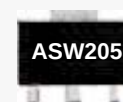


Features

- 20.7 dB Gain at 2 GHz
- 19.5 dBm P1dB at 2 GHz
- 32.5 dBm Output IP3 at 2 GHz
- MTTF > 100 Years
- Single Supply

Description

The ASW205, 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 5 MHz to 6 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 = Device Voltage, $T_A = +25\text{ }^{\circ}\text{C}$, $Z_0 = 50\text{ }\Omega$)

Parameters	Units	Typical					
Frequency	MHz	150	900	2000	2700	3000	
Gain	dB	25.7	24.2	20.7	18.3	18.7	
S11	dB	-17	-15	-17	-11	-18	
S22	dB	-10	-10	-9	-10	-14	
Output IP3	dBm	33.5 ¹⁾	33.5 ¹⁾	32.5 ¹⁾	31.0 ¹⁾	27.5 ²⁾	
Noise Figure	dB	3.3	3.5	3.6	3.9	3.5	
Output P1dB	dBm	18.5	19.0	19.5	18.0	17.0	
Current	mA	70	70	70	70	70	
Device Voltage	V	+5	+5	+5	+5	+5	

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

2) 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		20.7	
S11	dB		-17	
S22	dB		-9	
Output IP3	dBm		32.5	
Noise Figure	dB		3.6	
Output P1dB	dBm		19.5	
Current	mA		70	
Device Voltage	V		+5	

Absolute Maximum Ratings

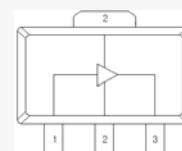
Parameters	Rating
Operating Case Temperature	-40 to +85 $^{\circ}\text{C}$
Storage Temperature	-40 to +150 $^{\circ}\text{C}$
Device Voltage	+5.5 V
Operating Junction Temperature	+150 $^{\circ}\text{C}$
Input RF Power (Continuous)*	+22 dBm
Thermal Resistance	145 $^{\circ}\text{C/W}$

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

Application Circuit

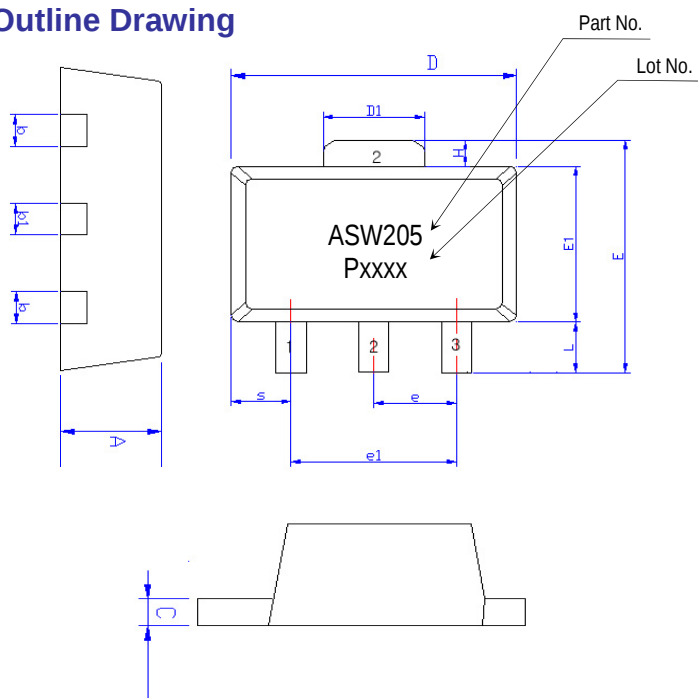
- 500 ~ 2700 MHz
- 5 ~ 4000 MHz
- IF
- 3000 ~ 4500 MHz
- 50 ~ 1000 MHz (75 Ω)
- 5 ~ 200 MHz (75 Ω)
- 500 ~ 2700 MHz (3.3 V/ 35 mA)

Pin Configuration



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

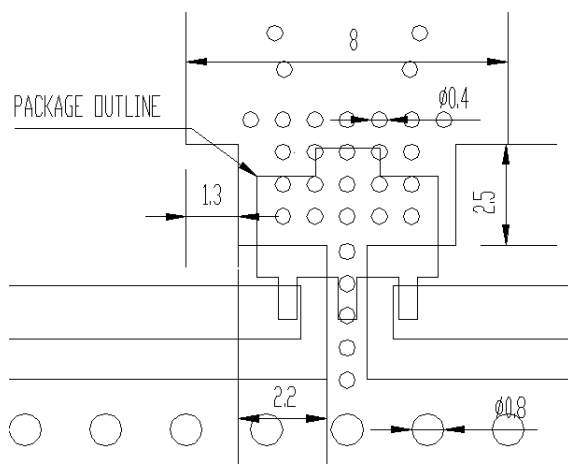
Outline Drawing



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: 500 V~1000 V
MM	Class A
	Voltage Level: <200 V

CAUTION: ESD-sensitive device!

Moisture Sensitivity Level (MSL)

Level 3 at 260 °C reflow

APPLICATION CIRCUIT

Wide Band

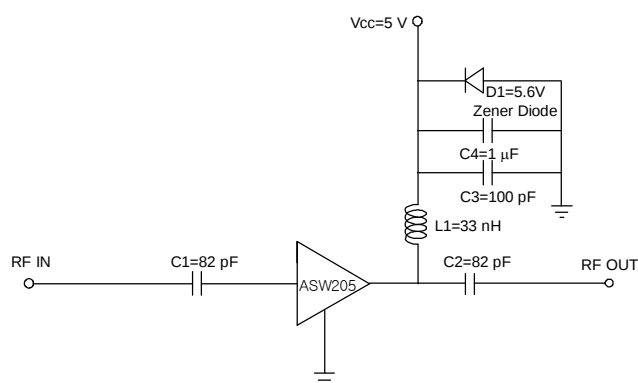
500 ~ 2700 MHz

+5 V

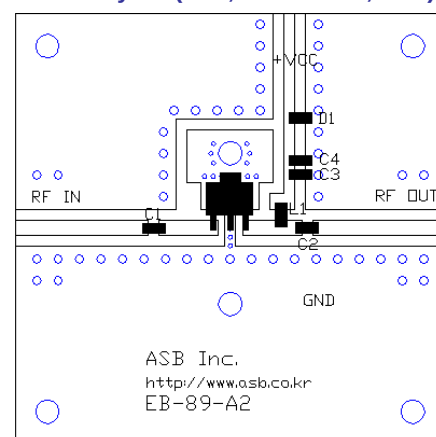
Frequency (MHz)	900	2000	2700
Magnitude S21 (dB)	24.2	20.7	18.3
Magnitude S11 (dB)	-15	-17	-11
Magnitude S22 (dB)	-10	-9	-10
Output P1dB (dBm)	19.0	19.5	18.0
Output IP3 ¹⁾ (dBm)	33.5	32.5	31.0
Noise Figure (dB)	3.5	3.6	3.9
Device Voltage (V)	+5	+5	+5
Current (mA)	70	70	70

