

TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process)

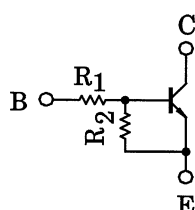
## RN1114, RN1115, RN1116, RN1117, RN1118

Switching, Inverter Circuit, Interface Circuit  
and Driver Circuit Applications

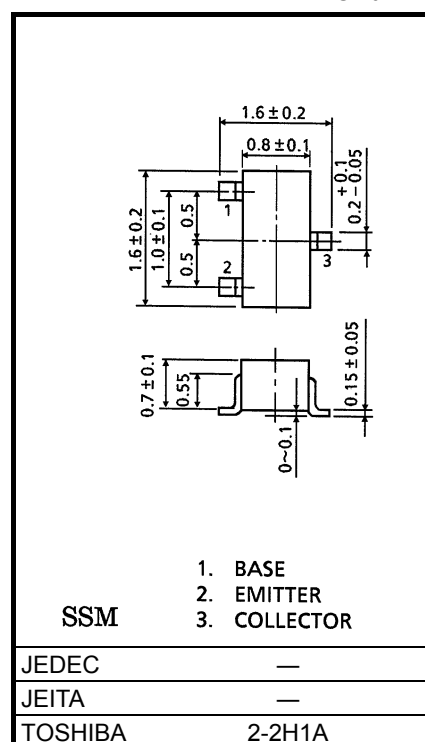
Unit: mm

- With built-in bias resistors.
- Simplified circuit design
- Reduced number of parts and simplified manufacturing process
- Complementary to RN2114 to 2118

### Equivalent Circuit and Bias Resistor Values



Type No.	R <sub>1</sub> (kΩ)	R <sub>2</sub> (kΩ)
RN1114	1	10
RN1115	2.2	10
RN1116	4.7	10
RN1117	10	4.7
RN1118	47	10



Weight: 2.4mg (typ.)

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

Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN1114 to 1118	V <sub>CBO</sub>	50	V
Collector-emitter voltage		V <sub>CEO</sub>	50	V
Emitter-base voltage	RN1114	V <sub>EBO</sub>	5	V
	RN1115		6	
	RN1116		7	
	RN1117		15	
	RN1118		25	
Collector current	RN1114 to 1118	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

