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

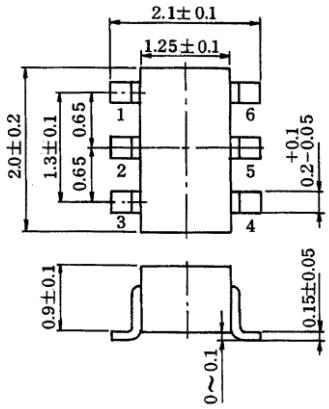
RN1901, RN1902, RN1903
RN1904, RN1905, RN1906

Unit: mm

Switching, Inverter Circuit, Interface Circuit and Driver Circuit

- AEC-Q101 Qualified (Note1)
- 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 and miniaturize equipment.
- Various resistance values are available to suit various circuit designs.
- Complementary to RN2901 to RN2906

Note1: For detail information, please contact to our sales.



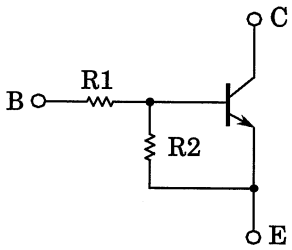
1. EMITTER 1 (E1)
2. BASE 1 (B1)
3. COLLECTOR 2 (C2)
4. EMITTER 2 (E2)
5. BASE 2 (B2)
6. COLLECTOR 1 (C1)

US6

JEDEC	—
JEITA	—
TOSHIBA	2-2J1A

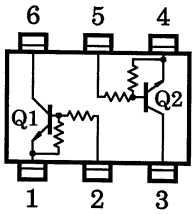
Weight: 6.8 mg(typ.)

Equivalent Circuit and 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

Equivalent Circuit (Top View)



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

Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN1901 to 1906	V_{CBO}	50	V
Collector-emitter voltage	RN1901 to 1906	V_{CEO}	50	V
Emitter-base voltage	RN1901 to 1904	V_{EBO}	10	V
	RN1905, 1906		5	
Collector current	RN1901 to 1906	I_C	100	mA
Collector power dissipation	RN1901 to 1906	P_C*	200	mW
Junction temperature	RN1901 to 1906	T_j	150	°C
Storage temperature range	RN1901 to 1906	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

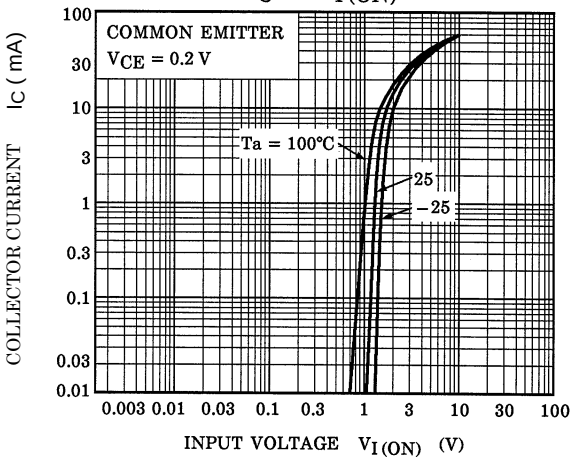
Start of commercial production
1990-12

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

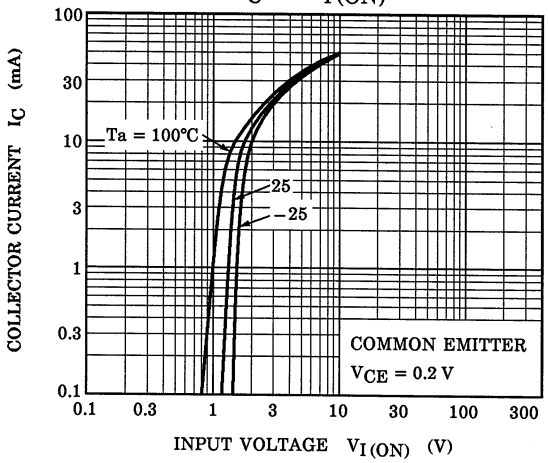
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1901 to 1906	I_{CBO}	V_{CB} = 50 V, I_E = 0 A	—	—	100	nA
		I_{CEO}	V_{CE} = 50 V, I_B = 0 A	—	—	500	
Emitter cut-off current	RN1901	I_{EBO}	V_{EB} = 10 V, I_C = 0 A	0.82	—	1.52	mA
	RN1902			0.38	—	0.71	
	RN1903			0.17	—	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	R1	—	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	R1/R2	—	0.9	1.0	1.1	—
	RN1905			0.0421	0.0468	0.0515	
	RN1906			0.09	0.1	0.11	

