

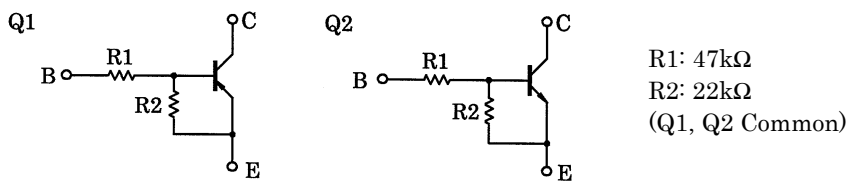
TOSHIBA Transistor
Silicon PNP Epitaxial Type (PCT Process) Silicon NPN Epitaxial Type (PCT Process)

RN4609

Switching, Inverter Circuit, Interface Circuit
And Driver Circuit Applications

- Including two devices in SM6 (super mini type with 6 leads)
- With built-in bias resistors
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process

Equivalent Circuit and Bias Resister Values



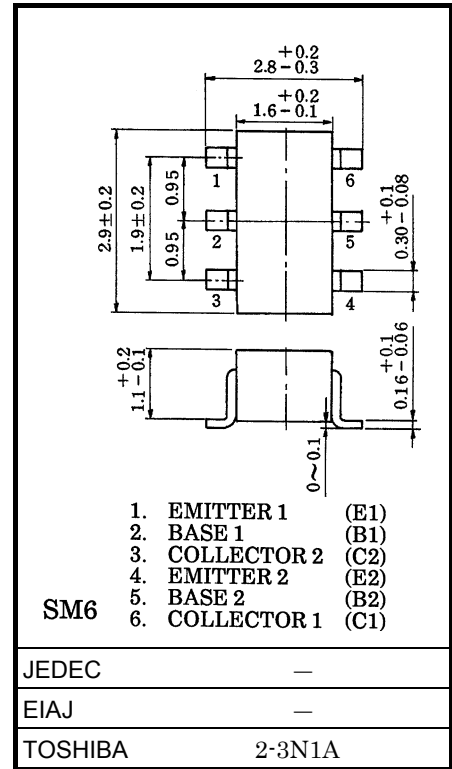
Q1 Absolute Maximum Ratings (Ta = 25°C)

| Characteristic | Symbol | Rating | Unit |
|---------------------------|------------------|--------|------|
| Collector-base voltage | V _{CBO} | -50 | V |
| Collector-emitter voltage | V _{CEO} | -50 | V |
| Emitter-base voltage | V _{EBO} | -15 | 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} | 15 | V |
| Collector current | I _C | 100 | mA |

Unit in mm



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

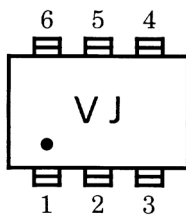
| Characteristic | Symbol | Rating | Unit |
|-----------------------------|------------------|---------|------|
| Collector power dissipation | P _C * | 300 | mW |
| Junction temperature | T _j | 150 | °C |
| Storage temperature range | T _{stg} | -55~150 | °C |

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.

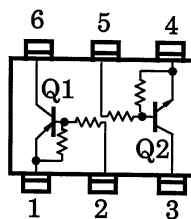
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

* Total rating

Marking



Equivalent Circuit (Top View)



Q1 Electrical Characteristics (Ta = 25°C)

