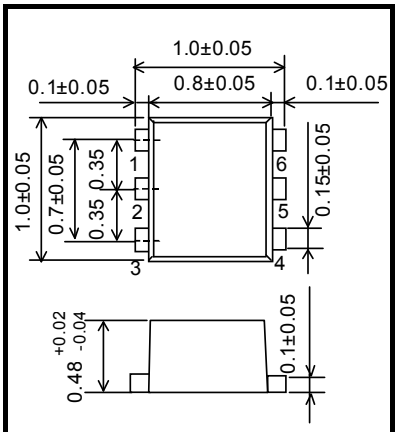
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

RN2901FS,RN2902FS,RN2903FS RN2904FS,RN2905FS,RN2906FS

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 RN1901FS~RN1906FS

Unit: mm



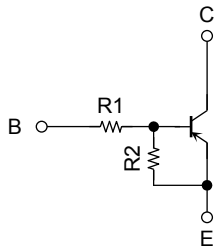
1.EMITTER1 (E1)
2.BASE1 (B1)
3.COLLECTOR2 (C2)
4.EMITTER2 (E2)
5.BASE2 (B2)
6.COLLECTOR1 (C1)

fS6

JEDEC	—
JEITA	—
TOSHIBA	2-1F1D

Weight: 0.001g (typ.)

Equivalent Circuit and Bias Resistor Values

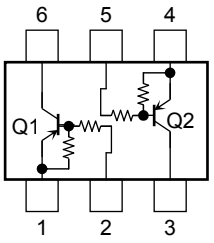


Type No.	R1 (kΩ)	R2 (kΩ)
RN2901FS	4.7	4.7
RN2902FS	10	10
RN2903FS	22	22
RN2904FS	47	47
RN2905FS	2.2	47
RN2906FS	4.7	47

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

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN2901FS~2906FS	V_{CBO}	−20	V
Collector-emitter voltage		V_{CEO}	−20	V
Emitter-base voltage	RN2901FS~2904FS	V_{EBO}	−10	V
	RN2905FS, 2906FS		−5	
Collector current	RN2901FS~2906FS	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)



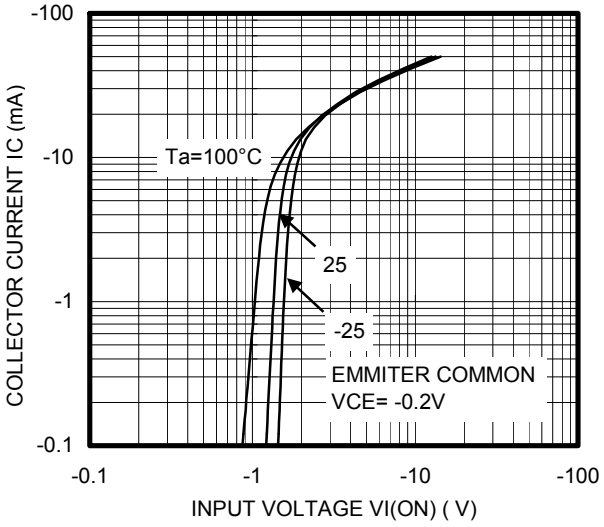
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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℃) (Q1, Q2 common)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2901FS~2906FS	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	RN2901FS	I_{EBO}	V_{EB} = –10 V, I_C = 0	–0.89	—	–1.33	mA
	RN2902FS			–0.41	—	–0.63	
	RN2903FS			–0.18	—	–0.29	
	RN2904FS			–0.088	—	–0.133	
	RN2905FS		V_{EB} = –5 V, I_C = 0	–0.085	—	–0.127	
	RN2906FS			–0.08	—	–0.121	
DC current gain	RN2901FS	h_{FE}	V_{CE} = –5 V, I_C = –10 mA	30	—	—	
	RN2902FS			60	—	—	
	RN2903FS			100	—	—	
	RN2904FS			120	—	—	
	RN2905FS			120	—	—	
	RN2906FS			120	—	—	
Collector-emitter saturation voltage	RN2901FS~2906FS	$V_{CE\ (sat)}$	I_C = –5 mA, I_B = –0.25 mA	—	—	–0.15	V
Input voltage (ON)	RN2901FS	$V_{I\ (ON)}$	V_{CE} = –0.2 V, I_C = –5 mA	–1.0	—	–2.0	V
	RN2902FS			–1.0	—	–2.2	
	RN2903FS			–1.1	—	–2.7	
	RN2904FS			–1.2	—	–3.6	
	RN2905FS			–0.6	—	–1.1	
	RN2906FS			–0.6	—	–1.2	
Input voltage (OFF)	RN2901FS~2904FS	$V_{I\ (OFF)}$	V_{CE} = –5 V, I_C = –0.1 mA	–0.8	—	–1.5	V
	RN2905FS, 2906FS			–0.4	—	–0.8	
Collector output capacitance	RN2901FS~2906FS	C_{ob}	V_{CB} = –10 V, I_E = 0, f = 1 MHz	—	1.2	—	pF
Input resistor	RN2901FS	R1	—	3.76	4.7	5.64	kΩ
	RN2902FS			8	10	12	
	RN2903FS			17.6	22	26.4	
	RN2904FS			37.6	47	56.4	
	RN2905FS			1.76	2.2	2.64	
	RN2906FS			3.76	4.7	5.64	
Resistor ratio	RN2901FS~2904FS	R1/R2	—	0.8	1.0	1.2	
	RN2905FS			0.0376	0.0468	0.0562	
	RN2906FS			0.08	0.1	0.12	

