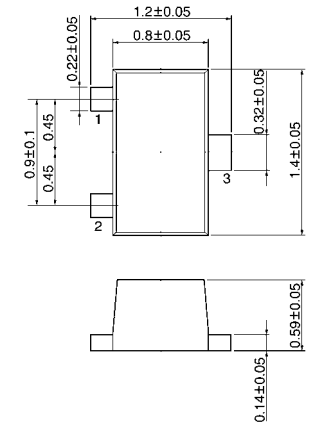
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

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

Switching, Inverter Circuit, Interface Circuit and
Driver Circuit Applications

- 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~RN2106FT

Unit: mm



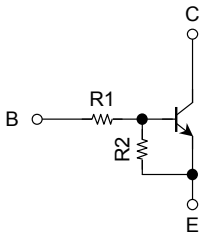

1. BASE
2. EMITTER
3. COLLECTOR

TESM

| | |
|---|---|
| JEDEC | — |
| JEITA | — |
| TOSHIBA | 2-1B1A |

Weight:0.0022 g (typ.)

## 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 |

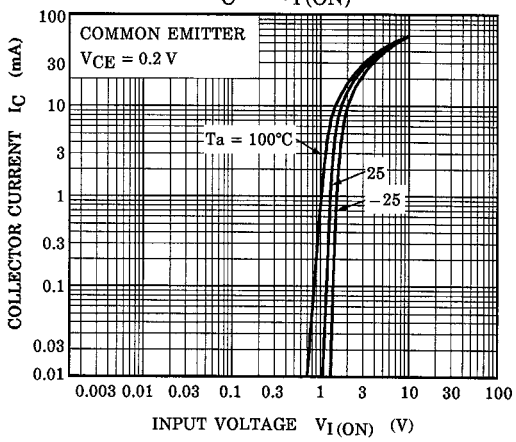
## Maximum Ratings (Ta = 25°C)

| Characteristics | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Collector-base voltage | RN1101FT~1106FT | $V_{CBO}$ | 50 | V |
| Collector-emitter voltage | | $V_{CEO}$ | 50 | V |
| Emitter-base voltage | RN1101FT~1104FT | $V_{EBO}$ | 10 | V |
| | RN1105FT, RN1106FT | | 5 | |
| Collector current | RN1101FT~1106FT | $I_C$ | 100 | mA |
| Collector power dissipation | | $P_C$ | 100 | mW |
| Junction temperature | | $T_j$ | 150 | °C |
| Storage temperature range | | $T_{stg}$ | −55~150 | °C |

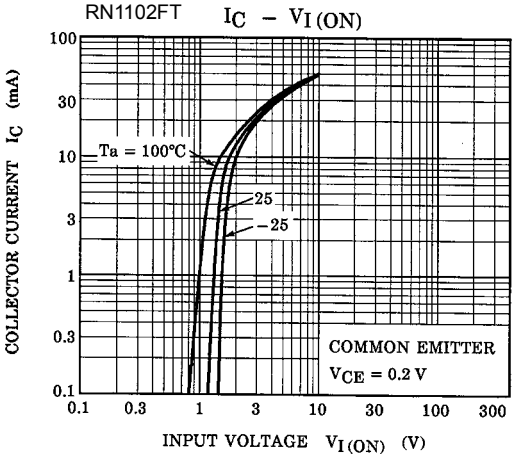
## Electrical Characteristics (Ta = 25°C)

