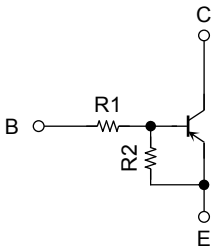
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process) (Bias Resistor Built-in Transistor)

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 enables the manufacture of ever more compact equipment and lowers assembly cost.
- Complementary to RN1967FE to RN1969FE

Equivalent Circuit and Bias Resistor Values



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

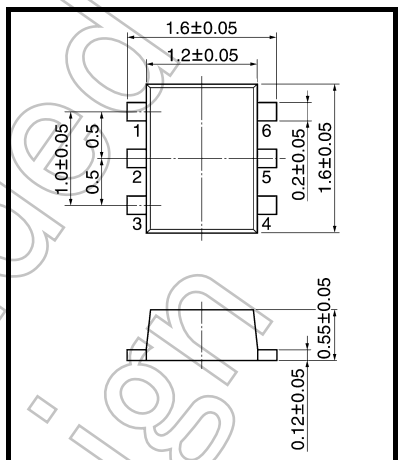
Absolute Maximum Ratings (Ta = 25°C) (Q1, Q2 common)

Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	−50	V
Collector-emitter voltage		V_{CEO}	−50	V
Emitter-base voltage	RN2967FE	V_{EBO}	−6	V
	RN2968FE		−7	
	RN2969FE		−15	
Collector current		I_C	−100	mA
Collector power dissipation		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

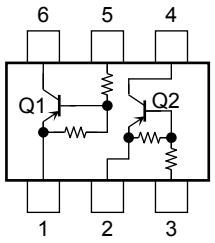
Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	2-2N1A

Weight: 3 mg (typ.)

Equivalent Circuit (top view)



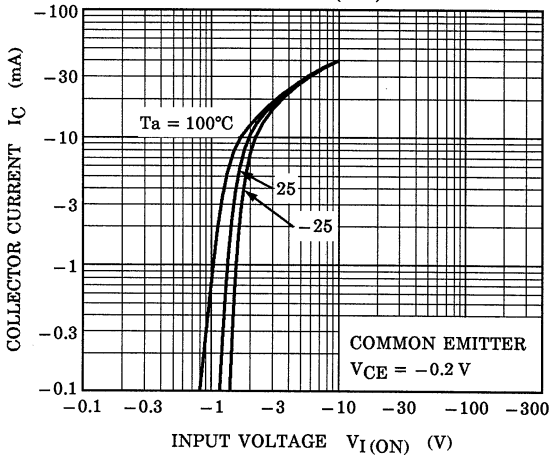
Start of commercial production
2000-05

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

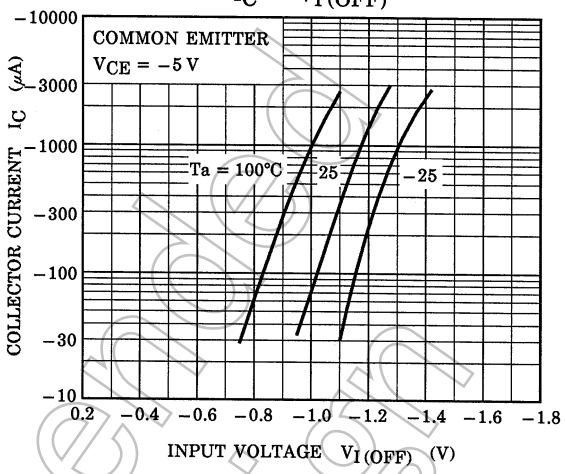
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2967FE to RN2969FE	I_{CBO}	V_{CB} = −50 V, I_E = 0	—	—	−100	nA
		I_{CEO}	V_{CE} = −50 V, I_B = 0	—	—	−500	
Emitter cut-off current	RN2967FE	I_{EBO}	V_{EB} = −6 V, I_C = 0	−0.081	—	−0.15	mA
	RN2968FE		V_{EB} = −7 V, I_C = 0	−0.078	—	−0.145	
	RN2969FE		V_{EB} = −15 V, I_C = 0	−0.167	—	−0.311	
DC current gain	RN2967FE	h_{FE}	V_{CE} = −5 V, I_C = −10 mA	80	—	—	
	RN2968FE			80	—	—	
	RN2969FE			70	—	—	
Collector-emitter saturation voltage	RN2967FE to RN2969FE	$V_{CE\ (sat)}$	I_C = −5 mA, I_B = −0.25 mA	—	−0.1	−0.3	V
Input voltage (ON)	RN2967FE	$V_{I\ (ON)}$	V_{CE} = −0.2 V, I_C = −5 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 V, I_C = −0.1 mA	−0.5	—	−1.0	V
	RN2968FE			−0.6	—	−1.16	
	RN2969FE			−1.5	—	−2.6	
Transition frequency	RN2967FE to RN2969FE	f_T	V_{CE} = −10 V, I_C = −5 mA	—	200	—	MHz
Collector output capacitance	RN2967FE to RN2969FE	C_{ob}	V_{CB} = −10 V, I_E = 0, f = 1 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	0.213	0.232	
	RN2968FE			0.421	0.468	0.515	
	RN2969FE			1.92	2.14	2.35	

