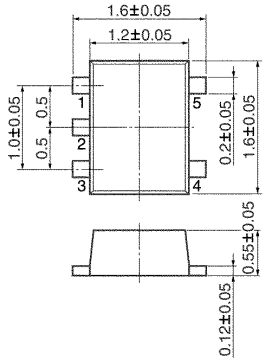
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process) (Bias Resistor Built-in Transistor)

RN1701JE,RN1702JE,RN1703JE RN1704JE,RN1705JE,RN1706JE

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- Two devices are incorporated into an Extreme-Super-Mini (5 pin) package.
- Incorporating a bias resistor into a transistor reduces parts count. Reducing the parts count enables the manufacture of ever more compact equipment and lowers assembly cost.
- A wide range of resistor values is available for use in various circuit designs.
- Complementary to RN2701JE~RN2706JE

Unit: mm



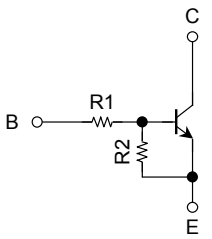
1.BASE1 (B1)
2.EMITTER (E)
3.BASE2 (B2)
4.COLLECTOR2 (C2)
5.COLLECTOR1 (C1)

ESV

JEDEC	—
JEITA	—
TOSHIBA	2-2P1D

Weight: 0.003 g (typ.)

Equivalent Circuit and Bias Resistor Values



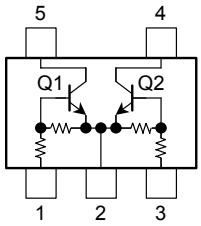
Type No.	R1 (kΩ)	R2 (kΩ)
RN1701JE	4.7	4.7
RN1702JE	10	10
RN1703JE	22	22
RN1704JE	47	47
RN1705JE	2.2	47
RN1706JE	4.7	47

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

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN1701JE~1706JE	V_{CBO}	50	V
Collector-emitter voltage		V_{CEO}	50	V
Emitter-base voltage	RN1701JE~1704JE	V_{EBO}	10	V
	RN1705JE, RN1706JE		5	
Collector current	RN1701JE~1706JE	I_C	100	mA
Collector power dissipation		P_C (Note)	100	mW
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55~150	°C

Note: Total rating

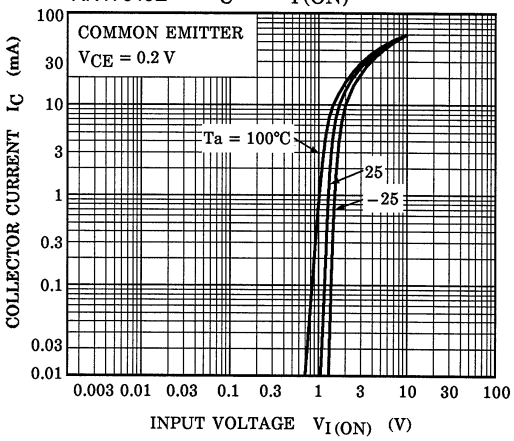
Equivalent Circuit (top view)



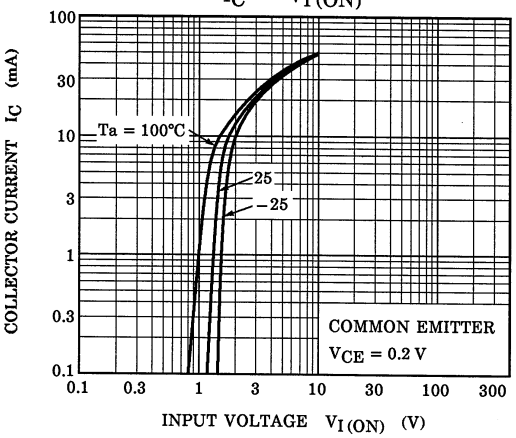
Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1701JE~1706JE	I_{CBO}	V_{CB} = 50 V, I_E = 0	—	—	100	nA
		I_{CEO}	V_{CE} = 50 V, I_B = 0	—	—	500	
Emitter cut-off current	RN1701JE	I_{EBO}	V_{EB} = 10 V, I_C = 0	0.82	—	1.52	mA
	RN1702JE			0.38	—	0.71	
	RN1703JE			0.17	—	0.33	
	RN1704JE			0.082	—	0.15	
	RN1705JE		V_{EB} = 5 V, I_C = 0	0.078	—	0.145	
	RN1706JE			0.074	—	0.138	
DC current gain	RN1701JE	h_{FE}	V_{CE} = 5 V, I_C = 10 mA	30	—	—	
	RN1702JE			50	—	—	
	RN1703JE			70	—	—	
	RN1704JE			80	—	—	
	RN1705JE			80	—	—	
	RN1706JE			80	—	—	
Collector-emitter saturation voltage	RN1701JE~1706JE	$V_{CE\ (sat)}$	I_C = 5 mA, I_B = 0.25 mA	—	0.1	0.3	V
Input voltage (ON)	RN1701JE	$V_{I\ (ON)}$	V_{CE} = 0.2 V, I_C = 5 mA	1.1	—	2.0	V
	RN1702JE			1.2	—	2.4	
	RN1703JE			1.3	—	3.0	
	RN1704JE			1.5	—	5.0	
	RN1705JE			0.6	—	1.1	
	RN1706JE			0.7	—	1.3	
Input voltage (OFF)	RN1701JE~1704JE	$V_{I\ (OFF)}$	V_{CE} = 5 V, I_C = 0.1 mA	1.0	—	1.5	V
	RN1705JE, 1706JE			0.5	—	0.8	
Transition frequency	RN1701JE~1706JE	f_T	V_{CE} = 10 V, I_C = 5 mA	—	250	—	MHz
Collector output capacitance	RN1701JE~1706JE	C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1 MHz	—	3	6	pF
Input resistor	RN1701JE	R1	—	3.29	4.7	6.11	kΩ
	RN1702JE			7	10	13	
	RN1703JE			15.4	22	28.6	
	RN1704JE			32.9	47	61.1	
	RN1705JE			1.54	2.2	2.86	
	RN1706JE			3.29	4.7	6.11	
Resistor ratio	RN1701JE~1704JE	R1/R2	—	0.9	1.0	1.1	
	RN1705JE			0.0421	0.0468	0.0515	
	RN1706JE			0.09	0.1	0.11	

