AST20S

High Gain, Low Noise Amplifier

Features

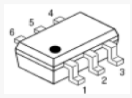
- 18 dB Gain at 900 MHz
- 0.6 dB NF at 900 MHz
- 29 dBm OIP3 at 900 MHz
- 16 dBm P1dB at 900 MHz

"AEC-Q100 Qualified"

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.

RoHS-compliant



Package Style: SOT363

Typical Performance

(Supply Voltage = +5 V, T_A = +25 °C, Zo = 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		900	
Gain	dB	17	18	
S11	dB		-13	
S22	dB		-15	
Output IP3	dBm	27	29	
Noise Figure	dB		0.6	0.7
Output P1dB	dBm	15	16	
Current	mA	30	40	50
Device Voltage	V		+3.44	

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	+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

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

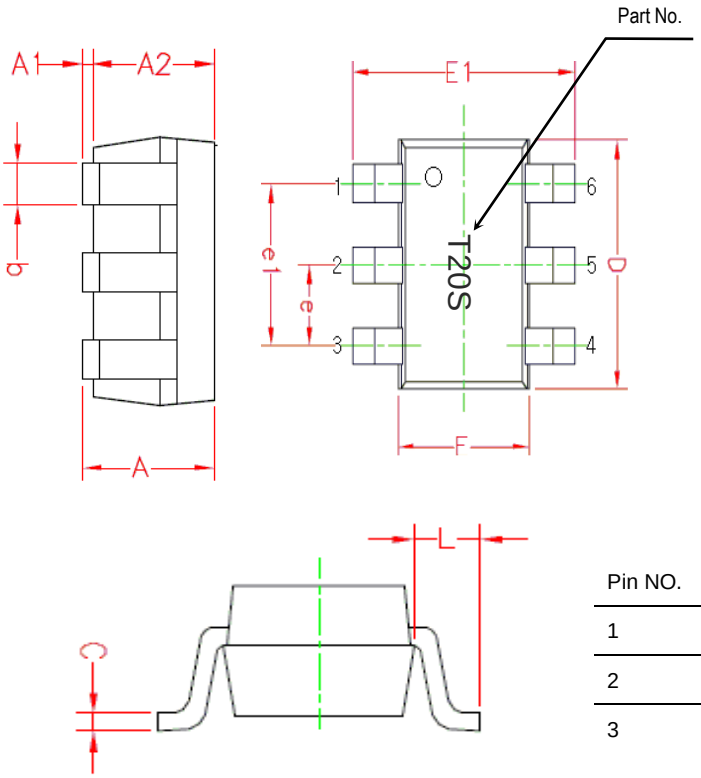
Application Circuit

- 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 ~ 1620 MHz (GPS,GLONASS,Galileo,Compass)
- 1560 ~ 1620 MHz (Current Deviation Reduced)
- 1472 MHz
- Satellite Phone
- 174 ~ 240 MHz
- 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)

Pin Configuration

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

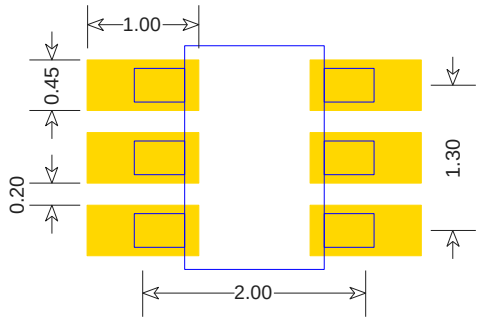
Outline Drawing



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: ESD-sensitive device!

Moisture Sensitivity Level

Level 3 at 260 °C reflow

APPLICATION CIRCUIT

LTE

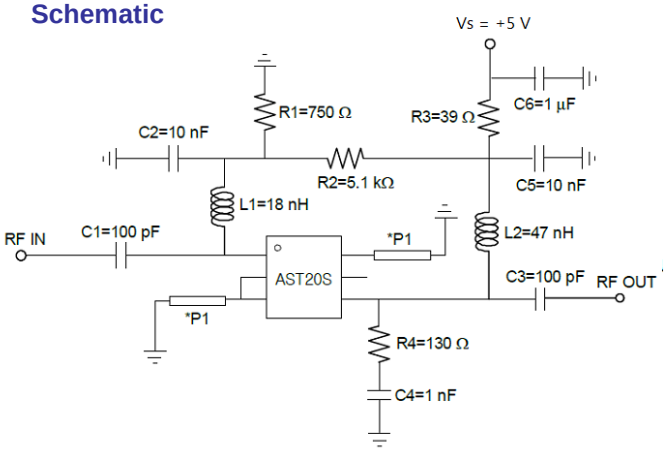
698 ~ 787 MHz

+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	
3rd 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



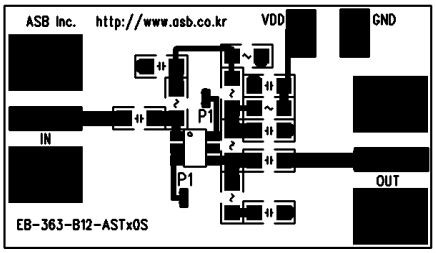
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 2.0 mm, Width: 0.3 mm

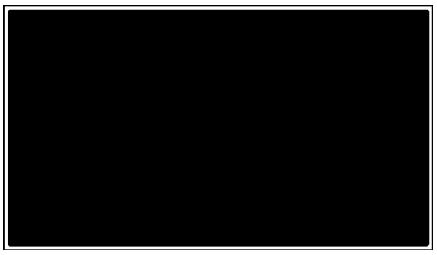
2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)

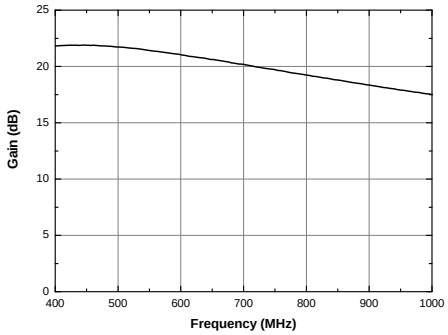
Top

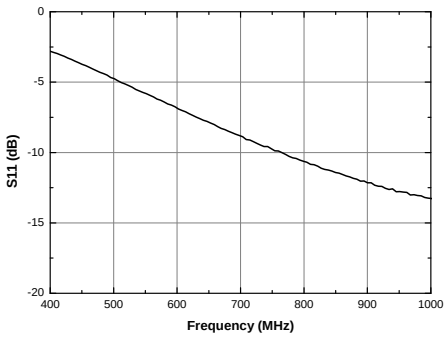


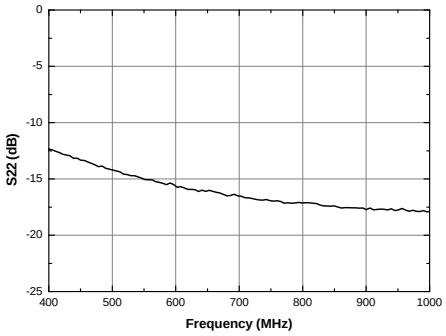
Bottom

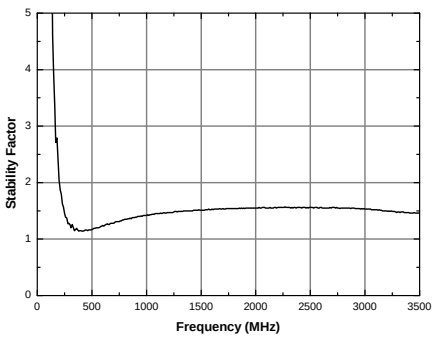


S-parameters & K-factor









APPLICATION CIRCUIT

GSM, CDMA

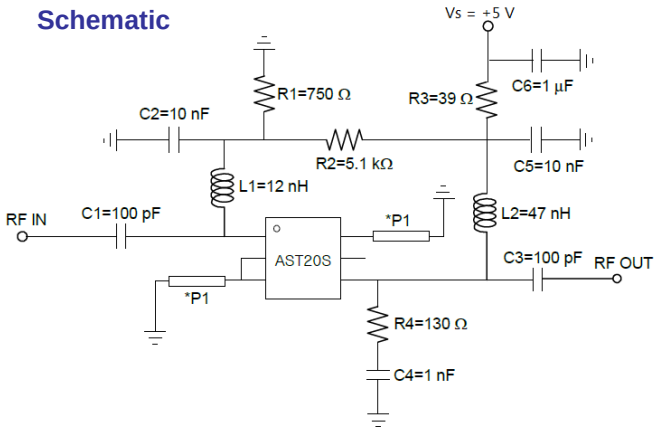
900 MHz

+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
3rd 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



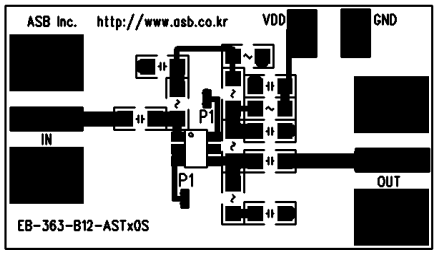
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 2.0 mm, Width: 0.3 mm

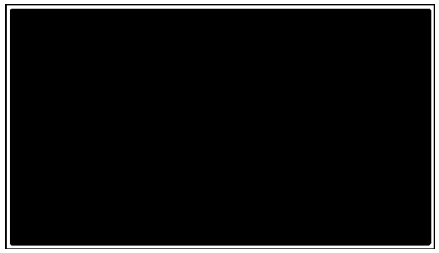
2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)

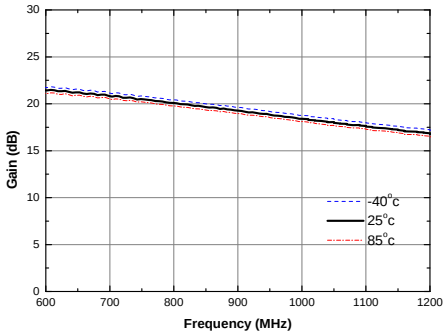
Top

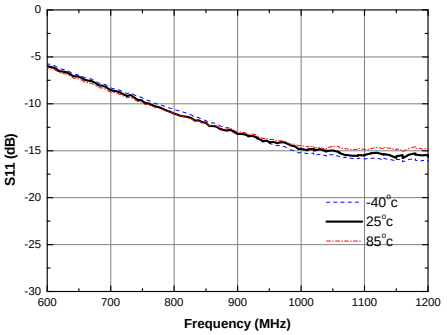


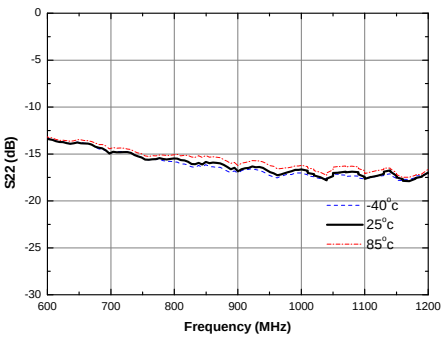
Bottom

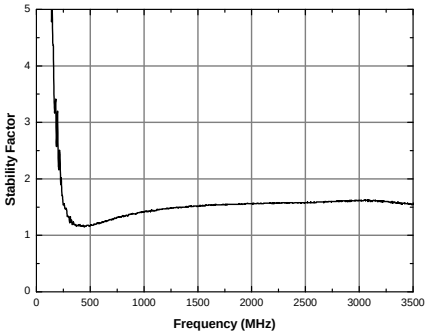


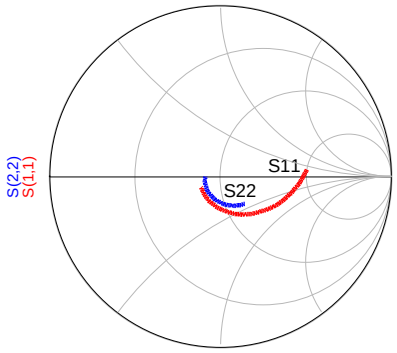
S-parameters & Noise Figure



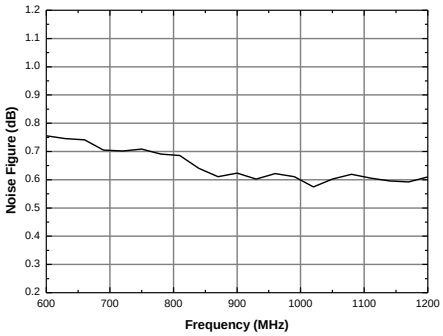




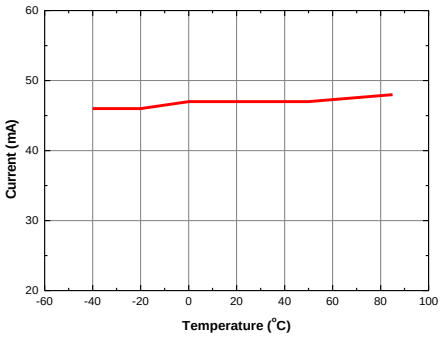




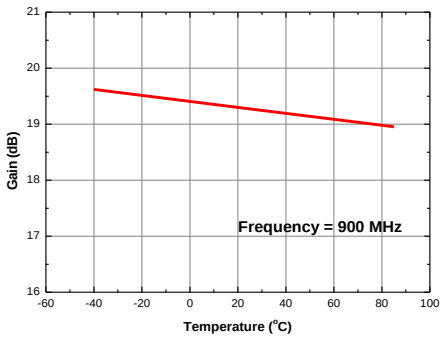
freq (600.0MHz to 1.200GHz)



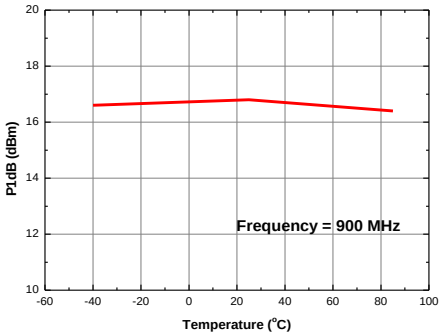
Current vs. Temperature



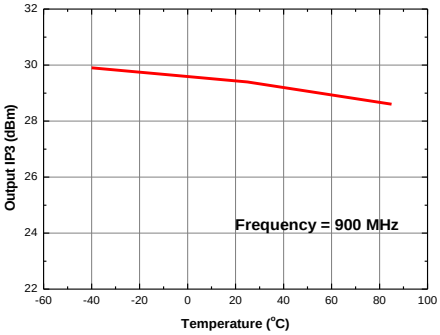
Gain vs. Temperature



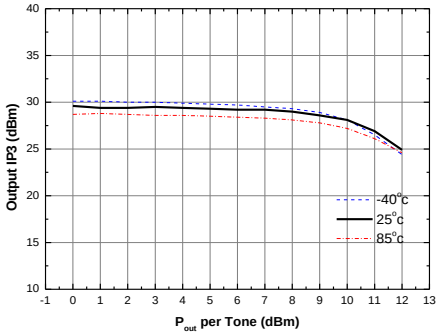
P1dB vs. Temperature



Output IP3 vs. Temperature



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



APPLICATION CIRCUIT

GSM, CDMA

S11 < -18 dB

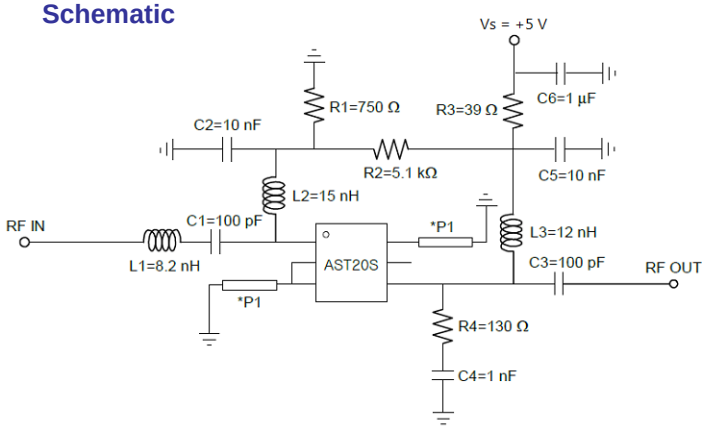
880 ~ 953 MHz

+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
3rd 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



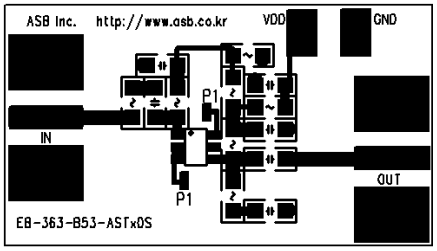
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 1.1 mm, Width: 0.3 mm

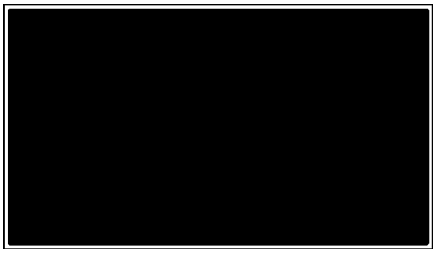
2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)

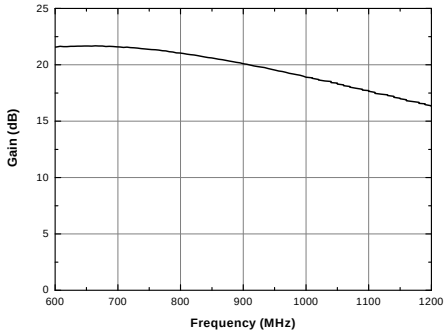
Top

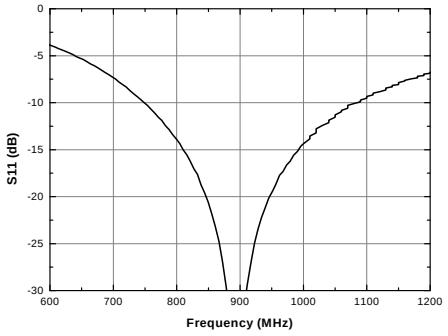


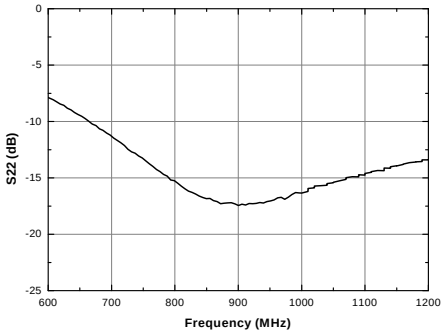
Bottom

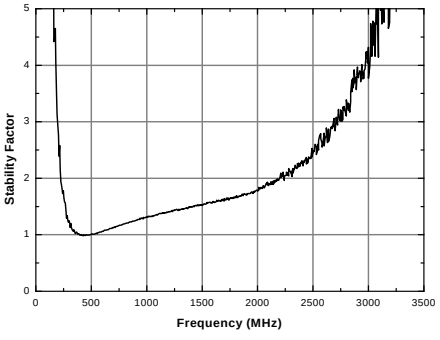


S-parameters & K-factor









APPLICATION CIRCUIT

GSM, CDMA

Balanced Type

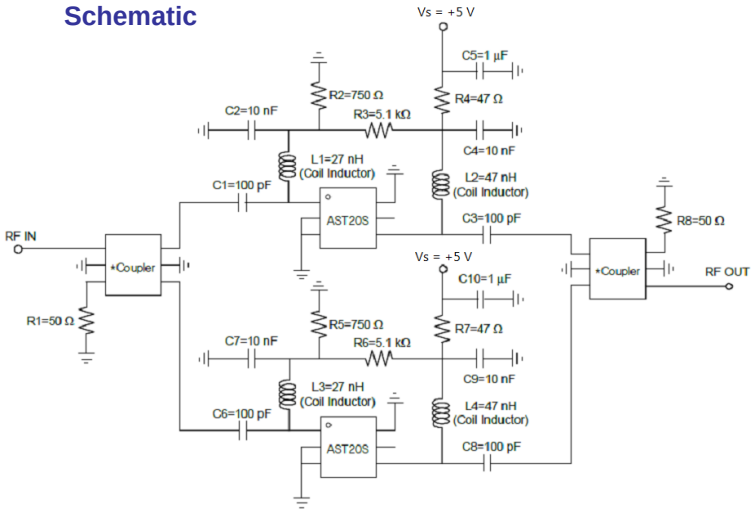
900 MHz

+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
3rd 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.

