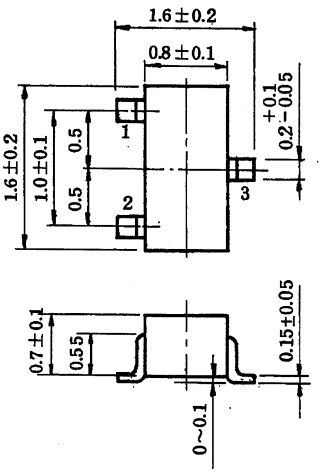
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor)

RN2101, RN2102, RN2103
RN2104, RN2105, RN2106

Switching, Inverter Circuit, Interface Circuit
and Driver Circuit Applications

- Built-in bias resistors
- Simplified circuit design
- Fewer parts and simplified manufacturing process
- Complementary to RN1101 to RN1106

Unit: mm



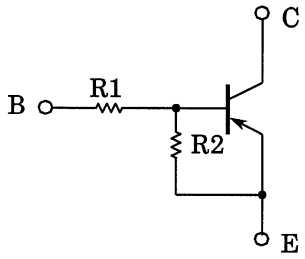
1. BASE
2. EMITTER
3. COLLECTOR

SSM

JEDEC	—
JEITA	—
TOSHIBA	2-2H1A

Weight: 2.4 mg (typ.)

Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN2101	4.7	4.7
RN2102	10	10
RN2103	22	22
RN2104	47	47
RN2105	2.2	47
RN2106	4.7	47

Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN2101 to 2106	V_{CBO}	−50	V
Collector-emitter voltage		V_{CEO}	−50	V
Emitter-base voltage	RN2101 to 2104	V_{EBO}	−10	V
	RN2105, 2106		−5	
Collector current	RN2101 to 2106	I_C	−100	mA
Collector power dissipation		P_C	100	mW
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

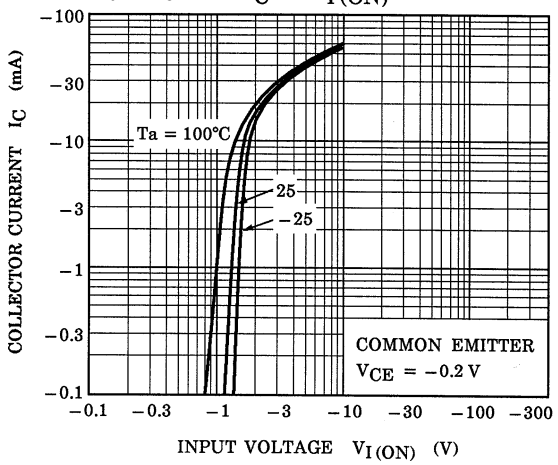
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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).

