

The Big Deal:

- Ultra Flat Gain Response:
± 0.2 dB over 1200-1600 MHz
- Excellent Combination of gain, P1dB, IP3 and NF
- 50Ω Input and Output:
no External Components Required



CASE STYLE: DL1636

Product Overview:

YSF-162+ is an advanced amplifier module in a Mini-Circuits System In Package **MSiP[®]**. This module is fully matched to 50Ω in/out impedance and has built-in Input & Output DC block capacitors. It is enclosed in a 5 x 6 mm MCLP plastic package. The YSF-162+ uses E-PHEMT technology enabling it to work with a single positive supply voltage.

Key Features

Feature	Advantages
Superior Gain Flatness ± 0.2dB	The YSF-162+ provides industry leading gain flatness over both GPS satellite bands (1227 and 1575 MHz) making this ideal for use in applications where gain-flatness and repeatability are critical performance requirements.
High Gain	The YSF-162+ is a two-stage design with internal feedback and bias to provide flat 20 dB nominal gain, supporting applications where a single gain block must overcome large system losses such as long cable runs and lossy components.
Strong Combination of Performance	The YSF-162+ provides a strong combination of performance parameters including high gain (20 dB), high IP3 (+35 dBm) and P1dB (+20 dBm) and low noise figures (2.8 dB) that are difficult to achieve in a single stage design and available only in the YSF amplifier series.
Integrated Matching, DC Blocking and Bias in Small Package	The YSF-162+ includes all support circuits including: Matching, Bias and DC Blocking, all integrated into a single 5x6mm package making the total footprint equal to or smaller than most solutions.
Excellent Return Loss	The YSF-162+ includes integrated input and output matching circuits to make this amplifier a simple, complete drop-in solution. The matching circuits provide excellent output return loss (20dB), and are designed to give optimal P1dB and IP3 performance in a 50Ω environment.
High Reverse Isolation	With 30 dB of reverse isolation – the YSF-162+ is an ideal gain block for use in integrated systems to minimize VSWR interactions resulting from cascading highly reflective components such as sharp filters.

Notes

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Flat Gain Amplifier

1.2-1.6 GHz

Product Features

- Matched 50-ohm surface mount amplifier
- High gain, 20 dB typ.
- Up to +20 dBm typ. output power
- High IP3, +35 dBm
- Low Noise Figure, 3.2 dB typ.
- High directivity, 31 dB isolation
- Internal Input & Output DC Block
- Separate terminal for DC
- Protected by us patent 8,994,157



YSF-162+

CASE STYLE: DL1636

+RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

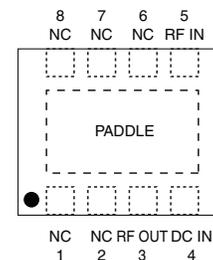
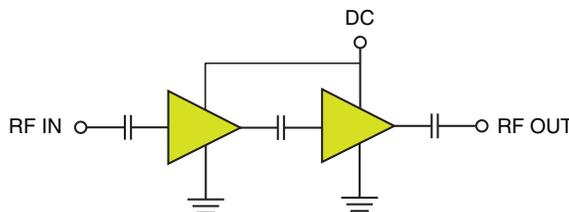
Typical Applications

- GPS
- Receivers & transmitters
- Radar

General Description

YSF-162+ is an advanced amplifier module in a Mini-Circuits System In Package **MSiP[®]**. This module is fully matched to 50Ω in/out impedance and has built-in Input & Output DC block capacitors. It is enclosed in a 5 x 6 mm MCLP plastic package. The YSF-162+ uses E-PHEMT* technology enabling it to work with a single positive supply voltage.

simplified schematic and pad description



Function	Pad Number	Description
RF-IN	5	RF Input
RF-OUT	3	RF Output
DC	4	DC Supply
GND	Paddle	Connected to ground
NOT USED	1,2,6,7,8	No internal connection

*Enhancement mode Pseudomorphic High Electron Mobility Transistor

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Electrical Specifications⁽¹⁾ at 25°C, Zo=50Ω unless noted

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range				1600	MHz
Gain	1200	18.3	20.3	22.3	dB
	1400	18.0	20.1	22.0	
	1600	18.0	20.0	22.0	
Gain Flatness			±0.2		dB
Input Return Loss	1200	—	11.0		dB
	1400	8.0	10.5		
	1600	—	10.0		
Output Return Loss	1200	—	17.3		dB
	1400	14.0	20.0		
	1600	—	22.0		
Reverse Isolation			31.0		dB
Output Power @ 1 dB compression	1200	—	20.4		dBm
	1400	—	20.0		
	1600	18.0	20.0		
Output Power @ 3 dB compression			21.0		dBm
Output IP3	1200	—	36.0		dBm
	1400	31.0	35.0		
	1600	—	35.0		
Noise Figure	1200		3.4	—	dB
	1400		3.2	4.2	
	1600		3.1	—	
Device Operating Voltage			5		V
Device Operating Current			118	145	mA
Device Current Variation vs. Temperature ⁽²⁾			2		μA/°C
Device Current Variation vs Voltage			0.002		mA/mV
Thermal Resistance, junction-to-ground lead ⁽³⁾			56		°C/W

