

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

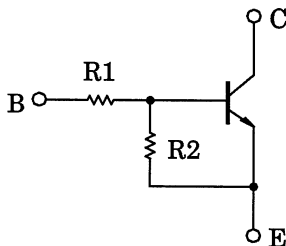
RN1421,RN1422,RN1423,RN1424 RN1425,RN1426,RN1427

Switching, Inverter Circuit, Interface Circuit
and Driver Circuit Applications

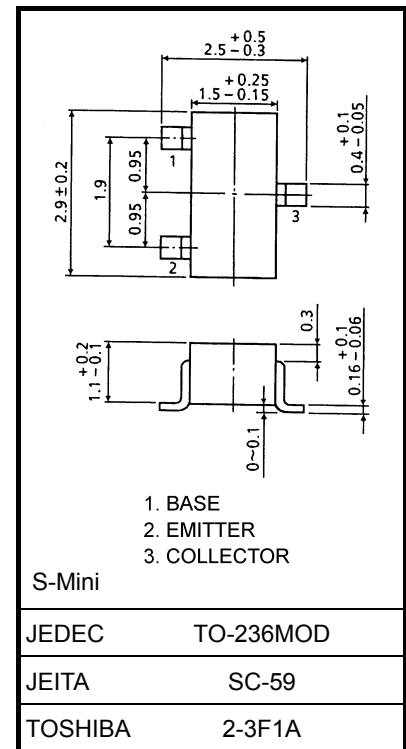
Unit: mm

- High current type (I_C (max) = 800mA)
- With built-in bias resistors
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process
- Low V_{CE} (sat)
- Complementary to RN2421 to RN2427

Equivalent Circuit and Bias Resistor Values



| Type No. | R1 (k Ω) | R2 (k Ω) |
|----------|------------------|------------------|
| RN1421 | 1 | 1 |
| RN1422 | 2.2 | 2.2 |
| RN1423 | 4.7 | 4.7 |
| RN1424 | 10 | 10 |
| RN1425 | 0.47 | 10 |
| RN1426 | 1 | 10 |
| RN1427 | 2.2 | 10 |



Weight: 12 mg (typ.)

