ASW208

5 ~ 6000 MHz MMIC Amplifier

Features

- 19 dB Gain at 2 GHz
- 22 dBm P1dB at 2 GHz
- 35 dBm Output IP3 at 2 GHz
- 1.7 dB NF at 2 GHz
- MTTF > 100 Years
- Single Supply

Description

The ASW208, a gain block amplifier MMIC, has a low noise, high gain, and high linearity over a wide range of frequency, being suitable for use in both receiver and transmitter of telecommunication systems up to 6 GHz. The amplifier is available in a SOT89 package and passes through the stringent DC, RF, and reliability tests.

RoHS-compliant GREEN Package



Package Style: SOT89

Typical Performance

(Supply Voltage = Device Voltage, T_A = +25 °C, Zo = 50 Ω)

Parameters	Units	Typical				
Frequency	MHz	50	900	2000	2700	3000
Gain	dB	21.0	21.0	19.0	17.0	16.2
S11	dB	-9	-14	-12	-11	-13
S22	dB	-18	-12	-12	-12	-11
Output IP3[1)]	dBm	32[1)]	37[2)]	35[2)]	33[2)]	29[3)]
Noise Figure	dB	5.2	1.6	1.7	1.9	2.4
Output P1dB	dBm	23	22	22	21	20
Current	mA	80	80	80	80	80
Device Voltage	V	+5.5	+5.5	+5.5	+5.5	+5.0

1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.
2) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 1 MHz.
3) OIP3 is measured with two tones at an output power of +5 dBm/tone separated by 1 MHz.

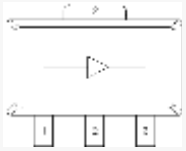
Application Circuit

- 500 ~ 3500 MHz (5.5 V)
- 500 ~ 3500 MHz (5 V)
- IF, 50 ~ 450 MHz (5.5 V)
- IF, 50 ~ 450 MHz (5 V)
- 3000 ~ 4500 MHz (5 V)
- SMATV, 950 ~ 2150 MHz (5.5 V)
- SMATV, 950 ~ 2150 MHz (5 V)
- 50 ~ 2600 MHz (5 V, 75 Ω)
- 1000 ~ 2600 MHz

Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		2000	
Gain	dB	18	19	
S11	dB	-9	-12	
S22	dB	-9	-12	
Output IP3	dBm	32	35	
Noise Figure	dB		1.7	2.0
Output P1dB	dBm	20.5	22.0	
Current	mA	60	80	100
Device Voltage	V		+5.5	

Pin Configuration



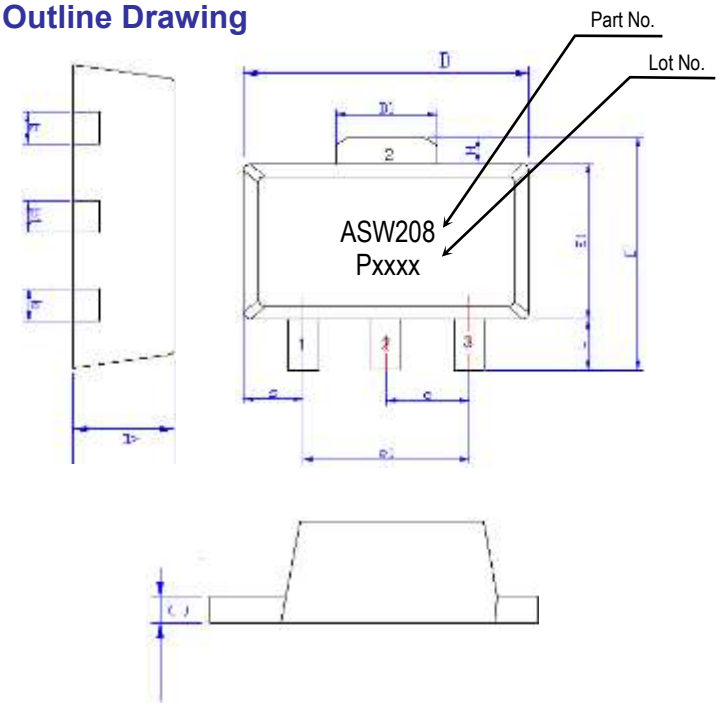
Pin No.	Function
1	RF IN
2	GND
3	RF OUT & Bias

Absolute Maximum Ratings

Parameters	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-40 to +150 °C
Device Voltage	+6 V
Operating Junction Temperature	+150 °C
Input RF Power (Continuous)	+22 dBm
Thermal Resistance	62 °C/W

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

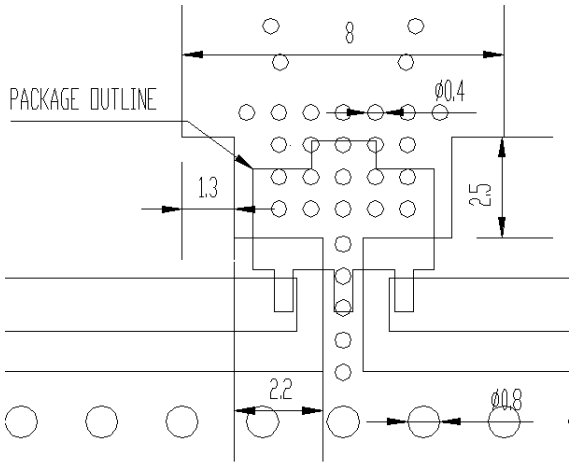
Outline Drawing



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 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

Wide Band

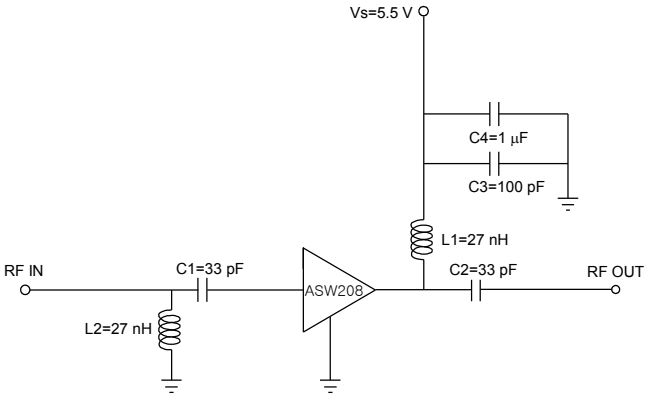
500 ~ 3500 MHz

+5.5 V

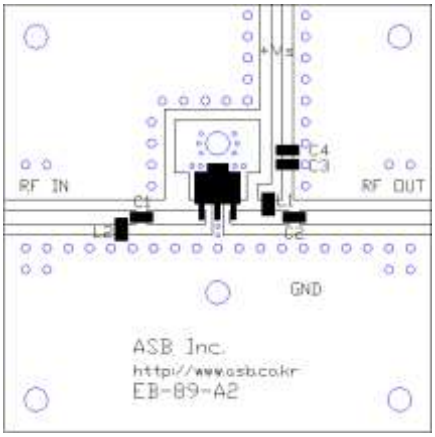
Frequency (MHz)	900	2000	2700
Magnitude S21 (dB)	21	19	17
Magnitude S11 (dB)	-14	-12	-11
Magnitude S22 (dB)	-12	-12	-12
Output P1dB (dBm)	22	22	21
Output IP3[1)] (dBm)	37	35	33
Noise Figure (dB)	1.6	1.7	1.9
Device Voltage (V)	+5.5	+5.5	+5.5
Current (mA)	80	80	80

