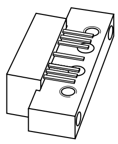


BGD902

860 MHz, 18.5 dB gain power doubler amplifier

Rev. 08 — 7 June 2007 **Product data sheet**

1. Product profile

1.1 General description

Hybrid amplifier module in a SOT115J package operating with a supply voltage of 24 V.

1.2 Features

- Excellent linearity
- Extremely low noise
- Excellent return loss properties
- Silicon nitride passivation
- Rugged construction
- Gold metallization ensures excellent reliability

1.3 Applications

- CATV systems operating in the 40 MHz to 900 MHz frequency range.

1.4 Quick reference data

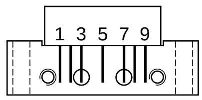
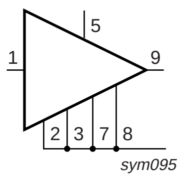
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
G_p	power gain	f = 50 MHz	18.2	18.5	18.8	dB
		f = 900 MHz	19	19.5	20	dB
I_{tot}	total current consumption (DC)	[1]	405	420	435	mA

[1] The module normally operates at V_B = 24 V, but is able to withstand supply transients up to 35 V.

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Symbol
1	input		
2, 3	common		
5	$+V_B$		
7, 8	common		
9	output		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BGD902	-	rectangular single-ended package; aluminium flange; 2 vertical mounting holes; 2 × 6-32 UNC and 2 extra horizontal mounting holes; 7 gold-plated in-line leads	SOT115J

4. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_B	supply voltage		-	30	V
V_i	RF input voltage		-	70	dBmV
T_{stg}	storage temperature		–40	+100	°C
T_{mb}	mounting base temperature		–20	+100	°C

5. Characteristics

Table 5. Characteristics

Bandwidth 40 MHz to 900 MHz; V_B = 24 V; T_{mb} = 35 °C; Z_S = Z_L = 75 Ω.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
G_p	power gain	f = 50 MHz	18.2	18.5	18.8	dB
		f = 900 MHz	19	19.5	20	dB
SL	slope cable equivalent	f = 40 MHz to 900 MHz	0.4	0.9	1.4	dB
FL	flatness of frequency response	f = 40 MHz to 900 MHz	-	±0.15	±0.3	dB
s_{11}	input return losses	f = 40 MHz to 80 MHz	21	23	-	dB
		f = 80 MHz to 160 MHz	22	24	-	dB
		f = 160 MHz to 320 MHz	21	24	-	dB
		f = 320 MHz to 550 MHz	18	23	-	dB
		f = 550 MHz to 650 MHz	17	23	-	dB
		f = 650 MHz to 750 MHz	16	24	-	dB
		f = 750 MHz to 900 MHz	16	26	-	dB
s_{22}	output return losses	f = 40 MHz to 80 MHz	25	32	-	dB
		f = 80 MHz to 160 MHz	23	31	-	dB
		f = 160 MHz to 320 MHz	20	29	-	dB
		f = 320 MHz to 550 MHz	20	28	-	dB
		f = 550 MHz to 650 MHz	19	31	-	dB
		f = 650 MHz to 750 MHz	18	29	-	dB
		f = 750 MHz to 900 MHz	17	22	-	dB

