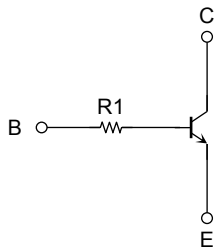
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

RN1970CT,RN1971CT

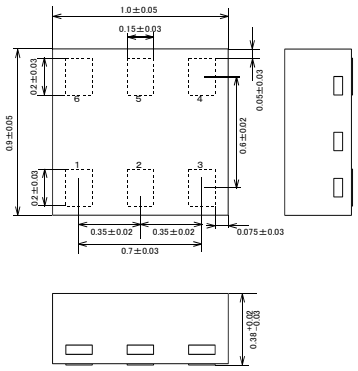
Switching, Inverter Circuit, Interface Circuit and
Driver Circuit Applications

- 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 RN2970CT, RN2971CT

Equivalent Circuit



Unit: mm



CST6	1.EMITTER1 2.EMITTER2 3.BASE2 4.COLLECTOR2 5.BASE1 6.COLLECTOR1
JEDEC	—
JEITA	—
TOSHIBA	2-1K1A

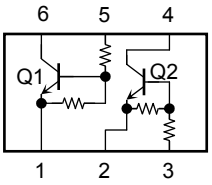
Weight:1.0mg (typ.)

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

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	20	V
Collector-emitter voltage	V_{CEO}	20	V
Emitter-base voltage	V_{EBO}	5	V
Collector current	I_C	50	mA
Collector power dissipation	$P_{C(Note1)}$	140	mW
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	−55 to 150	°C

Note1: Total rating

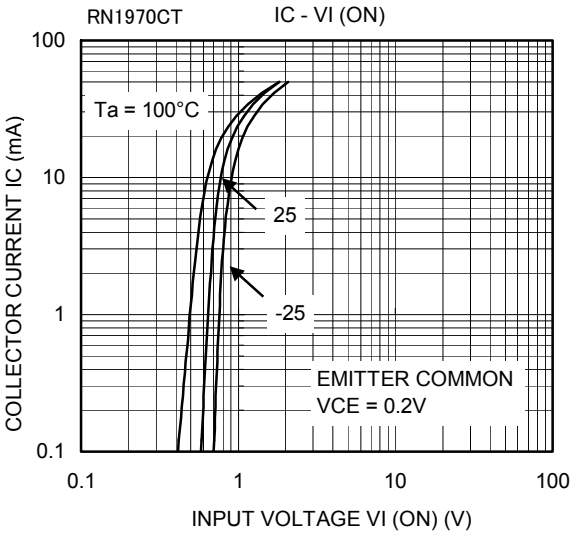
Equivalent Circuit (top view)

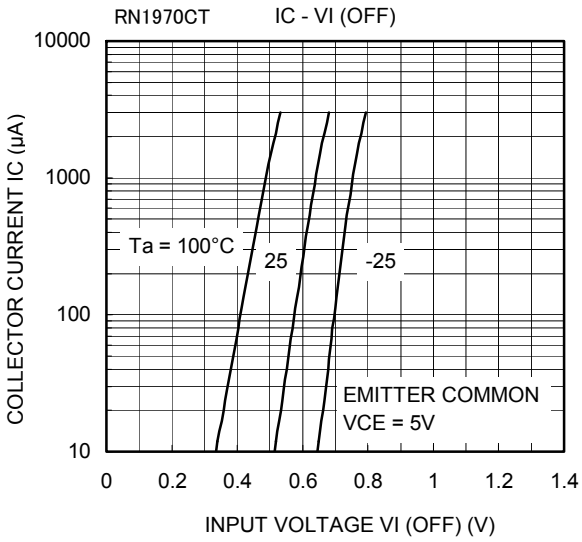


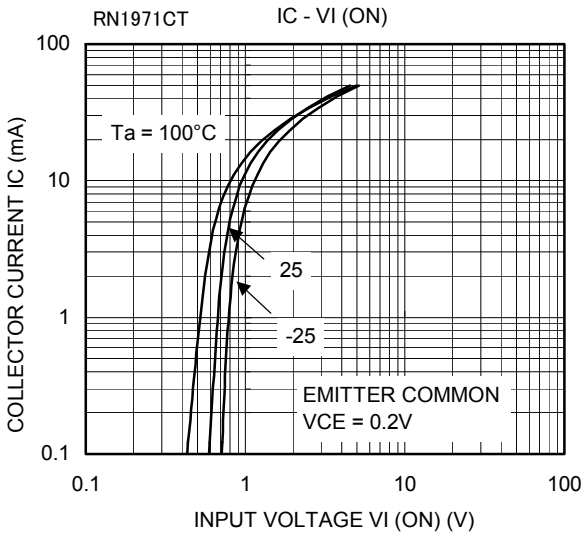
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e.operatingtemperature/current/voltage, etc.) are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

