

## Features

- SiGe Technology
- 18 dB Gain at 900 MHz
- +24 dBm P1dB
- +41 dBm Output IP3
- 2.6 dB Noise Figure
- MTTF > 100 Years
- Single +6 V Supply
- SOT-89 Surface Mount Package

## Description

The ASG304 is designed for high linearity, high gain, and low noise over a wide range of frequency, being suitable for use in both receiver and transmitter of wireless and wireline telecommunication systems. The product is manufactured using a state-of-the-art SiGe HBT process of the company's own, making it cost-effective and highly reliable. The amplifiers are available in a low cost SOT-89 package completing stringent DC and RF tests.

## Specifications <sup>1)</sup>

Parameters	Units	Min.	Typ.	Max.
Frequency Range	MHz		250 - 2000	
Gain	dB	17.5	18	
Input VSWR <sup>2)</sup>	-		1.2	
Output VSWR <sup>2)</sup>	-		1.7	
Output IP3 <sup>3)</sup>	dBm	39	41	45
Noise Figure	dB		2.6	
Output P1dB	dBm		24	
Supply Current	mA		110	
Supply Voltage	V		6	
Thermal Resistance, R <sub>th</sub> <sup>4)</sup>	°C/W		32	

1) Measurement conditions are as follows: T = 25°C, V<sub>CC</sub> = 6 V, Freq. = 900 MHz, 50 ohm system.

2) S11 & S22 can be improved, at a specific frequency, by moving an input shunt capacitor (C2) along an input transmission line.

3) OIP3 is measured with two tones at an output power of +8 dBm/tone separated by 1 MHz.

4) The thermal resistance was determined at a DC power of 0.834 W (V<sub>CC</sub>=6 V, I<sub>C</sub>=139 mA) with RF signal and a lead temperature of 85.2°C.

## Absolute Maximum Ratings

Parameters	Rating	Remarks
Operating Case Temperature	-40 to + 85°C	
Storage Temperature	-40 to + 150°C	
Supply Voltage	8 V	
Operating Junction Temperature	150°C	
Input RF Power (continuous) <sup>1)</sup>	+3 dB above Input P1dB <sup>1)</sup>	

1) Contact us for detailed information about a higher input power operation.

## Application Notes

[Application Circuit for 950 MHz \(GSM\)](#)

[Application Circuit for 1750 MHz](#)

[Application Circuit for 2250-2750 MHz](#)

[Application Circuit for 900 MHz \(5 V\)](#)

## Ordering Information

Part Number	Description
ASG304	High linearity medium power amplifier (Available in tape and reel)
EB-ASG304-900	Fully assembled evaluation kit (900 MHz)
EB-ASG304-2000	Fully assembled evaluation kit (2000 MHz)
EB-ASG304-1750	Fully assembled evaluation kit (1750 MHz)
EB-ASG304-IF	Fully assembled evaluation kit (10-200 MHz)
EB-ASG304-CATV	Fully assembled evaluation kit (50-860 MHz)



Package Style: SOT-89

## Applications

- CDMA, GSM, W-CDMA, PCS
- PA Driver Amplifier
- Gain Block
- CATV Amplifier
- IF Amplifier

