

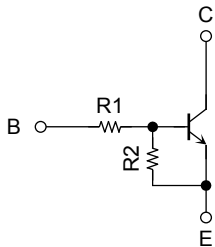
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

## RN1101CT, RN1102CT, RN1103CT RN1104CT, RN1105CT, RN1106CT

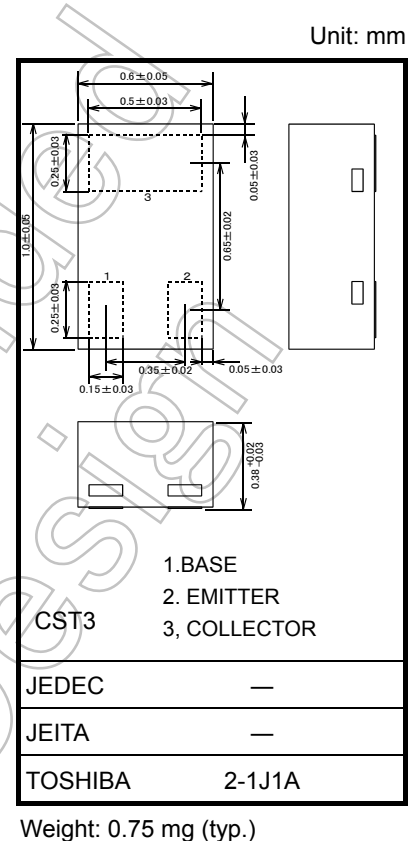
Switching Applications  
Inverter Circuit Applications  
Interface Circuit Applications  
Driver Circuit Applications

- 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.
- Complementary to RN2101CT to RN2106CT

### Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN1101CT	4.7	4.7
RN1102CT	10	10
RN1103CT	22	22
RN1104CT	47	47
RN1105CT	2.2	47
RN1106CT	4.7	47



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

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V <sub>CB0</sub>	20	V
Collector-emitter voltage			
Emitter-base voltage	V <sub>EBO</sub>	10	V
		5	
Collector current	I <sub>C</sub>	50	mA
Collector power dissipation	P <sub>C</sub>	50	mW
Junction temperature	T <sub>j</sub>	150	°C
Storage temperature range	T <sub>stg</sub>	-55 to 150	°C

