

ASL122 Data Sheet

Low Noise Amplifier MMIC for GPS, GLONASS, Galileo and Compass

1. Product Overview

1.1 General Description

ASL122 is a flat gain LNA to be suitable to GNSS receiver application. The active bias circuit stabilizing the current over temperature and process variation is adopted. The amplifier is available in an SOT363 package and passes through the stringent 100% DC & RF test via an automated test handler.



1.2 Features

- 21 dB flat gain
- 0.9 dB NF at 1575 MHz
- 8.5 dBm P1dB at 1575 MHz
- 21.5 dBm OIP3 at 1575 MHz
- MTTF > 100 Years
- Single Supply: +3.3 V

1.3 Applications

- LNA for GNSS from 1164 to 1620 MHz like GPS, GLONASS, Beidou, Galileo and others
- Low current LNA for other communication

1.4 Package Profile & RoHS Compliance

 <p>SOT363, 2.1x2.0 mm², surface mount</p>	 <p>RoHS-compliant</p>
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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	1164	1575	1620	MHz
Gain	21.2	21.2	21	dB
S11	-8	-10	-9	dB
S22	-8	-10	-9	dB
Noise Figure	0.85	0.9	0.9	dB
Output IP3 ¹⁾	22.5	21.5	22	dBm
Output P1dB	12	8.5	9.5	dBm
Current	10			mA
Device Voltage	+3.3			V

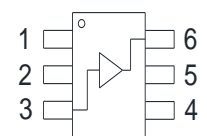
1) OIP3 is measured with two tones at the output power of -3 dBm/tone separated by 1 MHz.

2.2 Product Specification

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

Parameter	Min	Typ	Max	Unit
Frequency		1575		MHz
Gain		21.2		dB
S11		-10		dB
S22		-10		dB
Noise Figure		0.9		dB
Output IP3		21.5		dBm
Output P1dB		8.5		dBm
Current		10		mA
Device Voltage		+3.3		V

2.3 Pin Configuration

Pin	Description	Simplified Outline
3	RF_IN	
1,2,4, 5	Ground	
6	RF_OUT & Bias	

2.4 Absolute Maximum Ratings

Parameters	Max. Ratings
Operation Case Temperature	-40 to +105 °C
Storage Temperature	-40 to +150 °C
Device Voltage	+5.5 V
Operation Junction Temperature	+150 °C
Input RF Power (CW, 50 Ω matched as 1575 MHz application circuit)*	+25 dBm

2.5 Thermal Resistance

Symbol	Description	Typ	Unit
R _{th}	Thermal resistance from junction to lead	210	°C/W

2.6 ESD Classification & Moisture Sensitivity Level

ESD Classification

HBM	Class 1B	Voltage Level: 500~1000 V
CDM	Class C3	Voltage Level: > 1000 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.

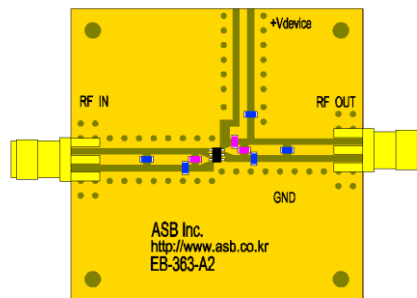
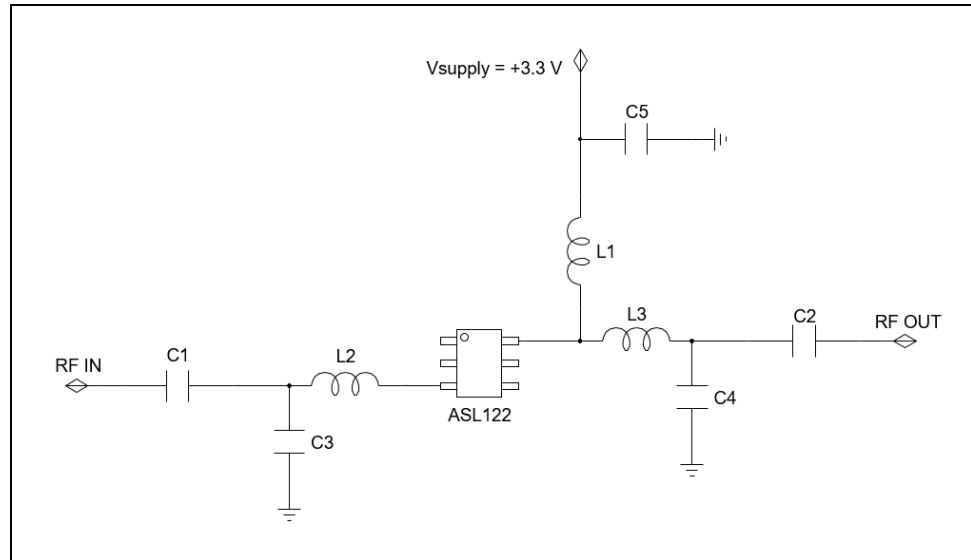
Moisture Sensitivity Level

MSL 3 at 260 °C reflow

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3. Application: 1164 ~ 1620 MHz ($V_{\text{supply}} = +3.3 \text{ V}$)

3.1 Application Circuit & Evaluation Board



PCB Information	
Material	FR4
Thickness (mm)	0.8
Size (mm)	40x40
EB No.	EB-363-A2

Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL122	-	-	MMIC Amplifier	ASB
C1, C2	100 pF	0603	DC blocking capacitor	Murata
C3, C4	0.75 pF	0603	Matching capacitor	Murata
C5	1 μ F	0603	Decoupling capacitor	Murata
L1	33 nH	0603	RF choke inductor	Murata
L2	6.8 nH	0603	Matching inductor	Murata
L3	8.2 nH	0603	Matching inductor	Murata

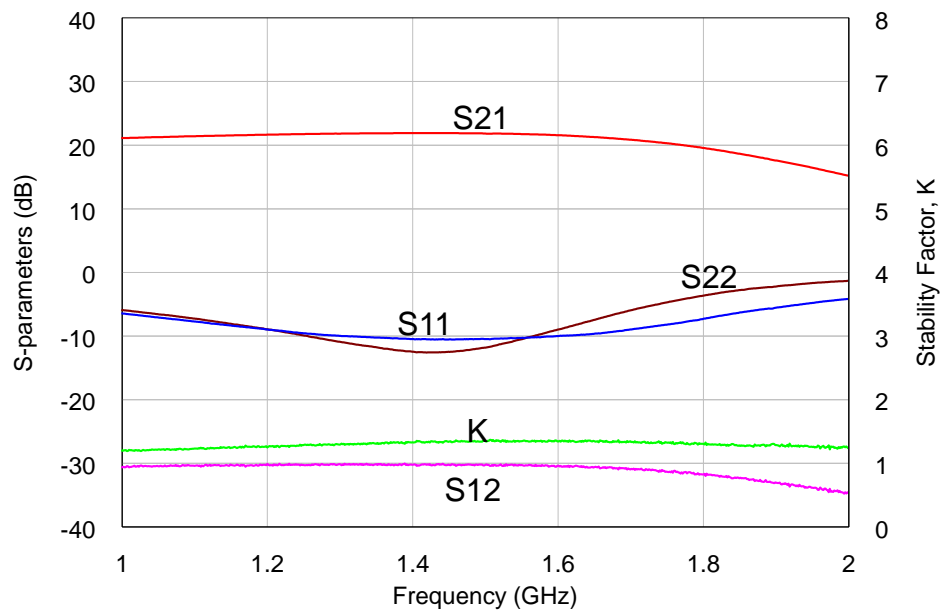
3.2 Performance Table

Supply voltage = +3.3 V, $T_A = +25\text{ }^\circ\text{C}$, $Z_O = 50\ \Omega$.

