

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

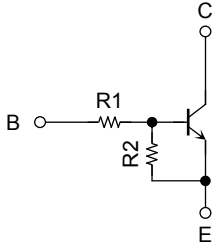
RN47A4JE

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



Q1

R1: 47 kΩ, R2: 47 kΩ

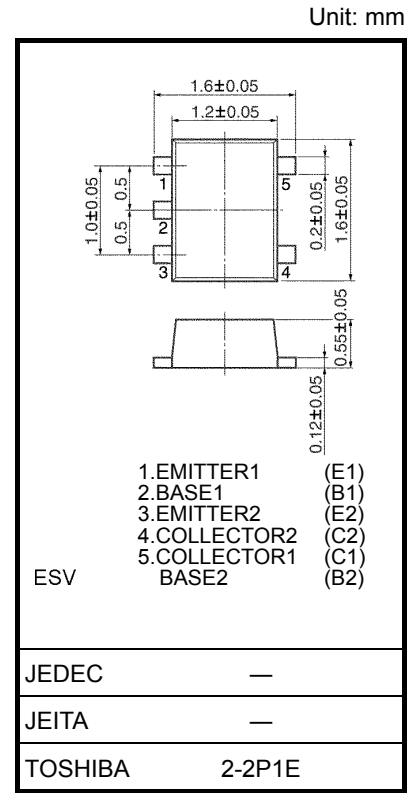
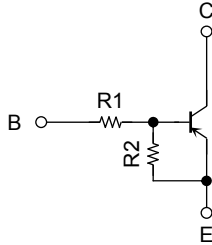
Q2

R1: 10 kΩ, R2: 47 kΩ

Q1: RN1104F

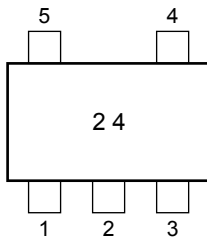
Q2: RN2107F

Q2

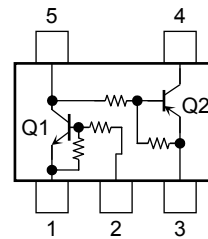


Weight: 0.003g (typ.)

Marking



Equivalent Circuit (top view)



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

| Characteristics | Symbol | Rating | Unit |
|---------------------------|------------------|--------|------|
| Collector-base voltage | V _{CB0} | 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 _{CB0} | -50 | V |
| Collector-emitter voltage | V _{CEO} | -50 | V |
| Emitter-base voltage | V _{EBO} | -6 | 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} | -55~150 | °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

