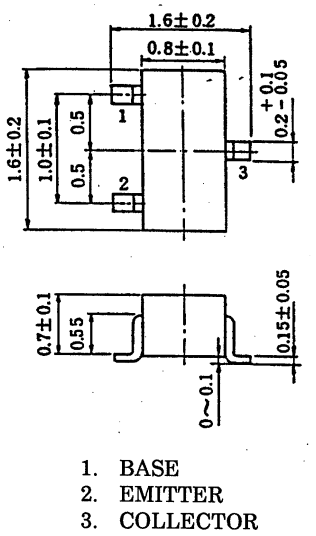
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process)

RN1101, RN1102, RN1103
RN1104, RN1105, RN1106

Switching, Inverter Circuit, Interface Circuit
and Driver Circuit Applications

- With built-in bias resistors
- Simplified circuit design
- Reduced number of parts and simplified manufacturing process
- Complementary to RN2101 to RN2106

Unit: mm

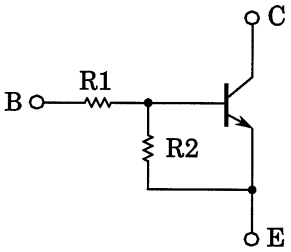


1. BASE
2. EMITTER
3. COLLECTOR

JEDEC	—
JEITA	—
TOSHIBA	2-2H1A

Weight: 2.4 mg (typ).

Equivalent Circuit and Bias Resister Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN1101	4.7	4.7
RN1102	10	10
RN1103	22	22
RN1104	47	47
RN1105	2.2	47
RN1106	4.7	47

Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN1101 to 1106	V_{CBO}	50	V
Collector-emitter voltage		V_{CEO}	50	V
Emitter-base voltage	RN1101 to 1104	V_{EBO}	10	V
	RN1105, 1106		5	
Collector current	RN1101 to 1106	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

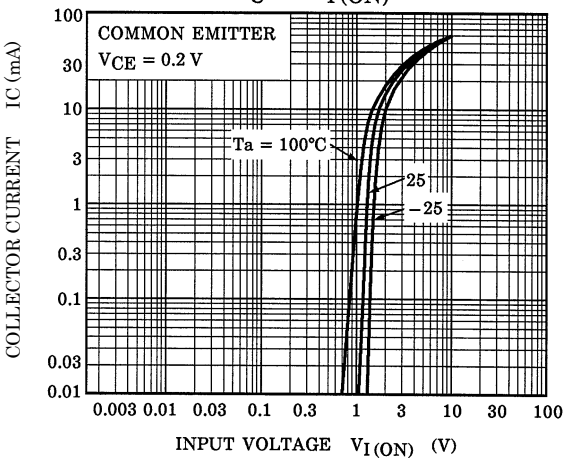
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