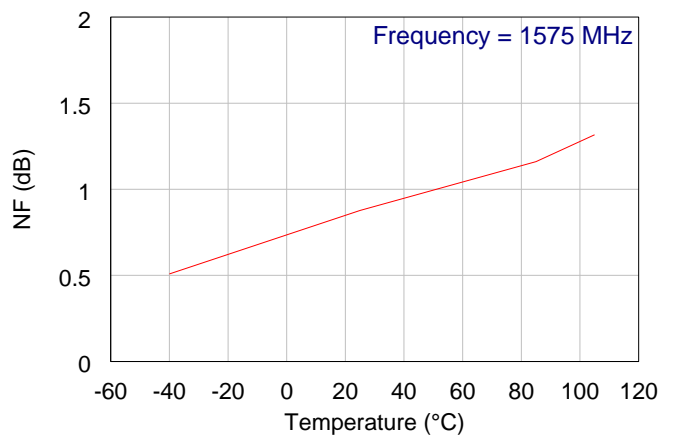
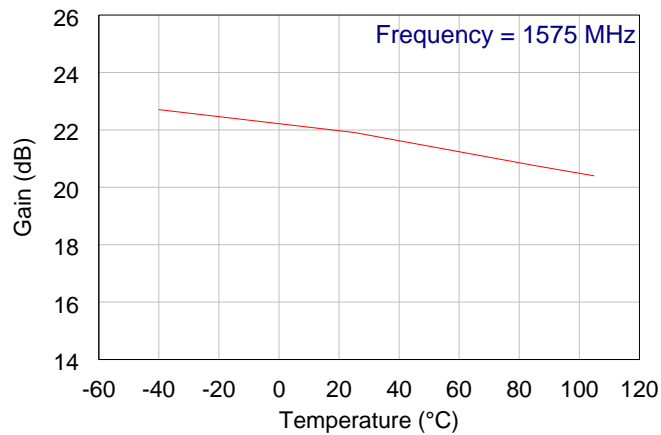
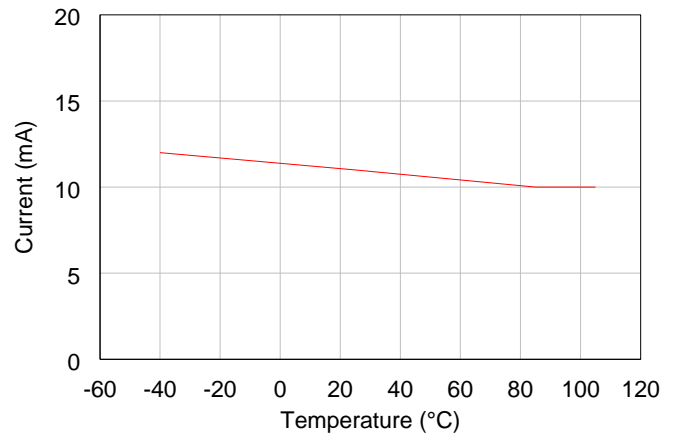
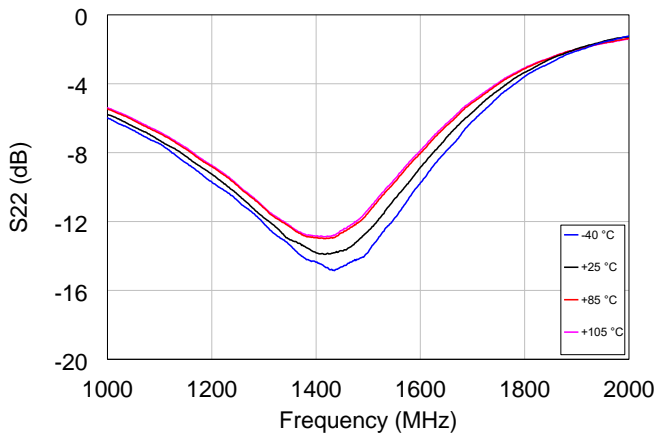
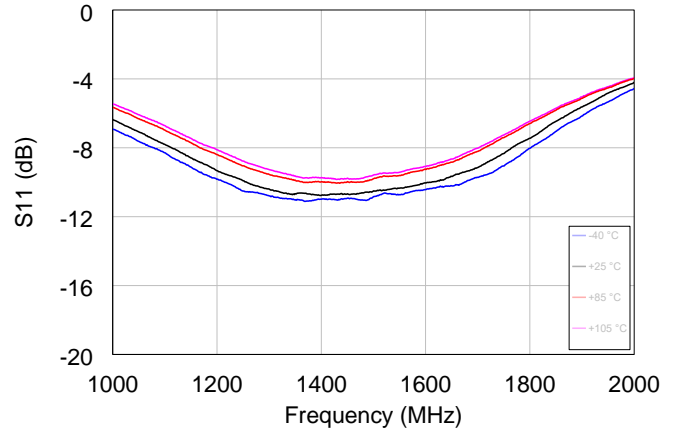
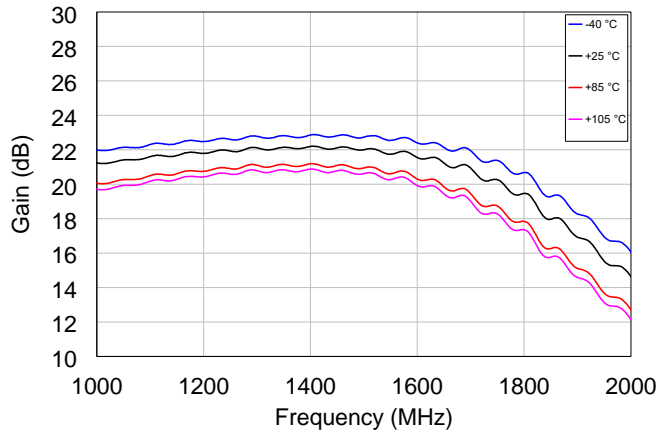
Parameter	Typical			Unit
Frequency	1164	1575	1620	MHz
Gain	21.2	21.2	21	dB
S11	-8	-10	-9	dB
S22	-8	-10	-9	dB
Noise Figure	0.85	0.9	0.9	dB
Output IP3 ¹⁾	22.5	21.5	22	dBm
Output P1dB	12	8.5	9.5	dBm
Current	10			mA
Device Voltage	+3.3			V

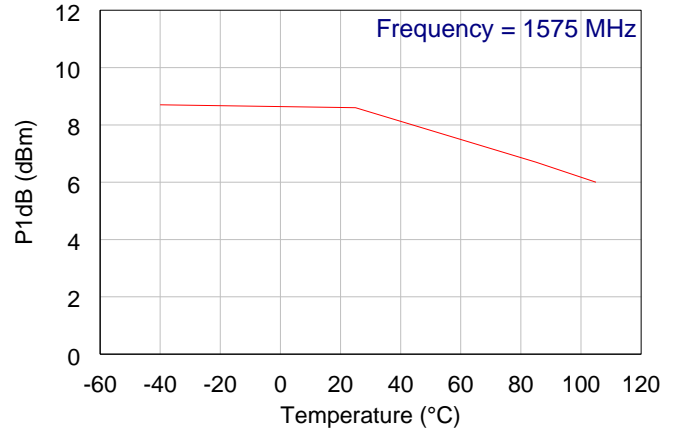
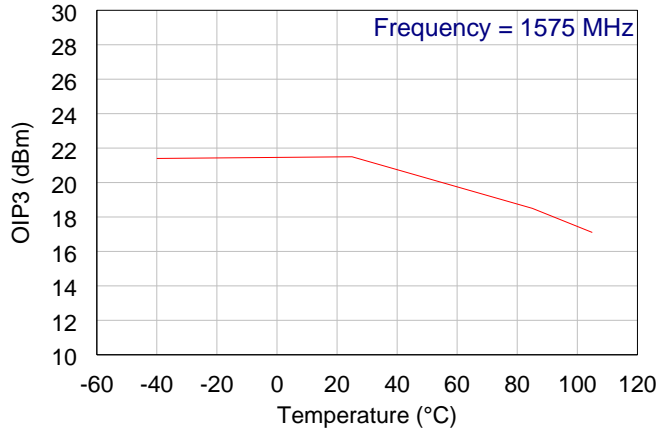
1) OIP3 is measured with two tones at the output power of -3 dBm/tone separated by 1 MHz.

