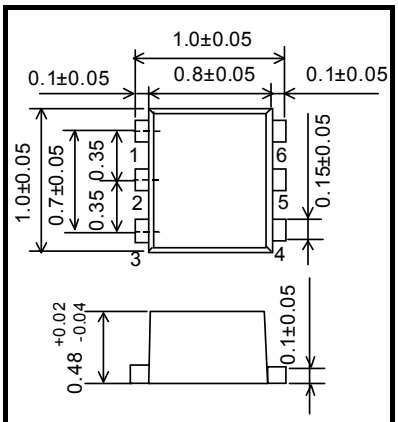
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

RN1961FS,RN1962FS,RN1963FS RN1964FS,RN1965FS,RN1966FS

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 RN2961FS~RN2966FS

Unit: mm



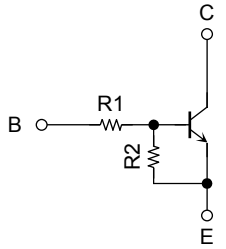
1.EMIITTER1 (E1)
2.EMITTER2 (E2)
3.BASE2 (B2)
4.COLLECTOR2 (C2)
5.BASE1 (B1)
6.COLLECTOR1 (C1)

fS6

JEDEC	—
JEITA	—
TOSHIBA	2-1F1C

Weight: 0.001 g (typ.)

Equivalent Circuit and Bias Resistor Values

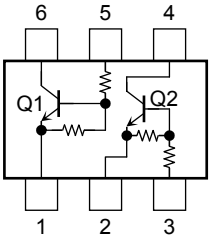


Type No.	R1 (kΩ)	R2 (kΩ)
RN1961FS	4.7	4.7
RN1962FS	10	10
RN1963FS	22	22
RN1964FS	47	47
RN1965FS	2.2	47
RN1966FS	4.7	47

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

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN1961FS~1966FS	V_{CBO}	20	V
Collector-emitter voltage		V_{CEO}	20	V
Emitter-base voltage	RN1961FS~1964FS	V_{EBO}	10	V
	RN1965FS, 1966FS		5	
Collector current	RN1961FS~RN1966FS	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).

