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

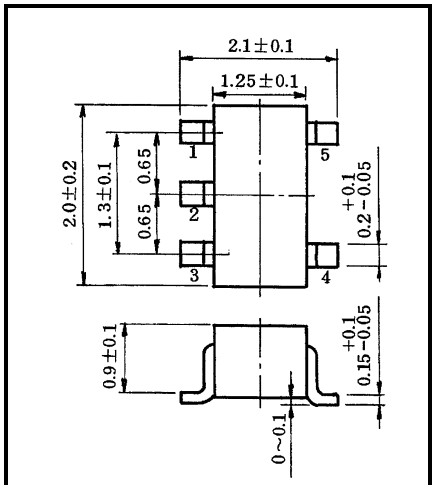
RN1701, RN1702, RN1703
RN1704, RN1705, RN1706

Unit: mm

Switching, Inverter Circuit,

Interface Circuit and Driver Circuit

- Including two devices in USV (ultra super mini type with 5 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 RN2701 to RN2706



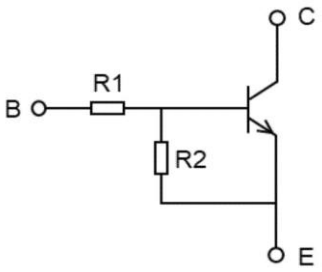
1. BASE 1 (B1)
2. EMITTER (E)
3. BASE 2 (B2)
4. COLLECTOR 2 (C2)
5. COLLECTOR 1 (C1)

USV

JEDEC	—
JEITA	—
TOSHIBA	2-2L1A

Weight: 6.2mg (typ.)

Equivalent Circuit and Bias Resistor Values



Part No.	R1 (kΩ)	R2 (kΩ)
RN1701	4.7	4.7
RN1702	10	10
RN1703	22	22
RN1704	47	47
RN1705	2.2	47
RN1706	4.7	47

Start of commercial production
1992-01

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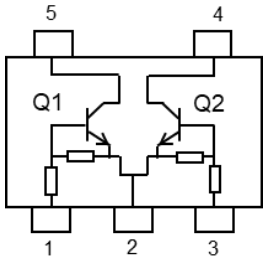
Absolute Maximum Ratings (Note) (Ta = 25°C) (Q1, Q2 Common)

Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN1701 to 1706	V_{CBO}	50	V
Collector-emitter voltage		V_{CEO}	50	V
Emitter-base voltage	RN1701 to 1704	V_{EBO}	10	V
	RN1705, 1706		5	
Collector current	RN1701 to 1706	I_C	100	mA
Collector power dissipation		P_C (Note 1)	200	mW
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55 to150	°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).

Note 1: Total rating

Equivalent Circuit (Top View)



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

Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1701 to 1706	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	RN1701	I_{EBO}	—	V_{EB} = 10 V, I_C = 0 mA	0.82	—	1.52	mA
	RN1702		—		0.38	—	0.71	
	RN1703		—		0.17	—	0.33	
	RN1704		—		0.082	—	0.15	
	RN1705		—	V_{EB} = 5 V, I_C = 0 mA	0.078	—	0.145	
	RN1706		—		0.074	—	0.138	
DC current gain	RN1701	h_{FE}	—	V_{CE} = 5 V, I_C = 10 mA	30	—	—	—
	RN1702		—		50	—	—	
	RN1703		—		70	—	—	
	RN1704		—		80	—	—	
	RN1705		—		80	—	—	
	RN1706		—		80	—	—	
Collector-emitter saturation voltage	RN1701 to 1706	$V_{CE\ (sat)}$	—	I_C = 5 mA, I_B = 0.25 mA	—	0.1	0.3	V
Input voltage (ON)	RN1701	$V_{I\ (ON)}$	—	V_{CE} = 0.2 V, I_C = 5 mA	1.1	—	2.0	V
	RN1702		—		1.2	—	2.4	
	RN1703		—		1.3	—	3.0	
	RN1704		—		1.5	—	5.0	
	RN1705		—		0.6	—	1.1	
	RN1706		—		0.7	—	1.3	
Input voltage (OFF)	RN1701 to 1704	$V_{I\ (OFF)}$	—	V_{CE} = 5 V, I_C = 0.1 mA	1.0	—	1.5	V
	RN1705, 1706		—		0.5	—	0.8	
Transition frequency	RN1701 to 1706	f_T	—	V_{CE} = 10 V, I_C = 5 mA	—	250	—	MHz
Collector output capacitance	RN1701 to 1706	C_{ob}	—	V_{CB} = 10 V, I_E = 0 mA f = 1 MHz	—	3	6	pF
Input resistor	RN1701	R1	—	—	3.29	4.7	6.11	kΩ
	RN1702		—		7	10	13	
	RN1703		—		15.4	22	28.6	
	RN1704		—		32.9	47	61.1	
	RN1705		—		1.54	2.2	2.86	
	RN1706		—		3.29	4.7	6.11	
Resistor ratio	RN1701 to 1704	R1/R2	—	—	0.9	1.0	1.1	—
	RN1705		—		0.0421	0.0468	0.0515	
	RN1706		—		0.09	0.1	0.11	

