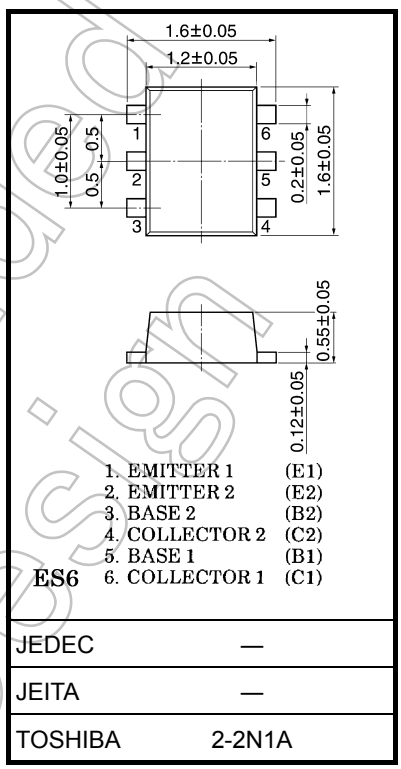
TOSHIBA Transistor Silicon NPN・PNP Epitaxial Type
(PCT Process) (Bias Resistor built-in Transistor)

RN4962FE

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 enables the manufacture of ever more compact equipment and lowers assembly cost.

Unit: mm

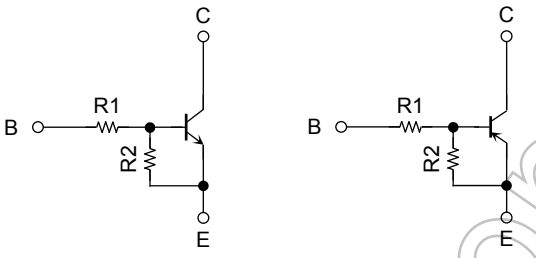


JEDEC	—
JEITA	—
TOSHIBA	2-2N1A

Weight: 0.003 g (typ.)

Equivalent Circuit and Bias Resistor Values

Q1 **Q2**

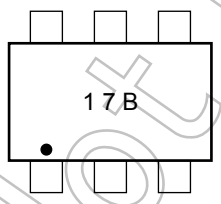


R1: 10 kΩ

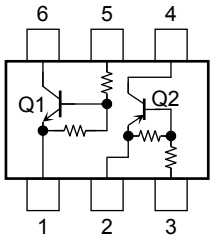
R2: 10 kΩ

(Q1, Q2 common)

Marking



Equivalent Circuit (top view)



Start of commercial production
2000-05

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}	−10	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)	100	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).

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	0.38	—	0.71	mA
DC current gain	h_{FE}	V_{CE} = 5 V, I_C = 10 mA	50	—	—	
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	1.2	—	2.4	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} = 50 V, I_C = 0	—	250	—	MHz
Collector output capacitance	C_{ob}	V_{CB} = 50 V, I_E = 0, f = 1 MHz	—	3	6	pF

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

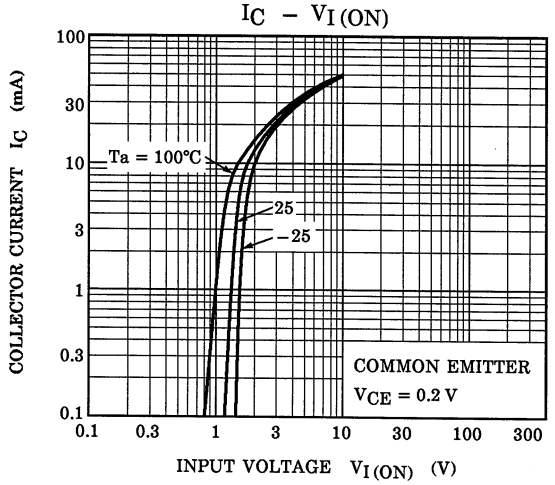
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	V_{CB} = −50 V, I_E = 0	—	—	−100	nA
	I_{CEO}	V_{CE} = −50 V, I_B = 0	—	—	−500	
Emitter cut-off current	I_{EBO}	V_{EB} = −10 V, I_C = 0	−0.38	—	−0.71	mA
DC current gain	h_{FE}	V_{CE} = −5 V, I_C = −10 mA	50	—	—	
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	−1.2	—	−2.4	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} = −50 V, I_C = 0	—	200	—	MHz
Collector output capacitance	C_{ob}	V_{CB} = −50 V, I_E = 0, f = 1 MHz	—	3	6	pF

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

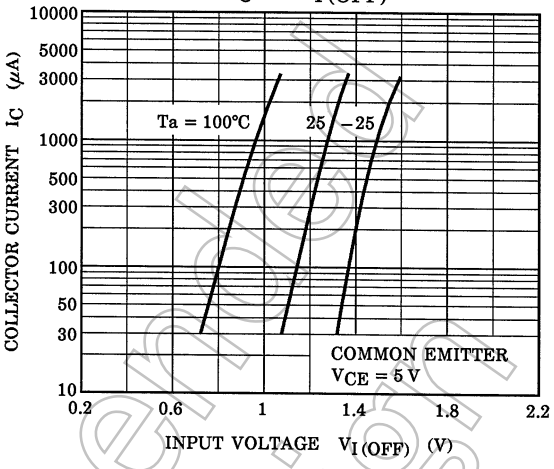
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Input resistor	R1	—	7	10	13	kΩ
Resistor ratio	R1/R2	—	0.9	1.0	1.1	

