

ASL39D2 Data Sheet

1.8 GHz CATV Push-pull Amplifier MMIC

1. Product Overview

1.1 General Description

ASL39D2, a wide-band linear push-pull amplifier MMIC, has high linearity and low noise over a wide range of frequency up to 1800 MHz, being suitable for use in the FTTH, optical receiver, distribution amplifiers, and drop amplifiers of CATV. The amplifier is available in an SOIC8 package and passes through the stringent 100% DC & RF test in an automated test handler.

1.2 Features

- 5 ~ 1200 MHz Bandwidth
- 19.0 dB High Gain at 1000 MHz
- High Output Power: 105 dB μ V
- Robust under Hard Operating Conditions
- +5 V, 300 mA Supply

1.3 Applications

- Low Noise Amplifier for CATV
- Other Low Distortion and Low Noise Applications

1.4 Package Profile & RoHS Compliance

 SOIC8, 6.0x4.8 mm², surface mount	 RoHS-compliant
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2. Summary on Product Performance

2.1 Typical Performance

Supply voltage = +5 V, $T_A = +25\text{ }^{\circ}\text{C}$, $Z_0 = 75\text{ }\Omega$.

Parameter	Reverse			Forward					
Frequency	5	50	300	50	500	860	1002	1200	MHz
Noise Figure	1.8	1.2	1.3	1.2	1.3	1.6	1.6	1.9	dB
Gain	20.0	20.0	20.0	19.8	19.5	19.0	19.0	18.5	dB
S11	-18	-18	-18	-18	-18	-18	-18	-15	dB
S22	-18	-18	-18	-18	-18	-18	-18	-15	dB
OIP3 ¹⁾	40.0	42.0	44.5	41.0	44.0	41.0	42.0	41.5	dBm
OIP2	67 ^{1), 2)}	74 ^{1), 2)}	72 ^{1), 2)}	66 ³⁾					dBm
P1dB	24	27	27	27	27	26	27	25	dBm
CSO ⁴⁾ (@ 84 Ch, PAL)				60					dBc
CSO ⁴⁾ (@ 60 Ch, PAL)				68					dBc
CTB ⁴⁾ (@ 84 Ch, PAL)				66					dBc
CTB ⁴⁾ (@ 60 Ch, PAL)				70					dBc
Current	300								mA
Device Voltage	+5								V

1) OIP3 and OIP2 are measured with two tones at an output power of +12 dBm/tone separated by 1 MHz for reverse and 6 MHz for forward.

2) OIP2 is measured at F1+F2 Frequency.

3) OIP2 is measured with two tones at an output power of +14 dBm/tone at F1 (400 MHz) + F2 (450 MHz).

4) CSO & CTB measured at $P_{out} = 105\text{ dB}\mu\text{V}$.

2.2 Product Specification

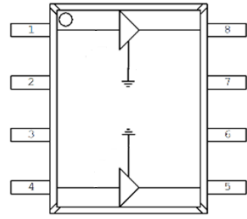
Supply voltage = +5 V, $T_A = +25\text{ }^{\circ}\text{C}$, $Z_0 = 75\text{ }\Omega$.

Parameter	Min	Typ	Max	Unit
Frequency		500		MHz
Noise Figure		1.3		dB
Gain		19.5		dB
S11		-18		dB
S22		-18		dB
OIP3 ¹⁾		44.0		dBm
OIP2 ²⁾		66		dBm
P1dB		27		dBm
Current		300		mA
Device Voltage		+5		V

1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 6 MHz.

2) OIP2 is measured with two tones at an output power of +14 dBm/tone at F1 (400 MHz) + F2 (450 MHz).

2.3 Pin Configuration

Pin	Description	Simplified Outline
1	RF_IN 1	
2, 3, 6, 7	NC	
4	RF_IN 2	
5	RF_OUT 2	
8	RF_OUT 1	

Note: Backside metal paddle is RF and DC ground.

2.4 Absolute Maximum Ratings, $T_A = +25\text{ }^{\circ}\text{C}$

Parameters	Max. Ratings
Operation Case Temperature	-40 to +85 $^{\circ}\text{C}$
Storage Temperature	-40 to +150 $^{\circ}\text{C}$
Device Voltage	+9 V
Maximum Current	500 mA
Operation Junction Temperature	+160 $^{\circ}\text{C}$
Input RF Power (CW, 75 Ω matched)*	+25 dBm

The operation of this device in excess of any of these limits may cause permanent damage.

* Refer to the max. input RF power data at http://www.asb.co.kr/pdf/Maximum_Input_Power_Analysis.pdf. The max. input RF power, in principle, depends upon application frequency, matching circuit, and device voltage.

2.5 Thermal Resistance

Symbol	Description	Typ	Unit
R_{th}	Thermal resistance from junction to lead	18	$^{\circ}\text{C/W}$

2.6 ESD Classification & Moisture Sensitivity Level

ESD Classification

HBM	Class 1B	Voltage Level: 550 V
MM	Class A	Voltage Level: 50 V

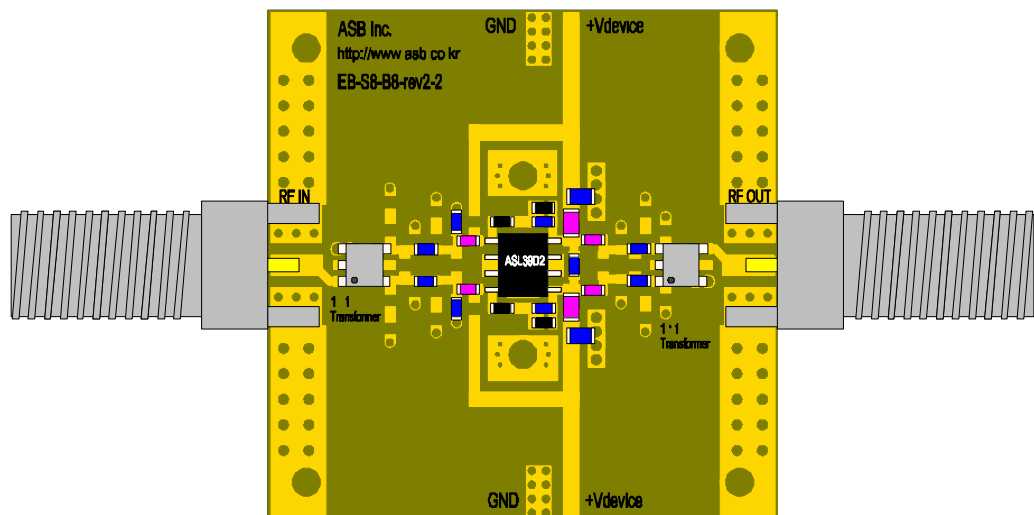
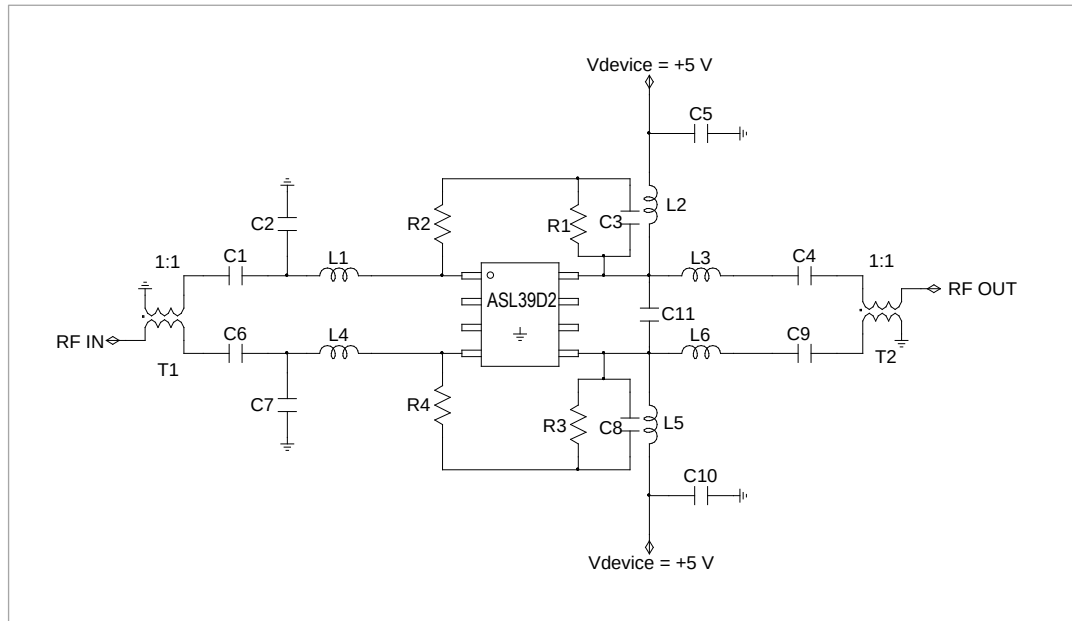
CAUTION: Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Moisture Sensitivity Level

Level 3 at 260 $^{\circ}\text{C}$ reflow

3. Application: 50 ~ 1002 MHz ($V_{\text{supply}} = +5 \text{ V}$)

3.1 Application Circuit & Evaluation Board



PCB Information

Material	FR4
Thickness (mm)	0.8
Size (mm)	40 x 40
EB No.	EB-S8-B8-rev2-2

Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL39D2	-	-	MMIC Amplifier	ASB
C5, C10	10 μ F	2012	Decoupling capacitor	MURATA
C1, C4, C6, C9	1 μ F	1608	DC blocking capacitor	MURATA
C3, C8	1 μ F	1608	Feedback capacitor	MURATA
C2, C7, C11	1.5 pF	1608	Matching capacitor	MURATA
R2, R4	430 Ω	1608	Feedback resistor	Samsung
R1, R3	62 k Ω	1608	Bias resistor	Samsung
L1, L4	2.2 nH	1608	Matching inductor	MURATA
L3, L6	2.7 nH	1608	Matching inductor	MURATA
L2, L5	1 μ H	3216	RF choke inductor	MURATA
T1 ¹⁾ , T2 ¹⁾	1 : 1	SM-22	Transformer balun	MACOM

1) MABA007159

3.2 Performance Table

Supply voltage = +5 V, T_A = +25 °C, Z_O = 75 Ω .

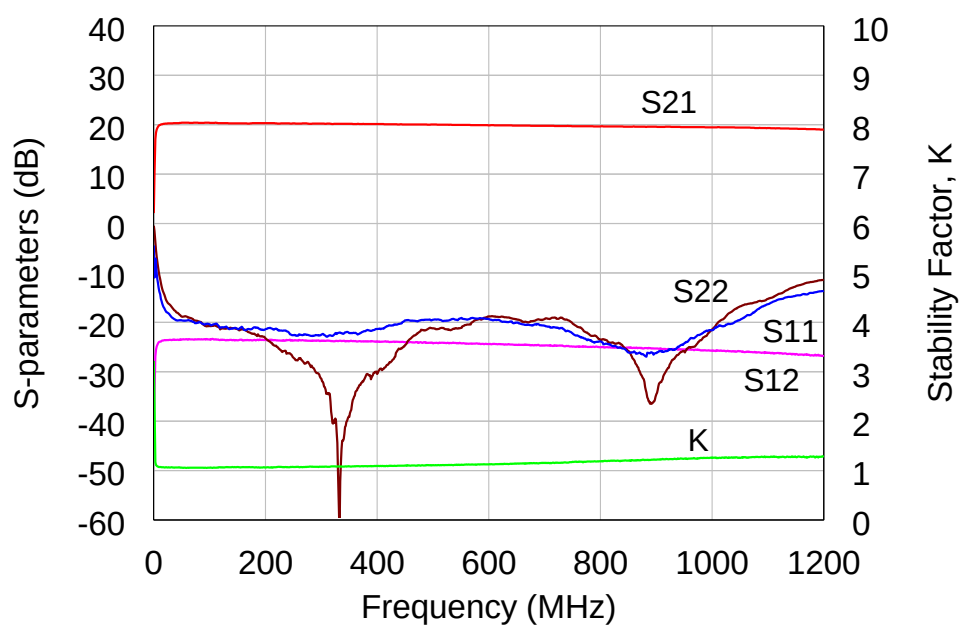
Parameter	Typical			
Frequency	50	500	1002	MHz
Noise Figure	1.2	1.3	1.6	dB
Gain	19.8	19.5	19.0	dB
S11	-18	-18	-18	dB
S22	-18	-18	-18	dB
OIP3 ¹⁾	41.0	44.0	42.0	dBm
OIP2 ²⁾	66			dBm
P1dB	27	27	26	dBm
CSO ³⁾ (@ 84 Ch, PAL)	60			dBc
CSO ³⁾ (@ 60 Ch, PAL)	68			dBc
CTB ³⁾ (@ 84 Ch, PAL)	66			dBc
CTB ³⁾ (@ 60 Ch, PAL)	70			dBc
Current	300			mA
Device Voltage	+5			V

1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 6 MHz.

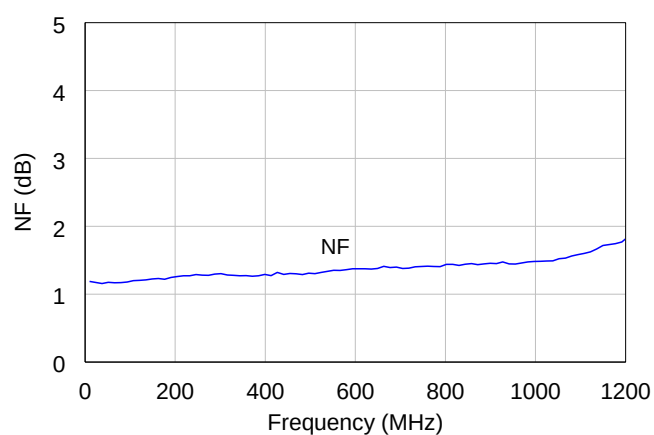
2) OIP2 is measured with two tones at an output power of +14 dBm/tone at F1 (400 MHz) + F2 (450 MHz).

3) CSO & CTB measured at P_{out} = 105 dB μ V.

