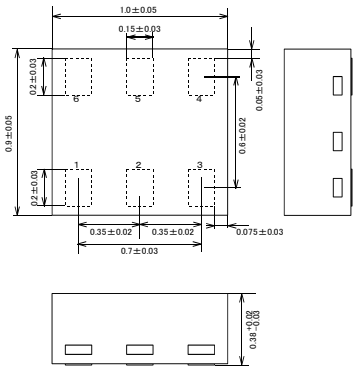
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

RN2967CT,RN2968CT,RN2969CT

Switching, Inverter Circuit, Interface Circuit and 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 RN1967CT to RN1969CT

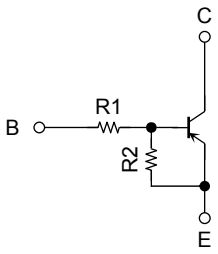
Unit: mm



CST6	1.EMIITTER1 (E1) 2.EMITTER2 (E2) 3.BASE2 (B2) 4.COLLECTOR2 (C2) 5.BASE1 (B1) 6.COLLECTOR1 (C1)
JEDEC	—
JEITA	—
TOSHIBA	2-1K1A

Weight: 1.0 mg (typ.)

Equivalent Circuit and Bias Resistor Values

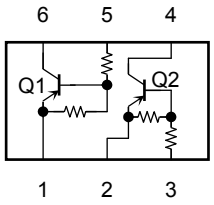


Type No.	R1 (kΩ)	R2 (kΩ)
RN2967 CT	10	47
RN2968 CT	22	47
RN2969 CT	47	22

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

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN2967CT to RN2969CT	V_{CBO}	−20	V
Collector-emitter voltage		V_{CEO}	−20	V
Emitter-base voltage	RN2967CT	V_{EBO}	−6	V
	RN2968CT		−7	
	RN2969CT		−15	
Collector current	RN2967CT to RN2969CT	I_C	−50	mA
Collector power dissipation		P_C (Note1)	50	mW
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

Equivalent Circuit (top view)



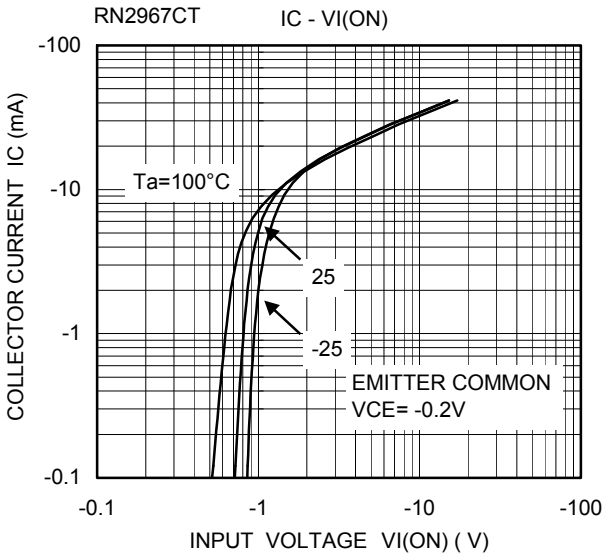
Note 1: Total rating

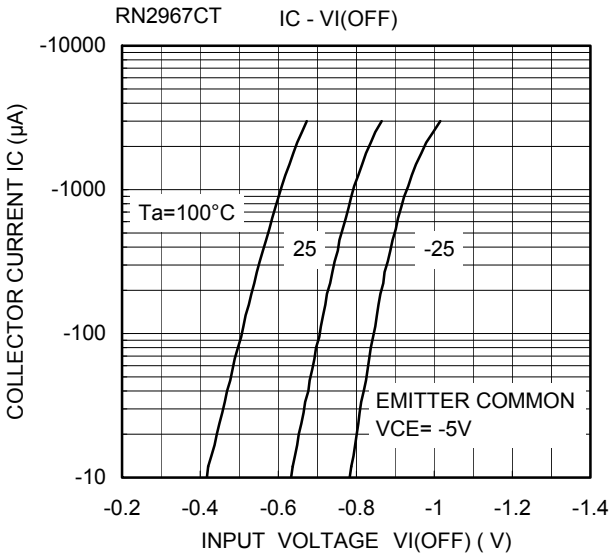
Note 2: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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).