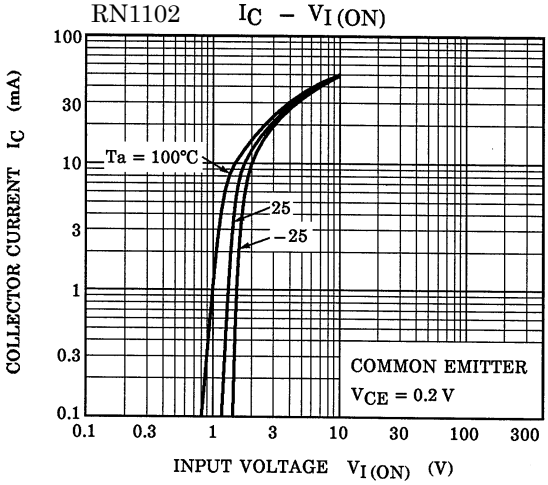
Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1101 to 1106	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	RN1101	I_{EBO}	—	V_{EB} = 10 V, I_C = 0	0.82	—	1.52	mA
	RN1102				0.38	—	0.71	
	RN1103				0.17	—	0.33	
	RN1104				0.082	—	0.15	
	RN1105			V_{EB} = 5 V, I_C = 0	0.078	—	0.145	
	RN1106				0.074	—	0.138	
DC current gain	RN1101	h_{FE}	—	V_{CE} = 5 V, I_C = 10 mA	30	—	—	—
	RN1102				50	—	—	
	RN1103				70	—	—	
	RN1104				80	—	—	
	RN1105				80	—	—	
	RN1106				80	—	—	
Collector-emitter saturation voltage	RN1101 to 1106	$V_{CE\ (sat)}$	—	I_C = 5 mA, I_B = 0.25 mA	—	0.1	0.3	V
Input voltage (ON)	RN1101	$V_{I\ (ON)}$	—	V_{CE} = 0.2 V, I_C = 5 mA	1.1	—	2.0	V
	RN1102				1.2	—	2.4	
	RN1103				1.3	—	3.0	
	RN1104				1.5	—	5.0	
	RN1105				0.6	—	1.1	
	RN1106				0.7	—	1.3	
Input voltage (OFF)	RN1101 to 1104	$V_{I\ (OFF)}$	—	V_{CE} = 5 V, I_C = 0.1 mA	1.0	—	1.5	V
	RN1105, 1106				0.5	—	0.8	
Transition frequency	RN1101 to 1106	f_T	—	V_{CE} = 10 V, I_C = 5 mA	—	250	—	MH_z
Collector output capacitance	RN1101 to 1106	C_{ob}	—	V_{CB} = 10 V, I_E = 0, f = 1 MH_z	—	3	6	pF
Input resistor	RN1101	R1	—		3.29	4.7	6.11	kΩ
	RN1102				7	10	13	
	RN1103				15.4	22	28.6	
	RN1104				32.9	47	61.1	
	RN1105				1.54	2.2	2.86	
	RN1106				3.29	4.7	6.11	
Resistor ratio	RN1101 to 1104	R1/R2	—		0.9	1.0	1.1	—
	RN1105				0.0421	0.0468	0.0515	
	RN1106				0.09	0.1	0.11	

RN1101 $I_C - V_{I(ON)}$



RN1102 $I_C - V_{I(ON)}$



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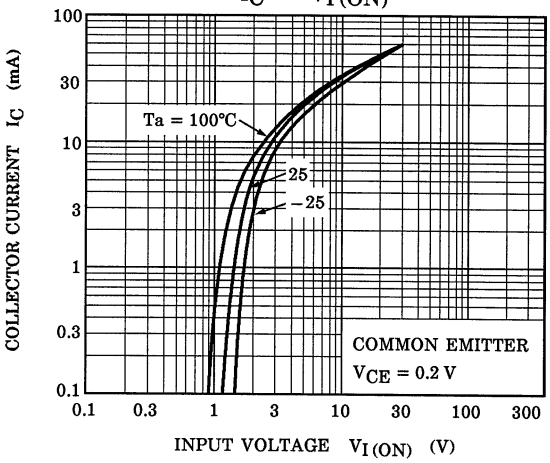

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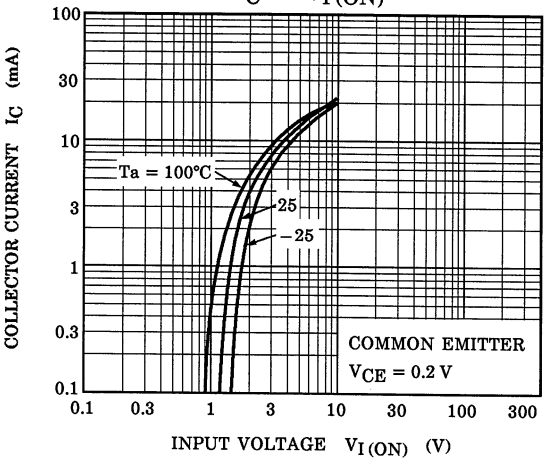