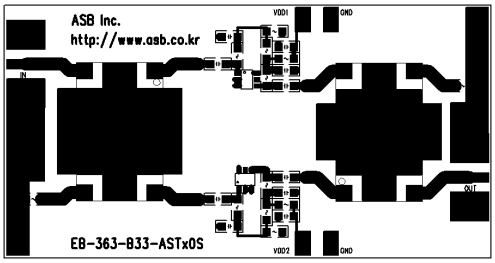
Schematic



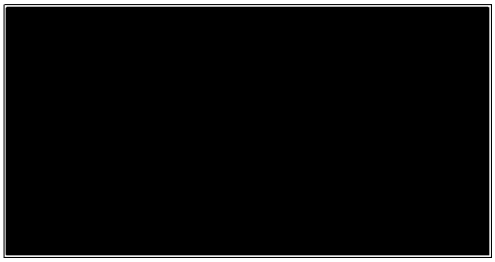
Coupler : Anaren, XC0900A-03

Board Layout (FR4, 50x26 mm², 0.8T)

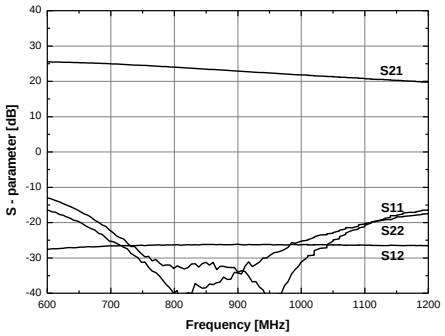
Top

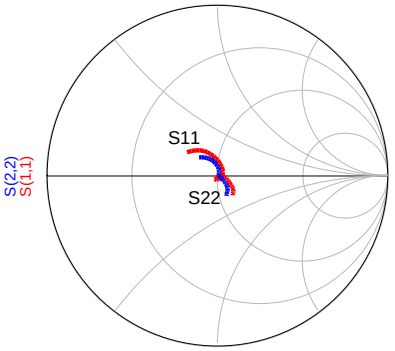


Bottom

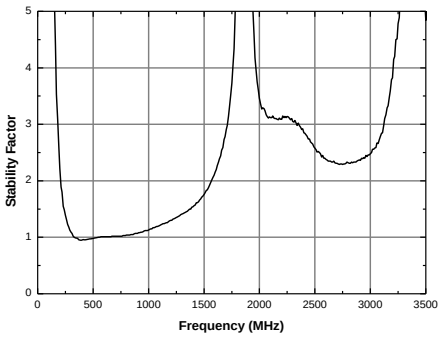


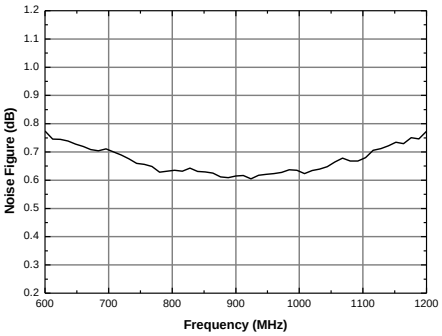
S-parameters & Noise Figure





freq (600.0MHz to 1.200GHz)





APPLICATION CIRCUIT

PCS

S11 < -18 dB

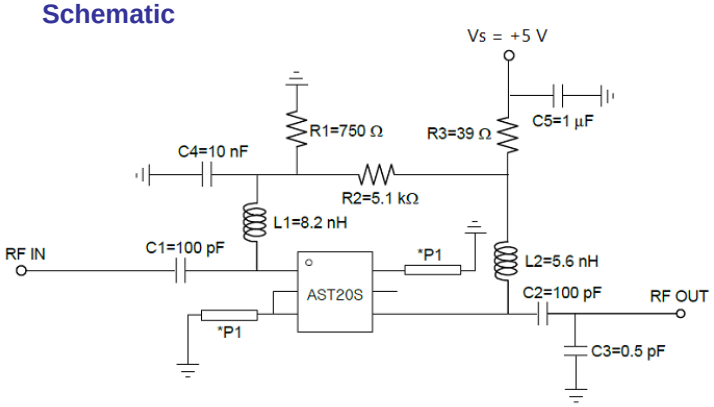
1755 ~ 2140 MHz

+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 Output Power	$P_{o(1dB)}$	dBm	17.0	17.5
3rd Intercept Point Output Power[1)]	OIP3	dBm	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



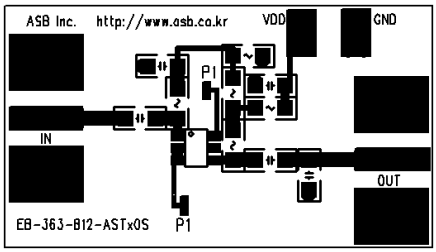
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 2.2 mm, Width: 0.3 mm

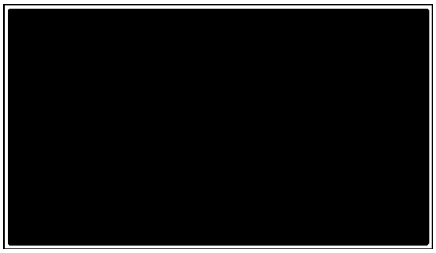
2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)

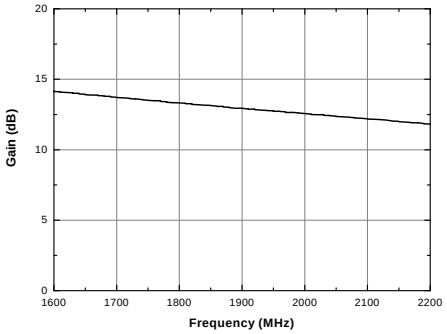
Top

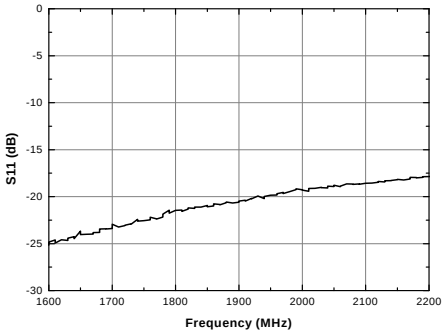


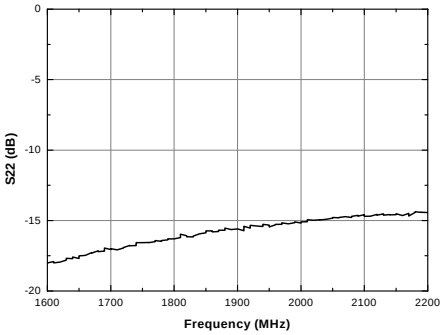
Bottom

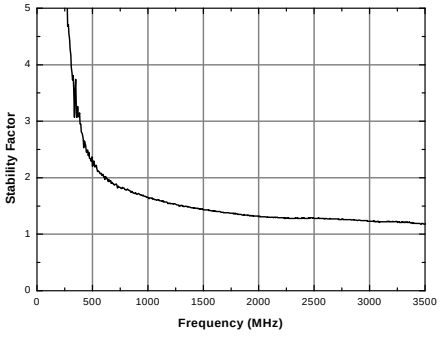


S-parameters & K-factor









APPLICATION CIRCUIT

WCDMA

High Gain

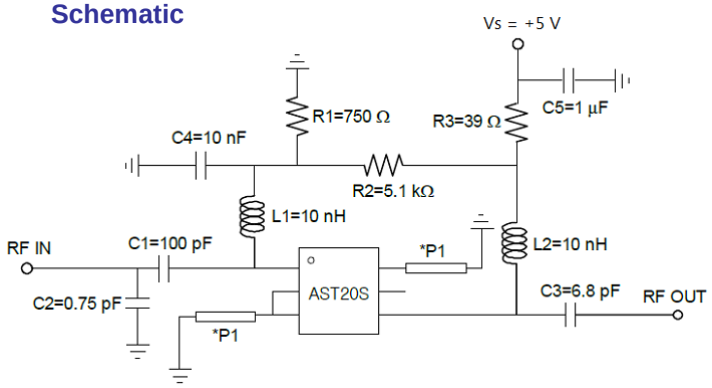
1950 MHz

+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
3rd 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



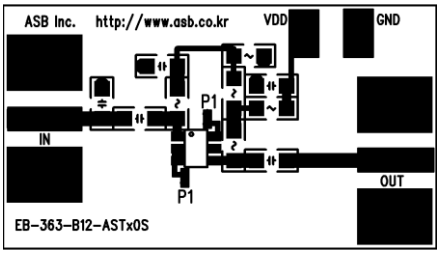
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

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)

Top



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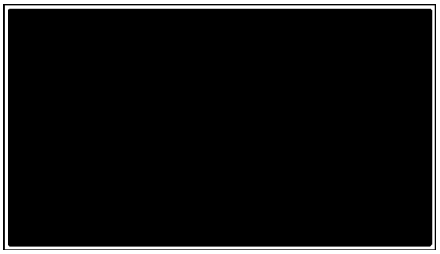
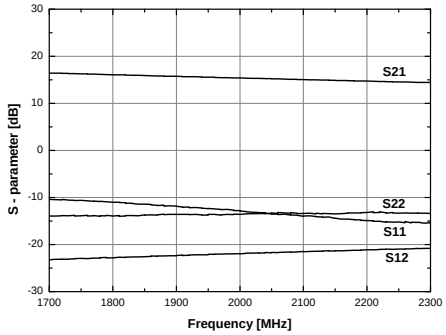
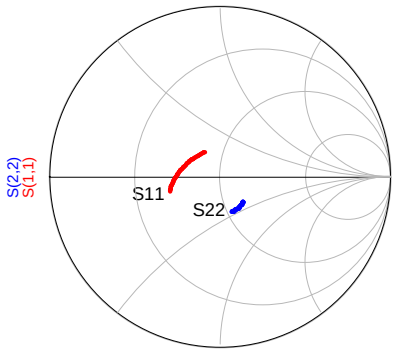
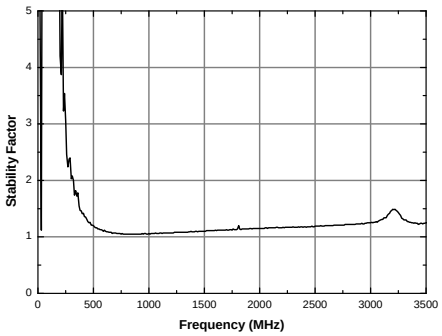


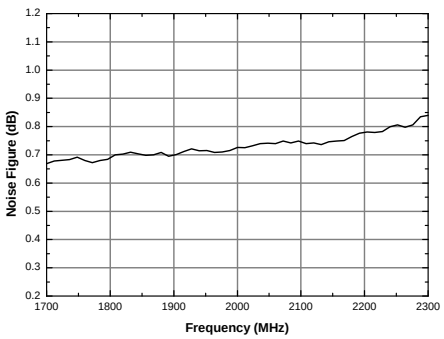
S-parameters & Noise Figure





freq (1.700GHz to 2.300GHz)





APPLICATION CIRCUIT

WCDMA

Low Noise

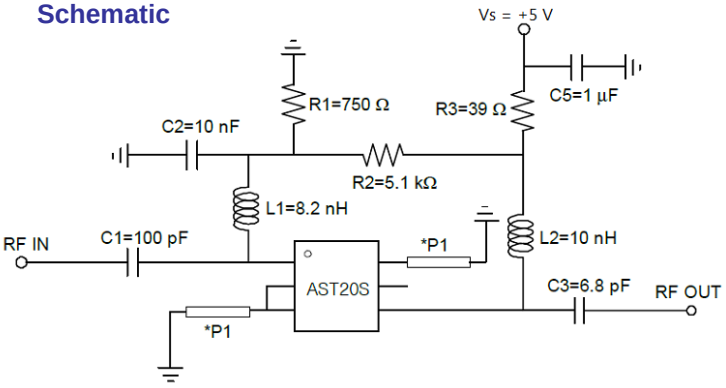
1950 MHz

+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
3rd 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/tone separated by 1MHz.

Schematic



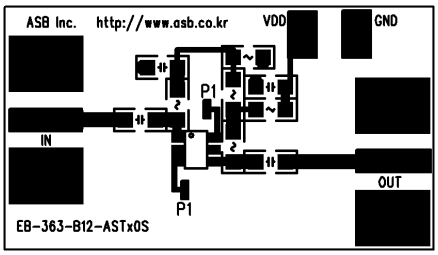
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 1.5 mm, Width: 0.3 mm

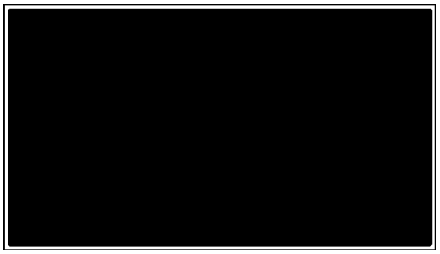
2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)

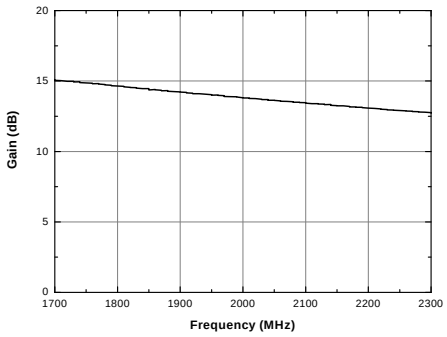
Top

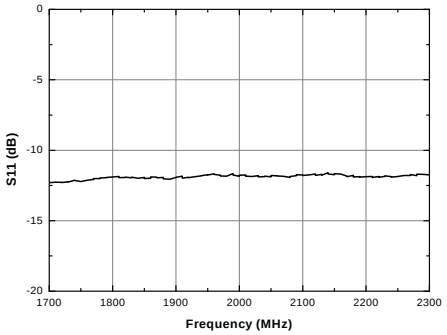


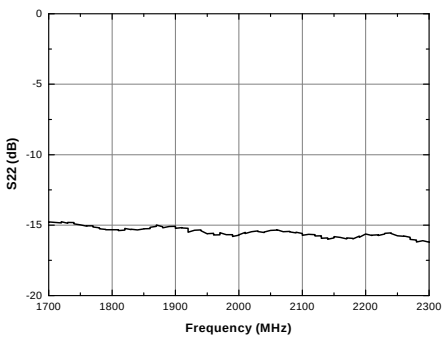
Bottom

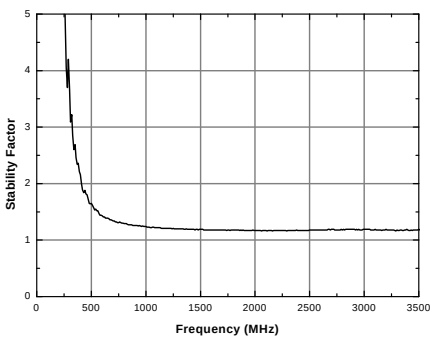


S-parameters & K-factor









APPLICATION CIRCUIT

WCDMA

Balanced Type

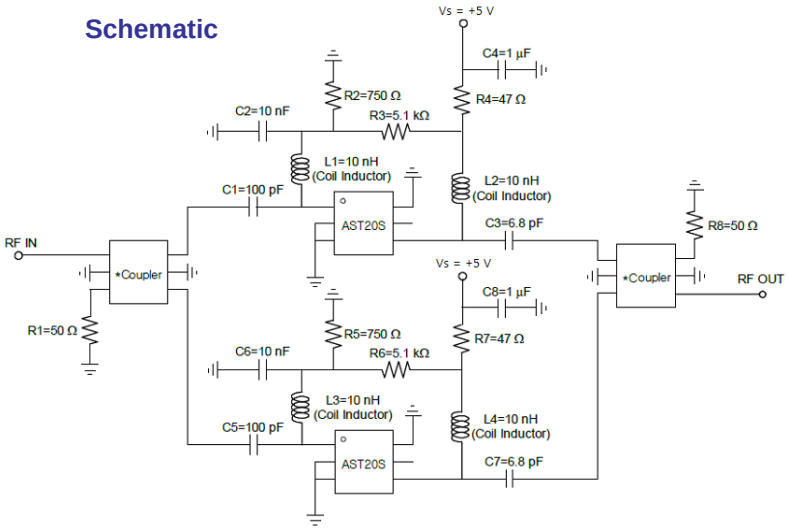
1950 MHz

+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
3rd 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.

