

Features

- 18 dB Gain at 2000 MHz
- 21 dBm P1dB at 2000 MHz
- 32.5 dBm OIP3 at 2000 MHz
- 1.75 dB NF at 2000 MHz
- MTTF > 100 Years
- Single Supply

Description

The ASW204, a power 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 8 GHz. The amplifier is available in a SOT89 package and passes through the stringent DC, RF, and reliability tests.



Package Style: SOT89

Typical Performance

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

Parameters	Units	Typical					
Frequency	MHz	900	2000	2700	3500	5500	
Gain	dB	19.8	18.0	16.7	15.0	12.8	
S11	dB	-13	-14	-18	-15	-7	
S22	dB	-13	-12	-10	-10	-14	
Output IP3 ¹⁾	dBm	32.0	32.5	32.5	28.0	28.0	
Noise Figure	dB	1.65	1.75	2.00	2.30	2.90	
Output P1dB	dBm	21	21	20	17	15	
Current	mA	55	55	55	55	55	
Device Voltage	V	+5	+5	+5	+5	+5	

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

Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		2000	
Gain	dB		18	
S11	dB		-14	
S22	dB		-12	
Output IP3	dBm		32.5	
Noise Figure	dB		1.75	
Output P1dB	dBm		21	
Current	mA		55	
Device Voltage	V		+5	

Absolute Maximum Ratings

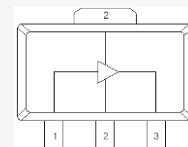
Parameters	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-40 to +150 °C
Device Voltage	+6 V
Operating Junction Temperature	+150 °C
Input RF Power (Continuous)	+22 dBm
Thermal Resistance	98 °C/W

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

Application Circuit

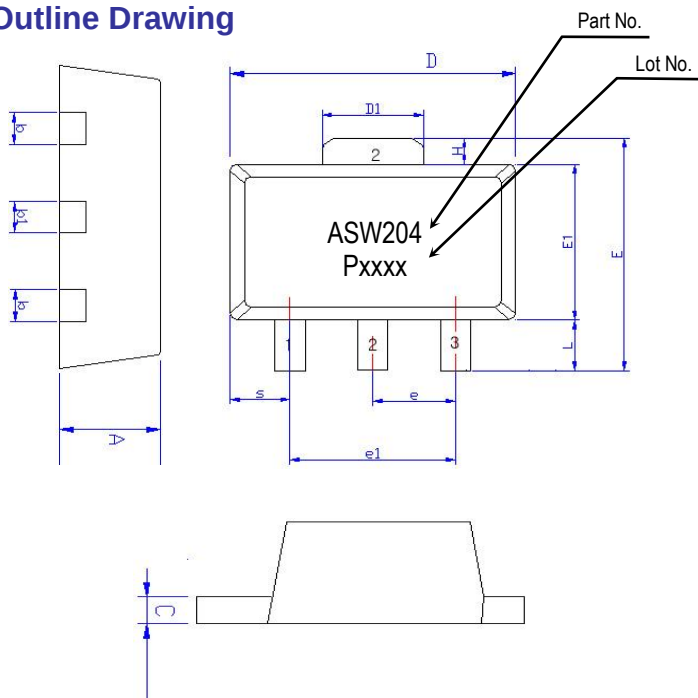
- 500 ~ 3500 MHz
- SMATV, DVB-S (50 Ω)
- SMATV(75 Ω)
 - 950 ~ 2150 MHz
 - 200 ~ 2600 MHz
- 500 ~ 3500 MHz (5.3 V)
- IF (50 ~ 450 MHz)
- 500 ~ 6000 MHz (Flat Gain)
- 5000 ~ 6000 MHz
- 500 ~ 2700 MHz (3.3 V/ 35 mA)

Pin Configuration



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

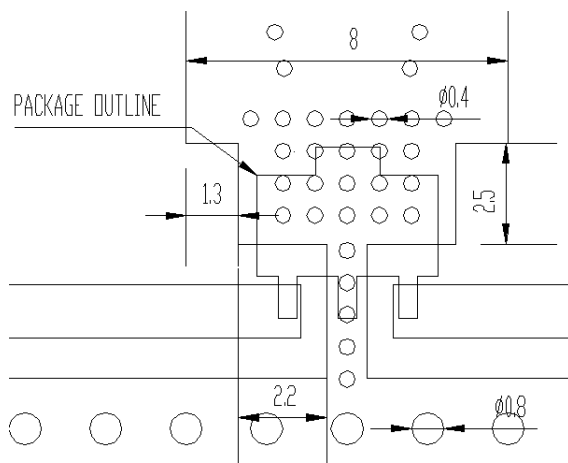
Outline Drawing



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 & 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

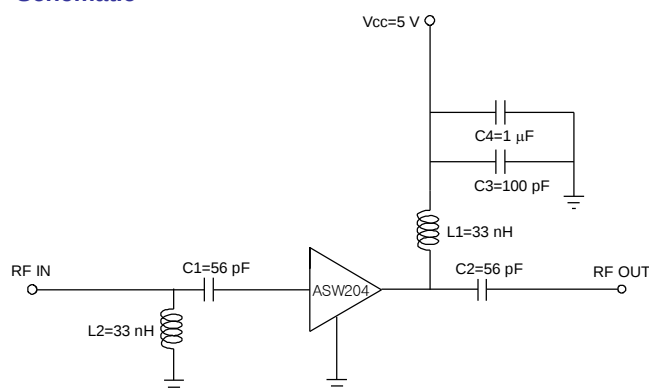
500 ~ 3500 MHz

+5 V

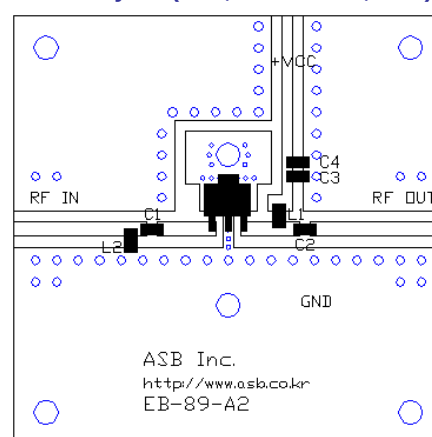
Frequency (MHz)	900	2000	2700	3500
Magnitude S ₂₁ (dB)	19.8	18.0	16.7	15.0
Magnitude S ₁₁ (dB)	-13	-14	-18	-15
Magnitude S ₂₂ (dB)	-13	-12	-10	-10
Output P _{1dB} (dBm)	21	21	20	17
Output IP ₃ ¹⁾ (dBm)	32.0	32.5	32.5	28.0
Noise Figure (dB)	1.65	1.75	2.00	2.30
Device Voltage (V)	+5	+5	+5	+5
Current (mA)	55	55	55	55