3.3 Plot of S-parameters & Stability Factor

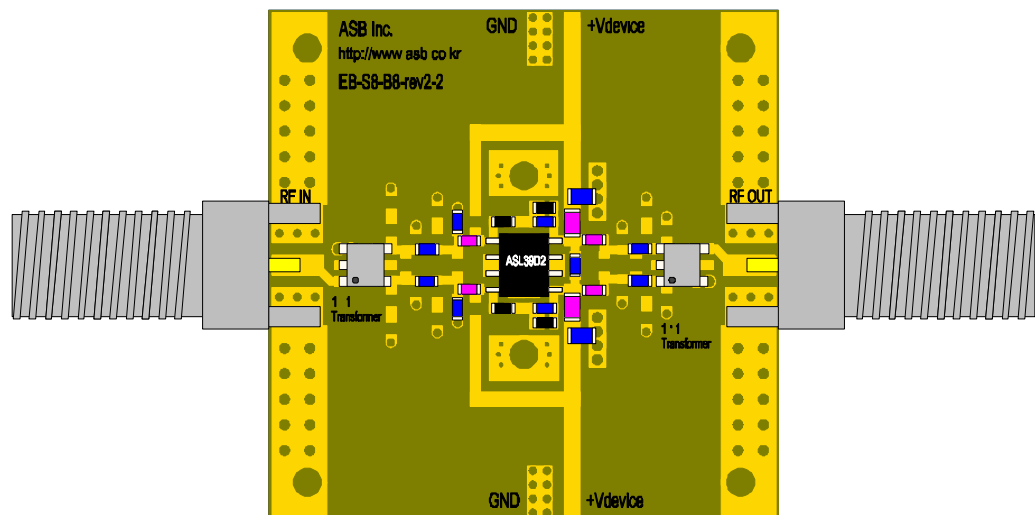
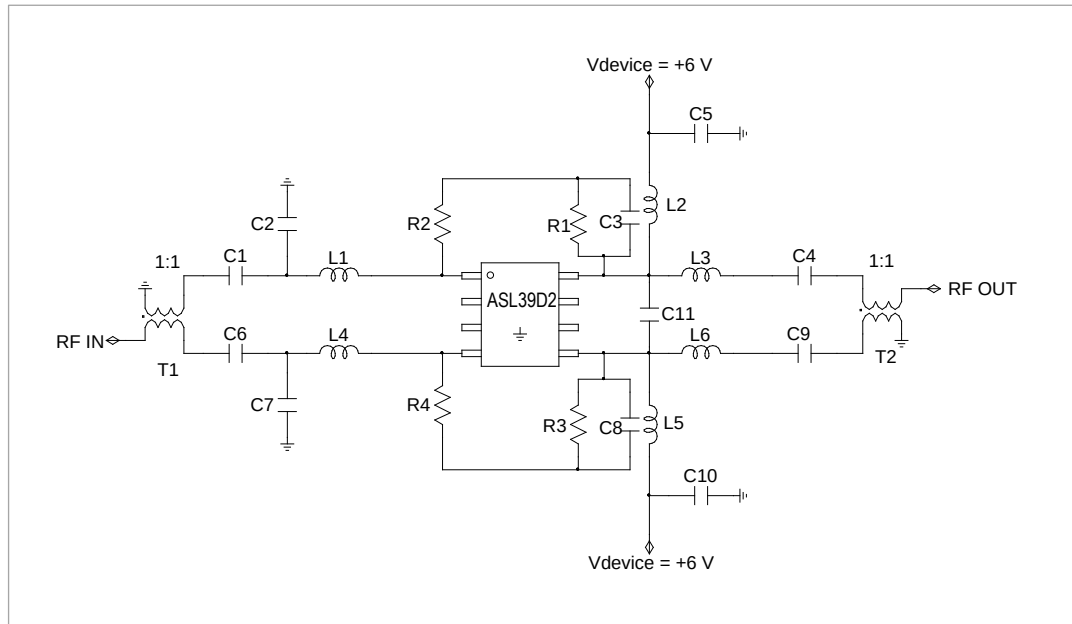


3.4 Plot of Performance



4. Application: 50 ~ 1002 MHz ($V_{\text{supply}} = +6 \text{ V}$)

4.1 Application Circuit & Evaluation Board



PCB Information

Material	FR4
Thickness (mm)	0.8
Size (mm)	40 x 40
EB No.	EB-S8-B8-rev2-2

Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL39D2	-	-	MMIC Amplifier	ASB
C5, C10	10 μ F	2012	Decoupling capacitor	MURATA
C1, C4, C6, C8	1 μ F	1608	DC blocking capacitor	MURATA
C3, C9	1 μ F	1608	Feedback capacitor	MURATA
C2, C7, C11	1.5 pF	1608	Matching capacitor	MURATA
R2, R4	430 Ω	1608	Feedback resistor	Samsung
R1, R3	51 k Ω	1608	Bias resistor	Samsung
L1, L4	2.2 nH	1608	Matching inductor	MURATA
VL3, L6	2.7 nH	1608	Matching inductor	MURATA
L2, L5	1 μ H	3216	RF choke inductor	MURATA
T1 ¹⁾ , T2 ¹⁾	1 : 1	SM-22	Transformer balun	MACOM

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4.2 Performance Table

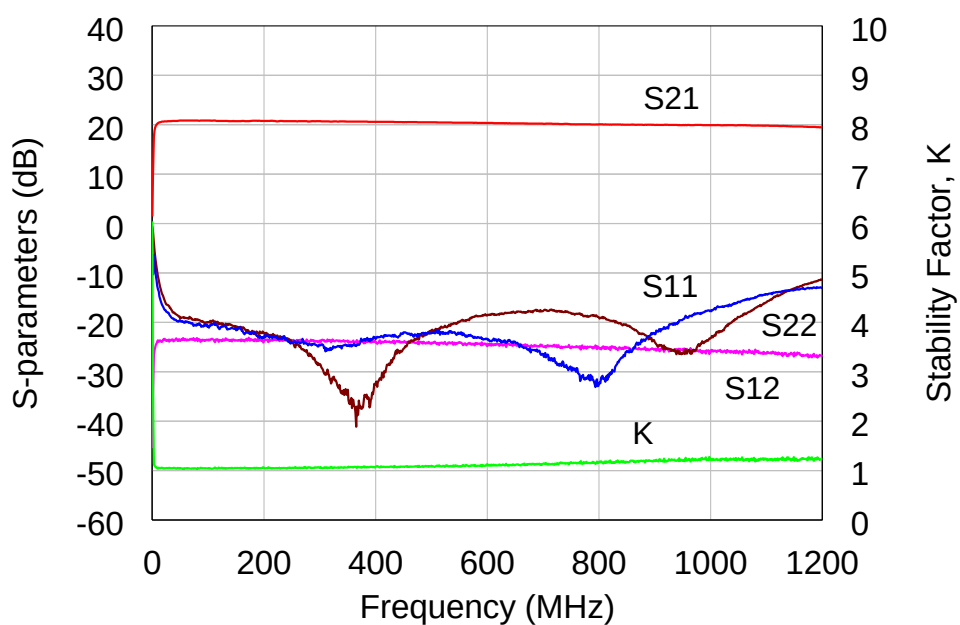
Supply voltage = +6 V, T_A = +25 °C, Z_O = 75 Ω .

Parameter	Typical			
Frequency	50	500	1002	MHz
Noise Figure	1.3	1.5	1.8	dB
Gain	20.0	19.5	19.0	dB
S11	-17	-18	-17	dB
S22	-17	-18	-17	dB
OIP3 ¹⁾	44.0	46.0	44.5	dBm
OIP2 ²⁾	66			dBm
P1dB	28	28	28	dBm
Current	430			mA
Device Voltage	+6			V

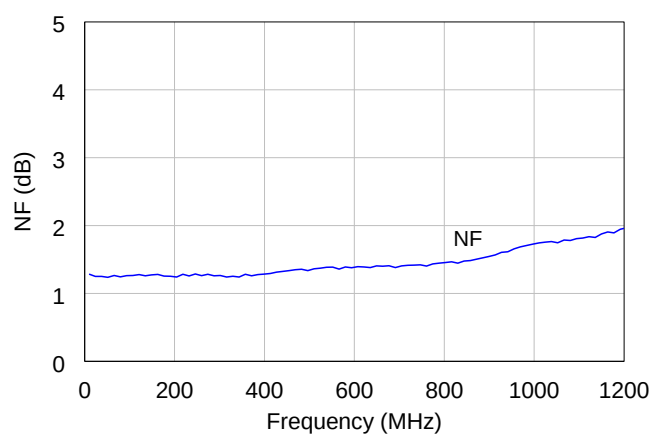
1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 6 MHz.

2) OIP2 is measured with two tones at an output power of +14 dBm/tone at F1 (400 MHz) + F2 (450 MHz).

4.3 Plot of S-parameters & Stability Factor

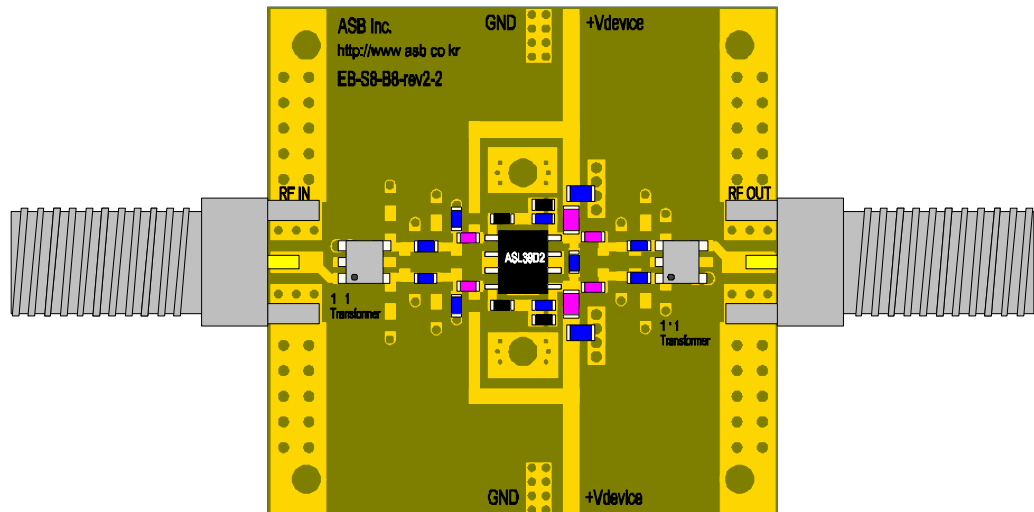
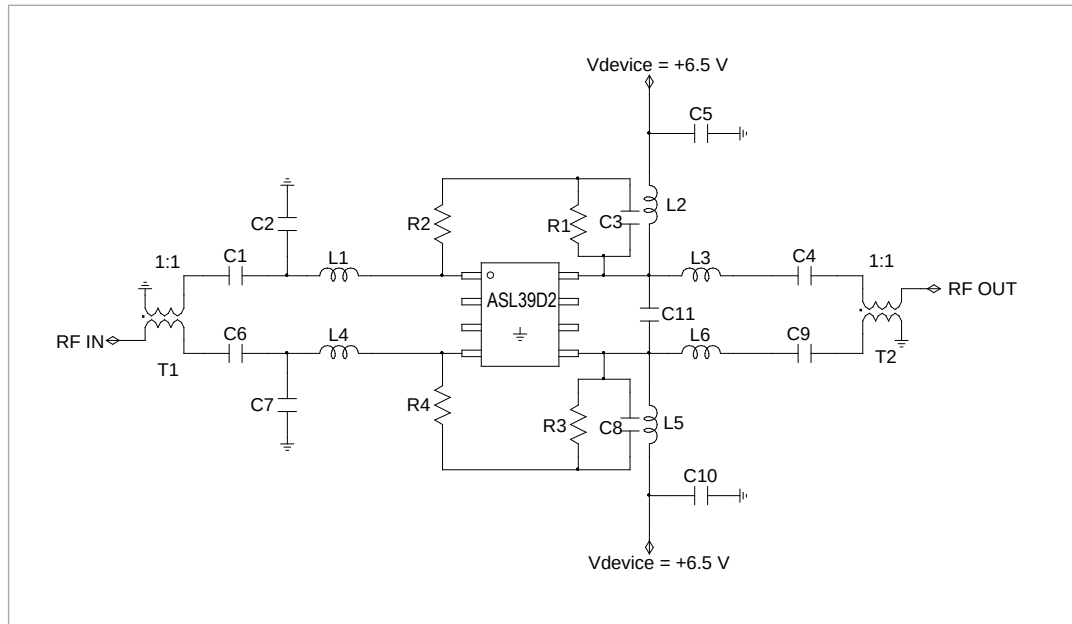


4.4 Plot of Performance



5. Application: 50 ~ 1002 MHz ($V_{\text{supply}} = +6.5 \text{ V}$)

5.1 Application Circuit & Evaluation Board



PCB Information

Material	FR4
Thickness (mm)	0.8
Size (mm)	40 x 40
EB No.	EB-S8-B8-rev2-2

Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL39D2	-	-	MMIC Amplifier	ASB
C5, C10	10 μ F	2012	Decoupling capacitor	MURATA
C1, C4, C6, C9	1 μ F	1608	DC blocking capacitor	MURATA
C3, C8	1 μ F	1608	Feedback capacitor	MURATA
C2, C7, C11	1.5 pF	1608	Matching capacitor	MURATA
R2, R4	430 Ω	1608	Feedback resistor	Samsung
R1, R3	62 k Ω	1608	Bias resistor	Samsung
L1, L4	2.2 nH	1608	Matching inductor	MURATA
L3, L6	2.7 nH	1608	Matching inductor	MURATA
L2, L5	1 μ H	3216	RF choke inductor	MURATA
T1 ¹⁾ , T2 ¹⁾	1 : 1	SM-22	Transformer balun	MACOM

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5.2 Performance Table

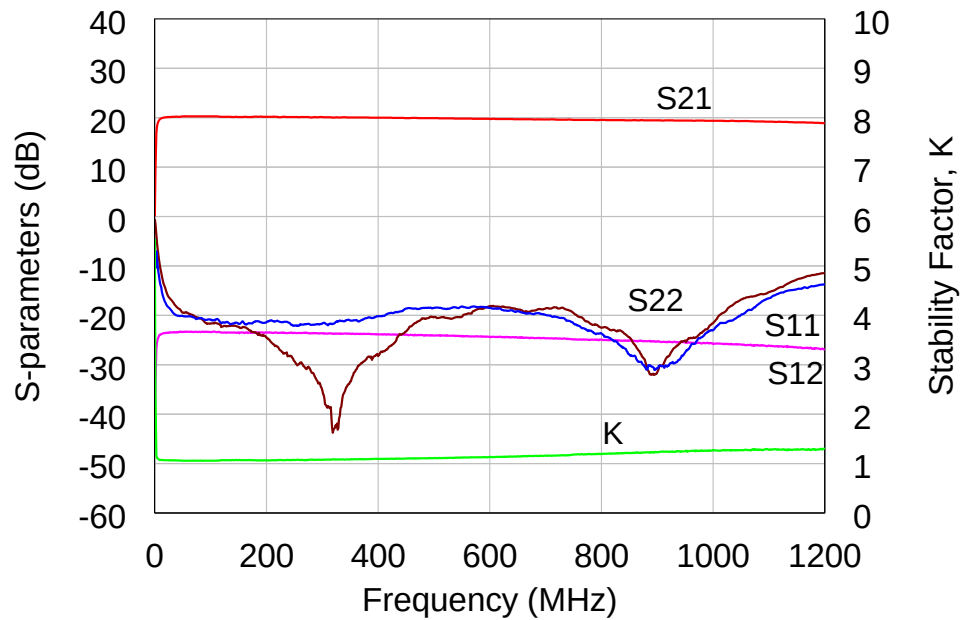
Supply voltage = +6.5 V, T_A = +25 °C, Z₀ = 75 Ω .

Parameter	Typical			
Frequency	50	500	1002	MHz
Noise Figure	1.4	1.5	1.6	dB
Gain	20.3	19.8	19.5	dB
S11	-18	-18	-18	dB
S22	-18	-18	-18	dB
OIP3 ¹⁾	44.5	45.5	43.0	dBm
OIP2 ²⁾	68			dBm
P1dB	28	28	28	dBm
Current	420			mA
Device Voltage	+6.5			V

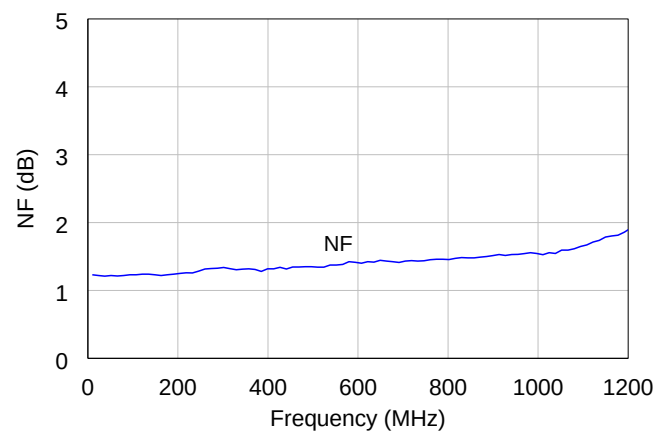
1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 6 MHz.

2) OIP2 is measured with two tones at an output power of +14 dBm/tone at F1 (400 MHz) + F2 (450 MHz).

