

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

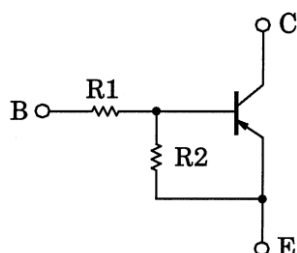
RN2301, RN2302, RN2303 RN2304, RN2305, RN2306

Switching, Inverter Circuit, Interface Circuit and Driver Circuit

- AEC-Q101 Qualified (Note1)
- With built-in bias resistors.
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process and miniaturize equipment.
- Various resistance values are available to suit various circuit designs.
- Complementary to RN1301 to RN1306

Note1: For detail information, please contact our sales representative.

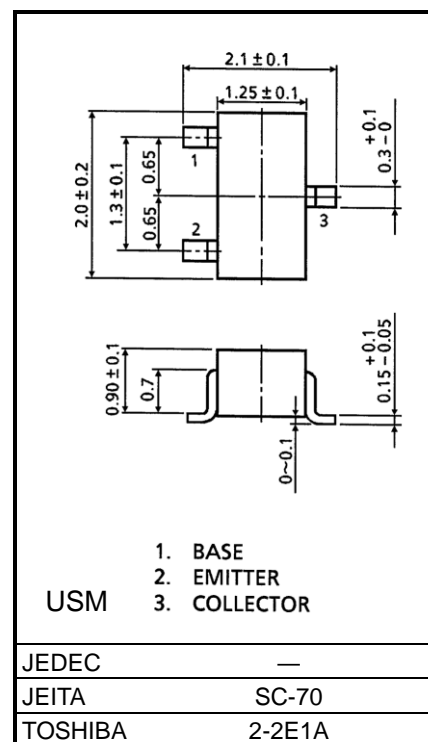
Equivalent Circuit



Bias Resistor Values

Part No.	R1 (kΩ)	R2 (kΩ)
RN2301	4.7	4.7
RN2302	10	10
RN2303	22	22
RN2304	47	47
RN2305	2.2	47
RN2306	4.7	47

Unit: mm



Weight: 0.006g (typ.)

Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector-base voltage	VCBO	-50	V
Collector-emitter voltage	VCEO	-50	V
Emitter-base voltage	VEBO	-10	V
		-5	V
Collector current	IC	-100	mA
Collector power dissipation	PC	100	mW
Junction temperature	Tj	150	°C
Storage temperature range	Tstg	-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.

