

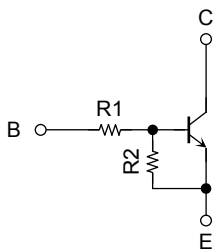
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

## RN1101FT, RN1102FT, RN1103FT RN1104FT, RN1105FT, RN1106FT

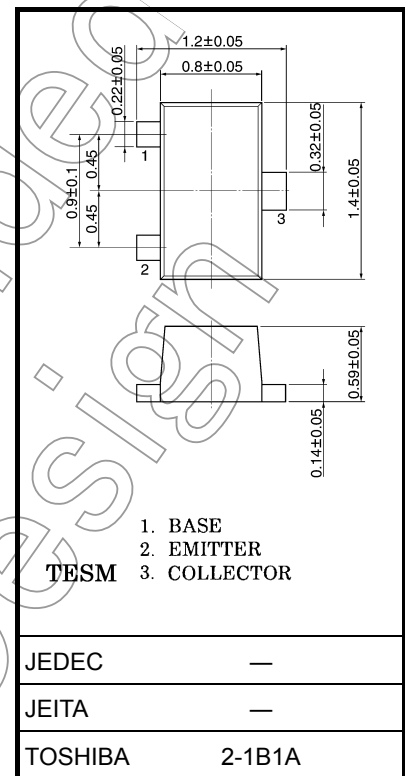
Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- High-density mount is possible because of devices housed in very thin TSM packages.
- Incorporating a bias resistor into a transistor reduces parts count. Reducing the parts count enable the manufacture of ever more compact equipment and save assembly cost.
- Wide range of resistor values are available to use in various circuit designs.
- Complementary to RN2101FT to RN2106FT

### Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN1101FT	4.7	4.7
RN1102FT	10	10
RN1103FT	22	22
RN1104FT	47	47
RN1105FT	2.2	47
RN1106FT	4.7	47



Weight: 2.2 mg (typ.)