3.3 Plot of S-parameter & Stability Factor



3.4 Plots of Noise Figure and Performances with Temperature

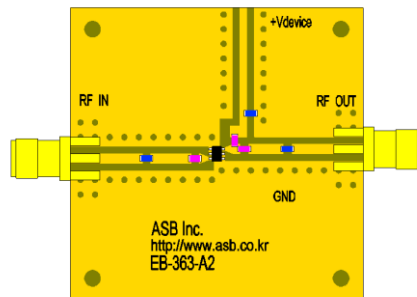
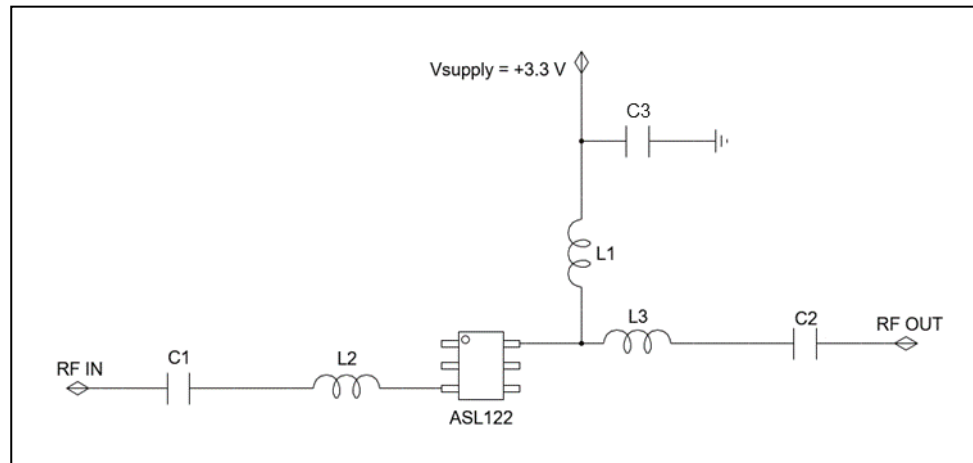




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4. Application: 1164 ~ 1381 MHz ($V_{\text{supply}} = +3.3 \text{ V}$)

4.1 Application Circuit & Evaluation Board



PCB Information	
Material	FR4
Thickness (mm)	0.8
Size (mm)	40x40
EB No.	EB-363-A2

Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL122	-	-	MMIC Amplifier	ASB
C1, C2	100 pF	0603	DC blocking capacitor	Murata
C3	1 μF	0603	Decoupling capacitor	Murata
L1	27 nH	0603	RF choke inductor	Murata
L2	6.8 nH	0603	Matching inductor	Murata
L3	8.2 nH	0603	Matching inductor	Murata

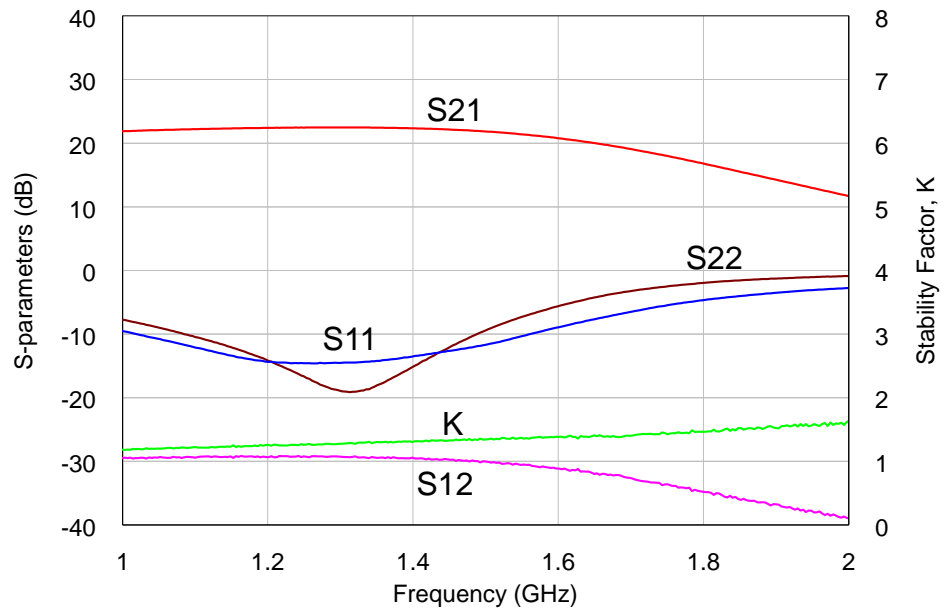
4.2 Performance Table

Supply voltage = +3.3 V, $T_A = +25\text{ }^\circ\text{C}$, $Z_O = 50\ \Omega$.