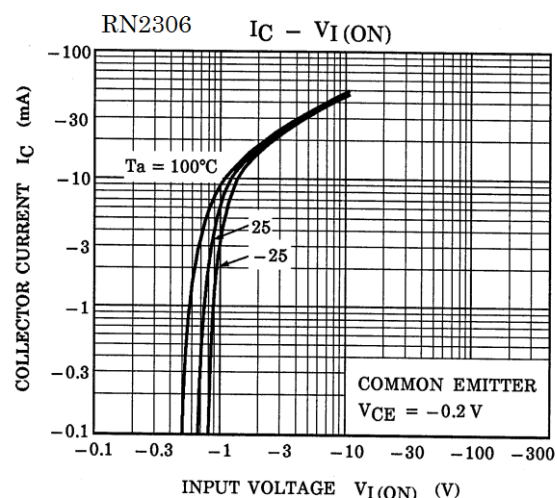
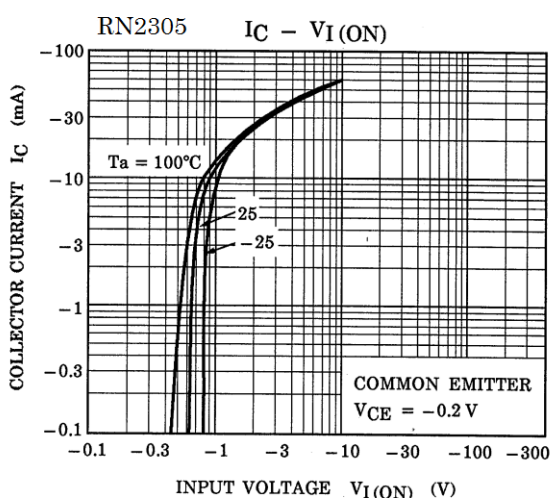
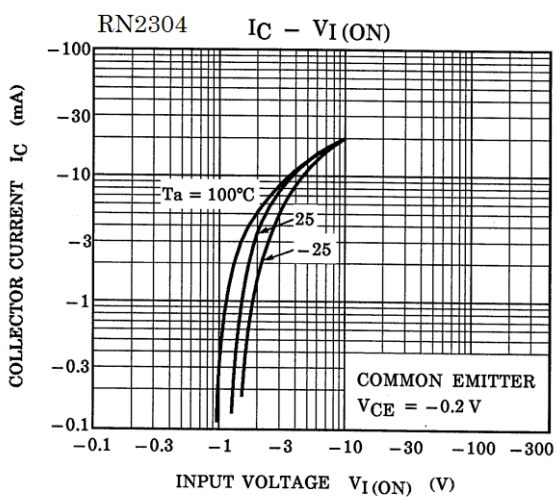
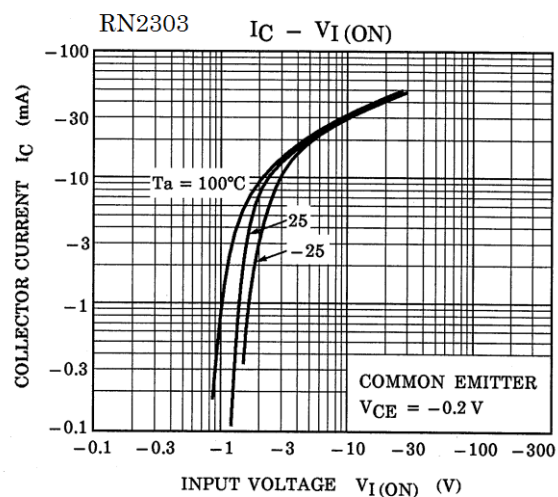
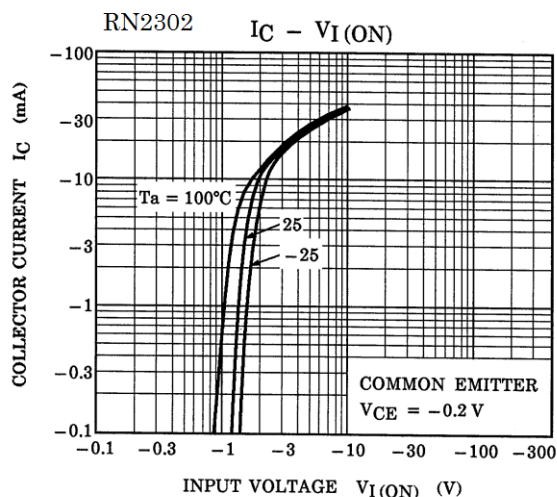
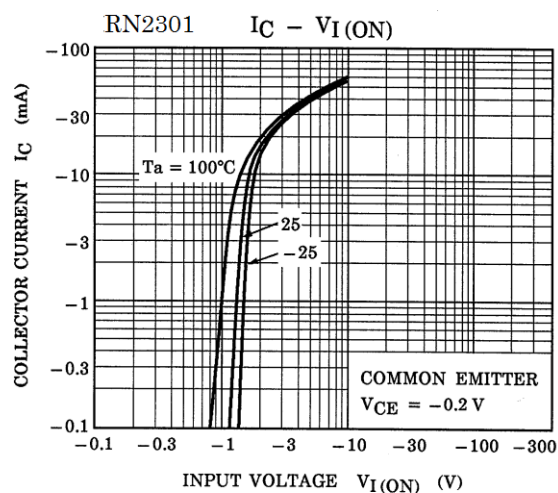
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc.).

