

Features

- 16 dB Gain at 2 GHz
- 21 dBm P1dB at 2 GHz
- 34.5 dBm Output IP3 at 2 GHz
- MTTF > 100 Years
- Single Supply

Description

The ASX201, 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 5 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 = +5 V, $T_A = +25\text{ }^{\circ}\text{C}$, $Z_0 = 50\text{ }\Omega$)

Parameters	Units	Typical			
Frequency	MHz	900	2000	2450	3500
Gain	dB	19.0	16.0	14.0	12.0
S11	dB	-13	-15	-15	-14
S22	dB	-13	-18	-18	-14
Output IP3 ¹⁾	dBm	34.0	34.5	36.0	34.0
Noise Figure	dB	4.0	3.3	3.3	3.2
Output P1dB	dBm	20	21	22	20
Current	mA	66	66	66	66
Device Voltage	V	+4.8	+4.8	+4.8	+4.8

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

Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		2000	
Gain	dB	15.0	16.0	
S11	dB		-15	
S22	dB		-18	
Output IP3	dBm	33.0	34.5	
Noise Figure	dB		3.3	3.5
Output P1dB	dBm	20	21	
Current	mA	61	66	72
Device Voltage	V		+4.8	

Absolute Maximum Ratings

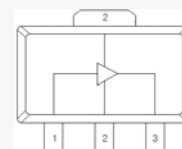
Parameters	Rating
Operating Case Temperature	-40 to +85 $^{\circ}\text{C}$
Storage Temperature	-40 to +150 $^{\circ}\text{C}$
Device Voltage	+6 V
Operating Junction Temperature	+150 $^{\circ}\text{C}$
Input RF Power (CW, 50 Ω matched) ¹⁾	+25 dBm
Thermal Resistance	166 $^{\circ}\text{C/W}$

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

Application Circuit

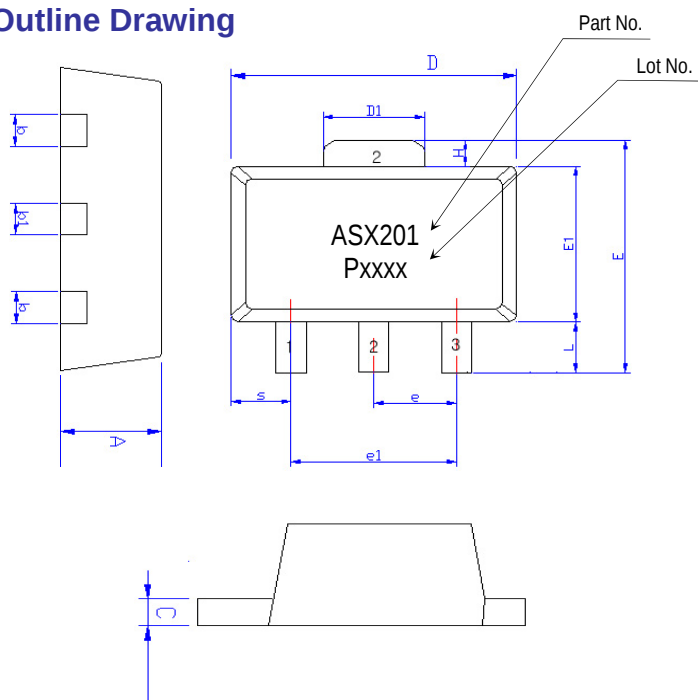
- IF (450 MHz)
- LTE
- CDMA
- GSM
- PCS
- WCDMA
- WiBro
- WLAN
- WiMAX
- C-Band (4500 MHz)

Pin Configuration



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

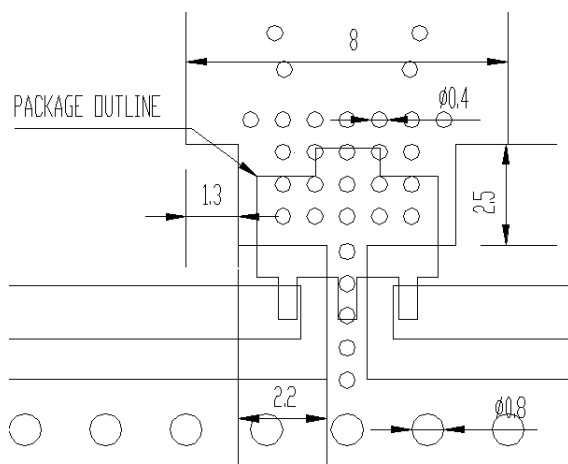
Outline Drawing



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 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

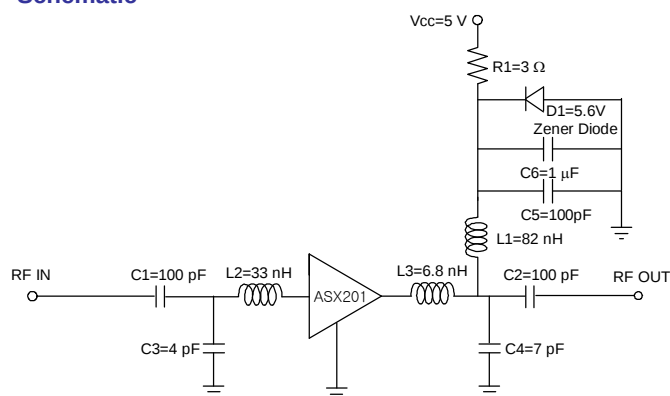
APPLICATION CIRCUIT

IF
450 MHz
+5 V

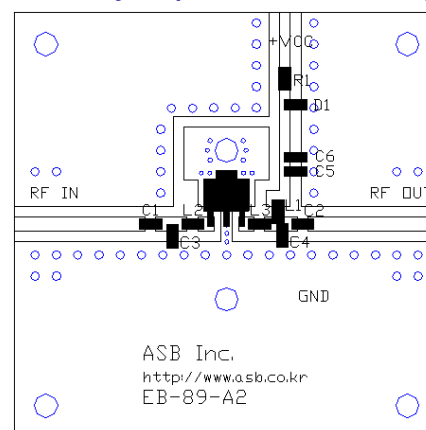
Frequency (MHz)	450
Magnitude S21 (dB)	21.0
Magnitude S11 (dB)	-18
Magnitude S22 (dB)	-15
Output P1dB (dBm)	20.5
Output IP3 ¹⁾ (dBm)	35
Noise Figure (dB)	5.5
Device Voltage (V)	+4.8
Current (mA)	66

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

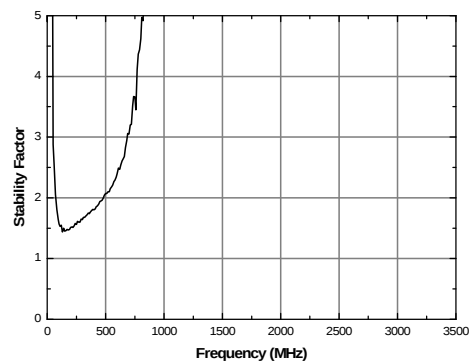
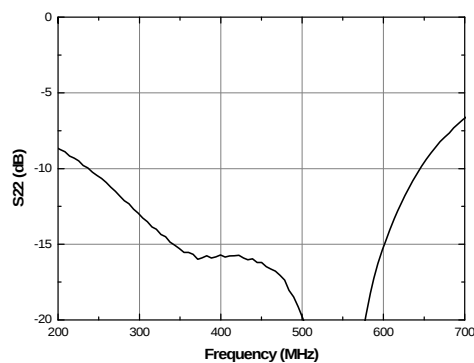
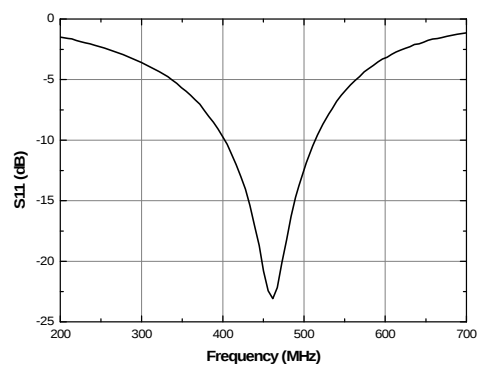
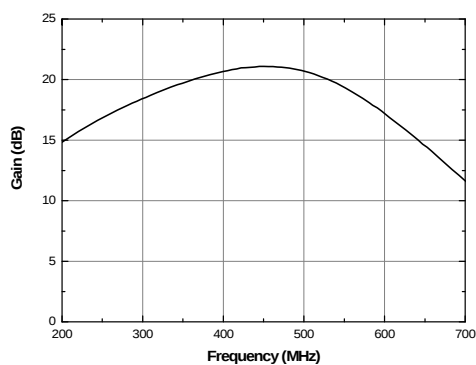
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



