ASL226

700-6000MHz MMIC LNA

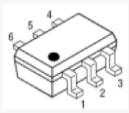
Features

- Two-stage LNA
- 28 dB gain & 1.1 dB NF at 1575 MHz GPS, GLONASS, Galileo and Compass
- Unconditionally Stable
- Need only 5 components
- 3 kV Contact Discharge ESD Rating achievable with one external L (Refer to an application circuit at page 8)

Description

ASL226 is a two-stage LNA for GPS, GLONASS, Galileo and Compass receiver low noise block. It has a low noise, high gain, and high linearity over a wide range of frequency up to 6 GHz. It is also suitable for use in the low noise amplifier block of the mobile wireless systems of T-DMB, CDMA, GSM, PCS, WCDMA, WiBro, WiMAX, and WLAN so on. The amplifier is available in an SOT-363 package and passes the stringent DC, RF, and reliability tests.

RoHS-compliant GREEN Package



Package Style: SOT-363

Typical Performance

(T_A = +25 °C, Z_0 = 50 Ω)

Parameters	Units	Typical								
Frequency	MHz	1575	1575	1575	1575	900	1950	2450	3500	5800
Gain	dB	23.5	28	28.5	30.5	34	25	21.5	15	9.5
S11	dB	-14	-16	-20	-11	-14	-15	-16	-16	-12
S22	dB	-12	-15	-20	-14	-15	-20	-16	-12	-11
S12	dB	-40	-40	-40	-40	-40	-35	-30	-30	-22
Output IP3[1)]	dBm	11	15.5	17	20	18	16.5	14	10	12
Noise Figure	dB	1.2	1.1	0.95	0.9	1.3	1.3	1.3	1.8	3.0
Output P1dB	dBm	9	11	11	11	9	10.5	11	8	7
Current	mA	5.5	8.5	9.5	18	8.5	8.5	8.5	8.5	8.5
Device Voltage	V	+2.2	+3	+3.3	+5	+3	+3	+3	+3	+3

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

Product Specifications

Parameters	Units	Min	Typ	Max
Frequency	MHz		1575	
Gain	dB	27	28	
S11	dB		-16	
S22	dB		-15	
S12	dB		-40	
Output IP3	dBm	14	15.5	
Noise Figure	dB		1.1	1.3
Output P1dB	dBm	9	11	
Current	mA	5.5	8.5	11
Device Voltage	V		+3	

Absolute Maximum Ratings, T_A = +25 °C

Parameters	Rating
Operating Case Temperature	-40 to +85°C
Storage Temperature	-40 to +150°C
Device Voltage	+5 V
Operating Junction Temperature	+150°C
Input RF Power (CW, 50 Ω matched as in 1575 MHz application circuit)*	+22 dBm
Thermal Resistance	285 °C/W

The operation of this device in excess of any of these limits may cause permanent damage.

* Refer to the max. input power data at http://www.asb.co.kr/pdf/Maximum_Input_Power_Analysis.pdf. The max. input power, in principle, depends upon the application frequency, the matching circuit, and device voltage.

Application Circuit

GPS/GLONASS/Galileo/Compass

- 1559 MHz ~ 1610 MHz (1.8V)
- 1559 MHz ~ 1610 MHz (2.2V)
- 1559 MHz ~ 1610 MHz (3.3V)
- 1559 MHz ~ 1610 MHz (NF=0.95dB, 3.3V)
- 1559 MHz ~ 1610 MHz (Gain>30dB, 5V)
- 1559 MHz ~ 1610 MHz (5.0V)
- 1559 MHz ~ 1610 MHz (Robust ESD / ± 3 kV)
- 1559 MHz ~ 1610 MHz (2.85V / 20dB Gain)
- 1559 MHz ~ 1610 MHz (With SAW Filter)
- 1164 MHz ~ 1300 MHz
- 1164 MHz ~ 1620 MHz

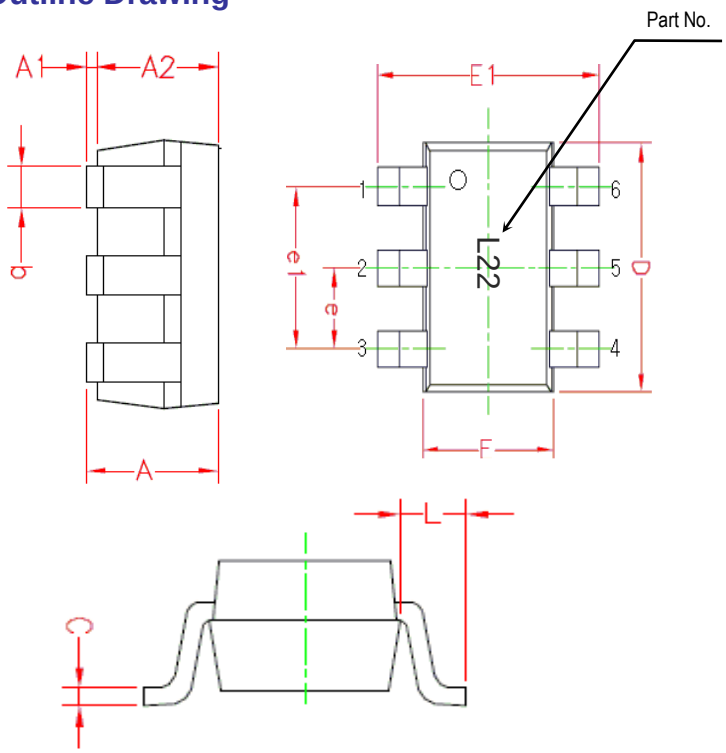
Others

- 900 MHz
- 1950 MHz
- 2450 MHz
- 2300~2900 MHz
- 2300~2900 MHz (Low Gain)
- 3300 ~ 3800MHz
- 4000~4500 MHz
- 5800 MHz

Pin Configuration

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

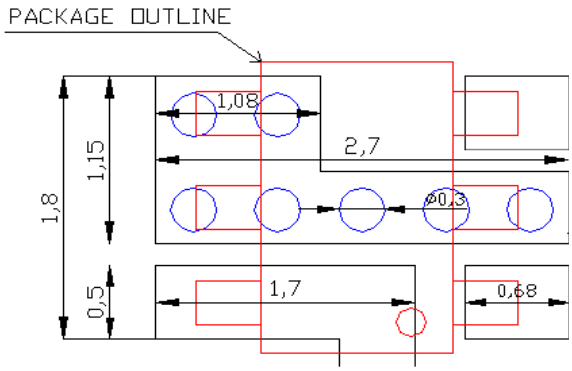
Outline Drawing



Symbols	Dimensions (In mm)		Dimensions (In inch)	
	MIN	MAX	MIN	MAX
A	0.90	1.10	.036	.044
A1	0.025	0.10	.001	.004
A2	0.875	1.00	.035	.040
b	0.20	0.40	.008	.016
C	0.10	0.15	.004	.006
D	1.90	2.10	.076	.084
F	1.15	1.35	.046	.054
E1	2.00	2.20	.080	.088
e	0.65 BSC.		.026 BSC.	
e1	1.30 BSC.		.052 BSC.	
L	0.425 REF.		.017 REF..	

Pin No.	Function	Pin No.	Function.
1	VDD	4	GND
2	GND	5	GND
3	RF OUT	6	RF IN

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 2,4 and 5 for better RF and thermal performance, as shown in the drawing at the left side.
3. You can download the gerber file of ASL226 from http://www.asb.co.kr/datasheet/EB-363-B55.zip

ESD Classification & Moisture Sensitivity Level

ESD Classification	
HBM	Class 0
	Voltage Level: 200 V
MM	Class A
	Voltage Level: 40 V

CAUTION: Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Moisture Sensitivity Level (MSL)
Level 3 at 260°C reflow

APPLICATION CIRCUIT

GPS/GLONASS/Galileo/Compass

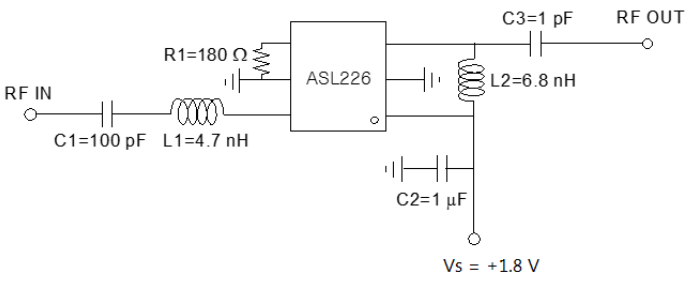
1559 MHz ~ 1610 MHz

+1.8 V

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Power Gain	G_p	F = 1.575 GHz		23.5		dB
Noise Figure	NF	F = 1.575 GHz		1.1		dB
Input Return Loss	RL_{in}	F = 1.575 GHz		-14		dB
Output Return Loss	RL_{out}	F = 1.575 GHz		-16		dB
Reverse Isolation	ISO	F = 1.575 GHz		-35		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 1.575 GHz		6		dBm
3rd Intercept Point Output Power 1)	OIP3	F = 1.575 GHz		14		dBm
Current	I_d	F = 1.575 GHz, Non-RF		6.5		mA

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

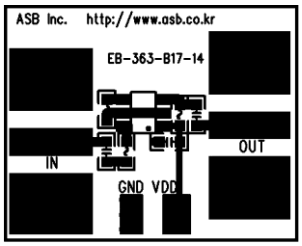
Schematic



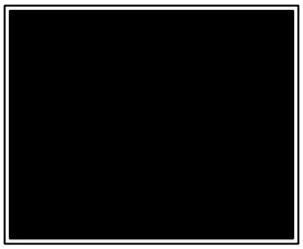
* Note: C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

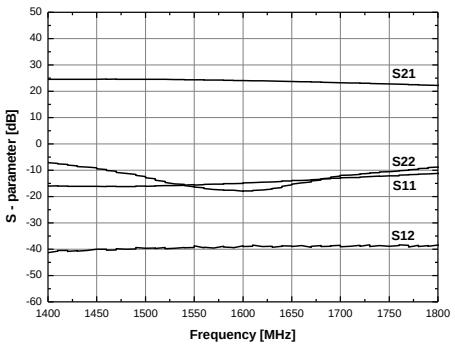
Top



Bottom



S-parameters



Gain & OIP3 & P1 & NF Vs. R1

R1 (ohm)	Vd (V)	Id (mA)	Gain (dB)	OIP3 (dBm)	P1 (dBm)	NF (dB)
180	1.8	6.5	24.2	14.3	6.4	1.03
160	1.8	6	23.9	14	7	1.05
120	1.8	5.5	23.6	13.1	7.2	1.07
100	1.8	5	23.5	12.6	7.3	1.09