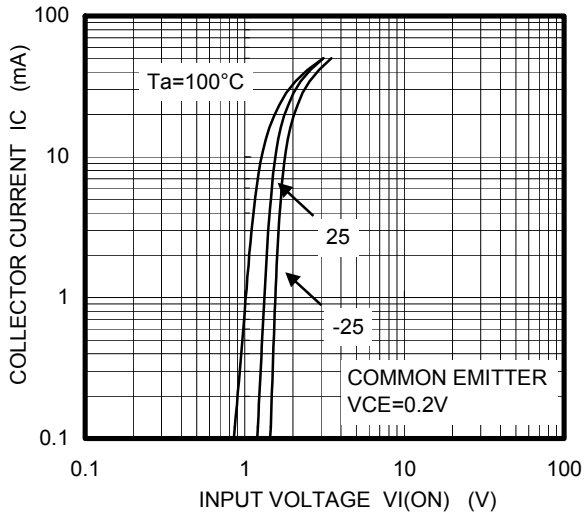
Note 1: Total rating

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

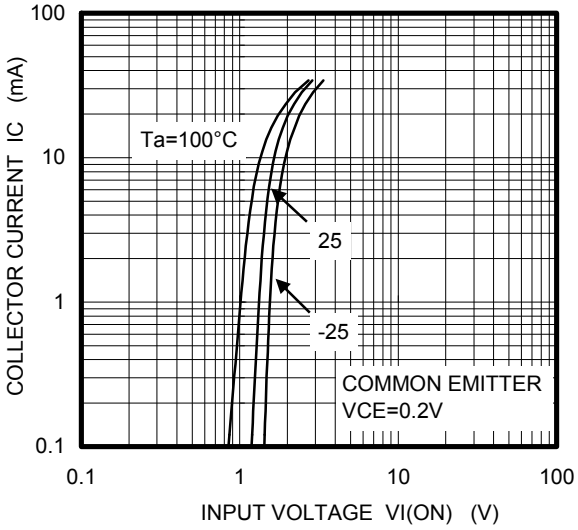
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1961FS~1966FS	I_{CBO}	V_{CB} = 20 V, I_E = 0	—	—	100	nA
		I_{CEO}	V_{CE} = 20 V, I_B = 0	—	—	500	
Emitter cut-off current	RN1961FS	I_{EBO}	V_{EB} = 10 V, I_C = 0	0.89	—	1.33	mA
	RN1962FS			0.41	—	0.63	
	RN1963FS			0.18	—	0.29	
	RN1964FS			0.088	—	0.133	
	RN1965FS		V_{EB} = 5 V, I_C = 0	0.085	—	0.127	
	RN1966FS			0.08	—	0.121	
DC current gain	RN1961FS	h_{FE}	V_{CE} = 5 V, I_C = 10 mA	30	—	—	
	RN1962FS			60	—	—	
	RN1963FS			100	—	—	
	RN1964FS			120	—	—	
	RN1965FS			120	—	—	
	RN1966FS			120	—	—	
Collector-emitter saturation voltage	RN1961FS~1966FS	$V_{CE\ (sat)}$	I_C = 5 mA, I_B = 0.25 mA	—	—	0.15	V
Input voltage (ON)	RN1961FS	$V_{I\ (ON)}$	V_{CE} = 0.2 V, I_C = 5 mA	1.0	—	2.0	V
	RN1962FS			1.0	—	2.2	
	RN1963FS			1.1	—	2.7	
	RN1964FS			1.2	—	3.6	
	RN1965FS			0.6	—	1.1	
	RN1966FS			0.6	—	1.2	
Input voltage (OFF)	RN1961FS~1964FS	$V_{I\ (OFF)}$	V_{CE} = 5 V, I_C = 0.1 mA	0.8	—	1.5	V
	RN1965FS, 1966FS			0.4	—	0.8	
Collector output capacitance	RN1961FS~1966FS	C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1 MHz	—	1.2	—	pF
Input resistor	RN1961FS	R1	—	3.76	4.7	5.64	kΩ
	RN1962FS			8	10	12	
	RN1963FS			17.6	22	26.4	
	RN1964FS			37.6	47	56.4	
	RN1965FS			1.76	2.2	2.64	
	RN1966FS			3.76	4.7	5.64	
Resistor ratio	RN1961FS~1964FS	R1/R2	—	0.8	1.0	1.2	
	RN1965FS			0.0376	0.0468	0.0562	
	RN1966FS			0.08	0.1	0.12	

(Q1,Q2 common)

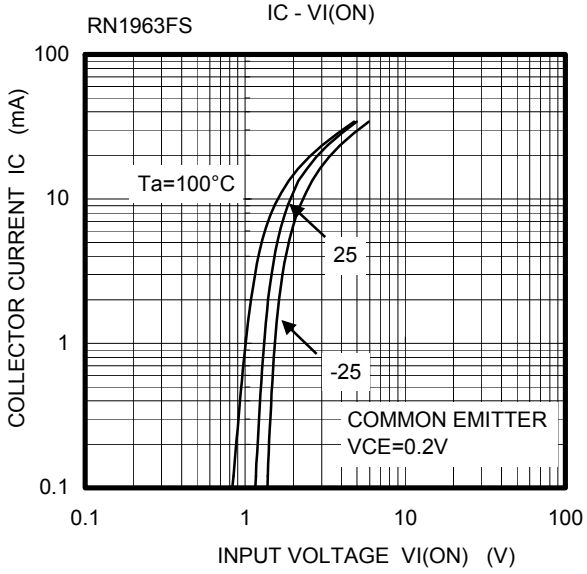
RN1961FS IC - VI(ON)



