

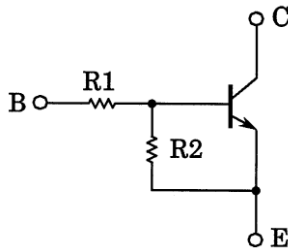
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor)

## RN1101MFV, RN1102MFV, RN1103MFV RN1104MFV, RN1105MFV, RN1106MFV

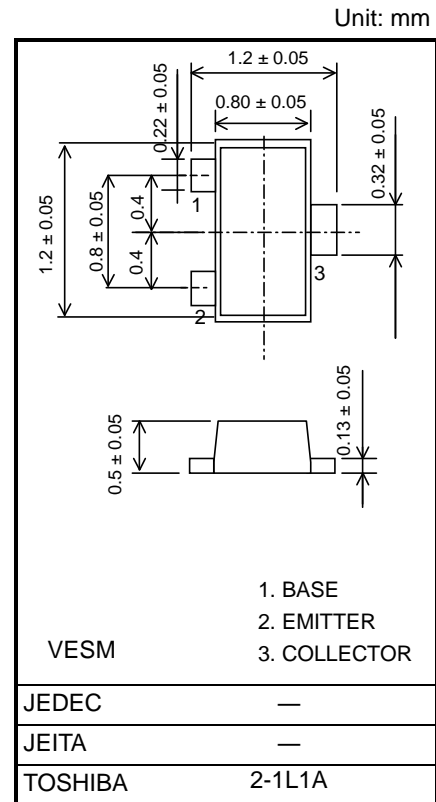
Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- Ultra-small package, suited to very high density mounting
- Incorporating a bias resistor into the transistor reduces the number of parts, so enabling the manufacture of ever more compact equipment and lowering assembly cost.
- A wide range of resistor values is available for use in various circuits.
- Complementary to the RN2101MFV to RN2106MFV

### Equivalent Circuit and Bias Resistor Values



| Type No.  | R1 (kΩ) | R2 (kΩ) |
|-----------|---------|---------|
| RN1101MFV | 4.7     | 4.7     |
| RN1102MFV | 10      | 10      |
| RN1103MFV | 22      | 22      |
| RN1104MFV | 47      | 47      |
| RN1105MFV | 2.2     | 47      |
| RN1106MFV | 4.7     | 47      |



Weight: 1.5 mg (typ.)

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

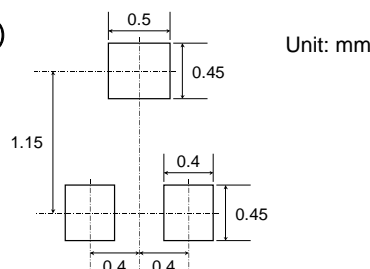
| Characteristic              | Symbol     | Rating     | Unit |
|-----------------------------|------------|------------|------|
| Collector-base voltage      | VCBO       | 50         | V    |
| Collector-emitter voltage   | VCEO       | 50         | V    |
| Emitter-base voltage        | VEBO       | 10         | V    |
|                             |            | 5          |      |
| Collector current           | IC         | 100        | mA   |
| Collector power dissipation | PC(Note 1) | 150        | mW   |
| Junction temperature        | Tj         | 150        | °C   |
| Storage temperature range   | Tstg       | -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).

Note 1: Mounted on an FR4 board (25.4 mm × 25.4 mm × 1.6 mm)

