Advanced Semiconductor Business Inc.

ASL09S

5-4000 MHz High Linearity LNA MMIC

Features

- Same circuit over 800~3500 MHz
- 12.8 dB Gain at 1950 MHz
- 19.5 dBm P1dB at 1950 MHz
- 34.5 dBm Output IP3 at 1950 MHz
- 0.9 dB NF at 1950 MHz
- MTTF > 100 Years
- Single Supply

Description

The ASL09S, a wideband linear low noise amplifier MMIC, has a low noise and high linearity at low bias current, being suitable for use in both receiver and transmitter of telecommunication systems up to 3.5 GHz. S11 down to –18 dB is easily achieved for low noise application to provide a good productivity. The amplifier is available in an SOT-89 package and passes through the stringent DC, RF, and reliability tests.

RoHS-compliant



Package Style: SOT-89

Application Circuit

- 800 ~ 3500 MHz
- 800 ~ 3500 MHz(3V)
- TETRA (380~460MHz)

Typical Performance

Parameters	Units	Typical				
Frequency	MHz	800	1950	2400	2700	3500
Gain	dB	19.3	12.8	11	10	7.5
S11	dB	-18	-18	-20	-20	-18
S22	dB	-10	-10	-9.5	-9.5	-9
Output IP3[1)]	dBm	32	34.5	35.5	36.5	36
Noise Figure	dB	0.8	0.9	1.1	1.2	1.5
Output P1dB	dBm	19.5	19.5	20	19.5	20
Current	mA	45	45	45	45	45
Device Voltage	V	4.4	4.4	4.4	4.4	4.4

1) OIP3 is measured with two tones at an output power of +5 dBm/tone separated by 1 MHz.

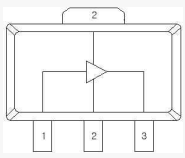
Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		1950	
Gain	dB		12.8	
S11	dB		-18	
S22	dB		-10	
Output IP3	dBm		34.5	
Noise Figure	dB		0.9	
Output P1dB	dBm		19.5	
Current	mA		45	
Device Voltage	V		4.4	

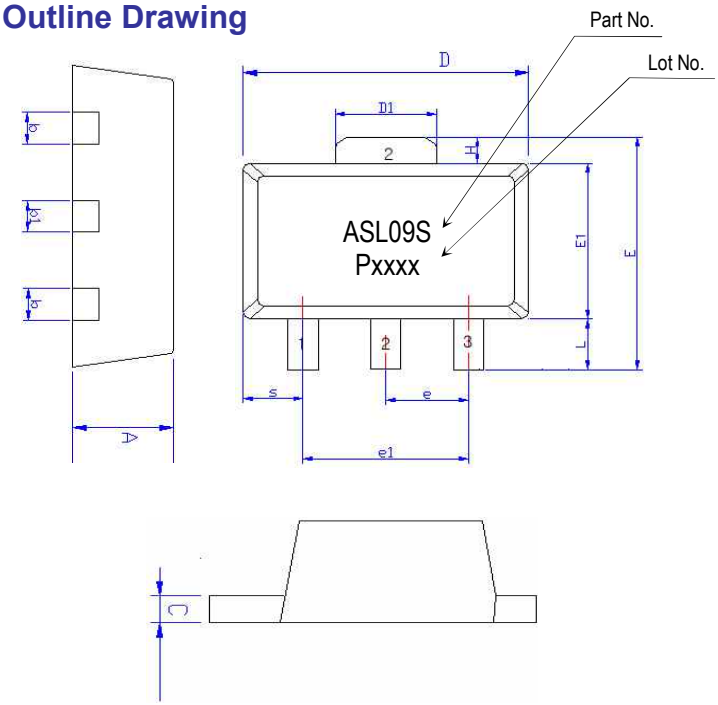
Absolute Maximum Ratings

Parameters	Rating
Operating Case Temperature	-40 to +85°C
Storage Temperature	-40 to +150°C
Device Voltage	+5 V
Operating Junction Temperature	+150°C
Input RF Power (CW, 50ohm matched)*	20 dBm

* Please find the max. input power data from http://www.asb.co.kr/pdf/Maximum_Input_Power_Analysis.pdf