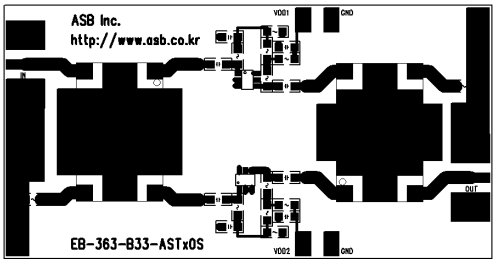
Schematic



Coupler : Anaren, XC1900A-03

Board Layout (FR4, 50x26 mm², 0.8T)

Top



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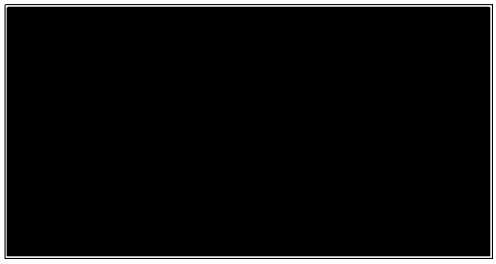
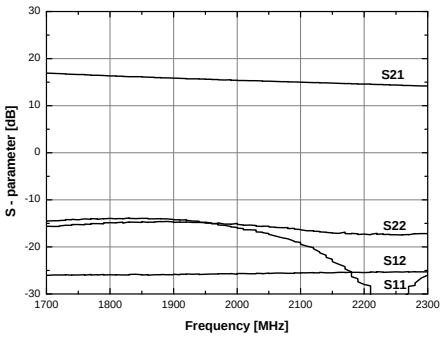
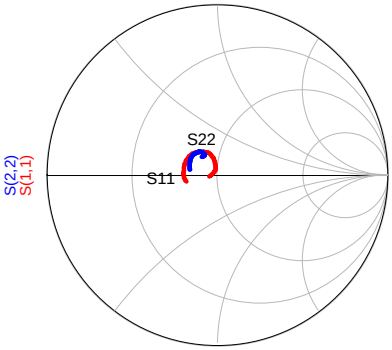
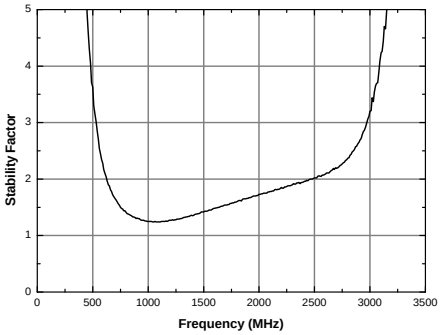


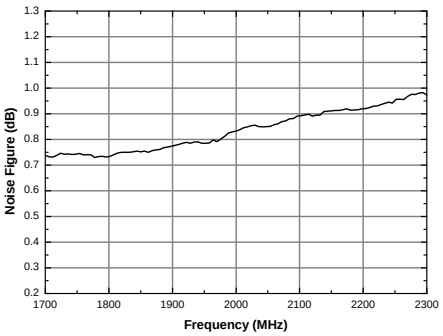
S-parameters & Noise Figure





freq (1.700GHz to 2.300GHz)





APPLICATION CIRCUIT

WCDMA

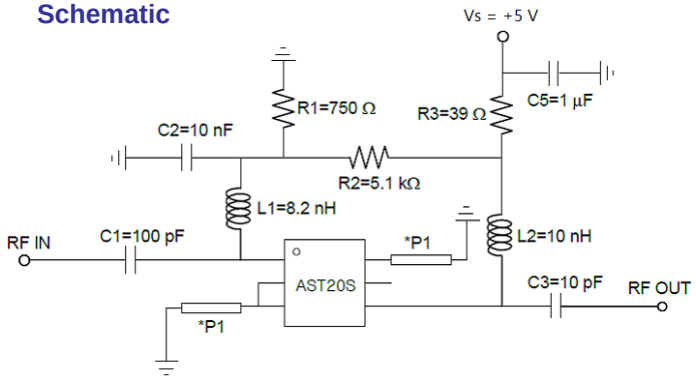
2140 MHz

+5 V

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

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

Schematic



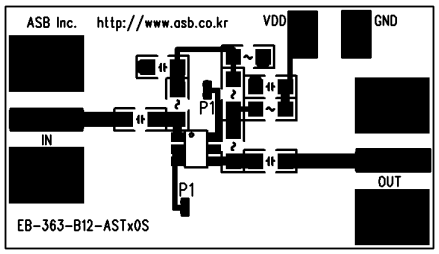
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 2.5 mm, Width: 0.3 mm

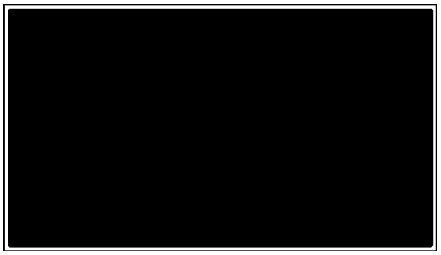
2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)

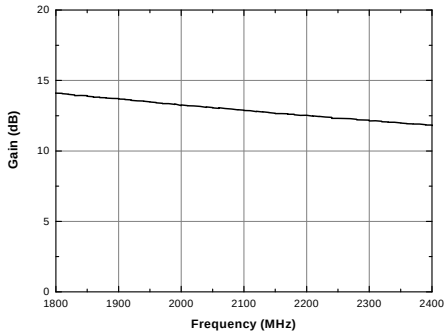
Top

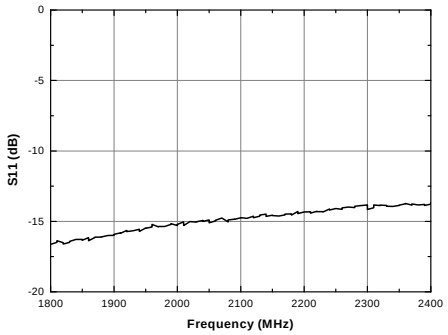


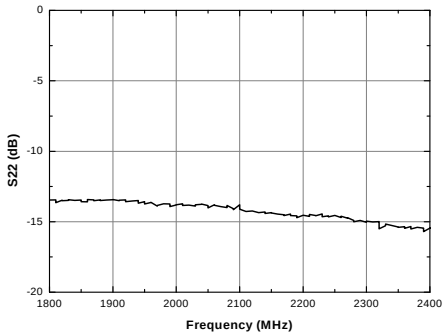
Bottom

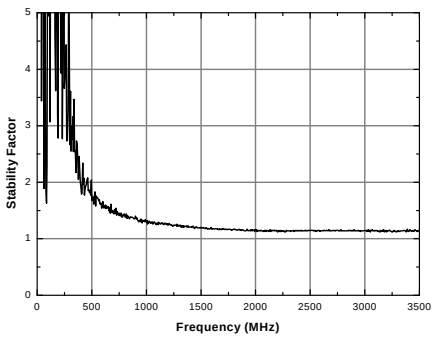


S-parameters & K-factor









APPLICATION CIRCUIT

WLAN

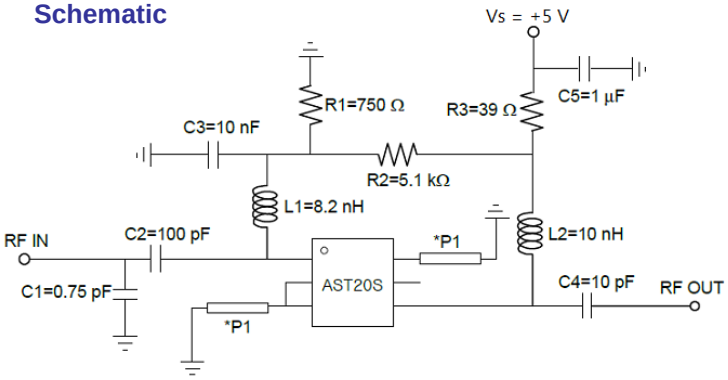
2450 MHz

+5 V

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

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

Schematic



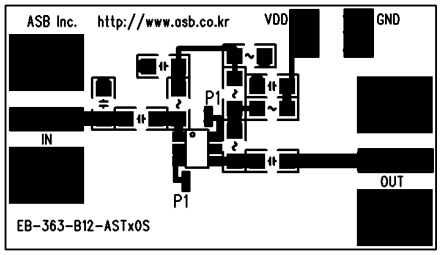
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 1.0 mm, Width: 0.3 mm

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

Board Layout (FR4, 23x13 mm², 0.8T)

Top



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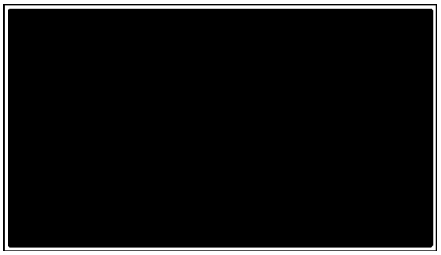
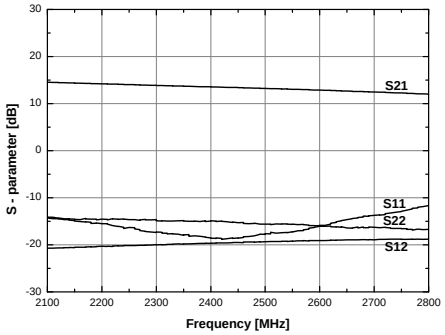
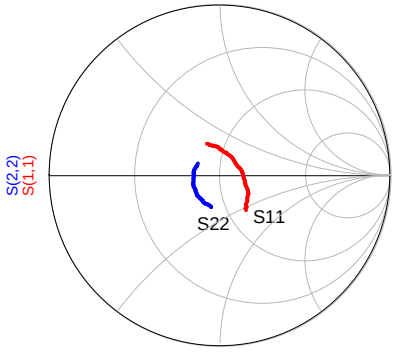
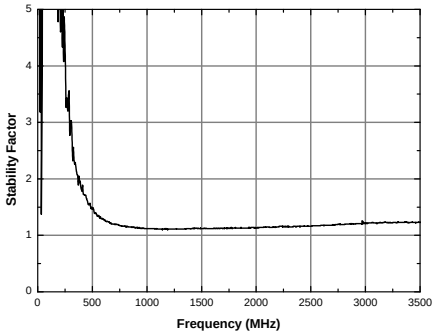


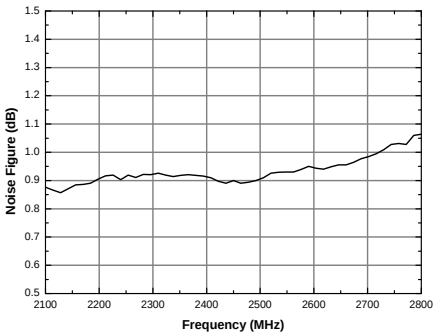
S-parameters & Noise Figure





freq (2.100GHz to 2.800GHz)





APPLICATION CIRCUIT

WLAN

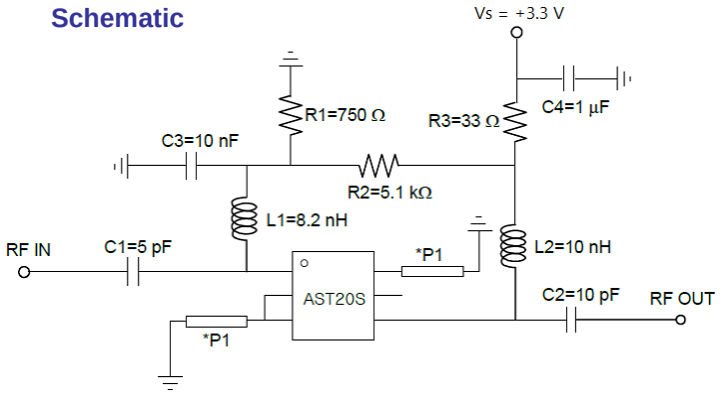
2500 MHz

+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
3rd 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



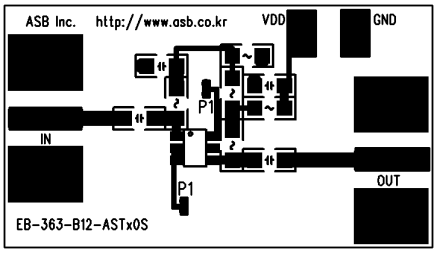
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 2.5 mm, Width: 0.3 mm

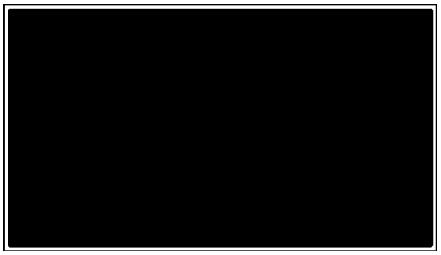
2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)

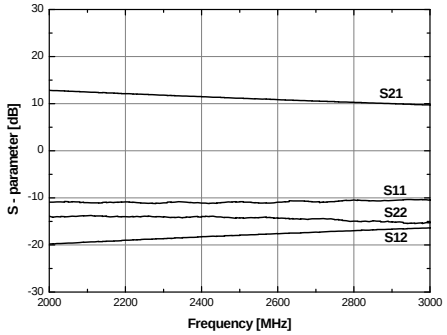
Top

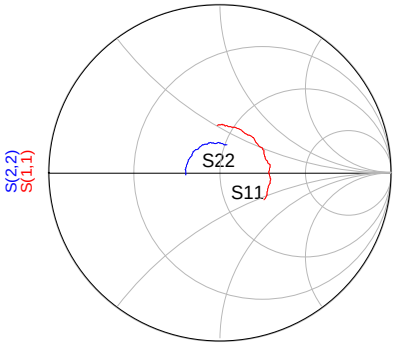


Bottom

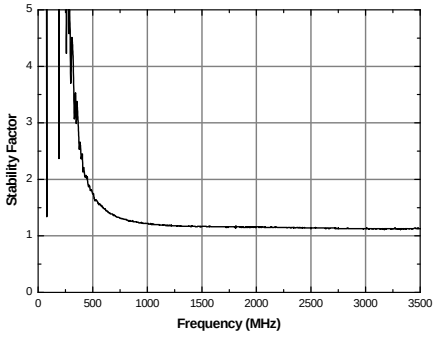


S-parameters & K-factor





freq (2.000GHz to 3.000GHz)



APPLICATION CIRCUIT

WiMAX

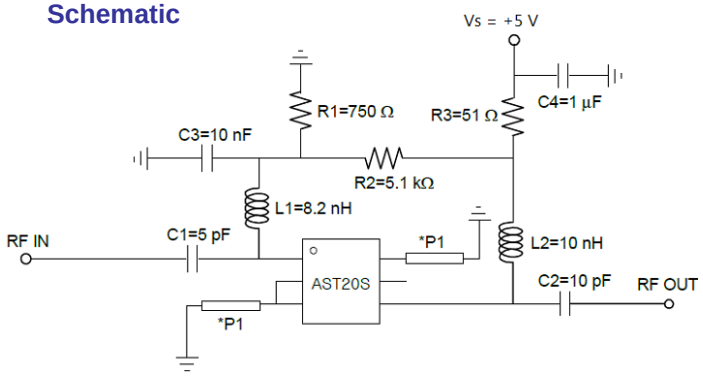
2600 MHz

+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
3rd 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



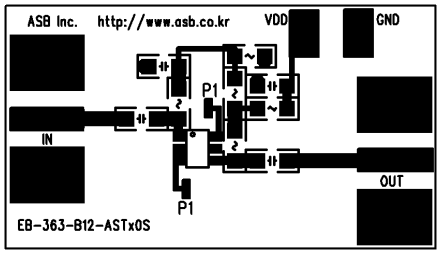
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 1.5 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)

Top



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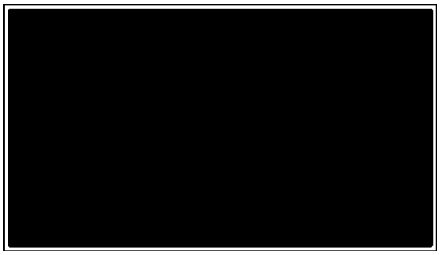
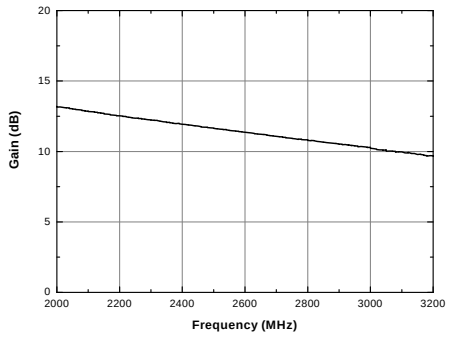
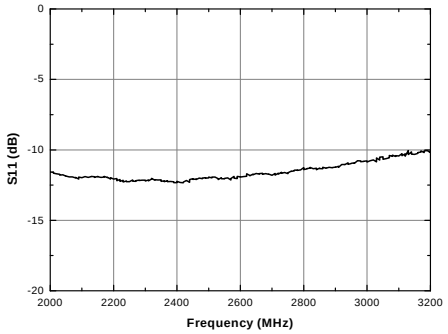
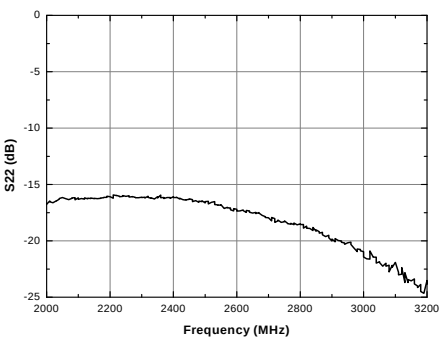
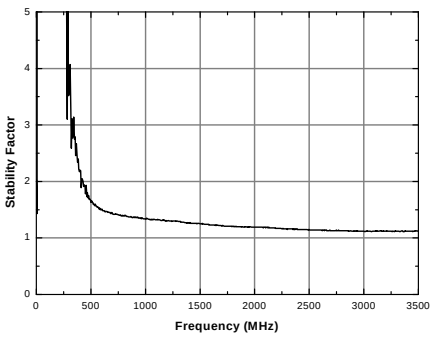


