

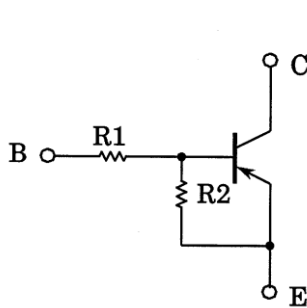
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor)

## RN2101MFV, RN2102MFV, RN2103MFV RN2104MFV, RN2105MFV, RN2106MFV

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- Ultra-small package, suited to very high density mounting
- Incorporating a bias resistor into the transistor reduces the number of parts, so enabling the manufacture of ever more compact equipment and lowering assembly cost.
- A wide range of resistor values is available for use in various circuits.
- Complementary to the RN1101MFV to RN1106MFV

### Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN2101MFV	4.7	4.7
RN2102MFV	10	10
RN2103MFV	22	22
RN2104MFV	47	47
RN2105MFV	2.2	47
RN2106MFV	4.7	47

### Absolute Maximum Ratings (Ta = 25°C)

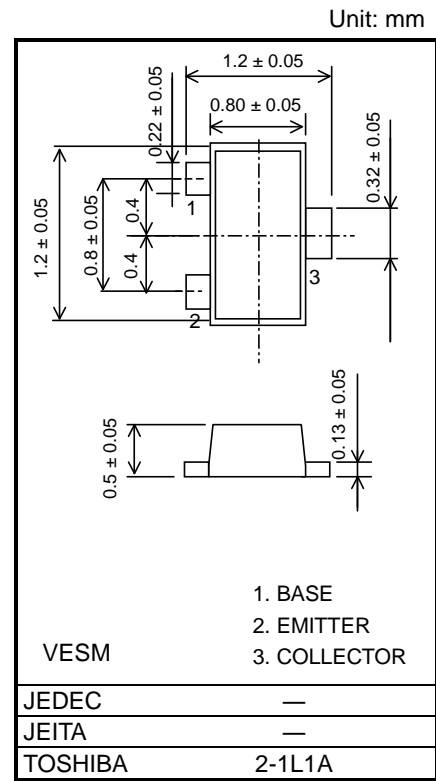
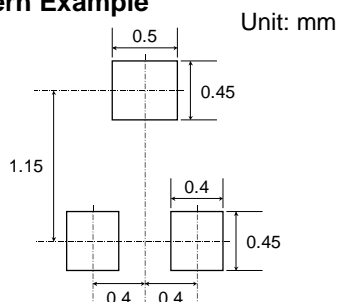
Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN2101MFV to 2106MFV	$V_{CBO}$	-50	V
