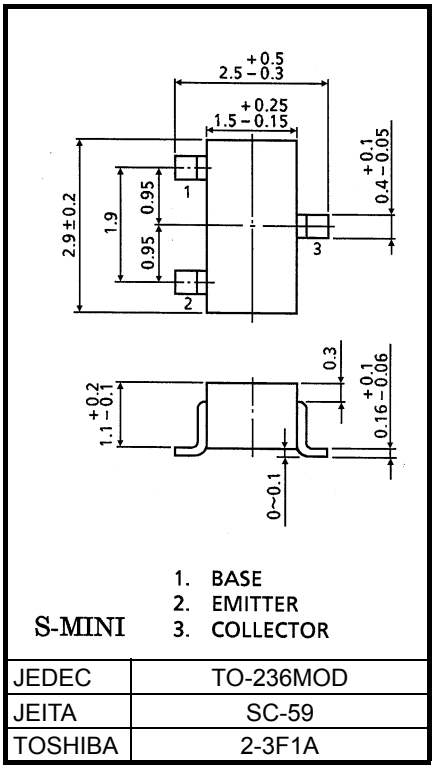
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor)

RN2401, RN2402, RN2403
RN2404, RN2405, RN2406

Unit: mm

Switching, Inverter Circuit, Interface Circuit
and Driver Circuit Applications

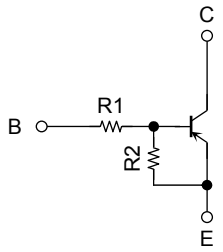
- With built-in bias resistors
- Simplified circuit design
- Reduce a quantity of parts and manufacturing process
- Complementary to RN1401 to 1406



JEDEC	TO-236MOD
JEITA	SC-59
TOSHIBA	2-3F1A

Weight:12mg (typ.)

Equivalent Circuit Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN2401	4.7	4.7
RN2402	10	10
RN2403	22	22
RN2404	47	47
RN2405	2.2	47
RN2406	4.7	47

Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN2401 to 2406	V_{CBO}	−50	V
Collector-emitter voltage		V_{CEO}	−50	V
Emitter-base voltage	RN2401 to 2404	V_{EBO}	−10	V
	RN2405, 2406		−5	V
Collector current	RN2401 to 2406	I_C	−100	mA
Collector power dissipation		P_C	200	mW
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

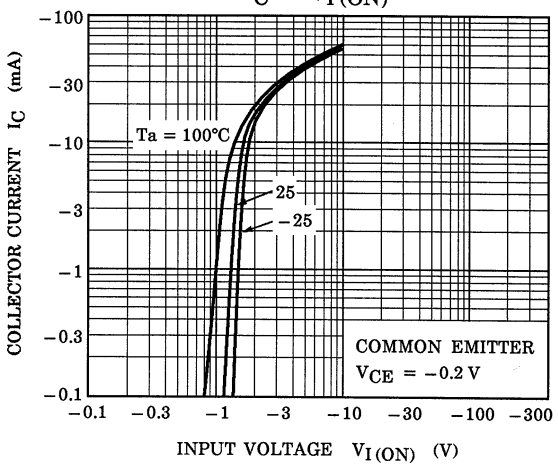
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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
1983-06