RN2901FS IC - VI(ON)



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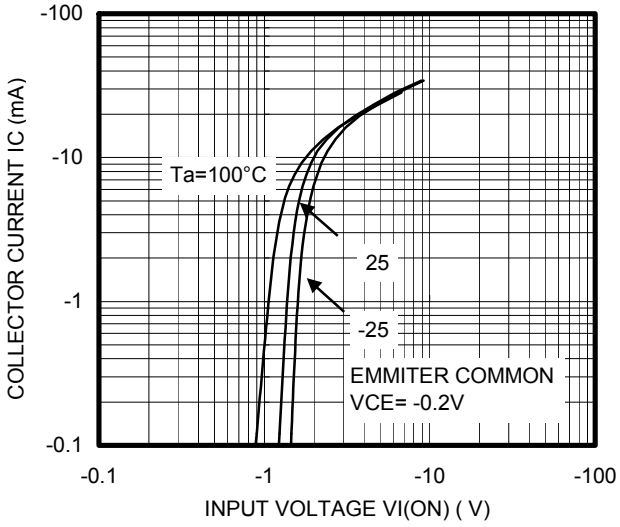

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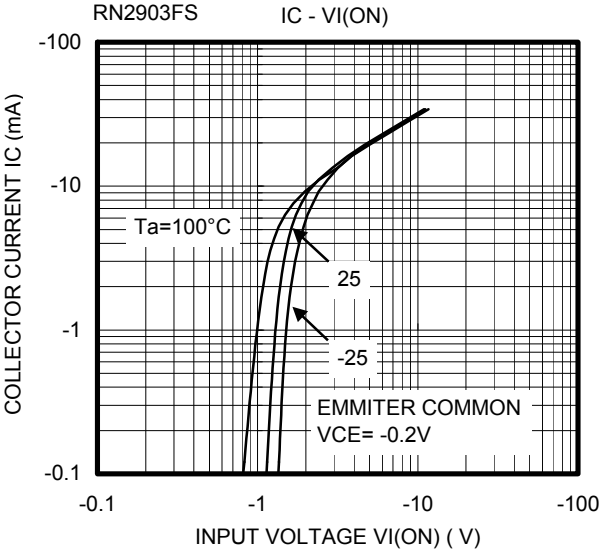

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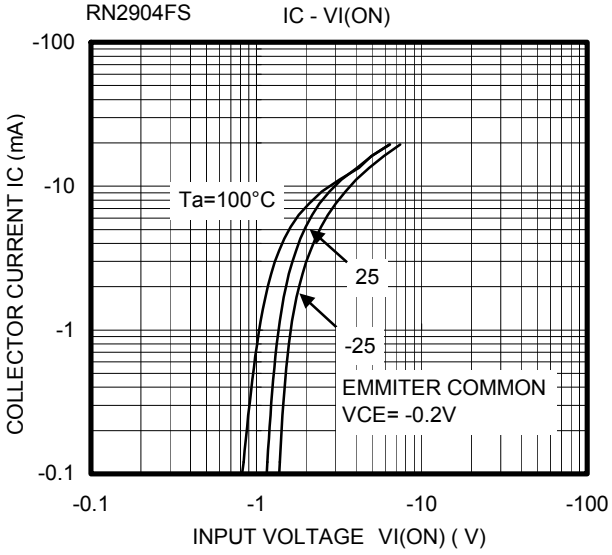