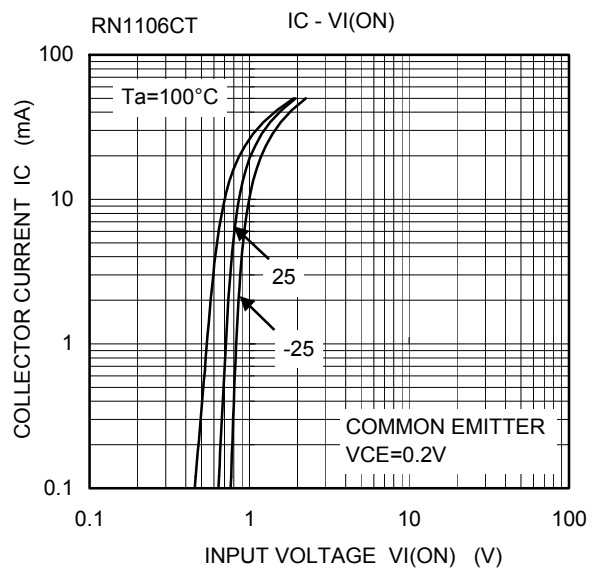
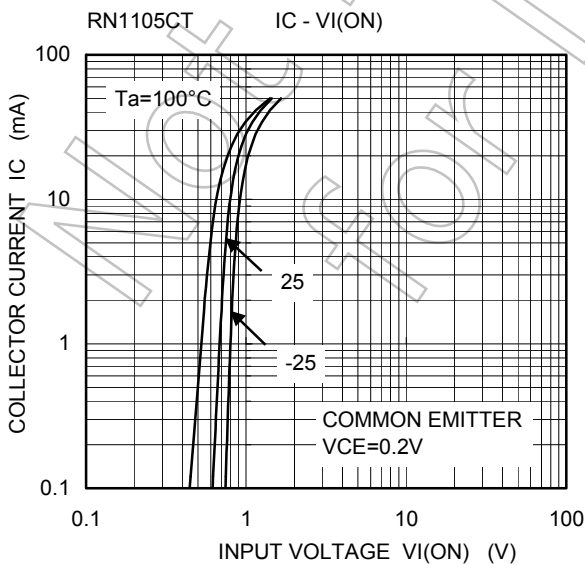
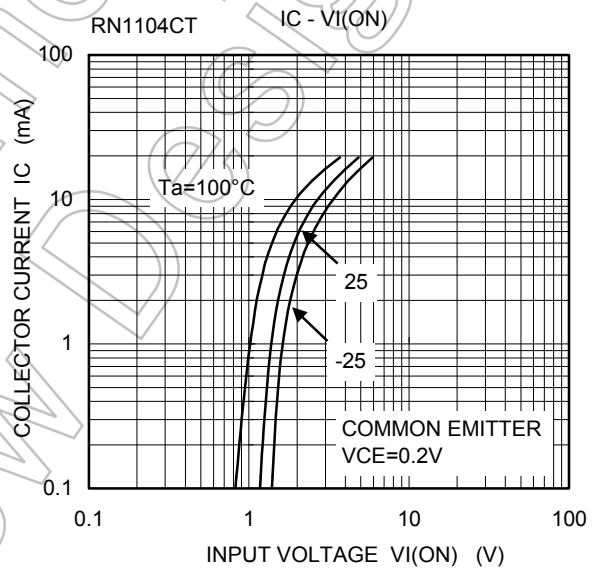
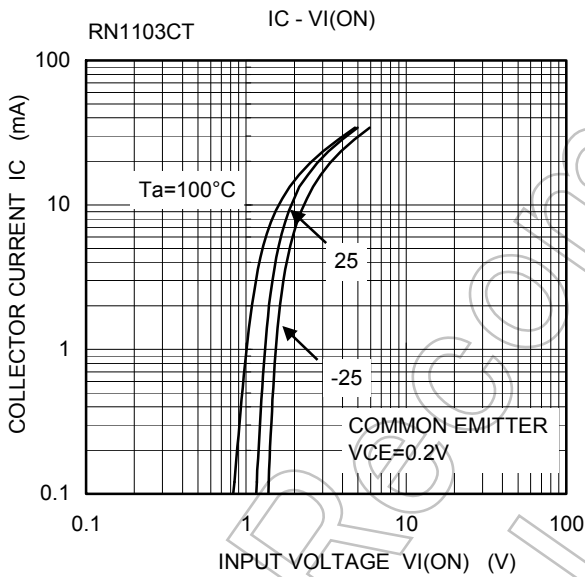
