

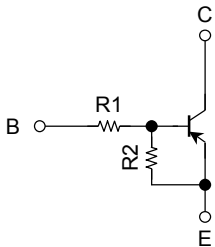
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

RN2967FE, RN2968FE, RN2969FE

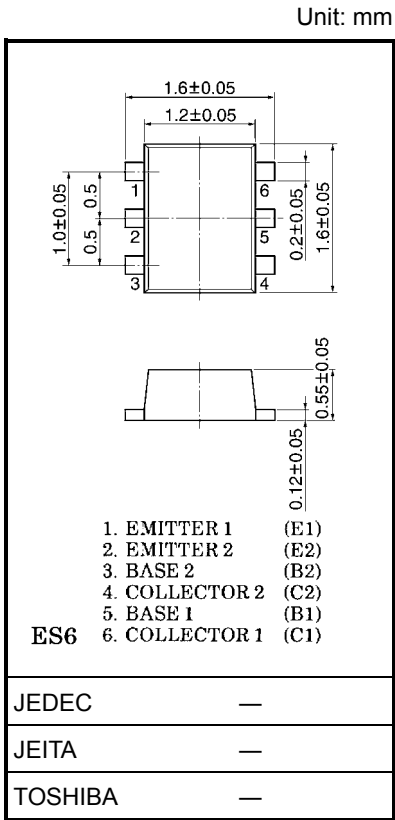
Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications.

- 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 RN1967FE~RN1969FE

Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN2967FE	10	47
RN2968FE	22	47
RN2969FE	47	22



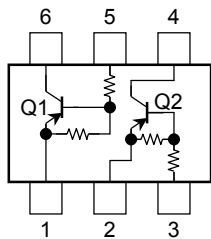
Weight: g (typ.)

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}	-6	V
		-7	
		-15	
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

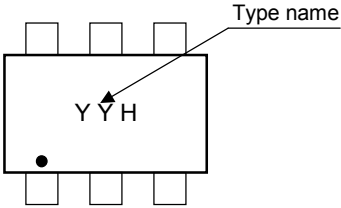
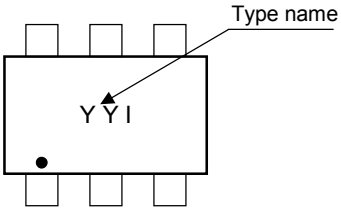
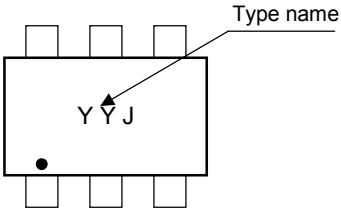
Note: Total rating

Equivalent Circuit (top view)



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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2967FE~2969FE	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	RN2967FE	I_{EBO}	$V_{EB} = -6\text{ V}, I_C = 0$	-0.081	—	-0.15	mA
	RN2968FE		$V_{EB} = -7\text{ V}, I_C = 0$	-0.078	—	-0.145	
	RN2969FE		$V_{EB} = -15\text{ V}, I_C = 0$	-0.167	—	-0.311	
DC current gain	RN2967FE	h_{FE}	$V_{CE} = -5\text{ V}, I_C = -10\text{ mA}$	80	—	—	
	RN2968FE			80	—	—	
	RN2969FE			70	—	—	
Collector-emitter saturation voltage	RN2967FE~2969FE	$V_{CE(sat)}$	$I_C = -5\text{ mA}, I_B = -0.25\text{ mA}$	—	-0.1	-0.3	V
Input voltage (ON)	RN2967FE	$V_{I(ON)}$	$V_{CE} = -0.2\text{ V}, I_C = -5\text{ mA}$	-0.7	—	-1.8	V
	RN2968FE			-1.0	—	-2.6	
	RN2969FE			-2.2	—	-5.8	
Input voltage (OFF)	RN2967FE	$V_{I(OFF)}$	$V_{CE} = -5\text{ V}, I_C = -0.1\text{ mA}$	-0.5	—	-1.0	V
	RN2968FE			-0.6	—	-1.16	
	RN2969FE			-1.5	—	-2.6	
Transition frequency	RN2967FE~2969FE	f_T	$V_{CE} = -10\text{ V}, I_C = -5\text{ mA}$	—	200	—	MHz
Collector output capacitance	RN2967FE~2969FE	C_{ob}	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	3	6	pF
Input resistor	RN2967FE	R1	—	7	10	13	kΩ
	RN2968FE			15.4	22	28.6	
	RN2969FE			32.9	47	61.1	
Resistor ratio	RN2967FE	R1/R2	—	0.191	0.2	0.232	
	RN2968FE			0.421	0.468	0.515	
	RN2969FE			1.92	2.14	2.35	

Type Name	Marking
RN2967FE	 The diagram shows a rectangular component with six pins (three on top, three on bottom). Inside the rectangle, the characters 'Y Y H' are printed. A small black dot is located at the bottom-left corner of the rectangle. An arrow points from the text 'Type name' to the second 'Y' in 'Y Y H'.
RN2968FE	 The diagram shows a rectangular component with six pins (three on top, three on bottom). Inside the rectangle, the characters 'Y Y I' are printed. A small black dot is located at the bottom-left corner of the rectangle. An arrow points from the text 'Type name' to the second 'Y' in 'Y Y I'.
RN2969FE	 The diagram shows a rectangular component with six pins (three on top, three on bottom). Inside the rectangle, the characters 'Y Y J' are printed. A small black dot is located at the bottom-left corner of the rectangle. An arrow points from the text 'Type name' to the second 'Y' in 'Y Y J'.

RESTRICTIONS ON PRODUCT USE

000707EAA

- 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.
- 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.