

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

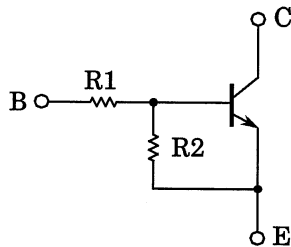
RN1961, RN1962, RN1963 RN1964, RN1965, RN1966

Unit: mm

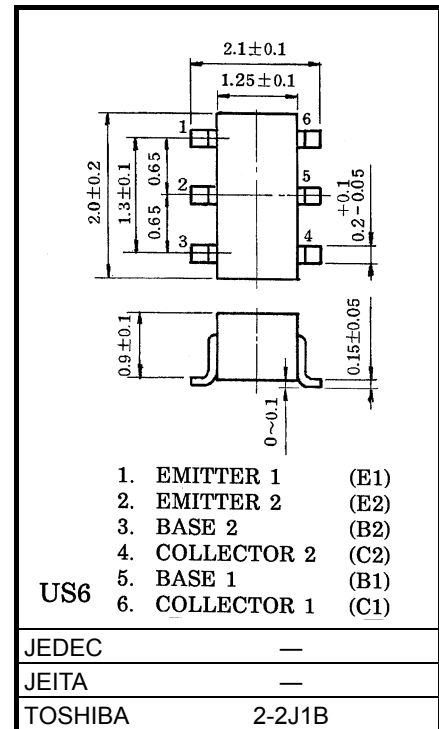
Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- Including two devices in US6 (ultra super mini type 6 leads)
- With built-in bias resistors
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process
- Complementary to RN2961 to RN2966

Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN1961	4.7	4.7
RN1962	10	10
RN1963	22	22
RN1964	47	47
RN1965	2.2	47
RN1966	4.7	47



Absolute Maximum Ratings (Ta = 25°C) (Q1, Q2 Common) Weight: 6.8 mg (typ.)

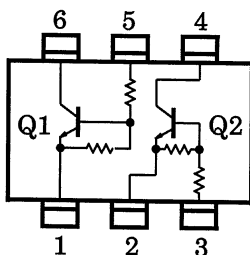
Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN1961 to 1966	V _{CBO}	50	V
Collector-emitter voltage		V _{CEO}	50	V
Emitter-base voltage	RN1961 to 1964	V _{EBO}	10	V
	RN1965, 1966		5	
Collector current	RN1961 to 1966	I _C	100	mA
Collector power dissipation		P _C *	200	mW
Junction temperature		T _j	150	°C
Storage temperature range		T _{stg}	-55 to 150	°C

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).

