

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

RN1114MFV to RN1118MFV

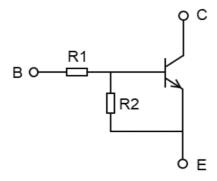
1. Applications

- · 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



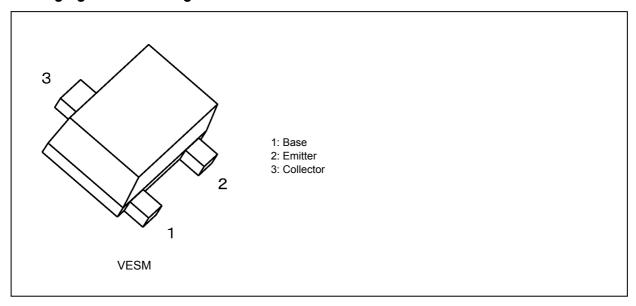
4. Bias Resistor Values

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



5. Packaging and Pin Assignment



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

Characteri	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

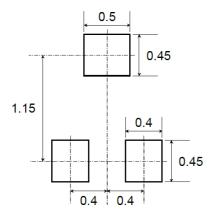
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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	Тур.	Max	Unit
Collector cut-off current	RN1114MFV to	I _{CBO}	V _{CB} = 50 V, I _E = 0 mA	_	_	100	nA
	RN1118MFV	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	h _{FE}	V _{CE} = 5 V, I _C = 10 mA	50	_	_	_
	RN1117MFV			30			
	RN1118MFV			50			
Collector-emitter saturation voltage	RN1114MFV to RN1118MFV	V _{CE(sat)}	$I_C = 5 \text{ mA}, I_B = 0.5 \text{ mA}$	_	0.1	0.3	V
Input voltage (ON)	RN1114MFV	$V_{I(ON)}$	$V_{CE} = 0.2 \text{ V}, I_{C} = 5 \text{ mA}$	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	$V_{I(OFF)}$	$V_{CE} = 5 \text{ V}, I_{C} = 0.1 \text{ mA}$	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

