

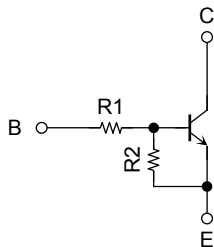
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

RN2967FS, RN2968FS, RN2969FS

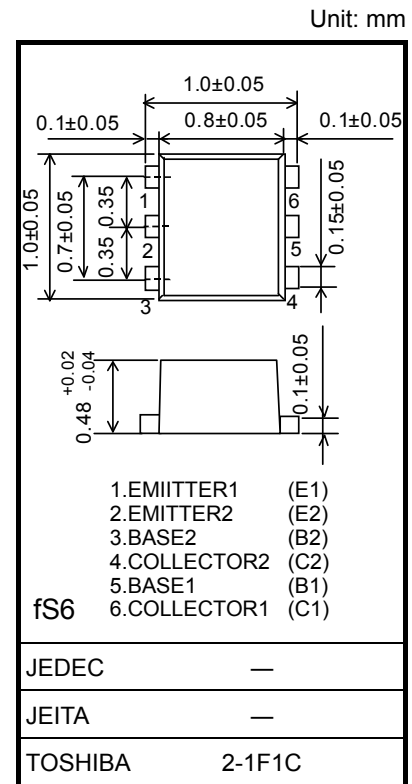
Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- Two devices are incorporated into a fine pitch Small Mold (6 pin) package.
- Incorporating a bias resistor into a transistor reduces parts count.
Reducing the parts count enable the manufacture of ever more compact equipment and save assembly cost.
- Complementary to RN1967FS~RN1969FS

Equivalent Circuit and Bias Resistor Values



| Type No. | R1 (kΩ) | R2 (kΩ) |
|----------|---------|---------|
| RN2967FS | 10 | 47 |
| RN2968FS | 22 | 47 |
| RN2969FS | 47 | 22 |

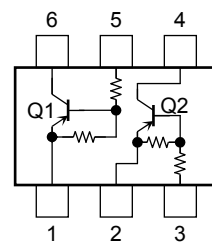


Weight: 0.001 g (typ.)

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

| Characteristics | | Symbol | Rating | Unit |
|-----------------------------|-------------------|-------------------------|---------|------|
| Collector-base voltage | RN2967FS~RN2969FS | V _{CBO} | -20 | V |
| Collector-emitter voltage | RN2967FS~RN2969FS | V _{CEO} | -20 | V |
| Emitter-base voltage | RN2967FS | V _{EBO} | -6 | V |
| | RN2968FS | | -7 | |
| | RN2969FS | | -15 | |
| Collector current | | I _C | -50 | mA |
| Collector power dissipation | RN2967FS~RN2969FS | P _C (Note 1) | 50 | mW |
| Junction temperature | | T _j | 150 | °C |
| Storage temperature range | | T _{stg} | -55~150 | °C |

Equivalent Circuit (top view)



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.

