

Features

- 20 dB Gain at 1200 MHz
- 23.5 dBm P1dB at 1200 MHz
- 38 dBm Output IP3 at 1200 MHz
- 1.25 dB NF
- +5 V Single Supply

Description

The AWB459, a gain block amplifier MMIC, has a high linearity, high gain, and high efficiency over a wide range of frequency, being suitable for use in both receiver and transmitter of telecommunication systems up to 2 GHz. It has an active bias network for stable current over temperature and process variation. The amplifier is available in a SOT89 package and passes through the stringent DC, RF, and reliability tests

Typical Performance

(Supply Voltage = +5 V, $T_A = +25\text{ }^{\circ}\text{C}$, $Z_0 = 50\text{ }\Omega$)

Parameters	Units	Typical					
Frequency	MHz	30	512	800	1200	1600	
Gain	dB	24.0	23.5	20.0	20.0	20.5	
S11	dB	-15	-16	-12	-14	-13	
S22	dB	-15	-16	-18	-12	-10	
Output IP3 ¹⁾	dBm	40	40	39	38	38	
Noise Figure	dB	0.8	1.1	1.2	1.25	1.4	
Output P1dB	dBm	23.0	23.5	23.5	23.5	24.0	
Current	mA	130	130	130	130	130	
Device Voltage	V	+5	+5	+5	+5	+5	

1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

Product Specifications

Parameters	Units	Min	Typ.	Max
Testing Frequency	MHz		1200	
Gain	dB		20.0	
S11	dB		-14	
S22	dB		-12	
Output IP3	dBm		38	
Noise Figure	dB		1.25	
Output P1dB	dBm		23.5	
Current	mA	110	130	
Device Voltage	V		+5	

Absolute Maximum Ratings

Parameters	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-40 to +150 °C
Device Voltage	+10 V
Operating Junction Temperature	+150 °C
Input RF Power	+26 dBm
(CW, 50 Ω matched as in 512 MHz application circuit)*	
Thermal Resistance	43 °C/W

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

The max. input power, in principle, depends upon the application frequency and the matching circuit.

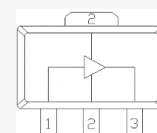


Package Style: SOT89

Applications

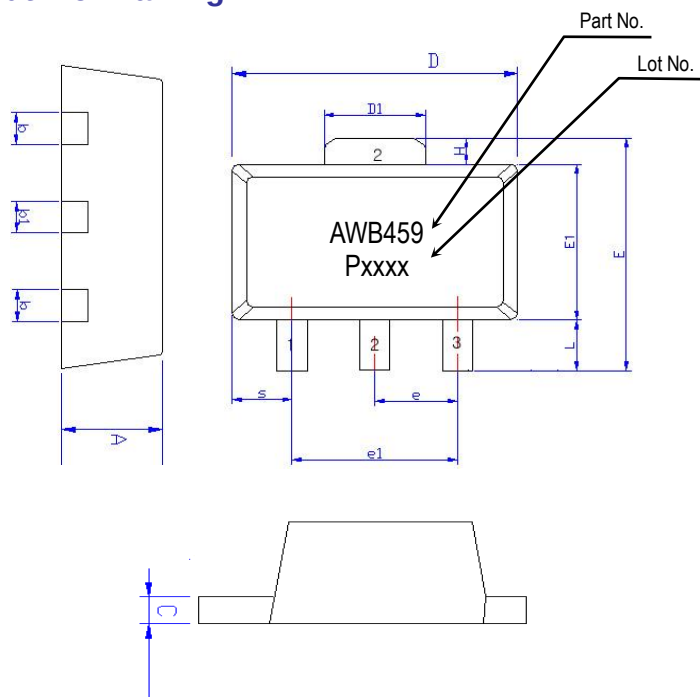
- IF 1.5 ~ 500 MHz (6.5 V)
- IF 30 ~ 512 MHz (5 V & 8 V)
- IF 30 ~ 512 MHz (8 V, 140 mA)
- DVB 470 ~ 800 MHz (5 V & 8 V)
- IF 1.5 ~ 1000 MHz (8 V)
- MoCA
- (800 ~ 1600 MHz, 5 V & 8 V)
- 1200 ~ 1700 MHz (5 V & 8 V)
- Wide Band
- (1000 ~ 2000 MHz, 5 V & 8 V)

Pin Configuration



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

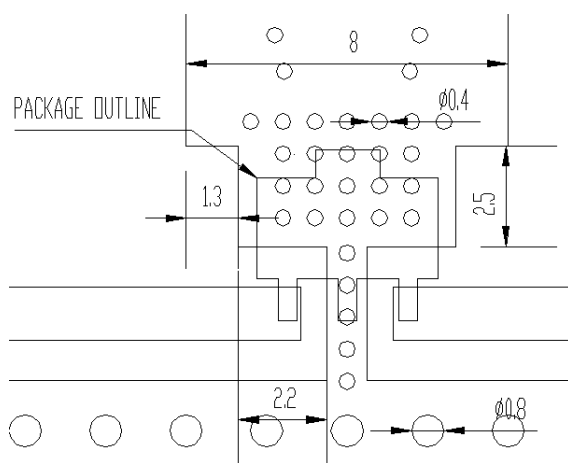
Outline Drawing



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

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

CAUTION: ESD-sensitive device!

Moisture Sensitivity Level (MSL)

Level 3 at 260 °C reflow

APPLICATION CIRCUIT

IF

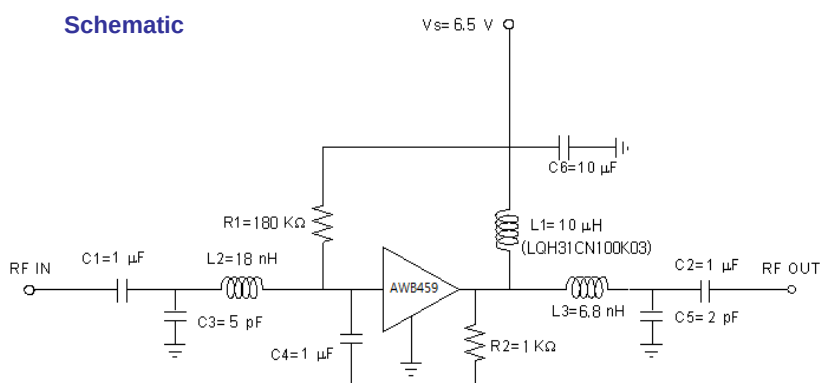
1.5 ~ 500 MHz

+6.5 V

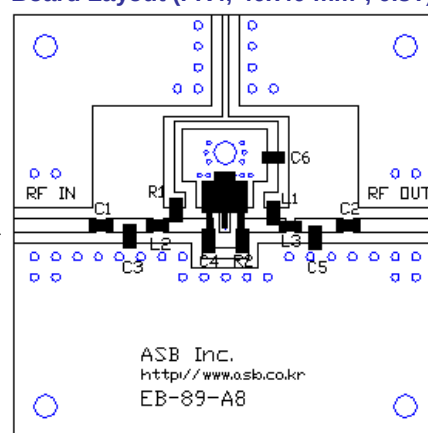
Frequency (MHz)	1.5	250	500
Magnitude S21 (dB)	23.5	24.0	23.5
Magnitude S11 (dB)	-11	-18	-15
Magnitude S22 (dB)	-11	-18	-13
Output P1dB (dBm)	22	26	26
Output IP3 ¹⁾ (dBm)	41	43	42
Noise Figure (dB)	1.25	0.95	1.35
Device Voltage (V)	+6.5	+6.5	+6.5
Current (mA)	140	140	140

