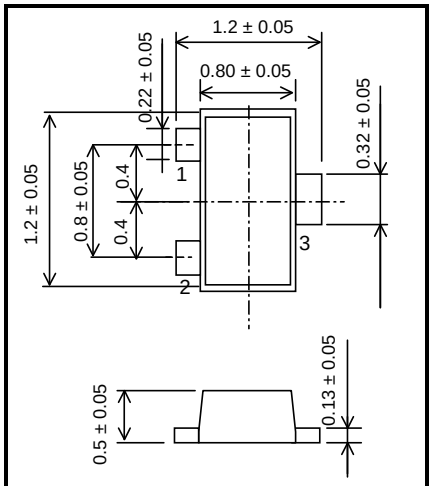
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor)

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

Unit: mm

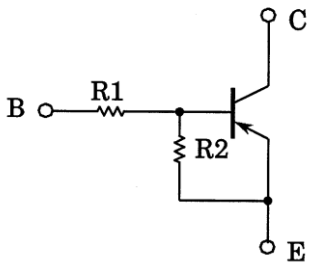


1. BASE
2. EMITTER
3. COLLECTOR

VESM	
JEDEC	—
JEITA	—
TOSHIBA	2-1L1A

Weight: 1.5 mg (typ.)

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)

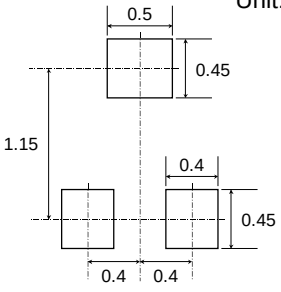
Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN2101MFV to 2106MFV	V_{CBO}	−50	V
Collector-emitter voltage		V_{CEO}	−50	V
Emitter-base voltage	RN2101MFV to 2104MFV	V_{EBO}	−10	V
	RN2105MFV, 2106MFV		−5	
Collector current	RN2101MFV to 2106MFV	I_C	−100	mA
Collector power dissipation		P_C(Note 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

