

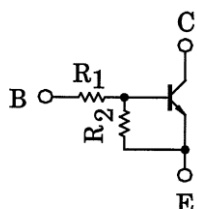
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor)

RN1314, RN1315, RN1316 RN1317, RN1318

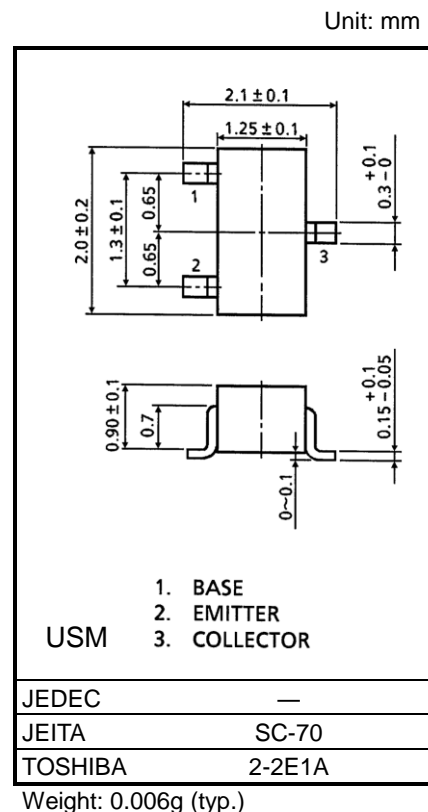
Switching, Inverter Circuit, Interface Circuit and Driver Circuit

- With built-in bias resistors.
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process and miniaturize equipment.
- Various resistance values are available to suit various circuit designs.
- Complementary to RN2314 to RN2318

Equivalent Circuit and Bias Resistor Values



| Part No. | R1 (kΩ) | R2 (kΩ) |
|----------|---------|---------|
| RN1314 | 1 | 10 |
| RN1315 | 2.2 | 10 |
| RN1316 | 4.7 | 10 |
| RN1317 | 10 | 4.7 |
| RN1318 | 47 | 10 |



Absolute Maximum Ratings (Ta = 25°C)

