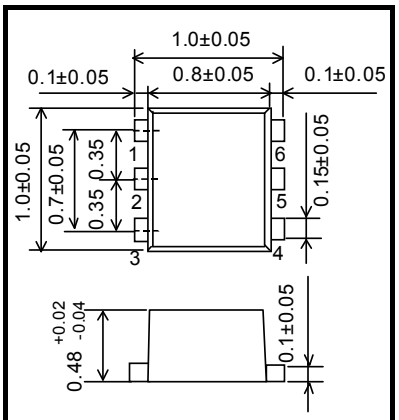
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

RN2961FS,RN2962FS,RN2963FS RN2964FS,RN2965FS,RN2966FS

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 enable the manufacture of ever more compact equipment and save assembly cost.
- Complementary to RN1961FS~RN1966FS

Unit: mm



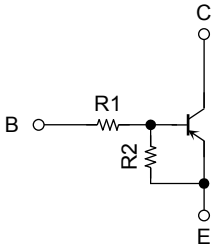
1.EMIITTER1	(E1)
2.EMITTER2	(E2)
3.BASE2	(B2)
4.COLLECTOR2	(C2)
5.BASE1	(B1)
6.COLLECTOR1	(C1)

fS6

JEDEC	—
JEITA	—
TOSHIBA	2-1F1C

Weight: 0.001 g (typ.)

Equivalent Circuit and Bias Resistor Values

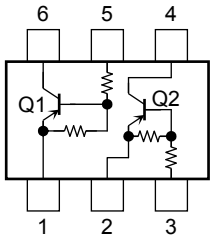


Type No.	R1 (kΩ)	R2 (kΩ)
RN2961FS	4.7	4.7
RN2962FS	10	10
RN2963FS	22	22
RN2964FS	47	47
RN2965FS	2.2	47
RN2966FS	4.7	47

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

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN2961FS~2966FS	V_{CBO}	−20	V
Collector-emitter voltage		V_{CEO}	−20	V
Emitter-base voltage	RN2961FS~2964FS	V_{EBO}	−10	V
	RN2965FS, 2966FS		−5	
Collector current	RN2961FS~2966FS	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)



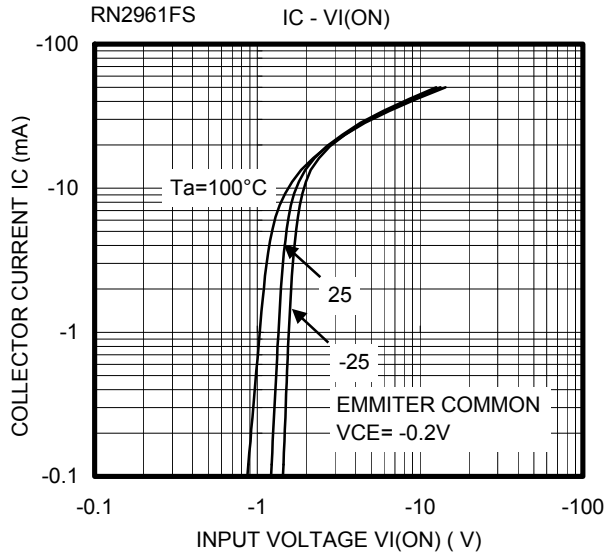
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

