

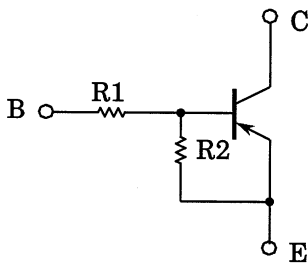
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor)

RN2101MFV, RN2102MFV, RN2103MFV RN2104MFV, RN2105MFV, RN2106MFV

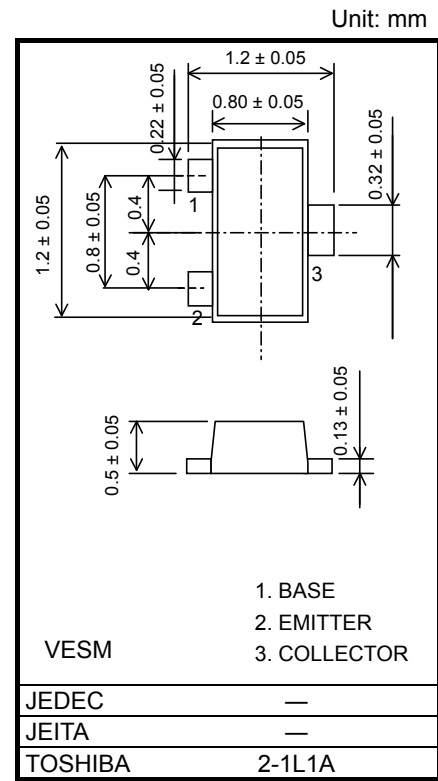
Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- 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 RN1101MFV to RN1106MFV

Equivalent Circuit and Bias Resistor Values



| Type No. | R1 (kΩ) | R2 (kΩ) |
|-----------|---------|---------|
| RN2101MFV | 4.7 | 4.7 |
| RN2102MFV | 10 | 10 |
| RN2103MFV | 22 | 22 |
| RN2104MFV | 47 | 47 |
| RN2105MFV | 2.2 | 47 |
| RN2106MFV | 4.7 | 47 |



Weight: 1.5 mg (typ.)

Absolute Maximum Ratings (Ta = 25°C)

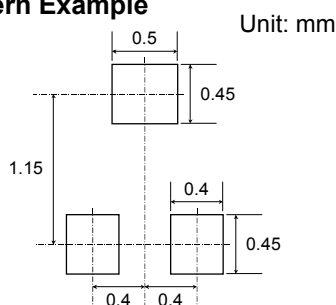
| Characteristic | | Symbol | Rating | Unit |
|-----------------------------|----------------------|----------------|------------|------|
| Collector-base voltage | RN2101MFV to 2106MFV | V_{CBO} | -50 | V |
| Collector-emitter voltage | | V_{CEO} | -50 | V |
| Emitter-base voltage | RN2101MFV to 2104MFV | V_{EBO} | -10 | V |
| | RN2105MFV, 2106MFV | | -5 | |
| Collector current | RN2101MFV to 2106MFV | I_C | -100 | mA |
| Collector power dissipation | | P_C (Note 1) | 150 | 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.).

