

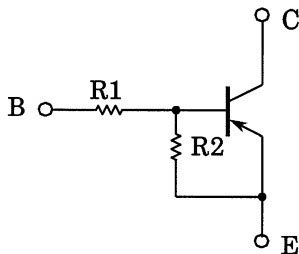
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor)

## RN2101, RN2102, RN2103 RN2104, RN2105, RN2106

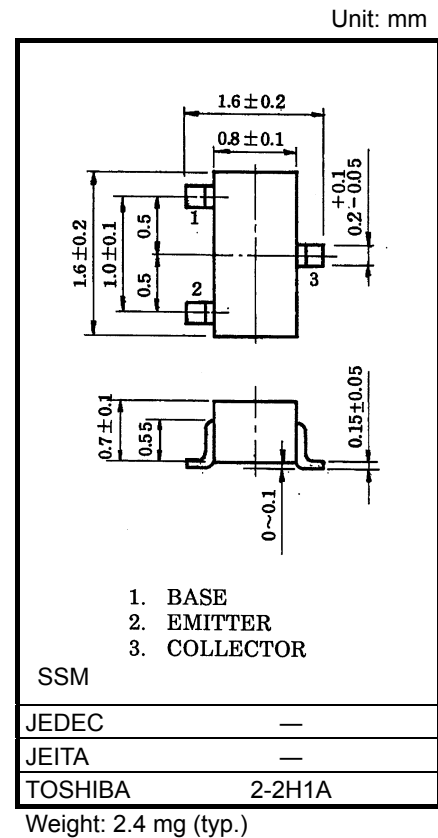
Switching, Inverter Circuit, Interface Circuit  
and Driver Circuit Applications

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

### 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 <sub>CB0</sub>	-50	V
Collector-emitter voltage				
Emitter-base voltage	RN2101 to 2104	V <sub>EBO</sub>	-10	V
