

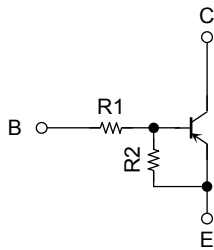
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process) (Bias Resistor Built-in Transistor)

## RN2901FE, RN2902FE, RN2903FE RN2904FE, RN2905FE, RN2906FE

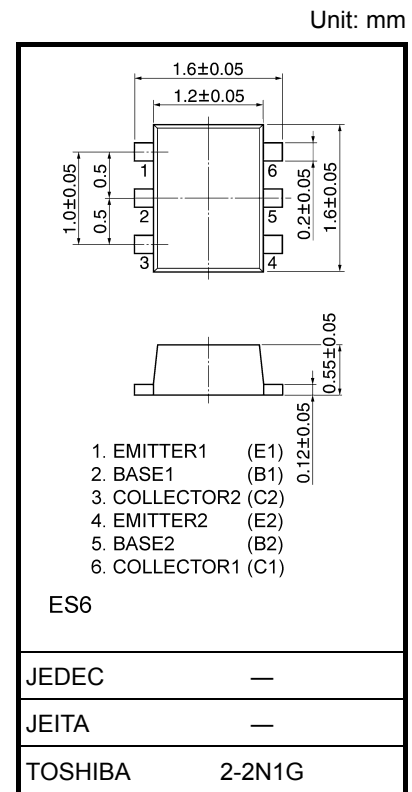
Switching, Inverter Circuit, Interface Circuit and  
Driver Circuit Applications

- Two devices are incorporated into an Extreme-Super-Mini (6-pin) package.
- Incorporating a bias resistor into a transistor reduces parts count. Reducing the parts count enables the manufacture of ever more compact equipment and lowers assembly cost.
- Complementary to RN1901FE to RN1906FE

### Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN2901FE	4.7	4.7
RN2902FE	10	10
RN2903FE	22	22
RN2904FE	47	47
RN2905FE	2.2	47
RN2906FE	4.7	47



Weight: 0.003 g (typ.)

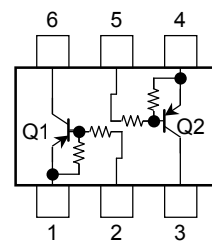
### Absolute Maximum Ratings (Ta = 25°C) (Q1, Q2 common)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	RN2901FE to 2906FE $V_{CBO}$	-50	V
Collector-emitter voltage	$V_{CEO}$	-50	V
Emitter-base voltage	RN2901FE to 2904FE $V_{EBO}$	-10	V
	RN2905FE to 2906FE	-5	
Collector current	$I_C$	-100	mA
Collector power dissipation	RN2901FE to 2906FE $P_C$ (Note 1)	100	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)