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

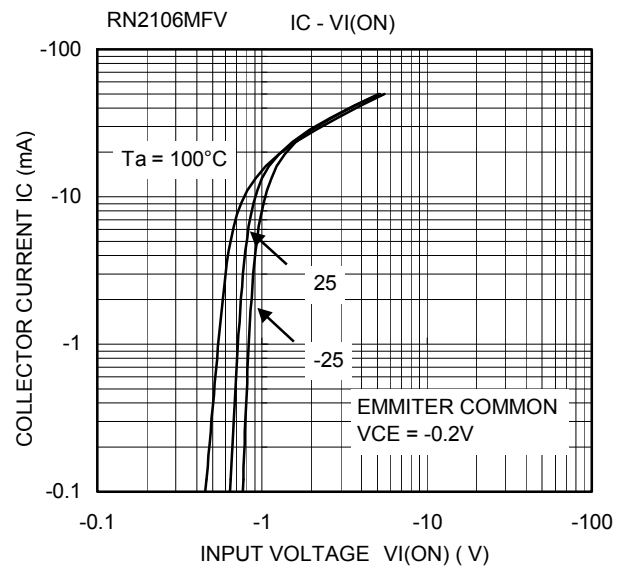
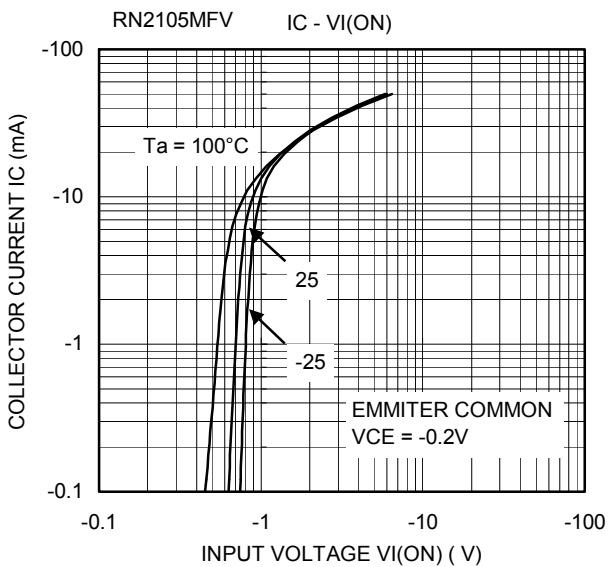
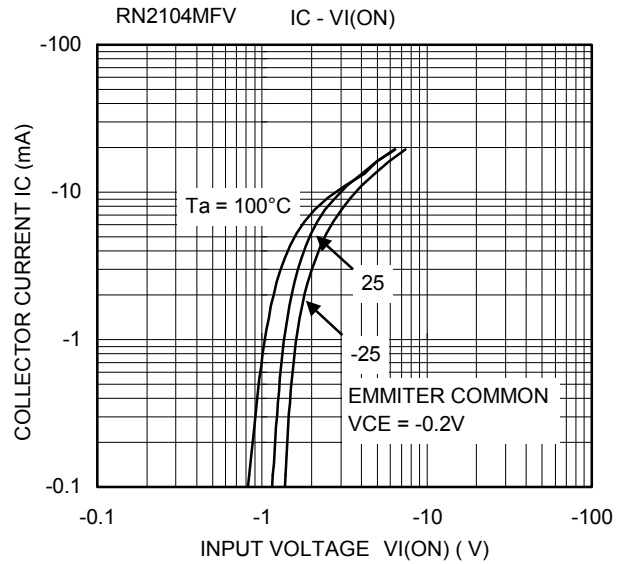
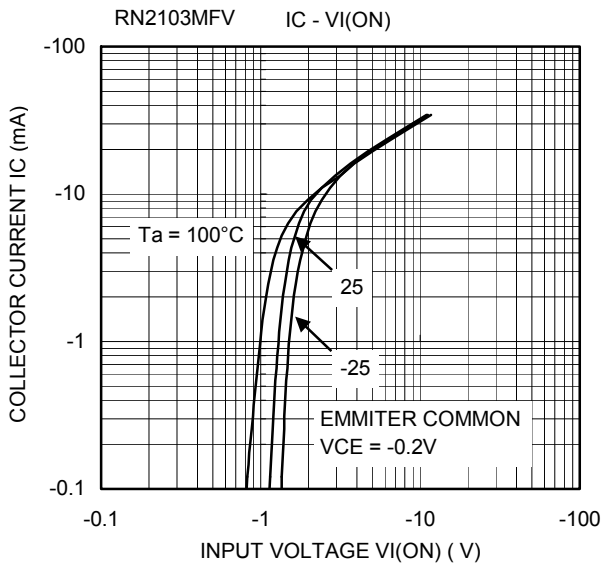
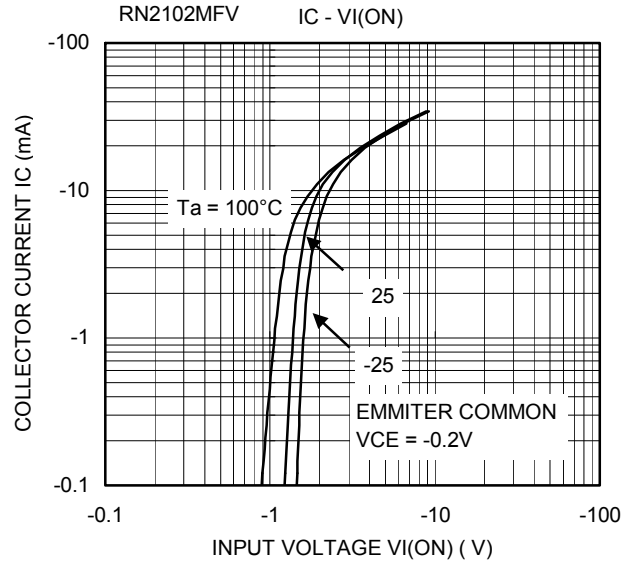
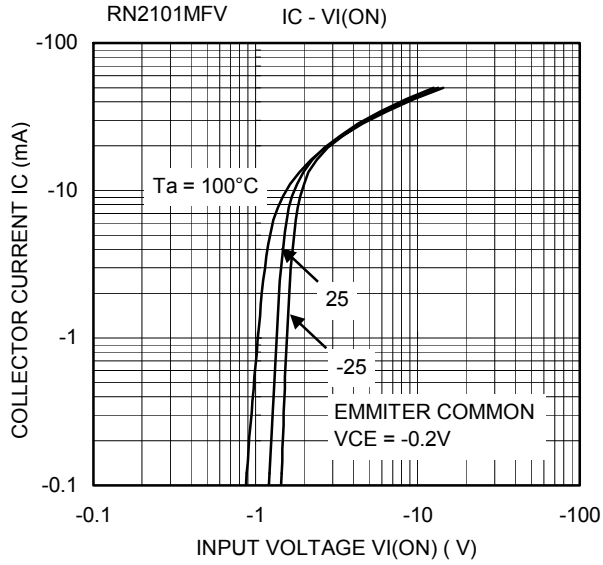
Land Pattern Example

