

TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process)

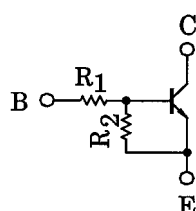
## RN1414,RN1415,RN1416 RN1417,RN1418

Switching, Inverter Circuit, Interface Circuit  
And Driver Circuit Applications

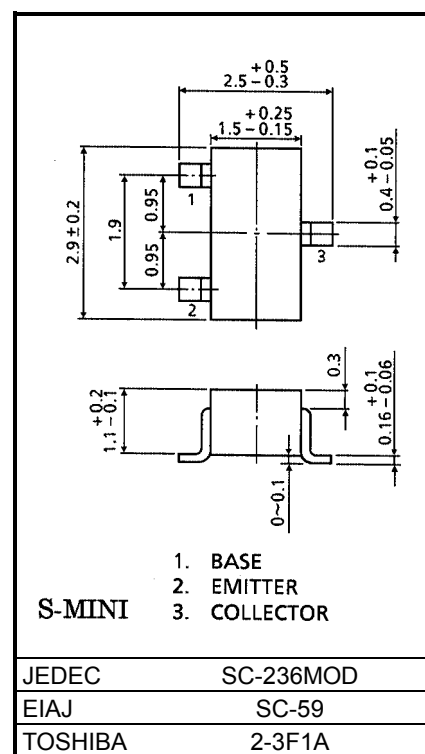
Unit: mm

- With built-in bias resistors
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process
- Complementary to RN2414~RN2418

### Equivalent Circuit and Bias Resister Values



| Type No. | R1 (kΩ) | R2 (kΩ) |
|----------|---------|---------|
| RN1414   | 1       | 10      |
| RN1415   | 2.2     | 10      |
| RN1416   | 4.7     | 10      |
| RN1417   | 10      | 4.7     |
| RN1418   | 47      | 10      |



