

Features

- 20 dB Gain at 900 MHz
- 22 dBm P1dB at 900 MHz
- 35.5 dBm Output IP3 at 900 MHz
- 0.8 dB NF at 900 MHz
- MTTF > 100 Years
- Single Supply

Description

The ASL19W, a wideband linear low noise amplifier MMIC, has a low noise and high linearity at low bias current, being suitable for use in both receiver and transmitter of telecommunication systems up to 3 GHz. S11 down to -20 dB is easily achieved for low noise application to provide a good productivity. The amplifier is available in an SOT-89 package and passes through the stringent DC, RF, and reliability tests.



Package Style: SOT-89

Typical Performance

Parameters	Units	Typical				
		Low Noise				
Frequency	MHz	70	250	900	2000	2700
Gain	dB	24.5	25.5	20	13.5	11
S11	dB	-13	-18	-18	-18	-16
S22	dB	-15	-13	-15	-15	-14
Output IP3 ¹⁾	dBm	32	33	35.5	37	38
Noise Figure	dB	2.9	0.9	0.8	0.9	1.1
Output P1dB	dBm	21	21	22	22	22
Current	mA	73	73	73	73	73
Device Voltage	V	4.4	4.4	4.4	4.4	4.4

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

Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		900	
Gain	dB	19	20	
S11	dB		-18	
S22	dB		-15	
Output IP3	dBm	34	35.5	
Noise Figure	dB		0.8	1.1
Output P1dB	dBm	20	22	
Current	mA	55	73	86
Device Voltage	V		4.4	

Absolute Maximum Ratings

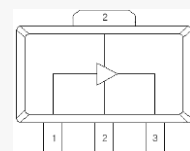
Parameters	Rating
Operating Case Temperature	-40 to +85°C
Storage Temperature	-40 to +150°C
Device Voltage	+5.5 V
Operating Junction Temperature	+150°C
Input RF Power (CW, 50ohm matched)*	22 dBm
Thermal Resistance	80 °C/W

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

Application Circuit

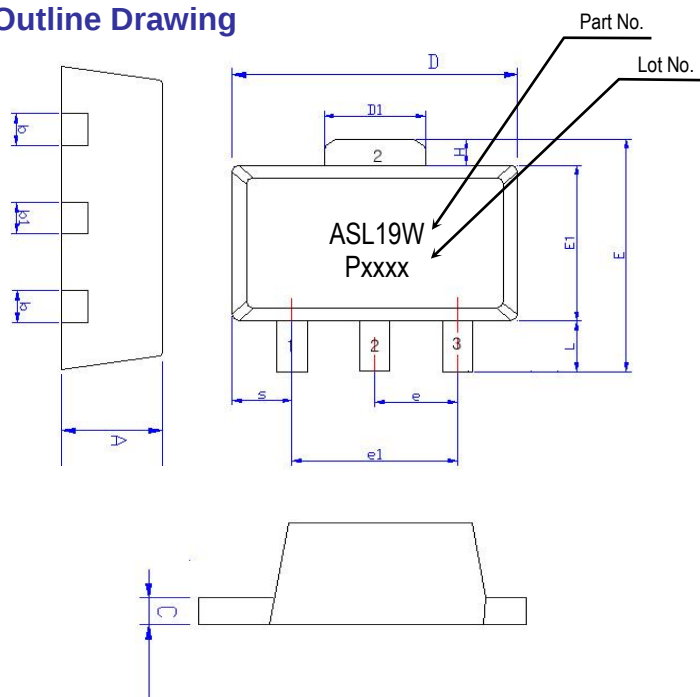
- 500 ~ 3500 MHz (Low Noise)
- IF
- 250 MHz
- TETRA
- LTE
- CDMA (Low Noise)
- GSM (Low Noise)
- 1250 MHz
- GPS (5V, 3.3V)
- PCS (Low Noise)
- US PCS (Low Noise)
- WCDMA (Low Noise)
- 2300 ~ 2700 MHz (Low Noise)
- DVB-T (V-band)
- DVB-T (U-band)

Pin Configuration



Pin No.	Function
1	RF IN
2	GND
3	RF OUT / Bias

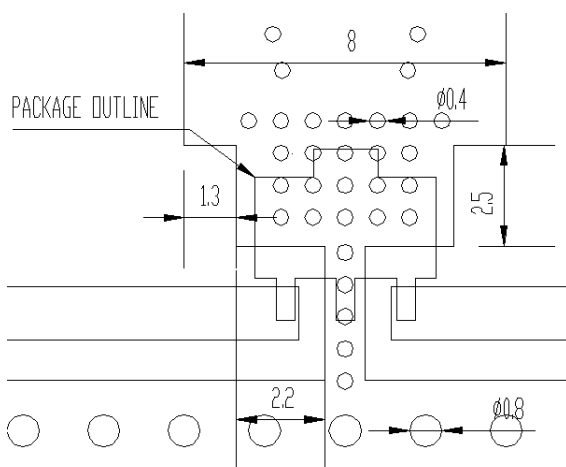
Outline Drawing



Symbols	Dimensions (In mm)		
	MIN	NOM	MAX
A	1.40	1.50	1.60
L	0.89	1.04	1.20
b	0.36	0.42	0.48
b1	0.41	0.47	0.53
C	0.38	0.40	0.43
D	4.40	4.50	4.60
D1	1.40	1.60	1.75
E	3.64	---	4.25
E1	2.40	2.50	2.60
e1	2.90	3.00	3.10
H	0.35	0.40	0.45
S	0.65	0.75	0.85
e	1.40	1.50	1.60

Pin No.	Function
1	RF IN
2	GND
3	RF OUT / Bias

Mounting Recommendation (in mm)



- Note:**
1. The number and size of ground via holes in a circuit board is critical for thermal and RF grounding considerations.
 2. We recommend that the ground via holes be placed on the bottom of the lead pin 2 and exposed pad of the device for better RF and thermal performance, as shown in the drawing at the left side.

ESD Classification & Moisture Sensitivity Level

ESD Classification

HBM	Class 1A
	Voltage Level: 400 V
MM	Class A
	Voltage Level: 50 V

CAUTION: ESD-sensitive device!

Moisture Sensitivity Level (MSL)

Level 3 at 260°C reflow

OIP3 & Noise Figure Vs. Bias Resistor

RD (ohm)	RB (ohm)	Vd (V)	Ic (mA)	CDMA		WCDMA		RD (ohm)	RB (ohm)	Vd (V)	Ic (mA)	CDMA		WCDMA	
				NF (dB)	OIP3 (dBm)	NF (dB)	OIP3 (dBm)					NF (dB)	OIP3 (dBm)	NF (dB)	OIP3 (dBm)
8.2	6.2k	4.38	73	1.01	36	0.86	38.4	20	7.5k	3.68	66	1.05	35.2	0.89	36.8
	5.6k	4.51	59	0.98	35.2	0.86	37.1		6.8k	3.86	59	0.97	34.7	0.88	36.5
	5.1k	4.61	47	0.98	33.4	0.87	34.4		6.2k	4.06	48	0.99	33.2	0.86	35.2
	4.7k	4.7	36	0.99	30.6	0.9	30.8		5.6k	4.21	41	1.03	31.4	0.9	33.5
	4.3k	4.76	28	0.96	27.8	0.96	27.7		5.1k	4.34	34	1.04	29.2	0.92	31.2
10	6.2k	4.33	68	0.93	35.8	0.84	38	20	4.7k	4.48	27	1.05	27.1	0.94	29.1
	5.6k	4.46	55	0.96	34.6	0.87	36.2		4.3k	4.59	21	1.05	25.7	0.99	27.5
	5.1k	4.56	44	0.98	32.5	0.88	33.9	30	11k	2.84	73	0.98	34.9	0.88	36.5
	4.7k	4.64	36	0.97	30.6	0.91	30.5		10k	2.99	68	0.98	36.3	0.87	38.8
	4.3k	4.74	26	1.05	27	0.95	27.8		9.1k	3.14	63	1.01	35.9	0.89	37.8
12	6.8k	4.08	75	0.97	35.8	0.89	37		8.2k	3.31	57	0.95	34.6	0.89	36.5
	6.2k	4.26	61	1.01	35.3	0.86	37.2		7.5k	3.49	52	0.99	33.7	0.86	35.6
	5.6k	1.39	50	0.98	34	0.88	35.8		6.8k	3.48	47	0.99	32.7	0.88	35.6
	5.1k	4.51	41	0.96	31.9	0.88	32.7		6.2k	3.85	38	1.06	30.8	0.89	32.9
	4.7k	4.62	31	1.04	28.8	0.91	30		5.6k	4.22	33	1	29.1	0.92	30.8
	4.3k	4.7	24	1.06	26.5	0.95	27.6		5.1k	4.18	28	1.08	26.9	0.94	29
									4.7k	4.35	22	1.03	25.8	0.97	27.6
15	6.8k	3.99	68	0.99	35.5	0.87	37								
	6.2k	4.14	58	1.01	34.9	0.87	35.8								
	5.6k	4.29	47	1.04	33.3	0.86	34.4								
	5.1k	4.43	38	1.04	30.9	0.9	31.1								
	4.7k	4.55	30	1.07	28.1	0.93	28.8								
	4.3k	4.65	23	1.09	26.1	0.97	26.8								

* Test Application Circuit : ASL19W CDMA / WCDMA application circuit

* OIP3 Test Condition : Freq. – 894MHz / – 2140MHz, +10dBm output power per tone

* Vd : Applied voltage to the device

APPLICATION CIRCUIT

Low Noise

500 ~ 3500 MHz

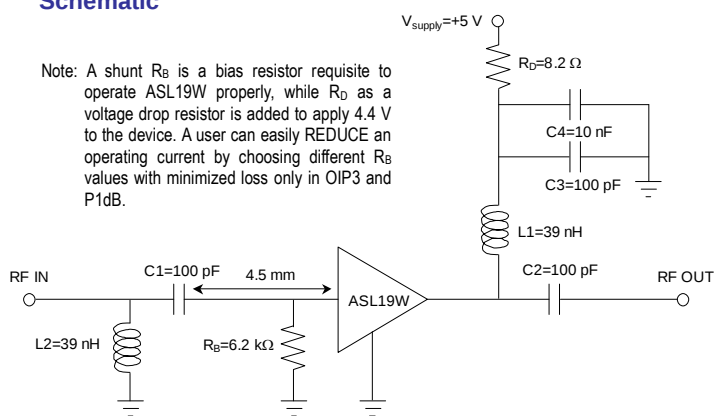
+5 V

Frequency (MHz)	900	2000
Magnitude S21 (dB)	19	13
Magnitude S11 (dB)	-7	-7
Magnitude S22 (dB)	-18	-18
Output P1dB (dBm)	22	22
Output IP3 ¹⁾ (dBm)	37	37.5
Noise Figure (dB)	0.7	0.9
Device Voltage (V)	4.4	4.4
Current (mA)	73	73

