

Features

- 17 dB Gain at 900 MHz
- 21 dBm P1dB at 900 MHz
- 42.5 dBm OIP3 at 900 MHz
- 1.9 dBm NF at 900 MHz
- MTTF > 100 Years

Description

The ASW316, 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 3 GHz. The amplifier is available in a SOT89 package and passes through the stringent DC, RF, and reliability tests.

Typical Performance

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

Parameters	Units	Typical			
Frequency	MHz	5	900	1950	2700
Gain	dB	14.8	17.0	16.0	15.5
S11	dB	-18	-18	-20	-20
S22	dB	-10	-12	-10	-10
Output IP3	dBm	40.0 ¹⁾	42.5 ²⁾	39.0 ³⁾	38.0 ⁴⁾
Noise Figure	dB	2.9	1.9	2.6	3.2
Output P1dB	dBm	20.5	21.0	22.5	20.0
Current	mA	110	110	110	110
Device Voltage	V	+5	+5	+5	+5

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

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

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

4) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1 MHz.

Product Specifications

Parameters	Units	Min	Typ.	Max
Testing Frequency	MHz		900	
Gain	dB		17	
S11	dB		-18	
S22	dB		-12	
Output IP3	dBm		42.5	
Noise Figure	dB		1.9	
Output P1dB	dBm		21	
Current	mA		110	
Device Voltage	V		+5	

Absolute Maximum Ratings

Parameters	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-40 to +150 °C
Device Voltage	+6 V
Operating Junction Temperature	+150 °C
Input RF Power (CW, 50 Ω matched as in 1950 MHz application circuit)*	+23 dBm
Thermal Resistance	60 °C/W

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

The max. input power, in principle, depends upon the application frequency and the matching circuit.

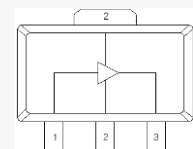


Package Style: SOT89

Application Circuit

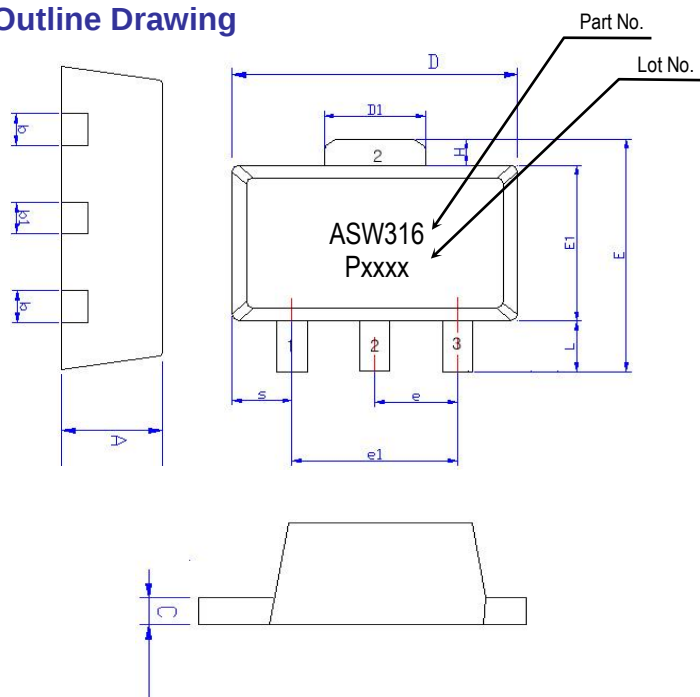
- LTE (698 ~ 787 MHz)
- CMMB
- 900 MHz
- LTE (1745 ~ 1860 MHz)
- 1950 MHz
- 2400 MHz
- 2700 MHz
- 500 ~ 3000 MHz
- IF (5 ~ 1000 MHz)
- IF (50 ~ 1000 MHz)
- IF (30 ~ 512 MHz)

Pin Configuration



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

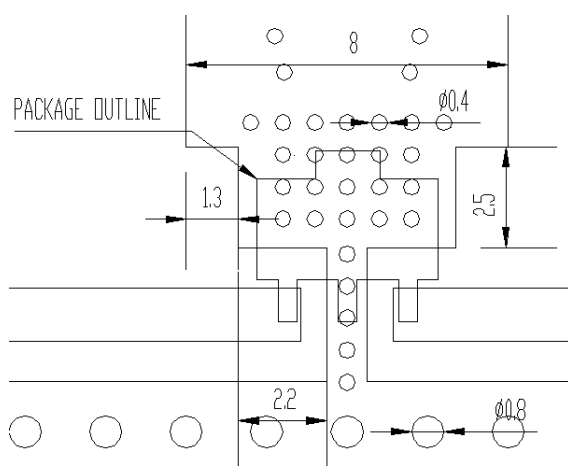
Outline Drawing



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 1A
	Voltage Level: 400 V
MM	Class A
	Voltage Level: 50 V

CAUTION: ESD-sensitive device!

Moisture Sensitivity Level (MSL)

Level 3 at 260 °C reflow

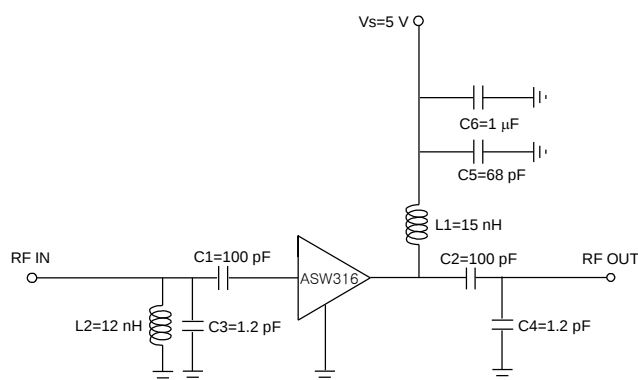
APPLICATION CIRCUIT

LTE
698 ~ 787 MHz
+5 V

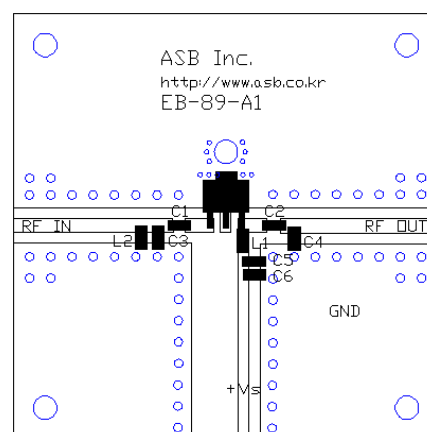
Frequency (MHz)	698 ~ 787
Magnitude S21 (dB)	17
Magnitude S11 (dB)	-14
Magnitude S22 (dB)	-13
Output P1dB (dBm)	21
Output IP3 ¹⁾ (dBm)	42
Noise Figure (dB)	1.8
Device Voltage (V)	+5
Current (mA)	110

