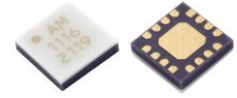


AM1116 – Amplifier

20 MHz to 6 GHz Gain Block

Description

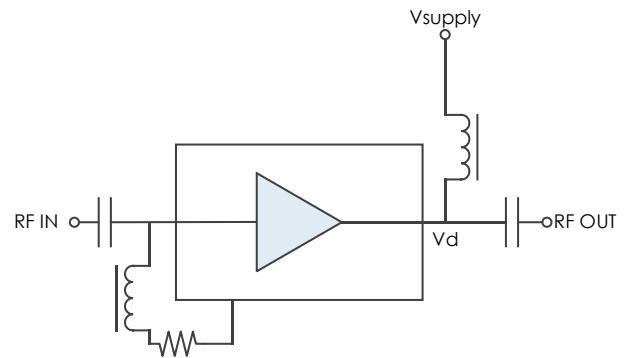
AM1116 is a high dynamic range gain block covering the 20 MHz to 6 GHz frequency range. The device exhibits flat gain, low noise figure and high third order intercept performance while also providing excellent gain stability over the operating temperature range. With internal 50 ohm matching and packaged in a 3mm QFN, the AM1116 represents a compact total PCB footprint.



Features

- 15 dB Gain
- 2 dB Noise Figure
- +17 dBm P1dB
- +31 dBm OIP3
- +3.3V Operation
- 168 mW Power Consumption
- 3mm QFN, or 1.3mm x 2mm DFN
- -40C to +85C Operation
- Unconditionally Stable

Functional Diagram



Characteristic Performance

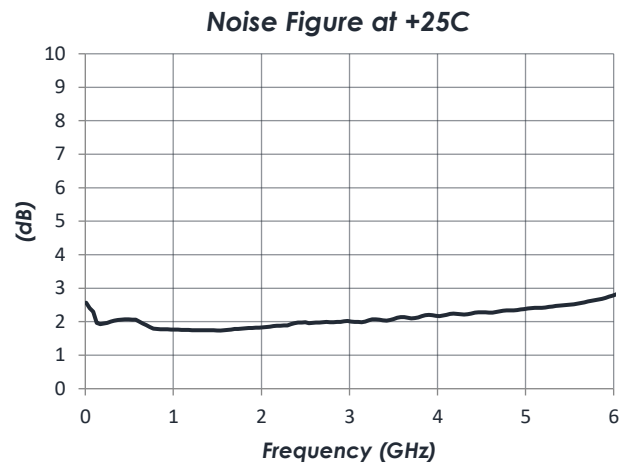
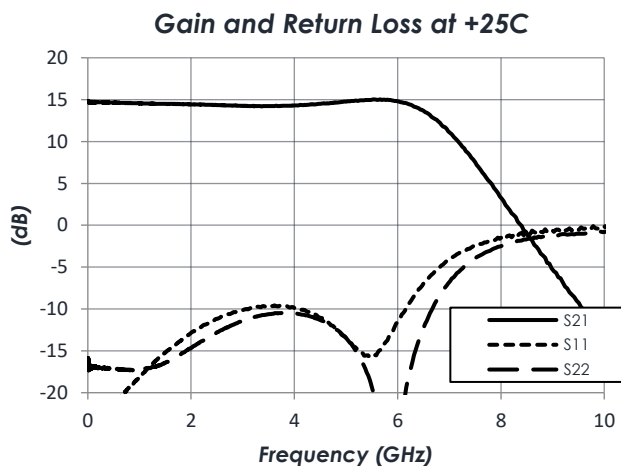


Table of Contents

Description	1	Recommended Operating Conditions ...	5
Features	1	Thermal Information	5
Functional Diagram	1	DC Electrical Characteristics.....	6
Characteristic Performance	1	RF Performance	6
Revision History	2	Typical Performance	7
Pin Layout and Definitions	3	Typical Application	9
Pin Layout and Definitions (continued)	4	Evaluation PC Board	10
Specifications	5	Related Parts	10
Absolute Maximum Ratings.....	5	Component Compliance Information	11
Handling Information	5		

