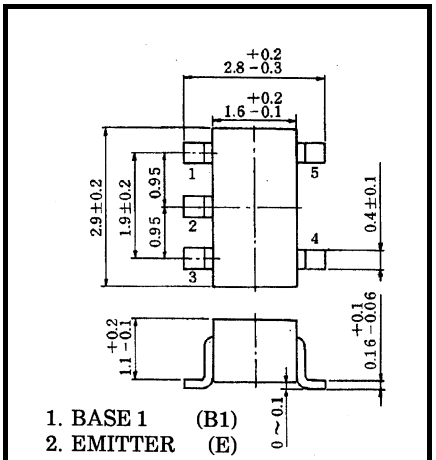
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor)

RN2501,RN2502,RN2503 RN2504,RN2505,RN2506

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- Including two devices in SMV (super mini type with 5 leads)
- With built-in bias resistors
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process
- Complementary to RN1501 to RN1506

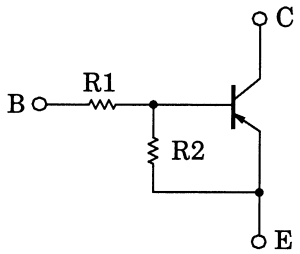
Unit: mm



SMV	
JEDEC	—
JEITA	—
TOSHIBA	2-3L1A

Weight: 14 mg (typ.)

Equivalent Circuit and Bias Resistor Values

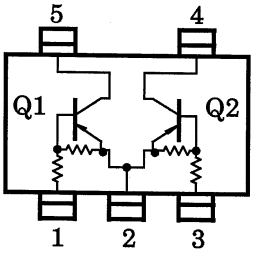


Type No.	R1 (kΩ)	R2 (kΩ)
RN2501	4.7	4.7
RN2502	10	10
RN2503	22	22
RN2504	47	47
RN2505	2.2	47
RN2506	4.7	47

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

Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN2501 to 2506	V_{CBO}	−50	V
Collector-emitter voltage	RN2501 to 2506	V_{CEO}	−50	V
Emitter base voltage	RN2501 to 2504	V_{EBO}	−10	V
	RN2505, 2506		−5	
Collector current	RN2501 to 2506	I_C	−100	mA
Collector power dissipation		P_C*	300	mW
Junction temperature		Tj	150	°C
Storage temperature range		Tstg	−55 to150	°C

Equivalent Circuit (Top View)



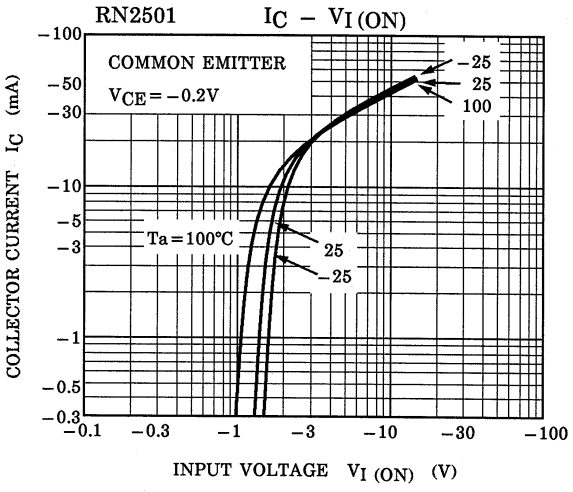
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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).