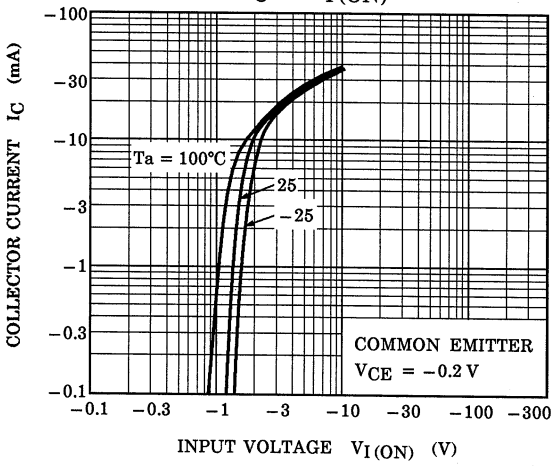
Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2401 to 2406	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	RN2401	I_{EBO}	—	V_{EB} = −10 V, I_C = 0	−0.82	—	−1.52	mA
	RN2402		—		−0.38	—	−0.71	
	RN2403		—		−0.17	—	−0.33	
	RN2404		—		−0.082	—	−0.15	
	RN2405		—	V_{EB} = −5 V, I_C = 0	−0.078	—	−0.145	
	RN2406		—		−0.074	—	−0.138	
DC current gain	RN2401	h_{FE}	—	V_{CE} = −5 V, I_C = −10 mA	30	—	—	—
	RN2402		—		50	—	—	
	RN2403		—		70	—	—	
	RN2404		—		80	—	—	
	RN2405		—		80	—	—	
	RN2406		—		80	—	—	
Collector-emitter saturation voltage	RN2401 to 2406	$V_{CE\ (sat)}$	—	I_C = −5 mA, I_B = −0.25 mA	—	−0.1	−0.3	V
Input voltage (ON)	RN2401	$V_{I\ (ON)}$	—	V_{CE} = −0.2 V, I_C = −5 mA	−1.1	—	−2.0	V
	RN2402		—		−1.2	—	−2.4	
	RN2403		—		−1.3	—	−3.0	
	RN2404		—		−1.5	—	−5.0	
	RN2405		—		−0.6	—	−1.1	
	RN2406		—		−0.7	—	−1.3	
Input voltage (OFF)	RN2401 to 2404	$V_{I\ (OFF)}$	—	V_{CE} = −5 V, I_C = −0.1 mA	−1.0	—	−1.5	V
	RN2405, 2406		—		−0.5	—	−0.8	
Transition frequency	RN2401 to 2406	f_T	—	V_{CE} = −10 V, I_C = −5 mA	—	200	—	MHz
Collector output capacitance	RN2401 to 2406	C_{ob}	—	V_{CB} = −10 V, I_E = 0, f = 1 MHz	—	3	6	pF
Input resistor	RN2401	R1	—	—	3.29	4.7	6.11	kΩ
	RN2402		—		7	10	13	
	RN2403		—		15.4	22	28.6	
	RN2404		—		32.9	47	61.1	
	RN2405		—		1.54	2.2	2.86	
	RN2406		—		3.29	4.7	6.11	
Resistor ratio	RN2401 to 2404	R1/R2	—	—	0.9	1.0	1.1	—
	RN2405		—		0.0421	0.0468	0.0515	
	RN2406		—		0.09	0.1	0.11	

