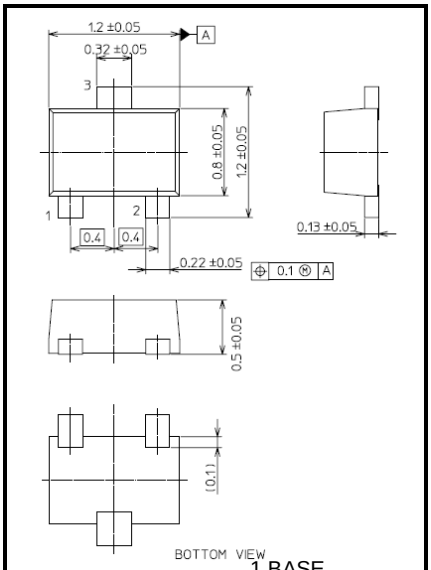
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor)

# 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

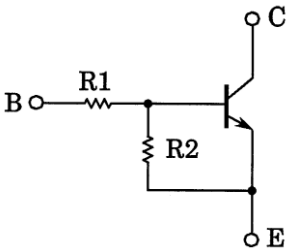
Unit: mm




| | |
|---|---|
| VESM | 1.BASE<br>2.EMITTER<br>3.COLLECTOR |
| **JEDEC** | — |
| JEITA | — |
| TOSHIBA | 1-1Q1S |

Weight: 1.5 mg (typ.)

## 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 |

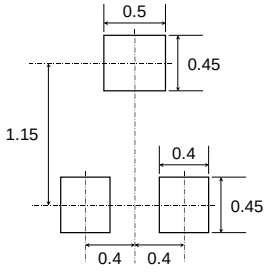
## Absolute Maximum Ratings (Ta = 25°C)

| Characteristic | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Collector-base voltage | RN1101MFV to 1106MFV | $V_{CBO}$ | 50 | V |
| Collector-emitter voltage | | $V_{CEO}$ | 50 | V |
| Emitter-base voltage | RN1101MFV to 1104MFV | $V_{EBO}$ | 10 | V |
| | RN1105MFV, 1106MFV | | 5 | |
| Collector current | RN1101MFV to 1106MFV | $I_C$ | 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 Dimensions
(for reference only)




Unit: mm

Start of commercial production
2005-02

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## Electrical Characteristics (Ta = 25°C)

| Characteristic | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Collector cutoff current | RN1101MFV to RN1106MFV | $I_{CBO}$ | $V_{CB}$ = 50 V, $I_E$ = 0 A | — | — | 100 | nA |
| | | $I_{CEO}$ | $V_{CE}$ = 50 V, $I_B$ = 0 A | — | — | 500 | |
| Emitter cutoff current | RN1101MFV | $I_{EBO}$ | $V_{EB}$ = 10 V, $I_C$ = 0 A | 0.82 | — | 1.52 | mA |
| | RN1102MFV | | | 0.38 | — | 0.71 | |
| | RN1103MFV | | | 0.17 | — | 0.33 | |
| | RN1104MFV | | | 0.082 | — | 0.15 | |
| | RN1105MFV | | $V_{EB}$ = 5 V, $I_C$ = 0 A | 0.078 | — | 0.145 | |
| | RN1106MFV | | | 0.074 | — | 0.138 | |
| DC current gain | RN1101MFV | $h_{FE}$ | $V_{CE}$ = 5 V, $I_C$ = 10 mA | 30 | — | — | – |
| | RN1102MFV | | | 50 | — | — | |
| | RN1103MFV | | | 70 | — | — | |
| | RN1104MFV | | | 80 | — | — | |
| | RN1105MFV | | | 80 | — | — | |
| | RN1106MFV | | | 80 | — | — | |
| Collector-emitter saturation voltage | RN1101MFV to RN1106MFV | $V_{CE\ (sat)}$ | $I_C$ = 5 mA, $I_B$ = 0.5 mA | — | 0.1 | 0.3 | V |
| Input voltage (ON) | RN1101MFV | $V_{I\ (ON)}$ | $V_{CE}$ = 0.2 V, $I_C$ = 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 | $V_{I\ (OFF)}$ | $V_{CE}$ = 5 V, $I_C$ = 0.1 mA | 1.0 | — | 1.5 | V |
| | RN1105MFV, RN1106MFV | | | 0.5 | — | 0.8 | |
| Collector output capacitance | RN1101MFV to RN1106MFV | $C_{ob}$ | $V_{CB}$ = 10 V, $I_E$ = 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 | |