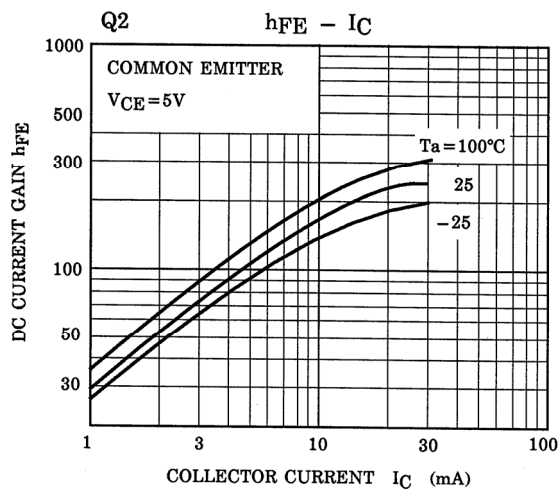
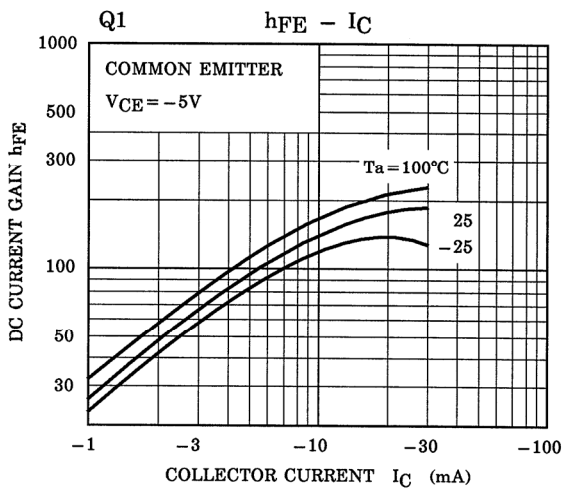
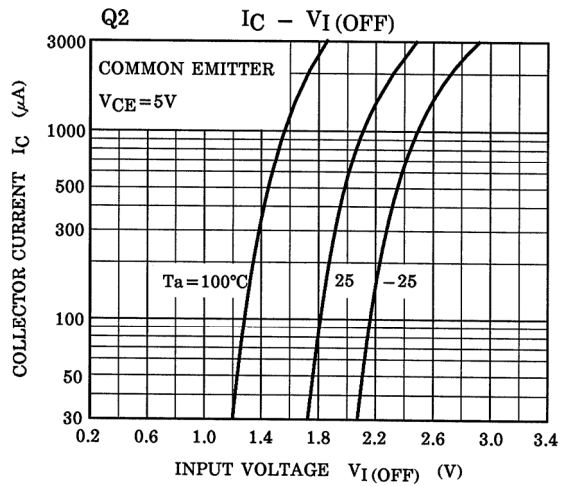
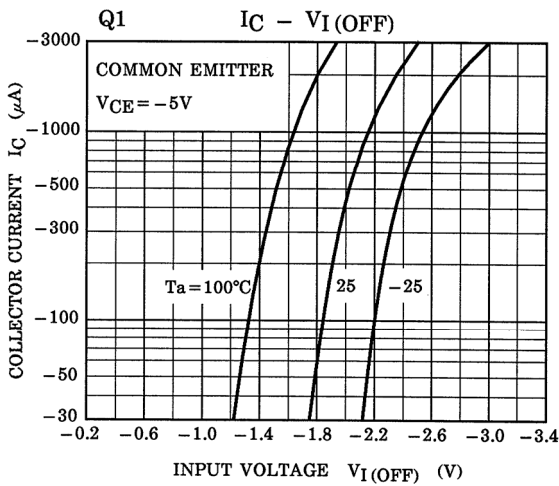
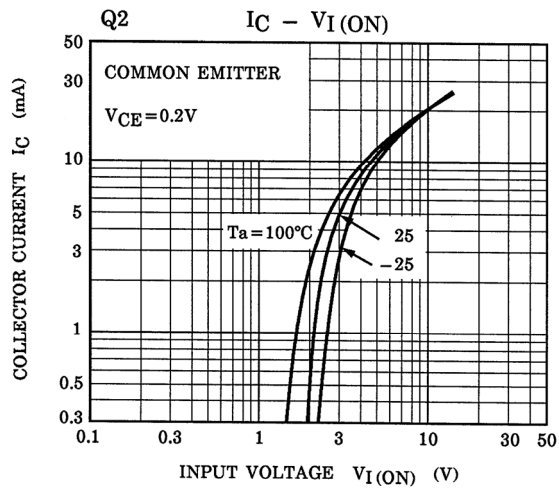
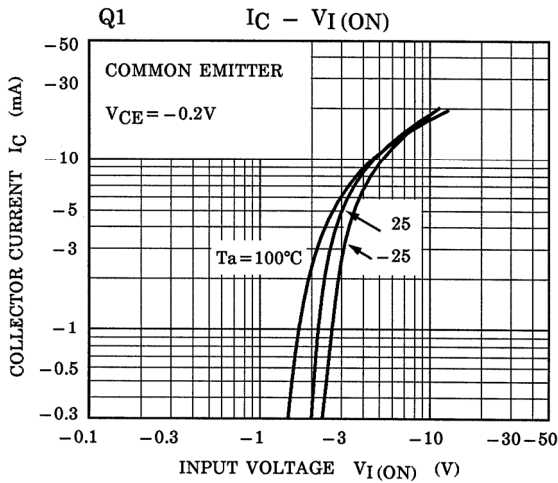
| Characteristic | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|-----------------------|--------------|---|--------|------|--------|------|
| Collector cut-off current | ICBO | — | V _{CB} = -50V, I _E = 0 | — | — | -100 | nA |
| | ICEO | — | V _{CE} = -50V, I _B = 0 | — | — | -500 | |
| Emitter cut-off current | IEBO | — | V _{EB} = -15V, I _C = 0 | -0.167 | — | -0.311 | mA |
| DC current gain | h _{FE} | — | V _{CE} = -5V, I _C = -10mA | 70 | — | — | — |
| Collector-emitter saturation voltage | V _{CE (sat)} | — | I _C = -5mA, I _B = -0.25mA | — | -0.1 | -0.3 | V |
| Input voltage (ON) | V _{I (ON)} | — | V _{CE} = -0.2V, I _C = -5mA | -2.2 | — | -5.8 | V |
| Input voltage (OFF) | V _{I (OFF)} | — | V _{CE} = -5V, I _C = -0.1mA | -1.5 | — | -2.6 | V |
| Transition frequency | f _T | — | V _{CE} = -10V, I _C = -5mA | — | 200 | — | MHz |
| Collector output capacitance | C _{ob} | — | V _{CB} = -10V, I _E = 0 | — | 3 | 6 | pF |