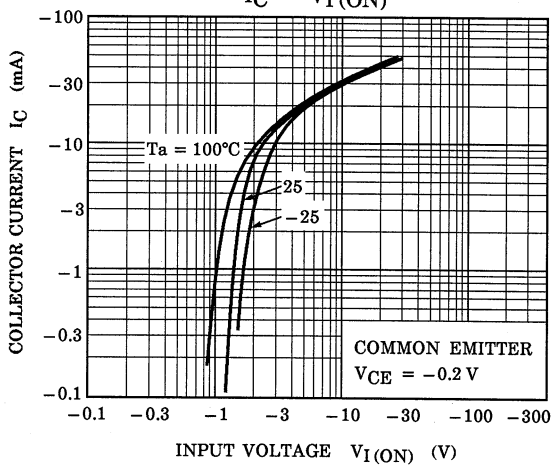
RN2401 $I_C - V_{I(ON)}$



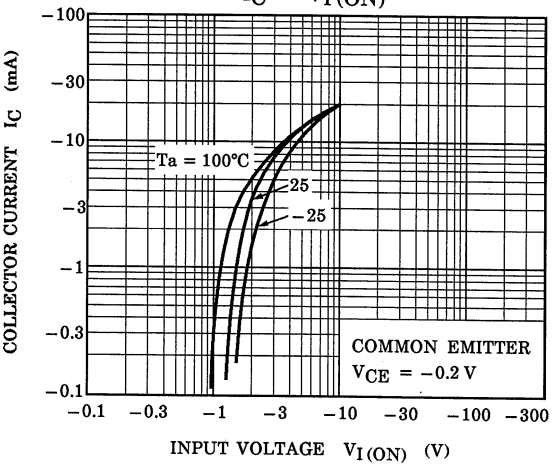
RN2402 $I_C - V_{I(ON)}$



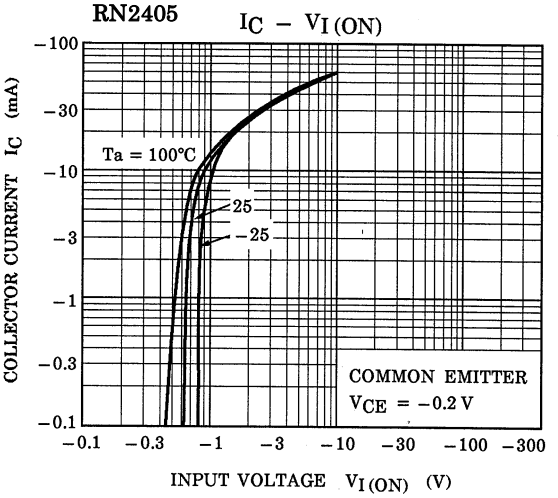
RN2403 $I_C - V_{I(ON)}$



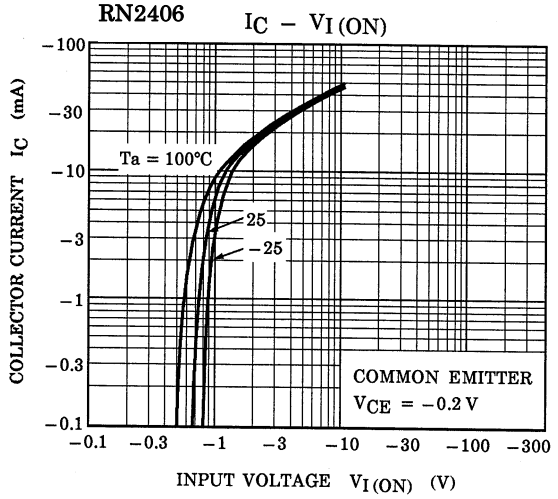
RN2404 $I_C - V_{I(ON)}$



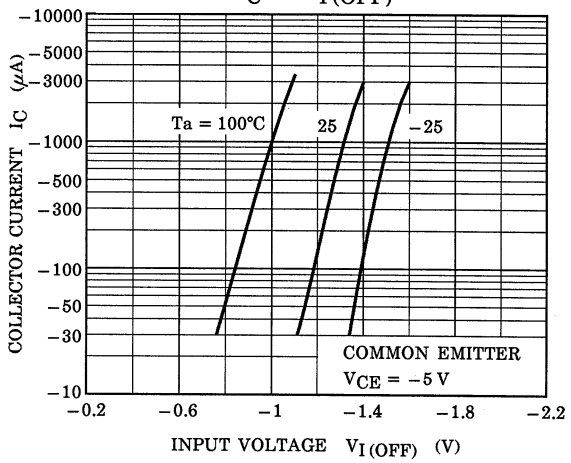
RN2405 $I_C - V_{I(ON)}$



RN2406 $I_C - V_{I(ON)}$



RN2401 $I_C - V_{I(OFF)}$



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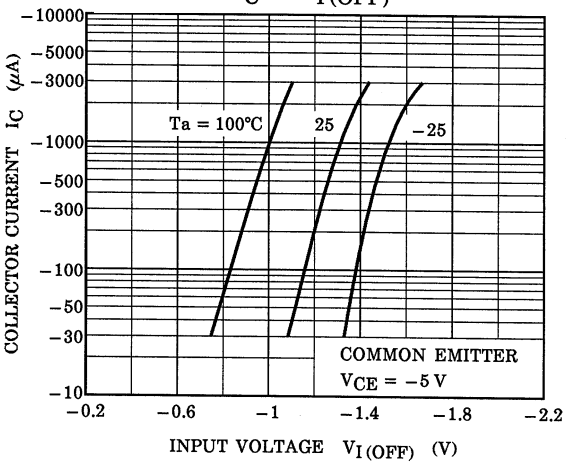