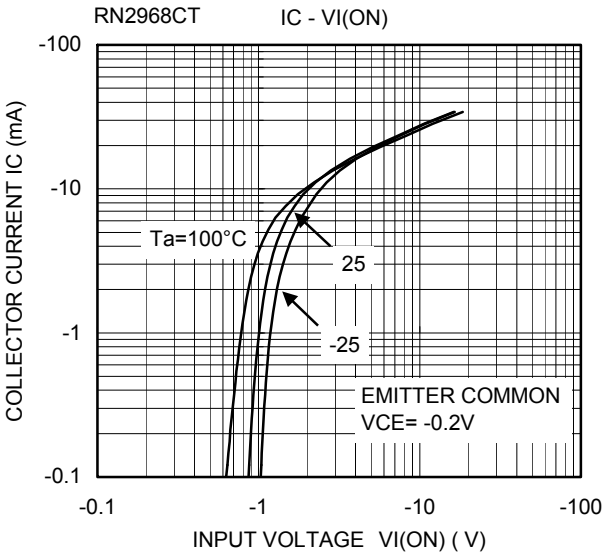
Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

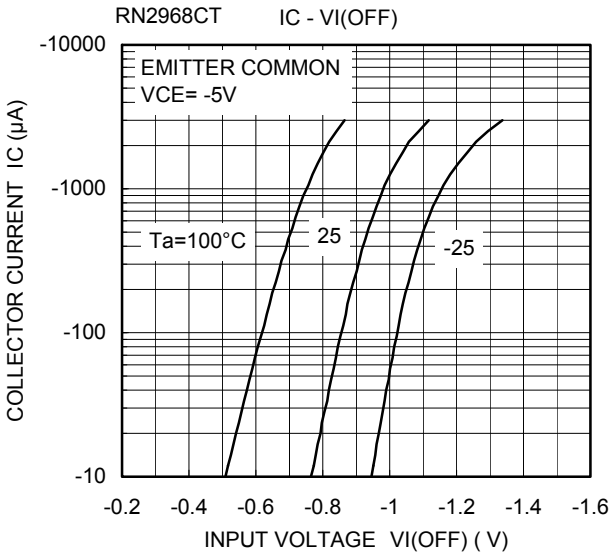
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2967CT to 2969CT	I_{CBO}	V_{CB} = –20 V, I_E = 0	—	—	–100	nA
		I_{CEO}	V_{CE} = –20 V, I_B = 0	—	—	–500	
Emitter cut-off current	RN2967CT	I_{EBO}	V_{EB} = –6 V, I_C = 0	–0.088	—	–0.131	mA
	RN2968CT		V_{EB} = –7 V, I_C = 0	–0.085	—	–0.126	
	RN2969CT		V_{EB} = –15 V, I_C = 0	–0.182	—	–0.271	
DC current gain	RN2967CT	h_{FE}	V_{CE} = –5 V, I_C = –10 mA	120	—	—	—
	RN2968CT			120	—	—	
	RN2969CT			100	—	—	
Collector-emitter saturation voltage	RN2967CT to 2969CT	$V_{CE\ (sat)}$	I_C = –5 mA, I_B = –0.25 mA	—	—	–0.15	V
Input voltage (ON)	RN2967CT	$V_{I\ (ON)}$	V_{CE} = –0.2 V, I_C = –5mA	–0.7	—	–1.5	V
	RN2968CT			–0.8	—	–2.2	
	RN2969CT			–1.6	—	–5.0	
Input voltage (OFF)	RN2967CT	$V_{I\ (OFF)}$	V_{CE} = –5 V, I_C = –0.1mA,	–0.5	—	–1.0	V
	RN2968CT			–0.6	—	–1.1	
	RN2969CT			–1.3	—	–2.6	
Collector output capacitance	RN2967CT to 2969CT	C_{ob}	V_{CB} = –10 V, I_E = 0, f = 1 MHz	—	1.2	—	pF
Input resistor	RN2967CT	R1	—	8	10	12	kΩ
	RN2968CT			17.6	22	26.4	
	RN2969CT			37.6	47	56.4	
Resistor ratio	RN2967CT	R1/R2	—	0.17	0.213	0.255	—
	RN2968CT			0.374	0.468	0.562	
	RN2969CT			1.71	2.14	2.56	

