ASW318

5 ~ 4000 MHz MMIC Amplifier

Features

- 16.5 dB Gain at 900 MHz
- 26 dBm P1dB at 900 MHz
- 47 dBm Output IP3 at 900 MHz
- MTTF > 100 Years
- Single Supply

Description

The ASW318, 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 = +8 V, T_A = +25 °C, Z_0 = 50 Ω)

Parameters	Units	Typical	
Frequency	MHz	900	1950
Gain	dB	16.5	15.0
S11	dB	-20	-15
S22	dB	-18	-11
Output IP3[1)]	dBm	47.0	45.5
Noise Figure	dB	2.3	3.3
Output P1dB	dBm	26	26
Current	mA	120	120
Device Voltage	V	+8	+8

1) OIP3 is measured with two tones at an output power of +11 dBm/tone separated by 1 MHz.

Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		900	
Gain	dB		16.5	
S11	dB		-20	
S22	dB		-18	
Output IP3	dBm		47	
Noise Figure	dB		2.3	
Output P1dB	dBm		26	
Current	mA		120	
Device Voltage	V		+8	

Absolute Maximum Ratings

Parameters	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-40 to +150 °C
Device Voltage	+9 V
Operating Junction Temperature	+150 °C
Input RF Power (CW, 50 Ω matched)[2), *]	+26 dBm

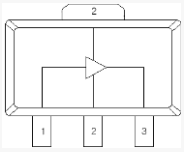
2) Range is in 22 ~ 26 dBm for 50 ~ 1950 MHz.

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

Application Circuit

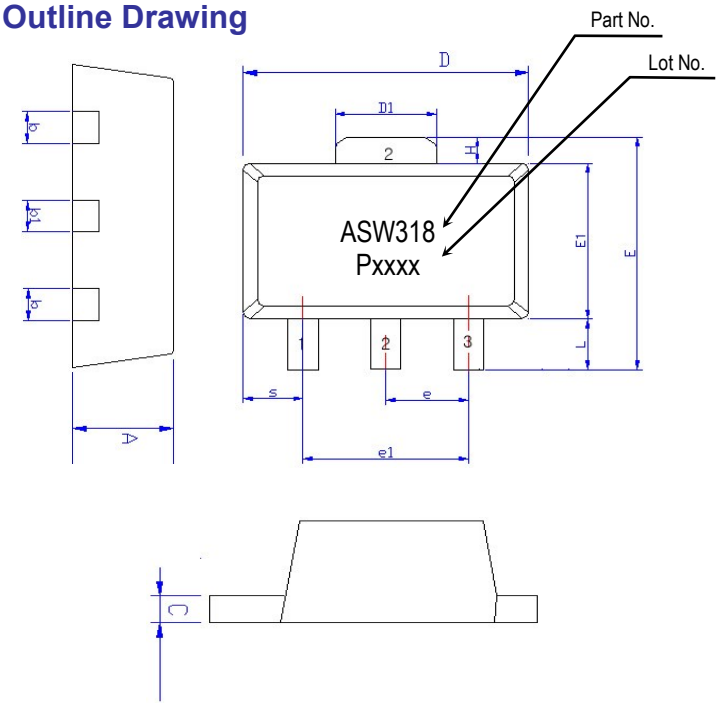
- IF (80 ~ 300 MHz)
- IF (30 ~ 512 MHz)
- LTE (698 ~ 787 MHz)
- CMMB
- 900 MHz
- LTE (1745 ~ 1860 MHz)
- WCDMA
- 50 ~ 1500 MHz
- 350 ~ 3000 MHz
- 470 ~ 2400 MHz
- 350 ~ 2500 MHz
- 70 ~ 2700 MHz
- CDMA (6 V)
- WCDMA (6 V)
- 960 ~ 1200 MHz
- 50 ~ 2700 MHz (75 Ω)

Pin Configuration



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

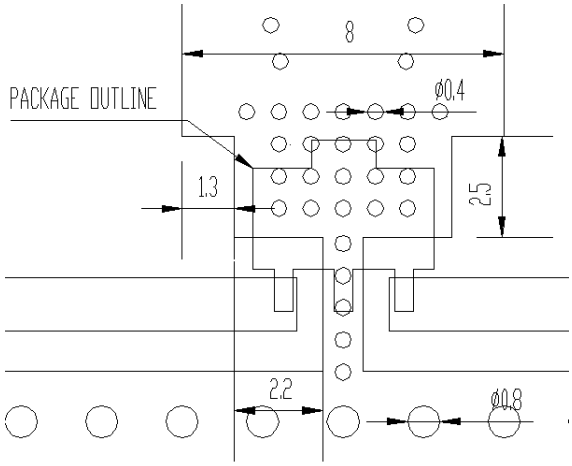
Outline Drawing



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

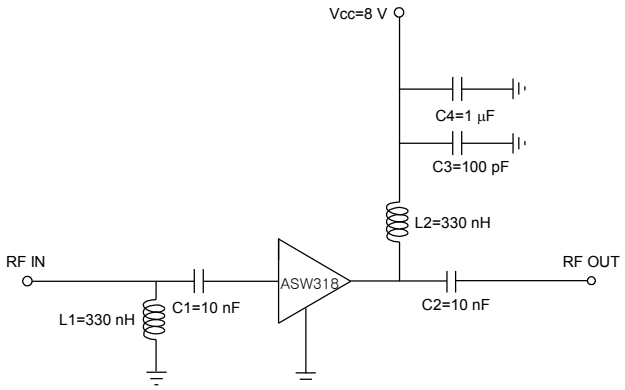
APPLICATION CIRCUIT

IF
80 ~ 300 MHz
+8 V

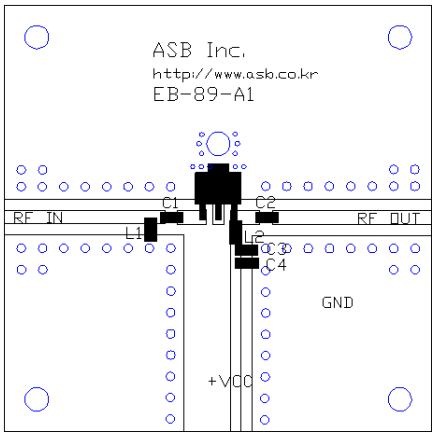
Frequency (MHz)	80 ~ 120	250
Magnitude S21 (dB)	17.5	17.0
Magnitude S11 (dB)	-9	-10
Magnitude S22 (dB)	-11	-12
Output P1dB (dBm)	25.5	25.5
Output IP3[1] (dBm)	44	41
Noise Figure (dB)	1.8	2.0
Device Voltage (V)	+8	
Current (mA)	120	

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

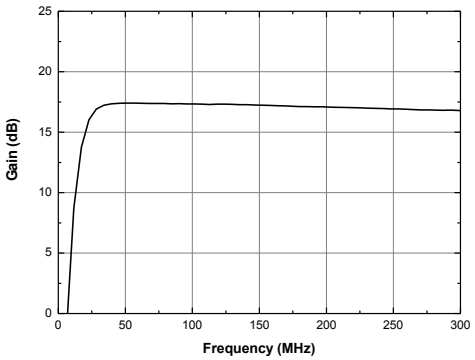
Schematic

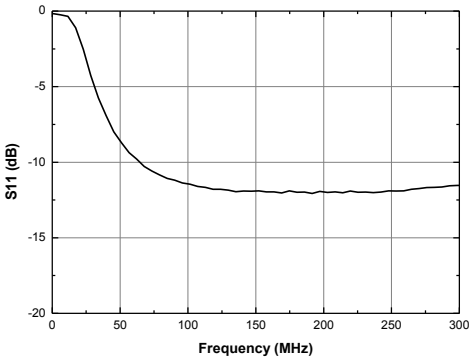


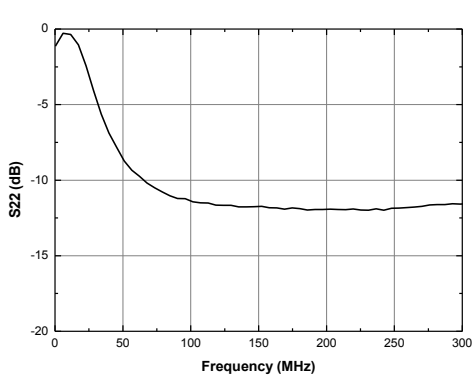
Board Layout (FR4, 40x40 mm², 0.8T)

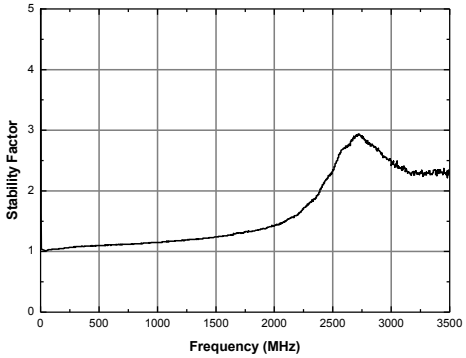


S-parameters & K-factor



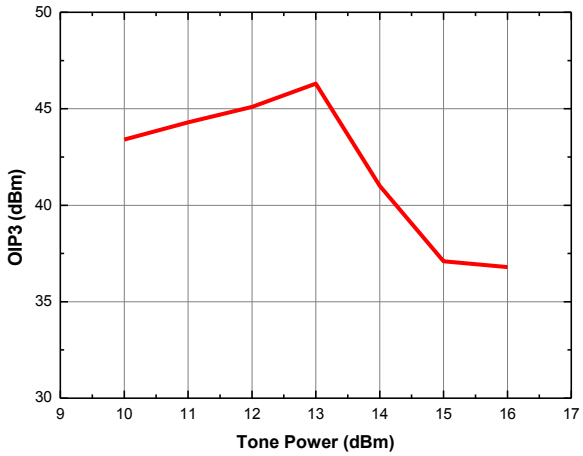






Output IP3 vs. Tone Power (Frequency = 300 MHz)

