ASX101

5 ~ 4000 MHz MMIC Amplifier

Features

- 22 dB Gain at 900 MHz
- 18.5 dBm P1dB at 900 MHz
- 31.5 dBm OIP3 at 900 MHz
- 3.1 dB NF at 900 MHz
- MTTF > 100 Years

Description

The ASX101, 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 4 GHz. The amplifier is available in a SOT89 package and passes through the stringent DC, RF, and reliability tests.

RoHS-compliant

Package Style: SOT89

Typical Performance

(Supply Voltage = +2.7, T_A = +25 °C, Z_0 = 50 Ω)

Parameters	Units	Typical						
Frequency	MHz	850	1950	2450	2700	100	900	2000
Gain	dB	21.5	15.0	13.0	13.0	28.5	22.0	15.0
S11	dB	-14	-15	-18	-18	-14	-14	-20
S22	dB	-14.0	-15.0	-11.5	-13.0	-15.0	-20.0	-15.0
Output IP3	dBm	27.0[1)]	29.0[1)]	30.0[2)]	28.5[2)]	27.7[2)]	31.5[2)]	33.0[2)]
Noise Figure	dB	3.2	3.2	3.5	3.4	3.5	3.1	3.2
Output P1dB	dBm	16.0	17.0	17.0	16.0	17.5	18.5	19.0
Current	mA	38	38	40	40	55	55	55
Device Voltage	V	+2.7	+2.7	+3.3	+3.3	+3.5	+3.5	+3.5

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

Product Specifications

Parameters	Units	Min	Typ.	Max
Testing Frequency	MHz		850	
Gain	dB	21.0	21.5	
S11	dB		-14	
S22	dB		-14	
Output IP3	dBm	26	27	
Noise Figure	dB		3.2	3.5
Output P1dB	dBm	15	16	
Current	mA	35	38	45
Device Voltage	V		+2.7	

Absolute Maximum Ratings

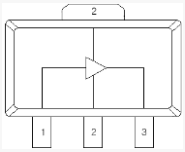
Parameters	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-40 to +150 °C
Device Voltage	+4 V
Operating Junction Temperature	+150 °C
Input RF Power (CW, 50 Ω matched)[1)]	+25 dBm
Thermal Resistance	210 °C/W

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.

Application Circuit

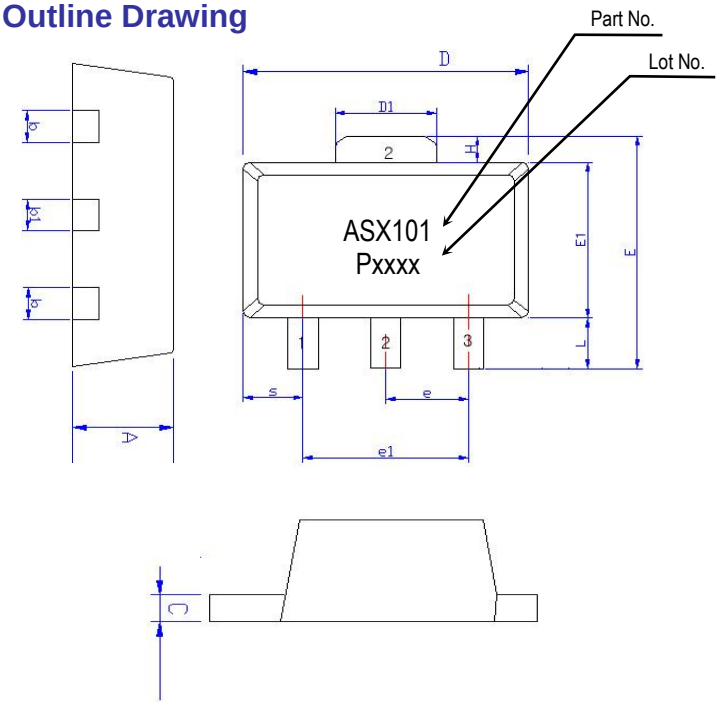
- IF (21 MHz)
- IF
- TETRA (380 ~ 520 MHz)
- CDMA
- CDMA & GSM (900 MHz)
- PCS & DCS
- WCDMA
- WCDMA (2000 MHz)
- WLAN
- LTE (2500 ~ 2700 MHz)
- GPS (1200 MHz)
- Wide Band (1500 ~ 2500 MHz)

Pin Configuration



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

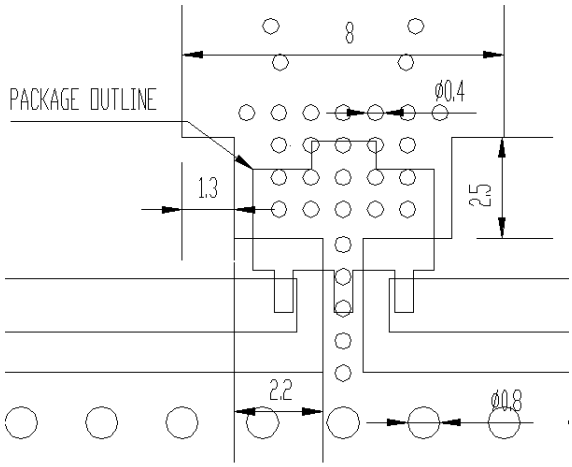
Outline Drawing



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: 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 (MSL)

Level 3 at 260 °C reflow

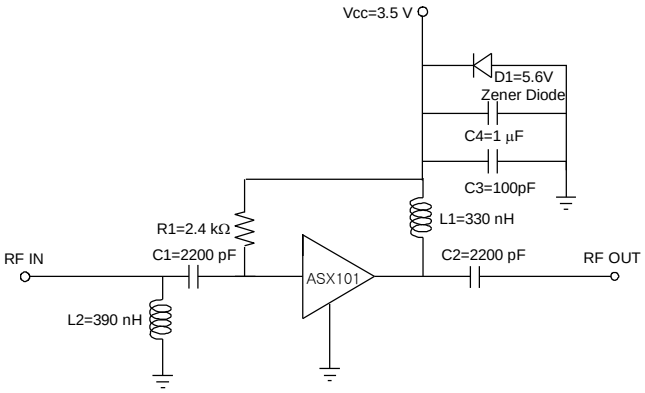
APPLICATION CIRCUIT

IF
21 MHz
+3.5 V

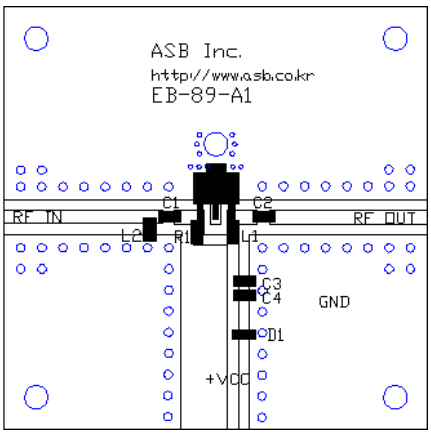
Frequency (MHz)	21
Magnitude S21 (dB)	27.5
Magnitude S11 (dB)	-10
Magnitude S22 (dB)	-10
Output P1dB (dBm)	16
Output IP3[1)] (dBm)	31
Noise Figure (dB)	3.9
Device Voltage (V)	+3.5
Current (mA)	55

