ASL226

700-6000MHz MMIC LNA

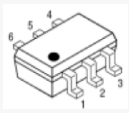
Features

- 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

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	1.0	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	

* 100% in-house DC & RF testing is done on packaged products before taping.

Absolute Maximum Ratings

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 1950 MHz application circuit)*	+22 dBm
Thermal Resistance	285 °C/W

* Please find the max. input power data from http://www.asb.co.kr/pdf/Maximum_Input_Power_Analysis.pdf
The max. input power, in principle, depends upon the application frequency and the matching circuit.

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 (Robust ESD / ± 3 kV)
- 1559 MHz ~ 1610 MHz (2.85V / 20dB Gain)
- 1559 MHz ~ 1610 MHz (With SAW Filter)
- 1164 MHz ~ 1300 MHz

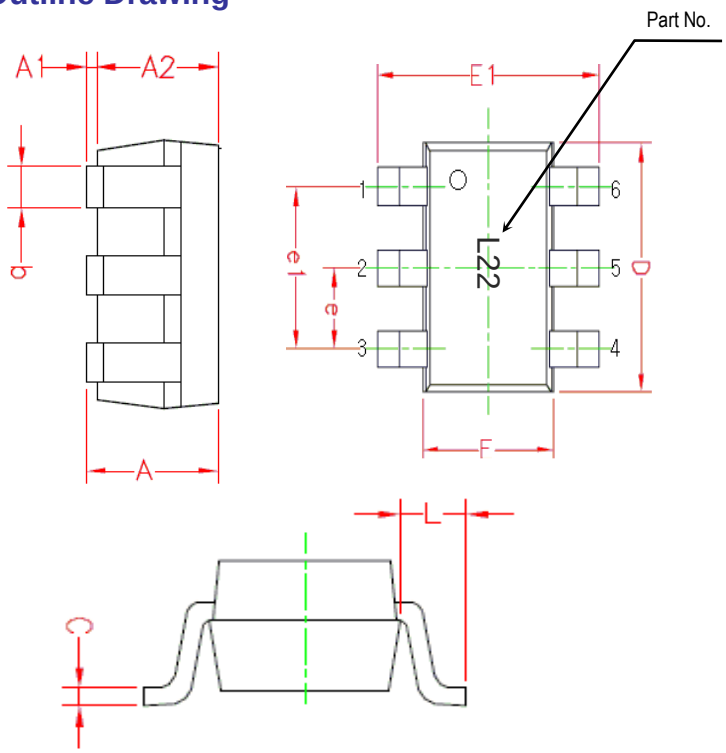
Others

- 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

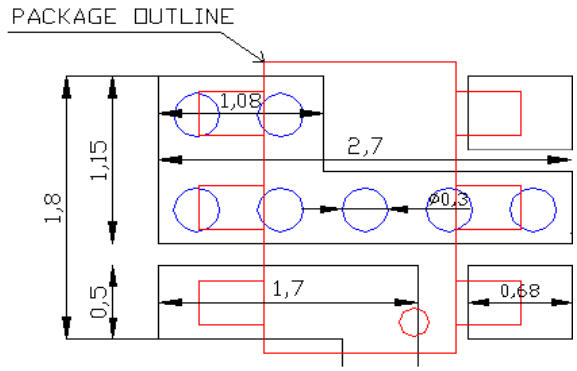
Outline Drawing



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
E	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/s-para/ASL226_gerber.zip

ESD Classification & Moisture Sensitivity Level

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

CAUTION: ESD-sensitive device!

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

APPLICATION CIRCUIT

GPS/GLONASS/Galileo/Compass

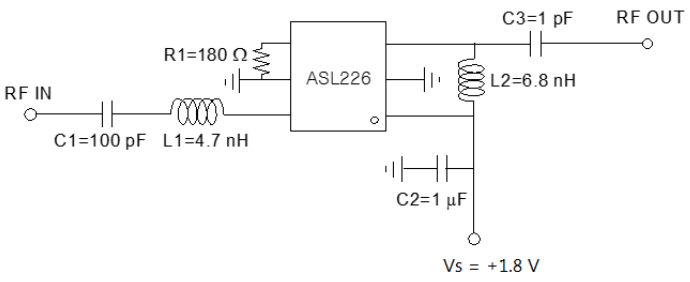
1559 MHz ~ 1610 MHz

+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.

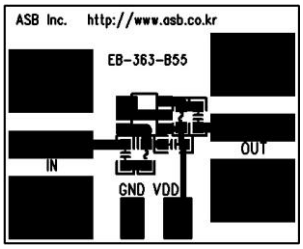
Schematic



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

Board Layout (FR4, 14x11.3 mm², 0.8T)

Top



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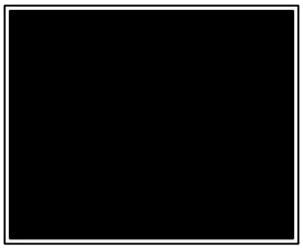
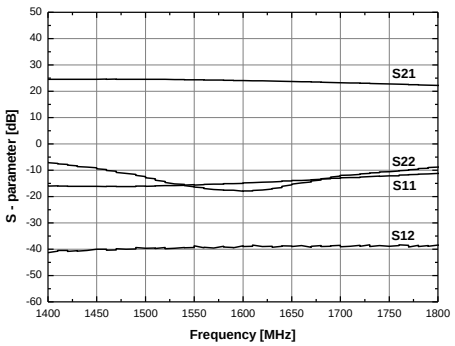


S-parameters



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

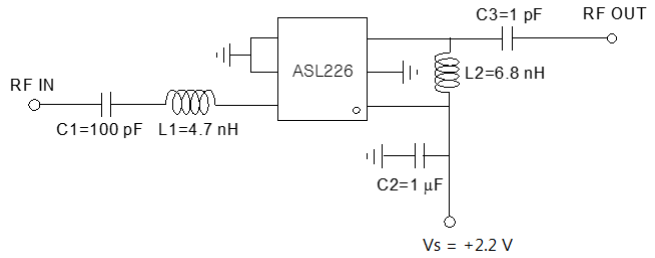
1559 MHz ~ 1610 MHz

+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.