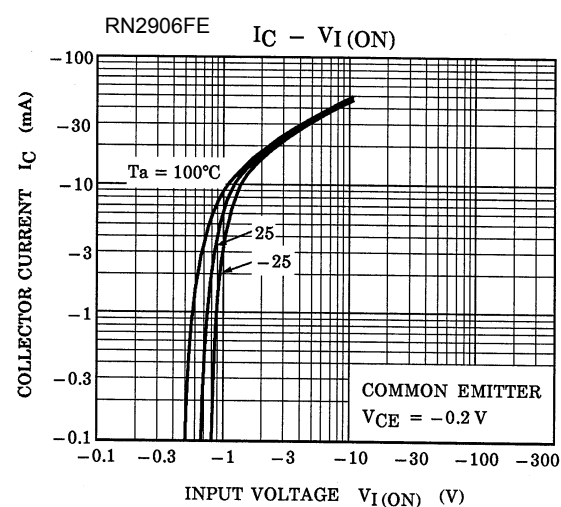
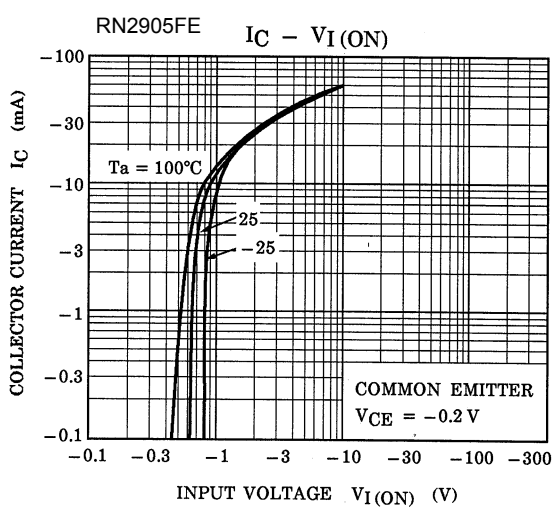
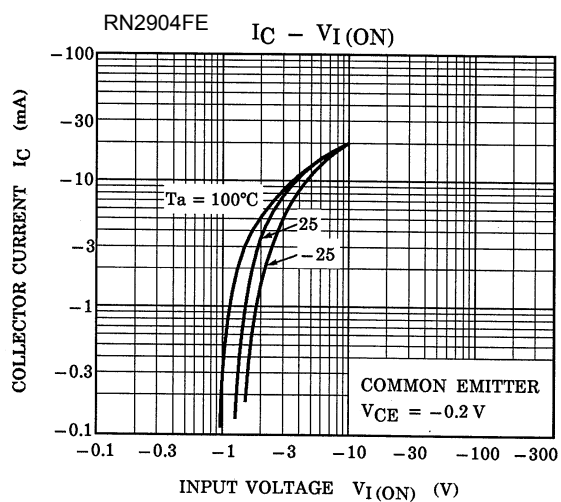
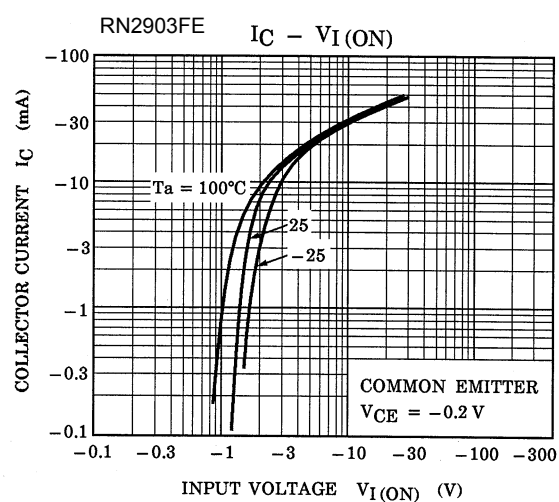
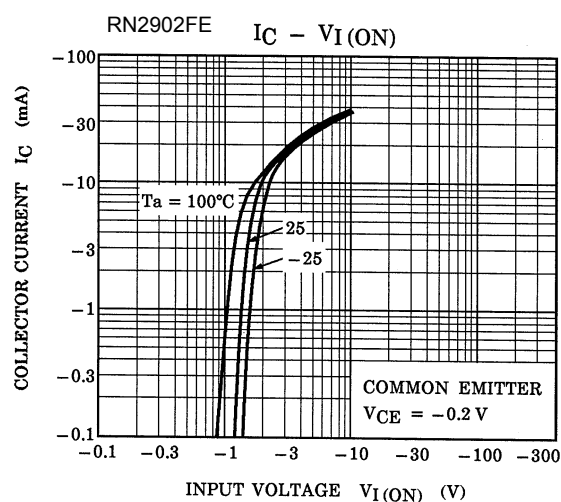
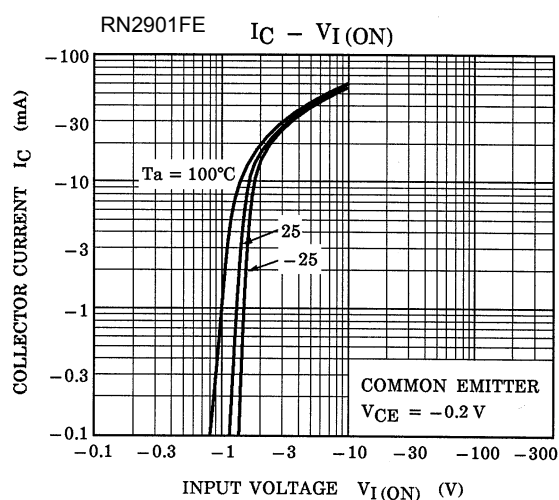