5.3 Plot of S-parameter & Stability Factor

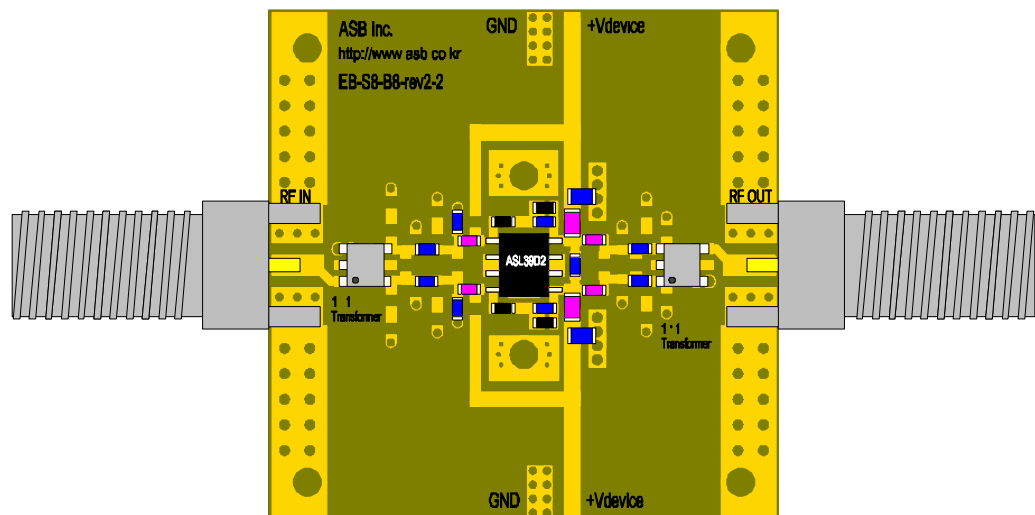
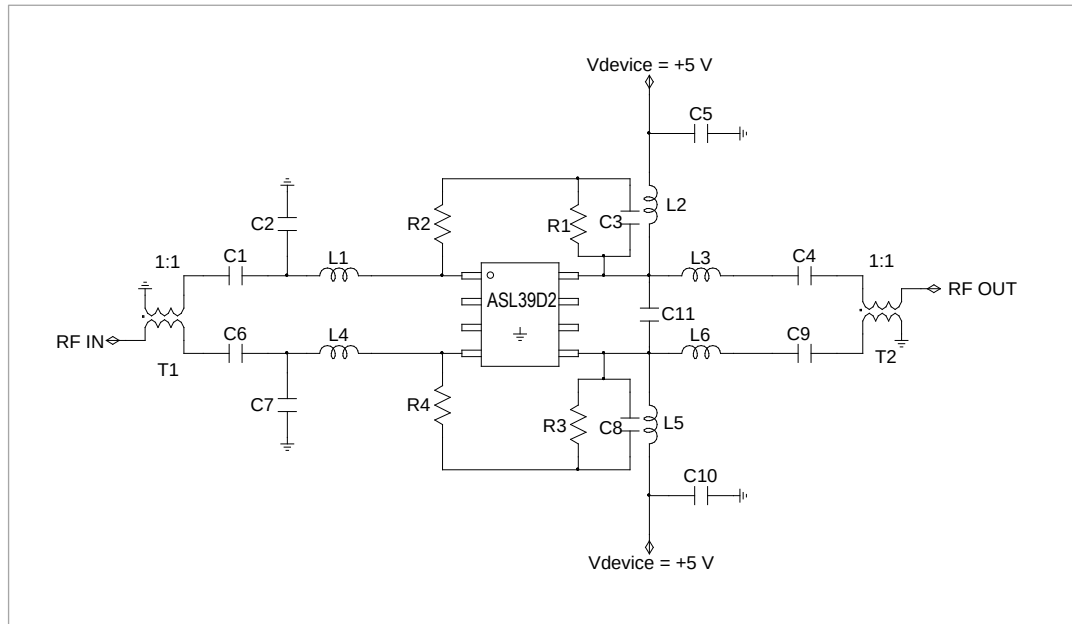


5.4 Plot of Performance



6. Application: 50 ~ 1200 MHz ($V_{\text{supply}} = +5 \text{ V}$)

6.1 Application Circuit & Evaluation Board



PCB Information

Material	FR4
Thickness (mm)	0.8
Size (mm)	40 x 40
EB No.	EB-S8-B8-rev2-2

Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL39D2	-	-	MMIC Amplifier	ASB
C5, C10	10 μ F	2012	Decoupling capacitor	MURATA
C1, C4, C6, C8	1 μ F	1608	DC blocking capacitor	MURATA
C3, C9	1 μ F	1608	Feedback capacitor	MURATA
C2, C7, C11	1.5 pF	1608	Matching capacitor	MURATA
R2, R4	390 Ω	1608	Feedback resistor	Samsung
R1, R3	62 k Ω	1608	Bias resistor	Samsung
L1, L4	1.8 nH	1608	Matching inductor	MURATA
L3, L6	1.5 nH	1608	Matching inductor	MURATA
L2, L5	1 μ H	3216	RF choke inductor	MURATA
T1 ¹⁾ , T2 ¹⁾	1 : 1	SM-22	Transformer balun	MACOM

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6.2 Performance Table

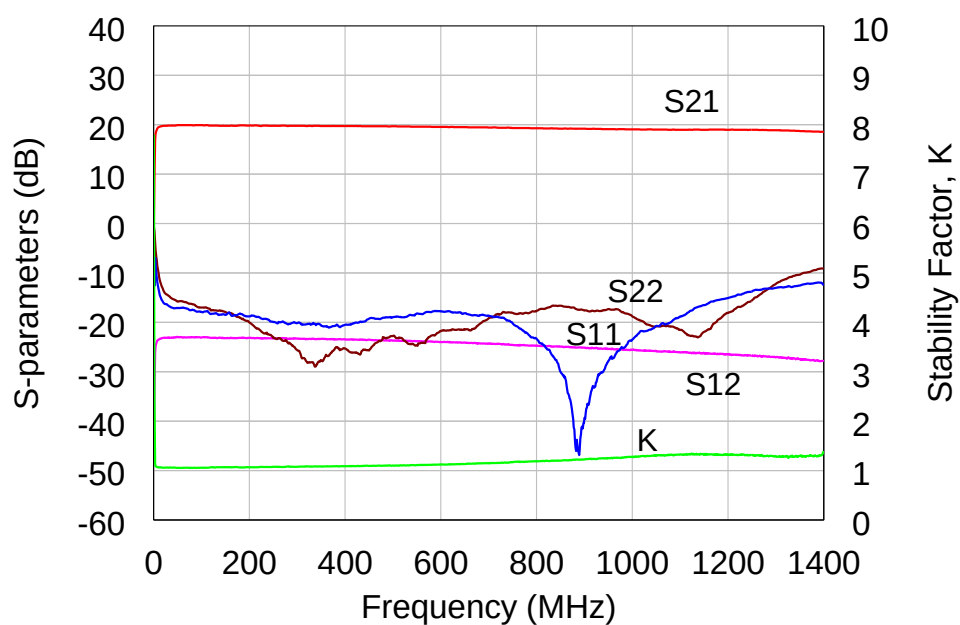
Supply voltage = +5 V, T_A = +25 °C, Z_O = 75 Ω .

Parameter	Typical			
Frequency	50	500	1200	MHz
Noise Figure	1.3	1.4	1.9	dB
Gain	19.3	19.0	18.5	dB
S11	-15	-17	-15	dB
S22	-15	-17	-15	dB
OIP3 ¹⁾	41.5	44.0	41.5	dBm
OIP2 ²⁾	67			dBm
P1dB	27	27	25	dBm
Current	300			mA
Device Voltage	+5			V

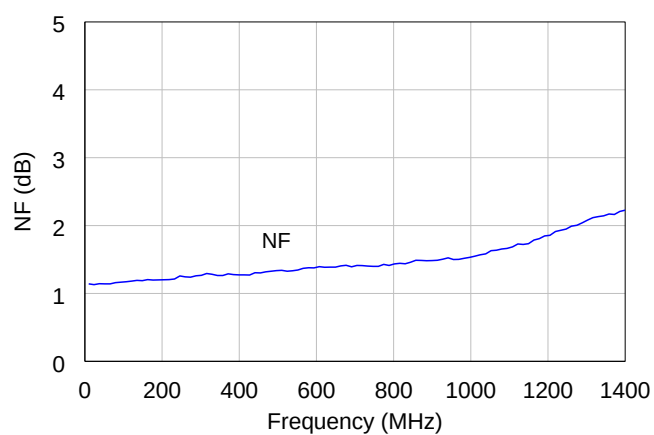
1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 6 MHz.

2) OIP2 is measured with two tones at an output power of +14 dBm/tone at F1 (400 MHz) + F2 (450 MHz).

6.3 Plot of S-parameters & Stability Factor



6.4 Plot of Performance



Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL39D2	-	-	MMIC Amplifier	ASB
C5, C10	10 μ F	2012	Decoupling capacitor	MURATA
C1, C4, C6, C8	1 μ F	1608	DC blocking capacitor	MURATA
C3, C9	1 μ F	1608	Feedback capacitor	MURATA
C2, C7, C11	1.5 pF	1608	Matching capacitor	MURATA
R2, R4	390 Ω	1608	Feedback resistor	Samsung
R1, R3	62 k Ω	1608	Bias resistor	Samsung
L1, L4	1.8 nH	1608	Matching inductor	MURATA
L3, L6	1.5 nH	1608	Matching inductor	MURATA
L2, L5	1 μ H	3216	RF choke inductor	MURATA
T1 ¹⁾ , T2 ¹⁾	1 : 1	SM-22	Transformer balun	MACOM

1) MABA007159

7.2 Performance Table

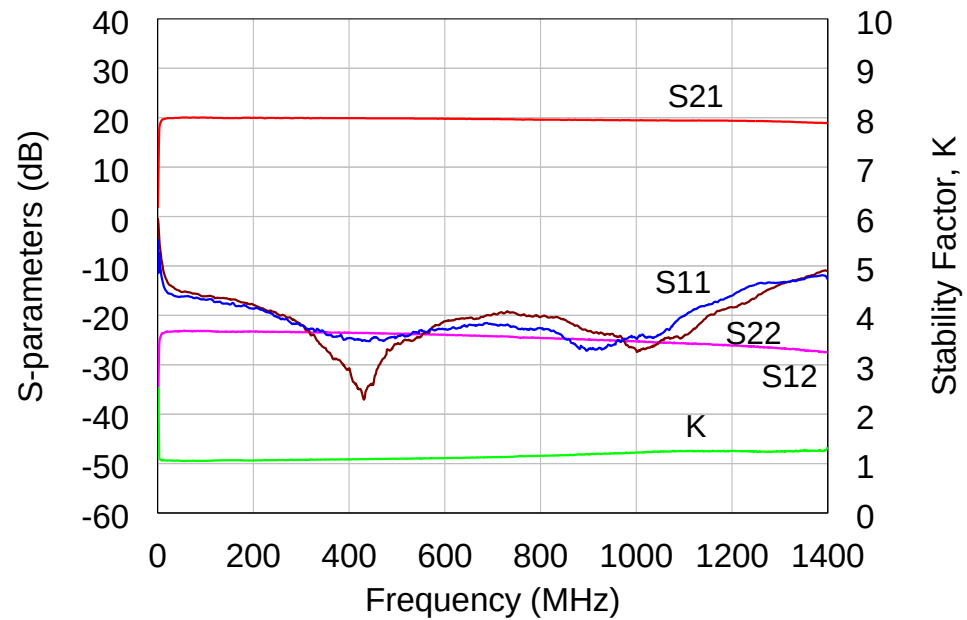
Supply voltage = +6.5 V, T_A = +25 °C, Z_O = 75 Ω .

Parameter	Typical			
Frequency	50	500	1200	MHz
Noise Figure	1.4	1.5	2.0	dB
Gain	19.5	19.2	18.9	dB
S11	-15	-17	-15	dB
S22	-15	-17	-15	dB
OIP3 ¹⁾	44.0	45.5	44.0	dBm
OIP2 ²⁾	69			dBm
P1dB	28	28	27	dBm
Current	420			mA
Device Voltage	+6.5			V

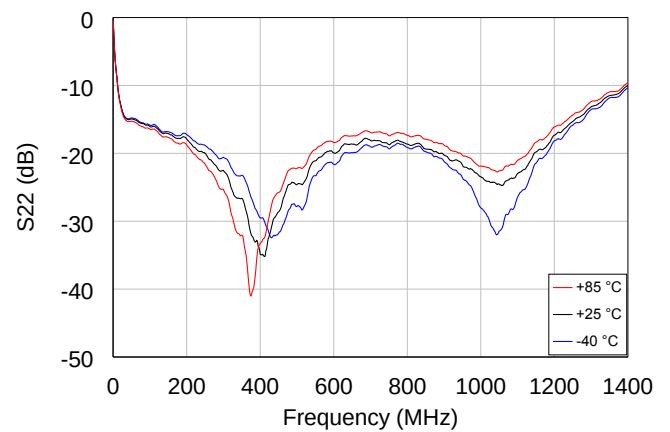
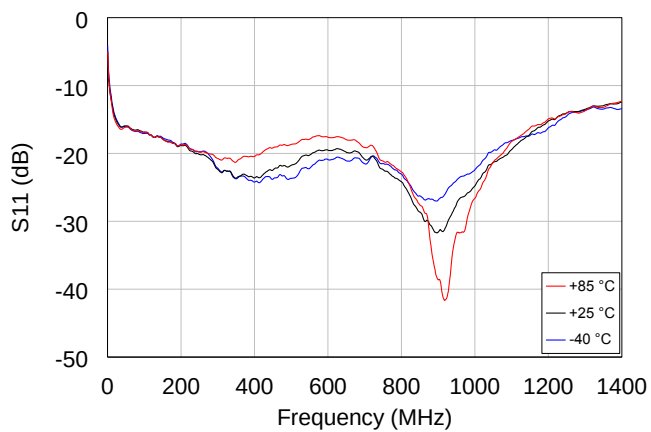
1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 6 MHz.

