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

RN1114MFV to RN1118MFV

1. Applications

- Switching
- Inverter Circuits
- Interfacing
- Driver Circuits

2. Features

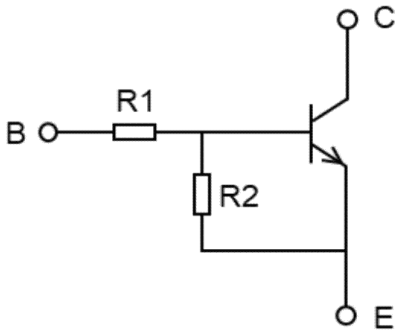
(1) Ultra-small package, suited to very high density mounting

(2) The integrated bias resistor reduces the number of external parts required, making it possible to reduce system size and assembly time.

(3) Toshiba offers transistors with a wide range of resistance to accommodate various circuit designs.

(4) Complementary to RN2114MFV to 2118MFV

3. Equivalent Circuit



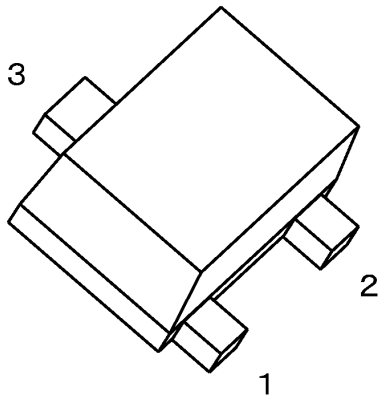
4. Bias Resistor Values

Part No.	R1 (kΩ)	R2 (kΩ)
RN1114MFV	1	10
RN1115MFV	2.2	10
RN1116MFV	4.7	10
RN1117MFV	10	4.7
RN1118MFV	47	10

Start of commercial production
2005-09

2024-11-18
Rev.4.0

5. Packaging and Pin Assignment



1: Base
2: Emitter
3: Collector

VESM

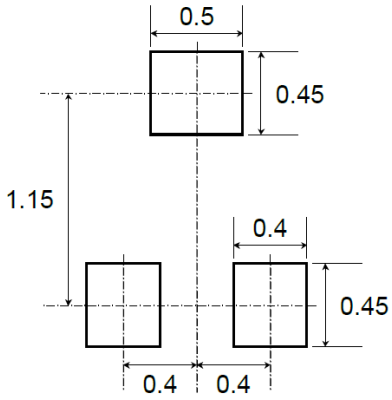
6. Absolute Maximum Ratings (Note) (Unless otherwise specified, T_a = 25 °C)

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN1114MFV to RN1118MFV	V_{CBO}	50	V
Collector-emitter voltage	RN1114MFV to RN1118MFV	V_{CEO}	50	V
Emitter-base voltage	RN1114MFV	V_{EBO}	5	V
	RN1115MFV		6	
	RN1116MFV		7	
	RN1117MFV		15	
	RN1118MFV		25	
Collector current	RN1114MFV to RN1118MFV	I_C	100	mA
Collector power dissipation	RN1114MFV to RN1118MFV	P_C (Note 1)	150	mW
Junction temperature	RN1114MFV to RN1118MFV	T_j	150	°C
Storage temperature	RN1114MFV to RN1118MFV	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)