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

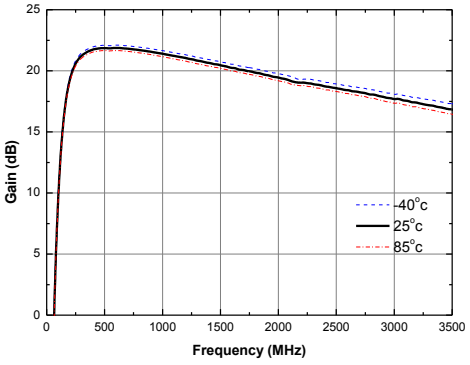
Schematic

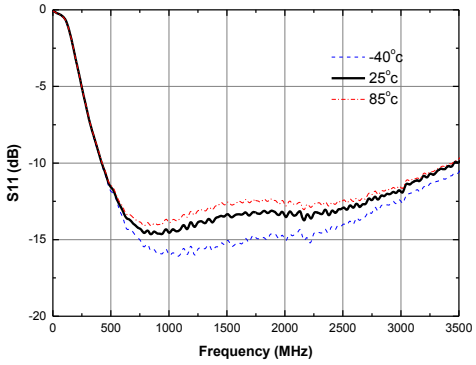


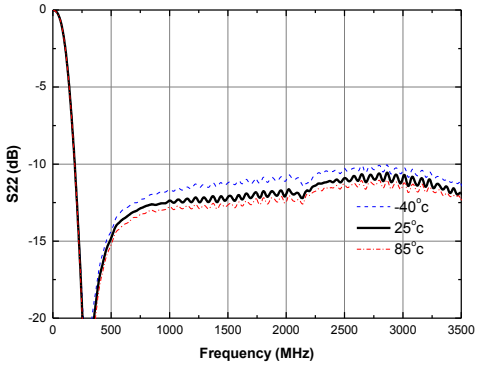
Board Layout (FR4, 40x40 mm², 0.8T)

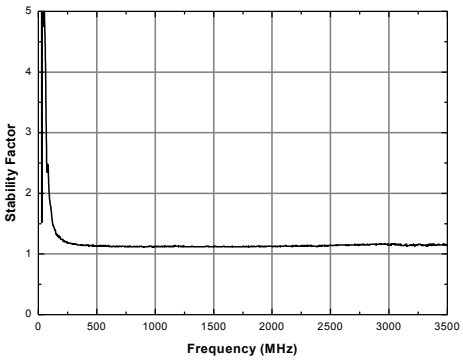


S-parameters & K-factor

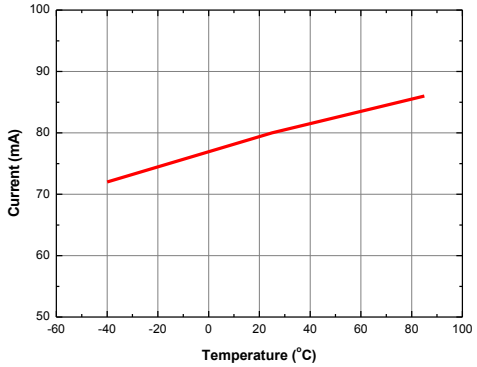




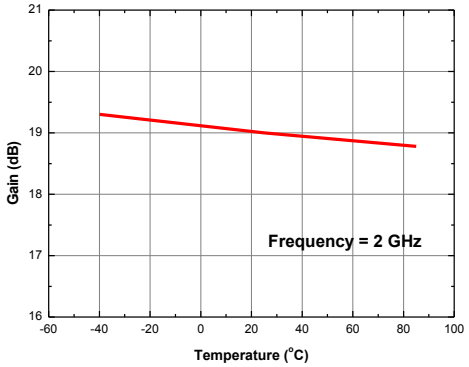




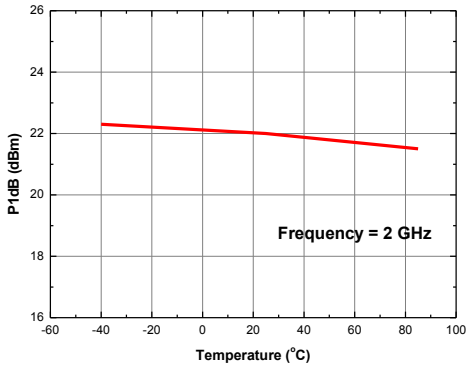
Current vs. Temperature



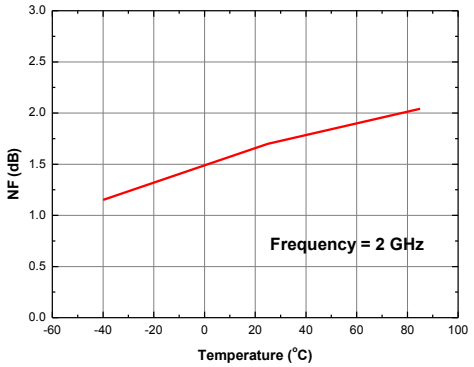
Gain vs. Temperature



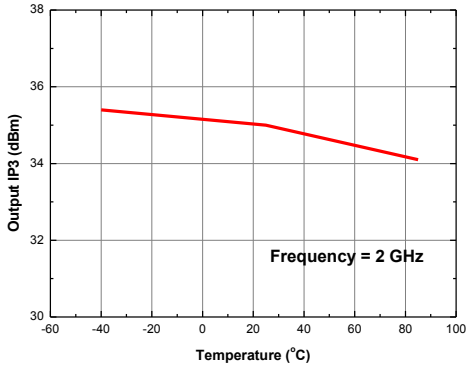
P1dB vs. Temperature



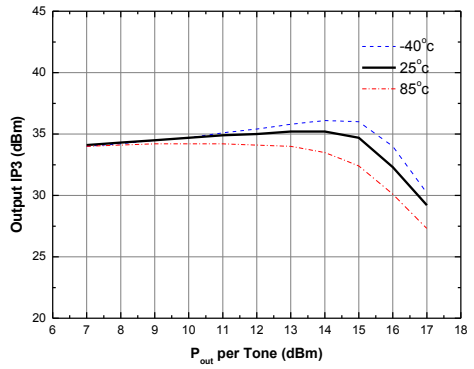
NF vs. Temperature



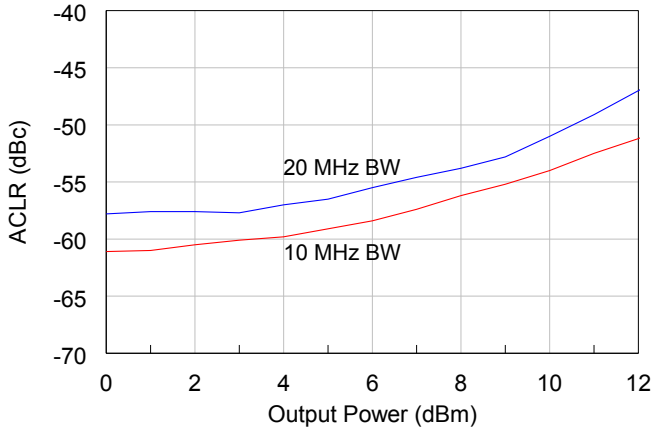
Output IP3 vs. Temperature



Output IP3 vs. Tone Power (Frequency = 2 GHz)