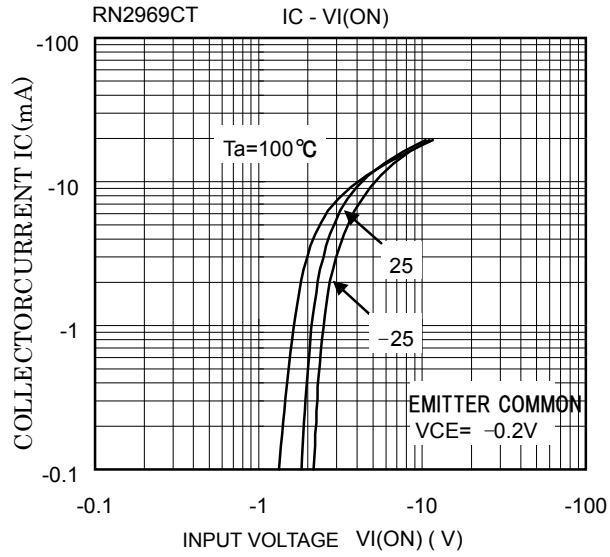
(Q1,Q2 common)

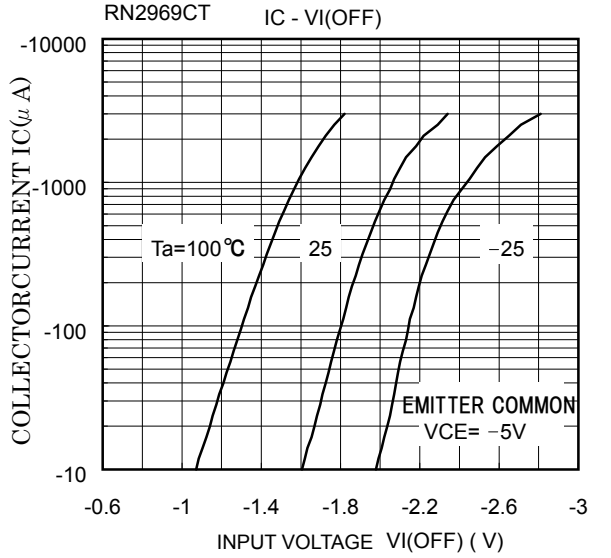

RN2967CT
IC - VI(ON)
COLLECTOR CURRENT IC (mA)
-100
-10
-1
-0.1
Ta=100°C
25
-25
EMITTER COMMON
VCE= -0.2V
-0.1
-1
-10
-100
INPUT VOLTAGE VI(ON) (V)


RN2967CT
IC - VI(OFF)
COLLECTOR CURRENT IC (μA)
-10000
-1000
-100
-10
Ta=100°C
25
-25
EMITTER COMMON
VCE= -5V
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
INPUT VOLTAGE VI(OFF) (V)

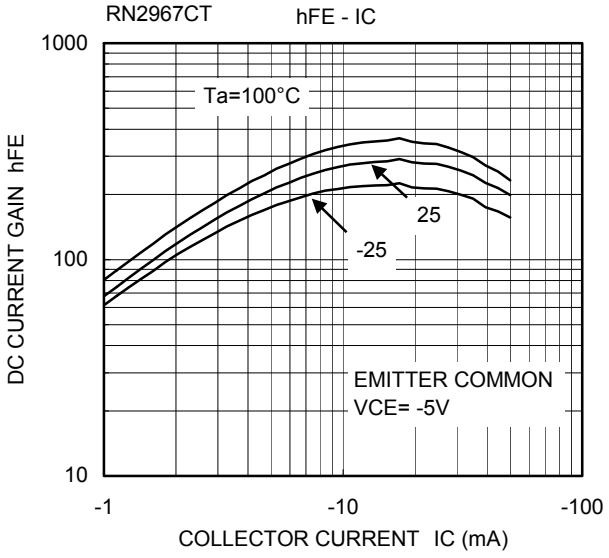

RN2968CT
IC - VI(ON)
COLLECTOR CURRENT IC (mA)
-100
-10
-1
-0.1
Ta=100°C
25
-25
EMITTER COMMON
VCE= -0.2V
-0.1
-1
-10
-100
INPUT VOLTAGE VI(ON) (V)