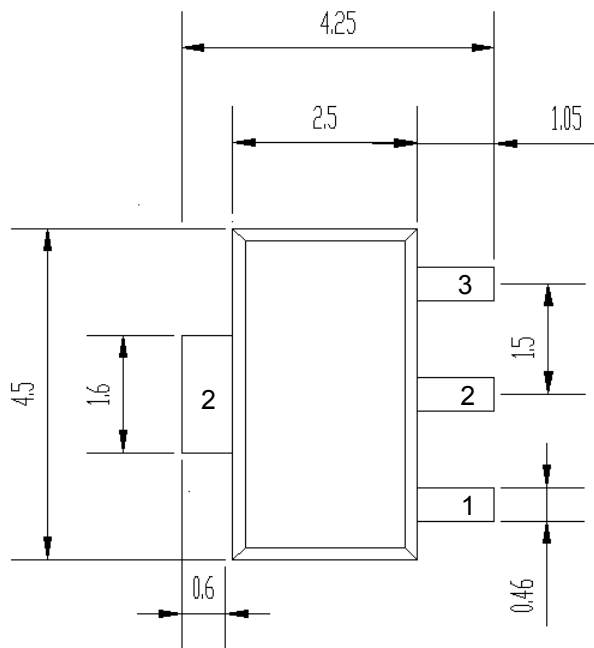
## More Information

Tel: (82) 42-528-7220

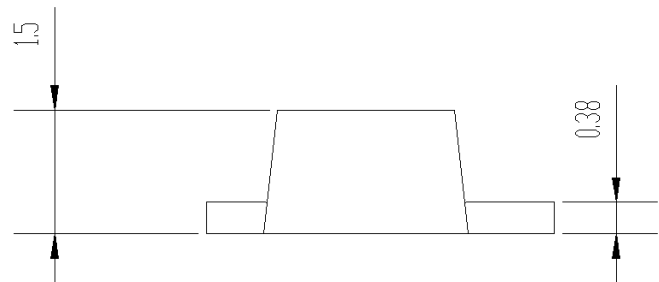
Fax: (82) 42-528-7222

ASB, Inc., 4<sup>th</sup> Fl. Venture Town Bldg.,  
367-17 Gojeong-Dong, Seo-Gu,  
Daejeon 302-716, Korea

Outline Drawing



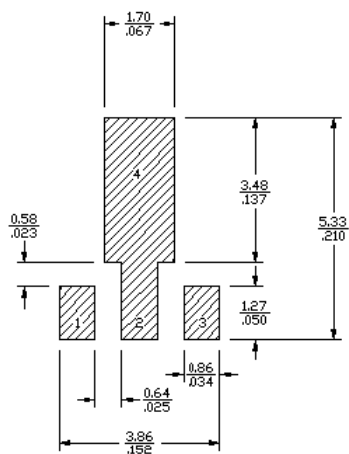
(Unit: mm)



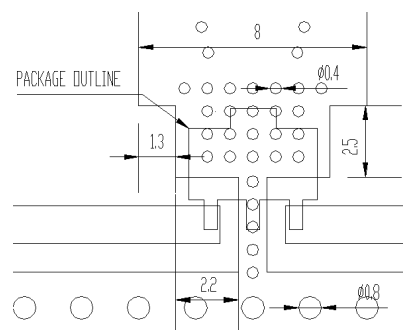
Pin Description

Function	Pin No.
Input	1
Ground	2
Output	3

Land Pattern



Mounting Configuration



(Unit: mm)

- Note: 1. The number and size of ground via holes in a circuit board is critical for thermal and RF grounding considerations.
- 2. We recommend that the ground via holes be placed on the bottom of lead pin 2 for better RF and thermal performance, as shown in the drawing at the left side.

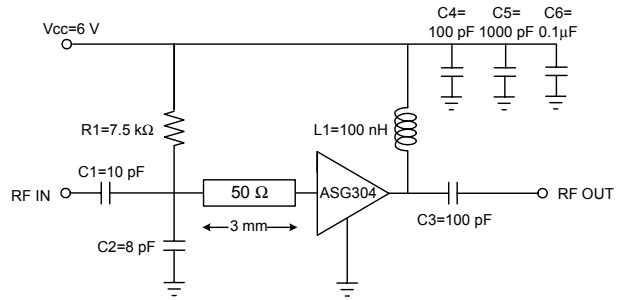
Application Circuit: 900 MHz

Typical Performance

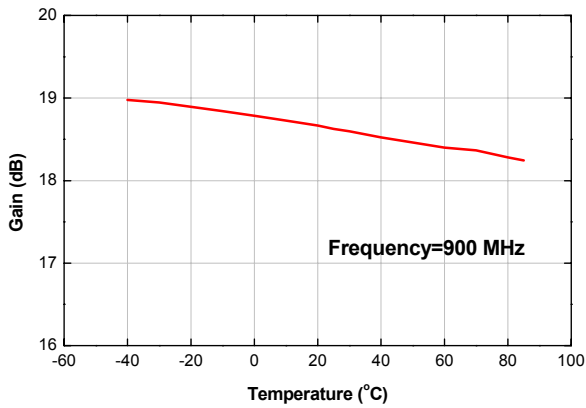
Frequency	900 MHz
Magnitude S21	18 dB
Magnitude S11 <sup>1)</sup>	-24 dB
Magnitude S22 <sup>1)</sup>	-11 dB
Output P1dB	24 dBm
Output IP3 <sup>2)</sup>	41 dBm
Noise Figure	2.6 dB
Supply Voltage	6 V
Current	110 mA

- 1) S11 & S22 can be improved, at a specific frequency, by moving an input shunt capacitor (C2) along an input transmission line.
- 2) OIP3 is measured with two tones at an output power of +8 dBm/tone separated by 1 MHz.

