

TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process)

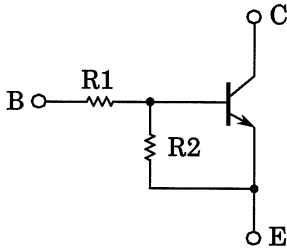
RN1101, RN1102, RN1103, RN1104, RN1105, RN1106

Switching, Inverter Circuit, Interface Circuit
and Driver Circuit Applications

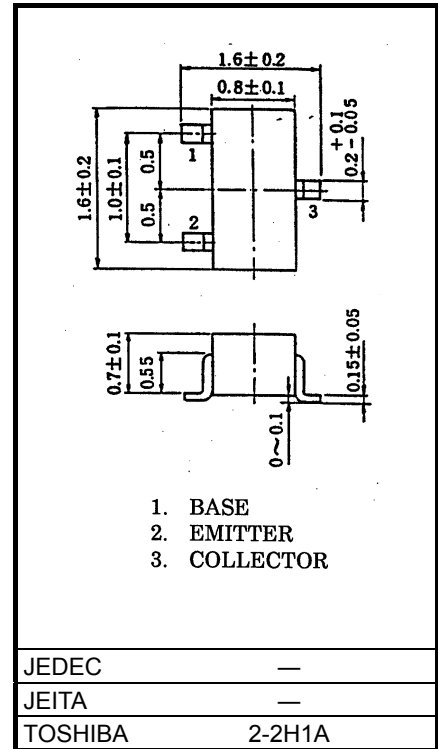
Unit: mm

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

Equivalent Circuit and Bias Resistor Values



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



Weight: 2.4 mg (typ).

Absolute Maximum Ratings (Ta = 25°C)