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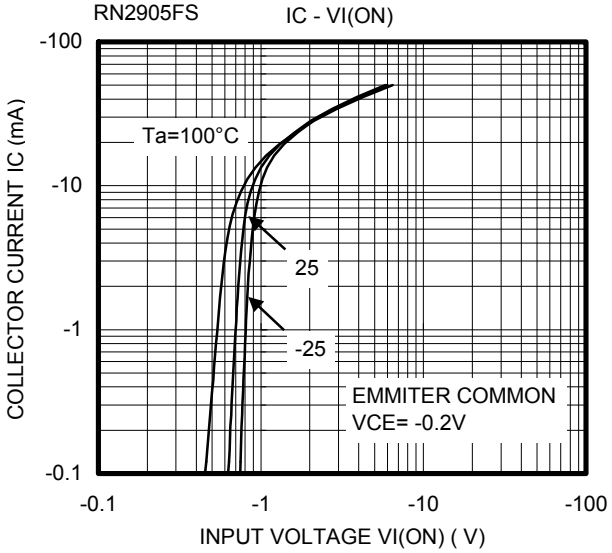

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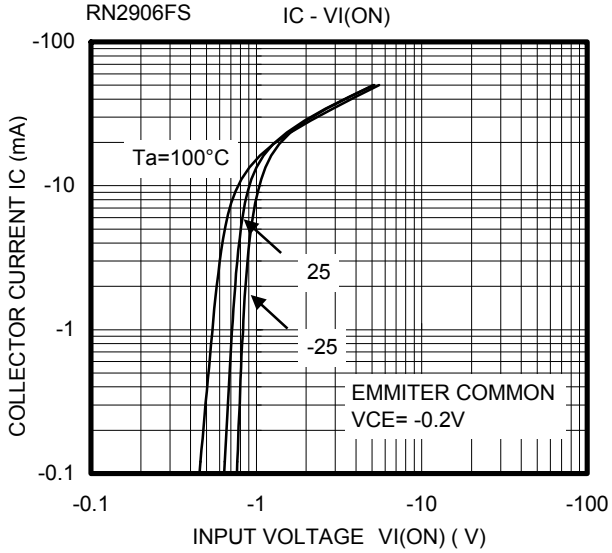
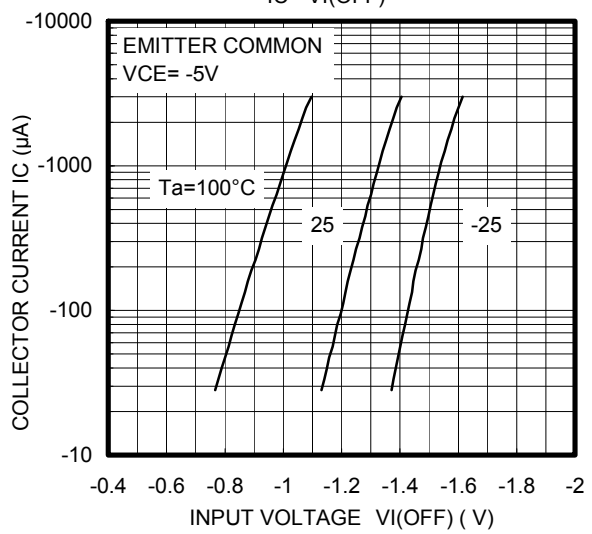


RN2901FS IC - VI(OFF)



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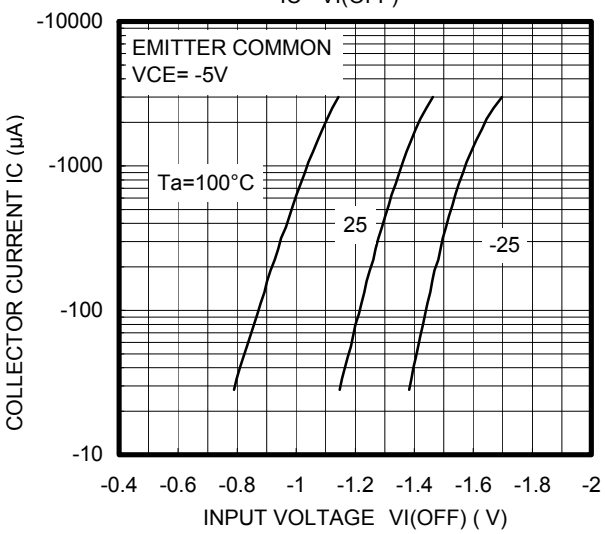