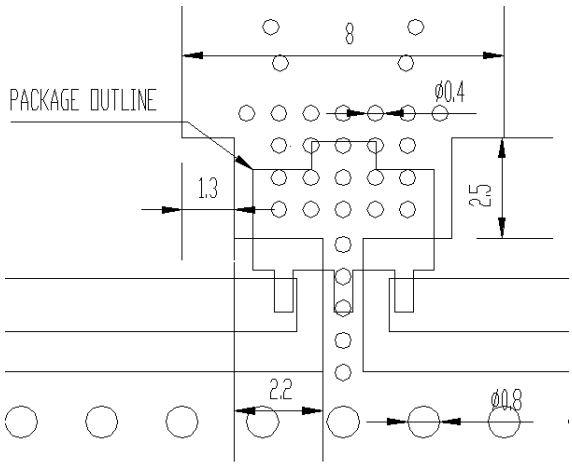
Outline Drawing



Symbols	Dimensions (In mm)		
	MIN	NOM	MAX
A	1.40	1.50	1.60
L	0.89	1.04	1.20
b	0.36	0.42	0.48
b1	0.41	0.47	0.53
C	0.38	0.40	0.43
D	4.40	4.50	4.60
D1	1.40	1.60	1.75
E	3.64	---	4.25
E1	2.40	2.50	2.60
e1	2.90	3.00	3.10
H	0.35	0.40	0.45
S	0.65	0.75	0.85
e	1.40	1.50	1.60

Pin No.	Function
1	RF IN
2	GND
3	RF OUT / Bias

Mounting Recommendation (in 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 the lead pin 2 and exposed pad of the device for better RF and thermal performance, as shown in the drawing at the left side.

ESD Classification & Moisture Sensitivity Level

ESD Classification	
HBM	Class 1A
	Voltage Level: 400 V
MM	Class A
	Voltage Level: 50 V

CAUTION: ESD-sensitive device!

Moisture Sensitivity Level (MSL)	
	Level 3 at 260°C reflow

APPLICATION CIRCUIT

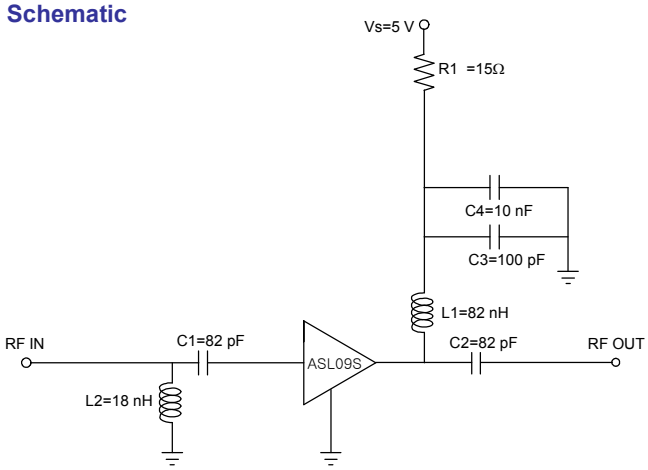
800 ~ 3500

+5 V

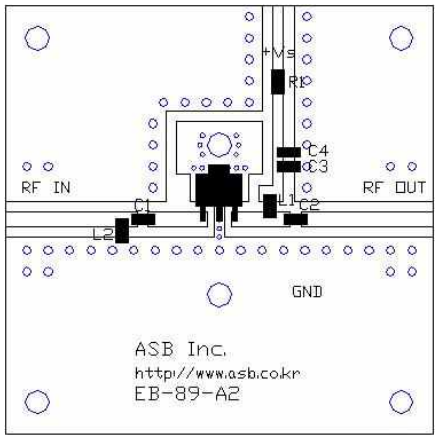
Frequency (MHz)	800	1950	2400	2700	3500
Magnitude S21 (dB)	19.3	12.8	11	10	7.5
Magnitude S11 (dB)	-18	-18	-20	-20	-18
Magnitude S22 (dB)	-10	-10	-9.5	-9.5	-9
Output P1dB (dBm)	19.5	19.5	20	19.5	20
Output IP3[1] (dBm)	32	34.5	35.5	36.5	36
Noise Figure (dB)	0.8	0.9	1.1	1.2	1.5
Device Voltage (V)	4.4	4.4	4.4	4.4	4.4
Current (mA)	45	45	45	45	45

1) OIP3 is measured with two tones at an output power of +5 dBm/tone separated by 1 MHz.