Start of commercial production  
2000-05

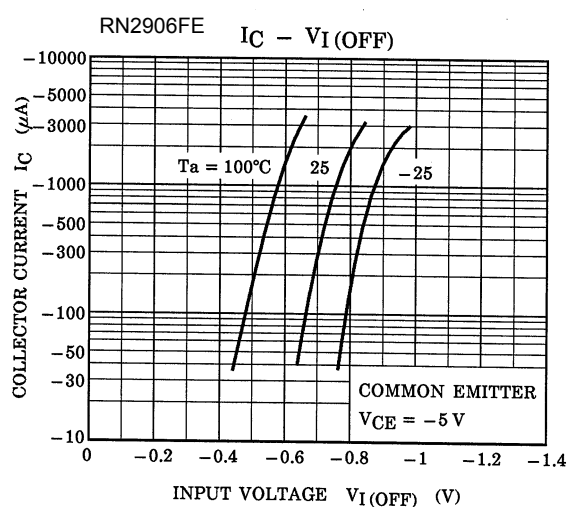
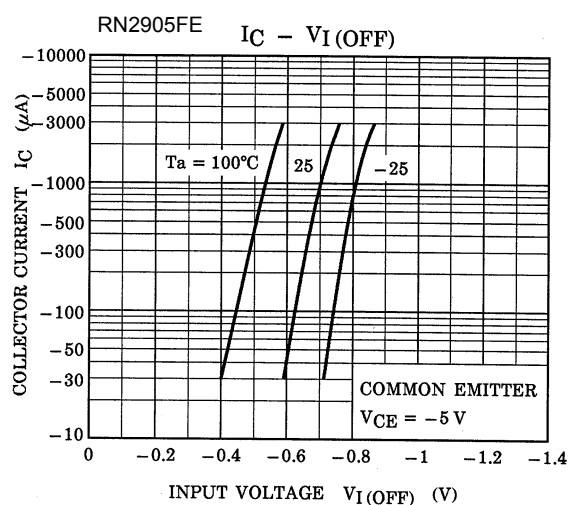
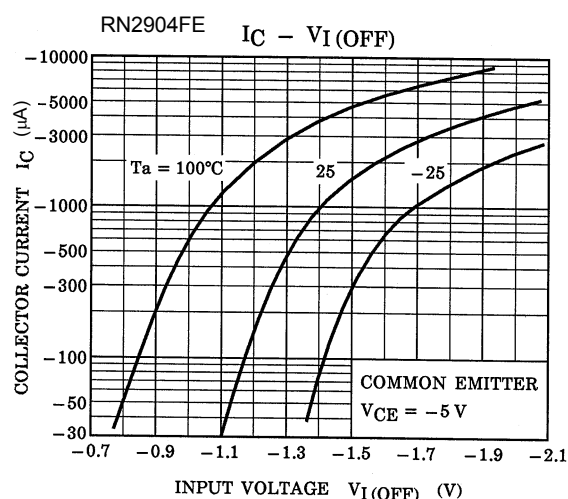
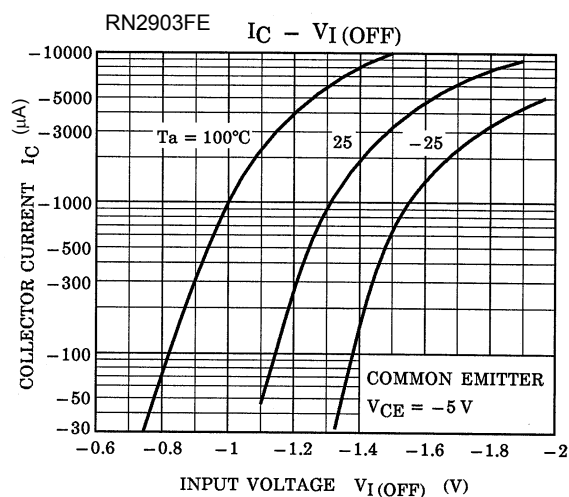
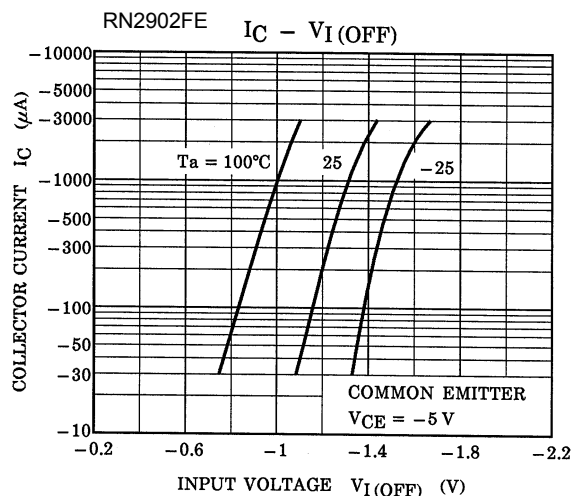
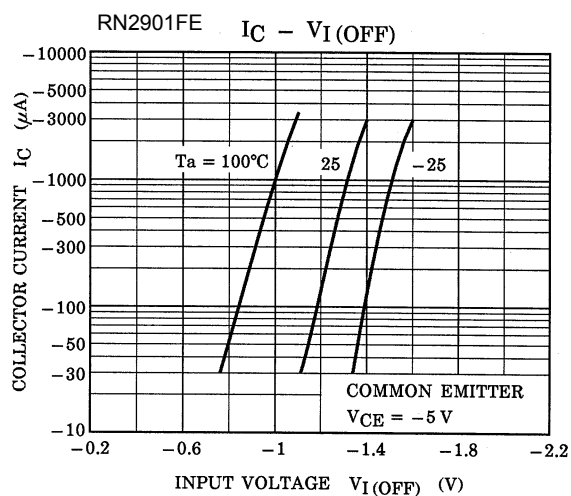
## Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

