ASX521

250 ~ 3000 MHz MMIC Amplifier

Features

- 19 dB Gain at 2000 MHz
- 31.5 dBm P1dB at 2000 MHz
- 48 dBm OIP3 at 2000 MHz
- MTTF > 100 Years
- Two Power Supplies

Description

The ASX521, 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 SOIC8 package and passes through the stringent DC, RF, and reliability tests.

RoHS-compliant

Package Style: SOIC8

Typical Performance

(Supply Voltage = Device Voltage, T_A = +25 °C, Z_0 = 50 Ω)

Parameters	Units	Typical									
Freq.	MHz	900	2000	2450	900	2000	2450	900	2000	2450	2700
Gain	dB	28.0	19.0	18.5	28.0	19.0	18.5	28.0	19.0	18.5	16.5
S11	dB	-15	-16	-18	-15	-16	-18	-15	-16	-18	-15
S22	dB	-11	-9	-15	-11	-9	-15	-11	-9	-15	-15
OIP3[1)]	dBm	44	44	44	47	45	45	48	48	48	48
NF	dB	9.0	5.0	5.1	10.0	5.0	5.1	11.0	5.6	5.1	5.3
P1dB	dBm	30.5	30.0	30.0	32.0	31.5	31.5	32.0	31.5	31.5	31.5
Current	mA	510			650			870			
Voltage	V	+4.3			+4.7			+5.0			

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

Application Circuit

- CDMA
- GSM
- WCDMA
- WiBro
- WLAN
- WiMAX

Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		2000	
Gain	dB	18.0	19.0	
S11	dB		-16	
S22	dB		-9	
Output IP3	dBm	46	48	
Noise Figure	dB		5.6	5.8
Output P1dB	dBm	30.0	31.5	
Current	mA	840	870	900
Device Voltage	V		+5	

Pin Configuration

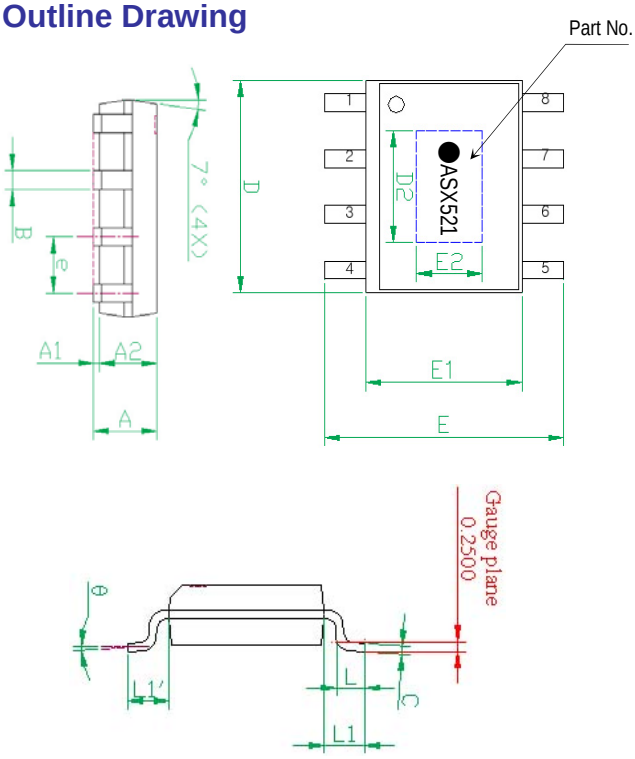
Pin No.	Function
1	2nd stage RF IN
2	1st stage RF OUT
3,5,8	GND
4	1st stage RF IN
6,7	2nd stage RF OUT

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)[1)]	+25 dBm
Thermal Resistance	13 °C/W

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

Outline Drawing

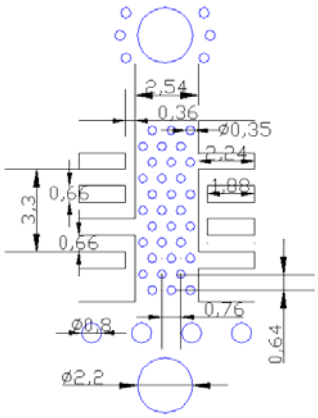


Symbols	Dimensions (In mm)		
	MIN	NOM	MAX
A	1.40	1.50	1.60
A1	0.00	---	0.10
A2	---	1.45	---
B	0.33	---	0.51
C	0.19	---	0.25
D	4.80	---	5.00
D2	3.20	3.30	3.40
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
E2	2.30	2.40	2.50
e	---	1.27	---
L	0.40	---	1.27
y	---	---	0.10
θ	0°	---	8°
|L1-L1'|	---	---	0.12
L1	1.04REF		

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

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 sinker. Ensure that the ground / thermal via region contacts the heat sinker.
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

