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

# **RN4987FE**

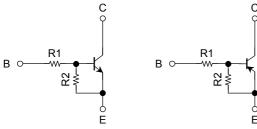
Switching, Inverter Circuit, Interface Circuit and **Driver Circuit Applications.** 

- Two devices are incorporated into an Extreme-Super-Mini (6 pin)
- Incorporating a bias resistor into a transistor reduces parts count. Reducing the parts count enable the manufacture of ever more compact equipment and save assembly cost.

### **Equivalent Circuit and Bias Resistor Values**

Q1

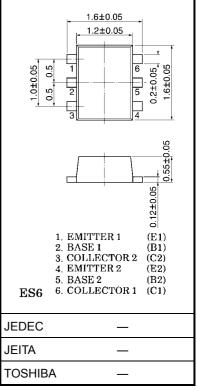
Q2



R1: 10 kΩ R2: 47 kΩ

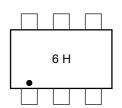
(Q1, Q2 common)

Unit: mm

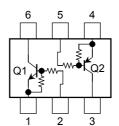


Weight: g (typ.)

#### Marking



#### **Equivalent Circuit (top view)**



## Maximum Ratings (Ta = 25°C) (Q1)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	50	V
Collector-emitter voltage	V <sub>CEO</sub>	50	V
Emitter-base voltage	V <sub>EBO</sub>	6	V
Collector current	IC	100	mA

### Maximum Ratings (Ta = 25°C) (Q2)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	-50	V
Collector-emitter voltage	V <sub>CEO</sub>	-50	V
Emitter-base voltage	V <sub>EBO</sub>	-6	V
Collector current	I <sub>C</sub>	-100	mA

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

Characteristics	Symbol	Rating	Unit
Collector power dissipation	P <sub>C</sub> (Note)	100	mW
Junction temperature	Tj	150	°C
Storage temperature range	T <sub>stg</sub>	<b>−55~150</b>	°C

Note: Total rating

2

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

Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Collector cut-off current	I <sub>CBO</sub>	$V_{CB} = 50 \text{ V}, I_{E} = 0$	_	_	100	nA
Conector cut-on current	I <sub>CEO</sub>	$V_{CE} = 50 \text{ V}, I_{B} = 0$	_	_	500	
Emitter cut-off current	I <sub>EBO</sub>	$V_{EB} = 6 \text{ V}, I_{C} = 0$	0.081	_	0.15	mA
DC current gain	h <sub>FE</sub>	$V_{CE} = 5 \text{ V}, I_{C} = 10 \text{ mA}$	80	_	_	
Collector-emitter saturation voltage	V <sub>CE</sub> (sat)	$I_C = 5 \text{ mA}, I_B = 0.25 \text{ mA}$	_	0.1	0.3	V
Input voltage (ON)	V <sub>I (ON)</sub>	$V_{CE} = 0.2 \text{ V}, I_{C} = 5 \text{ mA}$	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, f = 1 MHz	_	3	6	pF

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

Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Collector cut-off current	I <sub>CBO</sub>	$V_{CB} = -50 \text{ V}, I_E = 0$	_	_	-100	nA
	I <sub>CEO</sub>	$V_{CE} = -50 \text{ V}, I_B = 0$	_		-500	
Emitter cut-off current	I <sub>EBO</sub>	$V_{EB} = -6 \text{ V}, I_{C} = 0$	-0.081		-0.15	mA
DC current gain	h <sub>FE</sub>	$V_{CE} = -5 \text{ V}, I_{C} = -10 \text{ mA}$	80			
Collector-emitter saturation voltage	V <sub>CE</sub> (sat)	$I_C = -5 \text{ mA}, I_B = -0.25 \text{ mA}$	_	-0.1	-0.3	V
Input voltage (ON)	V <sub>I (ON)</sub>	$V_{CE} = -0.2 \text{ V}, I_{C} = -5 \text{ mA}$	-0.7	_	-1.8	٧
Input voltage (OFF)	V <sub>I (OFF)</sub>	$V_{CE} = -5 \text{ V}, I_{C} = -0.1 \text{ mA}$	-0.5	_	-1.0	٧
Transition frequency	f <sub>T</sub>	$V_{CE} = -10 \text{ V}, I_{C} = -5 \text{ mA}$		200		MHz
Collector output capacitance	C <sub>ob</sub>	$V_{CB} = -10 \text{ V}, I_E = 0, f = 1 \text{ MHz}$		3	6	pF

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

Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Input resistor	R1	_	7	10	13	kΩ
Resistor ratio	R1/R2		0.191	0.213	0.232	

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