

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

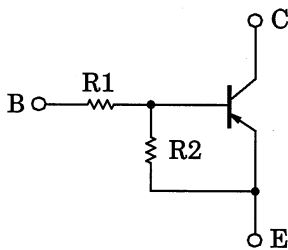
## RN2407, RN2408, RN2409

Unit: mm

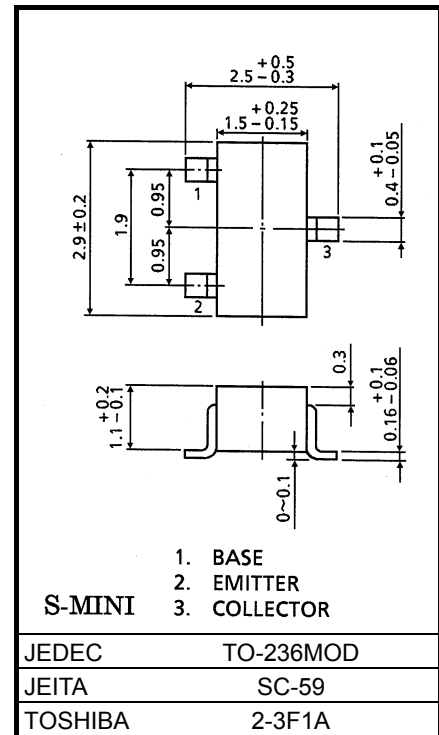
Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- With built-in bias resistors
- Simplified circuit design
- Reduce a quantity of parts and manufacturing process
- Complementary to RN1407 to 1409

### Equivalent Circuit and Bias Resistor Values



| Type No. | R1 (kΩ) | R2 (kΩ) |
|----------|---------|---------|
| RN2407   | 10      | 47      |
| RN2408   | 22      | 47      |
| RN2409   | 47      | 22      |



Weight: 12mg (typ.)

### Absolute Maximum Ratings (Ta = 25°C)

| Characteristic              | Symbol           | Rating           | Unit |            |    |
|-----------------------------|------------------|------------------|------|------------|----|
| Collector-base voltage      | RN2407 to RN2409 | V <sub>CB0</sub> | -50  | V          |    |
| Collector-emitter voltage   |                  |                  |      |            |    |
| Emitter-base voltage        | RN2407           | V <sub>EB0</sub> | -6   | V          |    |
|                             | RN2408           |                  | -7   |            |    |
|                             | RN2409           |                  | -15  |            |    |
| Collector current           | RN2407 to RN2409 | I <sub>C</sub>   | -100 | mA         |    |
| Collector power dissipation |                  | P <sub>C</sub>   | 200  | mW         |    |
| Junction temperature        |                  | T <sub>J</sub>   | 150  | °C         |    |
| Storage temperature range   |                  | T <sub>stg</sub> |      | -55 to 150 | °C |
|                             |                  |                  |      |            |    |