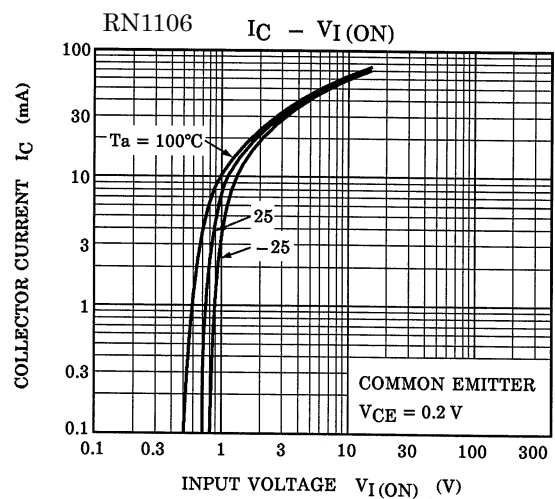
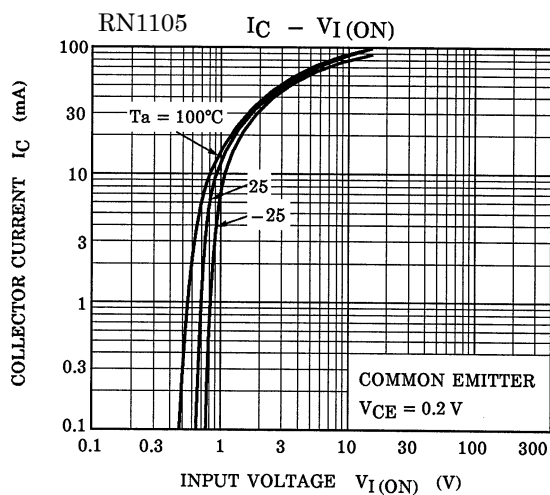
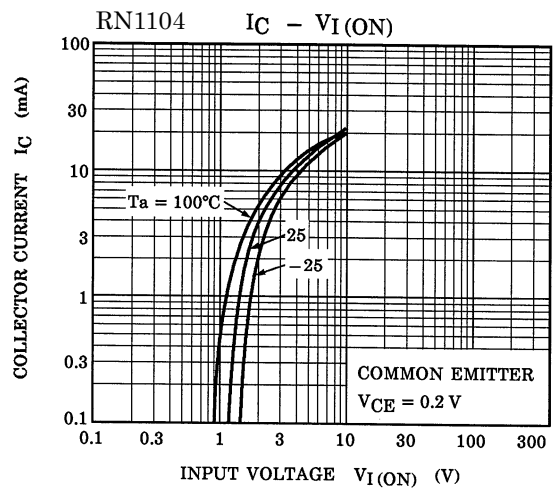
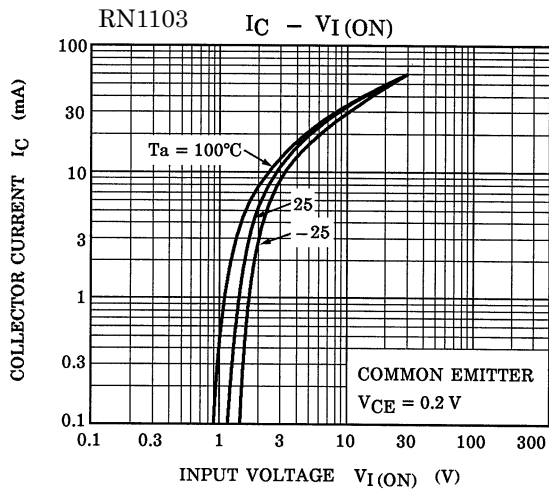
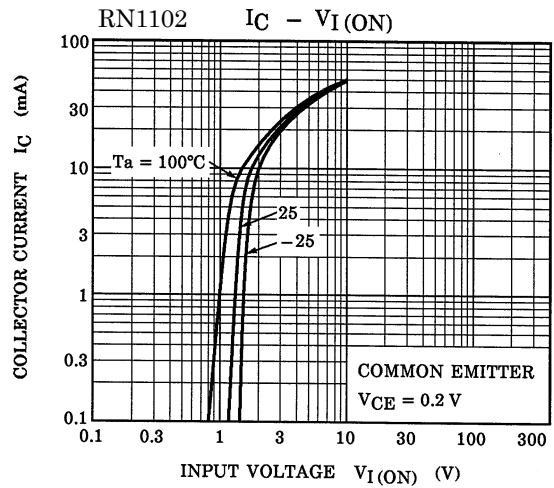
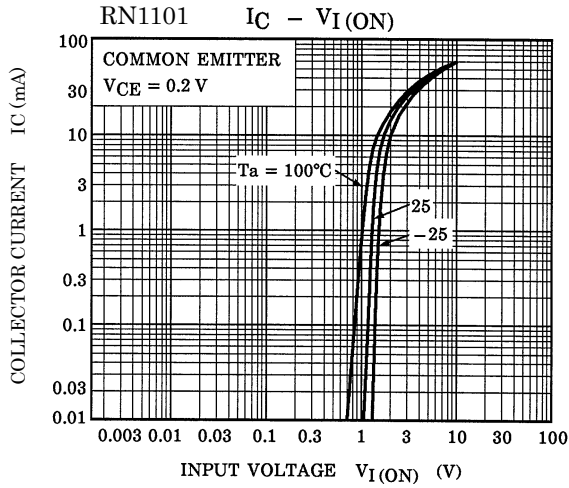
Characteristic	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	50	V
Collector-emitter voltage	V_{CEO}	50	V
Emitter-base voltage	V_{EBO}	10	V
		5	
Collector current	I_C	100	mA
Collector power dissipation	P_C	100	mW
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	-55~150	°C