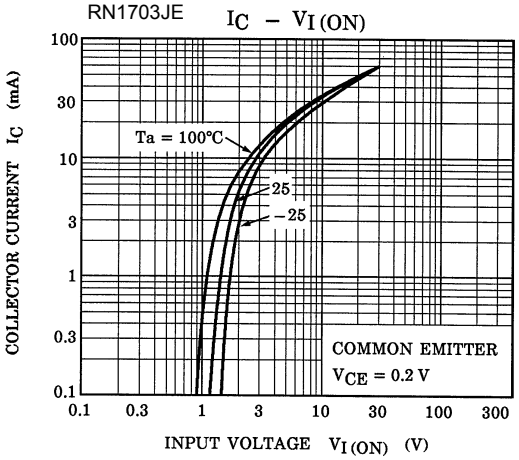
RN1701JE $I_C - V_{I(ON)}$



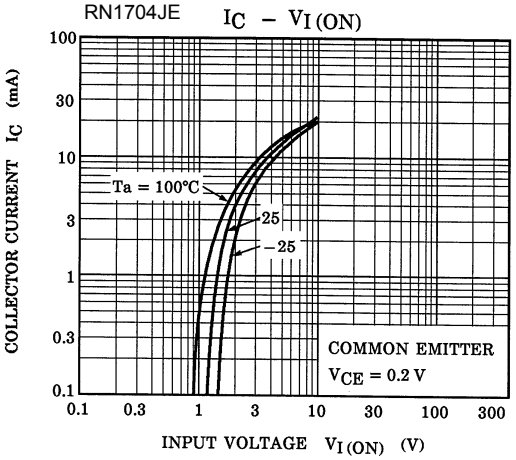
RN1702JE $I_C - V_{I(ON)}$



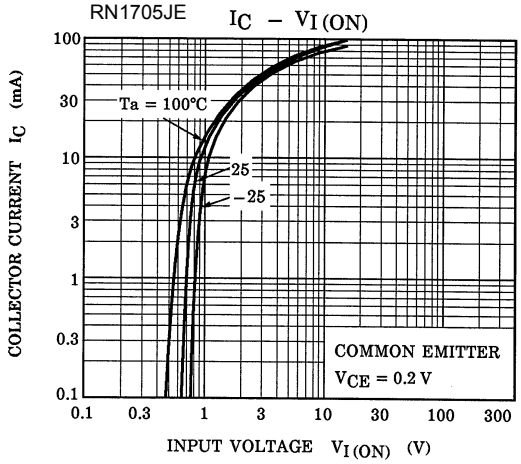
RN1703JE $I_C - V_{I(ON)}$



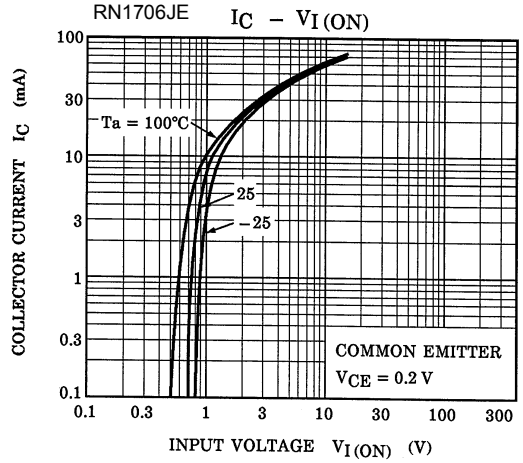
RN1704JE $I_C - V_{I(ON)}$



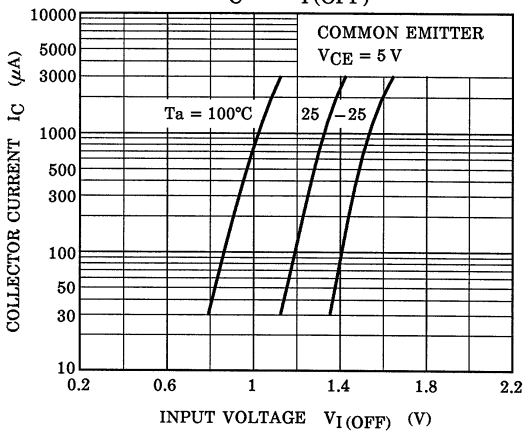
RN1705JE $I_C - V_{I(ON)}$



