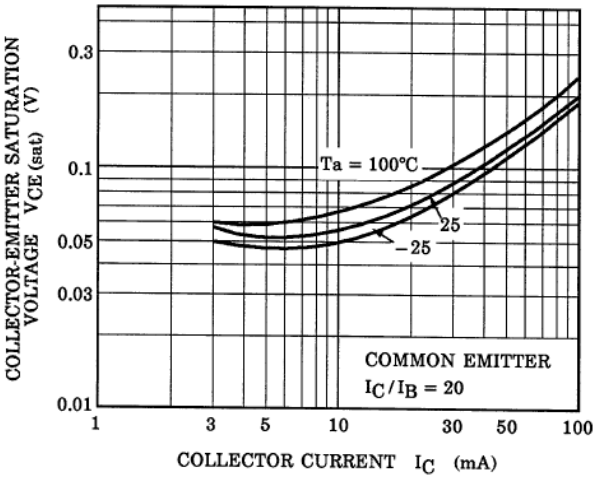


Fig. 10.20 RN1902 $V_{CE(sat)}$-I_C

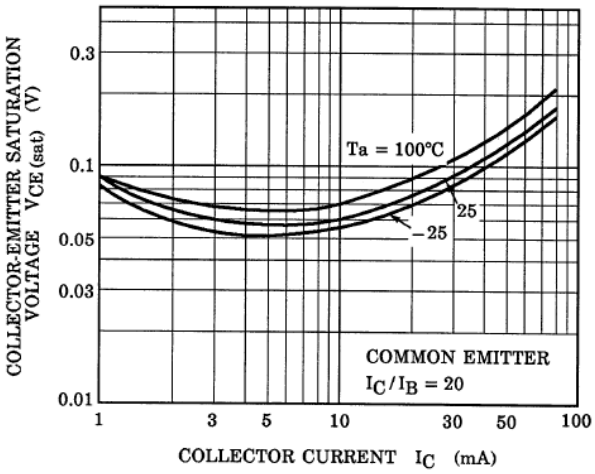


Fig. 10.21 RN1903 $V_{CE(sat)}$-I_C

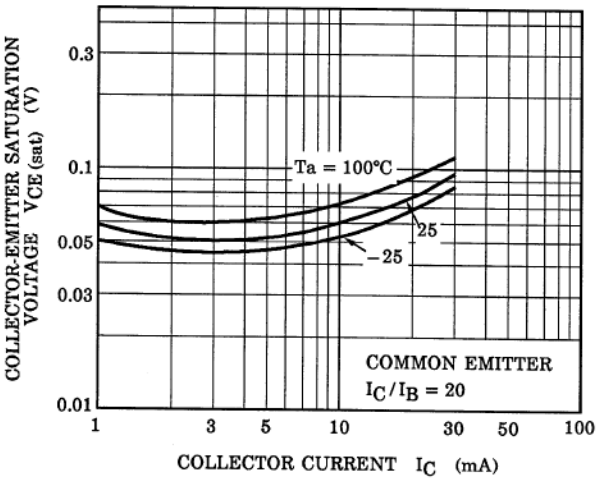


Fig. 10.22 RN1904 $V_{CE(sat)}$-I_C

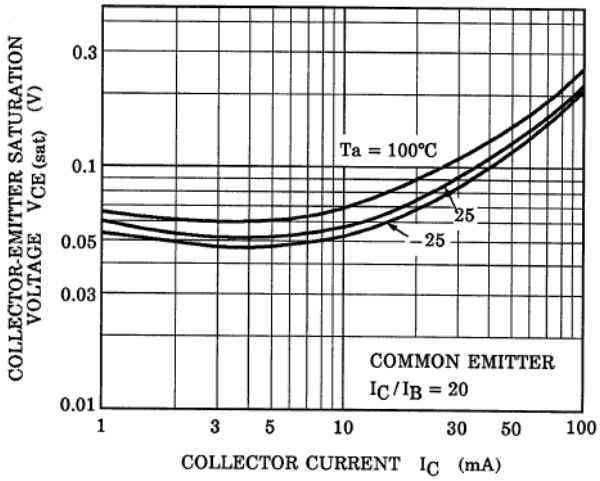


Fig. 10.23 RN1905 $V_{CE(sat)}$-I_C

