

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

## RN2961CT, RN2962CT, RN2963CT RN2964CT, RN2965CT, RN2966CT

Switching Applications

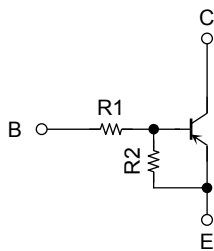
Inverter Circuit Applications

Interface Circuit Applications

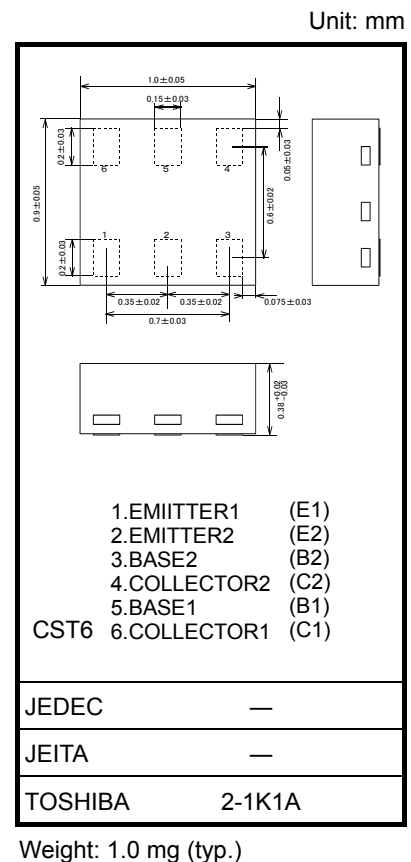
Driver Circuit Applications

- Two devices are incorporated into a fine pitch Small Mold (6 pin) package.
- Incorporating a bias resistor into a transistor reduces parts count, which enables the manufacture of ever more compact equipment and saves assembly cost.
- Complementary to RN1961CT to RN1966CT

### Equivalent Circuit and Bias Resistor Values



| Type No. | R1 (kΩ) | R2 (kΩ) |
|----------|---------|---------|
| RN2961CT | 4.7     | 4.7     |
| RN2962CT | 10      | 10      |
| RN2963CT | 22      | 22      |
| RN2964CT | 47      | 47      |
| RN2965CT | 2.2     | 47      |
| RN2966CT | 4.7     | 47      |



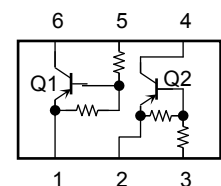
### Absolute Maximum Ratings (Ta = 25°C) (Q1, Q2 common)

| 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 | $P_C$ (Note1) | 140        | mW   |
| Junction temperature        | $T_j$         | 150        | °C   |
| Storage temperature range   | $T_{stg}$     | -55 to 150 | °C   |

Note1: Total rating, mounted on glass-epoxy board of 10mm × 10mm × 1mm.

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.).

