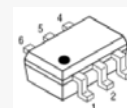


Features

- 17 dB Gain at 2000 MHz
- 14.5 dBm P1dB at 2000 MHz
- 29 dBm OIP3 at 2000 MHz
- 3.3 dB NF at 2000 MHz
- MTTF > 100 Years
- Single Supply

Description

The ASW114, 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 8 GHz. The amplifier is available in a SOT363 package and passes through the stringent DC, RF, and reliability tests.



Package Style: SOT363

Typical Performance

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

Parameters	Units	Typical						
Frequency	MHz	900	2000	3500	5800	900	2000	3500
Gain	dB	20.0	17.0	13.5	10.5	20.5	17.0	14.0
S11	dB	-18	-14	-18	-14	-20	-14	-16
S22	dB	-15	-15	-15	-18	-16	-16	-18
Output IP3 ¹⁾	dBm	24.5	26.0	26.5	23.0	29.5	29.0	--
Noise Figure	dB	3.2	3.3	4.2	3.9	3.1	3.3	4.3
Output P1dB	dBm	12.5	13.0	14.0	12.0	14.5	14.5	14.5
Current	mA	37				53		
Device Voltage	V	+3.2				+3.3		

1) 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		2000	
Gain	dB	16.5	17.0	
S11	dB		-14	
S22	dB		-15	
Output IP3	dBm	24	26	
Noise Figure	dB		3.3	3.5
Output P1dB	dBm	12	13	
Current	mA	32	37	42
Device Voltage	V		+3.2	

Absolute Maximum Ratings

Parameters	Rating
Operating Case Temperature	-40 to +85 $^{\circ}\text{C}$
Storage Temperature	-40 to +150 $^{\circ}\text{C}$
Device Voltage	+3.5 V
Operating Junction Temperature	+150 $^{\circ}\text{C}$
Input RF Power (CW, 50 Ω matched)	+25 dBm
Thermal Resistance	321 $^{\circ}\text{C/W}$

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

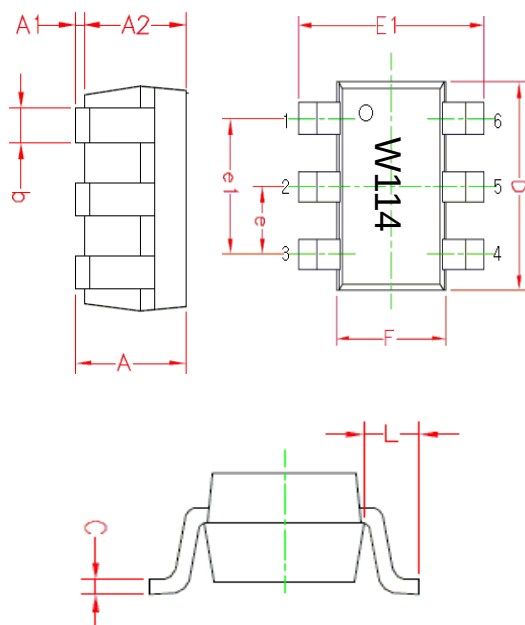
Application Circuit

- 5 ~ 140 MHz
- IF
- 500 ~ 3500 MHz
- 300 ~ 2170 MHz
- 4000 ~ 6000 MHz
- 6500 ~ 7800 MHz
- ATSC (57 ~ 213 MHz)
- DVB-T (V/U band)
- 50 ~ 1000MHz (CATV & 50 Ω)
- 50 ~ 1000MHz (CATV & 75 Ω)
- 950 ~ 2150 MHz (SMATV, 3.2 V)
- 950 ~ 2150 MHz (SMATV, 3.3 V)
- 50 ~ 2150MHz (SMATV & 75 Ω)

Pin Configuration

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

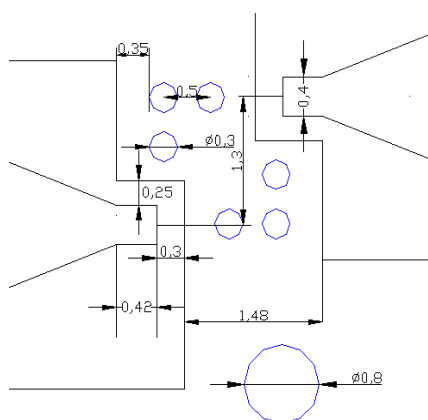
Outline Drawing



Symbols	Dimensions (In mm)		
	MIN	NOM	MAX
A	0.900	1.000	1.10
A1	0.025	0.062	0.10
A2	0.875	0.937	1.00
b	0.200	0.300	0.40
C	0.100	0.125	0.15
D	1.900	2.000	2.10
F	1.150	1.250	1.35
E1	2.000	2.100	2.20
e	--	0.65BSC	--
e1	--	1.30BSC	--
L	--	0.425REF	--

Pin NO.	Function	Pin NO.	Function.
1	GND	4	GND
2	GND	5	GND
3	RF IN	6	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 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: 300 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

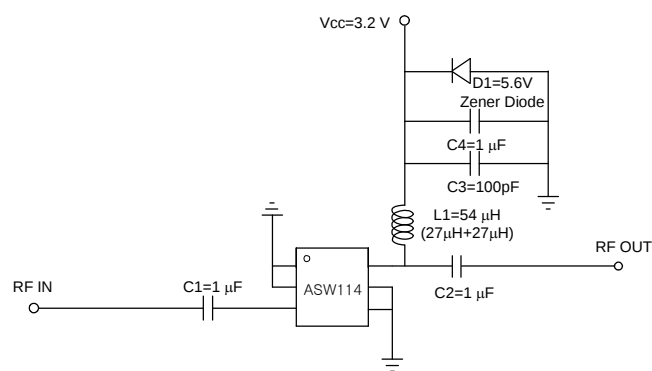
5 ~ 140 MHz

+3.2 V

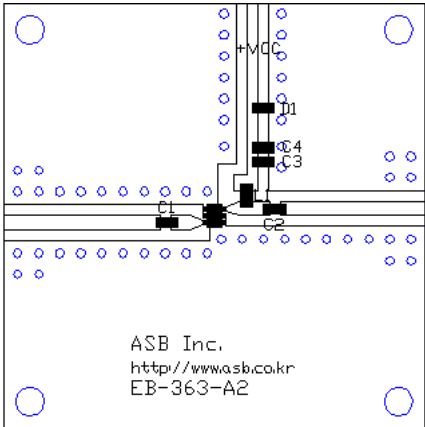
Frequency (MHz)	5	140
Magnitude S21 (dB)	20.5	20.5
Magnitude S11 (dB)	-18	-18
Magnitude S22 (dB)	-14	-14
Output P1dB (dBm)	10.0	9.5
Output IP3 ¹⁾ (dBm)	19.0	18.5
Noise Figure (dB)	3.0	2.9
Device Voltage (V)	+3.2	+3.2
Current (mA)	37	37

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

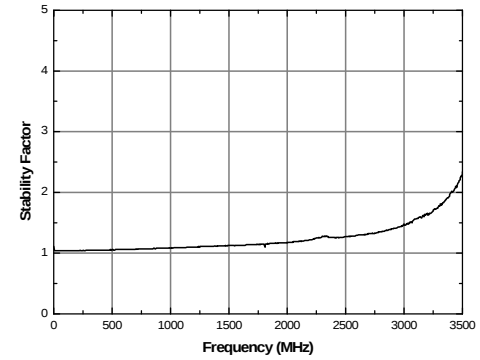
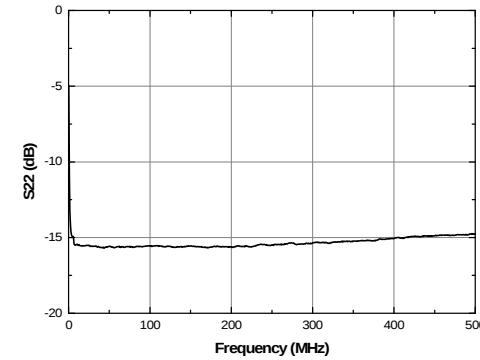
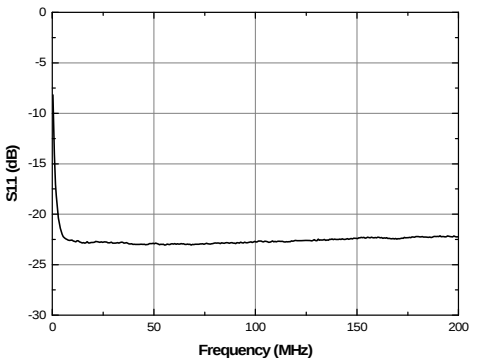
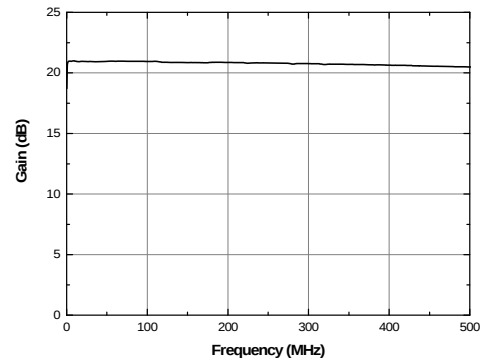
Schematic