Parameter	Typical			Unit
Frequency	1164	1227	1381	MHz
Gain	22.1	22.2	22.2	dB
S11	-13	-14	-13	dB
S22	-11	-13	-15	dB
Noise Figure	0.8	0.8	0.85	dB
Output IP3 ¹⁾	24	25	24	dBm
Output P1dB	10.5	10	9	dBm
Current	10			mA
Device Voltage	+3.3			V

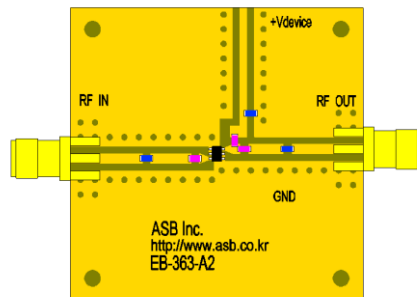
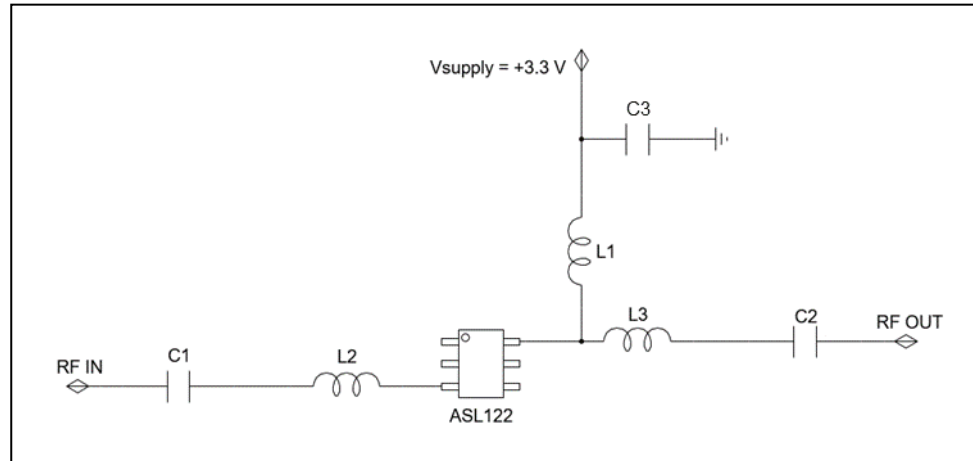
1) OIP3 is measured with two tones at the output power of -3 dBm/tone separated by 1 MHz.

4.3 Plot of S-parameter & Stability Factor



5. Application: 1575 ~ 1620 MHz ($V_{\text{supply}} = +3.3 \text{ V}$)

5.1 Application Circuit & Evaluation Board



PCB Information	
Material	FR4
Thickness (mm)	0.8
Size (mm)	40x40
EB No.	EB-363-A2

Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL122	-	-	MMIC Amplifier	ASB
C1, C2	100 pF	0603	DC blocking capacitor	Murata
C3	1 μ F	0603	Decoupling capacitor	Murata
L1	8.2 nH	0603	RF choke inductor	Murata
L2	5.6 nH	0603	Matching inductor	Murata
L3	8.2 nH	0603	Matching inductor	Murata

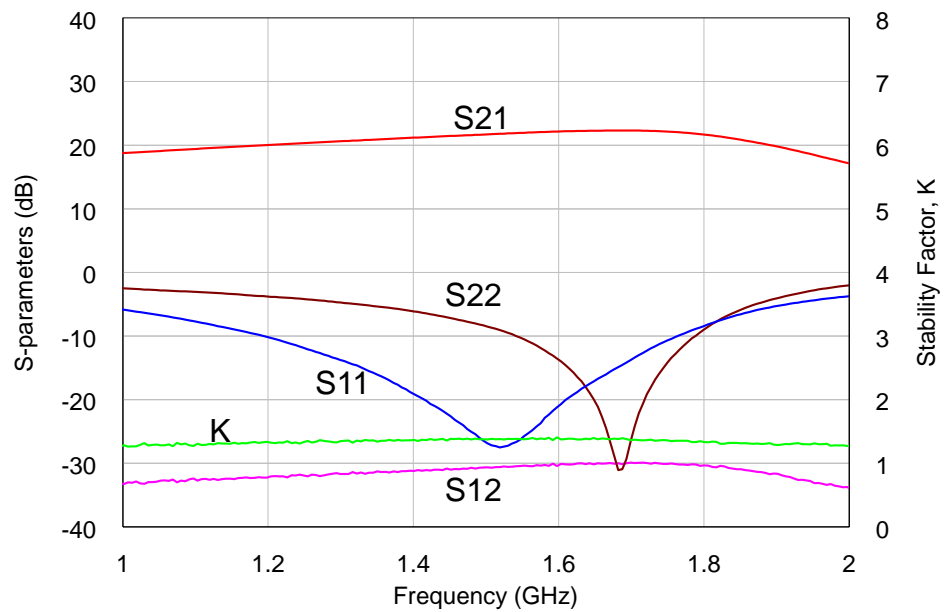
5.2 Performance Table

Supply voltage = +3.3 V, $T_A = +25\text{ }^\circ\text{C}$, $Z_0 = 50\ \Omega$.