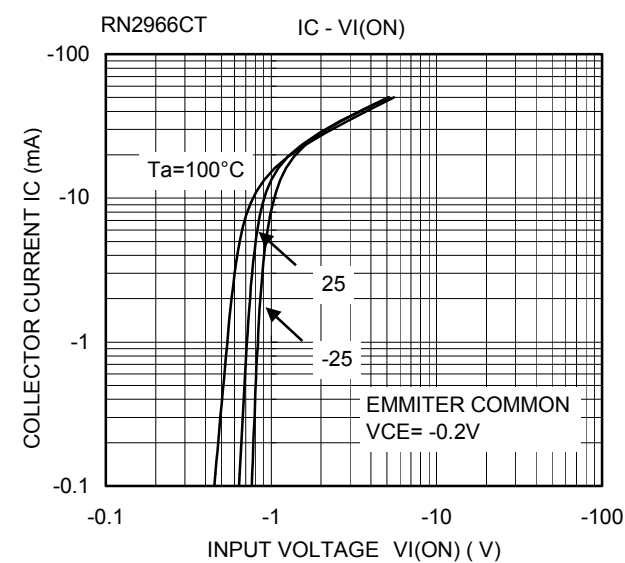
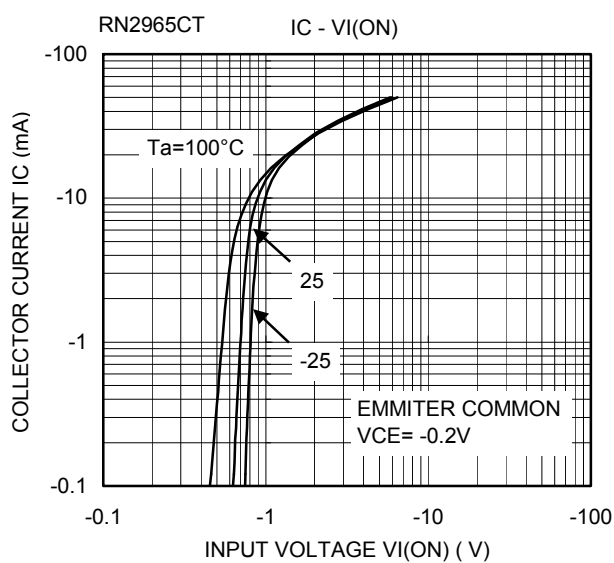
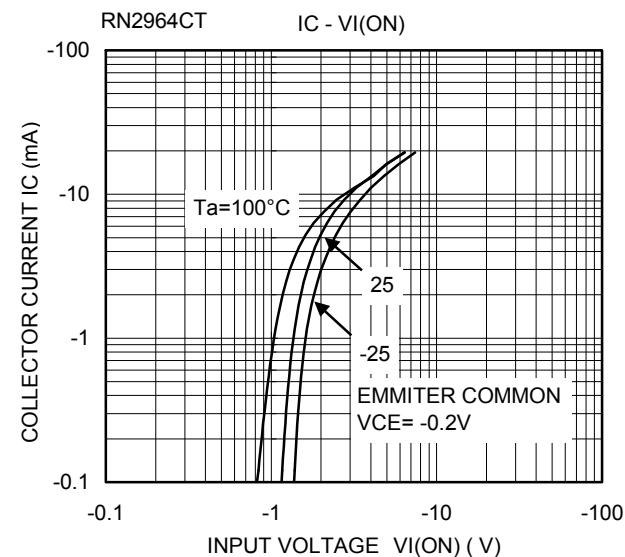
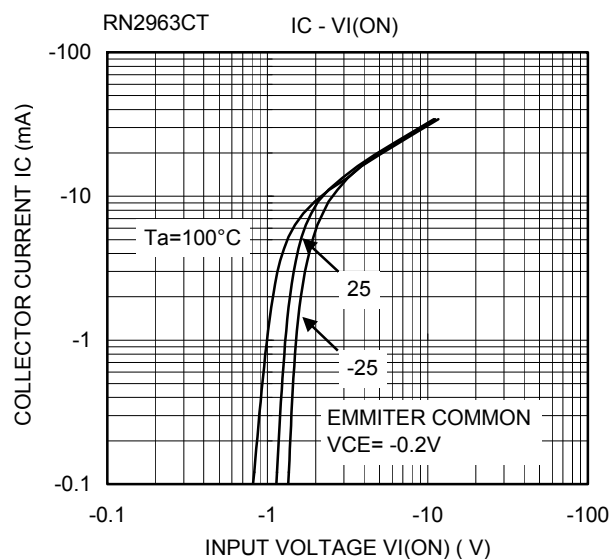
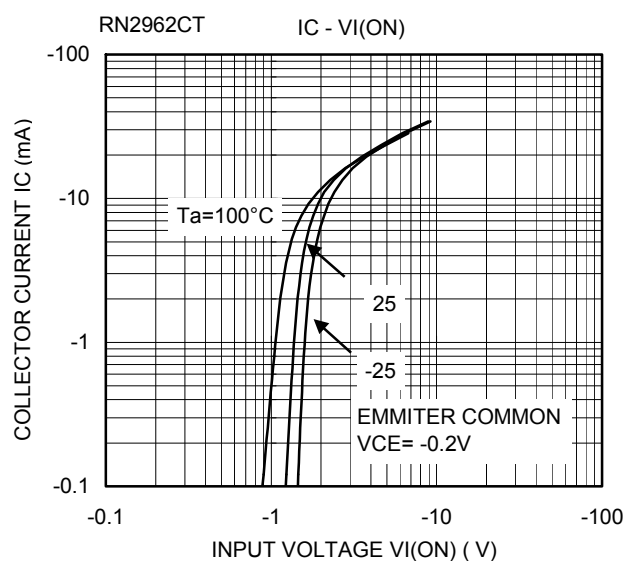
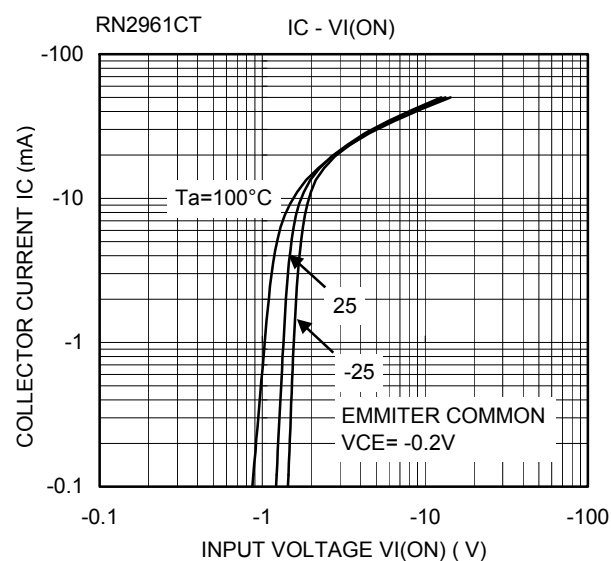
### Equivalent Circuit (top view)