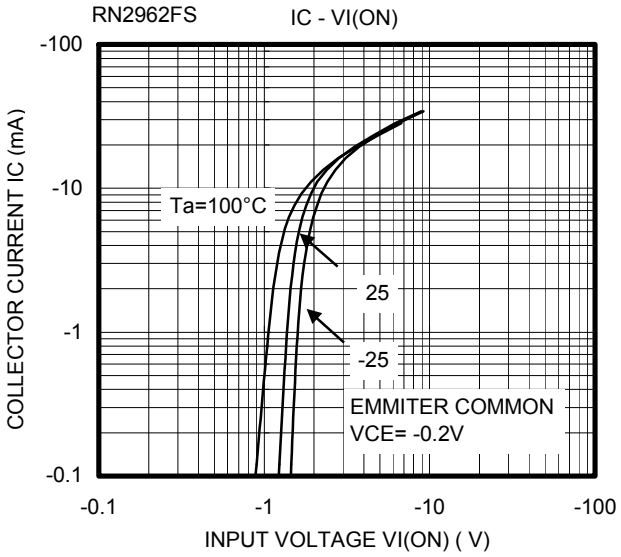
Note 1: Total rating

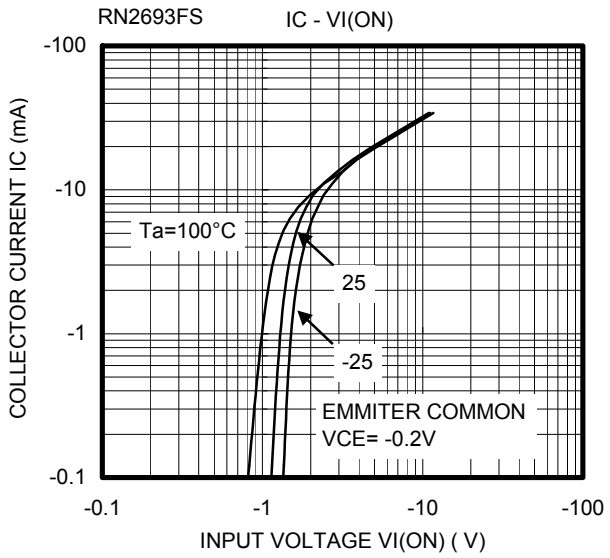
Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

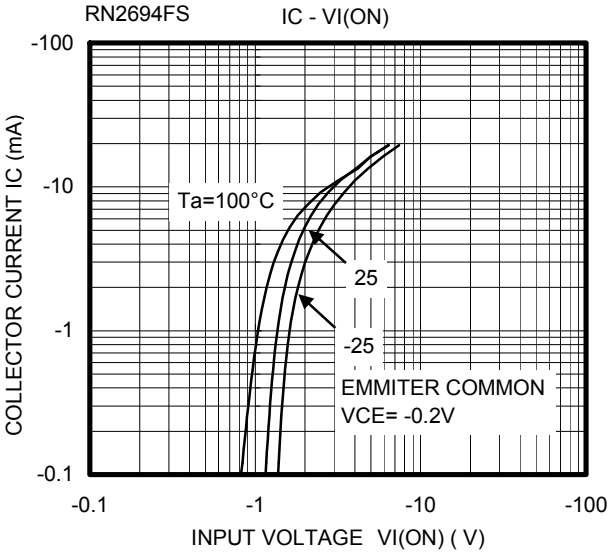
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2961FS~2966FS	I_{CBO}	V_{CB} = –20 V, I_E = 0	—	—	–100	nA
		I_{CEO}	V_{CE} = –20 V, I_B = 0	—	—	–500	
Emitter cut-off current	RN2961FS	I_{EBO}	V_{EB} = –10 V, I_C = 0	–0.89	—	–1.33	mA
	RN2962FS			–0.41	—	–0.63	
	RN2963FS			–0.18	—	–0.29	
	RN2964FS			–0.088	—	–0.133	
	RN2965FS		V_{EB} = –5 V, I_C = 0	–0.085	—	–0.127	
	RN2966FS			–0.08	—	–0.121	
DC current gain	RN2961FS	h_{FE}	V_{CE} = –5 V, I_C = –10 mA	30	—	—	
	RN2962FS			60	—	—	
	RN2963FS			100	—	—	
	RN2964FS			120	—	—	
	RN2965FS			120	—	—	
	RN2966FS			120	—	—	
Collector-emitter saturation voltage	RN2961FS~2966FS	$V_{CE\ (sat)}$	I_C = –5 mA, I_B = –0.25 mA	—	—	–0.15	V
Input voltage (ON)	RN2961FS	$V_{I\ (ON)}$	V_{CE} = –0.2 V, I_C = –5 mA	–1.0	—	–2.0	V
	RN2962FS			–1.0	—	–2.2	
	RN2963FS			–1.1	—	–2.7	
	RN2964FS			–1.2	—	–3.6	
	RN2965FS			–0.6	—	–1.1	
	RN2966FS			–0.6	—	–1.2	
Input voltage (OFF)	RN2961FS~2964FS	$V_{I\ (OFF)}$	V_{CE} = –5 V, I_C = –0.1 mA	–0.8	—	–1.5	V
	RN2965FS, 2966FS			–0.4	—	–0.8	
Collector output capacitance	RN2961FS~2966FS	C_{ob}	V_{CB} = –10 V, I_E = 0, f = 1 MHz	—	1.2	—	pF
Input resistor	RN2961FS	R1	—	3.76	4.7	5.64	kΩ
	RN2962FS			8	10	12	
	RN2963FS			17.6	22	26.4	
	RN2964FS			37.6	47	56.4	
	RN2965FS			1.76	2.2	2.64	
	RN2966FS			3.76	4.7	5.64	
Resistor ratio	RN2961FS~2964FS	R1/R2	—	0.8	1.0	1.2	
	RN2965FS			0.0376	0.0468	0.0562	
	RN2966FS			0.08	0.1	0.12	