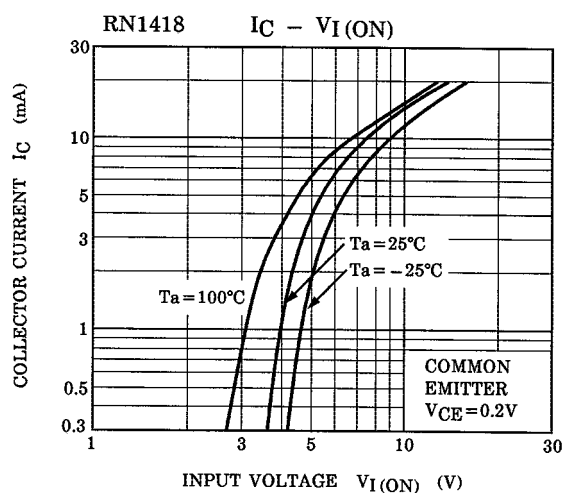
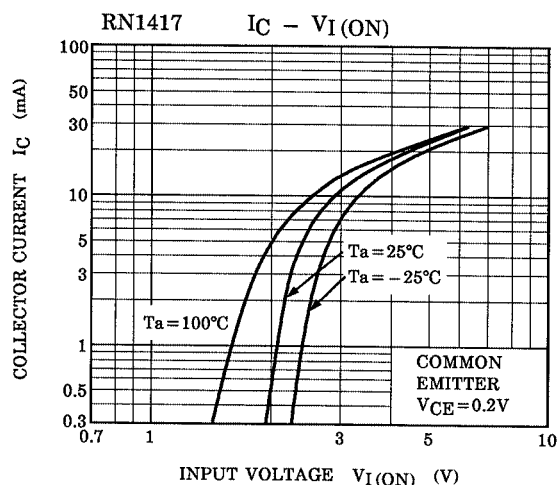
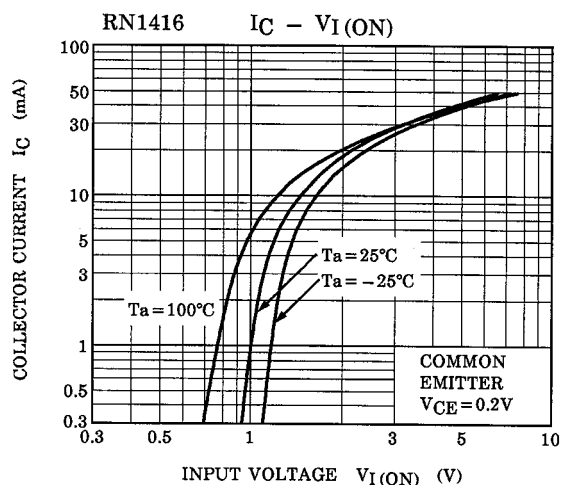
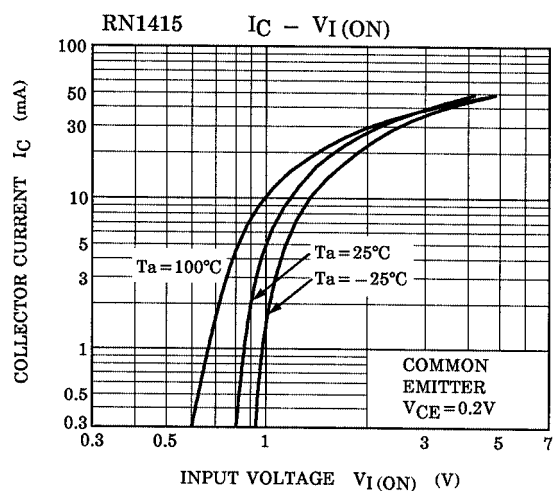
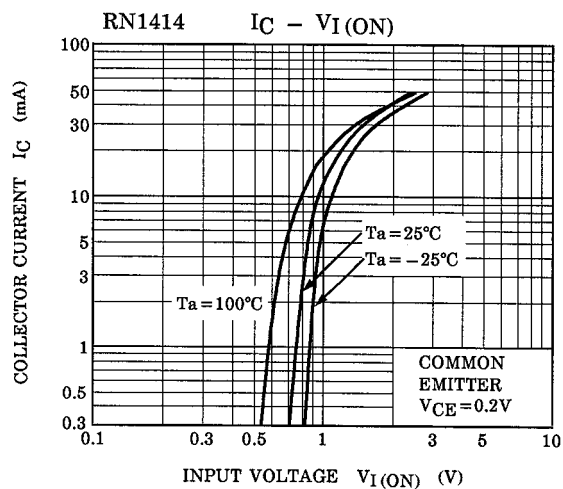
Weight: 0.012g