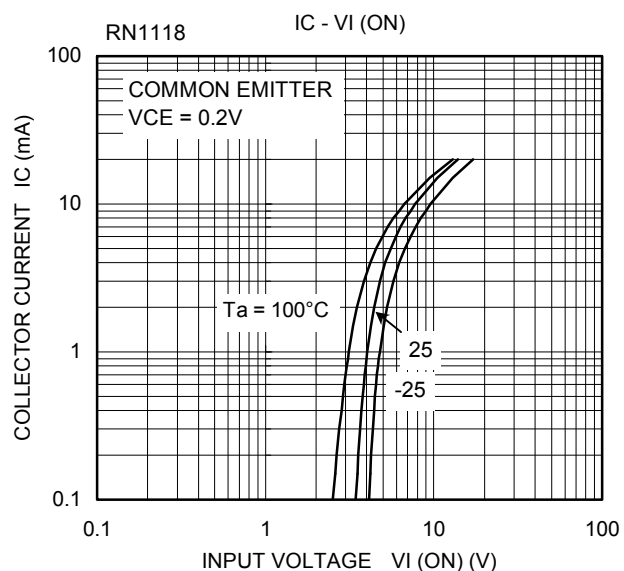
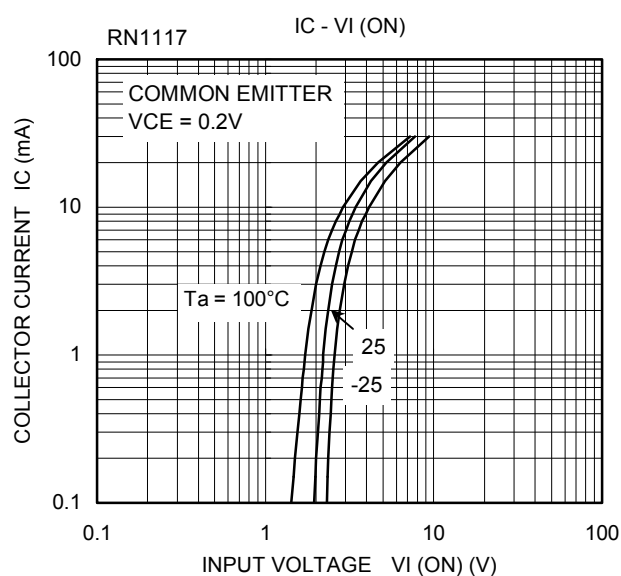
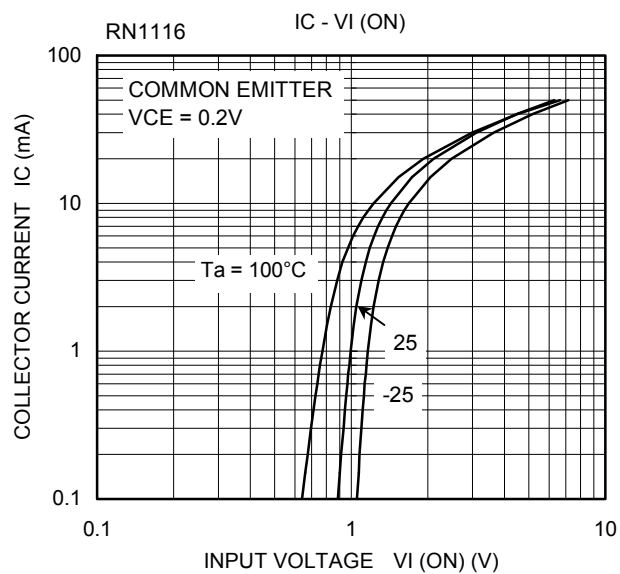
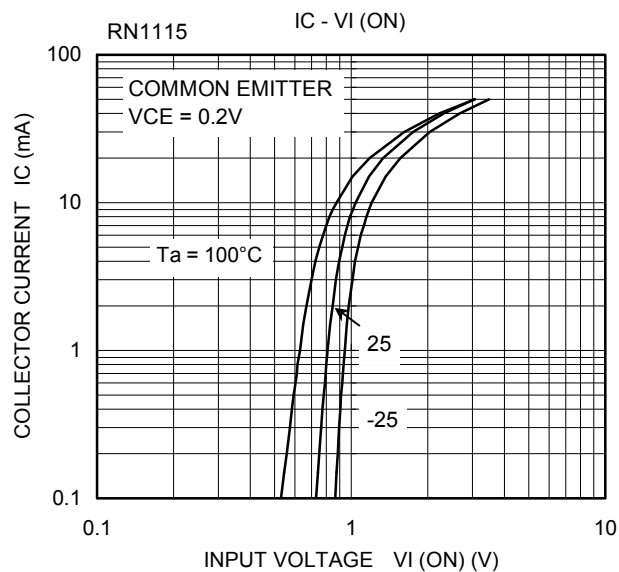
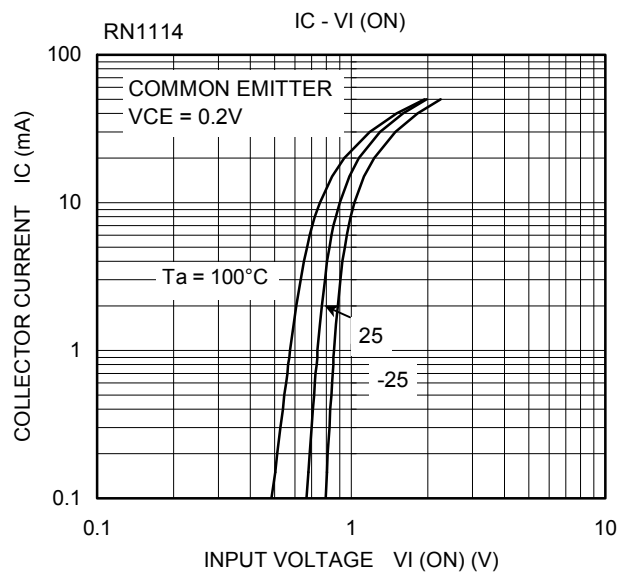
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

