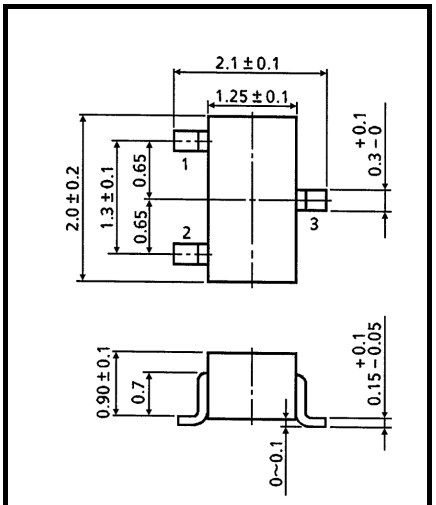
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process)

RN1301,RN1302,RN1303
RN1304,RN1305,RN1306

Switching, Inverter Circuit, Interface Circuit
and Driver Circuit Applications

- With built-in bias resistors.
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process
- Complementary to RN2301 to RN2306

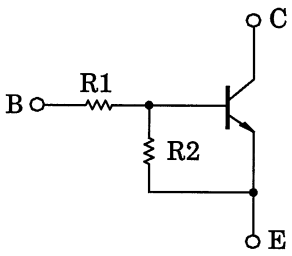
Unit: mm



JEDEC	—
JEITA	SC-70
TOSHIBA	2-2E1A

Weight: 6 mg (typ.)

Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN1301	4.7	4.7
RN1302	10	10
RN1303	22	22
RN1304	47	47
RN1305	2.2	47
RN1306	4.7	47

Absolute Maximum Ratings (Ta = 25°C)

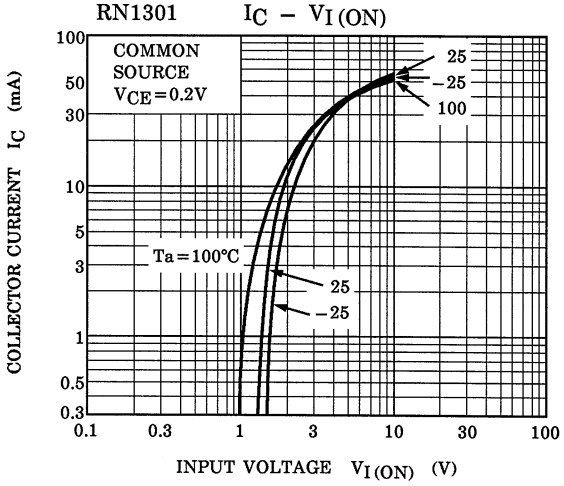
Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN1301 to 1306	V_{CBO}	50	V
Collector-emitter voltage		V_{CEO}	50	V
Emitter-base voltage	RN1301 to 1304	V_{EBO}	10	V
	RN1305, 1306		5	
Collector current	RN1301 to 1306	I_C	100	mA
Collector power dissipation		P_C	100	mW
Junction temperature		T_j	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).