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

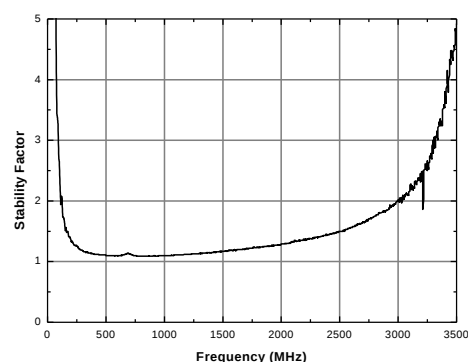
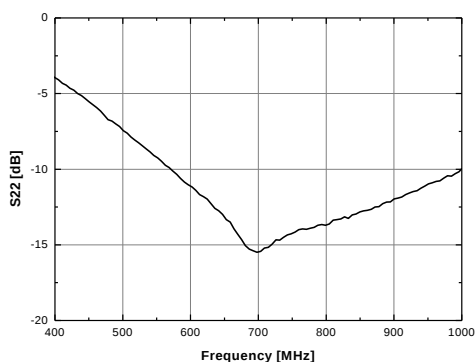
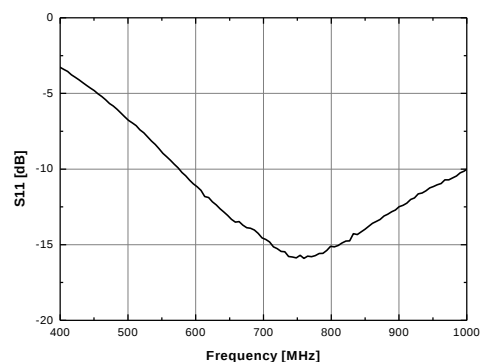
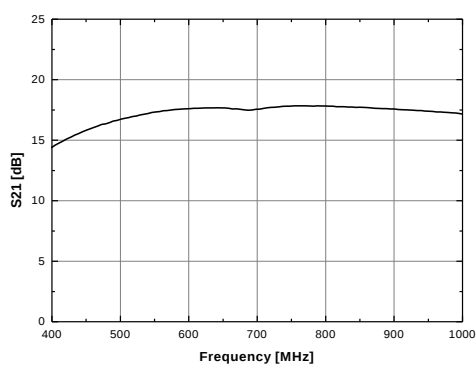
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

CMMB

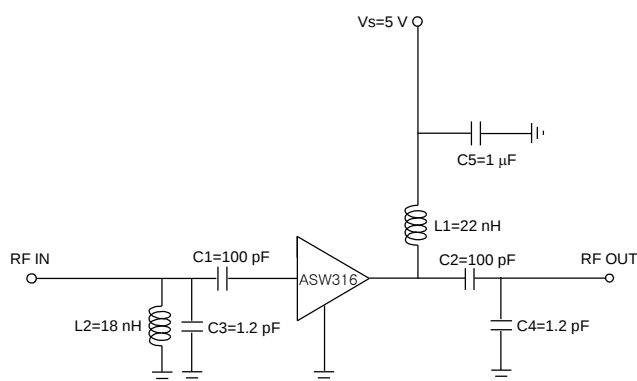
470 ~ 860 MHz

+5 V

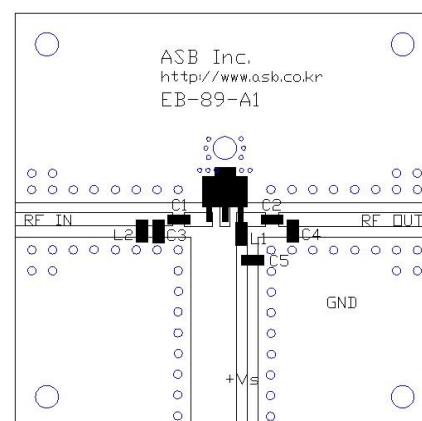
Frequency (MHz)	470	860
Magnitude S21 (dB)	17	17
Magnitude S11 (dB)	-9	-9
Magnitude S22 (dB)	-9	-9
Output P1dB (dBm)	22	21
Output IP3 ¹⁾ (dBm)	42.5	40.0
Noise Figure (dB)	2.0	1.7
Device Voltage (V)	+5	+5
Current (mA)	110	110

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

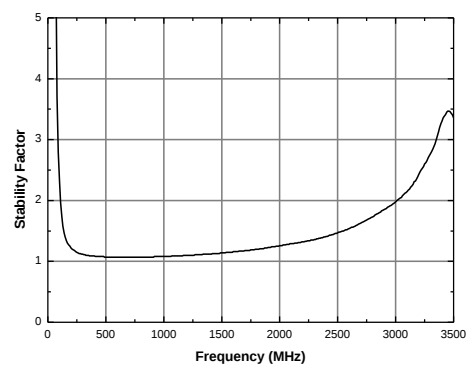
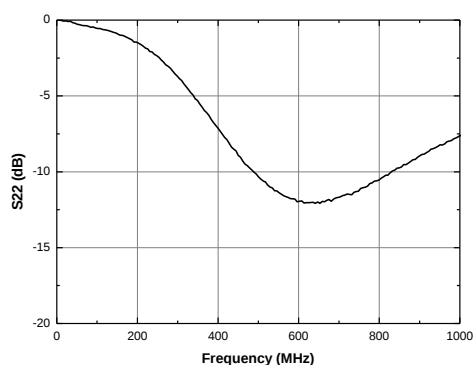
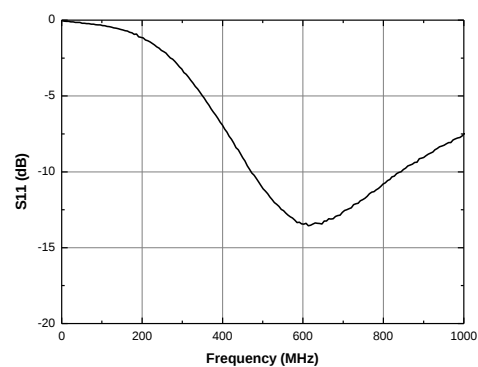
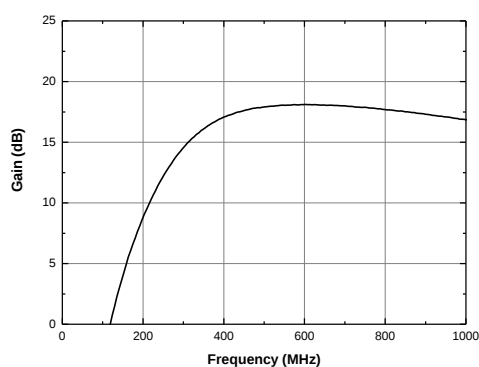
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

