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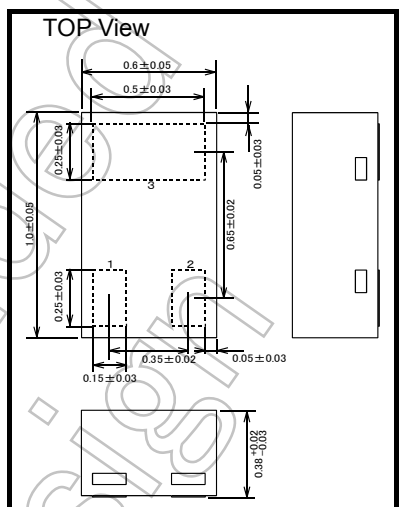
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

# RN1107ACT, RN1108ACT, RN1109ACT

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- Extra small package(CST3) is applicable for extra high density fabrication.
- Incorporating a bias resistor into a transistor reduces the number of parts, which enables the manufacture of ever more compact equipment and saves assembly cost.
- Complementary to RN2107ACT to RN2109ACT

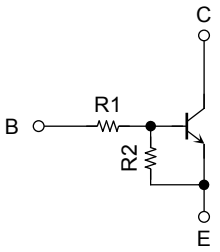
Unit: mm




| | |
|---|---|
| CST3 | 1: BASE<br>2: EMITTER<br>3: COLLECTOR |
| JEDEC | — |
| JEITA | — |
| TOSHIBA | 2-1J1A |

Weight: 0.75 mg (typ.)

## Equivalent Circuit and Bias Resistor Values




| Type No. | R1 (kΩ) | R2 (kΩ) |
|---|---|---|
| RN1107ACT | 10 | 47 |
| RN1108ACT | 22 | 47 |
| RN1109ACT | 47 | 22 |

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

| Characteristics | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Collector-base voltage | RN1107ACT to RN1109ACT | $V_{CBO}$ | 50 | V |
| Collector-emitter voltage | | $V_{CEO}$ | 50 | V |
| Emitter-base voltage | RN1107ACT | $V_{EBO}$ | 6 | V |
| | RN1108ACT | | 7 | |
| | RN1109ACT | | 15 | |
| Collector current | RN1107ACT to RN1109ACT | $I_C$ | 80 | mA |
| Collector power dissipation | | $P_C$ (Note1) | 100 | mW |
| Junction temperature | | $T_j$ | 150 | °C |
| Storage temperature range | | $T_{stg}$ | −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).

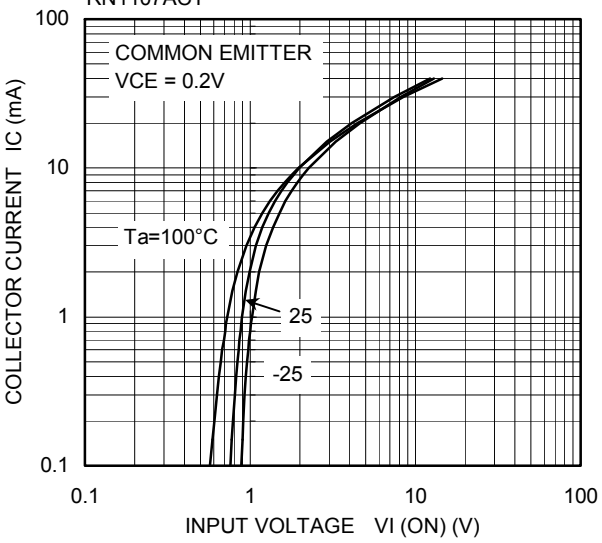
Note1 : Mounted on FR4 board (10 mm × 10 mm × 1 mmt)

