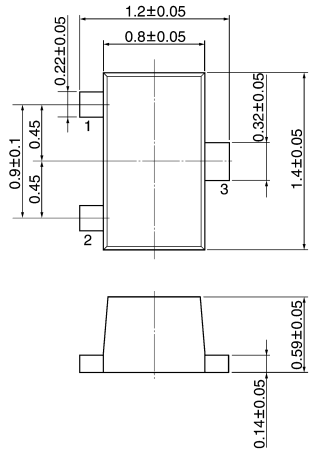
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

RN2101FT,RN2102FT,RN2103FT RN2104FT,RN2105FT,RN2106FT

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- High-density mount is possible because of devices housed in very thin TESM packages.
- Incorporating a bias resistor into a transistor reduces parts count. Reducing the parts count enable the manufacture of ever more compact equipment and save assembly cost.
- Wide range of resistor values are available to use in various circuit designs.
- Complementary to RN1101FT~RN1106FT

Unit: mm



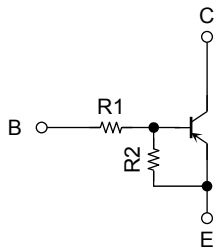
1. BASE
2. EMITTER
3. COLLECTOR

TESM

JEDEC	—
JEITA	—
TOSHIBA	2-1B1A

Weight: 0.0022 g (typ.)

Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN2101FT	4.7	4.7
RN2102FT	10	10
RN2103FT	22	22
RN2104FT	47	47
RN2105FT	2.2	47
RN2106FT	4.7	47

Absolute Maximum Ratings (Ta = 25°C)

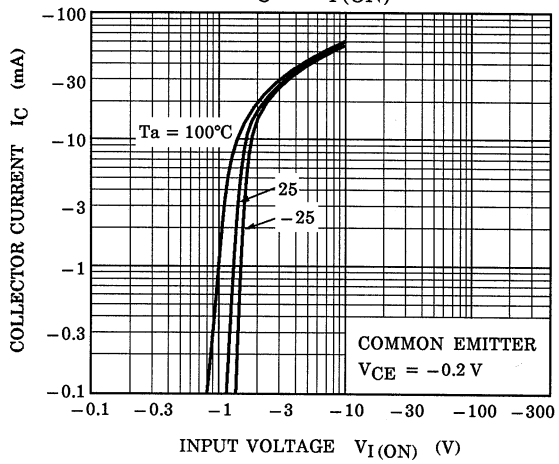
Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN2101FT~2106FT	V_{CBO}	−50	V
Collector-emitter voltage		V_{CEO}	−50	V
Emitter-base voltage	RN2101FT~2104FT	V_{EBO}	−10	V
	RN2105FT, RN2106FT		−5	
Collector current	RN2101FT~2106FT	I_C	−100	mA
Collector power dissipation		P_C	100	mW
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55~150	°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).