APPLICATION CIRCUIT

GPS/GLONASS/Galileo/Compass

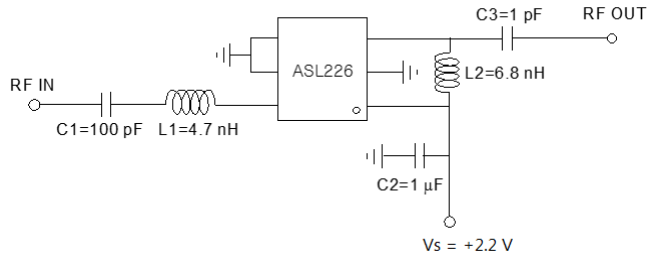
1559 MHz ~ 1610 MHz

+2.2 V

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Power Gain	G_p	F = 1.575 GHz		23.5		dB
Noise Figure	NF	F = 1.575 GHz		1.2		dB
Input Return Loss	RL_{in}	F = 1.575 GHz		-14		dB
Output Return Loss	RL_{out}	F = 1.575 GHz		-12		dB
Reverse Isolation	ISO	F = 1.575 GHz		-40		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 1.575 GHz		9		dBm
3rd Intercept Point Output Power 1)	OIP3	F = 1.575 GHz		11		dBm
Current	I_d	F = 1.575 GHz, Non-RF		5.5		mA

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

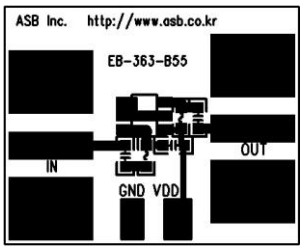
Schematic



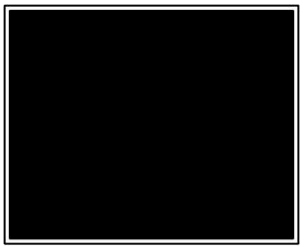
* Note: Gain and current can be reduced by controlling VDD to 2 V. C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

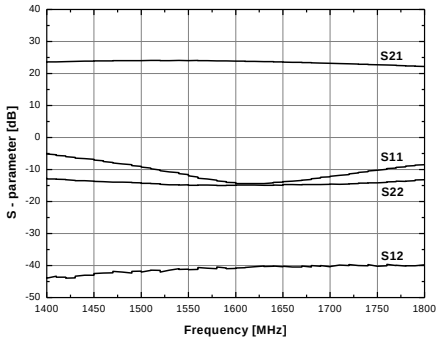
Top

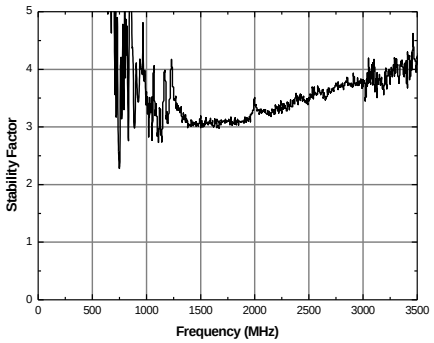


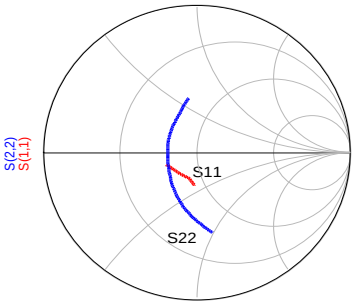
Bottom

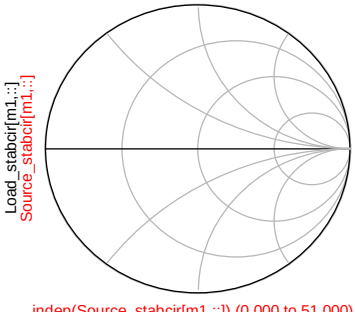


S-parameters & K-factor









APPLICATION CIRCUIT

GPS/GLONASS/Galileo/Compass

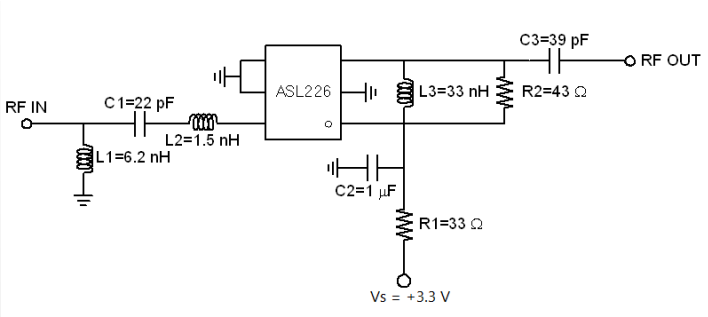
1559 MHz ~ 1610 MHz

+3.3 V

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Power Gain	G_p	F = 1.575 GHz		20		dB
Noise Figure	NF	F = 1.575 GHz		1.2		dB
Input Return Loss	RL_{in}	F = 1.575 GHz		-20		dB
Output Return Loss	RL_{out}	F = 1.575 GHz		-16		dB
Reverse Isolation	ISO	F = 1.575 GHz		-40		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 1.575 GHz		4		dBm
3rd Intercept Point Output Power 1)	OIP3	F = 1.575 GHz		3		dBm
Current	I_d	F = 1.575 GHz, Non-RF		8.5		mA

1) OIP3 is measured with two tones at an output power of -20 dBm/tone separated by 1MHz.

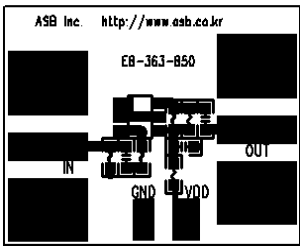
Schematic



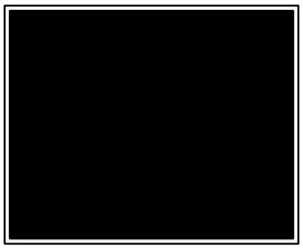
* Note: Gain and current can be reduced by controlling VDD to 2 V. C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

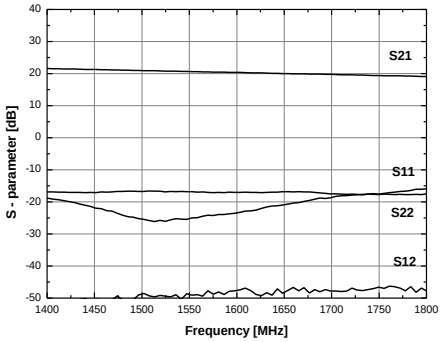
Top

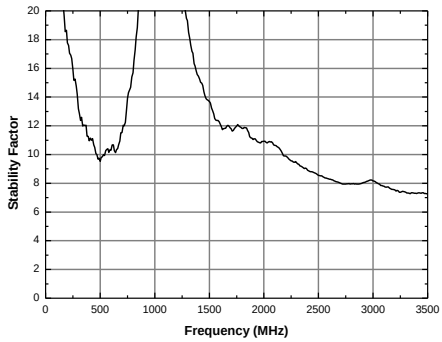


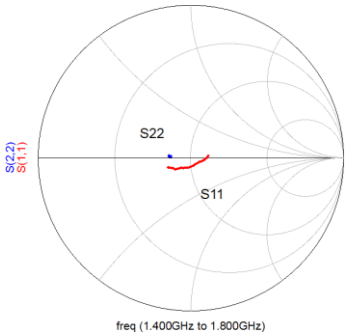
Bottom

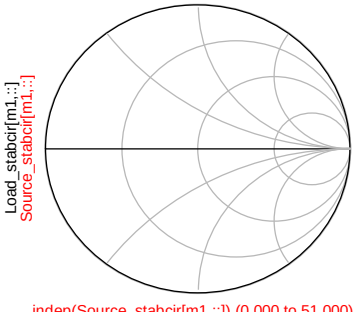


S-parameters & K-factor









APPLICATION CIRCUIT

GPS/GLONASS/Galileo/Compass

1559 MHz ~ 1610 MHz

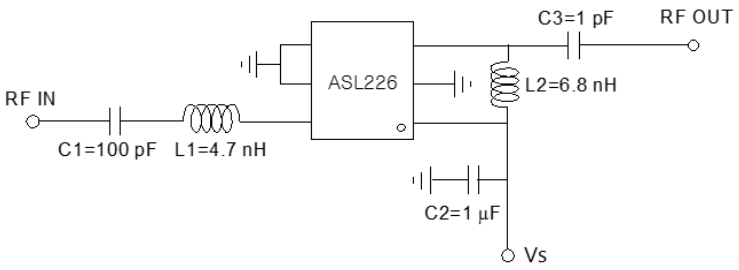
+3 V / +3.3 V / +5 V

Parameter	Symbol	Test Conditions	TYP			Unit
Power Gain	G_p	F = 1.575 GHz	28	28.5	30.5	dB
Noise Figure	NF	F = 1.575 GHz	1.1	0.95	0.9	dB
Input Return Loss	RL_{in}	F = 1.575 GHz	-16	-20	-11	dB
Output Return Loss	RL_{out}	F = 1.575 GHz	-15	-20	-14	dB
Reverse Isolation	ISO	F = 1.575 GHz	-40	-40	-40	dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 1.575 GHz	11	11	11	dBm
3rd Intercept Point Output Power	OIP3	F = 1.575 GHz	15.5[1)]	17[1)]	20[2)]	dBm
Device Voltage	Volt	F = 1.575 GHz	3	3.3	5	V
Current	I_d	F = 1.575 GHz, Non-RF	8.5	9.5	18	mA

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

2) OIP3 is measured with two tones at an output power of -3 dBm/tone separated by 1MHz.

