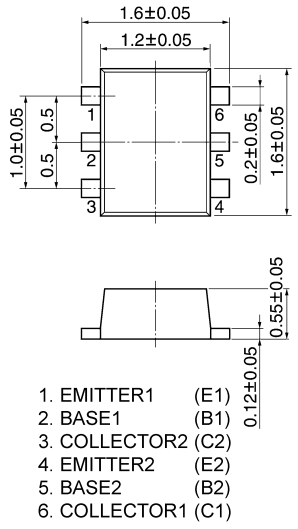
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process) (Bias Resistor Built-in Transistor)

RN2901FE,RN2902FE,RN2903FE RN2904FE,RN2905FE,RN2906FE

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- Two devices are incorporated into an Extreme-Super-Mini (6-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 RN1901FE~RN1906FE

Unit: mm



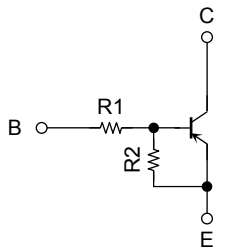
1. EMITTER1 (E1)
2. BASE1 (B1)
3. COLLECTOR2 (C2)
4. EMITTER2 (E2)
5. BASE2 (B2)
6. COLLECTOR1 (C1)

ES6

JEDEC	—
JEITA	—
TOSHIBA	2-2N1G

Weight:0.003 g (typ.)

Equivalent Circuit and Bias Resistor Values

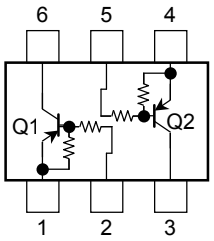


Type No.	R1 (kΩ)	R2 (kΩ)
RN2901FE	4.7	4.7
RN2902FE	10	10
RN2903FE	22	22
RN2904FE	47	47
RN2905FE	2.2	47
RN2906FE	4.7	47

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

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN2901FE~ RN2906FE	V_{CBO}	−50	V
Collector-emitter voltage		V_{CEO}	−50	V
Emitter-base voltage	RN2901FE~ RN2904FE	V_{EBO}	−10	V
	RN2905FE, RN2906FE		−5	
Collector current	RN2901FE~ RN2906FE	I_C	−100	mA
Collector power dissipation		P_C (Note 1)	100	mW
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55~150	°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).