Table 5. Characteristics *...continued*
Bandwidth 40 MHz to 900 MHz; V_B = 24 V; T_{mb} = 35 °C; Z_S = Z_L = 75 Ω.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
s_{21}	phase response	f = 50 MHz		–45	-	+45	deg
CTB	composite triple beat	49 chs flat; V_o = 47 dBmV; f_m = 859.25 MHz		-	–68.5	–67	dB
		77 chs flat; V_o = 44 dBmV; f_m = 547.25 MHz		-	–70	–68	dB
		110 chs flat; V_o = 44 dBmV; f_m = 745.25 MHz		-	–63.5	–62	dB
		129 chs flat; V_o = 44 dBmV; f_m = 859.25 MHz		-	–60	–58	dB
		110 chs; f_m = 400 MHz; V_o = 49 dBmV at 550 MHz	[1]	-	–64	–62	dB
		129 chs; f_m = 650 MHz; V_o = 49.5 dBmV at 860 MHz	[2]	-	–58.5	–56.5	dB
X_{mod}	cross modulation	49 chs flat; V_o = 47 dBmV; f_m = 55.25 MHz		-	–66.5	–64	dB
		77 chs flat; V_o = 44 dBmV; f_m = 55.25 MHz		-	–69.5	–67	dB
		110 chs flat; V_o = 44 dBmV; f_m = 55.25 MHz		-	–66	–63.5	dB
		129 chs flat; V_o = 44 dBmV; f_m = 55.25 MHz		-	–64.5	–62	dB
		110 chs; f_m = 400 MHz; V_o = 49 dBmV at 550 MHz	[1]	-	–63	–60	dB
		129 chs; f_m = 860 MHz; V_o = 49.5 dBmV at 860 MHz	[2]	-	–61	–58	dB
CSO	composite second order distortion	49 chs flat; V_o = 47 dBmV; f_m = 860.5 MHz		-	–65	–62	dB
		77 chs flat; V_o = 44 dBmV; f_m = 548.5 MHz		-	–72	–67	dB
		110 chs flat; V_o = 44 dBmV; f_m = 746.5 MHz		-	–65	–60	dB
		129 chs flat; V_o = 44 dBmV; f_m = 860.5 MHz		-	–61	–58	dB
		110 chs; f_m = 250 MHz; V_o = 49 dBmV at 550 MHz	[1]	-	–67	–63	dB
		129 chs; f_m = 250 MHz; V_o = 49.5 dBmV at 860 MHz	[2]	-	–62	–58	dB
IMD2	second order distortion		[3]	-	–80	–74	dB
			[4]	-	–83	–77	dB
			[5]	-	–84	–78	dB
V_o	output voltage	IMD = –60 dB	[6]	64.5	66	-	dBmV
			[7]	65.5	67	-	dBmV
			[8]	67.5	69	-	dBmV
		CTB compression = 1 dB; 129 chs flat; f = 859.25 MHz		48.5	49.5	-	dBmV
		CSO compression = 1 dB; 129 chs flat; f = 860.5 MHz		50	53	-	dBmV
F	noise figure	f = 50 MHz		-	4.5	5	dB
		f = 550 MHz		-	5	5.5	dB
		f = 750 MHz		-	5.5	6.5	dB
		f = 900 MHz		-	6.5	8	dB
I_{tot}	total current consumption (DC)		[9]	405	420	435	mA

[1] Tilt = 9 dB (50 MHz to 550 MHz); tilt = 3.5 dB at –6 dB offset (550 MHz to 750 MHz).

[2] Tilt = 12.5 dB (50 MHz to 860 MHz).

[3] f_p = 55.25 MHz; V_p = 44 dBmV; f_q = 805.25 MHz; V_q = 44 dBmV; measured at $f_p + f_q$ = 860.5 MHz.

[4] f_p = 55.25 MHz; V_p = 44 dBmV; f_q = 691.25 MHz; V_q = 44 dBmV; measured at $f_p + f_q$ = 746.5 MHz.

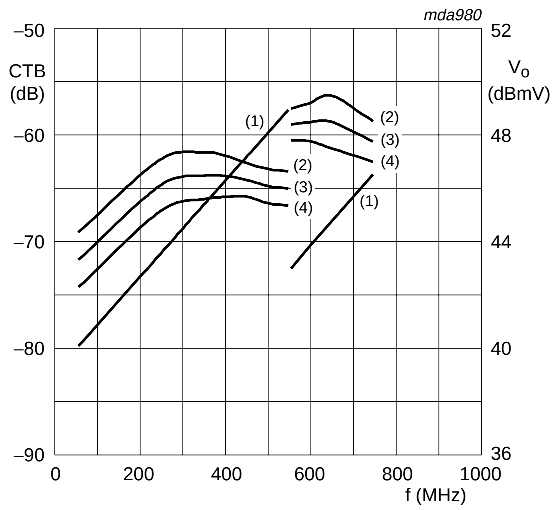
[5] f_p = 55.25 MHz; V_p = 44 dBmV; f_q = 493.25 MHz; V_q = 44 dBmV; measured at $f_p + f_q$ = 548.5 MHz.