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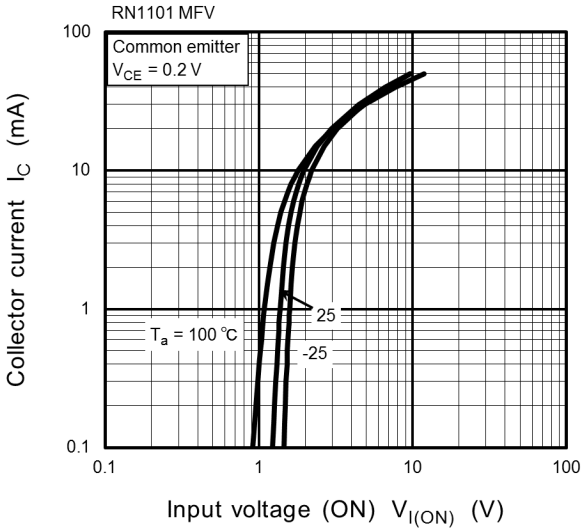


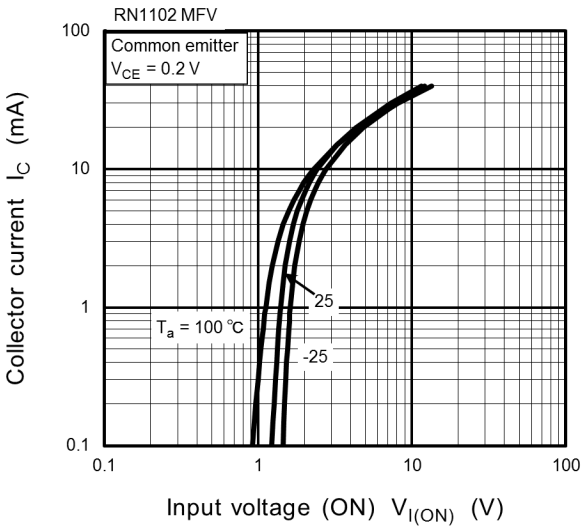


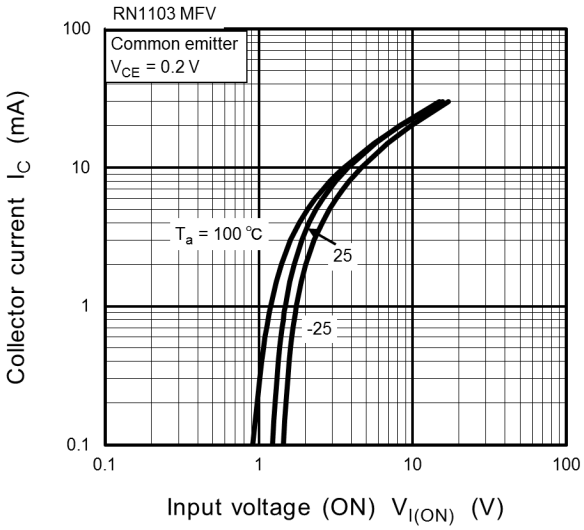