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

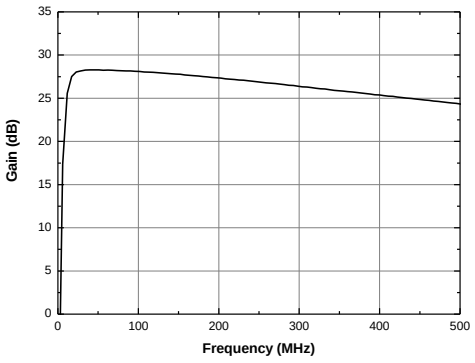
Schematic

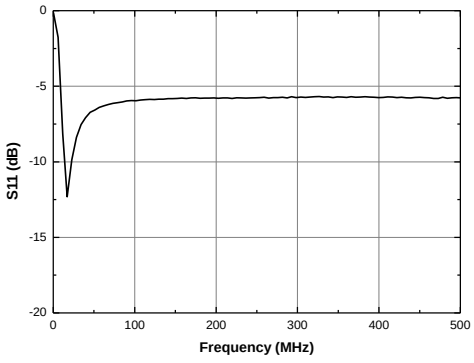


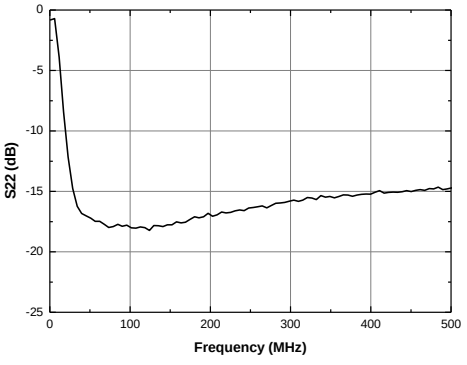
Board Layout (FR4, 40x40 mm², 0.8T)

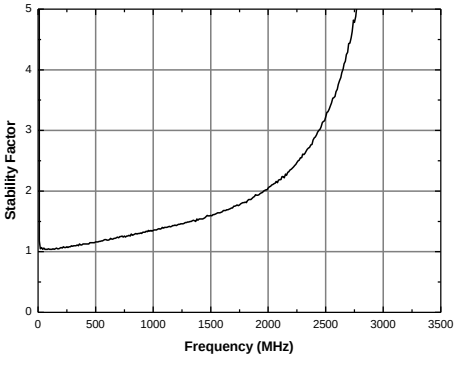


S-parameters & K-factor









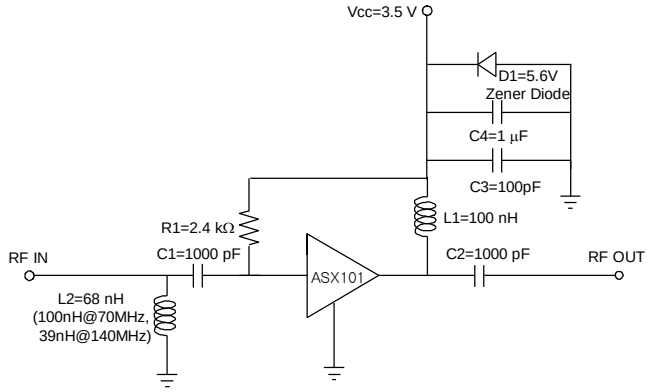
APPLICATION CIRCUIT

IF
70 ~ 140 MHz
+3.5 V

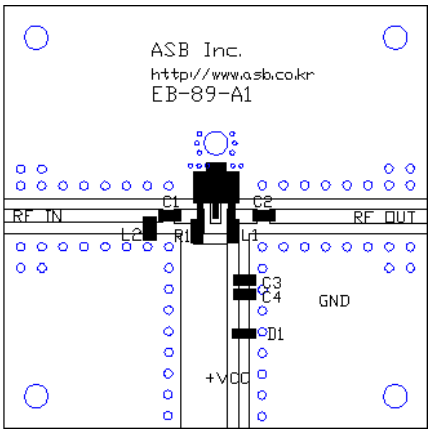
Frequency (MHz)	70 ~ 140 (@ 100 MHz)
Magnitude S21 (dB)	28.5
Magnitude S11 (dB)	-14
Magnitude S22 (dB)	-15
Output P1dB (dBm)	17.5
Output IP3[1)] (dBm)	27.7
Noise Figure (dB)	3.5
Device Voltage (V)	+3.5
Current (mA)	55

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

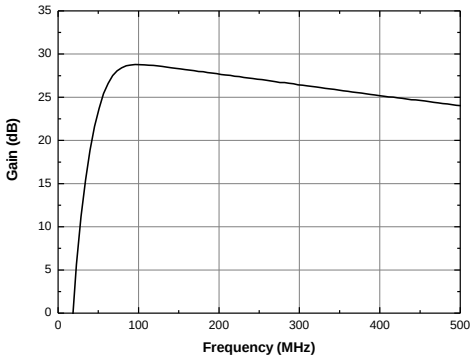
Schematic

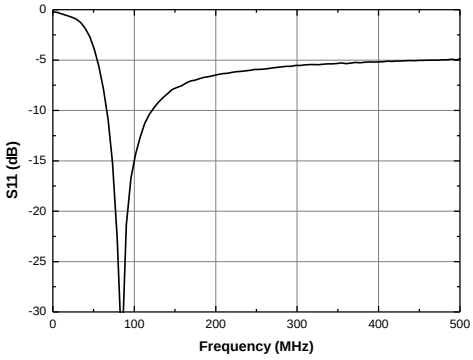


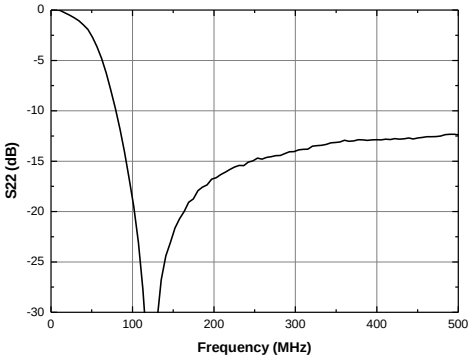
Board Layout (FR4, 40x40 mm², 0.8T)

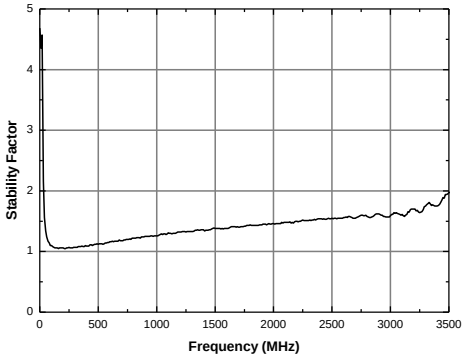


S-parameters & K-factor









APPLICATION CIRCUIT

TETRA

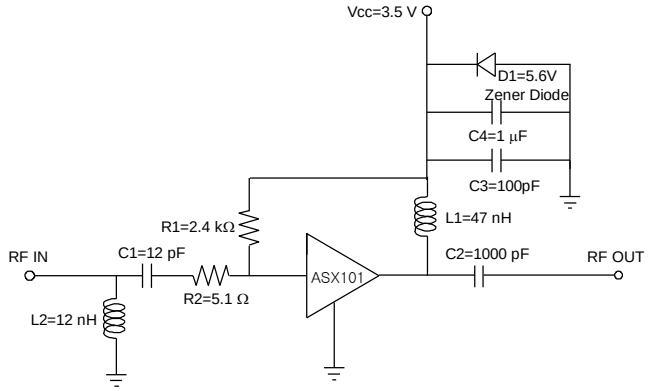
380 ~ 520 MHz

+3.5 V

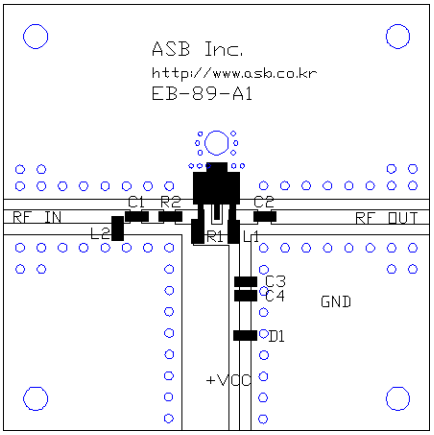
Frequency (MHz)	380	520
Magnitude S21 (dB)	25.0	23.5
Magnitude S11 (dB)	-11	-11
Magnitude S22 (dB)	-20	-12
Output P1dB (dBm)	18	19
Output IP3[1)] (dBm)	29	32
Noise Figure (dB)	4.8	4.5
Device Voltage (V)	+3.5	+3.5
Current (mA)	55	55