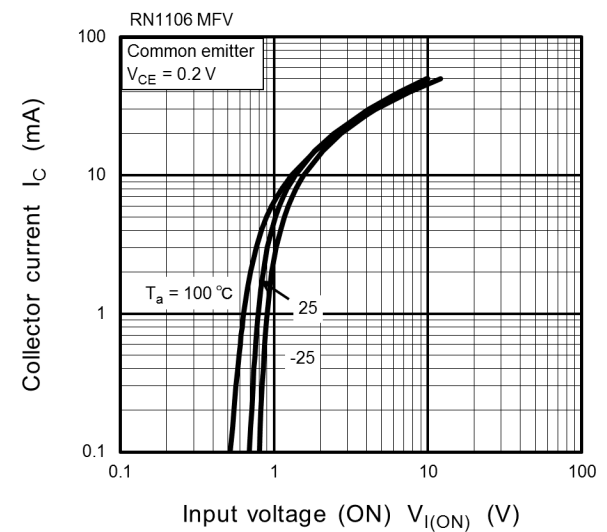
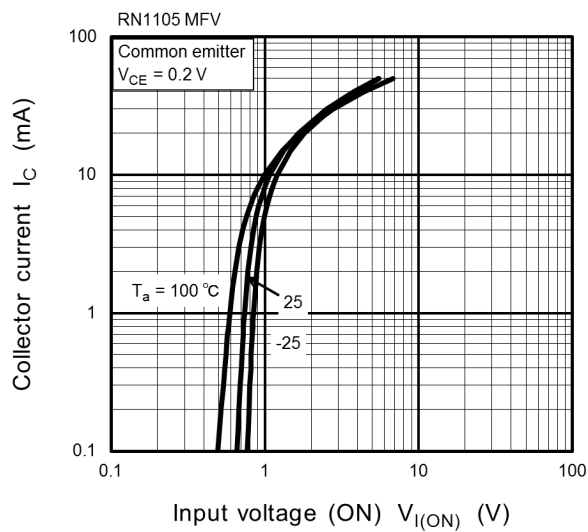
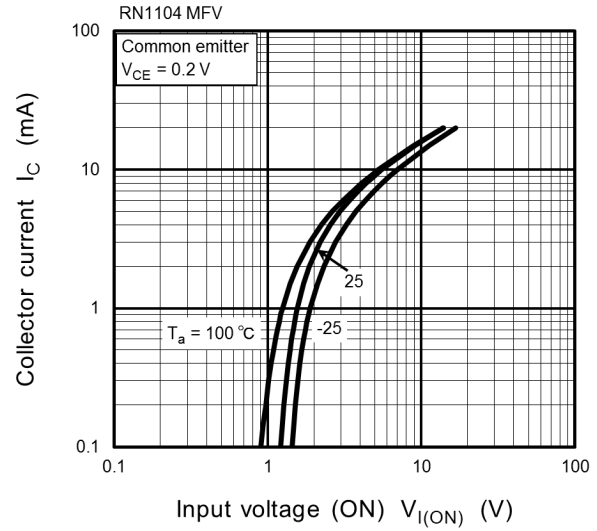