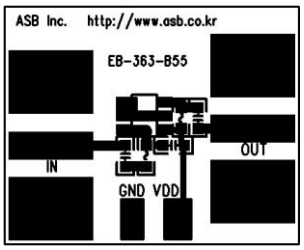
Schematic



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

Board Layout (FR4, 14x11.3 mm², 0.8T)

Top



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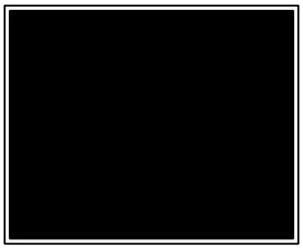
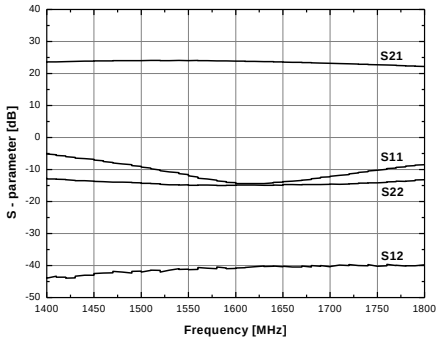
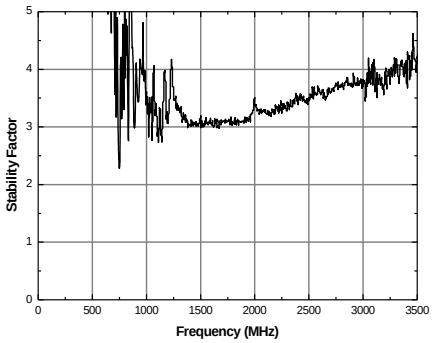
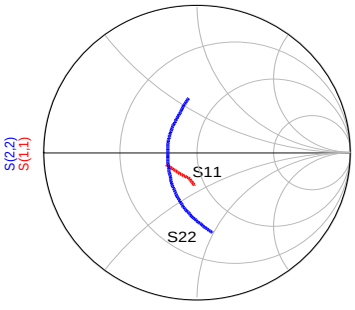
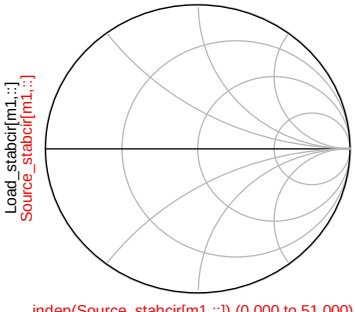


S-parameters & K-factor









APPLICATION CIRCUIT

GPS/GLONASS/Galileo/Compass

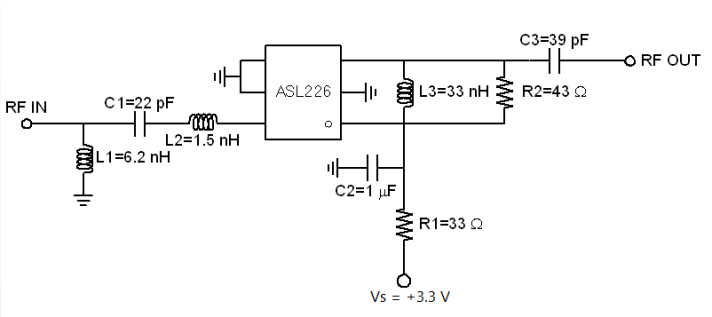
1559 MHz ~ 1610 MHz

+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.

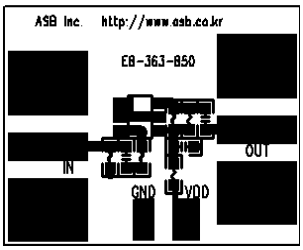
Schematic



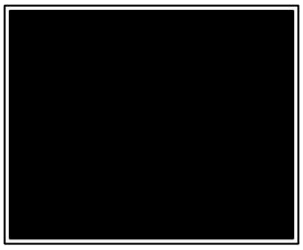
* Note: Gain and current can be reduced by controlling Vs to 2 V. C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

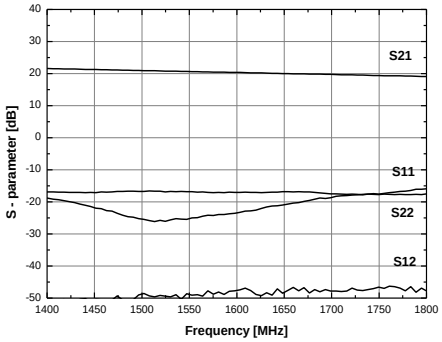
Top

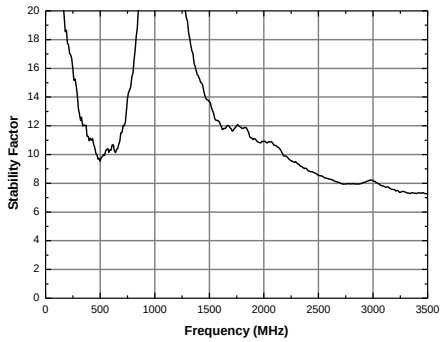


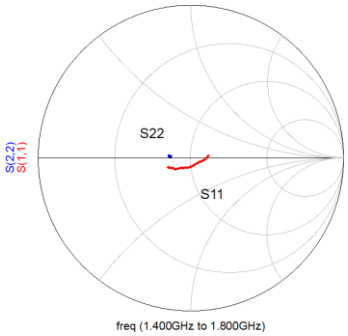
Bottom

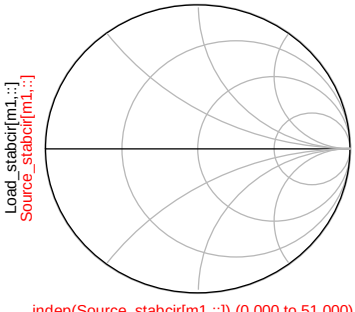


S-parameters & K-factor









APPLICATION CIRCUIT

GPS/GLONASS/Galileo/Compass

1559 MHz ~ 1610 MHz

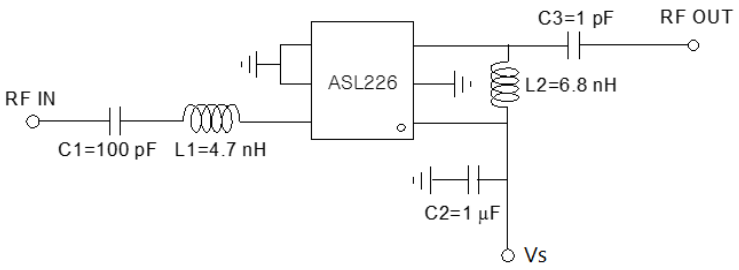
+3 V / +3.3 V / +5V

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	1.0	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.

