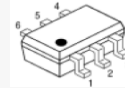


Features

- 15 dB Gain at 1950 MHz
- 0.7 dB NF at 1950 MHz
- 33 dBm OIP3 at 1950 MHz
- 18 dBm P1dB at 1950 MHz

Description

AST20S is a one-stage LNA which 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, GPS, GLONASS, Galileo, Compass, PCS, WCDMA, WiBro, WiMAX, and WLAN so on. The amplifier is available in a SOT363 package and passes the stringent DC, RF, and reliability tests.



Package Style: SOT363

Application Circuit

- 698 ~ 787 MHz
- 900 MHz
- 880 ~ 953 MHz
- 900 MHz (Balanced Type)
- 1755 ~ 2140 MHz
- 1950 MHz
- 1950 MHz (Balanced Type)
- 2140 MHz & 2450 MHz
- 2500 MHz & 2600 MHz
- 3500 MHz
- 1200 ~ 1900 MHz
- 433 MHz & 315 MHz
- 850 ~ 950 MHz
- 1164 ~ 1300 MHz
(GPS, GLONASS, Galileo, Compass)
- 1560 ~ 1620 MHz
- 1472 MHz
- 1525 ~ 1559 MHz (Satellite Phone)
- 50 ~ 200 MHz & 50 ~ 300 MHz
- 50 ~ 810 MHz (Wideband antenna)
- 800 ~ 2700 MHz (Wideband)
- 470 ~ 860 MHz (CMMB)
- 70 ~ 2700 MHz (ONU, 50 Ω)
- 2300 ~ 2700 MHz
- 900 ~ 2100 MHz (SMATV, 50 Ω)
- 50 ~ 2500 MHz
(Trans-impedance Amplifier, 50 Ω)

Typical Performance

(Supply Voltage = +5 V, T_A = +25 °C, Z_o = 50 Ω)

Parameters	Units	Typical			
Testing Frequency	MHz	900	1950	2450	3500
Gain	dB	18.0	15.0	13.0	8.5
S11	dB	-13	-11	-15	-10
S22	dB	-15	-13	-13	-10
Output IP3 ¹⁾	dBm	29	33	33	33
Noise Figure	dB	0.6	0.7	1.0	2.1
Output P1dB	dBm	16.0	18.0	18.5	18.0
Current	mA	40			
Device Voltage	V	+3.44			

1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Product Specifications

Parameters	Units	Min	Typ	Max
Frequency	MHz		1950	
Gain	dB	12.0	13.5	15.0
S11	dB	-8.0		
S22	dB	-8.0		
Output IP3	dBm	29	32	
Noise Figure	dB		0.7	0.8
Output P1dB	dBm	17.0	18.0	
Current	mA	30	40	50
Device Voltage	V		+3.44	

Absolute Maximum Ratings, T_A = +25 °C

Parameters	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-40 to +150 °C
Device Voltage	+6 V
Operating Junction Temperature	+150 °C
Input RF Power (CW, 50 Ω matched as in 1950 MHz application circuit)*	+22 dBm
Thermal Resistance	168 °C/W

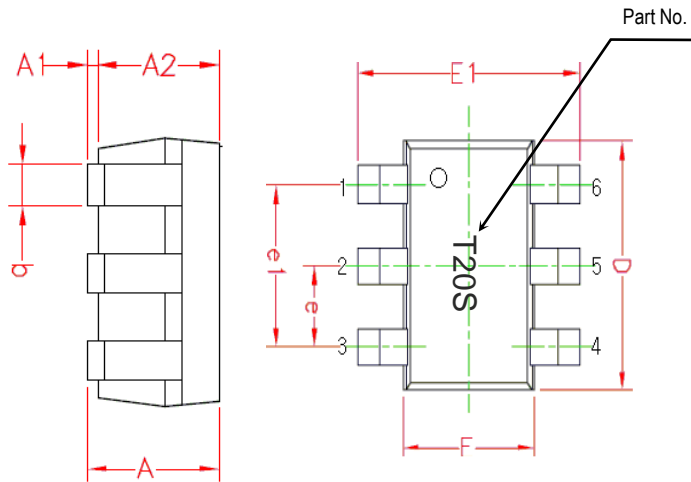
The operation of this device in excess of any of these limits may cause permanent damage.

* 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.

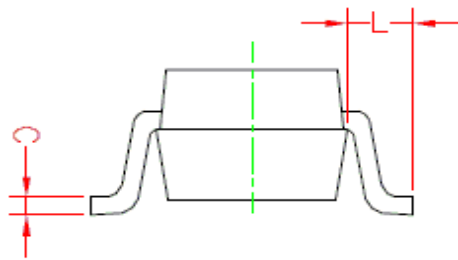
Pin Configuration

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

Outline Drawing

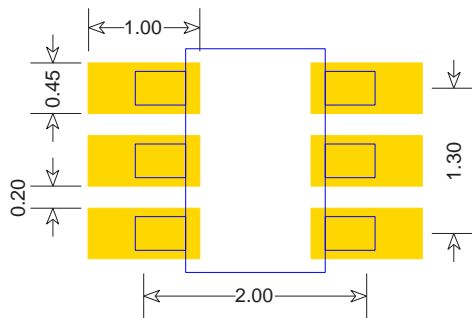


Symbols	Dimensions (In mm)		
	MIN	NOM	MAX
A	0.90	1.00	1.10
A1	0.025	0.062	0.10
A2	0.875	0.937	1.00
b	0.20	0.30	0.40
C	0.10	0.125	0.15
D	1.90	2.00	2.10
F	1.15	1.25	1.35
E1	2.00	2.10	2.20
e	--	0.65BSC	--
e1	--	1.30BSC	--
L	--	0.425REF	--



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

Mounting Recommendation (In mm)



ESD Classification & Moisture Sensitivity Level

ESD Classification

HBM	Class 1A Voltage Level: 300 V
MM	Class A Voltage Level: 50 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

Level 3 at 260 °C reflow

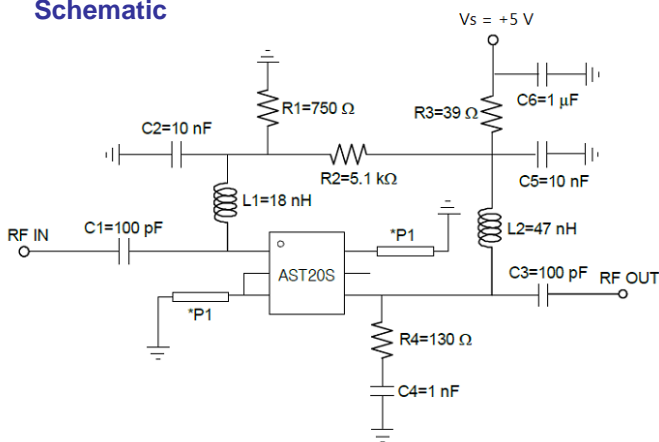
APPLICATION CIRCUIT

LTE
698 ~ 787 MHz
+5 V

Parameter	Symbol	Unit	Frequency (MHz)	
			698	787
Power Gain	G_p	dB	20	19
Noise Figure	NF	dB	0.55	0.50
Input Return Loss	RL_{in}	dB	-8	-10
Output Return Loss	RL_{out}	dB	-15	-15
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	15.5	
3 rd Intercept Point Output Power ¹⁾	OIP3	dBm	28	
Circuit Current	I_d	mA	40	

1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic

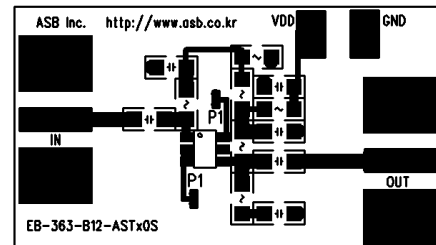


Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8$ mm.

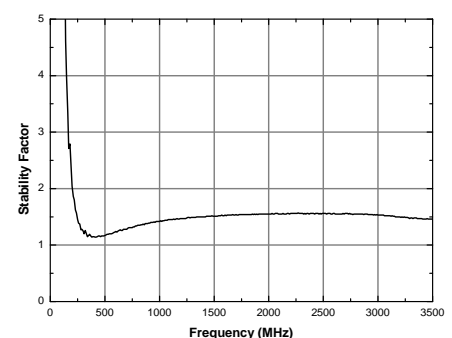
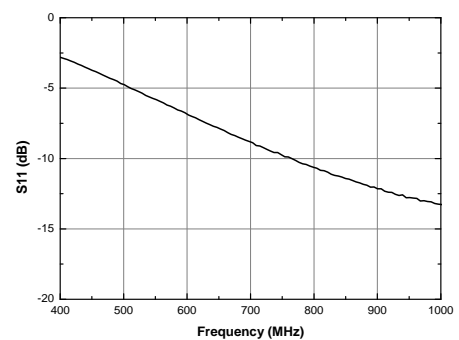
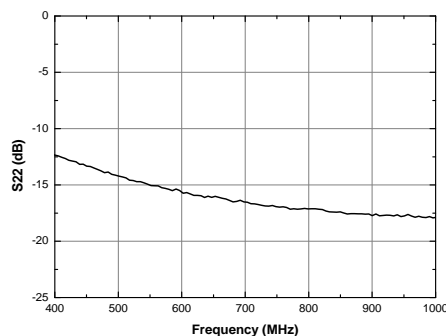
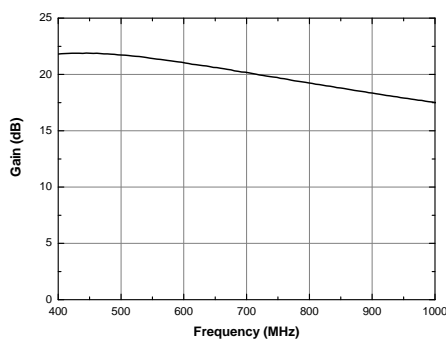
P1 Length: 2.0 mm, Width: 0.3 mm

2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

GSM, CDMA

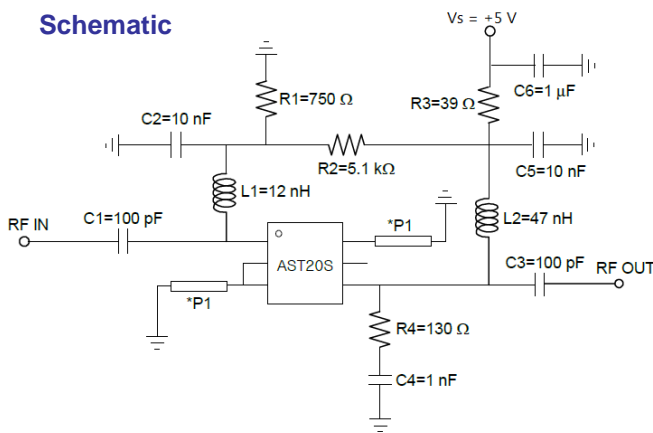
900 MHz

+5 V

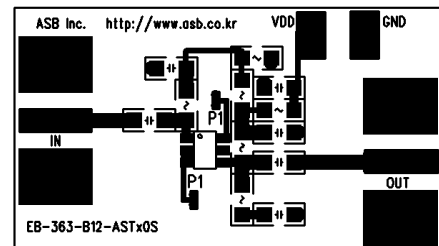
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Power Gain	G_p	F = 900 MHz		18		dB
Noise Figure	NF	F = 900 MHz		0.6		dB
Input Return Loss	RL_{in}	F = 900 MHz		-13		dB
Output Return Loss	RL_{out}	F = 900 MHz		-15		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 900 MHz		16		dBm
3 rd Intercept Point Output Power ¹⁾	OIP3	F = 900 MHz		29		dBm
Circuit Current	I_d	F = 900 MHz Non-RF		40		mA

1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic



Board Layout (FR4, 23x13 mm², 0.8T)

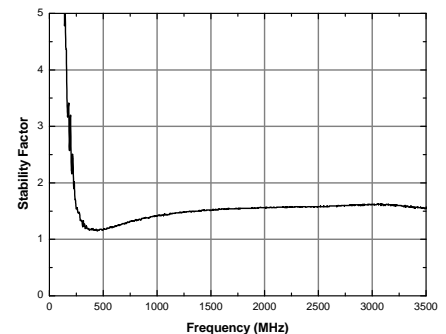
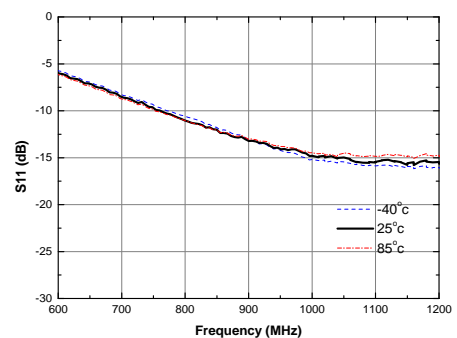
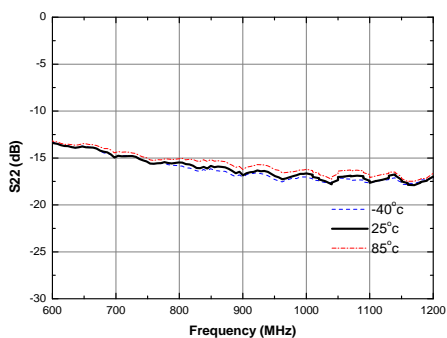
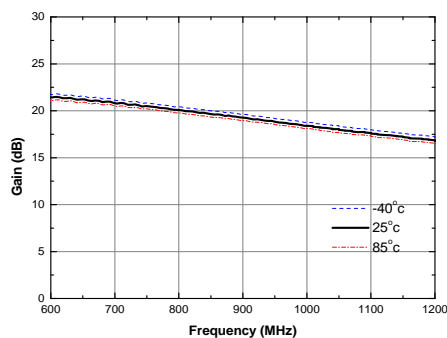


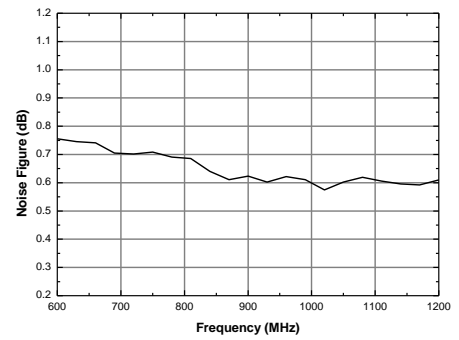
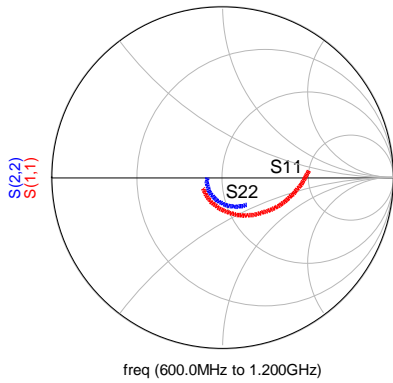
Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8$ mm.

P1 Length: 2.0 mm, Width: 0.3 mm

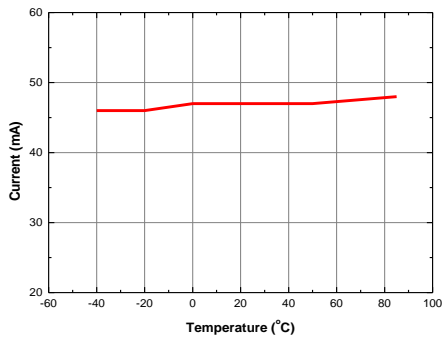
2) Gain and S11 are in trade-off and varied with the length of P1

S-parameters & Noise Figure

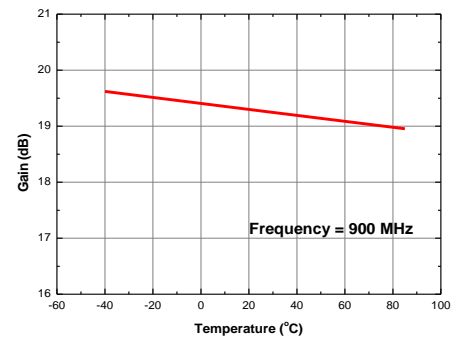




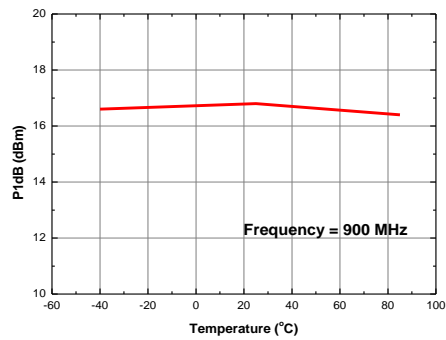
Current vs. Temperature



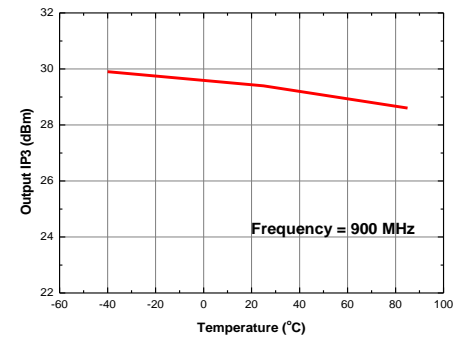
Gain vs. Temperature



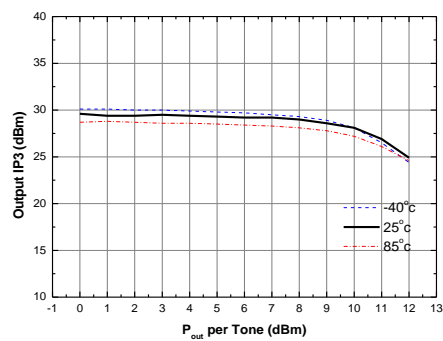
P1dB vs. Temperature



Output IP3 vs. Temperature



Output IP3 vs. Tone Power (Frequency = 900 MHz)



APPLICATION CIRCUIT

GSM, CDMA

S11 < -18 dB

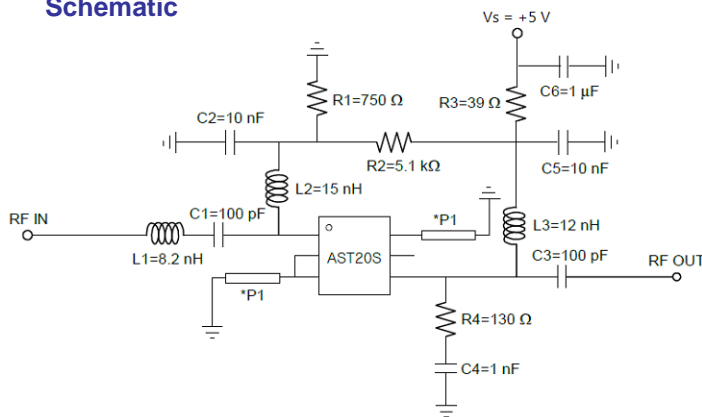
880 ~ 953 MHz

+5 V

Parameter	Symbol	Unit	Frequency (MHz)	
			880	953
Power Gain	G _p	dB	19.5	19.0
Noise Figure	NF	dB	0.8	0.8
Input Return Loss	RL _{in}	dB	-20	-18
Output Return Loss	RL _{out}	dB	-14	-14
1 dB Gain Compression Output Power	P _{o(1dB)}	dBm	15.5	15.5
3 rd Intercept Point Output Power ¹⁾	OIP3	dBm	26	27
Circuit Current	I _d	mA	40	