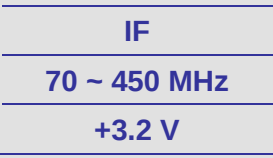
Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



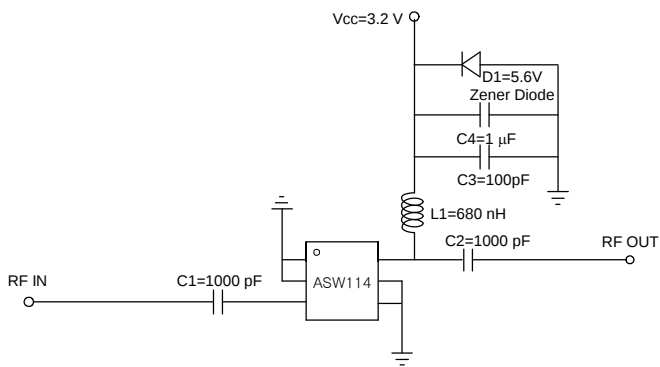
APPLICATION CIRCUIT



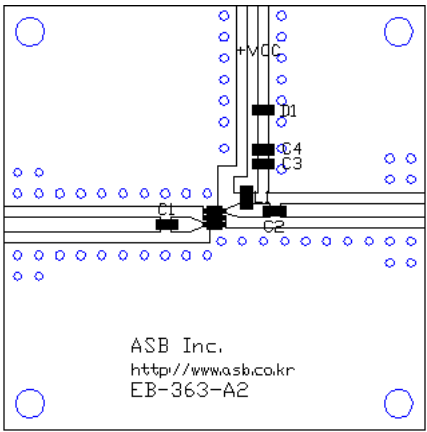
Frequency (MHz)	70	150	300	450
Magnitude S21 (dB)	21.0	21.0	21.0	20.5
Magnitude S11 (dB)	-15	-18	-18	-18
Magnitude S22 (dB)	-18	-16	-16	-16
Output P1dB (dBm)	12	12	12	12
Output IP3 ¹⁾ (dBm)	22.5	22.5	23.0	23.5
Noise Figure (dB)	3.2	3.2	3.2	3.2
Device Voltage (V)	+3.2	+3.2	+3.2	+3.2
Current (mA)	37	37	37	37

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

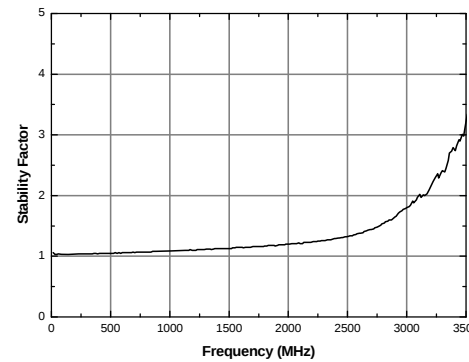
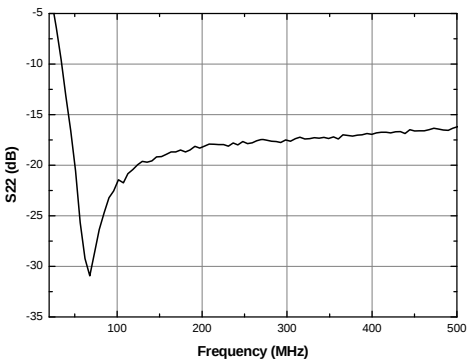
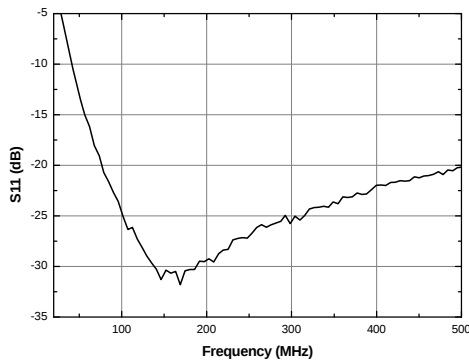
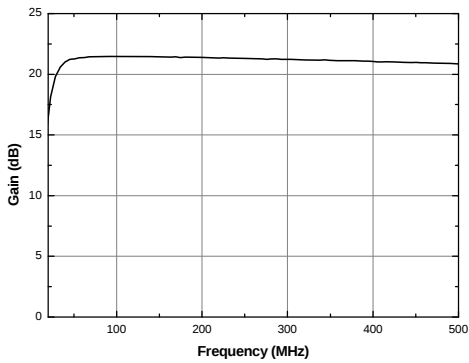
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

Wide Band

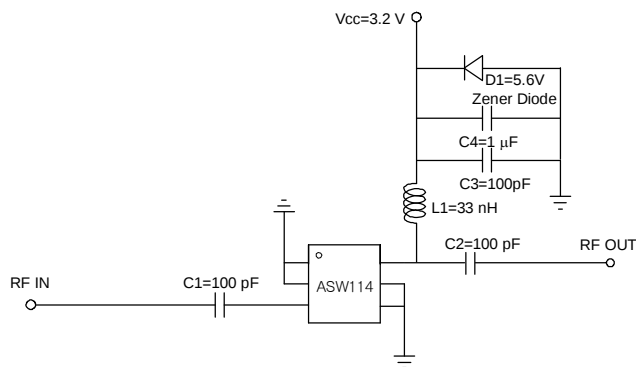
500 ~ 3500 MHz

+3.2 V

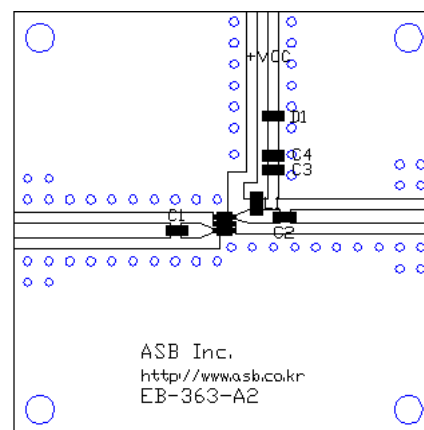
Frequency (MHz)	500	900	1750	2000	2400	2700	3500
Magnitude S21 (dB)	20.5	20.0	17.5	17.0	16.0	15.3	13.5
Magnitude S11 (dB)	-15	-18	-14	-14	-15	-15	-18
Magnitude S22 (dB)	-13	-15	-15	-15	-18	-18	-15
Output P1dB (dBm)	12.5	12.5	13.0	13.0	13.5	13.5	14.0
Output IP3 ¹⁾ (dBm)	25.0	24.5	25.0	26.0	26.5	25.5	26.5
Noise Figure (dB)	3.2	3.2	3.2	3.3	3.3	3.4	4.2
Device Voltage (V)	+3.2						
Current (mA)	37						

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

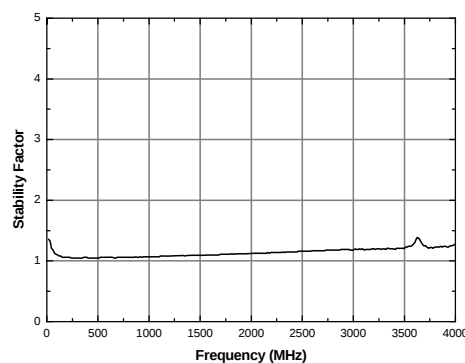
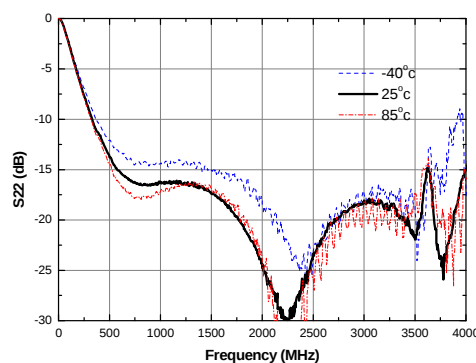
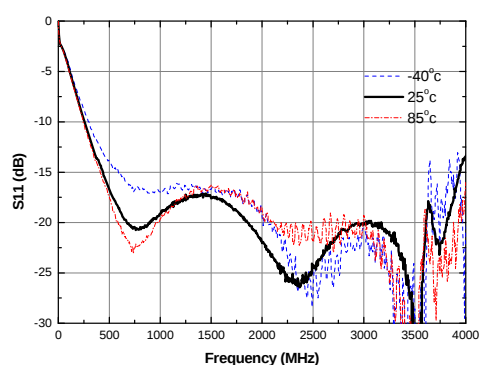
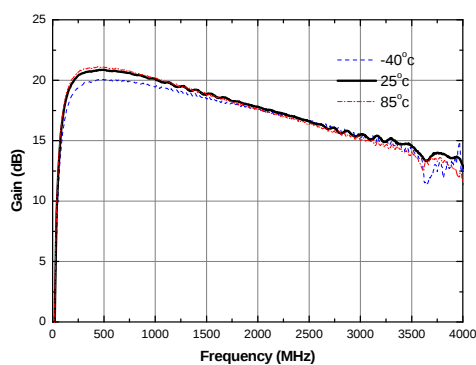
Schematic