GSM / CDMA

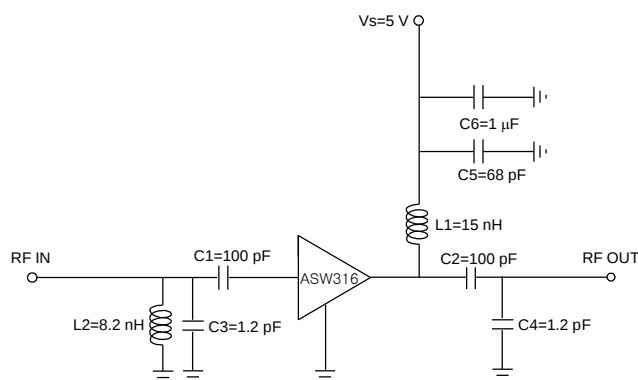
900 MHz

+5 V

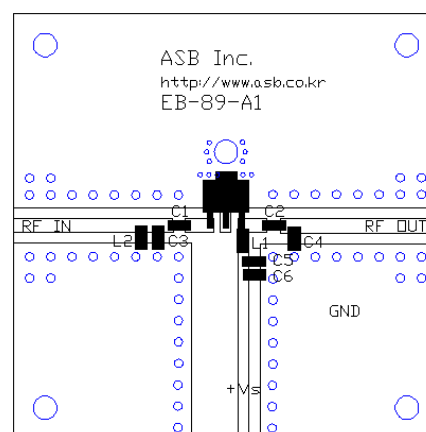
Frequency (MHz)	900
Magnitude S21 (dB)	17
Magnitude S11 (dB)	-18
Magnitude S22 (dB)	-12
Output P1dB (dBm)	21
Output IP3 ¹⁾ (dBm)	42.5
Noise Figure (dB)	1.9
Device Voltage (V)	+5
Current (mA)	110

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

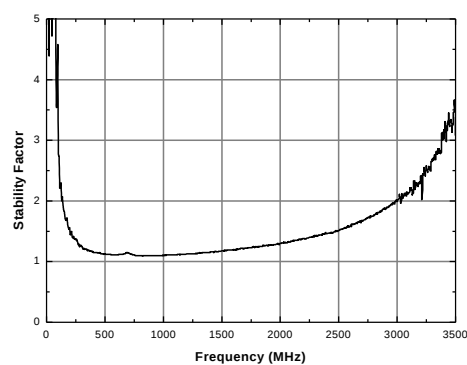
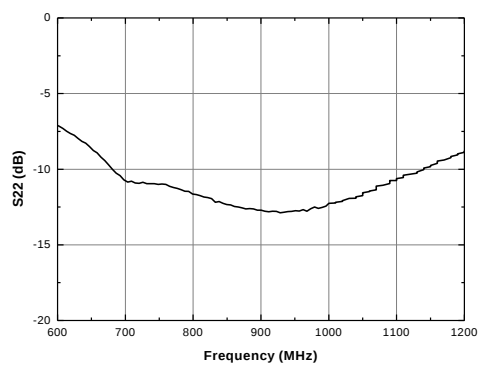
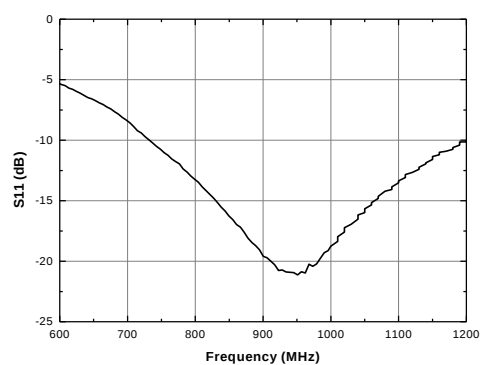
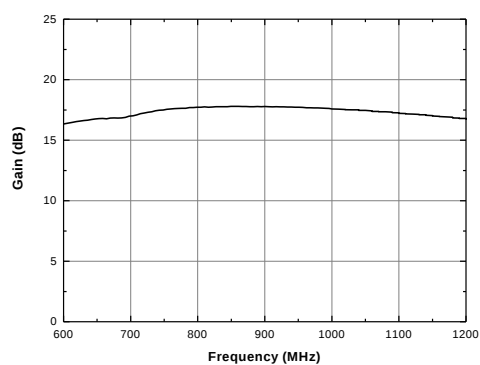
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



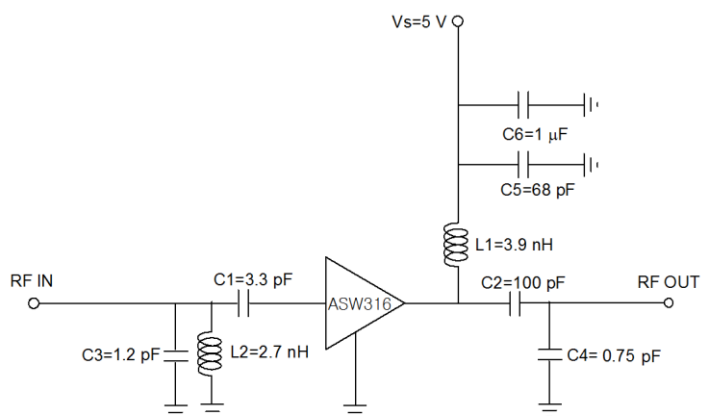
APPLICATION CIRCUIT

LTE
1745 ~ 1860 MHz
+5 V

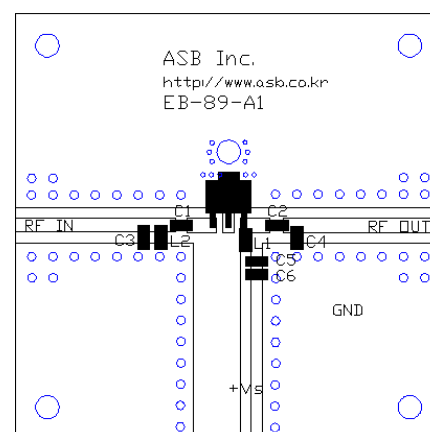
Frequency (MHz)	1745	1860
Magnitude S21 (dB)	16	16
Magnitude S11 (dB)	-18	-18
Magnitude S22 (dB)	-14	-14
Output P1dB (dBm)	22	22
Output IP3 ¹⁾ (dBm)	37	38
Noise Figure (dB)	2.4	2.4
Device Voltage (V)	+5	+5
Current (mA)	110	110