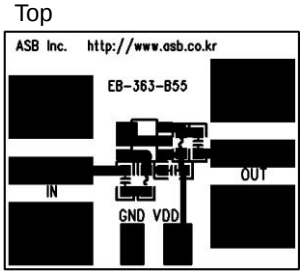
Schematic



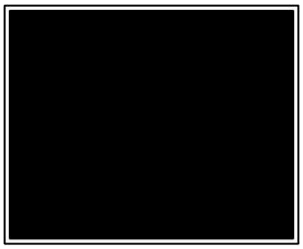
* Note: Gain and current can be reduced by controlling Vs to 2 V. C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

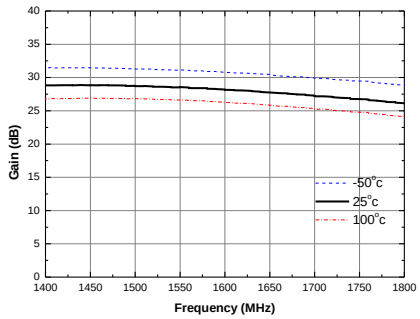
Top

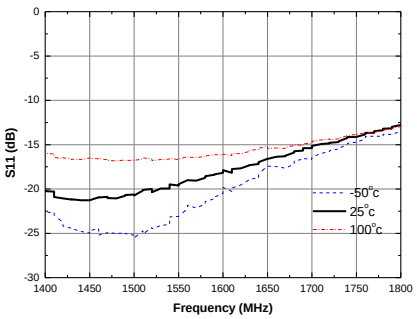


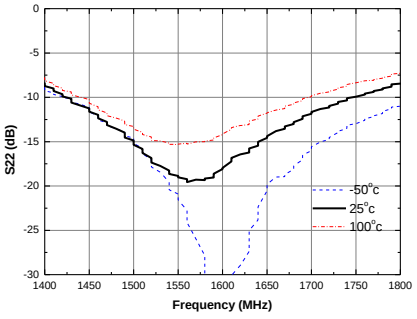
Bottom

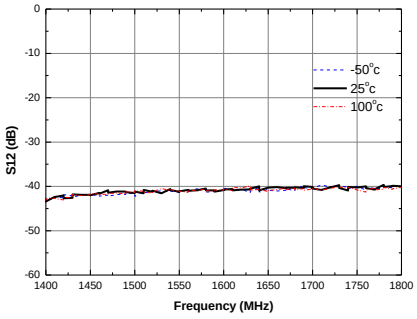


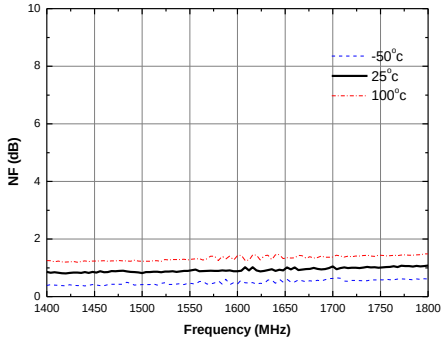
S-parameters & Noise Figure & K-factor

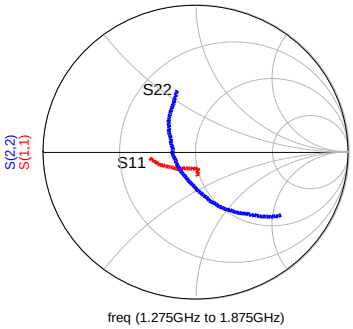


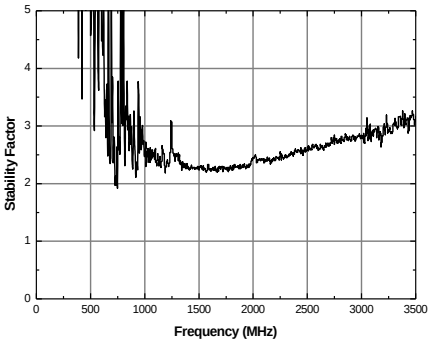


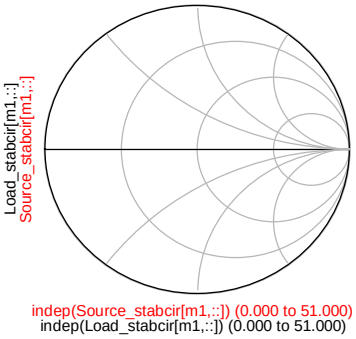




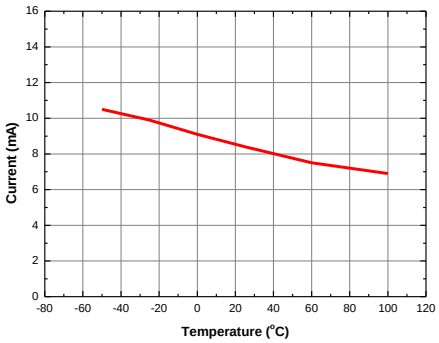




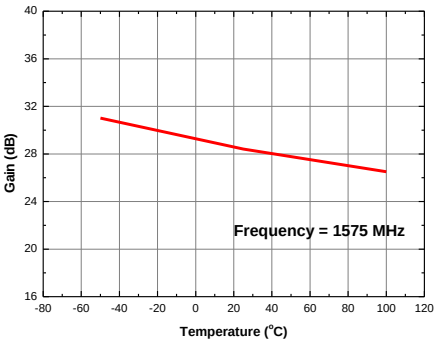




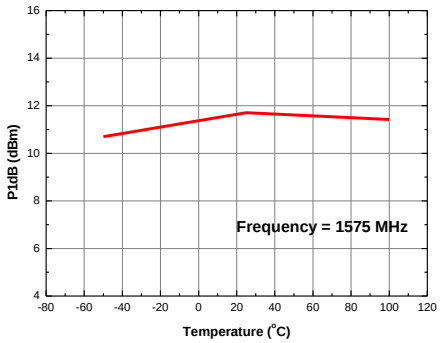
Current vs. Temperature



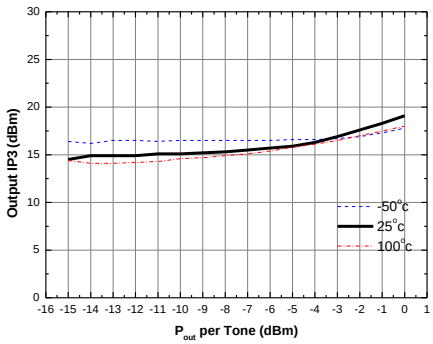
Gain vs. Temperature



P1dB vs. Temperature



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



APPLICATION CIRCUIT

Robust ESD (± 3 kV)*

W/O ESD Protector

GPS/GLONASS/Galileo/Compass

1559 MHz ~ 1610 MHz

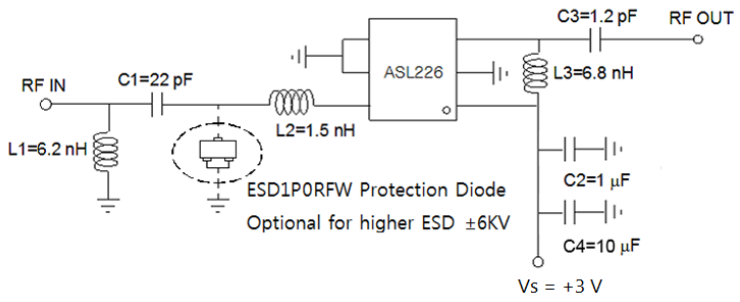
+3 V

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.

