

TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

RN2101CT, RN2102CT, RN2103CT RN2104CT, RN2105CT, RN2106CT

Switching Applications

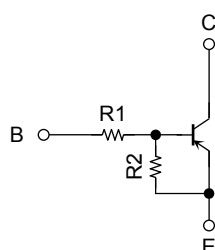
Inverter Circuit Applications

Interface Circuit Applications

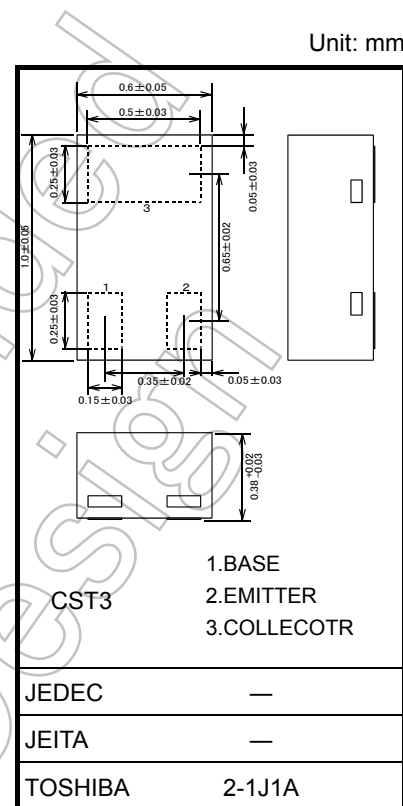
Driver Circuit Applications

- Incorporating a bias resistor into a transistor reduces parts count.
Reducing the parts count enable the manufacture of ever more compact equipment and save assembly cost.
- Complementary to RN1101CT to RN1106CT

Equivalent Circuit and Bias Resistor Values



| Type No. | R1 (kΩ) | R2 (kΩ) |
|----------|---------|---------|
| RN2101CT | 4.7 | 4.7 |
| RN2102CT | 10 | 10 |
| RN2103CT | 22 | 22 |
| RN2104CT | 47 | 47 |
| RN2105CT | 2.2 | 47 |
| RN2106CT | 4.7 | 47 |



Weight: 0.75 mg (typ.)

Absolute Maximum Ratings (Ta = 25°C)

| Characteristics | Symbol | Rating | Unit |
|-----------------------------|-----------|------------|------|
| Collector-base voltage | V_{CBO} | -20 | V |
| Collector-emitter voltage | V_{CEO} | -20 | V |
| Emitter-base voltage | V_{EBO} | -10 | V |
| | | -5 | V |
| Collector current | I_C | -50 | mA |
| Collector power dissipation | P_C | 50 | mW |
| Junction temperature | T_j | 150 | °C |
| Storage temperature range | T_{stg} | -55 to 150 | °C |