Characteristics Curves (Q1, Q2 Common)

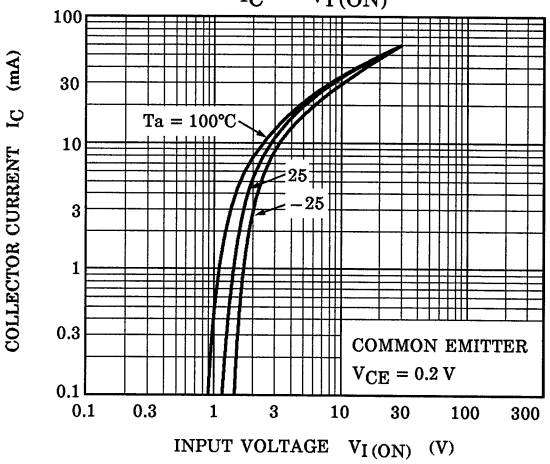
RN1901 I_C – $V_{I(ON)}$



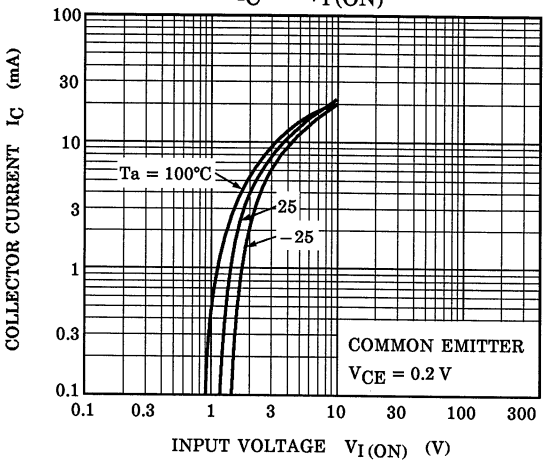
RN1902 I_C – $V_{I(ON)}$



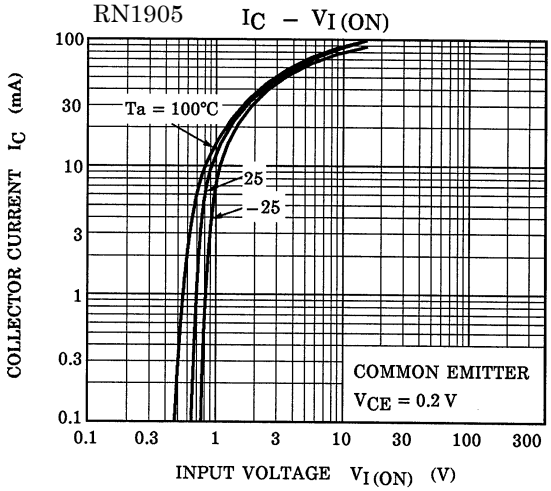
RN1903 I_C – $V_{I(ON)}$



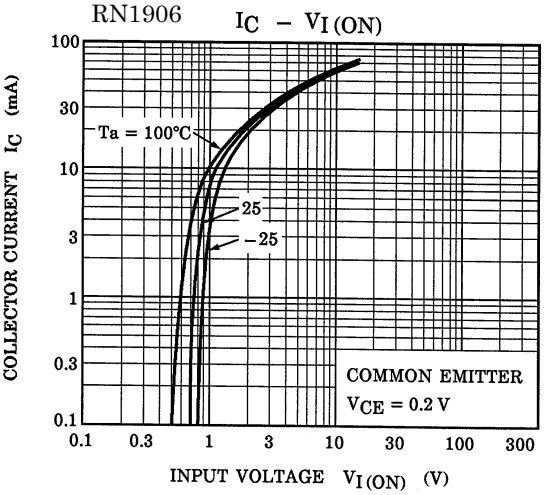
RN1904 I_C – $V_{I(ON)}$



RN1905 I_C – $V_{I(ON)}$



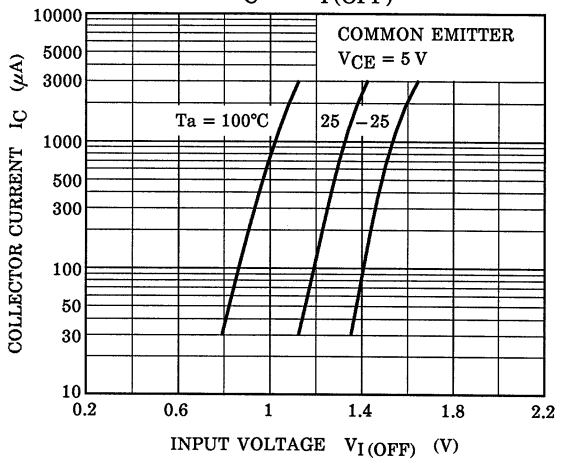
RN1906 I_C – $V_{I(ON)}$



