

TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process)

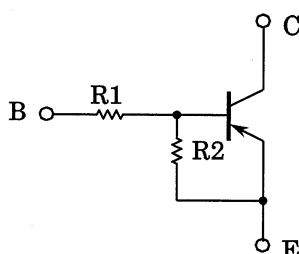
RN2001, RN2002, RN2003 RN2004, RN2005, RN2006

Switching, Inverter Circuit, Interface Circuit
and Driver Circuit Applications

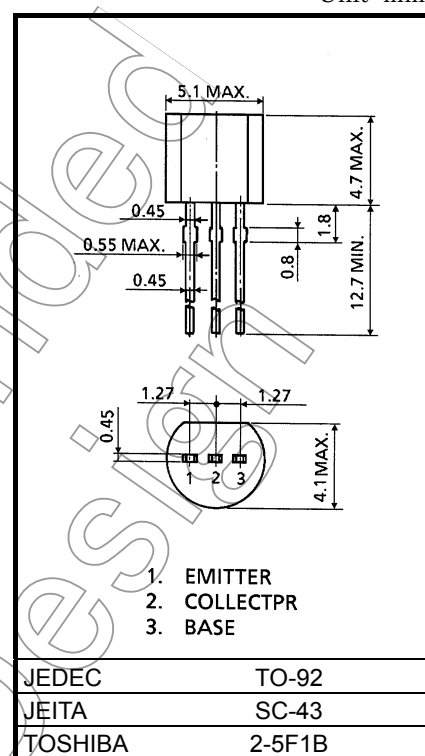
Unit: mm

- With built-in bias resistors
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process
- Complementary to RN1001~RN1006

Equivalent Circuit and Bias Resister Values



| Type No. | R1 (kΩ) | R2 (kΩ) |
|----------|---------|---------|
| RN2001 | 4.7 | 4.7 |
| RN2002 | 10 | 10 |
| RN2003 | 22 | 22 |
| RN2004 | 47 | 47 |
| RN2005 | 2.2 | 47 |
| RN2006 | 4.7 | 47 |



Weight: 0.21 g (typ.)

Absolute Maximum Ratings (Ta = 25°C)