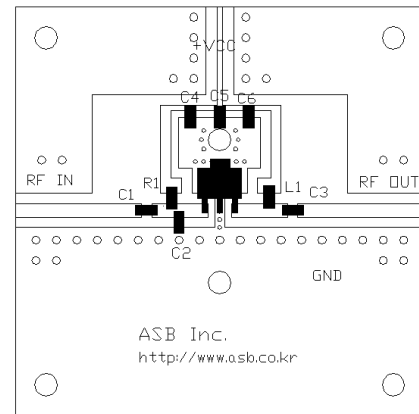
Schematic



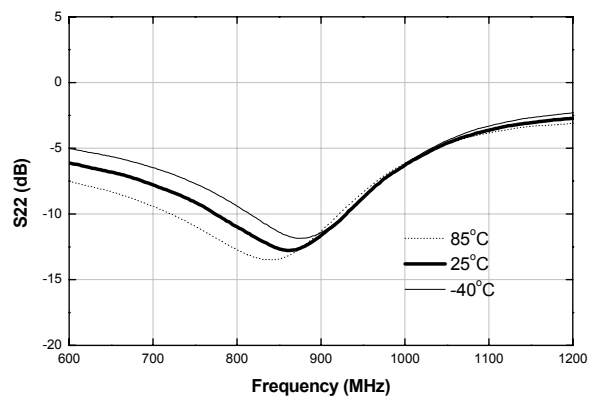
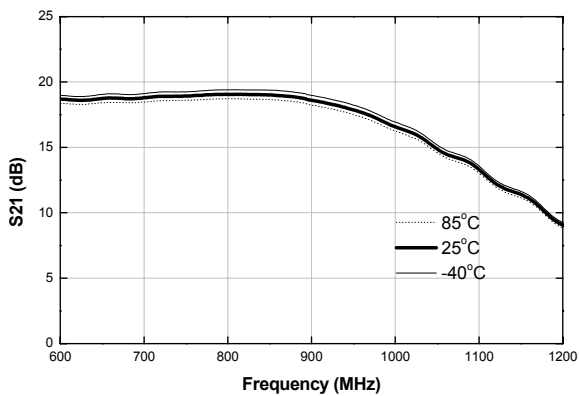
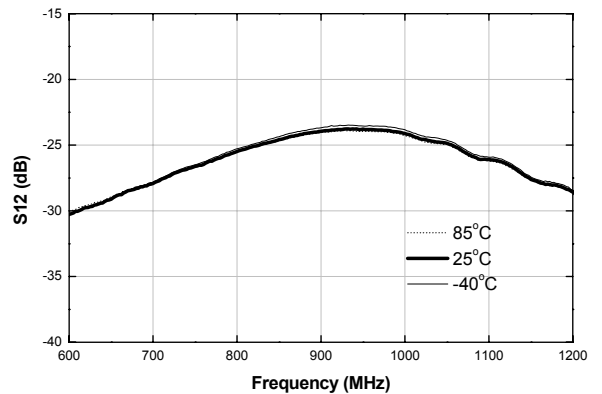
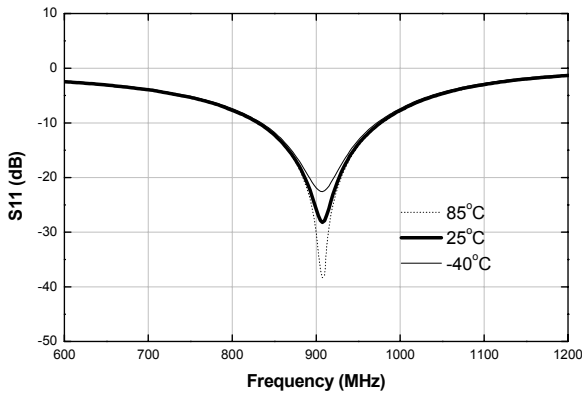
Gain vs. Temperature



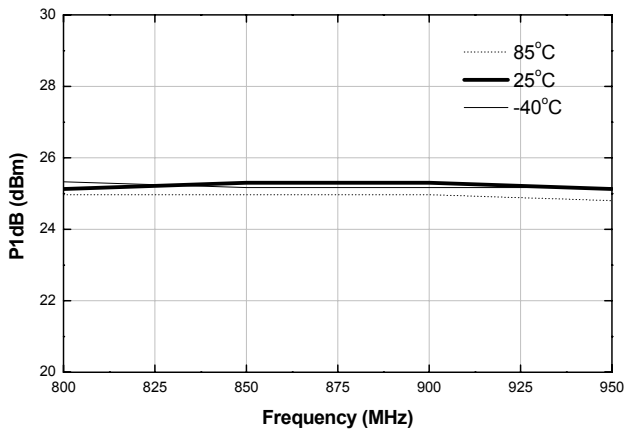
Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



