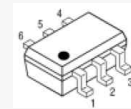


### Features

- 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 an SOT-363 package and passes the stringent DC, RF, and reliability tests.



Package Style: SOT-363

### Typical Performance

Parameters	Units	Typical					
		40	170	240	470	860	1575
Frequency	MHz	40	170	240	470	860	1575
Gain	dB	17	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 <sup>1)</sup>	dBm	19.5 <sup>1)</sup>	20 <sup>2)</sup>	18 <sup>2)</sup>	18 <sup>2)</sup>	20 <sup>2)</sup>	22.5 <sup>1)</sup>
Noise Figure	dB	1.1	1.1	1.2	1.2	1.1	1.3
Output P1dB	dBm	17	14	15.5	17	17.5	10.5
Current	mA	10	5	5	5	5	13
Device Voltage (V)	V	3.3	3	3	3	3	5

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 ohm matched)*	20 dBm

\* Please find the max. input power data from [http://www.asb.co.kr/pdf/Maximum\\_Input\\_Power\\_Analysis.pdf](http://www.asb.co.kr/pdf/Maximum_Input_Power_Analysis.pdf)

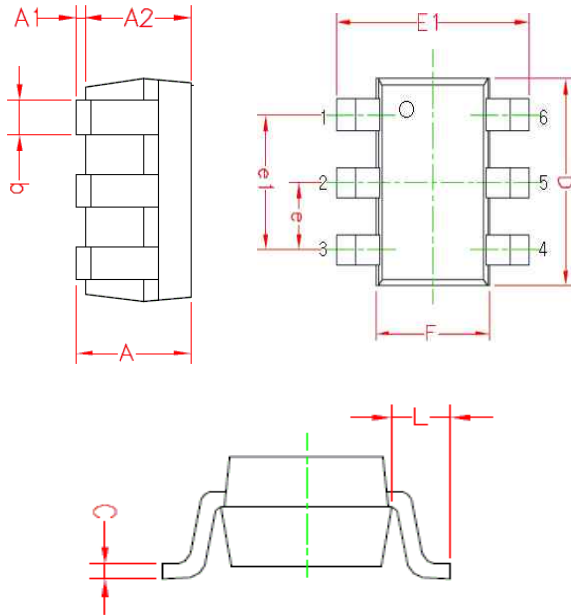
### Application Circuit

- DVB-T (V/U band)
- DVB / CMMB
- DVB-T (V/U band) / 75 ohm
- 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

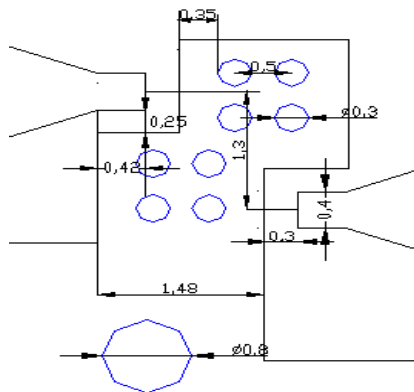
### Outline Drawing



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)

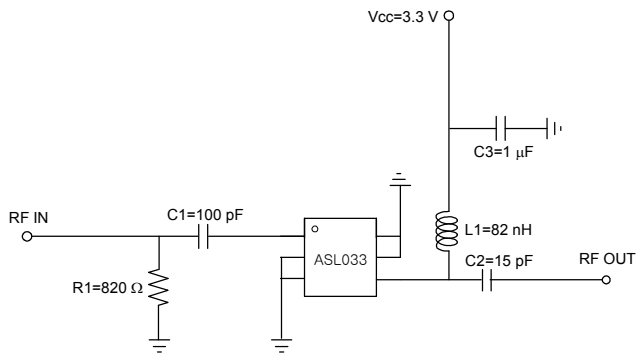
170 ~ 860 MHz

+3.3 V

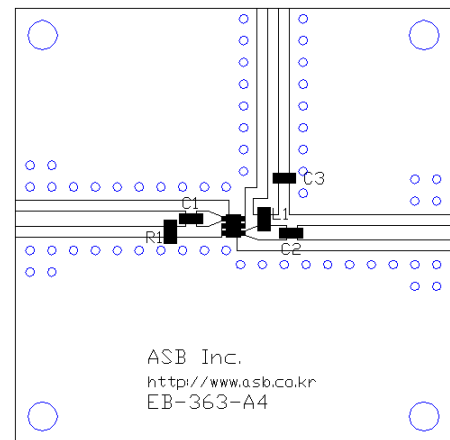
Frequency (MHz)	170	240	470	860
Magnitude S21 (dB)	20.2	19.6	18.4	16.6
Magnitude S11 (dB)	-6	-7	-6	-6
Magnitude S22 (dB)	-15	-8	-6	-6
Output P1dB (dBm)	15	16.5	17.5	17.5
Output IP3 <sup>1)</sup> (dBm)	24	21	21	19
Noise Figure (dB)	1.2	1.2	1.2	1.2
Device Voltage (V)	3.3	3.3	3.3	3.3
Current (mA)	10	10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

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

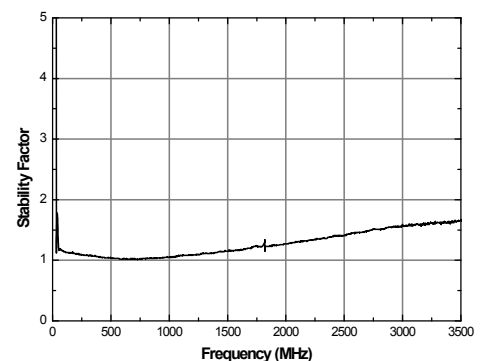
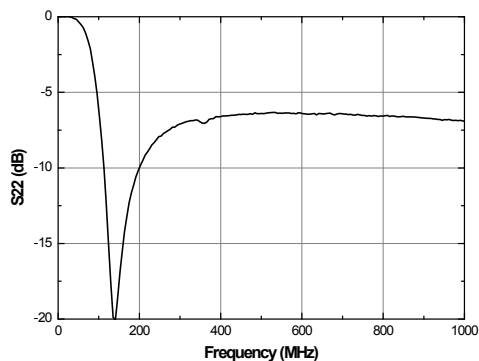
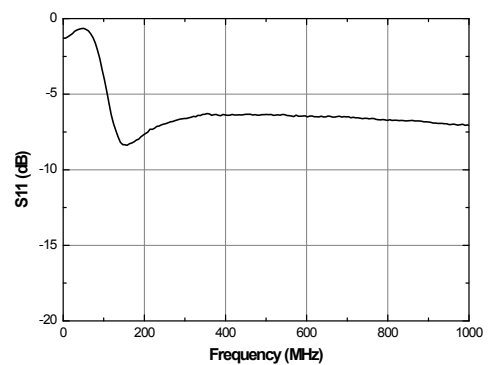
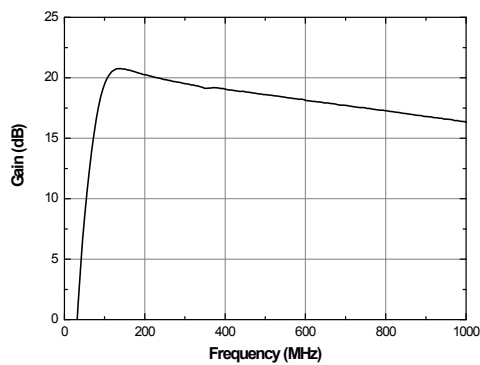
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters & K-factor



### APPLICATION CIRCUIT

DVB-T ( V / U band)