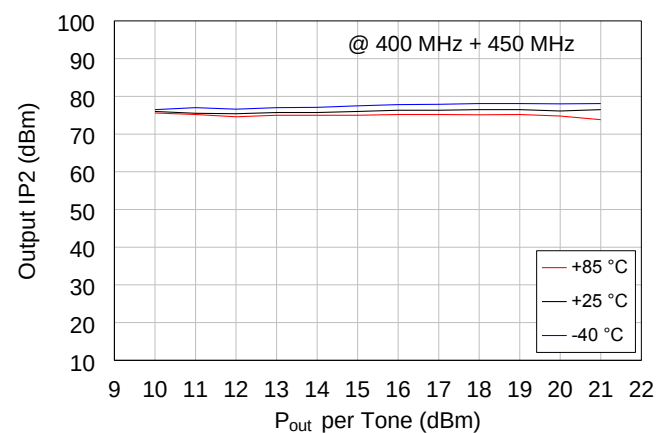
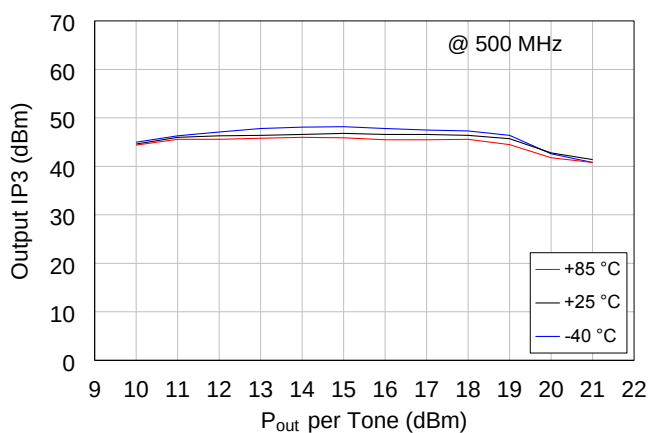
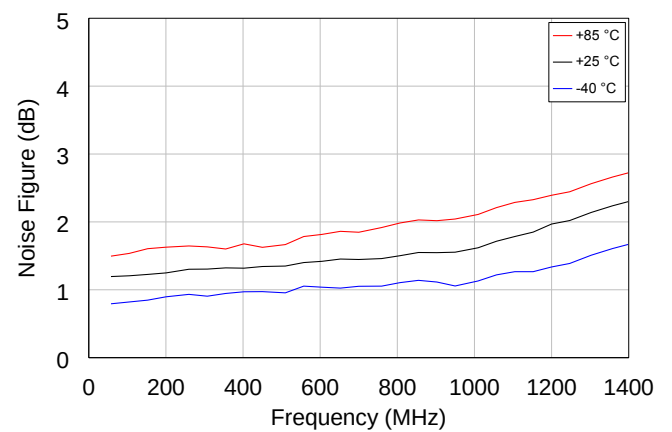
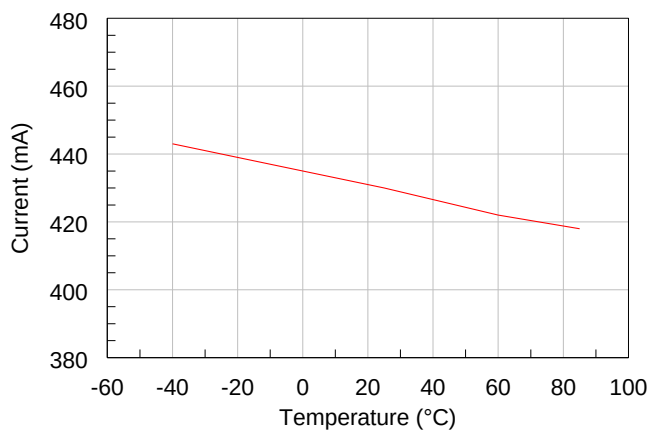
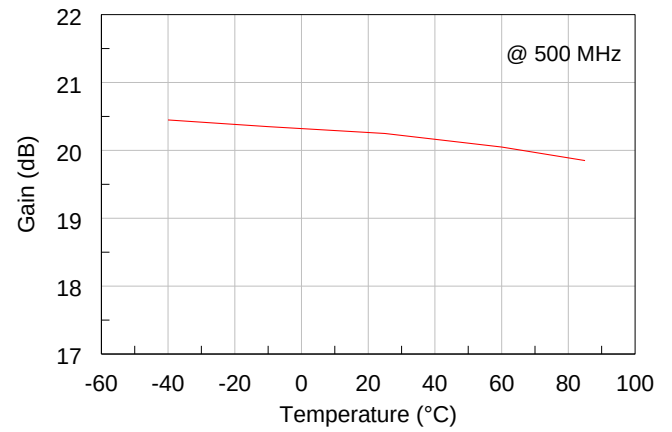
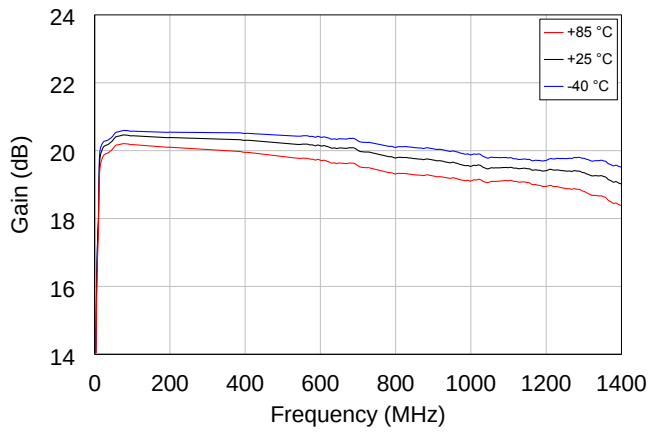
2) OIP2 is measured with two tones at an output power of +14 dBm/tone at F1 (400 MHz) + F2 (450 MHz).

7.3 Plot of S-parameters & Stability Factor



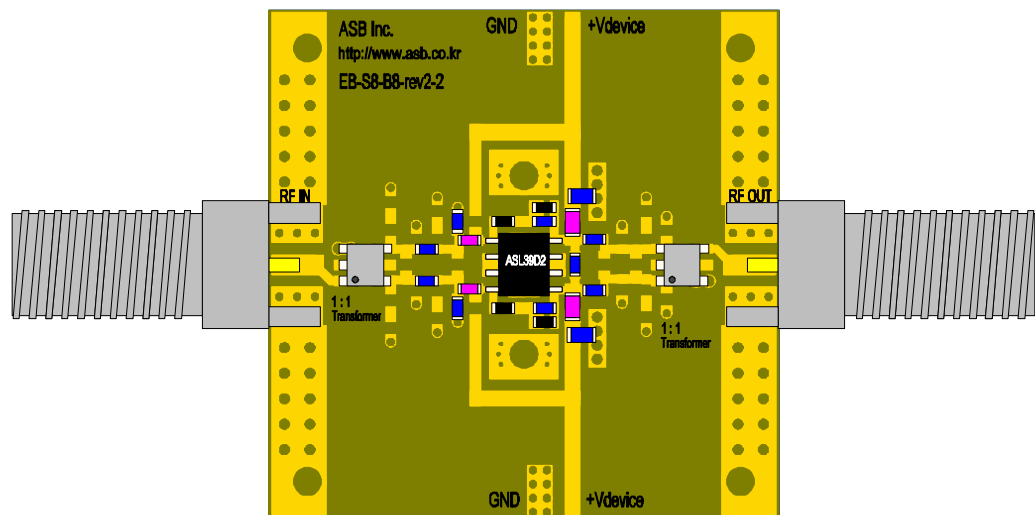
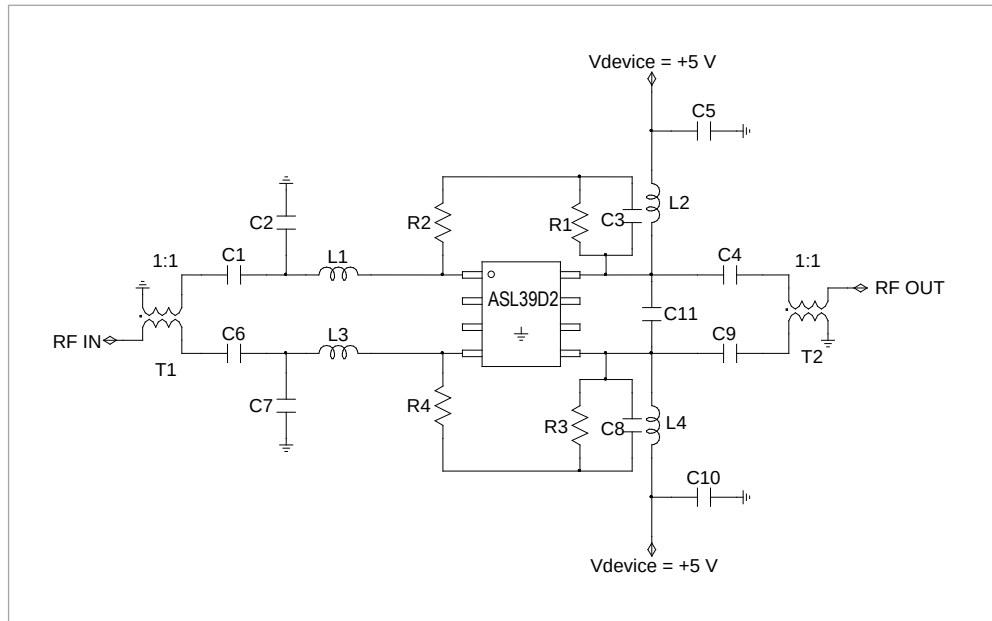
7.4 Plots of Performances with Temperature





8. Application: 50 ~ 860 MHz ($V_{\text{supply}} = +5 \text{ V}$)

8.1 Application Circuit & Evaluation Board



PCB Information

Material	FR4
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Size (mm)	40 x 40
EB No.	EB-S8-B8-rev2-2

Bill of Material

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1) MABA007159

8.2 Performance Table

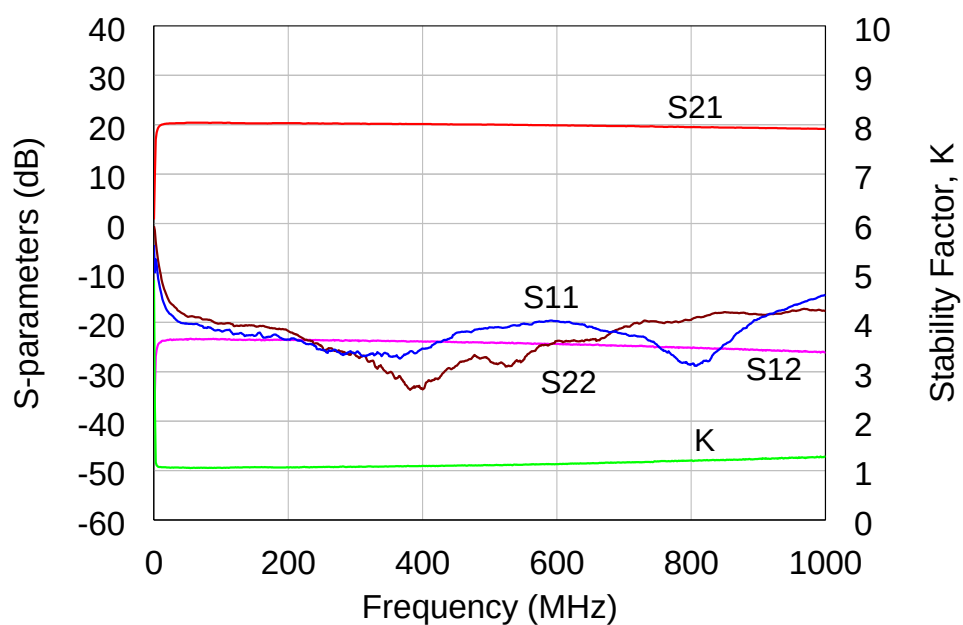
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Parameter	Typical			
Frequency	50	500	860	MHz
Noise Figure	1.4	1.5	1.6	dB
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Device Voltage	+5			V

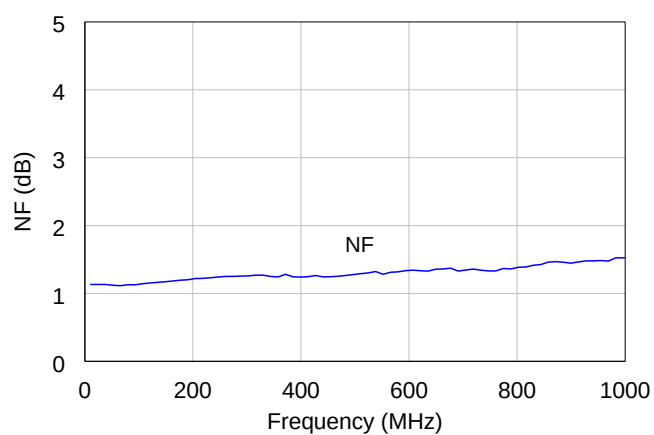
1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 6 MHz.

2) OIP2 is measured with two tones at an output power of +14 dBm/tone at F1 (400 MHz) + F2 (450 MHz).

8.3 Plot of S-parameters & Stability Factor

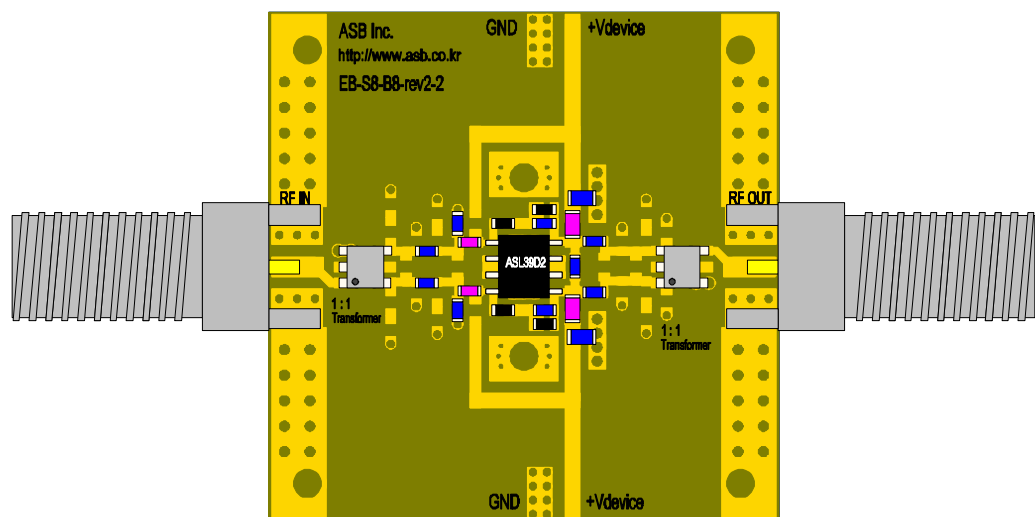
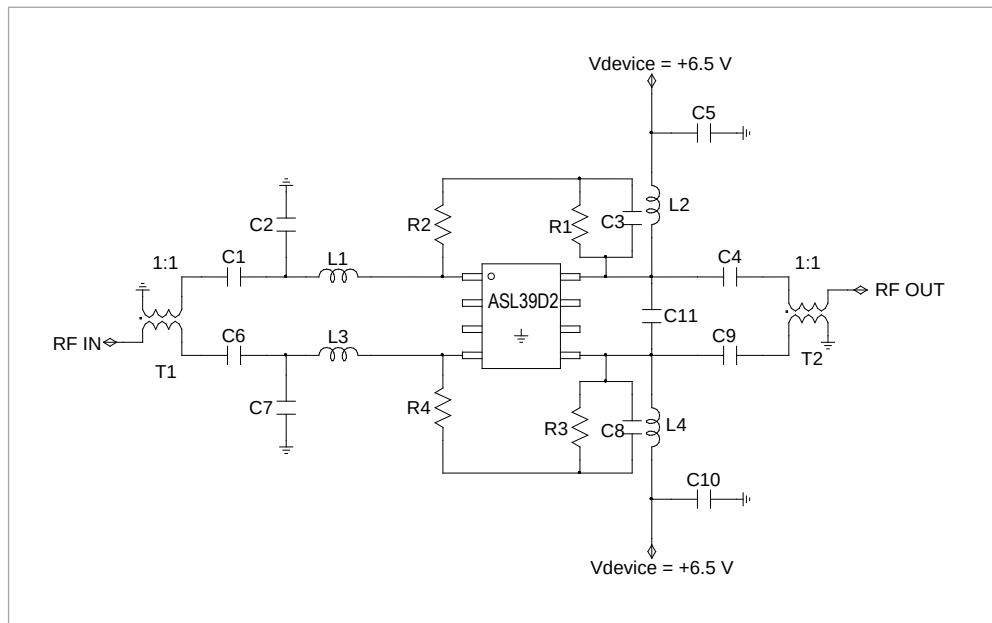


8.4 Plot of Performance



9. Application: 50 ~ 860 MHz ($V_{\text{supply}} = +6.5 \text{ V}$)

9.1 Application Circuit & Evaluation Board



PCB Information

Material	FR4
Thickness (mm)	0.8
Size (mm)	40 x 40
EB No.	EB-S8-B8-rev2-2

Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL39D2	-	-	MMIC Amplifier	ASB
C5, C10	10 μ F	2012	Decoupling capacitor	MURATA
C1, C4, C6, C8	1 μ F	1608	DC blocking capacitor	MURATA
C3, C9	1 μ F	1608	Feedback capacitor	MURATA
C2, C7, C11	1.2 pF	1608	Matching capacitor	MURATA
R2, R4	430 Ω	1608	Feedback resistor	Samsung
R1, R3	62 k Ω	1608	Bias resistor	Samsung
L1, L3	2.2 nH	1608	Matching inductor	MURATA
L2, L4	1 μ H	3216	RF choke inductor	MURATA
T1 ¹⁾ , T2 ¹⁾	1 : 1	SM-22	Transformer balun	MACOM

1) MABA007159

9.2 Performance Table

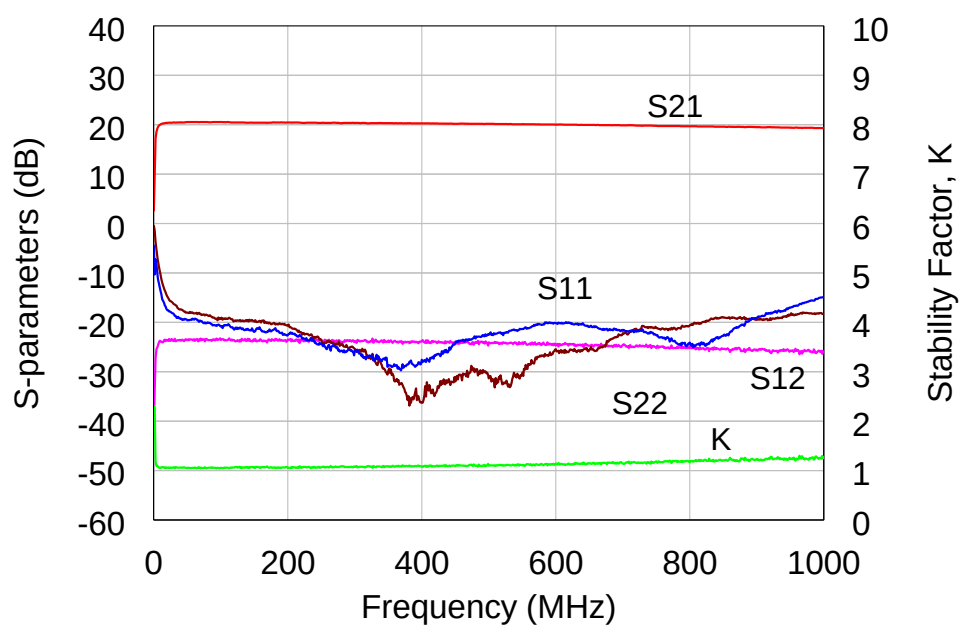
Supply voltage = +6.5 V, T_A = +25 °C, Z₀ = 75 Ω .