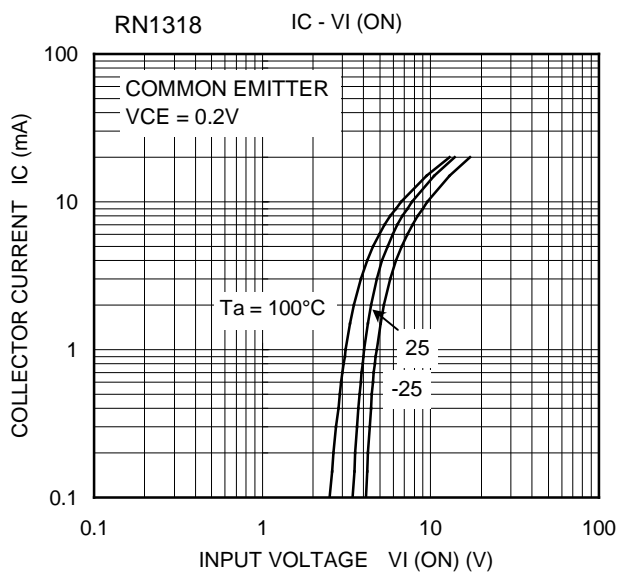
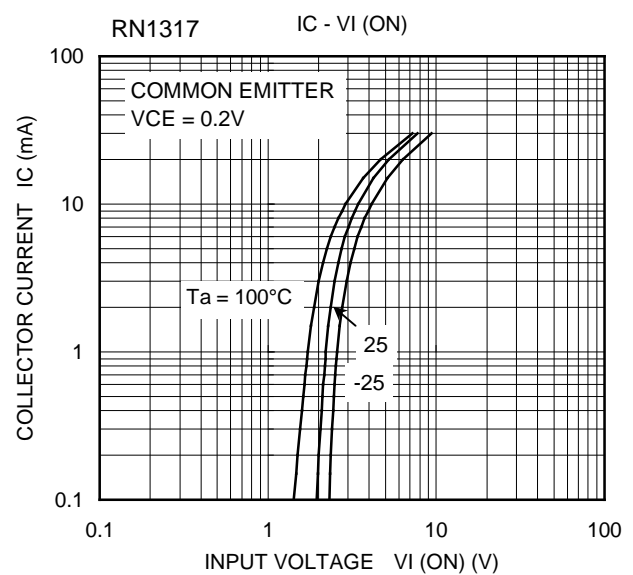
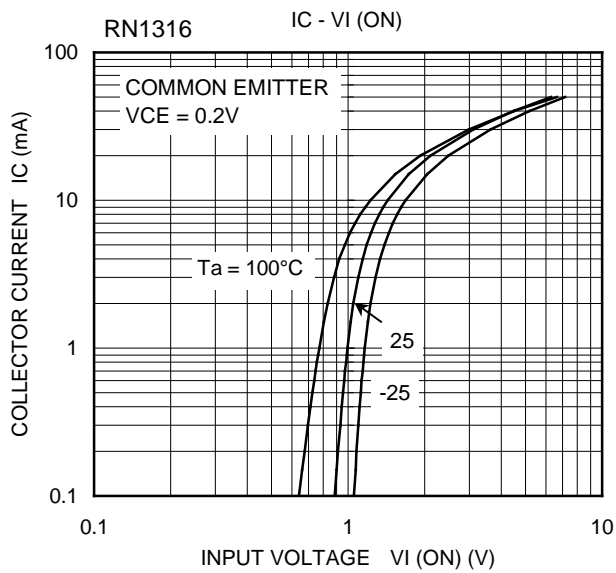
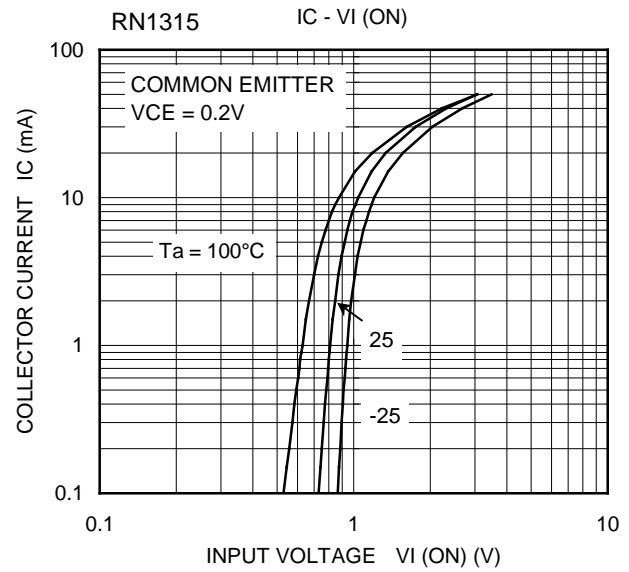
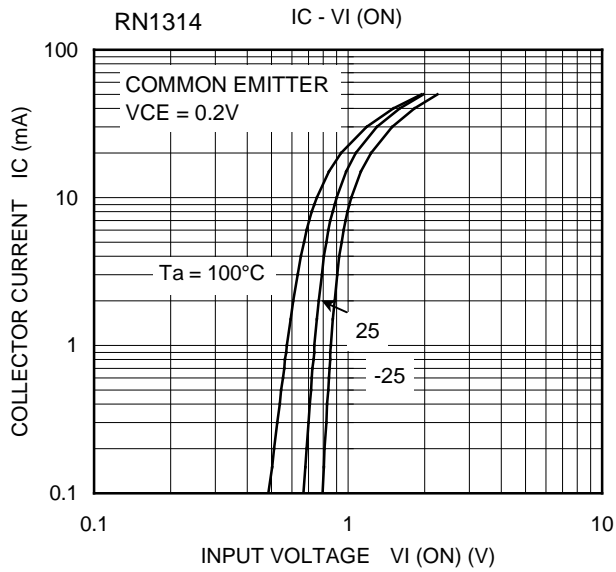
| Characteristic | Symbol | Rating | Unit |
|-----------------------------|--------|------------|------|
| Collector-base voltage | VCBO | 50 | V |
| Collector-emitter voltage | VCEO | 50 | V |
| Emitter-base voltage | VEBO | 5 | V |
| | | 6 | |
| | | 7 | |
| | | 15 | |
| | | 25 | |
| Collector current | IC | 100 | mA |
| Collector power dissipation | PC | 100 | mW |
| Junction temperature | Tj | 150 | °C |
| Storage temperature range | Tstg | -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).

