TOSHIBA Transistor   Silicon PNP Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor)
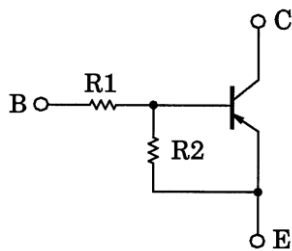
RN2701, RN2702, RN2703
RN2704, RN2705, RN2706

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 RN1701 to RN1706

Equivalent Circuit and Bias Resistor Values

Part No.	R1 (kΩ)	R2 (kΩ)
RN2701	4.7	4.7
RN2702	10	10
RN2703	22	22
RN2704	47	47
RN2705	2.2	47
RN2706	4.7	47

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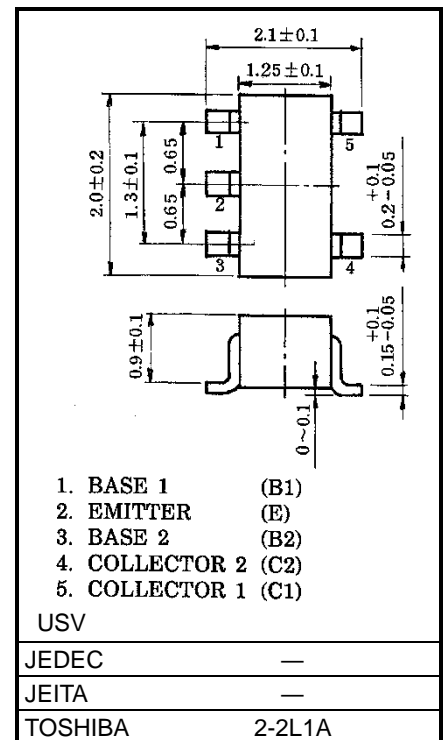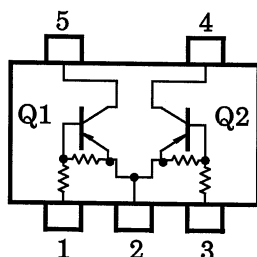
USV

JEDEC	—
JEITA	—
TOSHIBA	2-2L1A

Weight: 6.2 mg (typ.)

Equivalent Circuit
(top view)