1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic

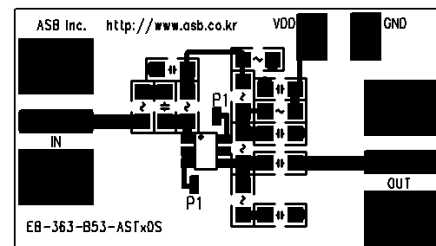


Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

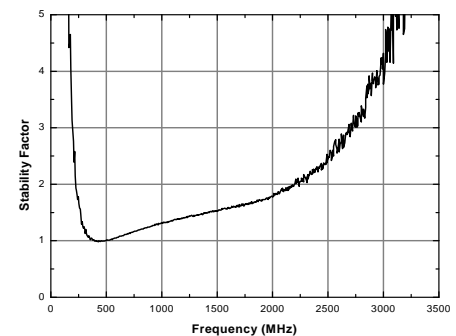
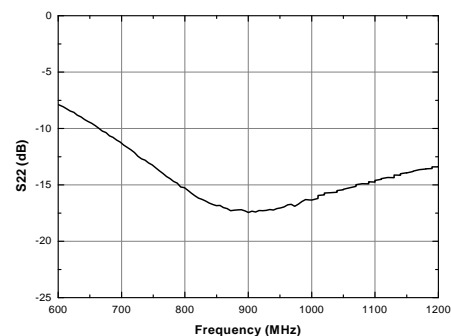
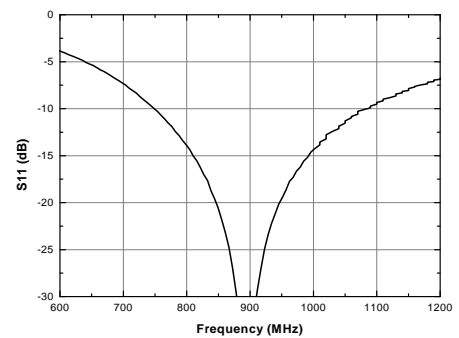
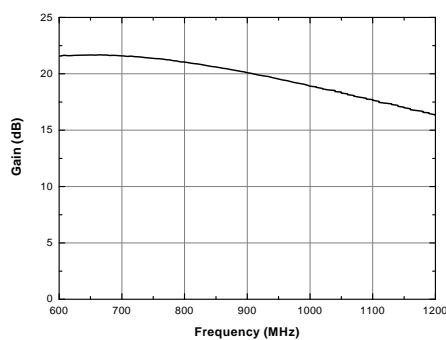
P1 Length: 1.1 mm, Width: 0.3 mm

2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

GSM, CDMA

Balanced Type

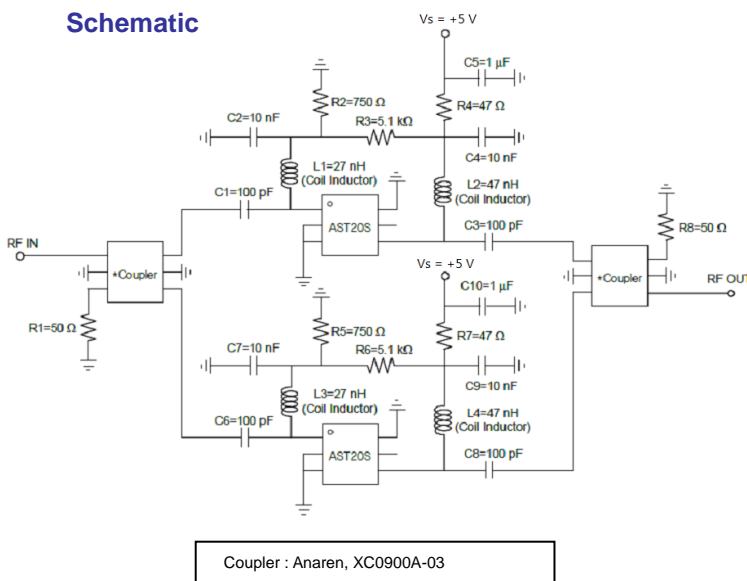
900 MHz

+5 V

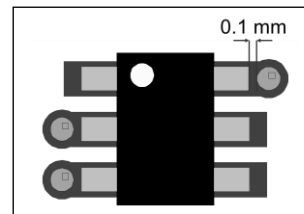
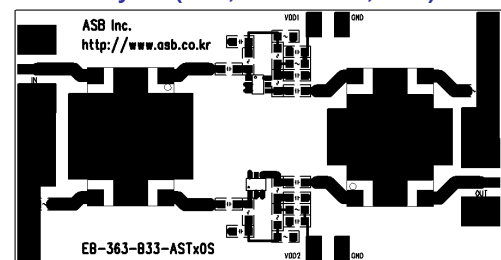
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Power Gain	G_p	F = 900 MHz		22.8		dB
Noise Figure	NF	F = 900 MHz		0.61		dB
Input Return Loss	RL_{in}	F = 900 MHz		-30		dB
Output Return Loss	RL_{out}	F = 900 MHz		-30		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 900 MHz		19		dBm
3 rd Intercept Point Output Power ¹⁾	OIP3	F = 900 MHz		32		dBm
Circuit Current	I_d	F = 900 MHz Non-RF		72		mA

1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic

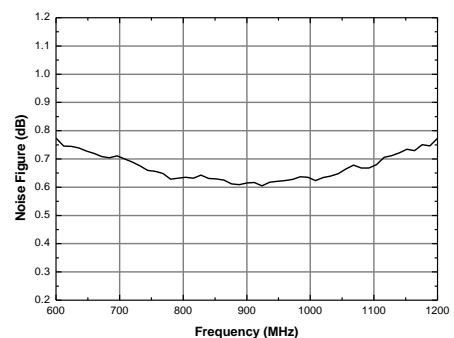
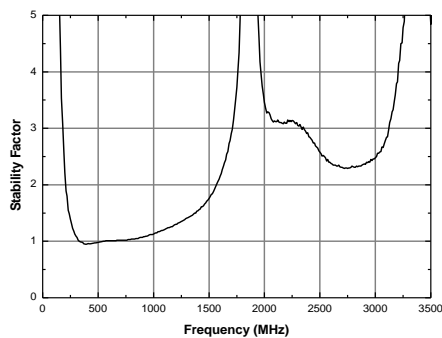
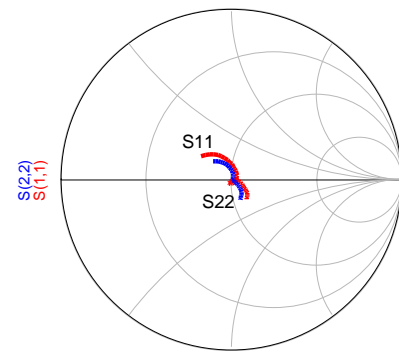
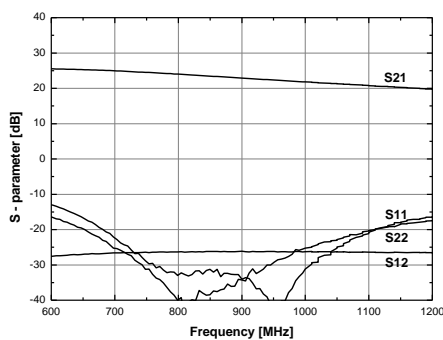


Board Layout (FR4, 50x26 mm², 0.8T)



Note: The ground via holes must be placed close to the lead pin 2, 3, and 6 within 0.1 mm.

S-parameters & Noise Figure



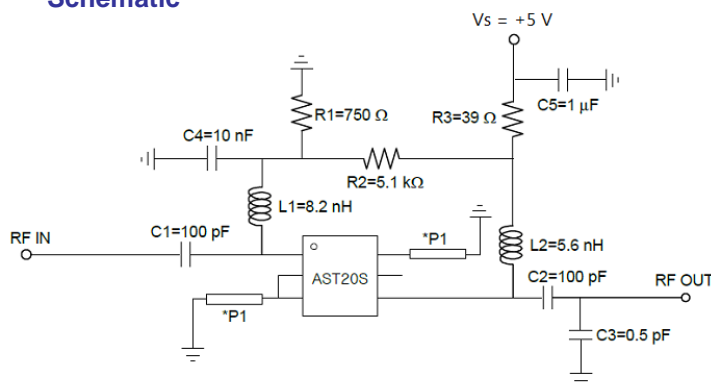
APPLICATION CIRCUIT

PCS
S11 < -18 dB
1755 ~ 2140 MHz
+5 V

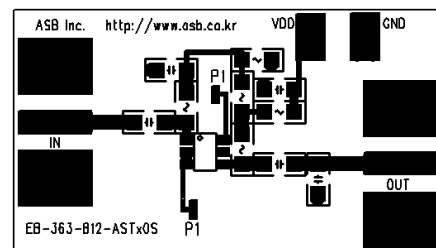
Parameter	Symbol	Unit	Frequency (MHz)	
			1755	2140
Power Gain	G_p	dB	12.5	11.0
Noise Figure	NF	dB	0.7	0.8
Input Return Loss	RL_{in}	dB	-20	-18
Output Return Loss	RL_{out}	dB	-15	-14
1 dB Gain Compression	$P_{o(1dB)}$	dBm	17.0	17.5
Output Power	OIP3	dBm	32	33
3 rd Intercept Point	I_d	mA	40	
Output Power ¹⁾				
Circuit Current				

1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic



Board Layout (FR4, 23x13 mm², 0.8T)

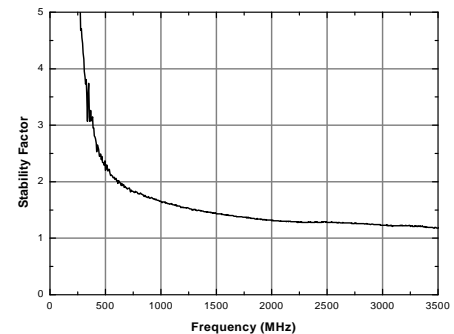
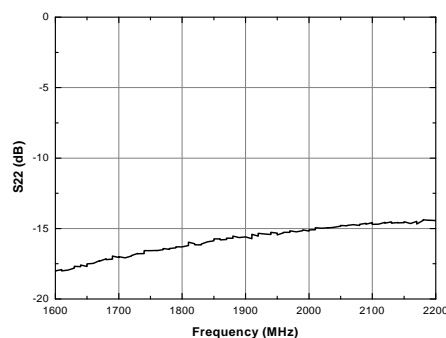
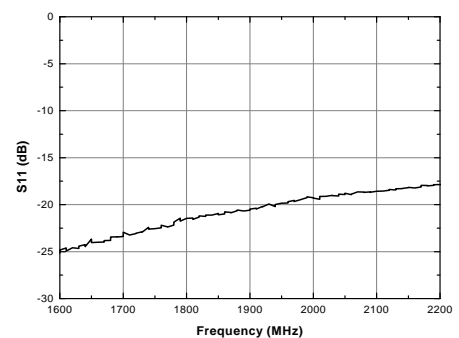
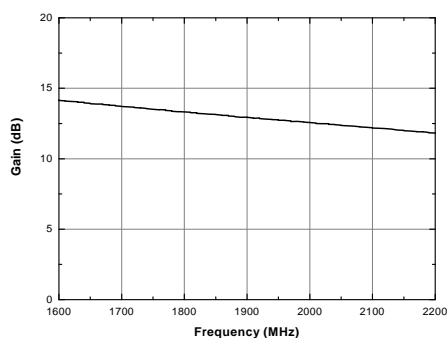


Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8$ mm.

P1 Length: 2.2 mm, Width: 0.3 mm

2) Gain and S11 are in trade-off and varied with the length of P1

S-parameters & K-factor



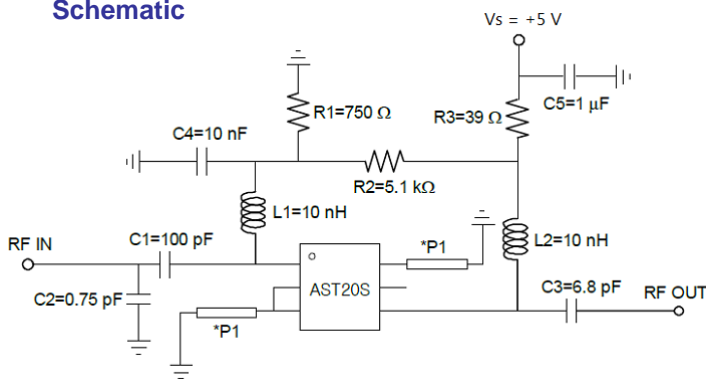
APPLICATION CIRCUIT

- WCDMA
- High Gain
- 1950 MHz
- +5 V

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Power Gain	G_p	F = 1.95 GHz		15		dB
Noise Figure	NF	F = 1.95 GHz		0.7		dB
Input Return Loss	RL_{in}	F = 1.95 GHz		-11		dB
Output Return Loss	RL_{out}	F = 1.95 GHz		-13		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 1.95 GHz		18		dBm
3 rd Intercept Point Output Power ¹⁾	OIP3	F = 1.95 GHz		33		dBm
Circuit Current	I_d	F = 1.95 GHz Non-RF		40		mA

1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

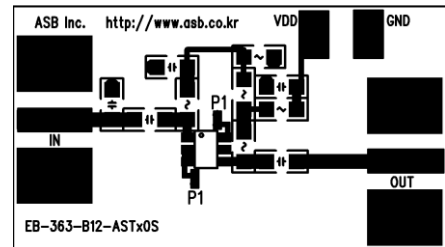
Schematic



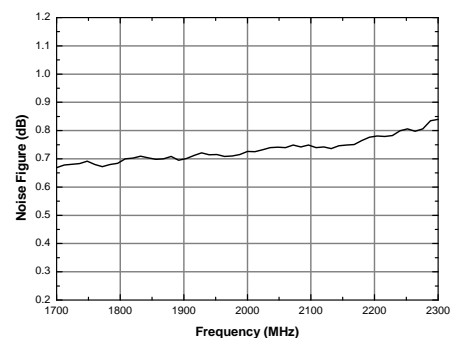
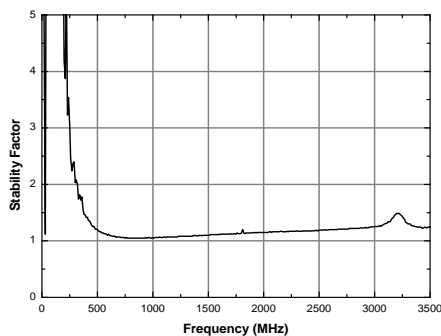
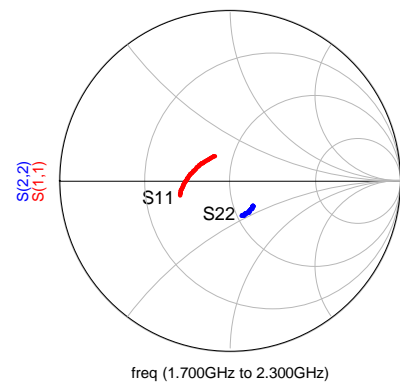
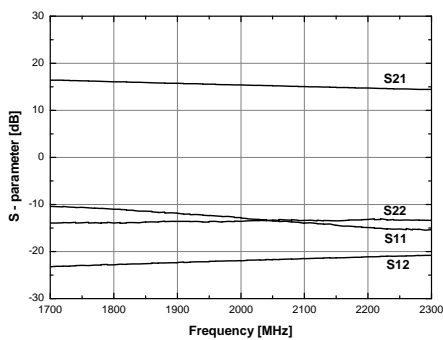
Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8$ mm.
P1 Length: 0.75 mm, Width: 0.3 mm

2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)



S-parameters & Noise Figure



APPLICATION CIRCUIT

WCDMA

Low Noise

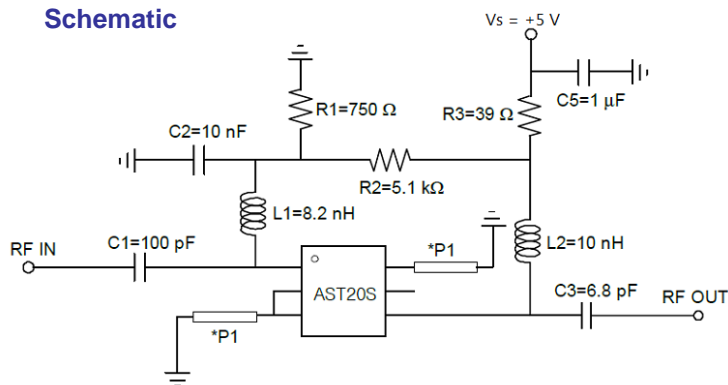
1950 MHz

+5 V

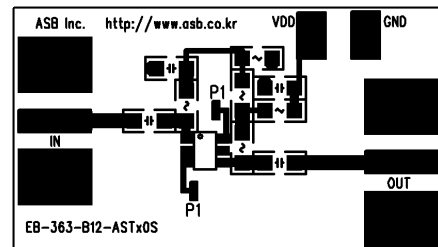
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Power Gain	G_p	F = 1.95 GHz		13.3		dB
Noise Figure	NF	F = 1.95 GHz		0.6		dB
Input Return Loss	RL_{in}	F = 1.95 GHz		-11		dB
Output Return Loss	RL_{out}	F = 1.95 GHz		-15		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 1.95 GHz		19		dBm
3 rd Intercept Point Output Power ¹⁾	OIP3	F = 1.95 GHz		34		dBm
Circuit Current	I_d	F = 1.95 GHz Non-RF		40		mA

1) OIP3 is measured with two tones at an output power of +4 dBm/one separated by 1MHz.

