

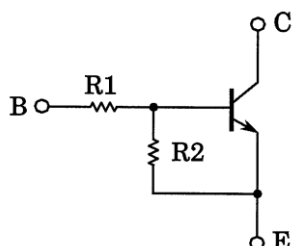
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor)

RN1967, RN1968, RN1969

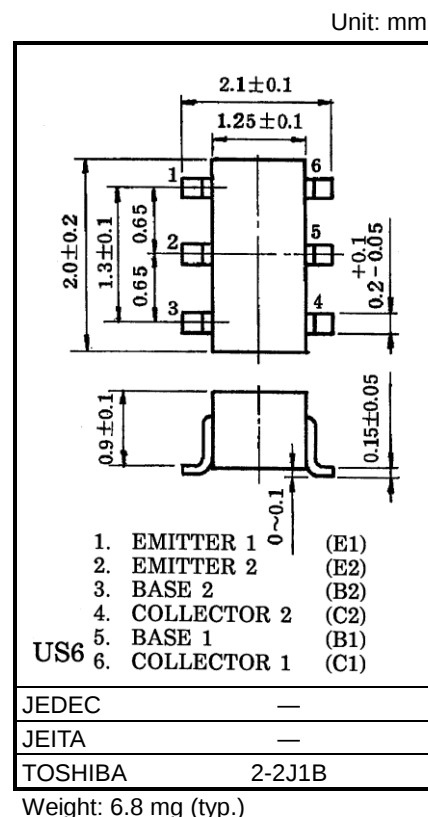
Switching, Inverter Circuit, Interface Circuit and Driver Circuit

- Including two devices in US6 (ultra super mini type with 6 leads).
- With built-in bias resistors.
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process and miniaturize equipment.
- Various resistance values are available to suit various circuit designs.
- Complementary to RN2967 to RN2969

Equivalent Circuit and Bias Resistor Values



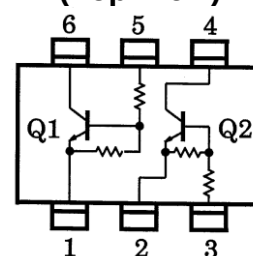
Type No.	R1 (kΩ)	R2 (kΩ)
RN1967	10	47
RN1968	22	47
RN1969	47	22



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

Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN1967 to 1969	V _{CBO}	50	V
Collector-emitter voltage	RN1967 to 1969	V _{CEO}	50	V
Emitter-base voltage	RN1967	V _{EBO}	6	V
	RN1968		7	
	RN1969		15	
Collector current	RN1967 to 1969	I _C	100	mA
Collector power dissipation	RN1967 to 1969	P _C *	200	mW
Junction temperature	RN1967 to 1969	T _j	150	°C
Storage temperature range	RN1967 to 1969	T _{stg}	-55 to 150	°C

Equivalent Circuit (Top View)



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).