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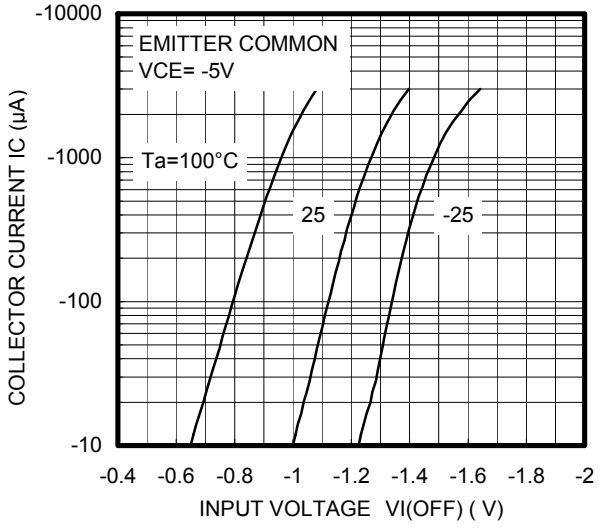

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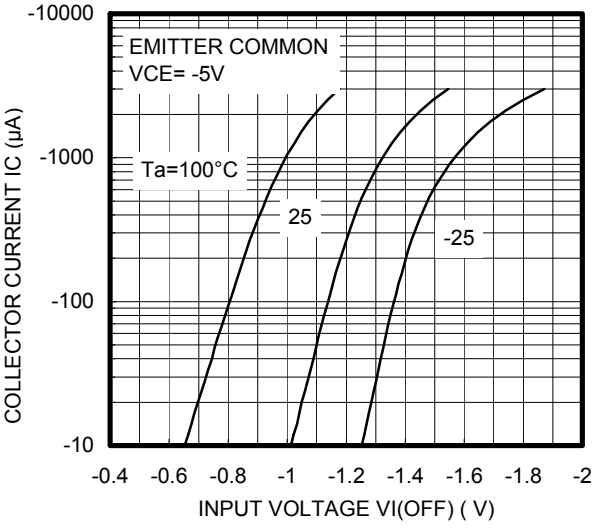

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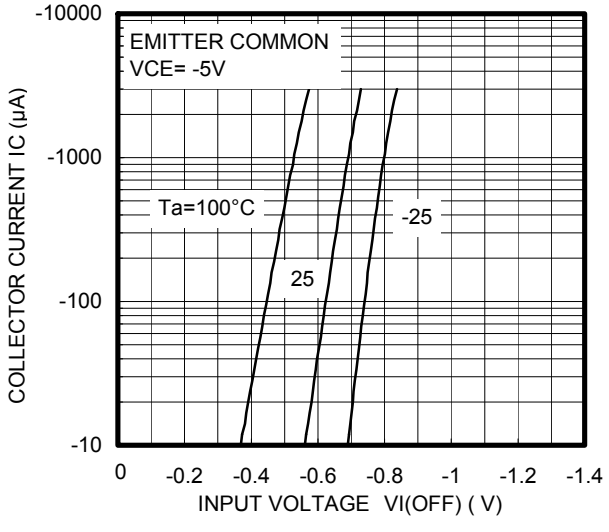