Schematic



Board Layout (FR4, 23x13 mm², 0.8T)

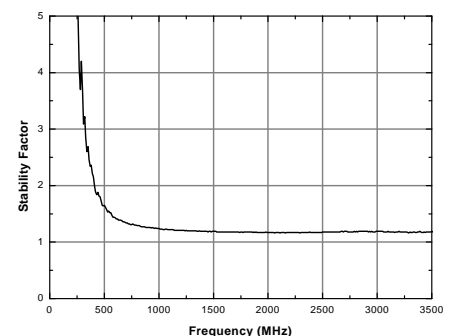
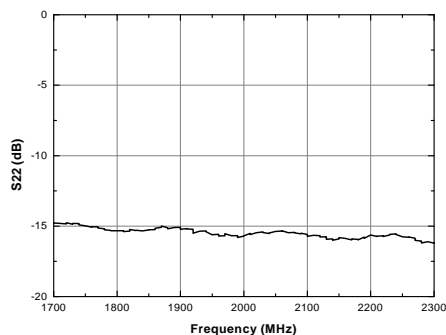
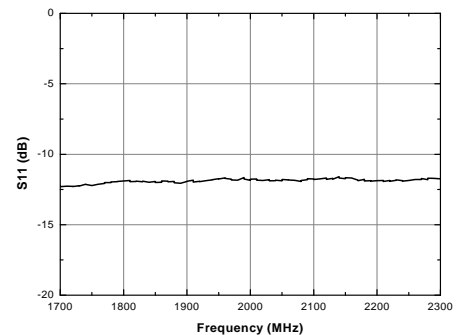
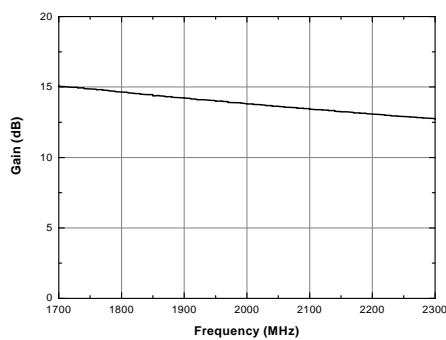


Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8$ mm.

P1 Length: 1.5 mm, Width: 0.3 mm

2) Gain and S11 are in trade-off and varied with the length of P1

S-parameters & K-factor



APPLICATION CIRCUIT

WCDMA

Balanced Type

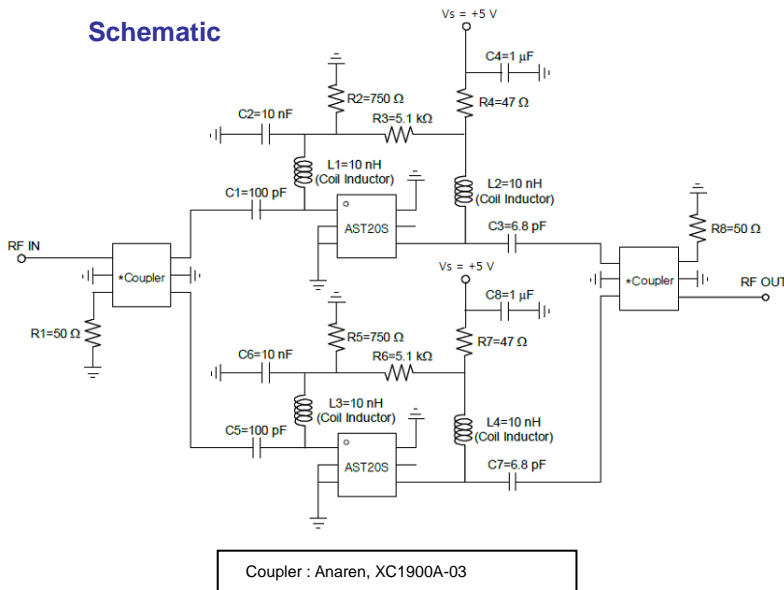
1950 MHz

+5 V

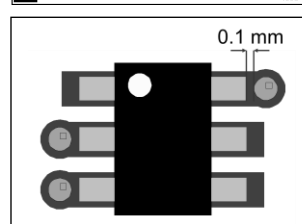
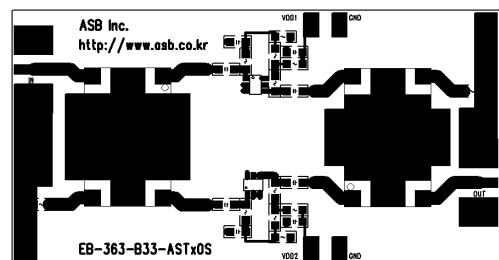
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Power Gain	G_p	F = 1.95 GHz		15.6		dB
Noise Figure	NF	F = 1.95 GHz		0.79		dB
Input Return Loss	RL_{in}	F = 1.95 GHz		-14		dB
Output Return Loss	RL_{out}	F = 1.95 GHz		-14		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 1.95 GHz		19.6		dBm
3 rd Intercept Point Output Power ¹⁾	OIP3	F = 1.95 GHz		35		dBm
Circuit Current	I_d	F = 1.95 GHz Non-RF		72		mA

1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic

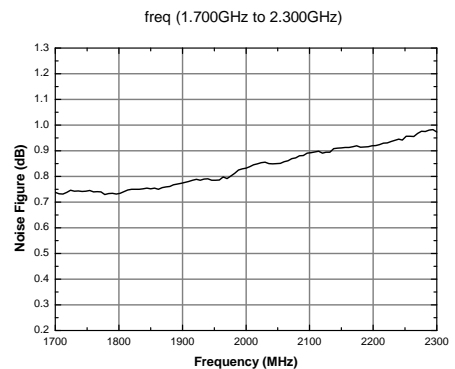
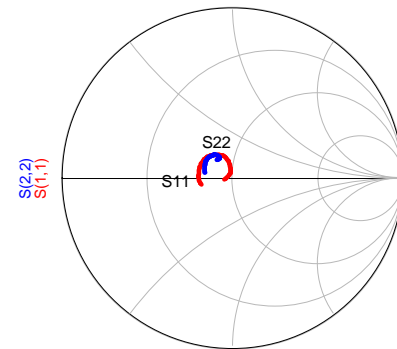
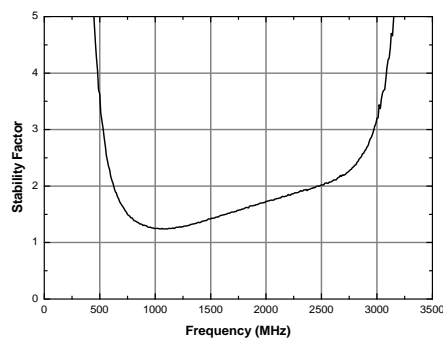
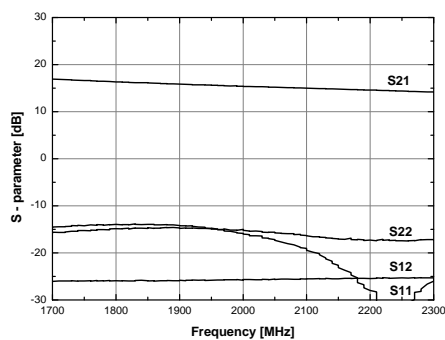


Board Layout (FR4, 50x26 mm², 0.8T)



Note: The ground via holes must be placed close to the lead pin 2, 3, and 6 within 0.1 mm.

S-parameters & Noise Figure



APPLICATION CIRCUIT

WCDMA

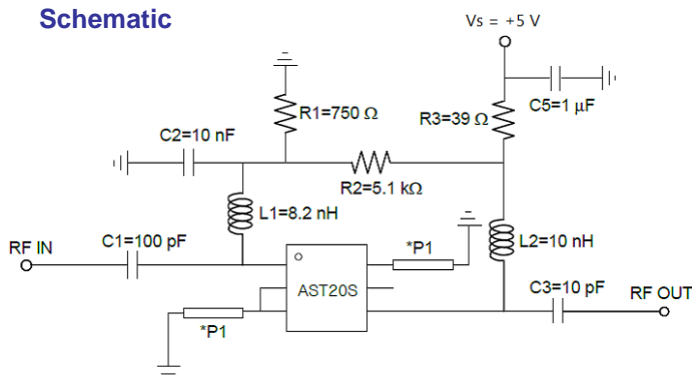
2140 MHz

+5 V

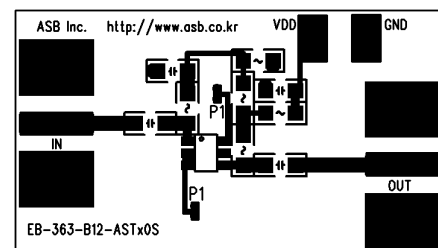
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Power Gain	G_p	$F = 2.14 \text{ GHz}$		12.5		dB
Noise Figure	NF	$F = 2.14 \text{ GHz}$		0.9		dB
Input Return Loss	RL_{in}	$F = 2.14 \text{ GHz}$		-13		dB
Output Return Loss	RL_{out}	$F = 2.14 \text{ GHz}$		-13		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	$F = 2.14 \text{ GHz}$		18.5		dBm
3 rd Intercept Point Output Power ¹⁾	OIP3	$F = 2.14 \text{ GHz}$		33.5		dBm
Circuit Current	I_d	$F = 2.14 \text{ GHz}$ Non-RF		40		mA

1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic



Board Layout (FR4, 23x13 mm², 0.8T)

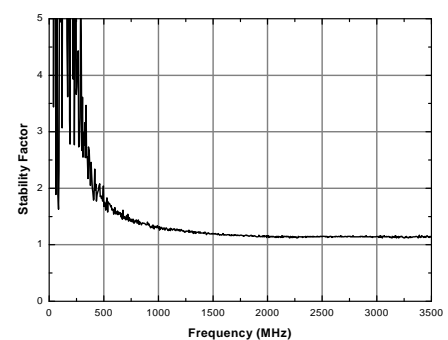
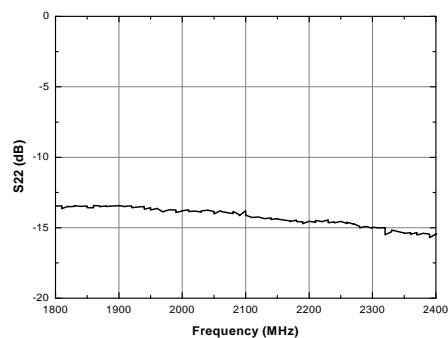
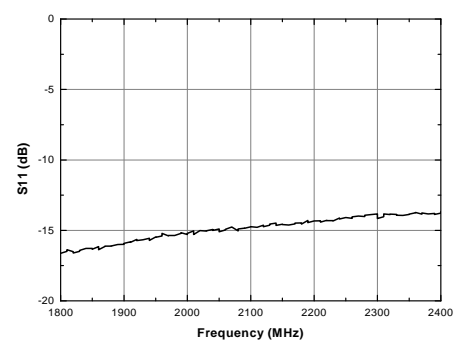
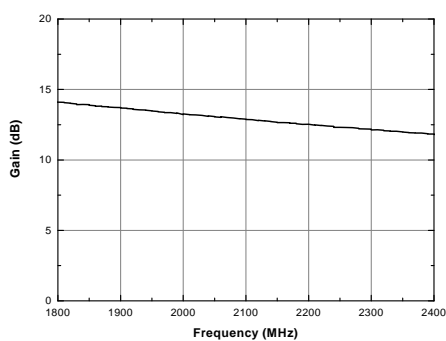


Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8 \text{ mm}$.

P1 Length: 2.5 mm, Width: 0.3 mm

2) Gain and S11 are in trade-off and varied with the length of P1

S-parameters & K-factor



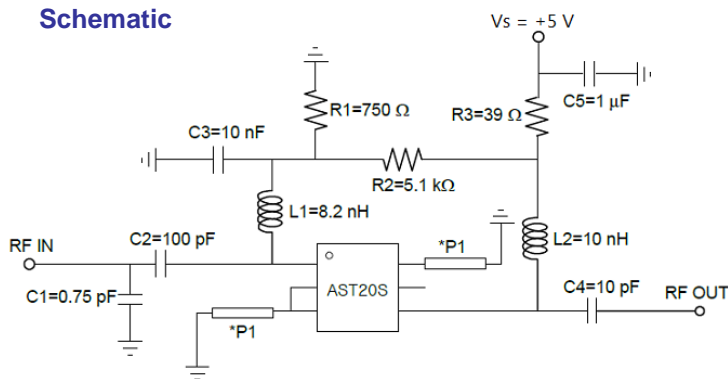
APPLICATION CIRCUIT

WLAN
2450 MHz
+5 V

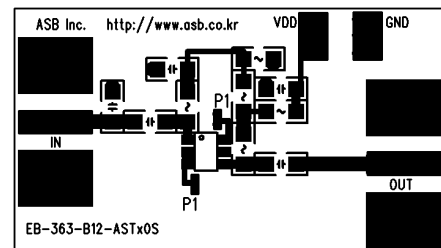
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Power Gain	G_p	$F = 2.45 \text{ GHz}$		13		dB
Noise Figure	NF	$F = 2.45 \text{ GHz}$		1.0		dB
Input Return Loss	RL_{in}	$F = 2.45 \text{ GHz}$		-15		dB
Output Return Loss	RL_{out}	$F = 2.45 \text{ GHz}$		-13		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	$F = 2.45 \text{ GHz}$		18.5		dBm
3 rd Intercept Point Output Power ¹⁾	OIP3	$F = 2.45 \text{ GHz}$		33		dBm
Circuit Current	I_d	$F = 2.45 \text{ GHz}$ Non-RF		40		mA

1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic



Board Layout (FR4, 23x13 mm², 0.8T)

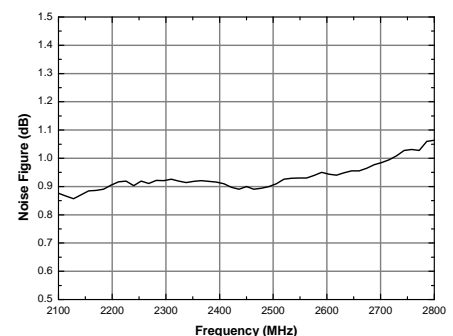
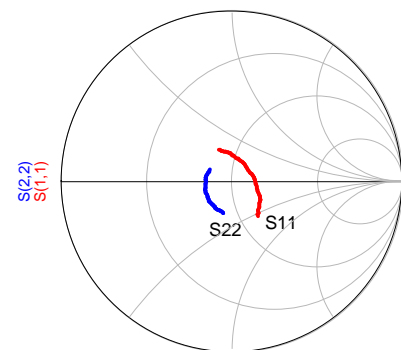
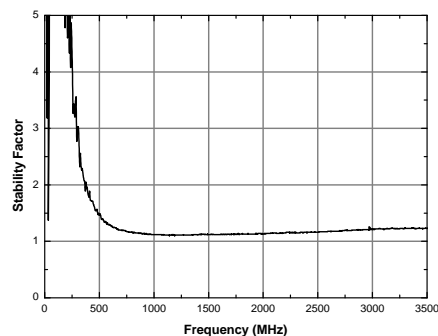
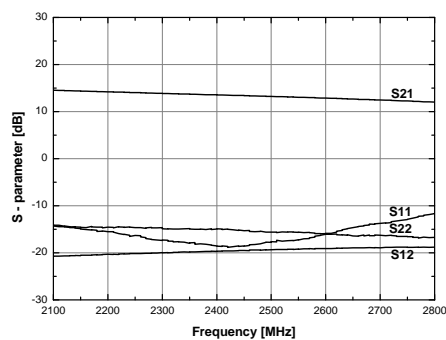


Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8 \text{ mm}$.

P1 Length: 1.0 mm, Width: 0.3 mm

2) Gain and S11 are in trade-off and varied with the length of P1

S-parameters & Noise Figure



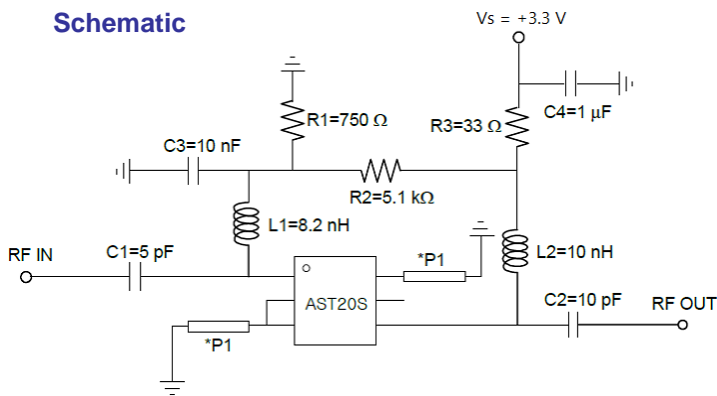
APPLICATION CIRCUIT

WLAN
2500 MHz
+3.3 V

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Power Gain	G_p	F = 2.5 GHz		11		dB
Noise Figure	NF	F = 2.5 GHz		0.9		dB
Input Return Loss	RL_{in}	F = 2.5 GHz		-10		dB
Output Return Loss	RL_{out}	F = 2.5 GHz		-14		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 2.5 GHz		15		dBm
3 rd Intercept Point Output Power ¹⁾	OIP3	F = 2.5 GHz		27		dBm
Circuit Current	I_d	F = 2.5 GHz Non-RF		20		mA

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

Schematic

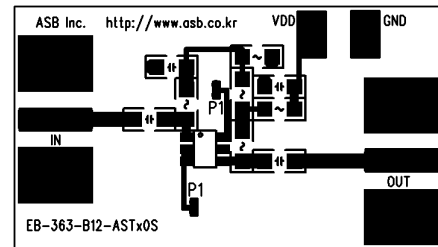


Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8$ mm.

