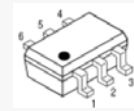


Features

- 14.6 dB Gain at 470 MHz
- 17 dBm P1dB at 470 MHz
- 18 dBm Output IP3 at 470 MHz
- 1.2 dB NF at 470 MHz
- MTTF > 100 Years
- Single Supply

Description

ASL033 is a one-stage LNA for mobile TV receiver low noise block. It has a low noise, high gain, and high linearity over a wide range of frequency up to 4 GHz. It is also suitable for use in the low noise amplifier block of mobile wireless systems. The amplifier is available in a SOT363 package and passes the stringent DC, RF, and reliability tests.



Package Style: SOT363

Typical Performance

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

Parameters	Units	Typical					
		40	170	240	470	860	1575
Frequency	MHz	40	170	240	470	860	1575
Gain	dB	17.0	16.6	15.5	14.6	14.2	15.5
S11	dB	-11	-5	-4	-4	-10	-20
S22	dB	-20	-11	-10	-10	-10	-15
Output IP3 ¹⁾	dBm	20 ¹⁾	20 ²⁾	18 ²⁾	18 ²⁾	20 ²⁾	23 ¹⁾
Noise Figure	dB	1.1	1.1	1.2	1.2	1.1	1.3
Output P1dB	dBm	17.0	14.0	15.5	17.0	17.5	10.5
Current	mA	10	5	5	5	5	13
Device Voltage (V)	V	+3.3	+3.0	+3.0	+3.0	+3.0	+5.0

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

2) OIP3 is measured with two tones at an output power of +0 dBm/tone separated by 1 MHz.

Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		470	
Gain	dB		14.6	
S11	dB		-4	
S22	dB		-10	
Output IP3	dBm		18	
Noise Figure	dB		1.2	
Output P1dB	dBm		17	
Current	mA		5	
Device Voltage (V)	V		+3	

Absolute Maximum Ratings

Parameters	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-40 to +150 °C
Device Voltage (V)	+5.5 V
Operating Junction Temperature	+150 °C
Input RF Power (CW, 50 Ω matched)*	+20 dBm

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

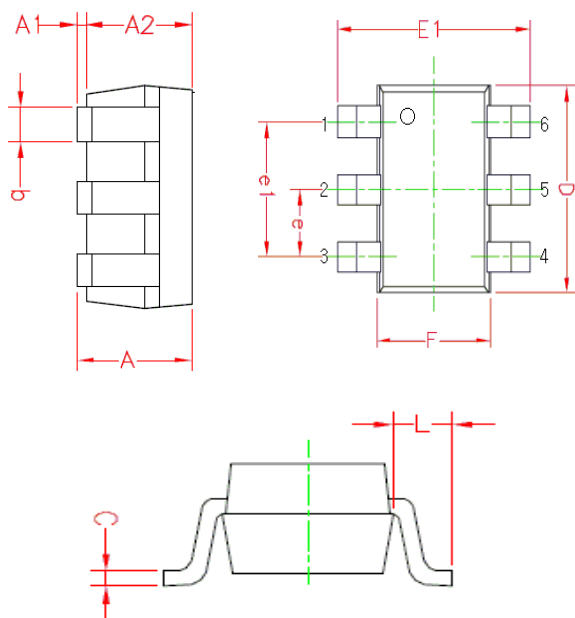
Application Circuit

- DVB-T (V, U band)
- DVB-T (V, U band) / Contact ESD +4 kV
- DVB, CMMB
- DVB-T (V, U band), 75 Ω
- 10 ~ 88 MHz
- ATSC (40 ~ 900 MHz)
- TETRA
- 434 MHz
- 1450 ~ 1500 MHz
- GPS

Pin Configuration

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

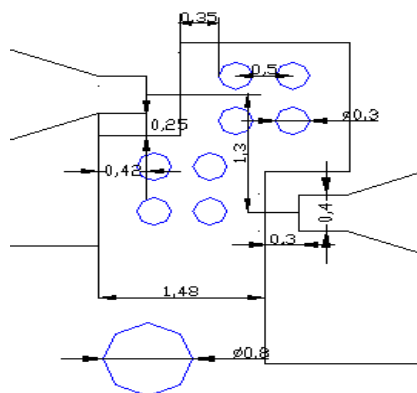
Outline Drawing



Symbols	Dimensions (In mm)		
	MIN	NOM	MAX
A	0.90	1.00	1.10
A1	0.025	0.062	0.10
A2	0.875	0.937	1.00
b	0.20	0.30	0.40
C	0.10	0.125	0.15
D	1.90	2.00	2.10
F	1.15	1.25	1.35
E1	2.00	2.10	2.20
e	--	0.65BSC	--
e1	--	1.30BSC	--
L	--	0.425REF	--

Pin NO.	Function	Pin NO.	Function.
1	RF IN	4	RF OUT & Bias
2	GND	5	GND
3	GND	6	GND

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 lead pin 2 for better RF and thermal performance, as shown in the drawing at the left side.

ESD Classification & Moisture Sensitivity Level

ESD Classification

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

CAUTION: ESD-sensitive device!

Moisture Sensitivity Level (MSL)

Level 3 at 260 °C reflow

APPLICATION CIRCUIT

DVB-T (V, U band)

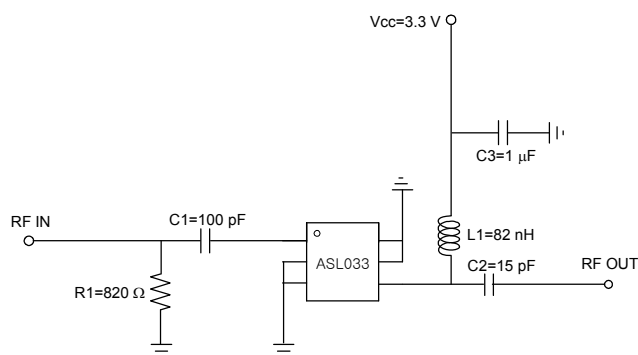
170 ~ 860 MHz

+3.3 V

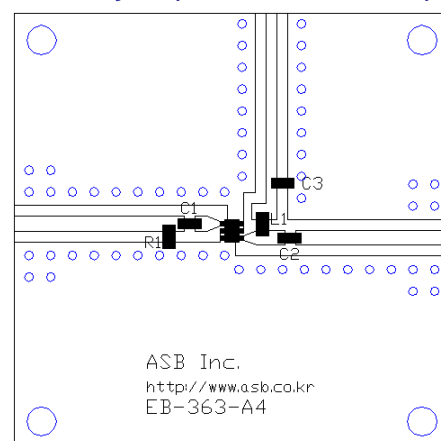
Frequency (MHz)	170	240	470	860
Magnitude S21 (dB)	20.2	19.6	18.4	16.6
Magnitude S11 (dB)	-6	-7	-6	-6
Magnitude S22 (dB)	-15	-8	-6	-6
Output P1dB (dBm)	15.0	16.5	17.5	17.5
Output IP3 ¹⁾ (dBm)	24	21	21	19
Noise Figure (dB)	1.2	1.2	1.2	1.2
Device Voltage (V)	+3.3	+3.3	+3.3	+3.3
Current (mA)	10	10	10	10

1) OIP3 is measured with two tones at an output power of +0 dBm/tone separated by 1 MHz.

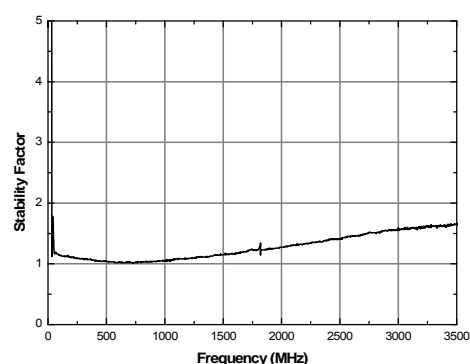
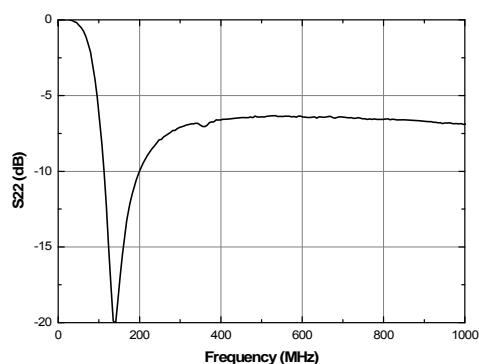
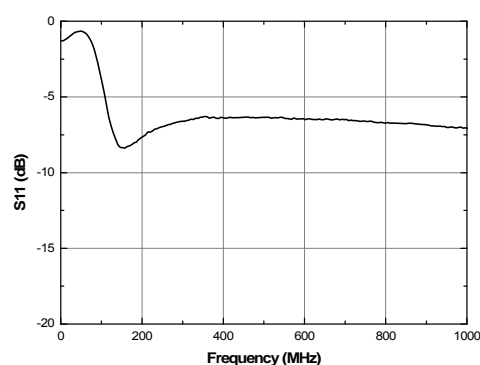
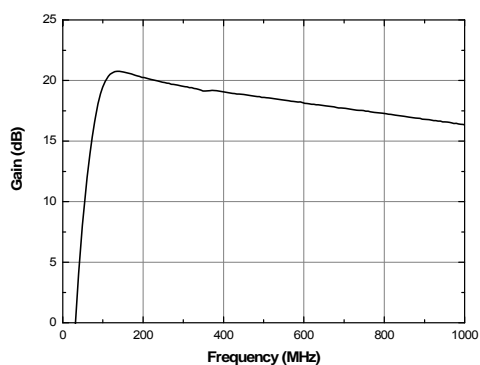
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

DVB-T (V, U band)

