

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

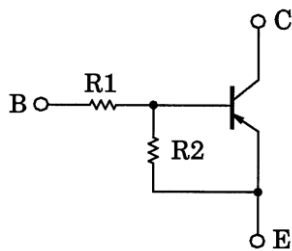
RN2701, RN2702, RN2703 RN2704, RN2705, RN2706

Unit: mm

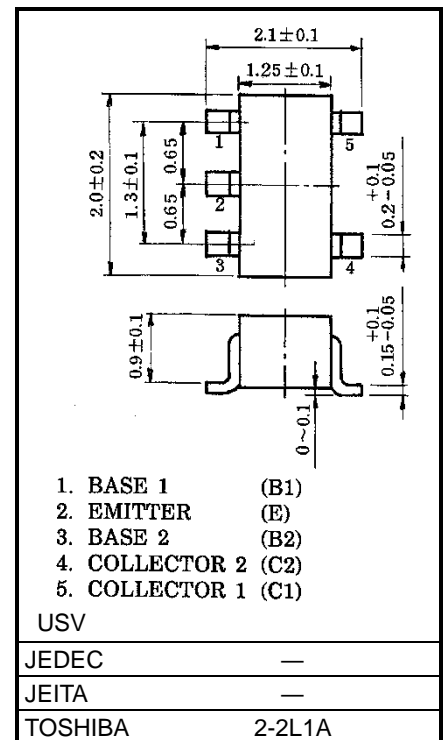
Switching, Inverter Circuit,
Interface Circuit and Driver Circuit

- Including two devices in USV (ultra super mini type with 5 leads)
- 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 RN1701 to RN1706

Equivalent Circuit and Bias Resistor Values

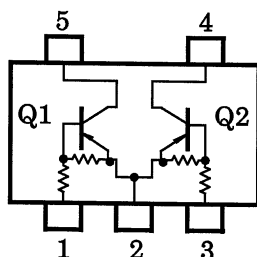


| Part No. | R1 (kΩ) | R2 (kΩ) |
|----------|---------|---------|
| RN2701 | 4.7 | 4.7 |
| RN2702 | 10 | 10 |
| RN2703 | 22 | 22 |
| RN2704 | 47 | 47 |
| RN2705 | 2.2 | 47 |
| RN2706 | 4.7 | 47 |



Weight: 6.2 mg (typ.)

Equivalent Circuit (top view)



Start of commercial production
1992-01

Absolute Maximum Ratings (Ta = 25°C) (Q1, Q2 Common)

| Characteristics | | Symbol | Rating | Unit |
|-----------------------------|----------------|------------------|------------|------|
| Collector-base voltage | RN2701 to 2706 | V _{CBO} | -50 | V |
| Collector-emitter voltage | | V _{CEO} | -50 | V |
| Emitter-base voltage | RN2701 to 2704 | V _{EBO} | -10 | V |
| | RN2705, 2706 | | -5 | |
| Collector current | RN2701 to 2706 | I _C | -100 | mA |
| Collector power dissipation | | P _C * | 200 | 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.