Unit: mm

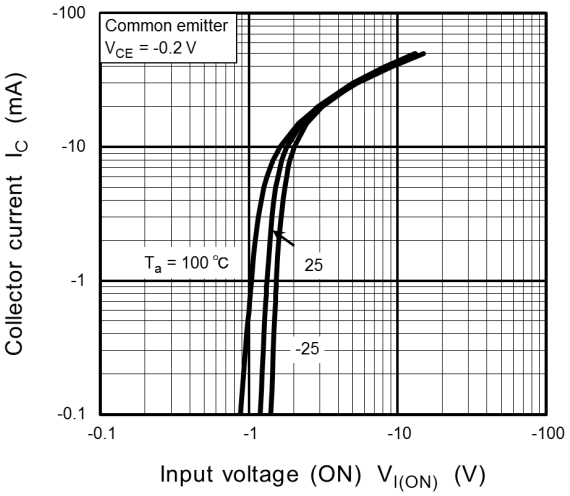


Start of commercial production
2005-02

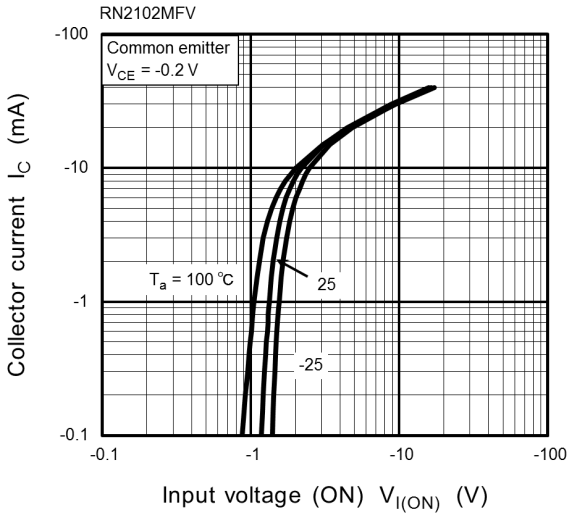
Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cutoff current	RN2101MFV to RN2106MFV	I_{CBO}	V_{CB} = −50 V, I_E = 0 A	—	—	−100	nA
		I_{CEO}	V_{CE} = −50 V, I_B = 0 A	—	—	−500	
Emitter cutoff current	RN2101MFV	I_{EBO}	V_{EB} = −10 V, I_C = 0 A	−0.82	—	−1.52	mA
	RN2102MFV			−0.38	—	−0.71	
	RN2103MFV			−0.17	—	−0.33	
	RN2104MFV			−0.082	—	−0.15	
	RN2105MFV		V_{EB} = −5 V, I_C = 0 A	−0.078	—	−0.145	
	RN2106MFV			−0.074	—	−0.138	
DC current gain	RN2101MFV	h_{FE}	V_{CE} = −5 V, I_C = −10 mA	30	—	—	—
	RN2102MFV			50	—	—	
	RN2103MFV			70	—	—	
	RN2104MFV			80	—	—	
	RN2105MFV			80	—	—	
	RN2106MFV			80	—	—	
Collector-emitter saturation voltage	RN2101MFV to RN2106MFV	$V_{CE\ (sat)}$	I_C = −5 mA, I_B = −0.5 mA	—	−0.1	−0.3	V
Input voltage (ON)	RN2101MFV	$V_{I\ (ON)}$	V_{CE} = −0.2 V, I_C = −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	$V_{I\ (OFF)}$	V_{CE} = −5 V, I_C = −0.1 mA	−1.0	—	−1.5	V
	RN2105MFV, RN2106MFV			−0.5	—	−0.8	
Transition frequency	RN2101MFV to RN2106MFV	f_T	V_{CE} = −10V, I_C = −5mA	—	250	—	MHz
Collector output capacitance	RN2101MFV to RN2106MFV	C_{ob}	V_{CB} = −10 V, I_E = 0 A, f = 1 MHz	—	0.9	—	pF
Input resistor	RN2101MFV	R1	—	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	R1/R2	—	0.8	1.0	1.2	—
	RN2105MFV			0.0376	0.0468	0.0562	
	RN2106MFV			0.08	0.1	0.12	

RN2101MFV



RN2102MFV



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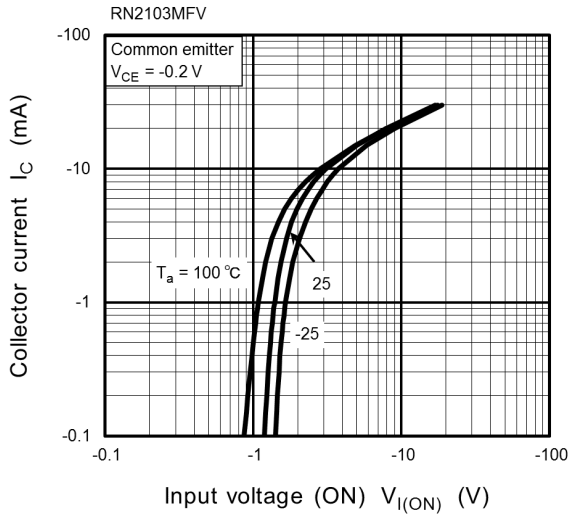

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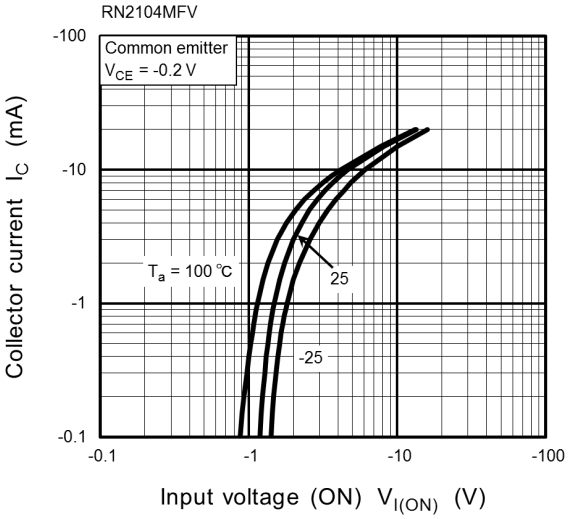