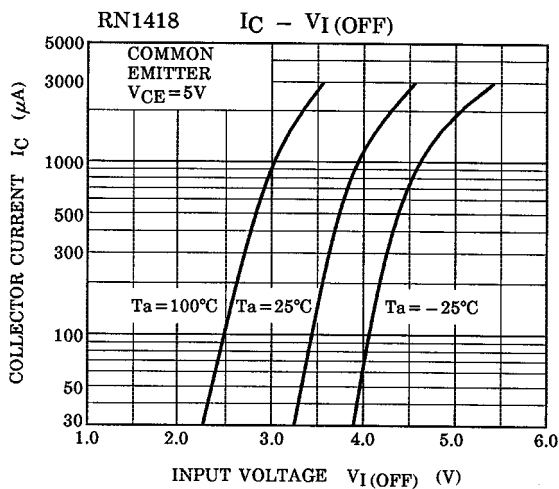
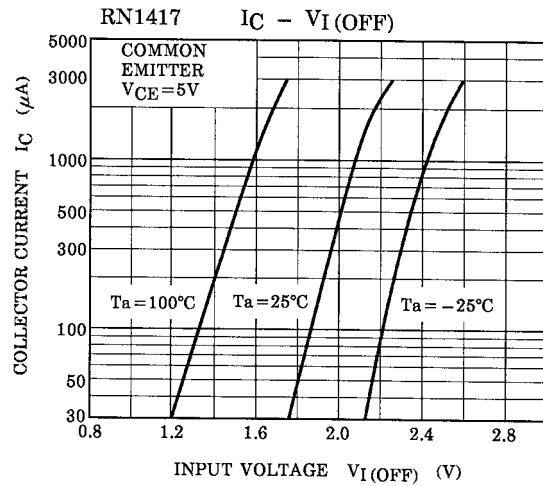
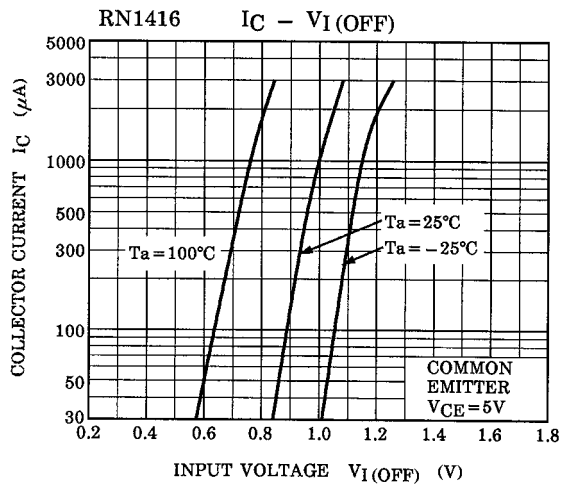
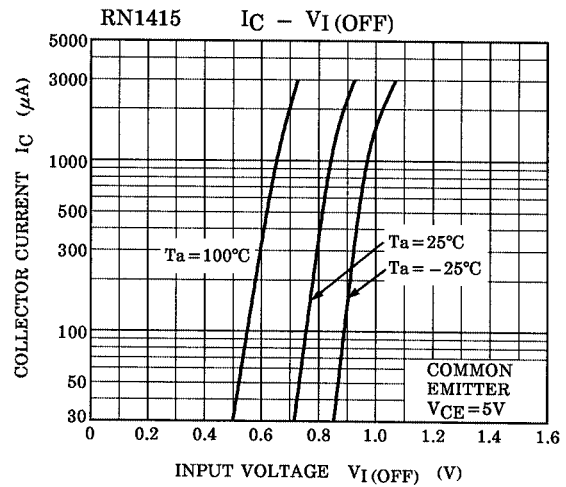
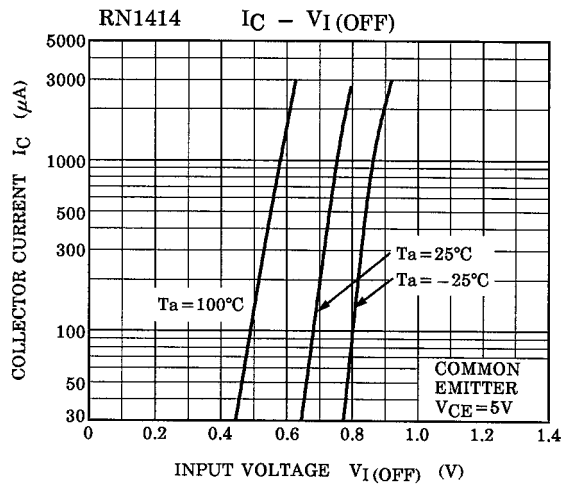
### Maximum Ratings (Ta = 25°C)