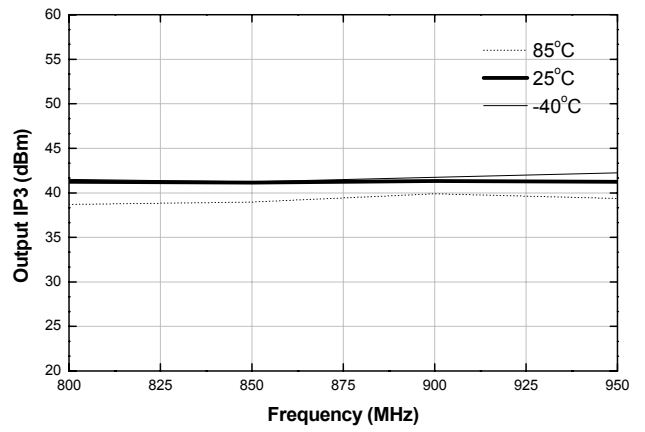
S-parameters



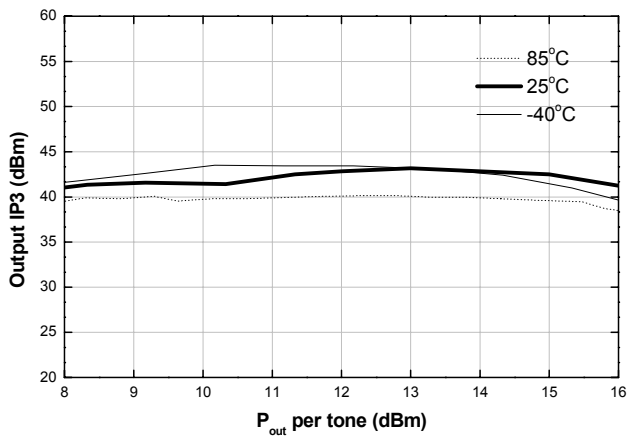
P1dB vs. Frequency



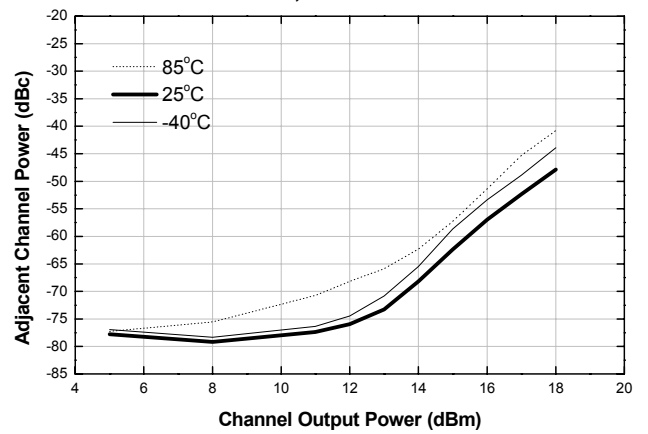
Output IP3 vs. Frequency (Pout per tone = 8 dBm)



Output IP3 vs. Tone Power (Frequency = 900 MHz)