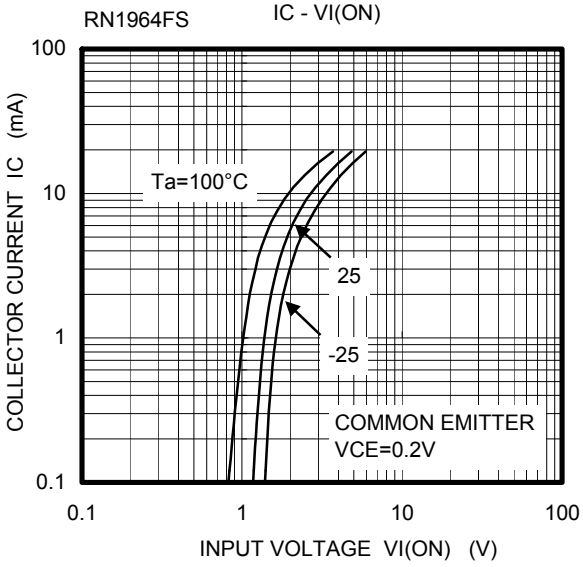
RN1962FS IC - VI(ON)



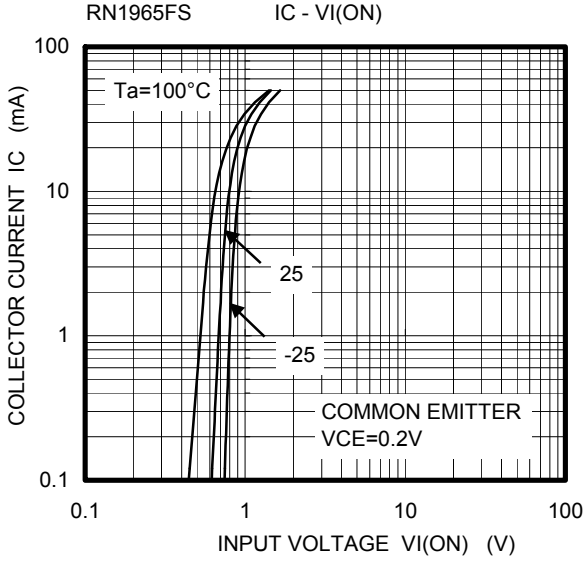
RN1963FS IC - VI(ON)



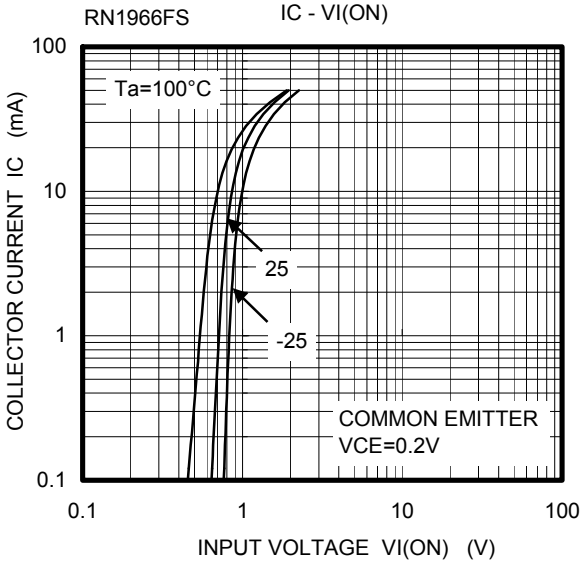
RN1964FS IC - VI(ON)



RN1965FS IC - VI(ON)