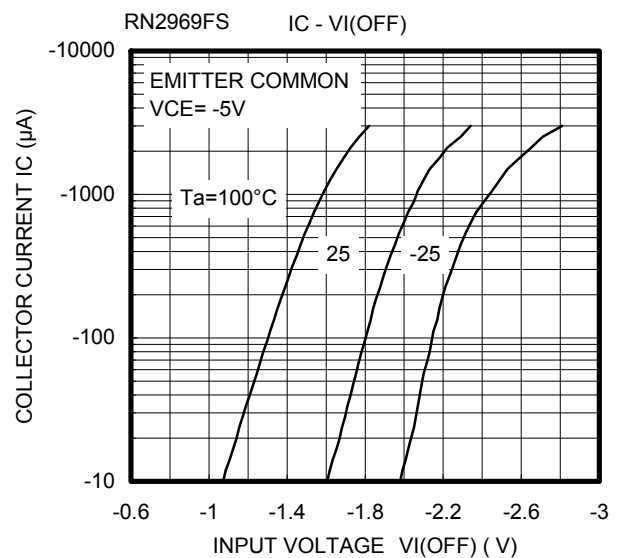
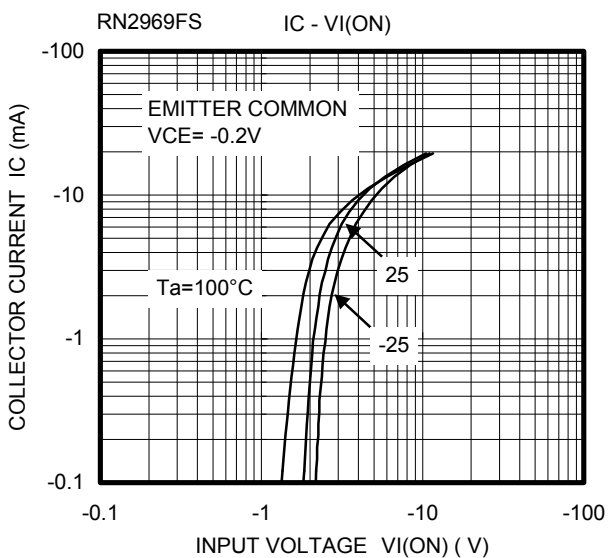
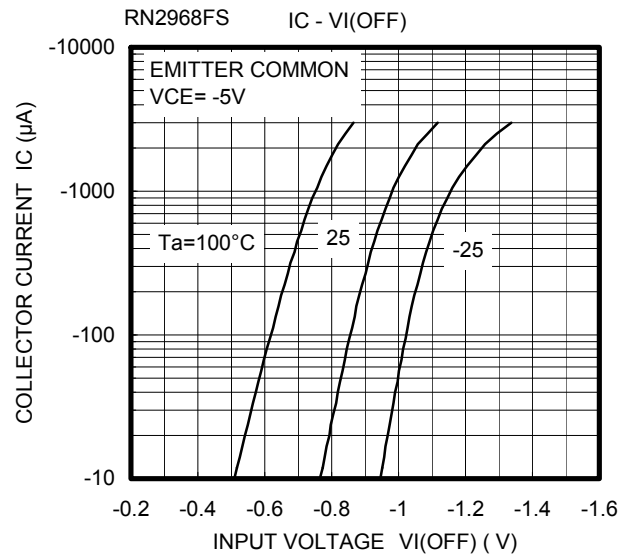
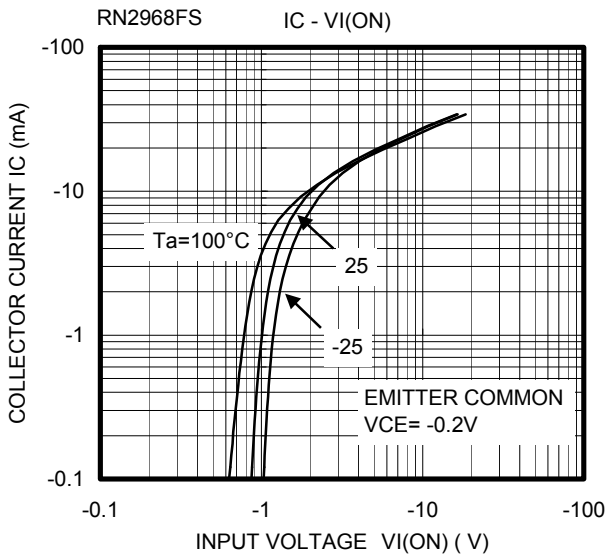
