

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

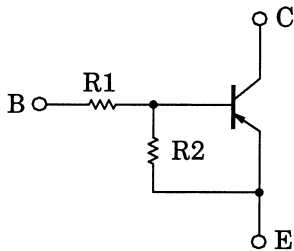
## RN2501,RN2502,RN2503 RN2504,RN2505,RN2506

Switching, Inverter Circuit, Interface Circuit  
and Driver Circuit Applications

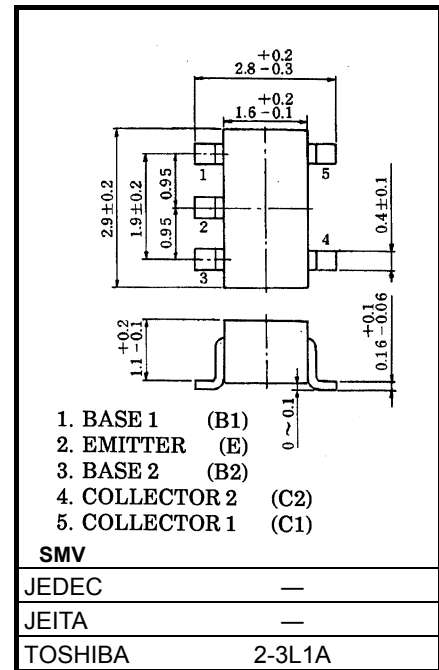
Unit: mm

- 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

### 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



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

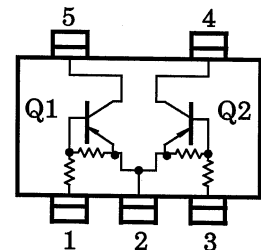
SMV	
JEDEC	—
JEITA	—
TOSHIBA	2-3L1A

Weight: 14 mg (typ.)

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

Characteristic	Symbol	Rating	Unit	
Collector-base voltage	RN2501 to 2506	$V_{CB0}$	-50	V
Collector-emitter voltage		$V_{CEO}$	-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		$T_j$	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.