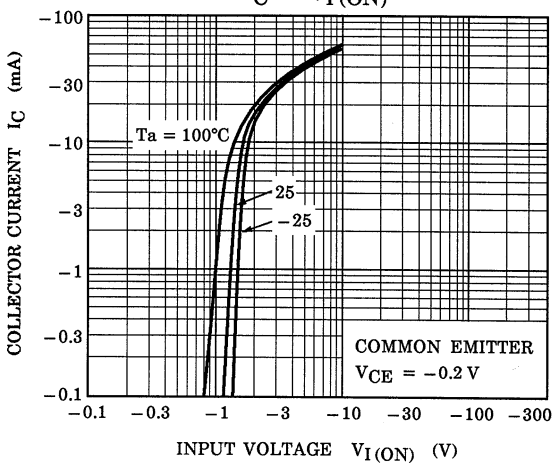
Note 1: Total rating

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

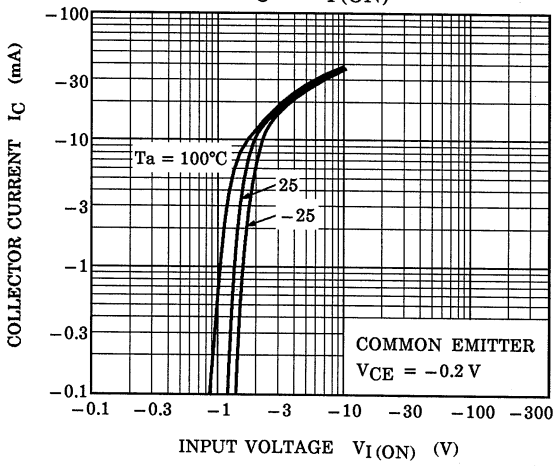
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2901FE~2906FE	I_{CBO}	V_{CB} = –50 V, I_E = 0	—	—	–100	nA
		I_{CEO}	V_{CE} = –50 V, I_B = 0	—	—	–500	
Emitter cut-off current	RN2901FE	I_{EBO}	V_{EB} = –10 V, I_C = 0	–0.82	—	–1.52	mA
	RN2902FE			–0.38	—	–0.71	
	RN2903FE			–0.17	—	–0.33	
	RN2904FE			–0.082	—	–0.15	
	RN2905FE		V_{EB} = –5 V, I_C = 0	–0.078	—	–0.145	
	RN2906FE			–0.074	—	–0.138	
DC current gain	RN2901FE	h_{FE}	V_{CE} = –5 V, I_C = –10 mA	30	—	—	
	RN2902FE			50	—	—	
	RN2903FE			70	—	—	
	RN2904FE			80	—	—	
	RN2905FE			80	—	—	
	RN2906FE			80	—	—	
Collector-emitter saturation voltage	RN2901FE~2906FE	$V_{CE\ (sat)}$	I_C = –5 mA, I_B = –0.25 mA	—	–0.1	–0.3	V
Input voltage (ON)	RN2901FE	$V_{I\ (ON)}$	V_{CE} = –0.2 V, I_C = –5 mA	–1.1	—	–2.0	V
	RN2902FE			–1.2	—	–2.4	
	RN2903FE			–1.3	—	–3.0	
	RN2904FE			–1.5	—	–5.0	
	RN2905FE			–0.6	—	–1.1	
	RN2906FE			–0.7	—	–1.3	
Input voltage (OFF)	RN2901FE~2904FE	$V_{I\ (OFF)}$	V_{CE} = –5 V, I_C = –0.1 mA	–1.0	—	–1.5	V
	RN2905FE, 2906FE			–0.5	—	–0.8	
Transition frequency	RN2901FE~2906FE	f_T	V_{CE} = –10 V, I_C = –5 mA	—	200	—	MHz
Collector output capacitance	RN2901FE~2906FE	C_{ob}	V_{CB} = –10 V, I_E = 0, f = 1 MHz	—	3	6	pF
Input resistor	RN2901FE	R1	—	3.29	4.7	6.11	kΩ
	RN2902FE			7	10	13	
	RN2903FE			15.4	22	28.6	
	RN2904FE			32.9	47	61.1	
	RN2905FE			1.54	2.2	2.86	
	RN2906FE			3.29	4.7	6.11	
Resistor ratio	RN2901FE~2904FE	R1/R2	—	0.9	1.0	1.1	
	RN2905FE			0.0421	0.0468	0.0515	
	RN2906FE			0.09	0.1	0.11	

Q1, Q2 Common

RN2901FE $I_C - V_{I(ON)}$



RN2902FE $I_C - V_{I(ON)}$



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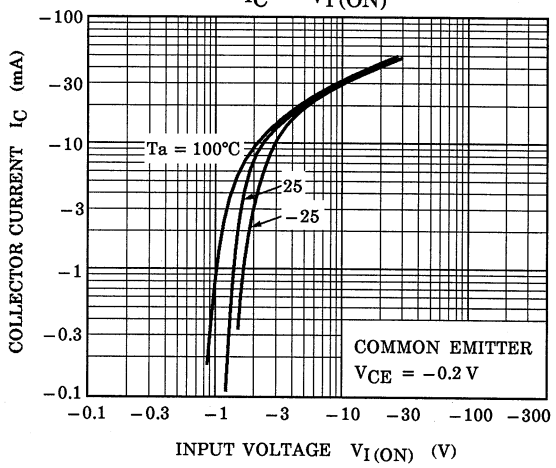

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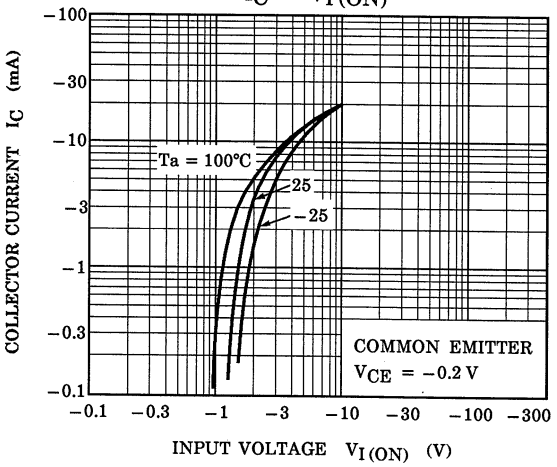