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

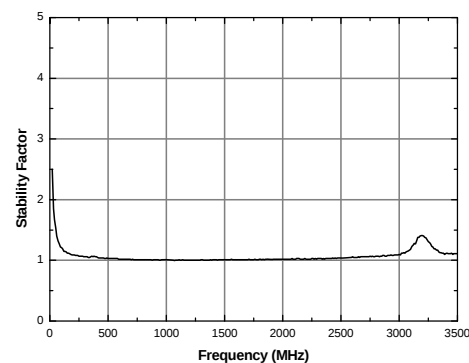
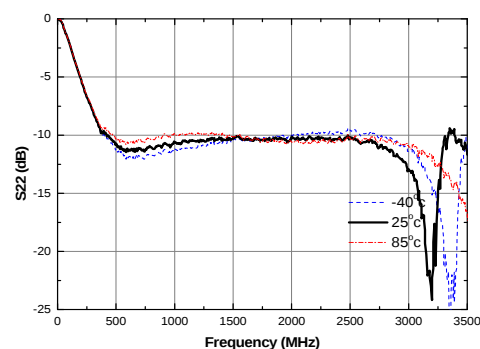
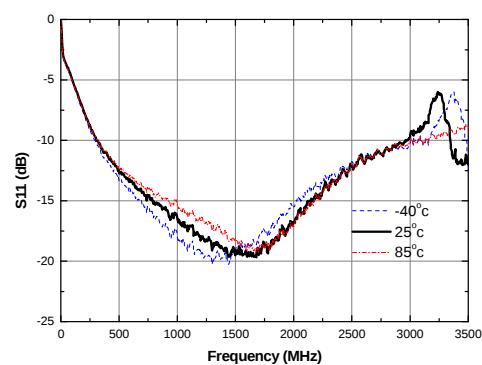
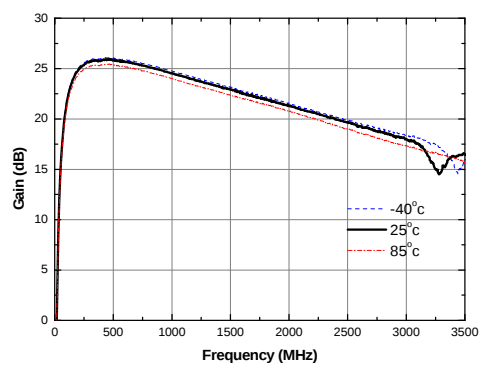
Schematic



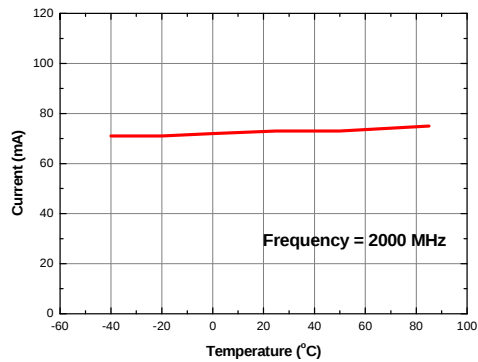
Board Layout (FR4, 40x40 mm², 0.8T)