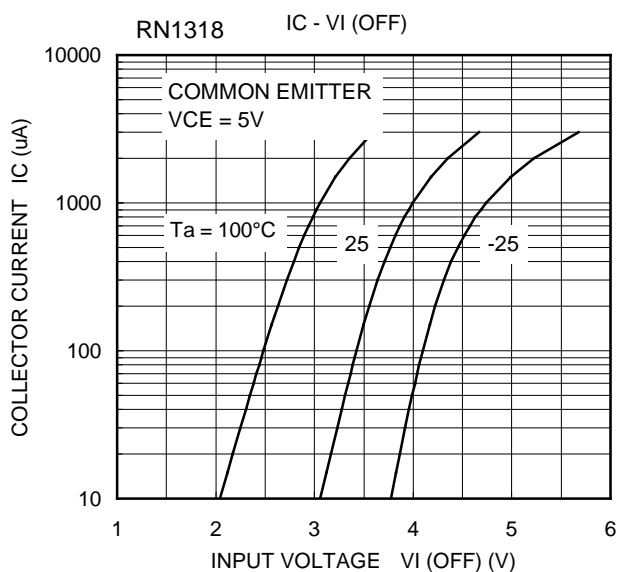
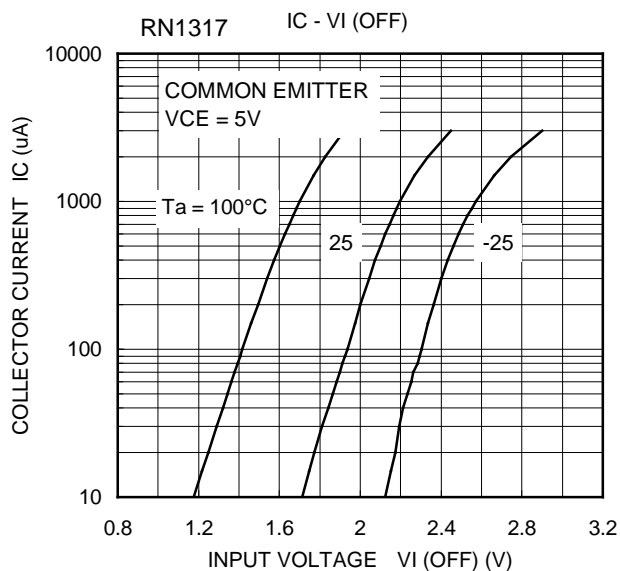
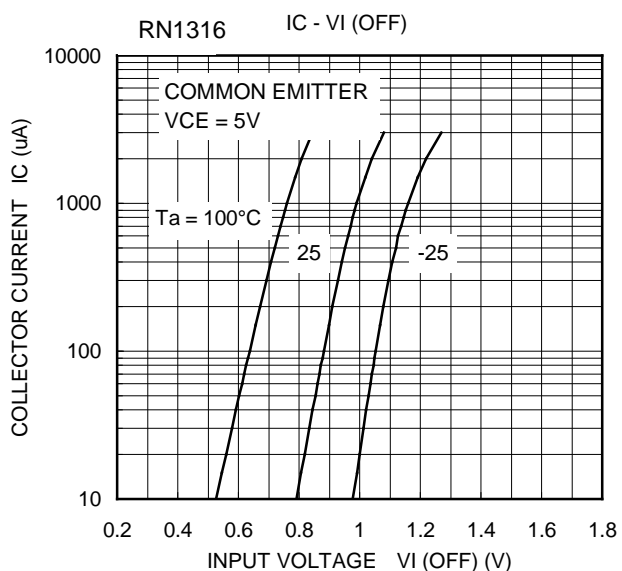
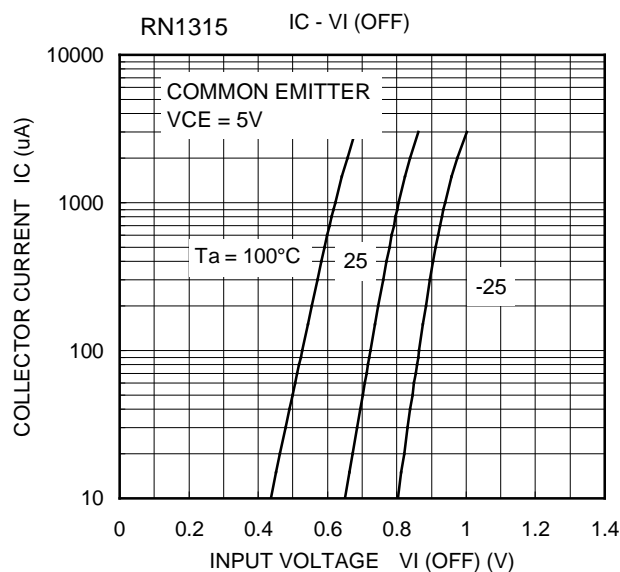
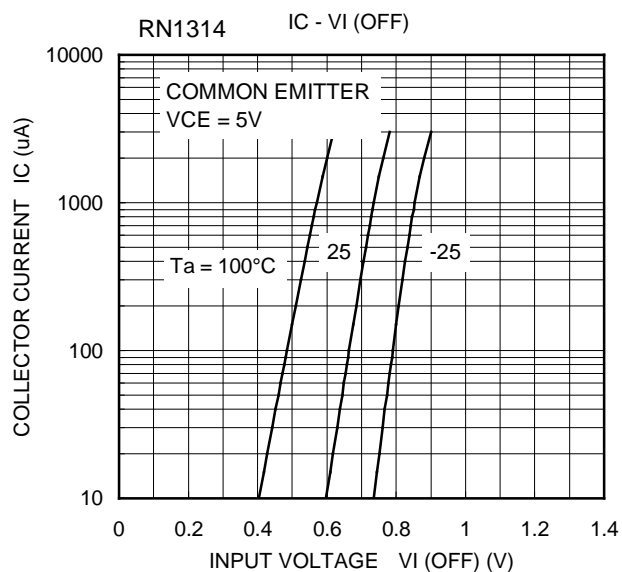
Start of commercial production
2002-11

