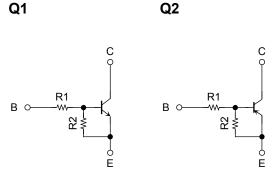
TOSHIBA Transistor Silicon NPN · PNP Epitaxial Type (PCT process) (Bias Resistor Built-in Transistor)

RN4989FS

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- Two devices are incorporated into a fine pitch small mold (6-pin) package.
- Incorporating a bias resistor into a transistor reduces parts count. Reducing the parts count enables the manufacture of ever more compact equipment and lowers assembly cost.

Equivalent Circuit and Bias Resistor Values

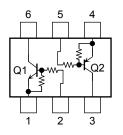


R1: 47 kΩ

R2: 22 k Ω

(Q1, Q2 common)

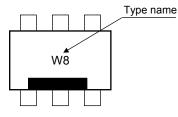
Equivalent Circuit (top view)



1.0±0.05 0.8±0.05 0.1±0.05 0.1±0.05 0.15±0.05 0.7±0.05 6 S 35 010. Q 5 35 1±0.05 +0.02 -0.04 48 0 1.EMIITTER1 (E1) 2.BASE1 (B1) 3.COLLECTOR2 (C2) 4.EMITTER2 (E2) 5.BASE2 (B2) 6.COLLECTOR1 fS6 (C1) JEDEC ____ JEITA TOSHIBA 2-1F1D

Weight: 0.001g (typ.)

Marking



Unit: mm

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

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V _{CBO}	20	V
Collector-emitter voltage	V _{CEO}	20	V
Emitter-base voltage	V _{EBO}	15	V
Collector current	Ι _C	50	mA

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

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V _{CBO}	-20	V
Collector-emitter voltage	V _{CEO}	-20	V
Emitter-base voltage	V _{EBO}	-15	V
Collector current	Ι _C	-50	mA

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

Characteristics	Symbol	Rating	Unit
Collector power dissipation	P _C (Note 1)	50	mW
Junction temperature	Tj	150	°C
Storage temperature range	T _{stg}	-55~150	°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

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

Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Collector cut-off current	I _{CBO}	$V_{CB}=20~V,~I_{E}=0$	_	_	100	nA
	I _{CEO}	$V_{CE}=20~V,~I_B=0$	_	_	500	
Emitter cut-off current	I _{EBO}	$V_{EB} = 15 \text{ V}, \text{ I}_{C} = 0$	0.182	_	0.271	mA
DC current gain	h _{FE}	$V_{CE} = 5 \text{ V}, \text{ I}_{C} = 10 \text{ mA}$	120	_	_	
Collector-emitter saturation voltage	V _{CE (sat)}	I _C = 5 mA, I _B = 0.25 mA	_	_	0.15	V
Input voltage (ON)	V _{I (ON)}	$V_{CE} = 0.2 \text{ V}, \text{ I}_{C} = 5 \text{ mA}$	1.6	_	5.0	V
Input voltage (OFF)	V _{I (OFF)}	$V_{CE} = 5 \text{ V}, \text{ I}_{C} = 0.1 \text{ mA}$	1.3	_	2.6	V
Collector output capacitance	C _{ob}	$V_{CB} = 10 \text{ V}, I_E = 0, f = 1 \text{ MHz}$		1.2		pF

Electrical Characteristics (Ta = 25°C) (Q2)