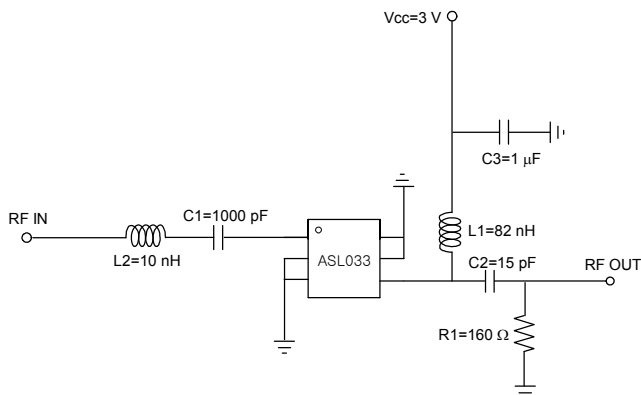
170 ~ 860 MHz

+3 V

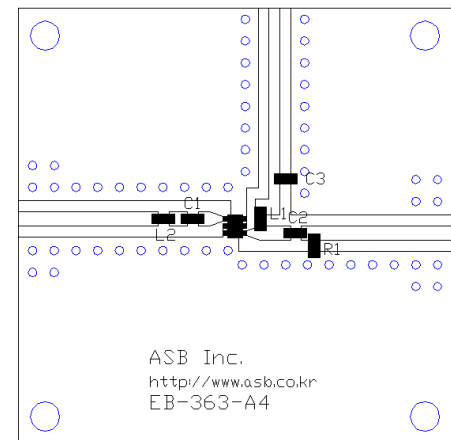
Frequency (MHz)	170	240	470	860
Magnitude S21 (dB)	16.6	15.5	14.6	14.2
Magnitude S11 (dB)	-5	-4	-4	-10
Magnitude S22 (dB)	-11	-10	-10	-10
Output P1dB (dBm)	14	15.5	17	17.5
Output IP3 <sup>1)</sup> (dBm)	20	18	18	20
Noise Figure (dB)	1.1	1.2	1.2	1.1
Device Voltage (V)	3	3	3	3
Current (mA)	5	5	5	5

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

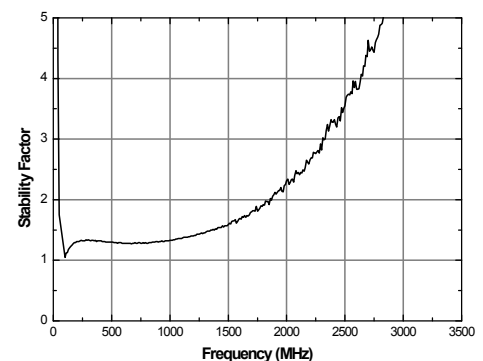
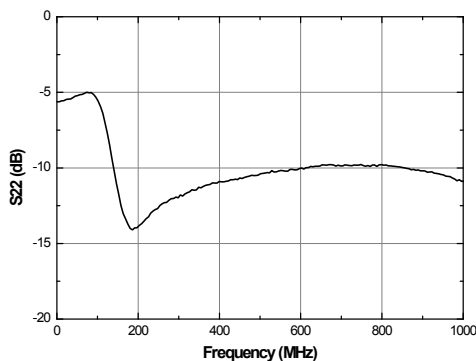
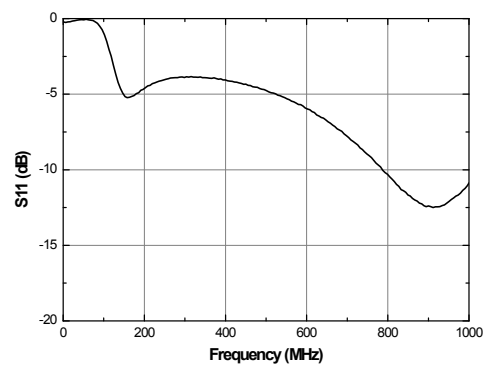
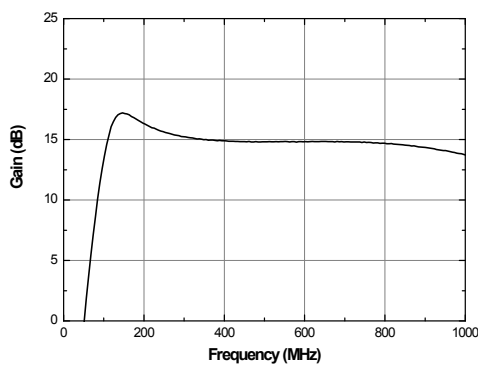
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters & K-factor



### APPLICATION CIRCUIT

DVB-T ( V / U band)

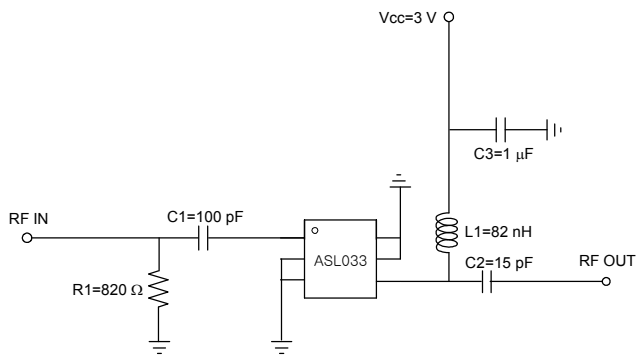
170 ~ 860 MHz

+3 V

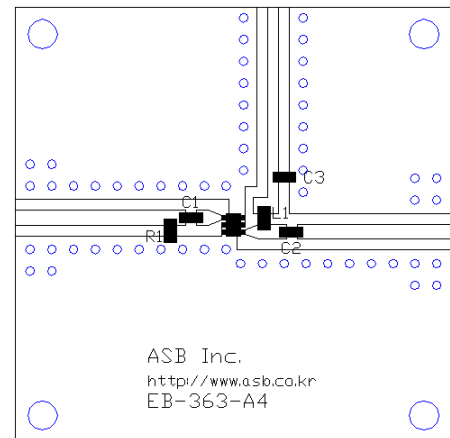
Frequency (MHz)	170	240	470	860
Magnitude S21 (dB)	17.8	16.9	15.7	14.3
Magnitude S11 (dB)	-6	-5	-4	-5
Magnitude S22 (dB)	-9	-5	-4	-4
Output P1dB (dBm)	15.5	16.5	17.5	17.5
Output IP3 <sup>1)</sup> (dBm)	24	21	21	18
Noise Figure (dB)	1.3	1.4	1.4	1.4
Device Voltage (V)	3	3	3	3
Current (mA)	5	5	5	5

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

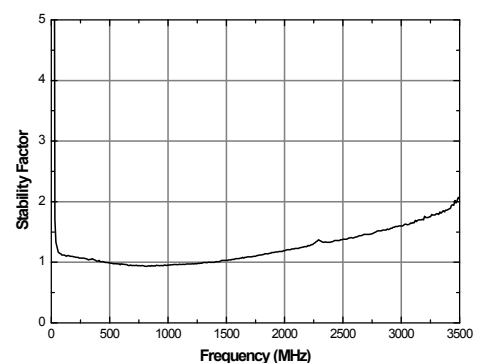
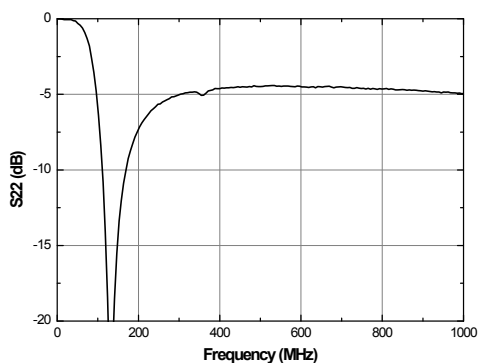
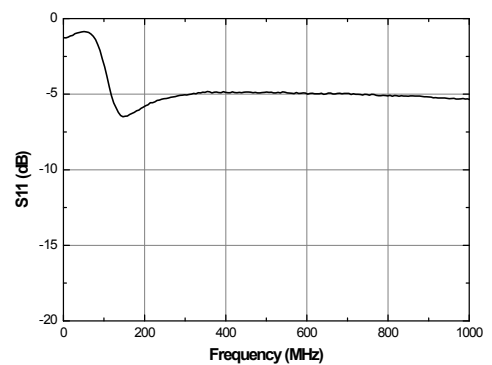
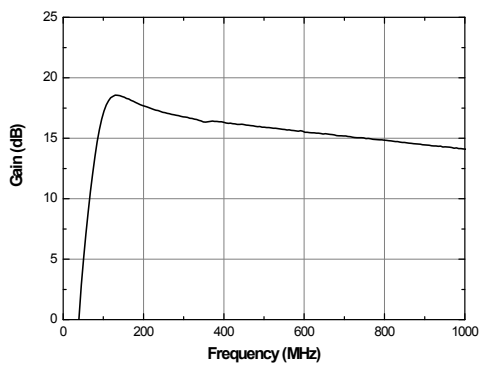
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters & K-factor



