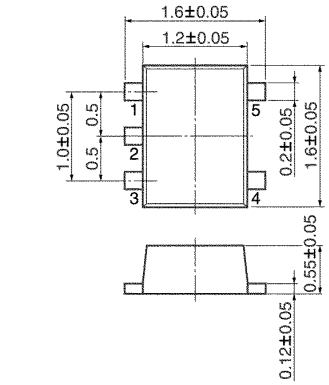
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor)

RN2701JE, RN2702JE, RN2703JE RN2704JE, RN2705JE, RN2706JE

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.
- Complementary to RN1701JE to RN1706JE

Unit: mm



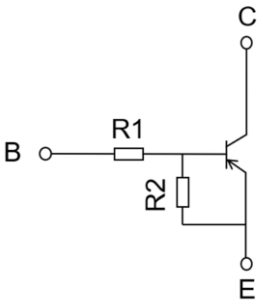
1.BASE1	(B1)
2.EMITTER	(E)
3.BASE2	(B2)
4.COLLECTOR2	(C2)
5.COLLECTOR1	(C1)

ESV

JEDEC	—
JEITA	—
TOSHIBA	2-2P1D

Weight: 0.003 g (typ.)

Equivalent Circuit and Bias Resistor Values

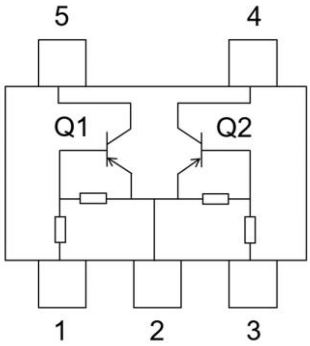


Type No.	R1 (kΩ)	R2 (kΩ)
RN2701JE	4.7	4.7
RN2702JE	10	10
RN2703JE	22	22
RN2704JE	47	47
RN2705JE	2.2	47
RN2706JE	4.7	47

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

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN2701JE to 2706JE	V_{CBO}	−50	V
Collector-emitter voltage		V_{CEO}	−50	V
Emitter-base voltage	RN2701JE to 2704JE	V_{EBO}	−10	V
	RN2705JE RN2706JE		−5	
Collector current	RN2701JE to 2706JE	I_C	−100	mA
Collector power dissipation		P_C (Note 1)	100	mW
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

Equivalent Circuit (top view)