Collector-emitter voltage		$V_{CEO}$	-50	V
Emitter-base voltage	RN2101MFV to 2104MFV	$V_{EBO}$	-10	V
	RN2105MFV, 2106MFV		-5	
Collector current	RN2101MFV to 2106MFV	$I_C$	-100	mA
Collector power dissipation		$P_C$ (Note 1)	150	mW
Junction temperature		$T_j$	150	°C
Storage temperature range		$T_{stg}$	-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)

### Land Pattern Example

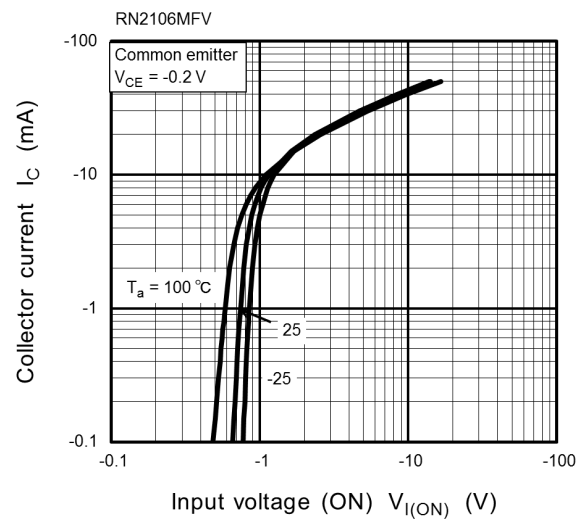