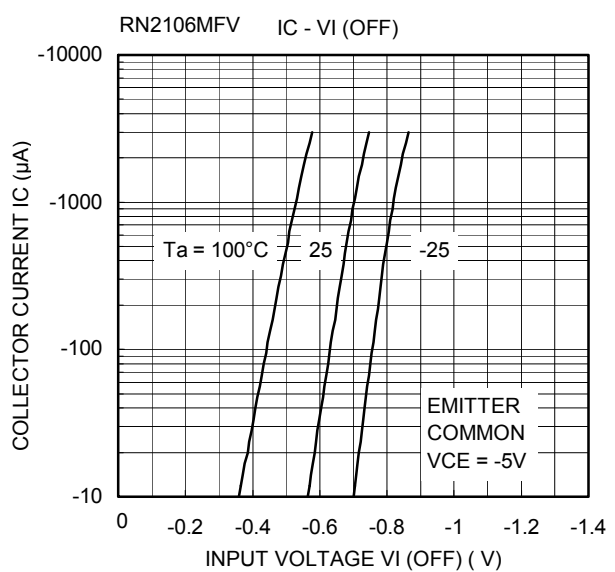
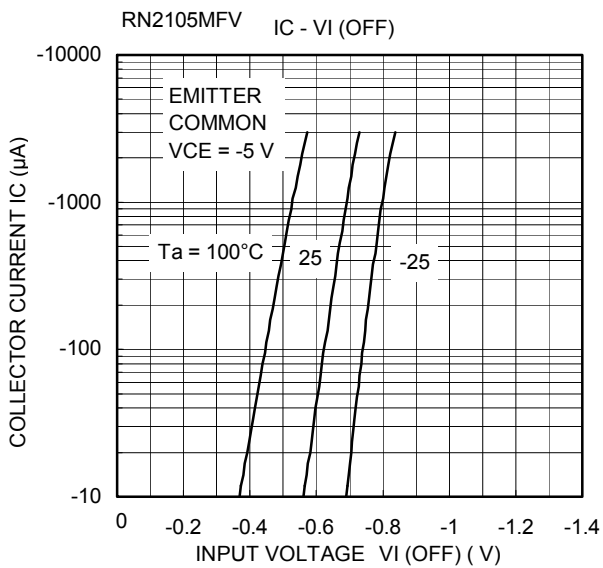
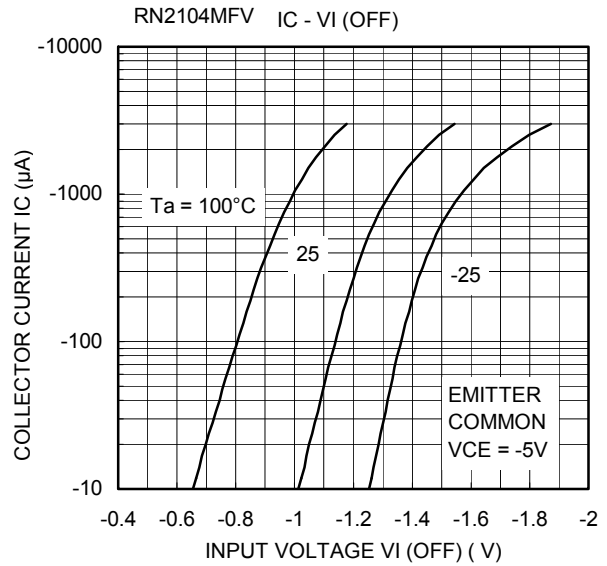
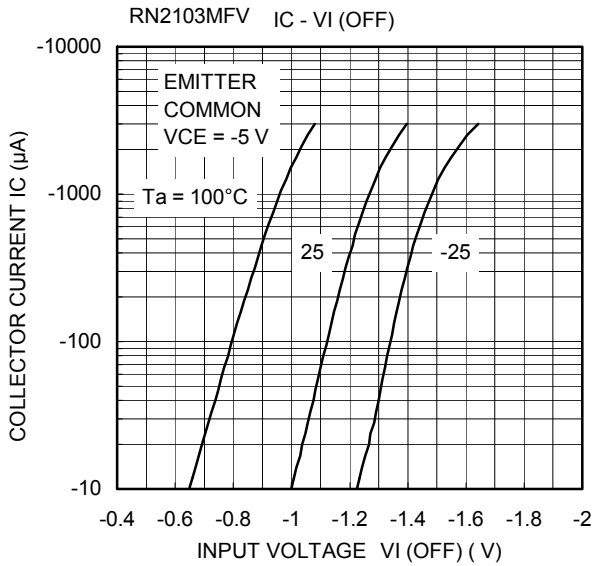
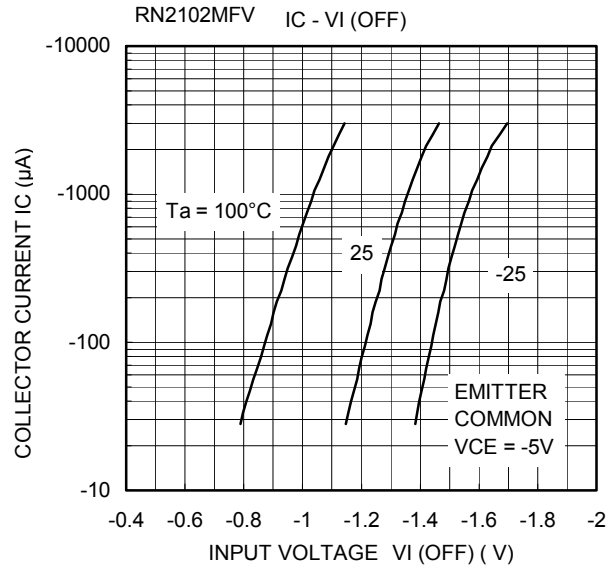
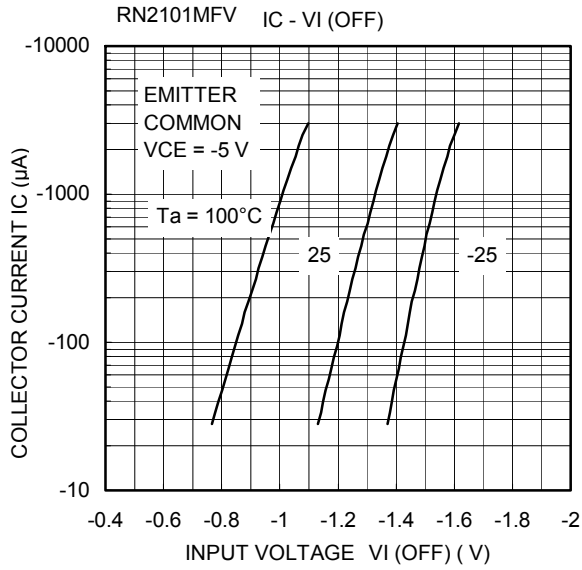