### Absolute Maximum Ratings (Ta = 25°C)

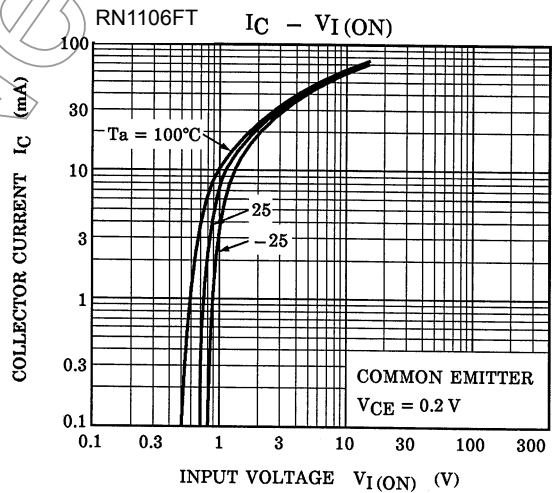
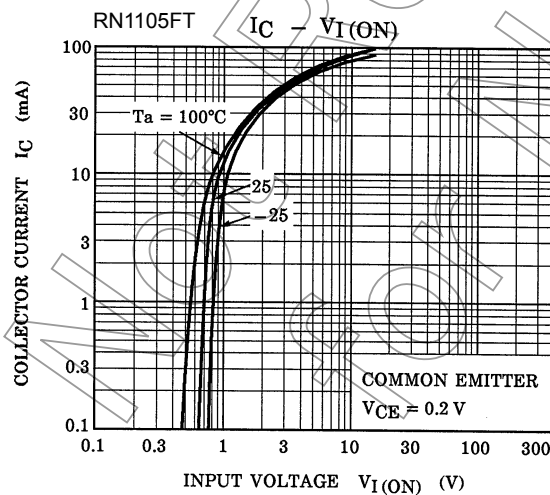
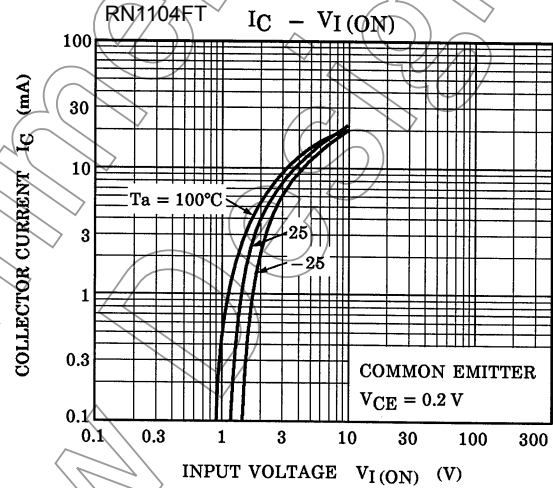
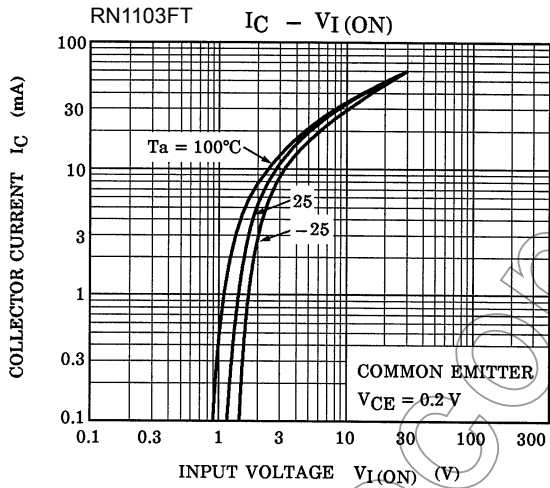
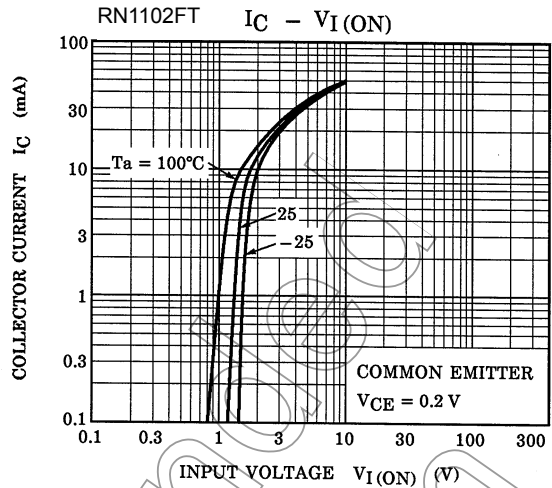
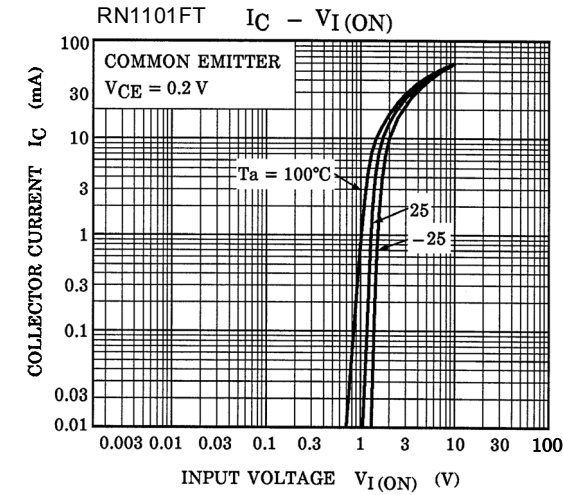
Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	50	V
Collector-emitter voltage	$V_{CEO}$	50	V
Emitter-base voltage	$V_{EBO}$	10	V
		5	
Collector current	$I_C$	100	mA
Collector power dissipation	$P_C$	100	mW
Junction temperature	$T_j$	150	°C
Storage temperature range	$T_{stg}$	-55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