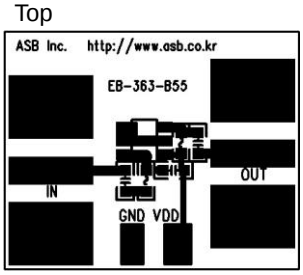
Schematic



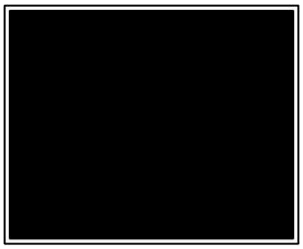
* Note: Gain and current can be reduced by controlling VDD to 2 V. C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

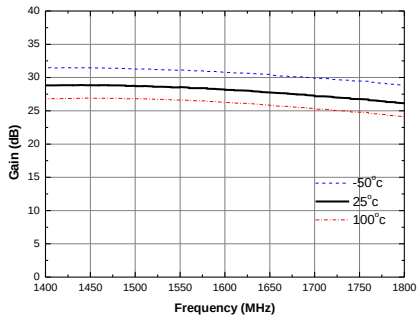
Top

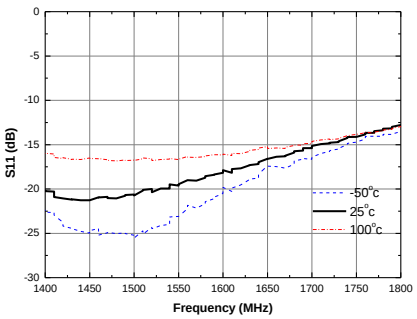


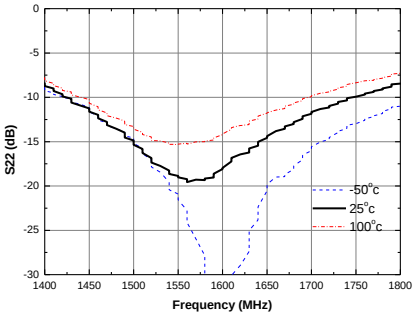
Bottom

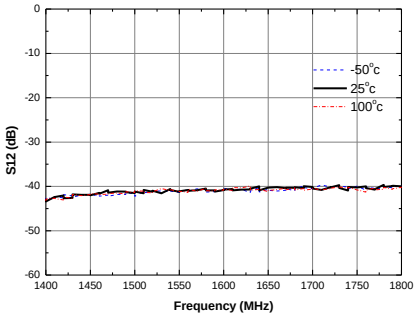


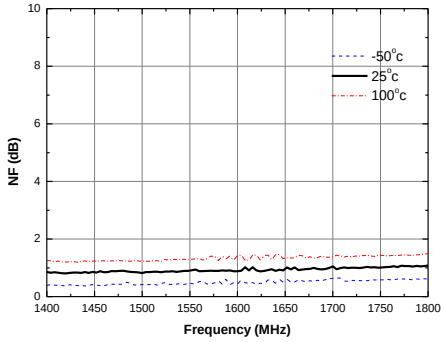
S-parameters & Noise Figure & K-factor

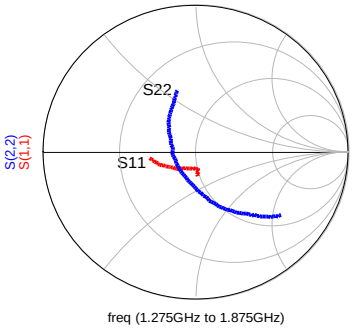


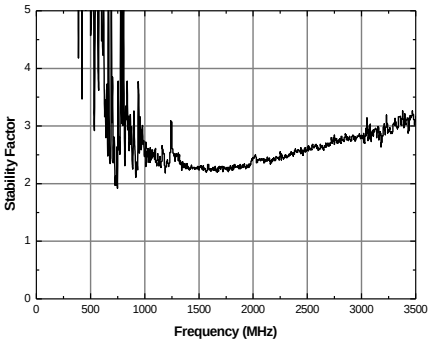


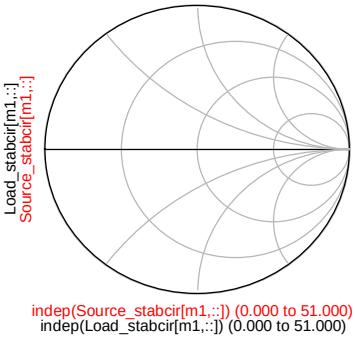




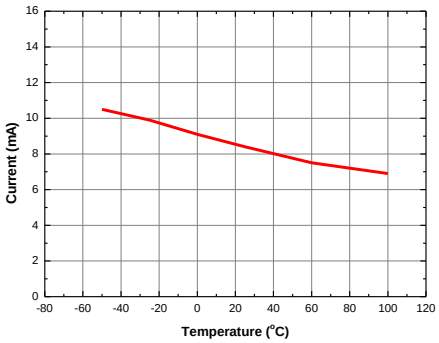




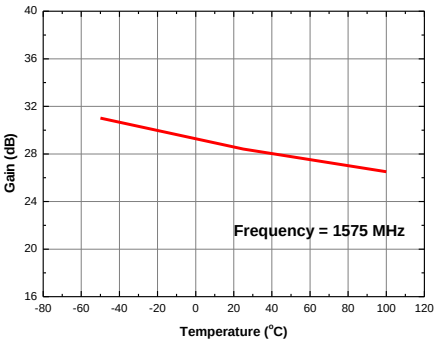




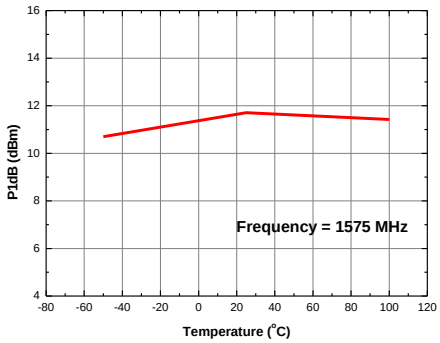
Current vs. Temperature



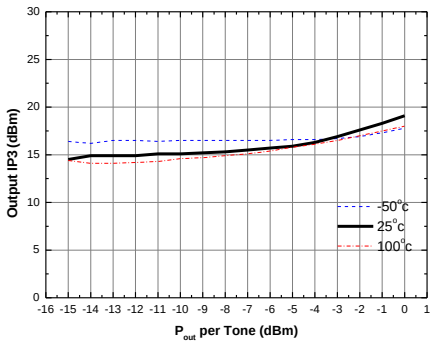
Gain vs. Temperature



P1dB vs. Temperature



Output IP3 vs. Tone Power (Frequency = 1575 MHz)



APPLICATION CIRCUIT

GPS/GLONASS/Galileo/Compass

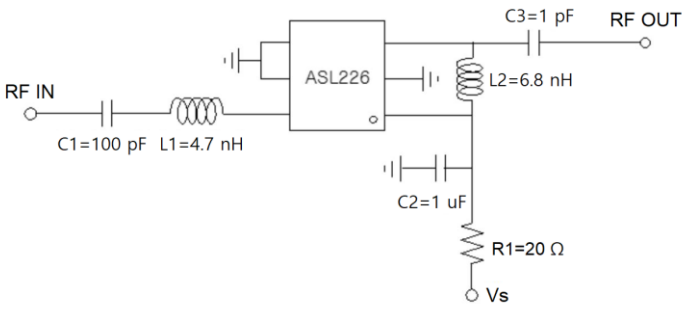
1559 MHz ~ 1610 MHz

+5 V

Parameter	Symbol	Test Conditions	MIN	TYP	MAX	Unit
Power Gain	G_p	F = 1.575 GHz		29.5		dB
Noise Figure	NF	F = 1.575 GHz		0.9		dB
Input Return Loss	RL_{in}	F = 1.575 GHz		-16		dB
Output Return Loss	RL_{out}	F = 1.575 GHz		-16		dB
Reverse Isolation	ISO	F = 1.575 GHz		-38		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 1.575 GHz		13		dBm
3rd Intercept Point Output Power[1)]	OIP3	F = 1.575 GHz		20		dBm
Device Voltage	Volt	F = 1.575 GHz		4.66		V
Current	I_d	F = 1.575 GHz, Non-RF		17		mA

1) OIP3 is measured with two tones at an output power of -3 dBm/tone separated by 1MHz.

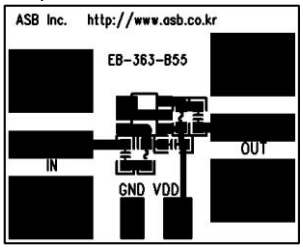
Schematic



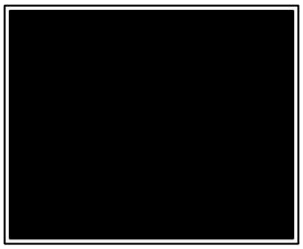
* Note: Gain and current can be reduced by controlling VDD to 2 V. C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