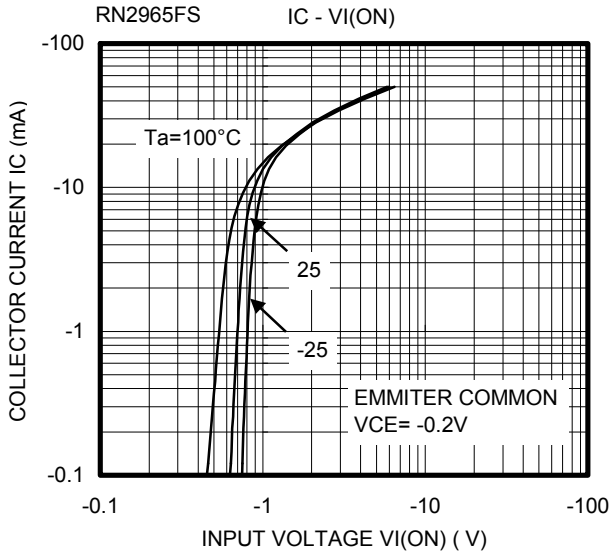
(Q1,Q2 common)

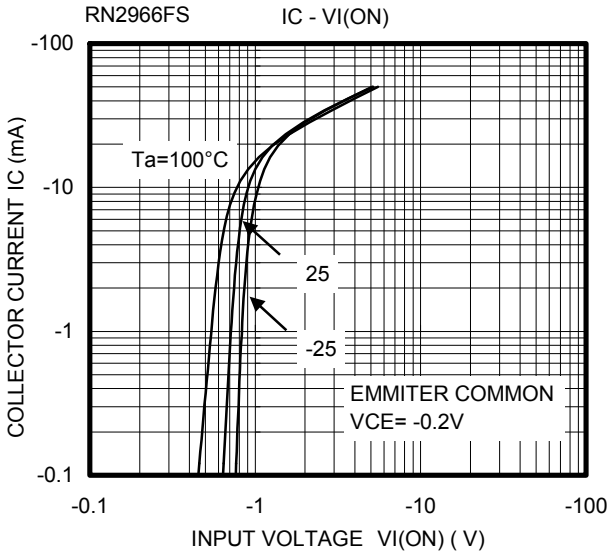

RN2961FS
IC - VI(ON)
COLLECTOR CURRENT IC (mA)
-100
-10
-1
-0.1
Ta=100°C
25
-25
EMMITER COMMON
VCE= -0.2V
-0.1
-1
-10
-100
INPUT VOLTAGE VI(ON) (V)


RN2962FS
IC - VI(ON)
COLLECTOR CURRENT IC (mA)
-100
-10
-1
-0.1
Ta=100°C
25
-25
EMMITER COMMON
VCE= -0.2V
-0.1
-1
-10
-100
INPUT VOLTAGE VI(ON) (V)


RN2693FS
IC - VI(ON)
COLLECTOR CURRENT IC (mA)
-100
-10
-1
-0.1
Ta=100°C
25
-25
EMMITER COMMON
VCE= -0.2V
-0.1
-1
-10
-100
INPUT VOLTAGE VI(ON) (V)

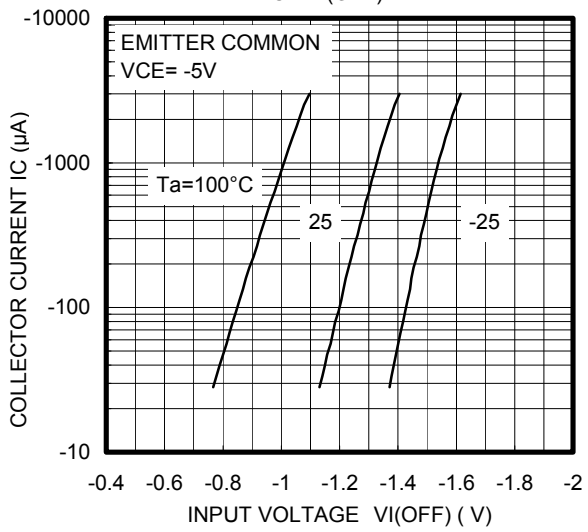

RN2694FS
IC - VI(ON)
COLLECTOR CURRENT IC (mA)
-100
-10
-1
-0.1
Ta=100°C
25
-25
EMMITER COMMON
VCE= -0.2V
-0.1
-1
-10
-100
INPUT VOLTAGE VI(ON) (V)


RN2965FS
IC - VI(ON)
COLLECTOR CURRENT IC (mA)
-100
-10
-1
-0.1
Ta=100°C
25
-25
EMMITER COMMON
VCE= -0.2V
-0.1
-1
-10
-100
INPUT VOLTAGE VI(ON) (V)