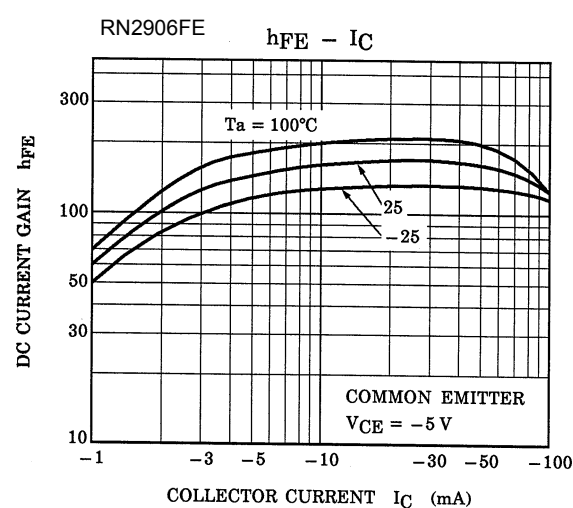
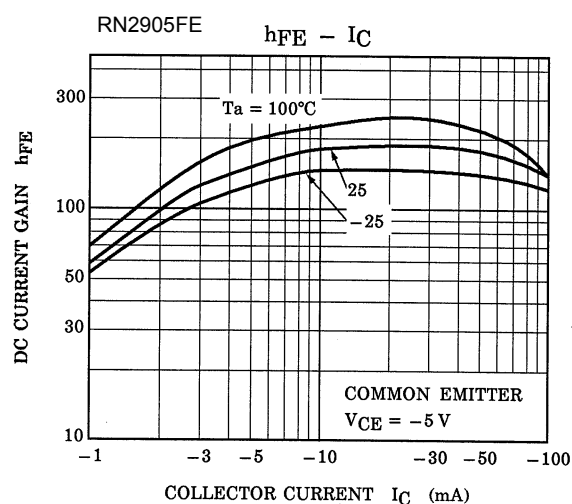
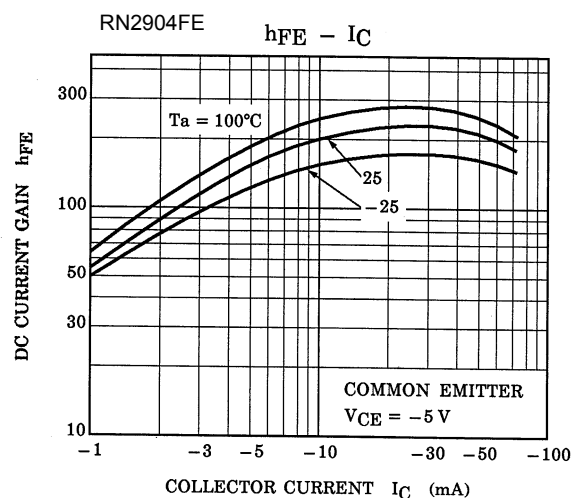
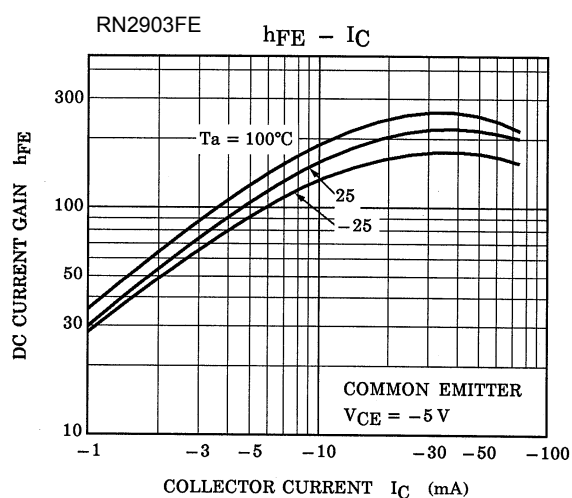
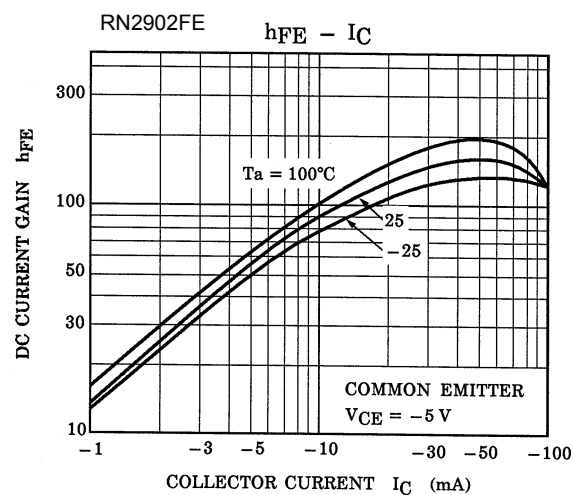
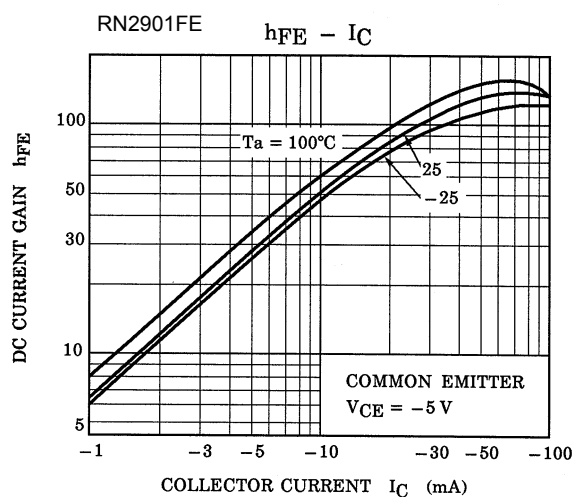
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2901FE to 2906FE	$I_{CBO}$	$V_{CB} = -50\text{ V}, I_E = 0$	—	—	-100	nA
		$I_{CEO}$	$V_{CE} = -50\text{ V}, I_B = 0$	—	—	-500	
Emitter cut-off current	RN2901FE	$I_{EBO}$	$V_{EB} = -10\text{ V}, I_C = 0$	-0.82	—	-1.52	mA
	RN2902FE			-0.38	—	-0.71	
	RN2903FE			-0.17	—	-0.33	
	RN2904FE			-0.082	—	-0.15	
	RN2905FE	$I_{EBO}$	$V_{EB} = -5\text{ V}, I_C = 0$	-0.078	—	-0.145	
	RN2906FE			-0.074	—	-0.138	
DC current gain	RN2901FE	$h_{FE}$	$V_{CE} = -5\text{ V}, I_C = -10\text{ mA}$	30	—	—	
	RN2902FE			50	—	—	
	RN2903FE			70	—	—	
	RN2904FE			80	—	—	
	RN2905FE			80	—	—	
	RN2906FE			80	—	—	
Collector-emitter saturation voltage	RN2901FE to 2906FE	$V_{CE(sat)}$	$I_C = -5\text{ mA}, I_B = -0.25\text{ mA}$	—	-0.1	-0.3	V