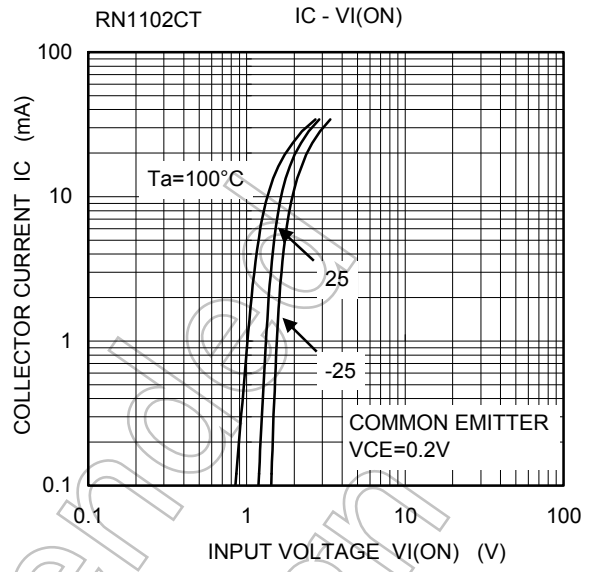
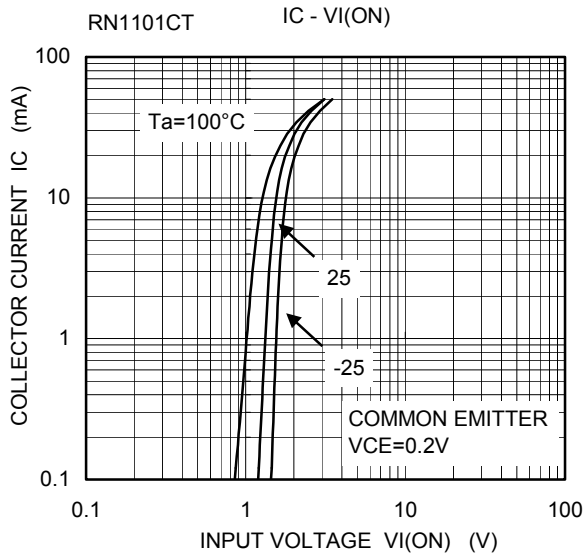
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