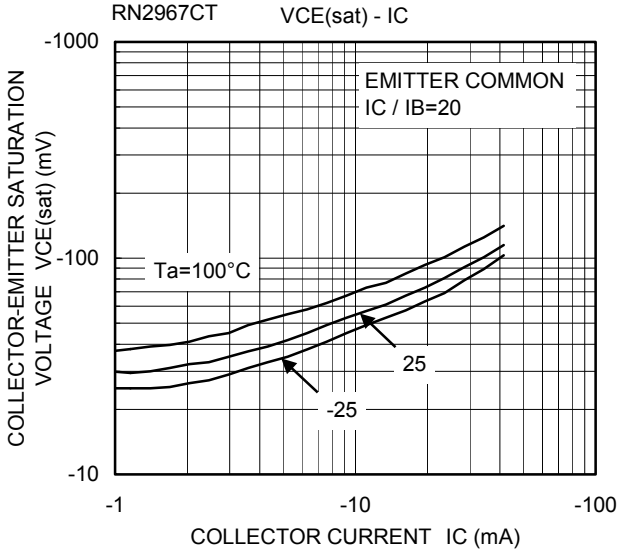

RN2968CT
IC - VI(OFF)
COLLECTOR CURRENT IC (μA)
-10000
-1000
-100
-10
EMITTER COMMON
VCE= -5V
Ta=100°C
25
-25
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
-1.6
INPUT VOLTAGE VI(OFF) (V)

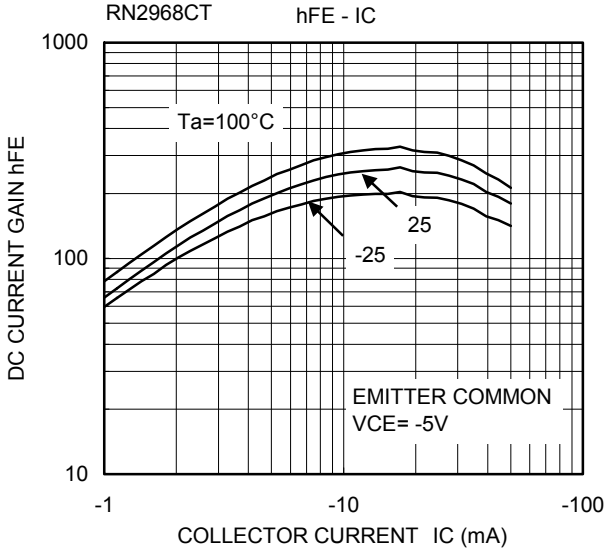

RN2969CT
IC - VI(ON)
COLLECTOR CURRENT IC(mA)
-100
-10
-1
-0.1
Ta=100℃
25
−25
EMITTER COMMON
VCE= −0.2V
-0.1
-1
-10
-100
INPUT VOLTAGE VI(ON) (V)

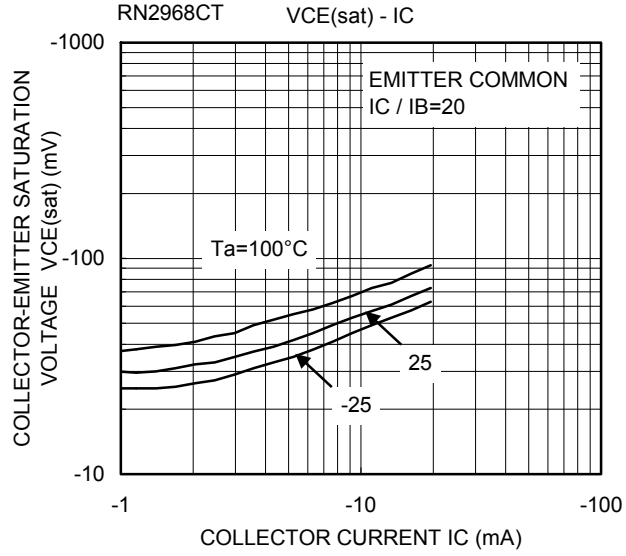

RN2969CT
IC - VI(OFF)
COLLECTOR CURRENT IC(μA)
-10000
-1000
-100
-10
Ta=100℃
25
−25
EMITTER COMMON
VCE= −5V
-0.6
-1
-1.4
-1.8
-2.2
-2.6
-3
INPUT VOLTAGE VI(OFF) (V)