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

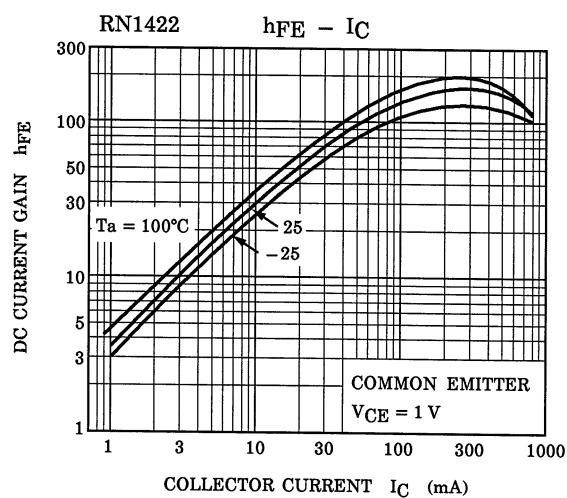
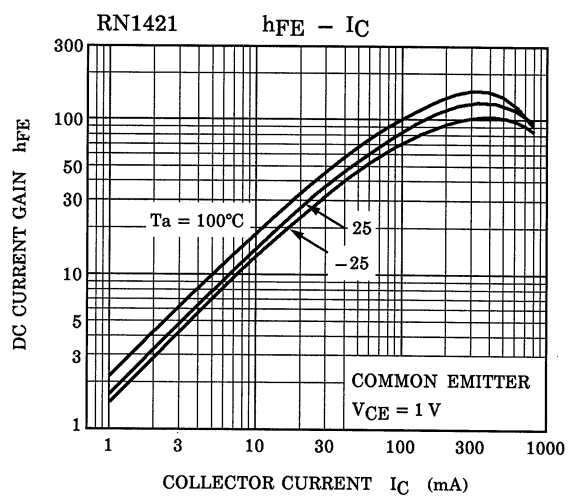
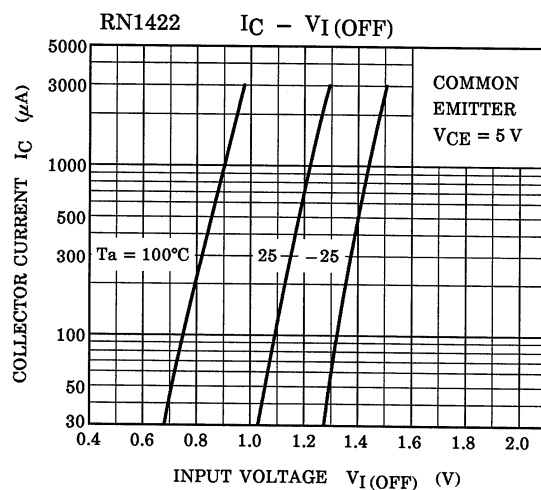
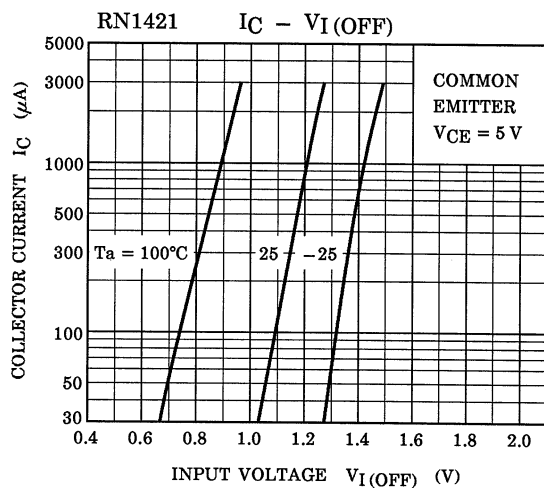
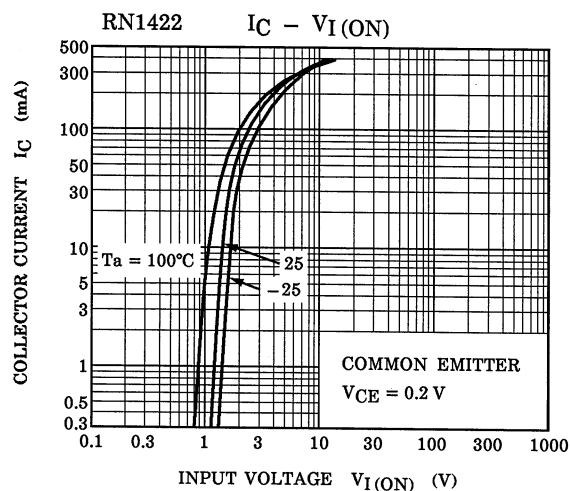
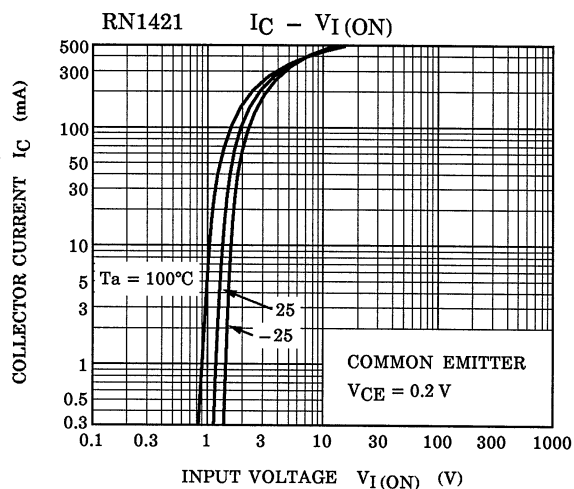
| Characteristic | Symbol | Rating | Unit |
|-----------------------------|-----------|------------|------------------|
| Collector-base voltage | V_{CBO} | 50 | V |
| Collector-emitter voltage | V_{CEO} | 50 | V |
| Emitter-base voltage | V_{EBO} | 10 | V |
| | | 5 | V |
| | | 6 | V |
| Collector current | I_C | 800 | mA |
| Collector power dissipation | P_C | 200 | mW |
| Junction temperature | T_j | 150 | $^\circ\text{C}$ |
| Storage temperature range | T_{stg} | -55 to 150 | $^\circ\text{C}$ |