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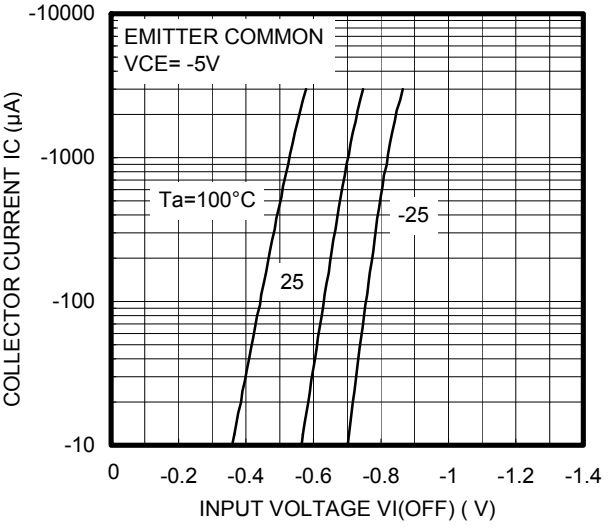
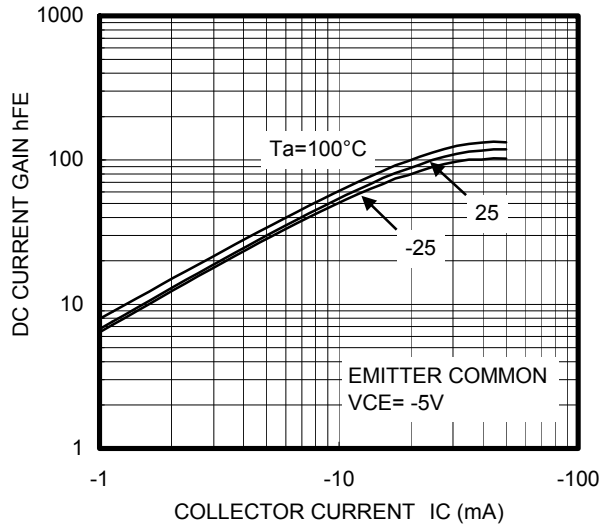


RN2901FS hFE - IC



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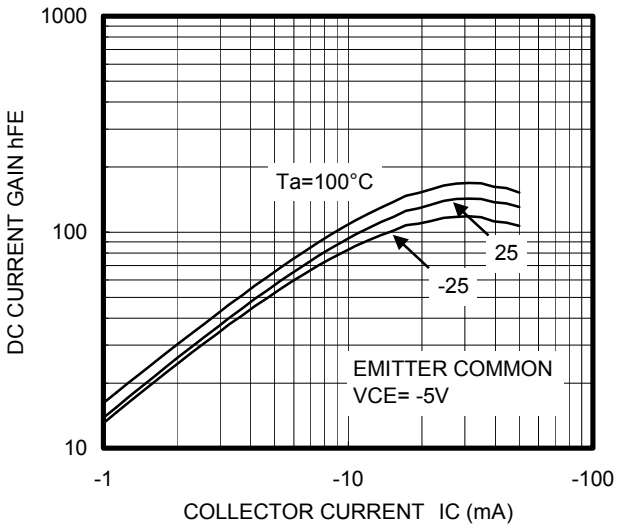

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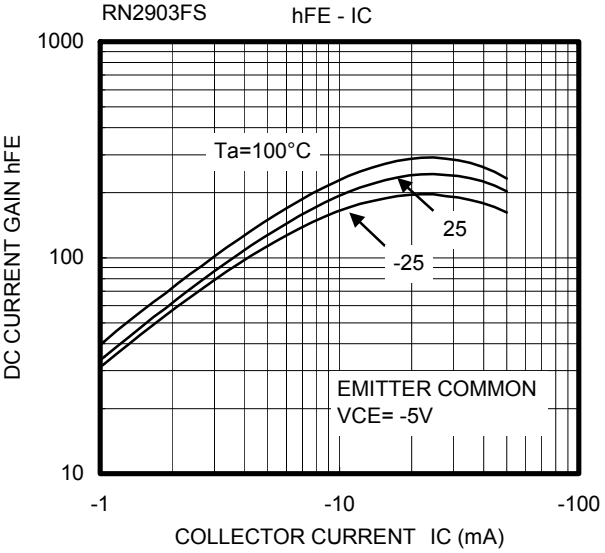

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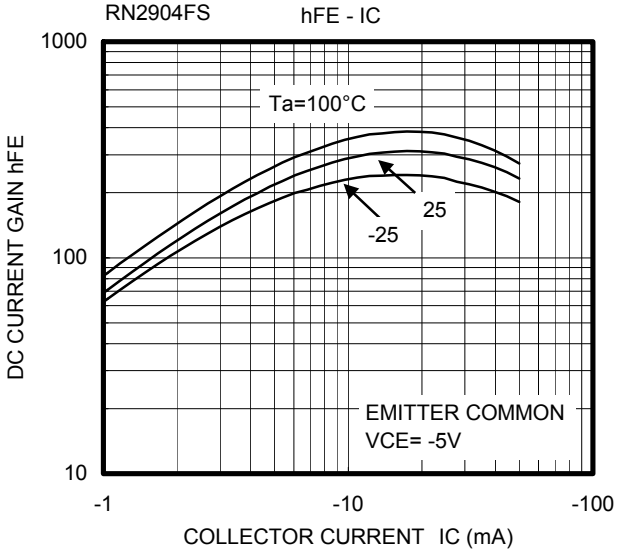

