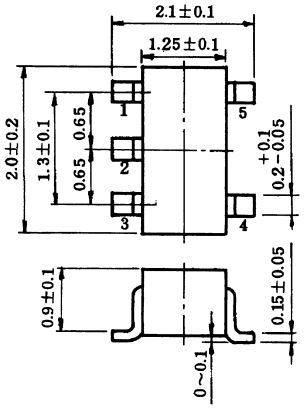
TOSHIBA Transistor Silicon NPN・PNP Epitaxial Type
(PCT process) (Bias Resistor built-in Transistor)

RN47A3

Switching, Inverter Circuit, Interface Circuit and
Driver Circuit Applications

- Two devices are incorporated into an Ultra-Super-Mini (5 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.

Unit: mm



1. EMITTER 1 (E1)
2. BASE 1 (B1)
3. EMITTER 2 (E2)
4. COLLECTOR 2 (C2)
5. COLLECTOR 1 (C1)
BASE 2 (B2)

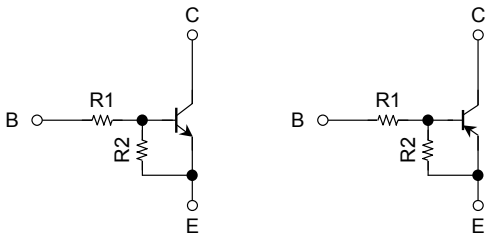
USV

JEDEC	—
JEITA	—
TOSHIBA	2-2L1D

Weight: 0.0062g (typ.)

Equivalent Circuit and Bias Resistor Values

Q1 **Q2**



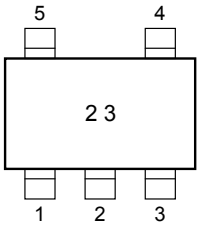
R1: 10 kΩ (Q1, Q2 common)

R2: 10 kΩ (Q1, Q2 common)

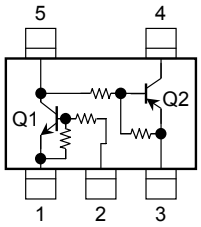
Q1: RN1102F

Q2: RN2102F

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_{CEO}	50	V
Emitter-base voltage	V_{EBO}	10	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}	−10	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)	200	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 V, I_E = 0	—	—	100	nA
	I_{CEO}	V_{CE} = 50 V, I_B = 0	—	—	500	
Emitter cut-off current	I_{EBO}	V_{EB} = 10 V, I_C = 0	0.38	—	0.71	mA
DC current gain	h_{FE}	V_{CE} = 5 V, I_C = 10 mA	50	—	—	
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	1.2	—	2.4	V
Input voltage (OFF)	$V_{I\ (OFF)}$	V_{CE} = 5 V, I_C = 0.1 mA	1.0	—	1.5	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, f = 1 MHz	—	3	—	pF
Input resistor	R1	—	7	10	13	kΩ
Resistor ratio	R1/R2	—	0.8	1.0	1.2	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	V_{CB} = −50 V, I_E = 0	—	—	−100	nA
	I_{CEO}	V_{CE} = −50 V, I_B = 0	—	—	−500	
Emitter cut-off current	I_{EBO}	V_{EB} = −10 V, I_C = 0	−0.38	—	−0.71	mA
DC current gain	h_{FE}	V_{CE} = −5 V, I_C = −10 mA	50	—	—	
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	−1.2	—	−2.4	V
Input voltage (OFF)	$V_{I\ (OFF)}$	V_{CE} = −5 V, I_C = −0.1 mA	−1.0	—	−1.5	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, f = 1 MHz	—	3	—	pF
Input resistor	R1	—	7	10	13	kΩ
Resistor ratio	R1/R2	—	0.8	1.0	1.2	