

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

RN1967CT, RN1968CT, RN1969CT

Switching Applications

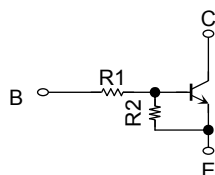
Inverter Circuit Applications

Interface Circuit Applications

Driver Circuit Applications

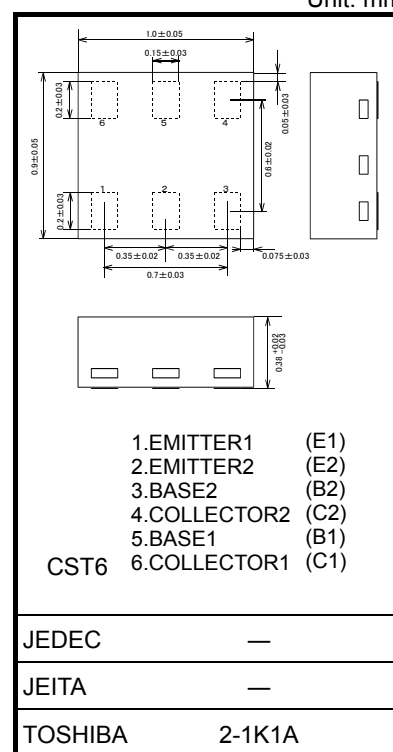
- Two devices are incorporated into a fine pitch Small Mold (6 pin) package.
- Incorporating a bias resistor into a transistor reduces parts count. Reducing the parts count enable the manufacture of ever more compact equipment and save assembly cost.
- Complementary to RN2967CT to RN2969CT

Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN1967CT	10	47
RN1968CT	22	47
RN1969CT	47	22

Unit: mm



Weight : 1 mg (typ.)

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

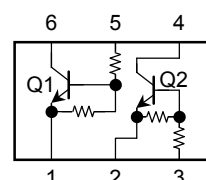
Characteristics	Symbol	Rating	Unit
Collector-base voltage	RN1967CT to RN1969CT V_{CBO}	20	V
Collector-emitter voltage	V_{CEO}	20	V
Emitter-base voltage	RN1967CT V_{EBO}	6	V
	RN1968CT	7	V
	RN1969CT	15	V
Collector current	I_C	50	mA
Collector power dissipation	RN1967CT to RN1969CT P_C (Note1)	50	mW
Junction 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).