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

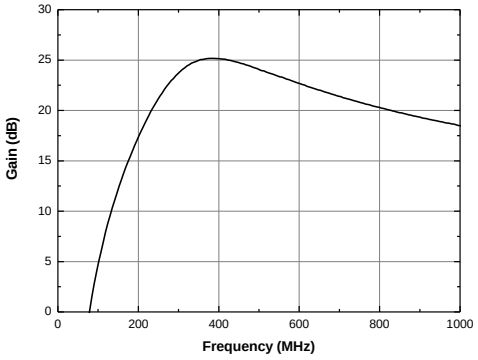
Schematic

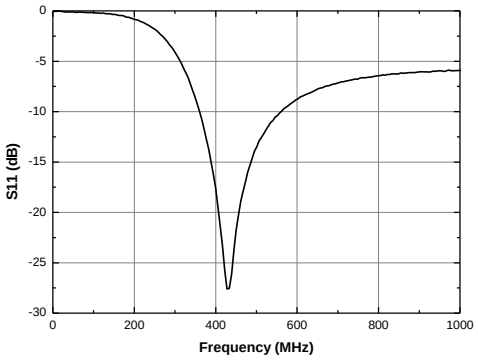


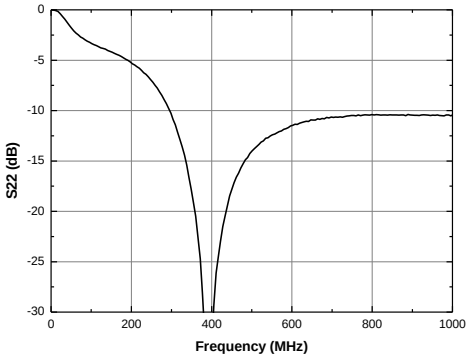
Board Layout (FR4, 40x40 mm², 0.8T)

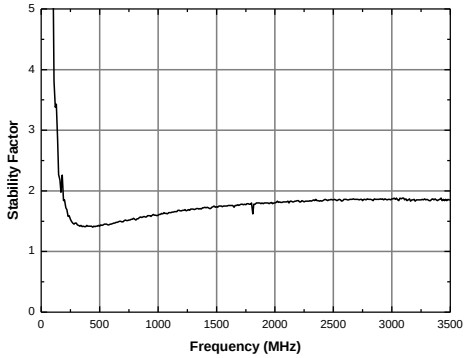


S-parameters & K-factor









APPLICATION CIRCUIT

CDMA

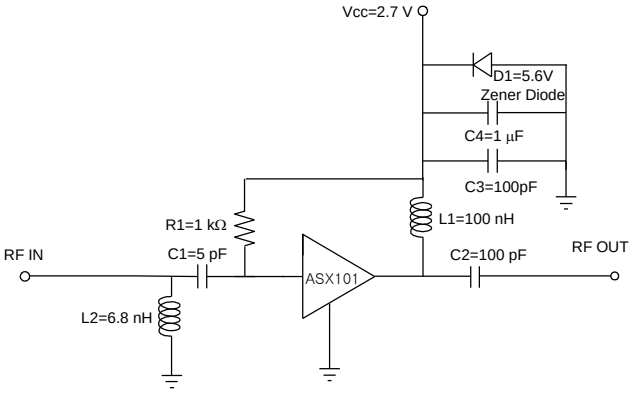
824 ~ 894 MHz

+2.7 V

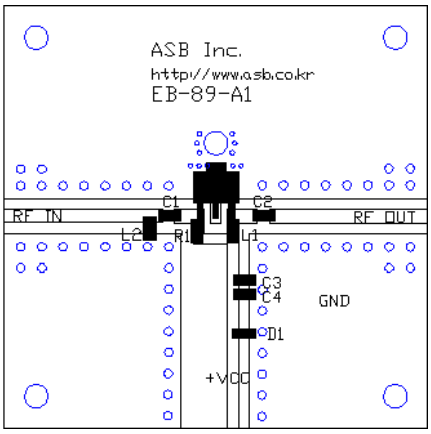
Frequency (MHz)	824 ~ 849	869 ~ 894
Magnitude S21 (dB)	21.5	21.5
Magnitude S11 (dB)	-14	-14
Magnitude S22 (dB)	-14	-14
Output P1dB (dBm)	16	16
Output IP3[1)] (dBm)	27	27
Noise Figure (dB)	3.2	3.2
Device Voltage (V)	+2.7	+2.7
Current (mA)	38	38

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

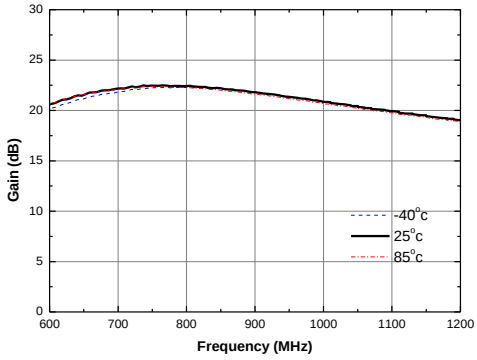
Schematic

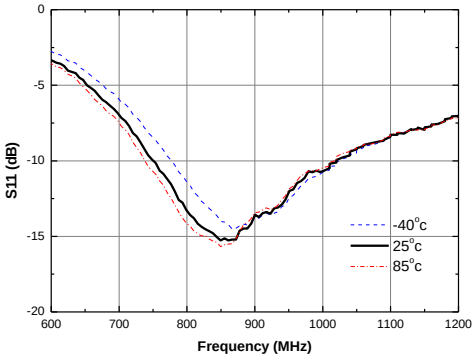


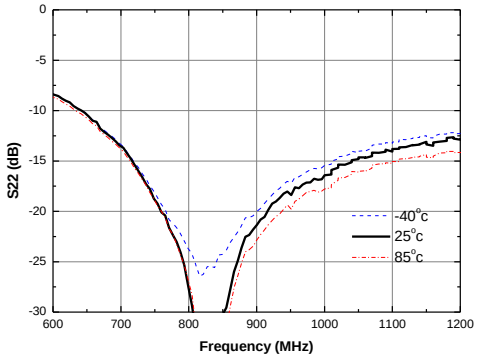
Board Layout (FR4, 40x40 mm², 0.8T)

