

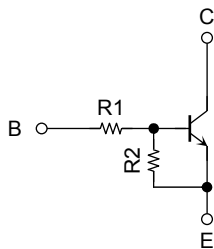
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process) (Transistor with Built-in Bias Resistor)

## RN1901AFS, RN1902AFS, RN1903AFS RN1904AFS, RN1905AFS, RN1906AFS

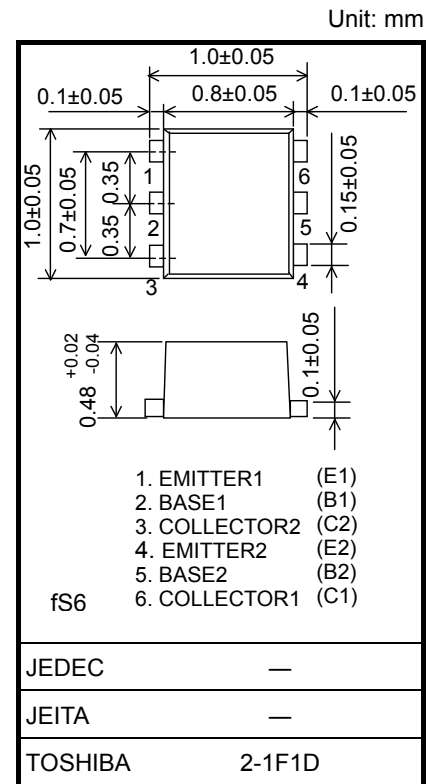
Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- Two devices are incorporated into a fine-pitch, Small-Mold (6-pin) package.
- Incorporating a bias resistor into a transistor reduces the parts count. Reducing the parts count enables the manufacture of ever more compact equipment and saves assembly costs.
- Complementary to the RN2901AFS~RN2906AFS

### Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN1901AFS	4.7	4.7
RN1902AFS	10	10
RN1903AFS	22	22
RN1904AFS	47	47
RN1905AFS	2.2	47
RN1906AFS	4.7	47

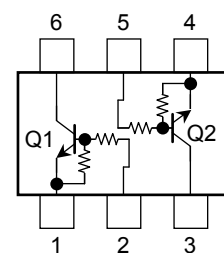


Weight: 0.001 g (typ.)

### Absolute Maximum Ratings (Ta = 25°C) (Q1, Q2 common)

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	$I_C$	80	mA
Collector power dissipation	$P_C$ (Note 1)	50	mW
Junction temperature	$T_j$	150	°C
Storage temperature range	$T_{stg}$	-55~150	°C