⁽¹⁾ Measured on Mini-Circuits Characterization test board TB-616+. See Characterization Test Circuit (Fig. 1)

⁽²⁾ D(+85°C to -45°C)

⁽³⁾ Thermal Resistance= $\frac{\text{Hot spot temperature} - \text{Ground lead temperature}}{\text{Power Dissipation}}$

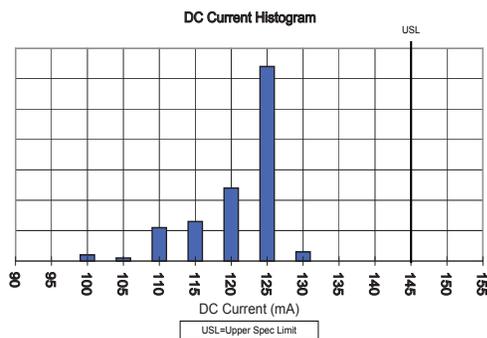
Absolute Maximum Ratings

Parameter	Ratings	Units
Operating Temperature ⁽⁴⁾	-40 to 85	°C
Storage Temperature	-65 to 150	°C
DC Voltage on Pad 4	7	V
Power Dissipation	1.5	W
Input Power	21	dBm

Note: Permanent damage may occur if any of these limits are exceeded.

These ratings are not intended for continuous normal operation.

⁽⁴⁾ Case is defined as ground paddle.



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Characterization Test Circuit

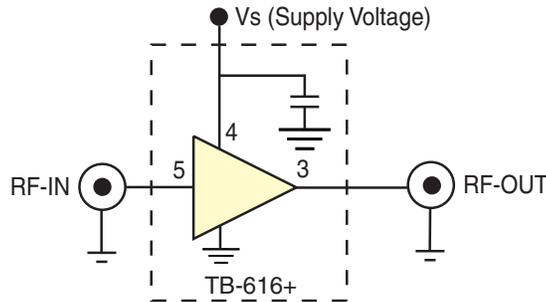


Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization Test Fixture TB-616+) Gain, Return loss, Output power at 1dB compression (P1 dB), Output IP3 (OIP3) and Noise Figure measured using Agilent's N5242A PNA-X microwave network analyzer.

Conditions:

1. Gain: Pin= -25dBm
2. Output IP3 (OIP3): Two tones, spaced 10 MHz apart, 2.5 dBm/tone at output.

Recommended Application Circuit

(refer to evaluation board for PCB Layout and component values)

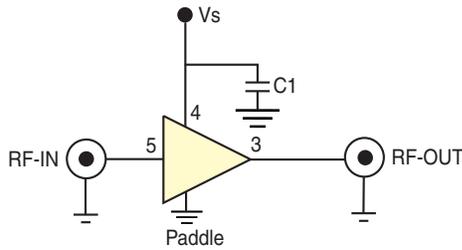
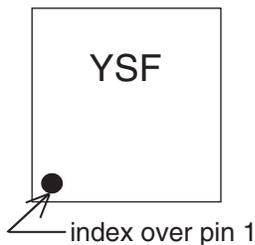


Fig 2. Recommended Application Circuit

Product Marking



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Additional Detailed Technical Information	
<i>additional information is available on our dash board. To access this information click here</i>	
Performance Data	Data Table
	Swept Graphs
	S-Parameter (S2P Files) Data Set (.zip file)
Case Style	DL1636 <i>Plastic package, exposed paddle, lead finish: tin/silver/nickel</i>
Tape & Reel Standard quantities available on reel	F68 <i>7" reels with 20, 50, 100, 200, 500 or 1K devices. 13" reels with 2K, or 4K devices.</i>
Suggested Layout for PCB Design	PL-352
Evaluation Board	TB-616-3+
Environmental Ratings	ENV08T1

ESD Rating

Human Body Model (HBM): Class 1A in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): Class M1 (25V) in accordance with ANSI/ESD STM5.2-1999

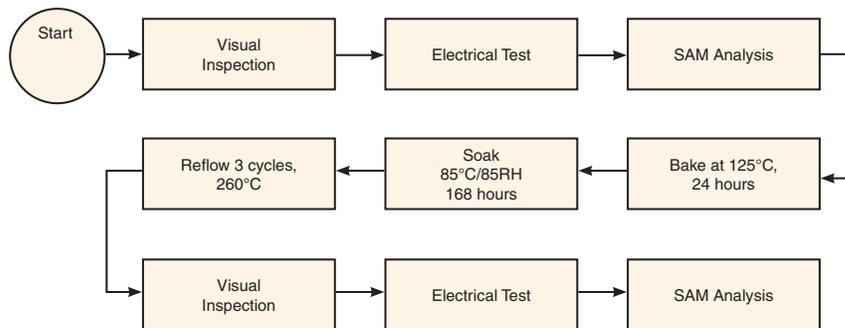


Attention
 Observe precautions
 for handling electrostatic
 sensitive devices

MSL Rating

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020D

MSL Test Flow Chart



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