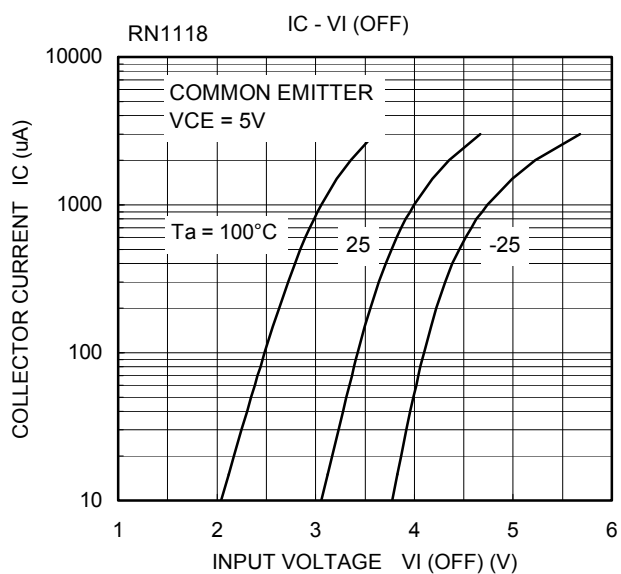
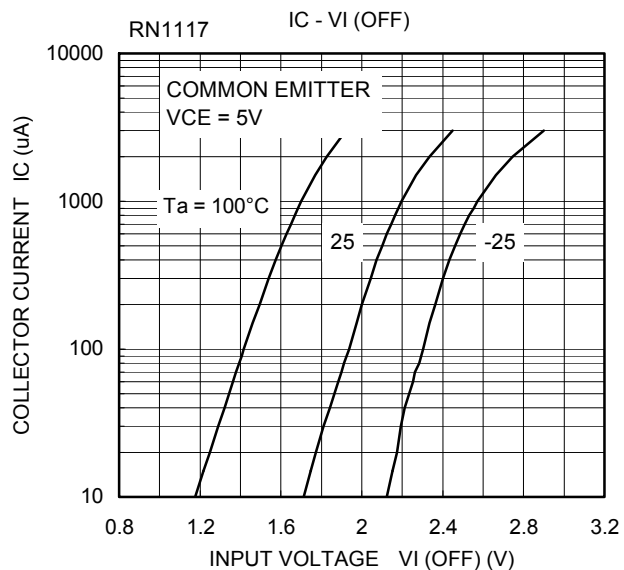
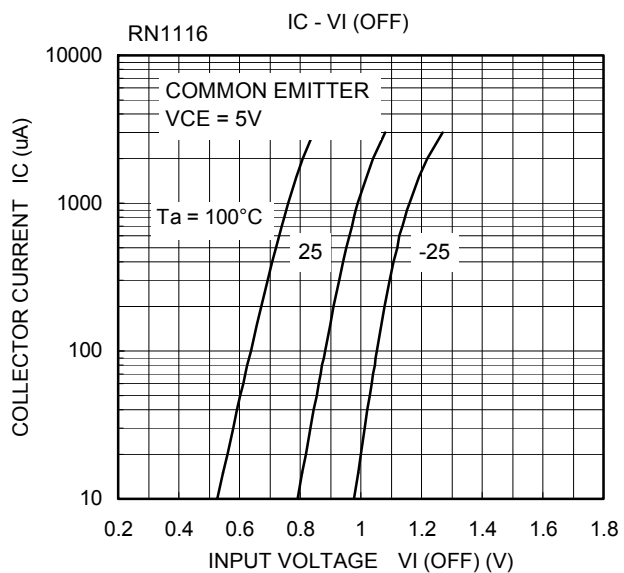
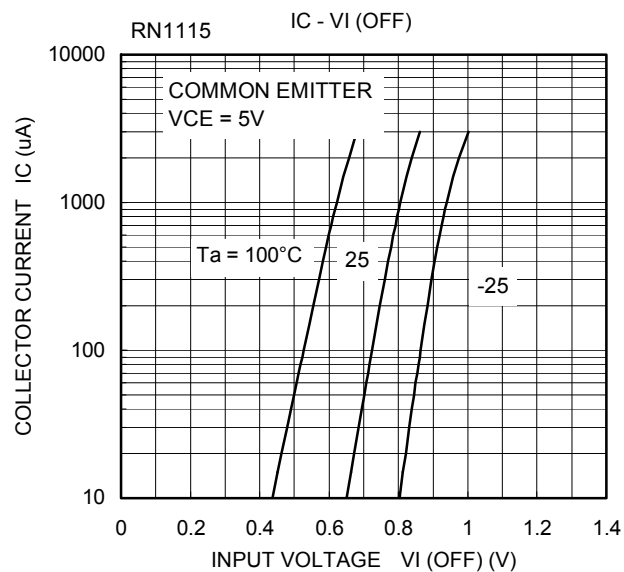
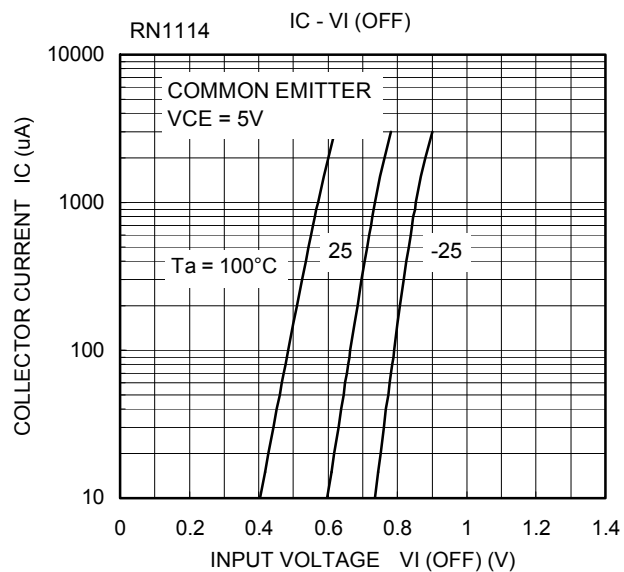
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