CDMA Rx

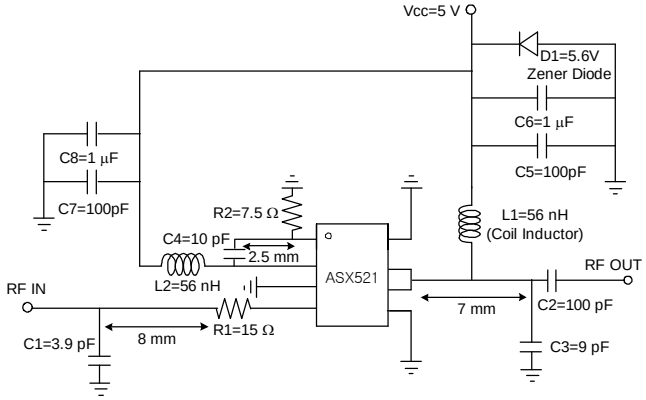
824 ~ 849 MHz

+5 V

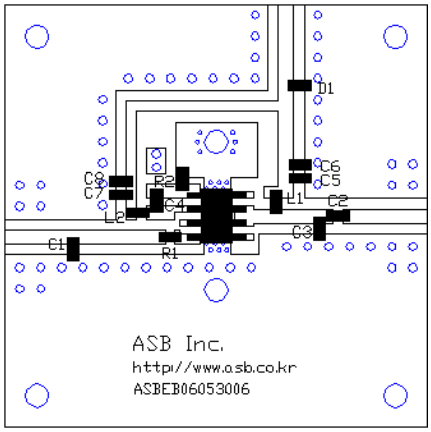
Frequency (MHz)	824 ~ 849
Magnitude S21 (dB)	30.5
Magnitude S11 (dB)	-14
Magnitude S22 (dB)	-8
Output P1dB (dBm)	32
Output IP3[1)] (dBm)	47
Noise Figure (dB)	11.0
Device Voltage (V)	+5
Current (mA)	870

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

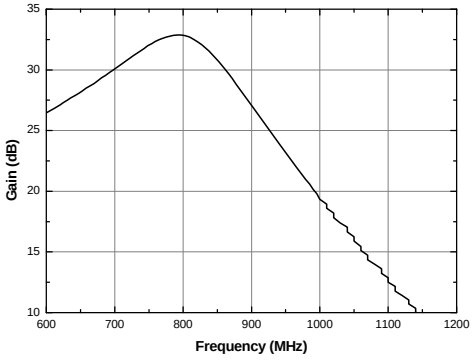
Schematic

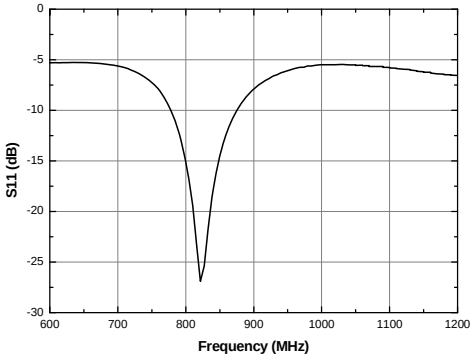


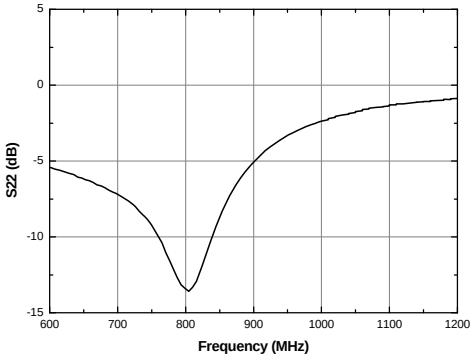
Board Layout (FR4, 40x40 mm², 0.8T)

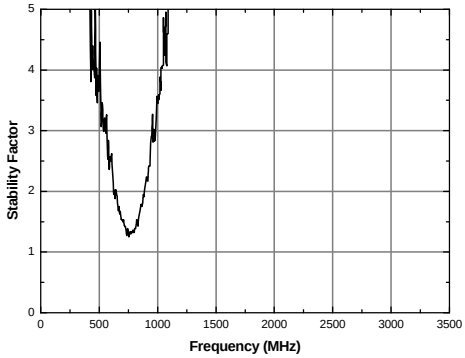


S-parameters









APPLICATION CIRCUIT

CDMA Tx

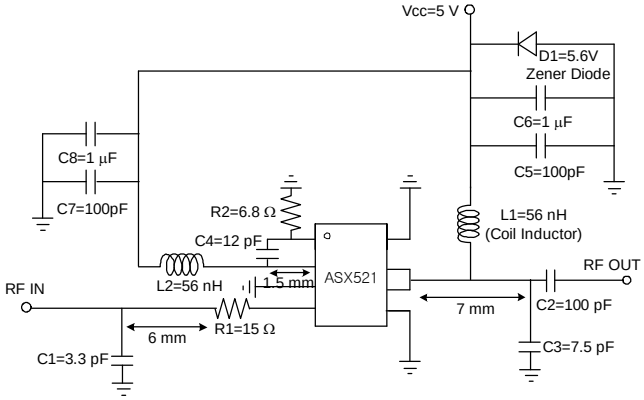
869 ~ 894 MHz

+5 V

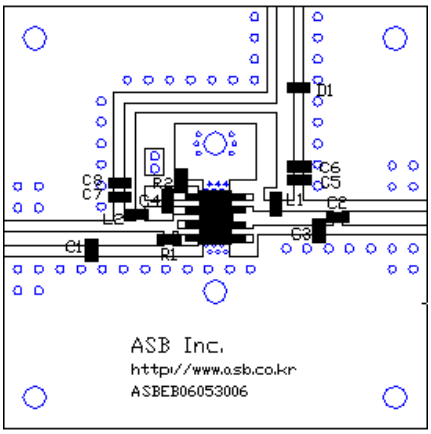
Frequency (MHz)	869 ~ 894
Magnitude S21 (dB)	30.5
Magnitude S11 (dB)	-15.0
Magnitude S22 (dB)	-7.5
Output P1dB (dBm)	32
Output IP3[1] (dBm)	47
Noise Figure (dB)	11.0
Device Voltage (V)	+5
Current (mA)	870

1) OIP3 is measured with two tones at an output power of +16 dBm/tone separated by 1 MHz.