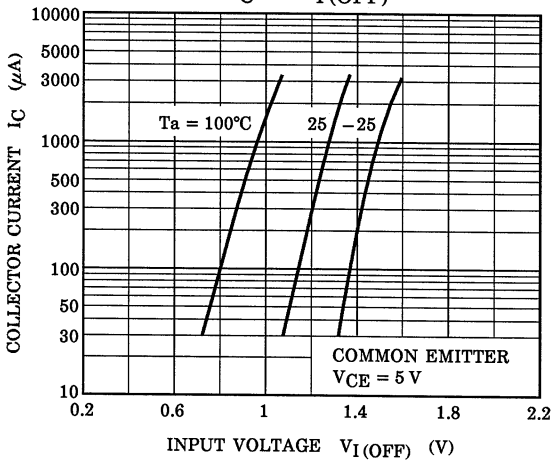
The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

Characteristics Curves (Q1, Q2 Common)

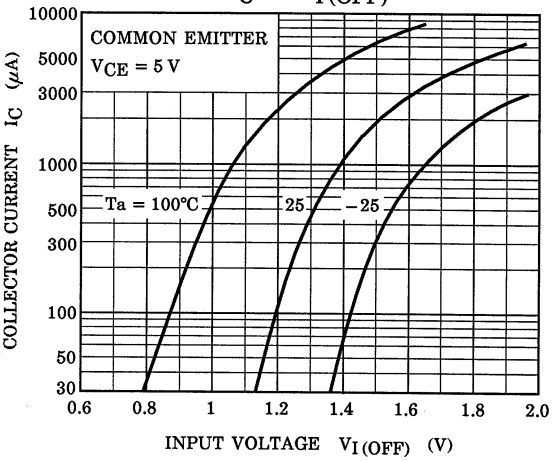
RN1901 I_C – $V_{I(OFF)}$



RN1902 I_C – $V_{I(OFF)}$



RN1903 I_C – $V_{I(OFF)}$



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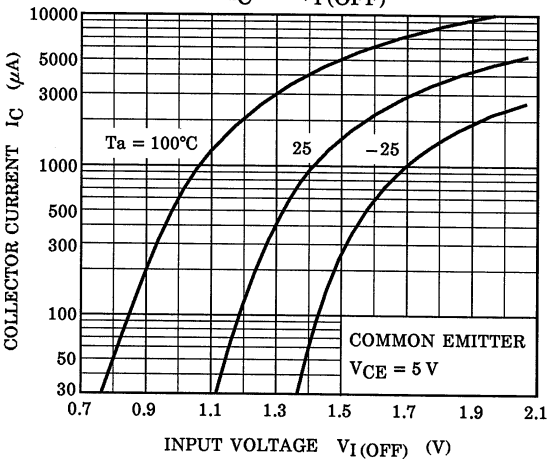
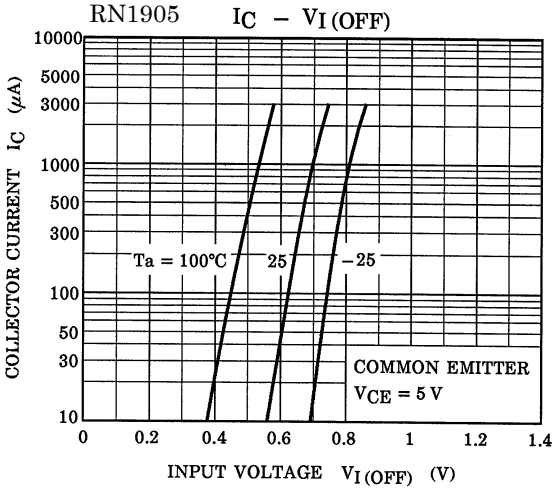
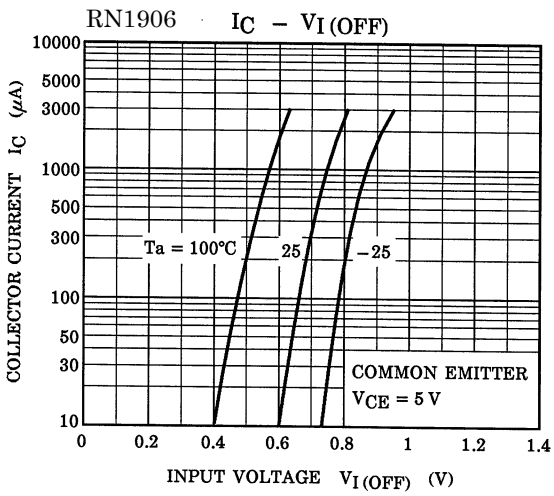


