

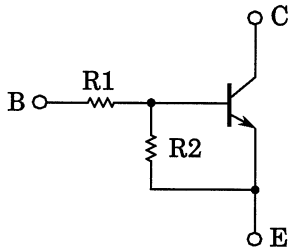
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process)

RN1101, RN1102, RN1103 RN1104, RN1105, RN1106

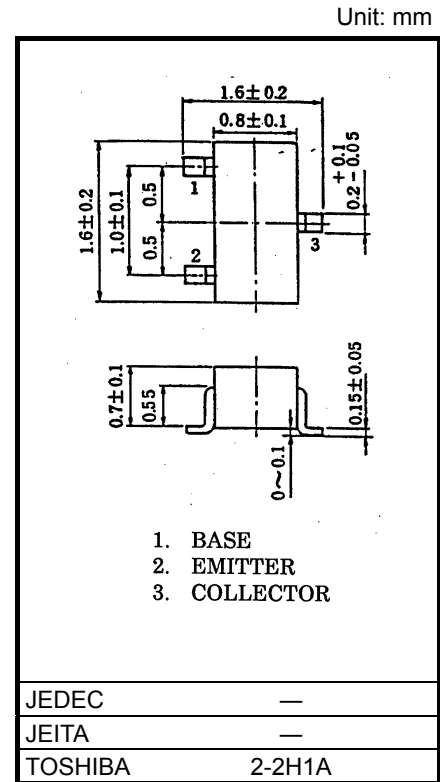
Switching, Inverter Circuit, Interface Circuit
and Driver Circuit Applications

- With built-in bias resistors
- Simplified circuit design
- Reduced number of parts and simplified manufacturing process
- Complementary to RN2101 to RN2106

Equivalent Circuit and Bias Resistor Values



| Type No. | R1 (kΩ) | R2 (kΩ) |
|----------|---------|---------|
| RN1101 | 4.7 | 4.7 |
| RN1102 | 10 | 10 |
| RN1103 | 22 | 22 |
| RN1104 | 47 | 47 |
| RN1105 | 2.2 | 47 |
| RN1106 | 4.7 | 47 |



Weight: 2.4 mg (typ).

Absolute Maximum Ratings (Ta = 25°C)

| Characteristic | Symbol | Rating | Unit |
|-----------------------------|------------------|------------|------|
| Collector-base voltage | V _{CBO} | 50 | V |
| Collector-emitter voltage | | | |
| Emitter-base voltage | V _{EBO} | 10 | V |
| | | 5 | |
| Collector current | I _C | 100 | mA |
| Collector power dissipation | P _C | 100 | mW |
| Junction temperature | T _j | 150 | °C |
| Storage temperature range | T _{stg} | -55 to 150 | °C |