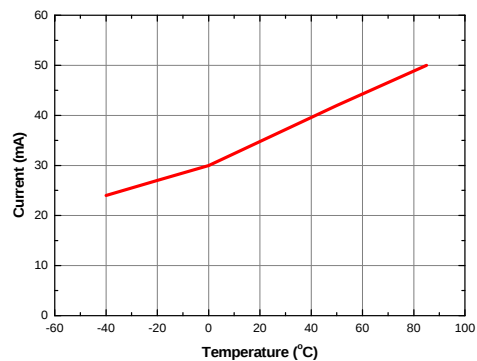
Board Layout (FR4, 40x40 mm², 0.8T)



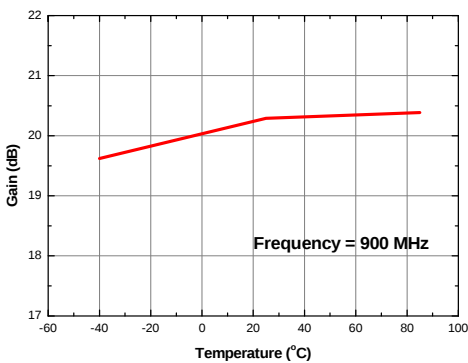
S-parameters & K-factor



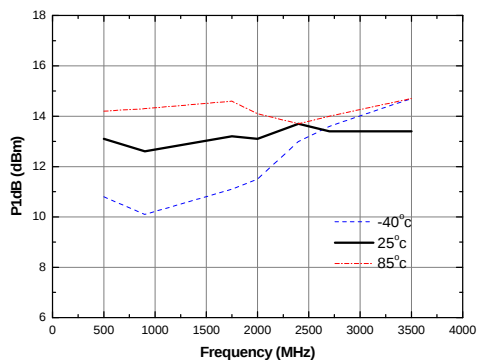
Current vs. Temperature



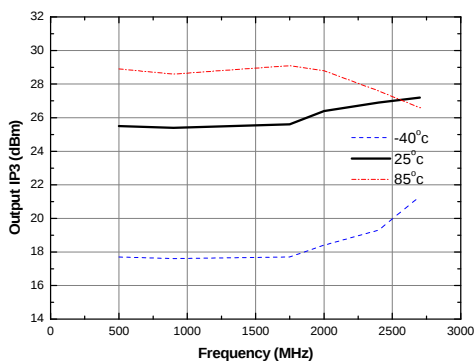
Gain vs. Temperature



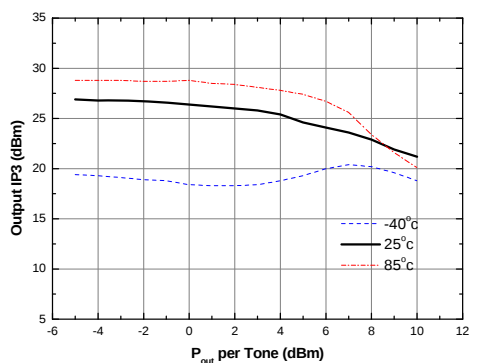
P1dB vs. Frequency



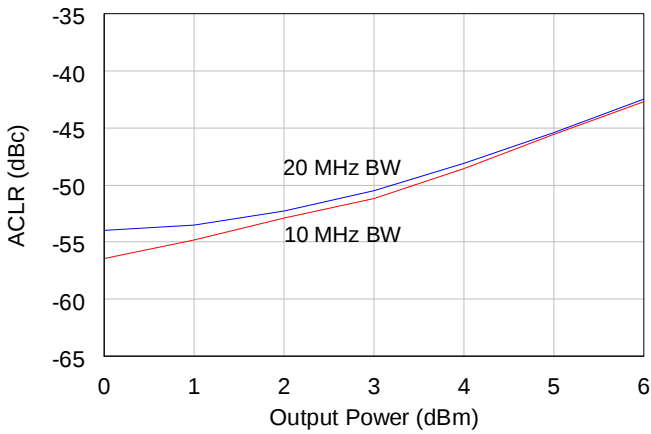
Output IP3 vs. Frequency



Output IP3 vs. Tone Power (Frequency = 2000 MHz)

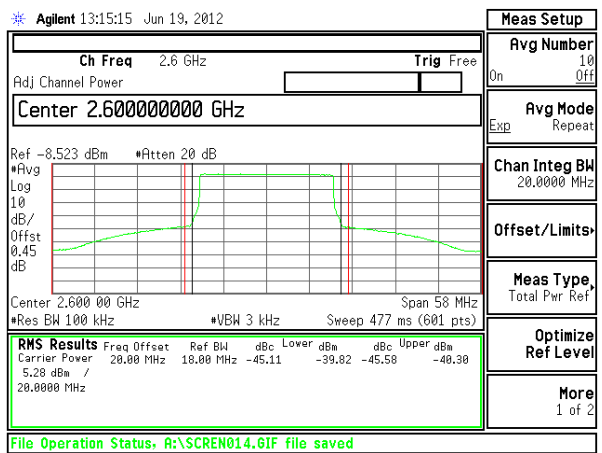


LTE ACLR – 10 MHz & 20 MHz



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

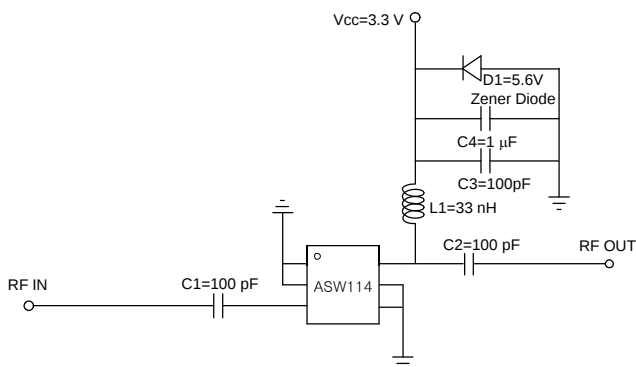
APPLICATION CIRCUIT

Wide Band
500 ~ 3500 MHz
+3.3 V

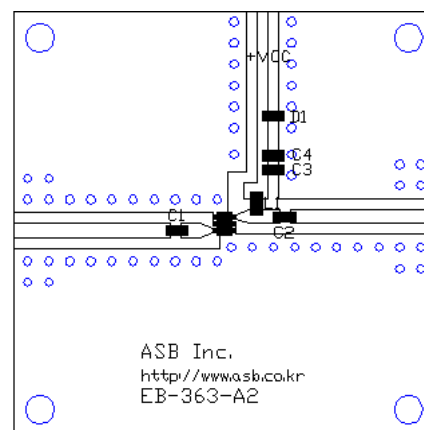
Frequency (MHz)	500	900	1750	2000	2400	2700	3500
Magnitude S21 (dB)	21.0	20.5	18.0	17.0	16.0	15.5	14.0
Magnitude S11 (dB)	-18	-20	-14	-14	-14	-13	-16
Magnitude S22 (dB)	-13	-16	-14	-16	-18	-18	-18
Output P1dB (dBm)	14.5	14.5	14.5	14.5	14.5	14.0	14.5
Output IP3 ¹⁾ (dBm)	30.0	29.5	29.0	29.0	29.0	27.0	--
Noise Figure (dB)	3.4	3.1	3.2	3.3	3.4	3.5	4.3
Device Voltage (V)	+3.3						
Current (mA)	53						

