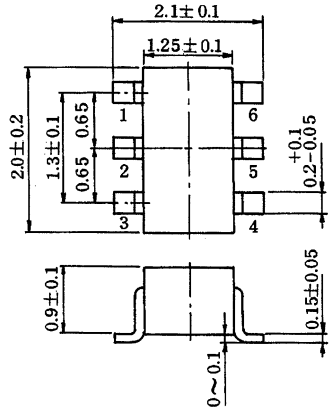
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process) (Bias Resistor Built-in Transistor)

RN2901, RN2902, RN2903
RN2904, RN2905, RN2906

Unit : mm

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- Including two devices in US6 (ultra super mini type with 6 leads)
- With built-in bias resistors
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process
- Complementary to RN1901 to RN1906



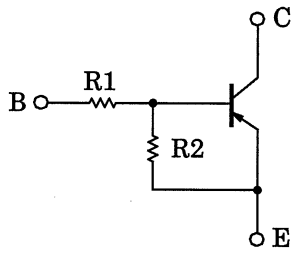
1. EMITTER 1 (E1)
2. BASE 1 (B1)
3. COLLECTOR 2 (C2)
4. EMITTER 2 (E2)
5. BASE 2 (B2)
6. COLLECTOR 1 (C1)

US6

JEDEC	—
JEITA	—
TOSHIBA	2-2J1A

Weight: 6.8 mg (typ.)

Equivalent Circuit and Bias Resistor Values

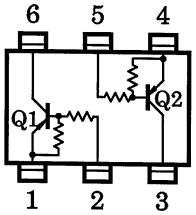


Type No.	R1 (kΩ)	R2 (kΩ)
RN2901	4.7	4.7
RN2902	10	10
RN2903	22	22
RN2904	47	47
RN2905	2.2	47
RN2906	4.7	47

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

Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN2901 to 2906	V_{CBO}	−50	V
Collector-emitter voltage		V_{CEO}	−50	V
Emitter-base voltage	RN2901 to 2904	V_{EBO}	−10	V
	RN2905, 2906		−5	
Collector current	RN2901 to 2906	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

Equivalent Circuit (Top View)