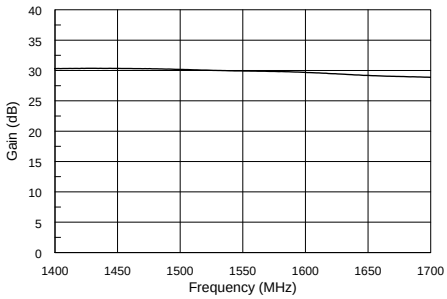
Top

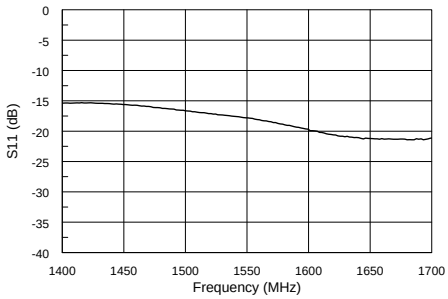


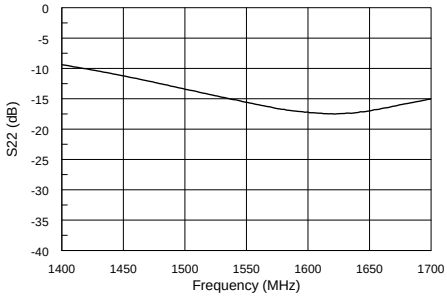
Bottom

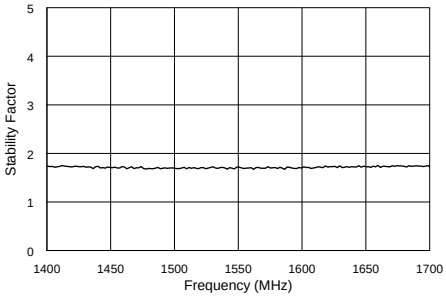


S-parameters & K-factor









APPLICATION CIRCUIT

Robust ESD (± 3 kV)*

W/O ESD Protector

GPS/GLONASS/Galileo/Compass

1559 MHz ~ 1610 MHz

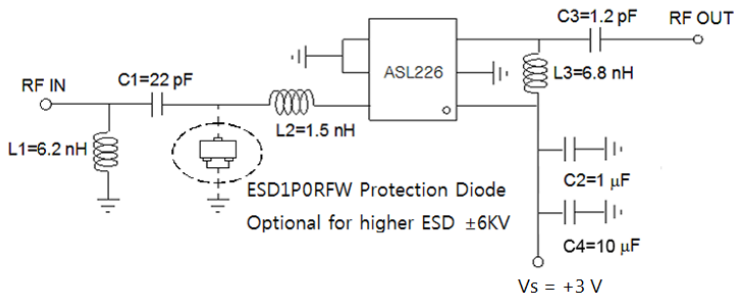
+3 V

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Power Gain	G_p	F = 1.575 GHz		26		dB
Noise Figure	NF	F = 1.575 GHz		1.2		dB
Input Return Loss	RL_{in}	F = 1.575 GHz		-14		dB
Output Return Loss	RL_{out}	F = 1.575 GHz		-18		dB
Reverse Isolation	ISO	F = 1.575 GHz		-35		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 1.575 GHz		12		dBm
3rd Intercept Point Output Power 1)	OIP3	F = 1.575 GHz		17		dBm
Current	I_d	F = 1.575 GHz, Non-RF		8.5		mA

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

* Test Method: Contact discharge on GPS patch antenna input.
Applying 10 times repeated voltage at 1 sec time Interval.

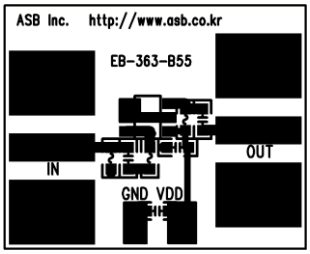
Schematic



* Note: Gain and current can be reduced by controlling VDD to 2 V.
C2 must be placed as close as possible to the device.

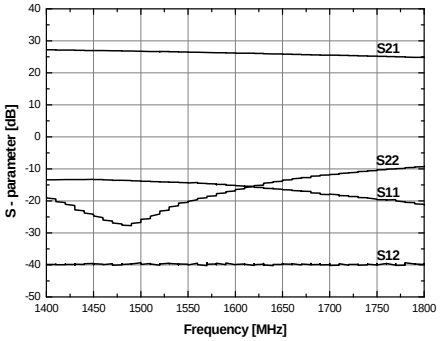
Board Layout (FR4, 14x11.3 mm², 0.8T)

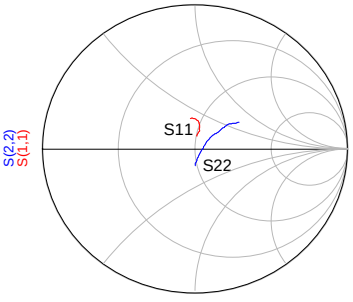
Top

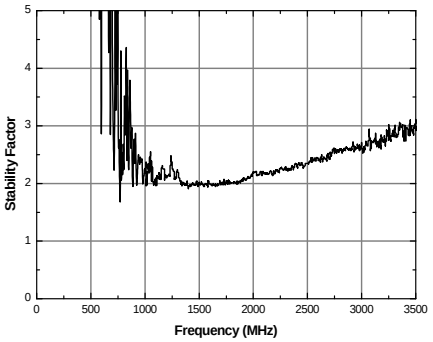


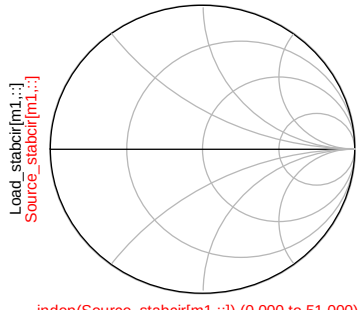
Bottom

S-parameters & K-factor









APPLICATION CIRCUIT

GPS/GLONASS/Galileo/Compass

1559 MHz ~ 1610 MHz

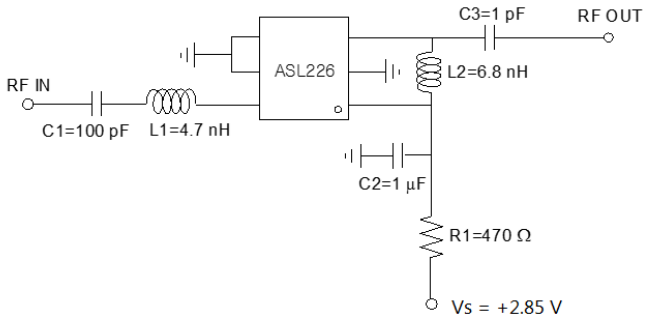
+2.85 V /

20 dB Gain

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Power Gain	G_p	F = 1.575 GHz		20		dB
Noise Figure	NF	F = 1.575 GHz		1.6		dB
Input Return Loss	RL_{in}	F = 1.575 GHz		-8		dB
Output Return Loss	RL_{out}	F = 1.575 GHz		-9		dB
Reverse Isolation	ISO	F = 1.575 GHz		-35		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 1.575 GHz		-5		dBm
3rd Intercept Point Output Power 1)	OIP3	F = 1.575 GHz		5.5		dBm
Current	I_d	F = 1.575 GHz, Non-RF		4.0		mA

1) OIP3 is measured with two tones at an output power of -20 dBm/tone separated by 1MHz.

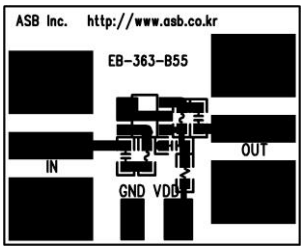
Schematic



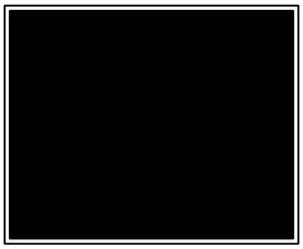
* Note: Gain and current can be reduced by controlling VDD to 2 V. C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

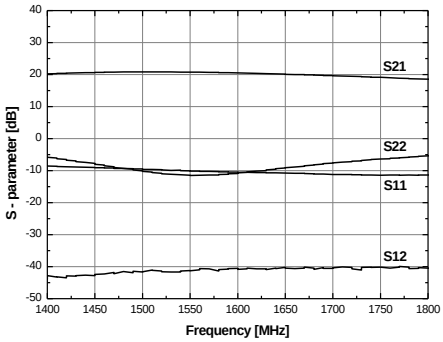
Top

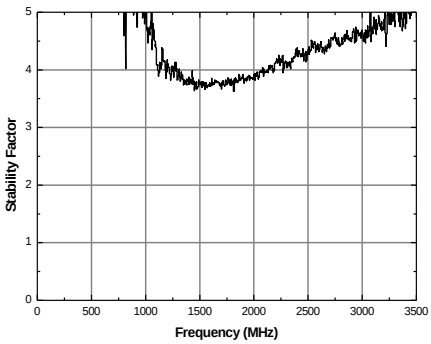


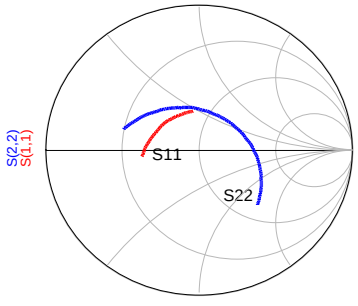
Bottom

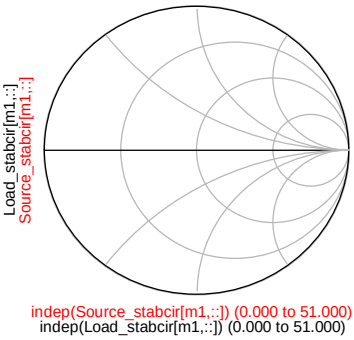


S-parameters & K-factor









APPLICATION CIRCUIT
(With SAW Filter)

GPS/GLONASS/Galileo/Compass

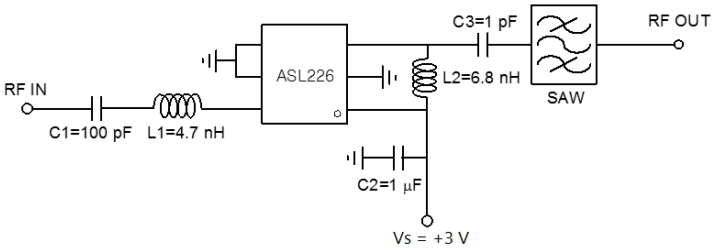
1559 MHz ~ 1610 MHz

+3 V

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Power Gain	G_p	F = 1.575 GHz		26.5		dB
Noise Figure	NF	F = 1.575 GHz		1.1		dB
Input Return Loss	RL_{in}	F = 1.575 GHz		-18		dB
Output Return Loss	RL_{out}	F = 1.575 GHz		-18		dB
Reverse Isolation	ISO	F = 1.575 GHz		-40		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 1.575 GHz		11		dBm
3rd Intercept Point Output Power 1)	OIP3	F = 1.575 GHz		14.5		dBm
Current	I_d	F = 1.575 GHz, Non-RF		8.5		mA

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

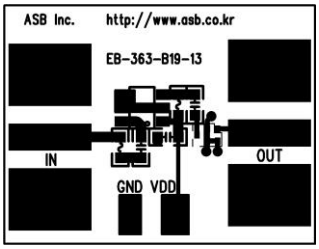
Schematic



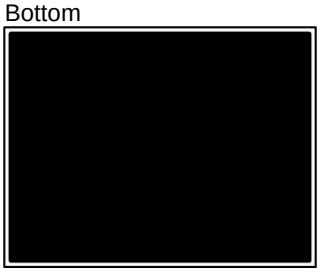
* Note: Gain and current can be reduced by controlling VDD to 2 V.
C2 must be placed as close as possible to the device.