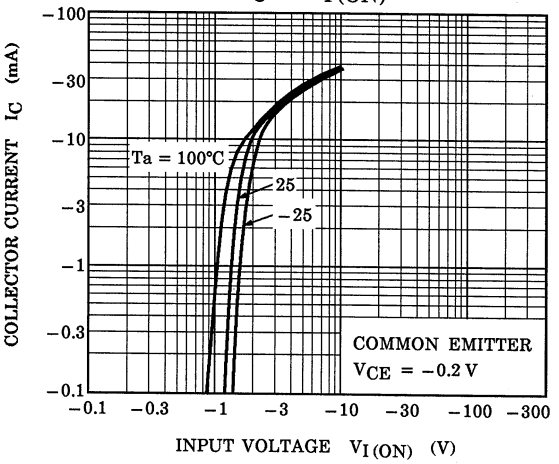
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2101FT~2106FT	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	RN2101FT	I_{EBO}	V_{EB} = –10 V, I_C = 0	–0.82	—	–1.52	mA
	RN2102FT			–0.38	—	–0.71	
	RN2103FT			–0.17	—	–0.33	
	RN2104FT			–0.082	—	–0.15	
	RN2105FT		V_{EB} = –5 V, I_C = 0	–0.078	—	–0.145	
	RN2106FT			–0.074	—	–0.138	
DC current gain	RN2101FT	h_{FE}	V_{CE} = –5 V, I_C = –10 mA	30	—	—	
	RN2102FT			50	—	—	
	RN2103FT			70	—	—	
	RN2104FT			80	—	—	
	RN2105FT			80	—	—	
	RN2106FT			80	—	—	
Collector-emitter saturation voltage	RN2101FT~2106FT	$V_{CE\ (sat)}$	I_C = –5 mA, I_B = –0.25 mA	—	–0.1	–0.3	V
Input voltage (ON)	RN2101FT	$V_{I\ (ON)}$	V_{CE} = –0.2 V, I_C = –5 mA	–1.1	—	–2.0	V
	RN2102FT			–1.2	—	–2.4	
	RN2103FT			–1.3	—	–3.0	
	RN2104FT			–1.5	—	–5.0	
	RN2105FT			–0.6	—	–1.1	
	RN2106FT			–0.7	—	–1.3	
Input voltage (OFF)	RN2101FT~2104FT	$V_{I\ (OFF)}$	V_{CE} = –5 V, I_C = –0.1 mA	–1.0	—	–1.5	V
	RN2105FT, 2106FT			–0.5	—	–0.8	
Transition frequency	RN2101FT~2106FT	f_T	V_{CE} = –10 V, I_C = –5 mA	—	200	—	MHz
Collector output capacitance	RN2101FT~2106FT	C_{ob}	V_{CB} = –10 V, I_E = 0, f = 1 MHz	—	3	6	pF
Input resistor	RN2101FT	R1	—	3.29	4.7	6.11	kΩ
	RN2102FT			7	10	13	
	RN2103FT			15.4	22	28.6	
	RN2104FT			32.9	47	61.1	
	RN2105FT			1.54	2.2	2.86	
	RN2106FT			3.29	4.7	6.11	
Resistor ratio	RN2101FT~2104FT	R1/R2	—	0.9	1.0	1.1	
	RN2105FT			0.0421	0.0468	0.0515	
	RN2106FT			0.09	0.1	0.11	

RN2101FT $I_C - V_{I(ON)}$



RN2102FT $I_C - V_{I(ON)}$



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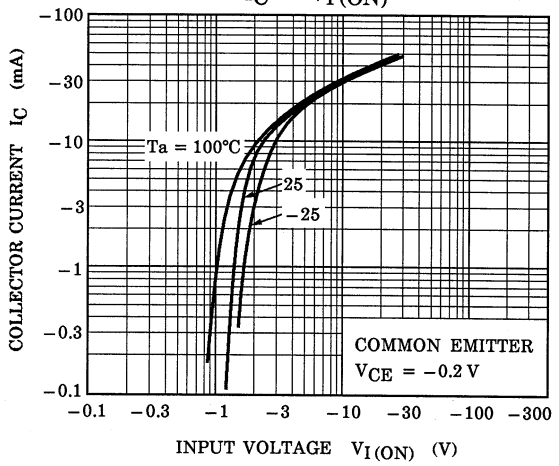

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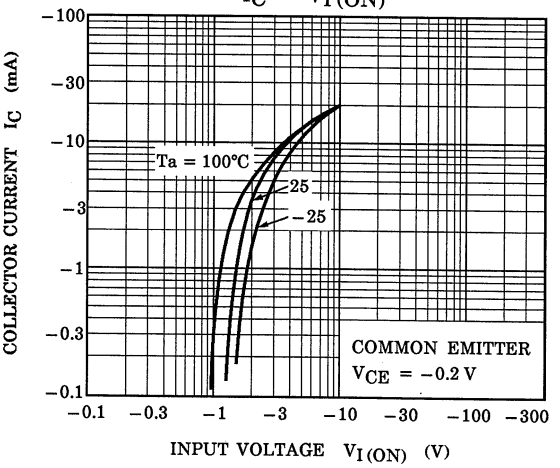

