

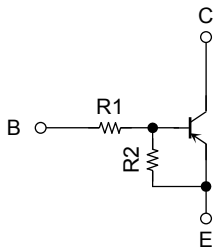
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

## RN2961FS, RN2962FS, RN2963FS RN2964FS, RN2965FS, RN2966FS

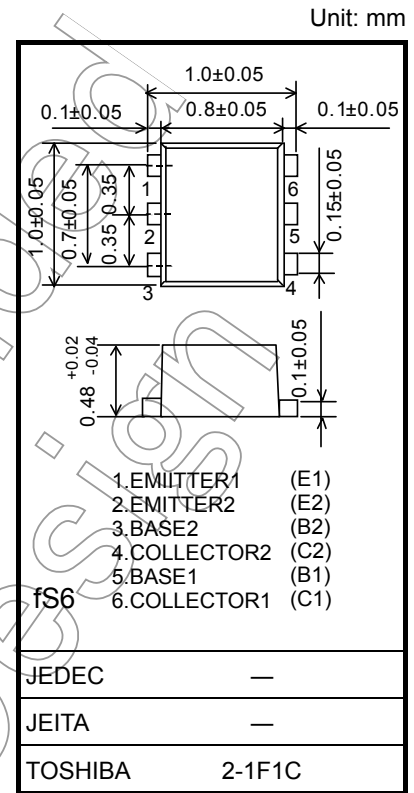
Switching, Inverter Circuit, Interface Circuit and  
Driver Circuit Applications

- 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

### 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

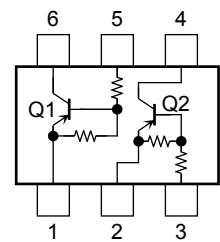


Weight: 0.001 g (typ.)

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

Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	-20	V
Collector-emitter voltage	$V_{CEO}$	-20	V
Emitter-base voltage	$V_{EBO}$	-10	V
		-5	
Collector current	$I_C$	-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.

