

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

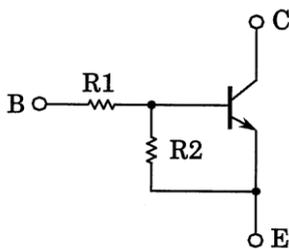
RN1901, RN1902, RN1903 RN1904, RN1905, RN1906

Unit: mm

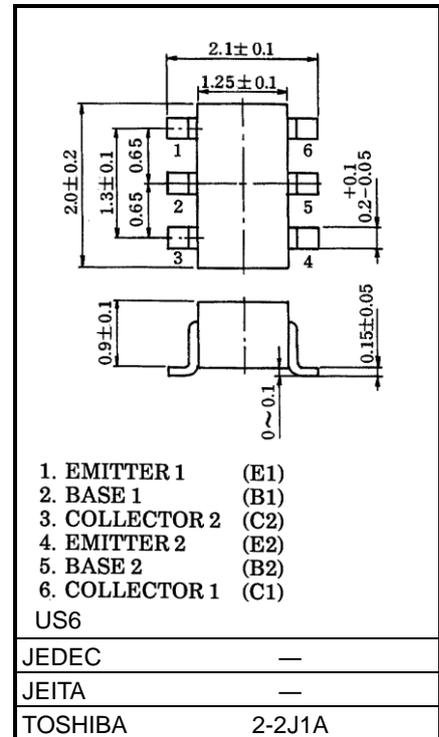
Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- Including two devices in US6 (ultra super mini type with 6 leads)
- With built-in bias resistors
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process
- Complementary to RN2901 to RN2906

Equivalent Circuit and Bias Resistor Values



Type 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



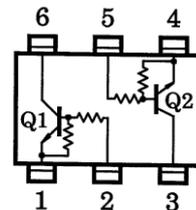
1. EMITTER 1 (E1)
2. BASE 1 (B1)
3. COLLECTOR 2 (C2)
4. EMITTER 2 (E2)
5. BASE 2 (B2)
6. COLLECTOR 1 (C1)

US6

JEDEC	—
JEITA	—
TOSHIBA	2-2J1A

Weight: 6.8 mg(typ.)

Equivalent Circuit (Top View)



Absolute Maximum Ratings (Ta = 25°C) (Q1, Q2 Common)

Characteristic	Symbol	Rating	Unit
Collector-base voltage	V _{CB0}	50	V
Collector-emitter voltage			
Emitter-base voltage	V _{EB0}	10	V
		5	
Collector current	I _C	100	mA
Collector power dissipation	P _C *	200	mW
Junction temperature	T _j	150	°C
Storage temperature range	T _{stg}	-55 to 150	°C

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).