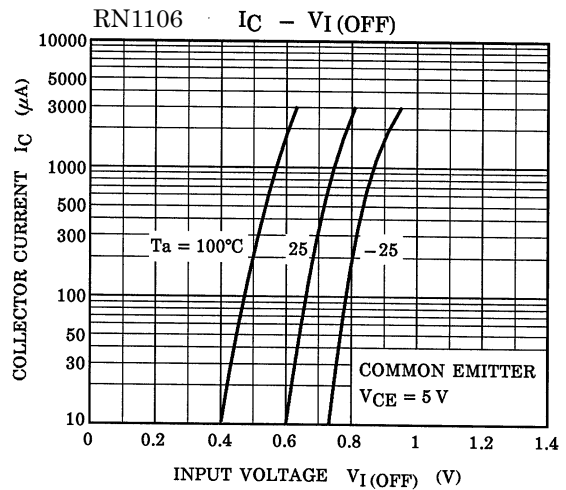
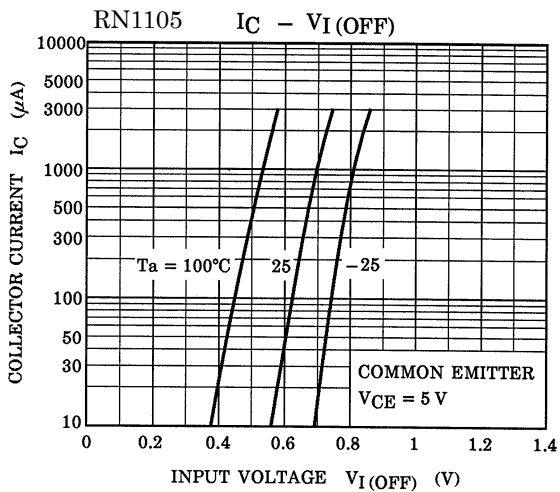
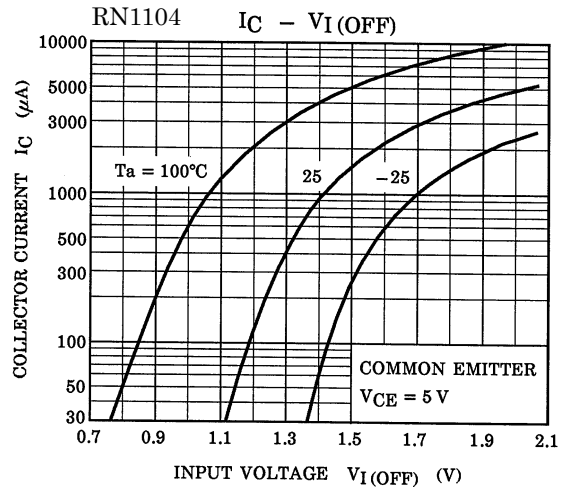
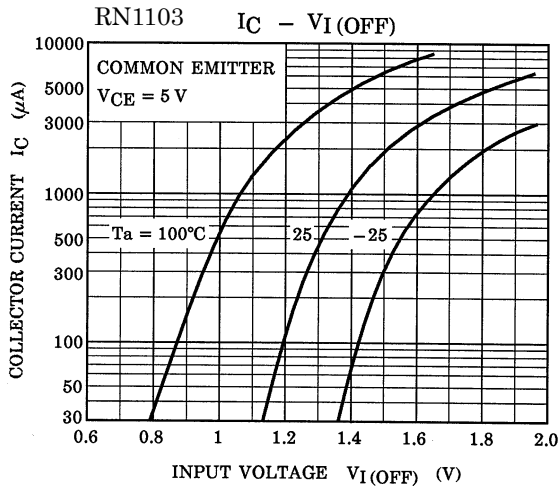
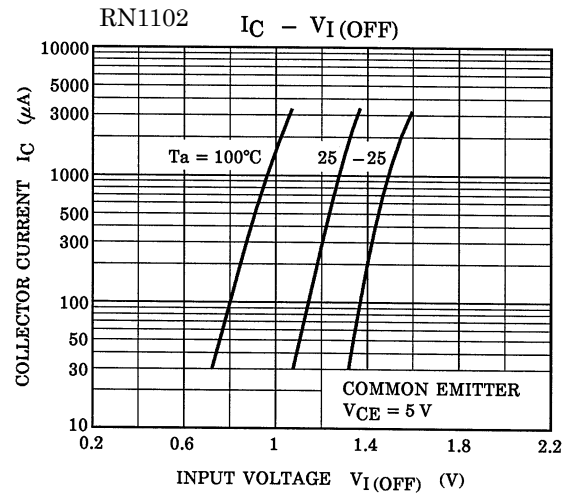
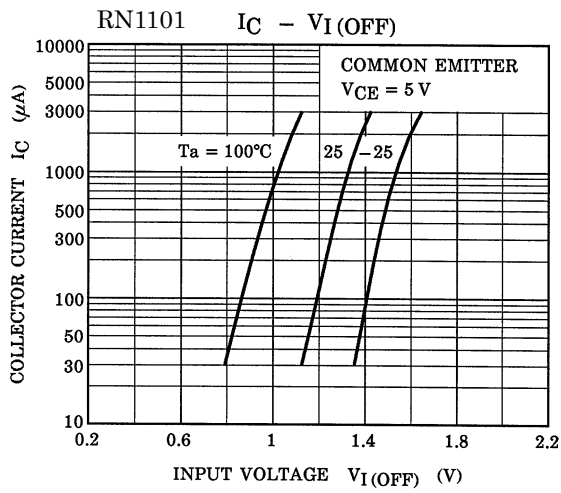
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

