

TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT process) (Transistor with Built-in Bias Resistor)

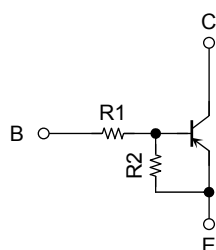
RN2901AFS, RN2902AFS, RN2903AFS RN2904AFS, RN2905AFS, RN2906AFS

Switching, Inverter Circuit, Interface Circuit and
Driver Circuit Applications

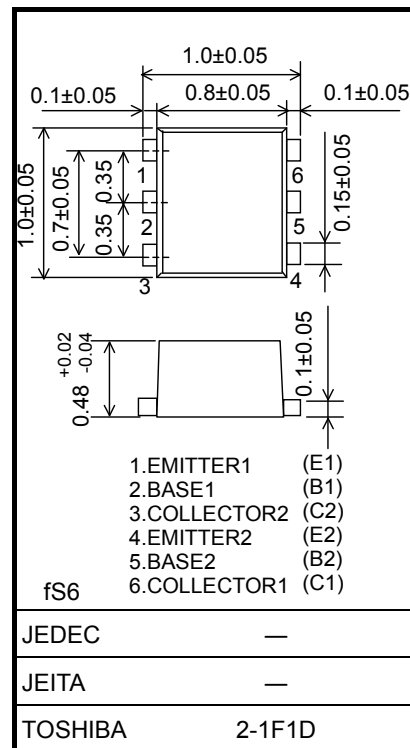
Unit: mm

- 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 cost.
- Complementary to the RN1901AFS to RN1906AFS

Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN2901AFS	4.7	4.7
RN2902AFS	10	10
RN2903AFS	22	22
RN2904AFS	47	47
RN2905AFS	2.2	47
RN2906AFS	4.7	47



Weight: 1 mg (typ.)

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

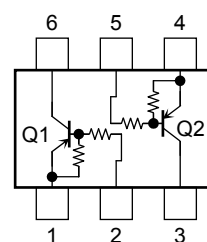
Characteristic	Symbol	Rating	Unit
Collector-base voltage	V _{CB0}	-50	V
Collector-emitter voltage	V _{CEO}	-50	V
Emitter-base voltage	V _{EBO}	-10	V
		-5	V
Collector current	I _C	-80	mA
Collector power dissipation	P _C (Note 1)	50	mW
Junction temperature	T _j	150	°C
Storage temperature range	T _{stg}	-55 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).