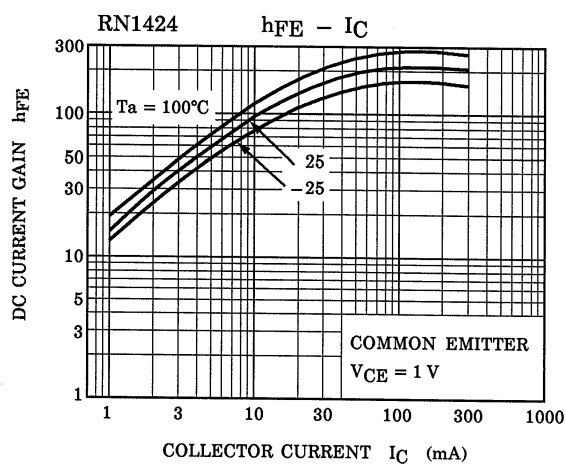
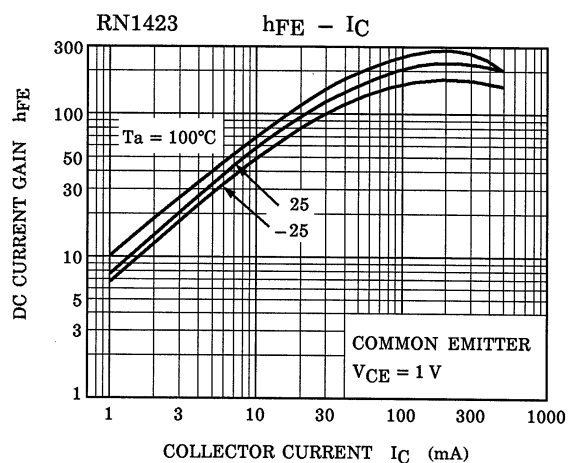
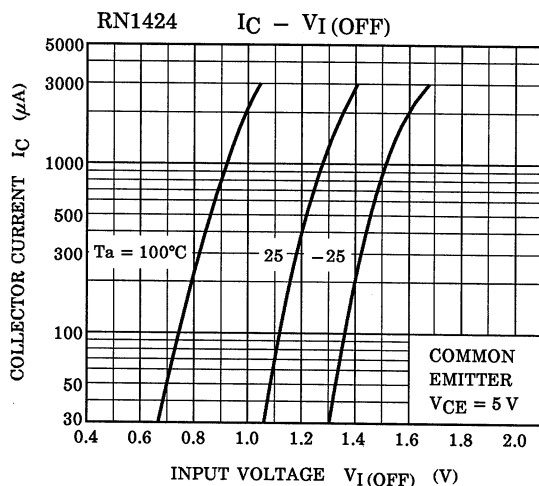
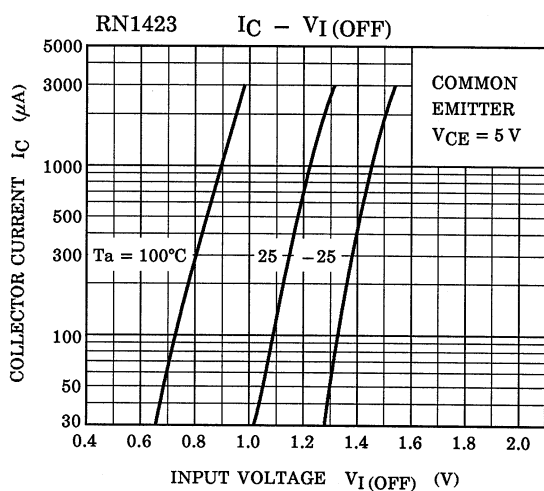
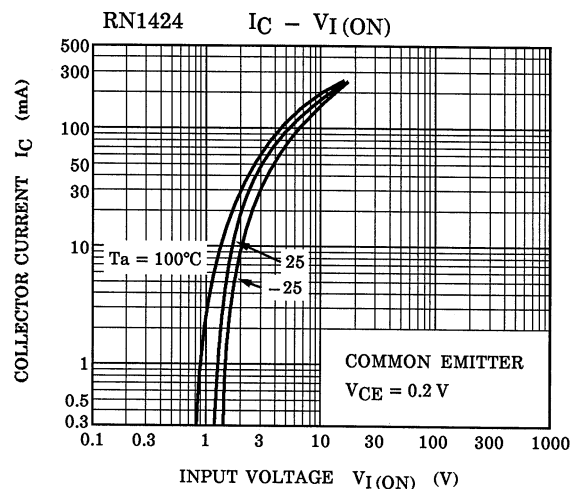
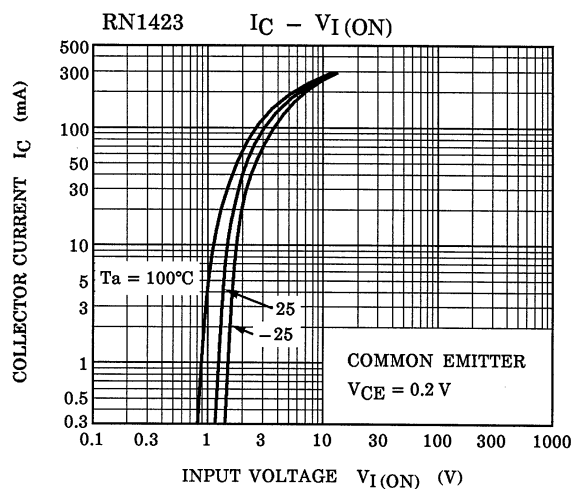
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