Note1: Total rating

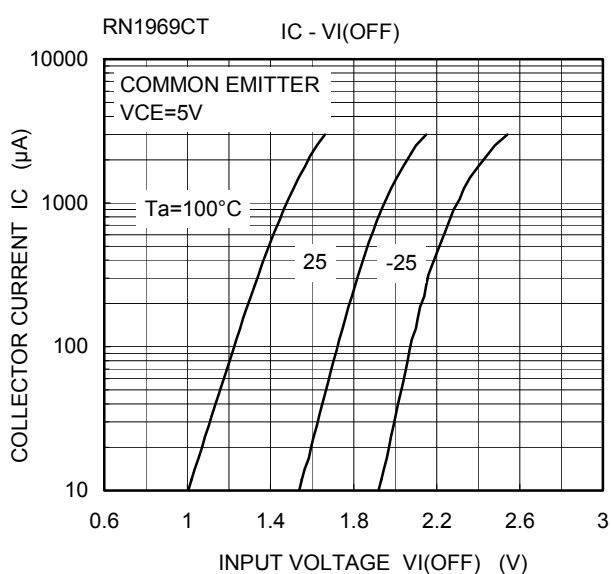
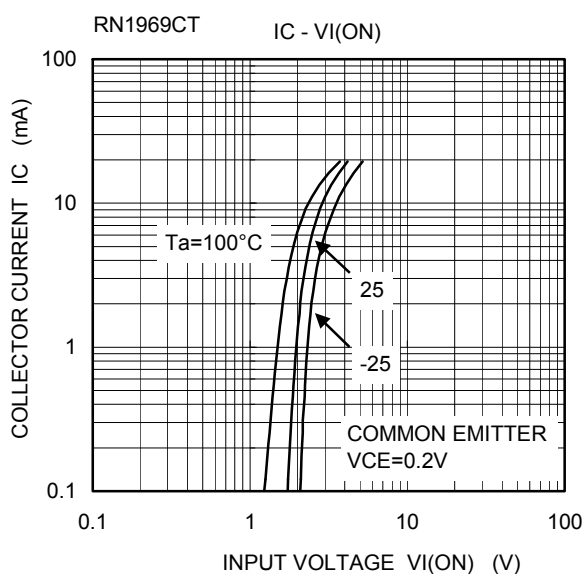
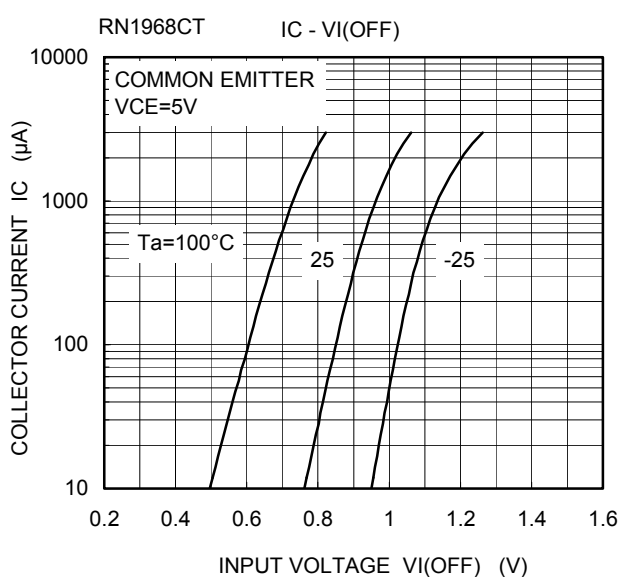
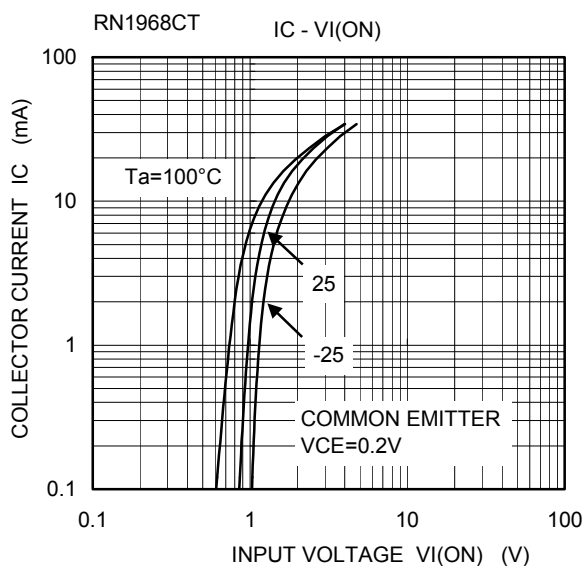
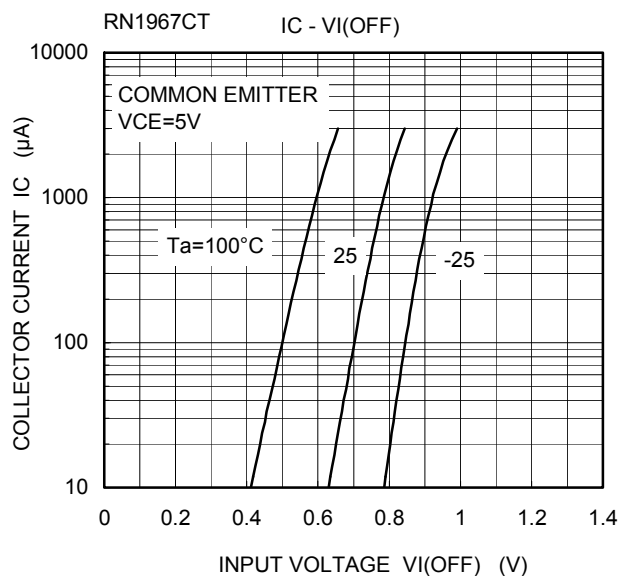
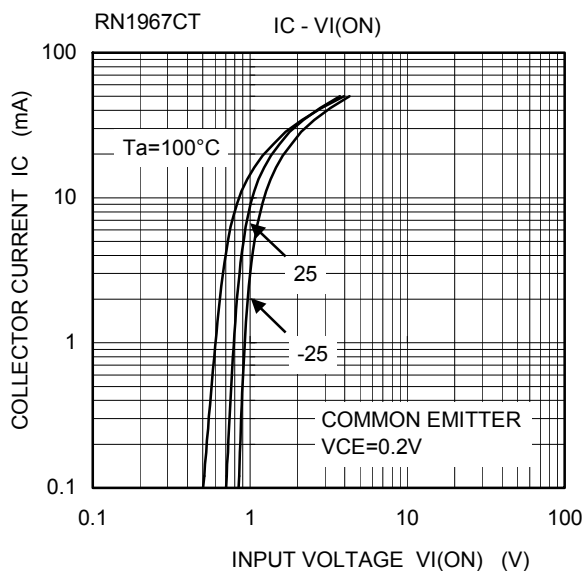
Equivalent Circuit (top view)