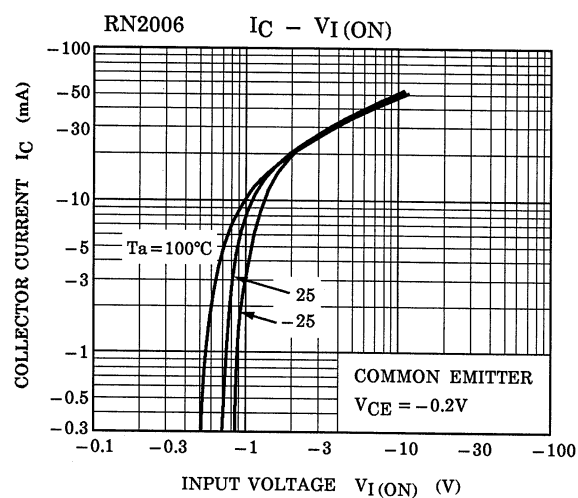
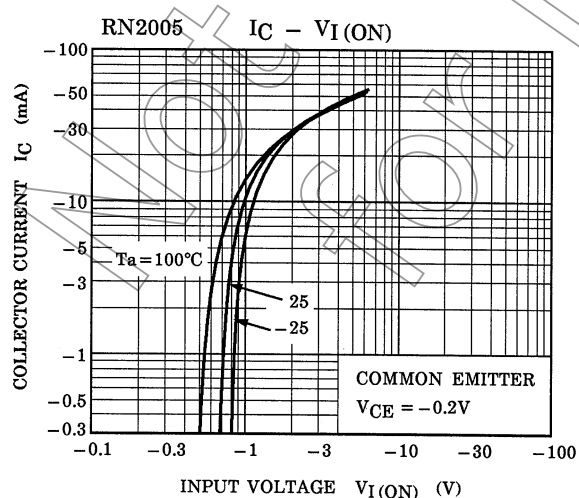
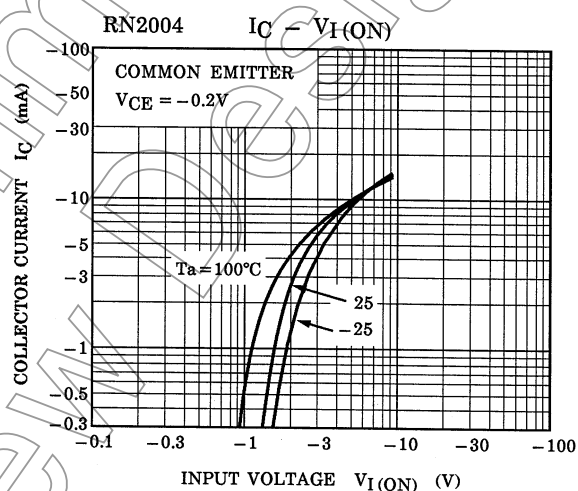
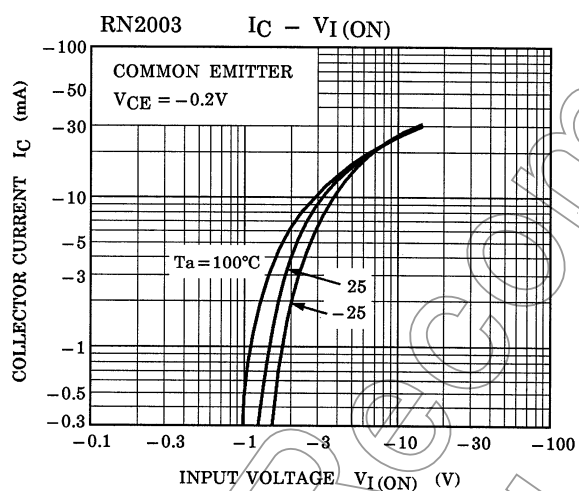
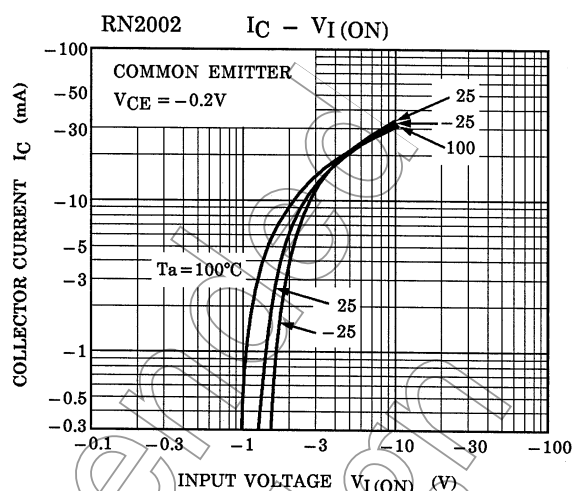
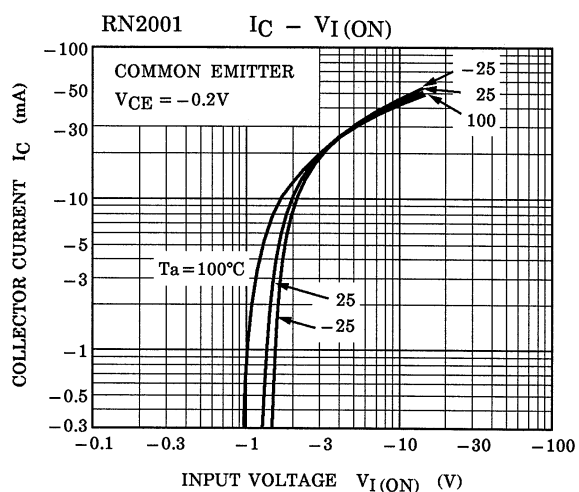
| Characteristic | Symbol | Rating | Unit |
|-----------------------------|-----------|---------|------|
| Collector-base voltage | V_{CBO} | -50 | V |
| Collector-emitter voltage | V_{CEO} | -50 | V |
| Emitter-base voltage | V_{EBO} | -10 | V |
| | | -5 | V |
| Collector current | I_C | -100 | mA |
| Collector power dissipation | P_C | 400 | mW |
| Junction temperature | T_j | 150 | °C |
| Storage temperature range | T_{stg} | -55~150 | °C |