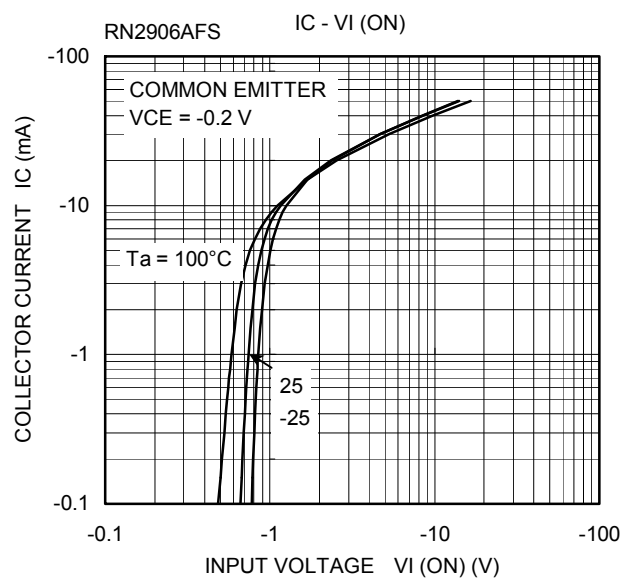
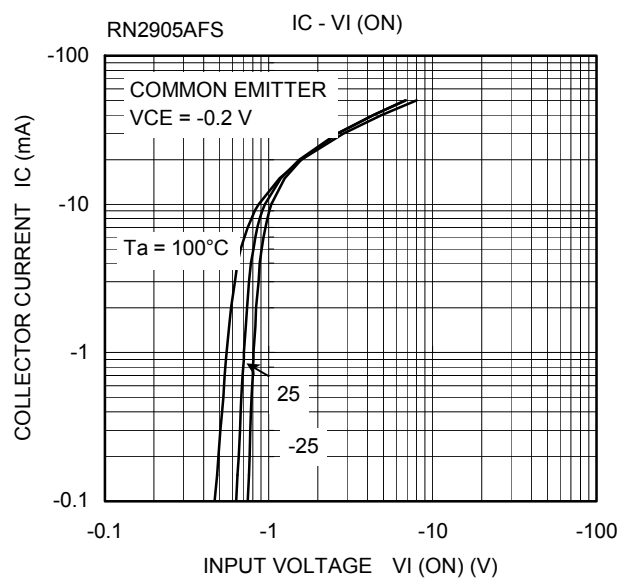
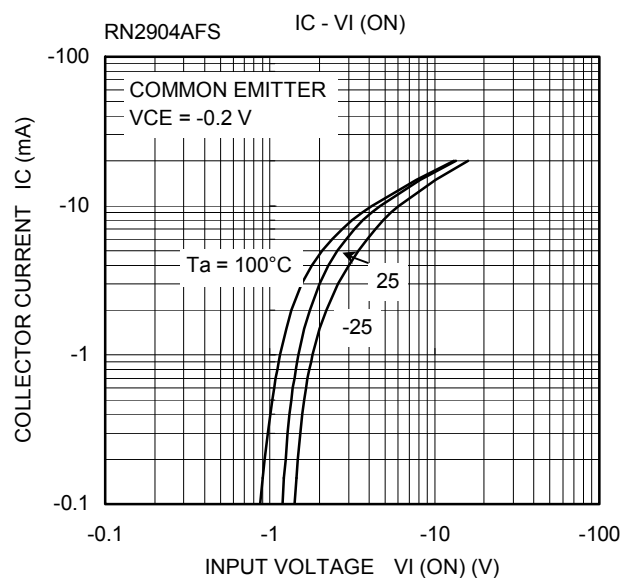
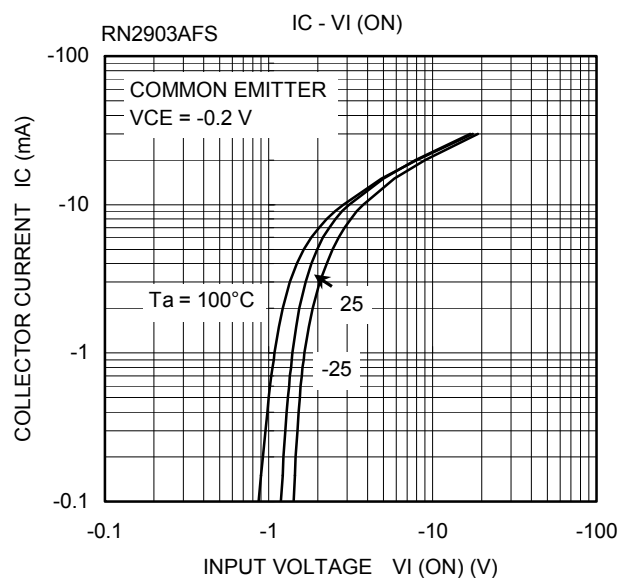
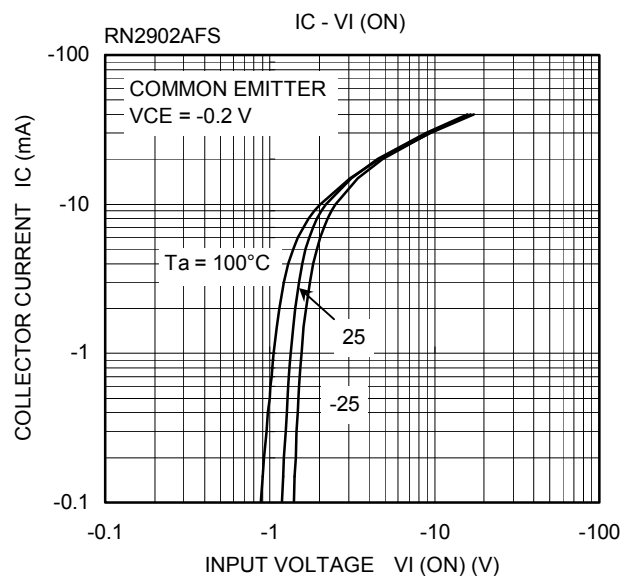
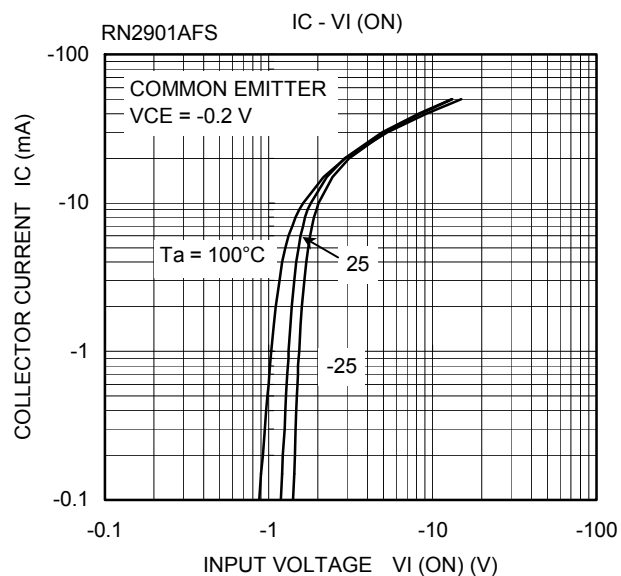
Note 1: Total rating

