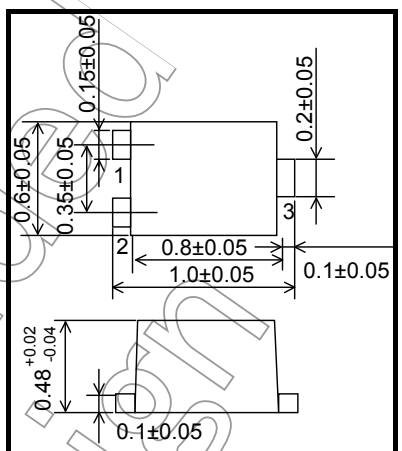
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

RN1101FS,RN1102FS,RN1103FS RN1104FS,RN1105FS,RN1106FS

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- Incorporating a bias resistor into a transistor reduces parts count. Reducing the parts count enable the manufacture of ever more compact equipment and save assembly cost.
- Complementary to RN2101FS~RN2106FS

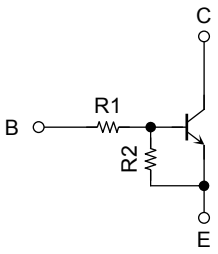
Unit: mm



fSM	1.BASE 2.EMITTER 3.COLLECOTR
JEDEC	—
JEITA	—
TOSHIBA	2-1E1A

Weight: 0.0006g (typ.)

Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN1101FS	4.7	4.7
RN1102FS	10	10
RN1103FS	22	22
RN1104FS	47	47
RN1105FS	2.2	47
RN1106FS	4.7	47

Absolute Maximum Ratings (Ta = 25°C)

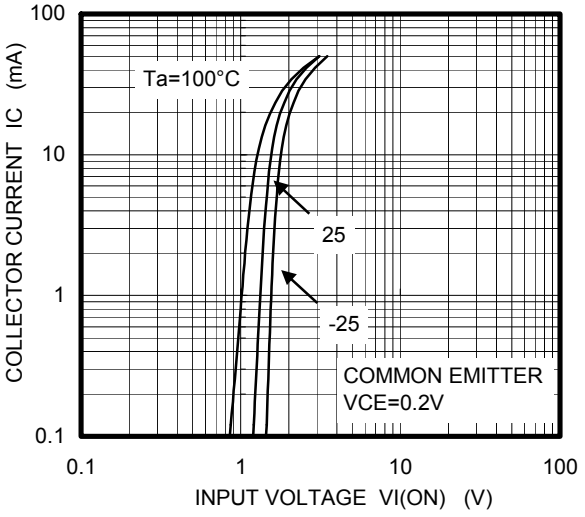
Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN1101FS~1106FS	V_{CBO}	20	V
Collector-emitter voltage		V_{CEO}	20	V
Emitter-base voltage	RN1101FS~1104FS	V_{EBO}	10	V
	RN1105FS, 1106FS		5	
Collector current	RN1101FS~RN1106FS	I_C	50	mA
Collector power dissipation		P_C	50	mW
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55~150	°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).