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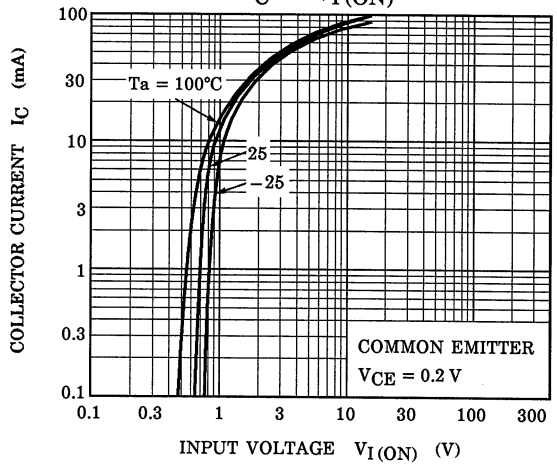

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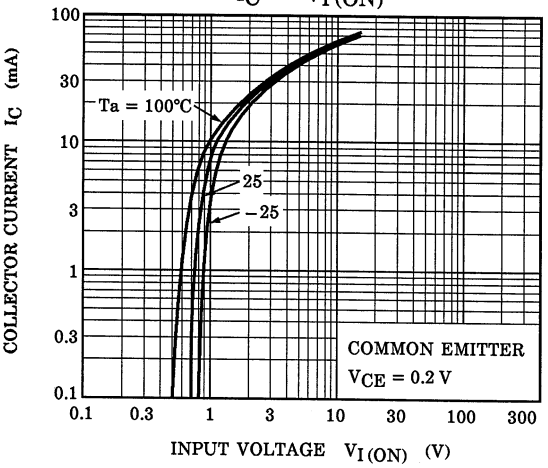
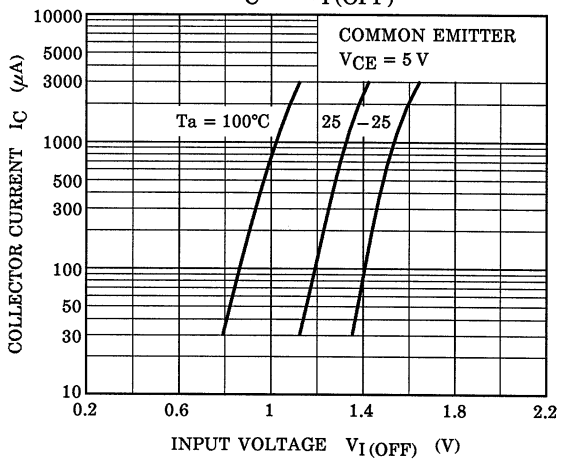


RN1101 I_C – $V_{I(OFF)}$



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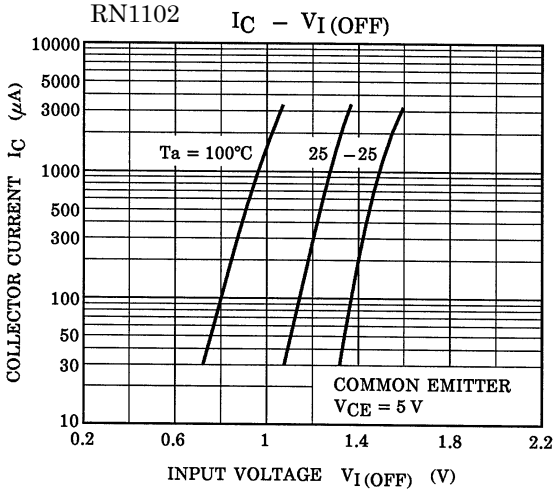