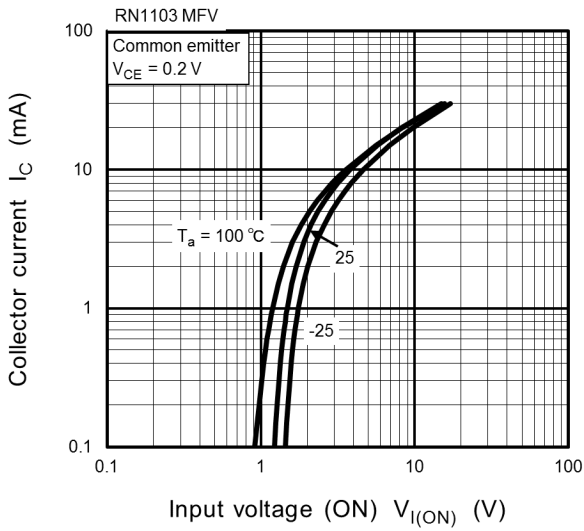
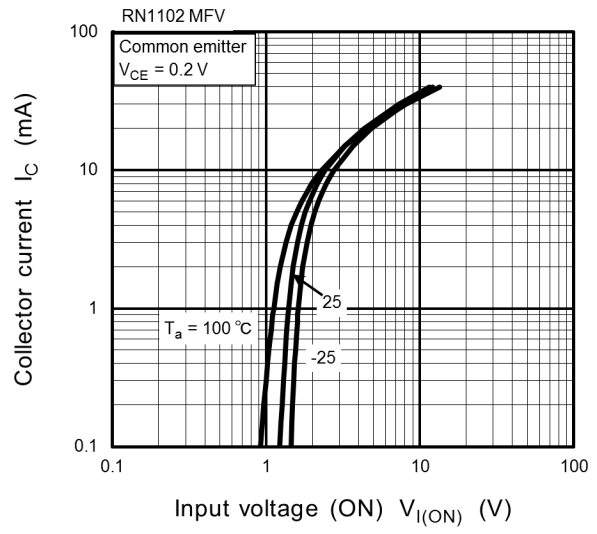
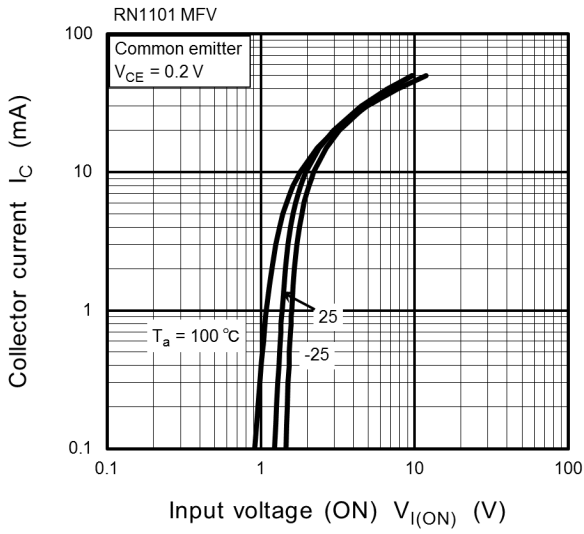
### Pad Dimension (Reference)