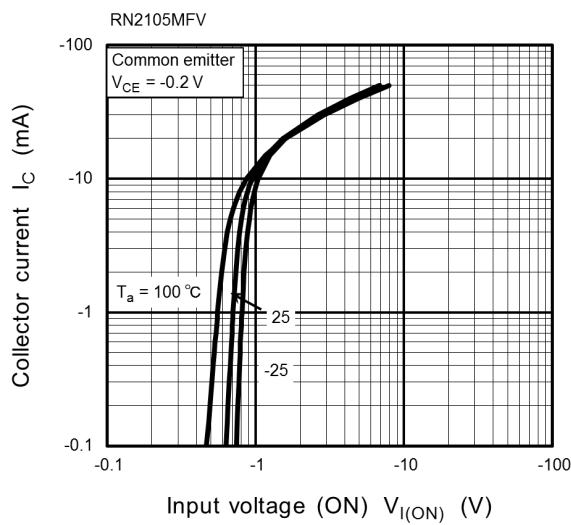
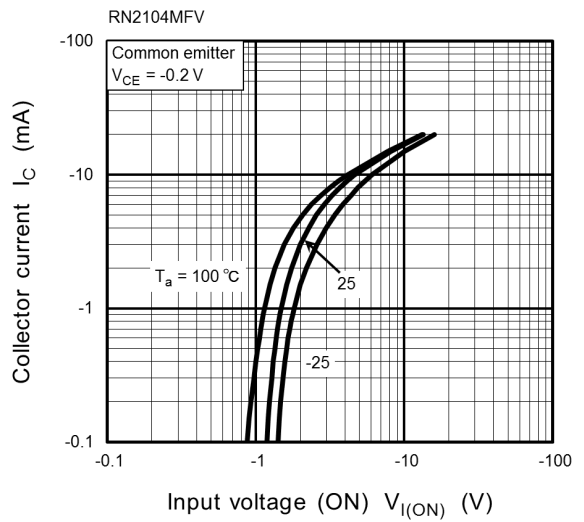
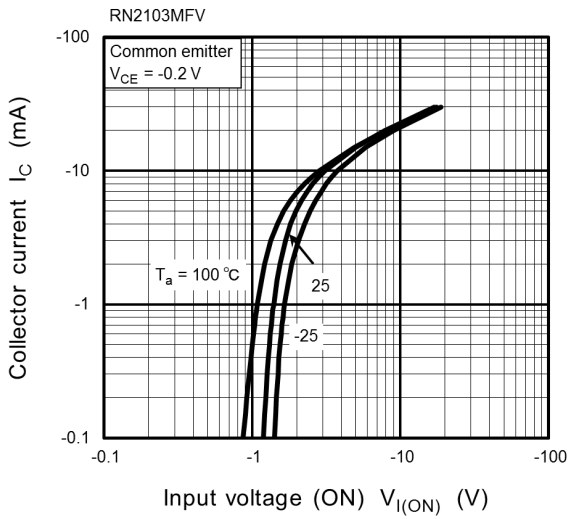
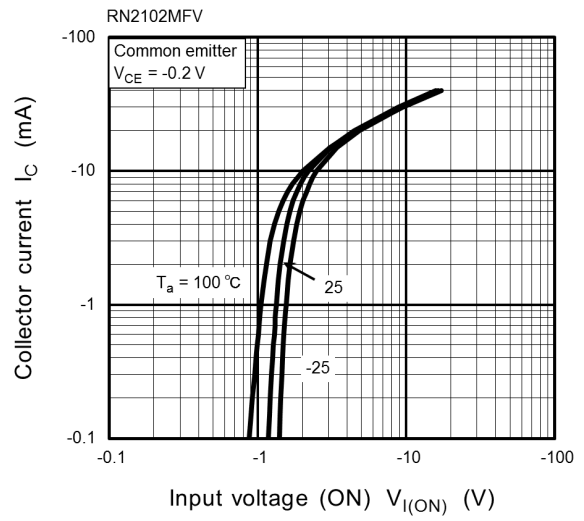
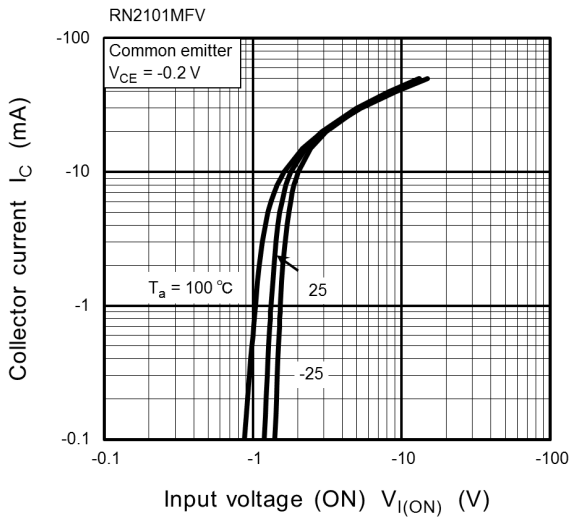


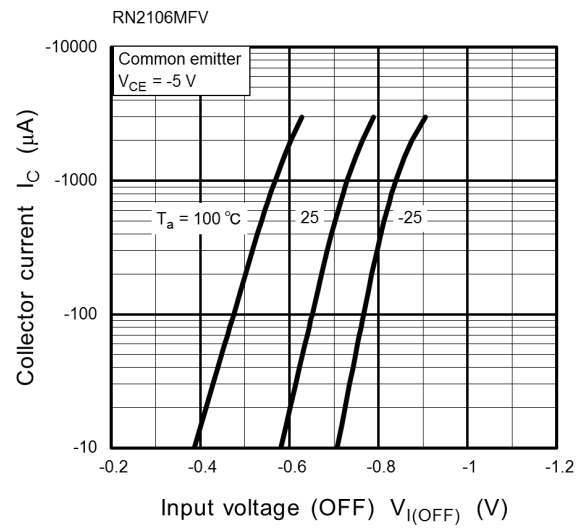
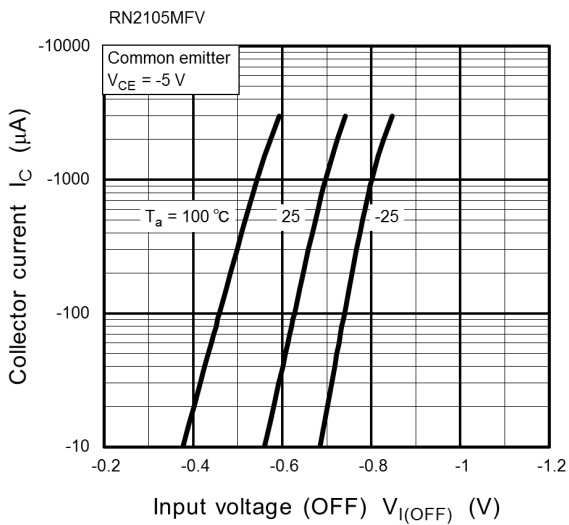
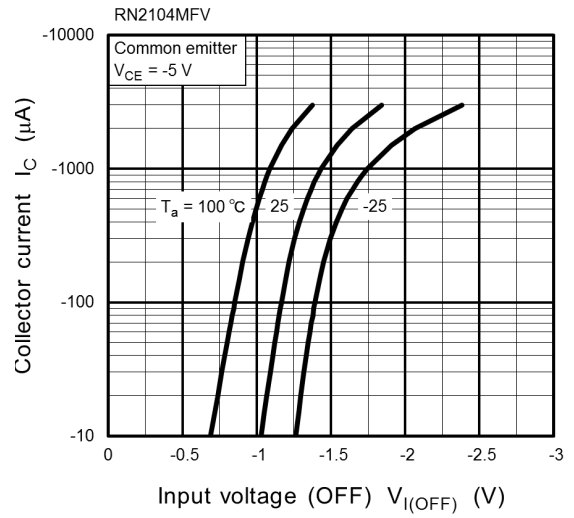
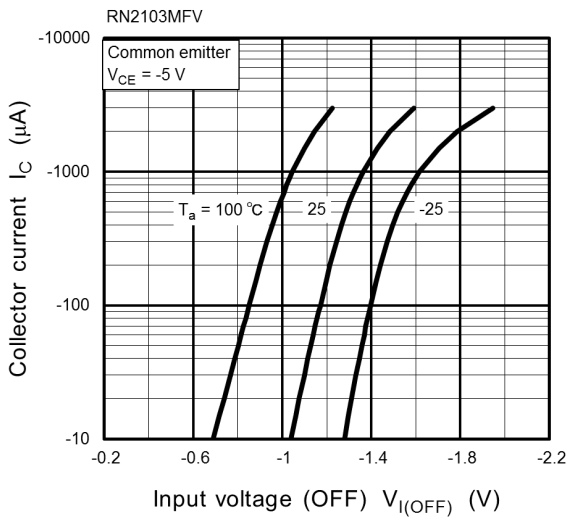
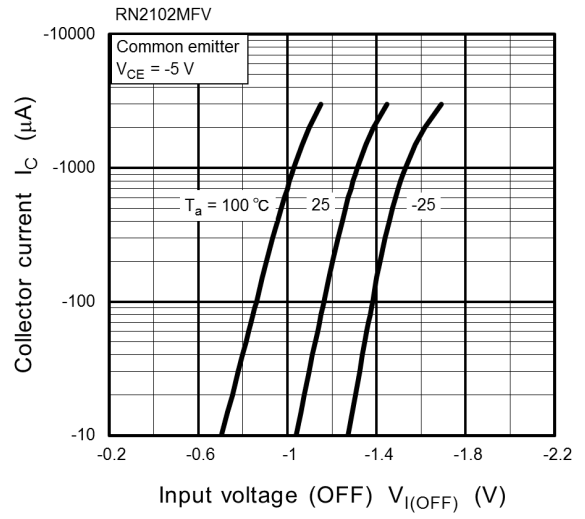
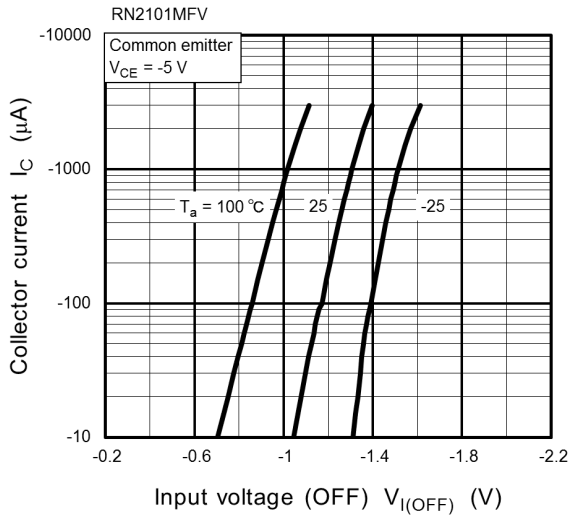
Weight: 1.5 mg (typ.)