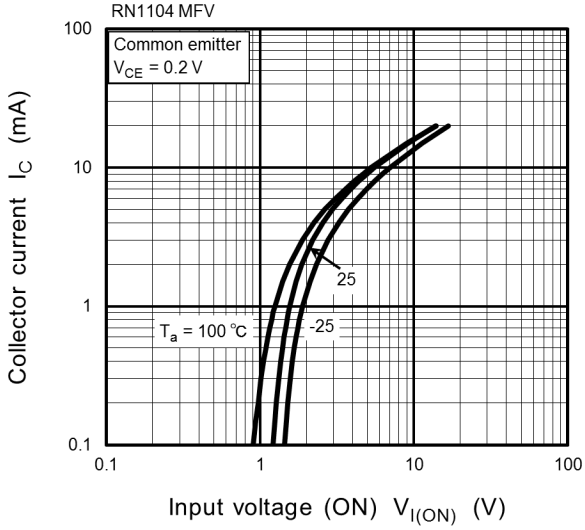


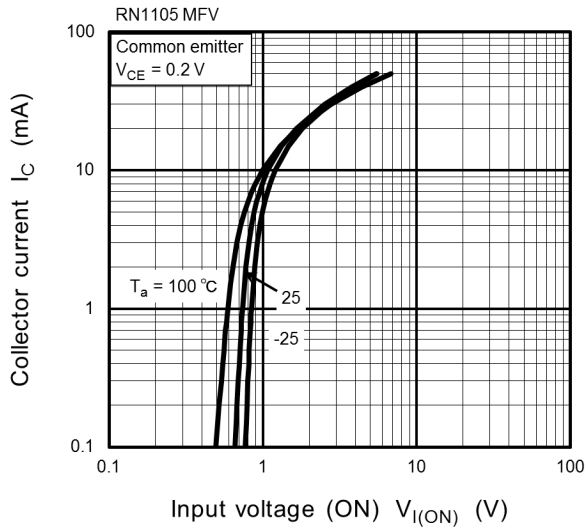


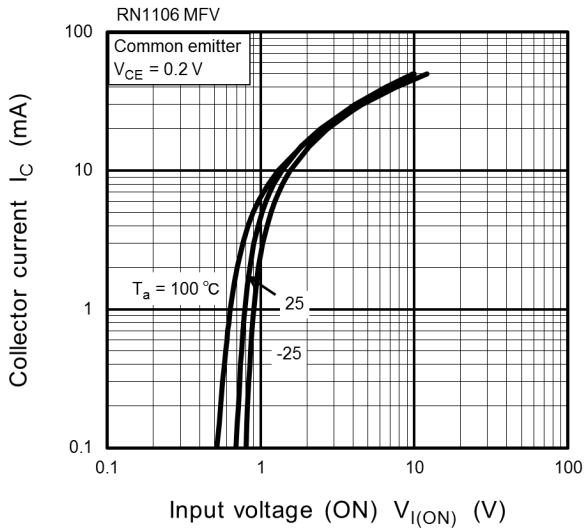


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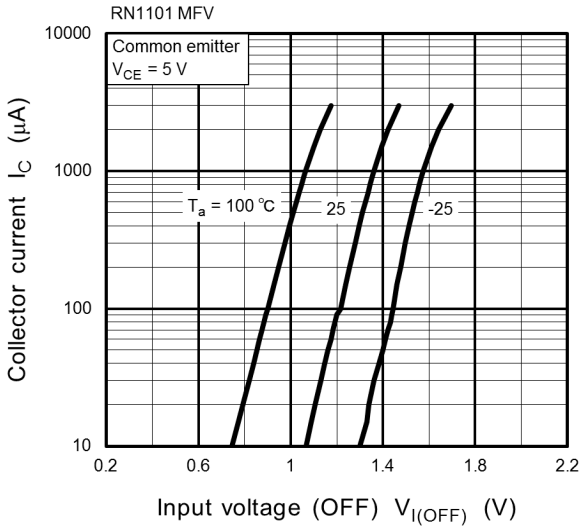