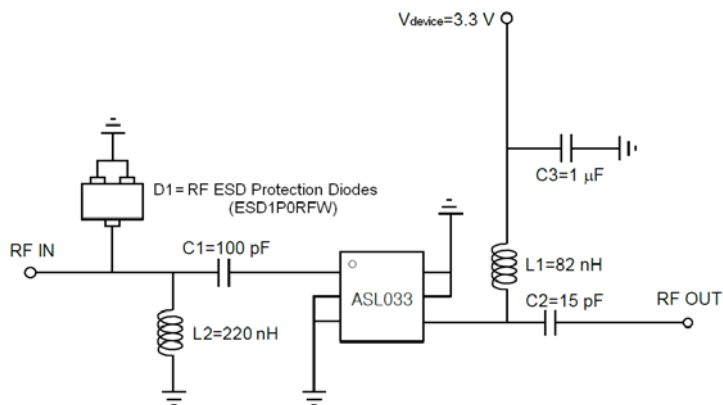
170 ~ 860 MHz

+3.3 V, Contact ESD +4 kV

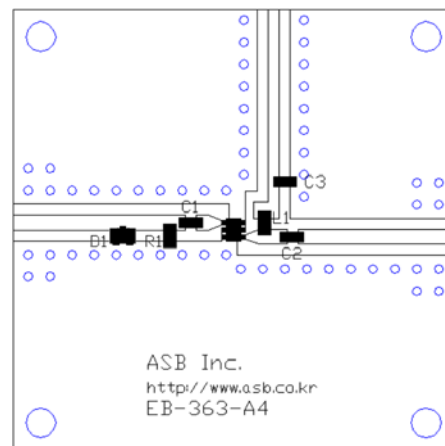
Frequency (MHz)	170	240	470	860
Magnitude S21 (dB)	21.0	20.6	19.0	16.8
Magnitude S11 (dB)	-6	-5	-4	-4
Magnitude S22 (dB)	-18	-9	-6	-6
Output P1dB (dBm)	14.5	16.0	17.5	17.5
Output IP3 ¹⁾ (dBm)	23	22	21	19
Noise Figure (dB)	1.2	1.1	1.0	1.1
Device Voltage (V)	+3.3	+3.3	+3.3	+3.3
Current (mA)	10	10	10	10

1) OIP3 is measured with two tones at an output power of +0 dBm/tone separated by 1 MHz.

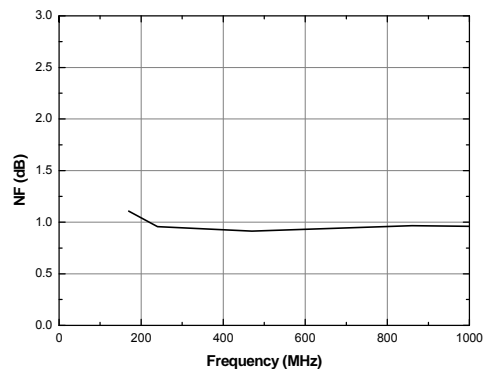
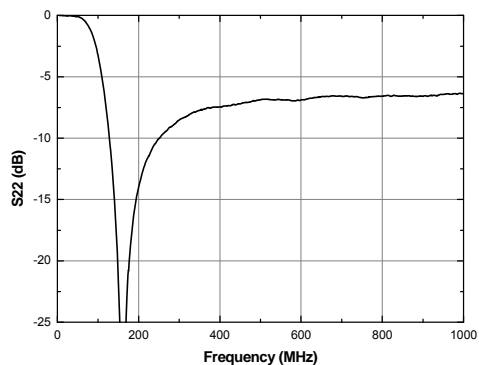
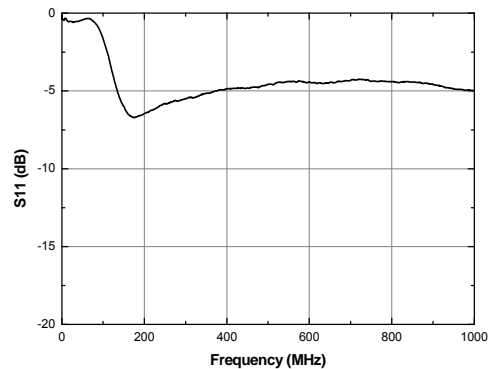
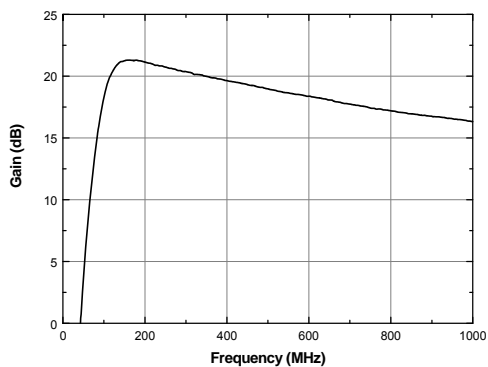
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

DVB-T (V, U band)

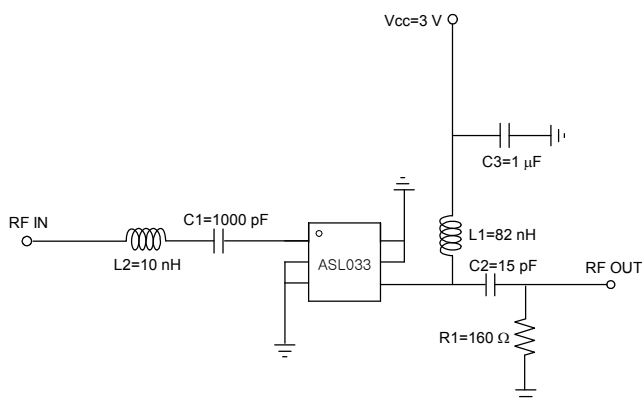
170 ~ 860 MHz

+3 V

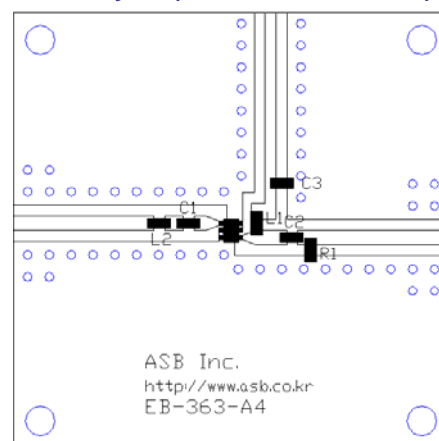
Frequency (MHz)	170	240	470	860
Magnitude S21 (dB)	16.6	15.5	14.6	14.2
Magnitude S11 (dB)	-5	-4	-4	-10
Magnitude S22 (dB)	-11	-10	-10	-10
Output P1dB (dBm)	14.0	15.5	17.0	17.5
Output IP3 ¹⁾ (dBm)	20	18	18	20
Noise Figure (dB)	1.1	1.2	1.2	1.1
Device Voltage (V)	+3	+3	+3	+3
Current (mA)	5	5	5	5

1) OIP3 is measured with two tones at an output power of +0 dBm/tone separated by 1 MHz.

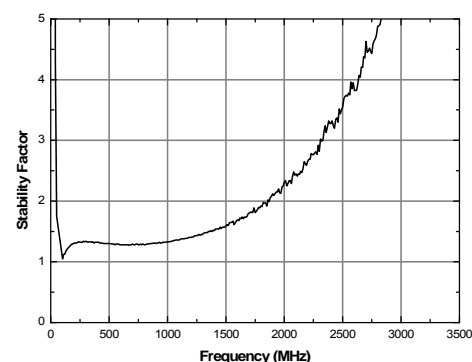
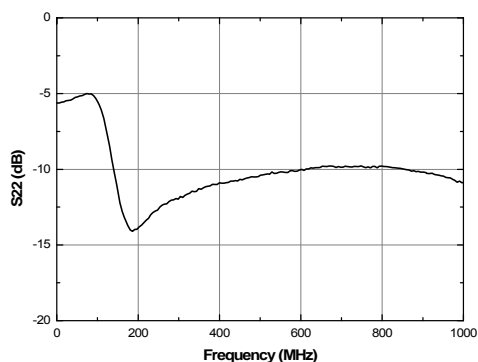
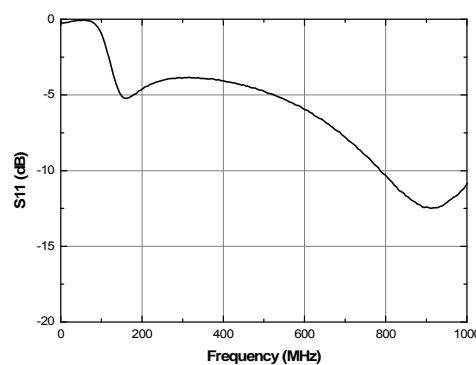
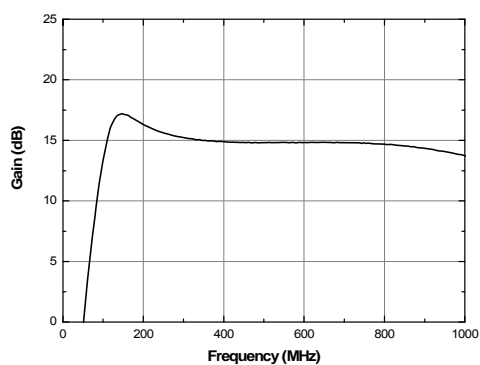
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

DVB-T (V, U band)

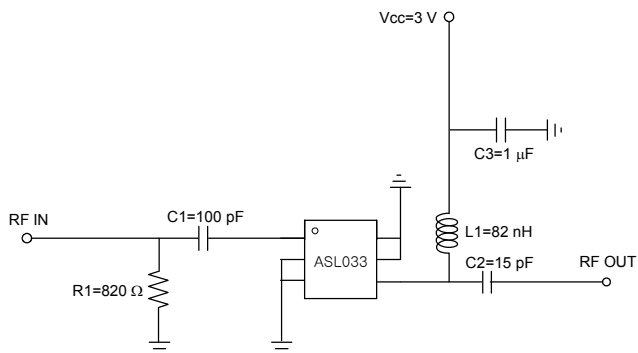
170 ~ 860 MHz

+3 V

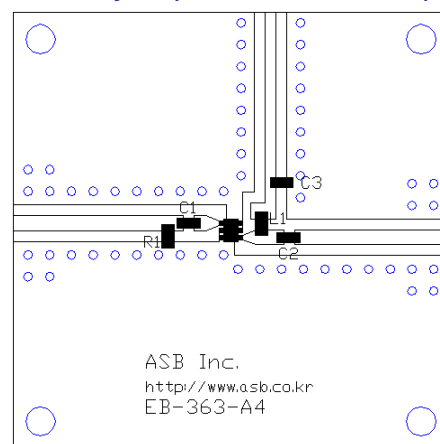
Frequency (MHz)	170	240	470	860
Magnitude S21 (dB)	17.8	16.9	15.7	14.3
Magnitude S11 (dB)	-6	-5	-4	-5
Magnitude S22 (dB)	-9	-5	-4	-4
Output P1dB (dBm)	15.5	16.5	17.5	17.5
Output IP3 ¹⁾ (dBm)	24	21	21	18
Noise Figure (dB)	1.3	1.4	1.4	1.4
Device Voltage (V)	+3	+3	+3	+3
Current (mA)	5	5	5	5

1) OIP3 is measured with two tones at an output power of +0 dBm/tone separated by 1 MHz.