RN1905 I_C – $V_{I(OFF)}$



RN1906 I_C – $V_{I(OFF)}$



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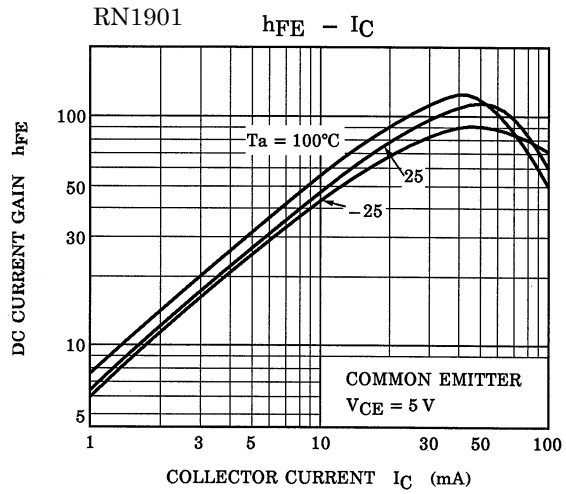
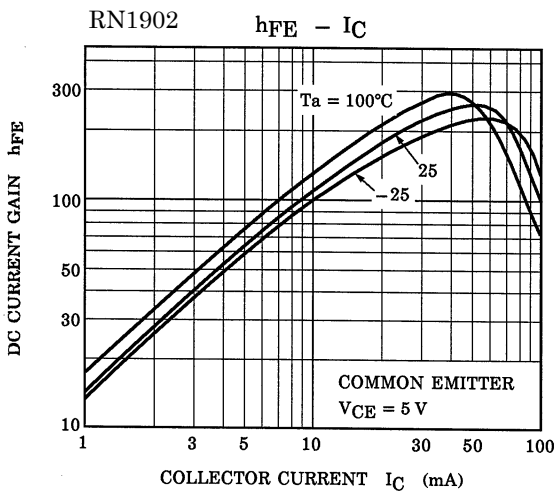
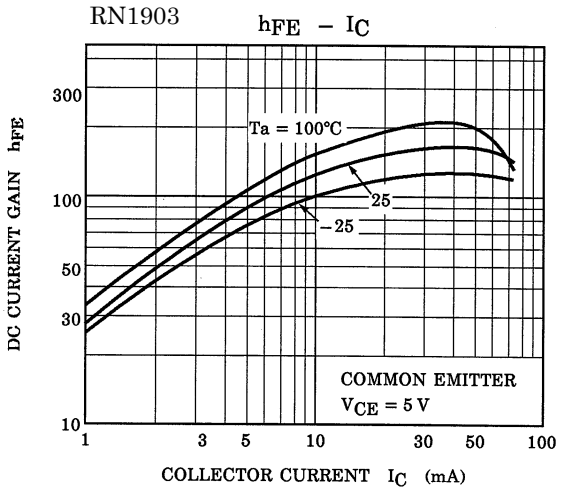
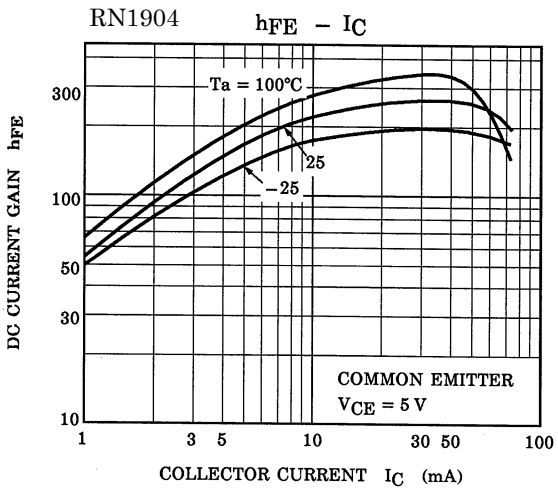
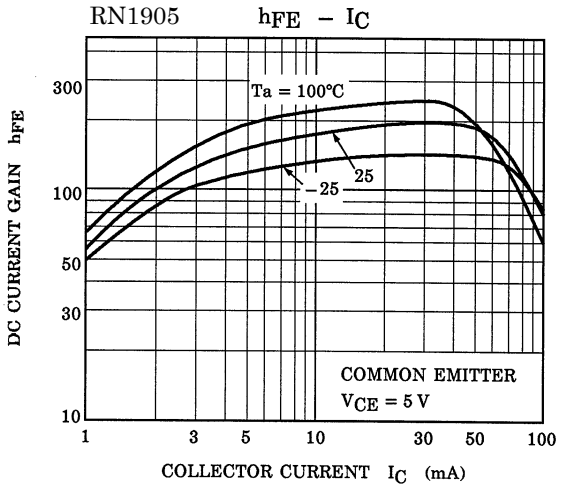
Characteristics Curves (Q1, Q2 Common)

