

Features

- 17.5 dB Gain at 900 MHz
- 26 dBm P1dB at 900 MHz
- 44 dBm Output IP3 at 900 MHz
- 2.0 dB NF at 900 MHz
- MTTF > 100 Years
- Single Supply

Description

The ASW338, 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 °C, Z_0 = 50 Ω)

Parameters	Units	Typical	
Frequency	MHz	900	1950
Gain	dB	17.5	16.5
S11	dB	-14	-14
S22	dB	-18	-14
Output IP3	dBm	44 ¹⁾	43 ²⁾
Noise Figure	dB	2.0	2.2
Output P1dB	dBm	26	25
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.

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

Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		900	
Gain	dB	17.0	17.5	18.0
S11	dB		-14	
S22	dB		-18	
Output IP3	dBm		44	
Noise Figure	dB		2.0	2.2
Output P1dB	dBm	25	26	
Current	mA	110	120	130
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 as in 1950 MHz application circuit)*	+26 dBm
Thermal Resistance	43 °C/W

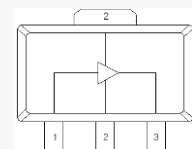
* Please find the max. input power data from http://www.asb.co.kr/pdf/Maximum_Input_Power_Analysis.pdf

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

Application Circuit

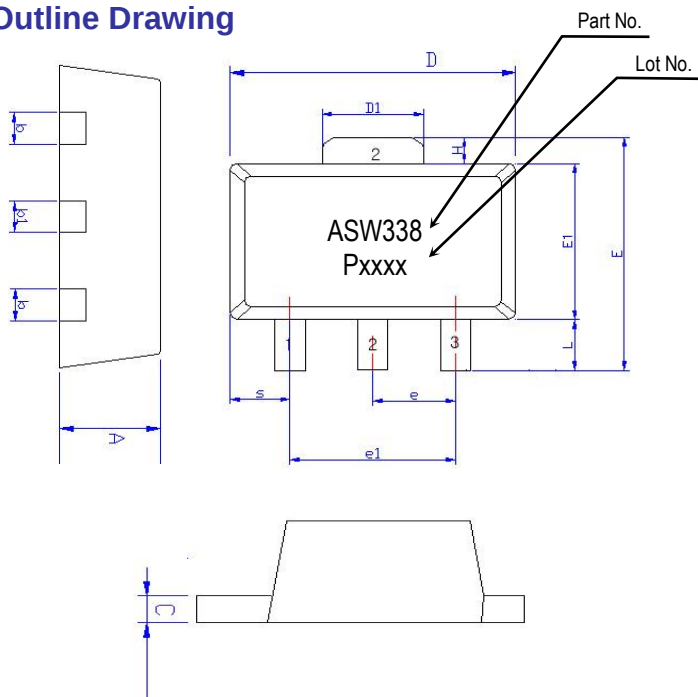
- IF (100 ~ 300 MHz)
- RFID (13.5 MHz)
- IF (10 ~ 100 MHz)
- IF (30 ~ 520 MHz)
- IF (140 +/- 25 MHz)
- LTE (698 ~ 787 MHz)
- CMMB
- CDMA & GSM (900 MHz)
- LTE (1745 ~ 1860 MHz)
- Wide Band (1700 ~ 2700 MHz)
- Wide Band (50 ~ 1500 MHz)
- Wide Band (350 ~ 3000 MHz)
- CATV (50 ~ 1000 MHz, 75 Ω)

Pin Configuration



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

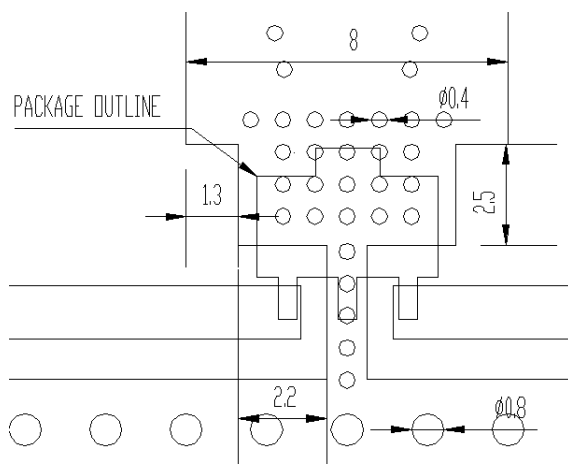
Outline Drawing



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

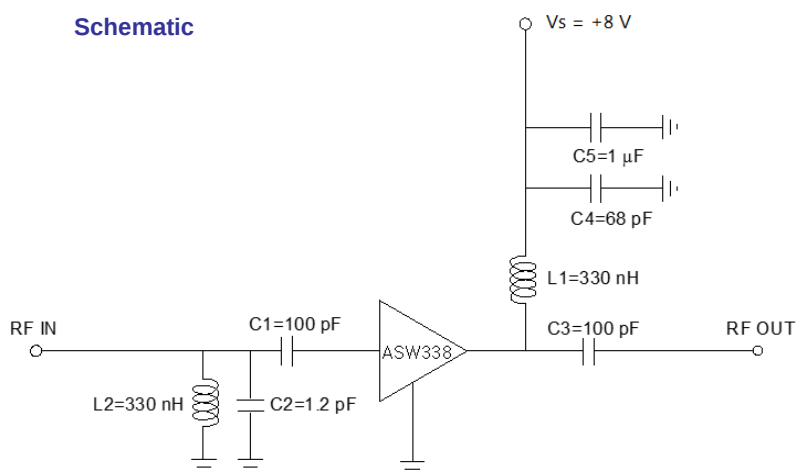
APPLICATION CIRCUIT

IF
100 ~ 300 MHz
+8 V

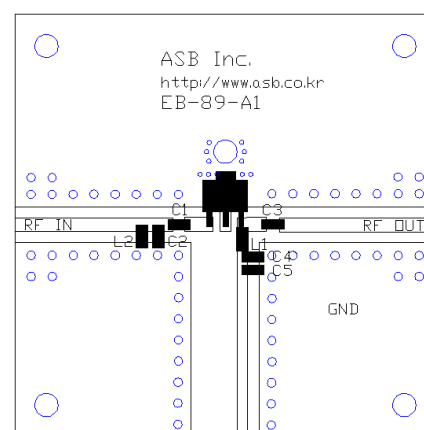
Frequency (MHz)	100	240
Magnitude S21 (dB)	19.0	18.5
Magnitude S11 (dB)	-14	-13
Magnitude S22 (dB)	-15	-14
Output P1dB (dBm)	26	26
Output IP3 ¹⁾ (dBm)	46	47
Noise Figure (dB)	1.7	1.9
Device Voltage (V)	+8	+8
Current (mA)	120	120

1) OIP3 is measured with two tones at an output power of +13 dBm/tone separated by 1 MHz.

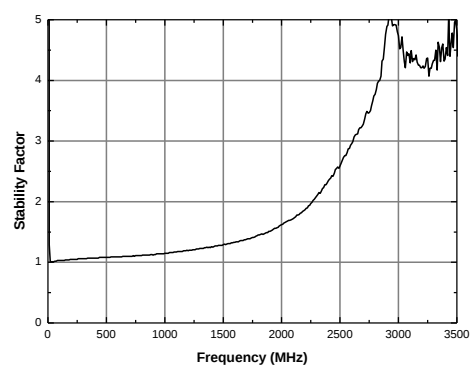
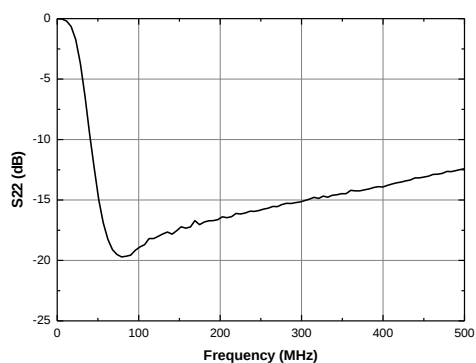
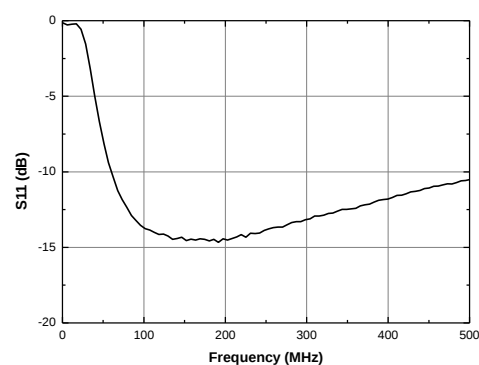
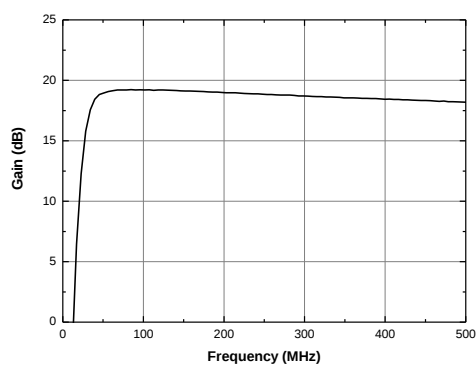
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)