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

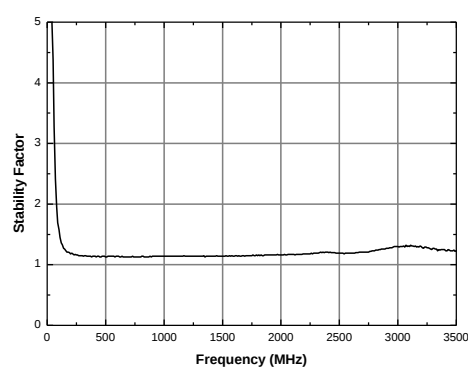
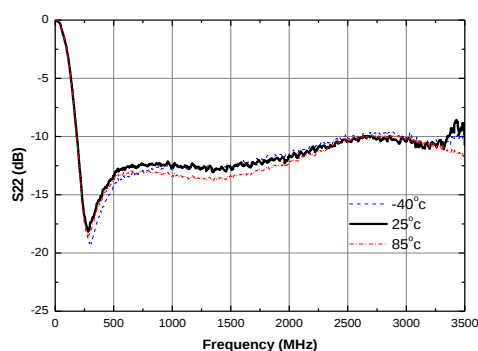
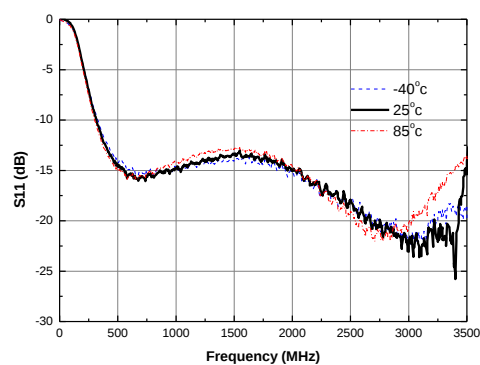
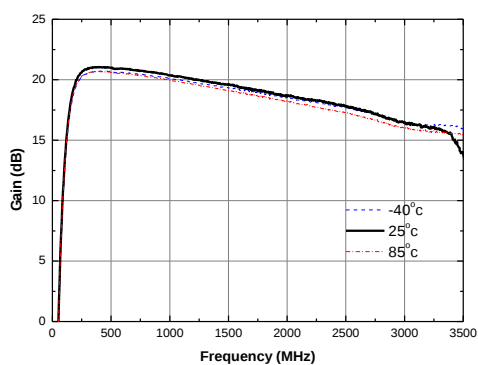
Schematic



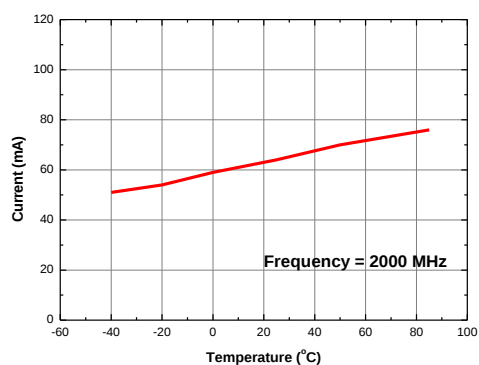
Board Layout (FR4, 40x40 mm², 0.8T)



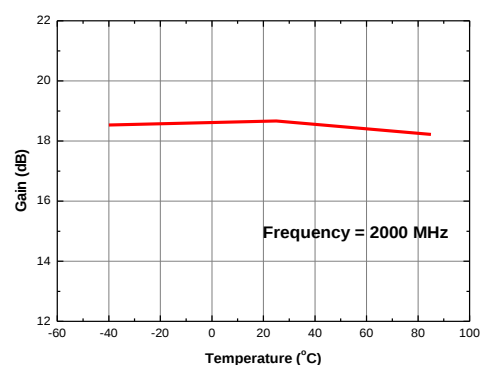
S-parameters & K-factor



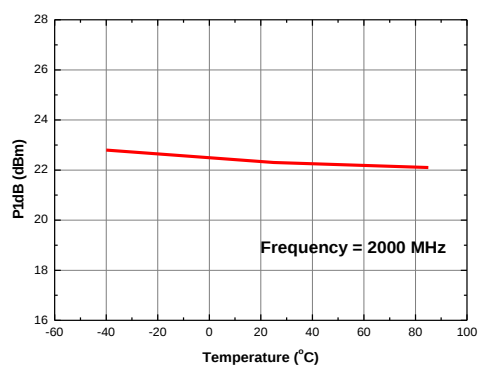
Current vs. Temperature



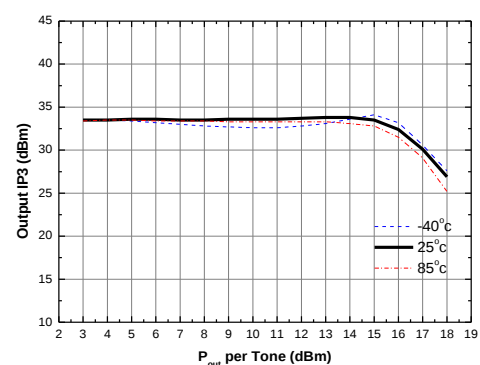
Gain vs. Temperature



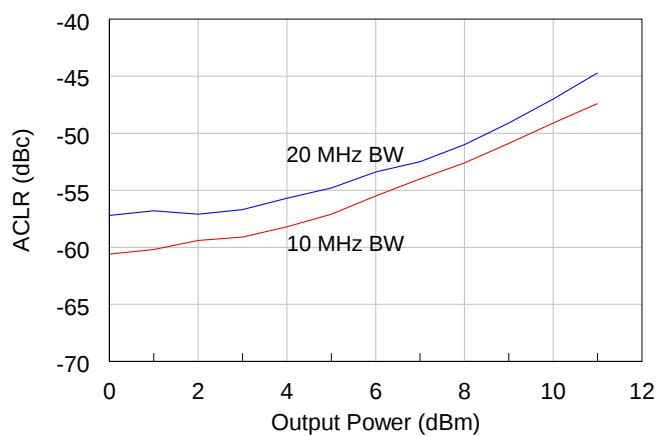
P1dB vs. Temperature



Output IP3 vs. Tone Power (Frequency=2000 MHz)