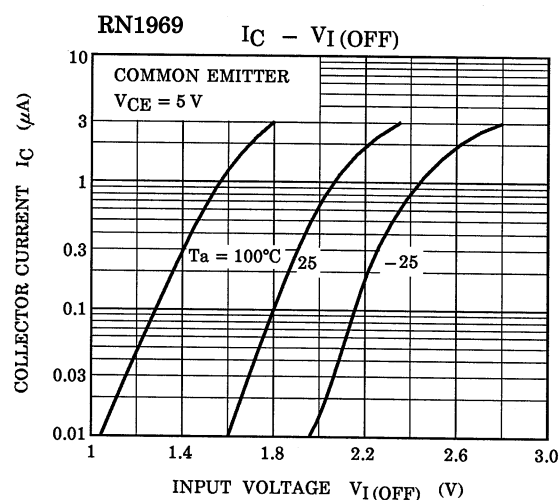
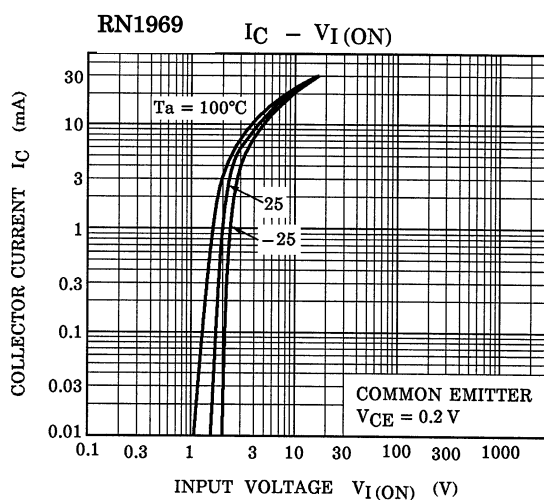
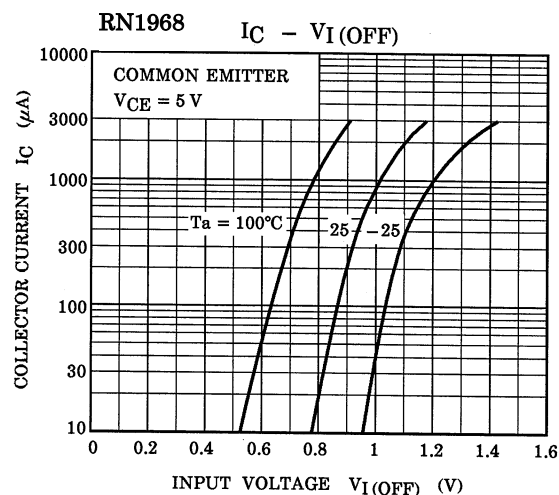
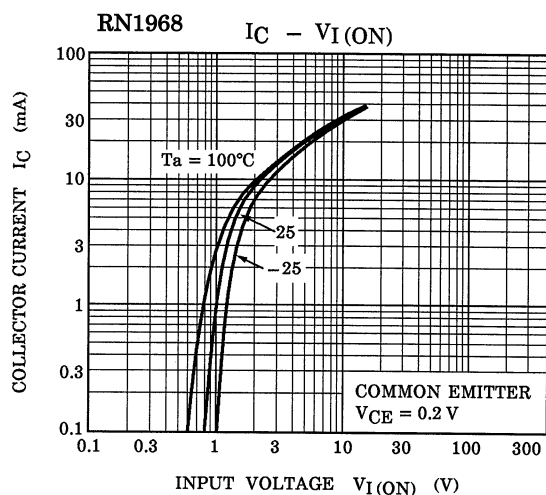
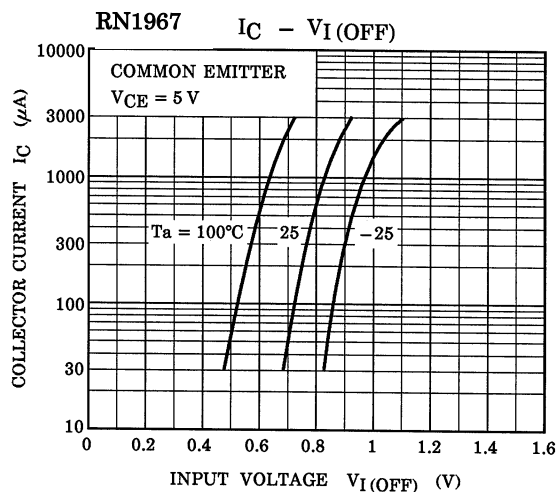
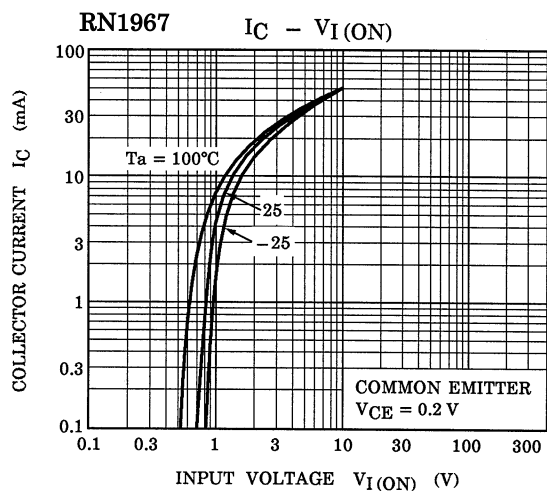
*: Total rating