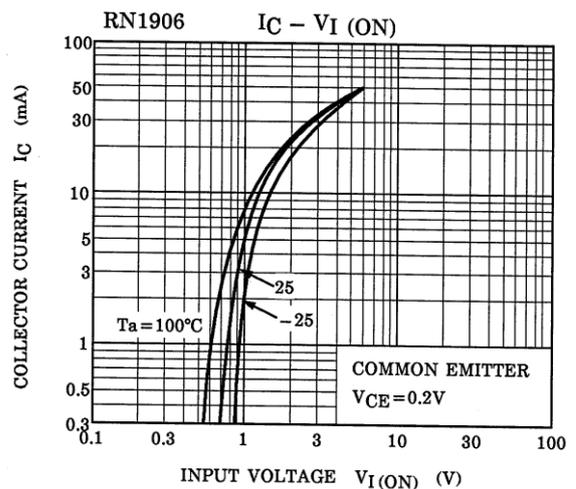
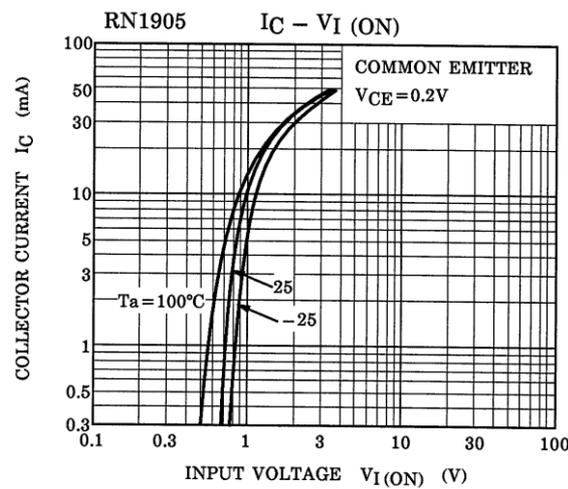
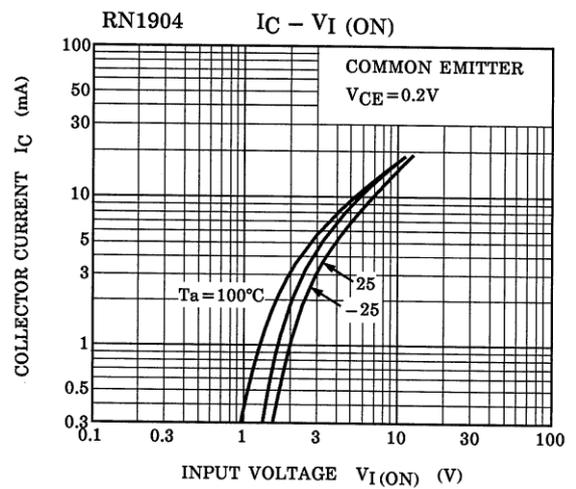
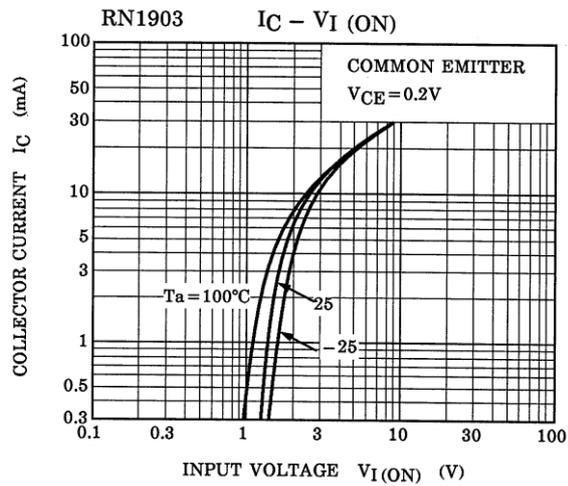
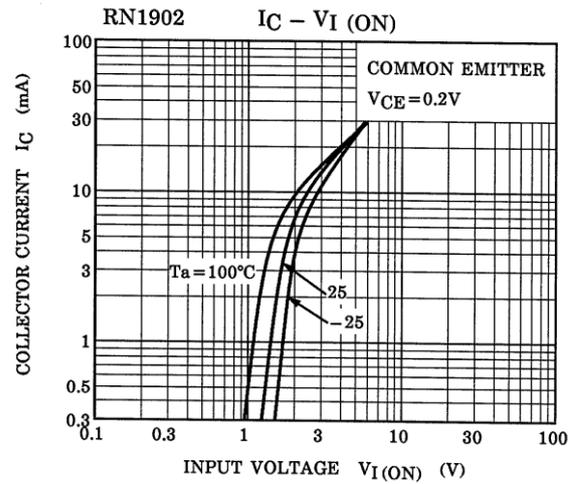
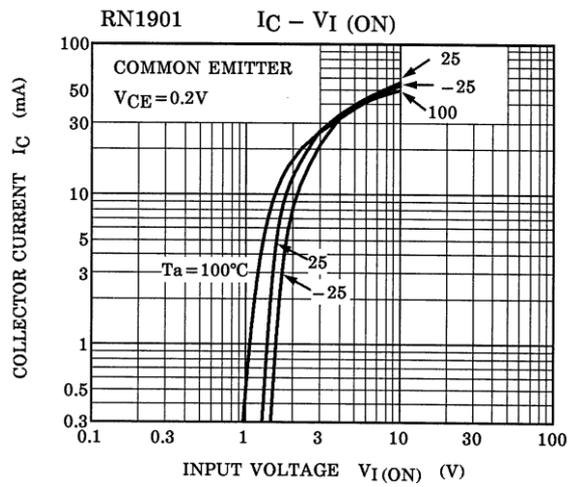
*: Total rating

