

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

RN1107MFV/08MFV/09MFV

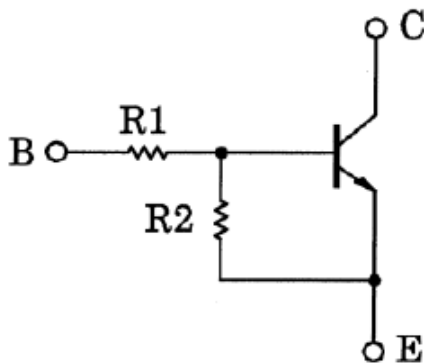
1. Applications

- Switching
- Inverter Circuits
- Interfacing
- Driver Circuits

2. Features

- (1) AEC-Q101 qualified (Please see the orderable part number list)
- (2) Ultra-small package, suited to very high density mounting
- (3) The integrated bias resistor reduces the number of external parts required, making it possible to reduce system size and assembly time.
- (4) Toshiba offers transistors with a wide range of resistance to accommodate various circuit designs.
- (5) Complementary to RN2107MFV to 2109MFV

3. Equivalent Circuit



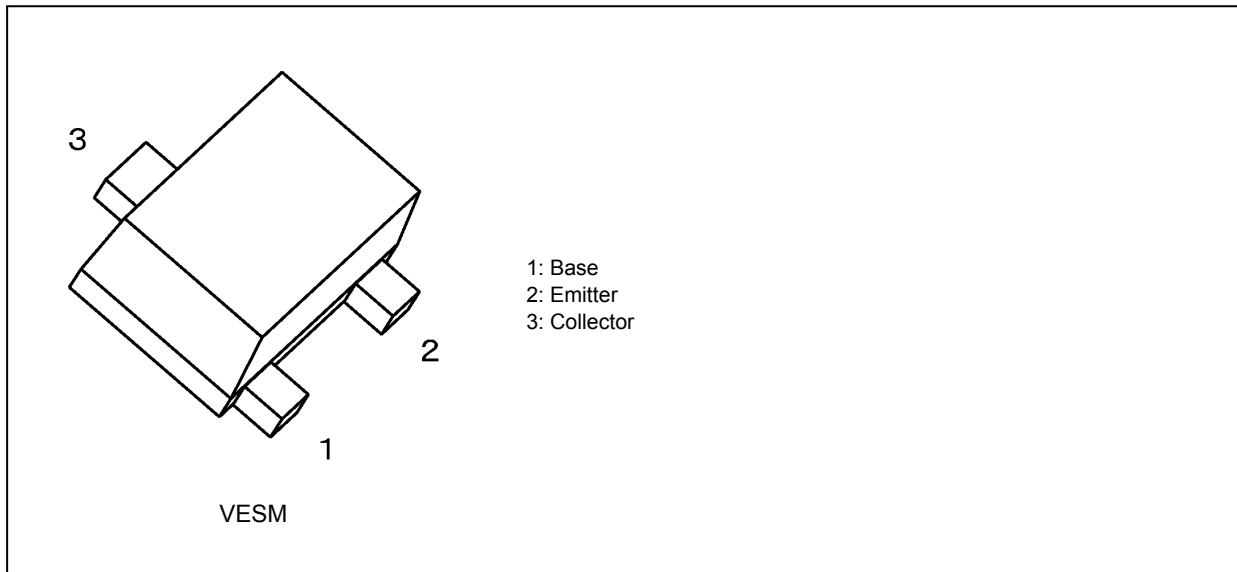
4. Bias Resistor Values

| Part No. | R1 (kΩ) | R2 (kΩ) |
|-----------|---------|---------|
| RN1107MFV | 10 | 47 |
| RN1108MFV | 22 | 47 |
| RN1109MFV | 47 | 22 |

Start of commercial production

2005-02

5. Packaging and Pin Assignment



6. Orderable part number

| Orderable part number | | AEC-Q101 | Note | Note |
|-----------------------|-----------------|----------|----------|-------------------------|
| RN1107MFV | RN1107MFV,L3F | — | | General Use |
| | RN1107MFV,L3XGF | YES | (Note 1) | Unintended Use (Note 1) |
| | RN1107MFV,L3XHF | YES | | Automotive Use |
| RN1108MFV | RN1108MFV,L3F | — | | General Use |
| | RN1108MFV,L3XGF | YES | (Note 1) | Unintended Use (Note 1) |
| RN1109MFV | RN1109MFV,L3F | — | | General Use |
| | RN1109MFV,L3XGF | YES | (Note 1) | Unintended Use (Note 1) |

Note 1: For more information, please contact our sales or use the inquiry form on our website.