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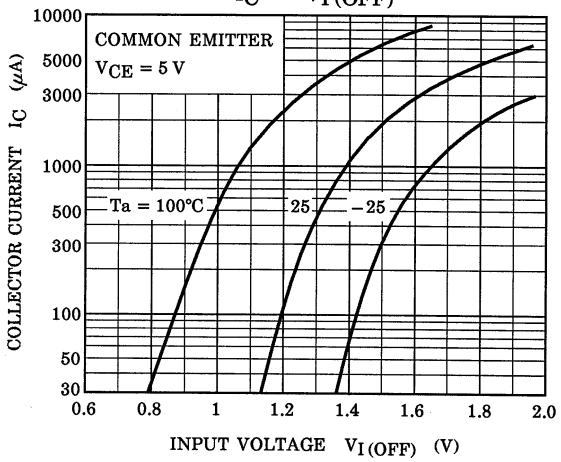

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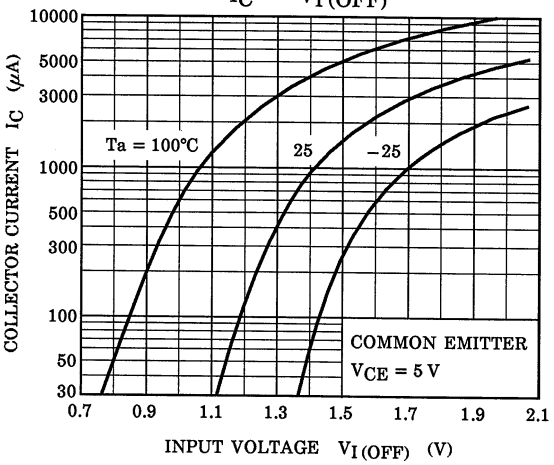

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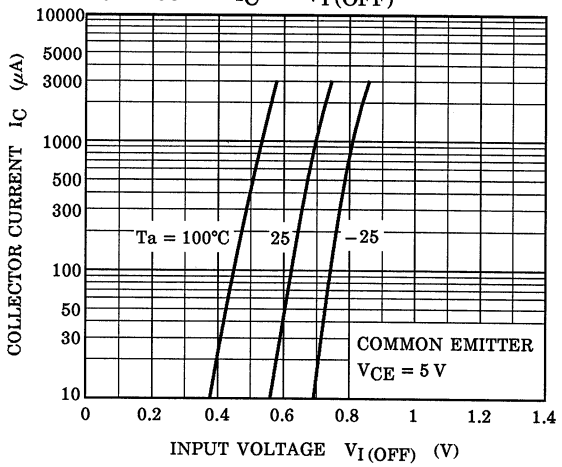

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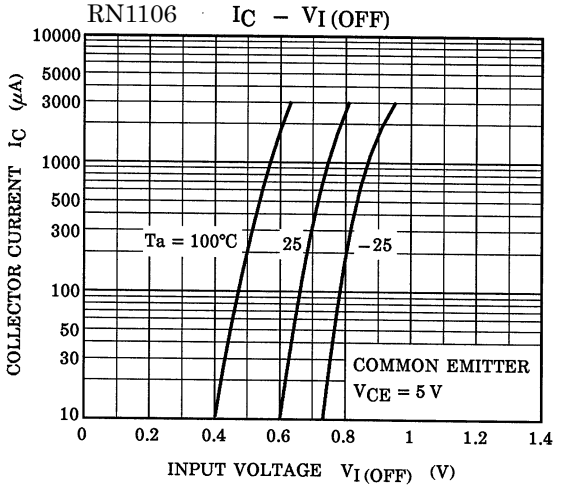
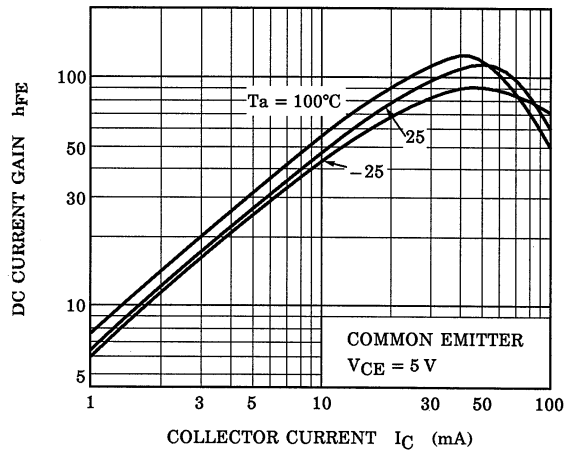