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

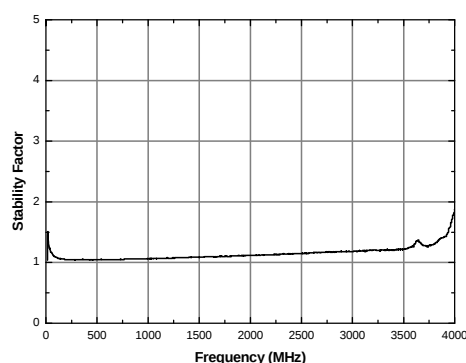
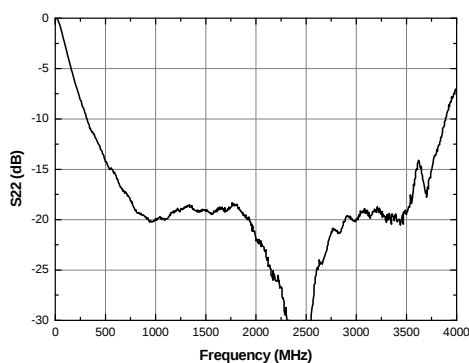
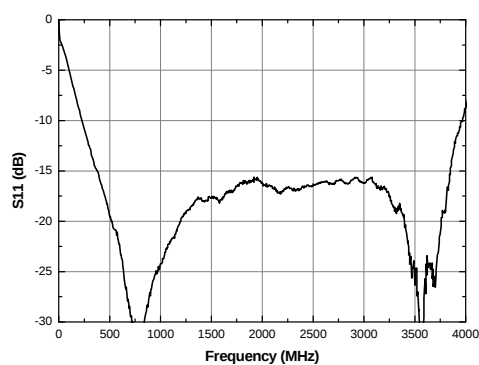
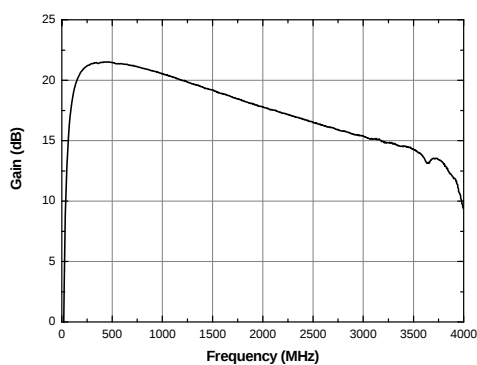
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

Wide Band

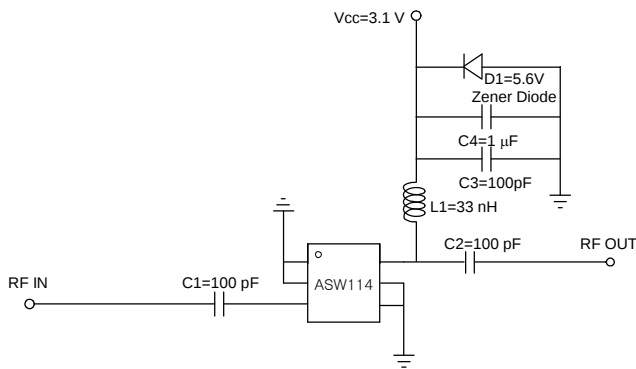
300 ~ 2700 MHz

+3.1 V

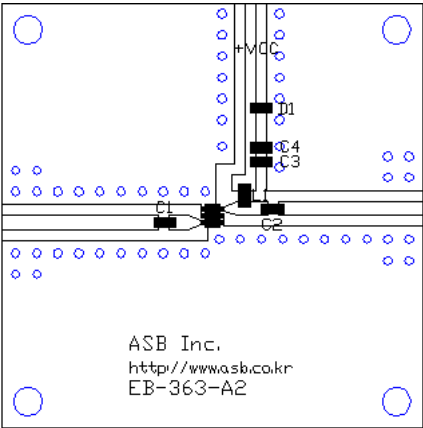
Frequency (MHz)	300	900	2000	2700
Magnitude S21 (dB)	19.3	19.0	16.4	15.0
Magnitude S11 (dB)	-10	-15	-15	-18
Magnitude S22 (dB)	-8	-13	-14	-16
Output P1dB (dBm)	11	11	11.5	12
Output IP3 ¹⁾ (dBm)	17.0	17.5	18.5	22.0
Noise Figure (dB)	3.2	3.0	3.0	3.3
Device Voltage (V)	+3.1	+3.1	+3.1	+3.1
Current (mA)	25	25	25	25

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

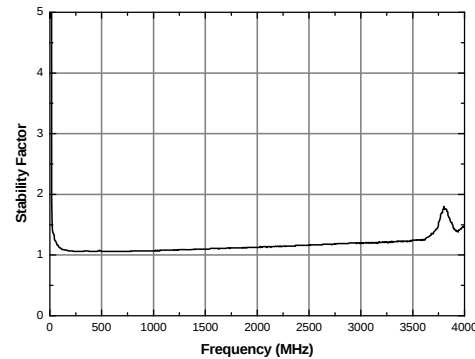
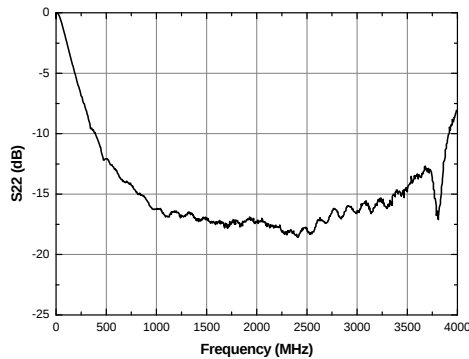
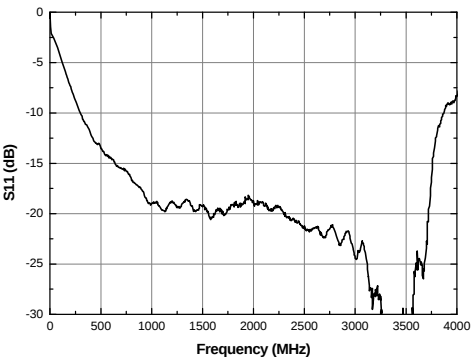
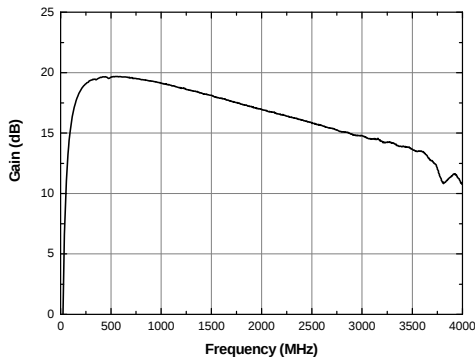
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

C-Band

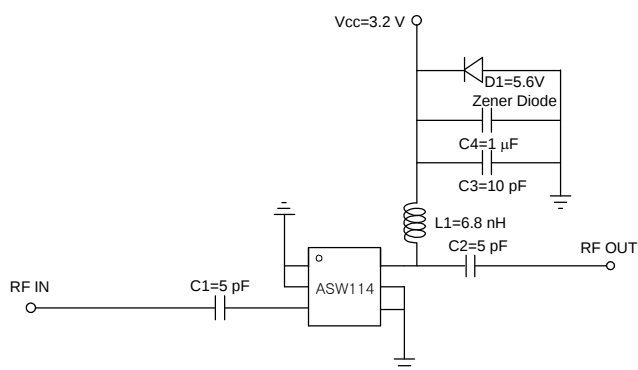
4000 ~ 6000 MHz

+3.2 V

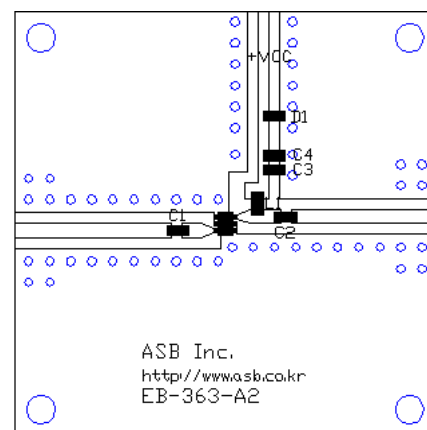
Frequency (MHz)	4000	5000	5800	6000
Magnitude S21 (dB)	13.0	11.5	10.5	10.5
Magnitude S11 (dB)	-18	-18	-14	-14
Magnitude S22 (dB)	-14	-16	-18	-16
Output P1dB (dBm)	13	12	12	11
Output IP3 ¹⁾ (dBm)	25.0	25.0	23.0	22.5
Noise Figure (dB)	3.4	3.8	3.9	3.9
Device Voltage (V)	+3.2	+3.2	+3.2	+3.2
Current (mA)	37	37	37	37