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

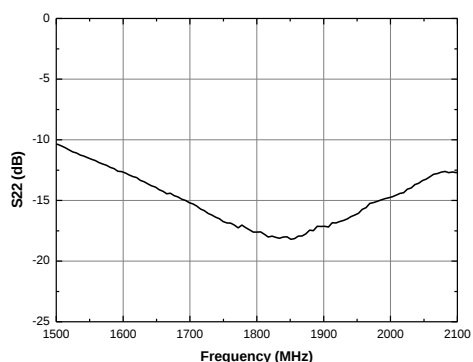
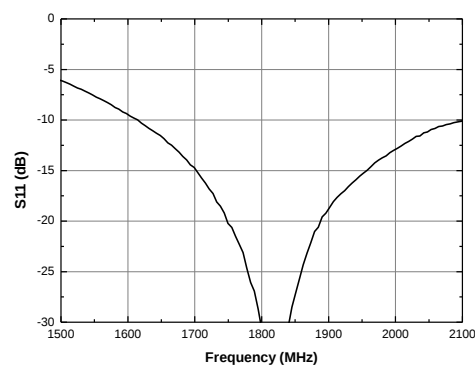
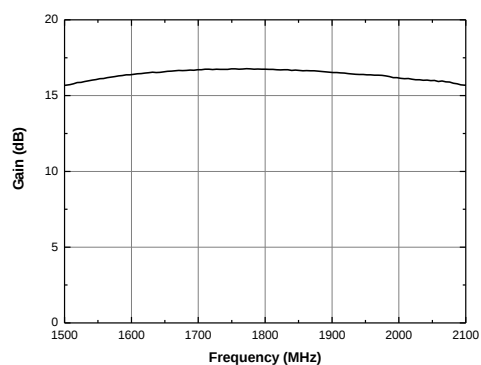
Schematic



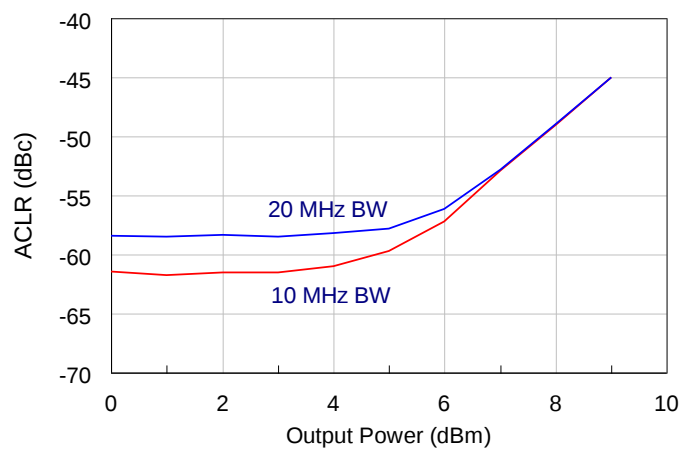
Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor

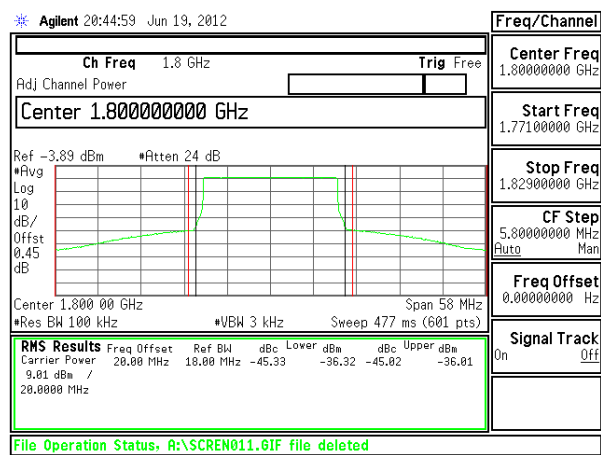


LTE ACLR – 10 MHz & 20 MHz



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

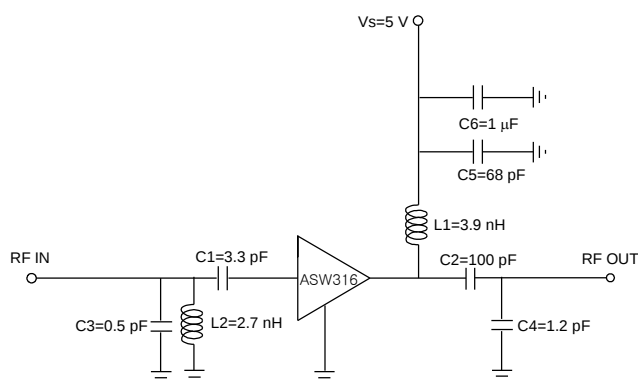
1950 MHz

+5 V

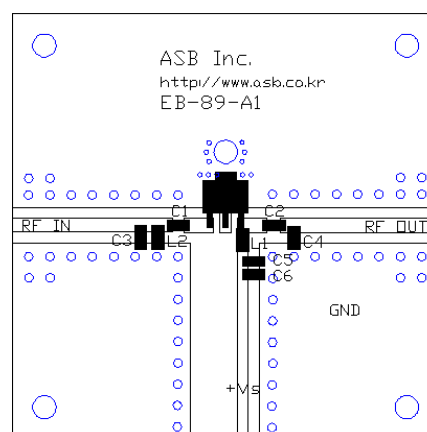
Frequency (MHz)	1950
Magnitude S21 (dB)	16
Magnitude S11 (dB)	-20
Magnitude S22 (dB)	-10
Output P1dB (dBm)	22.5
Output IP3 ¹⁾ (dBm)	39
Noise Figure (dB)	2.6
Device Voltage (V)	+5
Current (mA)	110