S-parameters & K-factor









APPLICATION CIRCUIT

WiMAX

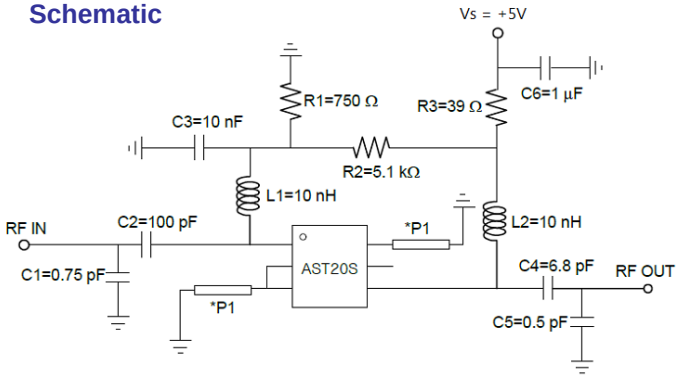
3500 MHz

+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
3rd 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



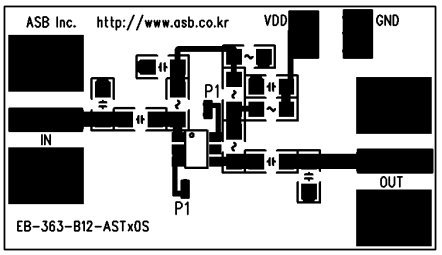
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 1.7 mm, Width: 0.3 mm

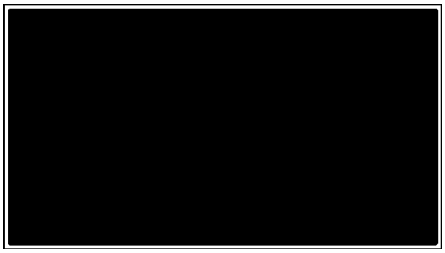
2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)

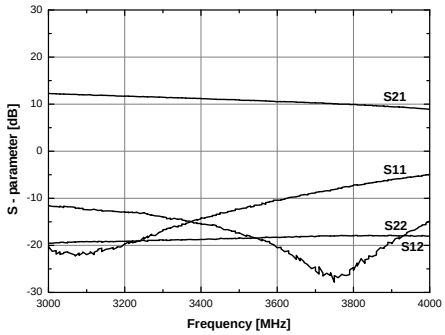
Top

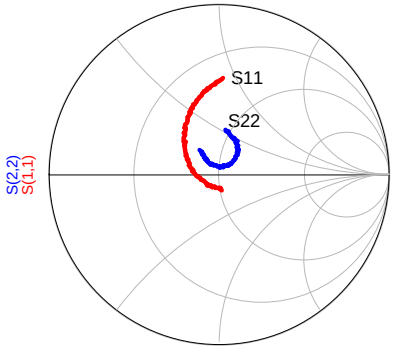


Bottom

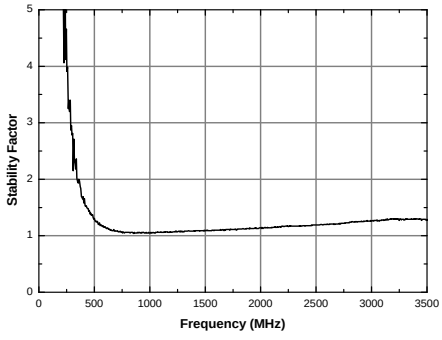


S-parameters & K-factor





freq (3.000GHz to 4.000GHz)



APPLICATION CIRCUIT

Wide Band

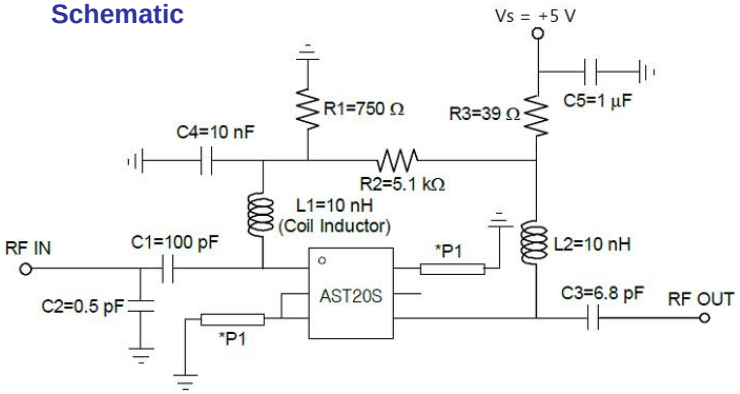
1200 ~ 1900 MHz

+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
3rd 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



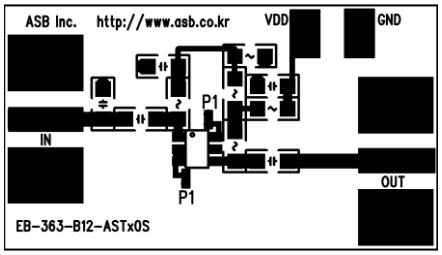
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 0.75 mm, Width: 0.3 mm

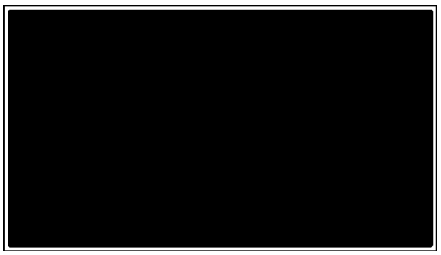
2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)

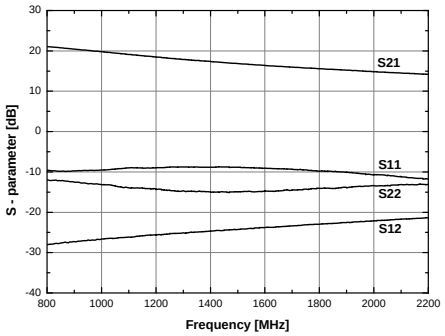
Top

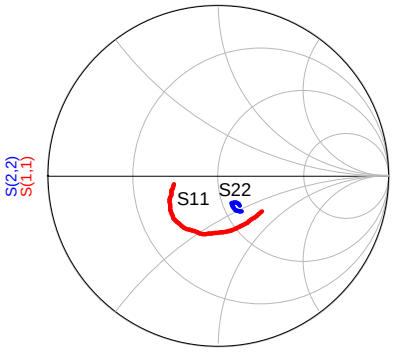


Bottom

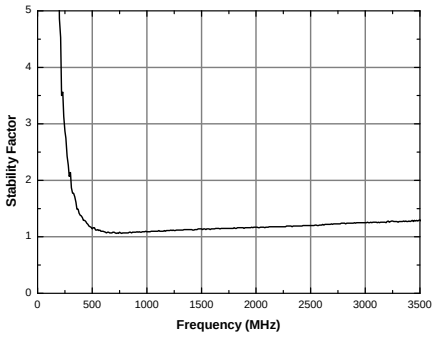


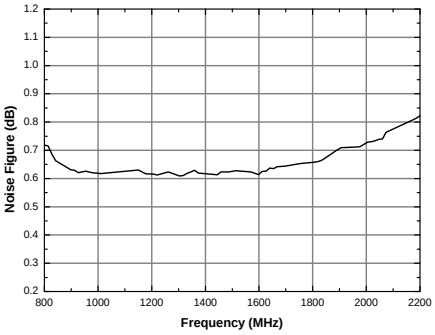
S-parameters & Noise Figure





freq (800.0MHz to 2.200GHz)





APPLICATION CIRCUIT

IF

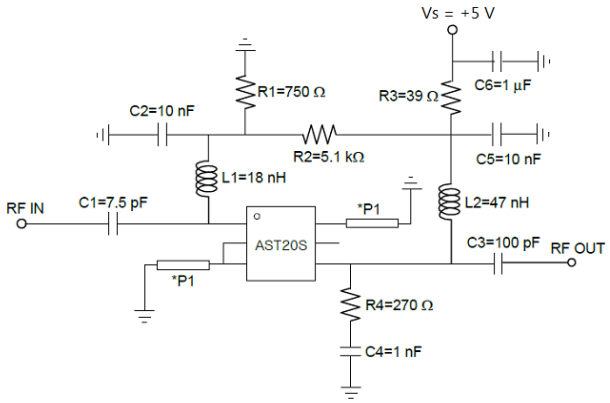
433 MHz

+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
3rd 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



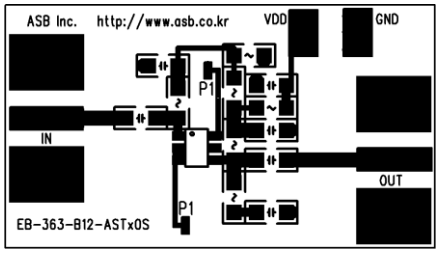
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 3.5 mm, Width: 0.3 mm

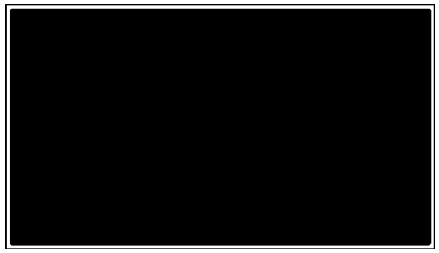
2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)

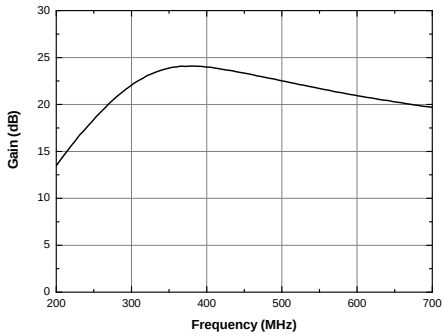
Top

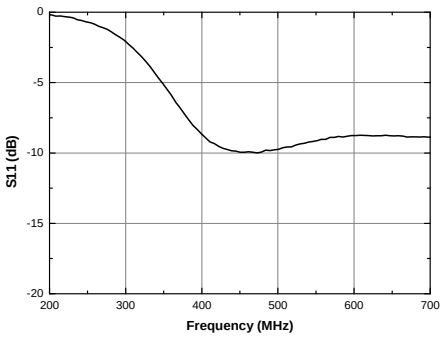


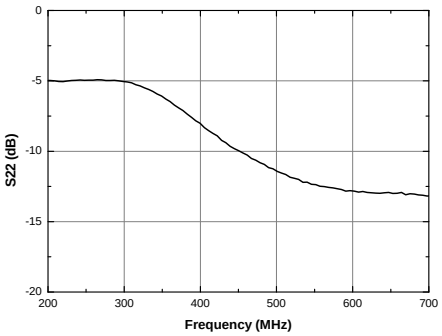
Bottom

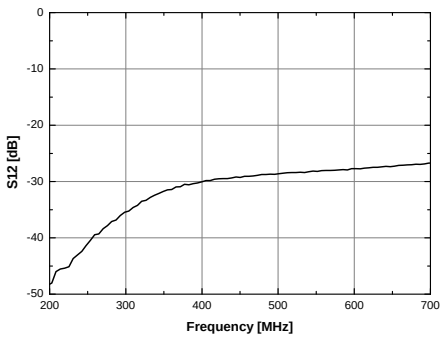


S-parameters









APPLICATION CIRCUIT

IF

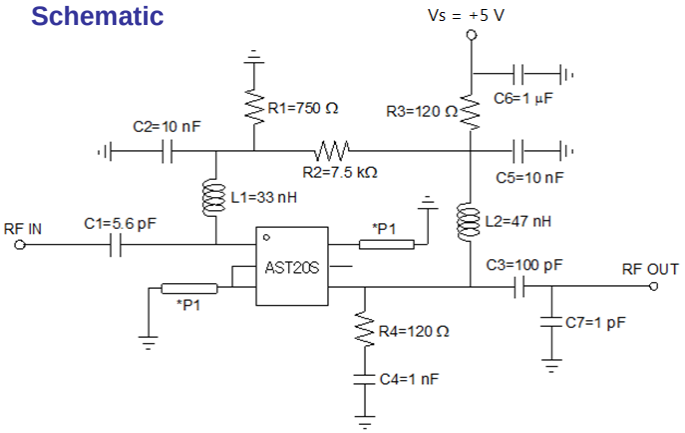
315 MHz

+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
3rd 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



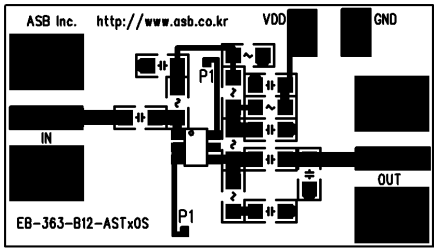
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 3.6 mm, Width: 0.3 mm

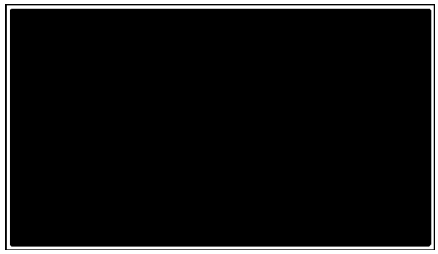
2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)

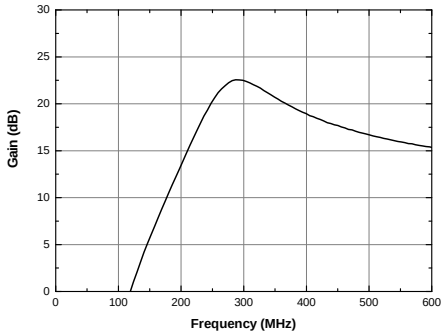
Top

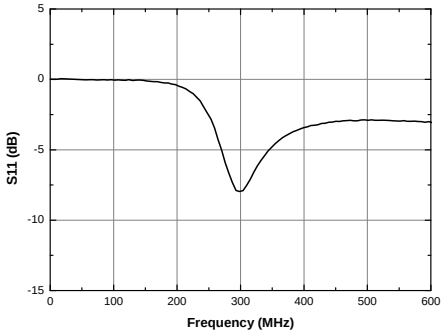


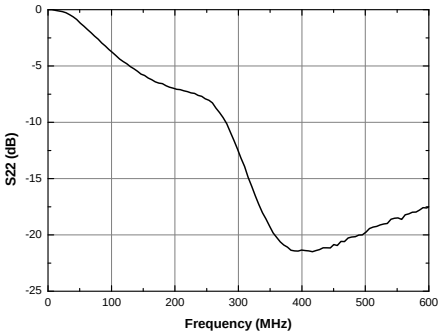
Bottom

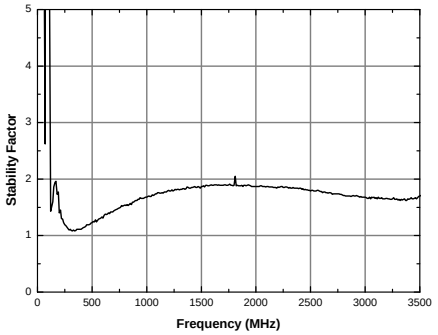


S-parameters & K-factor









APPLICATION CIRCUIT

IF

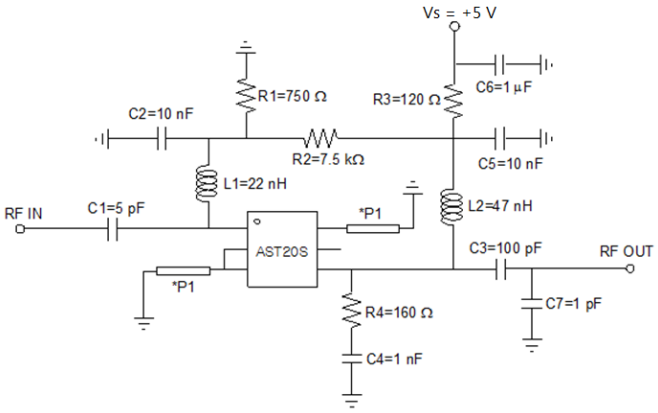
433 MHz

+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
3rd 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



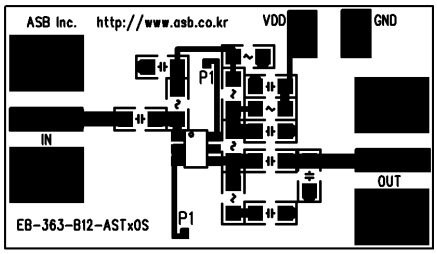
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 3.6 mm, Width: 0.3 mm

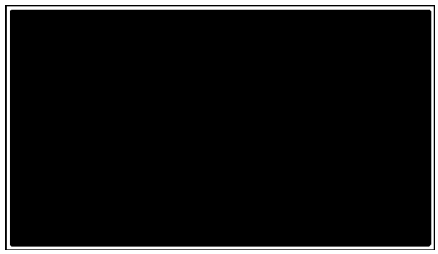
2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)