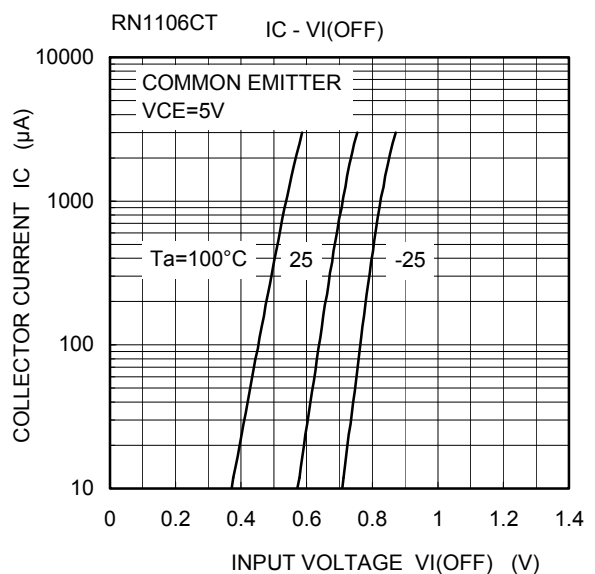
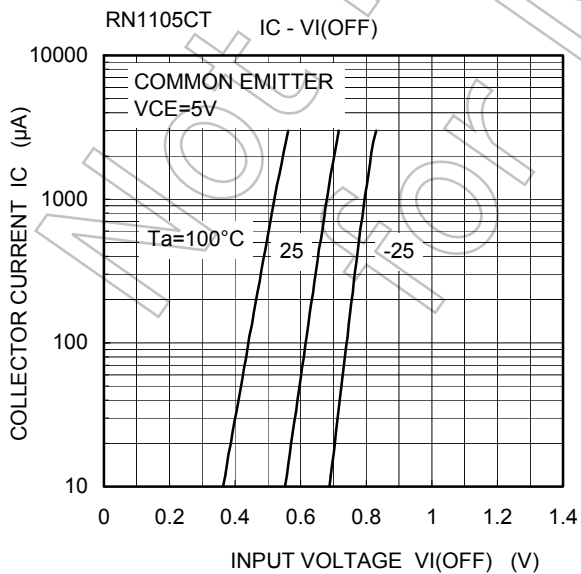
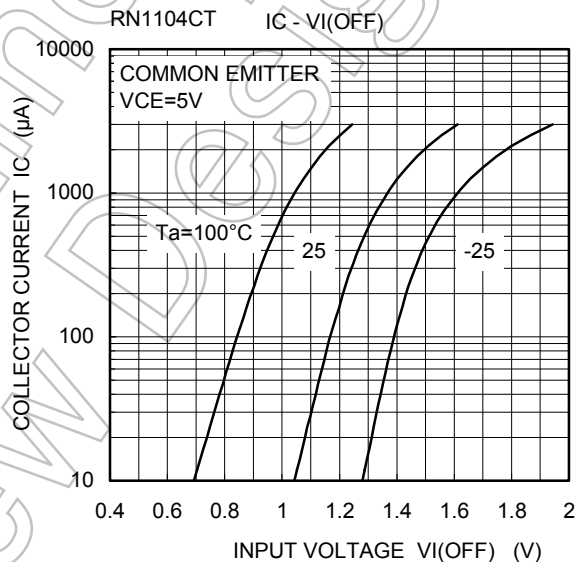
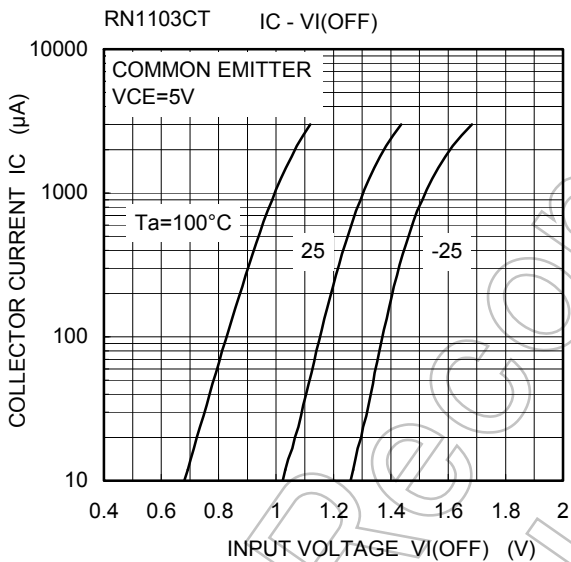
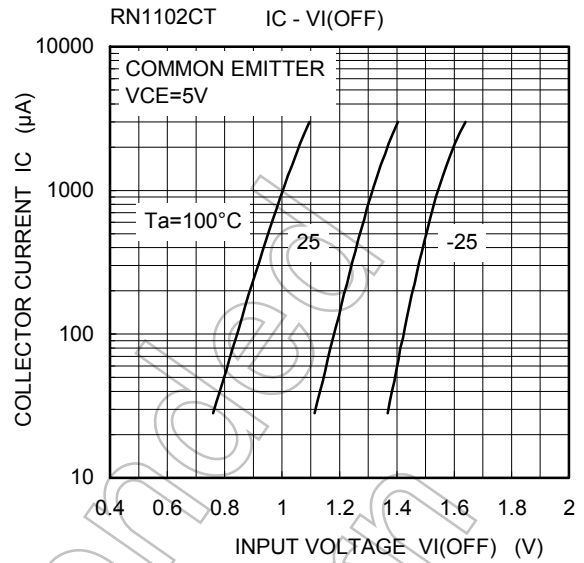
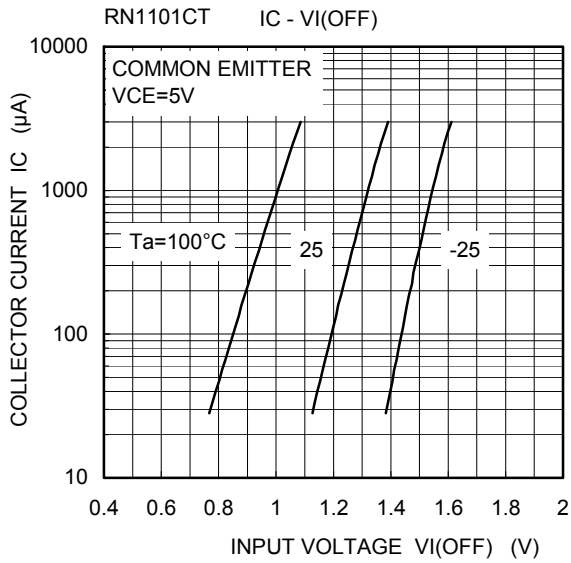
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