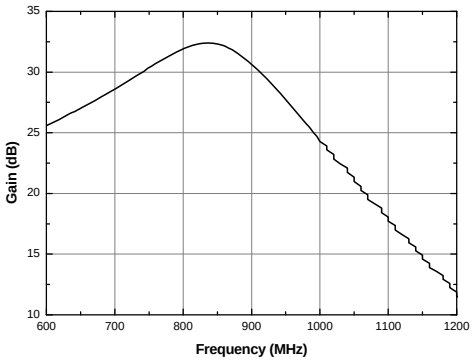
Schematic

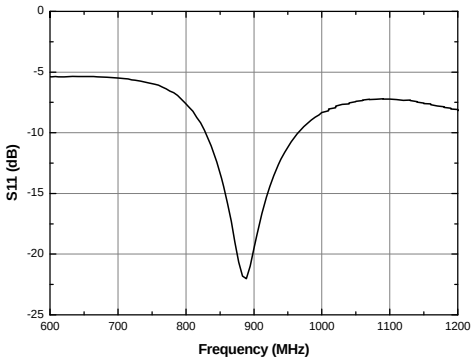


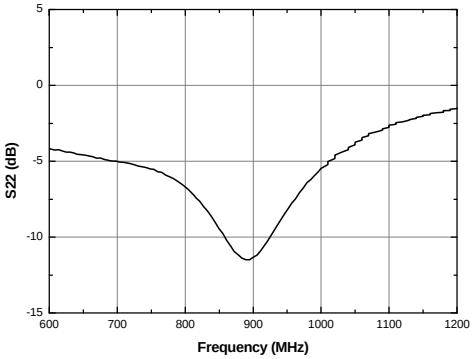
Board Layout (FR4, 40x40 mm², 0.8T)

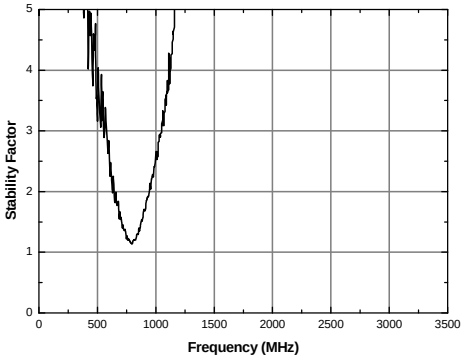


S-parameters









APPLICATION CIRCUIT

GSM Rx

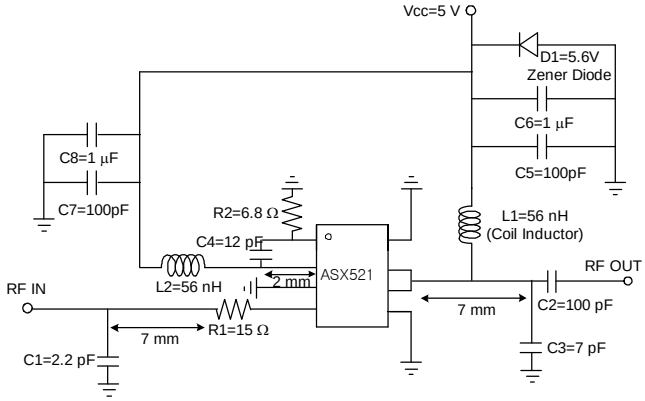
890 ~ 915 MHz

+5 V

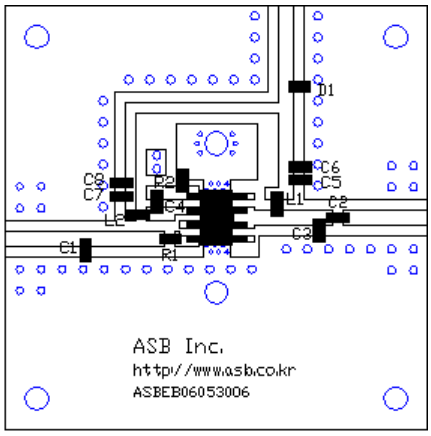
Frequency (MHz)	890 ~ 915
Magnitude S21 (dB)	28.0
Magnitude S11 (dB)	-15
Magnitude S22 (dB)	-11
Output P1dB (dBm)	32
Output IP3[1)] (dBm)	48
Noise Figure (dB)	11.0
Device Voltage (V)	+5
Current (mA)	890

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

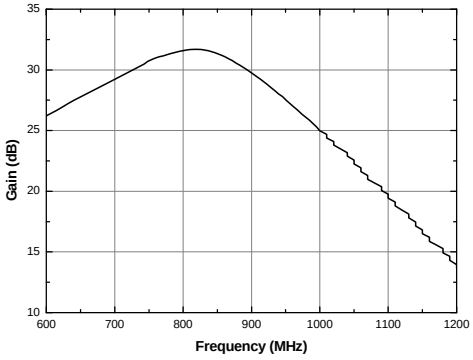
Schematic

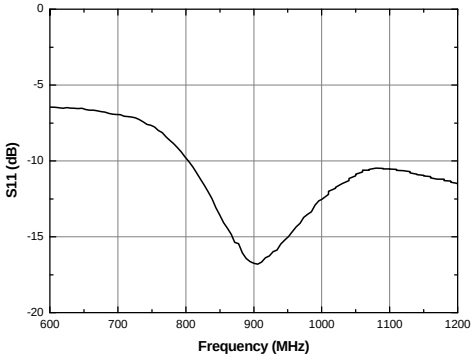


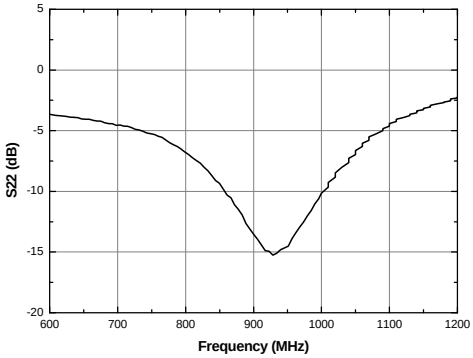
Board Layout (FR4, 40x40 mm², 0.8T)