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1101FS~1106FS	I_{CBO}	V_{CB} = 20 V, I_E = 0	—	—	100	nA
		I_{CEO}	V_{CE} = 20 V, I_B = 0	—	—	500	
Emitter cut-off current	RN1101FS	I_{EBO}	V_{EB} = 10 V, I_C = 0	0.89	—	1.33	mA
	RN1102FS			0.41	—	0.63	
	RN1103FS			0.18	—	0.29	
	RN1104FS			0.088	—	0.133	
	RN1105FS		V_{EB} = 5 V, I_C = 0	0.085	—	0.127	
	RN1106FS			0.08	—	0.121	
DC current gain	RN1101FS	h_{FE}	V_{CE} = 5 V, I_C = 10 mA	30	—	—	
	RN1102FS			60	—	—	
	RN1103FS			100	—	—	
	RN1104FS			120	—	—	
	RN1105FS			120	—	—	
	RN1106FS			120	—	—	
Collector-emitter saturation voltage	RN1101FS~1106FS	$V_{CE\ (sat)}$	I_C = 5 mA, I_B = 0.25 mA	—	—	0.15	V
Input voltage (ON)	RN1101FS	$V_{I\ (ON)}$	V_{CE} = 0.2 V, I_C = 5 mA	1.0	—	2.0	V
	RN1102FS			1.0	—	2.2	
	RN1103FS			1.1	—	2.7	
	RN1104FS			1.2	—	3.6	
	RN1105FS			0.6	—	1.1	
	RN1106FS			0.6	—	1.2	
Input voltage (OFF)	RN1101FS~1104FS	$V_{I\ (OFF)}$	V_{CE} = 5 V, I_C = 0.1 mA	0.8	—	1.5	V
	RN1105FS, 1106FS			0.4	—	0.8	
Collector output capacitance	RN1101FS~1106FS	C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1 MHz	—	1.2	—	pF
Input resistor	RN1101FS	R1	—	3.76	4.7	5.64	kΩ
	RN1102FS			8	10	12	
	RN1103FS			17.6	22	26.4	
	RN1104FS			37.6	47	56.4	
	RN1105FS			1.76	2.2	2.64	
	RN1106FE			3.76	4.7	5.64	
Resistor ratio	RN1101FS~1104FS	R1/R2	—	0.8	1.0	1.2	
	RN1105FS			0.0376	0.0468	0.0562	
	RN1106FS			0.08	0.1	0.12	

RN1101FS IC - VI(ON)



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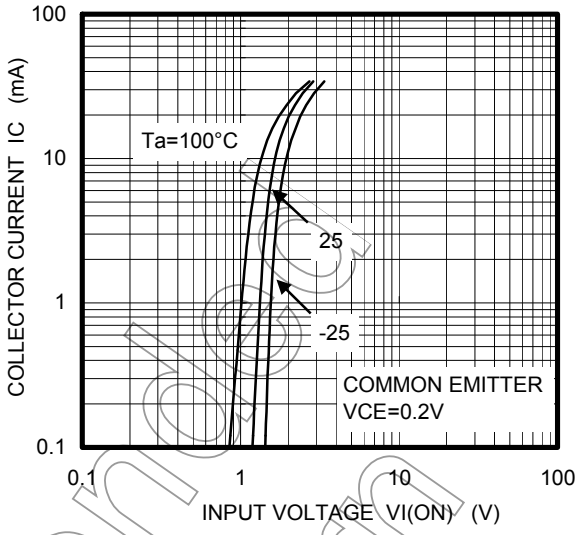

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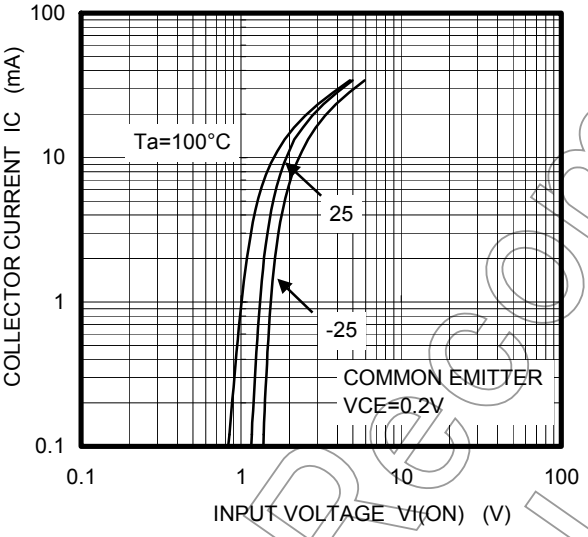

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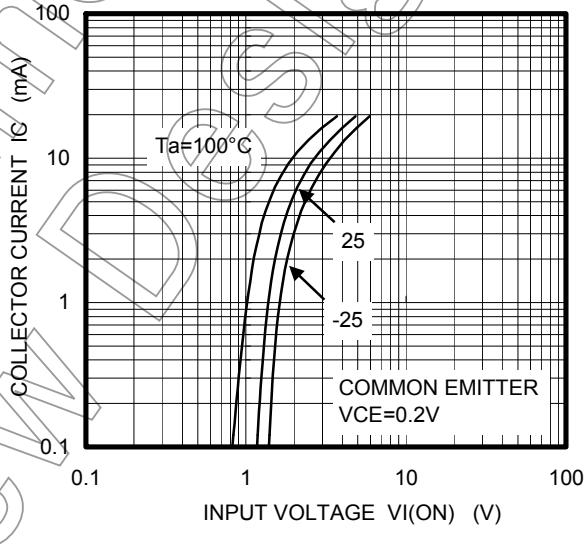

