

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: DL1020

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. |

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



YSF-162+

CASE STYLE: DL1020
PRICE: \$2.69 ea. QTY. (20)

+ RoHS compliant in accordance with EU Directive (2002/95/EC)

The +Suffix has been added in order to identify RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications.

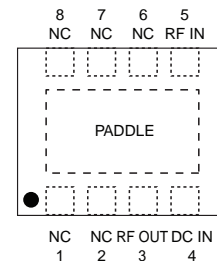
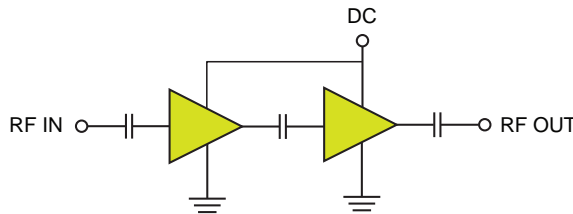
Typical Applications

- 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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IF/IRF MICROWAVE COMPONENTS

For detailed performance specs & shopping online see web site

Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp.

REV. OR
M128712
YSF-162+
101027
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Electrical Specifications⁽¹⁾ at 25°C, Zo=50Ω unless noted

| Parameter | Condition (MHz) | Min. | Typ. | Max. | Units |
|--|-----------------|------|-------|------|-------|
| Frequency Range | | | 1200 | | 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-589+. See Characterization Test Circuit (Fig. 1)

⁽²⁾ Δ(+85°C to -45°C)

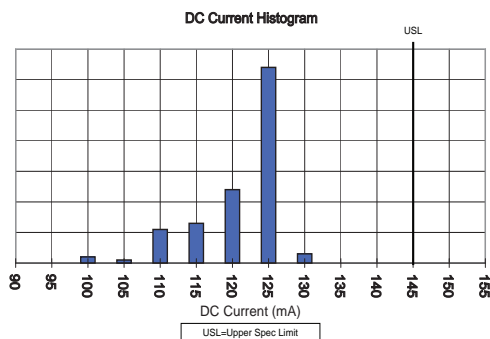
⁽³⁾ Thermal Resistance= $\frac{\text{Hot spot temperature} - \text{Ground lead temperature}}{\text{Power Dissipation}}$

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.



Characterization Test Circuit

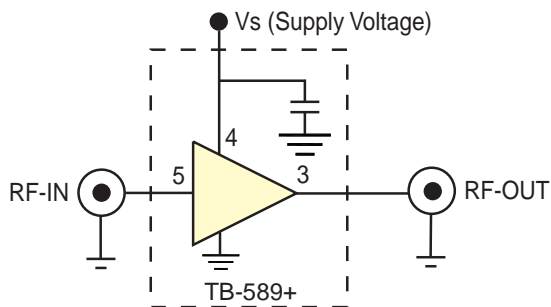


Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization Test Fixture TB-589+) Gain, Return loss, Output power at 1dB compression (P1 dB), Output IP3 (OIP3) and Noise Figure measured using Agilent's N5242A PNA-X microwave network analyzer.

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)

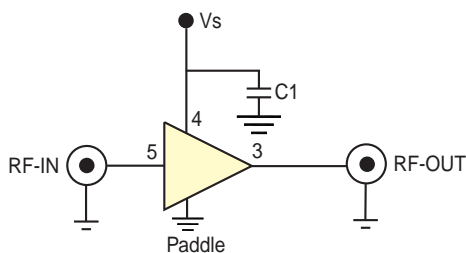
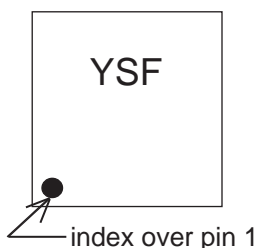


Fig 2. Recommended Application Circuit

Product Marking



| Additional Detailed Technical Information <small>(additional information is available on our web site. To access this information enter the model number on our web site home page)</small> | | |
|--|---|--|
| Performance Data | Data Table | |
| | Swept Graphs | |
| | S-Parameter (S2P Files) Data Set (.zip file) | |
| Case Style | DL1020 <i>Plastic package, exposed paddle, lead finish: tin/silver/nickel</i> | |
| Tape & Reel | F68 | |
| Suggested Layout for PCB Design | PL-335 | |
| Evaluation Board | TB-589-3+ | |
| 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

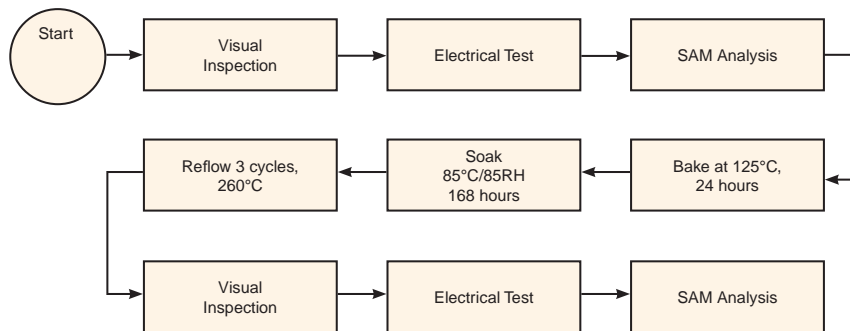


Attention
 Observe precautions
 for handling electrostatic
 sensitive devices

MSL Rating

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

MSL Test Flow Chart



For detailed performance specs & shopping online see web site

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