

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

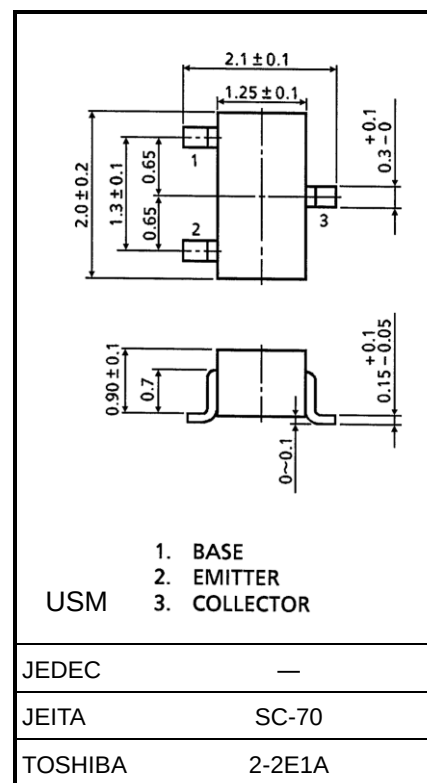
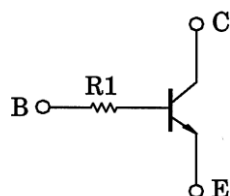
# RN1310, RN1311

Switching, Inverter Circuit, Interface Circuit and Driver Circuit

Unit: mm

- With built-in bias resistors
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process and miniaturize equipment.
- Various resistance values are available to suit various circuit designs.
- Complementary to RN2310 and RN2311

## Equivalent Circuit



Weight: 6 mg (typ.)

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

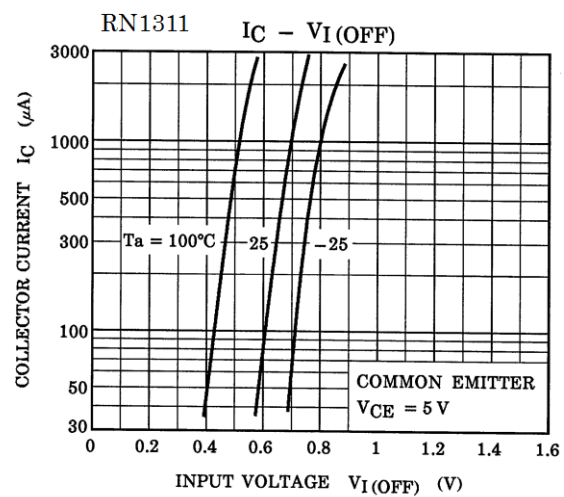
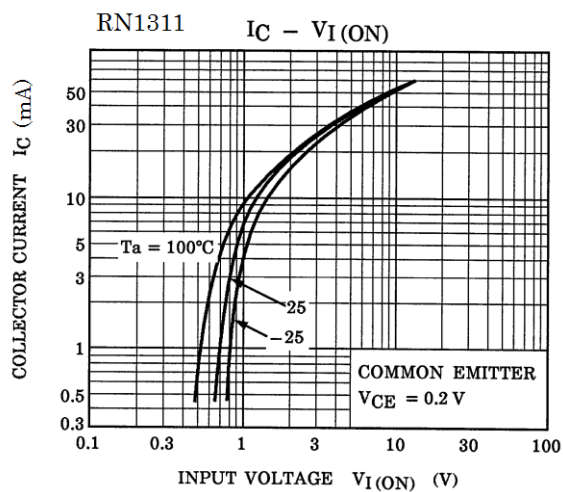
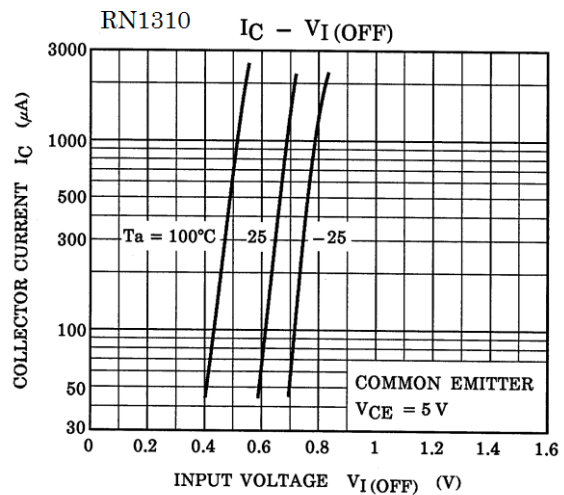
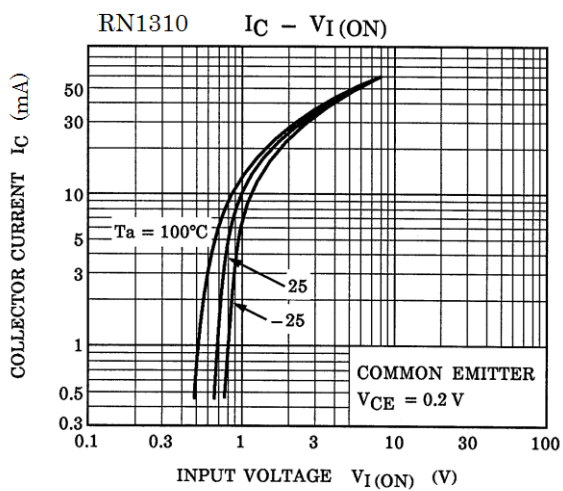
| Characterisitic             | Symbol    | Rating     | Unit |
|-----------------------------|-----------|------------|------|
| Collector-base voltage      | $V_{CBO}$ | 50         | V    |
| Collector-emitter voltage   | $V_{CEO}$ | 50         | V    |
| Emitter-base voltage        | $V_{EBO}$ | 5          | V    |
| Collector current           | $I_C$     | 100        | mA   |
| Collector power dissipation | $P_C$     | 100        | 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).

