

TOSHIBA Transistor Silicon PNP/NPN Epitaxial Type (PCT Process) (Transistor with Built-in Bias Resistor)

# RN4607

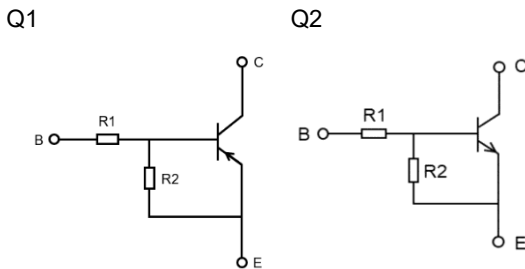
## 1. Applications

- Switching
- Inverter Circuit,
- Interface Circuit
- Driver Circuit

## 2. Features

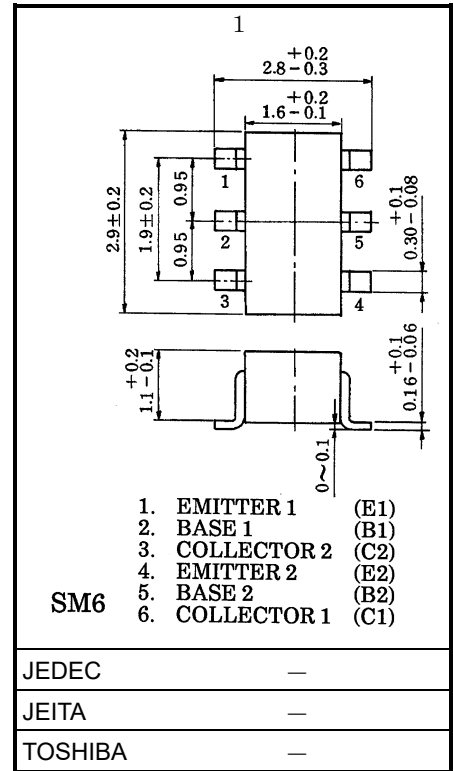
- Including two devices in SM6 (super mini type with 6 leads)
- With built-in bias resistors
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process and iniaturize equipment.

## 3. Equivalent Circuit and Bias Resistor Values



Part No (Q1, Q2 Common)	R1 (kΩ)	R2 (kΩ)
RN4607	10	47

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	—

Weight: 15 mg (typ.)

## 4. Q1 Absolute Maximum Ratings (Ta = 25 °C)

Characteristic	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	-50	V
Collector-emitter voltage	$V_{CEO}$	-50	V
Emitter-base voltage	$V_{EBO}$	-6	V
Collector current	$I_C$	-100	mA

## 5. Q2 Absolute Maximum Ratings (Ta = 25 °C)

Characteristic	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	50	V
Collector-emitter voltage	$V_{CEO}$	50	V
Emitter-base voltage	$V_{EBO}$	6	V
Collector current	$I_C$	100	mA

Start of commercial production  
1988-11

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

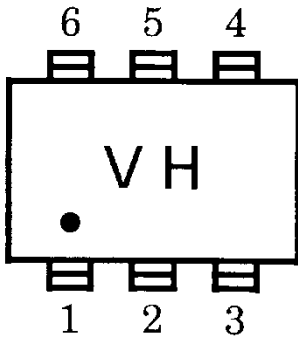
Characteristic	Symbol	Rating	Unit
Collector power dissipation	P <sub>C</sub> (Note 1)	300	mW
Junction temperature	T <sub>j</sub>	150	°C
Storage temperature range	T <sub>stg</sub>	-55 to 150	°C

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.

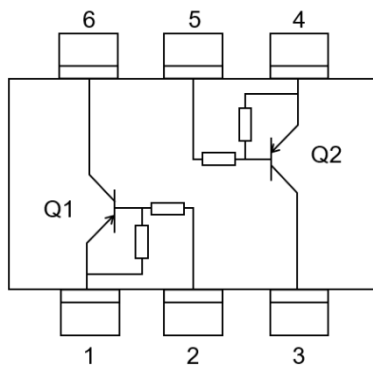
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: Total rating

