

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

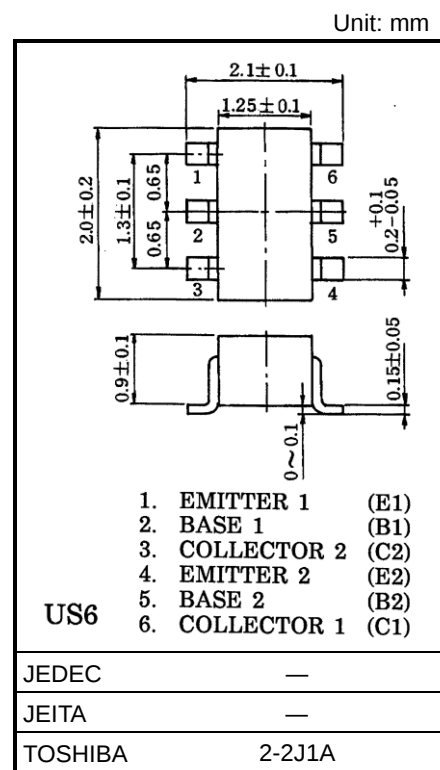
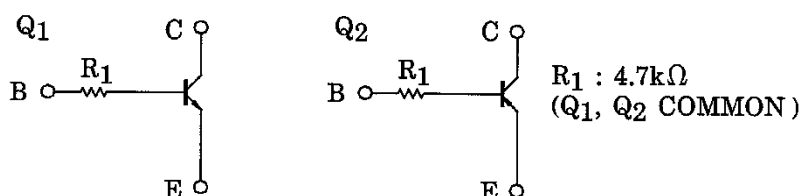
# RN4990

Switching, Inverter Circuit, Interface Circuit and Driver Circuit

- AEC-Q101 Qualified (Note1)
- Including two devices in US6 (ultra super mini type with 6 leads)
- With built-in bias resistors
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process and miniaturize equipment.

Note1: For detail information, please contact to our sales.

## Equivalent Circuit and Bias Resister Values



Weight: 6.8mg (typ.)

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

| Characteristic            | 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   |

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

| Characteristic            | 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   |

Start of commercial production  
1992-10

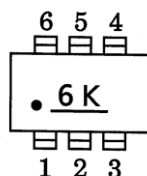
### Q1, Q2 Common Absolute Maximum Ratings (Ta = 25°C)

| Characteristic              | Symbol           | Rating     | Unit |
|-----------------------------|------------------|------------|------|
| Collector power dissipation | P <sub>C</sub> * | 200        | mW   |
| Junction temperature        | T <sub>j</sub>   | 150        | °C   |
| Storage temperature range   | T <sub>stg</sub> | -55 to 150 | °C   |

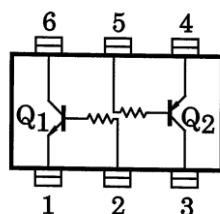
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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).

\* Total rating

### Marking



### Equivalent Circuit (Top View)



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

| Characteristic                       | Symbol                | Test Condition                                           | Min | Typ. | Max | Unit |
|--------------------------------------|-----------------------|----------------------------------------------------------|-----|------|-----|------|
| Collector cut-off current            | ICBO                  | V <sub>CB</sub> = 50 V, I <sub>E</sub> = 0 mA            | —   | —    | 100 | nA   |
| Emitter cut-off current              | IEBO                  | V <sub>EB</sub> = 5 V, I <sub>C</sub> = 0 mA             | —   | —    | 100 | nA   |
| DC current gain                      | h <sub>FE</sub>       | V <sub>CE</sub> = 5 V, I <sub>C</sub> = 1 mA             | 120 | —    | 700 | —    |
| Collector-emitter saturation voltage | V <sub>CE (sat)</sub> | I <sub>C</sub> = 5 mA, I <sub>B</sub> = 0.25 mA          | —   | 0.1  | 0.3 | V    |
| Transition frequency                 | f <sub>T</sub>        | V <sub>CE</sub> = 10 V, I <sub>C</sub> = 5 mA            | —   | 250  | —   | MHz  |
| Collector output capacitance         | C <sub>ob</sub>       | V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0 mA, f = 1 MHz | —   | 3    | 6   | pF   |