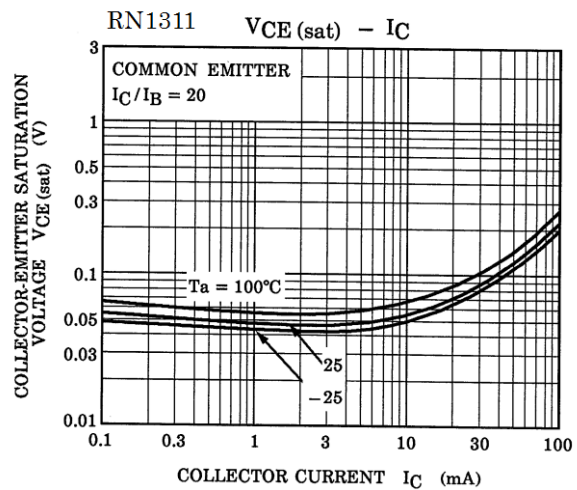
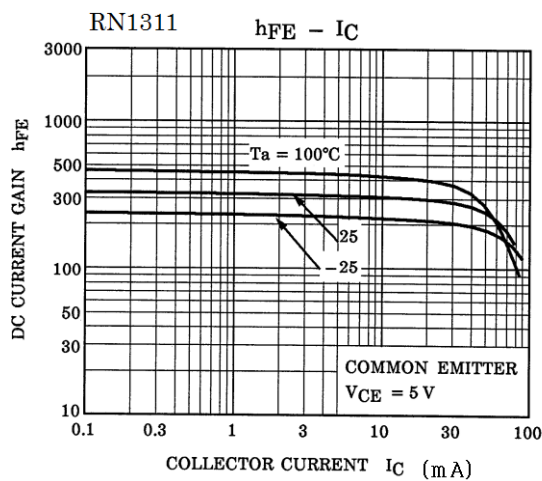
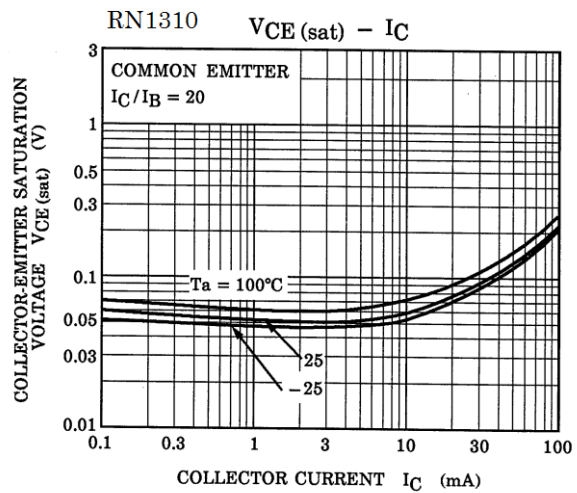
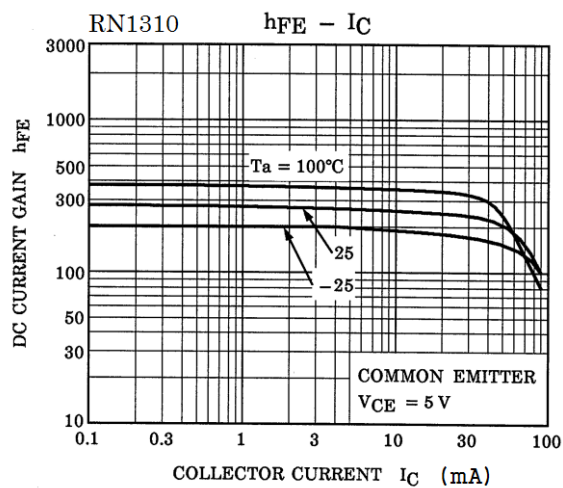
Start of commercial production  
1987-07

