

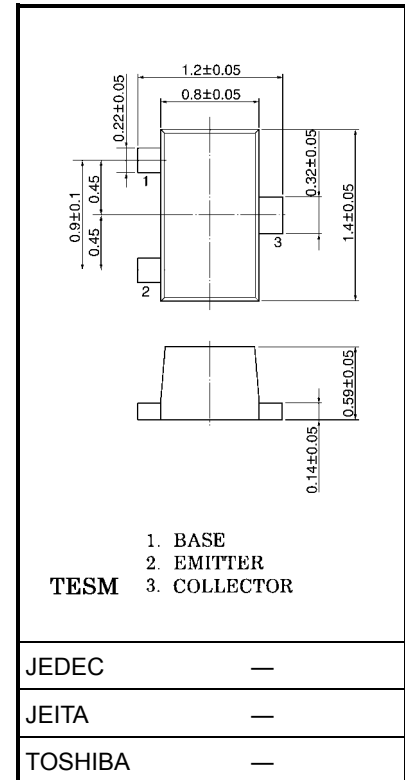
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

## RN1101FT, RN1102FT, RN1103FT RN1104FT, RN1105FT, RN1106FT

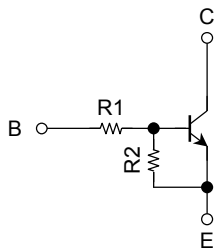
Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications.

Unit: mm

- High-density mount is possible because of devices housed in very thin TESM packages.
- 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.
- Wide range of resistor values are available to use in various circuit designs.
- Complementary to RN2101FT~2106FT



### Equivalent Circuit and Bias Resistor Values



| Type No. | R1 (kΩ) | R2 (kΩ) |
|----------|---------|---------|
| RN1101FT | 4.7     | 4.7     |
| RN1102FT | 10      | 10      |
| RN1103FT | 22      | 22      |
| RN1104FT | 47      | 47      |
| RN1105FT | 2.2     | 47      |
| RN1106FT | 4.7     | 47      |

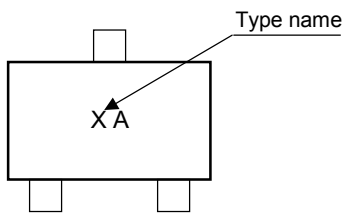
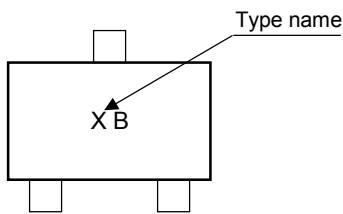
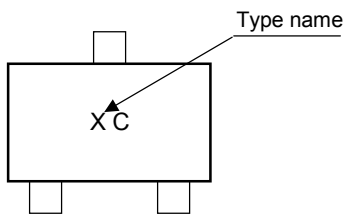
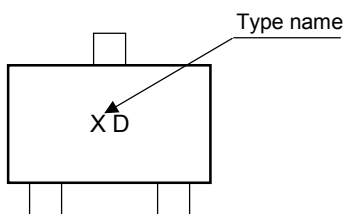
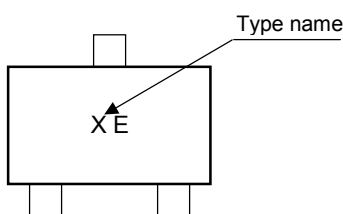
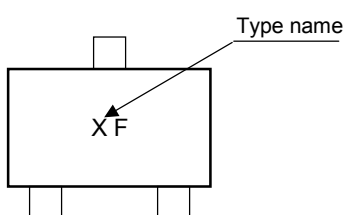
### Maximum Ratings (Ta = 25°C)

| Characteristics             |                    | Symbol                | Rating  | Unit |
|-----------------------------|--------------------|-----------------------|---------|------|
| Collector-base voltage      | RN1101FT~1106FT    | V <sub>CBO</sub>      | 50      | V    |
| Collector-emitter voltage   |                    | V <sub>CEO</sub>      | 50      | V    |
| Emitter-base voltage        | RN1101FT~1104FT    | V <sub>EBO</sub>      | 10      | V    |
|                             | RN1105FT, RN1106FT |                       | 5       |      |
| Collector current           | RN1101FT~1106FT    | I <sub>C</sub>        | 100     | mA   |
| Collector power dissipation |                    | P <sub>C</sub> (Note) | 100     | mW   |
| Junction temperature        |                    | T <sub>j</sub>        | 150     | °C   |
| Storage temperature range   |                    | T <sub>stg</sub>      | -55~150 | °C   |