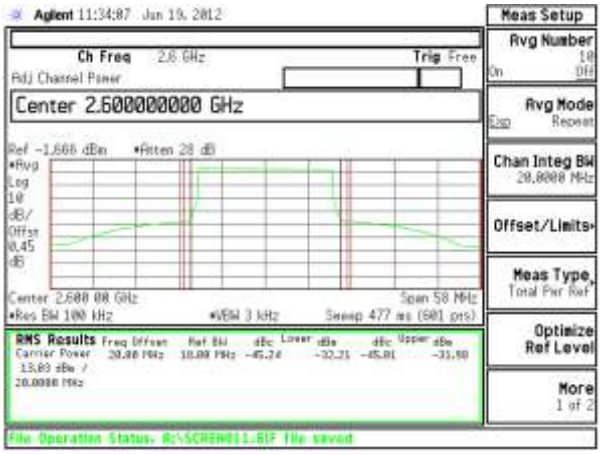


LTE ACLR – 10 MHz & 20 MHz



1) Test Source : LTE_FDD_test model 3.1, BW: 10 MHz & 20 MHz, Test Frequency: 2.6 GHz

LTE ACLR – 20 MHz



2) Test Source : LTE_FDD_test model 3.1, BW: 20 MHz, Test Frequency: 2.6 GHz

APPLICATION CIRCUIT

Wide Band

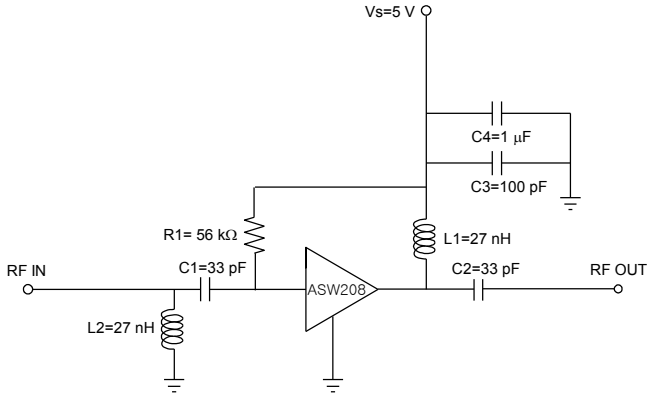
500 ~ 3500 MHz

+5 V

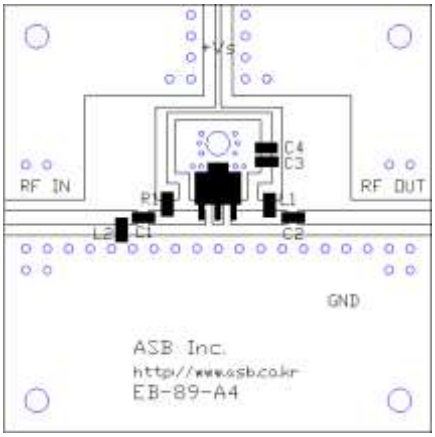
Frequency (MHz)	900	2000	2700
Magnitude S21 (dB)	21	19	17
Magnitude S11 (dB)	-14	-11	-11
Magnitude S22 (dB)	-12	-11	-10
Output P1dB (dBm)	22	22	21
Output IP3[1)] (dBm)	37	35	33
Noise Figure (dB)	1.6	1.7	1.9
Device Voltage (V)	+5	+5	+5
Current (mA)	80	80	80

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

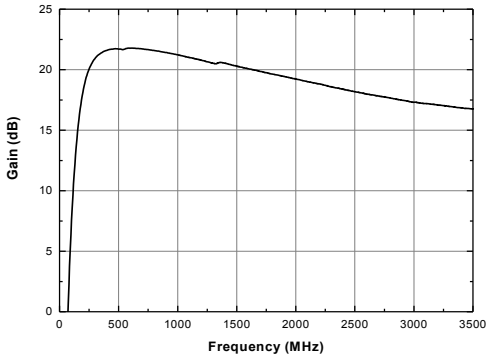
Schematic

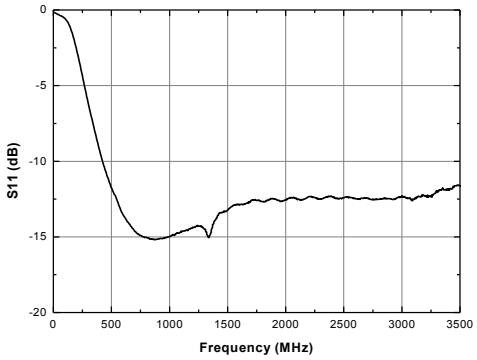


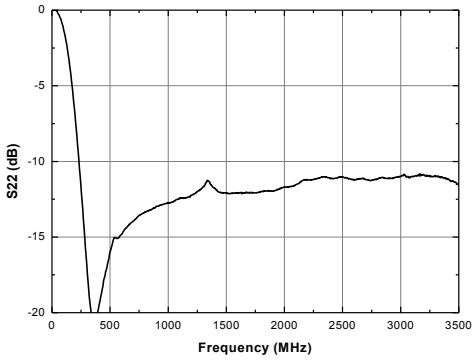
Board Layout (FR4, 40x40 mm², 0.8T)