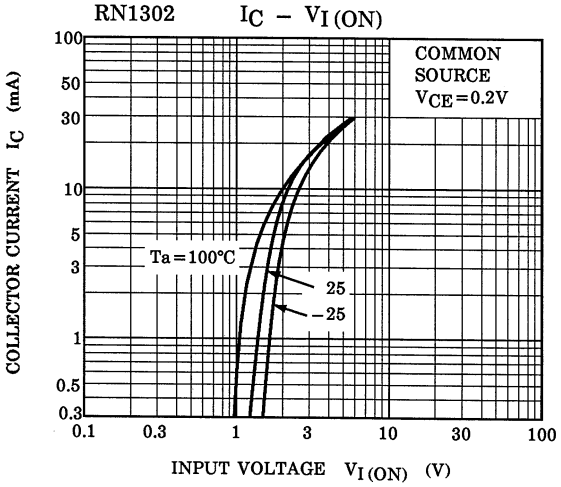
Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1301 to 1306	I_{CBO}	—	V_{CB} = 50V, I_E = 0	—	—	100	nA
		I_{CEO}	—	V_{CE} = 50V, I_B = 0	—	—	500	
Emitter cut-off current	RN1301	I_{EBO}	—	V_{EB} = 10V, I_C = 0	0.82	—	1.52	mA
	RN1302		—		0.38	—	0.71	
	RN1303		—		0.17	—	0.33	
	RN1304		—		0.082	—	0.15	
	RN1305		—	V_{EB} = 5V, I_C = 0	0.078	—	0.145	
	RN1306		—		0.074	—	0.138	
DC current gain	RN1301	h_{FE}	—	V_{CE} = 5V, I_C = 10mA	30	—	—	—
	RN1302		—		50	—	—	
	RN1303		—		70	—	—	
	RN1304		—		80	—	—	
	RN1305		—		80	—	—	
	RN1306		—		80	—	—	
Collector-emitter saturation voltage	RN1301 to 1306	$V_{CE\ (sat)}$	—	I_C = 5mA, I_B = 0.25mA	—	0.1	0.3	V
Input voltage (ON)	RN1301	$V_{I\ (ON)}$	—	V_{CE} = 0.2V, I_C = 5mA	1.1	—	2.0	V
	RN1302		—		1.2	—	2.4	
	RN1303		—		1.3	—	3.0	
	RN1304		—		1.5	—	5.0	
	RN1305		—		0.6	—	1.1	
	RN1306		—		0.7	—	1.3	
Input voltage (OFF)	RN1301 to 1304	$V_{I\ (OFF)}$	—	V_{CE} = 5V, I_C = 0.1mA	1.0	—	1.5	V
	RN1305, 1306		—		0.5	—	0.8	
Transition frequency	RN1301 to 1306	f_T	—	V_{CE} = 10V, I_C = 5mA	—	250	—	MHz
Collector output capacitance	RN1301 to 1306	C_{ob}	—	V_{CB} = 10V, I_E = 0, f = 1MHz	—	3	6	pF
Input resistor	RN1301	R1	—	—	3.29	4.7	6.11	kΩ
	RN1302		—		7	10	13	
	RN1303		—		15.4	22	28.6	
	RN1304		—		32.9	47	61.1	
	RN1305		—		1.54	2.2	2.86	
	RN1306		—		3.29	4.7	6.11	
Resistor ratio	RN1301 to 1304	R1/R2	—	—	0.9	1.0	1.1	—
	RN1305		—		0.0421	0.0468	0.0515	
	RN1306		—		0.09	0.1	0.11	

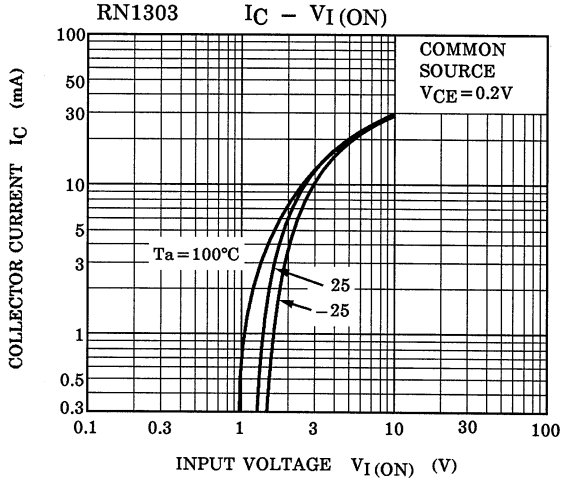
RN1301 $I_C - V_{I(ON)}$



RN1302 $I_C - V_{I(ON)}$



RN1303 $I_C - V_{I(ON)}$



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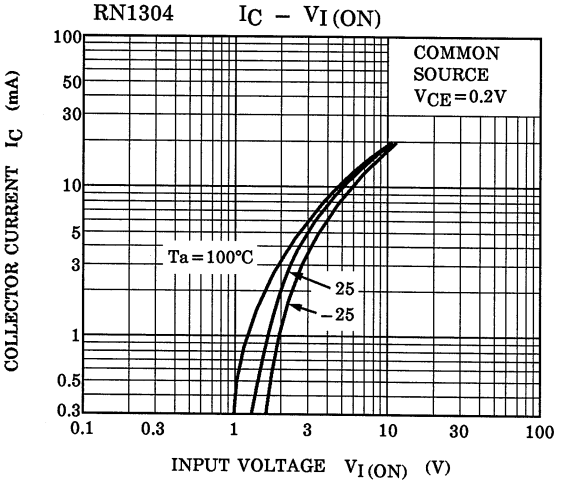

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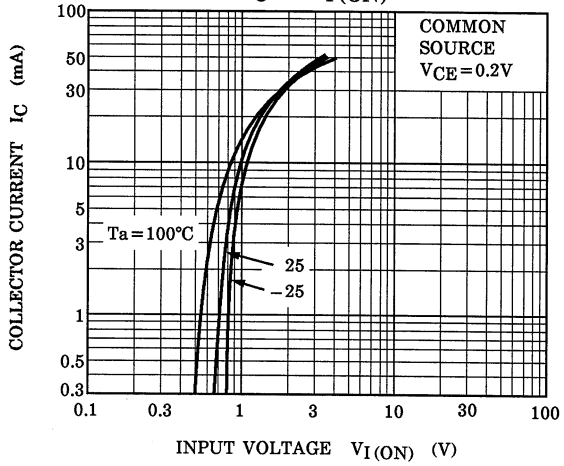