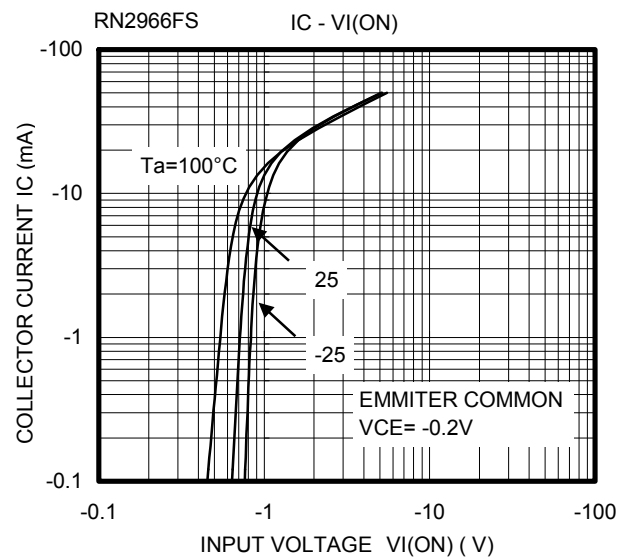
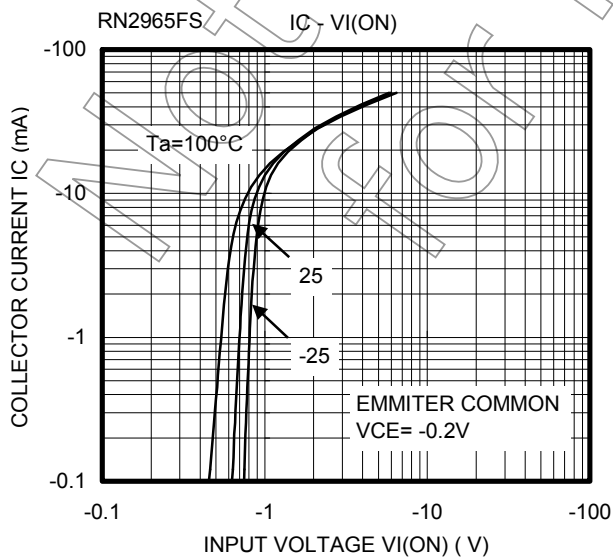
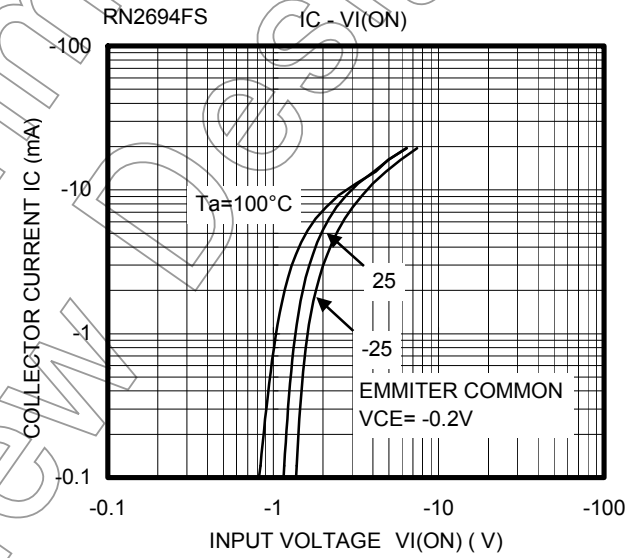
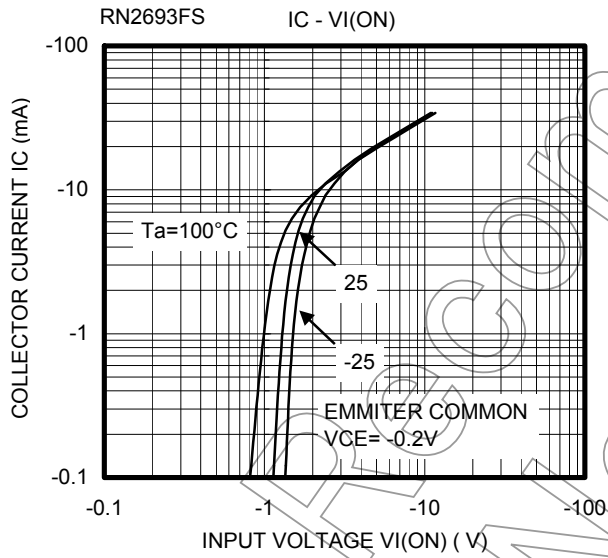
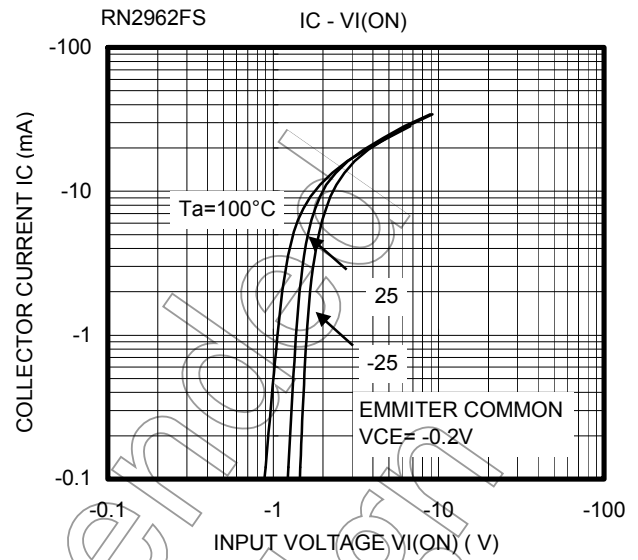
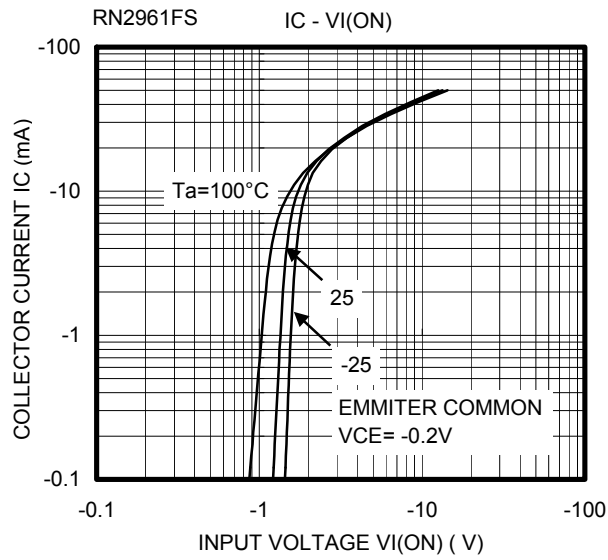
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: Total rating