Tone power(dBm)	OIP3(dBm)
10	43.4
11	44.3
12	45.1
13	46.3
14	41
15	37.1
16	36.8



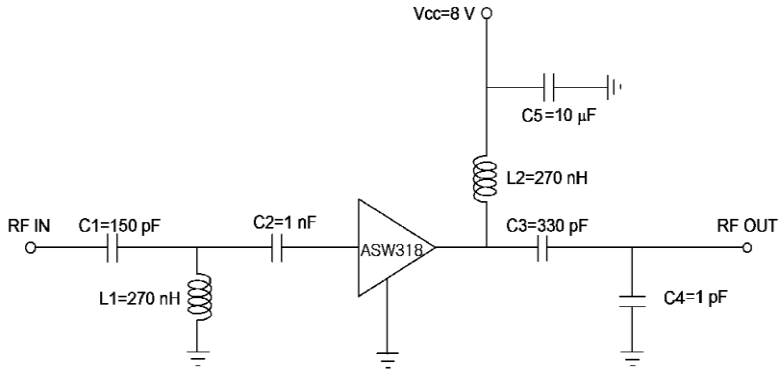
APPLICATION CIRCUIT

IF
30 ~ 512 MHz
+8 V

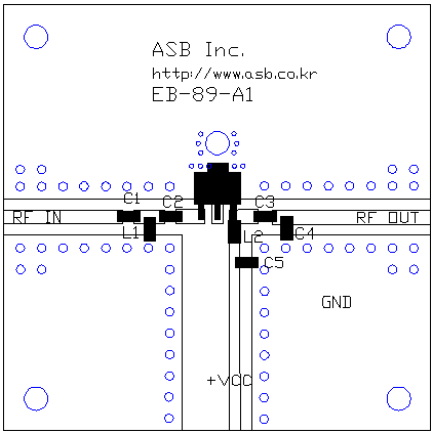
Frequency (MHz)	30	270	512
Magnitude S21 (dB)	16.8	16.5	16.2
Magnitude S11 (dB)	-13	-12	-10
Magnitude S22 (dB)	-11	-12	-10
Output P1dB (dBm)	24.0	25.5	25.5
Output IP3[1)] (dBm)	39.0	46.0	42.0
Noise Figure (dB)	2.0	1.9	2.2
Device Voltage (V)	+8		
Current (mA)	120		

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

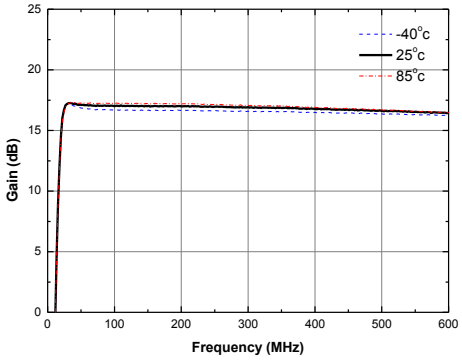
Schematic

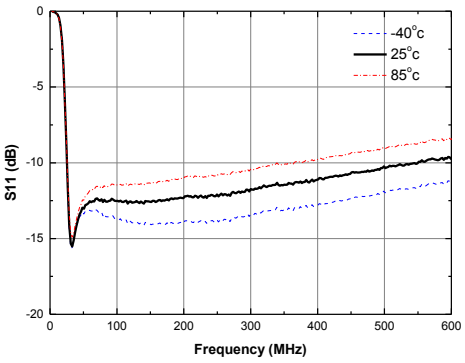


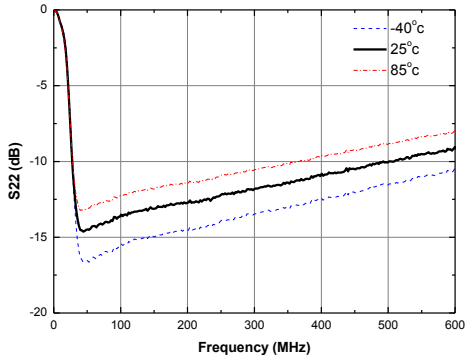
Board Layout (FR4, 40x40 mm², 0.8T)

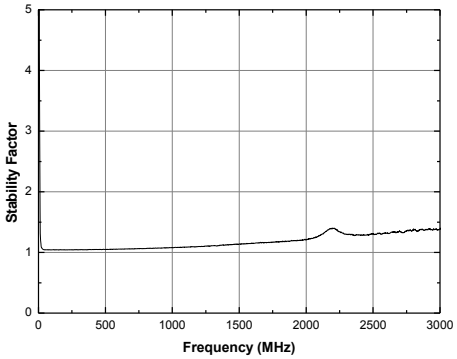


S-parameters & K-factor

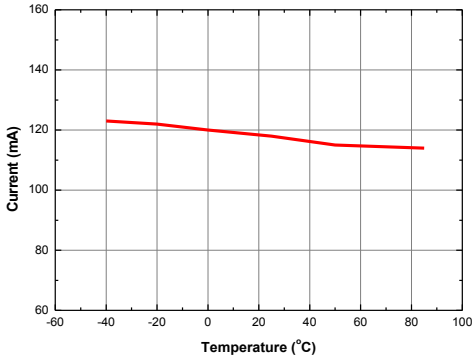




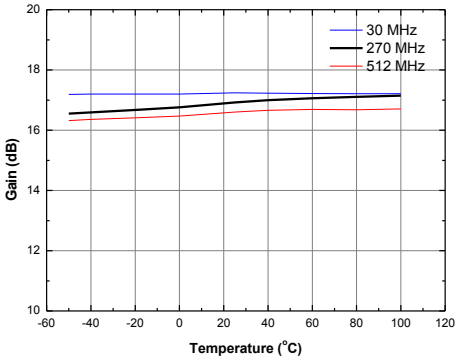




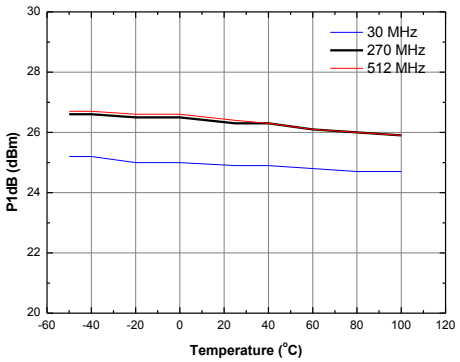
Current vs. Temperature



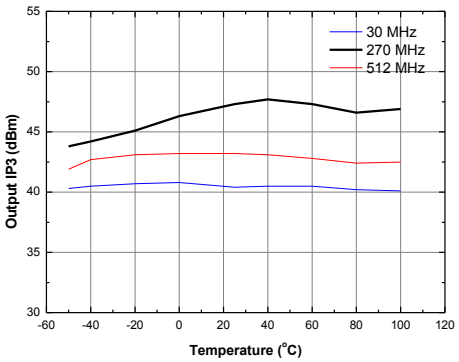
Gain vs. Temperature



P1dB vs. Temperature



Output IP3 vs. Temperature



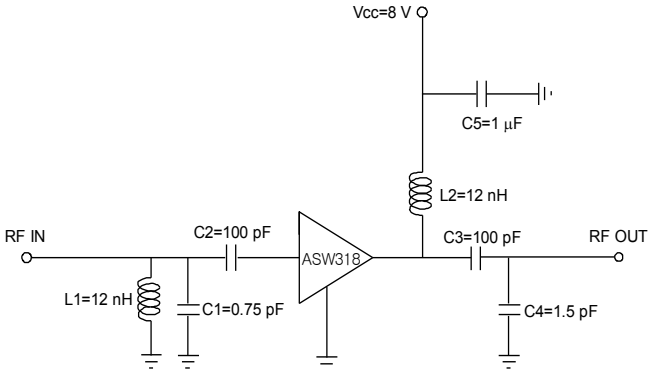
APPLICATION CIRCUIT

LTE
698 ~ 787 MHz
+8 V

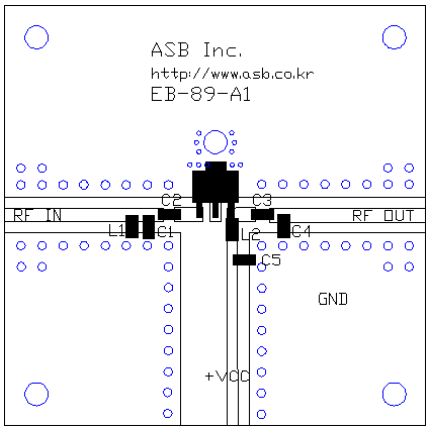
Frequency (MHz)	698 ~ 787
Magnitude S21 (dB)	16.5
Magnitude S11 (dB)	-18
Magnitude S22 (dB)	-15
Output P1dB (dBm)	25.5
Output IP3[1)] (dBm)	46.5
Noise Figure (dB)	1.8
Device Voltage (V)	+8
Current (mA)	120

1) OIP3 is measured with two tones at an output power of +11 dBm/tone separated by 1 MHz.

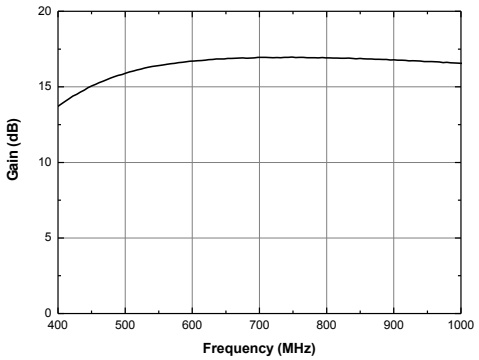
Schematic

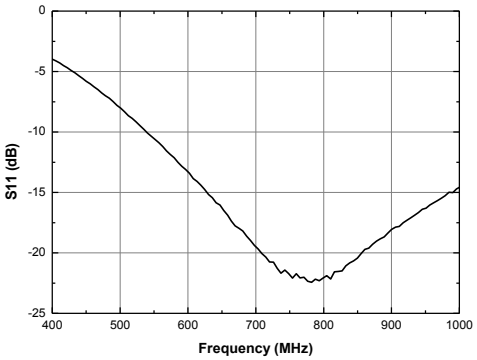


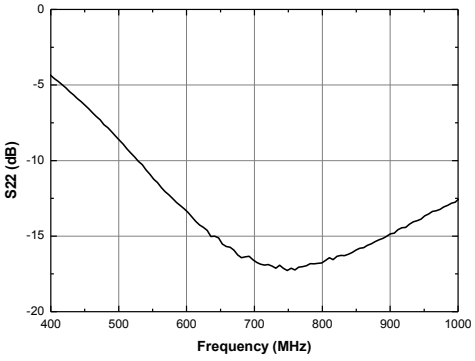
Board Layout (FR4, 40x40 mm², 0.8T)