Parameter	Typical			
Frequency	50	500	860	MHz
Noise Figure	1.4	1.5	1.6	dB
Gain	20.0	19.7	19.2	dB
S11	-18	-18	-18	dB
S22	-18	-18	-18	dB
OIP3 ¹⁾	44.0	46.0	44.5	dBm
OIP2 ²⁾	69			dBm
P1dB	28	28	28	dBm
Current	420			mA
Device Voltage	+6.5			V

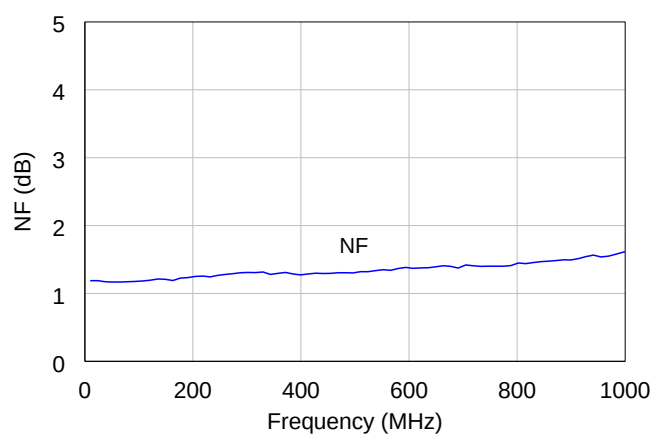
1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 6 MHz.

2) OIP2 is measured with two tones at an output power of +14 dBm/tone at F1 (400 MHz) + F2 (450 MHz).

9.3 Plot of S-parameters & Stability Factor

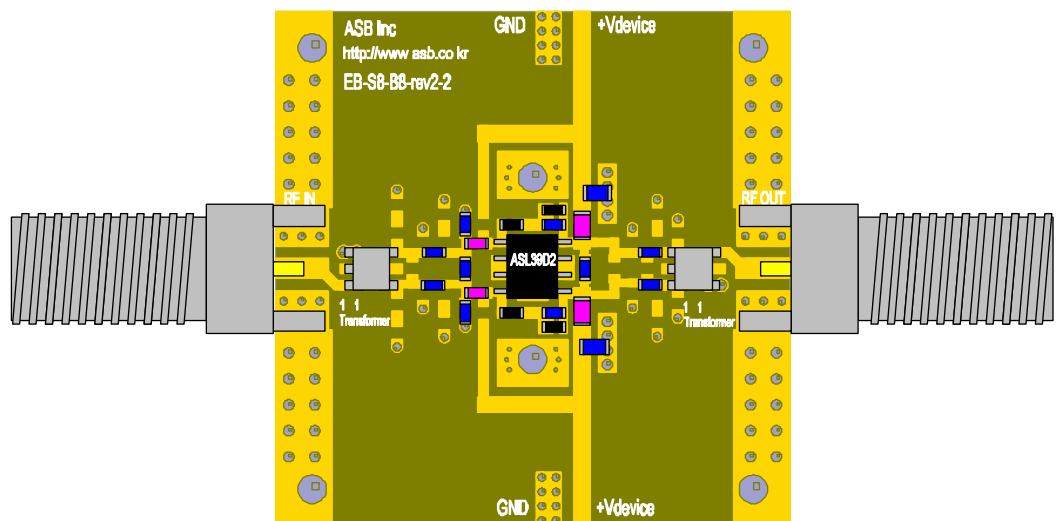
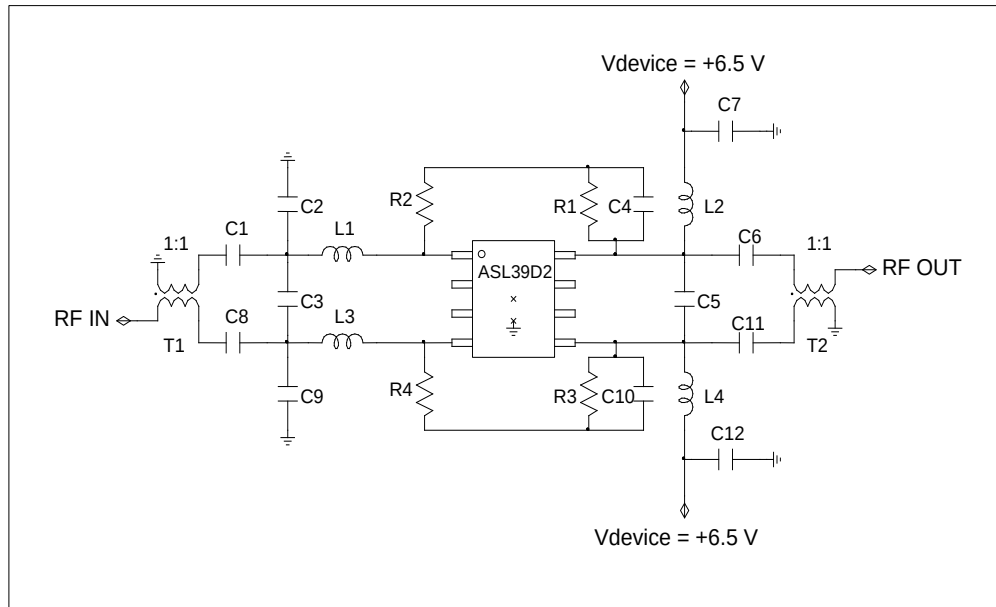


9.4 Plot of Performance



10. Application: 258 ~ 1800 MHz ($V_{\text{supply}} = +6.5 \text{ V}$)

10.1 Application Circuit & Evaluation Board



PCB Information

Material	FR4
Thickness (mm)	0.8
Size (mm)	40 x 40
EB No.	EB-S8-B8-rev2-2

Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL39D2	-	-	MMIC Amplifier	ASB
C7, C12	10 μ F	2012	Decoupling capacitor	MURATA
C1, C6, C8, C11	1 μ F	1608	DC blocking capacitor	MURATA
C4, C10	1 μ F	1608	Feedback capacitor	MURATA
C2, C9	1.5 pF	1608	Matching capacitor	MURATA
C3	1.2 pF	1608	Matching capacitor	MURATA
C5	0.75 pF	1608	Matching capacitor	MURATA
R2, R4	330 Ω	1608	Feedback resistor	Samsung
R1, R3	62 k Ω	1608	Bias resistor	Samsung
L1, L3	2.2 nH	1608	Matching inductor	MURATA
L2, L4	1 μ H	3216	RF choke inductor	MURATA
T1 ¹⁾	1 : 1	SM-22	Transformer balun	MACOM
T2 ²⁾	1 : 1	SM-22	Transformer balun	MACOM

1) MABA007159

2) MABACT0040

10.2 Performance Table

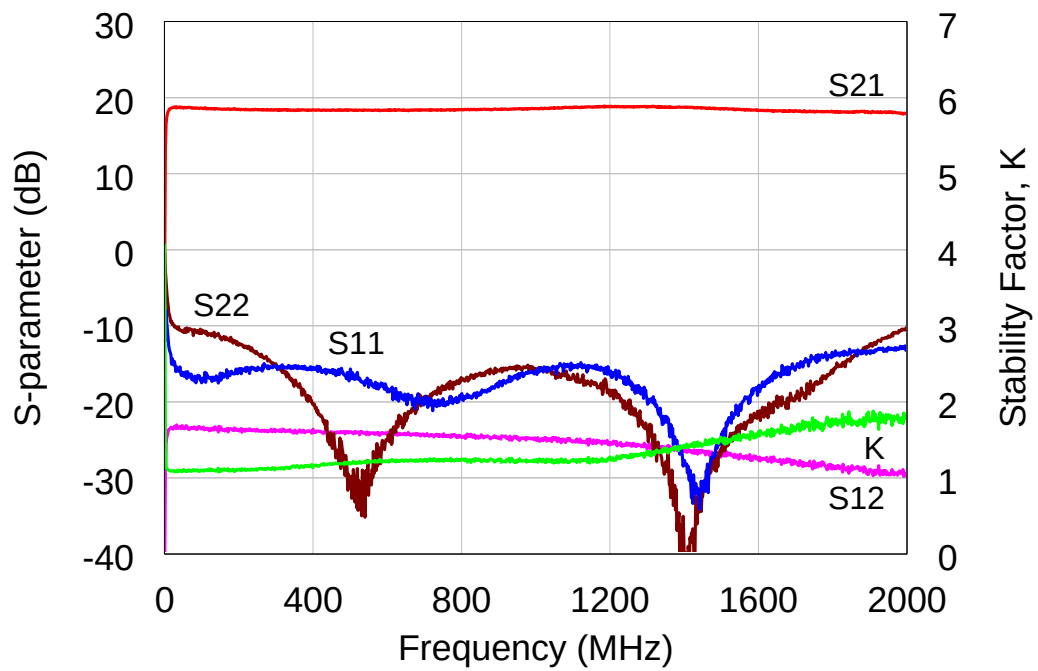
Supply voltage = +6.5 V, T_A = +25 °C, Z₀ = 75 Ω .

Parameter	Typical					
Frequency	258	700	1200	1600	1800	MHz
Noise Figure	1.6	1.8	2.2	2.6	3.0	dB
Gain	18.0	18.0	18.0	18.0	18.0	dB
S11	-15	-20	-14	-18	-12	dB
S22	-14	-18	-16	-17	-12	dB
OIP3 ¹⁾	44.0	45.0	43.0	43.0	40.0	dBm
OIP2 ²⁾	60					dBm
P1dB	28	28	28	28	27	dBm
Current	420					mA
Device Voltage	+6.5					V

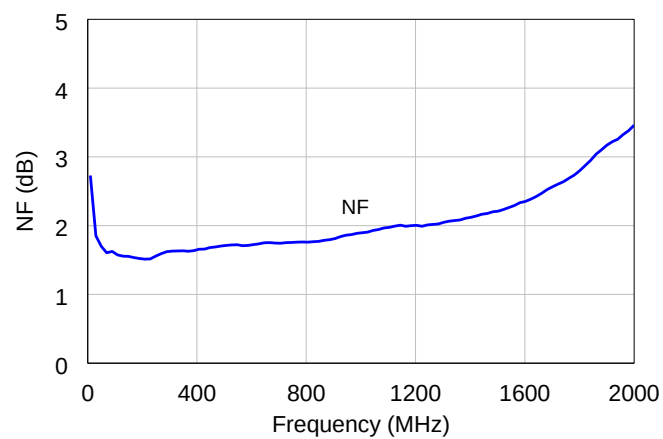
1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 6 MHz.

2) OIP2 is measured with two tones at an output power of +14 dBm/tone at F1 (700 MHz) + F2 (750 MHz).

10.3 Plot of S-parameter & Stability Factor



10.4 Plot of Performance



Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL39D2	-	-	MMIC Amplifier	ASB
C5, C10	10 μ F	2012	Decoupling capacitor	MURATA
C1, C4, C6, C9	1 μ F	1608	DC blocking capacitor	MURATA
C3, C8	1 μ F	1608	Feedback capacitor	MURATA
C2, C7	2.4 pF	1608	Matching capacitor	MURATA
C11	0.75 pF	1608	Matching capacitor	MURATA
R2, R4	330 Ω	1608	Feedback resistor	Samsung
R1, R3	62 k Ω	1608	Bias resistor	Samsung
L1, L3	2.2 nH	1608	Matching inductor	MURATA
L2, L4	1 μ H	3216	RF choke inductor	MURATA
T1 ¹⁾	1 : 1	SM-22	Transformer balun	MACOM
T2 ²⁾	1 : 1	SM-22	Transformer balun	MACOM

1) MABA007159

2) MABACT0040

11.2 Performance Table

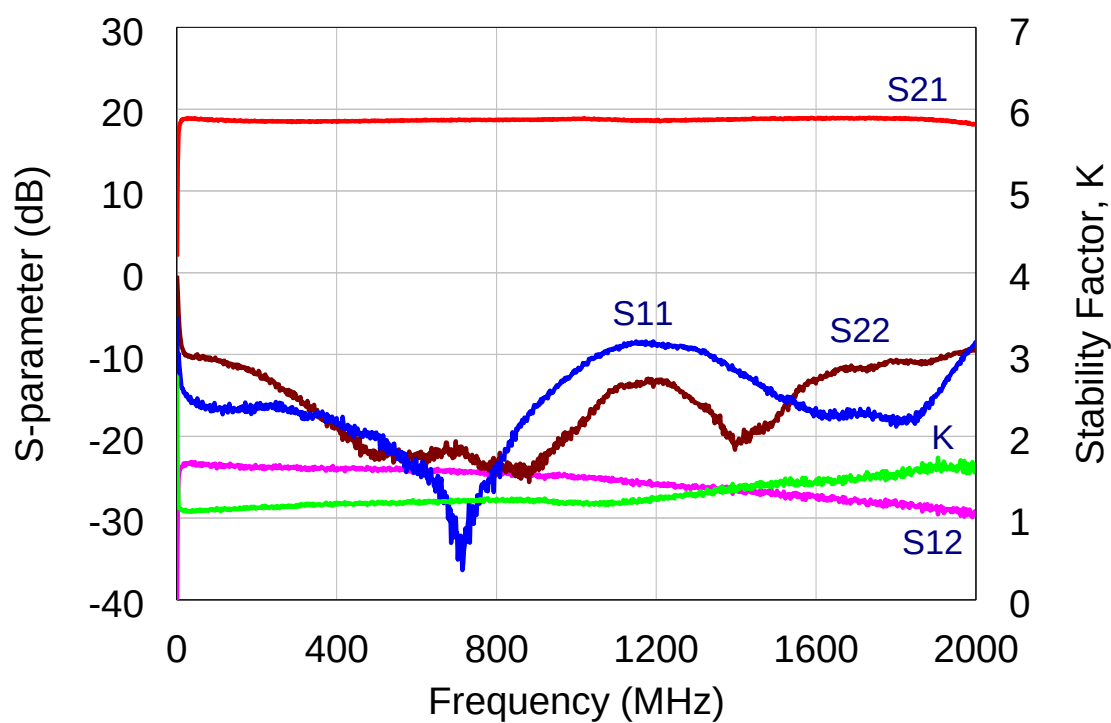
Supply voltage = +6.5 V, T_A = +25 °C, Z₀ = 75 Ω .