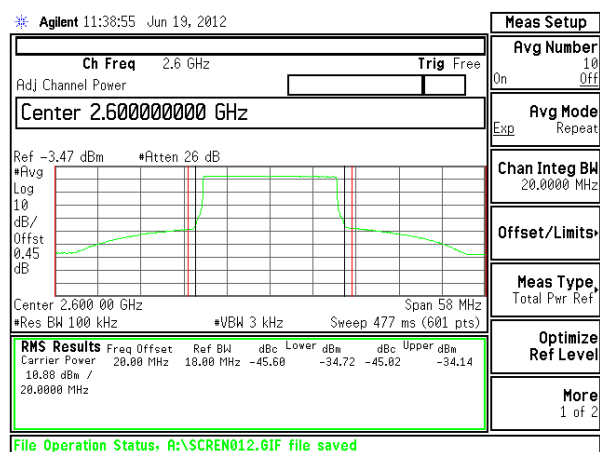


LTE ACLR – 10 MHz & 20 MHz



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

SMATV. DVB-S

(50 Ω)

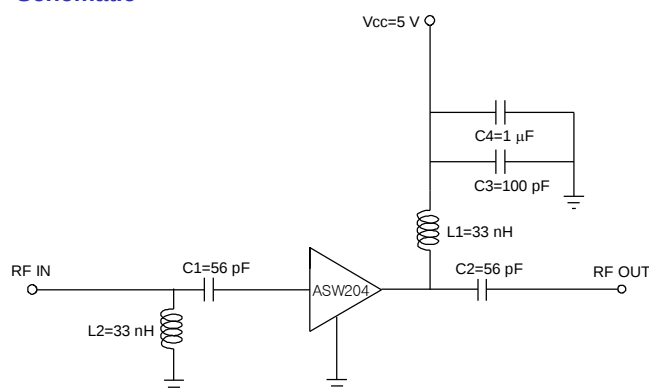
950 ~ 2150 MHz

+5 V

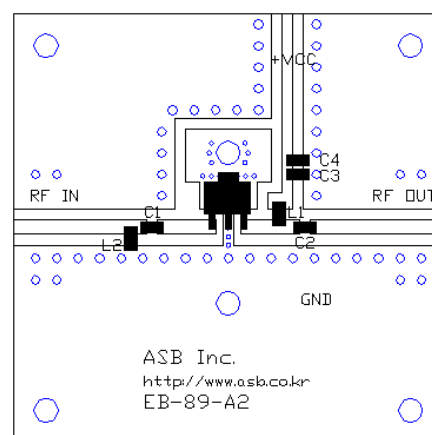
Frequency (MHz)	950	2150
Magnitude S21 (dB)	19.8	17.7
Magnitude S11 (dB)	-14	-12
Magnitude S22 (dB)	-13	-11
Output P1dB (dBm)	21.5	22.5
Output IP3 ¹⁾ (dBm)	32	31
Noise Figure (dB)	1.7	1.8
Device Voltage (V)	+5	+5
Current (mA)	55	55

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

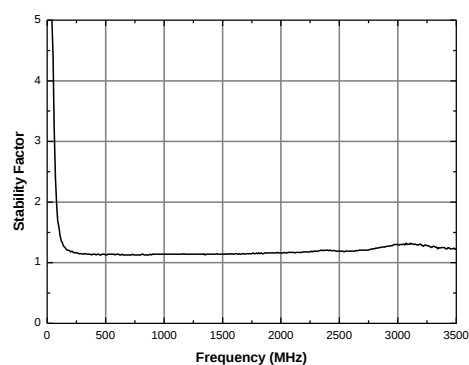
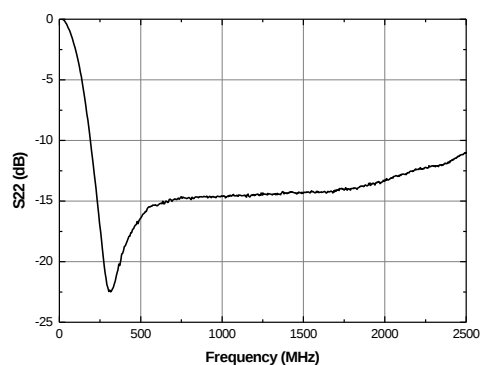
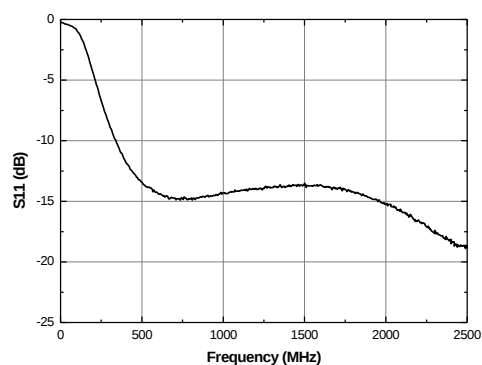
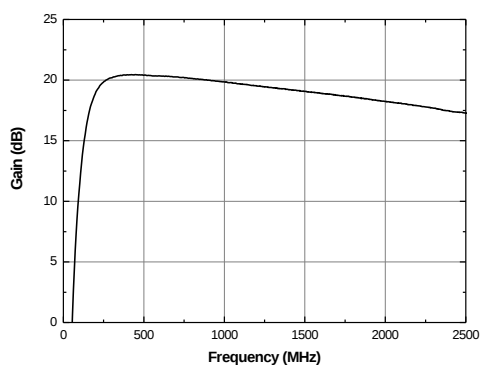
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

SMATV(75 Ω)