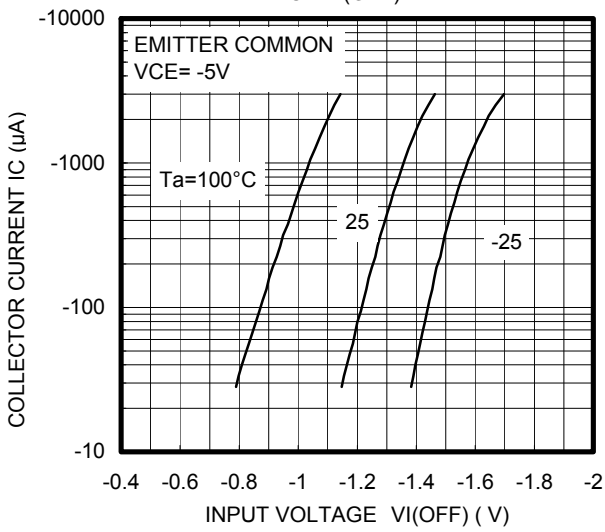

RN2966FS
IC - VI(ON)
COLLECTOR CURRENT IC (mA)
-100
-10
-1
-0.1
Ta=100°C
25
-25
EMMITER COMMON
VCE= -0.2V
-0.1
-1
-10
-100
INPUT VOLTAGE VI(ON) (V)

(Q1,Q2 common)

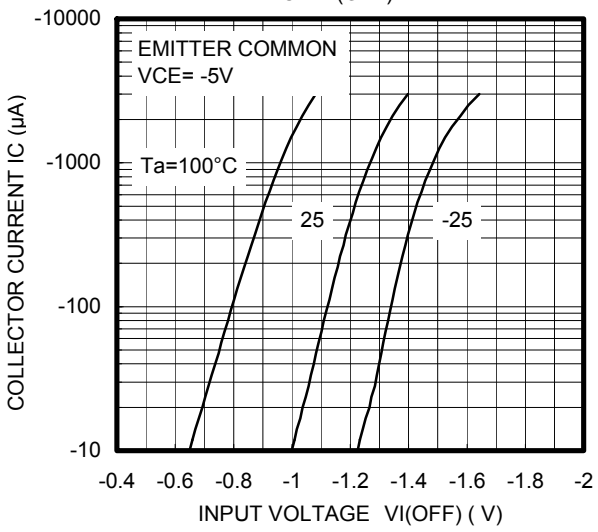
RN2961FS IC - VI(OFF)



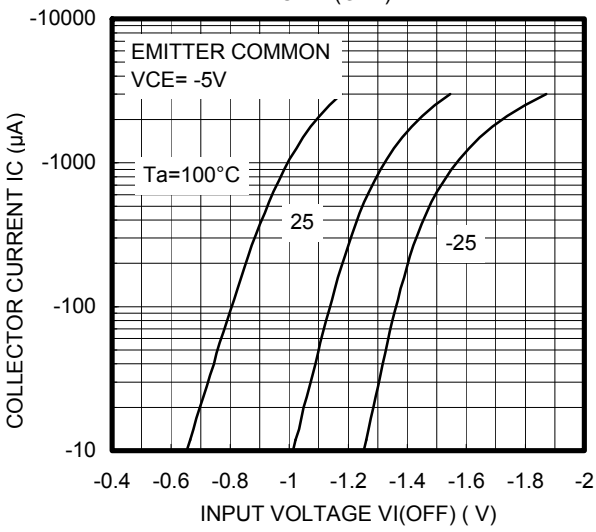
RN2962FS IC - VI(OFF)



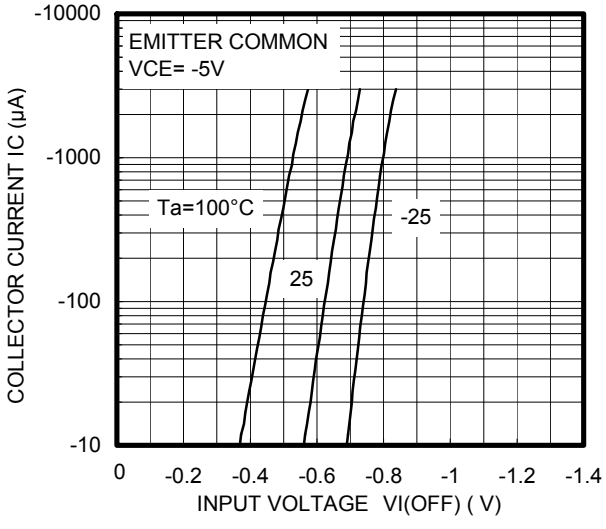
RN2963FS IC - VI(OFF)



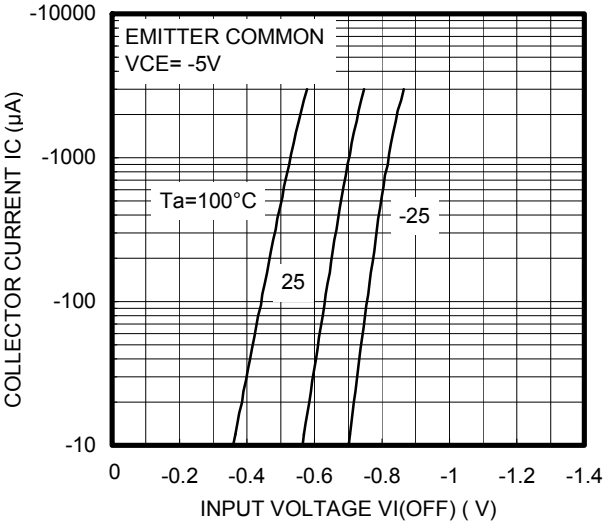
RN2964FS IC - VI(OFF)



