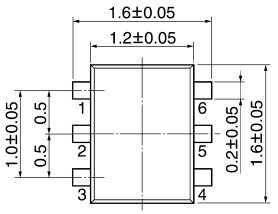
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process) (Bias Resistor Built-in Transistor)

RN1907FE, RN1908FE, RN1909FE

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 RN2907FE~RN2909FE

Unit: mm



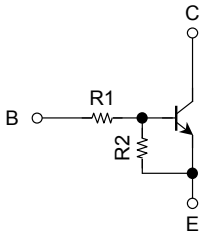
1. EMITTER1 (E1)
2. BASE1 (B1)
3. COLLECTOR2 (C2)
4. EMITTER2 (E2)
5. BASE2 (B2)
6. COLLECTOR1 (C1)

ES6

JEDEC	—
JEITA	—
TOSHIBA	2-2N1G

Weight: 0.003 g (typ.)

Equivalent Circuit and Bias Resistor Values



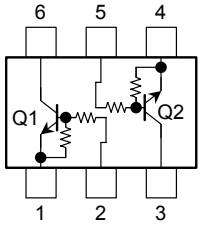
Type No.	R1 (kΩ)	R2 (kΩ)
RN1907FE	10	47
RN1908FE	22	47
RN1909FE	47	22

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

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN1907FE~ RN1909FE	V_{CBO}	50	V
Collector-emitter voltage		V_{CEO}	50	V
Emitter-base voltage	RN1907FE	V_{EBO}	6	V
	RN1908FE		7	
	RN1909FE		15	
Collector current	RN1907FE~ RN1909FE	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

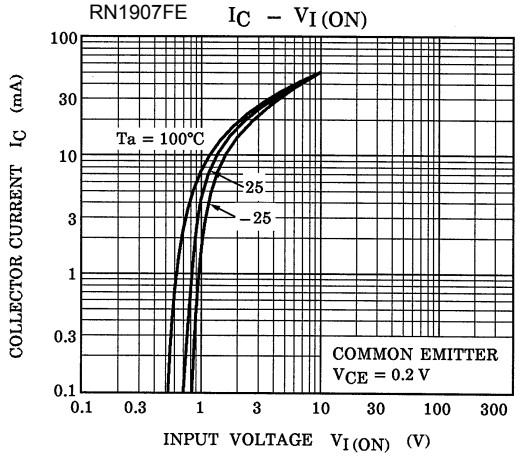
Equivalent Circuit (top view)



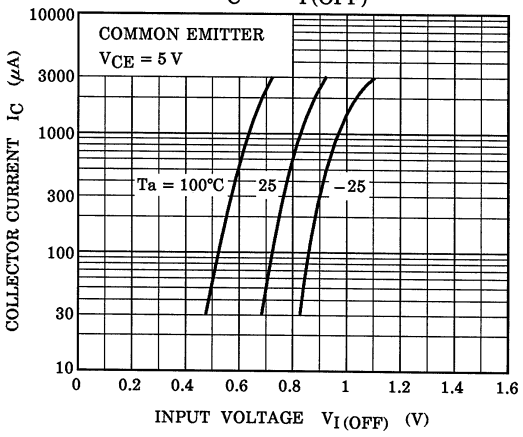
Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1907FE~1909FE	I_{CBO}	V_{CB} = 50 V, I_E = 0	—	—	100	nA
		I_{CEO}	V_{CE} = 50 V, I_B = 0	—	—	500	
Emitter cut-off current	RN1907FE	I_{EBO}	V_{EB} = 6 V, I_C = 0	0.081	—	0.15	mA
	RN1908FE		V_{EB} = 7 V, I_C = 0	0.078	—	0.145	
	RN1909FE		V_{EB} = 15 V, I_C = 0	0.167	—	0.311	
DC current gain	RN1907FE	h_{FE}	V_{CE} = 5 V, I_C = 10 mA	80	—	—	
	RN1908FE			80	—	—	
	RN1909FE			70	—	—	
Collector-emitter saturation voltage	RN1907FE~1909FE	$V_{CE\ (sat)}$	I_C = 5 mA, I_B = 0.25 mA	—	0.1	0.3	V
Input voltage (ON)	RN1907FE	$V_{I\ (ON)}$	V_{CE} = 0.2 V, I_C = 5 mA	0.7	—	1.8	V
	RN1908FE			1.0	—	2.6	
	RN1909FE			2.2	—	5.8	
Input voltage (OFF)	RN1907FE	$V_{I\ (OFF)}$	V_{CE} = 5 V, I_C = 0.1 mA	0.5	—	1	V
	RN1908FE			0.6	—	1.16	
	RN1909FE			1.5	—	2.6	
Transition frequency	RN1907FE~1909FE	f_T	V_{CE} = 10 V, I_C = 5 mA	—	250	—	MHz
Collector output capacitance	RN1907FE~1909FE	C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1 MHz	—	3	6	pF
Input resistor	RN1907FE	R1	—	7	10	13	kΩ
	RN1908FE			15.4	22	28.6	
	RN1909FE			32.9	47	61.1	
Resistor ratio	RN1907FE	R1/R2	—	0.191	0.213	0.232	
	RN1908FE			0.421	0.468	0.515	
	RN1909FE			1.92	2.14	2.35	