880 MHz Adjacent Channel Power vs. Channel Output Power  
IS-95, 9 Channels Forward



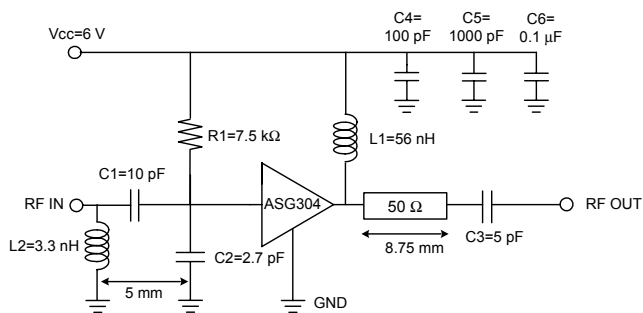
Application Circuit: 2000 MHz

Typical Performance

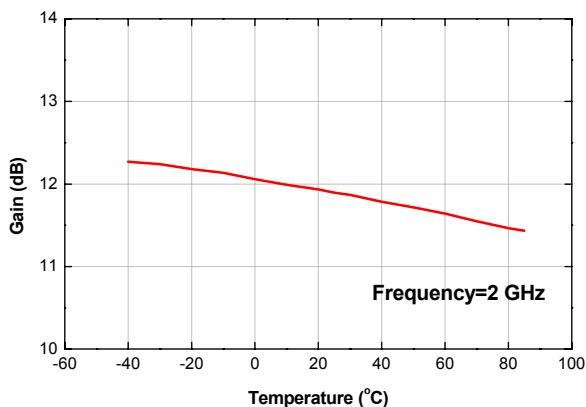
Frequency	2000 MHz
Magnitude S21	10.5 dB
Magnitude S11 <sup>1)</sup>	-20 dB
Magnitude S22 <sup>1)</sup>	-15 dB
Output P1dB	24 dBm
Output IP3 <sup>2)</sup>	40 dBm
Noise Figure	3.5 dB
Supply Voltage	6 V
Current	110 mA

- 1) S11 & S22 can be improved, at a specific frequency, by moving an input shunt capacitor (C2) and inductor (L2) along an input transmission line.
- 2) OIP3 is measured with two tones at an output power of +8 dBm/tone separated by 1 MHz.

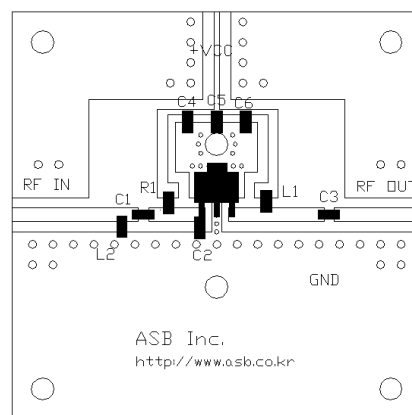
Schematic



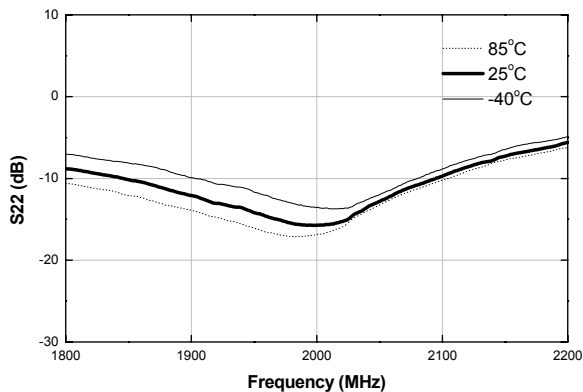
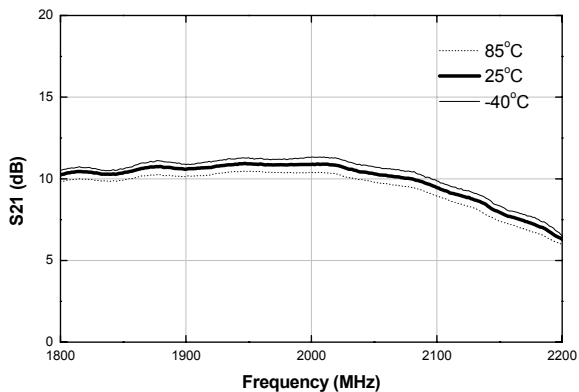
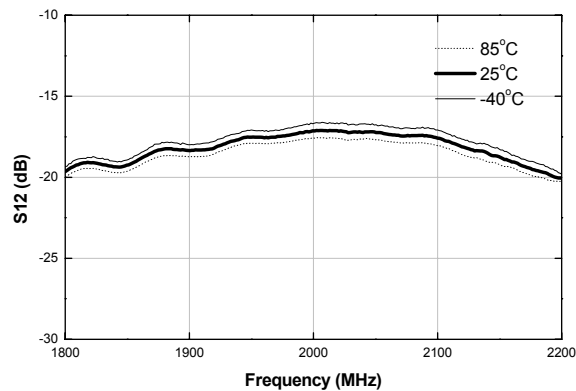
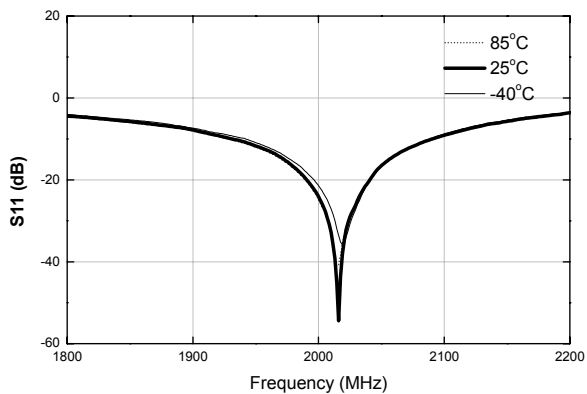
Gain vs. Temperature