7. Land Pattern Dimensions (for reference only)



Unit: mm

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1114MFV to RN1118MFV	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	RN1114MFV	I_{EBO}	V_{EB} = 5 V, I_C = 0 mA	0.35	—	0.65	mA
	RN1115MFV		V_{EB} = 6 V, I_C = 0 mA	0.37	—	0.71	
	RN1116MFV		V_{EB} = 7 V, I_C = 0 mA	0.36	—	0.68	
	RN1117MFV		V_{EB} = 15 V, I_C = 0 mA	0.78	—	1.46	
	RN1118MFV		V_{EB} = 25 V, I_C = 0 mA	0.33	—	0.63	
DC current gain	RN1114MFV to RN1116MFV, RN1118MFV	h_{FE}	V_{CE} = 5 V, I_C = 10 mA	50	—	—	—
	RN1117MFV			30	—	—	
Collector-emitter saturation voltage	RN1114MFV to RN1118MFV	$V_{CE(sat)}$	I_C = 5 mA, I_B = 0.5 mA	—	0.1	0.3	V
Input voltage (ON)	RN1114MFV	$V_{I(ON)}$	V_{CE} = 0.2 V, I_C = 5 mA	0.6	—	2.0	V
	RN1115MFV			0.7	—	2.5	
	RN1116MFV			0.8	—	2.5	
	RN1117MFV			1.5	—	3.5	
	RN1118MFV			2.5	—	10.0	
Input voltage (OFF)	RN1114MFV	$V_{I(OFF)}$	V_{CE} = 5 V, I_C = 0.1 mA	0.3	—	0.9	V
	RN1115MFV			0.3	—	1.0	
	RN1116MFV			0.3	—	1.1	
	RN1117MFV			0.3	—	2.3	
	RN1118MFV			0.5	—	5.7	
Collector output capacitance	RN1114MFV to RN1118MFV	C_{ob}	V_{CB} = 10 V, I_E = 0 A, f = 1 MHz	—	0.7	—	pF
Input resistance	RN1114MFV	R_1	—	0.7	1.0	1.3	kΩ
	RN1115MFV			1.54	2.2	2.86	
	RN1116MFV			3.29	4.7	6.11	
	RN1117MFV			7	10	13	
	RN1118MFV			32.9	47	61.1	
Resistor ratio	RN1114MFV	R1/R2	—	—	0.1	—	—
	RN1115MFV			—	0.22	—	
	RN1116MFV			—	0.47	—	
	RN1117MFV			—	2.13	—	
	RN1118MFV			—	4.7	—	