### Equivalent Circuit (top view)



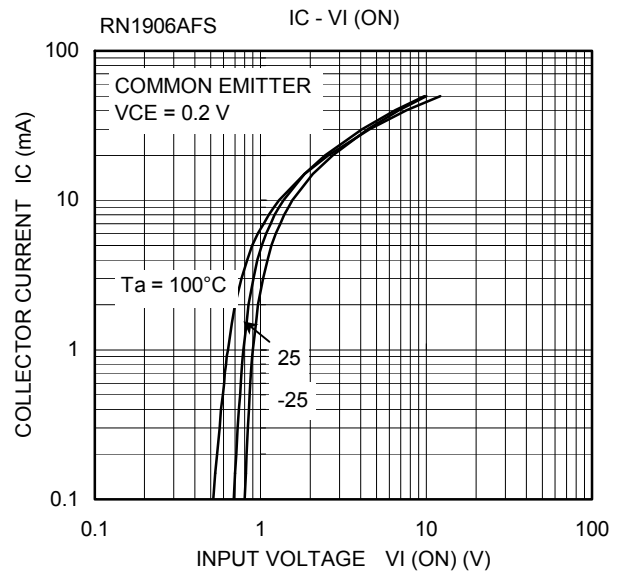
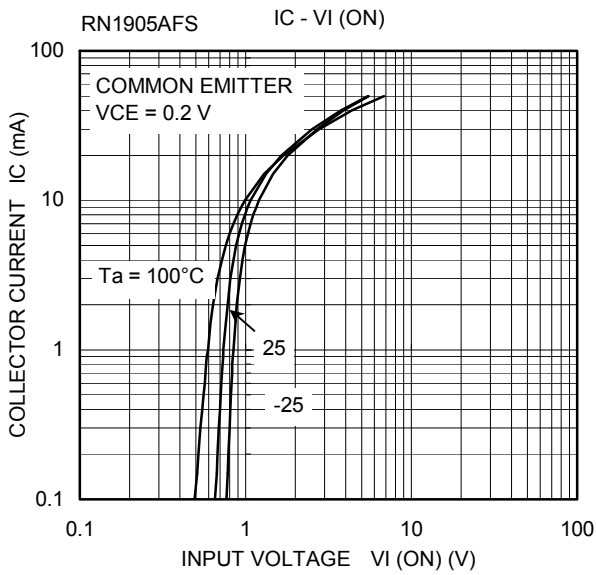
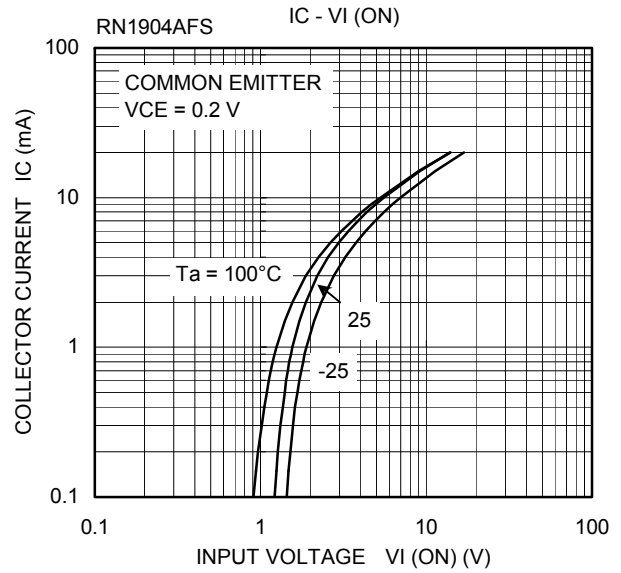
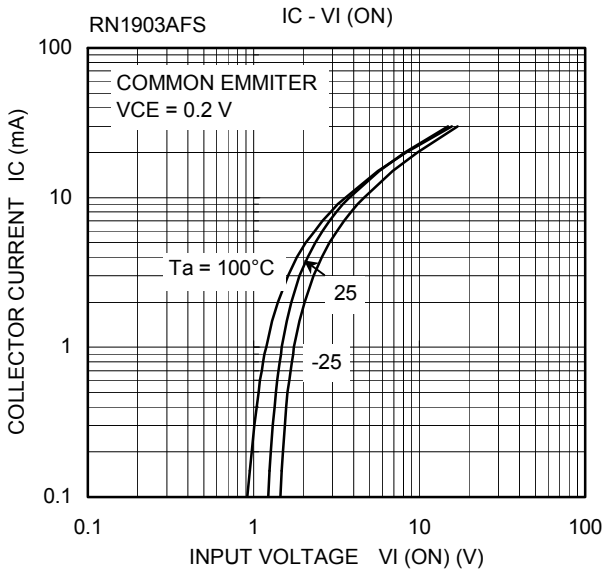
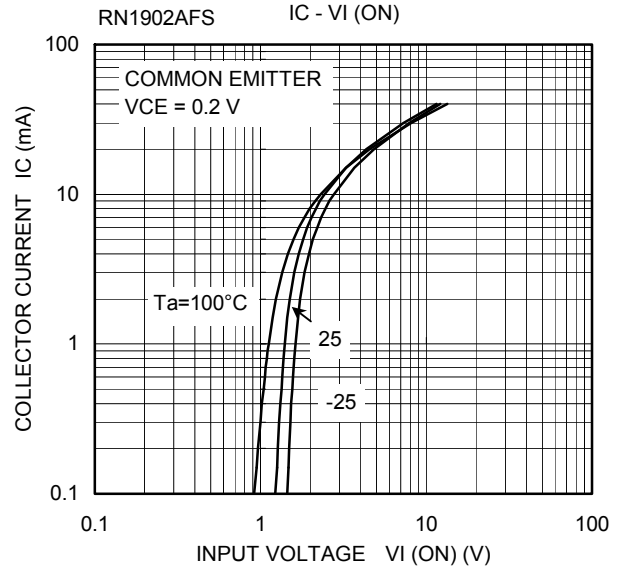
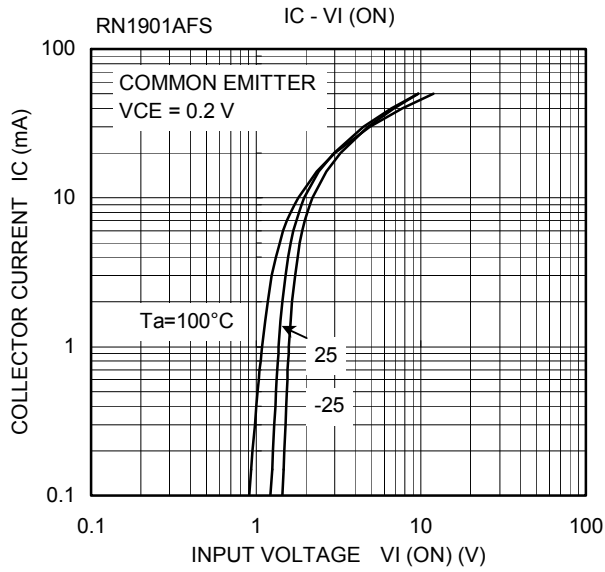
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