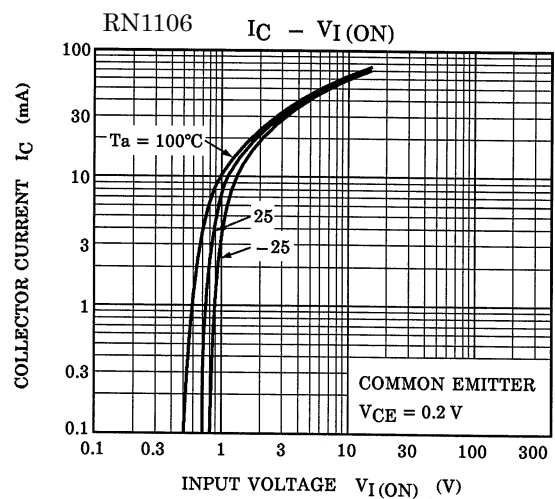
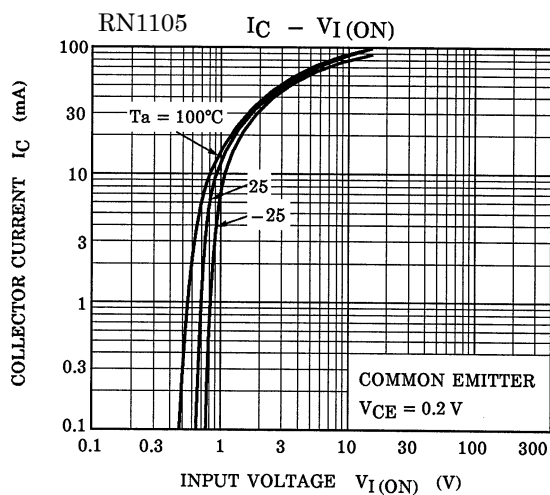
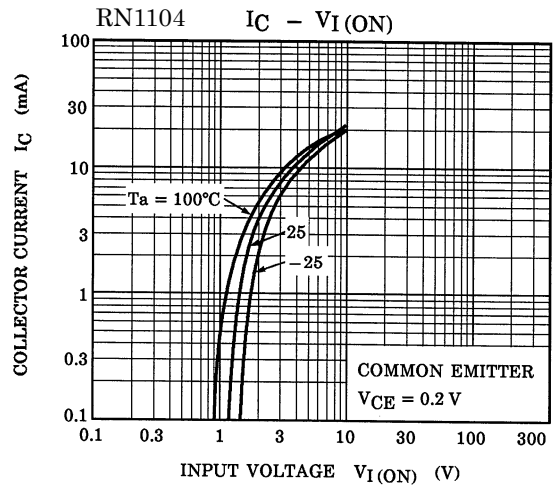
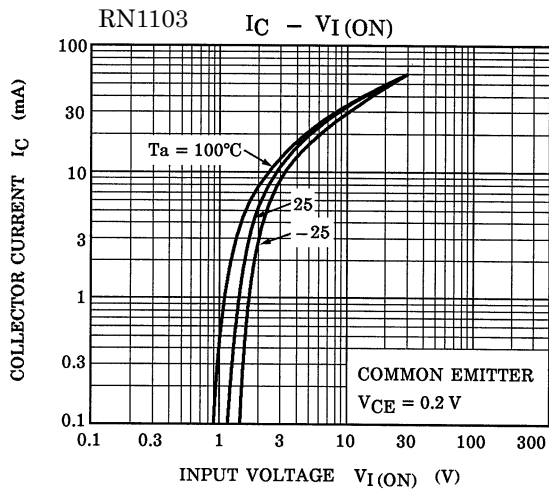
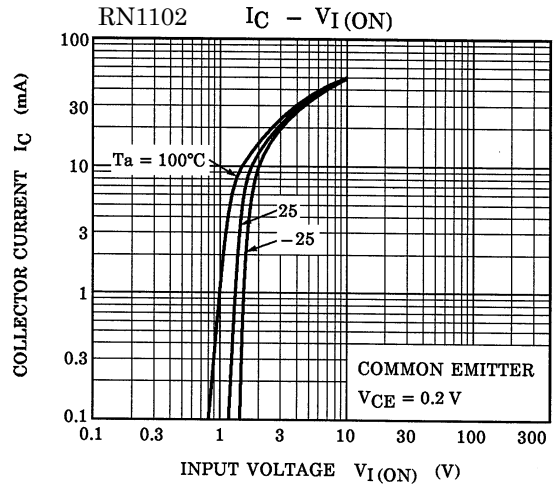
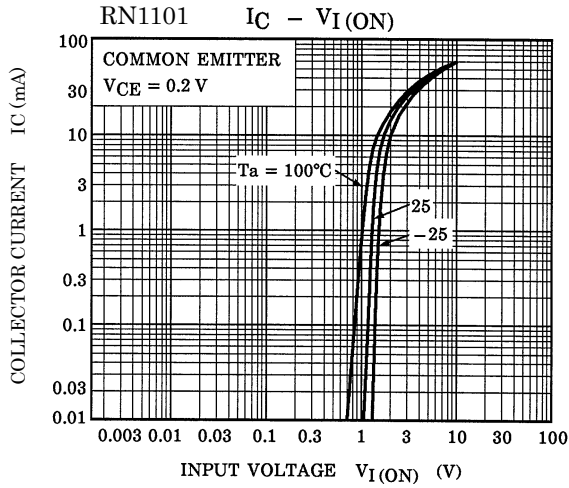
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