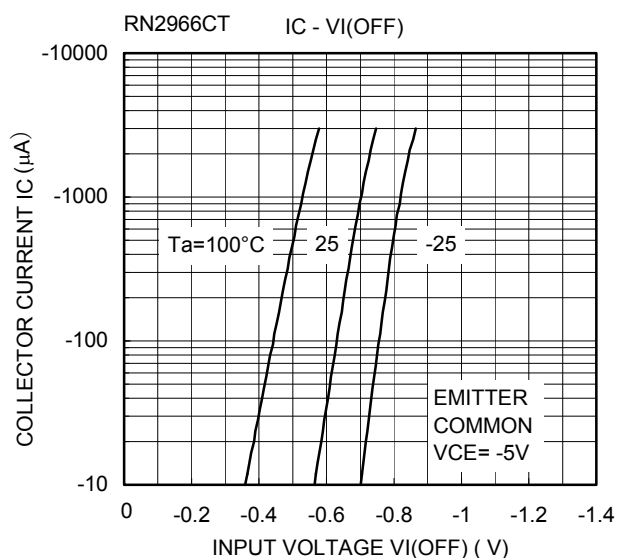
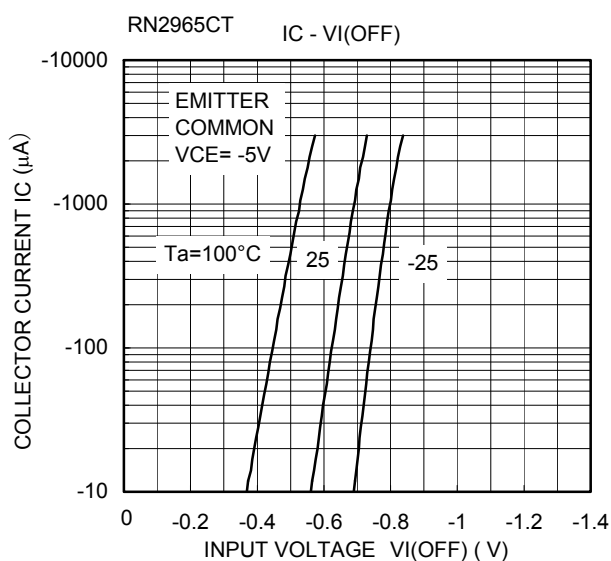
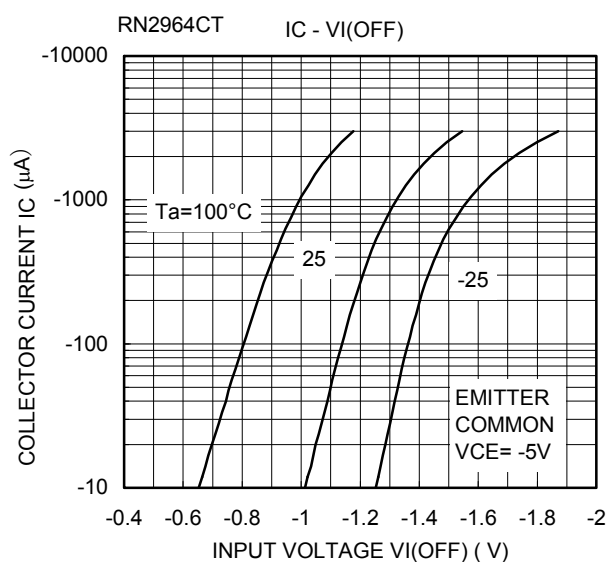
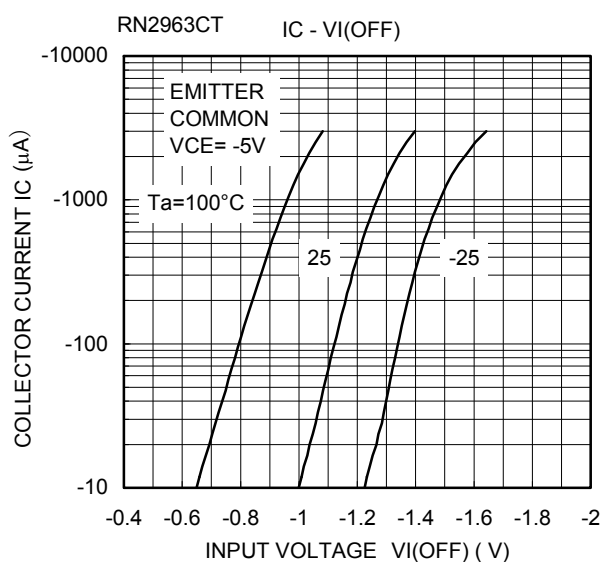
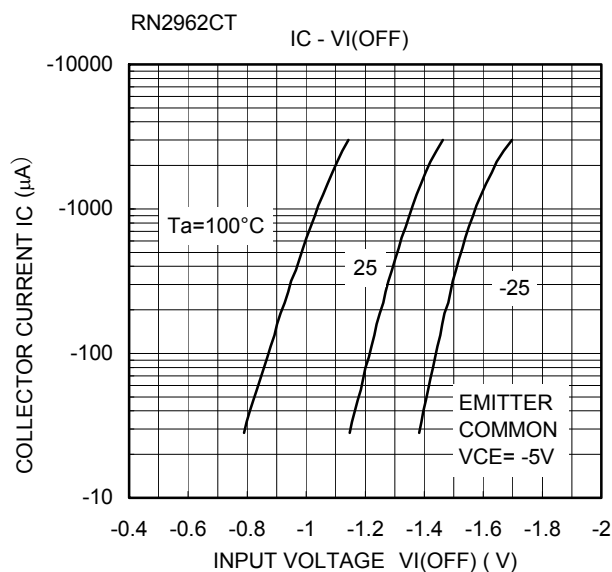
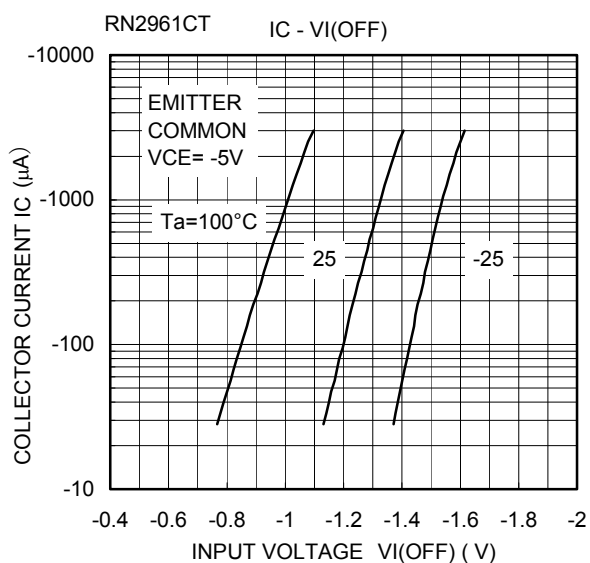
**Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)**