Start of commercial production
1992-01

2019-10-24

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

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN2701 to 2706	V_{CBO}	−50	V
Collector-emitter voltage		V_{CEO}	−50	V
Emitter-base voltage	RN2701 to 2704	V_{EBO}	−10	V
	RN2705, 2706		−5	
Collector current	RN2701 to 2706	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.
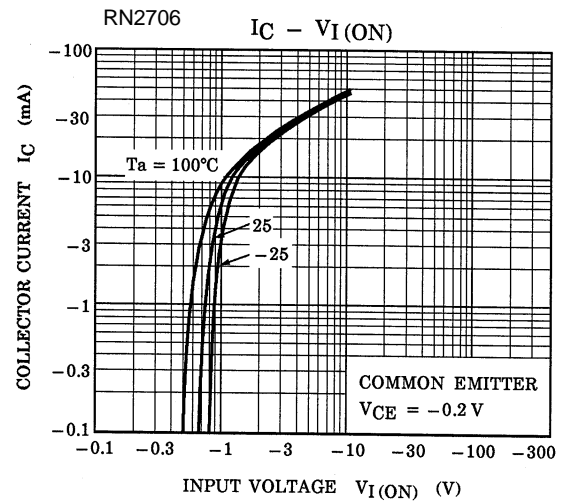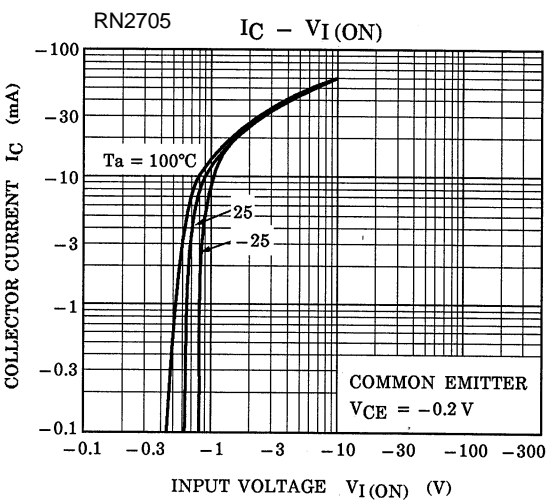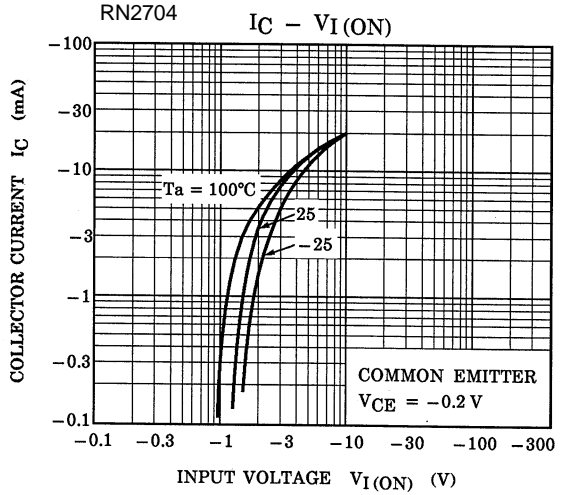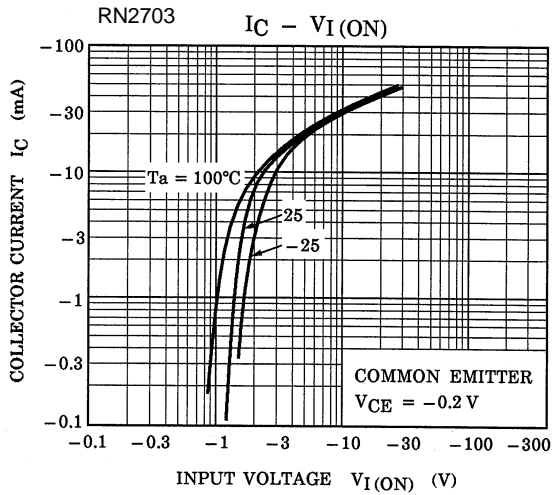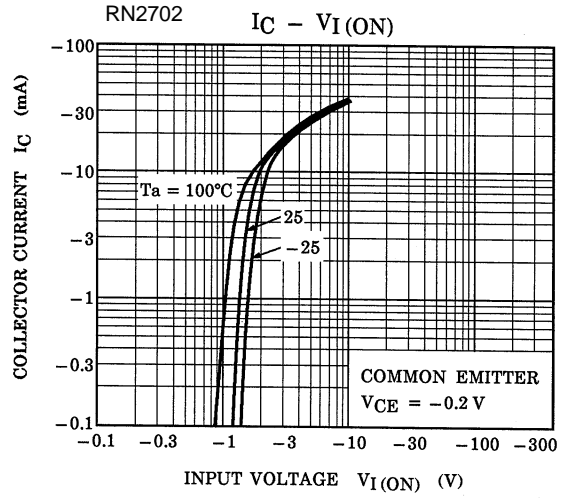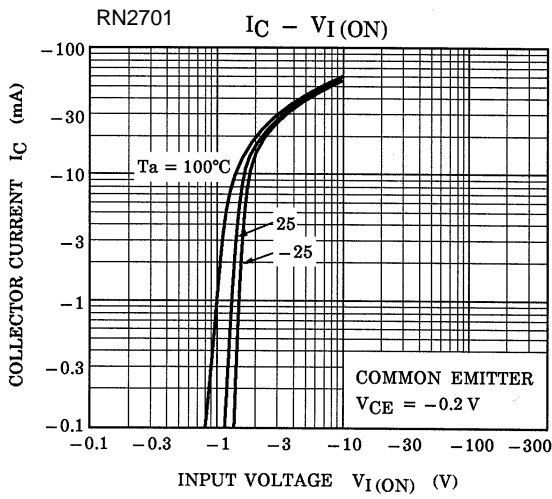
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