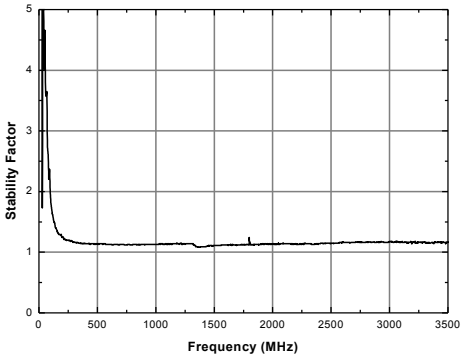


S-parameters & K-factor









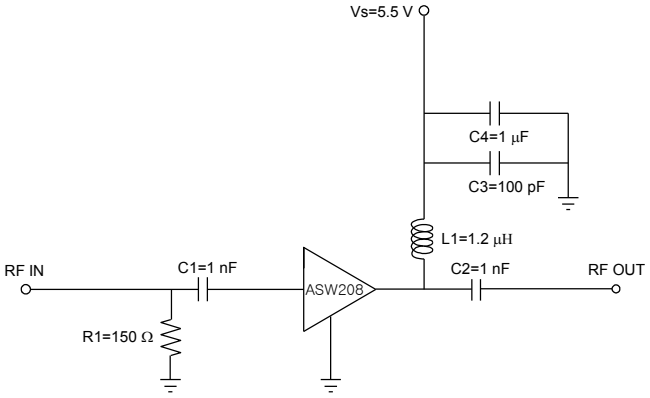
APPLICATION CIRCUIT

IF
50 ~ 450 MHz
+5.5 V

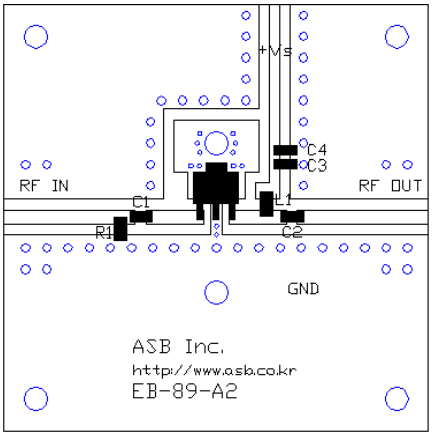
Frequency (MHz)	50	150	300	450
Magnitude S21 (dB)	21.0	20.0	20.0	19.5
Magnitude S11 (dB)	-9	-14	-15	-15
Magnitude S22 (dB)	-18	-18	-15	-15
Output P1dB (dBm)	23.0	23.5	23.5	23.5
Output IP3[1)] (dBm)	32	33	34	34
Noise Figure (dB)	5.2	3.4	3.2	3.2
Device Voltage (V)	+5.5	+5.5	+5.5	+5.5
Current (mA)	80	80	80	80

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

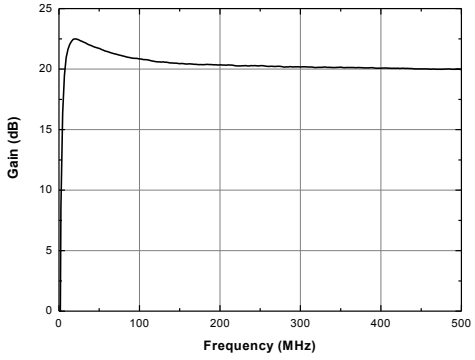
Schematic

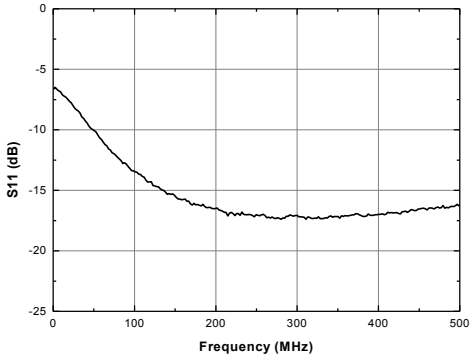


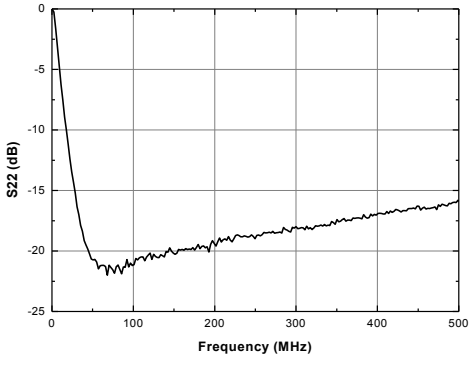
Board Layout (FR4, 40x40 mm², 0.8T)

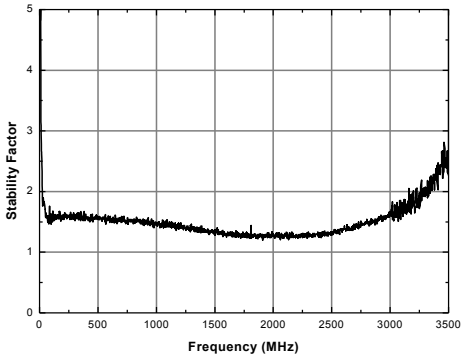


S-parameters & K-factor









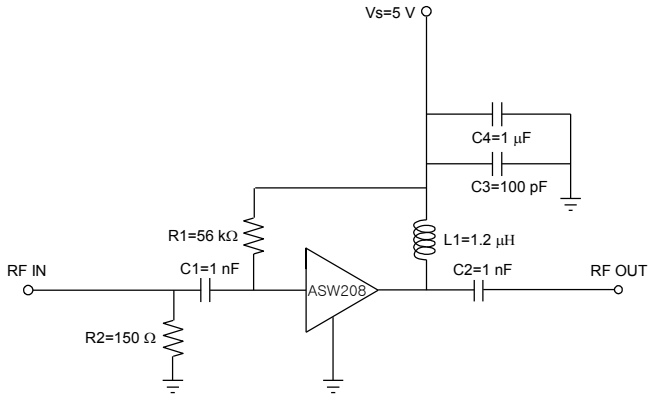
APPLICATION CIRCUIT

IF
50 ~ 450 MHz
+5 V

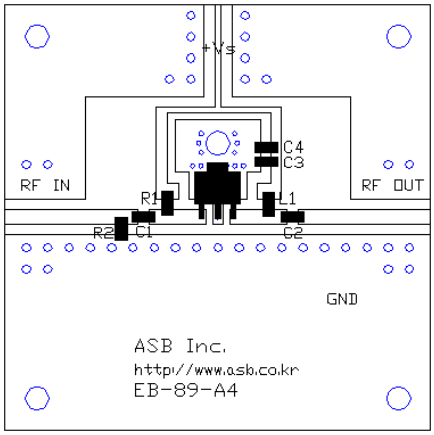
Frequency (MHz)	50	150	300	450
Magnitude S21 (dB)	21.0	20.0	19.5	19.5
Magnitude S11 (dB)	-10	-14	-15	-15
Magnitude S22 (dB)	-18	-18	-15	-15
Output P1dB (dBm)	22	22	22	22
Output IP3[1)] (dBm)	31	32	33	33
Noise Figure (dB)	4.0	3.2	3.2	3.2
Device Voltage (V)	+5	+5	+5	+5
Current (mA)	80	80	80	80

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

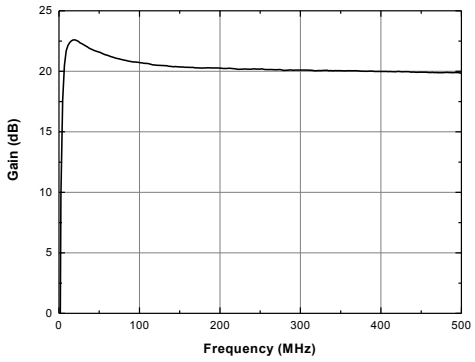
Schematic

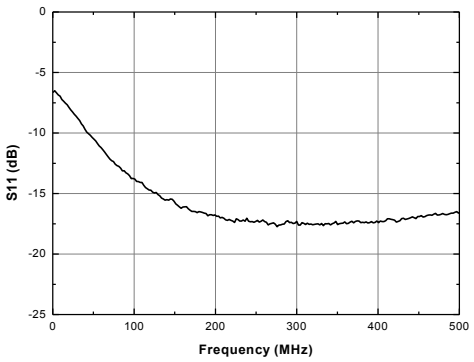


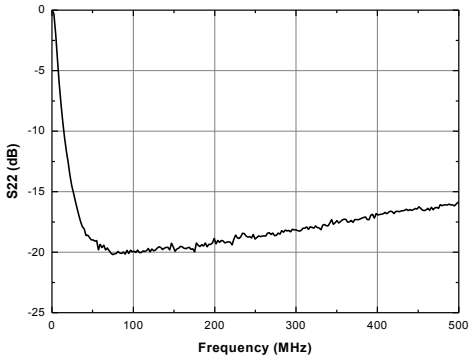
Board Layout (FR4, 40x40 mm², 0.8T)