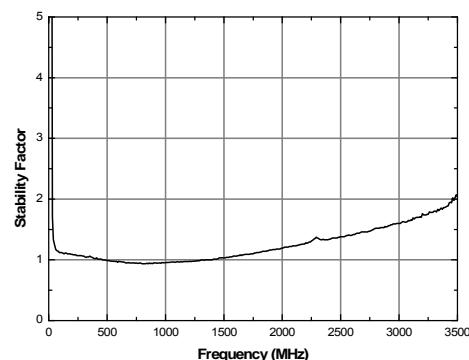
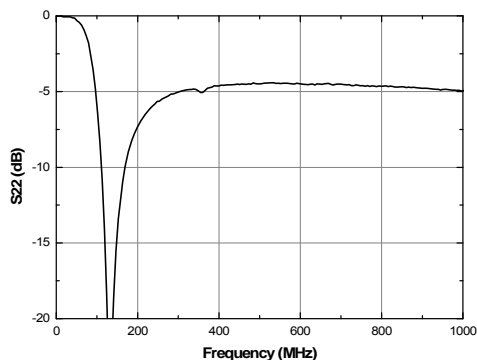
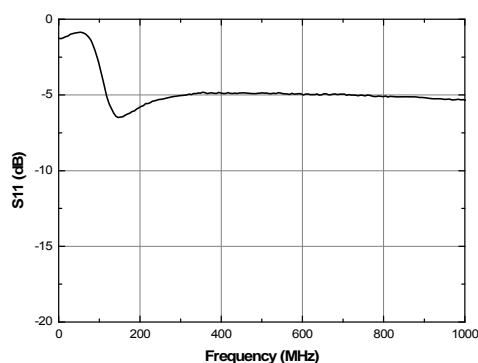
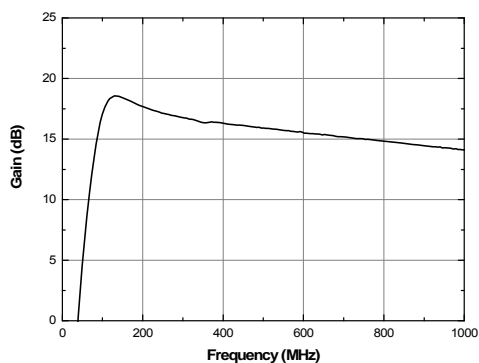
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

DVB & CMMB

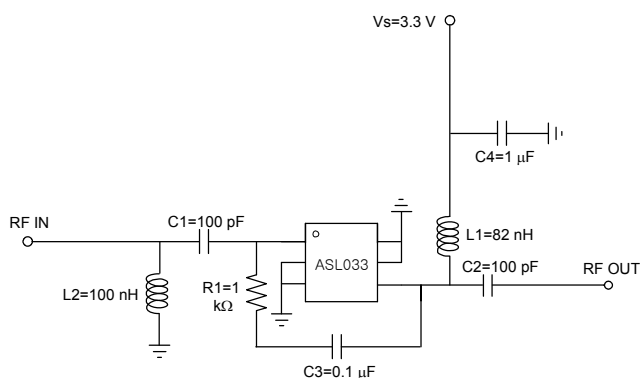
170 ~ 860 MHz

+3 V, 3.3 V

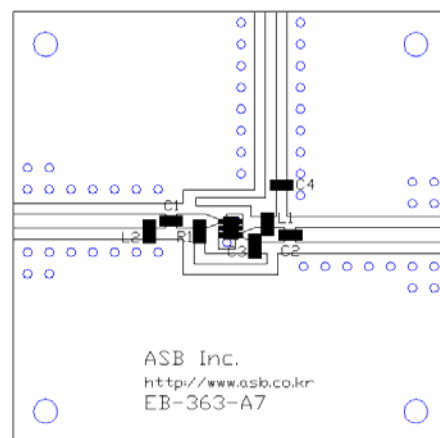
Frequency (MHz)	470	790	470	790
Magnitude S21 (dB)	15	14	17	16
Magnitude S11 (dB)	-8	-8	-12	-12
Magnitude S22 (dB)	-10	-10	-17	-14
Output P1dB (dBm)	18	18	18	18
Output IP3 ¹⁾ (dBm)	18	17	21	20
Noise Figure (dB)	1.3	1.3	1.1	1.1
Device Voltage (V)	+3.0	+3.0	+3.3	+3.3
Current (mA)	5	5	10	10

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

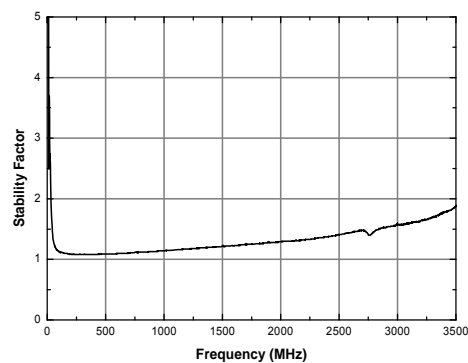
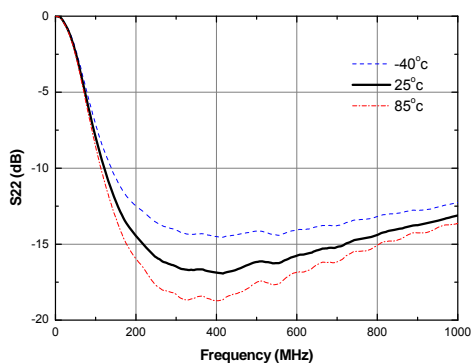
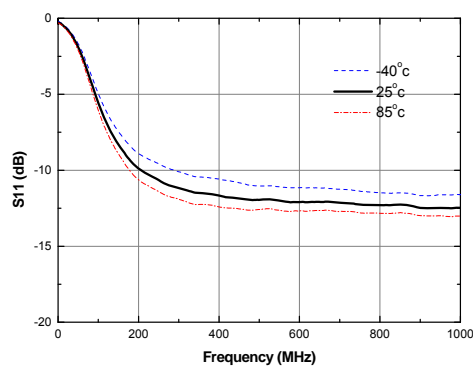
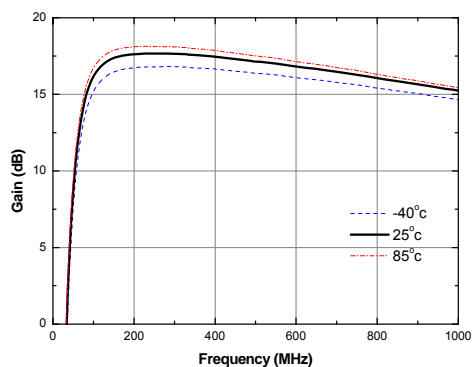
Schematic



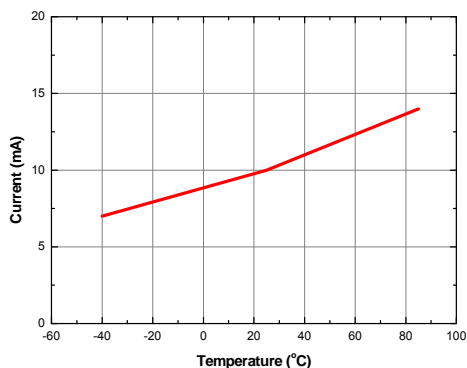
Board Layout (FR4, 40x40 mm², 0.8T)



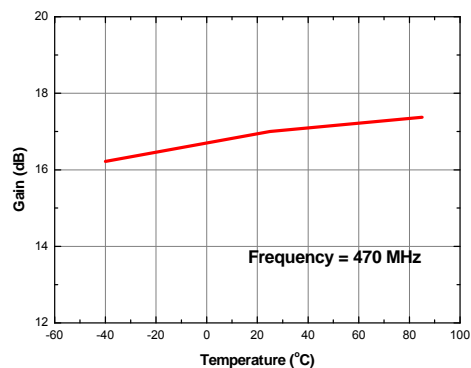
S parameters & K-factor (3.3V)



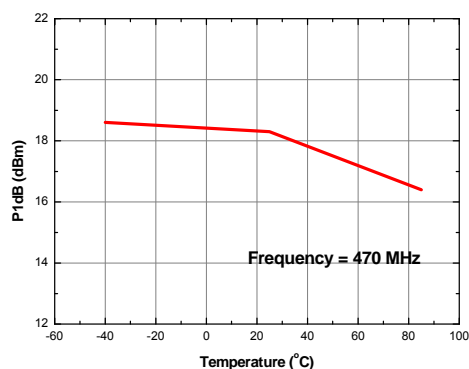
Current vs. Temperature



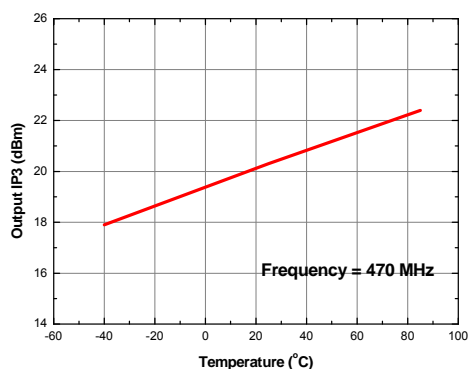
Gain vs. Temperature



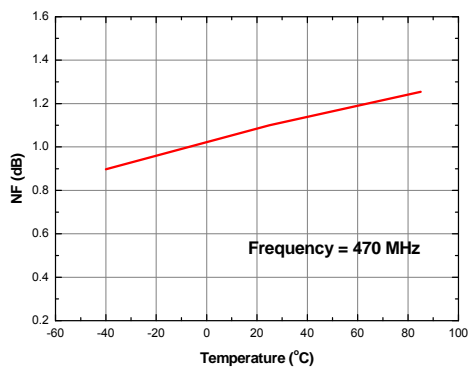
P1dB vs. Temperature



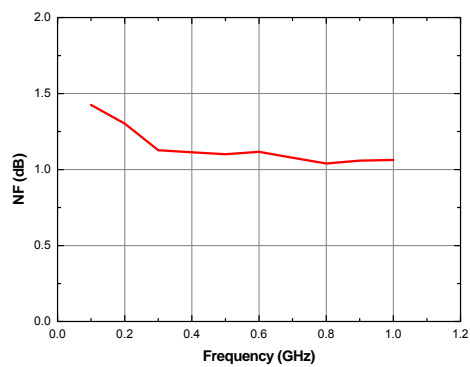
Output IP3 vs. Temperature



NF vs. Temperature



NF vs. Frequency



APPLICATION CIRCUIT

DVB-T (V, U band)