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

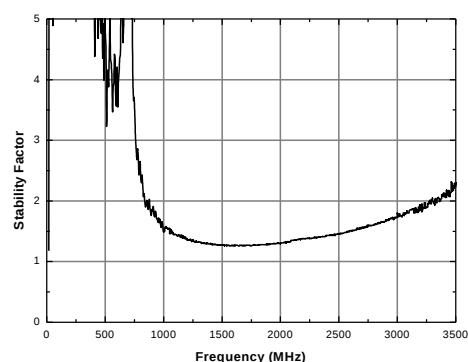
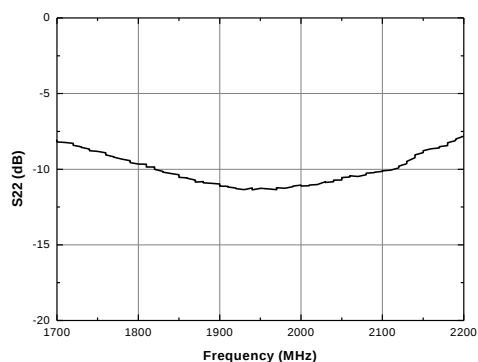
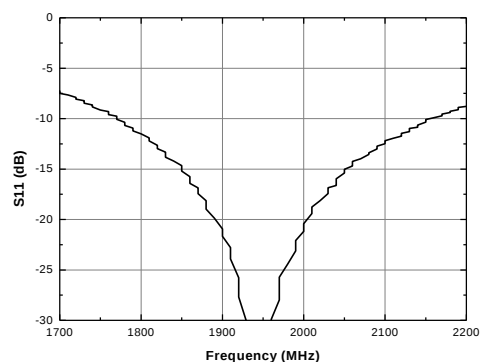
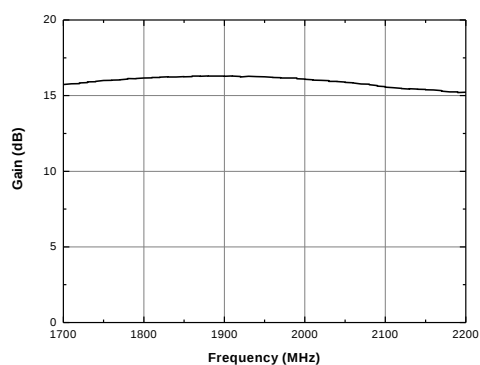
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

WLAN

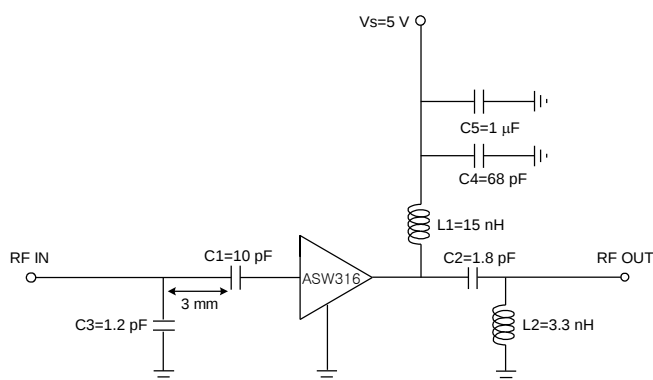
2400 MHz

+5 V

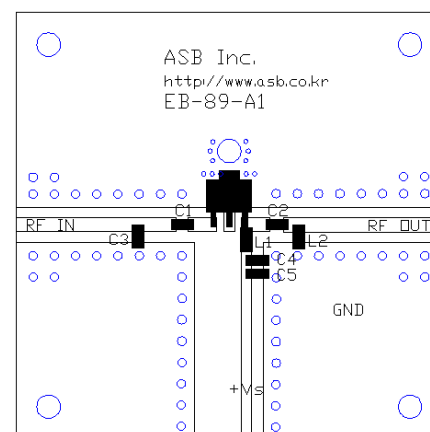
Frequency (MHz)	2400
Magnitude S21 (dB)	15.5
Magnitude S11 (dB)	-12
Magnitude S22 (dB)	-12
Output P1dB (dBm)	18
Output IP3 ¹⁾ (dBm)	38.5
Noise Figure (dB)	2.8
Device Voltage (V)	+5
Current (mA)	110

1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1 MHz.

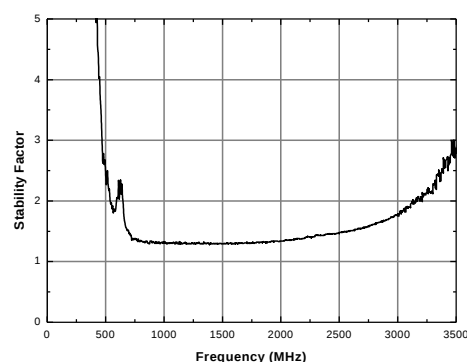
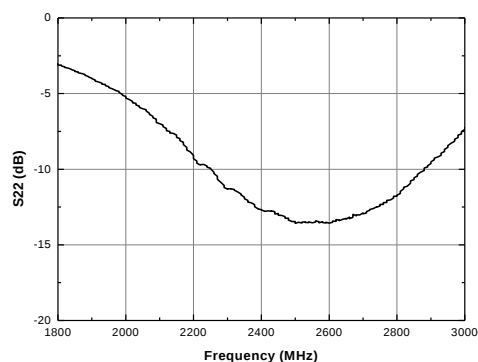
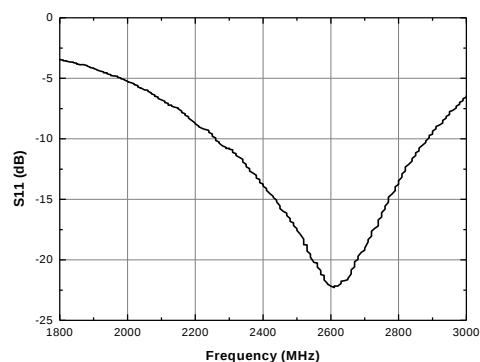
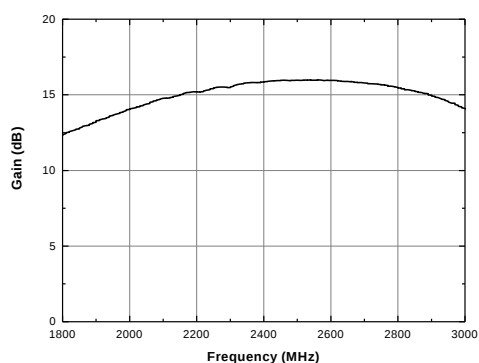
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

LTE

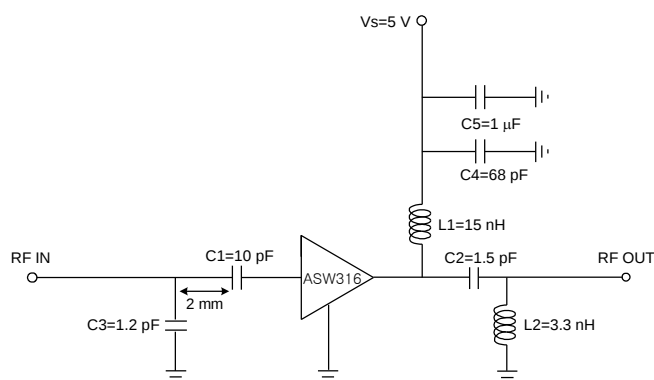
2700 MHz

+5 V

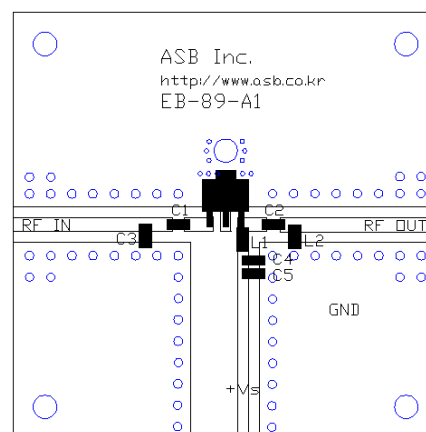
Frequency (MHz)	2700
Magnitude S21 (dB)	15.5
Magnitude S11 (dB)	-20
Magnitude S22 (dB)	-10
Output P1dB (dBm)	20
Output IP3 ¹⁾ (dBm)	38
Noise Figure (dB)	3.2
Device Voltage (V)	+5
Current (mA)	110

1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1 MHz.