Q1, Q2 Common

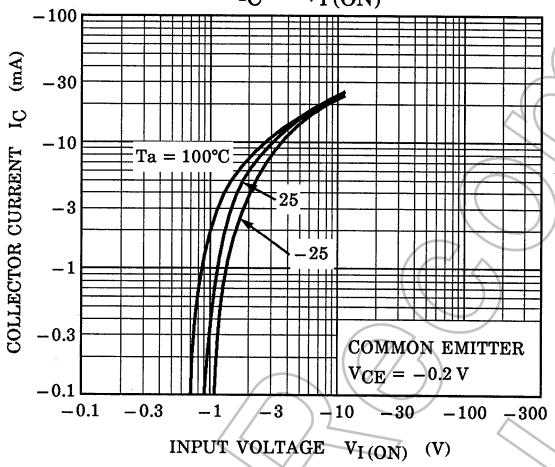
RN2967FE $I_C - V_{I(ON)}$



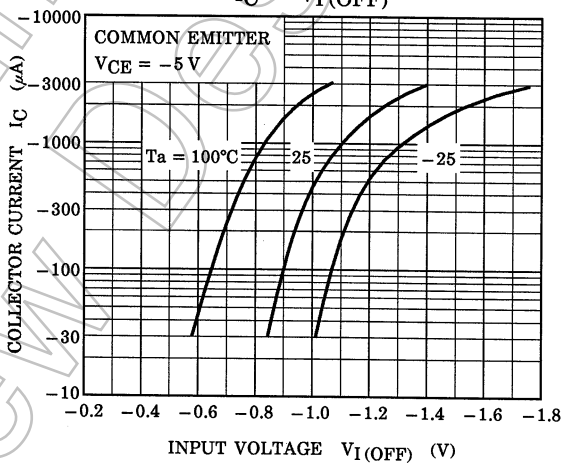
RN2967FE $I_C - V_{I(OFF)}$



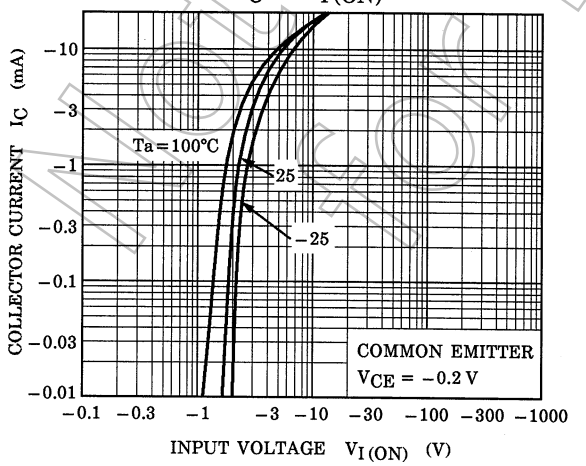
RN2968FE $I_C - V_{I(ON)}$



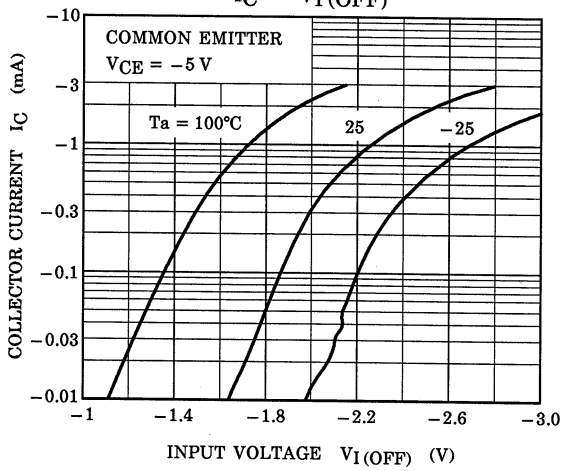
RN2968FE $I_C - V_{I(OFF)}$



RN2969FE $I_C - V_{I(ON)}$