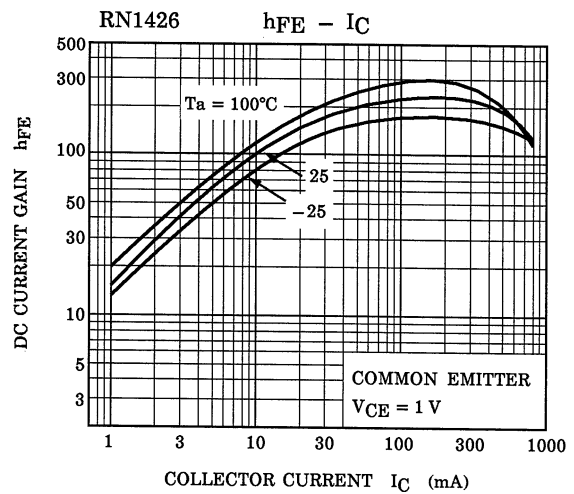
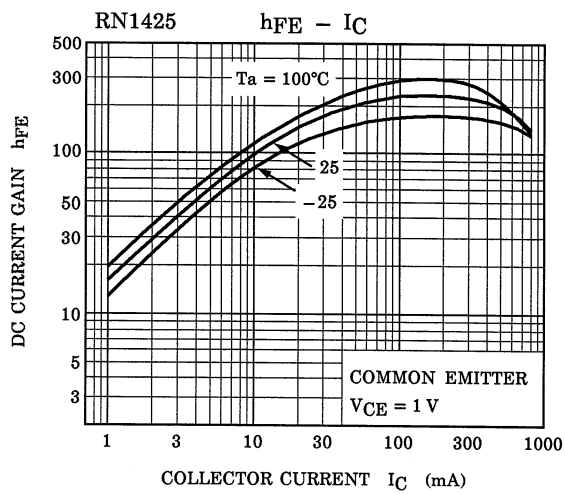
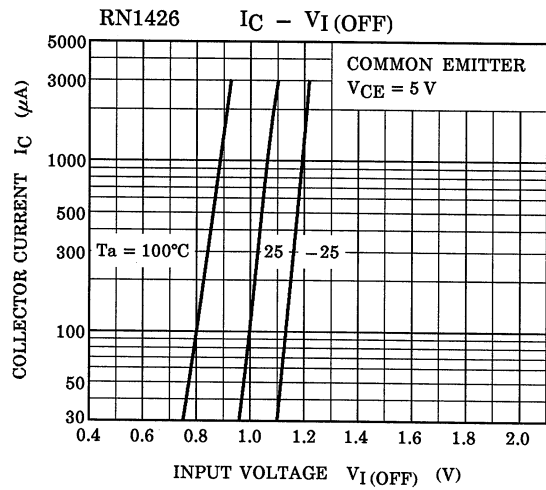
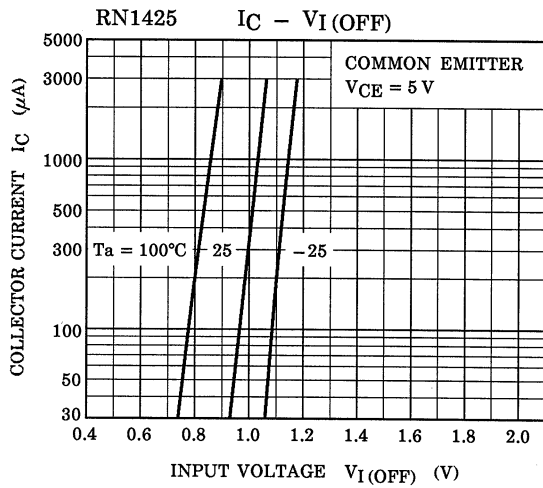
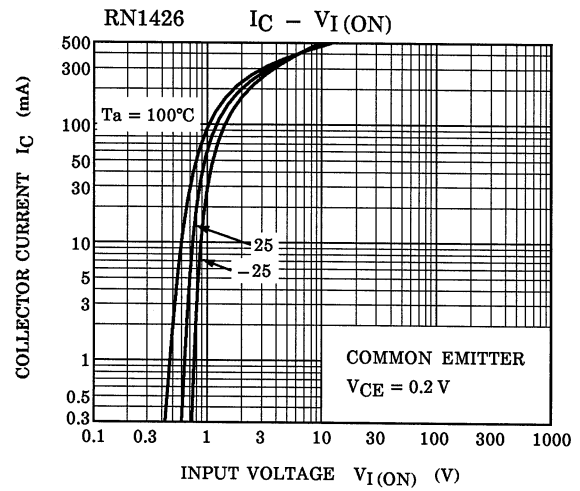
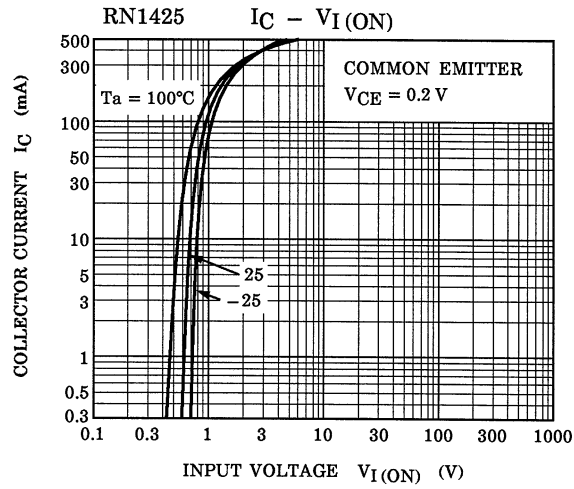
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

