

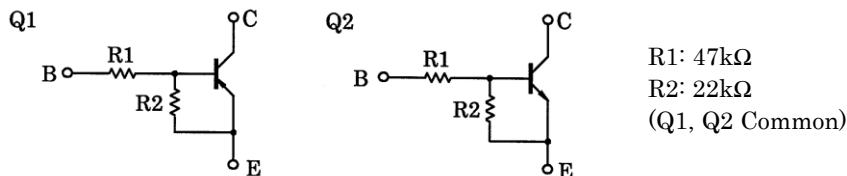
TOSHIBA Transistor Silicon NPN/PNP Epitaxial Type (PCT Process)
(Transistor with Built-in Bias Resistor)

RN4609

Switching, Inverter Circuit,
Interface Circuit and Driver Circuit

- 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.

Equivalent Circuit and Bias Resistor Values

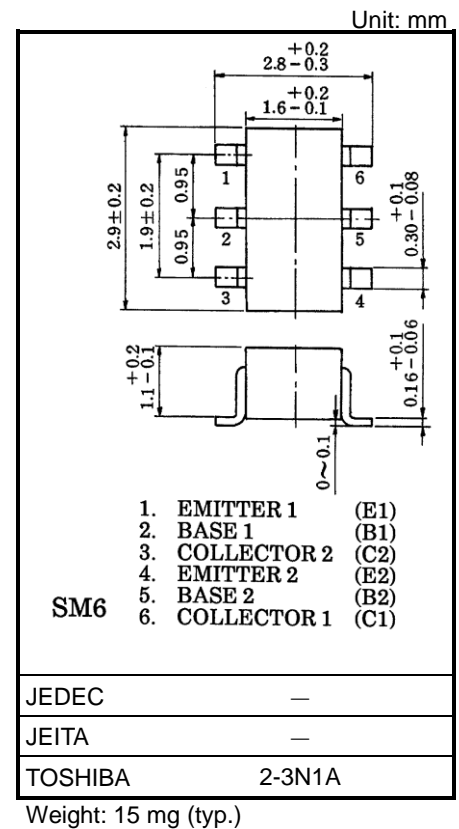


Q1 Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector-base voltage	V _{CB0}	-50	V
Collector-emitter voltage	V _{CE0}	-50	V
Emitter-base voltage	V _{EB0}	-15	V
Collector current	I _C	-100	mA

Q2 Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector-base voltage	V _{CB0}	50	V
Collector-emitter voltage	V _{CE0}	50	V
Emitter-base voltage	V _{EB0}	15	V
Collector current	I _C	100	mA



Start of commercial production
1988-11

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

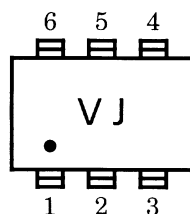
Characteristic	Symbol	Rating	Unit
Collector power dissipation	P _C *	300	mW
Junction temperature	T _j	150	°C
Storage temperature range	T _{stg}	–55 to 150	°C

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.

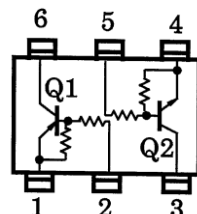
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

* 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 _{CB} = -50 V, I _E = 0 mA	—	—	-100	nA
	ICEO	—	V _{CE} = -50 V, I _B = 0 mA	—	—	-500	
Emitter cut-off current	IEBO	—	V _{EB} = -15 V, I _C = 0 mA	-0.167	—	-0.311	mA
DC current gain	h _{FE}	—	V _{CE} = -5 V, I _C = -10 mA	70	—	—	—
Collector-emitter saturation voltage	V _{CE (sat)}	—	I _C = -5 mA, I _B = -0.25 mA	—	-0.1	-0.3	V
Input voltage (ON)	V _{I (ON)}	—	V _{CE} = -0.2 V, I _C = -5 mA	-2.2	—	-5.8	V
Input voltage (OFF)	V _{I (OFF)}	—	V _{CE} = -5 V, I _C = -0.1 mA	-1.5	—	-2.6	V
Transition frequency	f _T	—	V _{CE} = -10 V, I _C = -5 mA	—	200	—	MHz
Collector output capacitance	C _{ob}	—	V _{CB} = -10 V, I _E = 0 mA, f = 1 MHz	—	3	6	pF