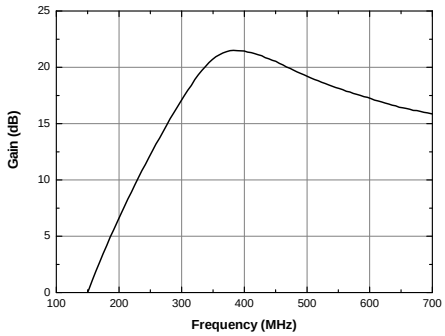
Top

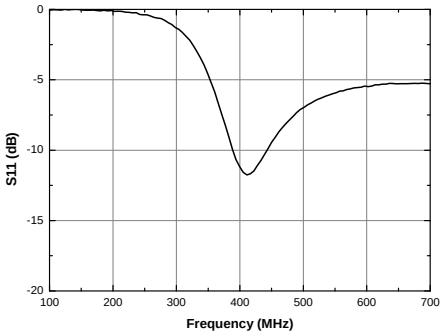


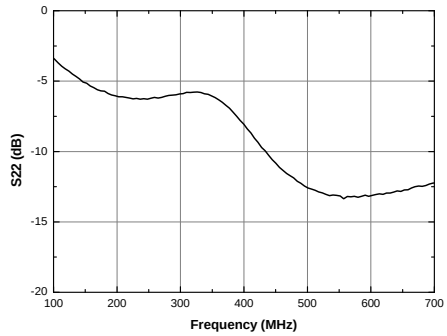
Bottom

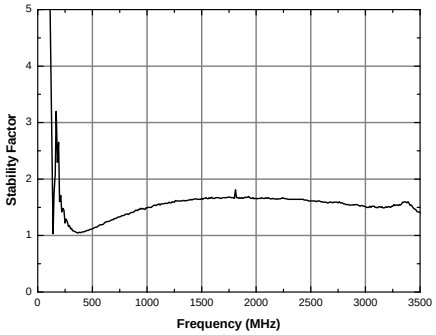


S-parameters & K-factor









APPLICATION CIRCUIT

GSM, CDMA

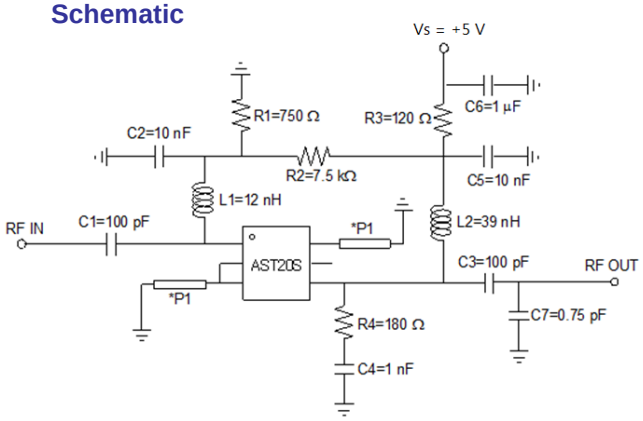
850 ~ 950 MHz

+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
3rd 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



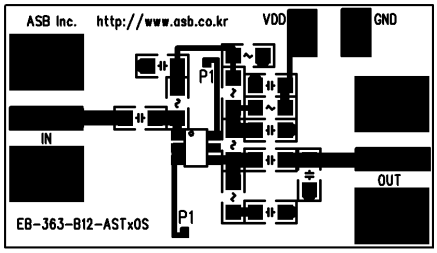
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 3.6 mm, Width: 0.3 mm

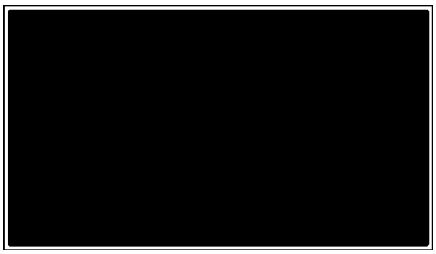
2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)

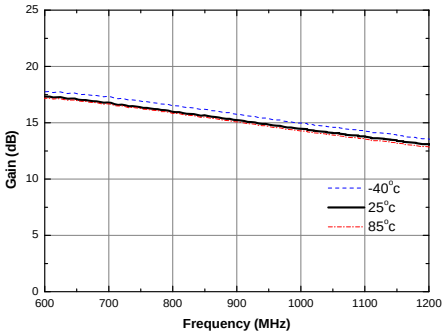
Top

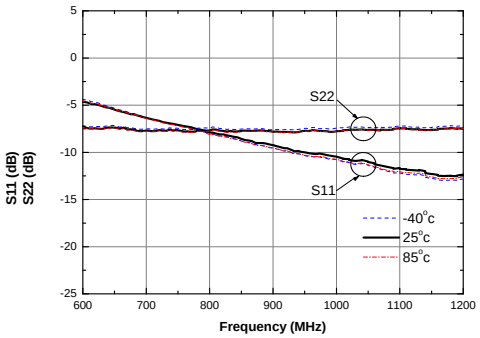


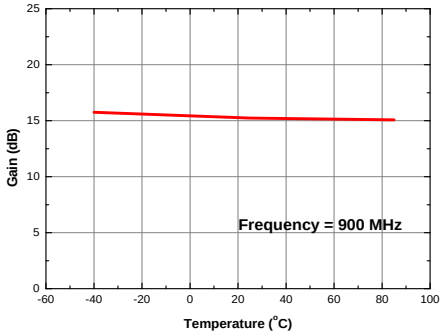
Bottom

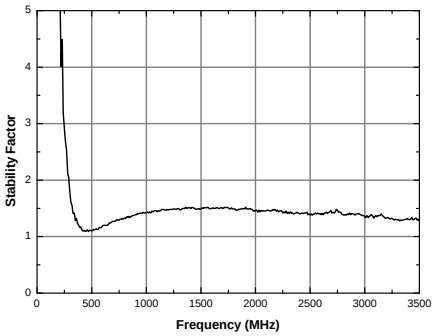


S-parameters & K-factor









APPLICATION CIRCUIT

GPS,GLONASS,Galileo,Compass

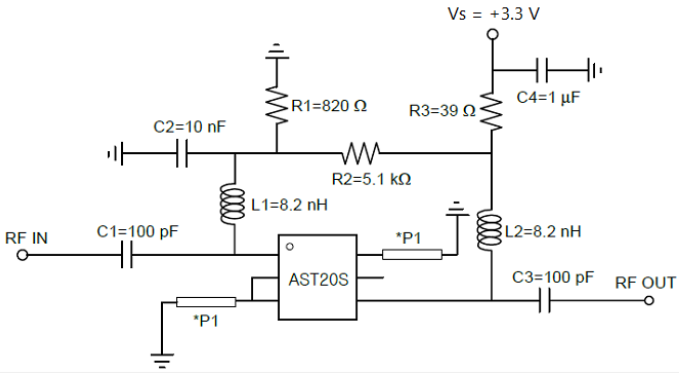
1164 ~ 1300 MHz

+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
3rd 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



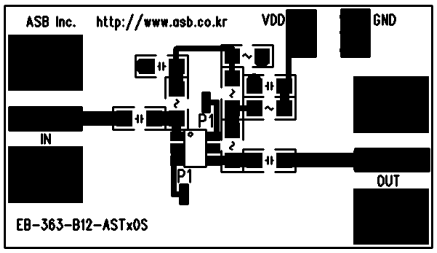
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 1.8 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)

Top



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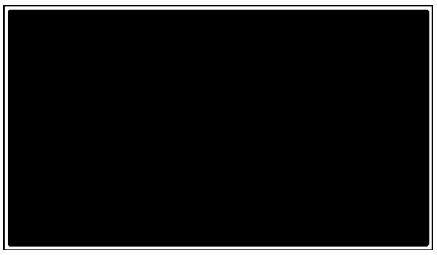
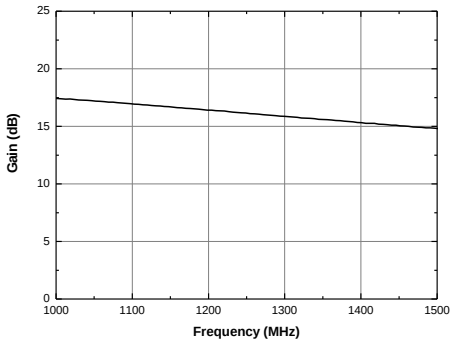
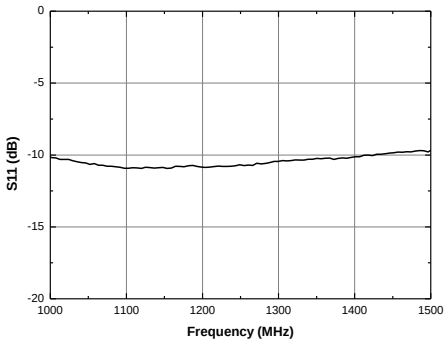
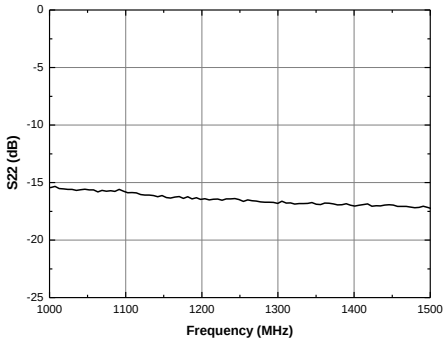
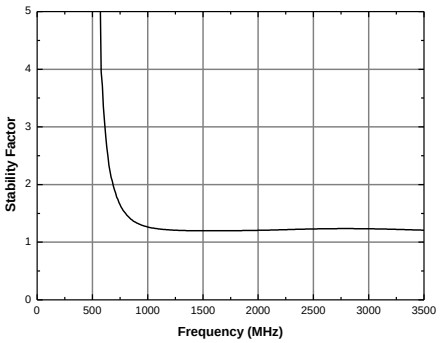


S-parameters & K-factor









APPLICATION CIRCUIT

GPS,GLONASS,Galileo,Compass

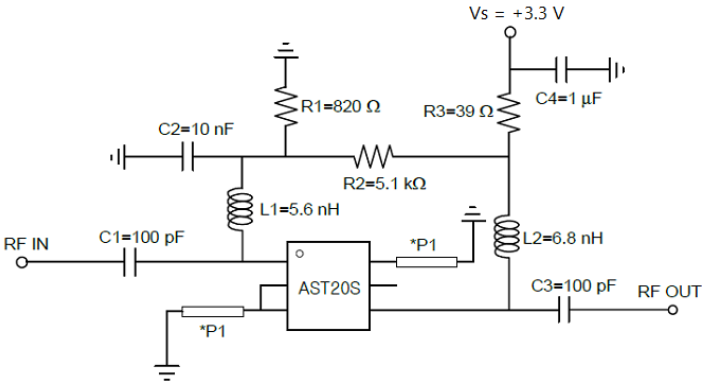
1164 ~ 1300 MHz

+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
3rd 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



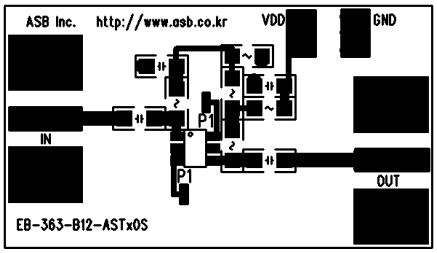
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 1.8 mm, Width: 0.3 mm

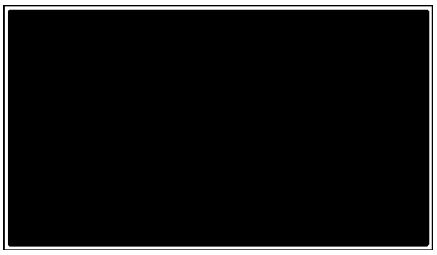
2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)

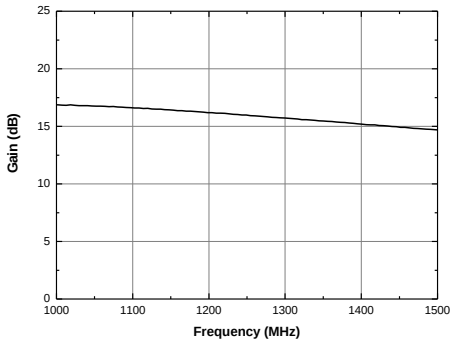
Top

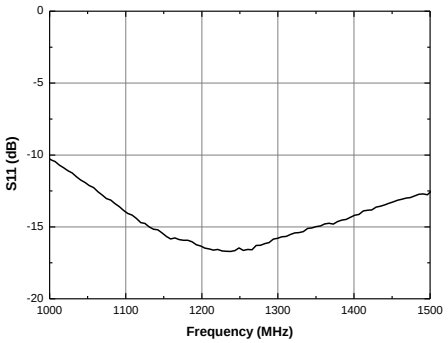


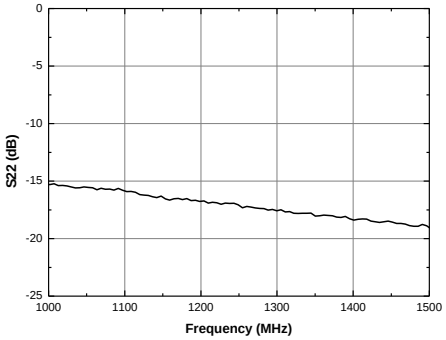
Bottom

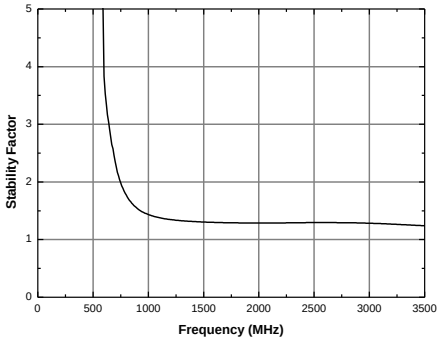


S-parameters & K-factor









APPLICATION CIRCUIT

Δ Id @ +25 °C < 9 mA

GPS,GLONASS,Galileo,Compass

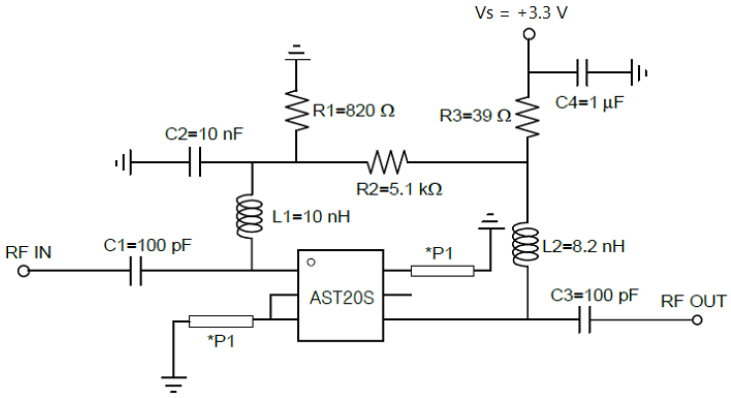
1560 ~ 1620 MHz

+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
3rd 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



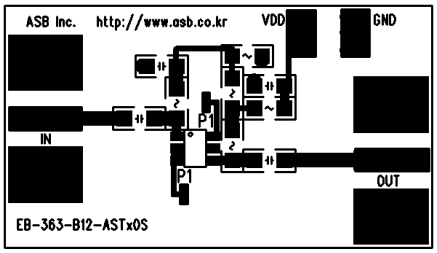
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

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)

Top



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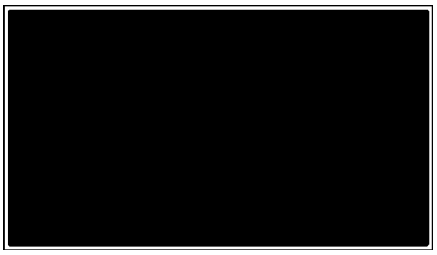
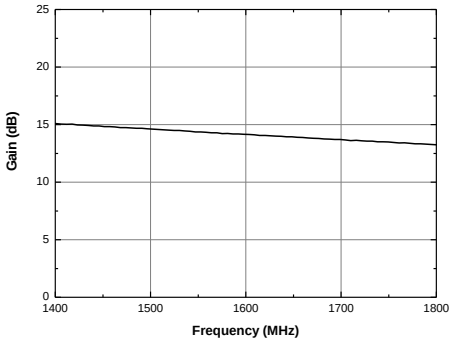
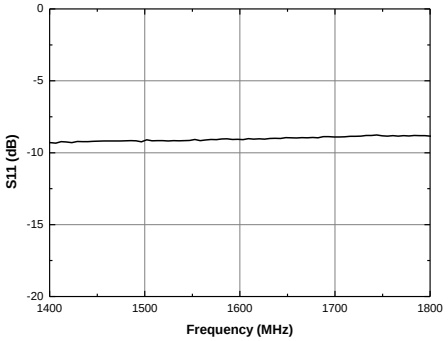
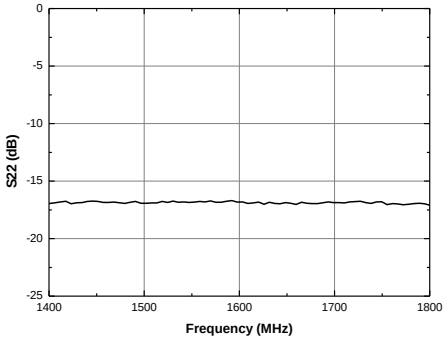
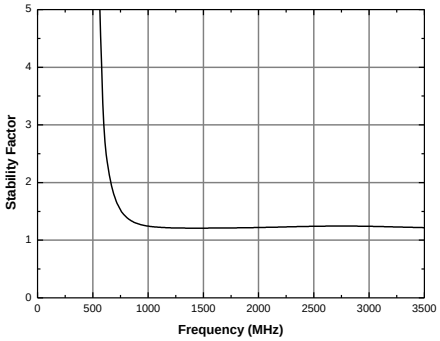


S-parameters & K-factor









APPLICATION CIRCUIT

Δ Id @ +25 °C < 3 mA

GPS,GLONASS,Galileo,Compass

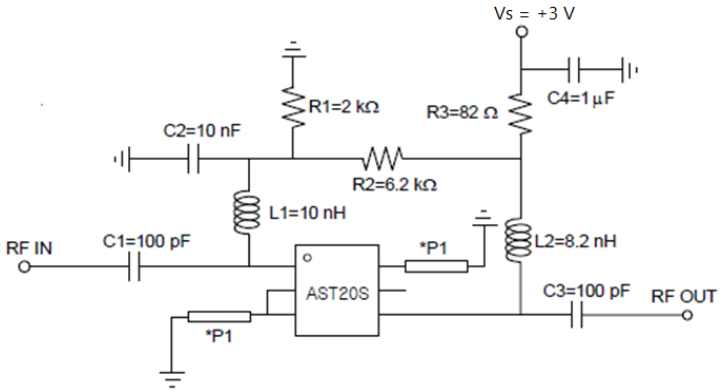
1560 ~ 1620 MHz

+3 V, 18 mA

Parameter	Symbol	Unit	Frequency (MHz)
			1560~1620
Power Gain	G_p	dB	13.5
Noise Figure	NF	dB	0.55
Input Return Loss	RL_{in}	dB	-8
Output Return Loss	RL_{out}	dB	-17
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	8
3rd Intercept Point Output Power[1)]	OIP3	dBm	21
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