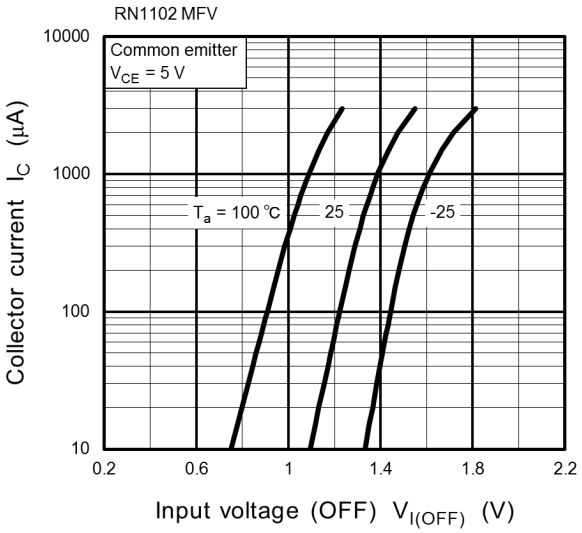


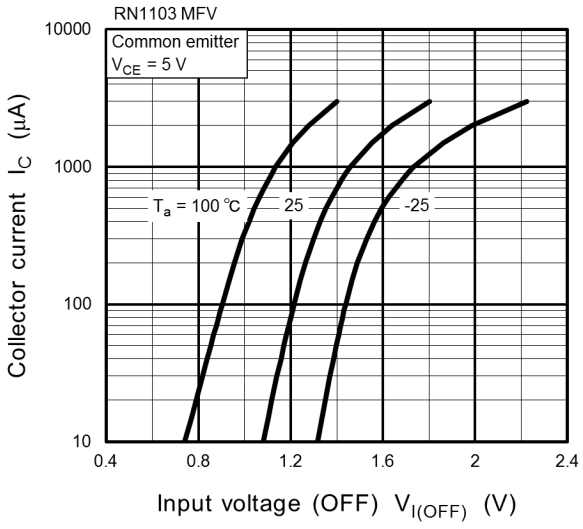


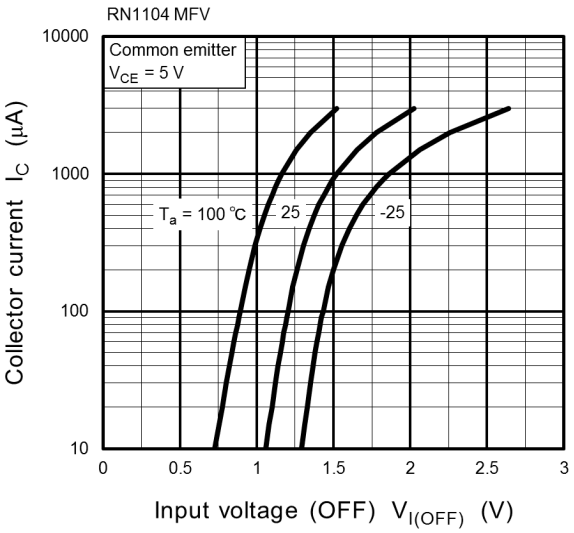


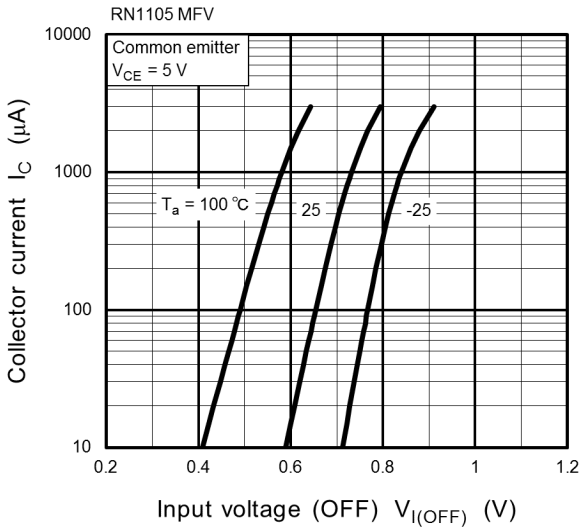


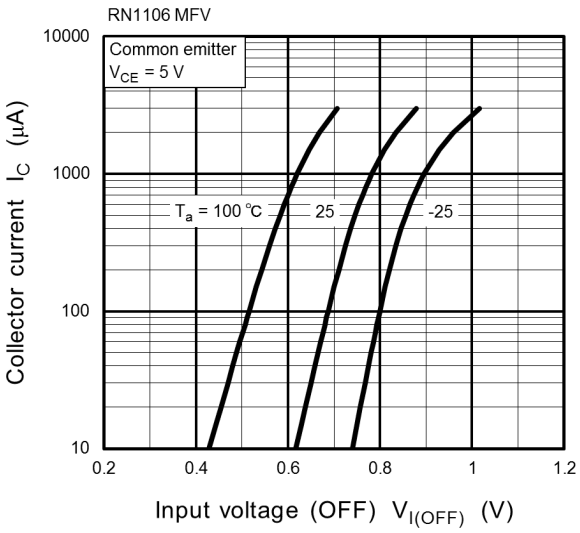


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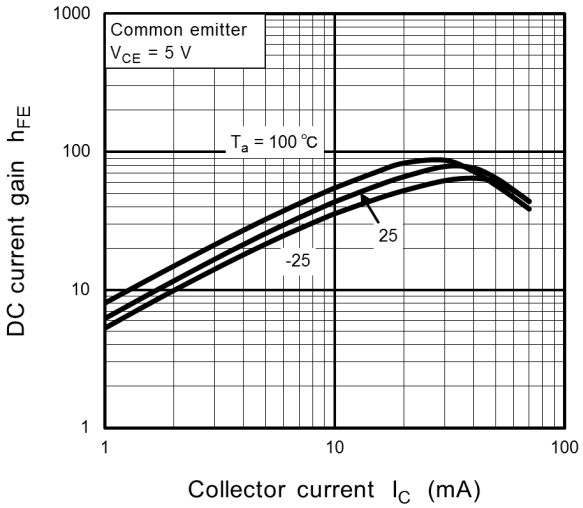
RN1101 MFV