Start of commercial production
1987-09

Electrical Characteristics (Ta = 25°C)

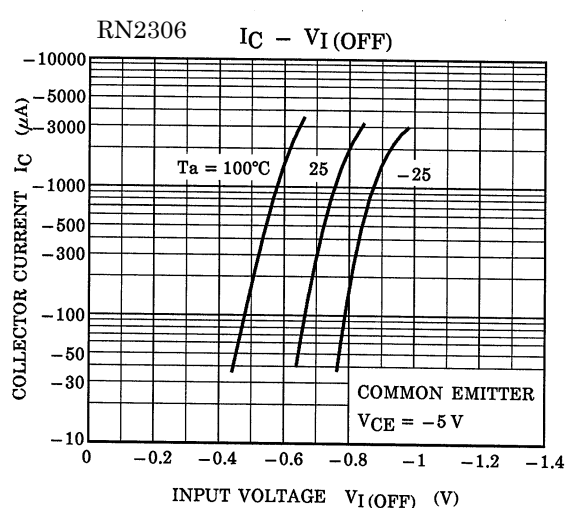
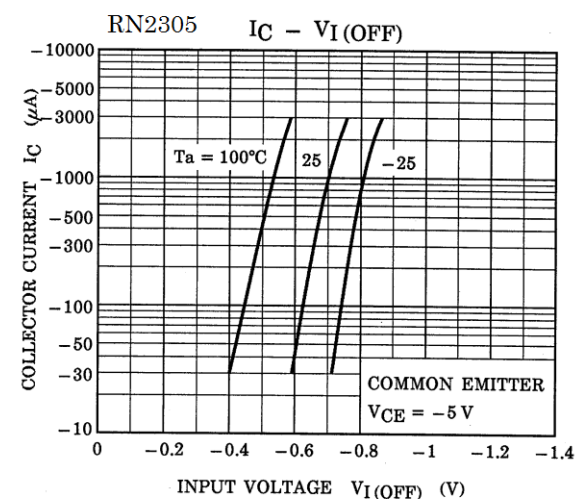
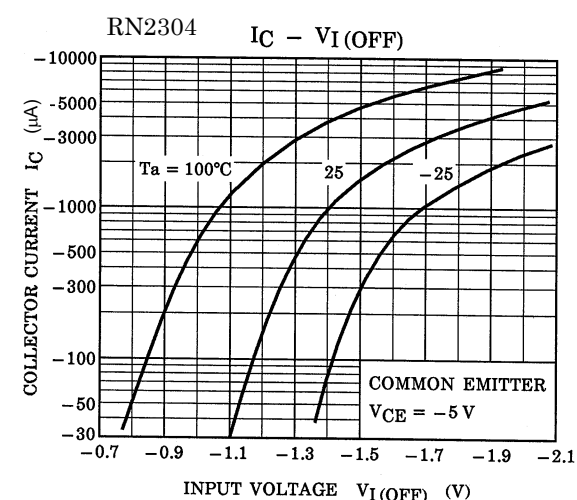
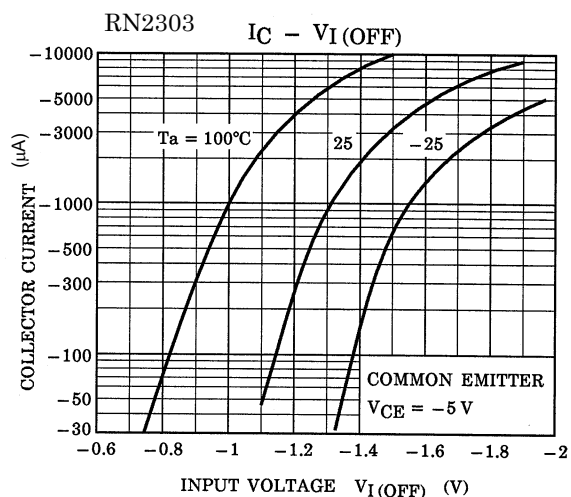
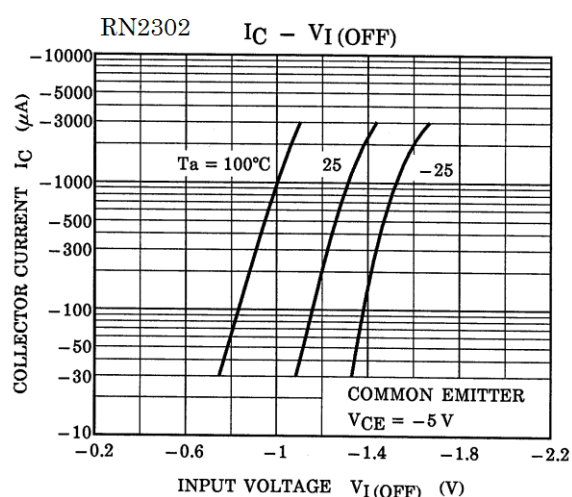
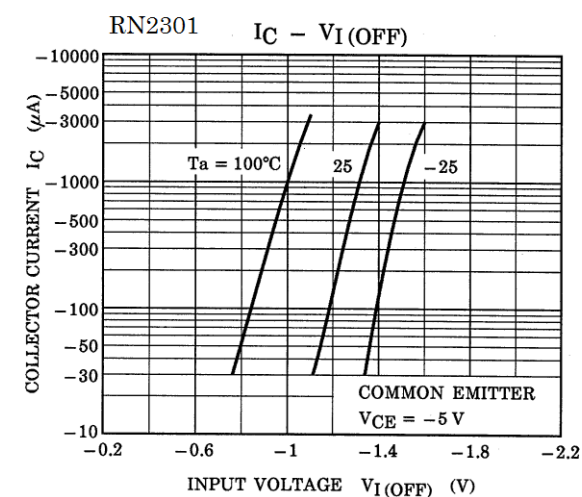
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2301 to RN2306	ICBO	V _{CB} = -50 V, I _E = 0 mA	—	—	-100	nA
		ICEO	V _{CE} = -50 V, I _B = 0 mA	—	—	-500	
Emitter cut-off current	RN2301	IEBO	V _{EB} = -10 V, I _C = 0 mA	-0.82	—	-1.52	mA
	RN2302			-0.38	—	-0.71	
	RN2303			-0.17	—	-0.33	
	RN2304			-0.082	—	-0.15	
	RN2305		V _{EB} = -5 V, I _C = 0 mA	-0.078	—	-0.145	
	RN2306			-0.074	—	-0.138	
DC current gain	RN2301	h _{FE}	V _{CE} = -5 V, I _C = -10 mA	30	—	—	—
	RN2302			50	—	—	
	RN2303			70	—	—	
	RN2304			80	—	—	
	RN2305			80	—	—	
	RN2306			80	—	—	