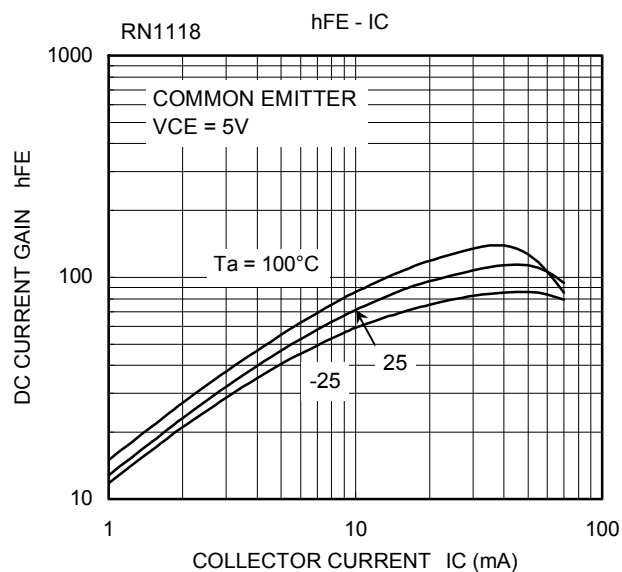
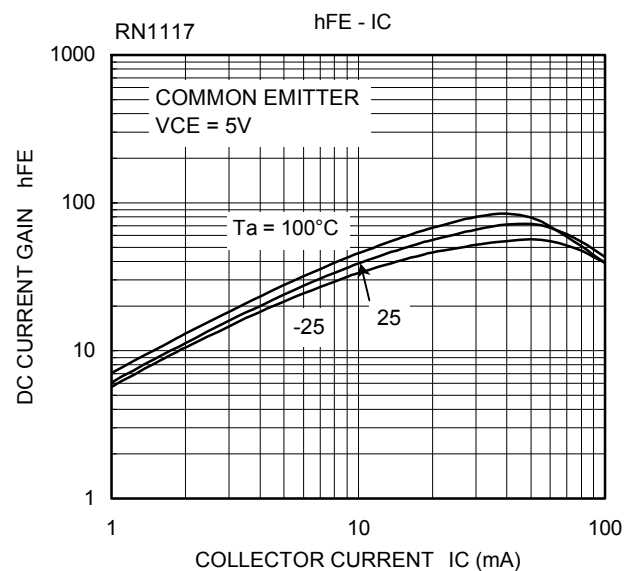
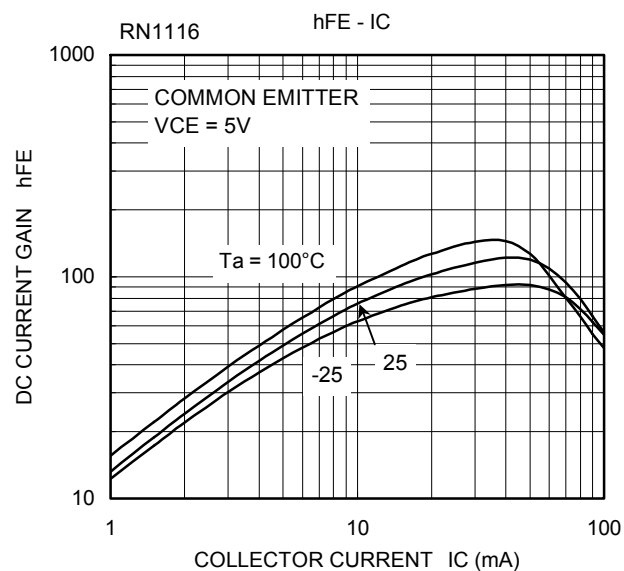
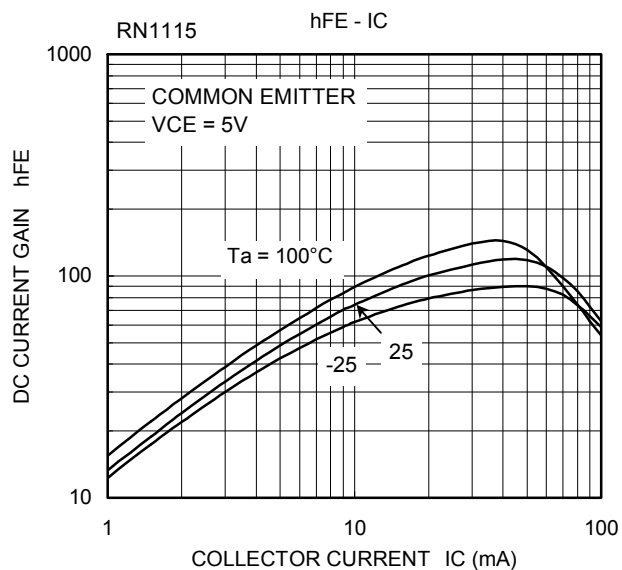
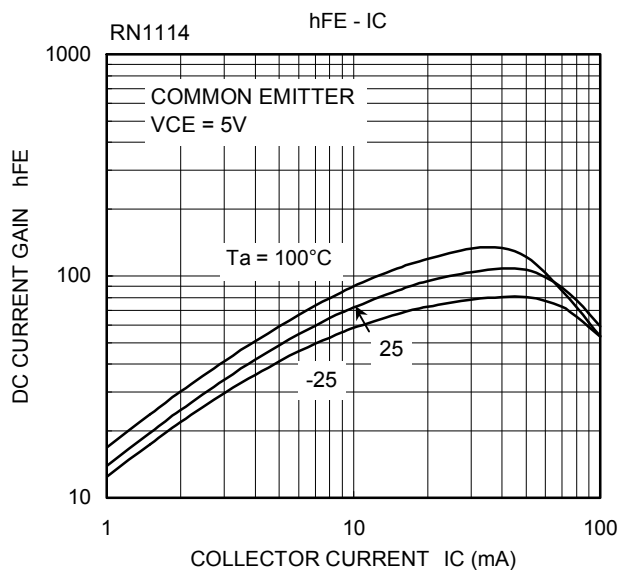
Start of commercial production  
1994-08