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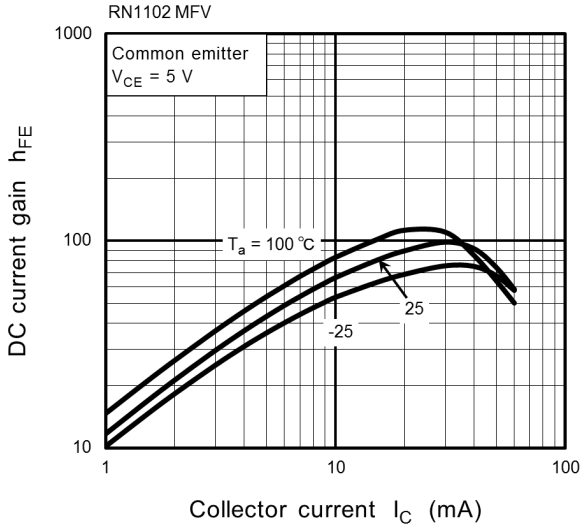


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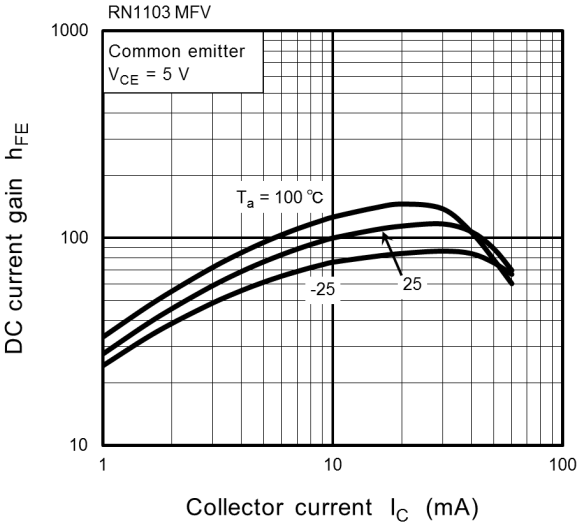


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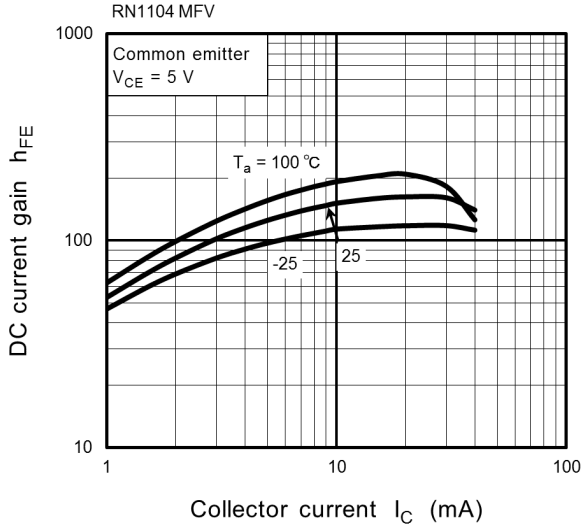


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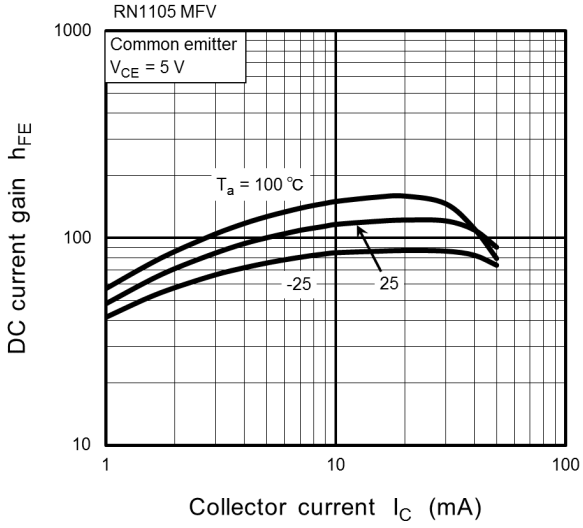