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

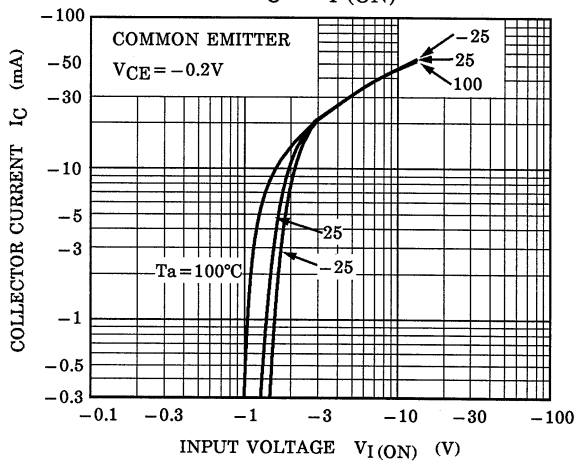
Start of commercial production
1990-12

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

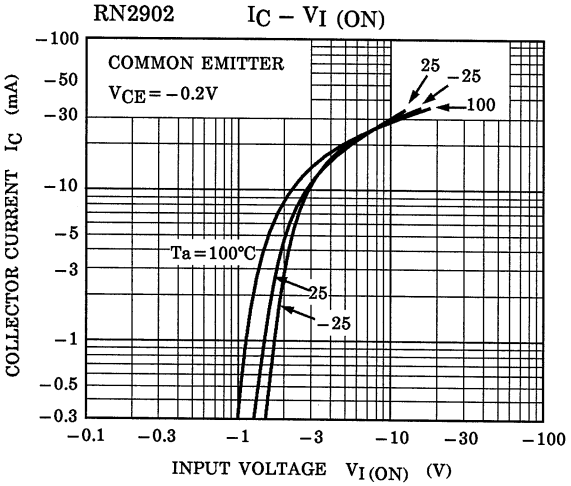
Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2901 to 2906	I_{CBO}	—	V_{CB} = −50V, I_E = 0	—	—	−100	nA
		I_{CEO}	—	V_{CE} = −50V, I_B = 0	—	—	−500	
Emitter cut-off current	RN2901	I_{EBO}	—	V_{EB} = −10V, I_C = 0	−0.82	—	−1.52	mA
	RN2902		—		−0.38	—	−0.71	
	RN2903		—		−0.17	—	−0.33	
	RN2904		—		−0.082	—	−0.15	
	RN2905		—	V_{EB} = −5V, I_C = 0	−0.078	—	−0.145	
	RN2906		—		−0.074	—	−0.138	
DC current gain	RN2901	h_{FE}	—	V_{CE} = −5V I_C = −10mA	30	—	—	—
	RN2902		—		50	—	—	
	RN2903		—		70	—	—	
	RN2904		—		80	—	—	
	RN2905		—		80	—	—	
	RN2906		—		80	—	—	
Collector-emitter saturation voltage	RN2901 to 2906	$V_{CE\ (sat)}$	—	I_C = −5mA I_B = −0.25mA	—	−0.1	−0.3	V
Input voltage (ON)	RN2901	$V_{I\ (ON)}$	—	V_{CE} = −0.2V I_C = −5mA	−1.1	—	−2.0	V
	RN2902		—		−1.2	—	−2.4	
	RN2903		—		−1.3	—	−3.0	
	RN2904		—		−1.5	—	−5.0	
	RN2905		—		−0.6	—	−1.1	
	RN2906		—		−0.7	—	−1.3	
Input voltage (OFF)	RN2901 to 2904	$V_{I\ (OFF)}$	—	V_{CE} = −5V, I_C = −0.1mA	−1.0	—	−1.5	V
	RN2905, 2906		—		−0.5	—	−0.8	
Transition frequency	RN2901 to 2906	f_T	—	V_{CE} = −10V, I_C = −5mA	—	200	—	MHz
Collector output capacitance	RN2901 to 2906	C_{ob}	—	V_{CB} = −10V, I_E = 0 f = 1MHz	—	3	6	pF
Input resistor	RN2901	R1	—	—	3.29	4.7	6.11	kΩ
	RN2902		—		7	10	13	
	RN2903		—		15.4	22	28.6	
	RN2904		—		32.9	47	61.1	
	RN2905		—		1.54	2.2	2.86	
	RN2906		—		3.29	4.7	6.11	
Resistor ratio	RN2901 to 2904	R1/R2	—	—	0.9	1.0	1.1	—
	RN2905		—		0.0421	0.0468	0.0515	
	RN2906		—		0.09	0.1	0.11	

(Q1, Q2 Common)

RN2901 $I_C - V_I$ (ON)



RN2902 $I_C - V_I$ (ON)



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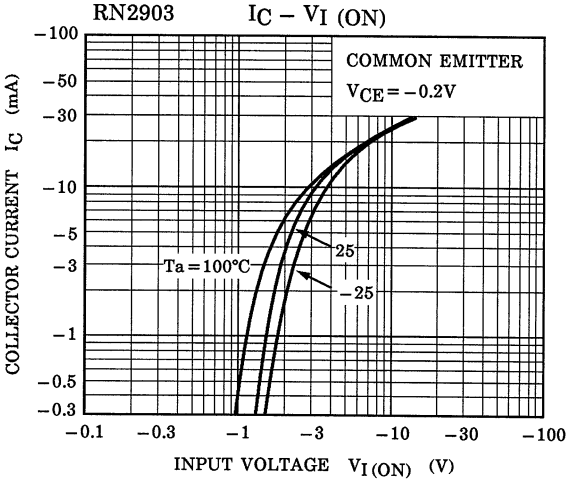