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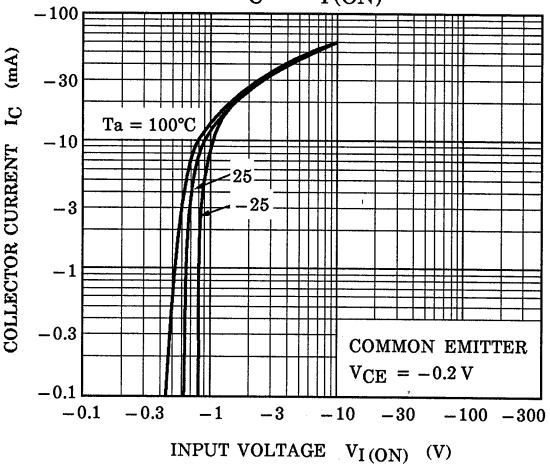

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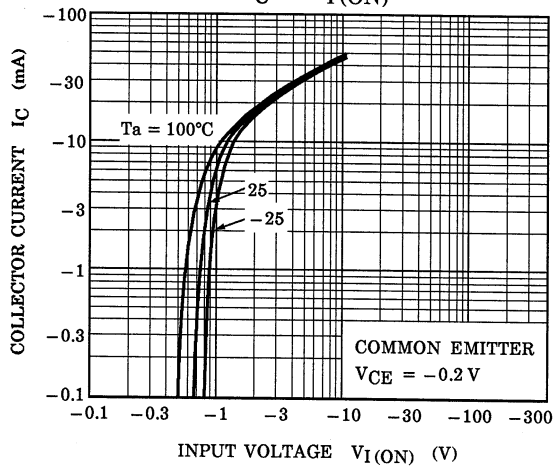

Q1, Q2 Common

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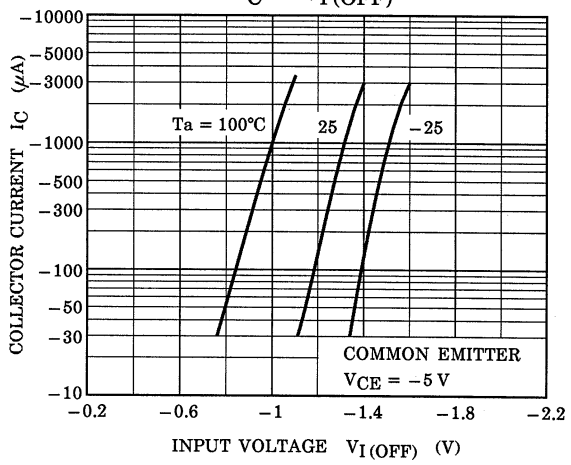

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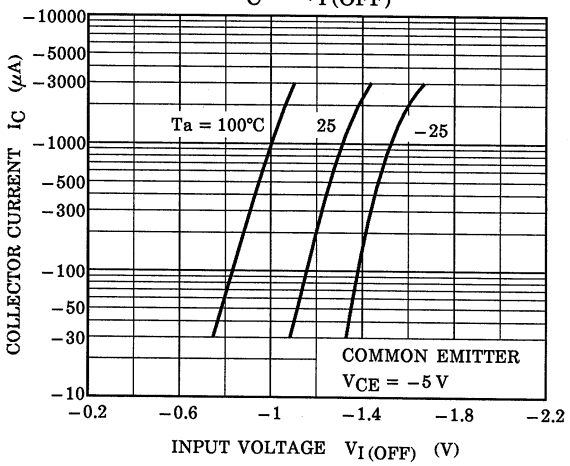