Start of commercial production
1990-12

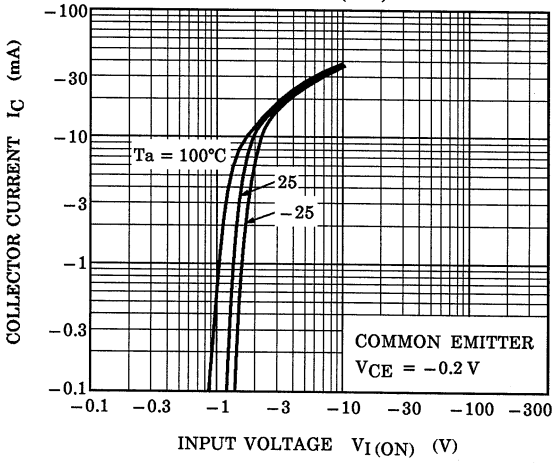
Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2101 to 2106	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	RN2101	I_{EBO}	—	V_{EB} = −10 V, I_C = 0	−0.82	—	−1.52	mA
	RN2102				−0.38	—	−0.71	
	RN2103				−0.17	—	−0.33	
	RN2104				−0.082	—	−0.15	
	RN2105			V_{EB} = −5 V, I_C = 0	−0.078	—	−0.145	
	RN2106				−0.074	—	−0.138	
DC current gain	RN2101	h_{FE}	—	V_{CE} = −5 V, I_C = −10 mA	30	—	—	—
	RN2102				50	—	—	
	RN2103				70	—	—	
	RN2104				80	—	—	
	RN2105				80	—	—	
	RN2106				80	—	—	
Collector-emitter saturation voltage	RN2101 to 2106	$V_{CE\ (sat)}$	—	I_C = −5 mA, I_B = −0.25 mA	—	−0.1	−0.3	V
Input voltage (ON)	RN2101	$V_{I\ (ON)}$	—	V_{CE} = −0.2 V, I_C = −5 mA	−1.1	—	−2.0	V
	RN2102				−1.2	—	−2.4	
	RN2103				−1.3	—	−3.0	
	RN2104				−1.5	—	−5.0	
	RN2105				−0.6	—	−1.1	
	RN2106				−0.7	—	−1.3	
Input voltage (OFF)	RN2101 to 2104	$V_{I\ (OFF)}$	—	V_{CE} = −5 V, I_C = −0.1 mA	−1.0	—	−1.5	V
	RN2105, 2106				−0.5	—	−0.8	
Transition frequency	RN2101 to 2106	f_T	—	V_{CE} = −10 V, I_C = −5 mA	—	200	—	MHz
Collector Output capacitance	RN2101 to 2106	C_{ob}	—	V_{CB} = −10 V, I_E = 0, f = 1 MHz	—	3	6	pF
Input resistor	RN2101	R1	—	—	3.29	4.7	6.11	kΩ
	RN2102				7	10	13	
	RN2103				15.4	22	28.6	
	RN2104				32.9	47	61.1	
	RN2105				1.54	2.2	2.86	
	RN2106				3.29	4.7	6.11	
Resistor ratio	RN2101 to 2104	R1/R2	—	—	0.9	1.0	1.1	—
	RN2105				0.0421	0.0468	0.0515	
	RN2106				0.09	0.1	0.11	

RN2101 $I_C - V_{I(ON)}$



RN2102 $I_C - V_{I(ON)}$



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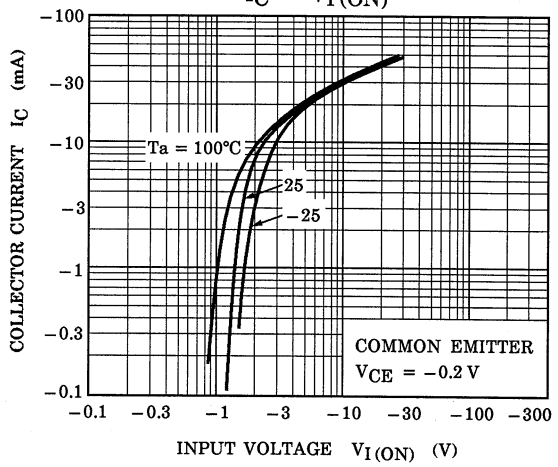

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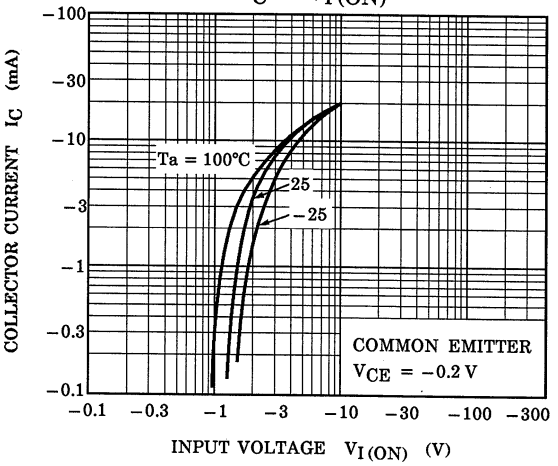

