Bipolar Transistors Silicon NPN Epitaxial Type (PCT Process)(Bias Resistor built-in Transistor)

RN1907FE/08FE/09FE

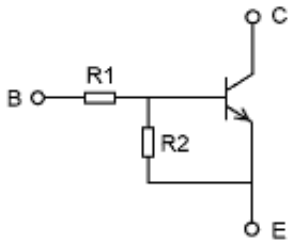
1. Applications

- Switching
- Inverter Circuits
- Interfacing
- Driver Circuits

2. Features

(1) AEC-Q101 qualified (Please see the orderable part number list)
(2) Small package (Dual type)
(3) The integrated bias resistor reduces the number of external parts required, making it possible to reduce system size and assembly time.
(4) Complementary to RN2907FE to RN2909FE

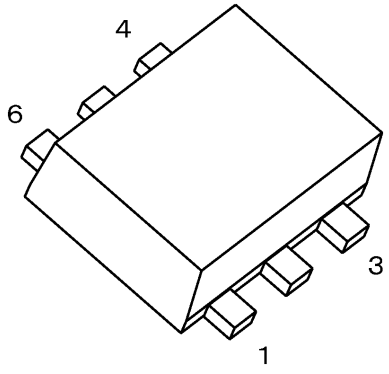
3. Equivalent Circuit



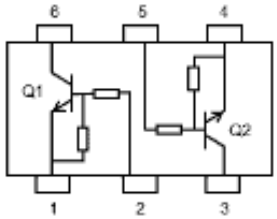
4. Bias Resistor Values

Part No.	R1 (kΩ)	R2 (kΩ)
RN1907FE	10	47
RN1908FE	22	47
RN1909FE	47	22

5. Packaging and Pin Assignment



ES6



1: Emitter1
2: Base1
3: Collector2
4: Emitter2
5: Base2
6: Collector1

Start of commercial production
2000-05

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6. Orderable part number

Orderable part number		AEC-Q101	Note
RN1907FE	RN1907FE,LF	—	General Use
	RN1907FE,LXGF	YES (Note 1)	Unintended Use (Note 1)
	RN1907FE,LXHF	YES	Automotive Use
RN1908FE	RN1908FE,LF	—	General Use
	RN1908FE,LXGF	YES (Note 1)	Unintended Use (Note 1)
	RN1908FE,LXHF	YES	Automotive Use
RN1909FE	RN1909FE,LF	—	General Use
	RN1909FE,LXGF	YES (Note 1)	Unintended Use (Note 1)
	RN1909FE,LXHF	YES	Automotive Use

Note 1: For more information, please contact our sales or use the inquiry form on our website.

7. Absolute Maximum Ratings (Note) (Unless otherwise specified, T_a = 25 °C) (Q1, Q2 Common)

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN1907FE to RN1909FE	V_{CBO}	50	V
Collector-emitter voltage		V_{CEO}	50	
Emitter-base voltage	RN1907FE	V_{EBO}	6	V
	RN1908FE		7	
	RN1909FE		15	
Collector current	RN1907FE to RN1909FE	I_C	100	mA
Collector power dissipation (Note 1)		P_C	100	mW
Junction temperature		T_j	150	°C
Storage temperature		T_{stg}	-55 to 150	

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).