	RN2105, 2106		-5	
Collector current	RN2101 to 2106	I <sub>C</sub>	-100	mA
Collector power dissipation		P <sub>C</sub>	100	mW
Junction temperature		T <sub>j</sub>	150	°C
Storage temperature range		T <sub>stg</sub>	-55 to 150	°C

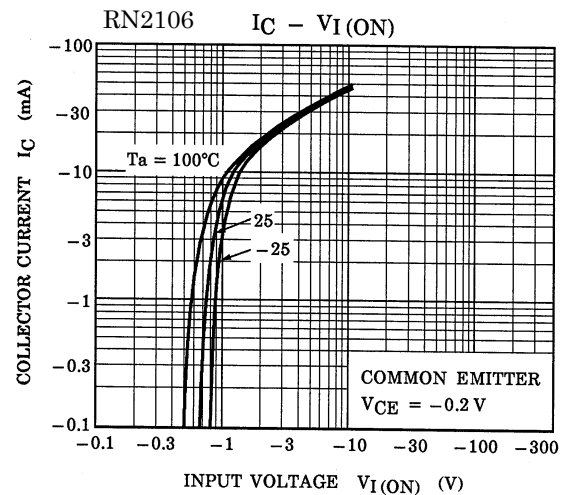
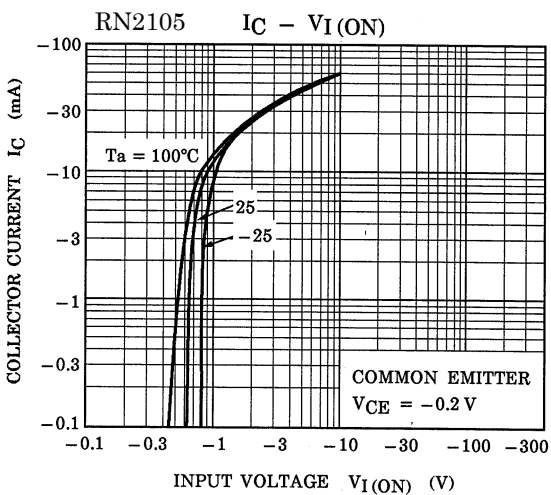
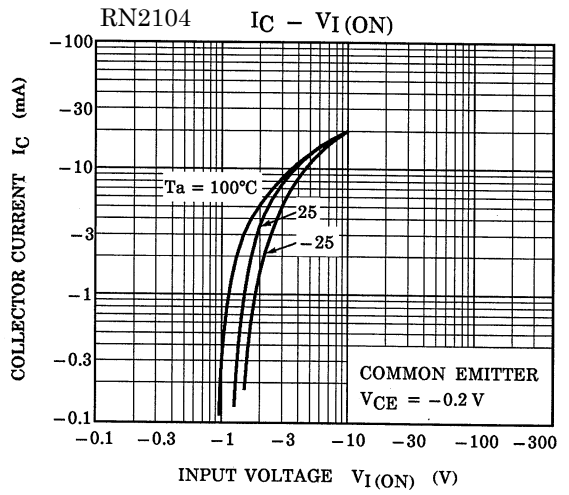
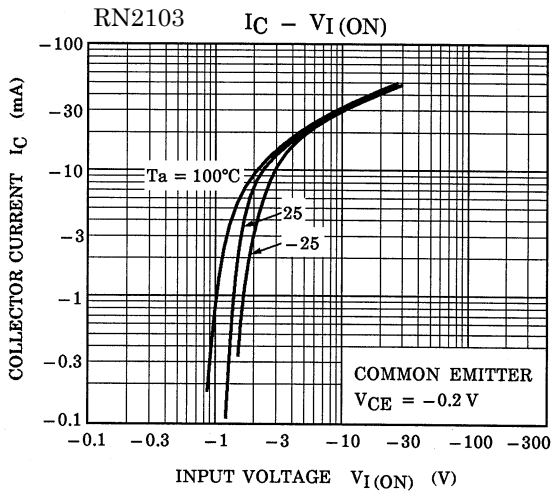
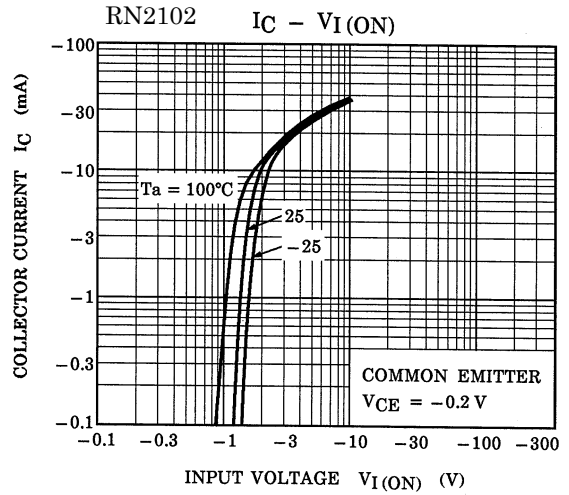
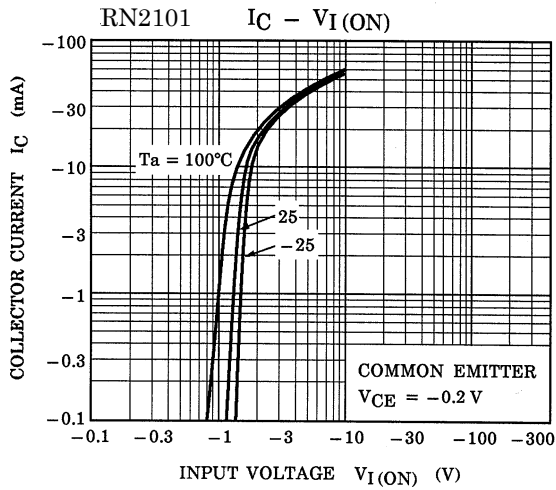
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