*: Total rating

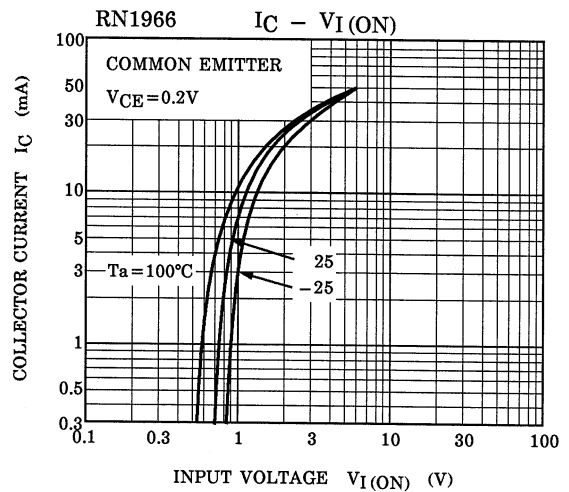
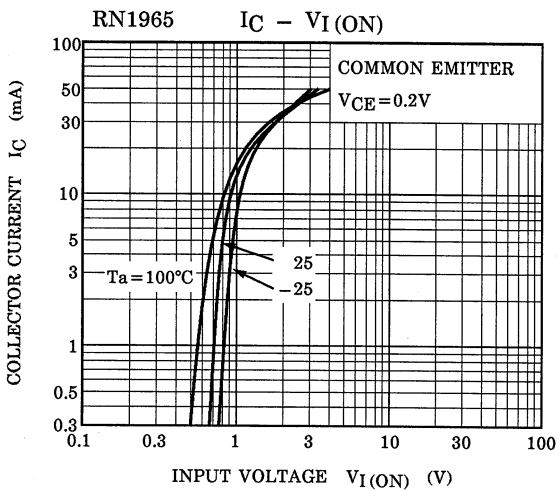
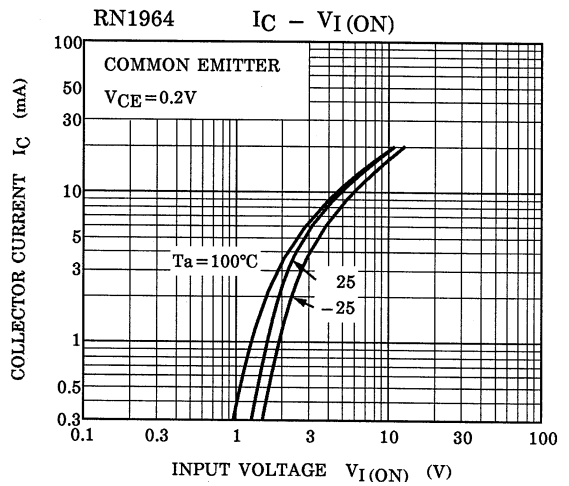
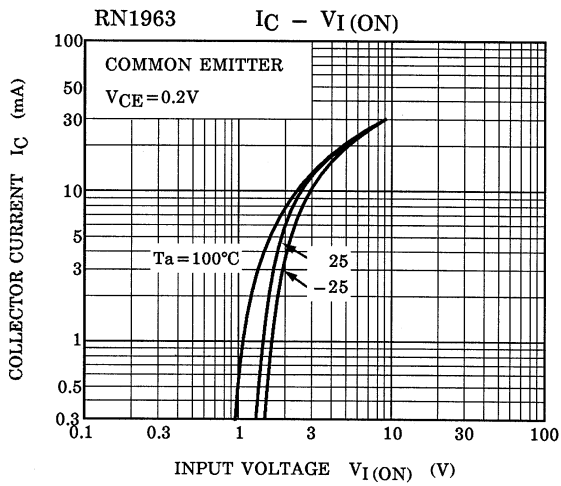
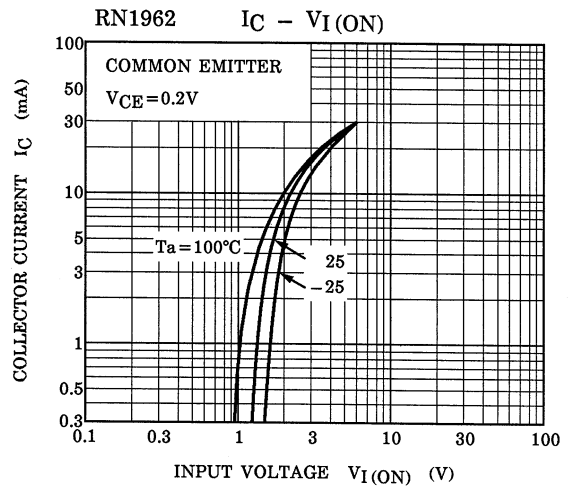
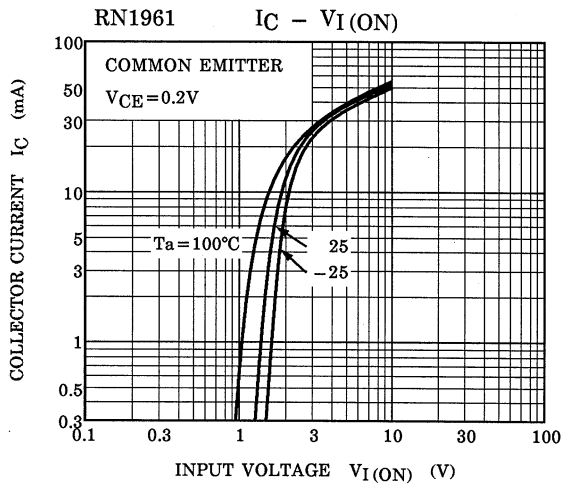
Equivalent Circuit (Top View)



