

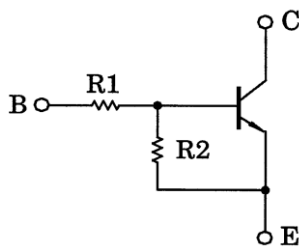
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor)

RN1707, RN1708, RN1709

Switching, Inverter Circuit,
Interface Circuit and Driver Circuit

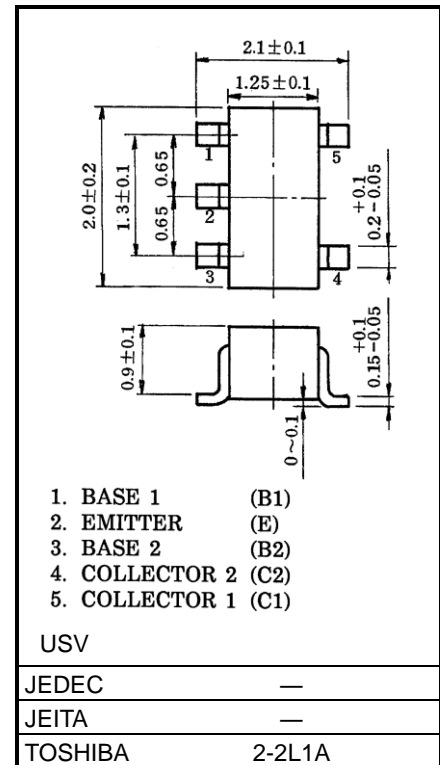
- Including two devices in USV (ultra super mini type with 5 leads)
- With built-in bias resistors
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process and miniaturize equipment.
- Various resistance values are available to suit various circuit designs.
- Complementary to RN2707 to RN2709

Equivalent Circuit and Bias Resistor Values



| Part No. | R1 (kΩ) | R2 (kΩ) |
|----------|---------|---------|
| RN1707 | 10 | 47 |
| RN1708 | 22 | 47 |
| RN1709 | 47 | 22 |

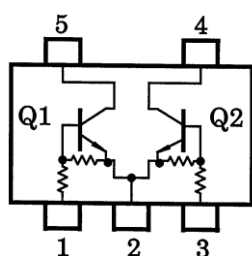
Unit: mm



Weight: 6.2mg (typ.)

Start of commercial production
1992-01

Equivalent Circuit(Top View)



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

| Characteristic | Symbol | Rating | Unit | |
|-----------------------------|----------------|--------|-----------|----|
| Collector-base voltage | RN1707 to 1709 | VCBO | 50 | V |
| Collector-emitter voltage | | VCEO | 50 | V |
| Emitter-base voltage | RN1707 | VEBO | 6 | V |
| | RN1708 | | 7 | |
| | RN1709 | | 15 | |
| Collector current | RN1707 to 1709 | IC | 100 | mA |
| Collector power dissipation | | PC* | 200 | mW |
| Junction temperature | | Tj | 150 | °C |
| Storage temperature range | | Tstg | -55 to150 | °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.

