

Features

- 10.5 dB Gain at 2000 MHz
- 33 dBm P1dB at 2000 MHz
- 48 dBm OIP3 at 2000 MHz
- MTTF > 100 Years

Description

The ASX602, 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 an SOIC-8 package and passes through the stringent DC, RF, and reliability tests.



Package Style: SOIC-8

Typical Performance

Parameters	Units	Typical			
		900	2000	2000	2400
Frequency	MHz	900	2000	2000	2400
Gain	dB	16.5	10.5	10	8.9
S11	dB	-20	-15	-18	-9
S22	dB	-7	-10	-10	-14
Output IP3	dBm	48 ¹⁾	48 ¹⁾	43 ¹⁾	43.5 ²⁾
Noise Figure	dB	4.9	5.2	5.0	5.7
Output P1dB	dBm	33	32	33	32.5
Current	mA	580	580	580	580
Device Voltage	V	5	5	5	5

1) OIP3 measured with two tones at an output power of +14 dBm/tone separated by 1 MHz.

2) OIP3 measured with two tones at an output power of +12 dBm/tone separated by 1 MHz.

Application Circuit

- LTE (740MHz)
- 900 MHz
- RFID (USA)
- 1240 ~ 1280 MHz
- 1600 MHz
- 2000 MHz
- 2400 MHz
- 1710 ~ 1785 MHz(Balanced)
- 2000 ~ 2200 MHz(Balanced)

Product Specifications*

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		2000	
Gain	dB		10.5	
S11	dB		-15	
S22	dB		-10	
Output IP3	dBm		48	
Noise Figure	dB		5.2	
Output P1dB	dBm		32	
Current	mA		580	
Device Voltage	V		5	

* 100% in-house DC & RF testing is done on packaged products before taping.

Absolute Maximum Ratings

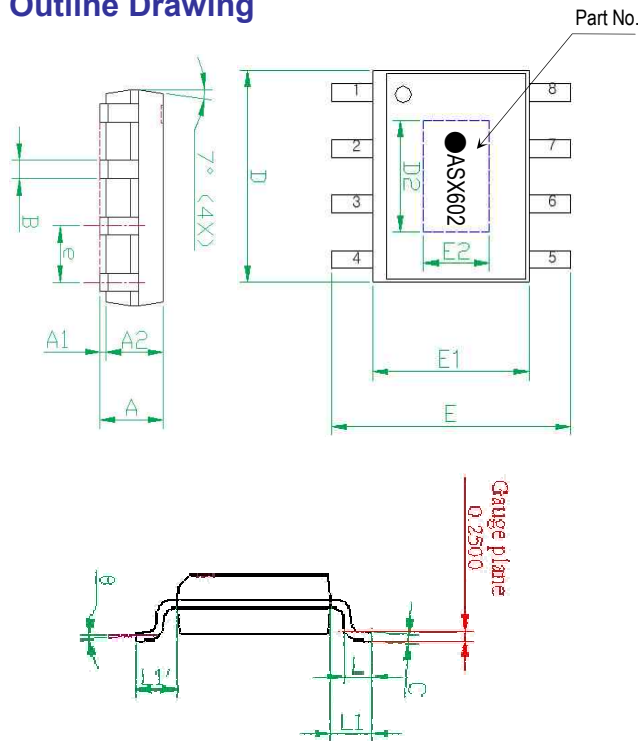
Parameters	Rating
Operating Case Temperature	-40 to +85°C
Storage Temperature	-40 to +150°C
Device Voltage	+5.5 V
Operating Junction Temperature	+150°C
Input RF Power (CW, 50ohm matched)*	23 dBm

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

Pin Configuration

Pin No.	Function
1,4,5	GND
2,3	RF IN
6,7	RF OUT
8	Bias

Outline Drawing

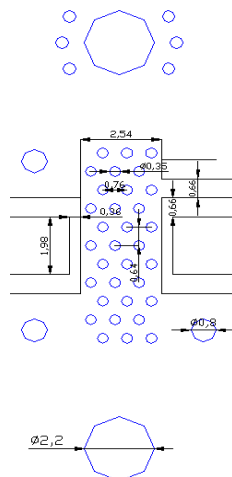


Symbols	Dimensions (In mm)		
	MIN	NOM	MAX
A	1.40	1.50	1.60
A1	0.00	---	0.10
A2	---	1.45	---
B	0.33	---	0.51
C	0.19	---	0.25
D	4.80	---	5.00
D2	3.20	3.30	3.40
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
E2	2.30	2.40	2.50
e	---	1.27	---
L	0.40	---	1.27
y	---	---	0.10
θ	0°	---	8°
L1-L1'	---	---	0.12
L1	1.04REF		

Pin No.	Function	Pin No.	Function.
1	GND	5	GND
2	RF IN	6	RF OUT
3	RF IN	7	RF OUT
4	GND	8	Bias

Note: 1. Backside metal paddle is RF and DC ground.

Mounting Recommendation (in mm)



- Note:**
1. Add as much copper as possible to inner and outer layers near the part to ensure optimal thermal performance.
 2. To ensure reliable operation, device ground paddle-to-ground pad soldering is critical.
 3. Add mounting screws near the part to fasten the board to a heat sink. Ensure that the ground / thermal via region contacts the heat sink.
 4. A proper heat dissipation path underneath the area of the PCB for the mounted device is strictly required for proper thermal operation. Damage to the device can result from inappropriate heat dissipation.

ESD Classification

HBM	Class 1B Voltage Level: 500 V~1000 V
MM	Class A Voltage Level: <200 V

CAUTION: ESD-sensitive device!