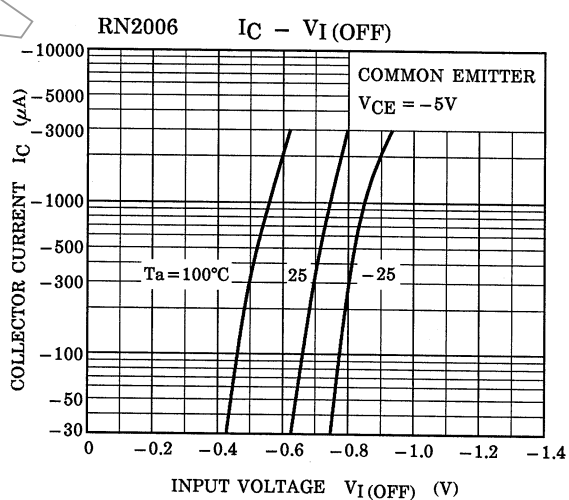
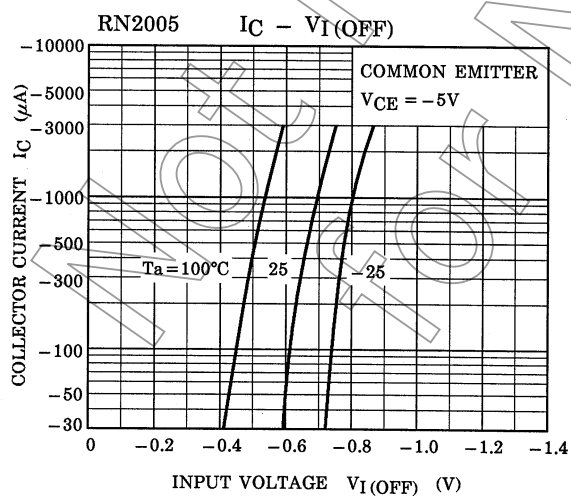
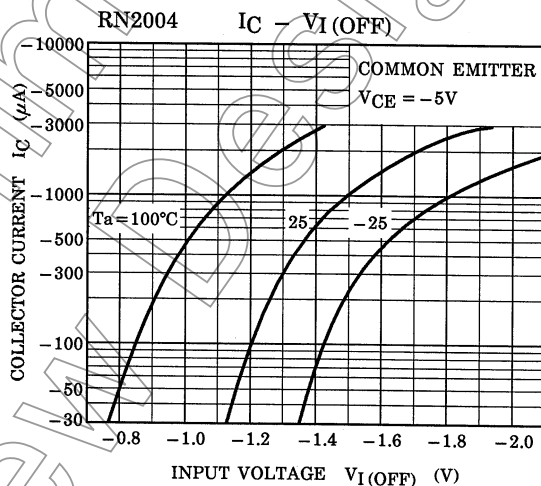
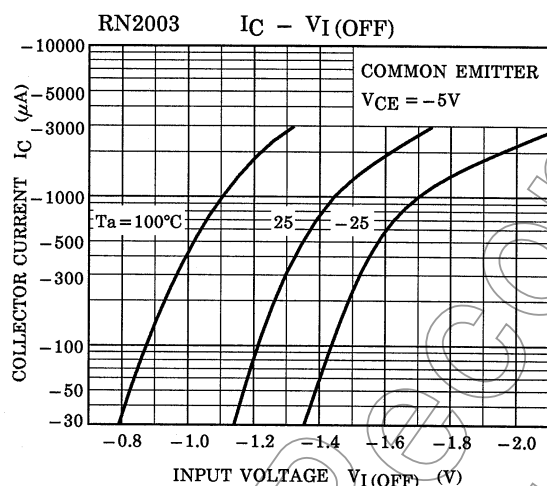
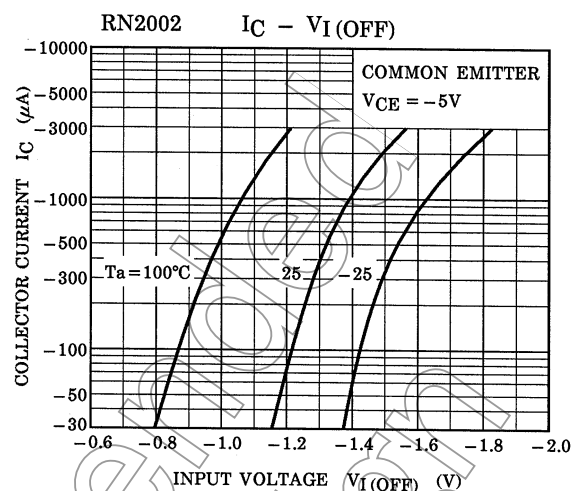
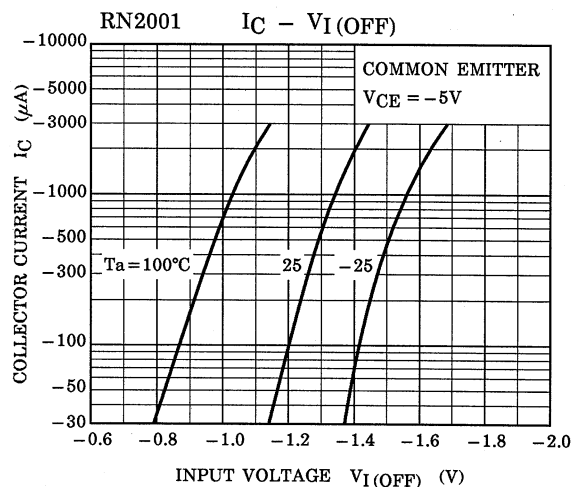
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

