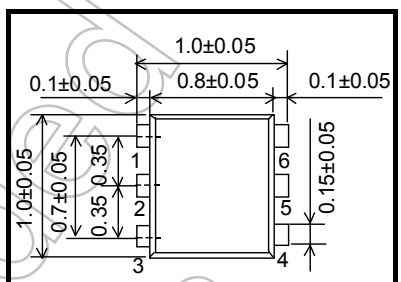
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process) (Bias Resistor Built-in Transistor)

RN1901FS,RN1902FS,RN1903FS RN1904FS,RN1905FS,RN1906FS

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- Two devices are incorporated into a fine pitch small mold (6-pin) package.
- Incorporating a bias resistor into a transistor reduces parts count. Reducing the parts count enables the manufacture of ever more compact equipment and lowers assembly cost.
- Complementary to RN2901FS~RN2906FS

Unit: mm



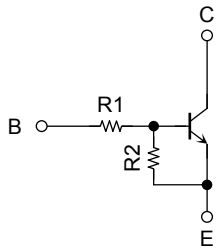
1.EMIITTER1	(E1)
2.BASE1	(B1)
3.COLLECTOR2	(C2)
4. EMIITTER2	(E2)
5.BASE2	(B2)
6.COLLECTOR1	(C1)

fS6

JEDEC	—
JEITA	—
TOSHIBA	2-1F1D

Weight: 0.001g (typ.)

Equivalent Circuit and Bias Resistor Values

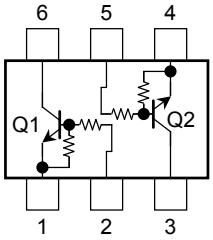


Type No.	R1 (kΩ)	R2 (kΩ)
RN1901FS	4.7	4.7
RN1902FS	10	10
RN1903FS	22	22
RN1904FS	47	47
RN1905FS	2.2	47
RN1906FS	4.7	47

Absolute Maximum Ratings (Ta = 25°C) (Q1, Q2 common)

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN1901FS~1906FS	V_{CBO}	20	V
Collector-emitter voltage		V_{CEO}	20	V
Emitter-base voltage	RN1901FS~1904FS	V_{EBO}	10	V
	RN1905FS, 1906FS		5	
Collector current	RN1901FS~RN1906FS	I_C	50	mA
Collector power dissipation		P_C (Note 1)	50	mW
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55~150	°C

Equivalent Circuit (top view)



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).