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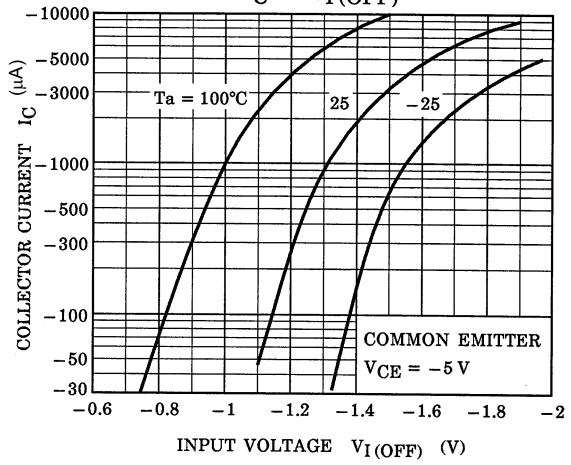

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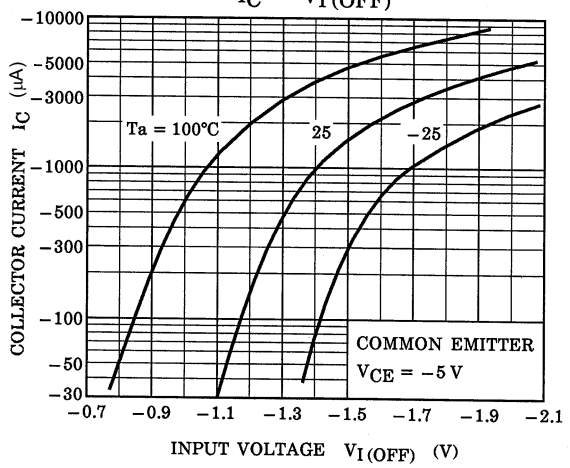

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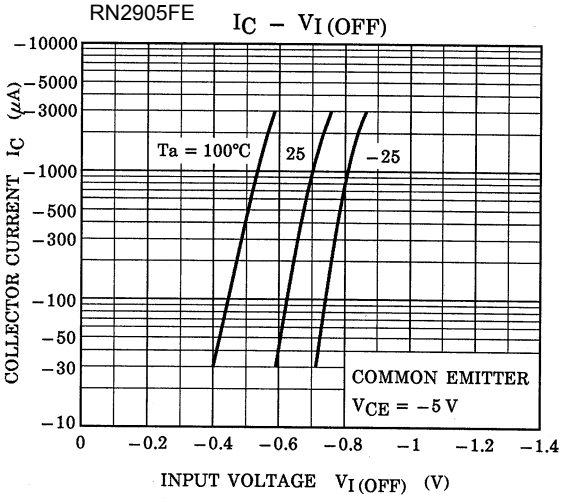

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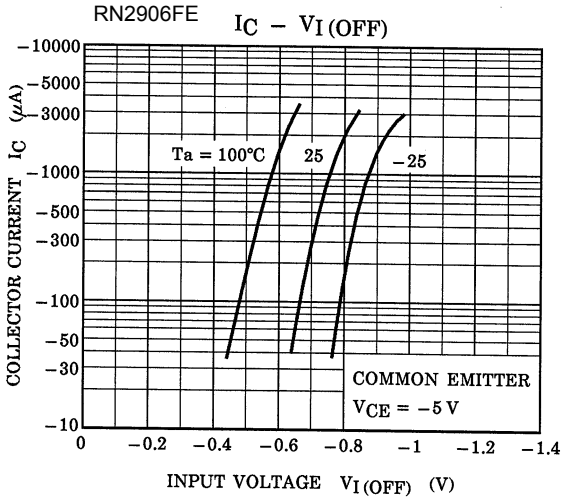

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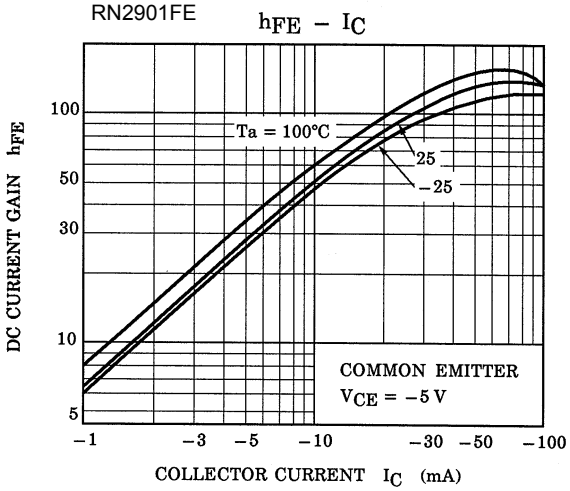