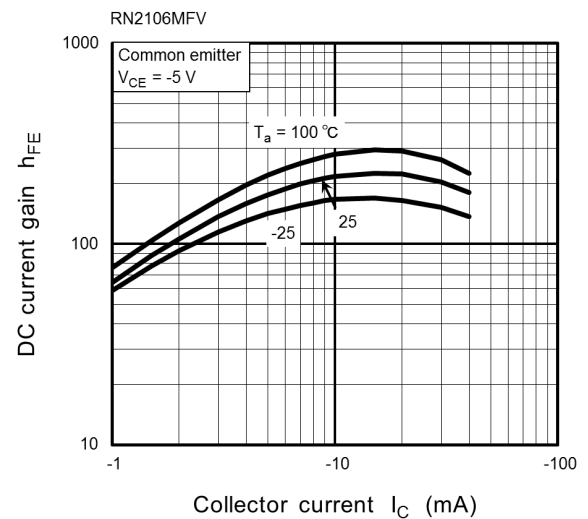
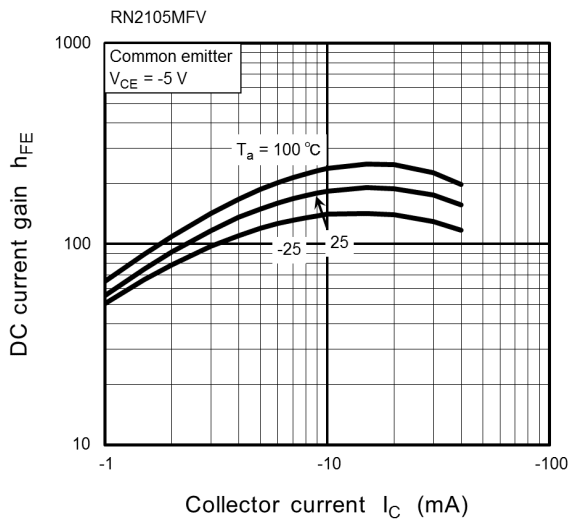
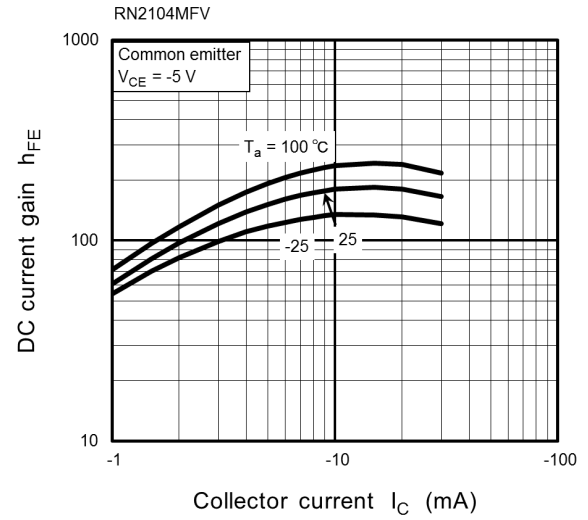
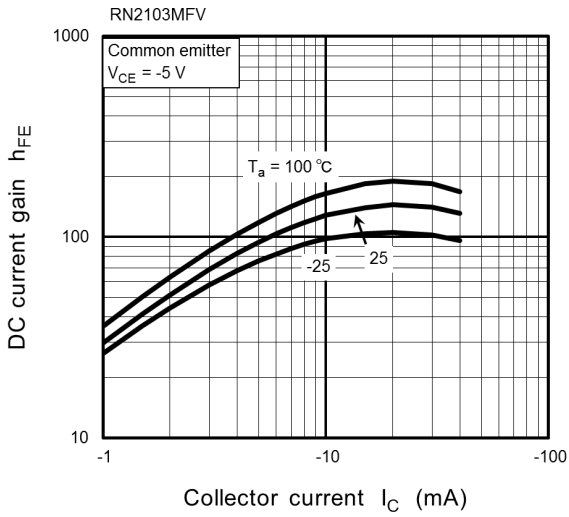
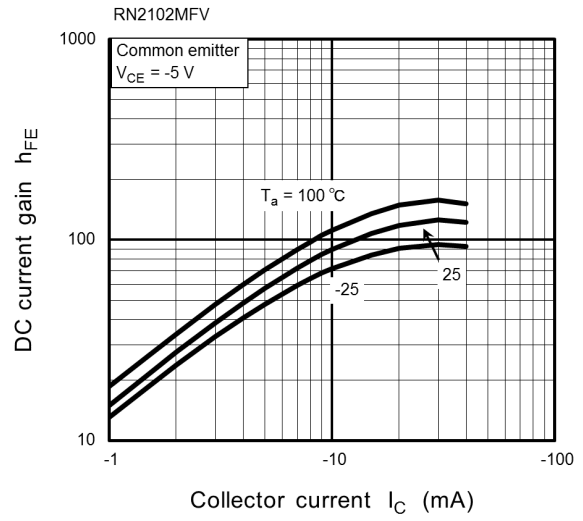
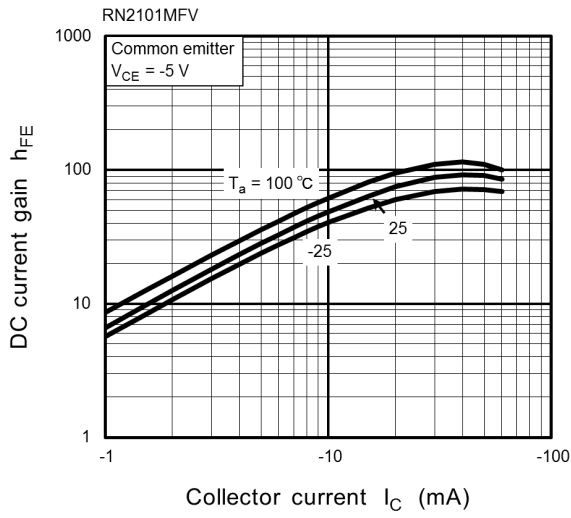
Start of commercial production  
2005-02

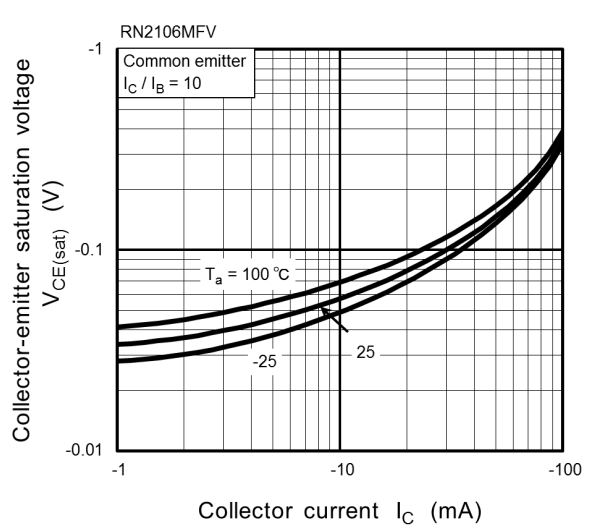
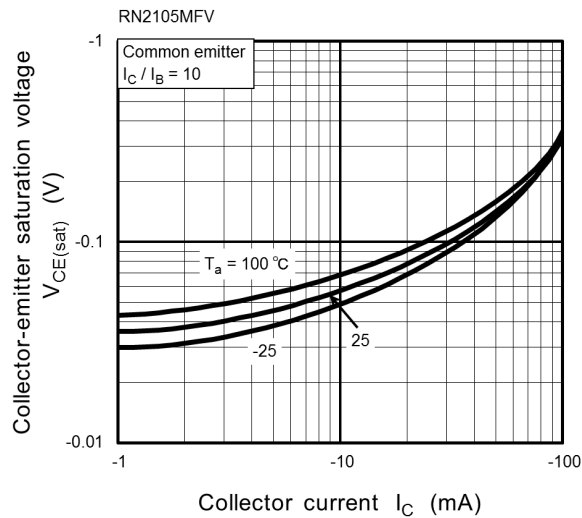
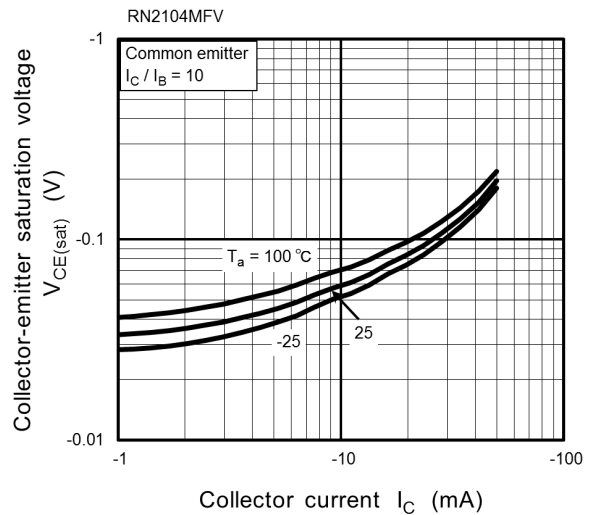
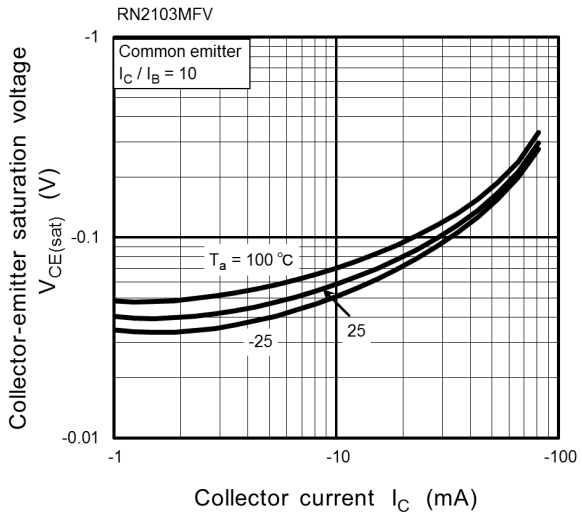
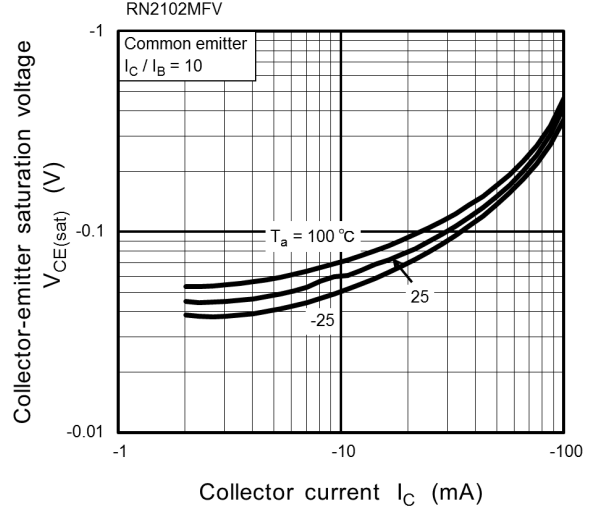
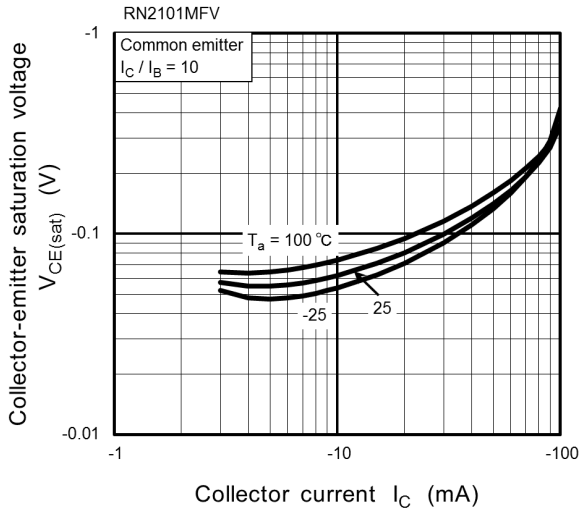
## Electrical Characteristics (Ta = 25°C)

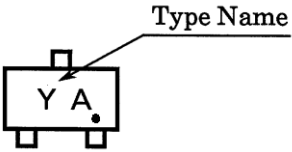
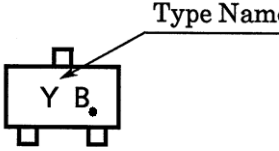
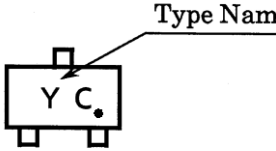
