

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.



Package Style: SOT89

Typical Performance

(Supply Voltage = +8 V, $T_A = +25\text{ }^\circ\text{C}$, $Z_0 = 50\ \Omega$)

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	100	120	142
Device Voltage	V		+8	

Absolute Maximum Ratings, $T_A = +25\text{ }^\circ\text{C}$

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 as in 2000 MHz application circuit)*	+26 dBm
Thermal Resistance	43 °C/W

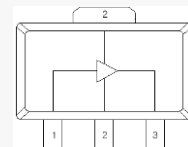
The operation of this device in excess of any of these limits may cause permanent damage.

* Refer to the max. input power data at http://www.asb.co.kr/pdf/Maximum_Input_Power_Analysis.pdf. The max. input power, in principle, depends upon the application frequency, the matching circuit, and device voltage.

Application Circuit

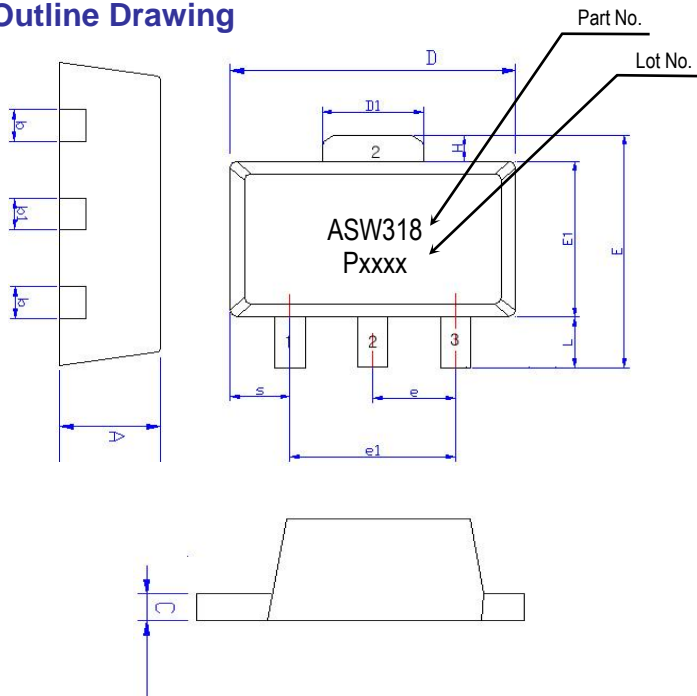
- IF (80 ~ 300 MHz)
- IF (30 ~ 512 MHz)
- LTE (698 ~ 787 MHz)
- CMMB
- 900 MHz
- LTE (1745 ~ 1860 MHz)
- WCDMA
- 50 ~ 1500 MHz
- 350 ~ 3000 MHz
- 470 ~ 2400 MHz
- 350 ~ 2500 MHz
- 70 ~ 2700 MHz
- CDMA (6 V)
- WCDMA (6 V)
- 960 ~ 1200 MHz
- 50 ~ 2700 MHz (75 Ω)

Pin Configuration



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

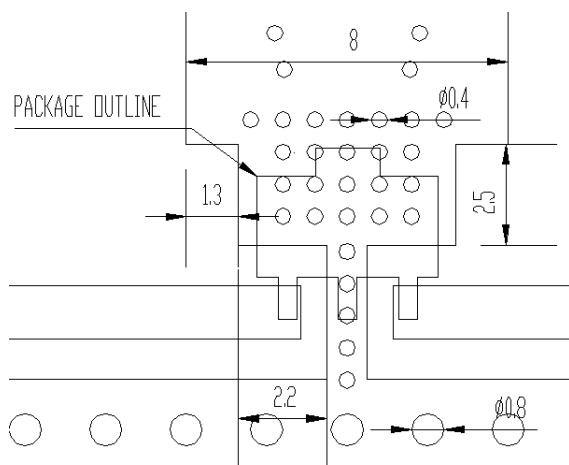
Outline Drawing



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: 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

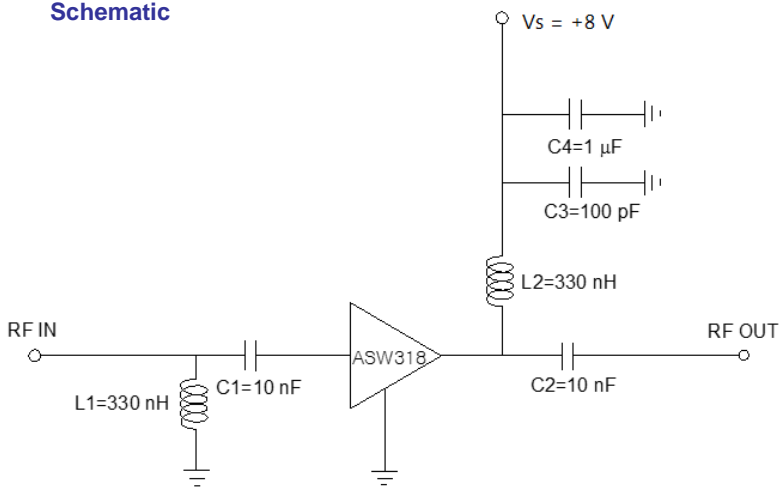
APPLICATION CIRCUIT

IF
 80 ~ 300 MHz
 +8 V

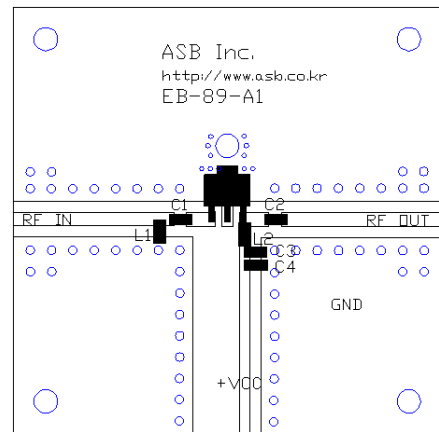
Frequency (MHz)	80 ~ 120	250
Magnitude S21 (dB)	17.5	17.0
Magnitude S11 (dB)	-9	-10
Magnitude S22 (dB)	-11	-12
Output P1dB (dBm)	25.5	25.5
Output IP3 ¹⁾ (dBm)	44	41
Noise Figure (dB)	1.8	2.0
Device Voltage (V)	+8	
Current (mA)	120	

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

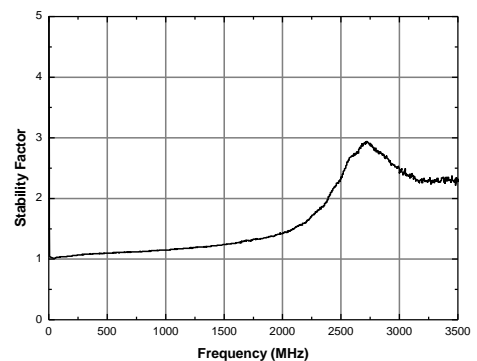
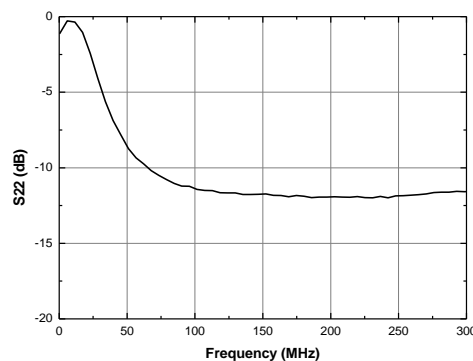
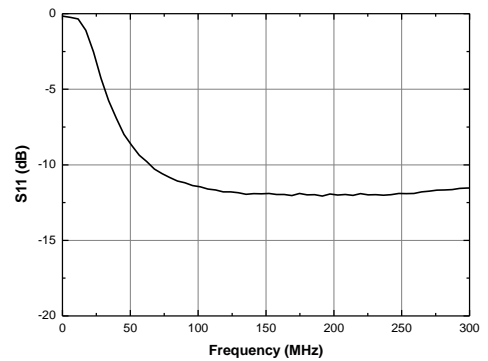
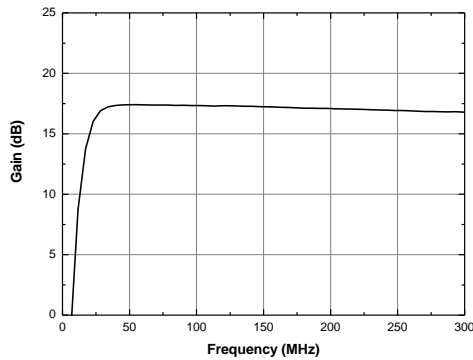
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)

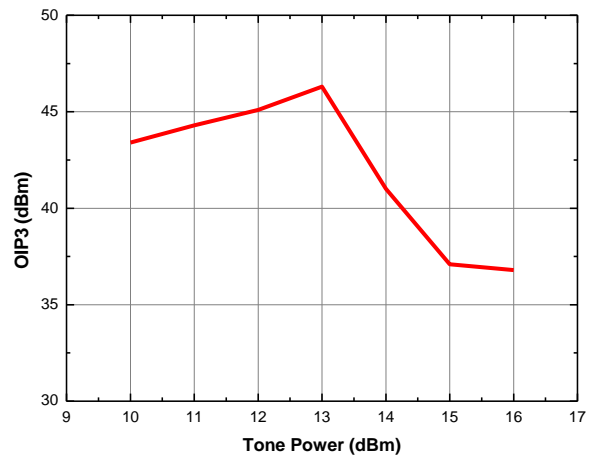


S-parameters & K-factor



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



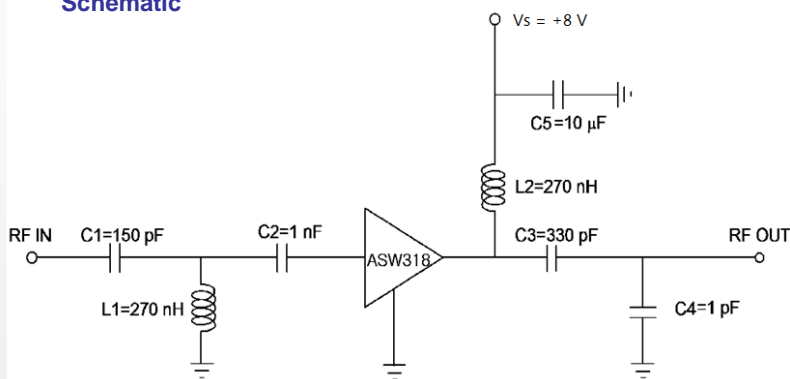
APPLICATION CIRCUIT

IF
 30 ~ 512 MHz
 +8 V

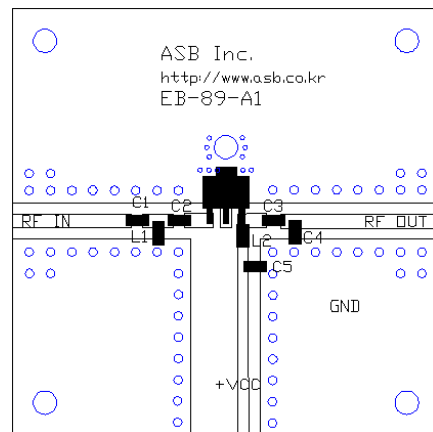
Frequency (MHz)	30	270	512
Magnitude S21 (dB)	16.8	16.5	16.2
Magnitude S11 (dB)	-13	-12	-10
Magnitude S22 (dB)	-11	-12	-10
Output P1dB (dBm)	24.0	25.5	25.5
Output IP3 ¹⁾ (dBm)	39.0	46.0	42.0
Noise Figure (dB)	2.0	1.9	2.2
Device Voltage (V)	+8		
Current (mA)	120		