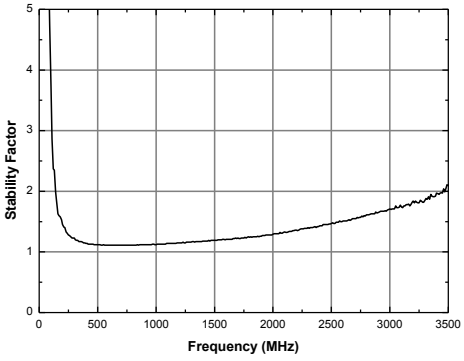


S-parameters & K-factor









APPLICATION CIRCUIT

CMMB

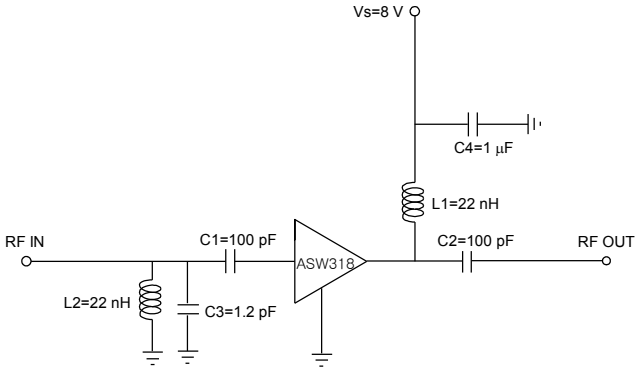
470 ~ 860 MHz

+8 V

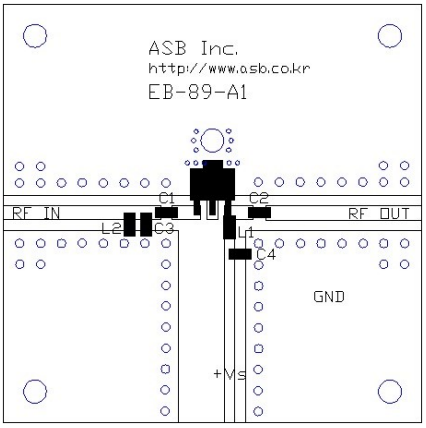
Frequency (MHz)	470	860
Magnitude S21 (dB)	16.0	16.0
Magnitude S11 (dB)	-11	-9
Magnitude S22 (dB)	-9	-11
Output P1dB (dBm)	24.5	25.0
Output IP3[1] (dBm)	45.5	42.0
Noise Figure (dB)	2.0	1.9
Device Voltage (V)	+8	+8
Current (mA)	120	120

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

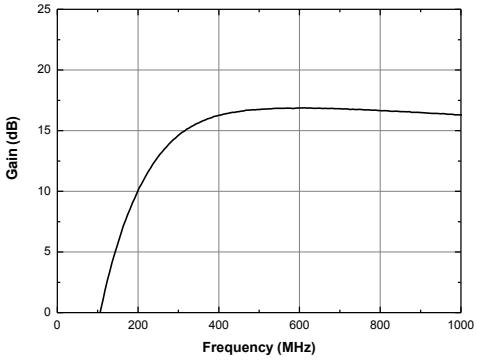
Schematic

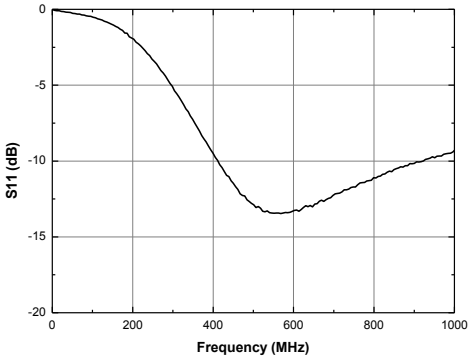


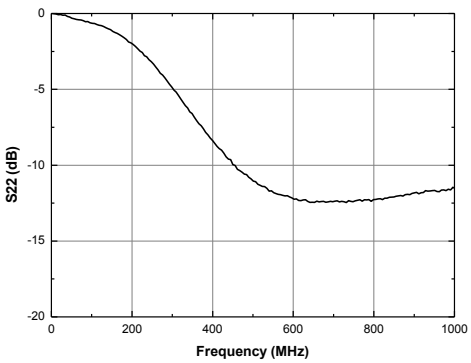
Board Layout (FR4, 40x40 mm², 0.8T)

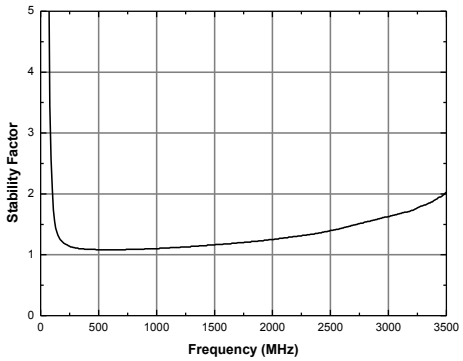


S-parameters & K-factor









APPLICATION CIRCUIT

GSM / CDMA

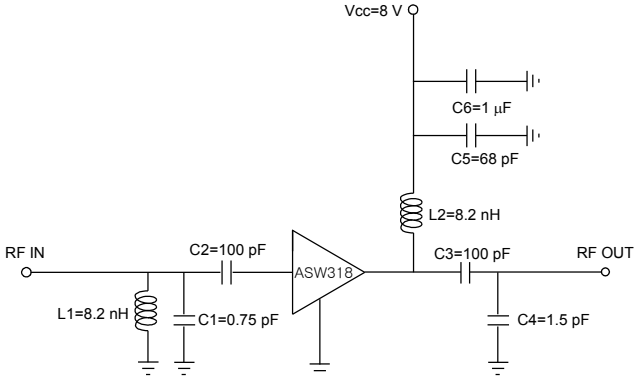
900 MHz

+8 V

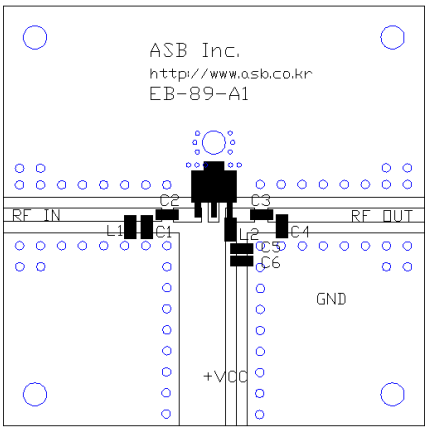
Frequency (MHz)	900
Magnitude S21 (dB)	16.5
Magnitude S11 (dB)	-20
Magnitude S22 (dB)	-18
Output P1dB (dBm)	26
Output IP3[1] (dBm)	47
Noise Figure (dB)	2.3
Device Voltage (V)	+8
Current (mA)	120

1) OIP3 is measured with two tones at an output power of +11 dBm/tone separated by 1 MHz.

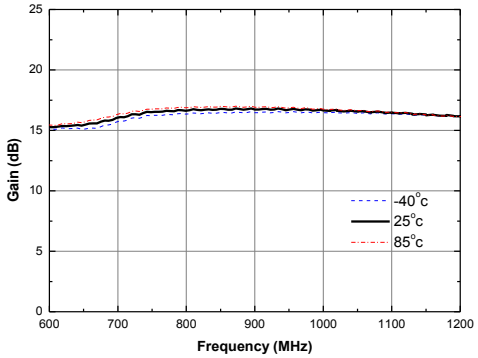
Schematic

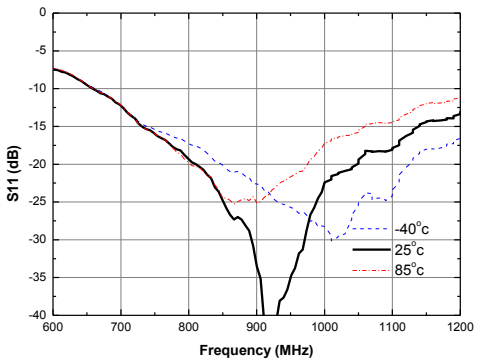


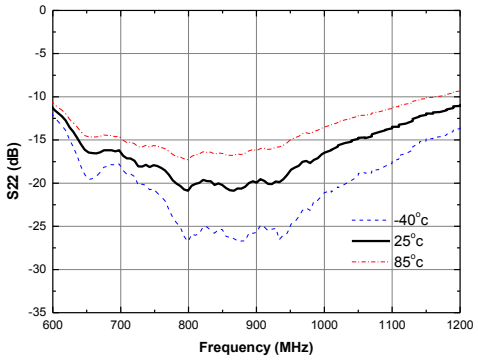
Board Layout (FR4, 40x40 mm², 0.8T)

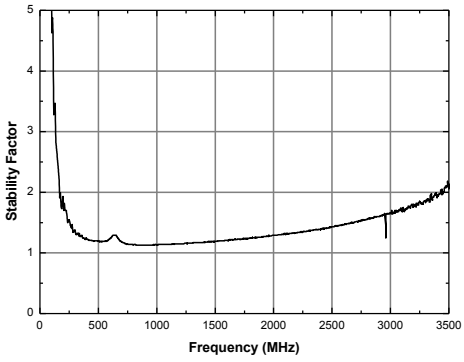


S-parameters & K-factor

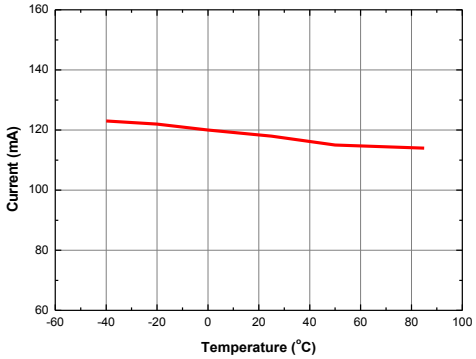




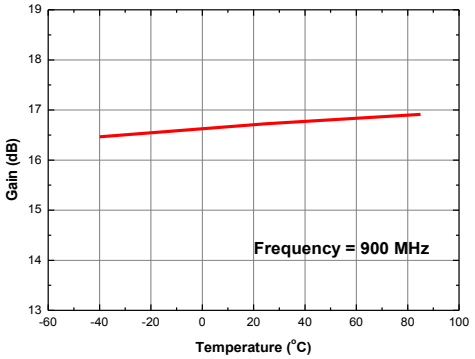




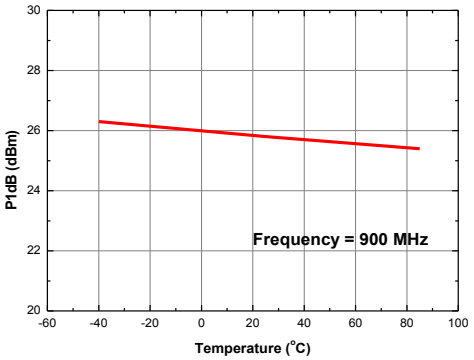
Current vs. Temperature



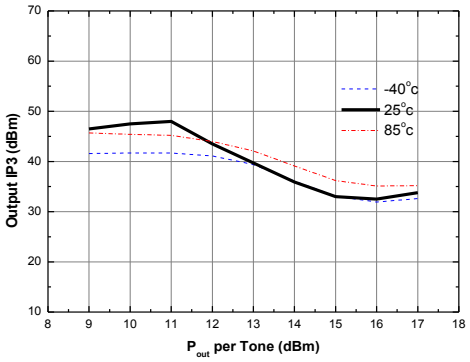
Gain vs. Temperature



P1dB vs. Temperature



Output IP3 vs. Tone Power (Frequency = 900 MHz)