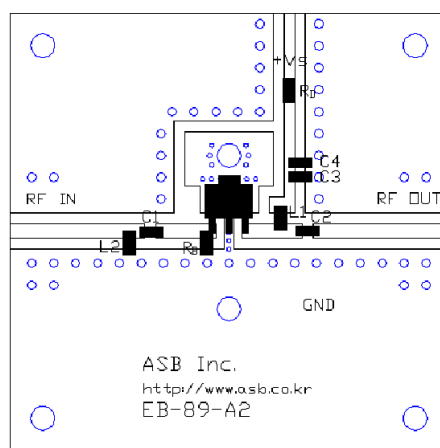
1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

Schematic

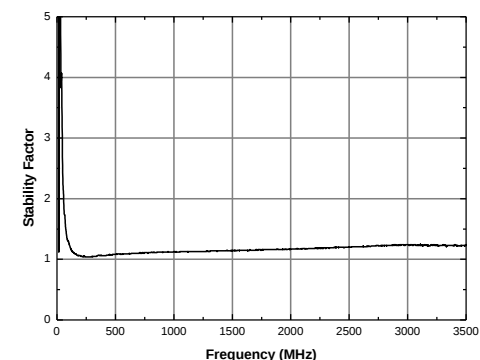
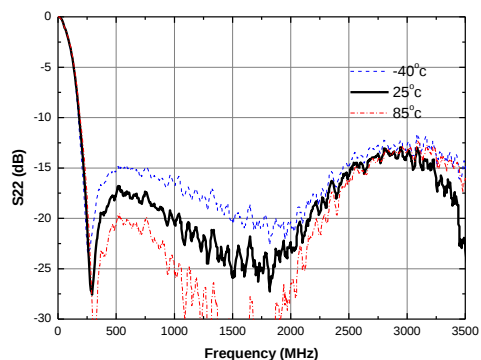
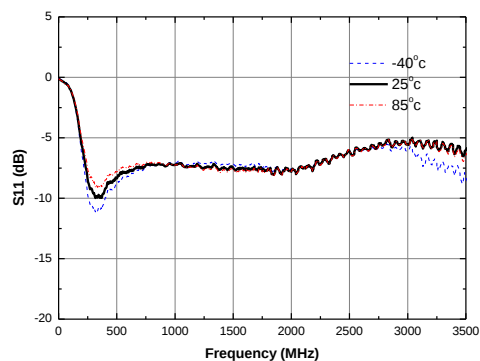
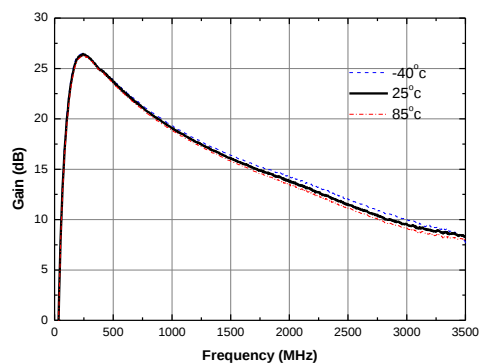
Note: A shunt R_B is a bias resistor requisite to operate ASL19W properly, while R_D as a voltage drop resistor is added to apply 4.4 V to the device. A user can easily REDUCE an operating current by choosing different R_B values with minimized loss only in OIP3 and P1dB.



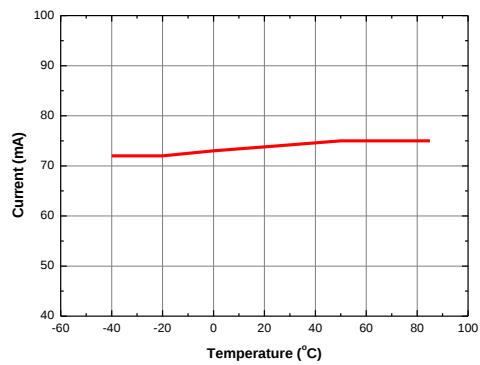
Board Layout (FR4, 40x40 mm², 0.8T)



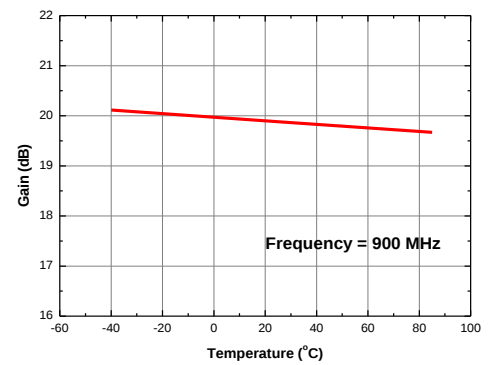
S-parameters & K-factor



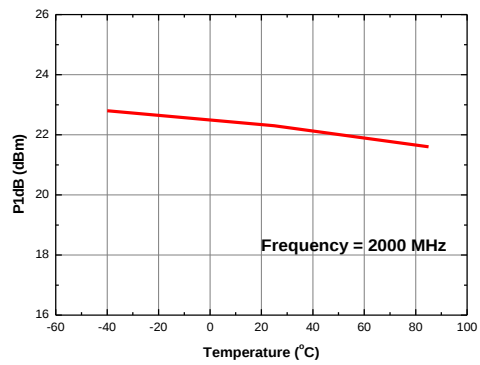
Current vs. Temperature



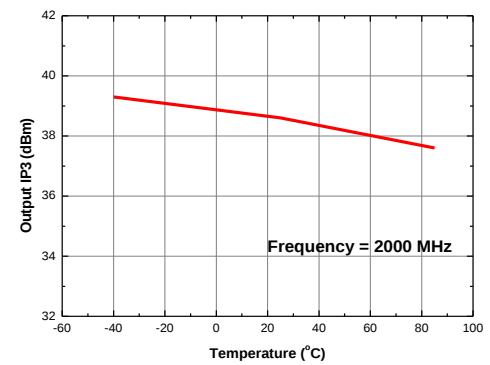
Gain vs. Temperature



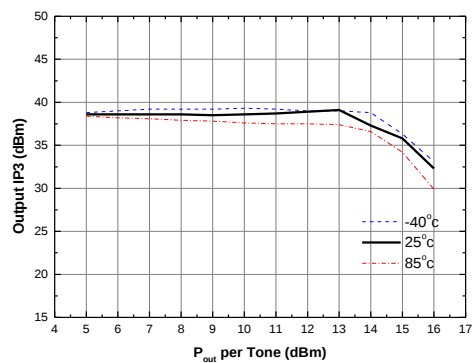
P1dB vs. Temperature



Output IP3 vs. Temperature



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



APPLICATION CIRCUIT

IF

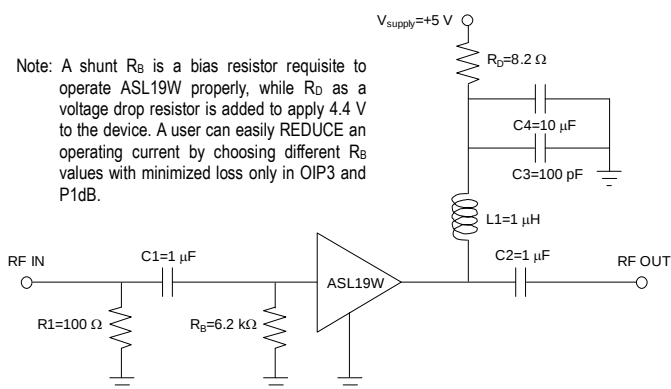
30 ~ 400 MHz

+5 V

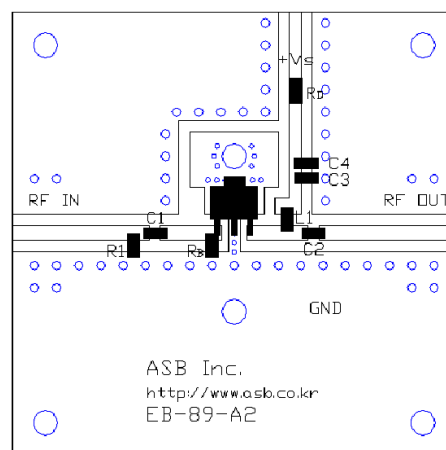
Frequency (MHz)	70	150	300
Magnitude S21 (dB)	24.5	24	22.5
Magnitude S11 (dB)	-13	-13	-10
Magnitude S22 (dB)	-15	-18	-18
Output P1dB (dBm)	21	21	21
Output IP3 ¹⁾ (dBm)	32	32.5	34
Noise Figure (dB)	2.9	2.9	2.8
Device Voltage (V)	4.4	4.4	4.4
Current (mA)	73	73	73

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

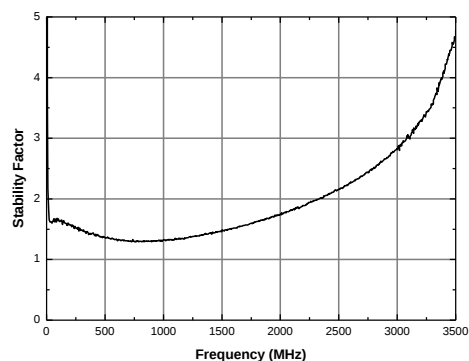
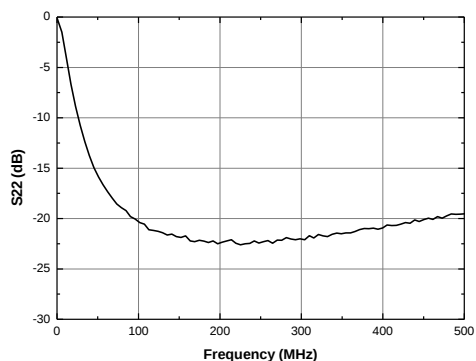
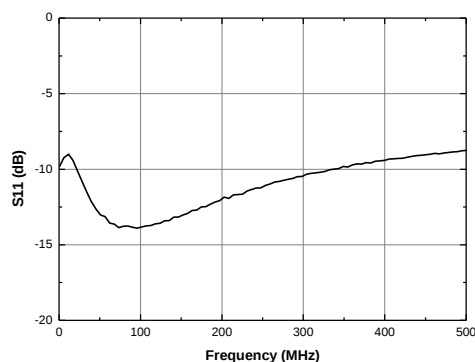
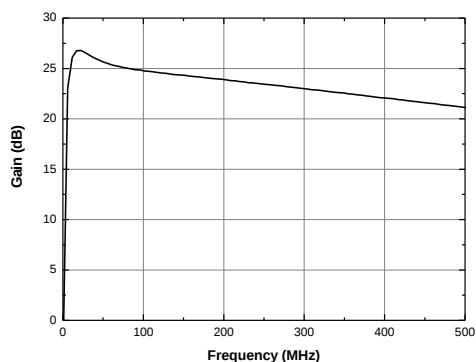
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