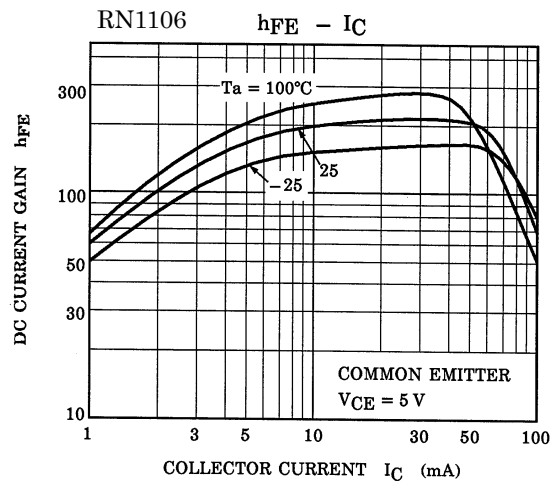
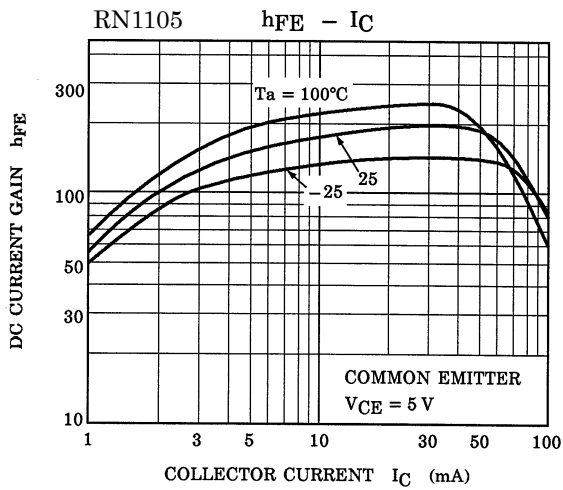
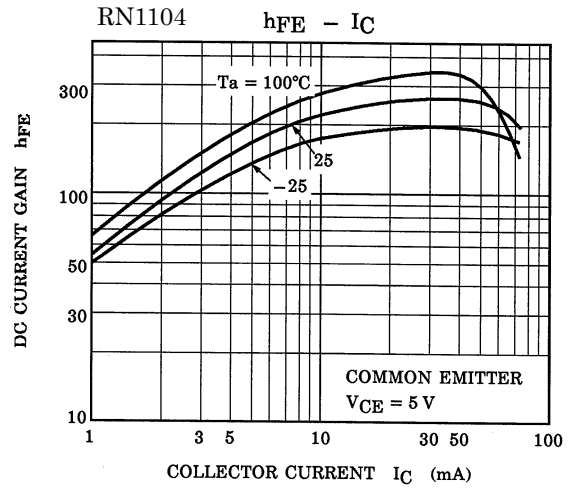
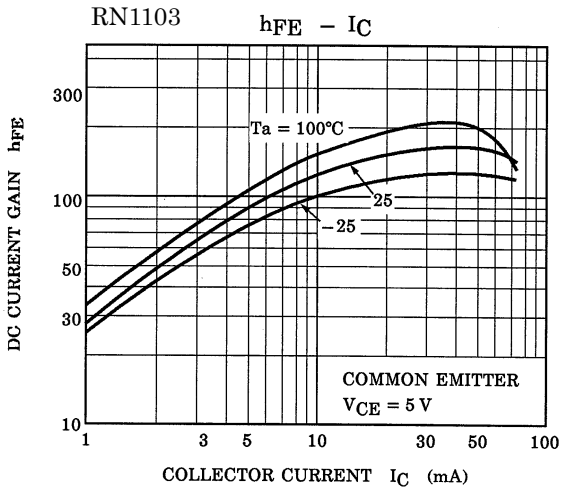
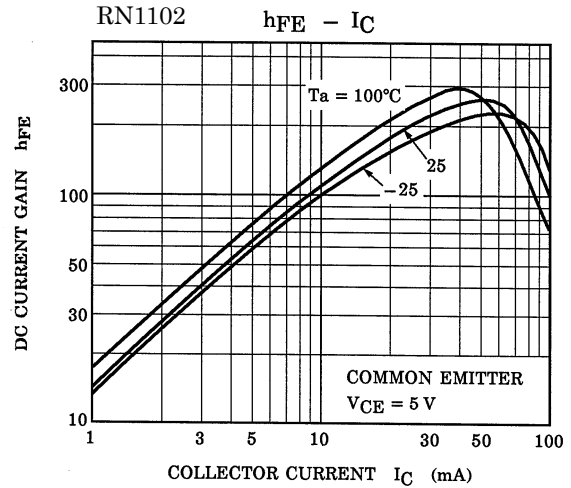
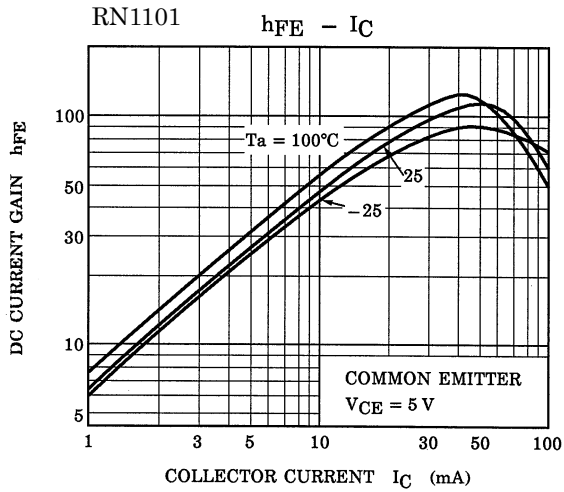
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