Moisture Sensitivity Level (MSL)

Level 3 at 260°C reflow

APPLICATION CIRCUIT

LTE

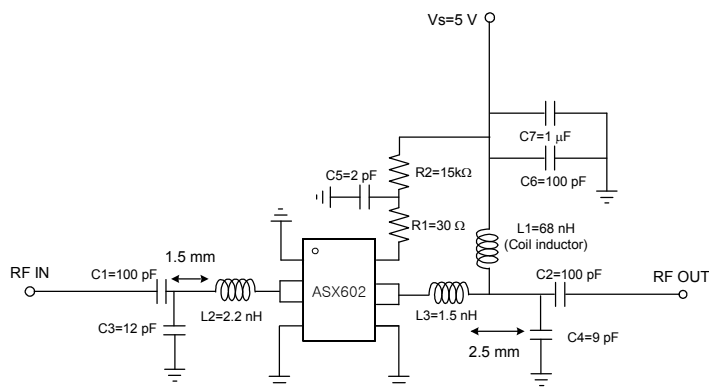
740 MHz

+5 V

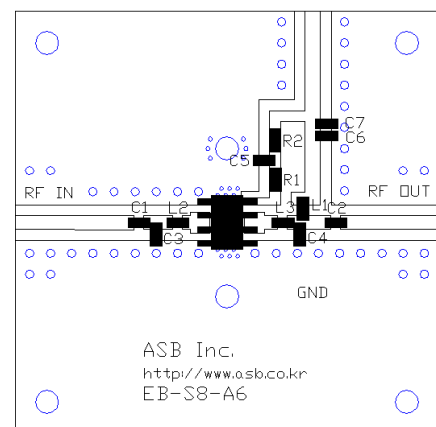
Frequency (MHz)	740
Magnitude S21 (dB)	17.5
Magnitude S11 (dB)	-18
Magnitude S22 (dB)	-10
Output P1dB (dBm)	32.5
Output IP3 ¹⁾ (dBm)	44
Noise Figure (dB)	5.5
Device Voltage (V)	5
Current (mA)	580

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

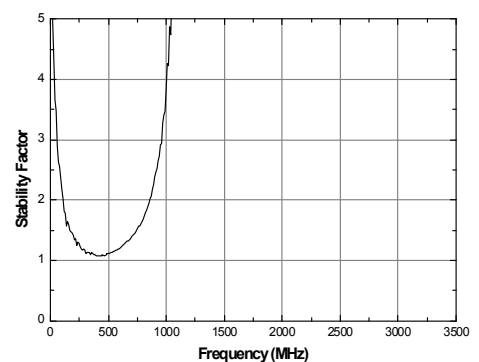
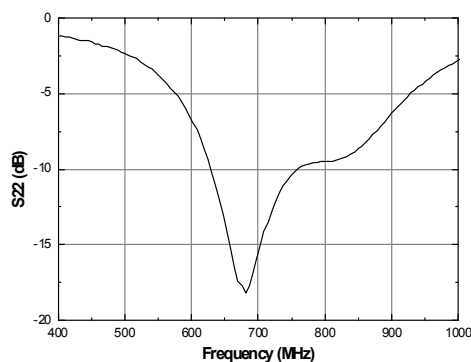
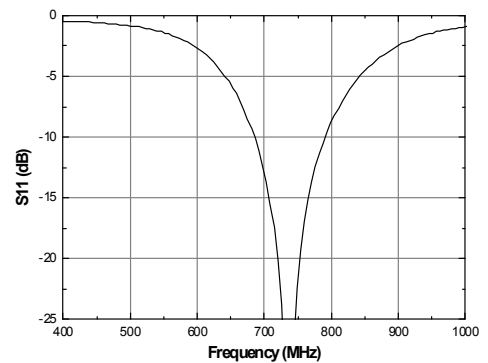
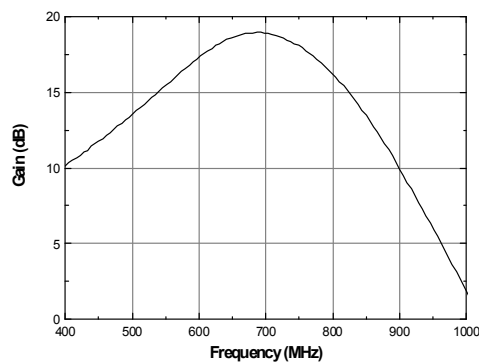
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

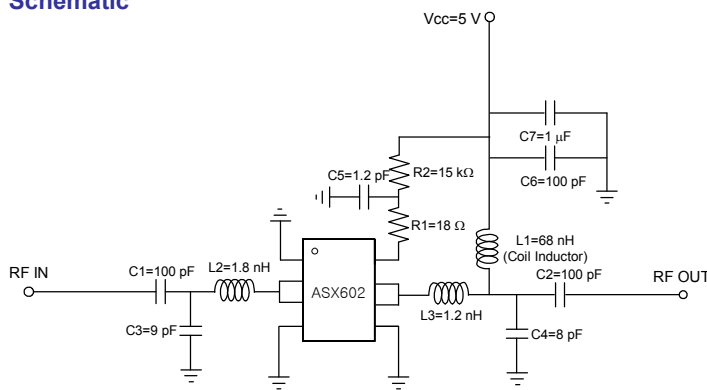
900 MHz

+5 V

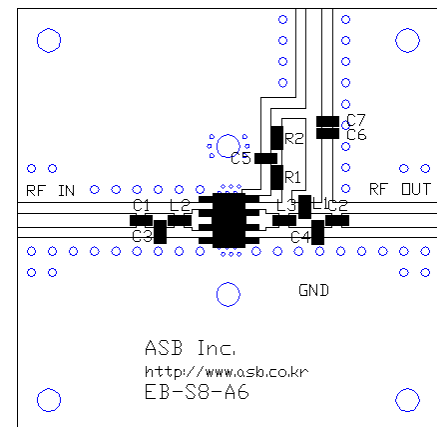
Frequency (MHz)	900
Magnitude S21 (dB)	16.5
Magnitude S11 (dB)	-20
Magnitude S22 (dB)	-7
Output P1dB (dBm)	33
Output IP3 ¹⁾ (dBm)	48
Noise Figure (dB)	4.9
Device Voltage (V)	5
Current (mA)	580

1) OIP3 is measured with two tones at an output power of +14 dBm/tone separated by 1 MHz.