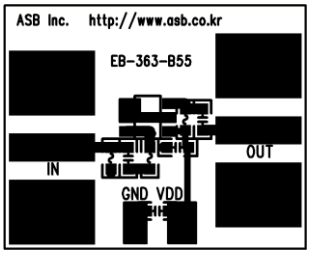
Schematic



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

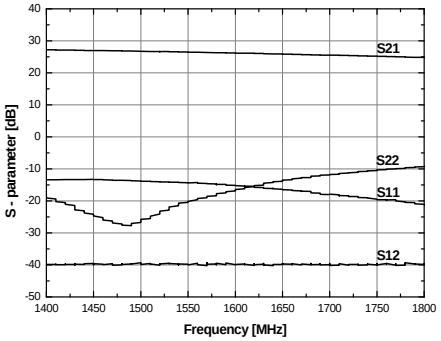
Board Layout (FR4, 14x11.3 mm², 0.8T)

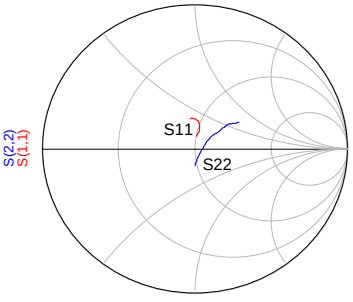
Top

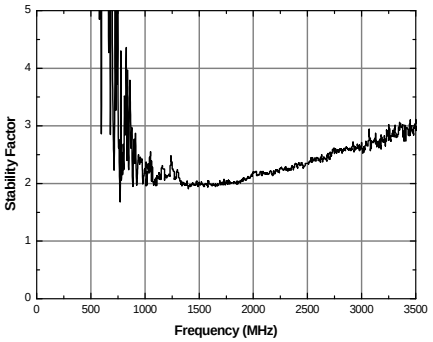


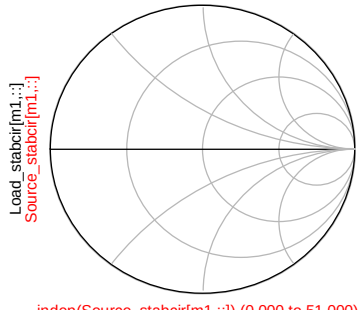
Bottom

S-parameters & K-factor









APPLICATION CIRCUIT

GPS/GLONASS/Galileo/Compass

1559 MHz ~ 1610 MHz

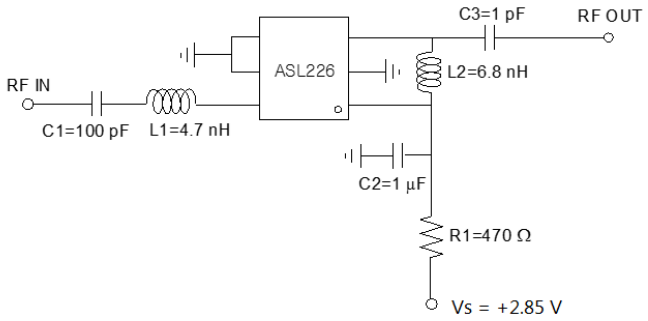
+2.85 V /

20dB 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.

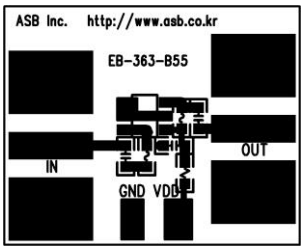
Schematic



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

Board Layout (FR4, 14x11.3 mm², 0.8T)

Top



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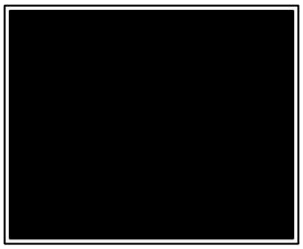
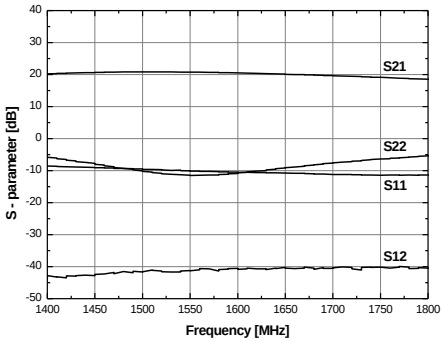
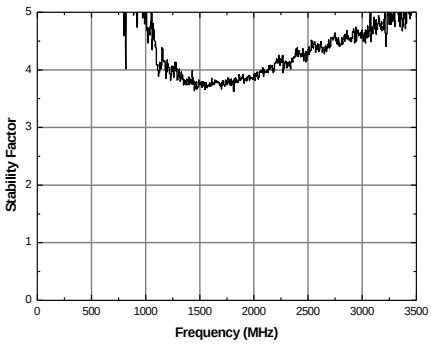
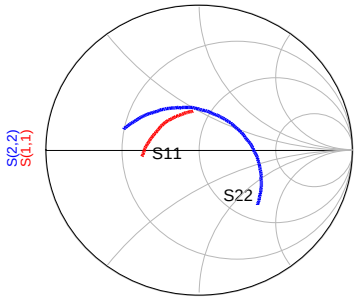
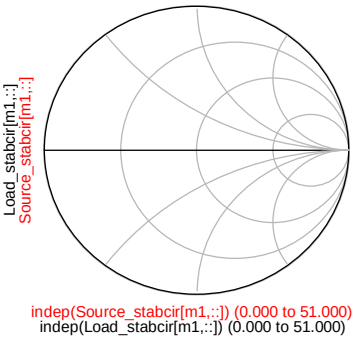


S-parameters & K-factor









APPLICATION CIRCUIT
(With SAW Filter)

GPS/GLONASS/Galileo/Compass

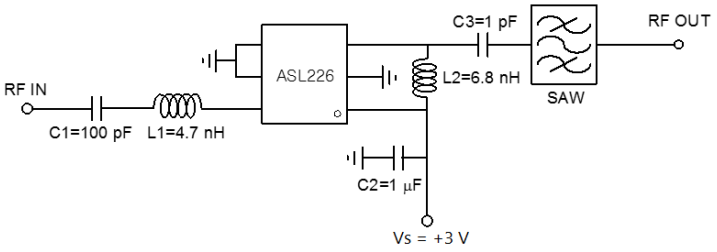
1559 MHz ~ 1610 MHz

+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.