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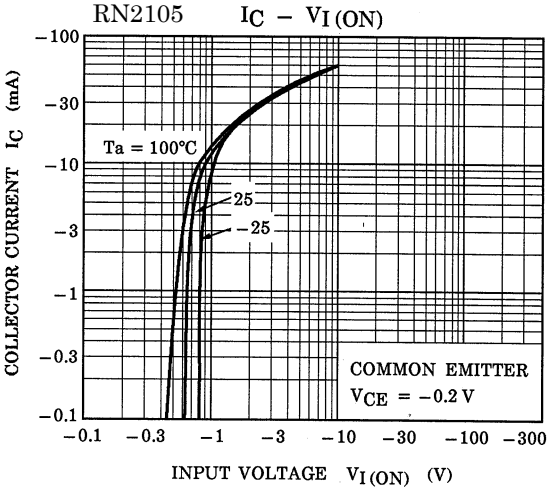

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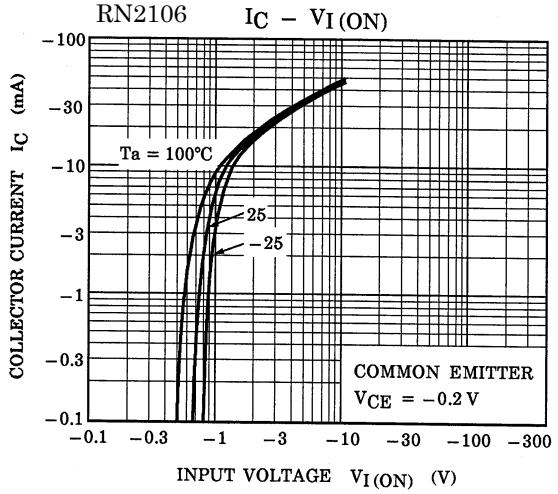

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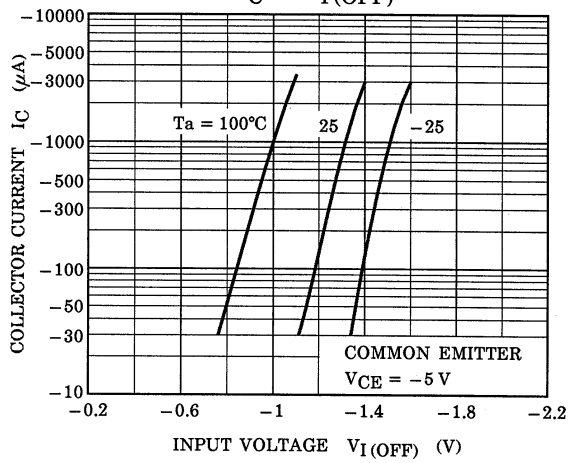

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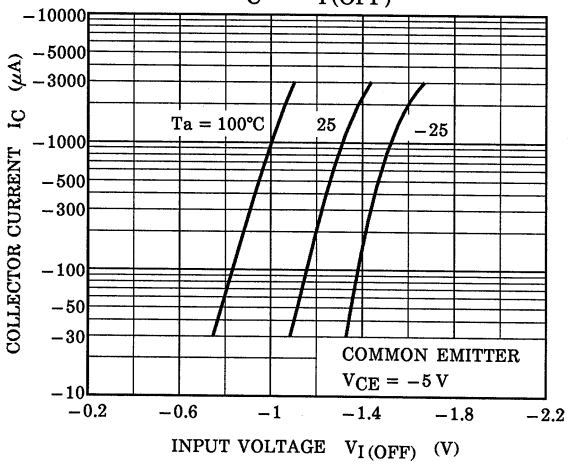

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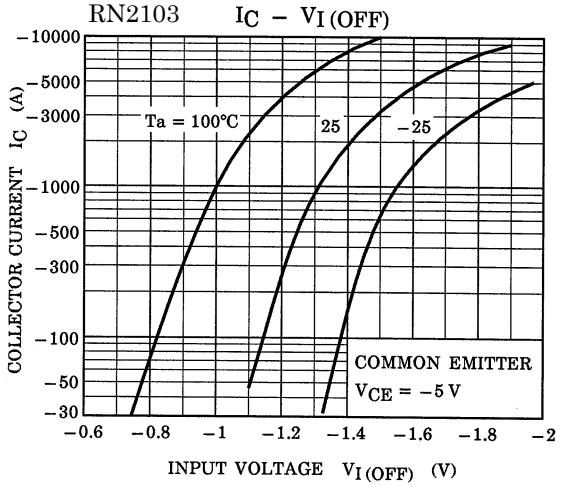