* Total rating

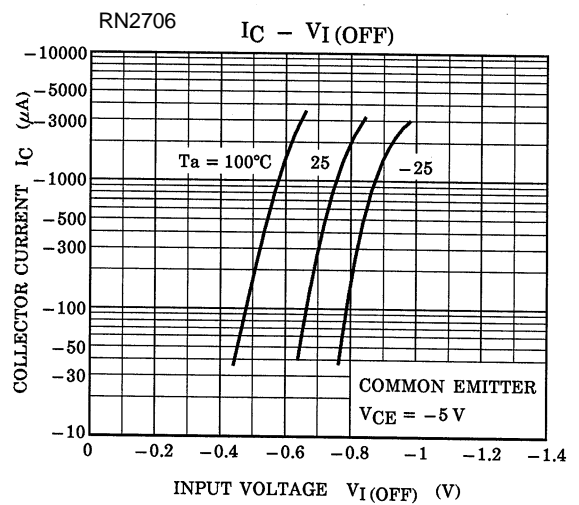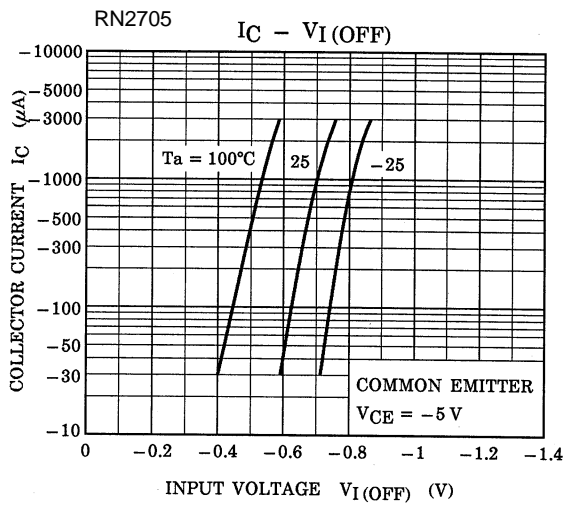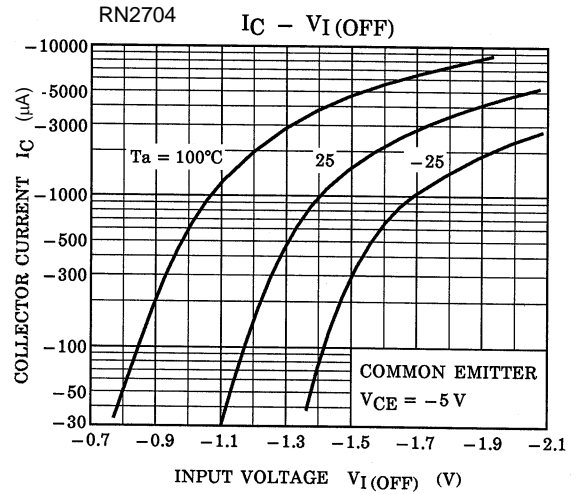2019-10-24
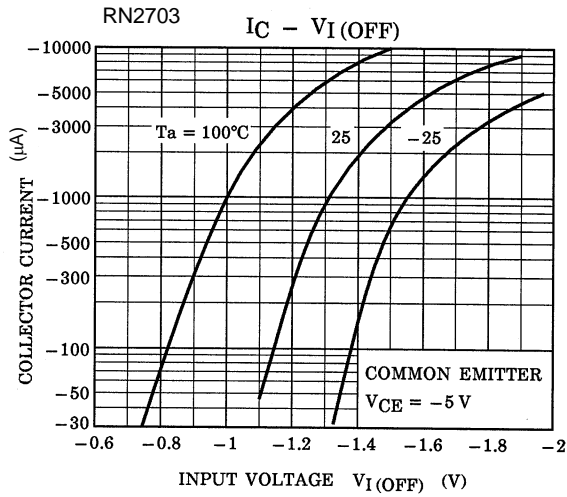
YH/AR