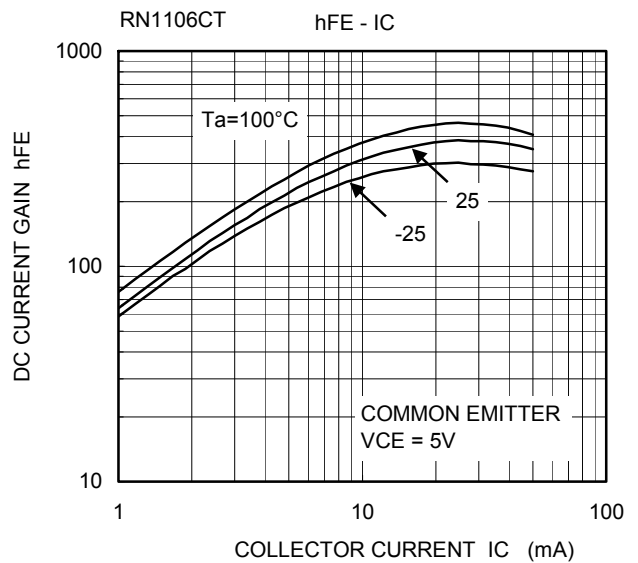
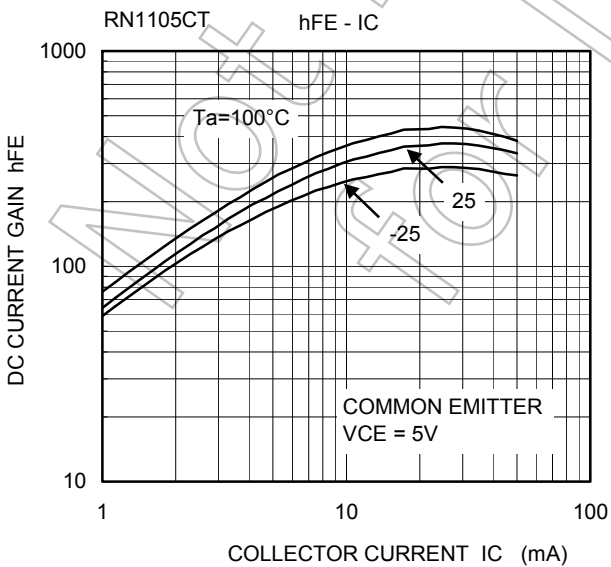
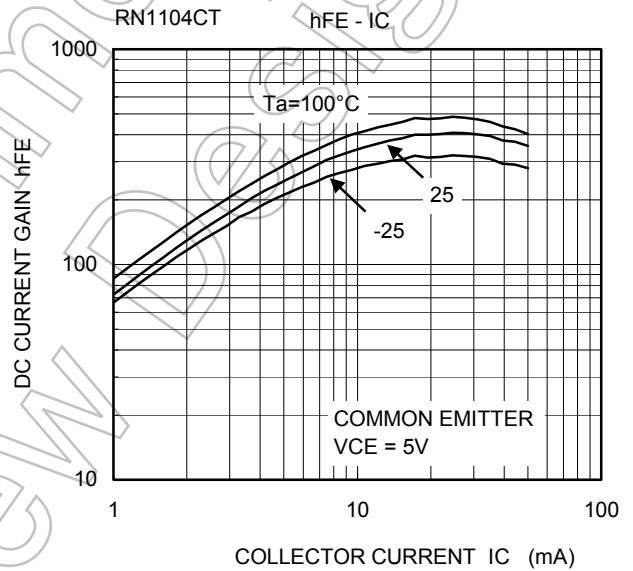
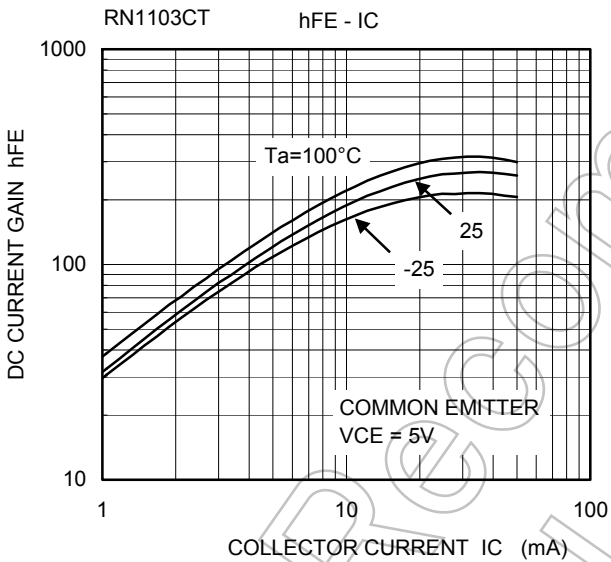