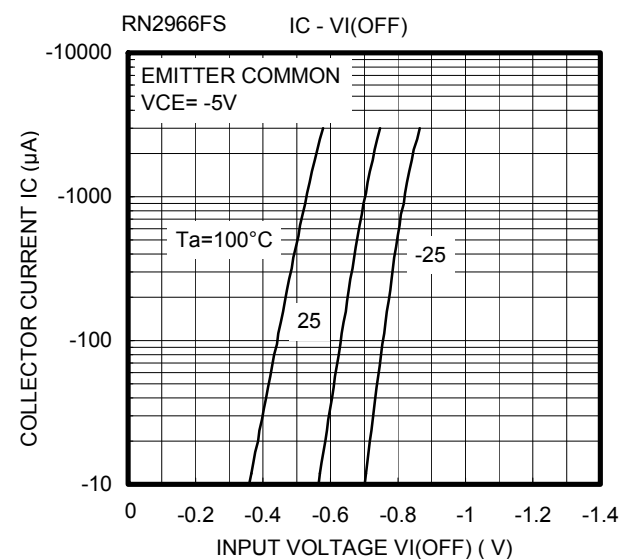
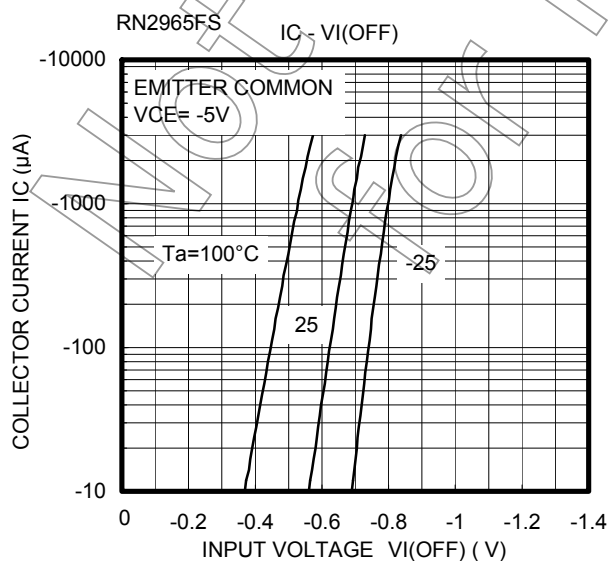
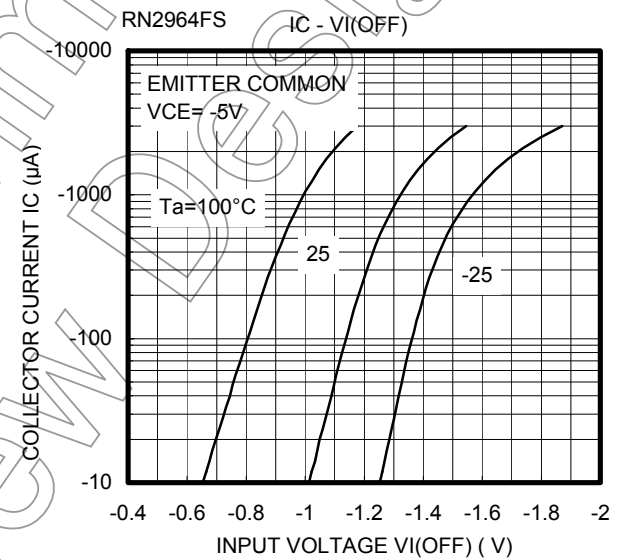
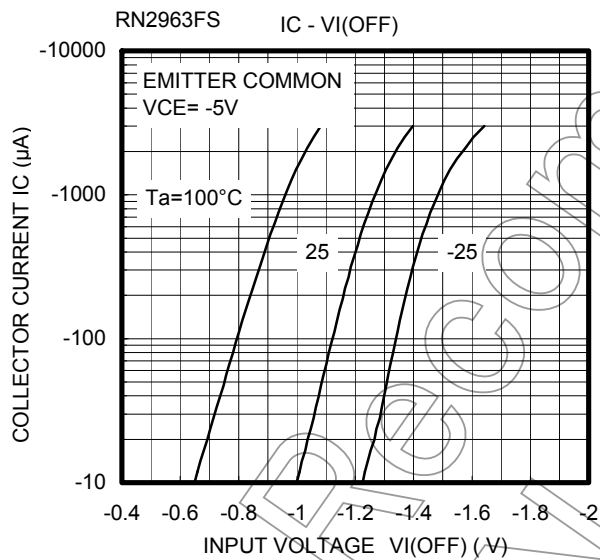
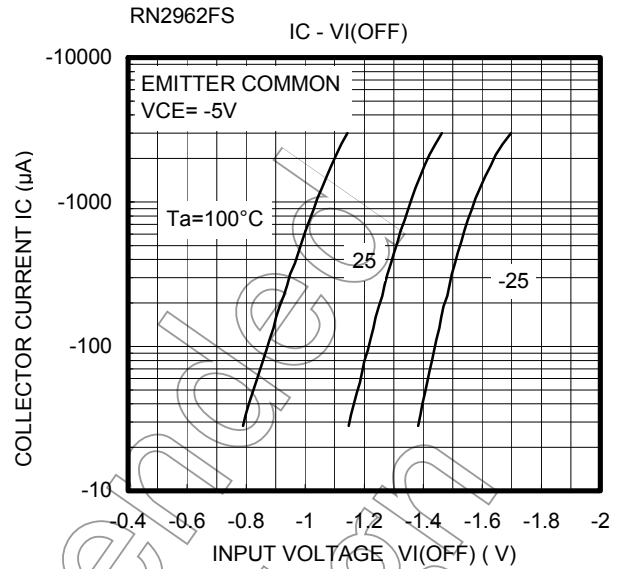
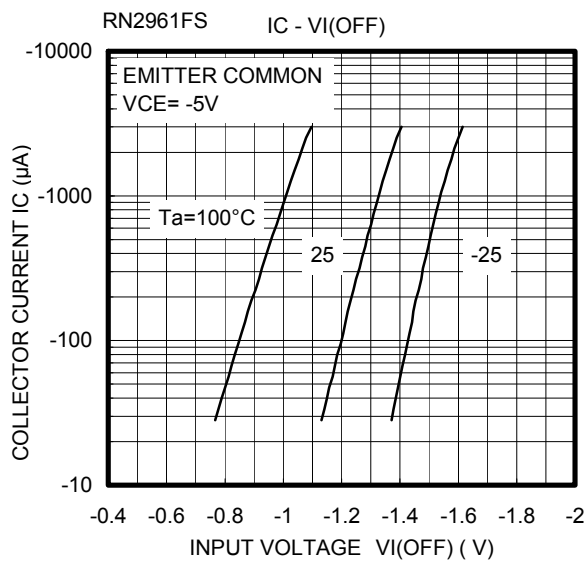
## Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2961FS~2966FS	$I_{CBO}$	$V_{CB} = -20\text{ V}, I_E = 0$	—	—	-100	nA
		$I_{CEO}$	$V_{CE} = -20\text{ V}, I_B = 0$	—	—	-500	
Emitter cut-off current	RN2961FS	$I_{EBO}$	$V_{EB} = -10\text{ V}, I_C = 0$	-0.89	—	-1.33	mA
	RN2962FS			-0.41	—	-0.63	
	RN2963FS			-0.18	—	-0.29	
	RN2964FS		-0.088	—	-0.133		
	RN2965FS		$V_{EB} = -5\text{ V}, I_C = 0$	-0.085	—	-0.127	
	RN2966FS			-0.08	—	-0.121	
DC current gain	RN2961FS	$h_{FE}$	$V_{CE} = -5\text{ V}, I_C = -10\text{ mA}$	30	—	—	
	RN2962FS			60	—	—	
	RN2963FS			100	—	—	
	RN2964FS			120	—	—	
	RN2965FS			120	—	—	
	RN2966FS			120	—	—	
Collector-emitter saturation voltage	RN2961FS~2966FS	$V_{CE(sat)}$	$I_C = -5\text{ mA}, I_B = -0.25\text{ mA}$	—	—	-0.15	V
Input voltage (ON)	RN2961FS	$V_I(ON)$	$V_{CE} = -0.2\text{ V}, I_C = -5\text{ mA}$	-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	$V_I(OFF)$	$V_{CE} = -5\text{ V}, I_C = -0.1\text{ mA}$	-0.8	—	-1.5	V
	RN2965FS, 2966FS			-0.4	—	-0.8	
Collector output capacitance	RN2961FS~2966FS	$C_{ob}$	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	1.2	—	pF
Input resistor	RN2961FS	$R_1$	—	3.76	4.7	5.64	k $\Omega$
	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	$R_1/R_2$	—	0.8	1.0	1.2	
	RN2965FS			0.0376	0.0468	0.0562	
	RN2966FS			0.08	0.1	0.12	

