Unit: mm

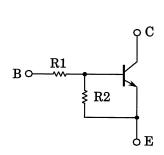
Silicon NPN Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor) **TOSHIBA Transistor** 

# RN1961, RN1962, RN1963 RN1964, RN1965, RN1966

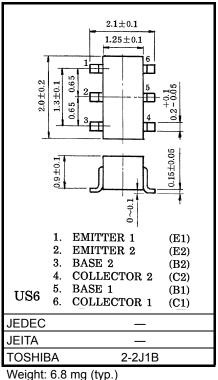
Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- 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



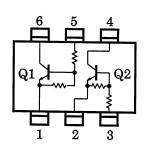
### Absolute Maximum Ratings (Ta = 25°C) (Q1, Q2 Common)

Characteristi	Symbol	Rating	Unit		
Collector-base voltage	RN1961 to 1966	$V_{CBO}$	50	V	
Collector-emitter voltage	KN 1901 to 1900	V <sub>CEO</sub>	50	V	
Emitter-base voltage	RN1961 to 1964	V <sub>EBO</sub>	10	V	
	RN1965, 1966	vEBO.	5		
Collector current		IC	100	mA	
Collector power dissipation	RN1961 to 1966	P <sub>C</sub> *	200	mW	
Junction temperature	KN1901 to 1900	Tj	150	°C	
Storage temperature range		T <sub>stg</sub>	-55 to150	°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).

#### **Equivalent Circuit** (Top View)



Start of commercial production 1992-01

<sup>\*:</sup> Total rating

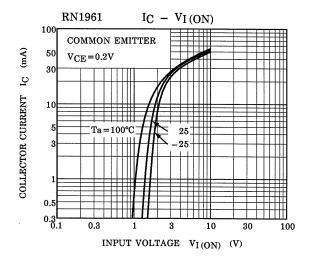


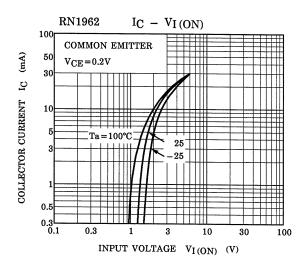
## Electrical Characteristics (Ta = 25°C) (Q1, Q2 Common)

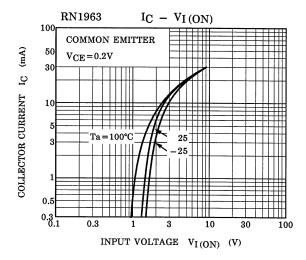
Character	istic	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
Collector cut-off current	RN1961 to 1966	I <sub>CBO</sub>	_	V <sub>CB</sub> = 50V, I <sub>E</sub> = 0	_	_	100	nA
	KN 1901 to 1900		_	V <sub>CE</sub> = 50V, I <sub>B</sub> = 0	_	_	500	
	RN1961	I <sub>EBO</sub>	_	V <sub>EB</sub> = 10V, I <sub>C</sub> = 0	0.82	_	1.52	mA
Emitter cut-off current	RN1962		_		0.38	_	0.71	
	RN1963		_		0.17	_	0.33	
	RN1964		_		0.082	_	0.15	
	RN1965		_	V <sub>EB</sub> = 5V, I <sub>C</sub> = 0	0.078	_	0.145	
	RN1966		_		0.074	_	0.138	
	RN1961		_		30	_	_	_
	RN1962		_		50	_	_	
DO 1 1	RN1963		_	514 40 4	70	_	_	
DC current gain	RN1964	h <sub>FE</sub>	_	$V_{CE}$ = 5V, $I_{C}$ = 10mA	80	_	_	
	RN1965		_		80	_	_	
	RN1966		_	-	80	_	_	
Collector-emitter saturation voltage	RN1961 to 1966	V <sub>CE (sat)</sub>	_	I <sub>C</sub> = 5mA, I <sub>B</sub> = 0.25mA	_	0.1	0.3	V
Input voltage (ON)	RN1961	V <sub>I (ON)</sub>	_	-V <sub>CE</sub> = 0.2V, I <sub>C</sub> = 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	
Land with the Country	RN1961 to 1964	V <sub>I</sub> (OFF)	_	V <sub>CE</sub> = 5V, I <sub>C</sub> = 0.1mA	1.0	_	1.5	٧
Input voltage (OFF)	RN1965, 1966		_		0.5	_	0.8	
Transition frequency	RN1961 to 1966	f <sub>T</sub>	_	V <sub>CE</sub> = 10V, I <sub>C</sub> = 5mA	_	250	_	MHz
Collector output capacitance	RN1961 to 1966	C <sub>ob</sub>	_	V <sub>CB</sub> = 10V, I <sub>E</sub> = 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	