9. Marking

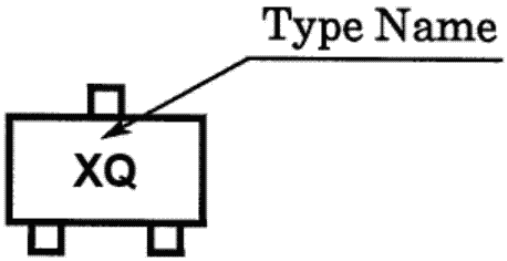


Fig. 9.1 Marking RN1114MFV

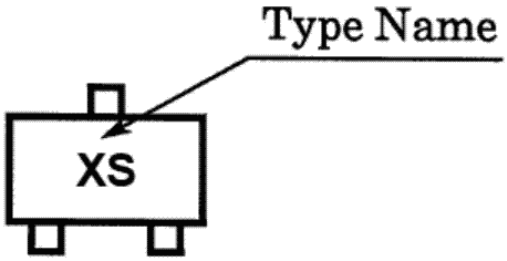


Fig. 9.2 Marking RN1115MFV

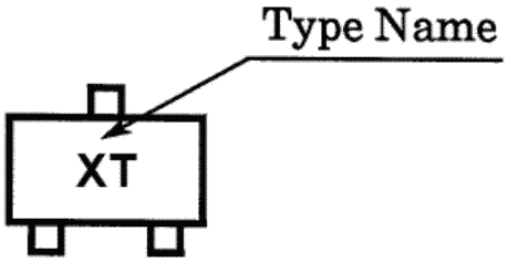


Fig. 9.3 Marking RN1116MFV

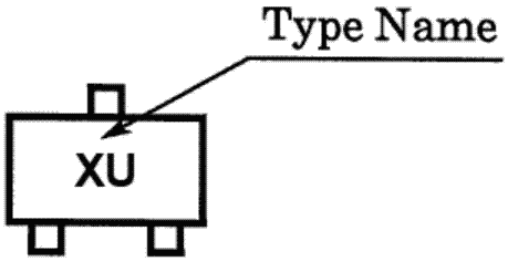


Fig. 9.4 Marking RN1117MFV

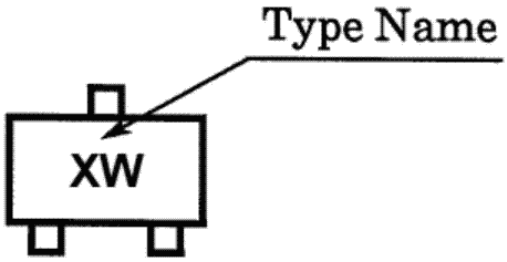


Fig. 9.5 Marking RN1118MFV

10. Characteristics Curves (Note)

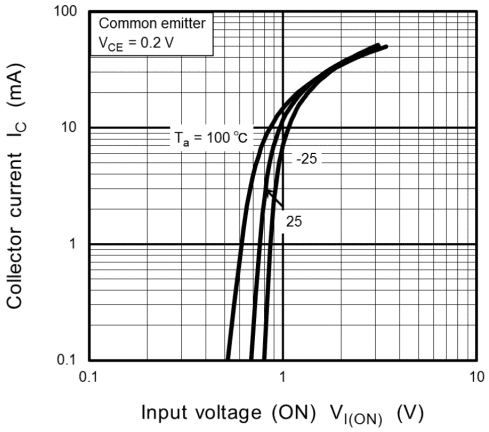