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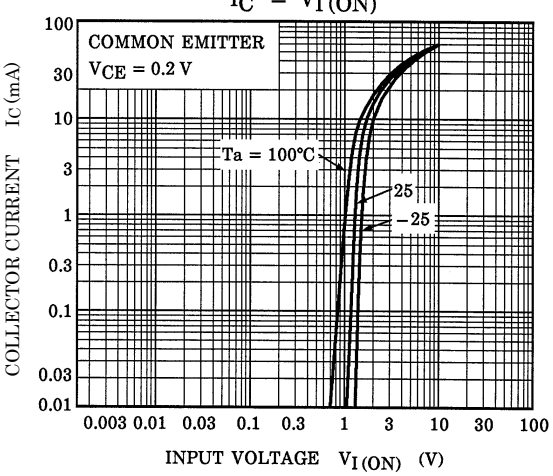
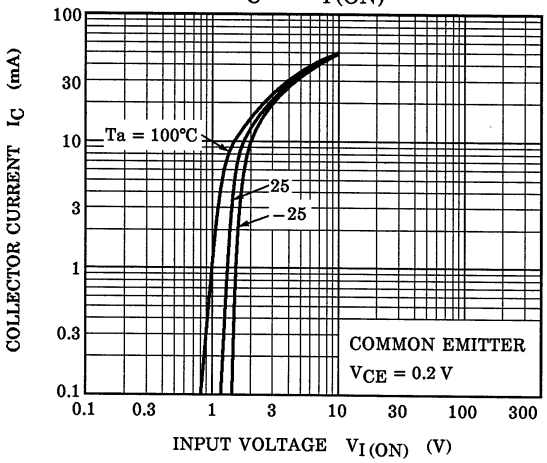
(Q1, Q2 Common)