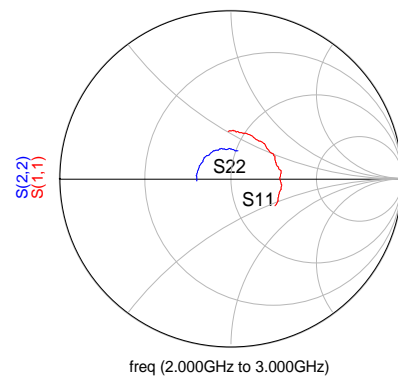
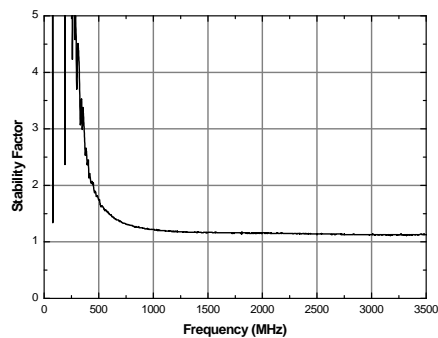
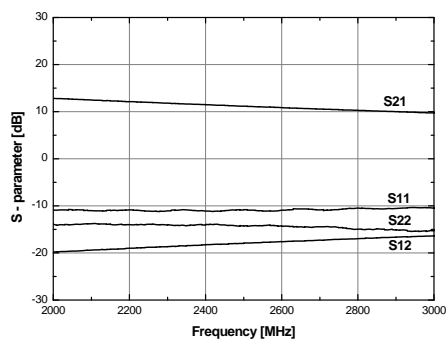
P1 Length: 2.5 mm, Width: 0.3 mm

2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)



S-parameters & K-factor



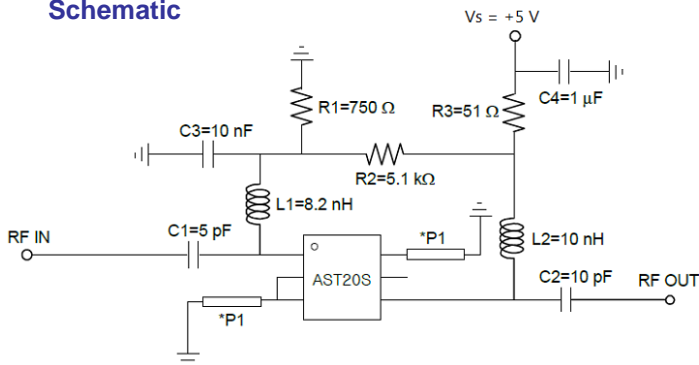
APPLICATION CIRCUIT

WIMAX
2600 MHz
+5 V

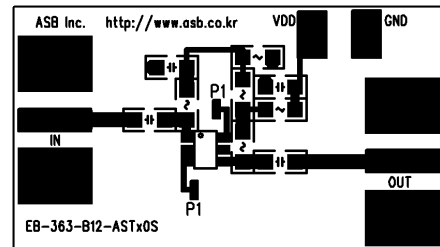
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Power Gain	G_p	F = 2.6 GHz		11		dB
Noise Figure	NF	F = 2.6 GHz		0.9		dB
Input Return Loss	RL_{in}	F = 2.6 GHz		-11		dB
Output Return Loss	RL_{out}	F = 2.6 GHz		-15		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 2.6 GHz		17		dBm
3 rd Intercept Point Output Power ¹⁾	OIP3	F = 2.6 GHz		31		dBm
Circuit Current	I_d	F = 2.6 GHz Non-RF		34		mA

1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic



Board Layout (FR4, 23x13 mm², 0.8T)

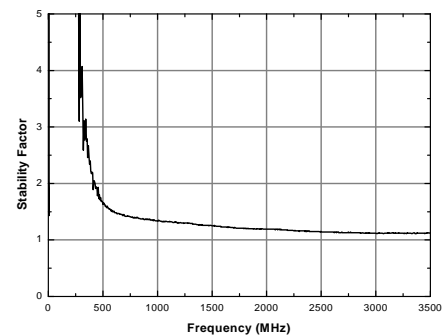
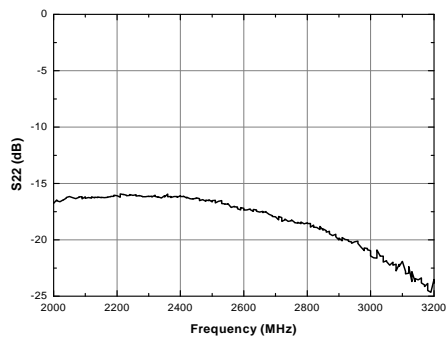
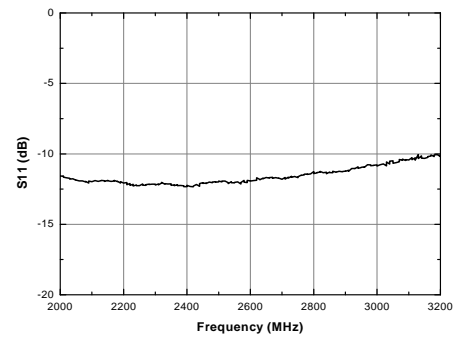
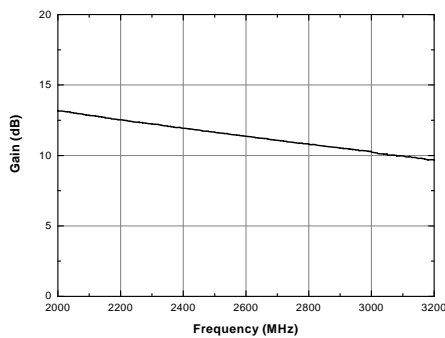


Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8$ mm.

P1 Length: 1.5 mm, Width: 0.3 mm

2) Gain and S11 are in trade-off and varied with the length of P1

S-parameters & K-factor



APPLICATION CIRCUIT

WIMAX

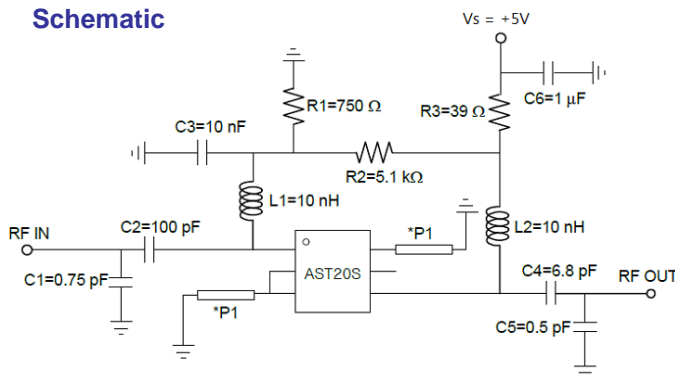
3500 MHz

+5 V

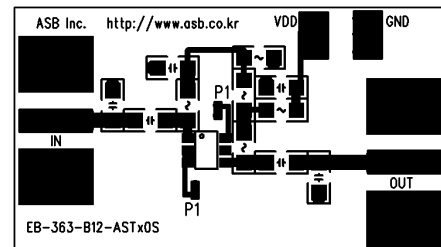
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Power Gain	G_p	F = 3.5 GHz		8.5		dB
Noise Figure	NF	F = 3.5 GHz		2.1		dB
Input Return Loss	RL_{in}	F = 3.5 GHz		-10		dB
Output Return Loss	RL_{out}	F = 3.5 GHz		-10		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 3.5 GHz		18		dBm
3 rd Intercept Point Output Power ¹⁾	OIP3	F = 3.5 GHz		33		dBm
Circuit Current	I_d	F = 3.5 GHz Non-RF		40		mA

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

Schematic



Board Layout (FR4, 23x13 mm², 0.8T)

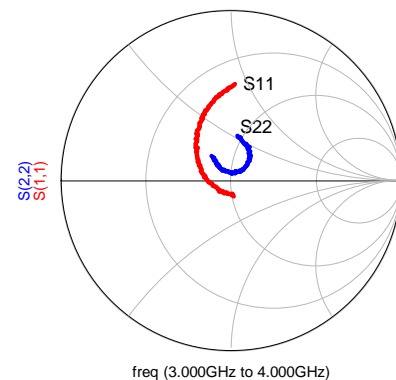
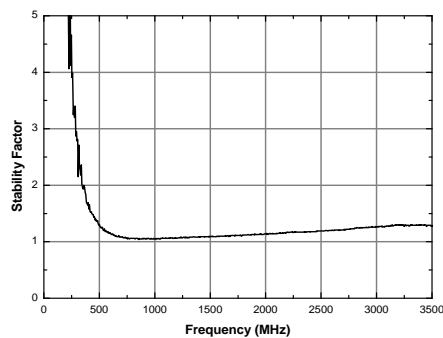
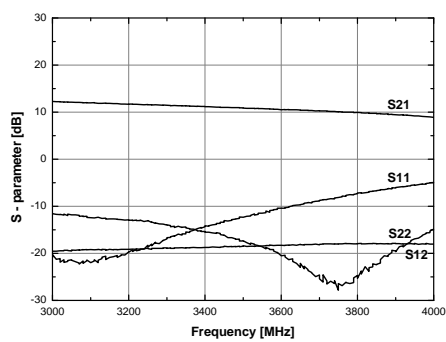


Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8$ mm.

P1 Length: 1.7 mm, Width: 0.3 mm

2) Gain and S11 are in trade-off and varied with the length of P1

S-parameters & K-factor



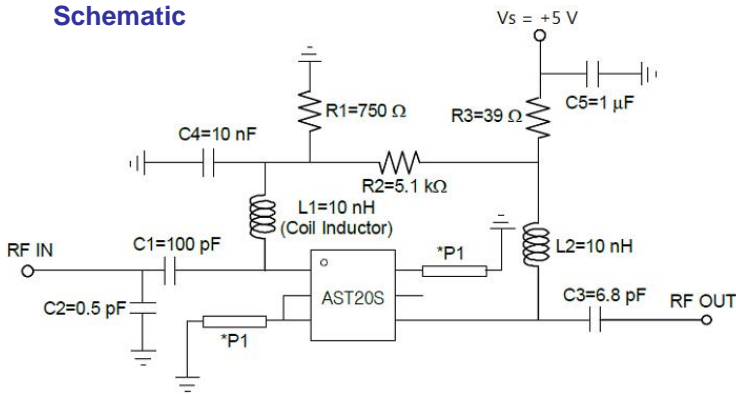
APPLICATION CIRCUIT

Wide Band
1200 ~ 1900 MHz
+5 V

Parameter	Symbol	Unit	Frequency (MHz)		
			1200	1550	1900
Power Gain	G_p	dB	18	17	15
Noise Figure	NF	dB	0.5	0.6	0.7
Input Return Loss	RL_{in}	dB	-9	-9	-10
Output Return Loss	RL_{out}	dB	-13	-14	-14
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	17	17.5	18
3 rd Intercept Point Output Power ¹⁾	OIP3	dBm	30	32	33
Circuit Current	I_d	mA	40		

1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic

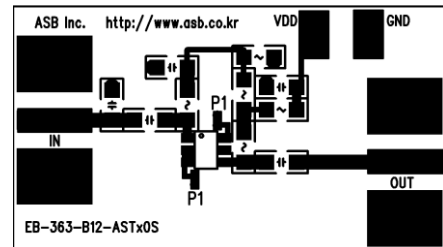


Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8$ mm.

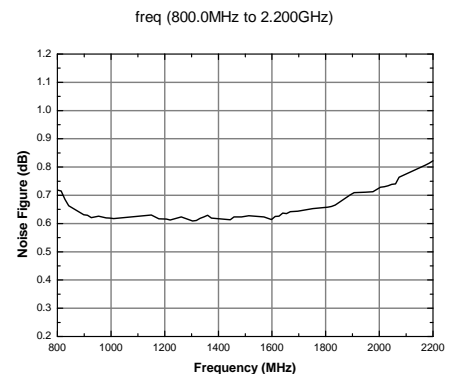
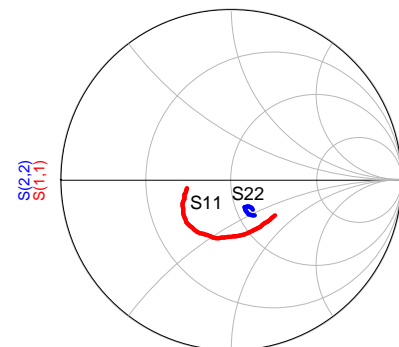
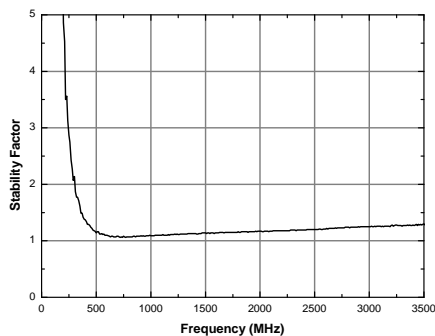
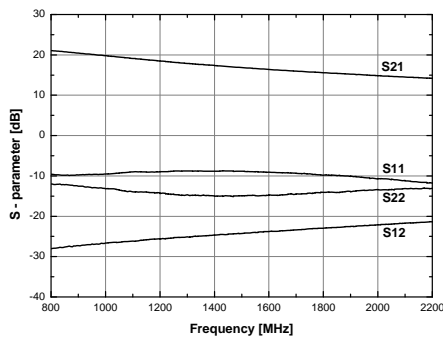
P1 Length: 0.75 mm, Width: 0.3 mm

2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)



S-parameters & Noise Figure



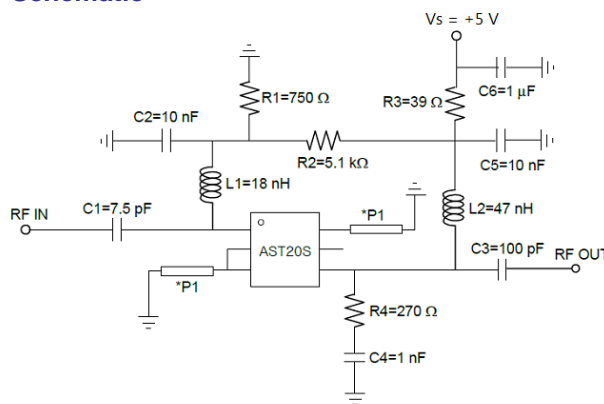
APPLICATION CIRCUIT

IF
 433 MHz
 +5 V

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Power Gain	G_p	F = 433 MHz		23.5		dB
Noise Figure	NF	F = 433 MHz		0.7		dB
Input Return Loss	RL_{in}	F = 433 MHz		-9		dB
Output Return Loss	RL_{out}	F = 433 MHz		-9		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 433 MHz		16		dBm
3 rd Intercept Point Output Power ¹⁾	OIP3	F = 433 MHz		27		dBm
Circuit Current	I_d	F = 433 MHz Non-RF		40		mA

1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic

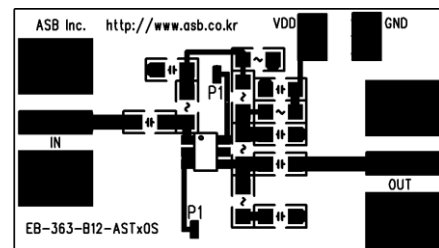


Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8$ mm.

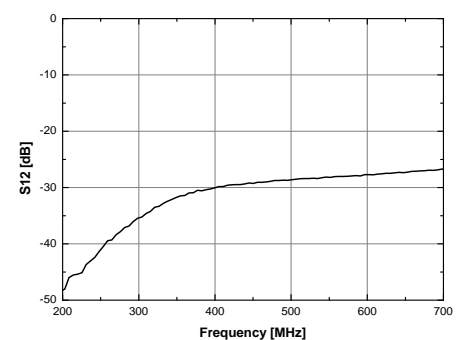
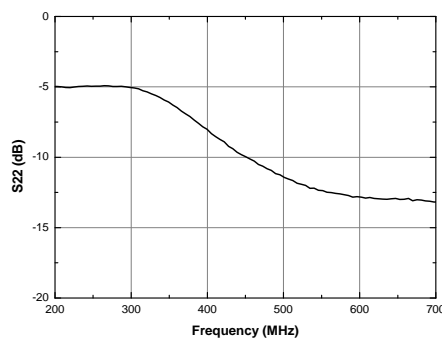
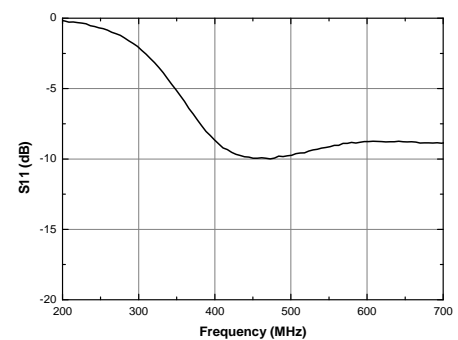
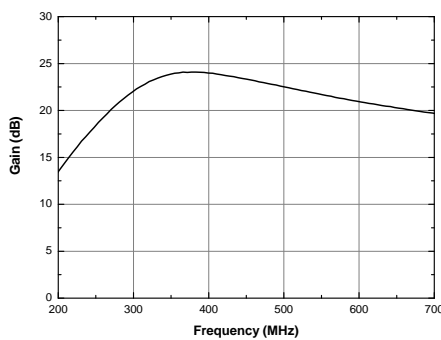
P1 Length: 3.5 mm, Width: 0.3 mm

2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)



S-parameters



APPLICATION CIRCUIT

IF

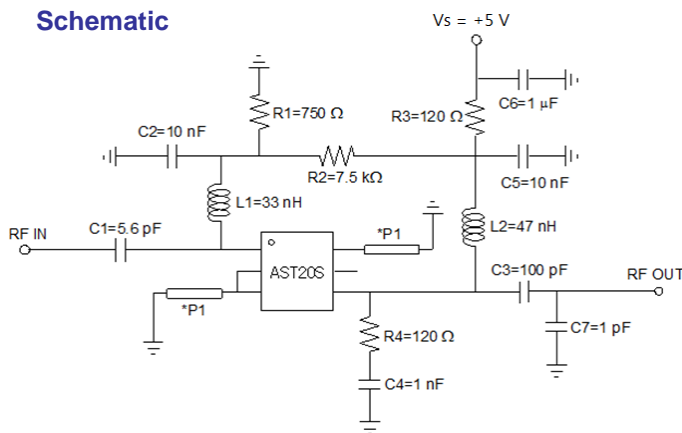
315 MHz

+5 V, 11 mA

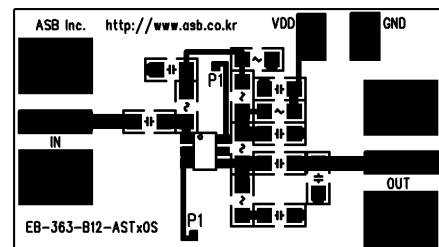
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Power Gain	G_p	F = 315 MHz		22		dB
Noise Figure	NF	F = 315 MHz		0.9		dB
Input Return Loss	RL_{in}	F = 315 MHz		-7		dB
Output Return Loss	RL_{out}	F = 315 MHz		-12		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 315 MHz		3		dBm
3 rd Intercept Point Output Power ¹⁾	OIP3	F = 315 MHz		17		dBm
Circuit Current	I_d	F = 315 MHz Non-RF		11		mA

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

Schematic



Board Layout (FR4, 23x13 mm², 0.8T)

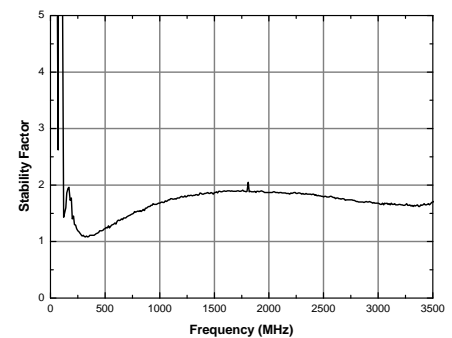
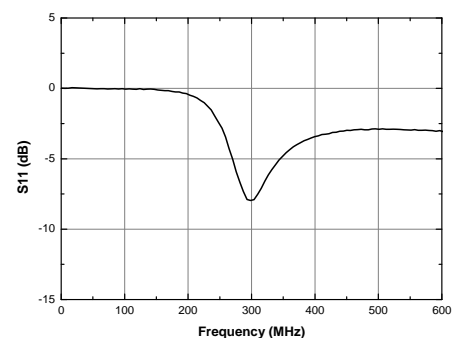
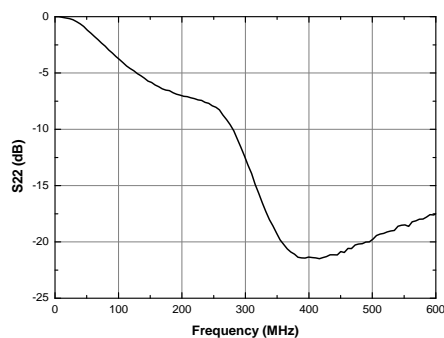
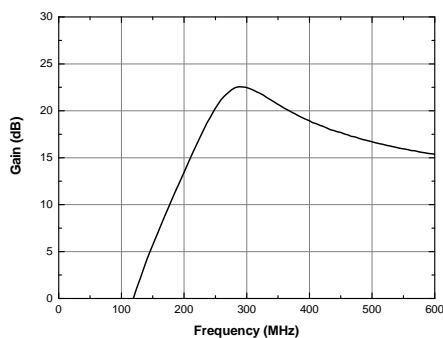


Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8$ mm.

