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

### RN1901, RN1902, RN1903 RN1904, RN1905, RN1906

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

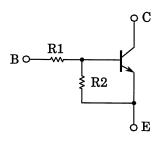
- Including two devices in US6 (ultra super mini type with 6 leads)
- With built-in bias resistors
- Simplify circuit design

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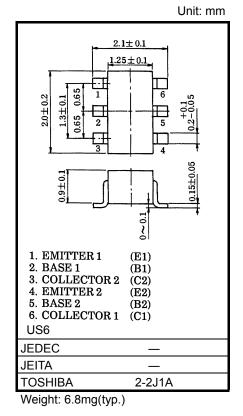
- Reduce a quantity of parts and manufacturing process
- Complementary to RN2901 to RN2906

#### **Equivalent Circuit and Bias Resistor Values**

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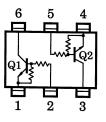


Type No.	R1 (kΩ)	R2 (kΩ)			
RN1901	4.7	4.7			
RN1902	10	10			
RN1903	22	22			
RN1904	47	47			
RN1905	2.2	47			
RN1906	4.7	47			



#### Equivalent Circuit (Top View)

osolute Maximum Ratings (Ta = 25°C) (Q1, Q2 Common)					
Characteristi	Symbol	Rating	Unit		
Collector-base voltage	RN1901 to 1906	V <sub>CBO</sub>	50	V	
Collector-emitter voltage		V <sub>CEO</sub>	50	V	
Emitter-base voltage	RN1901 to 1904	V <sub>EBO</sub>	10	v	
Emilier-base voltage	RN1905, 1906	▲EBO	5		
Collector current		Ι <sub>C</sub>	100	mA	
Collector power dissipation	RN1901 to 1906	P <sub>C</sub> *	200	mW	
Junction temperature		Tj	150	°C	
Storage temperature range		T <sub>stg</sub>	−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

Start of commercial production 1990-12

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

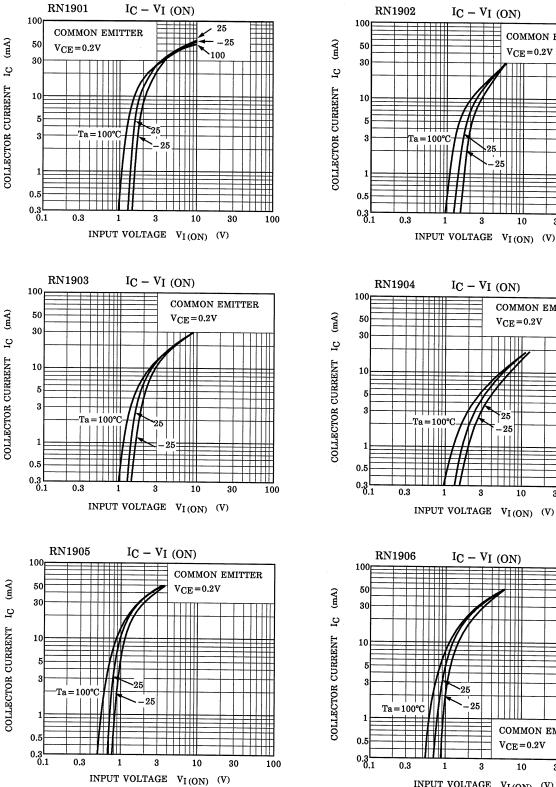
Characteristic		Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
Collector cut-off current	RN1901 to 1906	I <sub>CBO</sub>	—	V <sub>CB</sub> = 50V, I <sub>E</sub> = 0	—	_	100	۳Å
	KN 1901 to 1900	I <sub>CEO</sub>	_	V <sub>CE</sub> = 50V, I <sub>B</sub> = 0	_	_	500	nA
	RN1901	IEBO	—	- V <sub>EB</sub> = 10V, I <sub>C</sub> = 0	0.82	_	1.52	mA
	RN1902		_		0.38	-	0.71	
Emitter out off ourrent	RN1903		_		0.17	_	0.33	
Emitter cut-off current	RN1904		_		0.082	_	0.15	
	RN1905		_	V <sub>EB</sub> = 5V, I <sub>C</sub> = 0	0.078	_	0.145	
	RN1906		_		0.074	_	0.138	
	RN1901	-	—	V <sub>CE</sub> = 5V, I <sub>C</sub> = 10mA	30	_	—	·
	RN1902		_		50	_	_	
	RN1903	Ŀ	_		70	_	—	
DC current gain	RN1904	hFE			80	_	—	
	RN1905				80	_	—	
	RN1906				80	_	—	
Collector-emitter saturation voltage	RN1901 to 1906	V <sub>CE (sat)</sub>	_	I <sub>C</sub> = 5mA, I <sub>B</sub> = 0.25mA	_	0.1	0.3	V
	RN1901	VI (ON)	_	V <sub>CE</sub> = 0.2V, I <sub>C</sub> = 5mA	1.1	_	2.0	V
	RN1902		_		1.2	_	2.4	
	RN1903		_		1.3	_	3.0	
Input voltage (ON)	RN1904		_		1.5	_	5.0	
	RN1905		_		0.6	_	1.1	
	RN1906		_		0.7	_	1.3	
	RN1901 to 1904	V <sub>I (OFF)</sub>	—	V <sub>CE</sub> = 5V, I <sub>C</sub> = 0.1mA	1.0	—	1.5	v
Input voltage (OFF)	RN1905, 1906		_		0.5	_	0.8	
Transition frequency	RN1901 to 1906	f <sub>T</sub>	—	V <sub>CE</sub> = 10V, I <sub>C</sub> = 5mA	_	250	—	MHz
Collector output capacitance	RN1901 to 1906	C <sub>ob</sub>	_	V <sub>CB</sub> = 10V, I <sub>E</sub> = 0, f = 1MHz	-	3	6	pF
	RN1901		_		3.29	4.7	6.11	6 1 6
	RN1902	- R1 -	_		7	10	13	
	RN1903		_		15.4	22	28.6	
Input resistor	RN1904		_		32.9	47	61.1	
	RN1905		_		1.54	2.2	2.86	
	RN1906		_		3.29	4.7	6.11	
	RN1901 to 1904	R1/R2	_		0.9	1.0	1.1	
Resistor ratio	RN1905		—		0.0421	0.0468	0.0515	
	RN1906		—		0.09	0.1	0.11	

