

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

# RN1107MFV/08MFV/09MFV

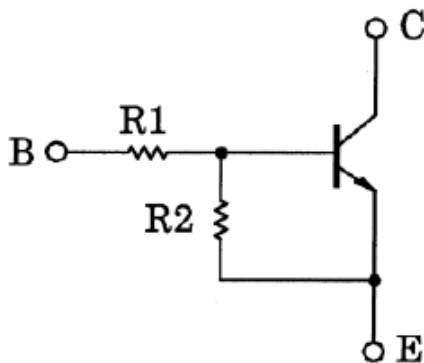
## 1. Applications

- 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



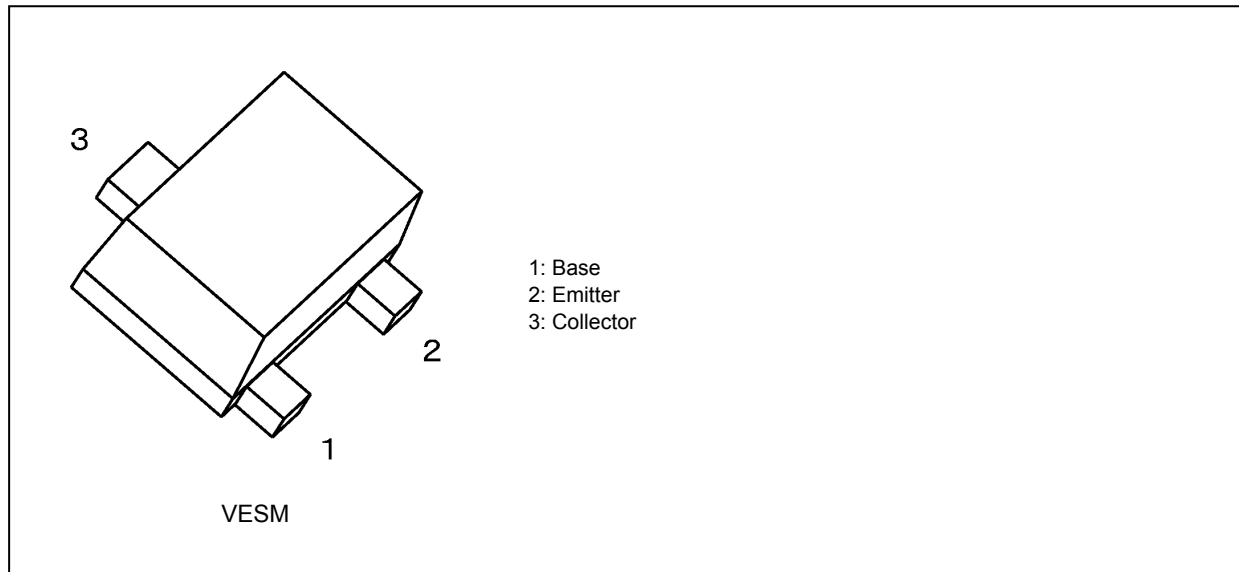
## 4. Bias Resistor Values

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, $T_a = 25\text{ }^\circ\text{C}$ )

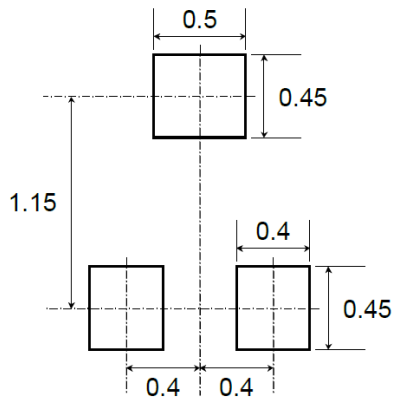
Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN1107MFV~RN1109MFV	$V_{CBO}$	50	V
Collector-emitter voltage		$V_{CEO}$	50	
Emitter-base voltage	RN1107MFV	$V_{EBO}$	6	V
	RN1108MFV		7	
	RN1109MFV		15	
Collector current	RN1107MFV~RN1109MFV	$I_C$	100	mA
Collector power dissipation		$P_C$ (Note 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 $\Omega$
	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