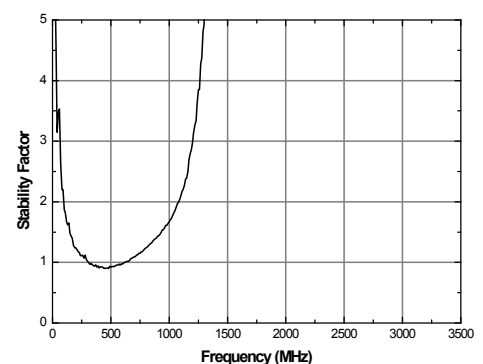
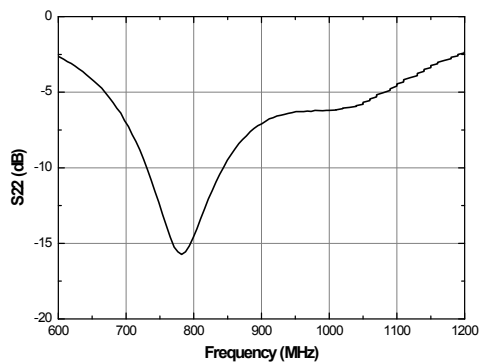
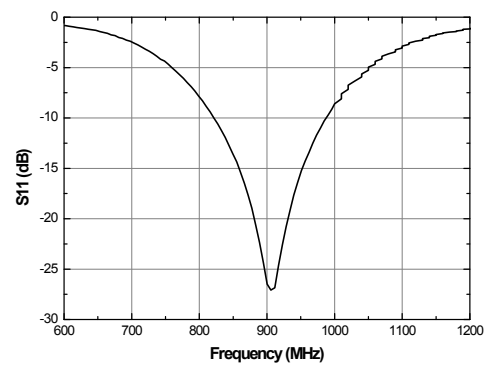
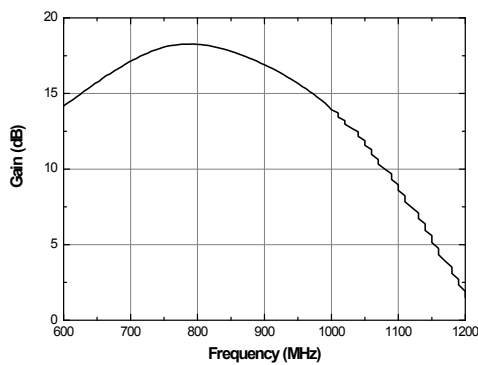
Schematic



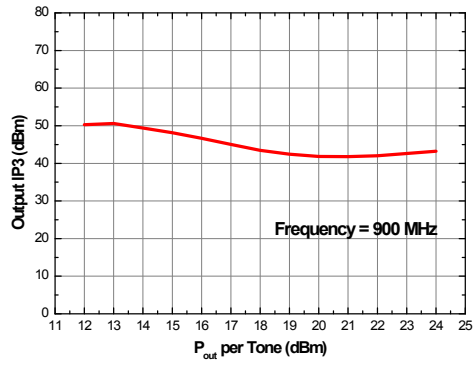
Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



Output IP3 vs. Tone Power



APPLICATION CIRCUIT

RFID(USA)

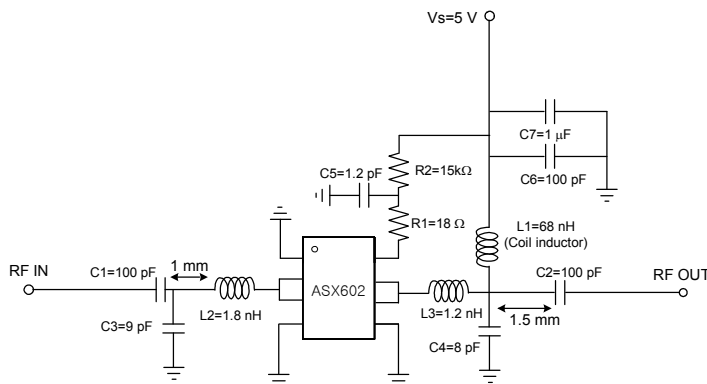
902 ~ 928 MHz

+5 V

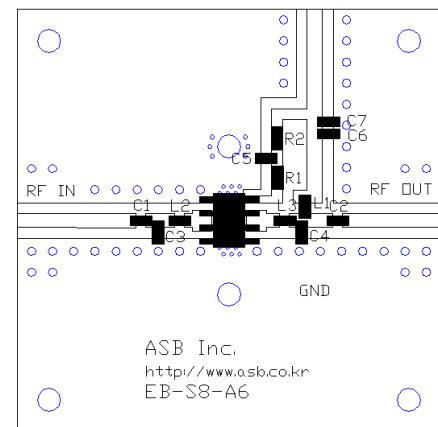
Frequency (MHz)	902	928
Magnitude S21 (dB)	16.8	16
Magnitude S11 (dB)	-18	-12
Magnitude S22 (dB)	-7	-7
Output P1dB (dBm)	32.5	33
Output IP3 ¹⁾ (dBm)	48	45
Noise Figure (dB)	4.9	5.0
Device Voltage (V)	5	5
Current (mA)	580	580

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

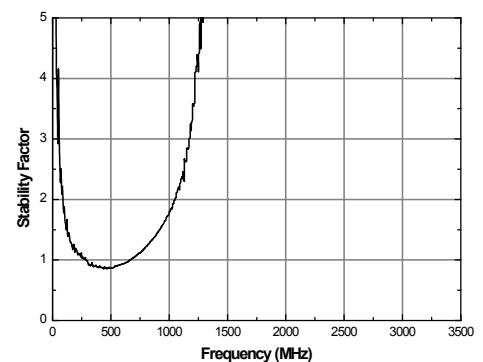
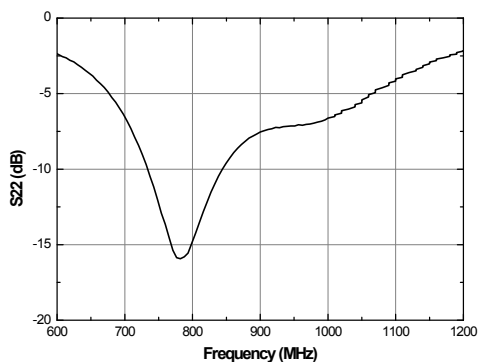
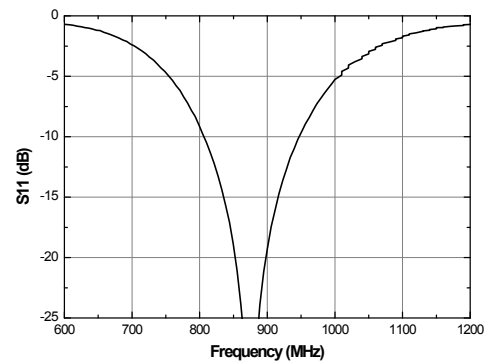
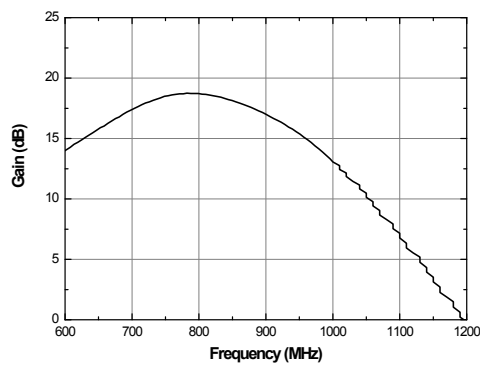
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