Start of commercial production
2004-08

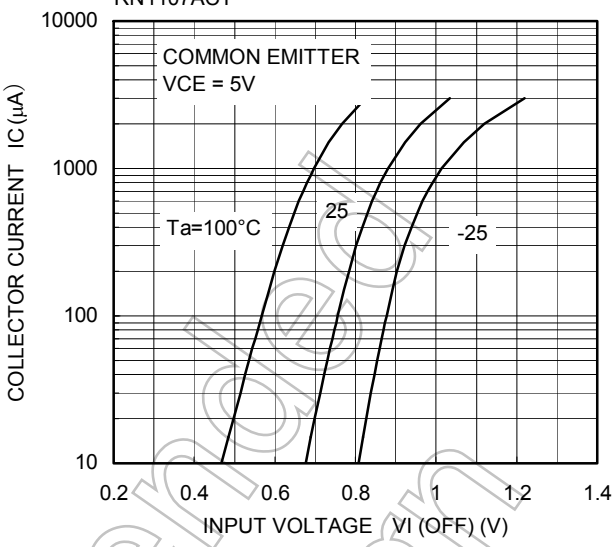
## Electrical Characteristics (Ta = 25°C)

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Collector cut-off current | RN1107ACT to 1109ACT | $I_{CBO}$ | $V_{CB}$ = 50 V, $I_E$ = 0 | — | — | 100 | nA |
| | | $I_{CEO}$ | $V_{CE}$ = 50 V, $I_B$ = 0 | — | — | 500 | |
| Emitter cut-off current | RN1107ACT | $I_{EBO}$ | $V_{EB}$ = 6 V, $I_C$ = 0 | 0.088 | — | 0.131 | mA |
| | RN1108ACT | | $V_{EB}$ = 7 V, $I_C$ = 0 | 0.085 | — | 0.126 | |
| | RN1109ACT | | $V_{EB}$ = 15 V, $I_C$ = 0 | 0.182 | — | 0.271 | |
| DC current gain | RN1107ACT | $h_{FE}$ | $V_{CE}$ = 5 V, $I_C$ = 10 mA | 80 | — | — | |
| | RN1108ACT | | | 80 | — | — | |
| | RN1109ACT | | | 70 | — | — | |
| Collector-emitter saturation voltage | RN1107ACT to 1109ACT | $V_{CE\ (sat)}$ | $I_C$ = 5 mA, $I_B$ = 0.25 mA | — | — | 0.15 | V |
| Input voltage (ON) | RN1107ACT | $V_{I\ (ON)}$ | $V_{CE}$ = 0.2 V, $I_C$ = 5 mA | 0.8 | — | 1.8 | V |
| | RN1108ACT | | | 1.0 | — | 3.0 | |
| | RN1109ACT | | | 2.0 | — | 6.4 | |
| Input voltage (OFF) | RN1107ACT | $V_{I\ (OFF)}$ | $V_{CE}$ = 5 V, $I_C$ = 0.1 mA | 0.6 | — | 0.9 | V |
| | RN1108ACT | | | 0.7 | — | 1.2 | |
| | RN1109ACT | | | 1.5 | — | 2.6 | |
| Collector output capacitance | RN1107ACT to 1109ACT | $C_{ob}$ | $V_{CB}$ = 10 V, $I_E$ = 0, f = 1 MHz | — | 0.7 | — | pF |
| Input resistor | RN1107ACT | R1 | — | 8 | 10 | 12 | kΩ |
| | RN1108ACT | | | 17.6 | 22 | 26.4 | |
| | RN1109ACT | | | 37.6 | 47 | 56.4 | |
| Resistor ratio | RN1107ACT | R1/R2 | — | 0.17 | 0.213 | 0.255 | |
| | RN1108ACT | | | 0.374 | 0.468 | 0.562 | |
| | RN1109ACT | | | 1.71 | 2.14 | 2.56 | |

RN1107ACT IC - VI (ON)




RN1107ACT IC - VI (OFF)