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

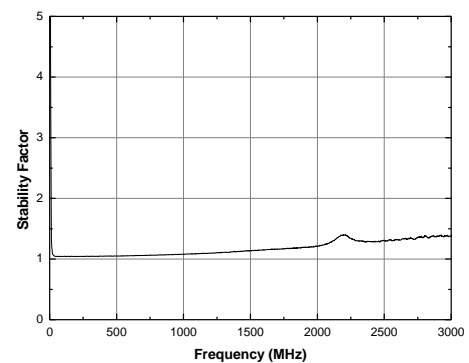
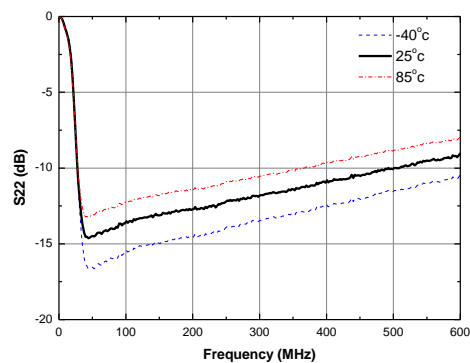
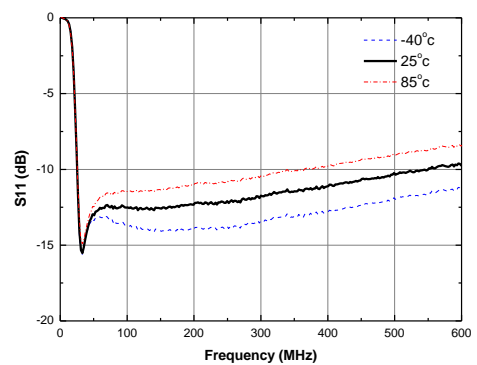
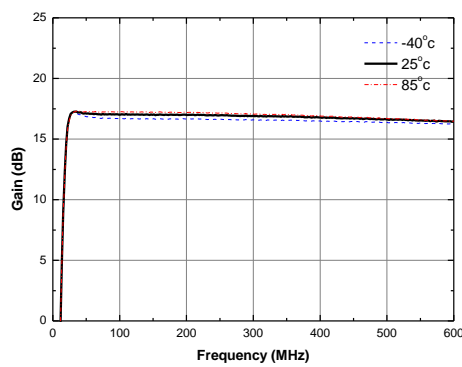
Schematic



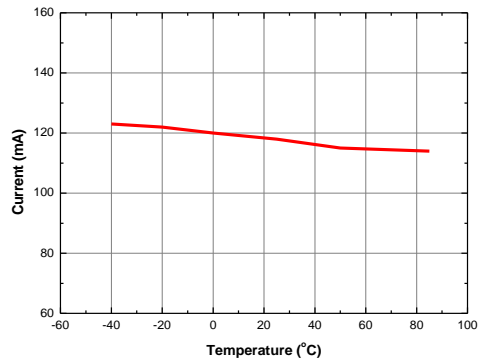
Board Layout (FR4, 40x40 mm², 0.8T)



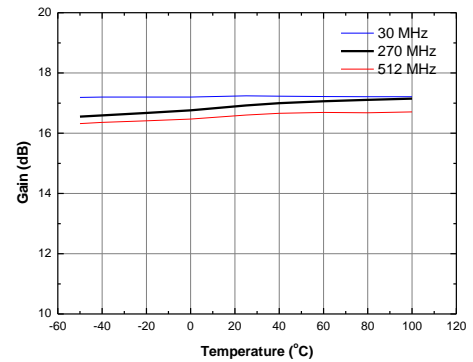
S-parameters & K-factor



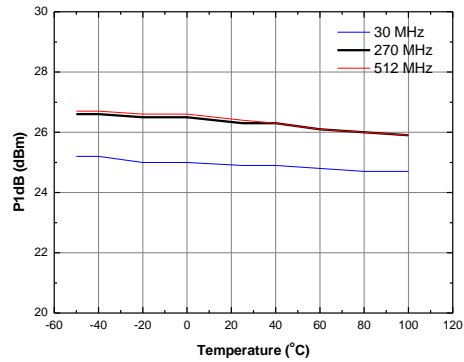
Current vs. Temperature



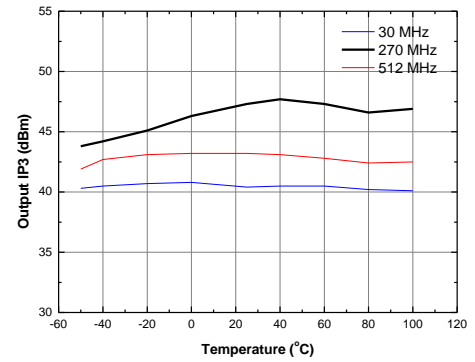
Gain vs. Temperature



P1dB vs. Temperature



Output IP3 vs. Temperature



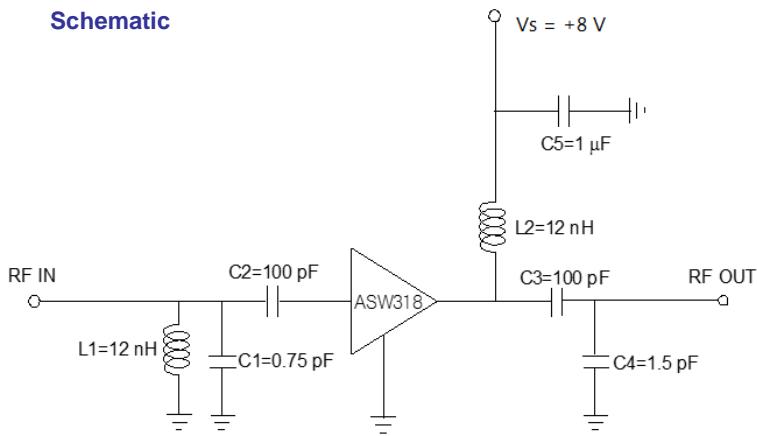
APPLICATION CIRCUIT

LTE
 698 ~ 787 MHz
 +8 V

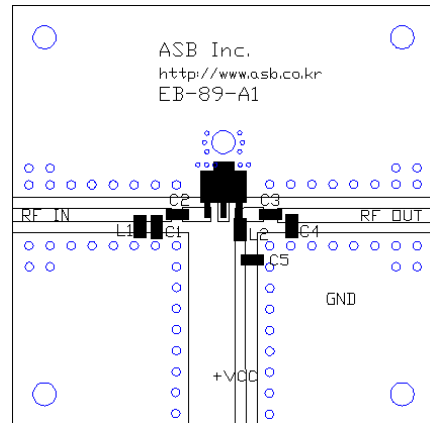
Frequency (MHz)	698 ~ 787
Magnitude S21 (dB)	16.5
Magnitude S11 (dB)	-18
Magnitude S22 (dB)	-15
Output P1dB (dBm)	25.5
Output IP3 ¹⁾ (dBm)	46.5
Noise Figure (dB)	1.8
Device Voltage (V)	+8
Current (mA)	120

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

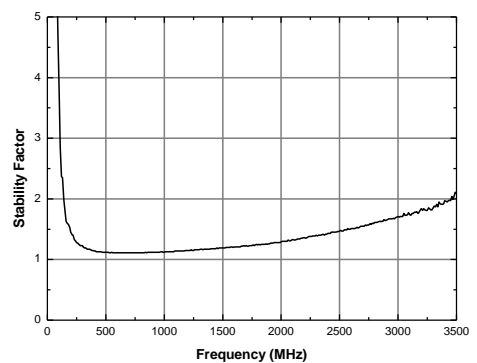
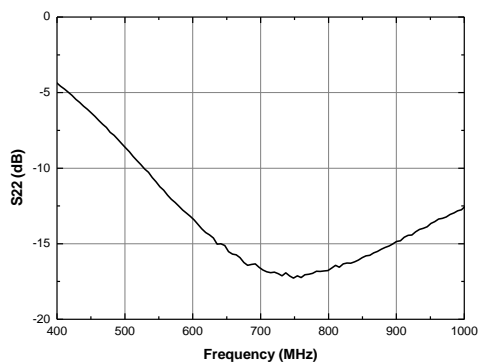
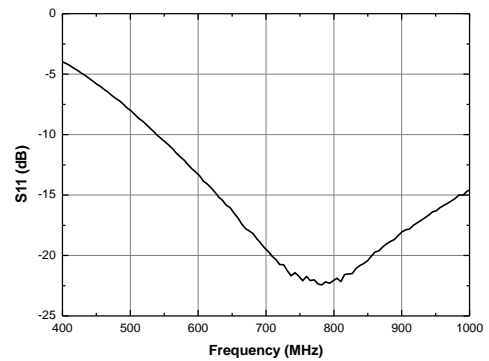
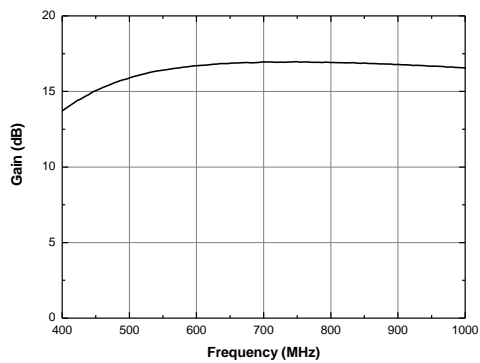
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

CMMB

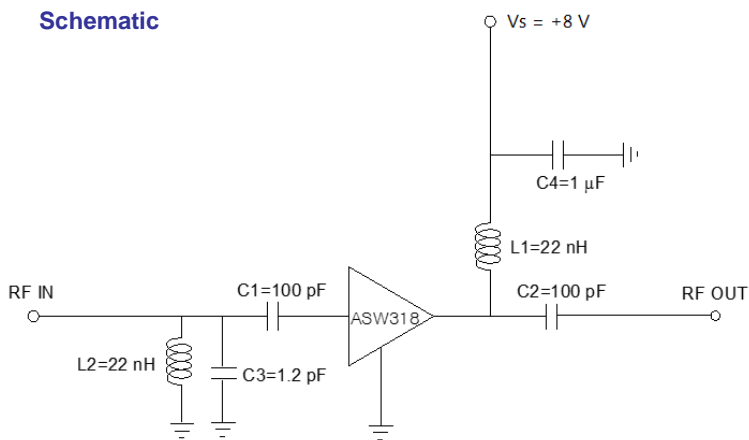
470 ~ 860 MHz

+8 V

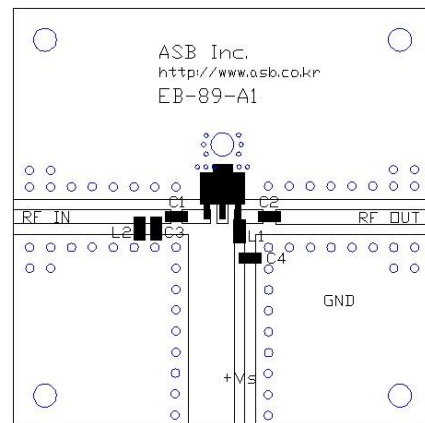
Frequency (MHz)	470	860
Magnitude S21 (dB)	16.0	16.0
Magnitude S11 (dB)	-11	-9
Magnitude S22 (dB)	-9	-11
Output P1dB (dBm)	24.5	25.0
Output IP3 ¹⁾ (dBm)	45.5	42.0
Noise Figure (dB)	2.0	1.9
Device Voltage (V)	+8	+8
Current (mA)	120	120