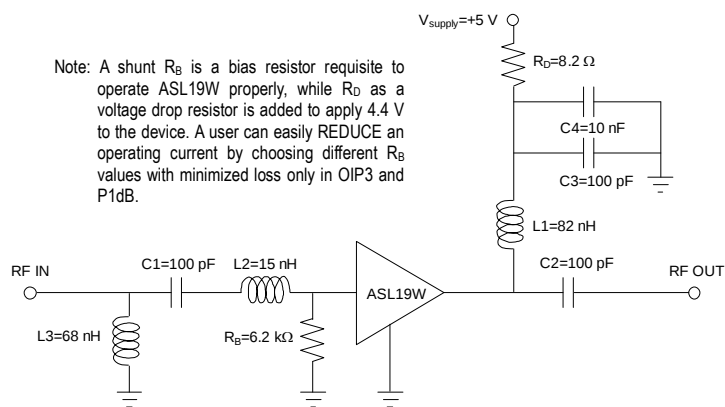
250 MHz

+5 V

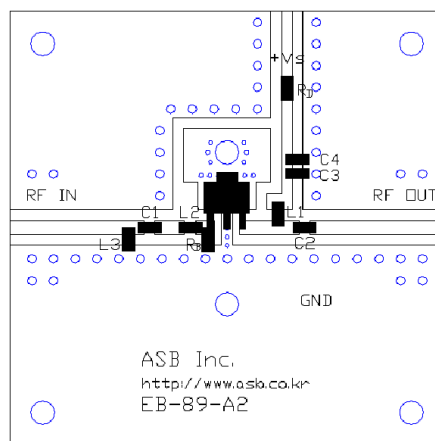
Frequency (MHz)	250
Magnitude S21 (dB)	25.5
Magnitude S11 (dB)	-18
Magnitude S22 (dB)	-13
Output P1dB (dBm)	21
Output IP3 ¹⁾ (dBm)	33
Noise Figure (dB)	0.9
Device Voltage (V)	4.4
Current (mA)	73

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

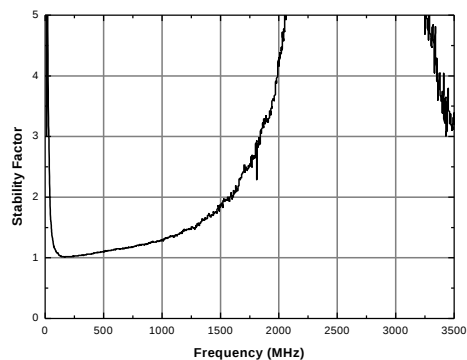
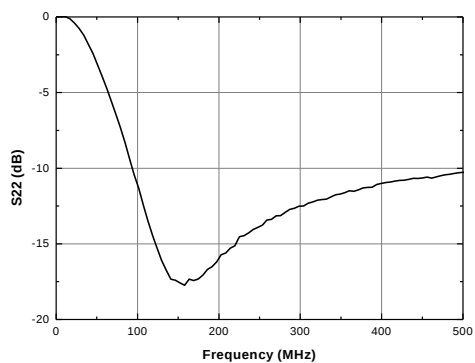
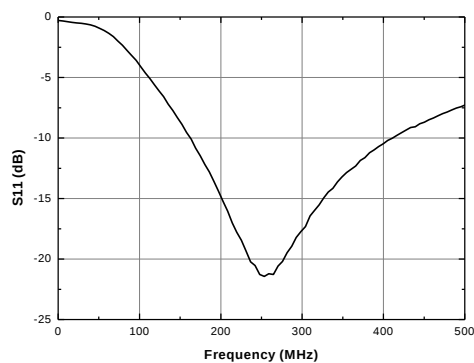
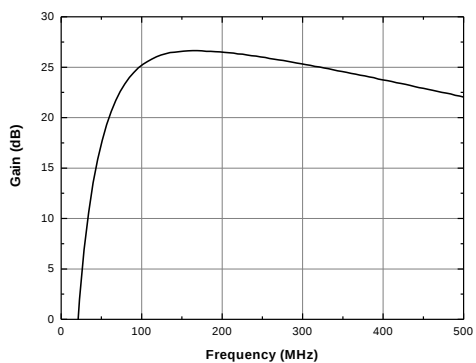
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

TETRA

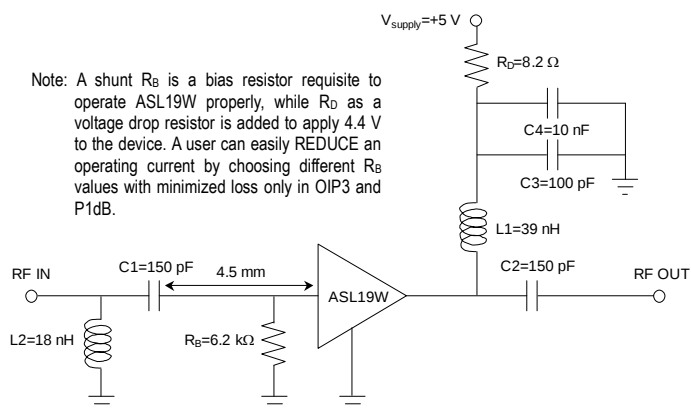
450 MHz

+5 V

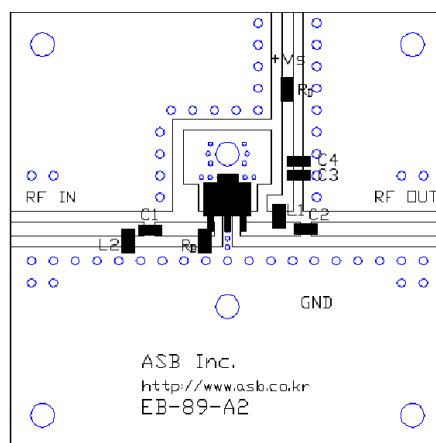
Frequency (MHz)	450
Magnitude S21 (dB)	23.5
Magnitude S11 (dB)	-18
Magnitude S22 (dB)	-18
Output P1dB (dBm)	21.5
Output IP3 ¹⁾ (dBm)	32
Noise Figure (dB)	1.15
Device Voltage (V)	4.4
Current (mA)	73

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

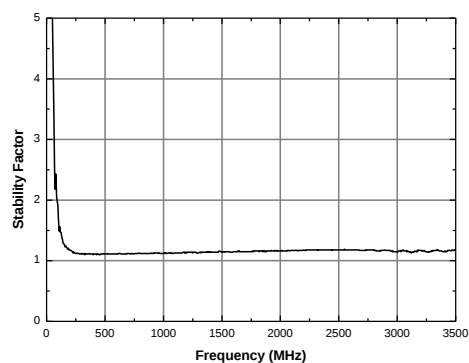
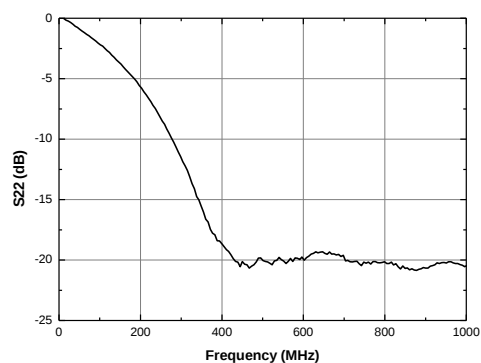
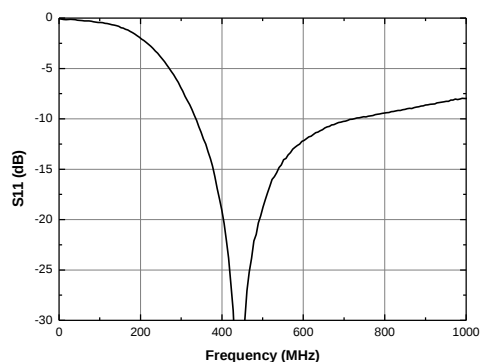
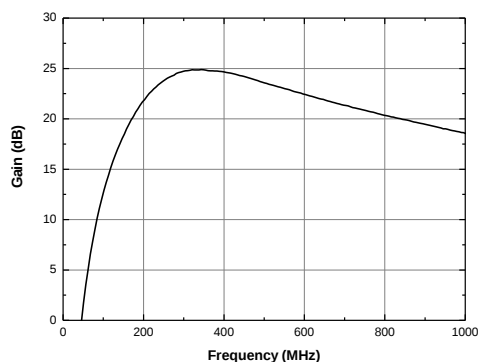
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

LTE

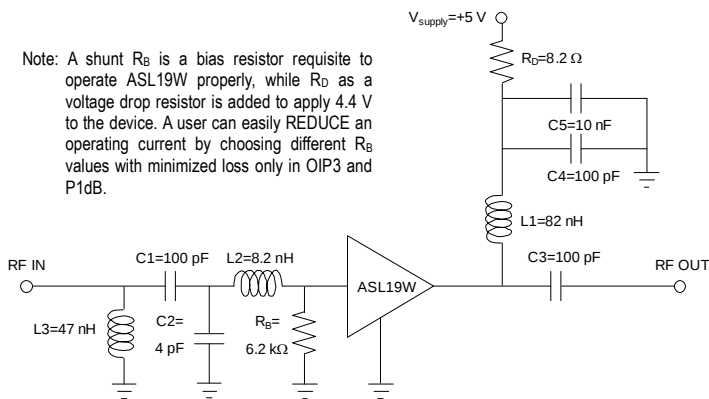
698 ~ 787 MHz

+5 V

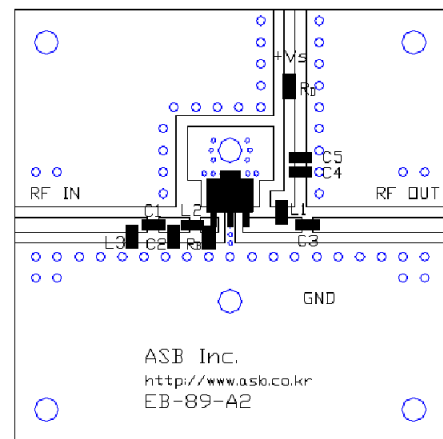
Frequency (MHz)	698~787
Magnitude S21 (dB)	20
Magnitude S11 (dB)	-18
Magnitude S22 (dB)	-14
Output P1dB (dBm)	22
Output IP3 ¹⁾ (dBm)	35
Noise Figure (dB)	0.8
Device Voltage (V)	4.4
Current (mA)	73

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

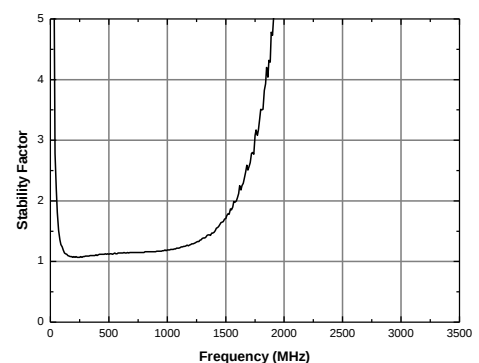
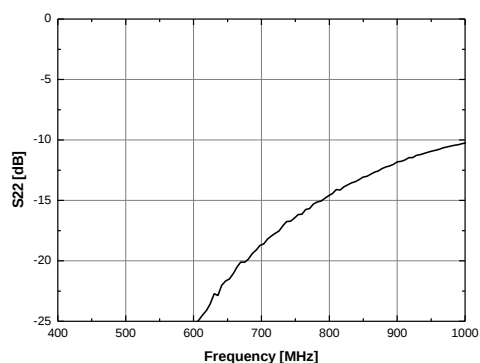
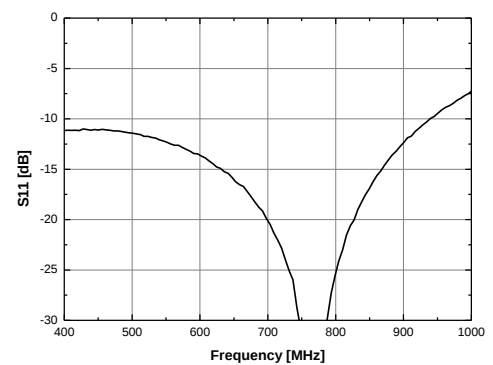
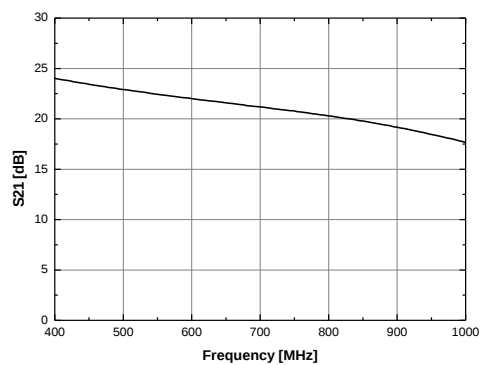
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