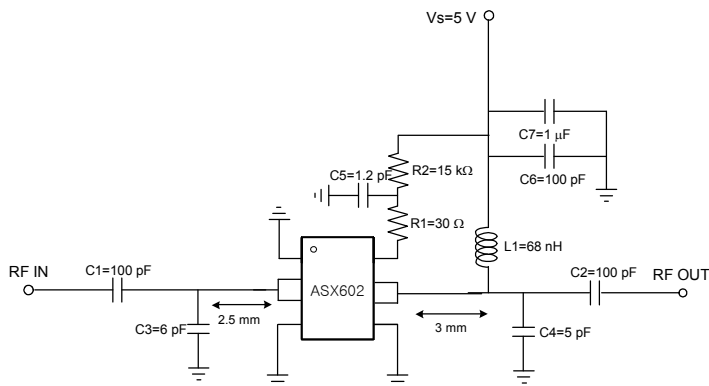
1240 ~ 1280 MHz

+5 V

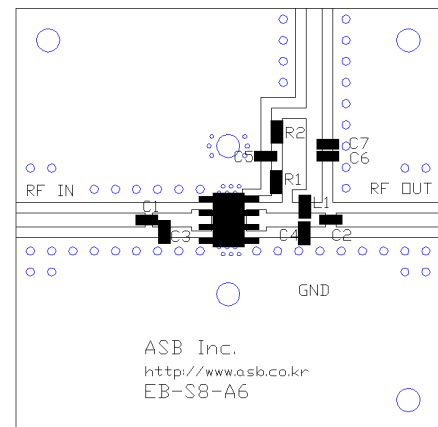
Frequency (MHz)	1240	1280
Magnitude S21 (dB)	14	13
Magnitude S11 (dB)	-18	-12
Magnitude S22 (dB)	-9	-9
Output P1dB (dBm)	33	
Output IP3 ¹⁾ (dBm)	41.5	
Noise Figure (dB)	5.1	
Device Voltage (V)	5	
Current (mA)	580	

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

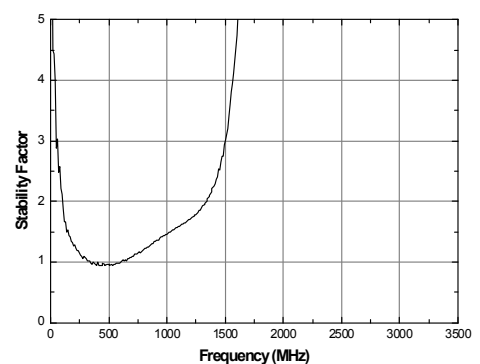
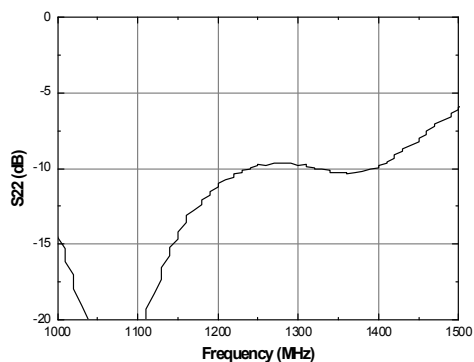
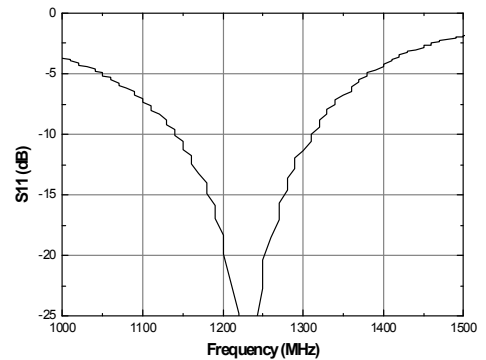
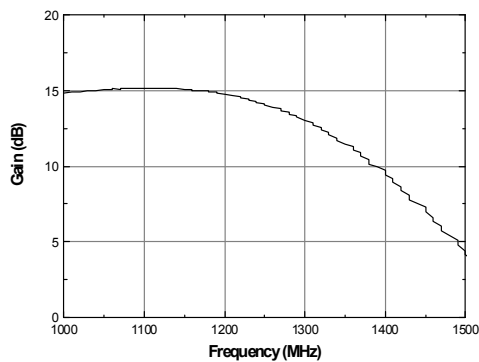
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

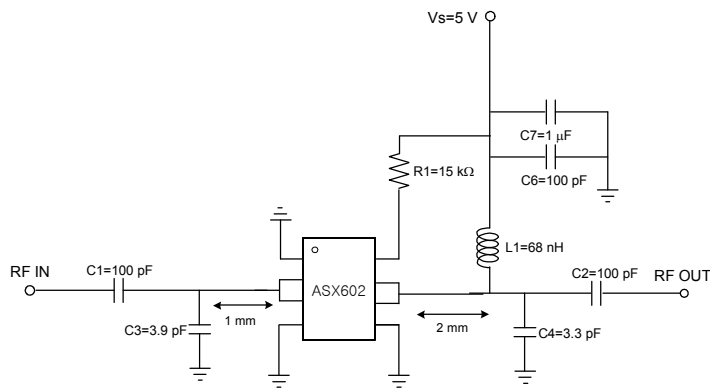
1600 MHz

+5 V

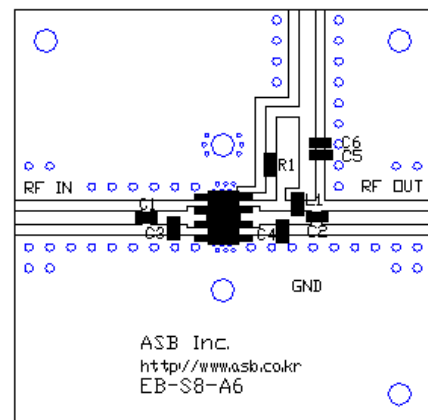
Frequency (MHz)	1600
Magnitude S21 (dB)	12.5
Magnitude S11 (dB)	-14
Magnitude S22 (dB)	-9
Output P1dB (dBm)	32.5
Output IP3 ¹⁾ (dBm)	45
Noise Figure (dB)	5.0
Device Voltage (V)	5
Current (mA)	580

1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 1 MHz.