APPLICATION CIRCUIT

LTE

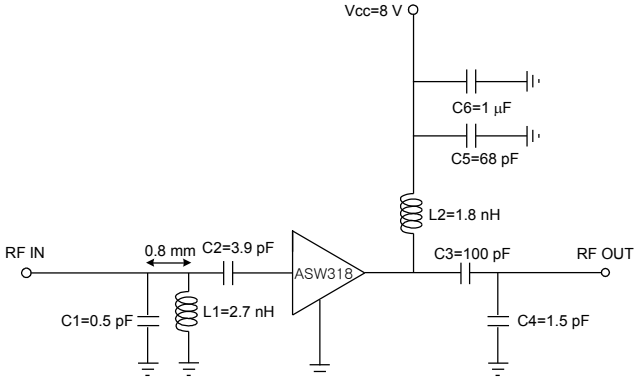
1745 ~ 1860 MHz

+8 V

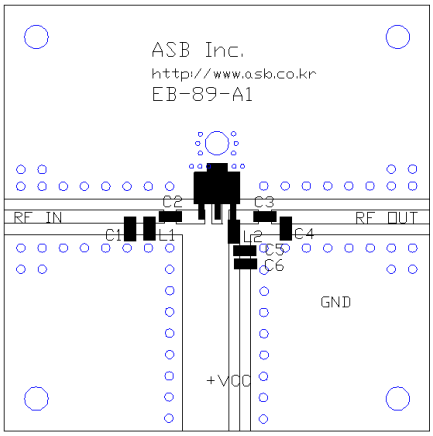
Frequency (MHz)	1745	1860
Magnitude S21 (dB)	14.5	14.5
Magnitude S11 (dB)	-18	-18
Magnitude S22 (dB)	-10	-10
Output P1dB (dBm)	25	25
Output IP3[1] (dBm)	45	45
Noise Figure (dB)	2.9	2.9
Device Voltage (V)	+8	+8
Current (mA)	120	120

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

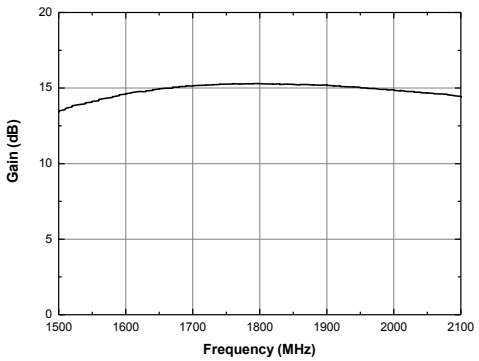
Schematic

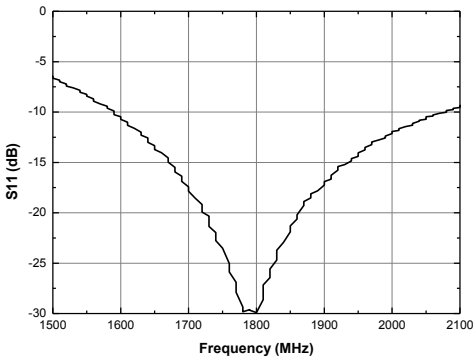


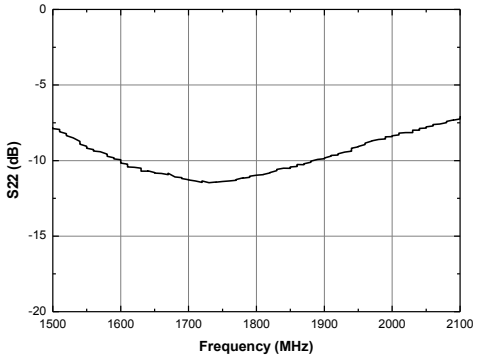
Board Layout (FR4, 40x40 mm², 0.8T)



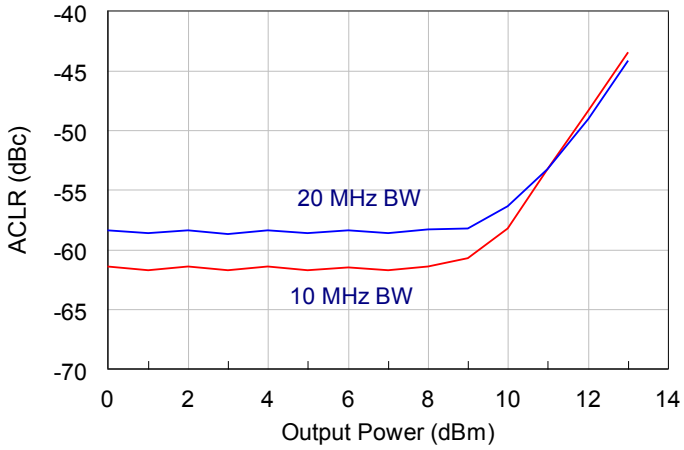
S-parameters & K-factor





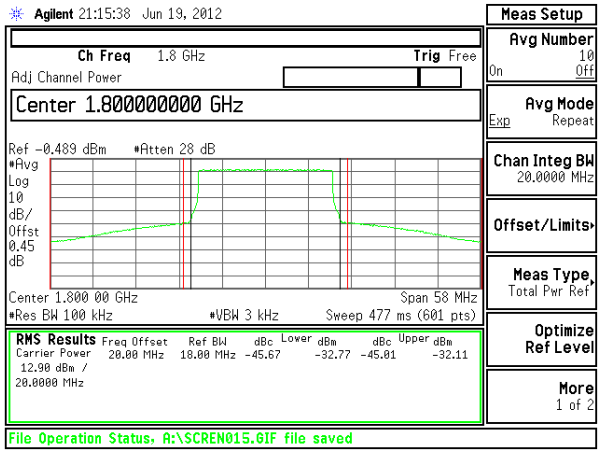


LTE ACLR – 10 MHz & 20 MHz



1) Test Source : LTE_FDD_test model 3.1, BW: 10 MHz & 20 MHz, Test Frequency: 1.8 GHz

LTE ACLR – 20 MHz



2) Test Source : LTE_FDD_test model 3.1, BW: 20 MHz, Test Frequency: 1.8 GHz

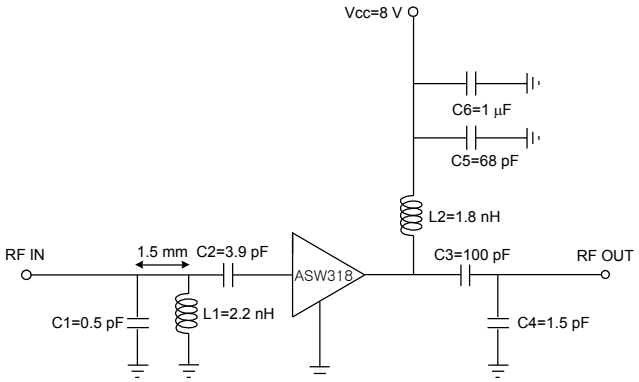
APPLICATION CIRCUIT

WCDMA
1920 ~ 1980 MHz
+8 V

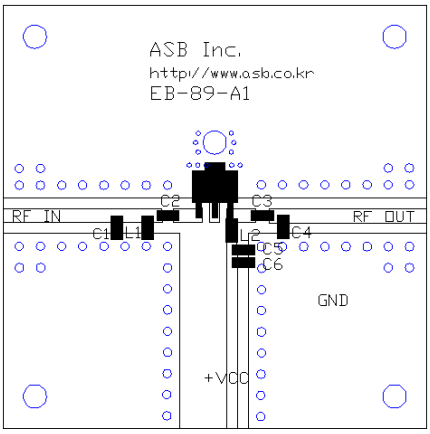
Frequency (MHz)	1920 ~ 1980
Magnitude S21 (dB)	15.0
Magnitude S11 (dB)	-15
Magnitude S22 (dB)	-11
Output P1dB (dBm)	26
Output IP3[1] (dBm)	45.5
Noise Figure (dB)	3.3
Device Voltage (V)	+8
Current (mA)	120

1) OIP3 is measured with two tones at an output power of +11 dBm/tone separated by 1 MHz.

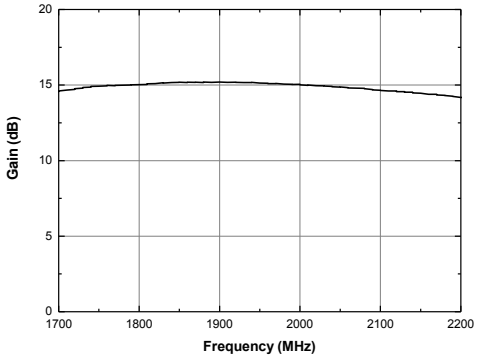
Schematic

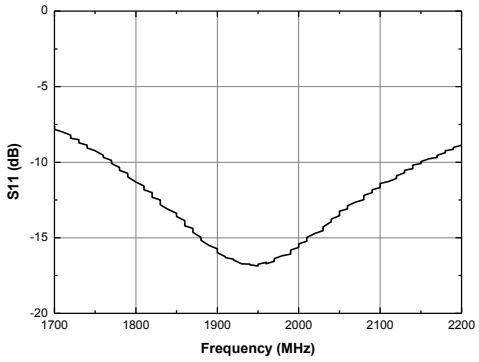


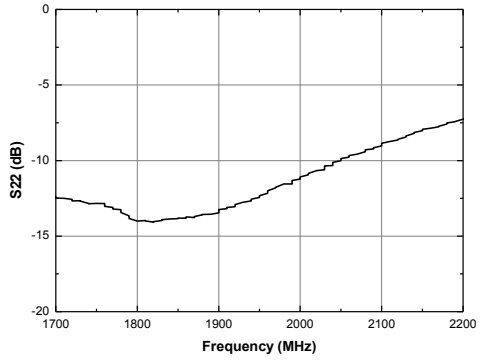
Board Layout (FR4, 40x40 mm², 0.8T)

