

Flat Gain, High Dynamic Range

# Monolithic Amplifier

PGA-106-75+

75Ω 0.05 to 1.5 GHz

## The Big Deal

- High IP3 and IP2
- Flat Gain / Excellent Return Loss
- Low Noise Figure



SOT-89 PACKAGE

## Product Overview

PGA-106-75+ (RoHS compliant) is an advanced wideband amplifier fabricated using E-PHEMT technology and offers extremely high dynamic range over a broad frequency range with low noise figure and flat gain. Lead finish is SnAgNi. It has repeatable performance from lot to lot and is enclosed in a SOT-89 package for very good thermal performance.

## Key Features

Feature	Advantages
Broad Band: 0.05 to 1.5 GHz	Broadband covering primary CATV applications.
High IP3 Versus DC power Consumption: 37 dBm typical at 0.5 GHz	The PGA-106-75+ matches industry leading IP3 performance relative to device size and power consumption. The combination of the design and E-PHEMPT structure provides enhanced linearity over a broad frequency range as evidence in the IP3 being typically 15-18 dB above the P 1dB point. This feature makes this amplifier ideal for use in CATV applications.
High IP2 50-60 dBm	Suppresses second order product on wideband applications such as CATV
Low Noise Figure: 3.1 dB at 0.5 GHz	Low noise figure performance in combination with the high output IP3 results in high dynamic range.
Excellent CSO/CTB* CSO, -56 dBc CTB, -72 dBc	Competitive performance at lower current and supply voltage.

\*78 channels flat, 30 dBm/channel at output, 6 MHz channel spacing.

### Notes

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# 75Ω Flat Gain, High Dynamic Range Monolithic Amplifier

## 0.05-1.5 GHz

### Product Features

- High IP3, 37 dBm typ. at 0.5 GHz
- Gain, 17.4 dB typ. at 0.5 GHz
- High Pout, P1dB 19.8 dBm typ. at 0.5 GHz
- Low Noise Figure, 3.1 dB at 0.5 GHz



Generic photo used for illustration purposes only

CASE STYLE: DF782

### Typical Applications

- CATV
- GPON
- MOCA
- DBS

## PGA-106-75+

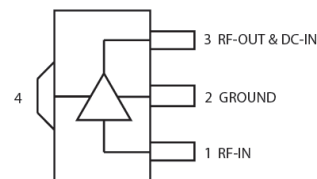
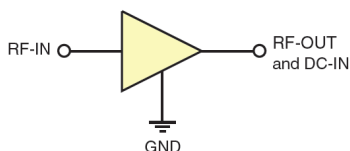
**+RoHS Compliant**

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

### General Description

PGA-106-75+ (RoHS compliant) is an advanced wideband amplifier fabricated using E-PHEMT\* technology and offers extremely high dynamic range over a broad frequency range and with low noise figure and flat gain. In addition, the PGA-106-75+ has excellent input and output return loss over a broad frequency range. Lead finish is SnAgNi. It has repeatable performance from lot to lot and is enclosed in a SOT-89 package for very good thermal performance.

### simplified schematic and pin description



Function	Pin Number	Description
RF IN	1	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.
RF-OUT and DC-IN	3	RF output and bias pin. DC voltage is present on this pin; therefore a DC blocking capacitor is necessary for proper operation. An RF choke is needed to feed DC bias without loss of RF signal due to the bias connection, as shown in "Recommended Application Circuit", Fig. 2
GND	2,4	Connections to ground. Use via holes as shown in "Suggested Layout for PCB Design" to reduce ground path inductance for best performance.

\*Enhanced mode pseudomorphic High Electron Mobility Transistor.

