ASL51S9 Data Sheet

High Gain, Low Noise Amplifier

1. Product Overview

1.1 General Description

ASL51S9 is a low noise amplifier with high linearity over a wide range of frequency up to 1.7 ~ 3.0 GHz with S11 & S22 < -10 dB. It is also suitable for use in the mobile wireless systems such as PCS, WCDMA, LTE, WiBro, WiMAX, WLAN and so on. It has an active bias circuit for stable current over temperature and process variation. The amplifier is available in SOT89 package and passes the stringent DC, RF and reliability tests.

1.2 Features

- 16.4 dB Gain at 2000 MHz
- 17.5 dBm P1dB at 2000 MHz
- 37.0 dBm Output IP3 at 2000 MHz
- 0.8 dB NF at 2000 MHz
- MTTF > 100 Years
- Single Supply: +3.3 V

1.3 Applications

- Low Noise Amplifier for PCS and WCDMA
- Other Low Noise Application

1.4 Package Profile & RoHS Compliance

	
SOT89, 4.5x4.0 mm^2, surface mount	RoHS-compliant

2. Summary on Product Performances

2.1 Typical Performance

Supply voltage = +3.3 V, T_A = +25 °C, Z_O = 50 Ω.

Parameter	Typical				Unit
Frequency	1700	1800	1900	2000	MHz
Noise Figure	0.70	0.75	0.75	0.80	dB
Gain	17.8	17.3	16.9	16.3	dB
S11	-18.0	-18.0	-18.0	-18.0	dB
S22	-10.0	-10.0	-10.0	-11.0	dB
Output IP3[1)]	37.0	37.0	37.0	37.0	dBm
Output P1dB	17.5	17.5	17.5	17.5	dBm
Current	60				mA
Device Voltage	+3.3				V

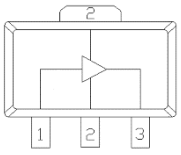
1) OIP3 is measured with two tones at the output power of +4 dBm/tone separated by 1 MHz.

2.2 Product Specification

Supply voltage = +3.3 V, T_A = +25 °C, Z_O = 50 Ω.

Parameter	Min	Typ	Max	Unit
Frequency		2000		MHz
Noise Figure		0.80		dB
Gain		16.3		dB
S11		-18.0		dB
S22		-11.0		dB
Output IP3		37.0		dBm
Output P1dB		17.5		dBm
Current		60		mA
Device Voltage		+3.3		V

2.3 Pin Configuration

Pin	Description	Simplified Outline
1	RF_IN	
2	Ground	
3	RF_OUT & Bias	

2.4 Absolute Maximum Ratings

Parameters	Max. Ratings
Operation Case Temperature	-40 to +85 °C
Storage Temperature	-40 to +150 °C
Device Voltage	+5.5 V
Operation Junction Temperature	+150 °C
Input RF Power (CW, 50 Ω matched)	+25 dBm

2.5 Thermal Resistance

Symbol	Description	Typ	Unit
R_{th}	Thermal resistance from junction to lead	110	°C/W