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

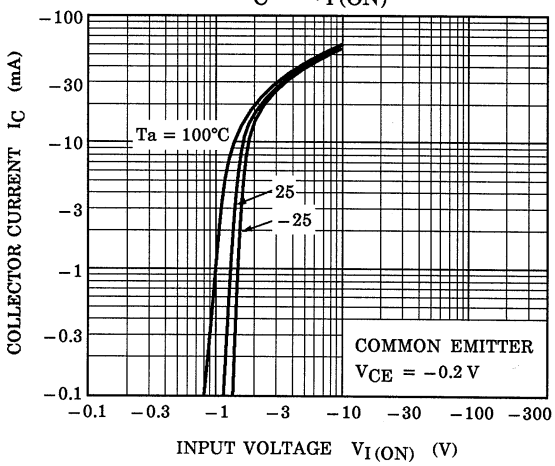
Start of commercial production
2000-06

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

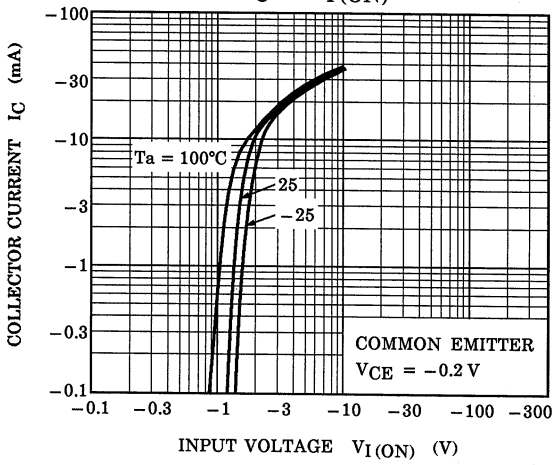
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2701JE to 2706JE	I_{CBO}	V_{CB} = –50 V, I_E = 0 mA	—	—	–100	nA
		I_{CEO}	V_{CE} = –50 V, I_B = 0 mA	—	—	–500	
Emitter cut-off current	RN2701JE	I_{EBO}	V_{EB} = –10 V, I_C = 0 mA	–0.82	—	–1.52	mA
	RN2702JE			–0.38	—	–0.71	
	RN2703JE			–0.17	—	–0.33	
	RN2704JE			–0.082	—	–0.15	
	RN2705JE		V_{EB} = –5 V, I_C = 0 mA	–0.078	—	–0.145	
	RN2706JE			–0.074	—	–0.138	
DC current gain	RN2701JE	h_{FE}	V_{CE} = –5 V, I_C = –10 mA	30	—	—	
	RN2702JE			50	—	—	
	RN2703JE			70	—	—	
	RN2704JE			80	—	—	
	RN2705JE			80	—	—	
	RN2706JE			80	—	—	
Collector-emitter saturation voltage	RN2701JE to 2706JE	$V_{CE\ (sat)}$	I_C = –5 mA, I_B = –0.25 mA	—	–0.1	–0.3	V
Input voltage (ON)	RN2701JE	$V_{I\ (ON)}$	V_{CE} = –0.2 V, I_C = –5 mA	–1.1	—	–2.0	V
	RN2702JE			–1.2	—	–2.4	
	RN2703JE			–1.3	—	–3.0	
	RN2704JE			–1.5	—	–5.0	
	RN2705JE			–0.6	—	–1.1	
	RN2706JE			–0.7	—	–1.3	
Input voltage (OFF)	RN2701JE to 2704JE	$V_{I\ (OFF)}$	V_{CE} = –5 V, I_C = –0.1 mA	–1.0	—	–1.5	V
	RN2705JE, 2706JE			–0.5	—	–0.8	
Transition frequency	RN2701JE to 2706JE	f_T	V_{CE} = –10 V, I_C = –5 mA	—	200	—	MHz
Collector output capacitance	RN2701JE to 2706JE	C_{ob}	V_{CB} = –10 V, I_E = 0 mA, f = 1 MHz	—	3	6	pF
Input resistor	RN2701JE	R1	—	3.29	4.7	6.11	kΩ
	RN2702JE			7	10	13	
	RN2703JE			15.4	22	28.6	
	RN2704JE			32.9	47	61.1	
	RN2705JE			1.54	2.2	2.86	
	RN2706JE			3.29	4.7	6.11	
Resistor ratio	RN2701JE to 2704JE	R1/R2	—	0.9	1.0	1.1	
	RN2705JE			0.0421	0.0468	0.0515	
	RN2706JE			0.09	0.1	0.11	

(Q1, Q2 Common)