| Characteristics                      |                    | Symbol        | Test Condition                                     | Min    | Typ.   | Max    | Unit |
|--------------------------------------|--------------------|---------------|----------------------------------------------------|--------|--------|--------|------|
| Collector cut-off current            | RN2961CT to 2966CT | $I_{CBO}$     | $V_{CB} = -20\text{ V}, I_E = 0$                   | —      | —      | -100   | nA   |
|                                      |                    | $I_{CEO}$     | $V_{CE} = -20\text{ V}, I_B = 0$                   | —      | —      | -500   |      |
| Emitter cut-off current              | RN2961CT           | $I_{EBO}$     | $V_{EB} = -10\text{ V}, I_C = 0$                   | -0.89  | —      | -1.33  | mA   |
|                                      | RN2962CT           |               |                                                    | -0.41  | —      | -0.63  |      |
|                                      | RN2963CT           |               |                                                    | -0.18  | —      | -0.29  |      |
|                                      | RN2964CT           |               |                                                    | -0.088 | —      | -0.133 |      |
|                                      | RN2965CT           | $I_{EBO}$     | $V_{EB} = -5\text{ V}, I_C = 0$                    | -0.085 | —      | -0.127 |      |
|                                      | RN2966CT           |               |                                                    | -0.08  | —      | -0.121 |      |
| DC current gain                      | RN2961CT           | $h_{FE}$      | $V_{CE} = -5\text{ V}, I_C = -10\text{ mA}$        | 30     | —      | —      |      |
|                                      | RN2962CT           |               |                                                    | 60     | —      | —      |      |
|                                      | RN2963CT           |               |                                                    | 100    | —      | —      |      |
|                                      | RN2964CT           |               |                                                    | 120    | —      | —      |      |
|                                      | RN2965CT           |               |                                                    | 120    | —      | —      |      |
|                                      | RN2966CT           |               |                                                    | 120    | —      | —      |      |
| Collector-emitter saturation voltage | RN2961CT~2966CT    | $V_{CE(sat)}$ | $I_C = -5\text{ mA}, I_B = -0.25\text{ mA}$        | —      | —      | -0.15  | V    |
| Input voltage (ON)                   | RN2961CT           | $V_I(ON)$     | $V_{CE} = -0.2\text{ V}, I_C = -5\text{ mA}$       | -1.0   | —      | -2.0   | V    |
|                                      | RN2962CT           |               |                                                    | -1.0   | —      | -2.2   |      |
|                                      | RN2963CT           |               |                                                    | -1.1   | —      | -2.7   |      |
|                                      | RN2964CT           |               |                                                    | -1.2   | —      | -3.6   |      |
|                                      | RN2965CT           |               |                                                    | -0.6   | —      | -1.1   |      |
|                                      | RN2966CT           |               |                                                    | -0.6   | —      | -1.2   |      |
| Input voltage (OFF)                  | RN2961CT to 2964CT | $V_I(OFF)$    | $V_{CE} = -5\text{ V}, I_C = -0.1\text{ mA}$       | -0.8   | —      | -1.5   | V    |
|                                      | RN2965CT, 2966CT   |               |                                                    | -0.4   | —      | -0.8   |      |
| Collector output capacitance         | RN2961CT to 2966CT | $C_{ob}$      | $V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$ | —      | 1.2    | —      | pF   |
| Input resistor                       | RN2961CT           | R1            | —                                                  | 3.76   | 4.7    | 5.64   | kΩ   |
|                                      | RN2962CT           |               |                                                    | 8      | 10     | 12     |      |
|                                      | RN2963CT           |               |                                                    | 17.6   | 22     | 26.4   |      |
|                                      | RN2964CT           |               |                                                    | 37.6   | 47     | 56.4   |      |
|                                      | RN2965CT           |               |                                                    | 1.76   | 2.2    | 2.64   |      |
|                                      | RN2966CT           |               |                                                    | 3.76   | 4.7    | 5.64   |      |
| Resistor ratio                       | RN2961CT to 2964CT | R1/R2         | —                                                  | 0.8    | 1.0    | 1.2    |      |
|                                      | RN2965CT           |               |                                                    | 0.0376 | 0.0468 | 0.0562 |      |
|                                      | RN2966CT           |               |                                                    | 0.08   | 0.1    | 0.12   |      |