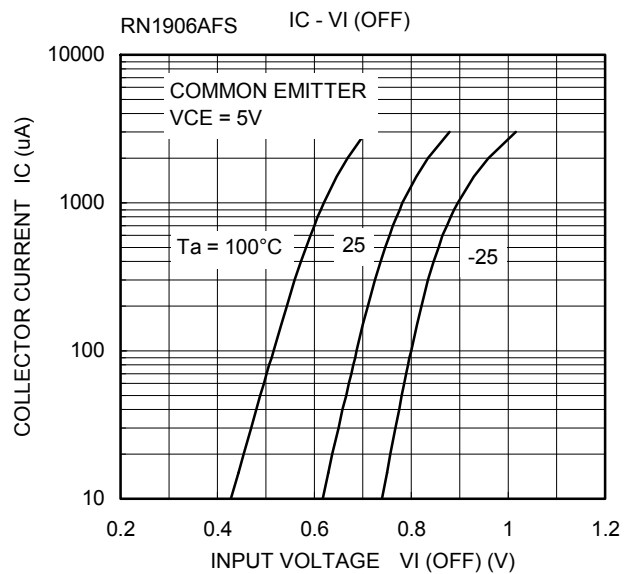
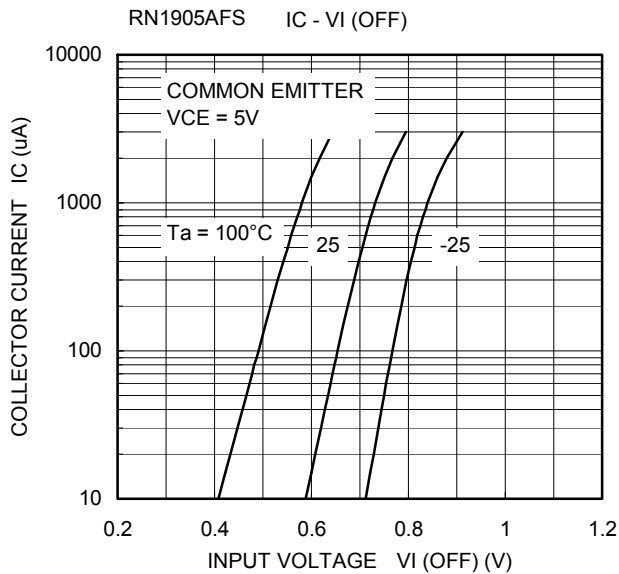
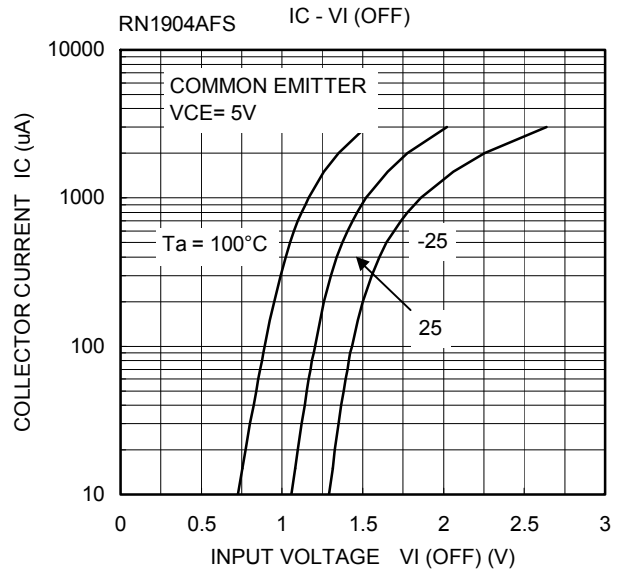
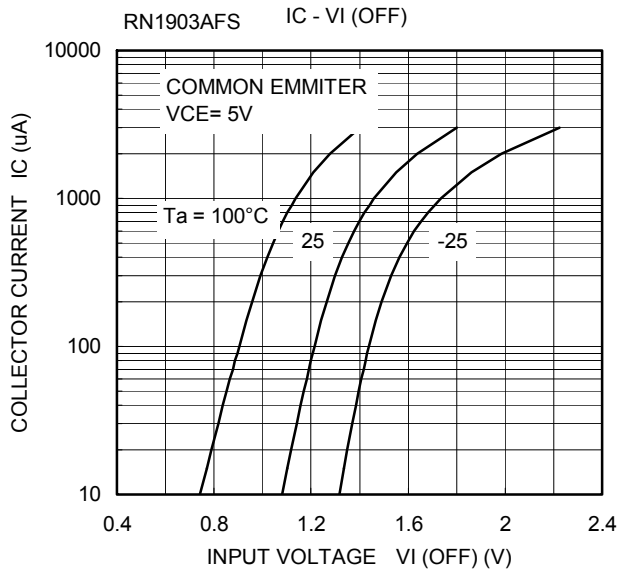