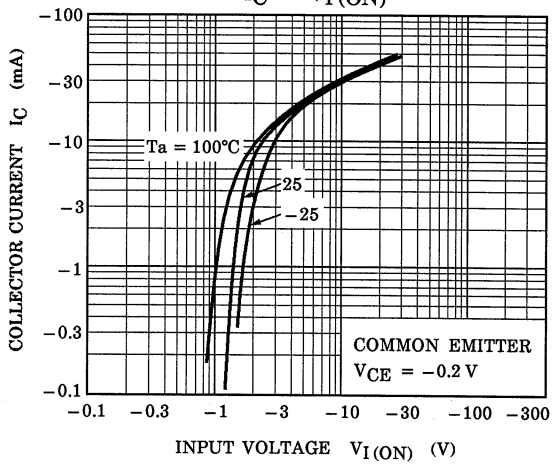
RN2701JE $I_C - V_{I(ON)}$



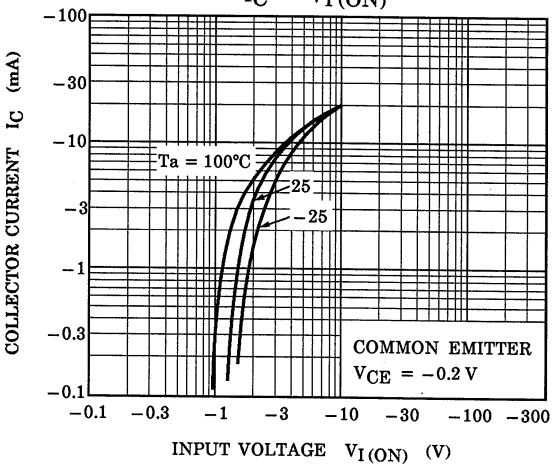
RN2702JE $I_C - V_{I(ON)}$



RN2703JE $I_C - V_{I(ON)}$



RN2704JE $I_C - V_{I(ON)}$



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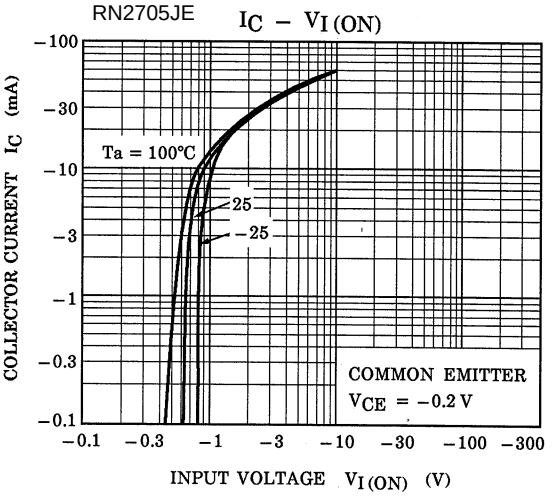
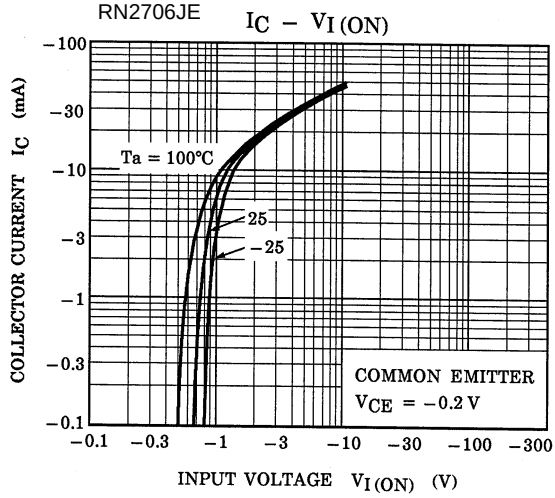
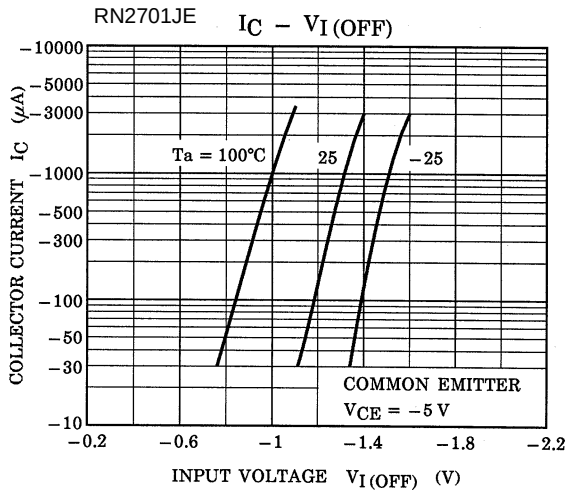


RN2706JE $I_C - V_{I(ON)}$



(Q1, Q2 Common)

RN2701JE



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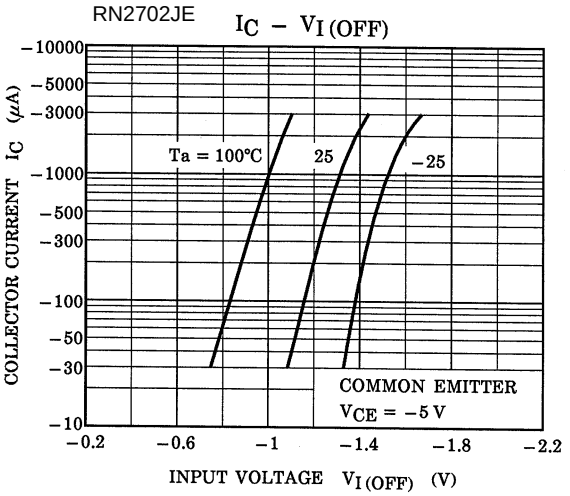