[6] Measured according to DIN45004B: f_p = 851.25 MHz; $V_p = V_o$; f_q = 858.25 MHz; $V_q = V_o$ –6 dB; f_r = 860.25 MHz; $V_r = V_o$ –6 dB; measured at $f_p + f_q - f_r$ = 849.25 MHz.

[7] Measured according to DIN45004B: f_p = 740.25 MHz; $V_p = V_o$; f_q = 747.25 MHz; $V_q = V_o$ –6 dB; f_r = 749.25 MHz; $V_r = V_o$ –6 dB; measured at $f_p + f_q - f_r$ = 738.25 MHz.

[8] Measured according to DIN45004B: f_p = 540.25 MHz; $V_p = V_o$; f_q = 547.25 MHz; $V_q = V_o$ –6 dB; f_r = 549.25 MHz; $V_r = V_o$ –6 dB; measured at $f_p + f_q - f_r$ = 538.25 MHz.

[9] The module normally operates at V_B = 24 V, but is able to withstand supply transients up to 35 V.



$Z_S = Z_L$ = 75 Ω; V_B = 24 V; 110 chs; tilt = 9 dB (50 MHz to 550 MHz); tilt = 3.5 dB at –6 dB offset (550 MHz to 750 MHz).

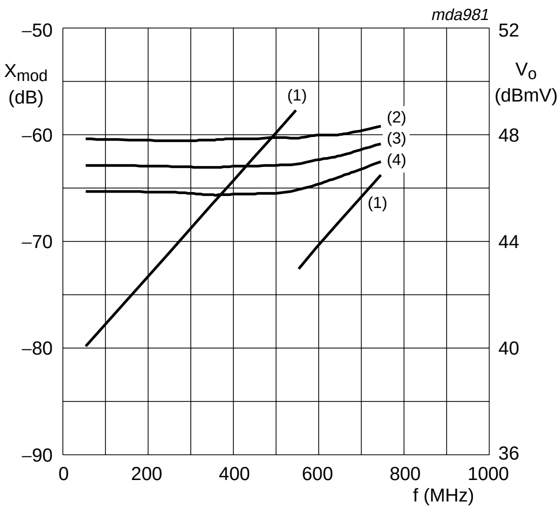
(1) V_o.

(2) Typ. +3 σ.

(3) Typ.

(4) Typ. –3 σ.

Fig 1. Composite triple beat as a function of frequency under tilted conditions



$Z_S = Z_L$ = 75 Ω; V_B = 24 V; 110 chs; tilt = 9 dB (50 MHz to 550 MHz); tilt = 3.5 dB at –6 dB offset (550 MHz to 750 MHz).

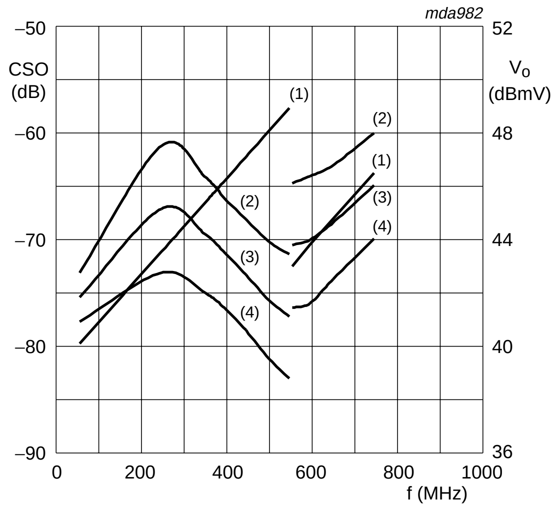
(1) V_o.