Note 1: Total rating

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8. Electrical Characteristics (Unless otherwise specified, T_a = 25 °C) (Q1, Q2 Common)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1907FE to RN1909FE	I_{CBO}	V_{CB} = 50 V, I_E = 0 mA	—	—	100	nA
Collector cut-off current		I_{CEO}	V_{CE} = 50 V, I_B = 0 mA	—	—	500	
Emitter cut-off current	RN1907FE	I_{EBO}	V_{EB} = 6 V, I_C = 0 mA	0.081	—	0.15	mA
	RN1908FE		V_{EB} = 7 V, I_C = 0 mA	0.078	—	0.145	
	RN1909FE		V_{EB} = 15 V, I_C = 0 mA	0.167	—	0.311	
DC current gain	RN1907FE	h_{FE}	V_{CE} = 5 V, I_C = 10 mA	80	—	—	—
	RN1908FE			80	—	—	
	RN1909FE			70	—	—	
Collector-emitter saturation voltage	RN1907FE to RN1909FE	$V_{CE(sat)}$	I_C = 5 mA, I_B = 0.25 mA	—	0.1	0.3	V
Input voltage (ON)	RN1907FE	$V_{I(ON)}$	V_{CE} = 0.2 V, I_C = 5 mA	0.7	—	1.8	V
	RN1908FE			1.0	—	2.6	
	RN1909FE			2.2	—	5.8	
Input voltage (OFF)	RN1907FE	$V_{I(OFF)}$	V_{CE} = 5 V, I_C = 0.1 mA	0.5	—	1.0	V
	RN1908FE			0.6	—	1.16	
	RN1909FE			1.5	—	2.6	
Transition frequency	RN1907FE to RN1909FE	f_T	V_{CE} = 10 V, I_C = 5 mA	—	250	—	MHz
Collector output capacitance	RN1907FE to RN1909FE	C_{ob}	V_{CB} = 10 V, I_E = 0 mA, f = 1 MHz	—	3	6	pF
Input resistance	RN1907FE	R_1	-	7	10	13	kΩ
	RN1908FE			15.4	22	28.6	
	RN1909FE			32.9	47	61.1	
Resistor ratio	RN1907FE	R1/R2	-	0.191	0.213	0.232	—
	RN1908FE			0.421	0.468	0.515	
	RN1909FE			1.92	2.14	2.35	

9. Marking

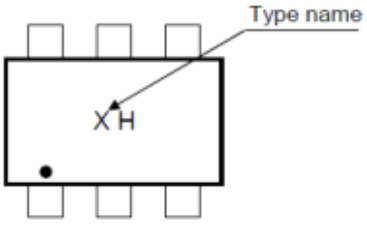


Fig. 9.1 Marking RN1907FE

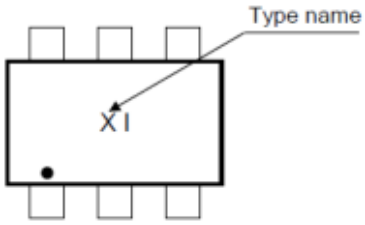


Fig. 9.2 Marking RN1908FE

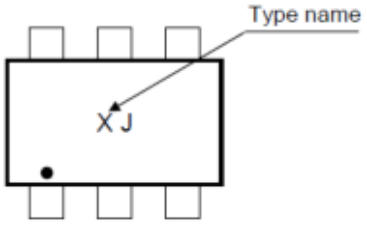


Fig. 9.3 Marking RN1909FE

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10. Characteristics Curves (Note)(Q1, Q2 Common)