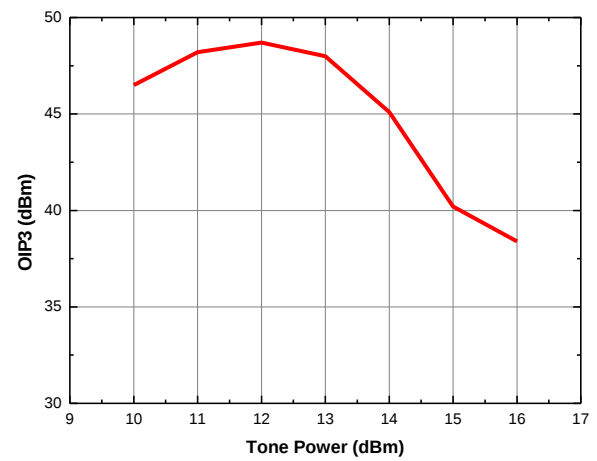


S-parameters & K-factor



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

Tone power(dBm)	OIP3(dBm)
10	46.5
11	48.2
12	48.7
13	48
14	45.1
15	40.2
16	38.4



APPLICATION CIRCUIT

RFID

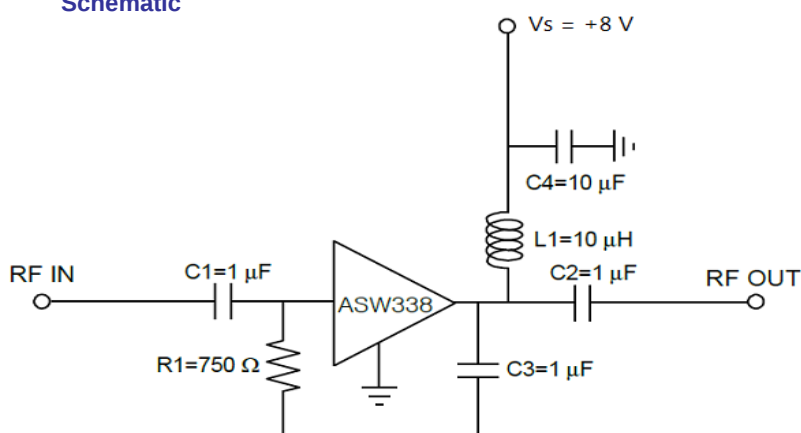
13.5 MHz

+8 V

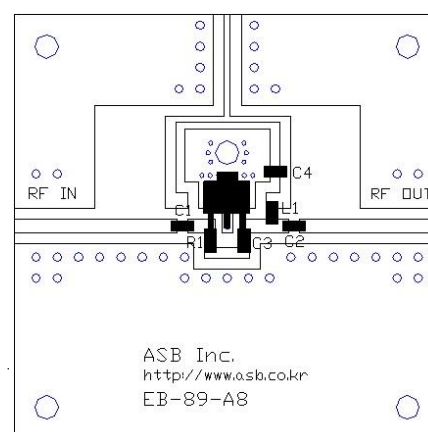
Frequency (MHz)	13.5
Magnitude S21 (dB)	17.5
Magnitude S11 (dB)	-10
Magnitude S22 (dB)	-20
Output P1dB (dBm)	25
Output IP3 ¹⁾ (dBm)	41
Noise Figure (dB)	2.2
Device Voltage (V)	+8
Current (mA)	120

1) OIP3 is measured with two tones at an output power of +13 dBm/tone separated by 1 MHz.

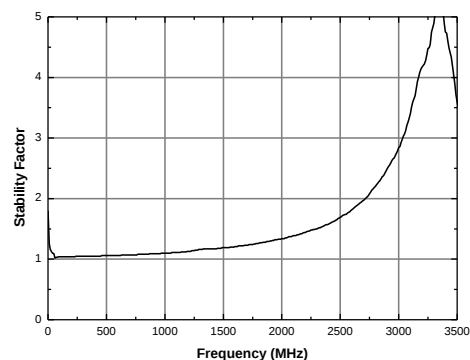
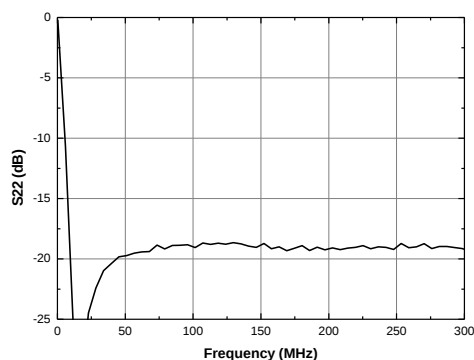
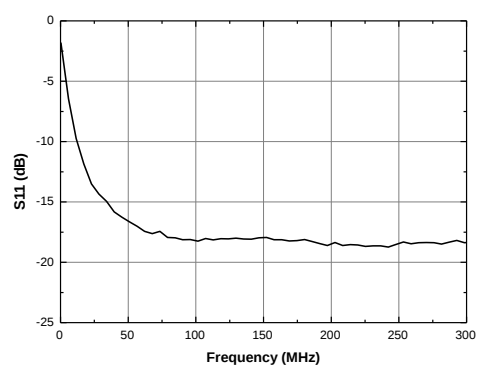
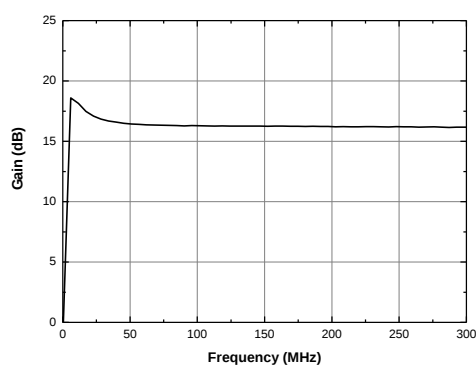
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



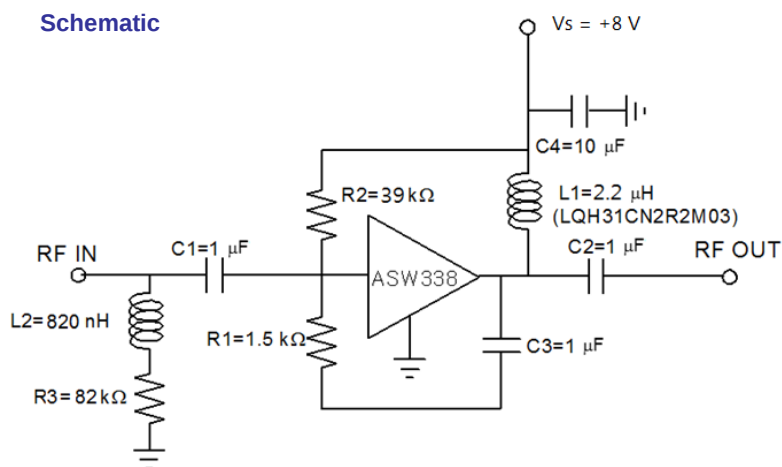
APPLICATION CIRCUIT

IF
10 ~ 100 MHz
+8 V

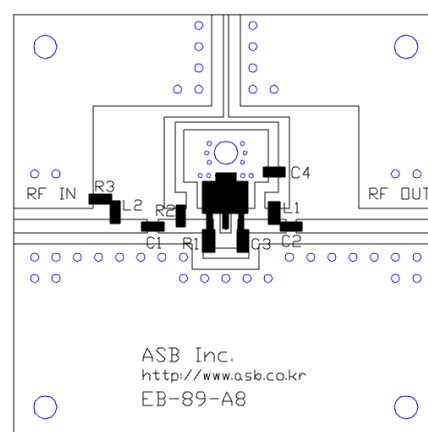
Frequency (MHz)	10	100
Magnitude S21 (dB)	16.0	15.5
Magnitude S11 (dB)	-14	-14
Magnitude S22 (dB)	-14	-14
Output P1dB (dBm)	25	26
Output IP3 ¹⁾ (dBm)	41.0	48.0
Noise Figure (dB)	4.6	2.0
Device Voltage (V)	+8	+8
Current (mA)	170	170

1) OIP3 is measured with two tones at an output power of +15 dBm/tone separated by 1 MHz.