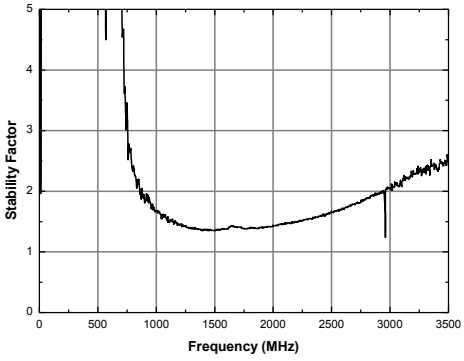


S-parameters & K-factor









APPLICATION CIRCUIT

Wide Band

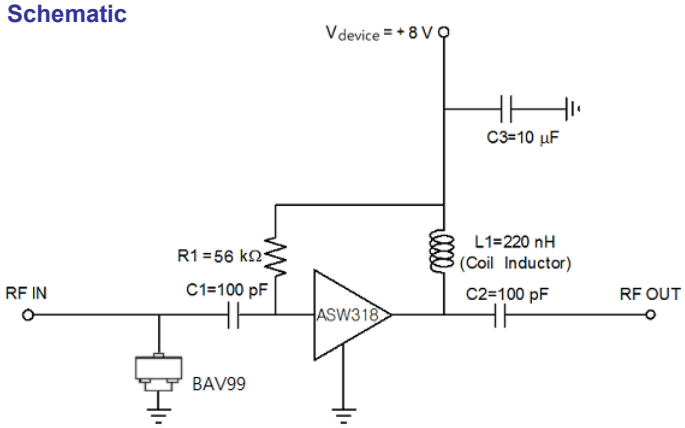
50 ~ 1500 MHz

+8 V

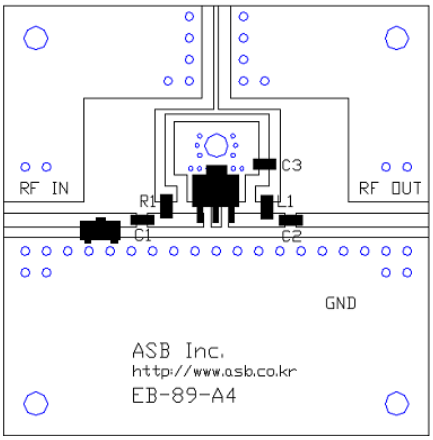
Frequency (MHz)	50	1000	1500
Magnitude S21 (dB)	16.2	16.0	15.2
Magnitude S11 (dB)	-5	-11	-10
Magnitude S22 (dB)	-11	-12	-10
Output P1dB (dBm)	24.5	25.5	25.5
Output IP3[1)] (dBm)	45	45	45
Noise Figure (dB)	2.0	2.1	2.2
Device Voltage (V)	+8		
Current (mA)	150		

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

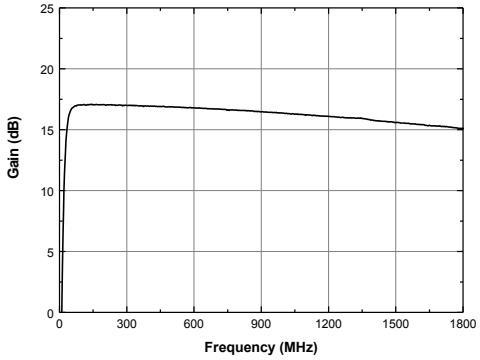
Schematic

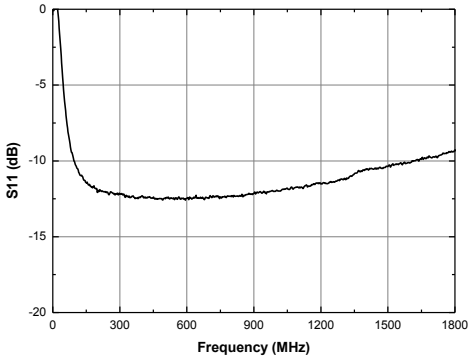


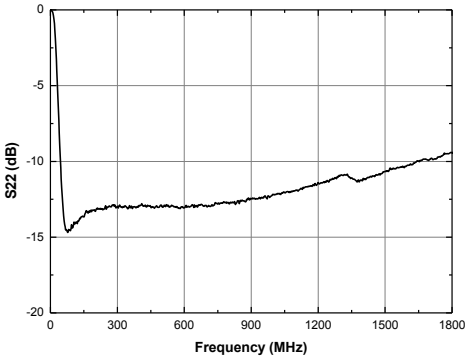
Board Layout (FR4, 40x40 mm², 0.8T)

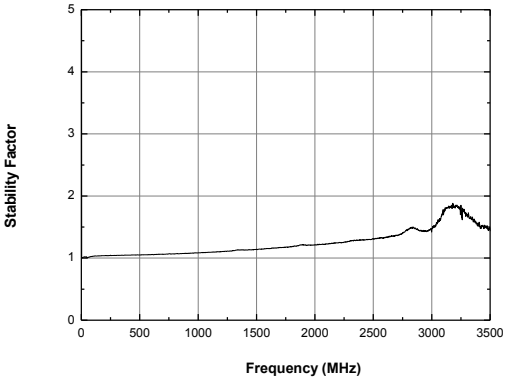


S-parameters & K-factor









APPLICATION CIRCUIT

Wide Band

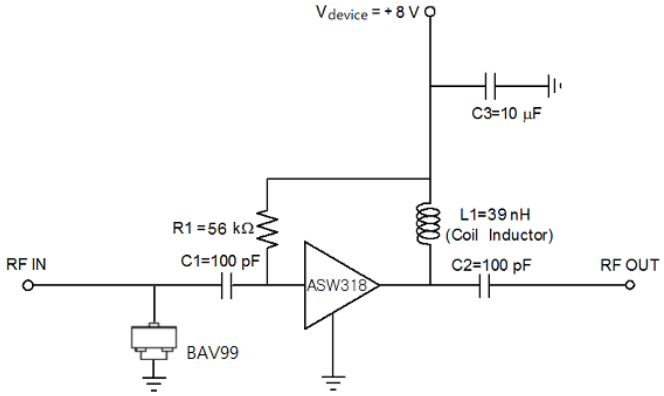
350 ~ 3000 MHz

+8 V

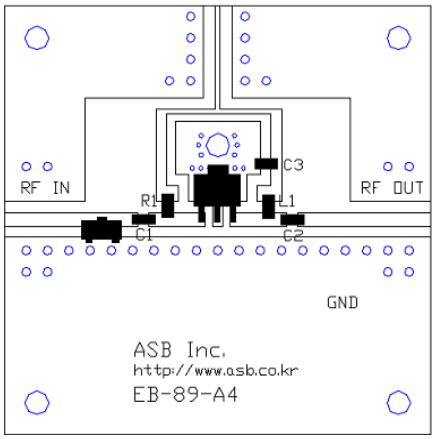
Frequency (MHz)	350	1500	2000	2400	3000
Magnitude S21 (dB)	16.5	15.4	14.5	13.9	13.0
Magnitude S11 (dB)	-9	-10	-9	-7	-5
Magnitude S22 (dB)	-9	-10	-8	-7	-5
Output P1dB (dBm)	25	25	25	24	21
Output IP3[1)] (dBm)	42.5	45.5	45.5	44.0	40.0
Noise Figure (dB)	2.0	2.2	2.5	2.8	-
Device Voltage (V)	+8				
Current (mA)	150				

1) OIP3 is measured with two tones at an output power of +9 dBm/tone separated by 1 MHz.

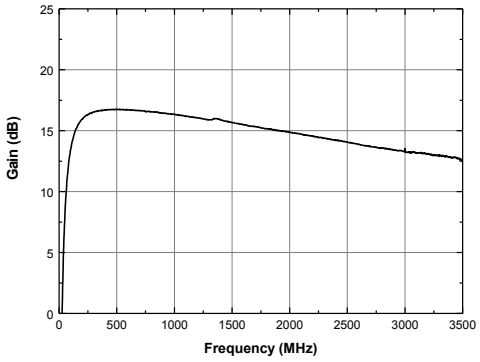
Schematic

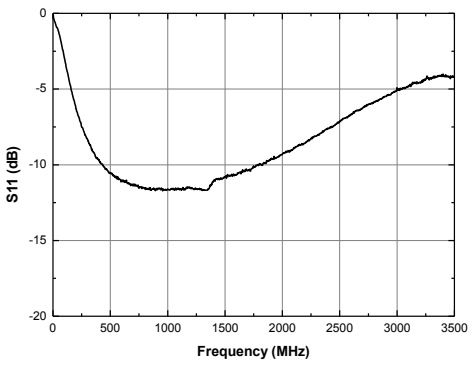


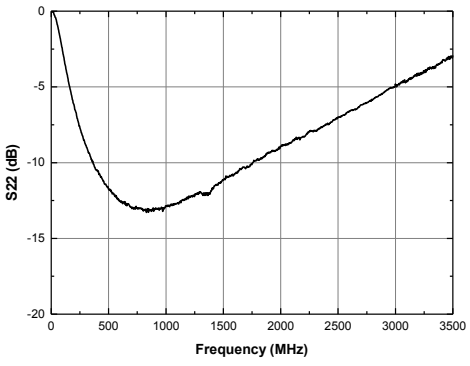
Board Layout (FR4, 40x40 mm², 0.8T)

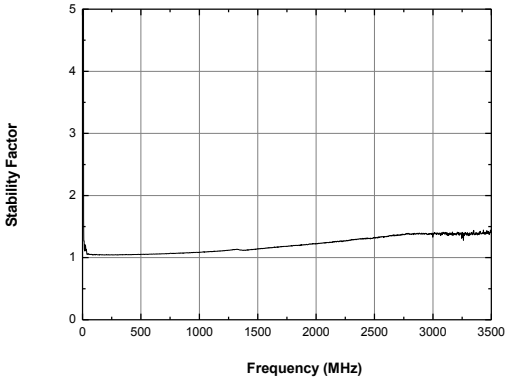


S-parameters & K-factor









APPLICATION CIRCUIT

Wide Band

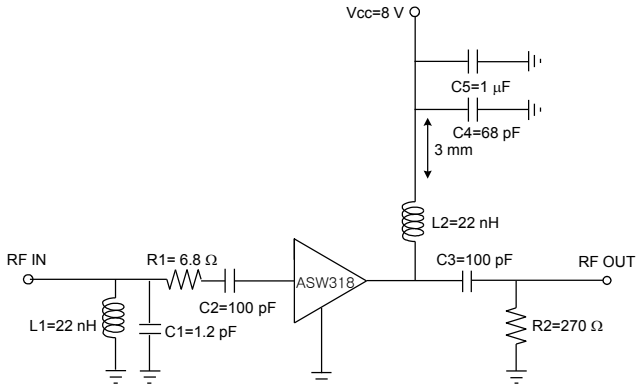
470 ~ 2400 MHz

+8 V

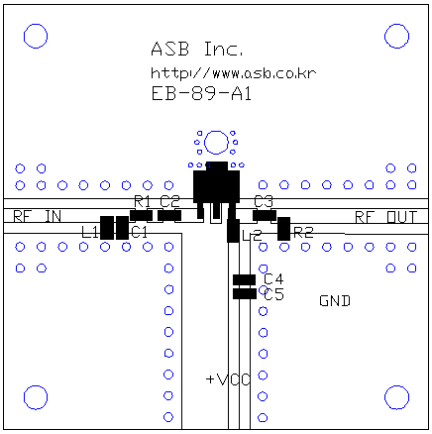
Frequency (MHz)	470	800	1600	2400
Magnitude S21 (dB)	15.4	15.0	13.5	13.0
Magnitude S11 (dB)	-11.5	-11.5	-11	-11
Magnitude S22 (dB)	-15	-15	-10	-10
Output P1dB (dBm)	25.0	25.0	25.0	21.5
Output IP3[1)] (dBm)	46	46	44	39
Noise Figure (dB)	2.9	2.5	3.2	4.2
Device Voltage (V)	+8			
Current (mA)	120			