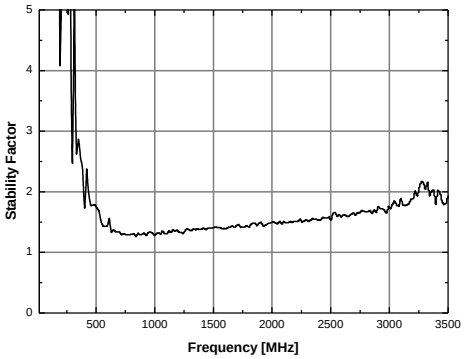


S-parameters & K-factor

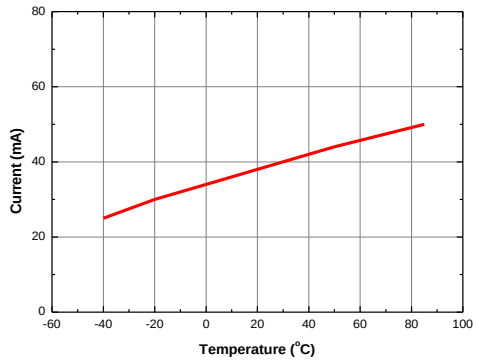




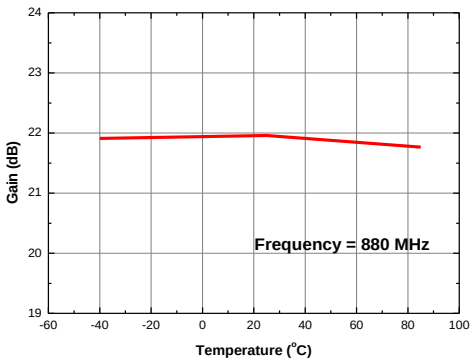




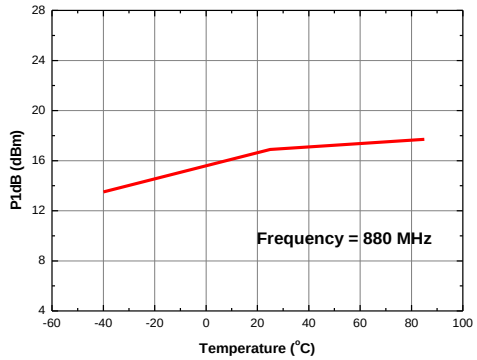
Current vs. Temperature



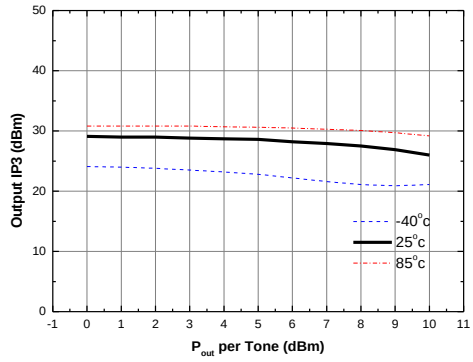
Gain vs. Temperature



P1dB vs. Temperature



Output IP3 vs. Tone Power (Frequency = 880 MHz)



APPLICATION CIRCUIT

CDMA & GSM

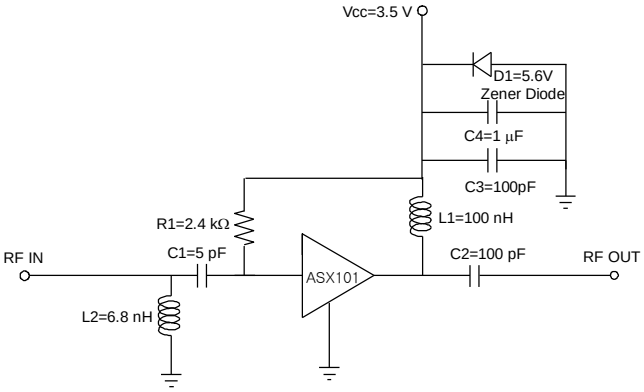
900 MHz

+3.5 V

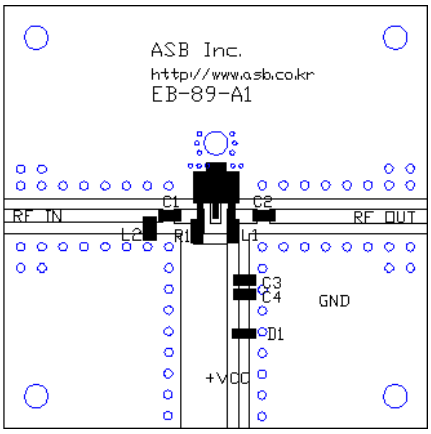
Frequency (MHz)	900
Magnitude S21 (dB)	22.0
Magnitude S11 (dB)	-14
Magnitude S22 (dB)	-20
Output P1dB (dBm)	18.5
Output IP3[1)] (dBm)	31.5
Noise Figure (dB)	3.1
Device Voltage (V)	+3.5
Current (mA)	55

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

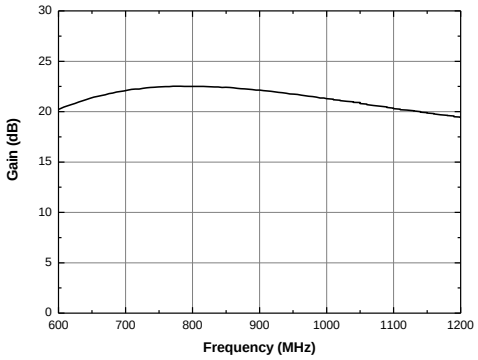
Schematic

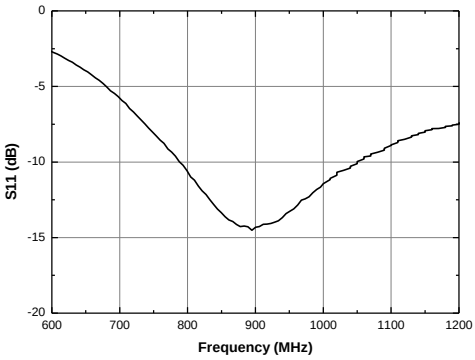


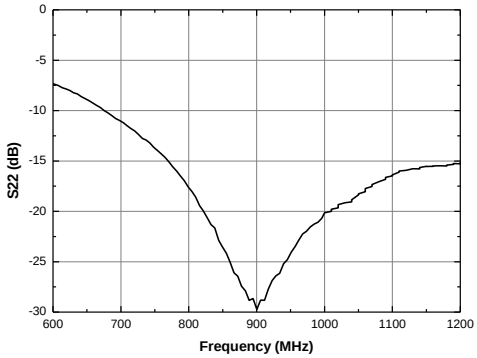
Board Layout (FR4, 40x40 mm², 0.8T)

