

TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process)

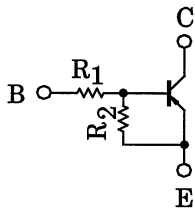
## RN2414, RN2415, RN2416, RN2417, RN2418

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

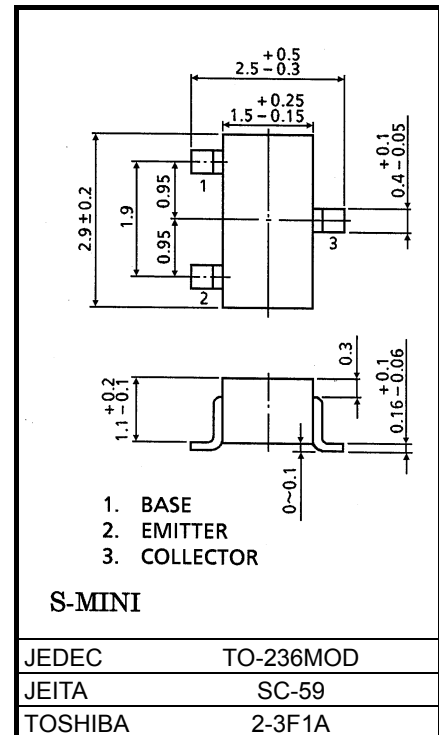
Unit: mm

- With built-in bias resistors
- Simplified circuit design
- Reduce a quantity of parts and manufacturing process
- Complementary to RN1414~RN1418

### Equivalent Circuit and Bias Resistor Values



Type No.	R <sub>1</sub> (kΩ)	R <sub>2</sub> (kΩ)
RN2414	1	10
RN2415	2.2	10
RN2416	4.7	10
RN2417	10	4.7
RN2418	47	10



JEDEC	TO-236MOD
JEITA	SC-59
TOSHIBA	2-3F1A

Weight: 0.012g (typ.)