Collector-emitter saturation voltage	RN2301 to RN2306	V _{CE (sat)}	I _C = -5 mA, I _B = -0.25 mA	—	-0.1	-0.3	V
Input voltage (ON)	RN2301	V _{I (ON)}	V _{CE} = -0.2 V, I _C = -5 mA	-1.1	—	-2.0	V
	RN2302			-1.2	—	-2.4	
	RN2303			-1.3	—	-3.0	
	RN2304			-1.5	—	-5.0	
	RN2305			-0.6	—	-1.1	
	RN2306			-0.7	—	-1.3	
Input voltage (OFF)	RN2301 to RN2304	V _{I (OFF)}	V _{CE} = -5 V, I _C = -0.1 mA	-1.0	—	-1.5	V
	RN2305, RN2306			-0.5	—	-0.8	
Transition frequency	RN2301 to RN2306	f _T	V _{CE} = -10 V, I _C = -5 mA	—	200	—	MHz
Collector output capacitance	RN2301 to RN2306	C _{ob}	V _{CB} = -10 V, I _E = 0 mA f = 1 MHz	—	3	6	pF
Input resistor	RN2301	R ₁	—	3.29	4.7	6.11	kΩ
	RN2302			7	10	13	
	RN2303			15.4	22	28.6	
	RN2304			32.9	47	61.1	
	RN2305			1.54	2.2	2.86	
	RN2306			3.29	4.7	6.11	
Resistor ratio	RN2301 to RN2304	R _{1/R2}	—	0.9	1.0	1.1	—
	RN2305			0.0421	0.0468	0.0515	
	RN2306			0.09	0.1	0.11	