Q2 Electrical Characteristics (Ta = 25°C)

| Characteristic | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|-----------------------|--------------|--|-------|------|-------|------|
| Collector cut-off current | ICBO | — | V _{CB} = 50V, I _E = 0 | — | — | 100 | nA |
| | ICEO | — | V _{CE} = 50V, I _B = 0 | — | — | 500 | |
| Emitter cut-off current | IEBO | — | V _{EB} = 15V, I _C = 0 | 0.167 | — | 0.311 | mA |
| DC current gain | h _{FE} | — | V _{CE} = 5V, I _C = 10mA | 70 | — | — | — |
| Collector-emitter saturation voltage | V _{CE (sat)} | — | I _C = 5mA, I _B = 0.25mA | — | 0.1 | 0.3 | V |
| Input voltage (ON) | V _{I (ON)} | — | V _{CE} = 0.2V, I _C = 5mA | 2.2 | — | 5.8 | V |
| Input voltage (OFF) | V _{I (OFF)} | — | V _{CE} = 5V, I _C = 0.1mA | 1.5 | — | 2.6 | V |
| Transition frequency | f _T | — | V _{CE} = 10V, I _C = 5mA | — | 250 | — | MHz |
| Collector output capacitance | C _{ob} | — | V _{CB} = 10V, I _E = 0, f = 1 MHz | — | 3 | 6 | pF |

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

| Characteristic | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit |
|----------------|--------|--------------|----------------|------|------|------|------|
| Input resistor | R1 | — | — | 32.9 | 47 | 61.1 | kΩ |
| Resistor ratio | R1/R2 | — | — | 1.92 | 2.14 | 2.35 | — |



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20070701-EN GENERAL

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