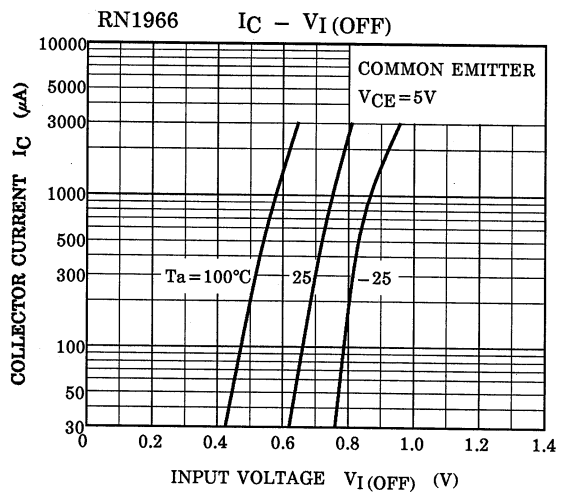
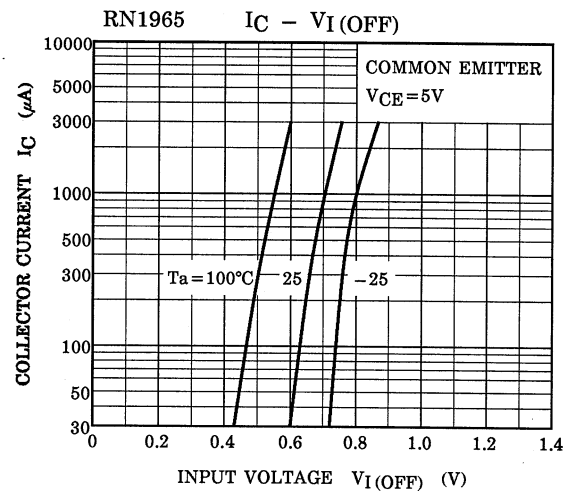
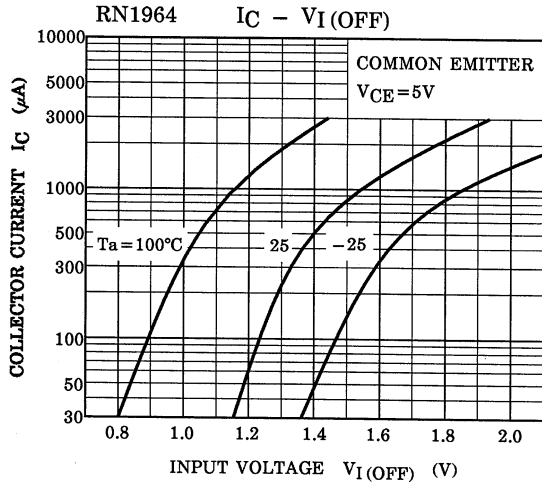
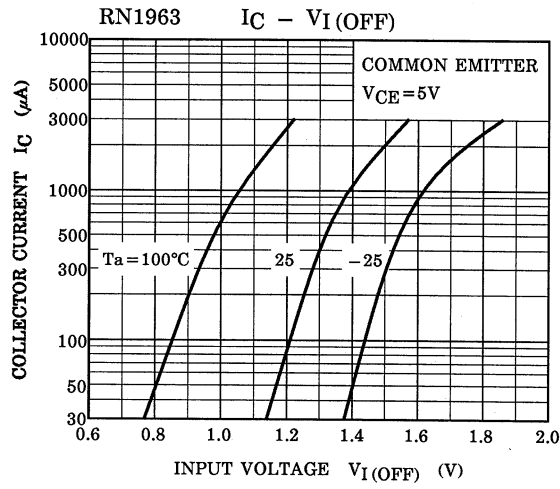
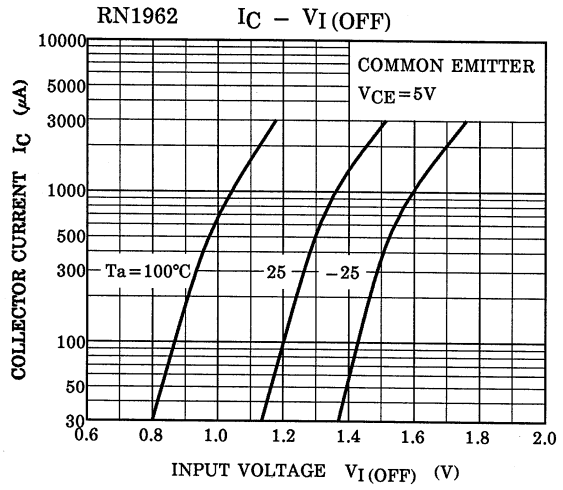
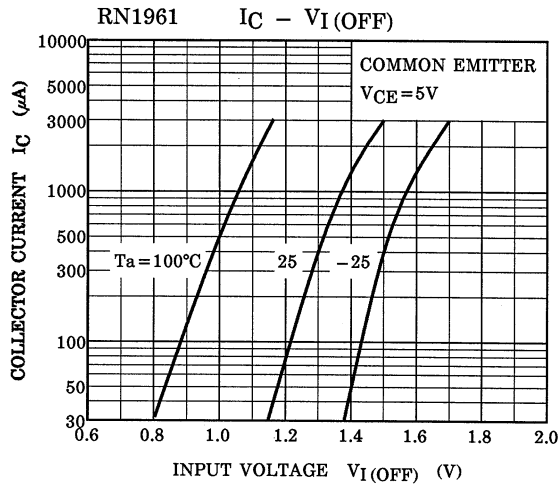
Electrical Characteristics (Ta = 25°C) (Q1, Q2 Common)

Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1961 to 1966	I_{CBO}	—	$V_{CB} = 50V, I_E = 0$	—	—	100	nA
		I_{CEO}	—	$V_{CE} = 50V, I_B = 0$	—	—	500	
Emitter cut-off current	RN1961	I_{EBO}	—	$V_{EB} = 10V, I_C = 0$	0.82	—	1.52	mA
	RN1962		—		0.38	—	0.71	
	RN1963		—		0.17	—	0.33	
	RN1964		—	0.082	—	0.15		
	RN1965		—	$V_{EB} = 5V, I_C = 0$	0.078	—	0.145	
	RN1966		—		0.074	—	0.138	
DC current gain	RN1961	h_{FE}	—	$V_{CE} = 5V, I_C = 10mA$	30	—	—	—
	RN1962		—		50	—	—	
	RN1963		—		70	—	—	
	RN1964		—		80	—	—	
	RN1965		—		80	—	—	
	RN1966		—		80	—	—	
Collector-emitter saturation voltage	RN1961 to 1966	$V_{CE(sat)}$	—	$I_C = 5mA, I_B = 0.25mA$	—	0.1	0.3	V
Input voltage (ON)	RN1961	$V_{I(ON)}$	—	$V_{CE} = 0.2V, I_C = 5mA$	1.1	—	2.0	V
	RN1962		—		1.2	—	2.4	
	RN1963		—		1.3	—	3.0	
	RN1964		—		1.5	—	5.0	
	RN1965		—		0.6	—	1.1	
	RN1966		—		0.7	—	1.3	
Input voltage (OFF)	RN1961 to 1964	$V_{I(OFF)}$	—	$V_{CE} = 5V, I_C = 0.1mA$	1.0	—	1.5	V
	RN1965, 1966		—		0.5	—	0.8	
Transition frequency	RN1961 to 1966	f_T	—	$V_{CE} = 10V, I_C = 5mA$	—	250	—	MHz
Collector output capacitance	RN1961 to 1966	C_{ob}	—	$V_{CB} = 10V, I_E = 0, f = 1MHz$	—	3	6	pF
Input resistor	RN1961	R1	—	—	3.29	4.7	6.11	kΩ
	RN1962		—		7	10	13	
	RN1963		—		15.4	22	28.6	
	RN1964		—		32.9	47	61.1	
	RN1965		—		1.54	2.2	2.86	
	RN1966		—		3.29	4.7	6.11	
Resistor ratio	RN1961 to 1964	R1/R2	—	—	0.9	1.0	1.1	—
	RN1965		—		0.0421	0.0468	0.0515	
	RN1966		—		0.09	0.1	0.11	