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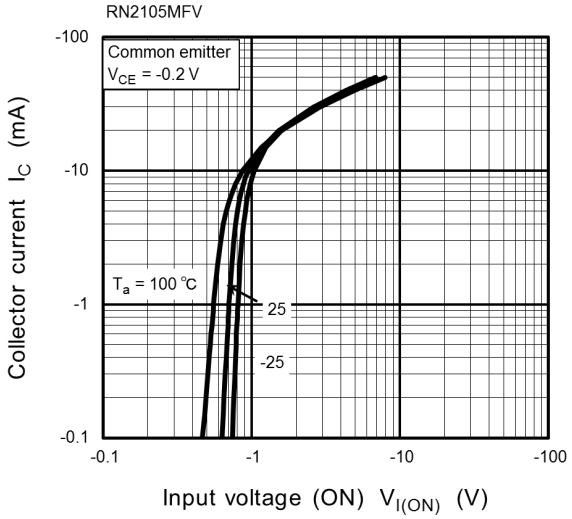

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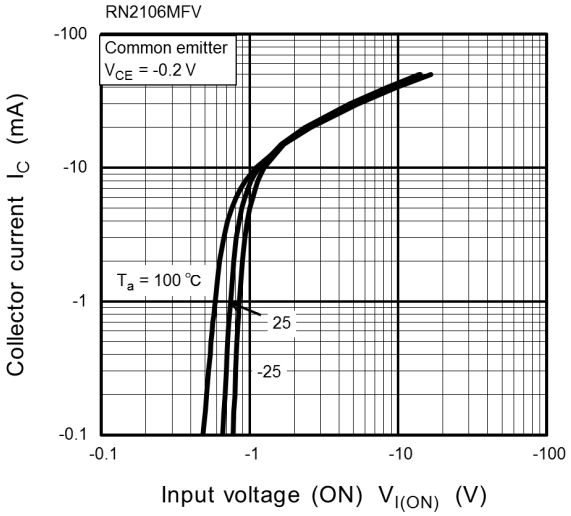

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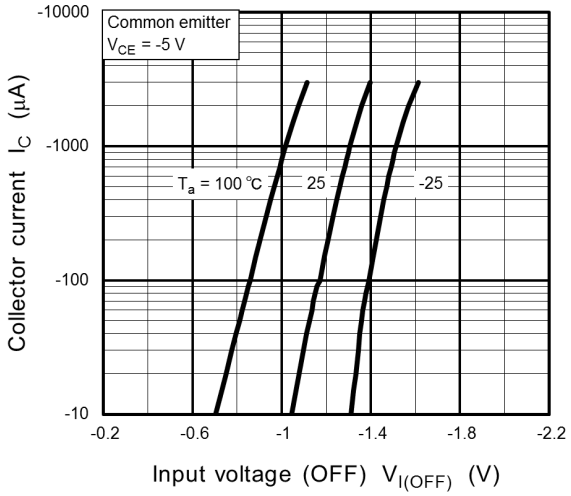

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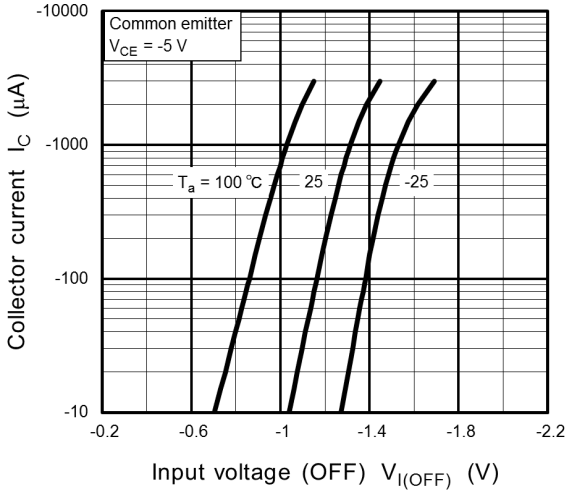