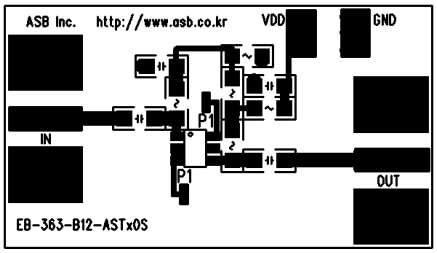
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 1.8 mm, Width: 0.3 mm

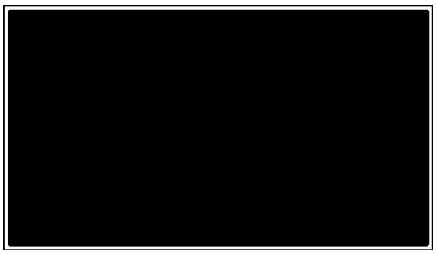
2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)

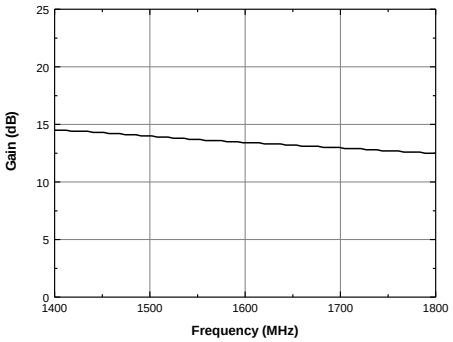
Top

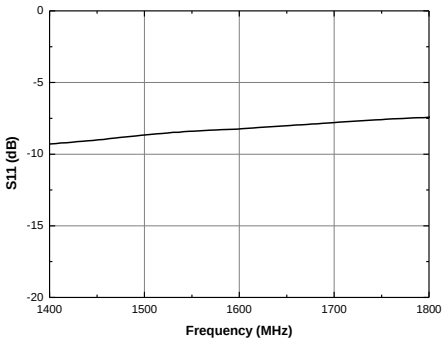


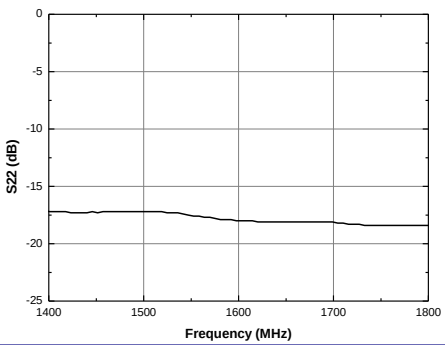
Bottom

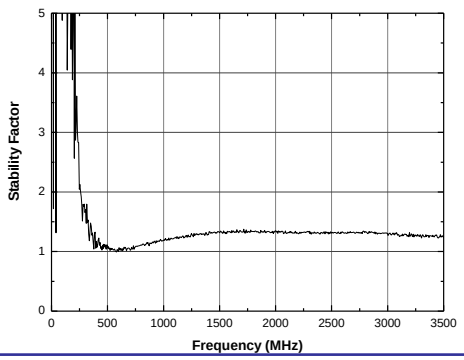


S-parameters & K-factor









APPLICATION CIRCUIT

GPS,GLONASS,Galileo,Compass

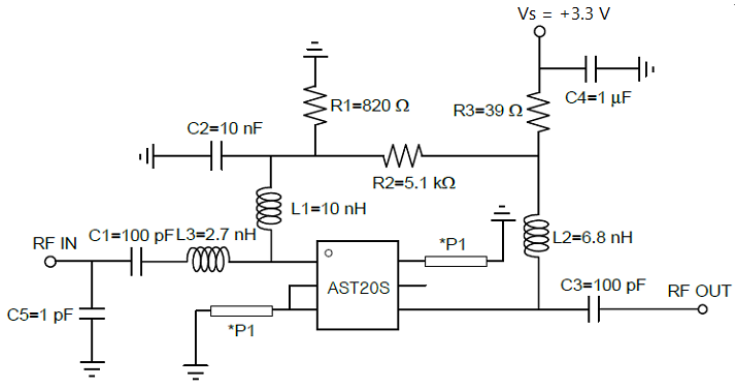
1560 ~ 1620 MHz

+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
3rd 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



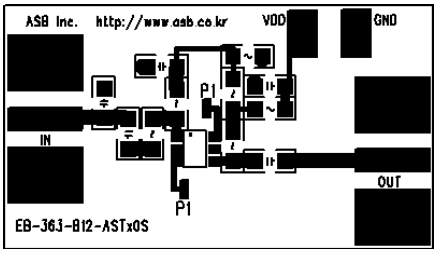
Note: 1) Tthe length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 1.8 mm, Width: 0.3 mm

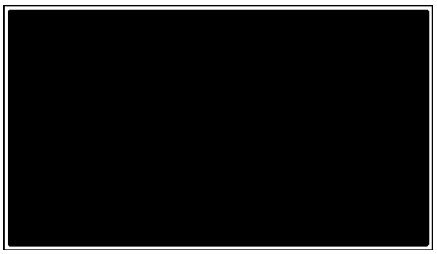
2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)

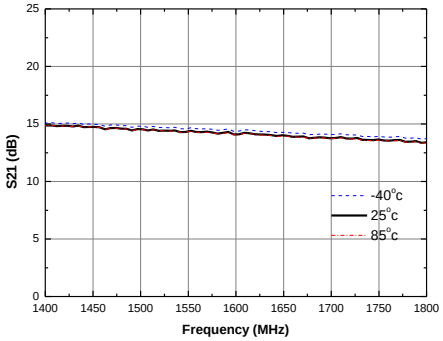
Top

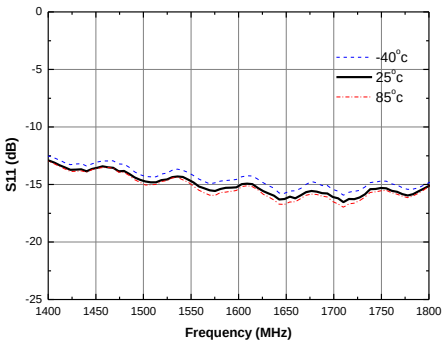


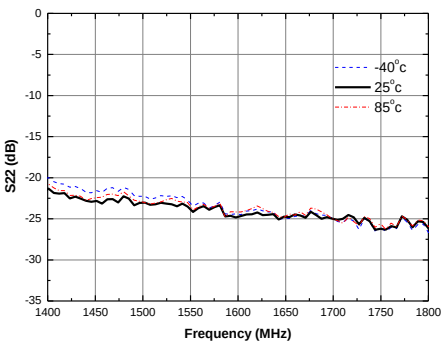
Bottom

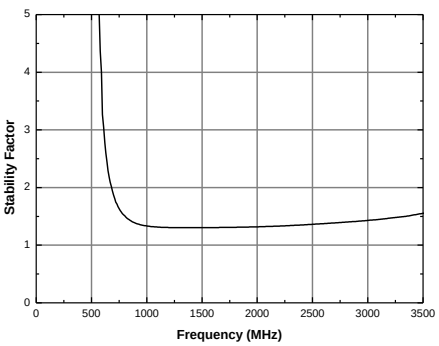


S-parameters & K-factor

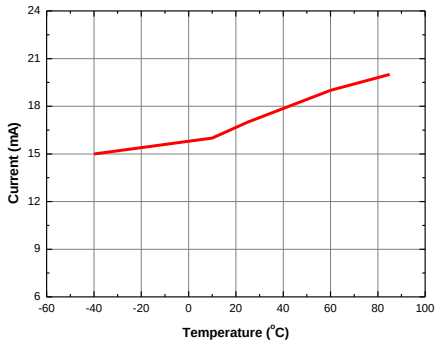




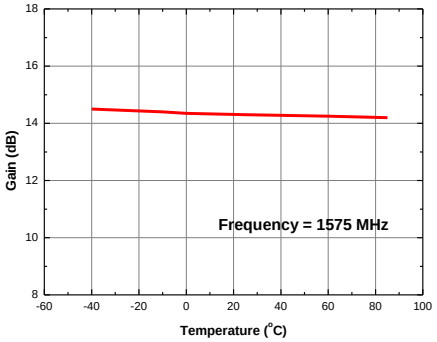




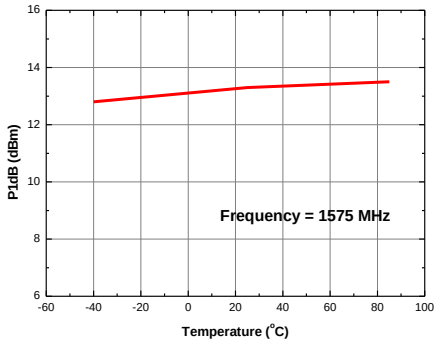
Current vs. Temperature



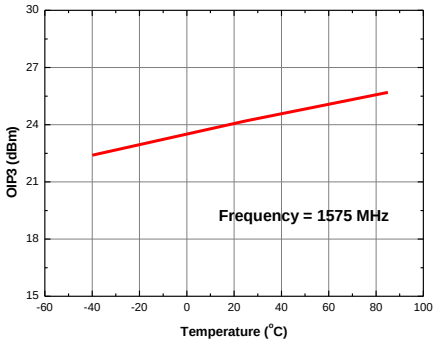
Gain vs. Temperature



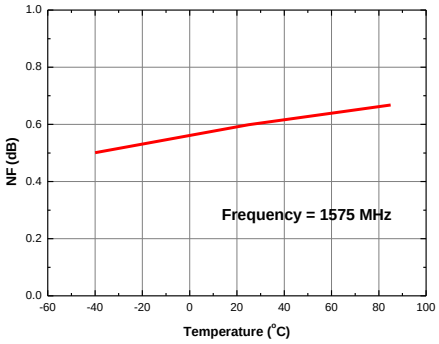
P1dB vs. Temperature



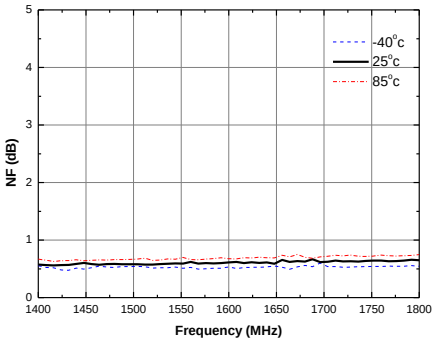
Output IP3 vs. Temperature



NF vs. Temperature



NF vs. Frequency



APPLICATION CIRCUIT

GPS

1472 MHz

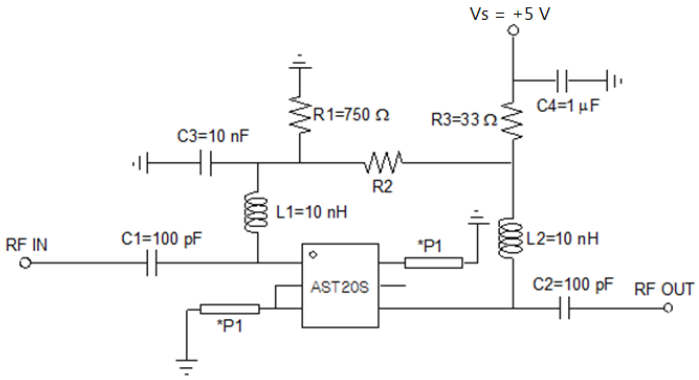
+5V

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
3rd 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) TYP[1] : R2 = 8.2KΩ, TYP[2] : R2 = 5.1KΩ

Schematic



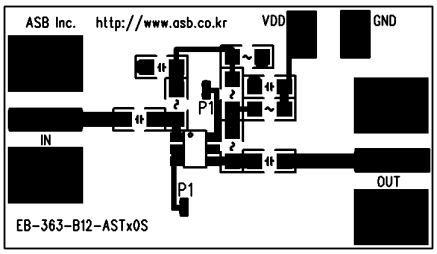
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 2.5 mm, Width: 0.3 mm

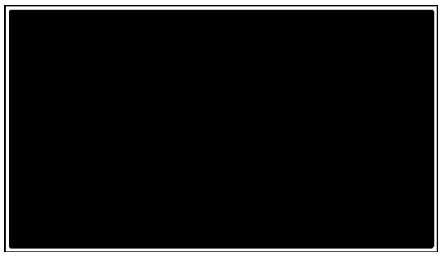
2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)

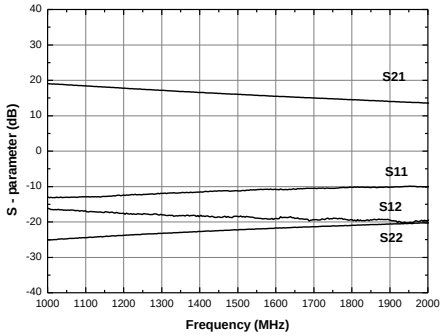
Top

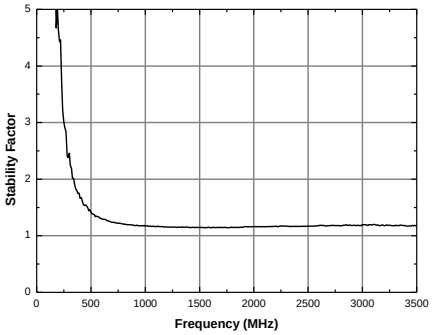


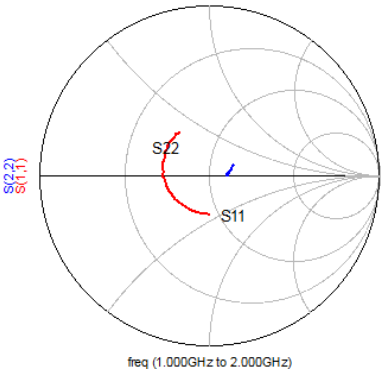
Bottom



S-parameters & K-factor







APPLICATION CIRCUIT

Satellite Phone

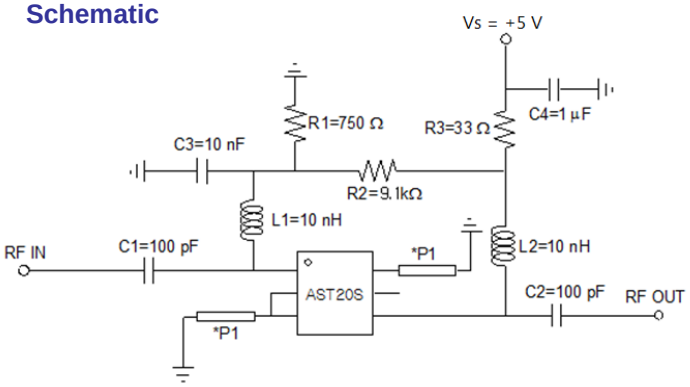
1525 ~ 1559 MHz

+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	
3rd 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



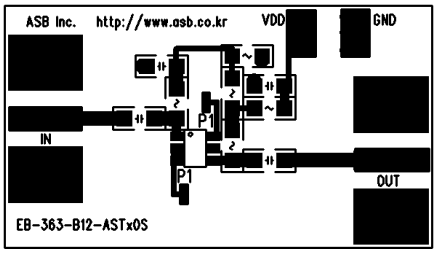
Note: 1) The length of the strip line P1 is given as below at the PCB with Er = 4.5 and T = 0.8 mm.

P1 Length: 1.8 mm, Width: 0.3 mm

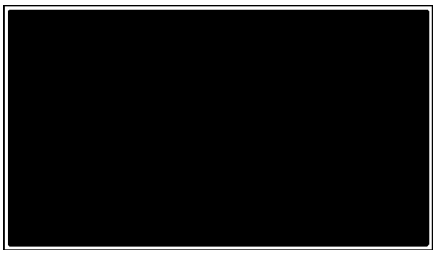
2) Gain and S11 are in trade-off and varied with the length of P1

Board Layout (FR4, 23x13 mm², 0.8T)

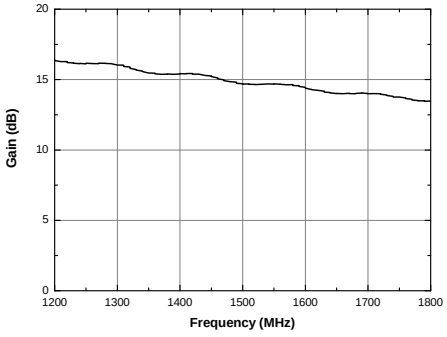
Top

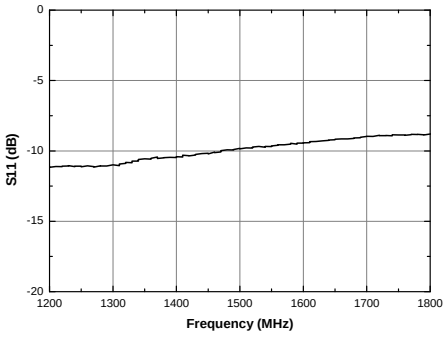


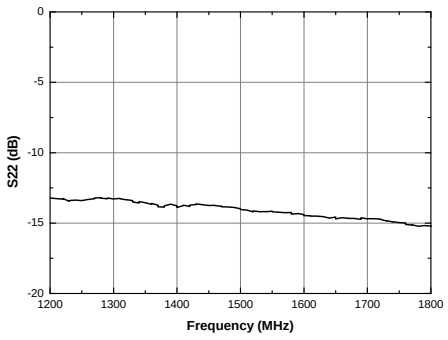
Bottom

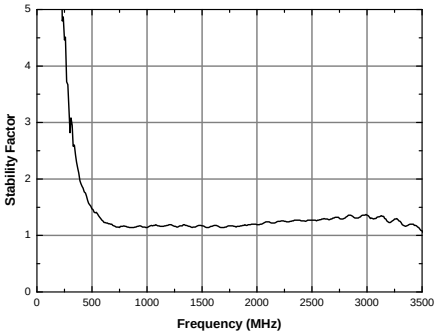


S-parameters & K-factor









APPLICATION CIRCUIT

IF

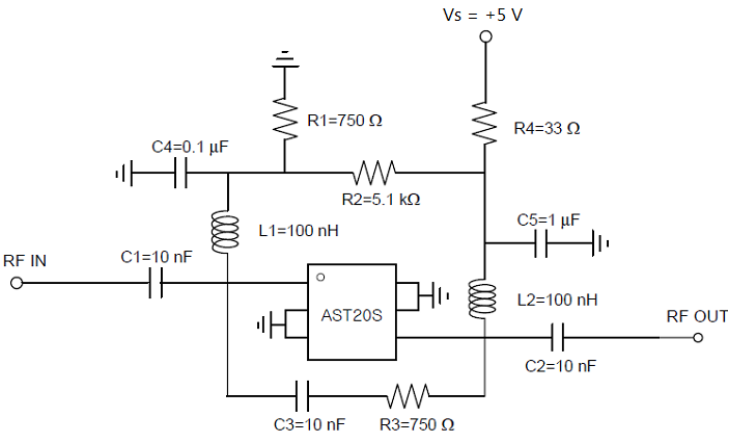
174 ~ 240 MHz

+5 V

Parameter	Symbol	Unit	Frequency (MHz)	
			174	240
Power Gain	G_p	dB	21	21
Noise Figure	NF	dB	0.9	1.0
Input Return Loss	RL_{in}	dB	-18	-15
Output Return Loss	RL_{out}	dB	-15	-14
1 dB Gain Compression Output Power	$P_{o(1dB)}$	dBm	17.5	18.5
3rd Intercept Point Output Power[1)]	OIP3	dBm	29.0	30.0
Circuit Current	I_d	mA	45	