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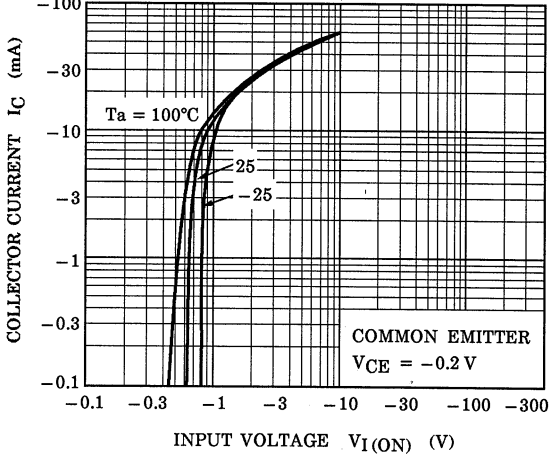

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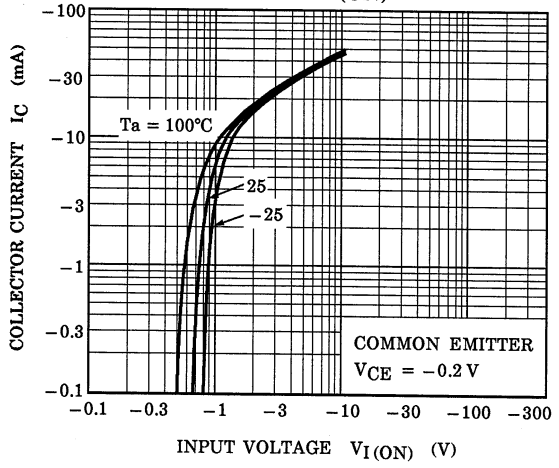

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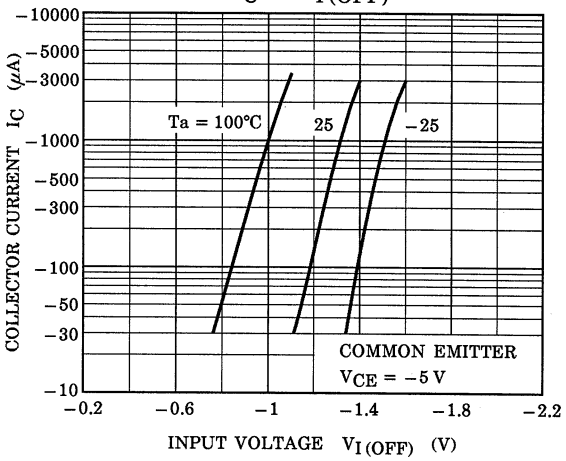

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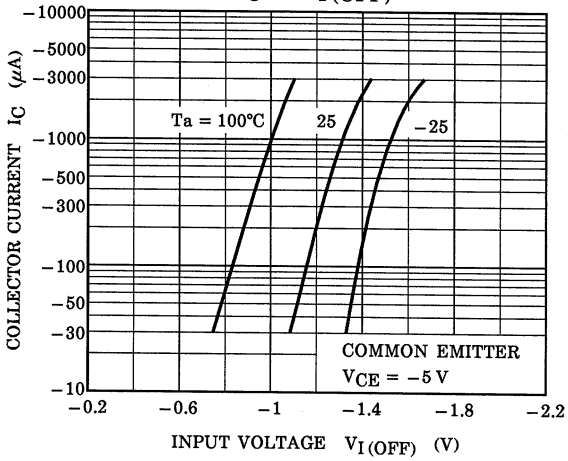

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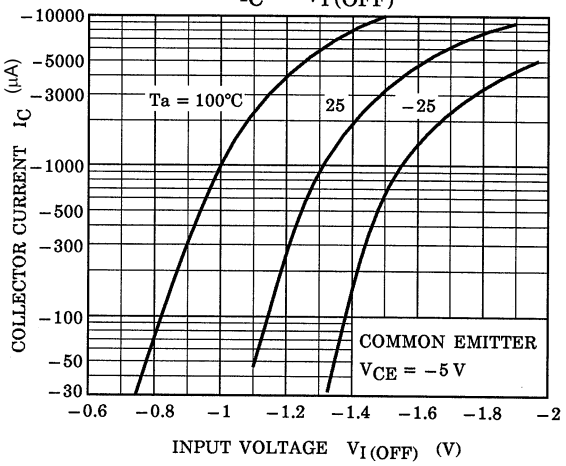