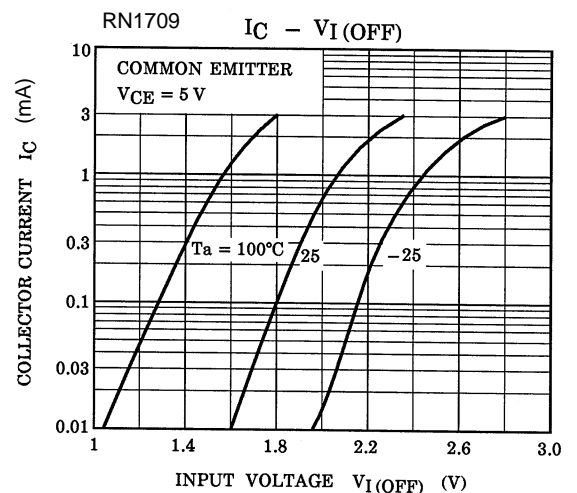
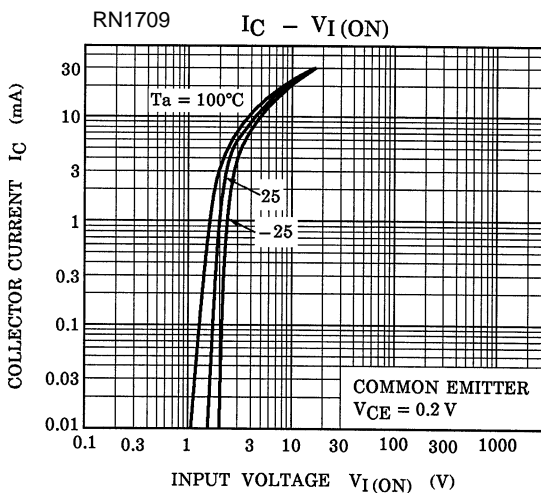
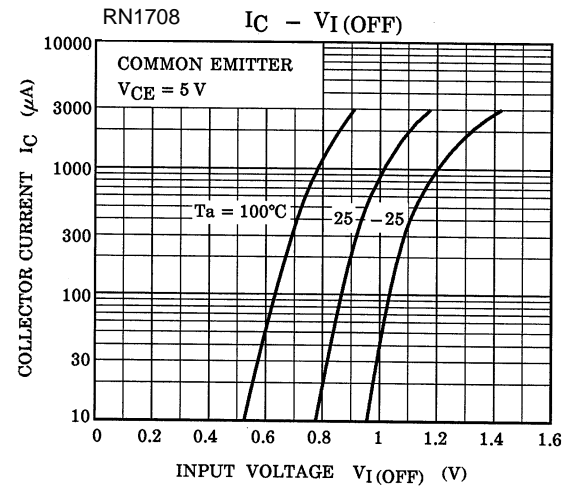
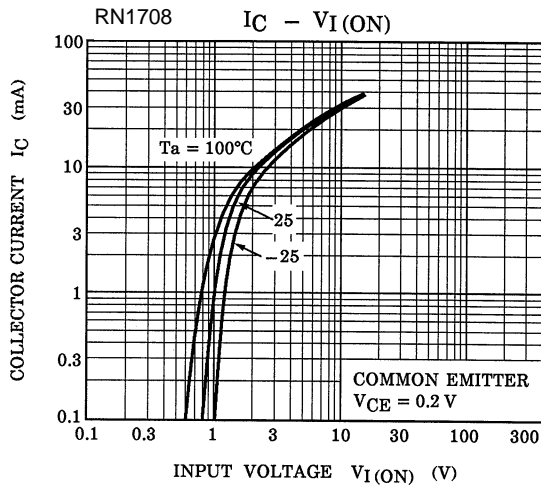
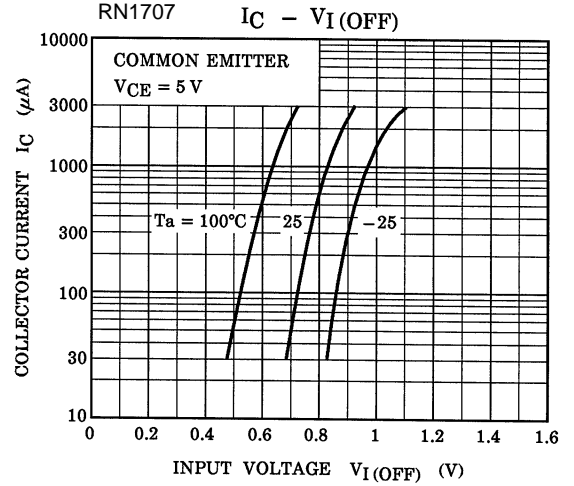
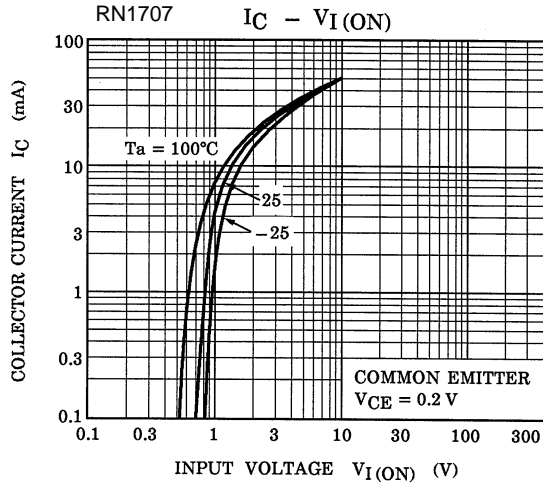
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