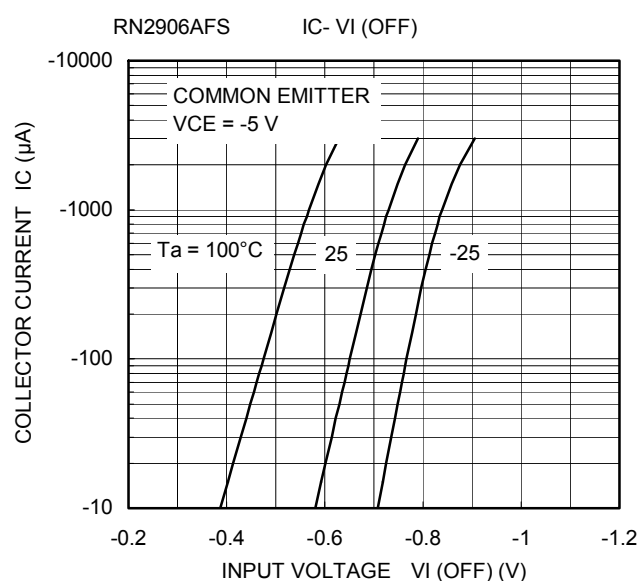
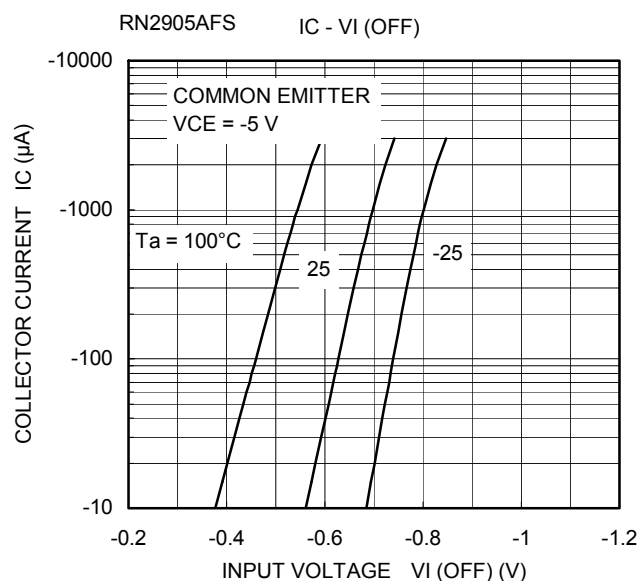
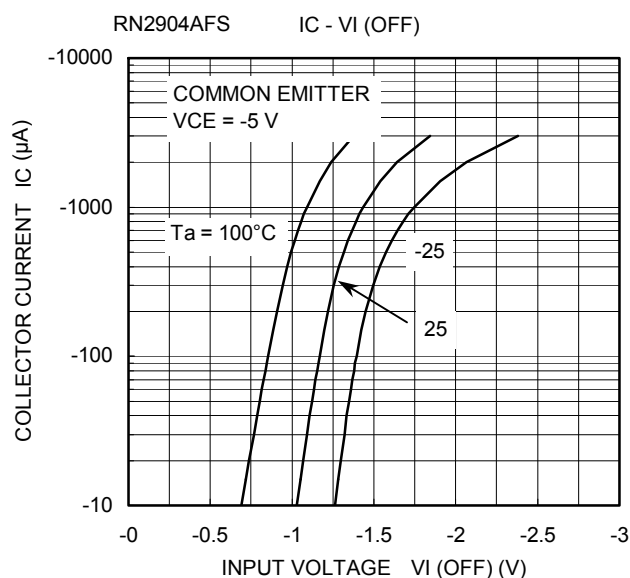
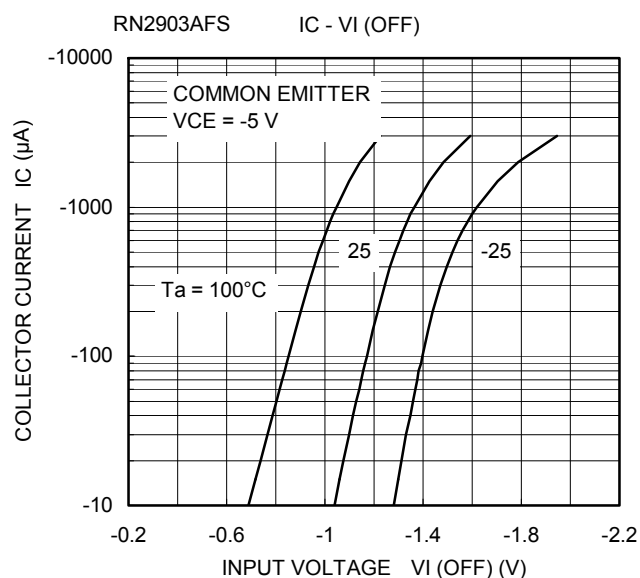
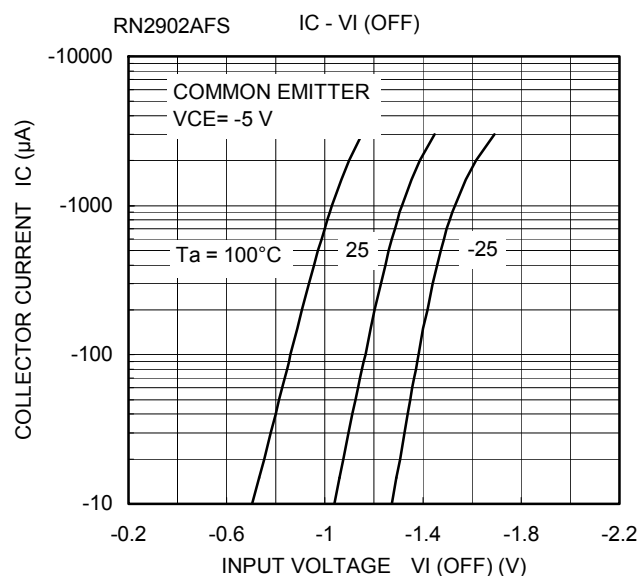
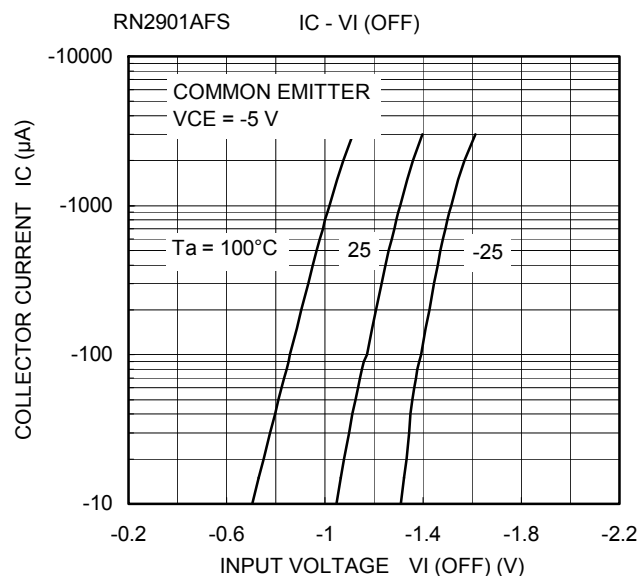
Equivalent Circuit (top view)