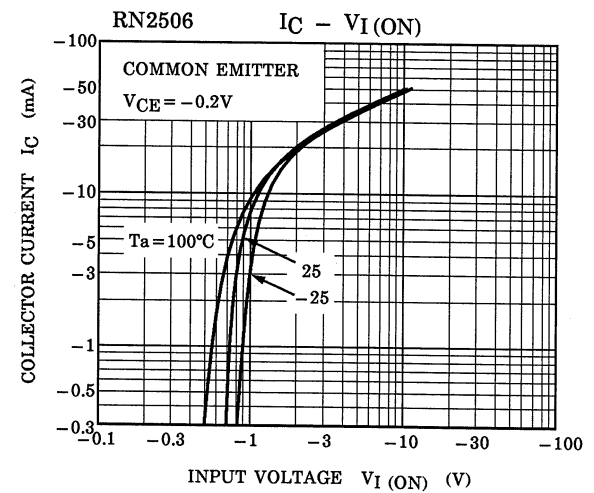
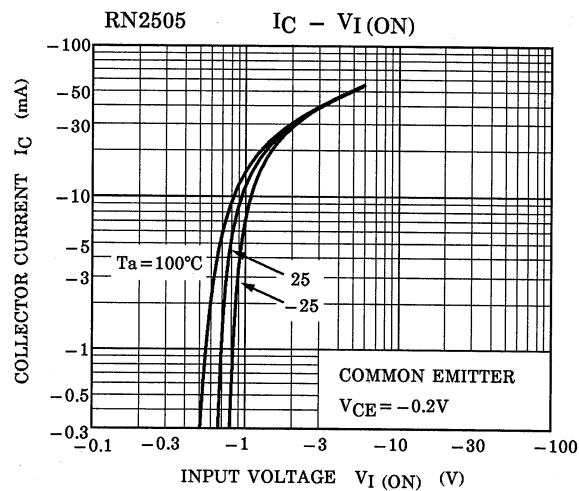
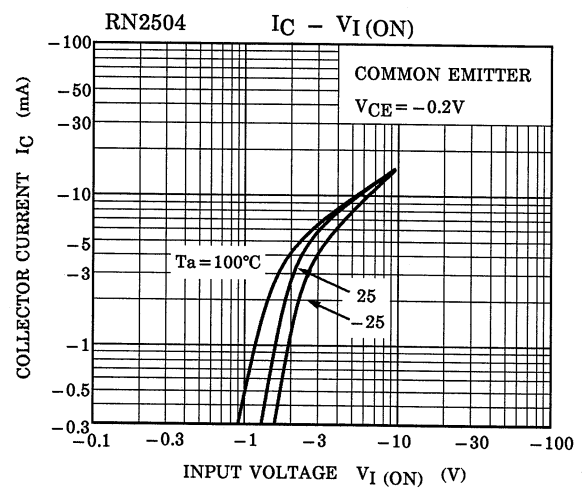
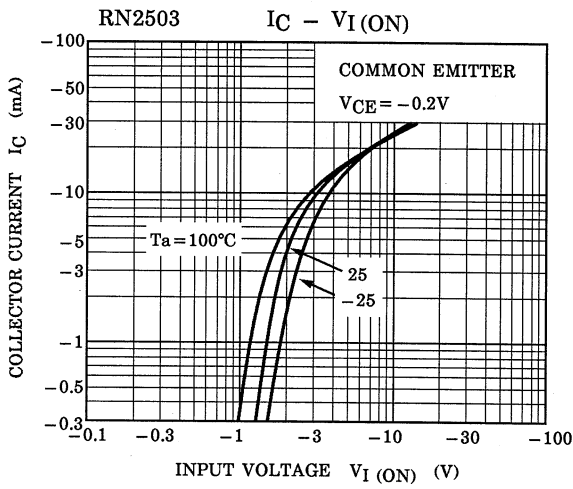
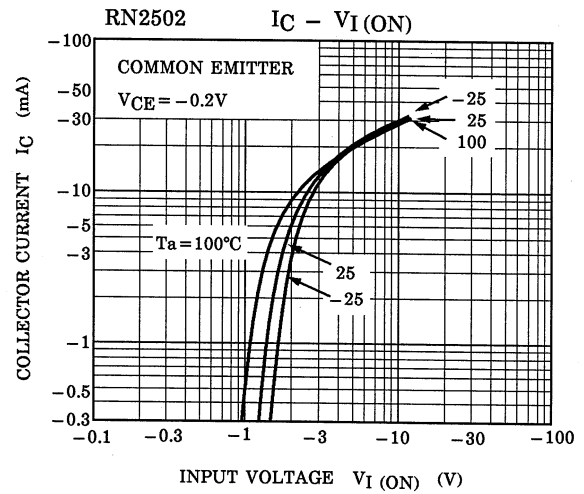
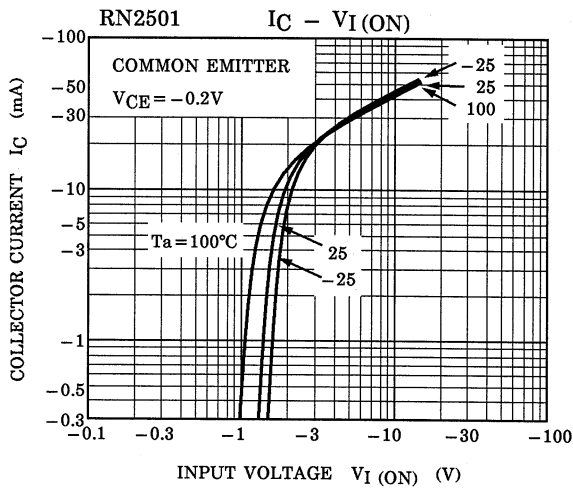
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