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

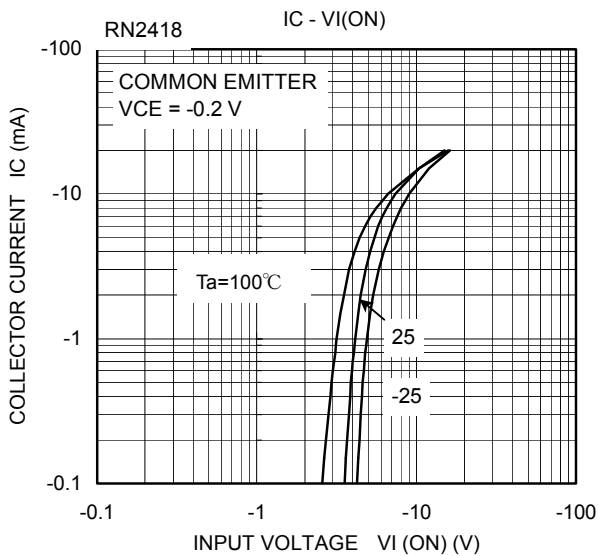
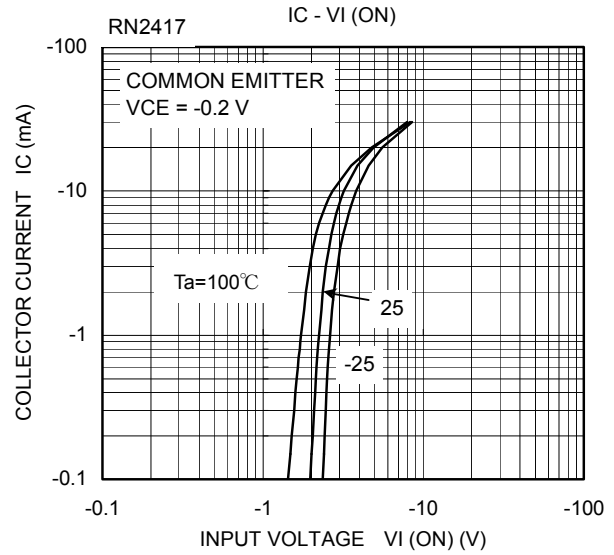
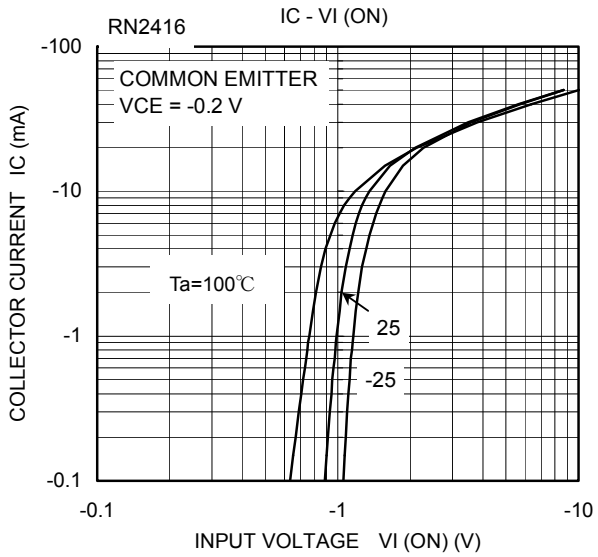
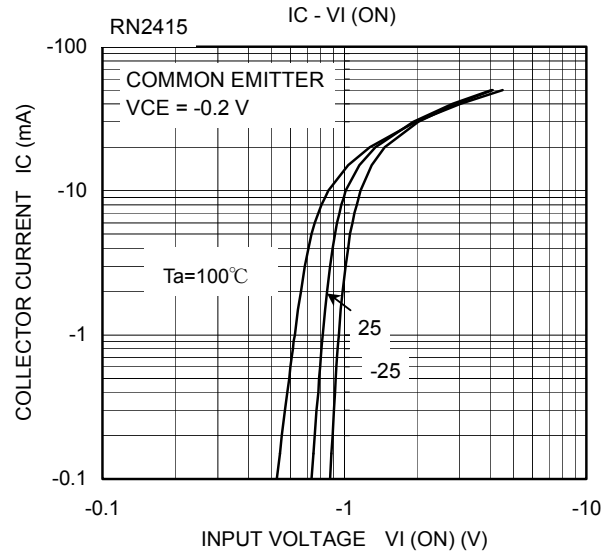
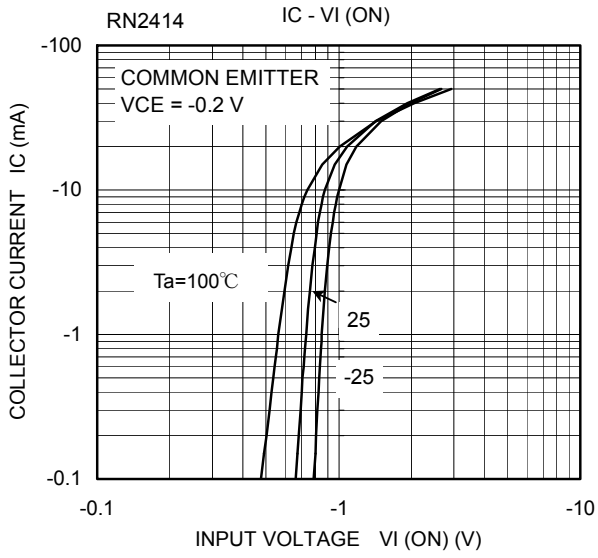
Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN2414~2418	V <sub>CB0</sub>	-50	V
Collector-emitter voltage		V <sub>CE0</sub>	-50	V
Emitter-base voltage	RN2414	V <sub>EBO</sub>	-5	V
	RN2415		-6	
	RN2416		-7	
	RN2417		-15	
	RN2418		-25	
Collector current	RN2414~2418	I <sub>C</sub>	-100	mA
Collector power dissipation		P <sub>C</sub>	200	mW
Junction temperature		T <sub>j</sub>	150	°C
Storage temperature range		T <sub>stg</sub>	-55~150	°C