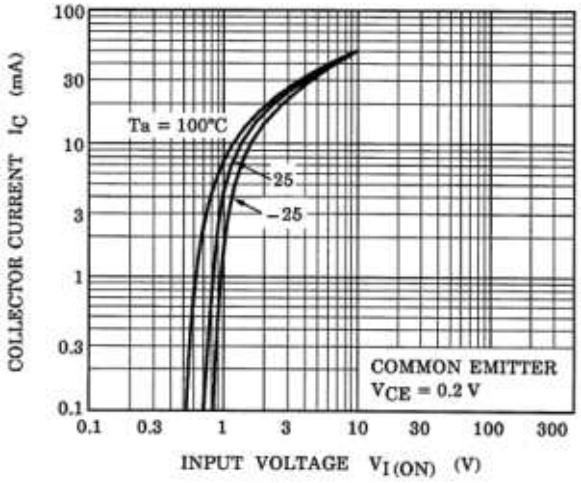


Fig. 10.1 RN1907FE I_C-$V_{I(ON)}$

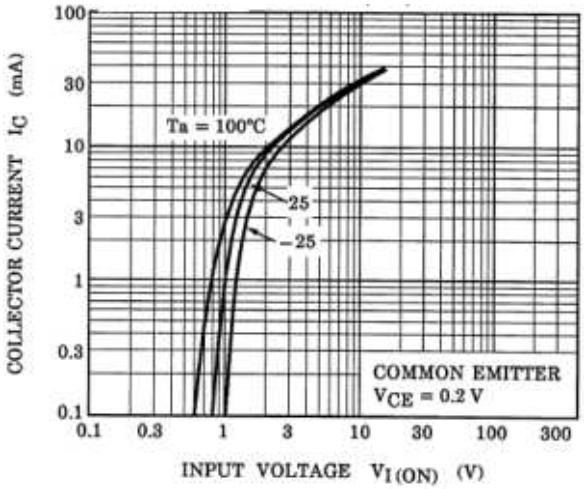


Fig. 10.2 RN1908FE I_C-$V_{I(ON)}$

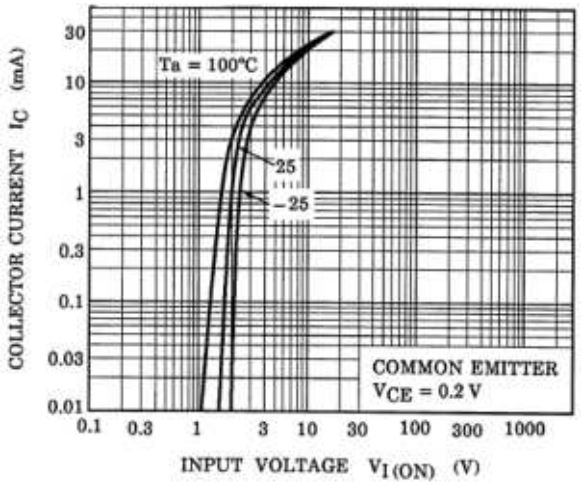


Fig. 10.3 RN1909FE I_C-$V_{I(ON)}$

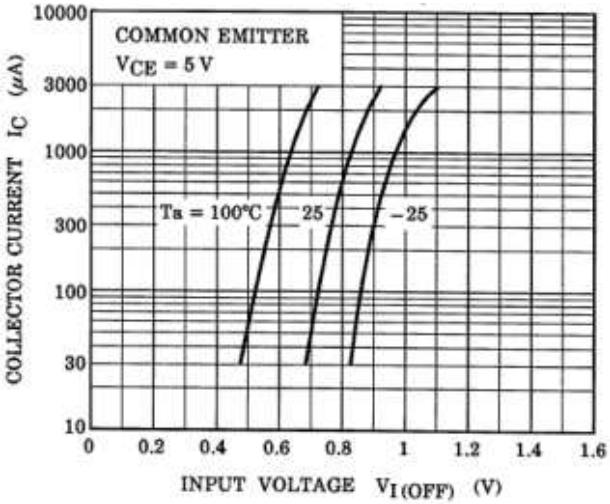