### APPLICATION CIRCUIT

DVB / CMMB

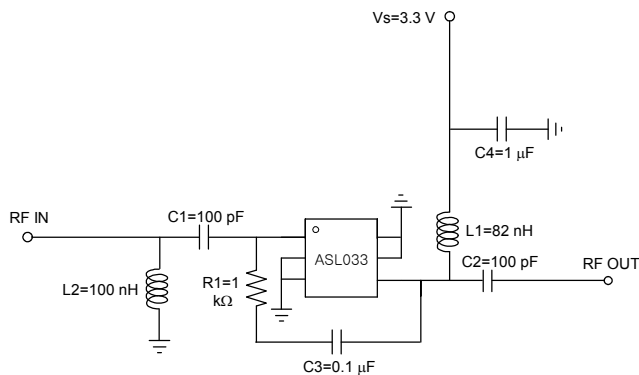
170 ~ 860 MHz

+3 V / 3.3 V

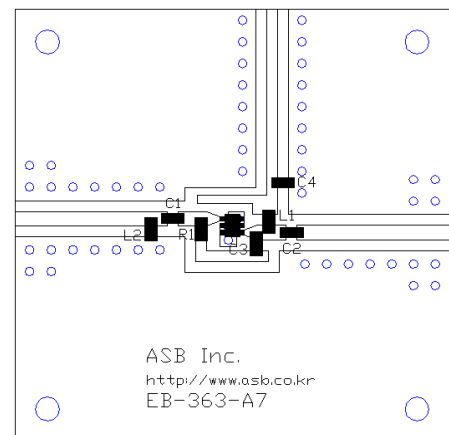
Frequency (MHz)	470	790	470	790
Magnitude S21 (dB)	15	14	17	16
Magnitude S11 (dB)	-8	-8	-12	-12
Magnitude S22 (dB)	-10	-10	-17	-14
Output P1dB (dBm)	18	18	18	18
Output IP3 <sup>1)</sup> (dBm)	18	17	20.5	20
Noise Figure (dB)	1.3	1.3	1.1	1.1
Device Voltage (V)	3	3	3.3	3.3
Current (mA)	5	5	10	10

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

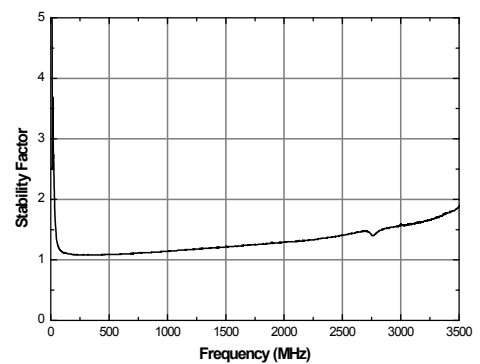
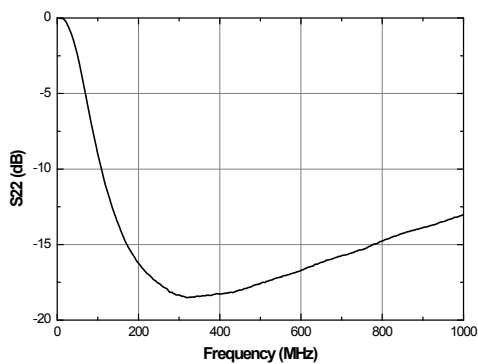
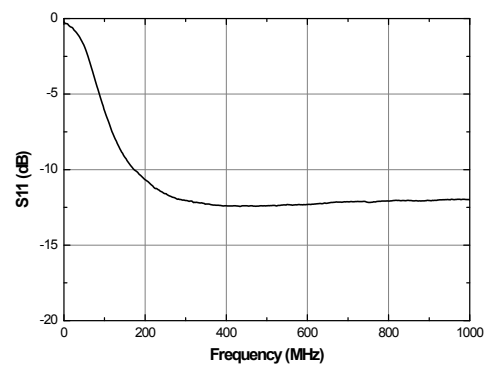
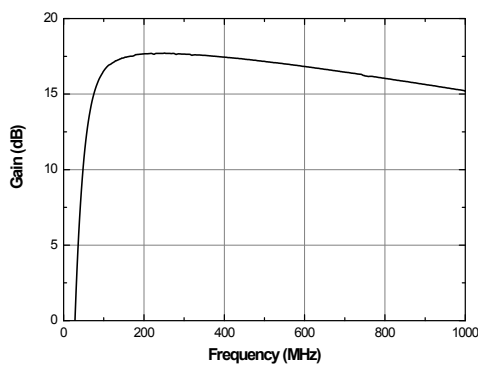
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S parameters & K-factor (3.3V)



### APPLICATION CIRCUIT

DVB-T ( V / U band)  
( 75 Ohm)

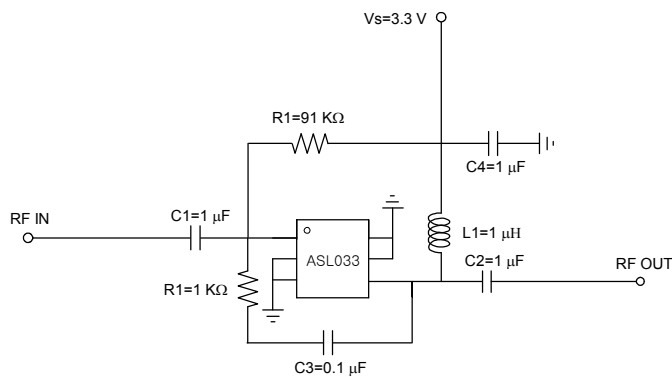
47 ~ 860 MHz

+3.3 V

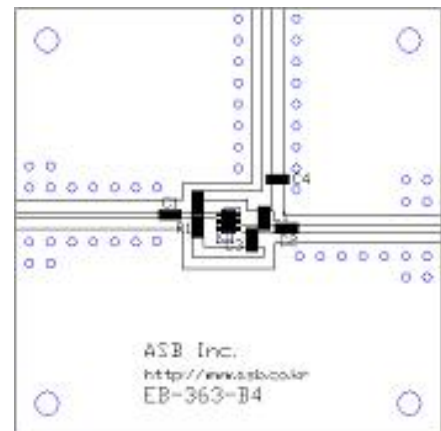
Frequency (MHz)	47	470	860
Magnitude S21 (dB)	20.5	19	17.5
Magnitude S11 (dB)	-12	-13	-15
Magnitude S22 (dB)	-7.5	-10	-15
Output P1dB (dBm)	17	17	16.5
Output IP3 <sup>1)</sup> (dBm)	29.5	30	29.5
Noise Figure (dB)	0.95	1.1	1.1
Device Voltage (V)	3.3	3.3	3.3
Current (mA)	37	37	37

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

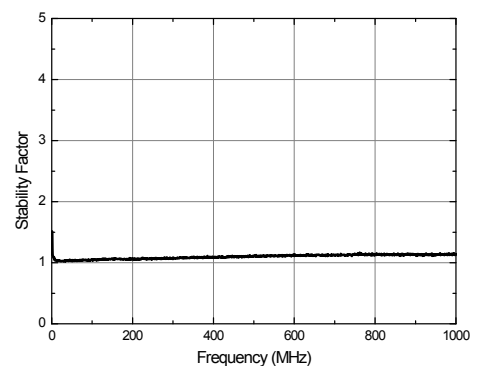
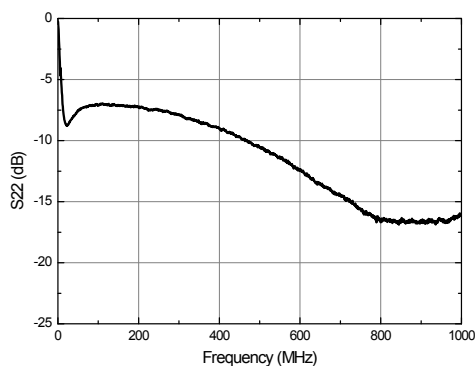
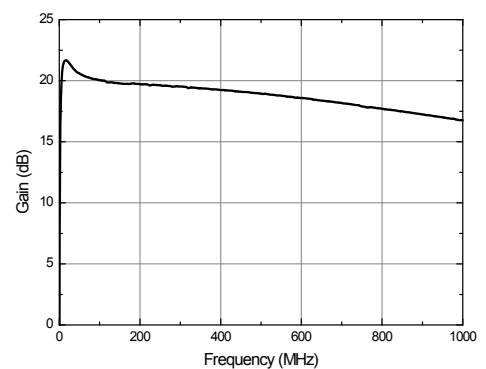
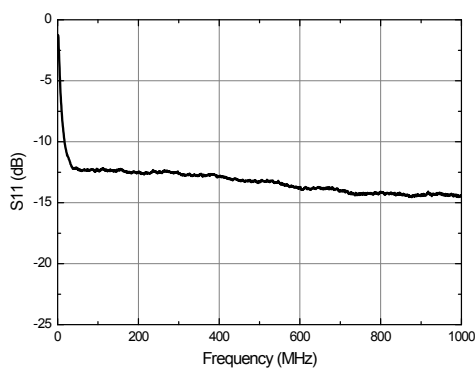
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters (3.3V)