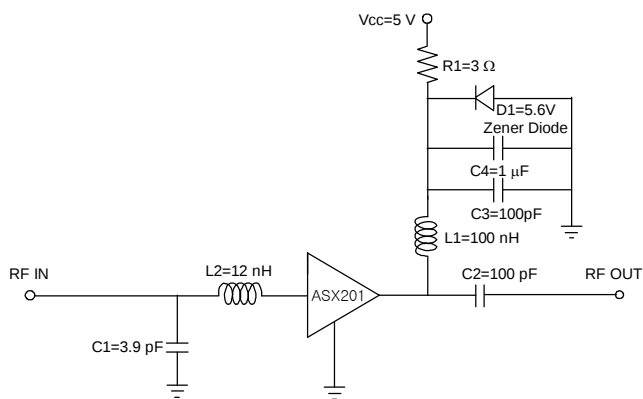
APPLICATION CIRCUIT

LTE
698 ~ 787 MHz
+5 V

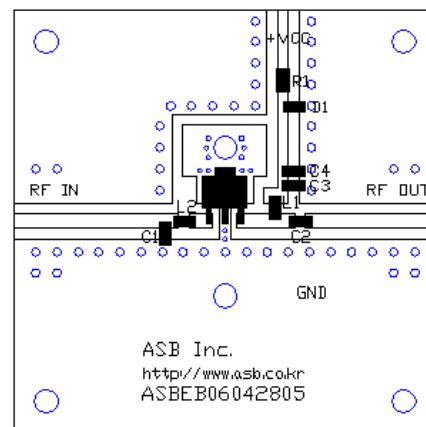
Frequency (MHz)	698 ~ 787
Magnitude S21 (dB)	19.5
Magnitude S11 (dB)	-12
Magnitude S22 (dB)	-10
Output P1dB (dBm)	20
Output IP3 ¹⁾ (dBm)	33.5
Noise Figure (dB)	3.7
Device Voltage (V)	+4.8
Current (mA)	66

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

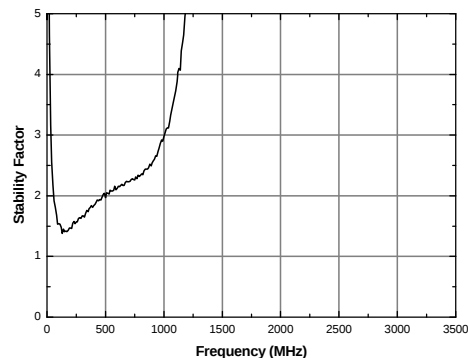
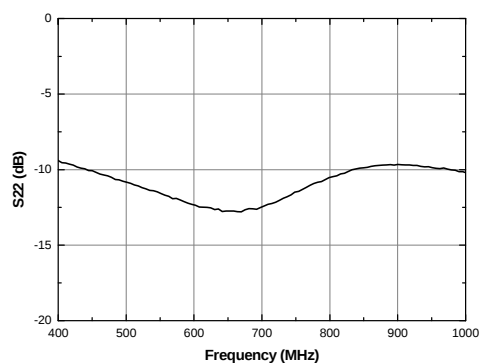
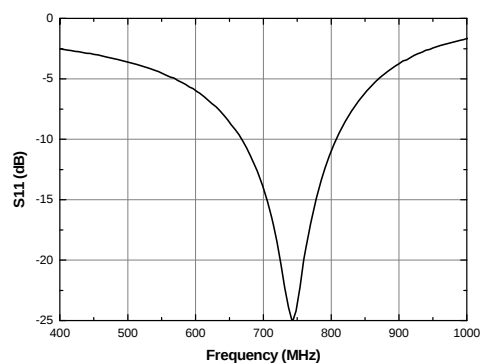
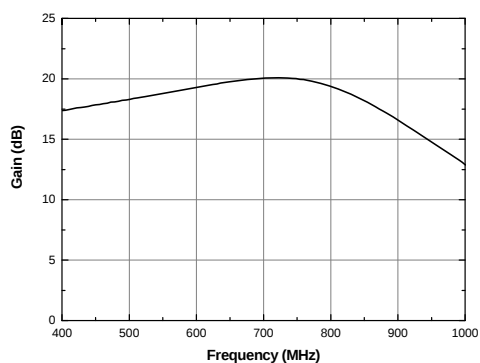
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

CDMA Rx

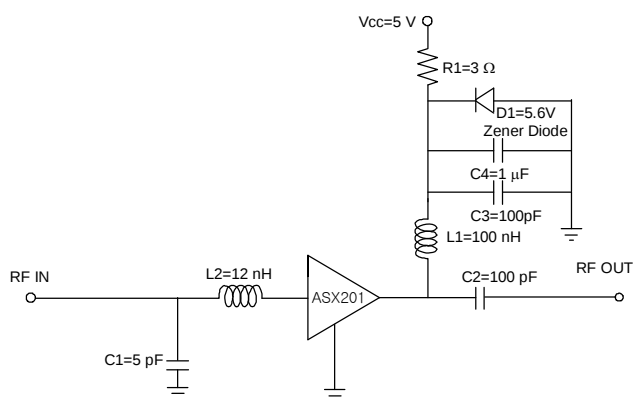
824 ~ 849 MHz

+5 V

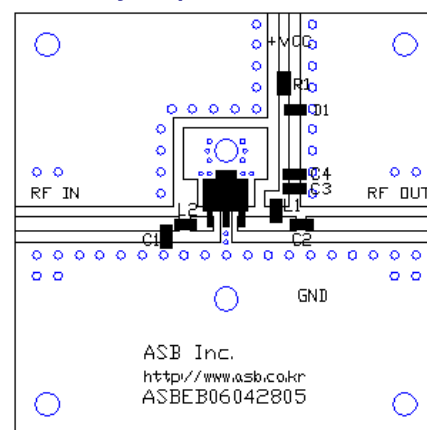
Frequency (MHz)	824 ~ 849
Magnitude S21 (dB)	19.5
Magnitude S11 (dB)	-18
Magnitude S22 (dB)	-13
Output P1dB (dBm)	20
Output IP3 ¹⁾ (dBm)	34
Noise Figure (dB)	4.0
Device Voltage (V)	+4.8
Current (mA)	66

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

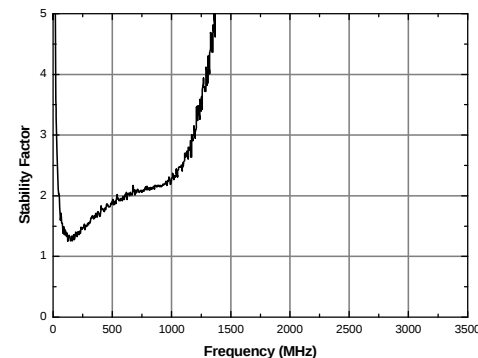
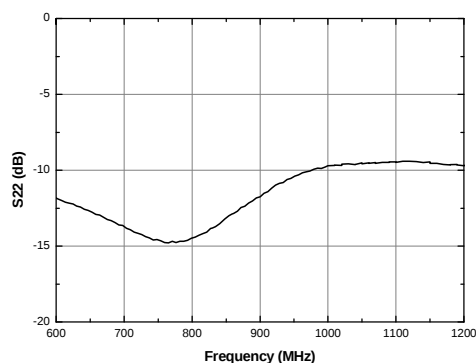
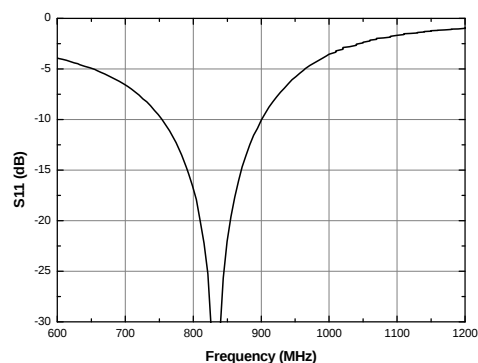
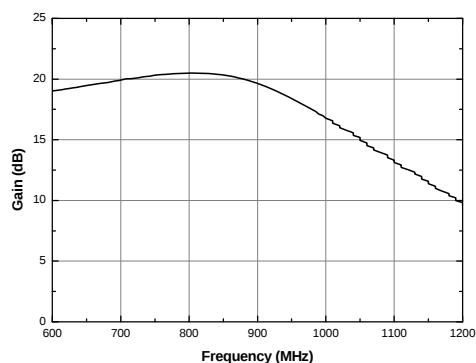
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

CDMA Tx

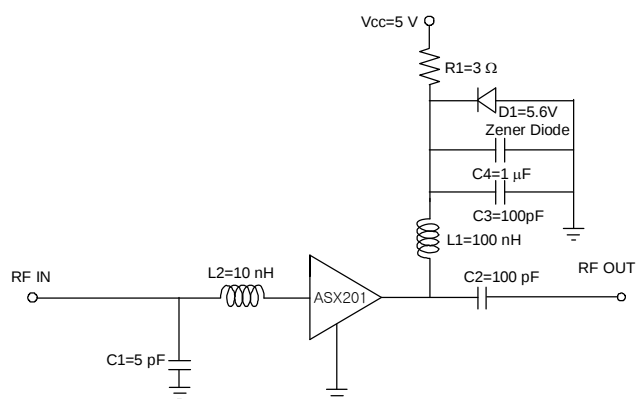
869 ~ 894 MHz

+5 V

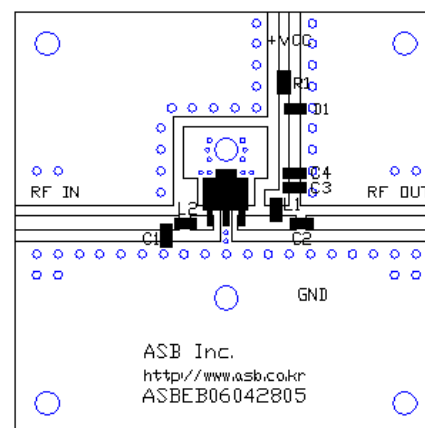
Frequency (MHz)	869 ~ 894
Magnitude S21 (dB)	19.5
Magnitude S11 (dB)	-13
Magnitude S22 (dB)	-13
Output P1dB (dBm)	20
Output IP3 ¹⁾ (dBm)	34
Noise Figure (dB)	4.0
Device Voltage (V)	+4.8
Current (mA)	66