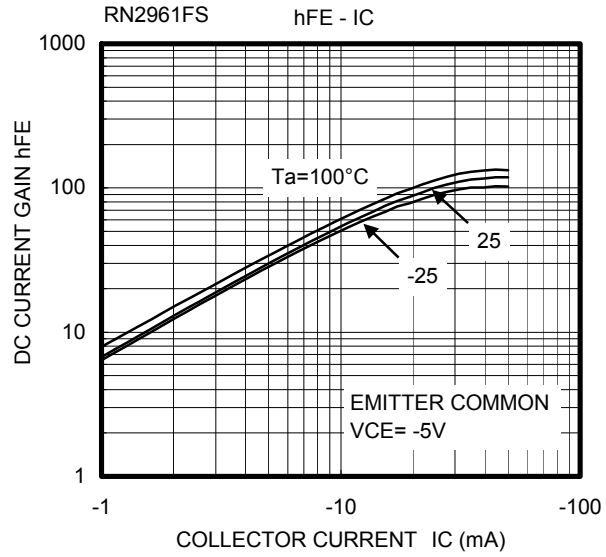
RN2965FS IC - VI(OFF)

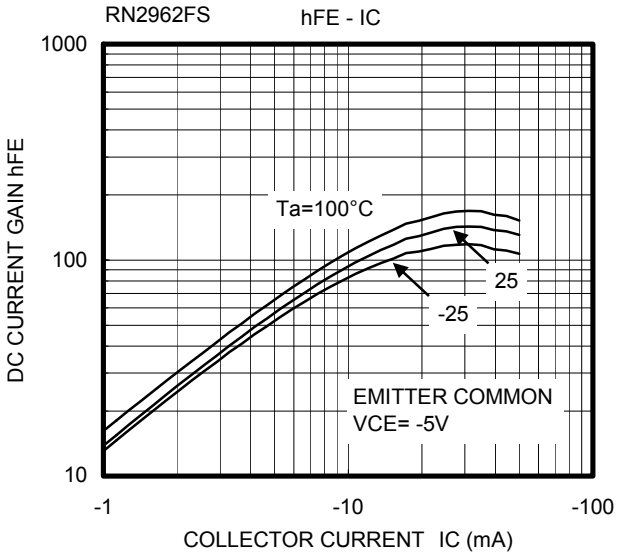


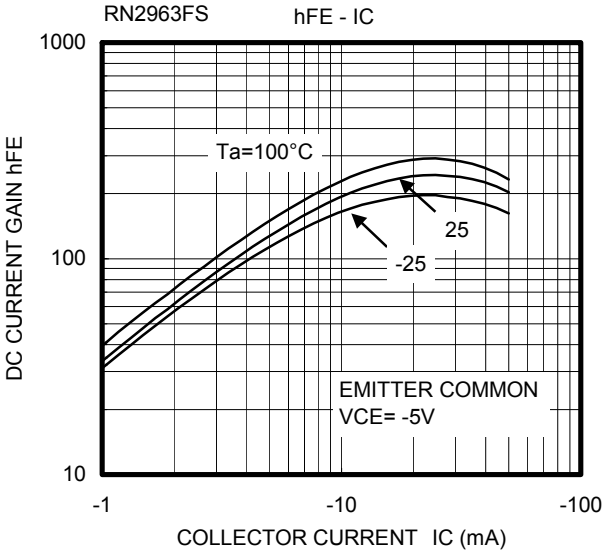
RN2966FS IC - VI(OFF)