Note: Total rating

## Electrical Characteristics (Ta = 25°C)

| Characteristics                      |                  | Symbol                         | Test Condition                                    | Min    | Typ.   | Max    | Unit |
|--------------------------------------|------------------|--------------------------------|---|--------|--------|--------|------|
| Collector cut-off current            | RN1101FT~1106FT  | $I_{CBO}$                      | $V_{CB} = 50\text{ V}, I_E = 0$                   | —      | —      | 100    | nA   |
|                                      |                  | $I_{CEO}$                      | $V_{CE} = 50\text{ V}, I_B = 0$                   | —      | —      | 500    |      |
| Emitter cut-off current              | RN1101FT         | $I_{EBO}$                      | $V_{EB} = 10\text{ V}, I_C = 0$                   | 0.82   | —      | 1.52   | mA   |
|                                      | RN1102FT         |                                |   | 0.38   | —      | 0.71   |      |
|                                      | RN1103FT         |                                |   | 0.17   | —      | 0.33   |      |
|                                      | RN1104FT         |                                |   | 0.082  | —      | 0.15   |      |
|                                      | RN1105FT         | $V_{EB} = 5\text{ V}, I_C = 0$ | 0.078   | —      | 0.145  |        |      |
|                                      | RN1106FT         |                                | 0.074   | —      | 0.138  |        |      |
| DC current gain                      | RN1101FT         | $h_{FE}$                       | $V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$         | 30     | —      | —      |      |
|                                      | RN1102FT         |                                |   | 50     | —      | —      |      |
|                                      | RN1103FT         |                                |   | 70     | —      | —      |      |
|                                      | RN1104FT         |                                |   | 80     | —      | —      |      |
|                                      | RN1105FT         |                                |   | 80     | —      | —      |      |
|                                      | RN1106FT         |                                |   | 80     | —      | —      |      |
| Collector-emitter saturation voltage | RN1101FT~1106FT  | $V_{CE(sat)}$                  | $I_C = 5\text{ mA}, I_B = 0.25\text{ mA}$         | —      | 0.1    | 0.3    | V    |
| Input voltage (ON)                   | RN1101FT         | $V_{I(ON)}$                    | $V_{CE} = 0.2\text{ V}, I_C = 5\text{ mA}$        | 1.1    | —      | 2.0    | V    |
|                                      | RN1102FT         |                                |   | 1.2    | —      | 2.4    |      |
|                                      | RN1103FT         |                                |   | 1.3    | —      | 3.0    |      |
|                                      | RN1104FT         |                                |   | 1.5    | —      | 5.0    |      |
|                                      | RN1105FT         |                                |   | 0.6    | —      | 1.1    |      |
|                                      | RN1106FT         |                                |   | 0.7    | —      | 1.3    |      |
| Input voltage (OFF)                  | RN1101FT~1104FT  | $V_{I(OFF)}$                   | $V_{CE} = 5\text{ V}, I_C = 0.1\text{ mA}$        | 1.0    | —      | 1.5    | V    |
|                                      | RN1105FT, 1106FT |                                |   | 0.5    | —      | 0.8    |      |
| Transition frequency                 | RN1101FT~1106FT  | $f_T$                          | $V_{CE} = 10\text{ V}, I_C = 5\text{ mA}$         | —      | 250    | —      | MHz  |
| Collector output capacitance         | RN1101FT~1106FT  | $C_{ob}$                       | $V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$ | —      | 3      | 6      | pF   |
| Input resistor                       | RN1101FT         | R1                             | —   | 3.29   | 4.7    | 6.11   | kΩ   |
|                                      | RN1102FT         |                                |   | 7      | 10     | 13     |      |
|                                      | RN1103FT         |                                |   | 15.4   | 22     | 28.6   |      |
|                                      | RN1104FT         |                                |   | 32.9   | 47     | 61.1   |      |
|                                      | RN1105FT         |                                |   | 1.54   | 2.2    | 2.86   |      |
|                                      | RN1106FT         |                                |   | 3.29   | 4.7    | 6.11   |      |
| Resistor ratio                       | RN1101FT~1104FT  | R1/R2                          | —   | 0.9    | 1.0    | 1.1    |      |
|                                      | RN1105FT         |                                |   | 0.0421 | 0.0468 | 0.0515 |      |
|                                      | RN1106FT         |                                |   | 0.09   | 0.1    | 0.11   |      |

| Type Name | Marking   |
|-----------|---|
| RN1101FT  |    |
| RN1102FT  |    |
| RN1103FT  |   |
| RN1104FT  |  |
| RN1105FT  |  |
| RN1106FT  |  |

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