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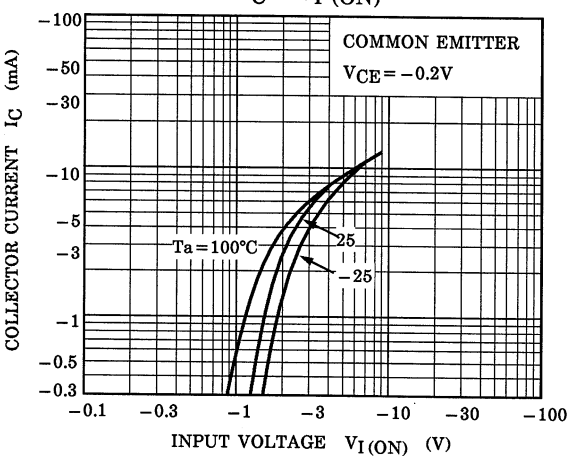
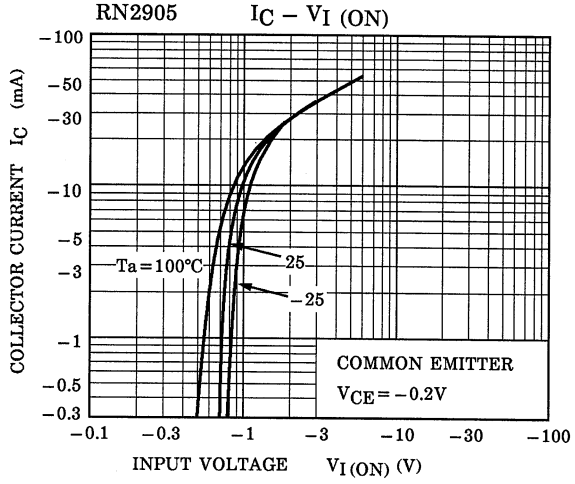
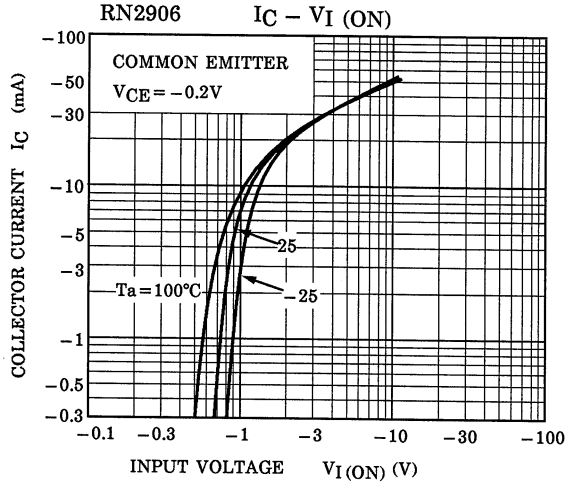


RN2905 $I_C - V_I$ (ON)

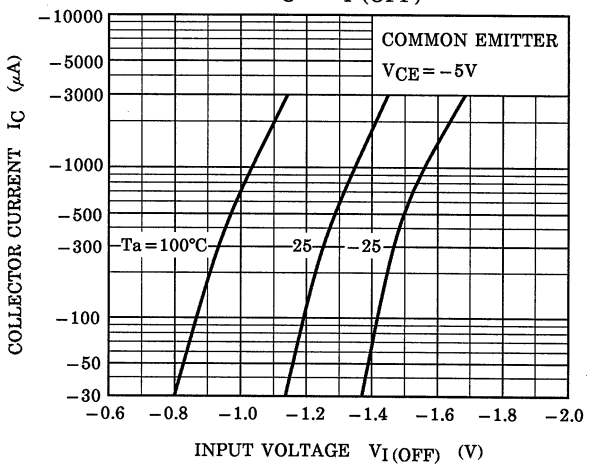


RN2906 $I_C - V_I$ (ON)