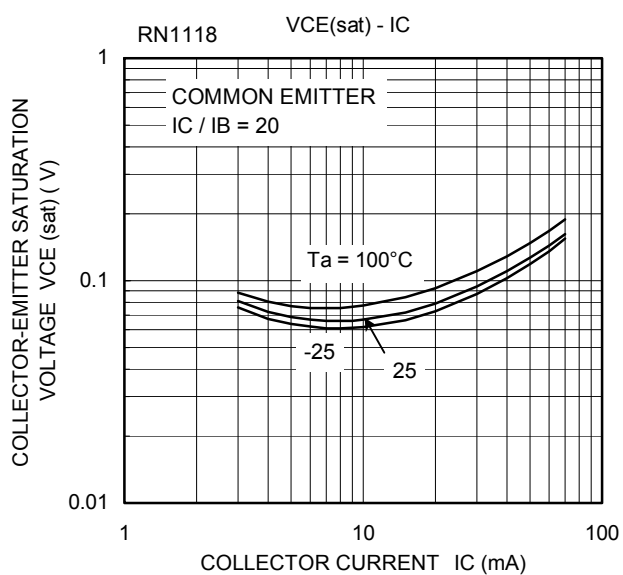
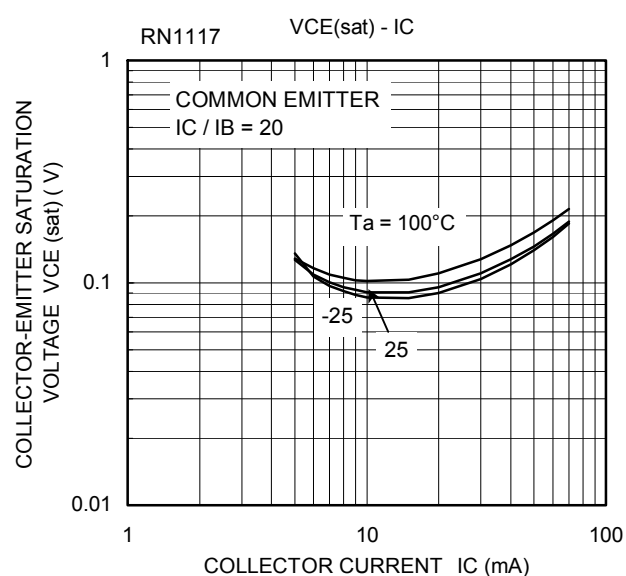
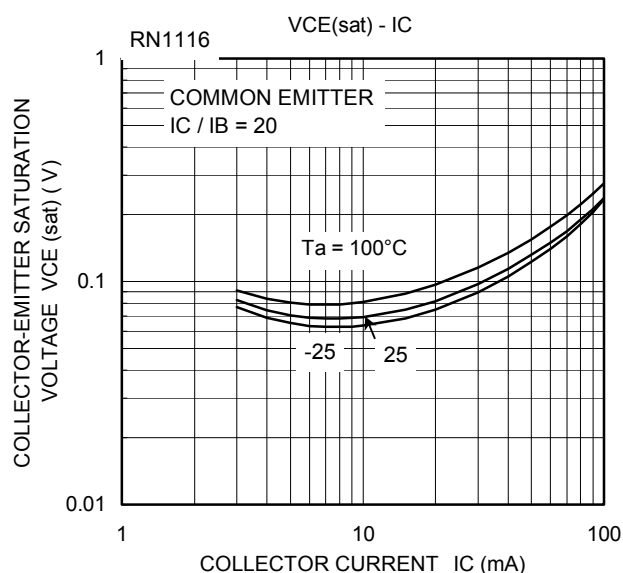
