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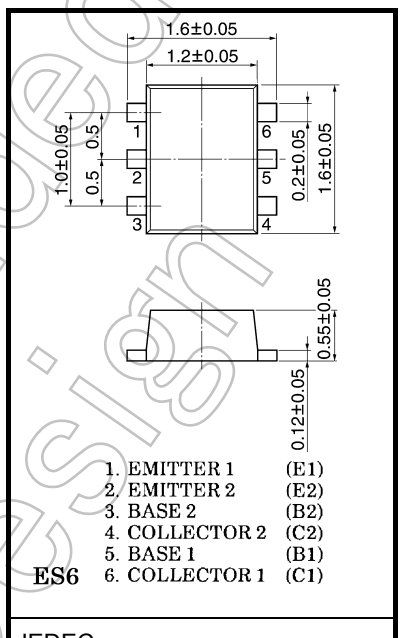
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process) (Bias Resistor Built-in Transistor)

RN2961FE, RN2962FE, RN2963FE RN2964FE, RN2965FE, RN2966FE

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 RN1961FE to RN1966FE

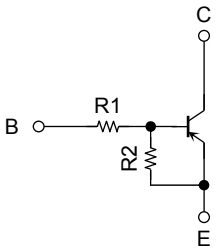
Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	2-2N1A

Weight: 0.003 g (typ.)

Equivalent Circuit and Bias Resistor Values

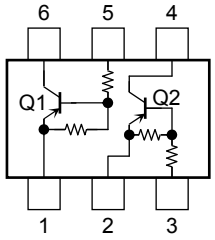


Type No.	R1 (kΩ)	R2 (kΩ)
RN2961FE	4.7	4.7
RN2962FE	10	10
RN2963FE	22	22
RN2964FE	47	47
RN2965FE	2.2	47
RN2966FE	4.7	47

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

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN2961FE to RN2966FE	V_{CBO}	−50	V
Collector-emitter voltage		V_{CEO}	−50	V
Emitter-base voltage	RN2961FE to RN2964FE	V_{EBO}	−10	V
	RN2965FE, RN2966FE		−5	
Collector current	RN2961FE to RN2966FE	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).

