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

RN1107MFV/08MFV/09MFV

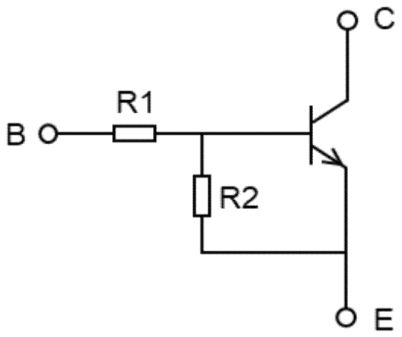
1. Applications

- 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

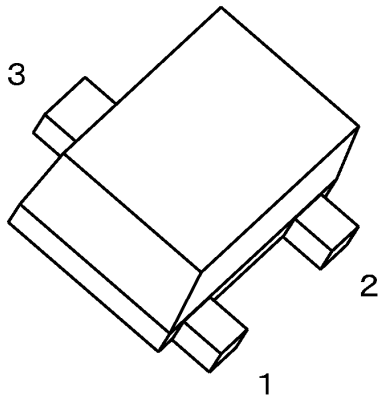
Part No.	R1 (kΩ)	R2 (kΩ)
RN1107MFV	10	47
RN1108MFV	22	47
RN1109MFV	47	22

Start of commercial production
2005-02

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5. Packaging and Pin Assignment



1: Base
2: Emitter
3: Collector

VESM

6. Orderable part number

Orderable part number		AEC-Q101	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 °C)

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN1107MFV to 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 to RN1109MFV	I_C	100	mA
Collector power dissipation		P_C (Note 1)	150	mW
Junction temperature		T_j	150	°C
Storage temperature		T_{stg}	-55 to 150	

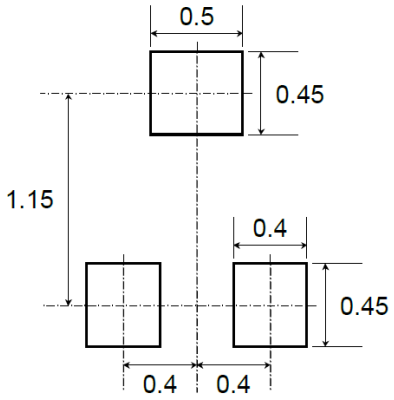
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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)

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8. Land Pattern Dimensions (for reference only)



Unit: mm

9. Electrical Characteristics (Unless otherwise specified, T_a = 25 °C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1107MFV to RN1109MFV	I_{CBO}	V_{CB} = 50 V, I_E = 0 mA	—	—	100	nA
		I_{CEO}	V_{CE} = 50 V, I_B = 0 mA	—	—	500	
Emitter cut-off current	RN1107MFV	I_{EBO}	V_{EB} = 6 V, I_C = 0 mA	0.081	—	0.15	mA
	RN1108MFV		V_{EB} = 7 V, I_C = 0 mA	0.078	—	0.145	
	RN1109MFV		V_{EB} = 15 V, I_C = 0 mA	0.167	—	0.311	
DC current gain	RN1107MFV	h_{FE}	V_{CE} = 5 V, I_C = 10 mA	80	—	—	—
	RN1108MFV			80	—	—	
	RN1109MFV			70	—	—	
Collector-emitter saturation voltage	RN1107MFV to RN1109MFV	$V_{CE(sat)}$	I_C = 5 mA, I_B = 0.5 mA	—	0.1	0.3	V
Input voltage (ON)	RN1107MFV	$V_{I(ON)}$	V_{CE} = 0.2 V, I_C = 5 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 V, I_C = 0.1 mA	0.5	—	1.0	V
	RN1108MFV			0.6	—	1.16	
	RN1109MFV			1.5	—	2.6	
Collector output capacitance	RN1107MFV to RN1109MFV	C_{ob}	V_{CB} = 10 V, I_E = 0 mA, f = 1 MHz	—	0.7	—	pF
Input resistance	RN1107MFV	R_1	-	7	10	13	kΩ
	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	