2.6 ESD Classification & Moisture Sensitivity Level

ESD Classification

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

CAUTION: Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

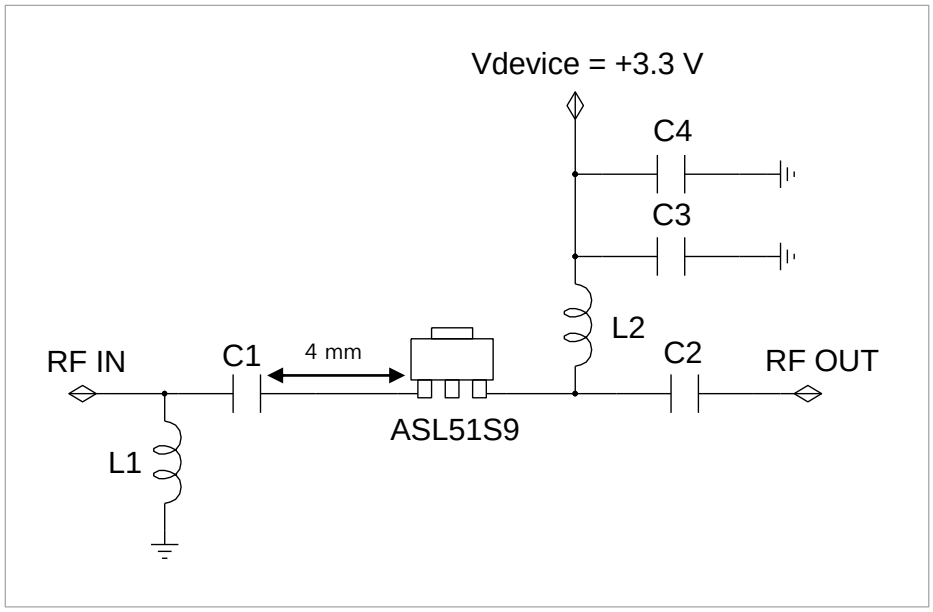
Moisture Sensitivity Level

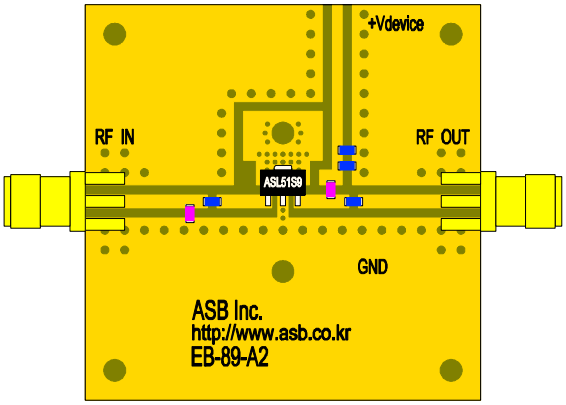
MSL 3 at 260 °C reflow

(Intentionally Blanked)

3. Application: 1700 ~ 2000 MHz (V_{supply} = +3.3 V)

3.1 Application Circuit & Evaluation Board





PCB Information	
Material	FR4
Thickness (mm)	0.8
Size (mm)	40x40
EB No.	EB-89-A2

Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL51S9	-	-	MMIC Amplifier	ASB
C1	3 pF	0603	DC block and matching capacitor	Murata
C2	100 pF	0603	DC blocking capacitor	Murata
C3	100 pF	0603	Decoupling capacitor	Murata
C3	1 μF	0603	Decoupling capacitor	Murata
L1	5.6 nH	0603	Matching inductor	Murata
L2	18 nH	0603	RF choke inductor	Murata

3.2 Performance Table

Supply voltage = +3.3 V, T_A = +25 °C, Z_O = 50 Ω.