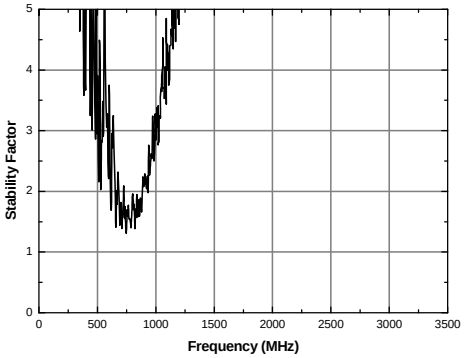


S-parameters









APPLICATION CIRCUIT

GSM Tx

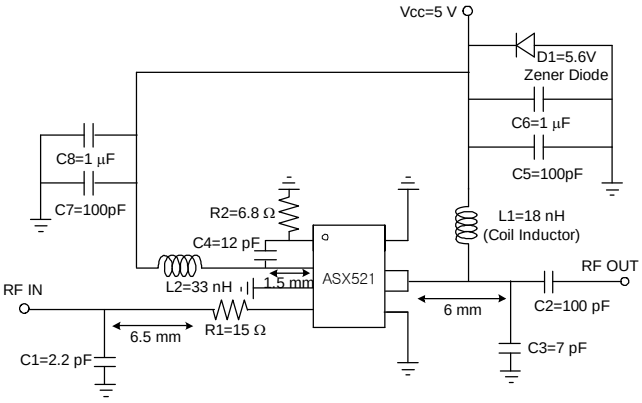
935 ~ 960 MHz

+5 V

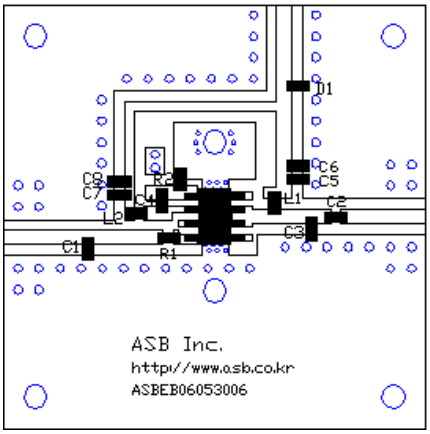
Frequency (MHz)	935 ~ 960
Magnitude S21 (dB)	27.0
Magnitude S11 (dB)	-15
Magnitude S22 (dB)	-11
Output P1dB (dBm)	32
Output IP3[1)] (dBm)	47
Noise Figure (dB)	10.5
Device Voltage (V)	+5
Current (mA)	870

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

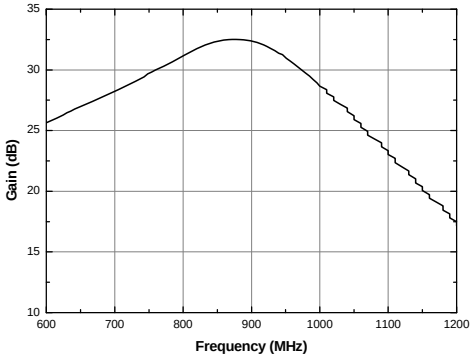
Schematic

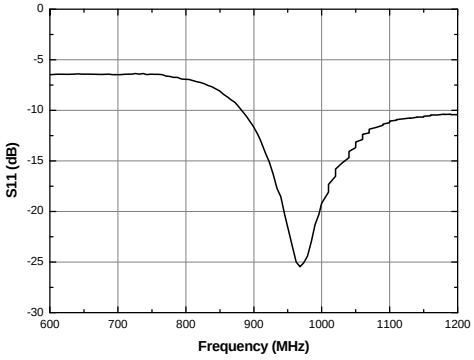


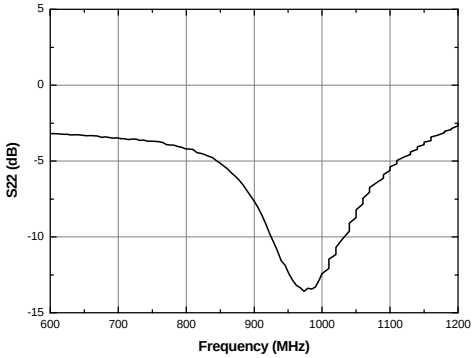
Board Layout (FR4, 40x40 mm², 0.8T)