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

Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2701 to 2706	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	RN2701	I_{EBO}	—	V_{EB} = −10 V, I_C = 0 mA	−0.82	—	−1.52	mA
	RN2702		—		−0.38	—	−0.71	
	RN2703		—		−0.17	—	−0.33	
	RN2704		—		−0.082	—	−0.15	
	RN2705		—	V_{EB} = −5 V, I_C = 0 mA	−0.078	—	−0.145	
	RN2706		—		−0.074	—	−0.138	
DC current gain	RN2701	h_{FE}	—	V_{CE} = −5 V, I_C = −10 mA	30	—	—	—
	RN2702		—		50	—	—	
	RN2703		—		70	—	—	
	RN2704		—		80	—	—	
	RN2705		—		80	—	—	
	RN2706		—		80	—	—	
Collector-emitter saturation voltage	RN2701 to 2706	$V_{CE\,(sat)}$	—	I_C = −5 mA, I_B = −0.25 mA	—	−0.1	−0.3	V
Input voltage (ON)	RN2701	$V_{I\,(ON)}$	—	V_{CE} = −0.2 V, I_C = −5 mA	−1.1	—	−2.0	V
	RN2702		—		−1.2	—	−2.4	
	RN2703		—		−1.3	—	−3.0	
	RN2704		—		−1.5	—	−5.0	
	RN2705		—		−0.6	—	−1.1	
	RN2706		—		−0.7	—	−1.3	
Input voltage (OFF)	RN2701 to 2704	$V_{I\,(OFF)}$	—	V_{CE} = −5 V, I_C = −0.1 mA	−1.0	—	−1.5	V
	RN2705, 2706		—		−0.5	—	−0.8	
Transition frequency	RN2701 to 2706	f_T	—	V_{CE} = −10 V, I_C = −5 mA	—	200	—	MHz
Collector output capacitance	RN2701 to 2706	C_{ob}	—	V_{CB} = −10 V, I_E = 0 mA f = 1 MHz	—	3	6	pF
Input resistance	RN2701	R1	—	—	3.29	4.7	6.11	kΩ
	RN2702		—		7	10	13	
	RN2703		—		15.4	22	28.6	
	RN2704		—		32.9	47	61.1	
	RN2705		—		1.54	2.2	2.86	
	RN2706		—		3.29	4.7	6.11	
Resistor ratio	RN2701 to 2704	R1/R2	—	—	0.9	1.0	1.1	—
	RN2705		—		0.0421	0.0468	0.0515	
	RN2706		—		0.09	0.1	0.11	

2019-10-24

(Q1, Q2 Common)

RN2701 $I_C - V_{I(ON)}$

COLLECTOR CURRENT I_C (mA)

Ta = 100°C

25
−25

COMMON EMITTER
$V_{CE} = -0.2 V$

INPUT VOLTAGE $V_{I(ON)}$ (V)

RN2702 $I_C - V_{I(ON)}$

COLLECTOR CURRENT I_C (mA)

Ta = 100°C

25
−25

COMMON EMITTER
$V_{CE} = -0.2 V$

INPUT VOLTAGE $V_{I(ON)}$ (V)

RN2703 $I_C - V_{I(ON)}$

COLLECTOR CURRENT I_C (mA)

Ta = 100°C

25
−25

COMMON EMITTER
$V_{CE} = -0.2 V$

INPUT VOLTAGE $V_{I(ON)}$ (V)

RN2704 $I_C - V_{I(ON)}$

COLLECTOR CURRENT I_C (mA)