Parameter	Typical				Unit
Frequency	1700	1800	1900	2000	MHz
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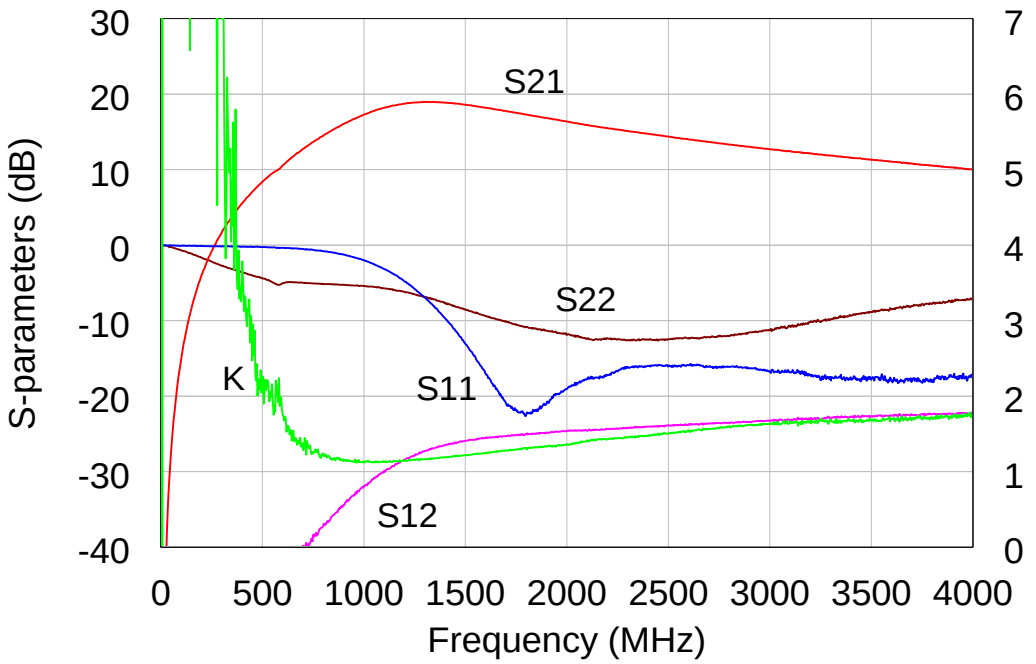
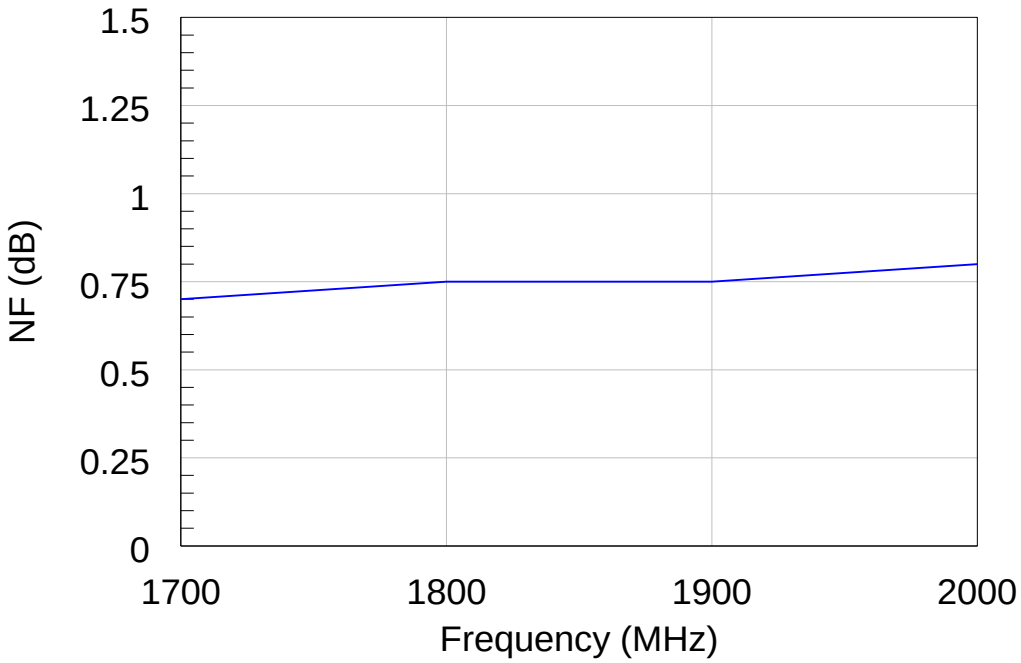
Output P1dB[1)]	17.5	17.5	17.5	17.5	dBm
Current	60				mA
Device Voltage	+3.3				V

1) OIP3 is measured with two tones at the output power of +4 dBm/tone separated by 1 MHz.