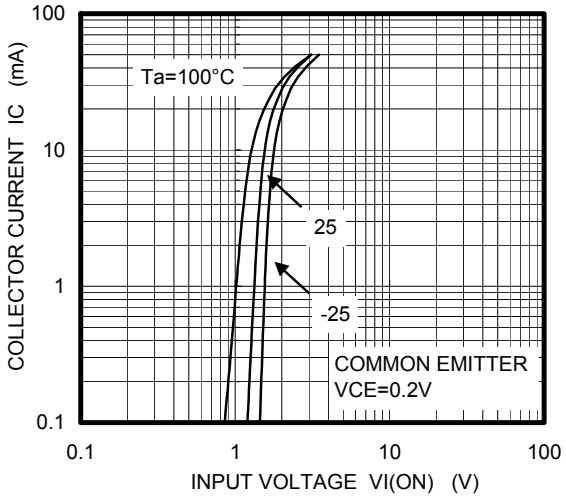
Note 1: Total rating

Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1901FS~1906FS	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	RN1901FS	I_{EBO}	V_{EB} = 10 V, I_C = 0	0.89	—	1.33	mA
	RN1902FS			0.41	—	0.63	
	RN1903FS			0.18	—	0.29	
	RN1904FS			0.088	—	0.133	
	RN1905FS		V_{EB} = 5 V, I_C = 0	0.085	—	0.127	
	RN1906FS			0.08	—	0.121	
DC current gain	RN1901FS	h_{FE}	V_{CE} = 5 V, I_C = 10 mA	30	—	—	
	RN1902FS			60	—	—	
	RN1903FS			100	—	—	
	RN1904FS			120	—	—	
	RN1905FS			120	—	—	
	RN1906FS			120	—	—	
Collector-emitter saturation voltage	RN1901FS~1906FS	$V_{CE\ (sat)}$	I_C = 5 mA, I_B = 0.25 mA	—	—	0.15	V
Input voltage (ON)	RN1901FS	$V_{I\ (ON)}$	V_{CE} = 0.2 V, I_C = 5 mA	1.0	—	2.0	V
	RN1902FS			1.0	—	2.2	
	RN1903FS			1.1	—	2.7	
	RN1904FS			1.2	—	3.6	
	RN1905FS			0.6	—	1.1	
	RN1906FS			0.6	—	1.2	
Input voltage (OFF)	RN1901FS~1904FS	$V_{I\ (OFF)}$	V_{CE} = 5 V, I_C = 0.1 mA	0.8	—	1.5	V
	RN1905FS, 1906FS			0.4	—	0.8	
Collector output capacitance	RN1901FS~1906FS	C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1 MHz	—	1.2	—	pF
Input resistor	RN1901FS	R1	—	3.76	4.7	5.64	kΩ
	RN1902FS			8	10	12	
	RN1903FS			17.6	22	26.4	
	RN1904FS			37.6	47	56.4	
	RN1905FS			1.76	2.2	2.64	
	RN1906FS			3.76	4.7	5.64	
Resistor ratio	RN1901FS~1904FS	R1/R2	—	0.8	1.0	1.2	
	RN1905FS			0.0376	0.0468	0.0562	
	RN1906FS			0.08	0.1	0.12	

(Q1, Q2 Common)

RN1901FS IC - VI(ON)



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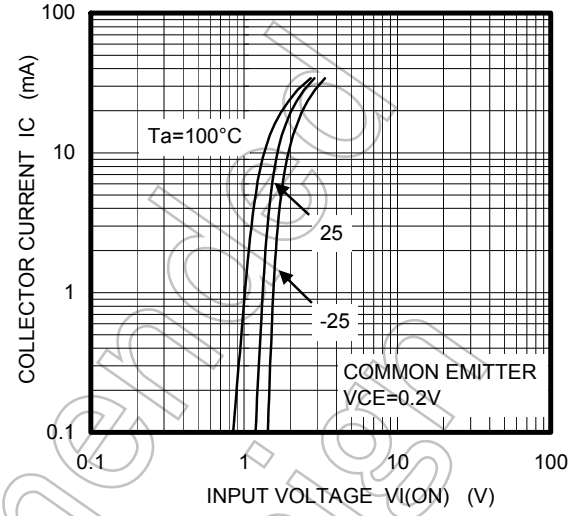

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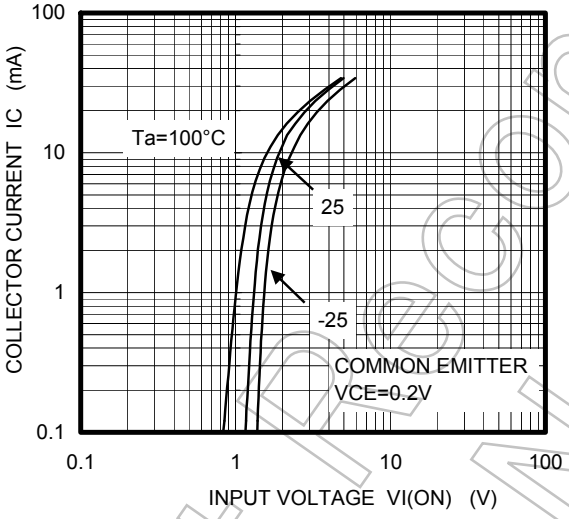