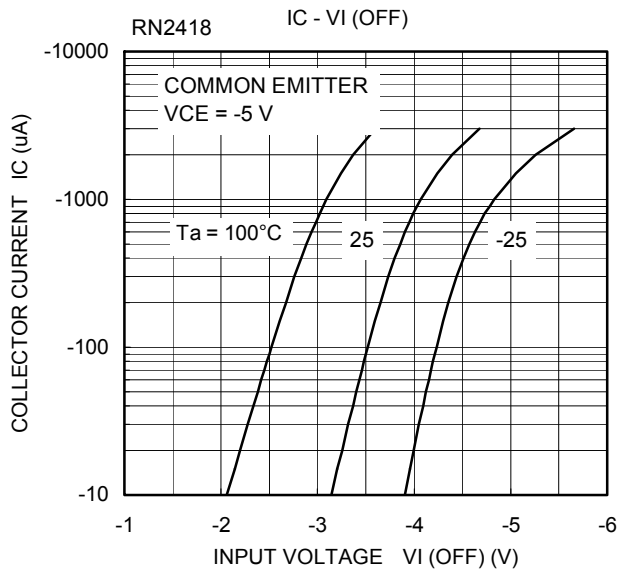
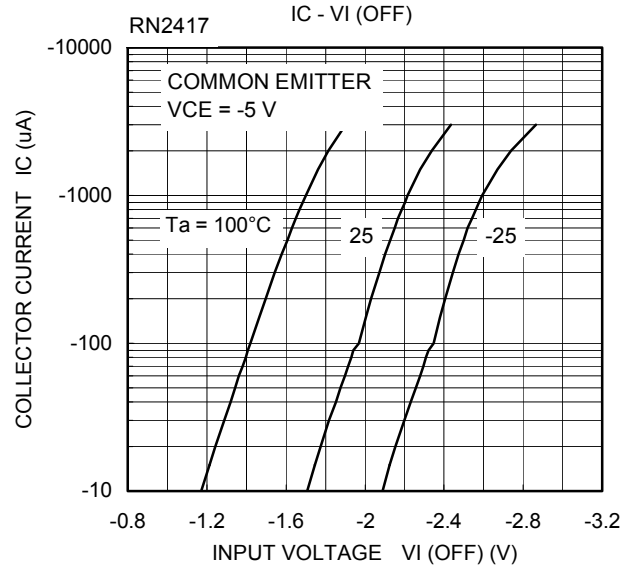
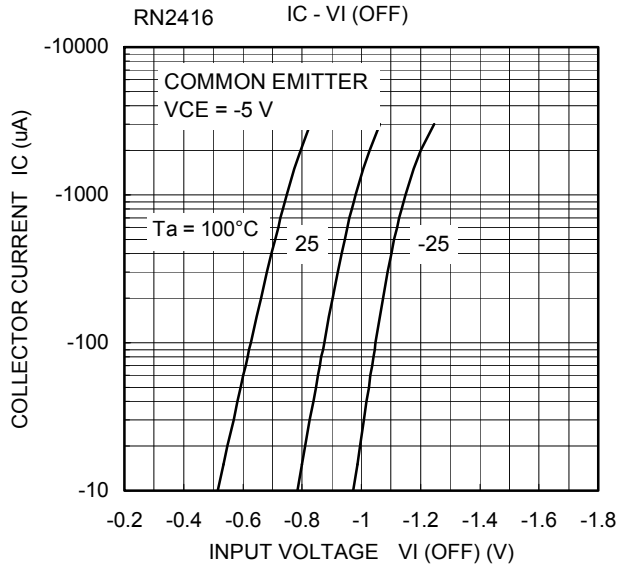
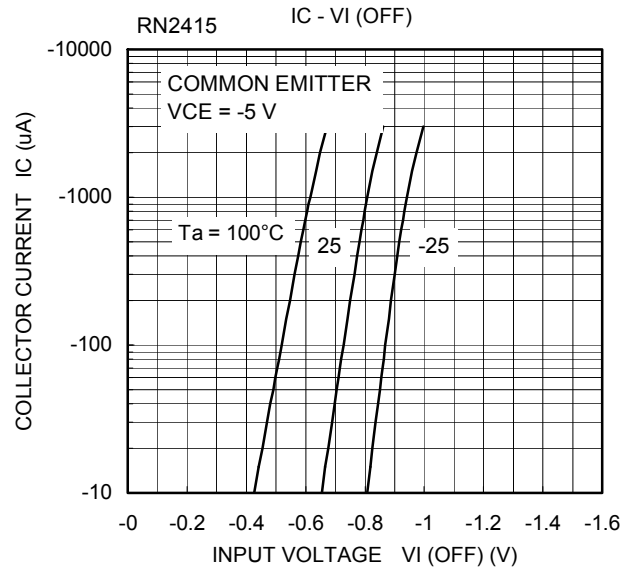
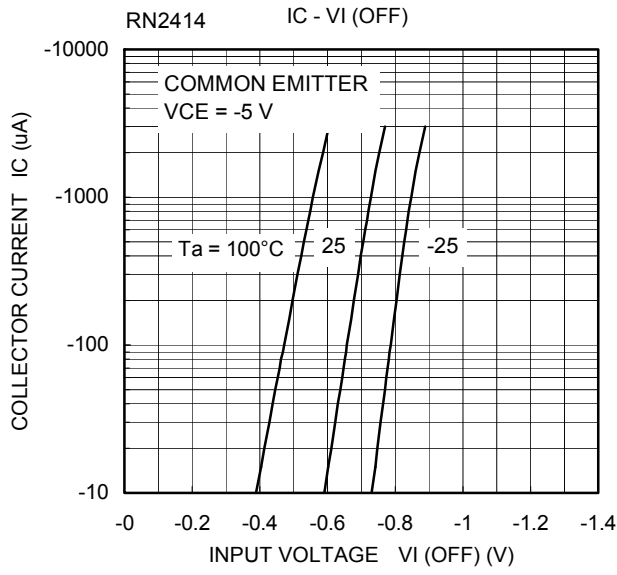
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