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

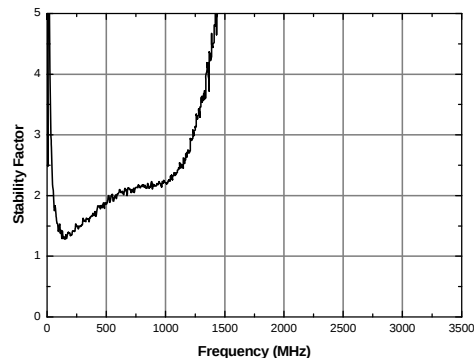
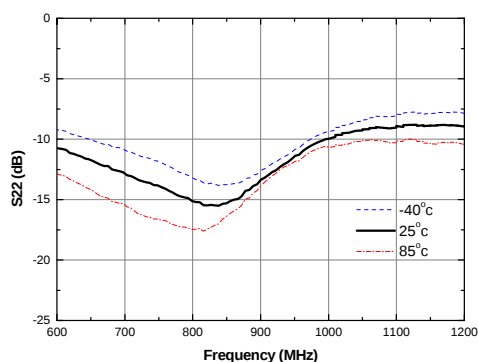
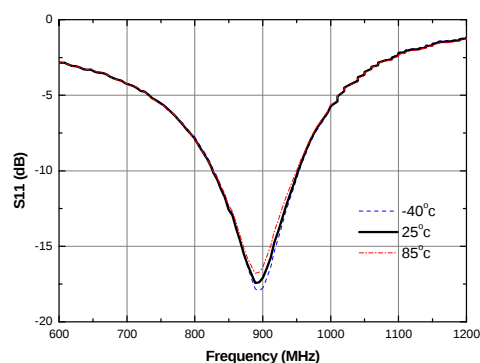
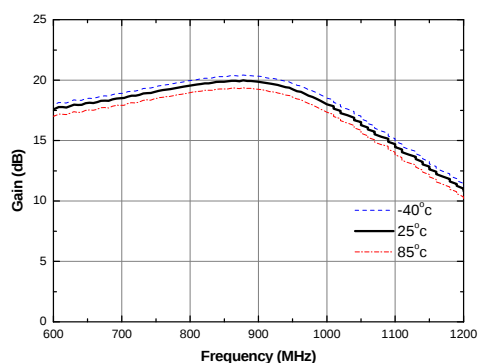
Schematic



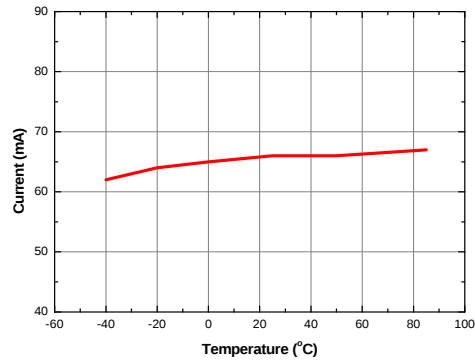
Board Layout (FR4, 40x40 mm², 0.8T)



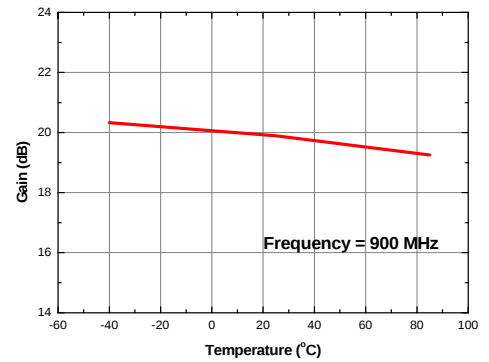
S-parameters & K-factor



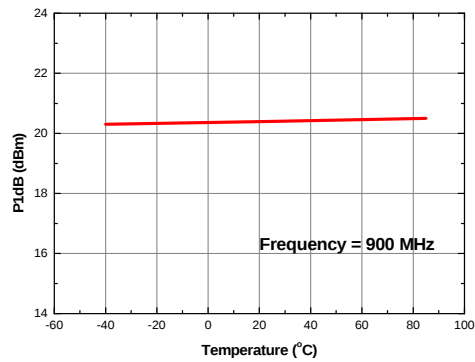
Current vs. Temperature



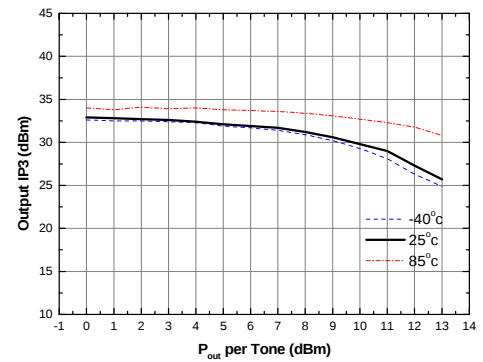
Gain vs. Temperature



P1dB vs. Temperature



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



APPLICATION CIRCUIT

GSM

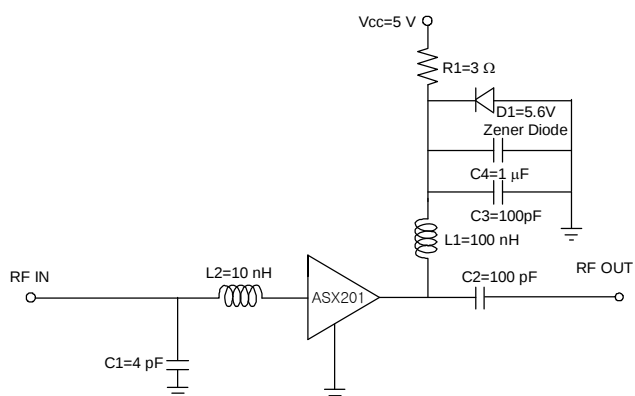
890 ~ 960 MHz

+5 V

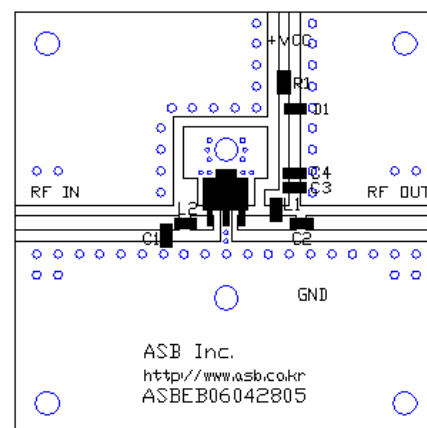
Frequency (MHz)	890 ~ 960
Magnitude S21 (dB)	19.0
Magnitude S11 (dB)	-13
Magnitude S22 (dB)	-13
Output P1dB (dBm)	20
Output IP3 ¹⁾ (dBm)	34
Noise Figure (dB)	4.0
Device Voltage (V)	+4.8
Current (mA)	66

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

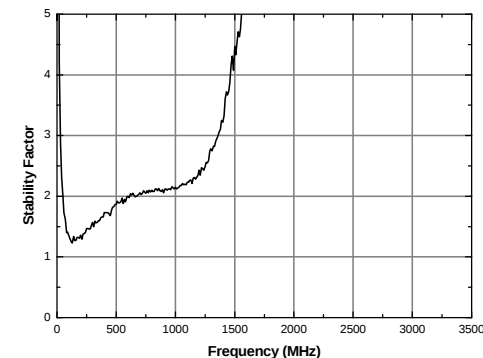
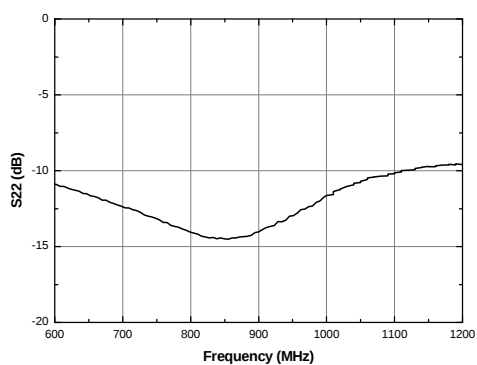
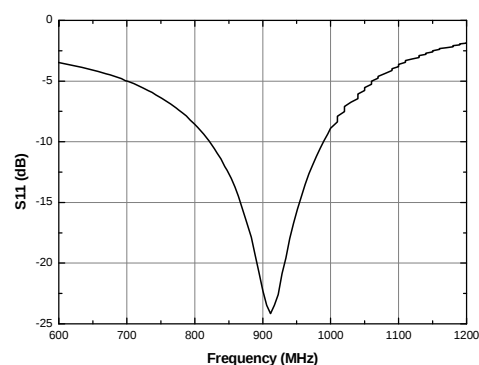
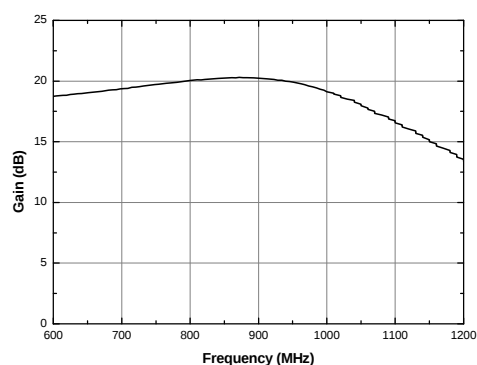
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