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PGA-106-75+  
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Electrical Specifications at 25°C, 75Ω and 5.0V<sup>1</sup>, unless noted

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
Frequency range		0.05		1.5	GHz
Gain	0.05	—	17.8	—	dB
	0.5	—	17.4	—	
	1.0	15.5	16.9	19.5	
	1.2	—	16.7	—	
	1.5	—	16.1	—	
Input return loss	0.05		14.9		dB
	0.5		14.5		
	1.0		21.0		
	1.2		25.3		
	1.5		18.4		
Output return loss	0.05		21.2		dB
	0.5		16.0		
	1.0		15.5		
	1.2		14.6		
	1.5		12.5		
Reverse isolation	1.0		24.4		dB
Output power @ 1 dB compression	0.05		19.2		dBm
	0.5		19.8		
	1.0		20.1		
	1.2		19.8		
	1.5		19.3		
Output IP3 <sup>2</sup>	0.05		37.5		dBm
	0.5		37.3		
	1.0		36.2		
	1.2		36.0		
	1.5		35.0		
Output IP2 <sup>2</sup>	0.05		61.0		dBm
	0.5		59.8		
	1.0		58.4		
	1.2		52.2		
	1.5		59.8		
Noise figure	0.05		3.3		dB
	0.5		3.1		
	1.0		3.3		
	1.2		3.3		
	1.5		3.7		
Device operating voltage (Vd)		4.8	5.0	5.2	V
Device operating current			116	132	mA
Device current variation vs. temperature <sup>4</sup>			97		μA/°C
Device current variation vs voltage			0.05		mA/mV
Thermal resistance <sup>3</sup>			76		°C/W

1. Measured on Mini-Circuits Characterization Eval board TB-670+. See Characterization Test Circuit (Fig. 1)
2. Output IP2 measured at sum frequency of the two tones (f meas= f1+f2).
3. Junction to ground lead.
4. (Current at 85°C - Current at -45°C)/130

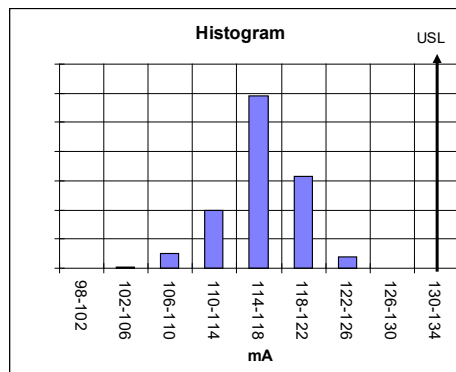
Absolute Maximum Ratings

Parameter	Ratings
Operating Temperature (ground lead)	-40°C to 85°C
Storage Temperature	-65°C to 150°C
Operating Current at 5.0V	170 mA
Power Dissipation	0.85 W
Input Power (CW)	+26 dBm (5 minutes) +14 dBm (continuous)
DC Voltage on Pin 3	6 V

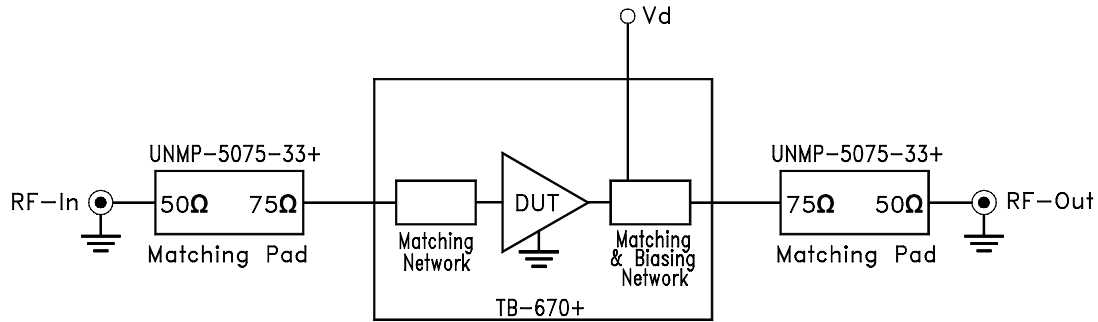
Permanent damage may occur if any of these limits are exceeded.  
Electrical maximum ratings are not intended for continuous normal operation.