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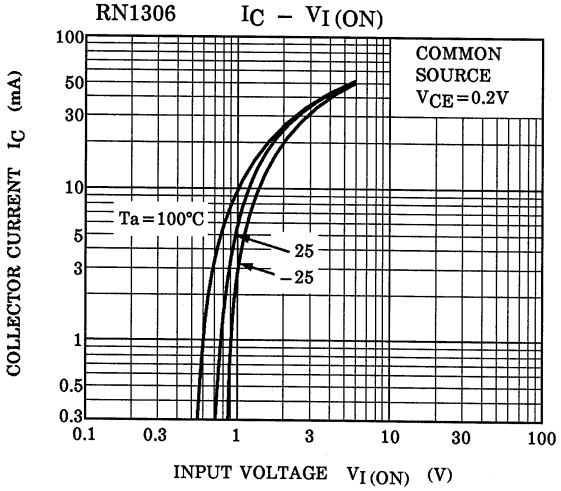
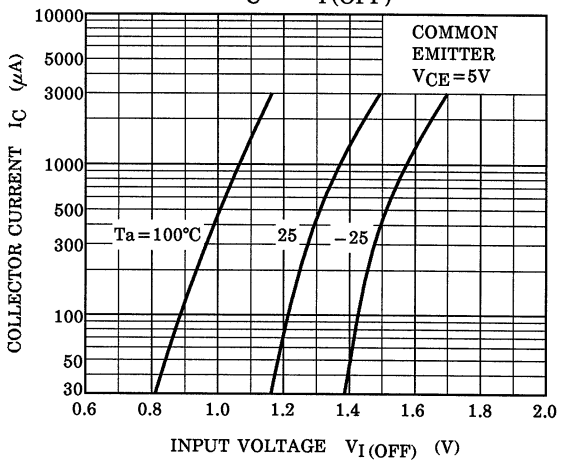


RN1301 $I_C - V_{I(OFF)}$



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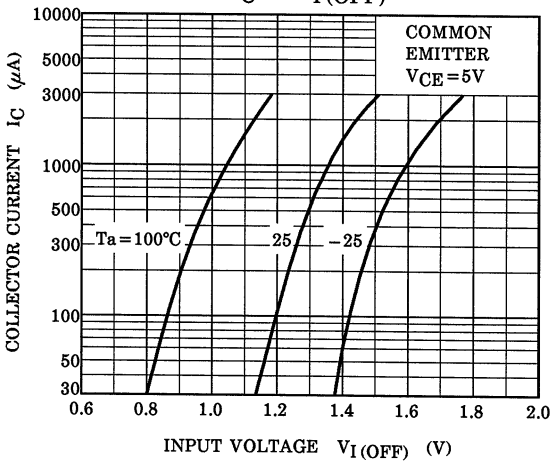

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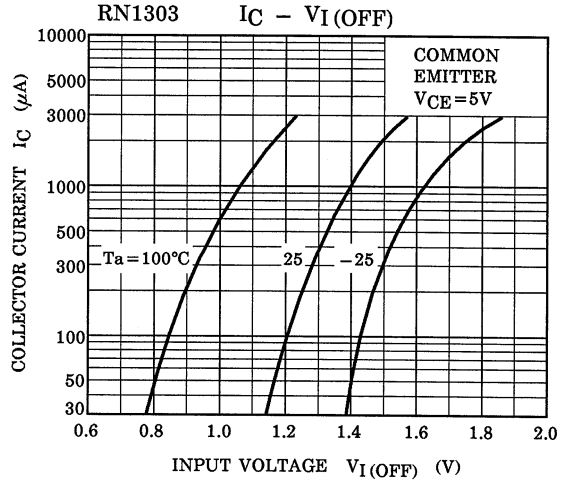

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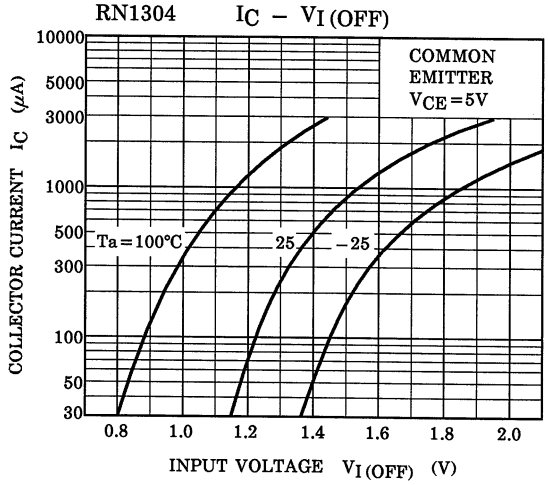