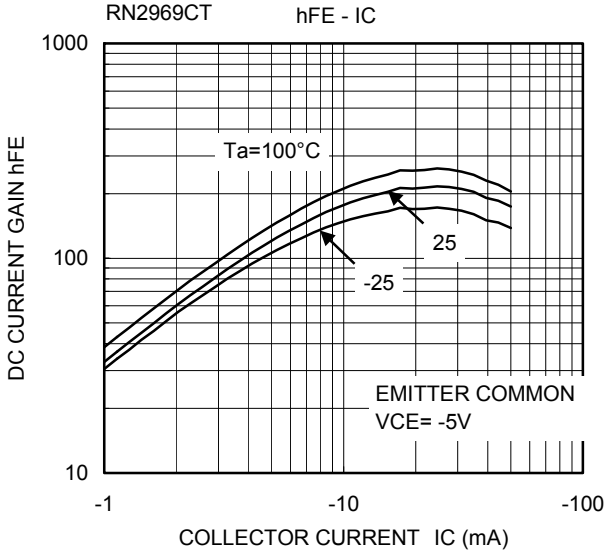
(Q1,Q2 common)

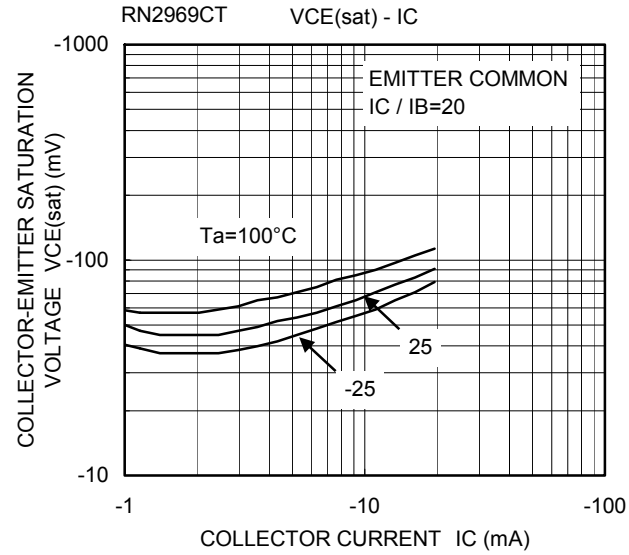

RN2967CT
hFE - IC
1000
100
10
DC CURRENT GAIN hFE
Ta=100°C
25
-25
EMITTER COMMON
VCE= -5V
-1
-10
-100
COLLECTOR CURRENT IC (mA)


RN2967CT
VCE(sat) - IC
-1000
-100
-10
COLLECTOR-EMITTER SATURATION VOLTAGE VCE(sat) (mV)
EMITTER COMMON
IC / IB=20
Ta=100°C
25
-25
-1
-10
-100
COLLECTOR CURRENT IC (mA)

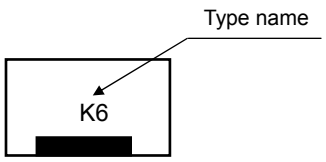
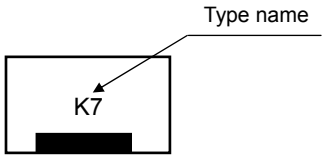
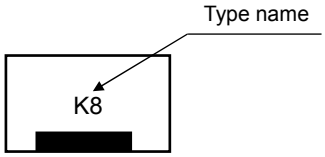

RN2968CT
hFE - IC
1000
100
10
DC CURRENT GAIN hFE
Ta=100°C
25
-25
EMITTER COMMON
VCE= -5V
-1
-10
-100
COLLECTOR CURRENT IC (mA)


RN2968CT
VCE(sat) - IC
-1000
-100
-10
COLLECTOR-EMITTER SATURATION VOLTAGE VCE(sat) (mV)
EMITTER COMMON
IC / IB=20
Ta=100°C
25
-25
-1
-10
-100
COLLECTOR CURRENT IC (mA)


RN2969CT
hFE - IC
1000
100
10
DC CURRENT GAIN hFE
Ta=100°C
25
-25
EMITTER COMMON
VCE= -5V
-1
-10
-100
COLLECTOR CURRENT IC (mA)


RN2969CT
VCE(sat) - IC
-1000
-100
-10
COLLECTOR-EMITTER SATURATION VOLTAGE VCE(sat) (mV)
EMITTER COMMON
IC / IB=20
Ta=100°C
25
-25
-1
-10
-100
COLLECTOR CURRENT IC (mA)

Marking

Type Name	Marking
RN2967CT	
RN2968CT	
RN2969CT	

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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