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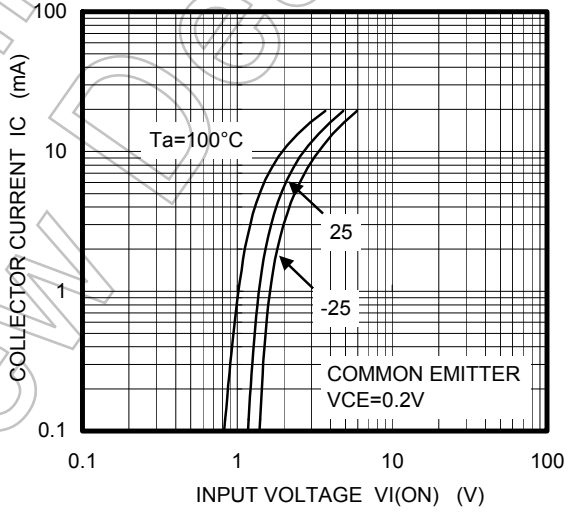

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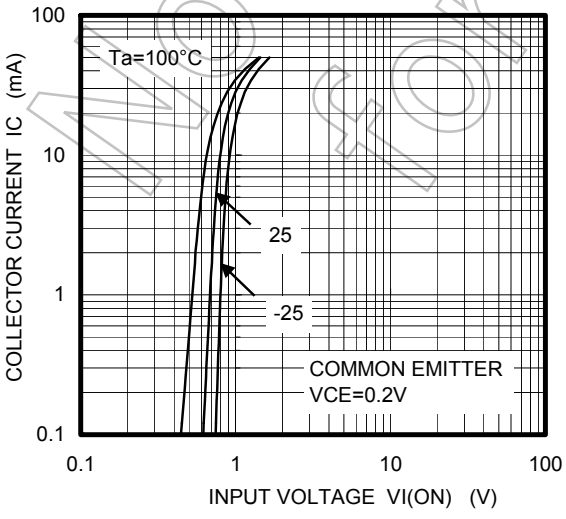

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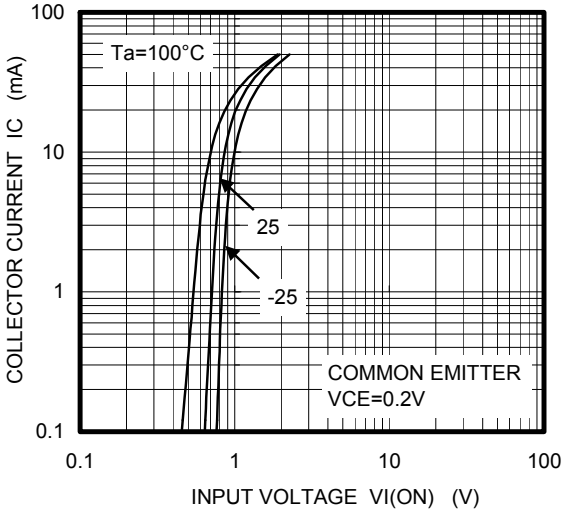

(Q1,Q2 Common)

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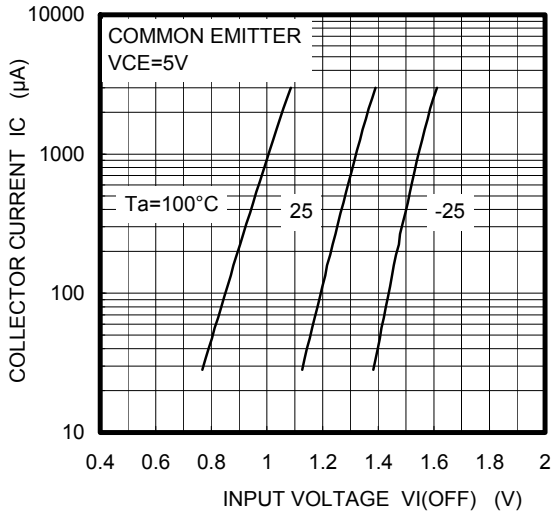