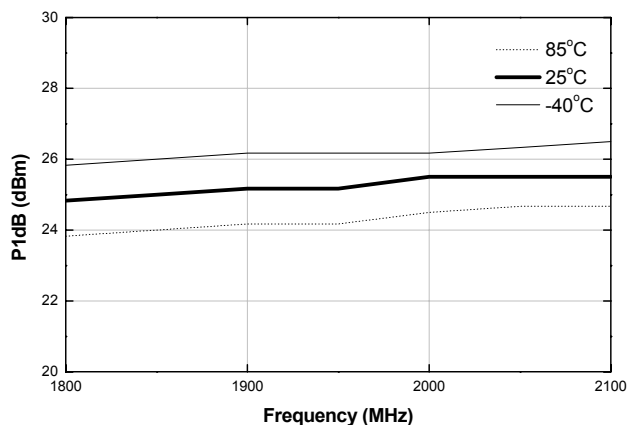
Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



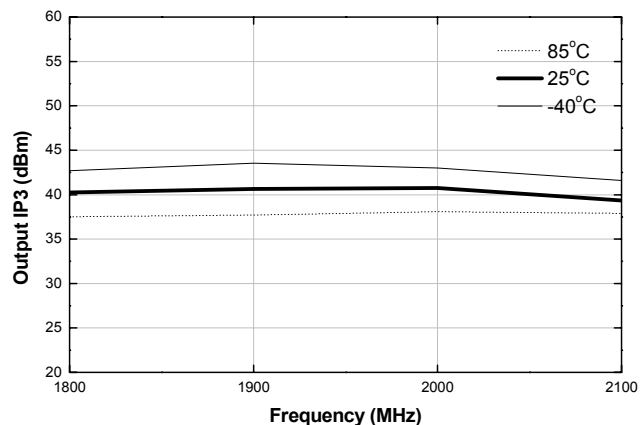
S-parameters



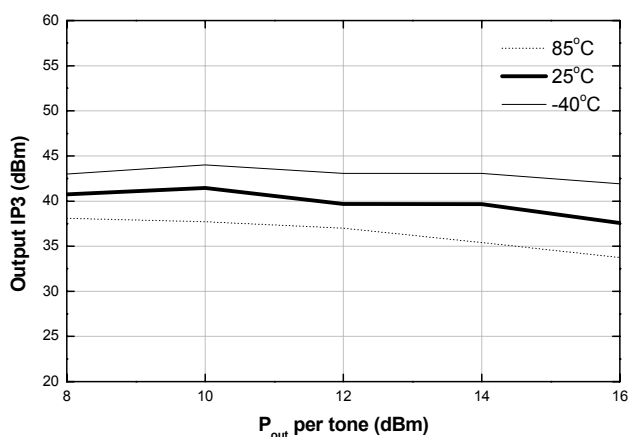
P1dB vs. Frequency



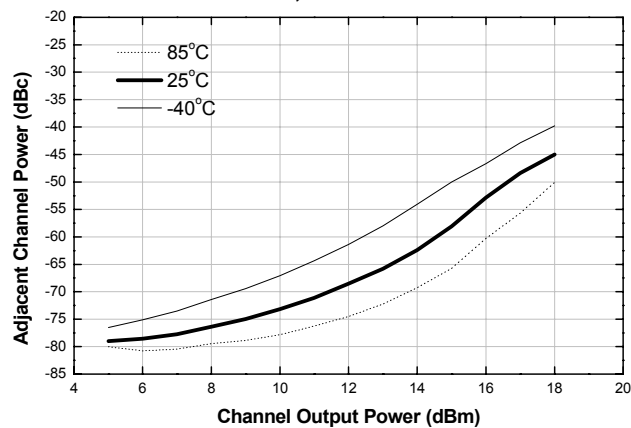
Output IP3 vs. Frequency (Pout per tone = 8 dBm)