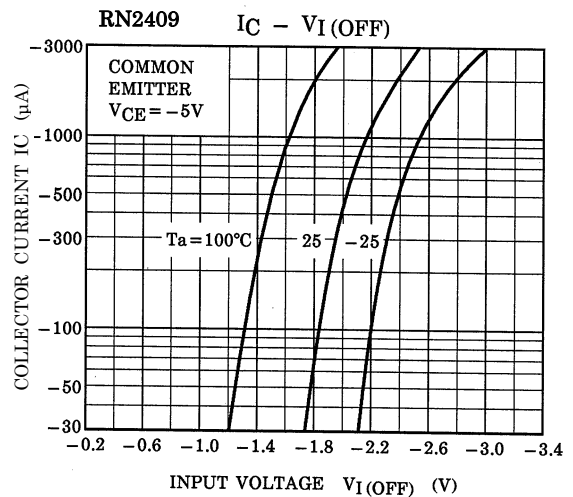
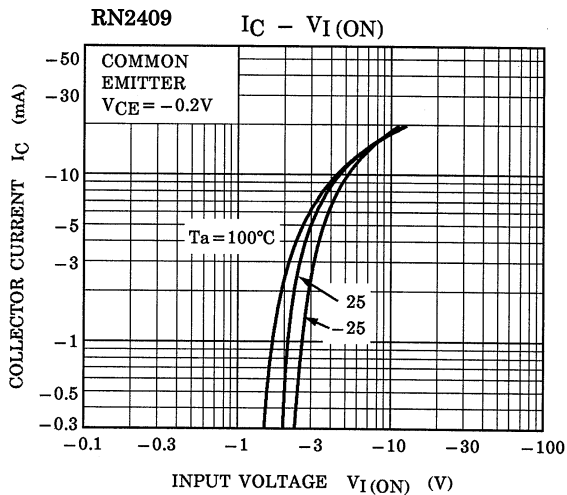
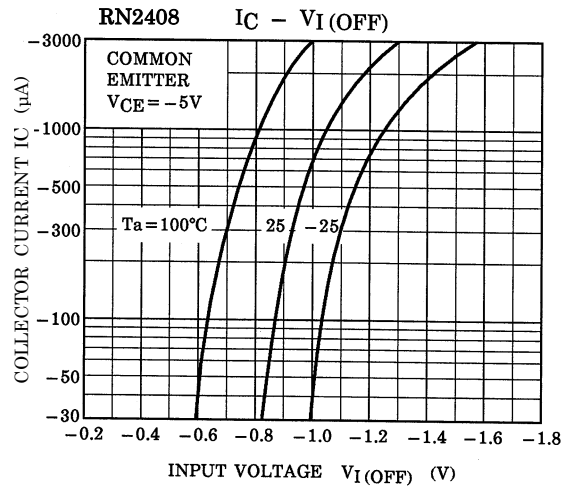
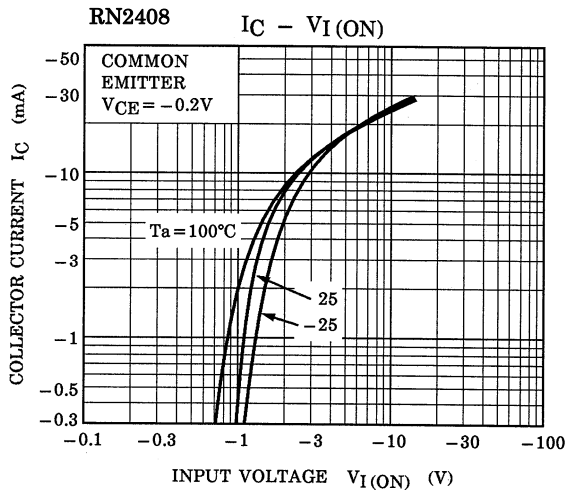
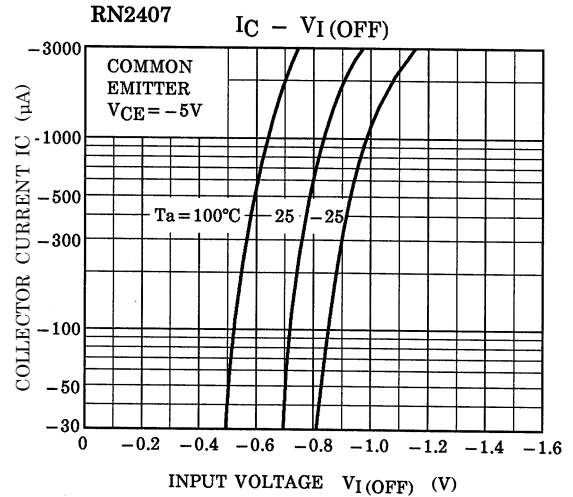
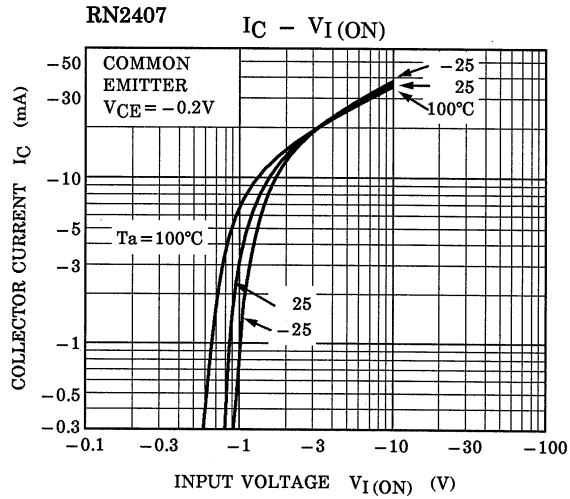
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