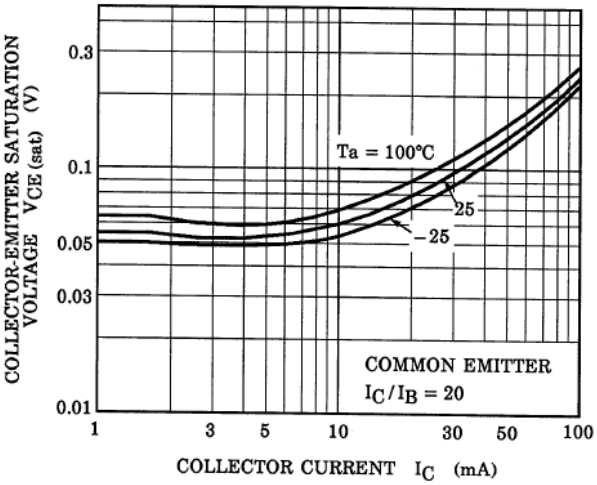
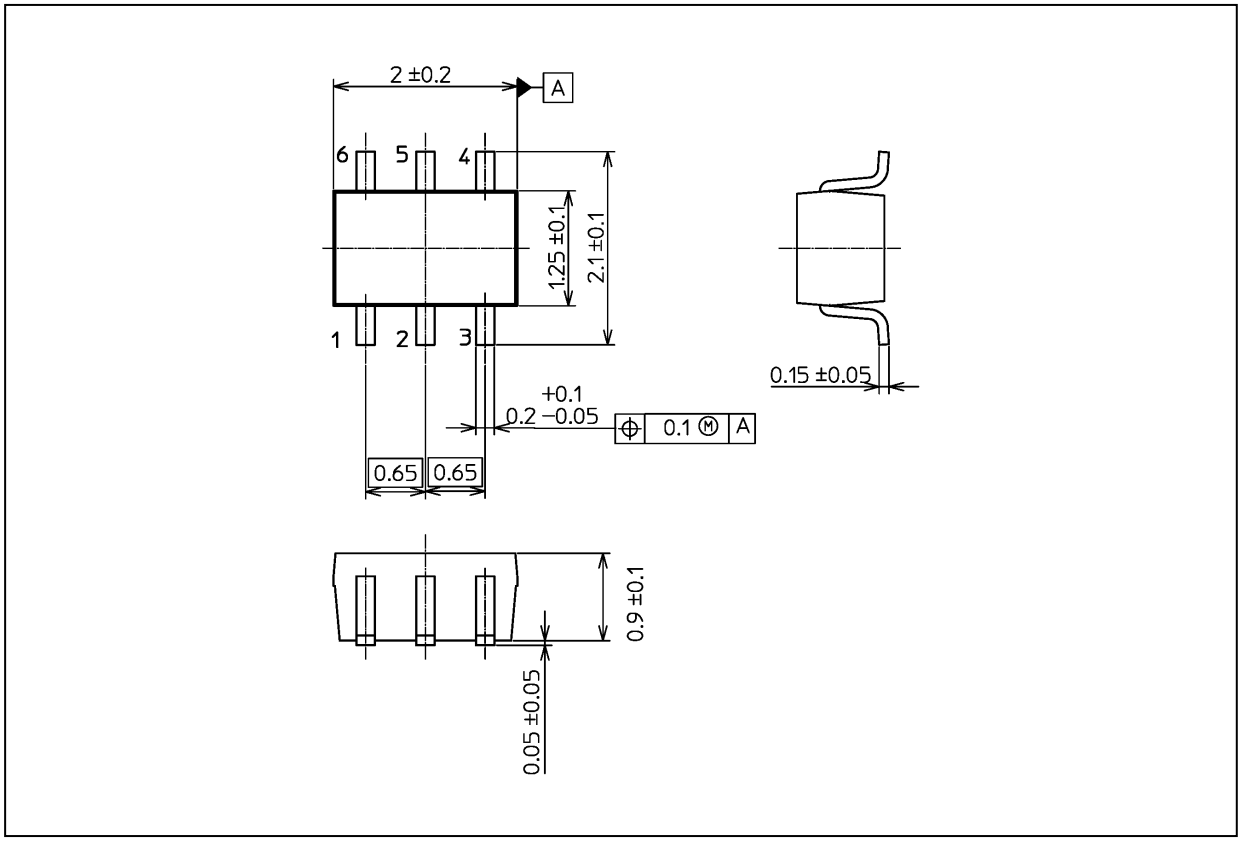


Fig. 10.24 RN1906 $V_{CE(sat)}$-I_C

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

Package Dimensions

Unit: mm



Weight: 6.8 mg (typ.)

Package Name(s)
TOSHIBA: 1-2T1S
Nickname: US6

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