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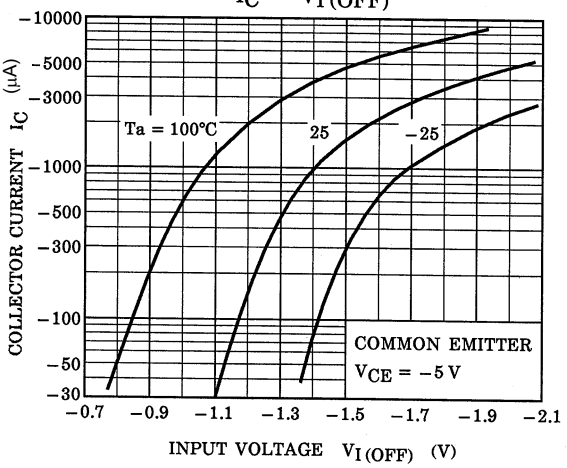

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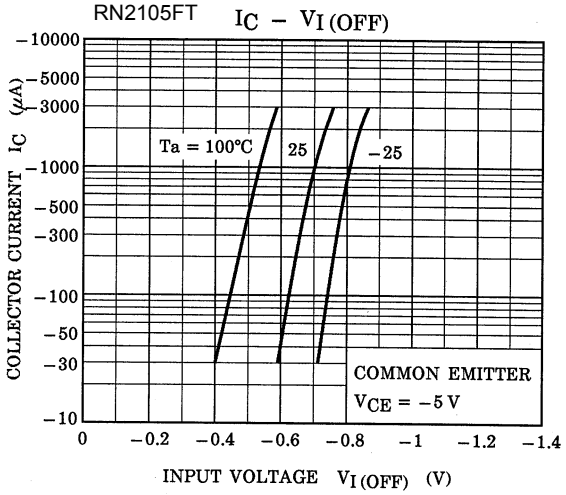

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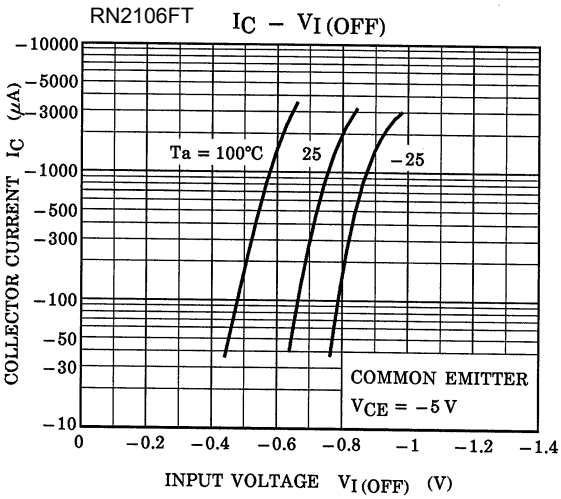
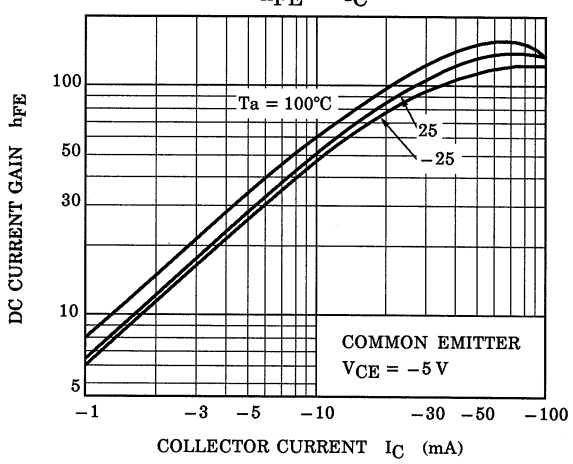


