

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

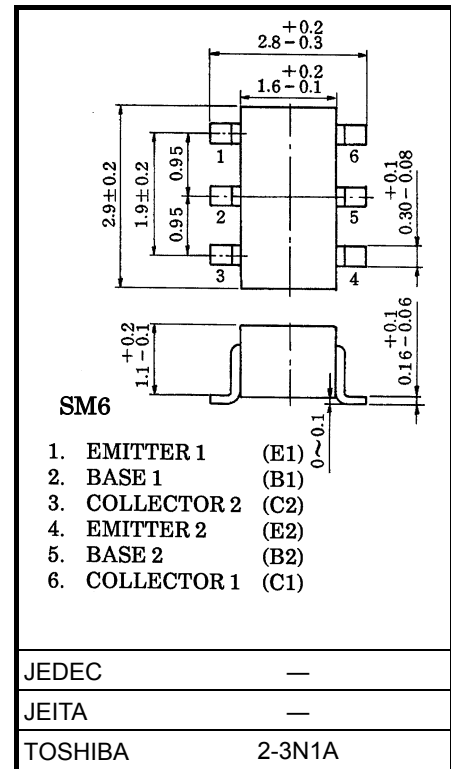
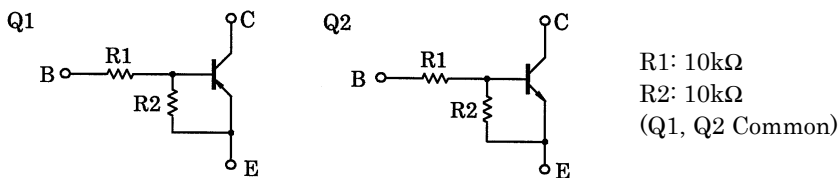
## RN4602

Switching, Inverter Circuit, Interface Circuit  
and Driver Circuit Applications

Unit: mm

- 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

### Equivalent Circuit and Bias Resistor Values



Weight: 15 mg (typ.)

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

Characteristic	Symbol	Rating	Unit
Collector-base voltage	V <sub>CBO</sub>	-50	V
Collector-emitter voltage	V <sub>CEO</sub>	-50	V
Emitter-base voltage	V <sub>EBO</sub>	-10	V
Collector current	I <sub>C</sub>	-100	mA

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

Characteristic	Symbol	Rating	Unit
Collector-base voltage	V <sub>CBO</sub>	50	V
Collector-emitter voltage	V <sub>CEO</sub>	50	V
Emitter-base voltage	V <sub>EBO</sub>	10	V
Collector current	I <sub>C</sub>	100	mA

Start of commercial production  
1988-11

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

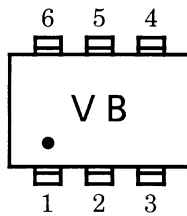
Characteristic	Symbol	Rating	Unit
Collector power dissipation	P <sub>C</sub> *	300	mW
Junction temperature	T <sub>j</sub>	150	°C
Storage temperature range	T <sub>stg</sub>	-55 to 150	°C

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.

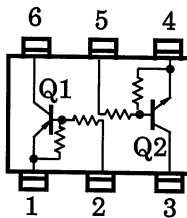
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