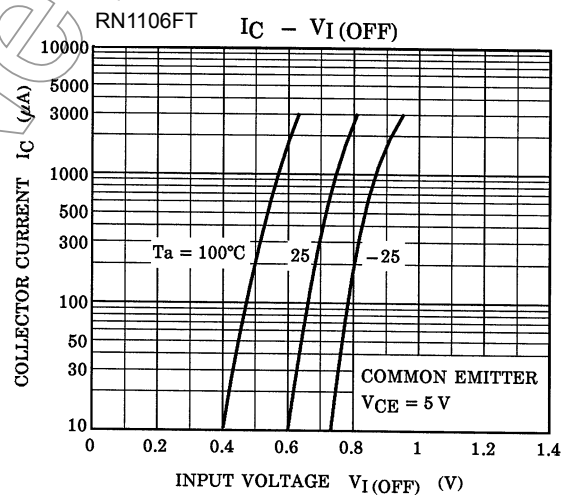
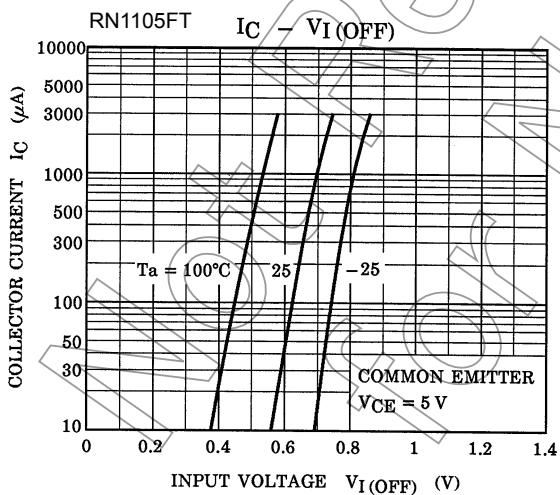
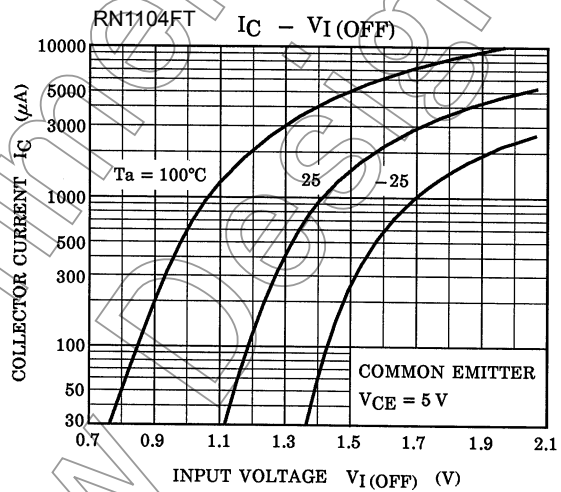
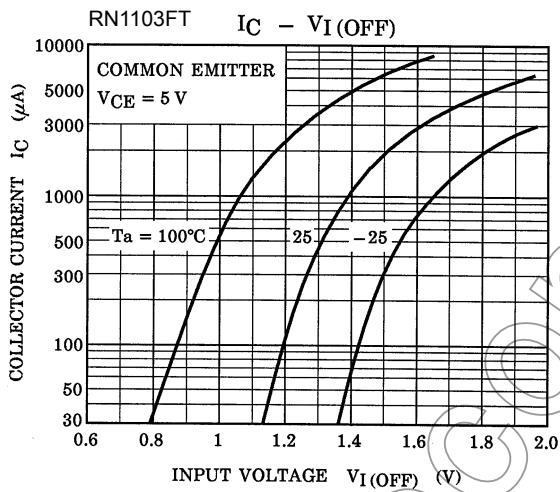
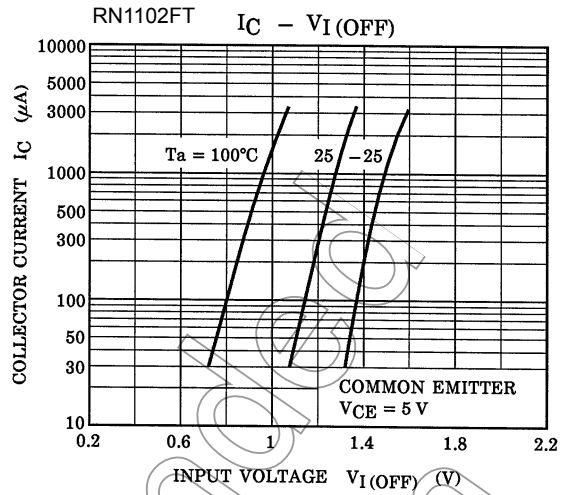
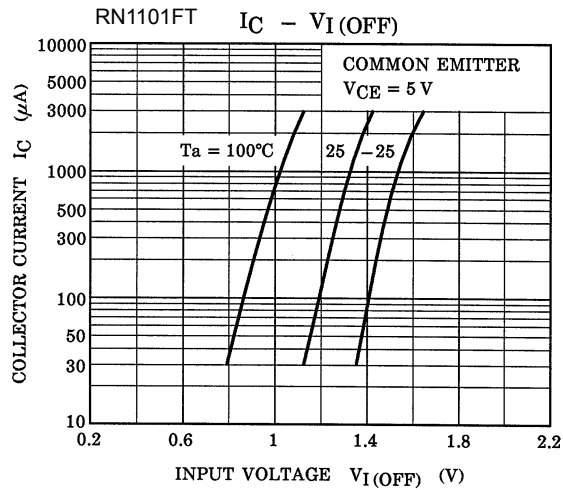
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