Output IP3 vs. Tone Power (Frequency = 2 GHz)



1960 MHz Adjacent Channel Power vs. Channel Output Power  
IS-95, 9 Channels Forward



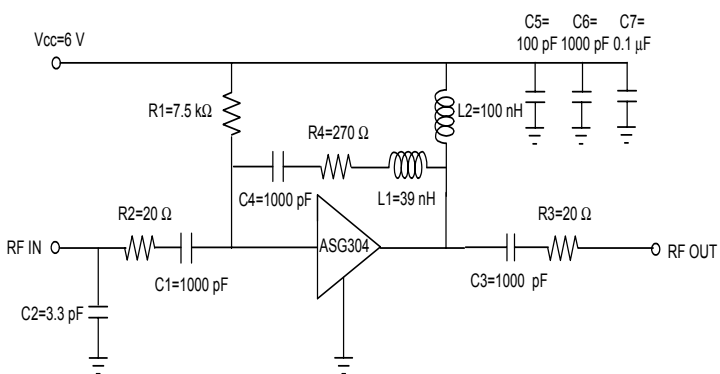
Application Circuit: 50-860 MHz for CATV

Typical Performance

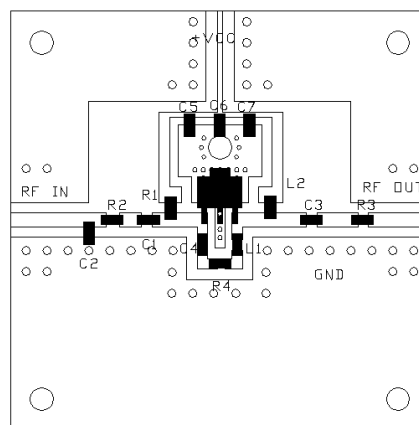
\*  $Z_o=50 \Omega$  ,  $V_{cc}=6 V$  ,  $I_c=120 mA$

Parameters	Units	Frequency (MHz)				
		50	250	450	650	850
Gain	dB	13.3	13.4	13.2	13.6	13.1
Output P1dB	dBm	22	23	22.4	22	21.5
S11	dB	-8.1	-8.2	-9.1	-12	-15.8
S22	dB	-8.4	-9.5	-9.2	-8.8	-10.1
S12	dB	-43	-41	-37	-33	-30
Noise Figure	dB	5.2	5.4	5.9	5.9	5.6
OIP3	dBm	36	38	37	33	35
OIP2	dBm	49	52	53	63	70

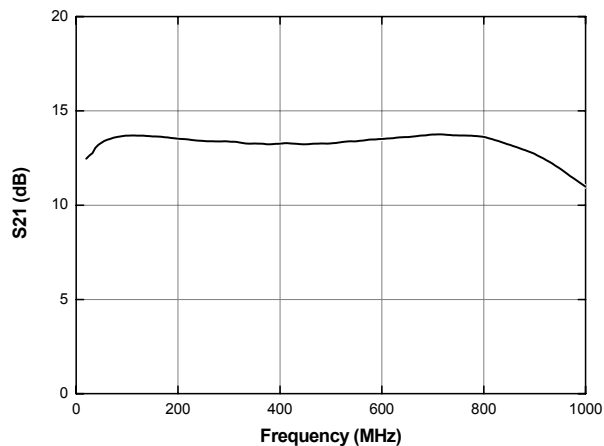
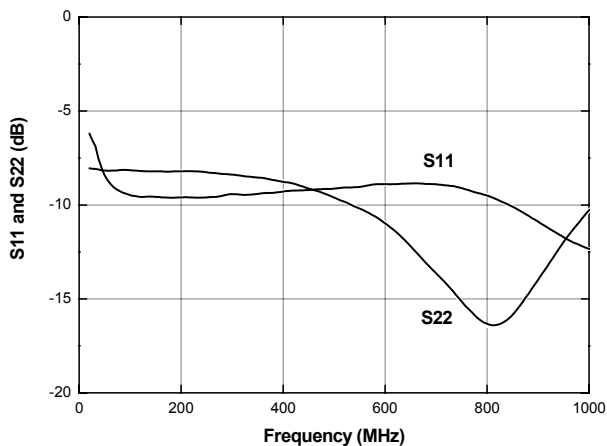
Schematic