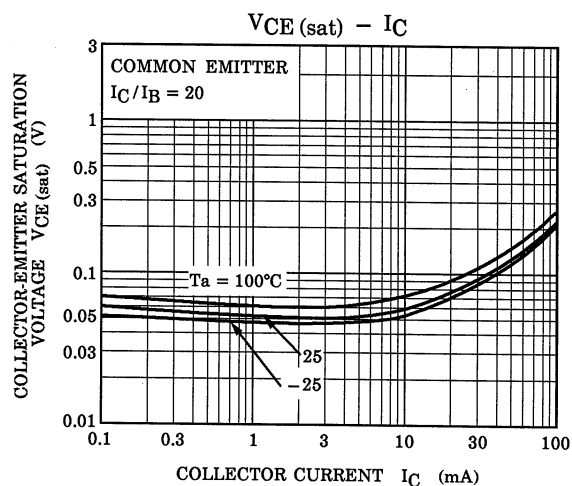
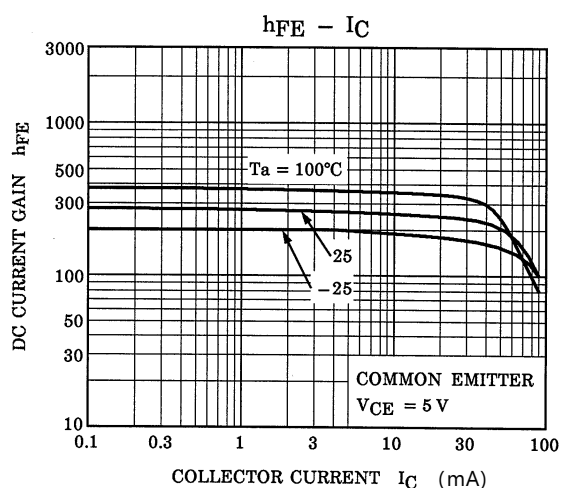
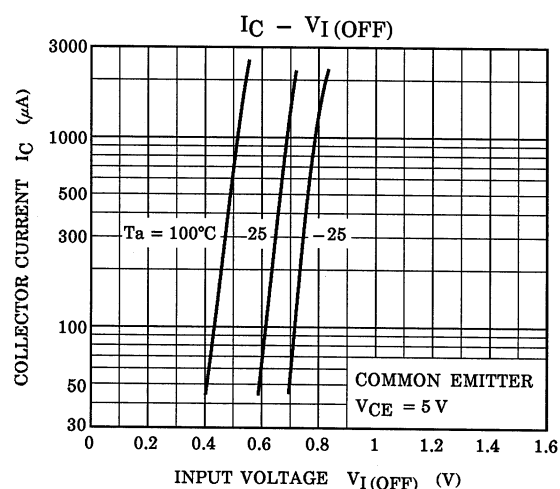
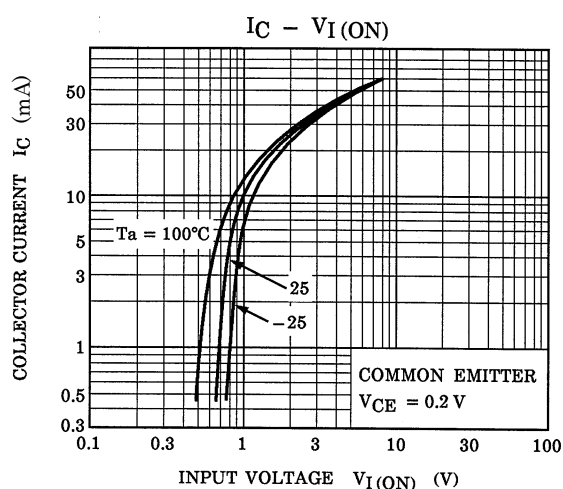
### Q2 Electrical Characteristics (Ta = 25°C)

| Characteristic                       | Symbol                | Test Condition                                            | Min | Typ. | Max  | Unit |
|--------------------------------------|-----------------------|-----------------------------------------------------------|-----|------|------|------|
| Collector cut-off current            | ICBO                  | V <sub>CB</sub> = -50 V, I <sub>E</sub> = 0 mA            | —   | —    | -100 | nA   |
| Emitter cut-off current              | IEBO                  | V <sub>EB</sub> = -5 V, I <sub>C</sub> = 0 mA             | —   | —    | -100 | nA   |
| DC current gain                      | h <sub>FE</sub>       | V <sub>CE</sub> = -5 V, I <sub>C</sub> = -1 mA            | 120 | —    | 400  | —    |
| Collector-emitter saturation voltage | V <sub>CE (sat)</sub> | I <sub>C</sub> = -5 mA, I <sub>B</sub> = -0.25 mA         | —   | -0.1 | -0.3 | V    |
| Transition frequency                 | f <sub>T</sub>        | V <sub>CE</sub> = -10 V, I <sub>C</sub> = -5 mA           | —   | 200  | —    | MHz  |
| Collector output capacitance         | C <sub>ob</sub>       | V <sub>CB</sub> = -10 V, I <sub>E</sub> = 0 mA, f = 1 MHz | —   | 3    | 6    | pF   |