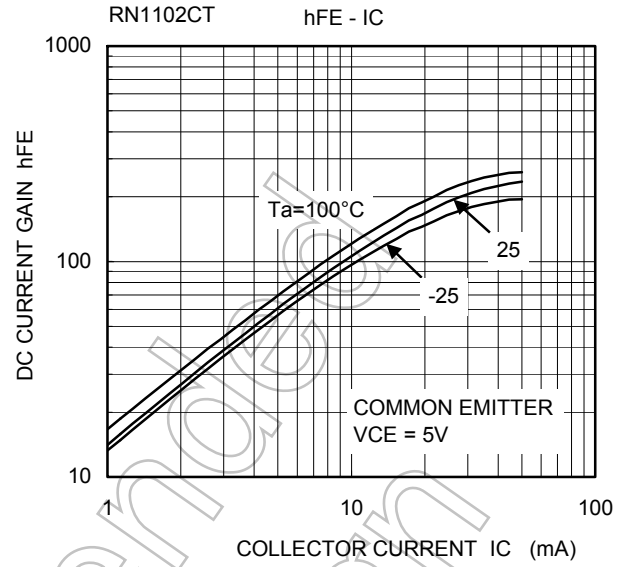
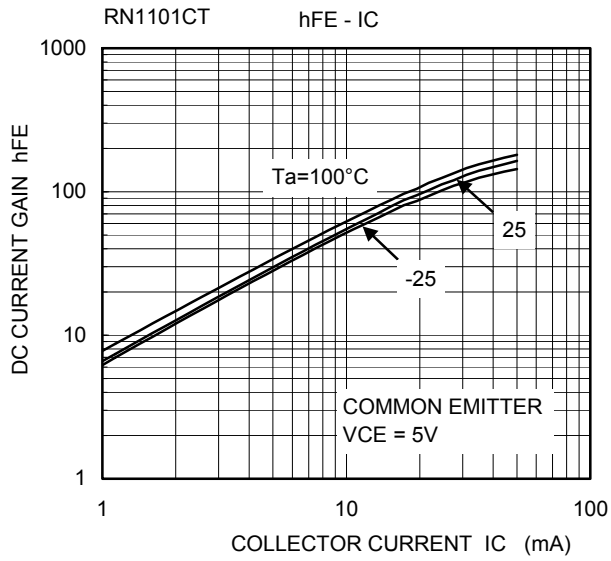
Start of commercial production  
2004-10