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

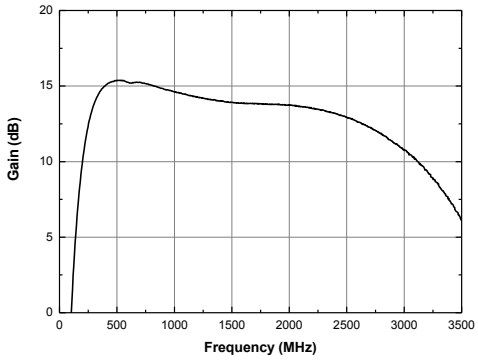
Schematic

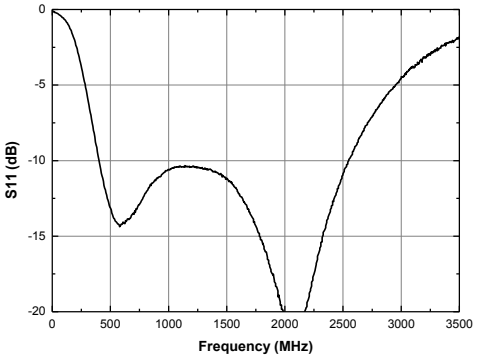


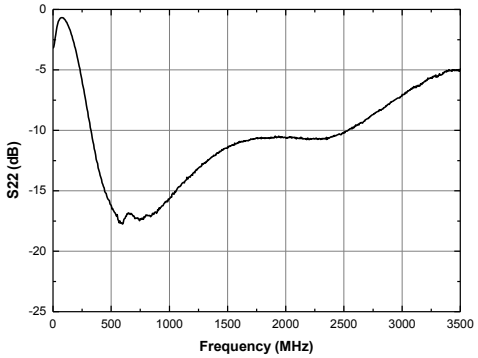
Board Layout (FR4, 40x40 mm², 0.8T)

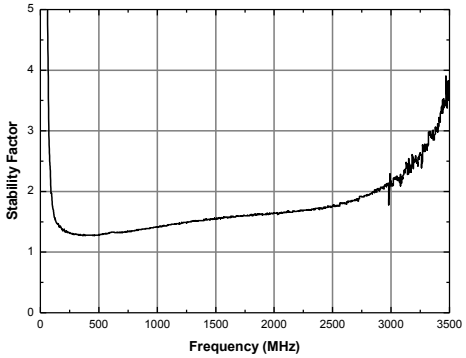


S-parameters & K-factor









APPLICATION CIRCUIT

Wide Band

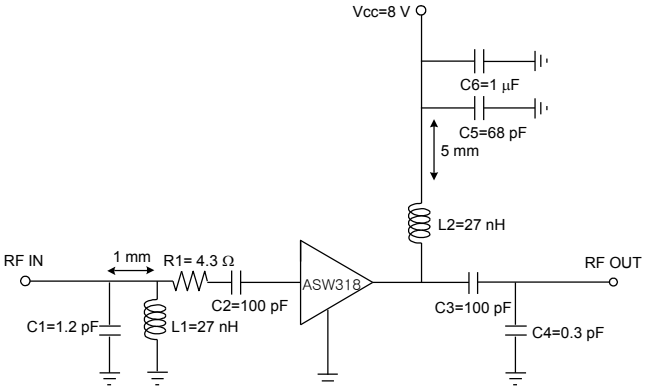
350 ~ 2500 MHz

+8 V

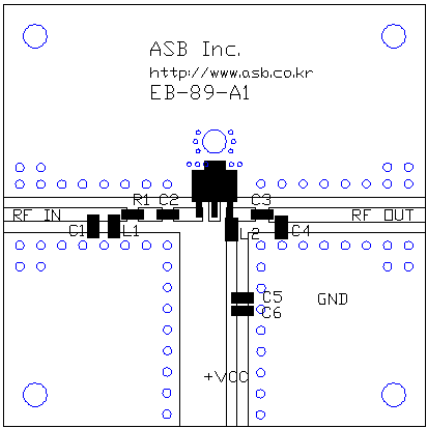
Frequency (MHz)	350	800	1950	2500
Magnitude S21 (dB)	16.0	16.0	14.5	12.5
Magnitude S11 (dB)	-10	-10	-18	-6.5
Magnitude S22 (dB)	-11	-10	-10	-7.5
Output P1dB (dBm)	25	26	26	24
Output IP3[1)] (dBm)	42.0	43.5	44.0	39.0
Noise Figure (dB)	2.7	2.3	3.3	4.6
Device Voltage (V)	+8			
Current (mA)	120			

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

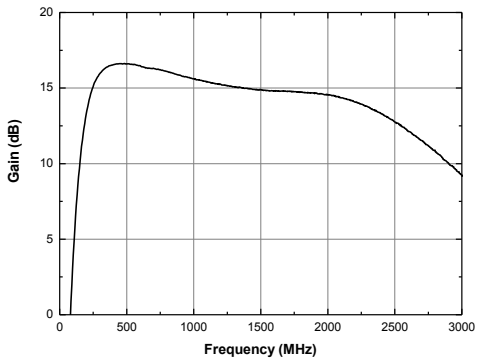
Schematic

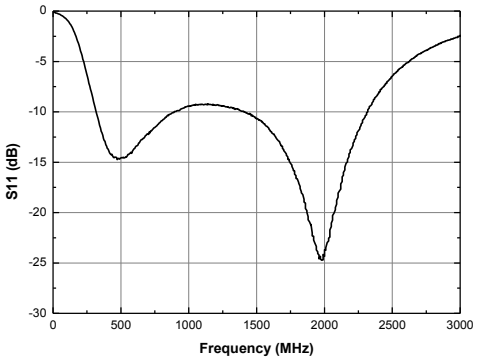


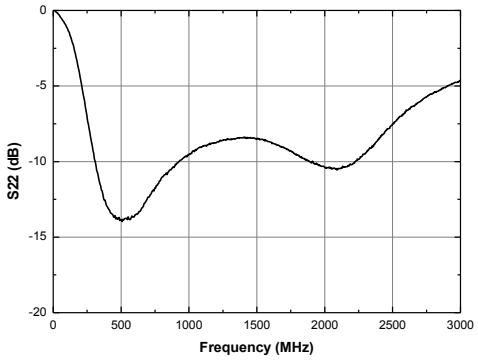
Board Layout (FR4, 40x40 mm², 0.8T)

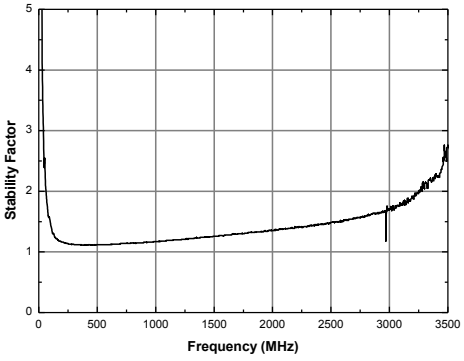


S-parameters & K-factor









APPLICATION CIRCUIT

ONU

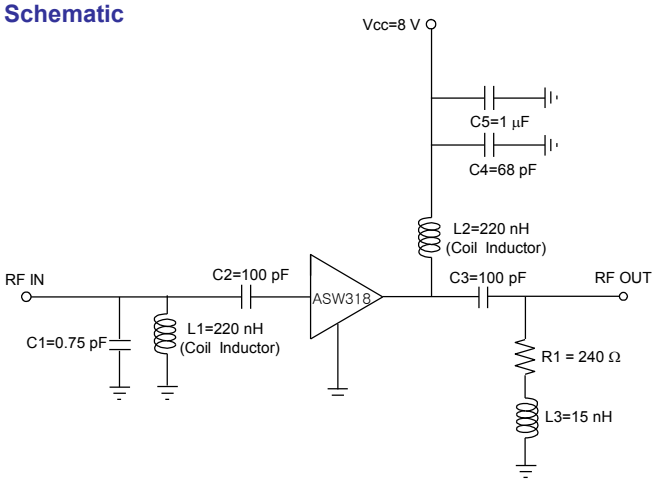
70 ~ 2700 MHz

+8 V

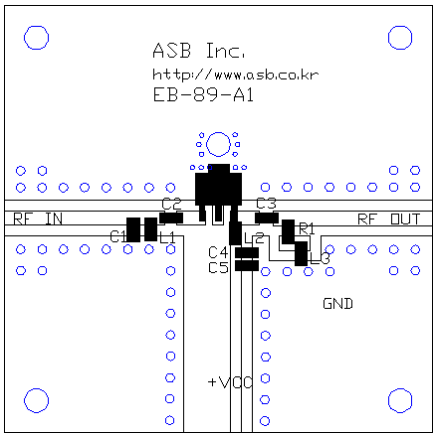
Frequency (MHz)	70	900	1800	2700
Magnitude S21 (dB)	16.0	15.0	14.5	14.0
Magnitude S11 (dB)	-8	-7	-8	-15
Magnitude S22 (dB)	-14	-11	-7	-7
Output P1dB (dBm)	24	24	24	21
Output IP3[1)] (dBm)	44.0	41.5	43.5	39.0
Noise Figure (dB)	2.0	2.1	2.4	3.1
Device Voltage (V)	+8			
Current (mA)	120			