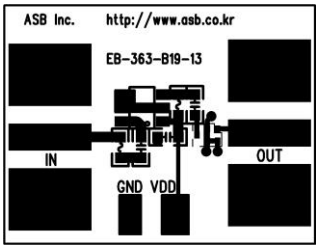
Schematic



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

Board Layout (FR4, 15x11.5 mm², 0.8T)

Top



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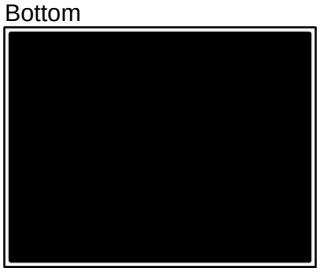
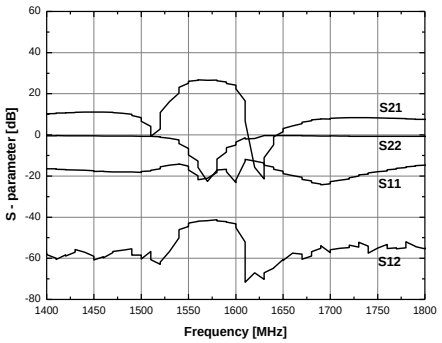
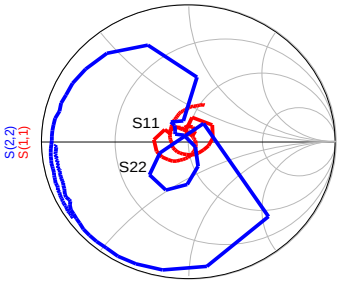
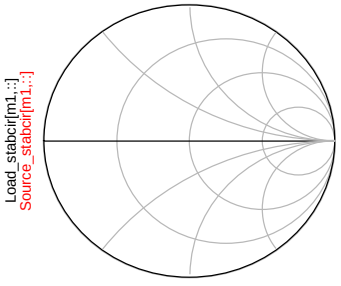
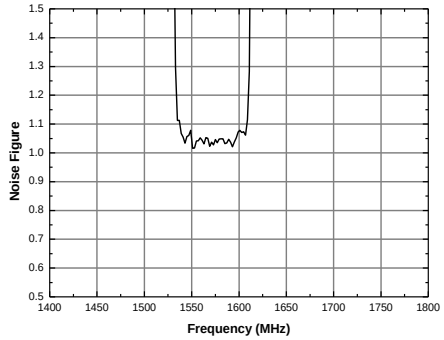


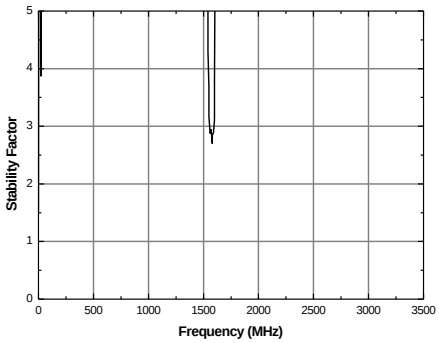
S-parameters & Noise Figure & K-factor











APPLICATION CIRCUIT

GPS/GLONASS/Galileo/Compass

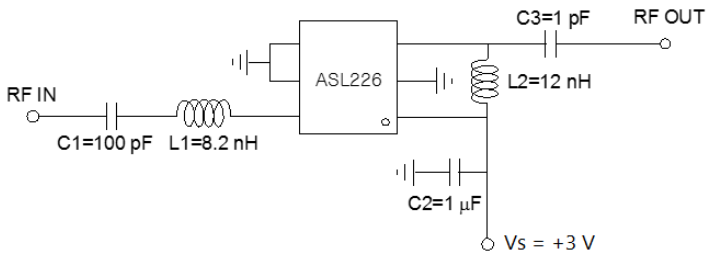
1164 MHz ~ 1300 MHz

+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.

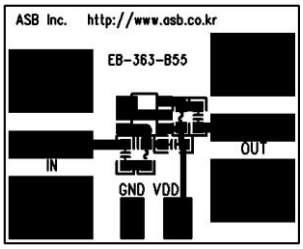
Schematic



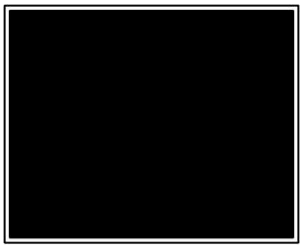
* Note: Gain and current can be reduced by controlling Vs to 2 V.
C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

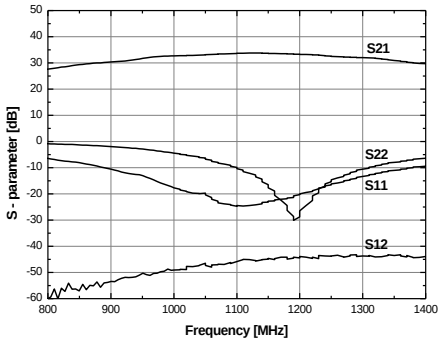
Top

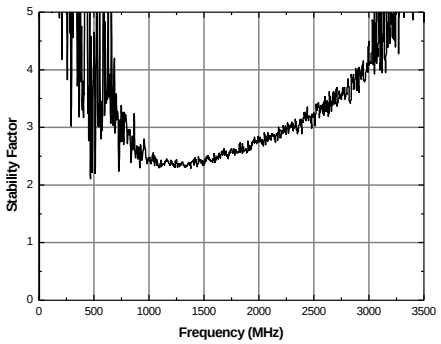


Bottom



S-parameters & K-factor





APPLICATION CIRCUIT

GPS/GLONASS/Galileo/Compass

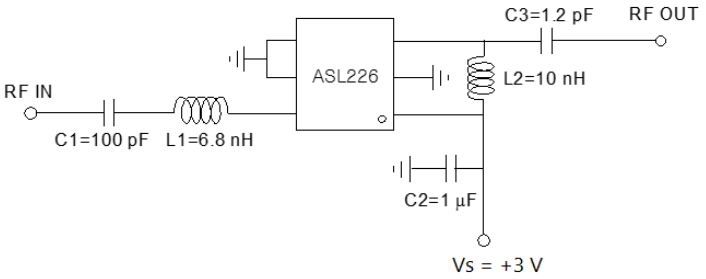
1164 MHz ~ 1300 MHz

+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.

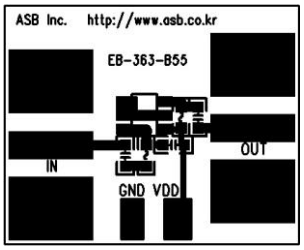
Schematic



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

Board Layout (FR4, 14x11.3 mm², 0.8T)

Top



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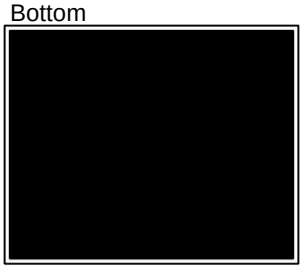
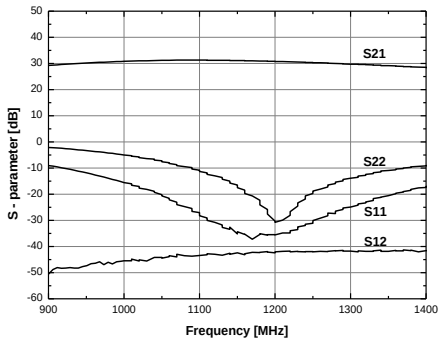
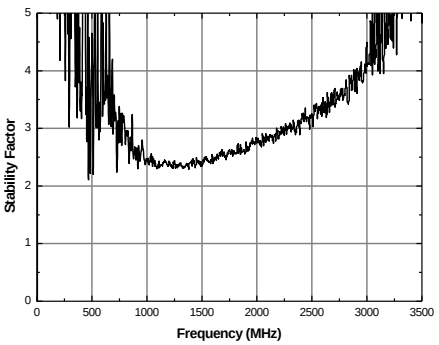


S-parameters & K-factor





APPLICATION CIRCUIT

CDMA, GSM

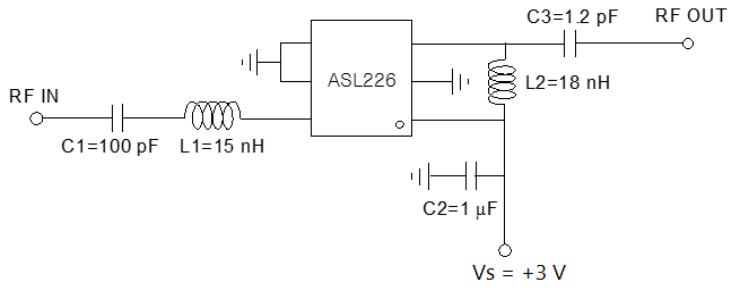
900 MHz

+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.