Revision History

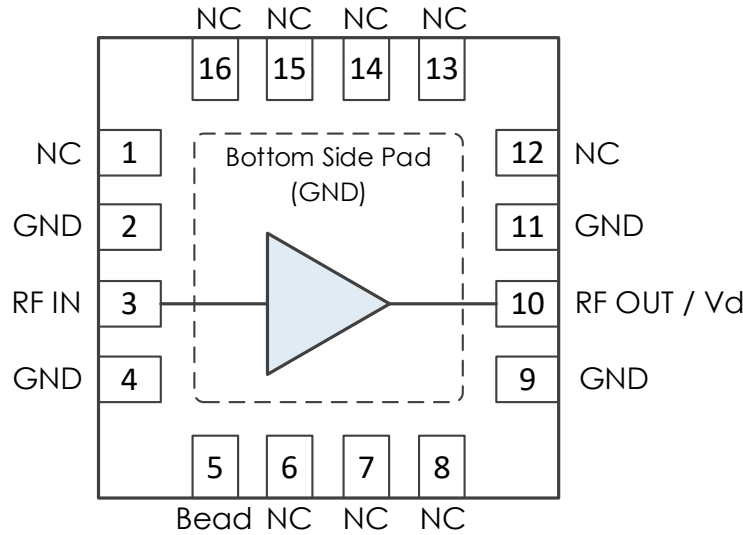
Date	Revision Number	Notes
October 25, 2021	1	Initial Release
December 16, 2021	2	Updated format, added DFN package

AM1116 – Amplifier

20 MHz to 6 GHz Gain Block

Pin Layout and Definitions

AM1116-1: 3mm QFN

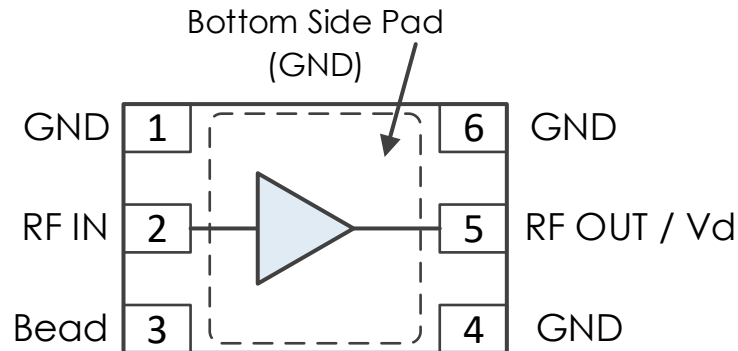


Pin Number	Pin Name	Pin Function
1	NC	Not Connected*
2	GND	Ground - Common
3	RF IN	RF Input – 50 Ohms – DC Coupled. External DC Blocking Capacitor Required
4	GND	Ground - Common
5	Bead	Connect to RF IN through external ferrite bead or large inductor in series with a 32.4-ohm resistor.
6-8	NC	Not Connected*
9	GND	Ground - Common
10	RF OUT / Vd	RF Output and DC Power Input – 50 Ohms – DC Coupled. External DC Blocking Capacitor Required
11	GND	Ground - Common
12-16	NC	Not Connected*

*NC Pins may be grounded or left open

Pin Layout and Definitions (continued)

AM1116-2: 2mm DFN



Pin Number	Pin Name	Pin Function
1	GND	Ground – Common
2	RF In	RF Input – 50 Ohms – DC Coupled. External DC Blocking Capacitor Required
3	Bead	Connect to RF IN through external ferrite bead or large inductor in series with a 32.4-ohm resistor.
4	GND	Ground – Common
5	RF Out	RF Output – 50 Ohms – DC Coupled. External DC Blocking Capacitor Required
6	GND	Ground – Common

AM1116 – Amplifier

20 MHz to 6 GHz Gain Block

Specifications

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	-0.3 V	+3.5 V
RF Input Power		+20 dBm
Operating Junction Temperature	-40 C	+150 C
Storage Temperature Range	-55 C	+150 C

Note: Any device operation beyond the Absolute Maximum Ratings may result in permanent damage to the device. The values listed in this table are extremes and do not imply functional operation of the device at these or any other conditions beyond what is listed under Recommended Operating Conditions. Any part subjected to conditions outside of what is recommended for an extended amount of time may suffer from reliability concerns.