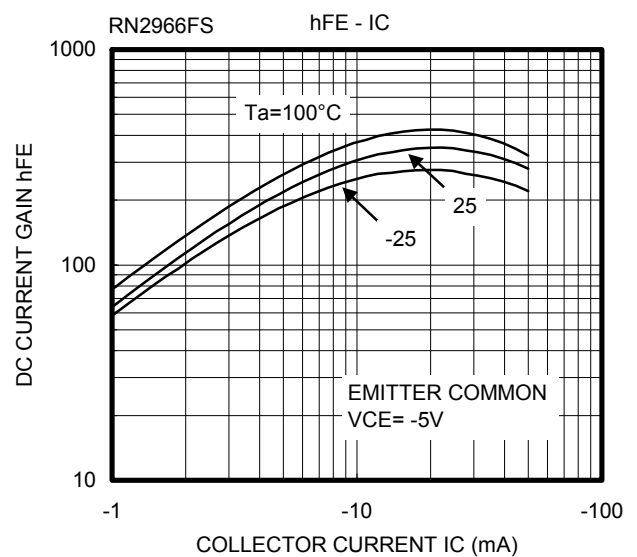
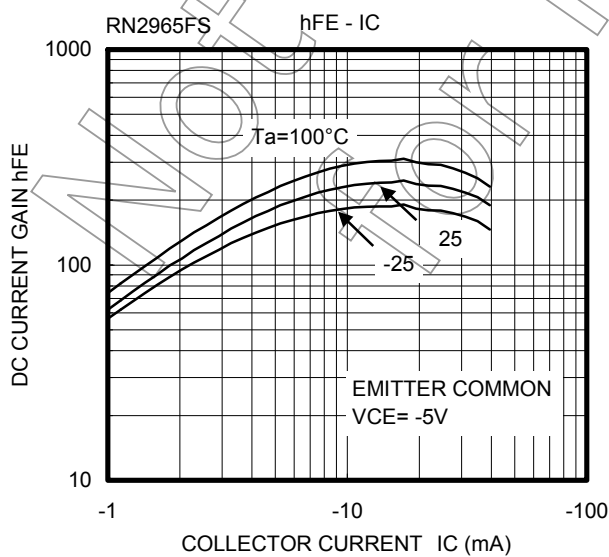
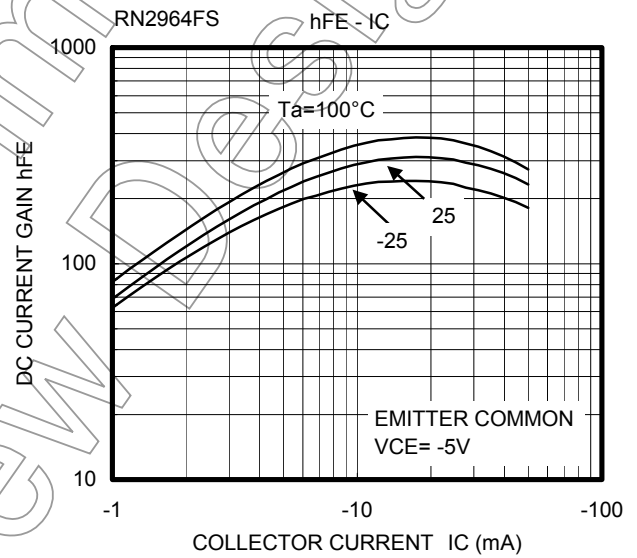
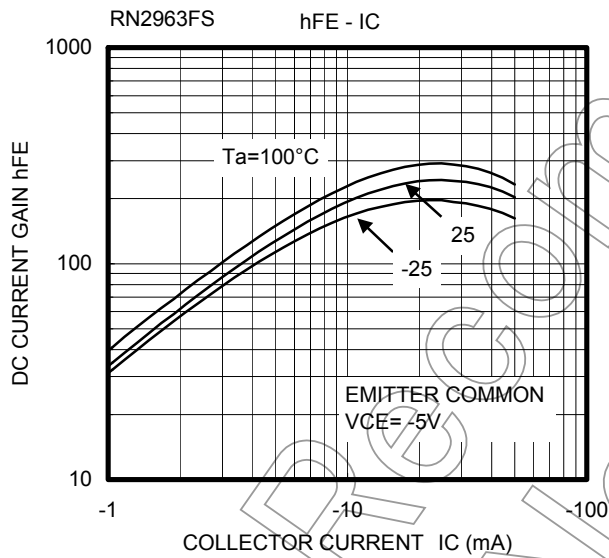
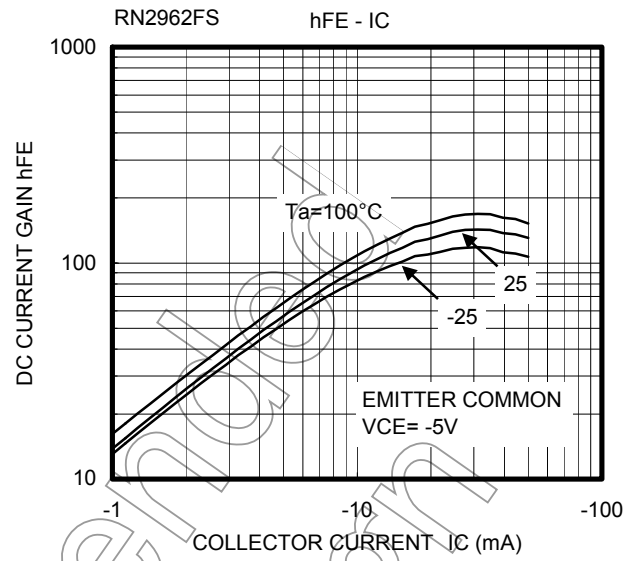
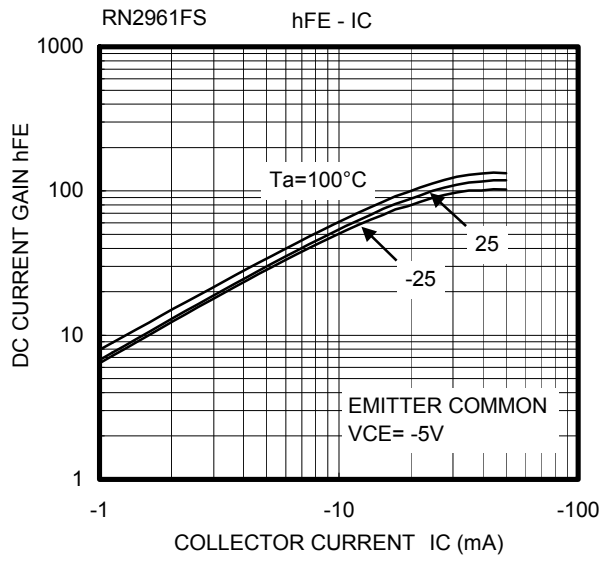
(Q1,Q2 common)