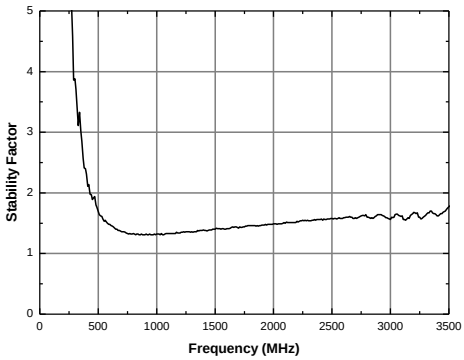


S-parameters & K-factor









APPLICATION CIRCUIT

PCS & DCS

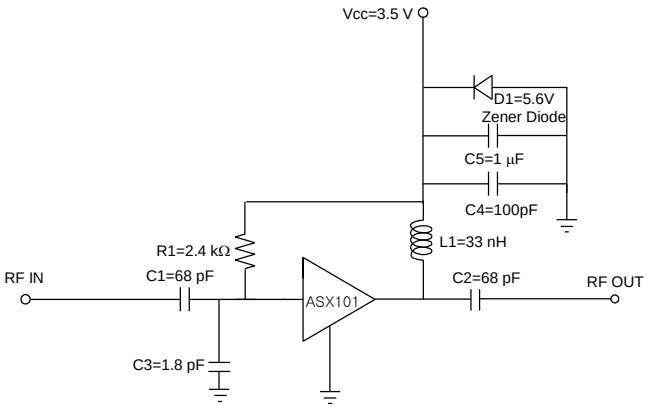
1710 ~ 1880 MHz

+3.5 V

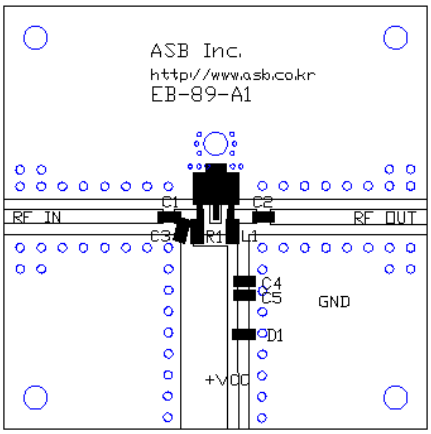
Frequency (MHz)	1710	1880
Magnitude S21 (dB)	16.5	16.0
Magnitude S11 (dB)	-15	-18
Magnitude S22 (dB)	-18	-14
Output P1dB (dBm)	19	19
Output IP3[1)] (dBm)	33.0	33.5
Noise Figure (dB)	3.4	3.5
Device Voltage (V)	+3.5	+3.5
Current (mA)	55	55

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

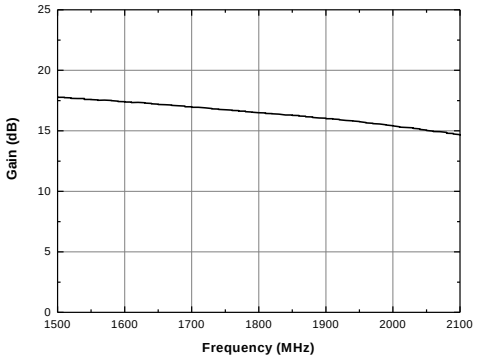
Schematic

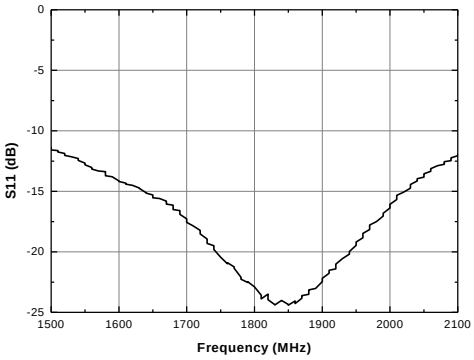


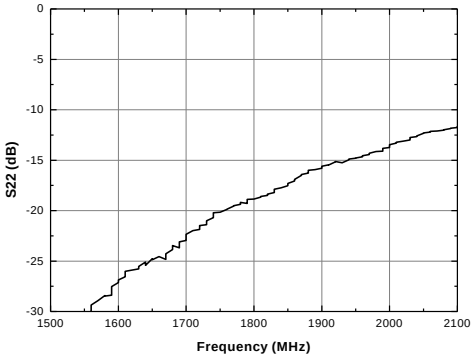
Board Layout (FR4, 40x40 mm², 0.8T)

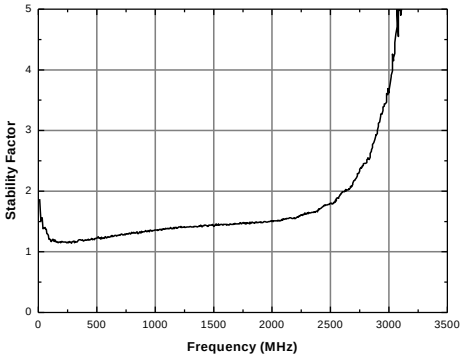


S-parameters & K-factor









APPLICATION CIRCUIT

WCDMA

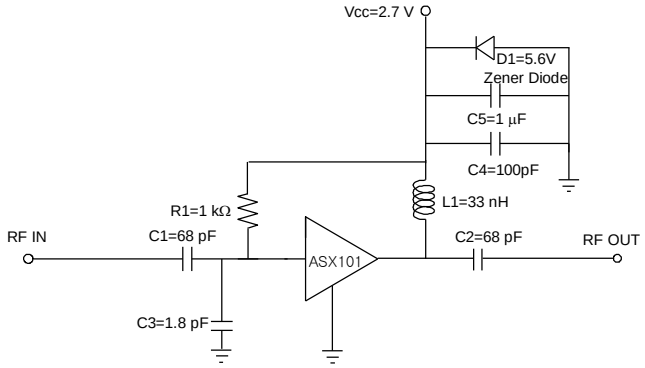
1920 ~ 2170 MHz

+2.7 V

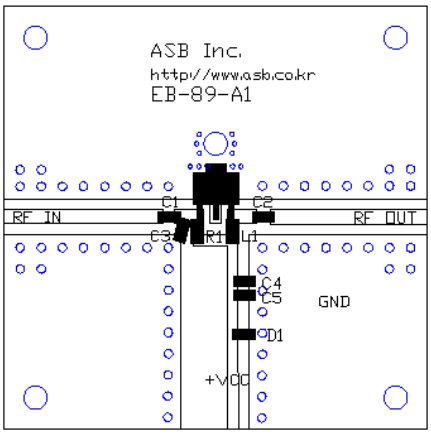
Frequency (MHz)	1920 ~ 1980	2110 ~ 2170
Magnitude S21 (dB)	15.0	14.0
Magnitude S11 (dB)	-15	-15
Magnitude S22 (dB)	-15	-13
Output P1dB (dBm)	17	17
Output IP3[1)] (dBm)	29	29
Noise Figure (dB)	3.2	3.2
Device Voltage (V)	+2.7	+2.7
Current (mA)	38	38

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

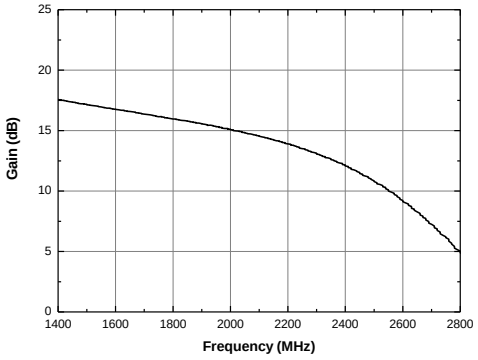
Schematic

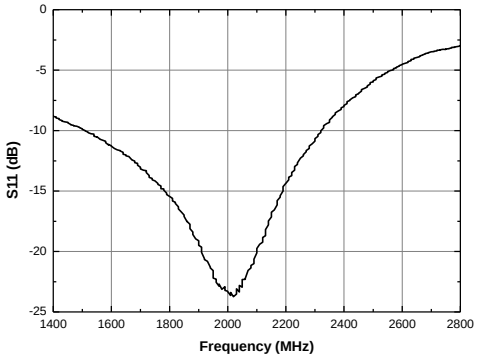


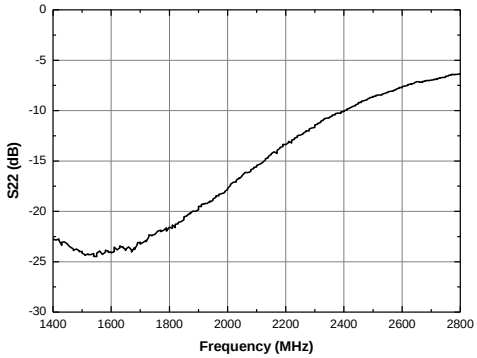
Board Layout (FR4, 40x40 mm², 0.8T)