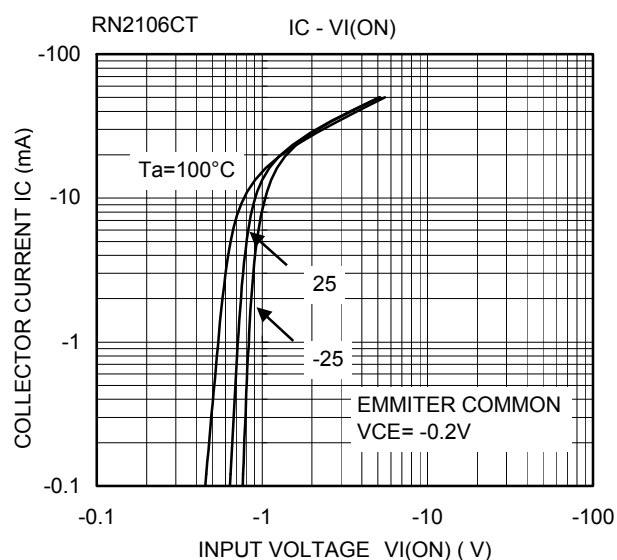
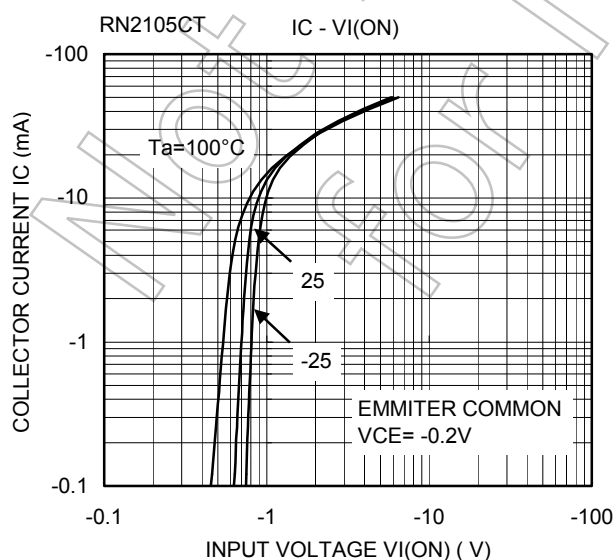
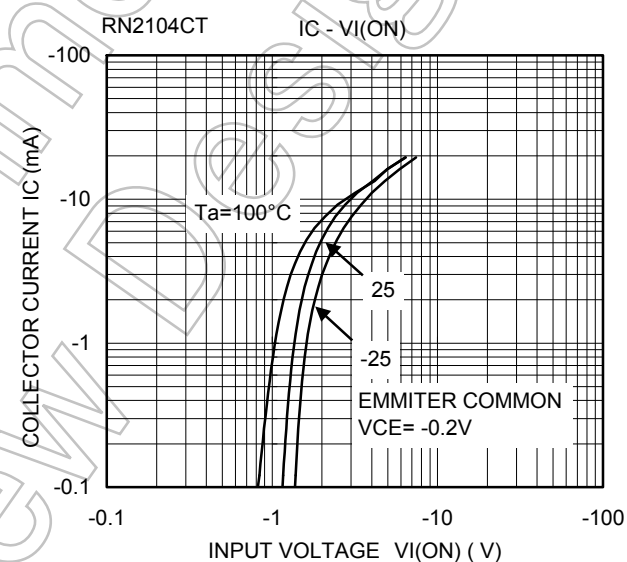
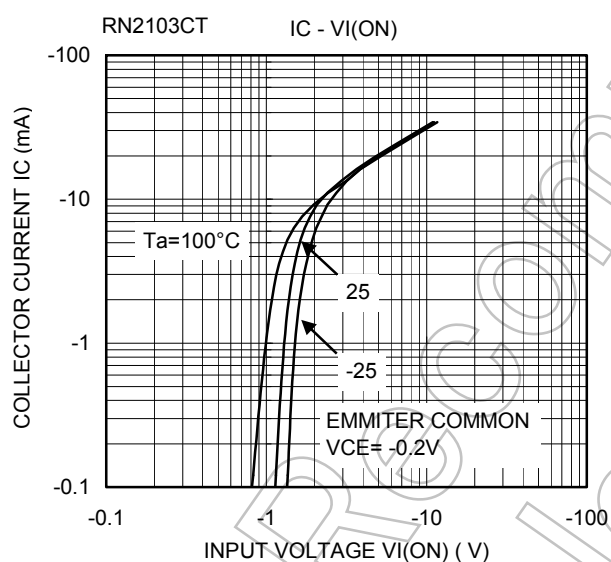
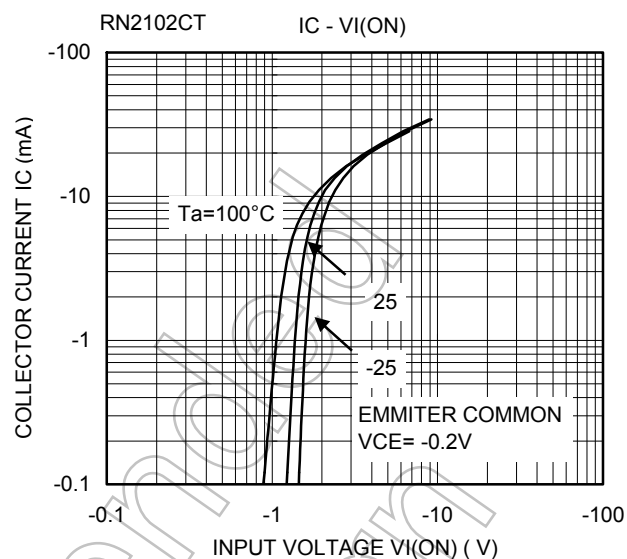
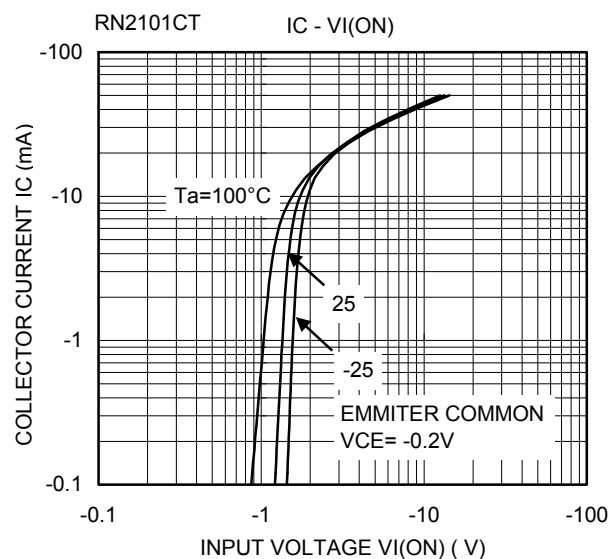
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