1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

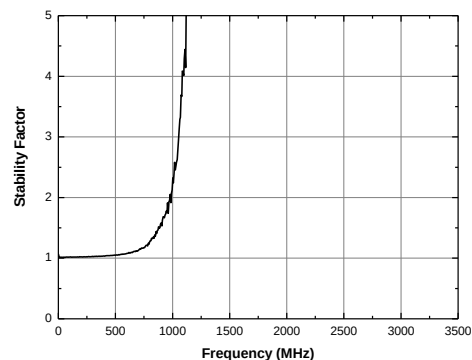
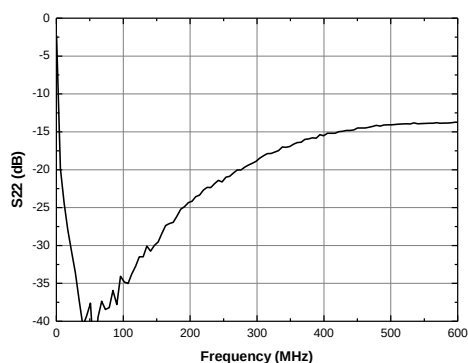
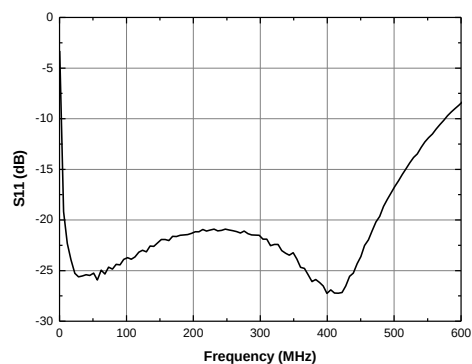
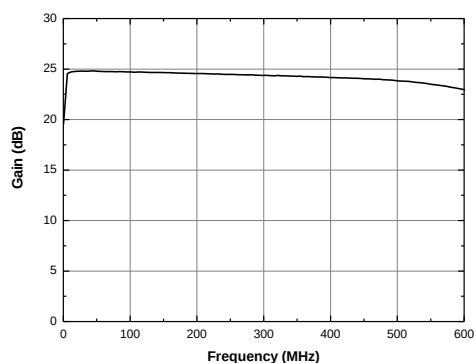
Schematic



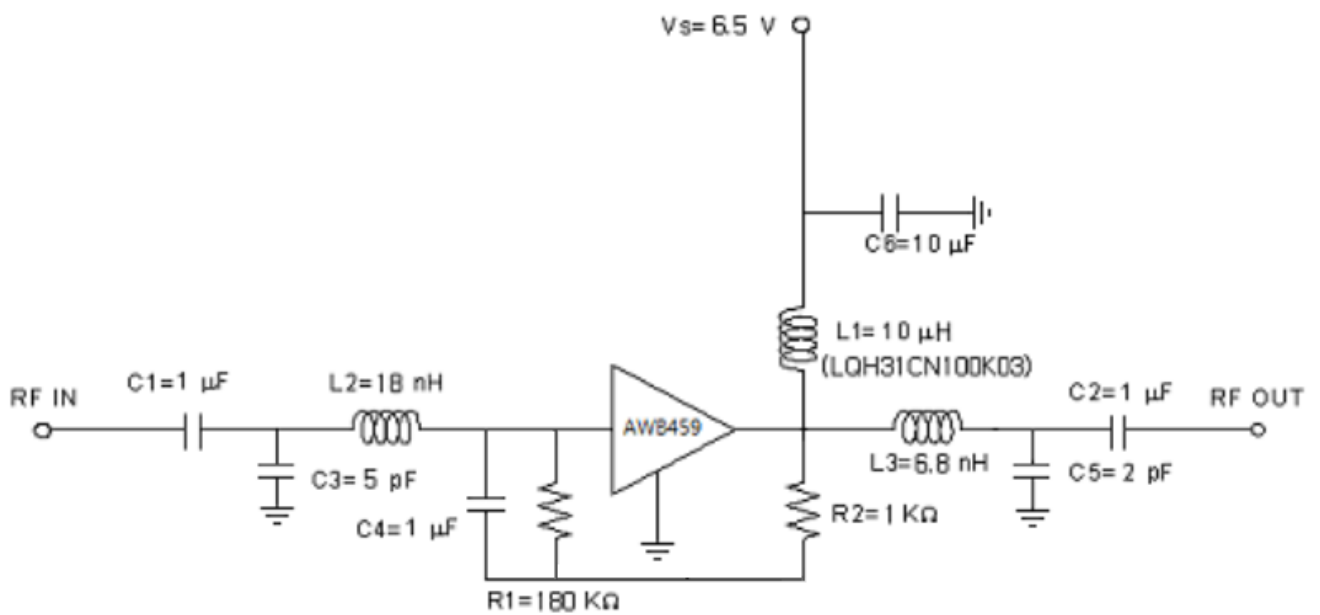
Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



ALTERNATIVE APPLICATION CIRCUIT



APPLICATION CIRCUIT

IF

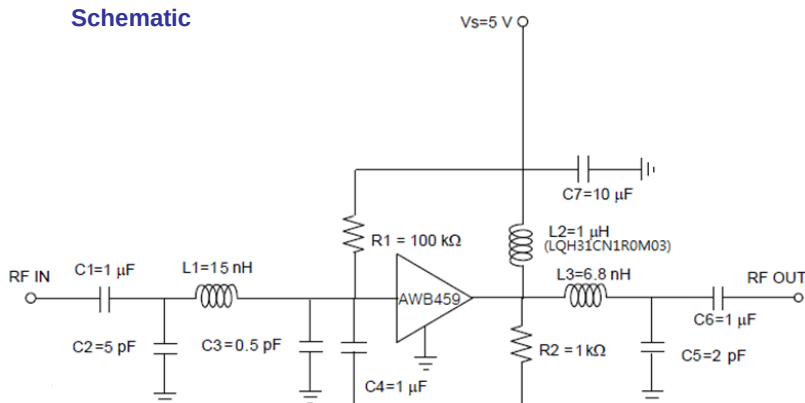
30 ~ 512 MHz

+5 V

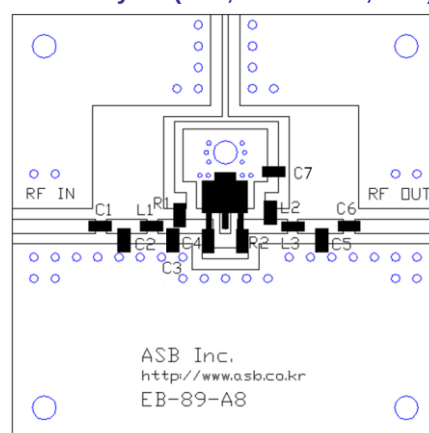
Frequency (MHz)	30	250	512
Magnitude S21 (dB)	24.0	24.0	23.5
Magnitude S11 (dB)	-15	-16	-16
Magnitude S22 (dB)	-15	-16	-16
Output P1dB (dBm)	23.0	23.0	23.5
Output IP3 ¹⁾ (dBm)	40	42	40
Noise Figure (dB)	0.8	1.1	1.1
Device Voltage (V)	+5	+5	+5
Current (mA)	130	130	130

1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

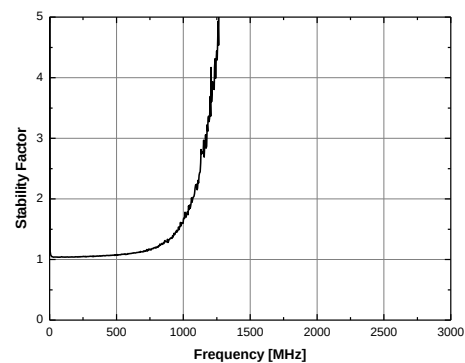
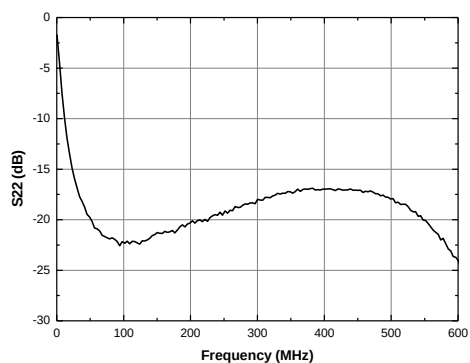
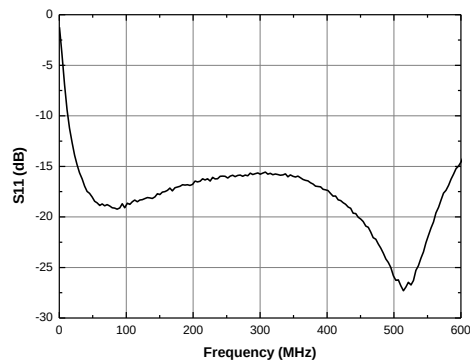
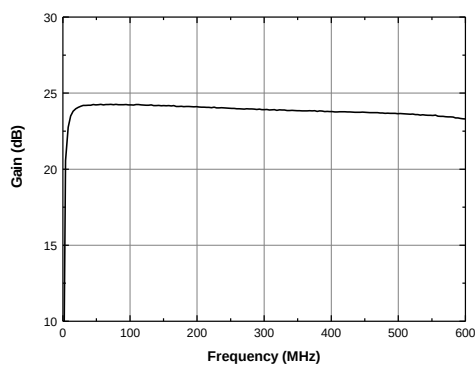
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