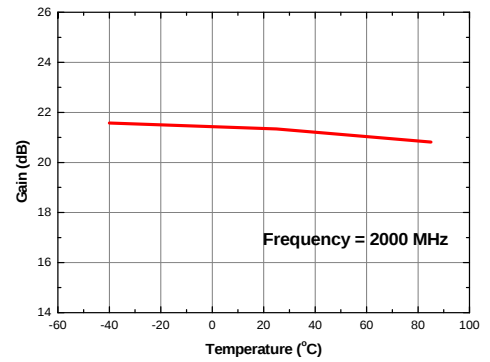
S-parameters & K-factor



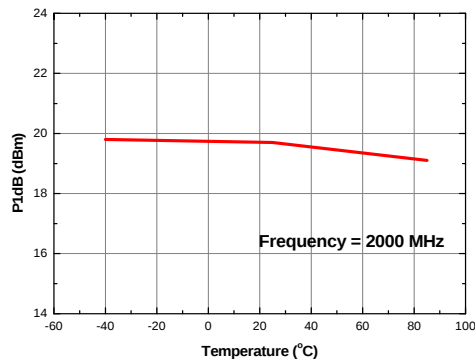
Current vs. Temperature



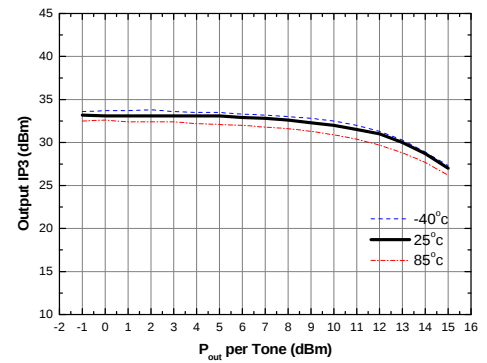
Gain vs. Temperature



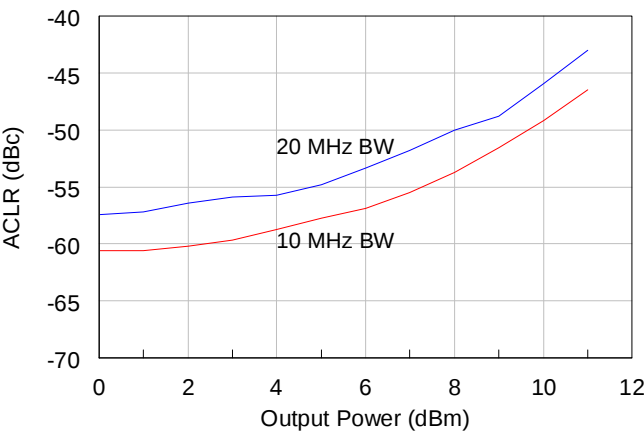
P1dB vs. Temperature



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

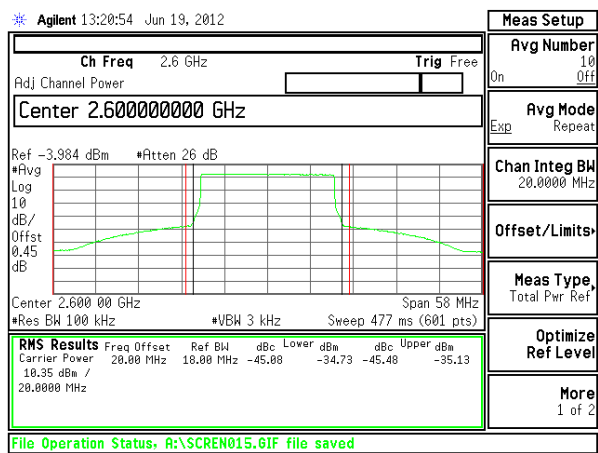


LTE ACLR – 10 MHz & 20 MHz



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

Wide Band

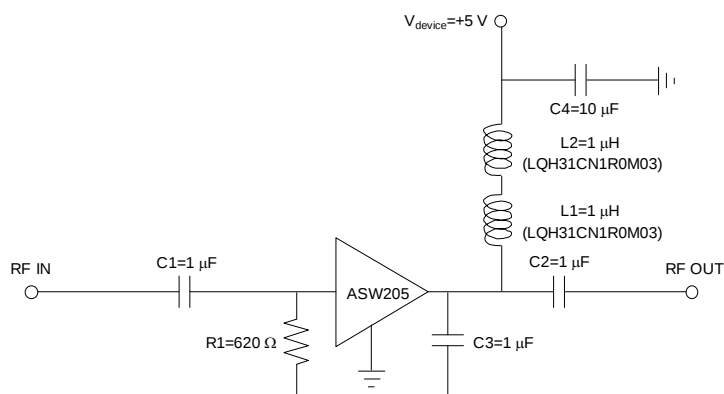
5 ~ 4000 MHz

+5 V

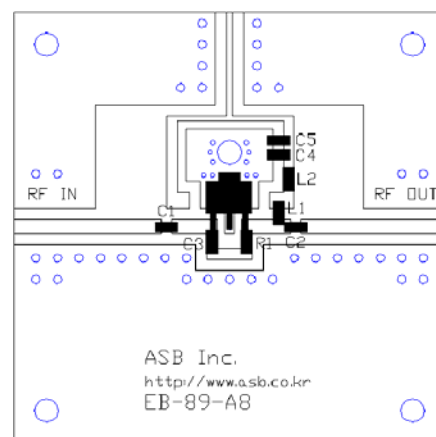
Frequency (MHz)	5	2000	4000
Magnitude S21 (dB)	19.0	18.7	18.3
Magnitude S11 (dB)	-7	-9	-10
Magnitude S22 (dB)	-8	-13	-20
Output P1dB (dBm)	17.0	18.0	14.5
Output IP3 ¹⁾ (dBm)	32.0	31.5	26.5
Noise Figure (dB)	4.1	4.0	4.1
Device Voltage (V)	+5	+5	+5
Current (mA)	70	70	70

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

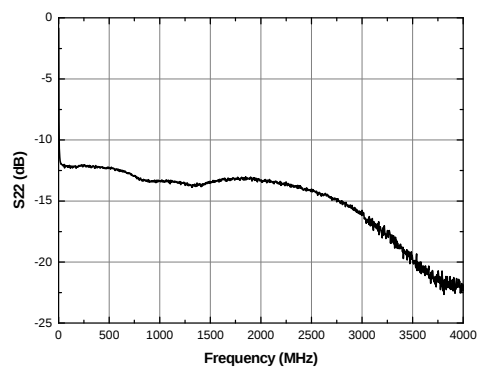
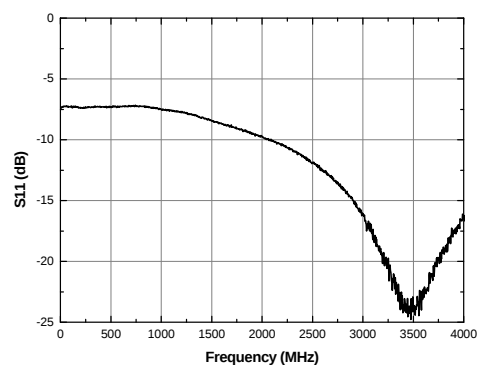
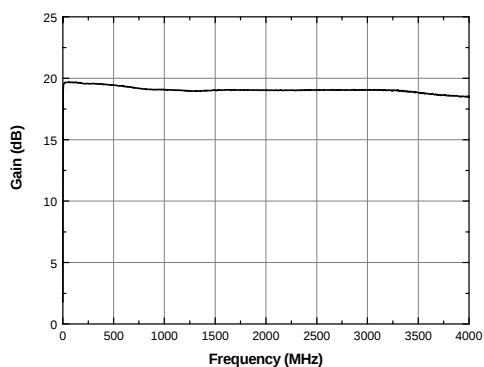
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



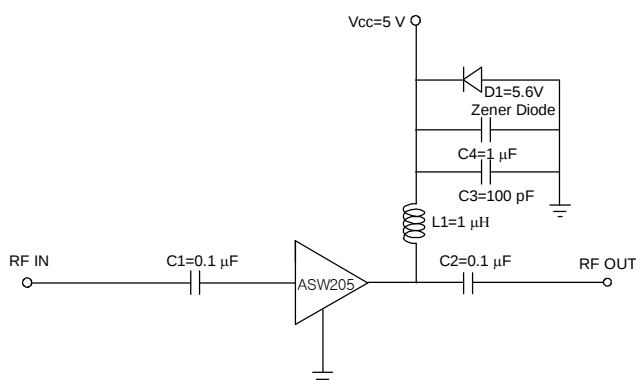
APPLICATION CIRCUIT

IF
50 ~ 450 MHz
+5 V

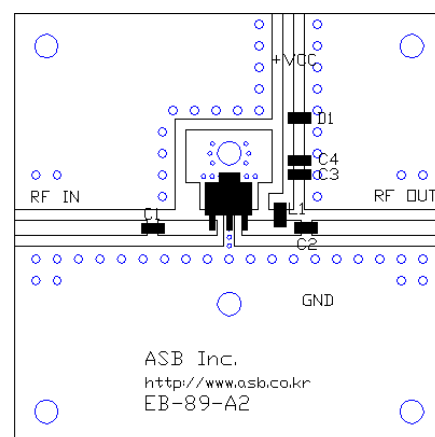
Frequency (MHz)	70	150	300
Magnitude S21 (dB)	25.8	25.7	25.4
Magnitude S11 (dB)	-17	-17	-17
Magnitude S22 (dB)	-10	-10	-10
Output P1dB (dBm)	18.5	18.5	19.0
Output IP3 ¹⁾ (dBm)	32.0	33.5	34.5
Noise Figure (dB)	3.3	3.3	3.4
Device Voltage (V)	+5	+5	+5
Current (mA)	70	70	70