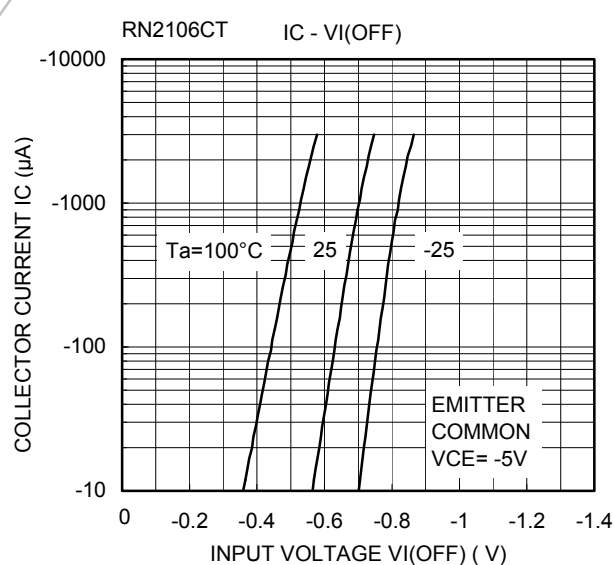
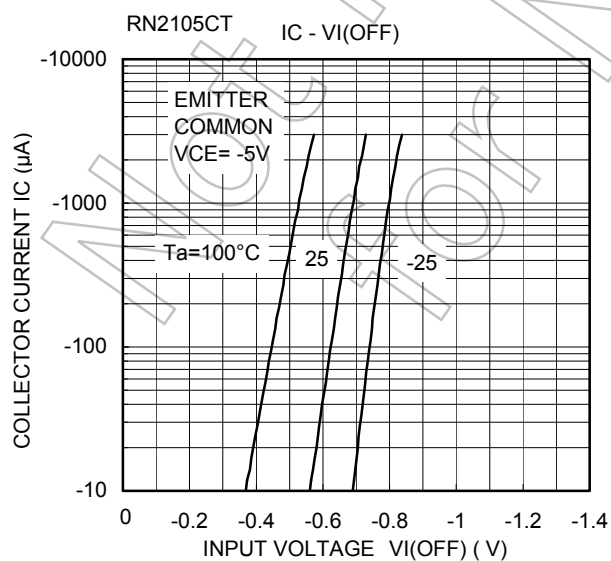
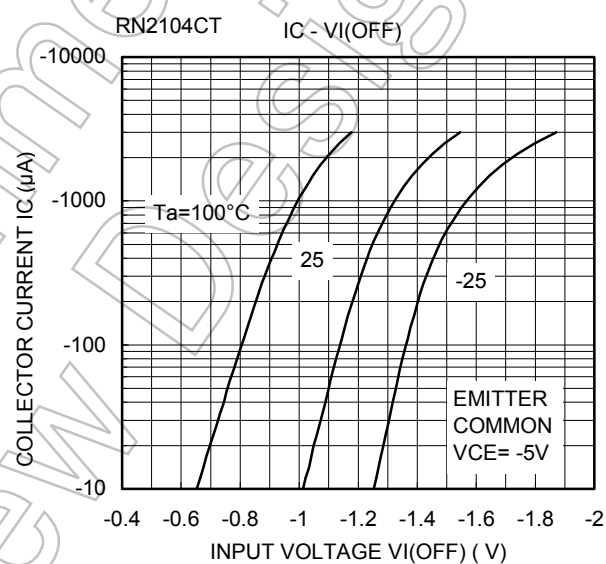
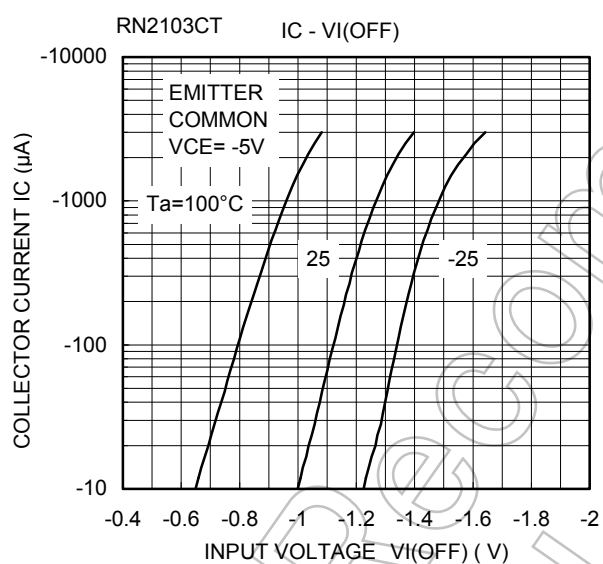