Fig. 10.4 RN1907FE I_C-$V_{I(OFF)}$

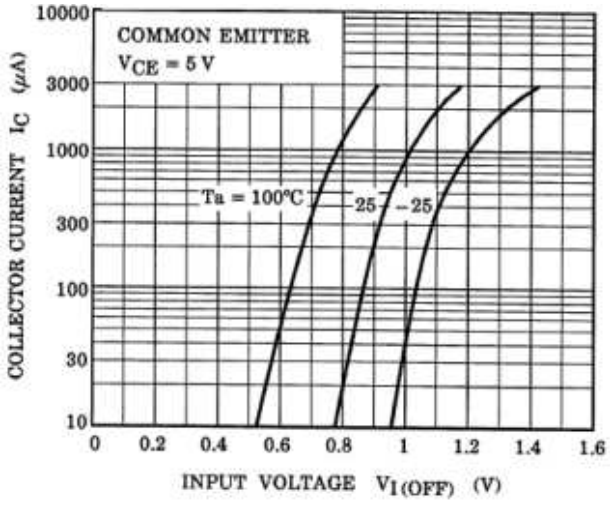


Fig. 10.5 RN1908FE I_C-$V_{I(OFF)}$

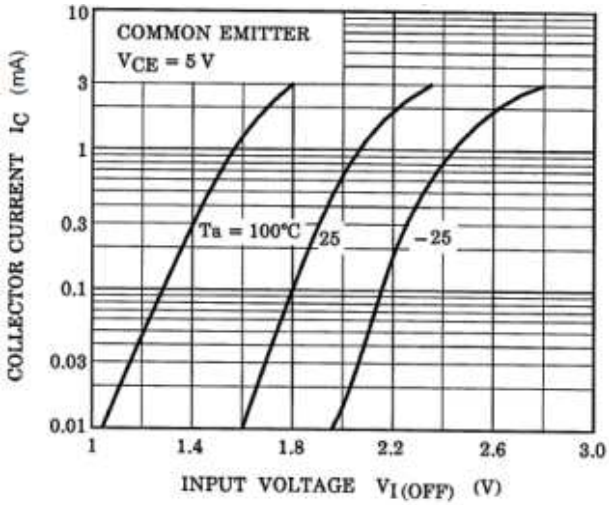


Fig. 10.6 RN1909FE I_C-$V_{I(OFF)}$

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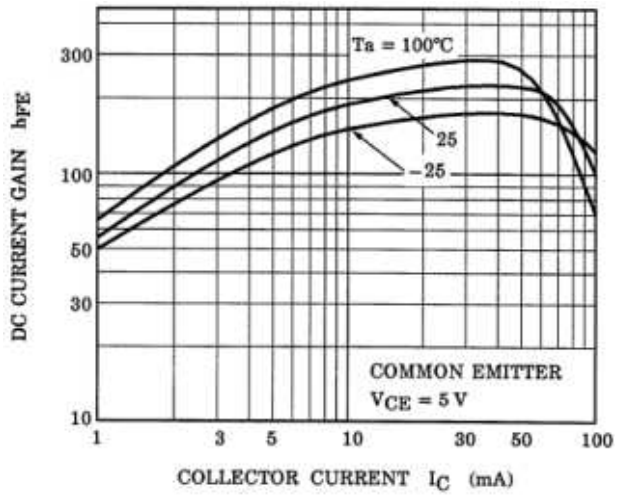