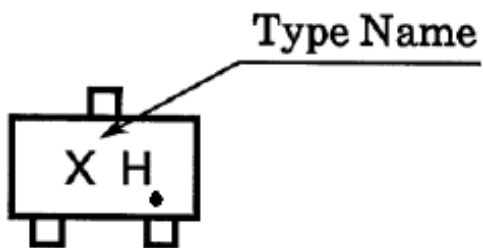


Fig. 10.1 Marking RN1107MFV

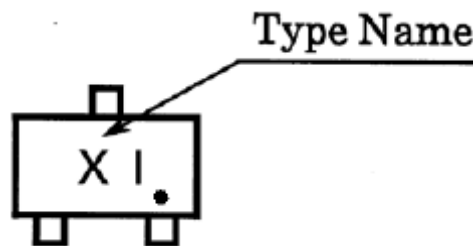


Fig. 10.2 Marking RN1108MFV

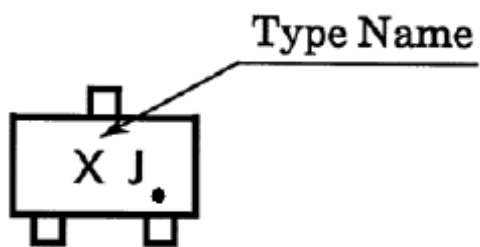


Fig. 10.3 Marking RN1109MFV

### 11. Characteristics Curves (Note)

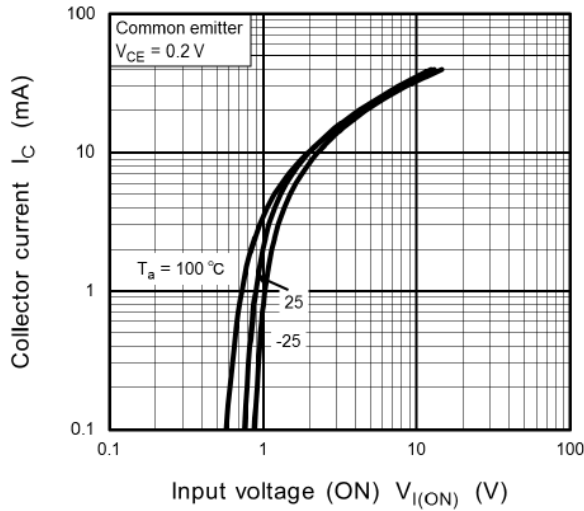