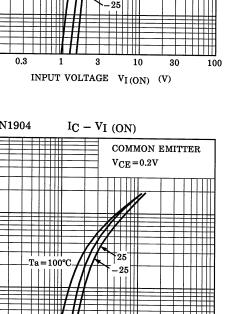
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COMMON EMITTER

 $V_{CE} = 0.2V$ 

### (Q1, Q2 Common)





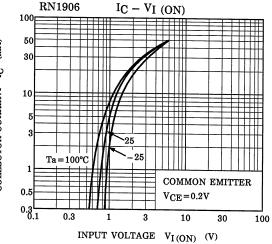
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100

10

IC - VI (ON)

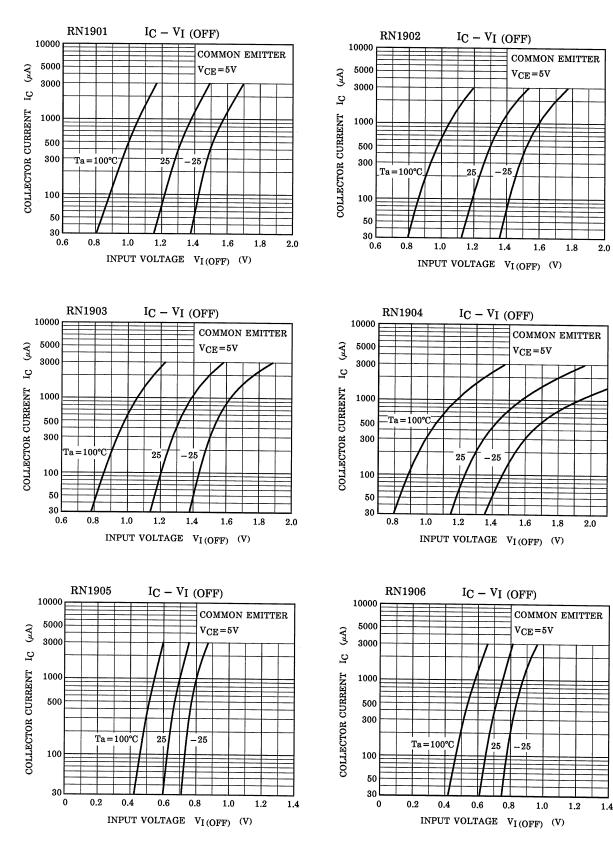
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3

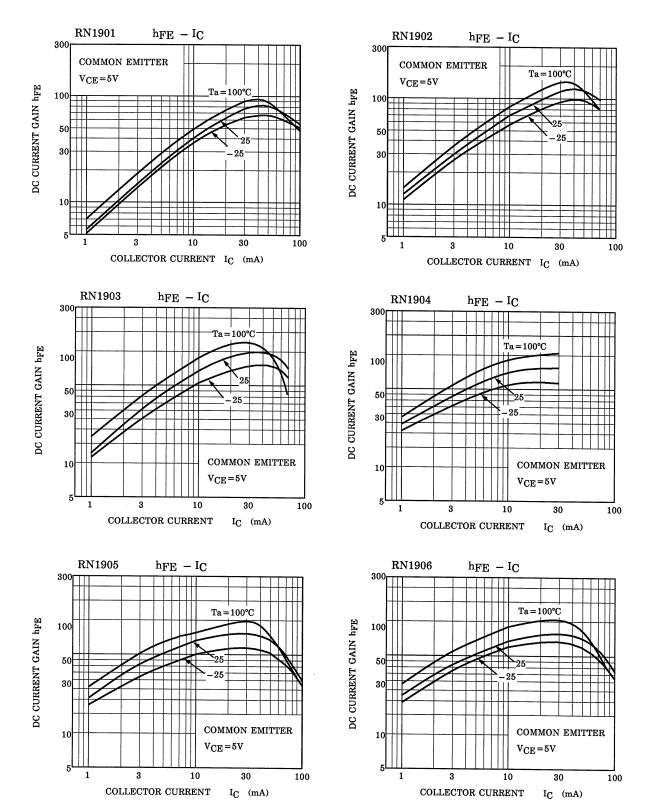
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### (Q1, Q2 Common)



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#### (Q1, Q2 Common)



## **TOSHIBA**

### Marking

Type Name	Marking
RN1901	Type Name KA BBB
RN1902	Type Name REA X B BBB
RN1903	Type Name EEE X C EEE
RN1904	Type Name XD UUU
RN1905	Type Name X E
RN1906	Type Name X F UUU

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