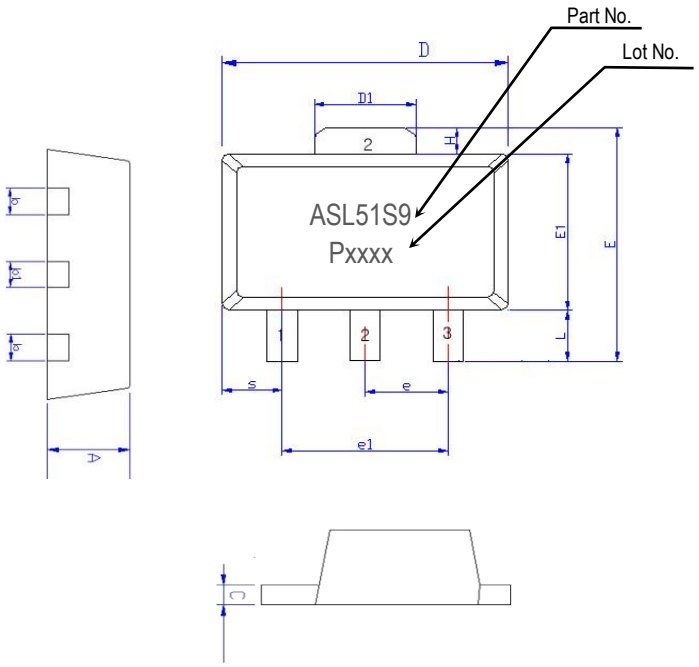
3.3 Plot of S-parameter & Stability Factor



3.4 Plot of Noise Figure

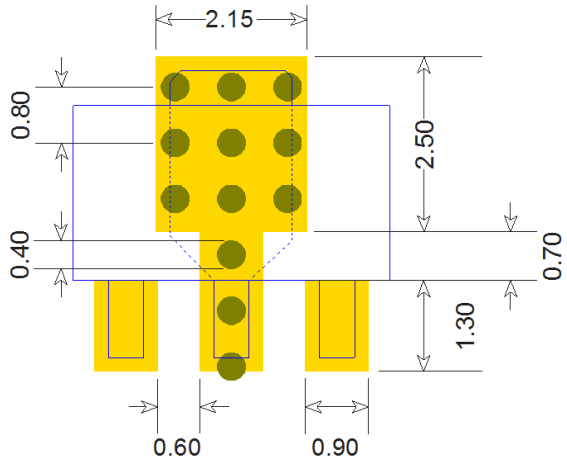


4. Package Outline (SOT89, 4.5x4.0x1.5 mm)



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

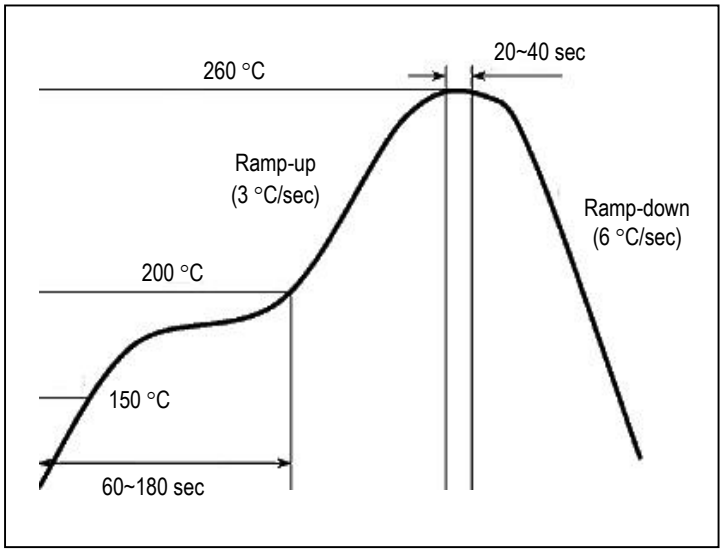
5. Surface Mount Recommendation (In mm)



NOTE

1. The number and size of ground via holes in a circuit board are critical for thermal and RF grounding considerations.
2. Recommended is 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.

6. Recommended Soldering Reflow Profile



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