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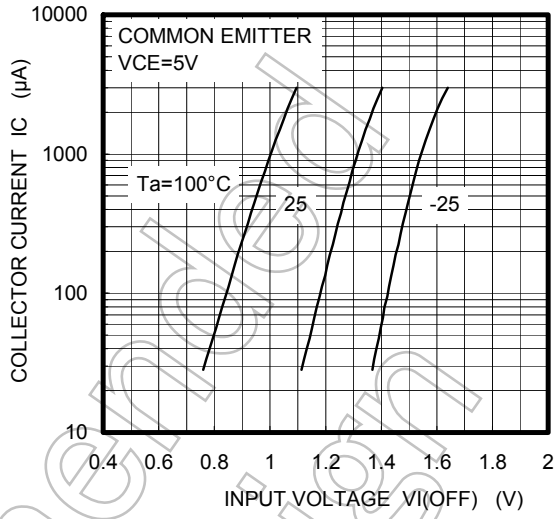

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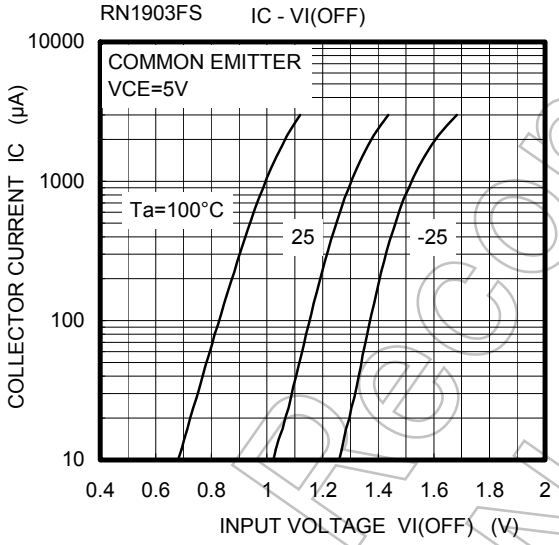

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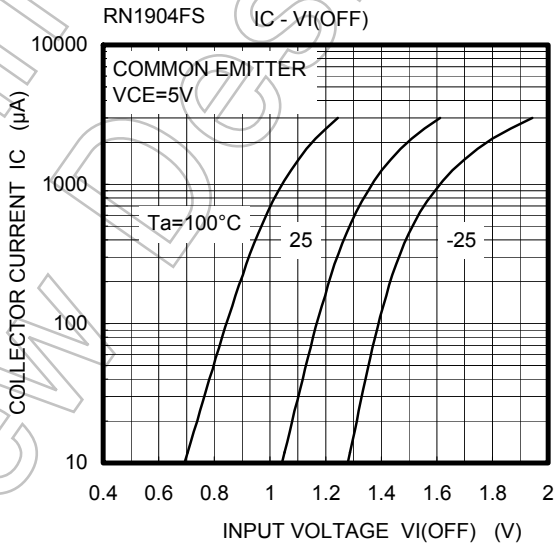

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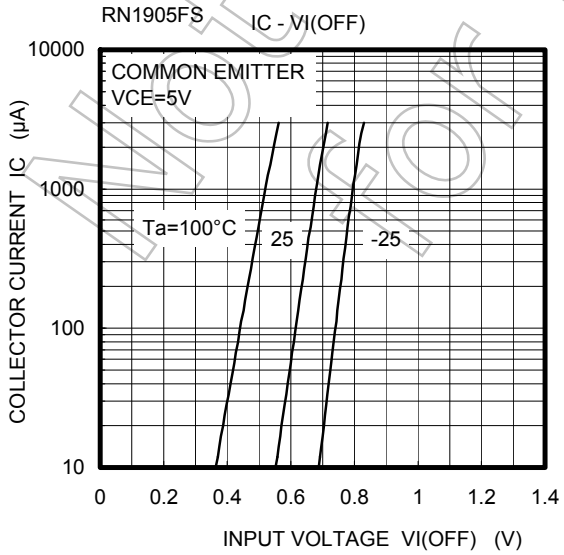