IF

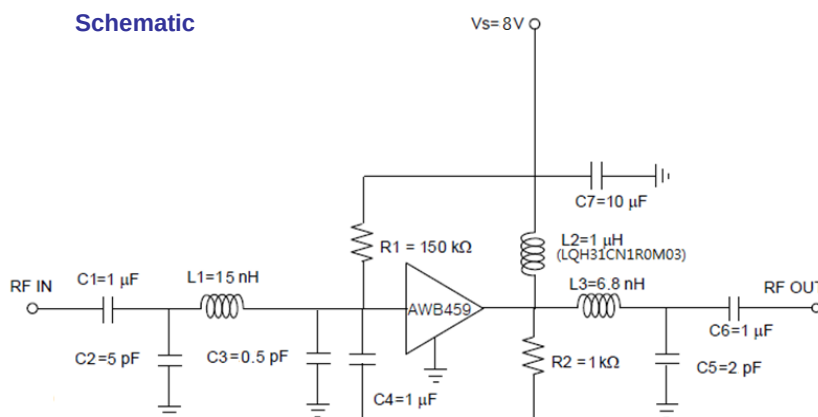
30 ~ 512 MHz

+8 V

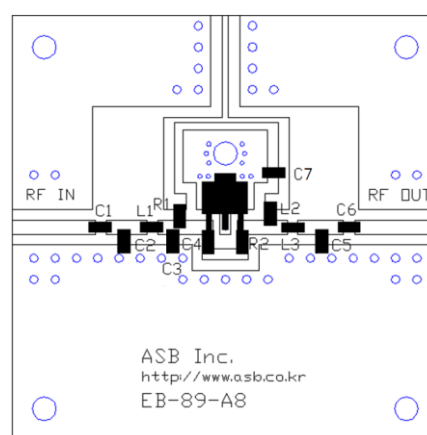
Frequency (MHz)	30	250	512
Magnitude S21 (dB)	24.0	24.0	23.5
Magnitude S11 (dB)	-15	-16	-16
Magnitude S22 (dB)	-15	-16	-16
Output P1dB (dBm)	27	28	28
Output IP3 ¹⁾ (dBm)	40	41	41
Noise Figure (dB)	0.9	1.2	1.2
Device Voltage (V)	+8	+8	+8
Current (mA)	200	200	200

1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

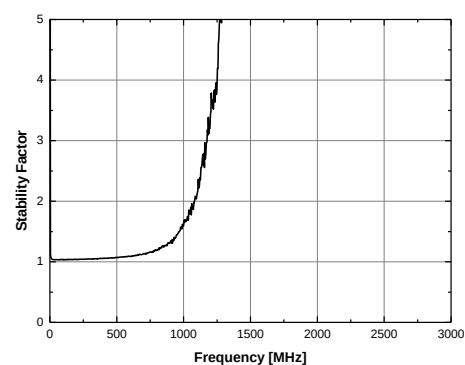
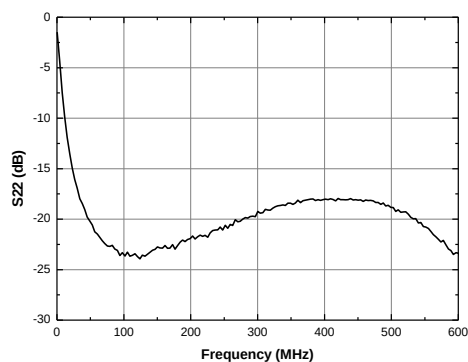
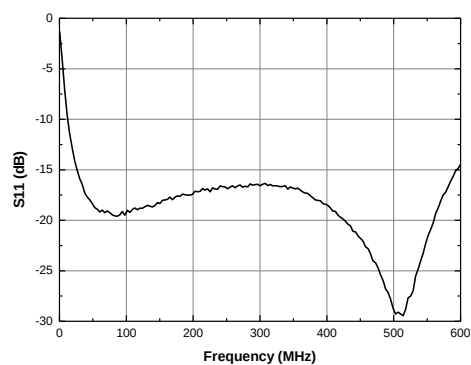
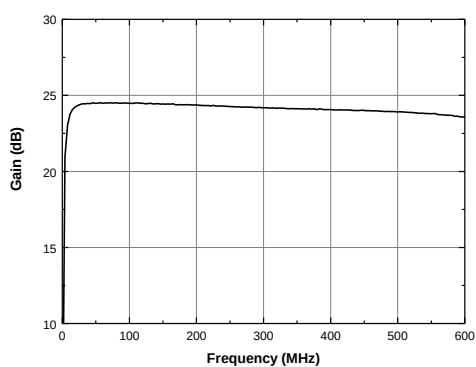
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

IF

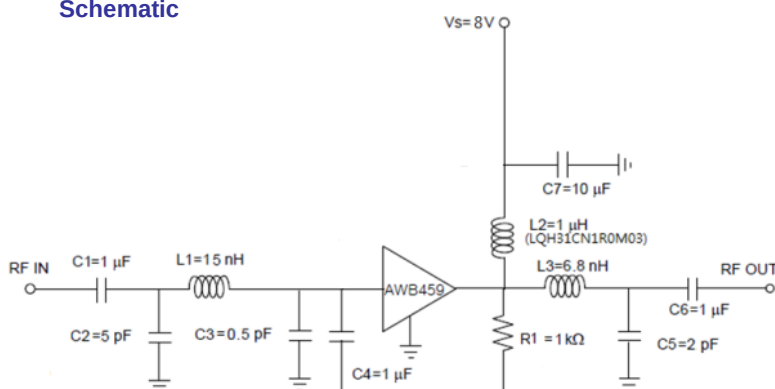
30 ~ 512 MHz

+8 V

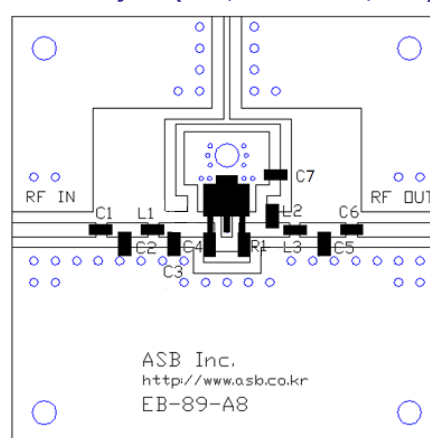
Frequency (MHz)	30	250	512
Magnitude S21 (dB)	24.0	24.0	23.5
Magnitude S11 (dB)	-15	-15	-18
Magnitude S22 (dB)	-15	-18	-18
Output P1dB (dBm)	26.5	27.0	27.0
Output IP3 ¹⁾ (dBm)	40.0	40.5	40.5
Noise Figure (dB)	0.8	1.2	1.2
Device Voltage (V)	+8	+8	+8
Current (mA)	140	140	140

1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

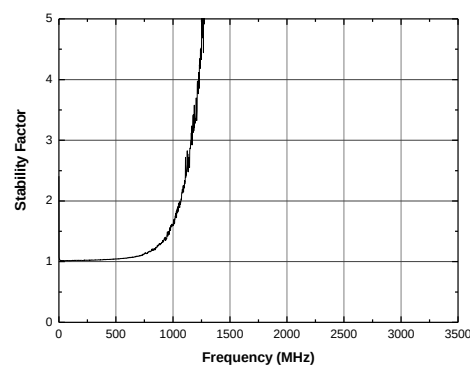
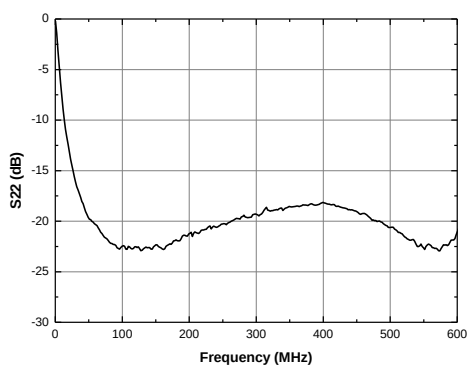
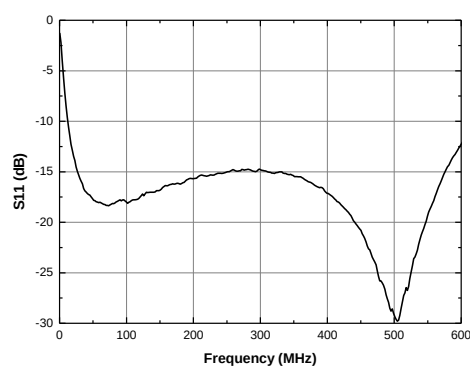
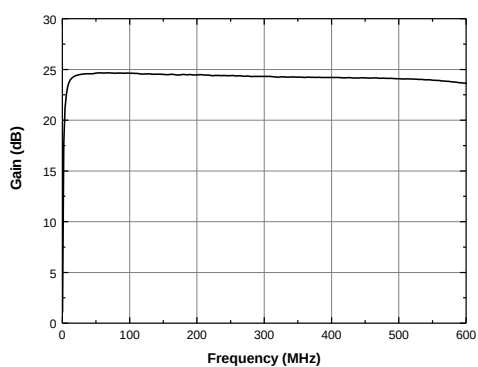
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