Fig. 10.1 RN1114MFV I_C-$V_{I(ON)}$

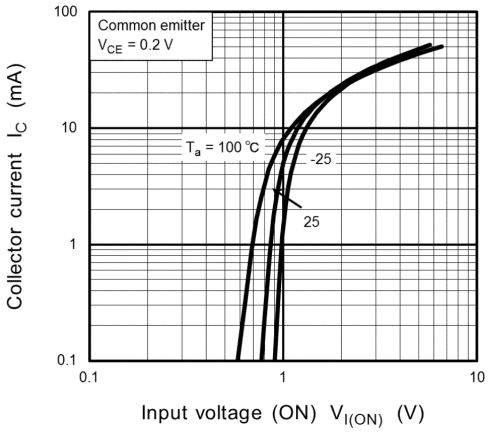


Fig. 10.2 RN1115MFV I_C-$V_{I(ON)}$

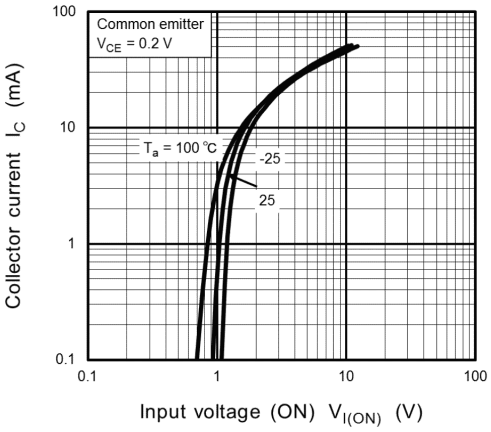


Fig. 10.3 RN1116MFV I_C-$V_{I(ON)}$

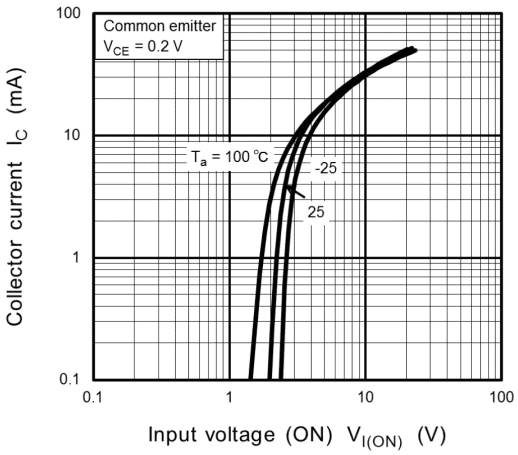


Fig. 10.4 RN1117MFV I_C-$V_{I(ON)}$

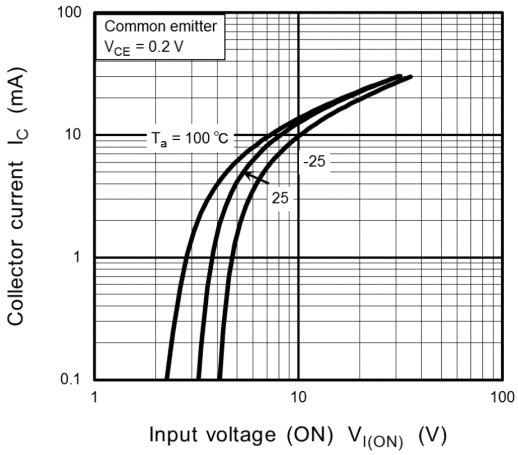


Fig. 10.5 RN1118MFV I_C-$V_{I(ON)}$

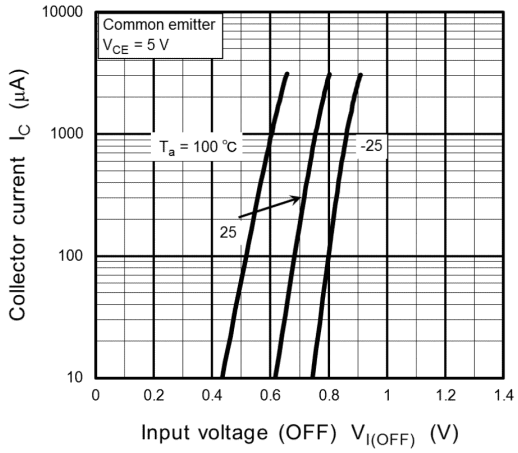


