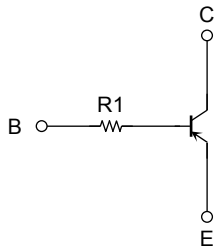
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

RN2972HFE,RN2973HFE

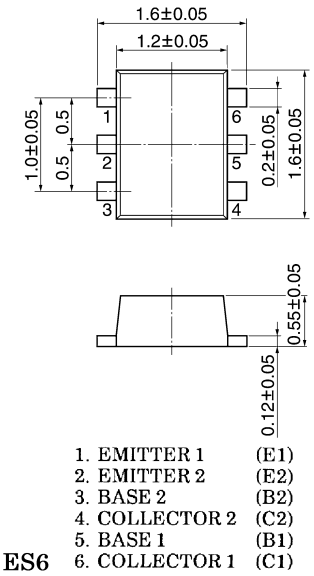
Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- 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 enable the manufacture of ever more compact equipment and save assembly cost.
- Complementary to RN1970HFE, RN1971HFE

Equivalent Circuit and Bias Resistor Values



Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	2−2N1A

Weight:0.003g (typ.)

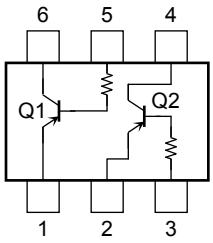
Absolute Maximum Ratings (Ta = 25°C) (Q1, Q2 common)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	−30	V
Collector-emitter voltage	V_{CEO}	−30	V
Emitter-base voltage	V_{EBO}	−5	V
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}	−55~150	°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

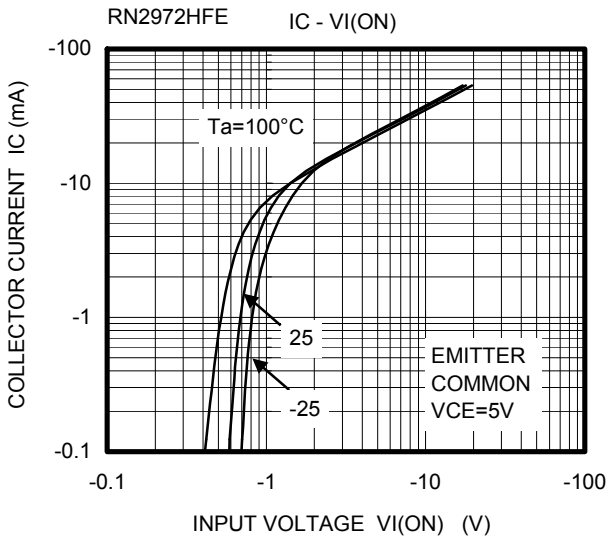
Equivalent Circuit (top view)

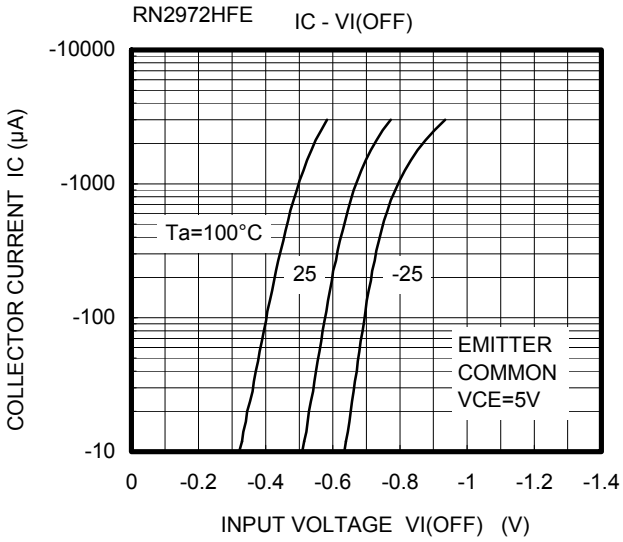


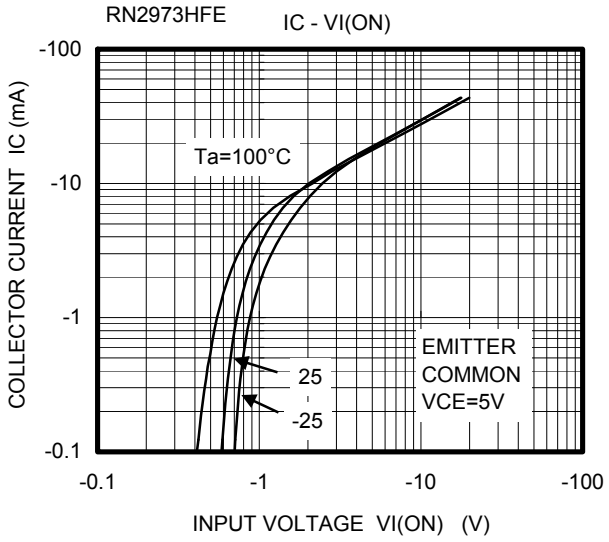
Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