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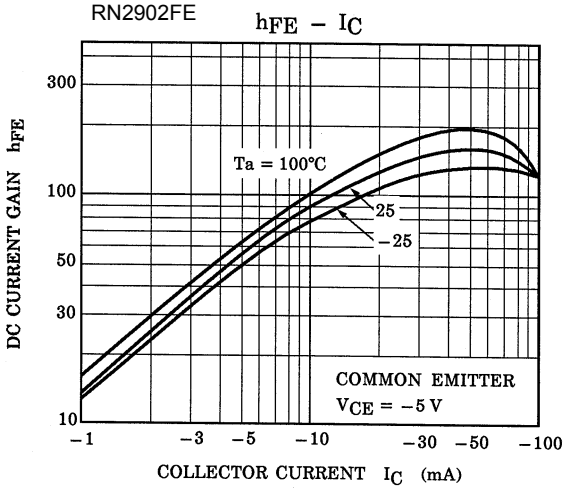

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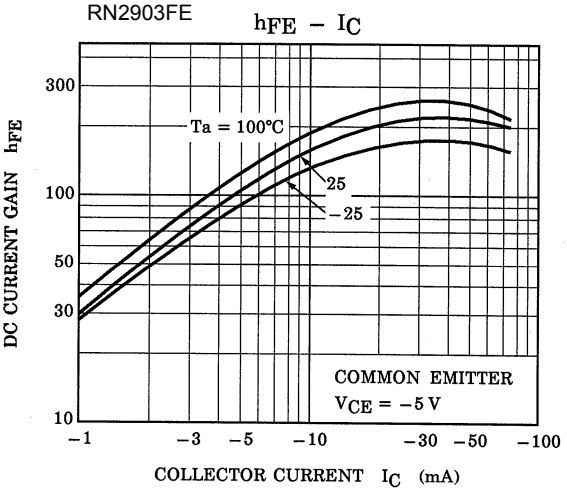

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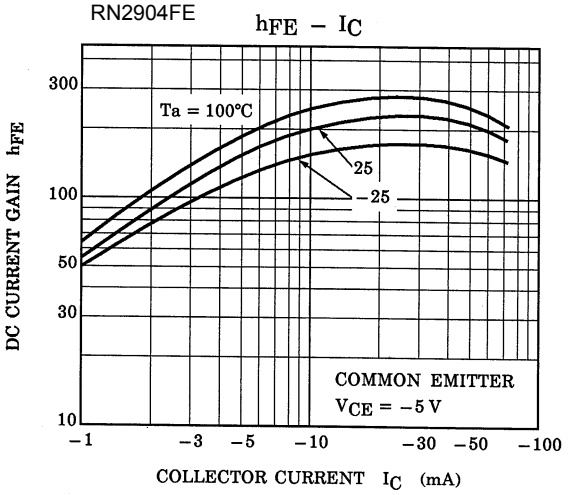

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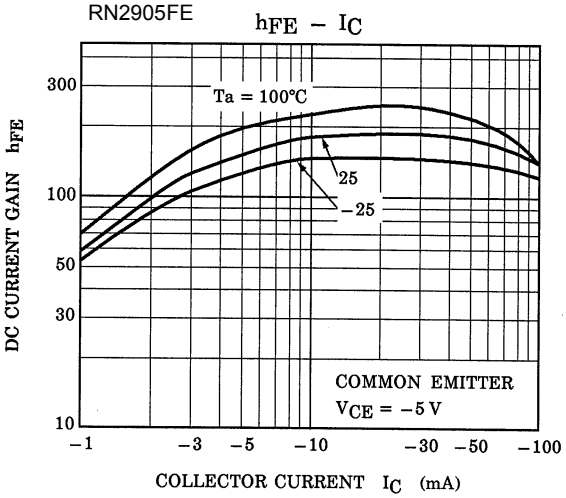