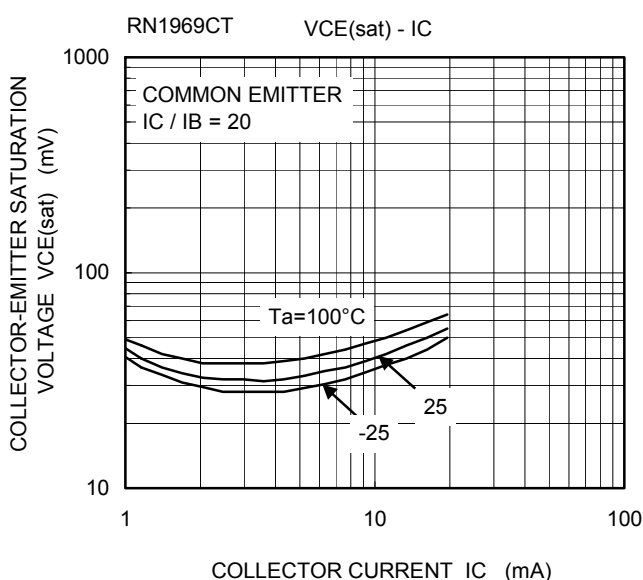
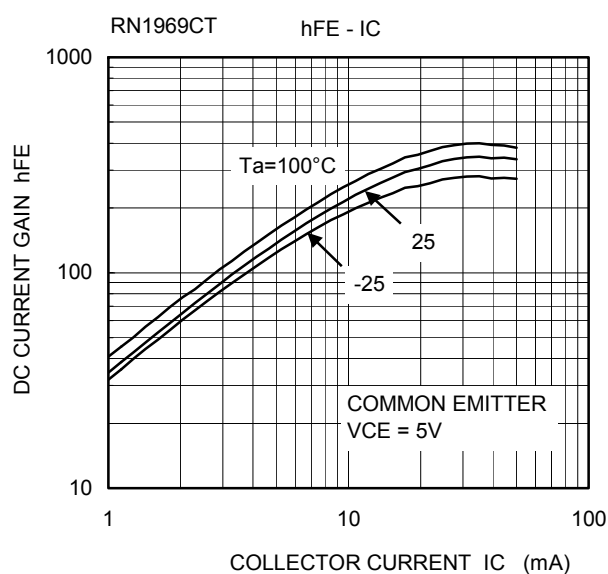
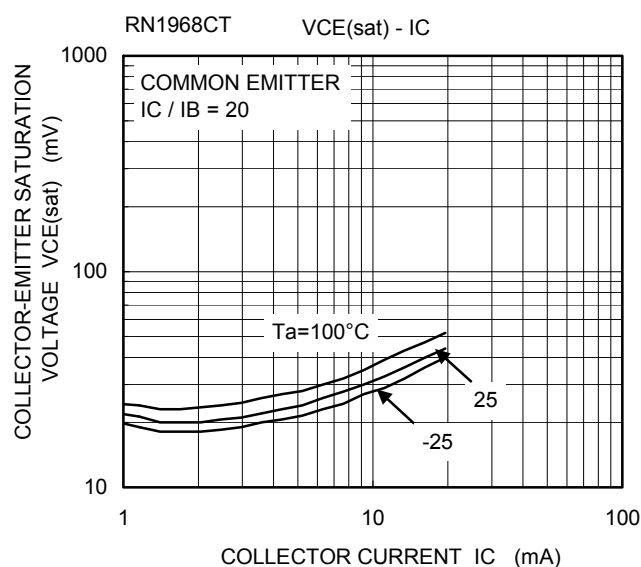
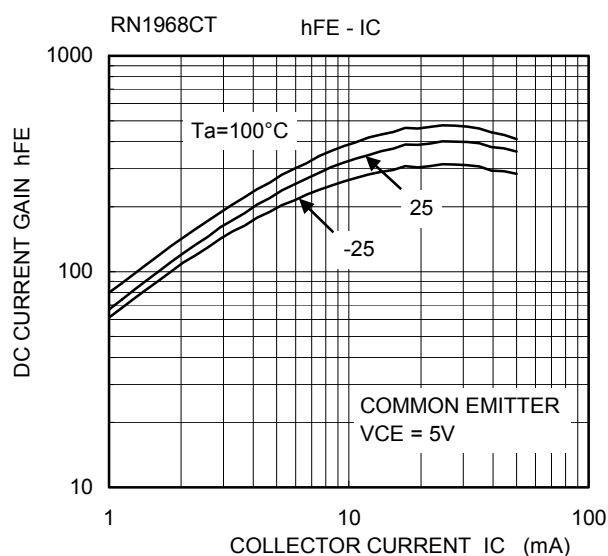