\* Total rating

**Marking**



**Equivalent Circuit (Top View)**



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

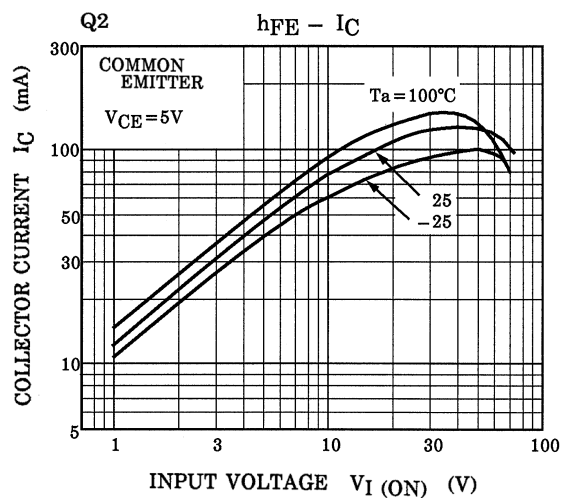
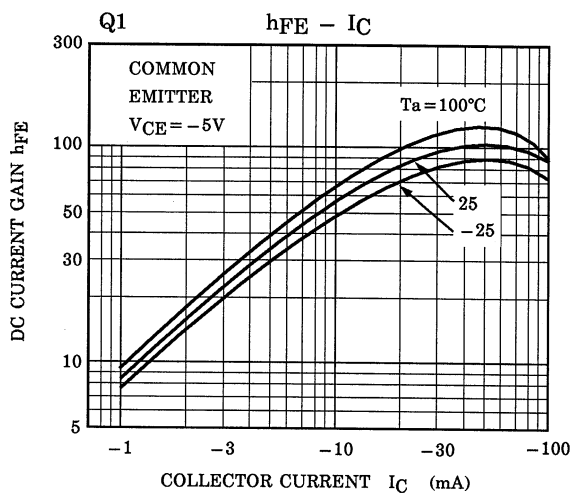
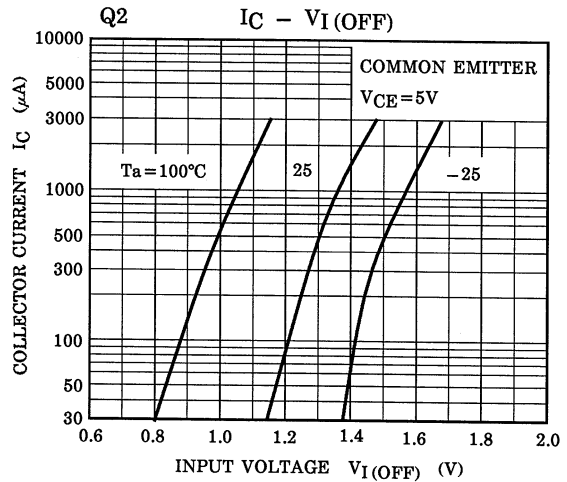
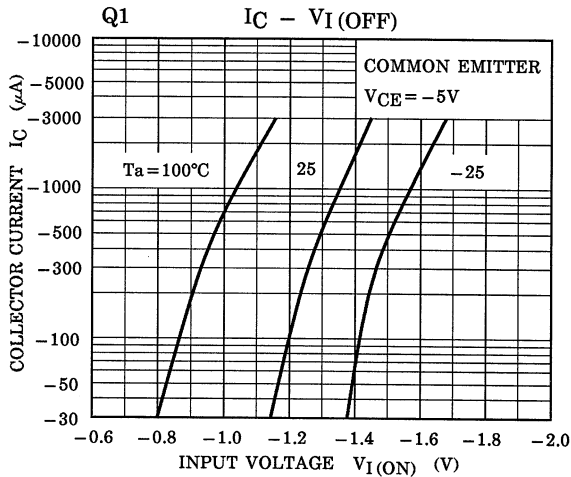
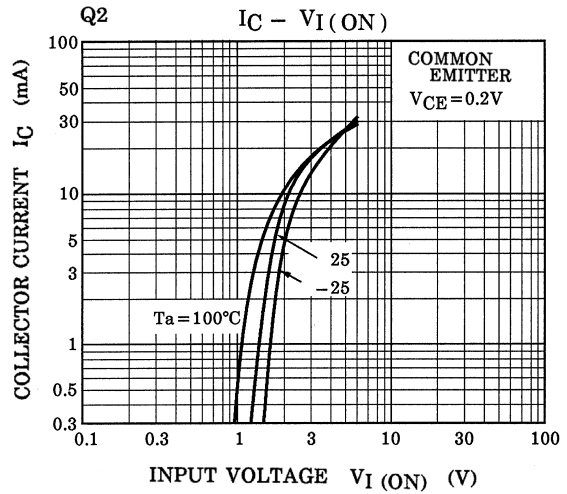
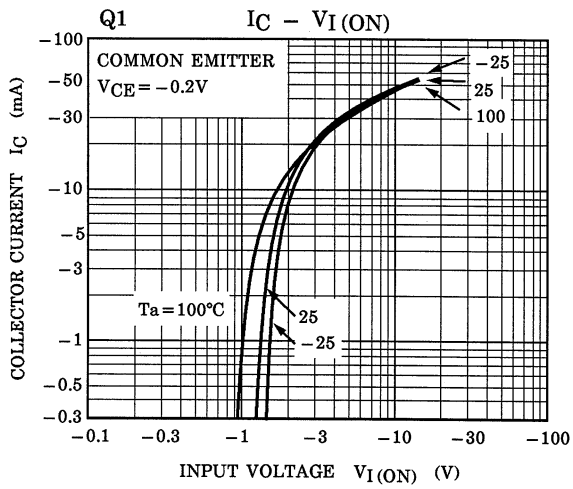
Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	ICBO	—	V <sub>CB</sub> = -50V, I <sub>E</sub> = 0	—	—	-100	nA
	ICEO	—	V <sub>CE</sub> = -50V, I <sub>B</sub> = 0	—	—	-500	
Emitter cut-off current	IEBO	—	V <sub>EB</sub> = -10V, I <sub>C</sub> = 0	-0.38	—	-0.71	mA
DC current gain	h <sub>FE</sub>	—	V <sub>CE</sub> = -5V, I <sub>C</sub> = -10mA	50	—	—	—
Collector-emitter saturation voltage	V <sub>CE (sat)</sub>	—	I <sub>C</sub> = -5mA, I <sub>B</sub> = -0.25mA	—	-0.1	-0.3	V
Input voltage (ON)	V <sub>I (ON)</sub>	—	V <sub>CE</sub> = -0.2V, I <sub>C</sub> = -5mA	-1.2	—	-2.4	V
Input voltage (OFF)	V <sub>I (OFF)</sub>	—	V <sub>CE</sub> = -5V, I <sub>C</sub> = -0.1mA	-1.0	—	-1.5	V
Transition frequency	f <sub>T</sub>	—	V <sub>CE</sub> = -10V, I <sub>C</sub> = -5mA	—	200	—	MHz
Collector output capacitance	C <sub>ob</sub>	—	V <sub>CB</sub> = -10V, I <sub>E</sub> = 0, f = 1MHz	—	3	6	pF