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

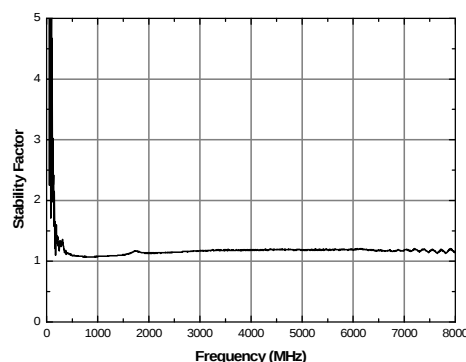
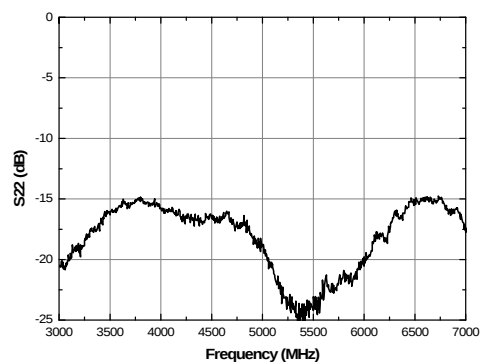
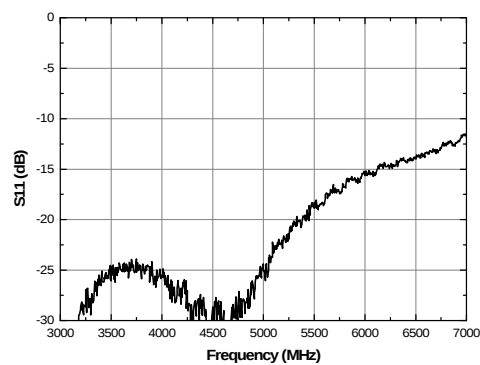
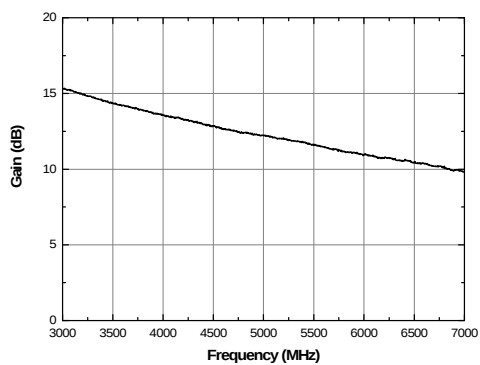
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

C-Band

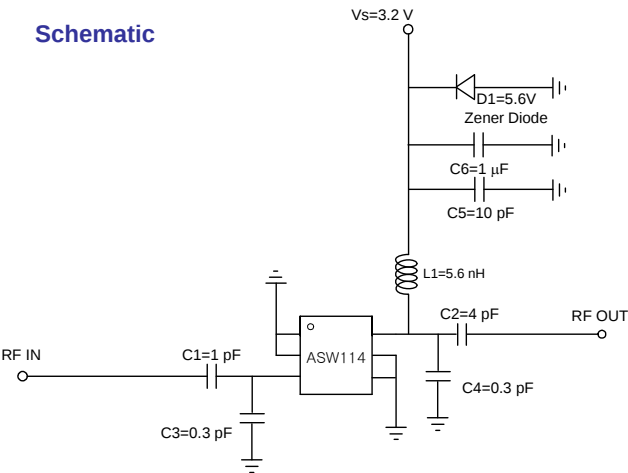
6500 ~ 7800 MHz

+3.2 V

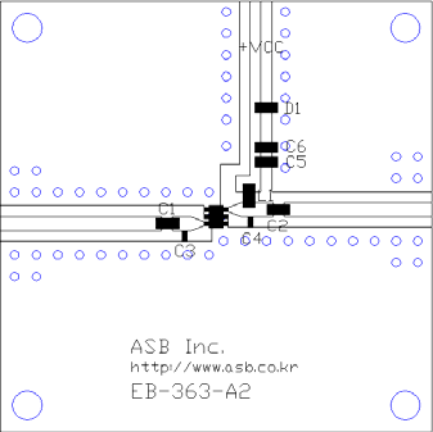
Frequency (MHz)	6500	7800
Magnitude S21 (dB)	9.8	9.1
Magnitude S11 (dB)	-11	-8
Magnitude S22 (dB)	-18	-18
Output P1dB (dBm)	6	3
Output IP3 ¹⁾ (dBm)	15.5	14.0
Noise Figure (dB)	5.6	5.5
Device Voltage (V)	+3.2	+3.2
Current (mA)	37	37

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

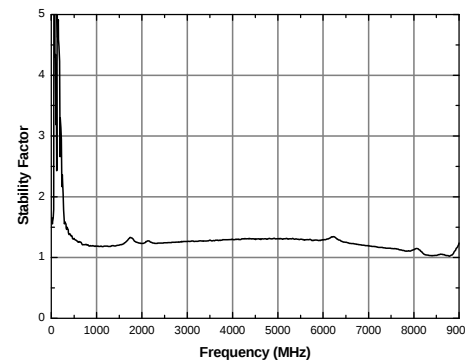
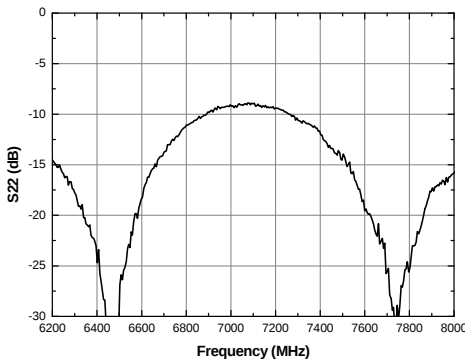
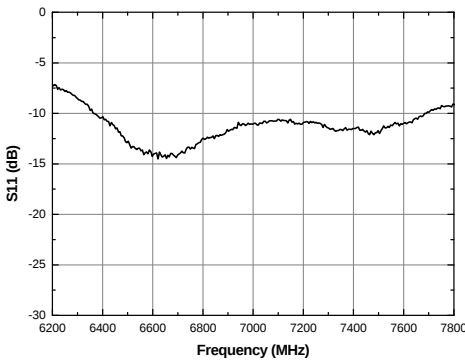
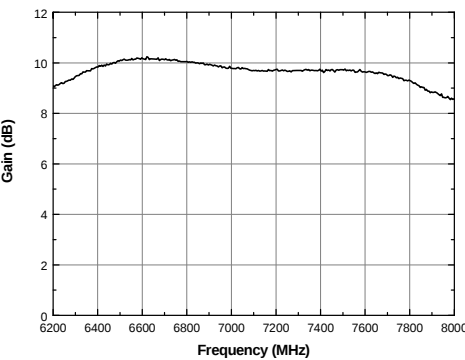
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

ATSC

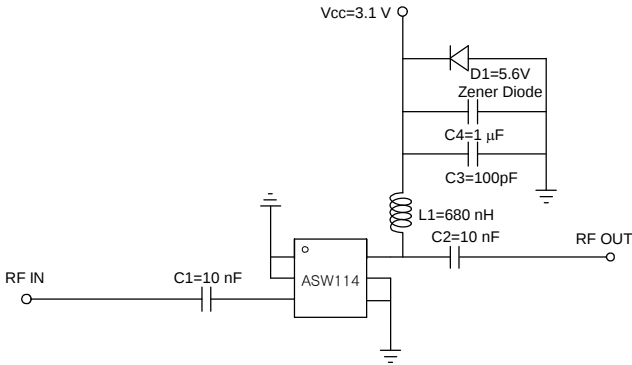
57 ~ 213 MHz

+3.1 V

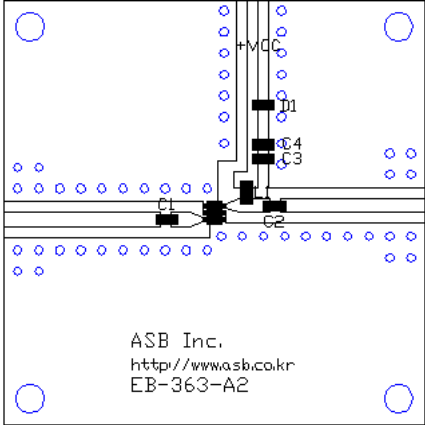
Frequency (MHz)	57	213
Magnitude S21 (dB)	20	20
Magnitude S11 (dB)	-15	-15
Magnitude S22 (dB)	-12	-13
Output P1dB (dBm)	10.5	10.5
Output IP3 ¹⁾ (dBm)	18.5	19.0
Noise Figure (dB)	2.7	2.8
Device Voltage (V)	+3.1	+3.1
Current (mA)	25	25