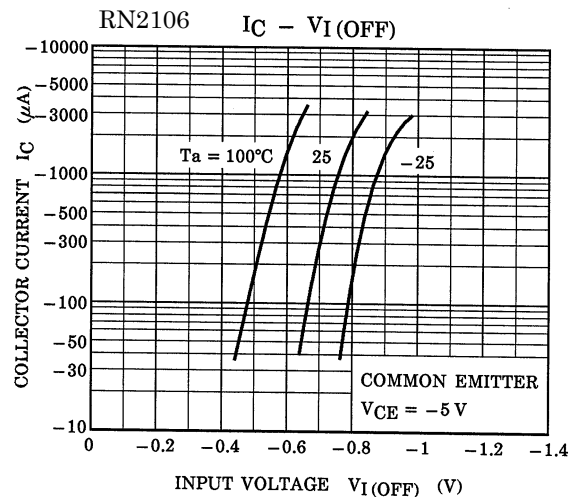
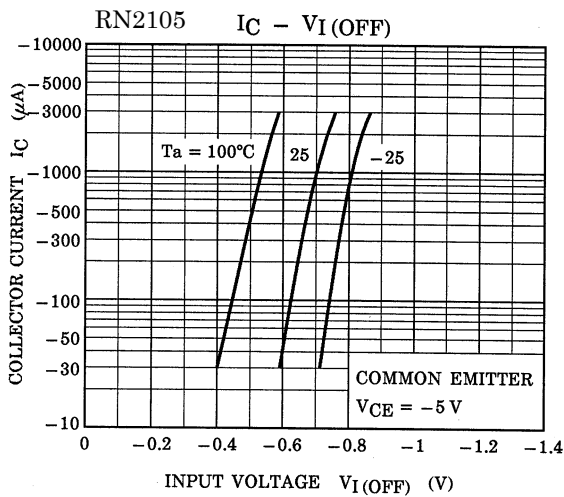
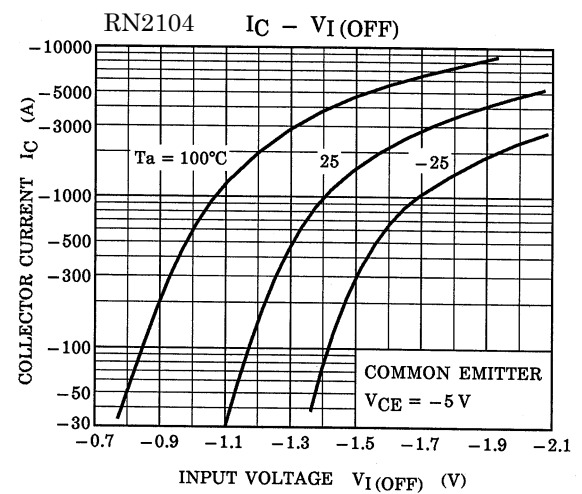
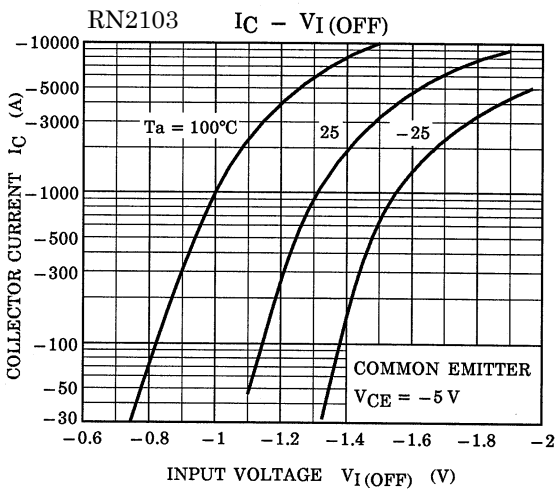
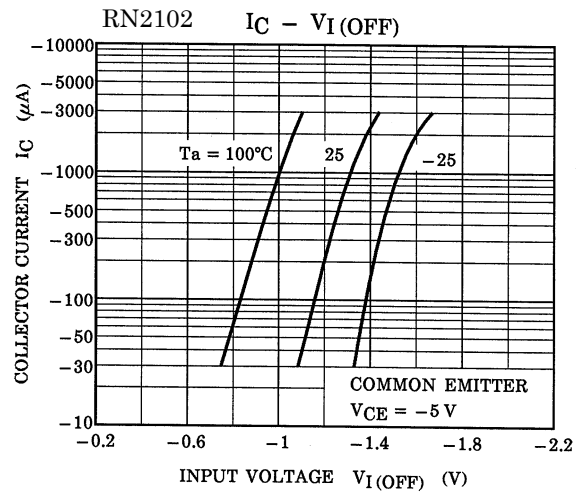
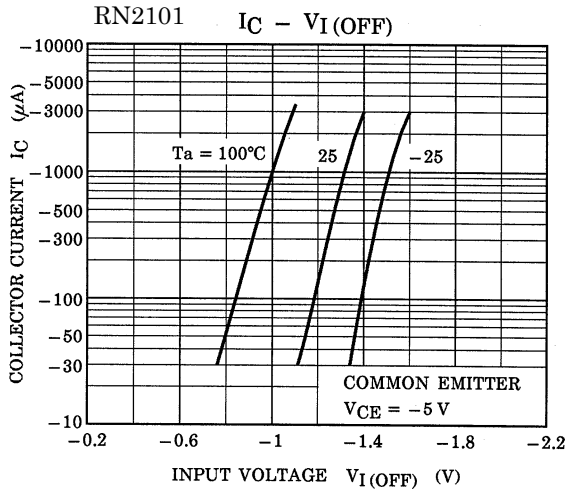
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

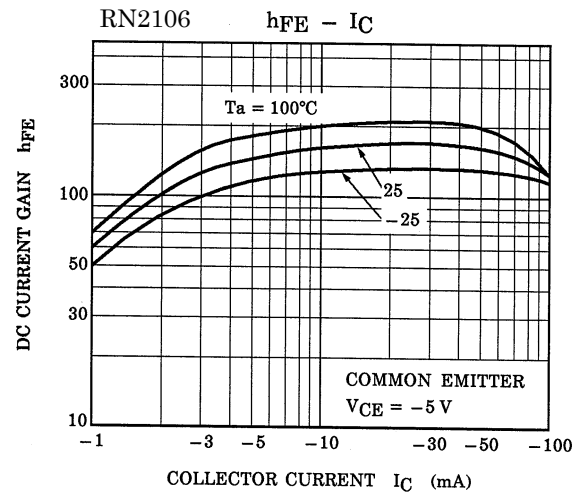
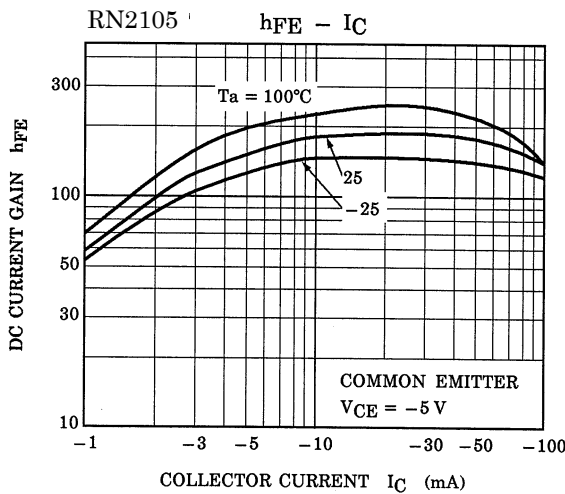
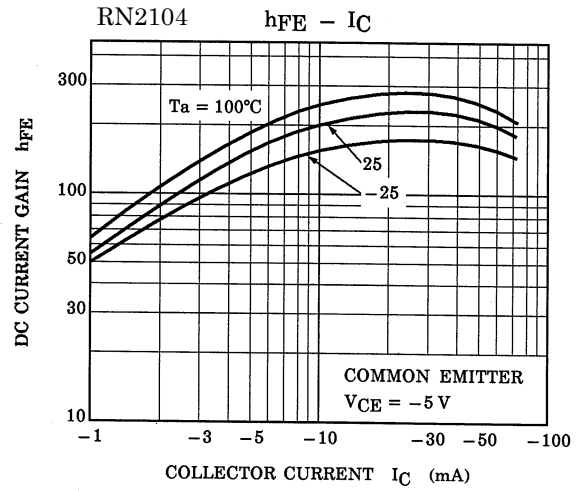
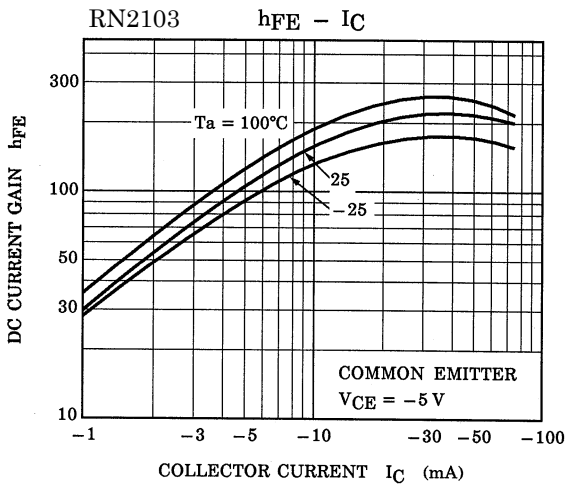
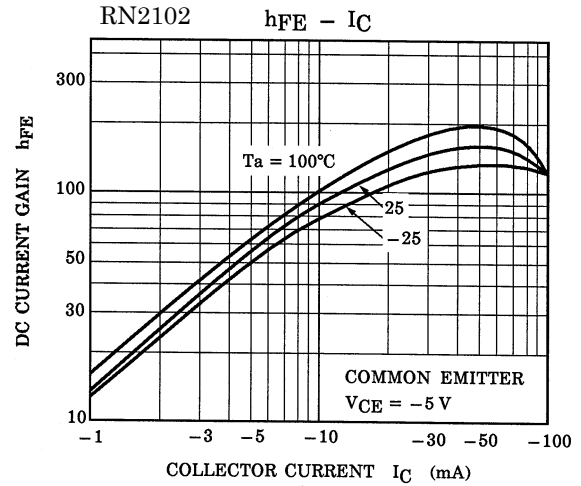