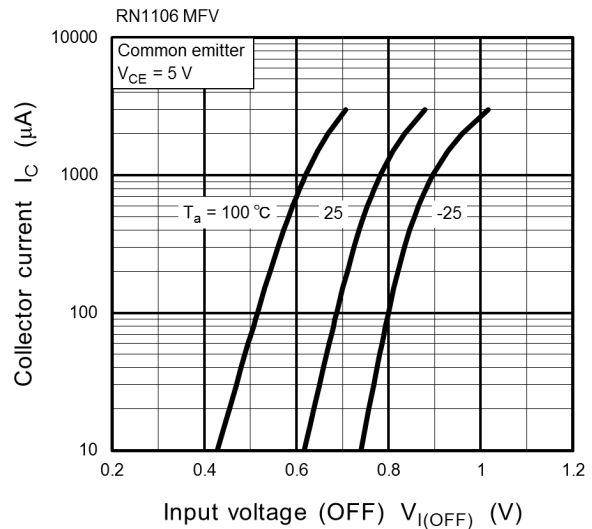
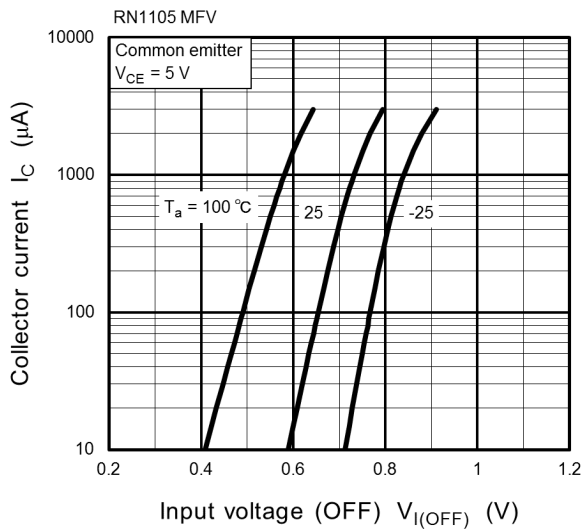
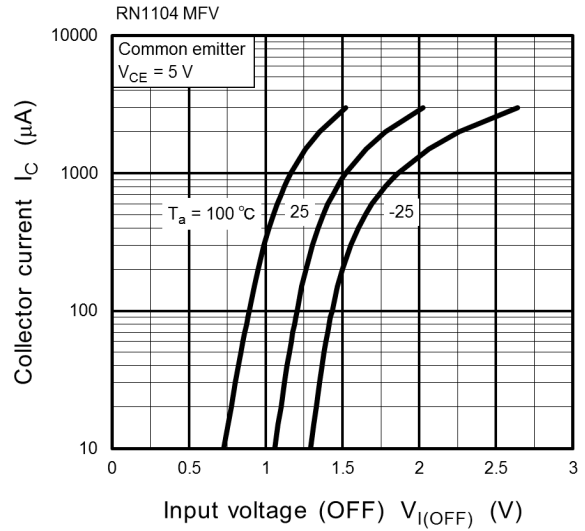
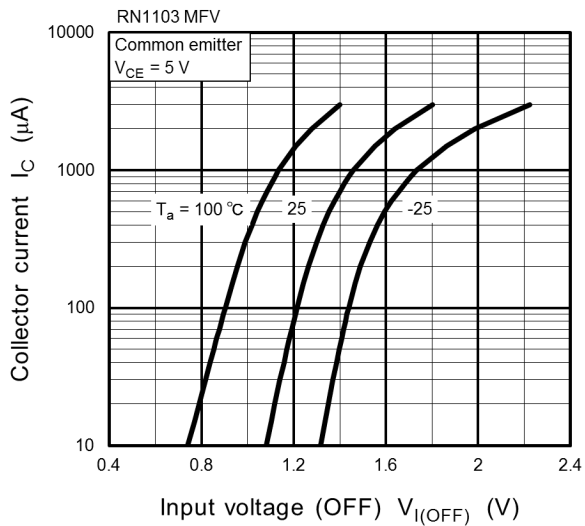
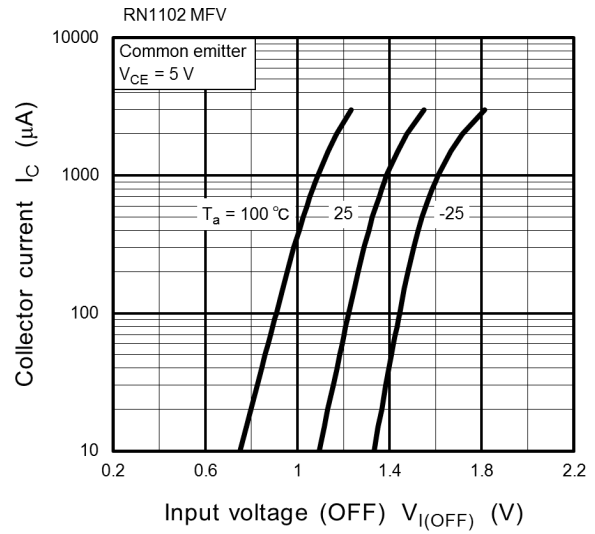
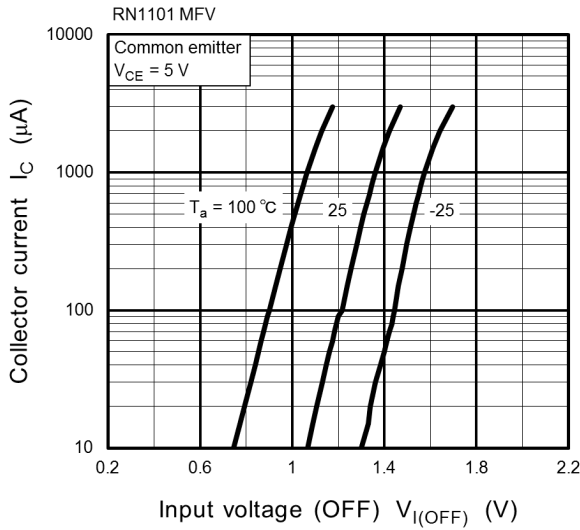