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

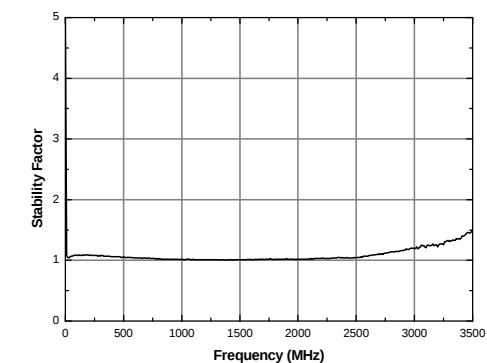
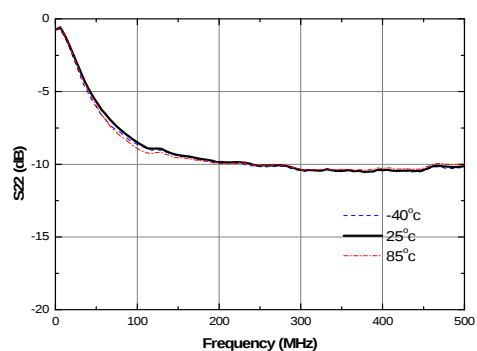
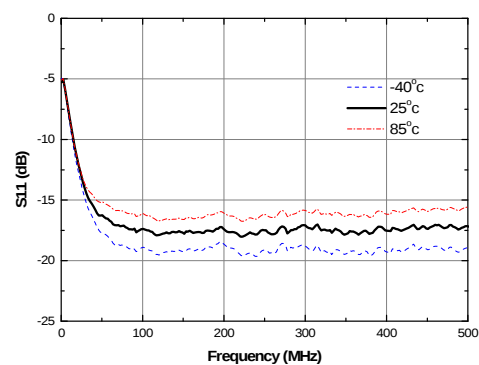
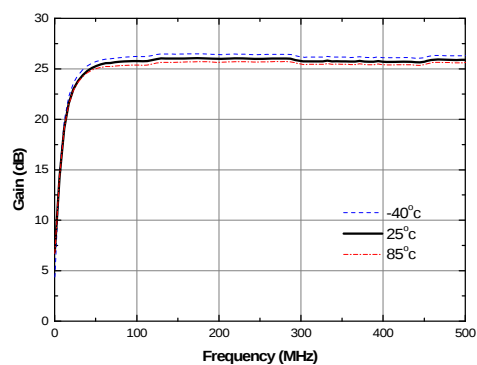
Schematic



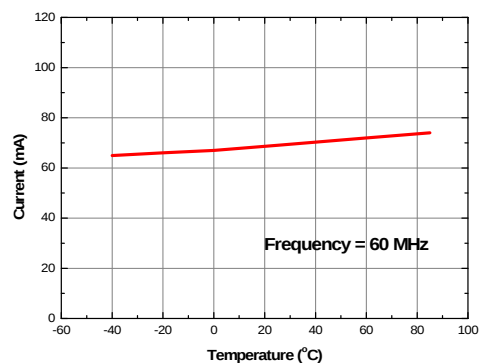
Board Layout (FR4, 40x40 mm², 0.8T)



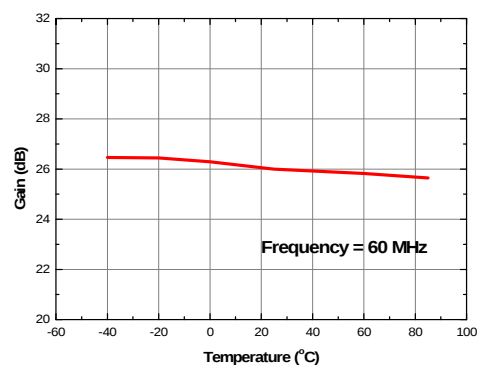
S-parameters & K-factor



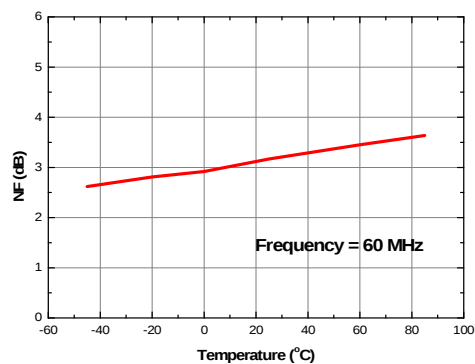
Current vs. Temperature



Gain vs. Temperature



NF vs. Temperature (Frequency = 60 MHz)



APPLICATION CIRCUIT

Wide Band

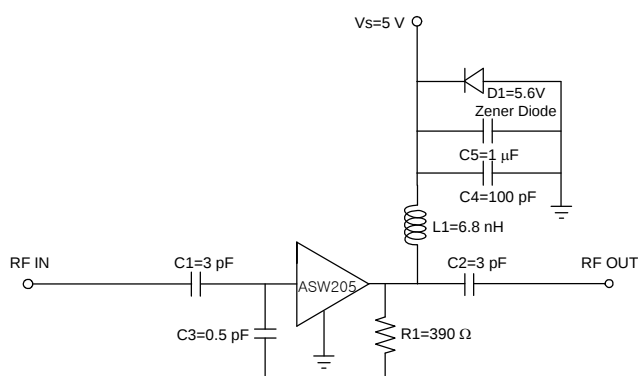
3000 ~ 4500 MHz

+5 V

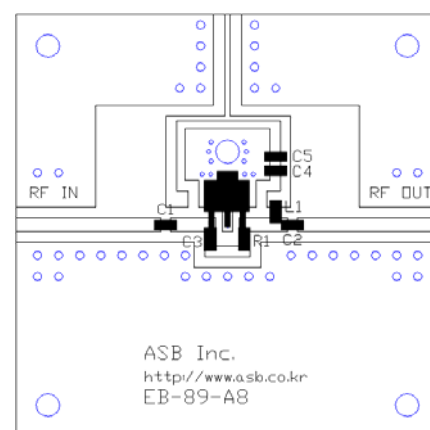
Frequency (MHz)	3000	4500
Magnitude S21 (dB)	18.7	18.0
Magnitude S11 (dB)	-18	-12
Magnitude S22 (dB)	-14	-14
Output P1dB (dBm)	17.0	14.5
Output IP3 ¹⁾ (dBm)	27.5	26.0
Noise Figure (dB)	3.5	4.1
Device Voltage (V)	+5	+5
Current (mA)	70	70