PCS Rx

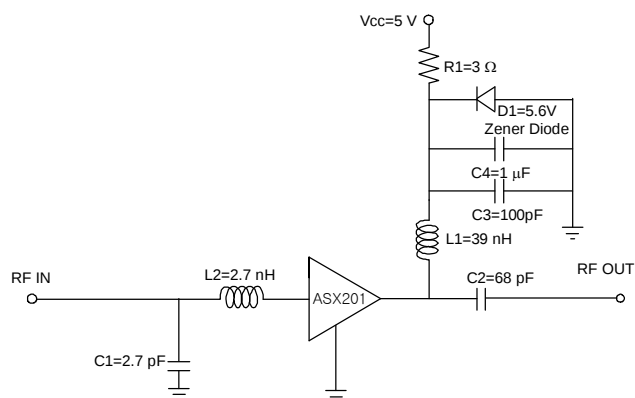
1750 ~ 1780 MHz

+5 V

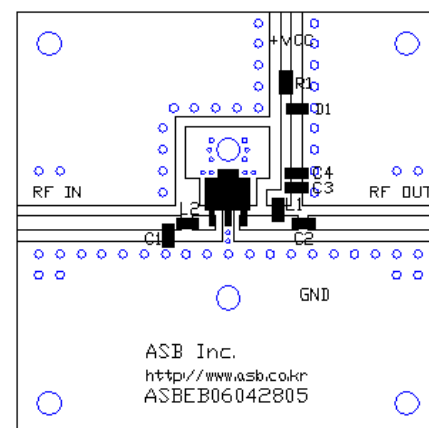
Frequency (MHz)	1750 ~ 1780
Magnitude S21 (dB)	16.5
Magnitude S11 (dB)	-15
Magnitude S22 (dB)	-18
Output P1dB (dBm)	20
Output IP3 ¹⁾ (dBm)	34
Noise Figure (dB)	3.5
Device Voltage (V)	+4.8
Current (mA)	66

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

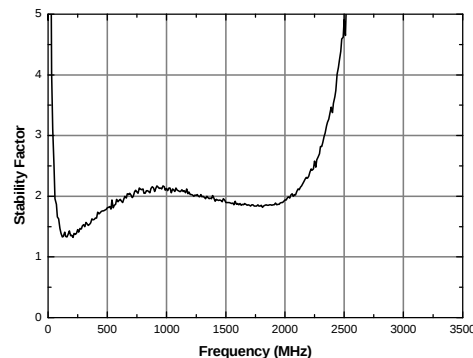
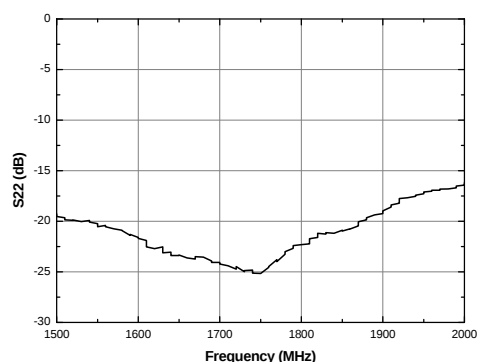
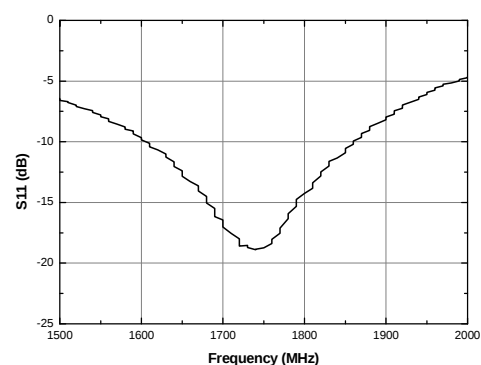
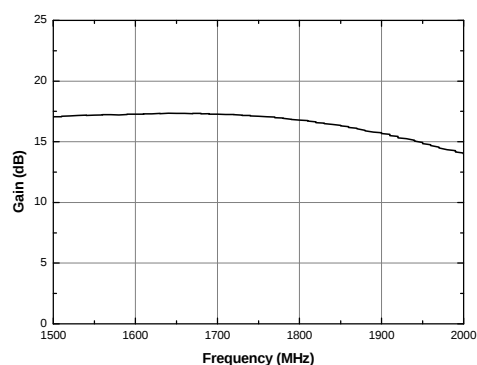
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

PCS Tx

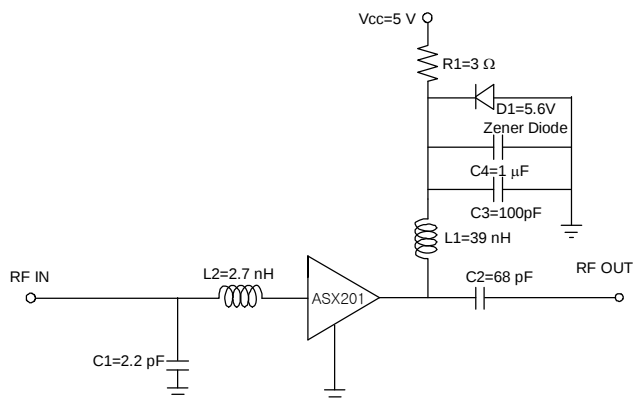
1840 ~ 1870 MHz

+5 V

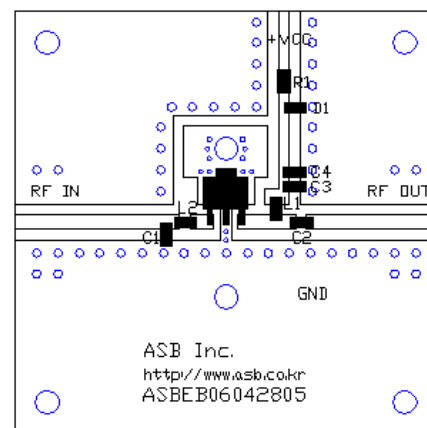
Frequency (MHz)	1840 ~ 1870
Magnitude S21 (dB)	16.0
Magnitude S11 (dB)	-15
Magnitude S22 (dB)	-18
Output P1dB (dBm)	21
Output IP3 ¹⁾ (dBm)	34.5
Noise Figure (dB)	3.5
Device Voltage (V)	+4.8
Current (mA)	66

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

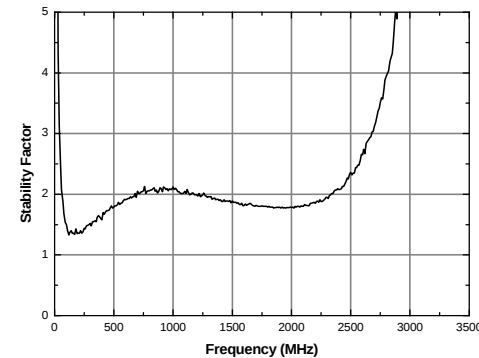
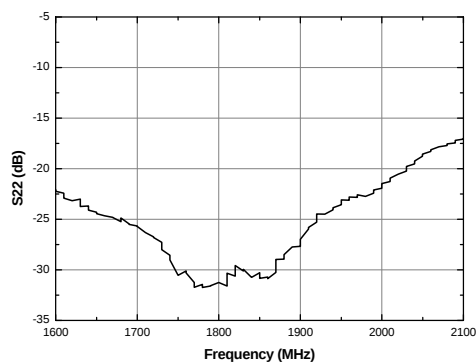
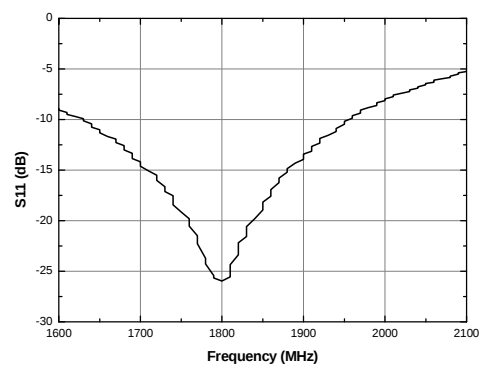
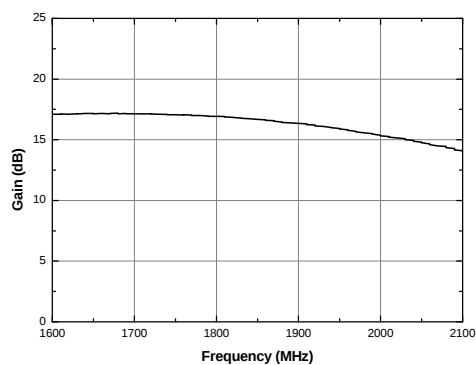
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