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Collector cut-off current | RN1101FT~1106FT | $I_{CBO}$ | $V_{CB}$ = 50 V, $I_E$ = 0 | — | — | 100 | nA |
| | | $I_{CEO}$ | $V_{CE}$ = 50 V, $I_B$ = 0 | — | — | 500 | |
| Emitter cut-off current | RN1101FT | $I_{EBO}$ | $V_{EB}$ = 10 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 V, $I_C$ = 0 | 0.078 | — | 0.145 | |
| | RN1106FT | | | 0.074 | — | 0.138 | |
| DC current gain | RN1101FT | $h_{FE}$ | $V_{CE}$ = 5 V, $I_C$ = 10 mA | 30 | — | — | |
| | RN1102FT | | | 50 | — | — | |
| | RN1103FT | | | 70 | — | — | |
| | RN1104FT | | | 80 | — | — | |
| | RN1105FT | | | 80 | — | — | |
| | RN1106FT | | | 80 | — | — | |
| Collector-emitter saturation voltage | RN1101FT~1106FT | $V_{CE\ (sat)}$ | $I_C$ = 5 mA, $I_B$ = 0.25 mA | — | 0.1 | 0.3 | V |
| Input voltage (ON) | RN1101FT | $V_{I\ (ON)}$ | $V_{CE}$ = 0.2 V, $I_C$ = 5 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 V, $I_C$ = 0.1 mA | 1.0 | — | 1.5 | V |
| | RN1105FT, 1106FT | | | 0.5 | — | 0.8 | |
| Transition frequency | RN1101FT~1106FT | $f_T$ | $V_{CE}$ = 10 V, $I_C$ = 5 mA | — | 250 | — | MHz |
| Collector output capacitance | RN1101FT~1106FT | $C_{ob}$ | $V_{CB}$ = 10 V, $I_E$ = 0, f = 1 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 | |