### APPLICATION CIRCUIT

DVB-T ( V / U band )  
( 75 Ohm )

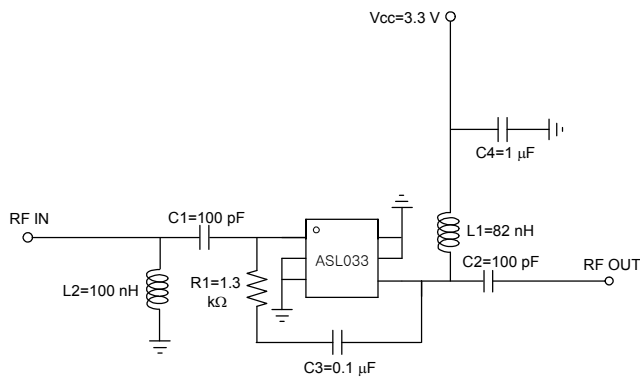
170 ~ 860 MHz

+3.3 V / 3.6 V

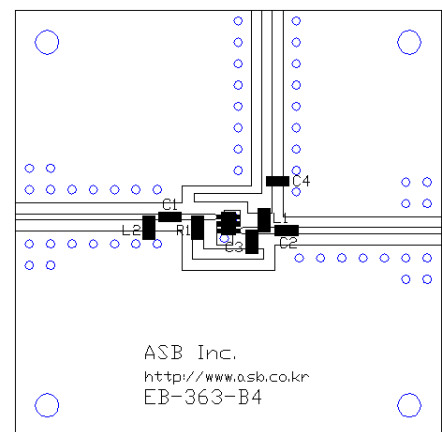
Frequency (MHz)	170	240	470	860	170	240	470	860
Magnitude S21 (dB)	18	18	17.1	15.2	19.4	19.3	18.4	16.5
Magnitude S11 (dB)	-14	-18	-14	-10	-18	-18	-13	-11
Magnitude S22 (dB)	-18	-18	-15	-11	-15	-13	-13	-14
Output P1dB (dBm)	17	17	17	17	12	13.5	17	17.5
Output IP3 <sup>1)</sup> (dBm)	17	18	19.5	22	19.5	21	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.

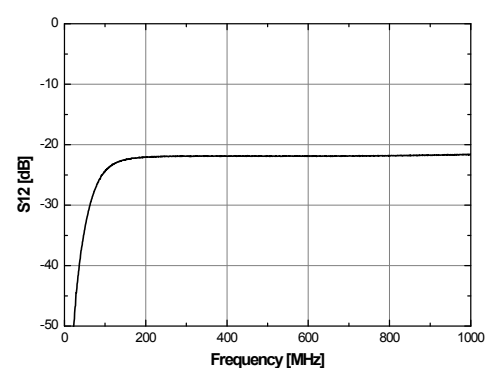
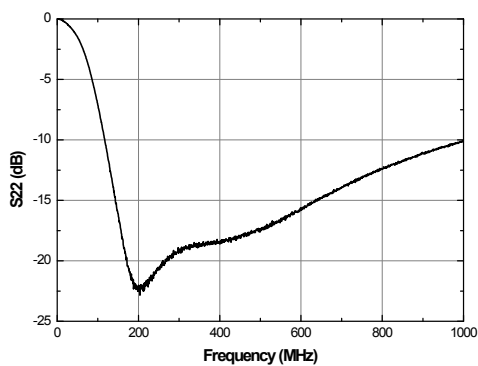
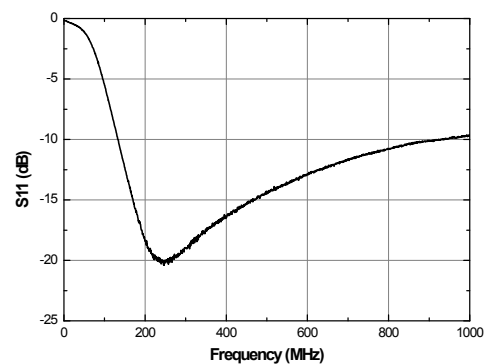
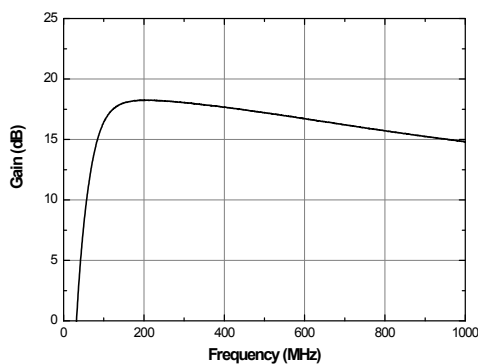
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters (3.3V)



### APPLICATION CIRCUIT

SMATV( 75 Ohm)

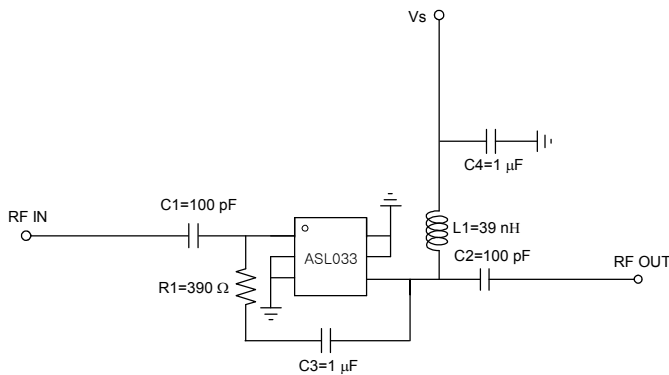
900 ~ 2100 MHz

+3.3 V / 3.6 V

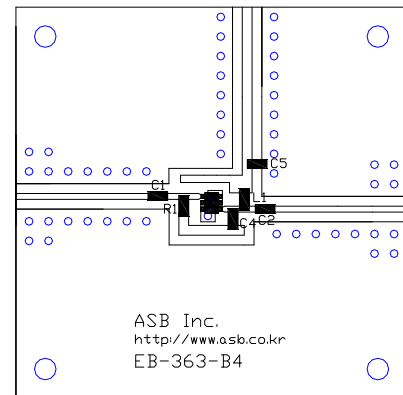
Frequency (MHz)	900	1500	2100	900	1500	2100
Magnitude S21 (dB)	13	11.9	10.2	14.3	13.1	11.4
Magnitude S11 (dB)	-11	-16	-10	-10	-18	-12
Magnitude S22 (dB)	-11	-14	-11	-14	-18	-12
Output P1dB (dBm)	17	13	14	16	10	12
Output IP3 <sup>1)</sup> (dBm)	22	18	16	25	17	19
Noise Figure (dB)	2.1	2.2	2	2	2	1.9
Device 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.

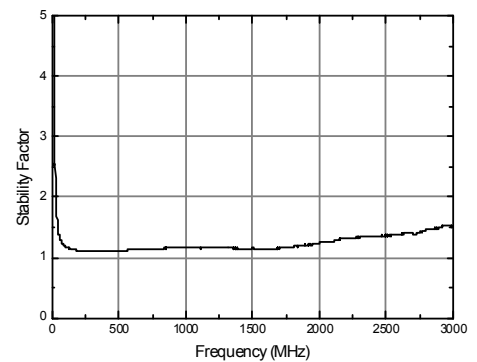
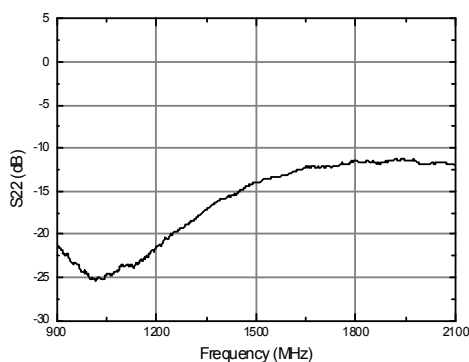
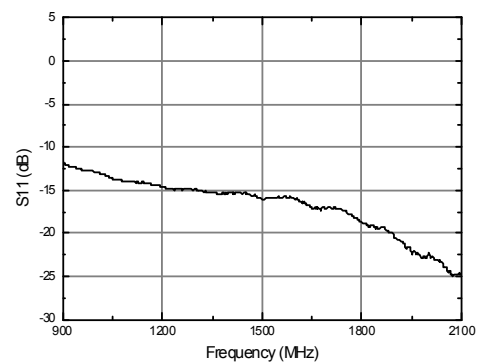
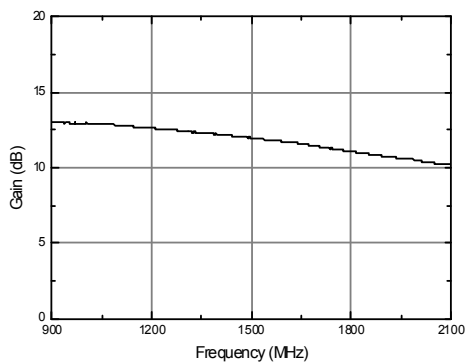
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters (3.3V)



