

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

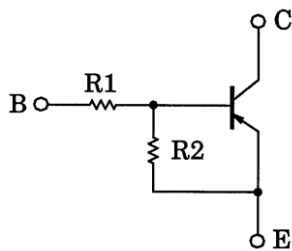
### RN2701, RN2702, RN2703 RN2704, RN2705, RN2706

Unit: mm

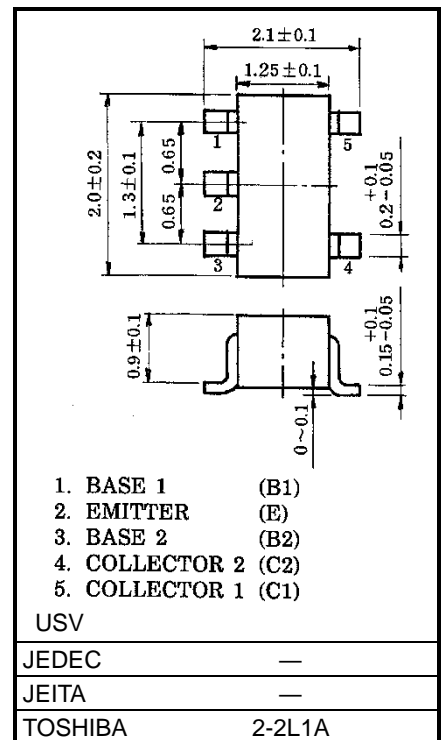
Switching, Inverter Circuit,  
Interface Circuit and Driver Circuit

- 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



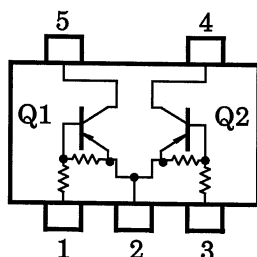
1. BASE 1 (B1)
2. EMITTER (E)
3. BASE 2 (B2)
4. COLLECTOR 2 (C2)
5. COLLECTOR 1 (C1)

USV

JEDEC	—
JEITA	—
TOSHIBA	2-2L1A

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 <sub>CBO</sub>	-50	V
Collector-emitter voltage		V <sub>CEO</sub>	-50	V
Emitter-base voltage	RN2701 to 2704	V <sub>EBO</sub>	-10	V
	RN2705, 2706		-5	
Collector current	RN2701 to 2706	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 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.