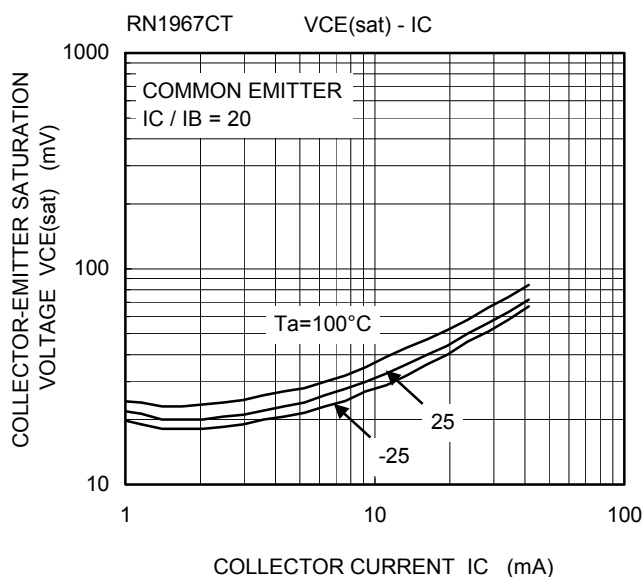
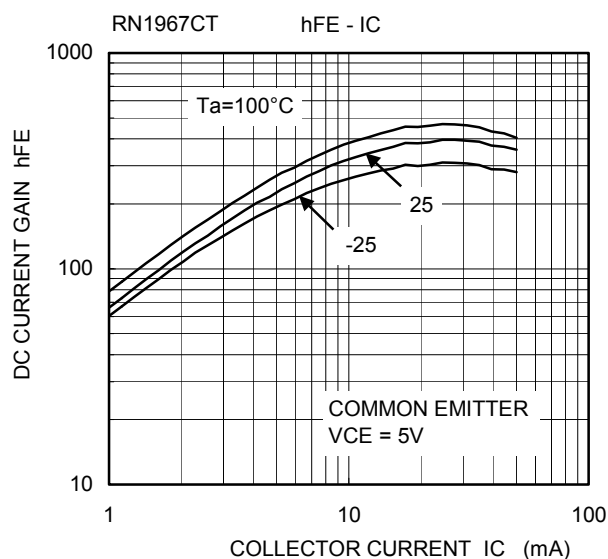
Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