Fig. 10.7 RN1907FE h_{FE}-I_C

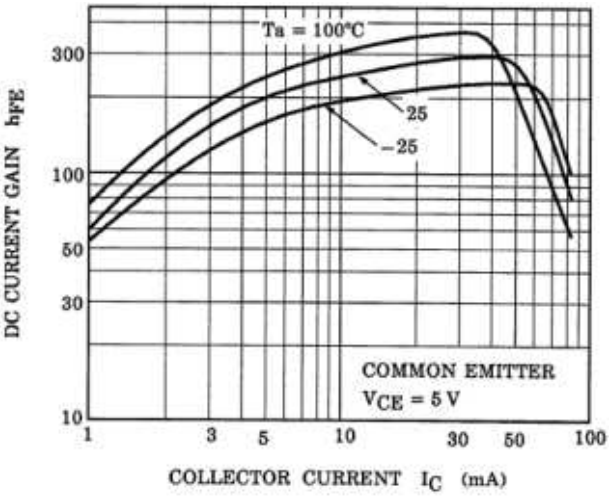


Fig. 10.8 RN1908FE h_{FE}-I_C

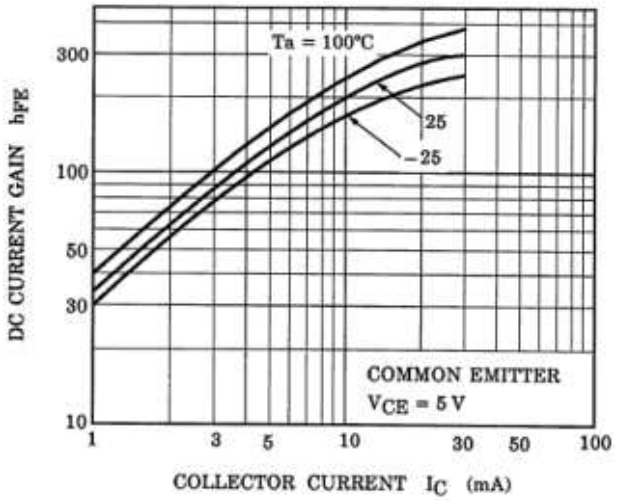


Fig. 10.9 RN1909FE h_{FE}-I_C

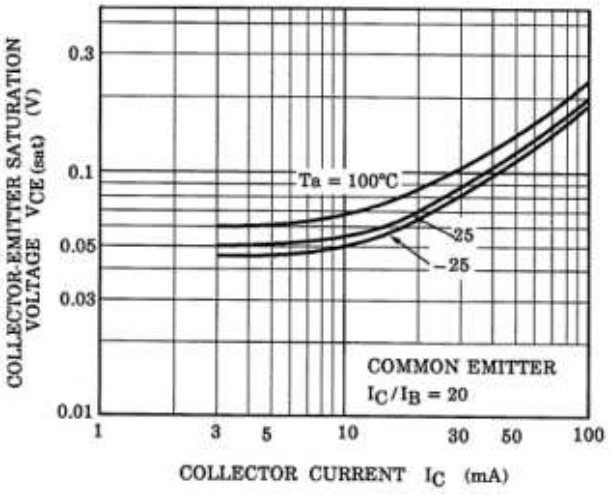


Fig. 10.10 RN1907FE $V_{CE(sat)}$-I_C

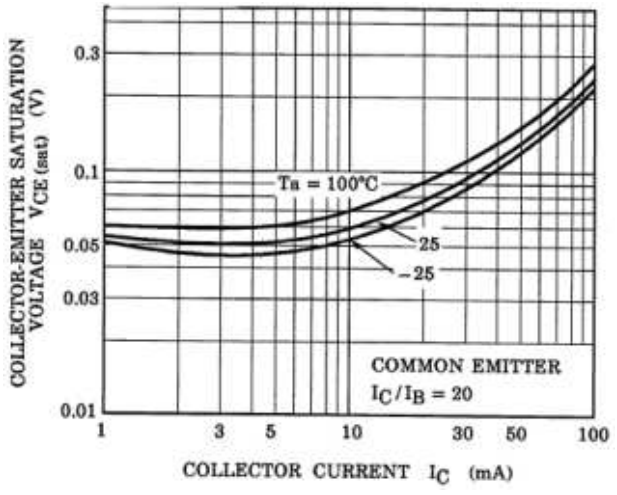


Fig. 10.11 RN1908FE $V_{CE(sat)}$-I_C