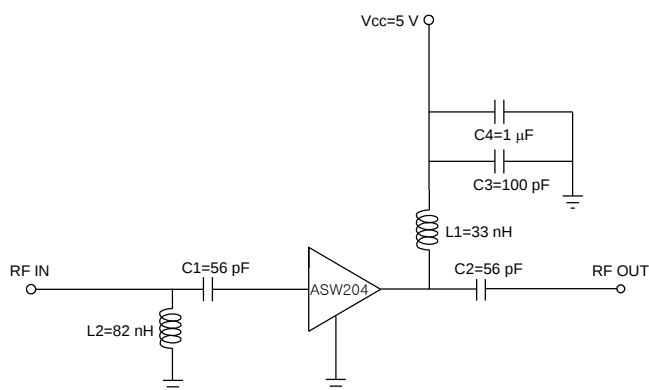
950 ~ 2150 MHz

+5 V

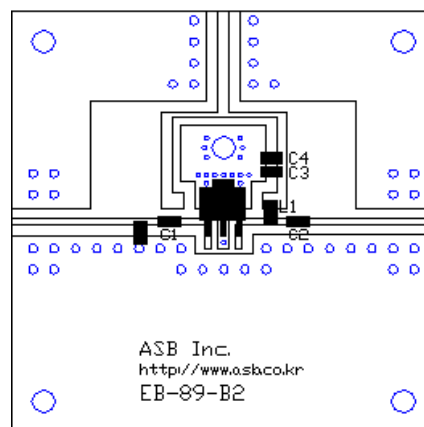
Frequency (MHz)	950	2150
Magnitude S21 (dB)	19.7	17.6
Magnitude S11 (dB)	-13	-16
Magnitude S22 (dB)	-8.5	-10
Output P1dB (dBm)	22	22
Output IP3 ¹⁾ (dBm)	33.0	32.5
Noise Figure (dB)	1.7	1.8
Device Voltage (V)	+5	+5
Current (mA)	55	55

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

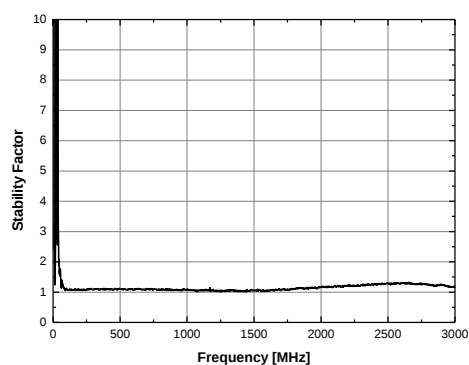
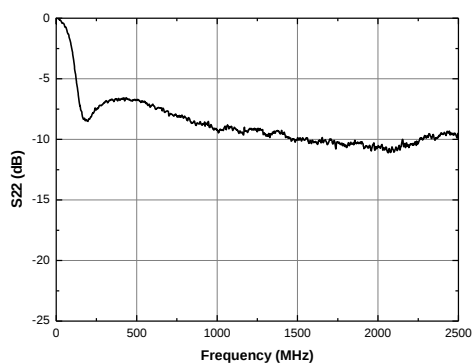
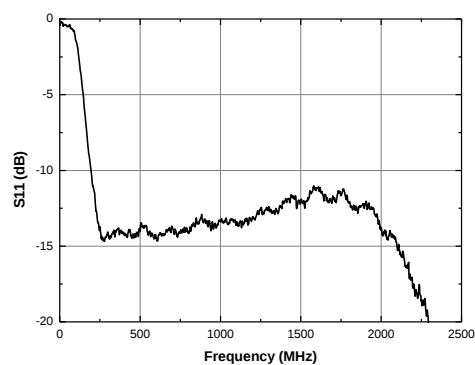
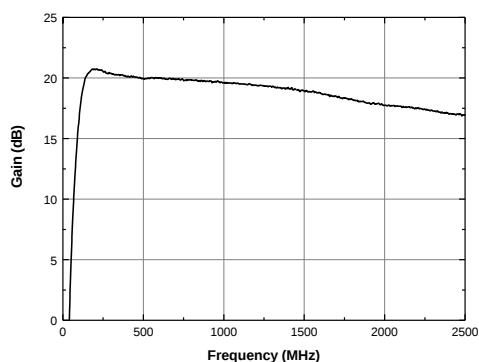
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

SMATV(75 Ω)

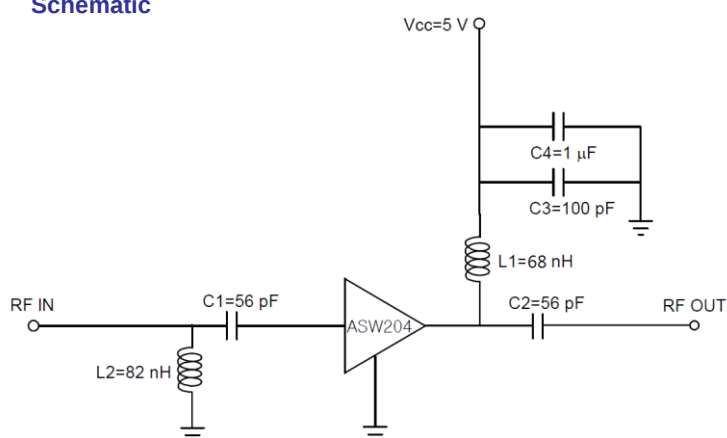
200 ~ 2600 MHz

+5 V

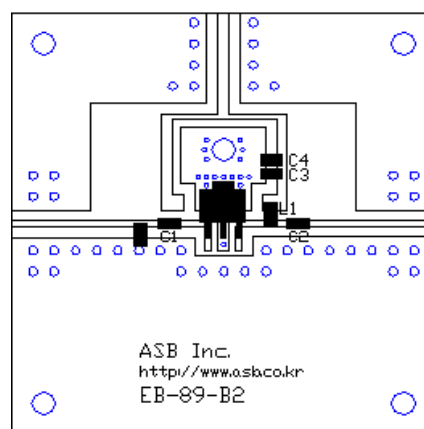
Frequency (MHz)	200	950	2150	2600
Magnitude S21 (dB)	21.0	20.0	17.3	16.6
Magnitude S11 (dB)	-20	-13	-18	-20
Magnitude S22 (dB)	-7.0	-8.0	-9.0	-9.0
Output P1dB (dBm)	22	21	21	20
Output IP3 ¹⁾ (dBm)	29	33	32	31
Noise Figure (dB)	1.8	1.3	1.6	1.8
Device Voltage (V)	+5	+5	+5	+5
Current (mA)	55	55	55	55