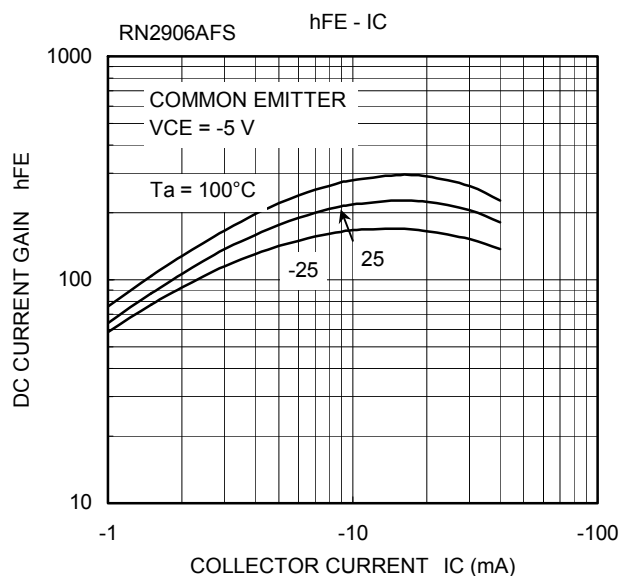
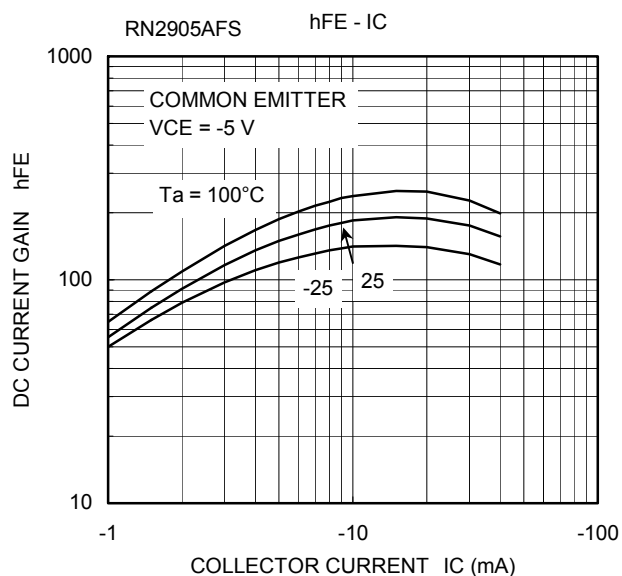
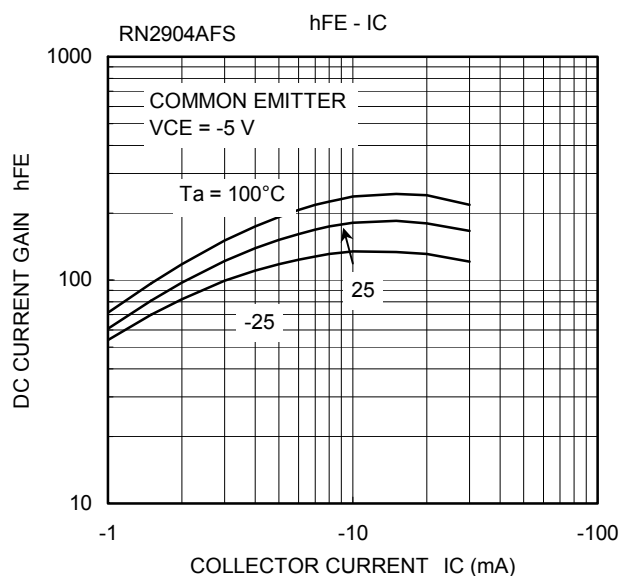
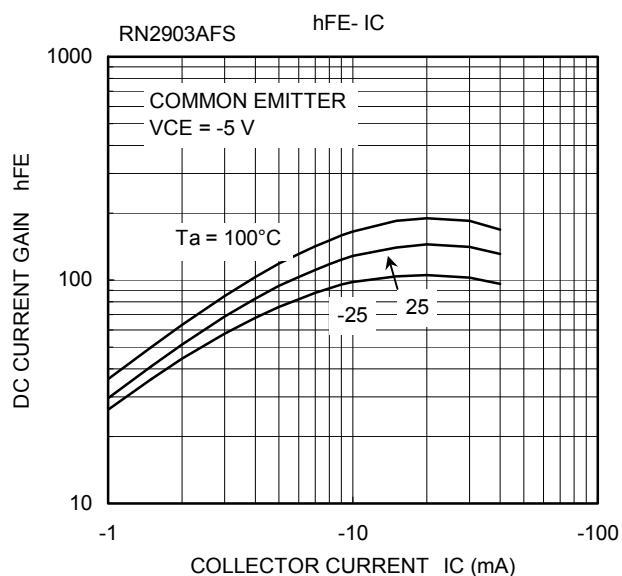
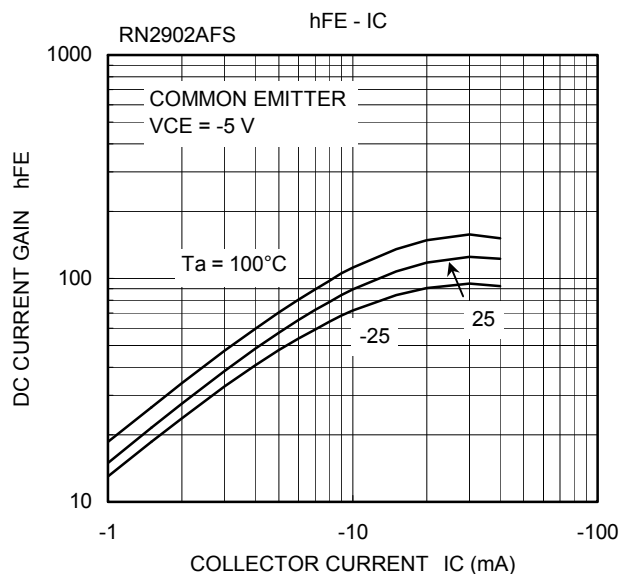
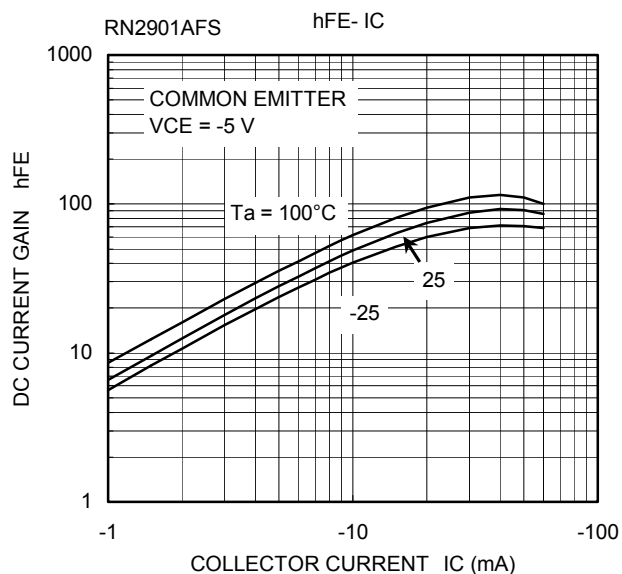