Fig. 11.1 RN1107MFV  $I_C$ - $V_{I(ON)}$

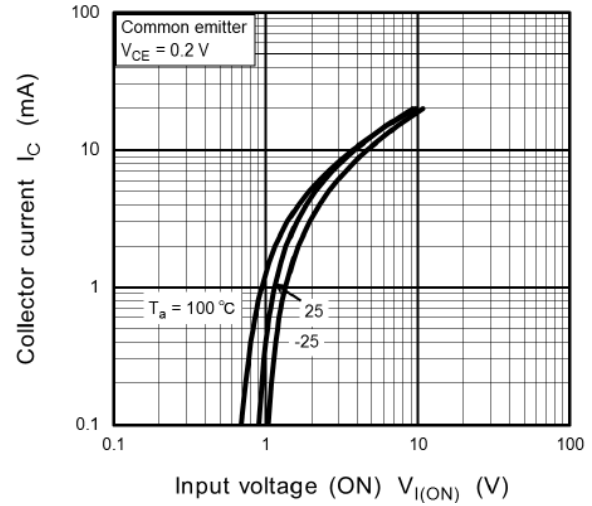


Fig. 11.2 RN1108MFV  $I_C$ - $V_{I(ON)}$

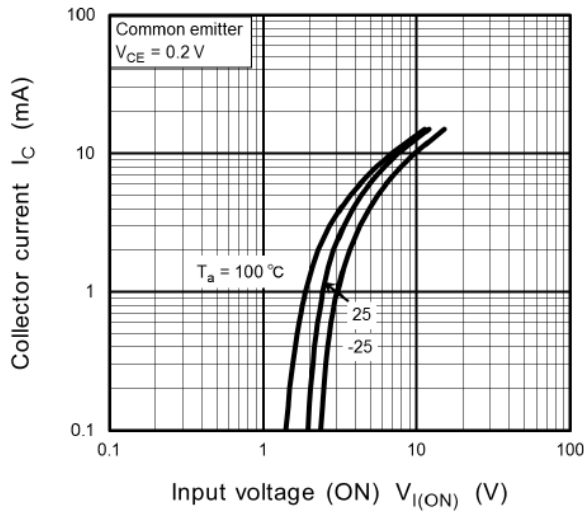


Fig. 11.3 RN1109MFV  $I_C$ - $V_{I(ON)}$

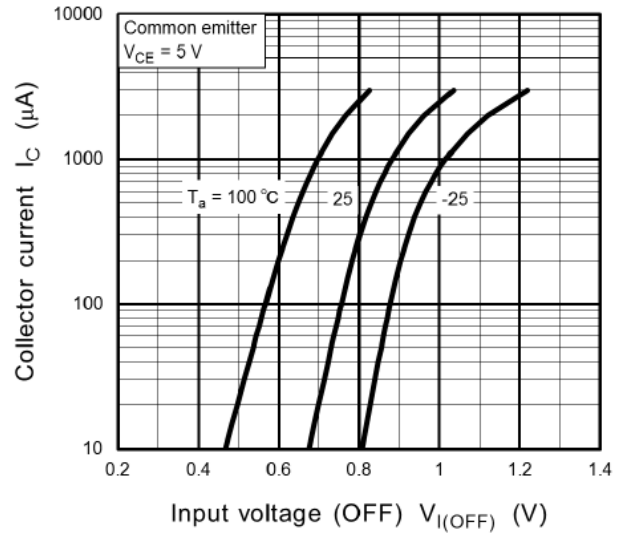


Fig. 11.4 RN1107MFV  $I_C$ - $V_{I(OFF)}$