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

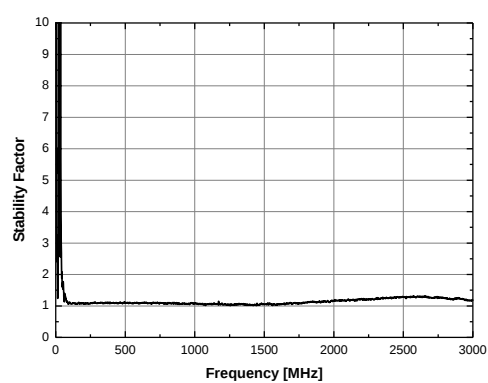
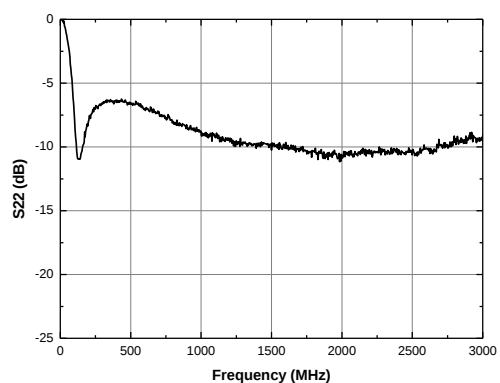
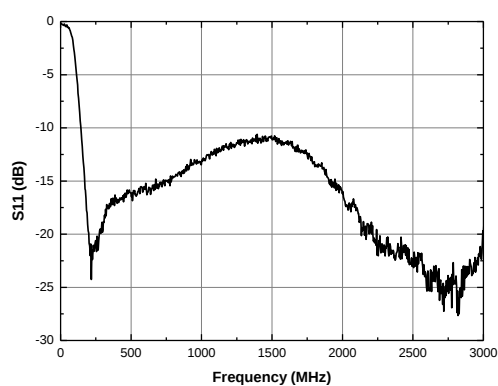
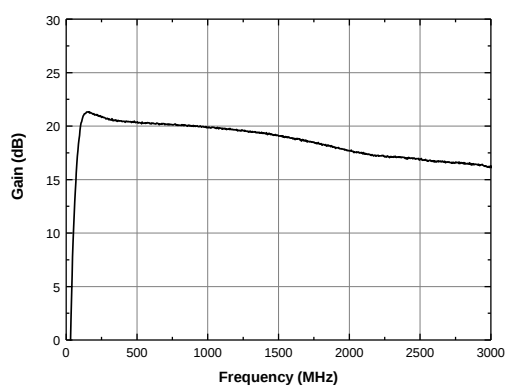
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

Wide Band

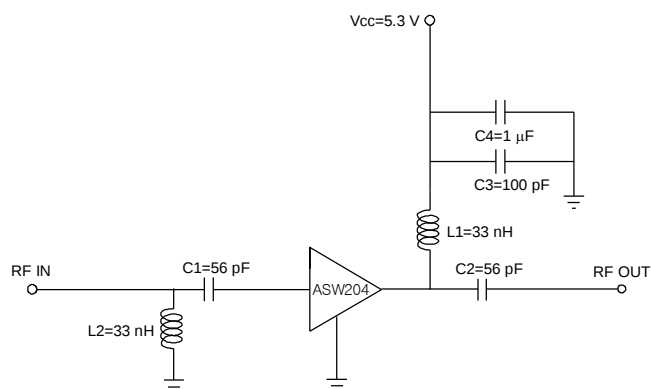
500 ~ 3500 MHz

+5.3 V

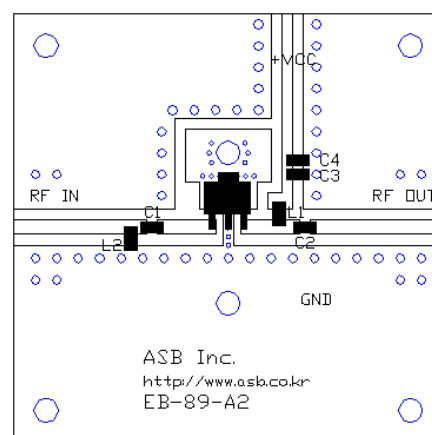
Frequency (MHz)	900	2000	2700	3500
Magnitude S21 (dB)	20.2	18.3	17.0	15.2
Magnitude S11 (dB)	-15	-15	-20	-15
Magnitude S22 (dB)	-12	-12	-10	-10
Output P1dB (dBm)	22.5	22.5	21.5	17.0
Output IP3 ¹⁾ (dBm)	34.5	34.0	33.5	29.5
Noise Figure (dB)	1.7	1.8	2.0	2.4
Device Voltage (V)	+5.3	+5.3	+5.3	+5.3
Current (mA)	75	75	75	75

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

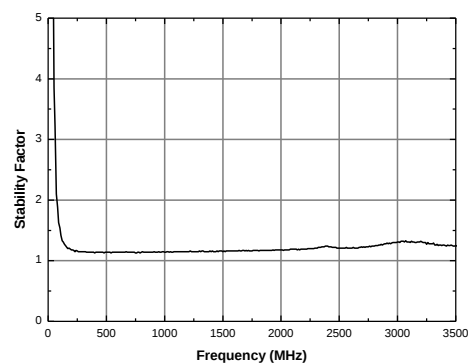
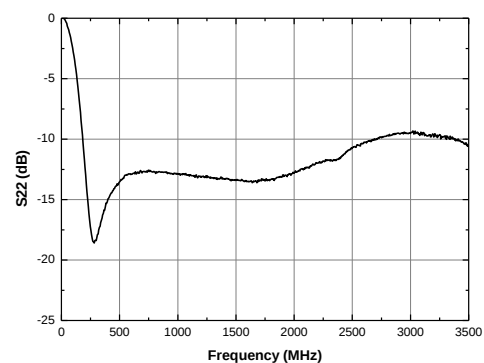
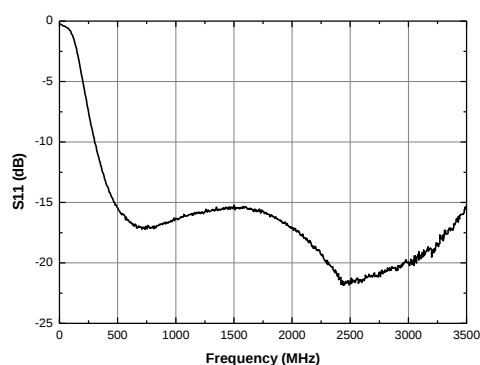
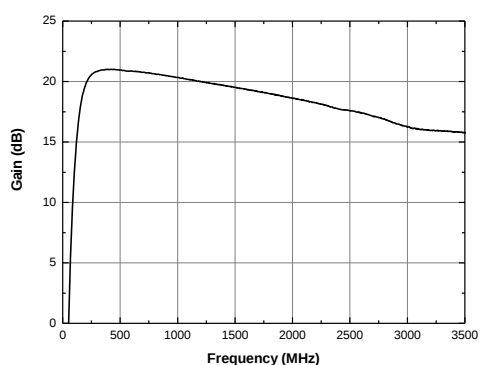
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