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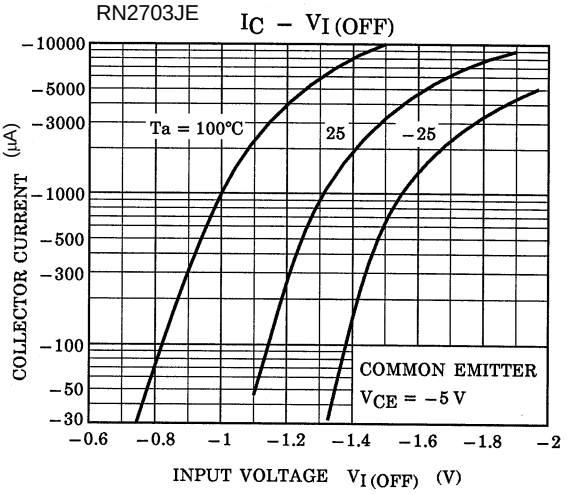

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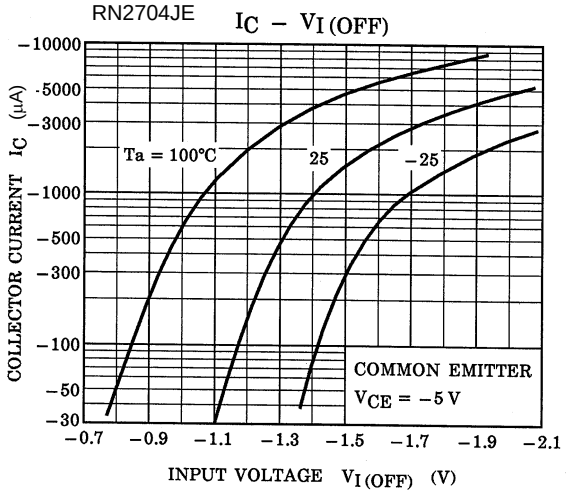

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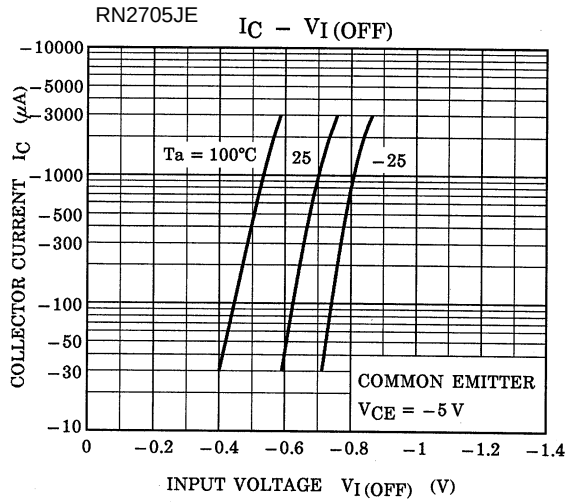

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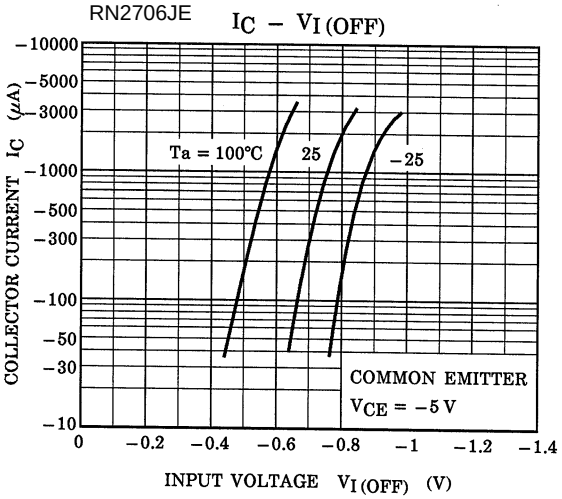

(Q1, Q2 Common)