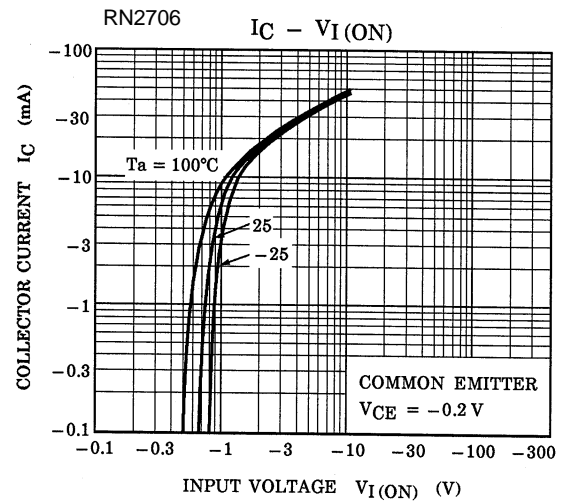
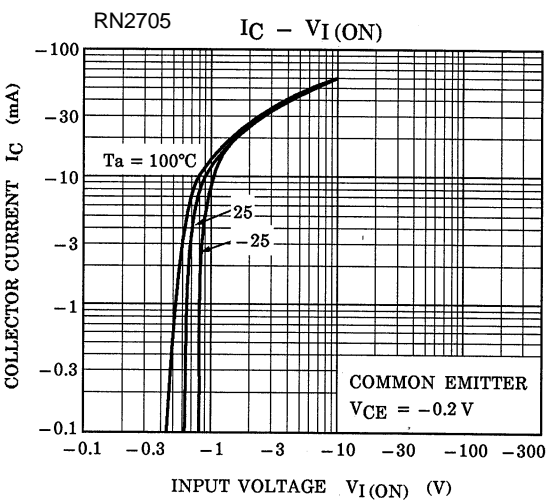
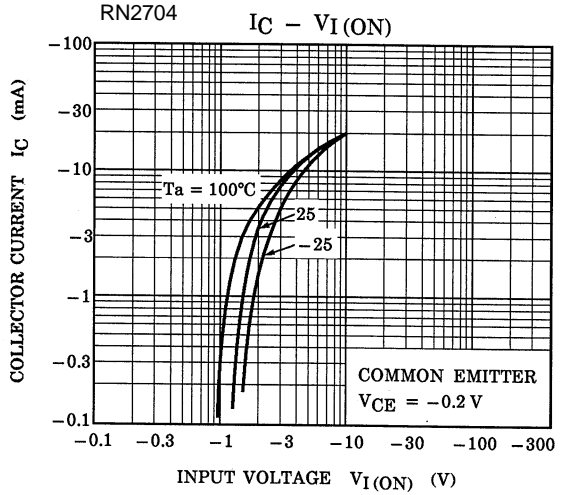
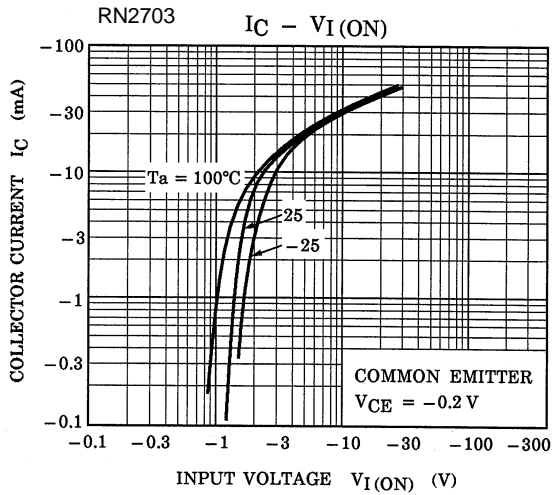
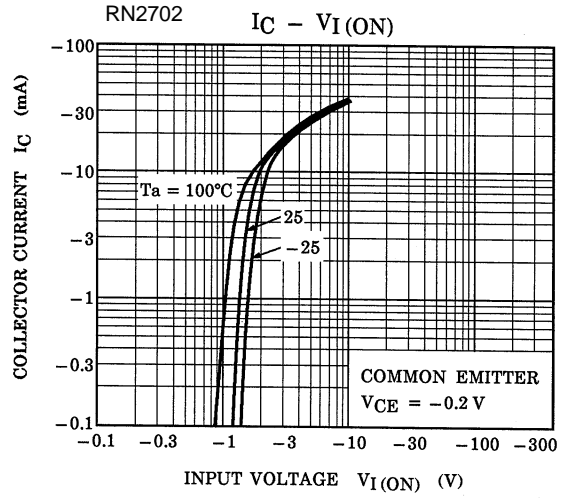
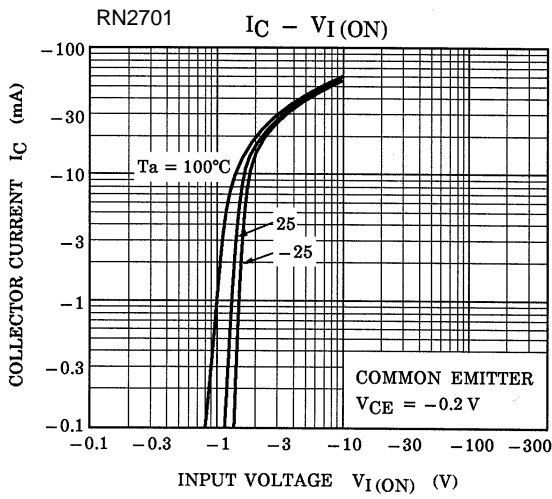
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