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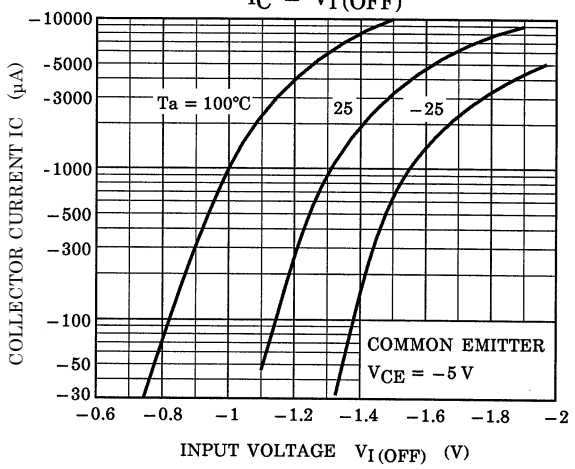

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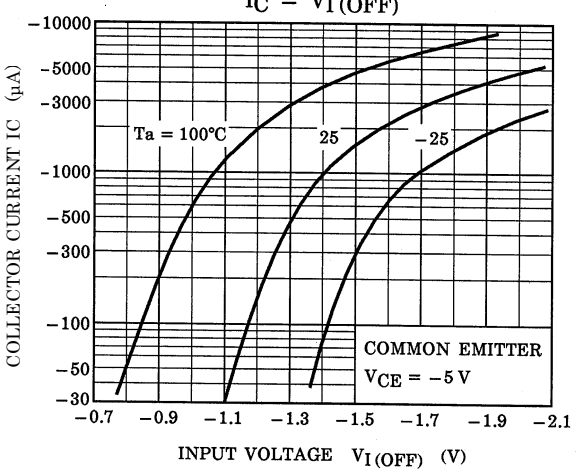

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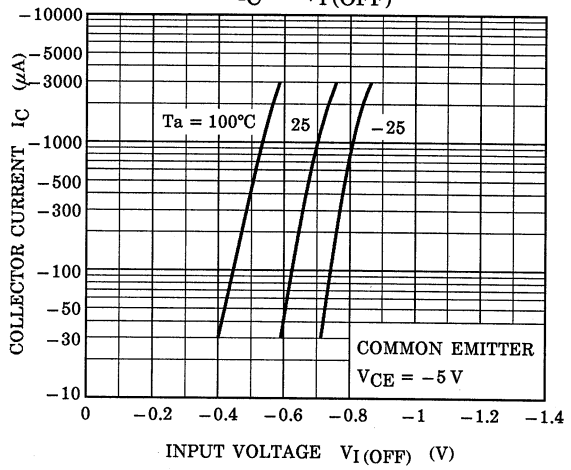

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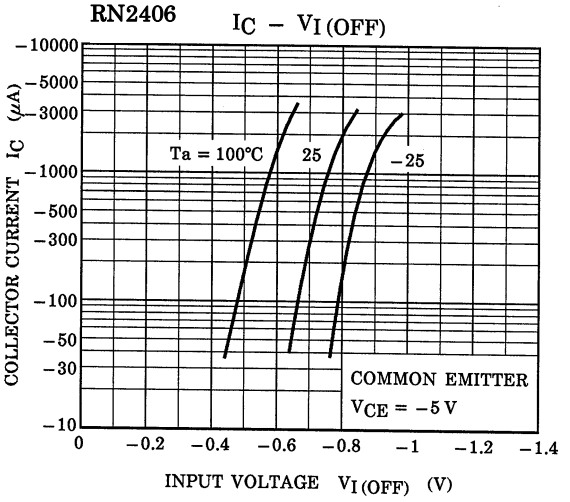

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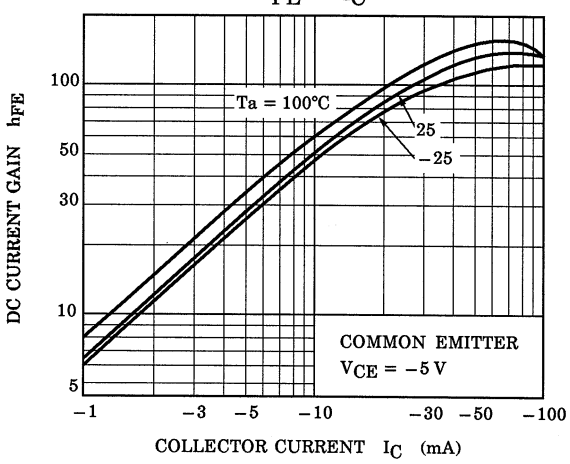