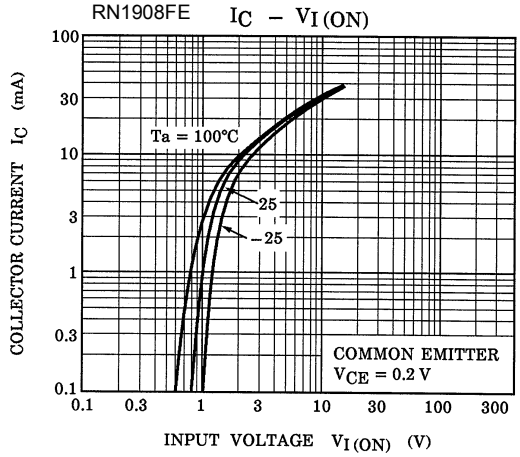
RN1907FE I_C – $V_{I(ON)}$



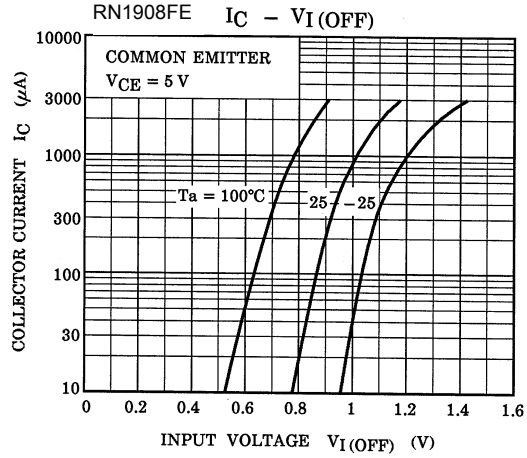
RN1907FE I_C – $V_{I(OFF)}$



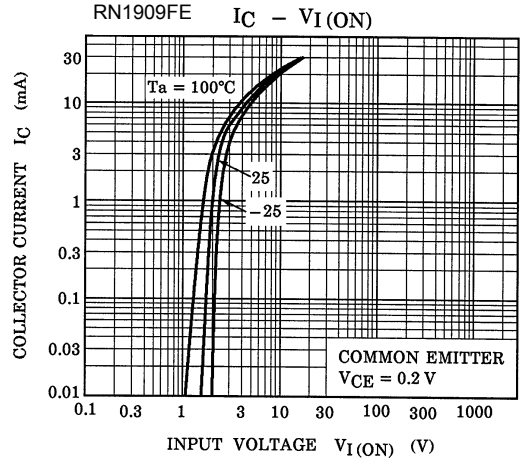
RN1908FE I_C – $V_{I(ON)}$



RN1908FE I_C – $V_{I(OFF)}$



RN1909FE I_C – $V_{I(ON)}$



RN1909FE I_C – $V_{I(OFF)}$