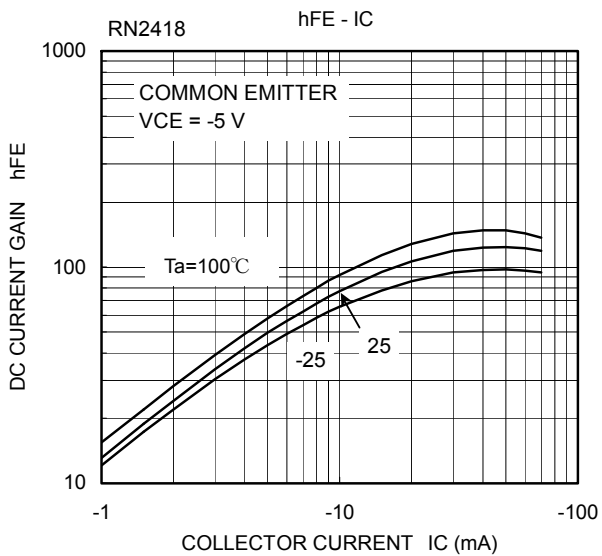
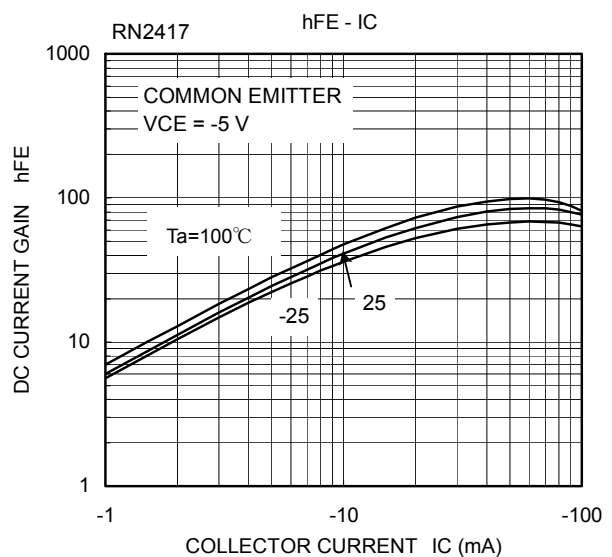
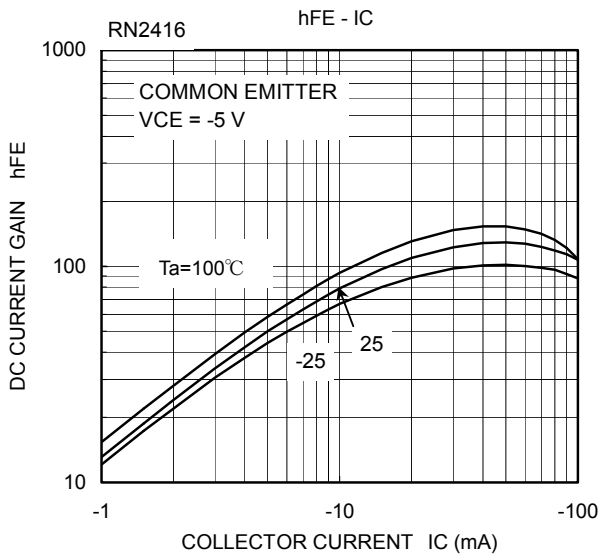
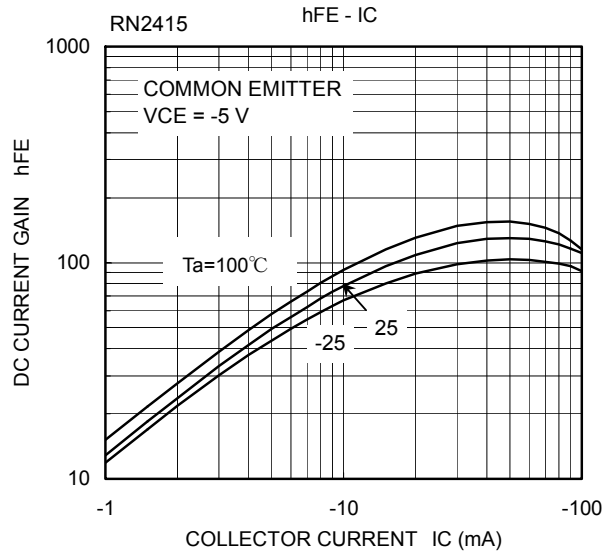
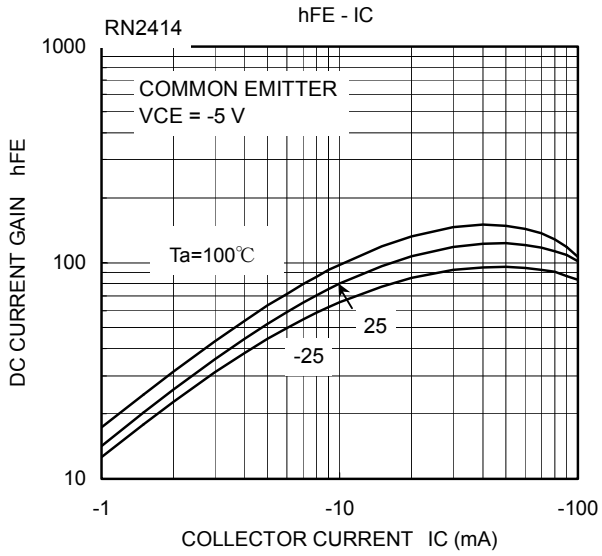
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