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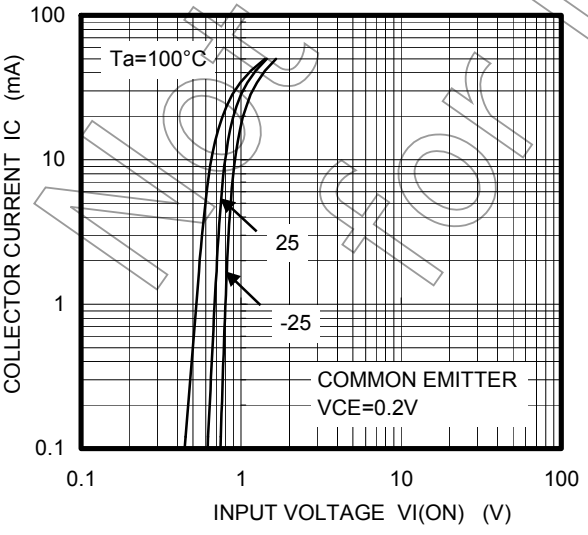

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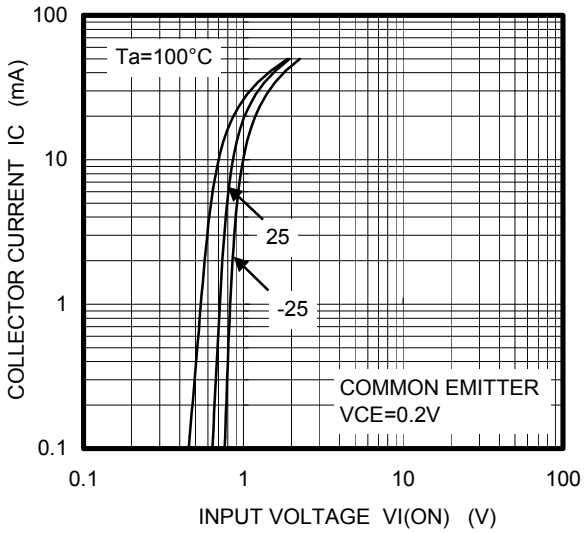

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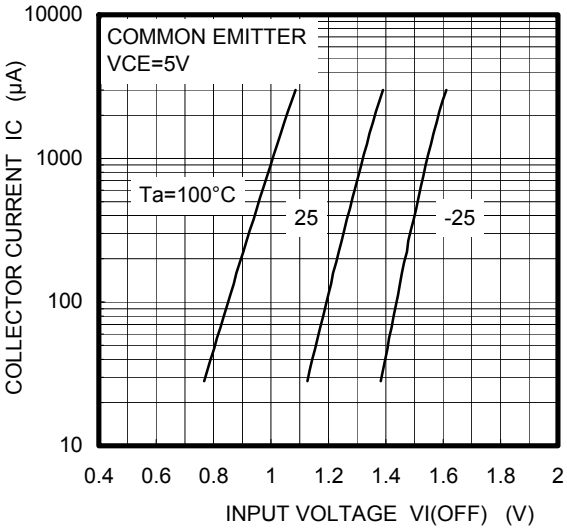

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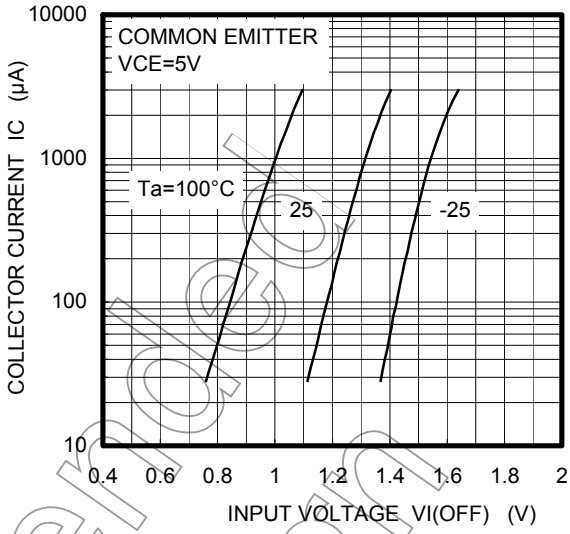