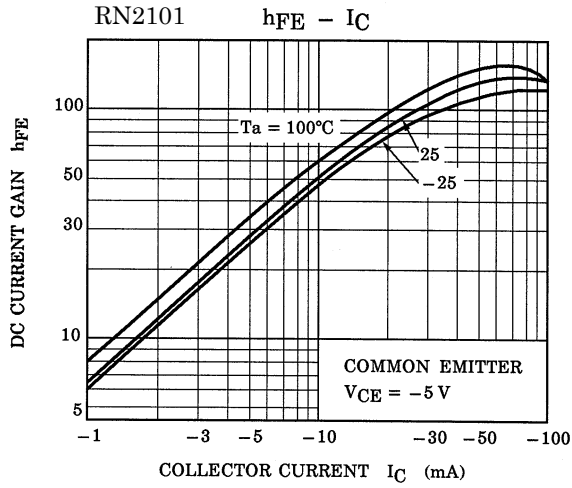
Start of commercial production  
1990-12

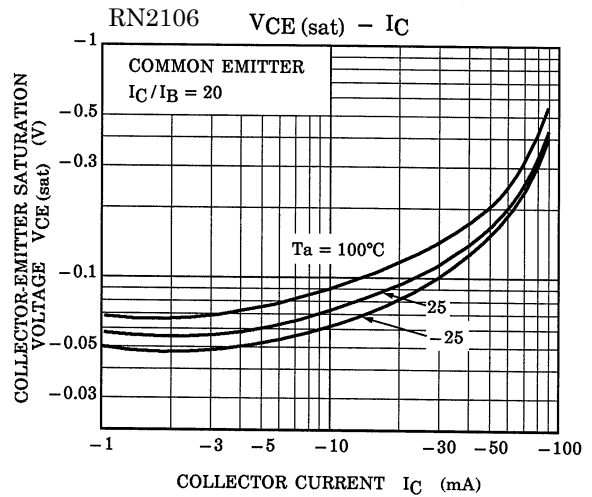
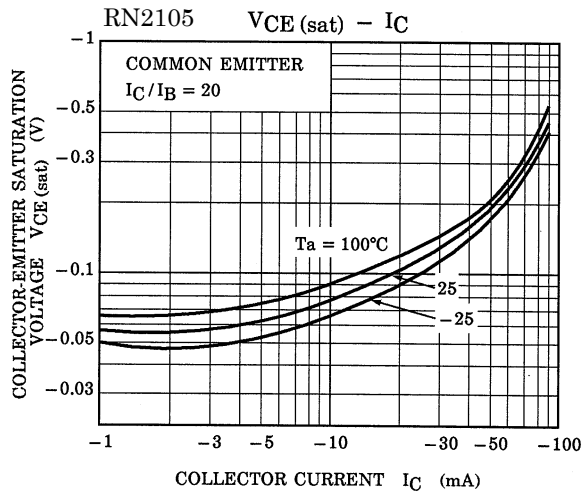
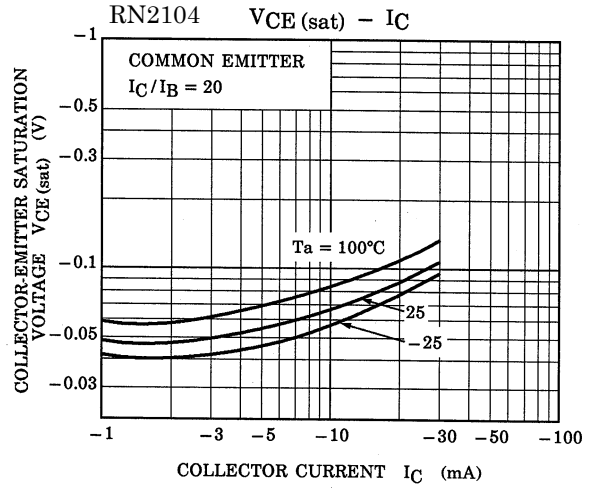
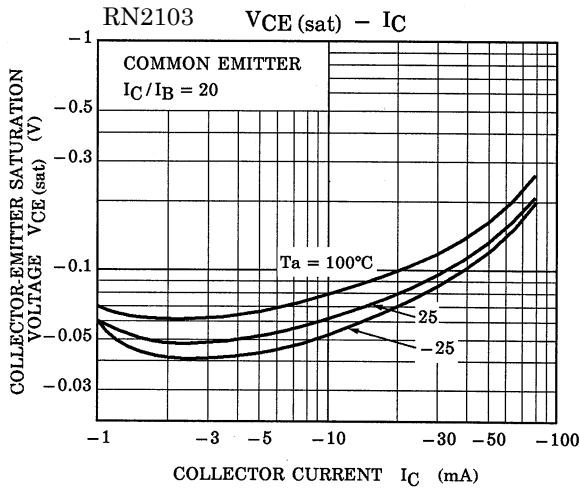
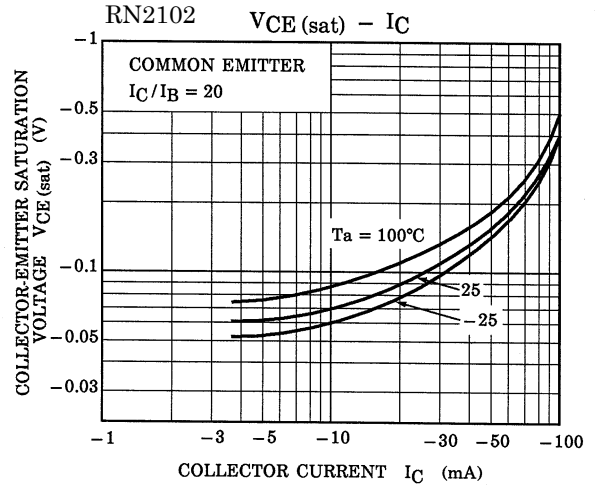
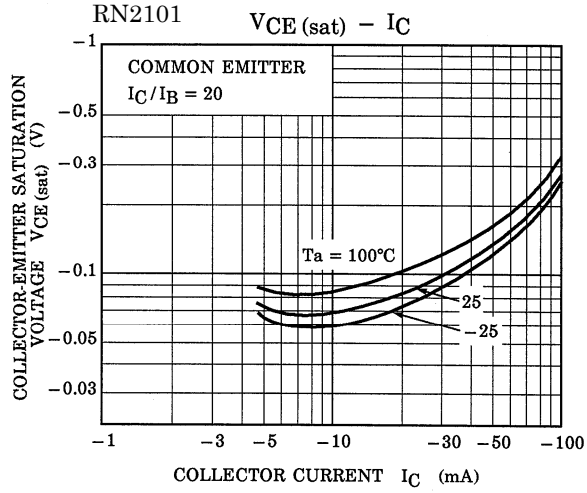
## Electrical Characteristics (Ta = 25°C)

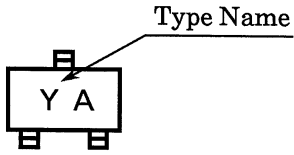
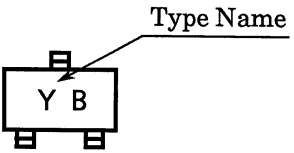
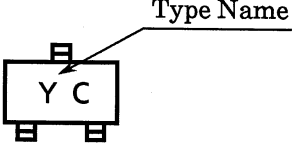