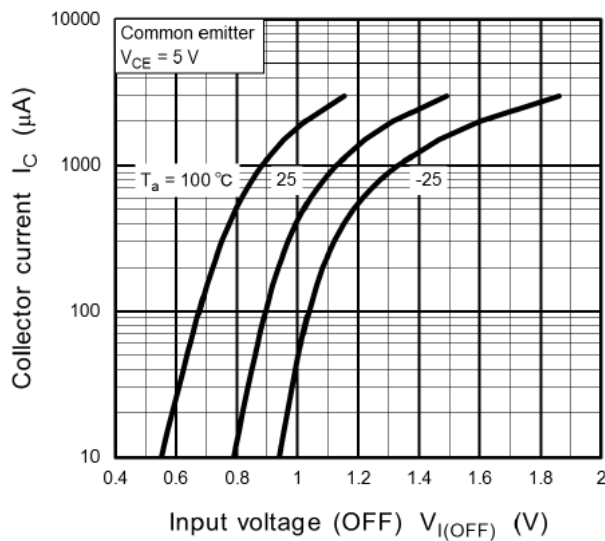


Fig. 11.5 RN1108MFV  $I_C$ - $V_{I(OFF)}$

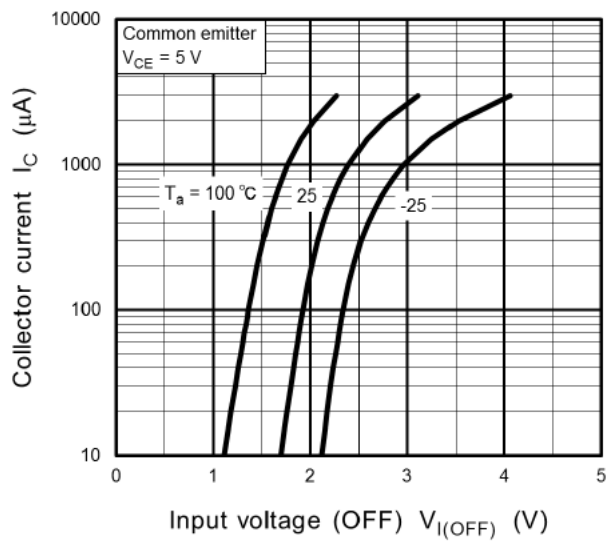
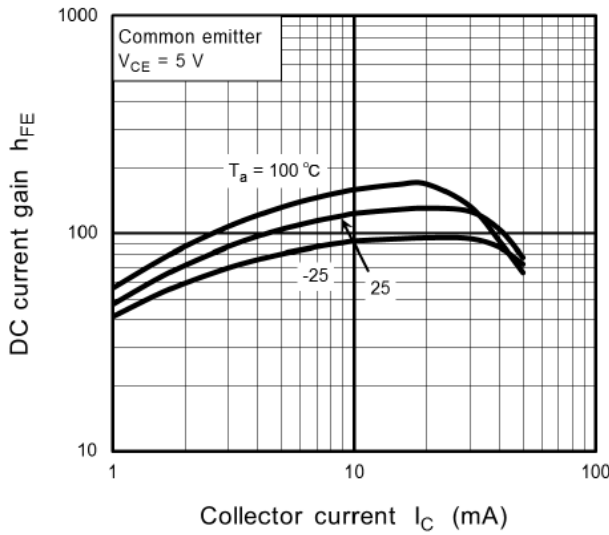
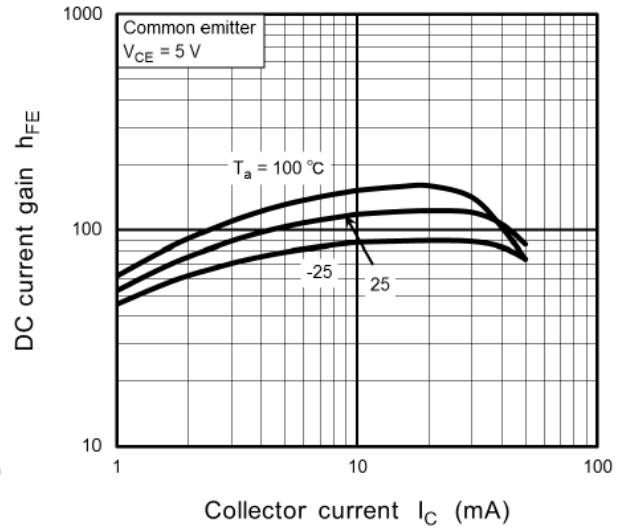


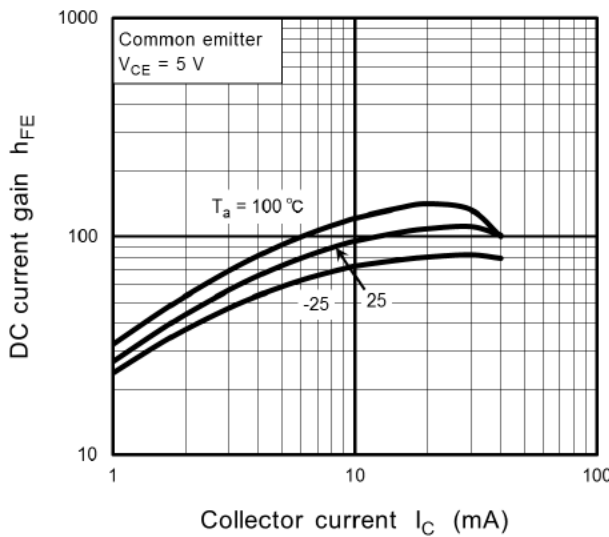
Fig. 11.6 RN1109MFV  $I_C$ - $V_{I(OFF)}$