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

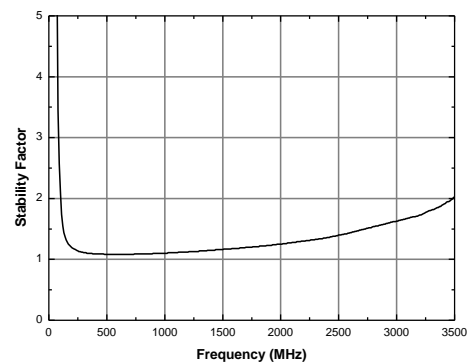
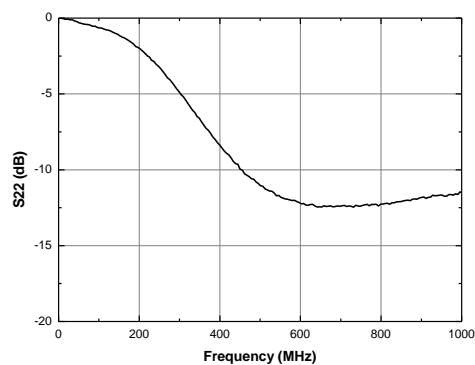
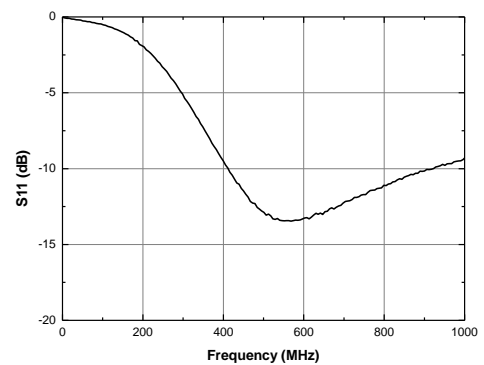
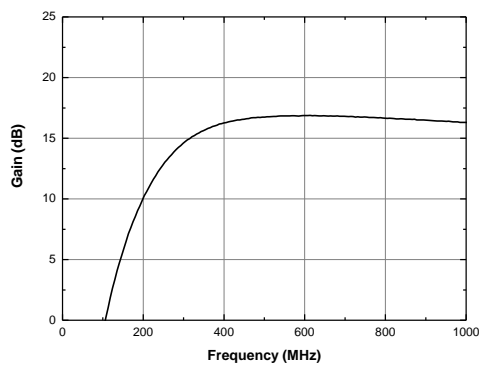
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



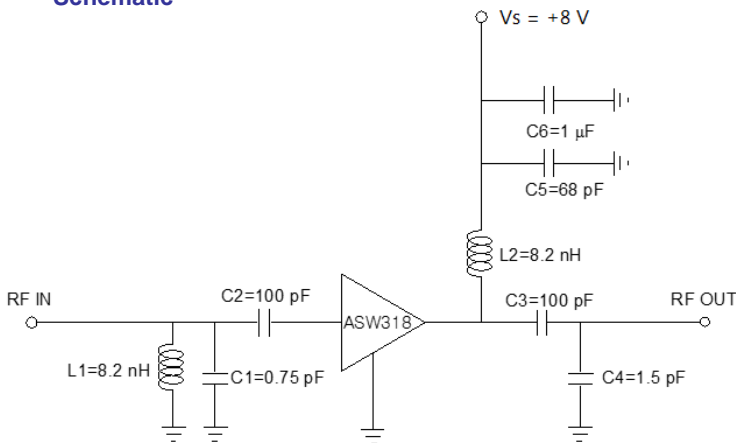
APPLICATION CIRCUIT

GSM / CDMA
900 MHz
+8 V

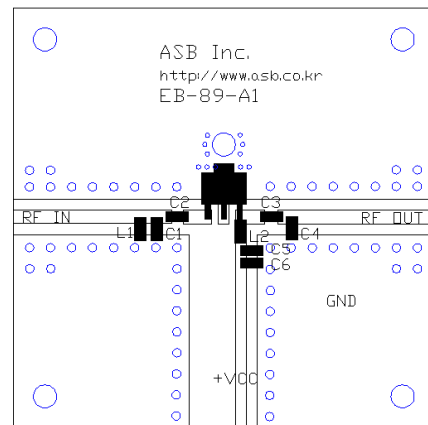
Frequency (MHz)	900
Magnitude S21 (dB)	16.5
Magnitude S11 (dB)	-20
Magnitude S22 (dB)	-18
Output P1dB (dBm)	26
Output IP3 ¹⁾ (dBm)	47
Noise Figure (dB)	2.3
Device Voltage (V)	+8
Current (mA)	120

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

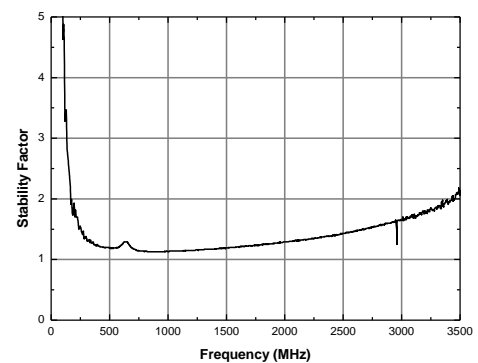
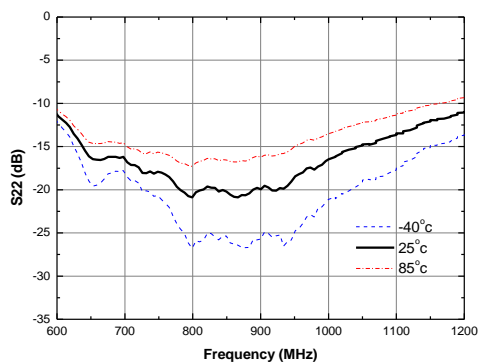
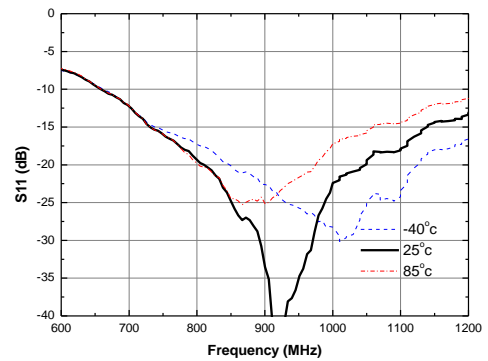
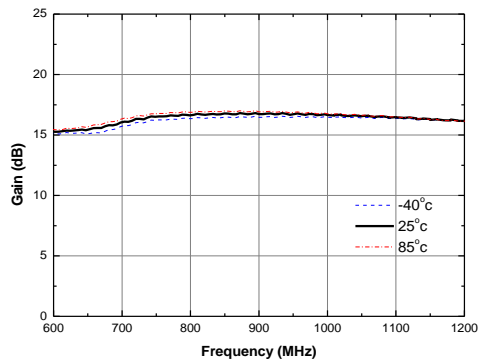
Schematic



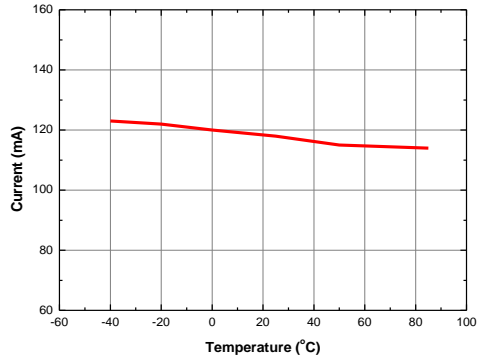
Board Layout (FR4, 40x40 mm², 0.8T)



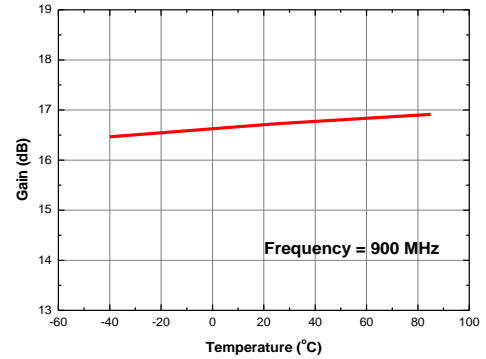
S-parameters & K-factor



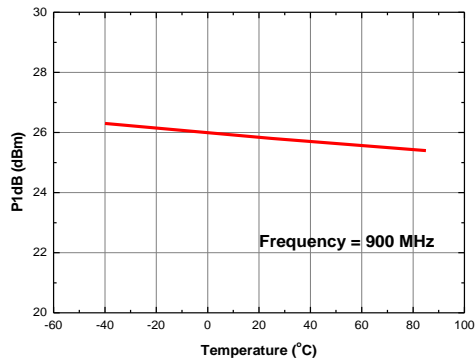
Current vs. Temperature



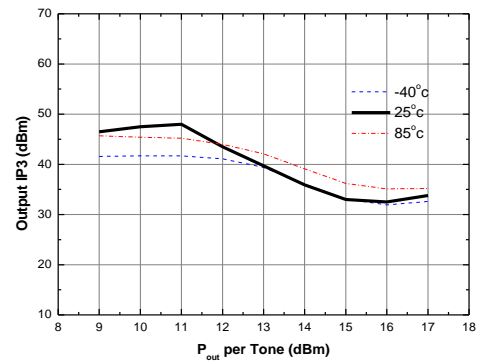
Gain vs. Temperature



P1dB vs. Temperature



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



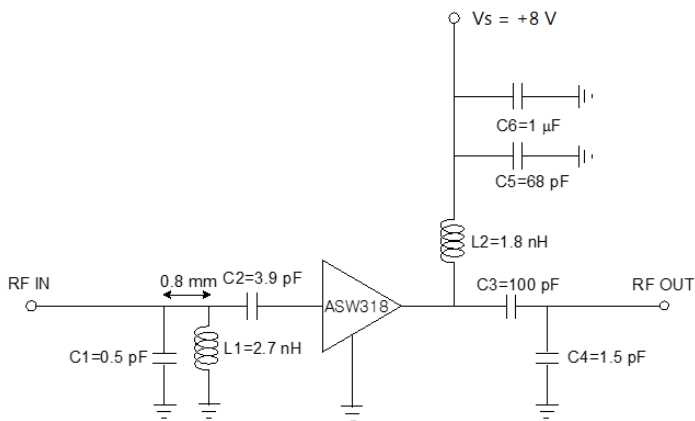
APPLICATION CIRCUIT

LTE
1745 ~ 1860 MHz
+8 V

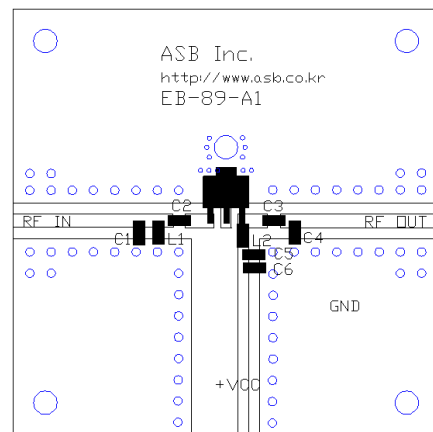
Frequency (MHz)	1745	1860
Magnitude S21 (dB)	14.5	14.5
Magnitude S11 (dB)	-18	-18
Magnitude S22 (dB)	-10	-10
Output P1dB (dBm)	25	25
Output IP3 ¹⁾ (dBm)	45	45
Noise Figure (dB)	2.9	2.9
Device Voltage (V)	+8	+8
Current (mA)	120	120

