Unit: mm

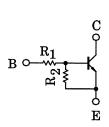
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process)

## RN1114FT, RN1115FT, RN11116FT, RN1117FT, RN1118FT

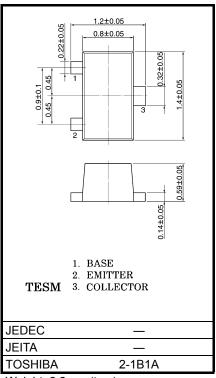
Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- Built-in bias resistors
- Enabling simplified circuit design
- Enabling reduction in the quantity of parts and manufacturing process
- Complementary to the RN2114FT to 2118FT

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



| Type No. | R <sub>1</sub> (kΩ) | R <sub>2</sub> (kΩ) |
|----------|---------------------|---------------------|
| RN1114FT | 1                   | 10                  |
| RN1115FT | 2.2                 | 10                  |
| RN1116FT | 4.7                 | 10                  |
| RN1117FT | 10                  | 4.7                 |
| RN1118FT | 47                  | 10                  |



Weight: 2.2 mg (typ.)

### Absolute Maximum Ratings (Ta = 25°C)

| Characteris                 | Symbol                 | Rating           | Unit       |    |  |
|-----------------------------|------------------------|------------------|------------|----|--|
| Collector-base voltage      | RN1114FT to 1118FT     | $V_{CBO}$        | 50         | V  |  |
| Collector-emitter voltage   | KINTTI TO TITOLI       | V <sub>CEO</sub> | 50         | V  |  |
| Emitter-base voltage        | RN1114FT               |                  | 5          |    |  |
|                             | RN1115FT               |                  | 6          |    |  |
|                             | RN1116FT               | $V_{EBO}$        | 7          | V  |  |
|                             | RN1117FT               |                  | 15         |    |  |
|                             | RN1118FT               |                  | 25         |    |  |
| Collector current           |                        | IC               | 100        | mA |  |
| Collector power dissipation | RN1114FT to 1118FT     | PC               | 100        | mW |  |
| Junction temperature        | 1 KINTI 14FT (U TT10FT | Tj               | 150        | °C |  |
| Storage temperature range   |                        | T <sub>stg</sub> | -55 to 150 | °C |  |

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.

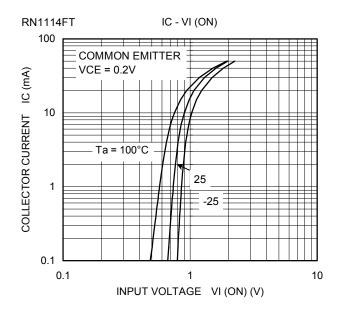
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

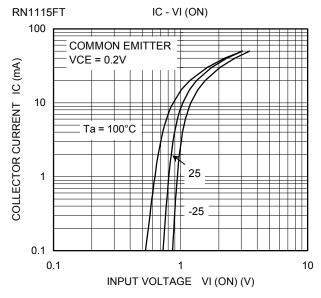


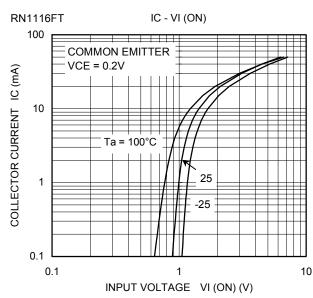
# Electrical Characteristics (Ta = 25°C)