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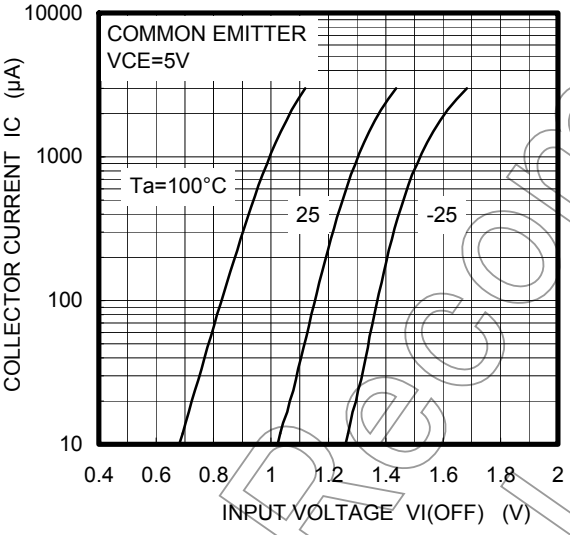

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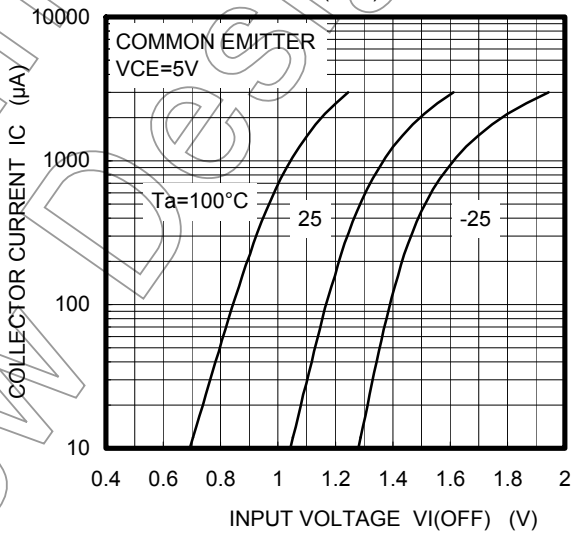

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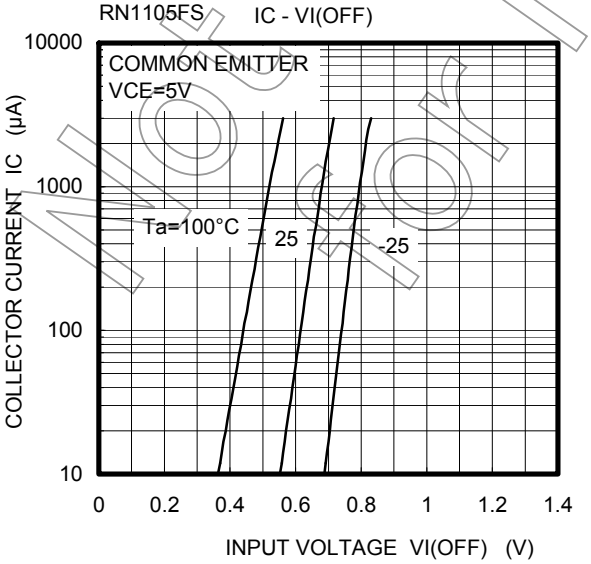