\*Total rating

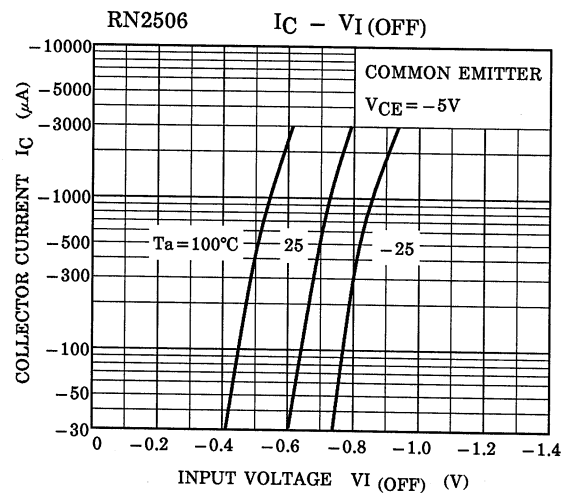
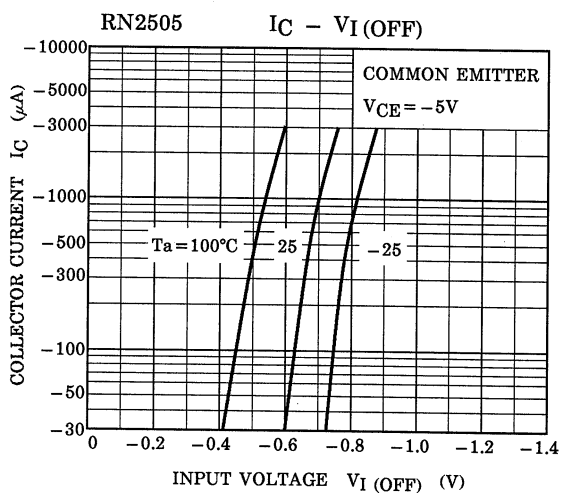
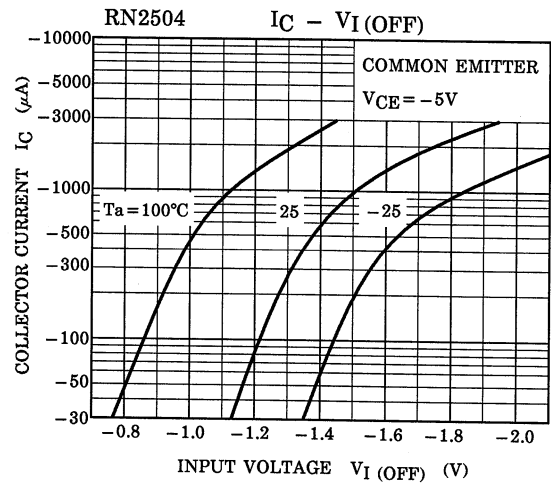
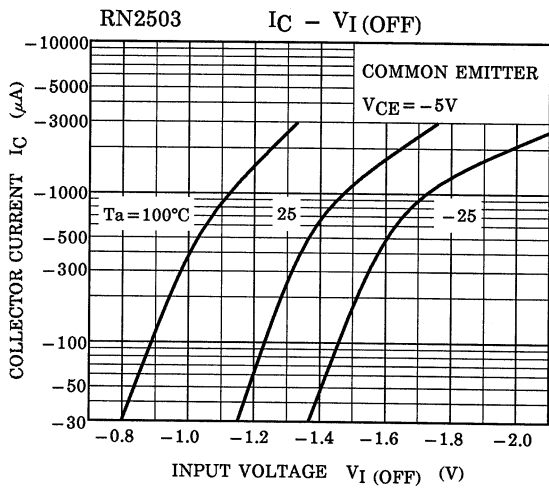
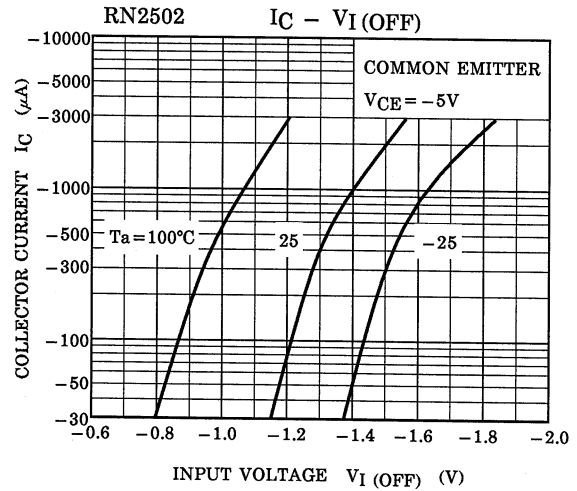
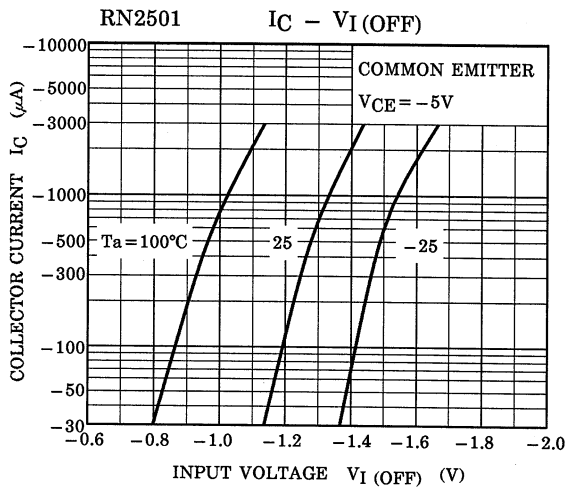
## Electrical Characteristics (Ta = 25°C) (Q1, Q2 Common)