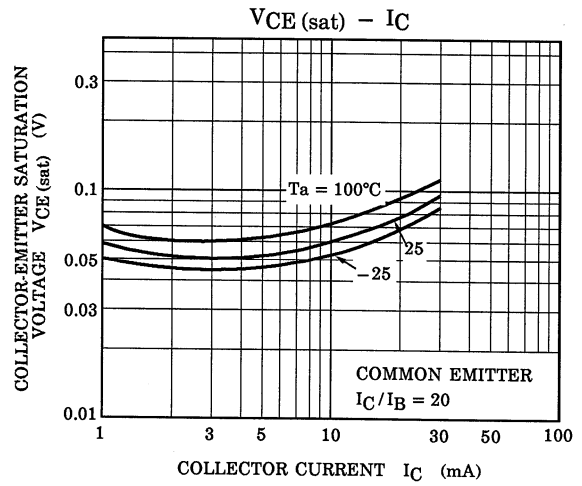
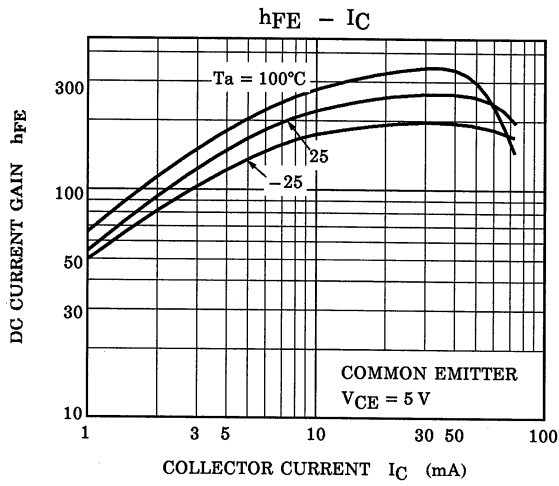
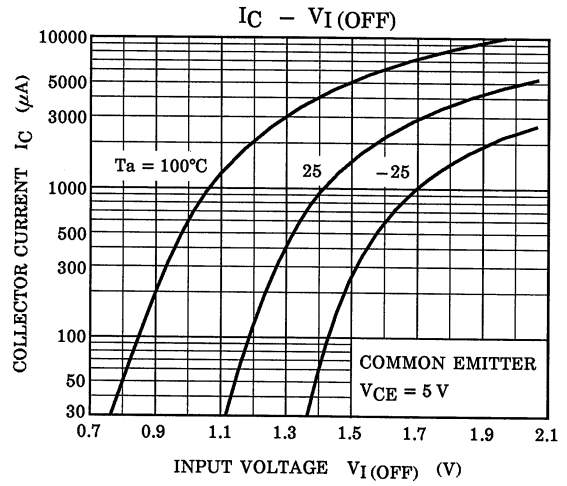
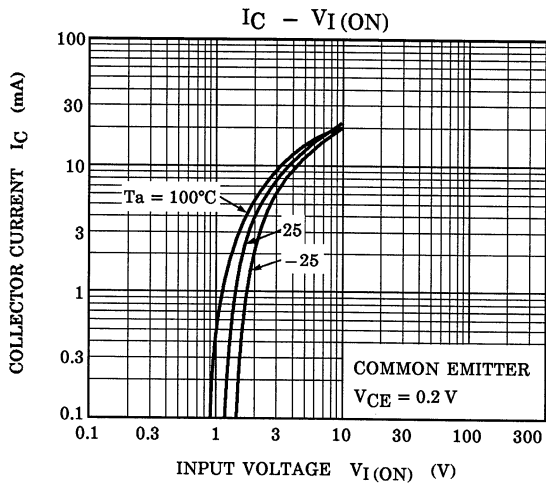
Electrical Characteristics (Ta = 25°C) (Q1)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|---------------|---------------------------------------------------|-------|------|------|------------|
| Collector cut-off current | I_{CBO} | $V_{CB} = 50\text{ V}, I_E = 0$ | — | — | 100 | nA |
| | I_{CEO} | $V_{CE} = 50\text{ V}, I_B = 0$ | — | — | 500 | |
| Emitter cut-off current | I_{EBO} | $V_{EB} = 10\text{ V}, I_C = 0$ | 0.082 | — | 0.15 | mA |
| DC current gain | h_{FE} | $V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$ | 80 | — | — | |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C = 5\text{ mA}, I_B = 0.25\text{ mA}$ | — | 0.1 | 0.3 | V |
| Input voltage (ON) | $V_I(ON)$ | $V_{CE} = 0.2\text{ V}, I_C = 5\text{ mA}$ | 1.5 | — | 5.0 | V |
| Input voltage (OFF) | $V_I(OFF)$ | $V_{CE} = 5\text{ V}, I_C = 0.1\text{ mA}$ | 1.0 | — | 1.5 | V |
| Transition frequency | f_T | $V_{CE} = 10\text{ V}, I_C = 5\text{ mA}$ | — | 250 | — | MHz |
| Collector output capacitance | C_{ob} | $V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$ | — | 3 | — | pF |
| Input resistor | R1 | — | 32.9 | 47 | 61.1 | k Ω |
| Resistor ratio | R1/R2 | — | 0.8 | 1.0 | 1.2 | |