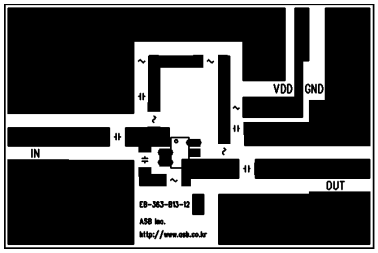
1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic

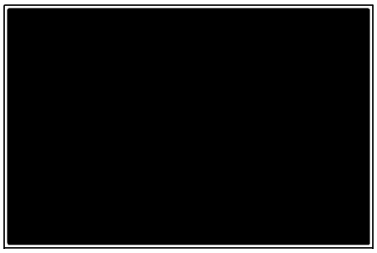


Board Layout (FR4, 24x16 mm², 0.8T)

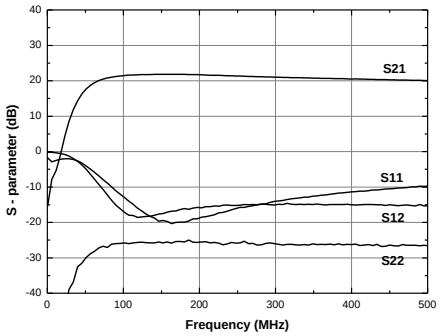
Top

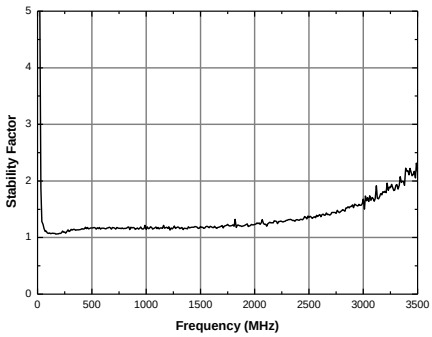


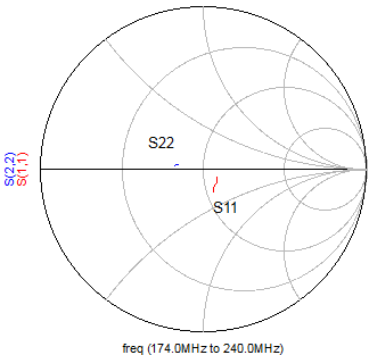
Bottom



S-parameters & K-factor







APPLICATION CIRCUIT

IF

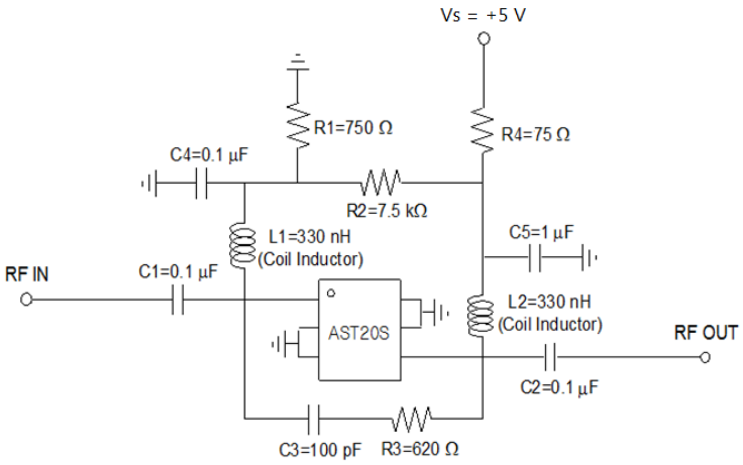
50 ~ 200 MHz

+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
3rd Intercept Point Output Power[1)]	OIP3	dBm	20	20
Circuit Current	I_d	mA	15	

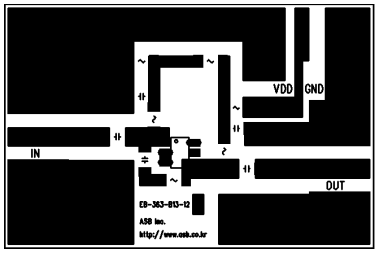
1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic

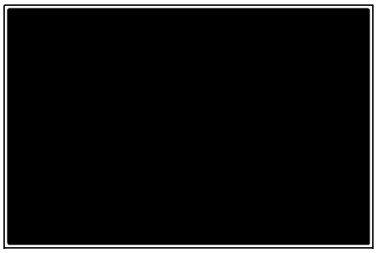


Board Layout (FR4, 24x16 mm², 0.8T)

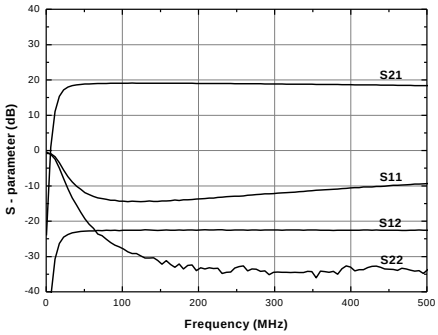
Top

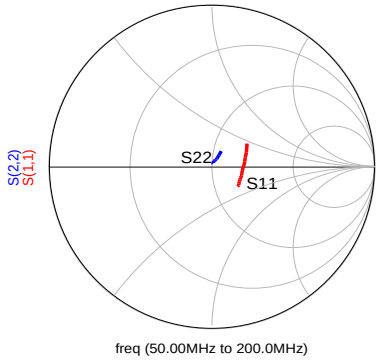


Bottom

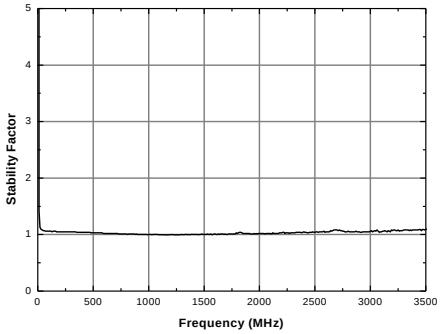


S-parameters & K-factor





freq (50.00MHz to 200.0MHz)



APPLICATION CIRCUIT

IF

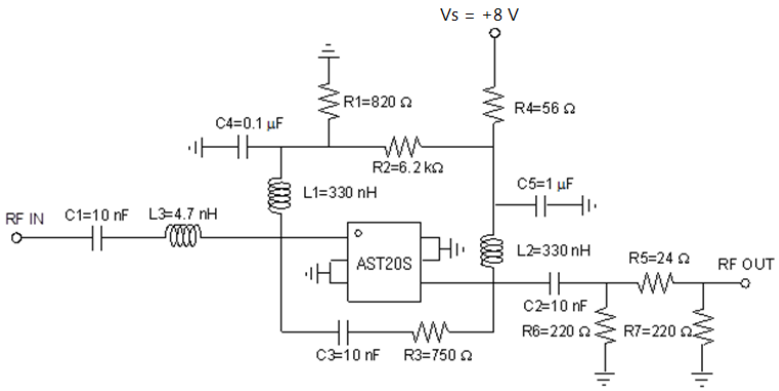
50 ~ 300 MHz

+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
3rd Intercept Point Output Power[1)]	OIP3	dBm	27	29
Circuit Current	I_d	mA	65	

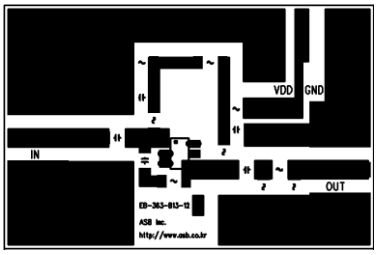
1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic

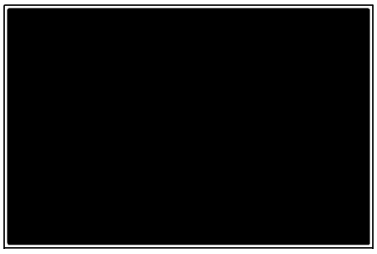


Board Layout (FR4, 24x16 mm², 0.8T)

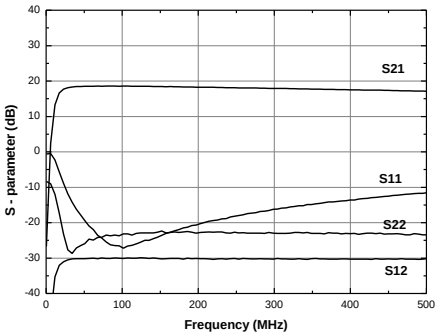
Top

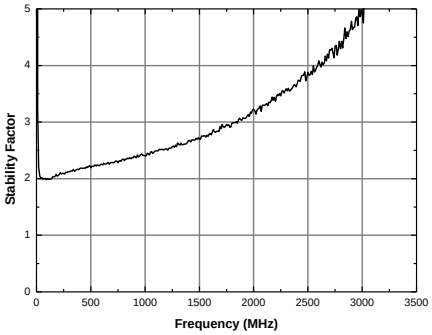


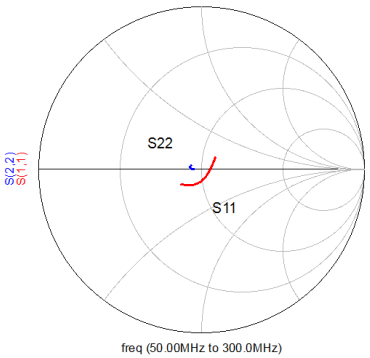
Bottom



S-parameters & K-factor







APPLICATION CIRCUIT

Wide Band

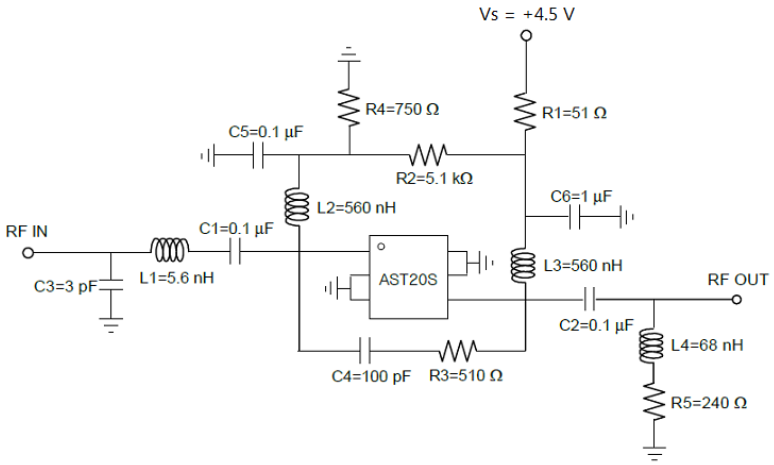
50 ~ 810 MHz

+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
3rd Intercept Point Output Power[1)]	OIP3	dBm	24.5	26.0	25.0
Circuit Current	I_d	mA	28		

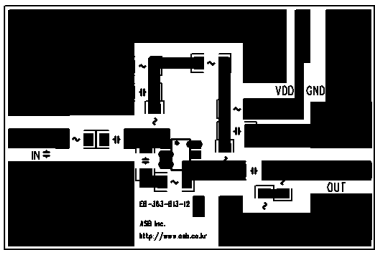
1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic

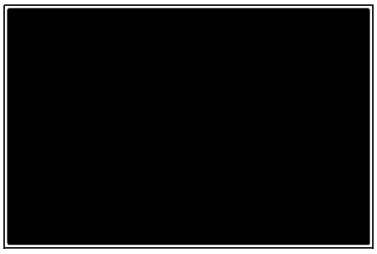


Board Layout (FR4, 24x16 mm², 0.8T)

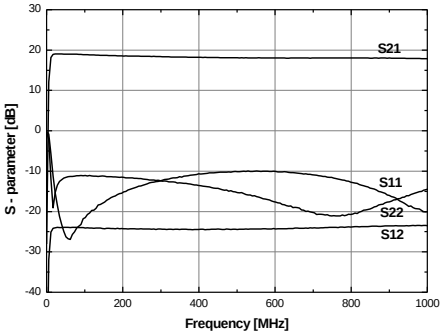
Top

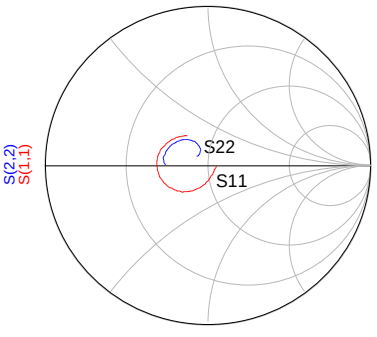


Bottom

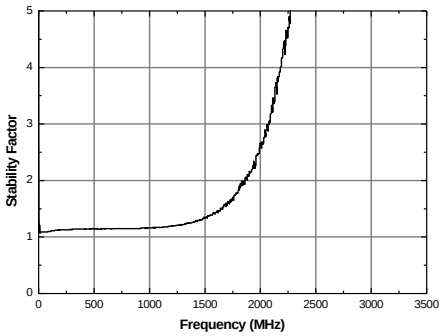


S-parameters & K-factor





freq (50.00MHz to 810.0MHz)



APPLICATION CIRCUIT

Wide Band

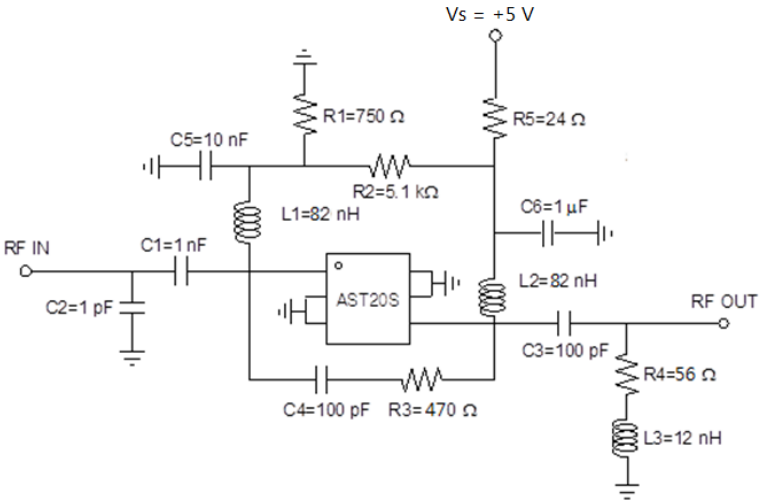
800 ~ 2700 MHz

+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
3rd Intercept Point Output Power[1)]	OIP3	dBm	29.0	33.0	33.0
Circuit Current	I_d	mA	54		

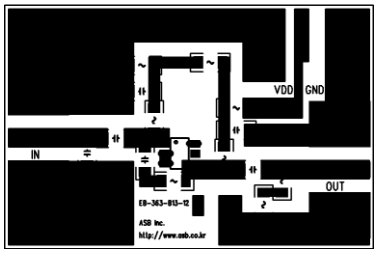
1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic

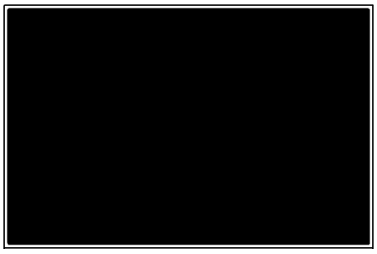


Board Layout (FR4, 24x16 mm², 0.8T)

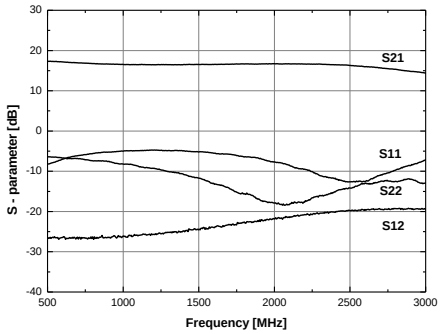
Top

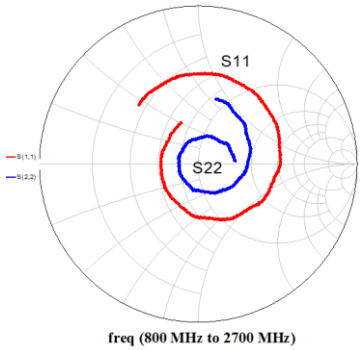


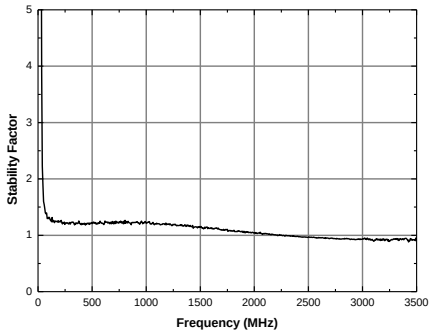
Bottom



S-parameters & K-factor







APPLICATION CIRCUIT

CMMB

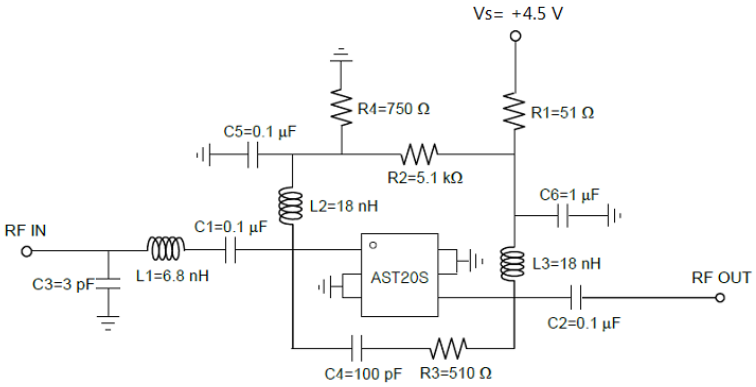
470 ~ 860 MHz

+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
3rd Intercept Point Output Power[1)]	OIP3	dBm	24	26
Circuit Current	I_d	mA	28	

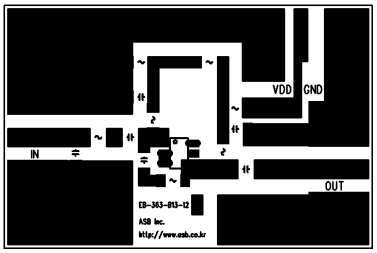
1) OIP3 is measured with two tones at an output power of +0 dBm/tone separated by 1MHz.