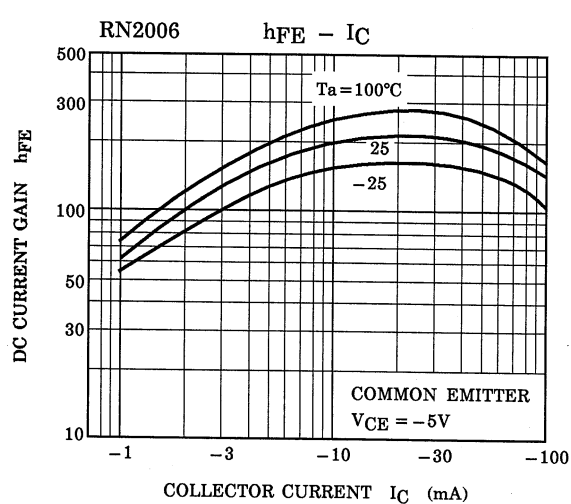
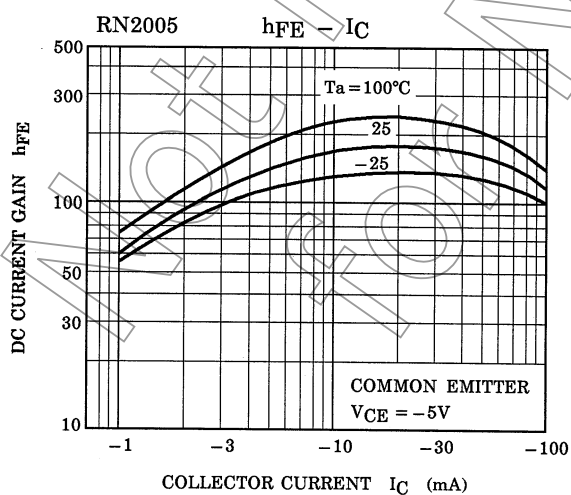
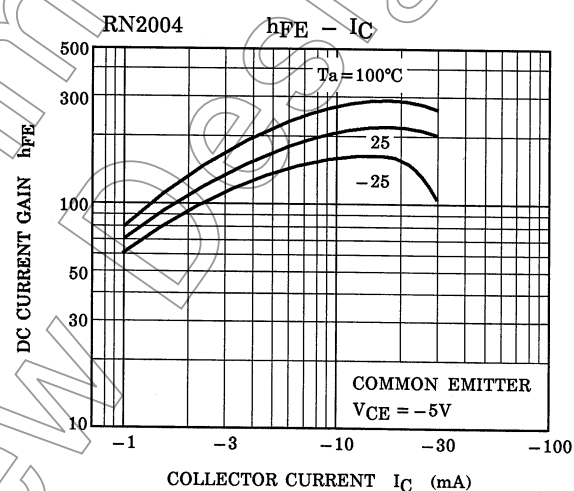
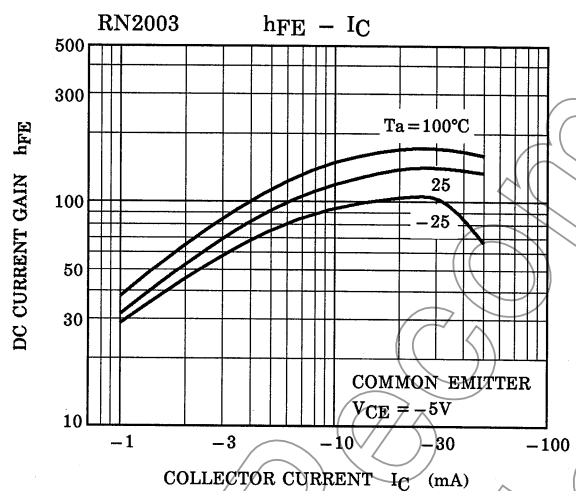
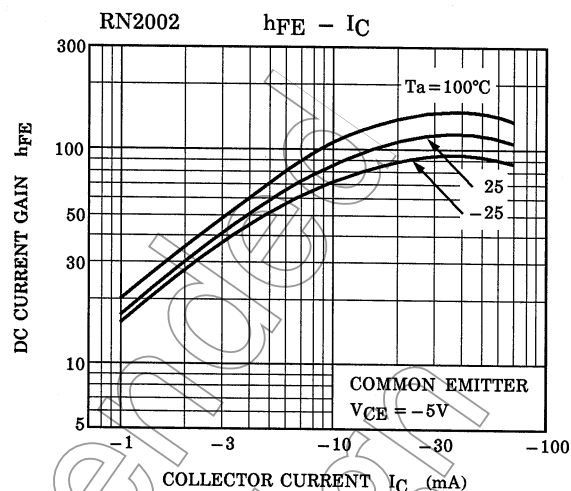
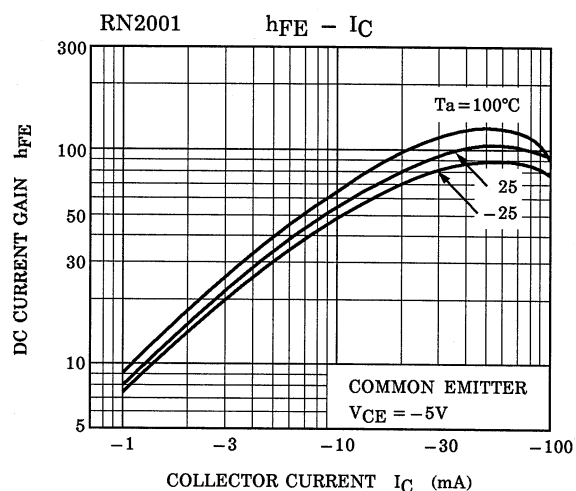
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Electrical Characteristics (Ta = 25°C)