Parameter	Typical				
Frequency	258	700	1200	1800	MHz
Noise Figure	1.7	1.9	2.2	3.0	dB
Gain	18.0	18.0	18.0	18.0	dB
S11	-16	-20	-9	-13	dB
S22	-14	-20	-12	-9	dB
OIP3 ¹⁾	44.0	45.0	44.0	40.0	dBm
OIP2 ²⁾	60				dBm
P1dB	28	28	28	27	dBm
Current	420				mA
Device Voltage	+6.5				V

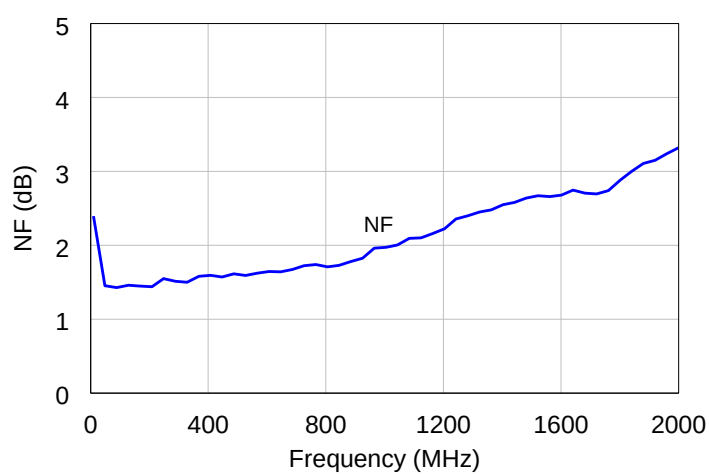
1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 6 MHz.

2) OIP2 is measured with two tones at an output power of +14 dBm/tone at F1 (700 MHz) + F2 (750 MHz).

11.3 Plot of S-parameter & Stability Factor

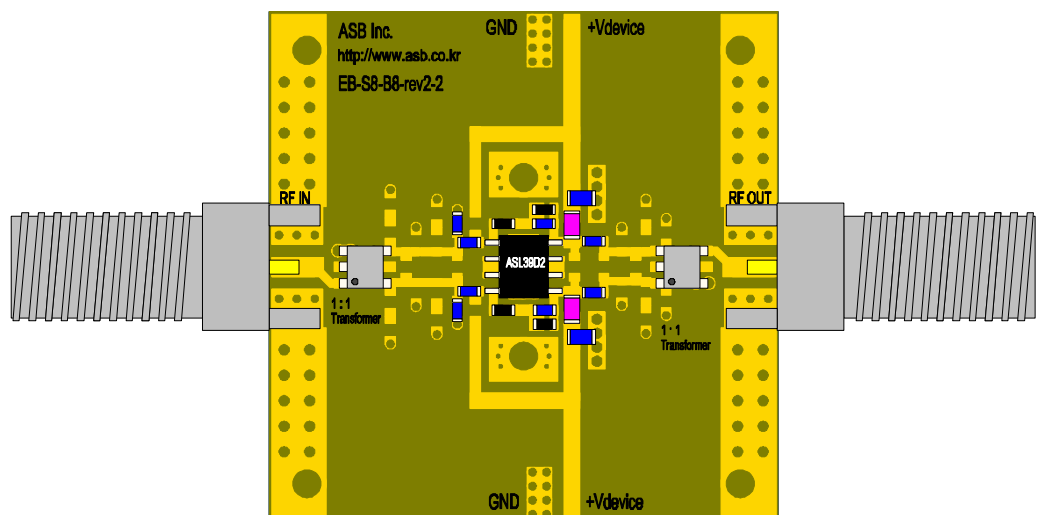
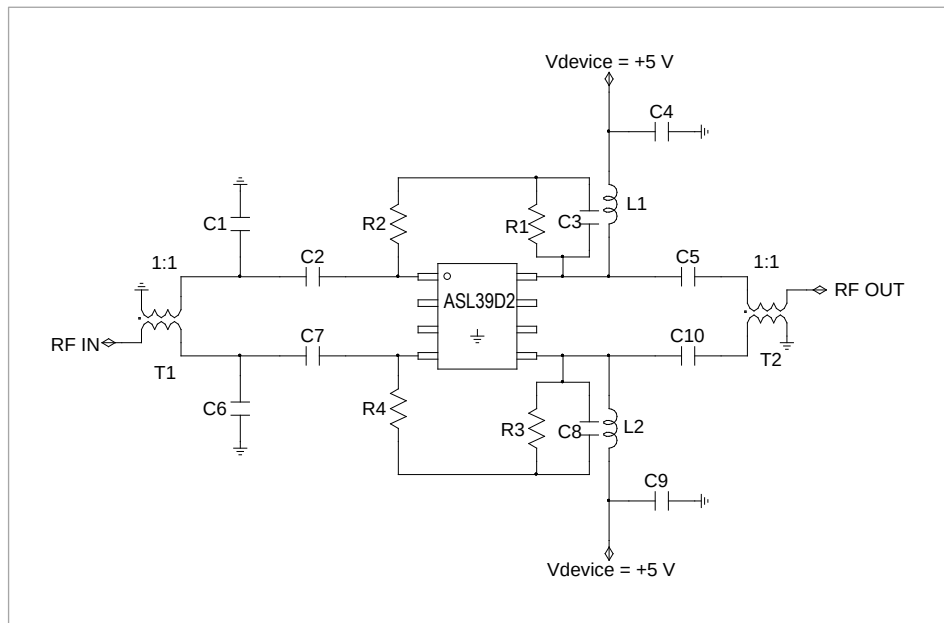


11.4 Plot of Performance



12. Application: 5 ~ 300 MHz ($V_{\text{supply}} = +5 \text{ V}$)

12.1 Application Circuit & Evaluation Board



PCB Information

Material	FR4
Thickness (mm)	0.8
Size (mm)	40 x 40
EB No.	EB-S8-B8-rev2-2

Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL39D2	-	-	MMIC Amplifier	ASB
C4, C9	10 μ F	2012	Decoupling capacitor	MURATA
C2, C5, C7, C10	1 μ F	1608	DC blocking capacitor	MURATA
C3, C8	1 μ F	1608	Feedback capacitor	MURATA
C1, C6	0.75 pF	1608	Matching capacitor	MURATA
R2, R4	430 Ω	1608	Feedback resistor	Samsung
R1, R3	62 k Ω	1608	Bias resistor	Samsung
L1, L2	10 μ H	3216	RF choke inductor	MURATA
T1 ¹⁾ , T2 ¹⁾	1 : 1	SM-22	Transformer balun	MACOM

1) MABA007159

12.2 Performance Table

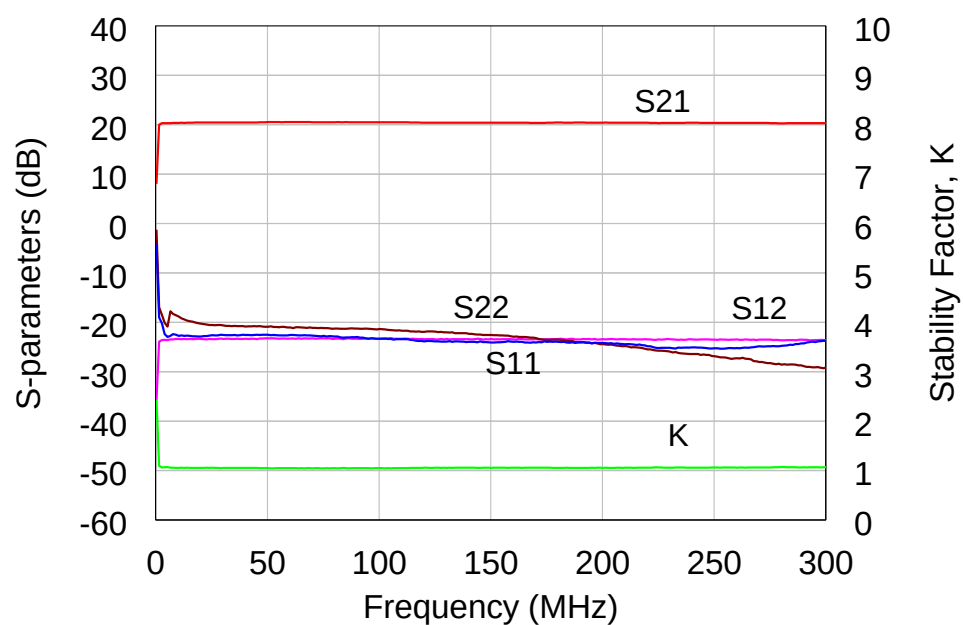
Supply voltage = +5 V, T_A = +25 °C, Z₀ = 75 Ω .

Parameter	Typical			
Frequency	5	50	300	MHz
Noise Figure	1.8	1.2	1.3	dB
Gain	20.0	20.0	20.0	dB
S11	-18	-18	-18	dB
S22	-18	-18	-18	dB
OIP3 ¹⁾	40.0	42.0	44.5	dBm
OIP2 ^{1), 2)}	67	74	72	dBm
P1dB	24	27	27	dBm
Current	300			mA
Device Voltage	+5			V

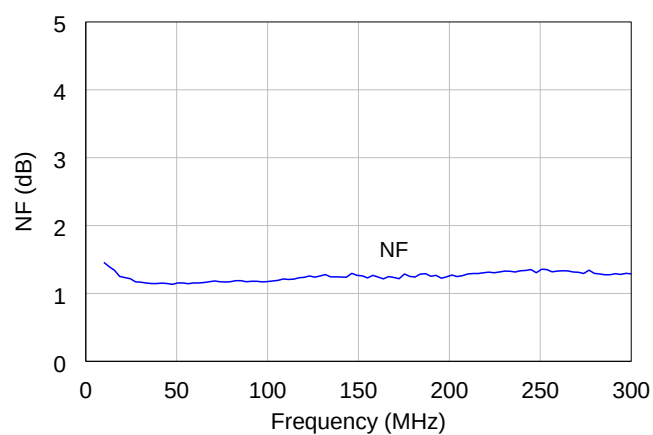
1) OIP3 and OIP2 are measured with two tones at an output power of +12 dBm/tone separated by 1 MHz.

2) OIP2 is measured at F1 + F2 Frequency.

12.3 Plot of S-parameters & Stability Factor

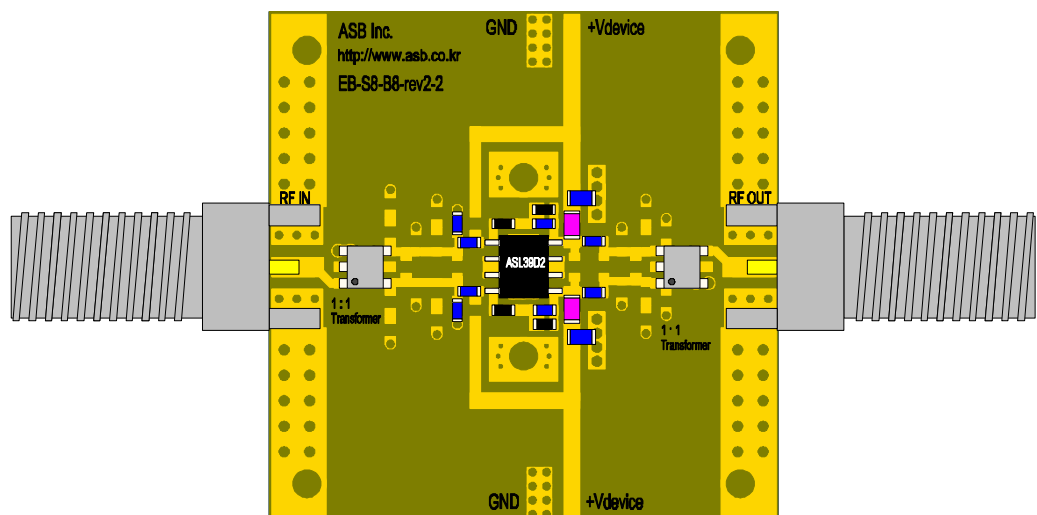
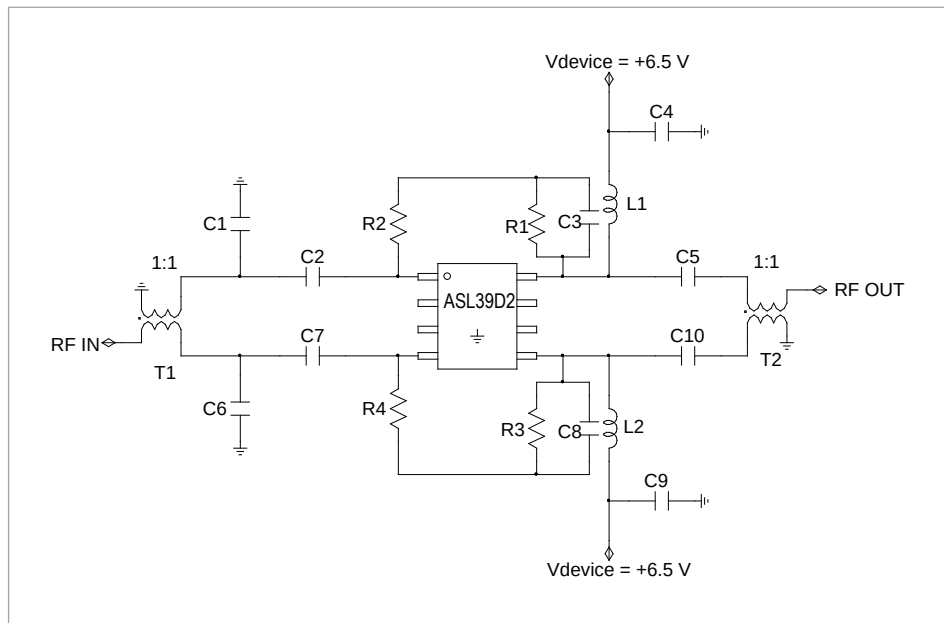


12.4 Plot of Performance



13. Application: 5 ~ 300 MHz ($V_{\text{supply}} = +6.5 \text{ V}$)

13.1 Application Circuit & Evaluation Board



PCB Information

Material	FR4
Thickness (mm)	0.8
Size (mm)	40 x 40
EB No.	EB-S8-B8-rev2-2

Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL39D2	-	-	MMIC Amplifier	ASB
C4, C9	10 μ F	2012	Decoupling capacitor	MURATA
C2, C5, C7, C10	1 μ F	1608	DC blocking capacitor	MURATA
C3, C8	1 μ F	1608	Feedback capacitor	MURATA
C1, C6	0.75 pF	1608	Matching capacitor	MURATA
R2, R4	430 Ω	1608	Feedback resistor	Samsung
R1, R3	62 k Ω	1608	Bias resistor	Samsung
L1, L2	10 μ H	3216	RF choke inductor	MURATA
T1 ¹⁾ , T2 ¹⁾	1 : 1	SM-22	Transformer balun	MACOM

1) MABA007159

13.2 Performance Table

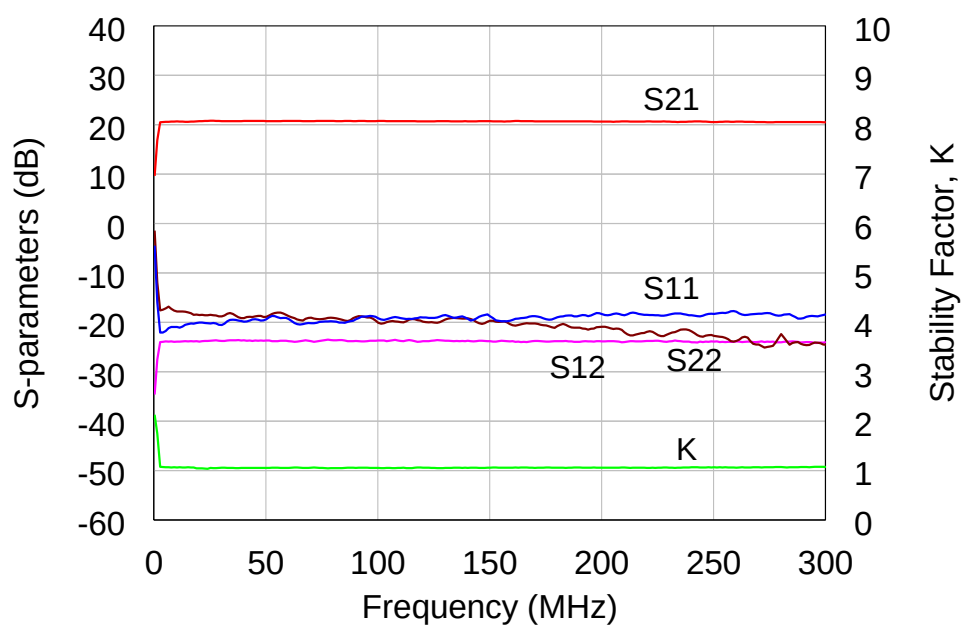
Supply voltage = +6.5 V, T_A = +25 °C, Z₀ = 75 Ω .