RN2101FT h_{FE} – I_C



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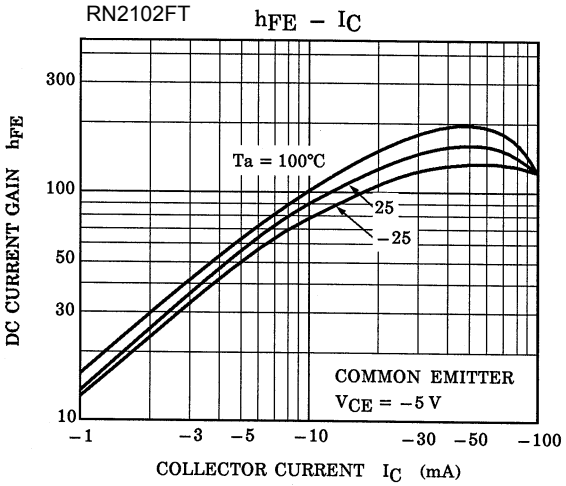

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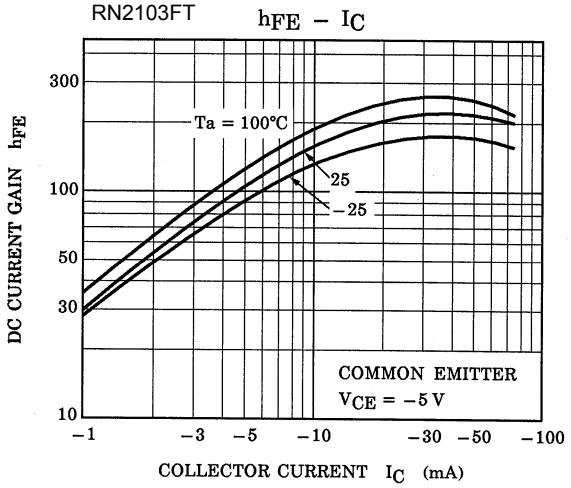

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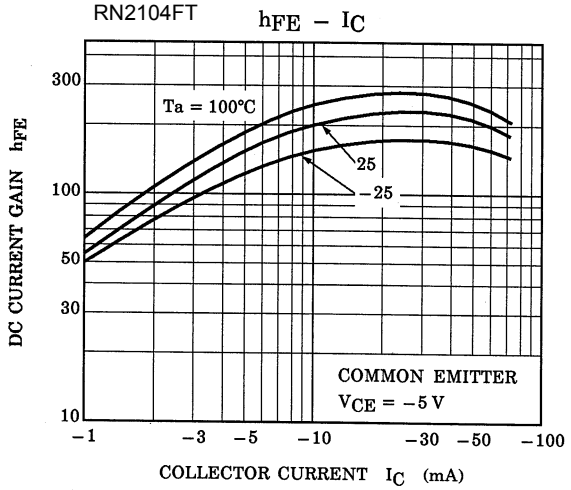

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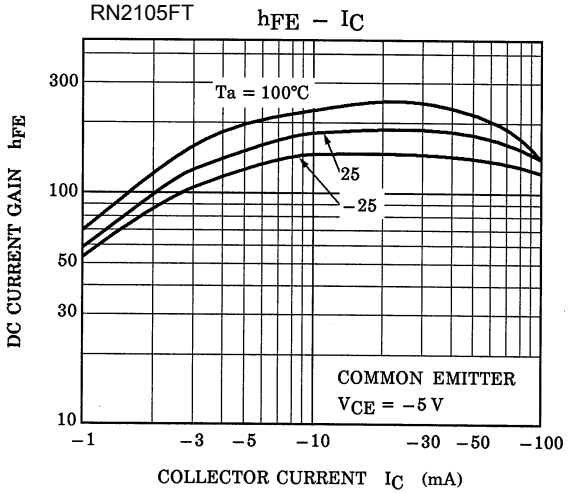