Parameter	Typical		Unit
Frequency	1575	1620	MHz
Gain	22	22.1	dB
S11	-20	-15	dB
S22	-12	-15	dB
Noise Figure	0.85	0.85	dB
Output IP3 ¹⁾	21.5	23	dBm
Output P1dB	6.5	7	dBm
Current	10		mA
Device Voltage	+3.3		V

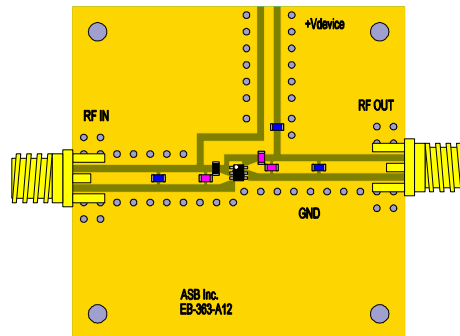
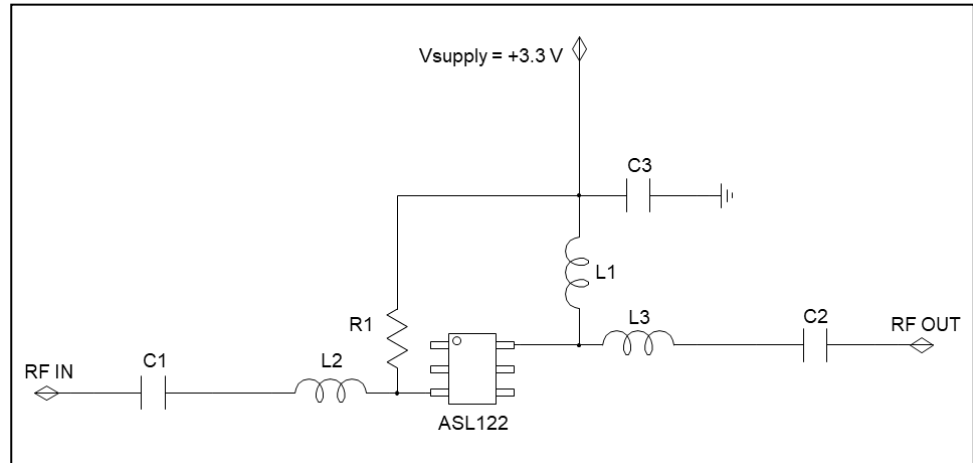
1) OIP3 is measured with two tones at the output power of -3 dBm/tone separated by 1 MHz.

5.3 Plot of S-parameter & Stability Factor



6. Application: 1164 ~ 1620 MHz, Low Noise ($V_{\text{supply}} = +3.3 \text{ V}$)

6.1 Application Circuit & Evaluation Board



PCB Information

Material	FR4
Thickness (mm)	0.8
Size (mm)	40x40
EB No.	EB-363-A12

Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL122	-	-	MMIC Amplifier	ASB
C1, C2	100 pF	0603	DC blocking capacitor	Murata
C3	1 μ F	0603	Decoupling capacitor	Murata
L1	18 nH	0603	RF choke inductor	Murata
L2	4.7 nH	0603	Matching inductor	Murata
L3	6.8 nH	0603	Matching inductor	Murata
R1	390 k Ω	0603	Current adjust resistor	Samsung

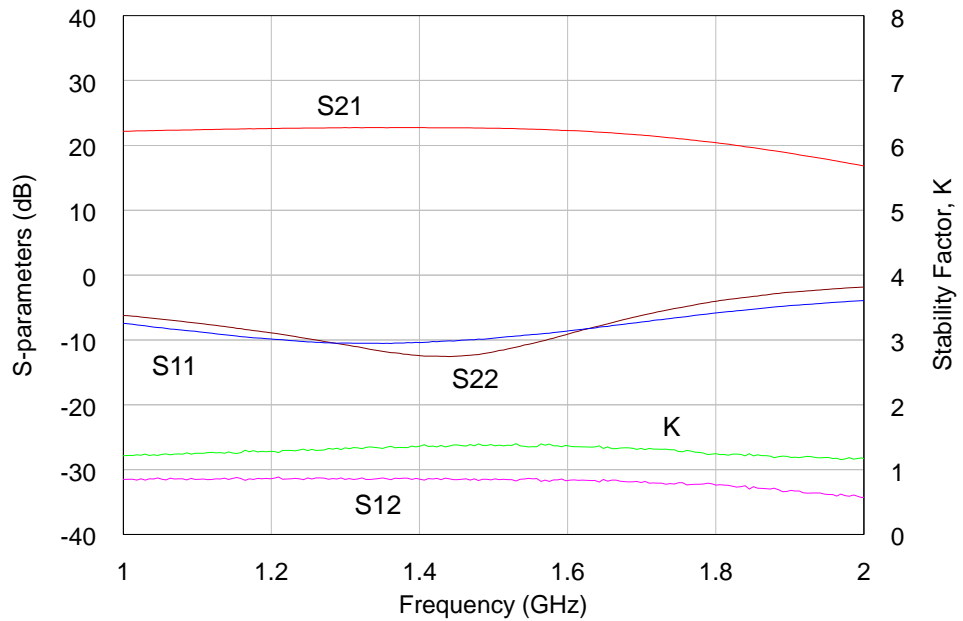
6.2 Performance Table

Supply voltage = +3.3 V, $T_A = +25\text{ }^\circ\text{C}$, $Z_O = 50\ \Omega$.