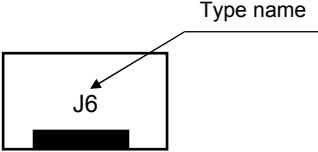
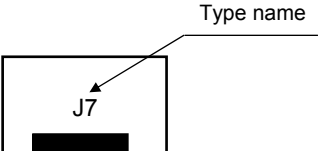
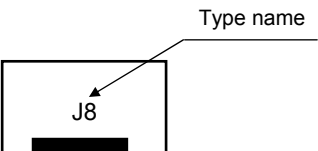
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1967CT to 1969CT	I_{CBO}	$V_{CB} = 20 \text{ V}, I_E = 0$	—	—	100	nA
		I_{CEO}	$V_{CE} = 20 \text{ V}, I_B = 0$	—	—	500	
Emitter cut-off current	RN1967CT	I_{EBO}	$V_{EB} = 6 \text{ V}, I_C = 0$	0.088	—	0.131	mA
	RN1968CT		$V_{EB} = 7 \text{ V}, I_C = 0$	0.085	—	0.126	
	RN1969CT		$V_{EB} = 15 \text{ V}, I_C = 0$	0.182	—	0.271	
DC current gain	RN1967CT	h_{FE}	$V_{CE} = 5 \text{ V}, I_C = 10 \text{ mA}$	120	—	—	
	RN1968CT			120	—	—	
	RN1969CT			100	—	—	
Collector-emitter saturation voltage	RN1967CT to 1969CT	$V_{CE(sat)}$	$I_C = 5 \text{ mA}, I_B = 0.25 \text{ mA}$	—	—	0.15	V
Input voltage (ON)	RN1967CT	$V_I(ON)$	$V_{CE} = 0.2 \text{ V}, I_C = 5 \text{ mA}$	0.7	—	1.5	V
	RN1968CT			0.8	—	2.2	
	RN1969CT			1.6	—	5.0	
Input voltage (OFF)	RN1967CT	$V_I(OFF)$	$V_{CE} = 5 \text{ V}, I_C = 0.1 \text{ mA}$	0.5	—	1.0	V
	RN1968CT			0.6	—	1.1	
	RN1969CT			1.3	—	2.6	
Collector output capacitance	RN1967CT to 1969CT	C_{ob}	$V_{CB} = 10 \text{ V}, I_E = 0, f = 1 \text{ MHz}$	—	1.2	—	pF
Input resistor	RN1967CT	R1	—	8	10	12	kΩ
	RN1968CT			17.6	22	26.4	
	RN1969CT			37.6	47	56.4	
Resistor ratio	RN1967CT	R1/R2	—	0.17	0.213	0.255	
	RN1968CT			0.374	0.468	0.562	
	RN1969CT			1.71	2.14	2.56	

(Q1,Q2 common)



(Q1,Q2 common)



Type Name	Marking
RN1967CT	
RN1968CT	
RN1969CT	

Handling Precaution

When handling individual devices (which are not yet mounted on a circuit board), be sure that the environment is protected against electrostatic electricity. Operators should wear anti-static clothing, and containers and other objects that come into direct contact with devices should be made of anti-static materials.

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