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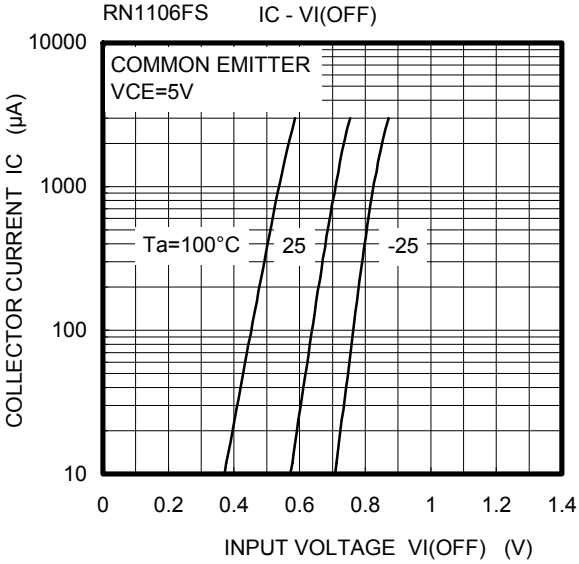

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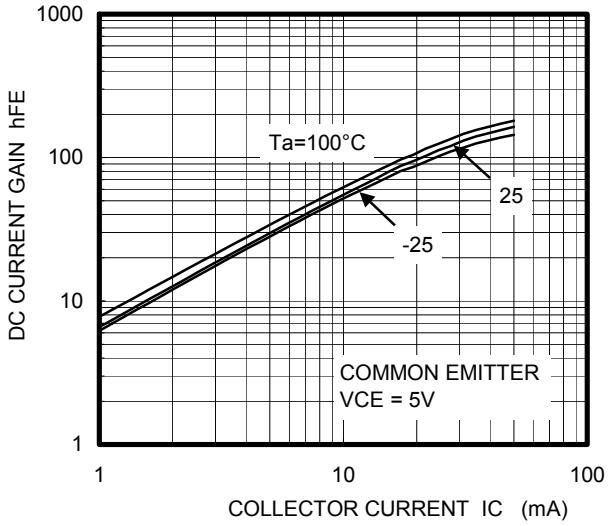

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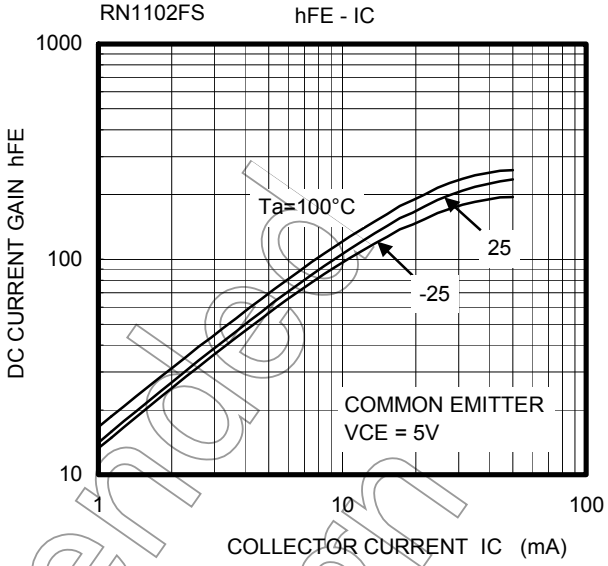

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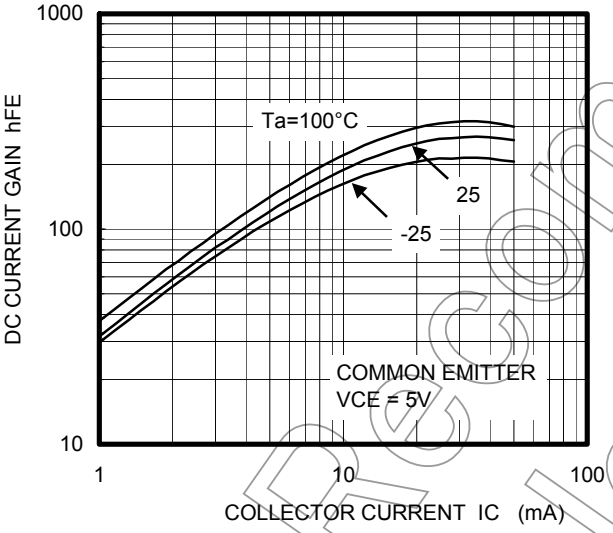