Board Layout (FR4, 15x11.5 mm², 0.8T)

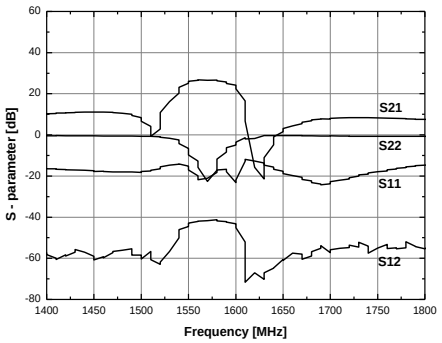
Top

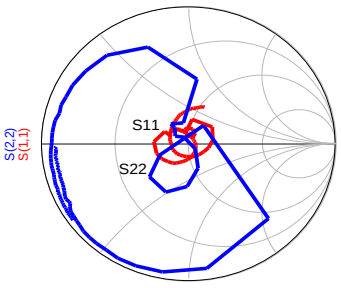


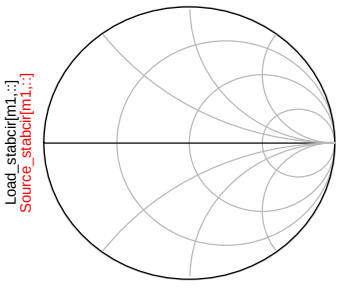
Bottom

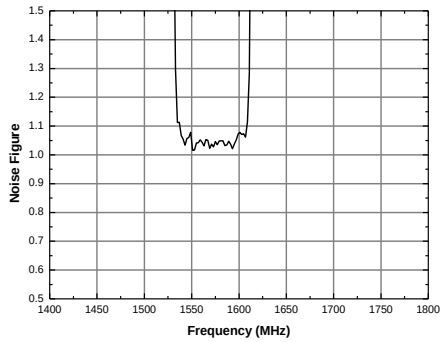


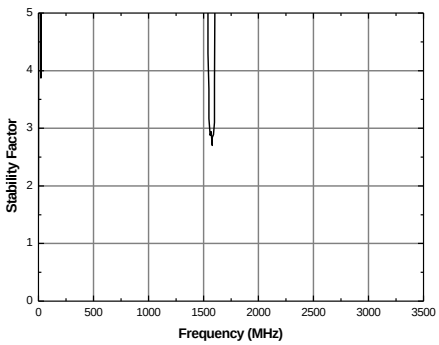
S-parameters & Noise Figure & K-factor











APPLICATION CIRCUIT

GPS/GLONASS/Galileo/Compass

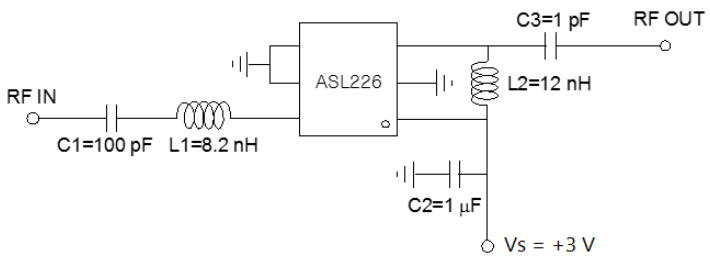
1164 MHz ~ 1300 MHz

+3 V

Parameter	Symbol	Unit	Frequency [MHz]	
			1176.45	1227
Power Gain	G_p	dB	33	31
Noise Figure	NF	dB	1.1	1.0
Input Return Loss	RL_{in}	dB	-20	-15
Output Return Loss	RL_{out}	dB	-20	-15
Reverse Isolation	ISO	dB	-40	-40
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	9	10.5
3rd Intercept Point Output Power[1)]	OIP3	dBm	18	18
Current	I_d	mA	8.5	8.5

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

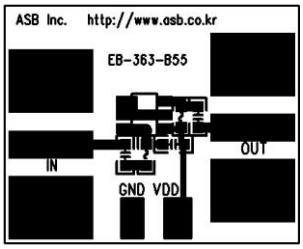
Schematic



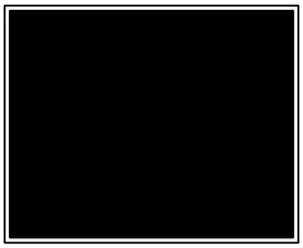
* Note: Gain and current can be reduced by controlling VDD to 2 V. C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

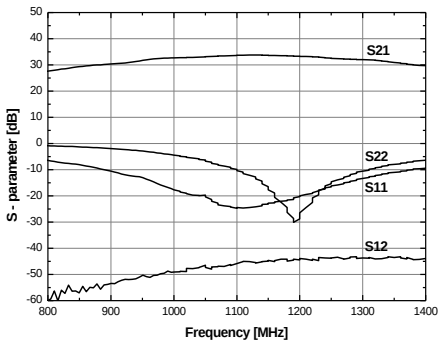
Top

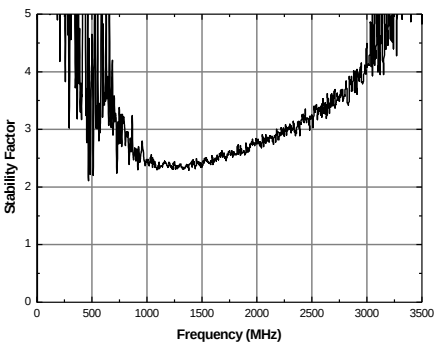


Bottom



S-parameters & K-factor





APPLICATION CIRCUIT

GPS/GLONASS/Galileo/Compass

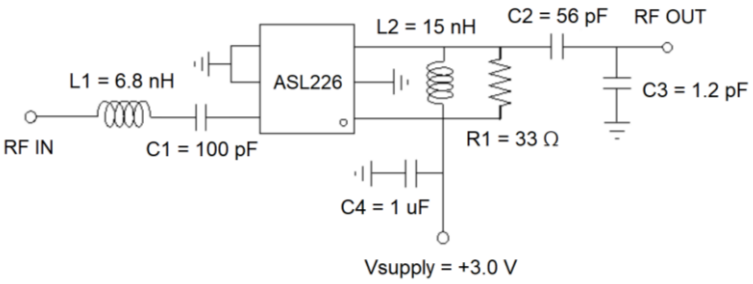
1164 MHz ~ 1300 MHz

+3 V

Parameter	Symbol	Unit	Frequency [MHz]	
			1175	1227
Power Gain	G_p	dB	22.3	21.8
Noise Figure	NF	dB	1.0	1.0
Input Return Loss	RL_{in}	dB	-12	-12
Output Return Loss	RL_{out}	dB	-18	-19
Reverse Isolation	ISO	dB	-40	-40
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	5.5	5.5
3rd Intercept Point Output Power[1)]	OIP3	dBm	7	7
Current	I_d	mA	8.5	8.5

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

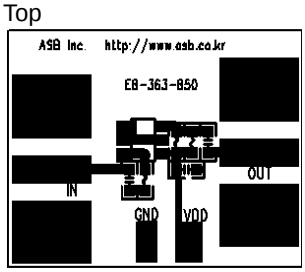
Schematic



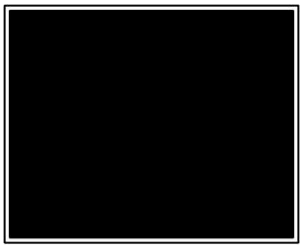
* Note: Gain and current can be reduced by controlling VDD to 2 V.
C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

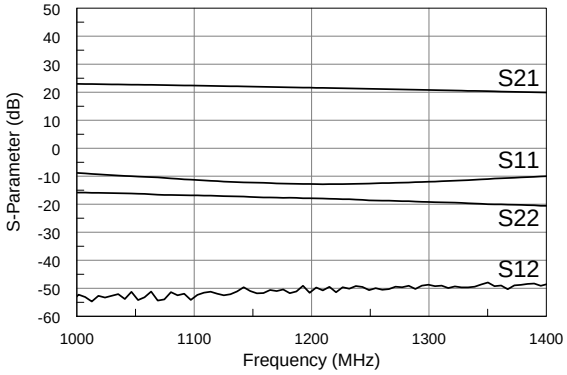
Top

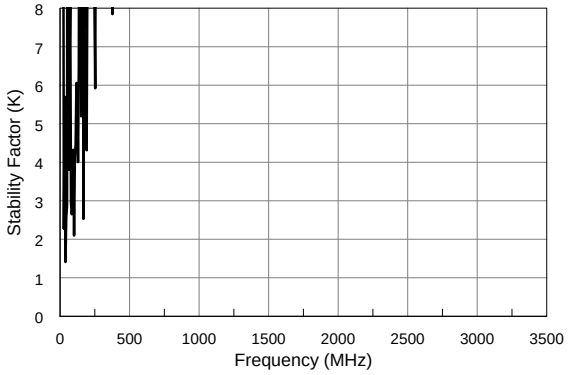


Bottom



S-parameters & K-factor





APPLICATION CIRCUIT

GPS/GLONASS/Galileo/Compass

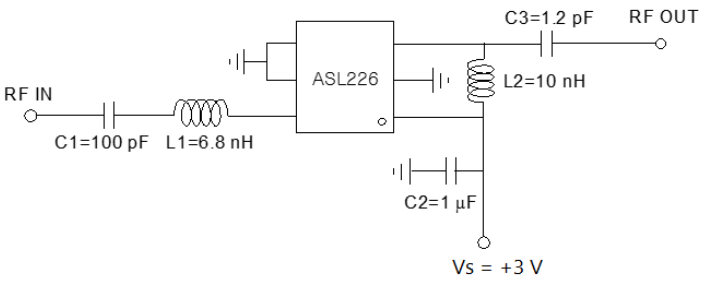
1164 MHz ~ 1300 MHz

+3 V

Parameter	Symbol	Unit	Frequency [MHz]	
			1163-1210	1204-1240
Power Gain	G_p	dB	30.5	30
Noise Figure	NF	dB	1.0	1.0
Input Return Loss	RL_{in}	dB	-20	-20
Output Return Loss	RL_{out}	dB	-18	-18
Reverse Isolation	ISO	dB	-40	-40
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	11	11
3rd Intercept Point Output Power[1)]	OIP3	dBm	17	17
Current	I_d	mA	8.5	8.5