## 7. Marking



## 8. Equivalent Circuit (Top View)



## 9. Q1 Electrical Characteristics (Ta = 25 °C)

Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	ICBO	—	V <sub>CB</sub> = -50 V, I <sub>E</sub> = 0 mA	—	—	-100	nA
	ICEO	—	V <sub>CE</sub> = -50 V, I <sub>B</sub> = 0 mA	—	—	-500	
Emitter cut-off current	IEBO	—	V <sub>EB</sub> = -6 V, I <sub>C</sub> = 0 mA	-0.081	—	-0.15	mA
DC current gain	hFE	—	V <sub>CE</sub> = -5 V, I <sub>C</sub> = -10 mA	80	—	—	—
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	—	I <sub>C</sub> = -5 mA, I <sub>B</sub> = -0.25 mA	—	-0.1	-0.3	V
Input voltage (ON)	V <sub>I(ON)</sub>	—	V <sub>CE</sub> = -0.2 V, I <sub>C</sub> = -5 mA	-0.7	—	-1.8	V
Input voltage (OFF)	V <sub>I(OFF)</sub>	—	V <sub>CE</sub> = -5 V, I <sub>C</sub> = -0.1 mA	-0.5	—	-1.0	V
Transition frequency	f <sub>T</sub>	—	V <sub>CE</sub> = -10 V, I <sub>C</sub> = -5 mA	—	200	—	MHz
Collector output capacitance	C <sub>ob</sub>	—	V <sub>CB</sub> = -10 V, I <sub>E</sub> = 0 mA, f = 1MHz	—	3	6	pF

## 10. Q2 Electrical Characteristics (Ta = 25 °C)

Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	ICBO	—	V <sub>CB</sub> = 50 V, I <sub>E</sub> = 0 mA	—	—	100	nA
	ICEO	—	V <sub>CE</sub> = 50 V, I <sub>B</sub> = 0 mA	—	—	500	
Emitter cut-off current	IEBO	—	V <sub>EB</sub> = 6 V, I <sub>C</sub> = 0 mA	0.081	—	0.15	mA
DC current gain	hFE	—	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 10 mA	80	—	—	—
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	—	I <sub>C</sub> = 5 mA, I <sub>B</sub> = 0.25 mA	—	0.1	0.3	V
Input voltage (ON)	V <sub>I(ON)</sub>	—	V <sub>CE</sub> = 0.2 V, I <sub>C</sub> = 5 mA	0.7	—	1.8	V
Input voltage (OFF)	V <sub>I(OFF)</sub>	—	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 0.1 mA	0.5	—	1.0	V
Transition frequency	f <sub>T</sub>	—	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 5 mA	—	250	—	MHz
Collector output capacitance	C <sub>ob</sub>	—	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0 mA, f = 1 MHz	—	3	6	pF

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

Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Input resistance	R1	—	—	7	10	13	kΩ
Resistance ratio	R1 / R2	—	—	0.191	0.213	0.232	—