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

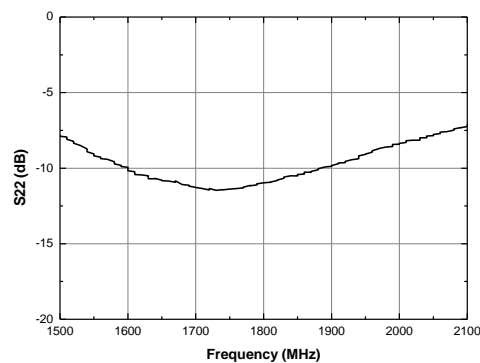
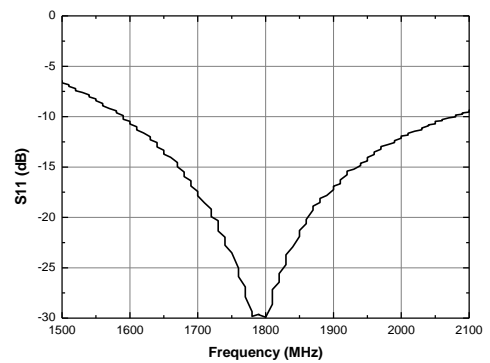
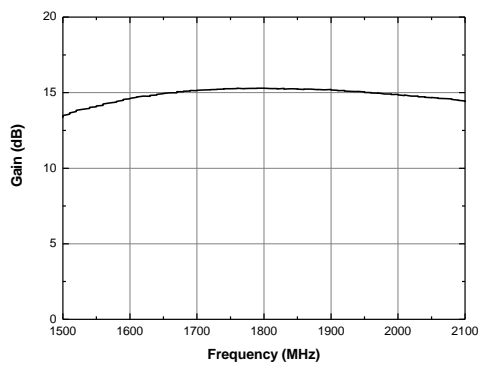
Schematic



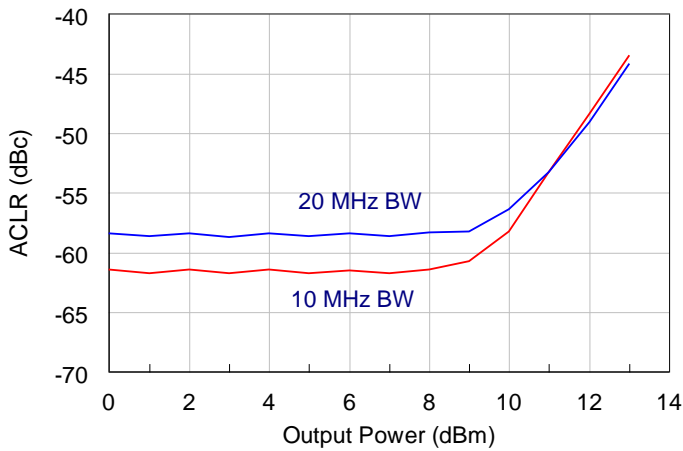
Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor

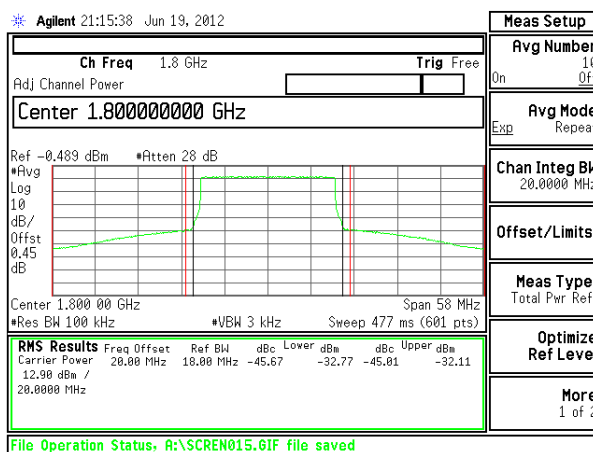


LTE ACLR – 10 MHz & 20 MHz



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

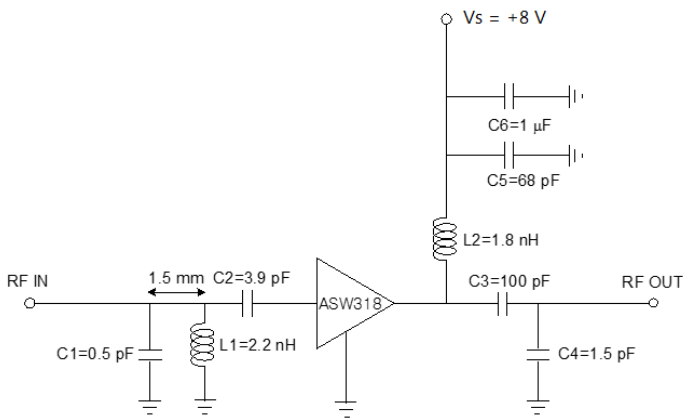
APPLICATION CIRCUIT

WCDMA
1920 ~ 1980 MHz
+8 V

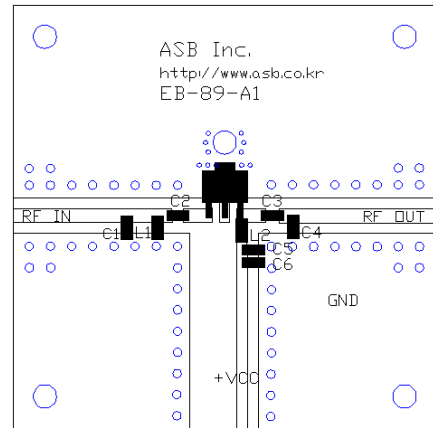
Frequency (MHz)	1920 ~ 1980
Magnitude S21 (dB)	15.0
Magnitude S11 (dB)	-15
Magnitude S22 (dB)	-11
Output P1dB (dBm)	26
Output IP3 ¹⁾ (dBm)	45.5
Noise Figure (dB)	3.3
Device Voltage (V)	+8
Current (mA)	120

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

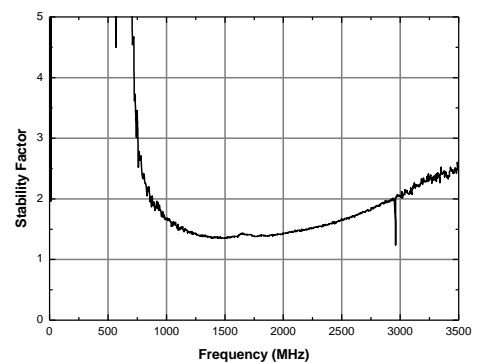
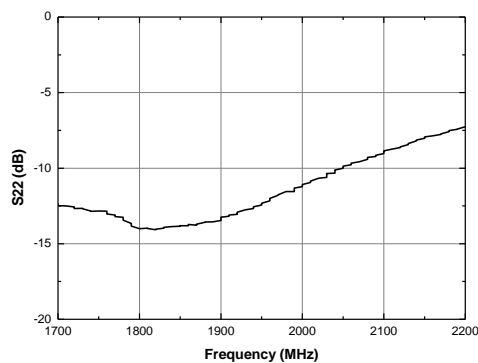
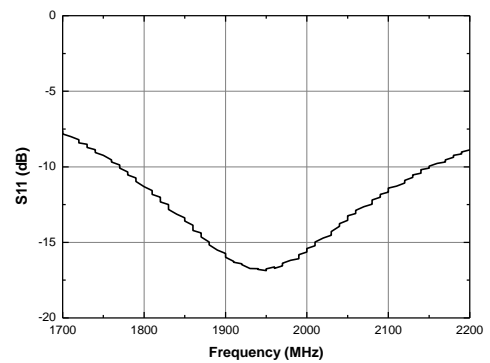
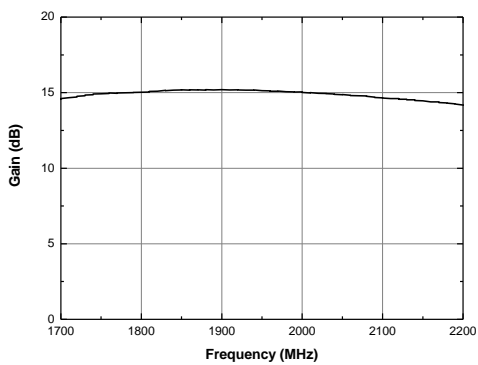
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



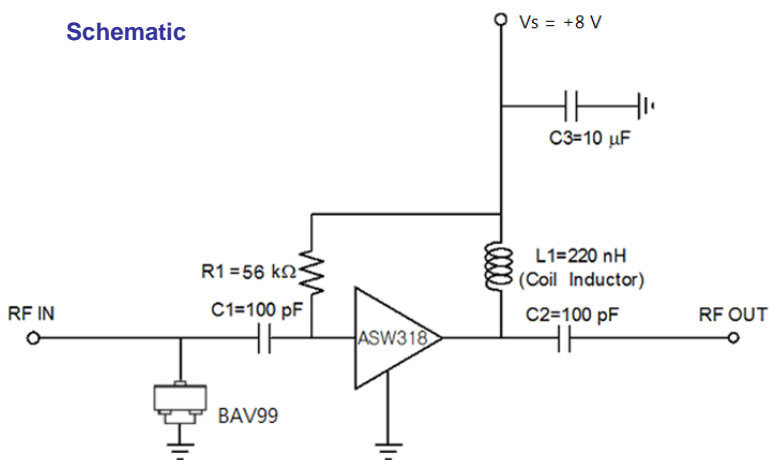
APPLICATION CIRCUIT

Wide Band
50 ~ 1500 MHz
+8 V

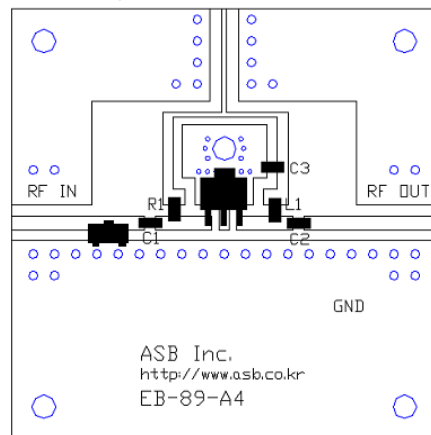
Frequency (MHz)	50	1000	1500
Magnitude S21 (dB)	16.2	16.0	15.2
Magnitude S11 (dB)	-5	-11	-10
Magnitude S22 (dB)	-11	-12	-10
Output P1dB (dBm)	24.5	25.5	25.5
Output IP3 ¹⁾ (dBm)	45	45	45
Noise Figure (dB)	2.0	2.1	2.2
Device Voltage (V)	+8		
Current (mA)	150		