Handling Information

	Minimum	Maximum
Moisture Sensitivity Level (-1 package)	MSL 1	
(-2 package)	MSL 3	
ESD classification (HBM, survivable)	Class 1a	



Atlanta Micro products are electrostatic sensitive.
Follow safe handling practices to avoid damage

Recommended Operating Conditions

	Minimum	Typical	Maximum
Supply Voltage	+3.0 V	+3.3 V	+3.5 V
Operating Case Temperature	-40 C		+85 C
Operating Junction Temperature	-40 C		+125 C

Thermal Information

Junction to Case Thermal Resistance (θ_{JC})	234 C/W
Nominal junction temperature at +85degC	+125 C
Channel Temperature to maintain 1 million hour MTF	+175 C

AM1116 – Amplifier

20 MHz to 6 GHz Gain Block

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Parameter	Testing Conditions	Minimum	Typical	Maximum
DC Supply Voltage			+3.3 V	
DC Supply Current	VDD = +3.3 V		51 mA	
Power Dissipated	VDD = +3.3 V		168 mW	

RF Performance

(T = 25 °C unless otherwise specified)

Parameter	Testing Conditions	Minimum	Typical	Maximum
Frequency Range		0.02 GHz		6.0 GHz
Gain	f = 3 GHz		14.5 dB	
Return Loss	f = 3 GHz		-10 dB	
Output IP2	f = 3 GHz, Sum Spur		+37 dBm	
	f = 3 GHz, Difference Spur		+40 dBm	
Output IP3	f = 3 GHz		+30 dBm	
Output P1dB	f = 3 GHz		+17 dBm	
Noise Figure	f = 3 GHz		2.0 dB	

Notes:

1. OIP3 measured with 10 MHz tone spacing
2. OIP2 characterized with sum and difference measurements
 - a. OIP2 sum measured with 10 MHz tone spacing. IM2 measured at $f_1 + f_2$
 - b. OIP2 difference measured with tones at f_1 and $f_2 = 2f_1 + 10MHz$. IM2 measured at $f_1 - f_2$

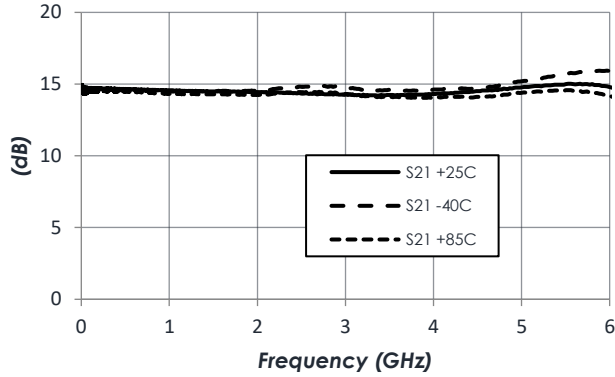
AM1116 – Amplifier

20 MHz to 6 GHz Gain Block

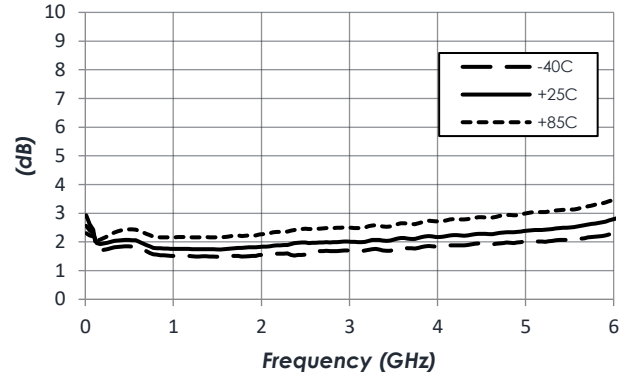
Typical Performance

(VDD=3.3V, T = 25 °C unless otherwise specified)