* Total rating

Electrical Characteristics (Ta = 25°C) (Q1, Q2 Common)

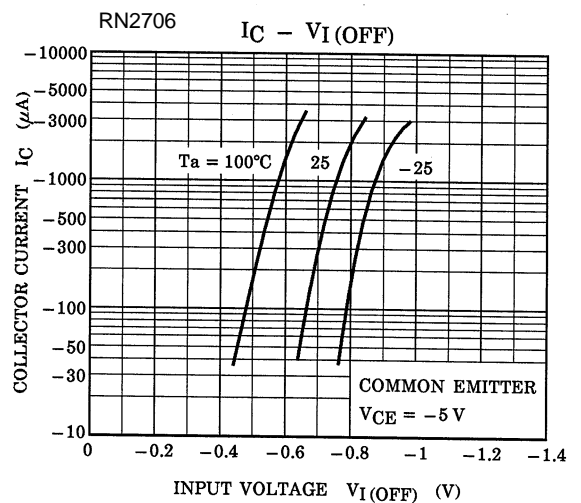
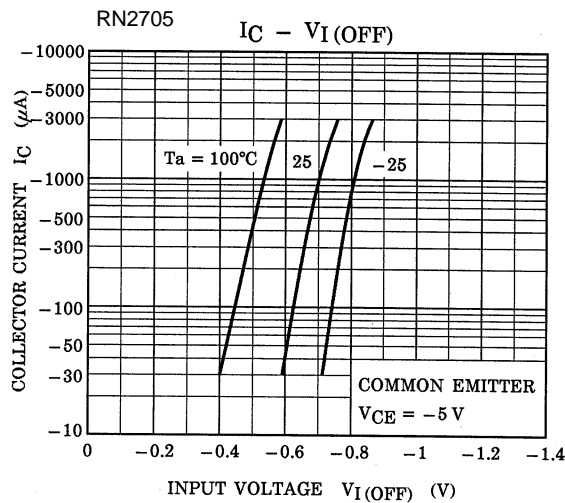
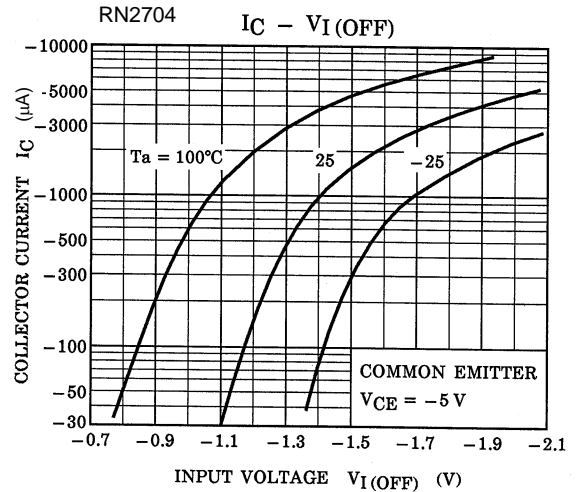
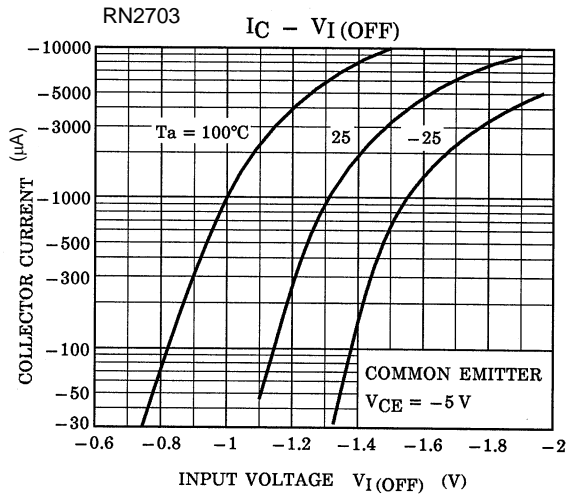
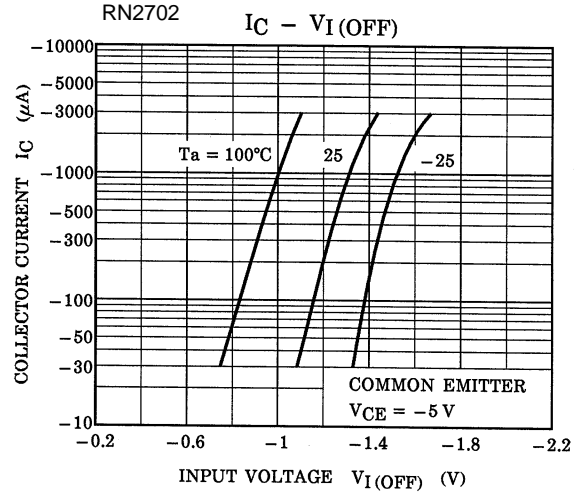
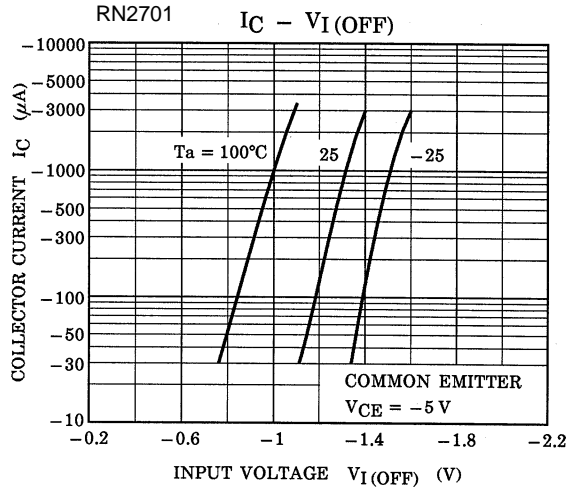
| Characteristics | | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|----------------|-----------------------|--------------|---|--------|--------|--------|------|
| Collector cut-off current | RN2701 to 2706 | ICBO | — | V _{CB} = -50 V, I _E = 0 mA | — | — | -100 | nA |
| | | ICEO | — | V _{CE} = -50 V, I _B = 0 mA | — | — | -500 | |
| Emitter cut-off current | RN2701 | IEBO | — | V _{EB} = -10 V, I _C = 0 mA | -0.82 | — | -1.52 | mA |
| | RN2702 | | — | | -0.38 | — | -0.71 | |
| | RN2703 | | — | | -0.17 | — | -0.33 | |
| | RN2704 | | — | -0.082 | — | -0.15 | | |
| | RN2705 | | — | V _{EB} = -5 V, I _C = 0 mA | -0.078 | — | -0.145 | |
| | RN2706 | | — | | -0.074 | — | -0.138 | |
| DC current gain | RN2701 | h _{FE} | — | V _{CE} = -5 V, I _C = -10 mA | 30 | — | — | — |
| | RN2702 | | — | | 50 | — | — | |
| | RN2703 | | — | | 70 | — | — | |
| | RN2704 | | — | | 80 | — | — | |
| | RN2705 | | — | | 80 | — | — | |
| | RN2706 | | — | | 80 | — | — | |