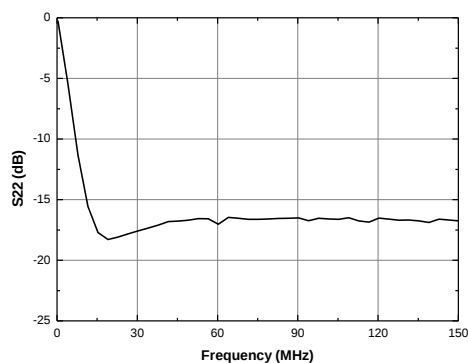
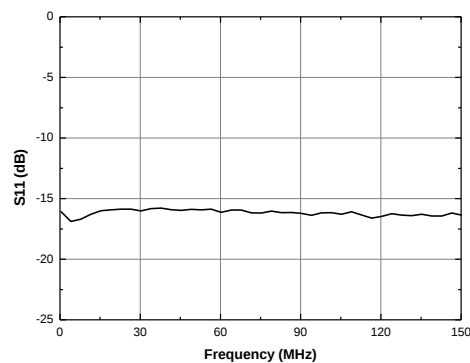
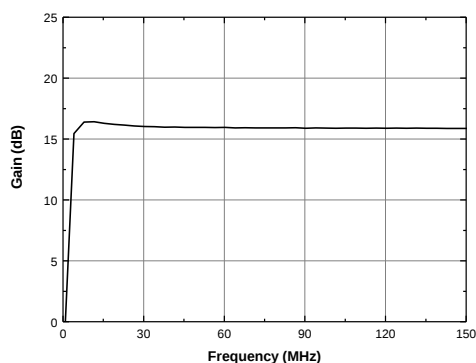
Schematic



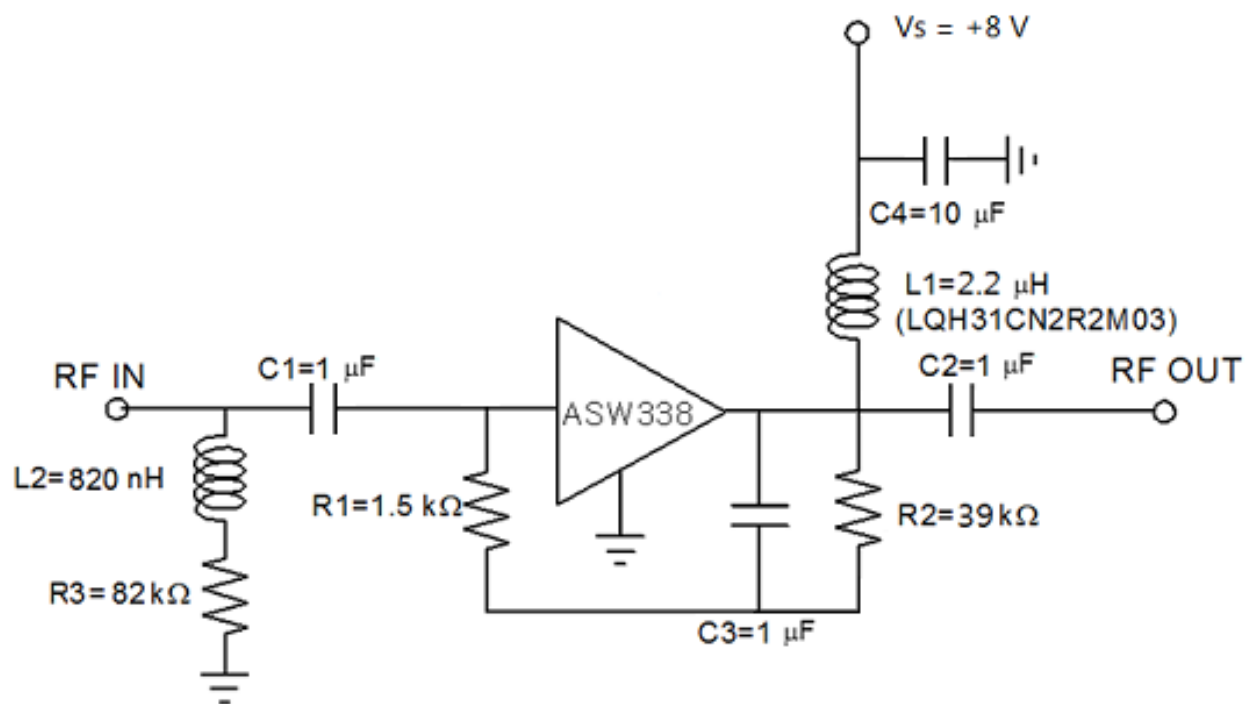
Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



ALTERNATIVE APPLICATION CIRCUIT



APPLICATION CIRCUIT

IF

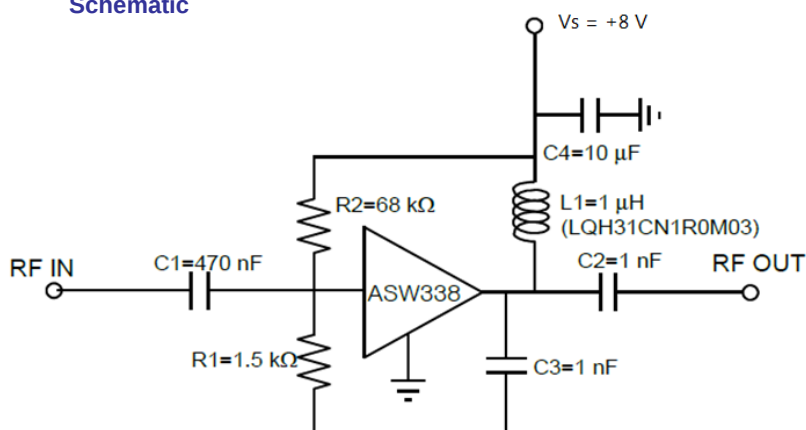
30 ~ 520 MHz

+8 V

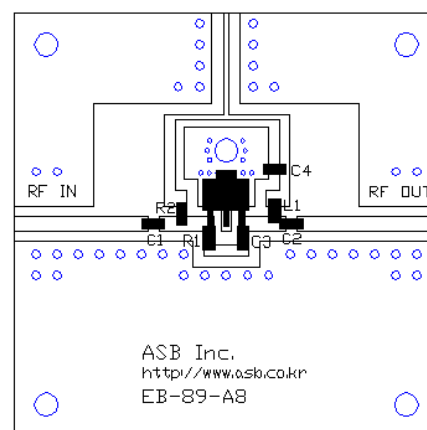
Frequency (MHz)	30	250	520
Magnitude S21 (dB)	17.0	17.0	16.5
Magnitude S11 (dB)	-8	-18	-18
Magnitude S22 (dB)	-18	-18	-18
Output P1dB (dBm)	26	26	26
Output IP3 ¹⁾ (dBm)	44.0 /39.5	48.0 /41.0	44.0 /36.5
Noise Figure (dB)	1.8	1.7	1.8
Device Voltage (V)	+8	+8	+8
Current (mA)	150	150	150

1) OIP3 is measured with two tones at an output power of +13/+17 dBm/tone separated by 1 MHz.

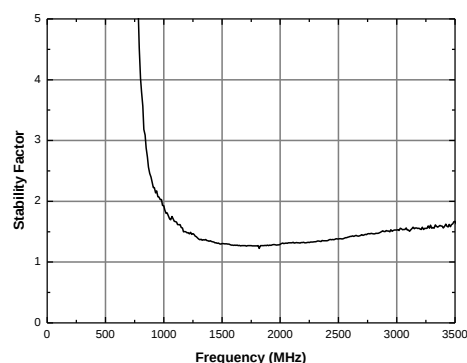
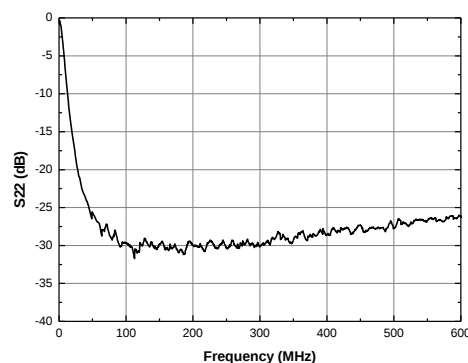
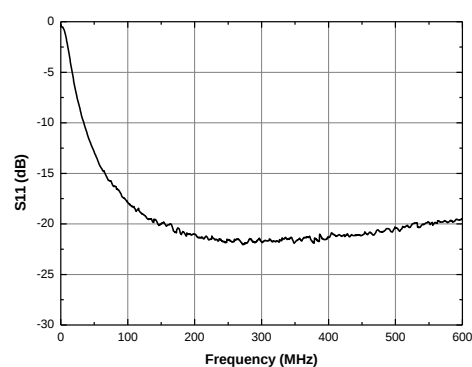
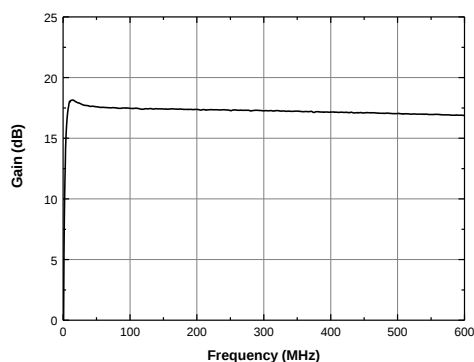
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