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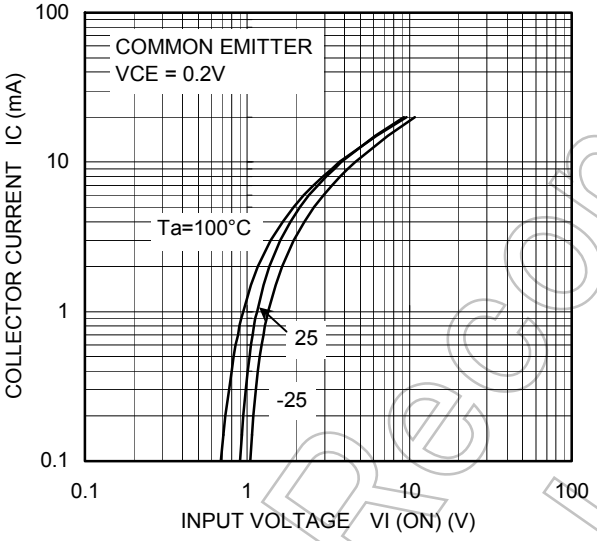
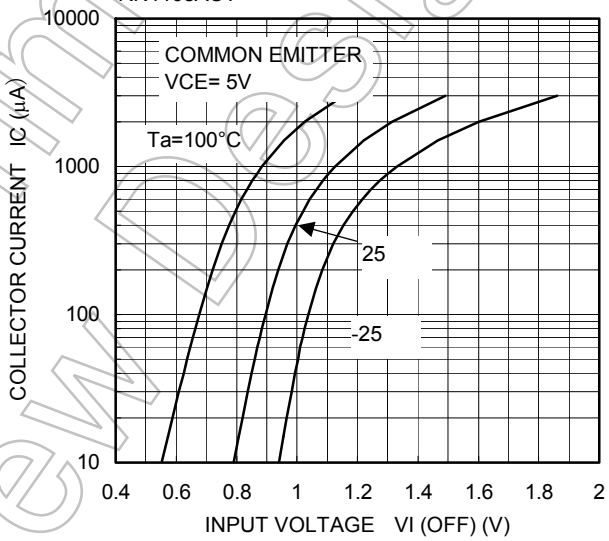
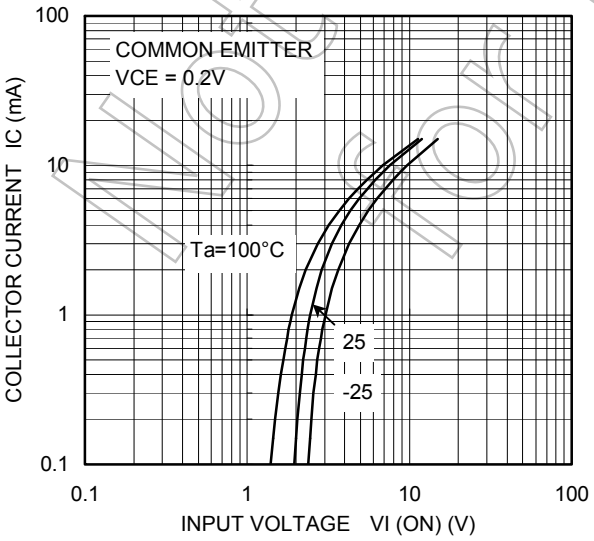


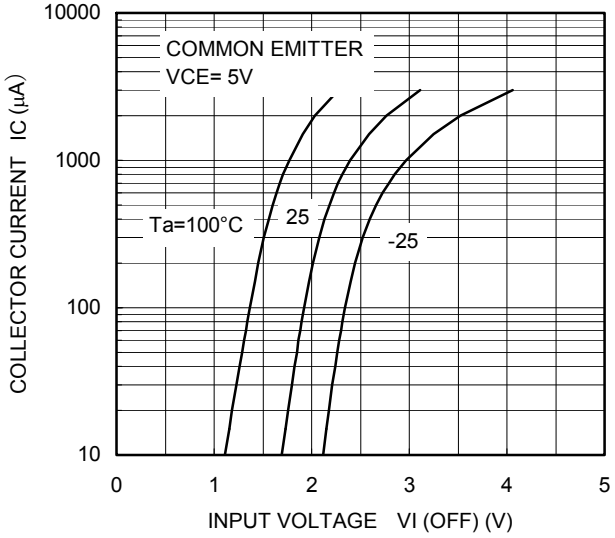

RN1108ACT IC - VI (OFF)