Low Noise

CDMA

824 ~ 894 MHz

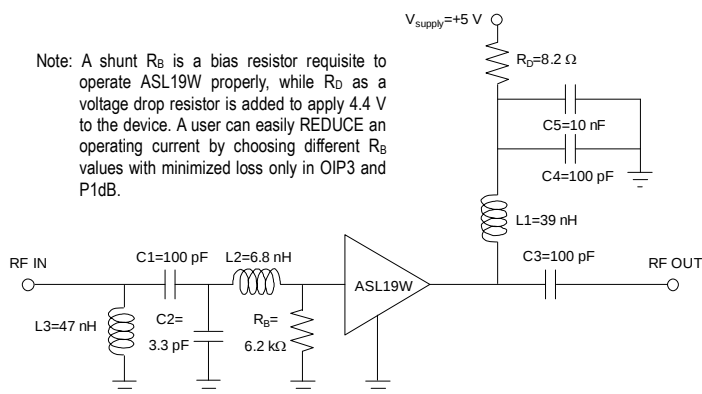
+5 V

Frequency (MHz)	824	894
Magnitude S ₂₁ (dB)	20	20
Magnitude S ₁₁ (dB)	-15	-18
Magnitude S ₂₂ (dB)	-18	-15
Output P _{1dB} (dBm)	22	22
Output IP ₃ ¹⁾ (dBm)	35.5	35.5
Noise Figure (dB)	0.8	0.8
Device Voltage (V)	4.4	4.4
Current (mA)	73	73

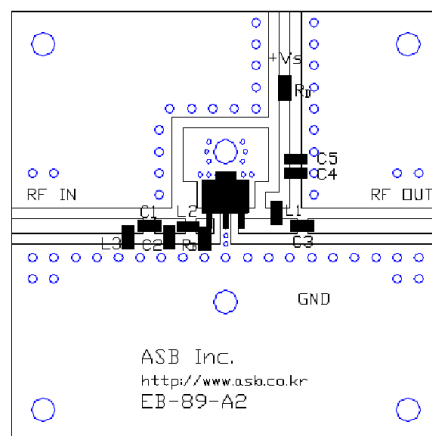
1) OIP₃ is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

Schematic

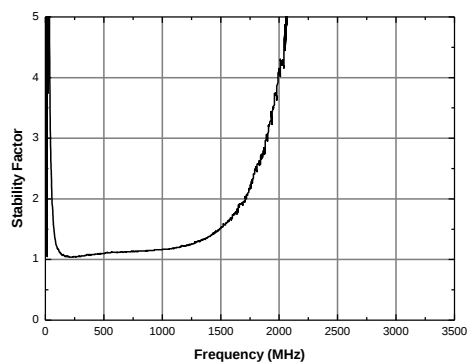
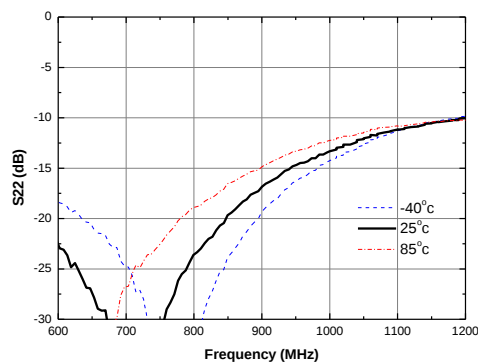
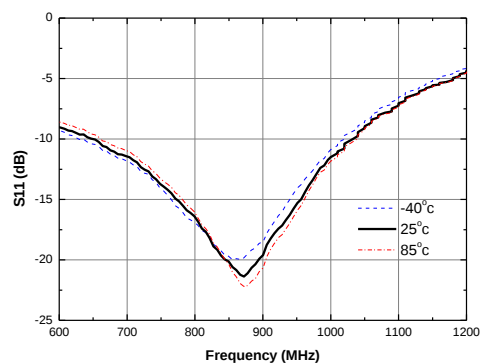
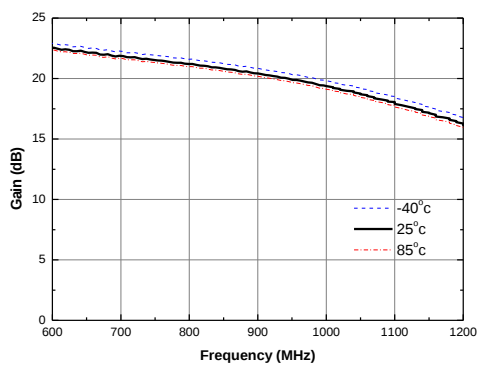
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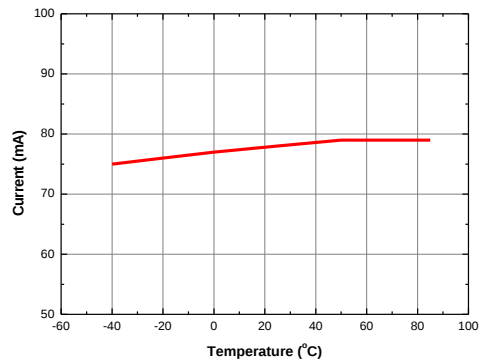
Board Layout (FR4, 40x40 mm², 0.8T)



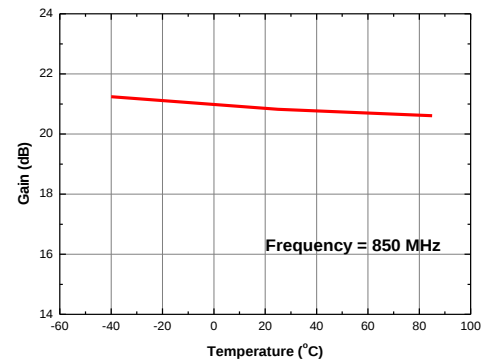
S-parameters & K-factor



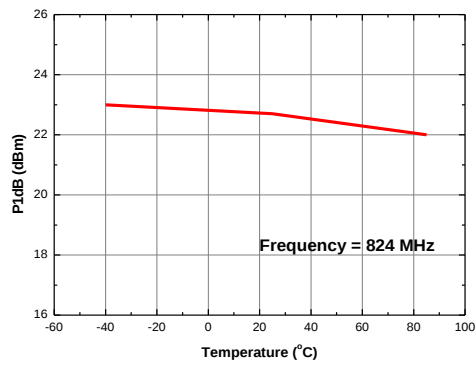
Current vs. Temperature



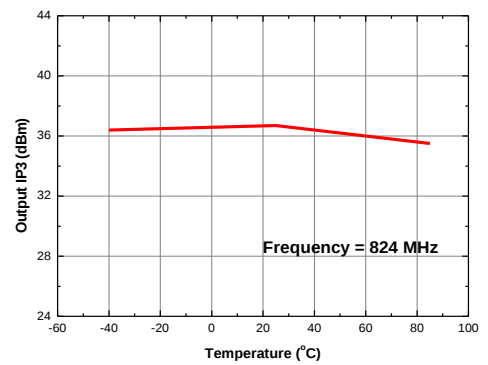
Gain vs. Temperature



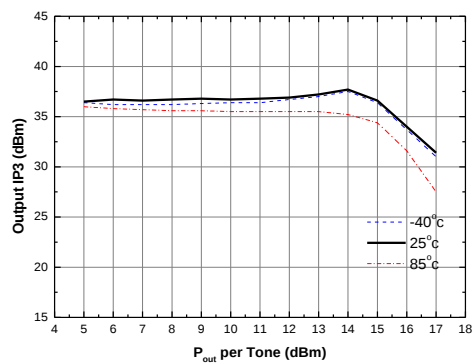
P1dB vs. Temperature



Output IP3 vs. Temperature



Output IP3 vs. Tone Power (Frequency = 824 MHz)



APPLICATION CIRCUIT

Low Noise

GSM

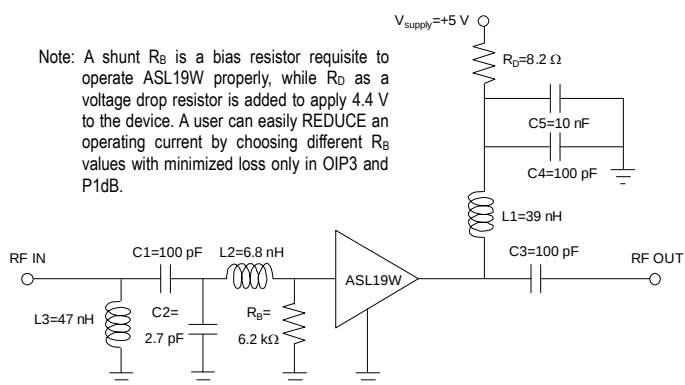
890 ~ 960 MHz

+5 V

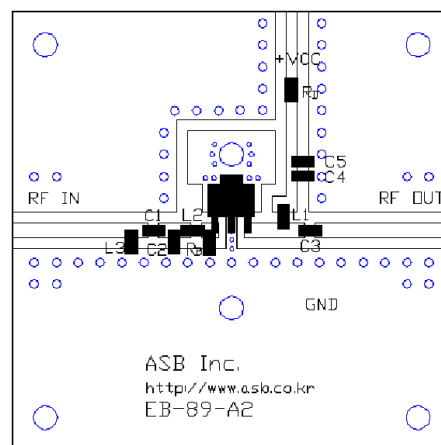
Frequency (MHz)	890	960
Magnitude S21 (dB)	18.5	18
Magnitude S11 (dB)	-18	-18
Magnitude S22 (dB)	-18	-15
Output P1dB (dBm)	22	22
Output IP3 ¹⁾ (dBm)	36	36
Noise Figure (dB)	0.8	0.8
Device Voltage (V)	4.4	4.4
Current (mA)	73	73