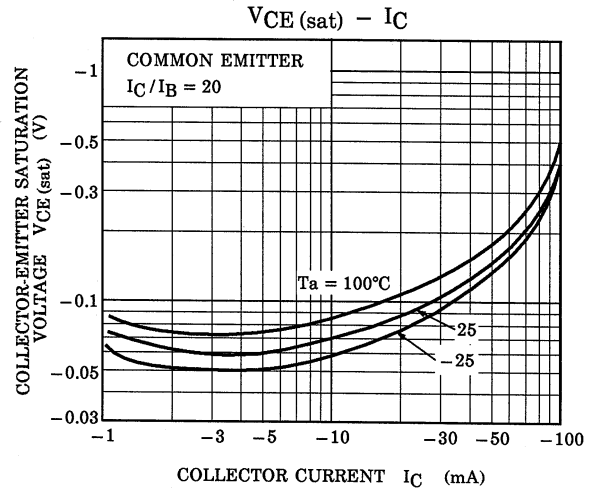
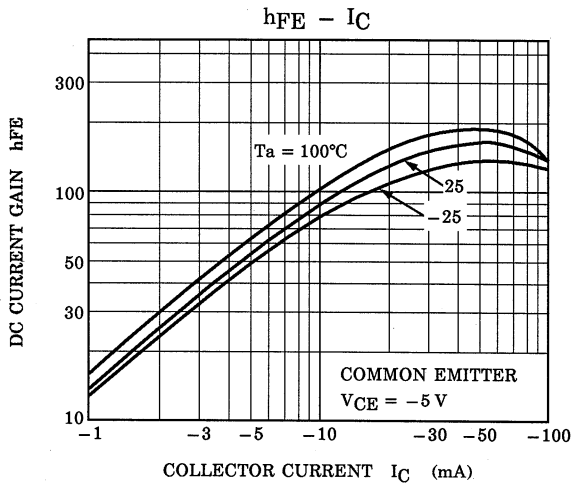
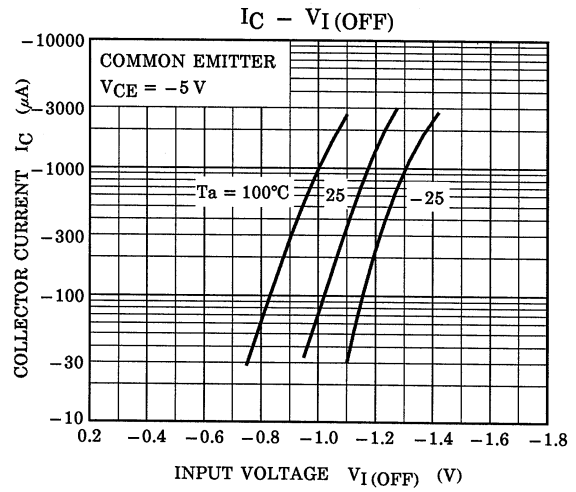
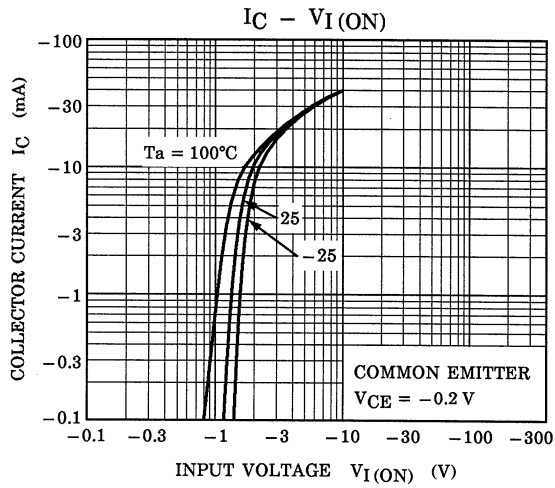
Electrical Characteristics (Ta = 25°C) (Q2)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|---------------|----------------------------------------------------|--------|-------|-------|------------|
| Collector cut-off current | I_{CBO} | $V_{CB} = -50\text{ V}, I_E = 0$ | — | — | -100 | nA |
| | I_{CEO} | $V_{CE} = -50\text{ V}, I_B = 0$ | — | — | -500 | |
| Emitter cut-off current | I_{EBO} | $V_{EB} = -6\text{ V}, I_C = 0$ | -0.081 | — | -0.15 | mA |
| DC current gain | h_{FE} | $V_{CE} = -5\text{ V}, I_C = -10\text{ mA}$ | 80 | — | — | |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C = -5\text{ mA}, I_B = -0.25\text{ mA}$ | — | -0.1 | -0.3 | V |
| Input voltage (ON) | $V_I(ON)$ | $V_{CE} = -0.2\text{ V}, I_C = -5\text{ mA}$ | -0.7 | — | -1.8 | V |
| Input voltage (OFF) | $V_I(OFF)$ | $V_{CE} = -5\text{ V}, I_C = -0.1\text{ mA}$ | -0.5 | — | -1.0 | 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 | — | 7 | 10 | 13 | k Ω |
| Resistor ratio | R1/R2 | — | 0.171 | 0.213 | 0.255 | |

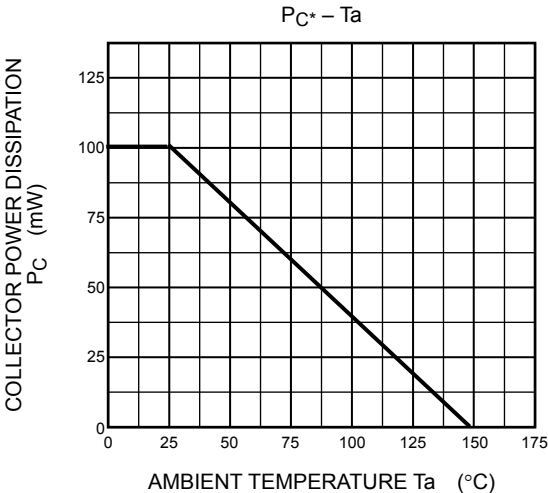
Q1



Q2



Q1, Q2 Common



*Total Rating.

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