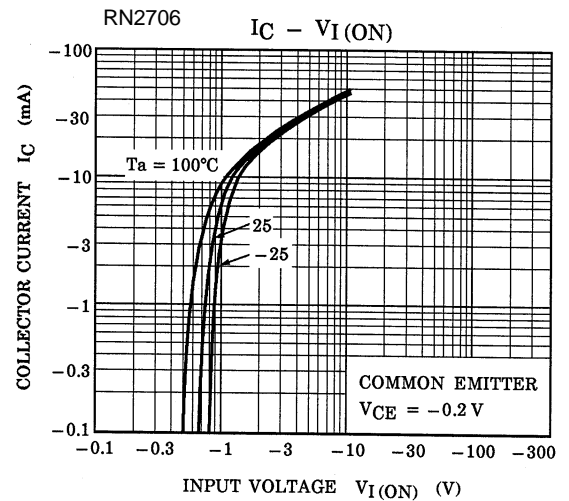
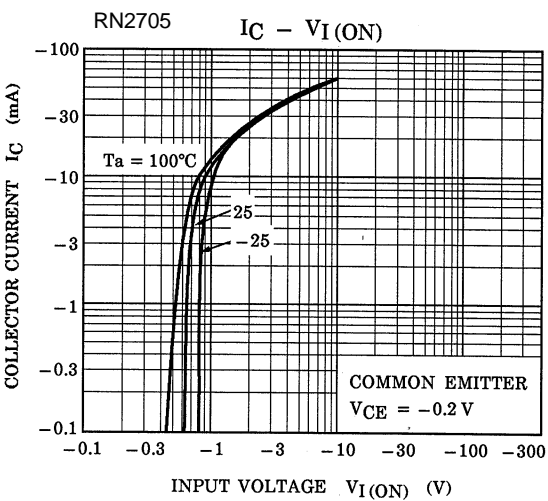
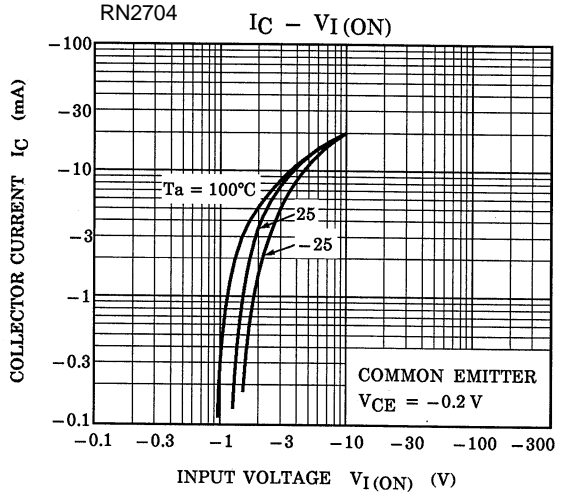
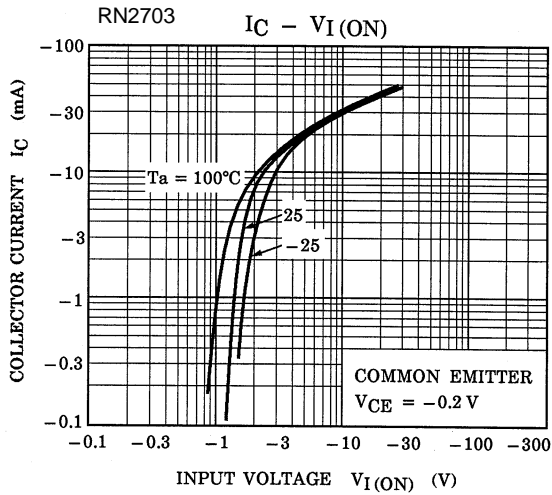
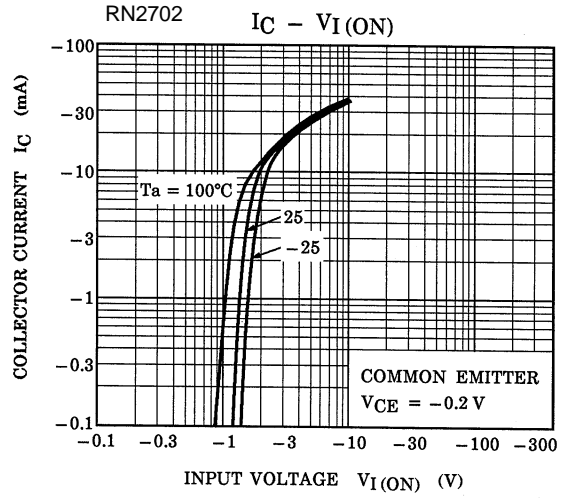
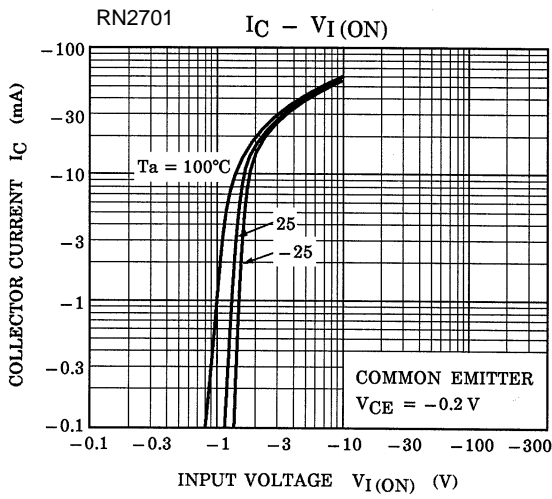
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