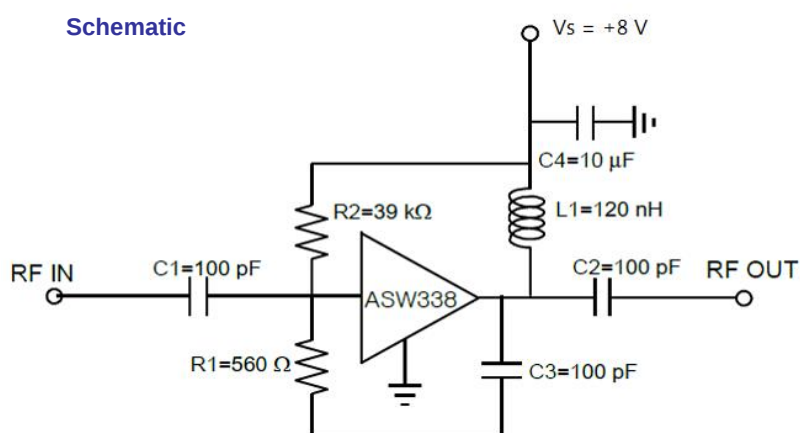
APPLICATION CIRCUIT

IF
140 +/- 25 MHz
+8 V

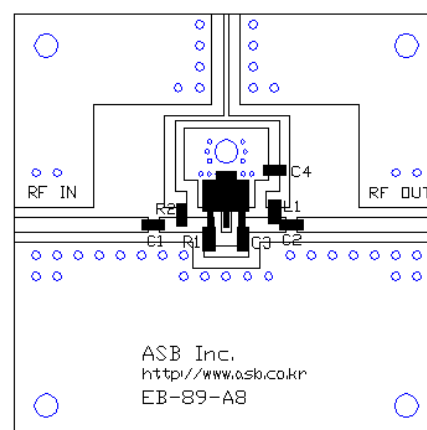
Frequency (MHz)	115	140	165
Magnitude S21 (dB)	14.4	14.6	14.7
Magnitude S11 (dB)	-9	-10	-11
Magnitude S22 (dB)	-10	-11	-11
Output P1dB (dBm)	25	25	25
Output IP3 ¹⁾ (dBm)	47	48	48
Noise Figure (dB)	2.2	2.2	2.2
Device Voltage (V)	+8	+8	+8
Current (mA)	170	170	170

1) OIP3 is measured with two tones at an output power of +13 dBm/tone separated by 1 MHz.

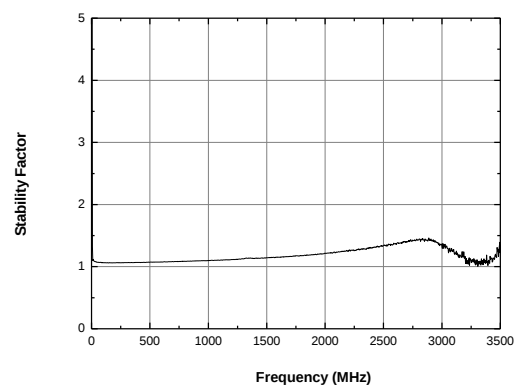
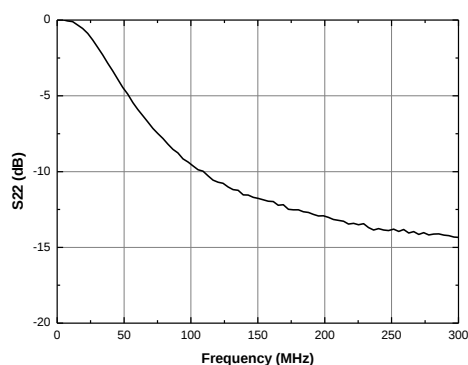
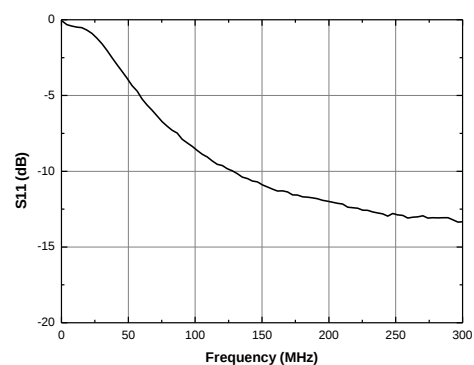
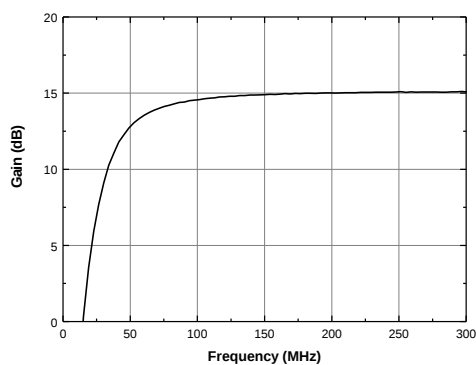
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



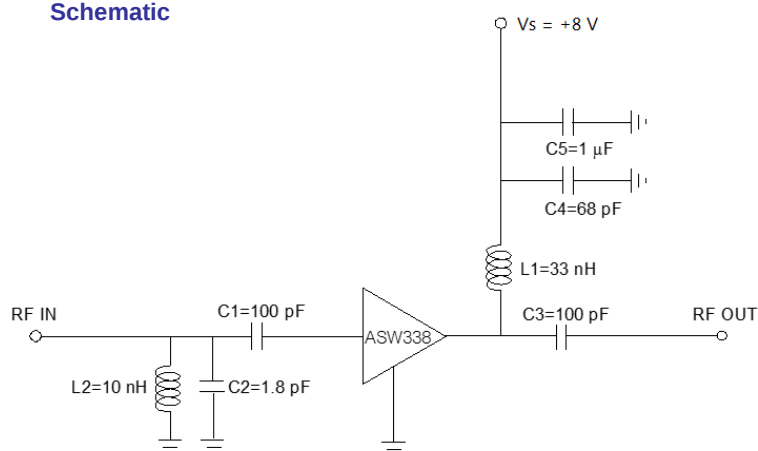
APPLICATION CIRCUIT

LTE
698 ~ 787 MHz
+8 V

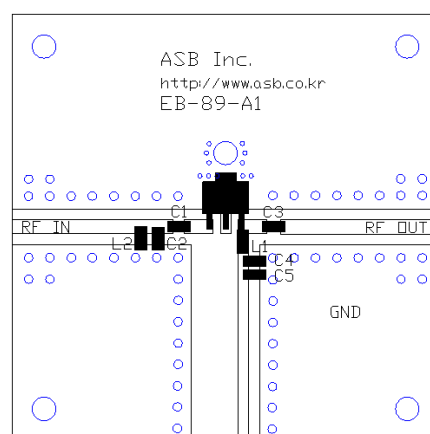
Frequency (MHz)	698 ~ 787
Magnitude S21 (dB)	17.5
Magnitude S11 (dB)	-17
Magnitude S22 (dB)	-18
Output P1dB (dBm)	26
Output IP3 ¹⁾ (dBm)	44
Noise Figure (dB)	1.7
Device Voltage (V)	+8
Current (mA)	120

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

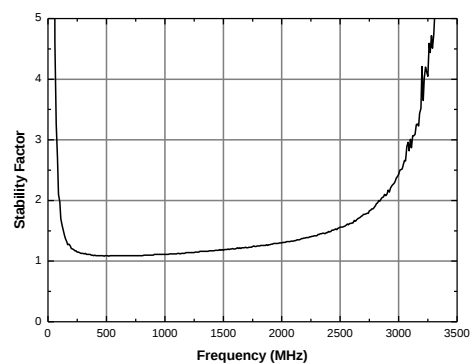
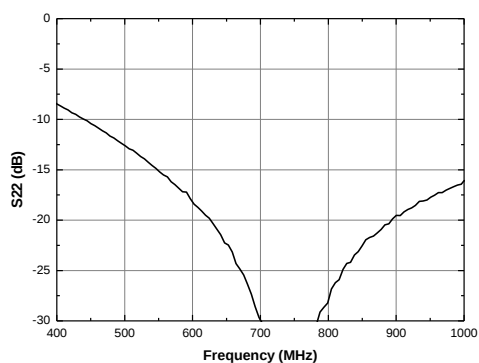
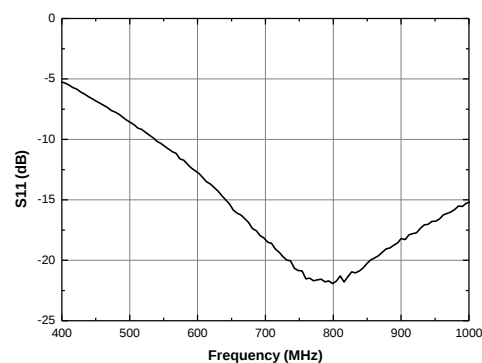
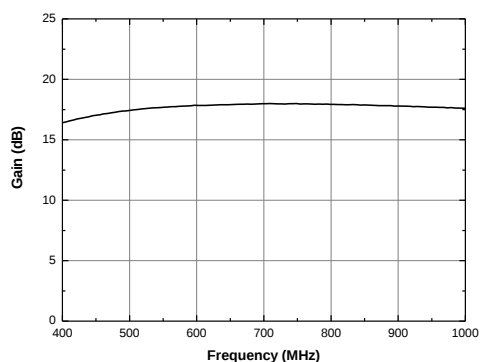
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