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

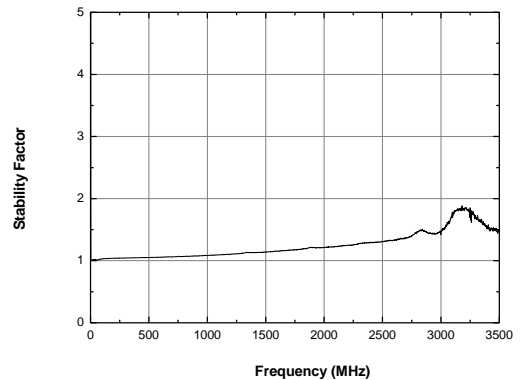
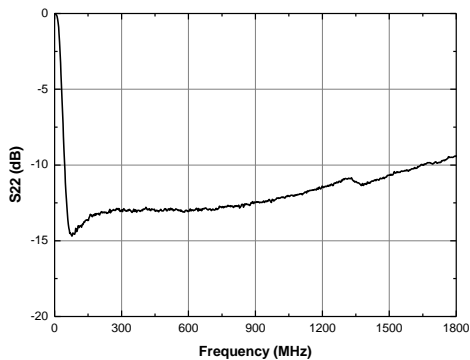
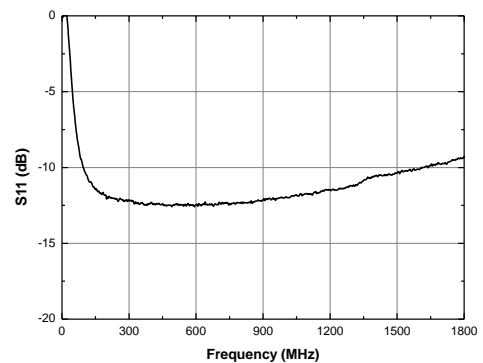
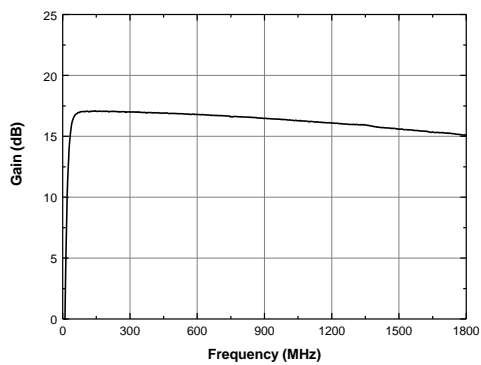
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



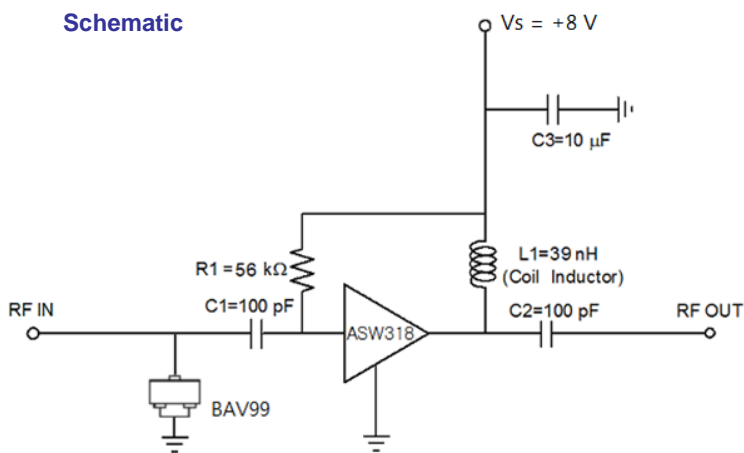
APPLICATION CIRCUIT

Wide Band
350 ~ 3000 MHz
+8 V

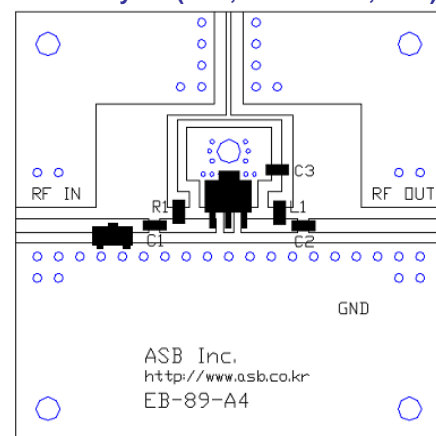
Frequency (MHz)	350	1500	2000	2400	3000
Magnitude S21 (dB)	16.5	15.4	14.5	13.9	13.0
Magnitude S11 (dB)	-9	-10	-9	-7	-5
Magnitude S22 (dB)	-9	-10	-8	-7	-5
Output P1dB (dBm)	25	25	25	24	21
Output IP3 ¹⁾ (dBm)	42.5	45.5	45.5	44.0	40.0
Noise Figure (dB)	2.0	2.2	2.5	2.8	-
Device Voltage (V)	+8				
Current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

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

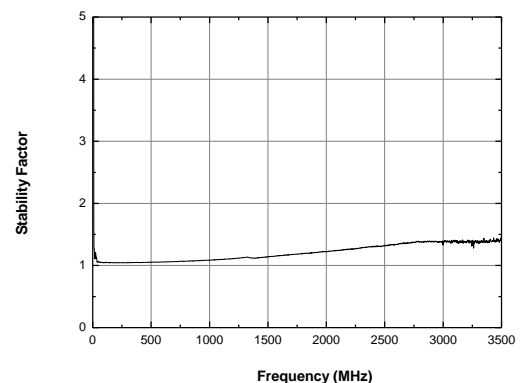
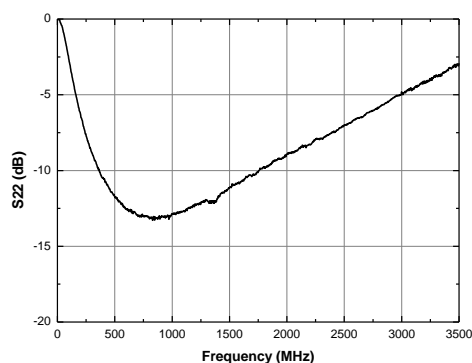
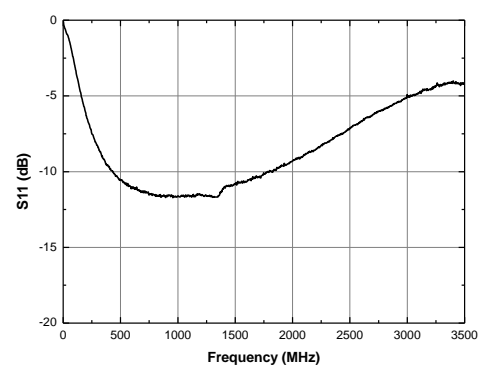
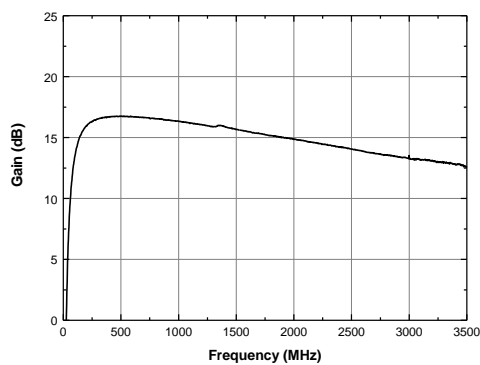
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



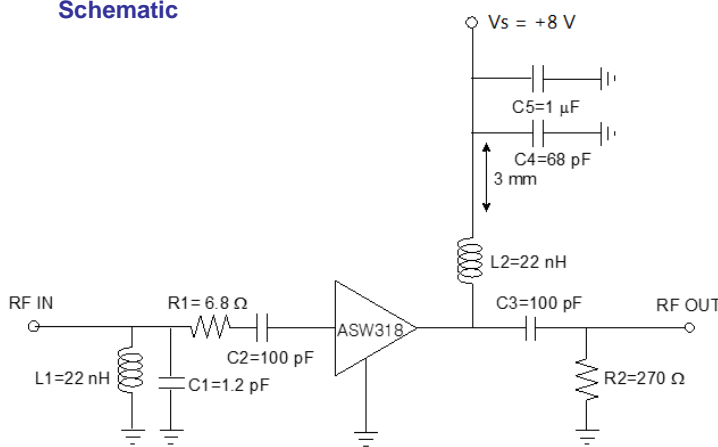
APPLICATION CIRCUIT

Wide Band
470 ~ 2400 MHz
+8 V

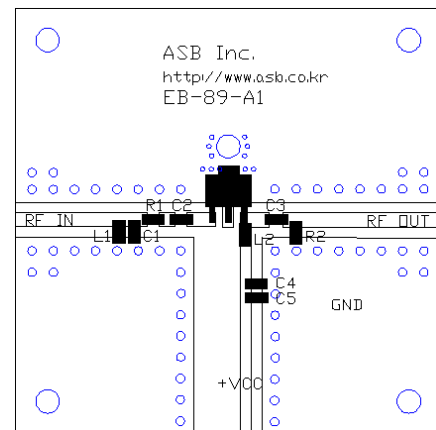
Frequency (MHz)	470	800	1600	2400
Magnitude S21 (dB)	15.4	15.0	13.5	13.0
Magnitude S11 (dB)	-11.5	-11.5	-11	-11
Magnitude S22 (dB)	-15	-15	-10	-10
Output P1dB (dBm)	25.0	25.0	25.0	21.5
Output IP3 ¹⁾ (dBm)	46	46	44	39
Noise Figure (dB)	2.9	2.5	3.2	4.2
Device Voltage (V)	+8			
Current (mA)	120			

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

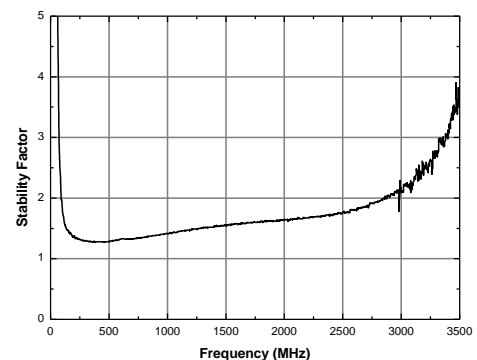
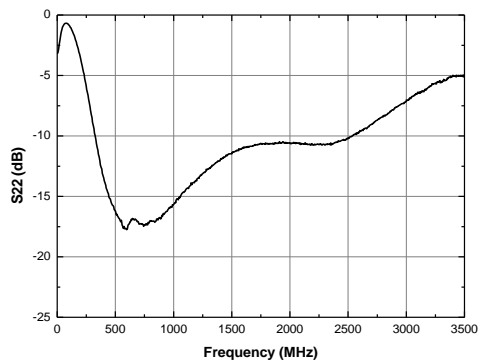
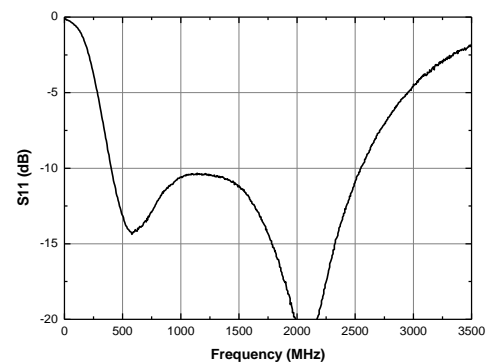
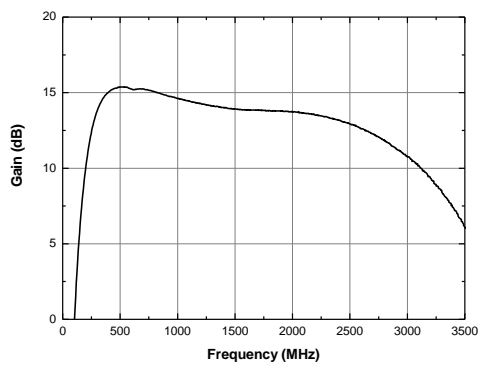
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