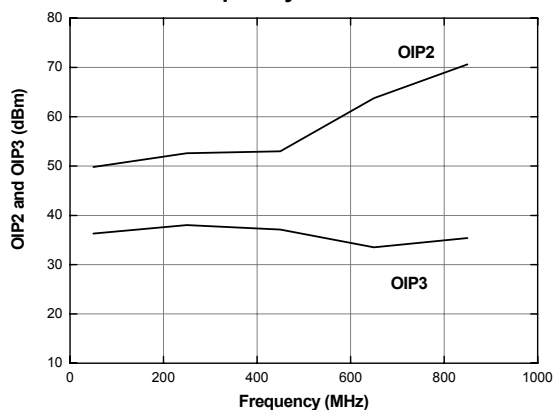
Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



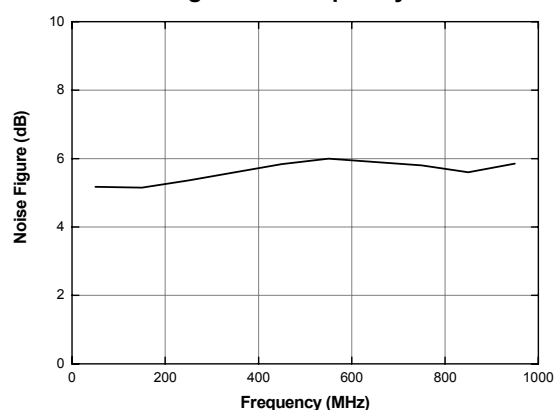
S-parameters



### OIP vs. Frequency



### Noise Figure vs. Frequency



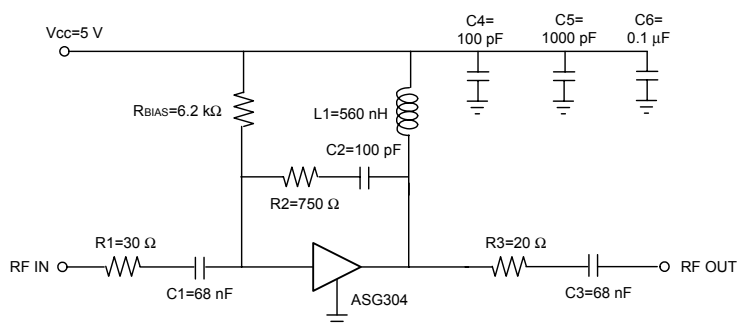
## Application Circuit: 10-200 MHz for IF

### Typical Performance

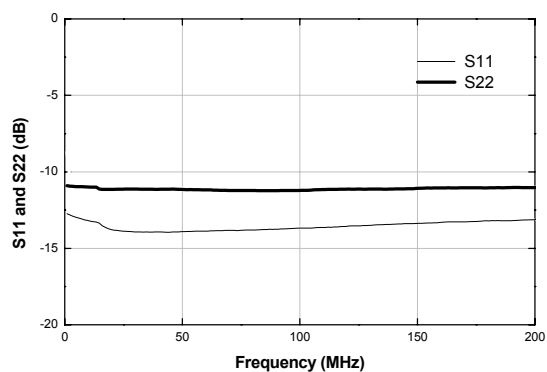
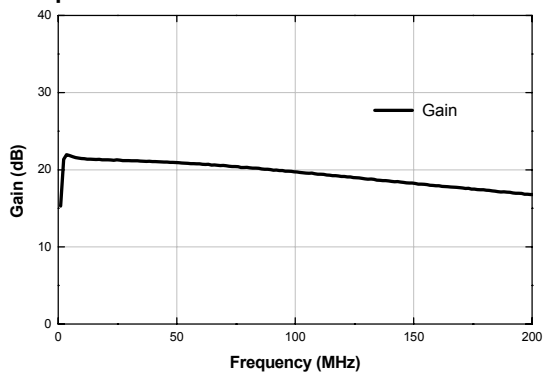
Frequency (MHz)	100	100
Magnitude S21 (dB)	19.6	19.7
Magnitude S11 (dB)	-13.5	-13.5
Magnitude S22 (dB)	-11.0	-11.0
Output P1dB (dBm)	22.0	22.8
Output IP3 <sup>1)</sup> (dBm)	37	36
Noise Figure (dB)	5.6	5.6
Supply Voltage (V)	5	6 <sup>2)</sup>
Current (mA)	113	114

1) OIP3 is measured with two tones at an output power of +8 dBm/ tone separated by 1 MHz.  
 2) For 6 V operation, R<sub>BIAS</sub> should be replaced with 7.5 kohm.

### Schematic



### S-parameters



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)