CMMB

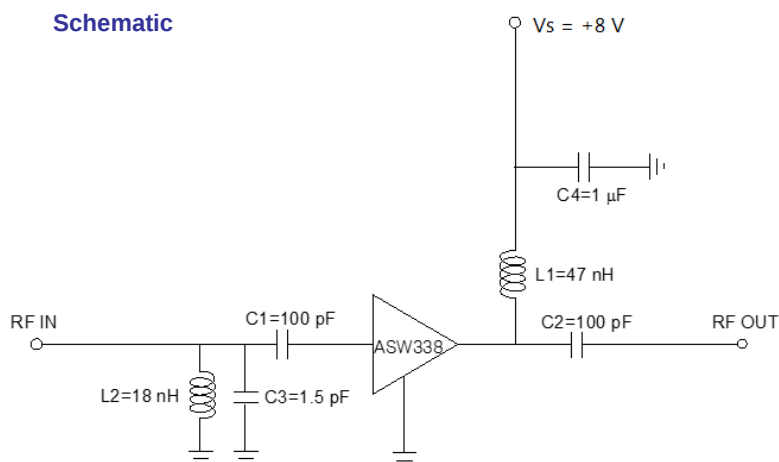
470 ~ 860 MHz

+8 V

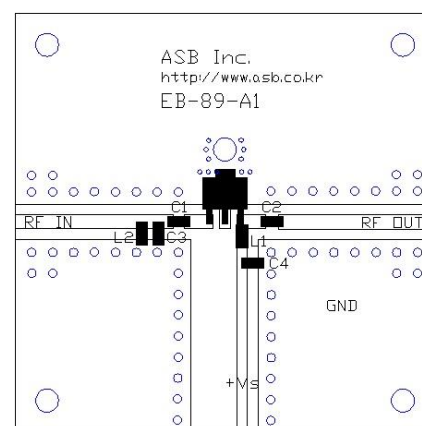
Frequency (MHz)	470	860
Magnitude S21 (dB)	17.5	17.5
Magnitude S11 (dB)	-15	-16
Magnitude S22 (dB)	-15	-16
Output P1dB (dBm)	26	26
Output IP3 ¹⁾ (dBm)	46.0	41.5
Noise Figure (dB)	2.0	1.7
Device Voltage (V)	+8	+8
Current (mA)	120	120

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

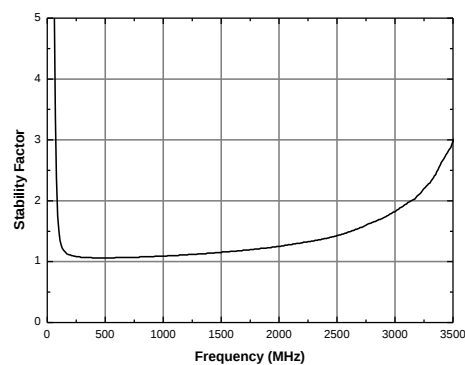
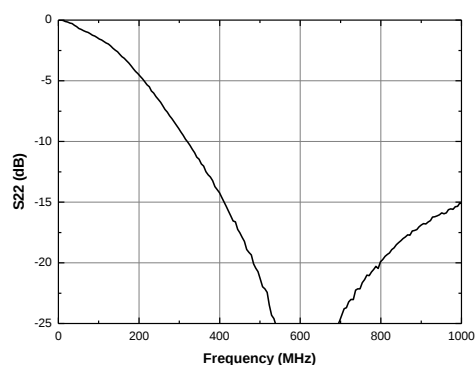
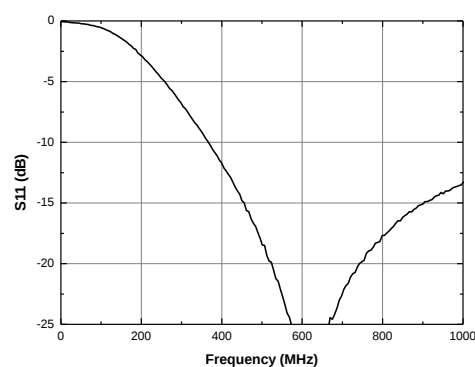
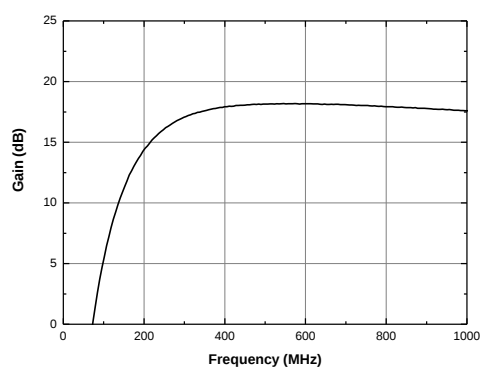
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

CDMA & GSM

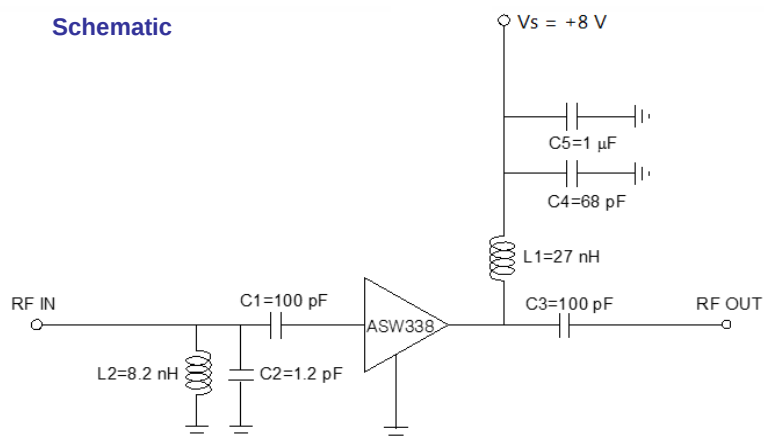
900 MHz

+8 V

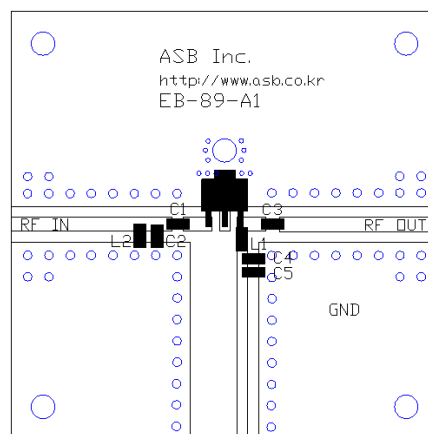
Frequency (MHz)	900
Magnitude S ₂₁ (dB)	17.5
Magnitude S ₁₁ (dB)	-14
Magnitude S ₂₂ (dB)	-18
Output P _{1dB} (dBm)	26
Output IP ₃ ¹⁾ (dBm)	44
Noise Figure (dB)	2.0
Device Voltage (V)	+8
Current (mA)	120