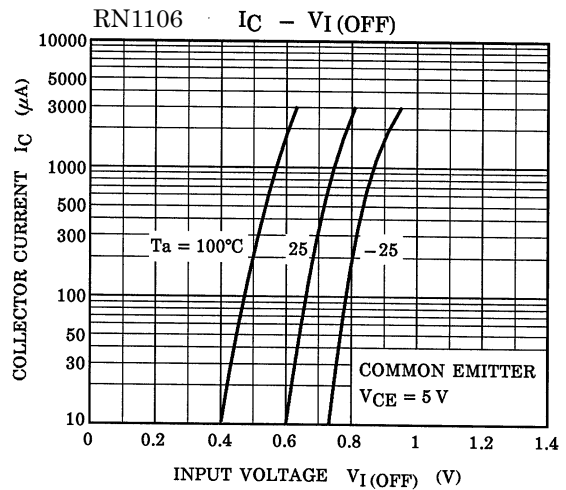
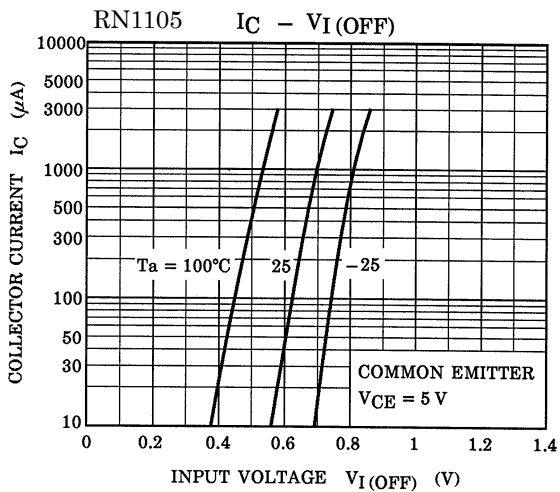
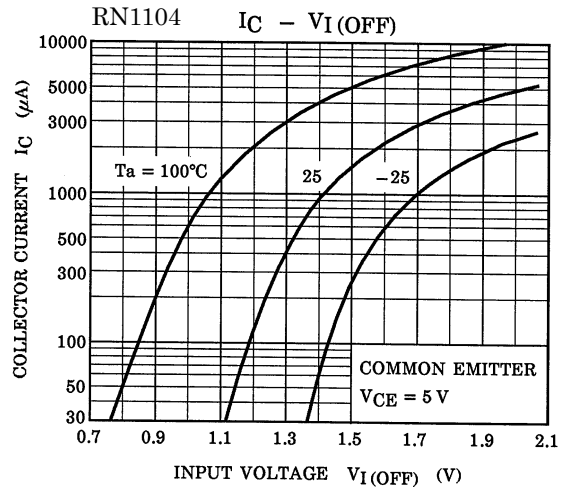
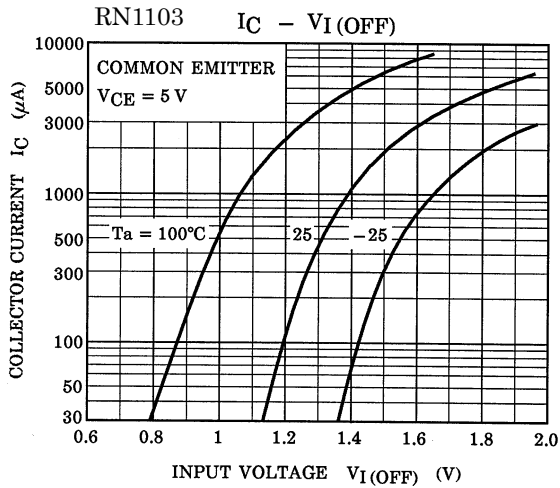
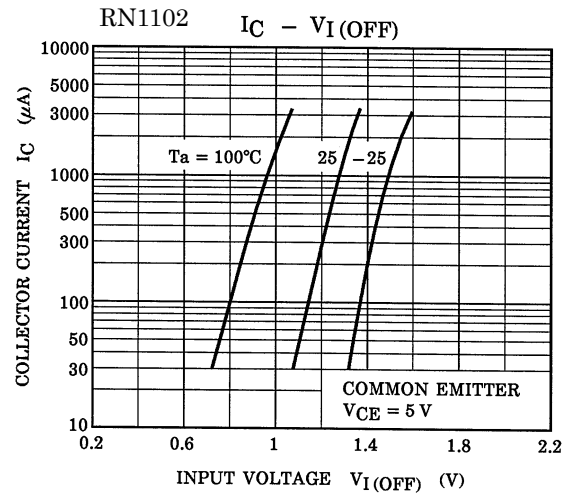
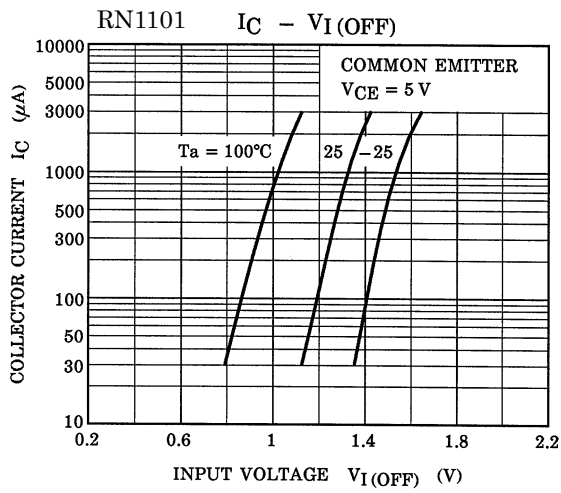
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