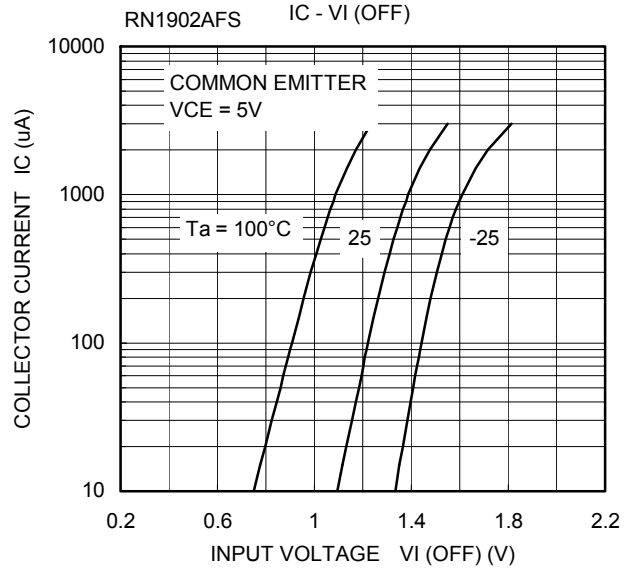
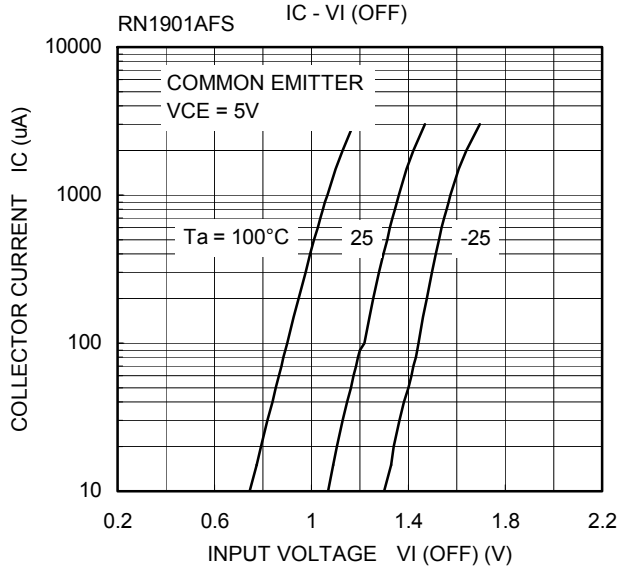
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