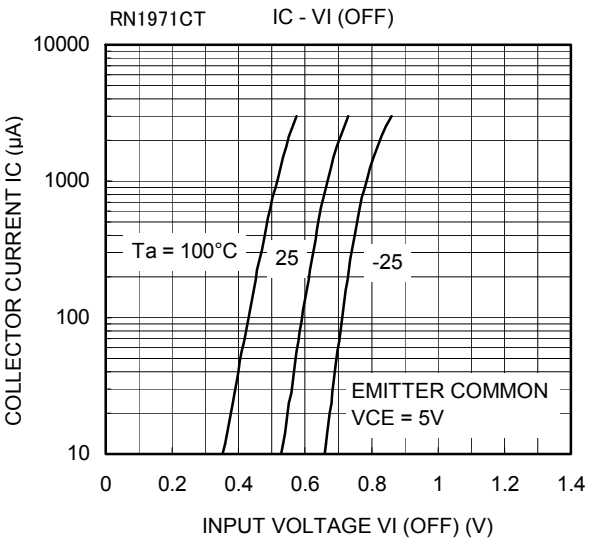
Electrical Characteristics (Ta = 25°C) (Q1, Q2 Common)

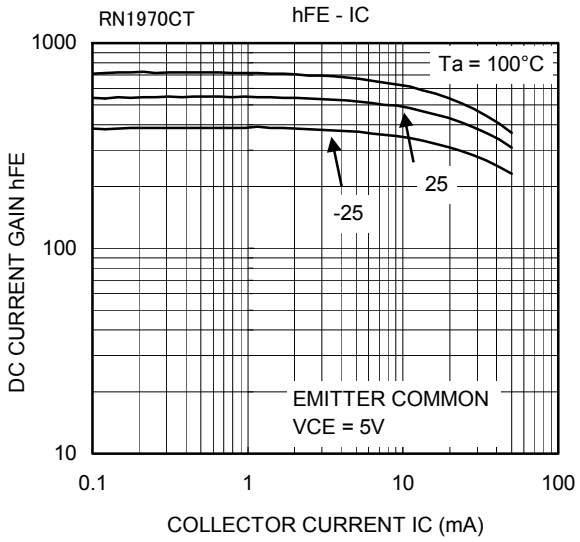
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		I_{CBO}	V_{CB} = 20 V, I_E = 0	—	—	100	nA
Emitter cut-off current		I_{EBO}	V_{EB} = 5 V, I_C = 0	—	—	100	nA
DC current gain		h_{FE}	V_{CE} = 5 V, I_C = 1 mA	300	—	—	
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	I_C = 5 mA, I_B = 0.25 mA	—		0.15	V
Collector output capacitance		C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1 MHz	—	1.2	—	pF
Input resistor	RN1970CT	R1	—	3.76	4.7	5.64	kΩ
	RN1971CT			8	10	12	

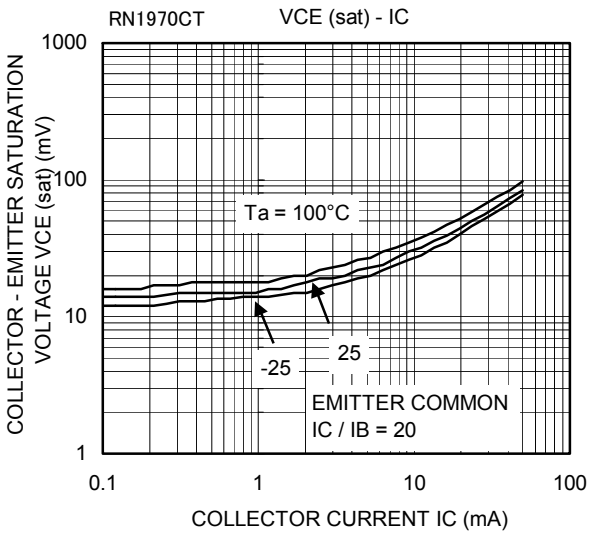

RN1970CT
IC - VI (ON)
COLLECTOR CURRENT IC (mA)
INPUT VOLTAGE VI (ON) (V)
Ta = 100°C
25
-25
EMITTER COMMON
VCE = 0.2V
100
10
1
0.1
0.1
1
10
100