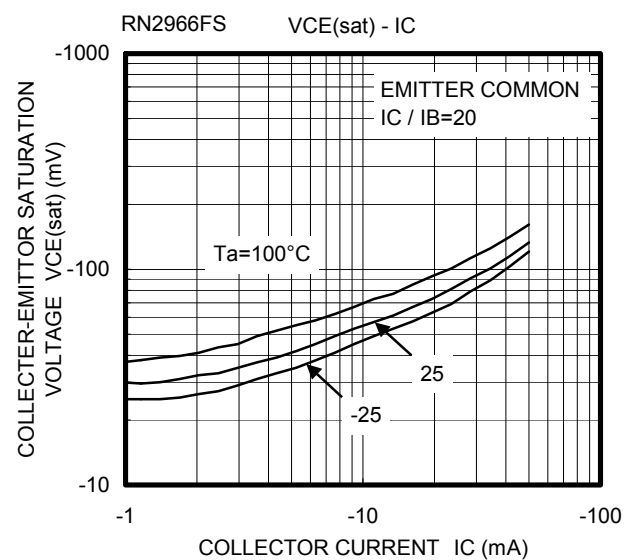
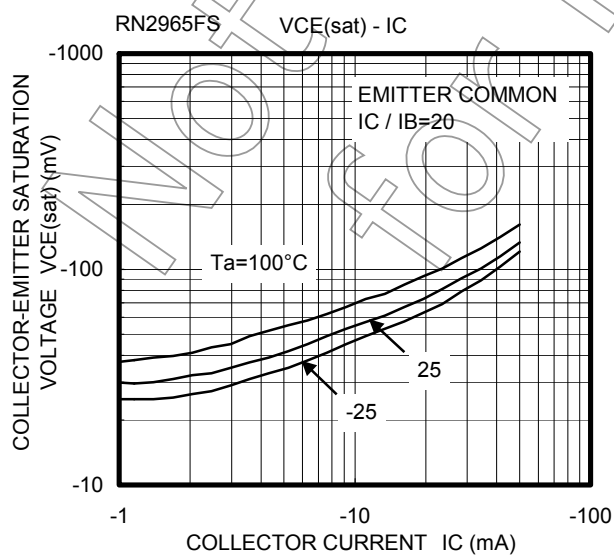
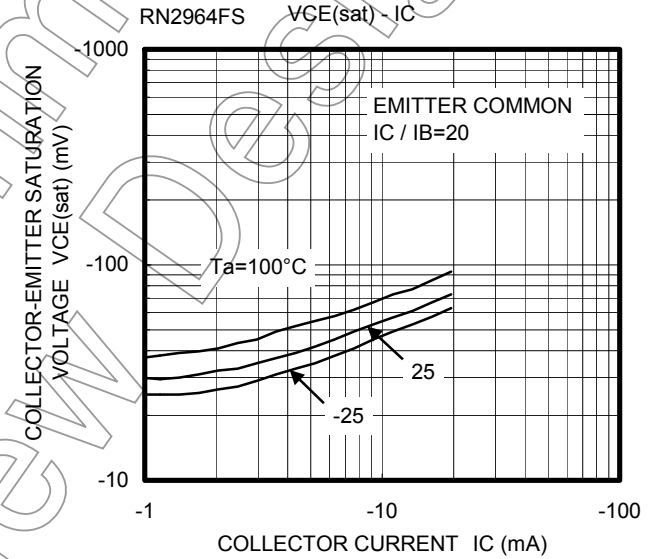