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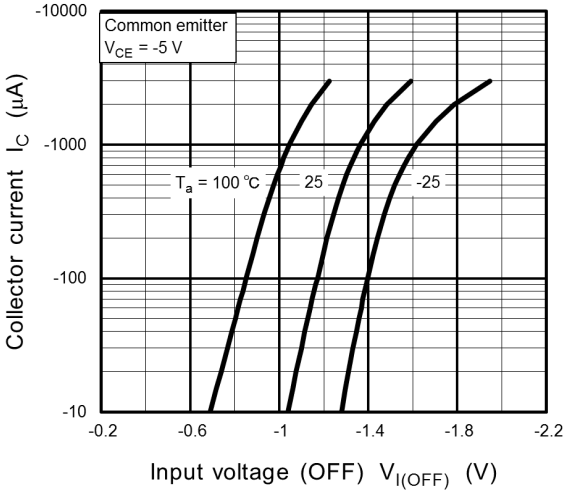

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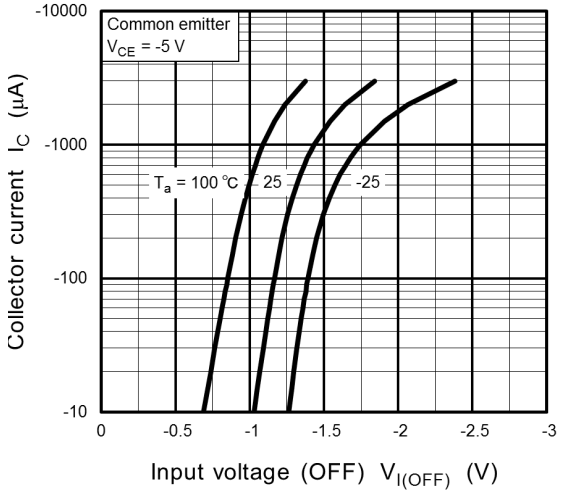

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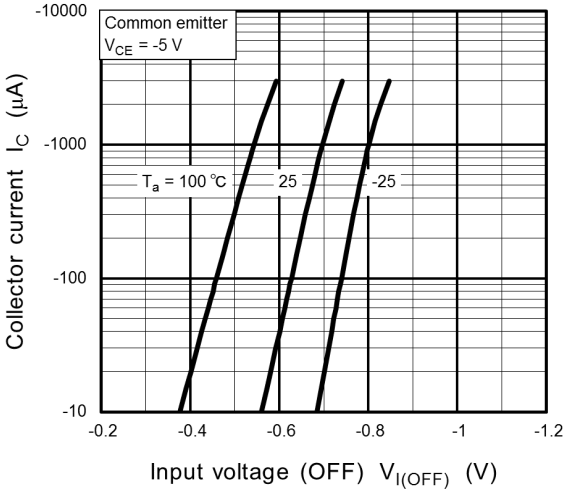

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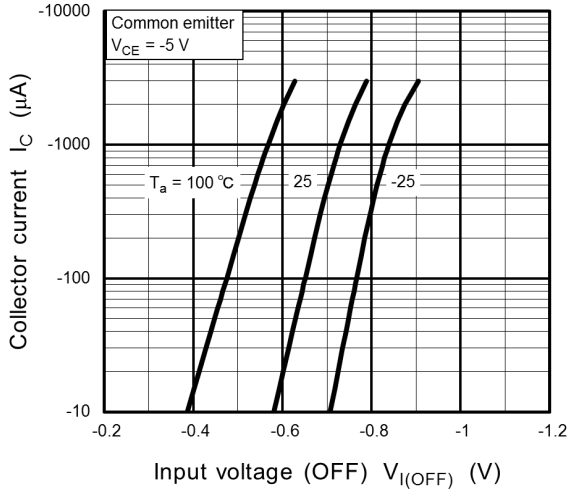

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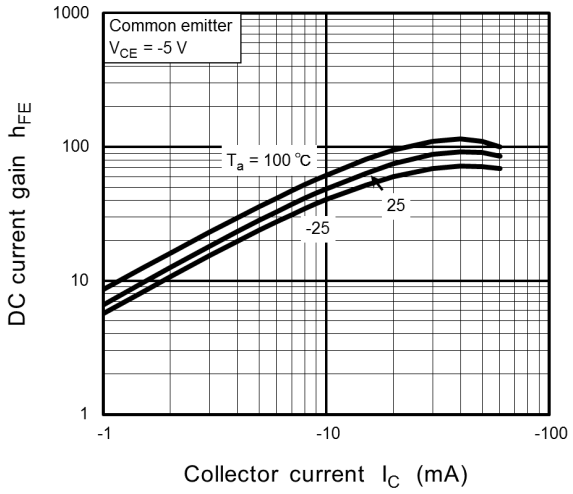