(2) Typ. +3 σ.

(3) Typ.

(4) Typ. –3 σ.

Fig 2. Cross modulation as a function of frequency under tilted conditions



$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 110 chs; tilt = 9 dB (50 MHz to 550 MHz); tilt = 3.5 dB at −6 dB offset (550 MHz to 750 MHz).

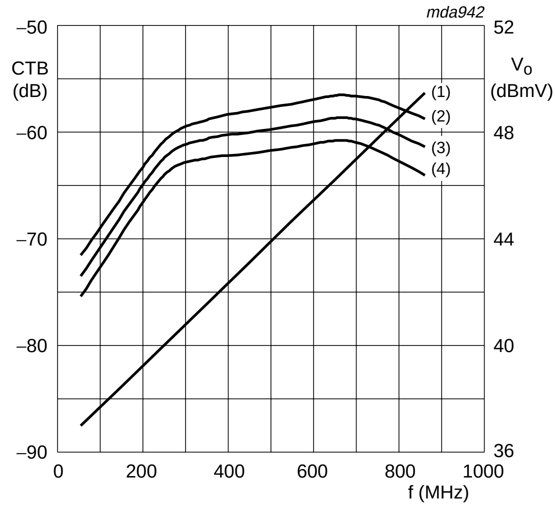
(1) V_o.

(2) Typ. +3 σ.

(3) Typ.

(4) Typ. −3 σ.

Fig 3. Composite second order distortion as a function of frequency under tilted conditions



$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 129 chs; tilt = 12.5 dB (50 MHz to 860 MHz).

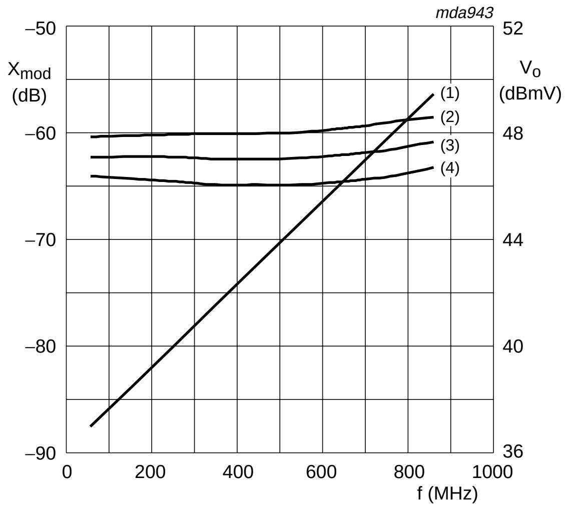
(1) V_o.

(2) Typ. +3 σ.

(3) Typ.

(4) Typ. −3 σ.

Fig 4. Composite triple beat as a function of frequency under tilted conditions



$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 129 chs; tilt = 12.5 dB (50 MHz to 860 MHz).

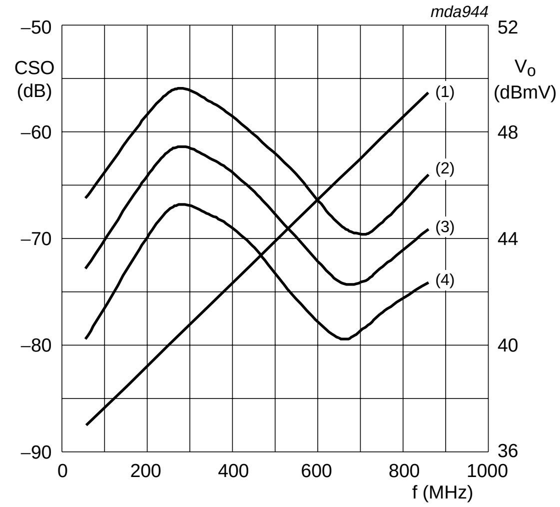
(1) V_o.