DVB

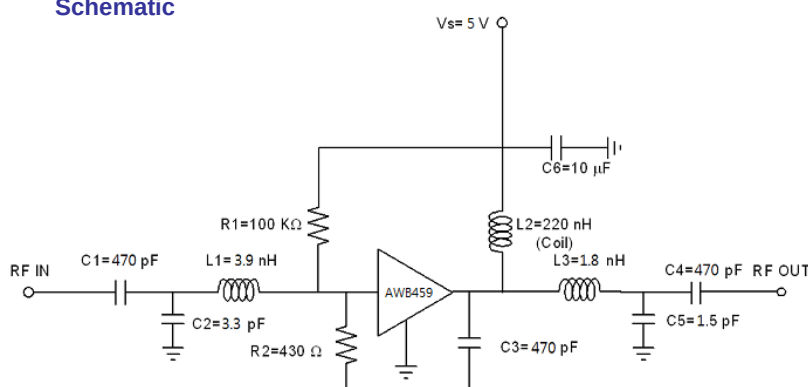
470 ~ 800 MHz

+5 V

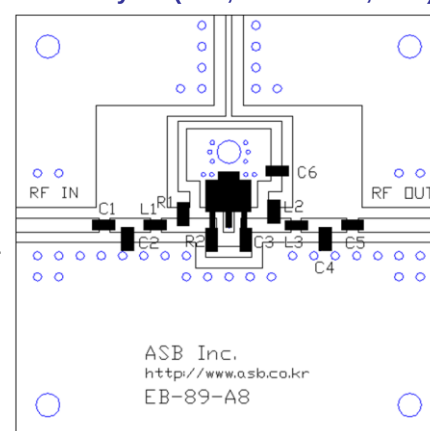
Frequency (MHz)	470	800
Magnitude S21 (dB)	20.5	20.5
Magnitude S11 (dB)	-13	-13
Magnitude S22 (dB)	-16	-14
Output P1dB (dBm)	24	24
Output IP3 ¹⁾ (dBm)	41.5	39.5
Noise Figure (dB)	1.3	1.3
Device Voltage (V)	+5	+5
Current (mA)	130	130

1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

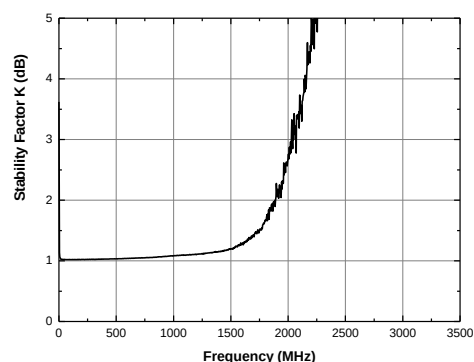
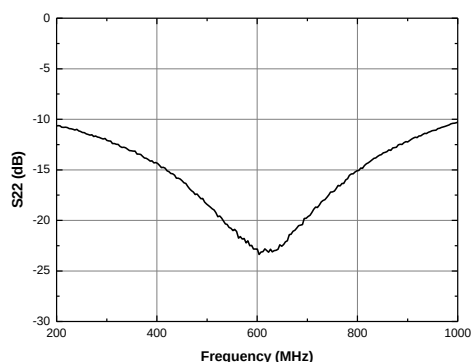
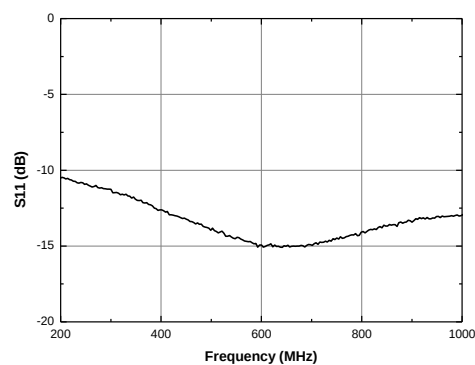
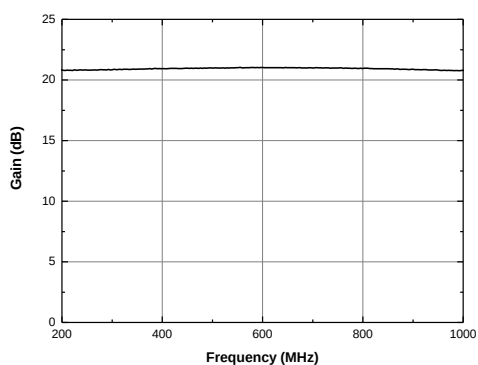
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

DVB

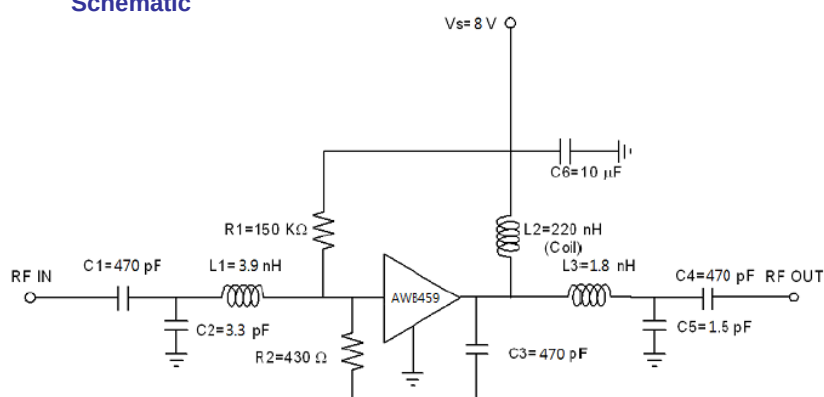
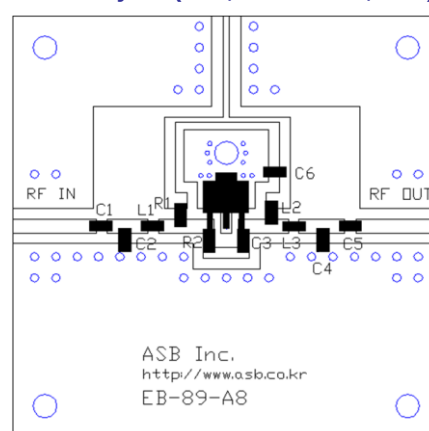
470 ~ 800 MHz

+8 V

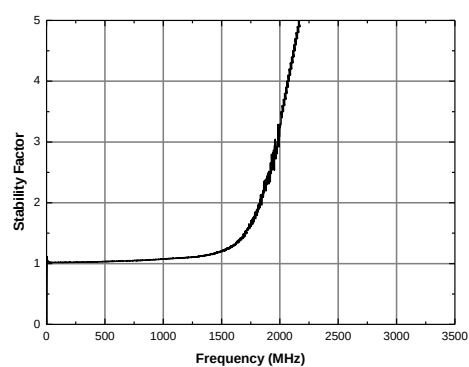
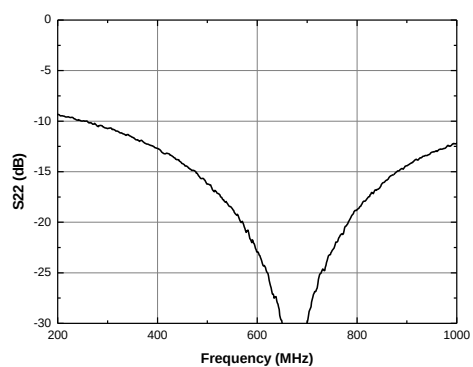
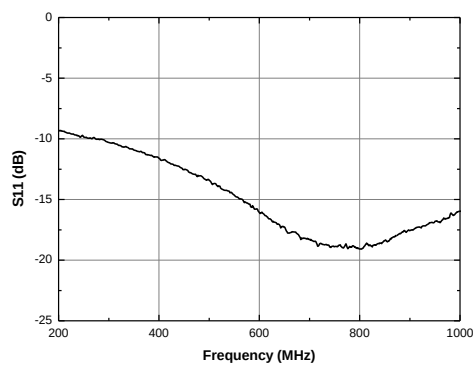
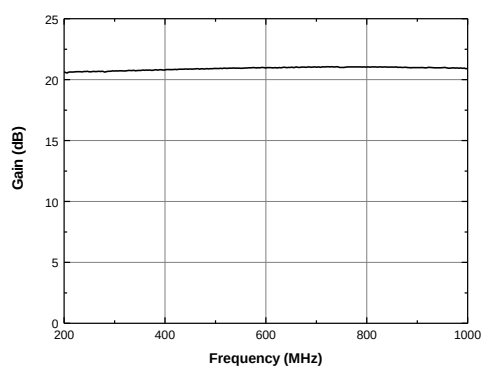
Frequency (MHz)	470	800
Magnitude S21 (dB)	20.5	20.5
Magnitude S11 (dB)	-12	-17
Magnitude S22 (dB)	-14	-17
Output P1dB (dBm)	26	26
Output IP3 ¹⁾ (dBm)	42	42
Noise Figure (dB)	1.3	1.3
Device Voltage (V)	+8	+8
Current (mA)	200	200