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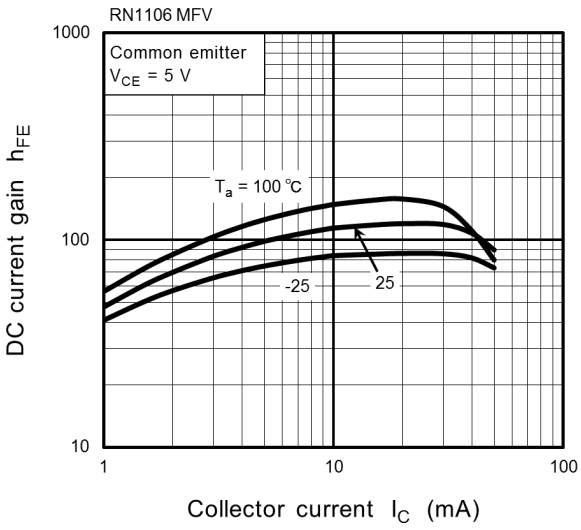


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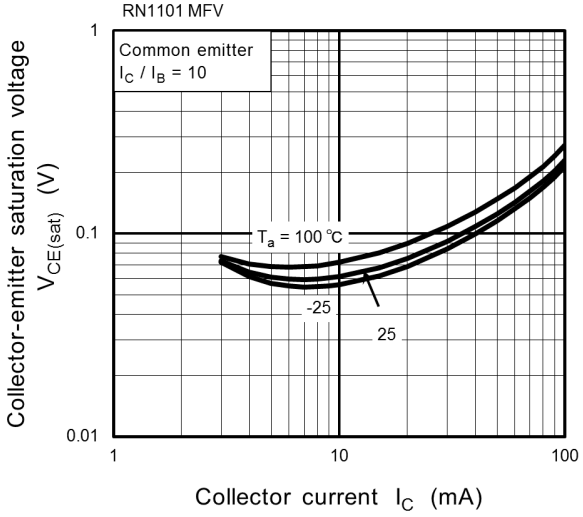


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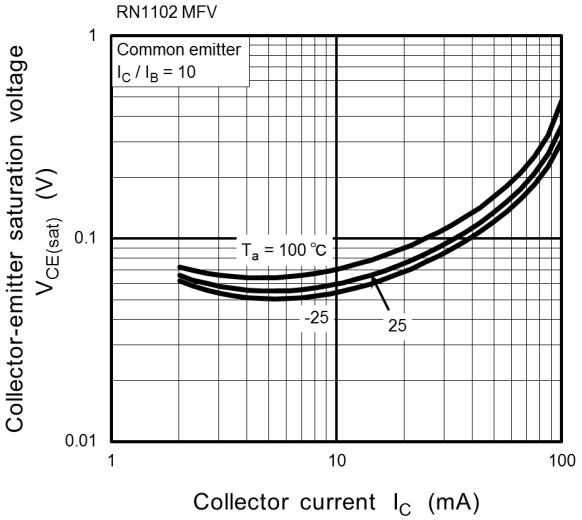


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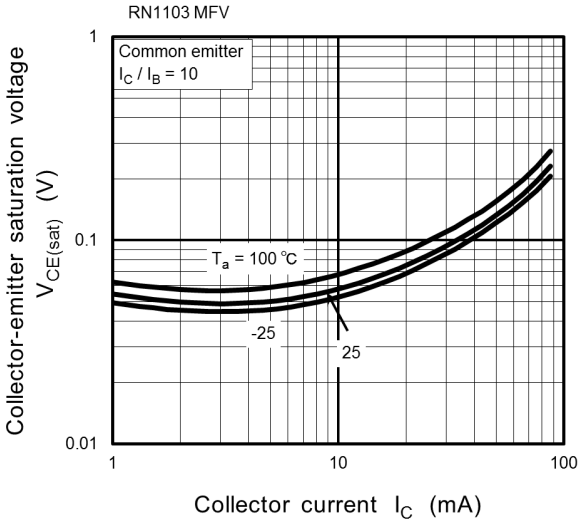