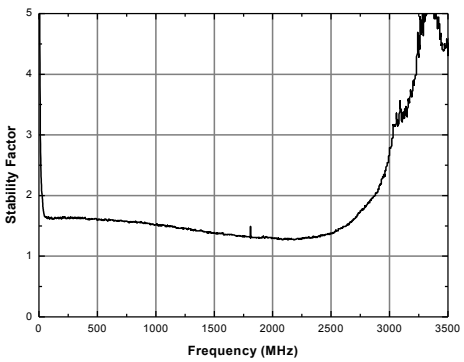


S-parameters & K-factor









APPLICATION CIRCUIT

Wide Band

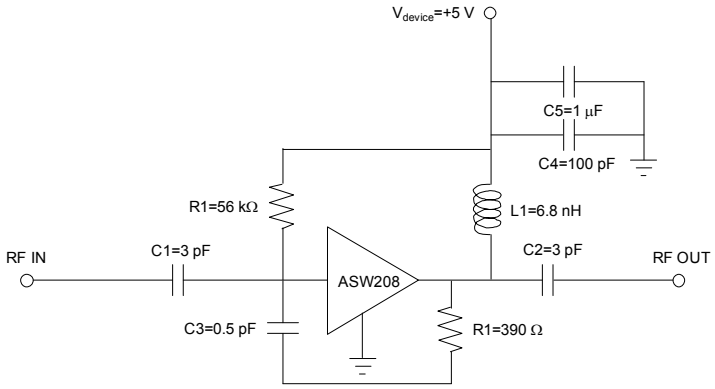
3000 ~ 4500 MHz

+5 V

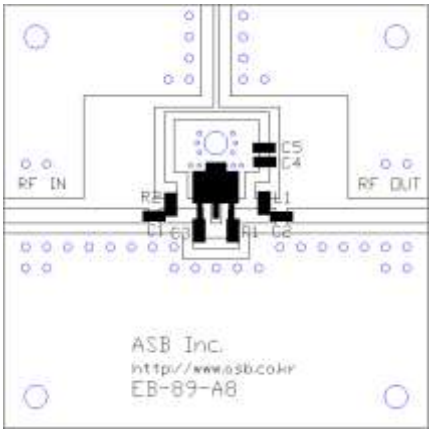
Frequency (MHz)	3000	4500
Magnitude S21 (dB)	16.2	16.4
Magnitude S11 (dB)	-13	-12
Magnitude S22 (dB)	-11	-13
Output P1dB (dBm)	20.0	16.5
Output IP3[1)] (dBm)	29.0	27.5
Noise Figure (dB)	2.4	2.7
Device Voltage (V)	+5	+5
Current (mA)	80	80

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

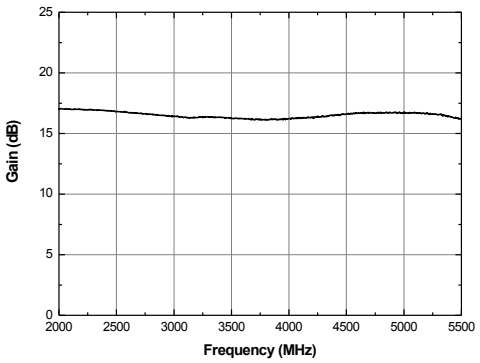
Schematic

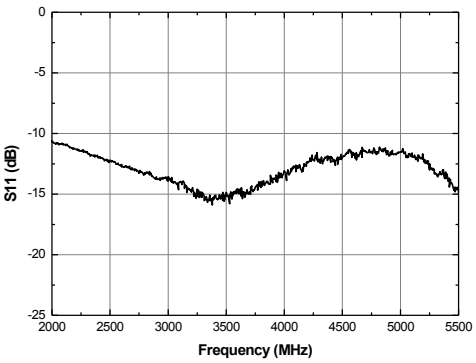


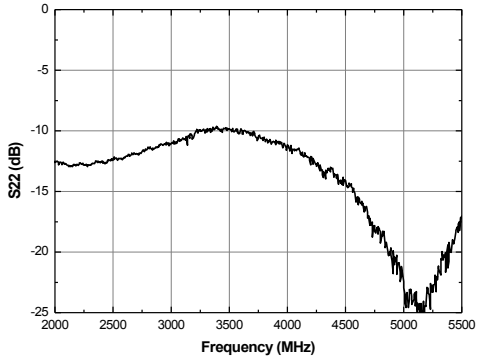
Board Layout (FR4, 40x40 mm², 0.8T)

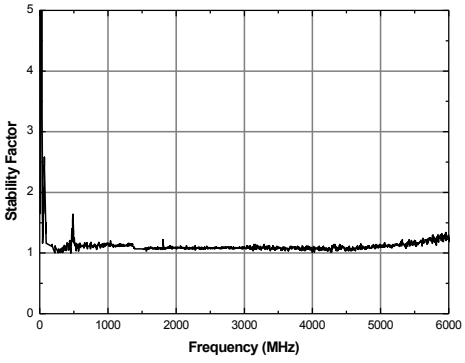


S-parameters & K-factor









APPLICATION CIRCUIT

SMATV

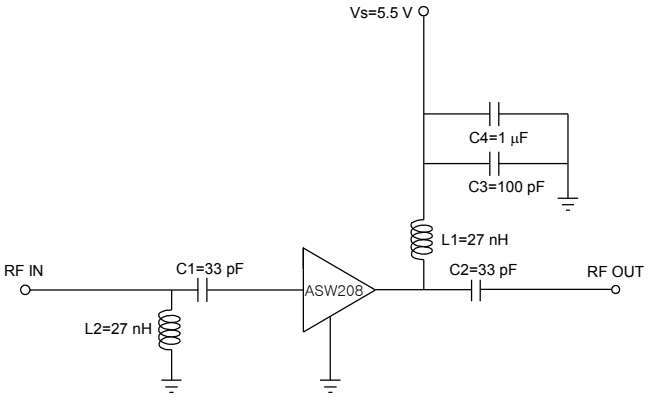
950 ~ 2150 MHz

+5.5 V

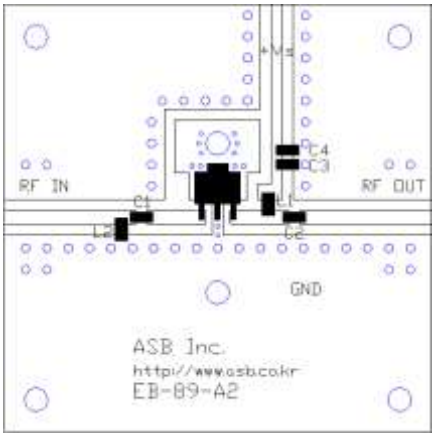
Frequency (MHz)	950	1500	2150
Magnitude S21 (dB)	21.0	20.0	17.5
Magnitude S11 (dB)	-14	-12	-11
Magnitude S22 (dB)	-12	-12	-12
Output P1dB (dBm)	22	22	21
Output IP3[1)] (dBm)	37	35	34
Noise Figure (dB)	1.6	1.7	1.8
Device Voltage (V)	+5.5	+5.5	+5.5
Current (mA)	80	80	80