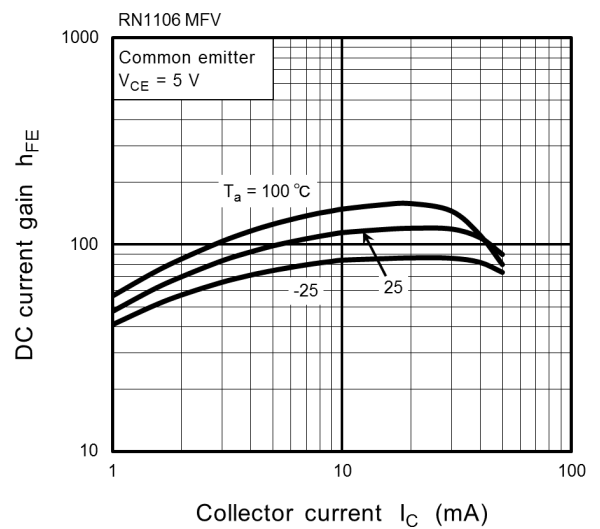
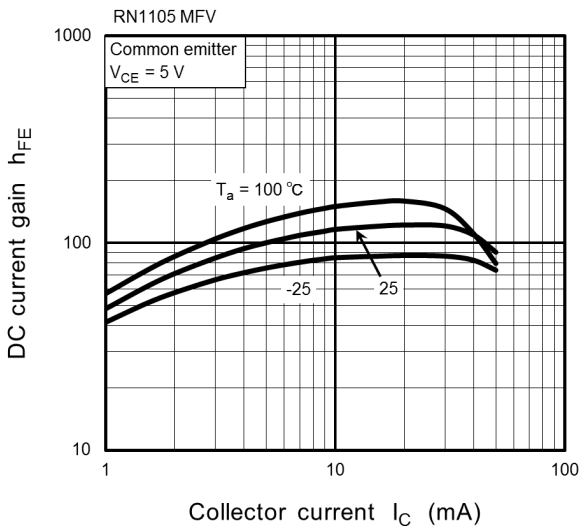
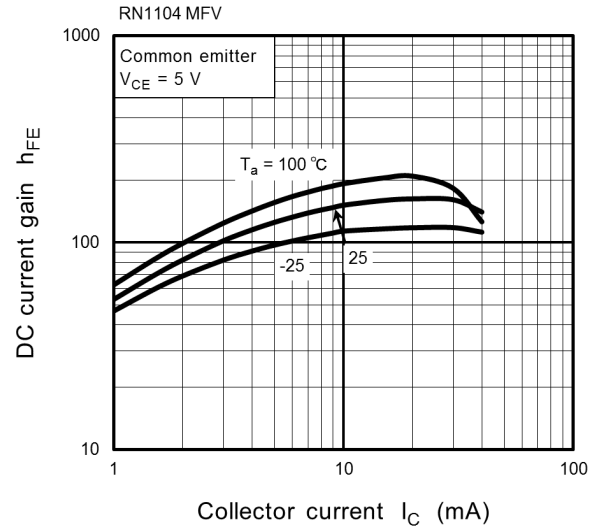
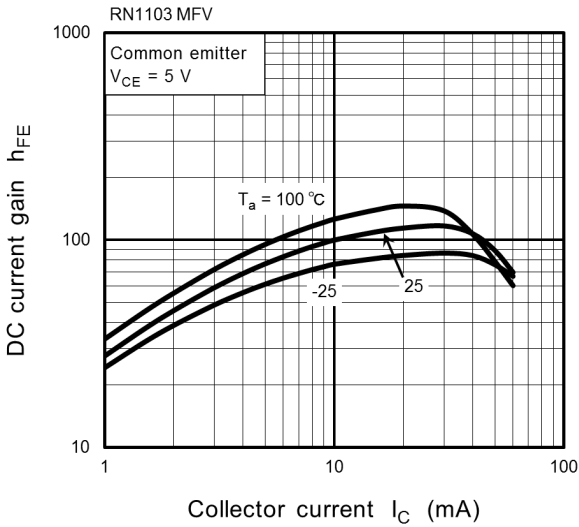
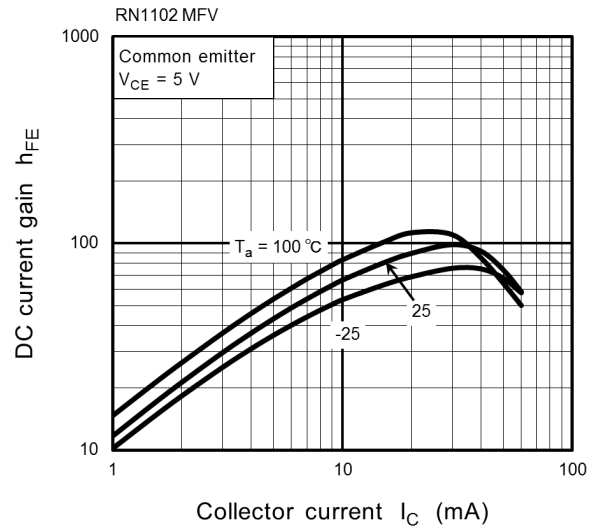
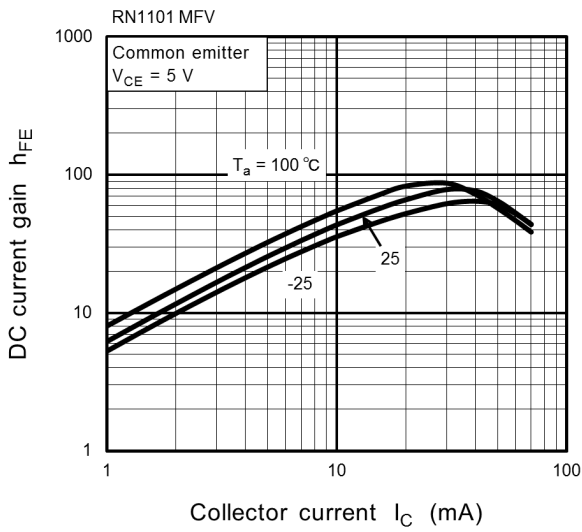
Start of commercial production  
2005-02