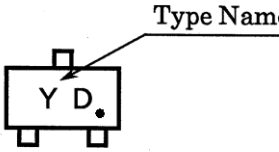
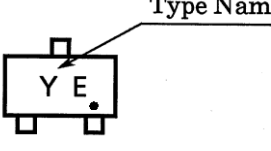
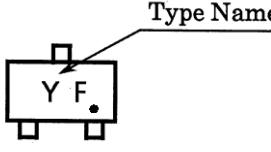
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cutoff current	RN2101MFV to RN2106MFV	ICBO	V <sub>CB</sub> = -50 V, I <sub>E</sub> = 0 A	—	—	-100	nA
		ICEO	V <sub>CE</sub> = -50 V, I <sub>B</sub> = 0 A	—	—	-500	
Emitter cutoff current	RN2101MFV	I <sub>EBO</sub>	V <sub>EB</sub> = -10 V, I <sub>C</sub> = 0 A	-0.82	—	-1.52	mA
	RN2102MFV			-0.38	—	-0.71	
	RN2103MFV			-0.17	—	-0.33	
	RN2104MFV			-0.082	—	-0.15	
	RN2105MFV			-0.078	—	-0.145	
	RN2106MFV			-0.074	—	-0.138	
DC current gain	RN2101MFV	h <sub>FE</sub>	V <sub>CE</sub> = -5 V, I <sub>C</sub> = -10 mA	30	—	—	—