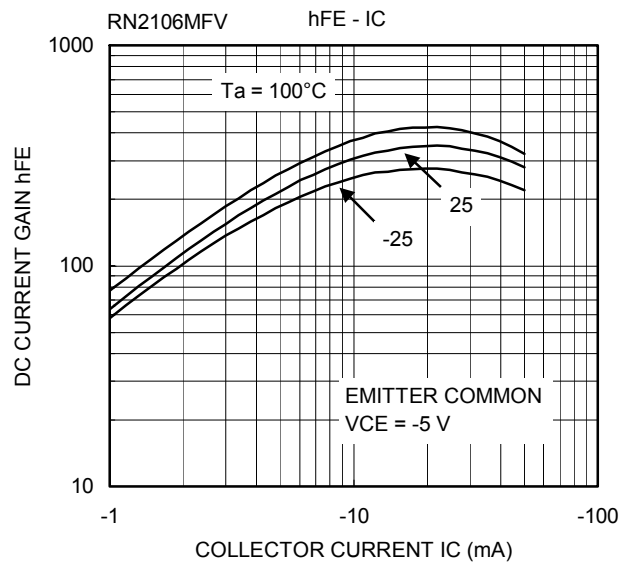
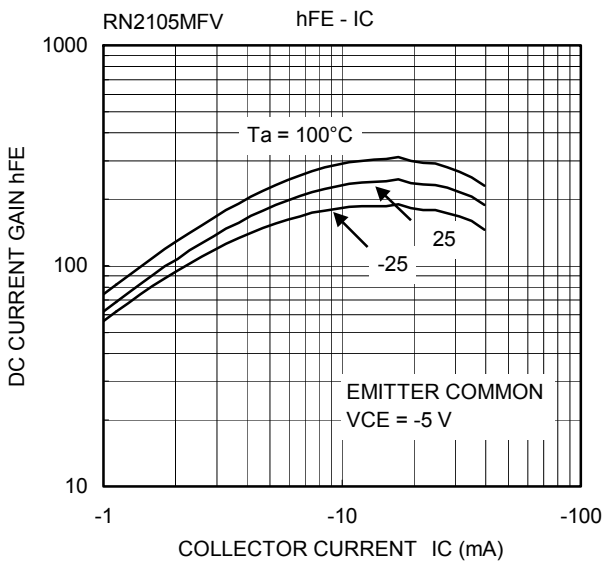
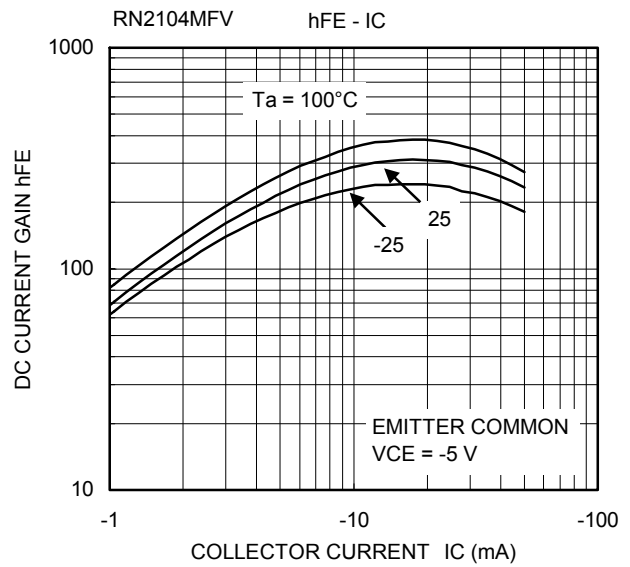