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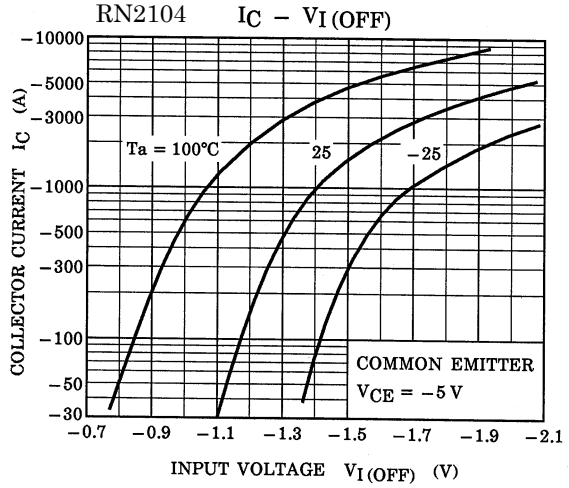

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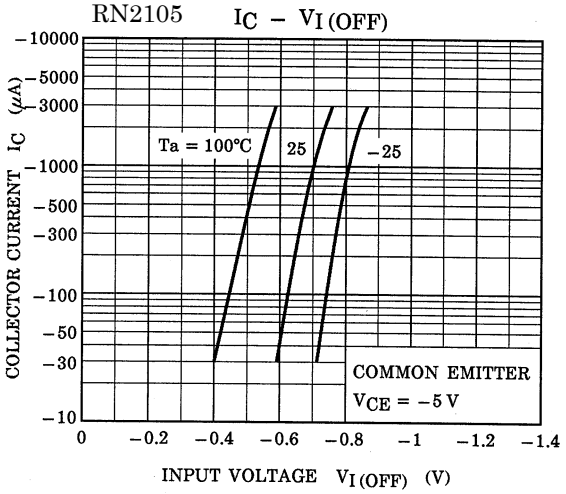

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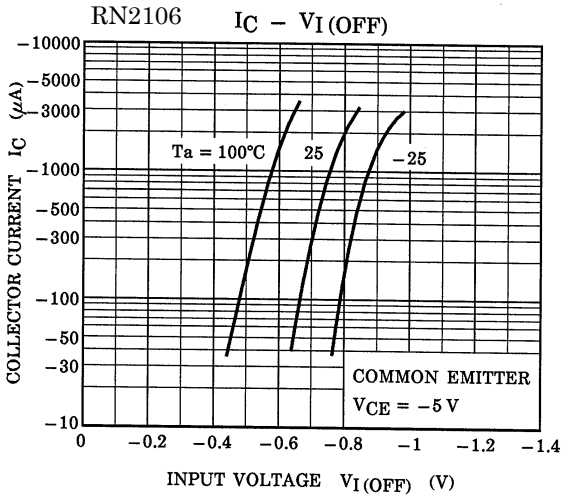
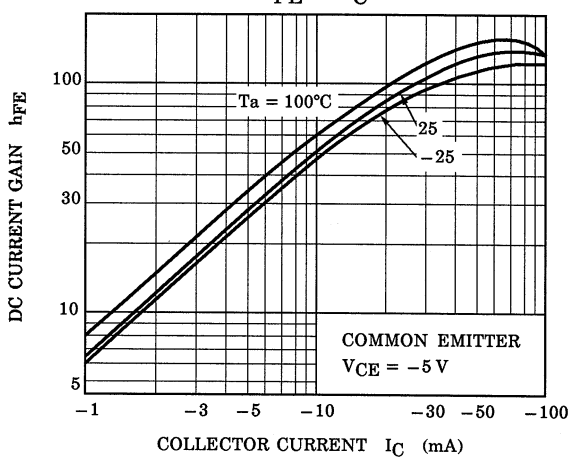


