

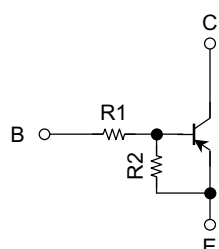
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

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

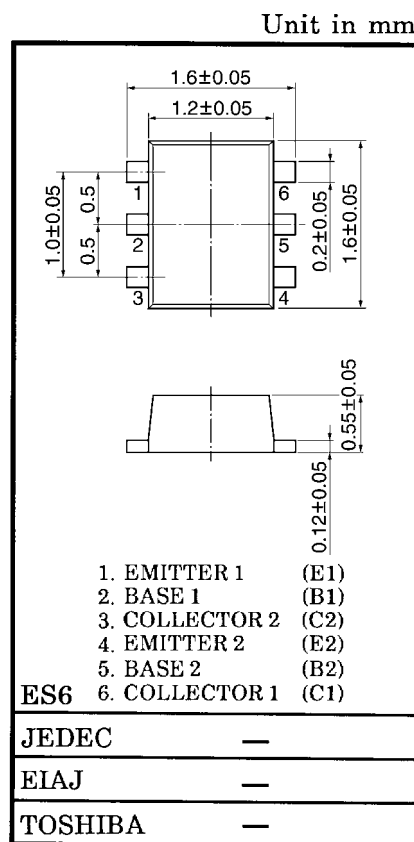
Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications.

- 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 enable the manufacture of ever more compact equipment and save assembly cost.
- Complementary to RN1901FE~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

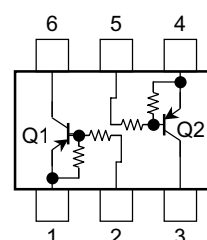


### Maximum Ratings (Ta = 25°C) (Q1, Q2 common)

Characteristics	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	V
Collector current	$I_C$	-100	mA
Collector power dissipation	$P_C$ (Note)	100	mW
Junction temperature	$T_j$	150	°C
Storage temperature range	$T_{stg}$	-55~150	°C

Note: Total rating

### Equivalent Circuit (top view)



000707EAA2

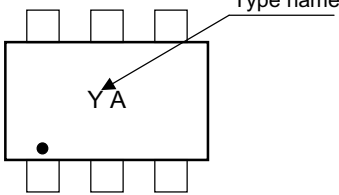
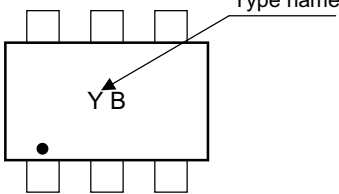
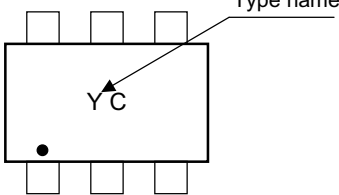
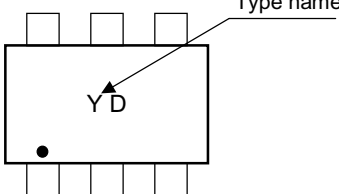
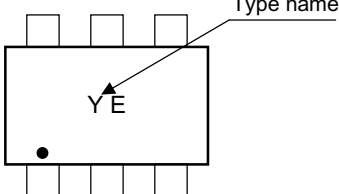
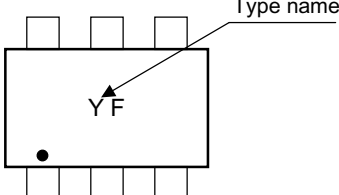
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2901FE~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~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~2904FE	$V_{I(OFF)}$	$V_{CE} = -5\text{ V}, I_C = -0.1\text{ mA}$	-1.0	—	-1.5	V
	RN2905FE, 2906FE			-0.5	—	-0.8	
Transition frequency	RN2901FE~2906FE	$f_T$	$V_{CE} = -10\text{ V}, I_C = -5\text{ mA}$	—	200	—	MHz
Collector output capacitance	RN2901FE~2906FE	$C_{ob}$	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	3	6	pF
Input resistor	RN2901FE	R1	—	3.29	4.7	6.11	kΩ
	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~2904FE	R1/R2	—	0.9	1.0	1.1	
	RN2905FE			0.0421	0.0468	0.0515	
	RN2906FE			0.09	0.1	0.11	

000707EAA2

- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.

Type Name	Marking
RN2901FE	 <p>The diagram shows a rectangular component with six pins (three on top, three on bottom). Inside the rectangle, the text 'YA' is printed with an arrow pointing to it. A label 'Type name' with a line points to the 'YA' text. A small black dot is located at the bottom-left corner of the rectangle.</p>
RN2902FE	 <p>The diagram shows a rectangular component with six pins (three on top, three on bottom). Inside the rectangle, the text 'YB' is printed with an arrow pointing to it. A label 'Type name' with a line points to the 'YB' text. A small black dot is located at the bottom-left corner of the rectangle.</p>
RN2903FE	 <p>The diagram shows a rectangular component with six pins (three on top, three on bottom). Inside the rectangle, the text 'YC' is printed with an arrow pointing to it. A label 'Type name' with a line points to the 'YC' text. A small black dot is located at the bottom-left corner of the rectangle.</p>
RN2904FE	 <p>The diagram shows a rectangular component with six pins (three on top, three on bottom). Inside the rectangle, the text 'YD' is printed with an arrow pointing to it. A label 'Type name' with a line points to the 'YD' text. A small black dot is located at the bottom-left corner of the rectangle.</p>
RN2905FE	 <p>The diagram shows a rectangular component with six pins (three on top, three on bottom). Inside the rectangle, the text 'YE' is printed with an arrow pointing to it. A label 'Type name' with a line points to the 'YE' text. A small black dot is located at the bottom-left corner of the rectangle.</p>
RN2906FE	 <p>The diagram shows a rectangular component with six pins (three on top, three on bottom). Inside the rectangle, the text 'YF' is printed with an arrow pointing to it. A label 'Type name' with a line points to the 'YF' text. A small black dot is located at the bottom-left corner of the rectangle.</p>