**12. Characteristics curves (Note) (Q1, Q2)**

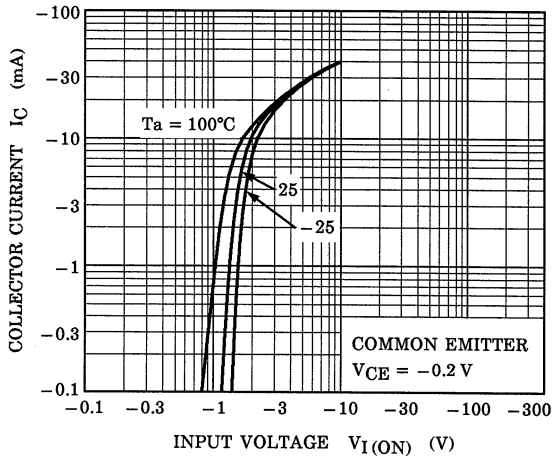


Fig 12.1 Q1  $I_C - V_{I(ON)}$

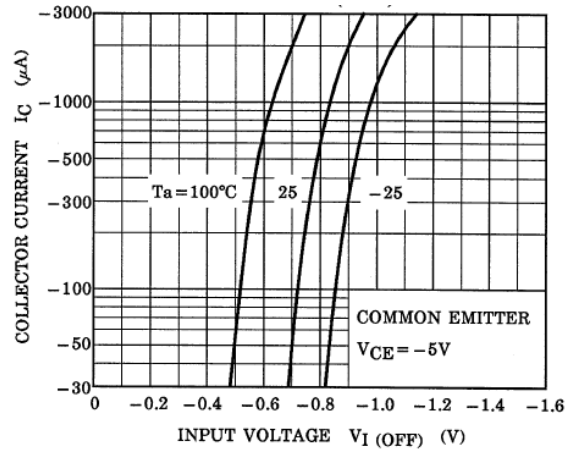


Fig 12.2 Q1  $I_C - V_{I(OFF)}$

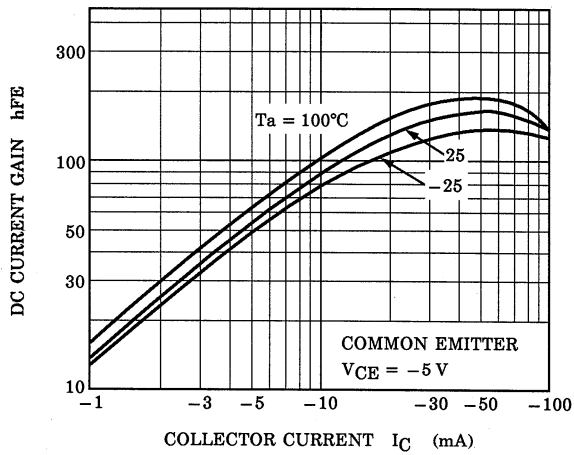


Fig 12.3 Q1  $h_{FE} - I_C$

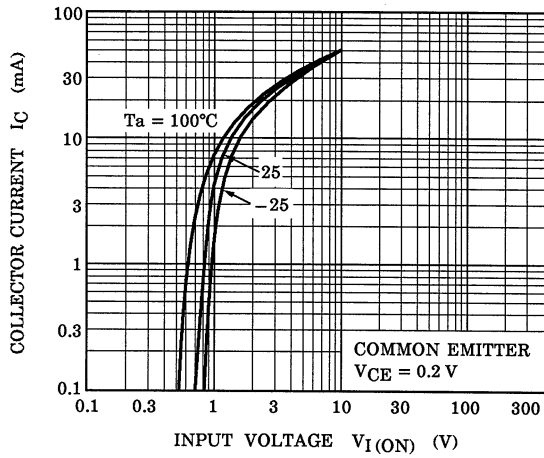


Fig 12.4 Q2  $I_C - V_{I(ON)}$

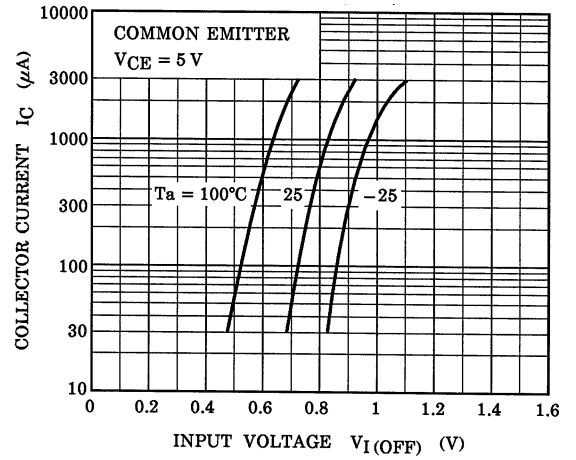


Fig 12.5 Q2  $I_C - V_{I(OFF)}$

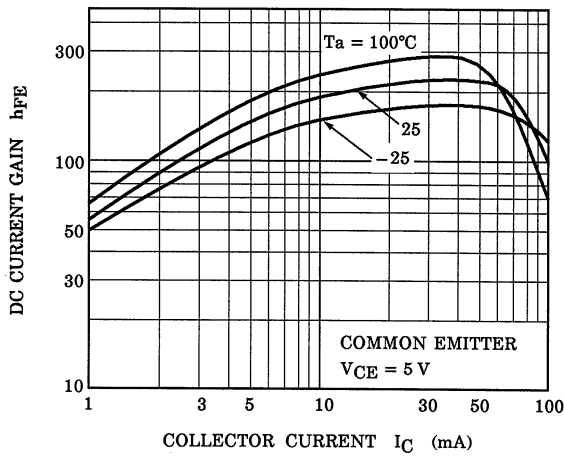


Fig 12.6 Q2  $h_{FE} - I_C$

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

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