Input voltage (ON)	RN2901FE	$V_{I(ON)}$	$V_{CE} = -0.2\text{ V}, I_C = -5\text{ mA}$	-1.1	—	-2.0	V
	RN2902FE			-1.2	—	-2.4	
	RN2903FE			-1.3	—	-3.0	
	RN2904FE			-1.5	—	-5.0	
	RN2905FE			-0.6	—	-1.1	
	RN2906FE			-0.7	—	-1.3	
Input voltage (OFF)	RN2901FE to 2904FE	$V_{I(OFF)}$	$V_{CE} = -5\text{ V}, I_C = -0.1\text{ mA}$	-1.0	—	-1.5	V
	RN2905FE, RN2906FE			-0.5	—	-0.8	
Transition frequency	RN2901FE to 2906FE	$f_T$	$V_{CE} = -10\text{ V}, I_C = -5\text{ mA}$	—	200	—	MHz
Collector output capacitance	RN2901FE to 2906FE	$C_{ob}$	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	3	6	pF
Input resistor	RN2901FE	$R_1$	—	3.29	4.7	6.11	k $\Omega$
	RN2902FE			7	10	13	
	RN2903FE			15.4	22	28.6	
	RN2904FE			32.9	47	61.1	
	RN2905FE			1.54	2.2	2.86	
	RN2906FE			3.29	4.7	6.11	
Resistor ratio	RN2901FE to 2904FE	$R_1/R_2$	—	0.9	1.0	1.1	
	RN2905FE			0.0421	0.0468	0.0515	
	RN2906FE			0.09	0.1	0.11	