P1 Length: 3.6 mm, Width: 0.3 mm

2) Gain and S11 are in trade-off and varied with the length of P1

S-parameters & K-factor



APPLICATION CIRCUIT

IF

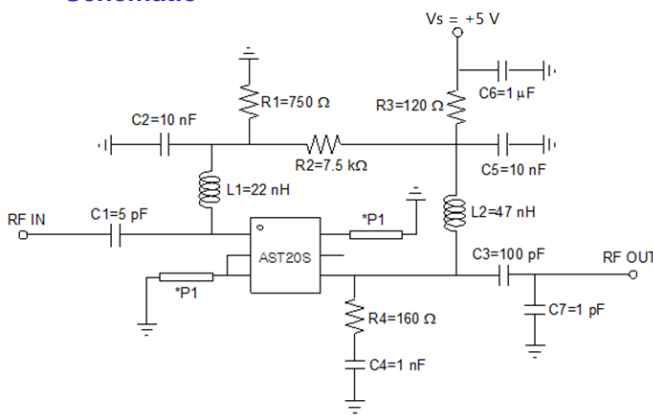
433 MHz

+5 V, 11 mA

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Power Gain	G_p	F =433 MHz		20.5		dB
Noise Figure	NF	F =433 MHz		0.9		dB
Input Return Loss	RL_{in}	F =433 MHz		-8		dB
Output Return Loss	RL_{out}	F =433 MHz		-10		dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F =433 MHz		2.5		dBm
3 rd Intercept Point Output Power ¹⁾	OIP3	F =433 MHz		18		dBm
Circuit Current	I_d	F =433 MHz Non-RF		11		mA

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

Schematic

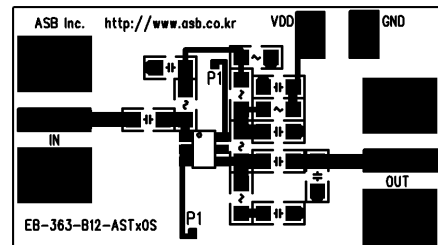


Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8$ mm.

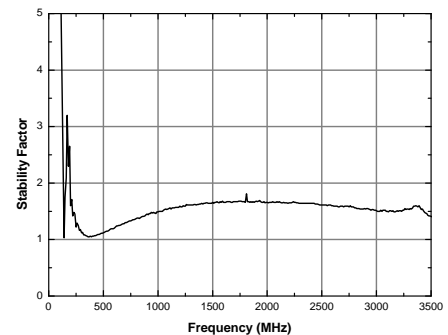
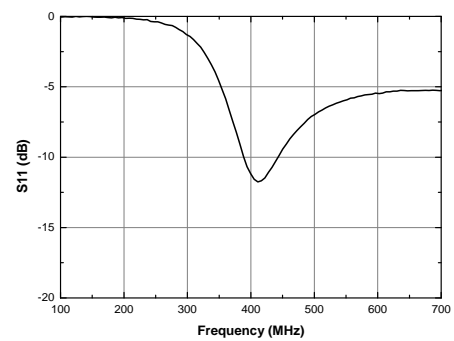
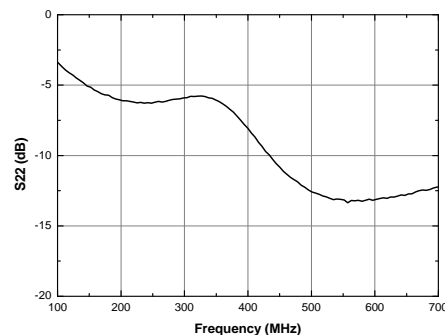
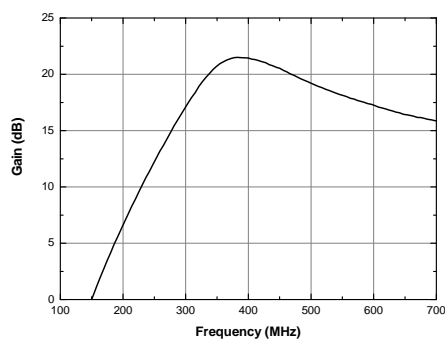
P1 Length: 3.6 mm, Width: 0.3 mm

2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

GSM, CDMA

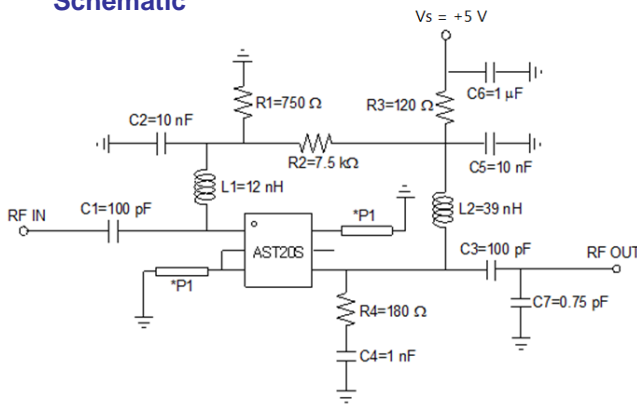
850 ~ 950 MHz

+5 V, 11 mA

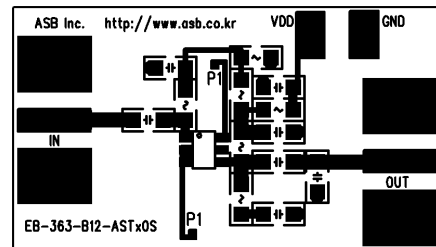
Parameter	Symbol	Unit	Frequency (MHz)	
			868	915
Power Gain	G_p	dB	15.5	15.0
Noise Figure	NF	dB	0.7	0.6
Input Return Loss	RL_{in}	dB	-9	-9
Output Return Loss	RL_{out}	dB	-8	-8
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	4	4
3 rd Intercept Point Output Power ¹⁾	OIP3	dBm	17.5	18.5
Circuit Current	I_d	mA	11	

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

Schematic



Board Layout (FR4, 23x13 mm², 0.8T)

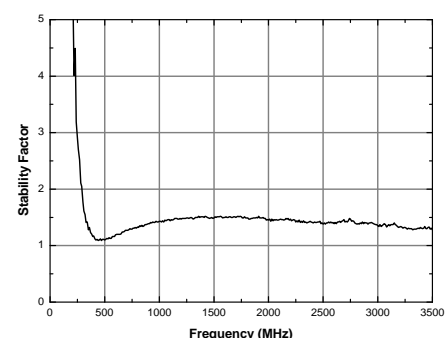
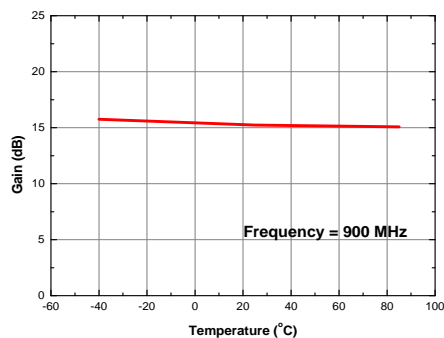
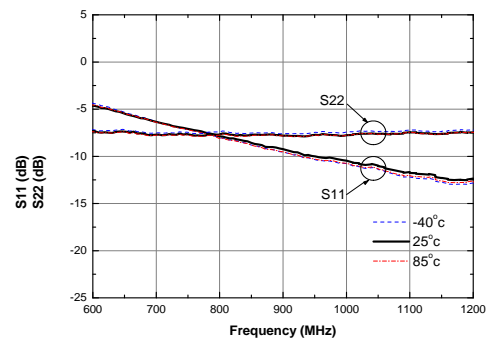
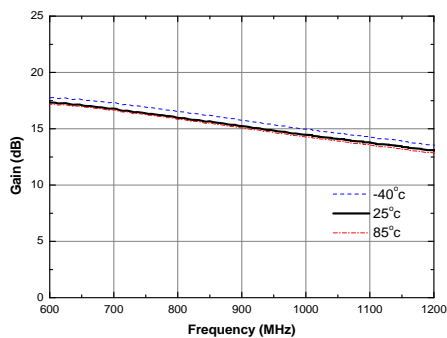


Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8$ mm.

P1 Length: 3.6 mm, Width: 0.3 mm

2) Gain and S11 are in trade-off and varied with the length of P1

S-parameters & K-factor



APPLICATION CIRCUIT

GPS, GLONASS, Galileo, Compass

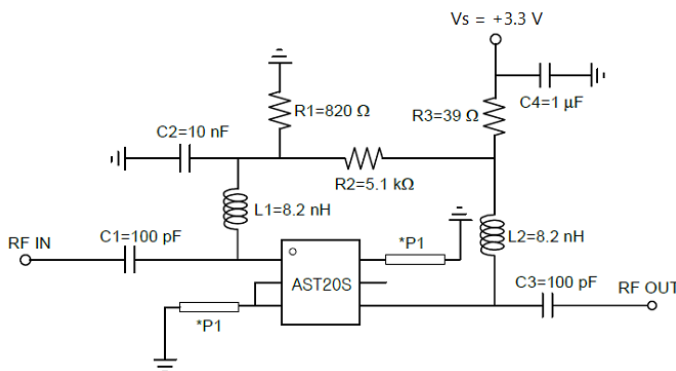
1164 ~ 1300 MHz

+3.3 V, 18 mA

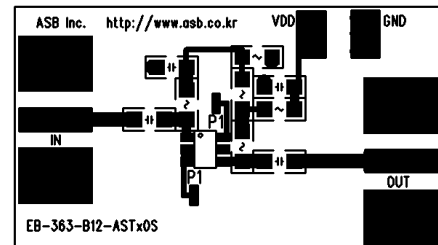
Parameter	Symbol	Unit	Frequency (MHz)
			1160~1300
Power Gain	G_p	dB	16
Noise Figure	NF	dB	0.55
Input Return Loss	RL_{in}	dB	-9.5
Output Return Loss	RL_{out}	dB	-10
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	10
3 rd Intercept Point Output Power ¹⁾	OIP3	dBm	20
Circuit Current	I_d	mA	18

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

Schematic



Board Layout (FR4, 23x13 mm², 0.8T)

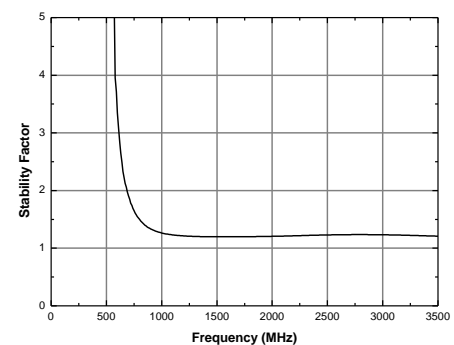
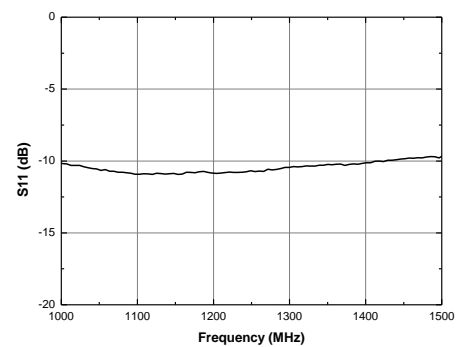
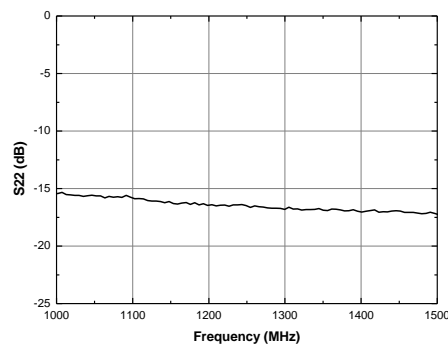
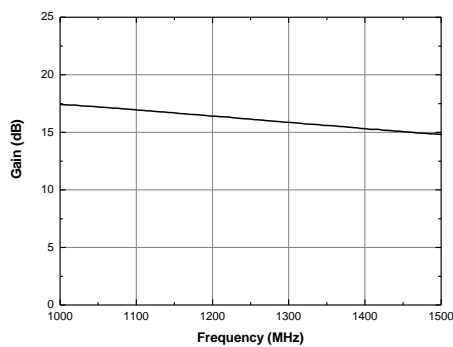


Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8$ mm.

P1 Length: 1.8 mm, Width: 0.3 mm

2) Gain and S11 are in trade-off and varied with the length of P1

S-parameters & K-factor



APPLICATION CIRCUIT

GPS, GLONASS, Galileo, Compass

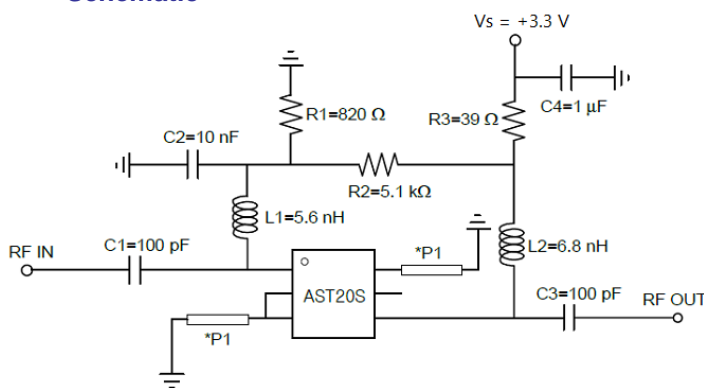
1164 ~ 1300 MHz

+3.3 V, 18 mA

Parameter	Symbol	Unit	Frequency (MHz)
			1160~1300
Power Gain	G_p	dB	16
Noise Figure	NF	dB	0.6
Input Return Loss	RL_{in}	dB	-14
Output Return Loss	RL_{out}	dB	-17
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	10
3 rd Intercept Point Output Power ¹⁾	OIP3	dBm	19
Circuit Current	I_d	mA	18

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

Schematic

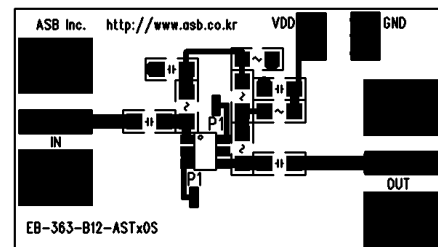


Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8$ mm.

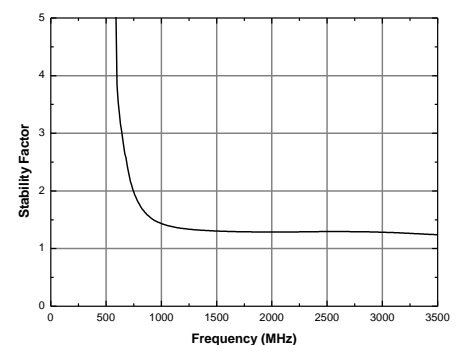
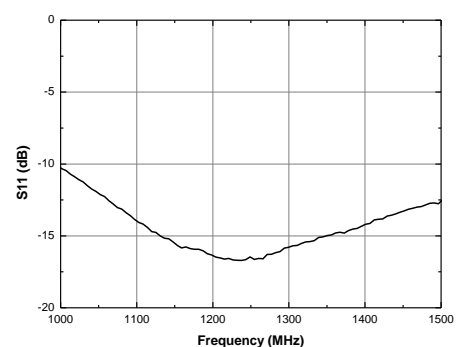
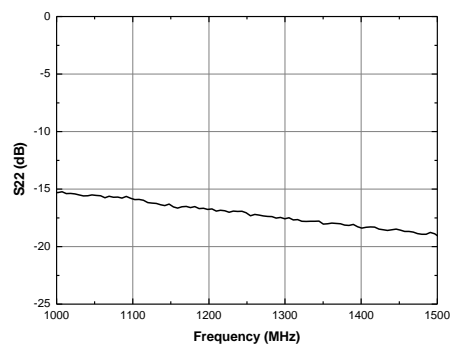
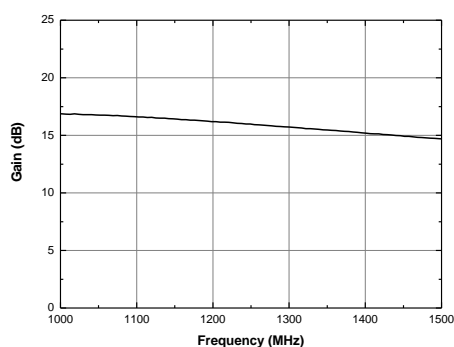
P1 Length: 1.8 mm, Width: 0.3 mm

2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

$\Delta I_d @ +25\text{ }^\circ\text{C} < 9\text{ mA}$

GPS, GLONASS, Galileo, Compass

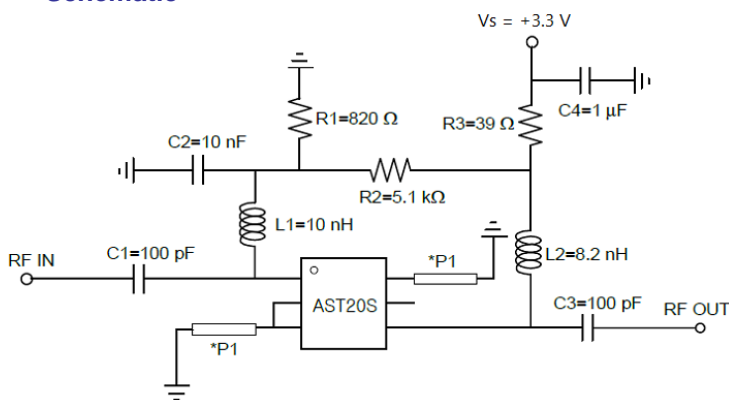
1560 ~ 1620 MHz

+3.3 V, 18 mA

Parameter	Symbol	Unit	Frequency (MHz)
			1560~1620
Power Gain	G_p	dB	14
Noise Figure	NF	dB	0.6
Input Return Loss	RL_{in}	dB	-8
Output Return Loss	RL_{out}	dB	-17
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	12
3 rd Intercept Point Output Power ¹⁾	OIP3	dBm	22
Circuit Current	I_d	mA	18

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

Schematic

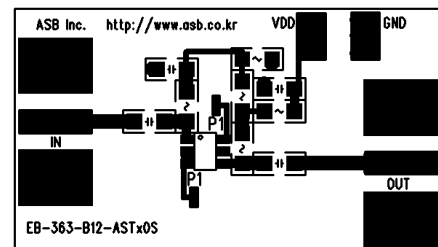


Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8\text{ mm}$.