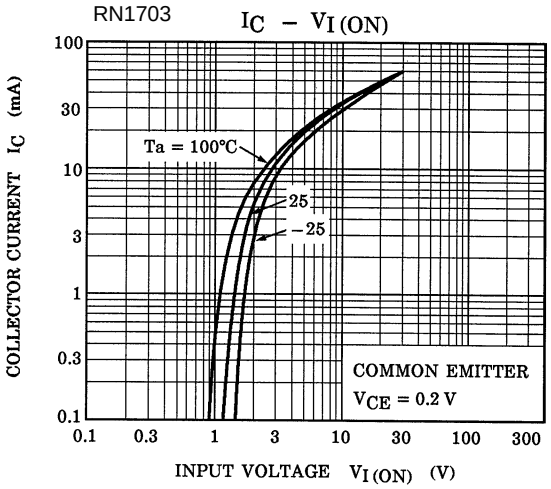
RN1701



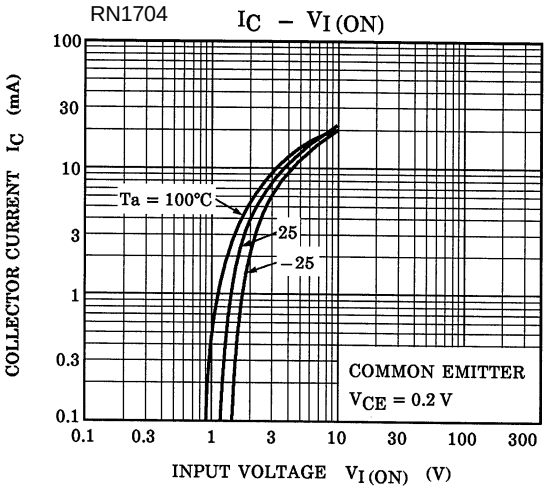
RN1702



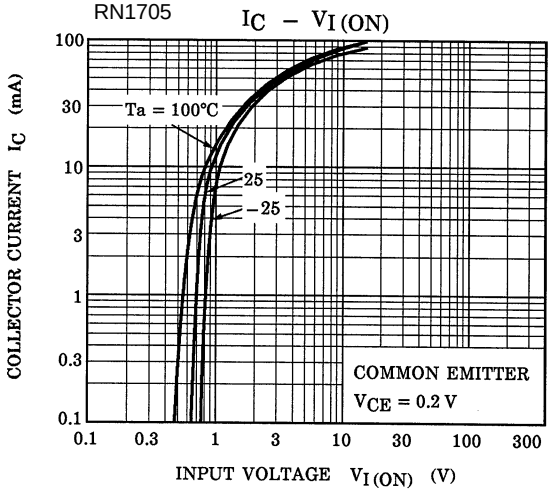
RN1703



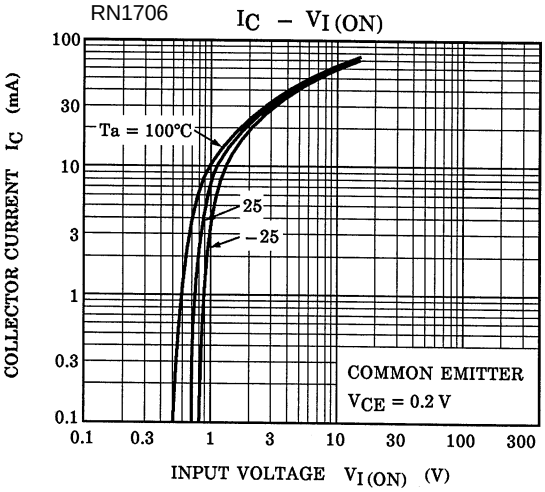
RN1704



RN1705



RN1706



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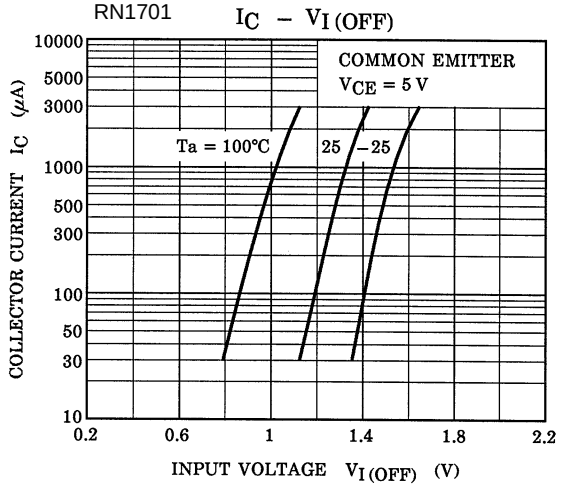
(Q1, Q2 Common)

RN1701



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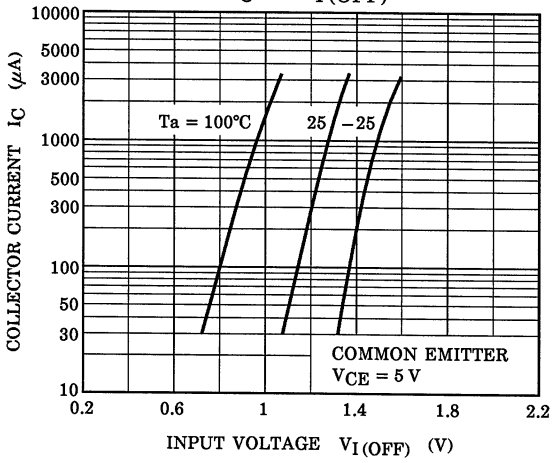

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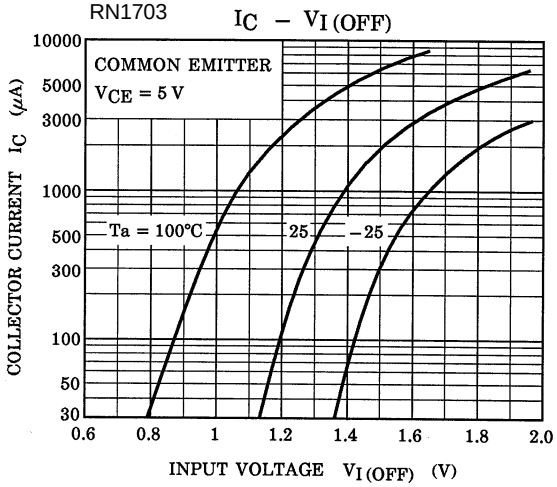