Ta = 100°C

25
−25

COMMON EMITTER
$V_{CE} = -0.2 V$

INPUT VOLTAGE $V_{I(ON)}$ (V)

RN2705 $I_C - V_{I(ON)}$

COLLECTOR CURRENT I_C (mA)

Ta = 100°C

25
−25

COMMON EMITTER
$V_{CE} = -0.2 V$

INPUT VOLTAGE $V_{I(ON)}$ (V)

RN2706 $I_C - V_{I(ON)}$

COLLECTOR CURRENT I_C (mA)

Ta = 100°C

25
−25

COMMON EMITTER
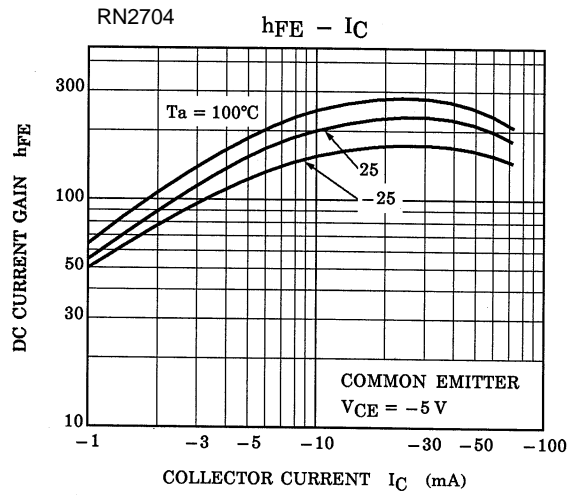$V_{CE} = -0.2 V$

INPUT VOLTAGE $V_{I(ON)}$ (V)

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

2019-10-24

(Q1, Q2 Common)

RN2701 $I_C - V_{I\,(OFF)}$

RN2702 $I_C - V_{I\,(OFF)}$

RN2703 $I_C - V_{I\,(OFF)}$

RN2704 $I_C - V_{I\,(OFF)}$

RN2705 $I_C - V_{I\,(OFF)}$
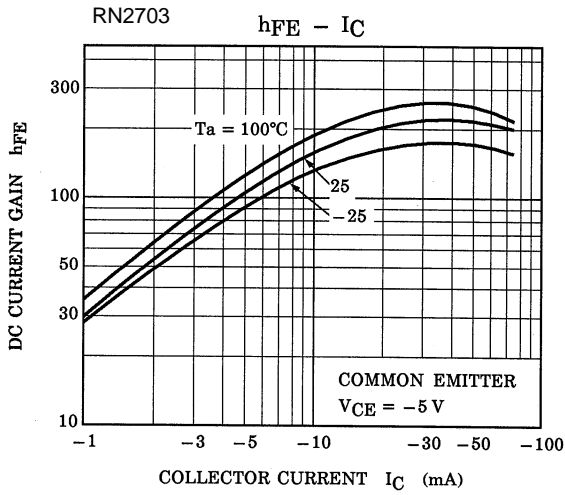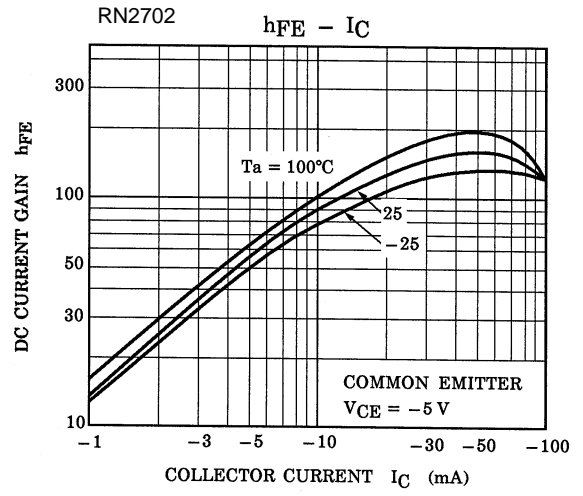