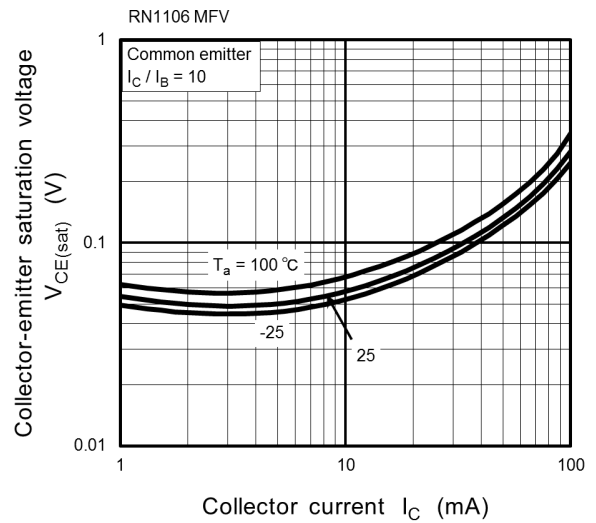
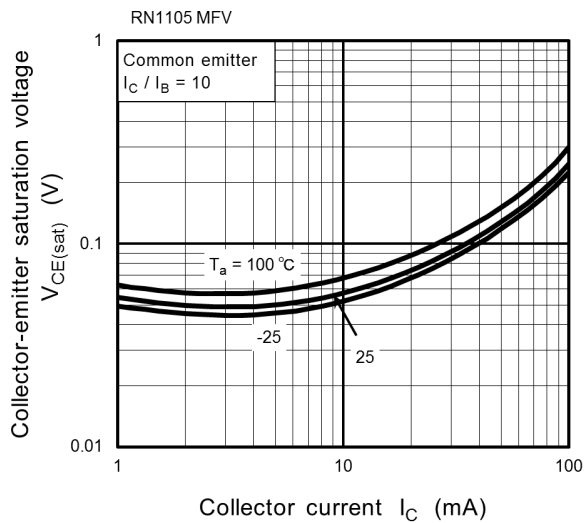
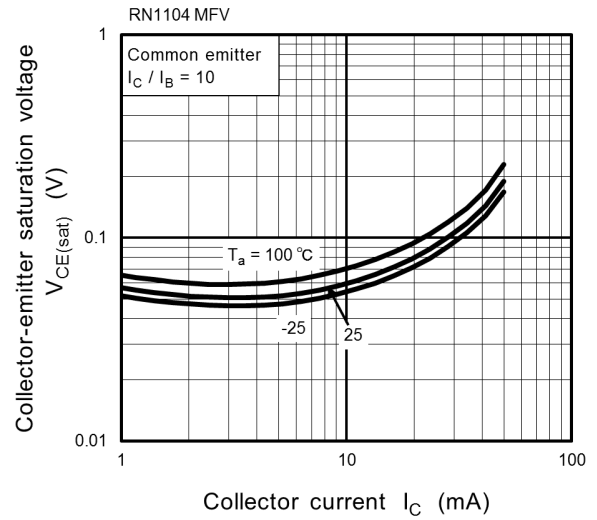
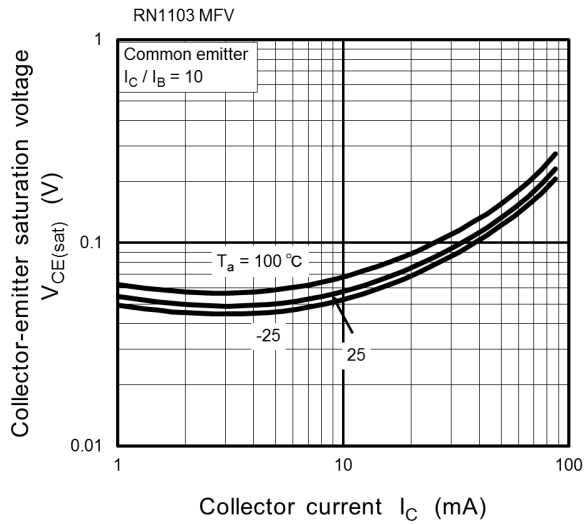