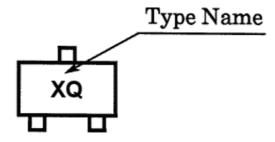


Fig. 9.1 Marking RN1114MFV

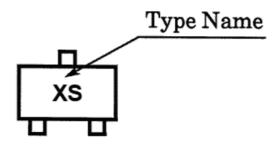


Fig. 9.2 Marking RN1115MFV

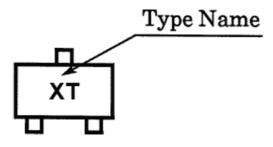


Fig. 9.3 Marking RN1116MFV

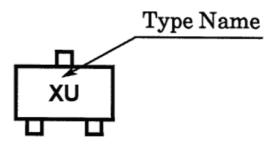


Fig. 9.4 Marking RN1117MFV

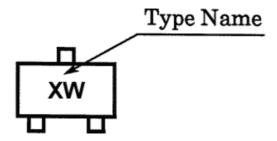


Fig. 9.5 Marking RN1118MFV



10. Characteristics Curves (Note)

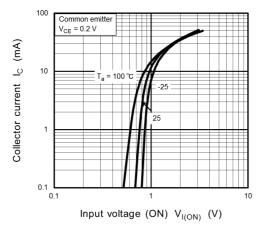


Fig. 10.1 RN1114MFV I_C-V_{I(ON)}

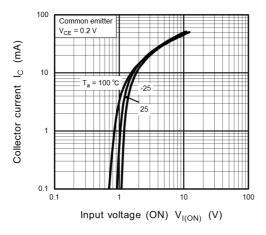


Fig. 10.3 RN1116MFV I_C-V_{I(ON)}

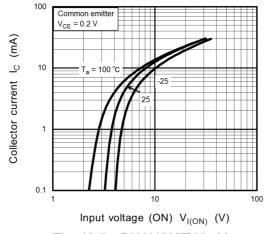


Fig. 10.5 RN1118MFV I_C-V_{I(ON)}

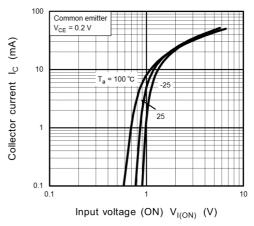


Fig. 10.2 RN1115MFV I_C-V_{I(ON)}

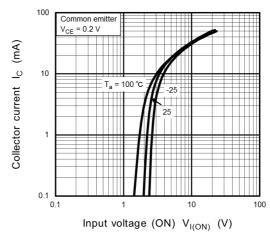


Fig. 10.4 RN1117MFV I_C-V_{I(ON)}



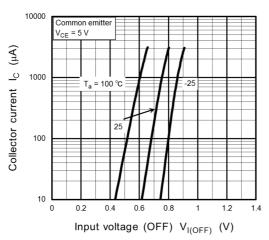


Fig. 10.6 RN1114MFV I_C-V_{I(OFF)}

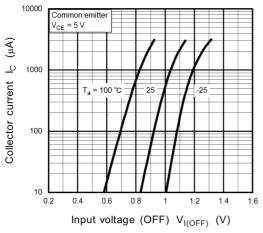


Fig. 10.8 RN1116MFV I_C-V_{I(OFF)}

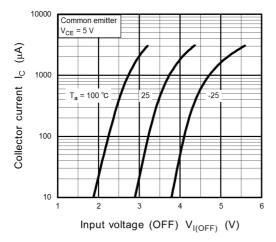


Fig. 10.10 RN1118MFV I_C-V_{I(OFF)}

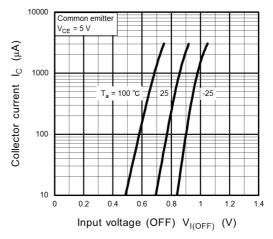


Fig. 10.7 RN1115MFV I_{C} - $V_{I(OFF)}$

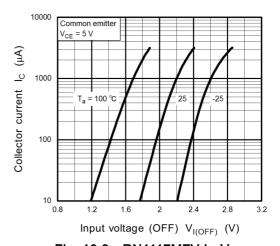


Fig. 10.9 RN1117MFV I_{C} - $V_{I(OFF)}$

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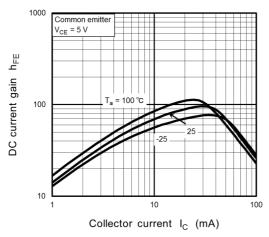


Fig. 10.11 RN1114MFV h_{FE}-I_C

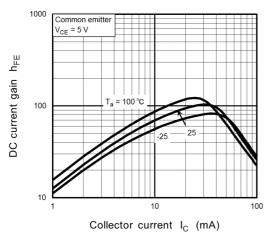


Fig. 10.13 RN1116MFV hFE-IC

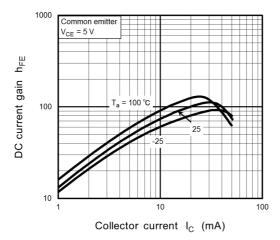


Fig. 10.15 RN1118MFV h_{FE}-I_C

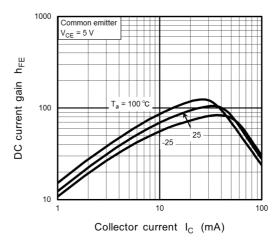


Fig. 10.12 RN1115MFV h_{FE}-I_C

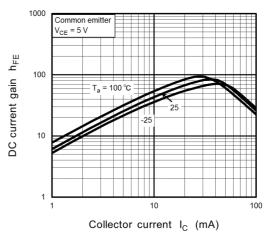


Fig. 10.14 RN1117MFV hFE-IC



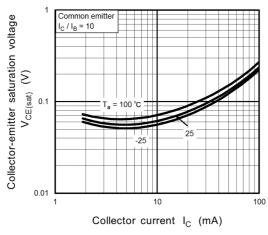


Fig. 10.16 RN1114MFV V_{CE(sat)}-I_C

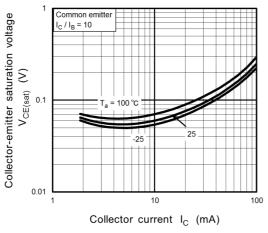


Fig. 10.18 RN1116MFV V_{CE(sat)}-I_C

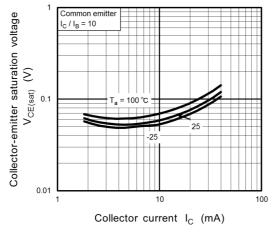


Fig. 10.20 RN1118MFV V_{CE(sat)}-I_C

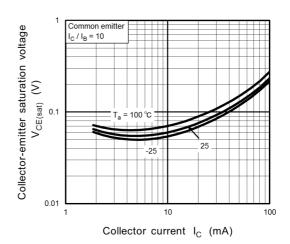


Fig. 10.17 RN1115MFV V_{CE(sat)}-I_C

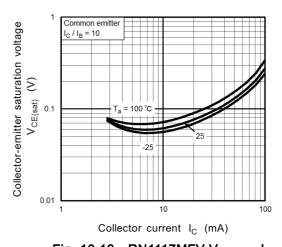


Fig. 10.19 RN1117MFV $V_{CE(sat)}$ -I_C

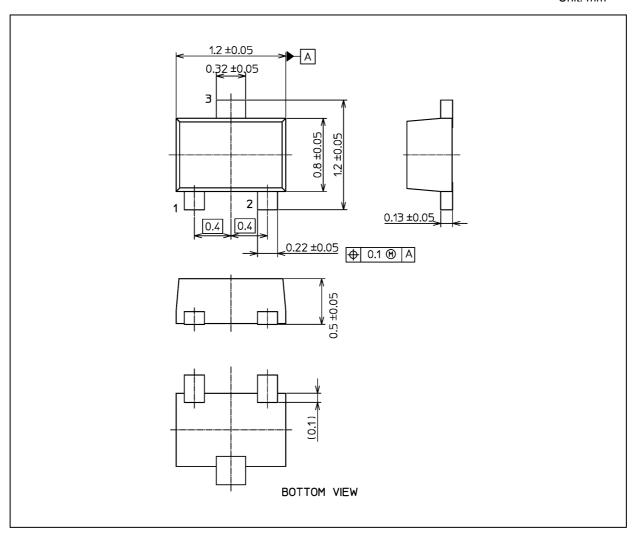
Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

Rev.5.0



Package Dimensions

Unit: mm



Weight: 1.5 mg (typ.)

	Package Name(s)
Nickname: VESM	



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