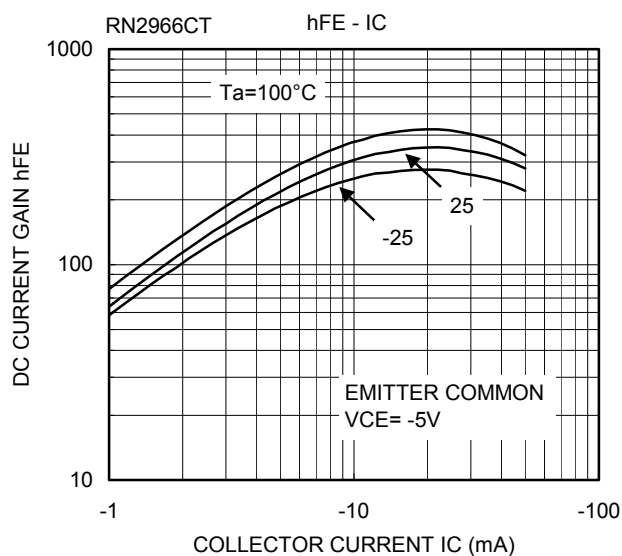
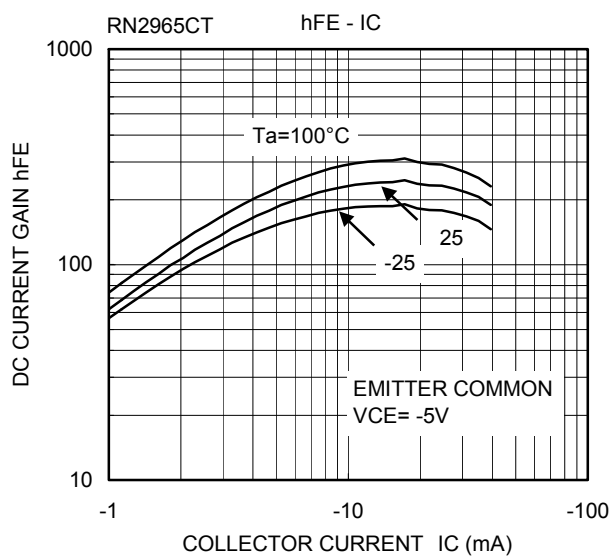
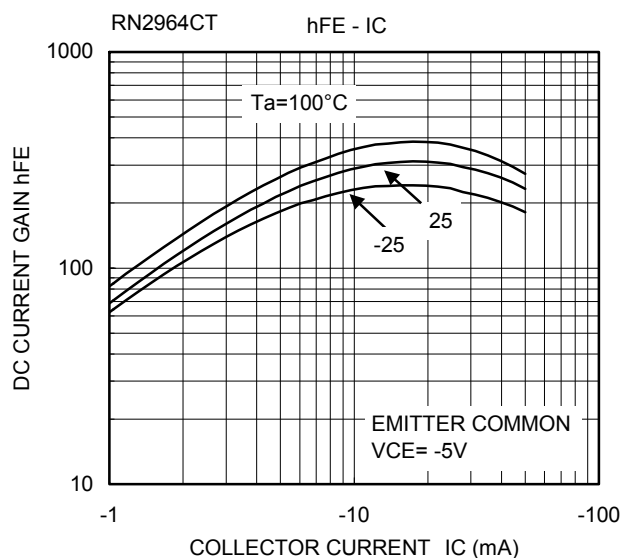
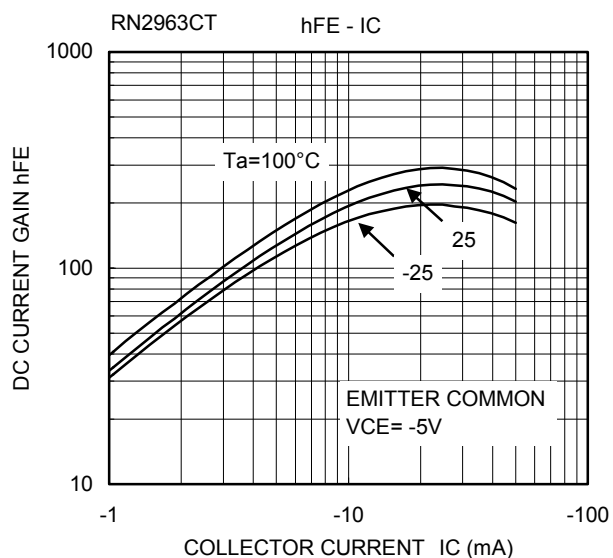
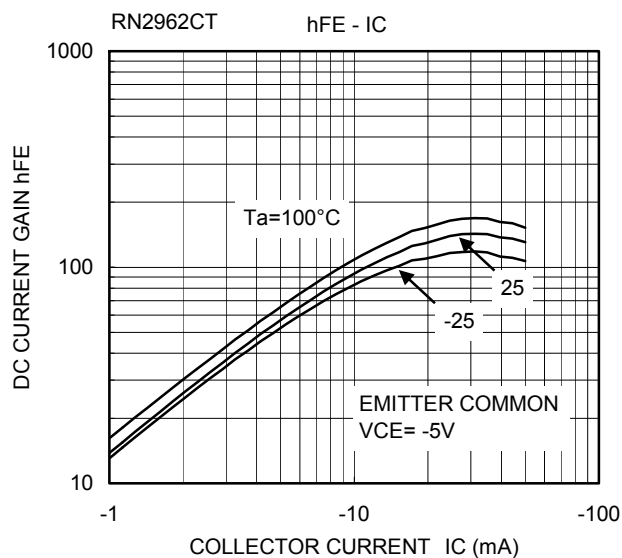
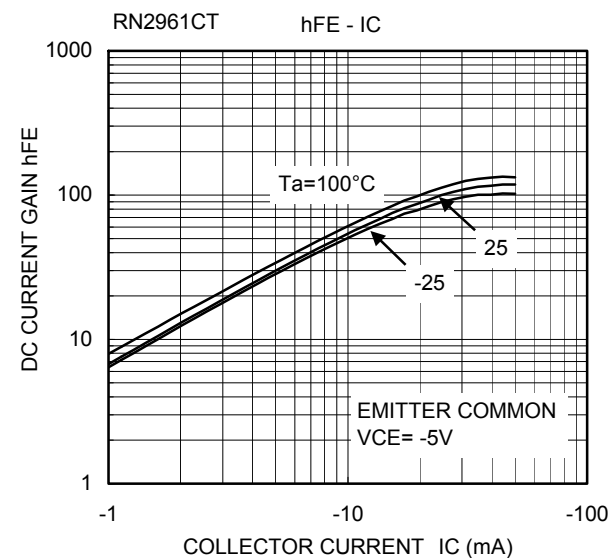
(Q1,Q2 common)