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

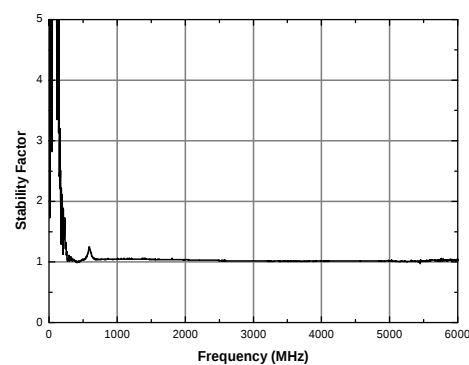
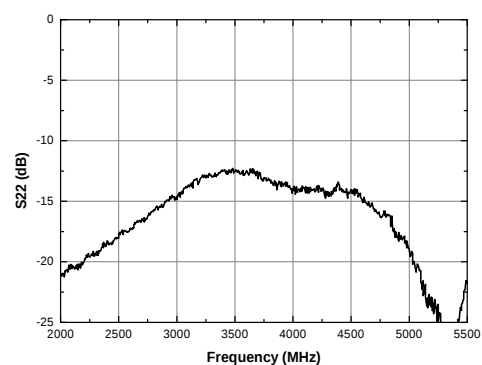
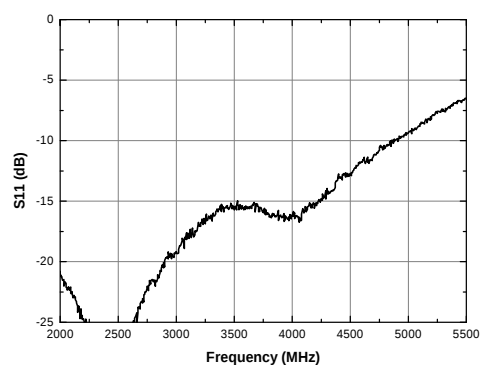
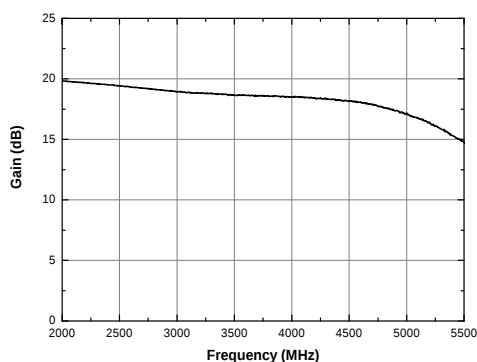
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

CATV (75 Ω)

50 ~ 1000 MHz

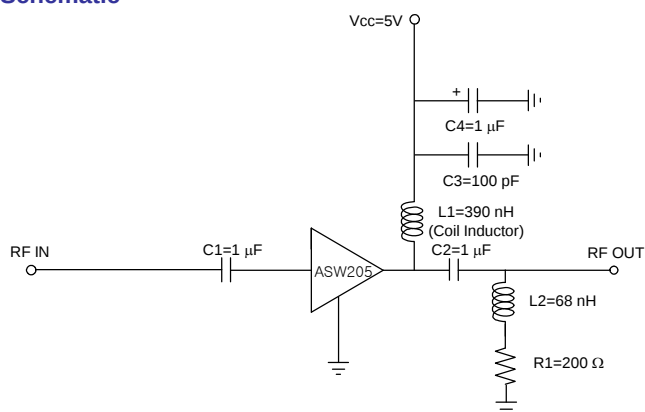
+5 V

Frequency (MHz)	50	500	860
Magnitude S21 (dB)	23.8	24.3	23.8
Magnitude S11 (dB)	-14	-10	-11
Magnitude S22 (dB)	-10	-13	-10
Output P1dB (dBm)	15.0	17.5	17.0
Output IP3 ¹⁾ (dBm)	28.0	32.5	31.5
Output IP2 ^{1),2)} (dBm)	33.0	42.5	48.0
Noise Figure (dB)	3.3	3.7	3.8
Device Voltage (V)	+5	+5	+5
Current (mA)	70	70	70

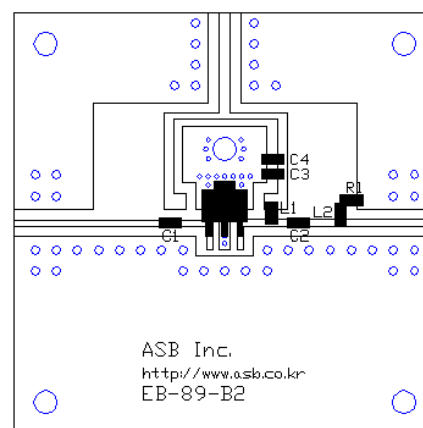
1) OIP3 and OIP2 are measured with two tones at an output power of +3 dBm/tone separated by 6 MHz.

2) OIP2 is measured at F1+F2 Frequency.

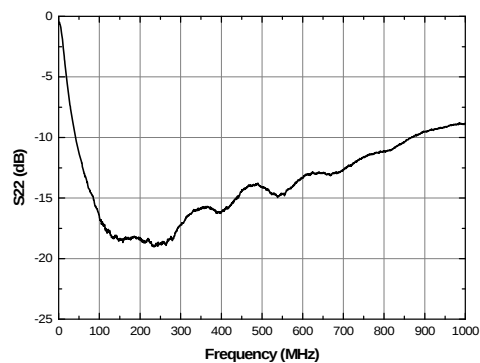
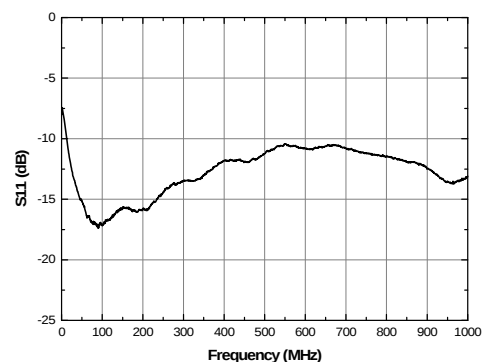
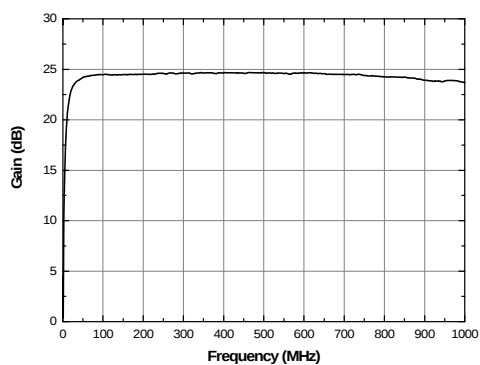
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters



APPLICATION CIRCUIT

CATV (75 Ω)

50 ~ 1000 MHz

+5 V

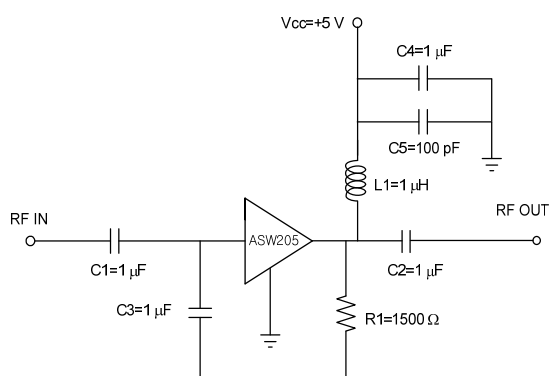
Gain = 21 dB

Frequency (MHz)	50	500	1000
Magnitude S21 (dB)	21.5	21.3	20.5
Magnitude S11 (dB)	-6.5	-8.0	-9.5
Magnitude S22 (dB)	-11	-12	-13
Output P1dB (dBm)	15.0	17.5	17.0
Output IP3 ¹⁾ (dBm)	28.0	32.5	31.5
Output IP2 ^{1),2)} (dBm)	33.0	42.5	48.0
Noise Figure (dB)	3.8	4.0	4.3
Device Voltage (V)	+5	+5	+5
Current (mA)	70	70	70

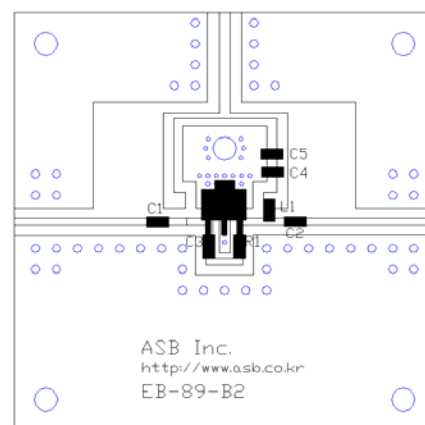
1) OIP3 and OIP2 are measured with two tones at an output power of +3 dBm/ tone separated by 6 MHz.