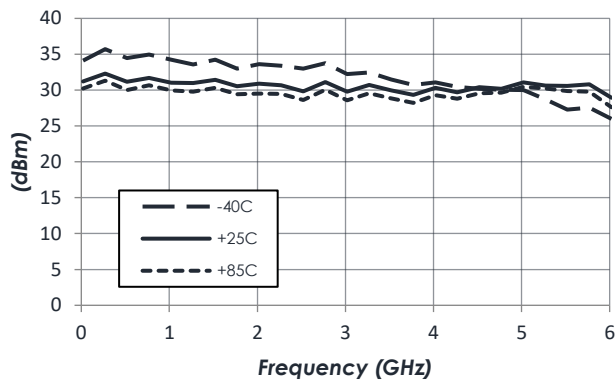
Gain vs Temperature



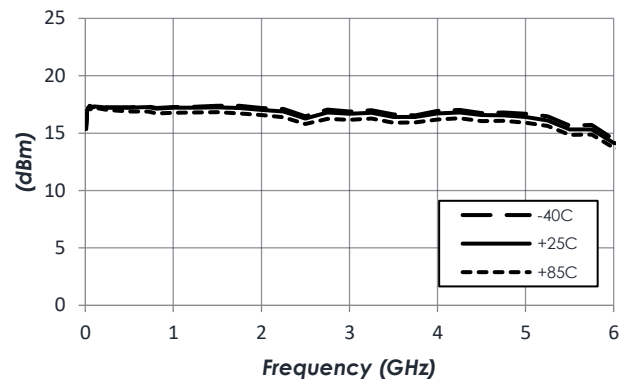
Noise Figure vs Temperature



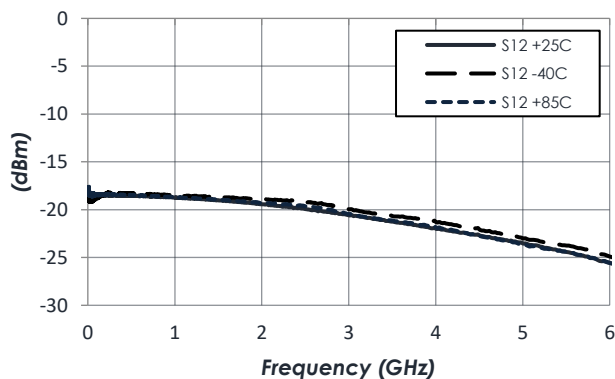
Output IP3 vs Temperature



P1dB vs Temperature



Reverse Isolation vs Temperature

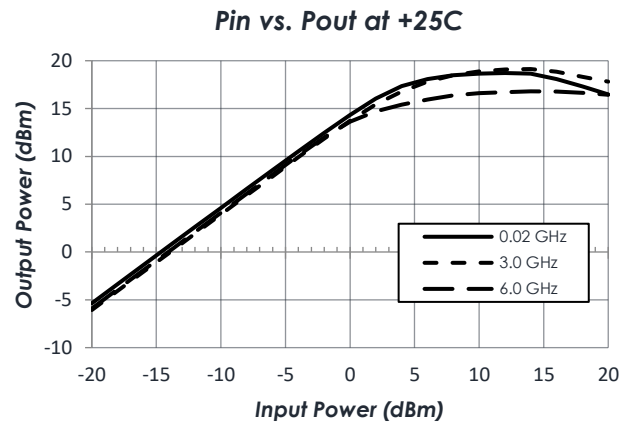
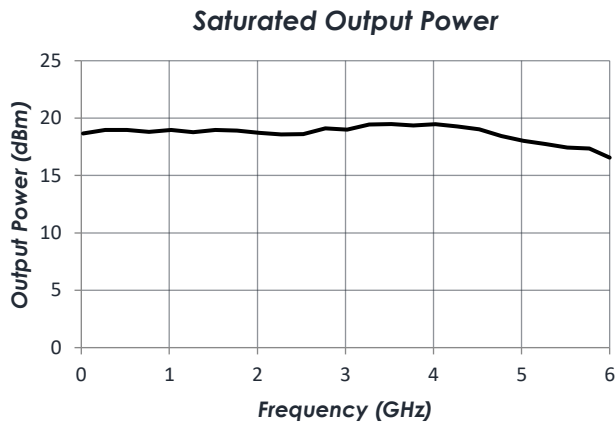
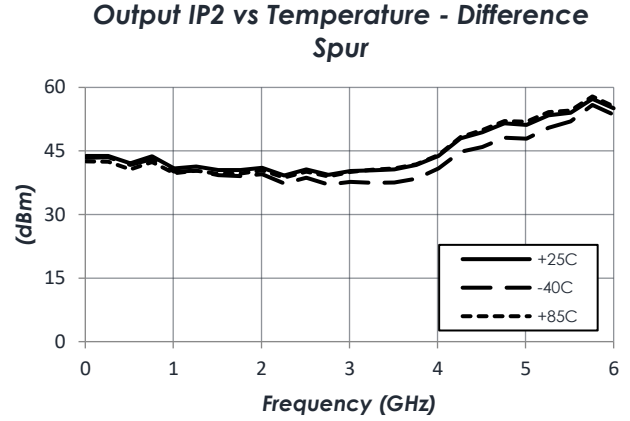
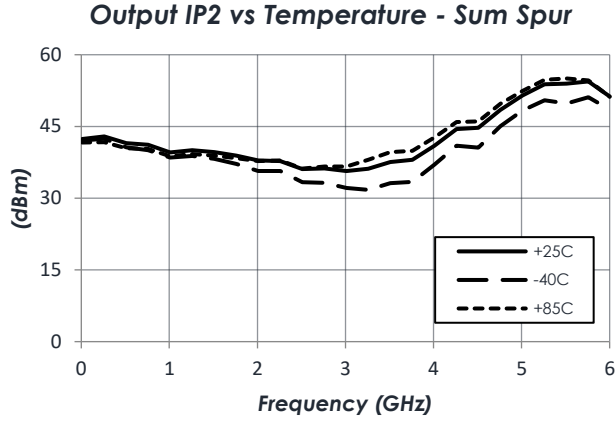