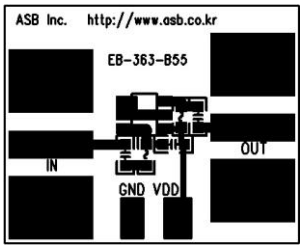
Schematic



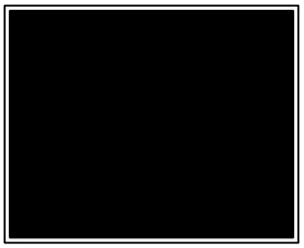
* Note: Gain and current can be reduced by controlling Vs to 2 V.
C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

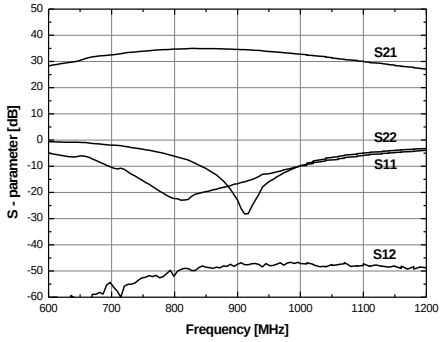
Top

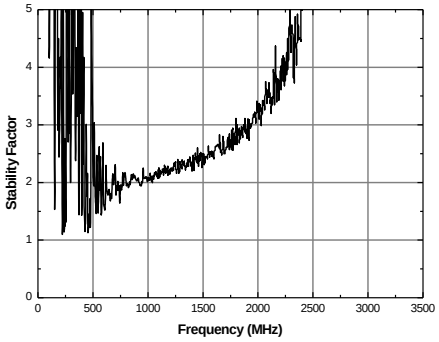


Bottom



S-parameters & K-factor





APPLICATION CIRCUIT

WCDMA

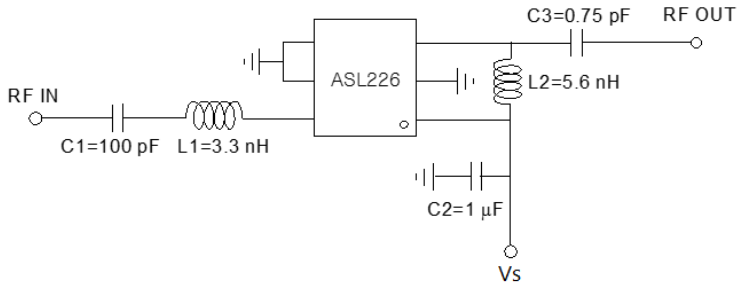
1950 MHz

+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.

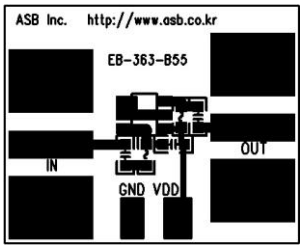
Schematic



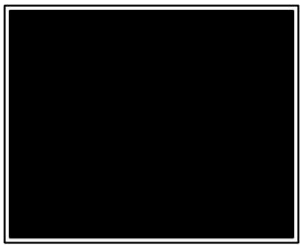
* Note: Gain and current can be reduced by controlling Vs to 2 V.
C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

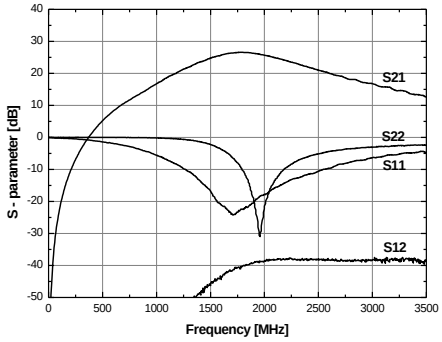
Top

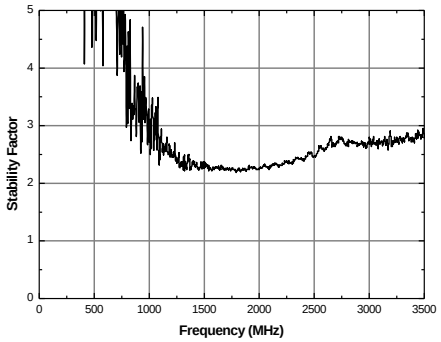


Bottom



S-parameters & K-factor





APPLICATION CIRCUIT

WLAN

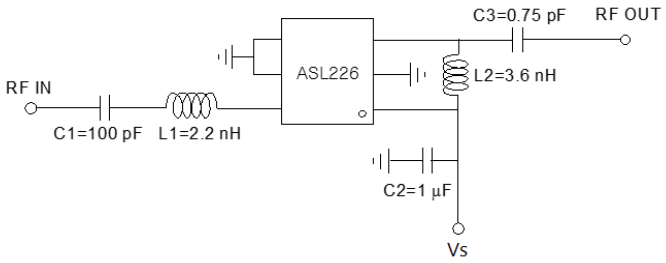
2450 MHz

+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.

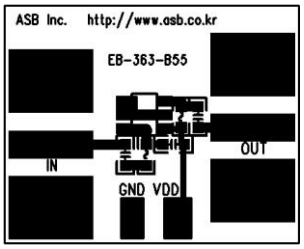
Schematic



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

Board Layout (FR4, 14x11.3 mm², 0.8T)

Top



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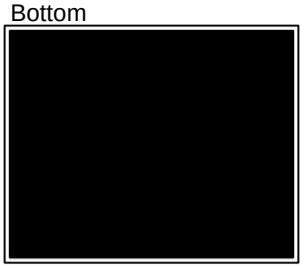
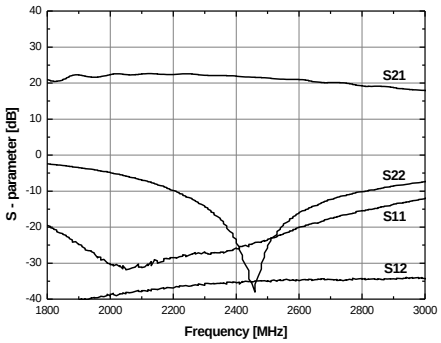
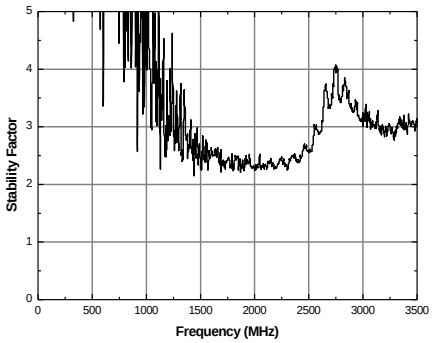