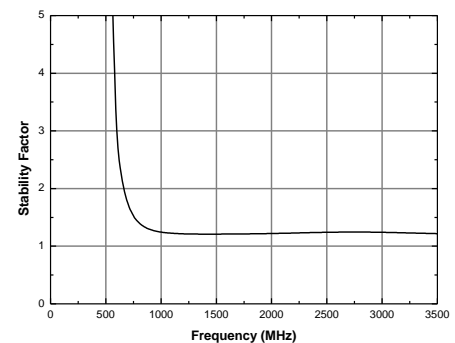
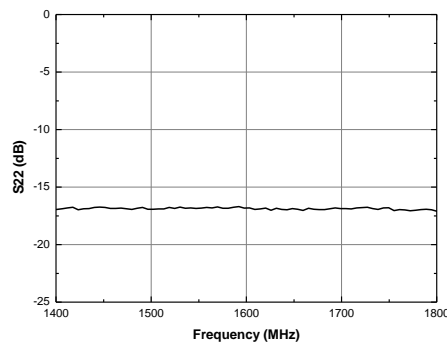
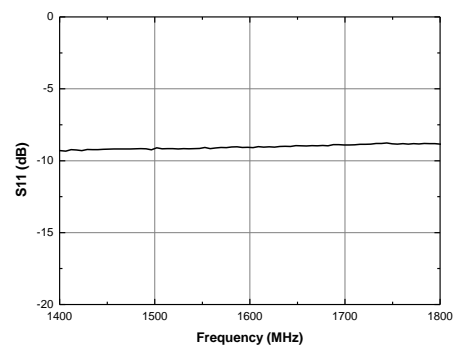
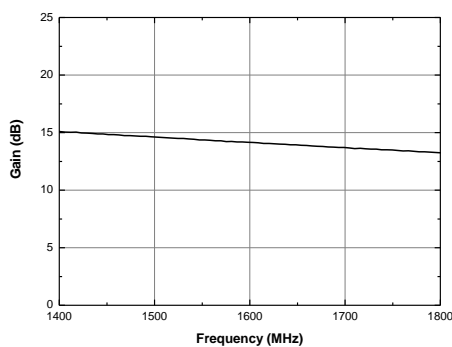
P1 Length: 1.8 mm, Width: 0.3 mm

2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

GPS, GLONASS, Galileo, Compass

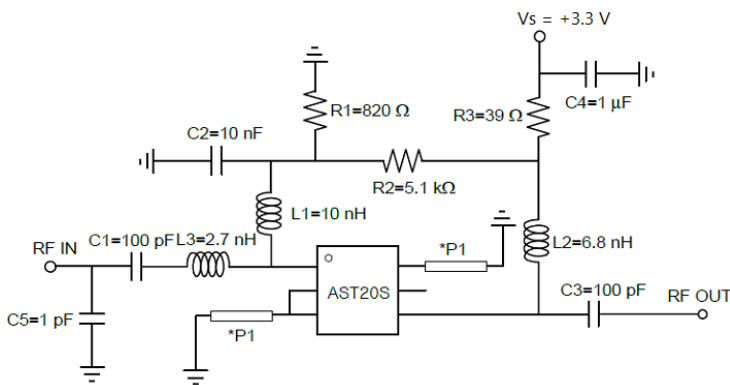
1560 ~ 1620 MHz

+3.3 V, 18 mA

Parameter	Symbol	Unit	Frequency (MHz)
			1560~1620
Power Gain	G_p	dB	14
Noise Figure	NF	dB	0.7
Input Return Loss	RL_{in}	dB	-14
Output Return Loss	RL_{out}	dB	-16
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	11.5
3 rd Intercept Point Output Power ¹⁾	OIP3	dBm	22
Circuit Current	I_d	mA	18

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

Schematic

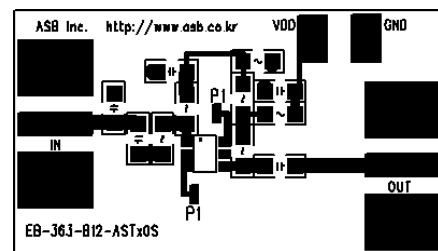


Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8$ mm.

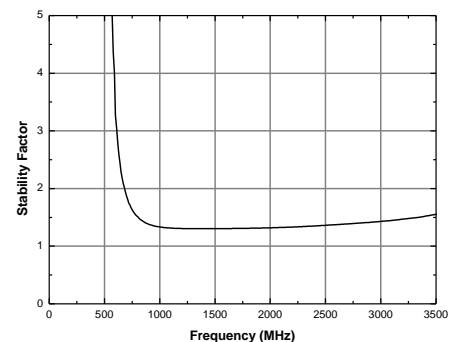
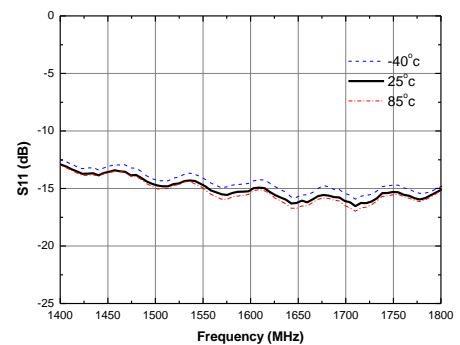
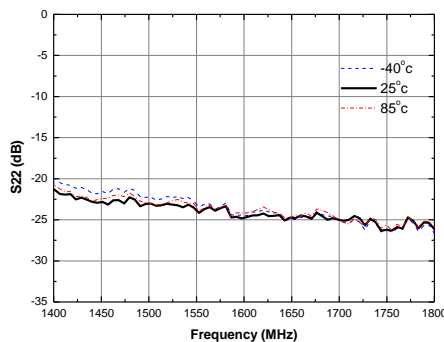
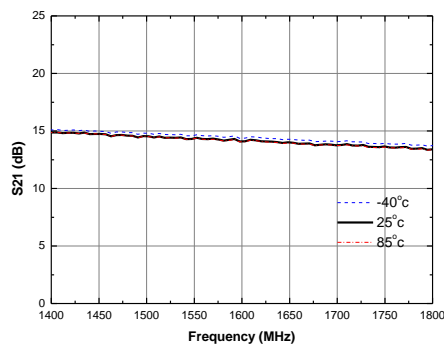
P1 Length: 1.8 mm, Width: 0.3 mm

2) Gain and S_{11} are in trade-off and varied with the length of P1

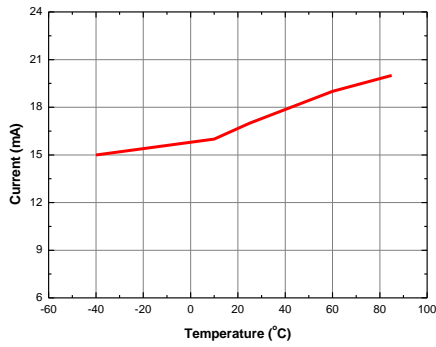
Board Layout (FR4, 23x13 mm², 0.8T)



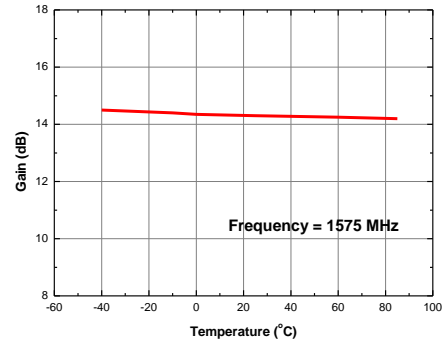
S-parameters & K-factor



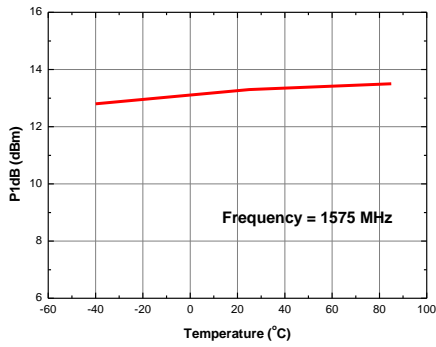
Current vs. Temperature



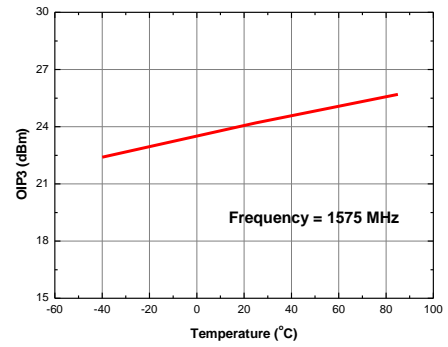
Gain vs. Temperature



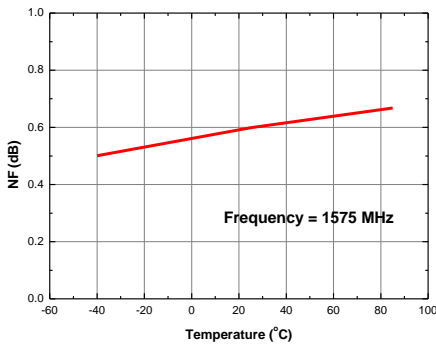
P1dB vs. Temperature



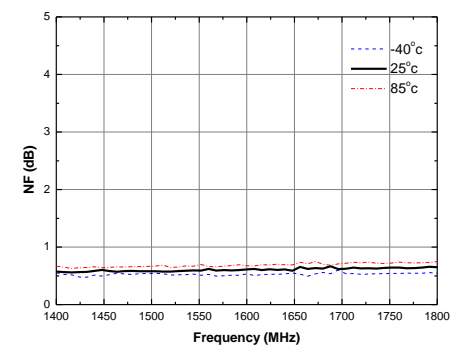
Output IP3 vs. Temperature



NF vs. Temperature



NF vs. Frequency



APPLICATION CIRCUIT

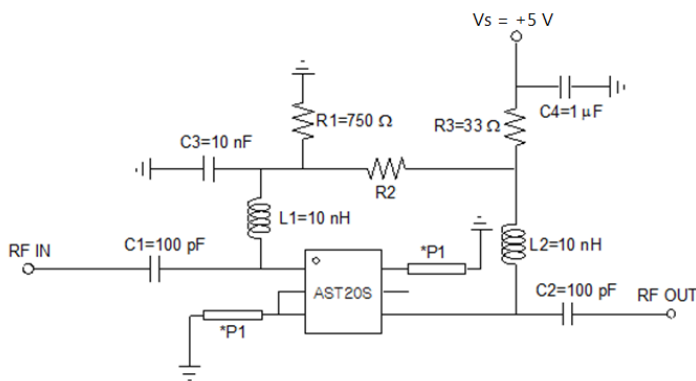
GPS
1472 MHz
+5V

Parameter	Symbol	Test Conditions	TYP ¹⁾	TYP ²⁾	Unit
Power Gain	G_p	F = 1472 GHz	15.0	15.5	dB
Noise Figure	NF	F = 1472 GHz	0.45	0.5	dB
Input Return Loss	RL_{in}	F = 1472 GHz	-10	-10	dB
Output Return Loss	RL_{out}	F = 1472 GHz	-13	-15	dB
1 dB Gain Compression Output Power	$P_{o(1dB)}$	F = 1472 GHz	14	17	dBm
3 rd Intercept Point Output Power ¹⁾	OIP3	F = 1472 GHz	29.5	32.0	dBm
Circuit Current	I_d	F = 1472 GHz Non-RF	20	45	mA

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

2) TYP¹⁾ : R2 = 8.2K Ω , TYP²⁾ : R2 = 5.1K Ω

Schematic

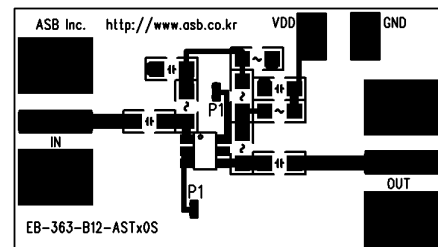


Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8$ mm.

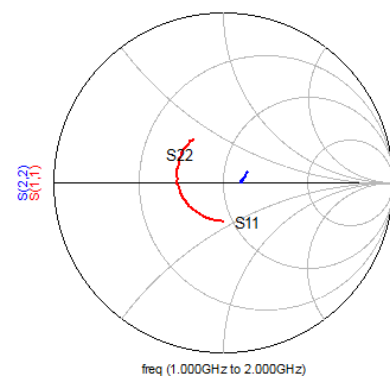
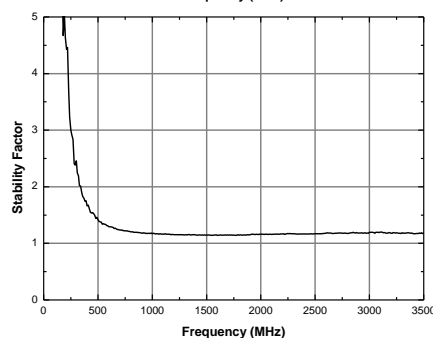
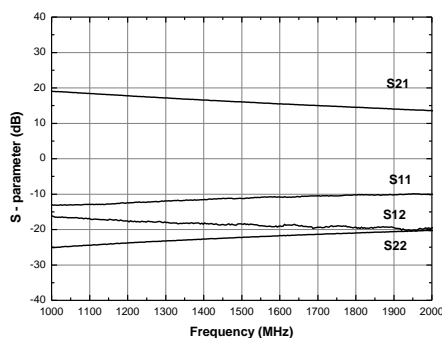
P1 Length: 2.5 mm, Width: 0.3 mm

2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

Satellite Phone

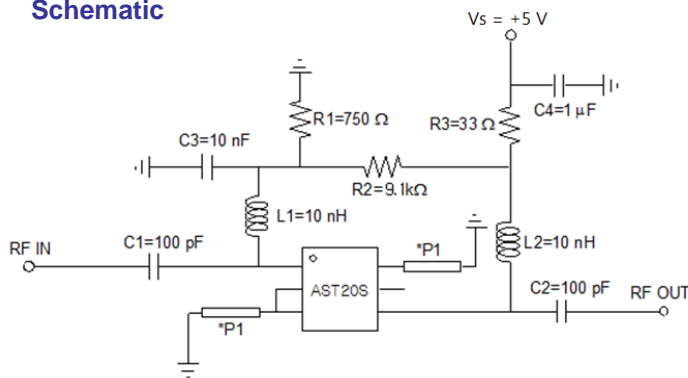
1525 ~ 1559 MHz

+5 V, 15 mA

Parameter	Symbol	Unit	Frequency (MHz)	
			1525	1559
Power Gain	G_p	dB	14.5	14.0
Noise Figure	NF	dB	0.6	0.6
Input Return Loss	RL_{in}	dB	-9	-9
Output Return Loss	RL_{out}	dB	-14	-14
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	16.5	
3 rd Intercept Point Output Power ¹⁾	OIP3	dBm	23.5	
Circuit Current	I_d	mA	15	

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

Schematic

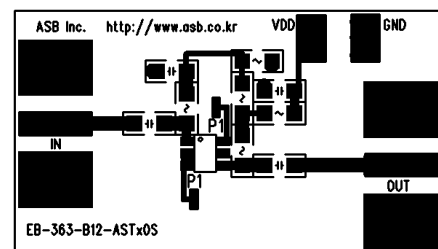


Note: 1) The length of the strip line P1 is given as below at the PCB with $\epsilon_r = 4.5$ and $T = 0.8$ mm.

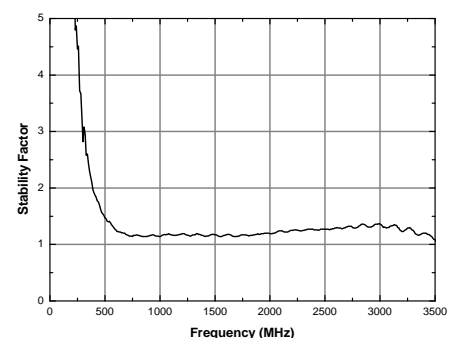
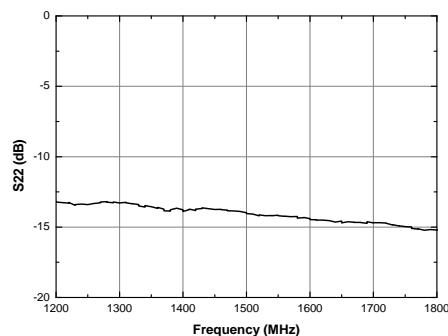
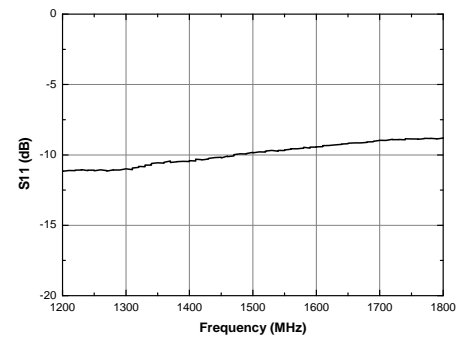
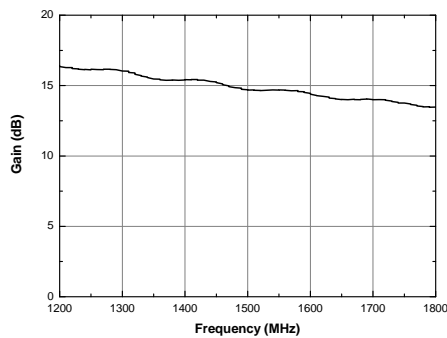
P1 Length: 1.8 mm, Width: 0.3 mm