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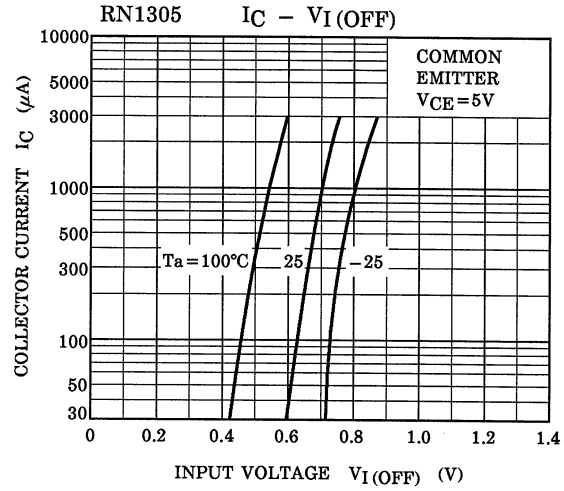

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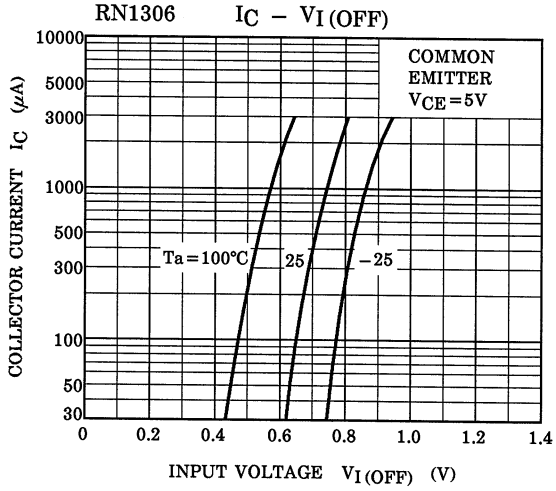
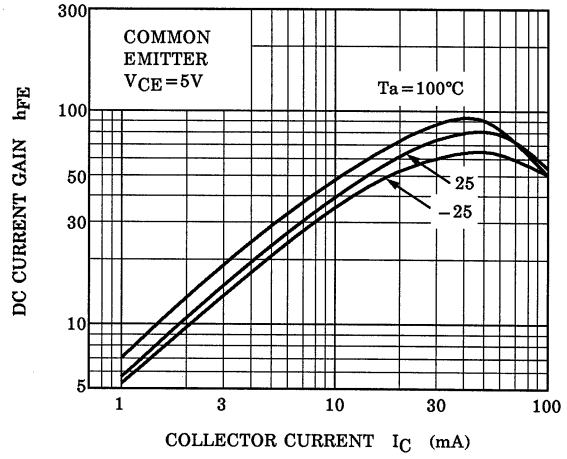


RN1301 h_{FE} – I_C



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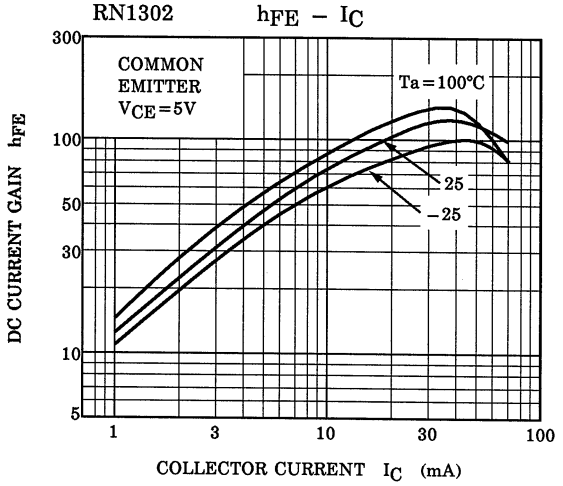

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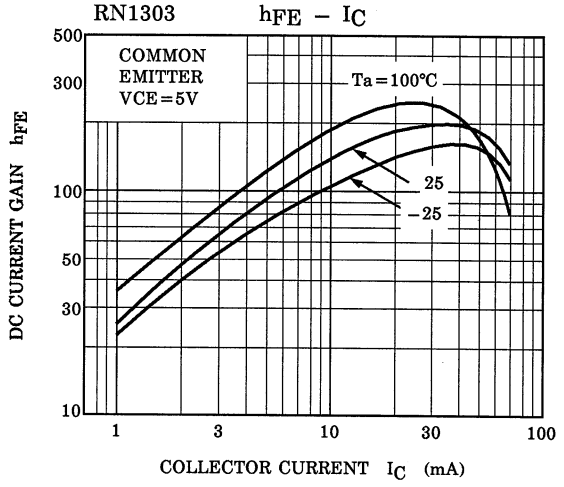