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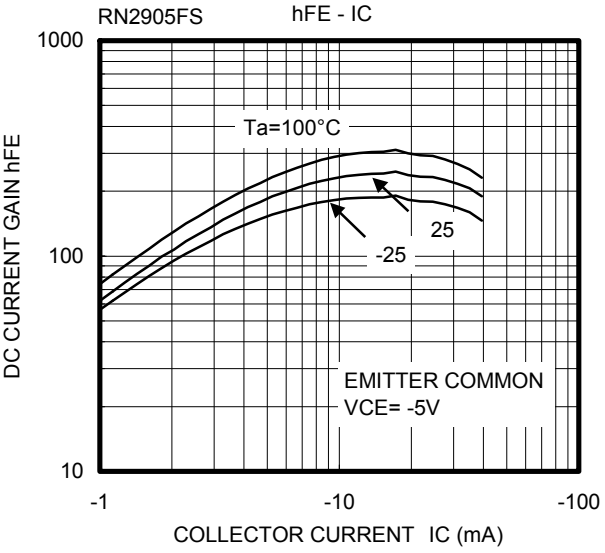

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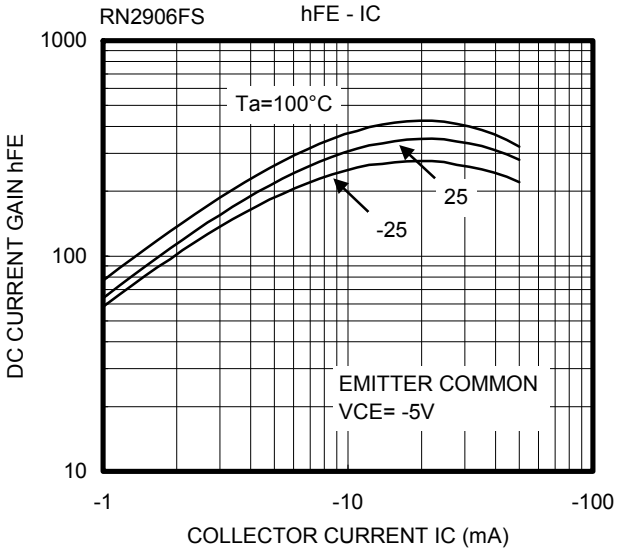