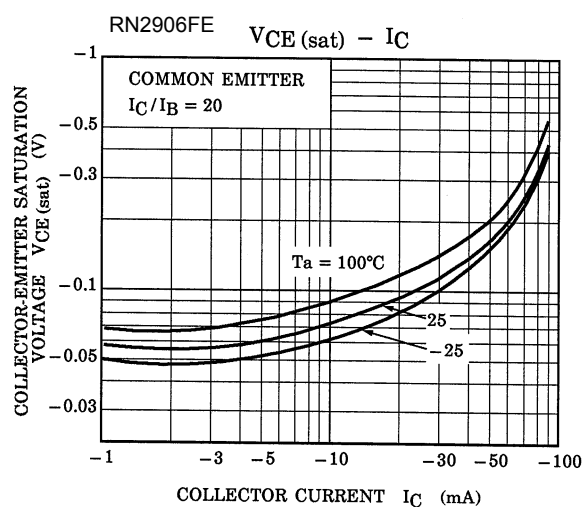
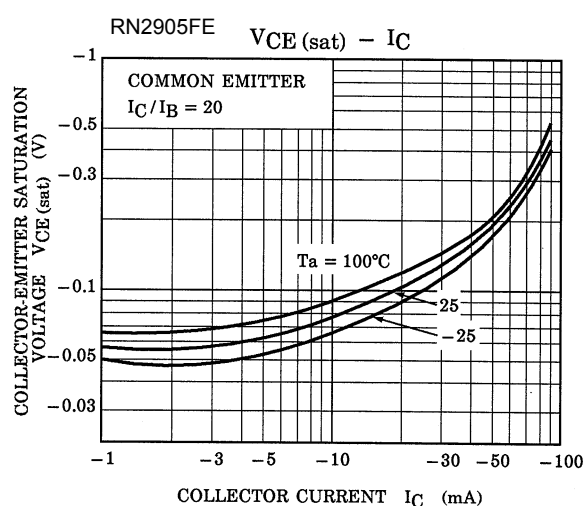
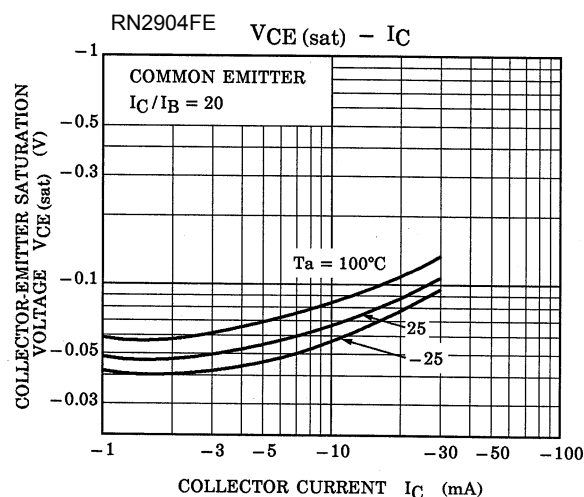
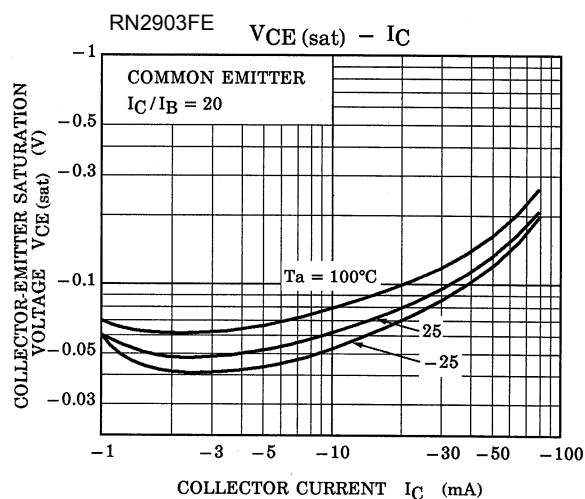
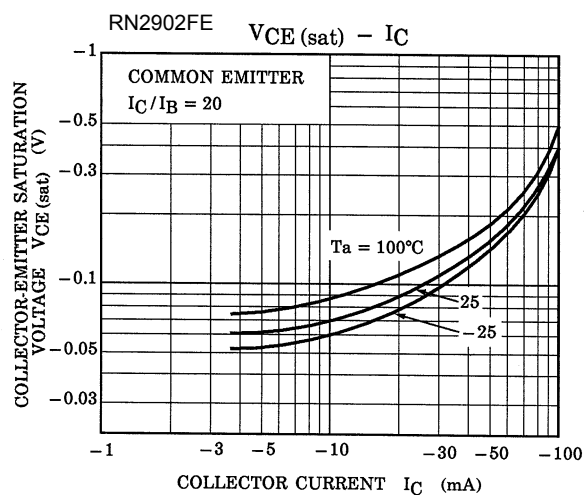
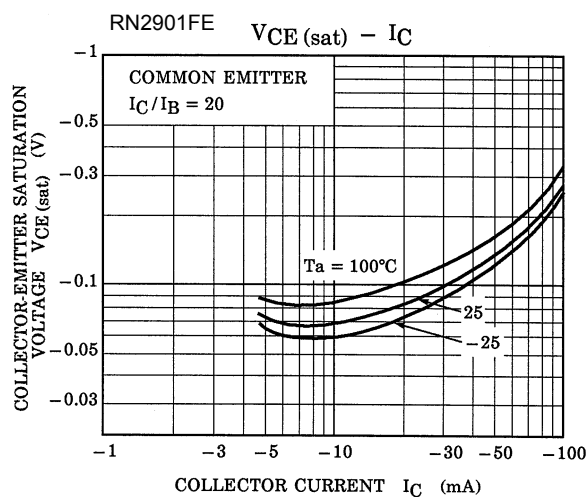
## Q1, Q2 Common