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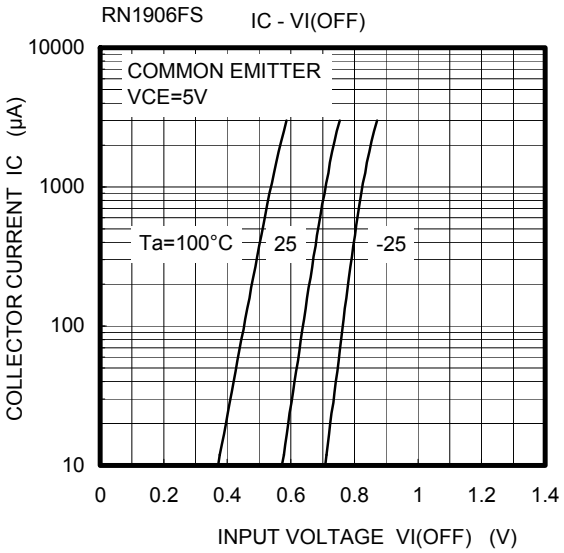
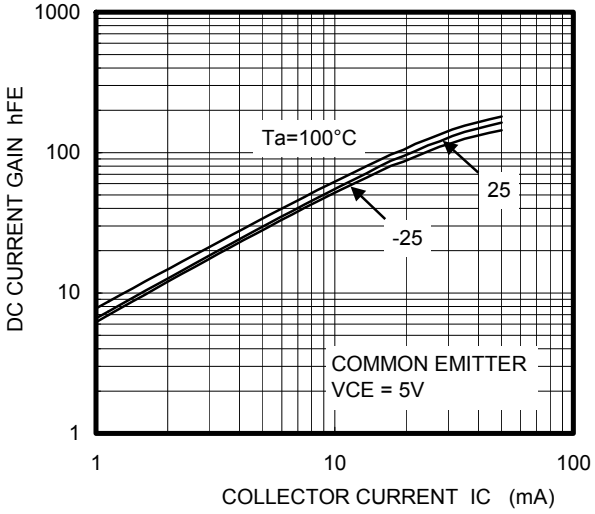


(Q1,Q2 Common)

RN1901FS hFE - IC



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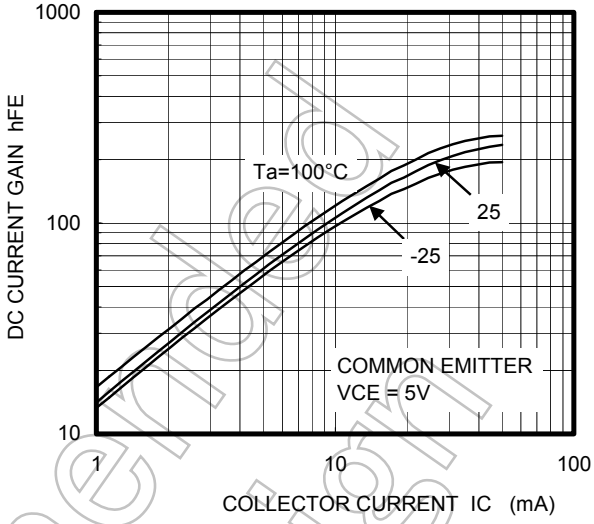

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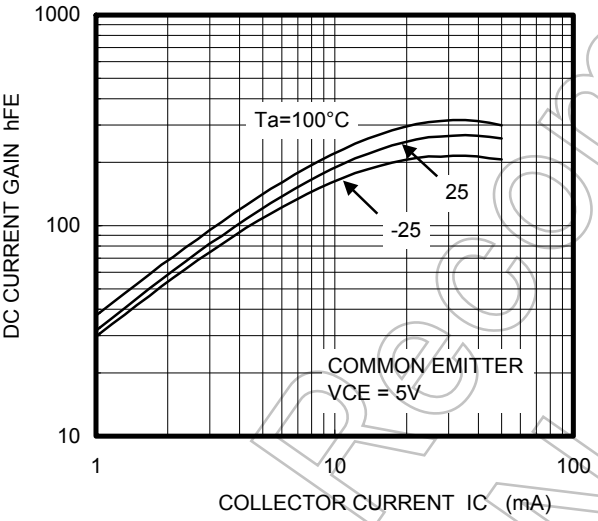