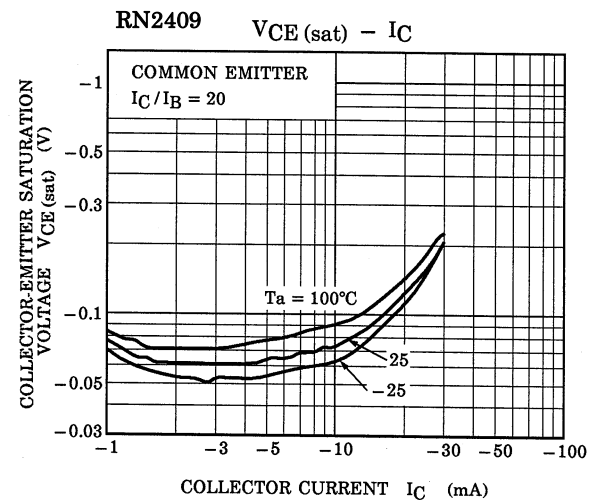
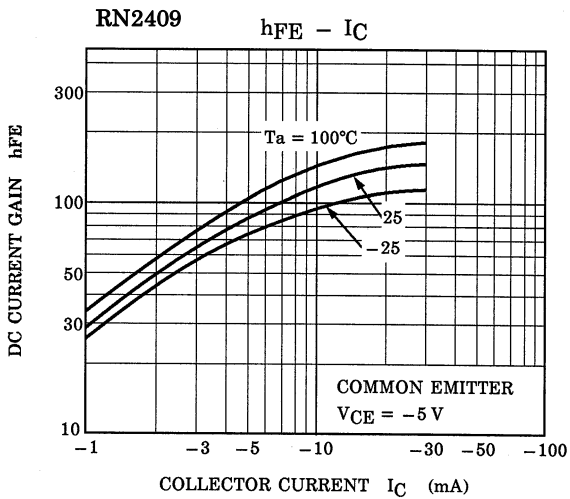
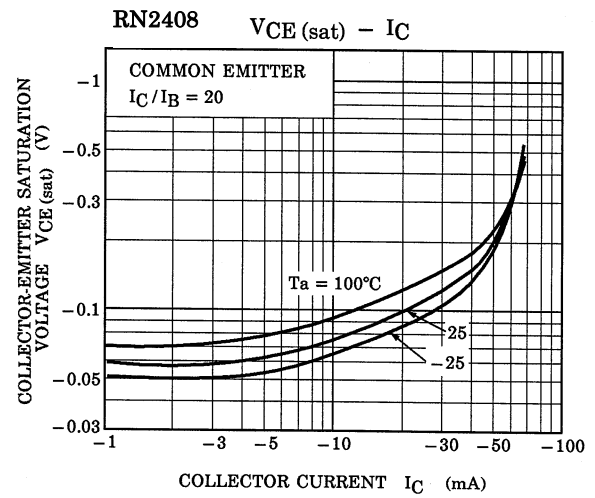
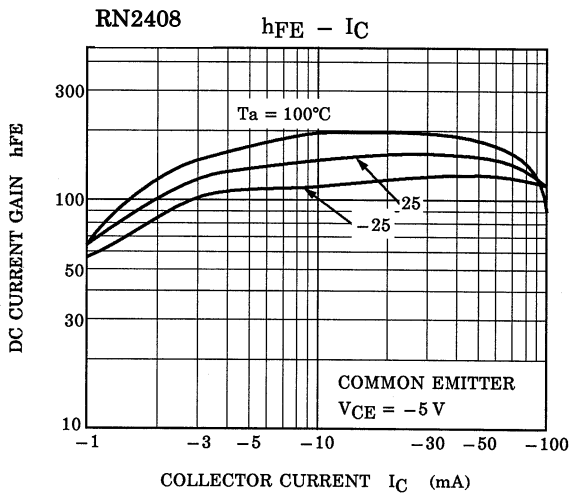
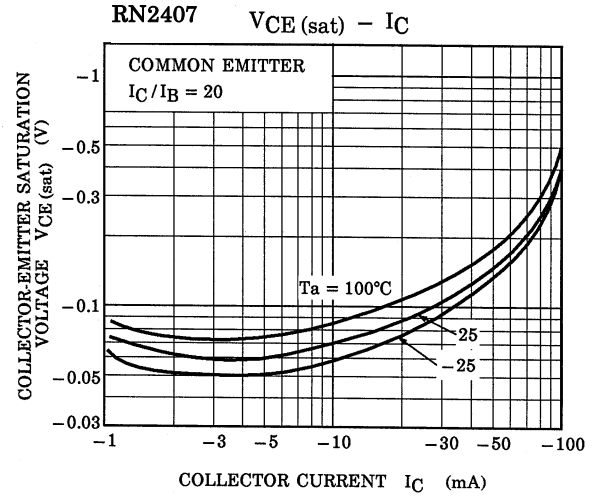
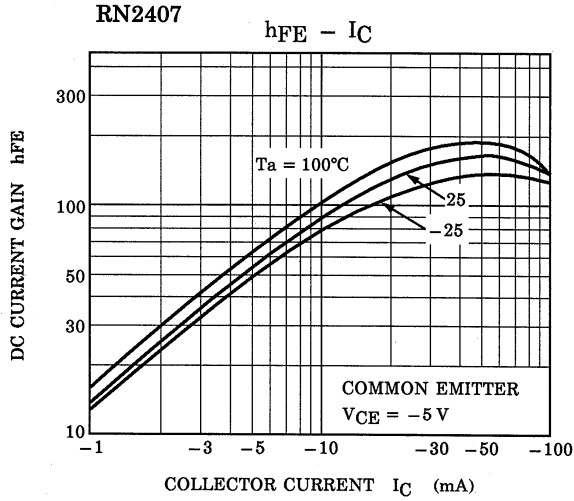
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