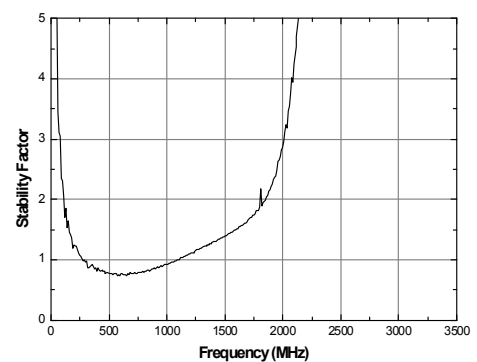
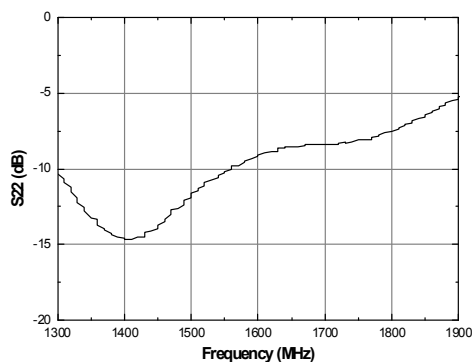
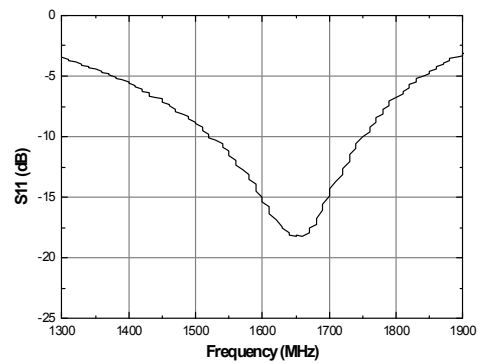
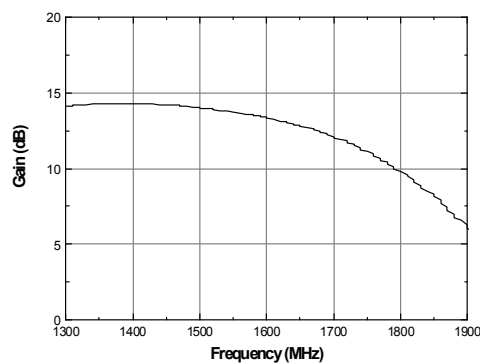
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

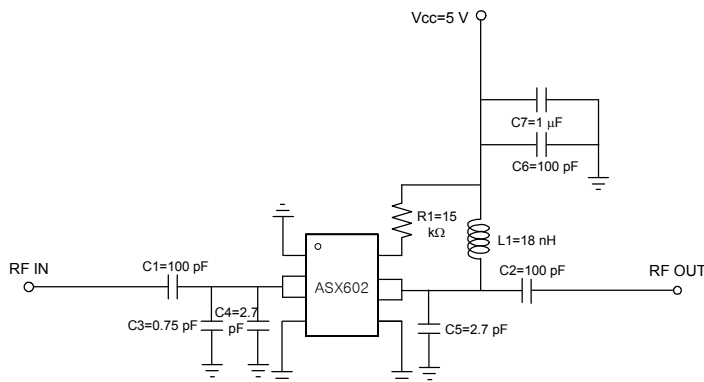
2000 MHz

+5 V

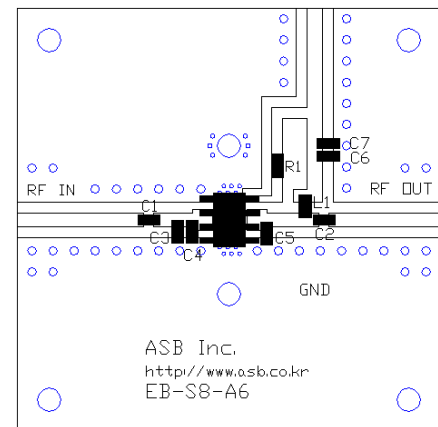
Frequency (MHz)	2000
Magnitude S21 (dB)	10.5
Magnitude S11 (dB)	-15
Magnitude S22 (dB)	-10
Output P1dB (dBm)	32
Output IP3 ¹⁾ (dBm)	48
Noise Figure (dB)	5.2
Device Voltage (V)	5
Current (mA)	580

1) OIP3 is measured with two tones at an output power of +14 dBm/tone separated by 1 MHz.

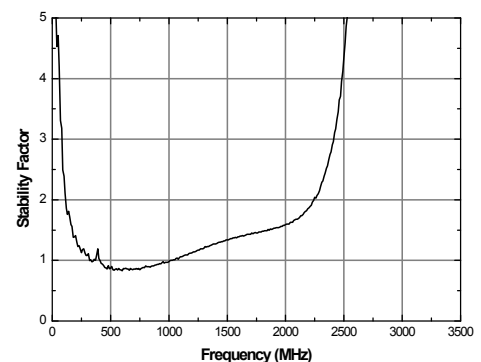
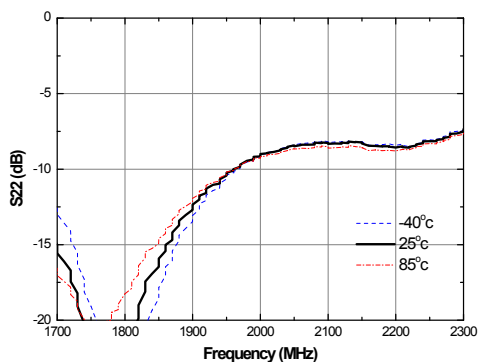
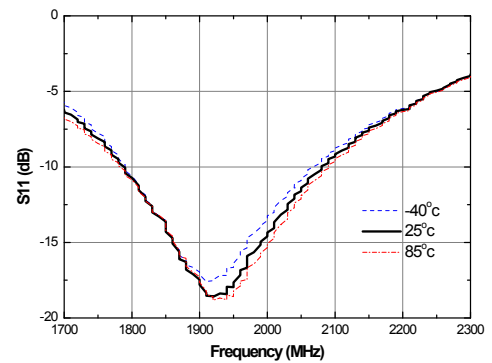
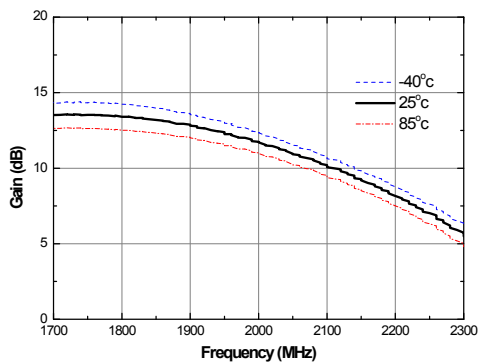
Schematic