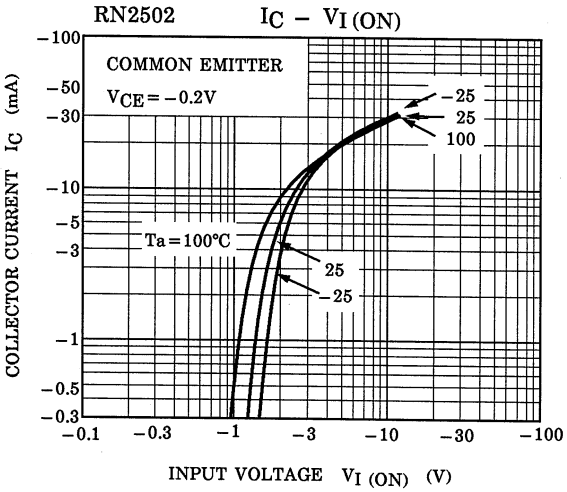
*Total rating

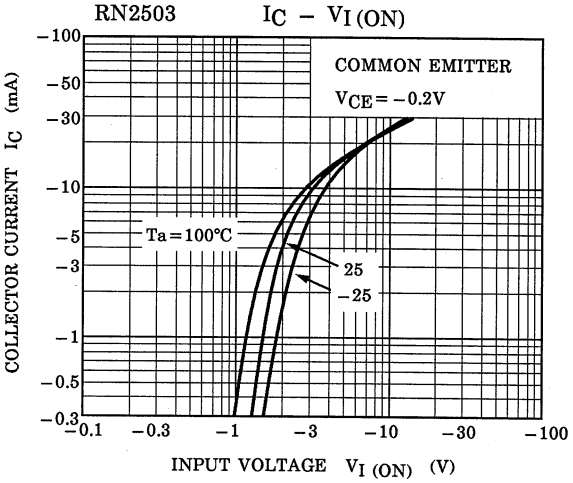
Electrical Characteristics (Ta = 25°C) (Q1, Q2 Common)

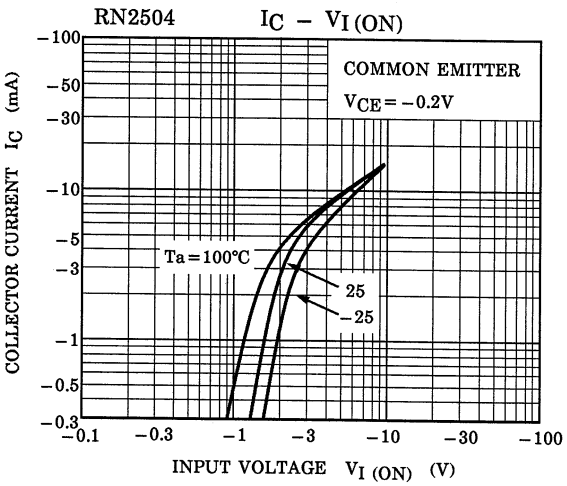
Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2501 to 2506	I_{CBO}	—	V_{CB} = −50V, I_E = 0	—	—	−100	nA
		I_{CEO}	—	V_{CE} = −50V, I_B = 0	—	—	−500	
Emitter cut-off current	RN2501	I_{EBO}	—	V_{EB} = −10V, I_C = 0	−0.82	—	−1.52	mA
	RN2502		—		−0.38	—	−0.71	
	RN2503		—		−0.17	—	−0.33	
	RN2504		—		−0.082	—	−0.15	
	RN2505		—	V_{EB} = −5V, I_C = 0	−0.078	—	−0.145	
	RN2506		—		−0.074	—	−0.138	
DC current gain	RN2501	h_{FE}	—	V_{CE} = −5V I_C = −10mA	30	—	—	—
	RN2502		—		50	—	—	
	RN2503		—		70	—	—	
	RN2504		—		80	—	—	
	RN2505		—		80	—	—	
	RN2506		—		80	—	—	
Collector-emitter saturation voltage	RN2501 to 2506	$V_{CE\ (sat)}$	—	I_C = −5mA I_B = −0.25mA	—	−0.1	−0.3	V
Input voltage (ON)	RN2501	$V_{I\ (ON)}$	—	V_{CE} = −0.2V I_C = −5mA	−1.1	—	−2.0	V
	RN2502		—		−1.2	—	−2.4	
	RN2503		—		−1.3	—	−3.0	
	RN2504		—		−1.5	—	−5.0	
	RN2505		—		−0.6	—	−1.1	
	RN2506		—		−0.7	—	−1.3	
Input voltage (OFF)	RN2501 to 2504	$V_{I\ (OFF)}$	—	V_{CE} = −5V I_C = −0.1mA	−1.0	—	−1.5	V
	RN2505, 2506		—		−0.5	—	−0.8	
Transition frequency	RN2501 to 2506	f_T	—	V_{CE} = −10V I_C = −5mA	—	200	—	MHz
Collector output capacitance	RN2501 to 2506	C_{ob}	—	V_{CB} = −10V, I_E = 0 f = 1MHz	—	3	6	pF
Input resistor	RN2501	R1	—	—	3.29	4.7	6.11	kΩ
	RN2502		—		7	10	13	
	RN2503		—		15.4	22	28.6	
	RN2504		—		32.9	47	61.1	
	RN2505		—		1.54	2.2	2.86	
	RN2506		—		3.29	4.7	6.11	
Resistor ratio	RN2501 to 2504	R1/R2	—	—	0.9	1.0	1.1	—
	RN2505		—		0.0421	0.0468	0.0515	
	RN2506		—		0.09	0.1	0.11	