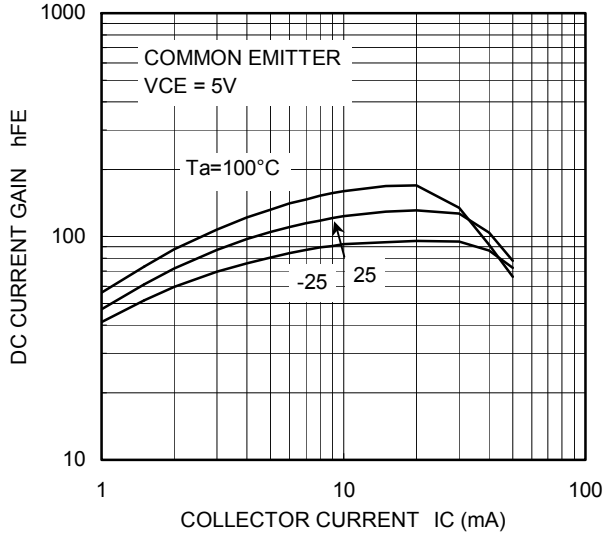

RN1109ACT IC- VI (ON)



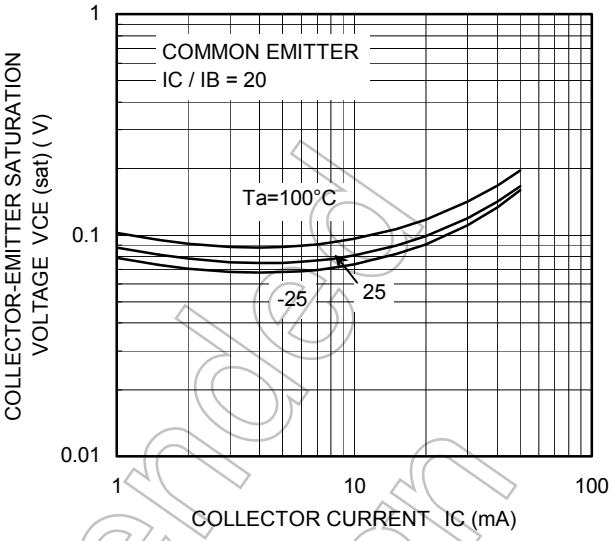

RN1109ACT IC - VI (OFF)