Parameter	Typical			
Frequency	5	50	300	MHz
Noise Figure	1.9	1.3	1.4	dB
Gain	20.0	20.0	20.0	dB
S11	-18	-18	-18	dB
S22	-17	-18	-18	dB
OIP3 ¹⁾	41.5	45.0	46.5	dBm
OIP2 ^{1), 2)}	69	78	77	dBm
P1dB	27	28	28	dBm
Current	420			mA
Device Voltage	+6.5			V

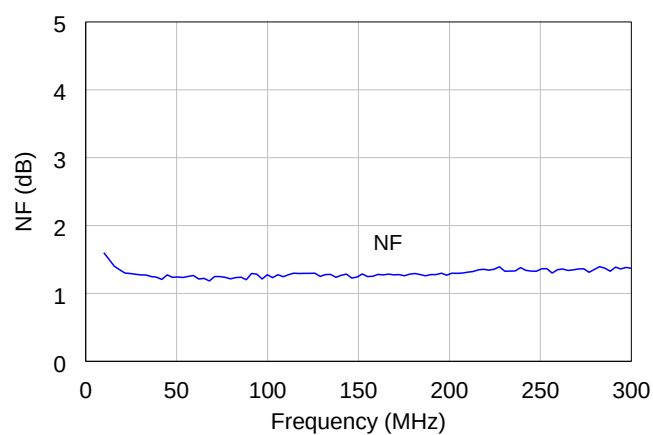
1) OIP3 and OIP2 are measured with two tones at an output power of +12 dBm/tone separated by 1 MHz.

2) OIP2 is measured at F1 + F2 Frequency.

13.3 Plot of S-parameters & Stability Factor

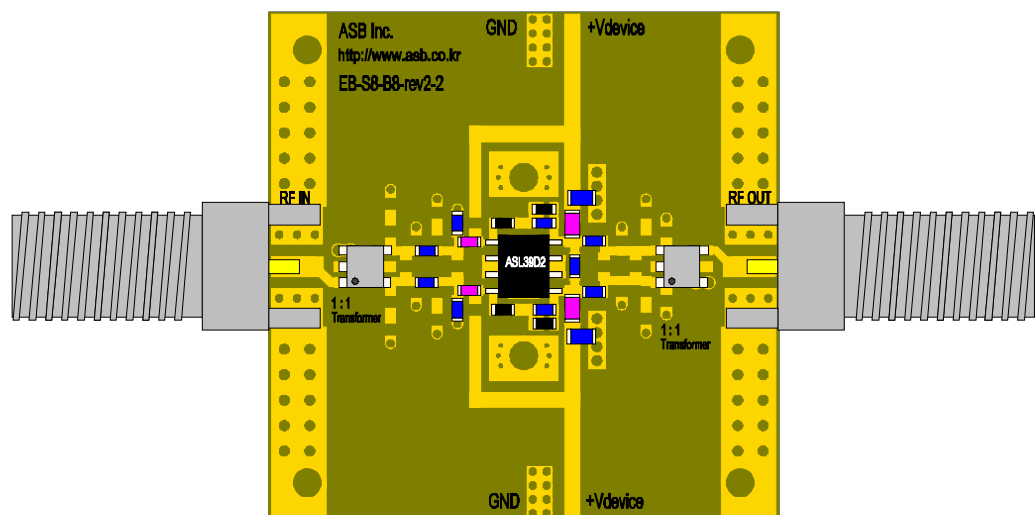
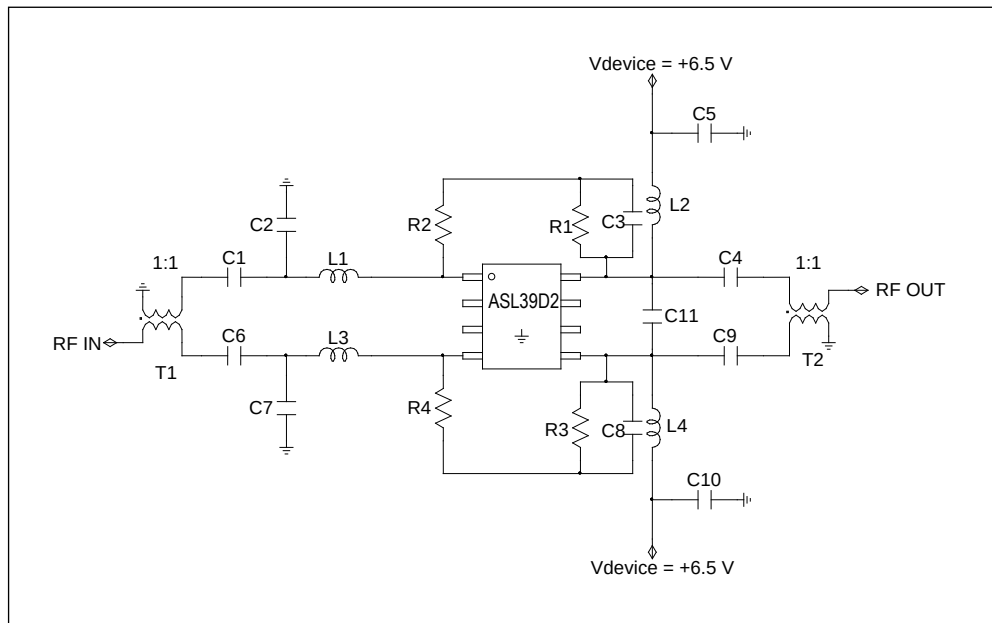


13.4 Plot of Performance



14. Application: 5 ~ 700 MHz ($V_{\text{supply}} = +6.5 \text{ V}$)

14.1 Application Circuit & Evaluation Board



PCB Information

Material	FR4
Thickness (mm)	0.8
Size (mm)	40 x 40
EB No.	EB-S8-B8-rev2-2

Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL39D2	-	-	MMIC Amplifier	ASB
C1, C6, C4, C9	1 μ F	1608	DC blocking capacitor	MURATA
C3, C8	1 μ F	1608	Feedback capacitor	MURATA
C2, C7, C11	1.2 pF	1608	Matching capacitor	MURATA
C5, C10	10 μ F	2012	Decoupling capacitor	MURATA
R1, R3	62 k Ω	1608	Bias resistor	Samsung
R2, R4	430 Ω	1608	Feedback resistor	Samsung
L1, L3	2.2 nH	1608	Matching inductor	MURATA
L2, L4	10 μ H	3216	RF choke inductor	MURATA
T1 ¹⁾ , T2 ¹⁾	1 : 1	SM-22	Transformer balun	MACOM

1) MABA007159

14.2 Performance Table

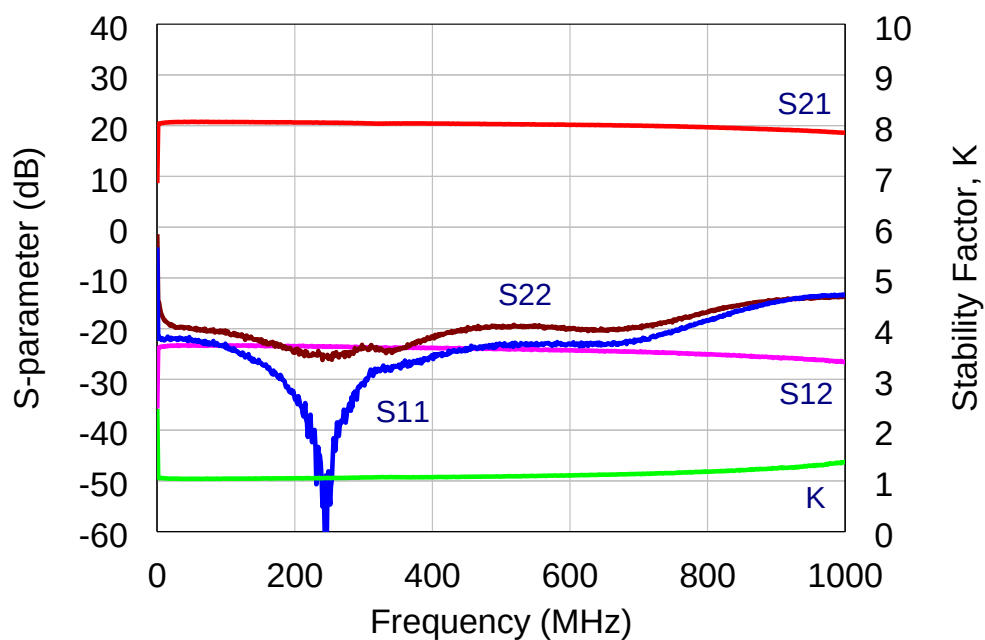
Supply voltage = +6.5 V, T_A = +25 °C, Z_O = 75 Ω .

Parameter	Typical			
Frequency	5	350	700	MHz
Noise Figure	-	1.5	1.6	dB
Gain	20.0	20.0	19.5	dB
S11	-20	-20	-20	dB
S22	-16	-20	-20	dB
OIP3 ¹⁾	40.0	44.0	44.0	dBm
OIP2 ²⁾	60			dBm
P1dB	26	28	28	dBm
Current	410			mA
Device Voltage	+6.5			V

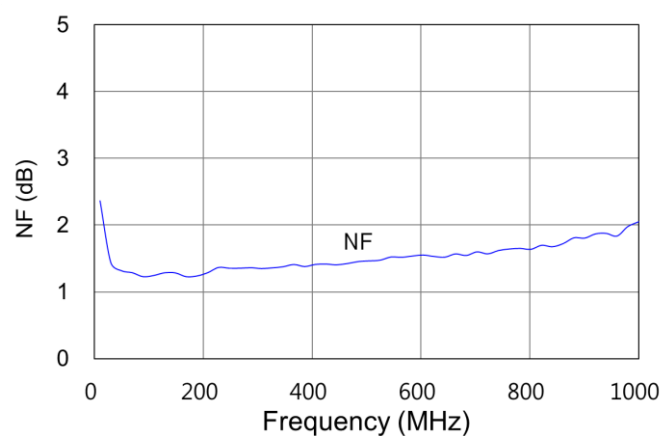
1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 1 MHz.

2) OIP2 is measured with two tones at an output power of +14 dBm/tone at F1 (300 MHz) + F2 (350 MHz).

14.3 Plot of S-parameters & Stability Factor

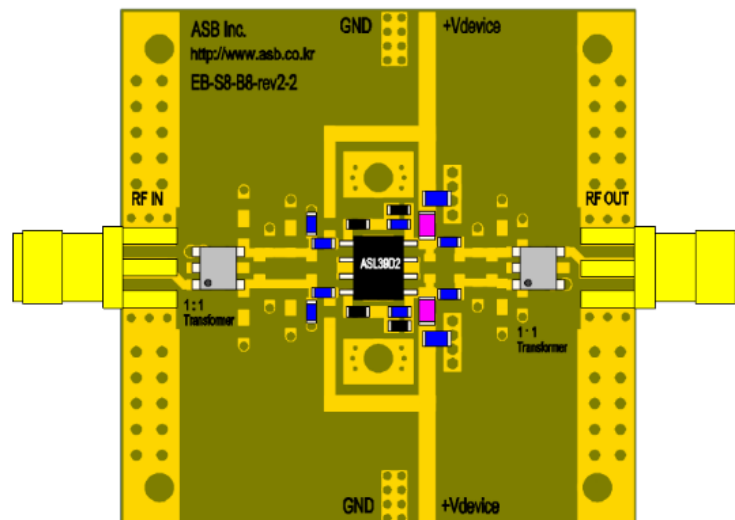
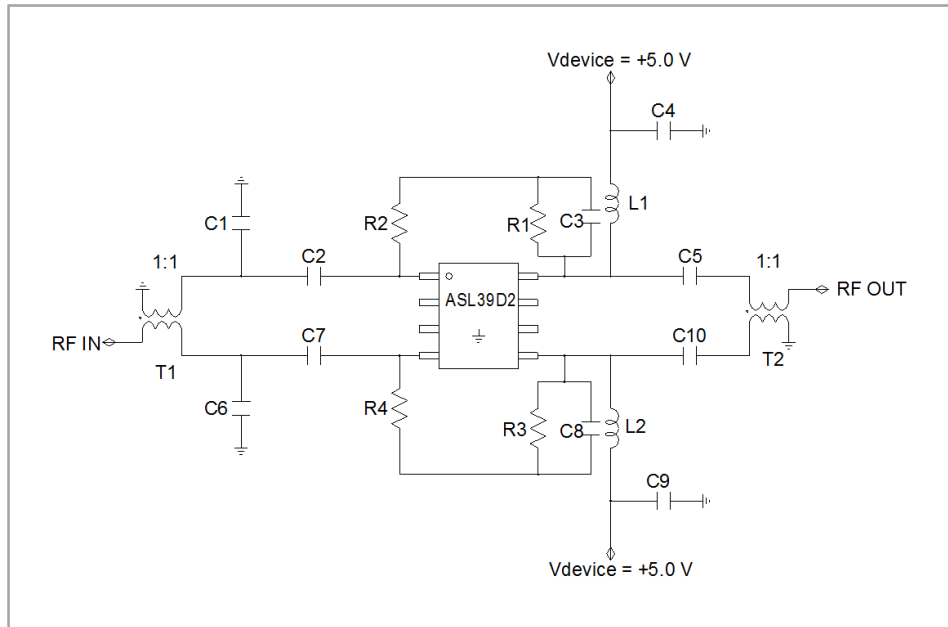


14.4 Plot of Performance



15. Application: 20 ~ 500 MHz (IF, 50 Ω , $V_{\text{supply}} = +5 \text{ V}$)

15.1 Application Circuit & Evaluation Board



PCB Information

Material	FR4
Thickness (mm)	0.8
Size (mm)	40 x 40
EB No.	EB-S8-B8-rev2-2

Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL39D2	-	-	MMIC Amplifier	ASB
C4, C9	10 μ F	2012	Decoupling capacitor	MURATA
C2, C5, C7, C10	1 μ F	1608	DC blocking capacitor	MURATA
C3, C8	1 μ F	1608	Feedback capacitor	MURATA
C1, C6	0.75 pF	1608	Matching capacitor	MURATA
R2, R4	360 Ω	1608	Feedback resistor	Samsung
R1, R3	62 k Ω	1608	Bias resistor	Samsung
L1, L2	1 μ H	3216	RF choke inductor	MURATA
T1 ¹⁾ , T2 ¹⁾	1 : 1	SM-22	Transformer balun	MACOM

1) MABA007159

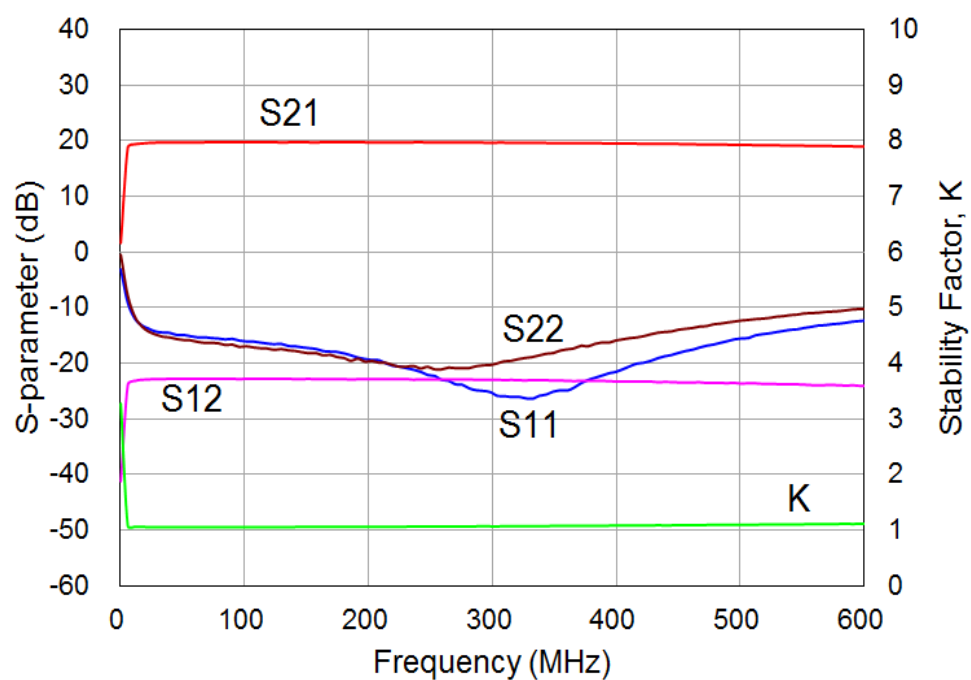
15.2 Performance Table

Supply voltage = +5.0 V, T_A = +25 °C, Z_O = 50 Ω .