Parameter	Typical			Unit
Frequency	1164	1575	1620	MHz
Gain	22.4	22.3	22.1	dB
S11	-8	-8	-8	dB
S22	-9	-9	-8	dB
Noise Figure	0.75	0.8	0.8	dB
Output IP3 ¹⁾	26	24	23	dBm
Output P1dB	10	9	8	dBm
Current	15			mA
Device Voltage	+3.3			V

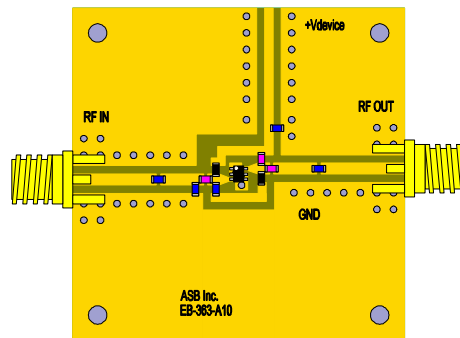
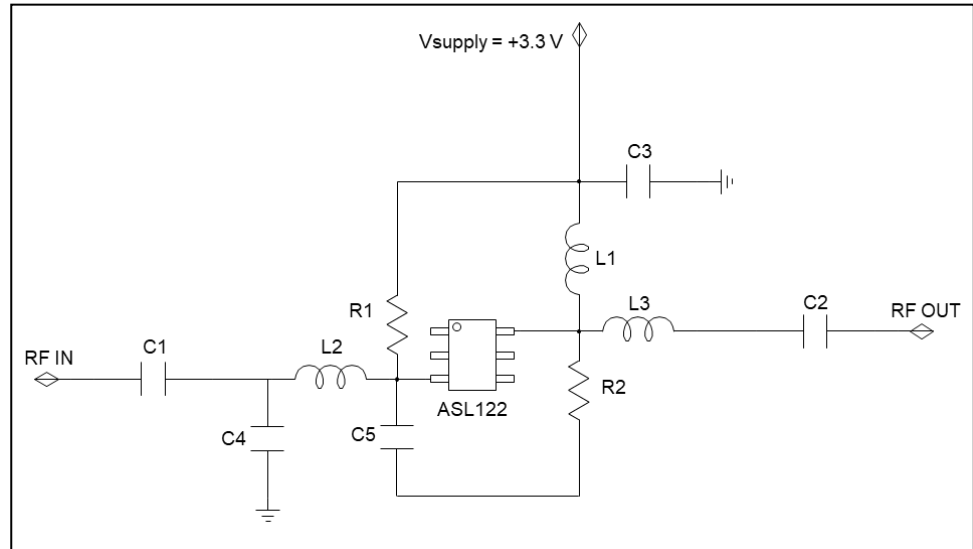
1) OIP3 is measured with two tones at the output power of -3 dBm/tone separated by 1 MHz.

6.3 Plot of S-parameter & Stability Factor



7. Application: 1164 ~ 1620 MHz, High IP1dB ($V_{\text{supply}} = +3.3 \text{ V}$)

7.1 Application Circuit & Evaluation Board



PCB Information

Material	FR4
Thickness (mm)	0.8
Size (mm)	40x40
EB No.	EB-363-A10

Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL122	-	-	MMIC Amplifier	ASB
C1, C2	100 pF	0603	DC blocking capacitor	Murata
C3	1 μ F	0603	Decoupling capacitor	Murata
C4	1.5 pF	0603	Matching capacitor	Murata
C5	100 pF	0603	Feedback capacitor	Murata
L1	18 nH	0603	RF choke inductor	Murata
L2	4.7 nH	0603	Matching inductor	Murata
L3	3.9 nH	0603	Matching inductor	Murata
R1	240 k Ω	0603	Current adjust resistor	Samsung
R2	1.5 k Ω	0603	Feedback resistor	Samsung

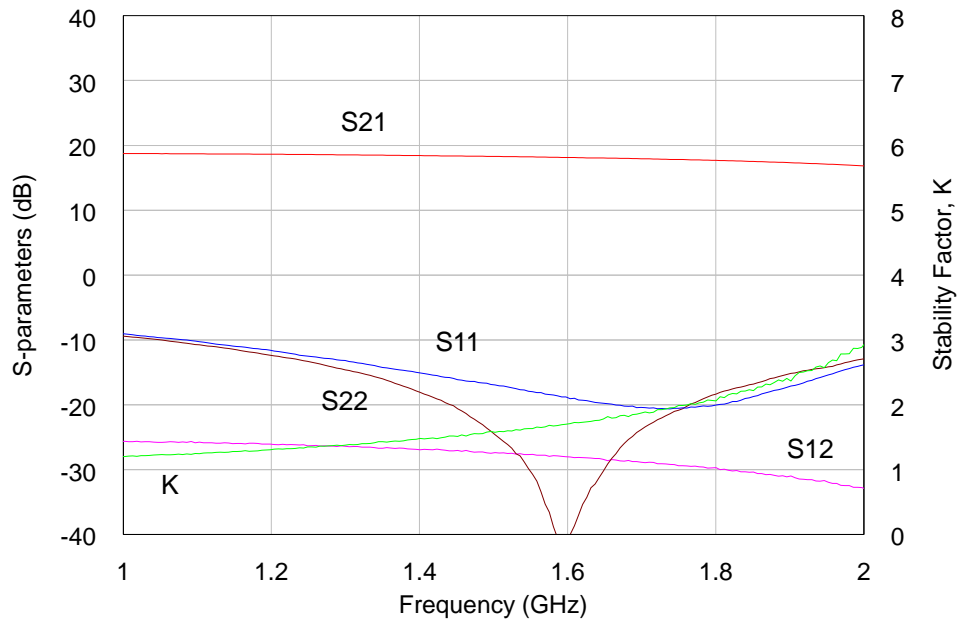
7.2 Performance Table

Supply voltage = +3.3 V, $T_A = +25\text{ }^\circ\text{C}$, $Z_O = 50\ \Omega$.