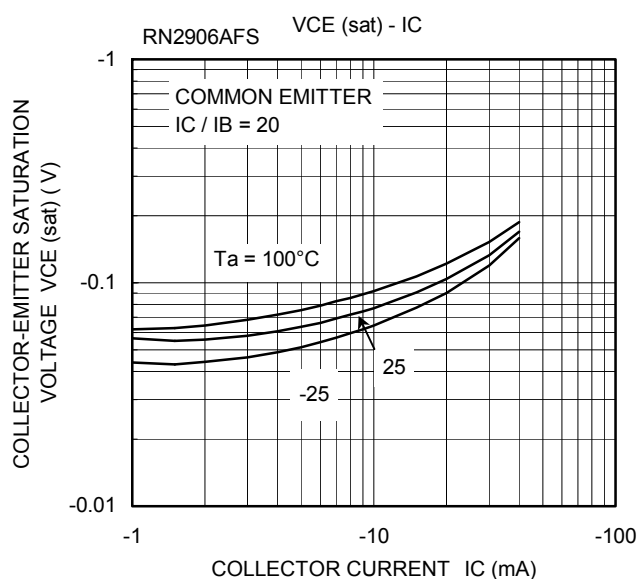
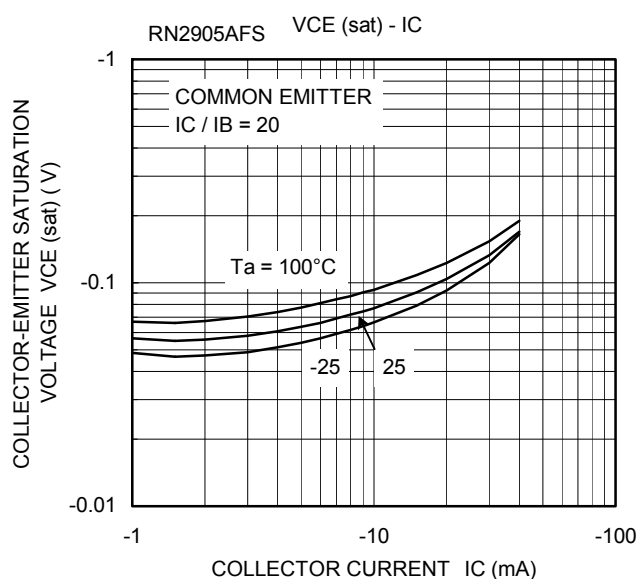
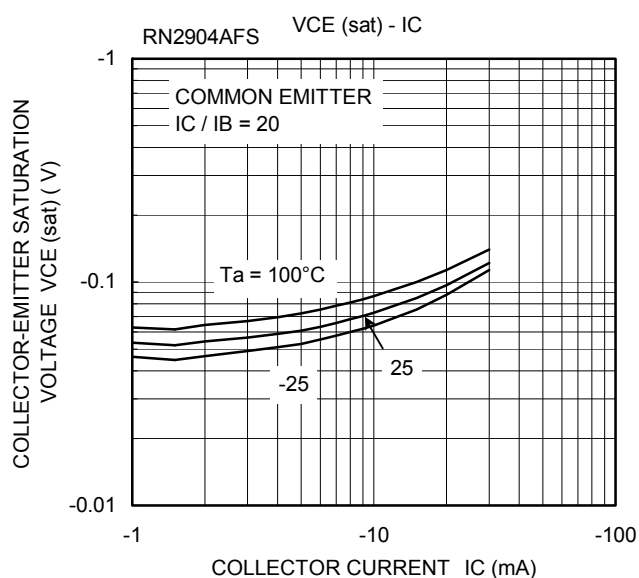
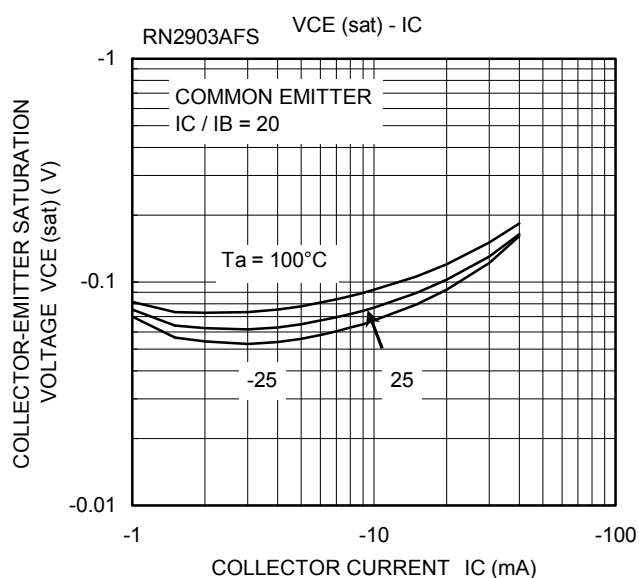
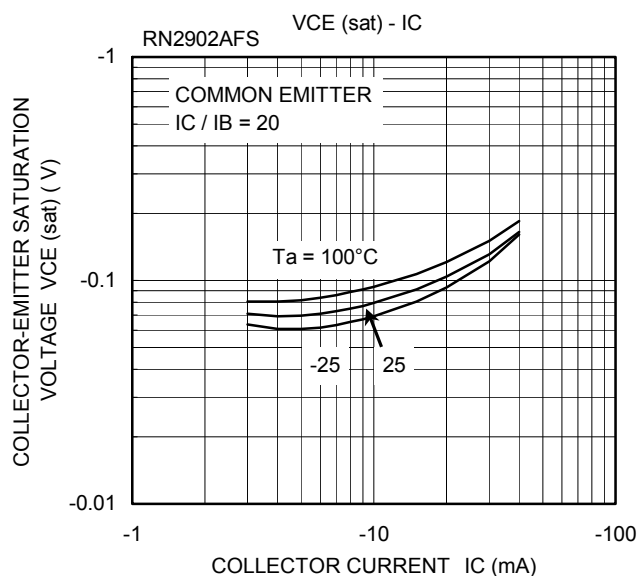
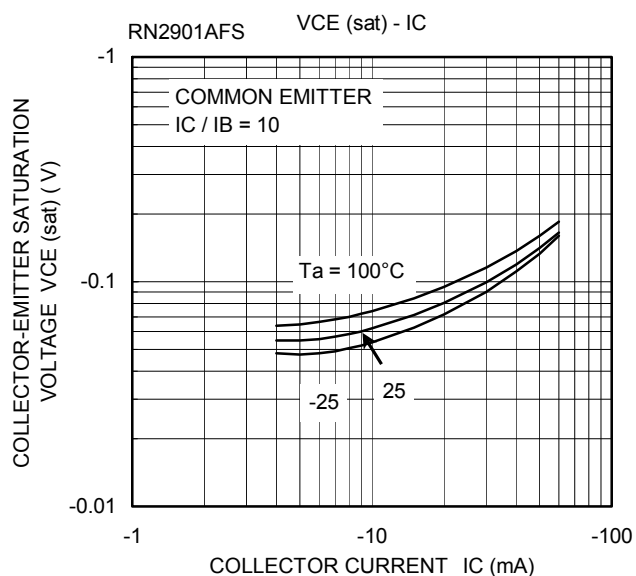
Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cutoff current	RN2901AFS to 2906AFS	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	RN2901AFS	I_{EBO}	$V_{EB} = -10\text{ V}, I_C = 0$	-0.89	—	-1.33	mA
	RN2902AFS			-0.41	—	-0.63	
	RN2903AFS			-0.18	—	-0.29	
	RN2904AFS			-0.088	—	-0.133	
	RN2905AFS	I_{EBO}	$V_{EB} = -5\text{ V}, I_C = 0$	-0.085	—	-0.127	
	RN2906AFS			-0.08	—	-0.121	
DC current gain	RN2901AFS	h_{FE}	$V_{CE} = -5\text{ V}, I_C = -10\text{ mA}$	30	—	—	
	RN2902AFS			50	—	—	
	RN2903AFS			70	—	—	
	RN2904AFS			80	—	—	
	RN2905AFS			80	—	—	
	RN2906AFS			50	—	—	
Collector-emitter saturation voltage	RN2901AFS	$V_{CE(sat)}$	$I_C = -5\text{ mA}, I_B = -0.5\text{ mA}$	—	—	-0.15	V