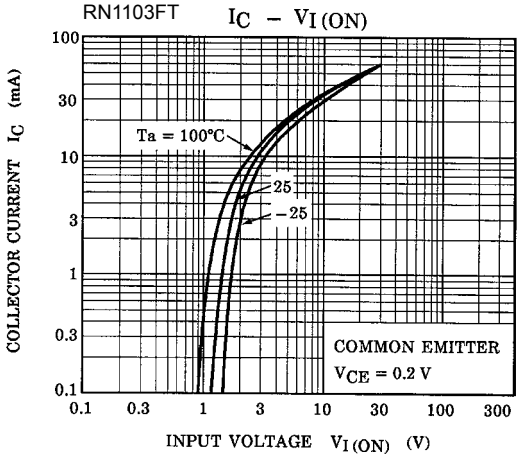
RN1101FT $I_C$ – $V_{I(ON)}$



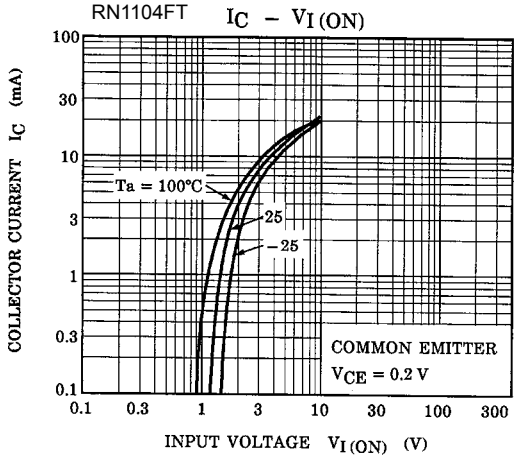

RN1102FT $I_C$ – $V_{I(ON)}$



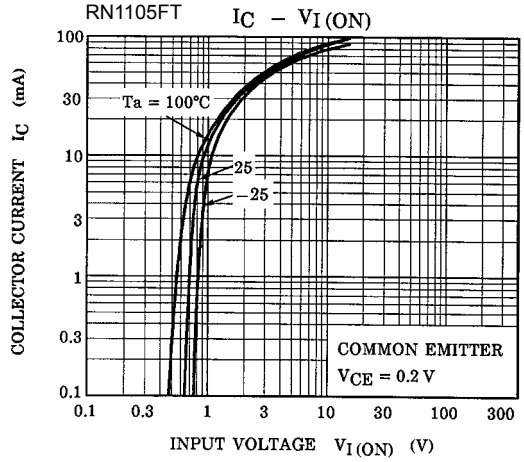

RN1103FT $I_C$ – $V_{I(ON)}$



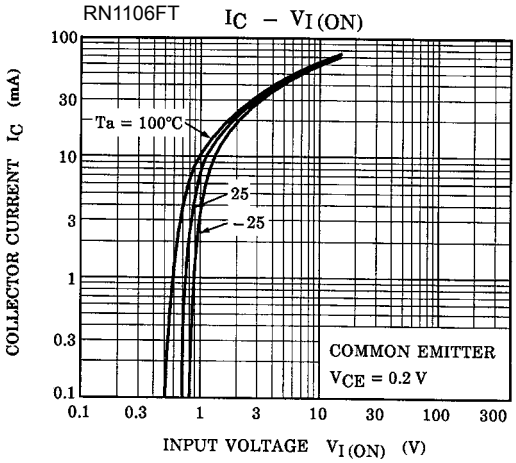

RN1104FT $I_C$ – $V_{I(ON)}$



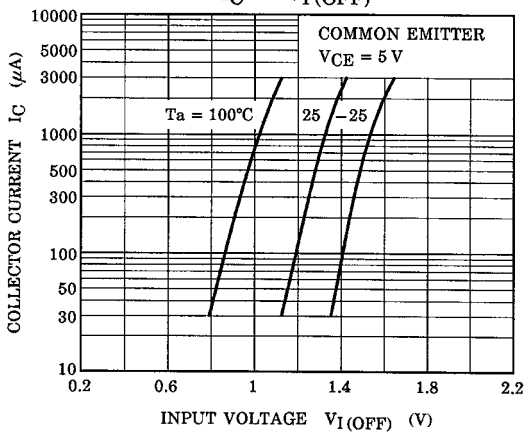

RN1105FT $I_C$ – $V_{I(ON)}$



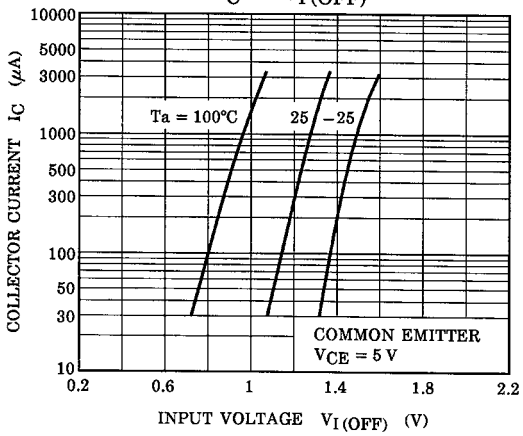

RN1106FT $I_C$ – $V_{I(ON)}$



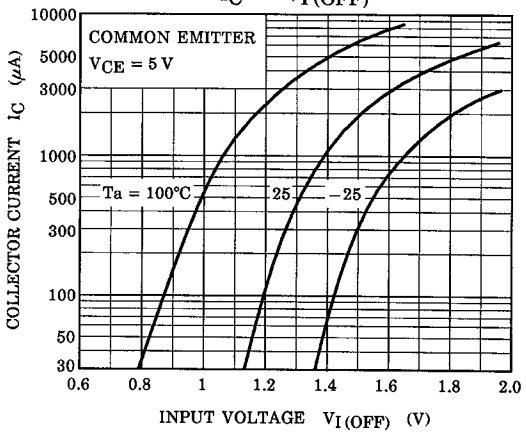
RN1101FT $I_C$ – $V_{I(OFF)}$




RN1102FT $I_C$ – $V_{I(OFF)}$




RN1103FT $I_C$ – $V_{I(OFF)}$

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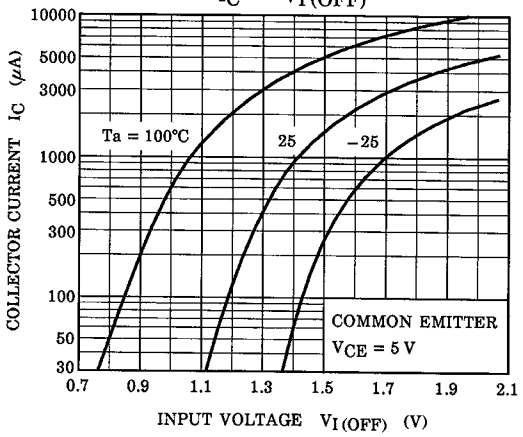