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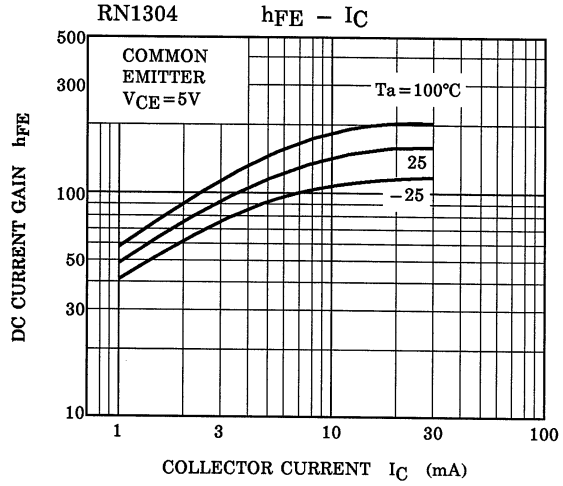

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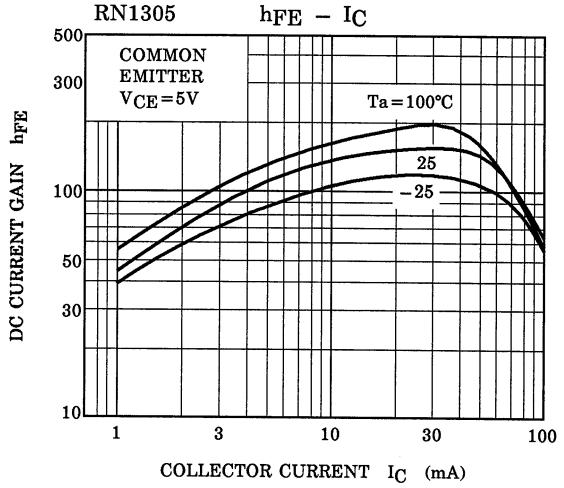

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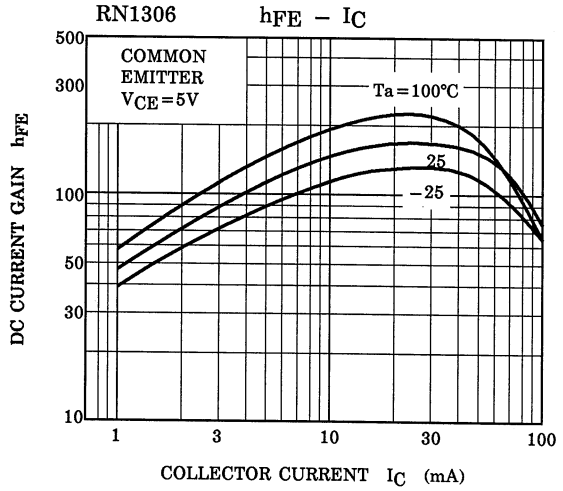

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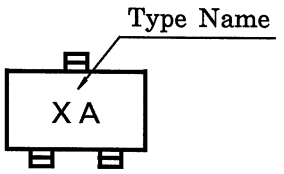
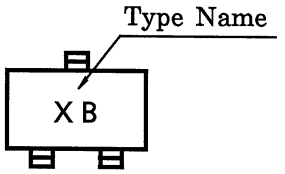
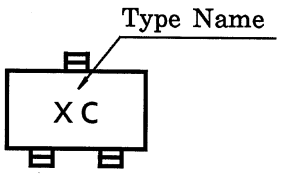
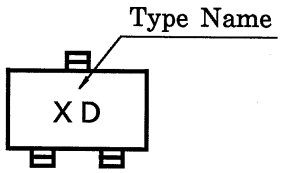
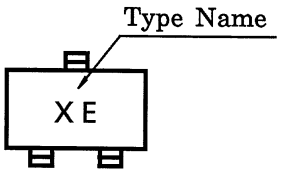
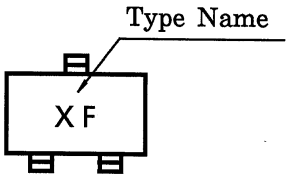
RN1301	
RN1302	
RN1303	
RN1304	
RN1305	
RN1306	

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