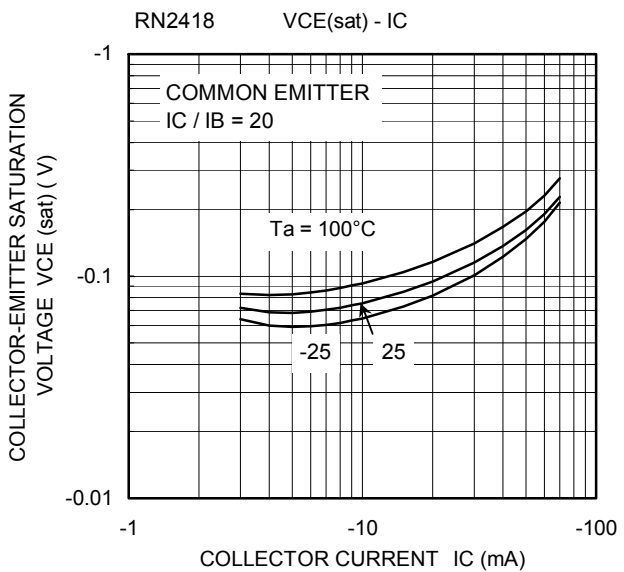
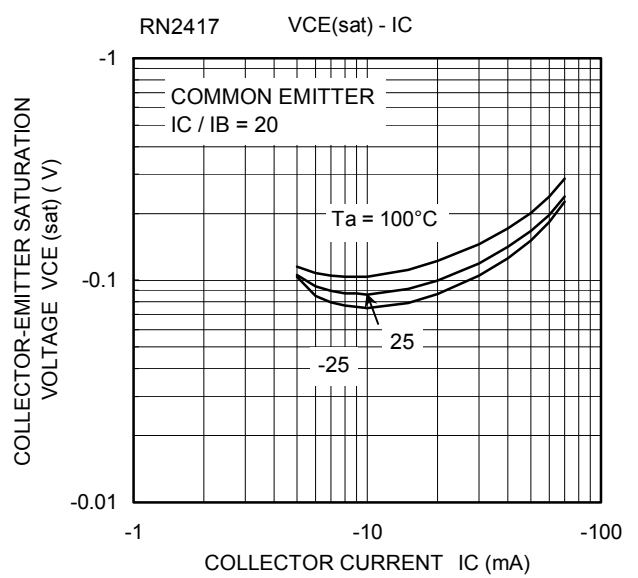
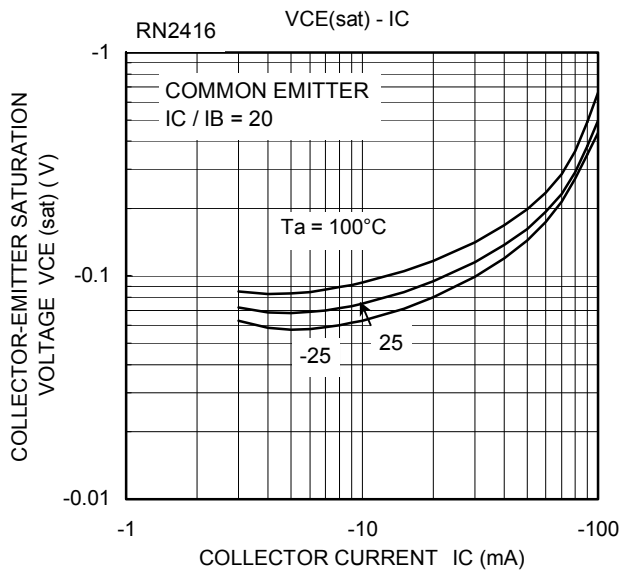