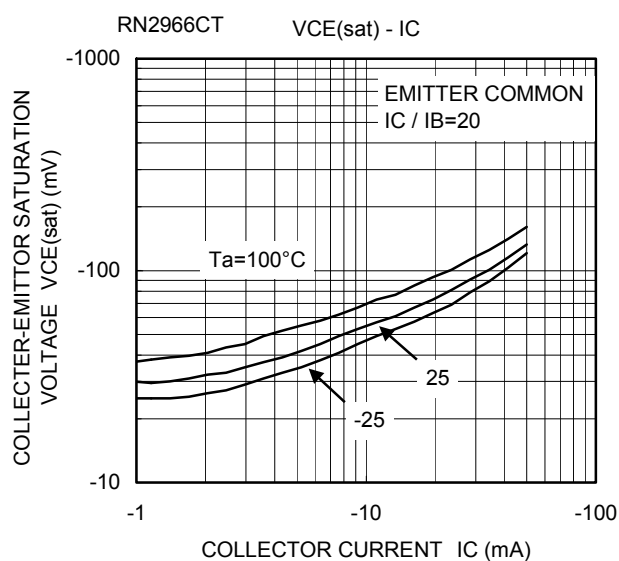
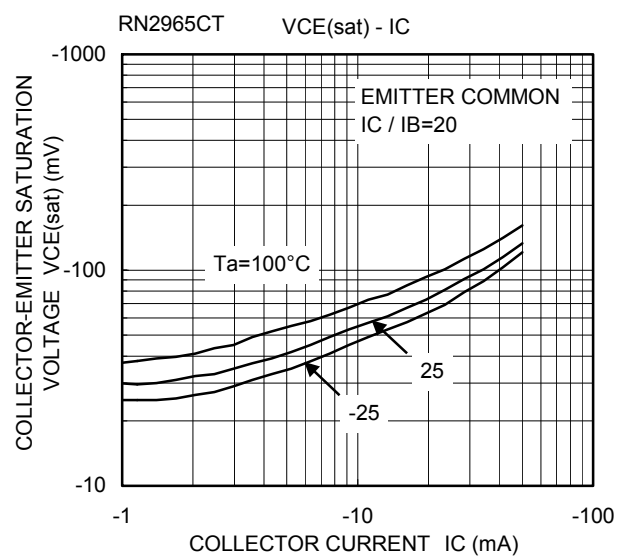
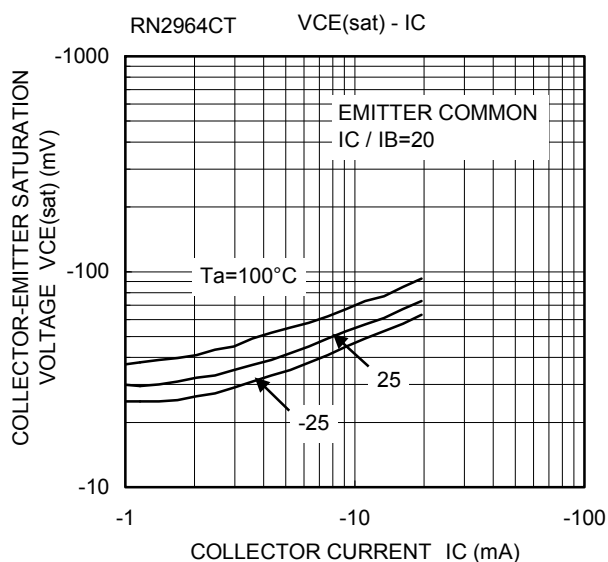