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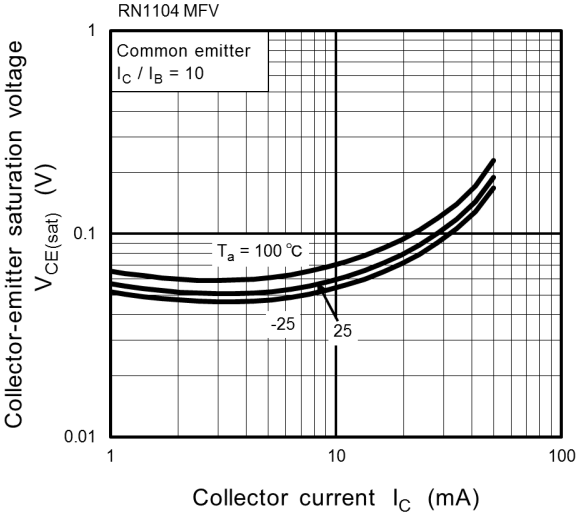


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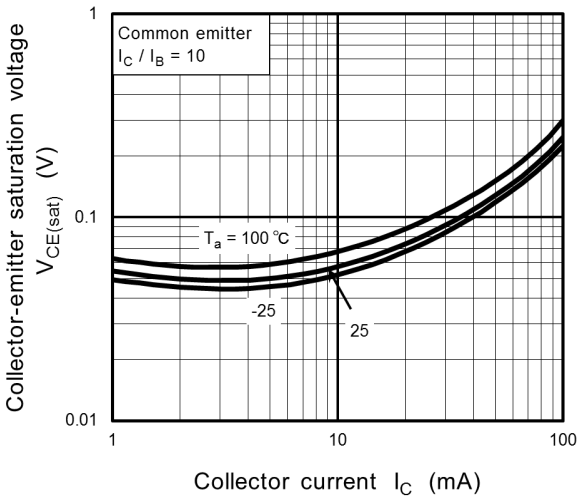


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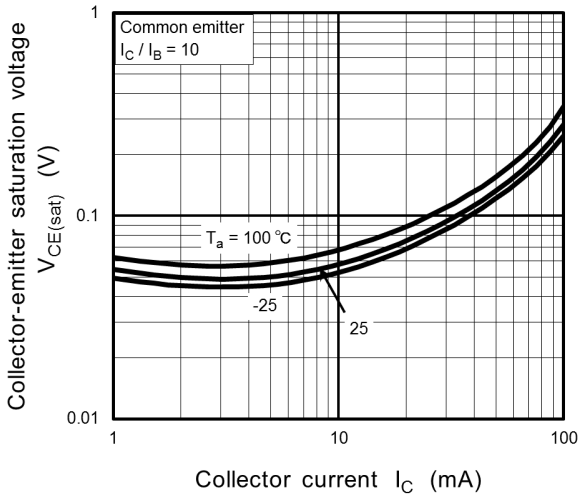


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## Marking

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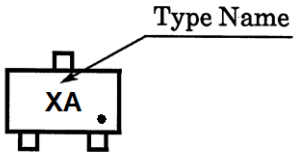
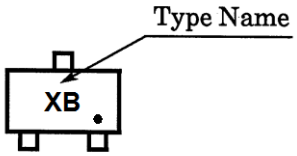
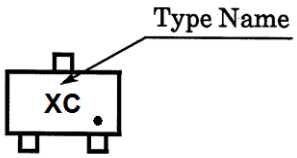
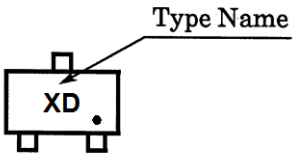
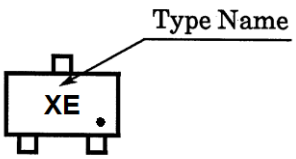
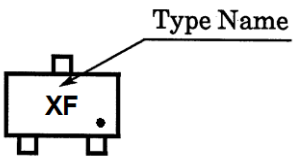
| RN1101MFV |   |
| RN1102MFV |   |
| RN1103MFV |   |
| RN1104MFV |   |
| RN1105MFV |   |
| RN1106MFV |   |

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