1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

Schematic

Board Layout (FR4, 40x40 mm², 0.8T)

S-parameters & K-factor



APPLICATION CIRCUIT

IF

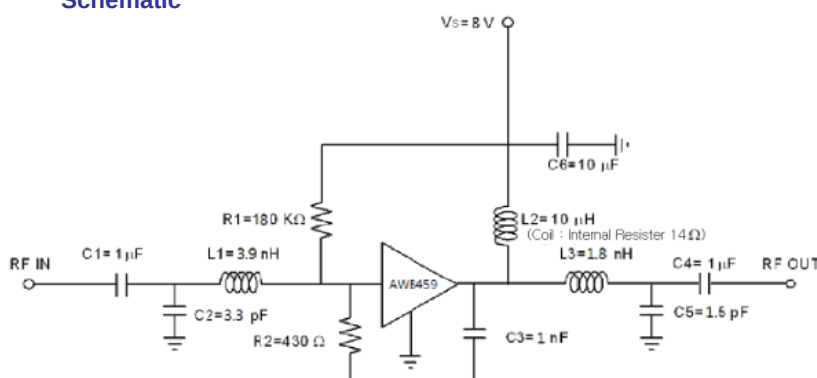
1.5 ~ 1000 MHz

+8 V

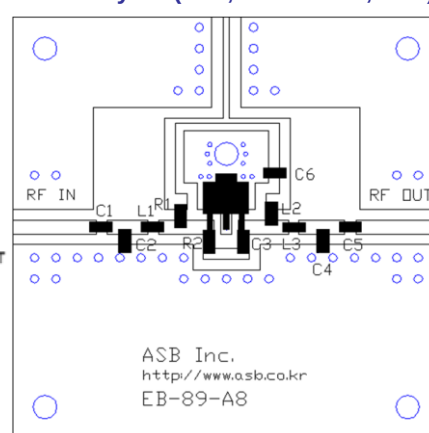
Frequency (MHz)	1.5	500	1000
Magnitude S21 (dB)	20.0	20.5	20.4
Magnitude S11 (dB)	-8	-14	-15
Magnitude S22 (dB)	-8	-17	-10
Output P1dB (dBm)	22.5	25.0	25.0
Output IP3 ¹⁾ (dBm)	39	41	39
Noise Figure (dB)	1.4	1.3	1.2
Device Voltage (V)	+8	+8	+8
Current (mA)	140	140	140

1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

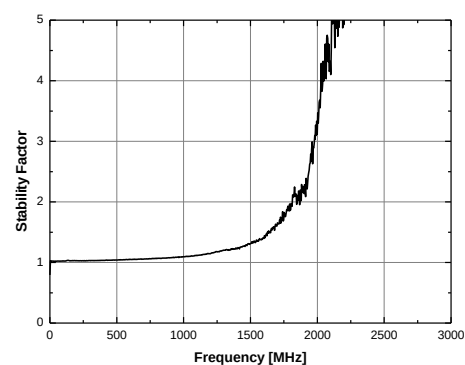
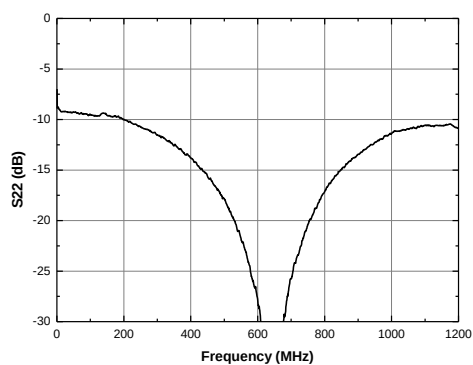
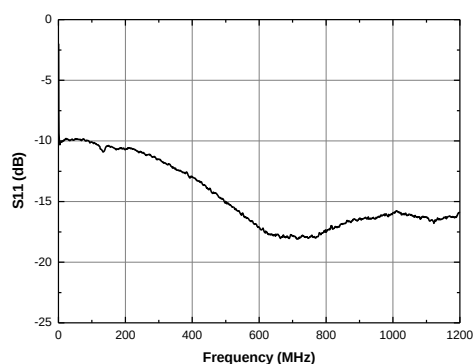
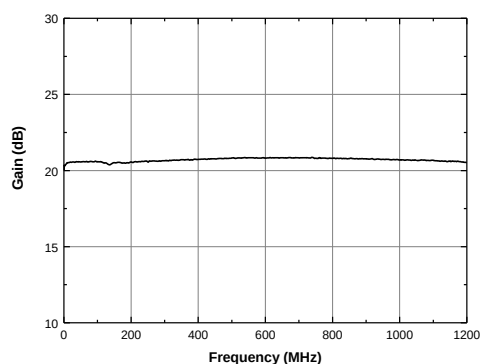
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

MoCA

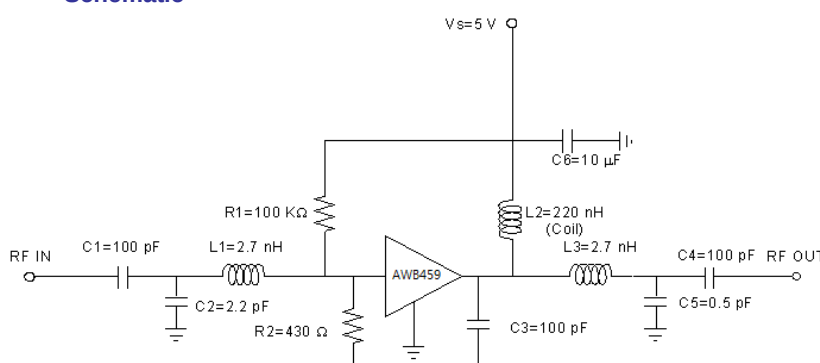
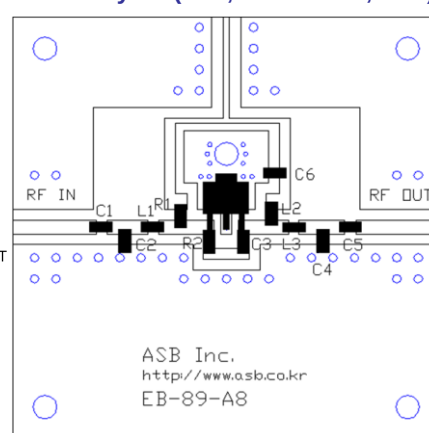
800 ~ 1600 MHz