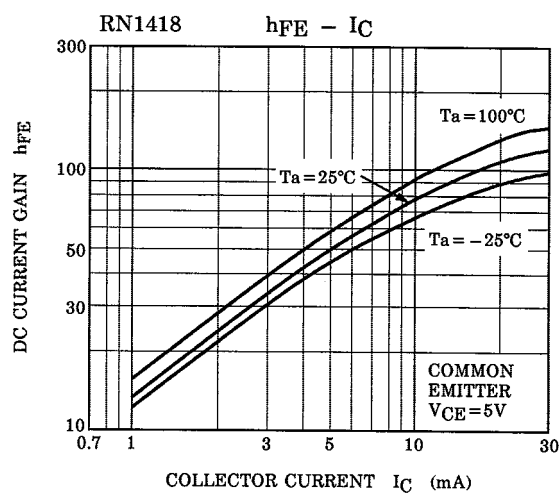
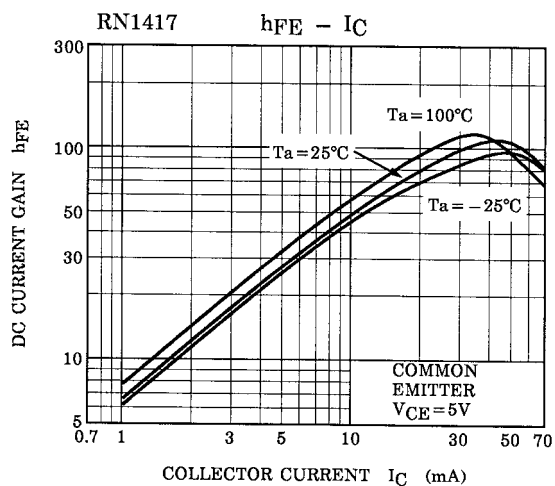
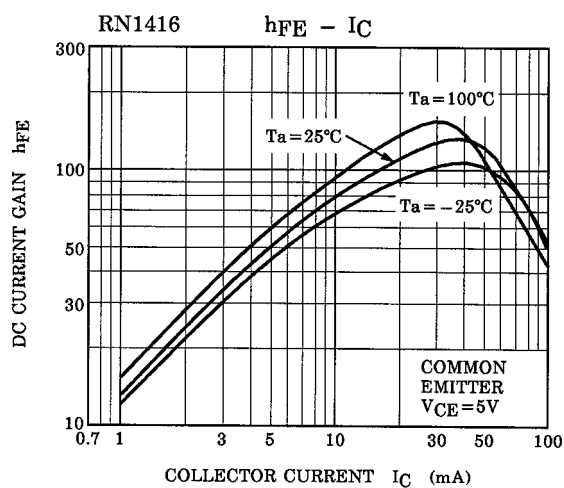
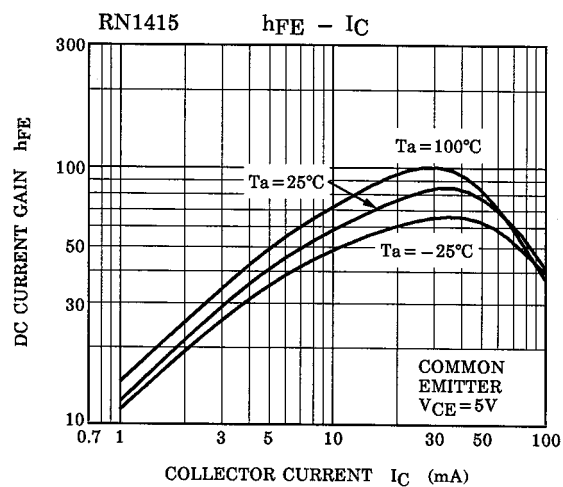
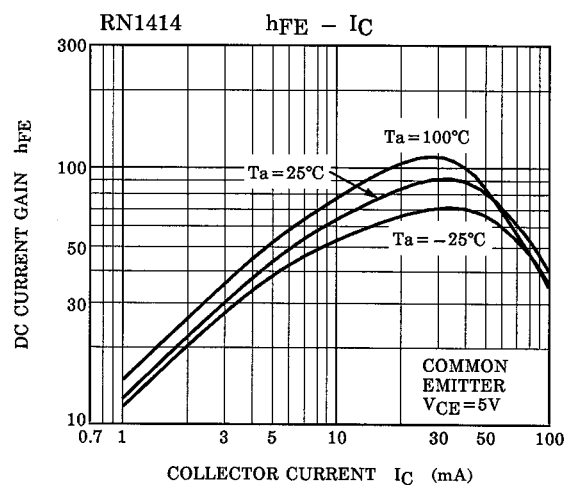
| Characteristic              |             | Symbol           | Rating  | Unit |
|-----------------------------|-------------|------------------|---------|------|
| Collector-base voltage      | RN1414~1418 | V <sub>CBO</sub> | 50      | V    |
| Collector-emitter voltage   |             | V <sub>CEO</sub> | 50      | V    |
| Emitter-base voltage        | RN1414      | V <sub>EBO</sub> | 5       | V    |
|                             | RN1415      |                  | 6       |      |
|                             | RN1416      |                  | 7       |      |
|                             | RN1417      |                  | 15      |      |
|                             | RN1418      |                  | 25      |      |
| Collector current           | RN1414~1418 | I <sub>C</sub>   | 100     | mA   |
| Collector power dissipation |             | P <sub>C</sub>   | 200     | mW   |
| Junction temperature        |             | T <sub>j</sub>   | 150     | °C   |
| Storage temperature range   |             | T <sub>stg</sub> | -55~150 | °C   |