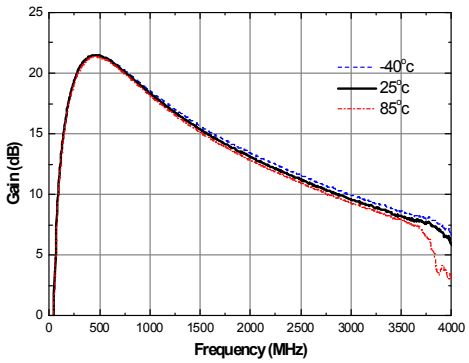
Schematic

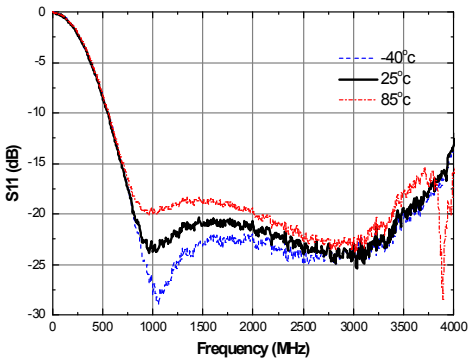


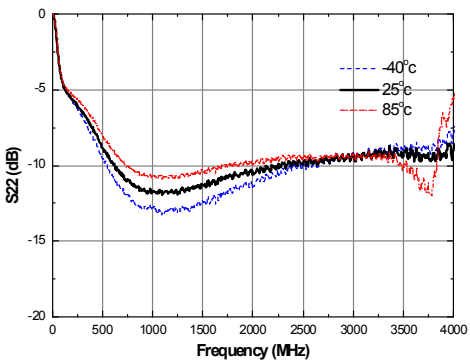
Board Layout (FR4, 40x40 mm^2, 0.8T)