+5 V

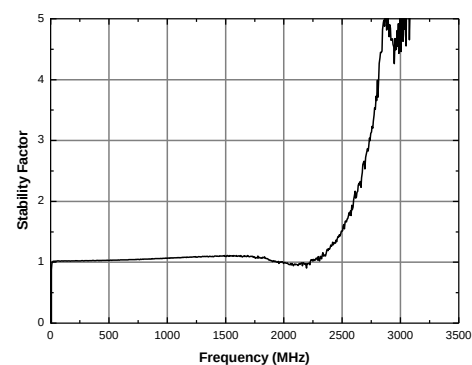
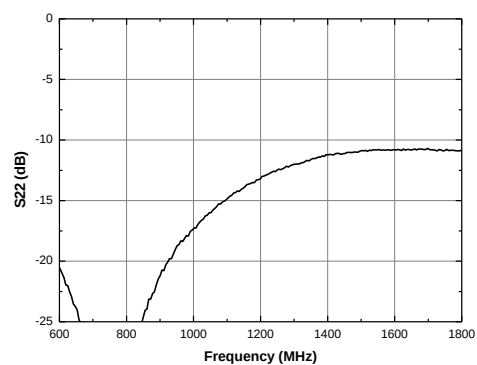
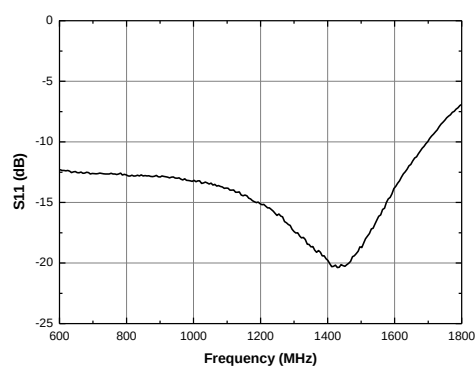
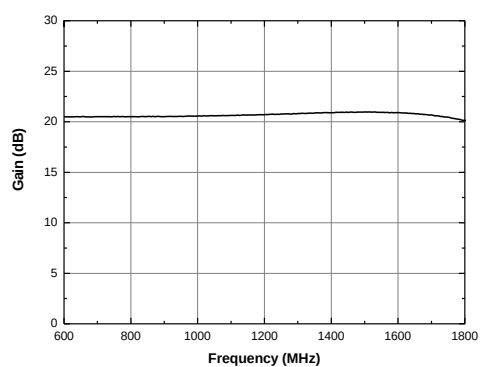
Frequency (MHz)	800	1200	1600
Magnitude S21 (dB)	20.0	20.0	20.5
Magnitude S11 (dB)	-12	-14	-13
Magnitude S22 (dB)	-18	-12	-10
Output P1dB (dBm)	23.5	23.5	24.0
Output IP3 ¹⁾ (dBm)	39	38	38
Noise Figure (dB)	1.2	1.25	1.4
Device Voltage (V)	+5	+5	+5
Current (mA)	130	130	130

1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

Schematic

Board Layout (FR4, 40x40 mm², 0.8T)

S-parameters & K-factor



APPLICATION CIRCUIT

MoCA

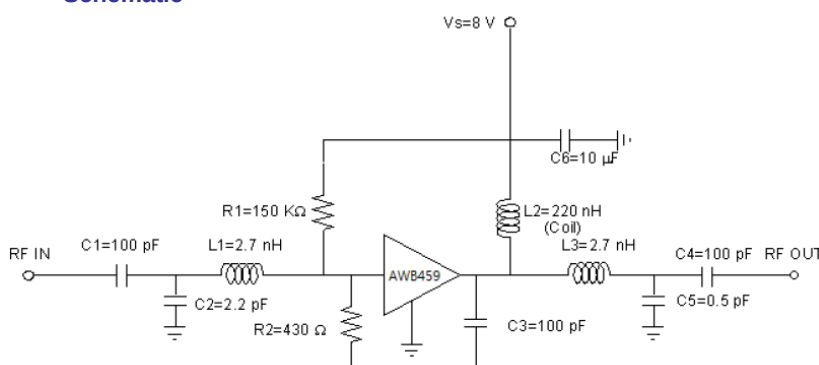
800 ~ 1600 MHz

+8 V

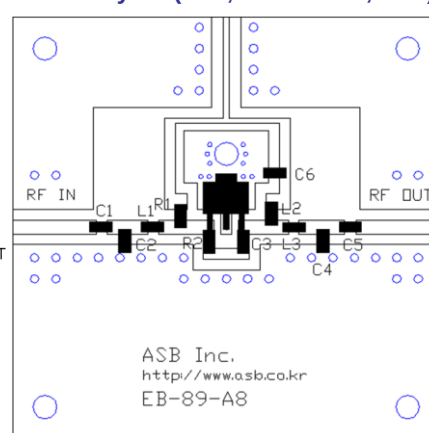
Frequency (MHz)	800	1200	1600
Magnitude S21 (dB)	20.0	20.0	20.5
Magnitude S11 (dB)	-12	-16	-13
Magnitude S22 (dB)	-18	-12	-10
Output P1dB (dBm)	27.5	27.0	27.0
Output IP3 ¹⁾ (dBm)	42	42	41
Noise Figure (dB)	1.3	1.3	1.45
Device Voltage (V)	+8	+8	+8
Current (mA)	200	200	200

1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

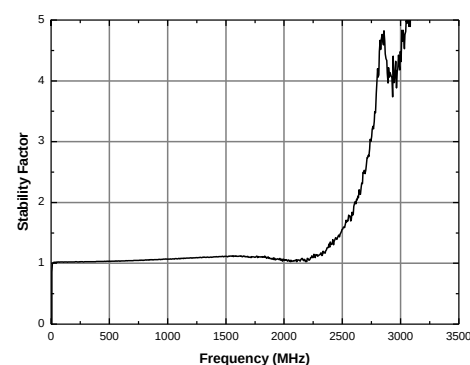
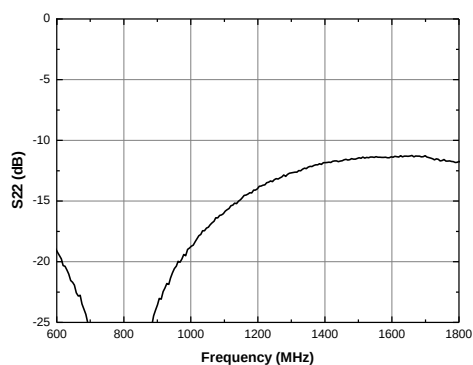
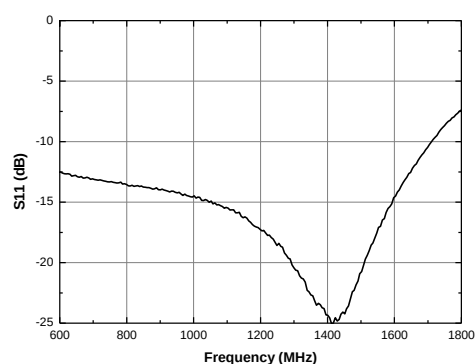
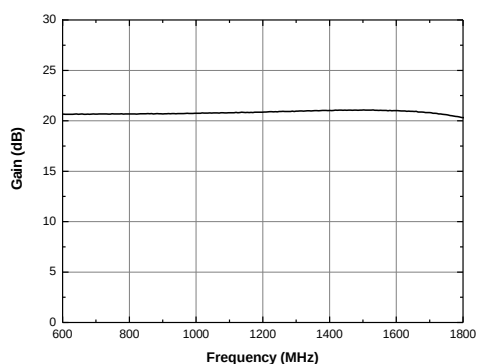
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

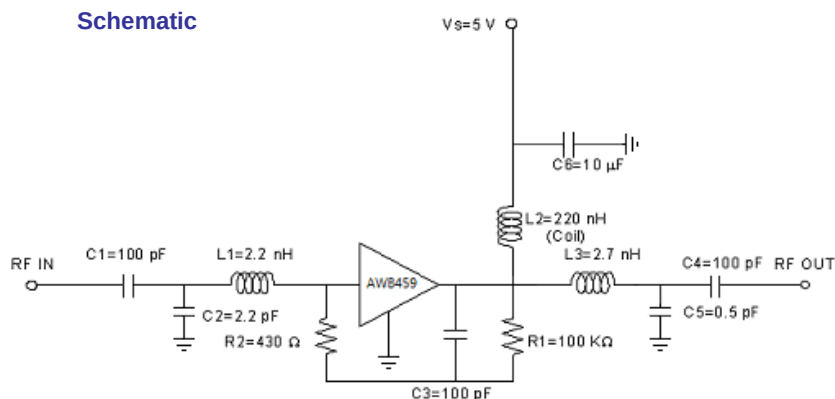
1200 ~ 1700 MHz

+5 V

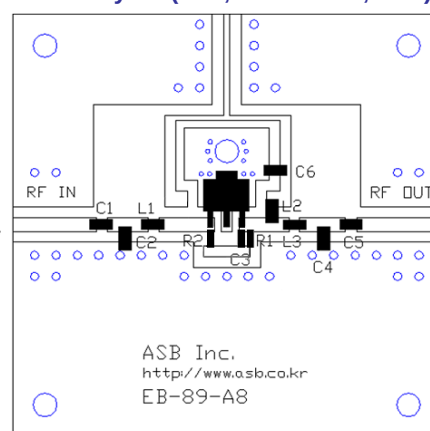
Frequency (MHz)	1200	1700
Magnitude S21 (dB)	21	21.5
Magnitude S11 (dB)	-13	-12
Magnitude S22 (dB)	-18	-15
Output P1dB (dBm)	23	22
Output IP3 ¹⁾ (dBm)	39	37
Noise Figure (dB)	1.3	1.4
Device Voltage (V)	+5	+5
Current (mA)	130	130