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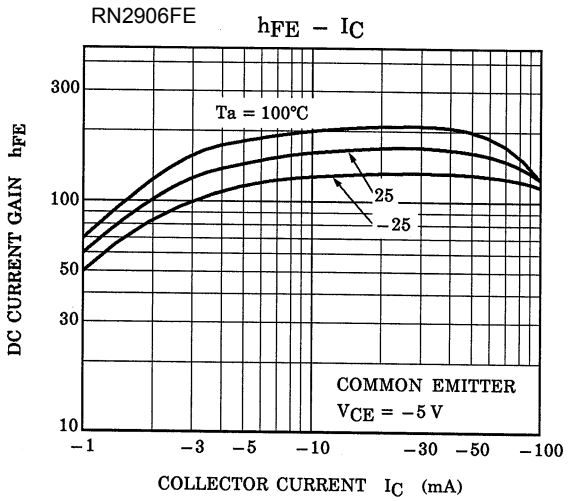

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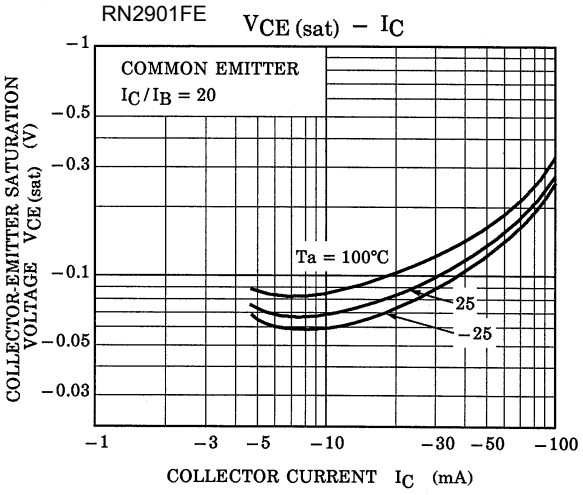

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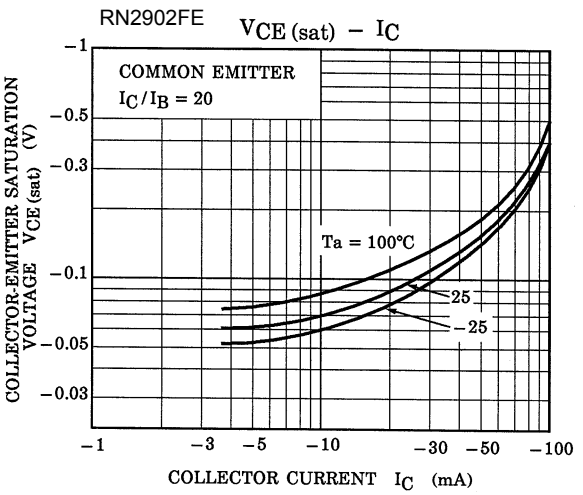

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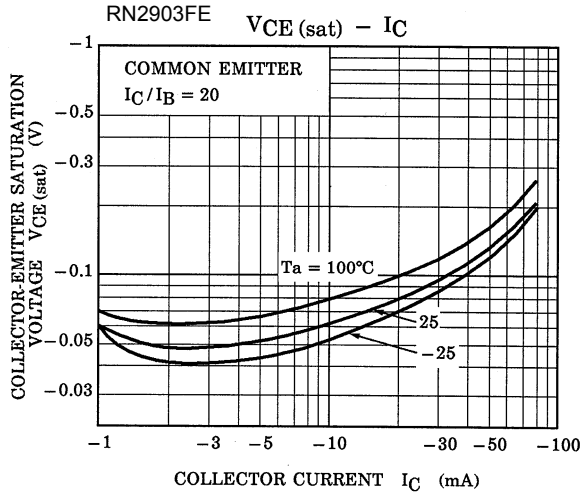