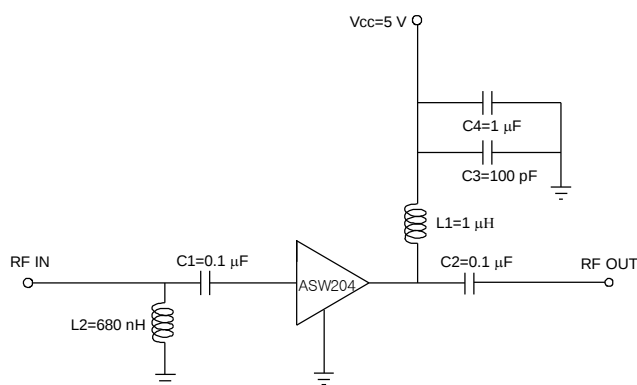
APPLICATION CIRCUIT

IF
50 ~ 450 MHz
+5 V

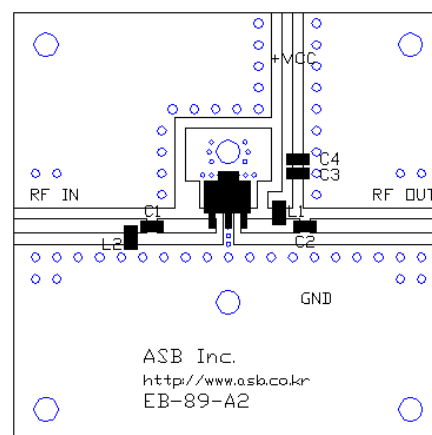
Frequency (MHz)	70	150	300
Magnitude S21 (dB)	22.5	21.0	20.0
Magnitude S11 (dB)	-5	-8	-10
Magnitude S22 (dB)	-15	-15	-15
Output P1dB (dBm)	21.5	21.5	21.5
Output IP3 ¹⁾ (dBm)	29.5	29.5	31.0
Noise Figure (dB)	1.9	1.6	2.0
Device Voltage (V)	+5	+5	+5
Current (mA)	55	55	55

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

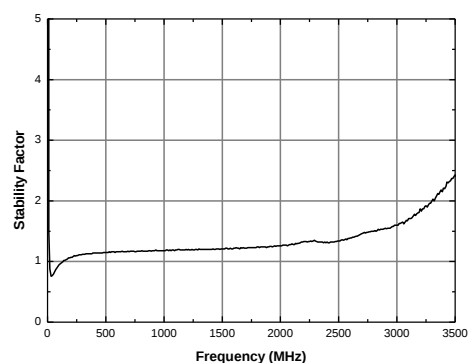
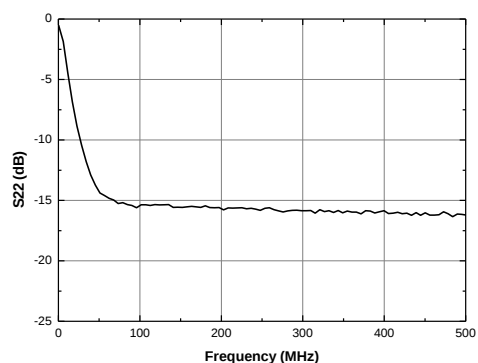
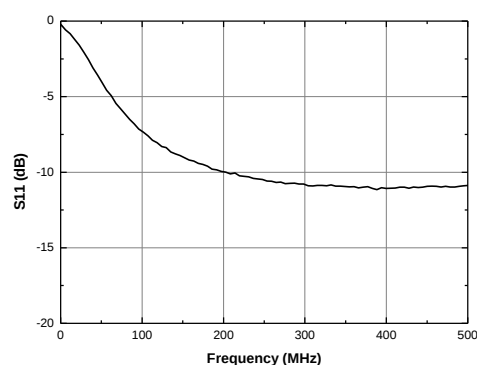
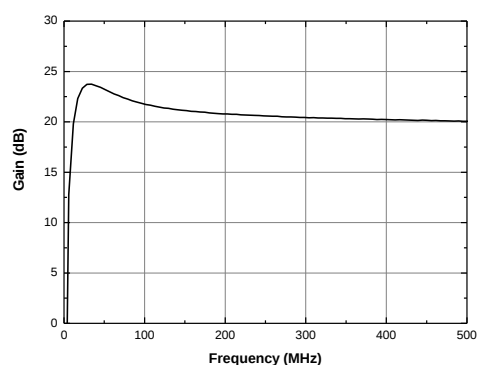
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

Flat Gain

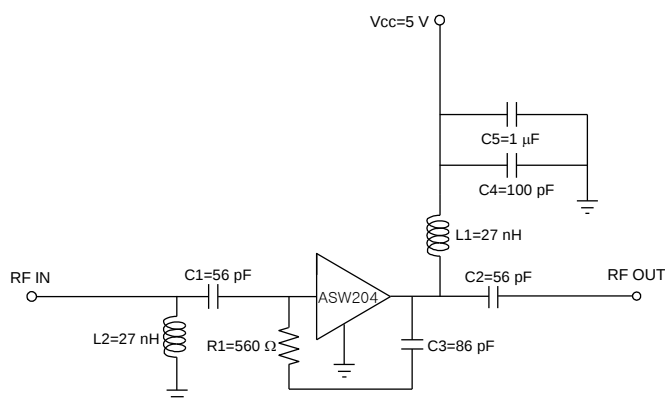
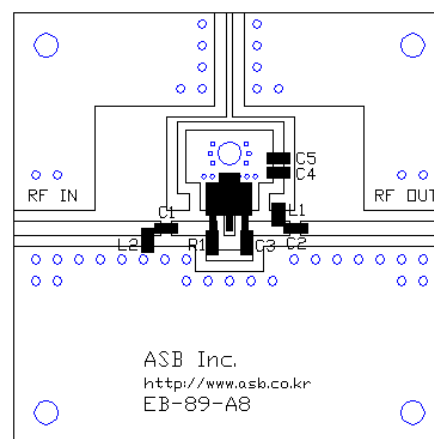
500 ~ 6000 MHz