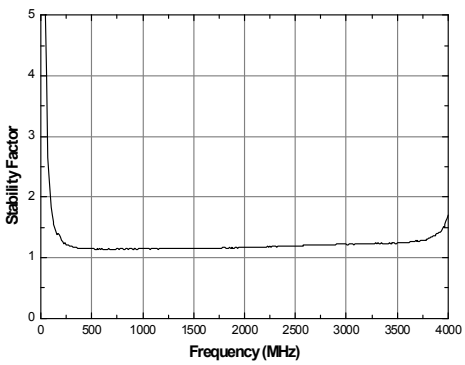


S-parameters & K-factor

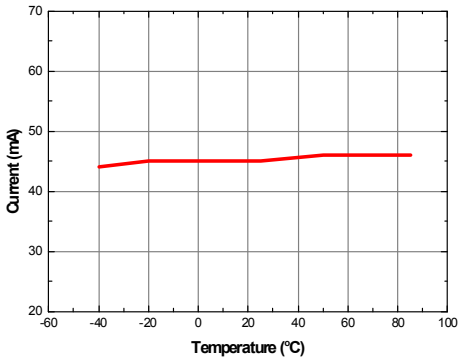




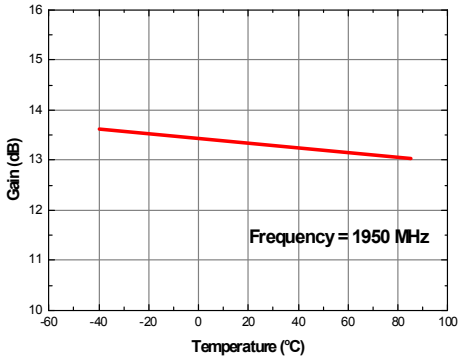




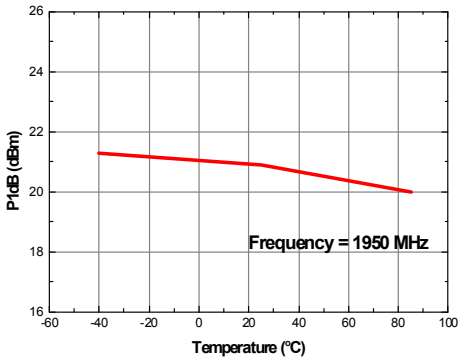
Current vs. Temperature



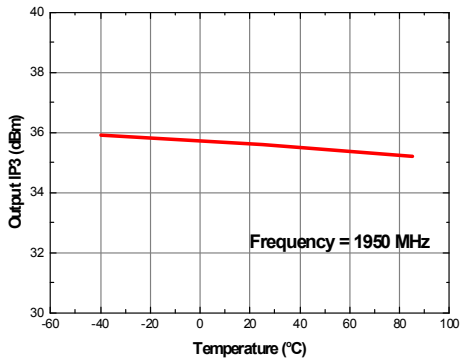
Gain vs. Temperature



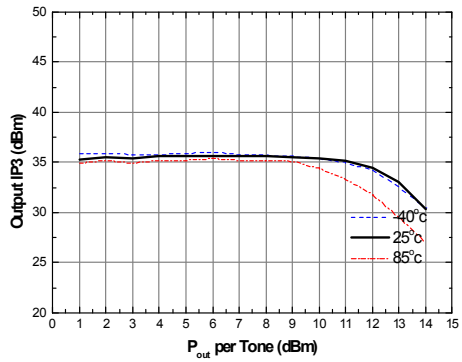
P1dB vs. Temperature



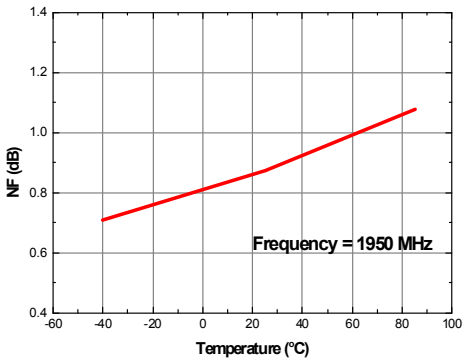
Output IP3 vs. Temperature



Output IP3 vs. Tone Power (Frequency = 1950 MHz)



NF vs. Temperature



APPLICATION CIRCUIT

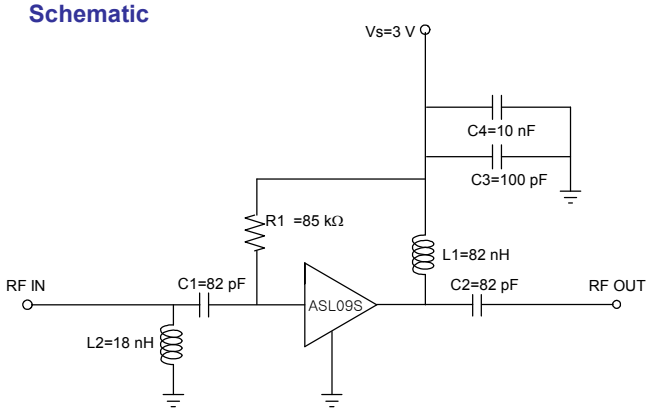
800 ~ 3500

+3 V

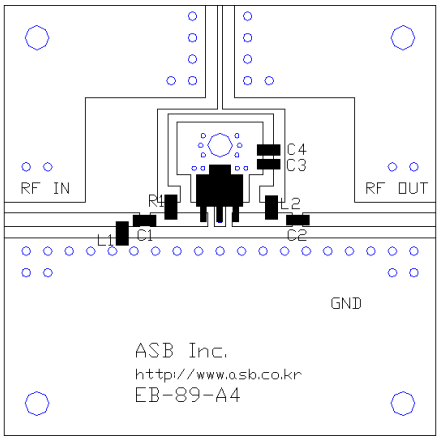
Frequency (MHz)	800	1950	2400	2700	3500
Magnitude S21 (dB)	19	12.6	10.8	9.8	7
Magnitude S11 (dB)	-18	-17	-18	-18	-18
Magnitude S22 (dB)	-10	-10	-10	-10	-9
Output P1dB (dBm)	17.5	18	18	18	19.5
Output IP3[1)] (dBm)	28.5	30.5	32	33	31
Noise Figure (dB)	0.8	0.95	1.15	1.25	1.5
Device Voltage (V)	3	3	3	3	3
Current (mA)	28	28	28	28	28

1) OIP3 is measured with two tones at an output power of +0 dBm/tone separated by 1 MHz.