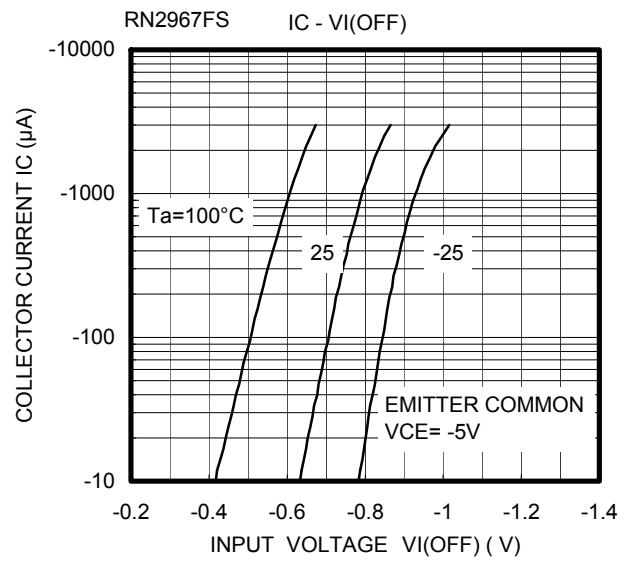
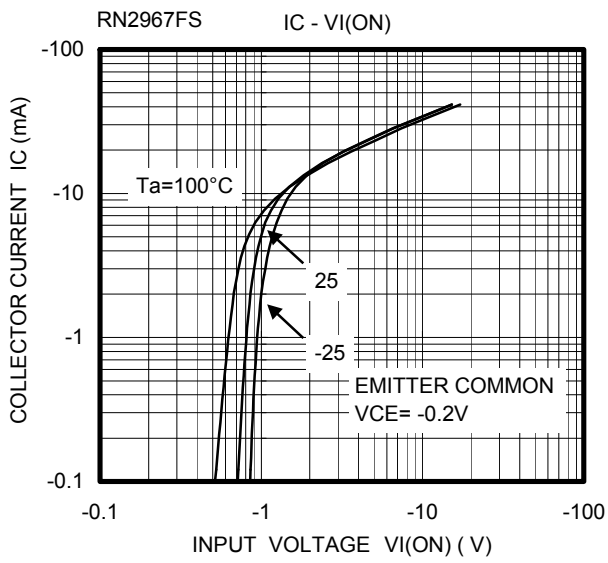
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: Total rating