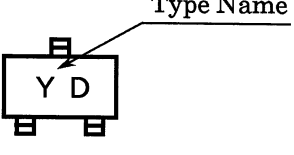
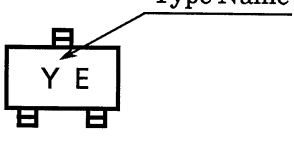
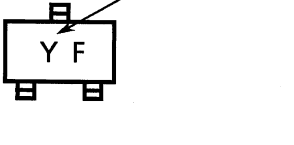
Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2101 to 2106	$I_{CBO}$	—	$V_{CB} = -50\text{ V}, I_E = 0$	—	—	-100	nA
		$I_{CEO}$		$V_{CE} = -50\text{ V}, I_B = 0$	—	—	-500	
Emitter cut-off current	RN2101	$I_{EBO}$	—	$V_{EB} = -10\text{ V}, I_C = 0$	-0.82	—	-1.52	mA
	RN2102				-0.38	—	-0.71	
	RN2103				-0.17	—	-0.33	
	RN2104			-0.082	—	-0.15		
	RN2105			$V_{EB} = -5\text{ V}, I_C = 0$	-0.078	—	-0.145	
	RN2106				-0.074	—	-0.138	
DC current gain	RN2101	$h_{FE}$	—	$V_{CE} = -5\text{ V}, I_C = -10\text{ mA}$	30	—	—	—
	RN2102				50	—	—	
	RN2103				70	—	—	
	RN2104				80	—	—	
	RN2105				80	—	—	
	RN2106				80	—	—	
Collector-emitter saturation voltage	RN2101 to 2106	$V_{CE(sat)}$	—	$I_C = -5\text{ mA}, I_B = -0.25\text{ mA}$	—	-0.1	-0.3	V
Input voltage (ON)	RN2101	$V_{I(ON)}$	—	$V_{CE} = -0.2\text{ V}, I_C = -5\text{ mA}$	-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	$V_{I(OFF)}$	—	$V_{CE} = -5\text{ V}, I_C = -0.1\text{ mA}$	-1.0	—	-1.5	V
	RN2105, 2106				-0.5	—	-0.8	
Transition frequency	RN2101 to 2106	$f_T$	—	$V_{CE} = -10\text{ V}, I_C = -5\text{ mA}$	—	200	—	MHz
Collector Output capacitance	RN2101 to 2106	$C_{ob}$	—	$V_{CB} = -10\text{ V}, I_E = 0,$ $f = 1\text{ MHz}$	—	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	









Type Name	Marking
RN2101	
RN2102	
RN2103	
RN2104	
RN2105	
RN2106	

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