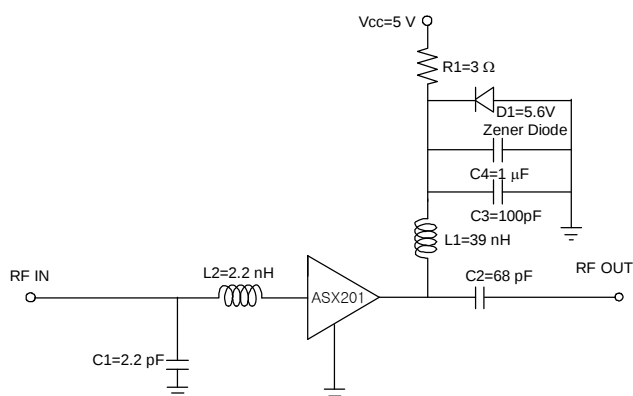
APPLICATION CIRCUIT

WCDMA Rx
1920 ~ 1980 MHz
+5 V

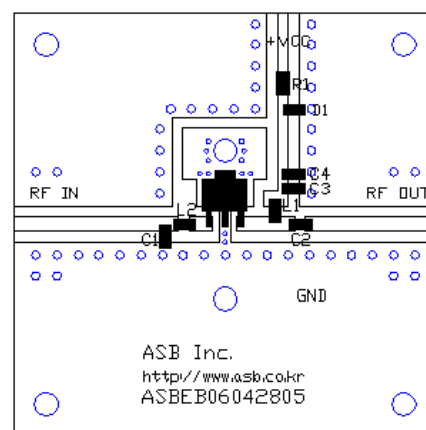
Frequency (MHz)	1920 ~ 1980
Magnitude S21 (dB)	16.0
Magnitude S11 (dB)	-15
Magnitude S22 (dB)	-18
Output P1dB (dBm)	21
Output IP3 ¹⁾ (dBm)	34.5
Noise Figure (dB)	3.3
Device Voltage (V)	+4.8
Current (mA)	66

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

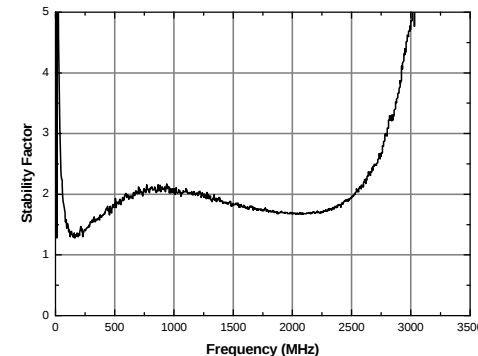
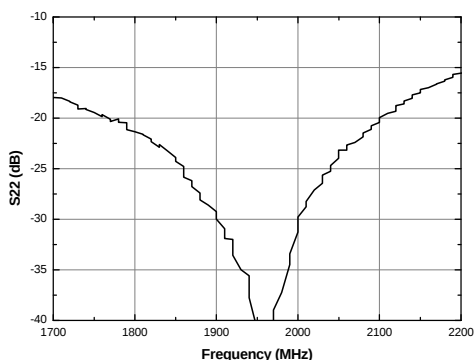
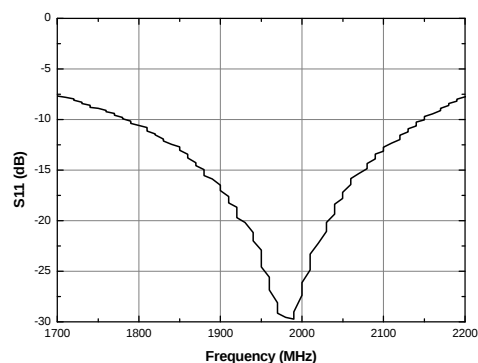
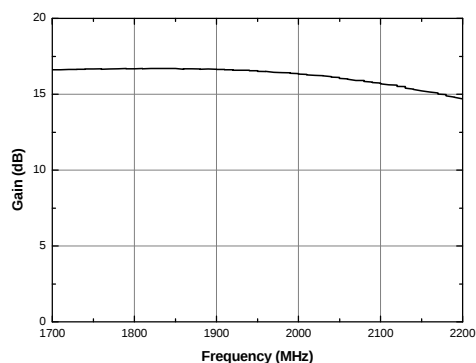
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



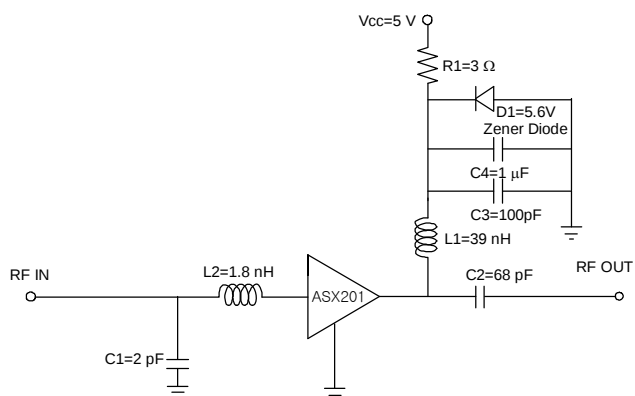
APPLICATION CIRCUIT

WCDMA Tx
2110 ~ 2170 MHz
+5 V

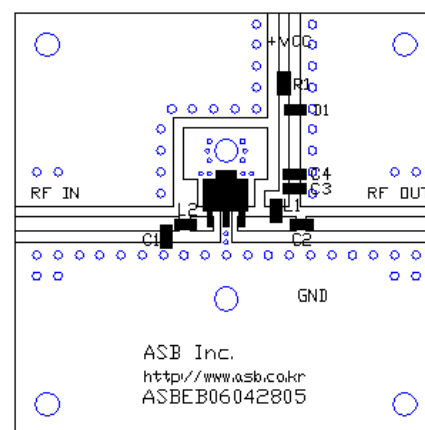
Frequency (MHz)	2110 ~ 2170
Magnitude S21 (dB)	15.5
Magnitude S11 (dB)	-17
Magnitude S22 (dB)	-18
Output P1dB (dBm)	20.5
Output IP3 ¹⁾ (dBm)	36
Noise Figure (dB)	3.3
Device Voltage (V)	+4.8
Current (mA)	66

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

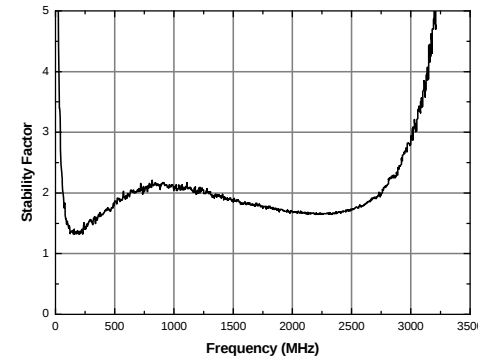
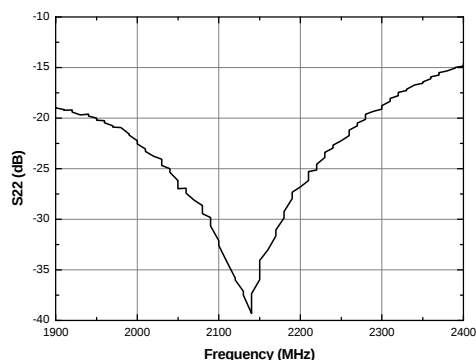
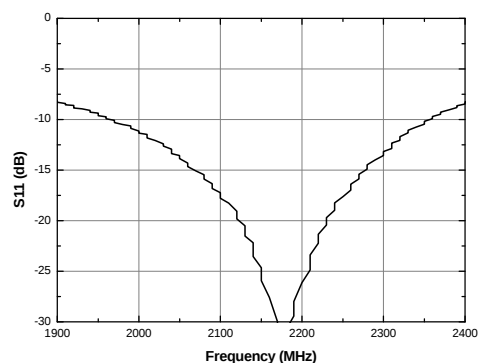
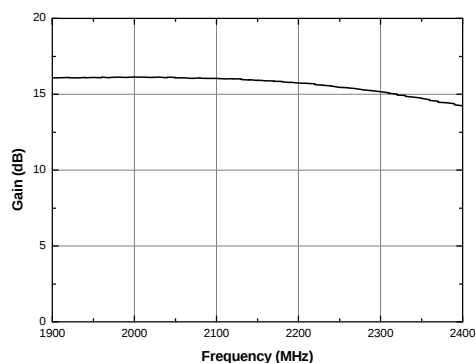
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

WiBro

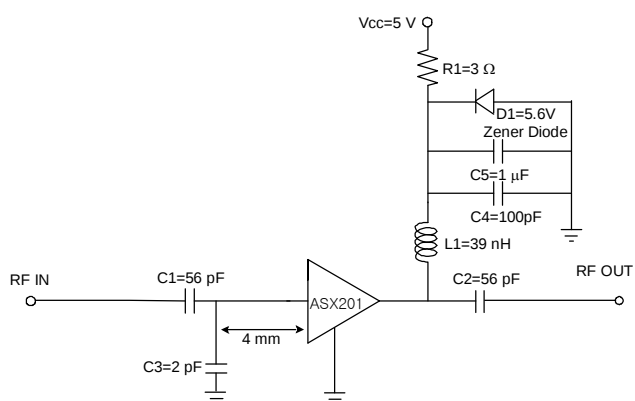
2300 ~ 2400 MHz

+5 V

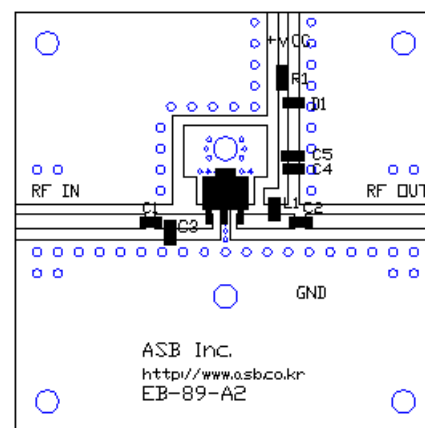
Frequency (MHz)	2300 ~ 2400
Magnitude S21 (dB)	14.5
Magnitude S11 (dB)	-15
Magnitude S22 (dB)	-18
Output P1dB (dBm)	22
Output IP3 ¹⁾ (dBm)	36
Noise Figure (dB)	3.3
Device Voltage (V)	+4.8
Current (mA)	66