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Characterization Test Circuit

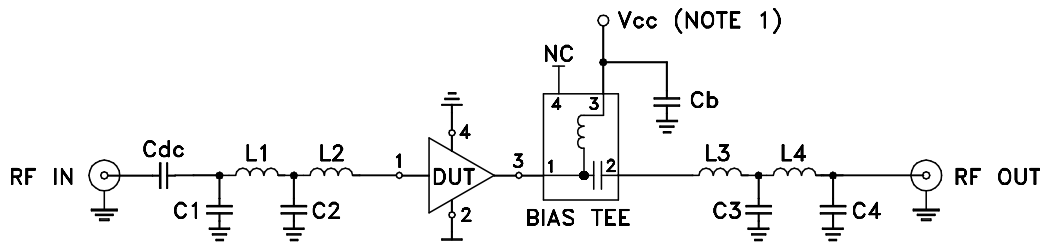


**Fig 1.** Block Diagram of Test Circuit used for characterization. (DUT tested on Mini-Circuits Characterization Eval board TB-670+) Gain, Return loss, Output power at 1dB compression (P1 dB) , output IP3 (OIP3), output IP2 (OIP2) and noise figure measured using Agilent’s N5242A PNA-X microwave network analyzer.

**Conditions:**

1. Gain and Return loss: Pin= -25dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 5 dBm/tone at output.
3. Output IP2 (OIP2): Two tones, spaced 11 MHz apart, 5 dBm/tone at output.

Recommended Application Circuit (TB-670+)

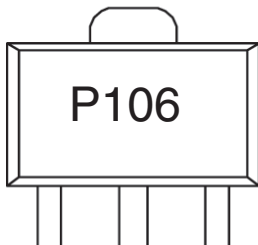


Note 1. Vcc voltage: +5±0.2V

Component	Value
DUT	PGA-106-75+
Bias Tee	Mini-Circuits TCBT-14+
Cdc	2400 pF
Cb	0.1 μF
C1	0.5 pF
C2	1.3 pF
C3	1.2 pF
C4	0.7 pF
L1, L2, L4	7.5 nH
L3	4.7 nH

**Fig 2.** Evaluation board includes case, connectors, and components soldered to PCB

Product Marking



Marking may contain other features or characters for internal lot control

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Additional Detailed Technical Information	
additional information is available on our dash board. To access this information <a href="#">click here</a>	
Performance Data	Data Table
	Swept Graphs
	S-Parameter (S2P Files) Data Set (.zip file)
Case Style	DF782 (SOT 89) <i>Plastic package, exposed paddle lead finish: tin-silver over nickel</i>
Tape & Reel Standard quantities available on reel	F55 <i>7" reels with 20, 50, 100, 200, 500 or 1K devices</i>
Suggested Layout for PCB Design	PL-379
Evaluation Board	TB-670+
Environmental Ratings	ENV08T1

**ESD Rating**

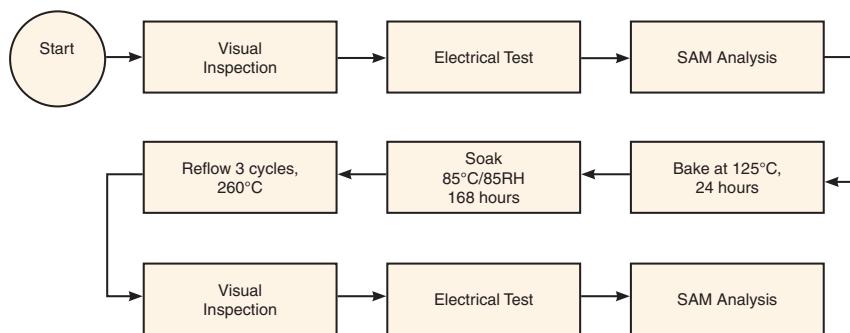
Human Body Model (HBM): Class 1B (500<1000) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): Class class M1 (50V) in accordance with ANSI/ESD STM5.2-1999

**MSL Rating**

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

**MSL Test Flow Chart**



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