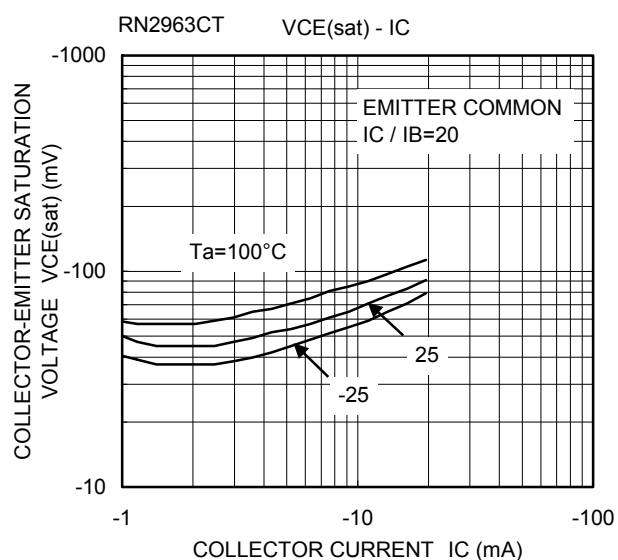
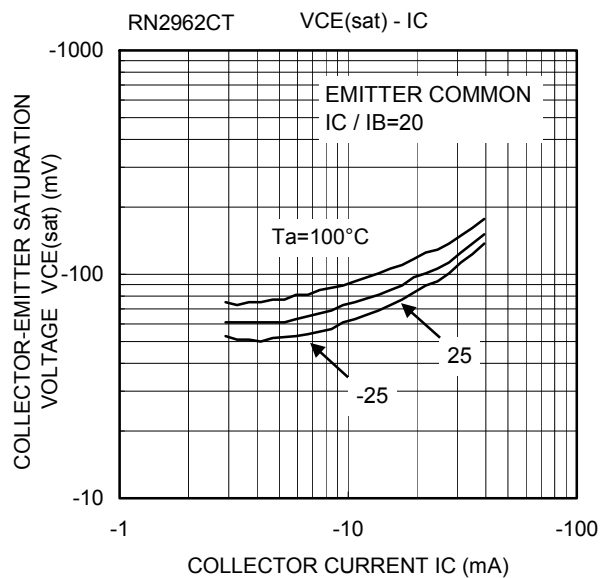
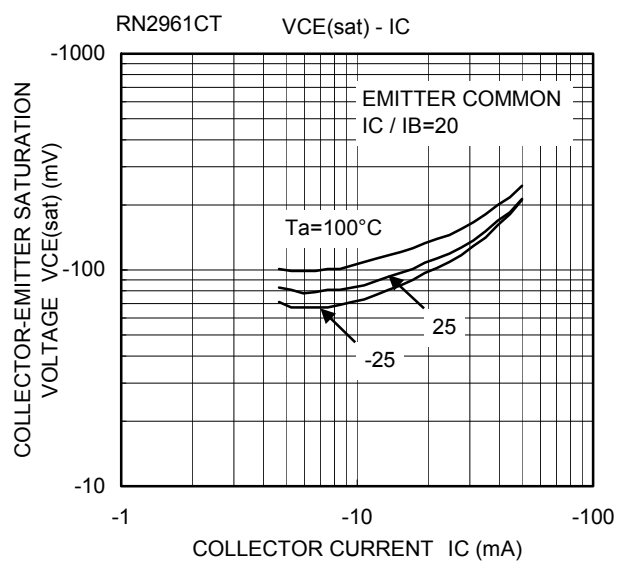
(Q1,Q2 common)