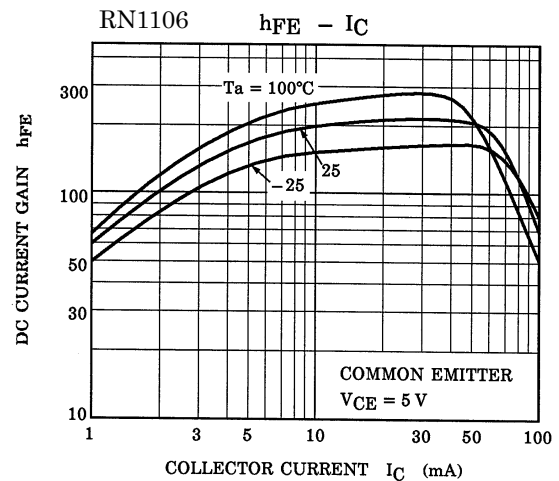
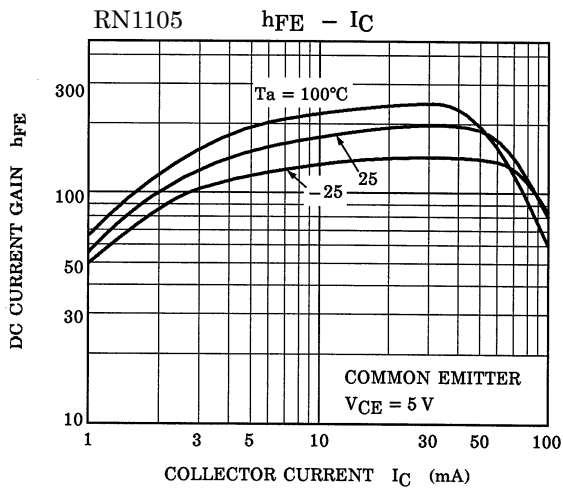
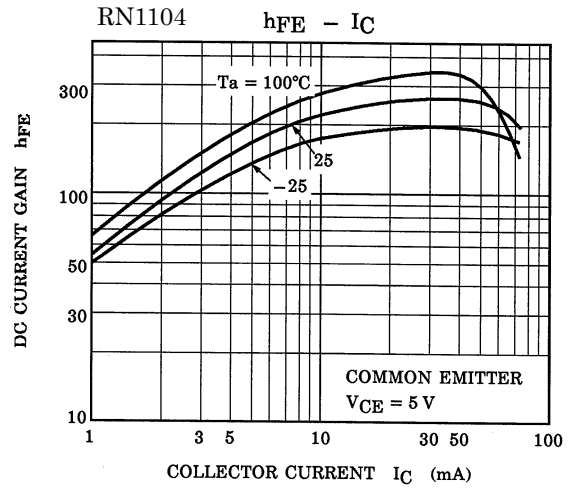
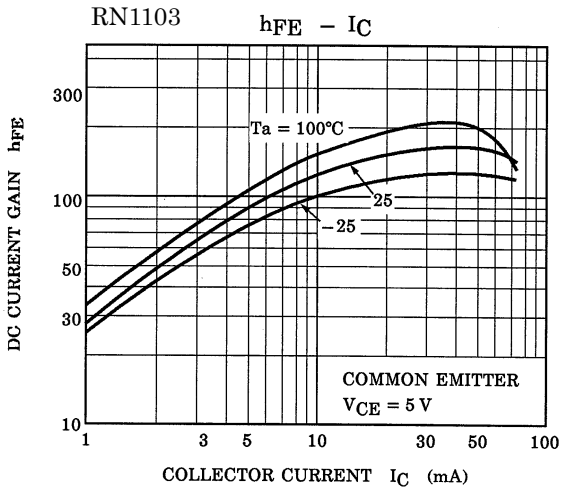
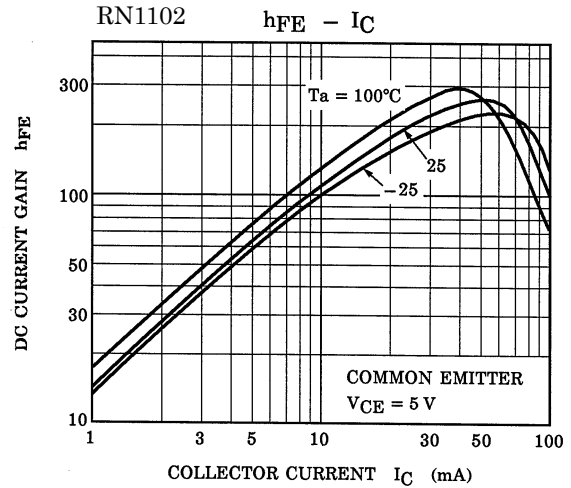
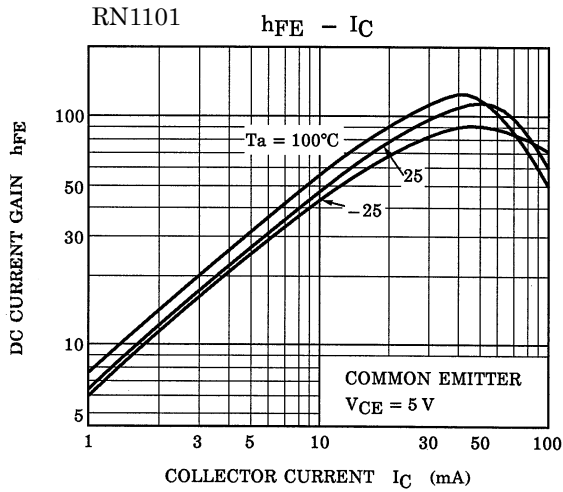
Start of commercial production
1990-12