+5 V

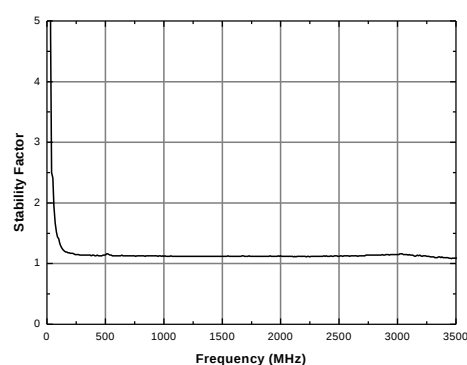
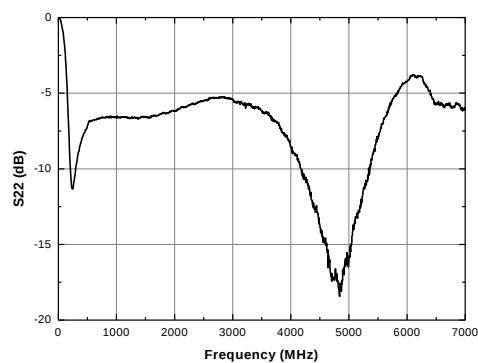
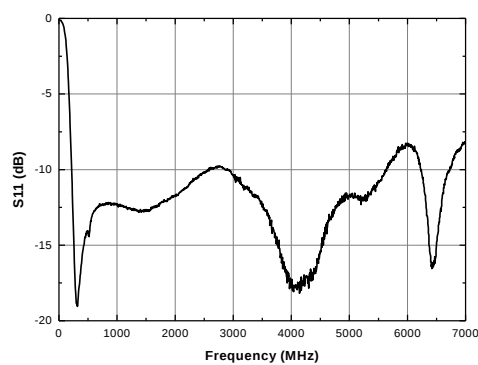
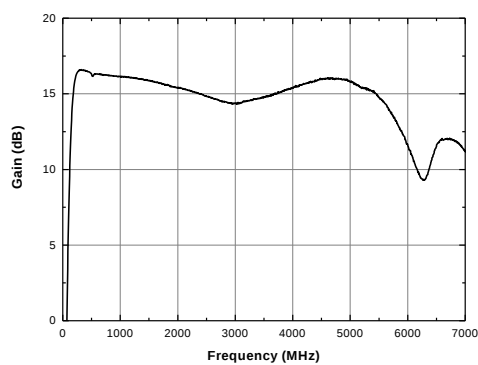
Frequency (MHz)	500	2000	4000	6000
Magnitude S21 (dB)	16.1	15.2	15.2	11.4
Magnitude S11 (dB)	-13	-11	-15	-8
Magnitude S22 (dB)	-6	-6	-8	-4
Output P1dB (dBm)	21.0	21.0	13.5	8.5
Output IP3* (dBm)	32 ⁽¹⁾	33 ⁽¹⁾	23.5 ⁽²⁾	19.5 ⁽³⁾
Noise Figure (dB)	2.8	2.2	2.9	3.3
Device Voltage (V)	+5	+5	+5	+5
Current (mA)	55	55	55	55

OIP3 is measured with two tones at an output power of +5(1) / +0(2) / -5(3) dBm/ tone separated by 1MHz.

Schematic

Board Layout (FR4, 40x40 mm², 0.8T)

S-parameters & K-factor



APPLICATION CIRCUIT

WLAN

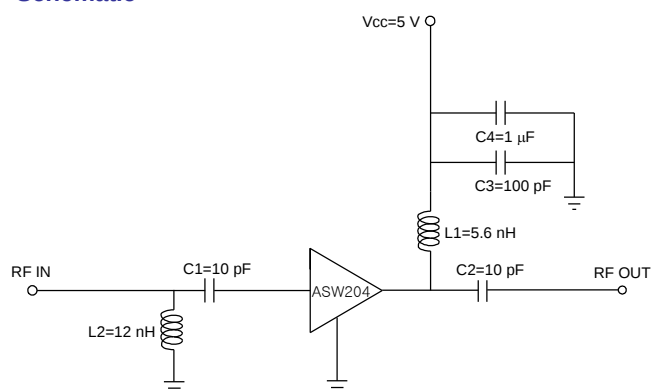
5000 ~ 6000 MHz

+5 V

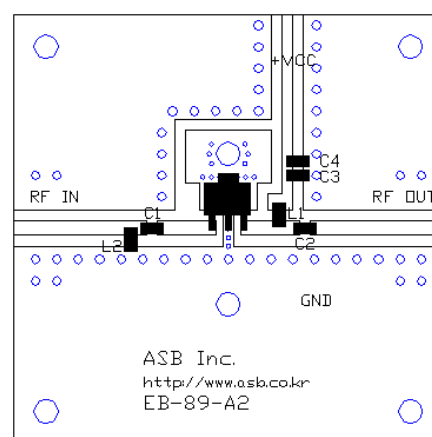
Frequency (MHz)	5000	5500	6000
Magnitude S21 (dB)	13.2	12.8	12.0
Magnitude S11 (dB)	-7	-7	-7
Magnitude S22 (dB)	-10	-14	-15
Output P1dB (dBm)	15.0	15.0	14.5
Output IP3 ¹⁾ (dBm)	27.0	28.0	25.5
Noise Figure (dB)	2.9	2.9	3.1
Device Voltage (V)	+5	+5	+5
Device Current (mA)	55	55	55

1) OIP3 is measured with two tones at an output power of +0 dBm/tone separated by 1MHz.

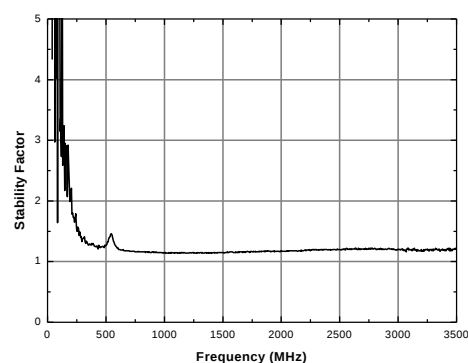
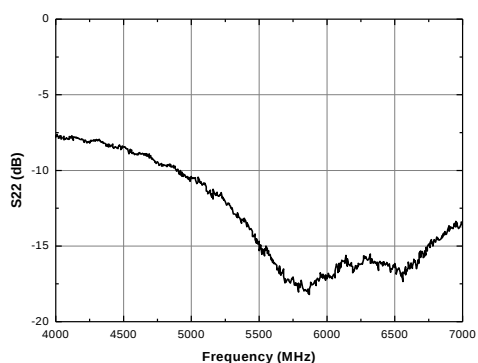
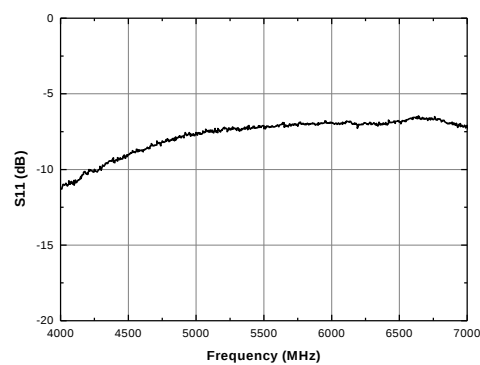
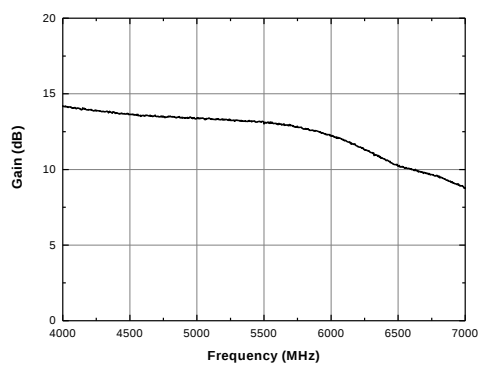
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