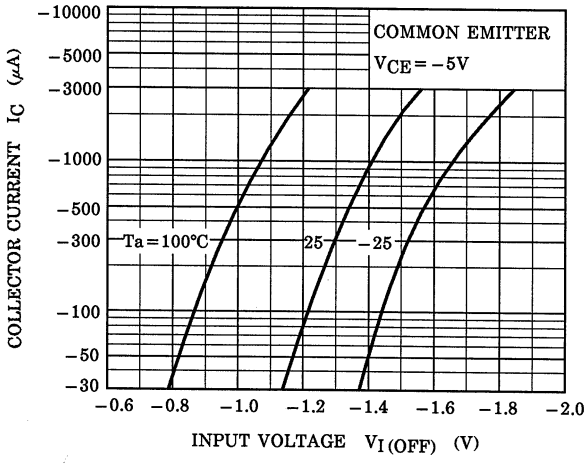


(Q1, Q2 Common)

RN2901 $I_C - V_{I\,(OFF)}$



RN2902 $I_C - V_{I\,(OFF)}$



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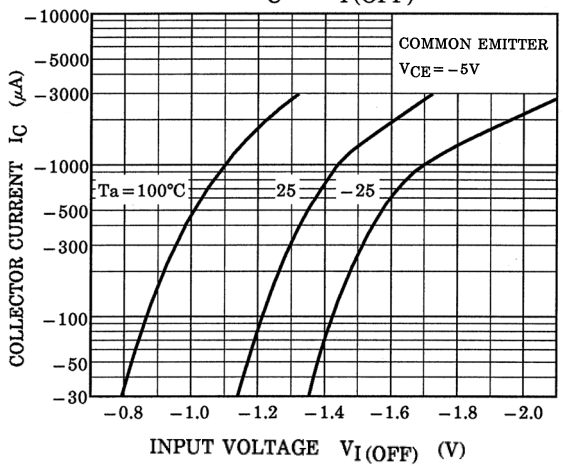

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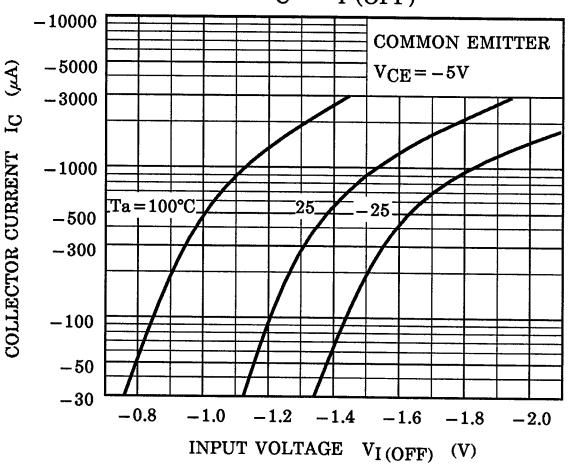

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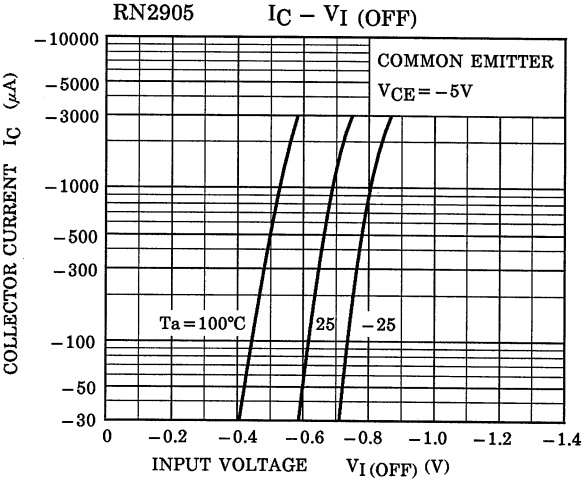
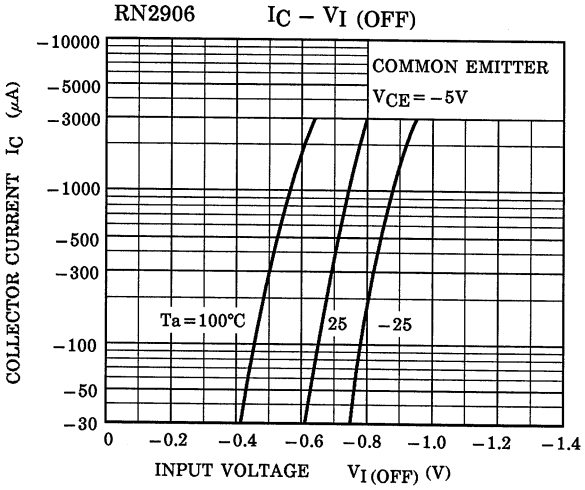
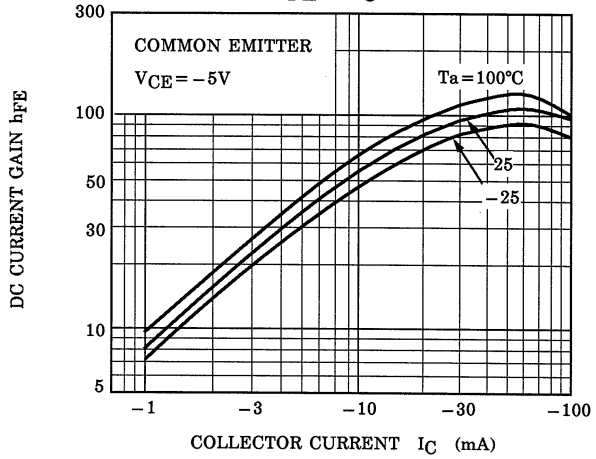