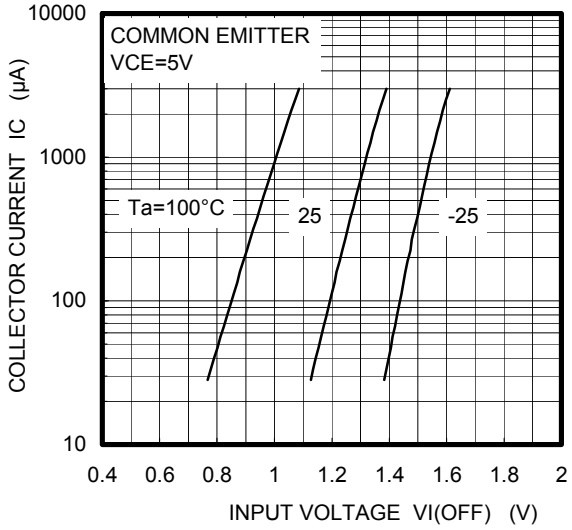


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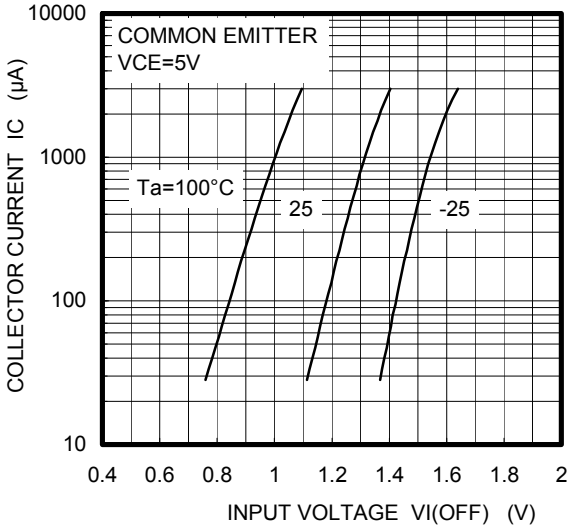


(Q1,Q2 common)

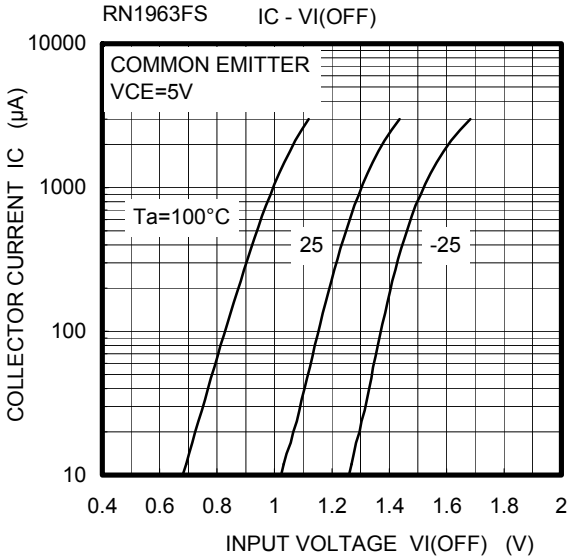
RN1961FS IC - VI(OFF)



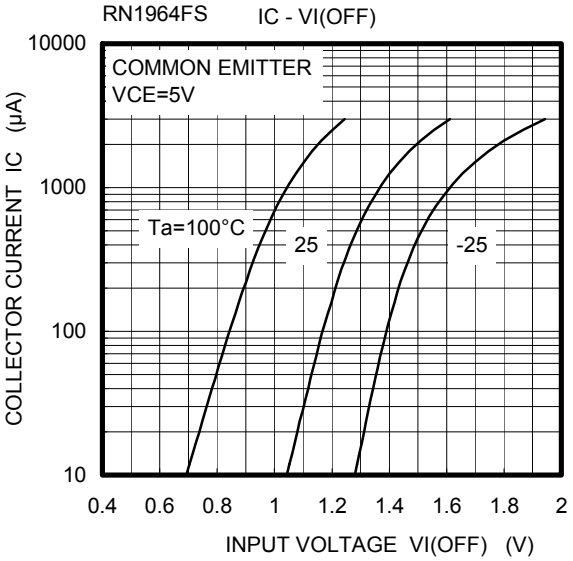
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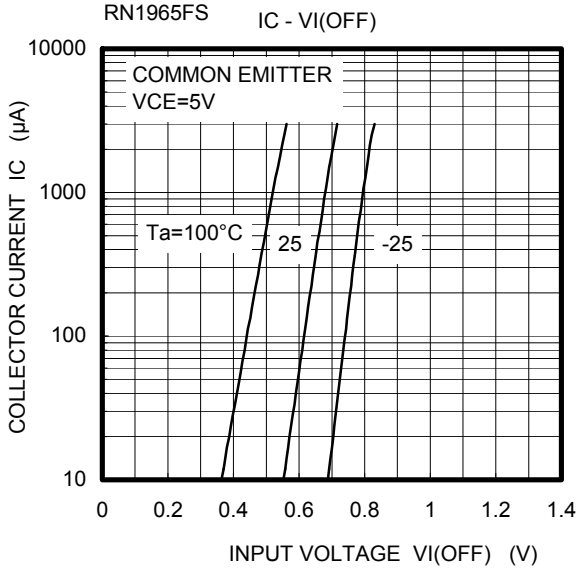
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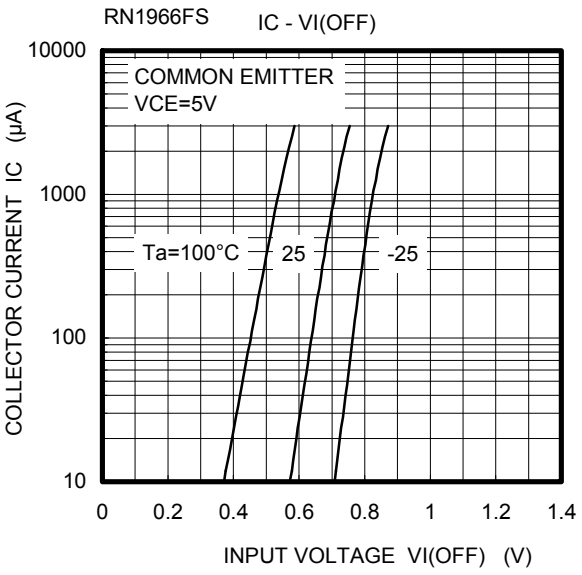
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RN1965FS IC - VI(OFF)