Fig. 10.6 RN1114MFV I_C-$V_{I(OFF)}$

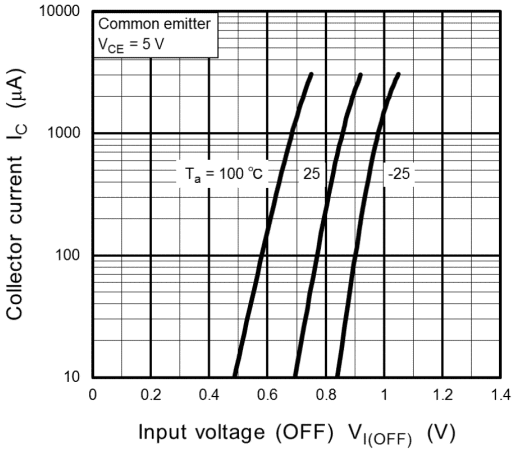


Fig. 10.7 RN1115MFV I_C-$V_{I(OFF)}$

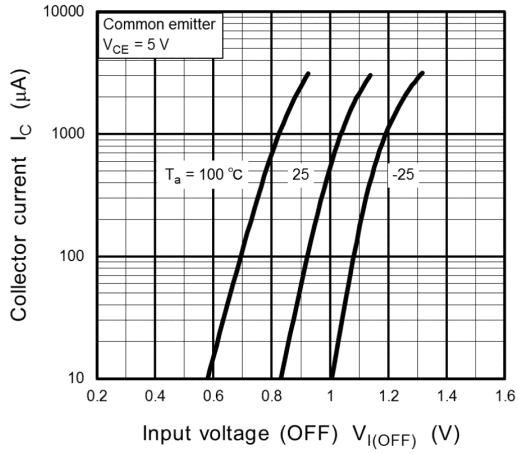


Fig. 10.8 RN1116MFV I_C-$V_{I(OFF)}$

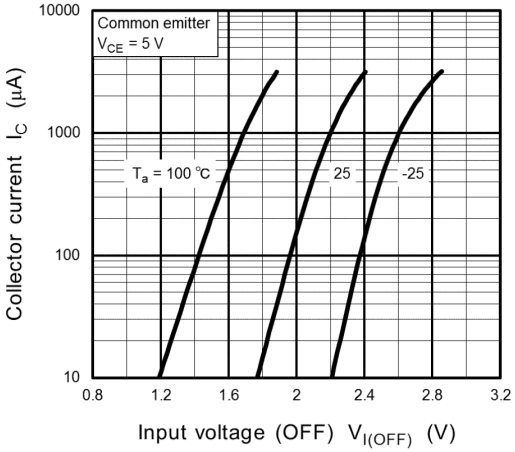


Fig. 10.9 RN1117MFV I_C-$V_{I(OFF)}$

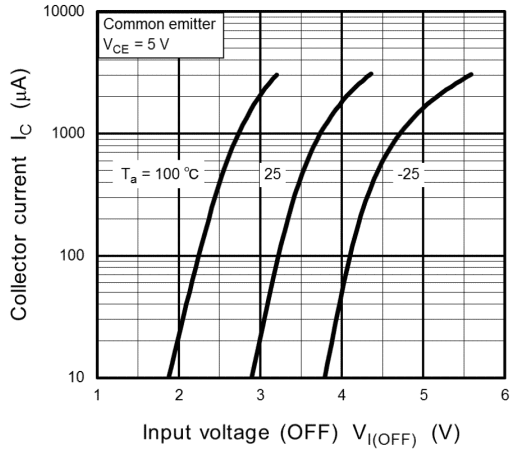


Fig. 10.10 RN1118MFV I_C-$V_{I(OFF)}$

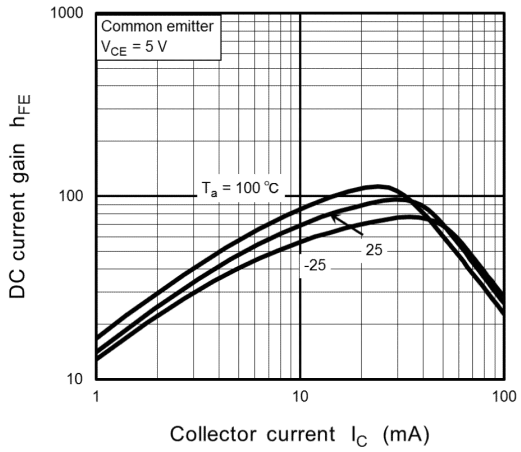


Fig. 10.11 RN1114MFV h_{FE}-I_C