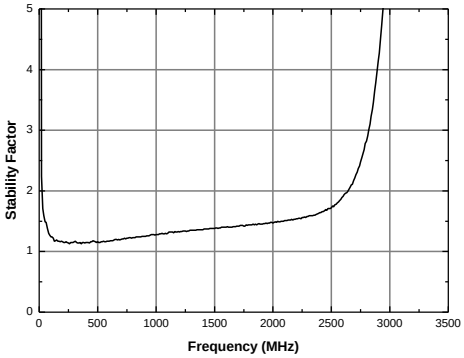


S-parameters & K-factor









APPLICATION CIRCUIT

WCDMA

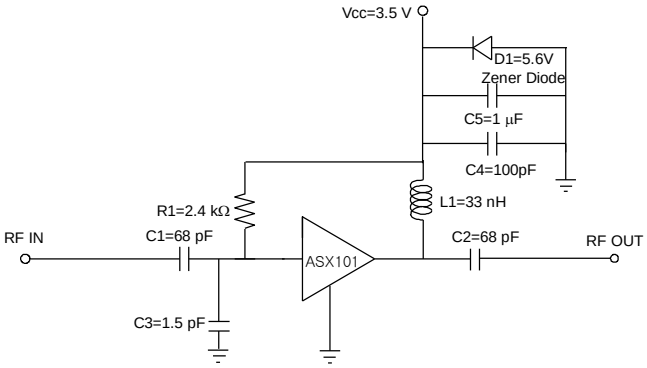
2000 MHz

+3.5 V

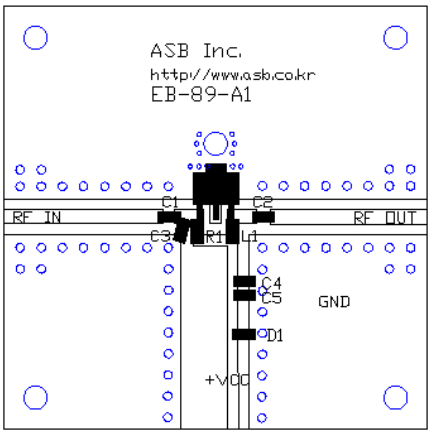
Frequency (MHz)	2000
Magnitude S21 (dB)	15.0
Magnitude S11 (dB)	-20
Magnitude S22 (dB)	-15
Output P1dB (dBm)	19
Output IP3[1)] (dBm)	33
Noise Figure (dB)	3.2
Device Voltage (V)	+3.5
Current (mA)	55

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

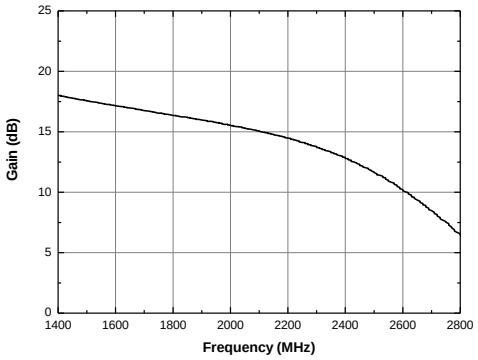
Schematic

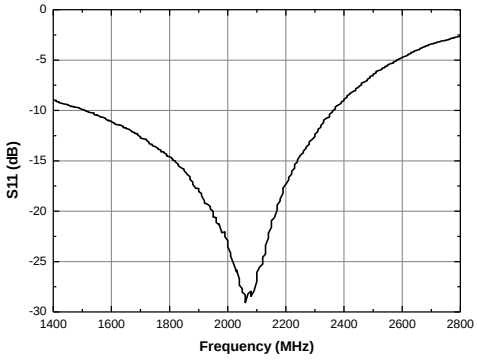


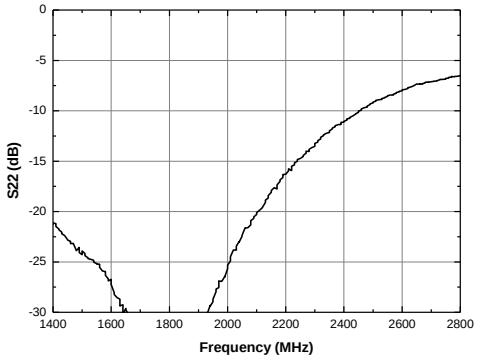
Board Layout (FR4, 40x40 mm², 0.8T)

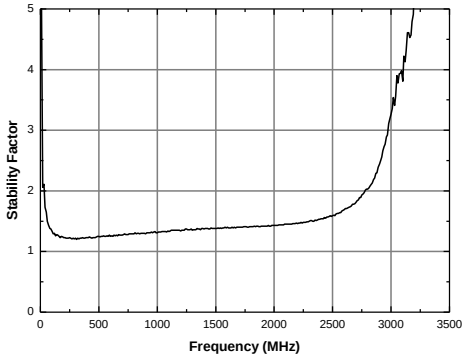


S-parameters & K-factor









APPLICATION CIRCUIT

WLAN

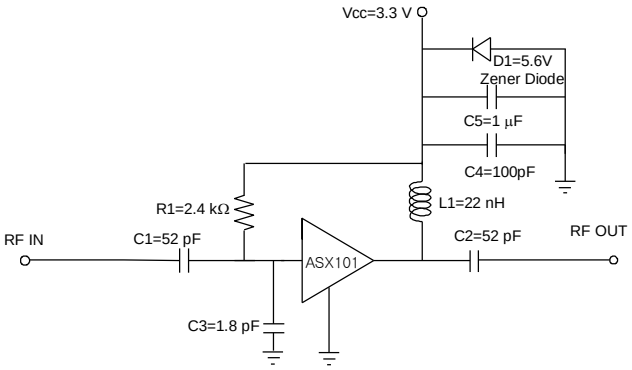
2400 ~ 2500 MHz

+3.3 V

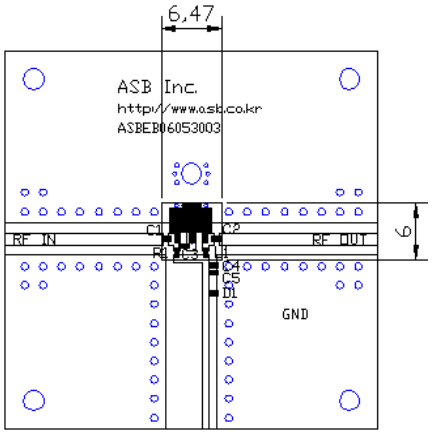
Frequency (MHz)	2400 ~ 2500
Magnitude S21 (dB)	13.0
Magnitude S11 (dB)	-18
Magnitude S22 (dB)	-11.5
Output P1dB (dBm)	17
Output IP3[1)] (dBm)	30
Noise Figure (dB)	3.5
Device Voltage (V)	+3.3
Current (mA)	40