Characteristics Curves



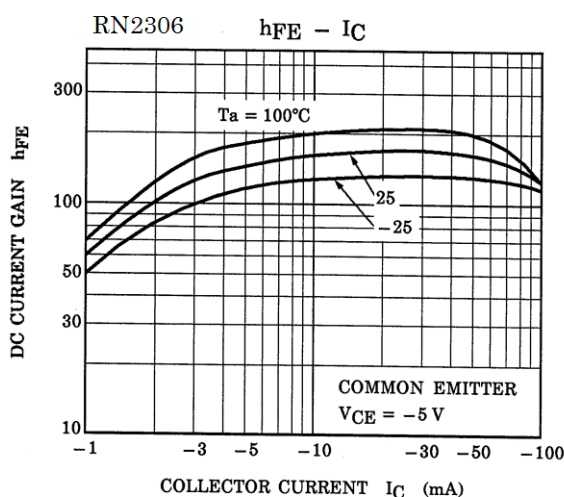
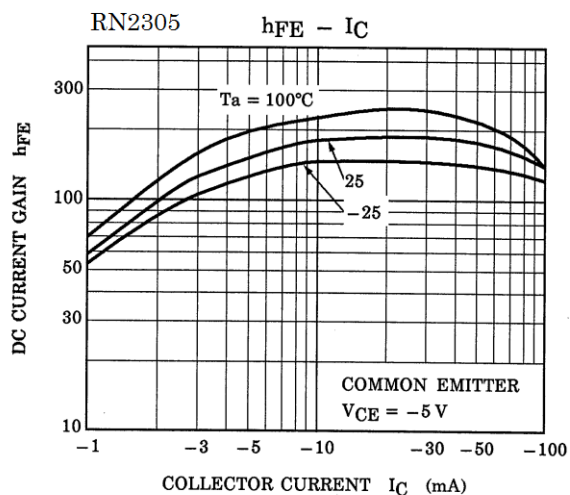
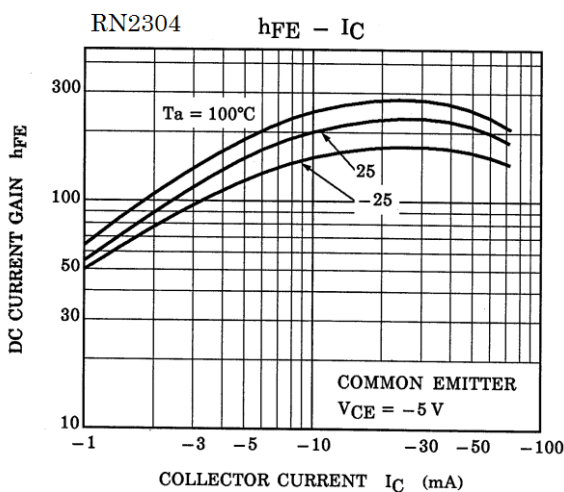
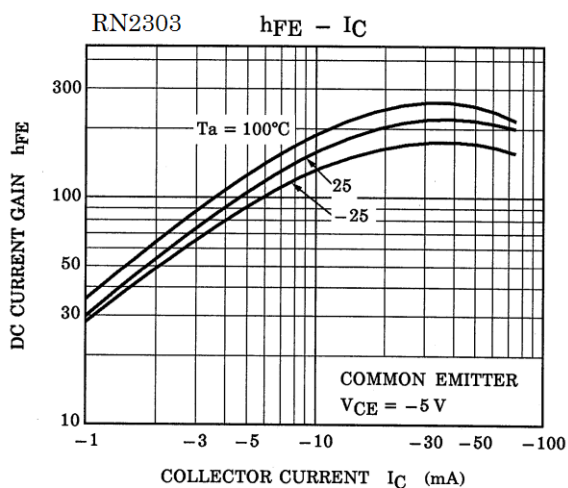
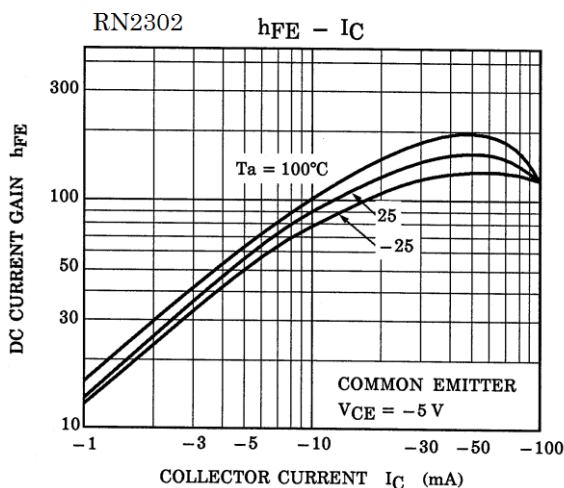
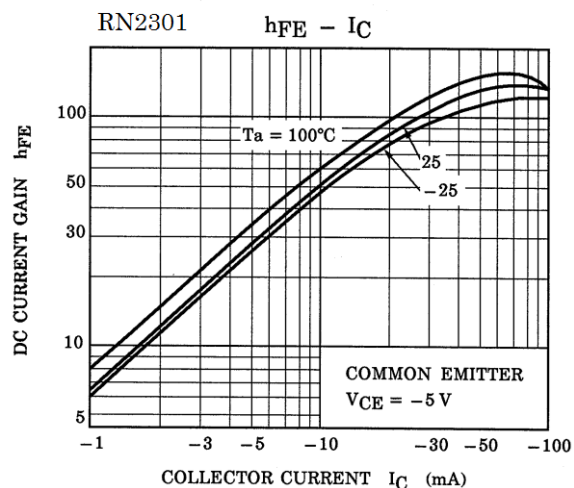
The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