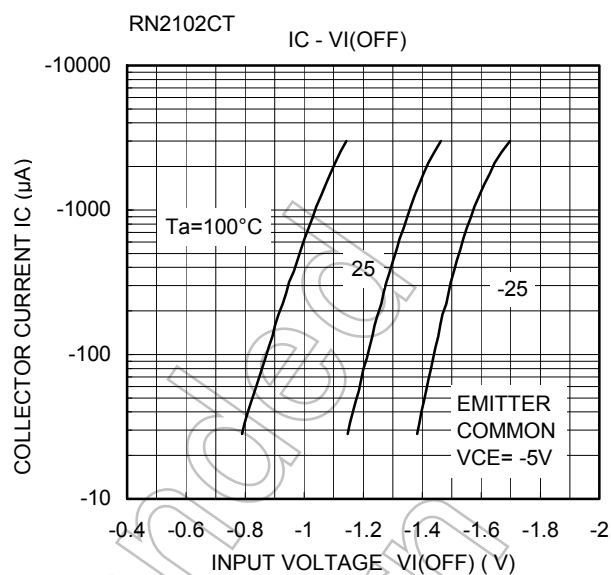
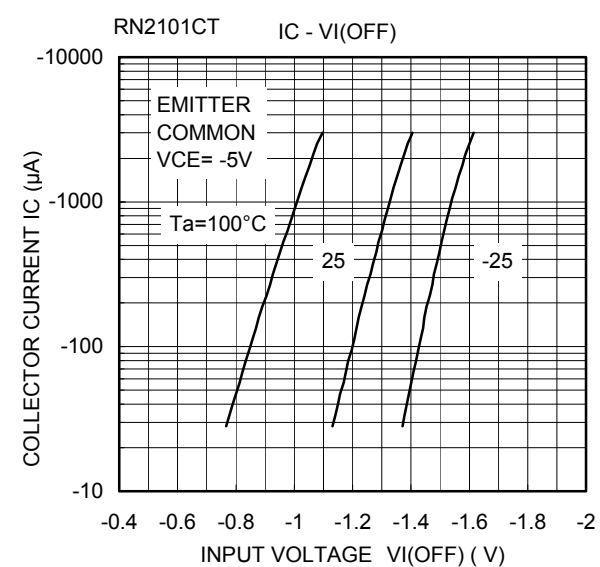
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