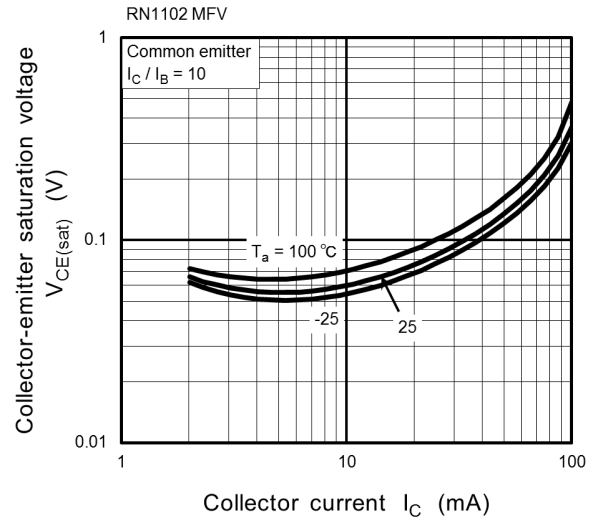
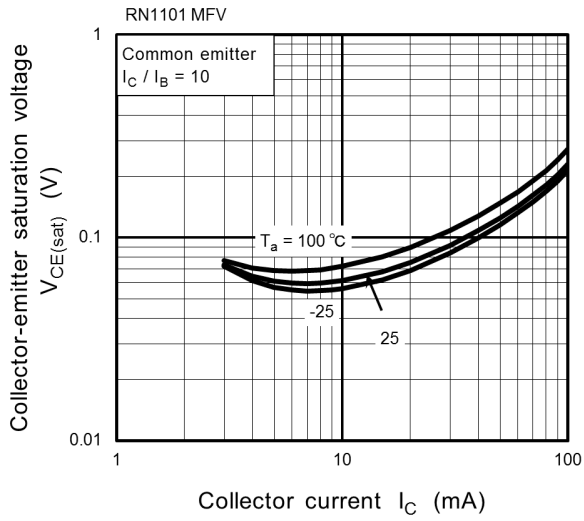
## Electrical Characteristics (Ta = 25°C)