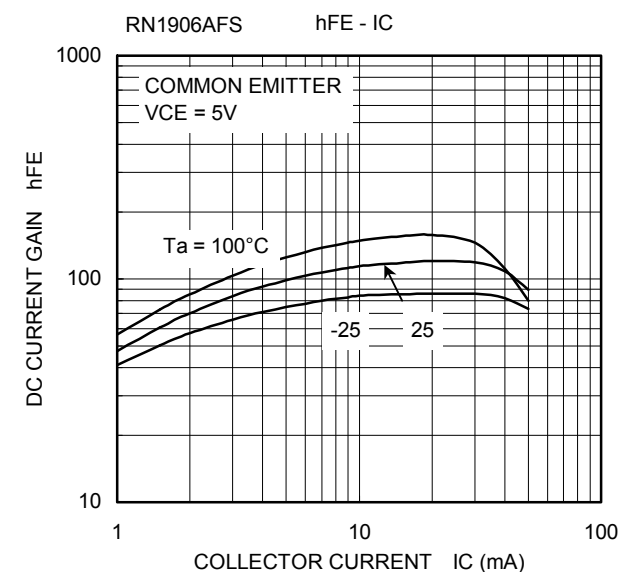
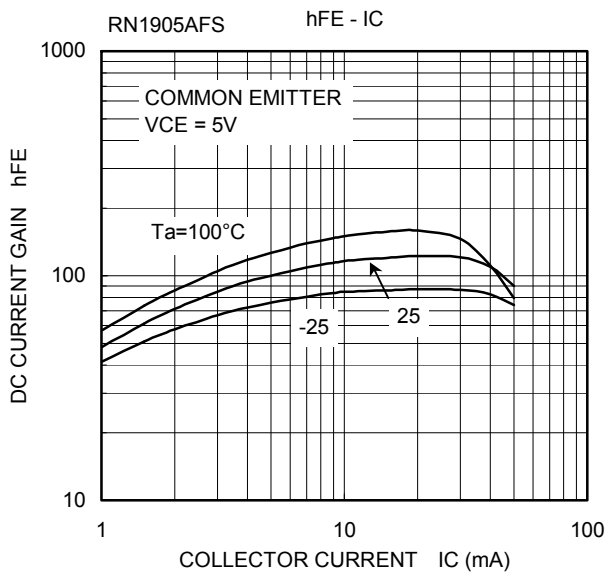
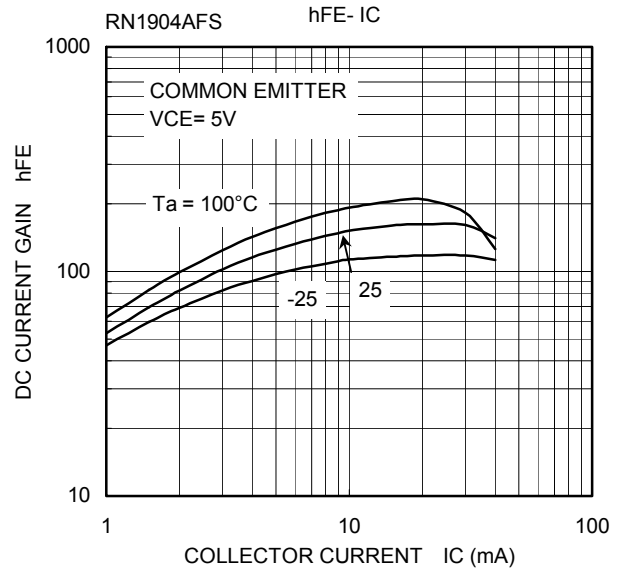
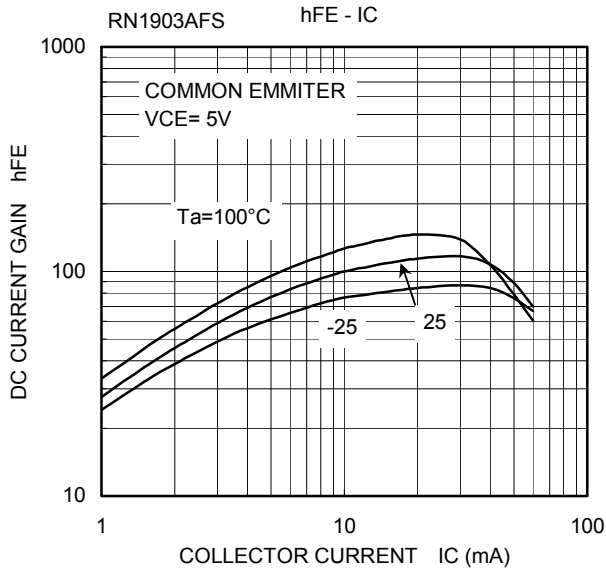
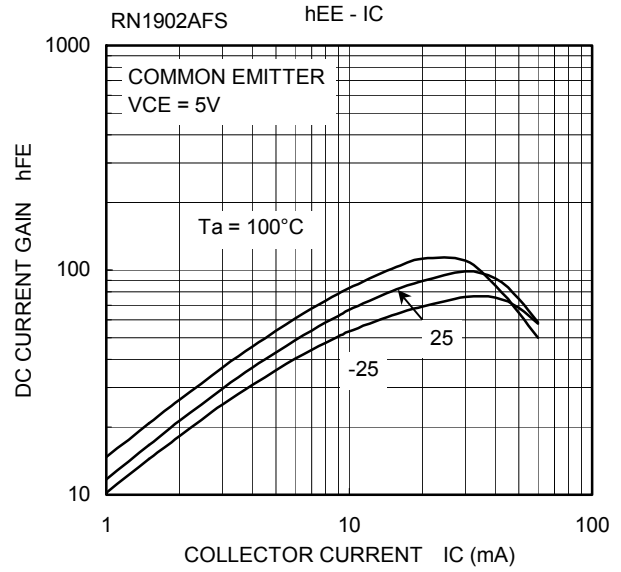
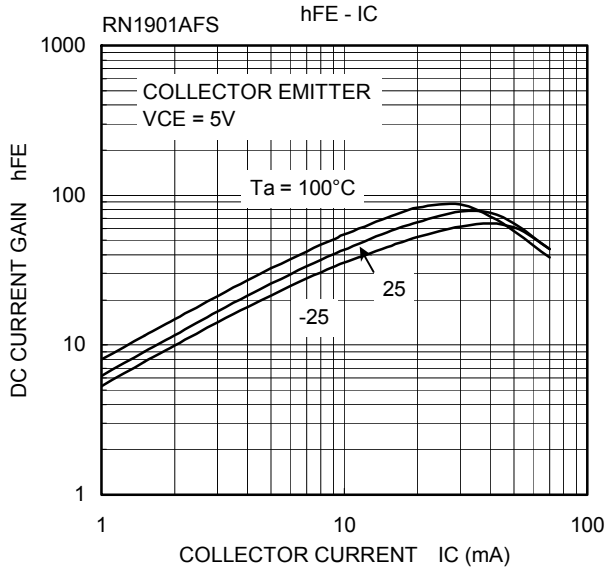
Note 1: Total rating