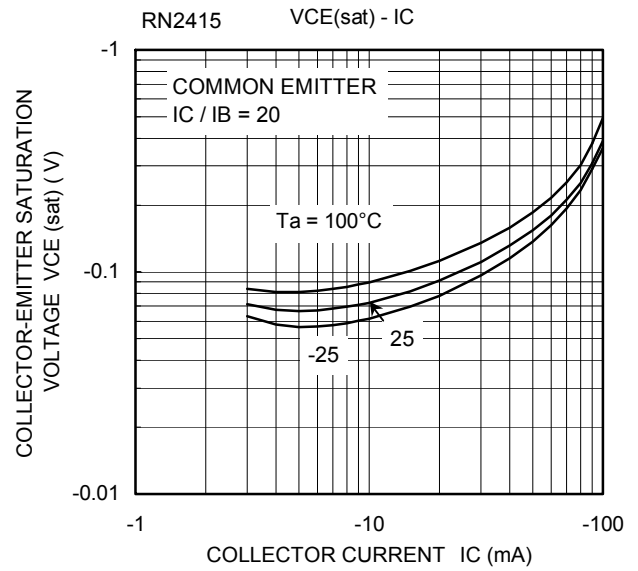
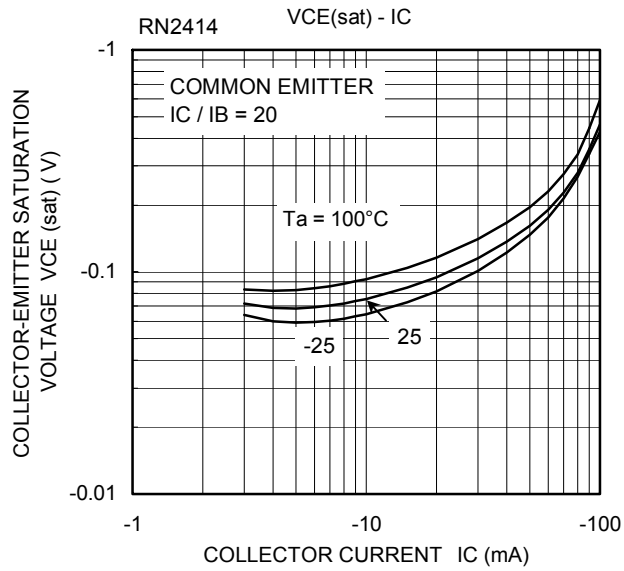
## Electrical Characteristics (Ta = 25°C)