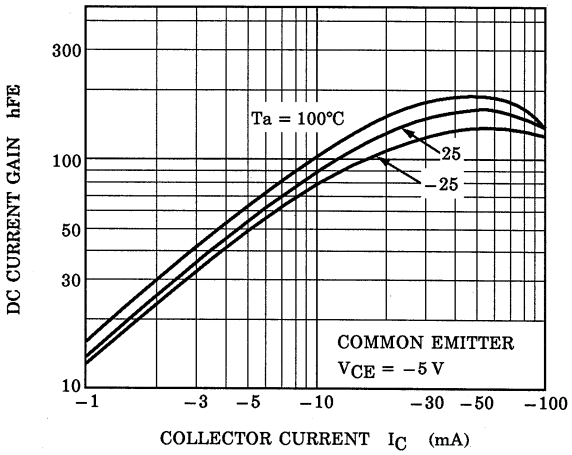


RN2969FE $I_C - V_{I(OFF)}$

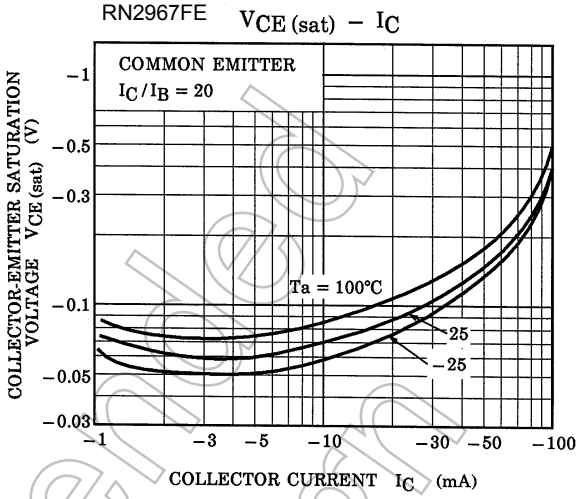


Q1, Q2 Common

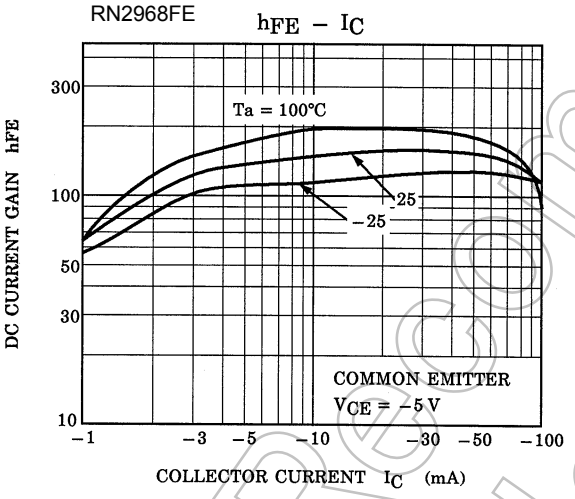
RN2967FE h_{FE} – I_C



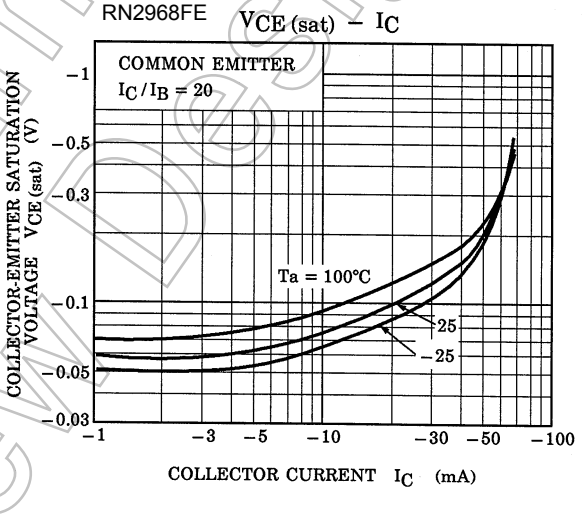
RN2967FE $V_{CE\,(sat)}$ – I_C



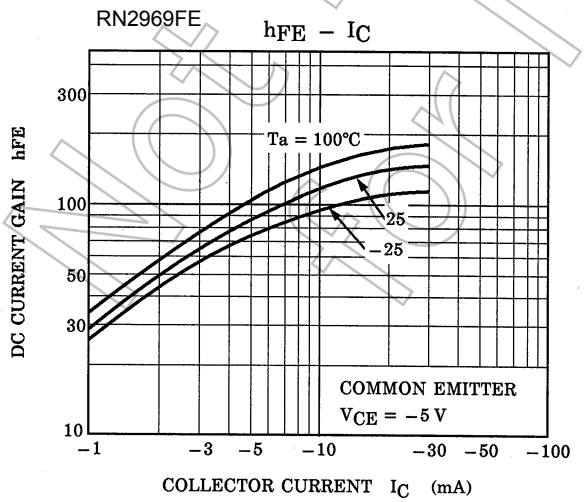
RN2968FE h_{FE} – I_C



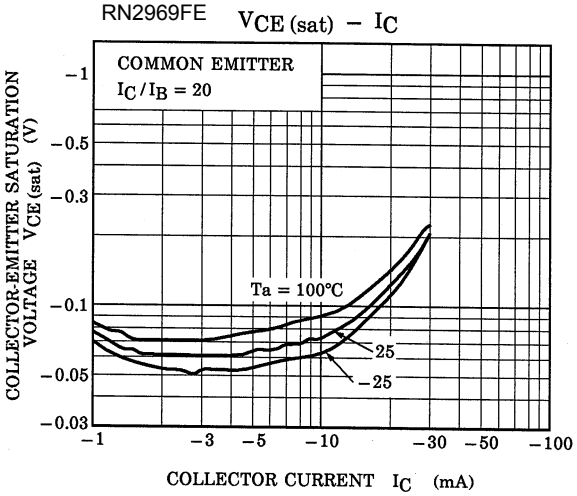
RN2968FE $V_{CE\,(sat)}$ – I_C



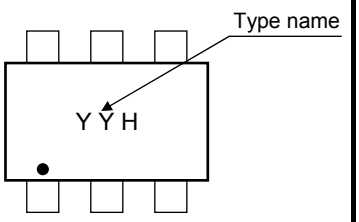
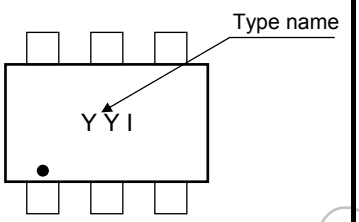
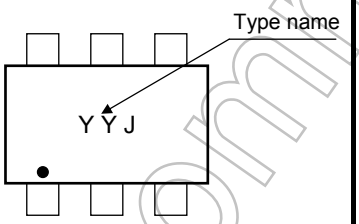
RN2969FE h_{FE} – I_C



RN2969FE $V_{CE\,(sat)}$ – I_C



Marking

Type Name	Marking
RN2967FE	
RN2968FE	
RN2969FE	

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