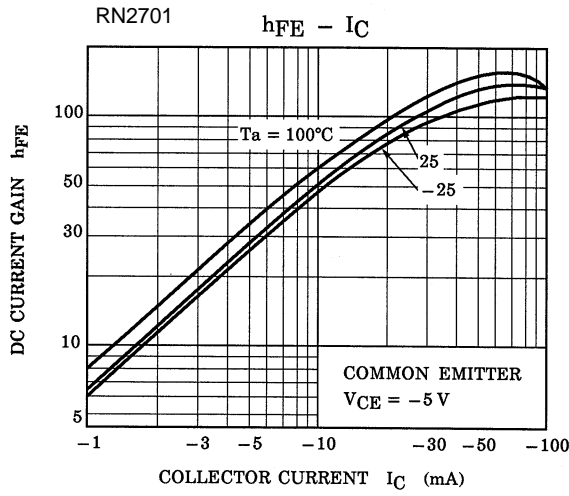RN2706 $I_C - V_{I\,(OFF)}$

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(Q1, Q2 Common)
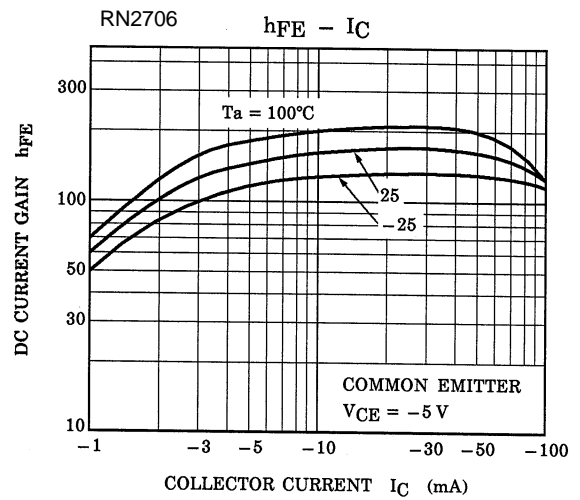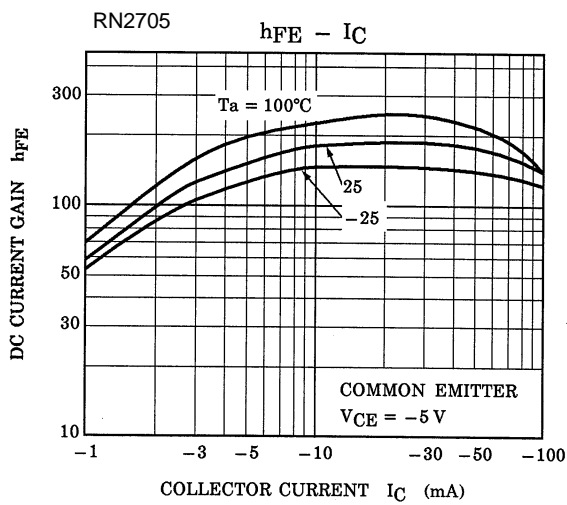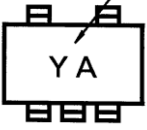
RN2701

$h_{FE} - I_C$

RN2702

$h_{FE} - I_C$

RN2703

$h_{FE} - I_C$

RN2704

$h_{FE} - I_C$

RN2705

$h_{FE} - I_C$

RN2706

$h_{FE} - I_C$

The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.
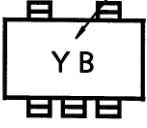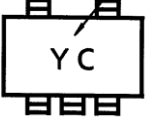
2019-10-24

Marking

Part No.	Marking
RN2701	Part No.(abbreviation code) Y A
RN2702	Part No.(abbreviation code) Y B
RN2703	Part No.(abbreviation code) Y C
RN2704	Part No.(abbreviation code) Y D
RN2705	Part No.(abbreviation code) Y E
RN2706	Part No.(abbreviation code) Y F

2019-10-24

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