

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

RN49A2

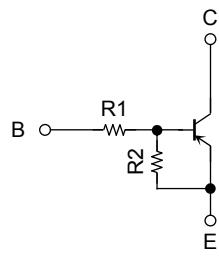
Switching, Inverter Circuit, Interface Circuit and
Driver Circuit Applications.

Unit: mm

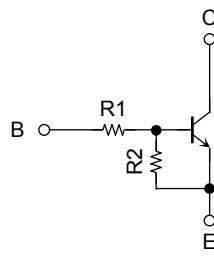
- Two devices are incorporated into an Ultra-Super-Mini (6-pin) package.
- Incorporating a bias resistor into a transistor reduces the parts count. Reducing the parts count enables the manufacture of ever more compact equipment and lowers assembly cost.

Equivalent Circuit and Bias Resistor Values

Q1



Q2



Q1

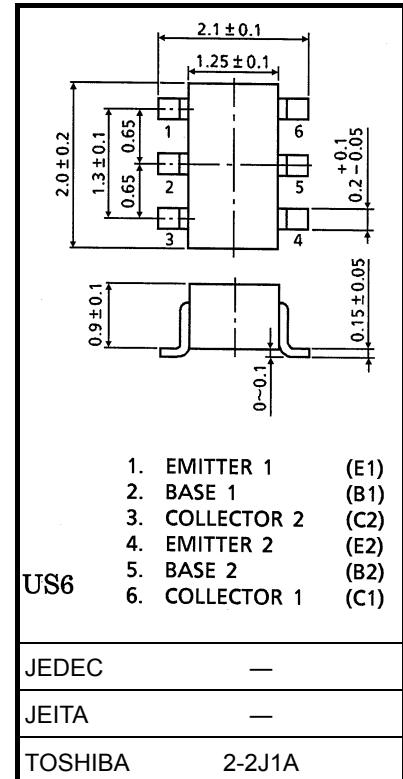
R1: 47 kΩ, R2: 47 kΩ

Q2

R1: 2.2 kΩ, R2: 47 kΩ

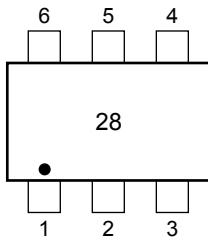
Q1: RN1104F equivalent

Q2: RN2105F equivalent

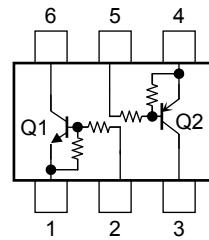


Weight: 0.006g (typ.)

Marking



Equivalent Circuit (top view)



Absolute Maximum Ratings (Ta = 25°C) (Q1)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	50	V
Collector-emitter voltage	V_{CEO}	50	V
Emitter-base voltage	V_{EBO}	10	V
Collector current	I_C	100	mA

Absolute Maximum Ratings (Ta = 25°C) (Q2)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	-50	V
Collector-emitter voltage	V_{CEO}	-50	V
Emitter-base voltage	V_{EBO}	-5	V
Collector current	I_C	-100	mA

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

Characteristics	Symbol	Rating	Unit
Collector power dissipation	P_C (Note 1)	200	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