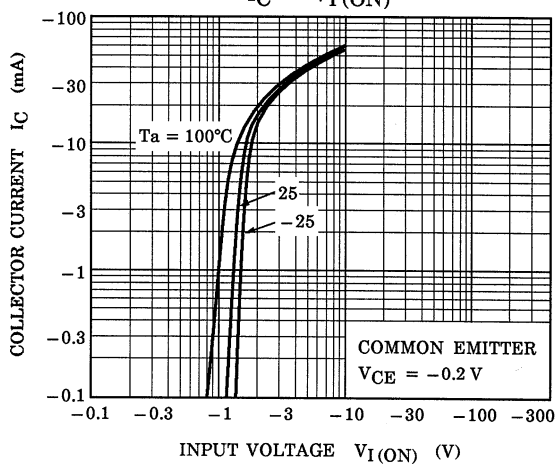
Note 1: Total rating

Start of commercial production
2000-05

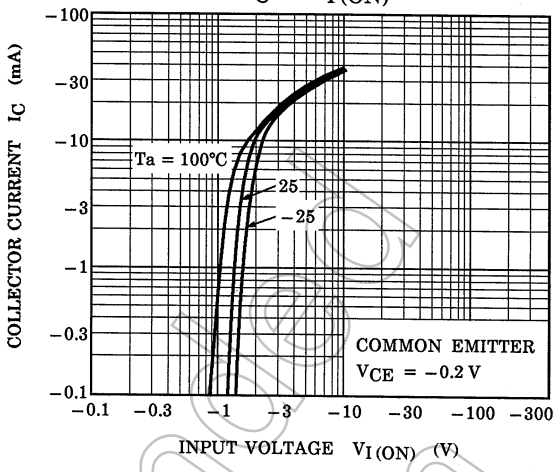
Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2961FE to RN2966FE	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	RN2961FE	I_{EBO}	V_{EB} = –10 V, I_C = 0	–0.82	—	–1.52	mA
	RN2962FE			–0.38	—	–0.71	
	RN2963FE			–0.17	—	–0.33	
	RN2964FE			–0.082	—	–0.15	
	RN2965FE		V_{EB} = –5 V, I_C = 0	–0.078	—	–0.145	
	RN2966FE			–0.074	—	–0.138	
DC current gain	RN2961FE	h_{FE}	V_{CE} = –5 V, I_C = –10 mA	30	—	—	
	RN2962FE			50	—	—	
	RN2963FE			70	—	—	
	RN2964FE			80	—	—	
	RN2965FE			80	—	—	
	RN2966FE			80	—	—	
Collector-emitter saturation voltage	RN2961FE to RN2966FE	$V_{CE\ (sat)}$	I_C = –5 mA, I_B = –0.25 mA	—	–0.1	–0.3	V
Input voltage (ON)	RN2961FE	$V_{I\ (ON)}$	V_{CE} = –0.2 V, I_C = –5 mA	–1.1	—	–2.0	V
	RN2962FE			–1.2	—	–2.4	
	RN2963FE			–1.3	—	–3.0	
	RN2964FE			–1.5	—	–5.0	
	RN2965FE			–0.6	—	–1.1	
	RN2966FE			–0.7	—	–1.3	
Input voltage (OFF)	RN2961FE to RN2964FE	$V_{I\ (OFF)}$	V_{CE} = –5 V, I_C = –0.1 mA	–1.0	—	–1.5	V
	RN2965FE, RN2966FE			–0.5	—	–0.8	
Transition frequency	RN2961FE to RN2966FE	f_T	V_{CE} = –10 V, I_C = –5 mA	—	200	—	MHz
Collector output capacitance	RN2961FE to RN2966FE	C_{ob}	V_{CB} = –10 V, I_E = 0, f = 1 MHz	—	3	6	pF
Input resistor	RN2961FE	R1	—	3.29	4.7	6.11	kΩ
	RN2962FE			7	10	13	
	RN2963FE			15.4	22	28.6	
	RN2964FE			32.9	47	61.1	
	RN2965FE			1.54	2.2	2.86	
	RN2966FE			3.29	4.7	6.11	
Resistor ratio	RN2961FE to RN2964FE	R1/R2	—	0.9	1.0	1.1	
	RN2965FE			0.0421	0.0468	0.0515	
	RN2966FE			0.09	0.1	0.11	

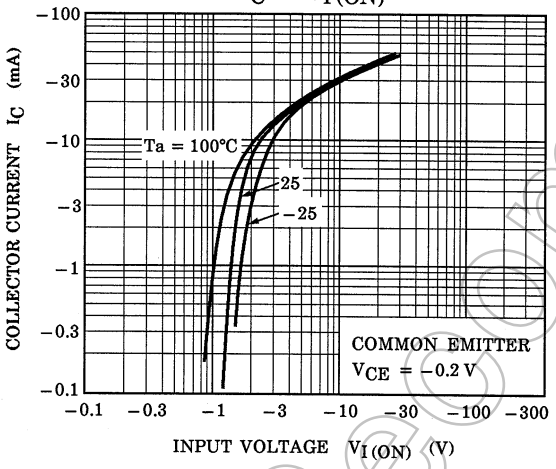
RN2961FE $I_C - V_{I(ON)}$



RN2962FE $I_C - V_{I(ON)}$



RN2963FE $I_C - V_{I(ON)}$



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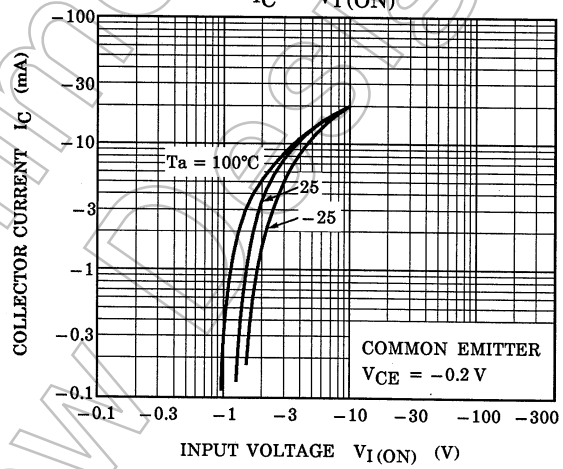