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

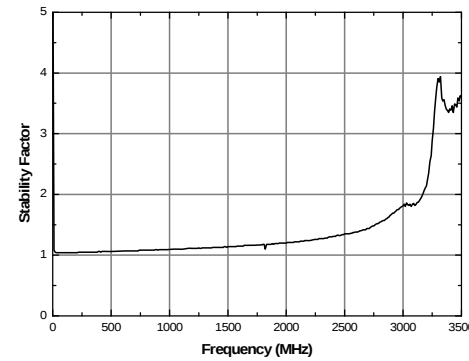
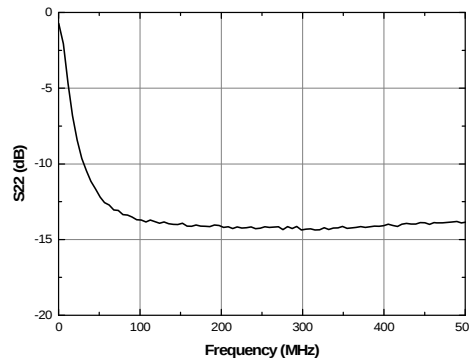
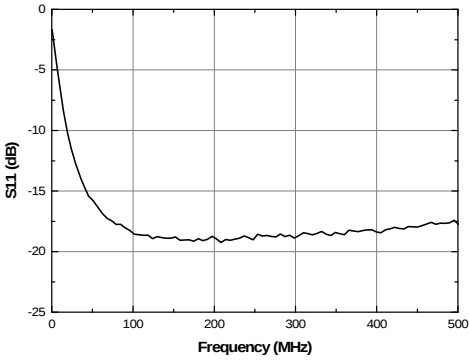
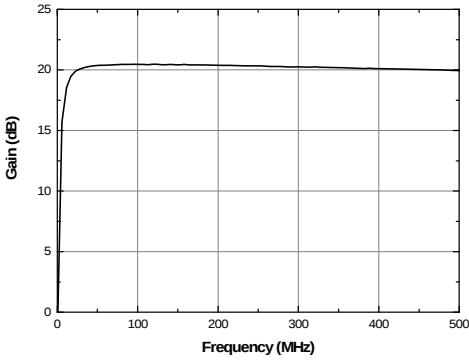
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

DVB-T (V / U band)

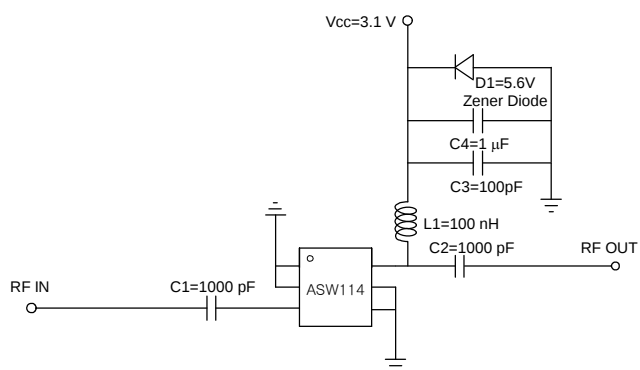
170 ~ 860 MHz

+3.1 V

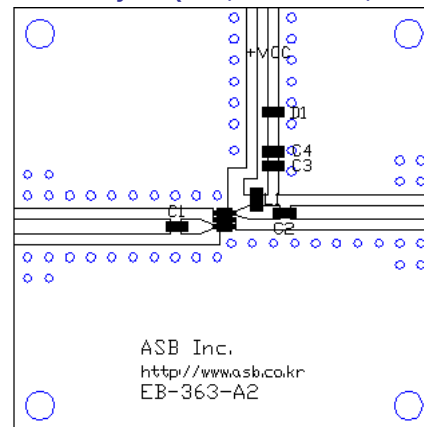
Frequency (MHz)	170	860
Magnitude S21 (dB)	20.0	18.5
Magnitude S11 (dB)	-15	-14
Magnitude S22 (dB)	-12	-15
Output P1dB (dBm)	11	10
Output IP3 ¹⁾ (dBm)	20	19
Noise Figure (dB)	2.7	2.8
Device Voltage (V)	+3.1	+3.1
Current (mA)	25	25

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

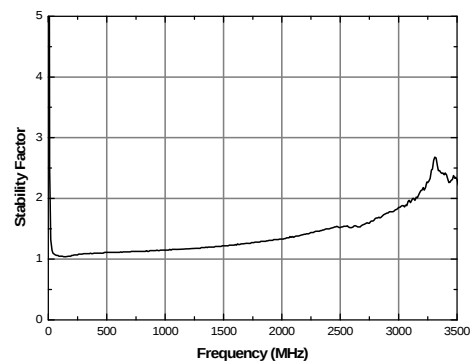
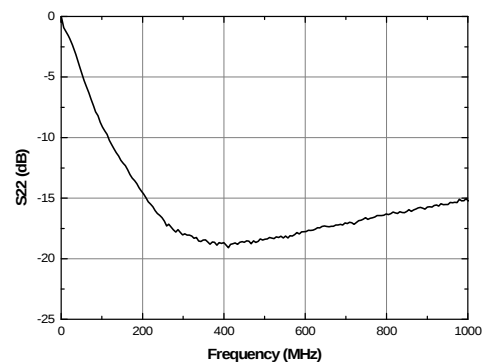
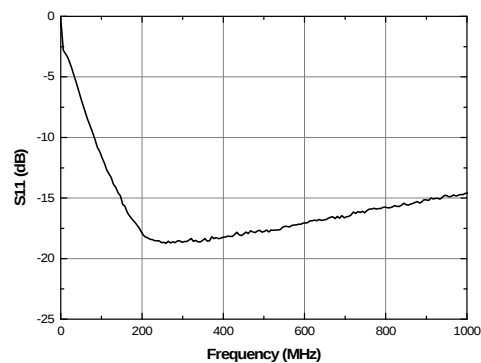
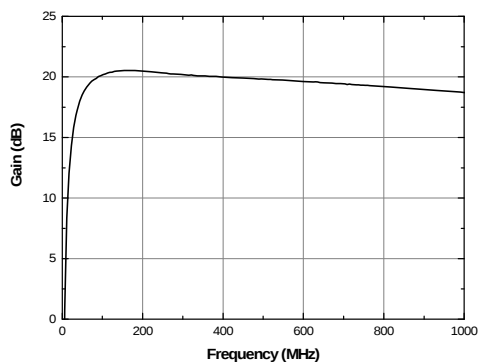
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

CATV (50 Ω)

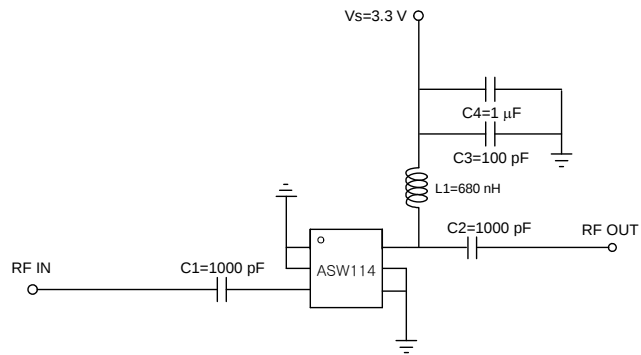
50 ~ 1000 MHz

+3.3 V

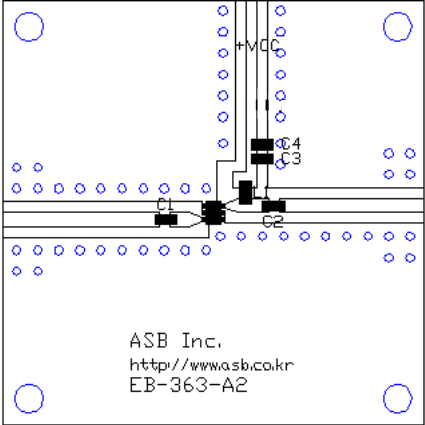
Frequency (MHz)	50	500	1000
Magnitude S21 (dB)	21.6	21.1	19.8
Magnitude S11 (dB)	-17	-18	-15
Magnitude S22 (dB)	-16	-18	-18
Output P1dB (dBm)	14	14	14
Output IP3 ¹⁾ (dBm)	29	30	29
Noise Figure (dB)	3.1	3.2	3.1
Device Voltage (V)	+3.3	+3.3	+3.3
Current (mA)	53	53	53