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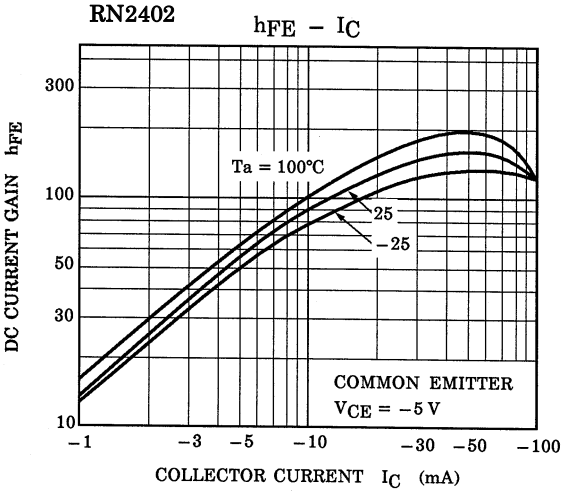

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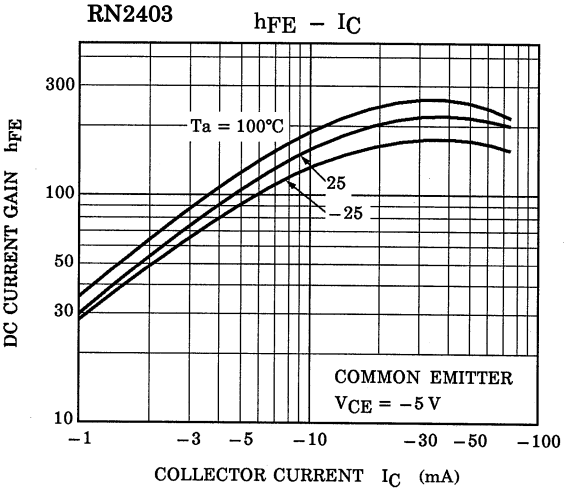

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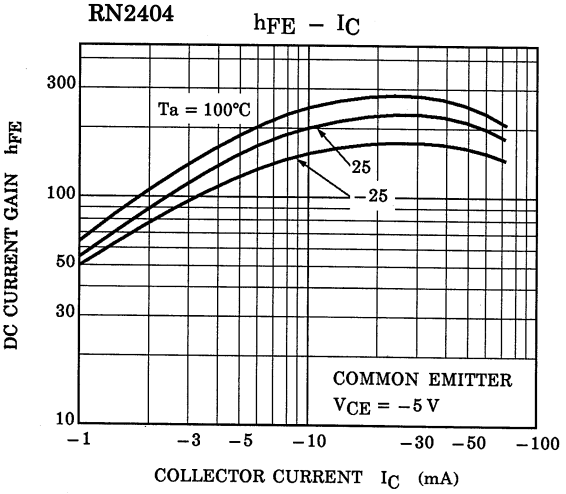

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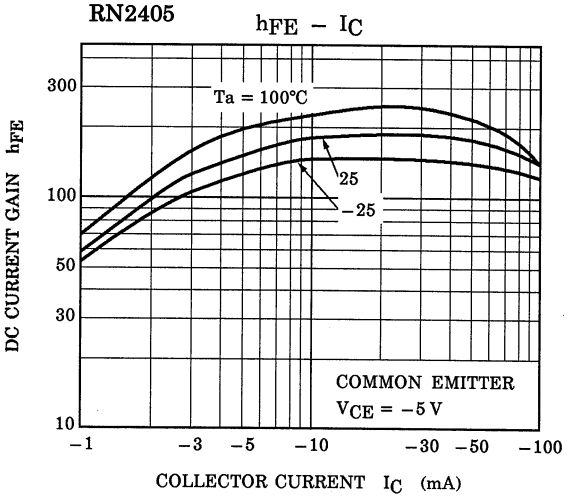