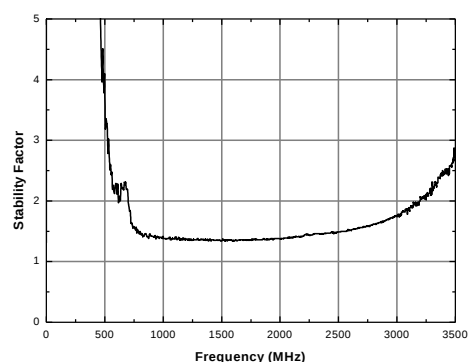
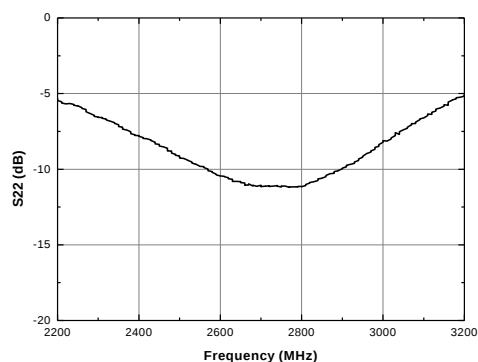
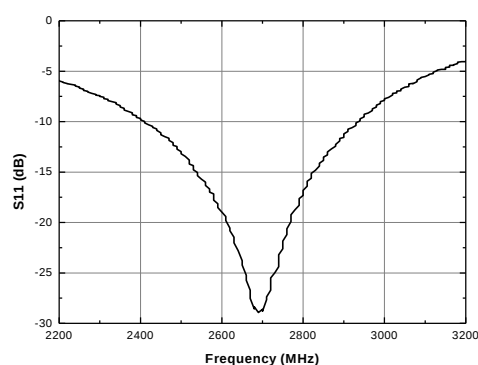
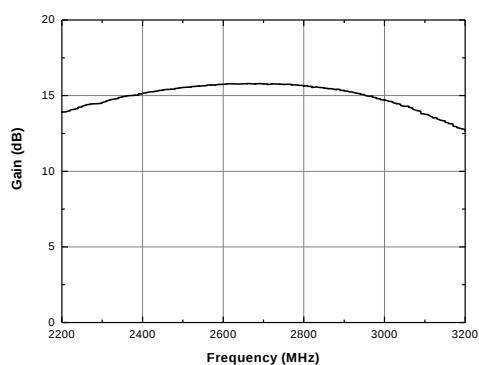
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

SMATV & Wideband

500 ~ 3000 MHz

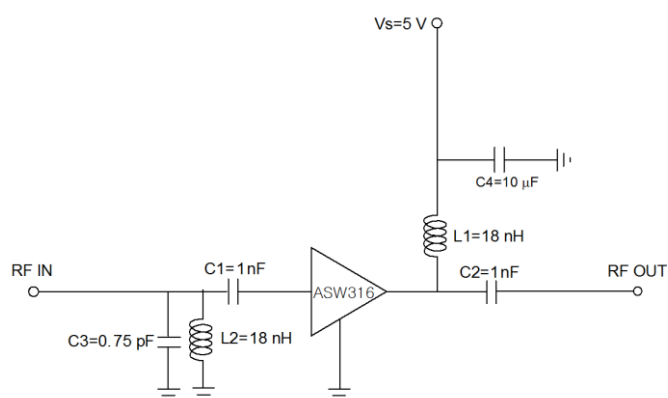
+5 V

Frequency (MHz)	500	900	2000	3000
Magnitude S21 (dB)	17.0	17.0	14.5	14.5
Magnitude S11 (dB)	-8	-9	-6	-11
Magnitude S22 (dB)	-7	-11	-6	-5
Output P1dB (dBm)	22	21	17	16
Output IP3 (dBm)	42.0 ¹⁾	40.0 ¹⁾	36.5 ¹⁾	33.5 ²⁾
Noise Figure (dB)	1.8	1.7	2.1	3.3
Device Voltage (V)	+5	+5	+5	+5
Current (mA)	110	110	110	110

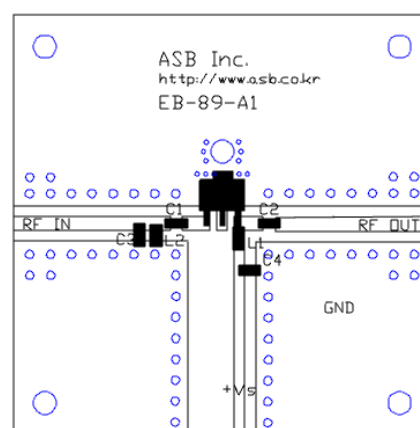
1) OIP3 is measured with two tones at an output power of +5 dBm/tone separated by 1 MHz.

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

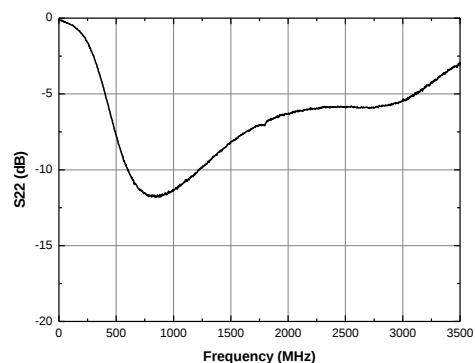
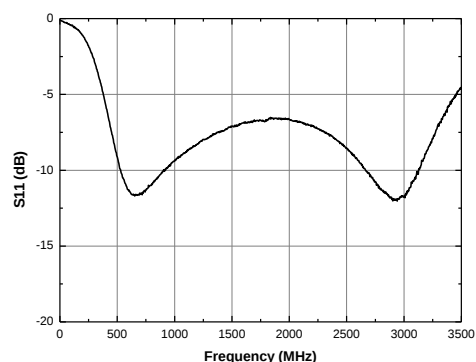
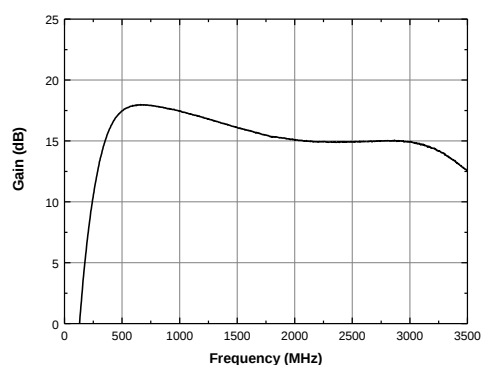
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