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

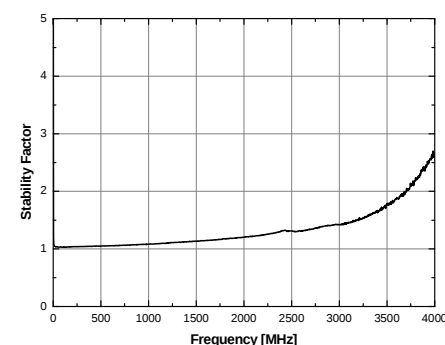
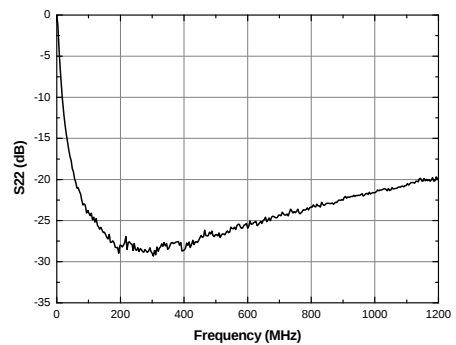
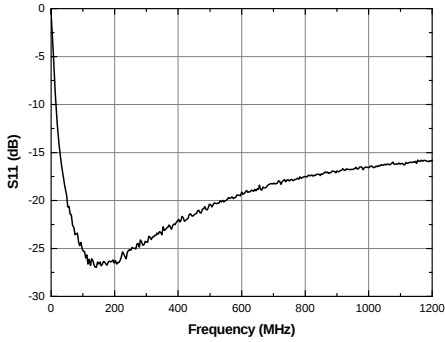
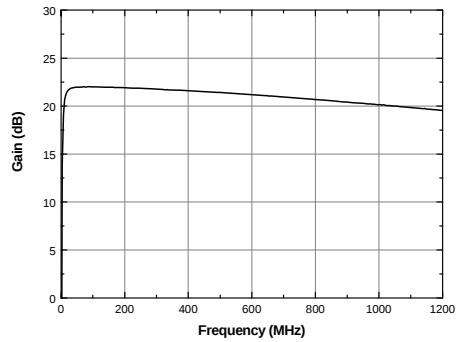
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

CATV (75 Ω)

50 ~ 1000 MHz

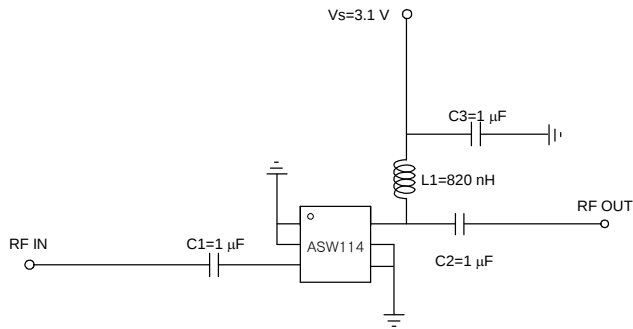
+3.1 V

Frequency (MHz)	50	500	860
Magnitude S21 (dB)	19.5	19.0	18.5
Magnitude S11 (dB)	-12.5	-17.0	-20.0
Magnitude S22 (dB)	-15	-20	-15
Output P1dB (dBm)	11	11	11
Output IP3 ¹⁾ (dBm)	17	19	20
Output IP2 ^{1),2)} (dBm)	16	24	26
Noise Figure (dB)	2.9	3.1	3.2
Device Voltage (V)	+3.1	+3.1	+3.1
Current (mA)	25	25	25

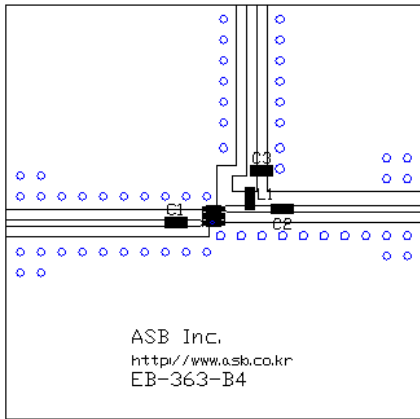
1) OIP3 and OIP2 are measured with two tones at an output power of +0 dBm/tone separated by 6 MHz.

2) OIP2 is measured at F1+F2 Frequency.

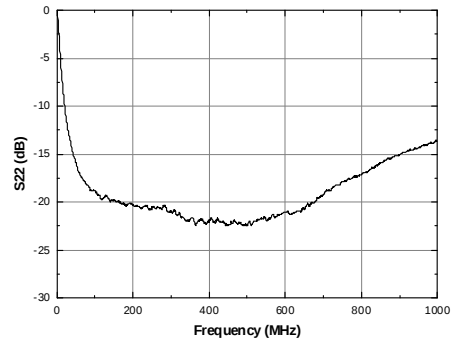
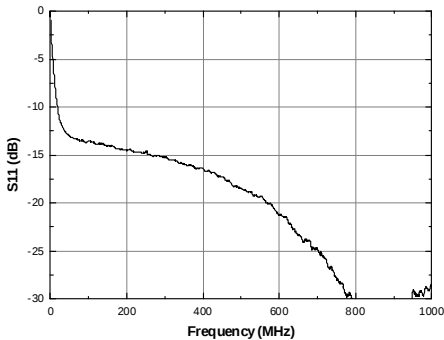
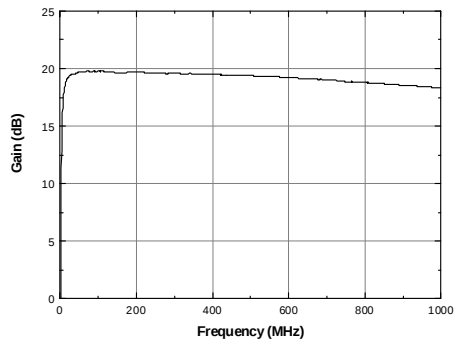
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

SMATV

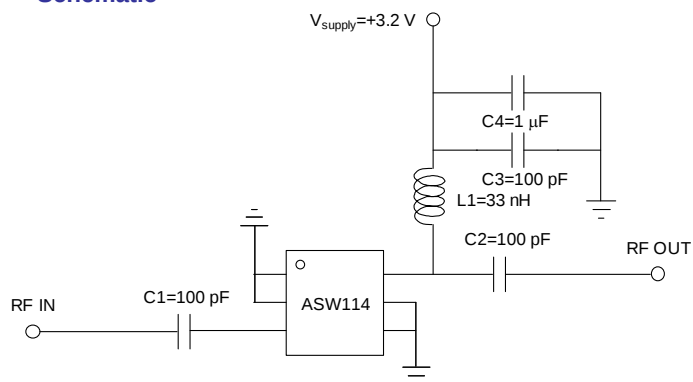
950 ~ 2150 MHz

+3.2 V

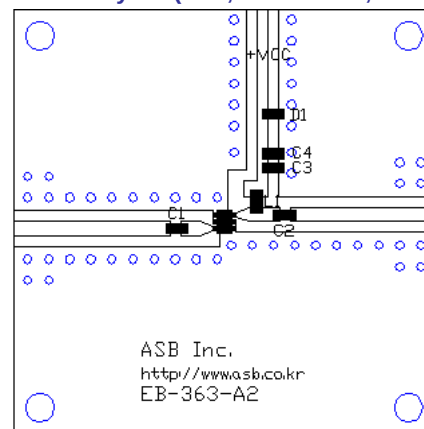
Frequency (MHz)	950	2150
Magnitude S21 (dB)	20.0	17.3
Magnitude S11 (dB)	-19	-18
Magnitude S22 (dB)	-16	-20
Output P1dB (dBm)	12	13
Output IP3 ¹⁾ (dBm)	25.0	25.5
Noise Figure (dB)	2.9	3.1
Device Voltage (V)	+3.2	+3.2
Current (mA)	37	37

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

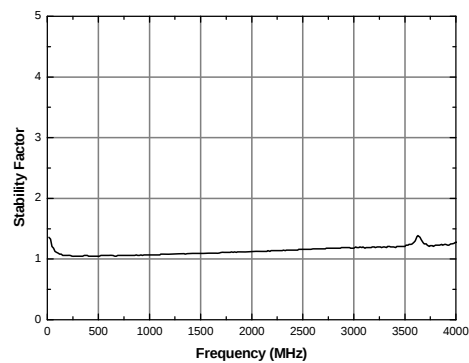
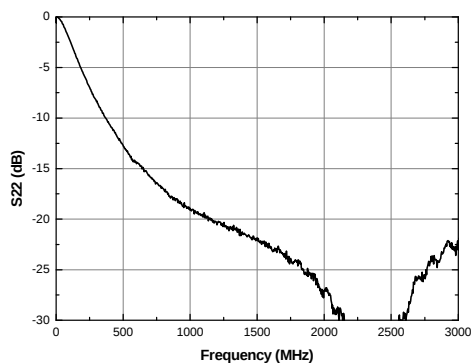
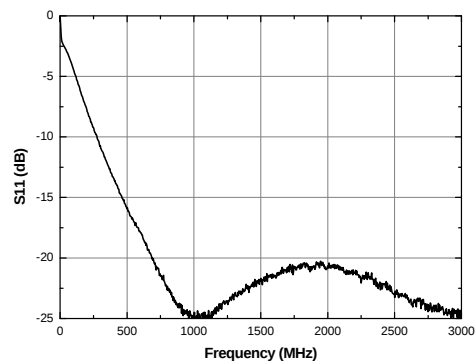
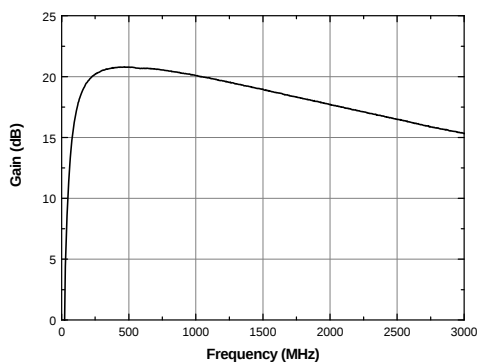
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