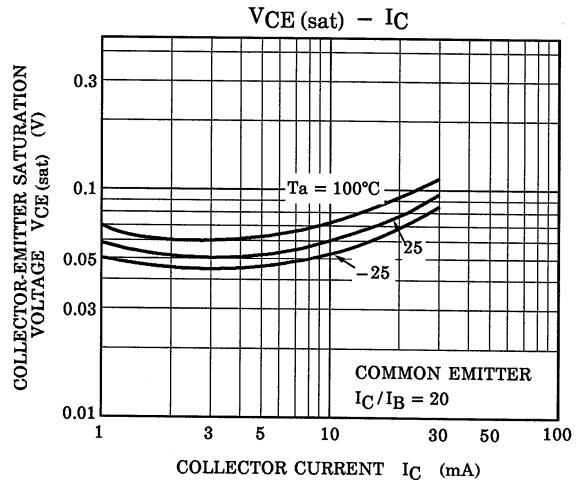
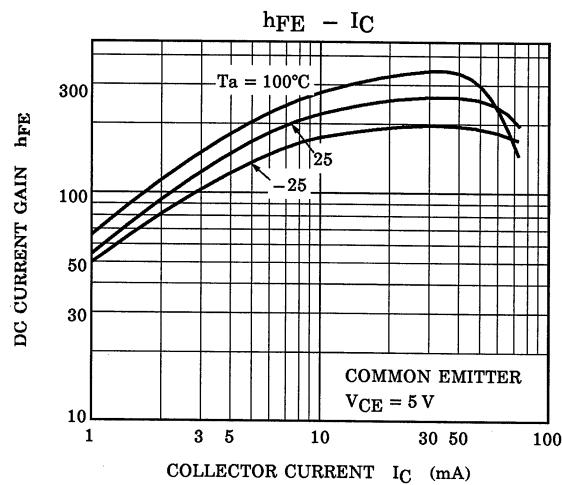
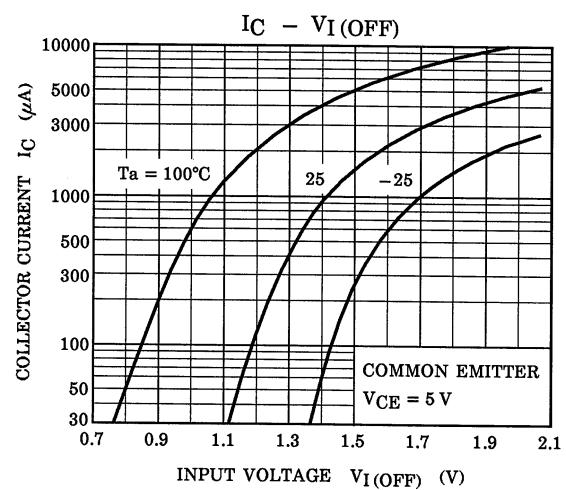
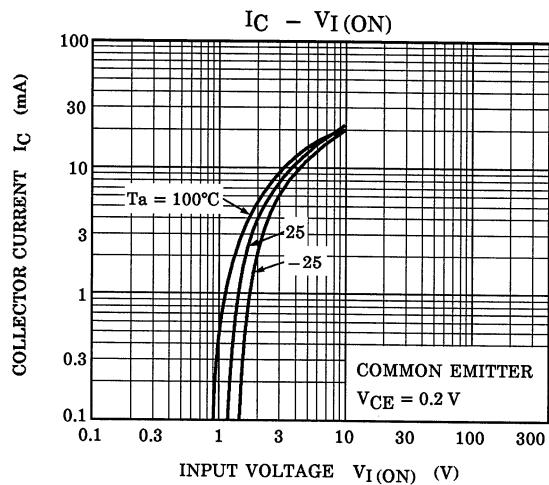
Electrical Characteristics (Ta = 25°C) (Q1)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I _{CBO}	V _{CB} = 50 V, I _E = 0	—	—	-100	nA
	I _{CEO}	V _{CE} = 50 V, I _B = 0	—	—	-500	
Emitter cut-off current	I _{EBO}	V _{EB} = 10 V, I _C = 0	0.082	—	0.15	mA
DC current gain	h _{FE}	V _{CE} = 5 V, I _C = 10 mA	80	—	—	
Collector-emitter saturation voltage	V _{CE} (sat)	I _C = 5 mA, I _B = 0.25 mA	—	0.1	0.3	V
Input voltage (ON)	V _I (ON)	V _{CE} = 0.2 V, I _C = 5 mA	1.5	—	5.0	V
Input voltage (OFF)	V _I (OFF)	V _{CE} = 5 V, I _C = 0.1 mA	1.0	—	1.5	V
Transition frequency	f _T	V _{CE} = 10 V, I _C = 5 mA	—	250	—	MHz
Collector output capacitance	C _{ob}	V _{CB} = 10 V, I _E = 0, f = 1 MHz	—	3	—	pF
Input resistance	R ₁	—	32.9	47	61.1	kΩ
Resistance ratio	R ₁ /R ₂	—	0.9	1.0	1.1	—