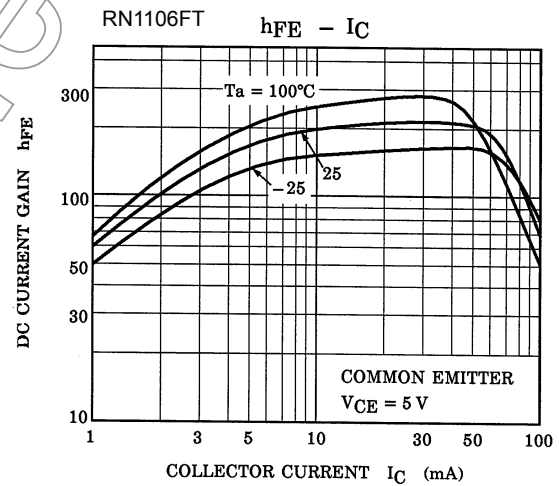
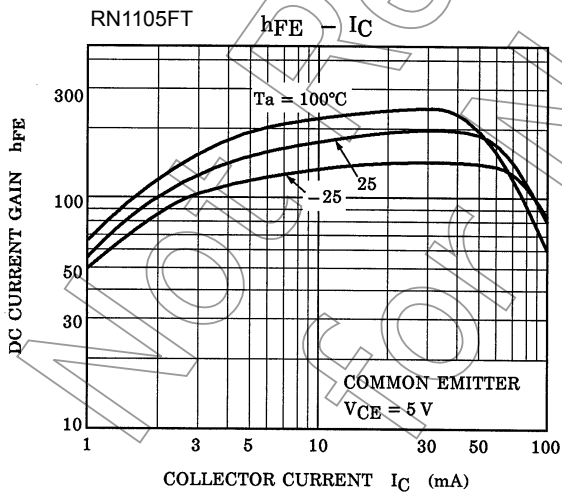
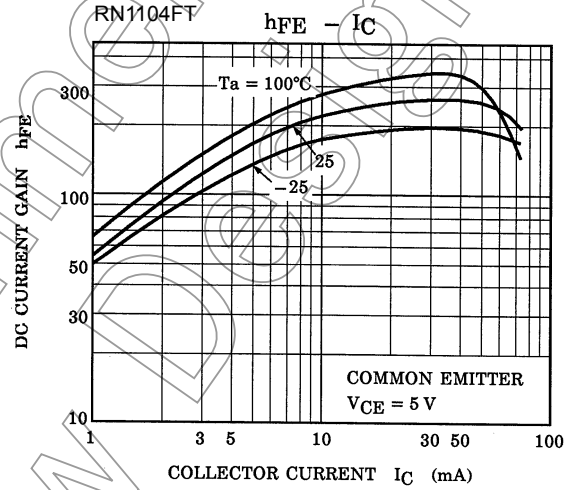
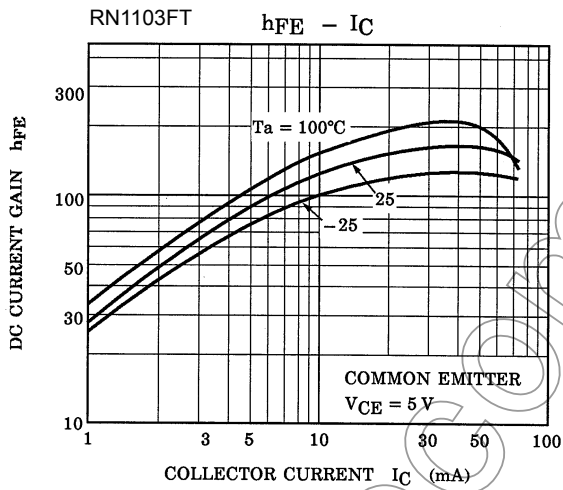
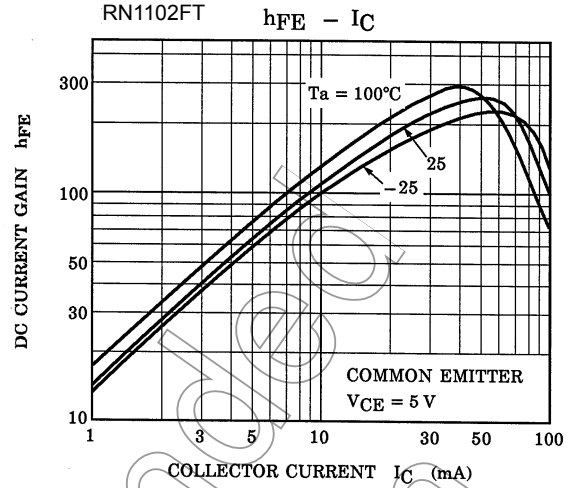
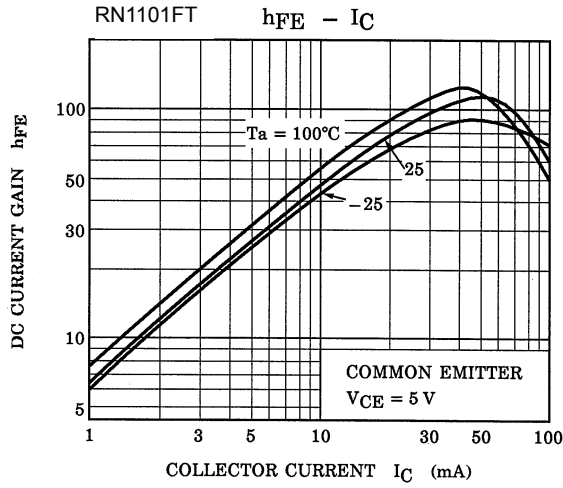
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