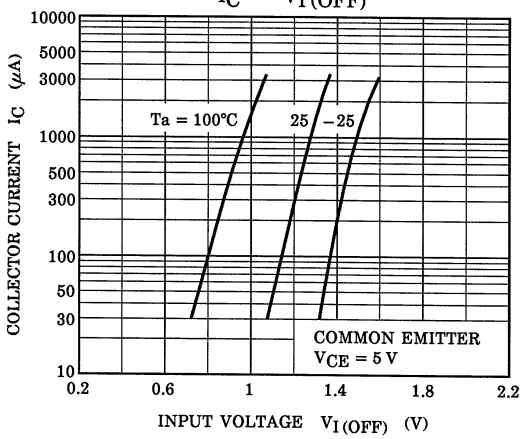
RN1706JE $I_C - V_{I(ON)}$



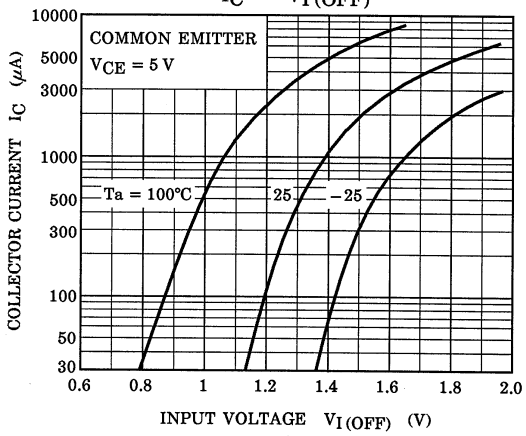
RN1701JE I_C – $V_{I(OFF)}$



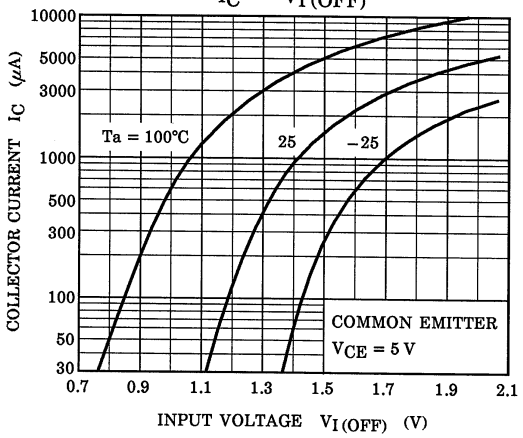
RN1702JE I_C – $V_{I(OFF)}$



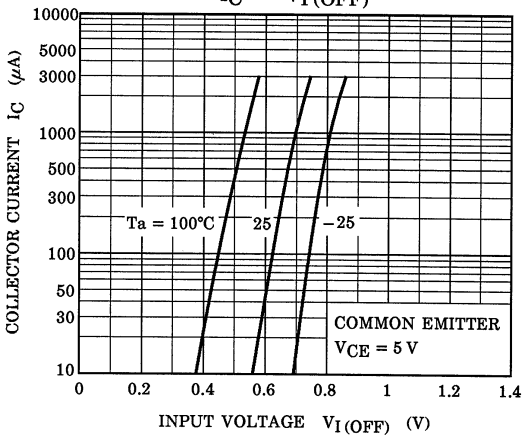
RN1703JE I_C – $V_{I(OFF)}$



RN1704JE I_C – $V_{I(OFF)}$



RN1705JE I_C – $V_{I(OFF)}$



RN1706JE I_C – $V_{I(OFF)}$