| Characteristic | | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|--------------|---------------|--------------|------------------------------------|--------|--------|--------|------|
| Collector cut-off current | RN2001~2006 | I_{CBO} | — | $V_{CB} = -50V, I_E = 0$ | — | — | -100 | nA |
| | | I_{CEO} | | $V_{CE} = -50V, I_B = 0$ | — | — | -500 | |
| Emitter cut-off current | RN2001 | I_{EBO} | — | $V_{EB} = -10V, I_C = 0$ | -0.82 | — | -1.52 | mA |
| | RN2002 | | | | -0.38 | — | -0.71 | |
| | RN2003 | | | | -0.17 | — | -0.33 | |
| | RN2004 | | | | -0.082 | — | -0.15 | |
| | RN2005 | | | $V_{EB} = -5V, I_C = 0$ | -0.078 | — | -0.145 | |
| | RN2006 | | | | -0.074 | — | -0.138 | |
| DC current gain | RN2001 | h_{FE} | — | $V_{CE} = -5V, I_C = -10mA$ | 30 | — | — | |
| | RN2002 | | | | 50 | — | — | |
| | RN2003 | | | | 70 | — | — | |
| | RN2004 | | | | 80 | — | — | |
| | RN2005 | | | | 80 | — | — | |
| | RN2006 | | | | 80 | — | — | |
| Collector-emitter saturation voltage | RN2001~2006 | $V_{CE(sat)}$ | — | $I_C = -5mA, I_B = -0.25mA$ | — | -0.1 | -0.3 | V |
| Input voltage (ON) | RN2001 | $V_{I(ON)}$ | — | $V_{CE} = -0.2V, I_C = -5mA$ | -1.1 | — | -2.0 | V |
| | RN2002 | | | | -1.2 | — | -2.4 | |
| | RN2003 | | | | -1.3 | — | -3.0 | |
| | RN2004 | | | | -1.5 | — | -5.0 | |
| | RN2005 | | | | -0.6 | — | -1.1 | |
| | RN2006 | | | | -0.7 | — | -1.3 | |
| Input voltage (OFF) | RN2001~2004 | $V_{I(OFF)}$ | — | $V_{CE} = -5V, I_C = -0.1mA$ | -1.0 | — | -1.5 | V |
| | RN2005, 2006 | | | | -0.5 | — | -0.8 | |
| Transition frequency | RN2001~2006 | f_T | — | $V_{CE} = -10V, I_C = -5mA$ | — | 200 | — | MHz |
| Collector Output capacitance | RN2001~2006 | C_{ob} | — | $V_{CB} = -10V, I_E = 0, f = 1MHz$ | — | 3 | 6 | pF |
| Input resistor | RN2001 | R_1 | — | | 3.29 | 4.7 | 6.11 | kΩ |
| | RN2002 | | | | 7 | 10 | 13 | |
| | RN2003 | | | | 15.4 | 22 | 28.6 | |
| | RN2004 | | | | 32.9 | 47 | 61.1 | |
| | RN2005 | | | | 1.54 | 2.2 | 2.86 | |
| | RN2006 | | | | 3.29 | 4.7 | 6.11 | |
| Resistor ratio | RN2001~2004 | R_1/R_2 | — | | 0.9 | 1.0 | 1.1 | |
| | RN2005 | | | | 0.0421 | 0.0468 | 0.0515 | |
| | RN2006 | | | | 0.09 | 0.1 | 0.11 | |







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