Q1

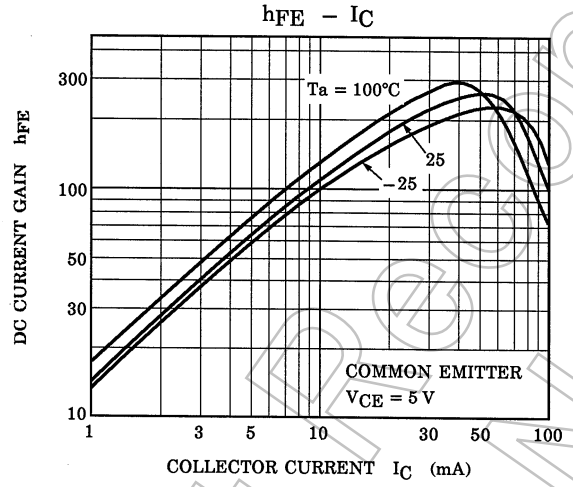
I_C – $V_{I\,(ON)}$



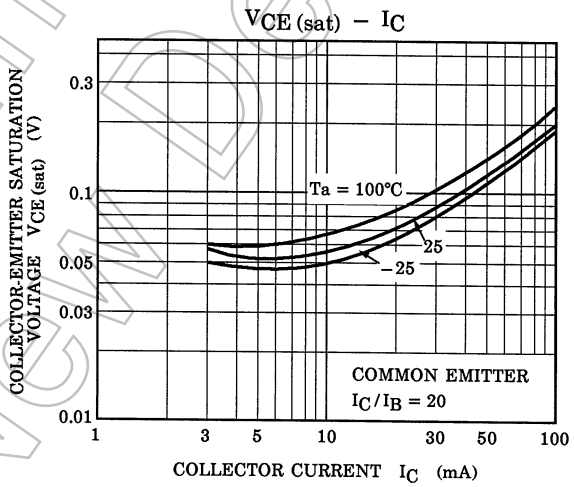
I_C – $V_{I\,(OFF)}$



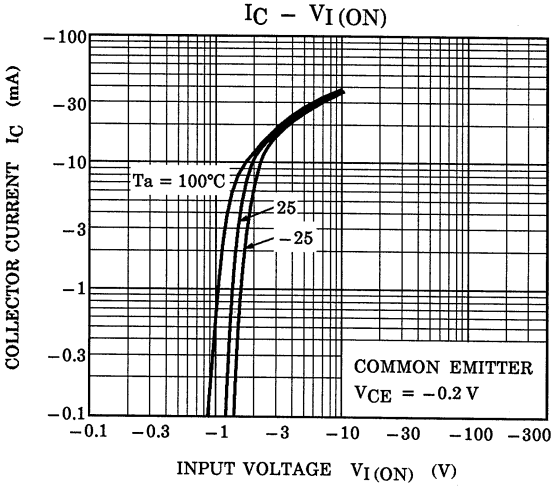
h_{FE} – I_C

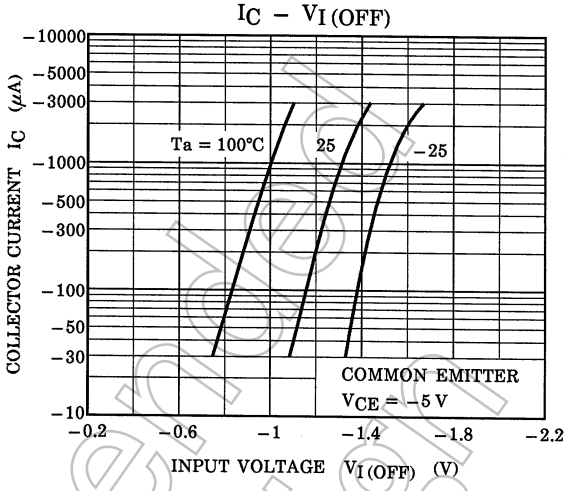


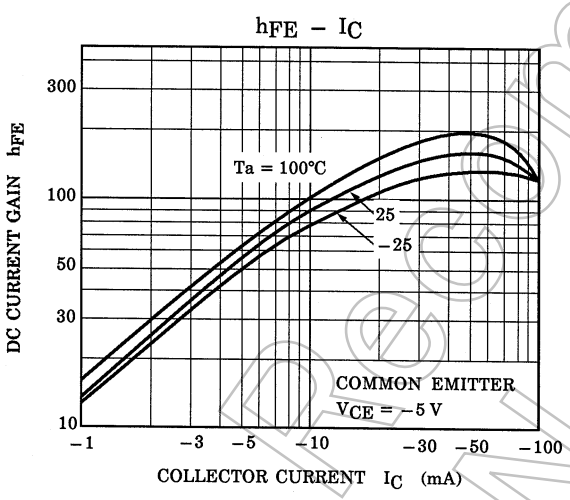
$V_{CE\,(sat)}$ – I_C

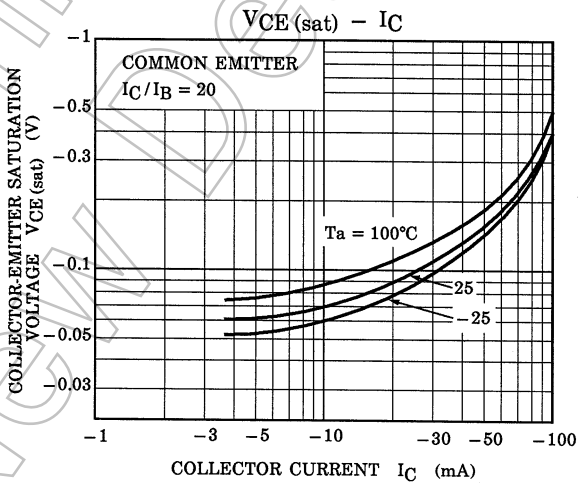


Q2









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