**APPLICATION CIRCUIT**

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**6 ~ 10 MHz**

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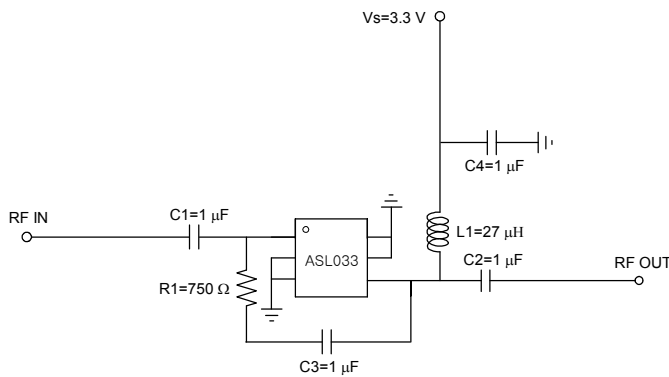
**+3.3**

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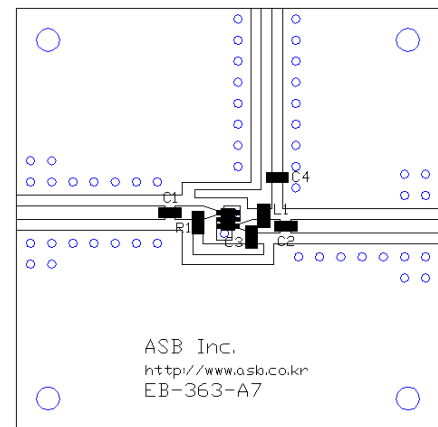
Frequency (MHz)	6	10
Magnitude S21 (dB)	18.3	18.2
Magnitude S11 (dB)	-9	-9
Magnitude S22 (dB)	-14	-14
Output P1dB (dBm)	17	17
Output IP3 <sup>1)</sup> (dBm)	18.5	18.5
Noise Figure (dB)	-	1.45
Device Voltage (V)	3.3	3.3
Current (mA)	10	10

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

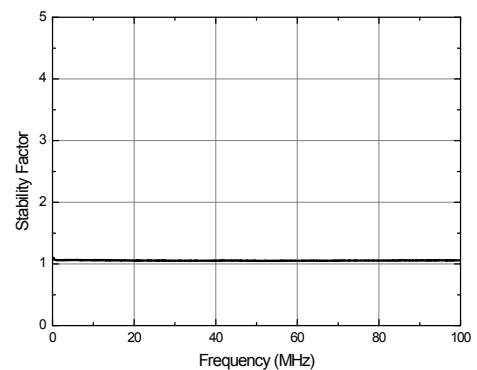
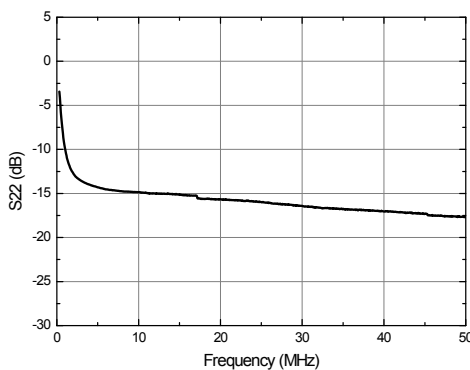
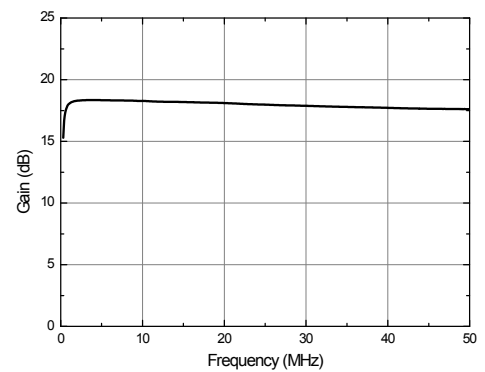
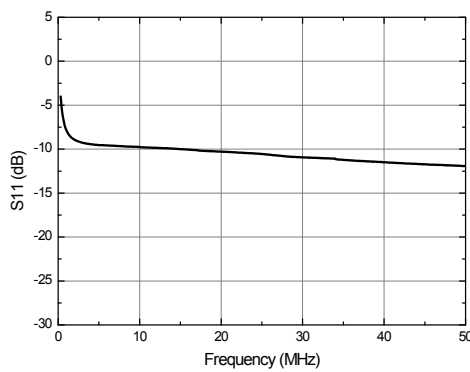
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters & K-factor



**APPLICATION CIRCUIT**

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**10 ~ 88 MHz**

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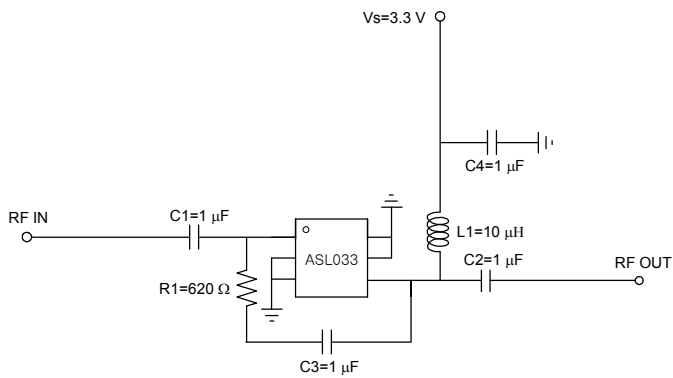
**+3.3**

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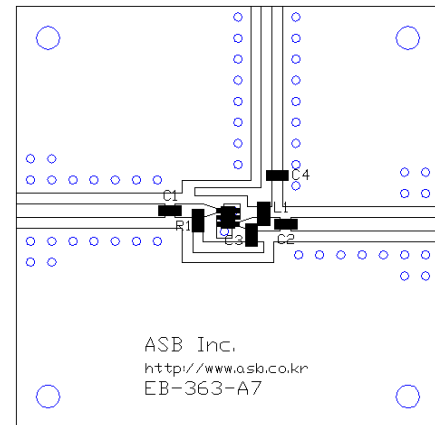
Frequency (MHz)	10	88
Magnitude S21 (dB)	17.5	16.5
Magnitude S11 (dB)	-11	-15
Magnitude S22 (dB)	-18	-20
Output P1dB (dBm)	15.5	15
Output IP3 <sup>1)</sup> (dBm)	18.5	17.5
Noise Figure (dB)	1.6	1.4
Device Voltage (V)	3.3	3.3
Current (mA)	10	10