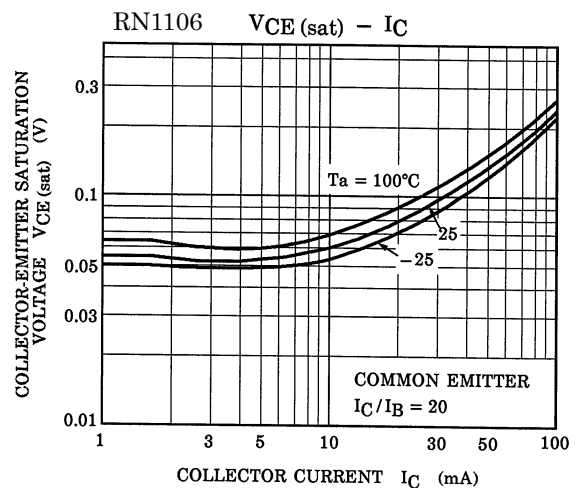
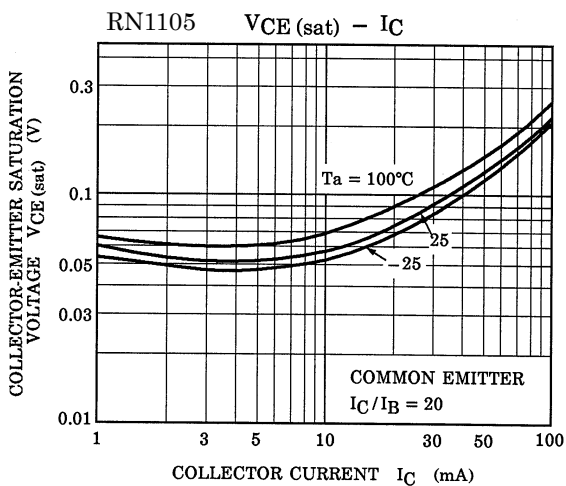
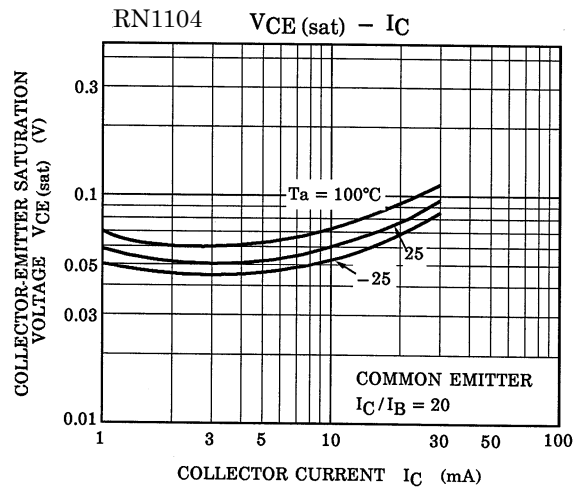