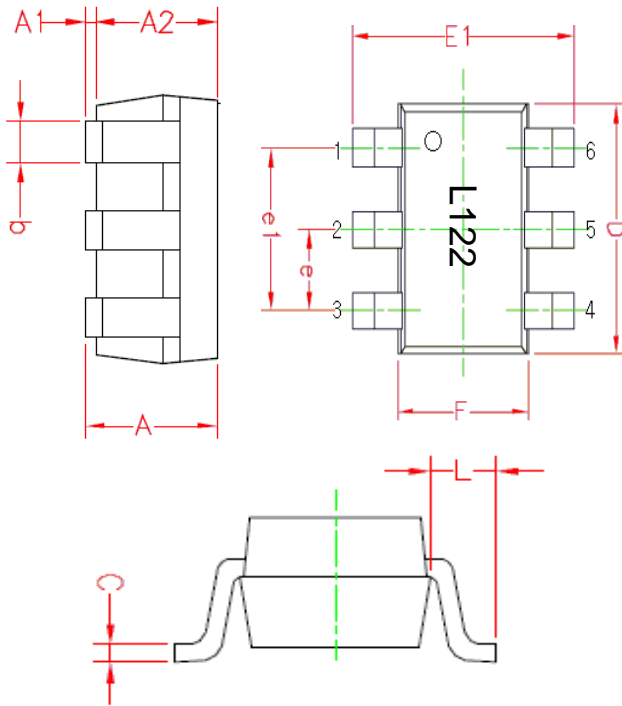
Parameter	Typical			Unit
Frequency	1164	1575	1620	MHz
Gain	18.5	18.1	18	dB
S11	-11	-18	-18	dB
S22	-11	-20	-20	dB
Noise Figure	1.1	1.2	1.2	dB
Output IP3 ¹⁾	26	27	26	dBm
Output P1dB	12.5	12.5	12.5	dBm
Current	20			mA
Device Voltage	+3.3			V

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

7.3 Plot of S-parameter & Stability Factor

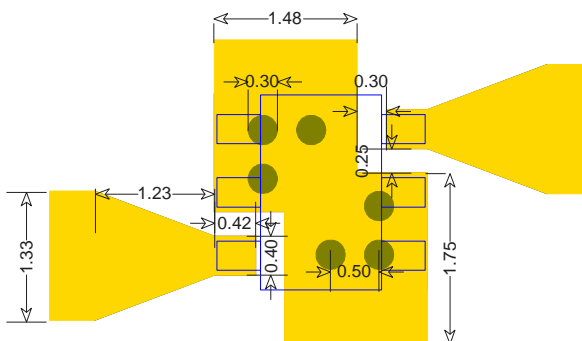


8. Package Outline (SOT363, 2.1x2.0x1.0 mm)



Symbols	Dimensions (In mm)		
	MIN	NOM	MAX
A	0.900	1.000	1.10
A1	0.025	0.062	0.10
A2	0.875	0.937	1.00
b	0.200	0.300	0.40
C	0.100	0.125	0.15
D	1.900	2.000	2.10
F	1.150	1.250	1.35
E1	2.000	2.100	2.20
e	0.65BSC		
e1	1.30BSC		
L	0.425REF		

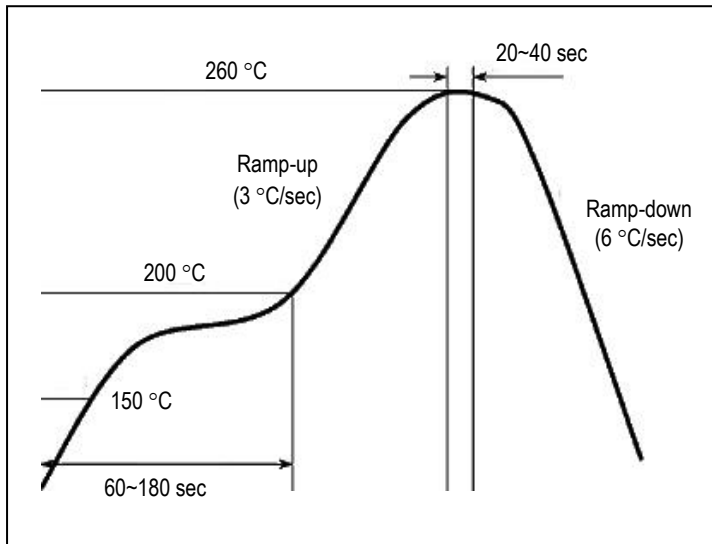
9. Surface Mount Recommendation (In mm)



NOTE

1. The number and size of ground via holes in a circuit board are critical for thermal and RF grounding considerations.
2. Recommend is that the ground via holes be placed on the bottom of the ground leads and exposed pad of the device for better RF and thermal performance, as shown in the drawing at the left side.

10. Recommended Soldering Reflow Profile



(End of Datasheet)

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