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	

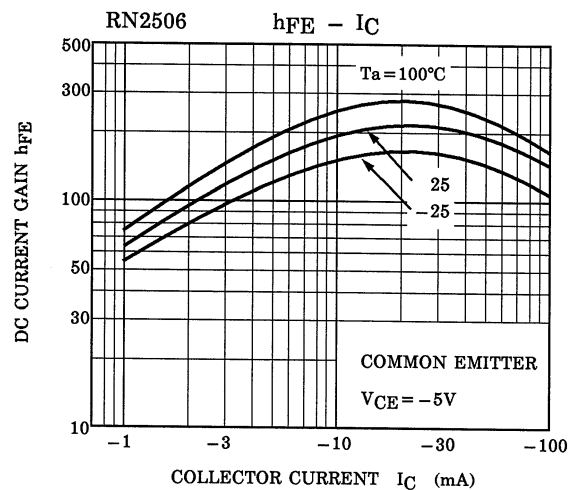
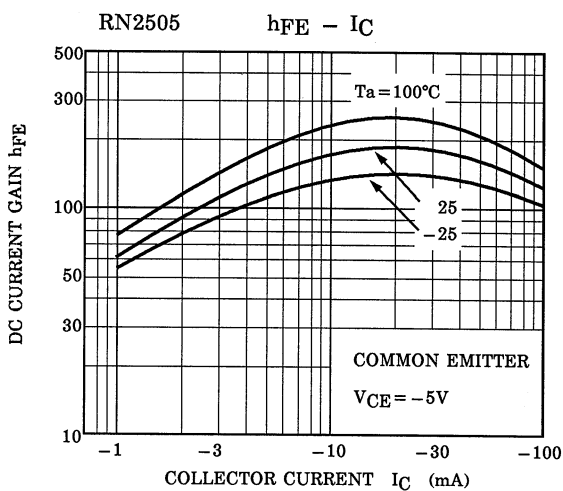
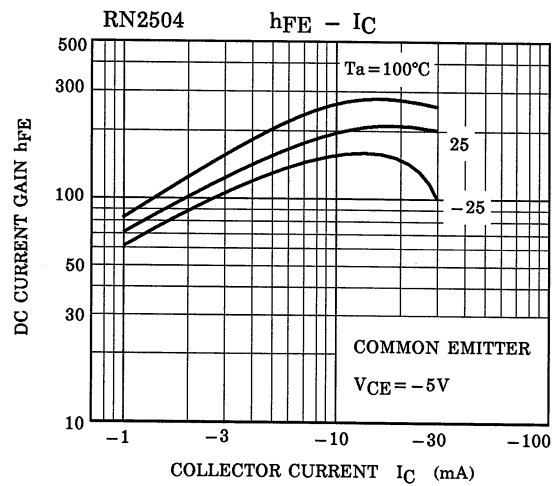
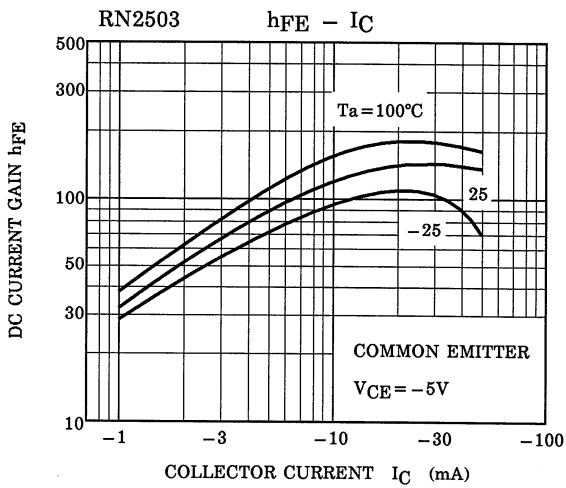
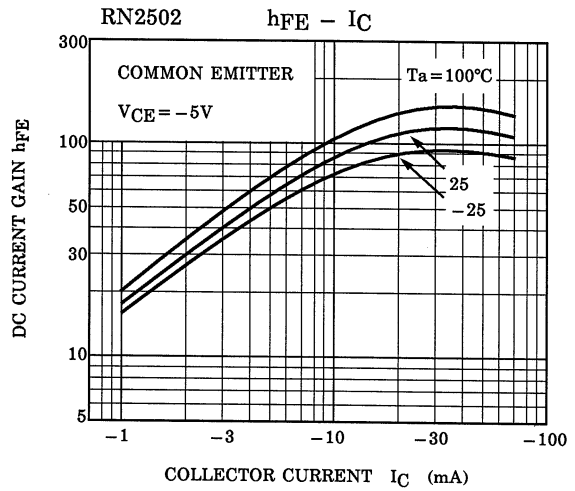
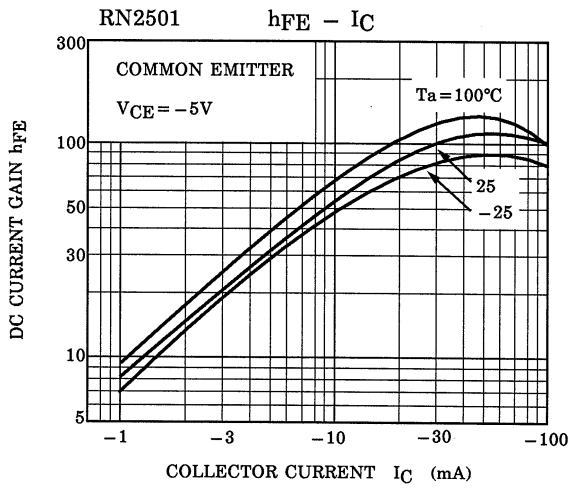
(Q1, Q2 Common)