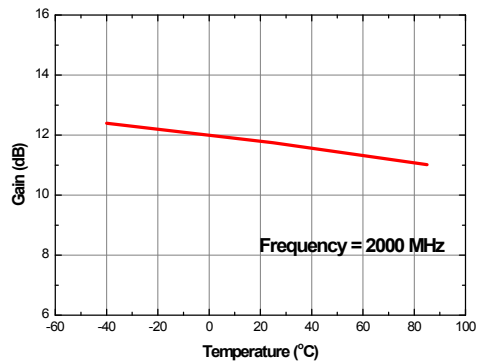
Board Layout (FR4, 40x40 mm², 0.8T)



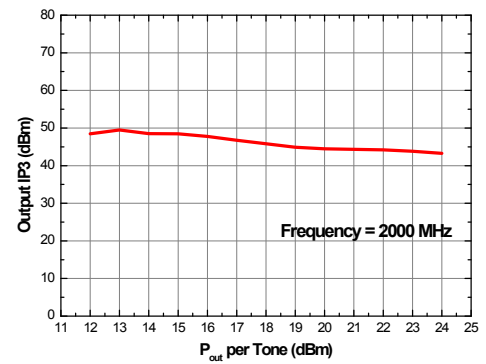
S-parameters & K-factor



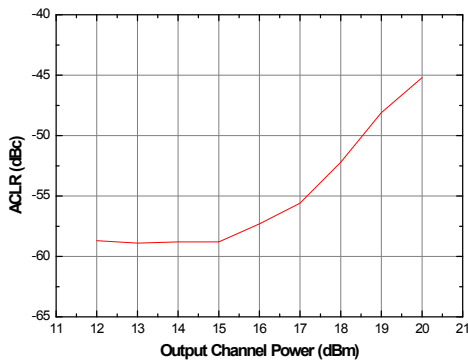
Gain vs. Temperature



Output IP3 vs. Tone Power

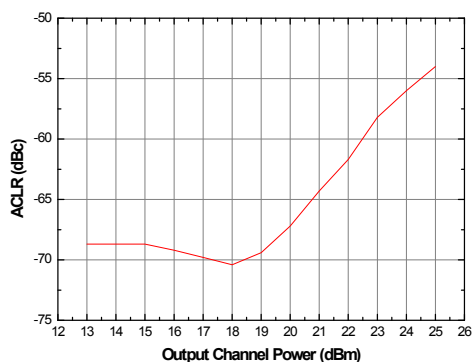


WCDMA ACLR – 4FA



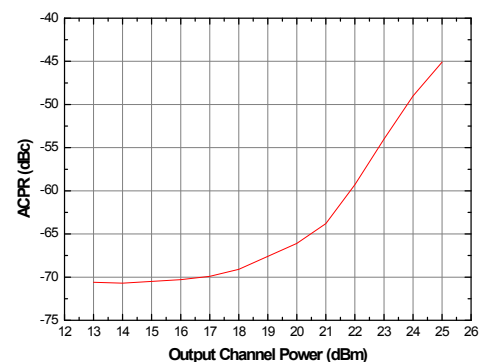
* Test Source : WCDMA 4FA(3GPP 3.4 12-00), Test Model1 w/64 DPCH, PAR=13dB @ 0.01 % probability on CCDF / 2000MHz / 5MHz offset

WCDMA ACLR – 1FA



* Test Source : WCDMA 1FA(3GPP 3.4 12-00), Test Model1 w/64 DPCH, PAR=13dB @ 0.01 % probability on CCDF / 2000MHz / 5MHz offset

CDMA ACPR – 1FA



* Test Source : IS-95, 9ch. Forward 30kHz Meas BW, 2000MHz / 750kHz offset

APPLICATION CIRCUIT

2000 MHz

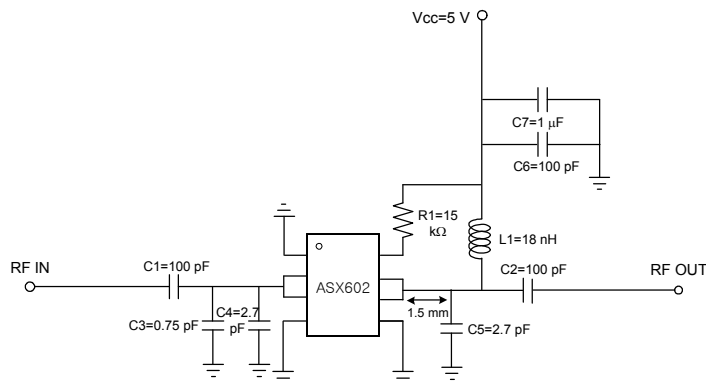
P1dB = 33 dBm

+5 V

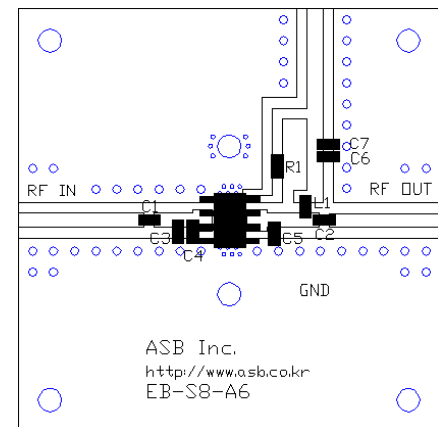
Frequency (MHz)	2000
Magnitude S21 (dB)	10
Magnitude S11 (dB)	-18
Magnitude S22 (dB)	-10
Output P1dB (dBm)	33
Output IP3 ¹⁾ (dBm)	43
Noise Figure (dB)	5.0
Device Voltage (V)	5
Current (mA)	580

1) OIP3 is measured with two tones at an output power of +14 dBm/tone separated by 1 MHz.