Electrical Characteristics (Ta = 25°C)

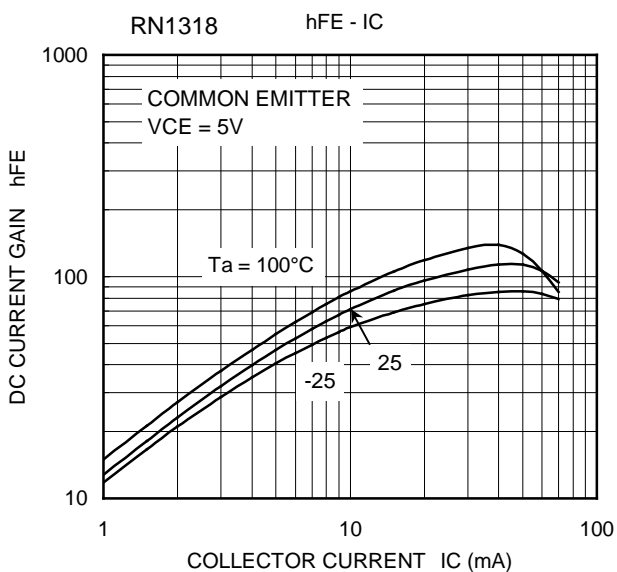
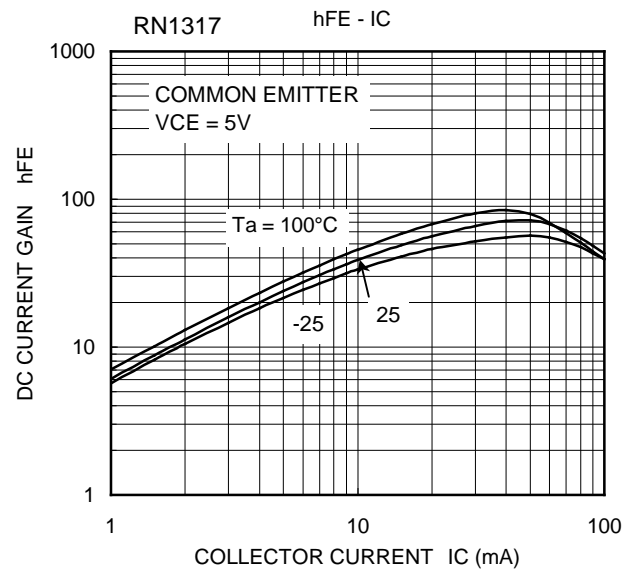
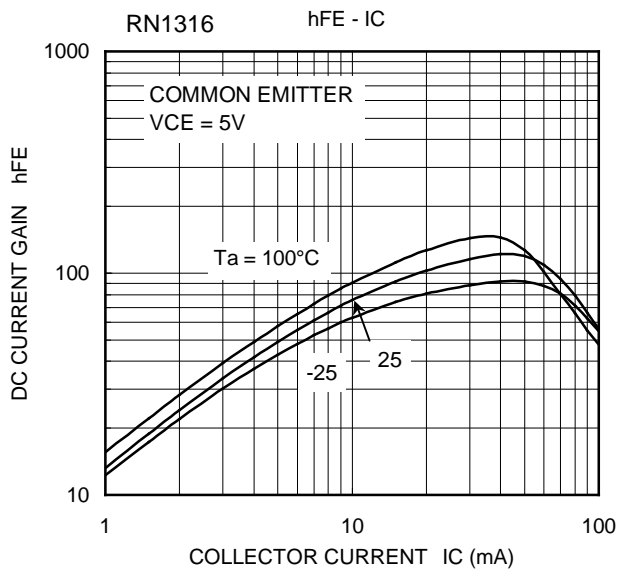
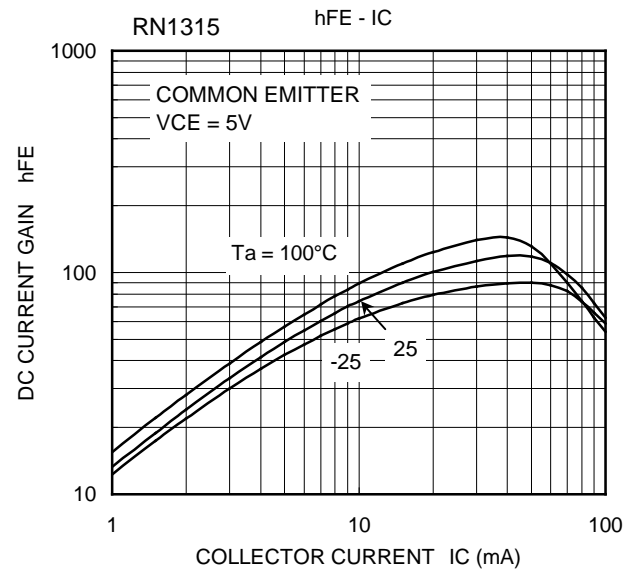
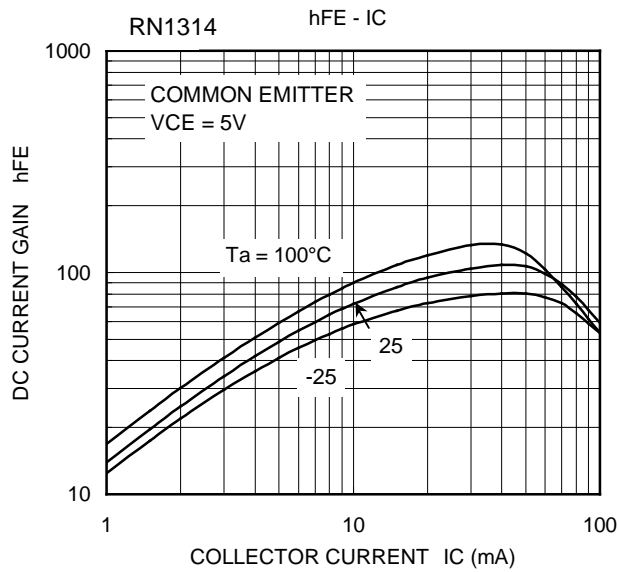
| Characteristic | | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|-----------------|--------------------------------|--------------|--|------|------|------|------|
| Collector cut-off current | RN1314 to 1318 | ICBO | — | V _{CB} = 50 V, I _E = 0 mA | — | — | 100 | nA |
| | RN1314 to 1318 | ICEO | | V _{CE} = 50 V, I _B = 0 mA | — | — | 500 | nA |
| Emitter cut-off current | RN1314 | IEBO | — | V _{EB} = 5 V, I _C = 0 mA | 0.35 | — | 0.65 | mA |
| | RN1315 | | | V _{EB} = 6 V, I _C = 0 mA | 0.37 | — | 0.71 | |
| | RN1316 | | | V _{EB} = 7 V, I _C = 0 mA | 0.36 | — | 0.68 | |
| | RN1317 | | | V _{EB} = 15 V, I _C = 0 mA | 0.78 | — | 1.46 | |
| | RN1318 | | | V _{EB} = 25 V, I _C = 0 mA | 0.33 | — | 0.63 | |
| DC current gain | RN1314 to 16,18 | h _{FE} | — | V _{CE} = 5 V, I _C = 10 mA | 50 | — | — | — |
| | RN1317 | | | | 30 | — | — | |
| Collector-emitter saturation voltage | RN1314 to 1318 | V _{CE (sat)} | — | I _C = 5 mA, I _B = 0.25 mA | — | 0.1 | 0.3 | V |