(2) Typ. +3 σ.

(3) Typ.

(4) Typ. −3 σ.

Fig 5. Cross modulation as a function of frequency under tilted conditions



$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 129 chs; tilt = 12.5 dB (50 MHz to 860 MHz).

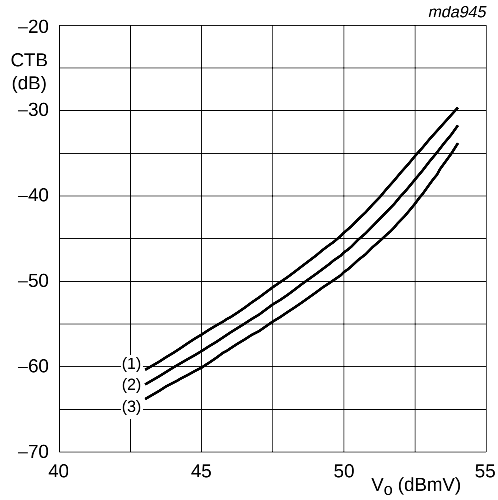
(1) V_o.

(2) Typ. +3 σ.

(3) Typ.

(4) Typ. −3 σ.

Fig 6. Composite second order distortion as a function of frequency under tilted conditions



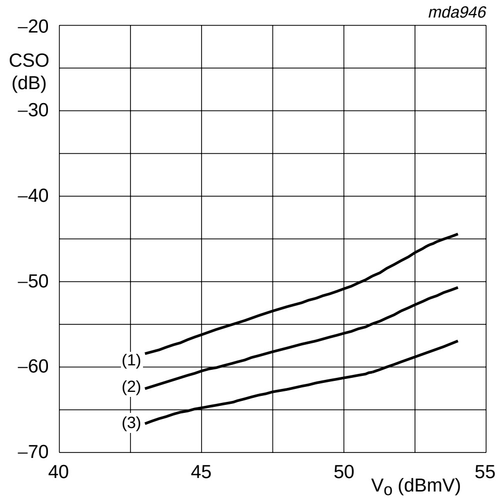
$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 129 chs; $f_m = 859.25$ MHz.

(1) Typ. +3 σ.

(2) Typ.

(3) Typ. −3 σ.

Fig 7. Composite triple beat as a function of output voltage



$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 129 chs; $f_m = 860.5$ MHz.

(1) Typ. +3 σ.