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10. Marking

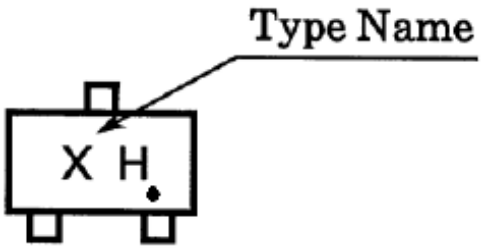


Fig. 10.1 Marking RN1107MFV

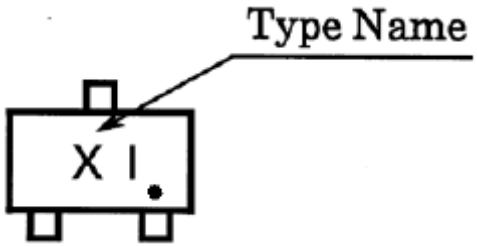


Fig. 10.2 Marking RN1108MFV

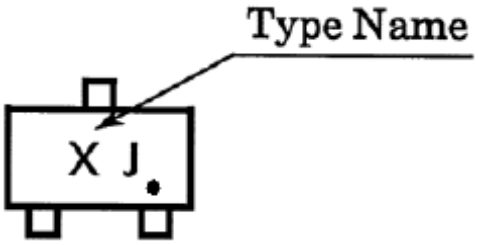


Fig. 10.3 Marking RN1109MFV

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11. Characteristics Curves (Note)