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

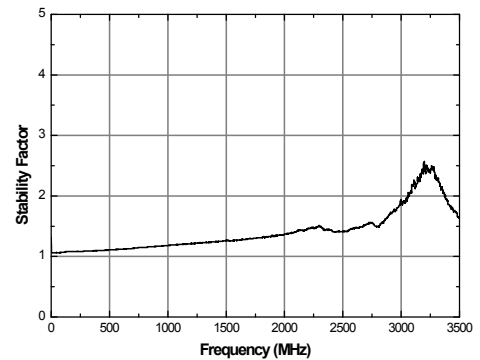
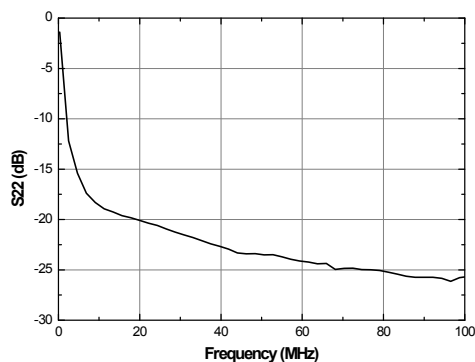
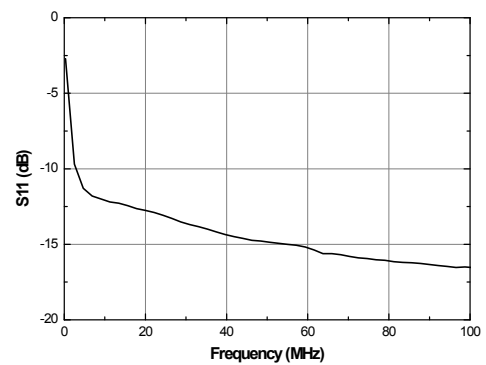
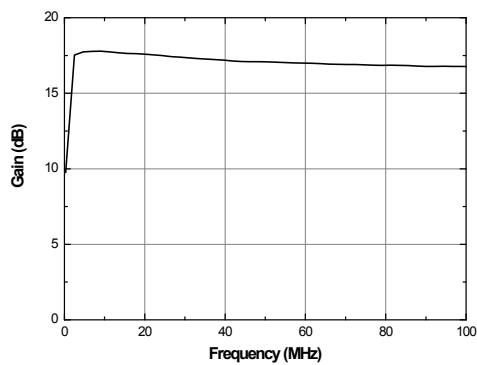
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters & K-factor



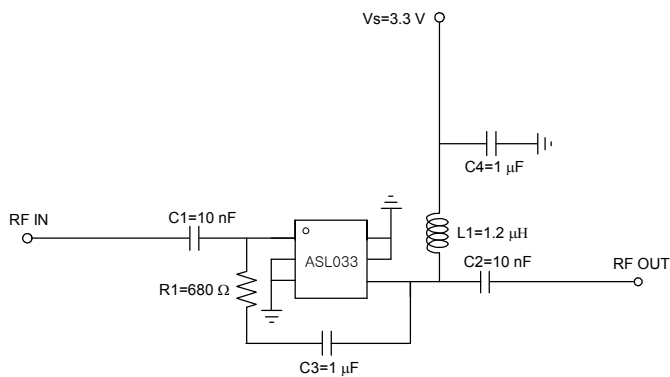
### APPLICATION CIRCUIT

ATSC  
40 ~ 900 MHz  
+3 V / 3.3 V

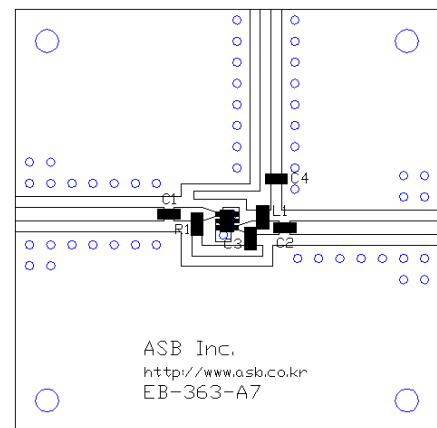
Frequency (MHz)	40	450	900	40	450	900
Magnitude S21 (dB)	14.5	13.5	12.2	17	15.7	14.3
Magnitude S11 (dB)	-8	-10	-11	-11	-15	-17
Magnitude S22 (dB)	-12	-13	-10	-20	-20	-15
Output P1dB (dBm)	16.5	17	17.5	17	17.5	17.5
Output IP3 <sup>1)</sup> (dBm)	19	18.5	16.5	19.5	20	18.5
Noise Figure (dB)	1.3	1.5	1.5	1.1	1.2	1.2
Device Voltage (V)	3	3	3	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.

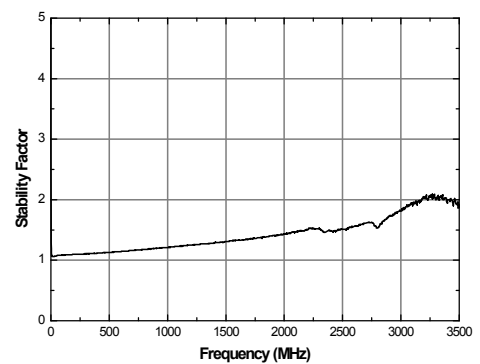
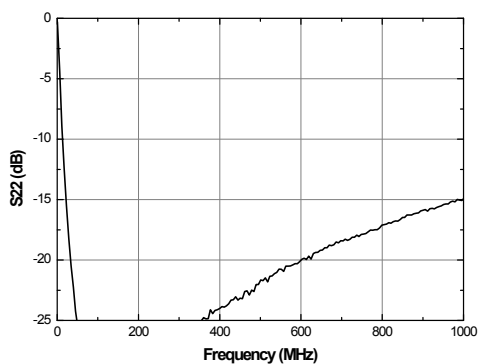
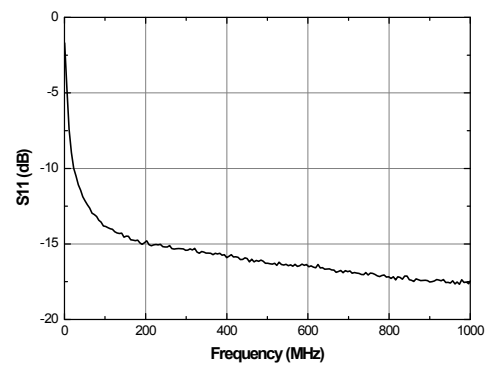
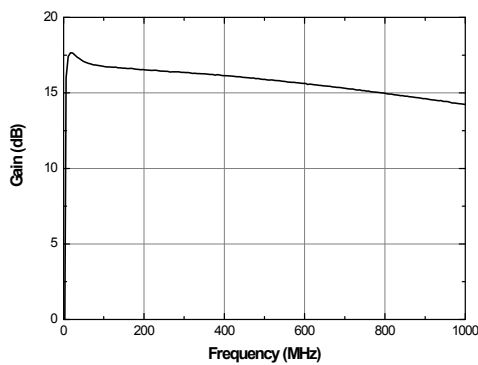
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S parameters & K-factor (3.3V)



### APPLICATION CIRCUIT

#### TETRA

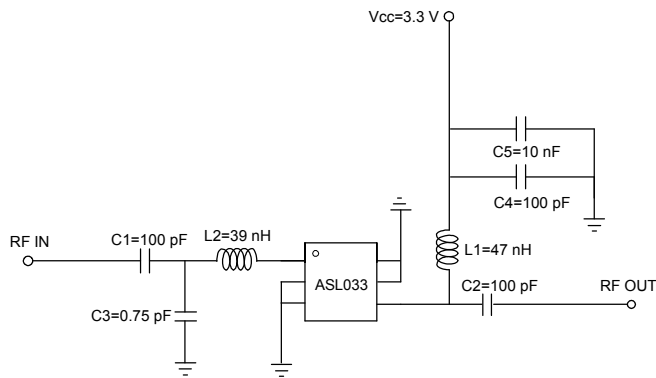
380 ~ 430 MHz

+3.3 V / 3.6 V

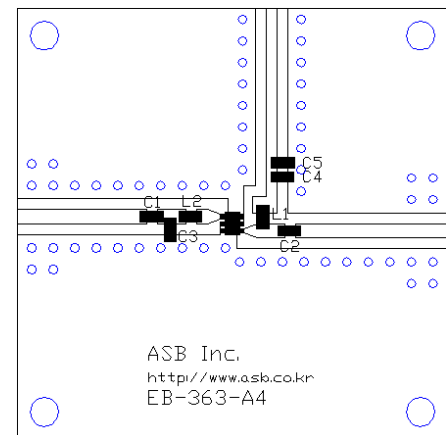
Frequency (MHz)	380~430	
Magnitude S21 (dB)	20	21.5
Magnitude S11 (dB)	-13	-14
Magnitude S22 (dB)	-8	-11
Output P1dB (dBm)	18.5	18
Output IP3 <sup>1)</sup> (dBm)	17.5	21
Noise Figure (dB)	1.8	1.6
Device Voltage (V)	3.3	3.6
Current (mA)	10	14