2) OIP2 is measured at F1+F2 Frequency.

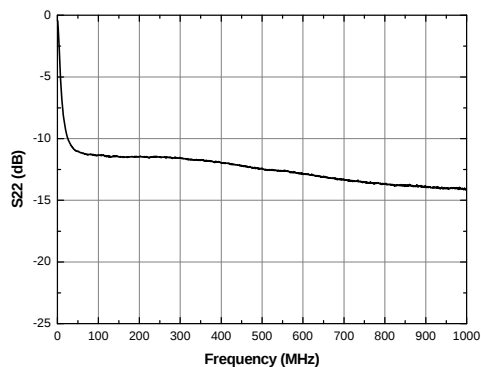
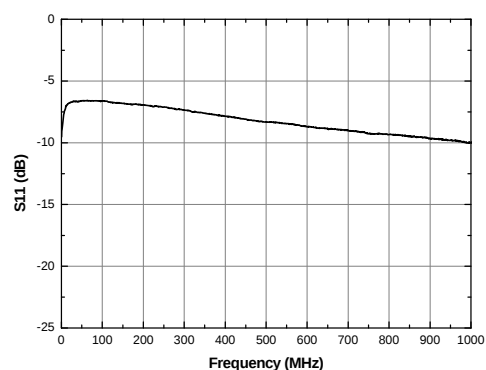
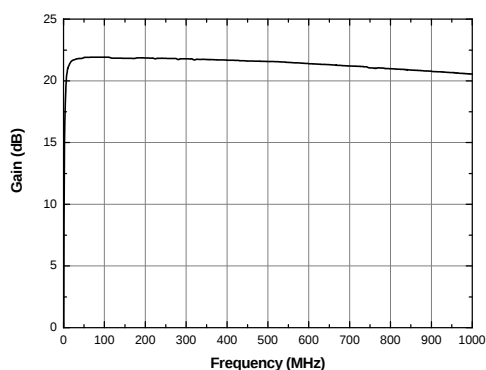
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters



APPLICATION CIRCUIT

CATV (75 Ω)

5 ~ 200 MHz

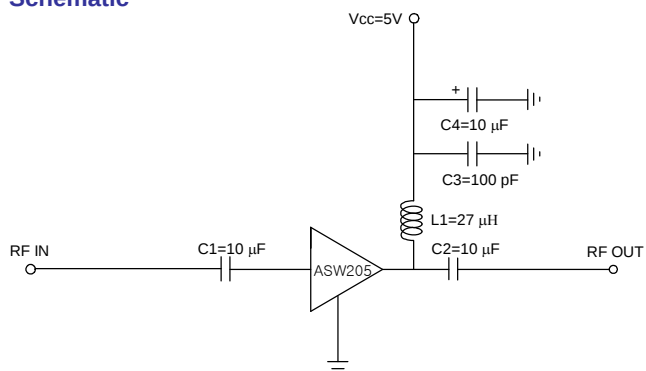
+5 V

Frequency (MHz)	5	50	200
Noise Figure (dB)	3.5	3.5	3.5
Magnitude S21 (dB)	25.5	25.8	25.5
Magnitude S11 (dB)	-12	-12	-12
Magnitude S22 (dB)	-12	-20	-15
Output P1dB (dBm)	18	18	18
Output IP3 ¹⁾ (dBm)	31	32	33
Output IP2 ^{1),2)} (dBm)	36	40	42
Device Voltage (V)	+5		
Current (mA)	70		

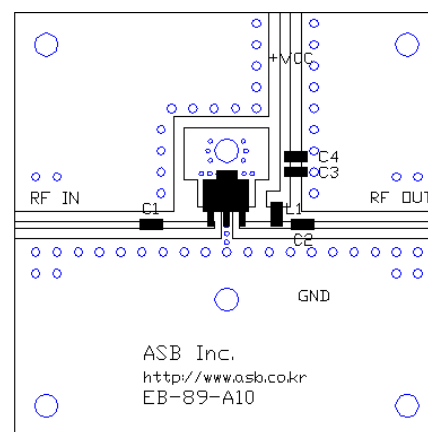
1) OIP3 and OIP2 are measured with two tones at an output power of +5 dBm/tone separated by 1 MHz.

2) OIP2 is measured at F1+F2 Frequency.

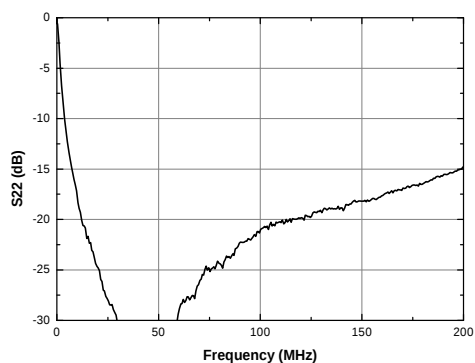
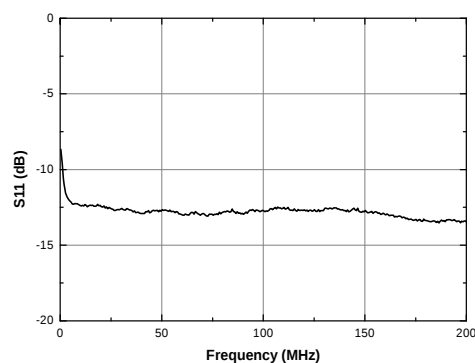
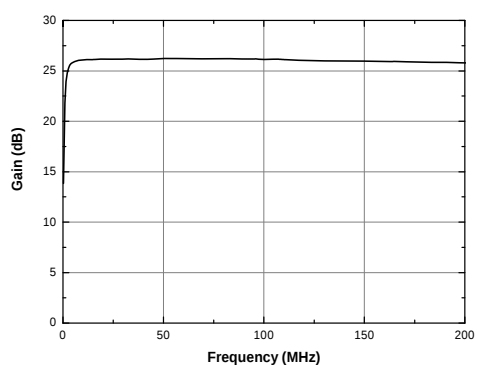
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters



APPLICATION CIRCUIT

CATV (75 Ω)