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

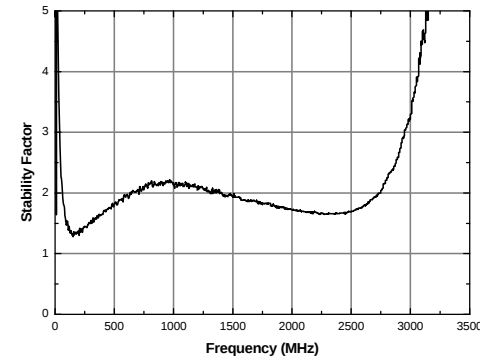
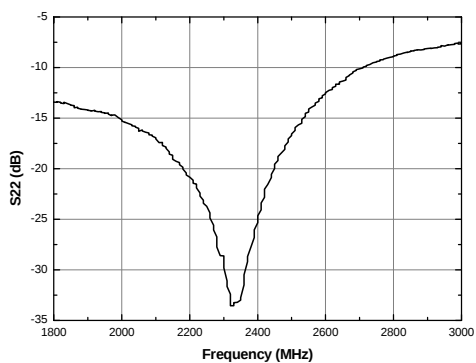
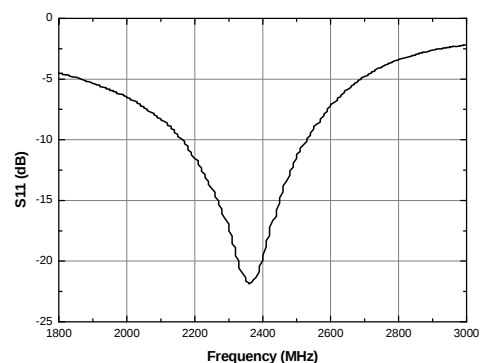
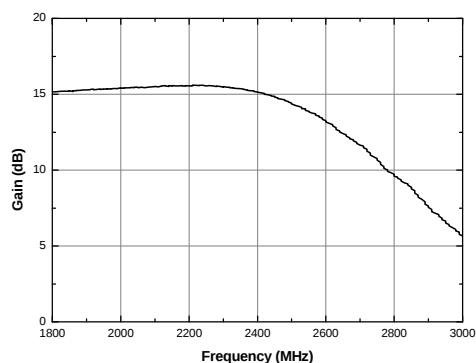
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

WLAN

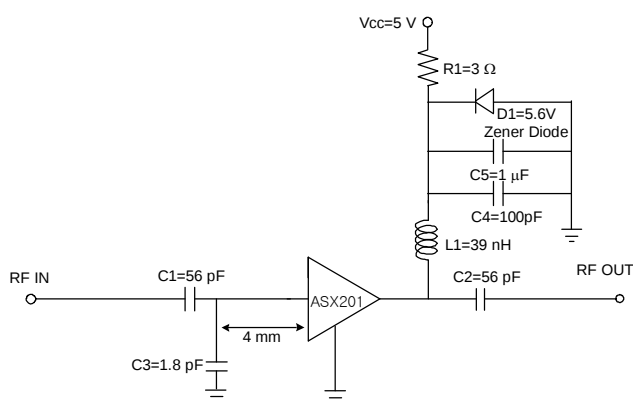
2400 ~ 2500 MHz

+5 V

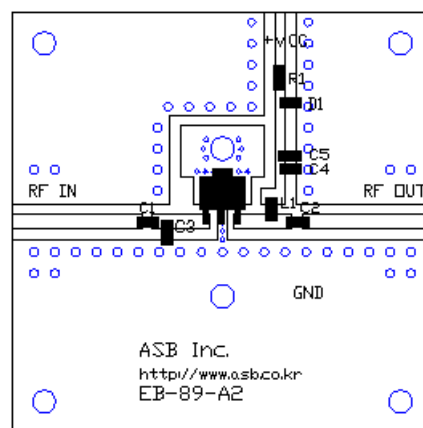
Frequency (MHz)	2400 ~ 2500
Magnitude S21 (dB)	14.0
Magnitude S11 (dB)	-15
Magnitude S22 (dB)	-18
Output P1dB (dBm)	22
Output IP3 ¹⁾ (dBm)	36
Noise Figure (dB)	3.3
Device Voltage (V)	+4.8
Current (mA)	66

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

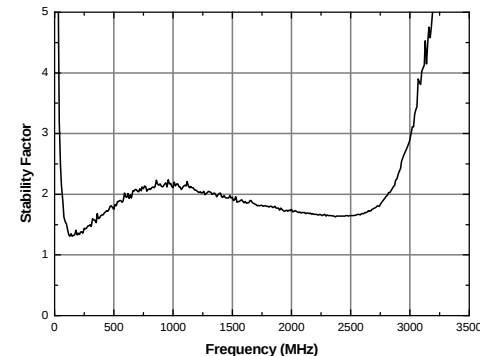
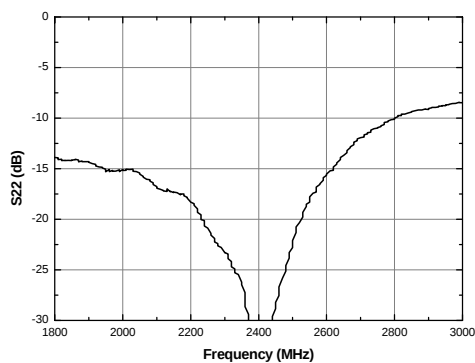
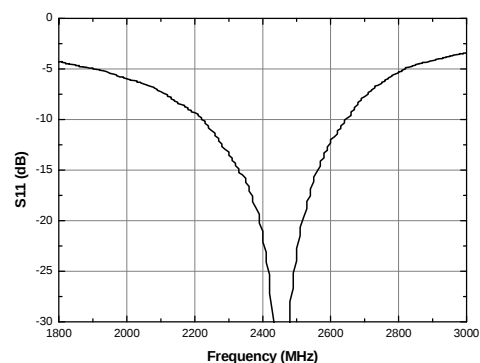
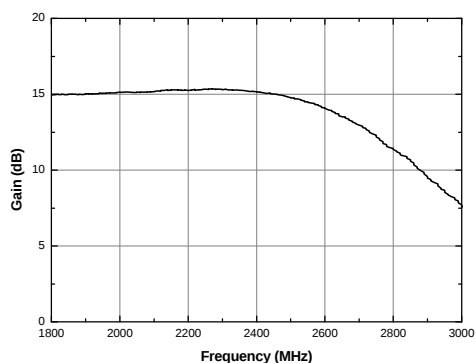
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

WiMAX

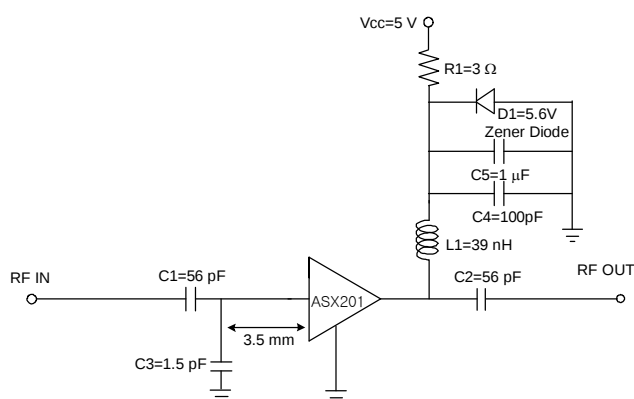
2500 ~ 2700 MHz

+5 V

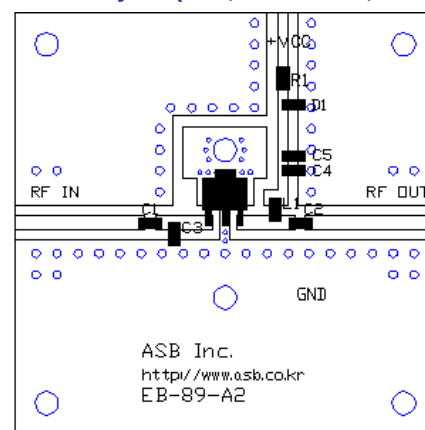
Frequency (MHz)	2500 ~ 2700
Magnitude S21 (dB)	14.0
Magnitude S11 (dB)	-14
Magnitude S22 (dB)	-17
Output P1dB (dBm)	21
Output IP3 ¹⁾ (dBm)	37.5
Noise Figure (dB)	2.9
Device Voltage (V)	+4.8
Current (mA)	66