RN1101 h_{FE} – I_C



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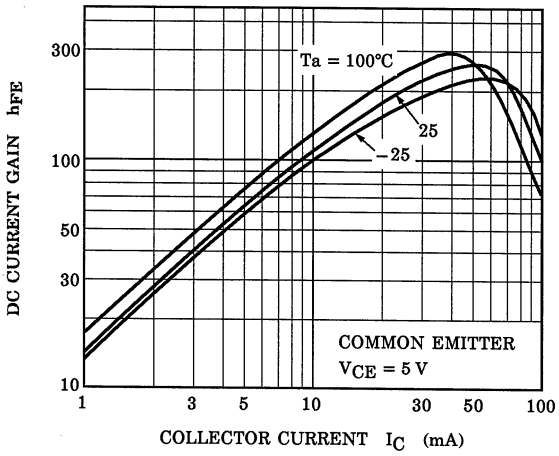

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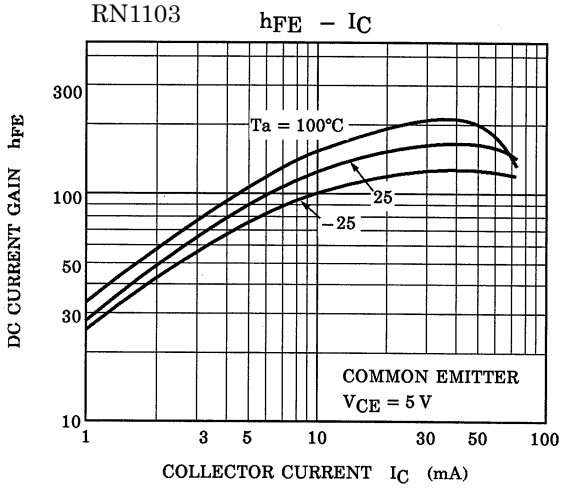

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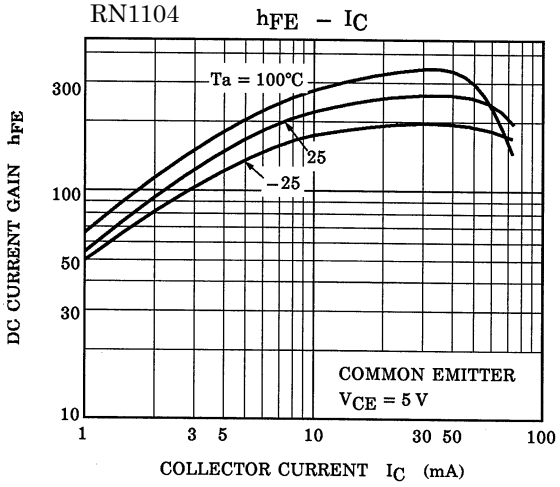

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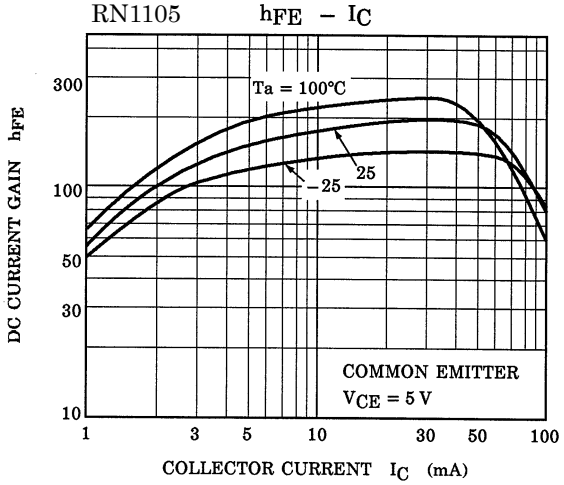