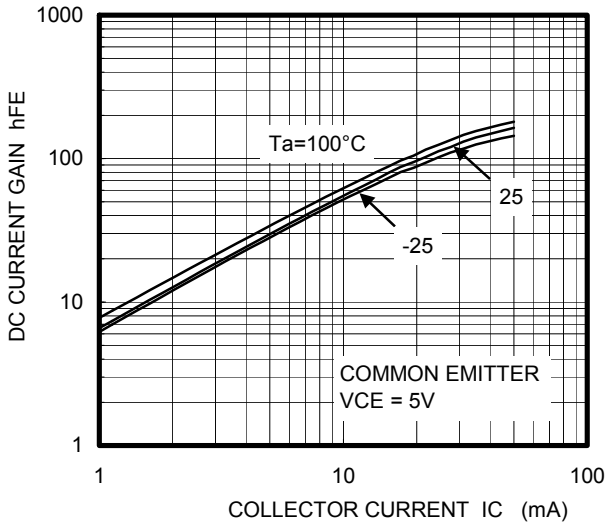


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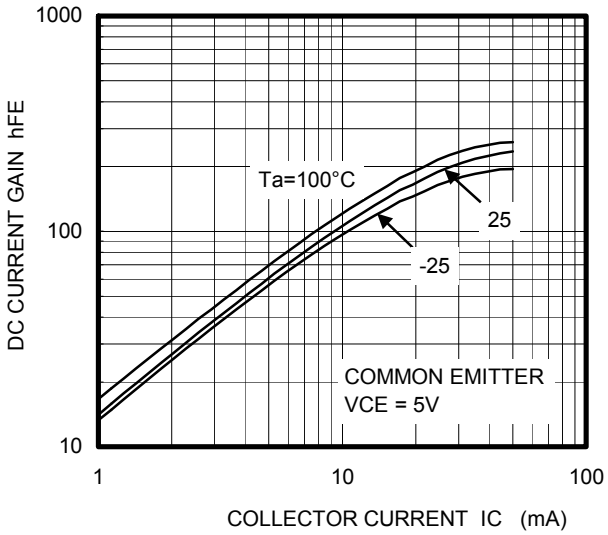


(Q1,Q2 common)