RN2101 h_{FE} – I_C



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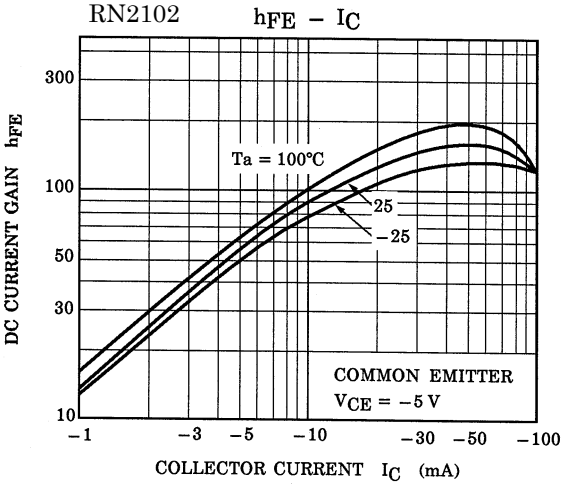

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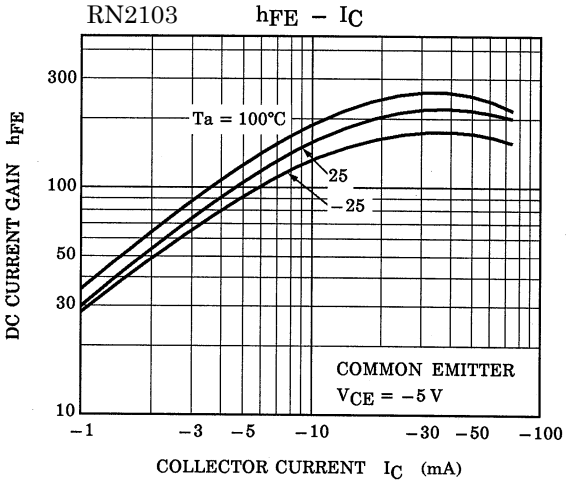

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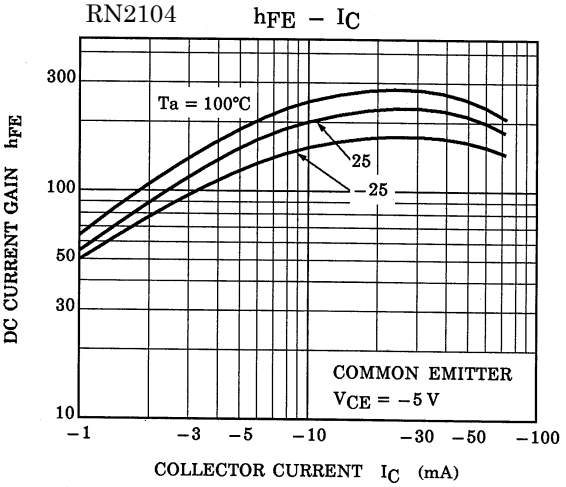