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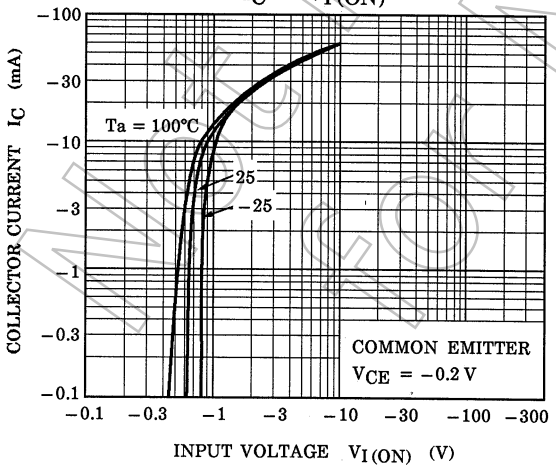

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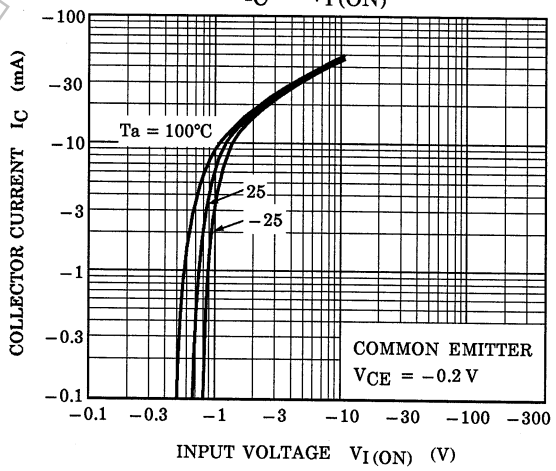

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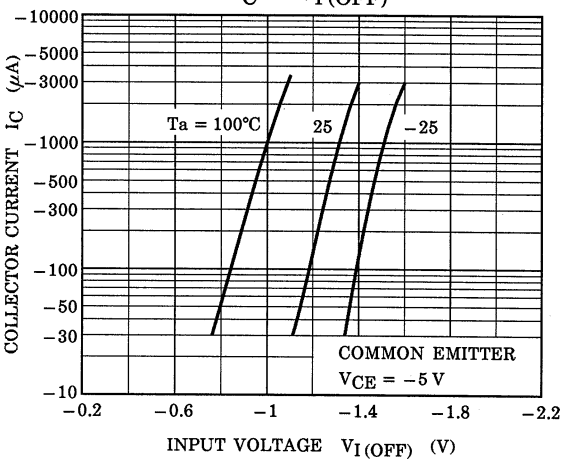

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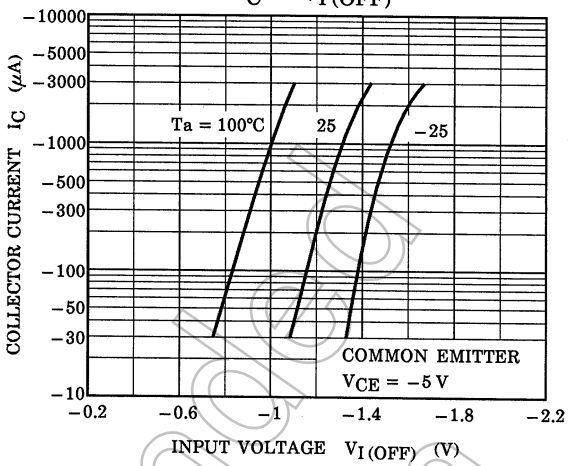