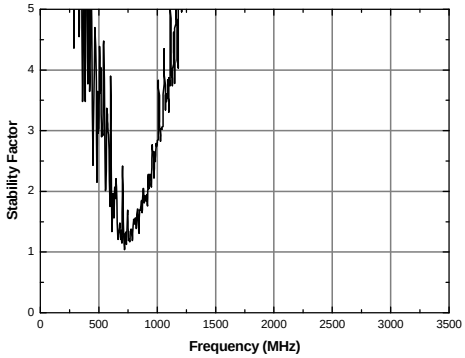


S-parameters









APPLICATION CIRCUIT

WCDMA Rx

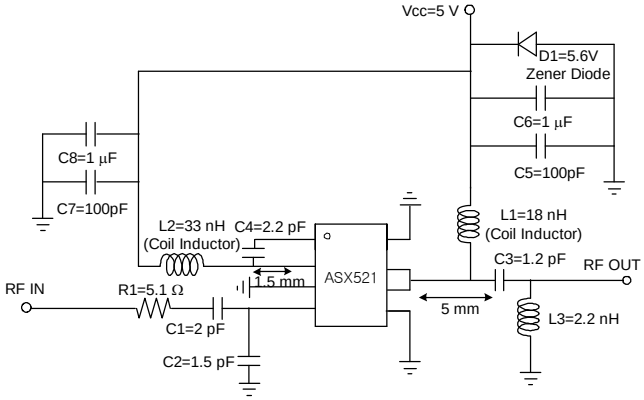
1920 ~ 1980 MHz

+5 V

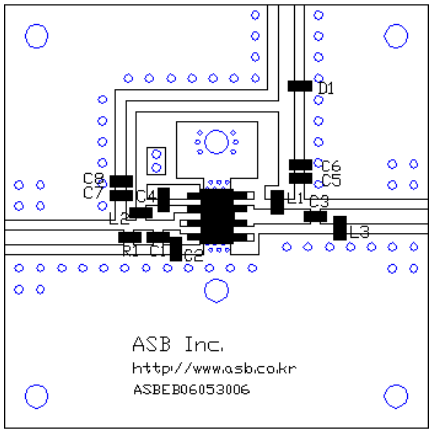
Frequency (MHz)	1920 ~ 1980
Magnitude S21 (dB)	19.0
Magnitude S11 (dB)	-16
Magnitude S22 (dB)	-9
Output P1dB (dBm)	31.5
Output IP3[1)] (dBm)	48
Noise Figure (dB)	5.6
Device Voltage (V)	+5
Current (mA)	870

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

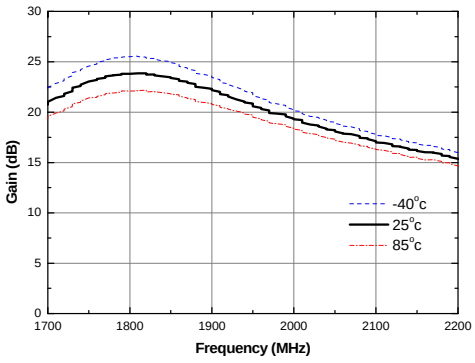
Schematic

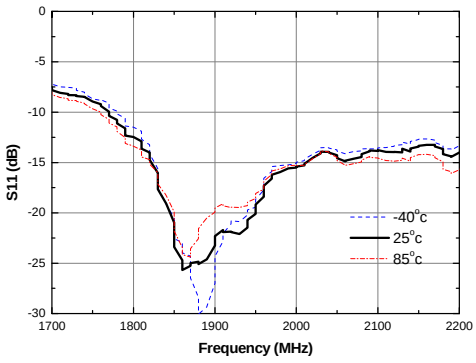


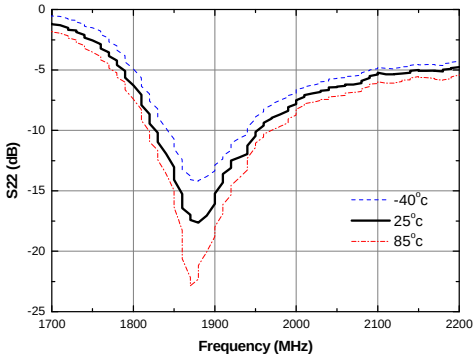
Board Layout (FR4, 40x40 mm², 0.8T)

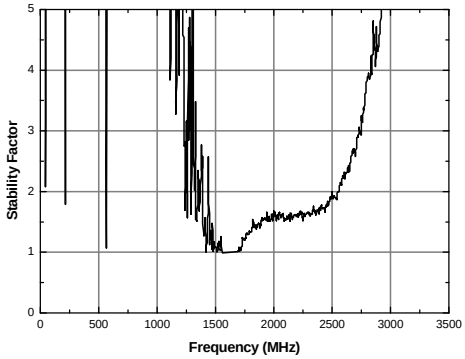


S-parameters

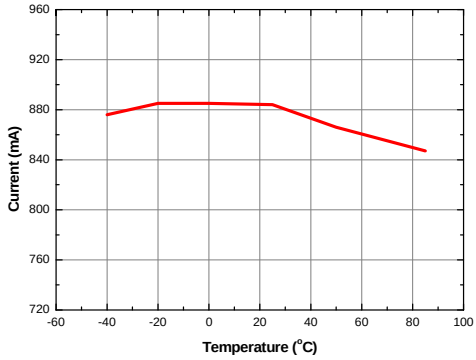




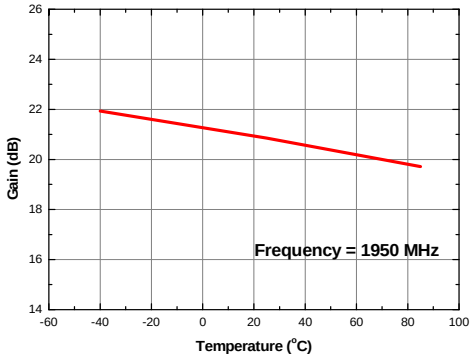




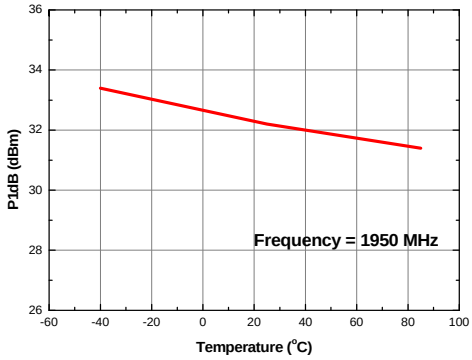
Current vs. Temperature



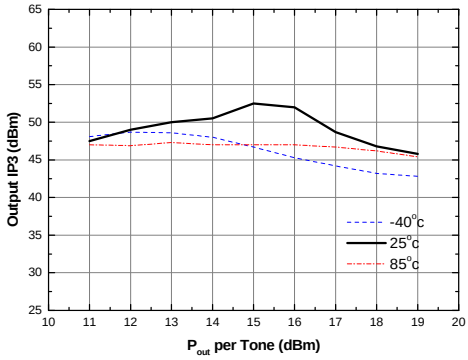
Gain vs. Temperature



P1dB vs. Temperature



Output IP3 vs. Tone Power (Frequency = 1950 MHz)