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

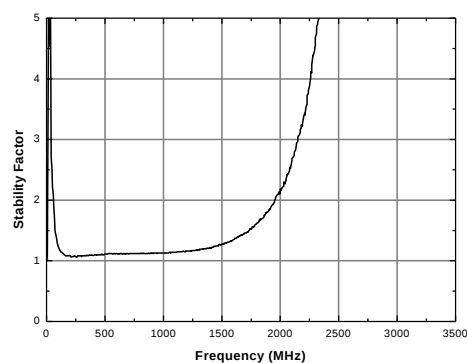
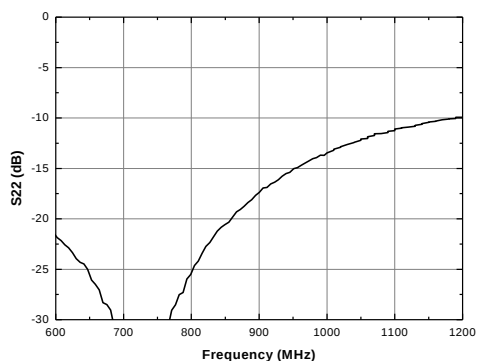
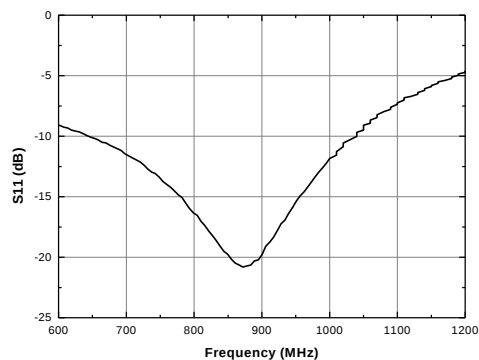
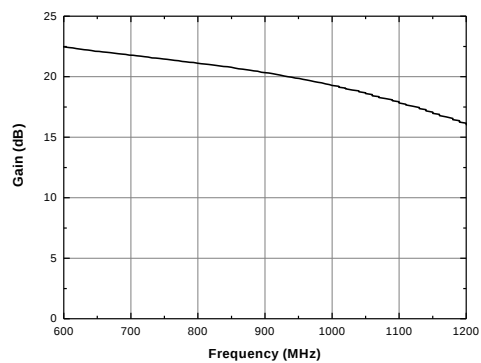
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

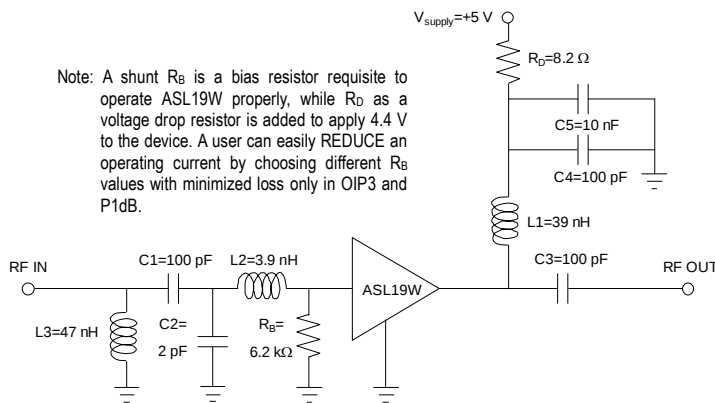
1250 MHz

+5 V

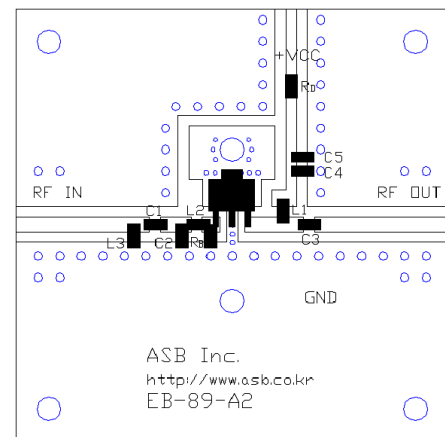
Frequency (MHz)	1250
Magnitude S21 (dB)	16
Magnitude S11 (dB)	-20
Magnitude S22 (dB)	-15
Output P1dB (dBm)	22
Output IP3 ¹⁾ (dBm)	37
Noise Figure (dB)	0.8
Device Voltage (V)	4.4
Current (mA)	73

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

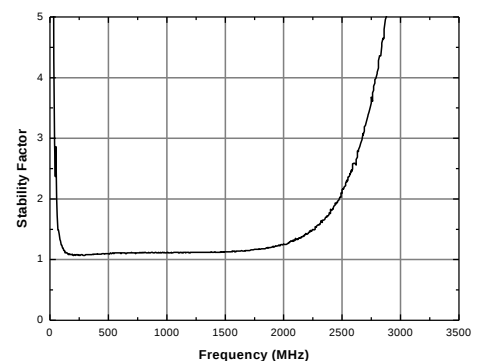
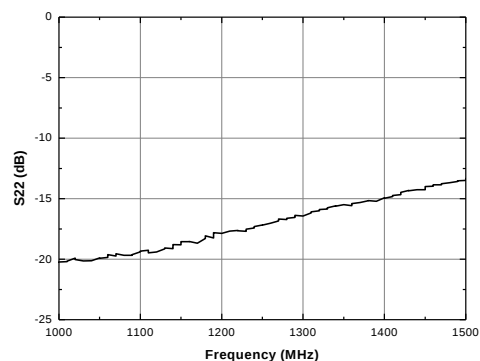
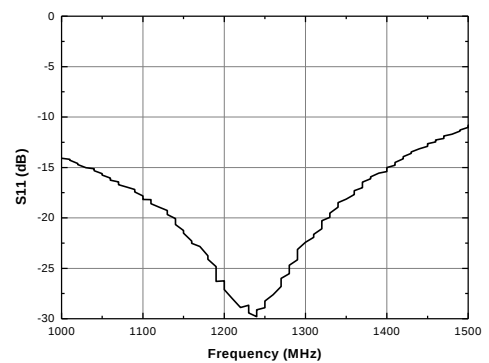
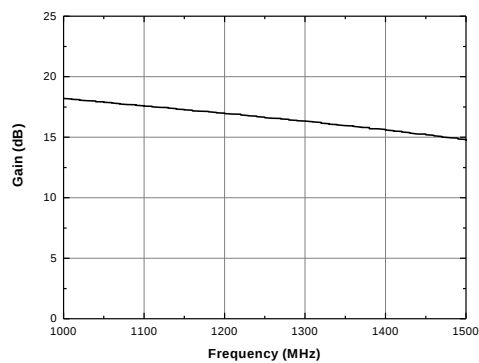
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

GPS

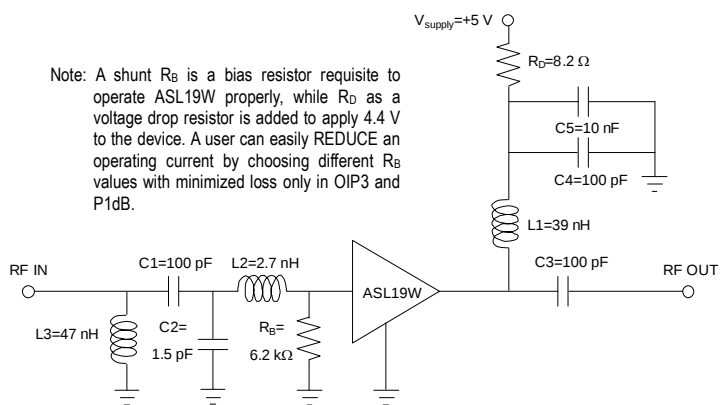
1575 MHz

+5 V

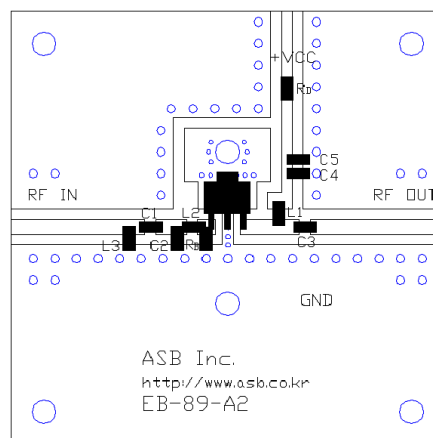
Frequency (MHz)	1575
Magnitude S21 (dB)	14.5
Magnitude S11 (dB)	-20
Magnitude S22 (dB)	-15
Output P1dB (dBm)	22
Output IP3 ¹⁾ (dBm)	37.5
Noise Figure (dB)	0.8
Device Voltage (V)	4.4
Current (mA)	73

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

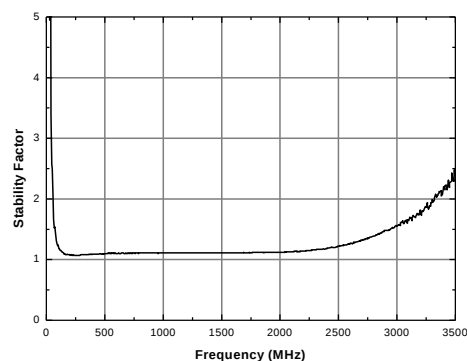
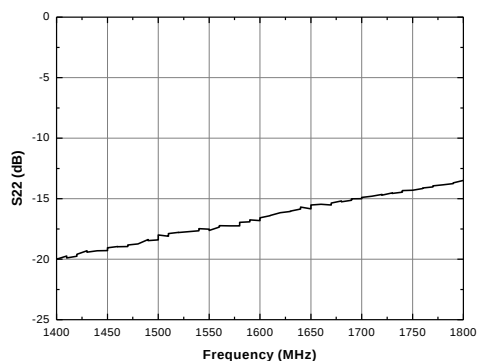
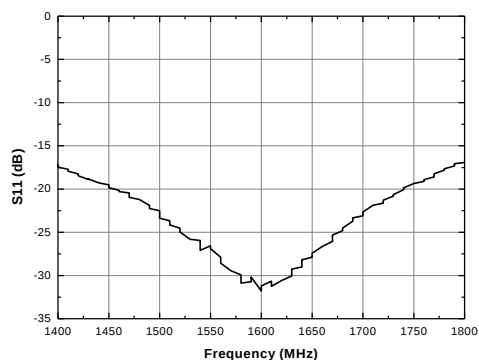
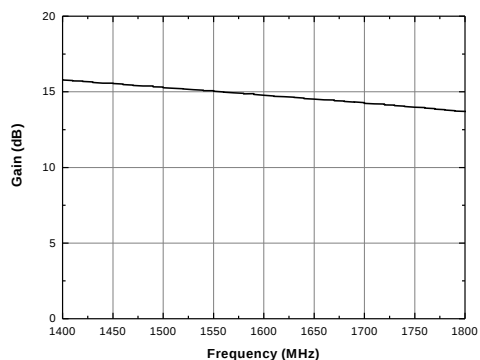
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