(75 Ω)

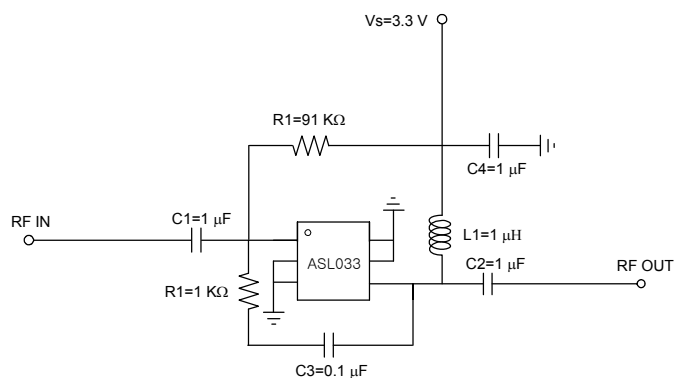
47 ~ 860 MHz

+3.3 V

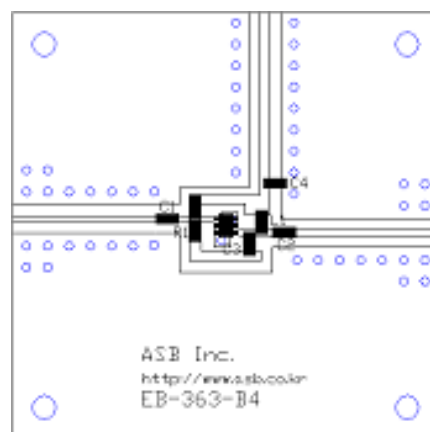
Frequency (MHz)	47	470	860
Magnitude S21 (dB)	20.5	19.0	17.5
Magnitude S11 (dB)	-12	-13	-15
Magnitude S22 (dB)	-7.5	-10	-15
Output P1dB (dBm)	17	17	17
Output IP3 ¹⁾ (dBm)	29.5	30.0	29.5
Noise Figure (dB)	0.95	1.10	1.10
Device Voltage (V)	+3.3	+3.3	+3.3
Current (mA)	37	37	37

1) OIP3 is measured with two tones at an output power of +0 dBm/tone separated by 6 MHz.

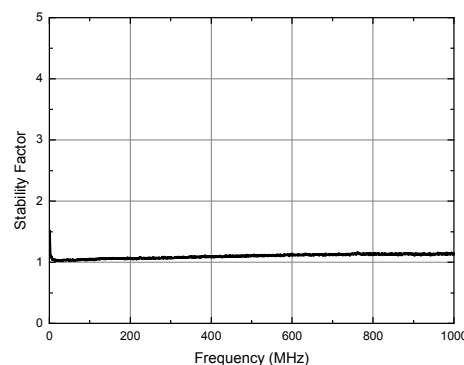
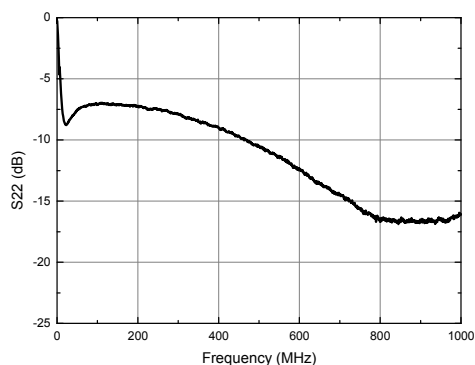
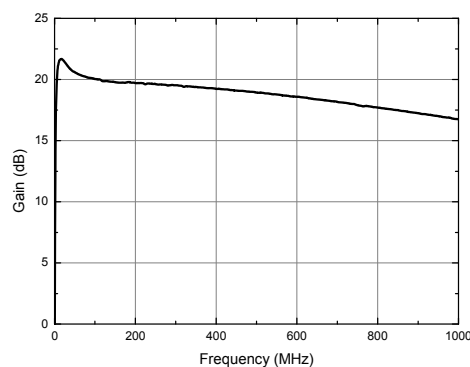
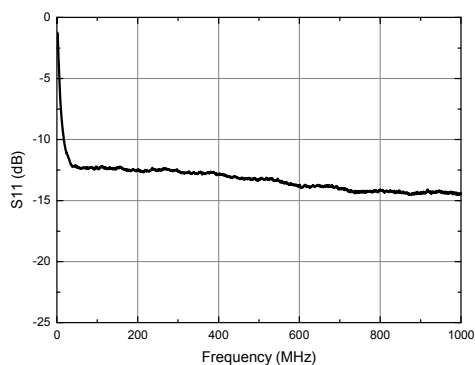
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters (3.3V)



APPLICATION CIRCUIT

DVB-T (V, U band)
(75 Ω)

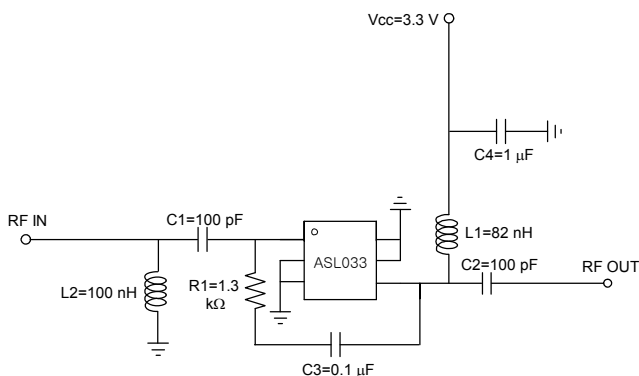
170 ~ 860 MHz

+3.3 V, 3.6 V

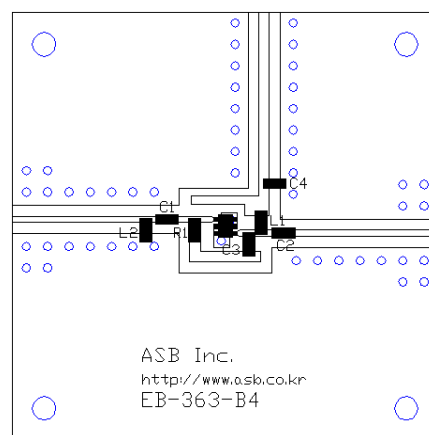
Frequency (MHz)	170	240	470	860	170	240	470	860
Magnitude S21 (dB)	18.0	18.0	17.1	15.2	19.4	19.3	18.4	16.5
Magnitude S11 (dB)	-14	-18	-14	-10	-18	-18	-13	-11
Magnitude S22 (dB)	-18	-18	-15	-11	-15	-13	-13	-14
Output P1dB (dBm)	17	17	17	17	12	14	17	18
Output IP3 ¹⁾ (dBm)	17.0	18.0	19.5	22.0	19.5	21.0	23.5	25.5
Noise Figure (dB)	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1
Device Voltage (V)	+3.3	+3.3	+3.3	+3.3	+3.6	+3.6	+3.6	+3.6
Current (mA)	10	10	10	10	16	16	16	16

1) OIP3 is measured with two tones at an output power of +0 dBm/tone separated by 6 MHz.

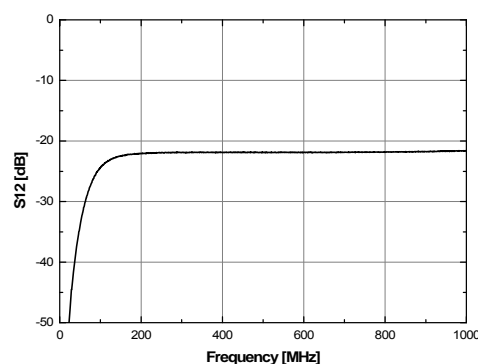
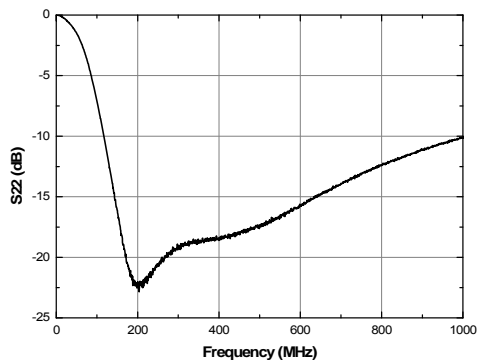
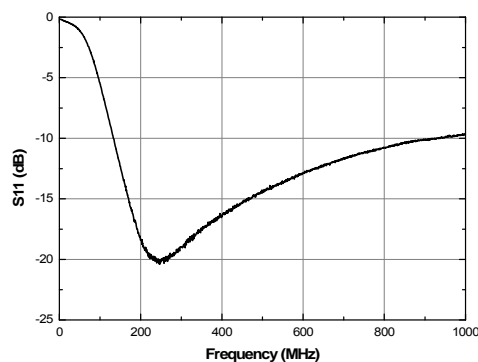
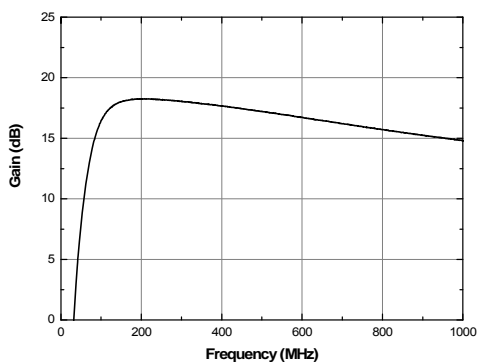
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters (3.3V)



APPLICATION CIRCUIT

DVB (75 Ω)