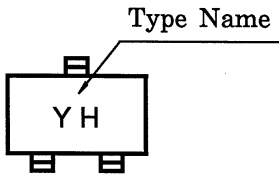
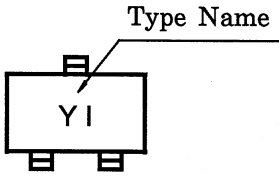
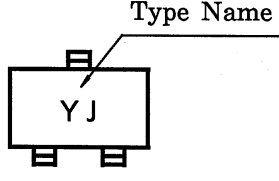
Start of commercial production  
1985-05

## Electrical Characteristics (Ta = 25°C)

| Characteristic                       |                  | Symbol        | Test Circuit | Test Condition  | Min    | Typ.  | Max    | Unit |
|--------------------------------------|------------------|---------------|--------------|---|--------|-------|--------|------|
| Collector cut-off current            | RN2407 to RN2409 | $I_{CBO}$     | —            | $V_{CB} = -50\text{ V}, I_E = 0$                        | —      | —     | -0.1   | nA   |
|                                      |                  | $I_{CEO}$     | —            | $V_{CE} = -50\text{ V}, I_B = 0$                        | —      | —     | -0.5   |      |
| Emitter cut-off current              | RN2407           | $I_{EBO}$     | —            | $V_{EB} = -6\text{ V}, I_C = 0$                         | -0.081 | —     | -0.15  | mA   |
|                                      | RN2408           |               | —            | $V_{EB} = -7\text{ V}, I_C = 0$                         | -0.078 | —     | -0.145 |      |
|                                      | RN2409           |               | —            | $V_{EB} = -15\text{ V}, I_C = 0$                        | -0.167 | —     | -0.311 |      |
| DC current gain                      | RN2407           | $h_{FE}$      | —            | $V_{CE} = -5\text{ V}, I_C = -10\text{ mA}$             | 80     | —     | —      | —    |
|                                      | RN2408           |               | —            |   | 80     | —     | —      |      |
|                                      | RN2409           |               | —            |   | 70     | —     | —      |      |
| Collector-emitter saturation voltage | RN2407 to RN2409 | $V_{CE(sat)}$ | —            | $I_C = -5\text{ mA}, I_B = -0.25\text{ mA}$             | —      | -0.1  | -0.3   | V    |
| Input voltage (ON)                   | RN2407           | $V_{I(ON)}$   | —            | $V_{CE} = -0.2\text{ V}, I_C = -5\text{ mA}$            | -0.7   | —     | -1.8   | V    |
|                                      | RN2408           |               | —            |   | -1.0   | —     | -2.6   |      |
|                                      | RN2409           |               | —            |   | -2.2   | —     | -5.8   |      |
| Input voltage (OFF)                  | RN2407           | $V_{I(OFF)}$  | —            | $V_{CE} = -5\text{ V}, I_C = -0.1\text{ mA}$            | -0.5   | —     | -1.0   | V    |
|                                      | RN2408           |               | —            |   | -0.6   | —     | -1.16  |      |
|                                      | RN2409           |               | —            |   | -1.5   | —     | -2.6   |      |
| Transition frequency                 | RN2407 to RN2409 | $f_T$         | —            | $V_{CE} = -10\text{ V}, I_C = -5\text{ mA}$             | —      | 200   | —      | MHz  |
| Collector output capacitance         | RN2407 to RN2409 | $C_{ob}$      | —            | $V_{CB} = -10\text{ V}, I_E = 0,$<br>$f = 1\text{ MHz}$ | —      | 3     | 6      | pF   |
| Input resistor                       | RN2407           | R1            | —            | —   | 7      | 10    | 13     | kΩ   |
|                                      | RN2408           |               | —            |   | 15.4   | 22    | 28.6   |      |
|                                      | RN2409           |               | —            |   | 32.9   | 47    | 61.1   |      |
| Resistor ratio                       | RN2407           | R1/R2         | —            | —   | 0.191  | 0.213 | 0.232  | —    |
|                                      | RN2408           |               | —            |   | 0.421  | 0.468 | 0.515  |      |
|                                      | RN2409           |               | —            |   | 1.92   | 2.14  | 2.35   |      |





| Type Name | Marking   |
|-----------|---|
| RN2407    |  |
| RN2408    |  |
| RN2409    |  |

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