5 ~ 105 MHz

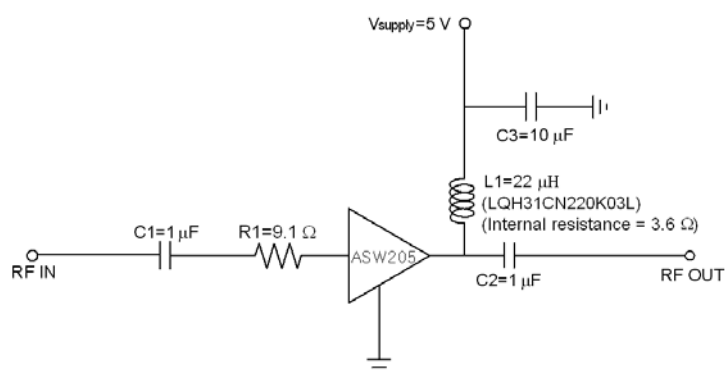
+5 V

Frequency (MHz)	5	50	105
Noise Figure (dB)	-	4.0	4.1
Magnitude S21 (dB)	25.1	25.2	25.1
Magnitude S11 (dB)	-16.0	-16.0	-16.0
Magnitude S22 (dB)	-21.0	-24.0	-20.0
Output P1dB (dBm)	17.5	17.5	17.5
Output IP3 ¹⁾ (dBm)	30.0	30.0	30.0
Output IP2 ^{1),2)} (dBm)	36.0	37.0	39.0
Device Voltage (V)	+4.8		
Current (mA)	58		

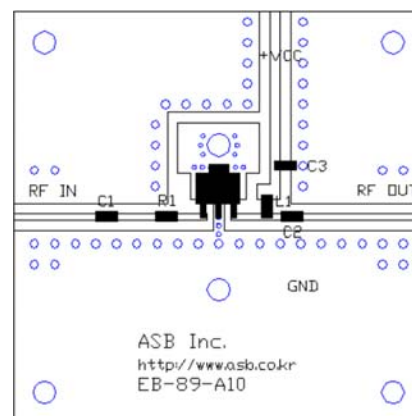
1) OIP3 and OIP2 are measured with two tones at an output power of +3 dBm/tone separated by 1 MHz.

2) OIP2 is measured at F1+F2 Frequency.

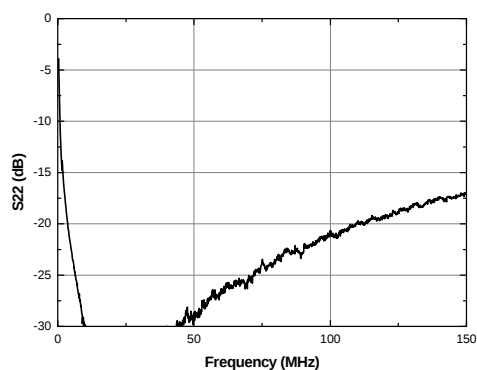
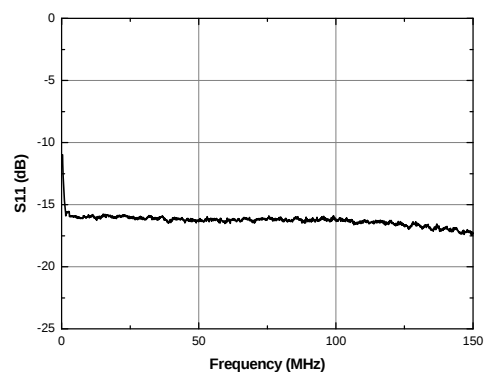
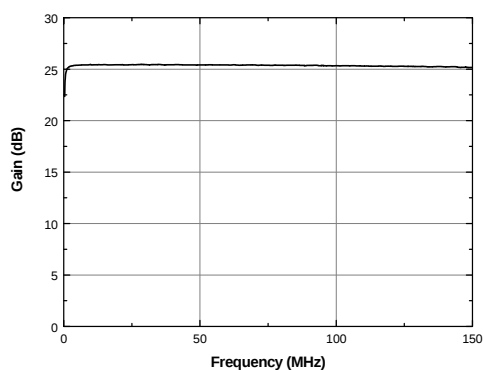
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters



APPLICATION CIRCUIT

SMATV (75 Ω)

200 ~ 2600 MHz

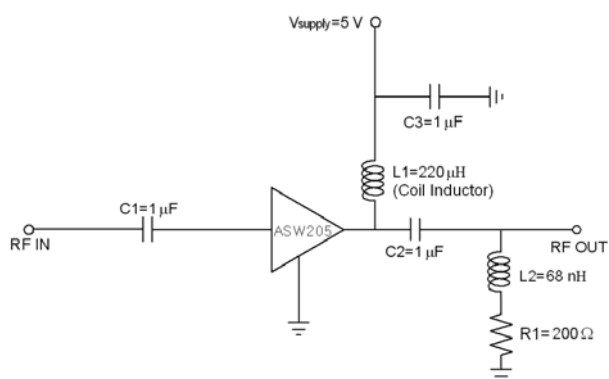
+5 V

Frequency (MHz)	200	950	2150	2600
Noise Figure (dB)	3.5	3.7	3.4	3.7
Magnitude S21 (dB)	24.5	24.0	19.5	18.5
Magnitude S11 (dB)	-12.0	-12.0	-11.0	-10.0
Magnitude S22 (dB)	-15.0	-8.0	-11.0	-13.0
Output P1dB (dBm)	17.0	18.0	19.0	18.0
Output IP3 ¹⁾ (dBm)	32.0	32.0	32.0	30.0
Output IP2 ^{1),2)} (dBm)	39.0	48.0	42.0	42.0
Device Voltage (V)	+5.0			
Current (mA)	70			

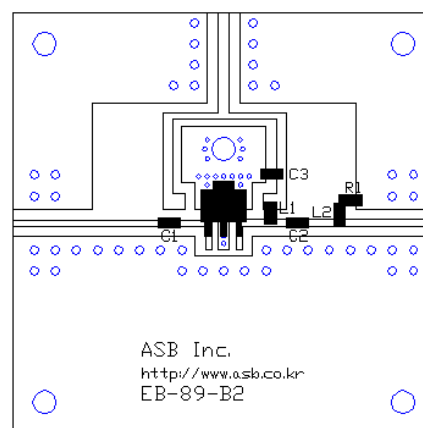
1) OIP3 and OIP2 are measured with two tones at an output power of +3 dBm/tone separated by 1 MHz.

2) OIP2 is measured at F1+F2 Frequency.

