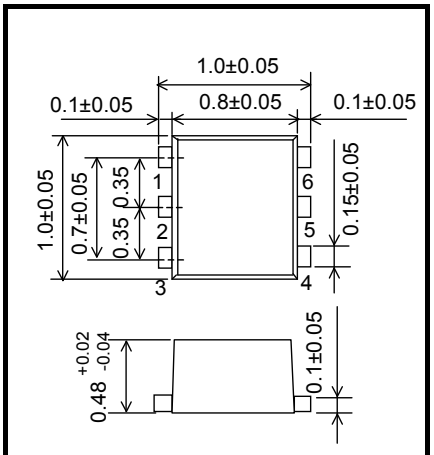
TOSHIBA Transistor Silicon PNP・NPN Epitaxial Type
(PCT process) (Bias Resistor Built-in Transistor)

# RN49J7FS

Unit: mm

Switching Applications
Inverter Circuit Applications
Interface Circuit Applications
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.




1. EMITTER1 (E1)
2. BASE2 (B2)
3. EMITTER2 (E2)
4. COLEECTOR2 (C2)
5. BASE1 (B1)
6. COLEECTOR1 (C1)

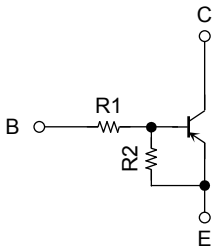
fS6

| | |
|---|---|
| JEDEC | — |
| JEITA | — |
| TOSHIBA | 2-1F1D |

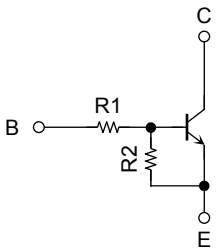
Weight: 1 mg (typ.)

## Equivalent Circuit and Bias Resistor Values

**Q1**




**Q2**

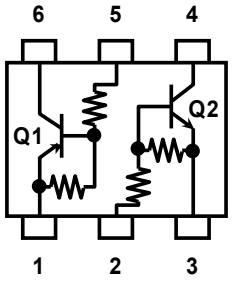



R1: 47 kΩ

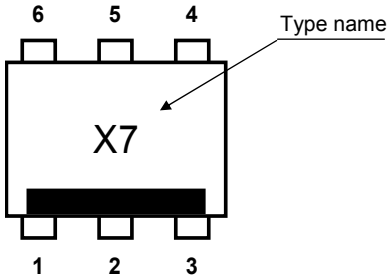
R2: 47 kΩ

(Q1, Q2 common)

## Equivalent Circuit (top view)




## Marking



## 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 | $V_{EBO}$ | −10 | V |
| Collector current | $I_C$ | −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 | $V_{EBO}$ | 10 | V |
| Collector current | $I_C$ | 50 | mA |

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

| Characteristics | Symbol | Rating | Unit |
|---|---|---|---|
| Collector power dissipation | $P_C$ (Note) | 50 | mW |
| Junction temperature | $T_j$ | 150 | °C |
| Storage temperature range | $T_{stg}$ | −55 to 150 | °C |

Note: Total rating

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).

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

| Characteristics | Symbol | Test Condition | Min | Typ. | 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 | $I_{EBO}$ | $V_{EB}$ = −10 V, $I_C$ = 0 | −0.088 | — | −0.133 | mA |
| DC current gain | $h_{FE}$ | $V_{CE}$ = −5 V, $I_C$ = −10 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 V, $I_C$ = −5 mA | −1.2 | — | −3.6 | V |
| Input voltage (OFF) | $V_{I\ (OFF)}$ | $V_{CE}$ = −5 V, $I_C$ = −0.1 mA | −0.8 | — | −1.5 | V |
| Collector output capacitance | $C_{ob}$ | $V_{CB}$ = −10 V, $I_E$ = 0, f = 1 MHz | — | 1.2 | — | pF |

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

| Characteristics | Symbol | Test Condition | Min | Typ. | 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 | $I_{EBO}$ | $V_{EB}$ = 10 V, $I_C$ = 0 | 0.088 | — | 0.133 | mA |
| DC current gain | $h_{FE}$ | $V_{CE}$ = 5 V, $I_C$ = 10 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 V, $I_C$ = 5 mA | 1.2 | — | 3.6 | V |
| Input voltage (OFF) | $V_{I\ (OFF)}$ | $V_{CE}$ = 5 V, $I_C$ = 0.1 mA | 0.8 | — | 1.5 | V |
| Collector output capacitance | $C_{ob}$ | $V_{CB}$ = 10 V, $I_E$ = 0, f = 1 MHz | — | 1.2 | — | pF |

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

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Input resistor | R1 | — | 37.6 | 47 | 56.4 | kΩ |
| Resistor ratio | R1/R2 | — | 0.8 | 1.0 | 1.2 | |

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