1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

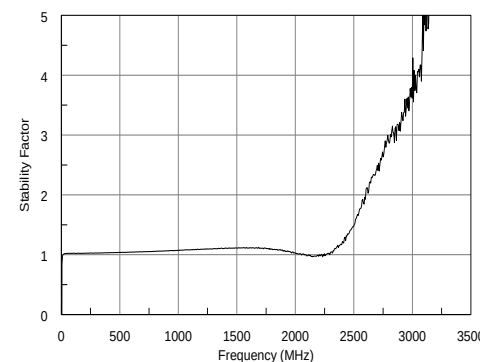
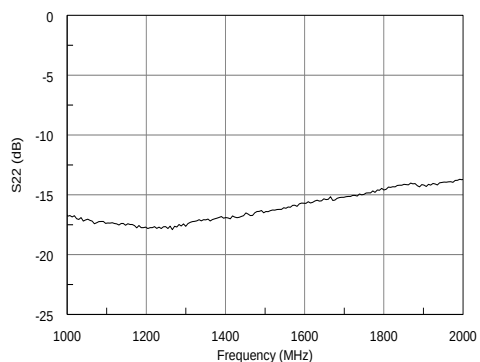
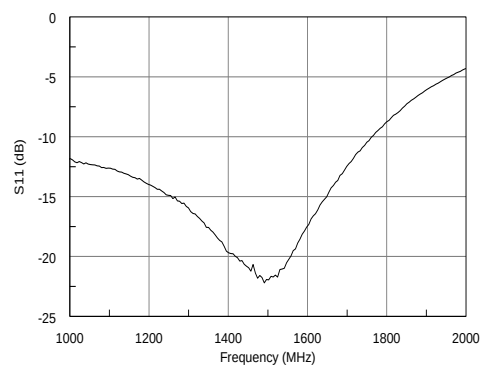
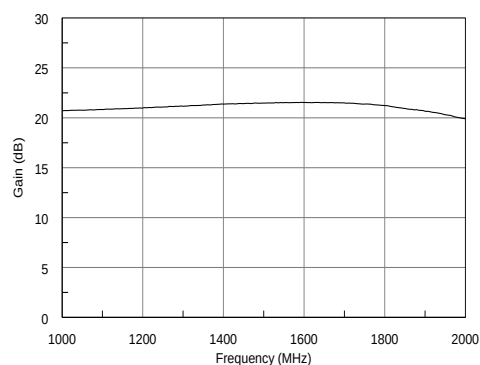
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

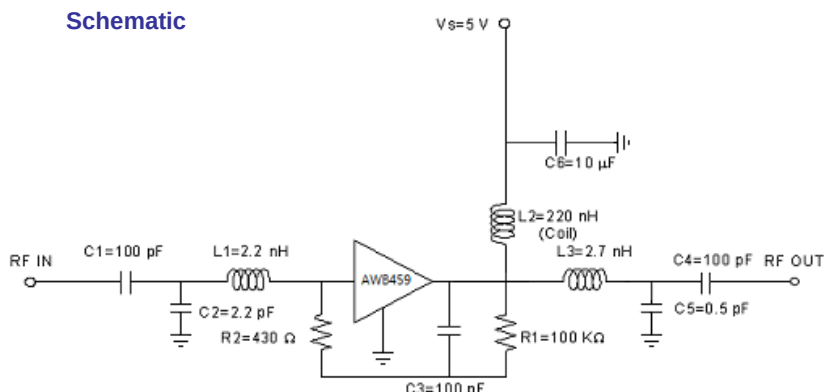
1200 ~ 1700 MHz

+8 V

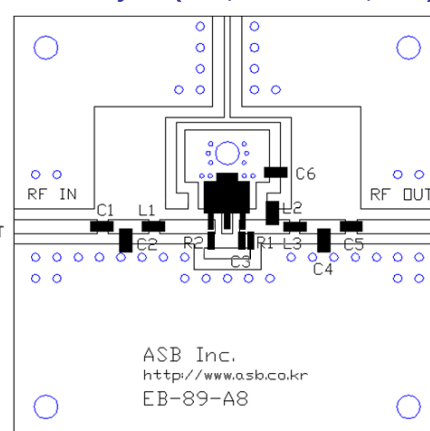
Frequency (MHz)	1200	1700
Magnitude S21 (dB)	21	21.5
Magnitude S11 (dB)	-15	-12
Magnitude S22 (dB)	-19	-16
Output P1dB (dBm)	27	26
Output IP3 ¹⁾ (dBm)	43	47
Noise Figure (dB)	1.3	1.5
Device Voltage (V)	+8	+8
Current (mA)	200	200

1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

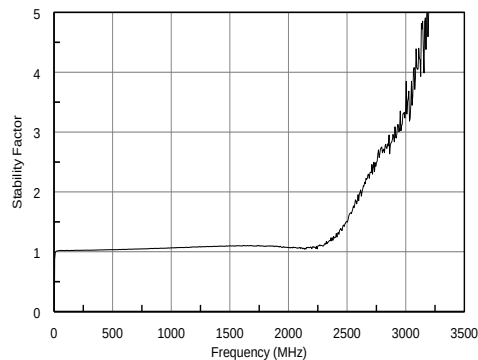
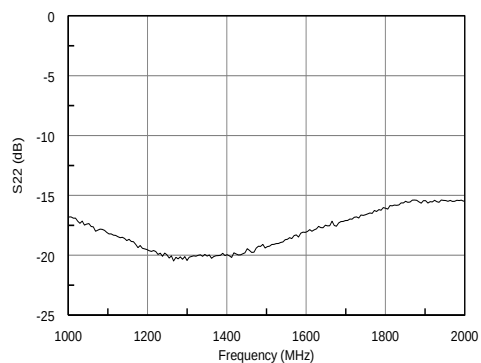
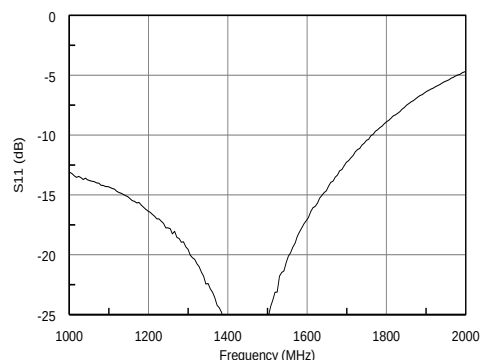
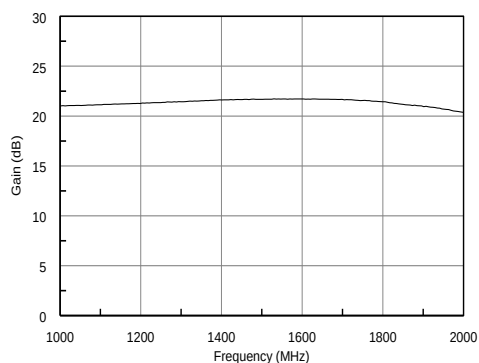
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



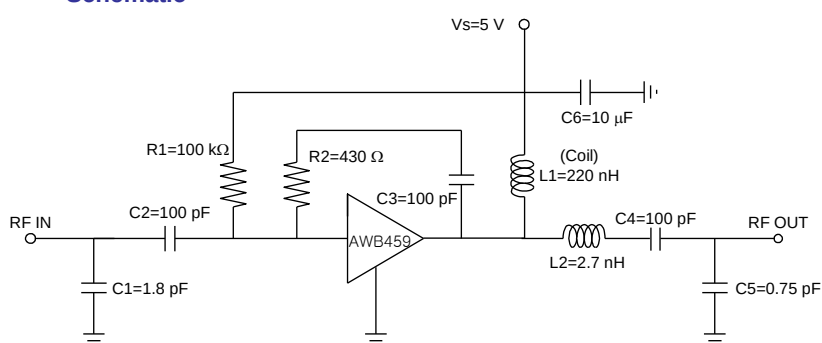
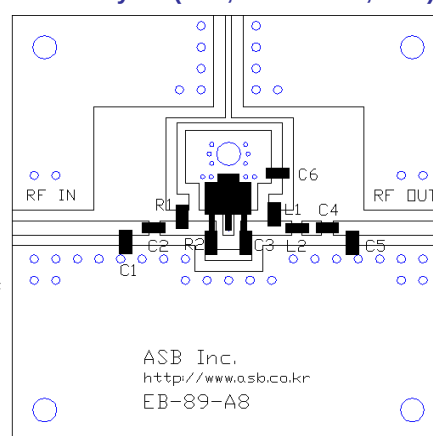
APPLICATION CIRCUIT