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

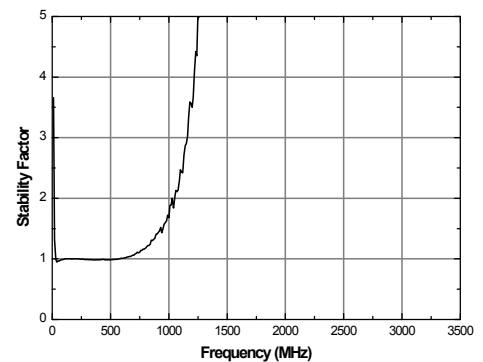
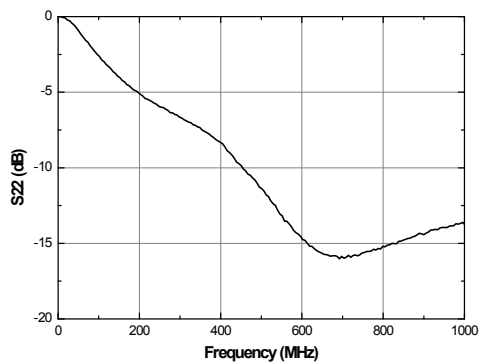
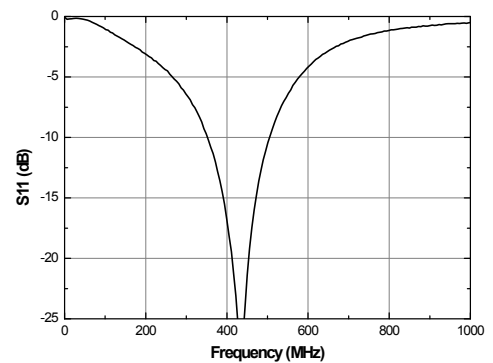
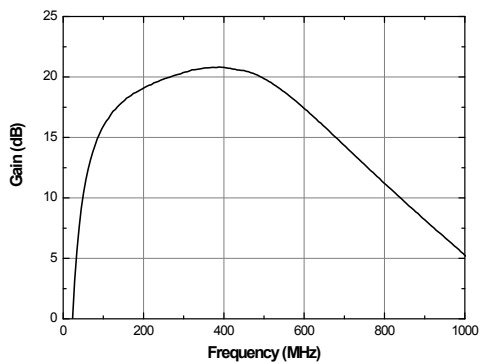
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters & K-factor (3.3V)



**APPLICATION CIRCUIT**

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**434 MHz**

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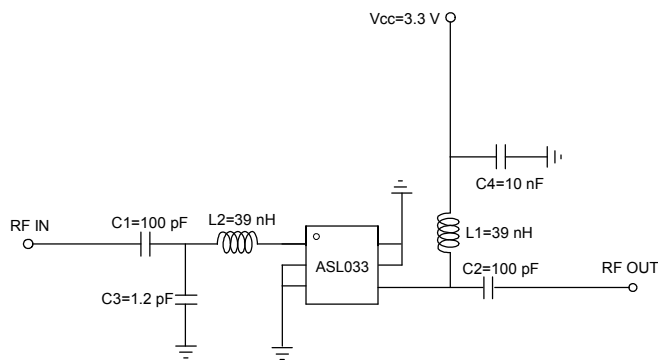
**+3 V / 3.3 V**

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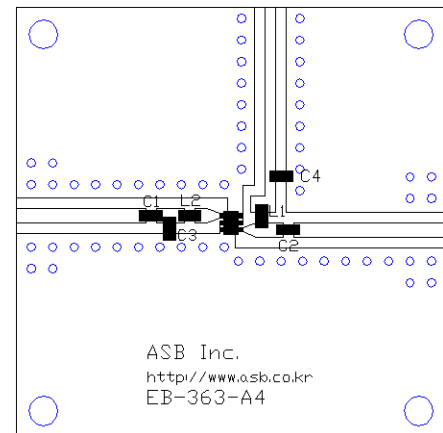
Frequency (MHz)	434	
Magnitude S21 (dB)	18	20.5
Magnitude S11 (dB)	-12	-20
Magnitude S22 (dB)	-6	-10
Output P1dB (dBm)	18	17
Output IP3 <sup>1)</sup> (dBm)	13	16
Noise Figure (dB)	1.6	1.5
Device Voltage (V)	3	3.3
Current (mA)	5	10

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

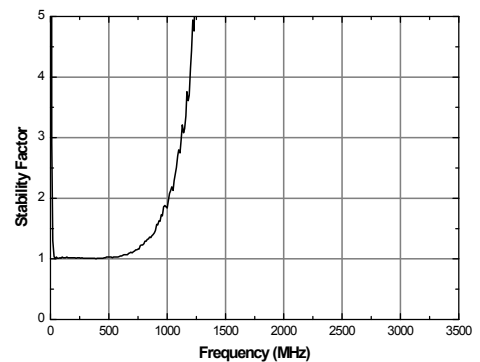
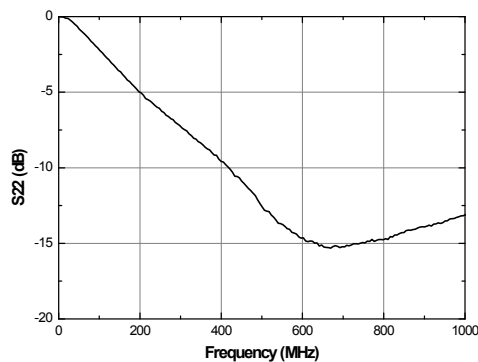
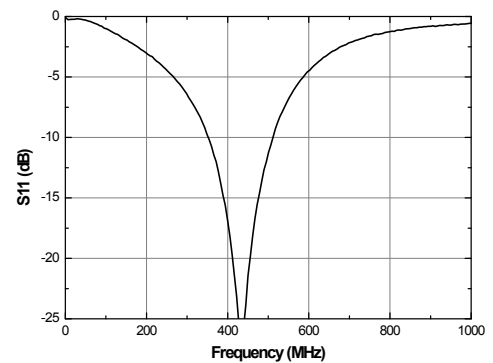
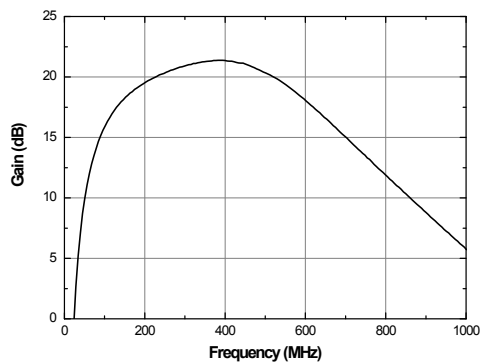
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters & K-factor (3.3V)



**APPLICATION CIRCUIT**

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**1450 ~ 1500 MHz**

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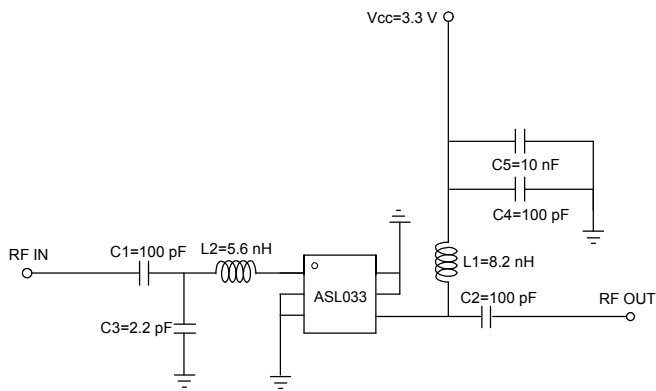
**+3 V / 3.3 V**

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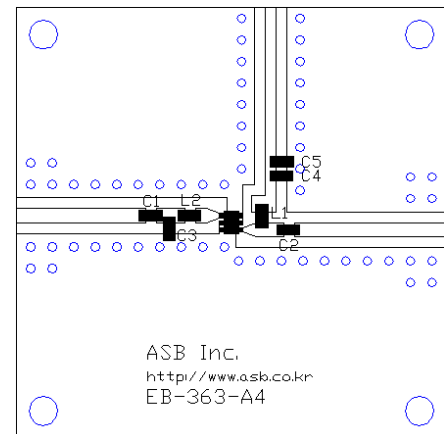
Frequency (MHz)	1450~1500	1450~1500
Magnitude S21 (dB)	15	16
Magnitude S11 (dB)	-10	-18
Magnitude S22 (dB)	-8	-11
Output P1dB (dBm)	17.5	18
Output IP3 <sup>1)</sup> (dBm)	19	19.5
Noise Figure (dB)	1.4	1.2
Device Voltage (V)	3	3.3
Current (mA)	5	10

