



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

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## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



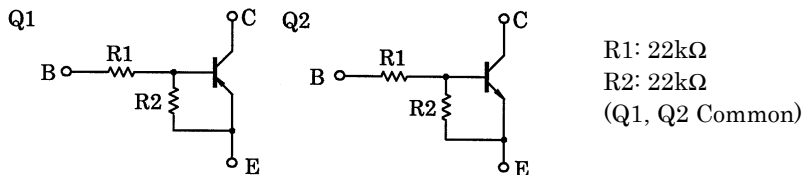
TOSHIBA Transistor  
Silicon NPN/PNP Epitaxial Type (PCT Process) (Transistor with Built-in Bias Resistor)

## RN4603

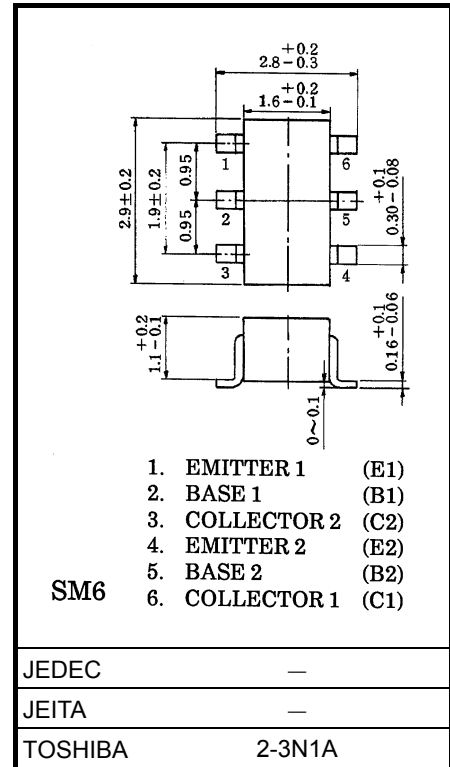
Switching, Inverter Circuit, Interface Circuit  
and Driver Circuit Applications

- 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



Unit: mm



SM6

JEDEC

JEITA

TOSHIBA

2-3N1A

Weight: 0.015g (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)

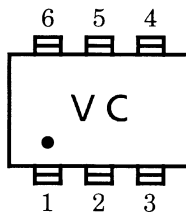
Characteristic	Symbol	Rating	Unit
Collector power dissipation	$P_C$ *	300	mW
Junction temperature	$T_j$	150	°C
Storage temperature range	$T_{stg}$	-55 to 150	°C

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.

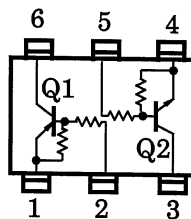
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