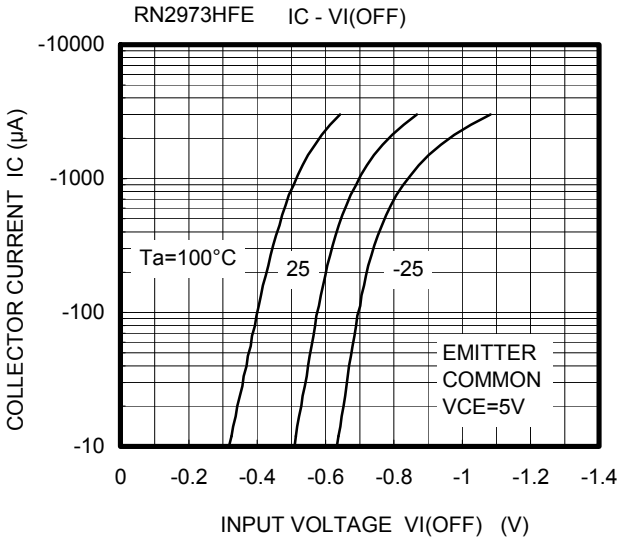
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		I_{CBO}	V_{CB} = −30 V, I_E = 0	—	—	−100	nA
Emitter cut-off current		I_{EBO}	V_{EB} = −5 V, I_C = 0	—	—	−100	nA
DC current gain		h_{FE}	V_{CE} = −5 V, I_C = −1 mA	300	—	—	
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	I_C = −5 mA, I_B = −0.25 mA	—	−0.06	−0.15	V
Transition frequency		f_T	V_{CE} = −10 V, I_C = −5 mA	—	200	—	MHz
Collector output capacitance		C_{ob}	V_{CB} = −10 V, I_E = 0, f = 1 MHz	—	3	—	pF
Input resistor	RN2972HFE	R1	—	17.6	22	26.4	kΩ
	RN2973HFE			37.6	47	56.4	

Q1,Q2 Common

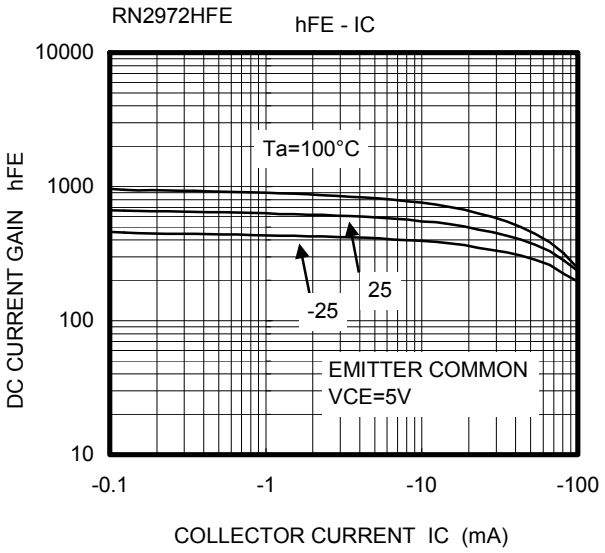

RN2972HFE
IC - VI(ON)
COLLECTOR CURRENT IC (mA)
-100
-10
-1
-0.1
Ta=100°C
25
-25
EMITTER
COMMON
VCE=5V
-0.1
-1
-10
-100
INPUT VOLTAGE VI(ON) (V)

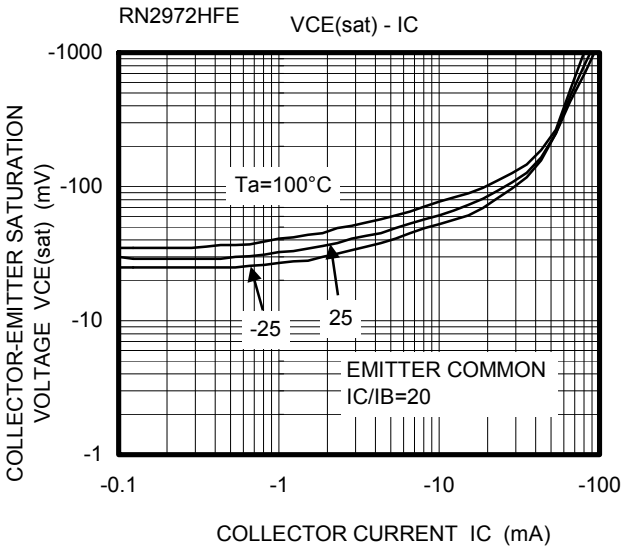

RN2972HFE
IC - VI(OFF)
COLLECTOR CURRENT IC (μA)
-10000
-1000
-100
-10
Ta=100°C
25
-25
EMITTER
COMMON
VCE=5V
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
INPUT VOLTAGE VI(OFF) (V)