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

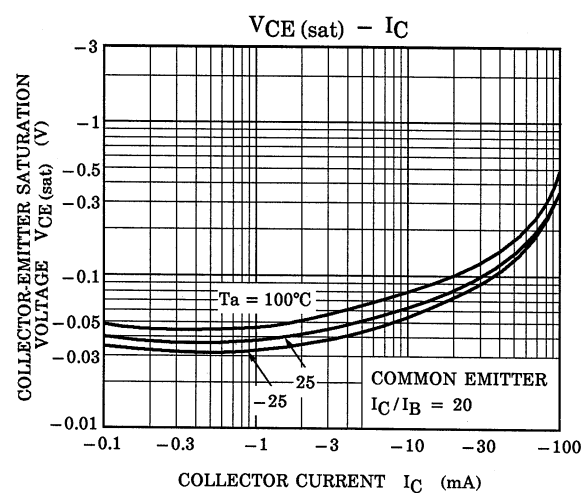
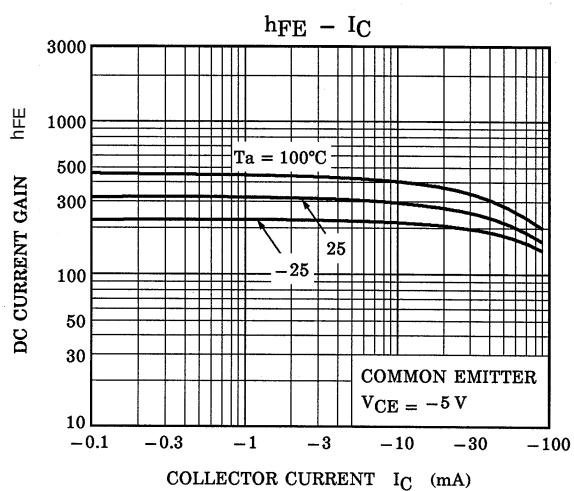
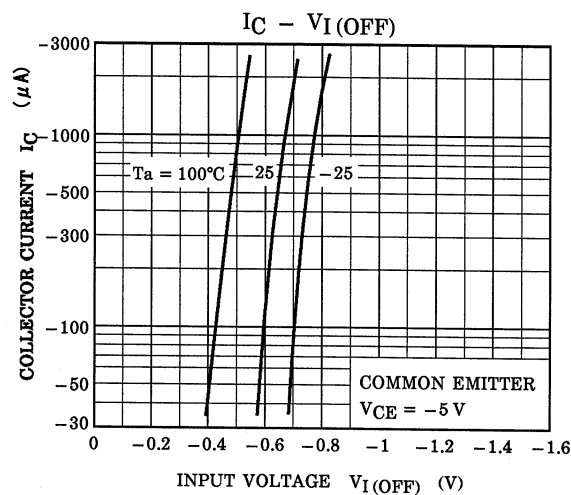
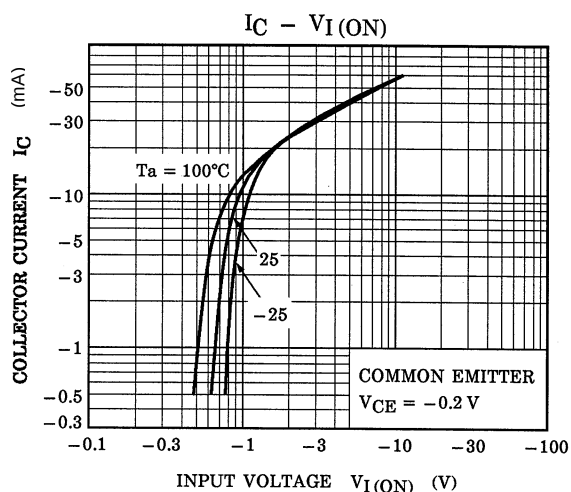
| Characteristic | Symbol | Test Condition | Min  | Typ. | Max  | Unit |
|----------------|--------|----------------|------|------|------|------|
| Input resistor | R1     | —              | 3.29 | 4.7  | 6.11 | kΩ   |

## Characteristics Curves Q1



The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

## Characteristics Curves Q2



The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

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