GPS

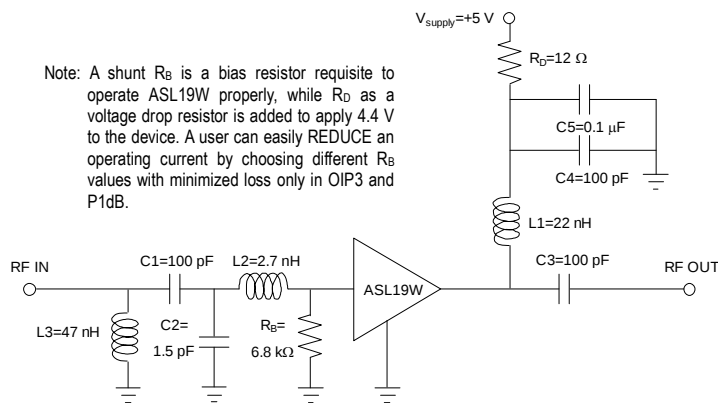
1575 MHz

+3.3 V

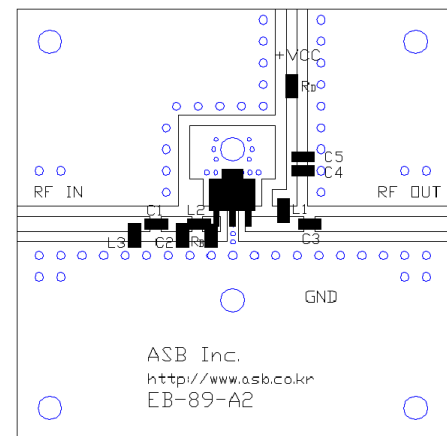
Frequency (MHz)	1575
Magnitude S21 (dB)	15.5
Magnitude S11 (dB)	-16
Magnitude S22 (dB)	-12
Output P1dB (dBm)	17
Output IP3 ¹⁾ (dBm)	28.5
Noise Figure (dB)	0.9
Device Voltage (V)	3.1
Current (mA)	20

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

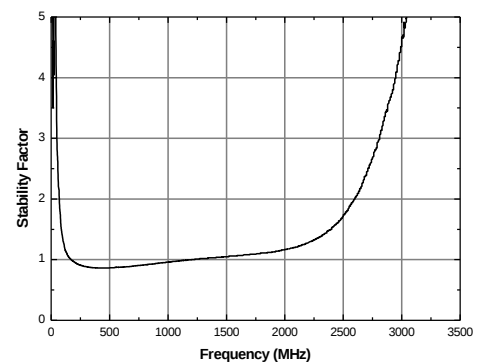
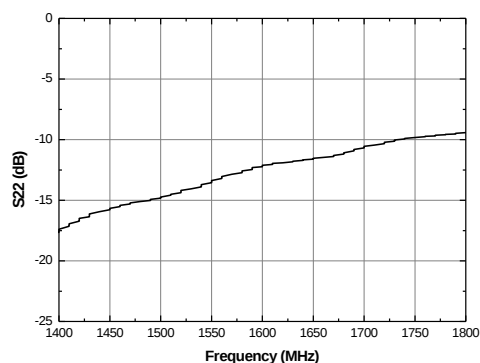
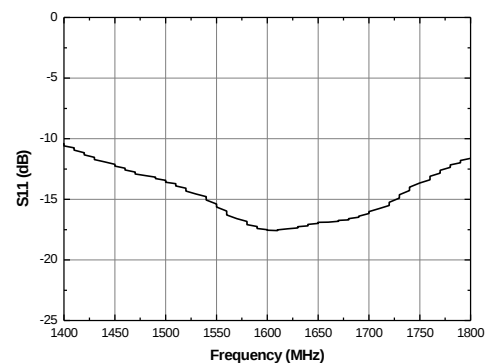
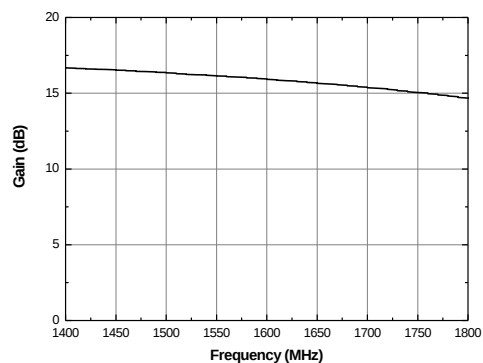
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

Low Noise

PCS

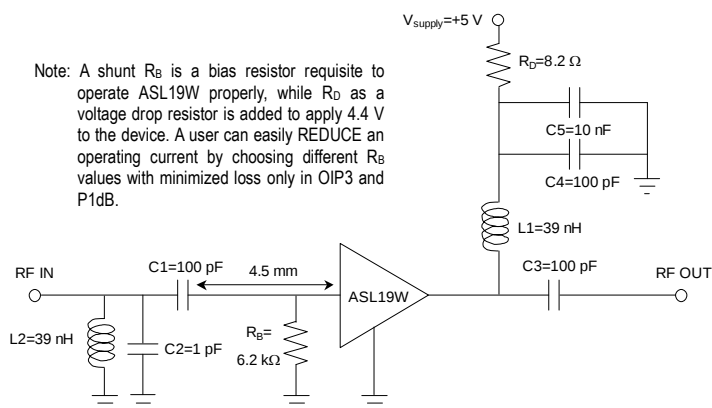
1750 ~ 1870 MHz

+5 V

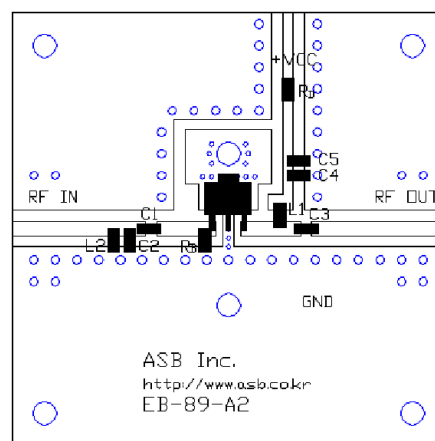
Frequency (MHz)	1750~1870
Magnitude S21 (dB)	13.5
Magnitude S11 (dB)	-18
Magnitude S22 (dB)	-15
Output P1dB (dBm)	21
Output IP3 ¹⁾ (dBm)	37
Noise Figure (dB)	0.9
Device Voltage (V)	4.4
Current (mA)	73

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

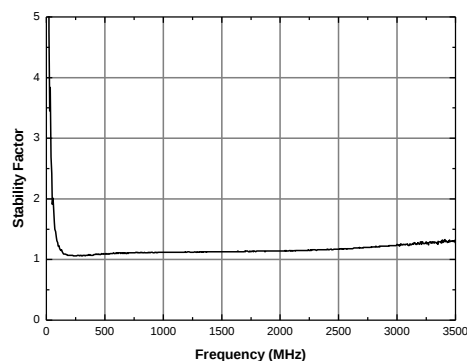
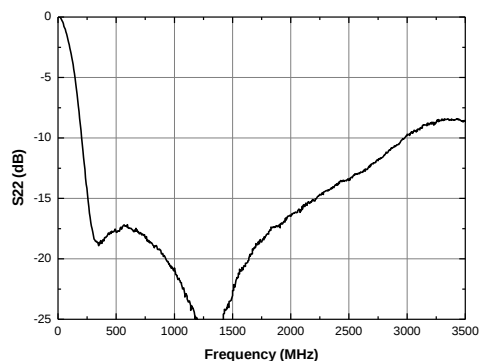
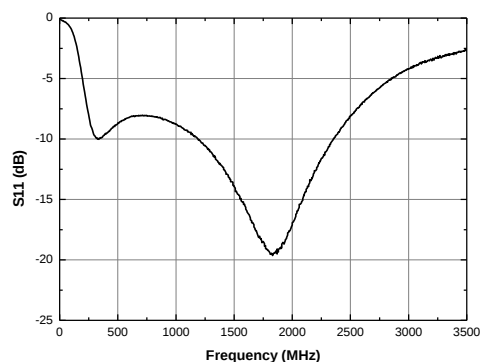
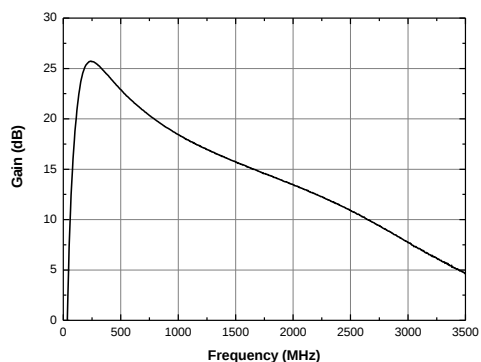
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

Low Noise

US PCS

1850 ~ 1920 MHz

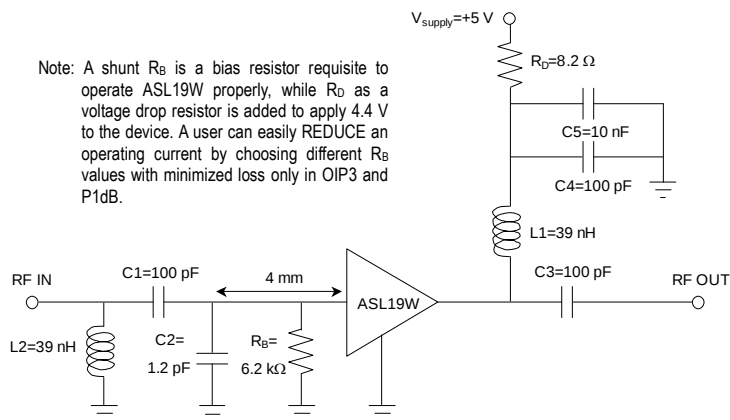
+5 V

Frequency (MHz)	1850~1920
Magnitude S21 (dB)	14.5
Magnitude S11 (dB)	-15
Magnitude S22 (dB)	-15
Output P1dB (dBm)	22
Output IP3 ¹⁾ (dBm)	37
Noise Figure (dB)	0.9
Device Voltage (V)	4.4
Current (mA)	73

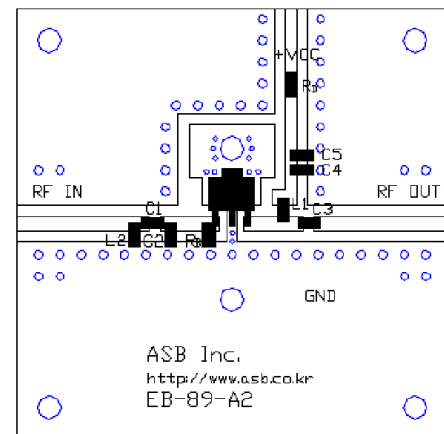
1) OIP3 is measured with two tones at an output power of +10 dBm/tone separated by 1 MHz.

Schematic

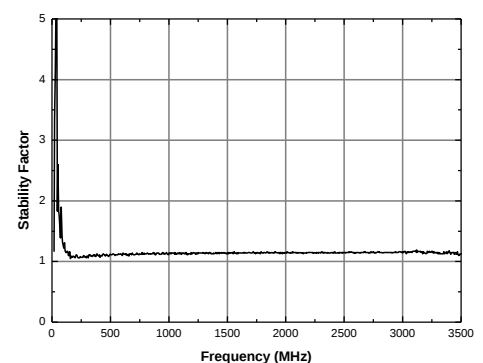
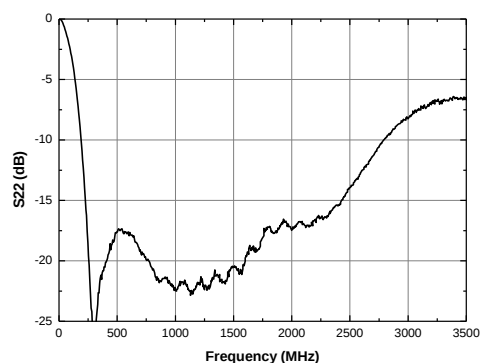
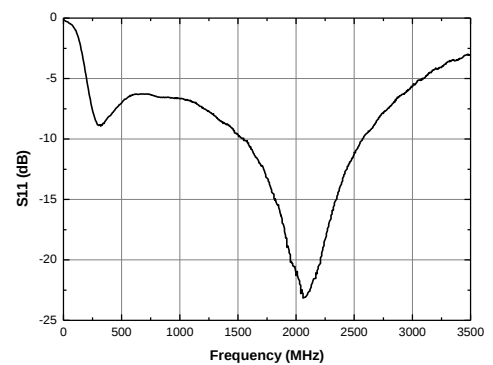
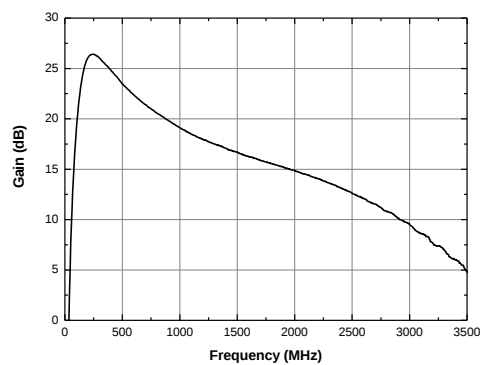
Note: A shunt R_B is a bias resistor requisite to operate ASL19W properly, while R_D as a voltage drop resistor is added to apply 4.4 V to the device. A user can easily REDUCE an operating current by choosing different R_B values with minimized loss only in OIP3 and P1dB.