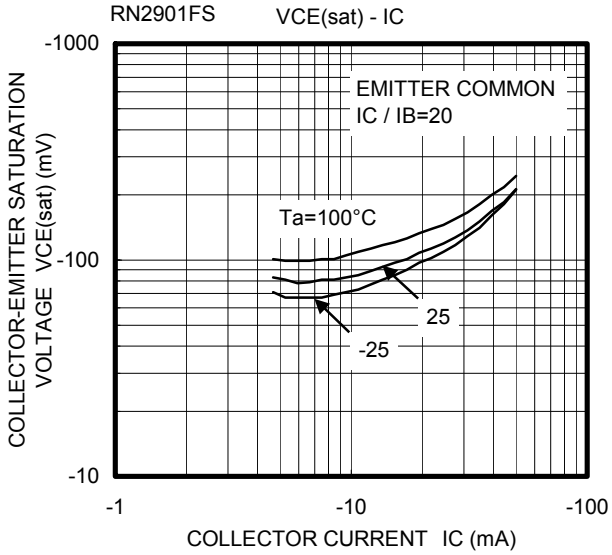
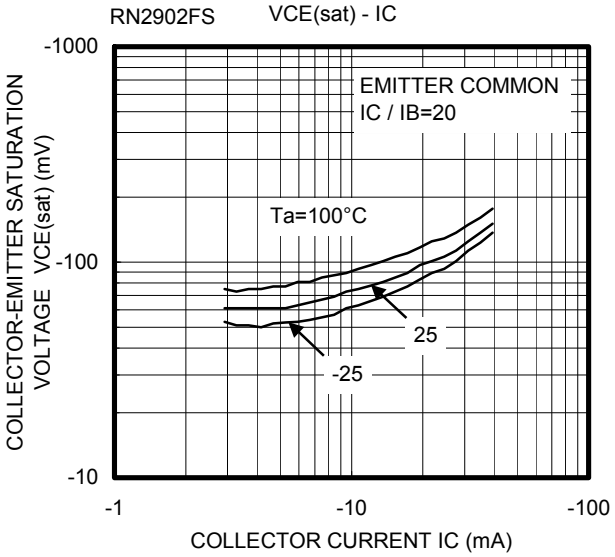
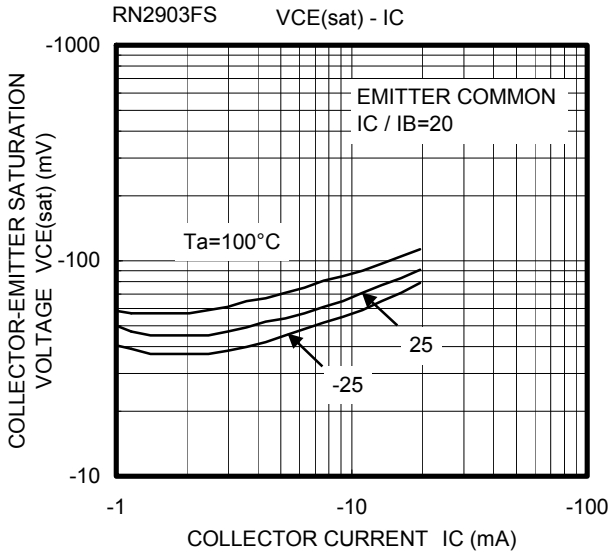
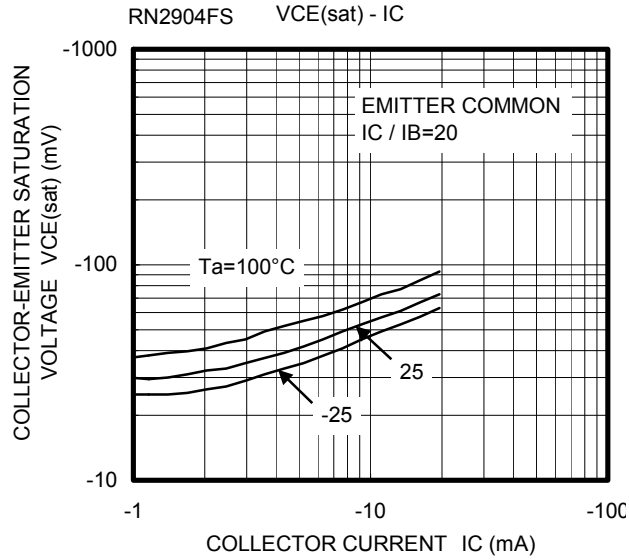
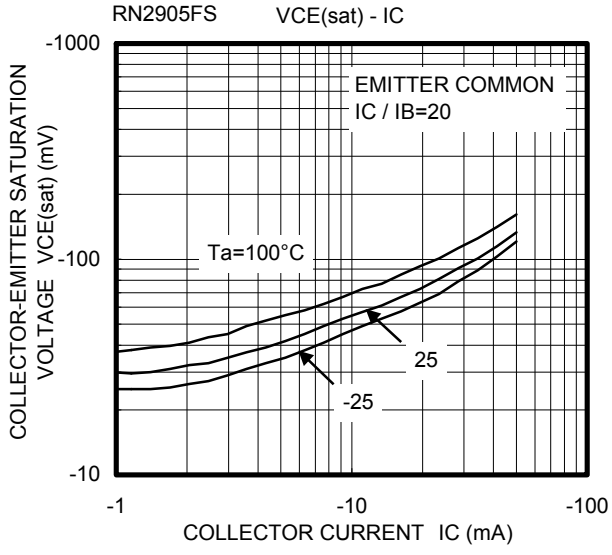