S-parameters & K-factor





APPLICATION CIRCUIT

WiMAX

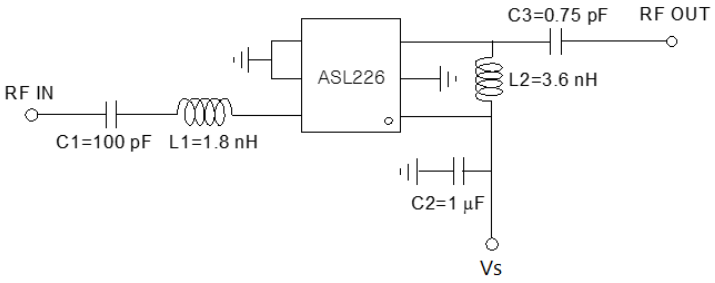
2300 ~ 2900 MHz

+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.

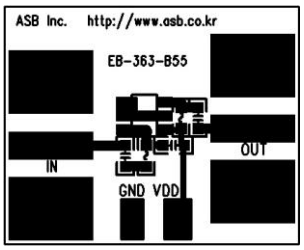
Schematic



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

Board Layout (FR4, 14x11.3 mm², 0.8T)

Top



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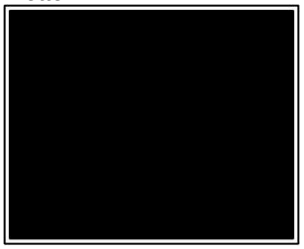
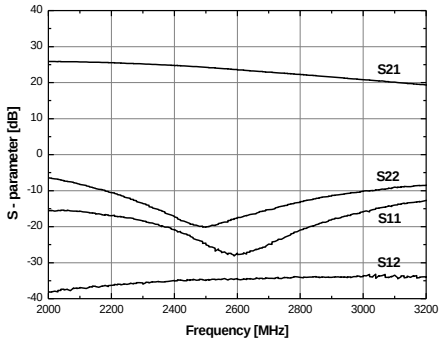
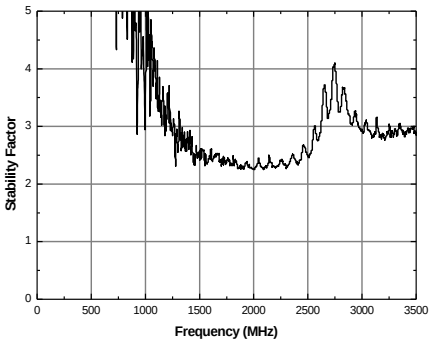
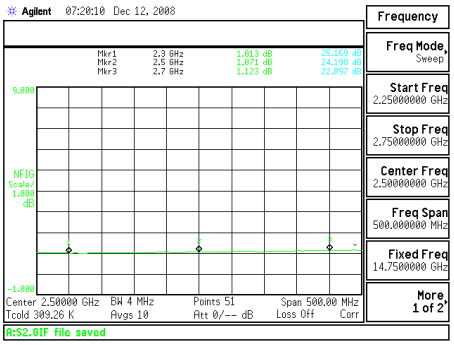


S-parameters & Noise Figure & K-factor (4.5V)







APPLICATION CIRCUIT

WiMAX

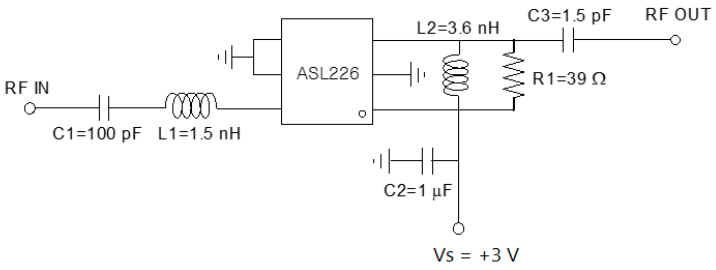
2300 ~ 2900 MHz

+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.

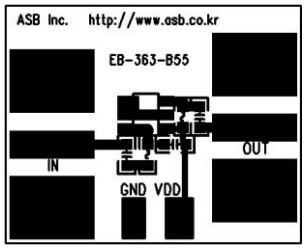
Schematic



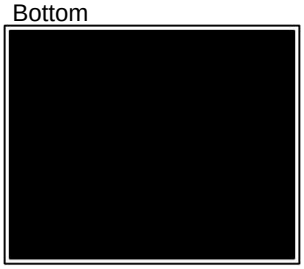
* Note: Gain and current can be reduced by controlling Vs to 2 V.
C2 must be placed as close as possible to the device.

Board Layout (FR4, 14x11.3 mm², 0.8T)

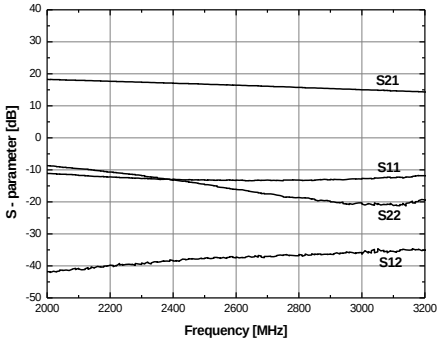
Top

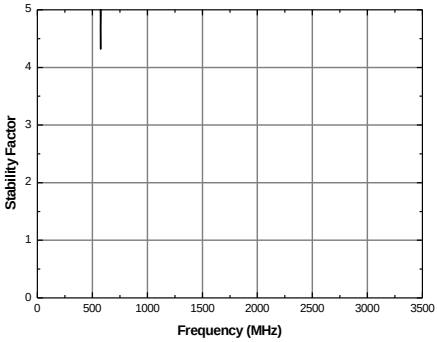


Bottom



S-parameters & K-factor





APPLICATION CIRCUIT

WiMAX

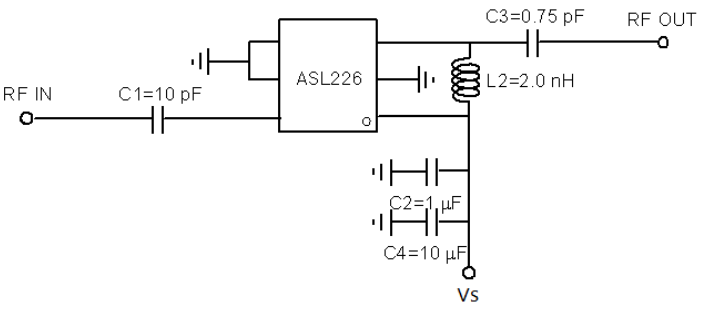
3300 ~ 3800 MHz

+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.