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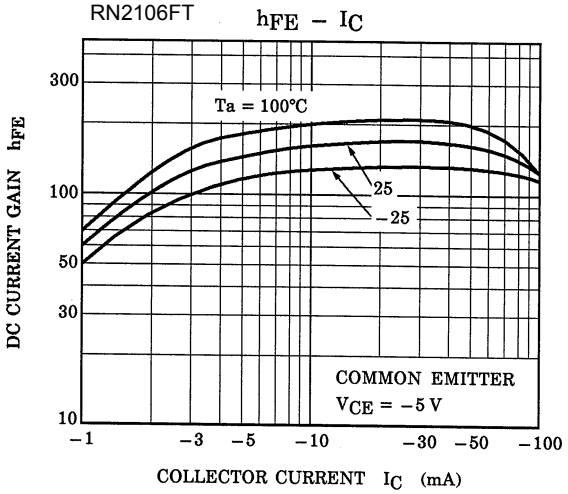
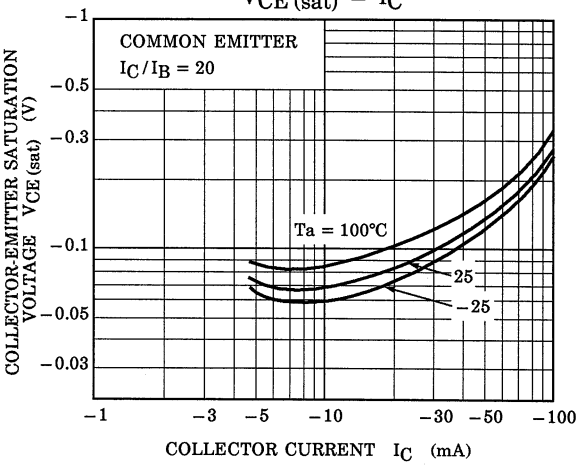


RN2101FT $V_{CE\,(sat)}$ – I_C



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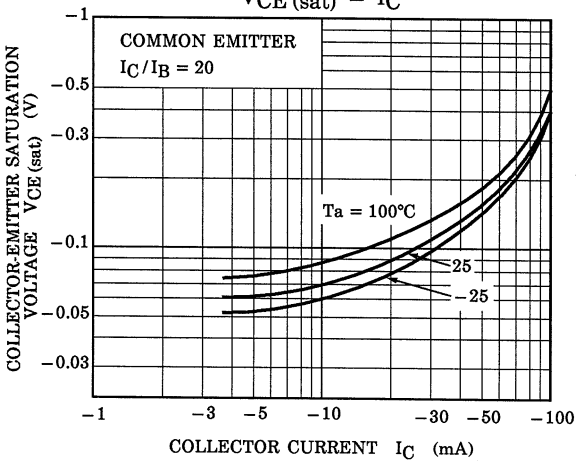

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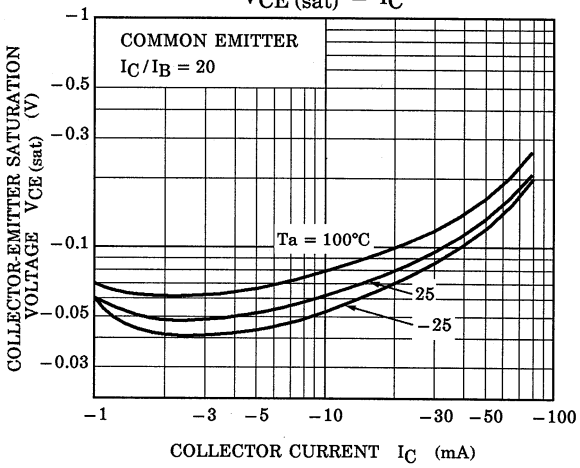

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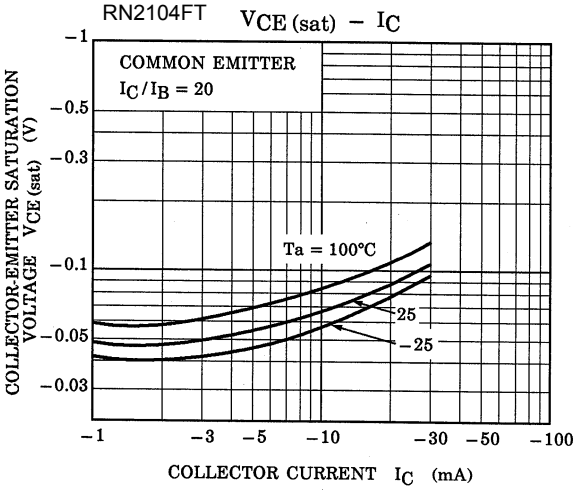