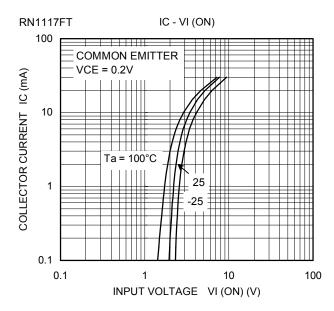
| Charact                              | teristics                 | Symbol                         | Test<br>Circuit | Test Condition   | Min  | Тур. | Max  | Unit |
|--------------------------------------|---------------------------|--------------------------------|-----------------|--|------|------|------|------|
| Collector cutoff current             | RN1114FT to 1118FT        | I <sub>CBO</sub>               | _               | V <sub>CB</sub> = 50 V, I <sub>E</sub> = 0               | _    | _    | 100  | nA   |
|                                      | RN1114FT to 1118FT        | I <sub>CEO</sub>               | _               | V <sub>CE</sub> = 50 V, I <sub>B</sub> = 0               | _    | _    | 500  | nA   |
|                                      | RN1114FT                  |                                | _               | V <sub>EB</sub> = 5 V, I <sub>C</sub> = 0                | 0.35 | _    | 0.65 |      |
|                                      | RN1115FT                  |                                | _               | V <sub>EB</sub> = 6 V, I <sub>C</sub> = 0                | 0.37 | _    | 0.71 |      |
| Emitter cutoff current               | RN1116FT                  | I <sub>EBO</sub>               | _               | V <sub>EB</sub> = 7 V, I <sub>C</sub> = 0                | 0.36 | _    | 0.68 | mA   |
|                                      | RN1117FT                  |                                | _               | V <sub>EB</sub> = 15 V, I <sub>C</sub> = 0               | 0.78 | _    | 1.46 |      |
|                                      | RN1118FT                  |                                | _               | V <sub>EB</sub> = 25 V, I <sub>C</sub> = 0               | 0.33 | _    | 0.63 |      |
| DC current gain                      | RN1114FT to 16FT,<br>18FT | h <sub>FE</sub>                | _               | V <sub>CE</sub> = 5 V, I <sub>C</sub> = 10 mA            | 50   | _    | _    | _    |
| j                                    | RN1117FT                  |                                | _               | 3 02 / 0   | 30   | _    | _    |      |
| Collector-emitter saturation voltage | RN1114FT to 1118FT        | V <sub>CE (sat)</sub>          | _               | $I_C = 5 \text{ mA}, I_B = 0.25 \text{ mA}$              | _    | 0.1  | 0.3  | V    |
|                                      | RN1114FT                  |                                | _               |  | 0.6  | _    | 2.0  | V    |
|                                      | RN1115FT                  |                                | _               |  | 0.7  | _    | 2.5  |      |
| Input voltage (ON)                   | RN1116FT                  | V <sub>I (ON)</sub>            | _               | $V_{CE} = 0.2 \text{ V}, I_{C} = 5 \text{ mA}$           | 8.0  | _    | 2.5  |      |
|                                      | RN1117FT                  |                                | _               |  | 1.5  | _    | 3.5  |      |
|                                      | RN1118FT                  |                                | _               |  | 2.5  | _    | 10.0 |      |
| Input voltage (OFF)                  | RN1114FT                  | VI (OFF)                       | _               | V <sub>CE</sub> = 5 V, I <sub>C</sub> = 0.1 mA           | 0.3  | _    | 0.9  | V    |
|                                      | RN1115FT                  |                                | _               |  | 0.3  | _    | 1.0  |      |
|                                      | RN1116FT                  |                                | _               |  | 0.3  | _    | 1.1  |      |
|                                      | RN1117FT                  |                                | _               |  | 0.3  | _    | 2.3  |      |
|                                      | RN1118FT                  |                                | _               |  | 0.5  | _    | 5.7  |      |
| Transition frequency                 | RN1114FT to 1118FT        | f <sub>T</sub>                 | _               | V <sub>CE</sub> = 10 V, I <sub>C</sub> = 5 mA            | _    | 250  | _    | MHz  |
| Collector output capacitance         | RN1114FT to 1118FT        | C <sub>ob</sub>                | _               | V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0,<br>f = 1 MHz | _    | 3.0  | 6.0  | pF   |
|                                      | RN1114FT                  | R <sub>1</sub>                 | _               | -<br>-<br>-<br>-   | 0.7  | 1.0  | 1.3  | kΩ   |
|                                      | RN1115FT                  |                                | _               |  | 1.54 | 2.2  | 2.86 |      |
| Input resistor                       | RN1116FT                  |                                | _               |  | 3.29 | 4.7  | 6.11 |      |
|                                      | RN1117FT                  |                                | _               |  | 7.0  | 10.0 | 13.0 |      |
|                                      | RN1118FT                  |                                | _               |  | 32.9 | 47.0 | 61.1 |      |
| Resistor ratio                       | RN1114FT                  | R <sub>1</sub> /R <sub>2</sub> | _               | _  | _    | 0.1  | _    |      |
|                                      | RN1115FT                  |                                | _               |  | _    | 0.22 | _    |      |
|                                      | RN1116FT                  |                                | _               |  | _    | 0.47 | _    |      |
|                                      | RN1117FT                  |                                | _               |  | _    | 2.13 | _    |      |
|                                      | RN1118FT                  |                                | _               |  | _    | 4.7  | _    |      |

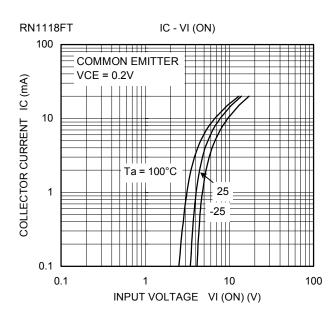
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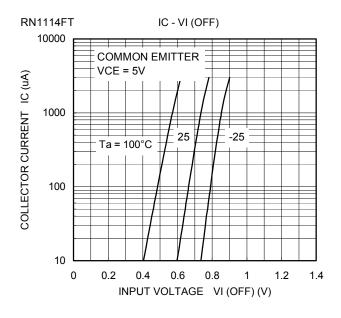