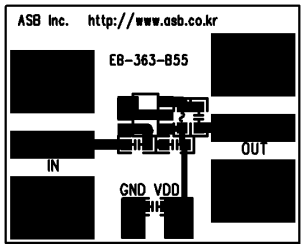
Schematic



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

Board Layout (FR4, 14x11.3 mm², 0.8T)

Top



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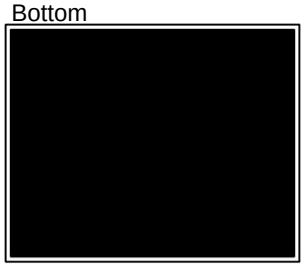
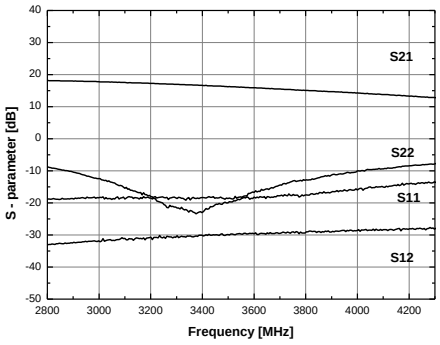
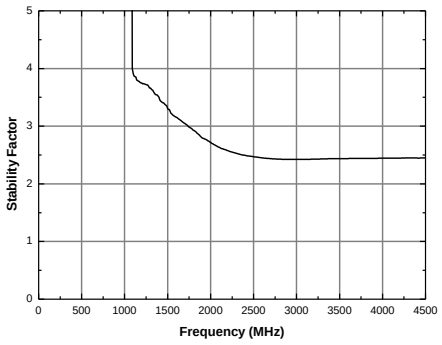


S-parameters & K-factor (3V)





APPLICATION CIRCUIT

C-Band

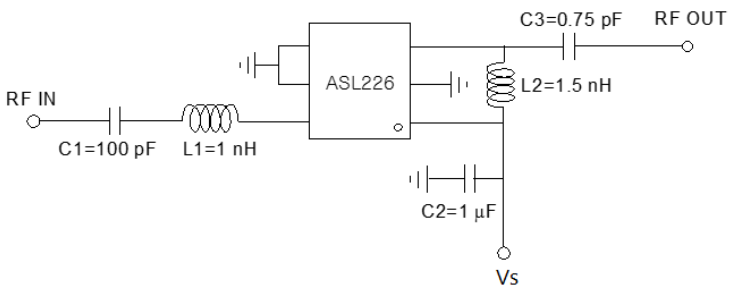
4000 ~ 4500 MHz

+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.

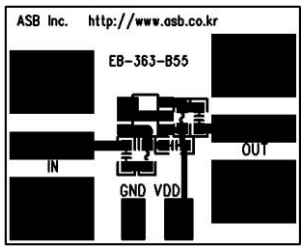
Schematic



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

Board Layout (FR4, 14x11.3 mm², 0.8T)

Top



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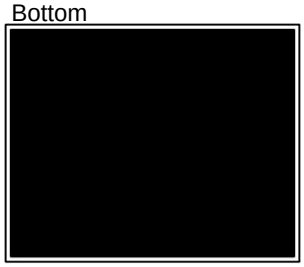
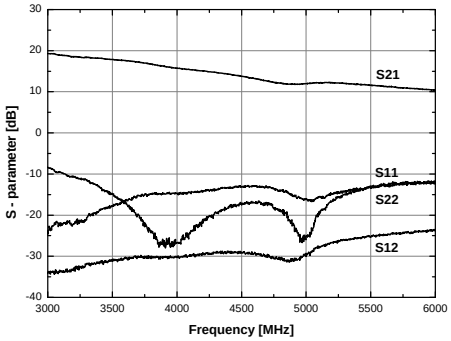
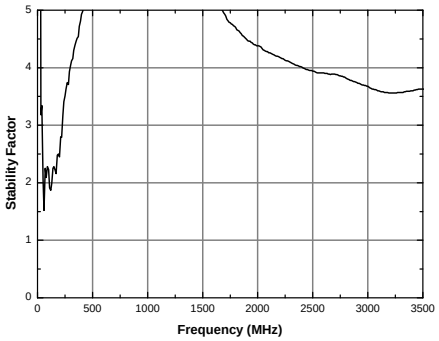


S-parameters & K-factor (5V)





APPLICATION CIRCUIT

WLAN

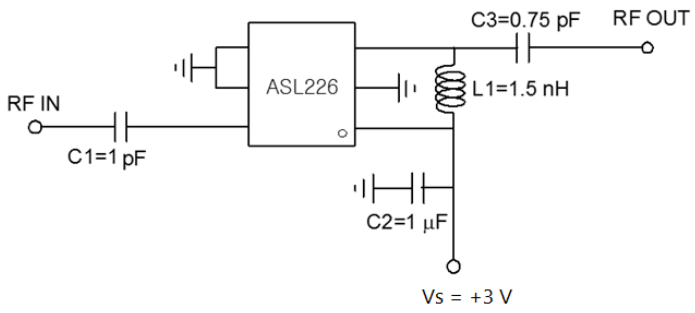
5800 MHz

+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.

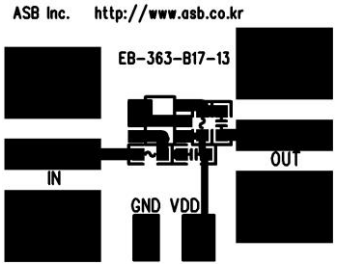
Schematic



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

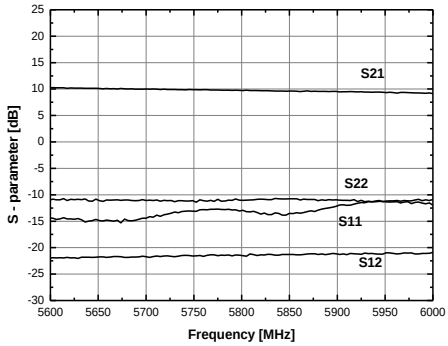
Board Layout (FR4, 14x11.3 mm², 0.8T)

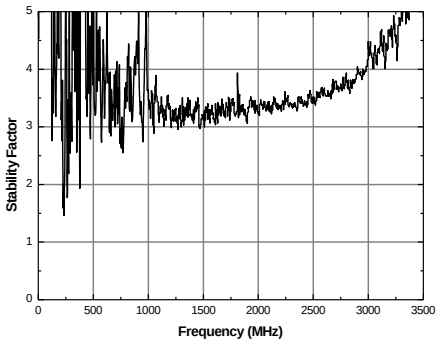
Top



Bottom

S-parameters & K-factor





Recommended Soldering Reflow Profile