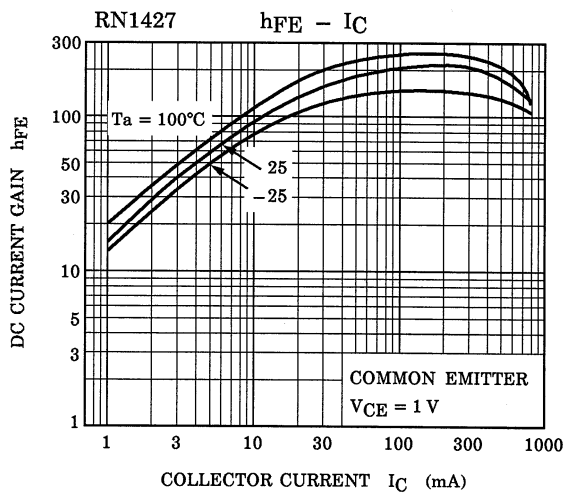
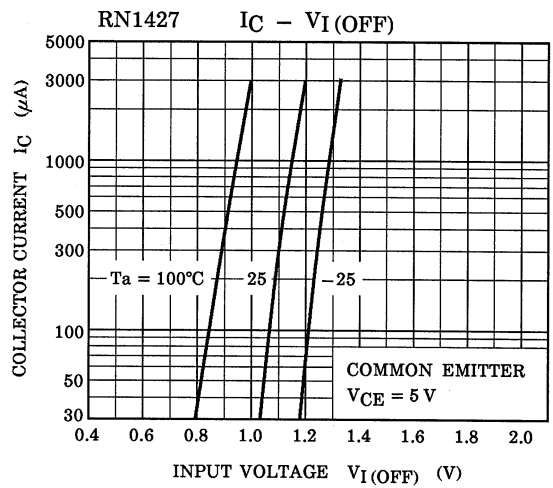
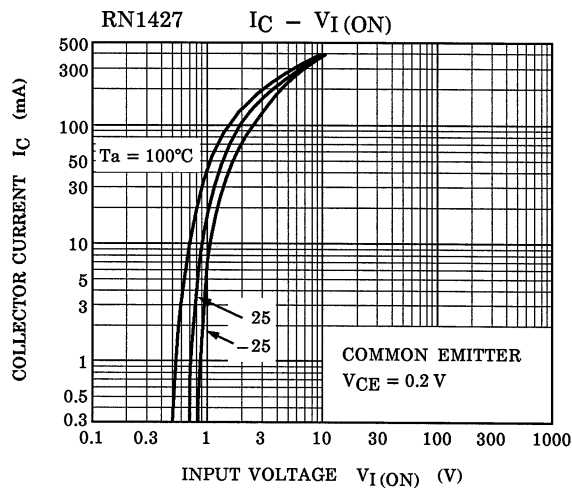
Electrical Characteristics (Ta = 25°C)