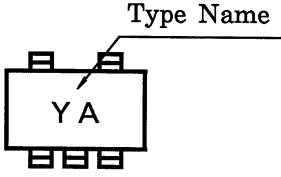
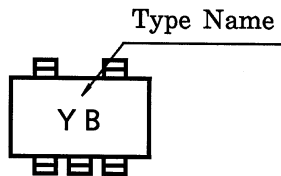
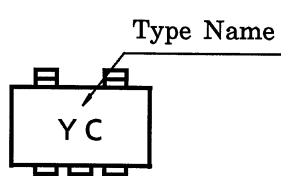
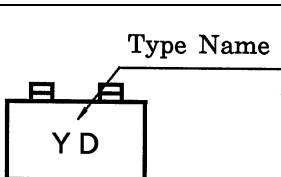
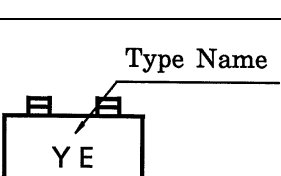
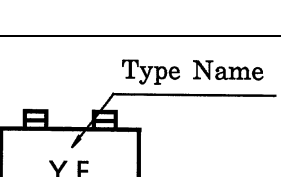
(Q1, Q2 Common)



(Q1, Q2 Common)



## Marking

Type Name	Marking
RN2501	
RN2502	
RN2503	
RN2504	
RN2505	
RN2506	

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