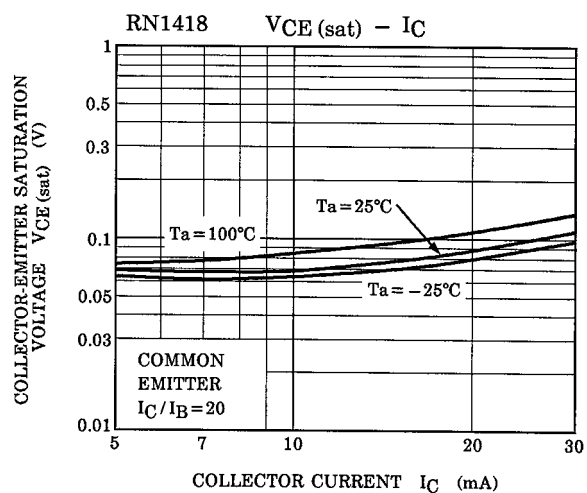
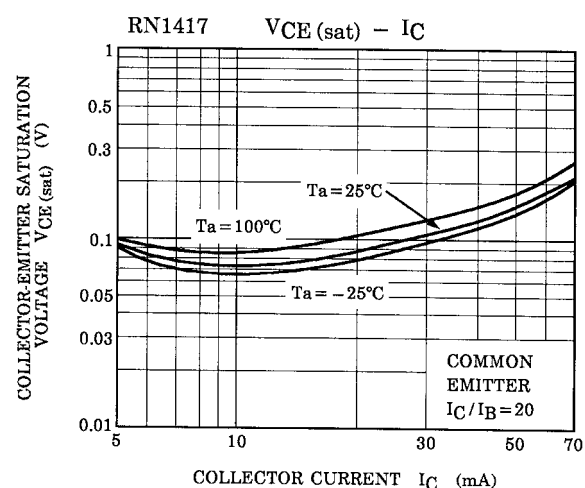
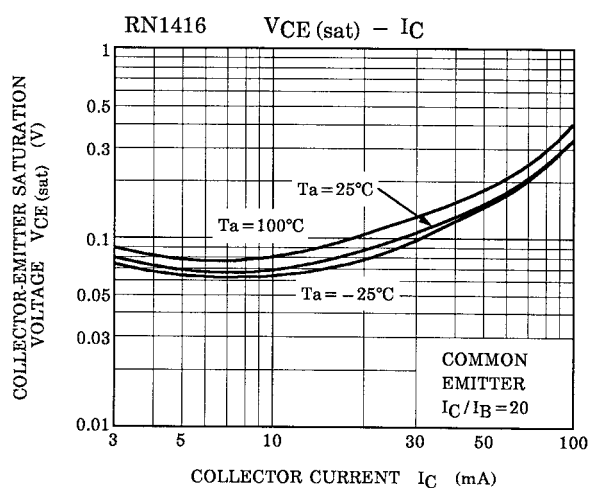
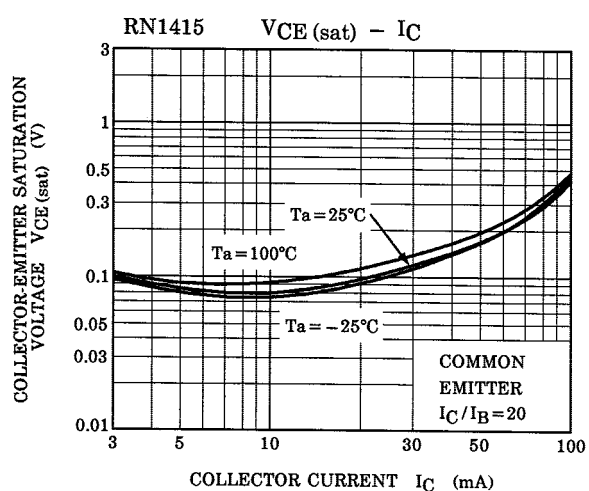
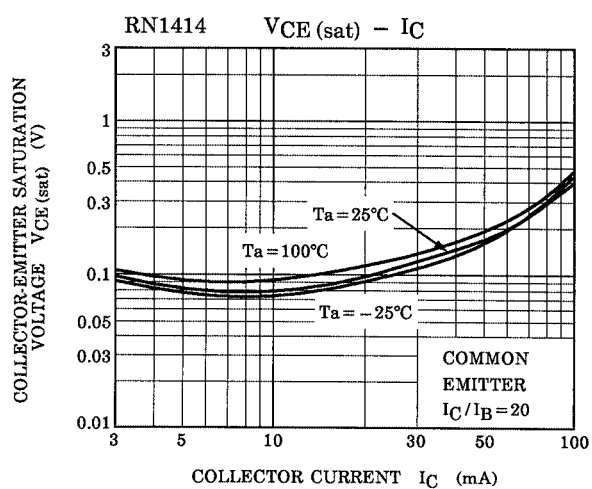
**Electrical Characteristics (Ta = 25°C)**