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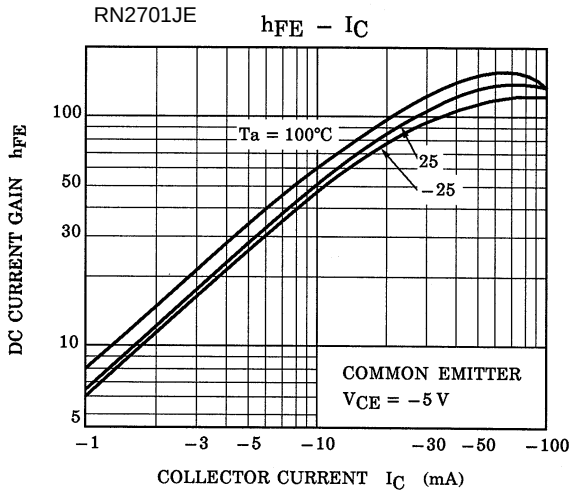

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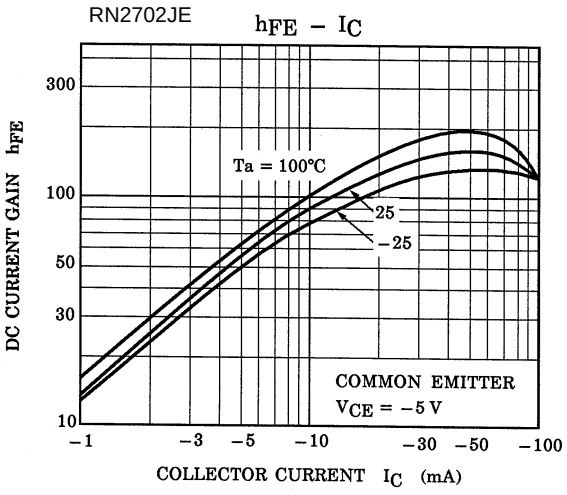

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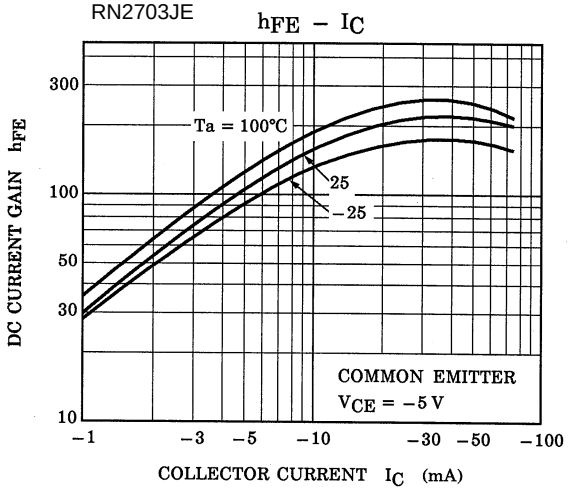

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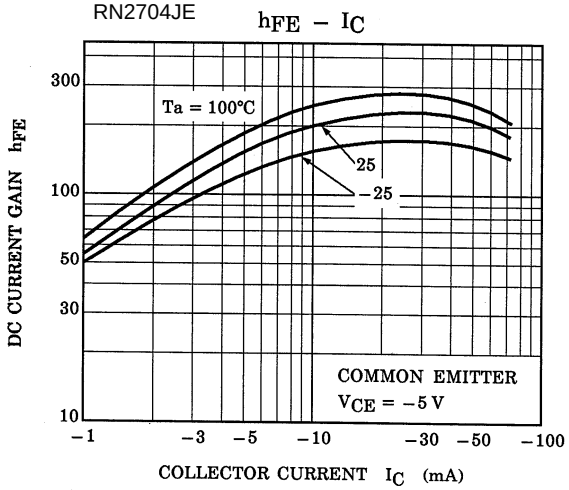

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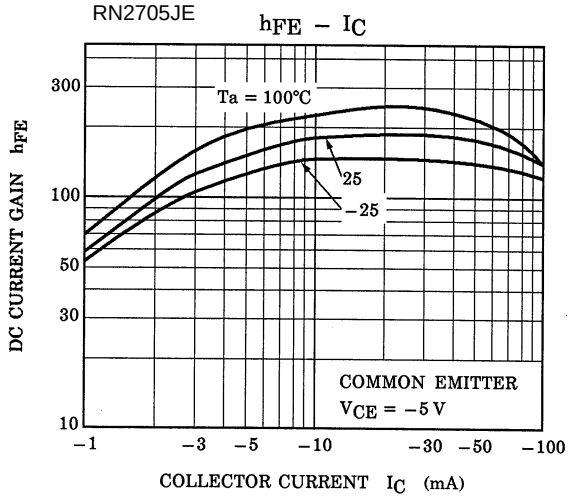