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

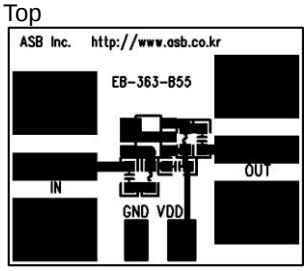
Schematic



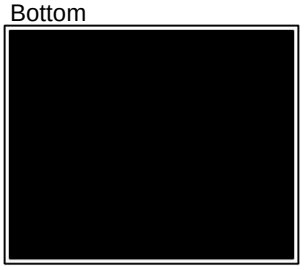
* Note: Gain and current can be reduced by controlling VDD to 2 V. C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

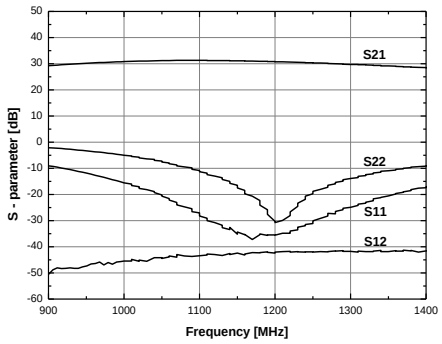
Top

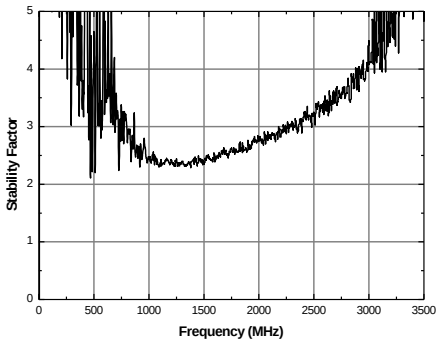


Bottom



S-parameters & K-factor





APPLICATION CIRCUIT

GPS/GLONASS/Galileo/Compass

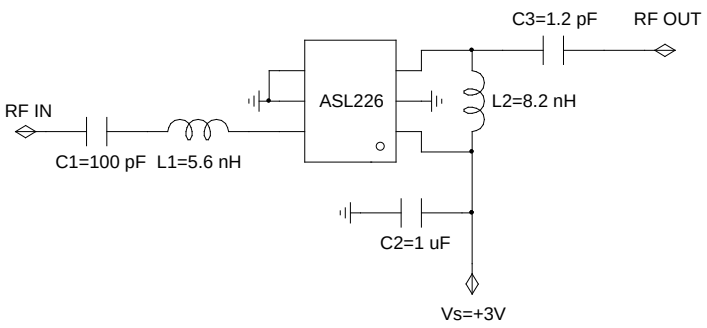
1164 MHz ~ 1620 MHz

+3 V

Parameter	Symbol	Unit	Frequency [MHz]	
			1164-1300	1559-1620
Power Gain	G_p	dB	30	27
Noise Figure	NF	dB	1.1	1.1
Input Return Loss	RL_{in}	dB	-16	-13
Output Return Loss	RL_{out}	dB	-6	-8
Reverse Isolation	ISO	dB	-40	-40
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	9	11
3rd Intercept Point Output Power[1)]	OIP3	dBm	13	14
Current	I_d	mA	8.5	8.5

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

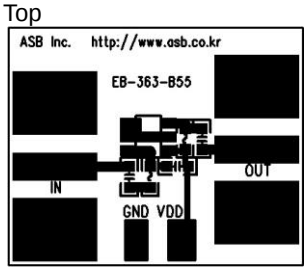
Schematic



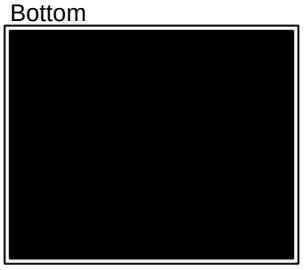
* Note: Gain and current can be reduced by controlling VDD to 2 V.
C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

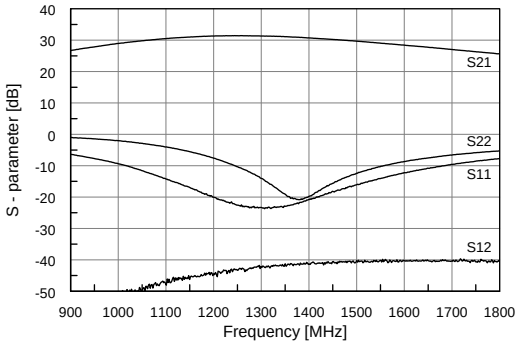
Top

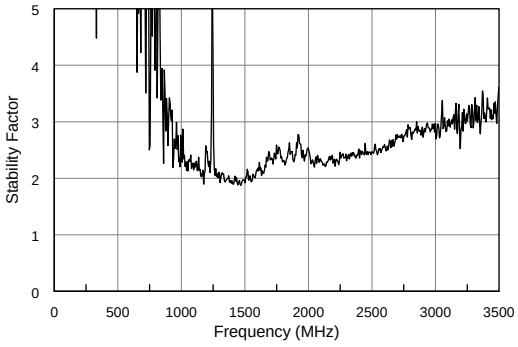


Bottom



S-parameters & K-factor





APPLICATION CIRCUIT

CDMA, GSM

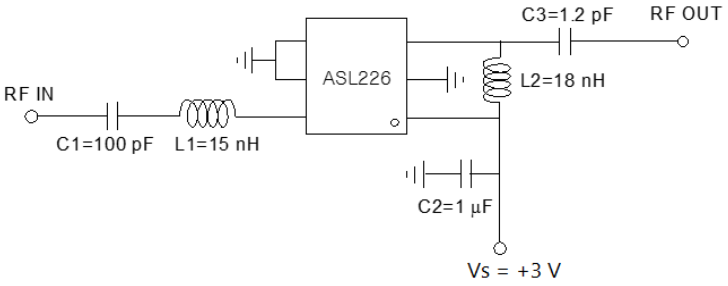
900 MHz

+3 V

Parameter	Symbol	Test Conditions	TYP.		Unit
Power Gain	G_p	F = 900 MHz	34	38	dB
Noise Figure	NF	F = 900 MHz	1.3	1.2	dB
Input Return Loss	RL_{in}	F = 900 MHz	-14	-10	dB
Output Return Loss	RL_{out}	F = 900 MHz	-15	-12	dB
Reverse Isolation	ISO	F = 900 MHz	-40	-45	dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 900 MHz	9.0	12	dBm
3rd Intercept Point Output Power 1)	OIP3	F = 900 MHz	18	23	dBm
Current	I_d	F = 900 MHz, Non-RF	8.5	18	mA
Device Voltage	V_d	F = 900 MHz, Non-RF	3	5	V

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

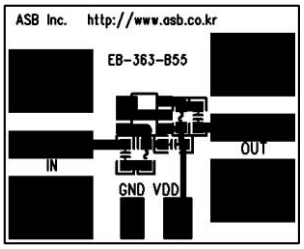
Schematic



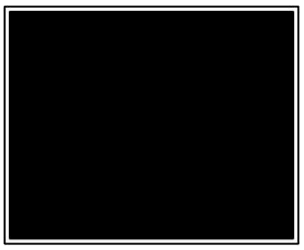
* Note: Gain and current can be reduced by controlling VDD to 2 V.
C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

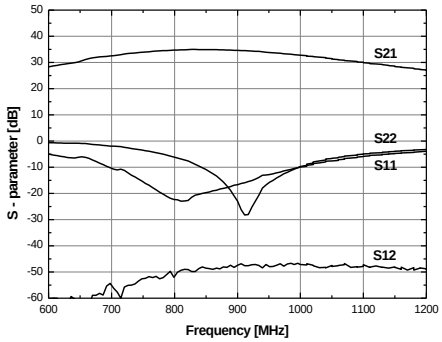
Top

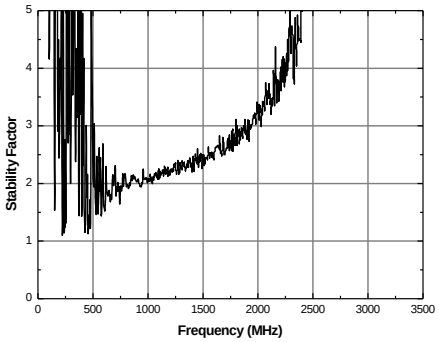


Bottom



S-parameters & K-factor





APPLICATION CIRCUIT

WCDMA

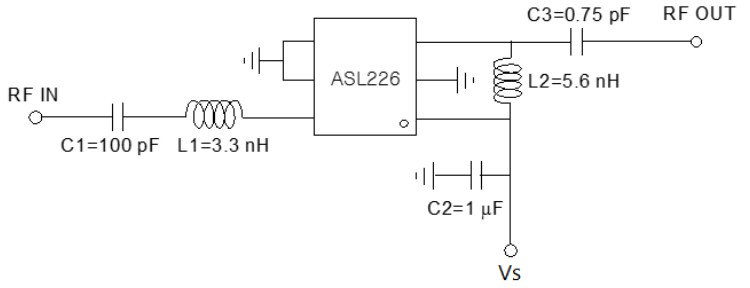
1950 MHz

+3 V / +5 V

Parameter	Symbol	Test Conditions	TYP.		Unit
Power Gain	G_p	F = 1950 MHz	25	28	dB
Noise Figure	NF	F = 1950 MHz	1.3	1.05	dB
Input Return Loss	RL_{in}	F = 1950 MHz	-15	-18	dB
Output Return Loss	RL_{out}	F = 1950 MHz	-20	-12	dB
Reverse Isolation	ISO	F = 1950 MHz	-35	-35	dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 1950 MHz	10.5	14	dBm
3rd Intercept Point Output Power 1)	OIP3	F = 1950 MHz	16.5	23	dBm
Current	I_d	F = 1950 MHz, Non-RF	8.5	18	mA
Device Voltage	V_d	F = 1950 MHz, Non-RF	3	5	V

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

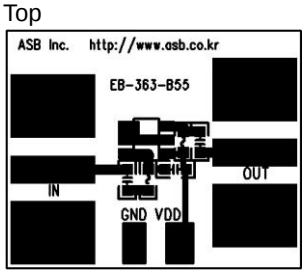
Schematic



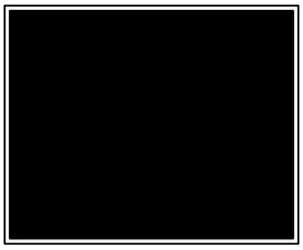
* Note: Gain and current can be reduced by controlling VDD to 2 V.
C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