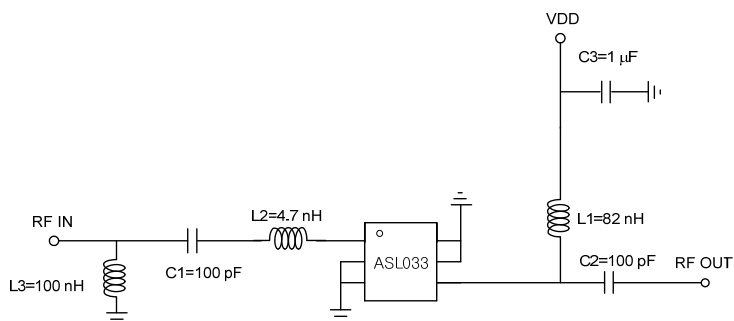
400 ~ 1000 MHz

+3.6 V

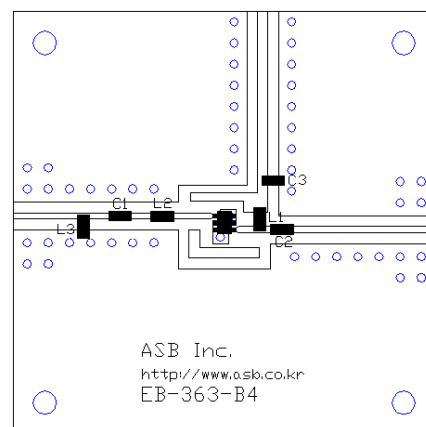
Frequency (MHz)	400	1000
Noise Figure (dB)	1	1
Magnitude S21 (dB)	22	18
Magnitude S11 (dB)	-10	-11
Magnitude S22 (dB)	-18	-14
Output P1dB (dBm)	15	17
Output IP3 ¹⁾ (dBm)	24	29
Device Voltage (V)	+3.6	
Current (mA)	16	

1) OIP3 is measured at an output power of +0dBm/tone separated by 6MHz.

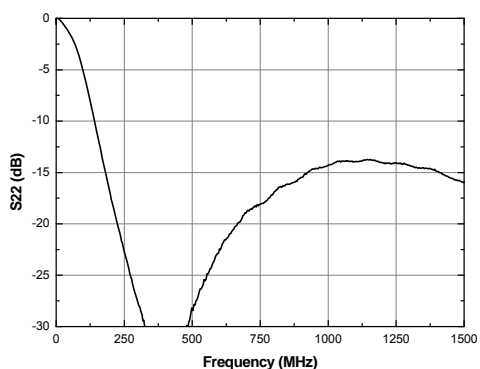
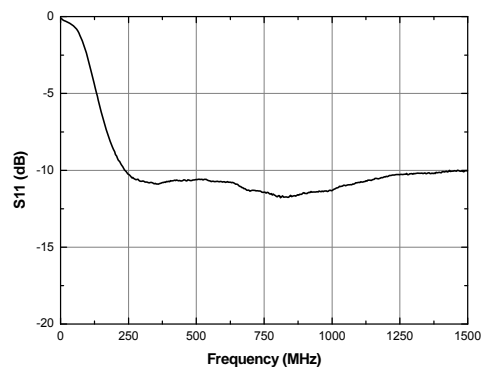
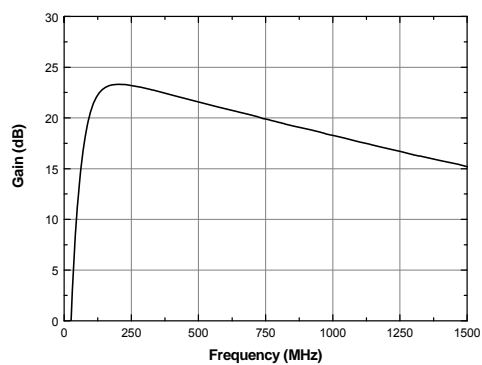
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters



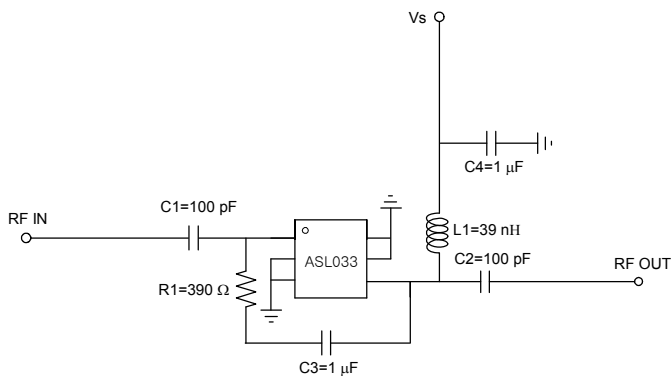
APPLICATION CIRCUIT

SMATV(75 Ω)
900 ~ 2100 MHz
+3.3 V, 3.6 V

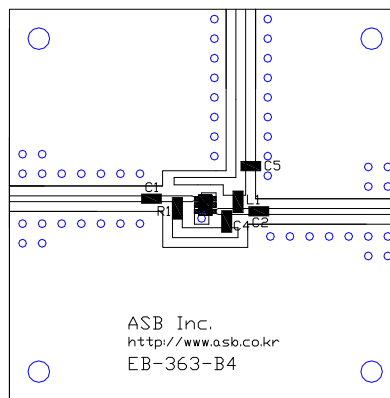
Frequency (MHz)	900	1500	2100	900	1500	2100
Magnitude S21 (dB)	13.0	11.9	10.2	14.3	13.1	11.4
Magnitude S11 (dB)	-11	-16	-10	-10	-18	-12
Magnitude S22 (dB)	-11	-14	-11	-14	-18	-12
Output P1dB (dBm)	17	13	14	16	10	12
Output IP3 ¹⁾ (dBm)	22	18	16	25	17	19
Noise Figure (dB)	2.1	2.2	2.0	2.0	2.0	1.9
Device Voltage (V)	+3.3	+3.3	+3.3	+3.6	+3.6	+3.6
Current (mA)	10	10	10	16	16	16

1) OIP3 is measured with two tones at an output power of +0 dBm/tone separated by 6 MHz.

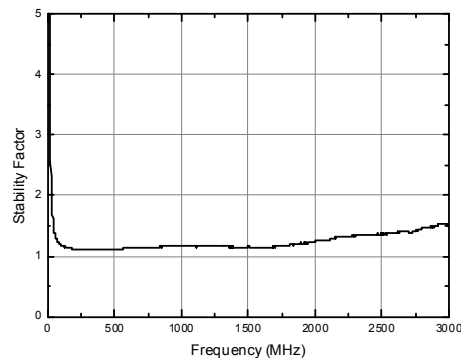
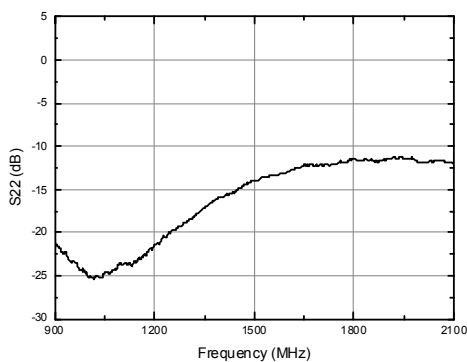
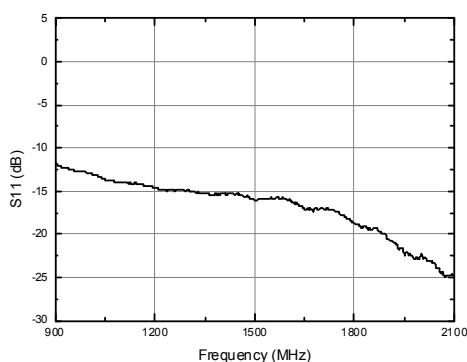
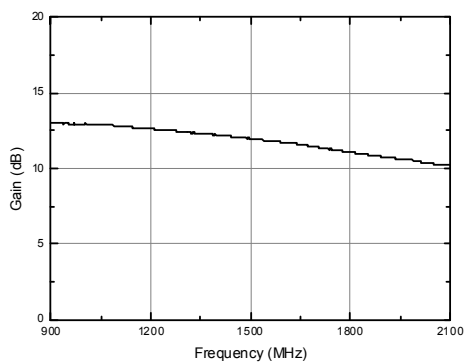
Schematic

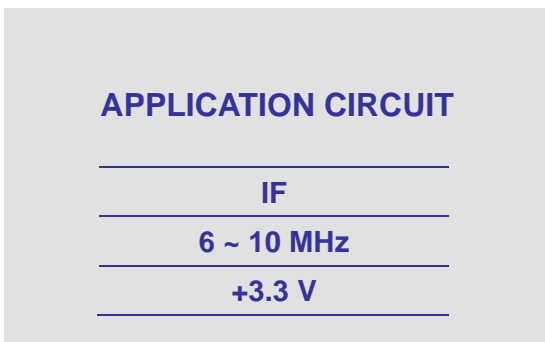


Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters (3.3V)

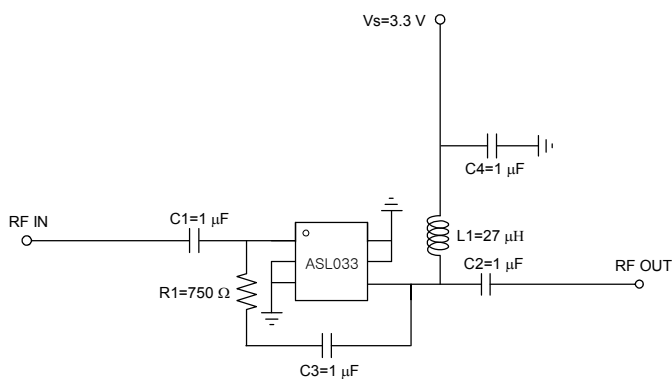




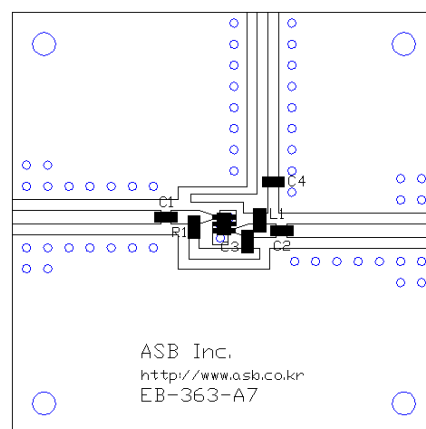
Frequency (MHz)	6	10
Magnitude S21 (dB)	18.3	18.2
Magnitude S11 (dB)	-9	-9
Magnitude S22 (dB)	-14	-14
Output P1dB (dBm)	17	17
Output IP3 ¹⁾ (dBm)	18.5	18.5
Noise Figure (dB)	-	1.45
Device Voltage (V)	+3.3	+3.3
Current (mA)	10	10