7. Absolute Maximum Ratings (Note) (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$)

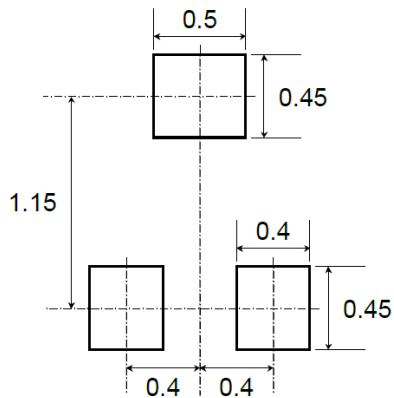
| Characteristics | | Symbol | Rating | Unit |
|-----------------------------|---------------------|----------------|------------|------|
| Collector-base voltage | RN1107MFV~RN1109MFV | V_{CBO} | 50 | V |
| Collector-emitter voltage | | V_{CEO} | 50 | |
| Emitter-base voltage | RN1107MFV | V_{EBO} | 6 | V |
| | RN1108MFV | | 7 | |
| | RN1109MFV | | 15 | |
| Collector current | RN1107MFV~RN1109MFV | I_C | 100 | mA |
| Collector power dissipation | | P_C (Note 1) | 150 | |
| Junction temperature | | T_j | 150 | |
| Storage temperature | | T_{stg} | -55 to 150 | |

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)

8. Land Pattern Dimensions (for reference only)



Unit: mm

9. Electrical Characteristics (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$)

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|-------------------------|---------------|---|-------|-------|-------|------------|
| Collector cut-off current | RN1107MFV~ RN1109MFV | I_{CBO} | $V_{CB} = 50\text{ V}, I_E = 0\text{ mA}$ | — | — | 100 | nA |
| | | I_{CEO} | $V_{CE} = 50\text{ V}, I_B = 0\text{ mA}$ | — | — | 500 | |
| Emitter cut-off current | RN1107MFV | I_{EBO} | $V_{EB} = 6\text{ V}, I_C = 0\text{ mA}$ | 0.081 | — | 0.15 | mA |
| | RN1108MFV | | $V_{EB} = 7\text{ V}, I_C = 0\text{ mA}$ | 0.078 | — | 0.145 | |
| | RN1109MFV | | $V_{EB} = 15\text{ V}, I_C = 0\text{ mA}$ | 0.167 | — | 0.311 | |
| DC current gain | RN1107MFV | h_{FE} | $V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$ | 80 | — | — | — |
| | RN1108MFV | | | 80 | — | — | |
| | RN1109MFV | | | 70 | — | — | |
| Collector-emitter saturation voltage | RN1107MFV~ RN1109MFV | $V_{CE(sat)}$ | $I_C = 5\text{ mA}, I_B = 0.5\text{ mA}$ | — | 0.1 | 0.3 | V |
| Input voltage (ON) | RN1107MFV | $V_{I(ON)}$ | $V_{CE} = 0.2\text{ V}, I_C = 5\text{ mA}$ | 0.7 | — | 1.8 | V |
| | RN1108MFV | | | 1.0 | — | 2.6 | |
| | RN1109MFV | | | 2.2 | — | 5.8 | |
| Input voltage (OFF) | RN1107MFV | $V_{I(OFF)}$ | $V_{CE} = 5\text{ V}, I_C = 0.1\text{ mA}$ | 0.5 | — | 1.0 | V |
| | RN1108MFV | | | 0.6 | — | 1.16 | |
| | RN1109MFV | | | 1.5 | — | 2.6 | |
| Collector output capacitance | RN1107MFV~ RN1109MFV | C_{ob} | $V_{CB} = 10\text{ V}, I_E = 0\text{ mA}, f = 1\text{ MHz}$ | — | 0.7 | — | pF |
| Input resistance | RN1107MFV | R_1 | - | 7 | 10 | 13 | k Ω |
| | RN1108MFV | | | 15.4 | 22 | 28.6 | |
| | RN1109MFV | | | 32.9 | 47 | 61.1 | |
| Resistor ratio | RN1107MFV | R1/R2 | - | 0.17 | 0.213 | 0.255 | — |
| | RN1108MFV | | | 0.374 | 0.468 | 0.562 | |
| | RN1109MFV | | | 1.71 | 2.14 | 2.56 | |