AM1116 – Amplifier

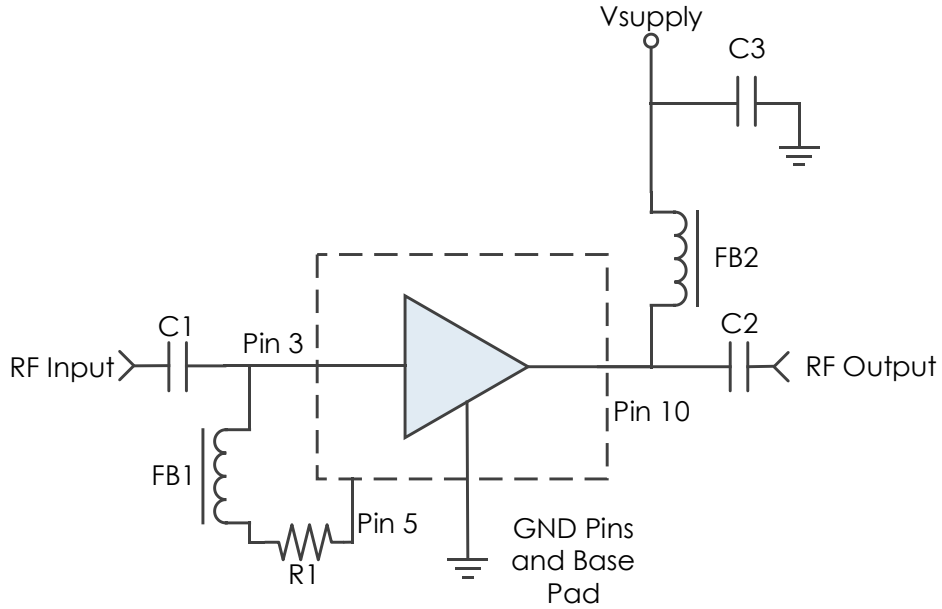
20 MHz to 6 GHz Gain Block

Typical Performance (continued)

(VDD=3.3V, T = 25 °C unless otherwise specified)



Typical Application



Recommended Component List (or equivalent):

Part	Value	Part Number	Manufacturer
C1, C2	0.1 μ F	0201BB104KW160	Passives Plus
C3	0.1 μ F	GRM155R71C104KA88	Murata
FB1, FB2	-	MMZ1005A222E	TDK
R1	32.4 Ω	RC0402FR-0732R4L	Yageo