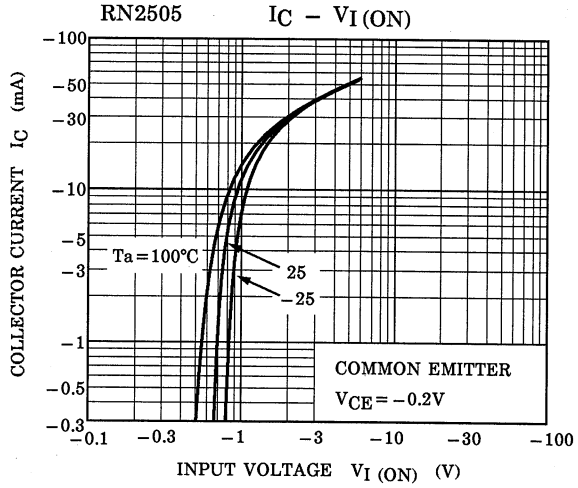
(Q1, Q2 Common)

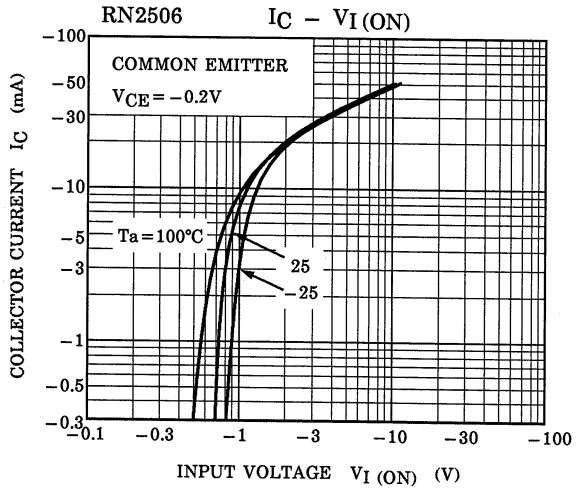

RN2501
I_C – $V_{I\,(ON)}$
COMMON EMITTER
V_{CE} = −0.2V
Ta = 100°C
25
−25
−25
25
100
COLLECTOR CURRENT I_C (mA)
INPUT VOLTAGE $V_{I\,(ON)}$ (V)
−100
−50
−30
−10
−5
−3
−1
−0.5
−0.3
−0.1
−0.3
−1
−3
−10
−30
−100


RN2502
I_C – $V_{I\,(ON)}$
COMMON EMITTER
V_{CE} = −0.2V
Ta = 100°C
25
−25
−25
25
100
COLLECTOR CURRENT I_C (mA)
INPUT VOLTAGE $V_{I\,(ON)}$ (V)
−100
−50
−30
−10
−5
−3
−1
−0.5
−0.3
−0.1
−0.3
−1
−3
−10
−30
−100


RN2503
I_C – $V_{I\,(ON)}$
COMMON EMITTER
V_{CE} = −0.2V
Ta = 100°C
25
−25
COLLECTOR CURRENT I_C (mA)
INPUT VOLTAGE $V_{I\,(ON)}$ (V)
−100
−50
−30
−10
−5
−3
−1
−0.5
−0.3
−0.1
−0.3
−1
−3
−10
−30
−100

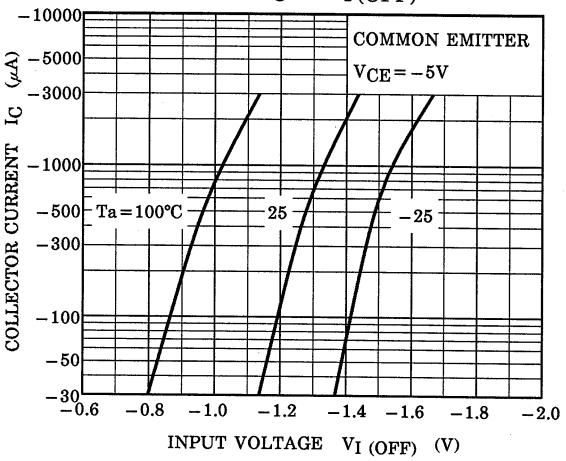

RN2504
I_C – $V_{I\,(ON)}$
COMMON EMITTER
V_{CE} = −0.2V
Ta = 100°C
25
−25
COLLECTOR CURRENT I_C (mA)
INPUT VOLTAGE $V_{I\,(ON)}$ (V)
−100
−50
−30
−10
−5
−3
−1
−0.5
−0.3
−0.1
−0.3
−1
−3
−10
−30
−100