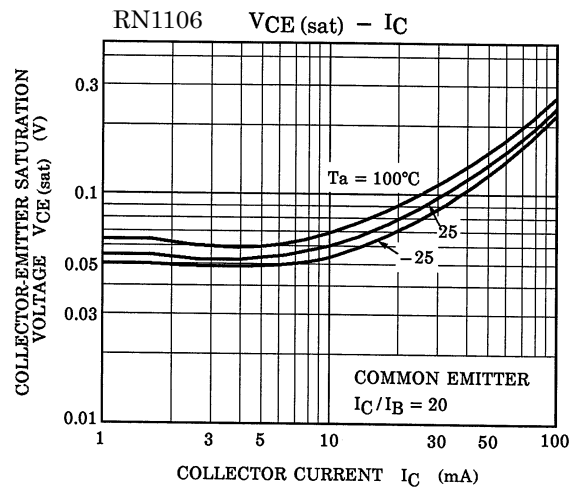
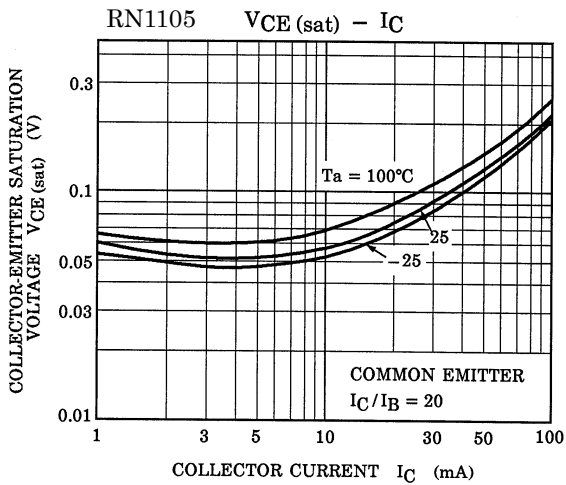
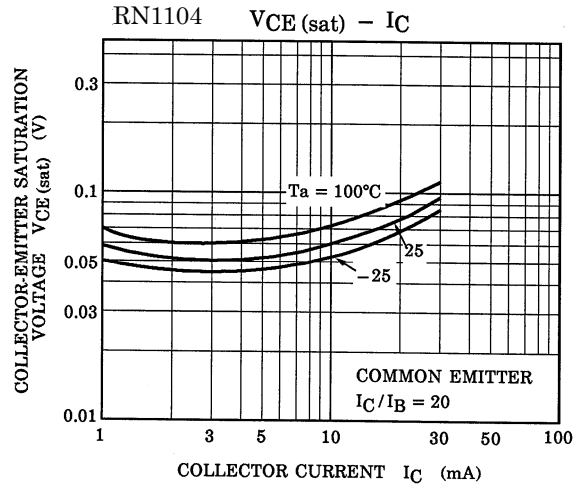