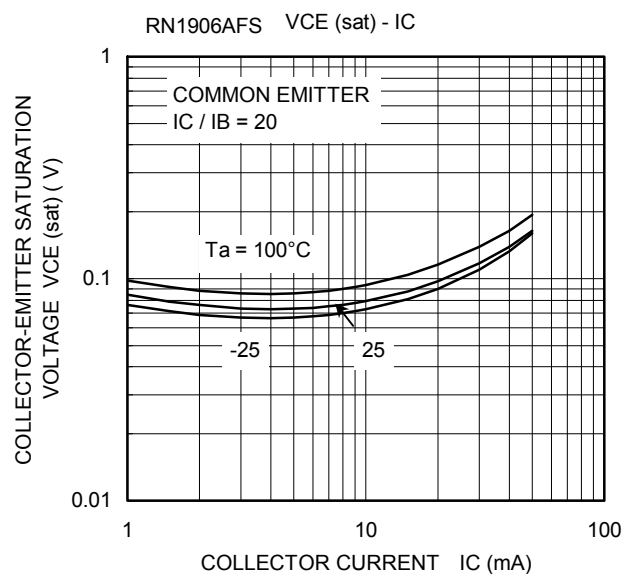
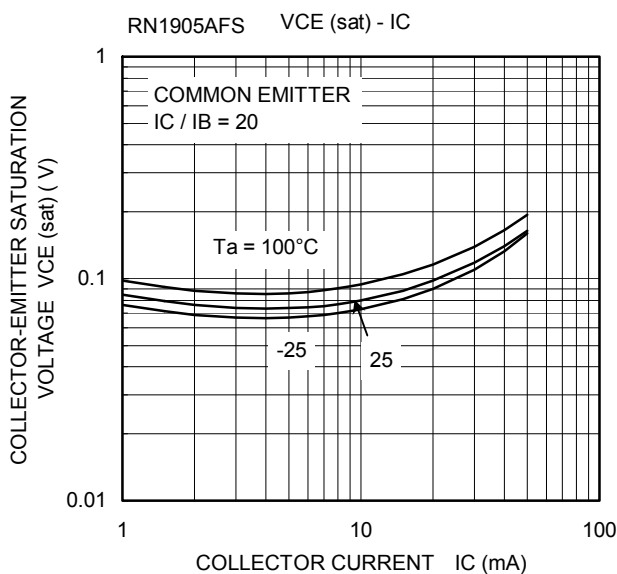
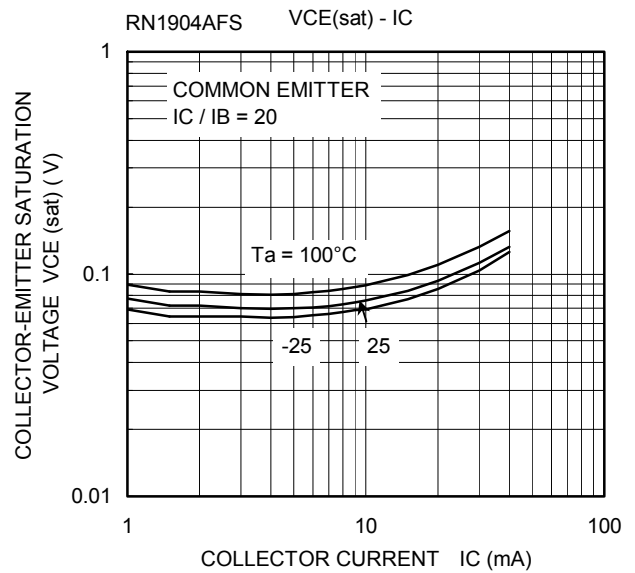
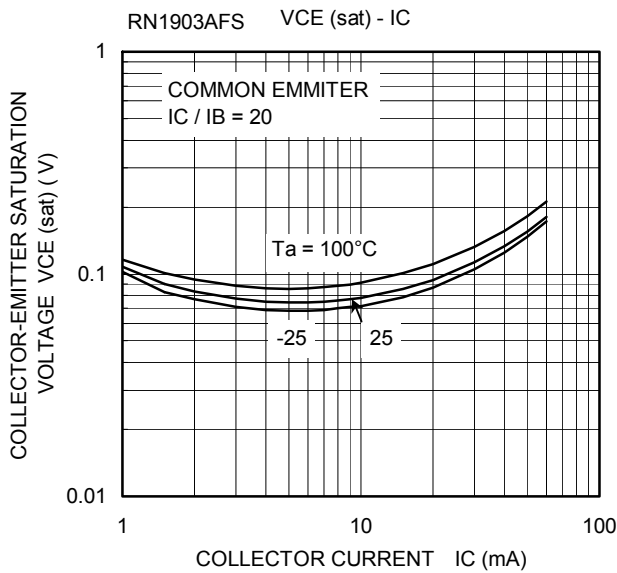