10. Marking

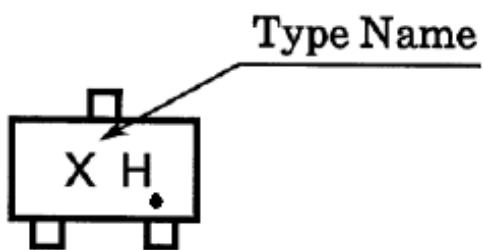


Fig. 10.1 Marking RN1107MFV

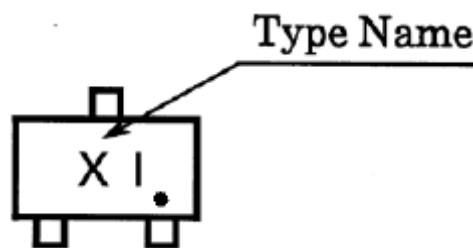


Fig. 10.2 Marking RN1108MFV

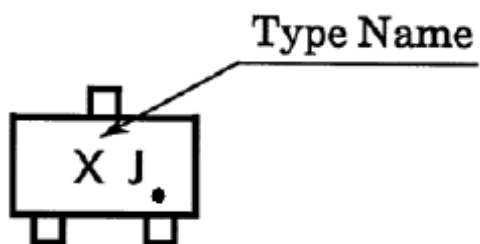


Fig. 10.3 Marking RN1109MFV

11. Characteristics Curves (Note)

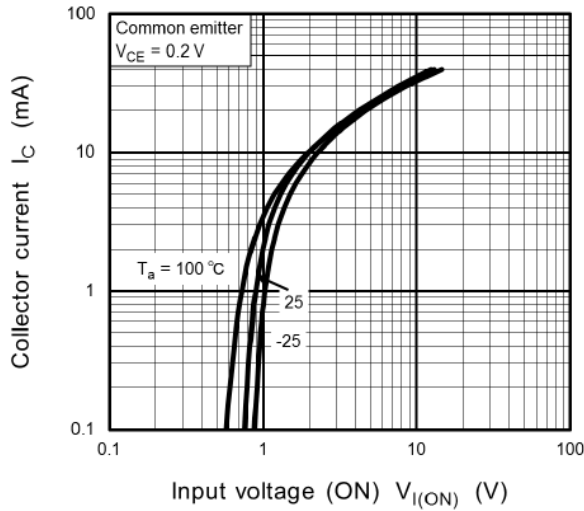