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

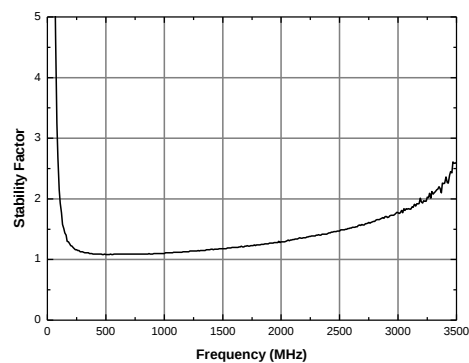
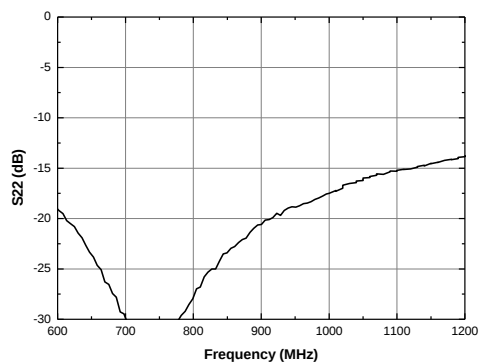
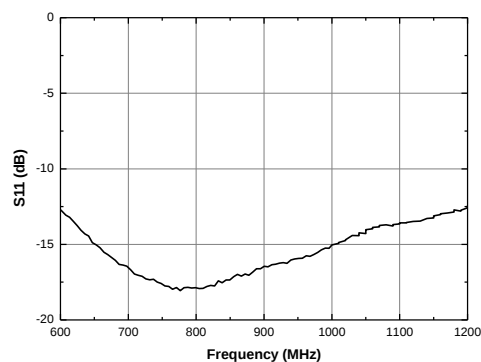
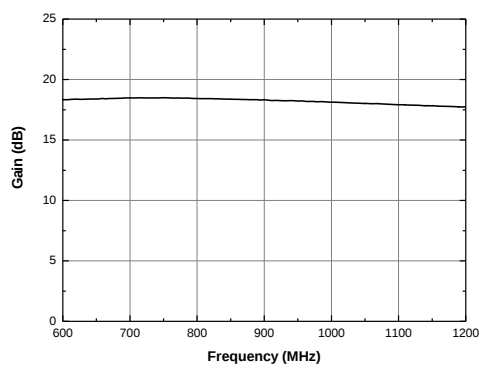
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



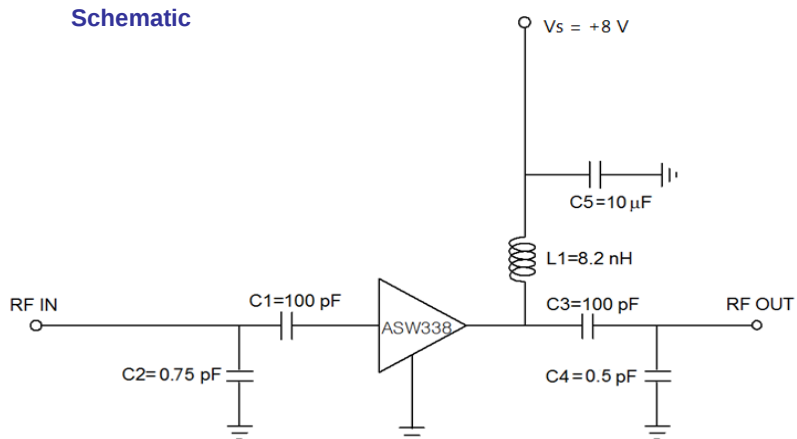
APPLICATION CIRCUIT

LTE
1745 ~ 1860 MHz
+8 V

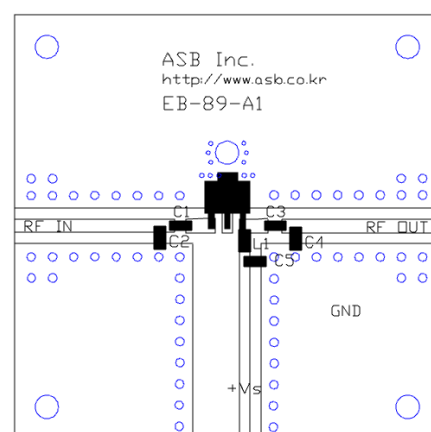
Frequency (MHz)	1745	1860
Magnitude S21 (dB)	16.0	16.0
Magnitude S11 (dB)	-12	-12
Magnitude S22 (dB)	-11	-11
Output P1dB (dBm)	25	24
Output IP3 ¹⁾ (dBm)	42.0	41.5
Noise Figure (dB)	2.1	2.1
Device Voltage (V)	+8	+8
Current (mA)	120	120

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

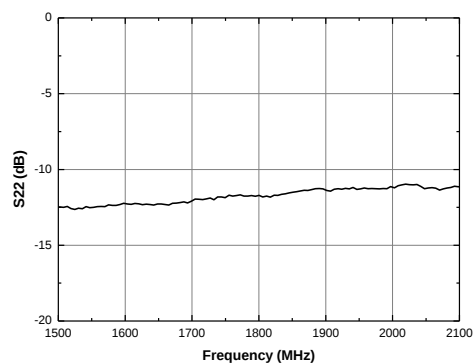
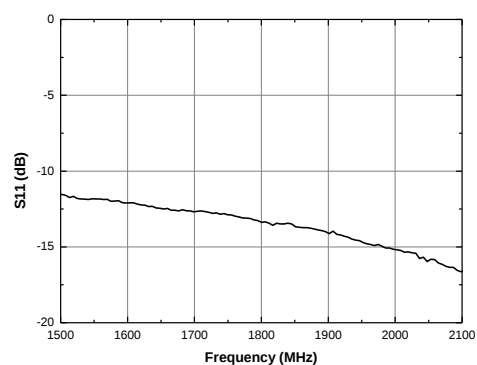
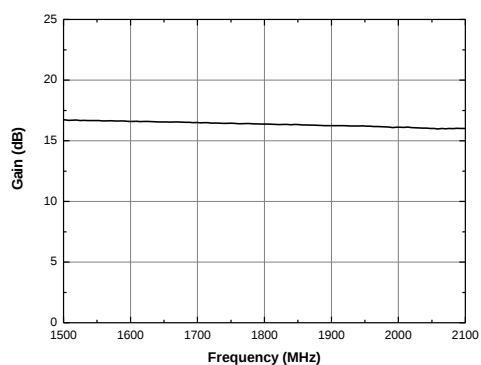
Schematic



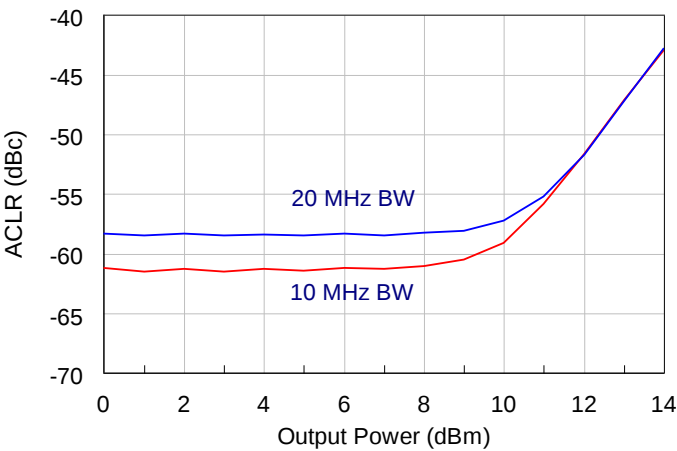
Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor

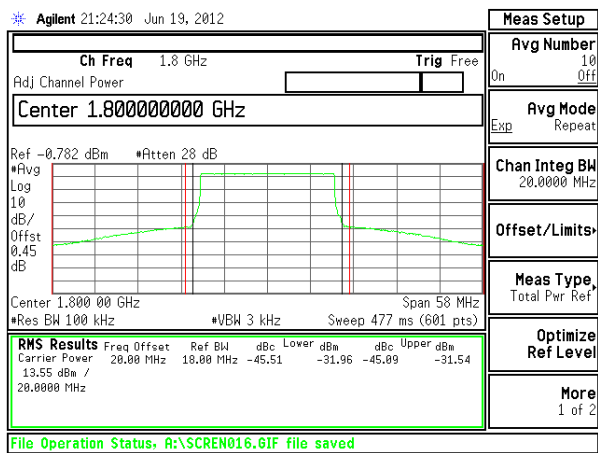


LTE ACLR – 10 MHz & 20 MHz



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

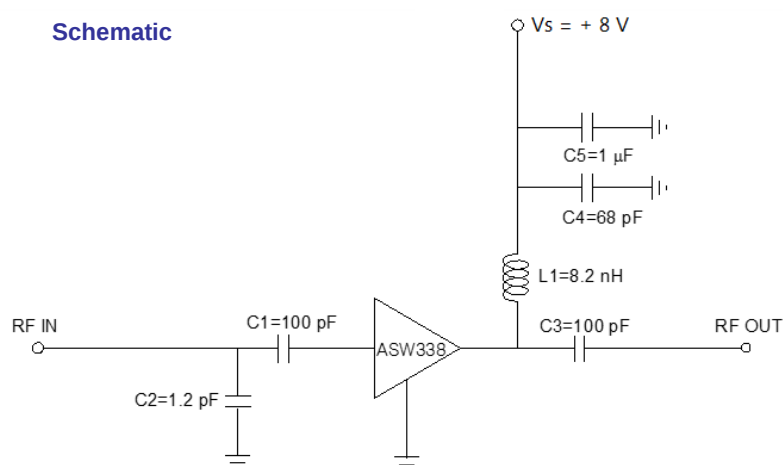
APPLICATION CIRCUIT

Wide Band
1700 ~ 2700 MHz
+8 V

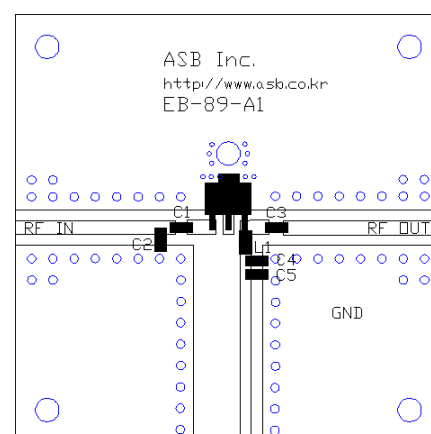
Frequency (MHz)	1950	2450
Magnitude S21 (dB)	16.5	16.0
Magnitude S11 (dB)	-14	-14
Magnitude S22 (dB)	-14	-14
Output P1dB (dBm)	25	22
Output IP3 ¹⁾ (dBm)	43.0	41.5
Noise Figure (dB)	2.2	2.8
Device Voltage (V)	+8	+8
Current (mA)	120	120