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

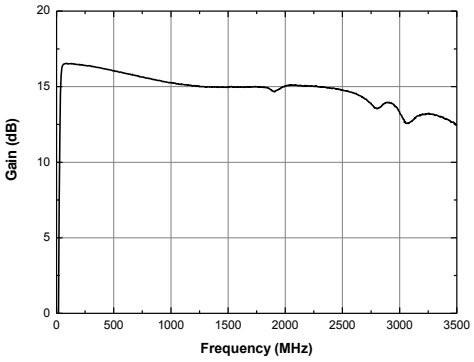
Schematic

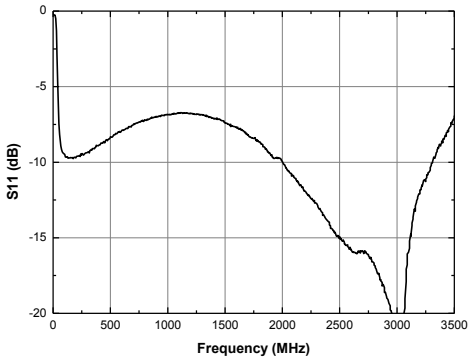


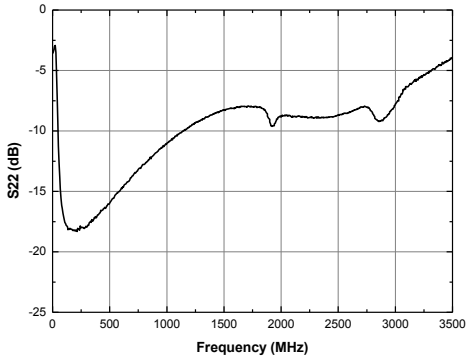
Board Layout (FR4, 40x40 mm², 0.8T)

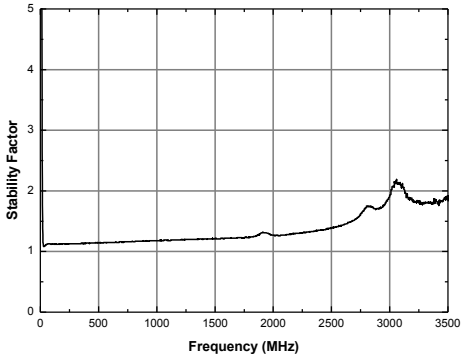


S-parameters & K-factor









APPLICATION CIRCUIT

CDMA Rx

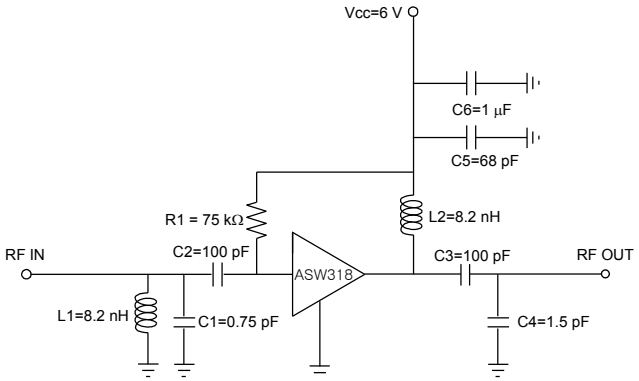
824 ~ 849 MHz

+6 V

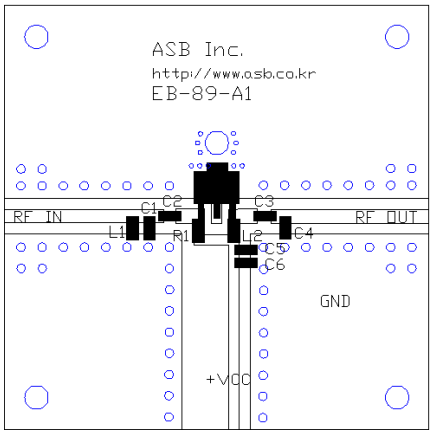
Frequency (MHz)	824 ~ 849
Magnitude S21 (dB)	16.0
Magnitude S11 (dB)	-20
Magnitude S22 (dB)	-18
Output P1dB (dBm)	23
Output IP3[1)] (dBm)	43.5
Noise Figure (dB)	2.3
Device Voltage (V)	+6
Current (mA)	100

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

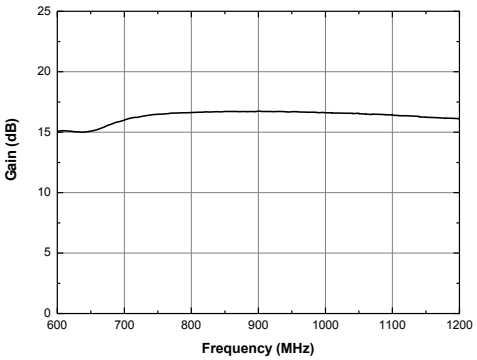
Schematic

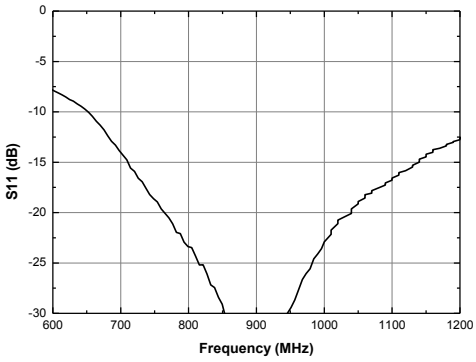


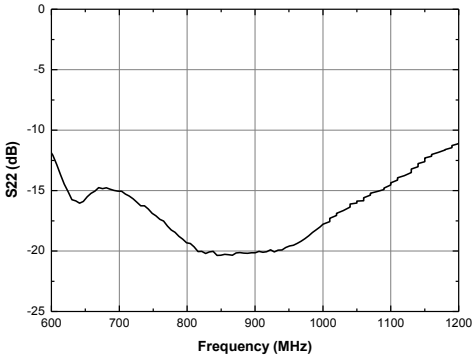
Board Layout (FR4, 40x40 mm², 0.8T)

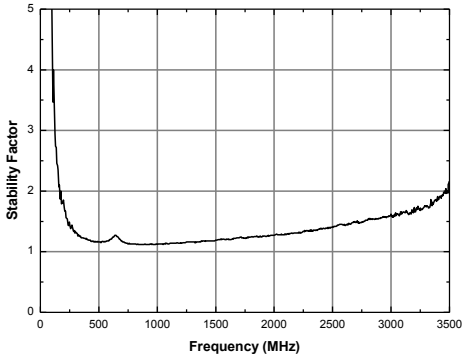


S-parameters & K-factor









APPLICATION CIRCUIT

WCDMA Rx

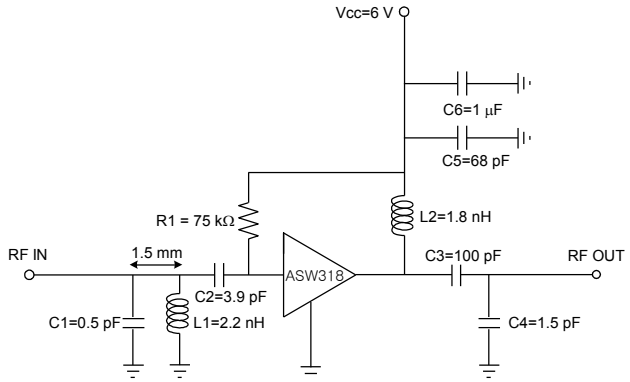
1920 ~ 1980 MHz

+6 V

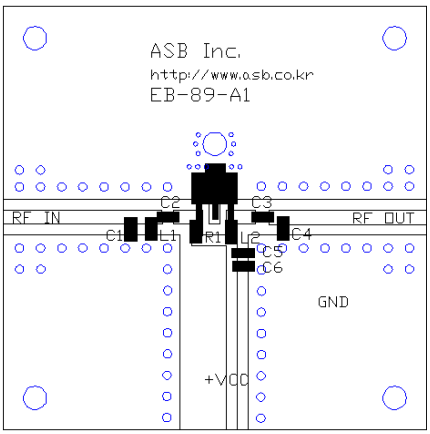
Frequency (MHz)	1920 ~ 1980
Magnitude S21 (dB)	15.0
Magnitude S11 (dB)	-14
Magnitude S22 (dB)	-11
Output P1dB (dBm)	23
Output IP3[1] (dBm)	43
Noise Figure (dB)	3.3
Device Voltage (V)	+6
Current (mA)	100

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

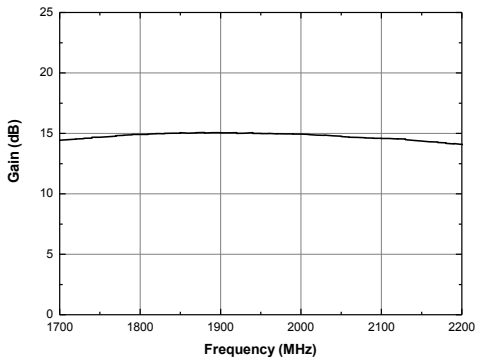
Schematic

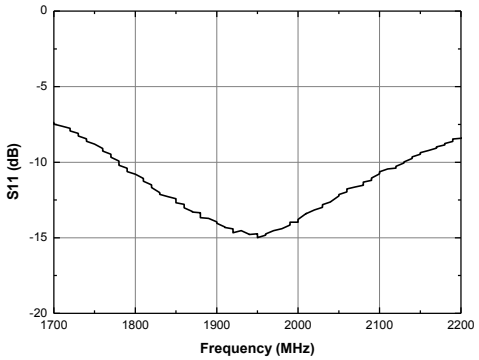


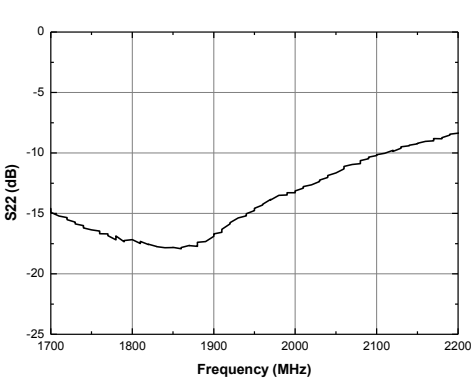
Board Layout (FR4, 40x40 mm², 0.8T)