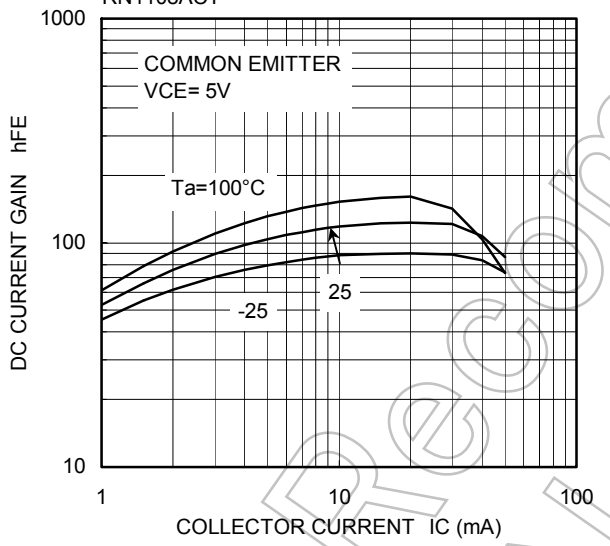
RN1107ACT hFE - IC




RN1107ACT VCE (sat) - IC




RN1108ACT hFE - IC

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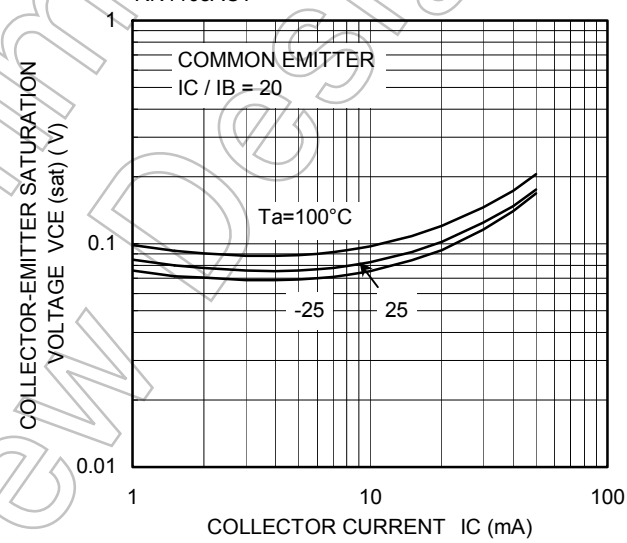


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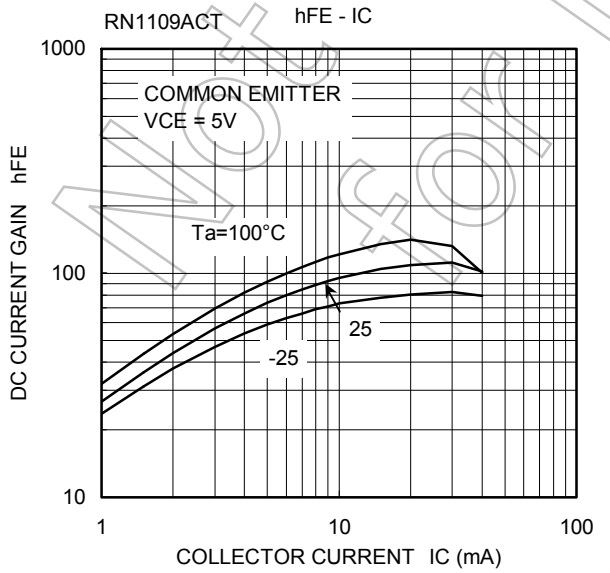
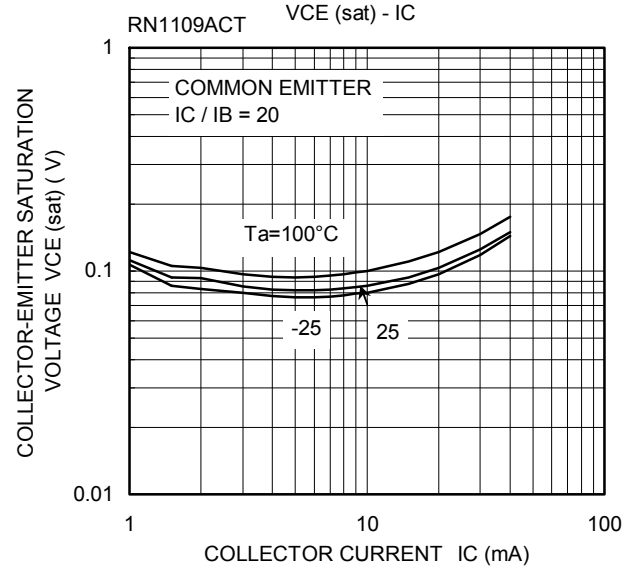
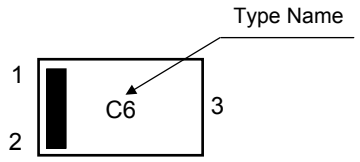
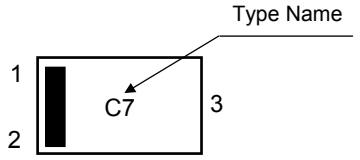
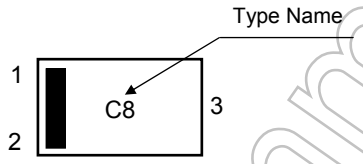



RN1109ACT VCE (sat) - IC



## Marking

| Type Name | Marking |
|---|---|
| RN1107ACT |   |
| RN1108ACT |   |
| RN1109ACT |   |

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