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

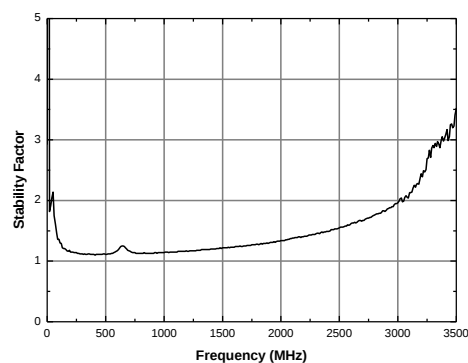
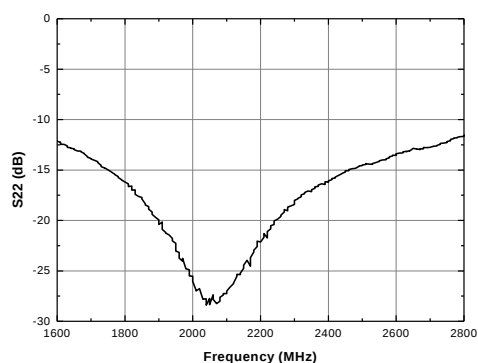
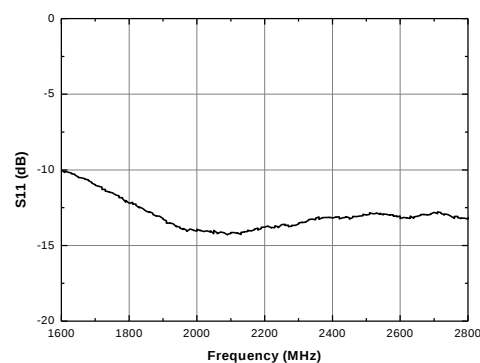
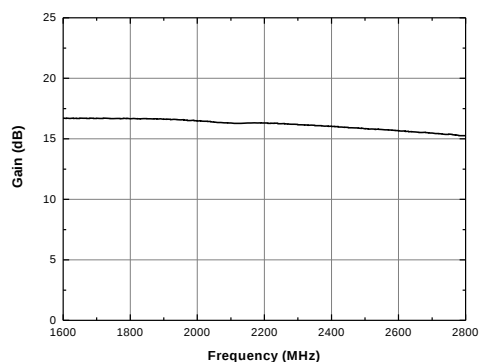
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

Wide Band

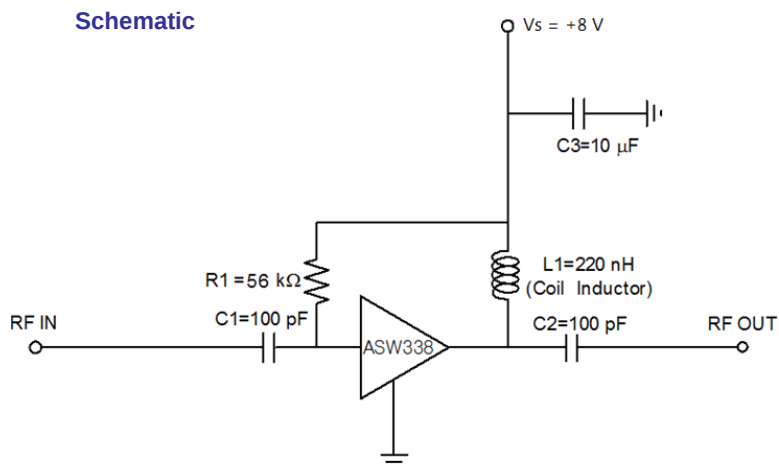
50 ~ 1500 MHz

+8 V

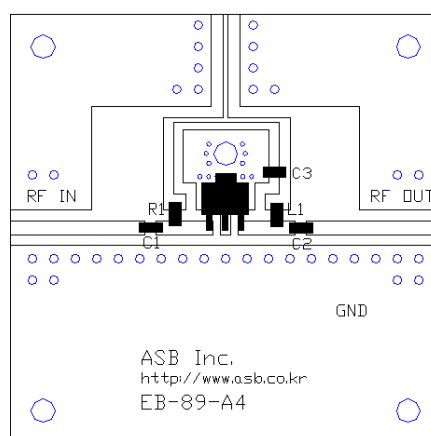
Frequency (MHz)	50	1000	1500
Magnitude S21 (dB)	17.9	17.6	16.7
Magnitude S11 (dB)	-5	-13	-11
Magnitude S22 (dB)	-10	-14	-11
Output P1dB (dBm)	25	26	26
Output IP3 ¹⁾ (dBm)	46	45	44
Noise Figure (dB)	1.8	1.8	2.0
Device Voltage (V)	+8	+8	+8
Current (mA)	150	150	150

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

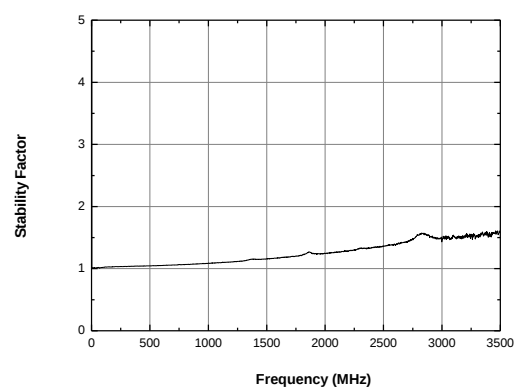
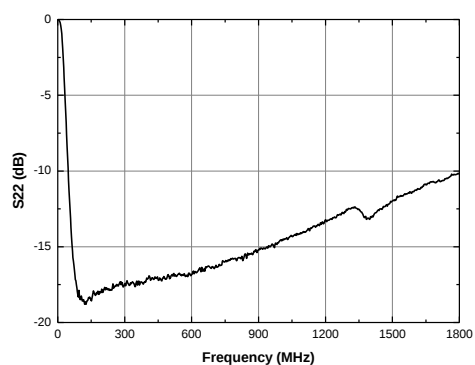
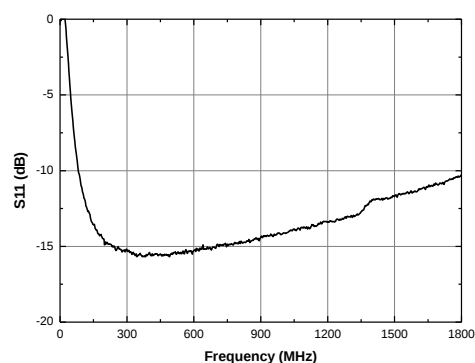
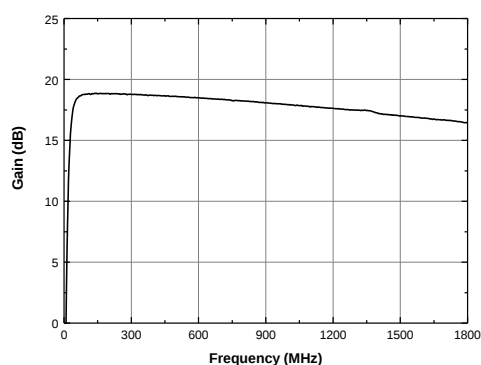
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