IF

5 ~ 1000 MHz

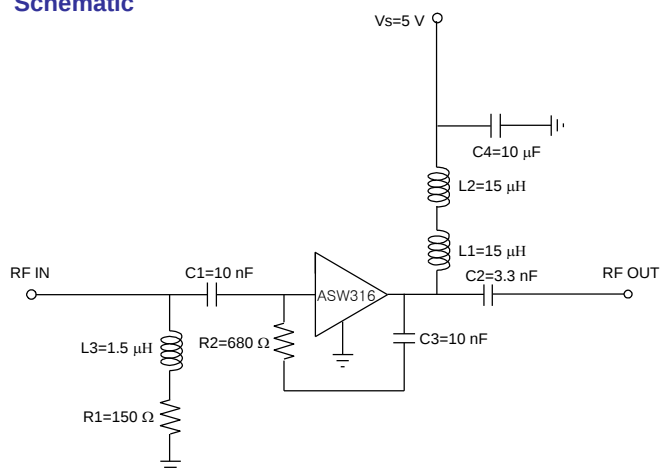
+5 V

Frequency (MHz)	5	50	1000
Magnitude S21 (dB)	14.8	14.6	13.4
Magnitude S11 (dB)	-18	-20	-11
Magnitude S22 (dB)	-10	-18	-10
Output P1dB (dBm)	20.5	21.0	21.0
Output IP3 (dBm)	40 ¹⁾	41 ¹⁾	38 ²⁾
Noise Figure (dB)	2.9	2.0	2.6
Device Voltage (V)	+5	+5	+5
Current (mA)	110	110	110

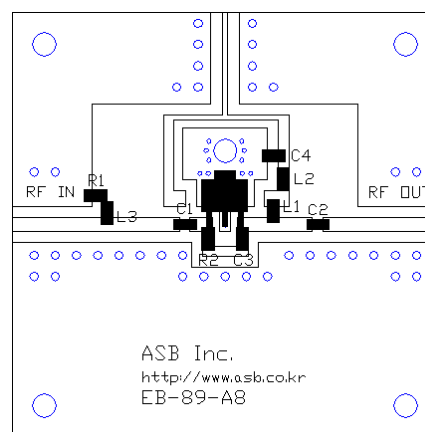
1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

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

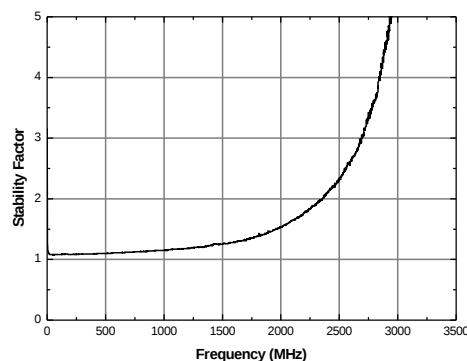
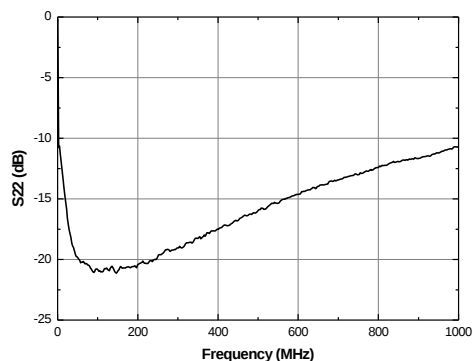
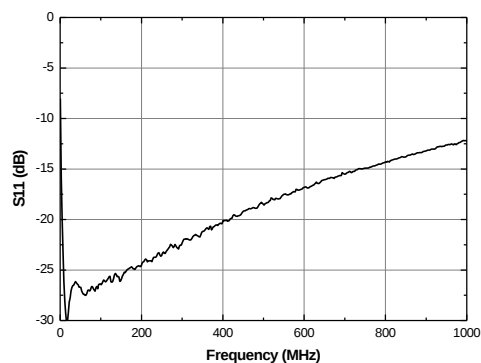
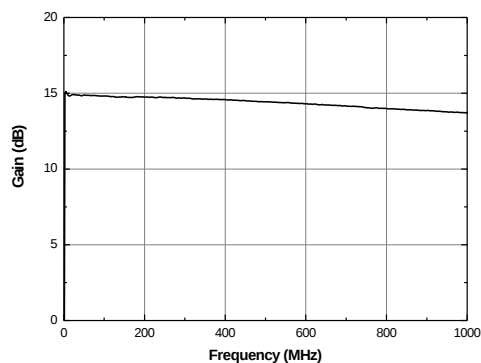
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



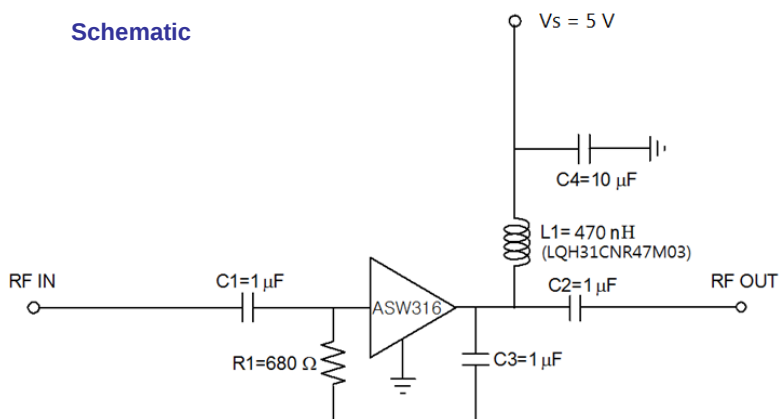
APPLICATION CIRCUIT

IF
50 ~ 1000 MHz
+5 V

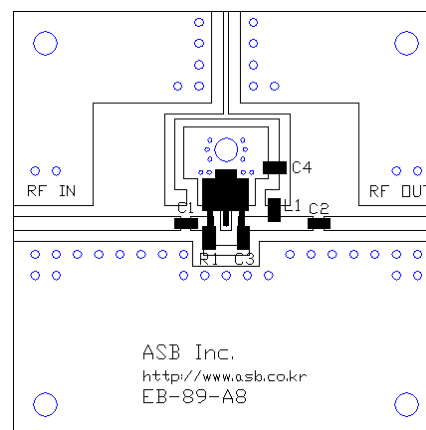
Frequency (MHz)	50	500	1000
Magnitude S21 (dB)	14.5	14.5	14.0
Magnitude S11 (dB)	-13	-17	-13
Magnitude S22 (dB)	-14	-17	-12
Output P1dB (dBm)	22.0	22.0	22.0
Output IP3 (dBm)	42	41	39
Noise Figure (dB)	2.0	2.1	2.2
Device Voltage (V)	+5	+5	+5
Current (mA)	110	110	110

1) OIP3 is measured with two tones at an output power of +8 dBm/tone separated by 1 MHz.