Wide Band

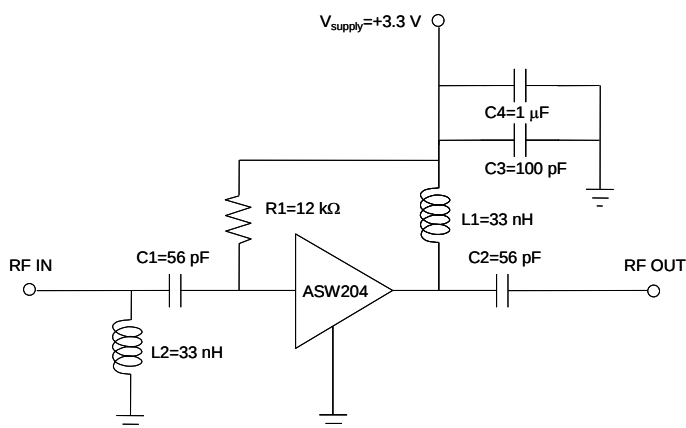
500 ~ 2700 MHz

+3.3 V/ 35 mA

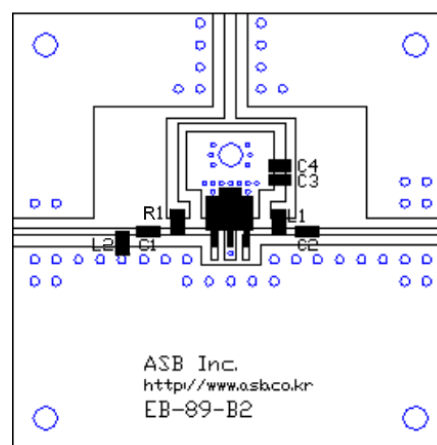
Frequency (MHz)	900	2000
Magnitude S21 (dB)	18.5	16.3
Magnitude S11 (dB)	-11	-10
Magnitude S22 (dB)	-15	-11
Output P1dB (dBm)	17.5	18.0
Output IP3 ¹⁾ (dBm)	27.5	28.0
Noise Figure (dB)	1.7	1.8
Device Voltage (V)	+3.3	+3.3
Current (mA)	35	35

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

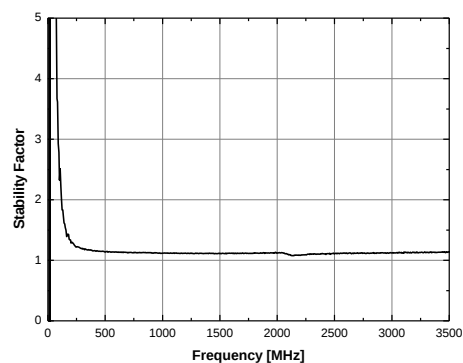
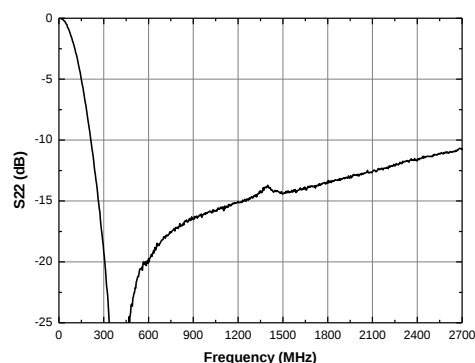
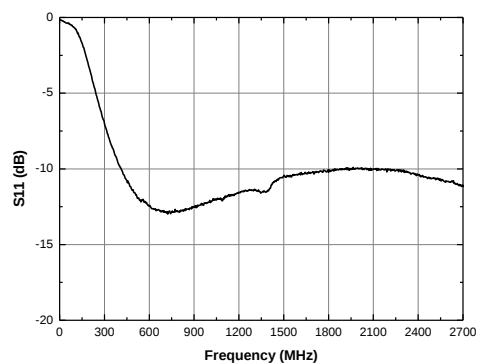
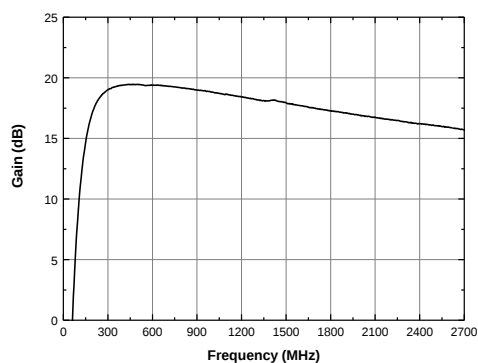
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



Performance with varying V_{DEVICE}

V_{DEVICE} (V)	Current (mA)	Freq. (MHz)	Gain (dB)	S11 (dB)	S22 (dB)	OIP3 (dBm)	P1dB (dBm)	NF (dB)
+5.3	75	900	20.4	-16.9	-12.6	34.7	23.2	1.64
		2000	18.5	-17.0	-12.2	34.8	22.9	1.71
+5.0	55	900	20.0	-15.2	-14.4	32.5	22.0	1.59
		2000	18.2	-15.2	-12.7	33.0	22.1	1.68
+4.8	43	900	19.5	-13.0	-15.1	30.2	21.2	1.59
		2000	17.8	-13.7	-13.0	31.1	21.5	1.67
+4.65	35	900	19.0	-12.7	-15.5	28.5	21.0	1.60
		2000	17.4	-11.2	-13.4	28.1	22.1	1.66

Recommended Soldering Reflow Profile