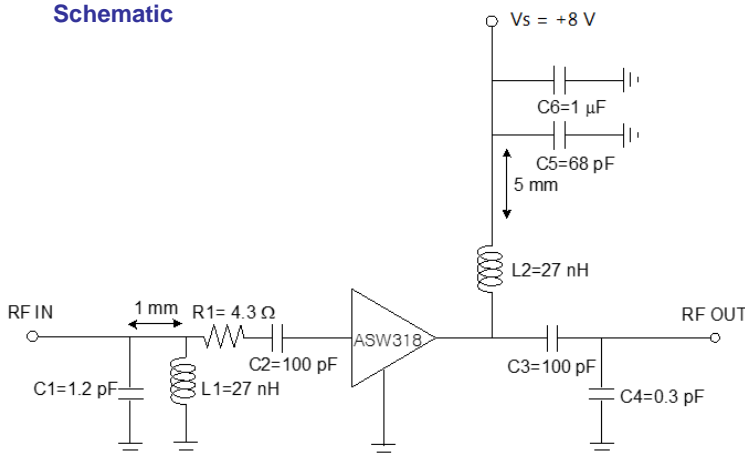
APPLICATION CIRCUIT

Wide Band
350 ~ 2500 MHz
+8 V

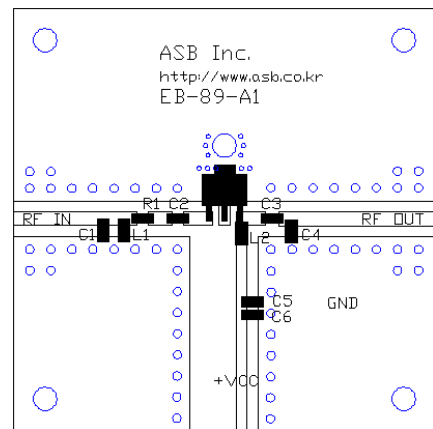
Frequency (MHz)	350	800	1950	2500
Magnitude S21 (dB)	16.0	16.0	14.5	12.5
Magnitude S11 (dB)	-10	-10	-18	-6.5
Magnitude S22 (dB)	-11	-10	-10	-7.5
Output P1dB (dBm)	25	26	26	24
Output IP3 ¹⁾ (dBm)	42.0	43.5	44.0	39.0
Noise Figure (dB)	2.7	2.3	3.3	4.6
Device Voltage (V)	+8			
Current (mA)	120			

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

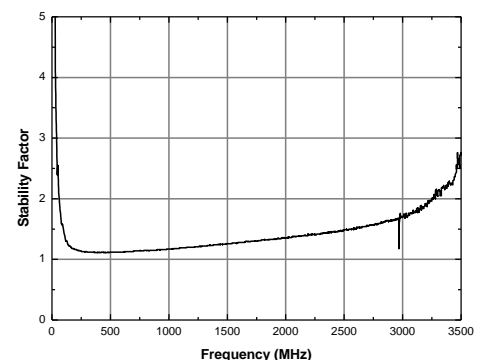
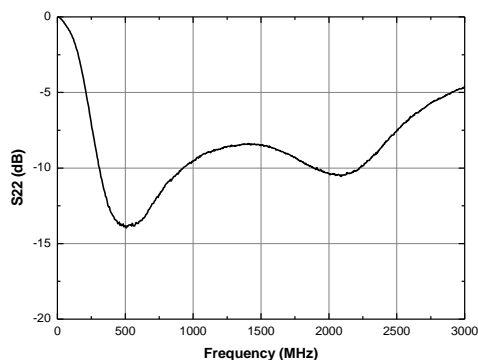
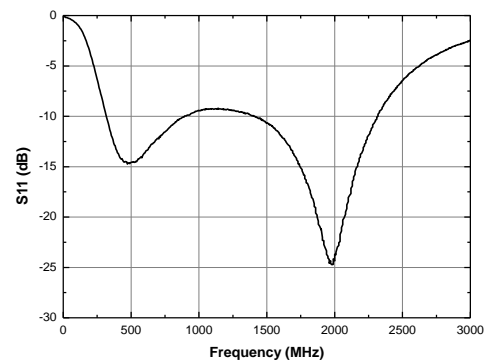
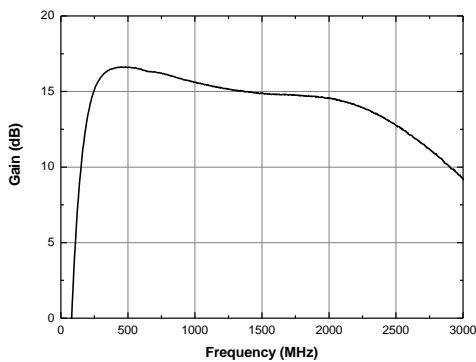
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



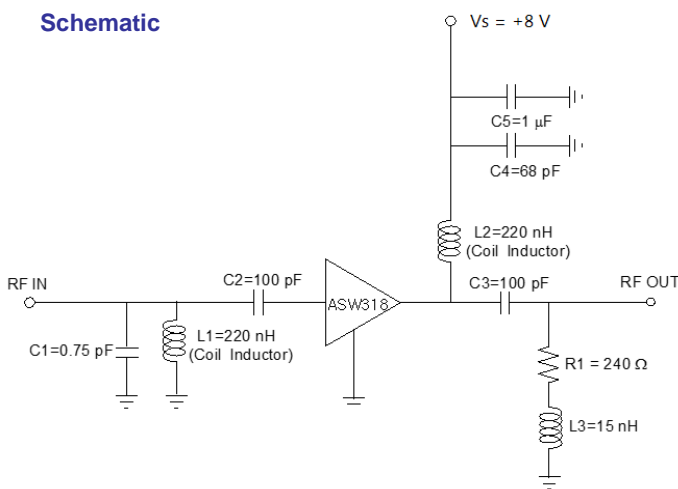
APPLICATION CIRCUIT

ONU
70 ~ 2700 MHz
+8 V

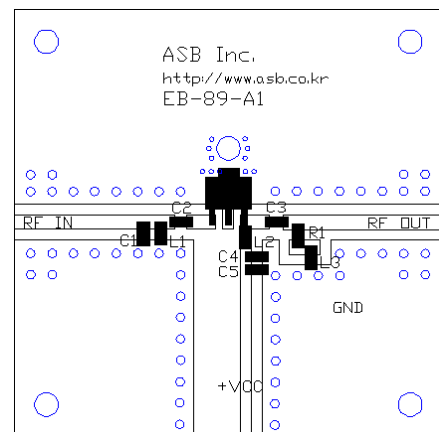
Frequency (MHz)	70	900	1800	2700
Magnitude S21 (dB)	16.0	15.0	14.5	14.0
Magnitude S11 (dB)	-8	-7	-8	-15
Magnitude S22 (dB)	-14	-11	-7	-7
Output P1dB (dBm)	24	24	24	21
Output IP3 ¹⁾ (dBm)	44.0	41.5	43.5	39.0
Noise Figure (dB)	2.0	2.1	2.4	3.1
Device Voltage (V)	+8			
Current (mA)	120			

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

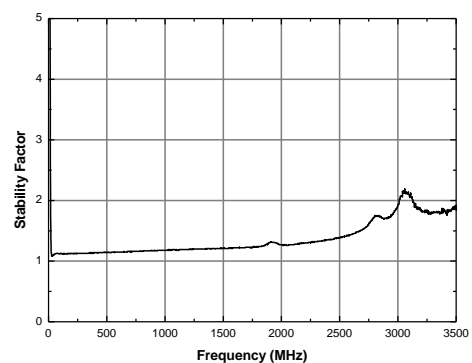
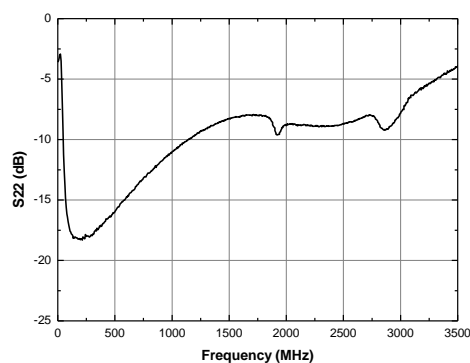
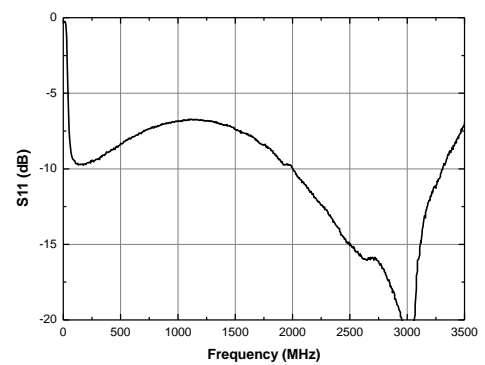
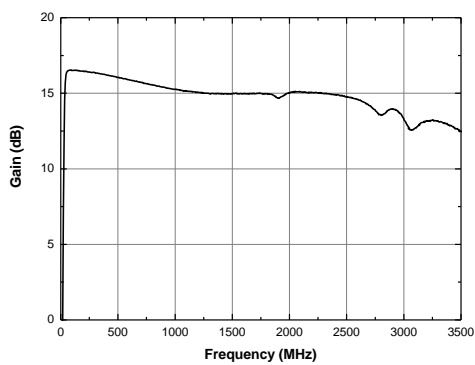
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



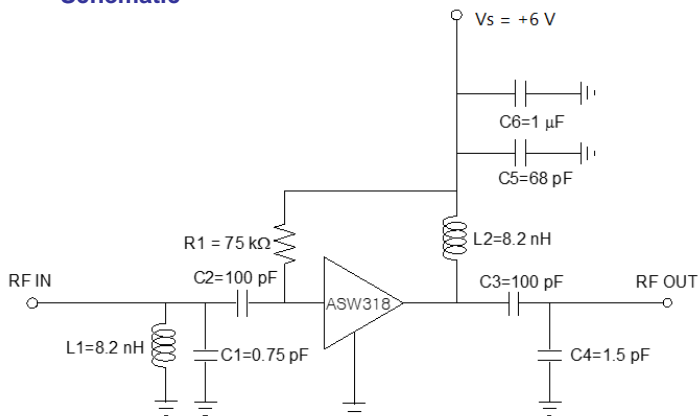
APPLICATION CIRCUIT

CDMA Rx
824 ~ 849 MHz
+6 V

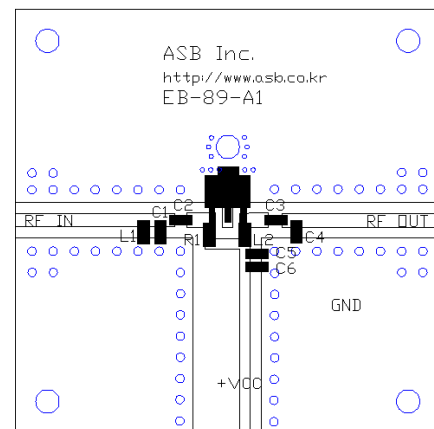
Frequency (MHz)	824 ~ 849
Magnitude S21 (dB)	16.0
Magnitude S11 (dB)	-20
Magnitude S22 (dB)	-18
Output P1dB (dBm)	23
Output IP3 ¹⁾ (dBm)	43.5
Noise Figure (dB)	2.3
Device Voltage (V)	+6
Current (mA)	100