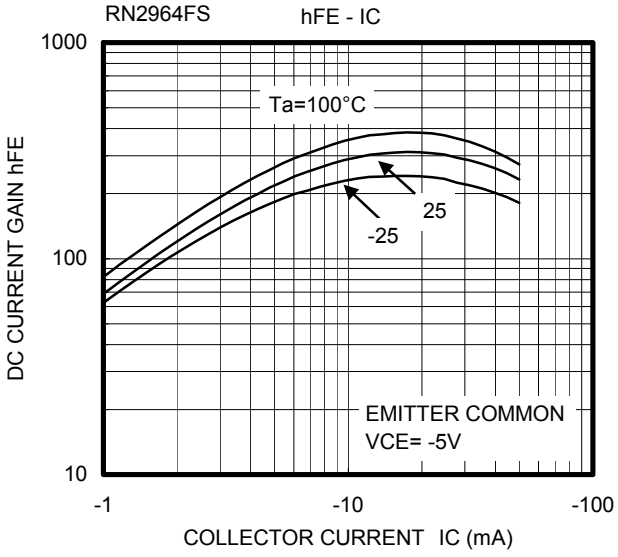


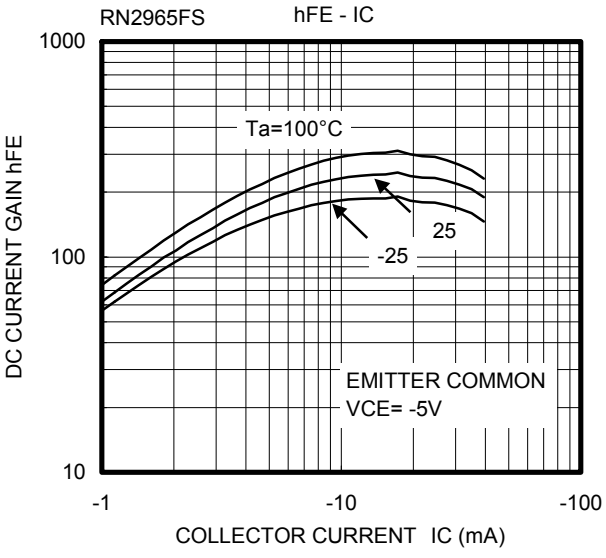
(Q1,Q2 common)

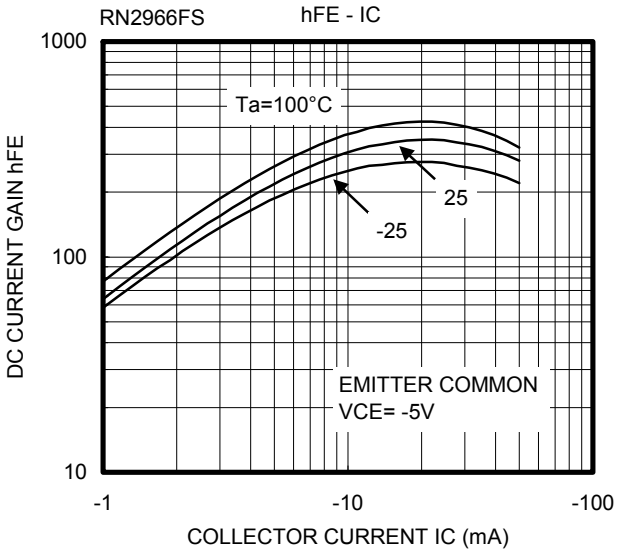

RN2961FS
hFE - IC
1000
100
10
1
DC CURRENT GAIN hFE
Ta=100°C
25
-25
EMITTER COMMON
VCE= -5V
-1
-10
-100
COLLECTOR CURRENT IC (mA)


RN2962FS
hFE - IC
1000
100
10
DC CURRENT GAIN hFE
Ta=100°C
25
-25
EMITTER COMMON
VCE= -5V
-1
-10
-100
COLLECTOR CURRENT IC (mA)

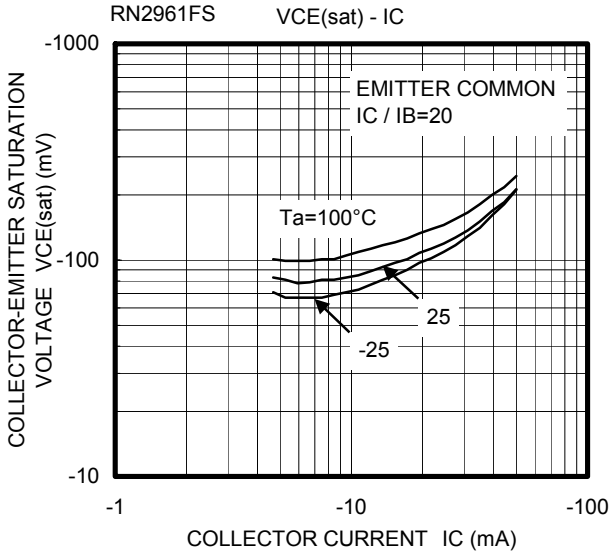

RN2963FS
hFE - IC
1000
100
10
DC CURRENT GAIN hFE
Ta=100°C
25
-25
EMITTER COMMON
VCE= -5V
-1
-10
-100
COLLECTOR CURRENT IC (mA)