2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

IF

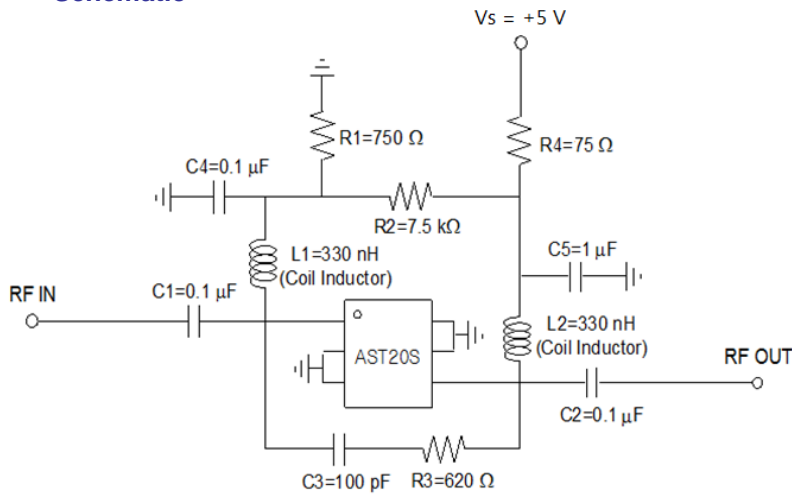
50 ~ 200 MHz

+5 V

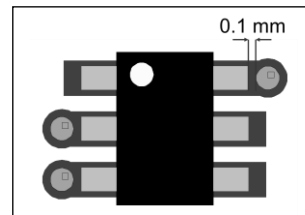
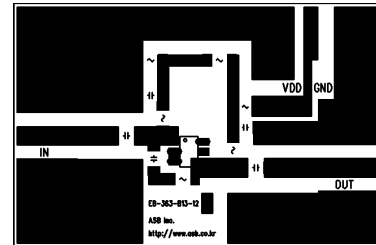
Parameter	Symbol	Unit	Frequency (MHz)	
			50	200
Power Gain	G_p	dB	18.5	18.5
Noise Figure	NF	dB	1.1	1.0
Input Return Loss	RL_{in}	dB	-11	-13
Output Return Loss	RL_{out}	dB	-18	-20
1 dB Gain Compression Output Power	$P_{O(1dB)}$	dBm	6	8
3 rd Intercept Point Output Power ¹⁾	OIP3	dBm	20	20
Circuit Current	I_d	mA	15	

1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic

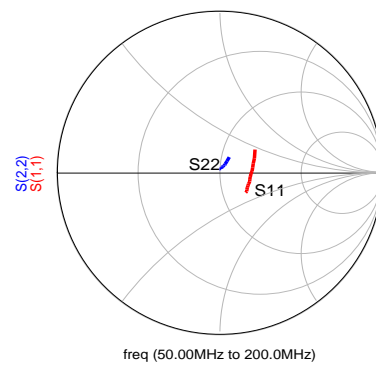
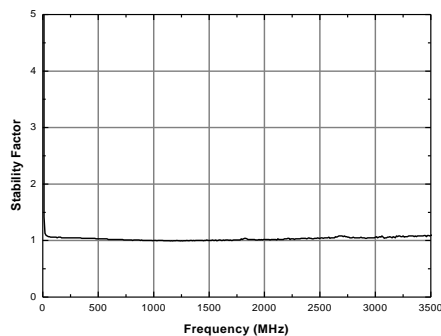
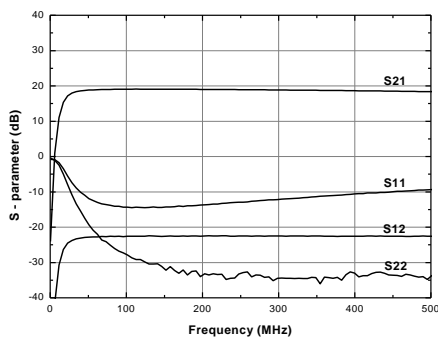


Board Layout (FR4, 24x16 mm², 0.8T)



Note: The ground via holes must be placed close to the lead pin 2, 3, and 6 within 0.1 mm.

S-parameters & K-factor



APPLICATION CIRCUIT

IF

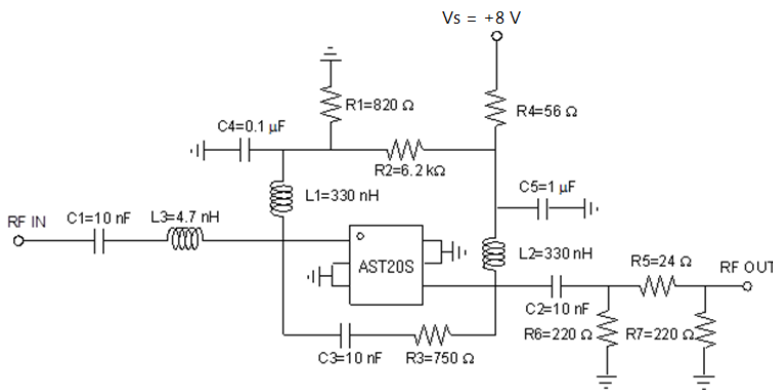
50 ~ 300 MHz

+8 V

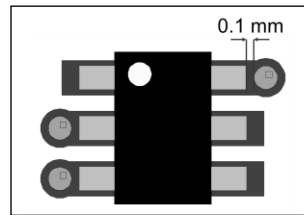
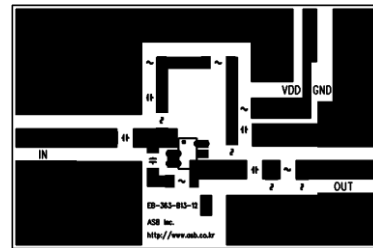
Parameter	Symbol	Unit	Frequency (MHz)	
			50	300
Power Gain	G_p	dB	18.0	17.5
Noise Figure	NF	dB	1.0	1.1
Input Return Loss	RL_{in}	dB	-15	-16
Output Return Loss	RL_{out}	dB	-18	-20
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	16.5	17.0
3 rd Intercept Point Output Power ¹⁾	OIP3	dBm	27	29
Circuit Current	I_d	mA	65	

1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic

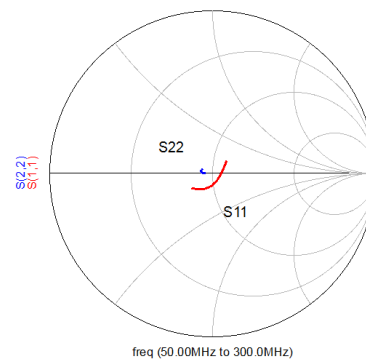
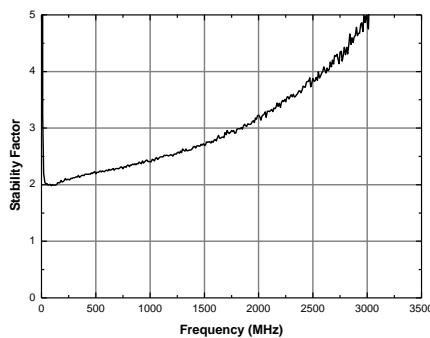
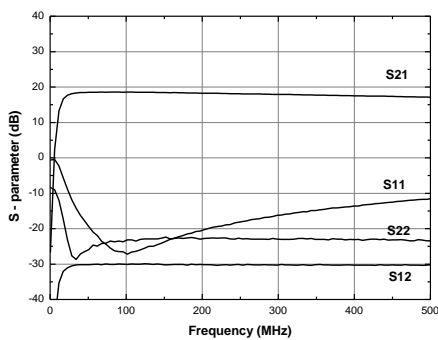


Board Layout (FR4, 24x16 mm², 0.8T)



Note: The ground via holes must be placed close to the lead pin 2, 3, and 6 within 0.1 mm.

S-parameters & K-factor



APPLICATION CIRCUIT

Wide Band

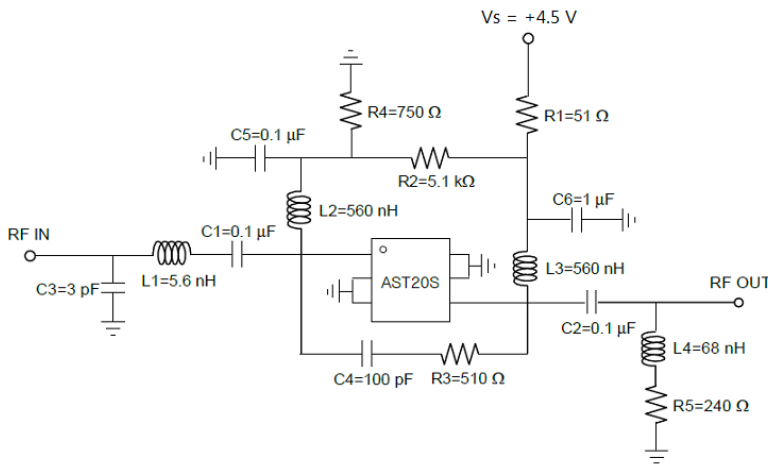
50 ~ 810 MHz

+4.5 V

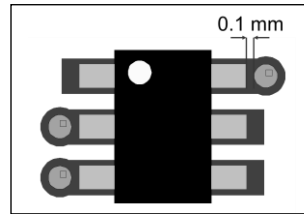
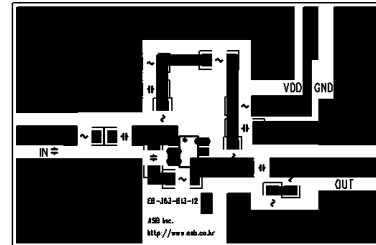
Parameter	Symbol	Unit	Frequency (MHz)		
			50	500	810
Power Gain	G_p	dB	18.7	17.8	17.7
Noise Figure	NF	dB	1.0	1.3	1.2
Input Return Loss	RL_{in}	dB	-20	-9	-12
Output Return Loss	RL_{out}	dB	-11	-14	-18
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	12	13	13
3 rd Intercept Point Output Power ¹⁾	OIP3	dBm	24.5	26.0	25.0
Circuit Current	I_d	mA	28		

1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic

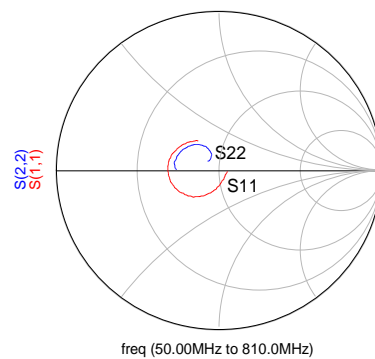
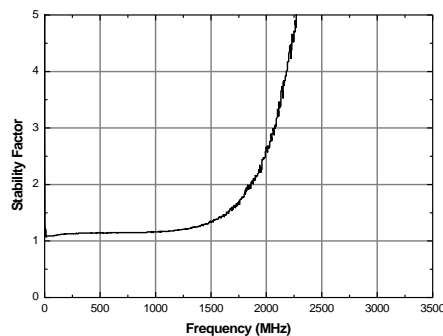
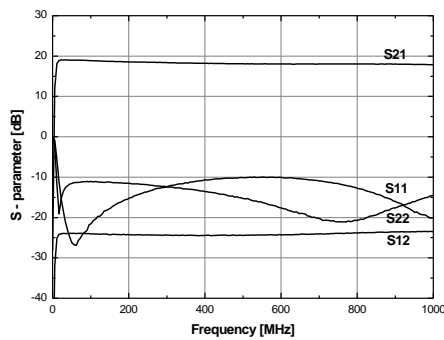


Board Layout (FR4, 24x16 mm², 0.8T)



Note: The ground via holes must be placed close to the lead pin 2, 3, and 6 within 0.1 mm.

S-parameters & K-factor



APPLICATION CIRCUIT

Wide Band

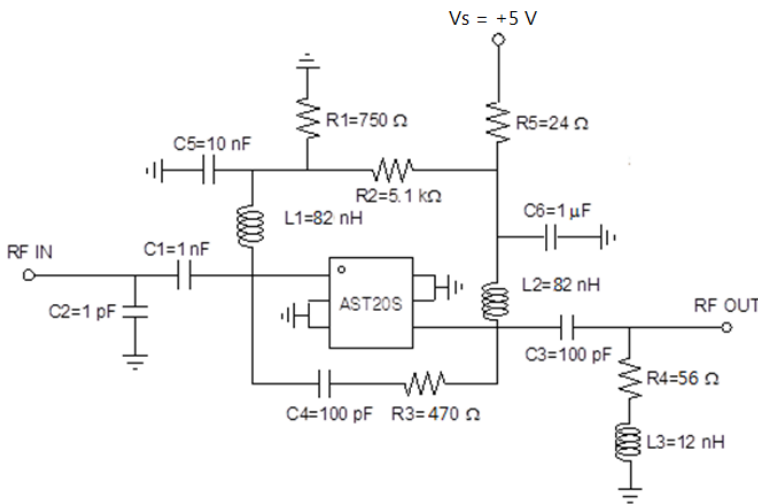
800 ~ 2700 MHz

+5 V

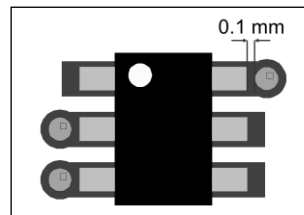
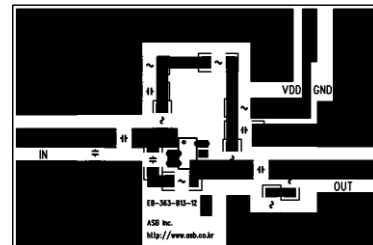
Parameter	Symbol	Unit	Frequency (MHz)		
			800	1500	2700
Power Gain	G_p	dB	15.8	15.5	14.7
Noise Figure	NF	dB	1.10	1.25	1.35
Input Return Loss	RL_{in}	dB	-5	-5	-10
Output Return Loss	RL_{out}	dB	-7	-11	-11
1 dB Gain Compression Output Power	$P_{O(1dB)}$	dBm	17	18	19
3 rd Intercept Point Output Power ¹⁾	OIP3	dBm	29.0	33.0	33.0
Circuit Current	I_d	mA	54		

1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic

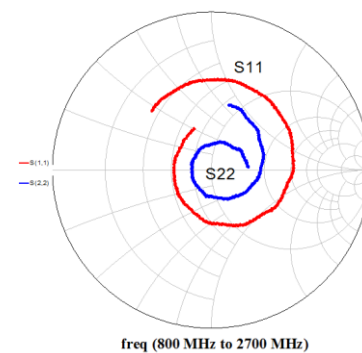
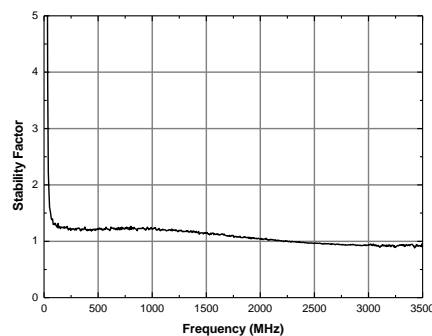
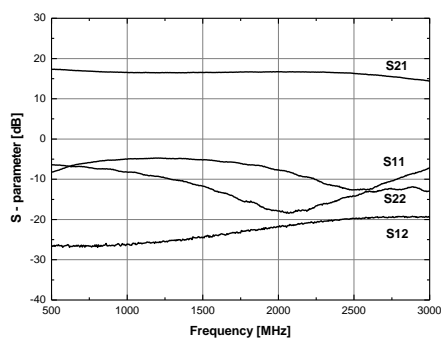


Board Layout (FR4, 24x16 mm², 0.8T)



Note: The ground via holes must be placed close to the lead pin 2, 3, and 6 within 0.1 mm.

S-parameters & K-factor



APPLICATION CIRCUIT

CMMB

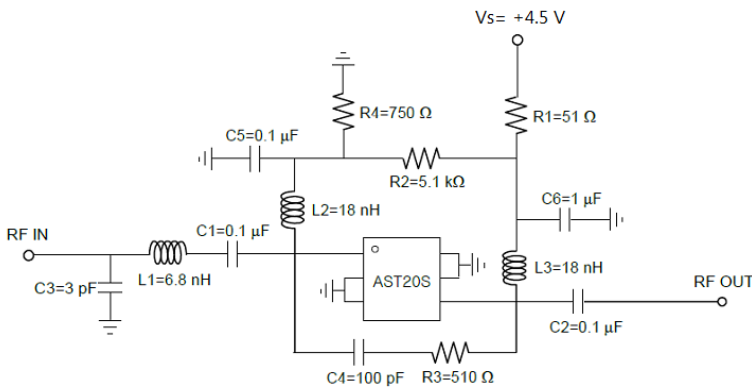
470 ~ 860 MHz

+4.5 V

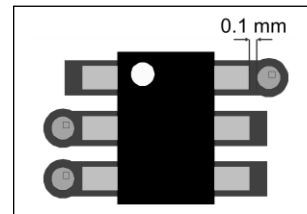
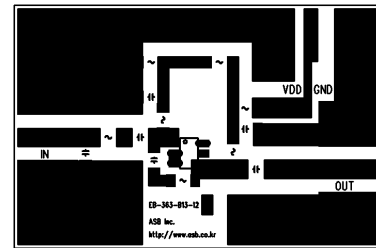
Parameter	Symbol	Unit	Frequency (MHz)	
			470	860
Power Gain	G_p	dB	18.4	18.2
Noise Figure	NF	dB	1.2	1.2
Input Return Loss	RL_{in}	dB	-15	-18
Output Return Loss	RL_{out}	dB	-12	-15
1 dB Gain Compression Output Power	$P_{O(1dB)}$	dBm	11	14
3 rd Intercept Point Output Power ¹⁾	OIP3	dBm	24	26
Circuit Current	I_d	mA	28	

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

Schematic

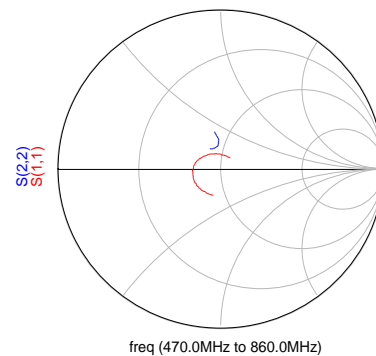
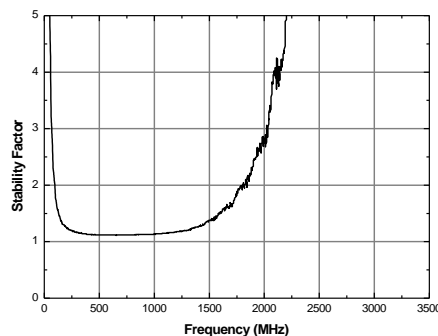
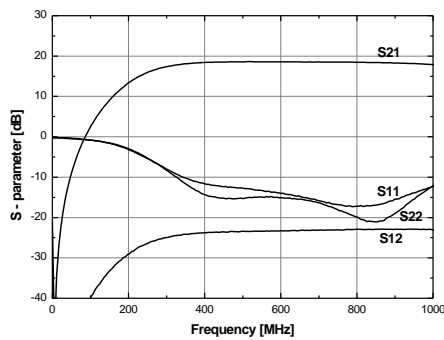


Board Layout (FR4, 24x16 mm², 0.8T)



Note: The ground via holes must be placed close to the lead pin 2, 3, and 6 within 0.1 mm.