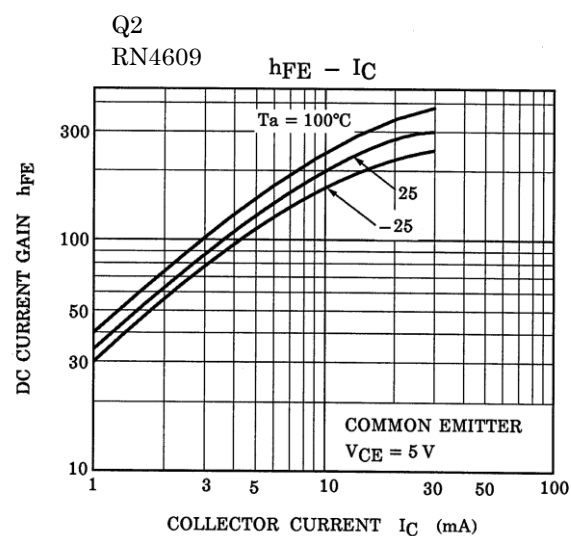
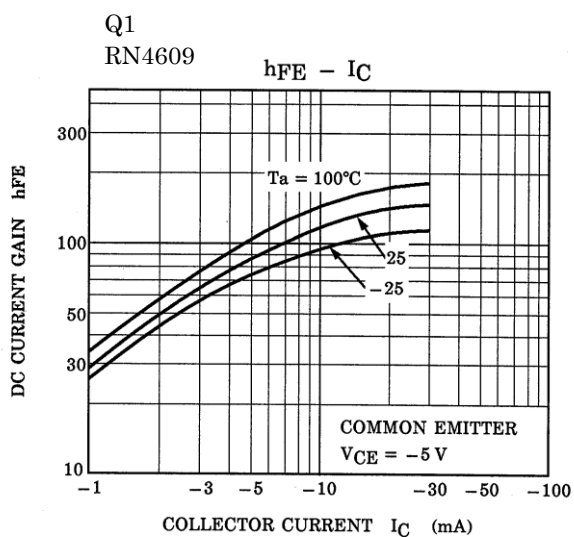
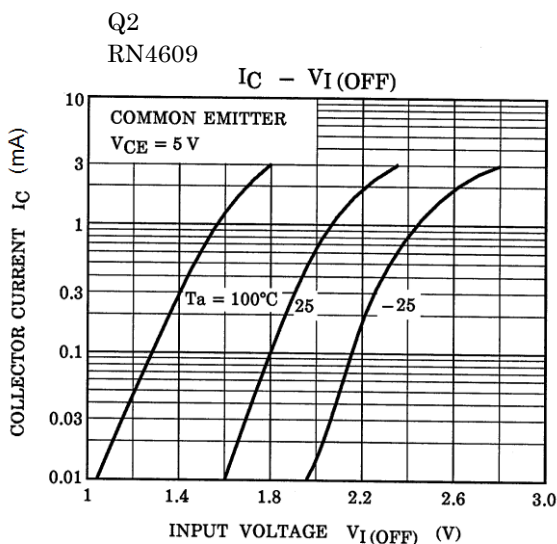
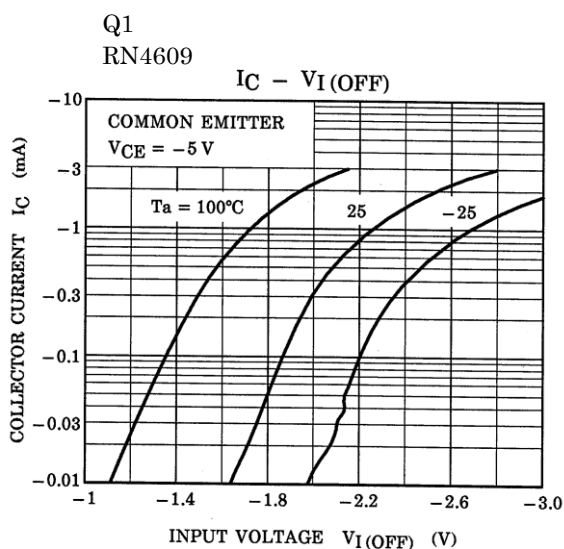
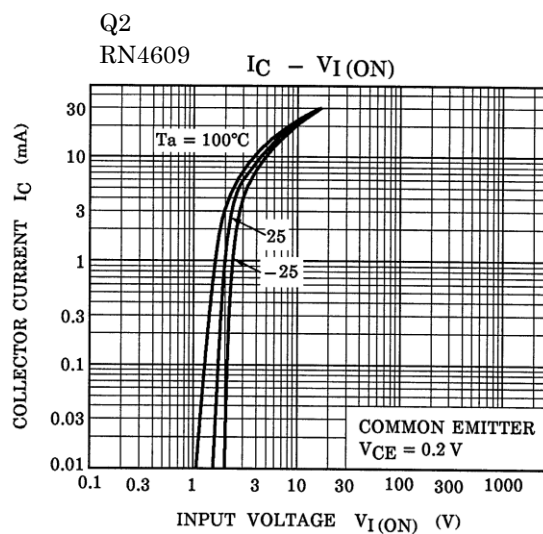
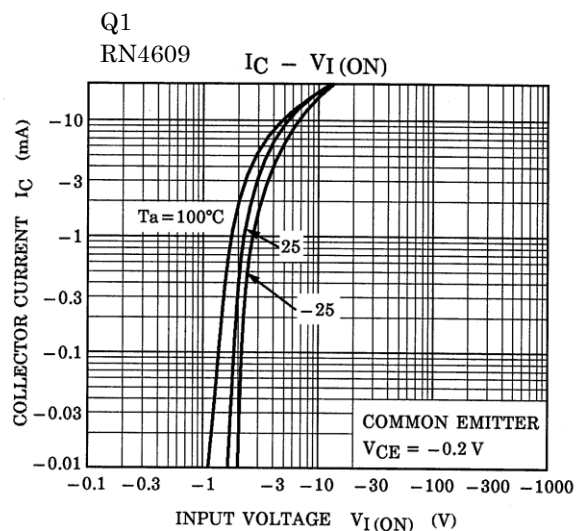
Q2 Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	ICBO	—	V _{CB} = 50 V, I _E = 0 mA	—	—	100	nA
	ICEO	—	V _{CE} = 50 V, I _B = 0 mA	—	—	500	
Emitter cut-off current	IEBO	—	V _{EB} = 15 V, I _C = 0 mA	0.167	—	0.311	mA
DC current gain	h _{FE}	—	V _{CE} = 5 V, I _C = 10 mA	70	—	—	—
Collector-emitter saturation voltage	V _{CE (sat)}	—	I _C = 5 mA, I _B = 0.25 mA	—	0.1	0.3	V
Input voltage (ON)	V _{I (ON)}	—	V _{CE} = 0.2 V, I _C = 5 mA	2.2	—	5.8	V
Input voltage (OFF)	V _{I (OFF)}	—	V _{CE} = 5 V, I _C = 0.1 mA	1.5	—	2.6	V
Transition frequency	f _T	—	V _{CE} = 10 V, I _C = 5 mA	—	250	—	MHz
Collector output capacitance	C _{ob}	—	V _{CB} = 10 V, I _E = 0 mA, 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 resistance	R _I	—	—	32.9	47	61.1	kΩ
Resistance ratio	R _I /R ₂	—	—	1.92	2.14	2.35	—

Q1,Q2 characteristics curves



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

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