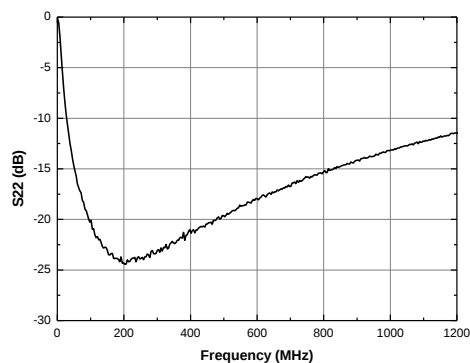
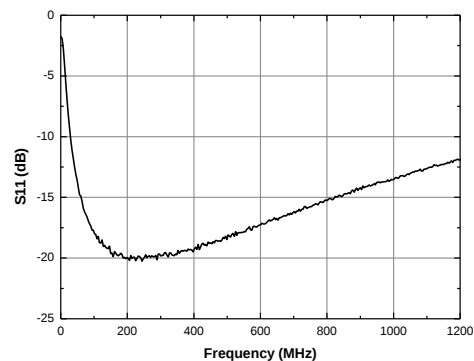
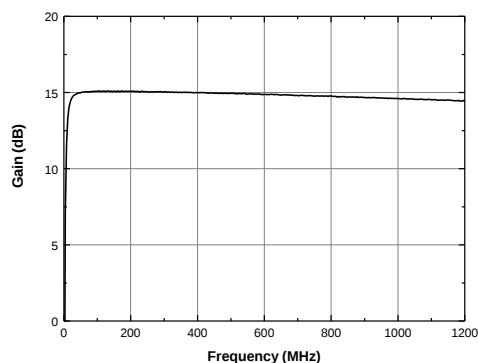
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

IF

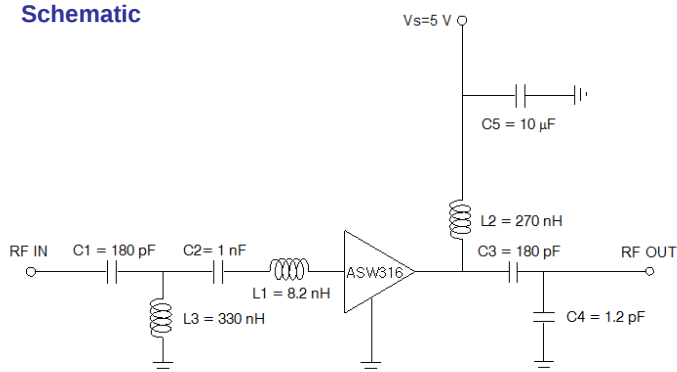
30 ~ 512 MHz

+5 V

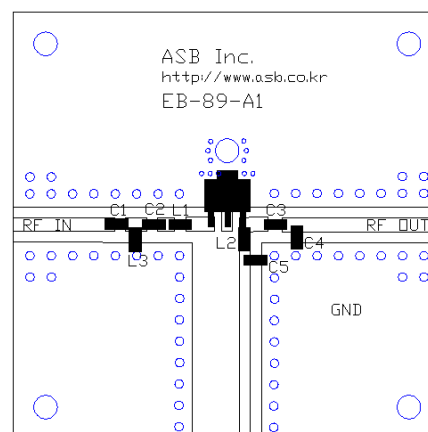
Frequency (MHz)	30	250	512
Magnitude S21 (dB)	17.8	17.6	17.3
Magnitude S11 (dB)	-7	-8	-9
Magnitude S22 (dB)	-10	-7	-7
Output P1dB (dBm)	20	22	22
Output IP3 (dBm) ¹⁾	46	45	40
Noise Figure (dB)	1.6	1.9	1.9
Device Voltage (V)	+5	+5	+5
Current (mA)	110	110	110

1) OIP3 is measured with two tones at an output power of +8 dBm/tone separated by 1 MHz.

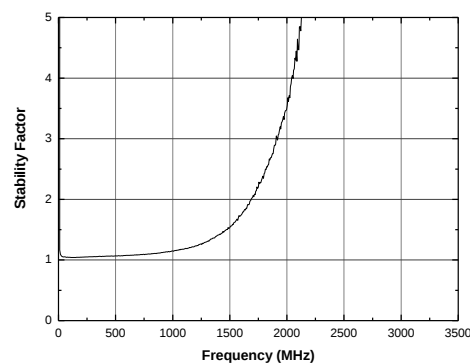
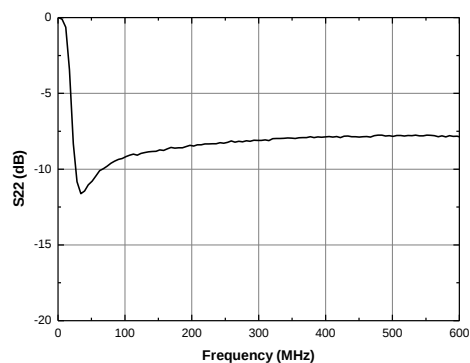
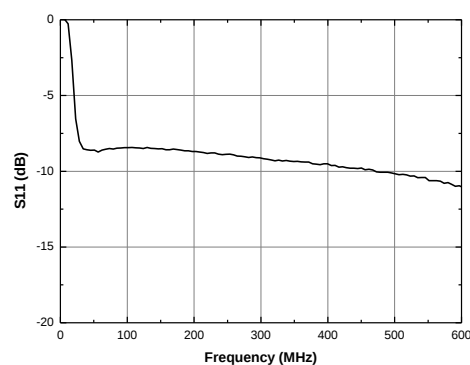
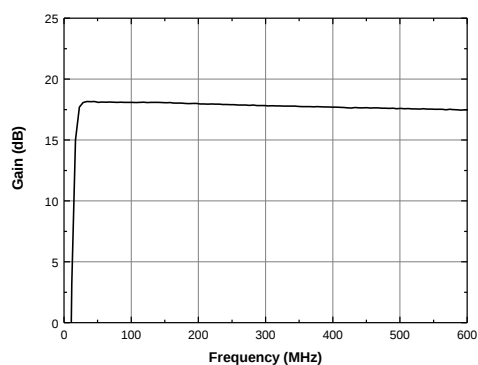
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



Recommended Soldering Reflow Profile