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

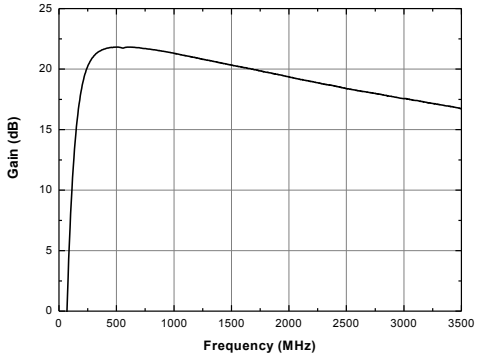
Schematic

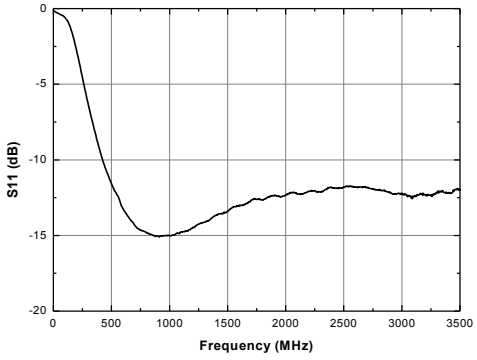


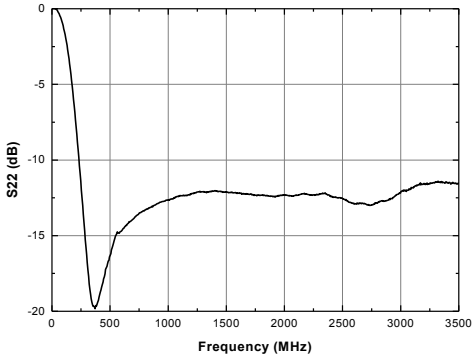
Board Layout (FR4, 40x40 mm², 0.8T)

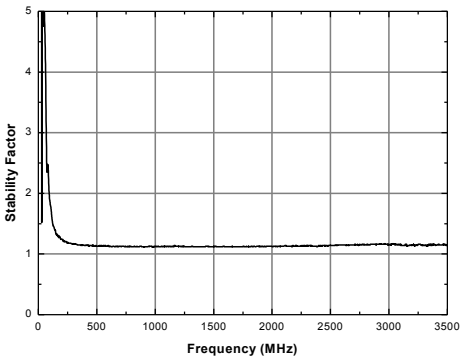


S-parameters & K-factor









APPLICATION CIRCUIT

SMATV

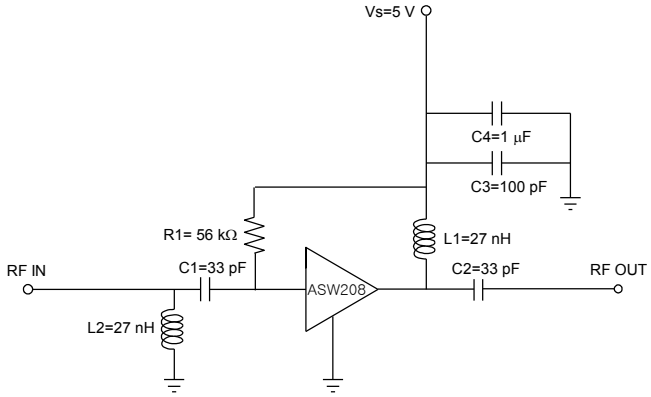
950 ~ 2150 MHz

+5 V

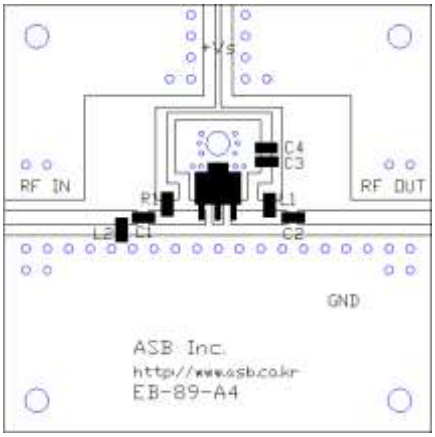
Frequency (MHz)	950	1500	2150
Magnitude S21 (dB)	21	20	18
Magnitude S11 (dB)	-14	-11	-11
Magnitude S22 (dB)	-12	-11	-10
Output P1dB (dBm)	22	22	21
Output IP3[1)] (dBm)	37	35	34
Noise Figure (dB)	1.6	1.7	1.8
Device Voltage (V)	+5	+5	+5
Current (mA)	80	80	80

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

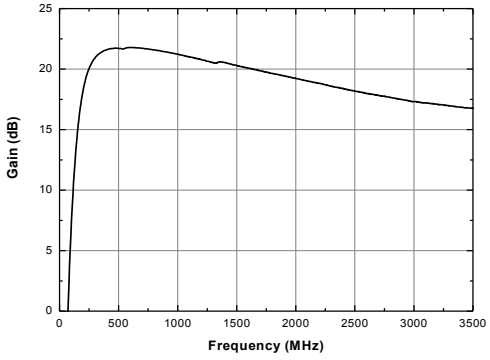
Schematic

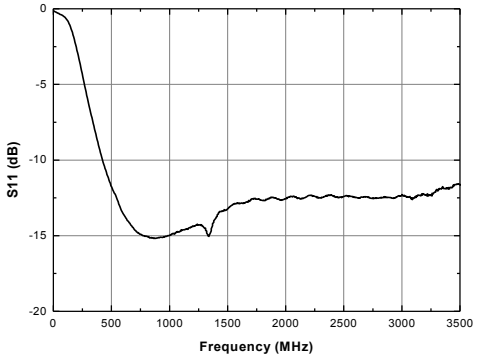


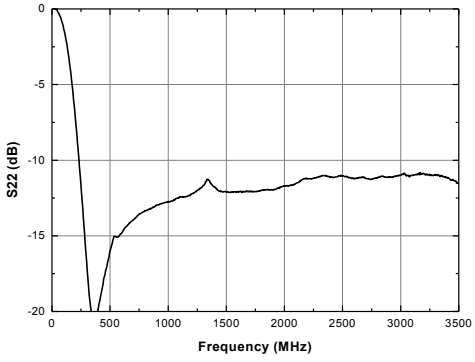
Board Layout (FR4, 40x40 mm², 0.8T)