*: Total rating

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

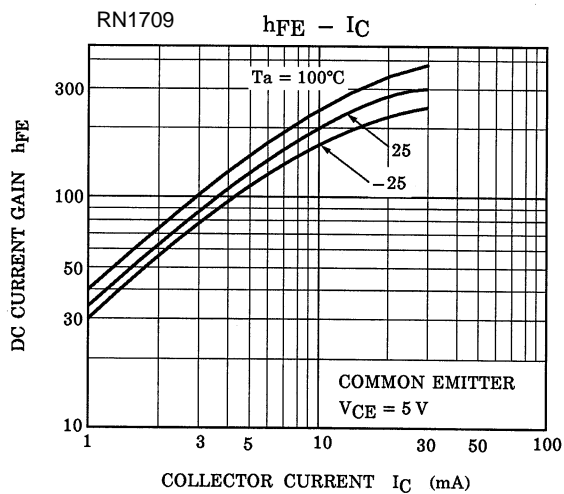
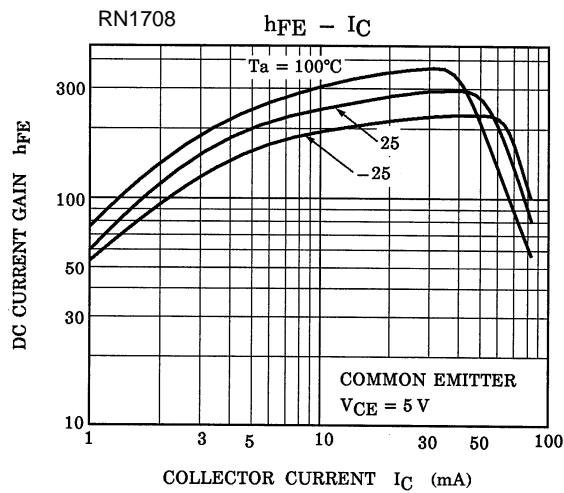
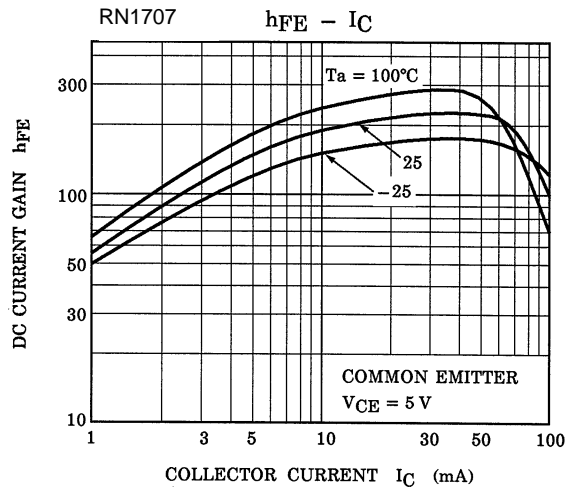
| Characteristic | | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|----------------|----------------------|--------------|--|-------|-------|-------|------|
| Collector cut-off current | RN1707 to 1709 | ICBO | — | V _{CB} = 50 V, I _E = 0 mA | — | — | 100 | nA |
| | | ICEO | — | V _{CE} = 50 V, I _B = 0 mA | — | — | 500 | nA |
| Emitter cut-off current | RN1707 | IEBO | — | V _{EB} = 6 V, I _C = 0 mA | 0.081 | — | 0.15 | mA |
| | RN1708 | | — | V _{EB} = 7 V, I _C = 0 mA | 0.078 | — | 0.145 | |
| | RN1709 | | — | V _{EB} = 15 V, I _C = 0 mA | 0.167 | — | 0.311 | |
| DC current gain | RN1707 | h _{FE} | — | V _{CE} = 5 V, I _C = 10 mA | 80 | — | — | — |
| | RN1708 | | — | | 80 | — | — | |
| | RN1709 | | — | | 70 | — | — | |
| Collector-emitter saturation voltage | RN1707 to 1709 | V _{CE(sat)} | — | I _C = 5 mA, I _B = 0.25 mA | — | 0.1 | 0.3 | V |
| Input voltage (ON) | RN1707 | V _{I(ON)} | — | V _{CE} = 0.2 V, I _C = 5 mA | 0.7 | — | 1.8 | V |
| | RN1708 | | — | | 1.0 | — | 2.6 | |
| | RN1709 | | — | | 2.2 | — | 5.8 | |
| Input voltage (OFF) | RN1707 | V _{I(OFF)} | — | V _{CE} = 5 V, I _C = 0.1 mA | 0.5 | — | 1.0 | V |
| | RN1708 | | — | | 0.6 | — | 1.16 | |
| | RN1709 | | — | | 1.5 | — | 2.6 | |
| Transition frequency | RN1707 to 1709 | f _T | — | V _{CE} = 10 V, I _C = 5 mA | — | 250 | — | MHz |
| Collector output capacitance | RN1707 to 1709 | C _{ob} | — | V _{CB} = 10 V, I _E = 0 mA, f = 1 MHz | — | 3 | 6 | pF |
| Input resistance | RN1707 | R ₁ | — | — | 7 | 10 | 13 | kΩ |
| | RN1708 | | — | | 15.4 | 22 | 28.6 | |
| | RN1709 | | — | | 32.9 | 47 | 61.1 | |
| Resistance ratio | RN1707 | R _{1/R2} | — | — | 0.191 | 0.213 | 0.232 | — |
| | RN1708 | | — | | 0.421 | 0.468 | 0.515 | |
| | RN1709 | | — | | 1.92 | 2.14 | 2.35 | |

(Q1, Q2 Common)



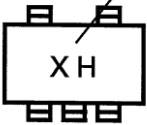
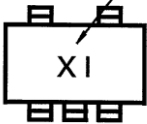
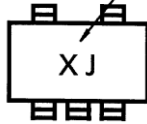
The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

(Q1, Q2 Common)



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

Marking

| Part No. | Marking |
|----------|--|
| RN1707 | <p data-bbox="571 297 831 322">Part No.(abbreviation code)</p>  |
| RN1708 | <p data-bbox="571 539 831 564">Part No.(abbreviation code)</p>  |
| RN1709 | <p data-bbox="571 781 831 806">Part No.(abbreviation code)</p>  |

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