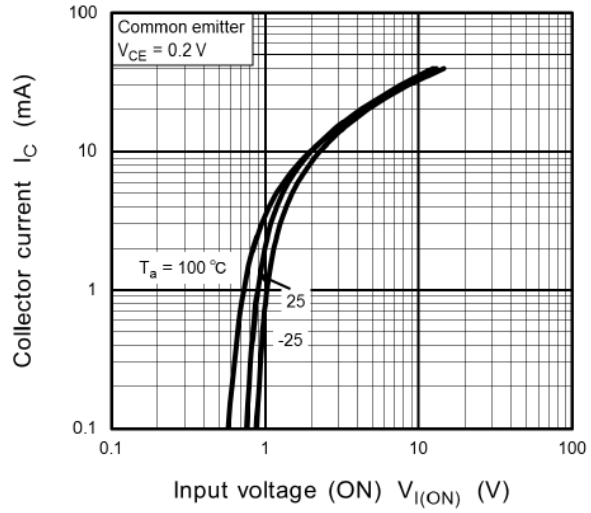


Fig. 11.1 RN1107MFV I_C-$V_{I(ON)}$

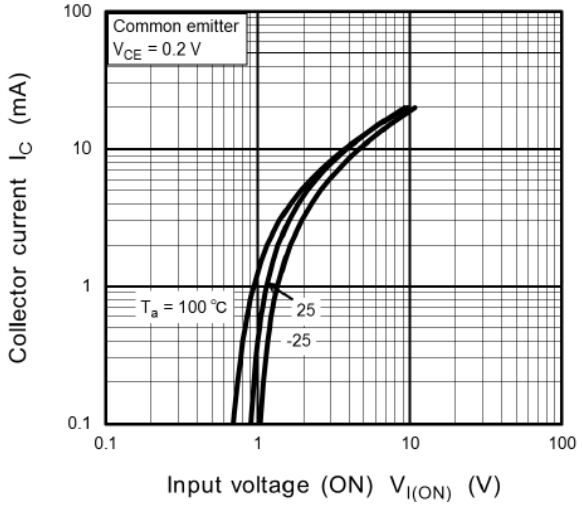


Fig. 11.2 RN1108MFV I_C-$V_{I(ON)}$

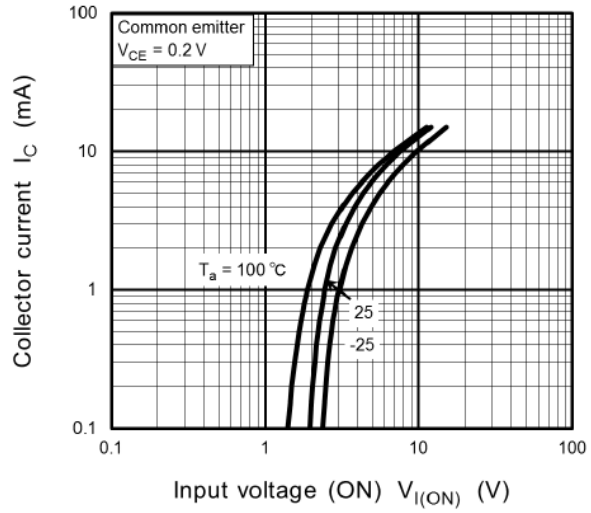


Fig. 11.3 RN1109MFV I_C-$V_{I(ON)}$

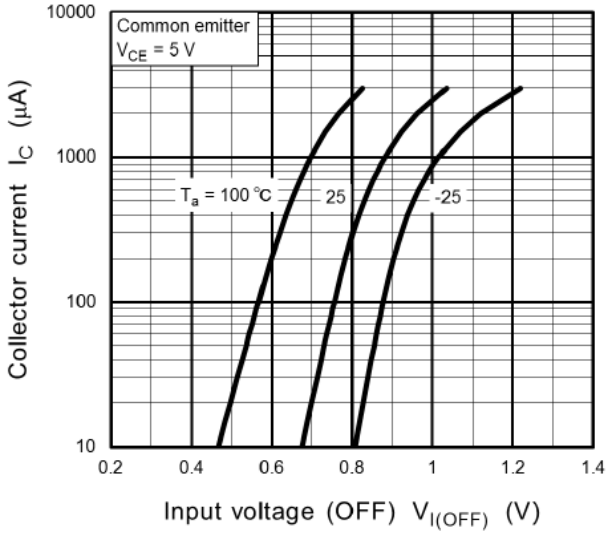