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

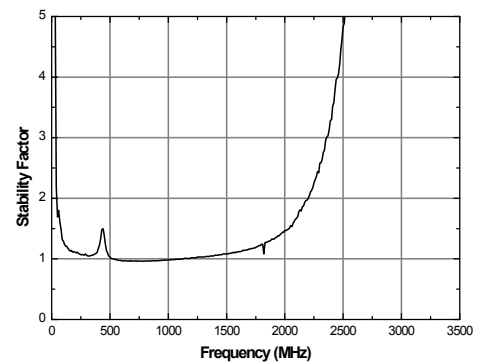
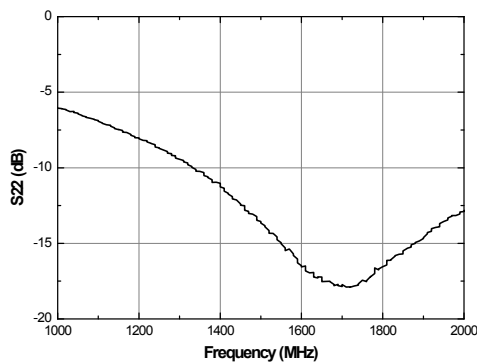
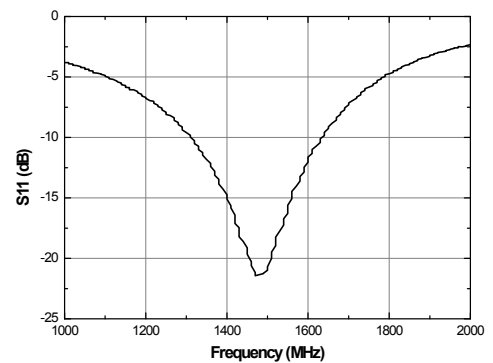
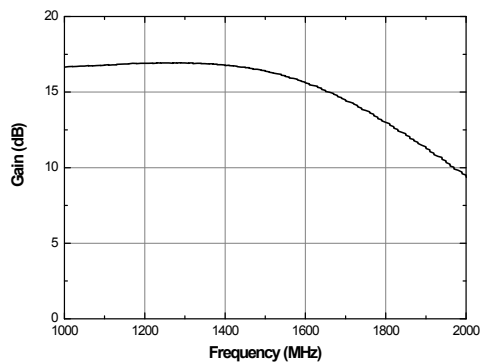
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters & K-factor (3.3V)



**APPLICATION CIRCUIT**

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**GPS**

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**1575 MHz**

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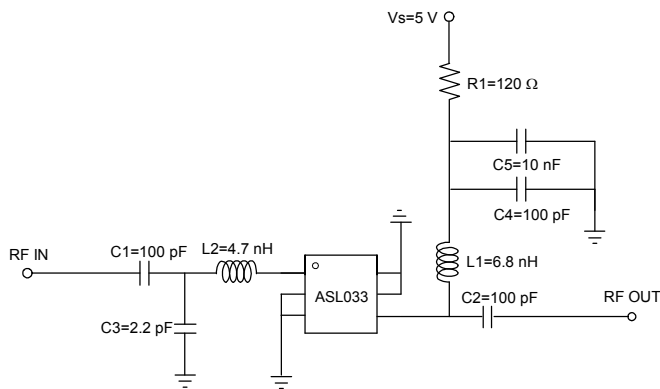
**+5 V**

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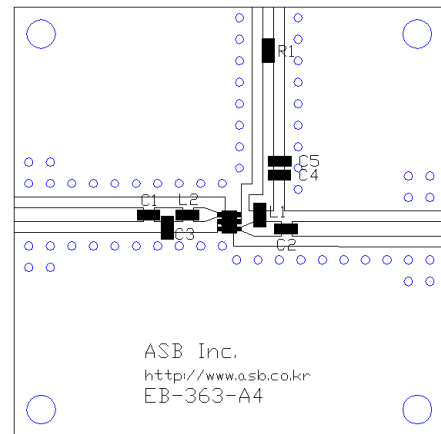
Frequency (MHz)	1575
Magnitude S21 (dB)	15.5
Magnitude S11 (dB)	-20
Magnitude S22 (dB)	-15
Output P1dB (dBm)	10.5
Output IP3 <sup>1)</sup> (dBm)	22.5
Noise Figure (dB)	1.3
Device Voltage (V)	5
Current (mA)	13

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

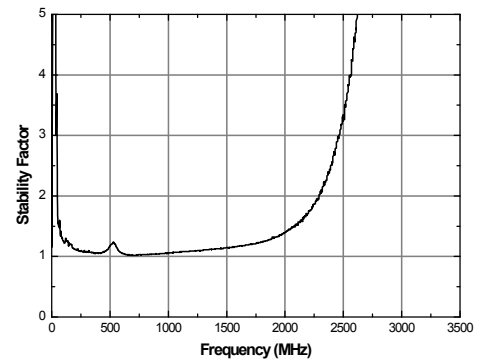
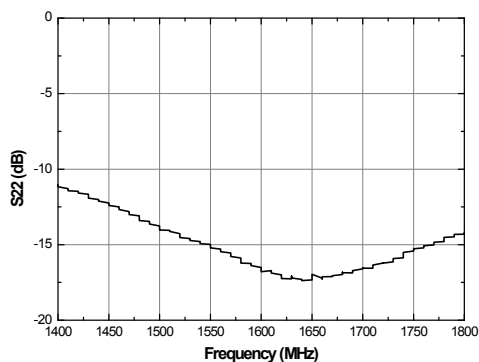
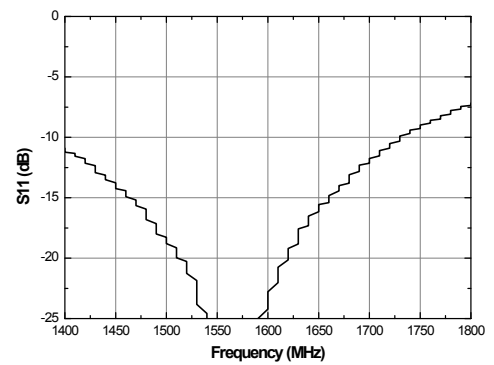
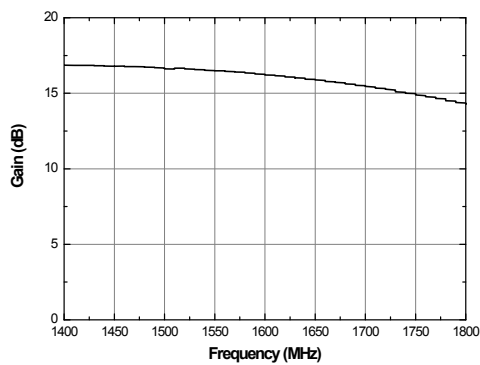
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters & K-factor



**APPLICATION CIRCUIT**

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**2400 ~ 2500 MHz**

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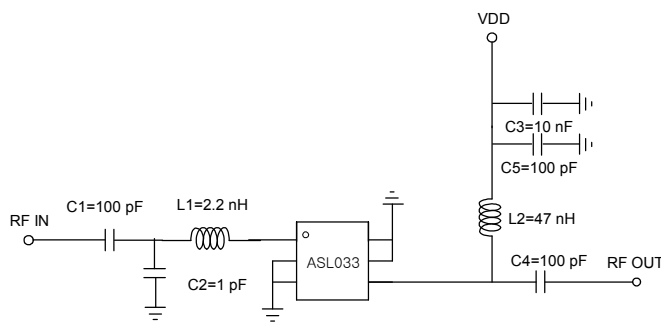
**3.3 V**

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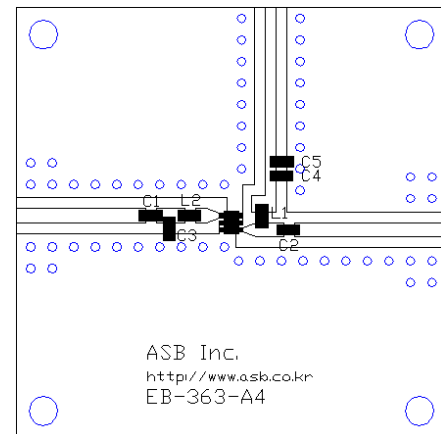
Frequency (MHz)	2400	2500
Magnitude S21 (dB)	12.2	12
Magnitude S11 (dB)	-18\	-18
Magnitude S22 (dB)	-10	-10
Output P1dB (dBm)	18	18
Output IP3 <sup>1)</sup> (dBm)	21	21
Noise Figure (dB)	1.15	1.15
Device Voltage (V)	3.3	3.3
Current (mA)	10	10

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

### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters & K-factor (3.3V)