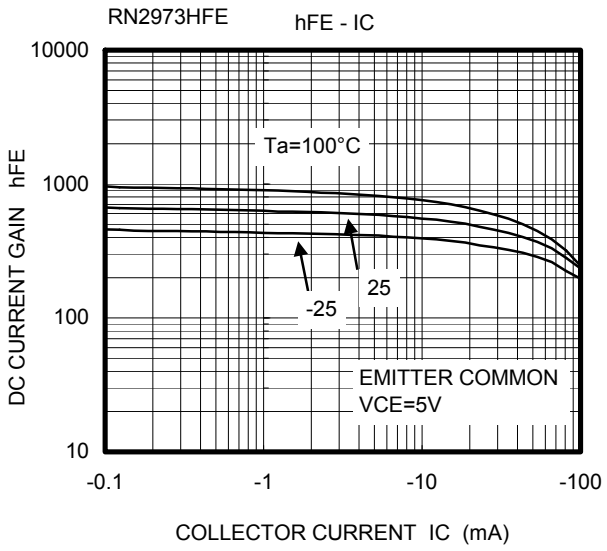

RN2973HFE
IC - VI(ON)
COLLECTOR CURRENT IC (mA)
-100
-10
-1
-0.1
Ta=100°C
25
-25
EMITTER
COMMON
VCE=5V
-0.1
-1
-10
-100
INPUT VOLTAGE VI(ON) (V)

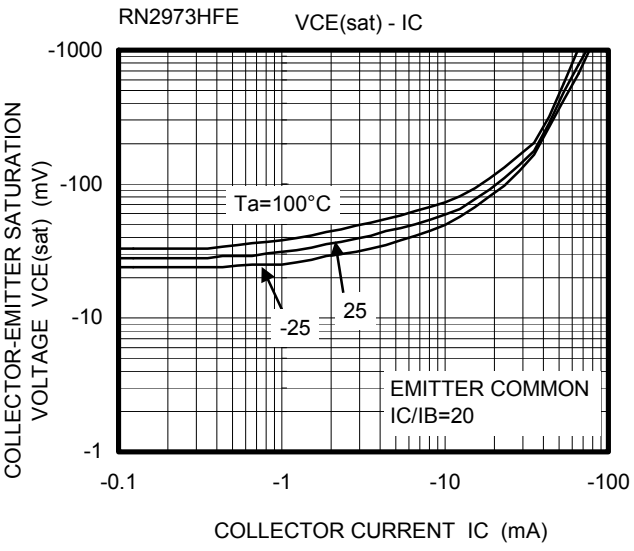

RN2973HFE
IC - VI(OFF)
COLLECTOR CURRENT IC (μA)
-10000
-1000
-100
-10
Ta=100°C
25
-25
EMITTER
COMMON
VCE=5V
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
INPUT VOLTAGE VI(OFF) (V)

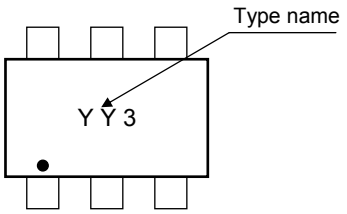
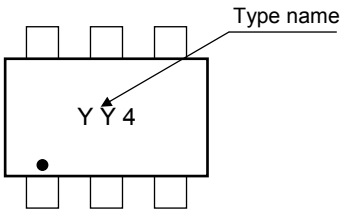
Q1,Q2 Common


RN2972HFE
hFE - IC
DC CURRENT GAIN hFE
10000
1000
100
10
Ta=100°C
25
-25
EMITTER COMMON
VCE=5V
-0.1
-1
-10
-100
COLLECTOR CURRENT IC (mA)


RN2972HFE
VCE(sat) - IC
COLLECTOR-EMITTER SATURATION VOLTAGE VCE(sat) (mV)
-1000
-100
-10
-1
Ta=100°C
-25
25
EMITTER COMMON
IC/IB=20
-0.1
-1
-10
-100
COLLECTOR CURRENT IC (mA)


RN2973HFE
hFE - IC
DC CURRENT GAIN hFE
10000
1000
100
10
Ta=100°C
25
-25
EMITTER COMMON
VCE=5V
-0.1
-1
-10
-100
COLLECTOR CURRENT IC (mA)


RN2973HFE
VCE(sat) - IC
COLLECTOR-EMITTER SATURATION VOLTAGE VCE(sat) (mV)
-1000
-100
-10
-1
Ta=100°C
-25
25
EMITTER COMMON
IC/IB=20
-0.1
-1
-10
-100
COLLECTOR CURRENT IC (mA)

Type Name	Marking
RN2972HFE	
RN2973HFE	

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