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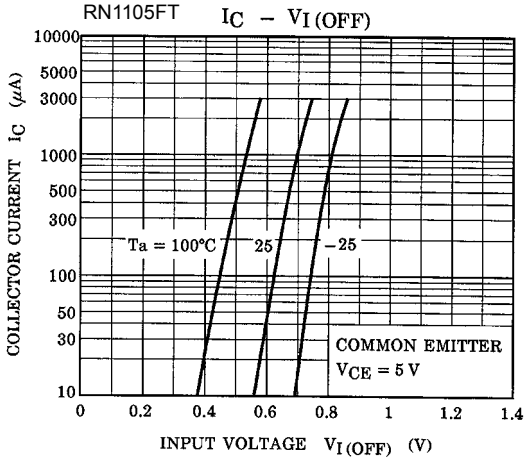
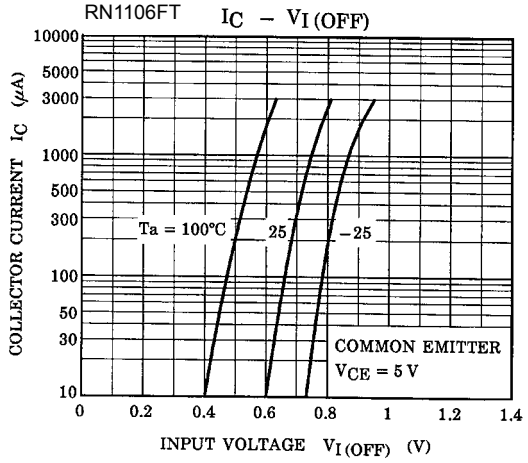
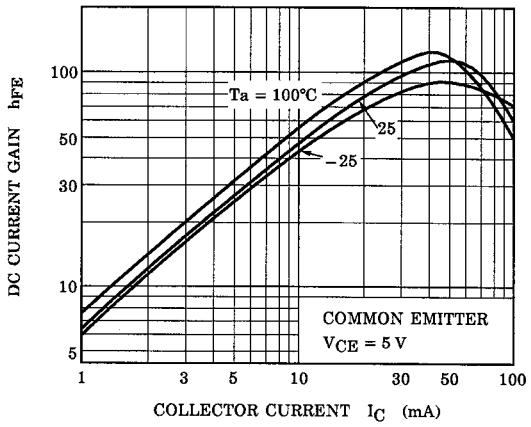



RN1106FT $I_C$ – $V_{I(OFF)}$



RN1101FT $h_{FE}$ – $I_C$

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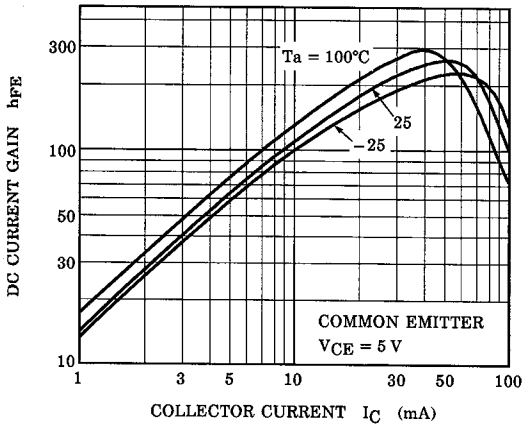
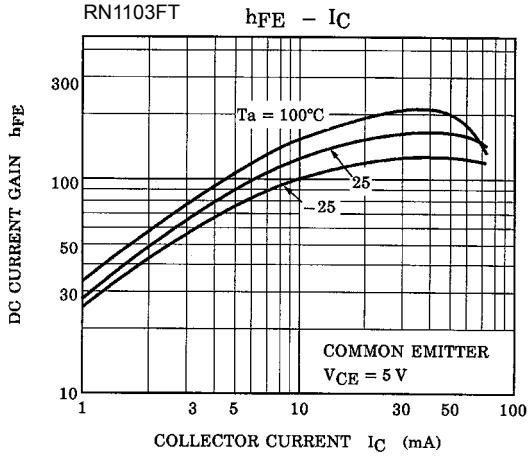
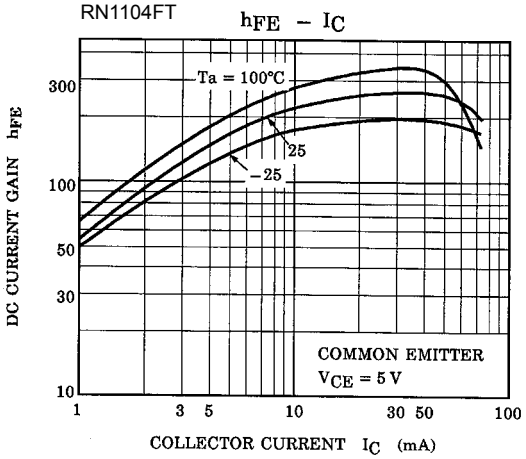