| Collector-emitter saturation voltage | RN2701 to 2706 | V _{CE (sat)} | — | I _C = -5 mA, I _B = -0.25 mA | — | -0.1 | -0.3 | V |
| Input voltage (ON) | RN2701 | V _{I (ON)} | — | V _{CE} = -0.2 V, I _C = -5 mA | -1.1 | — | -2.0 | V |
| | RN2702 | | — | | -1.2 | — | -2.4 | |
| | RN2703 | | — | | -1.3 | — | -3.0 | |
| | RN2704 | | — | | -1.5 | — | -5.0 | |
| | RN2705 | | — | | -0.6 | — | -1.1 | |
| | RN2706 | | — | | -0.7 | — | -1.3 | |
| Input voltage (OFF) | RN2701 to 2704 | V _{I (OFF)} | — | V _{CE} = -5 V, I _C = -0.1 mA | -1.0 | — | -1.5 | V |
| | RN2705, 2706 | | — | | -0.5 | — | -0.8 | |
| Transition frequency | RN2701 to 2706 | f _T | — | V _{CE} = -10 V, I _C = -5 mA | — | 200 | — | MHz |
| Collector output capacitance | RN2701 to 2706 | C _{ob} | — | V _{CB} = -10 V, I _E = 0 mA f = 1 MHz | — | 3 | 6 | pF |
| Input resistance | RN2701 | R ₁ | — | — | 3.29 | 4.7 | 6.11 | kΩ |
| | RN2702 | | — | | 7 | 10 | 13 | |
| | RN2703 | | — | | 15.4 | 22 | 28.6 | |
| | RN2704 | | — | | 32.9 | 47 | 61.1 | |
| | RN2705 | | — | | 1.54 | 2.2 | 2.86 | |
| | RN2706 | | — | | 3.29 | 4.7 | 6.11 | |
| Resistor ratio | RN2701 to 2704 | R _{1/R2} | — | — | 0.9 | 1.0 | 1.1 | — |
| | RN2705 | | — | | 0.0421 | 0.0468 | 0.0515 | |
| | RN2706 | | — | | 0.09 | 0.1 | 0.11 | |