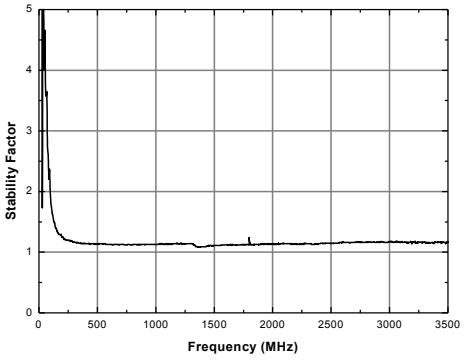


S-parameters & K-factor









APPLICATION CIRCUIT

ONU

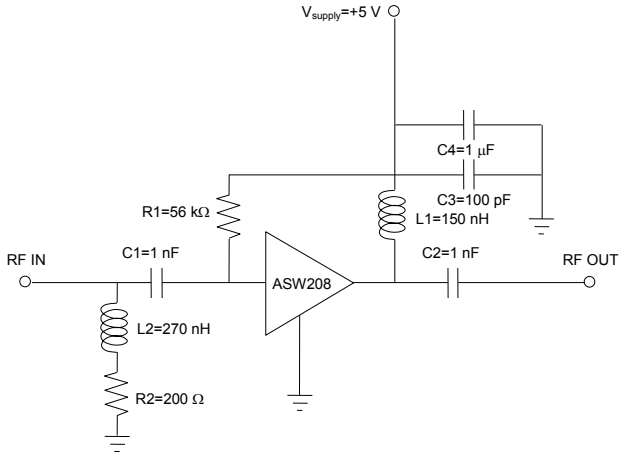
50 ~ 2600 MHz

+5 V, 75 Ω

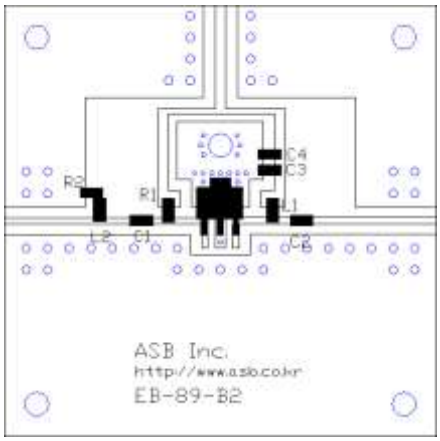
Frequency (MHz)	50	1300	2600
Magnitude S21 (dB)	21.8	20.0	17.0
Magnitude S11 (dB)	-7	-8	-10
Magnitude S22 (dB)	-7	-9	-15
Output P1dB (dBm)	21	21	20
Output IP3[1)] (dBm)	28.0	31.0	33.5
Output IP2[1)] (dBm)	29	46	49
Noise Figure (dB)	3.5	2.1	1.6
Device Voltage (V)	+5	+5	+5
Current (mA)	80	80	80

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

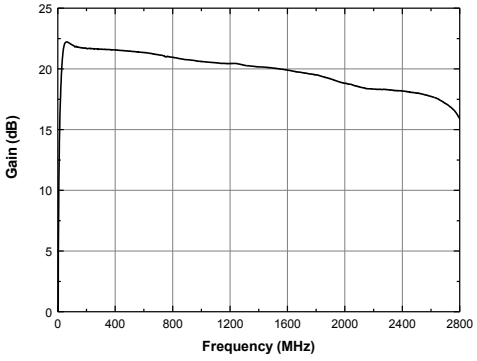
Schematic

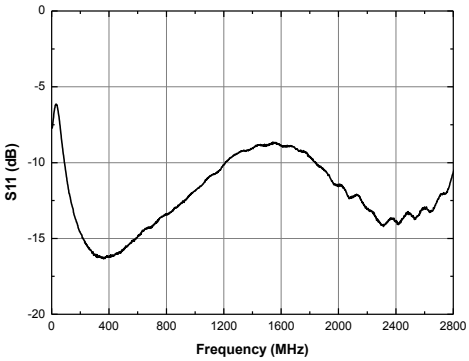


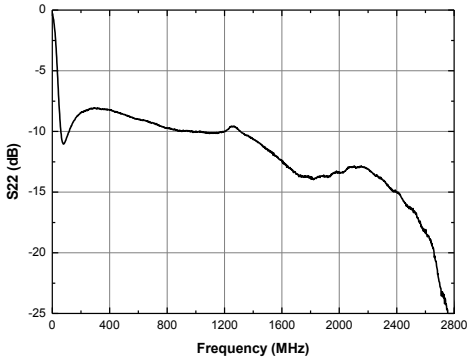
Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor







APPLICATION CIRCUIT

SMATV

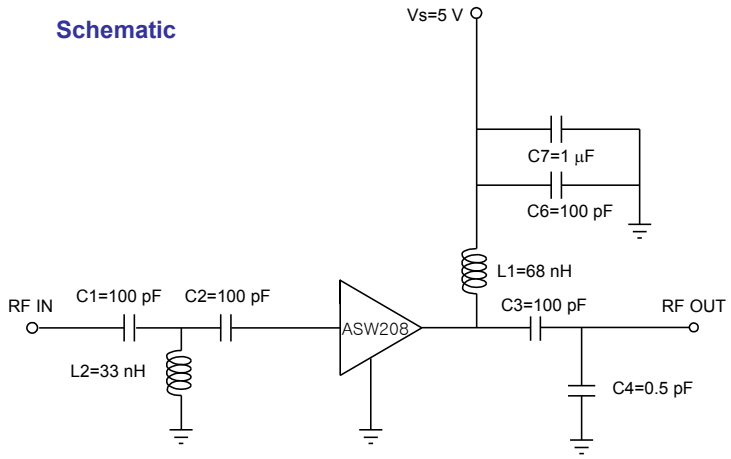
1000 ~ 2600 MHz

+5 V, 75 Ω

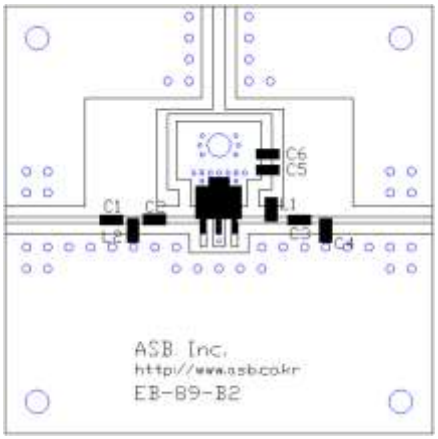
Frequency (MHz)	1000	1800	2600
Magnitude S21 (dB)	19.7	18.4	16.9
Magnitude S11 (dB)	-11	-8	-12
Magnitude S22 (dB)	-8	-15	-14
Output P1dB (dBm)	21	23	20
Output IP3[1] (dBm)	30	24	31
Noise Figure (dB)	1.8	2.5	2.5
Device Voltage (V)	+5	+5	+5
Current (mA)	45	45	45