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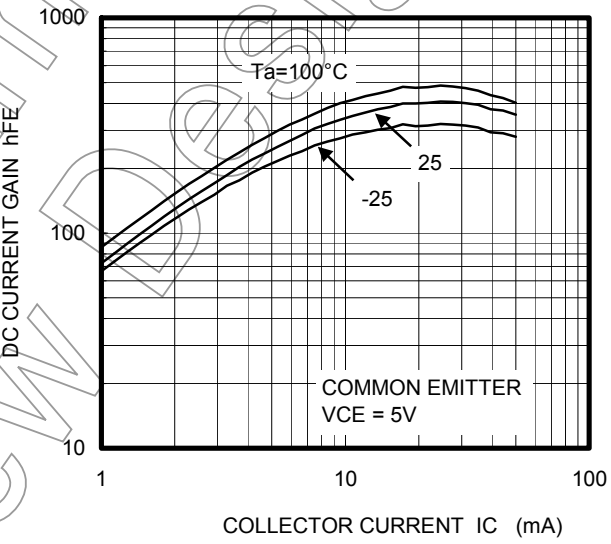

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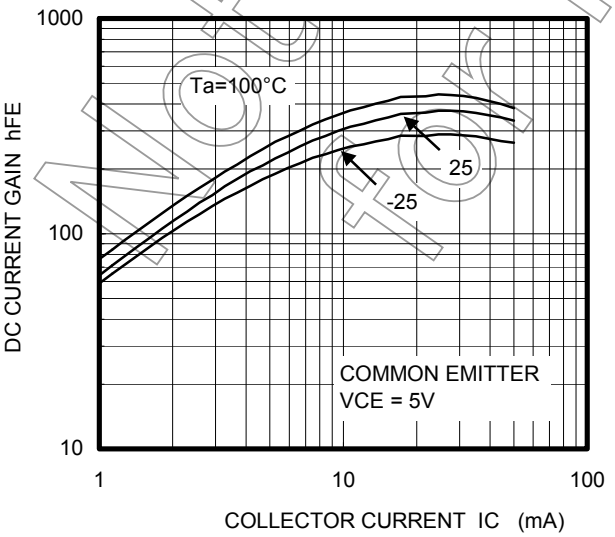

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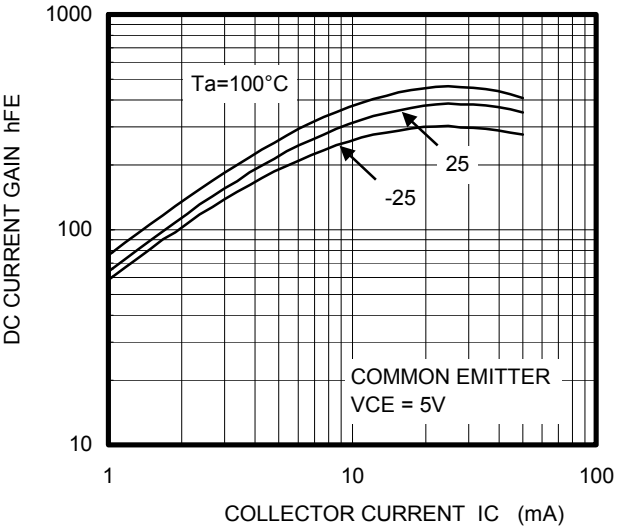
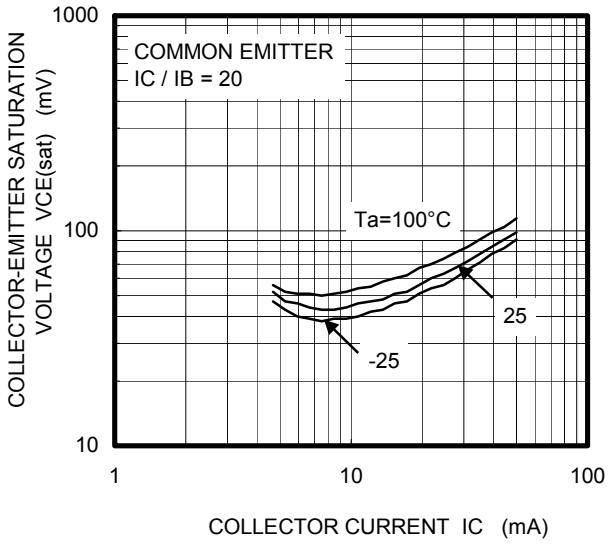