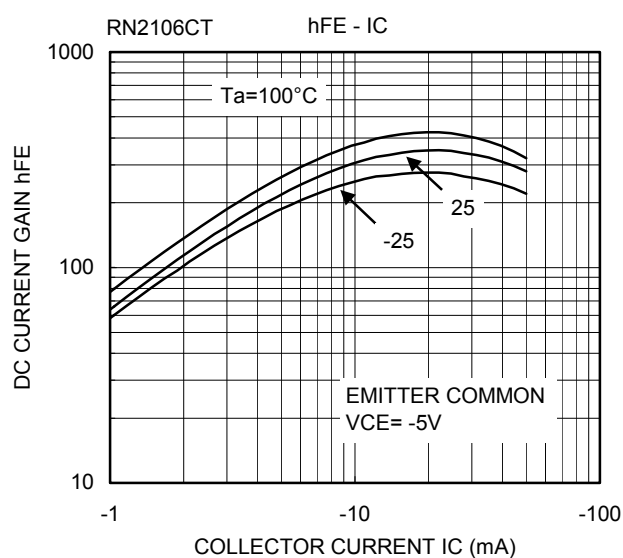
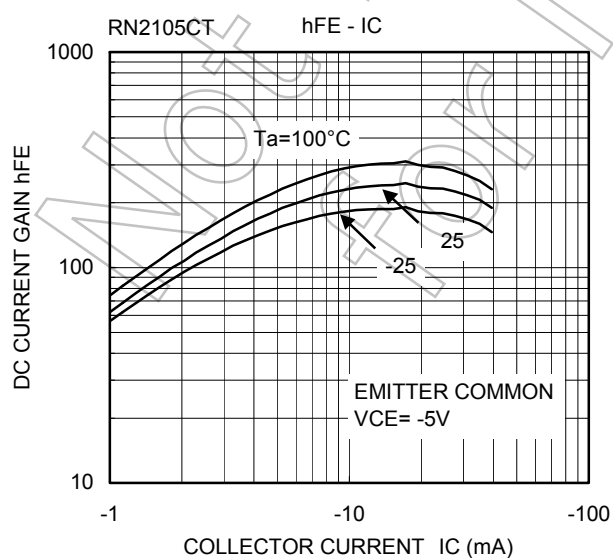
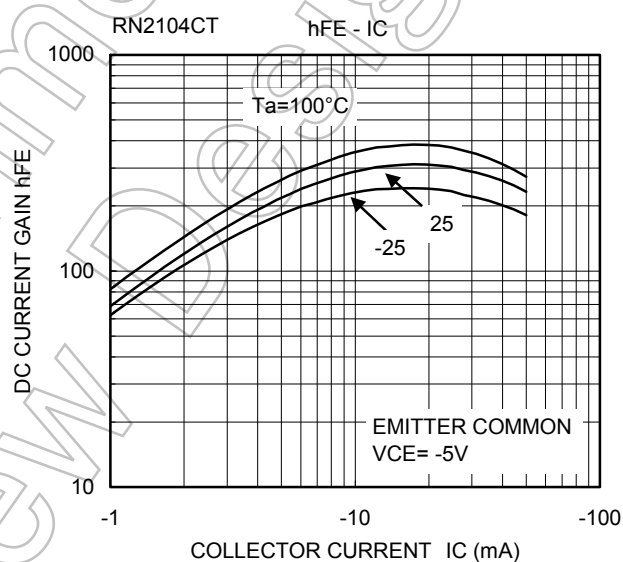
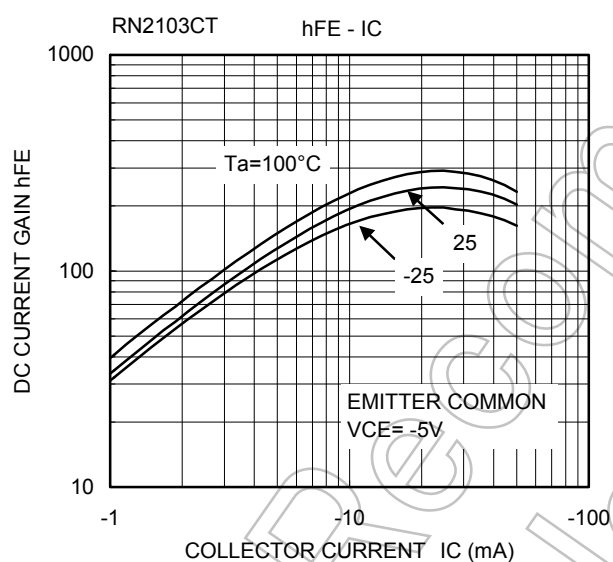
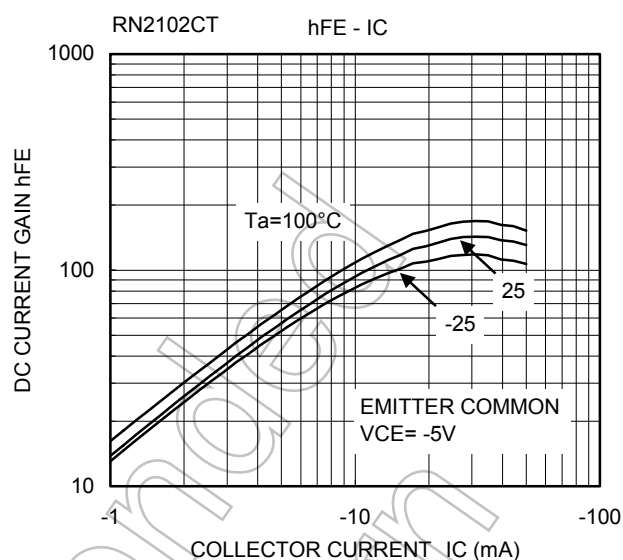
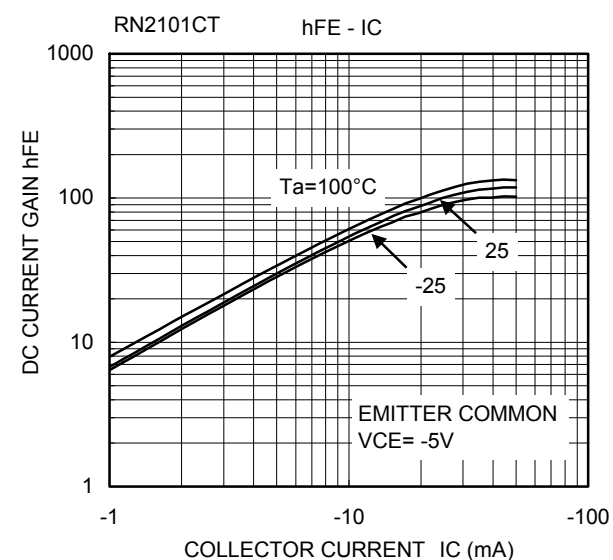
Start of commercial production
2004-10