APPLICATION CIRCUIT

WCDMA Tx

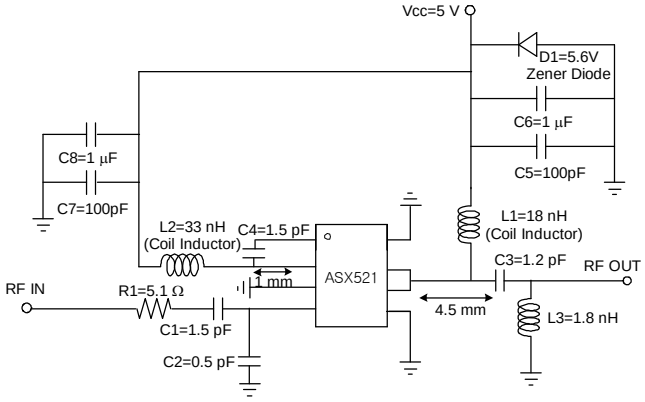
2110 ~ 2170 MHz

+5 V

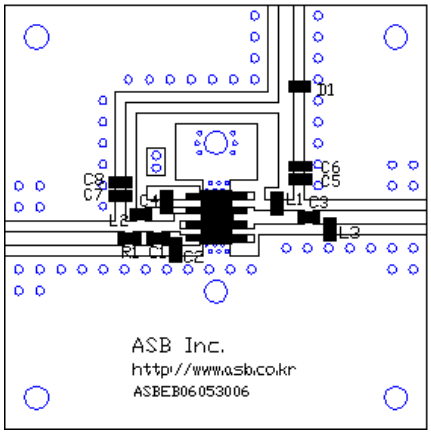
Frequency (MHz)	2110 ~ 2170
Magnitude S21 (dB)	18.0
Magnitude S11 (dB)	-15
Magnitude S22 (dB)	-7
Output P1dB (dBm)	31.5
Output IP3[1)] (dBm)	48
Noise Figure (dB)	7.5
Device Voltage (V)	+5
Current (mA)	870

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

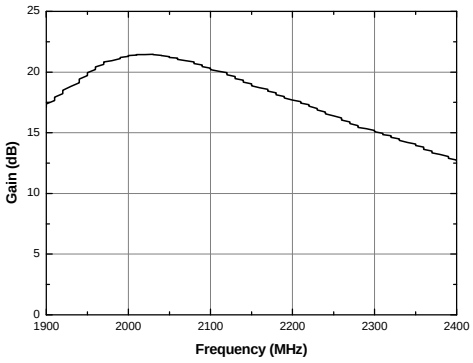
Schematic

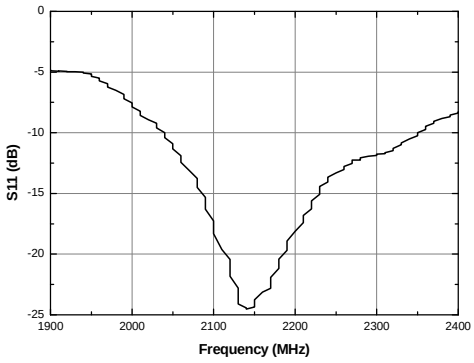


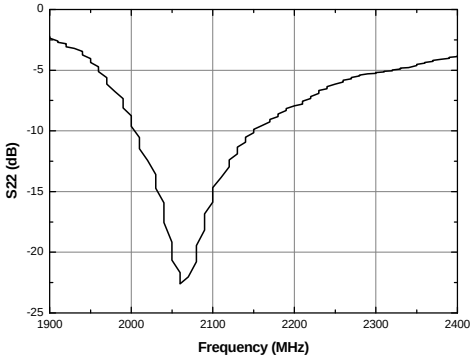
Board Layout (FR4, 40x40 mm², 0.8T)

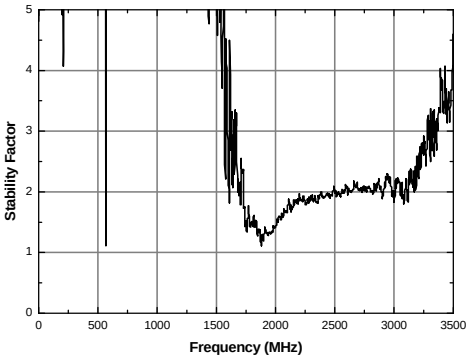


S-parameters









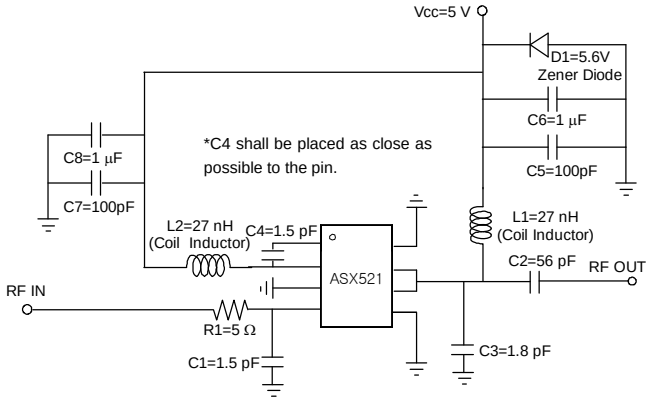
APPLICATION CIRCUIT

WiBro
2300 ~ 2400 MHz
+5 V

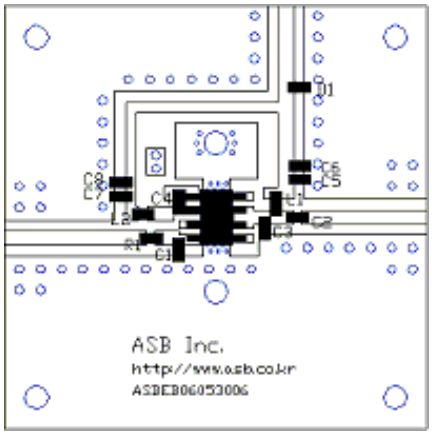
Frequency (MHz)	2300 ~ 2400
Magnitude S21 (dB)	18.0
Magnitude S11 (dB)	-17
Magnitude S22 (dB)	-11
Output P1dB (dBm)	31
Output IP3[1)] (dBm)	46.5
Noise Figure (dB)	6.5
Device Voltage (V)	+5
Current (mA)	870