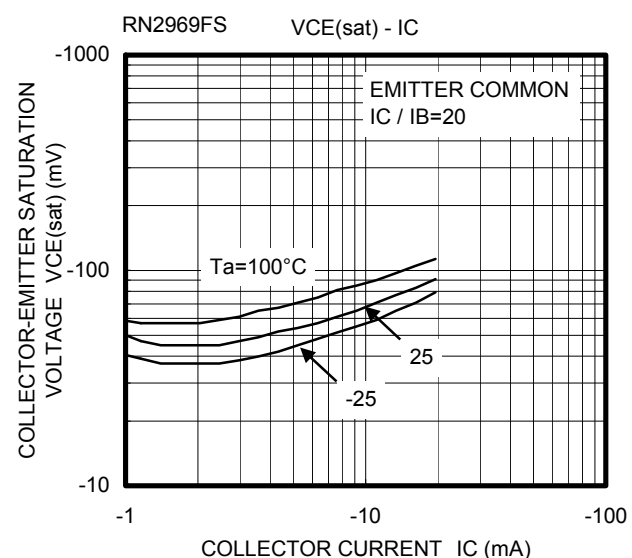
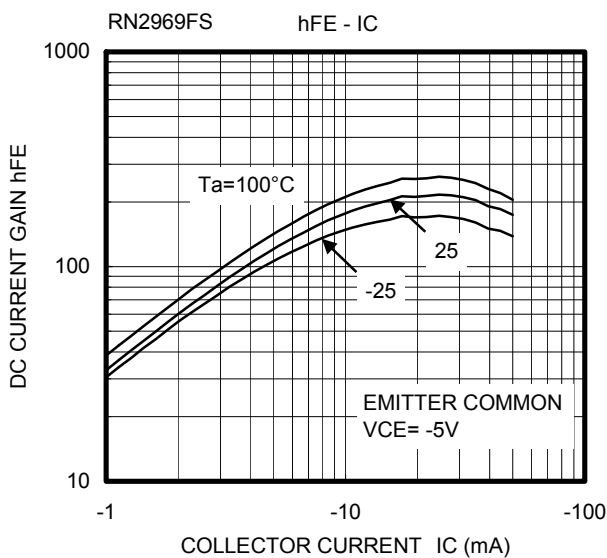
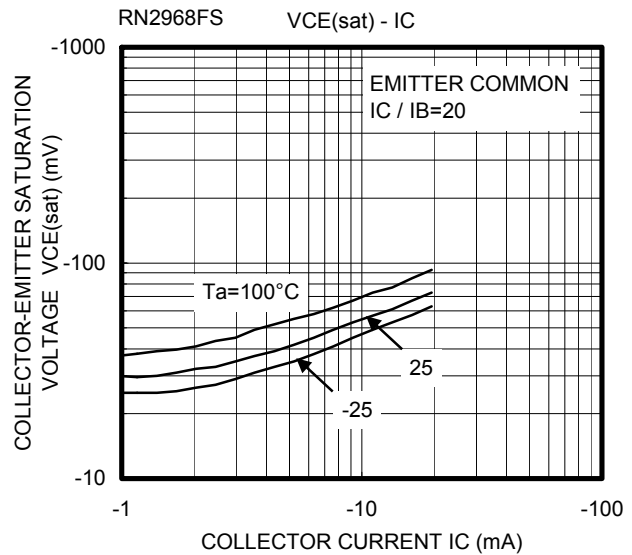
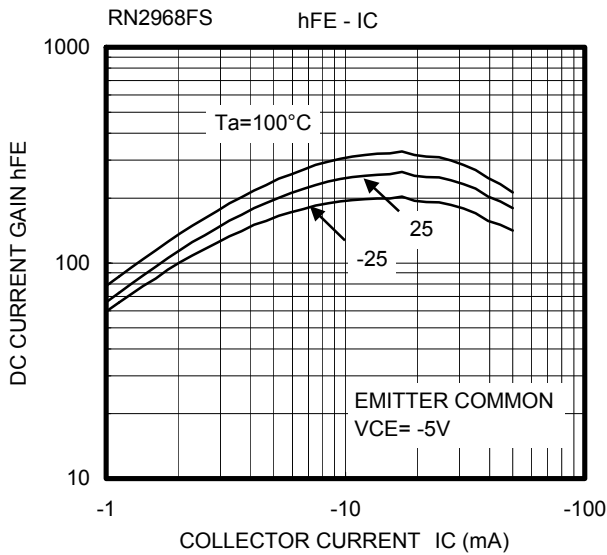
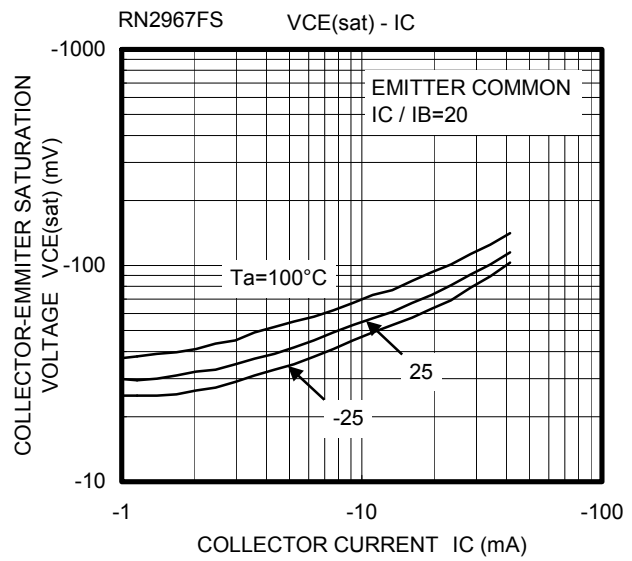
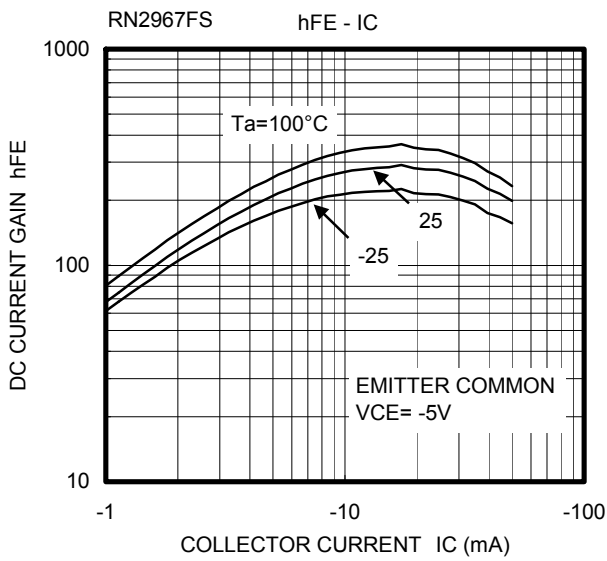
Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