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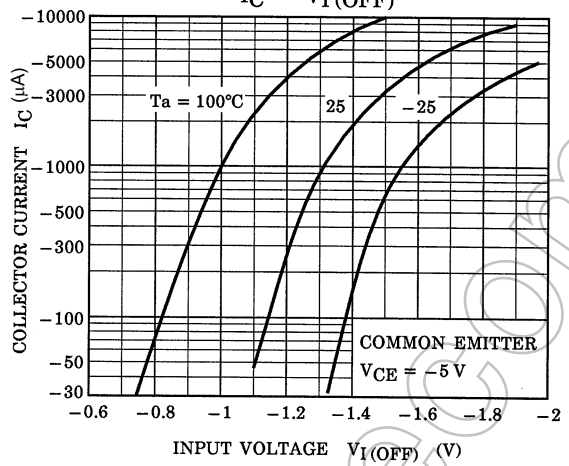

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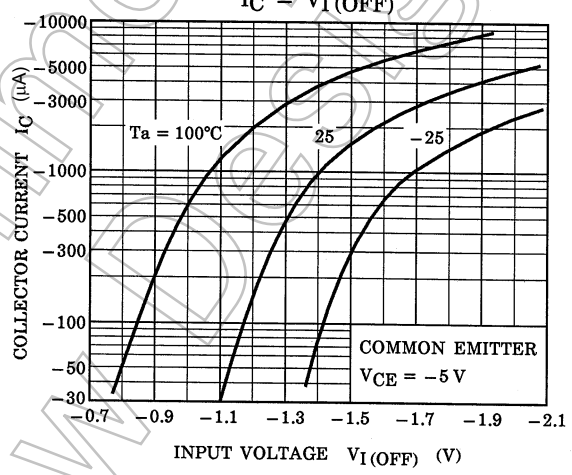

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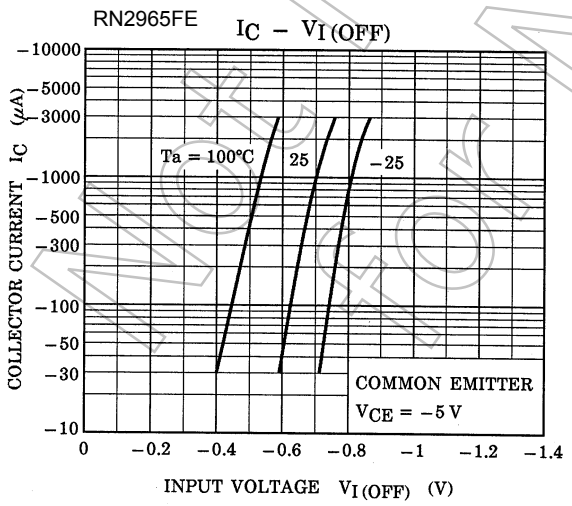

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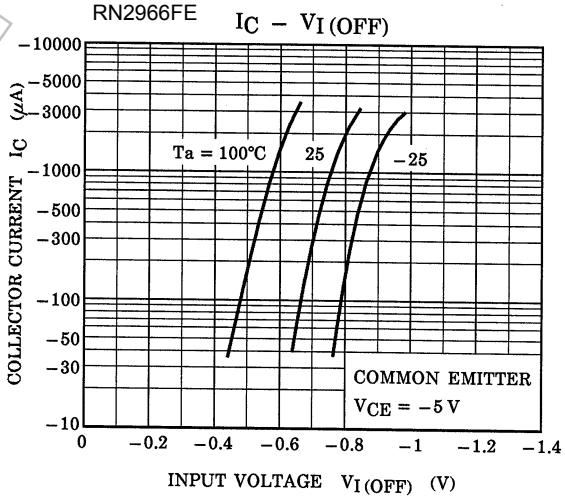

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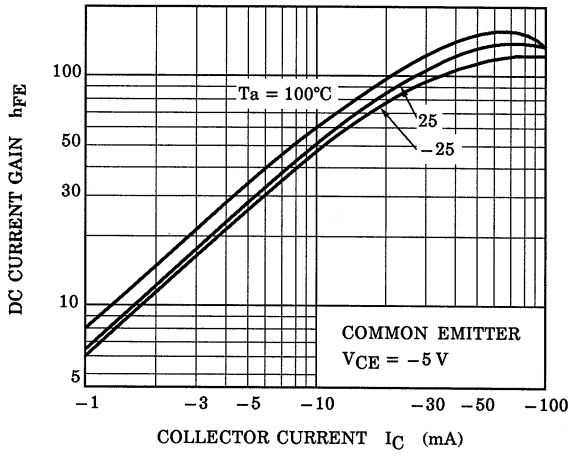