\* : Total rating

## Marking



## Equivalent Circuit (Top View)



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

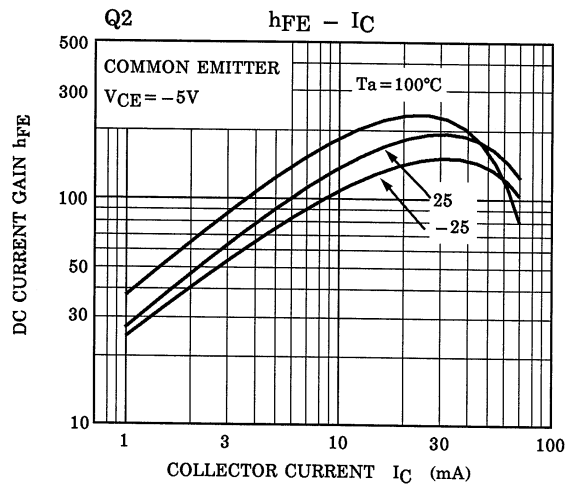
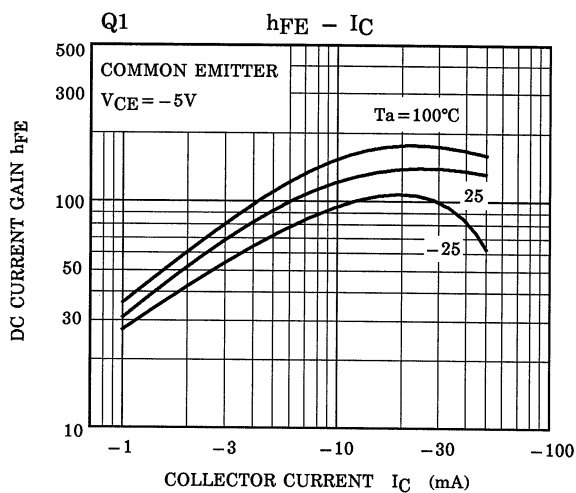
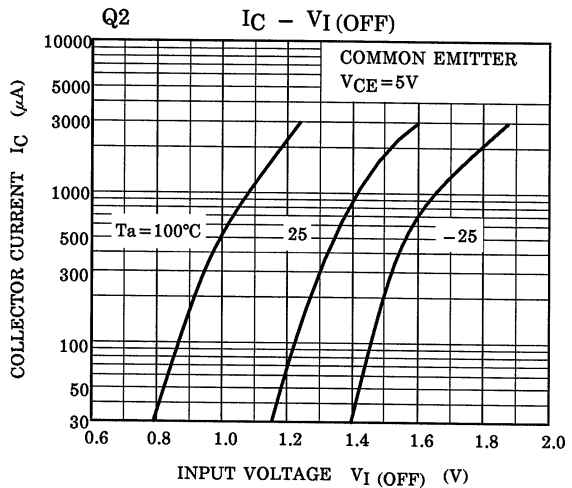
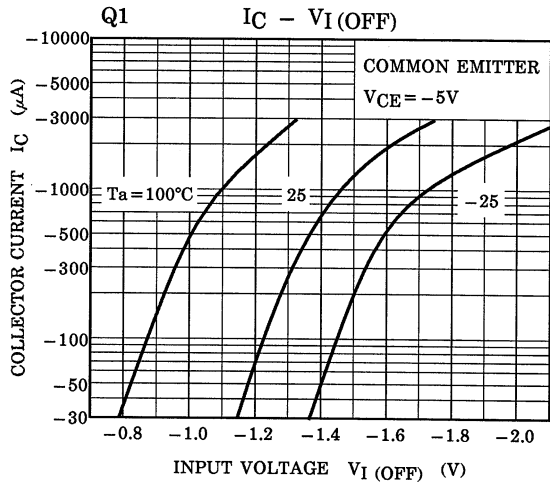
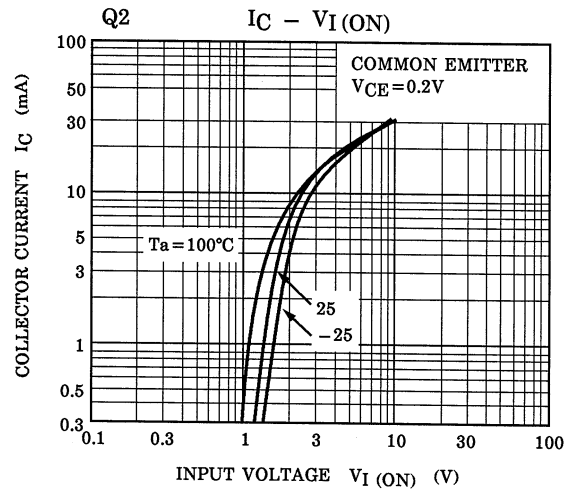
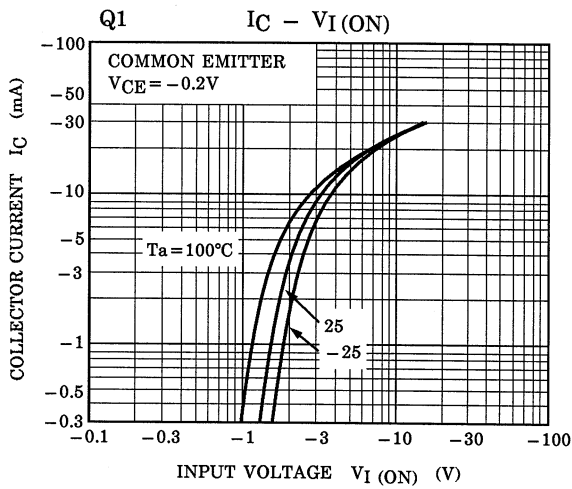
Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	ICBO	—	V <sub>CB</sub> = -50V, I <sub>E</sub> = 0	—	—	-100	nA
	ICEO	—	V <sub>CE</sub> = -50V, I <sub>B</sub> = 0	—	—	-500	
Emitter cut-off current	IEBO	—	V <sub>EB</sub> = -10V, I <sub>C</sub> = 0	-0.17	—	-0.33	mA
DC current gain	h <sub>FE</sub>	—	V <sub>CE</sub> = -5V, I <sub>C</sub> = -10mA	70	—	—	—
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	-1.3	—	-3.0	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	0.17	—	0.33	mA
DC current gain	h <sub>FE</sub>	—	V <sub>CE</sub> = 5V, I <sub>C</sub> = 10mA	70	—	—	—
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	1.3	—	3.0	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	—	—	15.4	22	28.6	kΩ
Resistor ratio	R1/R2	—	—	0.9	1.0	1.1	—



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