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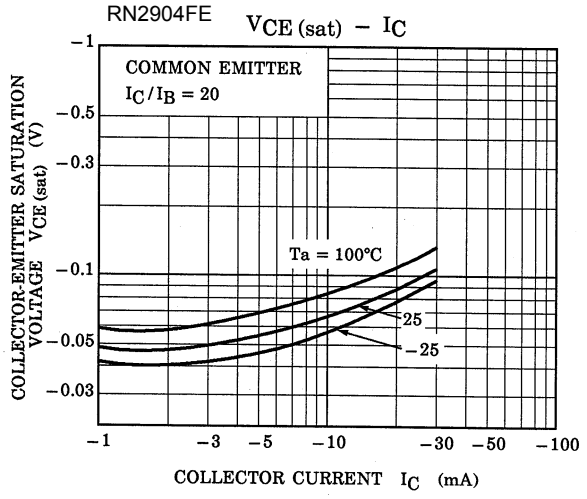

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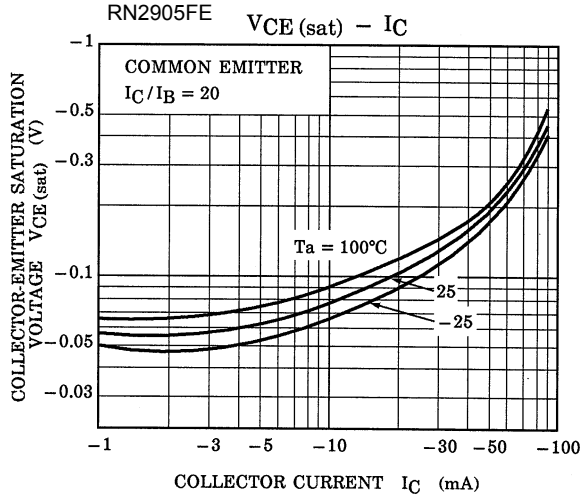

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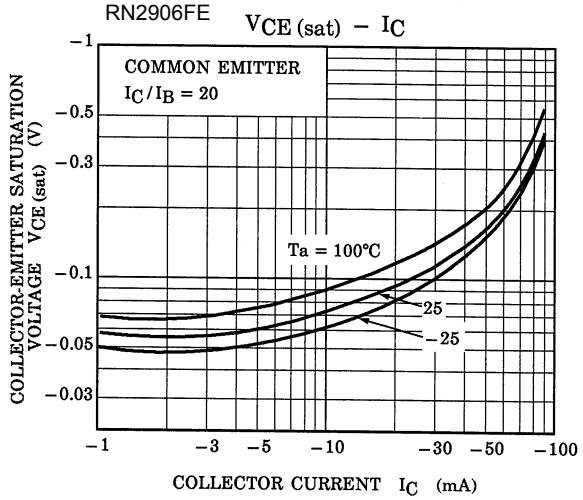

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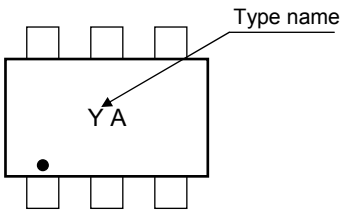
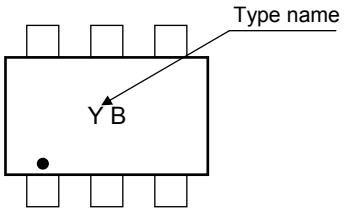
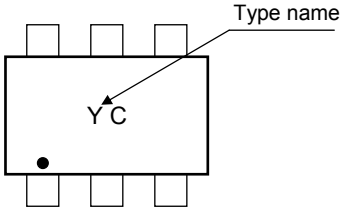
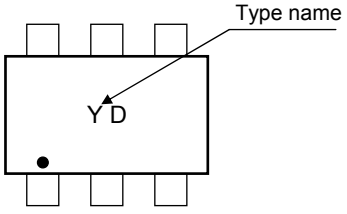
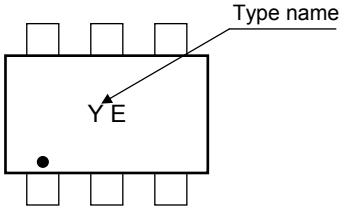
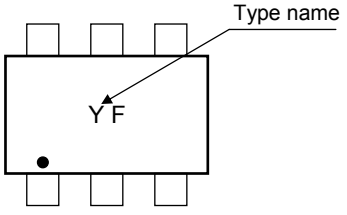
RN2901FE	
RN2902FE	
RN2903FE	
RN2904FE	
RN2905FE	
RN2906FE	

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