\* Total rating

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

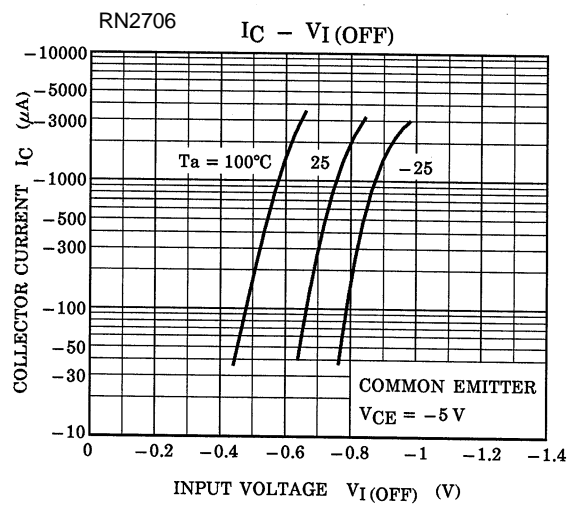
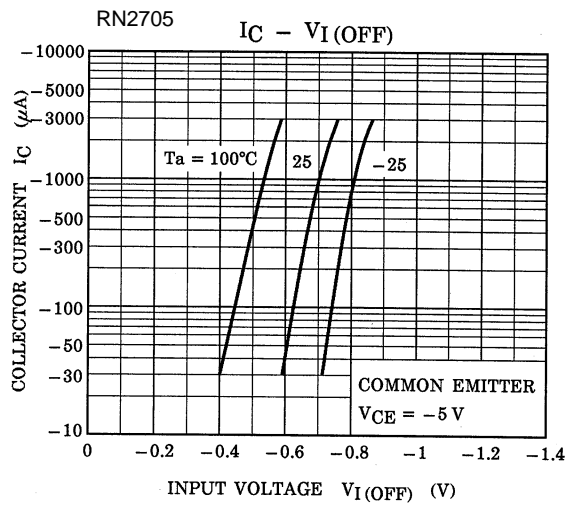
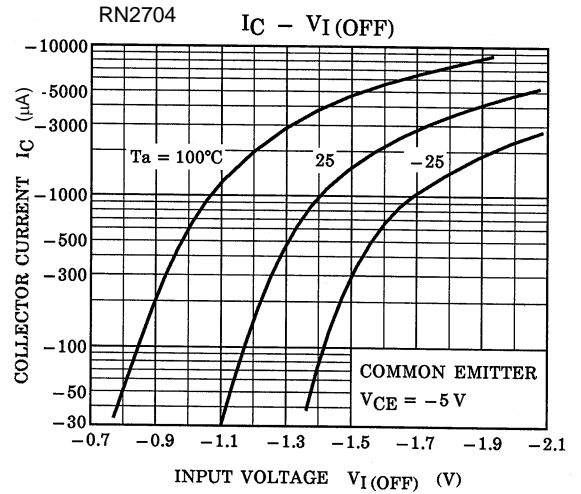
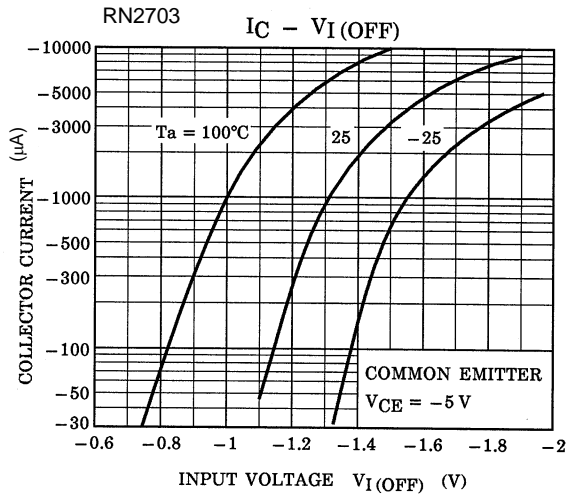
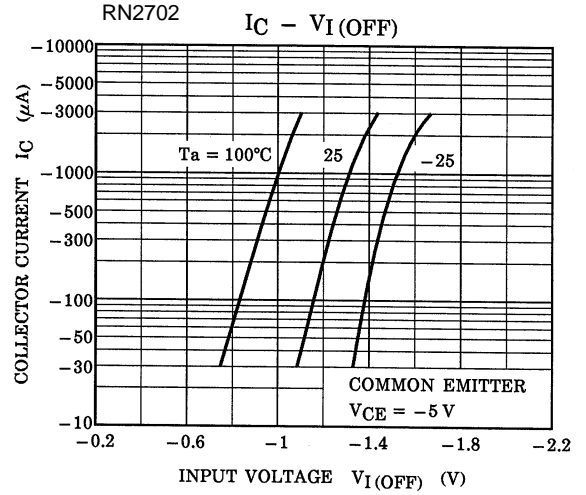
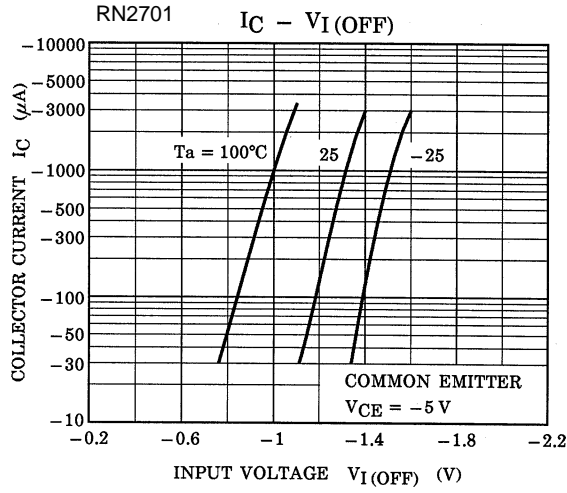
Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2701 to 2706	I <sub>CBO</sub>	—	V <sub>CB</sub> = -50 V, I <sub>E</sub> = 0 mA	—	—	-100	nA
		I <sub>CEO</sub>	—	V <sub>CE</sub> = -50 V, I <sub>B</sub> = 0 mA	—	—	-500	
Emitter cut-off current	RN2701	I <sub>EBO</sub>	—	V <sub>EB</sub> = -10 V, I <sub>C</sub> = 0 mA	-0.82	—	-1.52	mA
	RN2702		—		-0.38	—	-0.71	
	RN2703		—		-0.17	—	-0.33	
	RN2704		—	-0.082	—	-0.15		
	RN2705		—	V <sub>EB</sub> = -5 V, I <sub>C</sub> = 0 mA	-0.078	—	-0.145	
	RN2706		—		-0.074	—	-0.138	
DC current gain	RN2701	h <sub>FE</sub>	—	V <sub>CE</sub> = -5 V, I <sub>C</sub> = -10 mA	30	—	—	—