S-parameters & K-factor



High Gain, Low Noise Amplifier

APPLICATION CIRCUIT

ONU, 50 Ω

70 ~ 2700 MHz

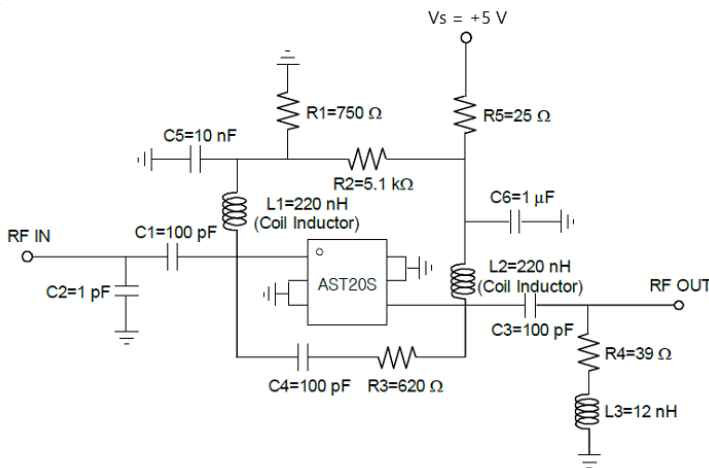
+5 V

Parameter	Symbol	Unit	Frequency (MHz)			
			70	470	1500	2700
Power Gain	G_p	dB	17.3	17.4	16.5	14.8
Noise Figure	NF	dB	1.2	1.1	1.2	1.3
Input Return Loss	RL_{in}	dB	-15	-6	-5	-9
Output Return Loss	RL_{out}	dB	-6	-7	-14	-16
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	16.0	16.4	19.0	19.5
3 rd Intercept Point Output Power ¹⁾	OIP3	dBm	27.0	28.5	33.0	32.5
2 nd Intercept Point Output Power ²⁾	OIP2	dBm	34.0			
Circuit Current	I_d	mA	54			

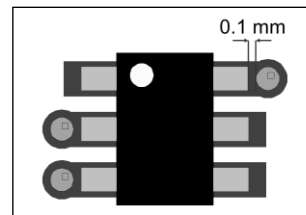
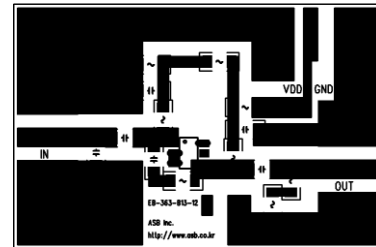
1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

2) OIP2 is measured with two tones (100MHz, 800MHz) at an output power of +0 dBm/tone, 700MHz.

Schematic

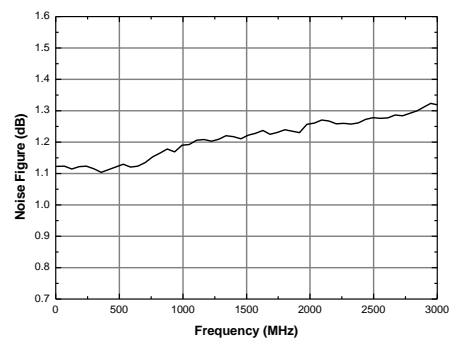
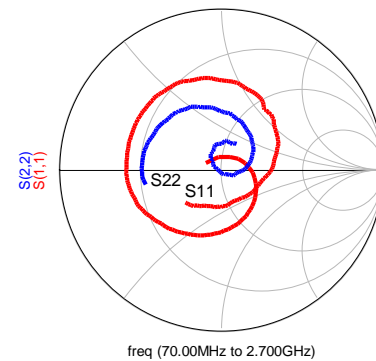
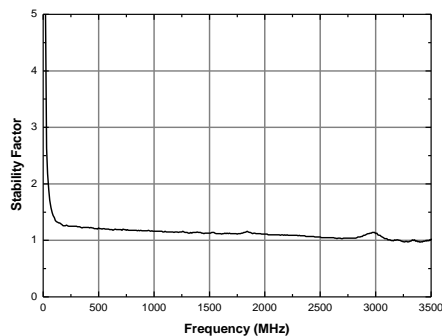
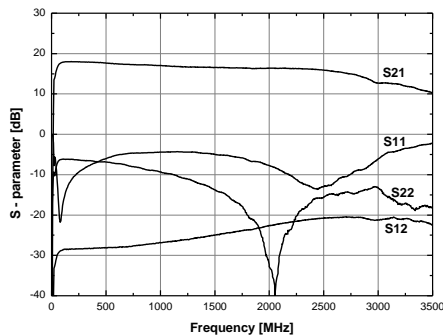


Board Layout (FR4, 24x16 mm², 0.8T)



Note: The ground via holes must be placed close to the lead pin 2, 3, and 6 within 0.1 mm.

S-parameters & Noise Figure



APPLICATION CIRCUIT

LTE

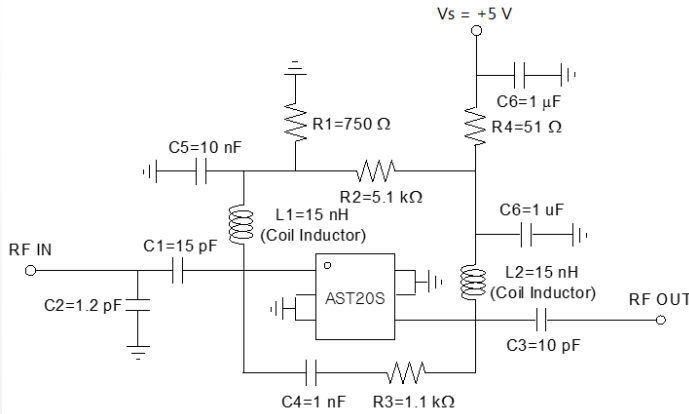
2300 ~ 2700 MHz

+5 V

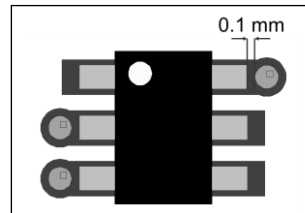
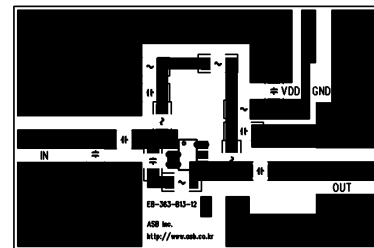
Parameter	Symbol	Unit	Frequency (MHz)		
			2300	2500	2700
Power Gain	G_p	dB	15.5	15.3	14.7
Noise Figure	NF	dB	1.2	1.2	1.2
Input Return Loss	RL_{in}	dB	-9	-12	-10
Output Return Loss	RL_{out}	dB	-20	-17	-13
1 dB Gain Compression	$P_{o(1dB)}$	dBm	17.5	17.5	17.5
Output Power	OIP3	dBm	30.5	30.0	33.5
3 rd Intercept Point Output Power ¹⁾	I_d	mA	34		
Circuit Current					

1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic

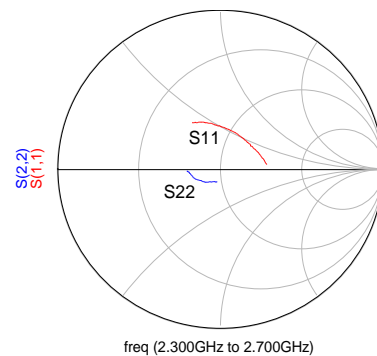
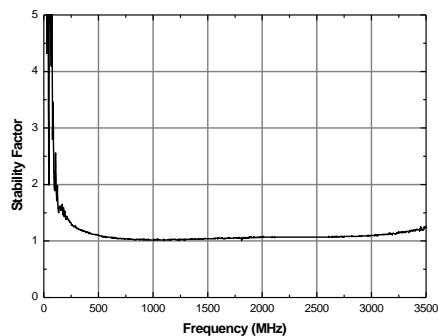
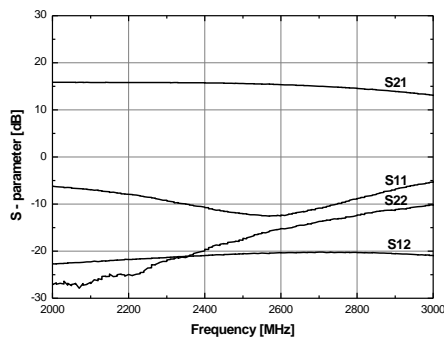


Board Layout (FR4, 24x16 mm², 0.8T)



Note: The ground via holes must be placed close to the lead pin 2, 3, and 6 within 0.1 mm.

S-parameters & K-factor



APPLICATION CIRCUIT

SMATV, 50 Ω

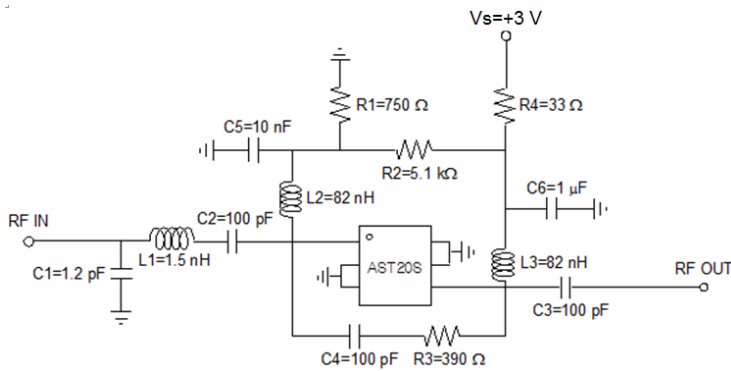
900 ~ 2100 MHz

+3 V

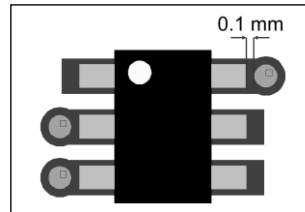
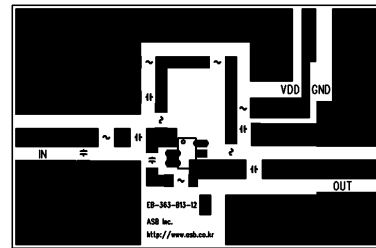
Parameter	Symbol	Unit	Frequency (MHz)		
			900	1500	2100
Power Gain	G_p	dB	14.0	13.5	13.5
Noise Figure	NF	dB	1.5	1.5	1.4
Input Return Loss	RL_{in}	dB	-6	-6	-9
Output Return Loss	RL_{out}	dB	-18	-14	-10
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	6.5	6.0	5.5
3 rd Intercept Point Output Power ¹⁾	OIP3	dBm	20.0	20.0	19.0
Circuit Current	I_d	mA	12		

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

Schematic

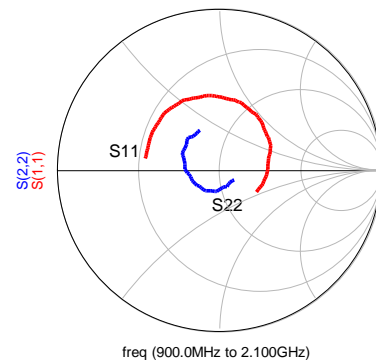
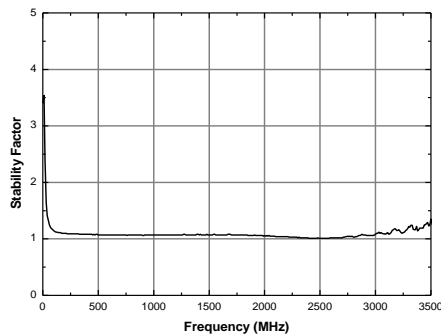
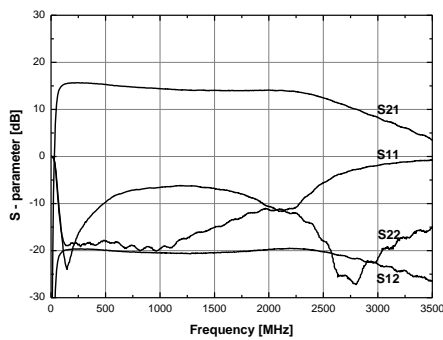


Board Layout (FR4, 24x16 mm², 0.8T)



Note: The ground via holes must be placed close to the lead pin 2, 3, and 6 within 0.1 mm.

S-parameters & K-factor



APPLICATION CIRCUIT

Trans-impedance Amplifier

50 Ω

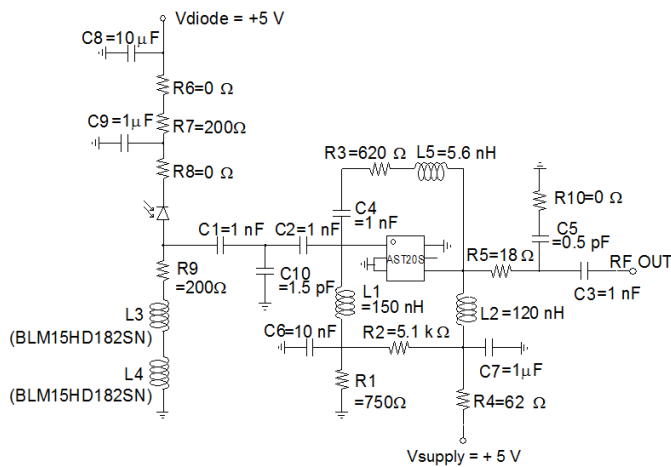
50 ~ 2500 MHz

+5 V

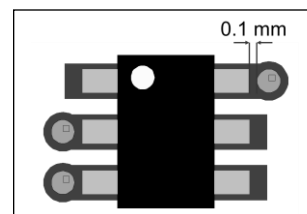
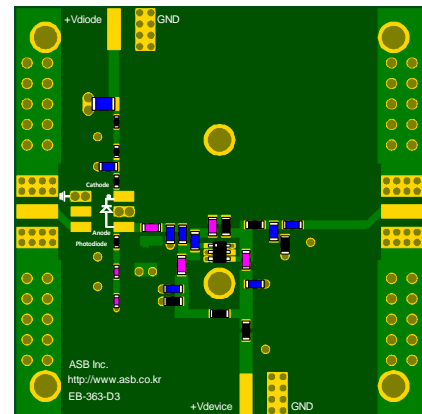
Parameter	Symbol	Unit	Frequency (MHz)				
			50	200	950	2150	2500
Power Gain	G_p	dB	15.0	14.5	11.5	16.1	16.1
Output Return Loss	RL_{out}	dB	-8	-8	-8	-15	-5
EIN	EIN	pA/rtHz	8.3	5.4	8.0	5.1	5.9
3 rd Intercept Point Output Power ¹⁾	OIP3	dBm	15 ¹⁾	13 ¹⁾	9 ²⁾	8 ²⁾	5 ²⁾
Circuit Current	I_d	mA	28				
Device Voltage	V_d	V	3.26				

1) OIP3 is measured with two tones at an output power of -17 dBm/tone separated by 1MHz.
 2) OIP3 is measured with two tones at an output power of -20 dBm/tone separated by 1MHz.

Schematic



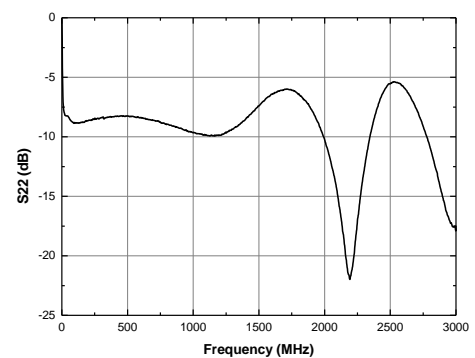
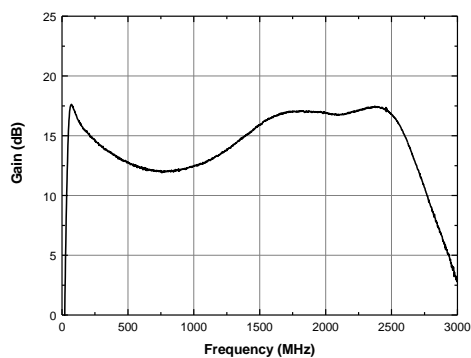
Board Layout (FR4, 40x40 mm², 0.8T)



Note:

1. The gain and S22 above 2 GHz are sensitive to the photodiode lead length.
2. The measurement is made with 4 mm long lead.
3. The ground via holes must be placed close to the lead pin 2, 3, and 6 within 0.1 mm.

S-parameters



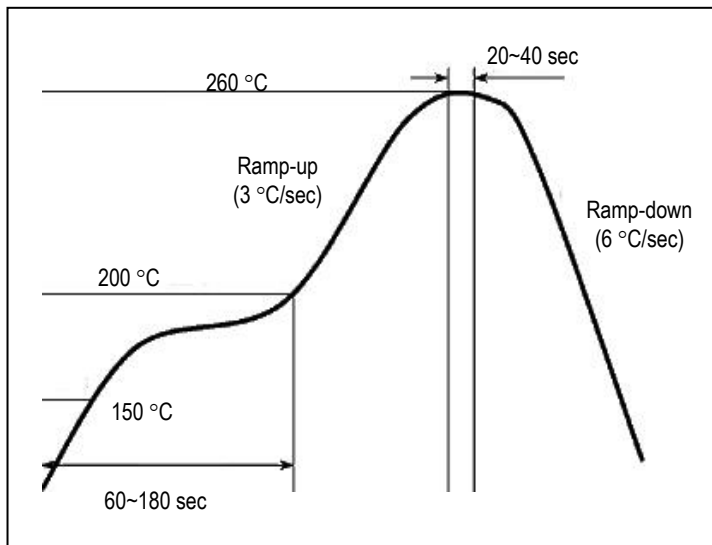
Noise Parameters

$V_{DS} = +3\text{ V}$, $I_{DS} = 30\text{ mA}$

Freq (Hz)	F_{min} (dB)	Γ_{opt} (Mag.)	Γ_{opt} (Ang.)	$R_{n/50}$
0.5e+9	0.03	0.86	-46.3	0.07
1e+9	0.22	0.41	-12.3	0.07
1.5e+9	0.28	0.47	50.8	0.07
2e+9	0.4	0.38	56.7	0.08
2.5e+9	0.52	0.29	73.5	0.08
3e+9	0.54	0.31	90.9	0.08
4e+9	0.48	0.35	111.6	0.08
5e+9	0.71	0.43	130.1	0.07
6e+9	0.83	0.46	139.7	0.07
7e+9	0.82	0.54	148	0.07
8e+9	1.15	0.58	152.5	0.06
9e+9	1.3	0.59	156.1	0.07
10e+9	1.41	0.63	159.7	0.06

$V_{DS} = +3\text{ V}$, $I_{DS} = 40\text{ mA}$

Freq (Hz)	F_{min} (dB)	Γ_{opt} (Mag.)	Γ_{opt} (Ang.)	$R_{n/50}$
0.5e+9	0	0.87	-48.4	0.07
1e+9	0.18	0.38	-18.6	0.06
1.5e+9	0.18	0.45	62.7	0.06
2e+9	0.27	0.34	58.4	0.08
2.5e+9	0.48	0.26	74.3	0.07
3e+9	0.54	0.29	93.2	0.07
4e+9	0.5	0.33	114.7	0.08
5e+9	0.72	0.42	133	0.07
6e+9	0.83	0.45	142.3	0.07
7e+9	0.84	0.53	150	0.06
8e+9	1.15	0.56	154.2	0.06
9e+9	1.32	0.58	157.6	0.07
10e+9	1.42	0.63	161.1	0.06

Recommended Soldering Reflow Profile

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