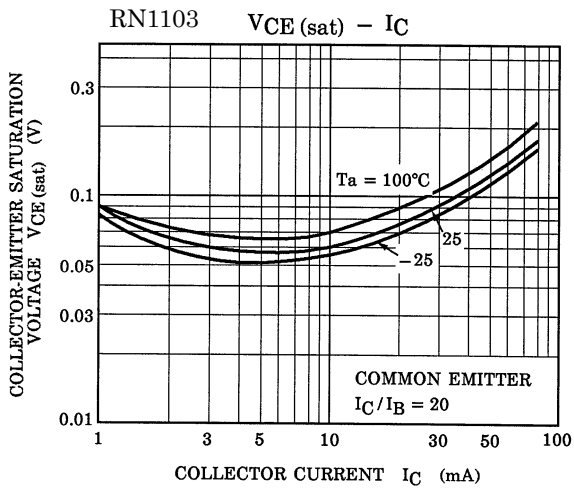
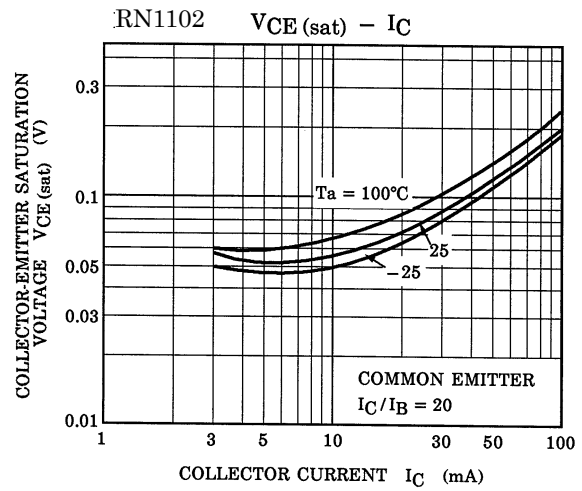
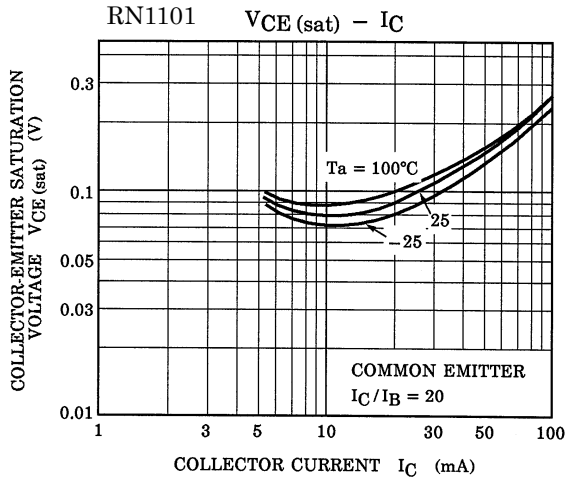
Electrical Characteristics (Ta = 25°C)