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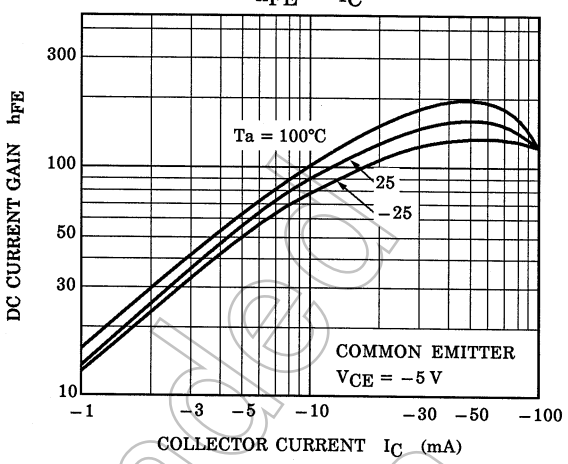

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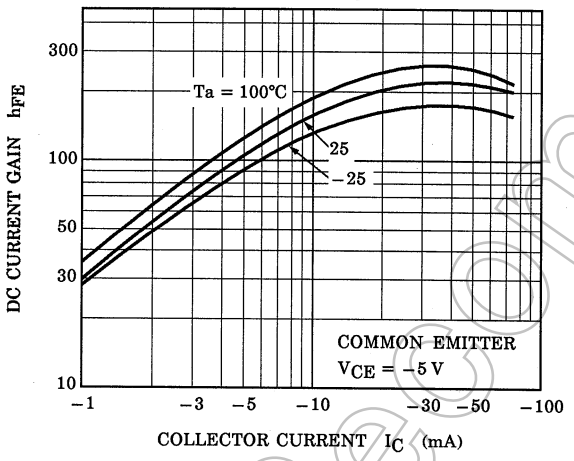

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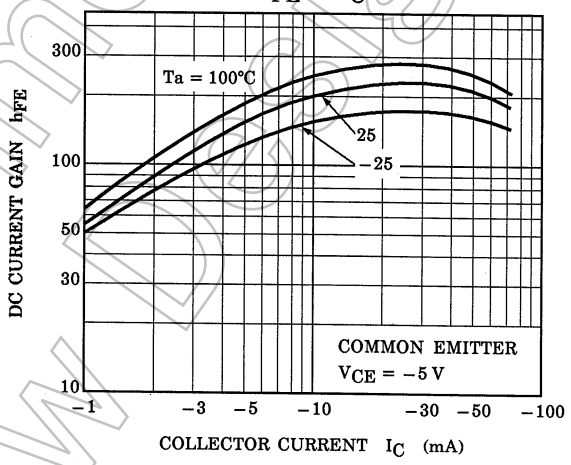

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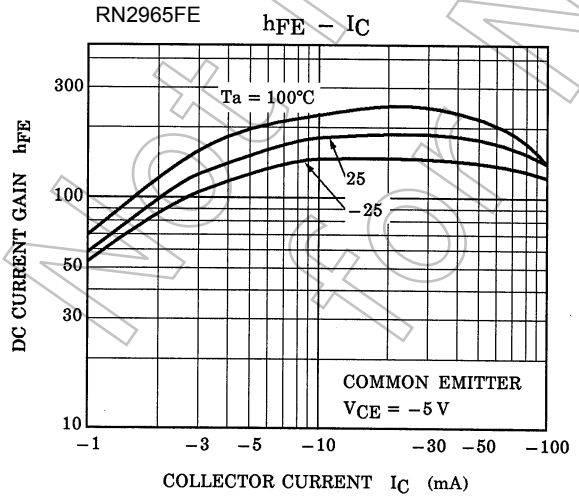