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

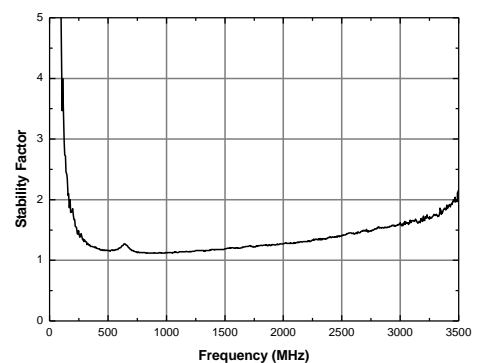
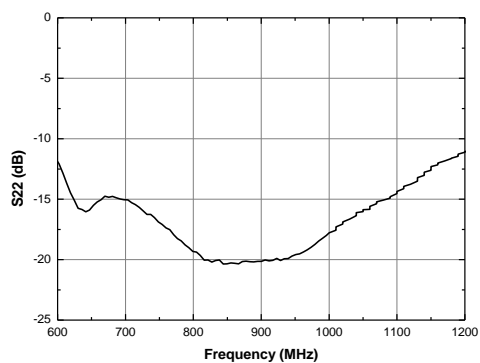
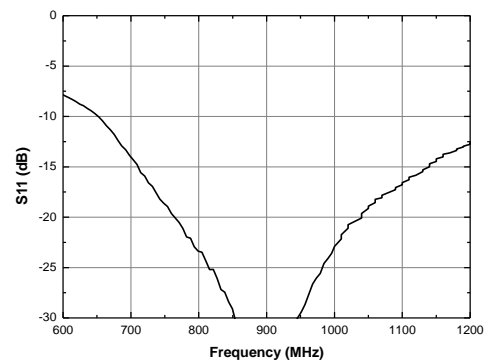
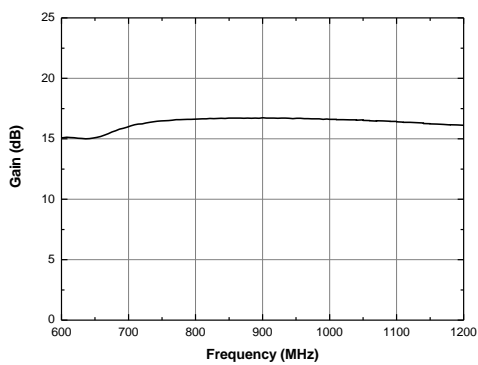
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



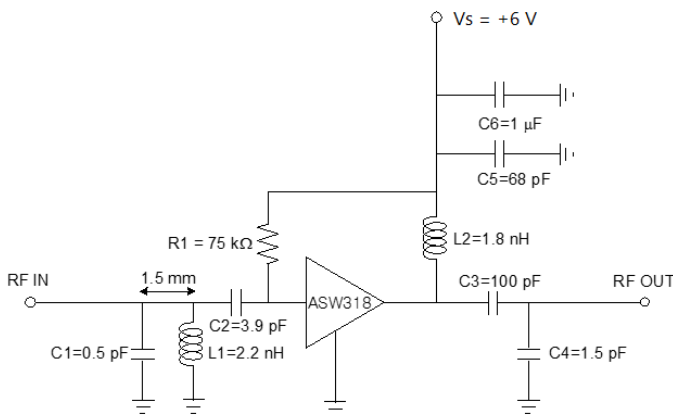
APPLICATION CIRCUIT

WCDMA Rx
1920 ~ 1980 MHz
+6 V

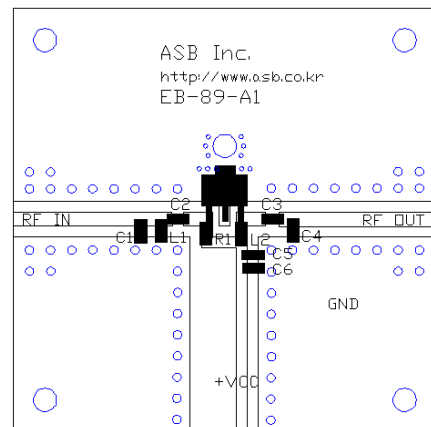
Frequency (MHz)	1920 ~ 1980
Magnitude S21 (dB)	15.0
Magnitude S11 (dB)	-14
Magnitude S22 (dB)	-11
Output P1dB (dBm)	23
Output IP3 ¹⁾ (dBm)	43
Noise Figure (dB)	3.3
Device Voltage (V)	+6
Current (mA)	100

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

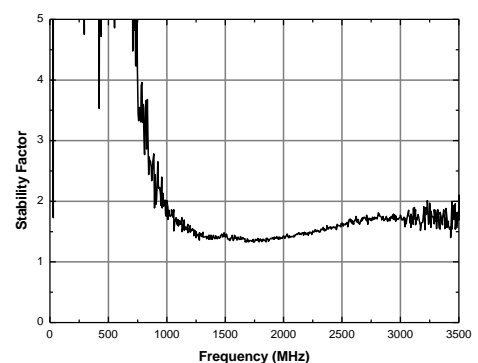
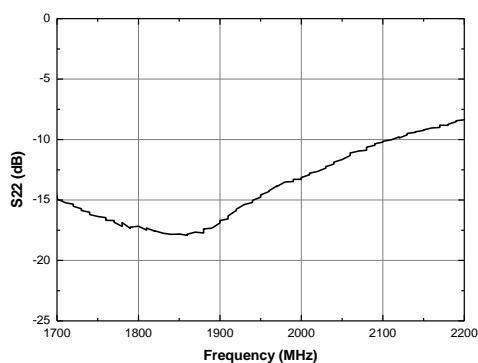
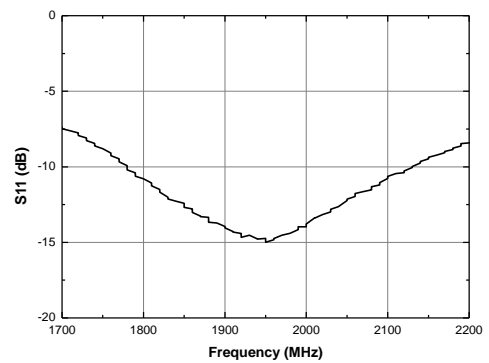
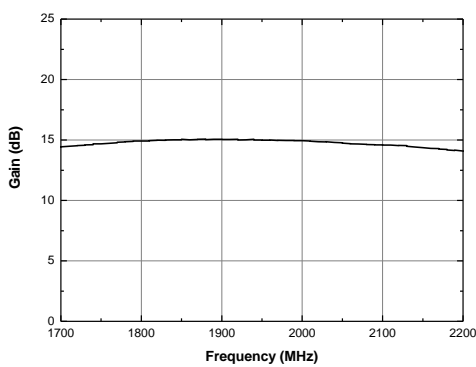
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



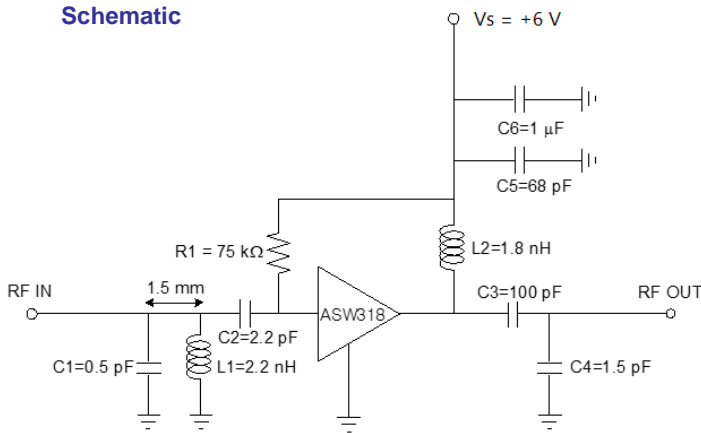
APPLICATION CIRCUIT

WCDMA Tx
2110 ~ 2170 MHz
+6 V

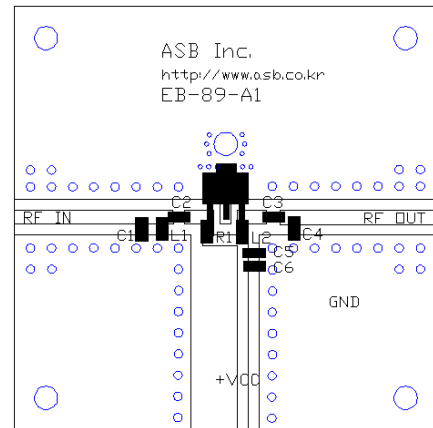
Frequency (MHz)	2110 ~ 2170
Magnitude S21 (dB)	14.3
Magnitude S11 (dB)	-18
Magnitude S22 (dB)	-10
Output P1dB (dBm)	22
Output IP3 ¹⁾ (dBm)	40.5
Noise Figure (dB)	3.2
Device Voltage (V)	+6
Current (mA)	100

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

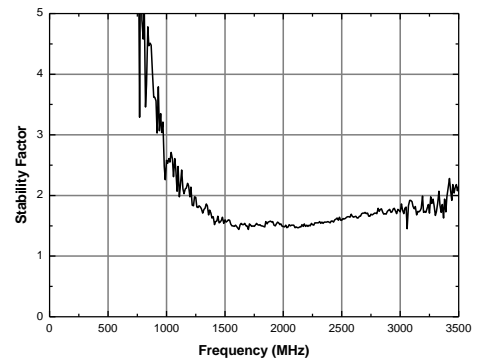
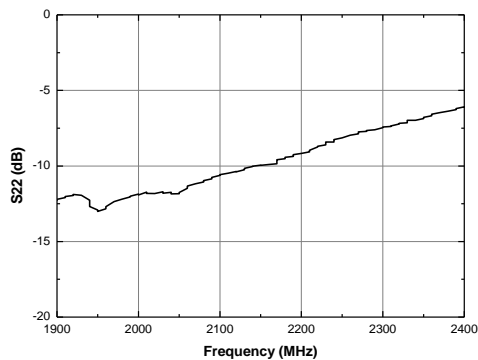
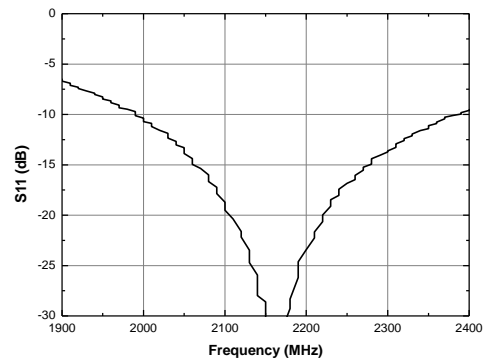
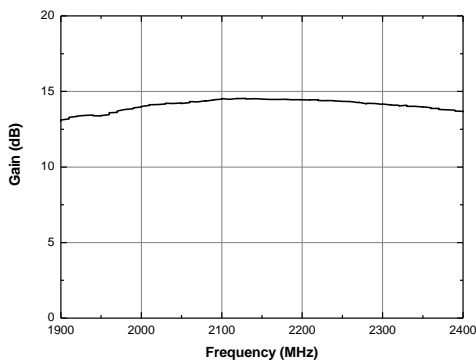
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