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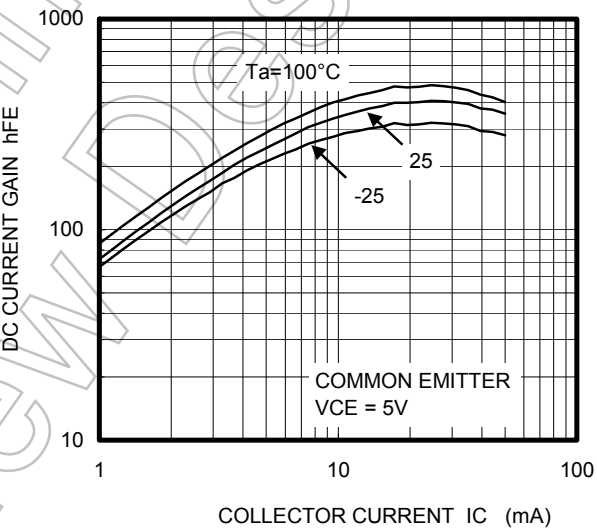

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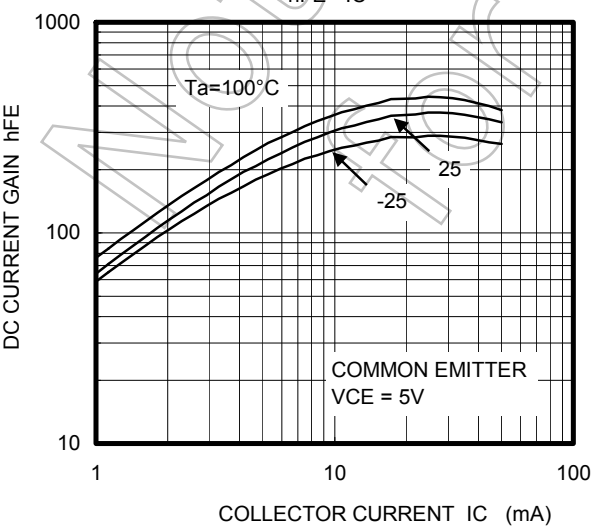

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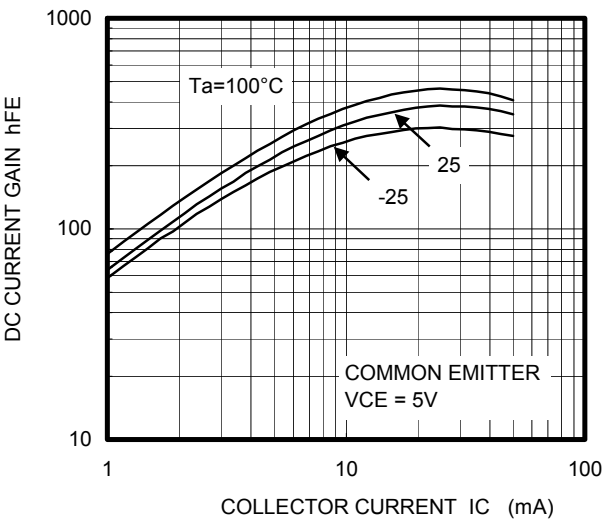
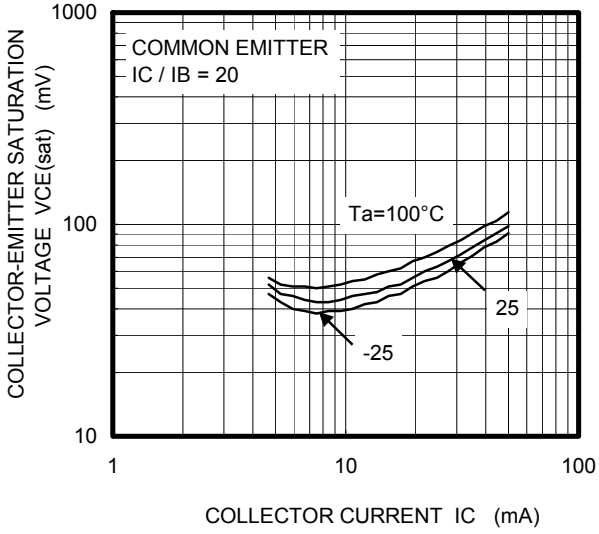