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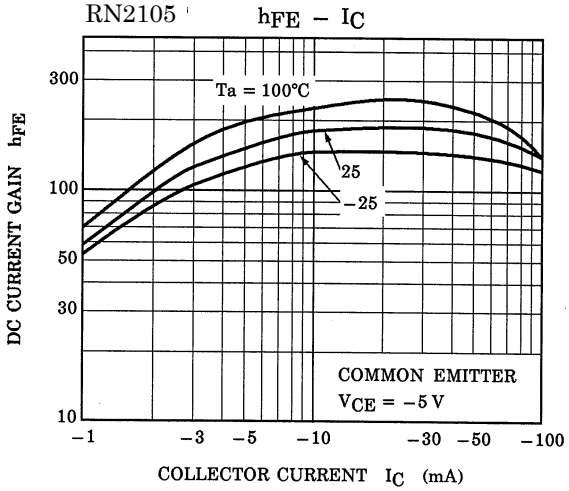
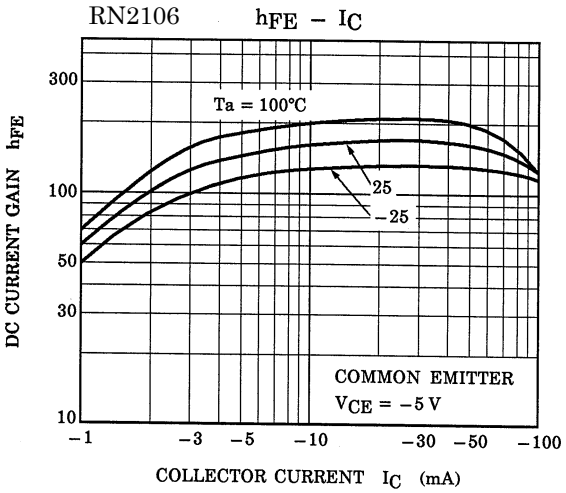
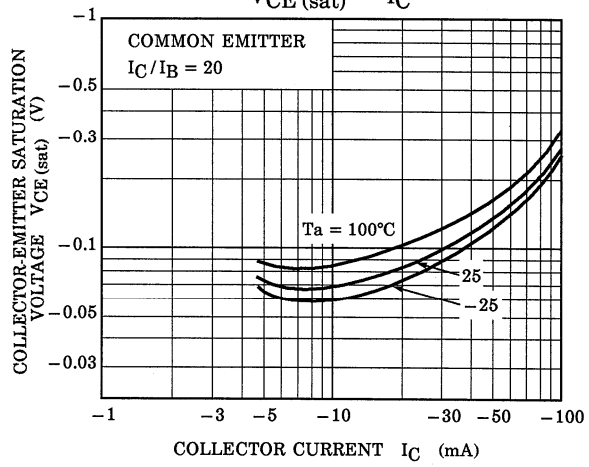


RN2106 h_{FE} – I_C



RN2101 $V_{CE\,(sat)}$ – I_C



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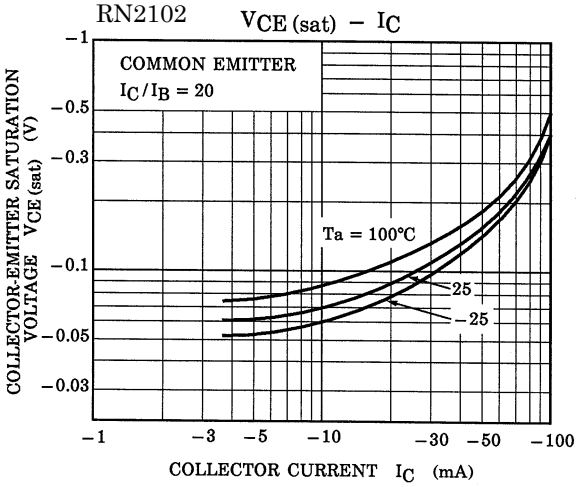

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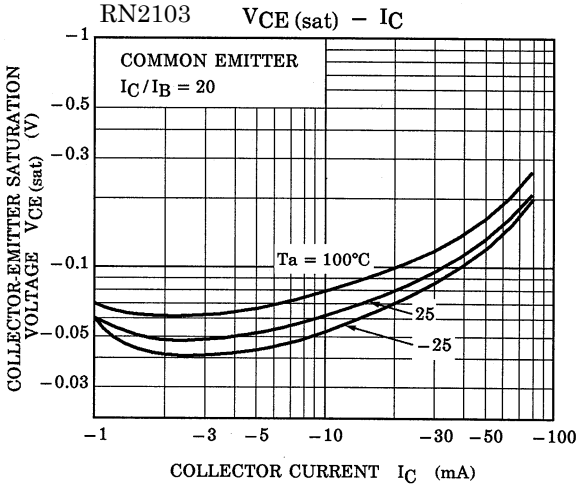