SMATV

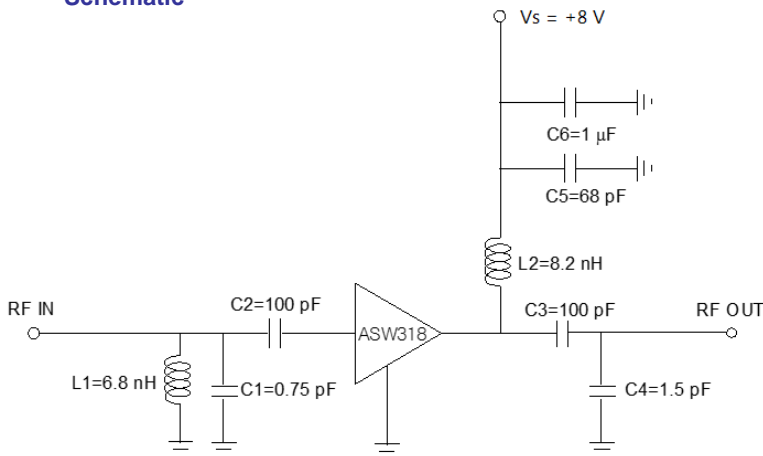
960 ~ 1200 MHz

+8 V

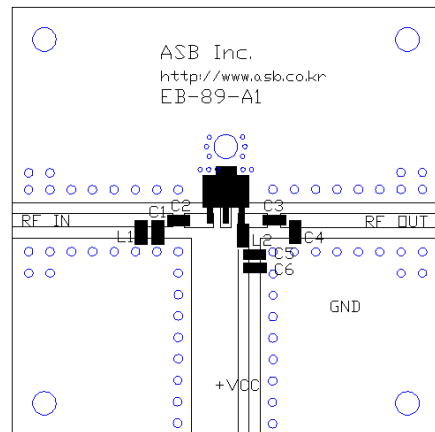
Frequency (MHz)	960	1200
Magnitude S21 (dB)	16.5	16.0
Magnitude S11 (dB)	-15	-15
Magnitude S22 (dB)	-20	-15
Output P1dB (dBm)	26	26
Output IP3 ¹⁾ (dBm)	45	47
Noise Figure (dB)	2.5	2.4
Device Voltage (V)	+8	+8
Current (mA)	120	120

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

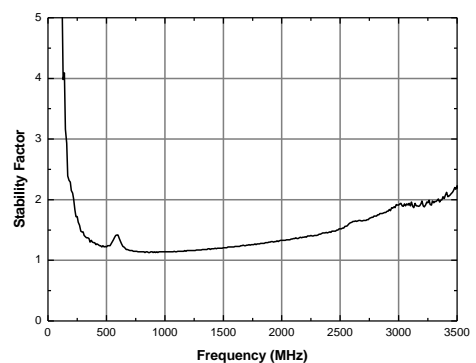
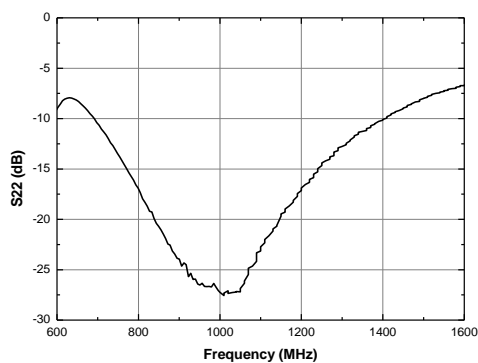
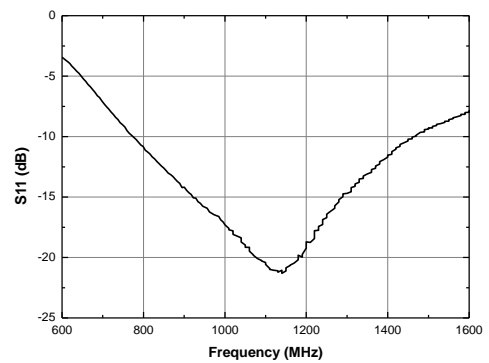
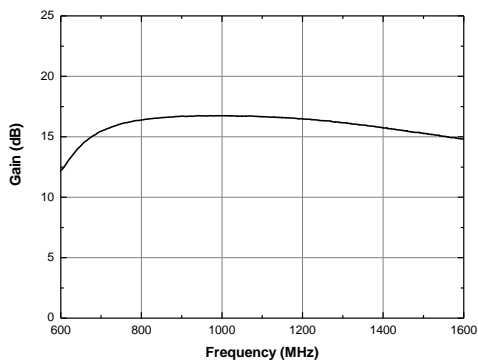
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

ONU

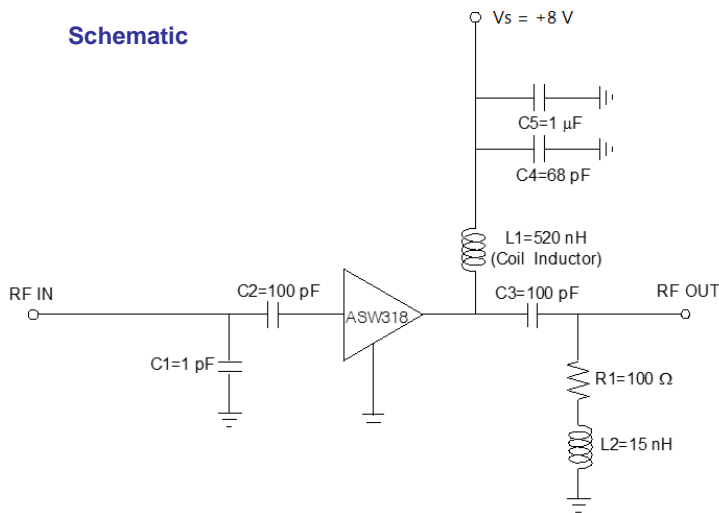
50 ~ 2700 MHz

+8 V, 75 Ω

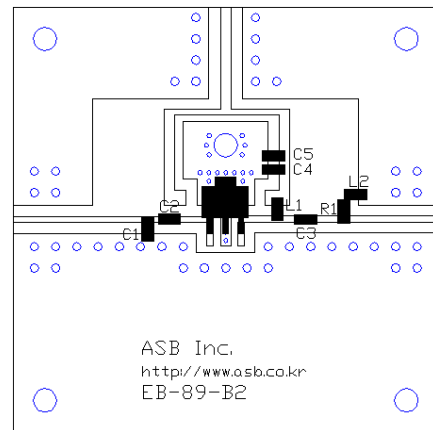
Frequency (MHz)	50	900	1800	2700
Magnitude S21 (dB)	15.0	14.5	13.0	14.0
Magnitude S11 (dB)	-10	-7	-4	-18
Magnitude S22 (dB)	-15	-13	-4	-13
Output P1dB (dBm)	23	24	20	19
Output IP3 ¹⁾ (dBm)	44.0	41.5	41.5	37.0
Noise Figure (dB)	2.0	2.2	3.2	3.3
Device Voltage (V)	+8			
Current (mA)	120			

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

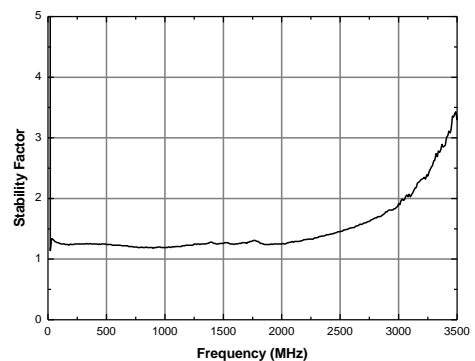
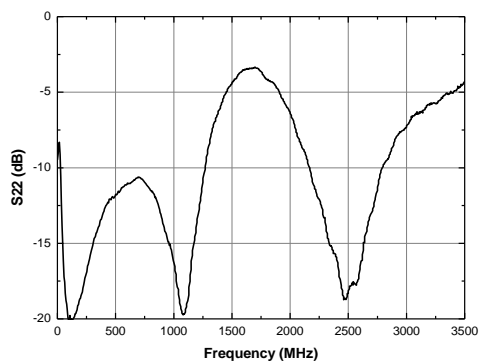
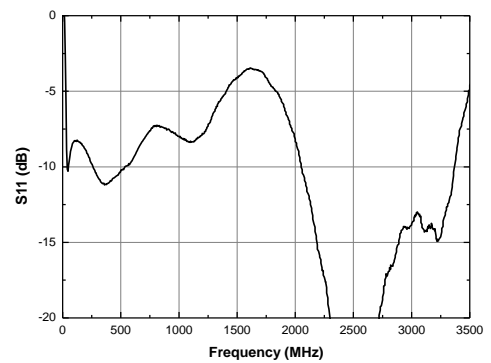
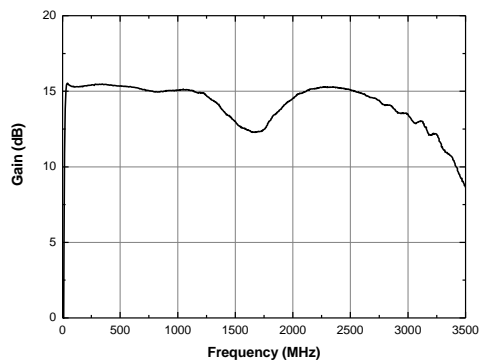
Schematic



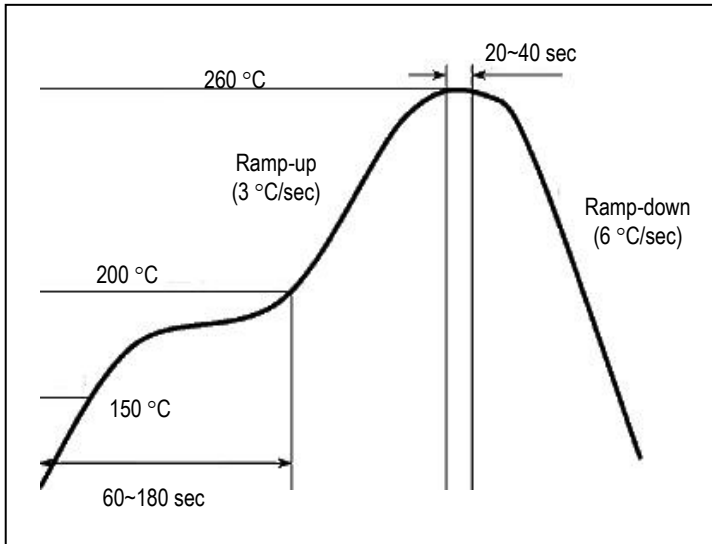
Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



Recommended Soldering Reflow Profile



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