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

Low Noise

WCDMA

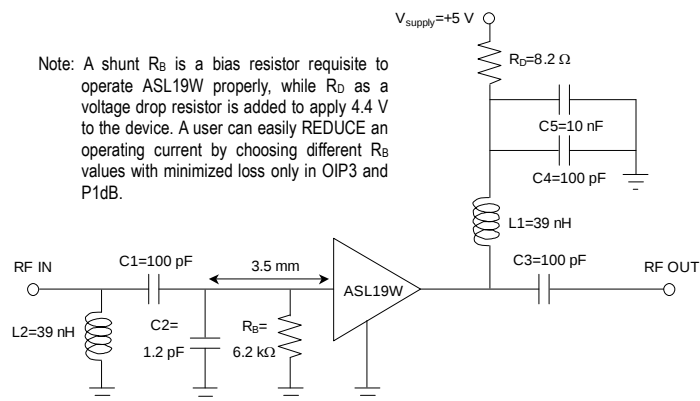
1920 ~ 2170 MHz

+5 V

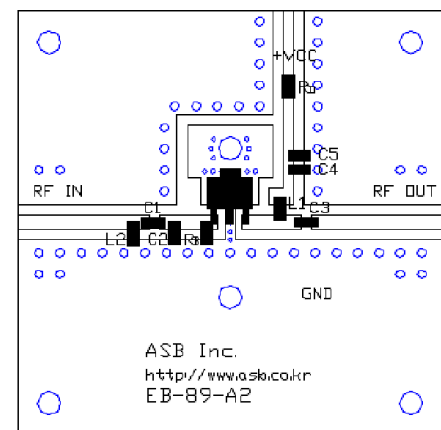
Frequency (MHz)	1920~1980	2110~2170
Magnitude S21 (dB)	13.5	13
Magnitude S11 (dB)	-18	-18
Magnitude S22 (dB)	-15	-14
Output P1dB (dBm)	22	22
Output IP3 ¹⁾ (dBm)	37	37
Noise Figure (dB)	0.9	0.9
Device Voltage (V)	4.4	4.4
Current (mA)	73	73

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

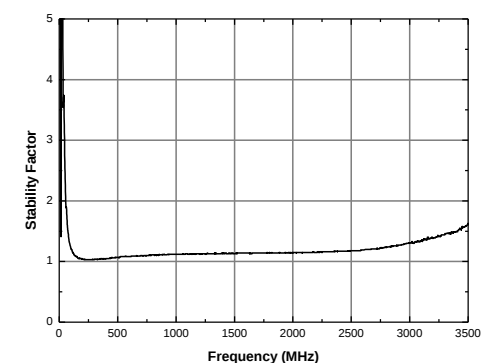
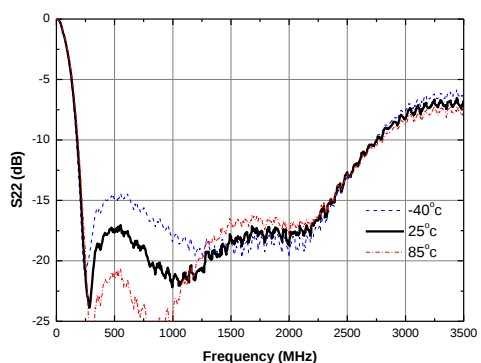
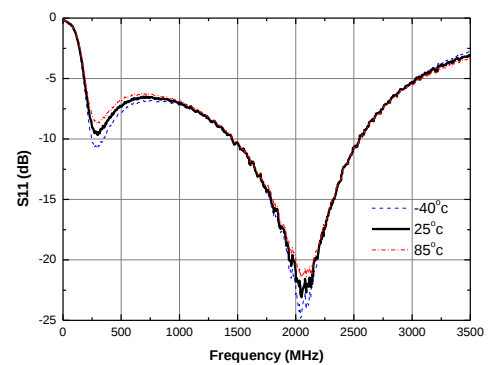
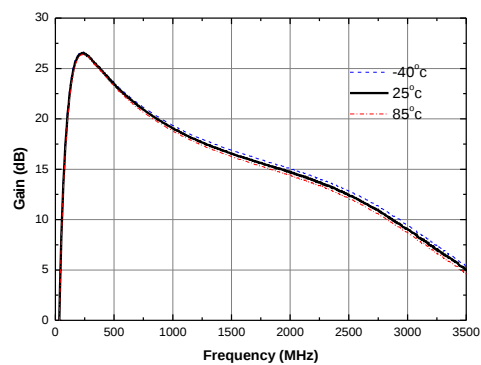
Schematic



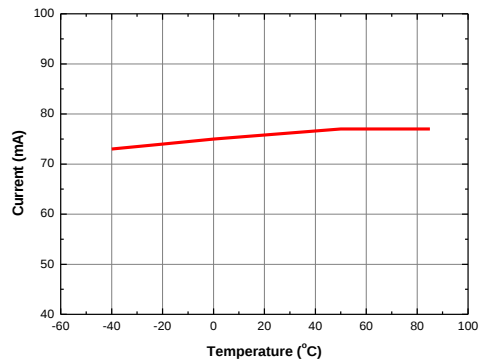
Board Layout (FR4, 40x40 mm², 0.8T)



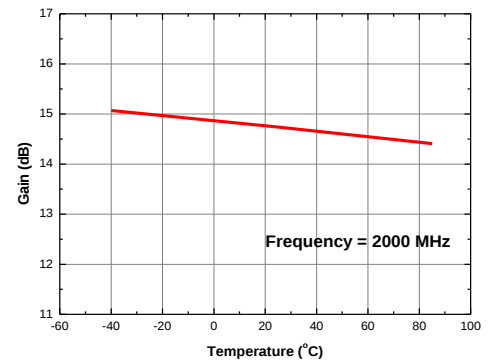
S-parameters & K-factor



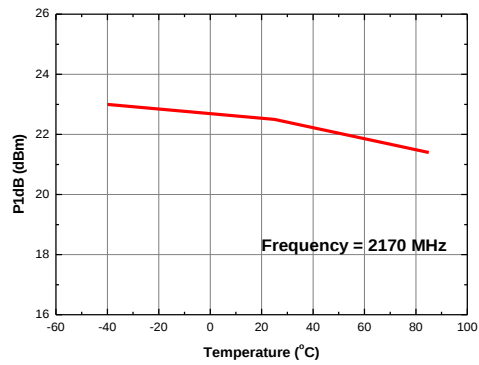
Current vs. Temperature



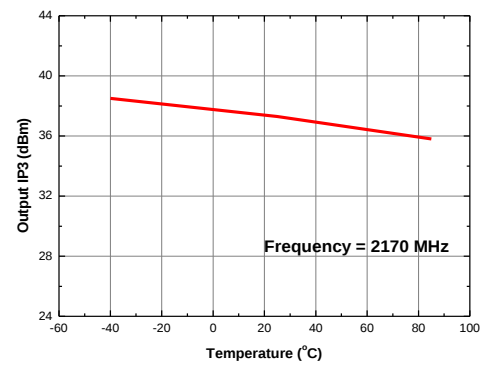
Gain vs. Temperature



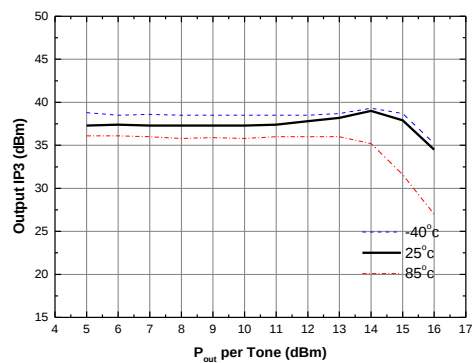
P1dB vs. Temperature



Output IP3 vs. Temperature



Output IP3 vs. Tone Power (Frequency = 2170 MHz)



APPLICATION CIRCUIT

Low Noise

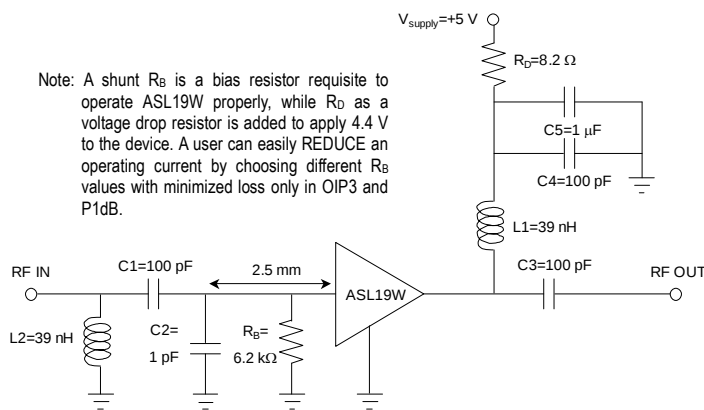
2300 ~ 2700 MHz

+5 V

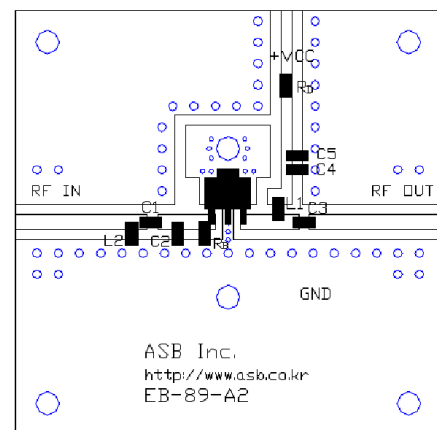
Frequency (MHz)	2300	2500	2700
Magnitude S21 (dB)	12	11.5	11
Magnitude S11 (dB)	-18	-18	-16
Magnitude S22 (dB)	-17	-16	-14
Output P1dB (dBm)	22	22	22
Output IP3 ¹⁾ (dBm)	37.5	37.5	38
Noise Figure (dB)	1.0	1.1	1.1
Device Voltage (V)	4.4	4.4	4.4
Current (mA)	73	73	73