	RN2902AFS to 2906AFS		$I_C = -5\text{ mA}, I_B = -0.25\text{ mA}$				
Input voltage (ON)	RN2901AFS	$V_I(ON)$	$V_{CE} = -0.2\text{ V}, I_C = -5\text{ mA}$	-1.2	—	-2.2	V
	RN2902AFS			-1.2	—	-2.6	
	RN2903AFS			-1.3	—	-3.5	
	RN2904AFS			-1.5	—	-5.0	
	RN2905AFS			-0.6	—	-1.1	
	RN2906AFS			-0.7	—	-1.3	
Input voltage (OFF)	RN2901AFS to 2904AFS	$V_I(OFF)$	$V_{CE} = -5\text{ V}, I_C = -0.1\text{ mA}$	-0.8	—	-1.5	V
	RN2905AFS, 2906AFS			-0.5	—	-0.8	
Collector output capacitance	RN2901AFS to 2906AFS	C_{ob}	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	0.9	—	pF
Input resistor	RN2901AFS	R1	—	3.76	4.7	5.64	kΩ
	RN2902AFS			8	10	12	
	RN2903AFS			17.6	22	26.4	
	RN2904AFS			37.6	47	56.4	
	RN2905AFS			1.76	2.2	2.64	
	RN2906AFS			3.76	4.7	5.64	
Resistor ratio	RN2901AFS to 2904AFS	R1/R2	—	0.8	1.0	1.2	
	RN2905AFS			0.0376	0.0468	0.0562	
	RN2906AFS			0.08	0.1	0.12	