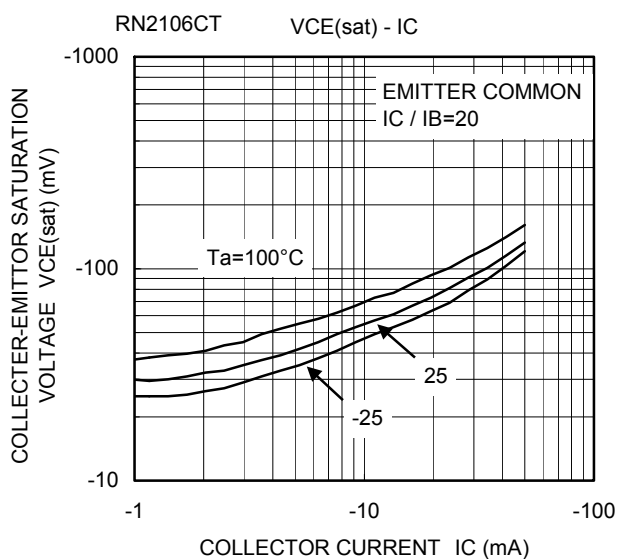
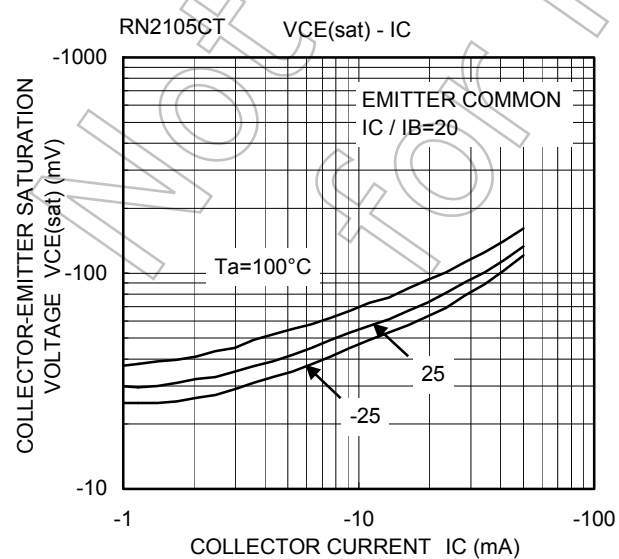
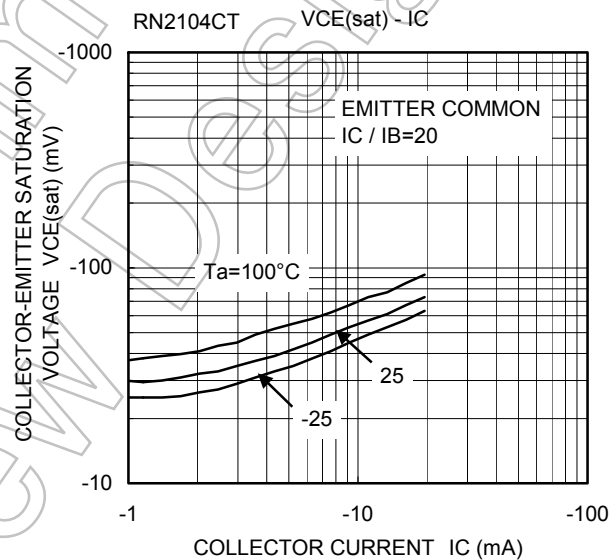