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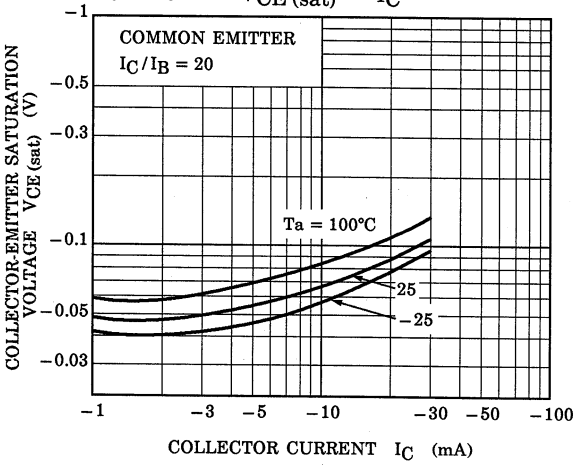
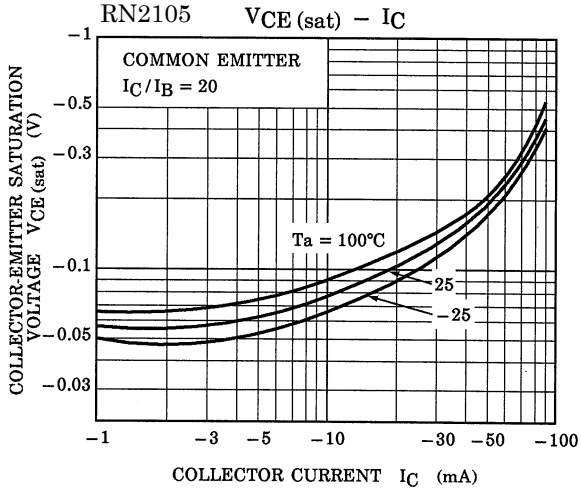


RN2105 $V_{CE\,(sat)}$ – I_C



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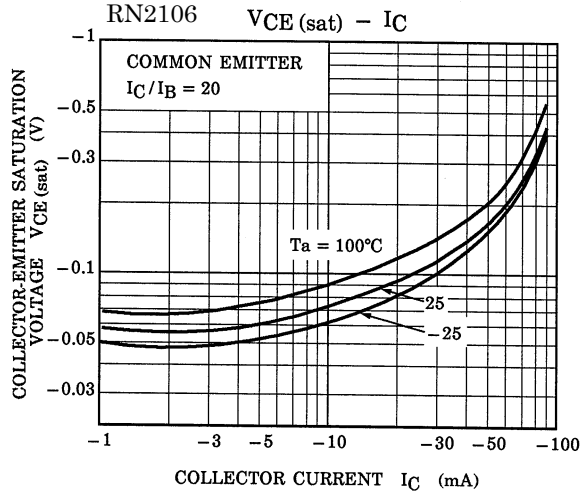

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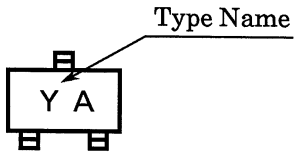
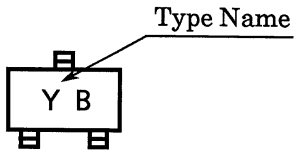
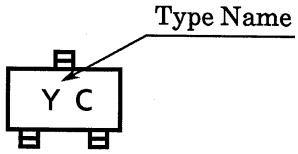
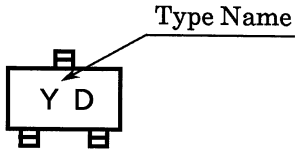
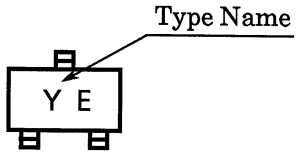
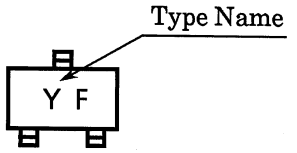
RN2101	
RN2102	
RN2103	
RN2104	
RN2105	
RN2106	

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