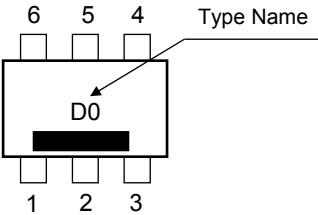
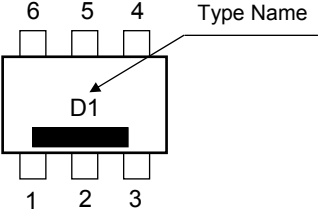
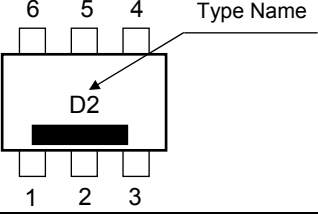
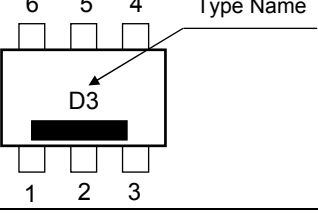
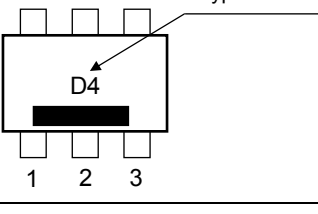
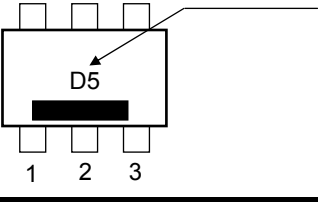