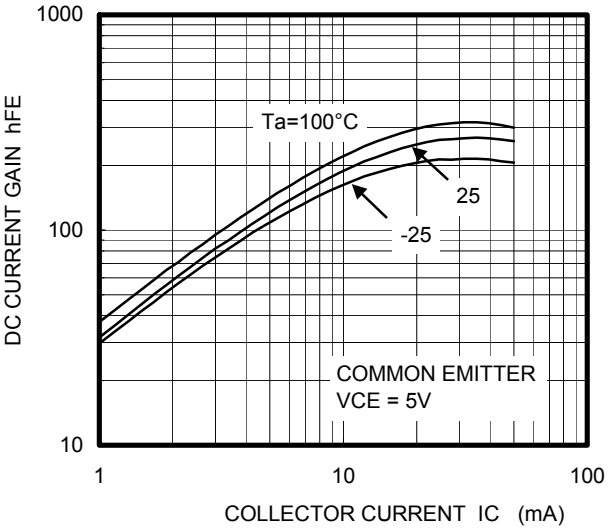
RN1961FS hFE - IC



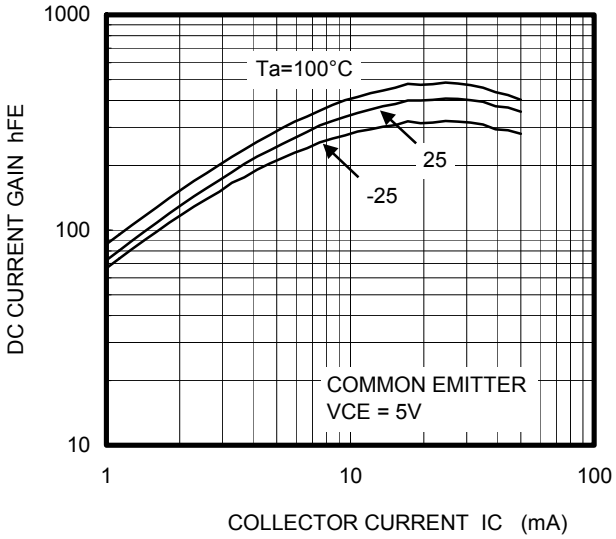
RN1962FS hFE - IC



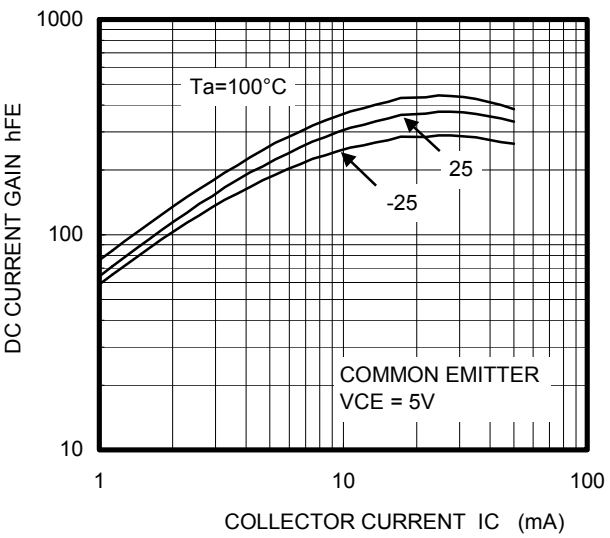
RN1963FS hFE - IC