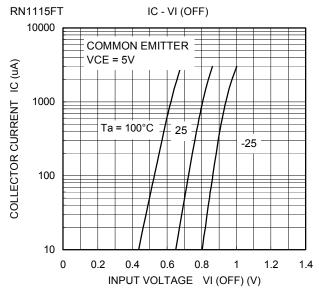


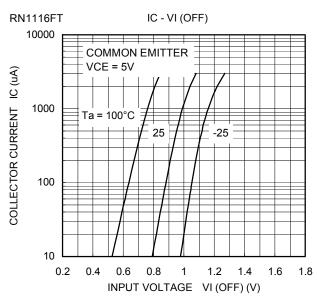


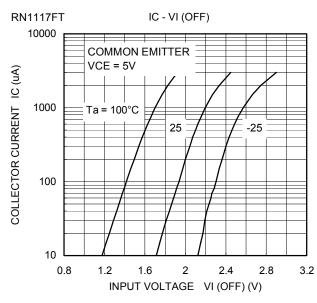


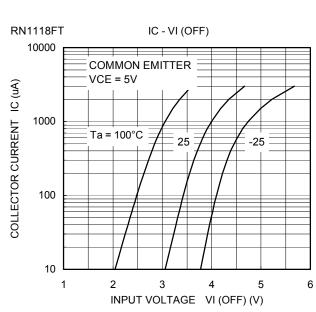


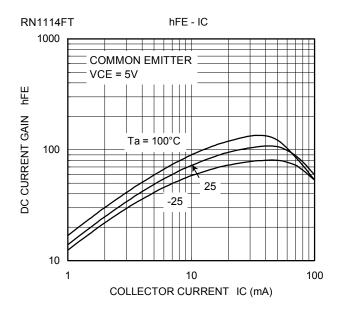


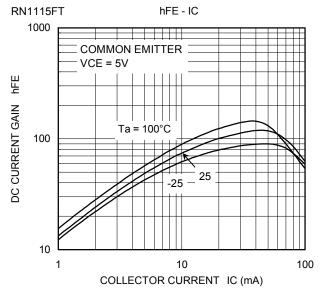


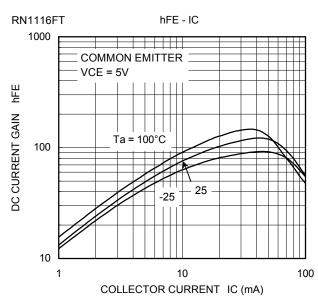


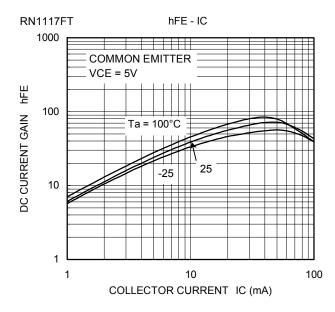


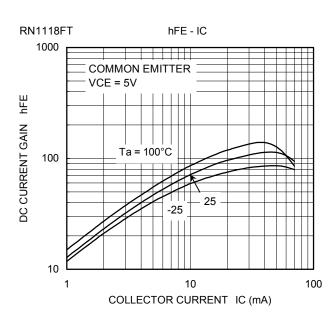




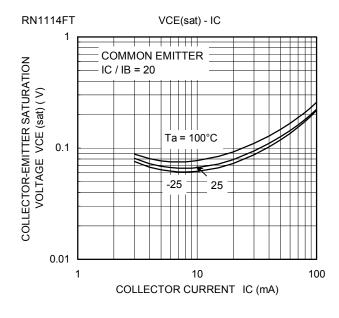


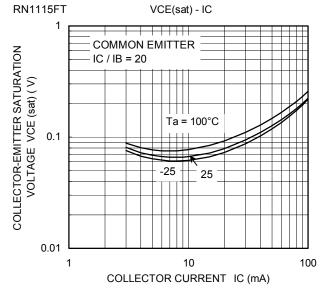


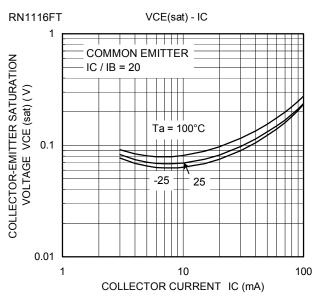


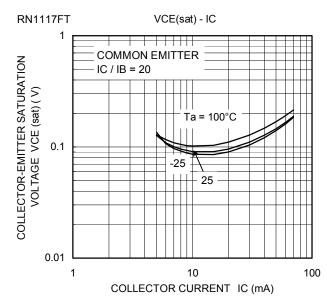


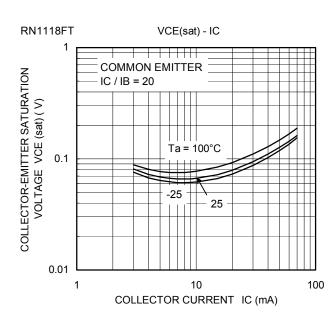
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| Type Name | Marking       |
|-----------|---------------|
| RN1114FT  | Type Name  XQ |
| RN1115FT  | Type Name  XS |
| RN1116FT  | Type Name  XT |
| RN1117FT  | Type Name  XU |
| RN1118FT  | Type Name  XW |

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