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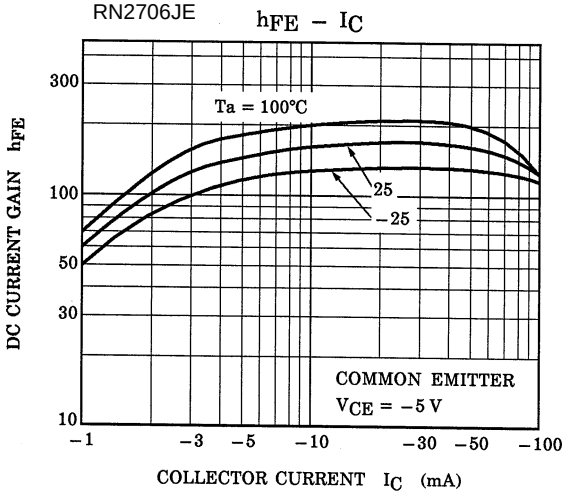
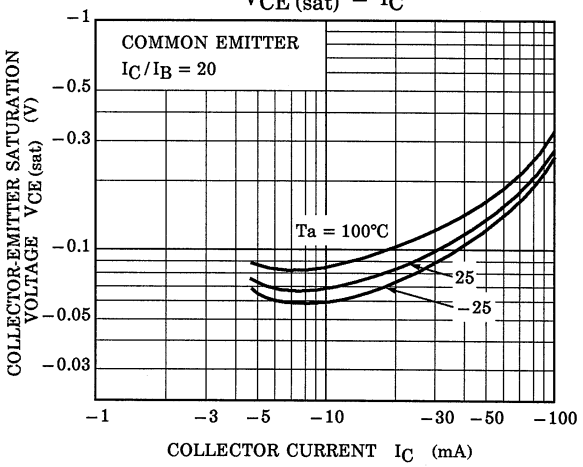


(Q1, Q2 Common)

RN2701JE



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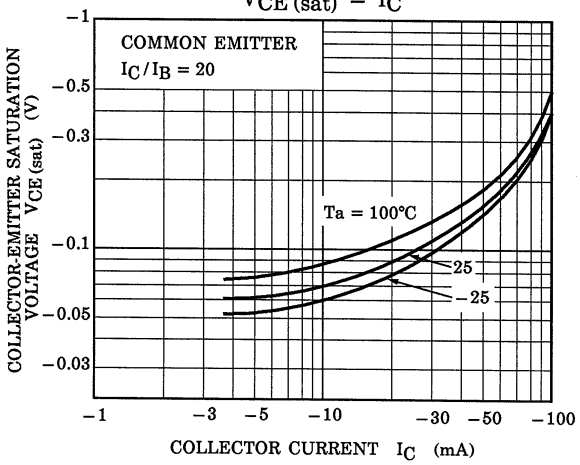

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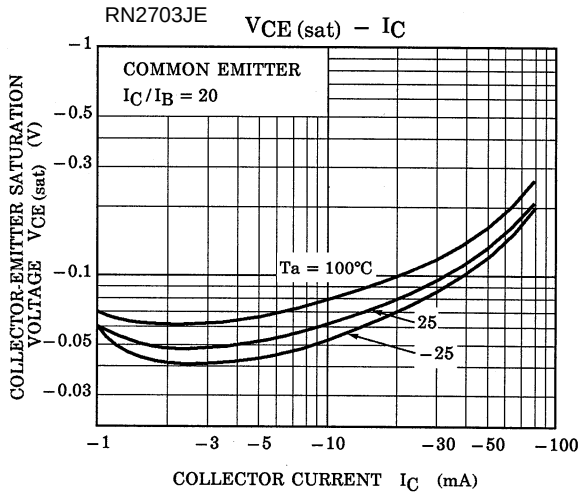