Start of commercial production
1992-01

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

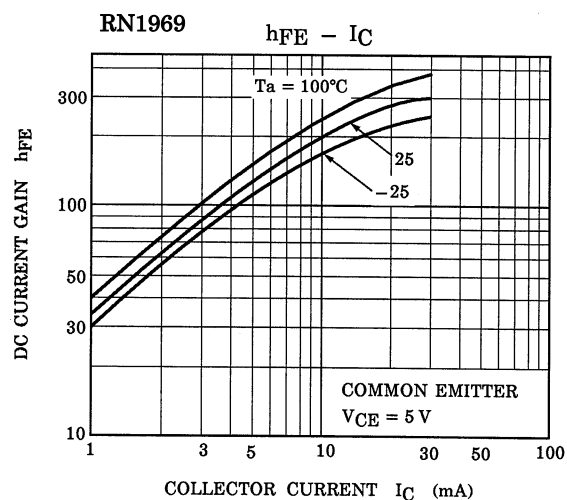
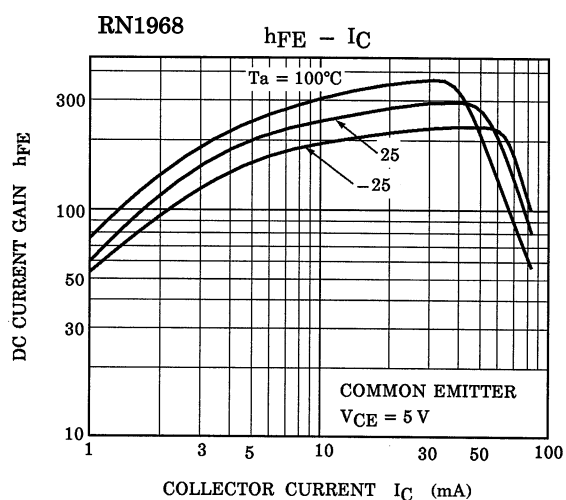
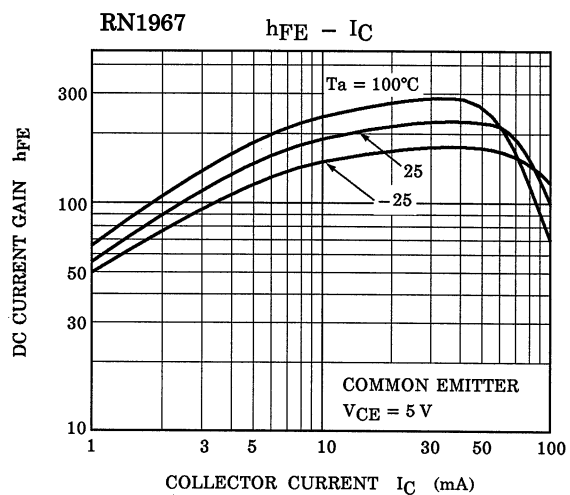
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1967 to 1969	I_{CBO}	$V_{CB} = 50 \text{ V}, I_E = 0 \text{ mA}$	—	—	100	nA
		I_{CEO}	$V_{CE} = 50 \text{ V}, I_B = 0 \text{ mA}$	—	—	500	nA
Emitter cut-off current	RN1967	I_{EBO}	$V_{EB} = 6 \text{ V}, I_C = 0 \text{ mA}$	0.081	—	0.15	mA
	RN1968		$V_{EB} = 7 \text{ V}, I_C = 0 \text{ mA}$	0.078	—	0.145	
	RN1969		$V_{EB} = 15 \text{ V}, I_C = 0 \text{ mA}$	0.167	—	0.311	
DC current gain	RN1967	h_{FE}	$V_{CE} = 5 \text{ V}, I_C = 10 \text{ mA}$	80	—	—	—
	RN1968			80	—	—	
	RN1969			70	—	—	
Collector-emitter saturation voltage	RN1967 to 1969	$V_{CE(sat)}$	$I_C = 5 \text{ mA}, I_B = 0.25 \text{ mA}$	—	0.1	0.3	V
Input voltage (ON)	RN1967	$V_I(\text{ON})$	$V_{CE} = 0.2 \text{ V}, I_C = 5 \text{ mA}$	0.7	—	1.8	V
	RN1968			1.0	—	2.6	
	RN1969			2.2	—	5.8	
Input voltage (OFF)	RN1967	$V_I(\text{OFF})$	$V_{CE} = 5 \text{ V}, I_C = 0.1 \text{ mA}$	0.5	—	1.0	V
	RN1968			0.6	—	1.16	
	RN1969			1.5	—	2.6	
Transition frequency	RN1967 to 1969	f_T	$V_{CE} = 10 \text{ V}, I_C = 5 \text{ mA}$	—	250	—	MHz
Collector output capacitance	RN1967 to 1969	C_{ob}	$V_{CB} = 10 \text{ V}, I_E = 0 \text{ mA}$ $f = 1 \text{ MHz}$	—	3	6	pF
Input resistor	RN1967	R1	—	7	10	13	kΩ
	RN1968			15.4	22	28.6	
	RN1969			32.9	47	61.1	
Resistor ratio	RN1967	R1/R2	—	0.191	0.213	0.232	—
	RN1968			0.421	0.468	0.515	
	RN1969			1.92	2.14	2.35	

Characteristics Curves (Q1, Q2 Common)



The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

Characteristics Curves (Q1, Q2 Common)



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Marking

Part No.	Marking
RN1967	Part No.(abbreviation code) 
RN1968	Part No.(abbreviation code) 
RN1969	Part No.(abbreviation code) 

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