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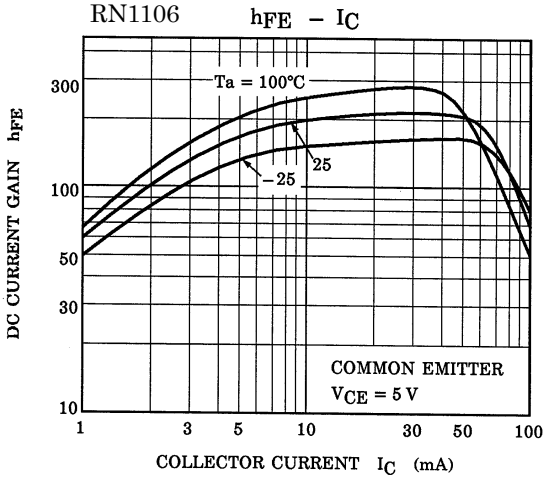
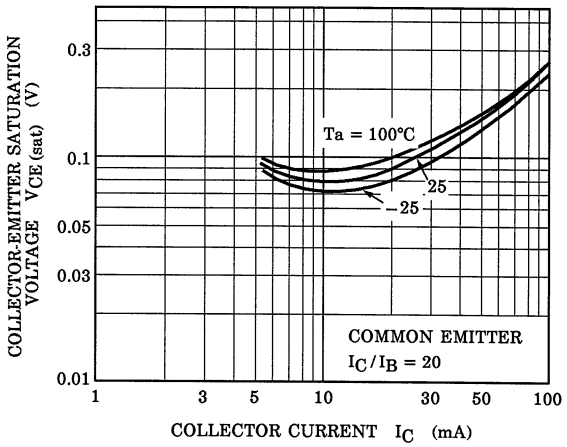


RN1101 $V_{CE\,(sat)}$ – I_C



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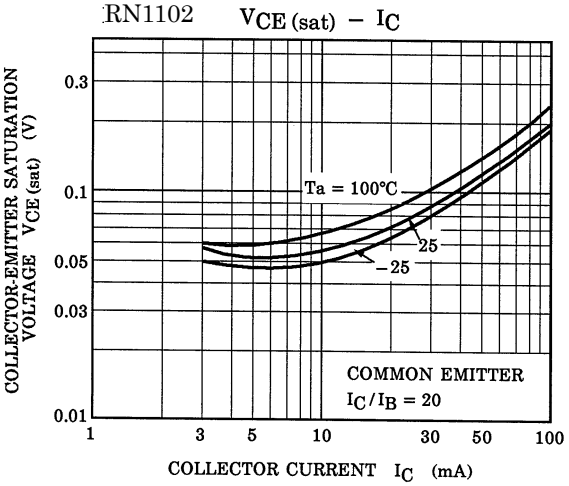

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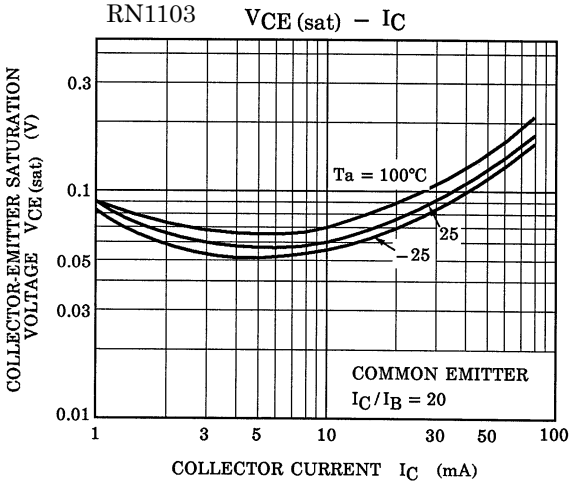