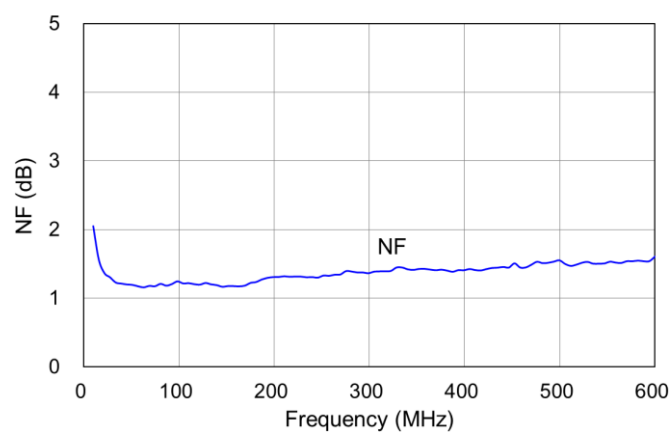
Parameter	Typical			
Frequency	20	250	500	MHz
Noise Figure	1.8	1.4	1.6	dB
Gain	19.0	19.0	19.0	dB
S11	-13	-20	-14	dB
S22	-13	-20	-12	dB
OIP3 ¹⁾	41	44	43	dBm
P1dB	26	27	27	dBm
Current	300			mA
Device Voltage	+5.0			V

1) OIP3 are measured with two tones at an output power of +12 dBm/tone separated by 1 MHz.

15.3 Plot of S-parameters & Stability Factor

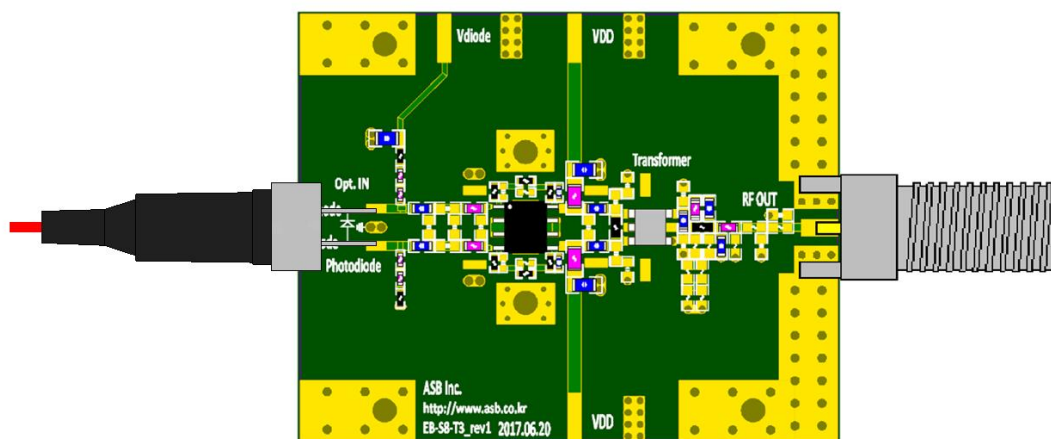
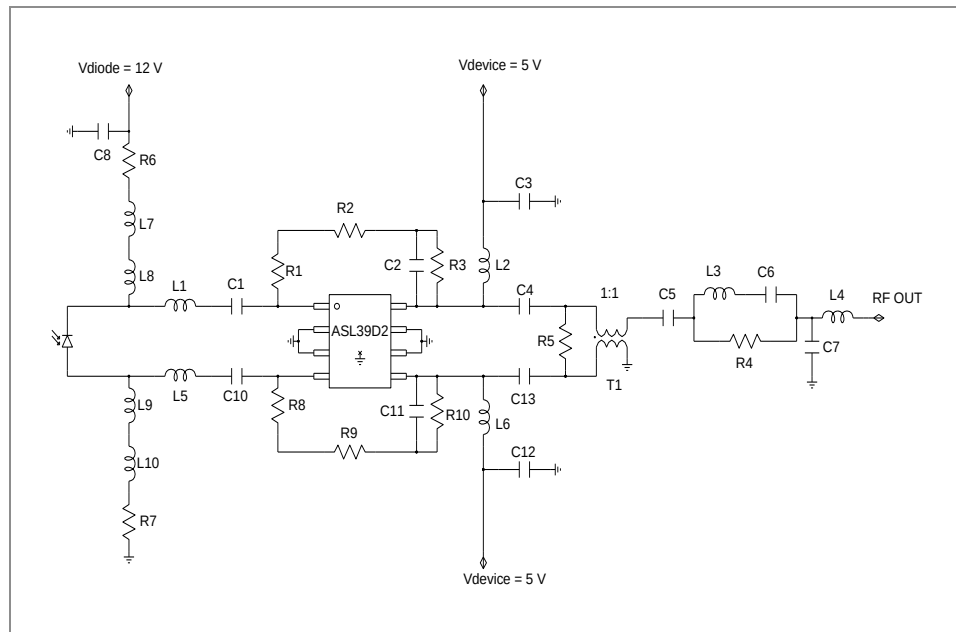


15.4 Plot of Performance



16. Application: 50 ~ 1200 MHz (TIA, $V_{\text{supply}} = +5 \text{ V}$)

16.1 Application Circuit & Evaluation Board



PCB Information

Material	FR4
Thickness (mm)	0.8
Size (mm)	50x40
EB No.	EB-S8-T3-rev1

Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL39D2	-	-	MMIC Amplifier	ASB
C1, C4, C10, C13	1 μ F	1608	DC blocking capacitor	MURATA
C3, C8, C12	10 μ F	2012	Decoupling capacitor	MURATA
C2, C11	1 μ F	1005	Feedback capacitor	MURATA
C5	1 μ F	1608	DC blocking capacitor	MURATA
C6	10 pF	1608	Matching capacitor	MURATA
C7	1 pF	1608	Matching capacitor	MURATA
R1, R8	750 Ω	1005	Feedback resistor	Samsung
R2, R9	0 Ω	1005	Feedback resistor	Samsung
R3, R10	62 k Ω	1005	Bias resistor	Samsung
R4	51 Ω	1608	Matching resistor	Samsung
R5	62 Ω	1608	Matching resistor	Samsung
R6, R7	1 k Ω	1005	Detecting resistor	Samsung
L1, L5	3.3 nH	1005	Matching inductor	MURATA
L2, L6	1 μ H	3216	RF choke inductor	MURATA
L3	8.2 nH	1608	Matching inductor	MURATA
L4	12 nH	1608	Matching inductor	MURATA
L7 ¹⁾ , L8 ¹⁾ , L9 ¹⁾ , L10 ¹⁾	Ferrite Bead	1005	RF choke inductor	MURATA
T1 ²⁾	1 : 1	SM-22	Transformer balun	MACOM

1) BLM15HD182SN

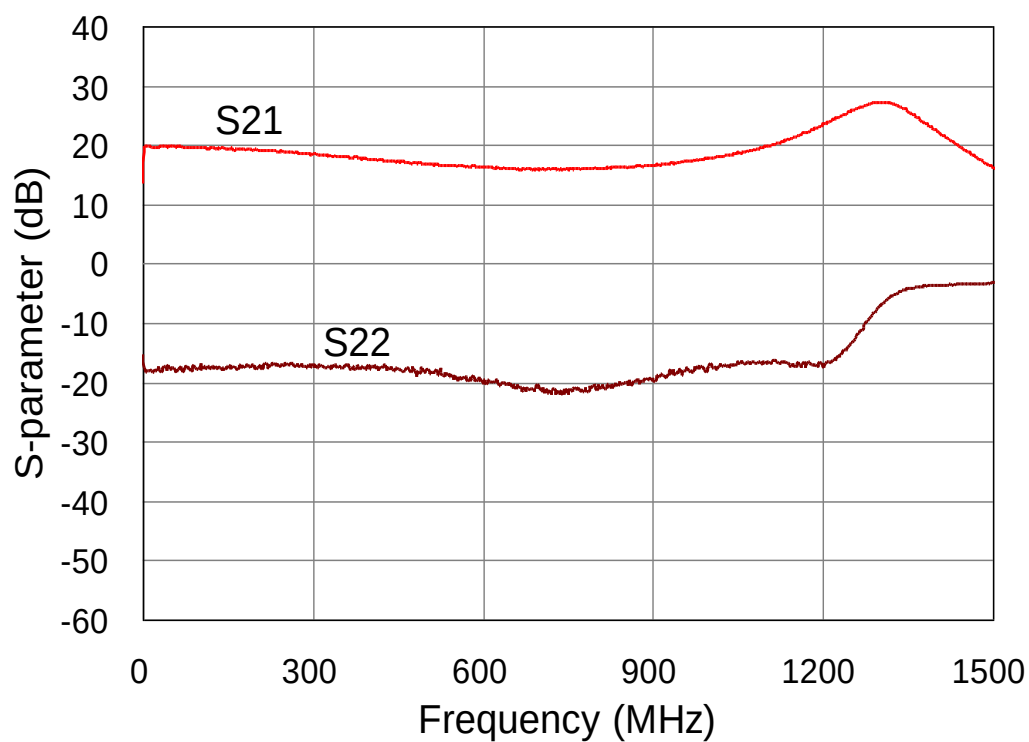
2) MABA007159

16.2 Performance Table

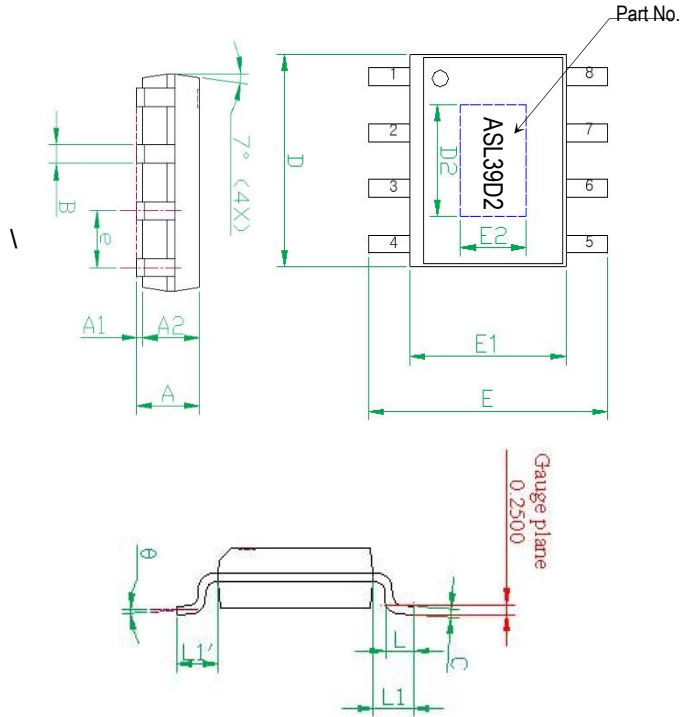
Supply voltage = +5.0 V, T_A = +25 °C, Z_0 = 75 Ω .

Parameter	Typical			
Frequency	50	500	1200	MHz
Gain	19	16	23	dB
S22	-16	-16	-16	dB
Current	300			mA
Device Voltage	+5.0			V

16.3 Plot of S-parameter

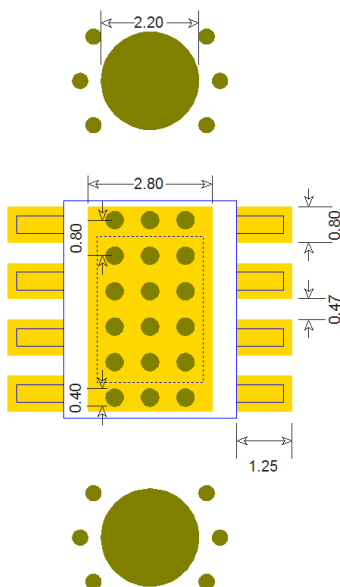


17. Package Outline (SOIC8)



Symbols	Dimensions (In mm)		
	MIN	NOM	MAX
A	1.40	1.50	1.60
A1	0.00	---	0.10
A2	---	1.45	---
B	0.33	---	0.51
C	0.19	---	0.25
D	4.80	---	5.00
D2	3.20	3.30	3.40
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
E2	2.30	2.40	2.50
e	---	1.27	---
L	0.40	---	1.27
y	---	---	0.10
θ	0°	---	8°
L1-L1'	---	---	0.12
L1		1.04REF	

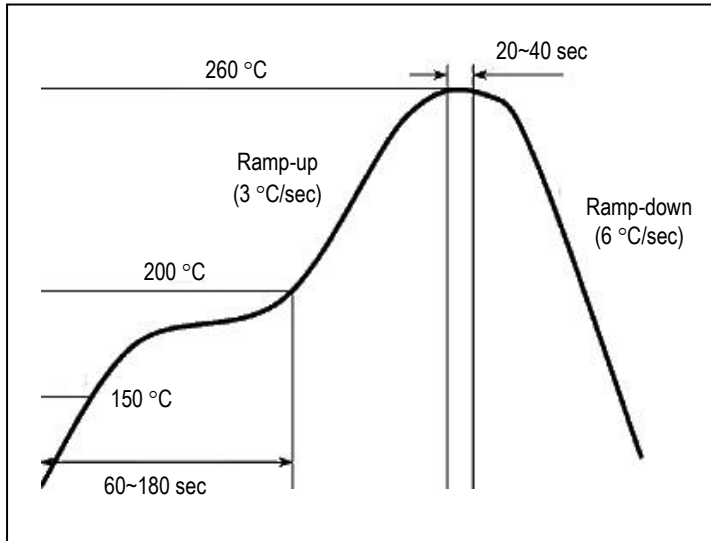
18. Surface Mount Recommendation (In mm)



NOTE

1. Add as much copper as possible to inner and outer layers near the part to ensure optimal thermal performance.
2. To ensure reliable operation, device ground paddle-to-ground pad soldering is critical. Recommended is that thermal grease should be used for better thermal performance.
3. Add mounting screws near the part to fasten the board to a heat sink. Ensure that the ground & thermal via region contacts the heat sink.
4. A proper heat dissipation path underneath the area of the PCB for the mounted device is strictly required for proper thermal operation. Damage to the device can result from inappropriate heat dissipation.

19. Recommended Soldering Reflow Profile



(End of Datasheet)

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