	RN2702		—		50	—	—	
	RN2703		—		70	—	—	
	RN2704		—		80	—	—	
	RN2705		—		80	—	—	
	RN2706		—		80	—	—	
Collector-emitter saturation voltage	RN2701 to 2706	V <sub>CE (sat)</sub>	—	I <sub>C</sub> = -5 mA, I <sub>B</sub> = -0.25 mA	—	-0.1	-0.3	V
Input voltage (ON)	RN2701	V <sub>I (ON)</sub>	—	V <sub>CE</sub> = -0.2 V, I <sub>C</sub> = -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 <sub>I (OFF)</sub>	—	V <sub>CE</sub> = -5 V, I <sub>C</sub> = -0.1 mA	-1.0	—	-1.5	V
	RN2705, 2706		—		-0.5	—	-0.8	
Transition frequency	RN2701 to 2706	f <sub>T</sub>	—	V <sub>CE</sub> = -10 V, I <sub>C</sub> = -5 mA	—	200	—	MHz
Collector output capacitance	RN2701 to 2706	C <sub>ob</sub>	—	V <sub>CB</sub> = -10 V, I <sub>E</sub> = 0 mA f = 1 MHz	—	3	6	pF
Input resistance	RN2701	R <sub>1</sub>	—	—	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 <sub>1/R2</sub>	—	—	0.9	1.0	1.1	—
	RN2705		—		0.0421	0.0468	0.0515	
	RN2706		—		0.09	0.1	0.11	