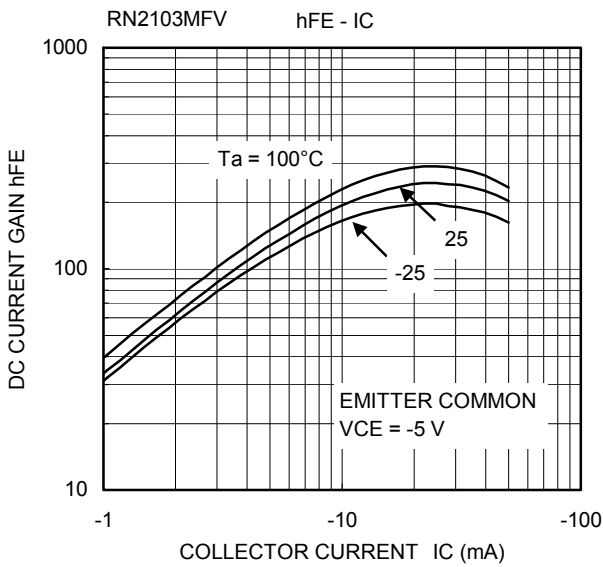
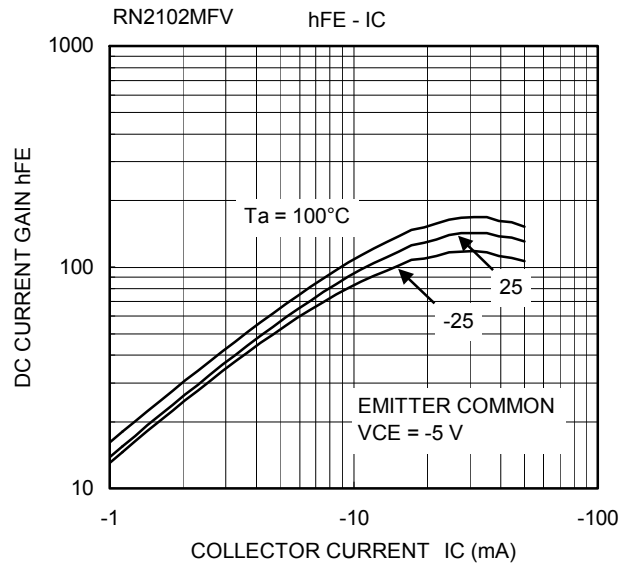
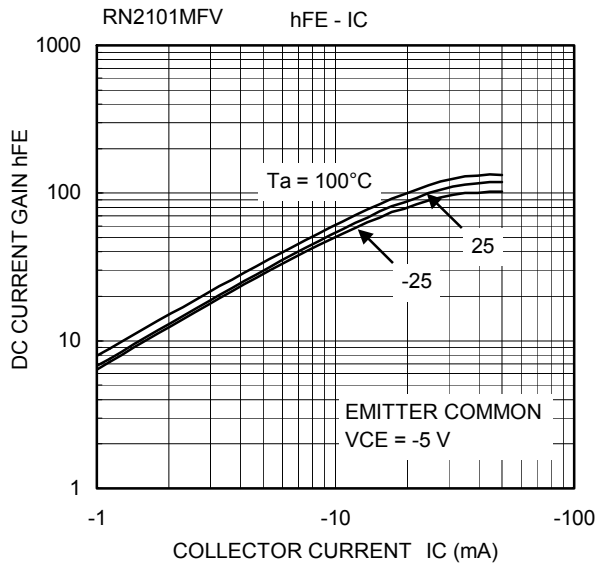
Start of commercial production
2005-02