(Q1, Q2 Common)



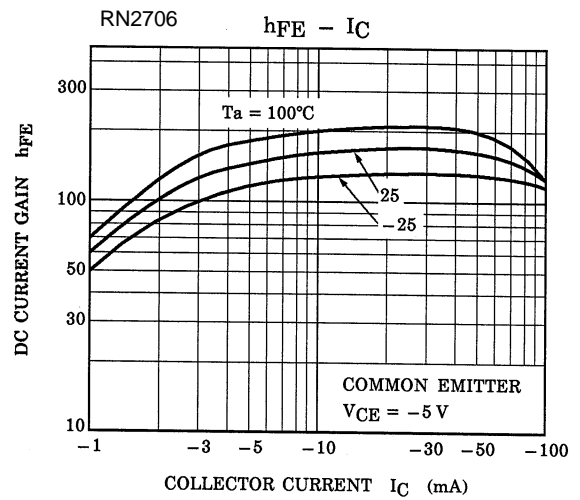
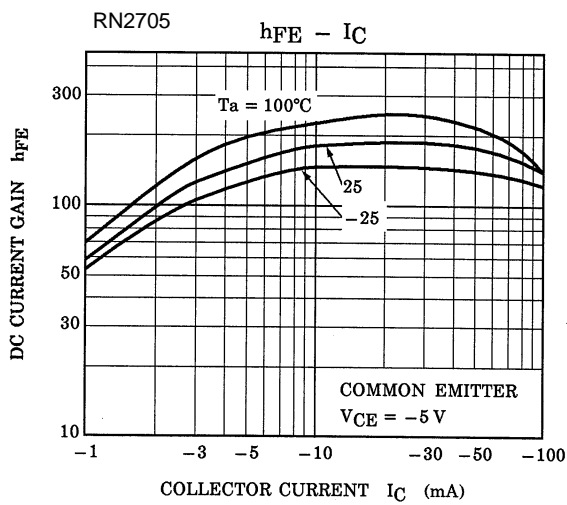
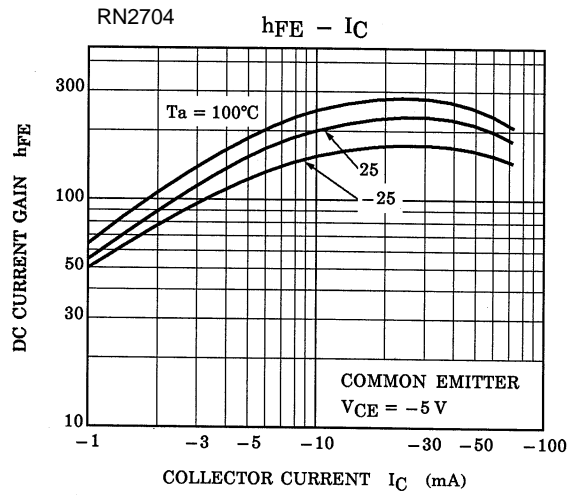
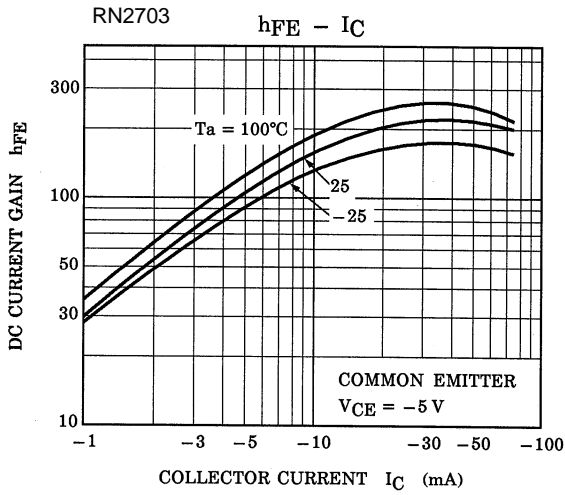
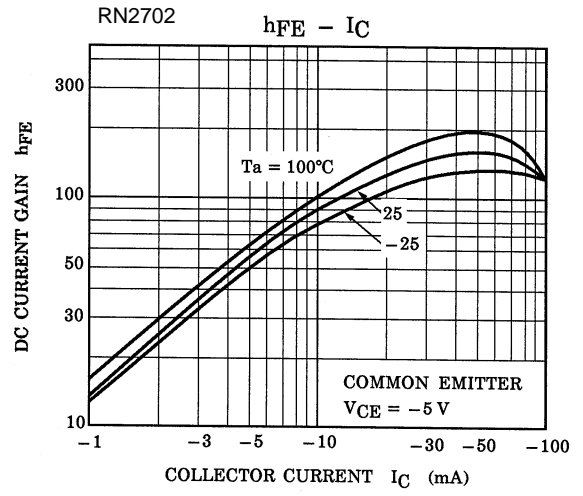
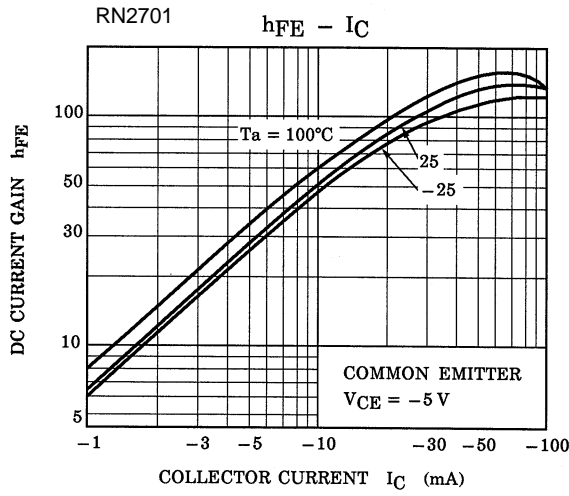
The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

(Q1, Q2 Common)



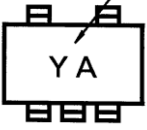
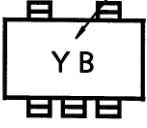
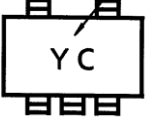
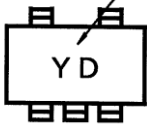
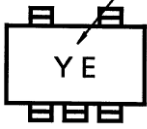
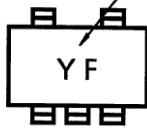
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(Q1, Q2 Common)



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Marking

| Part No. | Marking |
|----------|--|
| RN2701 | <p data-bbox="587 304 847 331">Part No.(abbreviation code)</p>  |
| RN2702 | <p data-bbox="587 557 847 584">Part No.(abbreviation code)</p>  |
| RN2703 | <p data-bbox="587 810 847 837">Part No.(abbreviation code)</p>  |
| RN2704 | <p data-bbox="587 1064 847 1090">Part No.(abbreviation code)</p>  |
| RN2705 | <p data-bbox="587 1274 847 1301">Part No.(abbreviation code)</p>  |
| RN2706 | <p data-bbox="587 1514 847 1541">Part No.(abbreviation code)</p>  |

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