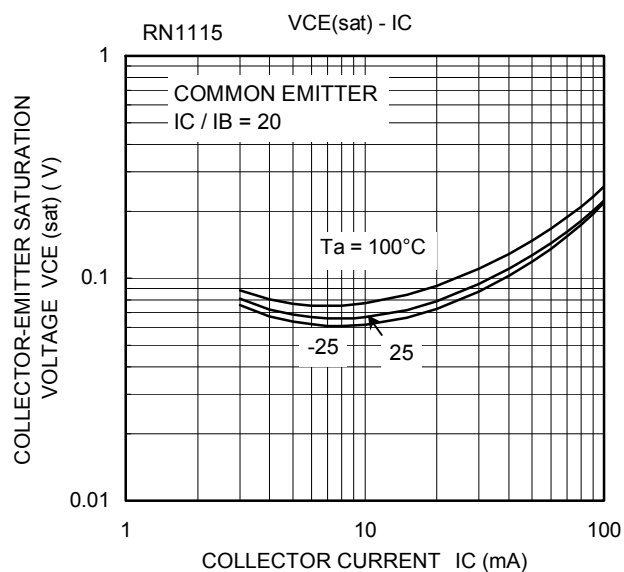
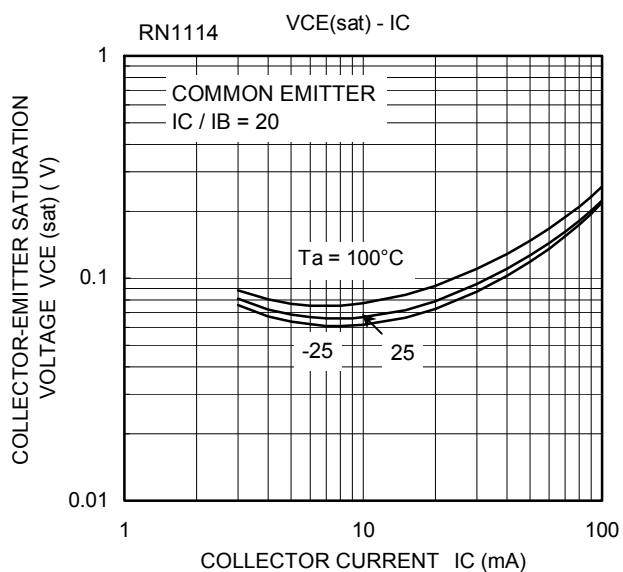
**Electrical Characteristics (Ta = 25°C)**