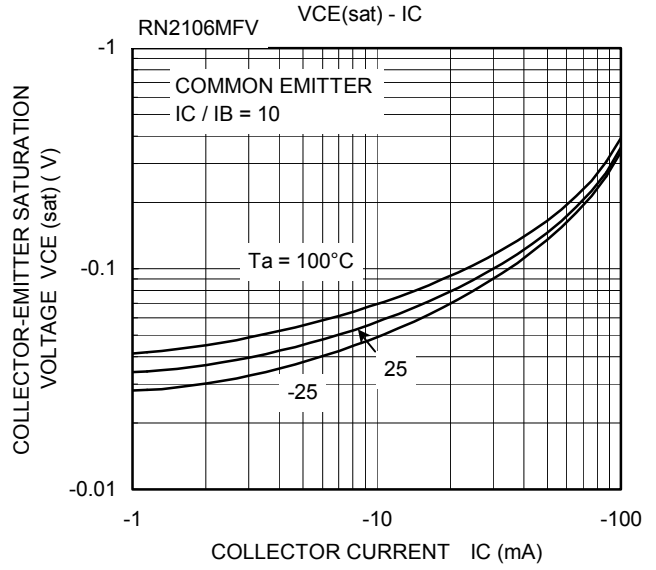
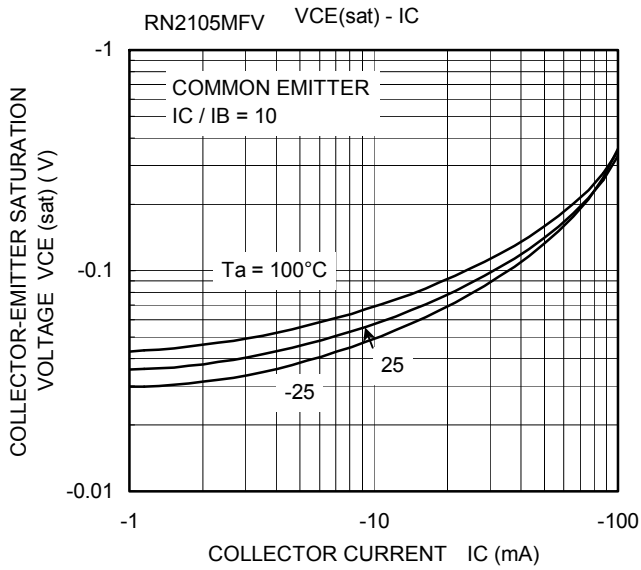
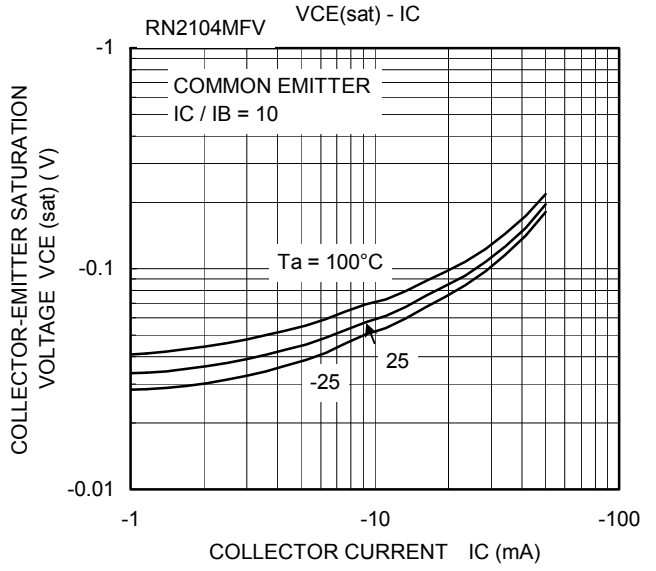