Schematic

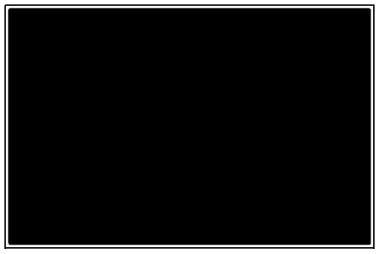


Board Layout (FR4, 24x16 mm², 0.8T)

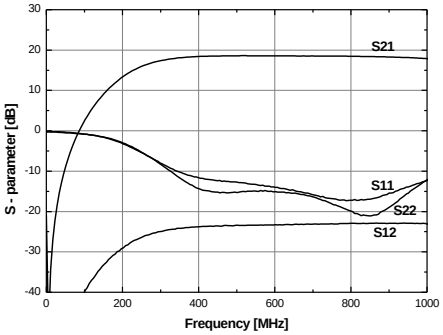
Top

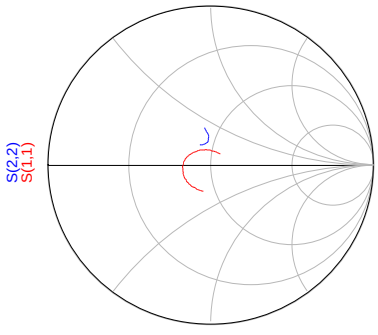


Bottom

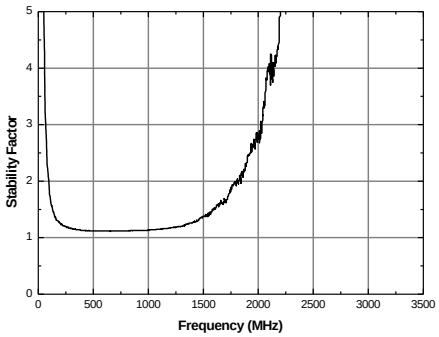


S-parameters & K-factor





freq (470.0MHz to 860.0MHz)



APPLICATION CIRCUIT

ONU, 50 Ω

70 ~ 2700 MHz

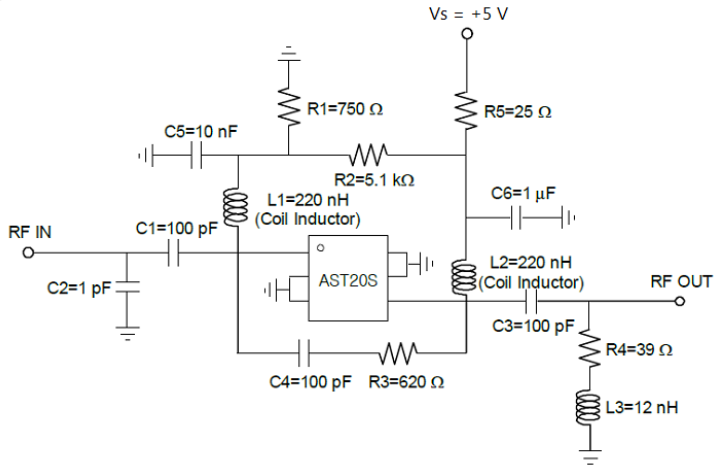
+5 V

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
3rd Intercept Point Output Power[1)]	OIP3	dBm	27.0	28.5	33.0	32.5
2nd 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.

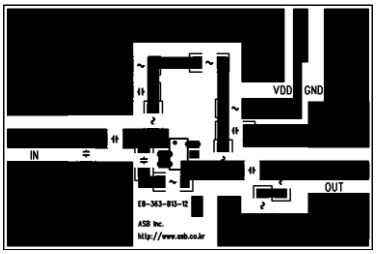
2) OIP2 is measured with two tones (100MHz, 800MHz) at an output power of +0 dBm/tone, 700MHz.

Schematic

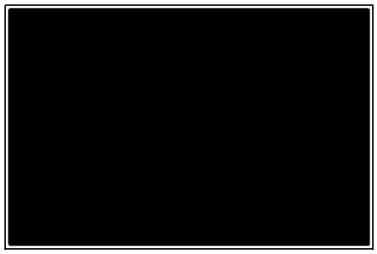


Board Layout (FR4, 24x16 mm², 0.8T)

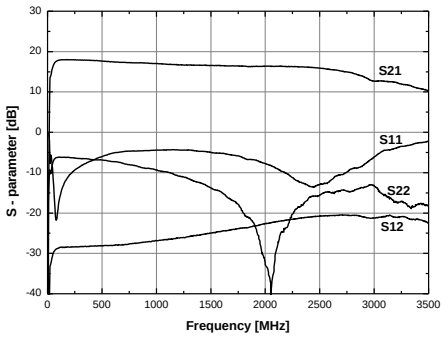
Top

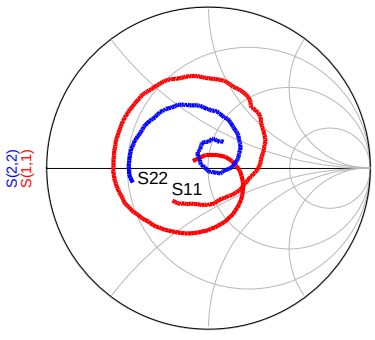


Bottom

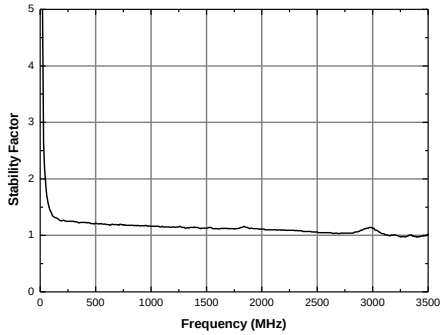


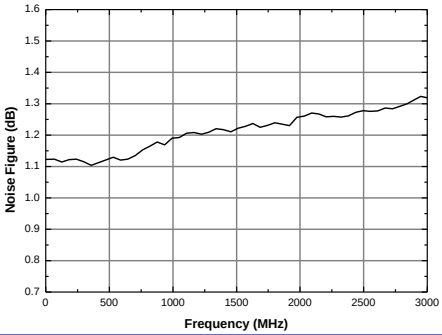
S-parameters & Noise Figure





freq (70.00MHz to 2.700GHz)





APPLICATION CIRCUIT

LTE

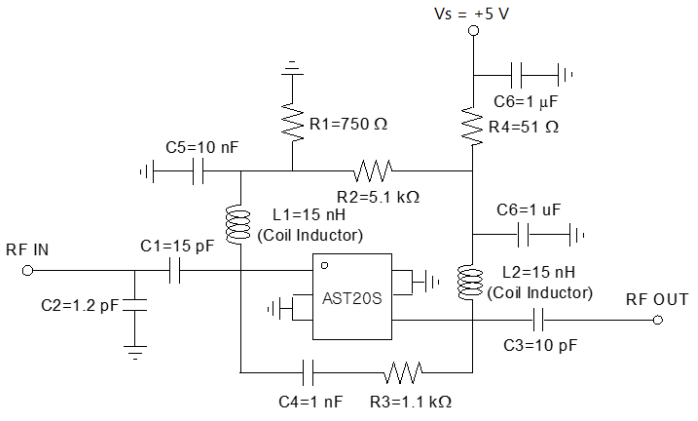
2300 ~ 2700 MHz

+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 Output Power	$P_{o(1dB)}$	dBm	17.5	17.5	17.5
3rd Intercept Point Output Power[1)]	OIP3	dBm	30.5	30.0	33.5
Circuit Current	I_d	mA	34		

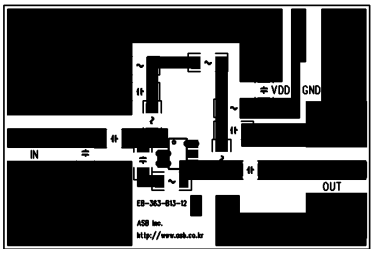
1) OIP3 is measured with two tones at an output power of +4 dBm/tone separated by 1MHz.

Schematic

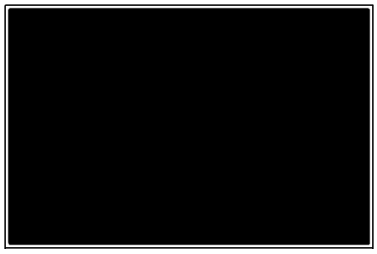


Board Layout (FR4, 24x16 mm², 0.8T)

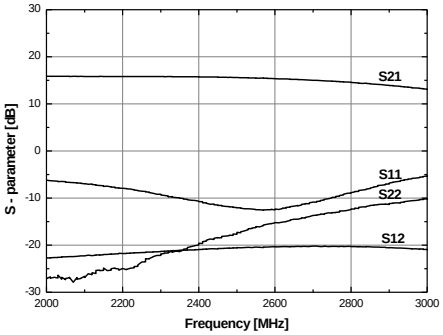
Top

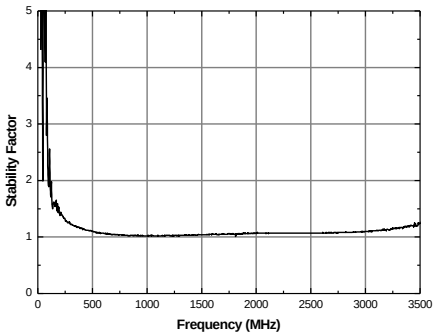


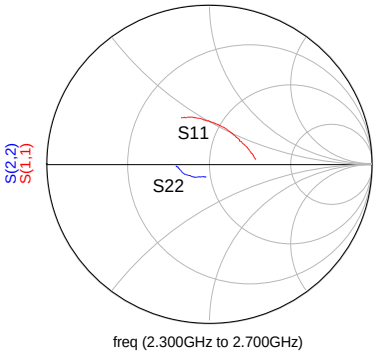
Bottom



S-parameters & K-factor







freq (2.300GHz to 2.700GHz)

APPLICATION CIRCUIT

SMATV, 50 Ω

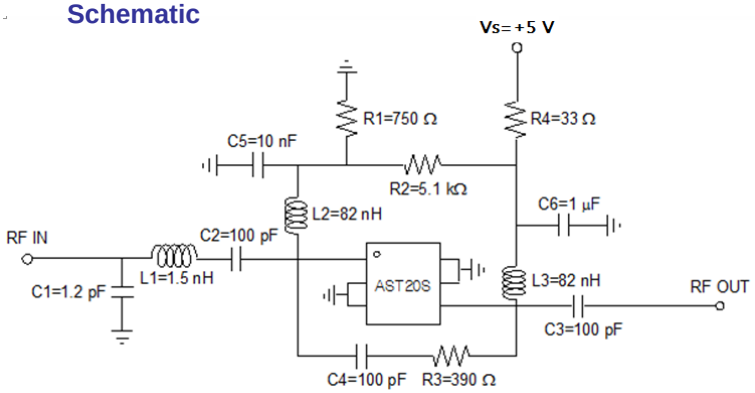
900 ~ 2100 MHz

+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
3rd Intercept Point Output Power[1)]	OIP3	dBm	20.0	20.0	19.0
Circuit Current	I_d	mA	12		

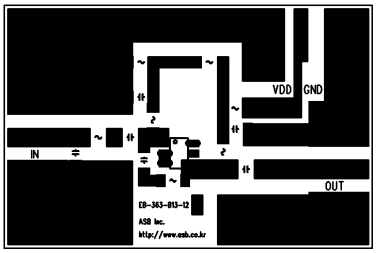
1) OIP3 is measured with two tones at an output power of -5 dBm/tone separated by 1MHz.

Schematic

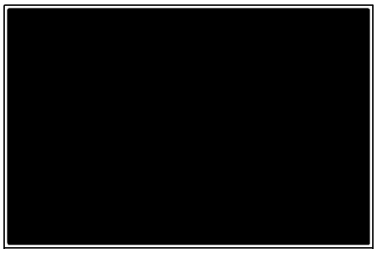


Board Layout (FR4, 24x16 mm², 0.8T)

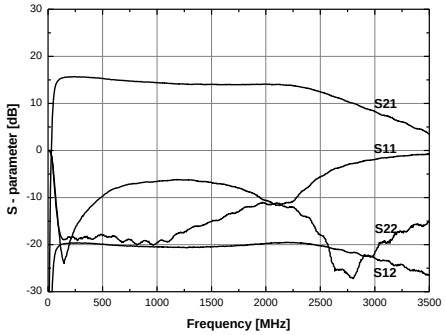
Top

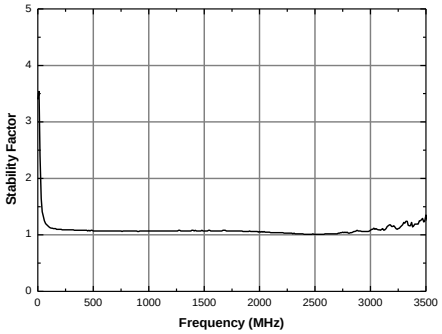


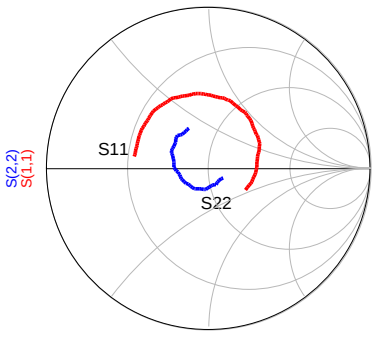
Bottom



S-parameters & K-factor







freq (900.0MHz to 2.100GHz)

APPLICATION CIRCUIT

Trans-impedance Amplifier

50 Ω

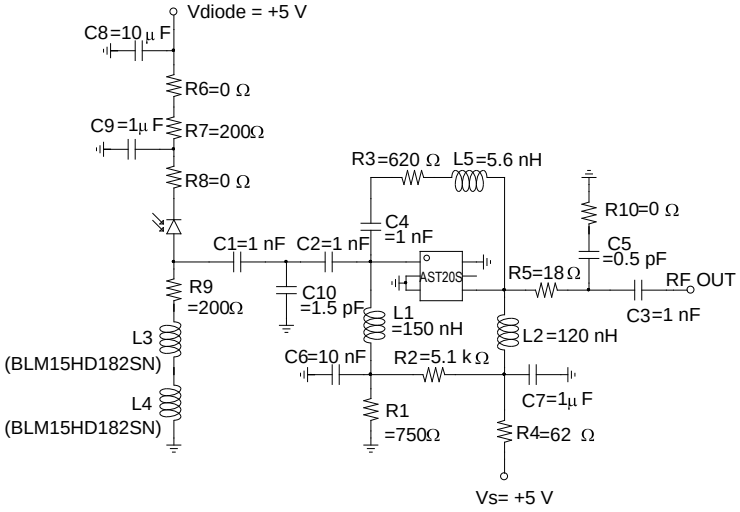
50 ~ 2500 MHz

+5 V

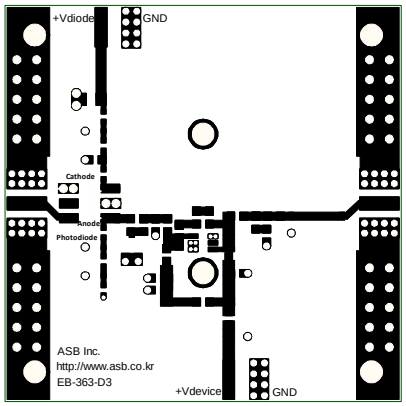
Parameter	Symbol	Unit	Frequency (MHz)				
			50	200	950	2150	2500
Power Gain	G_p	dB	15.0	14.5	11.5	16.1	16.1
Output Return Loss	RL_{out}	dB	-8	-8	-8	-15	-5
EIN	EIN	pA/rtHz	8.3	5.4	8.0	5.1	5.9
3rd Intercept Point Output Power[1)]	OIP3	dBm	15[1)]	13[1)]	9[2)]	8[2)]	5[2)]
Circuit Current	I_d	mA	28				

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.

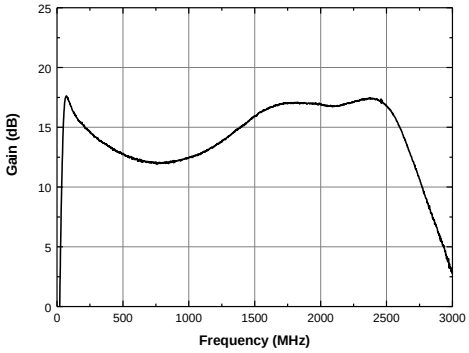
Schematic

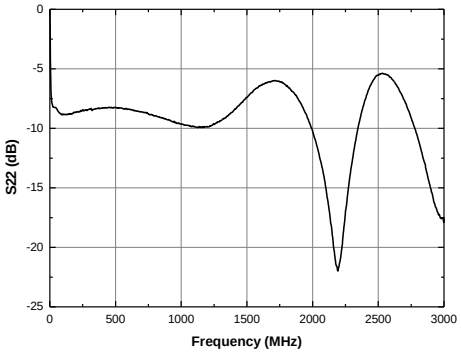


Board Layout (FR4, 24x16 mm², 0.8T)



S-parameters





Noise Parameters

V_{DS} = +3 V, I_{DS} = 30 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 V, I_{DS} = 40 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