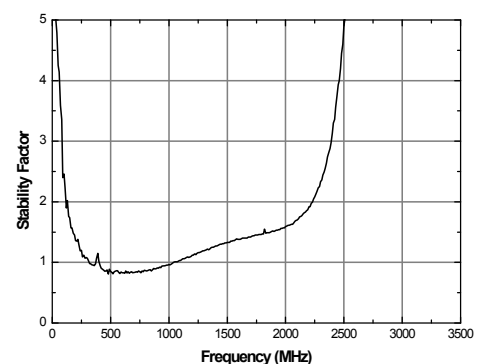
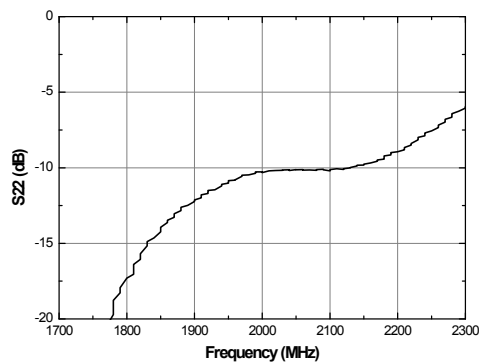
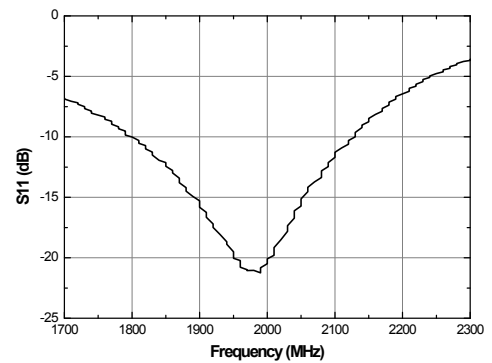
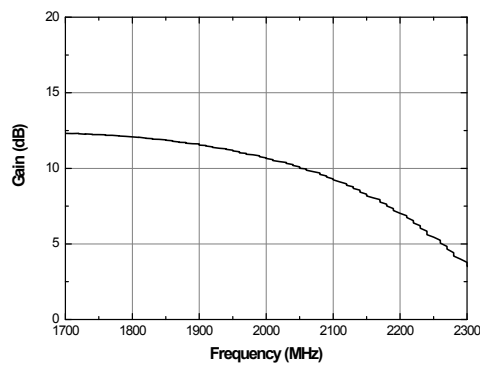
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

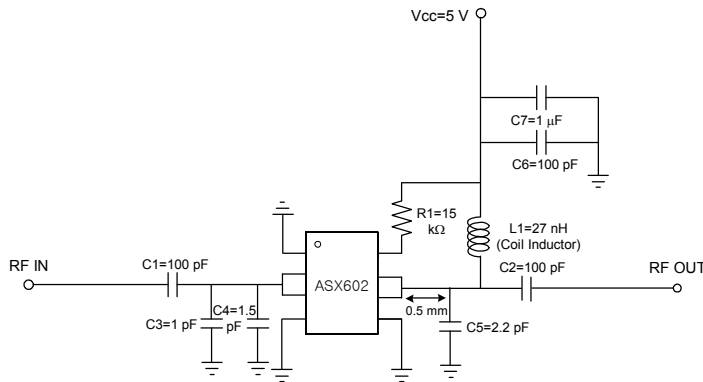
2400 MHz

+5 V

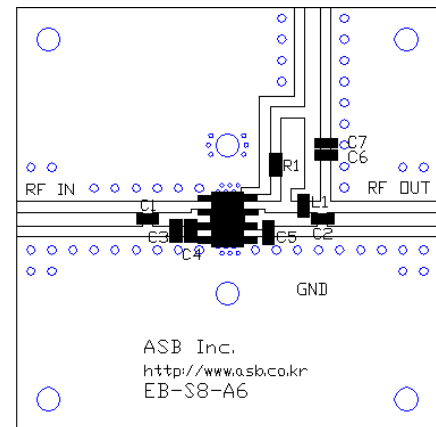
Frequency (MHz)	2400
Magnitude S21 (dB)	8.9
Magnitude S11 (dB)	-9
Magnitude S22 (dB)	-14
Output P1dB (dBm)	32.5
Output IP3 ¹⁾ (dBm)	43.5
Noise Figure (dB)	5.7
Device Voltage (V)	5
Current (mA)	580

1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 1 MHz.

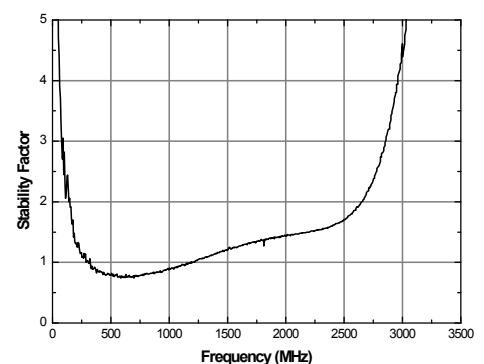
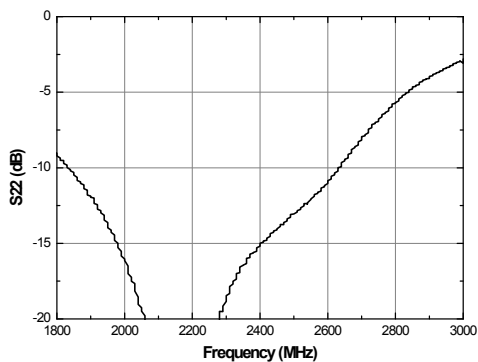
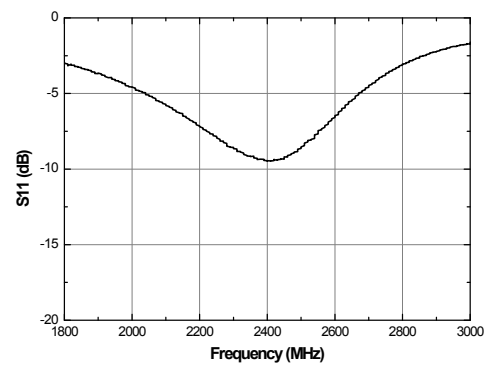
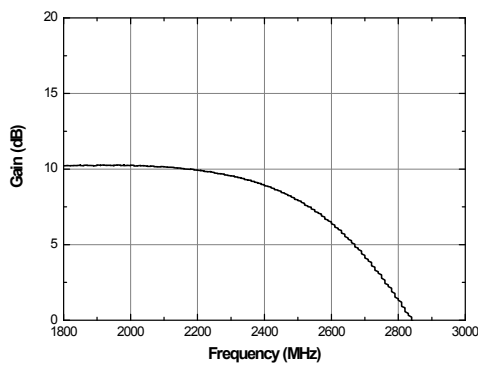
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