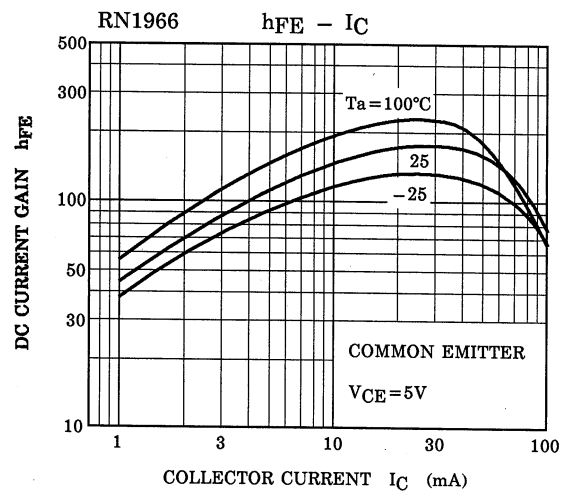
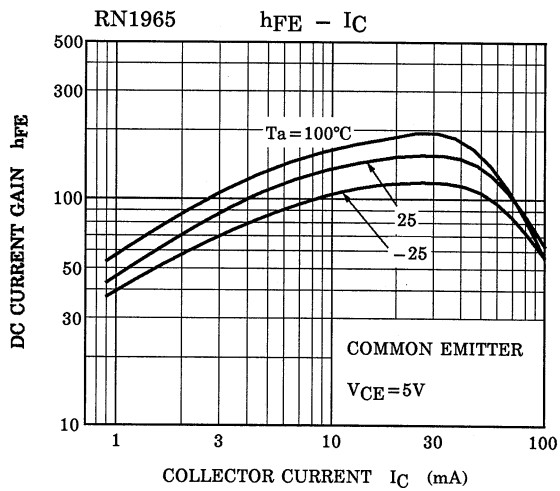
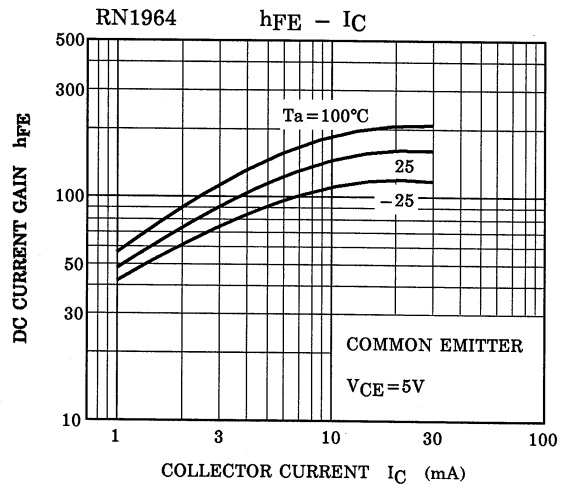
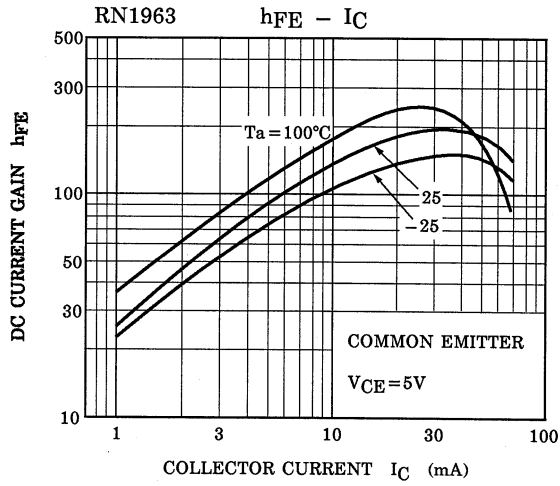
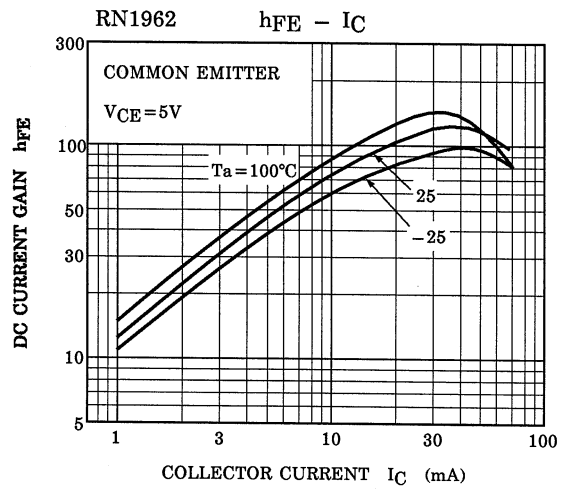
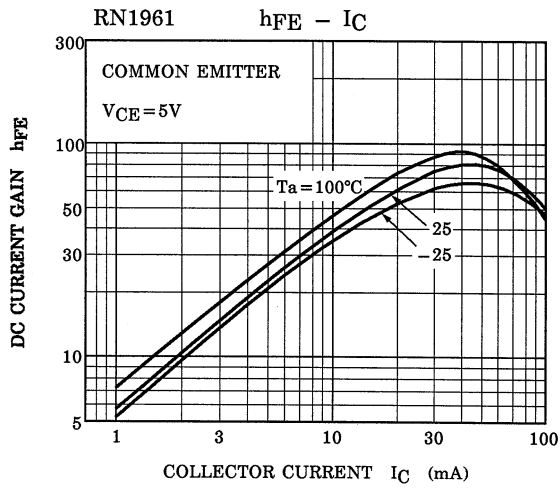
(Q1, Q2 Common)



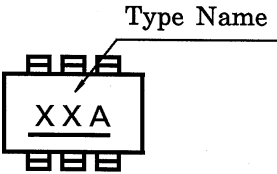
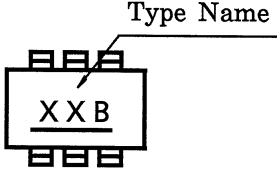
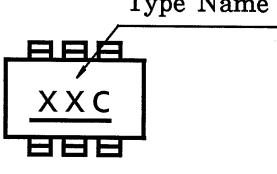
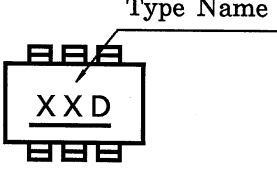
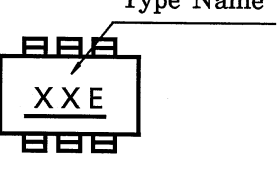
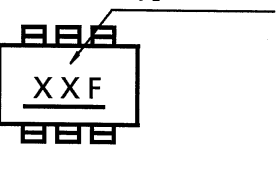
(Q1, Q2 Common)



(Q1, Q2 Common)



Marking

Type Name	Marking
RN1961	
RN1962	
RN1963	
RN1964	
RN1965	
RN1966	

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