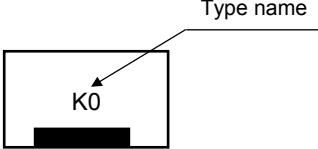
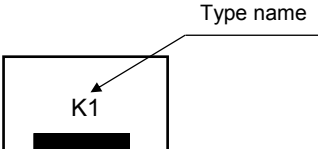
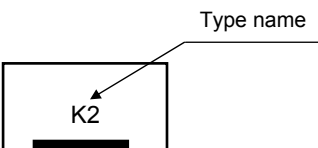
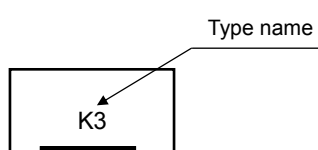
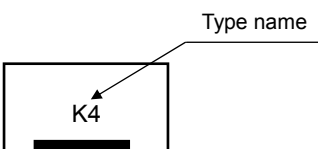
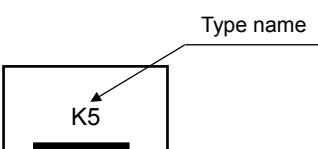


(Q1,Q2 common)



(Q1,Q2 common)



| Type Name | Marking                                                                             |
|-----------|-------------------------------------------------------------------------------------|
| RN2961CT  |    |
| RN2962CT  |    |
| RN2963CT  |    |
| RN2964CT  |  |
| RN2965CT  |  |
| RN2966CT  |  |

## 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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