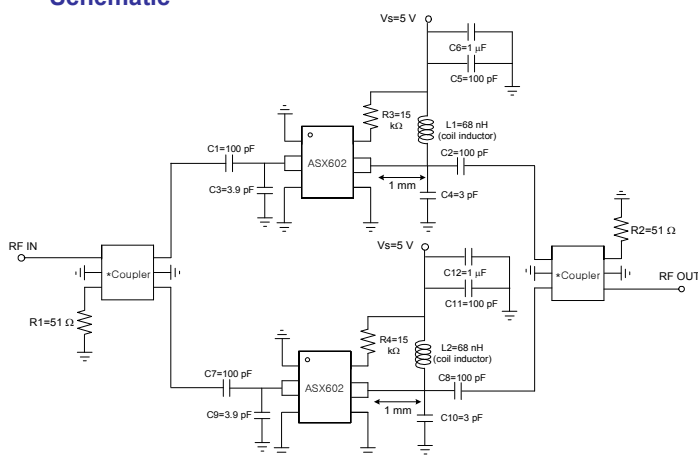
APPLICATION CIRCUIT

1710 ~ 1785 MHz
+5 V

Frequency (MHz)	1710~1785
Magnitude S21 (dB)	11.3
Magnitude S11 (dB)	-18
Magnitude S22 (dB)	-18
Output P1dB (dBm)	35
Output IP3 ¹⁾ (dBm)	42.5
Noise Figure (dB)	5.5
Device Voltage (V)	5
Current (mA)	1100

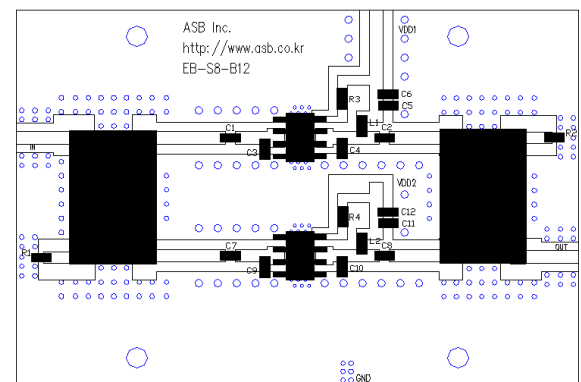
1) OIP3 is measured with two tones at an output power of +11 dBm/tone separated by 1 MHz.

Schematic

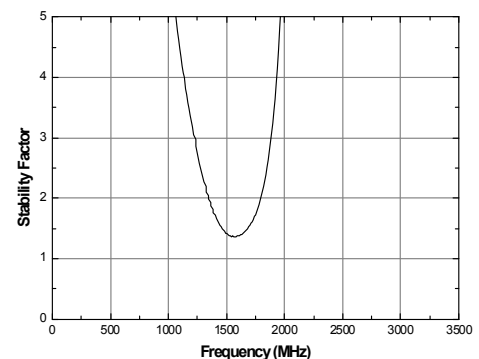
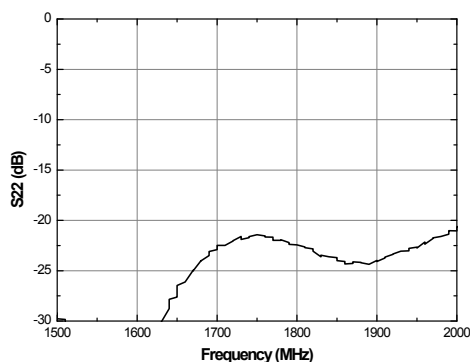
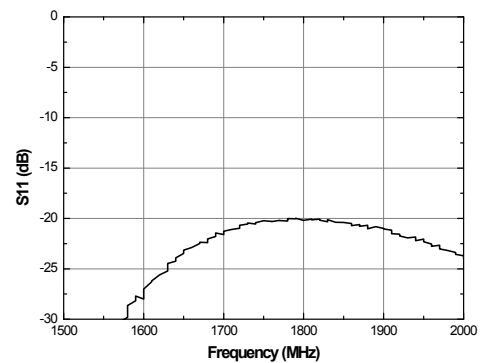
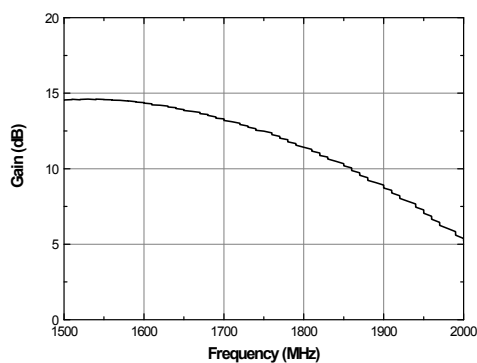


*Coupler: RN2, RCP1850A03

Board Layout (FR4, 59.5x39.5 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

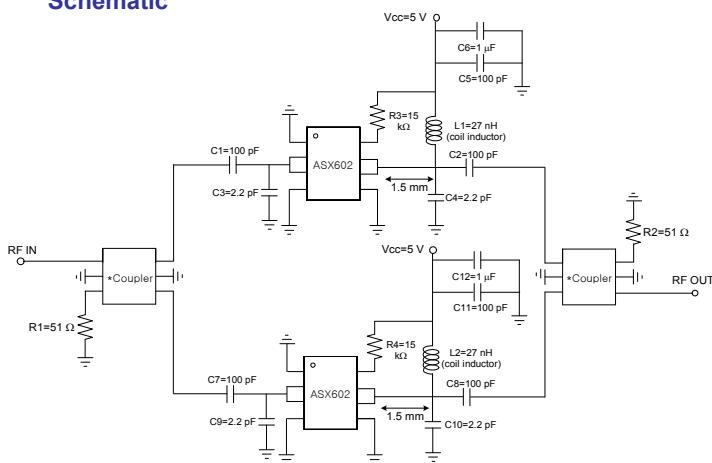
2000 ~ 2200 MHz

+5 V

Frequency (MHz)	2000	2200
Magnitude S21 (dB)	9.8	9.2
Magnitude S11 (dB)	-18	-18
Magnitude S22 (dB)	-20	-20
Output P1dB (dBm)	34.5	35
Output IP3 ¹⁾ (dBm)	43	41.5
Noise Figure (dB)	7.1	6.8
Device Voltage (V)	5	5
Current (mA)	1100	1100

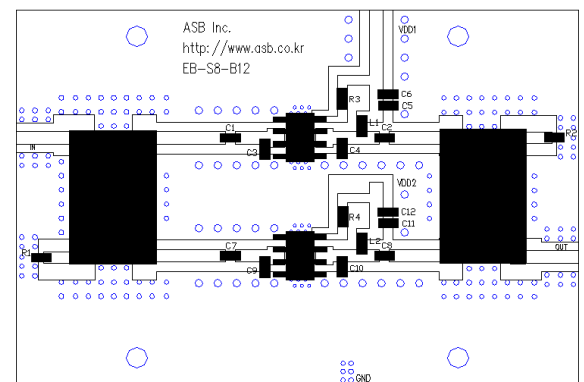
1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 1 MHz.

Schematic



*Coupler: RN2, RCP2150A03

Board Layout (FR4, 59.5x39.5 mm², 0.8T)



S-parameters & K-factor