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

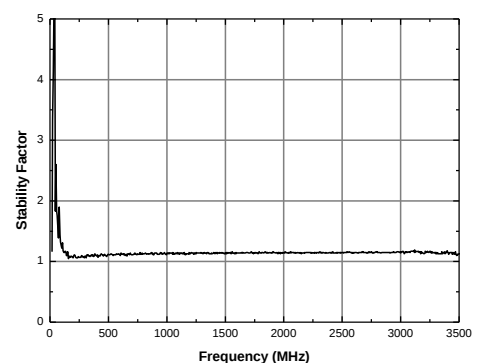
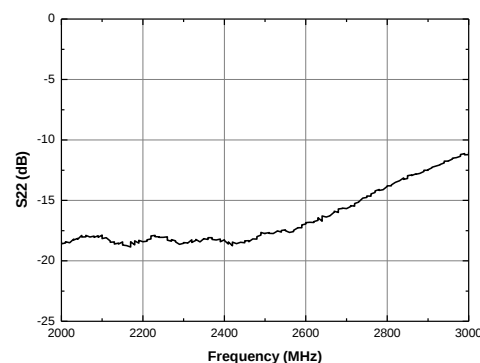
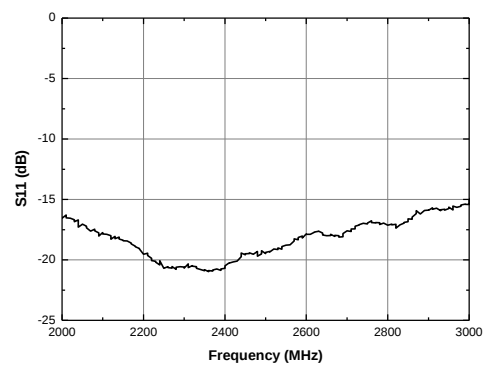
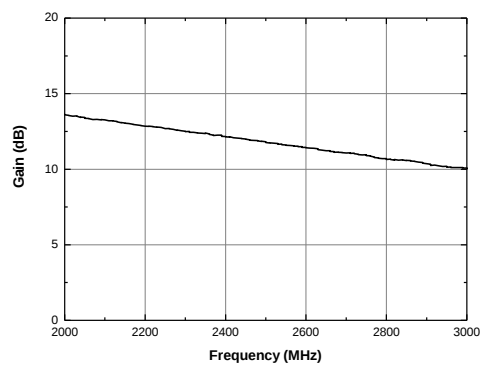
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

DVB-T (V band)

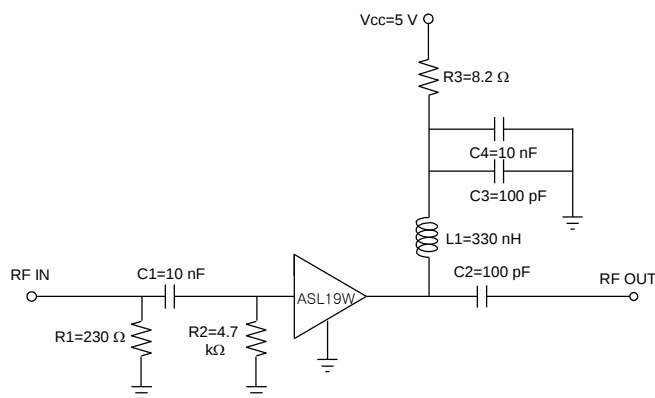
176 ~ 264 MHz

+5 V

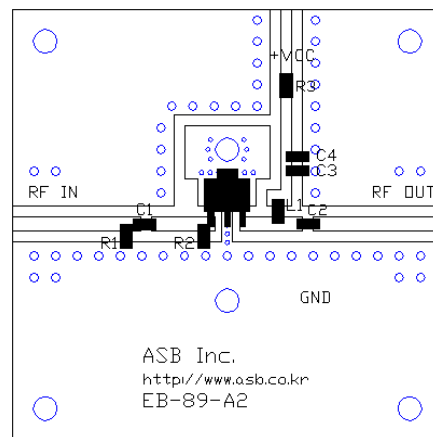
Frequency (MHz)	176	264
Gain Flatness (dB)	0.8	
Magnitude S21 (dB)	24.3	23.6
Magnitude S11 (dB)	-10	-10
Magnitude S22 (dB)	-14	-15
Output P1dB (dBm)	20	20
Output IP3 ¹⁾ (dBm)	30	30
Noise Figure (dB)	1.7	1.6
Device Voltage (V)	4.4	4.4
Current (mA)	37	37

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

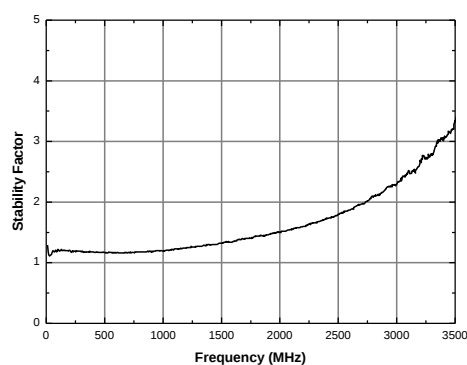
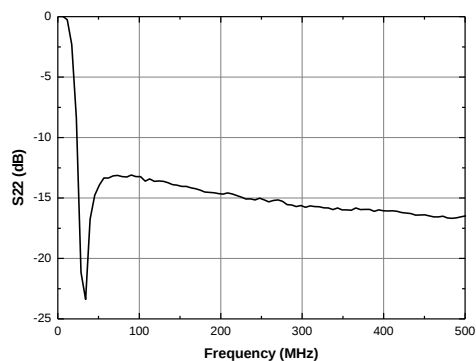
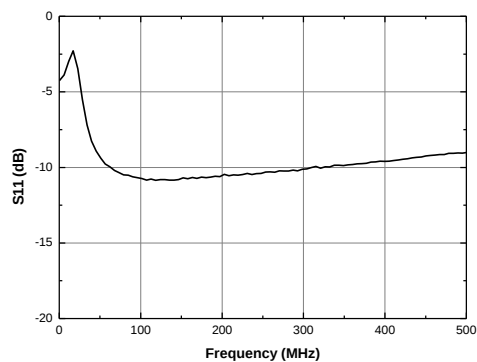
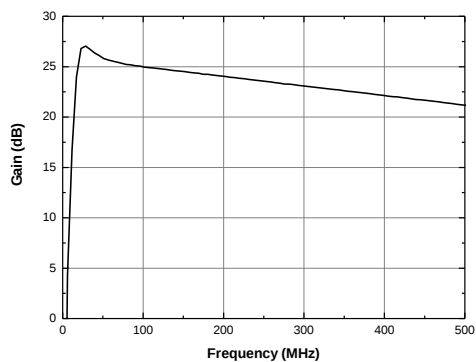
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

DVB-T (U band)

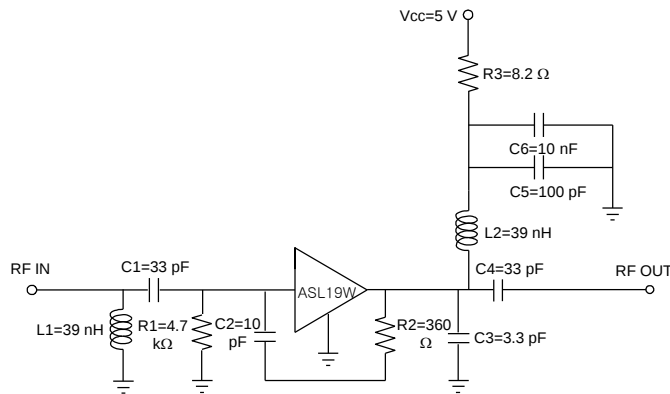
478 ~ 862 MHz

+5 V

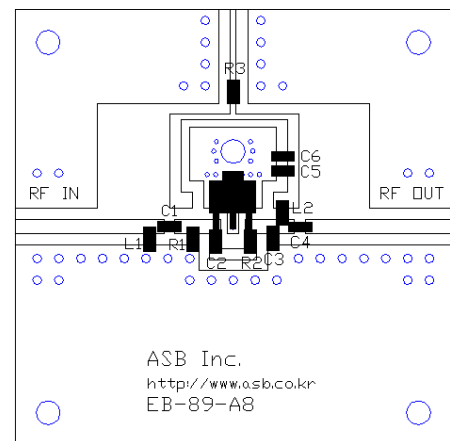
Frequency (MHz)	478	862
Gain Flatness (dB)	0.6	
Magnitude S21 (dB)	17.3	16.8
Magnitude S11 (dB)	-9	-12
Magnitude S22 (dB)	-9	-20
Output P1dB (dBm)	20	16
Output IP3 ¹⁾ (dBm)	28	25
Noise Figure (dB)	1.43	1.48
Device Voltage (V)	4.4	4.4
Current (mA)	37	37

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

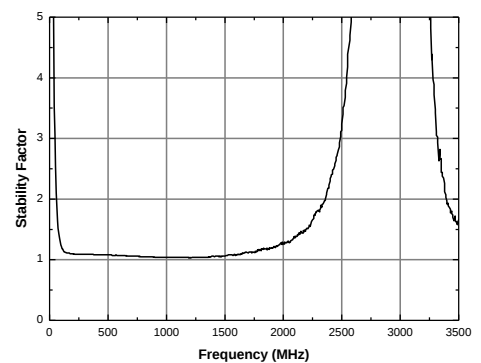
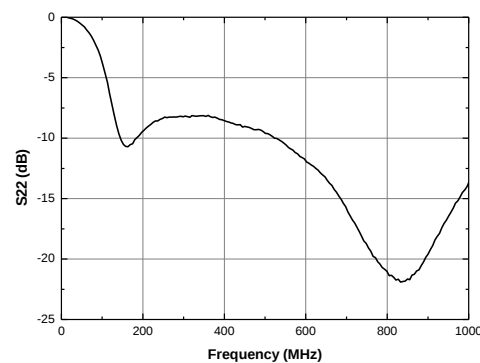
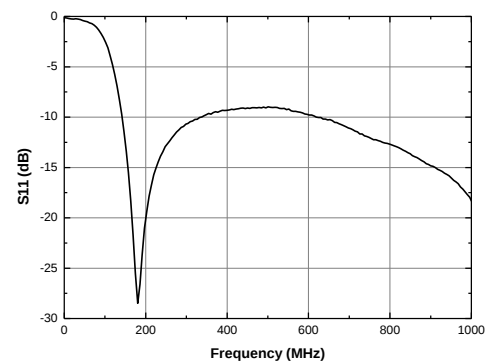
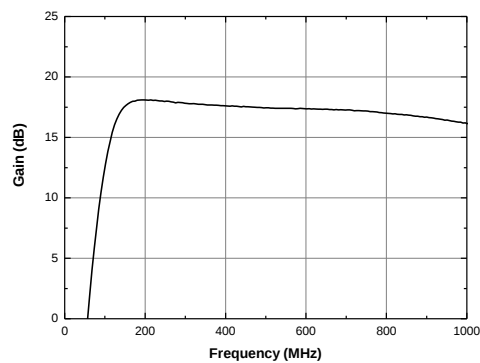
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



Recommended Soldering Reflow Profile