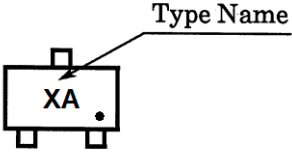
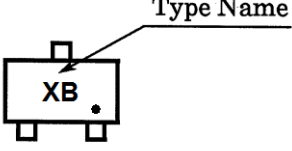
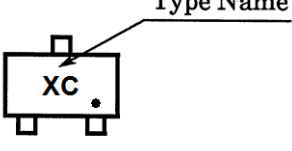
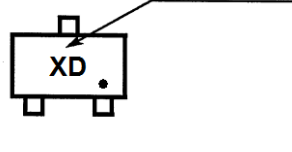
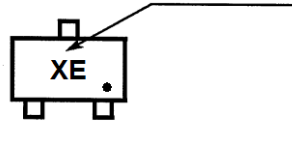
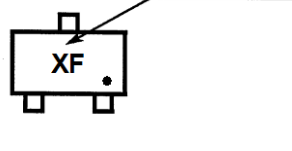
| Characteristic                       |                        | Symbol                | Test Condition  | Min    | Typ.   | Max    | Unit |
|--------------------------------------|------------------------|-----------------------|---|--------|--------|--------|------|
| Collector cutoff current             | RN1101MFV to RN1106MFV | ICBO                  | V <sub>CB</sub> = 50 V, I <sub>E</sub> = 0 A            | —      | —      | 100    | nA   |
|                                      |                        | ICEO                  | V <sub>CE</sub> = 50 V, I <sub>B</sub> = 0 A            | —      | —      | 500    |      |
| Emitter cutoff current               | RN1101MFV              | I <sub>EBO</sub>      | V <sub>EB</sub> = 10 V, I <sub>C</sub> = 0 A            | 0.82   | —      | 1.52   | mA   |
|                                      | RN1102MFV              |                       |   | 0.38   | —      | 0.71   |      |
|                                      | RN1103MFV              |                       |   | 0.17   | —      | 0.33   |      |
|                                      | RN1104MFV              |                       |   | 0.082  | —      | 0.15   |      |
|                                      | RN1105MFV              |                       | V <sub>EB</sub> = 5 V, I <sub>C</sub> = 0 A             | 0.078  | —      | 0.145  |      |
|                                      | RN1106MFV              |                       |   | 0.074  | —      | 0.138  |      |
| DC current gain                      | RN1101MFV              | h <sub>FE</sub>       | V <sub>CE</sub> = 5 V, I <sub>C</sub> = 10 mA           | 30     | —      | —      | —    |
|                                      | RN1102MFV              |                       |   | 50     | —      | —      |      |
|                                      | RN1103MFV              |                       |   | 70     | —      | —      |      |
|                                      | RN1104MFV              |                       |   | 80     | —      | —      |      |
|                                      | RN1105MFV              |                       |   | 80     | —      | —      |      |
|                                      | RN1106MFV              |                       |   | 80     | —      | —      |      |
| Collector-emitter saturation voltage | RN1101MFV to RN1106MFV | V <sub>CE (sat)</sub> | I <sub>C</sub> = 5 mA, I <sub>B</sub> = 0.5 mA          | —      | 0.1    | 0.3    | V    |
| Input voltage (ON)                   | RN1101MFV              | V <sub>I (ON)</sub>   | V <sub>CE</sub> = 0.2 V, I <sub>C</sub> = 5 mA          | 1.1    | —      | 2.0    | V    |
|                                      | RN1102MFV              |                       |   | 1.2    | —      | 2.4    |      |
|                                      | RN1103MFV              |                       |   | 1.3    | —      | 3.0    |      |
|                                      | RN1104MFV              |                       |   | 1.5    | —      | 5.0    |      |
|                                      | RN1105MFV              |                       |   | 0.6    | —      | 1.1    |      |
|                                      | RN1106MFV              |                       |   | 0.7    | —      | 1.3    |      |
| Input voltage (OFF)                  | RN1101MFV to RN1104MFV | V <sub>I (OFF)</sub>  | V <sub>CE</sub> = 5 V, I <sub>C</sub> = 0.1 mA          | 1.0    | —      | 1.5    | V    |
|                                      | RN1105MFV, RN1106MFV   |                       |   | 0.5    | —      | 0.8    |      |
| Collector output capacitance         | RN1101MFV to RN1106MFV | C <sub>ob</sub>       | V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0 A, f = 1 MHz | —      | 0.7    | —      | pF   |
| Input resistor                       | RN1101MFV              | R1                    | —   | 3.29   | 4.7    | 6.11   | kΩ   |
|                                      | RN1102MFV              |                       |   | 7      | 10     | 13     |      |
|                                      | RN1103MFV              |                       |   | 15.4   | 22     | 28.6   |      |
|                                      | RN1104MFV              |                       |   | 32.9   | 47     | 61.1   |      |
|                                      | RN1105MFV              |                       |   | 1.54   | 2.2    | 2.86   |      |
|                                      | RN1106MFV              |                       |   | 3.29   | 4.7    | 6.11   |      |
| Resistor ratio                       | RN1101MFV to RN1104MFV | R1/R2                 | —   | 0.8    | 1.0    | 1.2    | —    |
|                                      | RN1105MFV              |                       |   | 0.0376 | 0.0468 | 0.0562 |      |
|                                      | RN1106MFV              |                       |   | 0.08   | 0.1    | 0.12   |      |









| Type Name | Marking   |
|-----------|---|
| RN1101MFV |    |
| RN1102MFV |    |
| RN1103MFV |    |
| RN1104MFV |  |
| RN1105MFV |  |
| RN1106MFV |  |

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