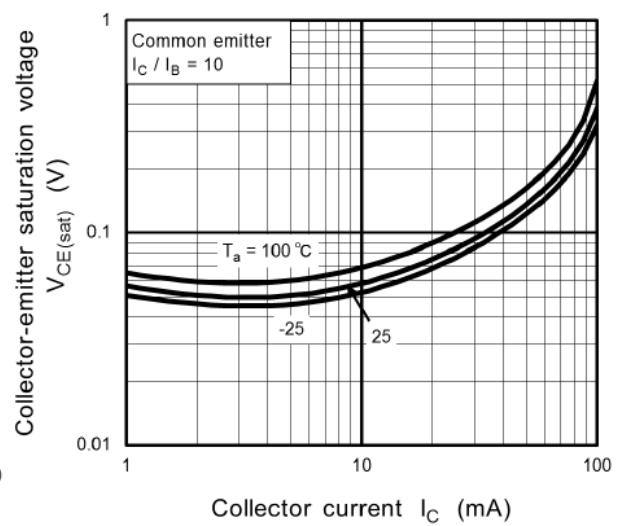
**Fig. 11.7 RN1107MFV  $h_{FE}$ - $I_C$**



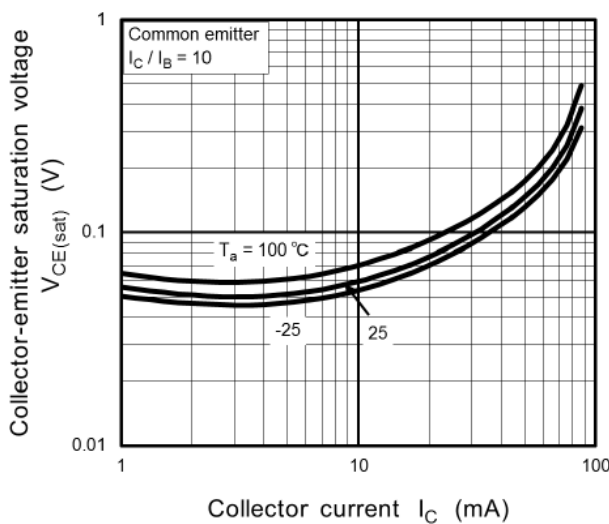
**Fig. 11.8 RN1108MFV  $h_{FE}$ - $I_C$**



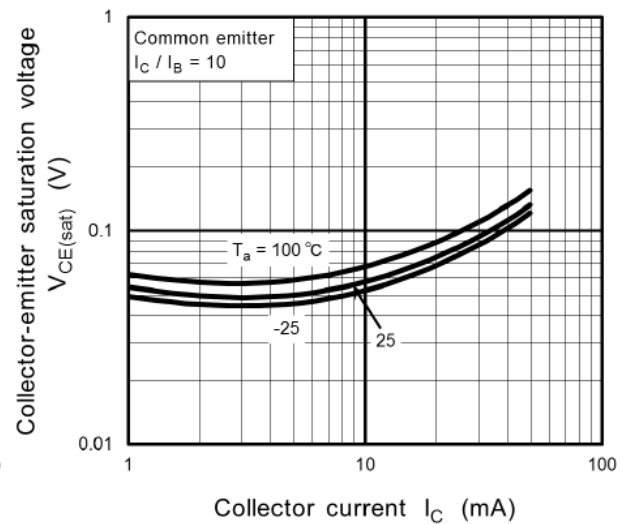
**Fig. 11.9 RN1109MFV  $h_{FE}$ - $I_C$**