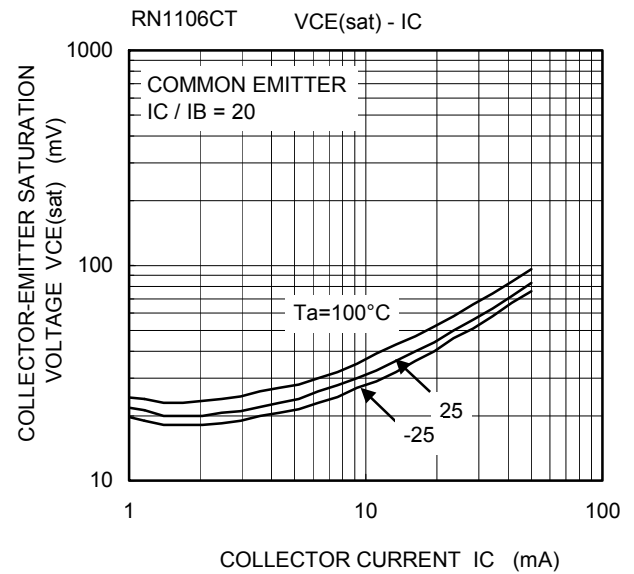
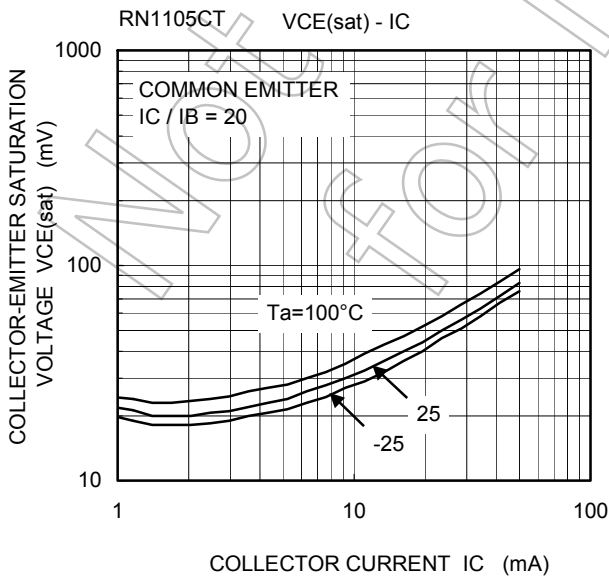
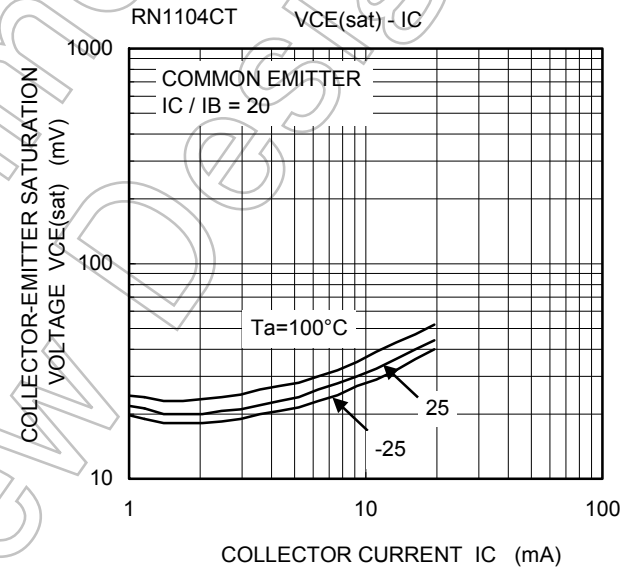
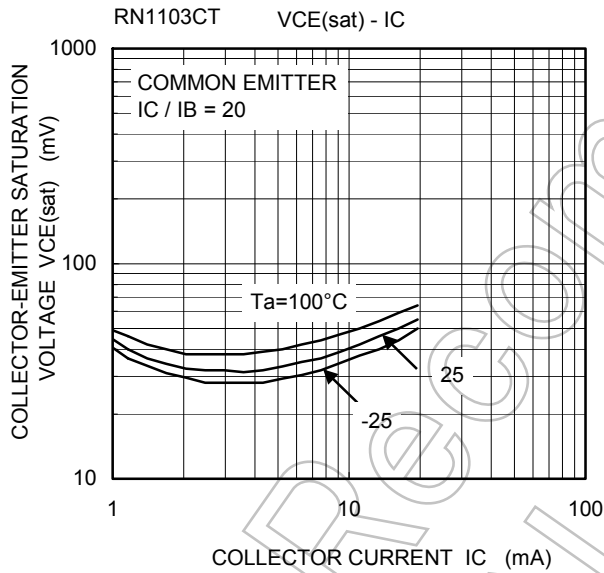
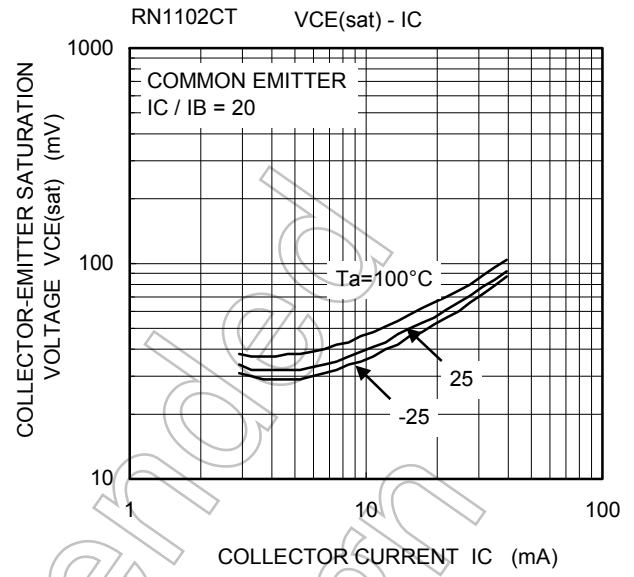
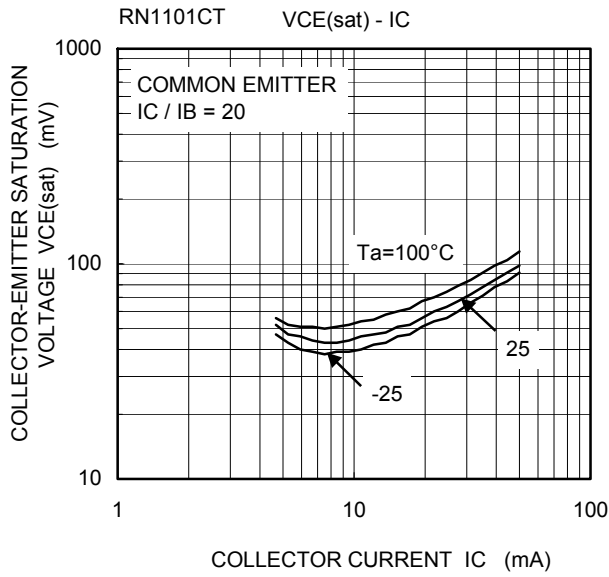
## Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1101CT to 1106CT	$I_{CBO}$	$V_{CB} = 20\text{ V}, I_E = 0$	—	—	100	nA
		$I_{CEO}$	$V_{CE} = 20\text{ V}, I_B = 0$	—	—	500	
Emitter cut-off current	RN1101CT	$I_{EBO}$	$V_{EB} = 10\text{ V}, I_C = 0$	0.89	—	1.33	mA
	RN1102CT			0.41	—	0.63	
	RN1103CT			0.18	—	0.29	
	RN1104CT		0.088	—	0.133		
	RN1105CT		$V_{EB} = 5\text{ V}, I_C = 0$	0.085	—	0.127	
	RN1106CT			0.08	—	0.121	
DC current gain	RN1101CT	$h_{FE}$	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$	30	—	—	
	RN1102CT			60	—	—	
	RN1103CT			100	—	—	
	RN1104CT			120	—	—	
	RN1105CT			120	—	—	
	RN1106CT			120	—	—	
Collector-emitter saturation voltage	RN1101CT to 1106CT	$V_{CE(sat)}$	$I_C = 5\text{ mA}, I_B = 0.25\text{ mA}$	—	—	0.15	V
Input voltage (ON)	RN1101CT	$V_{I(ON)}$	$V_{CE} = 0.2\text{ V}, I_C = 5\text{ mA}$	1.0	—	2.0	V
	RN1102CT			1.0	—	2.2	