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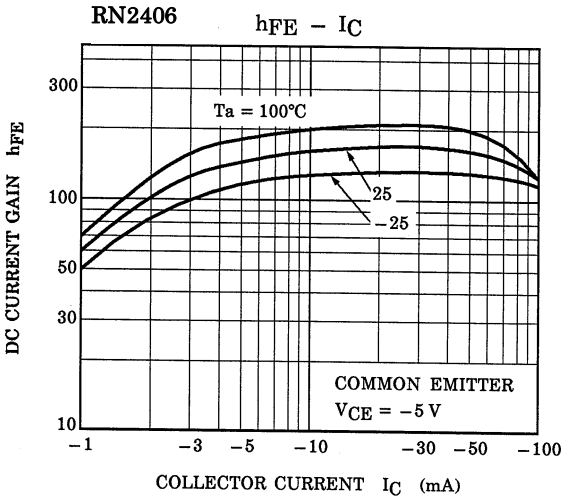
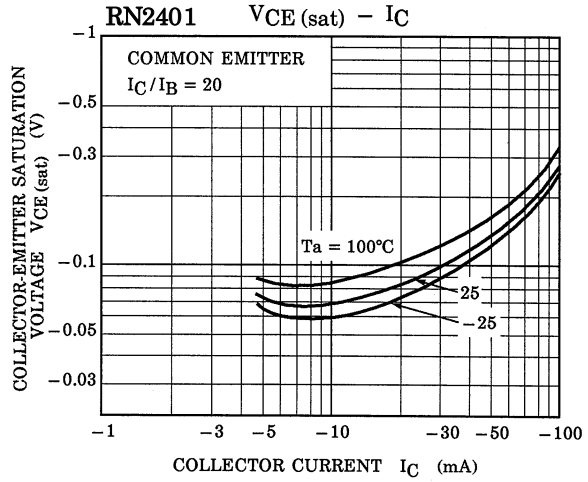
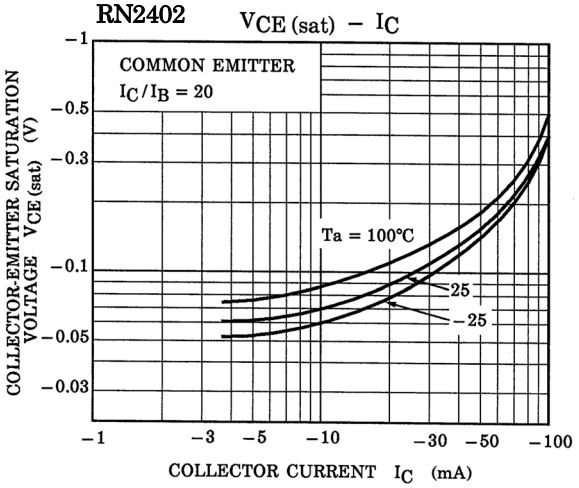