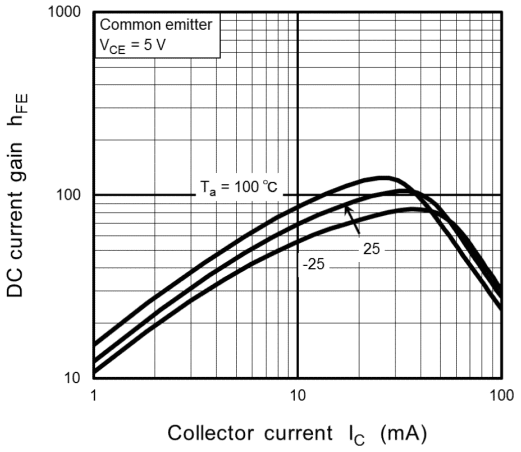


Fig. 10.12 RN1115MFV h_{FE}-I_C

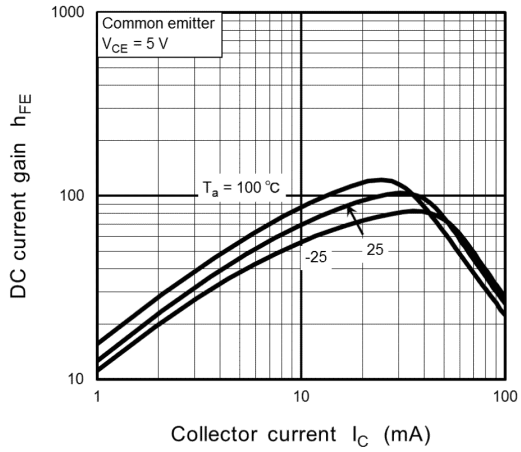


Fig. 10.13 RN1116MFV h_{FE}-I_C

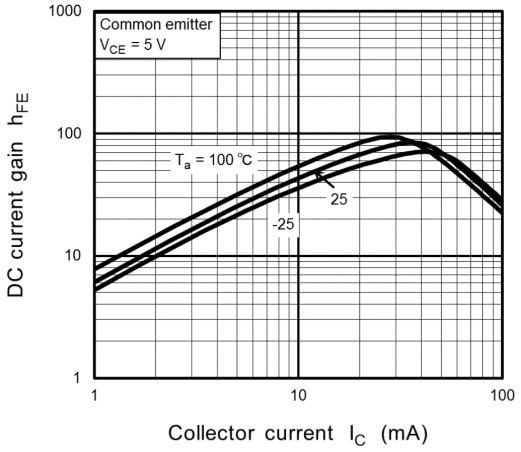


Fig. 10.14 RN1117MFV h_{FE}-I_C

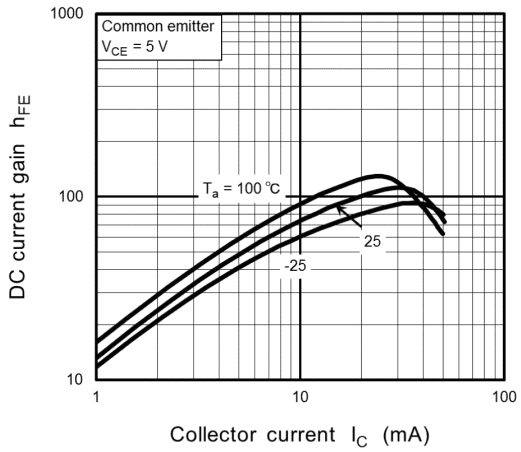


Fig. 10.15 RN1118MFV h_{FE}-I_C

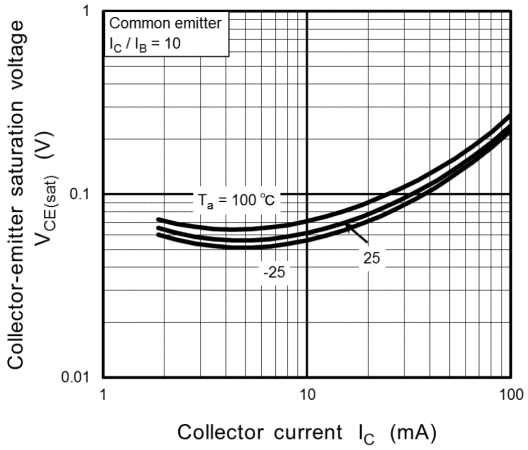


Fig. 10.16 RN1114MFV $V_{CE(sat)}$-I_C

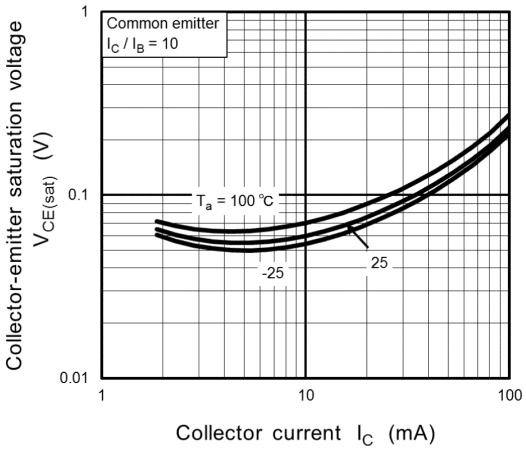