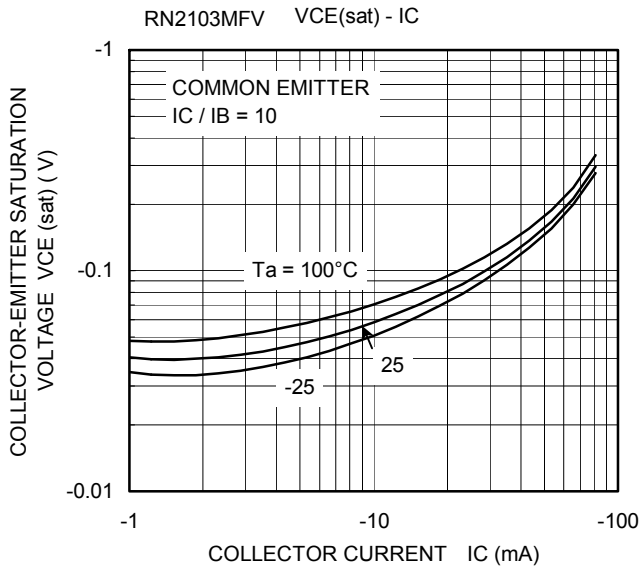
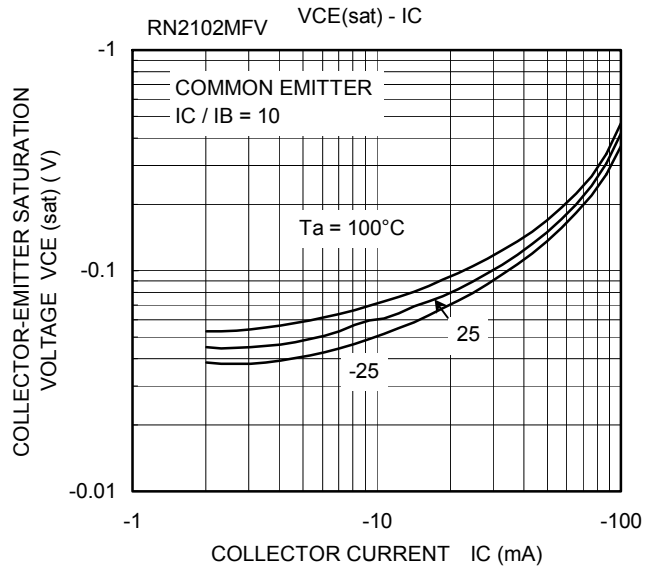
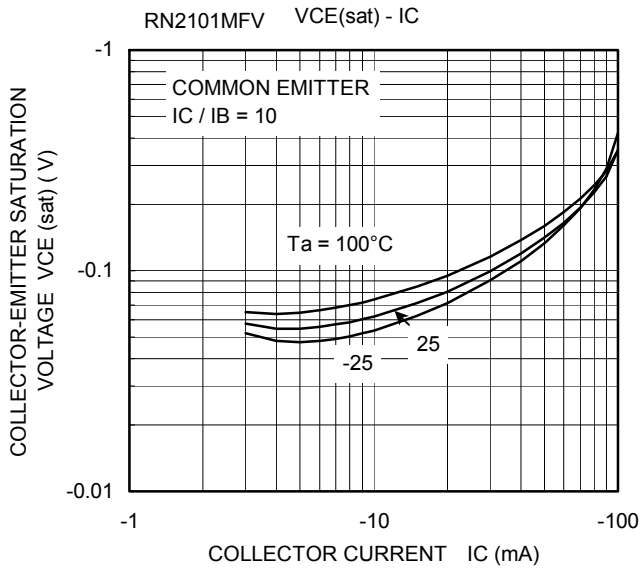
Electrical Characteristics (Ta = 25°C)