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

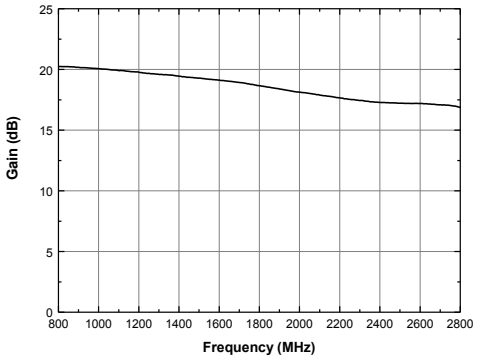
Schematic

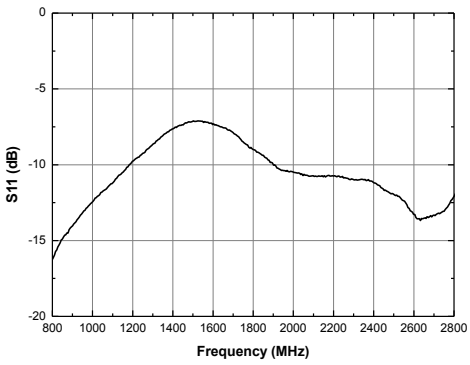


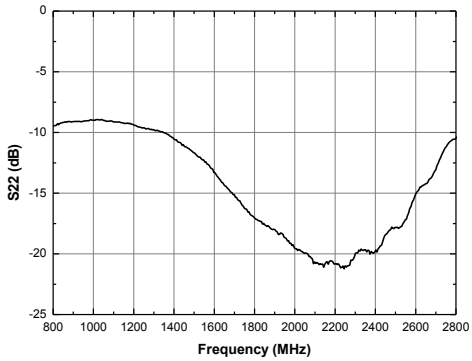
Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor







APPLICATION CIRCUIT

SMATV

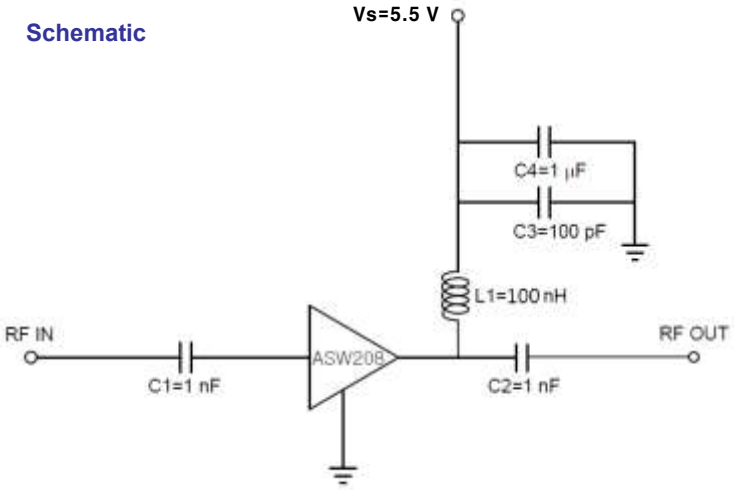
200 ~ 2600 MHz

+5.5 V, 75 Ω

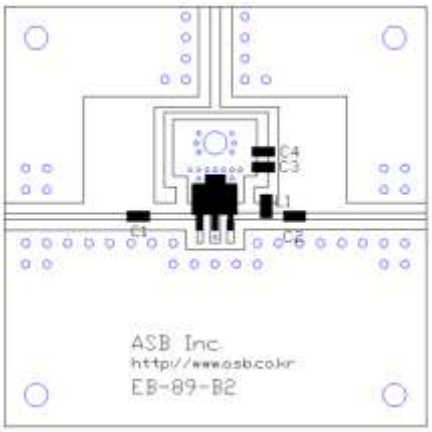
Frequency (MHz)	200	950	2150	2600
Magnitude S21 (dB)	21.5	20.7	18.0	17.2
Magnitude S11 (dB)	-10	-12	-18	-18
Magnitude S22 (dB)	-7.5	-9.5	-10	-12
Output P1dB (dBm)	23	21	23	22
Output IP3[1)] (dBm)	31	33	32	32
Noise Figure (dB)	1.6	1.2	1.6	1.6
Device Voltage (V)	+5.5	+5.5	+5.5	+5.5
Current (mA)	80	80	80	80

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

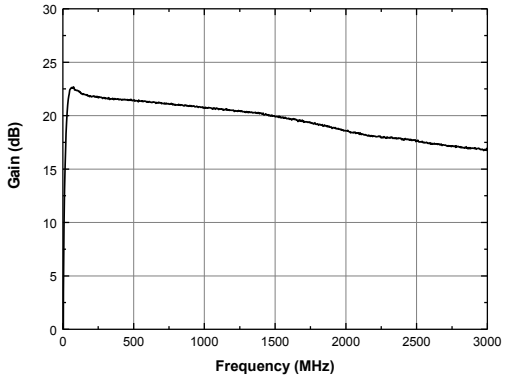
Schematic

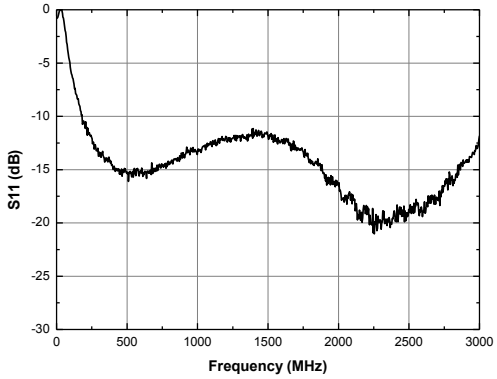


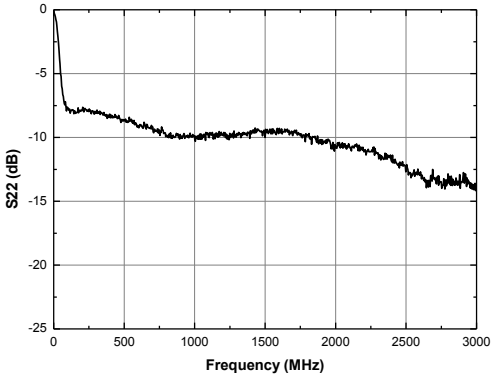
Board Layout (FR4, 40x40 mm², 0.8T)



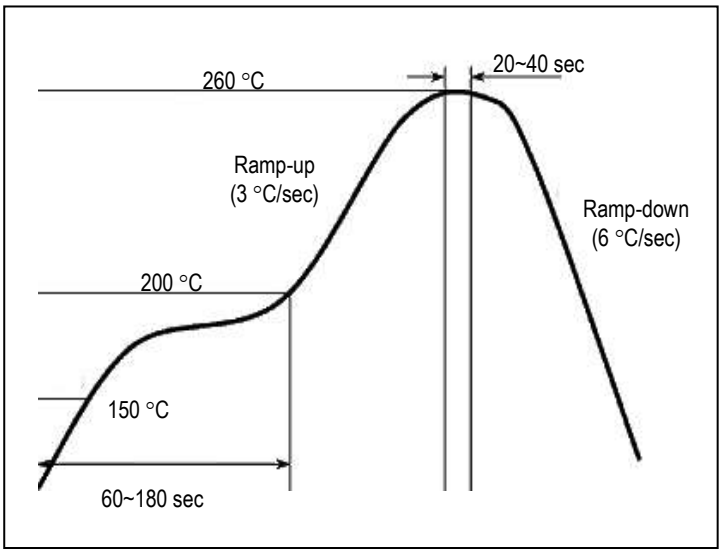
S-parameters & K-factor







Recommended Soldering Reflow Profile



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