SMATV

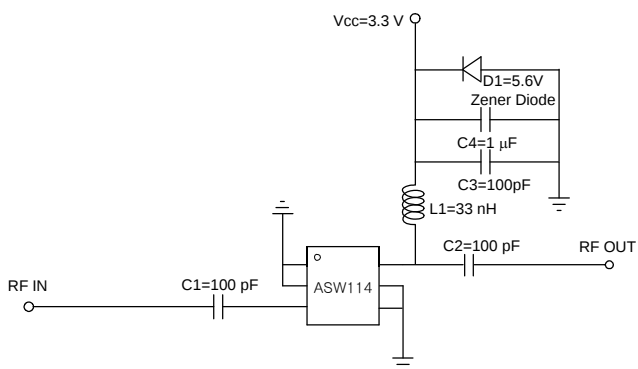
950 ~ 2150 MHz

+3.3 V

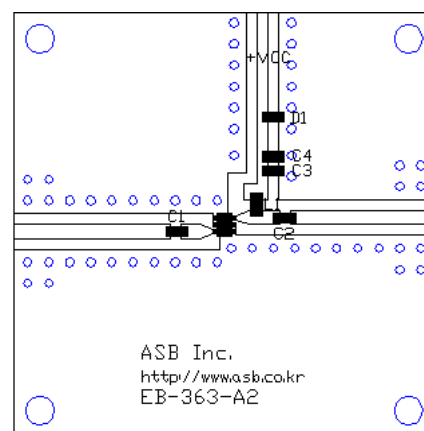
Frequency (MHz)	950	1500	2000
Magnitude S21 (dB)	20.5	18.5	17.0
Magnitude S11 (dB)	-20	-14	-14
Magnitude S22 (dB)	-16	-14	-16
Output P1dB (dBm)	14.5	14.5	14.5
Output IP3 ¹⁾ (dBm)	29.5	29	29
Noise Figure (dB)	3.1	3.2	3.3
Device Voltage (V)	+3.3		
Current (mA)	53		

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

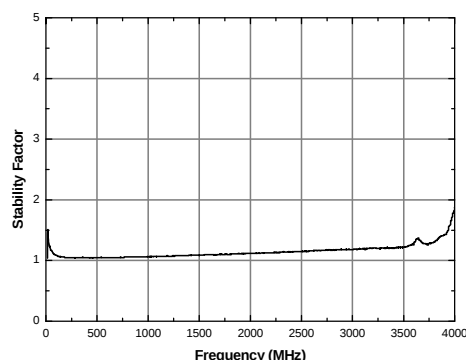
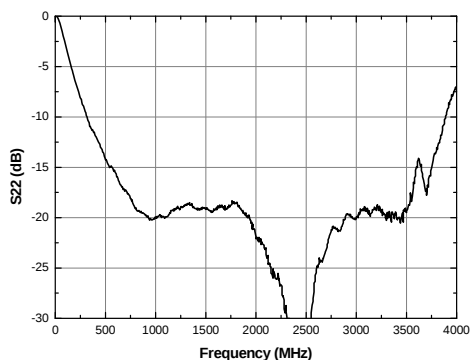
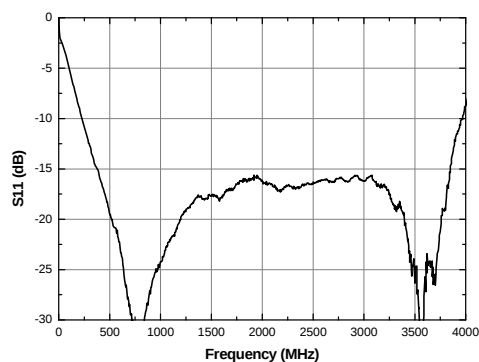
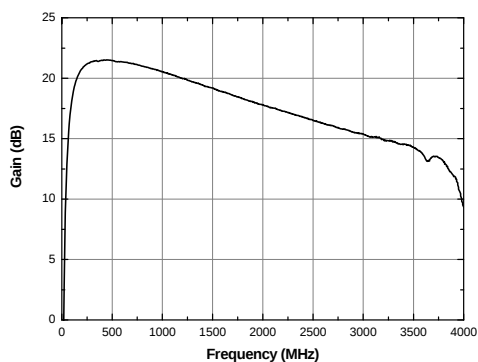
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

SMATV (75 Ω)

50 ~ 2150 MHz

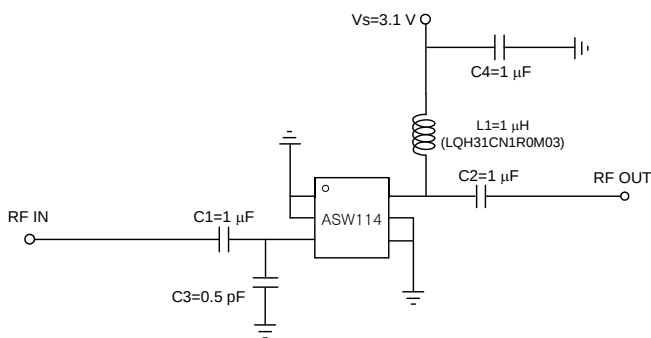
+3.1 V

Frequency (MHz)	50	1000	2150
Magnitude S21 (dB)	19.8	18.9	16.0
Magnitude S11 (dB)	-11	-16	-20
Magnitude S22 (dB)	-13	-16	-20
Output P1dB (dBm)	7	9	7
Output IP3 ¹⁾ (dBm)	17	20	17
Output IP2 ^{1),2)} (dBm)	18	29	25
Noise Figure (dB)	3.2	3.0	3.2
Device Voltage (V)	+3.1	+3.1	+3.1
Current (mA)	25	25	25

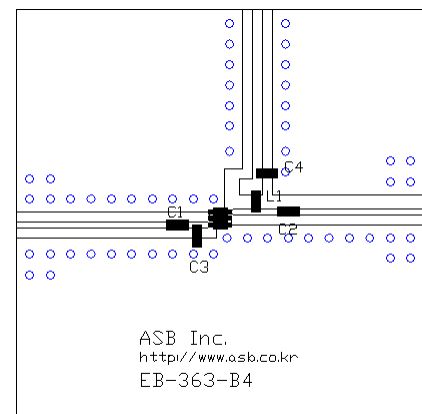
1) OIP3 and OIP2 are measured with two tones at an output power of +0 dBm/tone separated by 6 MHz.

2) OIP2 is measured at F1+F2 Frequency.

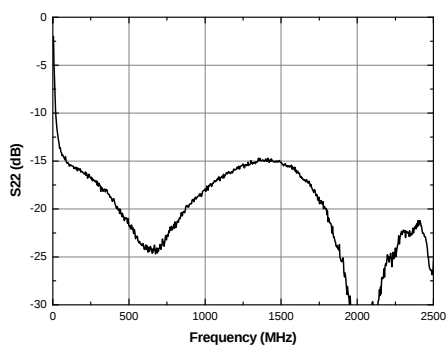
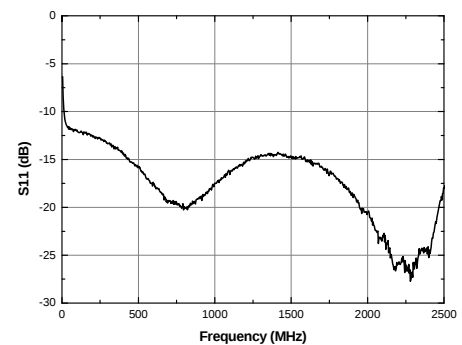
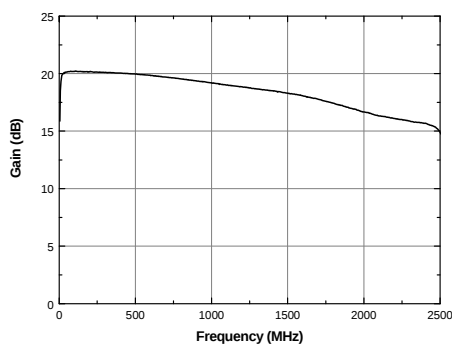
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



Recommended Soldering Reflow Profile