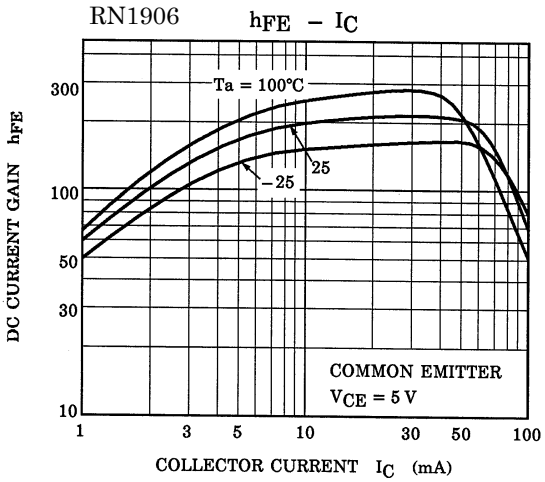












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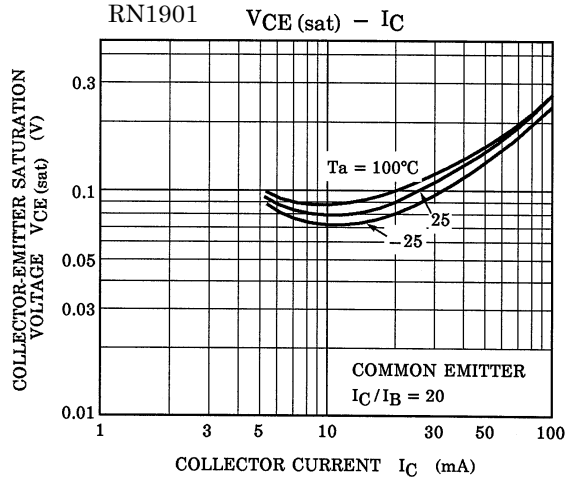
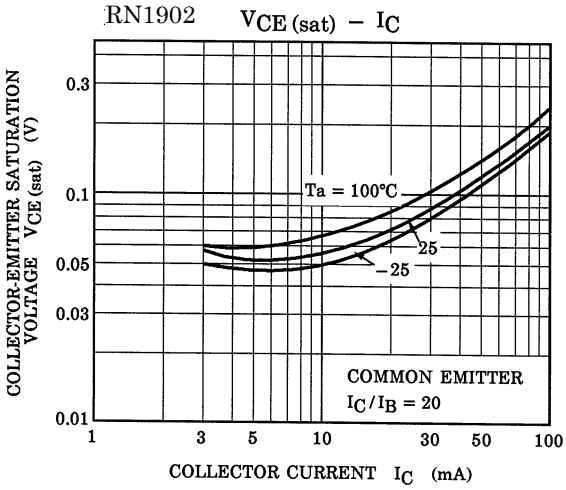
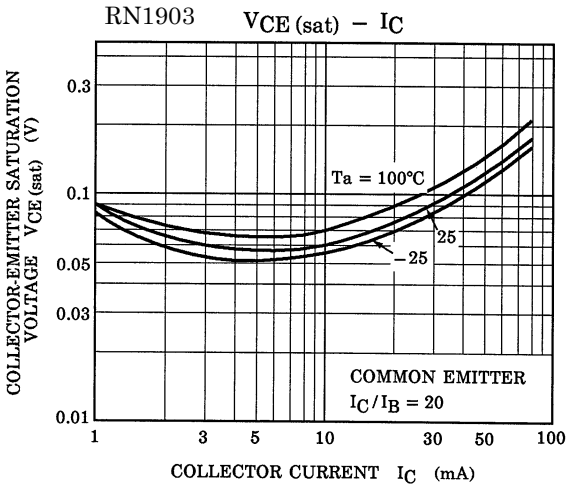
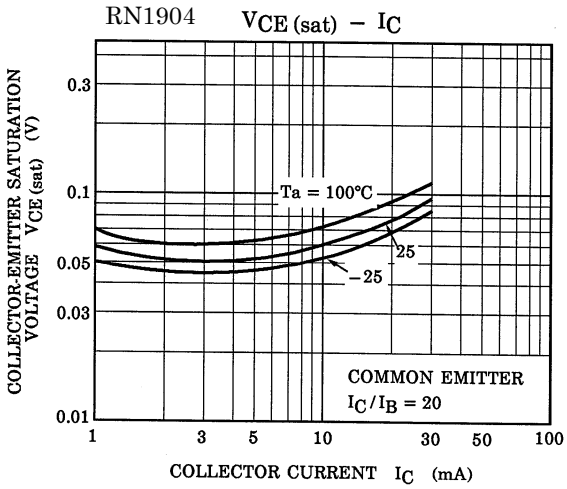
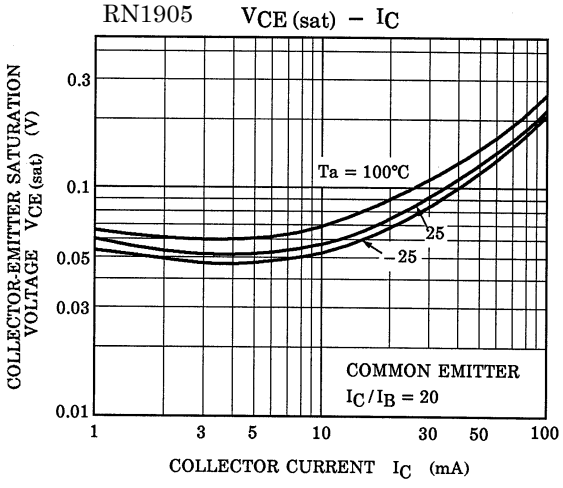
Characteristics Curves (Q1, Q2 Common)

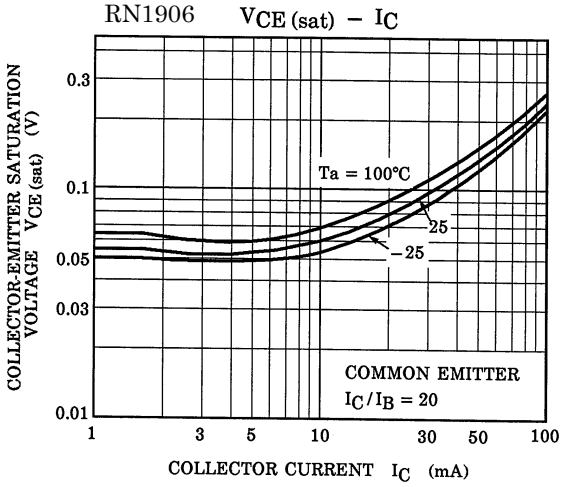












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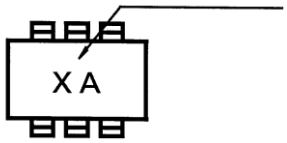
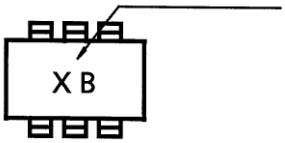
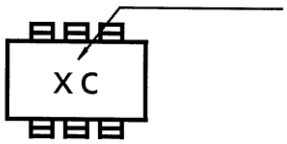
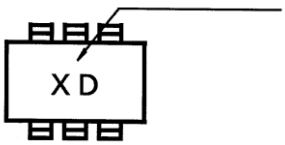
Marking

Part No.	Marking
RN1901	Part No.(abbreviation code) 
RN1902	Part No.(abbreviation code) 
RN1903	Part No.(abbreviation code) 
RN1904	Part No.(abbreviation code) 
RN1905	Part No.(abbreviation code) 
RN1906	Part No.(abbreviation code) 

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