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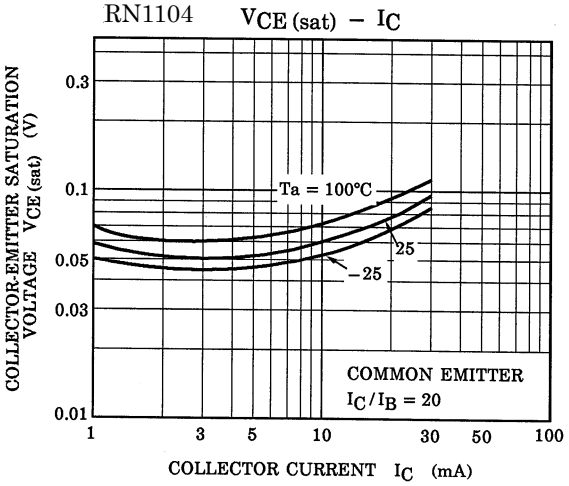

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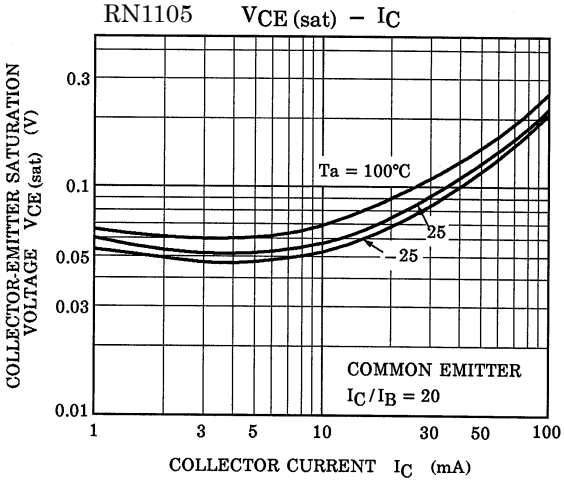
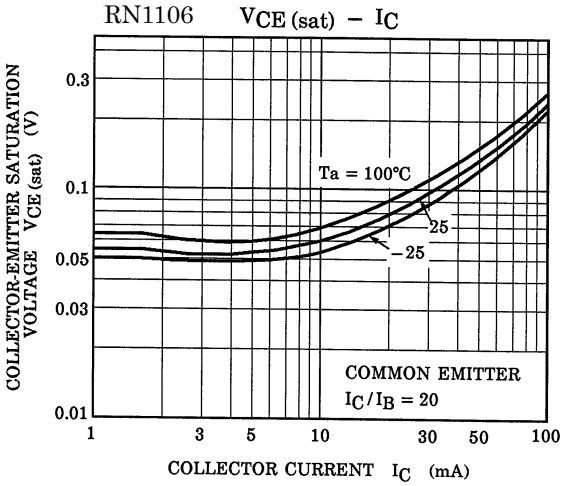


RN1106 $V_{CE\,(sat)}$ – I_C



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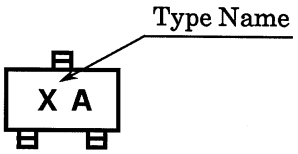
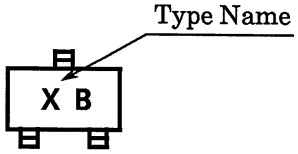
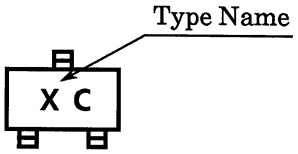
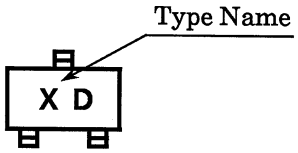
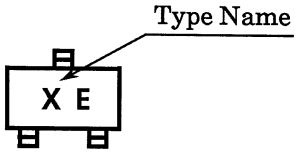
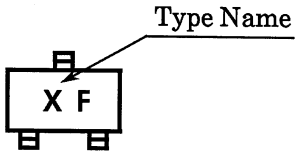
RN1101	
RN1102	
RN1103	
N1104	
RN1105	
RN1106	

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