	RN2102MFV			50	—	—	
	RN2103MFV			70	—	—	
	RN2104MFV			80	—	—	
	RN2105MFV			80	—	—	
	RN2106MFV			80	—	—	
Collector-emitter saturation voltage	RN2101MFV to RN2106MFV	V <sub>CE (sat)</sub>	I <sub>C</sub> = -5 mA, I <sub>B</sub> = -0.5 mA	—	-0.1	-0.3	V
Input voltage (ON)	RN2101MFV	V <sub>I (ON)</sub>	V <sub>CE</sub> = -0.2 V, I <sub>C</sub> = -5 mA	-1.1	—	-2.0	V
	RN2102MFV			-1.2	—	-2.4	
	RN2103MFV			-1.3	—	-3.0	
	RN2104MFV			-1.5	—	-5.0	
	RN2105MFV			-0.6	—	-1.1	
	RN2106MFV			-0.7	—	-1.3	
Input voltage (OFF)	RN2101MFV to RN2104MFV	V <sub>I (OFF)</sub>	V <sub>CE</sub> = -5 V, I <sub>C</sub> = -0.1 mA	-1.0	—	-1.5	V
	RN2105MFV, RN2106MFV			-0.5	—	-0.8	
Transition frequency	RN2101MFV to RN2106MFV	f <sub>T</sub>	V <sub>CE</sub> = -10V, I <sub>C</sub> = -5mA	—	250	—	MHz
Collector output capacitance	RN2101MFV to RN2106MFV	C <sub>ob</sub>	V <sub>CB</sub> = -10 V, I <sub>E</sub> = 0 A, f = 1 MHz	—	0.9	—	pF
Input resistor	RN2101MFV	R <sub>1</sub>	—	3.29	4.7	6.11	kΩ
	RN2102MFV			7	10	13	
	RN2103MFV			15.4	22	28.6	
	RN2104MFV			32.9	47	61.1	
	RN2105MFV			1.54	2.2	2.86	
	RN2106MFV			3.29	4.7	6.11	
Resistor ratio	RN2101MFV to RN2104MFV	R <sub>1/R2</sub>	—	0.8	1.0	1.2	—
	RN2105MFV			0.0376	0.0468	0.0562	
	RN2106MFV			0.08	0.1	0.12	









Type Name	Marking
RN2101MFV	
RN2102MFV	
RN2103MFV	
RN2104MFV	
RN2105MFV	
RN2106MFV	

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