## 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> = 50V, I <sub>E</sub> = 0	—	—	100	nA
	ICEO	—	V <sub>CE</sub> = 50V, I <sub>B</sub> = 0	—	—	500	
Emitter cut-off current	IEBO	—	V <sub>EB</sub> = 10V, I <sub>C</sub> = 0	0.38	—	0.71	mA
DC current gain	h <sub>FE</sub>	—	V <sub>CE</sub> = 5V, I <sub>C</sub> = 10mA	50	—	—	—
Collector-emitter saturation voltage	V <sub>CE (sat)</sub>	—	I <sub>C</sub> = 5mA, I <sub>B</sub> = 0.25mA	—	0.1	0.3	V
Input voltage (ON)	V <sub>I (ON)</sub>	—	V <sub>CE</sub> = 0.2V, I <sub>C</sub> = 5mA	1.2	—	2.4	V
Input voltage (OFF)	V <sub>I (OFF)</sub>	—	V <sub>CE</sub> = 5V, I <sub>C</sub> = 0.1mA	1.0	—	1.5	V
Transition frequency	f <sub>T</sub>	—	V <sub>CE</sub> = 10V, I <sub>C</sub> = 5mA	—	250	—	MHz
Collector output capacitance	C <sub>ob</sub>	—	V <sub>CB</sub> = 10V, I <sub>E</sub> = 0, f = 1 MHz	—	3	6	pF

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

Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Input resistor	R1	—	—	7	10	13	kΩ
Resistor ratio	R1/R2	—	—	0.9	1.0	1.1	—



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