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

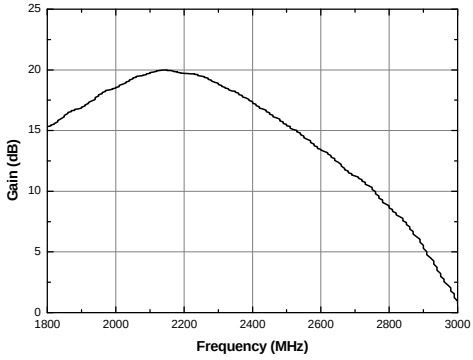
Schematic

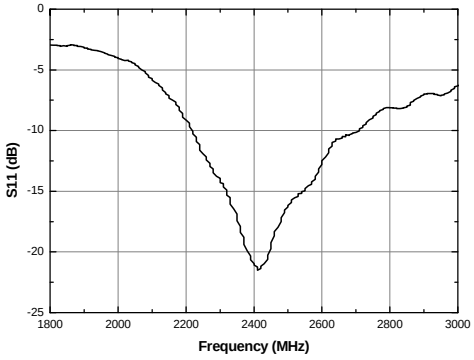


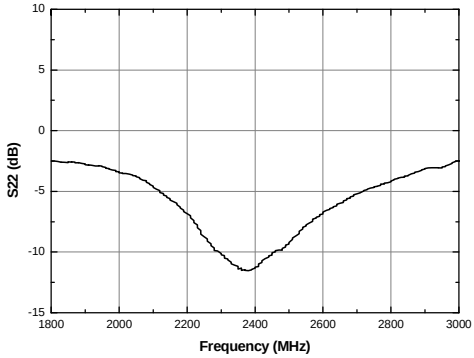
Board Layout (FR4, 40x40 mm², 0.8T)

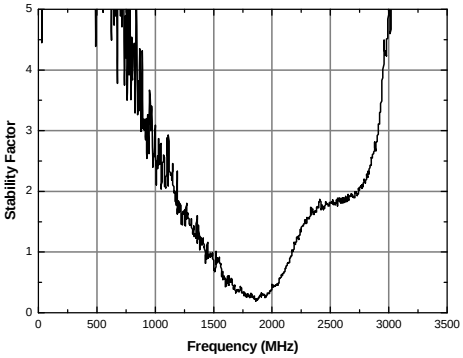


S-parameters & K-factor









APPLICATION CIRCUIT

WLAN

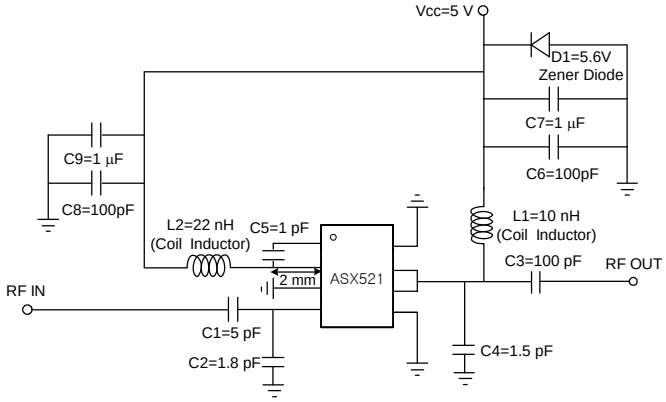
2400 ~ 2500 MHz

+5 V

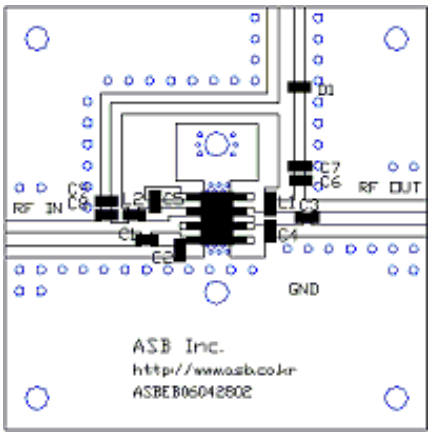
Frequency (MHz)	2400 ~ 2500
Magnitude S21 (dB)	18.5
Magnitude S11 (dB)	-18
Magnitude S22 (dB)	-15
Output P1dB (dBm)	31.5
Output IP3[1)] (dBm)	48
Noise Figure (dB)	5.1
Device Voltage (V)	+5
Current (mA)	870

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

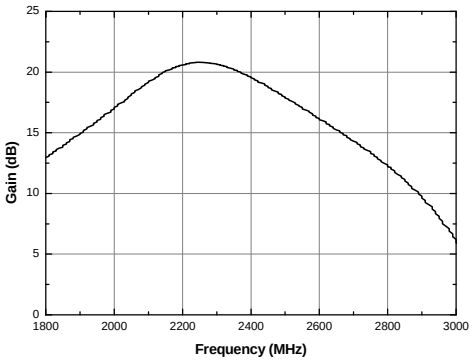
Schematic

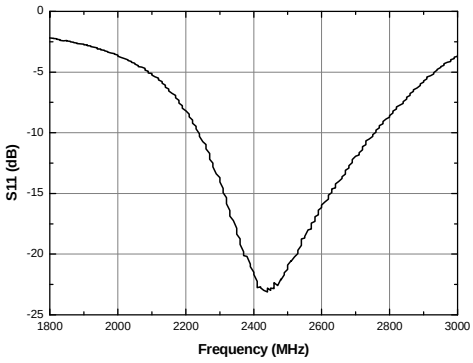


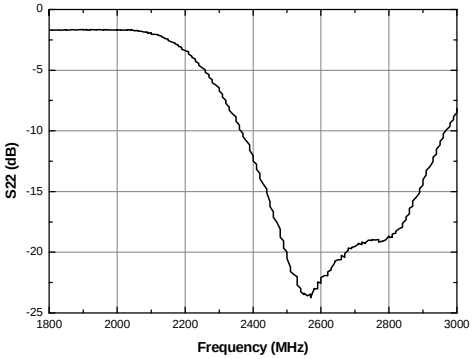
Board Layout (FR4, 40x40 mm², 0.8T)