Marking

Type Name	Marking
RN2901AFS	 A diagram of a 6-pin component. The top row of pins is labeled 6, 5, 4 from left to right. The bottom row of pins is labeled 1, 2, 3 from left to right. A rectangular box is drawn around the component, with an arrow pointing to it from the label 'D0' inside the box. Another arrow points from the label 'Type Name' to the top-right corner of the box. A solid black horizontal bar is located below the 'D0' label.
RN2902AFS	 A diagram of a 6-pin component. The top row of pins is labeled 6, 5, 4 from left to right. The bottom row of pins is labeled 1, 2, 3 from left to right. A rectangular box is drawn around the component, with an arrow pointing to it from the label 'D1' inside the box. Another arrow points from the label 'Type Name' to the top-right corner of the box. A solid black horizontal bar is located below the 'D1' label.
RN2903AFS	 A diagram of a 6-pin component. The top row of pins is labeled 6, 5, 4 from left to right. The bottom row of pins is labeled 1, 2, 3 from left to right. A rectangular box is drawn around the component, with an arrow pointing to it from the label 'D2' inside the box. Another arrow points from the label 'Type Name' to the top-right corner of the box. A solid black horizontal bar is located below the 'D2' label.
RN2904AFS	 A diagram of a 6-pin component. The top row of pins is labeled 6, 5, 4 from left to right. The bottom row of pins is labeled 1, 2, 3 from left to right. A rectangular box is drawn around the component, with an arrow pointing to it from the label 'D3' inside the box. Another arrow points from the label 'Type Name' to the top-right corner of the box. A solid black horizontal bar is located below the 'D3' label.
RN2905AFS	 A diagram of a 6-pin component. The top row of pins is labeled 6, 5, 4 from left to right. The bottom row of pins is labeled 1, 2, 3 from left to right. A rectangular box is drawn around the component, with an arrow pointing to it from the label 'D4' inside the box. Another arrow points from the label 'Type Name' to the top-right corner of the box. A solid black horizontal bar is located below the 'D4' label.
RN2906AFS	 A diagram of a 6-pin component. The top row of pins is labeled 6, 5, 4 from left to right. The bottom row of pins is labeled 1, 2, 3 from left to right. A rectangular box is drawn around the component, with an arrow pointing to it from the label 'D5' inside the box. Another arrow points from the label 'Type Name' to the top-right corner of the box. A solid black horizontal bar is located below the 'D5' label.

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