Start of commercial production
1990-12

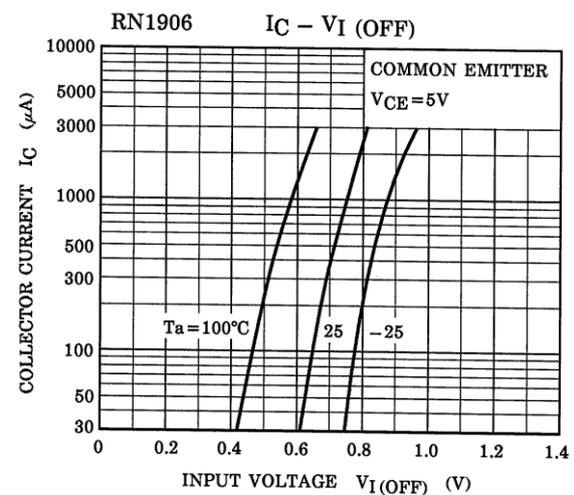
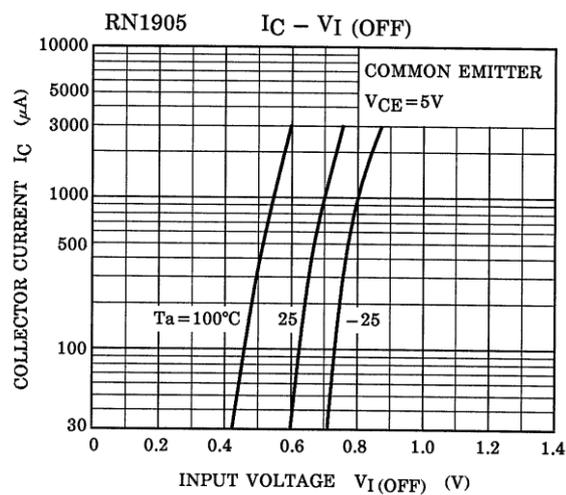
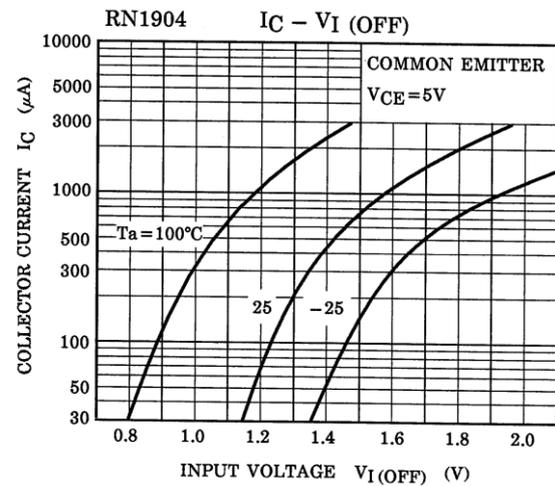
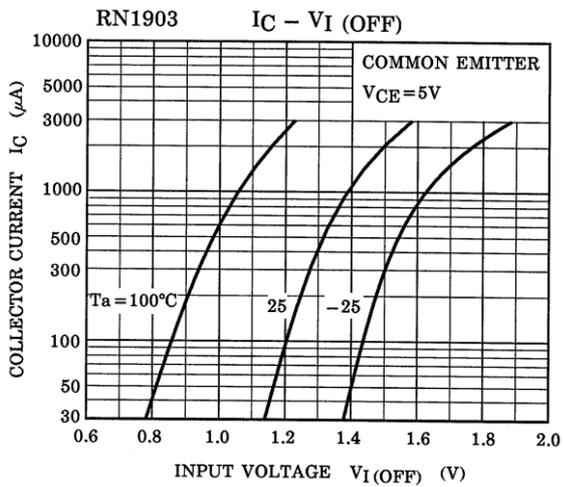
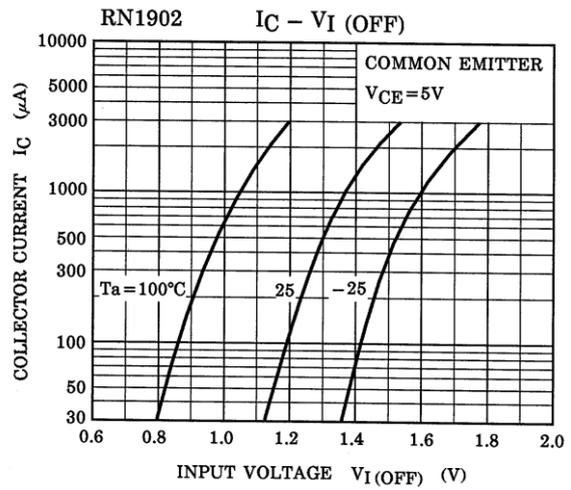
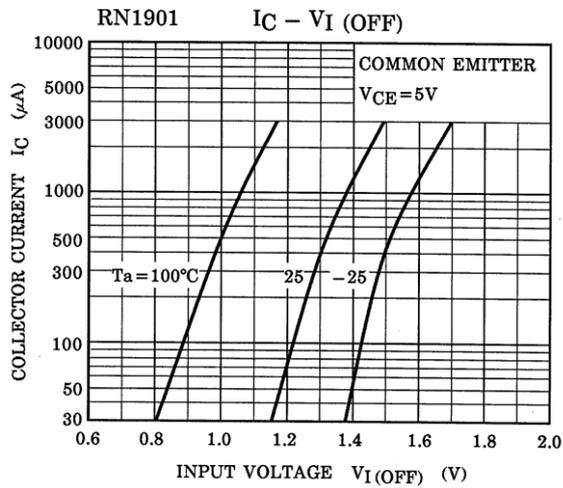
Electrical Characteristics (Ta = 25°C) (Q1, Q2 Common)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1901 to 1906	ICBO	V _{CB} = 50 V, I _E = 0 A	—	—	100	nA
		ICEO	V _{CE} = 50 V, I _B = 0 A	—	—	500	
Emitter cut-off current	RN1901	I _{EBO}	V _{EB} = 10 V, I _C = 0 A	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 A	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 to 1906	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	V
	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 to 1904	V _{I (OFF)}	V _{CE} = 5 V, I _C = 0.1 mA	1.0	—	1.5	V
	RN1905, 1906			0.5	—	0.8	
Transition frequency	RN1901 to 1906	f _T	V _{CE} = 10 V, I _C = 5 mA	—	250	—	MHz
Collector output capacitance	RN1901 to 1906	C _{ob}	V _{CB} = 10 V, I _E = 0 A, f = 1 MHz	—	3	6	pF
Input resistor	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 to 1904	R _{1/R2}	—	0.9	1.0	1.1	—
	RN1905			0.0421	0.0468	0.0515	
	RN1906			0.09	0.1	0.11	