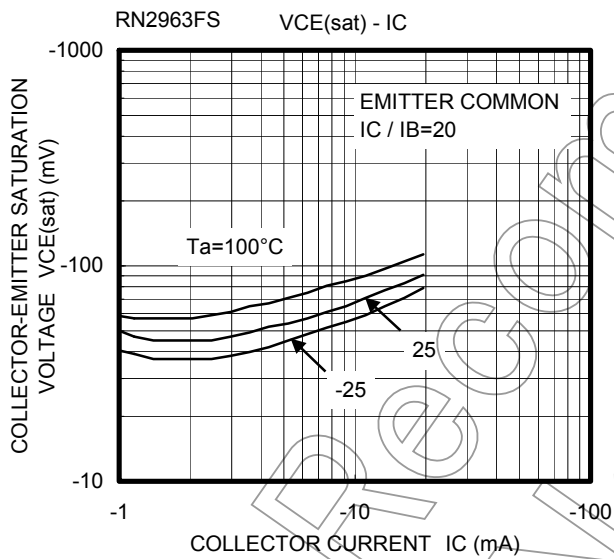
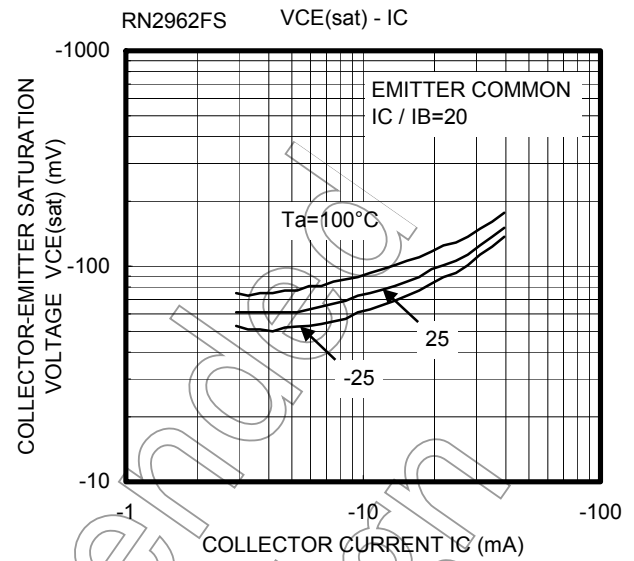
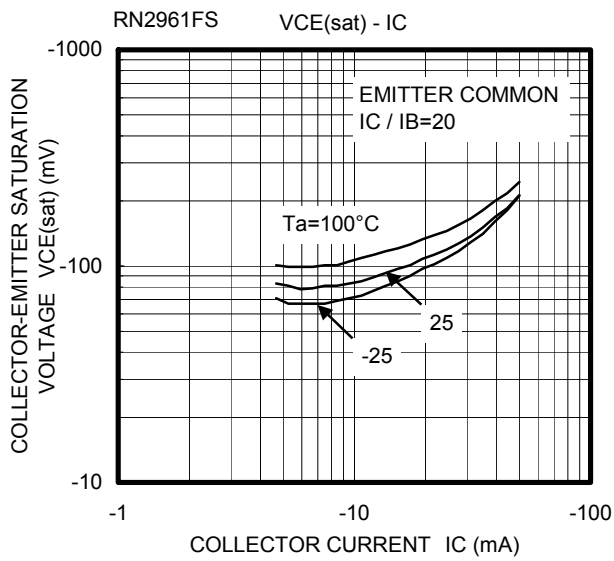
(Q1,Q2 common)