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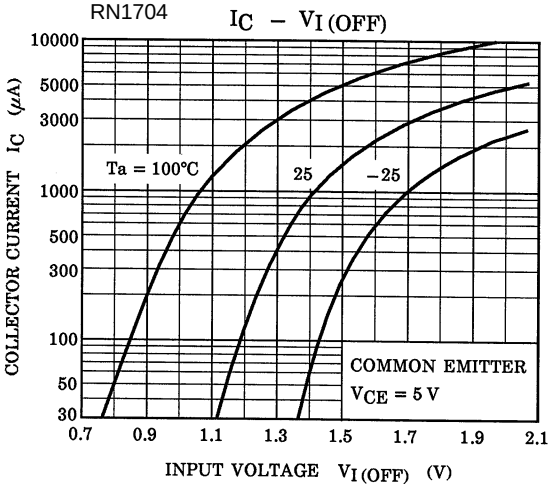

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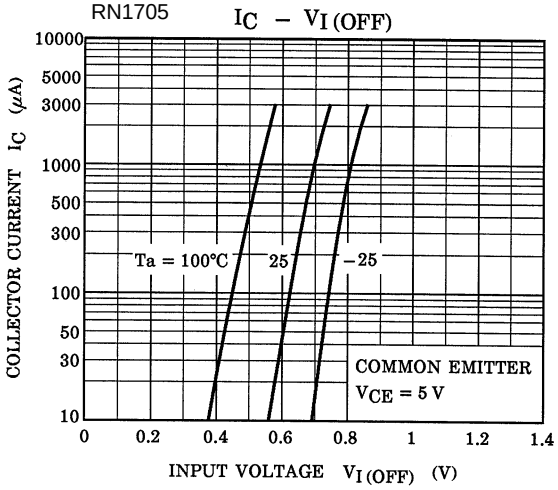

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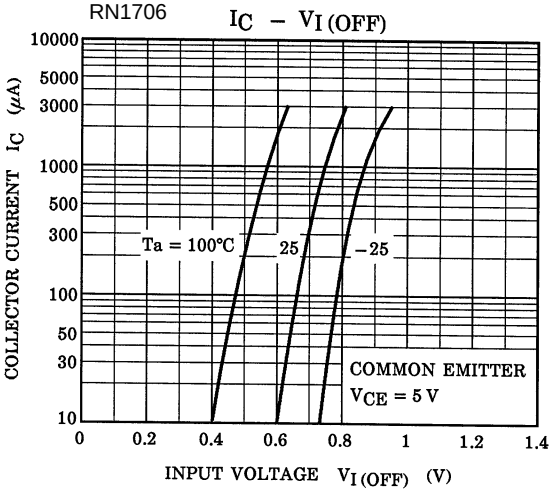

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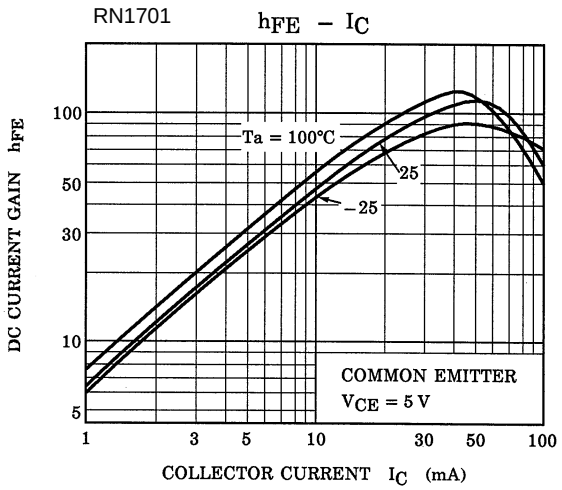
(Q1, Q2 Common)

RN1701



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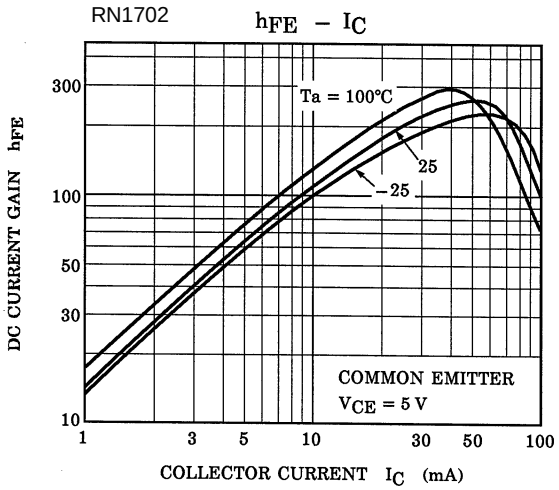