Fig. 11.4 RN1107MFV I_C-$V_{I(OFF)}$

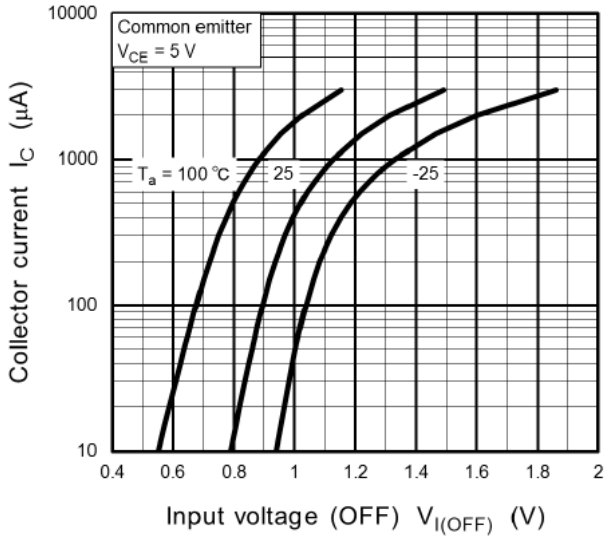


Fig. 11.5 RN1108MFV I_C-$V_{I(OFF)}$

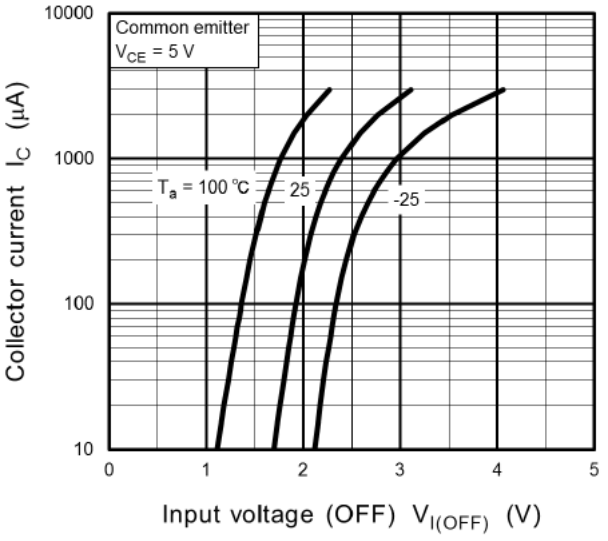


Fig. 11.6 RN1109MFV I_C-$V_{I(OFF)}$

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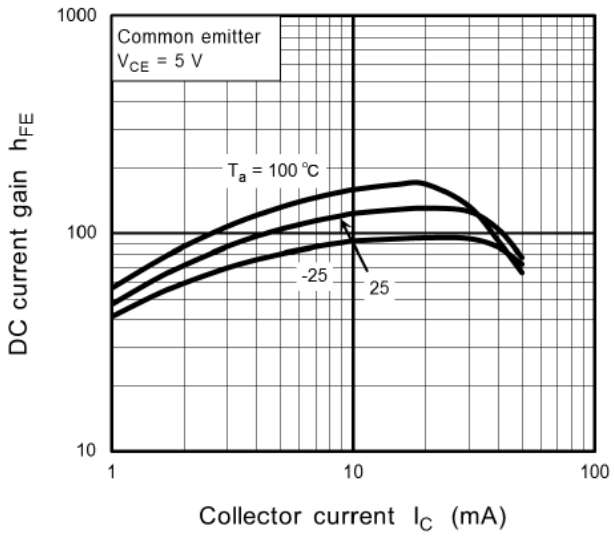