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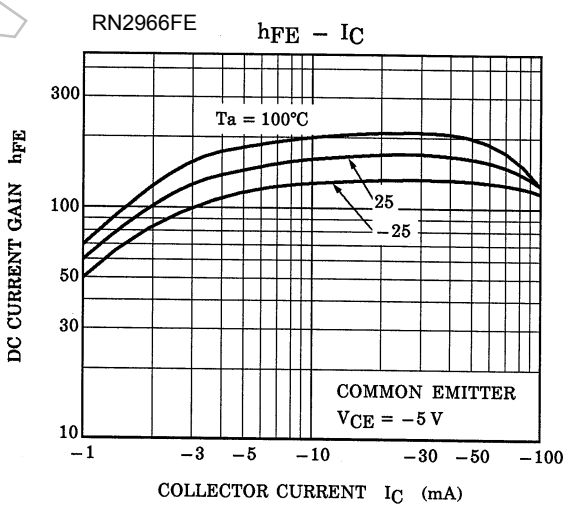

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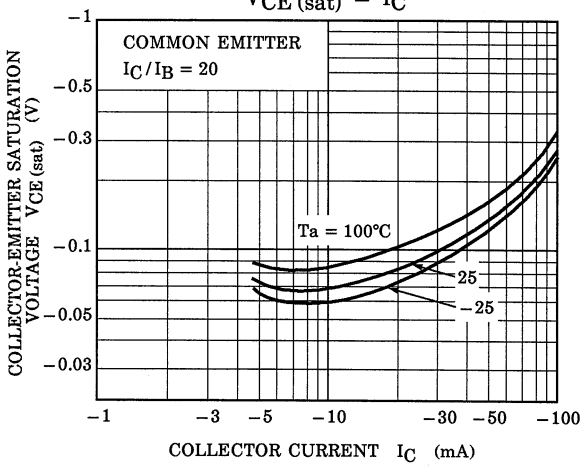

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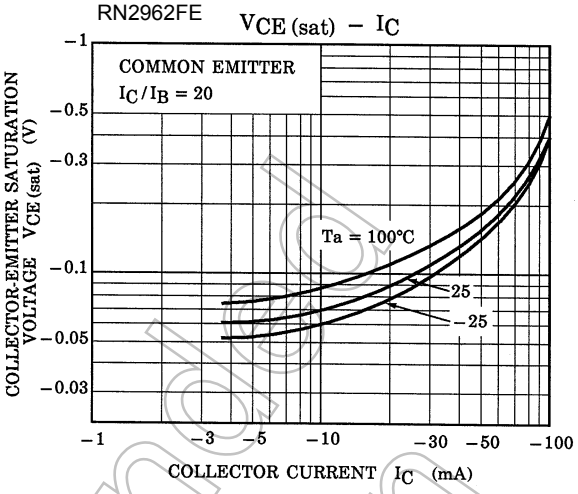

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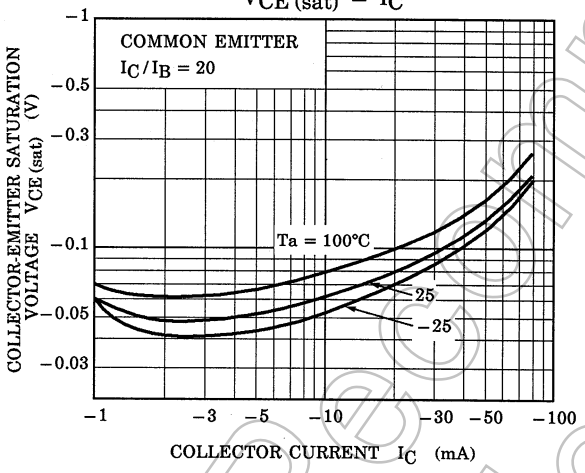