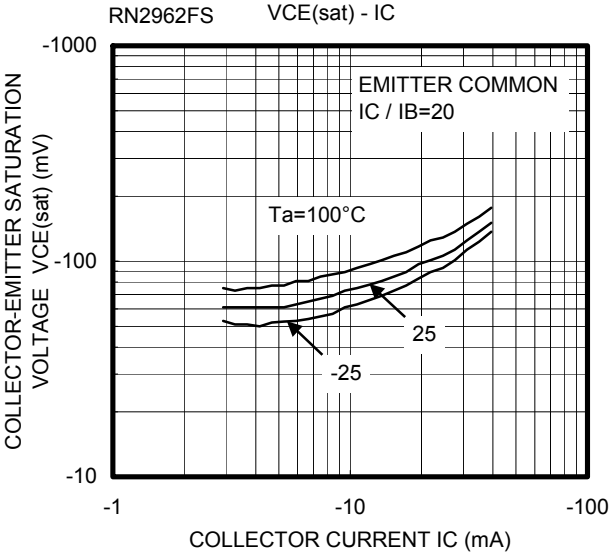

RN2964FS
hFE - IC
1000
100
10
DC CURRENT GAIN hFE
Ta=100°C
25
-25
EMITTER COMMON
VCE= -5V
-1
-10
-100
COLLECTOR CURRENT IC (mA)

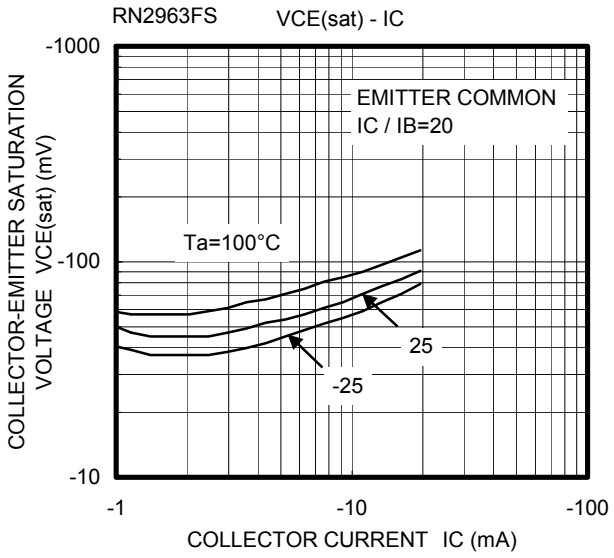

RN2965FS
hFE - IC
1000
100
10
DC CURRENT GAIN hFE
Ta=100°C
25
-25
EMITTER COMMON
VCE= -5V
-1
-10
-100
COLLECTOR CURRENT IC (mA)

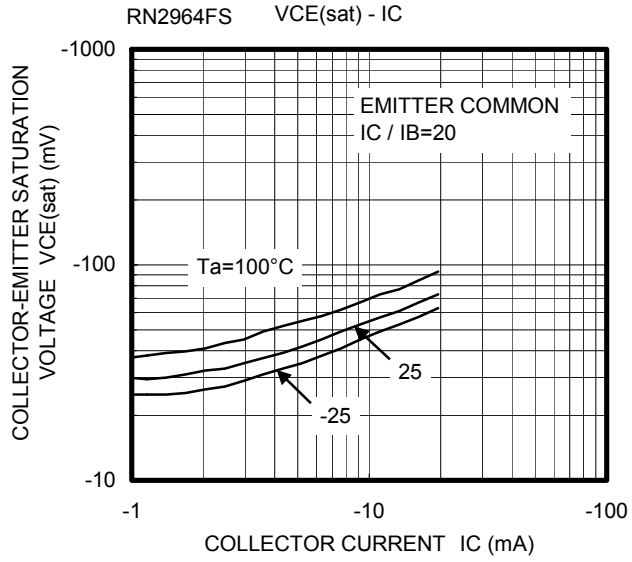

RN2966FS
hFE - IC
1000
100
10
DC CURRENT GAIN hFE
Ta=100°C
25
-25
EMITTER COMMON
VCE= -5V
-1
-10
-100
COLLECTOR CURRENT IC (mA)

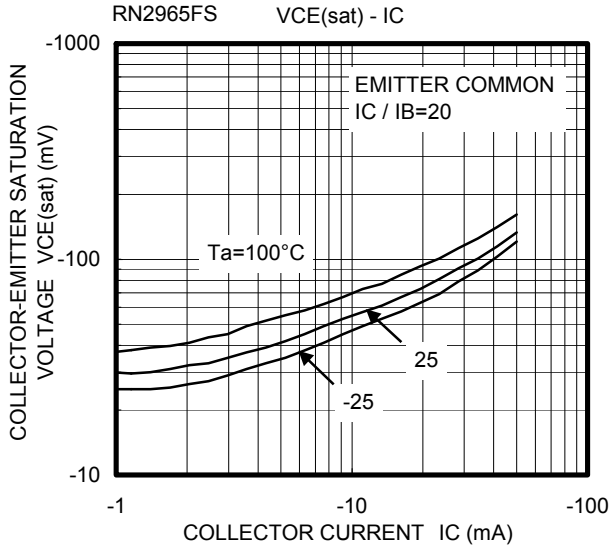
(Q1,Q2 common)