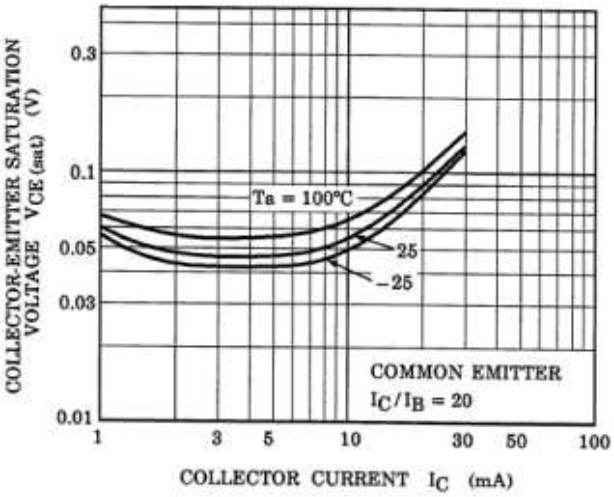


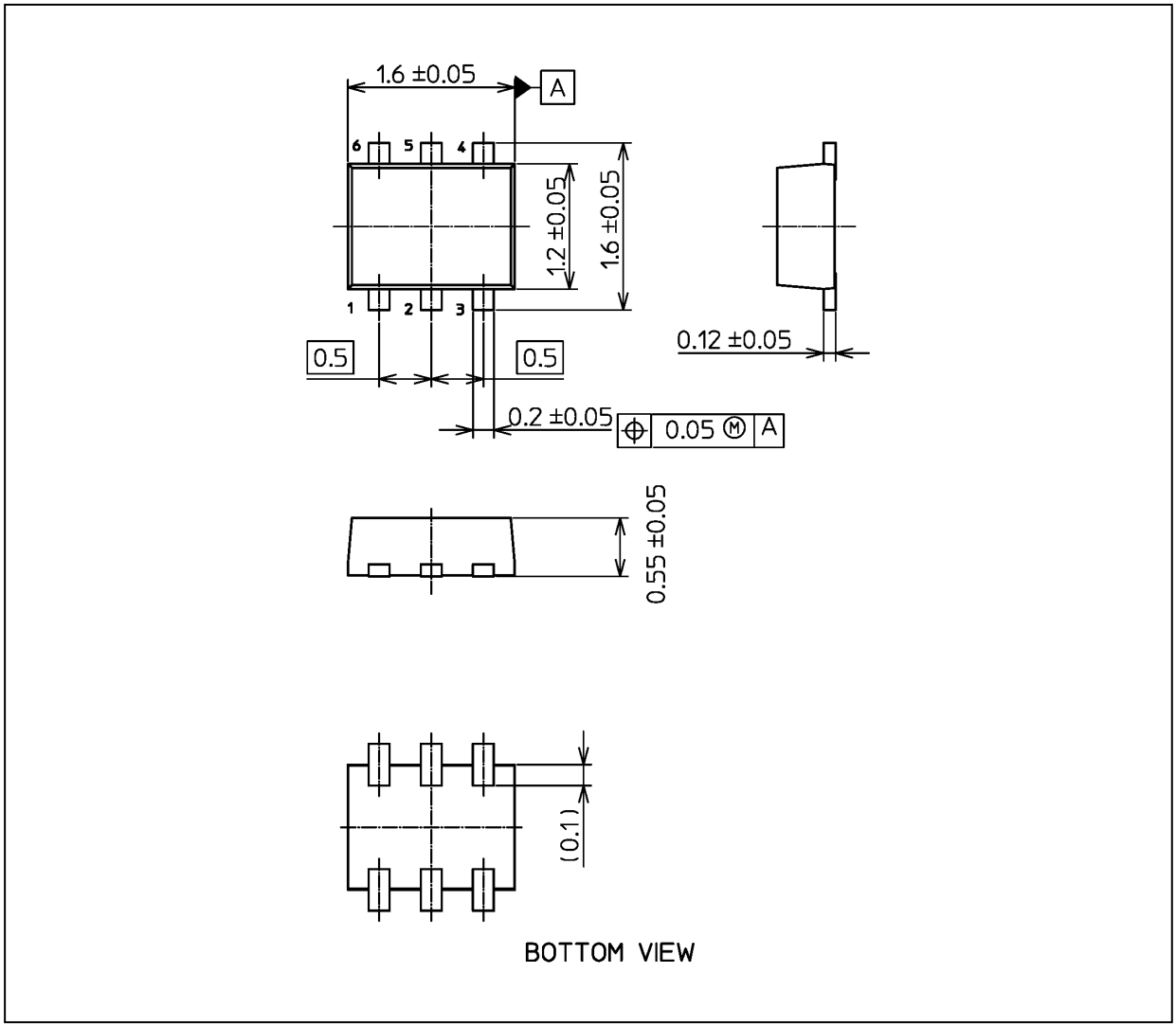
Fig. 10.12 RN1909FE $V_{CE(sat)}$-I_C

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

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Package Dimensions

Unit: mm



Weight: 3.0 mg (typ.)

Package Name(s)
Nickname: ES6

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