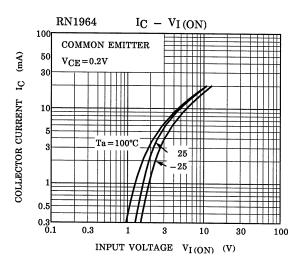
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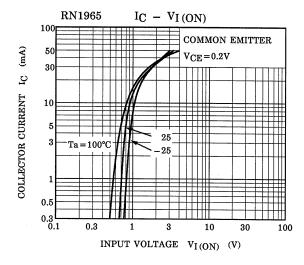
### (Q1, Q2 Common)

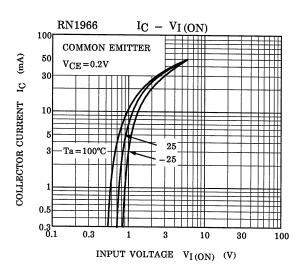






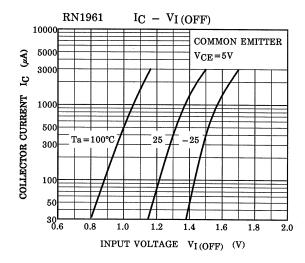


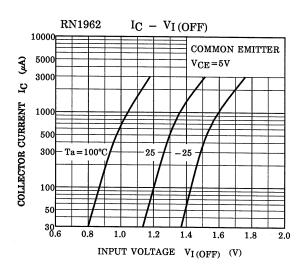


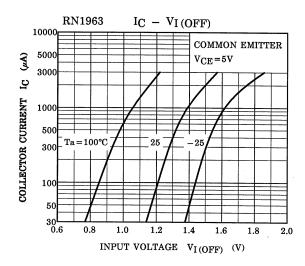


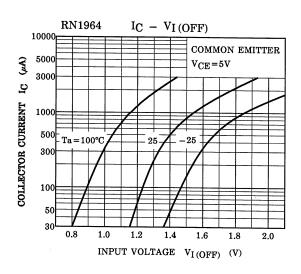
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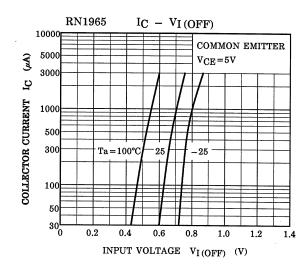
### (Q1, Q2 Common)

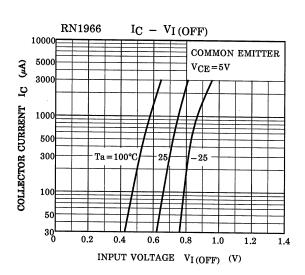




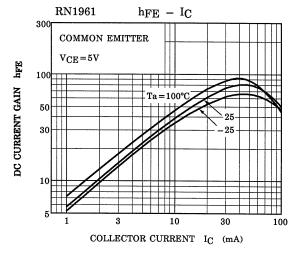


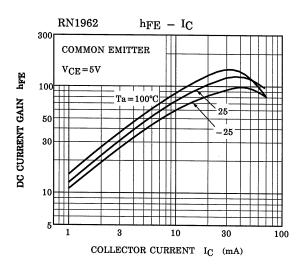


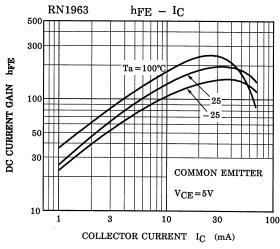


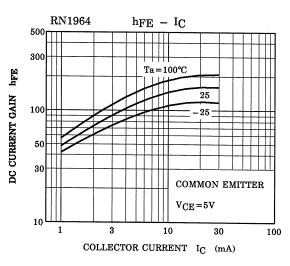


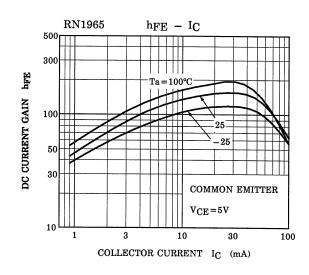
#### (Q1, Q2 Common)

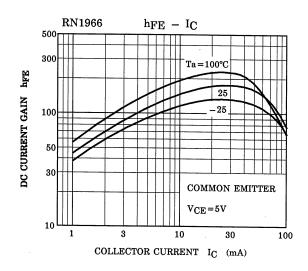












5

## Marking

Type Name	Marking
RN1961	Type Name  XXA
RN1962	Type Name  XXB
RN1963	Type Name  XXC
RN1964	Type Name  XXD
RN1965	Type Name  XXE
RN1966	Type Name  XXF

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