Fig. 11.1 RN1107MFV I_C - $V_{I(ON)}$

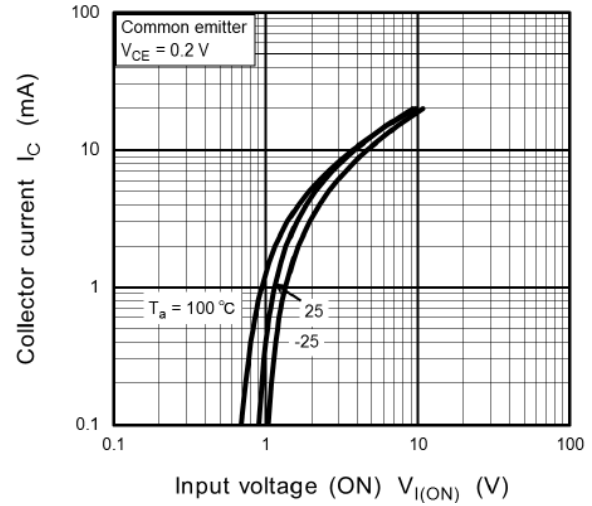


Fig. 11.2 RN1108MFV I_C - $V_{I(ON)}$

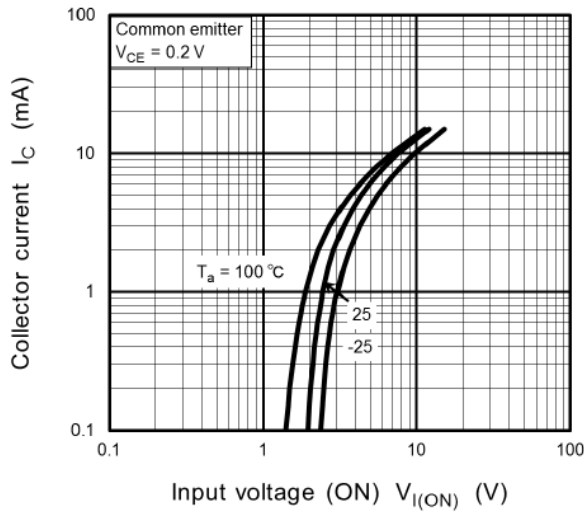


Fig. 11.3 RN1109MFV I_C - $V_{I(ON)}$

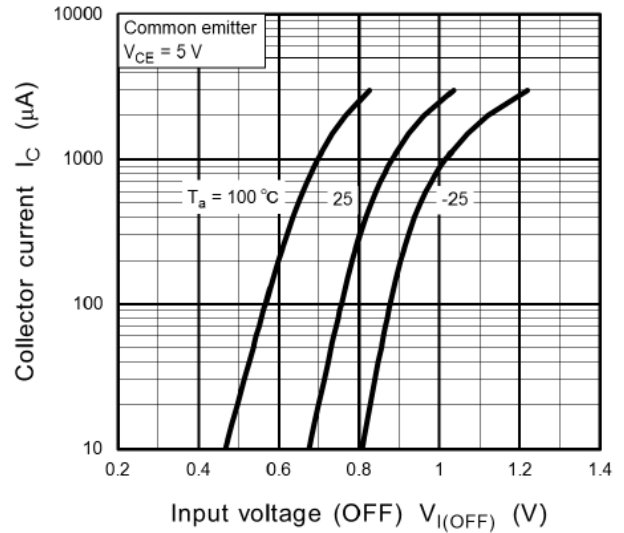


Fig. 11.4 RN1107MFV I_C - $V_{I(OFF)}$