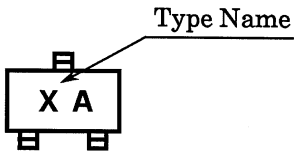
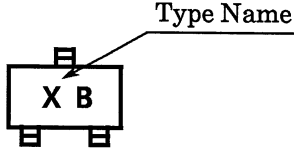
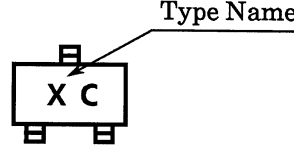
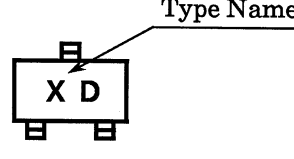
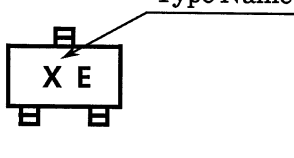
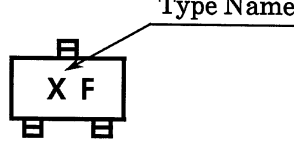
| Characteristic | | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|----------------|---------------|--------------|--|--------|--------|--------|------|
| Collector cut-off current | RN1101 to 1106 | I_{CBO} | — | $V_{CB} = 50\text{ V}, I_E = 0$ | — | — | 100 | nA |
| | | I_{CEO} | | $V_{CE} = 50\text{ V}, I_B = 0$ | — | — | 500 | |
| Emitter cut-off current | RN1101 | I_{EBO} | — | $V_{EB} = 10\text{ V}, I_C = 0$ | 0.82 | — | 1.52 | mA |
| | RN1102 | | | | 0.38 | — | 0.71 | |
| | RN1103 | | | | 0.17 | — | 0.33 | |
| | RN1104 | | | 0.082 | — | 0.15 | | |
| | RN1105 | | | $V_{EB} = 5\text{ V}, I_C = 0$ | 0.078 | — | 0.145 | |
| | RN1106 | | | | 0.074 | — | 0.138 | |
| DC current gain | RN1101 | h_{FE} | — | $V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$ | 30 | — | — | — |
| | RN1102 | | | | 50 | — | — | |
| | RN1103 | | | | 70 | — | — | |
| | RN1104 | | | | 80 | — | — | |
| | RN1105 | | | | 80 | — | — | |
| | RN1106 | | | | 80 | — | — | |
| Collector-emitter saturation voltage | RN1101 to 1106 | $V_{CE(sat)}$ | — | $I_C = 5\text{ mA}, I_B = 0.25\text{ mA}$ | — | 0.1 | 0.3 | V |
| Input voltage (ON) | RN1101 | $V_{I(ON)}$ | — | $V_{CE} = 0.2\text{ V}, I_C = 5\text{ mA}$ | 1.1 | — | 2.0 | V |
| | RN1102 | | | | 1.2 | — | 2.4 | |
| | RN1103 | | | | 1.3 | — | 3.0 | |
| | RN1104 | | | | 1.5 | — | 5.0 | |
| | RN1105 | | | | 0.6 | — | 1.1 | |
| | RN1106 | | | | 0.7 | — | 1.3 | |
| Input voltage (OFF) | RN1101 to 1104 | $V_{I(OFF)}$ | — | $V_{CE} = 5\text{ V}, I_C = 0.1\text{ mA}$ | 1.0 | — | 1.5 | V |
| | RN1105, 1106 | | | | 0.5 | — | 0.8 | |
| Transition frequency | RN1101 to 1106 | f_T | — | $V_{CE} = 10\text{ V}, I_C = 5\text{ mA}$ | — | 250 | — | MHz |
| Collector output capacitance | RN1101 to 1106 | C_{ob} | — | $V_{CB} = 10\text{ V}, I_E = 0,$ $f = 1\text{ MHz}$ | — | 3 | 6 | pF |
| Input resistor | RN1101 | R1 | — | | 3.29 | 4.7 | 6.11 | kΩ |
| | RN1102 | | | | 7 | 10 | 13 | |
| | RN1103 | | | | 15.4 | 22 | 28.6 | |
| | RN1104 | | | | 32.9 | 47 | 61.1 | |
| | RN1105 | | | | 1.54 | 2.2 | 2.86 | |
| | RN1106 | | | | 3.29 | 4.7 | 6.11 | |
| Resistor ratio | RN1101 to 1104 | R1/R2 | — | | 0.9 | 1.0 | 1.1 | — |
| | RN1105 | | | | 0.0421 | 0.0468 | 0.0515 | |
| | RN1106 | | | | 0.09 | 0.1 | 0.11 | |









| Type Name | Marking |
|-----------|---|
| RN1101 |  |
| RN1102 |  |
| RN1103 |  |
| RN1104 |  |
| RN1105 |  |
| RN1106 |  |

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