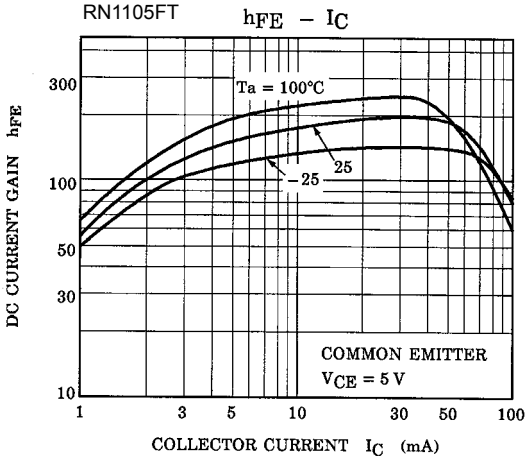

RN1103FT $h_{FE}$ – $I_C$



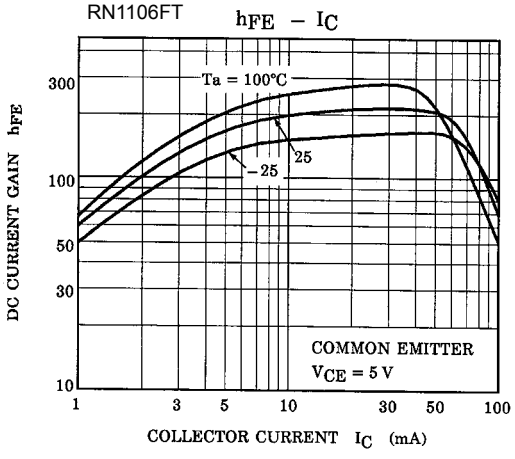

RN1104FT $h_{FE}$ – $I_C$



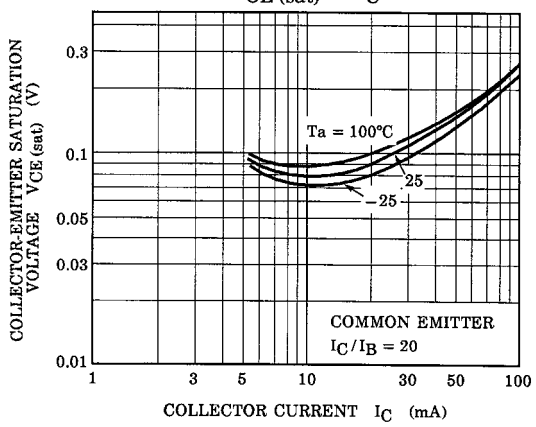

RN1105FT $h_{FE}$ – $I_C$




RN1106FT $h_{FE}$ – $I_C$



RN1101FT $V_{CE\,(sat)} - I_C$

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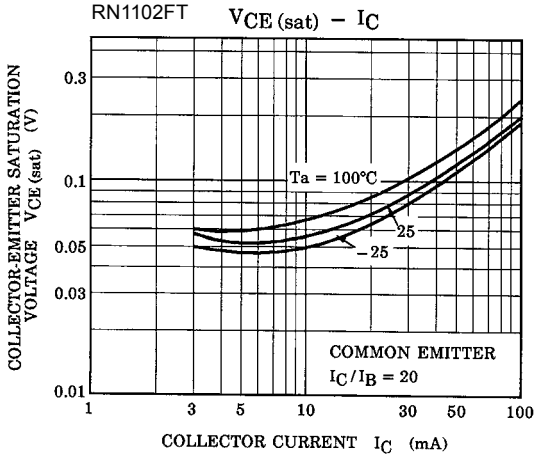
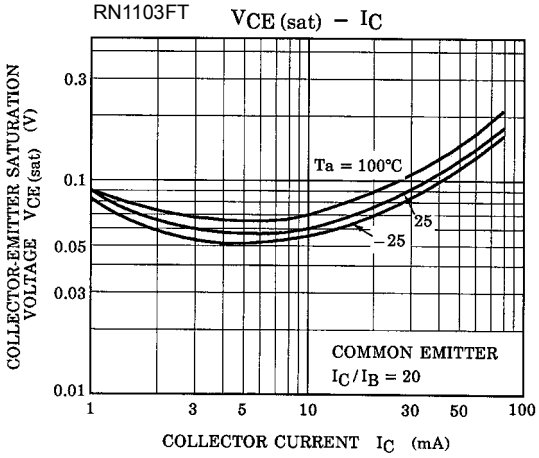