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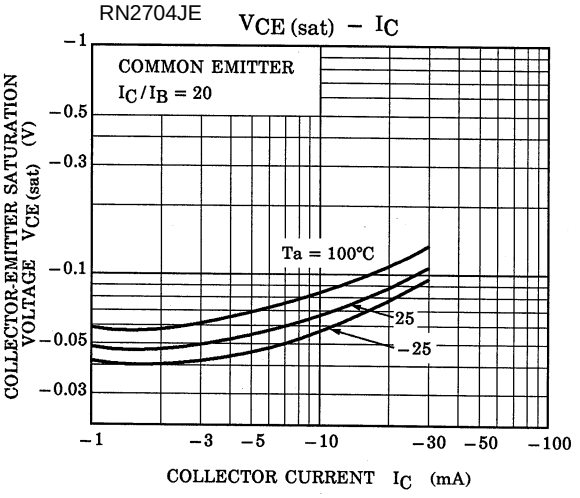

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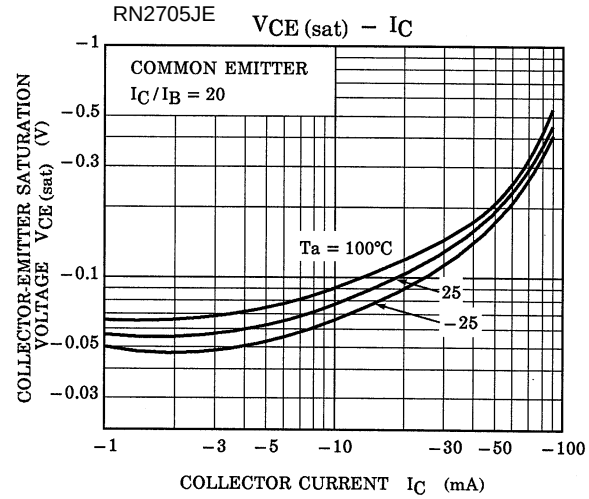

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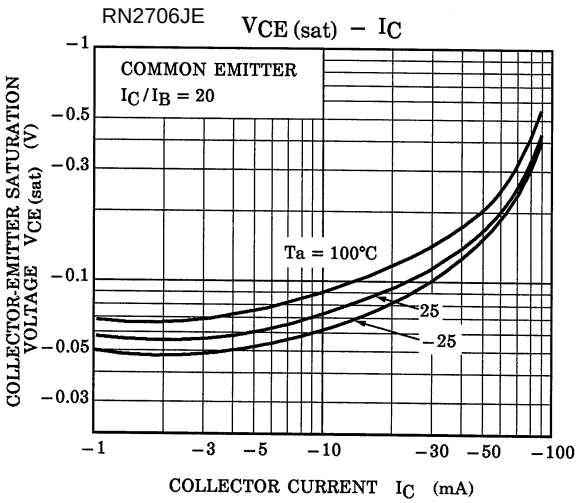

Marking

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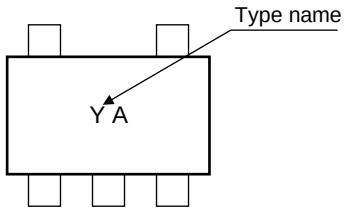
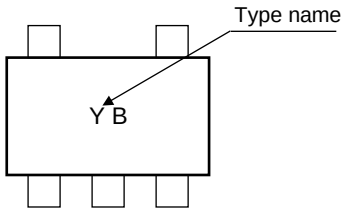
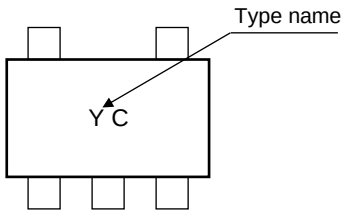
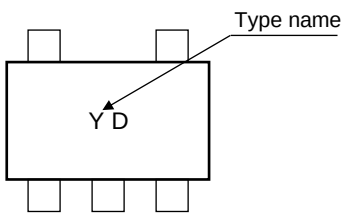
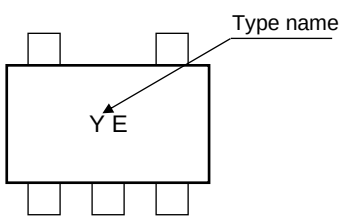
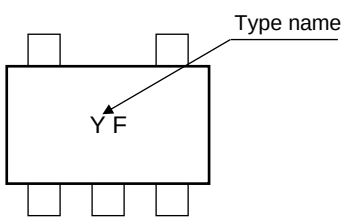
RN2701JE	
RN2702JE	
RN2703JE	
RN2704JE	
RN2705JE	
RN2706JE	

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