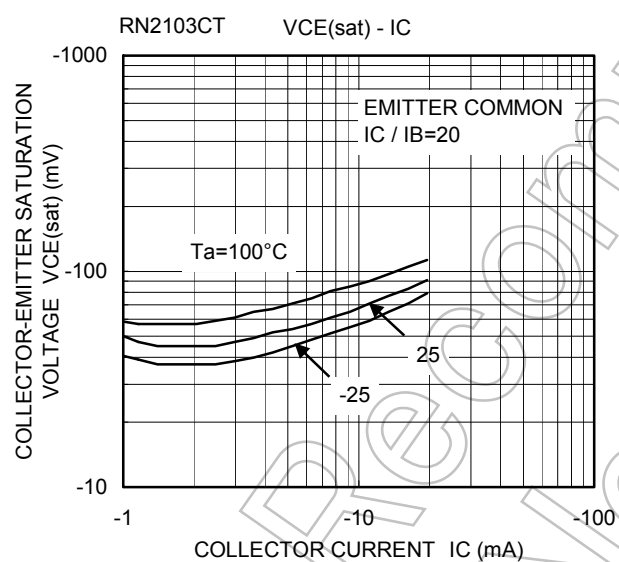
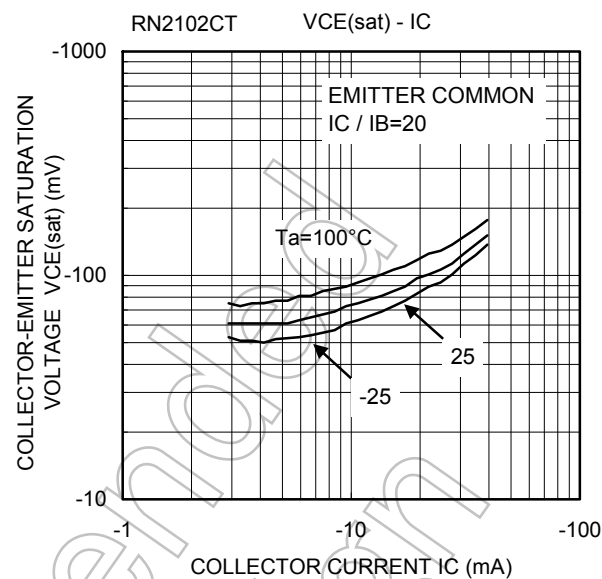
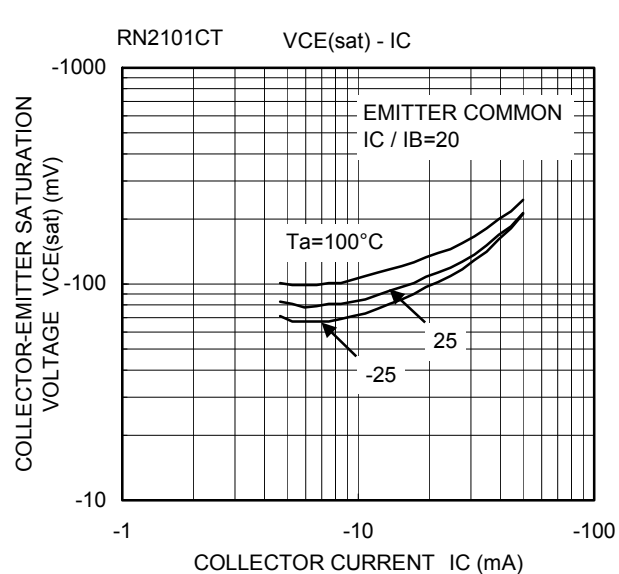
Electrical Characteristics (Ta = 25°C)