(Q1, Q2 Common)



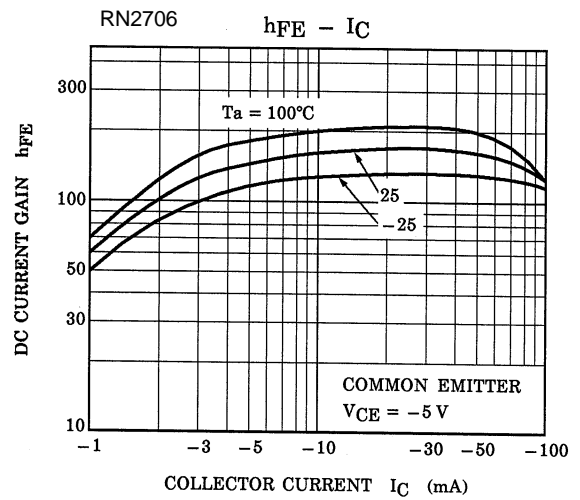
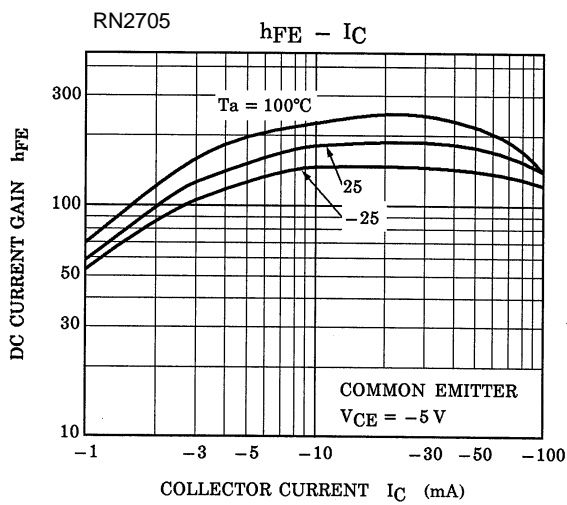
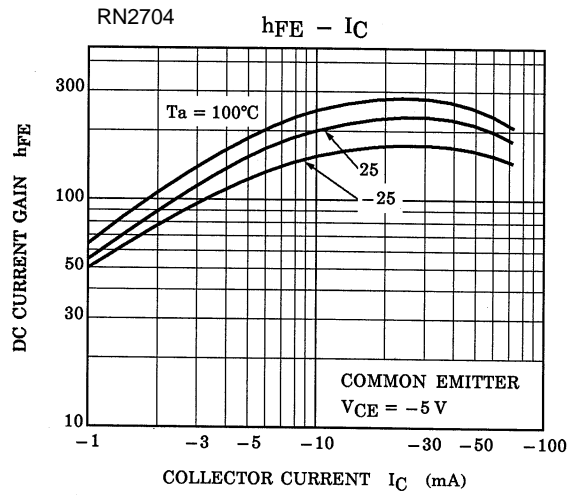
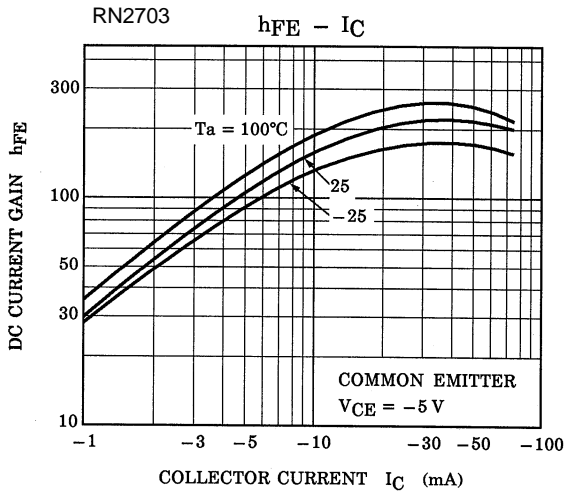
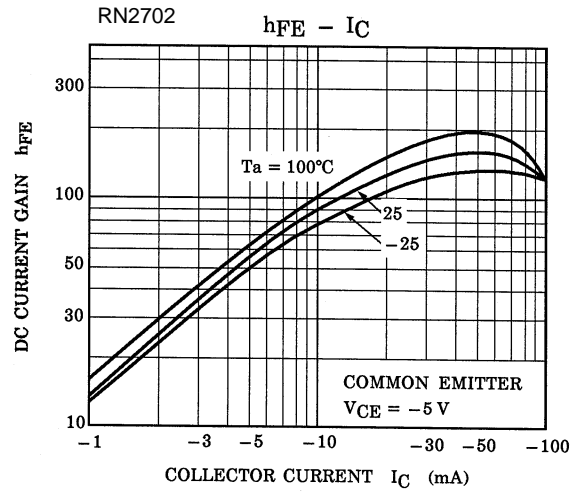
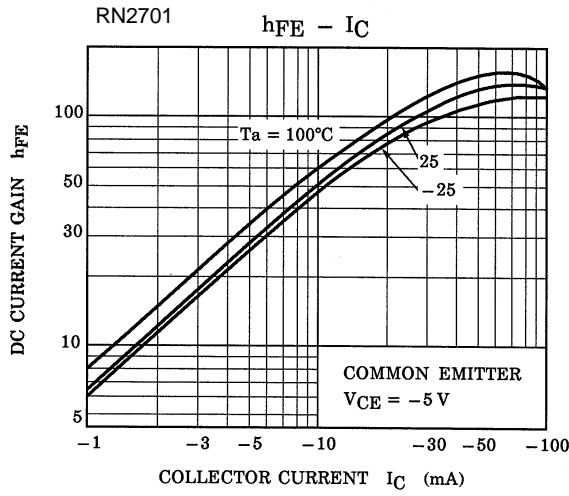
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(Q1, Q2 Common)



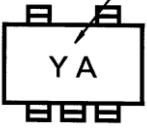
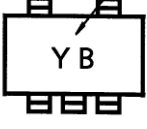
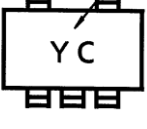
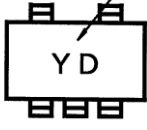
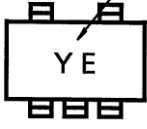
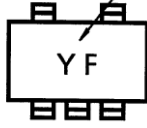
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(Q1, Q2 Common)



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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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