(Q1, Q2 Common)

RN1901FS VCE(sat) - IC



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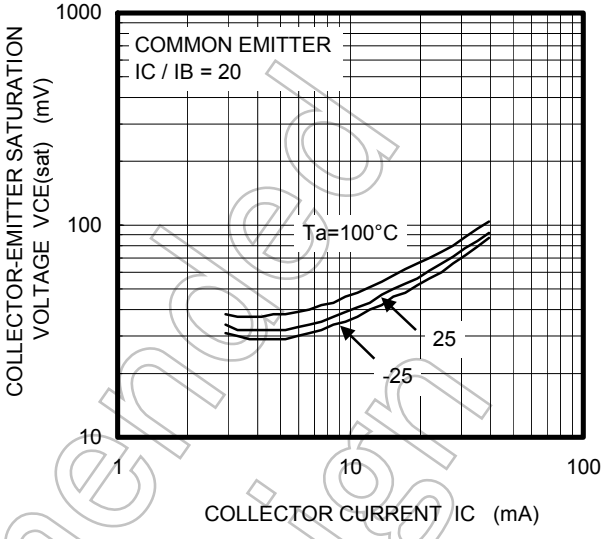

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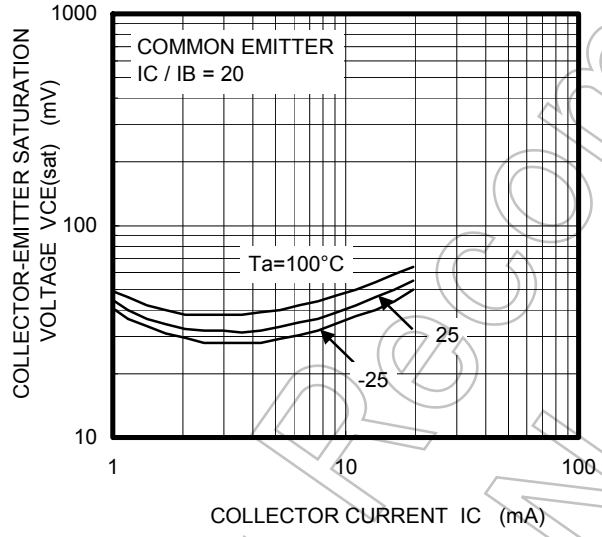

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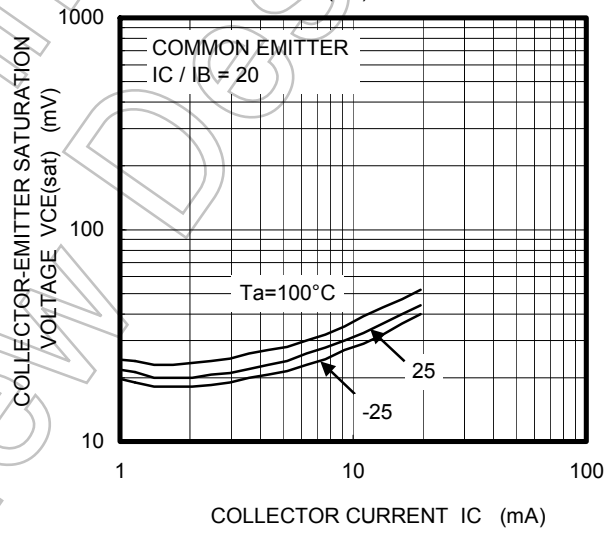