	RN1103CT			1.1	—	2.7	
	RN1104CT			1.2	—	3.6	
	RN1105CT			0.6	—	1.1	
	RN1106CT			0.6	—	1.2	
Input voltage (OFF)	RN1101CT to 1104CT	$V_{I(OFF)}$	$V_{CE} = 5\text{ V}, I_C = 0.1\text{ mA}$	0.8	—	1.5	V
	RN1105CT, 1106CT			0.4	—	0.8	
Collector output capacitance	RN1101CT to 1106CT	$C_{ob}$	$V_{CB} = 10\text{ V}, I_E = 0,$ $f = 1\text{ MHz}$	—	1.2	—	pF
Input resistor	RN1101CT	R1	—	3.76	4.7	5.64	k $\Omega$
	RN1102CT			8	10	12	
	RN1103CT			17.6	22	26.4	
	RN1104CT			37.6	47	56.4	
	RN1105CT			1.76	2.2	2.64	
	RN1106CT			3.76	4.7	5.64	
Resistor ratio	RN1101CT to 1104CT	R1/R2	—	0.8	1.0	1.2	
	RN1105CT			0.0376	0.0468	0.0562	
	RN1106CT			0.08	0.1	0.12	









Type Name	Marking
RN1101CT	
RN1102CT	
RN1103CT	
RN1104CT	
RN1105CT	
RN1106CT	

**Handling Precaution**

When handling individual devices (which are not yet mounted on a circuit board), be sure that the environment is protected against electrostatic electricity. Operators should wear anti-static clothing, and containers and other objects that come into direct contact with devices should be made of anti-static materials.

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