### Electrical Characteristics (Ta = 25°C)

| Characteristic                       |        | Symbol                | Test Circuit | Test Condition                                           | Min  | Typ. | Max  | Unit |
|--------------------------------------|--------|-----------------------|--------------|----------------------------------------------------------|------|------|------|------|
| Collector cut-off current            |        | ICBO                  | —            | V <sub>CB</sub> = 50 V, I <sub>E</sub> = 0 mA            | —    | —    | 100  | nA   |
| Emitter cut-off current              |        | IEBO                  | —            | V <sub>EB</sub> = 5 V, I <sub>C</sub> = 0 mA             | —    | —    | 100  | nA   |
| DC current gain                      |        | hFE                   | —            | V <sub>CE</sub> = 5 V, I <sub>C</sub> = 1 mA             | 120  | —    | 700  | —    |
| Collector-emitter saturation voltage |        | V <sub>CE</sub> (sat) | —            | I <sub>C</sub> = 5 mA, I <sub>B</sub> = 0.25 mA          | —    | 0.1  | 0.3  | V    |
| Transition frequency                 |        | f <sub>T</sub>        | —            | V <sub>CE</sub> = 10 V, I <sub>C</sub> = 5 mA            | —    | 250  | —    | MHz  |
| Collector output capacitance         |        | C <sub>ob</sub>       | —            | V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0 mA, f = 1 MHz | —    | 3    | 6    | pF   |
| Input resistor                       | RN1310 | R1                    | —            | —                                                        | 3.29 | 4.7  | 6.11 | kΩ   |
|                                      | RN1311 |                       |              |                                                          | 7    | 10   | 13   |      |

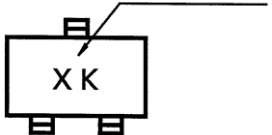
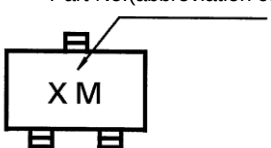


The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



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### Marking

| Part No | Marking                                                                                                              |
|---------|----------------------------------------------------------------------------------------------------------------------|
| RN1310  | <p>Part No.(abbreviation code)</p>  |
| RN1311  | <p>Part No.(abbreviation code)</p>  |

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