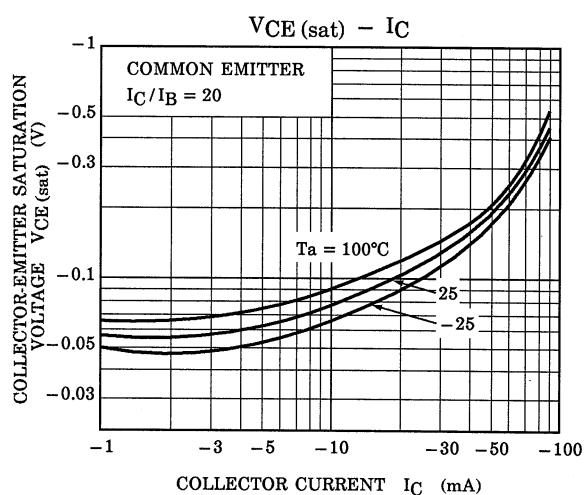
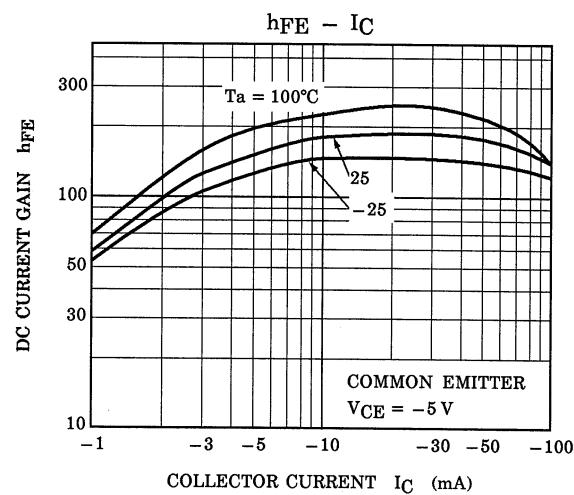
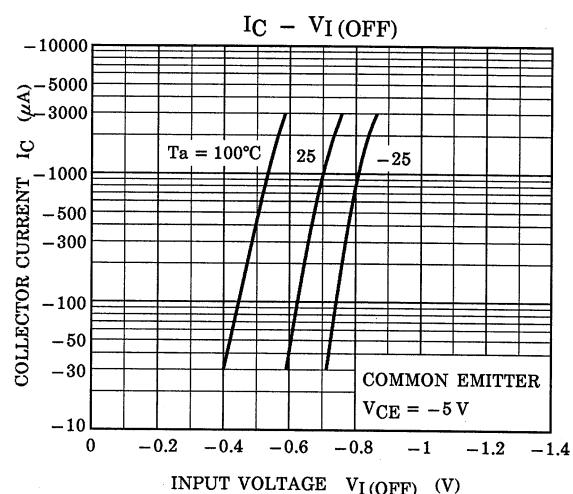
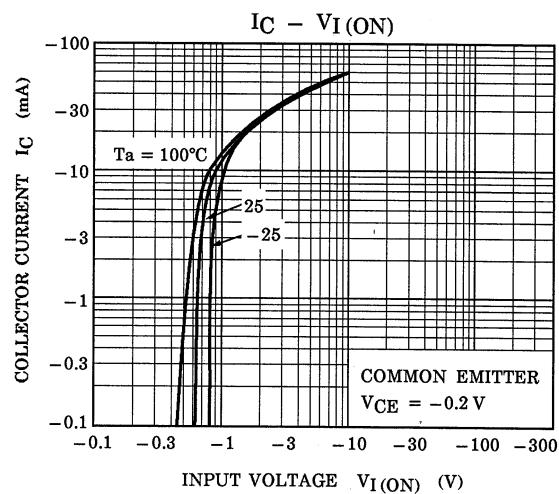
Electrical Characteristics (Ta = 25°C) (Q2)

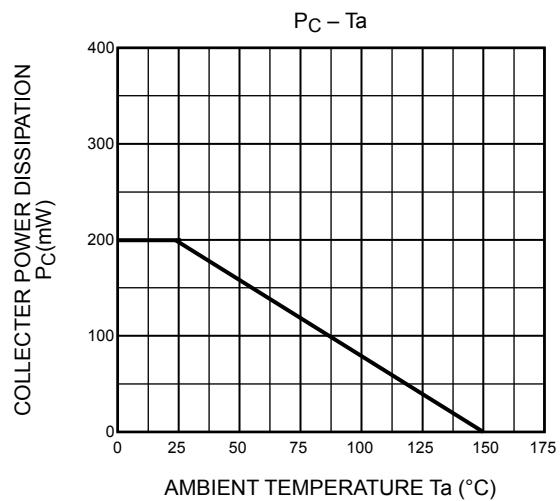
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I _{CBO}	V _{CB} = -50 V, I _E = 0	—	—	-100	nA
	I _{CEO}	V _{CE} = -50 V, I _B = 0	—	—	-500	
Emitter cut-off current	I _{EBO}	V _{EB} = -5 V, I _C = 0	-0.078	—	-0.145	mA
DC current gain	h _{FE}	V _{CE} = -5 V, I _C = -10 mA	80	—	—	
Collector-emitter saturation voltage	V _{CE} (sat)	I _C = -5 mA, I _B = -0.25 mA	—	-0.1	-0.3	V
Input voltage (ON)	V _I (ON)	V _{CE} = -0.2 V, I _C = -5 mA	-0.6	—	-1.1	V
Input voltage (OFF)	V _I (OFF)	V _{CE} = -5 V, I _C = -0.1 mA	-0.5	—	-0.8	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 f=1MHz	—	3	—	pF
Input resistance	R ₁	—	1.54	2.2	2.86	kΩ
Resistance ratio	R ₁ /R ₂	—	0.0421	0.0468	0.0515	—

Q1



Q2



Q1,Q2 COMMON

RESTRICTIONS ON PRODUCT USE

20070701-EN GENERAL

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