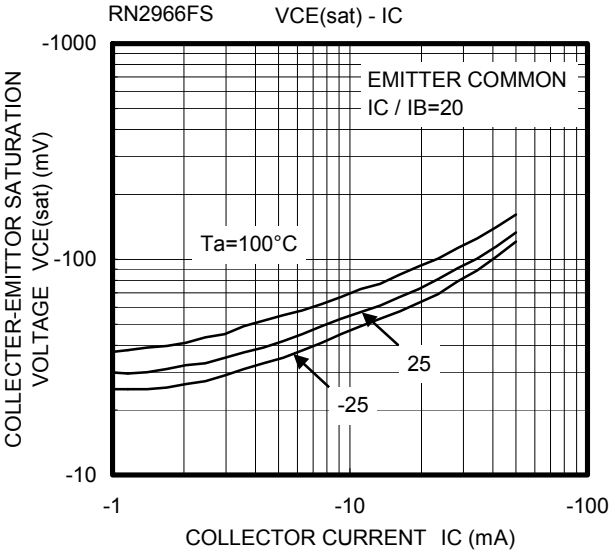

RN2961FS VCE(sat) - IC
EMITTER COMMON
IC / IB=20
Ta=100°C
25
-25
COLLECTOR-EMITTER SATURATION VOLTAGE VCE(sat) (mV)
COLLECTOR CURRENT IC (mA)
-1000
-100
-10
-1
-10
-100

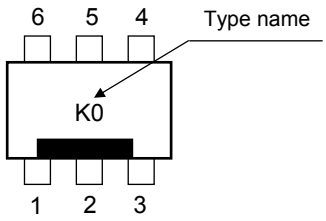
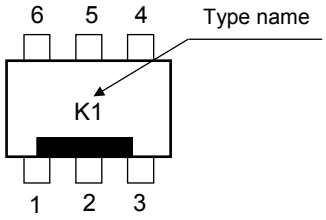
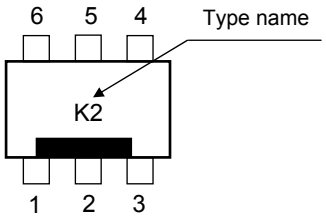
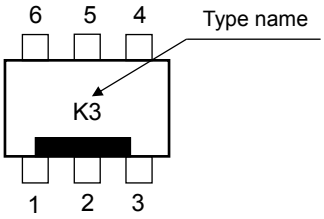
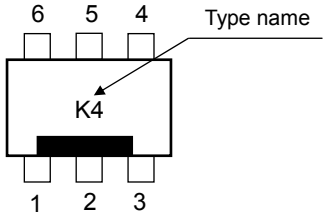
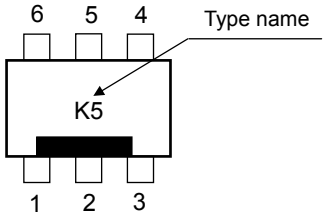

RN2962FS VCE(sat) - IC
EMITTER COMMON
IC / IB=20
Ta=100°C
25
-25
COLLECTOR-EMITTER SATURATION VOLTAGE VCE(sat) (mV)
COLLECTOR CURRENT IC (mA)
-1000
-100
-10
-1
-10
-100


RN2963FS VCE(sat) - IC
EMITTER COMMON
IC / IB=20
Ta=100°C
25
-25
COLLECTOR-EMITTER SATURATION VOLTAGE VCE(sat) (mV)
COLLECTOR CURRENT IC (mA)
-1000
-100
-10
-1
-10
-100


RN2964FS VCE(sat) - IC
EMITTER COMMON
IC / IB=20
Ta=100°C
25
-25
COLLECTOR-EMITTER SATURATION VOLTAGE VCE(sat) (mV)
COLLECTOR CURRENT IC (mA)
-1000
-100
-10
-1
-10
-100


RN2965FS VCE(sat) - IC
EMITTER COMMON
IC / IB=20
Ta=100°C
25
-25
COLLECTOR-EMITTER SATURATION VOLTAGE VCE(sat) (mV)
COLLECTOR CURRENT IC (mA)
-1000
-100
-10
-1
-10
-100


RN2966FS VCE(sat) - IC
EMITTER COMMON
IC / IB=20
Ta=100°C
25
-25
COLLECTER-EMITTOR SATURATION VOLTAGE VCE(sat) (mV)
COLLECTOR CURRENT IC (mA)
-1000
-100
-10
-1
-10
-100

Type Name	Marking
RN2961FS	
RN2962FS	
RN2963FS	
RN2964FS	
RN2965FS	
RN2966FS	

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.

RESTRICTIONS ON PRODUCT USE

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