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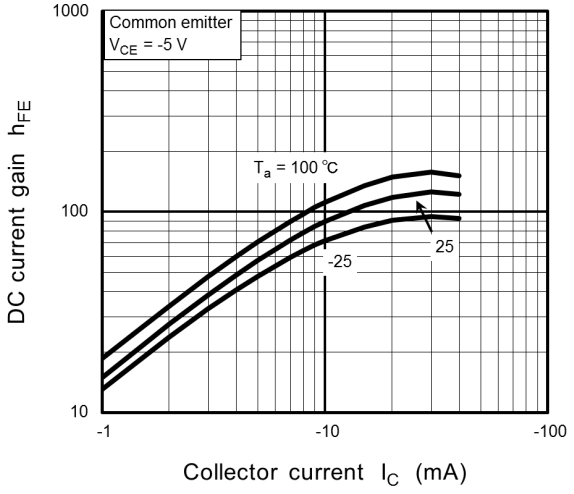

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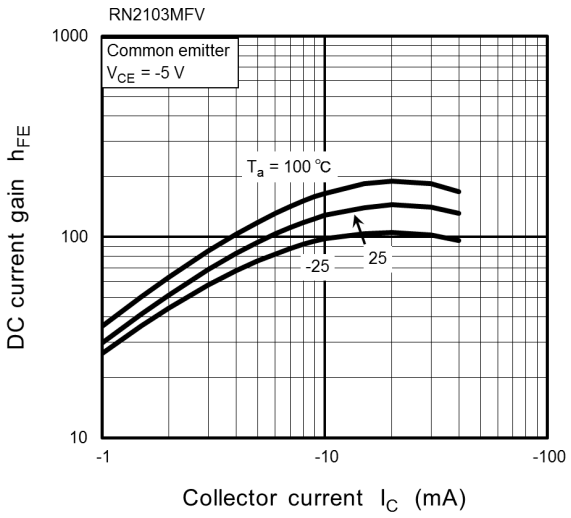

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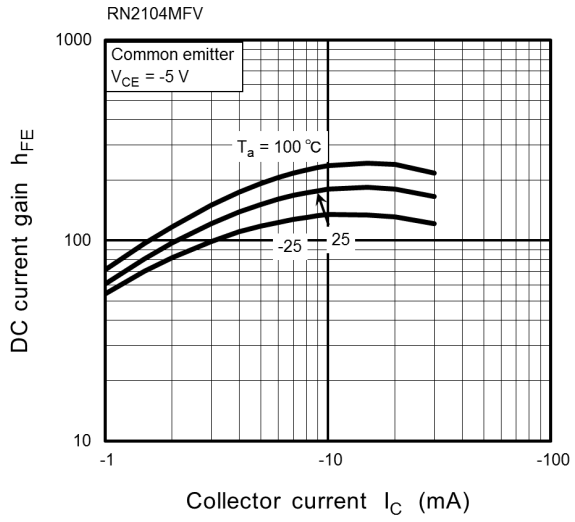

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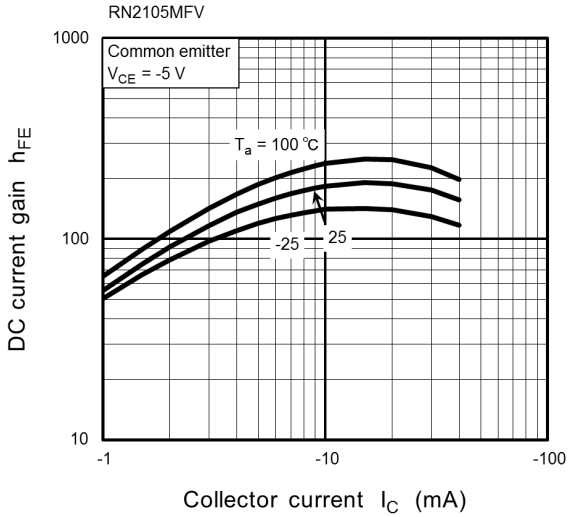