RN2505
I_C – $V_{I\,(ON)}$
Ta = 100°C
25
−25
COMMON EMITTER
V_{CE} = −0.2V
COLLECTOR CURRENT I_C (mA)
INPUT VOLTAGE $V_{I\,(ON)}$ (V)
−100
−50
−30
−10
−5
−3
−1
−0.5
−0.3
−0.1
−0.3
−1
−3
−10
−30
−100

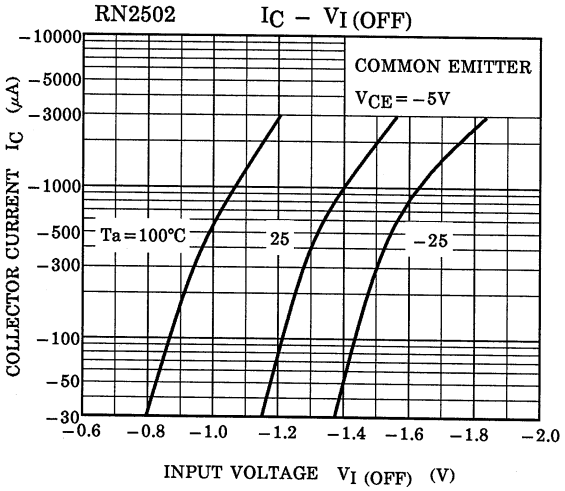

RN2506
I_C – $V_{I\,(ON)}$
COMMON EMITTER
V_{CE} = −0.2V
Ta = 100°C
25
−25
COLLECTOR CURRENT I_C (mA)
INPUT VOLTAGE $V_{I\,(ON)}$ (V)
−100
−50
−30
−10
−5
−3
−1
−0.5
−0.3
−0.1
−0.3
−1
−3
−10
−30
−100

(Q1, Q2 Common)