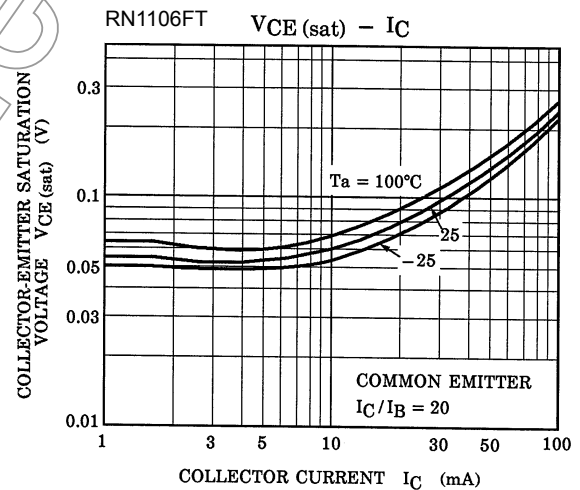
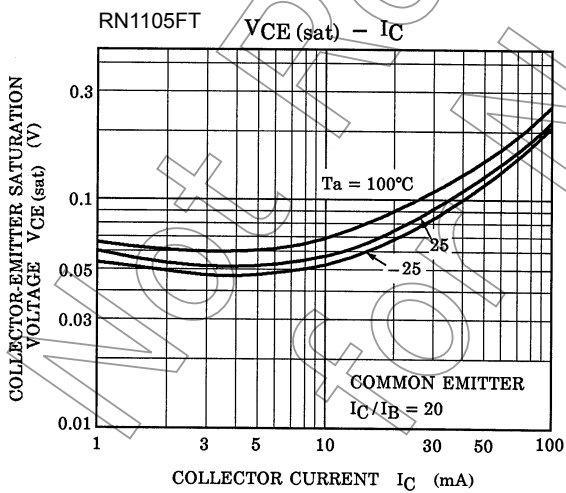
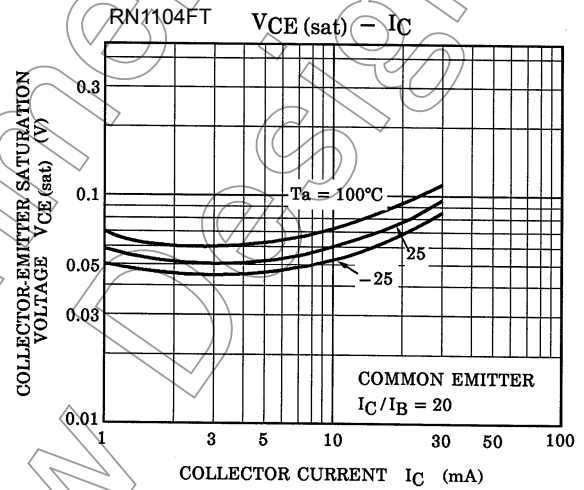
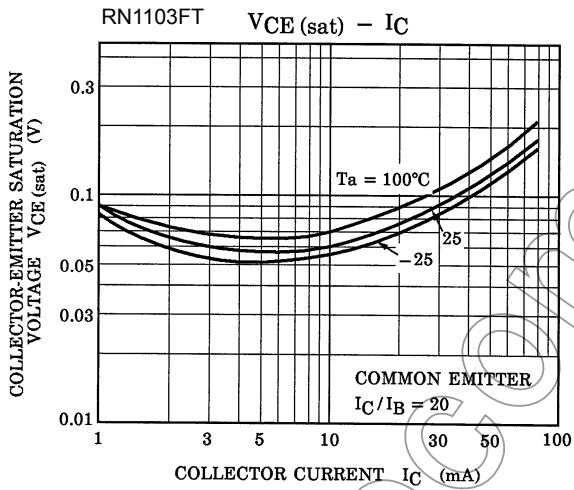
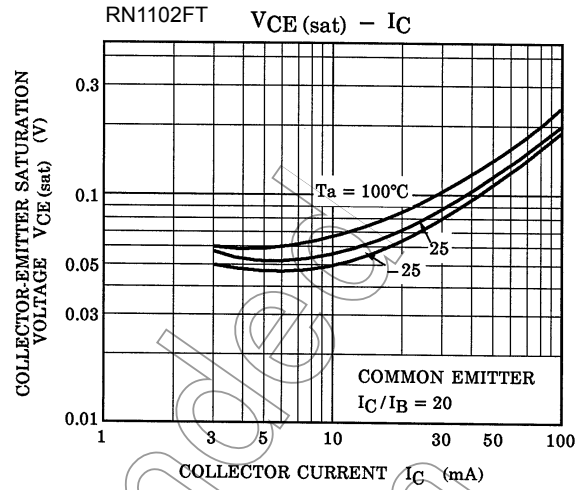
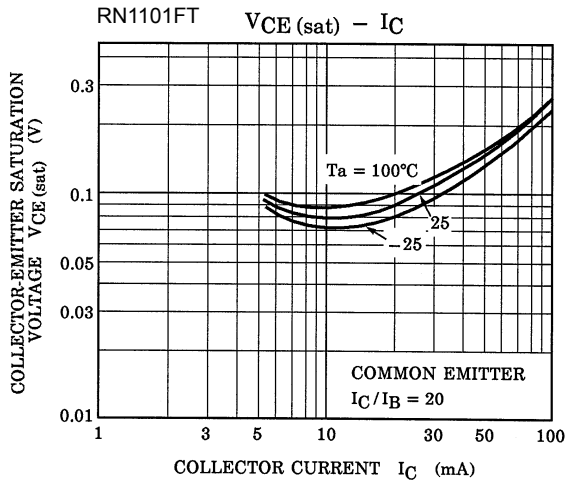
## Electrical Characteristics (Ta = 25°C)