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

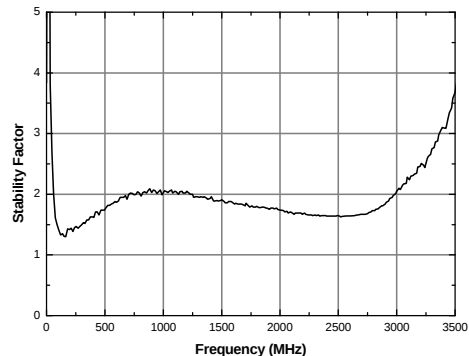
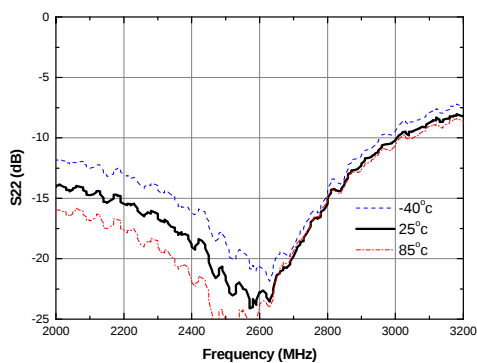
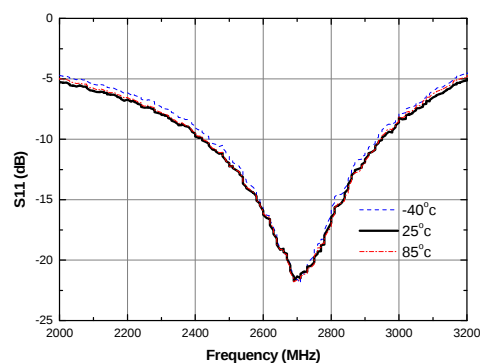
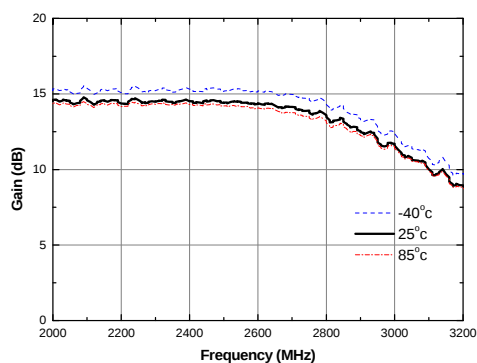
Schematic



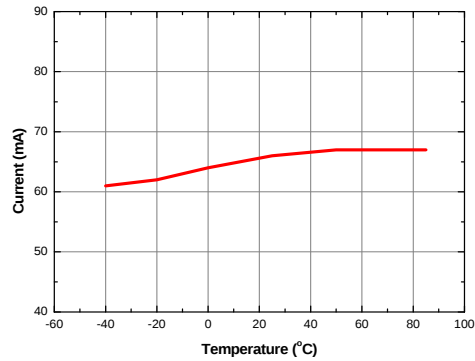
Board Layout (FR4, 40x40 mm², 0.8T)



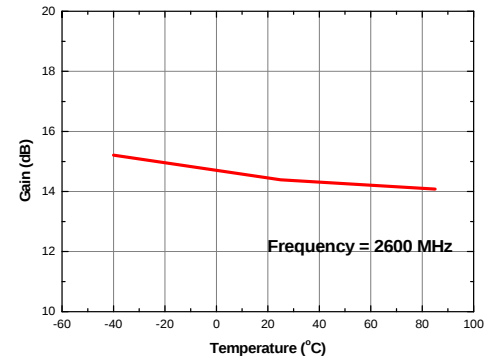
S-parameters & K-factor



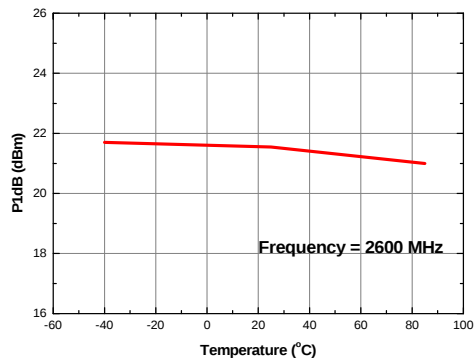
Current vs. Temperature



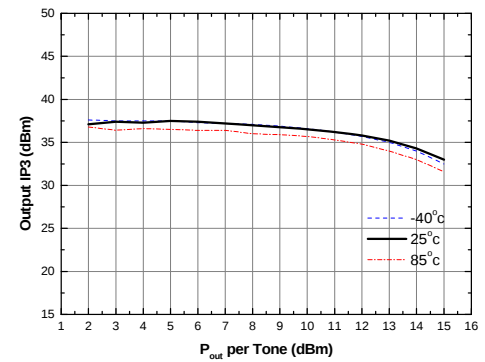
Gain vs. Temperature



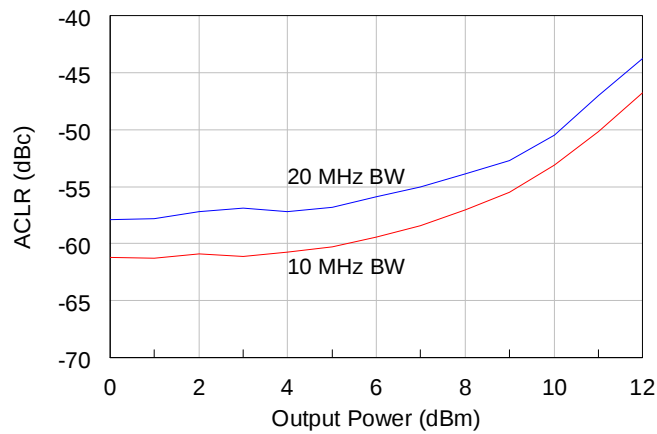
P1dB vs. Temperature



Output IP3 vs. Tone Power (Frequency = 2600 MHz)

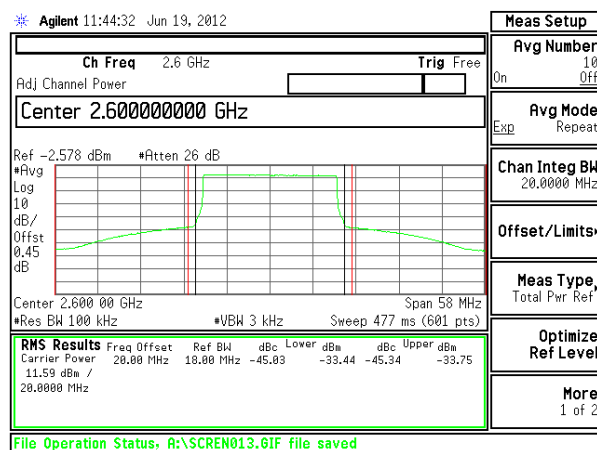


LTE ACLR – 10 MHz & 20 MHz



1) Test Source : LTE_FDD_test model 3.1, BW: 10 MHz & 20 MHz, Test Frequency: 2.6 GHz

LTE ACLR – 20 MHz



2) Test Source : LTE_FDD_test model 3.1, BW: 20 MHz, Test Frequency: 2.6 GHz

APPLICATION CIRCUIT

WiMAX

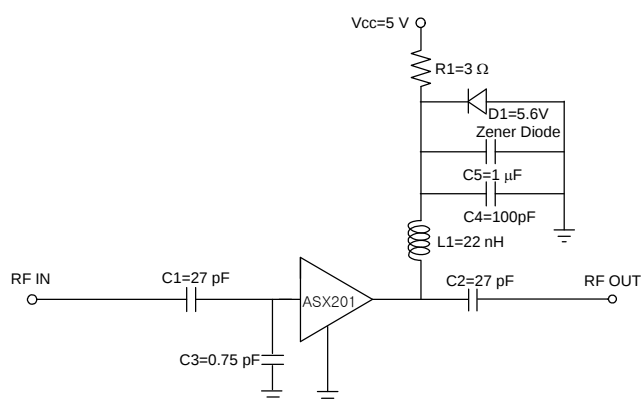
3400 ~ 3600 MHz

+5 V

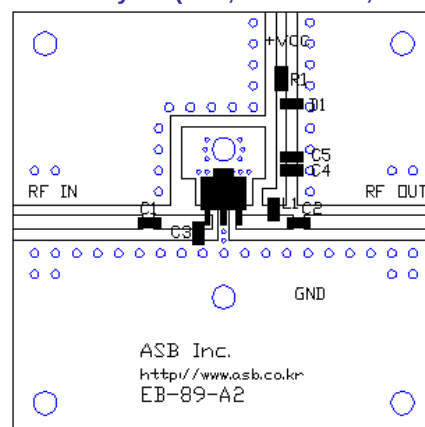
Frequency (MHz)	3400 ~ 3600
Magnitude S21 (dB)	12.0
Magnitude S11 (dB)	-12
Magnitude S22 (dB)	-13
Output P1dB (dBm)	20
Output IP3 ¹⁾ (dBm)	35
Noise Figure (dB)	3.2
Device Voltage (V)	+4.8
Current (mA)	66