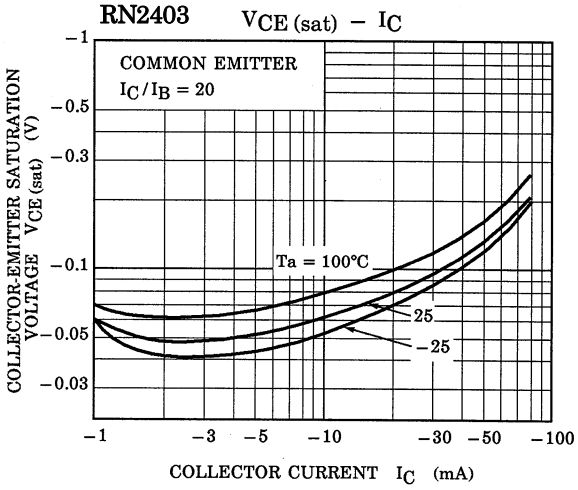
RN2401 $V_{CE\,(sat)}$ – I_C



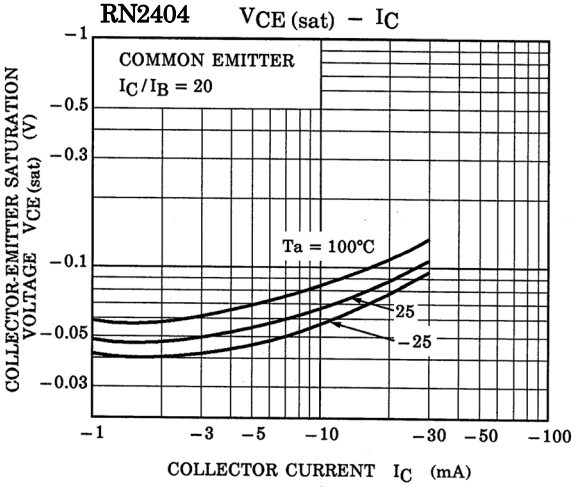
RN2402 $V_{CE\,(sat)}$ – I_C



RN2403 $V_{CE\,(sat)}$ – I_C



RN2404 $V_{CE\,(sat)}$ – I_C



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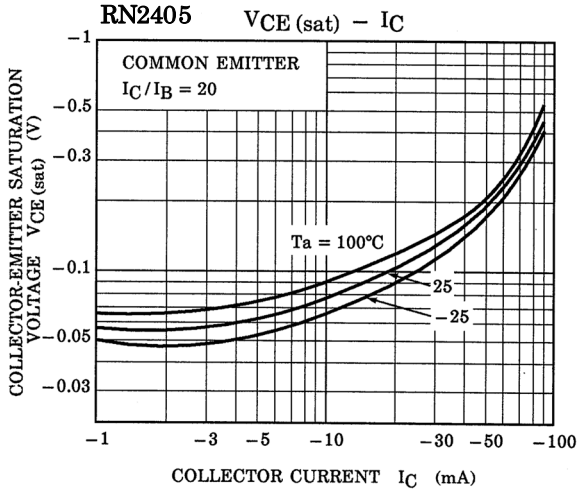

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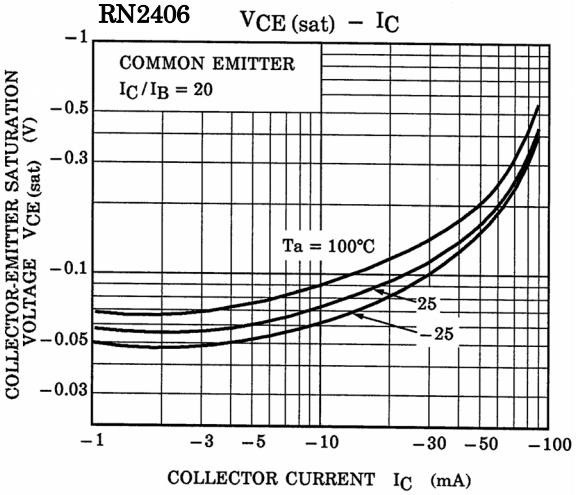

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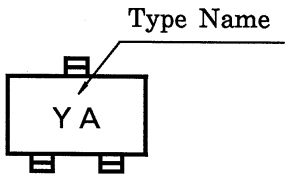
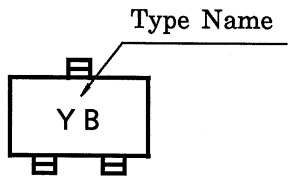
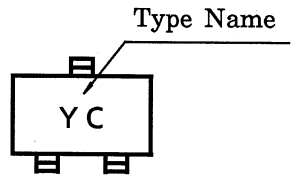
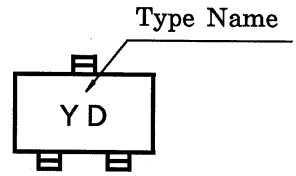
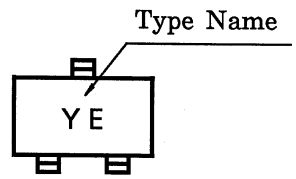
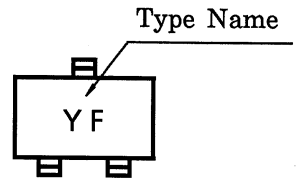
RN2401	
RN2402	
RN2403	
RN2404	
RN2405	
RN2406	

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