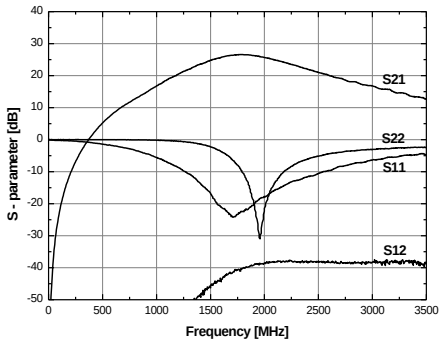
Top

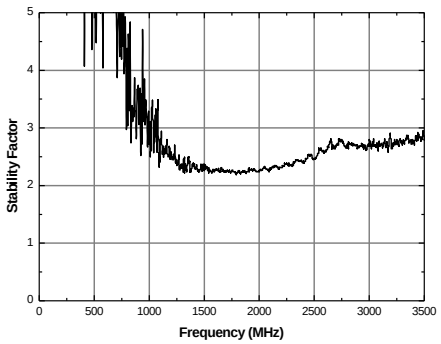


Bottom



S-parameters & K-factor





APPLICATION CIRCUIT

WLAN

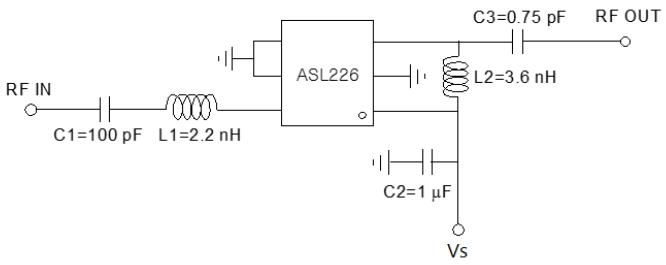
2450 MHz

+3 V / +4.2 V

Parameter	Symbol	Test Conditions	TYP.		Unit
Power Gain	G_p	F = 2450 MHz	21.5	23.5	dB
Noise Figure	NF	F = 2450 MHz	1.3	1.3	dB
Input Return Loss	RL_{in}	F = 2450 MHz	-16	-18	dB
Output Return Loss	RL_{out}	F = 2450 MHz	-16	-16	dB
Reverse Isolation	ISO	F = 2450 MHz	-30	-35	dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 2450 MHz	11	12	dBm
3rd Intercept Point Output Power 1)	OIP3	F = 2450 MHz	14	18	dBm
Current	I_d	F = 2450 MHz, Non-RF	8.5	13	mA
Device Voltage	V_d	F = 2450 MHz, Non-RF	3	4.2	V

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

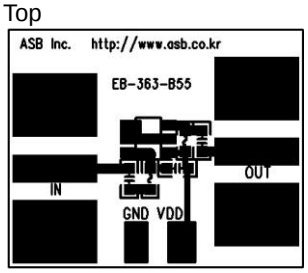
Schematic



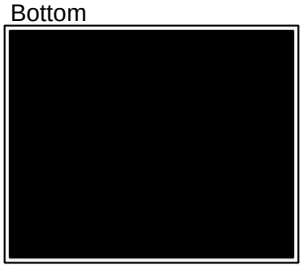
* Note: Gain and current can be reduced by controlling VDD to 2 V. C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

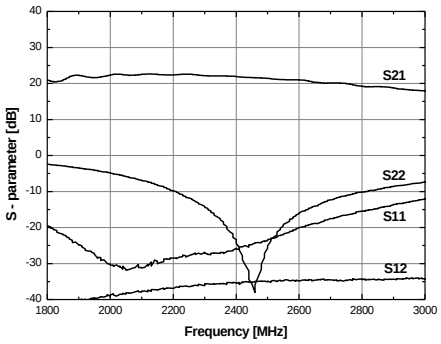
Top

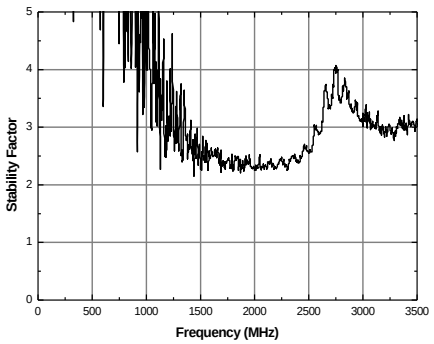


Bottom



S-parameters & K-factor





APPLICATION CIRCUIT

WiMAX

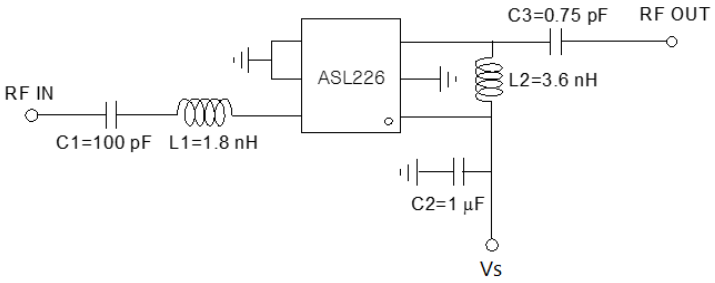
2300 ~ 2900 MHz

+3 V / +4.5 V

Parameter	Symbol	Unit	Frequency [MHz]			
			2300	2900	2300	2700
Power Gain	G_p	dB	22.5	19	25	23
Noise Figure	NF	dB	1.3	1.45	1.05	1.15
Input Return Loss	RL_{in}	dB	-18	-14	-18	-15
Output Return Loss	RL_{out}	dB	-15	-10	-12	-12
Reverse Isolation	ISO	dB	-30	-30	-30	-30
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	11		11	
3rd Intercept Point Output Power[1)]	OIP3	dBm	12.5		20	
Current	I_d	mA	8.5		17	
Device Voltage	V_d	V	3		4.5	

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

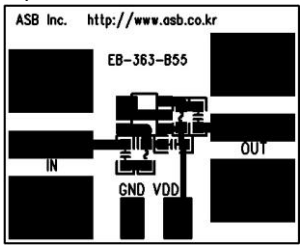
Schematic



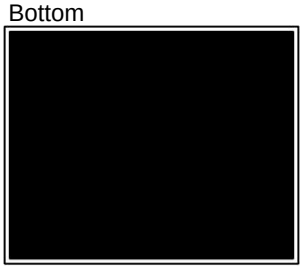
* Note: Gain and current can be reduced by controlling VDD to 2 V. C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

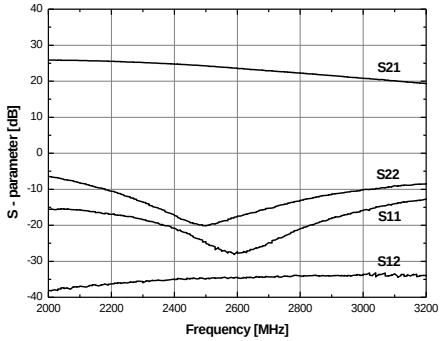
Top

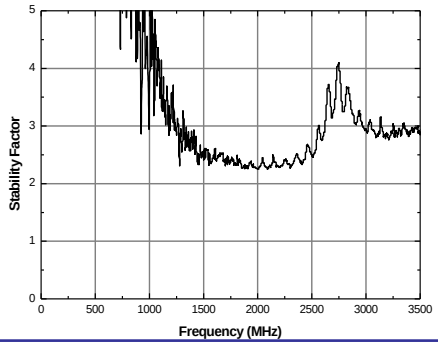


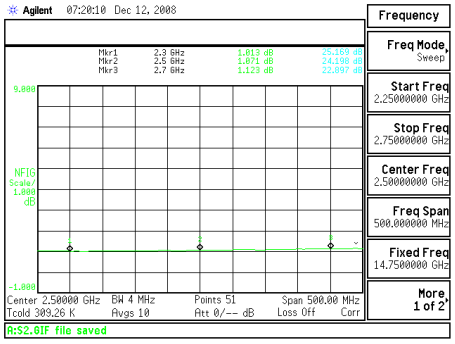
Bottom



S-parameters & Noise Figure & K-factor (4.5V)







APPLICATION CIRCUIT

WiMAX

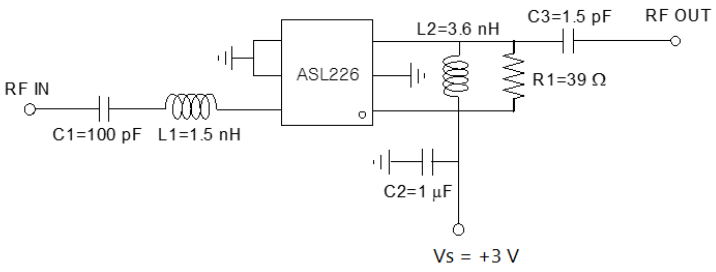
2300 ~ 2900 MHz

+3 V / Low Gain

Parameter	Symbol	Unit	Frequency [MHz]	
			2300	2900
Power Gain	G_p	dB	17	15
Noise Figure	NF	dB	1.3	1.45
Input Return Loss	RL_{in}	dB	-11	-12
Output Return Loss	RL_{out}	dB	-11	-18
Reverse Isolation	ISO	dB	-30	-30
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	5	5.5
3rd Intercept Point Output Power[1)]	OIP3	dBm	8	8
Current	I_d	mA	8.5	8.5
Device Voltage	V_d	V	3	3

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

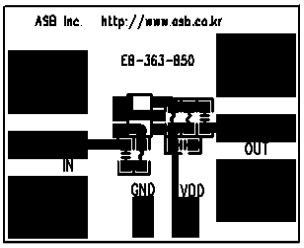
Schematic



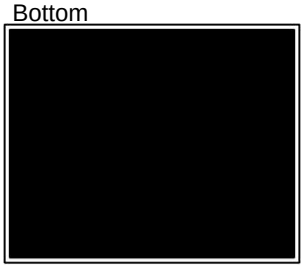
* Note: Gain and current can be reduced by controlling VDD to 2 V.
C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