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

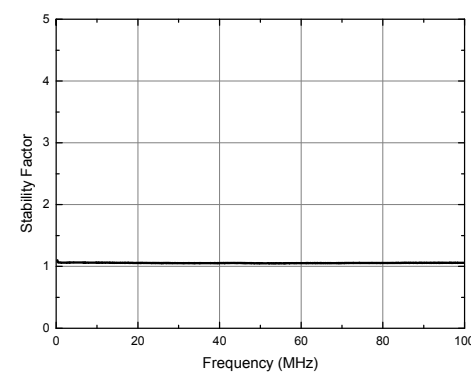
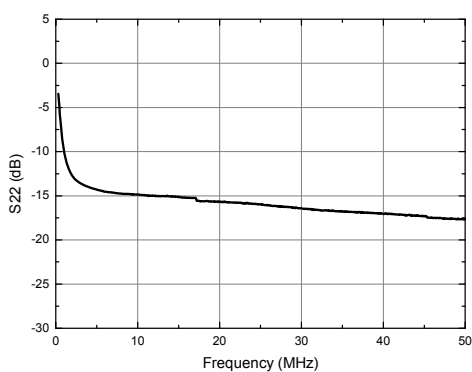
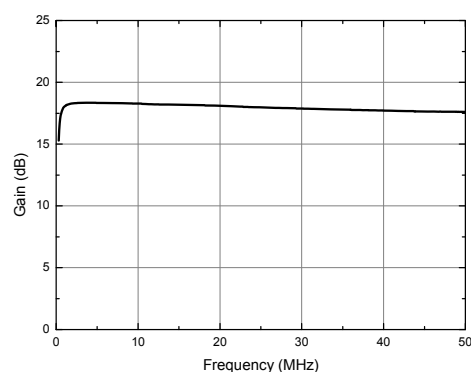
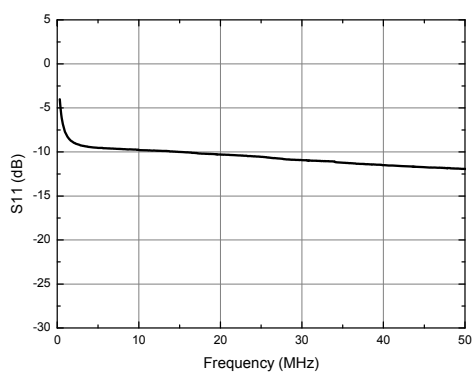
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

IF

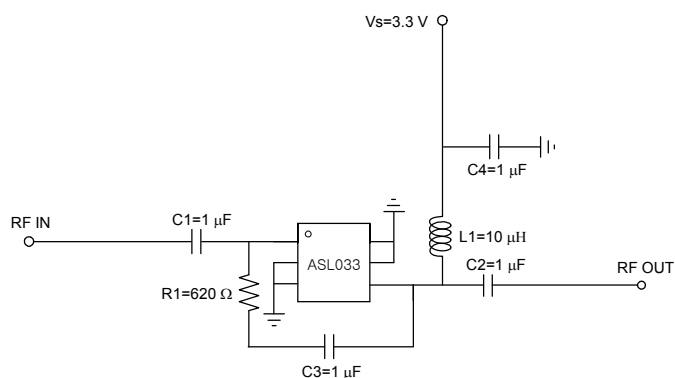
10 ~ 88 MHz

+3.3 V

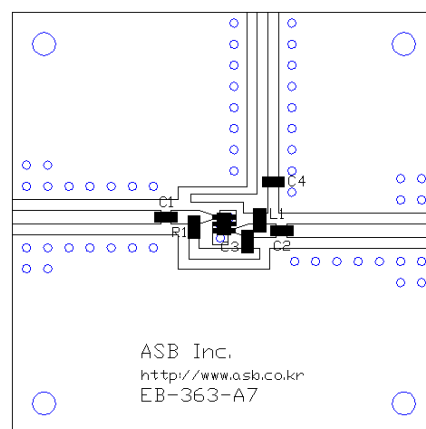
Frequency (MHz)	10	88
Magnitude S21 (dB)	17.5	16.5
Magnitude S11 (dB)	-11	-15
Magnitude S22 (dB)	-18	-20
Output P1dB (dBm)	15.5	15.0
Output IP3 ¹⁾ (dBm)	18.5	17.5
Noise Figure (dB)	1.6	1.4
Device Voltage (V)	+3.3	+3.3
Current (mA)	10	10

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

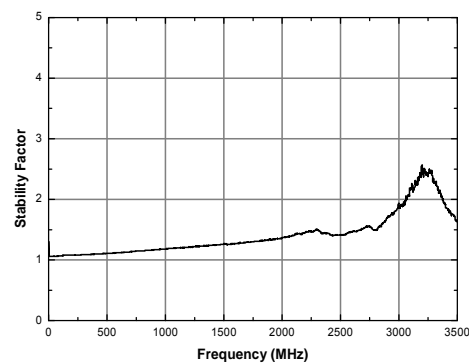
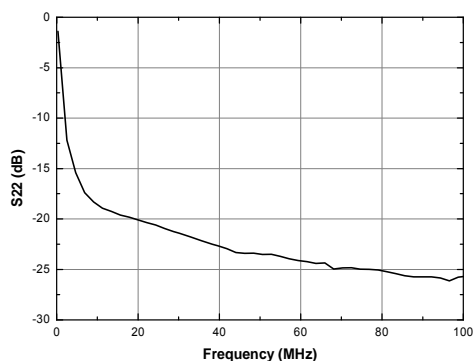
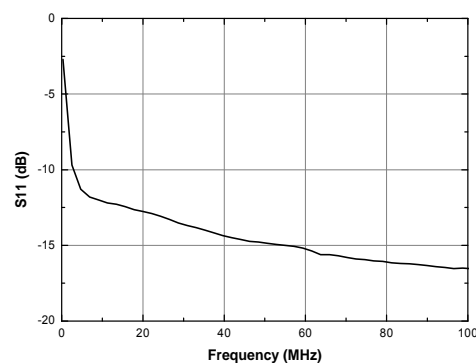
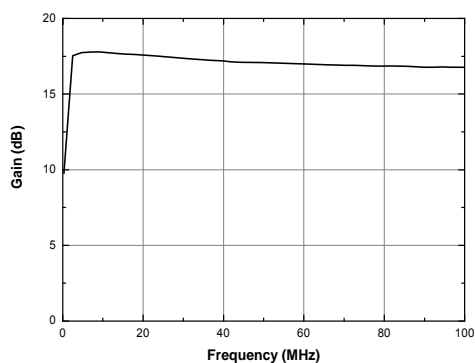
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



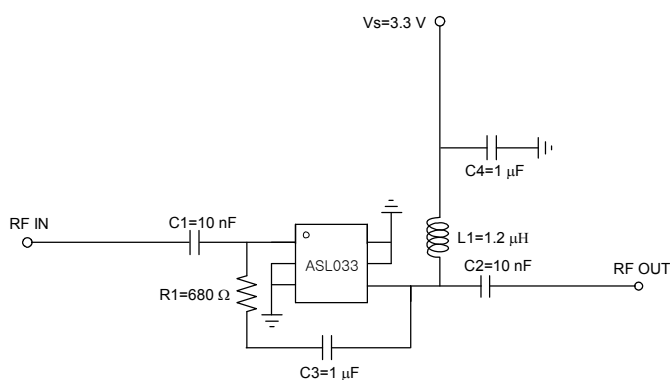
APPLICATION CIRCUIT

ATSC
40 ~ 900 MHz
+3 V, 3.3 V

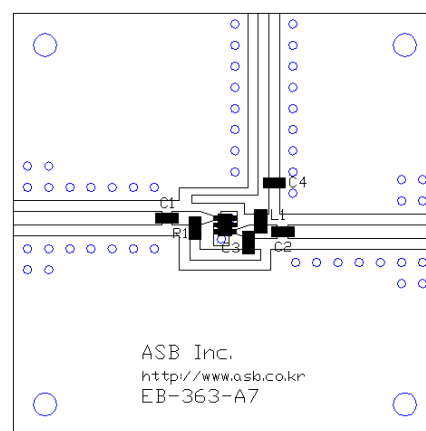
Frequency (MHz)	40	450	900	40	450	900
Magnitude S21 (dB)	14.5	13.5	12.2	17.0	15.7	14.3
Magnitude S11 (dB)	-8	-10	-11	-11	-15	-17
Magnitude S22 (dB)	-12	-13	-10	-20	-20	-15
Output P1dB (dBm)	16.5	17.0	17.5	17.0	17.5	17.5
Output IP3 ¹⁾ (dBm)	19.0	18.5	16.5	19.5	20.0	18.5
Noise Figure (dB)	1.3	1.5	1.5	1.1	1.2	1.2
Device Voltage (V)	+3.0	+3.0	+3.0	+3.3	+3.3	+3.3
Current (mA)	5	5	5	10	10	10