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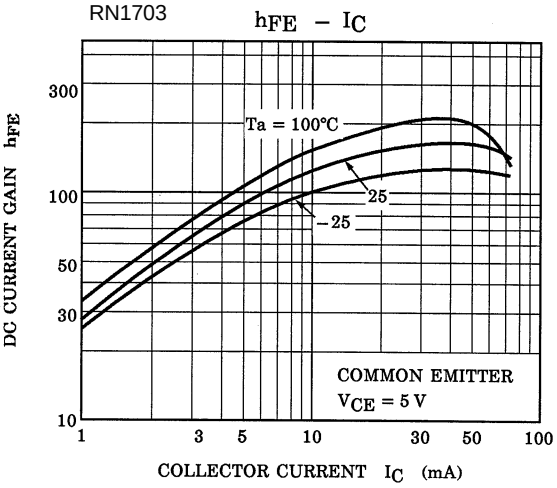

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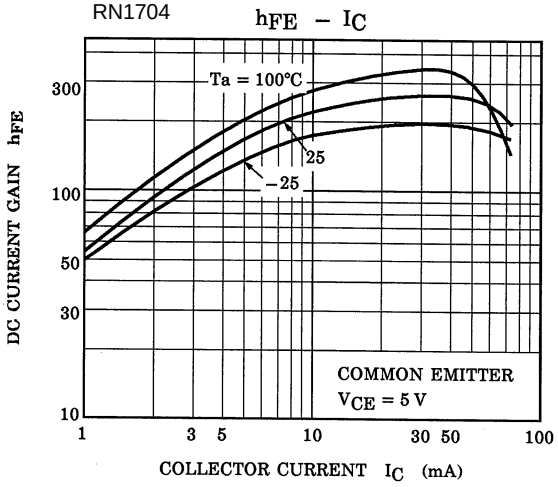

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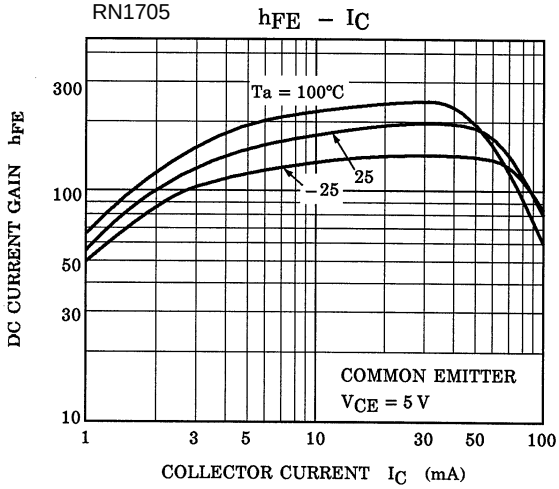

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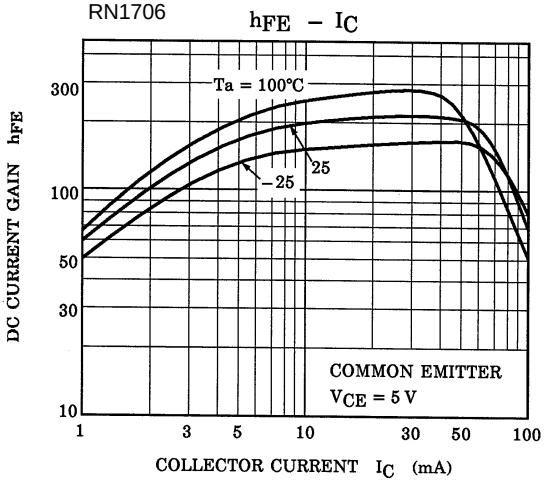

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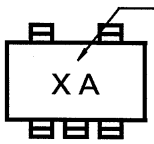
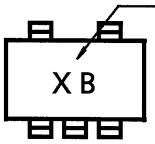
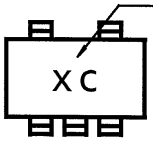
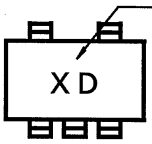
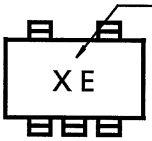
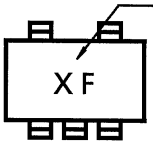
Part No.	Marking
RN1701	Part No.(abbreviation code) 
RN1702	Part No.(abbreviation code) 
RN1703	Part No.(abbreviation code) 
RN1704	Part No.(abbreviation code) 
RN1705	Part No.(abbreviation code) 
RN1706	Part No.(abbreviation code) 

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