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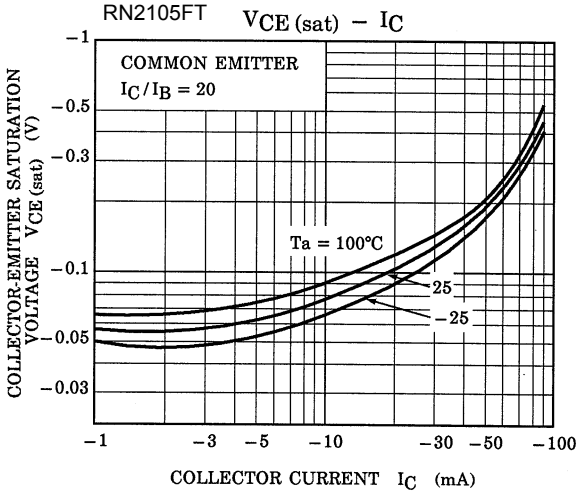

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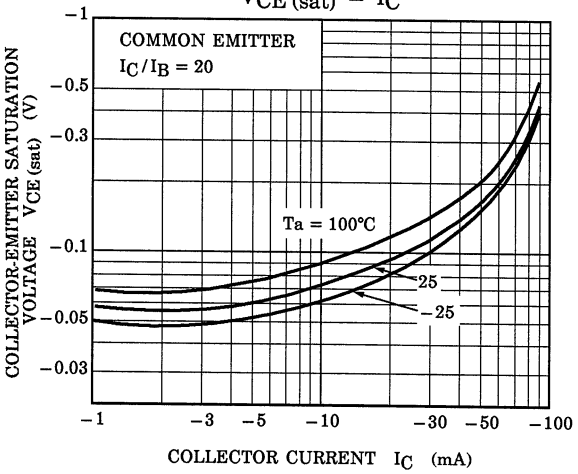

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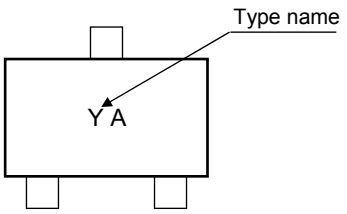
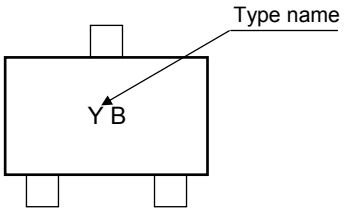
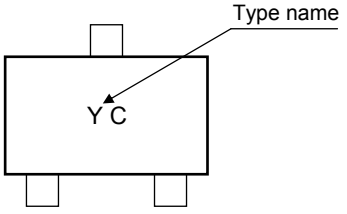
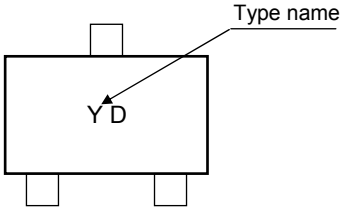
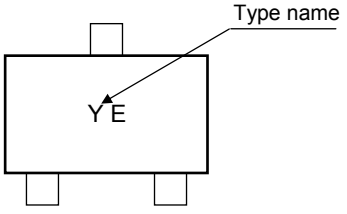
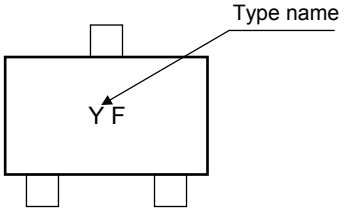
RN2101FT	
RN2102FT	
RN2103FT	
RN2104FT	
RN2105FT	
RN2106FT	

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