| Characteristic | | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|----------------|---------------|--------------|-----------------------------------|--------|-------|--------|------|
| Collector cut-off current | RN1421 to 1427 | I_{CBO} | — | $V_{CB} = 50V, I_E = 0$ | — | — | 100 | nA |
| | | I_{CEO} | | $V_{CE} = 50V, I_B = 0$ | — | — | 500 | |
| Emitter cut-off current | RN1421 | I_{EBO} | — | $V_{EB} = 10V, I_C = 0$ | 3.85 | — | 7.14 | mA |
| | RN1422 | | | | 1.75 | — | 3.25 | |
| | RN1423 | | | | 0.82 | — | 1.52 | |
| | RN1424 | | | $V_{EB} = 5V, I_C = 0$ | 0.38 | — | 0.71 | |
| | RN1425 | | | | 0.365 | — | 0.682 | |
| | RN1426 | | | $V_{EB} = 6V, I_C = 0$ | 0.35 | — | 0.65 | |
| | RN1427 | | | | 0.378 | — | 0.703 | |
| DC current gain | RN1421 | h_{FE} | — | $V_{CE} = 1V, I_C = 100mA$ | 60 | — | — | — |
| | RN1422 | | | | 65 | — | — | |
| | RN1423 | | | | 70 | — | — | |
| | RN1424 | | | | 90 | — | — | |
| | RN1425 | | | | 90 | — | — | |
| | RN1426 | | | | 90 | — | — | |
| | RN1427 | | | | 90 | — | — | |
| Collector-emitter saturation voltage | RN1421 | $V_{CE(sat)}$ | — | $I_C = 50mA, I_B = 2mA$ | — | — | 0.25 | V |
| | RN1422 to 1427 | | | $I_C = 50mA, I_B = 1mA$ | | | | |
| Input voltage (ON) | RN1421 | $V_{I(ON)}$ | — | $V_{CE} = 0.2V, I_C = 100mA$ | 1.0 | — | 3.5 | V |
| | RN1422 | | | | 1.4 | — | 4.5 | |
| | RN1423 | | | | 2.0 | — | 6.5 | |
| | RN1424 | | | | 3.0 | — | 12.0 | |
| | RN1425 | | | | 0.6 | — | 2.0 | |
| | RN1426 | | | | 0.7 | — | 2.5 | |
| | RN1427 | | | | 1.0 | — | 3.0 | |
| Input voltage (OFF) | RN1421 to 1424 | $V_{I(OFF)}$ | — | $V_{CE} = 5V, I_C = 0.1mA$ | 0.8 | — | 1.3 | V |
| | RN1425, 1426 | | | | 0.4 | — | 0.8 | |
| | RN1427 | | | | 0.5 | — | 1.0 | |
| Transition frequency | RN1421 to 1427 | f_T | — | $V_{CE} = 5V, I_C = 20mA$ | — | 300 | — | MHz |
| Collector Output capacitance | RN1421 to 1427 | C_{ob} | — | $V_{CB} = 10V, I_E = 0, f = 1MHz$ | — | 7 | — | pF |
| Input resistor | RN1421 | R1 | — | — | 0.7 | 1.0 | 1.3 | kΩ |
| | RN1422 | | | | 1.54 | 2.2 | 2.86 | |
| | RN1423 | | | | 3.29 | 4.7 | 6.11 | |
| | RN1424 | | | | 7 | 10 | 13 | |
| | RN1425 | | | | 0.329 | 0.47 | 0.61 | |
| | RN1426 | | | | 0.7 | 1.0 | 1.3 | |
| | RN1427 | | | | 1.54 | 2.2 | 2.86 | |
| Resistor ratio | RN1421 to 1424 | R1/R2 | — | — | 0.9 | 1.0 | 1.1 | — |
| | RN1425 | | | | 0.0423 | 0.047 | 0.0517 | |
| | RN1426 | | | | 0.09 | 0.1 | 0.11 | |
| | RN1427 | | | | 0.2 | 0.22 | 0.24 | |