| Input voltage (ON) | RN1314 | V _{I (ON)} | — | V _{CE} = 0.2 V, I _C = 5 mA | 0.6 | — | 2.0 | V |
| | RN1315 | | | | 0.7 | — | 2.5 | |
| | RN1316 | | | | 0.8 | — | 2.5 | |
| | RN1317 | | | | 1.5 | — | 3.5 | |
| | RN1318 | | | | 2.5 | — | 10.0 | |
| Input voltage (OFF) | RN1314 | V _{I (OFF)} | — | V _{CE} = 5 V, I _C = 0.1 mA | 0.3 | — | 0.9 | V |
| | RN1315 | | | | 0.3 | — | 1.0 | |
| | RN1316 | | | | 0.3 | — | 1.1 | |
| | RN1317 | | | | 0.3 | — | 2.3 | |
| | RN1318 | | | | 0.5 | — | 5.7 | |
| Transition frequency | RN1314 to 1318 | f _T | — | V _{CE} = 10 V, I _C = 5 mA | — | 250 | — | MHz |
| Collector Output capacitance | RN1314 to 1318 | C _{ob} | — | V _{CB} = 10 V, I _E = 0 mA, f = 1 MHz | — | 3.0 | 6.0 | pF |
| Input resistor | RN1314 | R ₁ | — | — | 0.7 | 1.0 | 1.3 | kΩ |
| | RN1315 | | | | 1.54 | 2.2 | 2.86 | |
| | RN1316 | | | | 3.29 | 4.7 | 6.11 | |
| | RN1317 | | | | 7.0 | 10.0 | 13.0 | |
| | RN1318 | | | | 32.9 | 47.0 | 61.1 | |
| Resistor ratio | RN1314 | R ₁ /R ₂ | — | — | — | 0.1 | — | — |
| | RN1315 | | | | — | 0.22 | — | |
| | RN1316 | | | | — | 0.47 | — | |
| | RN1317 | | | | — | 2.13 | — | |
| | RN1318 | | | | — | 4.7 | — | |