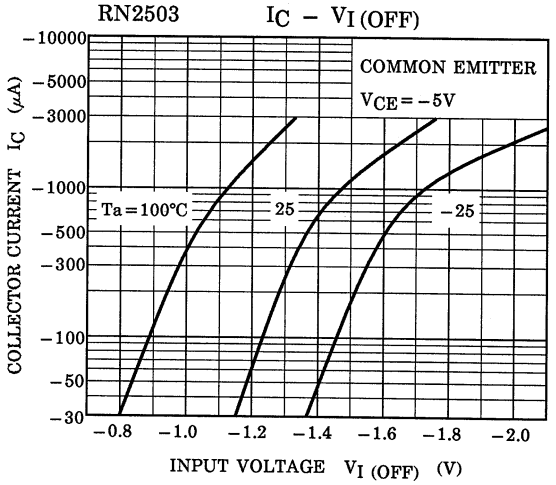
RN2501 $I_C - V_{I(OFF)}$



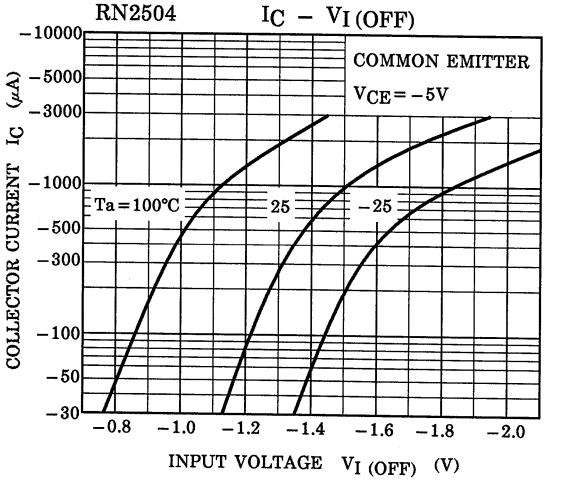
RN2502 $I_C - V_{I(OFF)}$



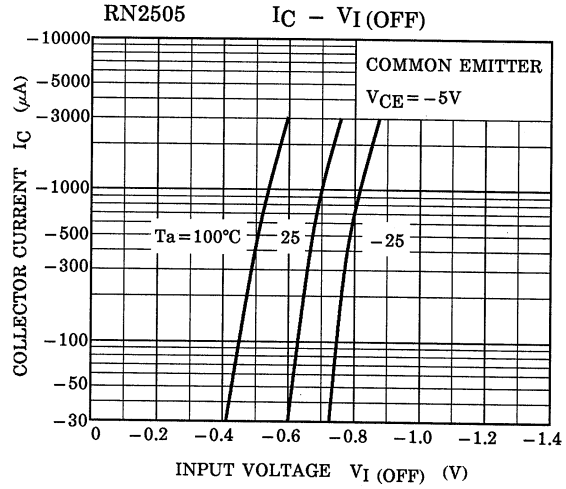
RN2503 $I_C - V_{I(OFF)}$



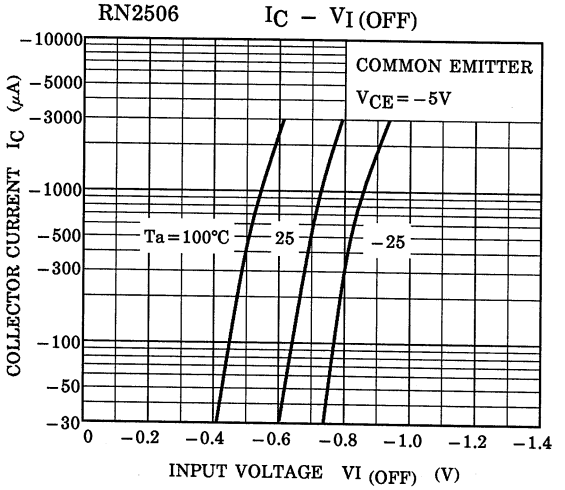
RN2504 $I_C - V_{I(OFF)}$



RN2505 $I_C - V_{I(OFF)}$

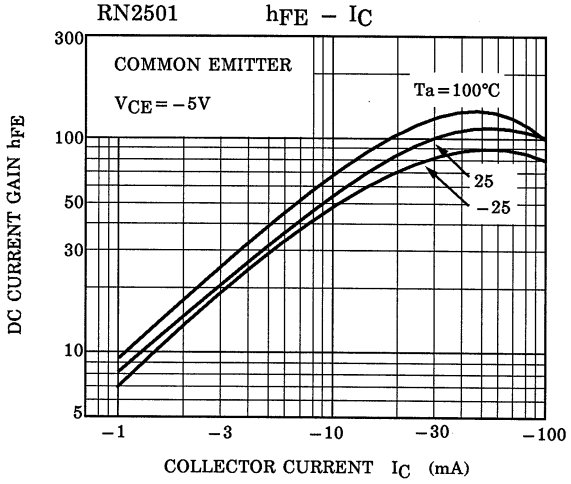


RN2506 $I_C - V_{I(OFF)}$

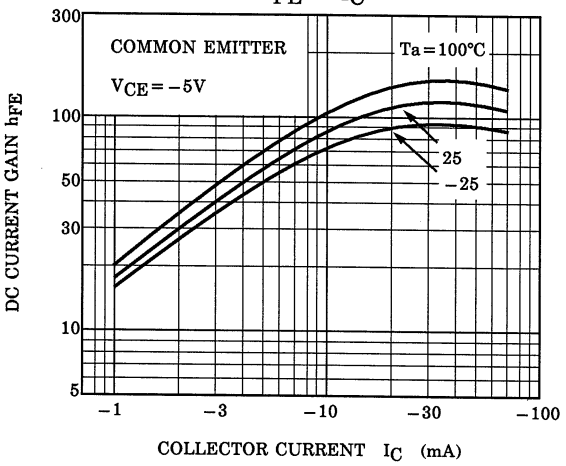


(Q1, Q2 Common)