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

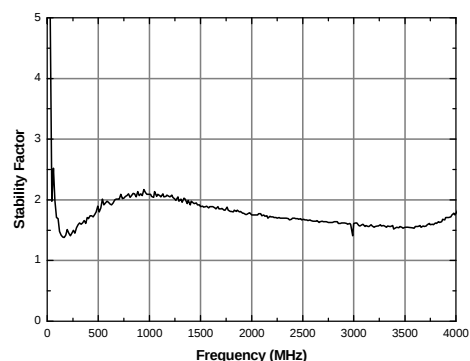
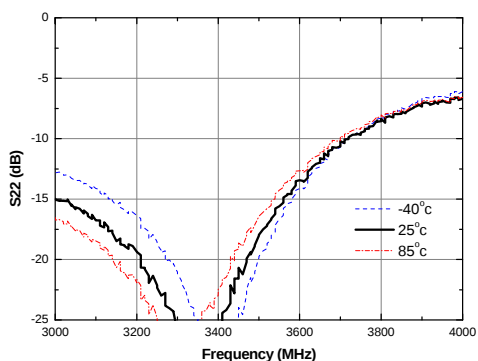
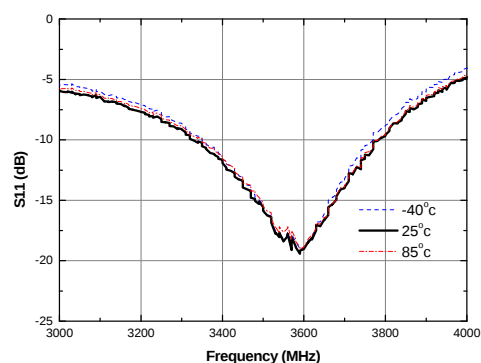
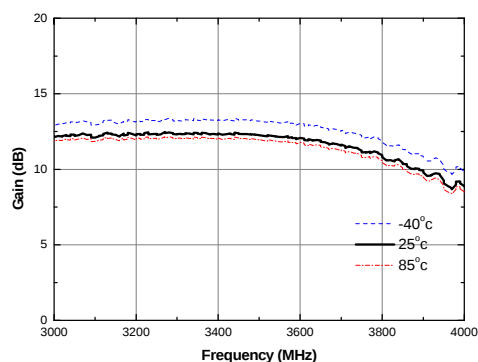
Schematic



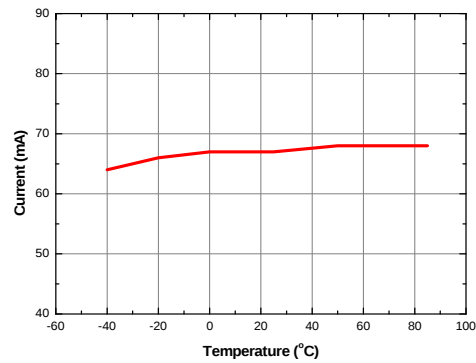
Board Layout (FR4, 40x40 mm², 0.8T)



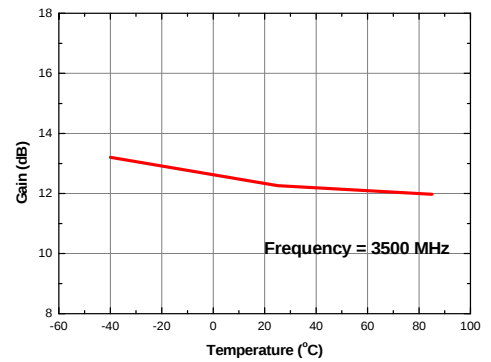
S-parameters & K-factor



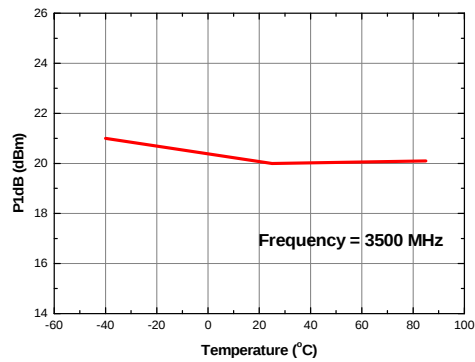
Current vs. Temperature



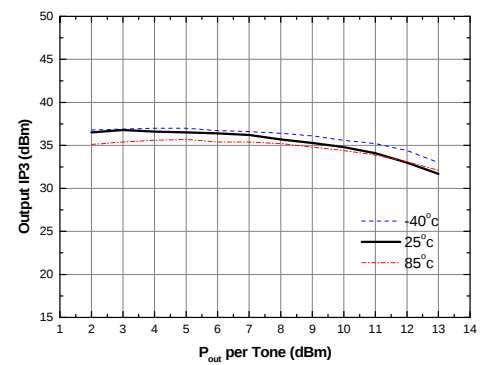
Gain vs. Temperature



P1dB vs. Temperature



Output IP3 vs. Tone Power (Frequency = 3500 MHz)



APPLICATION CIRCUIT

C-Band

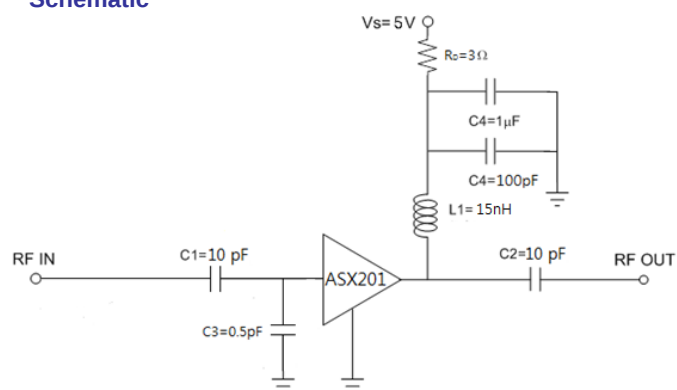
4500 MHz

+5 V

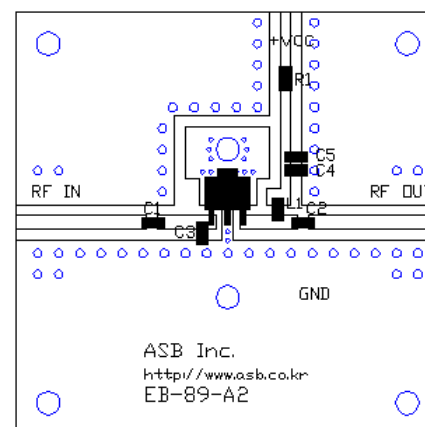
Frequency (MHz)	4500
Magnitude S21 (dB)	8.9
Magnitude S11 (dB)	-16
Magnitude S22 (dB)	-13
Output P1dB (dBm)	21.5
Output IP3 ¹⁾ (dBm)	37
Noise Figure (dB)	3.4
Device Voltage (V)	+4.8
Current (mA)	68

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

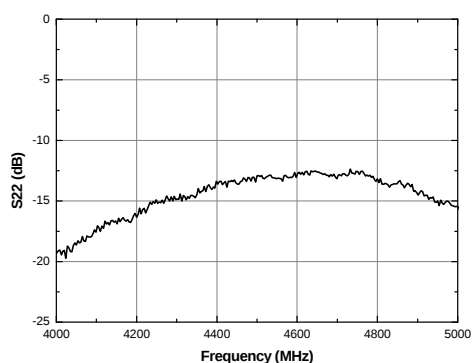
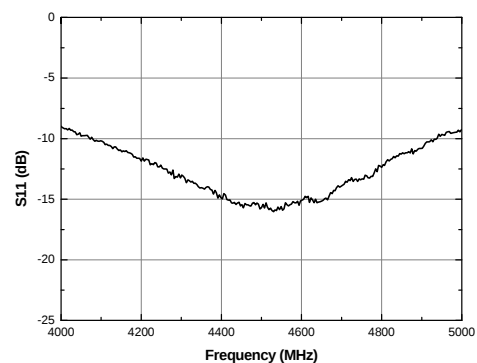
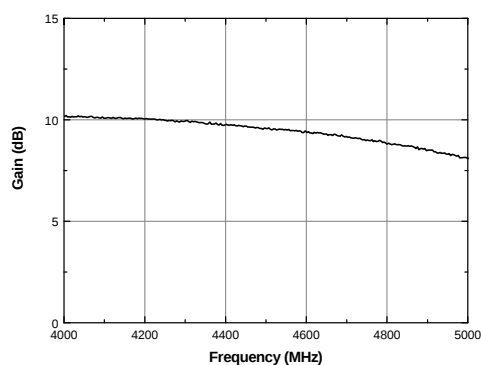
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



Performance with varying V_{DEVICE}

V_{DEVICE} (V)	Current (mA)	Freq. (MHz)	Gain (dB)	S11 (dB)	S22 (dB)	OIP3 ¹⁾ (dBm)	P1dB (dBm)	NF (dB)
+4.8	66	880	20.0	-21.5	-14.3	35.3	21.0	4.06
+4.5	51		19.7	-19.1	-14.4	31.3	18.4	3.63
+4.2	38		19.2	-16.5	-14.7	27.5	15.5	3.15
+4.8	66	1950	16.4	-27.8	-27.4	35.1	21.3	2.88
+4.5	51		16.2	-26.8	-25.2	31.5	18.8	2.55
+4.2	38		15.9	-24.0	-23.0	27.9	16.1	2.27
+4.8	66	3500	12.3	-14.4	-13.4	35.2	19.6	3.71
+4.5	51		12.2	-14.0	-13.2	30.9	16.4	3.27
+4.2	38		11.8	-13.2	-12.7	27.2	14.3	3.01

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

Recommended Soldering Reflow Profile