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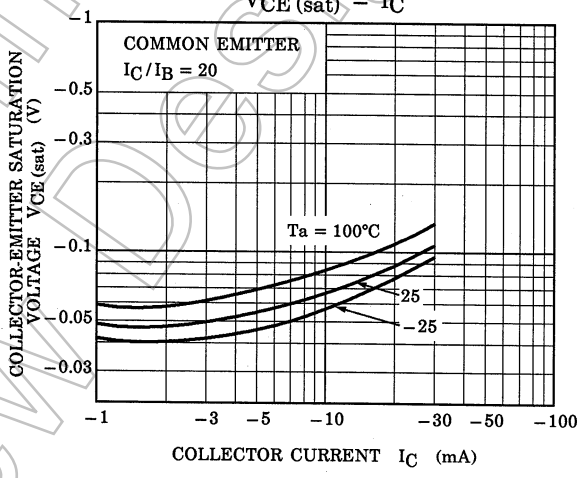

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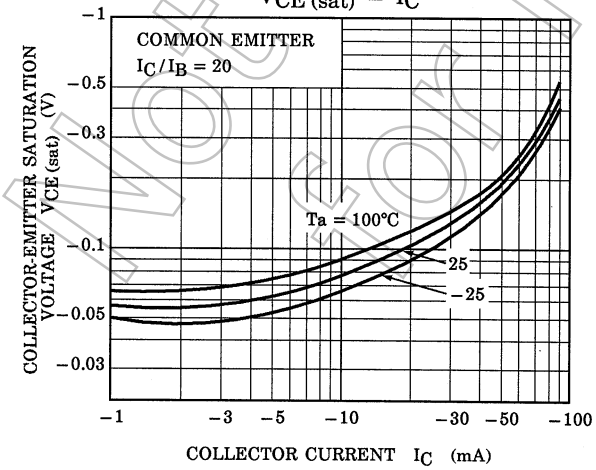

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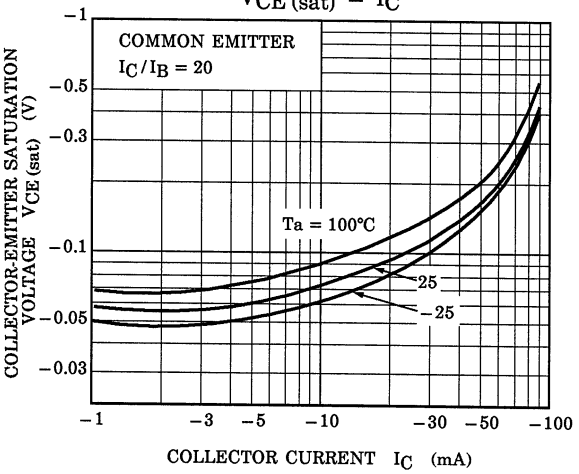

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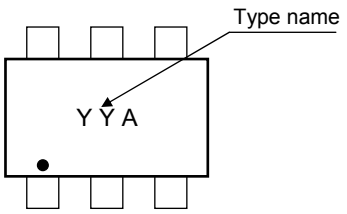
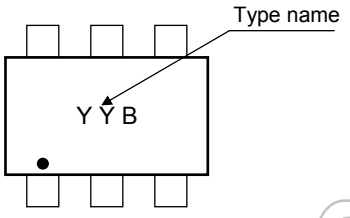
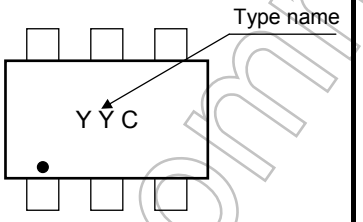
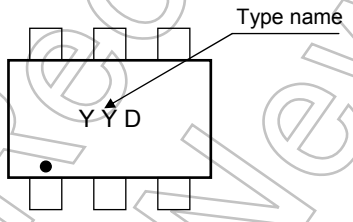
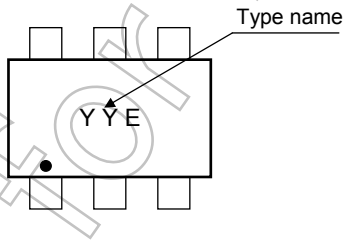
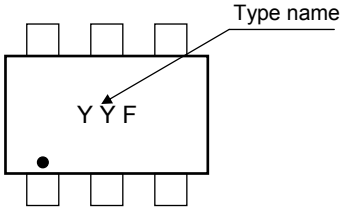
RN2961FE	
RN2962FE	
RN2963FE	
RN2964FE	
RN2965FE	
RN2966FE	

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