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

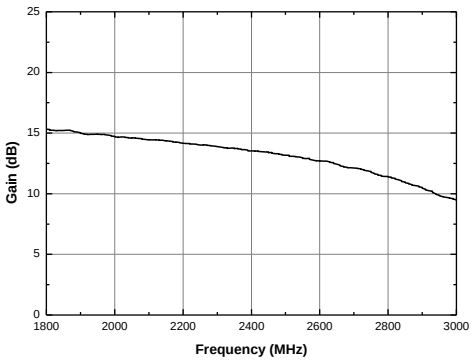
Schematic

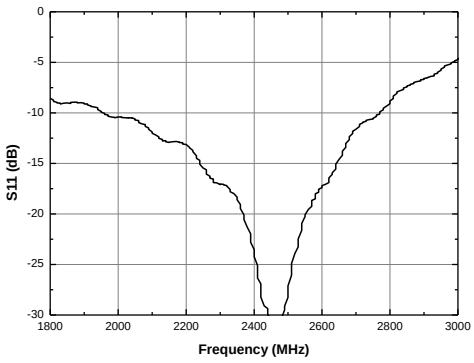


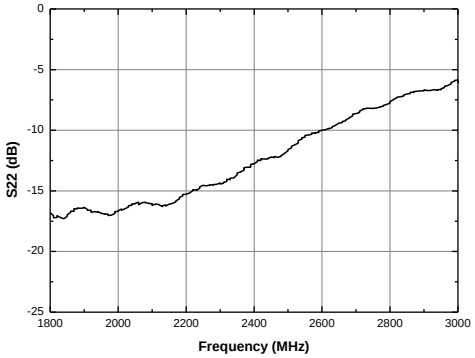
Board Layout (FR4, 40x40 mm², 0.8T)

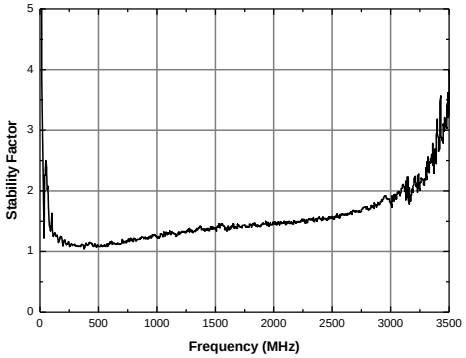


S-parameters & K-factor









APPLICATION CIRCUIT

LTE

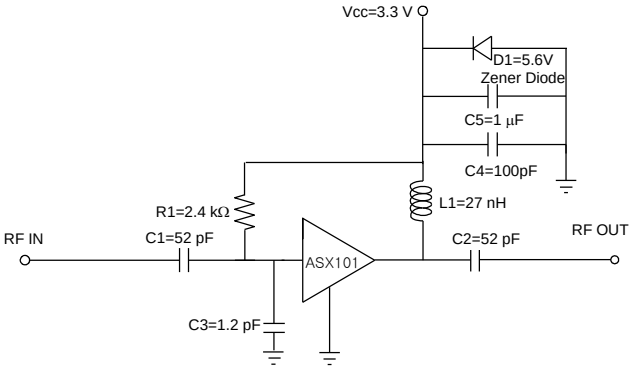
2500 ~ 2700 MHz

+3.3 V

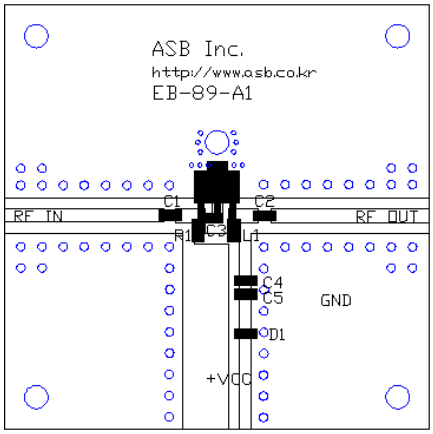
Frequency (MHz)	2500	2700
Magnitude S21 (dB)	13.5	13.0
Magnitude S11 (dB)	-13	-18
Magnitude S22 (dB)	-15	-13
Output P1dB (dBm)	17	16
Output IP3[1)] (dBm)	29.0	28.5
Noise Figure (dB)	3.3	3.4
Device Voltage (V)	+3.3	+3.3
Current (mA)	40	40

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

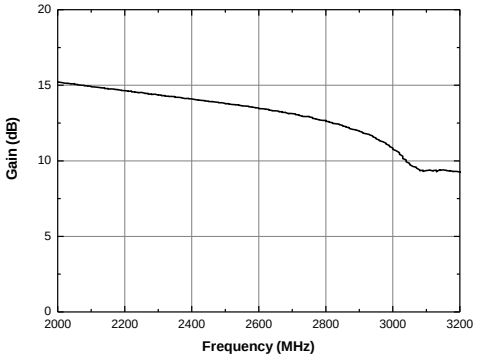
Schematic

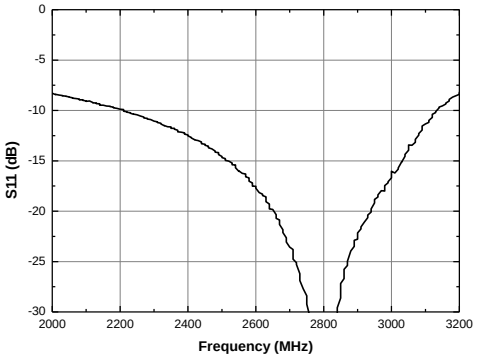


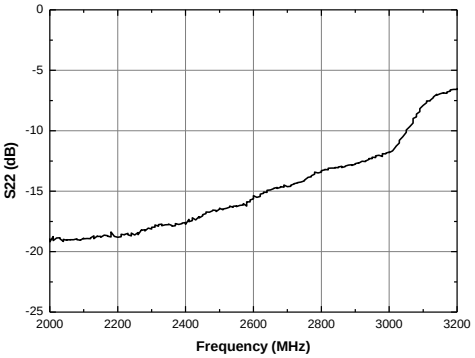
Board Layout (FR4, 40x40 mm², 0.8T)

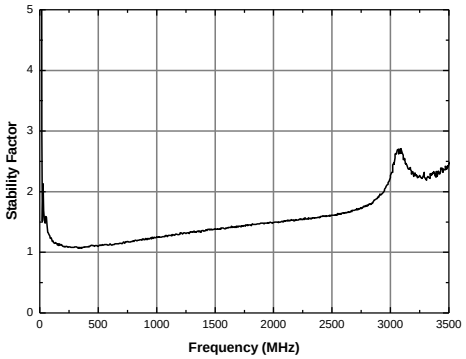


S-parameters & K-factor









APPLICATION CIRCUIT

GPS

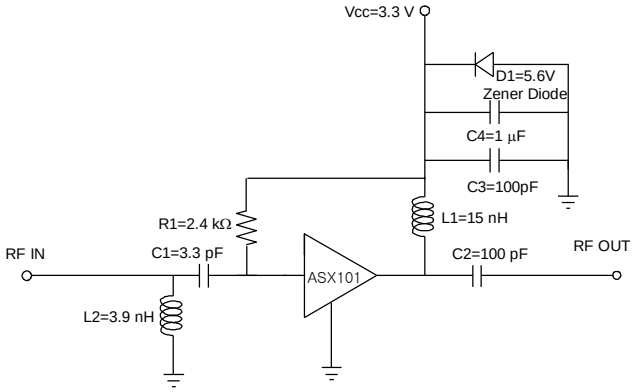
1200 MHz

+3.3 V

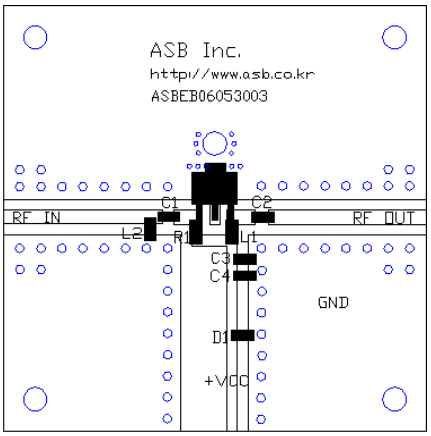
Frequency (MHz)	1200
Magnitude S21 (dB)	19.0
Magnitude S11 (dB)	-15
Magnitude S22 (dB)	-18
Output P1dB (dBm)	16.5
Output IP3[1)] (dBm)	28
Noise Figure (dB)	3.4
Device Voltage (V)	+3.3
Current (mA)	40