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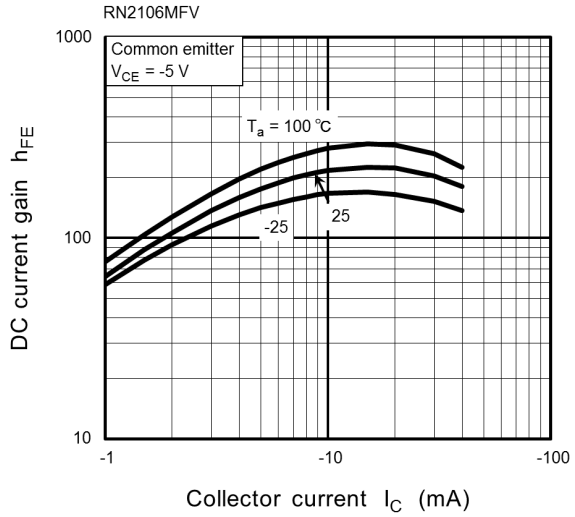

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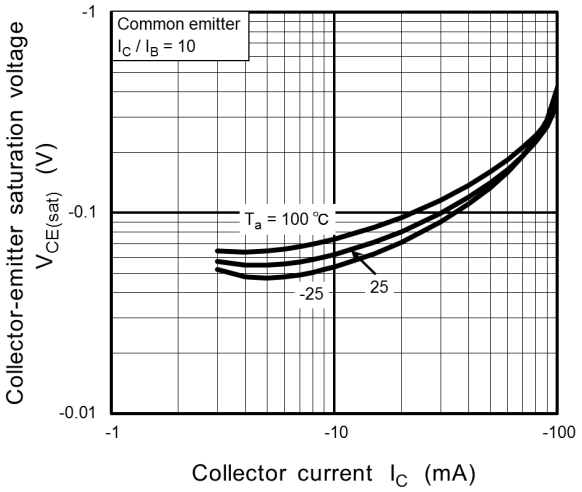

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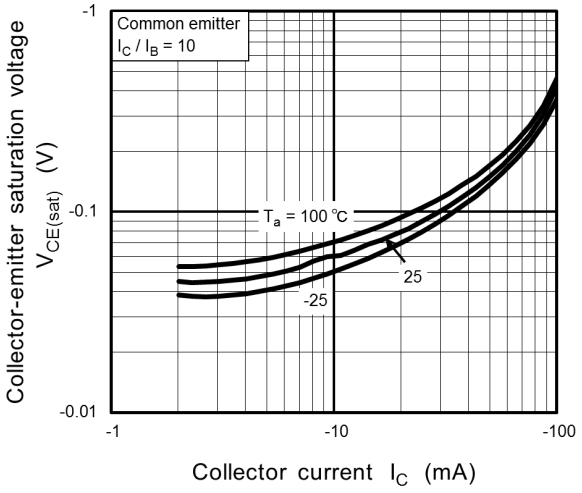

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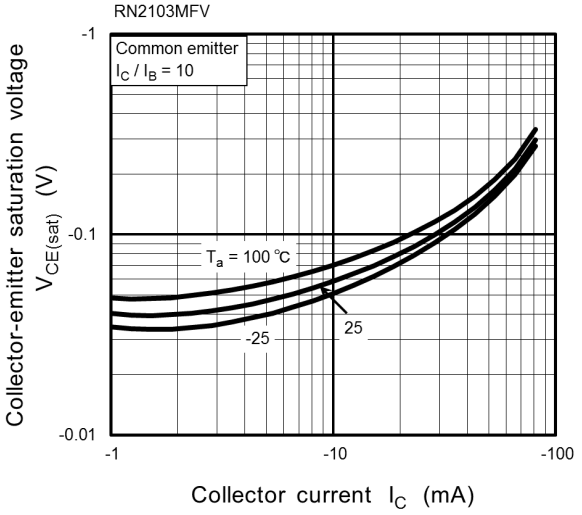