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

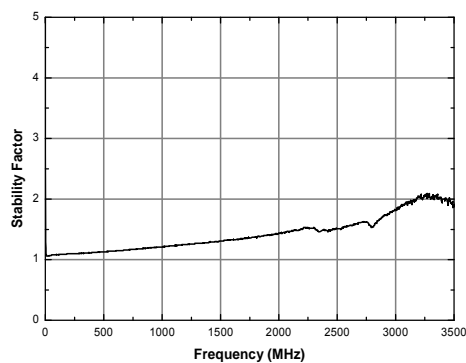
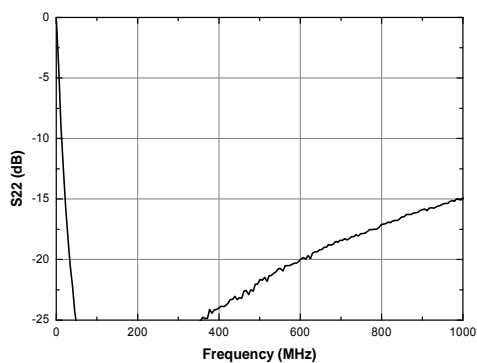
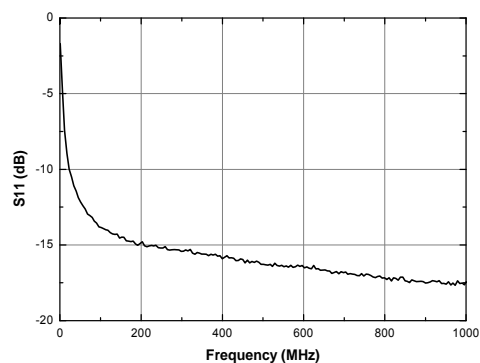
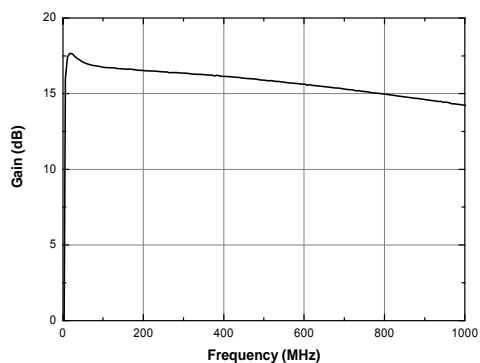
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S parameters & K-factor (3.3V)



APPLICATION CIRCUIT

TETRA

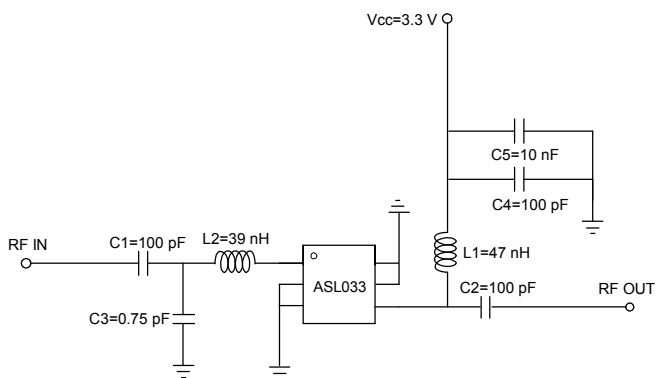
380 ~ 430 MHz

+3.3 V, 3.6 V

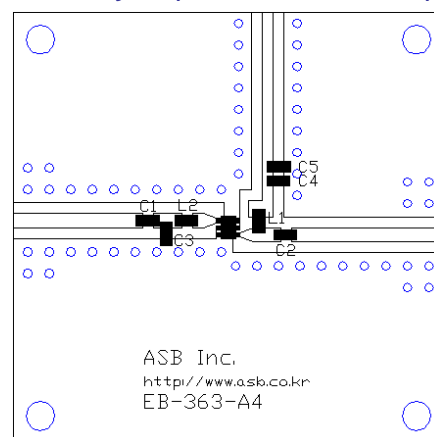
Frequency (MHz)	380 ~ 430	
Magnitude S21 (dB)	20	21.5
Magnitude S11 (dB)	-13	-14
Magnitude S22 (dB)	-8	-11
Output P1dB (dBm)	18.5	18.0
Output IP3 ¹⁾ (dBm)	17.5	21.0
Noise Figure (dB)	1.8	1.6
Device Voltage (V)	+3.3	+3.6
Current (mA)	10	14

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

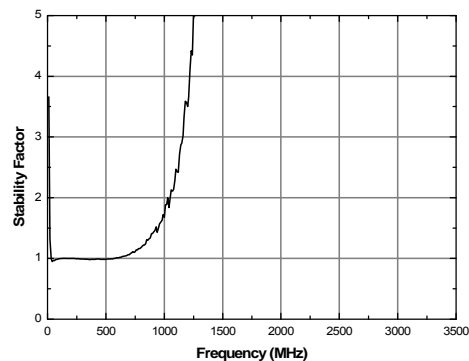
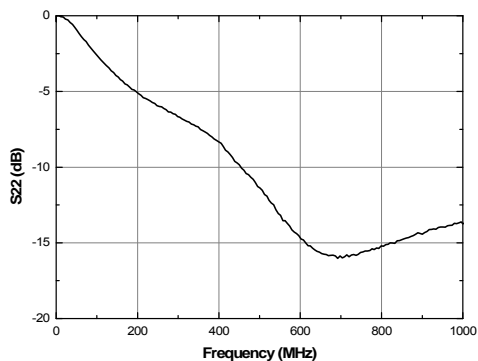
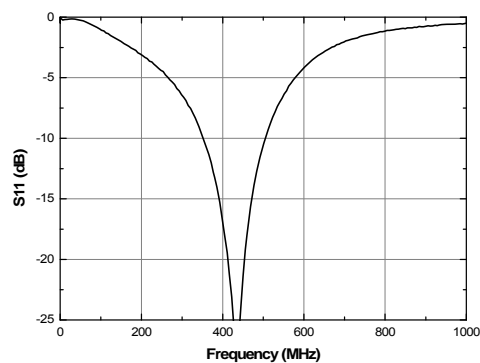
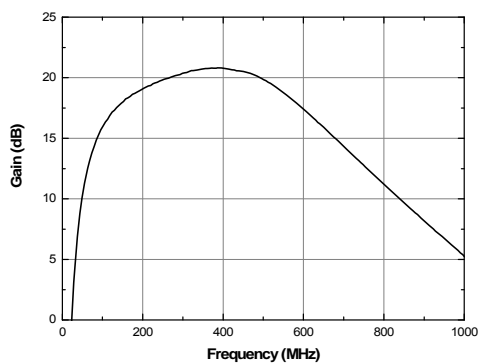
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor (3.3V)



APPLICATION CIRCUIT

IF

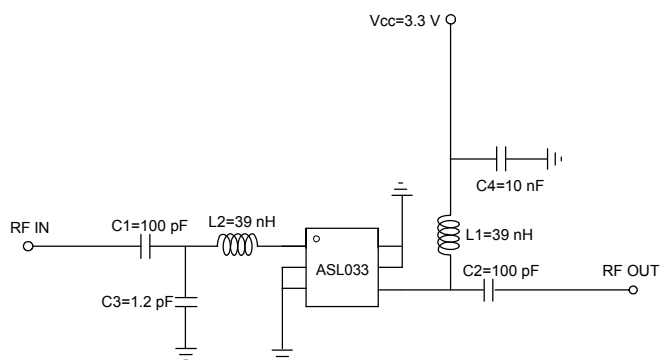
434 MHz

+3 V, 3.3 V

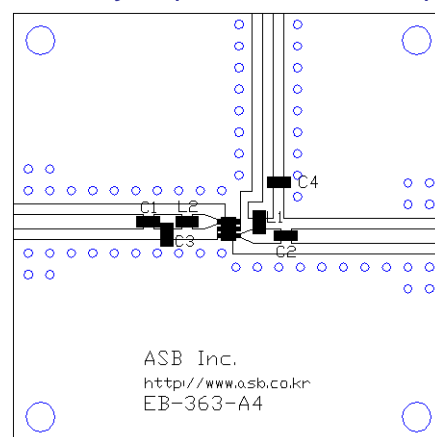
Frequency (MHz)	434	
Magnitude S21 (dB)	18.0	20.5
Magnitude S11 (dB)	-12	-20
Magnitude S22 (dB)	-6	-10
Output P1dB (dBm)	18	17
Output IP3 ¹⁾ (dBm)	13	16
Noise Figure (dB)	1.6	1.5
Device Voltage (V)	+3.0	+3.3
Current (mA)	5	10

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

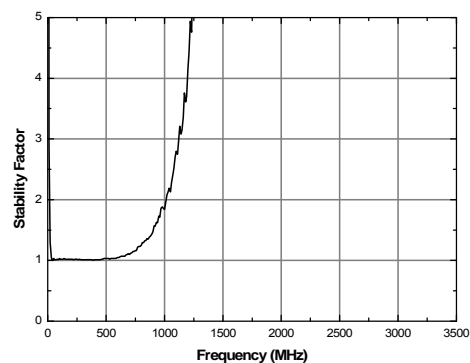
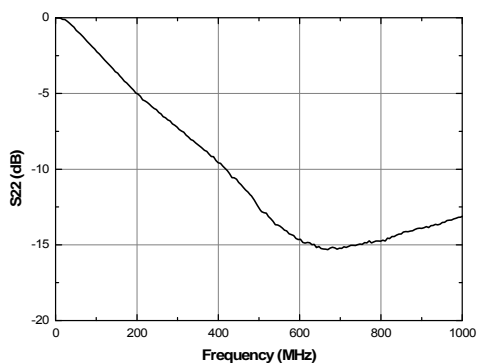
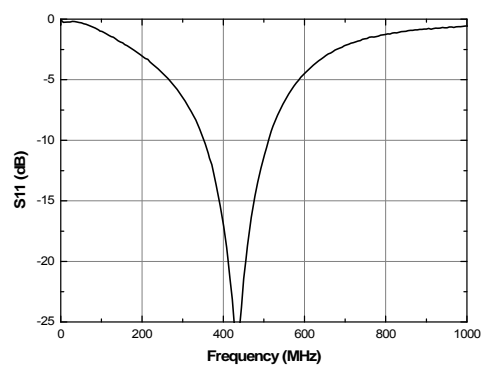
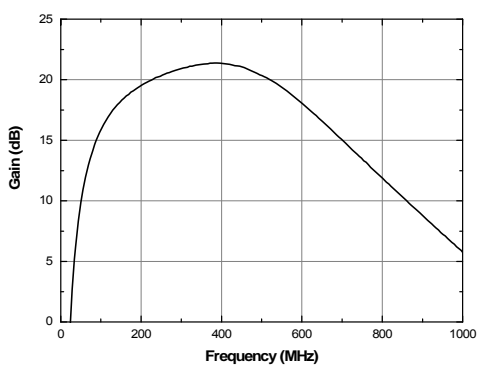
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor (3.3V)