Fig. 10.17 RN1115MFV $V_{CE(sat)}$-I_C

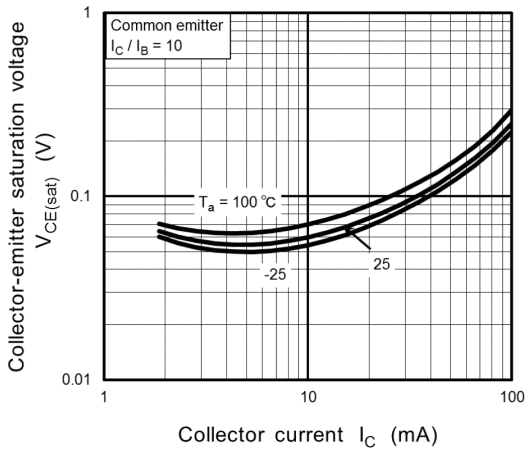


Fig. 10.18 RN1116MFV $V_{CE(sat)}$-I_C

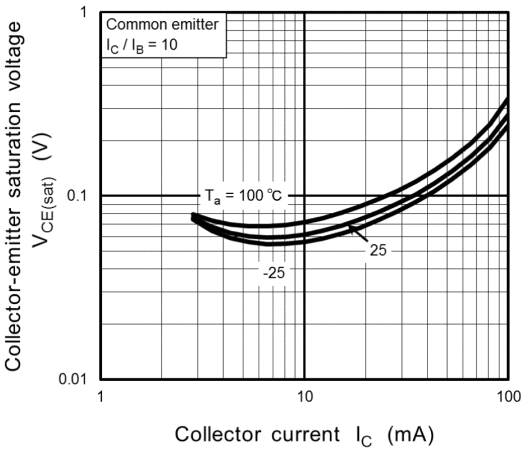


Fig. 10.19 RN1117MFV $V_{CE(sat)}$-I_C

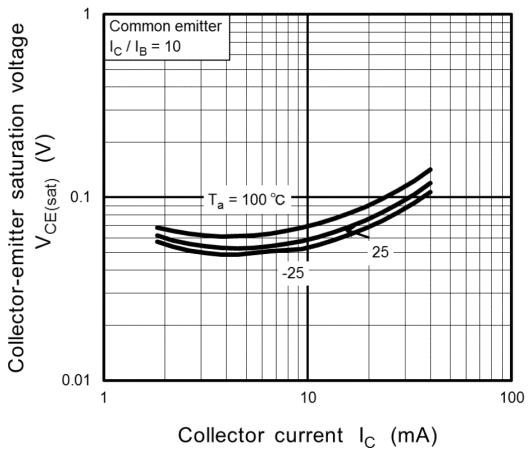
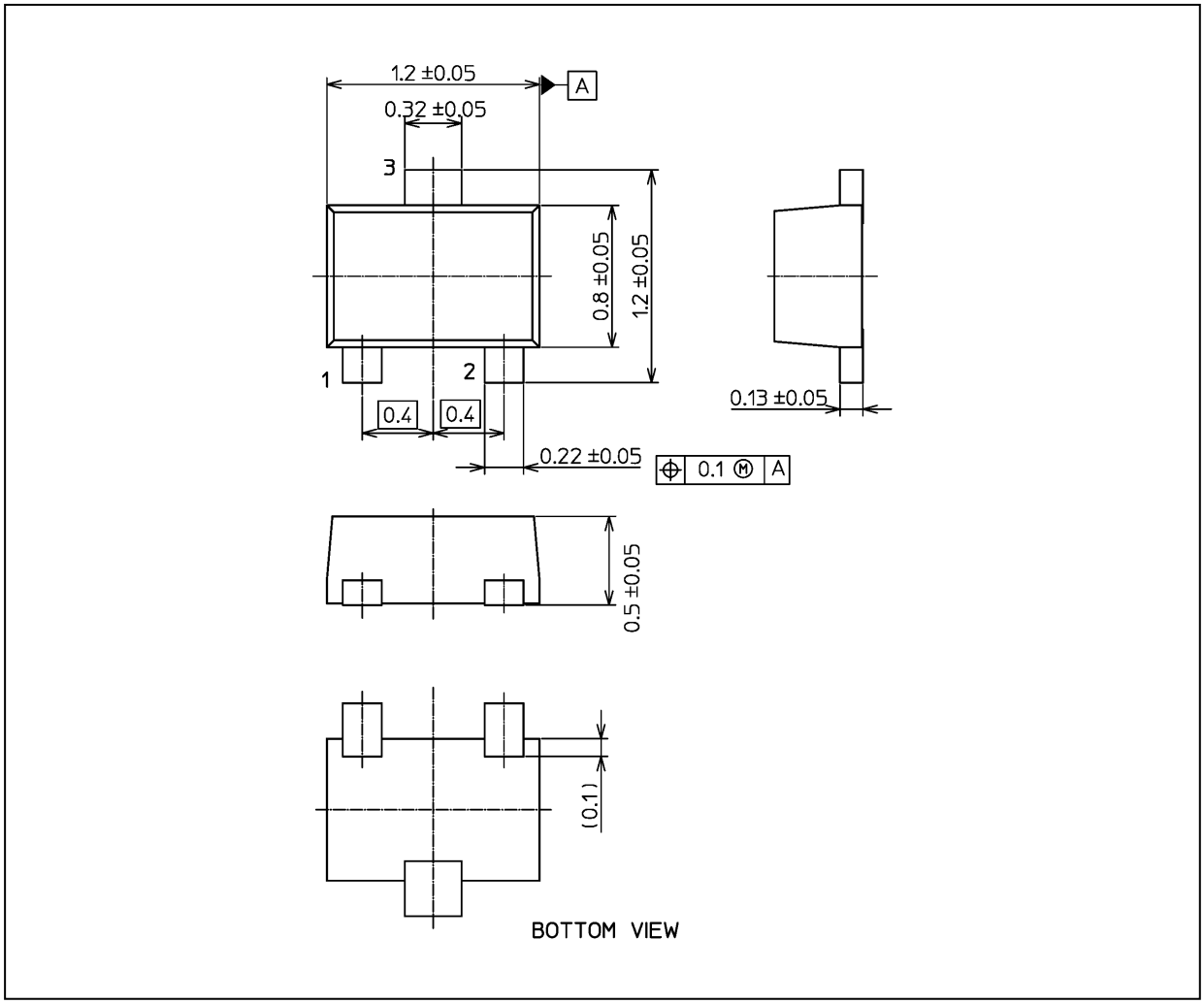


Fig. 10.20 RN1118MFV $V_{CE(sat)}$-I_C

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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