Fig. 11.7 RN1107MFV h_{FE}-I_C

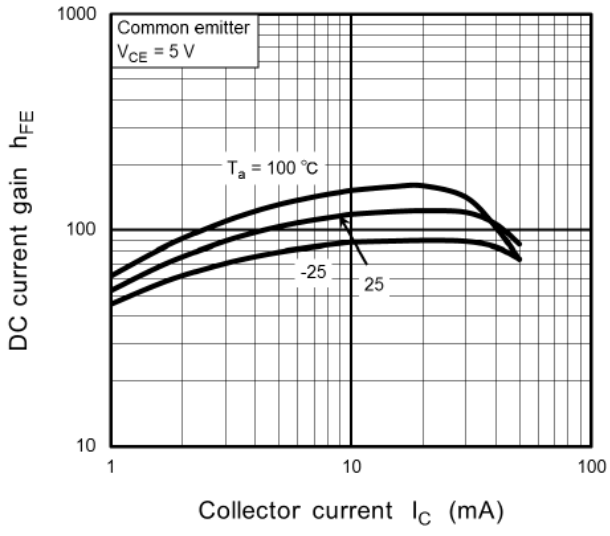


Fig. 11.8 RN1108MFV h_{FE}-I_C

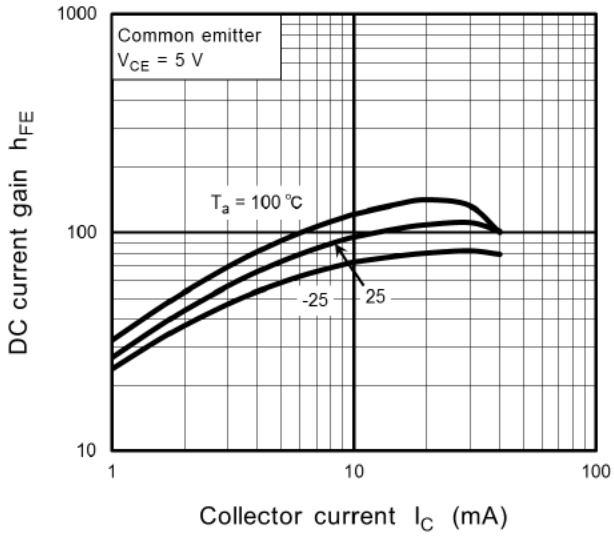


Fig. 11.9 RN1109MFV h_{FE}-I_C

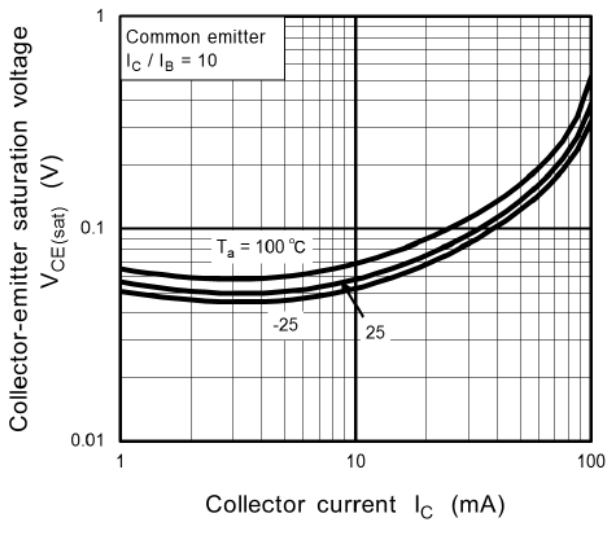


Fig. 11.10 RN1107MFV $V_{CE(sat)}$-I_C

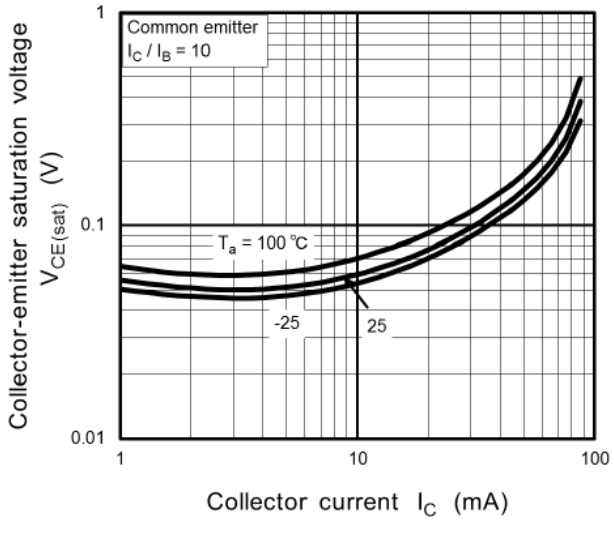


Fig. 11.11 RN1108MFV $V_{CE(sat)}$-I_C