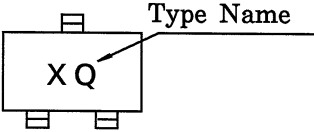
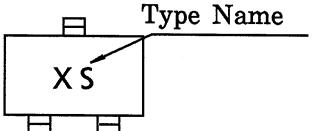
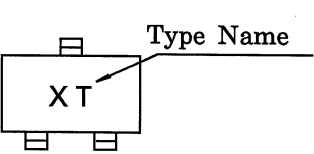
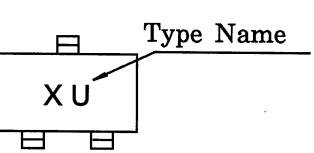
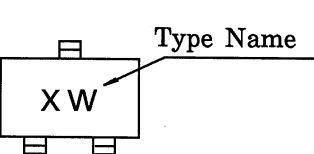
Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1114 to 1118	$I_{CBO}$	—	$V_{CB} = 50 \text{ V}, I_E = 0$	—	—	100	nA
	RN1114 to 1118	$I_{CEO}$	—	$V_{CE} = 50 \text{ V}, I_B = 0$	—	—	500	nA
Emitter cut-off current	RN1114	$I_{EBO}$	—	$V_{EB} = 5 \text{ V}, I_C = 0$	0.35	—	0.65	mA
	RN1115		—	$V_{EB} = 6 \text{ V}, I_C = 0$	0.37	—	0.71	
	RN1116		—	$V_{EB} = 7 \text{ V}, I_C = 0$	0.36	—	0.68	
	RN1117		—	$V_{EB} = 15 \text{ V}, I_C = 0$	0.78	—	1.46	
	RN1118		—	$V_{EB} = 25 \text{ V}, I_C = 0$	0.33	—	0.63	
DC current gain	RN1114 to 16, 18	$h_{FE}$	—	$V_{CE} = 5 \text{ V}, I_C = 10 \text{ mA}$	50	—	—	—
	RN1117		—		30	—	—	
Collector-emitter saturation voltage	RN1114 to 1118	$V_{CE(sat)}$	—	$I_C = 5 \text{ mA}, I_B = 0.25 \text{ mA}$	—	0.1	0.3	V
Input voltage (ON)	RN1114	$V_{I(ON)}$	—	$V_{CE} = 0.2 \text{ V}, I_C = 5 \text{ mA}$	0.6	—	2.0	V
	RN1115		—		0.7	—	2.5	
	RN1116		—		0.8	—	2.5	
	RN1117		—		1.5	—	3.5	
	RN1118		—		2.5	—	10.0	
Input voltage (OFF)	RN1114	$V_{I(OFF)}$	—	$V_{CE} = 5 \text{ V}, I_C = 0.1 \text{ mA}$	0.3	—	0.9	V
	RN1115		—		0.3	—	1.0	
	RN1116		—		0.3	—	1.1	
	RN1117		—		0.3	—	2.3	
	RN1118		—		0.5	—	5.7	
Transition frequency	RN1114 to 1118	$f_T$	—	$V_{CE} = 10 \text{ V}, I_C = 5 \text{ mA}$	—	250	—	MHz
Collector output capacitance	RN1114 to 1118	$C_{ob}$	—	$V_{CB} = 10 \text{ V}, I_E = 0, f = 1 \text{ MHz}$	—	3.0	6.0	pF
Input Resistor	RN1114	$R_1$	—	—	0.7	1.0	1.3	kΩ
	RN1115		—		1.54	2.2	2.86	
	RN1116		—		3.29	4.7	6.11	
	RN1117		—		7.0	10.0	13.0	
	RN1118		—		32.9	47.0	61.1	
Resistor Ratio	RN1114	$R_1/R_2$	—	—	—	0.1	—	—
	RN1115		—		—	0.22	—	
	RN1116		—		—	0.47	—	
	RN1117		—		—	2.13	—	
	RN1118		—		—	4.7	—	









Type Name	Marking
RN1114	
RN1115	
RN1116	
RN1117	
RN1118	

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