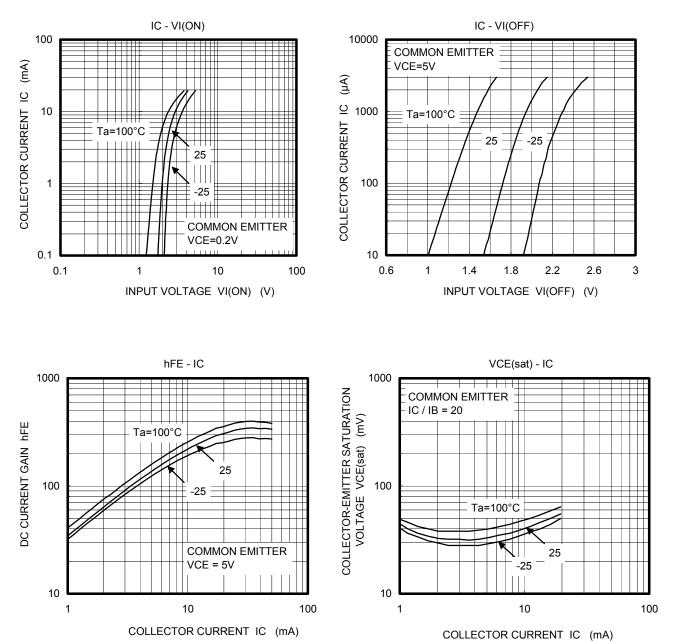
Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Collector cut-off current	I _{CBO}	$V_{CB}=-20~V,~I_{E}=0$	—	_	-100	nA
	ICEO	$V_{CE}=-20~V,~I_B=0$	—	_	-500	117
Emitter cut-off current	I _{EBO}	$V_{EB} = -15 \text{ V}, I_C = 0$	-0.182	_	-0.271	mA
DC current gain	h _{FE}	$V_{CE} = -5 \text{ V}, \text{ I}_{C} = -10 \text{ mA}$	120	_	_	
Collector-emitter saturation voltage	V _{CE (sat)}	$I_{C} = -5 \text{ mA}, I_{B} = -0.25 \text{ mA}$	—	_	-0.15	V
Input voltage (ON)	V _{I (ON)}	$V_{CE} = -0.2 \text{ V}, I_C = -5 \text{ mA}$	-1.6	_	-5.0	V
Input voltage (OFF)	VI (OFF)	$V_{CE} = -5 \text{ V}, \text{ I}_{C} = -0.1 \text{ mA}$	-1.3		-2.6	V
Collector output capacitance	C _{ob}	$V_{CB} = -10 \text{ V}, I_E = 0, f = 1 \text{ MHz}$	—	1.2	_	pF

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

Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Input resistor	R1	—	37.6	47	56.4	kΩ
Resistor ratio	R1/R2		1.71	2.14	2.56	

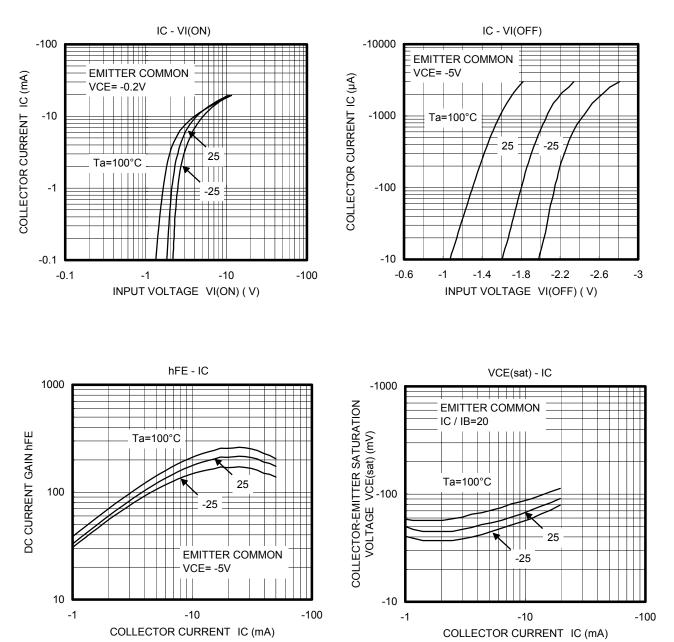
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Q2



Handling Precaution

When handling individual devices (which are not yet mounted on a circuit board), be sure that the environment is protected against electrostatic discharge. Operators should wear anti-static clothing, and containers and other objects that come into direct contact with devices should be made of anti-static materials.

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