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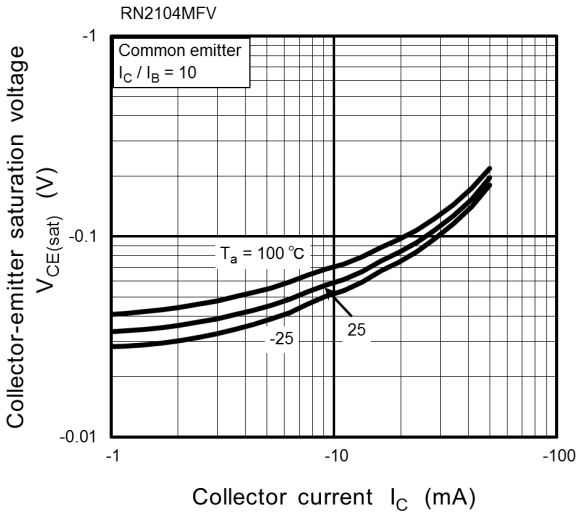

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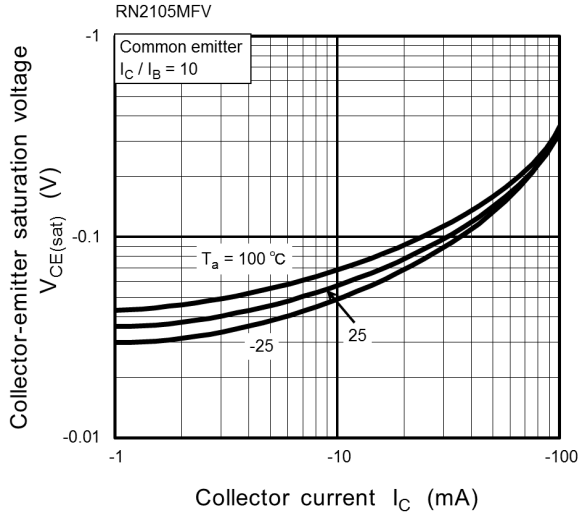

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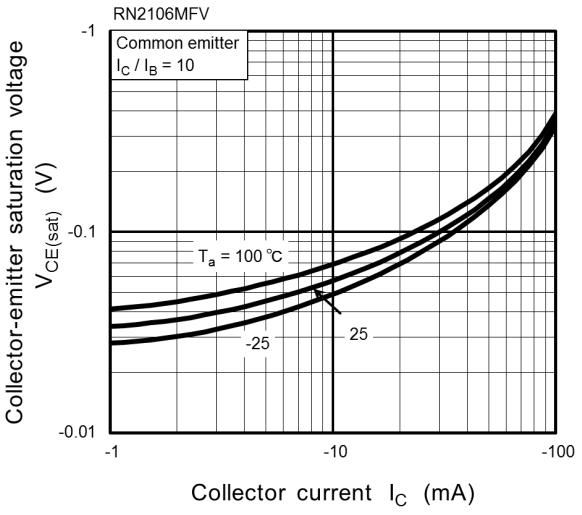

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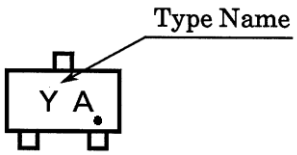
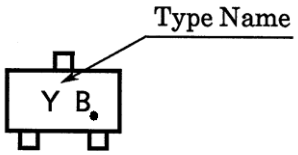
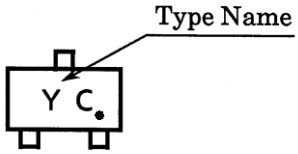
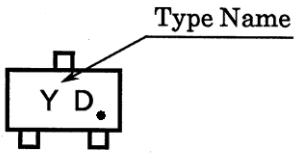
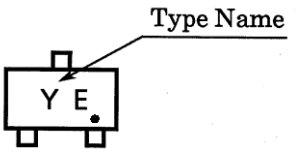
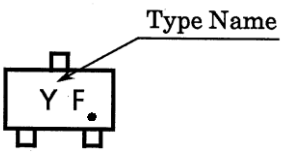
RN2101MFV	
RN2102MFV	
RN2103MFV	
RN2104MFV	
RN2105MFV	
RN2106MFV	

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