

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

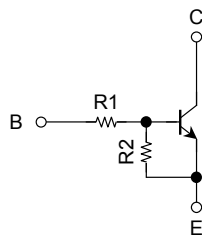
RN1967FE, RN1968FE, RN1969FE

Switching, Inverter Circuit, Interface Circuit and
Driver Circuit Applications

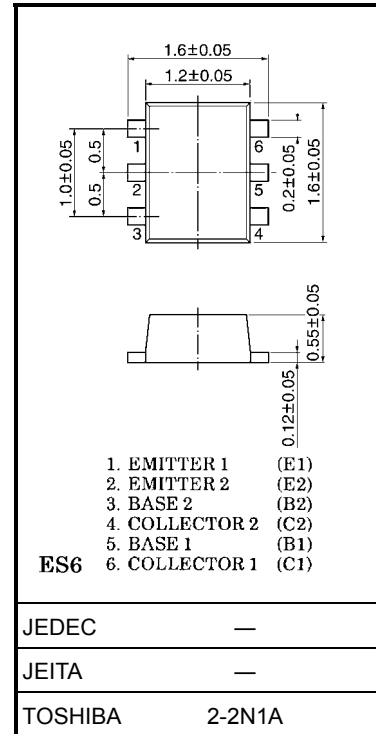
Unit: mm

- 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 RN2967FE~RN2969FE

Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN1967FE	10	47
RN1968FE	22	47
RN1969FE	47	22

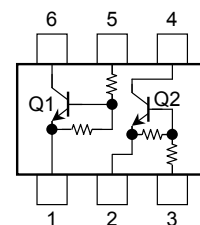


Maximum Ratings (Ta = 25°C) (Q1, Q2 common)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V _{CBO}	50	V
Collector-emitter voltage	V _{CEO}	50	V
Emitter-base voltage	RN1967FE	6	V
	RN1968FE	7	
	RN1969FE	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)



Weight: 0.003 g (typ.)

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1967FE~1969FE	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	RN1967FE	I_{EBO}	$V_{EB} = 6 \text{ V}, I_C = 0$	0.081	—	0.15	mA
	RN1968FE		$V_{EB} = 7 \text{ V}, I_C = 0$	0.078	—	0.145	
	RN1969FE		$V_{EB} = 15 \text{ V}, I_C = 0$	0.167	—	0.311	
DC current gain	RN1967FE	h_{FE}	$V_{CE} = 5 \text{ V}, I_C = 10 \text{ mA}$	80	—	—	
	RN1968FE			80	—	—	
	RN1969FE			70	—	—	
Collector-emitter saturation voltage	RN1967FE~1969FE	$V_{CE(sat)}$	$I_C = 5 \text{ mA}, I_B = 0.25 \text{ mA}$	—	0.1	0.3	V
Input voltage (ON)	RN1967FE	$V_{I(ON)}$	$V_{CE} = 0.2 \text{ V}, I_C = 5 \text{ mA}$	0.7	—	1.8	V
	RN1968FE			1.0	—	2.6	
	RN1969FE			2.2	—	5.8	
Input voltage (OFF)	RN1967FE	$V_{I(OFF)}$	$V_{CE} = 5 \text{ V}, I_C = 0.1 \text{ mA}$	0.5	—	1.0	V
	RN1968FE			0.6	—	1.16	
	RN1969FE			1.5	—	2.6	
Transition frequency	RN1967FE~1969FE	f_T	$V_{CE} = 10 \text{ V}, I_C = 5 \text{ mA}$	—	250	—	MHz
Collector output capacitance	RN1967FE~1969FE	C_{ob}	$V_{CB} = 10 \text{ V}, I_E = 0, f = 1 \text{ MHz}$	—	3	6	pF
Input resistor	RN1967FE	R1	—	7	10	13	kΩ
	RN1968FE			15.4	22	28.6	
	RN1969FE			32.9	47	61.1	
Resistor ratio	RN1967FE	R1/R2	—	0.191	0.213	0.232	
	RN1968FE			0.421	0.468	0.515	
	RN1969FE			1.92	2.14	2.35	