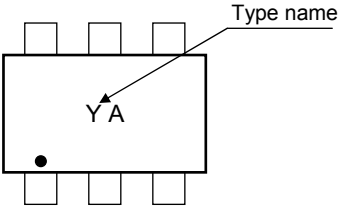
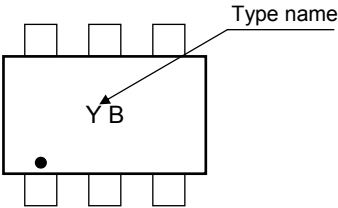
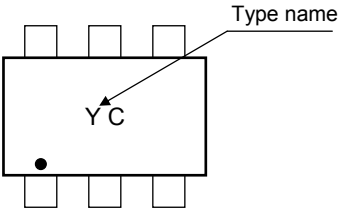
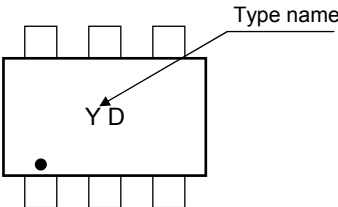
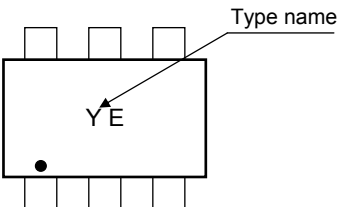
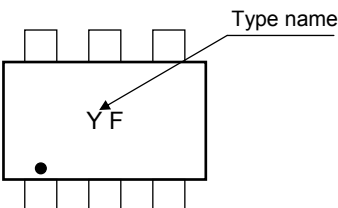