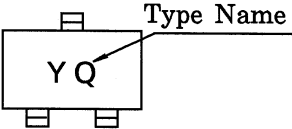
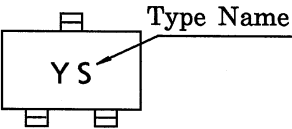
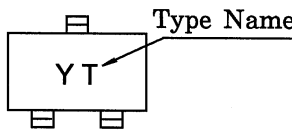
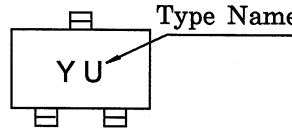
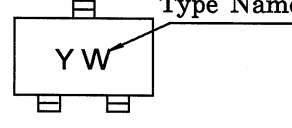
Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2414~2418	$I_{CBO}$	—	$V_{CB} = -50\text{ V}, I_E = 0$	—	—	-100	nA
	RN2414~2418	$I_{CEO}$	—	$V_{CE} = -50\text{ V}, I_B = 0$	—	—	-500	nA
Emitter cut-off current	RN2414	$I_{EBO}$	—	$V_{EB} = -5\text{ V}, I_C = 0$	-0.35	—	-0.65	mA
	RN2415		—	$V_{EB} = -6\text{ V}, I_C = 0$	-0.37	—	-0.71	
	RN2416		—	$V_{EB} = -7\text{ V}, I_C = 0$	-0.36	—	-0.68	
	RN2417		—	$V_{EB} = -15\text{ V}, I_C = 0$	-0.78	—	-1.46	
	RN2418		—	$V_{EB} = -25\text{ V}, I_C = 0$	-0.33	—	-0.63	
DC current gain	RN2414~16, 18	$h_{FE}$	—	$V_{CE} = -5\text{ V}, I_C = -10\text{ mA}$	50	—	—	—
	RN2417		—		30	—	—	
Collector-emitter saturation voltage	RN2414~2418	$V_{CE(sat)}$	—	$I_C = -5\text{ mA}, I_B = -0.25\text{ mA}$	—	-0.1	-0.3	V
Input voltage (ON)	RN2414	$V_I(ON)$	—	$V_{CE} = -0.2\text{ V}, I_C = -5\text{ mA}$	-0.5	—	-2.0	V
	RN2415		—		-0.6	—	-2.5	
	RN2416		—		-0.7	—	-2.5	
	RN2417		—		-1.5	—	-3.5	
	RN2418		—		-2.5	—	-10.0	
Input voltage (OFF)	RN2414	$V_I(OFF)$	—	$V_{CE} = -5\text{ V}, I_C = -0.1\text{ mA}$	-0.3	—	-0.9	V
	RN2415		—		-0.3	—	-1.0	
	RN2416		—		-0.3	—	-1.1	
	RN2417		—		-0.3	—	-3.0	
	RN2418		—		-0.5	—	-5.7	
Transition frequency	RN2414~2418	$f_T$	—	$V_{CE} = -10\text{ V}, I_C = -5\text{ mA}$	—	200	—	MHz
Collector output capacitance	RN2414~2418	$C_{ob}$	—	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	3.0	6.0	pF
Input resistor	RN2414	$R_1$	—	—	0.7	1.0	1.3	kΩ
	RN2415		—		1.54	2.2	2.86	
	RN2416		—		3.29	4.7	6.11	
	RN2417		—		7.0	10.0	13.0	
	RN2418		—		32.9	47.0	61.1	
Resistor ratio	RN2414	$R_1/R_2$	—	—	—	0.1	—	—
	RN2415		—		—	0.22	—	
	RN2416		—		—	0.47	—	
	RN2417		—		—	2.13	—	
	RN2418		—		—	4.7	—	









Type Name	Marking
RN2414	
RN2415	
RN2416	
RN2417	
RN2418	

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