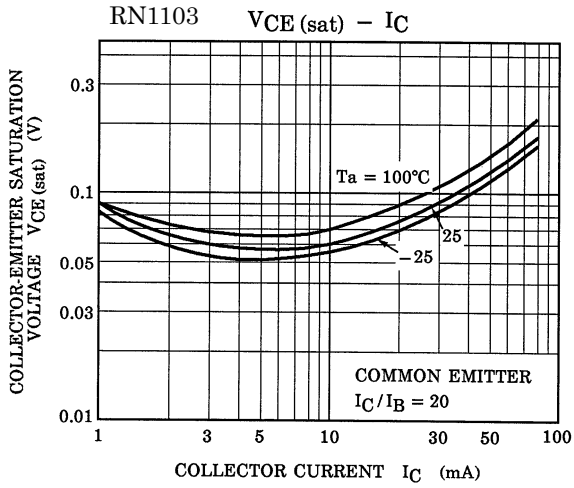
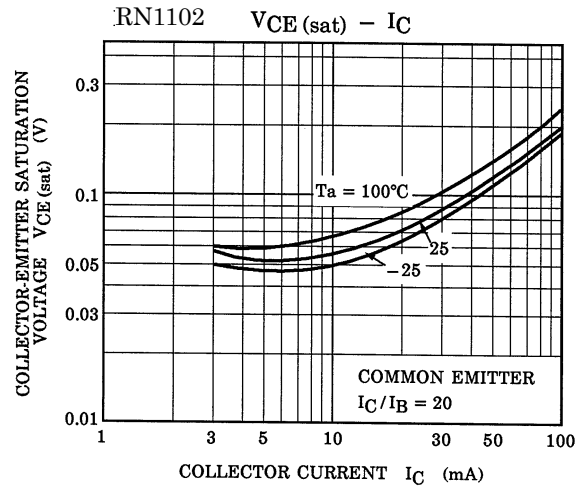
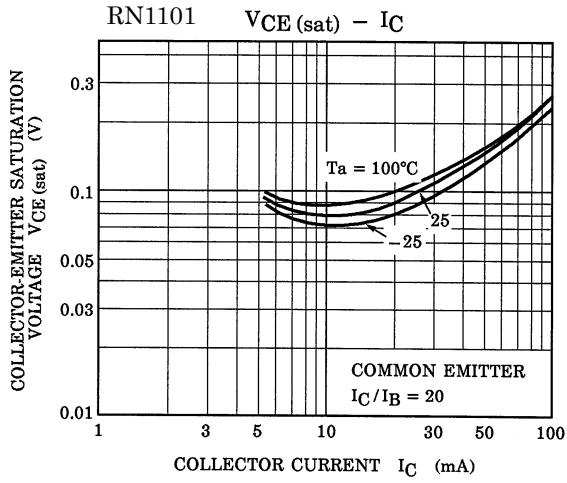
Electrical Characteristics (Ta = 25°C)