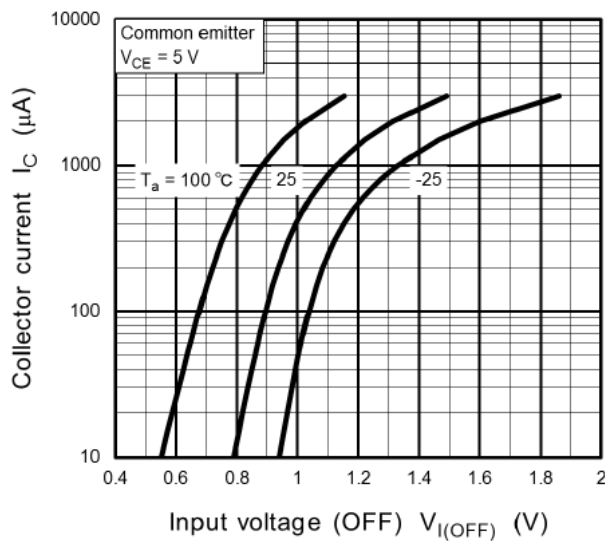


Fig. 11.5 RN1108MFV I_C - $V_{I(OFF)}$

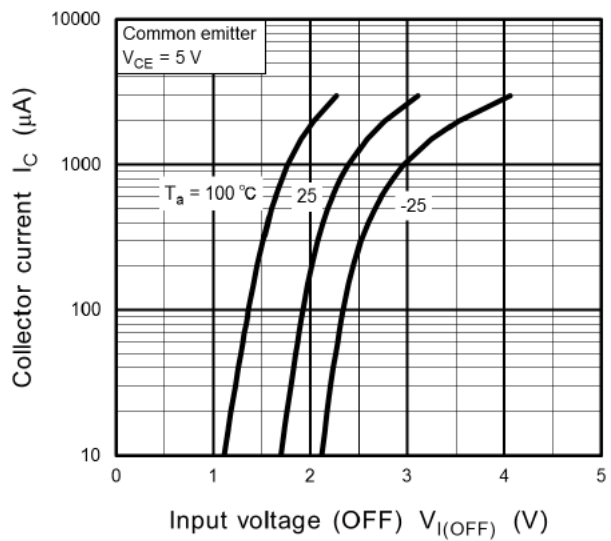


Fig. 11.6 RN1109MFV I_C - $V_{I(OFF)}$

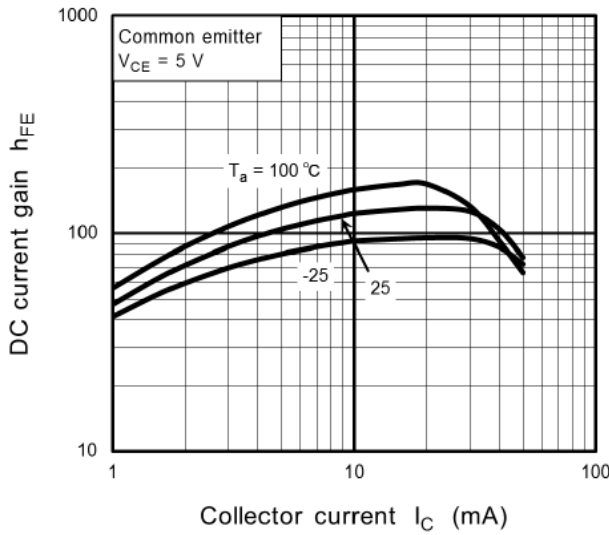


Fig. 11.7 RN1107MFV h_{FE} - I_C

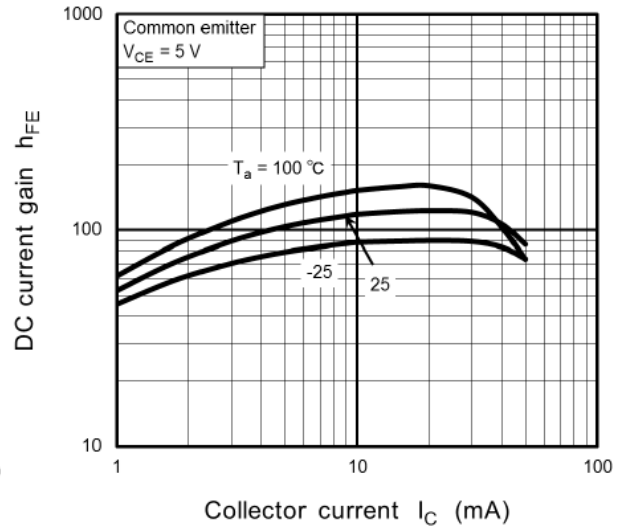


Fig. 11.8 RN1108MFV h_{FE} - I_C