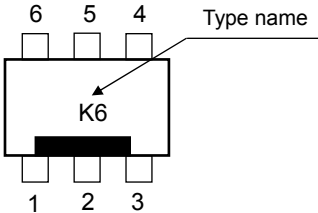
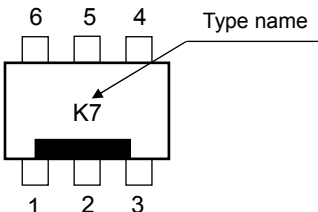
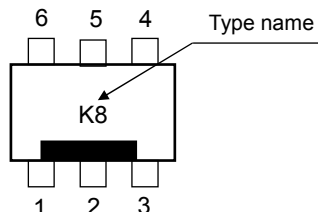
| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|-----------------|---------------|---|--------|-------|--------|------|
| Collector cut-off current | RN2967FS~2969FS | I_{CBO} | $V_{CB} = -20\text{ V}, I_E = 0$ | — | — | -100 | nA |
| | | I_{CEO} | $V_{CE} = -20\text{ V}, I_B = 0$ | — | — | -500 | |
| Emitter cut-off current | RN2967FS | I_{EBO} | $V_{EB} = -6\text{ V}, I_C = 0$ | -0.088 | — | -0.131 | mA |
| | RN2968FS | | $V_{EB} = -7\text{ V}, I_C = 0$ | -0.085 | — | -0.126 | |
| | RN2969FS | | $V_{EB} = -15\text{ V}, I_C = 0$ | -0.182 | — | -0.271 | |
| DC current gain | RN2967FS | h_{FE} | $V_{CE} = -5\text{ V},$ $I_C = -10\text{ mA}$ | 120 | — | — | |
| | RN2968FS | | | 120 | — | — | |
| | RN2969FS | | | 100 | — | — | |
| Collector-emitter saturation voltage | RN2967FS~2969FS | $V_{CE(sat)}$ | $I_C = -5\text{ mA},$ $I_B = -0.25\text{ mA}$ | — | — | -0.15 | V |
| Input voltage (ON) | RN2967FS | $V_I(ON)$ | $V_{CE} = -0.2\text{ V},$ $I_C = -5\text{ mA}$ | -0.7 | — | -1.5 | V |
| | RN2968FS | | | -0.8 | — | -2.2 | |
| | RN2969FS | | | -1.6 | — | -5.0 | |
| Input voltage (OFF) | RN2967FS | $V_I(OFF)$ | $V_{CE} = -5\text{ V},$ $I_C = -0.1\text{ mA},$ | -0.5 | — | -1.0 | V |
| | RN2968FS | | | -0.6 | — | -1.1 | |
| | RN2969FS | | | -1.3 | — | -2.6 | |
| Collector output capacitance | RN2967FS~2969FS | C_{ob} | $V_{CB} = -10\text{ V}, I_E = 0,$ $f = 1\text{ MHz}$ | — | 1.2 | — | pF |
| Input resistor | RN2967FS | R1 | — | 8 | 10 | 12 | kΩ |
| | RN2968FS | | | 17.6 | 22 | 26.4 | |
| | RN2969FS | | | 37.6 | 47 | 56.4 | |
| Resistor ratio | RN2967FS | R1/R2 | — | 0.17 | 0.213 | 0.255 | |
| | RN2968FS | | | 0.374 | 0.468 | 0.562 | |
| | RN2969FS | | | 1.71 | 2.14 | 2.56 | |

(Q1,Q2 common)



(Q1,Q2 common)



| Type Name | Marking |
|-----------|---|
| RN2967FS |  |
| RN2968FS |  |
| RN2969FS |  |

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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