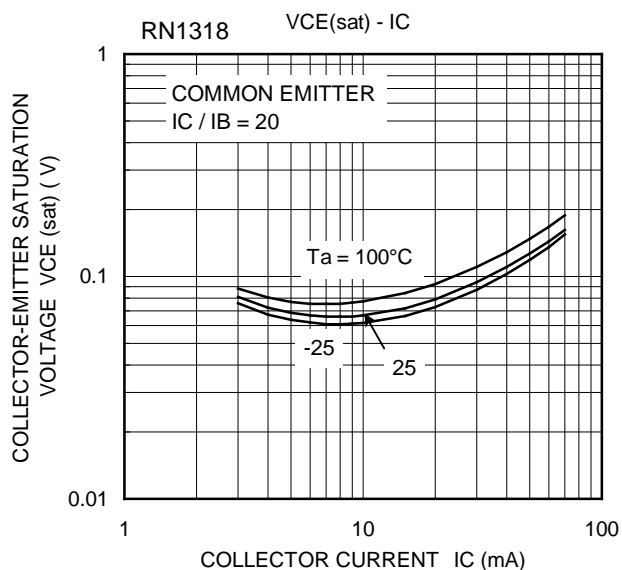
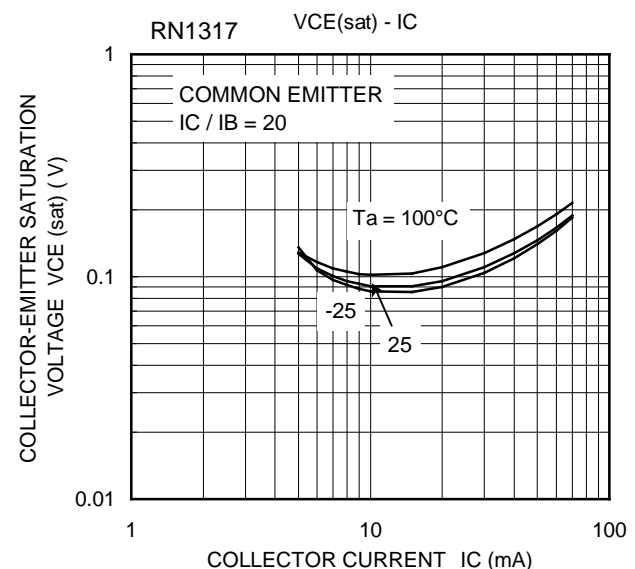
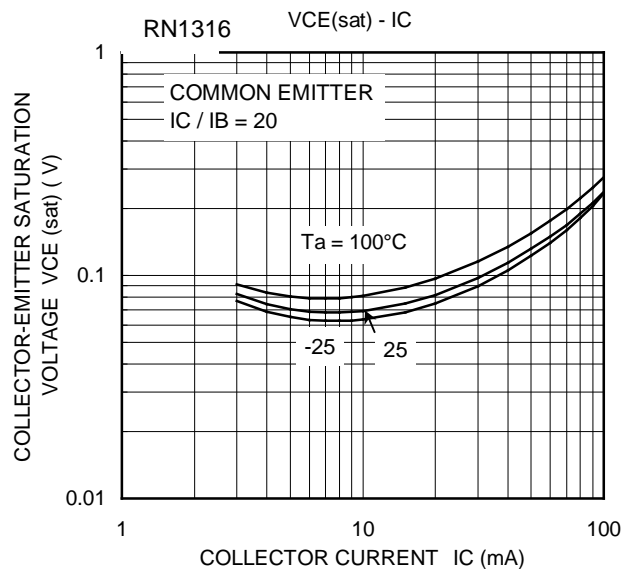
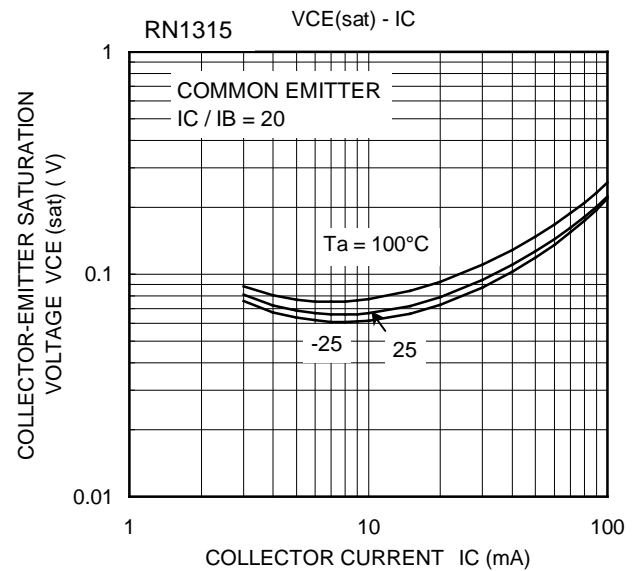
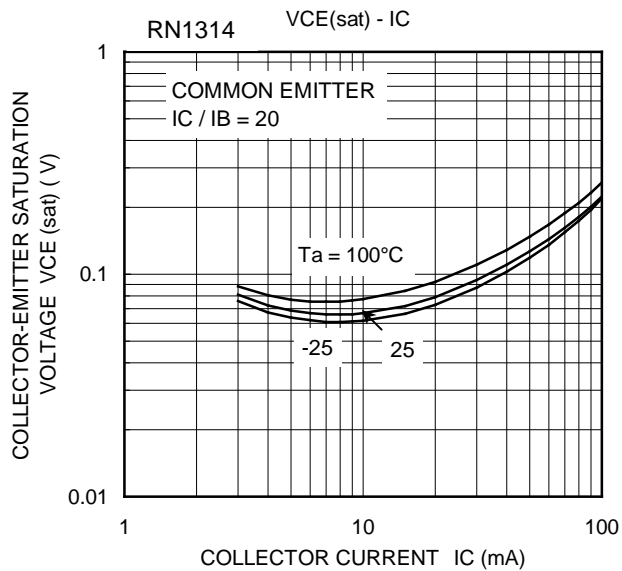
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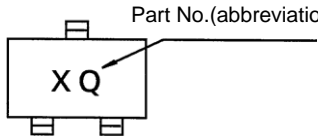
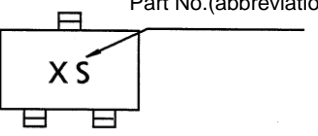
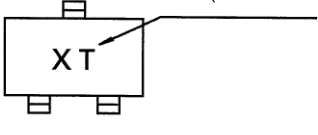
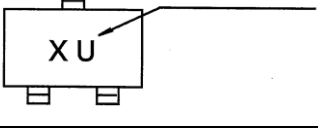
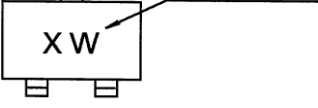


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Marking

| Part No. | Marking |
|----------|---|
| RN1314 |  |
| RN1315 |  |
| RN1316 |  |
| RN1317 |  |
| RN1318 |  |

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