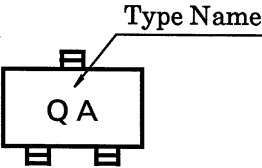
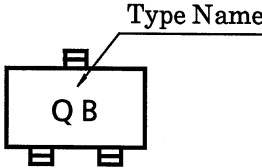
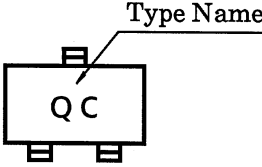
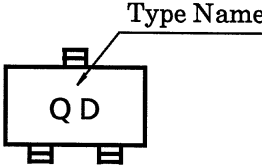
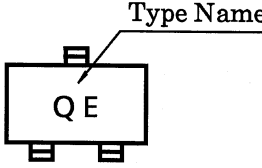
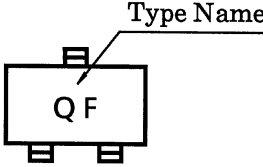
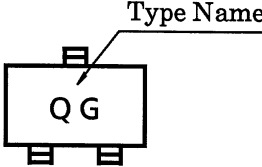








Marking

| Type Name | Marking |
|-----------|---|
| RN1421 |  |
| RN1422 |  |
| RN1423 |  |
| RN1424 |  |
| RN1425 |  |
| RN1426 |  |
| RN1427 |  |

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