Wide Band
1000 ~ 2000 MHz
+5 V

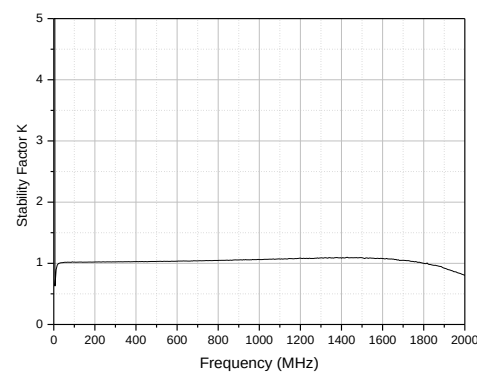
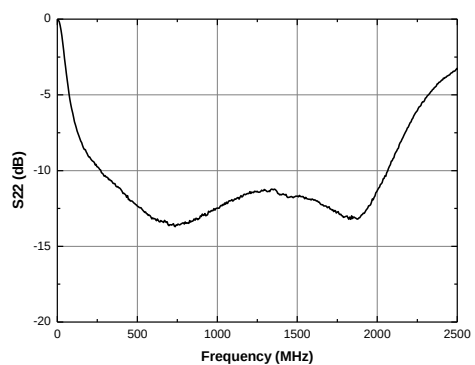
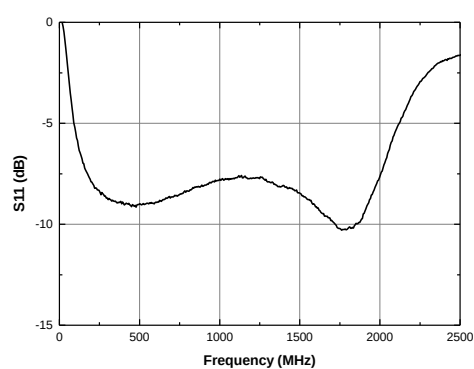
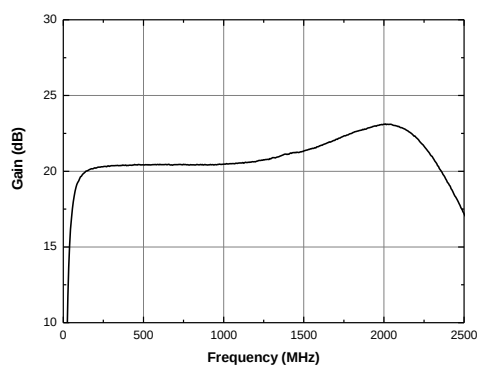
Frequency (MHz)	1000	1500	2000
Magnitude S21 (dB)	20.1	21.0	22.8
Magnitude S11 (dB)	-7	-8	-7
Magnitude S22 (dB)	-11	-10	-10
Output P1dB (dBm)	24.0	23.5	20.0
Output IP3 ¹⁾ (dBm)	39.0	38.5	35.0
Noise Figure (dB)	1.40	1.40	1.65
Device Voltage (V)	+5	+5	+5
Current (mA)	130	130	130

1) OIP3 is measured with two tones at an output power of +7 dBm/tone separated by 1 MHz.

Schematic

Board Layout (FR4, 40x40 mm², 0.8T)

S-parameters & K-factor



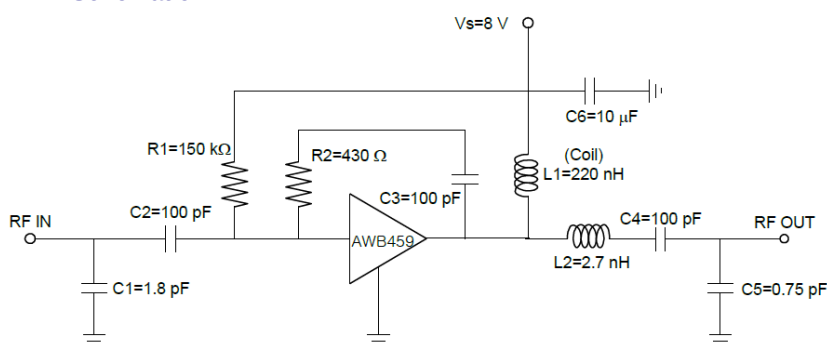
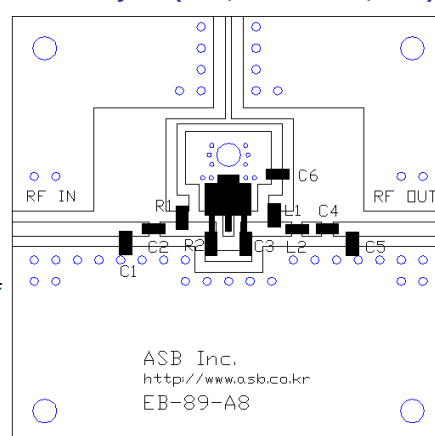
APPLICATION CIRCUIT

Wide Band
1000 ~ 2000 MHz
+8 V

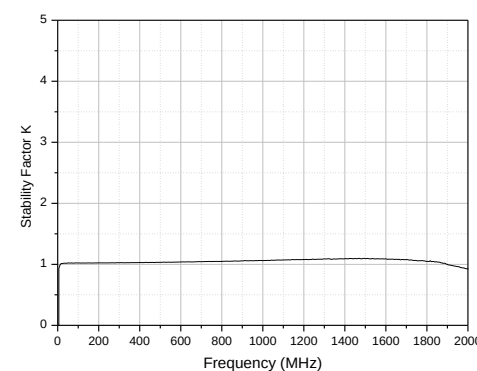
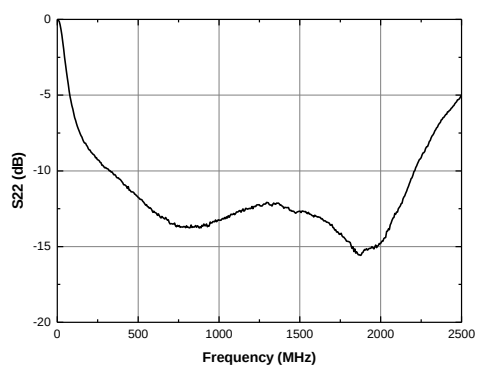
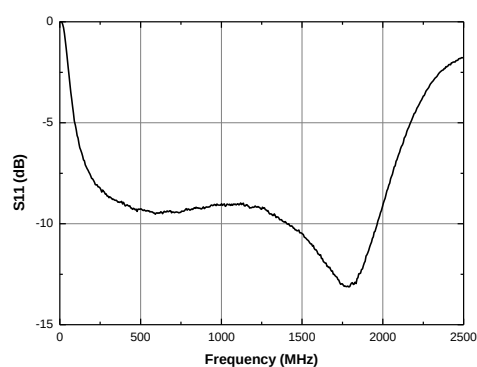
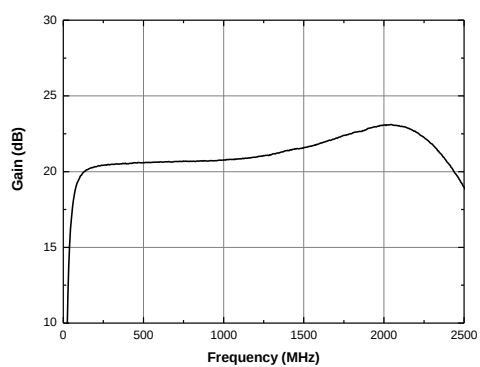
Frequency (MHz)	1000	1500	2000
Magnitude S21 (dB)	20.2	21.0	22.5
Magnitude S11 (dB)	-8	-9	-8
Magnitude S22 (dB)	-12	-11	-13
Output P1dB (dBm)	27.5	27.0	23.5
Output IP3 ¹⁾ (dBm)	40.5	40.5	37.5
Noise Figure (dB)	1.4	1.6	1.8
Device Voltage (V)	+8	+8	+8
Current (mA)	200	200	200

1) OIP3 is measured with two tones at an output power of +7 dBm/tone separated by 1 MHz.

Schematic

Board Layout (FR4, 40x40 mm², 0.8T)

S-parameters & K-factor



Recommended Soldering Reflow Profile