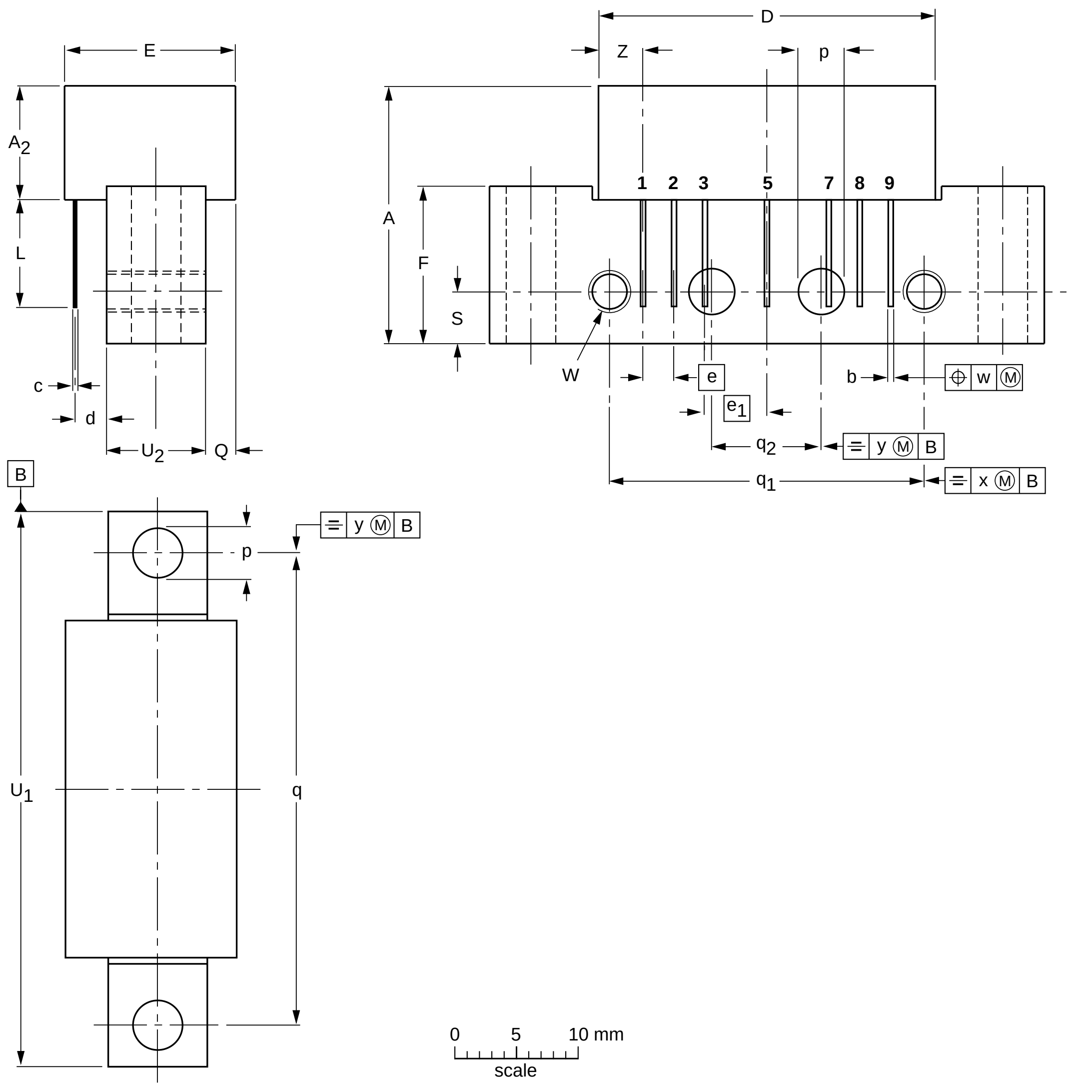
(2) Typ.

(3) Typ. −3 σ.

Fig 8. Composite second order distortion as a function of output voltage

6. Package outline

Rectangular single-ended package; aluminium flange; 2 vertical mounting holes; 2 x 6-32 UNC and 2 extra horizontal mounting holes; 7 gold-plated in-line leads **SOT115J**



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_2 max.	b	c	D max.	d max.	E max.	e	e_1	F	L min.	p	Q max.	q	q_1	q_2	S	U_1	U_2	W	w	x	y	Z max.
mm	20.8	9.1	0.51 0.38	0.25	27.2	2.54	13.75	2.54	5.08	12.7	8.8	4.15 3.85	2.4	38.1	25.4	10.2	4.2	44.75 44.25	8.2 7.8	6-32 UNC	0.25	0.7	0.1	3.8

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT115J						~~99-02-06~~ 04-02-04

Fig 9. Package outline SOT115J

7. Revision history

Table 6. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BGD902_8	20070607	Product data sheet		BGD902_7
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Table 5 “Characteristics”: updated values of s_{11} and s_{22}.			
BGD902_7	20050308	Product data sheet		BGD902_902MI_6
BGD902_902MI_6	20011102	Product specification		BGD902_902MI_5
BGD902_902MI_5	19990329	Product specification		BGD902_N_3 and BGD902MI_N_1
BGD902_N_3	19980709	Preliminary specification		BGD902_N_2
BGD902_N_2	19980609	Preliminary specification		BGD902_1
BGD902_1	19980312	Preliminary specification		-
BGD902MI_N_1	19980831	Preliminary specification		-

8. Legal information

8.1 Data sheet status

Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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10. Contents

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