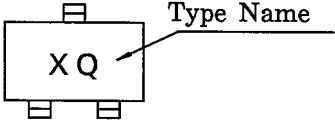
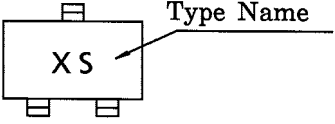
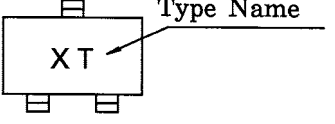
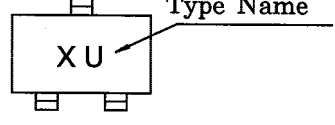
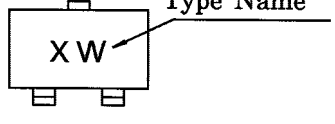
| Characteristic                       |               | Symbol        | Test Circuit | Test Condition                    | Min  | Typ. | Max  | Unit |
|--------------------------------------|---------------|---------------|--------------|-----------------------------------|------|------|------|------|
| Collector cut-off current            | RN1414~1418   | $I_{CBO}$     | —            | $V_{CB} = 50V, I_E = 0$           | —    | —    | 100  | nA   |
|                                      | RN1414~1418   | $I_{CEO}$     |              | $V_{CE} = 50V, I_B = 0$           | —    | —    | 500  | nA   |
| Emitter cut-off current              | RN1414        | $I_{EBO}$     | —            | $V_{EB} = 5V, I_C = 0$            | 0.35 | —    | 0.65 | mA   |
|                                      | RN1415        |               |              | $V_{EB} = 6V, I_C = 0$            | 0.37 | —    | 0.71 |      |
|                                      | RN1416        |               |              | $V_{EB} = 7V, I_C = 0$            | 0.36 | —    | 0.68 |      |
|                                      | RN1417        |               |              | $V_{EB} = 15V, I_C = 0$           | 0.78 | —    | 1.46 |      |
|                                      | RN1418        |               |              | $V_{EB} = 25V, I_C = 0$           | 0.33 | —    | 0.63 |      |
| DC current gain                      | RN1414~16, 18 | $h_{FE}$      | —            | $V_{CE} = 5V, I_C = 10mA$         | 50   | —    | —    |      |
|                                      | RN1417        |               |              |                                   | 30   | —    | —    |      |
| Collector-emitter saturation voltage | RN1414~1418   | $V_{CE(sat)}$ | —            | $I_C = 5mA, I_B = 0.25mA$         | —    | 0.1  | 0.3  | V    |
| Input voltage (ON)                   | RN1414        | $V_I(ON)$     | —            | $V_{CE} = 0.2V, I_C = 5mA$        | 0.6  | —    | 2.0  | V    |
|                                      | RN1415        |               |              |                                   | 0.7  | —    | 2.5  |      |
|                                      | RN1416        |               |              |                                   | 0.8  | —    | 2.5  |      |
|                                      | RN1417        |               |              |                                   | 1.5  | —    | 3.5  |      |
|                                      | RN1418        |               |              |                                   | 2.5  | —    | 10.0 |      |
| Input voltage (OFF)                  | RN1414        | $V_I(OFF)$    | —            | $V_{CE} = 5V, I_C = 0.1mA$        | 0.3  | —    | 0.9  | V    |
|                                      | RN1415        |               |              |                                   | 0.3  | —    | 1.0  |      |
|                                      | RN1416        |               |              |                                   | 0.3  | —    | 1.1  |      |
|                                      | RN1417        |               |              |                                   | 0.3  | —    | 2.3  |      |
|                                      | RN1418        |               |              |                                   | 0.5  | —    | 5.7  |      |
| Transition frequency                 | RN1414~1418   | $f_T$         | —            | $V_{CE} = 10V, I_C = 5mA$         | —    | 250  | —    | MHz  |
| Collector Output capacitance         | RN1414~1418   | $C_{ob}$      | —            | $V_{CB} = 10V, I_E = 0, f = 1MHz$ | —    | 3.0  | 6.0  | pF   |
| Input resistor                       | RN1414        | R1            | —            | —                                 | 0.7  | 1.0  | 1.3  | kΩ   |
|                                      | RN1415        |               |              |                                   | 1.54 | 2.2  | 2.86 |      |
|                                      | RN1416        |               |              |                                   | 3.29 | 4.7  | 6.11 |      |
|                                      | RN1417        |               |              |                                   | 7.0  | 10.0 | 13.0 |      |
|                                      | RN1418        |               |              |                                   | 32.9 | 47.0 | 61.1 |      |
| Resistor ratio                       | RN1414        | R1/R2         | —            | —                                 | —    | 0.1  | —    |      |
|                                      | RN1415        |               |              |                                   | —    | 0.22 | —    |      |
|                                      | RN1416        |               |              |                                   | —    | 0.47 | —    |      |
|                                      | RN1417        |               |              |                                   | —    | 2.13 | —    |      |
|                                      | RN1418        |               |              |                                   | —    | 4.7  | —    |      |









| Type Name | Marking                                                                             |
|-----------|-------------------------------------------------------------------------------------|
| RN1414    |    |
| RN1415    |    |
| RN1416    |    |
| RN1417    |  |
| RN1418    |  |

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000707EAA

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