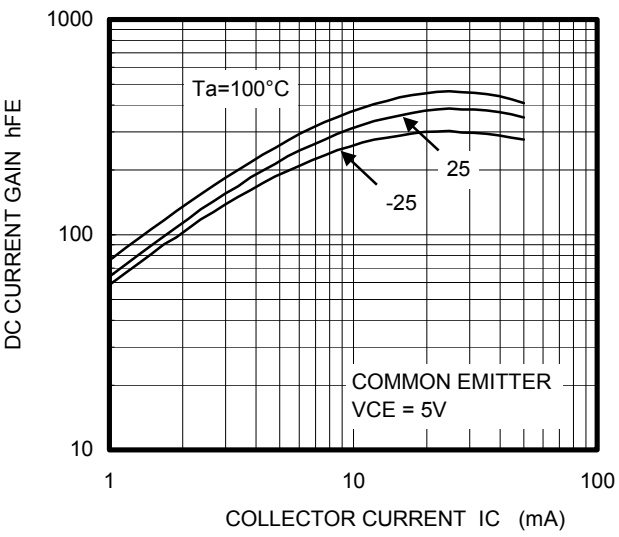
RN1964FS hFE - IC



RN1965FS hFE - IC

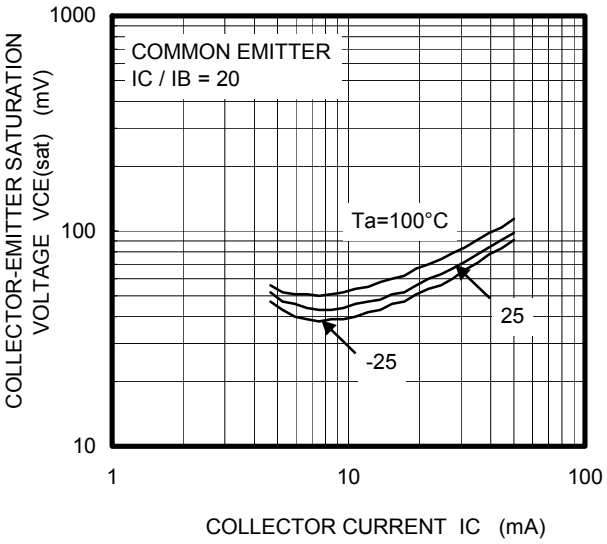


RN1966FS hFE - IC

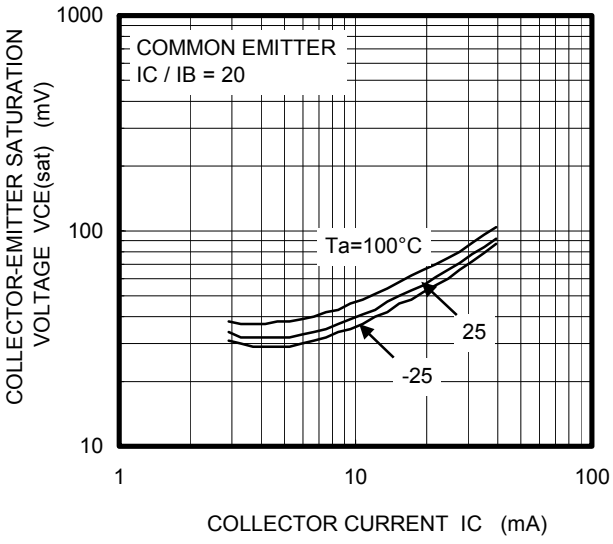


(Q1,Q2 common)