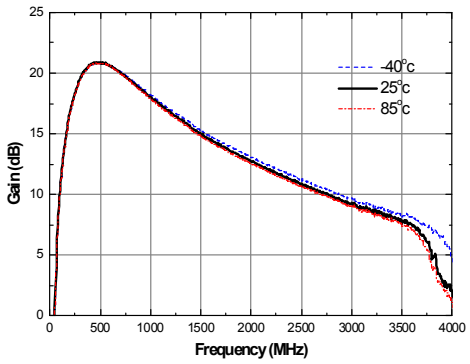
Schematic

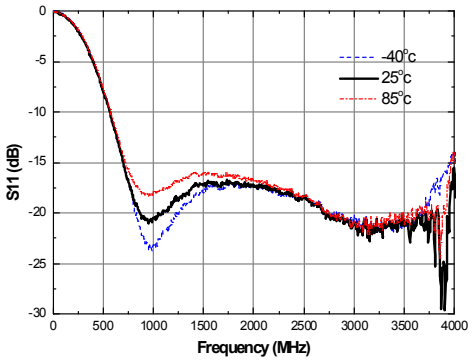


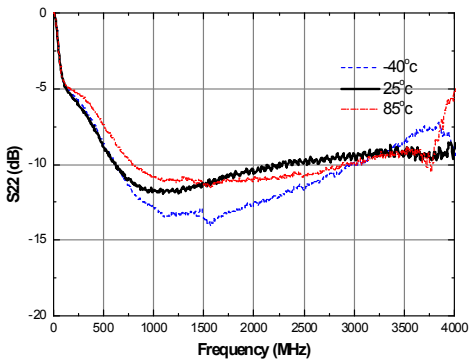
Board Layout (FR4, 40x40 mm^2, 0.8T)

