Unit: mm

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

RN47A1JE

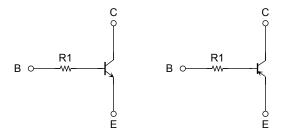
Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- Two devices are incorporated into an Extreme-Super-Mini (5 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.

Equivalent Circuit and Bias Resistor Values

Q1

Q2



R1: 4.7 kΩ (Q1, Q2 common)

Q1: RN1110F Q2: RN2110F

1.6±0.05

1.EMITTER1 (E1)
2.BASE1 (B1)
3.EMITTER2 (E2)
4.COLLECTOR2 (C2)
5.COLLECTOR1 (C1)
ESV BASE2 (B2)

JEDEC —

JEITA —

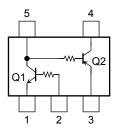
TOSHIBA 2-2P1E

Weight: 0.003g (typ.)

Marking

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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}	5	V
Collector current	IC	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	IC	-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	Tj	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).

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Note 1: Total rating

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

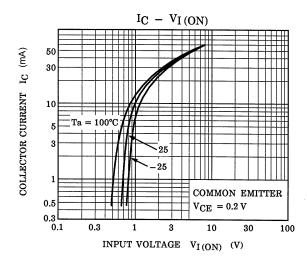
Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Collector cut-off current	I _{CBO}	$V_{CB} = 50 \text{ V}, I_{E} = 0$	_	_	100	nA
Emitter cut-off current	I _{EBO}	V _{EB} = 5 V, I _C = 0	_	_	100	nA
DC current gain	h _{FE}	V _{CE} = 5 V, I _C = 1 mA	120	_	700	
Collector-emitter saturation voltage	V _{CE (sat)}	$I_C = 5 \text{ mA}, I_B = 0.25 \text{ mA}$		0.1	0.3	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 resistor	R1	_	3.29	4.7	6.11	kΩ

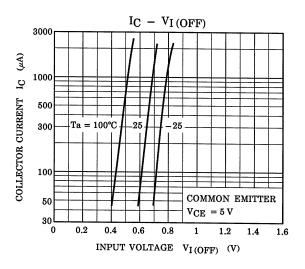
Electrical Characteristics (Ta = 25°C) (Q2)

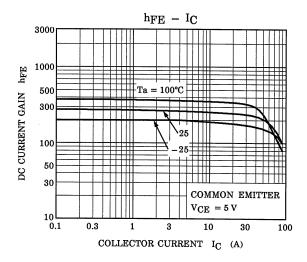
Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Collector cut-off current	I _{CBO}	$V_{CB} = -50 \text{ V}, I_E = 0$	_	_	-100	nA
Emitter cut-off current	I _{EBO}	$V_{EB} = -5 \text{ V}, I_{C} = 0$	_	_	-100	nA
DC current gain	h _{FE}	$V_{CE} = -5 \text{ V}, I_{C} = -1 \text{ mA}$	120	_	700	
Collector-emitter saturation voltage	V _{CE} (sat)	$I_C = -5 \text{ mA}, I_B = -0.25 \text{ mA}$	_	-0.1	-0.3	V
Transition frequency	f _T	$V_{CE} = -10 \text{ V}, I_{C} = -5 \text{ mA}$	_	200	_	MHz
Collector output capacitance	C _{ob}	$V_{CB} = -10 \text{ V}, I_E = 0, f = 1 \text{ MHz}$	_	3	_	pF
Input resistor	R1	_	3.29	4.7	6.11	kΩ

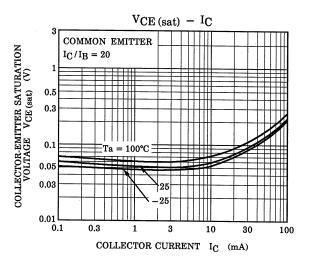
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Q1

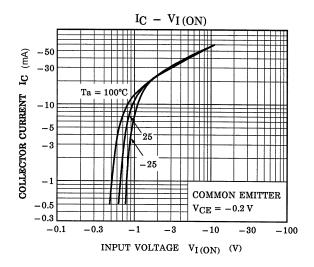


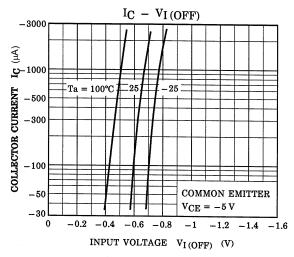


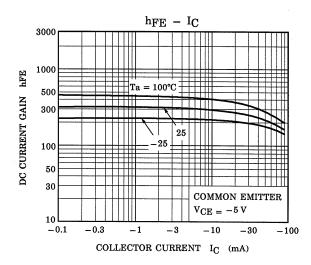


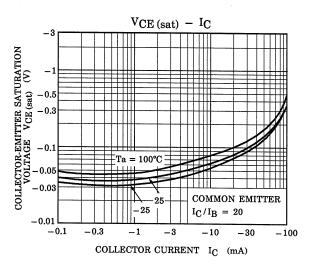


Q2

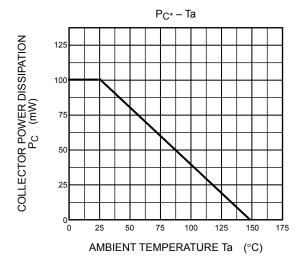








Q1, Q2 Common



^{*}Total Rating.

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