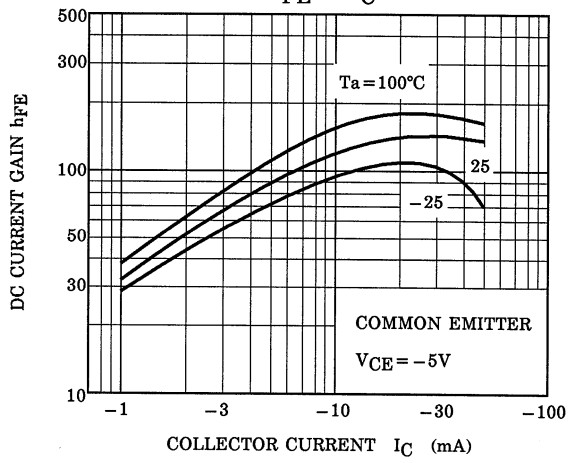
RN2501 h_{FE} – I_C



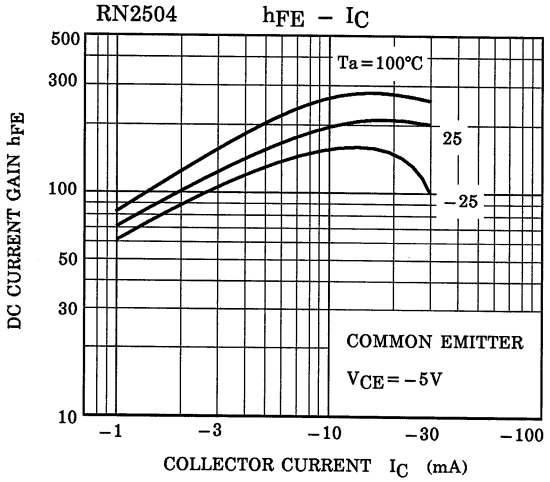
RN2502 h_{FE} – I_C



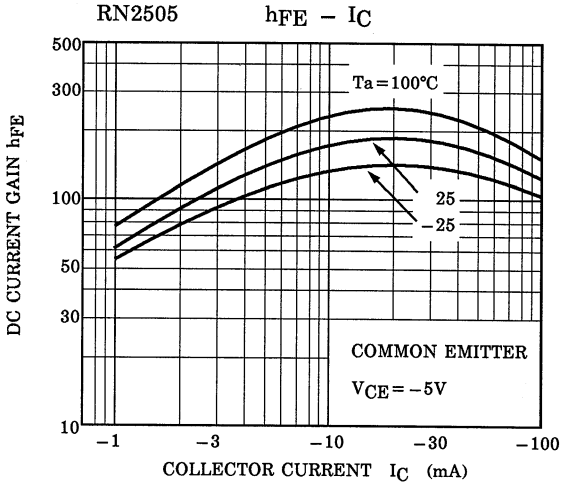
RN2503 h_{FE} – I_C



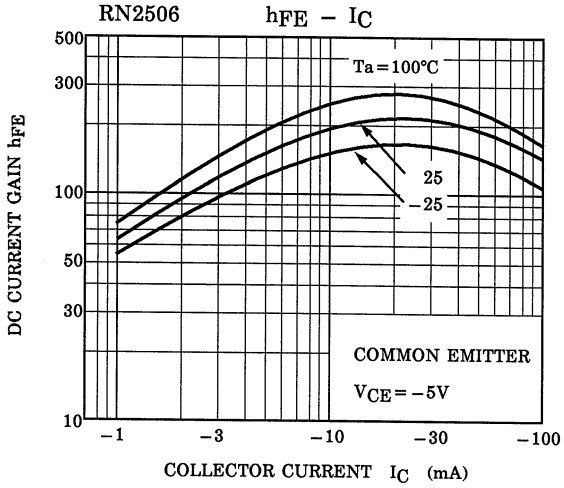
RN2504 h_{FE} – I_C



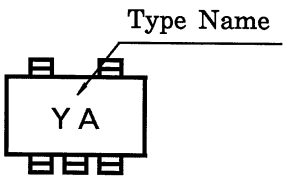
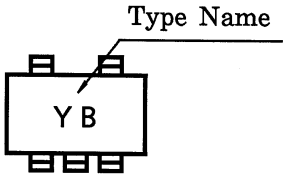
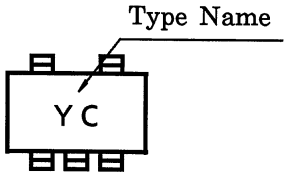
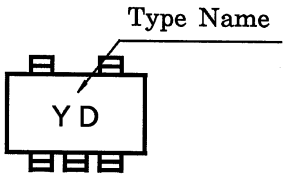
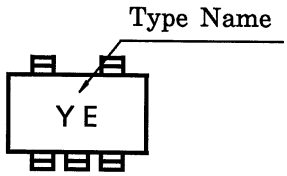
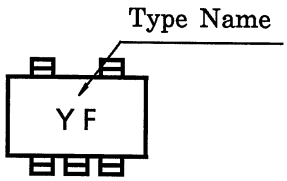
RN2505 h_{FE} – I_C



RN2506 h_{FE} – I_C



Marking

Type Name	Marking
RN2501	
RN2502	
RN2503	
RN2504	
RN2505	
RN2506	

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