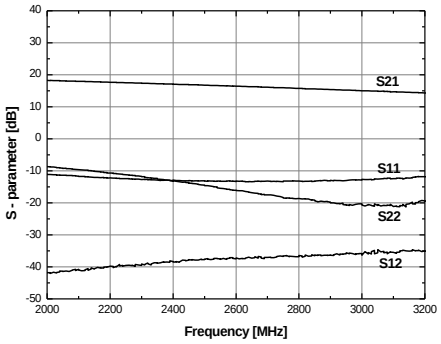
Top

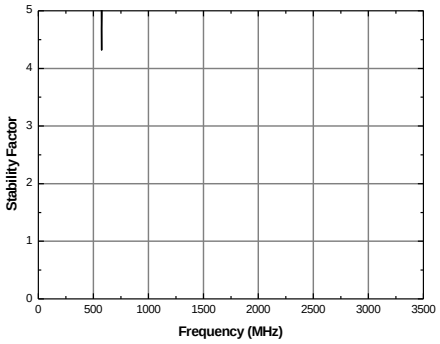


Bottom



S-parameters & K-factor





APPLICATION CIRCUIT

WiMAX

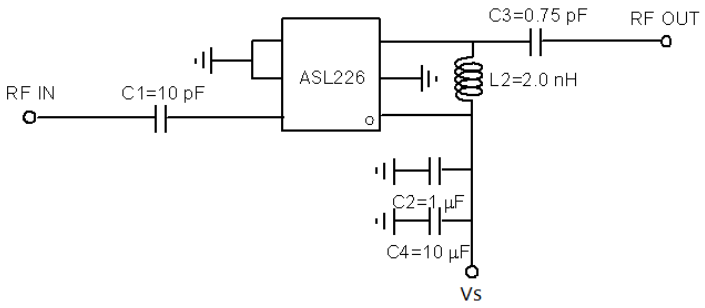
3300 ~ 3800 MHz

+3 V / +5 V

Parameter	Symbol	Unit	Frequency [MHz]			
			3300	3800	3300	3800
Power Gain	G_p	dB	16.5	14.5	19	17
Noise Figure	NF	dB	1.55	1.8	1.3	1.5
Input Return Loss	RL_{in}	dB	-16	-16	-16	-20
Output Return Loss	RL_{out}	dB	-20	-12	-16	-18
Reverse Isolation	ISO	dB	-30	-30	-30	-28
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	9	7.5	10	8
3rd Intercept Point Output Power[1)]	OIP3	dBm	12	9.5	19	16.5
Current	I_d	mA	8.5		18	
Device Voltage	V_d	V	3		5	

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

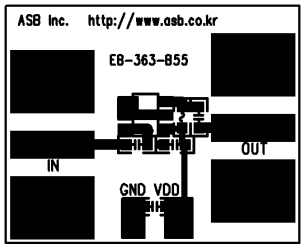
Schematic



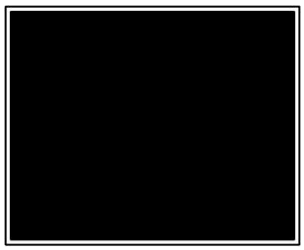
* Note: Gain and current can be reduced by controlling VDD to 2 V.
C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

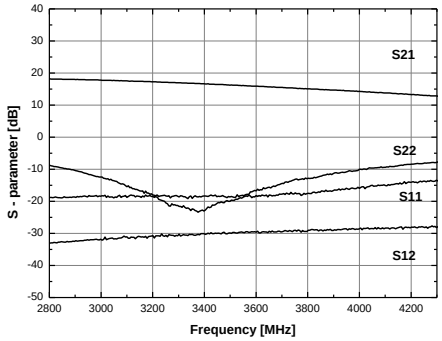
Top

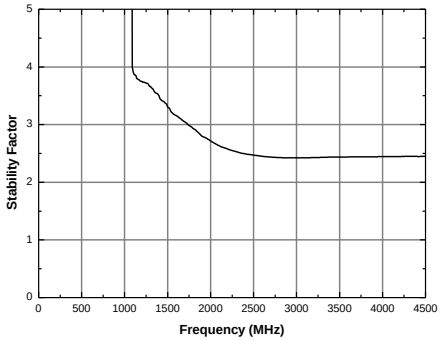


Bottom



S-parameters & K-factor (3V)





APPLICATION CIRCUIT

C-Band

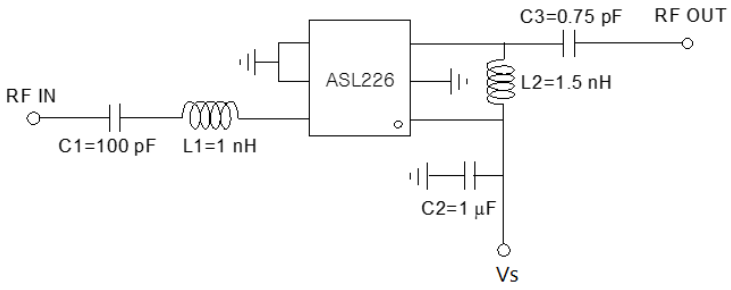
4000 ~ 4500 MHz

+3 V / +5 V

Parameter	Symbol	Unit	Frequency [MHz]			
			4000	4500	4000	4500
Power Gain	G_p	dB	12.5	10.5	15	13
Noise Figure	NF	dB	2.0	2.2	1.6	1.8
Input Return Loss	RL_{in}	dB	-10	-10	-15	-12
Output Return Loss	RL_{out}	dB	-14	-12	-18	-15
Reverse Isolation	ISO	dB	-30	-30	-30	-28
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	7		9	
3rd Intercept Point Output Power[1)]	OIP3	dBm	9.5		17	
Current	I_d	mA	8.5		18	
Device Voltage	V_d	V	3		5	

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

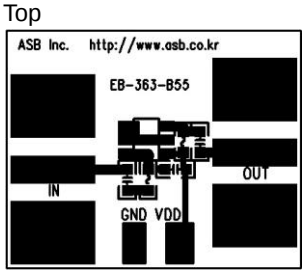
Schematic



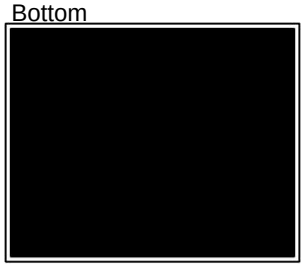
* Note: Gain and current can be reduced by controlling VDD to 2 V. C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

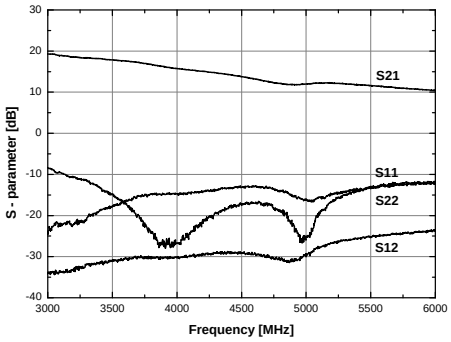
Top

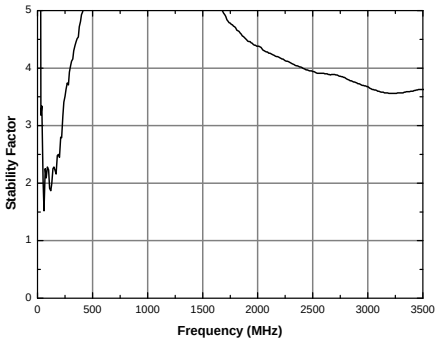


Bottom



S-parameters & K-factor (5V)





APPLICATION CIRCUIT

WLAN

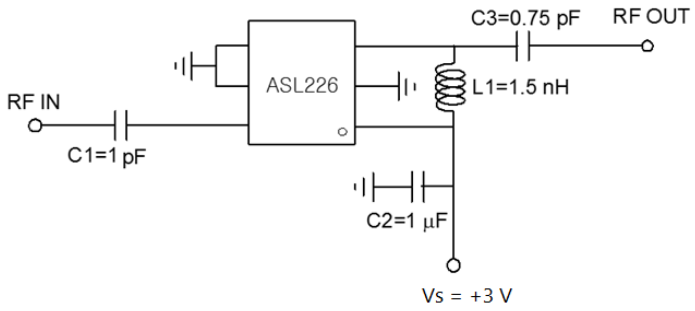
5800 MHz

+3 V

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Power Gain	G_p	F = 5800 MHz		9.5		dB
Noise Figure	NF	F = 5800 MHz		3.0		dB
Input Return Loss	RL_{in}	F = 5800 MHz		-11		dB
Output Return Loss	RL_{out}	F = 5800 MHz		-12		dB
Reverse Isolation	ISO	F = 5800 MHz		-22		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 5800 MHz		7		dBm
3rd Intercept Point Output Power 1)	OIP3	F = 5800 MHz		12		dBm
Current	I_d	F = 5800 MHz, Non-RF		8.5		mA

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

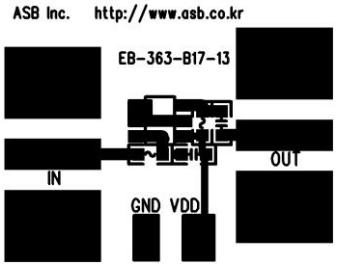
Schematic



* Note: Gain and current can be reduced by controlling VDD to 2 V. C2 must be placed as close as possible to the device.

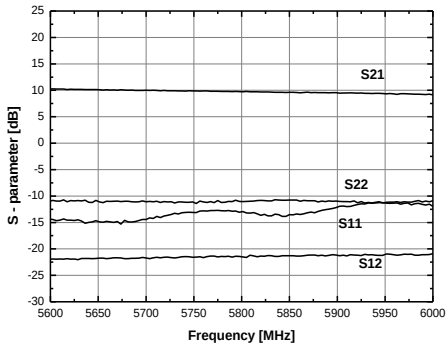
Board Layout (FR4, 14x11.3 mm², 0.8T)

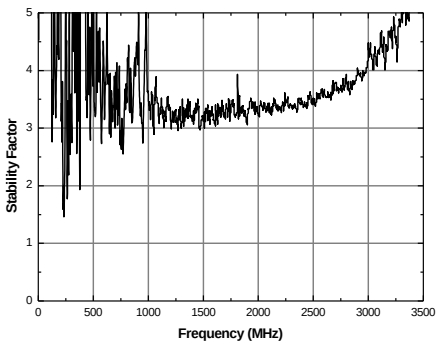
Top



Bottom

S-parameters & K-factor





Recommended Soldering Reflow Profile