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|--------------------|---------------|--|--------|--------|--------|------|
| Collector cut-off current | RN2101CT to 2106CT | I_{CBO} | $V_{CB} = -20 \text{ V}, I_E = 0$ | — | — | -100 | nA |
| | | I_{CEO} | $V_{CE} = -20 \text{ V}, I_B = 0$ | — | — | -500 | |
| Emitter cut-off current | RN2101CT | I_{EBO} | $V_{EB} = -10 \text{ V}, I_C = 0$ | -0.89 | — | -1.33 | mA |
| | RN2102CT | | | -0.41 | — | -0.63 | |
| | RN2103CT | | | -0.18 | — | -0.29 | |
| | RN2104CT | | $V_{EB} = -5 \text{ V}, I_C = 0$ | -0.088 | — | -0.133 | |
| | RN2105CT | | | -0.085 | — | -0.127 | |
| | RN2106CT | | | -0.08 | — | -0.121 | |
| DC current gain | RN2101CT | h_{FE} | $V_{CE} = -5 \text{ V}, I_C = -10 \text{ mA}$ | 30 | — | — | |
| | RN2102CT | | | 60 | — | — | |
| | RN2103CT | | | 100 | — | — | |
| | RN2104CT | | | 120 | — | — | |
| | RN2105CT | | | 120 | — | — | |
| | RN2106CT | | | 120 | — | — | |
| Collector-emitter saturation voltage | RN2101CT to 2106CT | $V_{CE(sat)}$ | $I_C = -5 \text{ mA}, I_B = -0.25 \text{ mA}$ | — | — | -0.15 | V |
| Input voltage (ON) | RN2101CT | $V_{I(ON)}$ | $V_{CE} = -0.2 \text{ V}, I_C = -5 \text{ mA}$ | -1.0 | — | -2.0 | V |
| | RN2102CT | | | -1.0 | — | -2.2 | |
| | RN2103CT | | | -1.1 | — | -2.7 | |
| | RN2104CT | | | -1.2 | — | -3.6 | |
| | RN2105CT | | | -0.6 | — | -1.1 | |
| | RN2106CT | | | -0.6 | — | -1.2 | |
| Input voltage (OFF) | RN2101CT to 2104CT | $V_{I(OFF)}$ | $V_{CE} = -5 \text{ V}, I_C = -0.1 \text{ mA}$ | -0.8 | — | -1.5 | V |
| | RN2105CT, 2106CT | | | -0.4 | — | -0.8 | |
| Collector output capacitance | RN2101CT to 2106CT | C_{ob} | $V_{CB} = -10 \text{ V}, I_E = 0, f = 1 \text{ MHz}$ | — | 1.2 | — | pF |
| Input resistor | RN2101CT | R_1 | — | 3.76 | 4.7 | 5.64 | kΩ |
| | RN2102CT | | | 8 | 10 | 12 | |
| | RN2103CT | | | 17.6 | 22 | 26.4 | |
| | RN2104CT | | | 37.6 | 47 | 56.4 | |
| | RN2105CT | | | 1.76 | 2.2 | 2.64 | |
| | RN2106CT | | | 3.76 | 4.7 | 5.64 | |
| Resistor ratio | RN2101CT to 2104CT | R_1/R_2 | — | 0.8 | 1.0 | 1.2 | |
| | RN2105CT | | | 0.0376 | 0.0468 | 0.0562 | |
| | RN2106CT | | | 0.08 | 0.1 | 0.12 | |









| Type Name | Marking |
|-----------|---------|
| RN2101CT | |
| RN2102CT | |
| RN2103CT | |
| RN2104CT | |
| RN2105CT | |
| RN2106CT | |

Handling Precaution

When handling individual devices (which are not yet mounted on a circuit board), be sure that the environment is protected against electrostatic electricity. Operators should wear anti-static clothing, and containers and other objects that come into direct contact with devices should be made of anti-static materials.

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