RN1103FT $V_{CE\,(sat)} - I_C$

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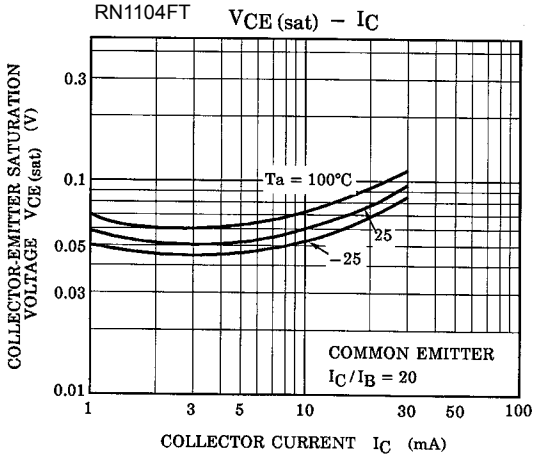


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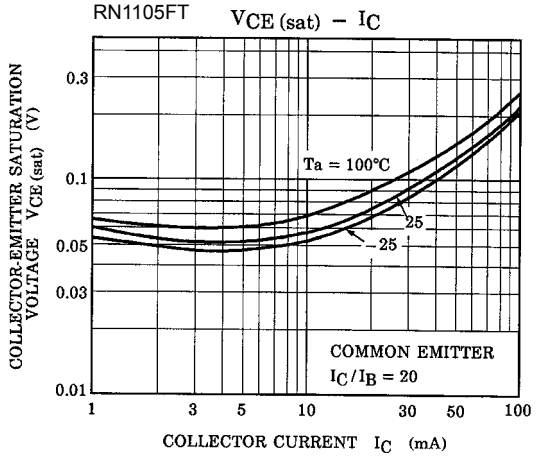


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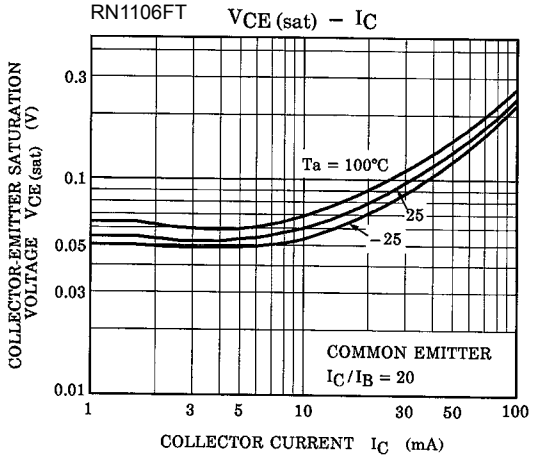

| Type Name | Marking |
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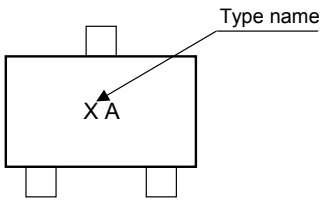
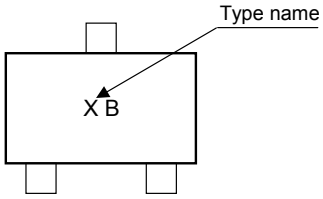
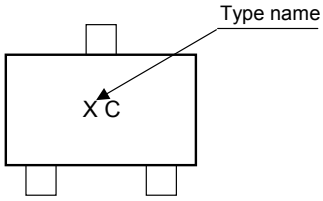
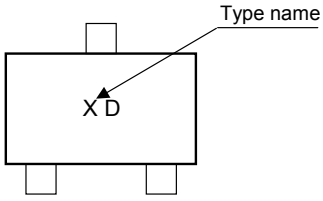
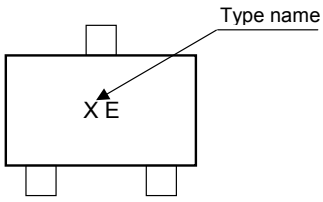
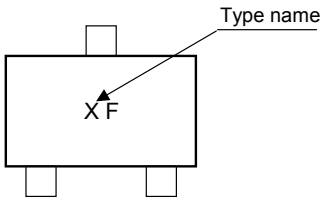
| RN1101FT |   |
| RN1102FT |   |
| RN1103FT |   |
| RN1104FT |   |
| RN1105FT |   |
| RN1106FT |   |

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