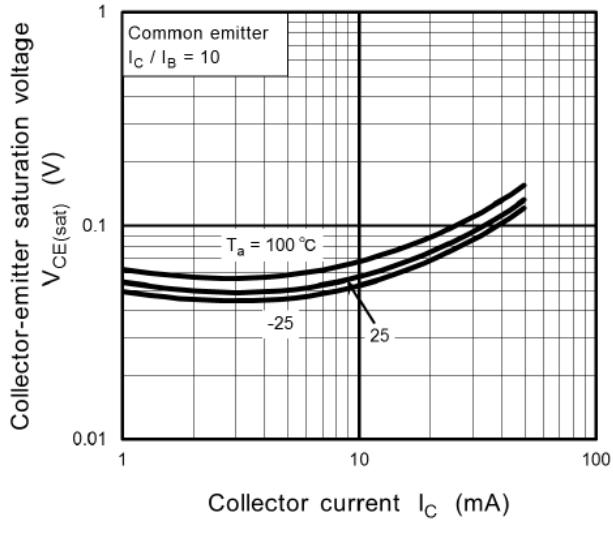


Fig. 11.12 RN1109MFV $V_{CE(sat)}$-I_C

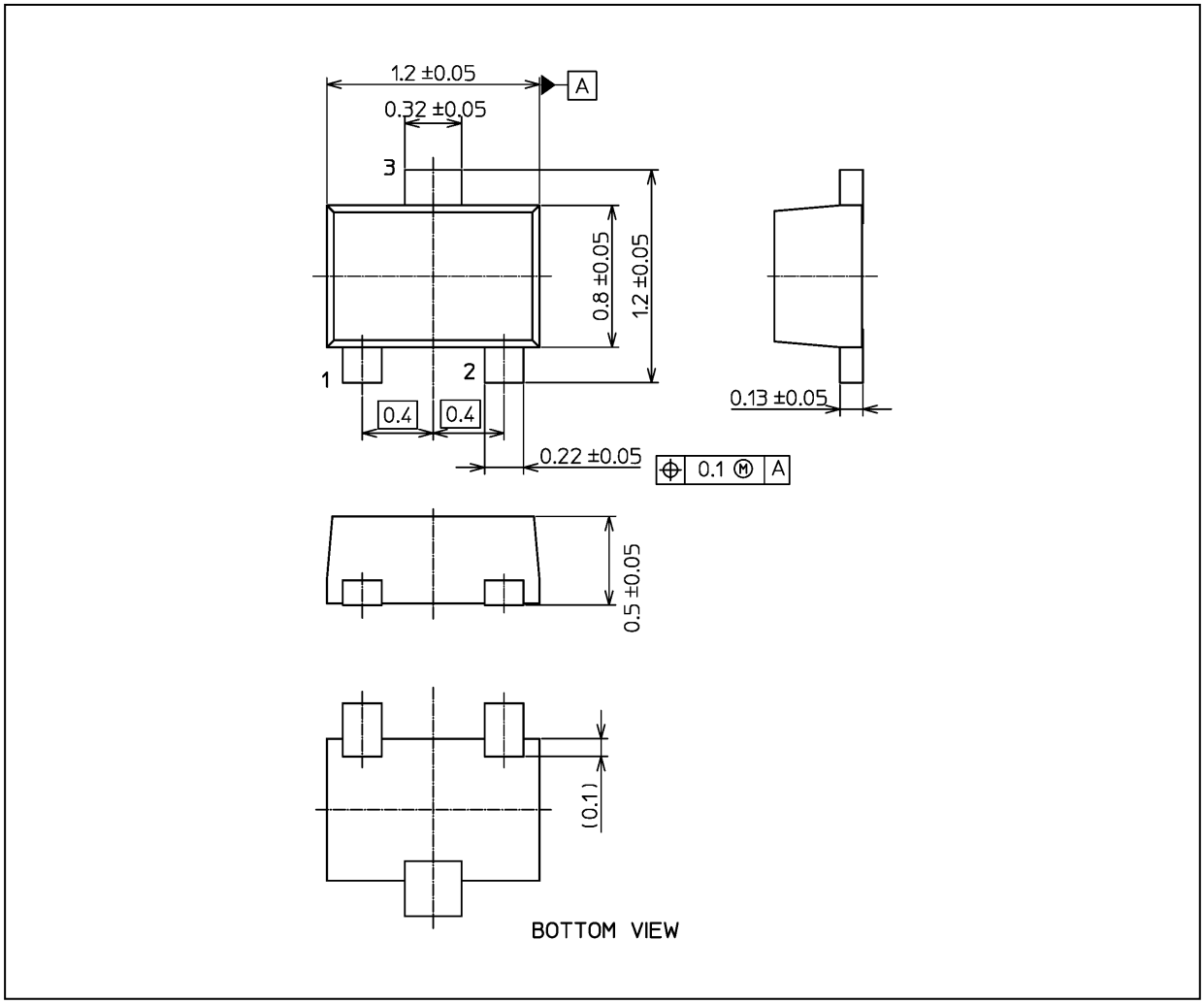
Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

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Package Dimensions

Unit: mm



Weight: 1.5 mg (typ.)

Package Name(s)
Nickname: VESM

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