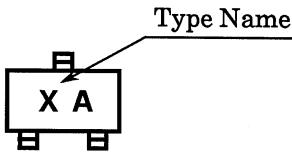
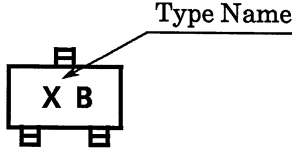
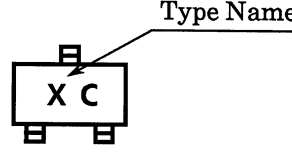
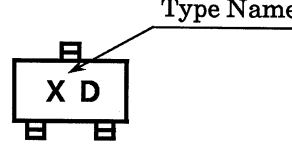
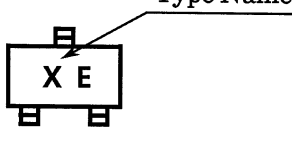
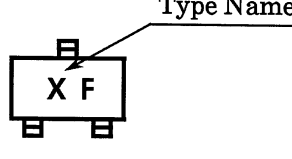
Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1101~1106	I_{CBO}	—	$V_{CB} = 50\text{ V}, I_E = 0$	—	—	100	nA
		I_{CEO}		$V_{CE} = 50\text{ V}, I_B = 0$	—	—	500	
Emitter cut-off current	RN1101	I_{EBO}	—	$V_{EB} = 10\text{ V}, I_C = 0$	0.82	—	1.52	mA
	RN1102				0.38	—	0.71	
	RN1103				0.17	—	0.33	
	RN1104				0.082	—	0.15	
	RN1105			$V_{EB} = 5\text{ V}, I_C = 0$	0.078	—	0.145	
	RN1106				0.074	—	0.138	
DC current gain	RN1101	h_{FE}	—	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$	30	—	—	—
	RN1102				50	—	—	
	RN1103				70	—	—	
	RN1104				80	—	—	
	RN1105				80	—	—	
	RN1106				80	—	—	
Collector-emitter saturation voltage	RN1101~1106	$V_{CE(sat)}$	—	$I_C = 5\text{ mA}, I_B = 0.25\text{ mA}$	—	0.1	0.3	V
Input voltage (ON)	RN1101	$V_{I(ON)}$	—	$V_{CE} = 0.2\text{ V}, I_C = 5\text{ mA}$	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)	RN1101~1104	$V_{I(OFF)}$	—	$V_{CE} = 5\text{ V}, I_C = 0.1\text{ mA}$	1.0	—	1.5	V
	RN1105, 1106				0.5	—	0.8	
Transition frequency	RN1101~1106	f_T	—	$V_{CE} = 10\text{ V}, I_C = 5\text{ mA}$	—	250	—	MHz
Collector output capacitance	RN1101~1106	C_{ob}	—	$V_{CB} = 10\text{ V}, I_E = 0,$ $f = 1\text{ MHz}$	—	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	RN1101~1104	R1/R2	—		0.9	1.0	1.1	—
	RN1105				0.0421	0.0468	0.0515	
	RN1106				0.09	0.1	0.11	









Type Name	Marking
RN1101	
RN1102	
RN1103	
RN1104	
RN1105	
RN1106	

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