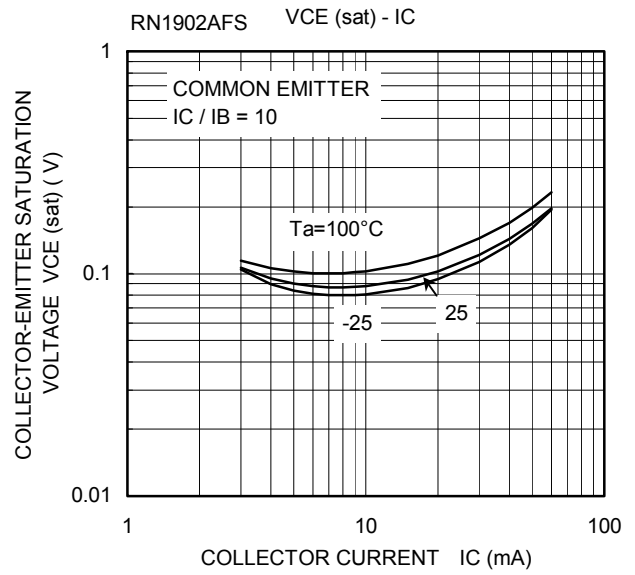
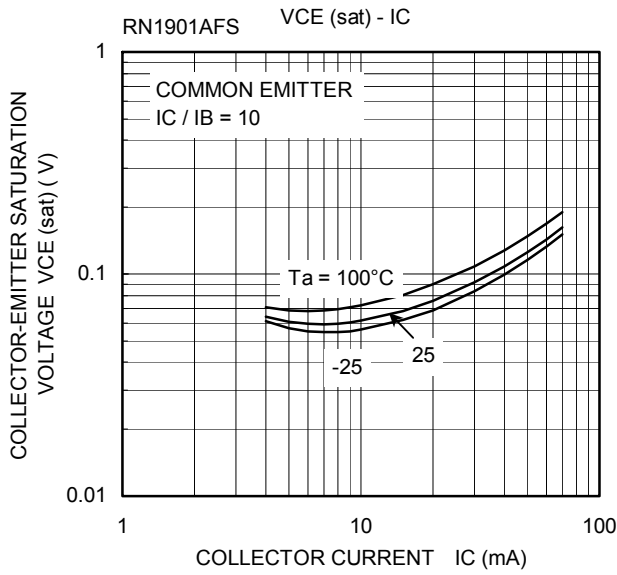
## Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