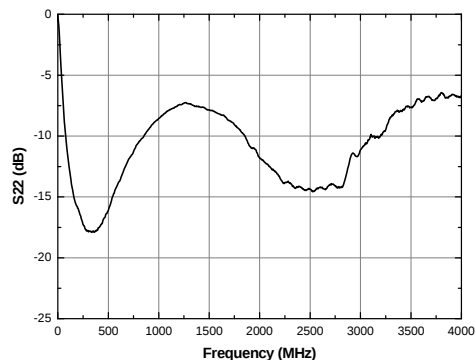
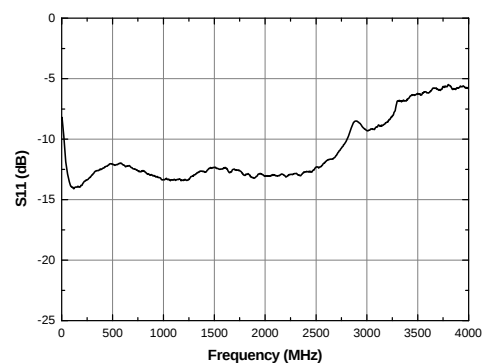
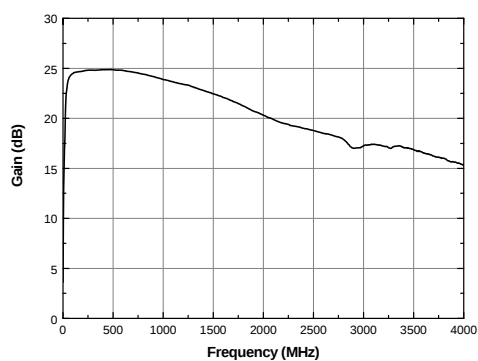
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters



APPLICATION CIRCUIT

Wide Band

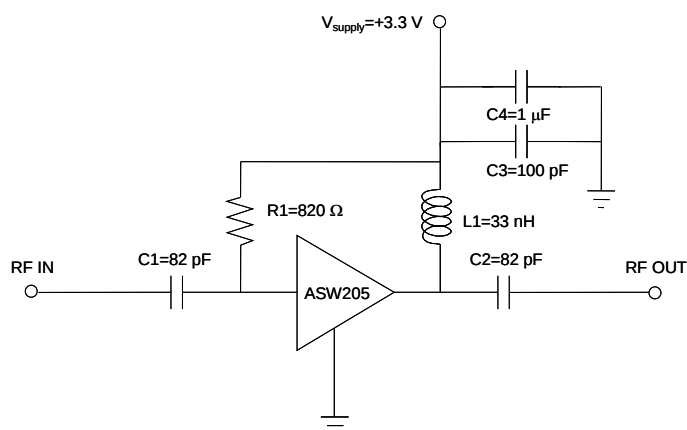
500 ~ 2700 MHz

+3.3 V/ 35 mA

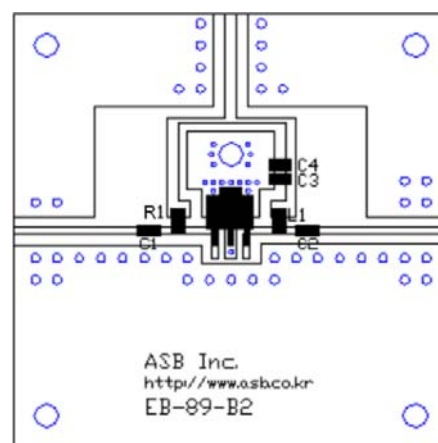
Frequency (MHz)	900	2000
Magnitude S21 (dB)	22.7	19.3
Magnitude S11 (dB)	-12.0	-11.5
Magnitude S22 (dB)	-9	-8
Output P1dB (dBm)	12.5	13.5
Output IP3 ¹⁾ (dBm)	23.5	24.5
Noise Figure (dB)	3.4	3.5
Device Voltage (V)	+3.3	+3.3
Current (mA)	35	35

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

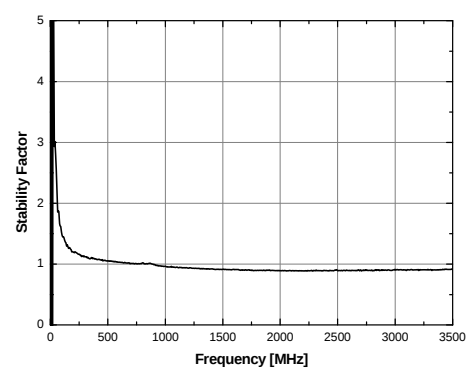
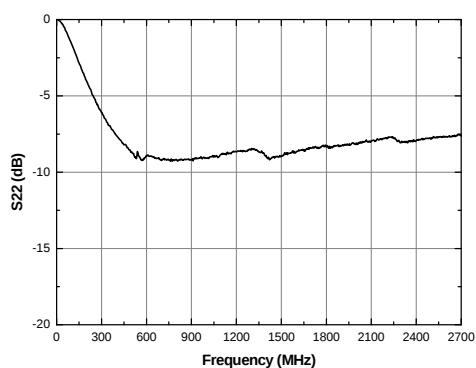
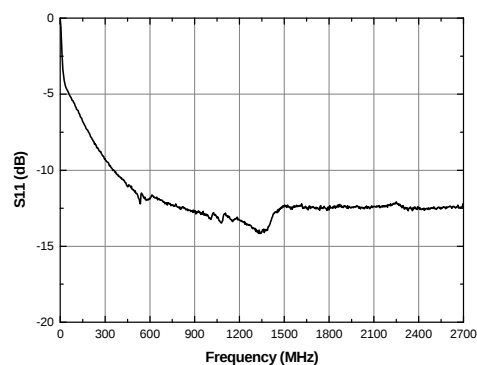
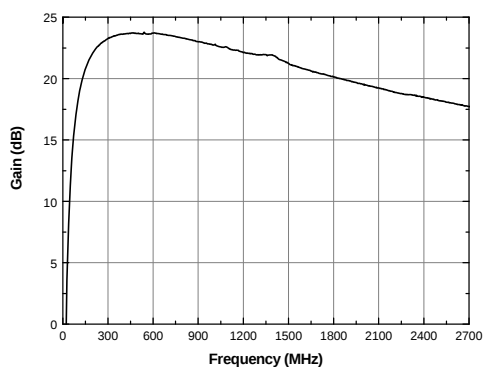
Schematic



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	72	900	24.4	-16.4	-11.0	33.9	19.2	3.26
		2000	20.8	-19.1	-10.7	33.3	19.8	3.38
+4.9	63	900	24.3	-15.9	-10.7	32.4	18.4	3.22
		2000	20.7	-19.0	-10.5	32.6	19.4	3.34
+4.75	52	900	24.0	-15.1	-10.0	29.8	17.0	3.10
		2000	20.6	-18.7	-10.1	30.8	18.6	3.24
+4.6	42	900	23.6	-14.0	-9.2	26.8	15.3	3.02
		2000	20.4	-18.1	-9.5	28.4	17.6	3.19
+4.45	35	900	23.3	-12.9	-8.6	23.7	13.6	3.00
		2000	20.3	-13.8	-9.2	25.1	16.4	3.30

Recommended Soldering Reflow Profile