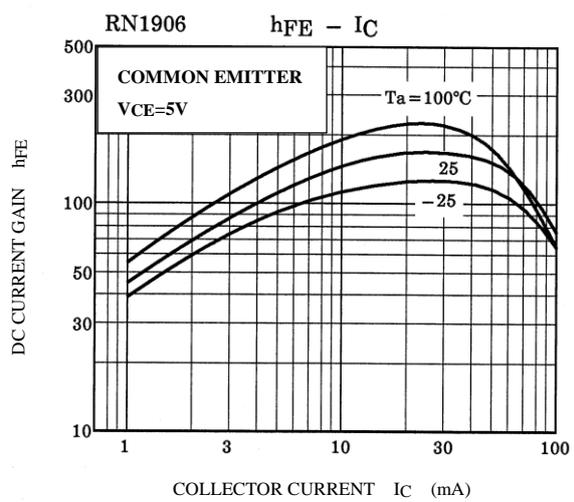
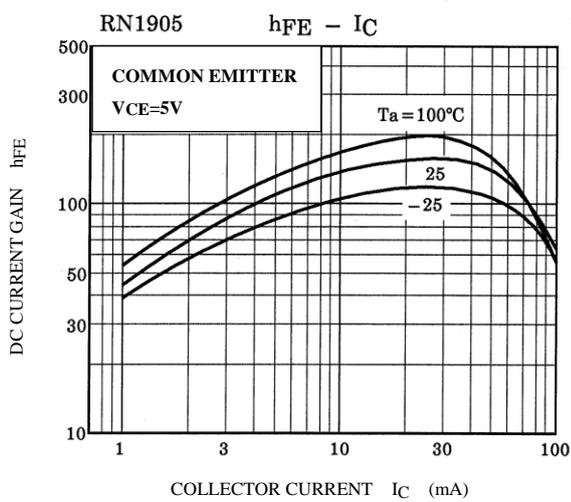
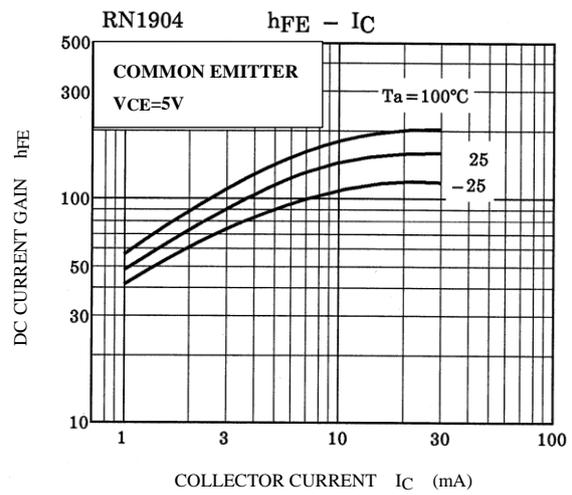
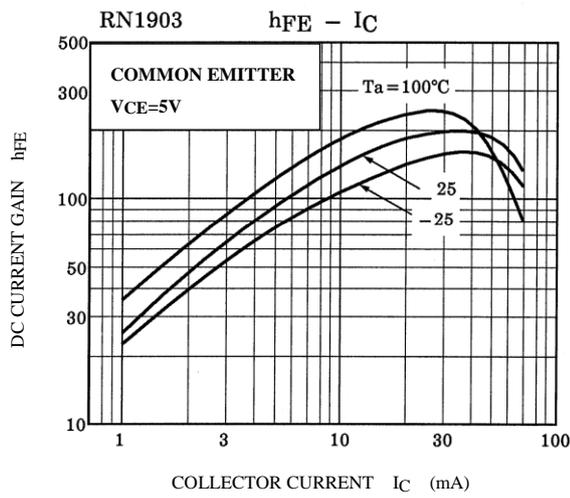
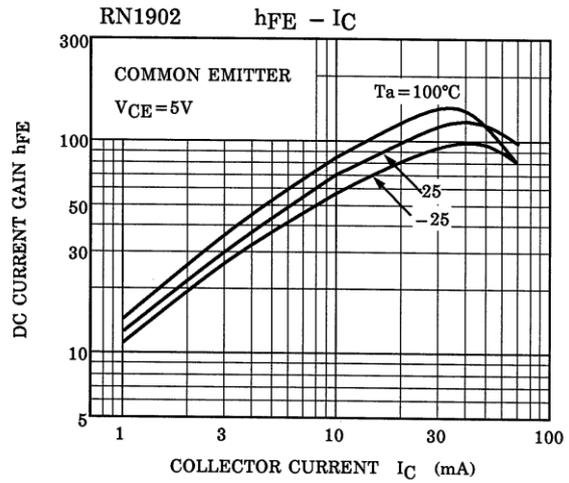
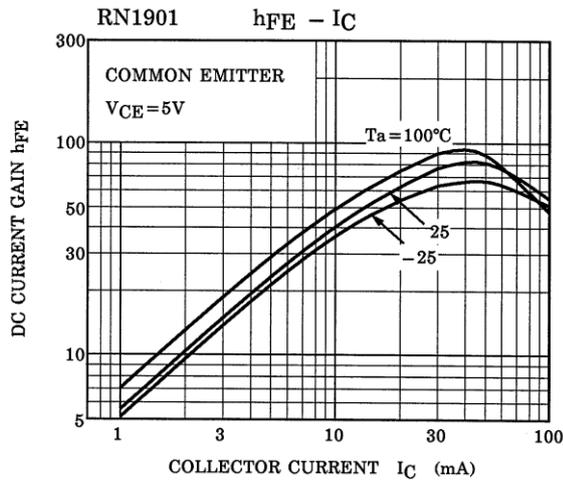
(Q1, Q2 Common)



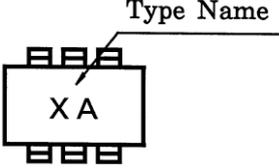
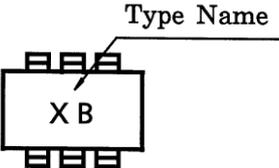
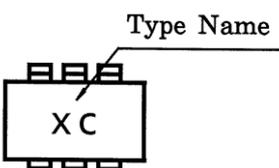
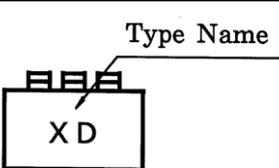
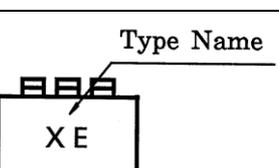
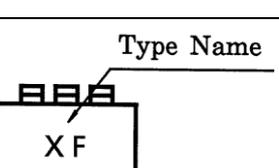
(Q1, Q2 Common)



(Q1, Q2 Common)



Marking

Type Name	Marking
RN1901	
RN1902	
RN1903	
RN1904	
RN1905	
RN1906	

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