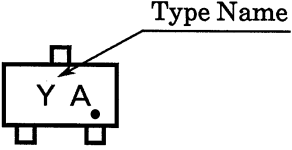
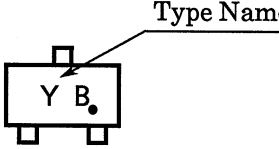
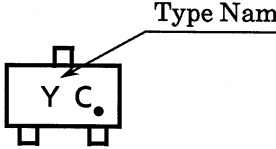
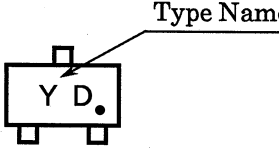
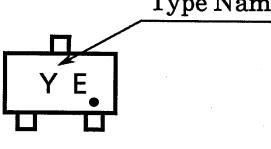
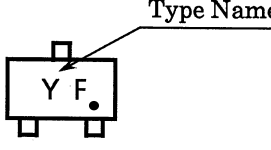
| Characteristic | | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|------------------------|---------------|--------------|--|--------|--------|--------|------|
| Collector cutoff current | RN2101MFV to RN2106MFV | I_{CBO} | — | $V_{CB} = -50\text{ V}, I_E = 0$ | — | — | -100 | nA |
| | | I_{CEO} | — | $V_{CE} = -50\text{ V}, I_B = 0$ | — | — | -500 | |
| Emitter cutoff current | RN2101MFV | I_{EBO} | — | $V_{EB} = -10\text{ V}, I_C = 0$ | -0.82 | — | -1.52 | mA |
| | RN2102MFV | | | | -0.38 | — | -0.71 | |
| | RN2103MFV | | | | -0.17 | — | -0.33 | |
| | RN2104MFV | | | -0.082 | — | -0.15 | | |
| | RN2105MFV | | | -0.078 | — | -0.145 | | |
| | RN2106MFV | | | -0.074 | — | -0.138 | | |
| DC current gain | RN2101MFV | h_{FE} | — | $V_{CE} = -5\text{ V}, I_C = -10\text{ mA}$ | 30 | — | — | — |
| | RN2102MFV | | | | 50 | — | — | |
| | RN2103MFV | | | | 70 | — | — | |
| | RN2104MFV | | | | 80 | — | — | |
| | RN2105MFV | | | | 80 | — | — | |
| | RN2106MFV | | | | 80 | — | — | |
| Collector-emitter saturation voltage | RN2101MFV to RN2106MFV | $V_{CE(sat)}$ | — | $I_C = -5\text{ mA}, I_B = -0.5\text{ mA}$ | — | -0.1 | -0.3 | V |
| Input voltage (ON) | RN2101MFV | $V_{I(ON)}$ | — | $V_{CE} = -0.2\text{ V}, I_C = -5\text{ mA}$ | -1.1 | — | -2.0 | V |
| | RN2102MFV | | | | -1.2 | — | -2.4 | |
| | RN2103MFV | | | | -1.3 | — | -3.0 | |
| | RN2104MFV | | | | -1.5 | — | -5.0 | |
| | RN2105MFV | | | | -0.6 | — | -1.1 | |
| | RN2106MFV | | | | -0.7 | — | -1.3 | |
| Input voltage (OFF) | RN2101MFV to RN2104MFV | $V_{I(OFF)}$ | — | $V_{CE} = -5\text{ V}, I_C = -0.1\text{ mA}$ | -1.0 | — | -1.5 | V |
| | RN2105MFV, RN2106MFV | | | | -0.5 | — | -0.8 | |
| Transition frequency | RN2101MFV to RN2106MFV | f_T | — | $V_{CE} = -10\text{ V}, I_C = -5\text{ mA}$ | — | 250 | — | MHz |
| Collector output capacitance | RN2101MFV to RN2106MFV | C_{ob} | — | $V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$ | — | 0.9 | — | pF |
| Input resistor | RN2101MFV | R1 | — | | 3.29 | 4.7 | 6.11 | kΩ |
| | RN2102MFV | | | | 7 | 10 | 13 | |
| | RN2103MFV | | | | 15.4 | 22 | 28.6 | |
| | RN2104MFV | | | | 32.9 | 47 | 61.1 | |
| | RN2105MFV | | | | 1.54 | 2.2 | 2.86 | |
| | RN2106MFV | | | | 3.29 | 4.7 | 6.11 | |
| Resistor ratio | RN2101MFV to RN2104MFV | R1/R2 | — | | 0.8 | 1.0 | 1.2 | — |
| | RN2105MFV | | | | 0.0376 | 0.0468 | 0.0562 | |
| | RN2106MFV | | | | 0.08 | 0.1 | 0.12 | |









| Type Name | Marking |
|-----------|---|
| RN2101MFV |  |
| RN2102MFV |  |
| RN2103MFV |  |
| RN2104MFV |  |
| RN2105MFV |  |
| RN2106MFV |  |

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