

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

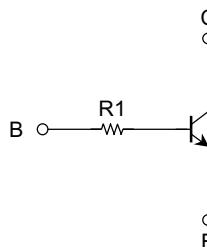
R N 4 9 9 0 F E

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

- Two devices are incorporated into an Extreme-Super-Mini (6 pin) package.
- 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

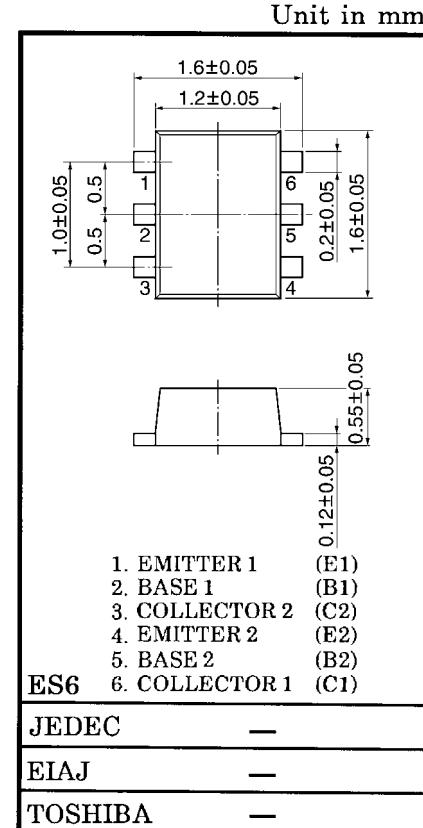
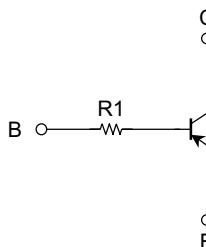
Q1



R1: 4.7 kΩ

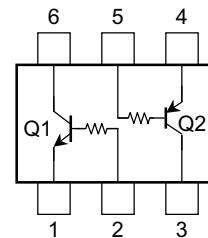
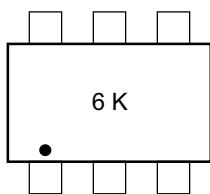
(Q1, Q2 common)

Q2



Marking

Equivalent Circuit (top view)



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Maximum Ratings (Ta = 25°C) (Q1)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	50	V
Collector-emitter voltage	V_{CEO}	50	V
Emitter-base voltage	V_{EBO}	5	V
Collector current	I_C	100	mA

Maximum Ratings (Ta = 25°C) (Q2)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	-50	V
Collector-emitter voltage	V_{CEO}	-50	V
Emitter-base voltage	V_{EBO}	-5	V
Collector current	I_C	-100	mA

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

Characteristics	Symbol	Rating	Unit
Collector power dissipation	P_C (Note)	100	mW
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	-55~150	°C

Note: Total rating

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	$V_{CB} = 50 \text{ V}$, $I_E = 0$	—	—	100	nA
Emitter cut-off current	I_{EBO}	$V_{EB} = 10 \text{ V}$, $I_C = 0$	—	—	100	nA
DC current gain	h_{FE}	$V_{CE} = 5 \text{ V}$, $I_C = 1 \text{ mA}$	120	—	700	
Collector-emitter saturation voltage	$V_{CE} (\text{sat})$	$I_C = 5 \text{ mA}$, $I_B = 0.25 \text{ mA}$	—	0.1	0.3	V
Transition frequency	f_T	$V_{CE} = 10 \text{ V}$, $I_C = 5 \text{ mA}$	—	250	—	MHz
Collector output capacitance	C_{ob}	$V_{CB} = 10 \text{ V}$, $I_E = 0$, $f = 1 \text{ MHz}$	—	3	6	pF

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	$V_{CB} = -50 \text{ V}$, $I_E = 0$	—	—	-100	nA
Emitter cut-off current	I_{EBO}	$V_{EB} = -5 \text{ V}$, $I_C = 0$	—	—	-100	nA
DC current gain	h_{FE}	$V_{CE} = -5 \text{ V}$, $I_C = -1 \text{ mA}$	120	—	400	
Collector-emitter saturation voltage	$V_{CE} (\text{sat})$	$I_C = -5 \text{ mA}$, $I_B = -0.25 \text{ mA}$	—	-0.1	-0.3	V
Transition frequency	f_T	$V_{CE} = -10 \text{ V}$, $I_C = -5 \text{ mA}$	—	200	—	MHz
Collector output capacitance	C_{ob}	$V_{CB} = -10 \text{ V}$, $I_E = 0$, $f = 1 \text{ MHz}$	—	3	6	pF

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Input resistor	R_1	—	3.29	4.7	6.11	kΩ