## Q1, Q2 Common







Type Name	Marking
RN2901FE	 A diagram of a rectangular component with six pins (three on top, three on bottom). Inside the rectangle, the text 'Y A' is printed with an arrow pointing to the 'A'. A small black dot is located at the bottom-left corner. A label 'Type name' with an arrow points to the 'Y'.
RN2902FE	 A diagram of a rectangular component with six pins (three on top, three on bottom). Inside the rectangle, the text 'Y B' is printed with an arrow pointing to the 'B'. A small black dot is located at the bottom-left corner. A label 'Type name' with an arrow points to the 'Y'.
RN2903FE	 A diagram of a rectangular component with six pins (three on top, three on bottom). Inside the rectangle, the text 'Y C' is printed with an arrow pointing to the 'C'. A small black dot is located at the bottom-left corner. A label 'Type name' with an arrow points to the 'Y'.
RN2904FE	 A diagram of a rectangular component with six pins (three on top, three on bottom). Inside the rectangle, the text 'Y D' is printed with an arrow pointing to the 'D'. A small black dot is located at the bottom-left corner. A label 'Type name' with an arrow points to the 'Y'.
RN2905FE	 A diagram of a rectangular component with six pins (three on top, three on bottom). Inside the rectangle, the text 'Y E' is printed with an arrow pointing to the 'E'. A small black dot is located at the bottom-left corner. A label 'Type name' with an arrow points to the 'Y'.
RN2906FE	 A diagram of a rectangular component with six pins (three on top, three on bottom). Inside the rectangle, the text 'Y F' is printed with an arrow pointing to the 'F'. A small black dot is located at the bottom-left corner. A label 'Type name' with an arrow points to the 'Y'.

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