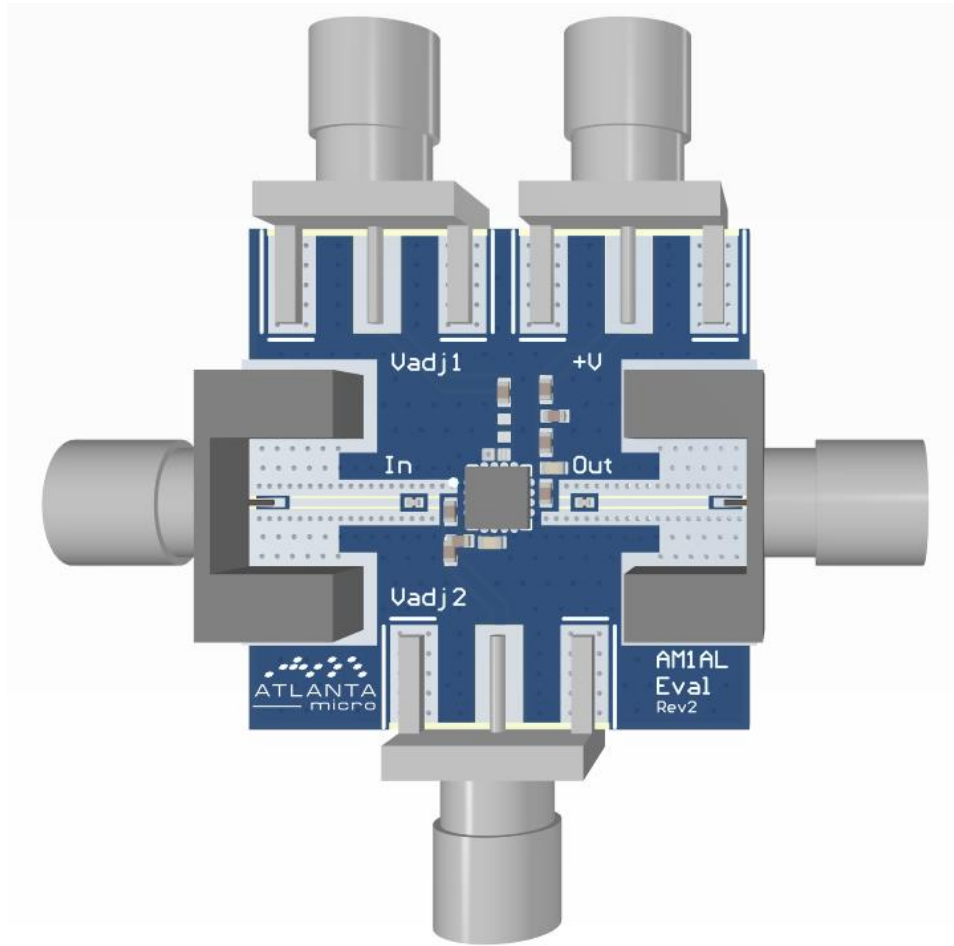
Notes:

1. DC blocking capacitors should be high performance, low-loss, broadband capacitors for optimum performance.
2. R1 is required for optimum performance.

AM1116 – Amplifier

20 MHz to 6 GHz Gain Block

Evaluation PC Board



Related Parts

Part Number				Description
AM1016	20 MHz	to	6 GHz	Low Noise Gain Block, +3.3 V
AM1018	20 MHz	to	6 GHz	Low Noise Gain Block, +3.3 V
AM1127	20 MHz	to	6 GHz	Driver Amplifier, +6 V

Component Compliance Information

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Substance List	Allowable Maximum Concentration
Lead (Pb)	<1000 PPM (0.1% by weight)
Mercury (Hg)	<1000 PPM (0.1% by weight)
Cadmium (Cd)	<75 PPM (0.0075% by weight)
Hexavalent Chromium (CrVI)	<1000 PPM (0.1% by weight)
Polybrominated Biphenyls (PBB)	<1000 PPM (0.1% by weight)
Polybrominated Diphenyl ethers (PBDE)	<1000 PPM (0.1% by weight)
Decabromodiphenyl Deca BDE	<1000 PPM (0.1% by weight)
Bis (2-ethylhexyl) Phthalate (DEHP)	<1000 PPM (0.1% by weight)
Butyl Benzyl Phthalate (BBP)	<1000 PPM (0.1% by weight)
Dibutyl Phthalate (DBP)	<1000 PPM (0.1% by weight)
Diisobutyl Phthalate (DIBP)	<1000 PPM (0.1% by weight)

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