RN1101FS VCE(sat) - IC



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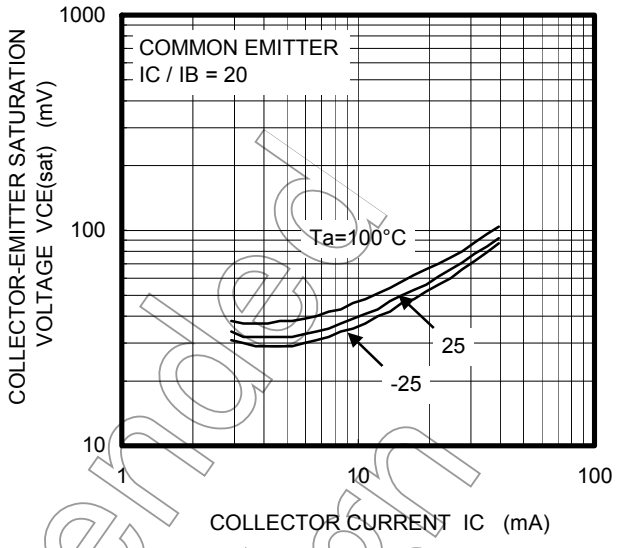

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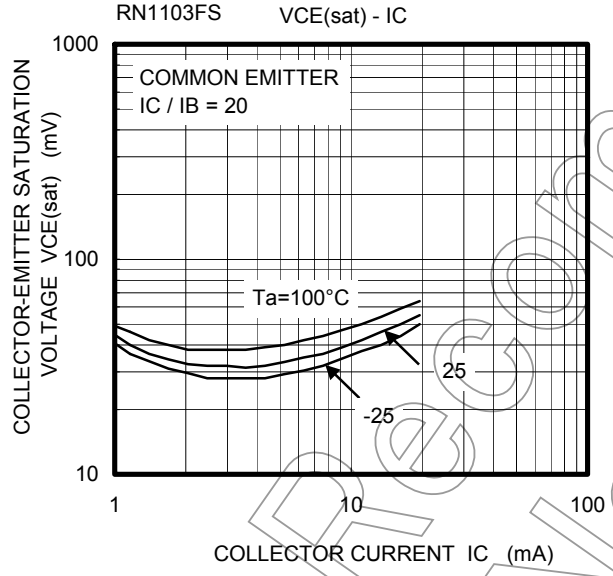

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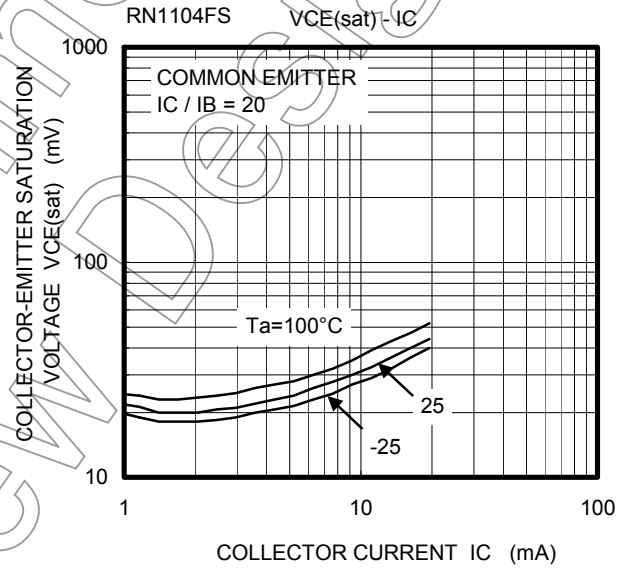