RN2906 $I_C - V_{I\,(OFF)}$

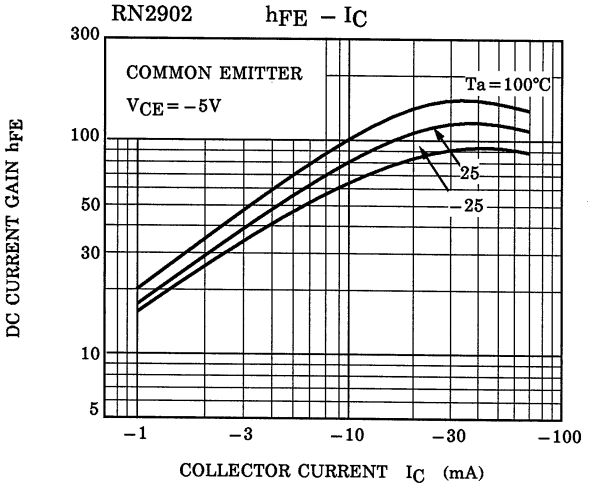


(Q1, Q2 Common)

RN2901 h_{FE} – I_C



RN2902 h_{FE} – I_C



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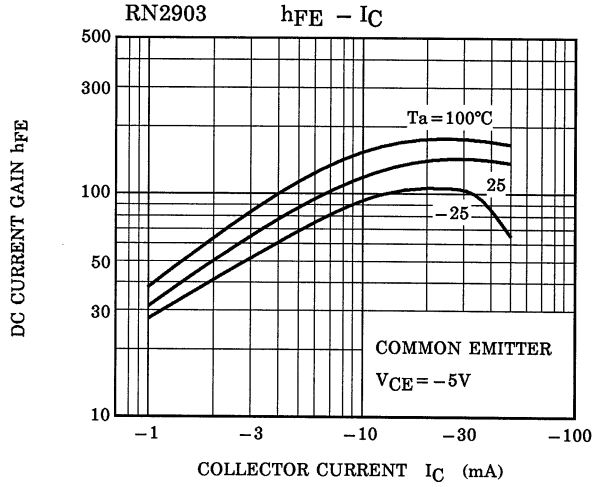