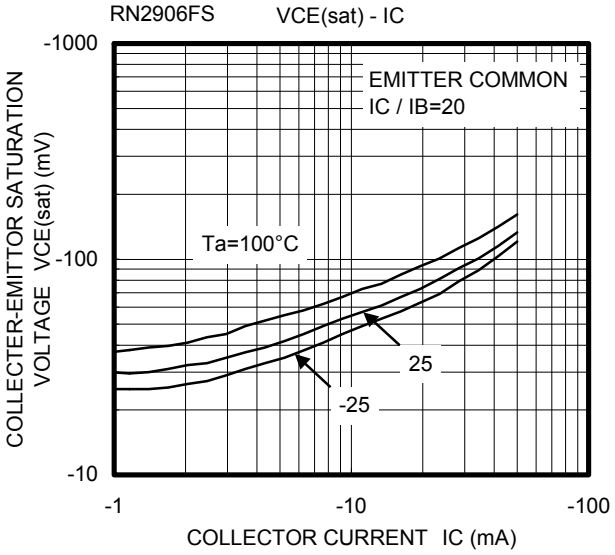

RN2901FS VCE(sat) - IC
EMITTER COMMON
IC / IB=20
Ta=100°C
25
-25
COLLECTOR-EMITTER SATURATION VOLTAGE VCE(sat) (mV)
-1000
-100
-10
-1
-10
-100
COLLECTOR CURRENT IC (mA)

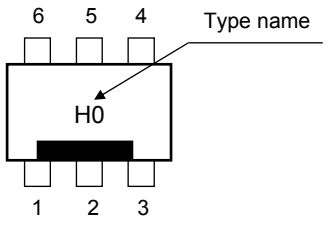
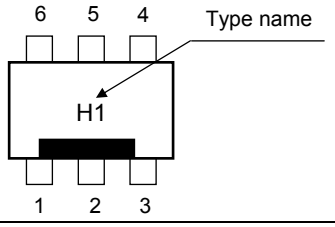
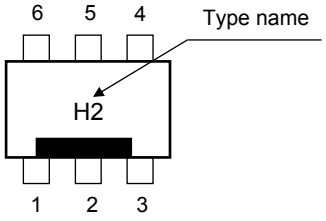
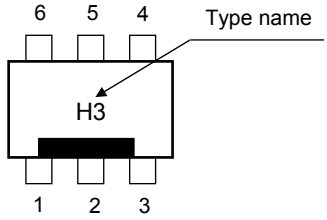
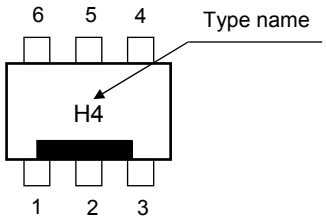
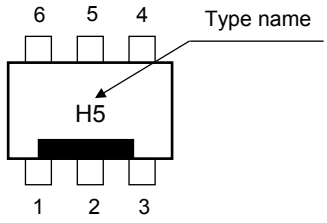

RN2902FS VCE(sat) - IC
EMITTER COMMON
IC / IB=20
Ta=100°C
25
-25
COLLECTOR-EMITTER SATURATION VOLTAGE VCE(sat) (mV)
-1000
-100
-10
-1
-10
-100
COLLECTOR CURRENT IC (mA)


RN2903FS VCE(sat) - IC
EMITTER COMMON
IC / IB=20
Ta=100°C
25
-25
COLLECTOR-EMITTER SATURATION VOLTAGE VCE(sat) (mV)
-1000
-100
-10
-1
-10
-100
COLLECTOR CURRENT IC (mA)


RN2904FS VCE(sat) - IC
EMITTER COMMON
IC / IB=20
Ta=100°C
25
-25
COLLECTOR-EMITTER SATURATION VOLTAGE VCE(sat) (mV)
-1000
-100
-10
-1
-10
-100
COLLECTOR CURRENT IC (mA)


RN2905FS VCE(sat) - IC
EMITTER COMMON
IC / IB=20
Ta=100°C
25
-25
COLLECTOR-EMITTER SATURATION VOLTAGE VCE(sat) (mV)
-1000
-100
-10
-1
-10
-100
COLLECTOR CURRENT IC (mA)


RN2906FS VCE(sat) - IC
EMITTER COMMON
IC / IB=20
Ta=100°C
25
-25
COLLECTER-EMITTOR SATURATION VOLTAGE VCE(sat) (mV)
-1000
-100
-10
-1
-10
-100
COLLECTOR CURRENT IC (mA)

Type Name	Marking
RN2901FS	
RN2902FS	
RN2903FS	
RN2904FS	
RN2905FS	
RN2906FS	

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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