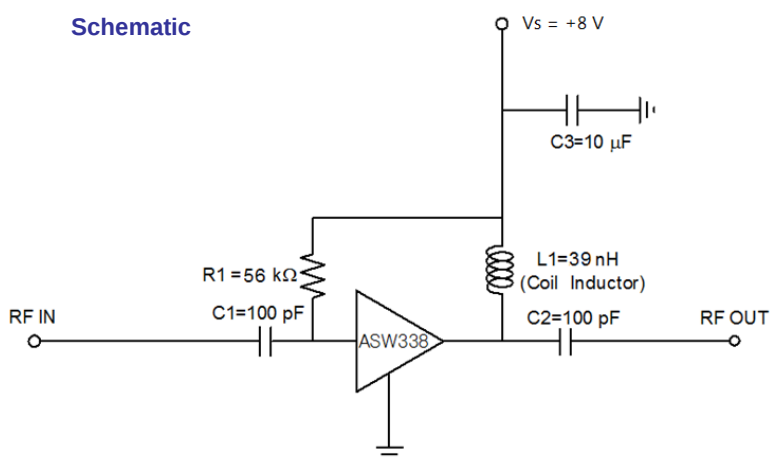
APPLICATION CIRCUIT

Wide Band
350 ~ 3000 MHz
+8 V

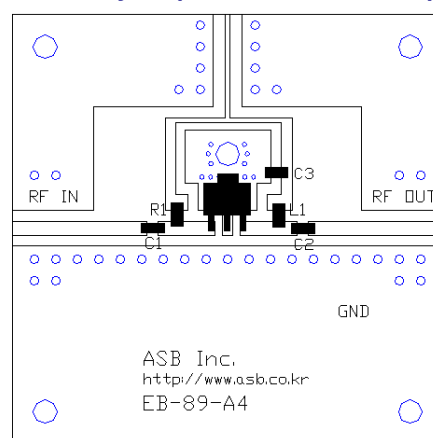
Frequency (MHz)	350	1500	2000	2400	3000
Magnitude S21 (dB)	18.0	17.0	16.0	15.5	14.6
Magnitude S11 (dB)	-9	-12	-10	-8	-6
Magnitude S22 (dB)	-10	-12	-10	-8	-5
Output P1dB (dBm)	25.5	25.5	25.0	20.5	20.0
Output IP3 ¹⁾ (dBm)	45.0	44.0	43.0	40.5	40.5
Noise Figure (dB)	2.0	2.0	2.4	2.8	-
Device Voltage (V)	+8	+8	+8	+8	+8
Current (mA)	150	150	150	150	150

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

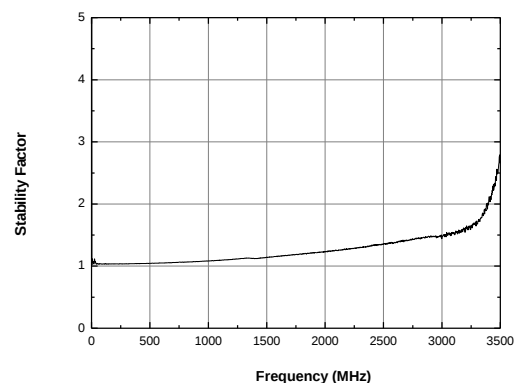
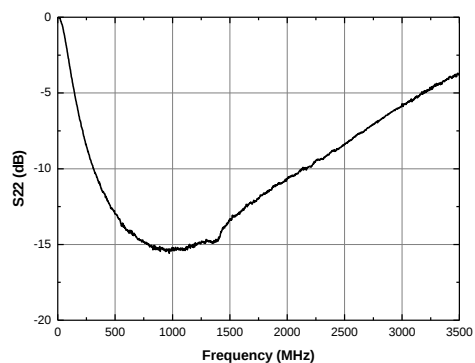
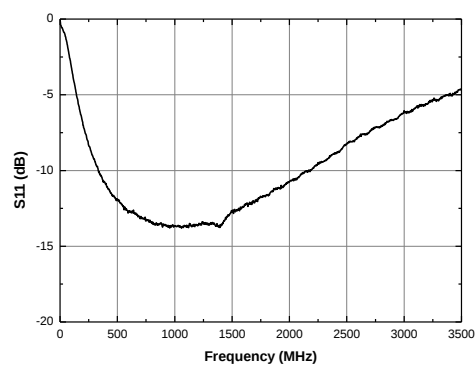
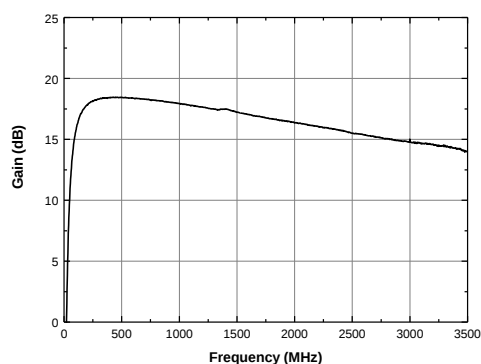
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

CATV Push-Pull (75 Ω)

50 ~ 1000 MHz

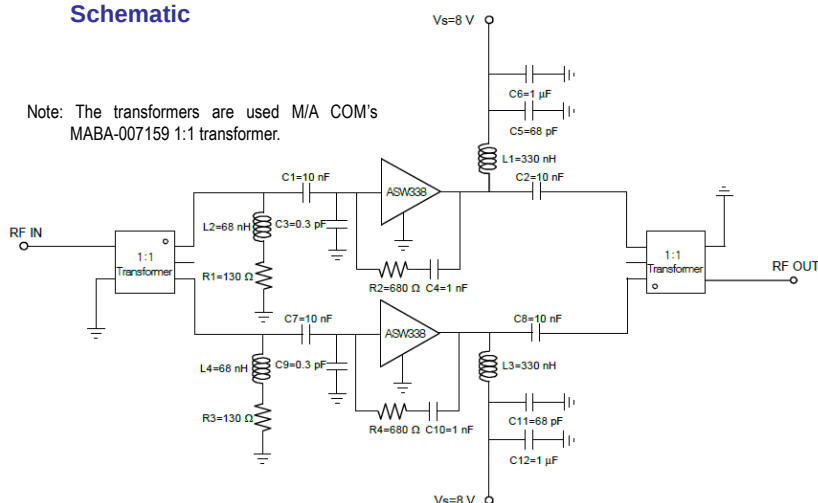
+8 V

Frequency (MHz)	50	500	860
Magnitude S21 (dB)	14.1	14.3	14.2
Magnitude S11 (dB)	-15	-11	-14
Magnitude S22 (dB)	-11	-10	-12
Output P1dB (dBm)	26	28	28
Output IP3 ¹⁾ (dBm)	41.0	45.0	42.5
Output IP2 ^{1),2)} (dBm)	73	65	54
Noise Figure (dB)	3.5	2.8	3.2
Device Voltage (V)	+8	+8	+8
Current (mA)	240	240	240

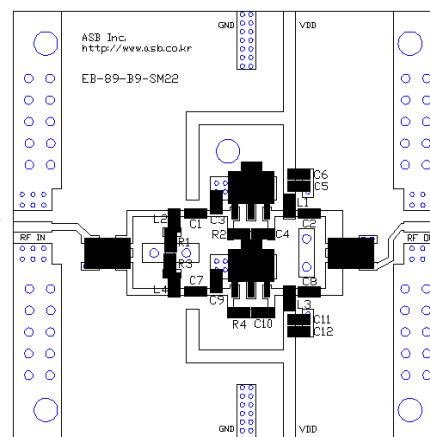
1) OIP3 and OIP2 are measured with two tones at an output power of +8 dBm/tone separated by 6 MHz.

2) OIP2 is measured at F1+F2 Frequency.

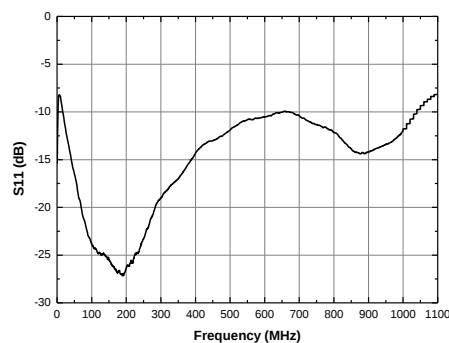
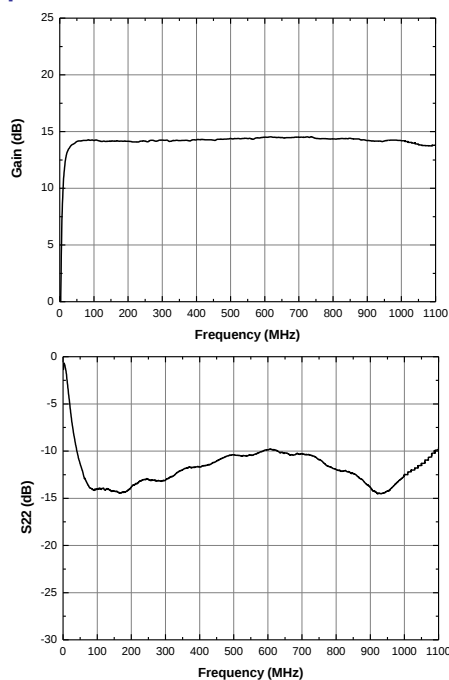
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters



Recommended Soldering Reflow Profile