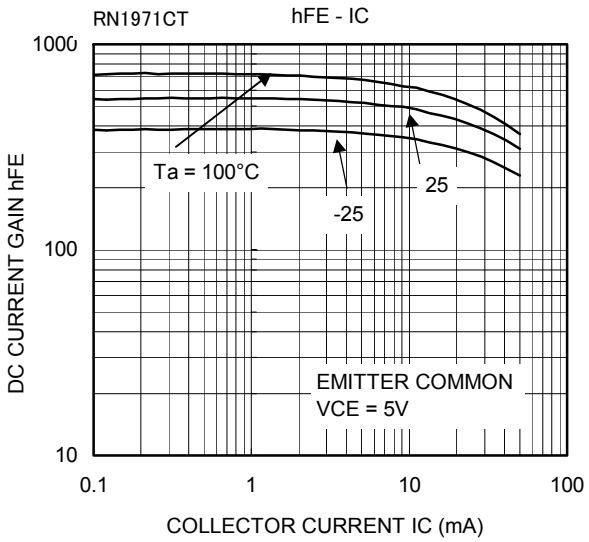

RN1970CT
IC - VI (OFF)
COLLECTOR CURRENT IC (μA)
INPUT VOLTAGE VI (OFF) (V)
Ta = 100°C
25
-25
EMITTER COMMON
VCE = 5V
10000
1000
100
10
0
0.2
0.4
0.6
0.8
1
1.2
1.4

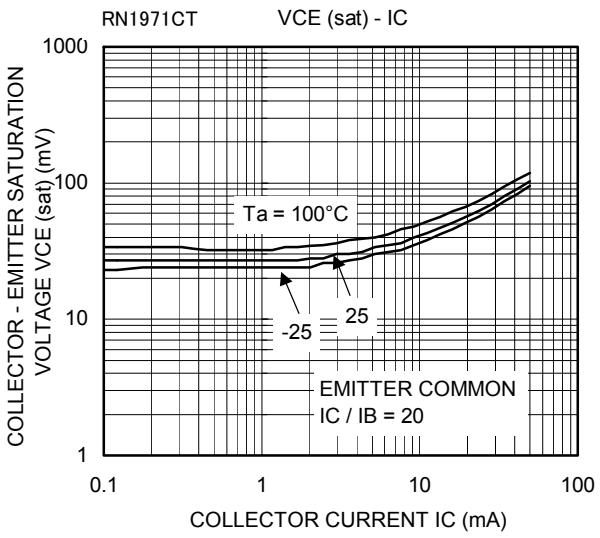

RN1971CT
IC - VI (ON)
COLLECTOR CURRENT IC (mA)
INPUT VOLTAGE VI (ON) (V)
Ta = 100°C
25
-25
EMITTER COMMON
VCE = 0.2V
100
10
1
0.1
0.1
1
10
100

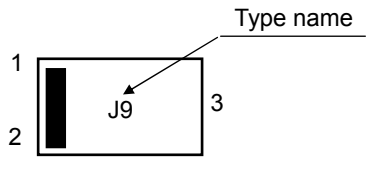
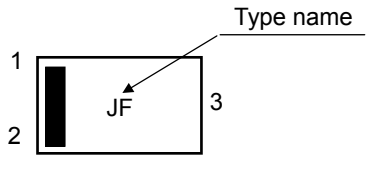

RN1971CT
IC - VI (OFF)
COLLECTOR CURRENT IC (μA)
INPUT VOLTAGE VI (OFF) (V)
Ta = 100°C
25
-25
EMITTER COMMON
VCE = 5V
10000
1000
100
10
0
0.2
0.4
0.6
0.8
1
1.2
1.4


RN1970CT
hFE - IC
1000
100
10
DC CURRENT GAIN hFE
Ta = 100°C
25
-25
EMITTER COMMON
VCE = 5V
0.1
1
10
100
COLLECTOR CURRENT IC (mA)


RN1970CT
VCE (sat) - IC
1000
100
10
1
COLLECTOR - EMITTER SATURATION VOLTAGE VCE (sat) (mV)
Ta = 100°C
-25
25
EMITTER COMMON
IC / IB = 20
0.1
1
10
100
COLLECTOR CURRENT IC (mA)


RN1971CT
hFE - IC
1000
100
10
DC CURRENT GAIN hFE
Ta = 100°C
25
-25
EMITTER COMMON
VCE = 5V
0.1
1
10
100
COLLECTOR CURRENT IC (mA)


RN1971CT
VCE (sat) - IC
1000
100
10
1
COLLECTOR - EMITTER SATURATION VOLTAGE VCE (sat) (mV)
Ta = 100°C
-25
25
EMITTER COMMON
IC / IB = 20
0.1
1
10
100
COLLECTOR CURRENT IC (mA)

Type Name	Marking
RN1970CT	
RN1971CT	

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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