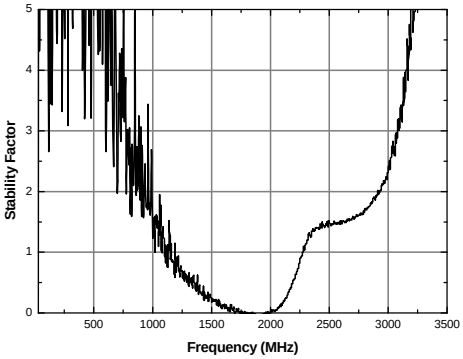


S-parameters









APPLICATION CIRCUIT

WiMAX

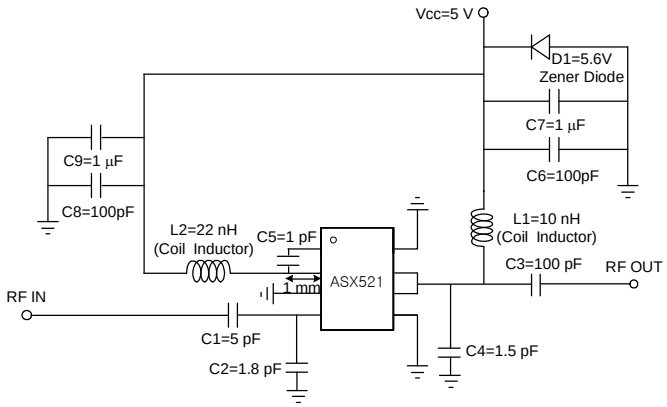
2600 ~ 2700 MHz

+5 V

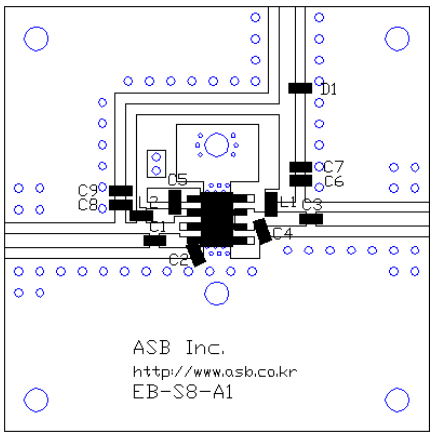
Frequency (MHz)	2600 ~ 2700
Magnitude S21 (dB)	16.5
Magnitude S11 (dB)	-15
Magnitude S22 (dB)	-15
Output P1dB (dBm)	31.5
Output IP3[1)] (dBm)	48
Noise Figure (dB)	5.3
Device Voltage (V)	+5
Current (mA)	870

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

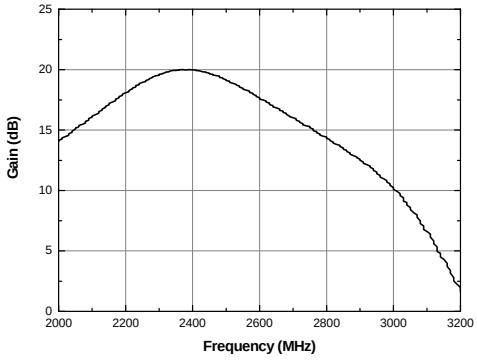
Schematic

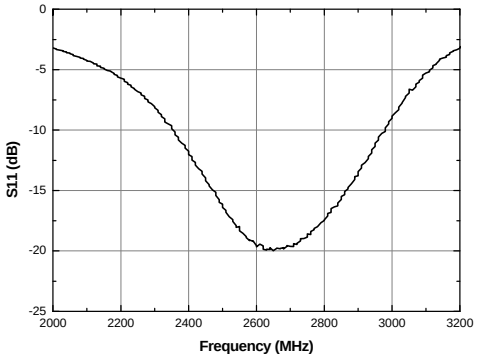


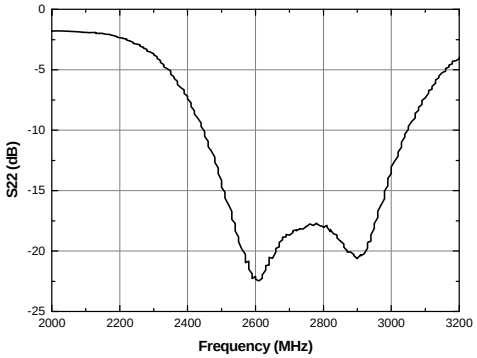
Board Layout (FR4, 40x40 mm², 0.8T)

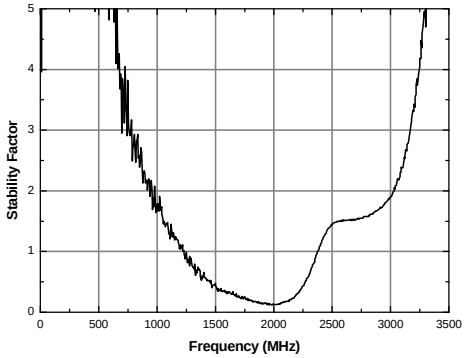


S-parameters









Recommended Soldering Reflow Profile