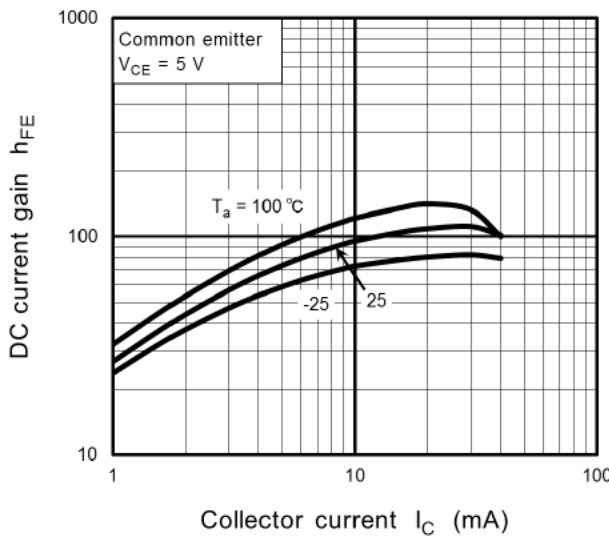


Fig. 11.9 RN1109MFV h_{FE} - I_C

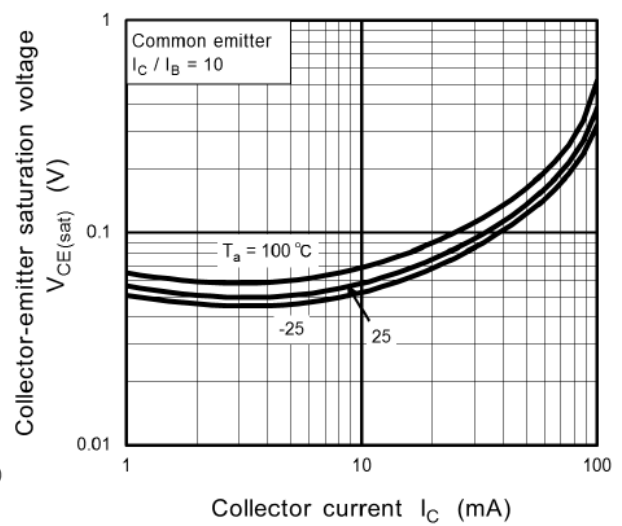


Fig. 11.10 RN1107MFV $V_{CE(sat)}$ - I_C

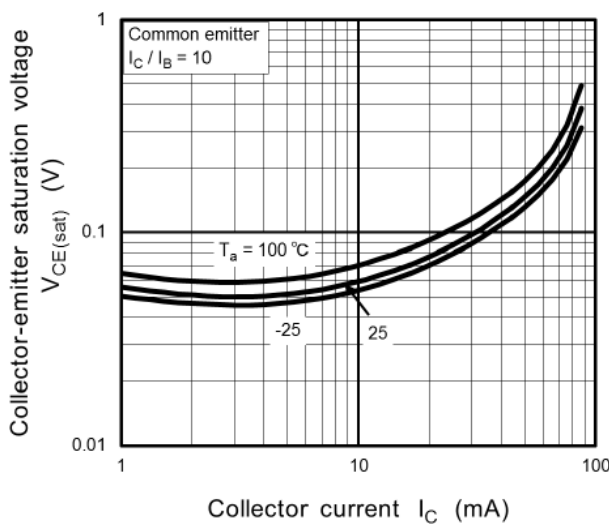


Fig. 11.11 RN1108MFV $V_{CE(sat)}$ - I_C

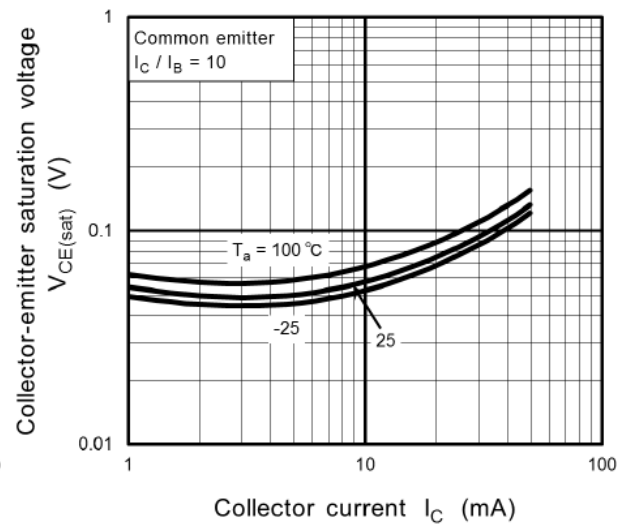
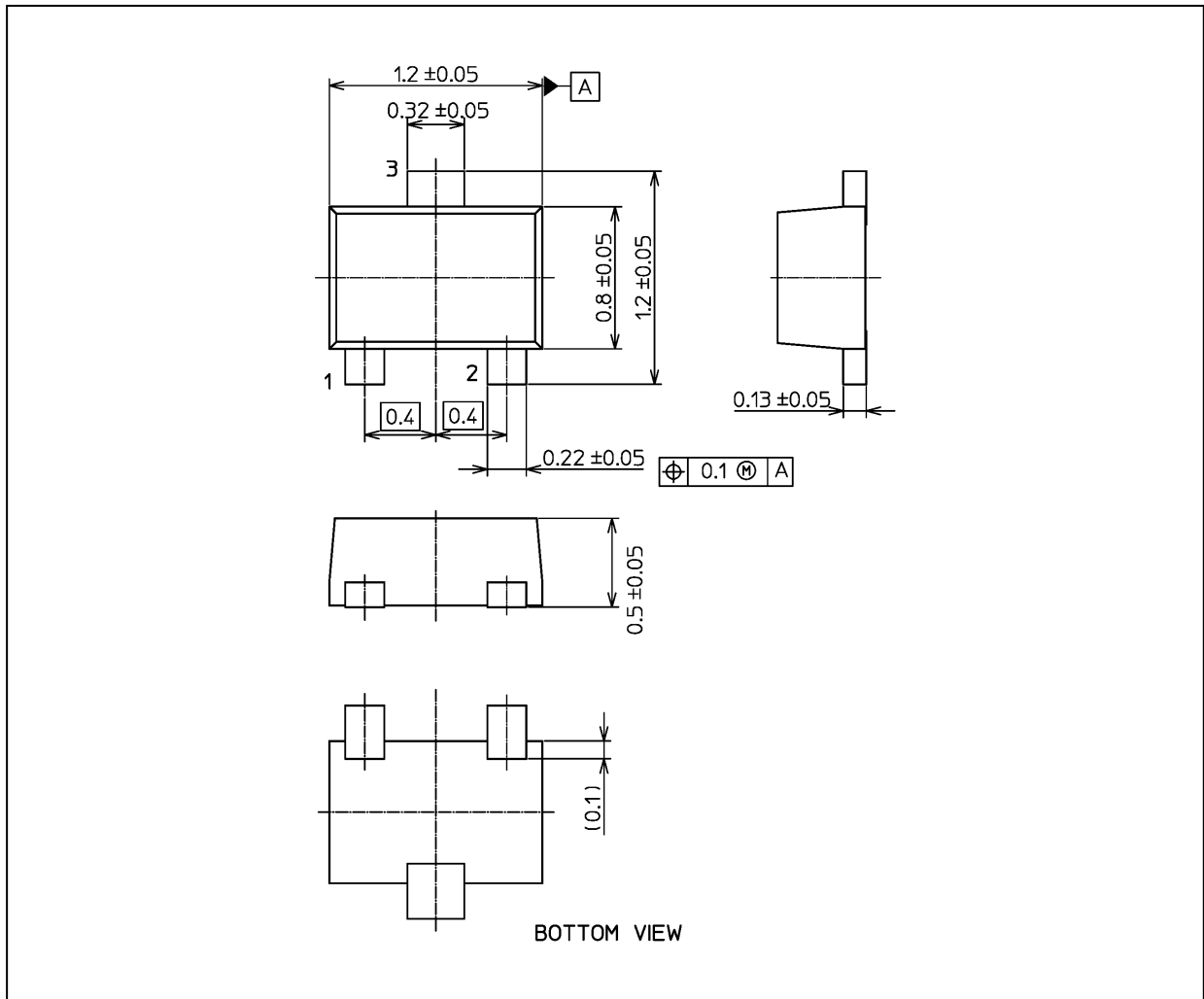


Fig. 11.12 RN1109MFV $V_{CE(sat)}$ - I_C

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

Package Dimensions

Unit: mm



Weight: 1.5 mg (typ.)

| Package Name(s) |
|-----------------|
| TOSHIBA: 1-1Q1S |
| Nickname: VESM |

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