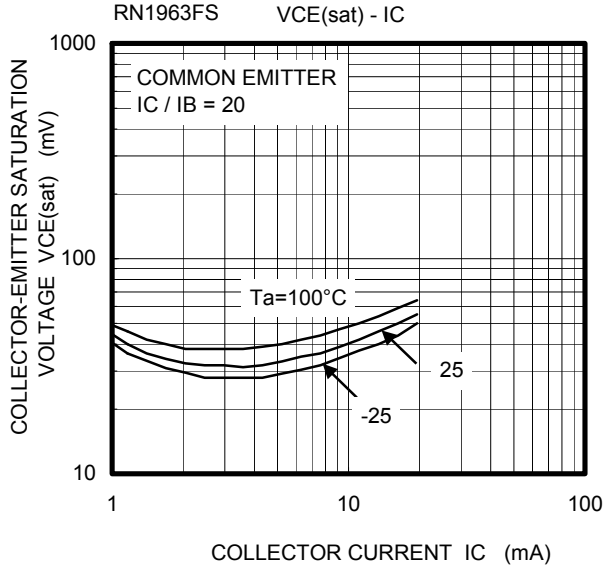
RN1961FS VCE(sat) - IC



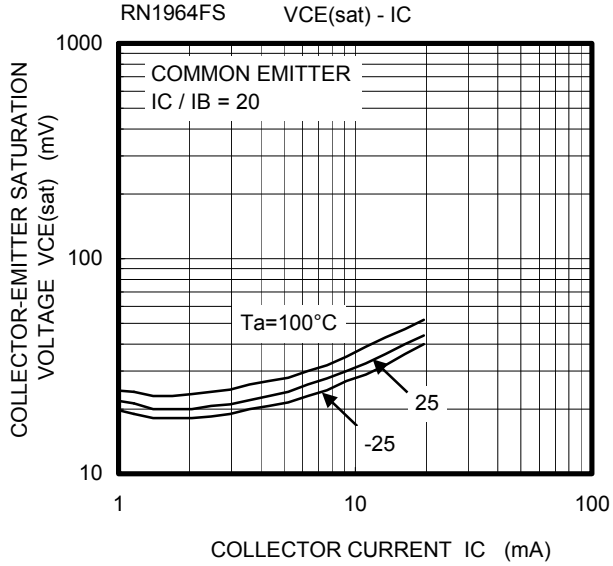
RN1962FS VCE(sat) - IC



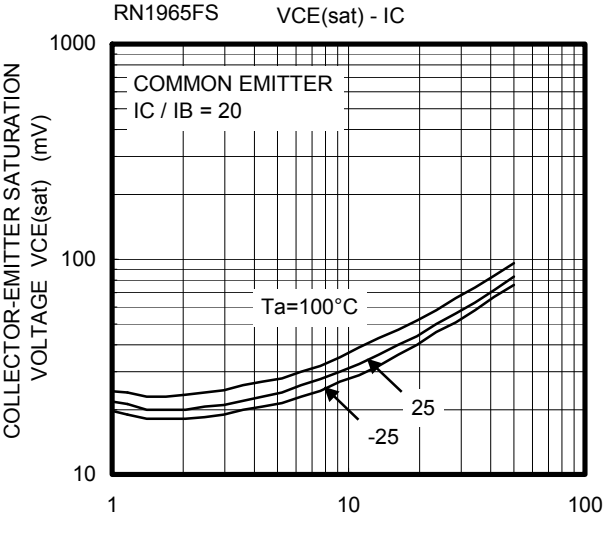
RN1963FS VCE(sat) - IC



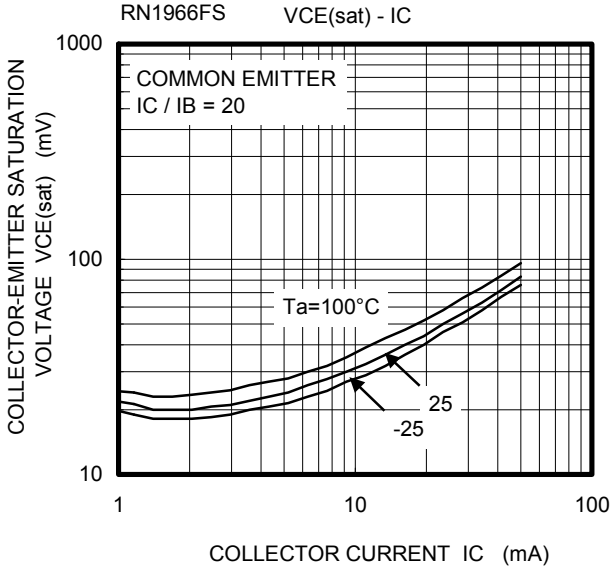
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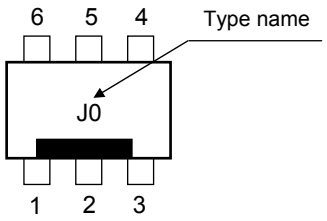
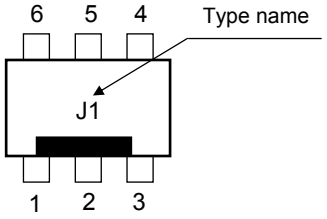
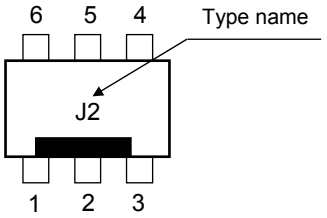
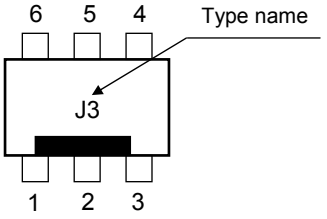
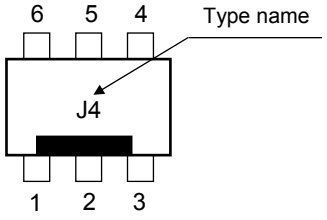
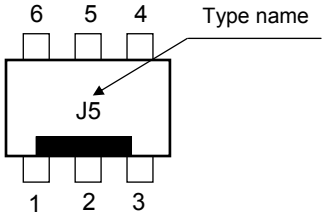


RN1965FS VCE(sat) - IC



RN1966FS VCE(sat) - IC



Type Name	Marking
RN1961FS	
RN1962FS	
RN1963FS	
RN1964FS	
RN1965FS	
RN1966FS	

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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