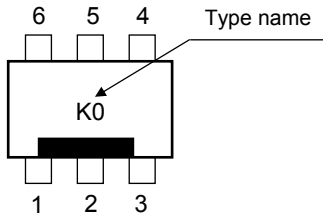
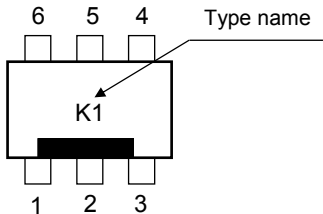
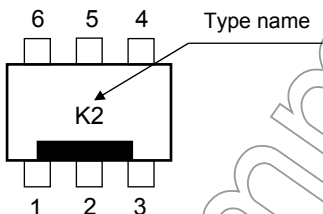
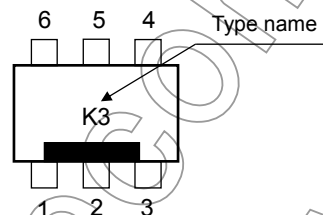
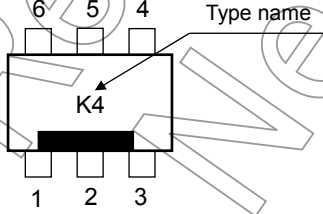
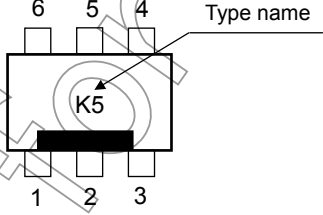


(Q1,Q2 common)



(Q1,Q2 common)



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.

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