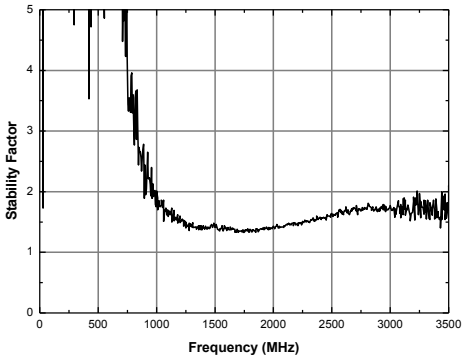


S-parameters & K-factor









APPLICATION CIRCUIT

WCDMA Tx

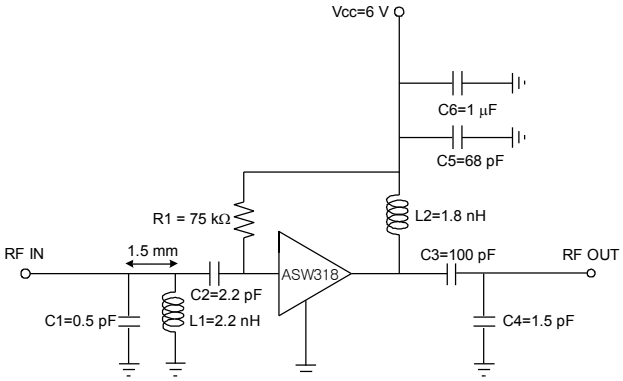
2110 ~ 2170 MHz

+6 V

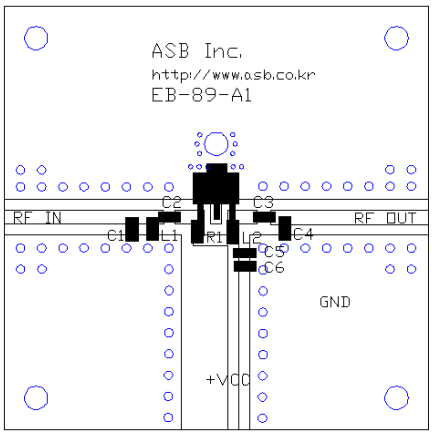
Frequency (MHz)	2110 ~ 2170
Magnitude S21 (dB)	14.3
Magnitude S11 (dB)	-18
Magnitude S22 (dB)	-10
Output P1dB (dBm)	22
Output IP3[1] (dBm)	40.5
Noise Figure (dB)	3.2
Device Voltage (V)	+6
Current (mA)	100

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

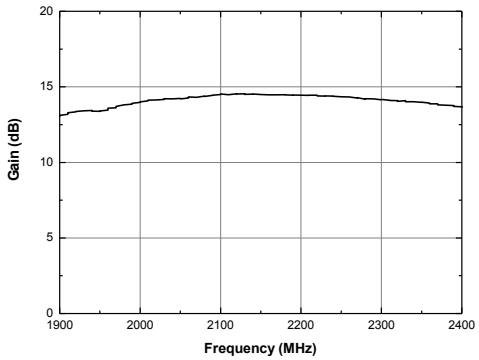
Schematic

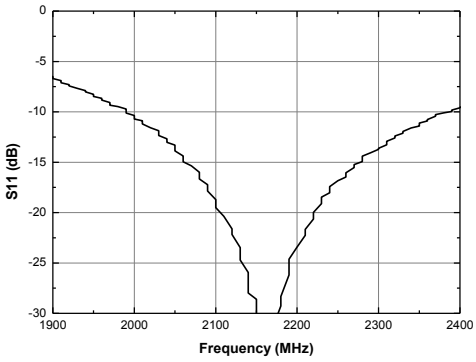


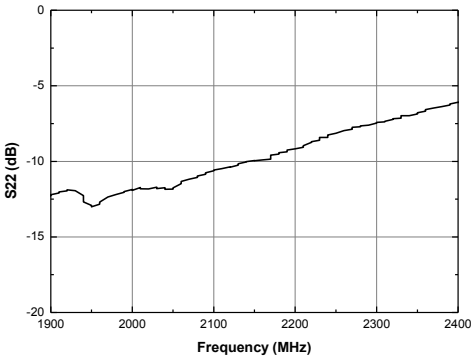
Board Layout (FR4, 40x40 mm², 0.8T)

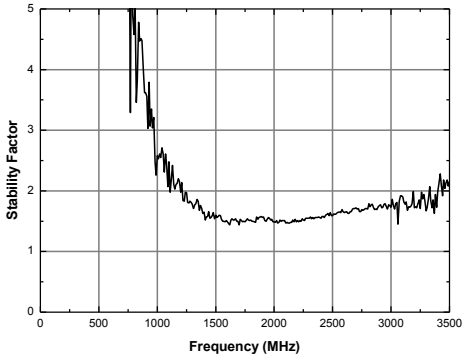


S-parameters & K-factor









APPLICATION CIRCUIT

SMATV

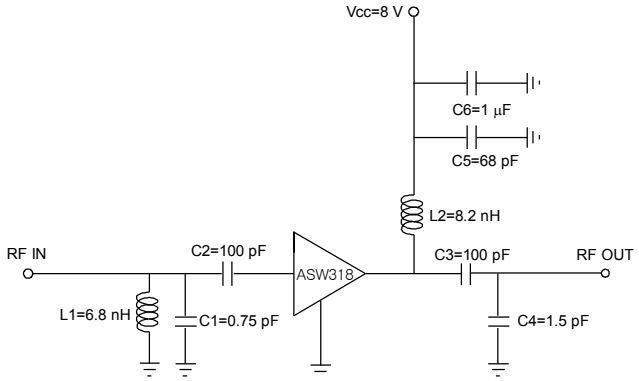
960 ~ 1200 MHz

+8 V

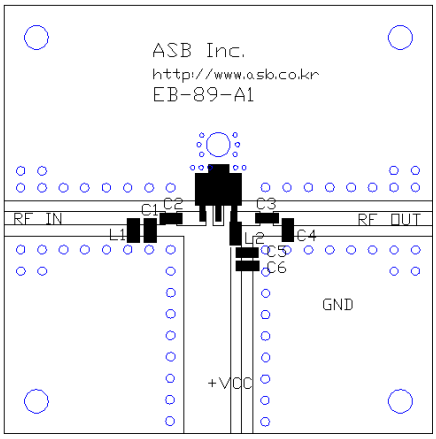
Frequency (MHz)	960	1200
Magnitude S21 (dB)	16.5	16.0
Magnitude S11 (dB)	-15	-15
Magnitude S22 (dB)	-20	-15
Output P1dB (dBm)	26	26
Output IP3[1] (dBm)	45	47
Noise Figure (dB)	2.5	2.4
Device Voltage (V)	+8	+8
Current (mA)	120	120

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

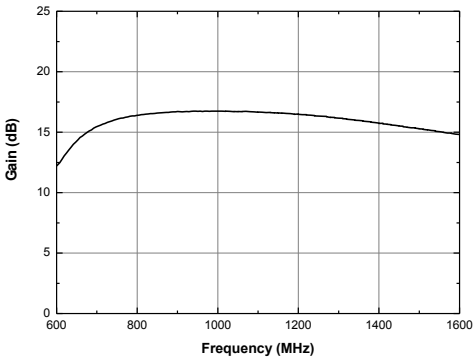
Schematic

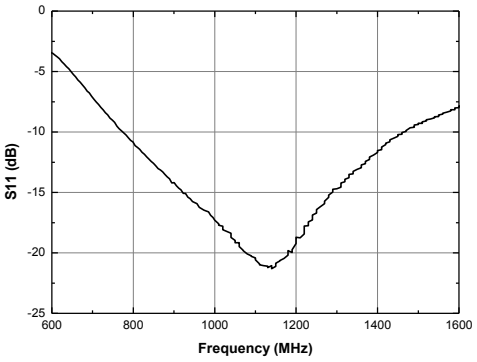


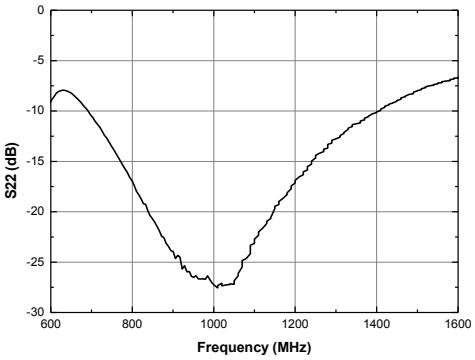
Board Layout (FR4, 40x40 mm², 0.8T)

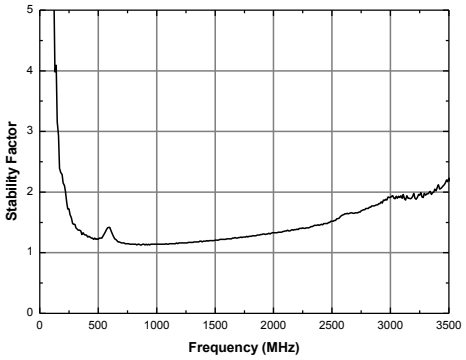


S-parameters & K-factor









APPLICATION CIRCUIT

ONU

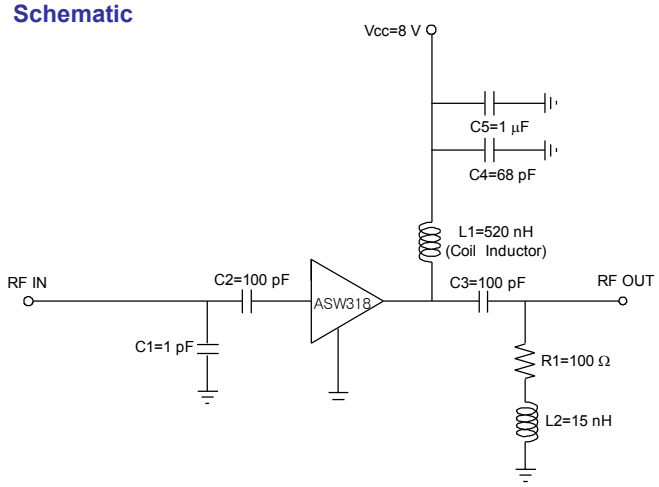
50 ~ 2700 MHz

+8 V, 75 Ω

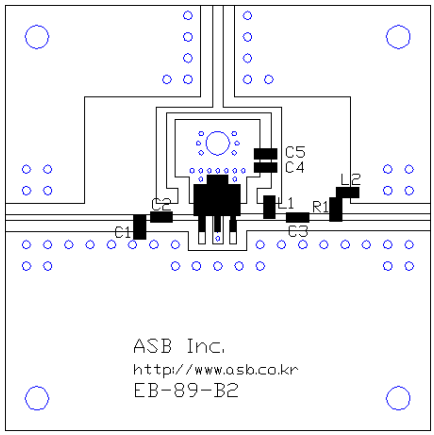
Frequency (MHz)	50	900	1800	2700
Magnitude S21 (dB)	15.0	14.5	13.0	14.0
Magnitude S11 (dB)	-10	-7	-4	-18
Magnitude S22 (dB)	-15	-13	-4	-13
Output P1dB (dBm)	23	24	20	19
Output IP3[1)] (dBm)	44.0	41.5	41.5	37.0
Noise Figure (dB)	2.0	2.2	3.2	3.3
Device Voltage (V)	+8			
Current (mA)	120			

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

Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor