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



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

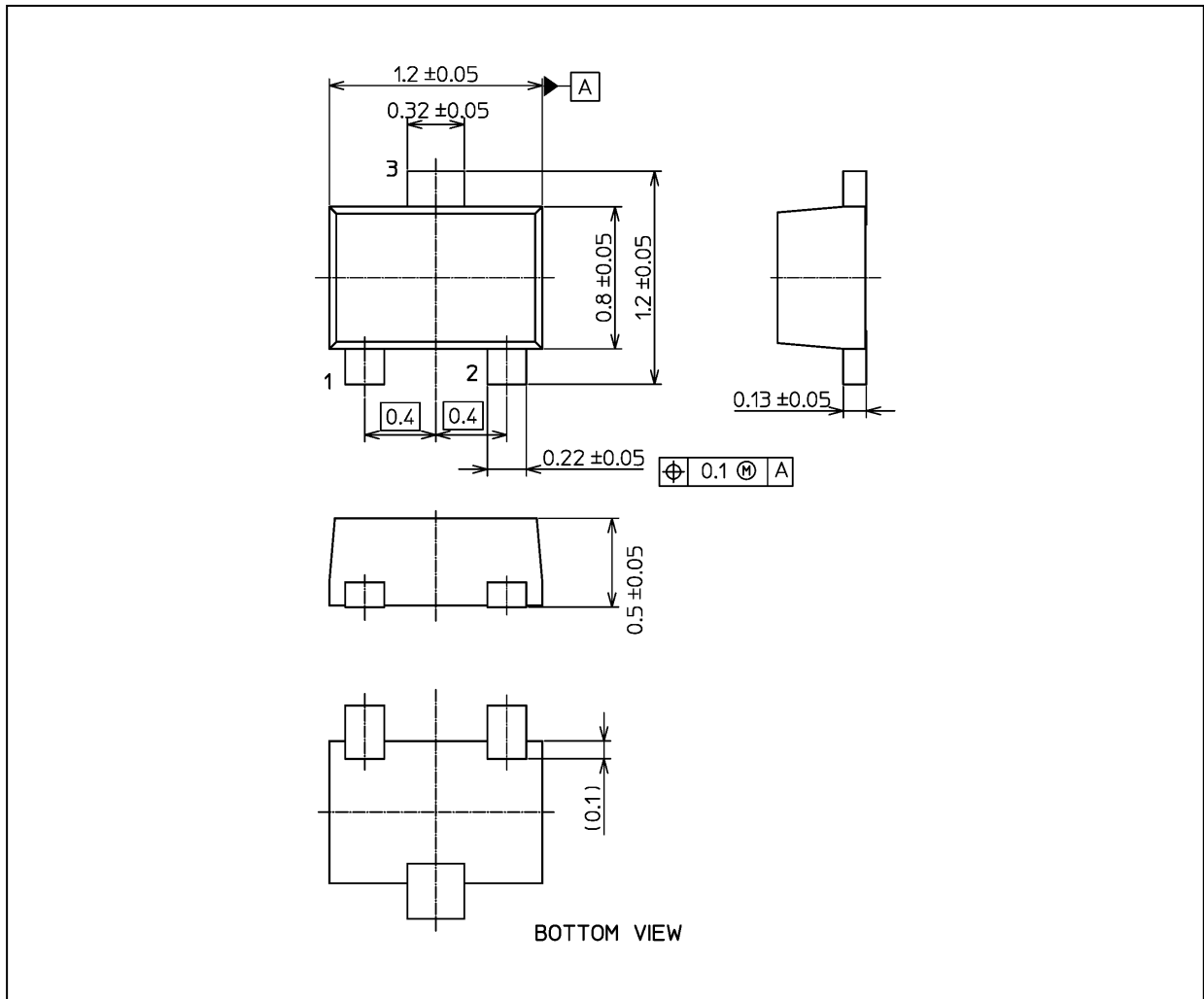


**Fig. 11.12 RN1109MFV  $V_{CE(sat)}$ - $I_C$**

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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