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

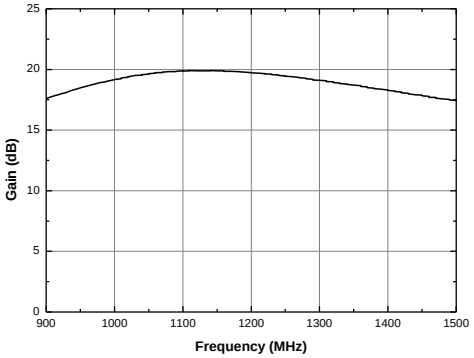
Schematic

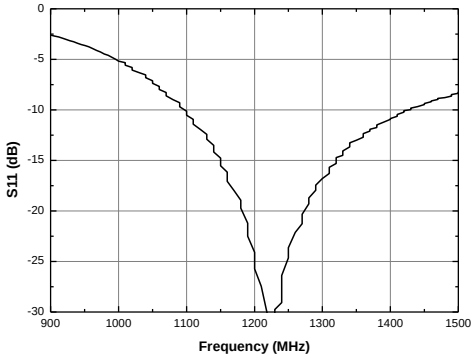


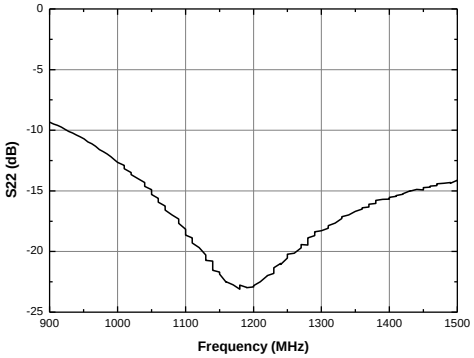
Board Layout (FR4, 40x40 mm², 0.8T)

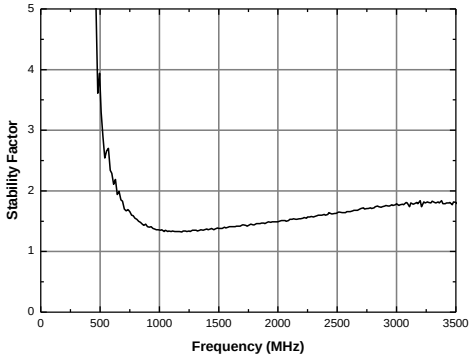


S-parameters & K-factor









APPLICATION CIRCUIT

Wide Band

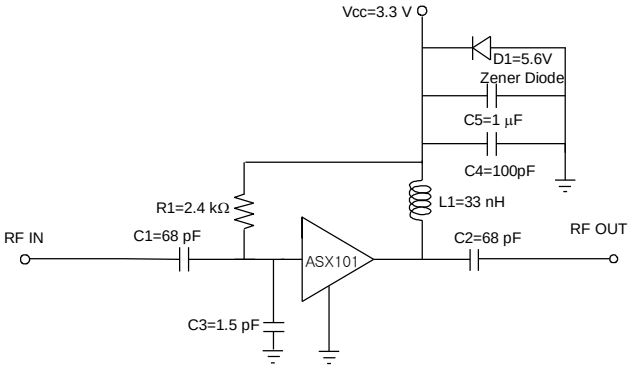
1500 ~ 2500 MHz

+3.3 V

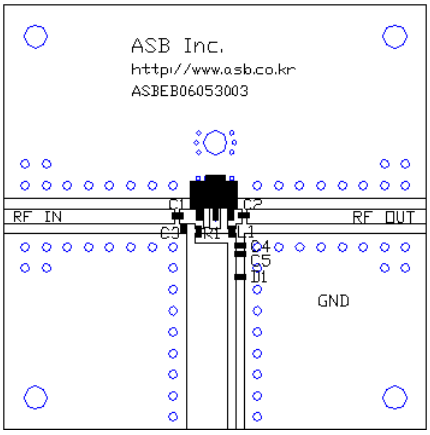
Frequency (MHz)	1500	2000	2500
Magnitude S21 (dB)	17.0	15.0	12.5
Magnitude S11 (dB)	-9.0	-15.0	-9.5
Magnitude S22 (dB)	-18	-18	-11
Output P1dB (dBm)	15.5	17.0	19.0
Output IP3[1)] (dBm)	28	29	31
Noise Figure (dB)	2.8	3.0	3.5
Device Voltage (V)	+3.3	+3.3	+3.3
Current (mA)	40	40	40

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

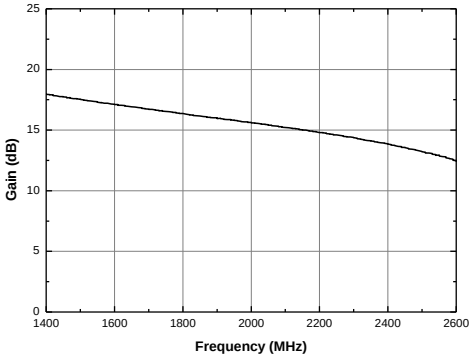
Schematic

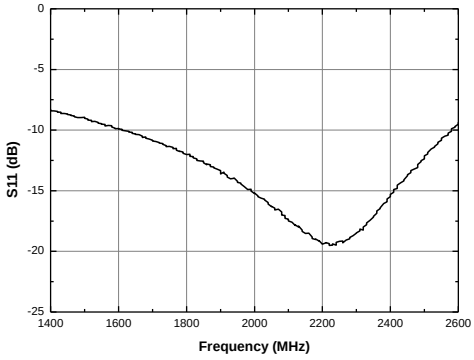


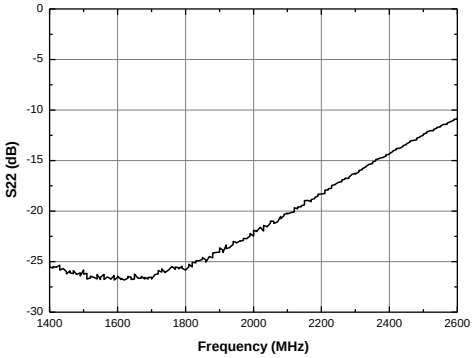
Board Layout (FR4, 40x40 mm², 0.8T)

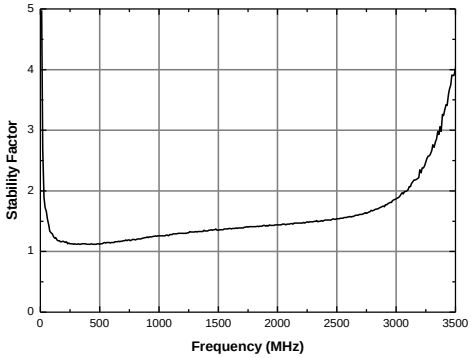


S-parameters & K-factor









Recommended Soldering Reflow Profile