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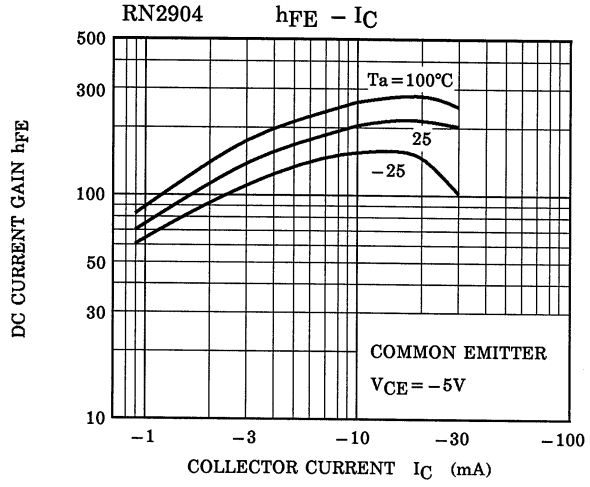
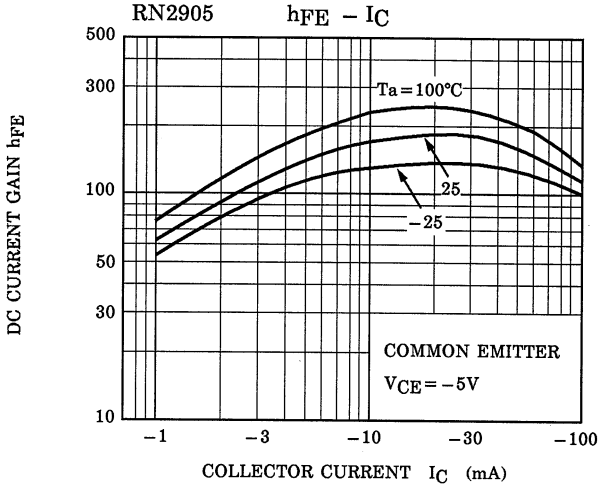
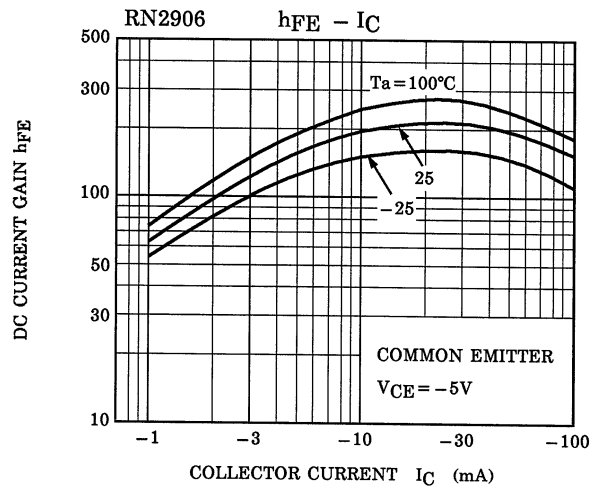


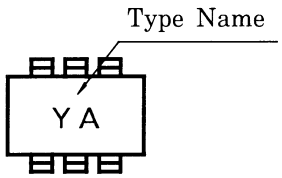
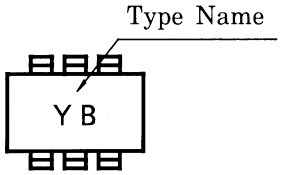
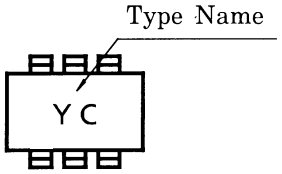
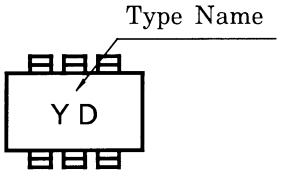
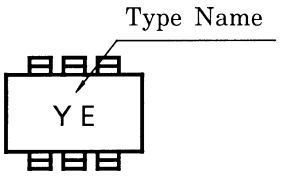
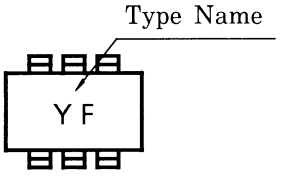
RN2905 h_{FE} – I_C



RN2906 h_{FE} – I_C



Marking

Type Name	Marking
RN2901	
RN2902	
RN2903	
RN2904	
RN2905	
RN2906	

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