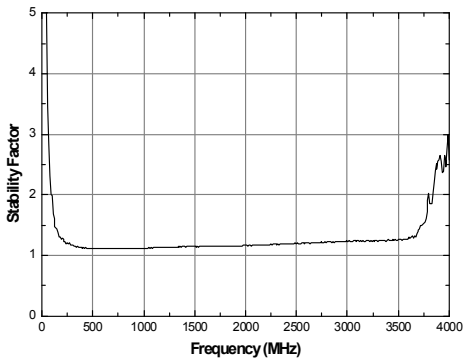


S-parameters & K-factor

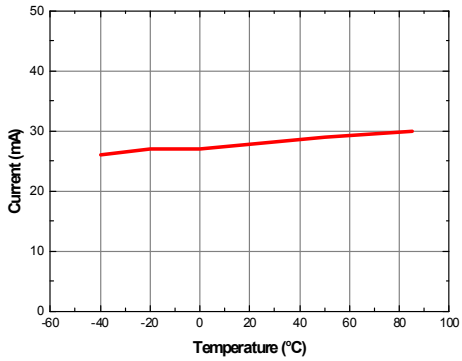




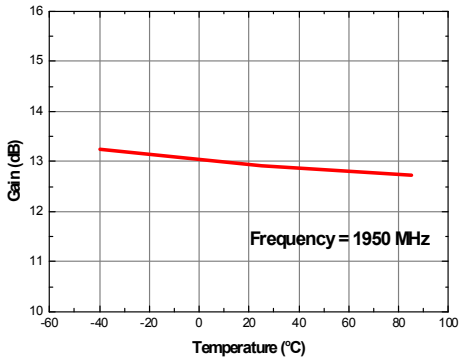




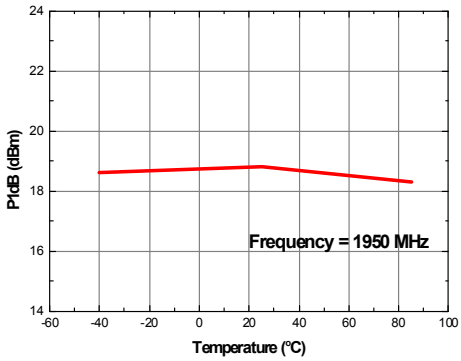
Current vs. Temperature



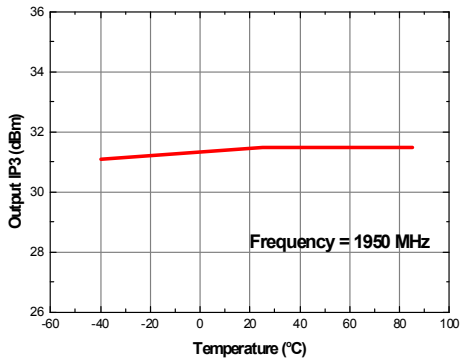
Gain vs. Temperature



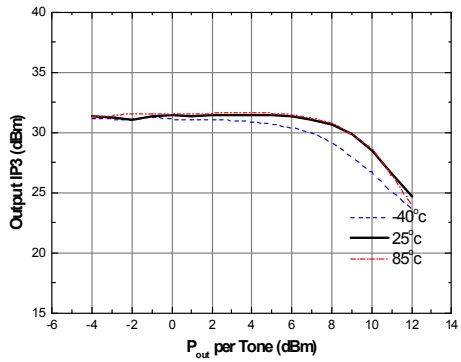
P1dB vs. Temperature



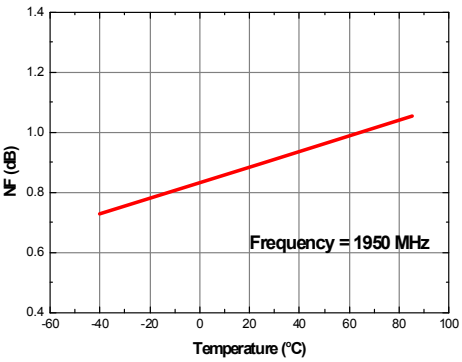
Output IP3 vs. Temperature



Output IP3 vs. Tone Power (Frequency = 1950 MHz)



NF vs. Temperature



APPLICATION CIRCUIT

TETRA

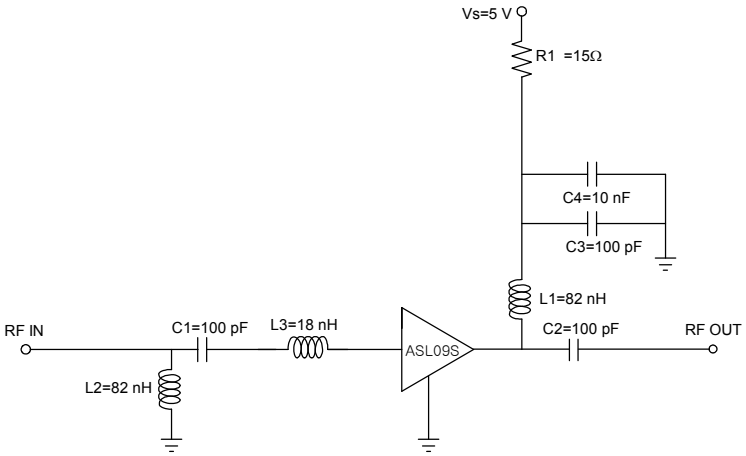
380 ~ 460

+5 V

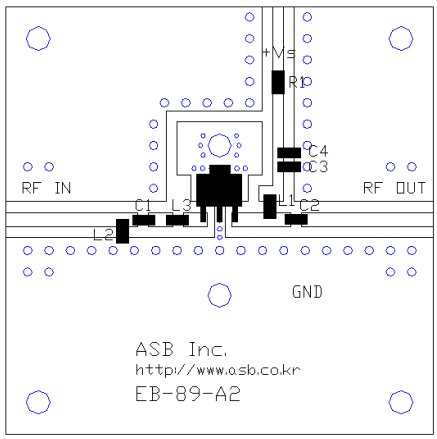
Frequency (MHz)	380	460
Magnitude S21 (dB)	23.1	22.5
Magnitude S11 (dB)	-15	-18
Magnitude S22 (dB)	-14	-15
Output P1dB (dBm)	19.5	19.5
Output IP3[1] (dBm)	31.5	32
Noise Figure (dB)	1.0	1.05
Device Voltage (V)	4.4	4.4
Current (mA)	45	45

1) OIP3 is measured with two tones at an output power of +5 dBm/tone separated by 1 MHz.

Schematic



Board Layout (FR4, 40x40 mm^2, 0.8T)



S-parameters & K-factor