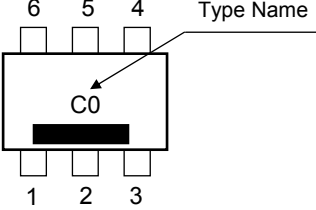
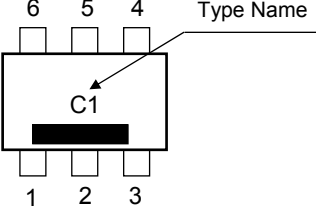
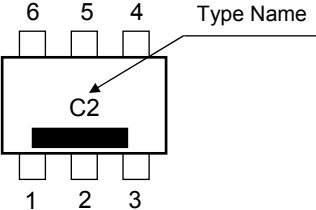
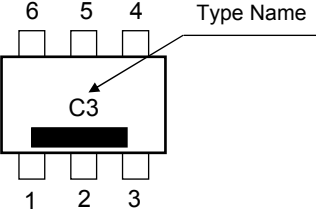
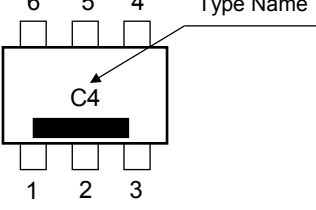
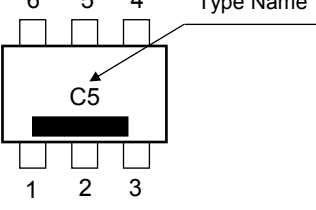
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cutoff current	RN1901AFS~1906AFS	$I_{CBO}$	$V_{CB} = 50\text{ V}, I_E = 0$	—	—	100	nA
		$I_{CEO}$	$V_{CE} = 50\text{ V}, I_B = 0$	—	—	500	
Emitter cutoff current	RN1901AFS	$I_{EBO}$	$V_{EB} = 10\text{ V}, I_C = 0$	0.89	—	1.33	mA
	RN1902AFS			0.41	—	0.63	
	RN1903AFS			0.18	—	0.29	
	RN1904AFS			0.088	—	0.133	
	RN1905AFS	$V_{EB} = 5\text{ V}, I_C = 0$	0.085	—	0.127		
	RN1906AFS		0.08	—	0.121		
DC current gain	RN1901AFS	$h_{FE}$	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$	30	—	—	
	RN1902AFS			50	—	—	
	RN1903AFS			70	—	—	
	RN1904AFS			80	—	—	
	RN1905AFS			80	—	—	
	RN1906AFS			80	—	—	
Collector-emitter saturation voltage	RN1901AFS	$V_{CE(sat)}$	$I_C = 5\text{ mA}, I_B = 0.5\text{ mA}$	—	—	0.15	V
	RN1902AFS~1906AFS		$I_C = 5\text{ mA}, I_B = 0.25\text{ mA}$	—	—	0.15	
Input voltage (ON)	RN1901AFS	$V_{I(ON)}$	$V_{CE} = 0.2\text{ V}, I_C = 5\text{ mA}$	1.2	—	2.2	V
	RN1902AFS			1.2	—	2.6	
	RN1903AFS			1.3	—	3.5	
	RN1904AFS			1.5	—	5.0	
	RN1905AFS			0.6	—	1.1	
	RN1906AFS			0.7	—	1.3	
Input voltage (OFF)	RN1901AFS~1904AFS	$V_{I(OFF)}$	$V_{CE} = 5\text{ V}, I_C = 0.1\text{ mA}$	0.8	—	1.5	V
	RN1905AFS, 1906AFS			0.5	—	0.8	
Collector output capacitance	RN1901AFS~1906AFS	$C_{ob}$	$V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	0.7	—	pF
Input resistor	RN1901AFS	$R_1$	—	3.76	4.7	5.64	k $\Omega$
	RN1902AFS			8	10	12	
	RN1903AFS			17.6	22	26.4	
	RN1904AFS			37.6	47	56.4	
	RN1905AFS			1.76	2.2	2.64	
	RN1906AFS			3.76	4.7	5.64	
Resistor ratio	RN1901AFS~1904AFS	$R_1/R_2$	—	0.8	1.0	1.2	
	RN1905AFS			0.0376	0.0468	0.0562	
	RN1906AFS			0.08	0.1	0.12	









Type Name	Marking
RN1901AFS	 <p>Diagram showing marking C0 on a component with pins 1, 2, 3 at the bottom and 4, 5, 6 at the top. A label 'Type Name' points to the top right corner.</p>
RN1902AFS	 <p>Diagram showing marking C1 on a component with pins 1, 2, 3 at the bottom and 4, 5, 6 at the top. A label 'Type Name' points to the top right corner.</p>
RN1903AFS	 <p>Diagram showing marking C2 on a component with pins 1, 2, 3 at the bottom and 4, 5, 6 at the top. A label 'Type Name' points to the top right corner.</p>
RN1904AFS	 <p>Diagram showing marking C3 on a component with pins 1, 2, 3 at the bottom and 4, 5, 6 at the top. A label 'Type Name' points to the top right corner.</p>
RN1905AFS	 <p>Diagram showing marking C4 on a component with pins 1, 2, 3 at the bottom and 4, 5, 6 at the top. A label 'Type Name' points to the top right corner.</p>
RN1906AFS	 <p>Diagram showing marking C5 on a component with pins 1, 2, 3 at the bottom and 4, 5, 6 at the top. A label 'Type Name' points to the top right corner.</p>

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