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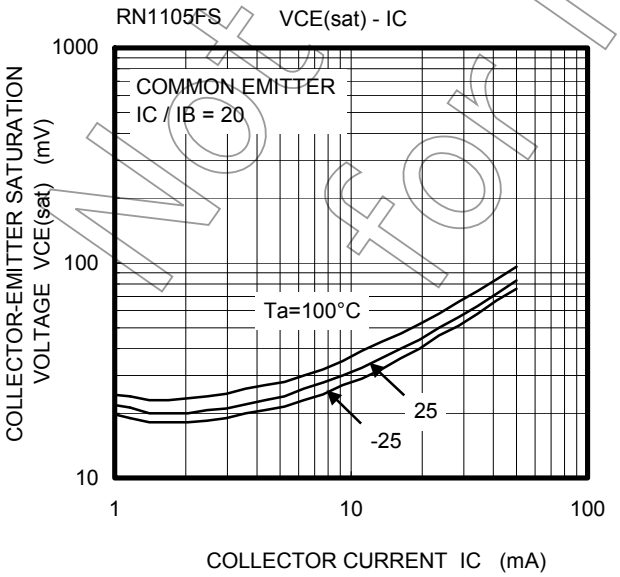

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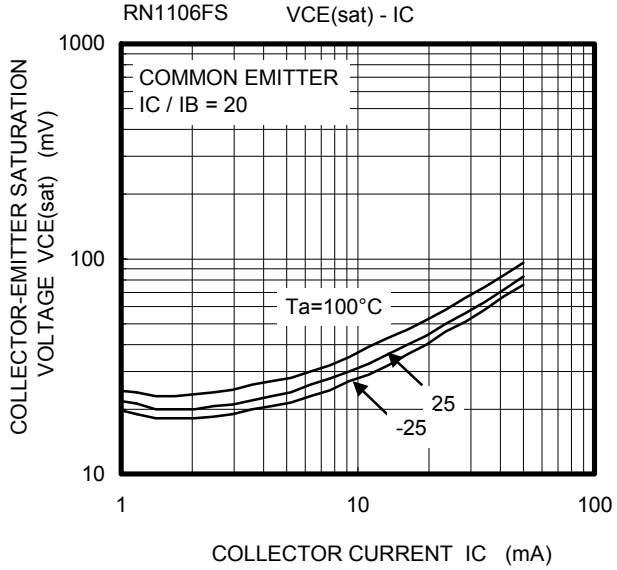

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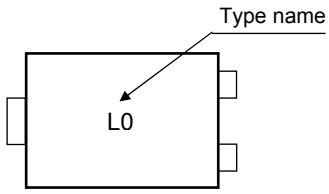
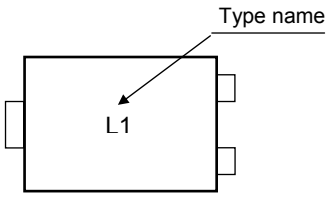
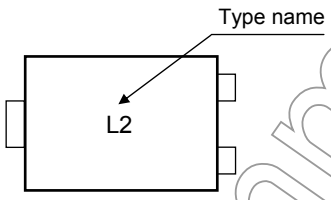
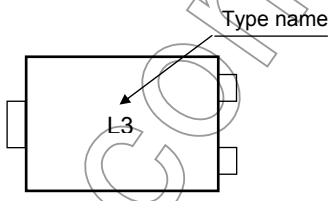
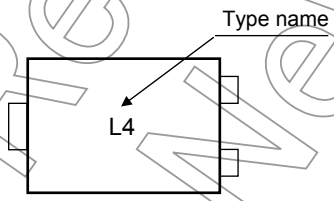
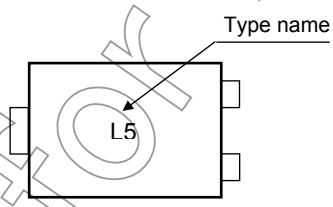
RN1101FS	
RN1102FS	
RN1103FS	
RN1104FS	
RN1105FS	
RN1106FS	

Handling Precaution

When handling individual devices (which are not yet mounted on a circuit board), be sure that the environment is protected against electrostatic electricity. Operators should wear anti-static clothing, and containers and other objects that come into direct contact with devices should be made of anti-static materials.

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