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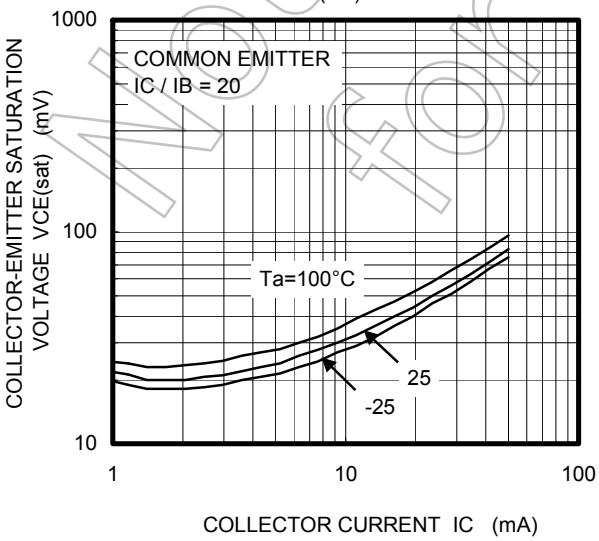

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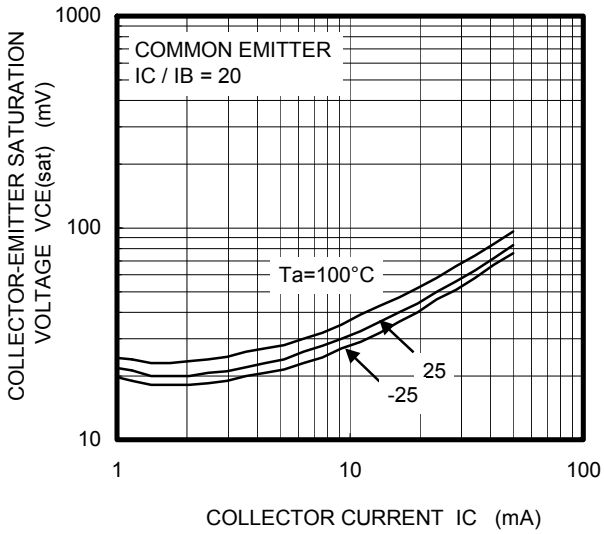

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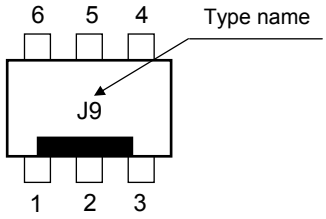
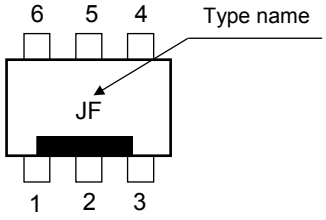
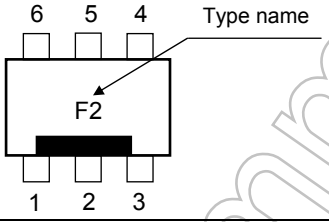
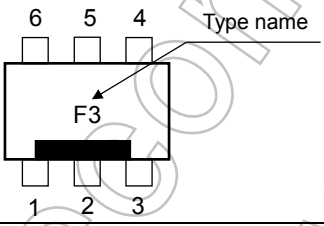
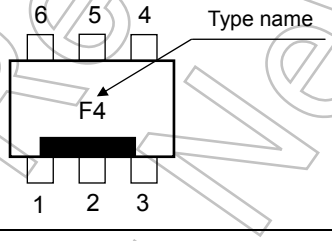
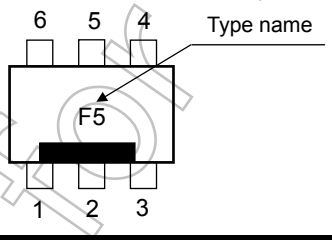
RN1901FS	
RN1902FS	
RN1903FS	
RN1904FS	
RN1905FS	
RN1906FS	

Handling Precaution

When handling individual devices (which are not yet mounted on a circuit board), be sure that the environment is protected against electrostatic discharge. 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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