Characteristics Curves



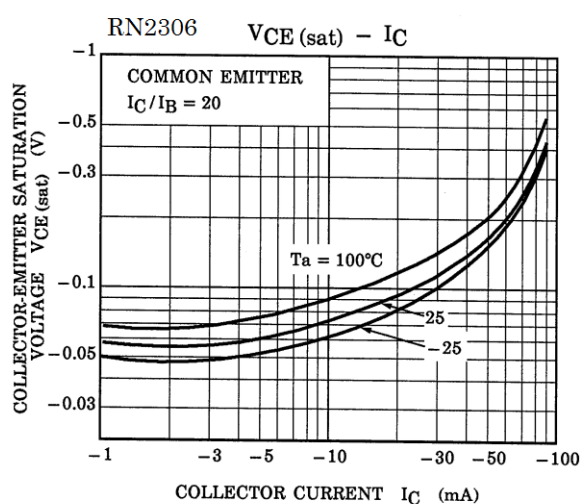
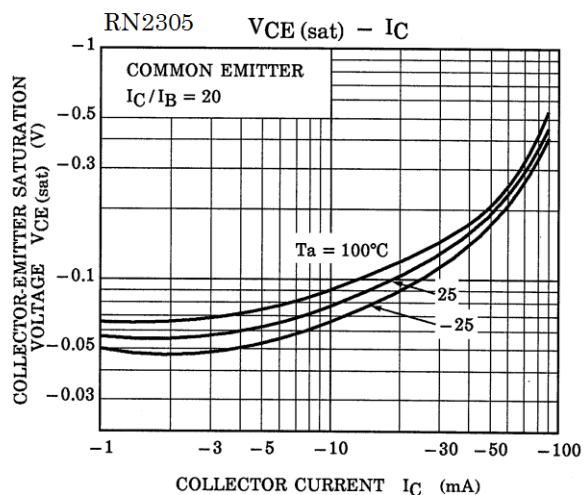
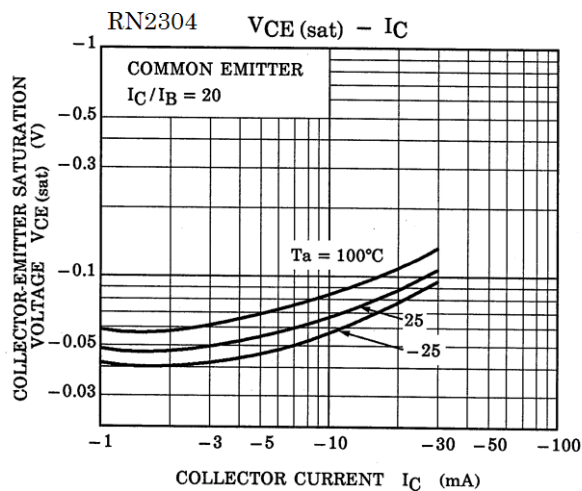
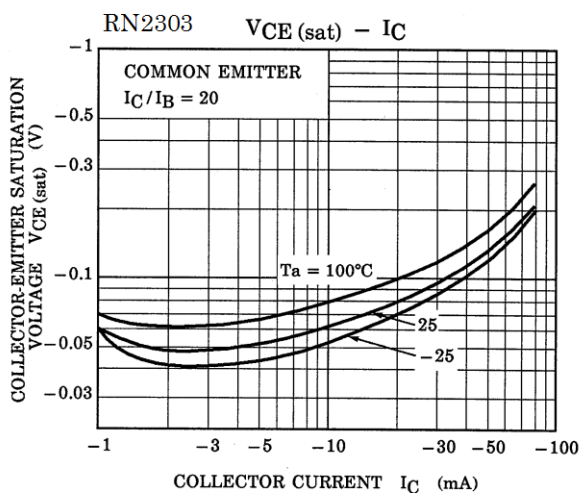
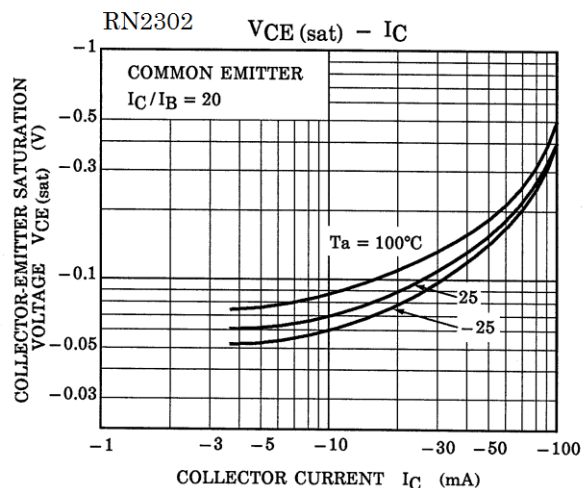
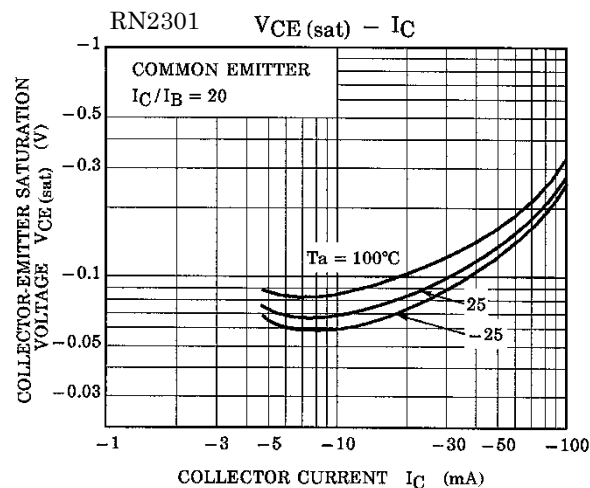
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Characteristics Curves



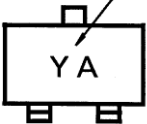
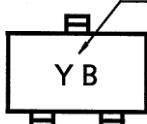
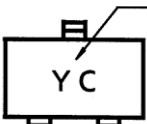
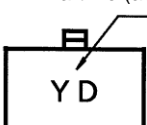
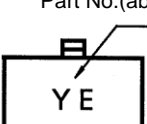
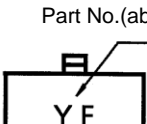
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Characteristics Curves



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Marking

Part No.	Marking
RN2301	<p>Part No.(abbreviation code)</p> 
RN2302	<p>Part No.(abbreviation code)</p> 
RN2303	<p>Part No.(abbreviation code)</p> 
RN2304	<p>Part No.(abbreviation code)</p> 
RN2305	<p>Part No.(abbreviation code)</p> 
RN2306	<p>Part No.(abbreviation code)</p> 

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