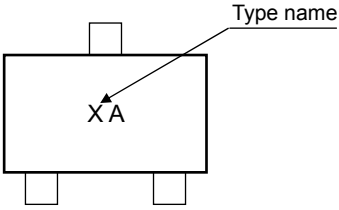
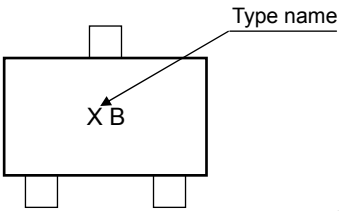
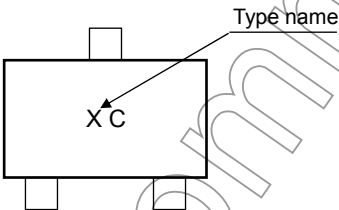
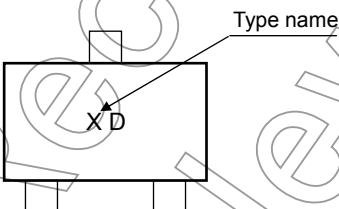
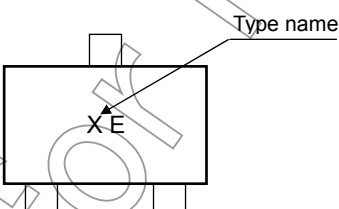
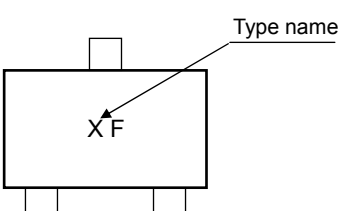
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1101FT to 1106FT	$I_{CBO}$	$V_{CB} = 50\text{ V}, I_E = 0$	—	—	100	nA
		$I_{CEO}$	$V_{CE} = 50\text{ V}, I_B = 0$	—	—	500	
Emitter cut-off current	RN1101FT	$I_{EBO}$	$V_{EB} = 10\text{ V}, I_C = 0$	0.82	—	1.52	mA
	RN1102FT			0.38	—	0.71	
	RN1103FT			0.17	—	0.33	
	RN1104FT		0.082	—	0.15		
	RN1105FT		$V_{EB} = 5\text{ V}, I_C = 0$	0.078	—	0.145	
	RN1106FT			0.074	—	0.138	
DC current gain	RN1101FT	$h_{FE}$	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$	30	—	—	
	RN1102FT			50	—	—	
	RN1103FT			70	—	—	
	RN1104FT			80	—	—	
	RN1105FT			80	—	—	
	RN1106FT			80	—	—	
Collector-emitter saturation voltage	RN1101FT to 1106FT	$V_{CE(sat)}$	$I_C = 5\text{ mA}, I_B = 0.25\text{ mA}$	—	0.1	0.3	V
Input voltage (ON)	RN1101FT	$V_I(ON)$	$V_{CE} = 0.2\text{ V}, I_C = 5\text{ mA}$	1.1	—	2.0	V
	RN1102FT			1.2	—	2.4	
	RN1103FT			1.3	—	3.0	
	RN1104FT			1.5	—	5.0	
	RN1105FT			0.6	—	1.1	
	RN1106FT			0.7	—	1.3	
Input voltage (OFF)	RN1101FT to 1104FT	$V_I(OFF)$	$V_{CE} = 5\text{ V}, I_C = 0.1\text{ mA}$	1.0	—	1.5	V
	RN1105FT, 1106FT			0.5	—	0.8	
Transition frequency	RN1101FT to 1106FT	$f_T$	$V_{CE} = 10\text{ V}, I_C = 5\text{ mA}$	—	250	—	MHz
Collector output capacitance	RN1101FT to 1106FT	$C_{ob}$	$V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	3	6	pF
Input resistor	RN1101FT	$R_1$	—	3.29	4.7	6.11	k $\Omega$
	RN1102FT			7	10	13	
	RN1103FT			15.4	22	28.6	
	RN1104FT			32.9	47	61.1	
	RN1105FT			1.54	2.2	2.86	
	RN1106FT			3.29	4.7	6.11	
Resistor ratio	RN1101FT to 1104FT	$R_1/R_2$	—	0.9	1.0	1.1	
	RN1105FT			0.0421	0.0468	0.0515	
	RN1106FT			0.09	0.1	0.11	









Type Name	Marking
RN1101FT	
RN1102FT	
RN1103FT	
RN1104FT	
RN1105FT	
RN1106FT	

Not for New Design

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