APPLICATION CIRCUIT

GPS, GLONASS, Galileo & Compass

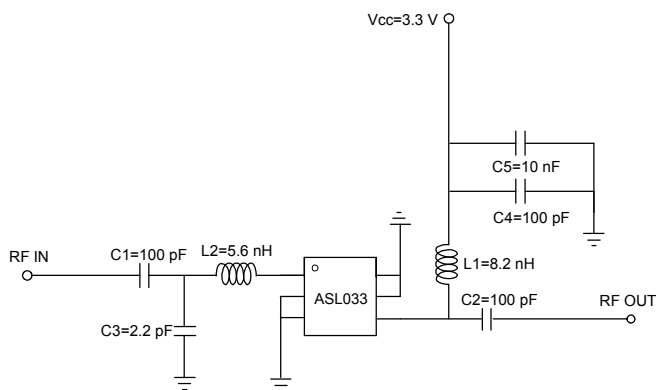
1450 ~ 1500 MHz

+3 V, 3.3 V

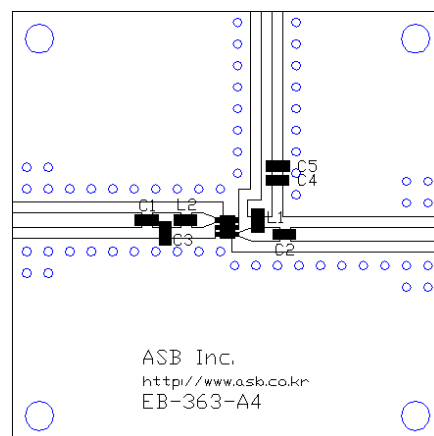
Frequency (MHz)	1450~1500	1450~1500
Magnitude S21 (dB)	15	16
Magnitude S11 (dB)	-10	-18
Magnitude S22 (dB)	-8	-11
Output P1dB (dBm)	17.5	18.0
Output IP3 ¹⁾ (dBm)	19.0	19.5
Noise Figure (dB)	1.4	1.2
Device Voltage (V)	+3.0	+3.3
Current (mA)	5	10

1) OIP3 is measured with two tones at an output power of +0 dBm/tone separated by 1 MHz.

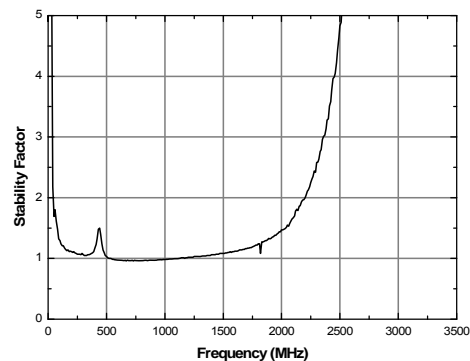
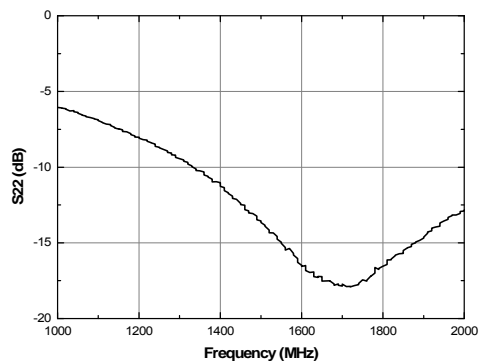
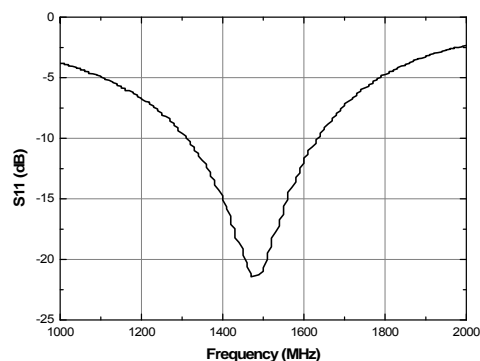
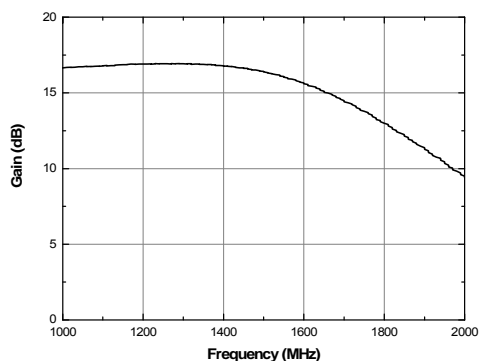
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor (3.3V)



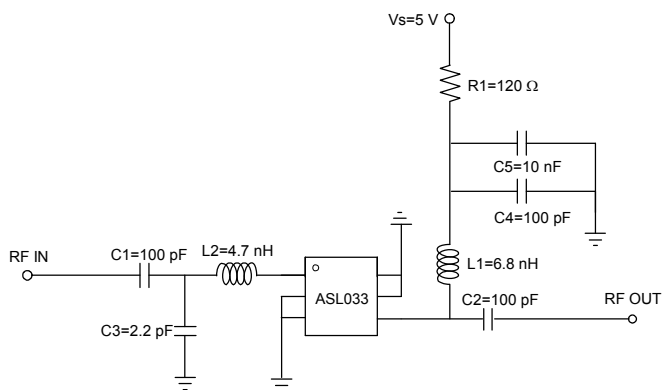
APPLICATION CIRCUIT

GPS
1575 MHz
+5 V

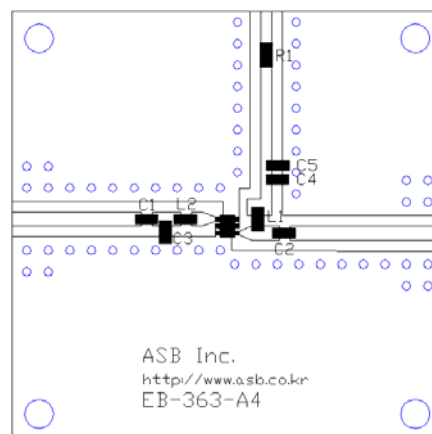
Frequency (MHz)	1575
Magnitude S21 (dB)	15.5
Magnitude S11 (dB)	-20
Magnitude S22 (dB)	-15
Output P1dB (dBm)	10.5
Output IP3 ¹⁾ (dBm)	22.5
Noise Figure (dB)	1.3
Device Voltage (V)	+5
Current (mA)	13

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

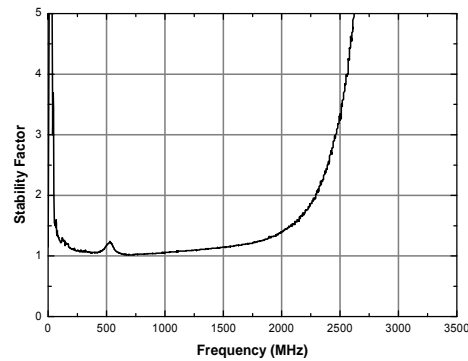
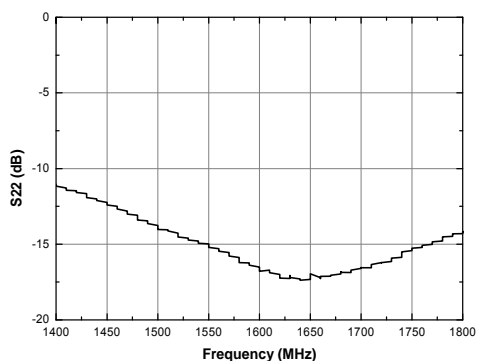
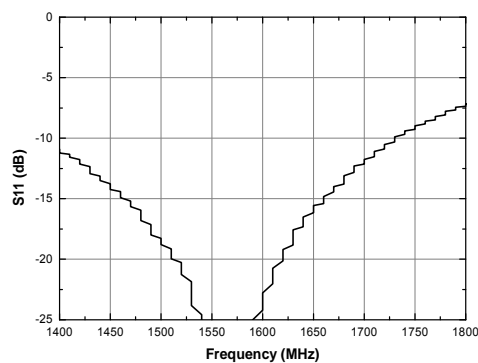
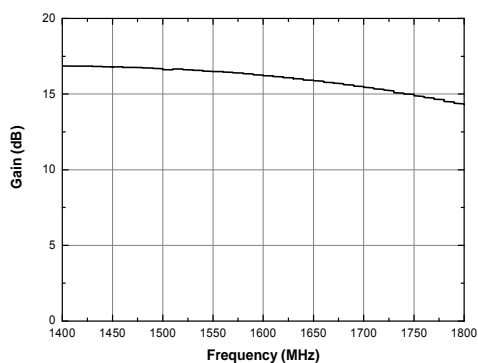
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

WLAN

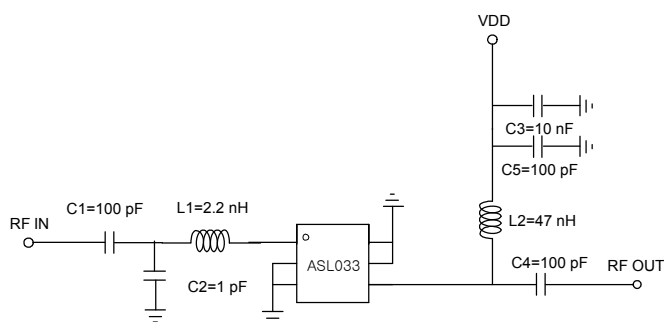
2400 ~ 2500 MHz

3.3 V

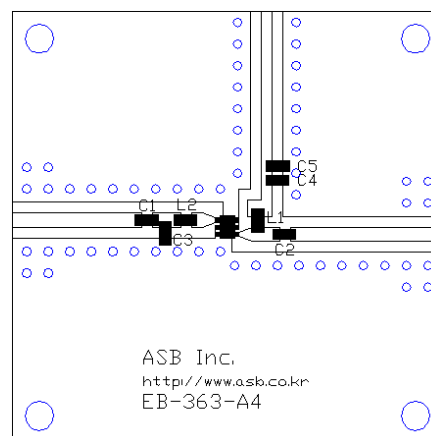
Frequency (MHz)	2400	2500
Magnitude S21 (dB)	12.2	12.0
Magnitude S11 (dB)	-18	-18
Magnitude S22 (dB)	-10	-10
Output P1dB (dBm)	18	18
Output IP3 ¹⁾ (dBm)	21	21
Noise Figure (dB)	1.15	1.15
Device Voltage (V)	+3.3	+3.3
Current (mA)	10	10

1) OIP3 is measured with two tones at an output power of +0 dBm/tone separated by 1 MHz.

Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor (3.3V)

