

### Features

- 14 dB Gain at 900 MHz
- 18 dBm P1dB at 900 MHz
- 35 dBm Output IP3 at 900 MHz
- 5.0 dB NF at 900 MHz
- MTTF > 100 Years
- Single Supply

### Description

The ASW212, a power amplifier MMIC, has a high linearity, high gain, and high efficiency over a wide range of frequency, being suitable for use in both receiver and transmitter of telecommunication systems up to 8 GHz. The amplifier is available in a SOT89 package and passes through the stringent DC, RF, and reliability tests.



Package Style: SOT89

### Typical Performance

(Supply Voltage = +5 V, T<sub>A</sub> = +25 °C, Z<sub>o</sub> = 50 Ω)

Parameters	Units	Typical			
Frequency	MHz	900	2000	3500	5800
Gain	dB	14.0	12.5	11.0	11.0
S11	dB	-11	-11	-9	-18
S22	dB	-16	-14	-15	-15
Output IP3 <sup>1)</sup>	dBm	35.0	34.0	28.0	26.5
Noise Figure	dB	5.0	5.5	5.9	5.6
Output P1dB	dBm	18	18	17	16
Current	mA	73	73	73	73
Device Voltage	V	+4.8	+4.8	+4.8	+4.8

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

### Application Circuit

- IF
- 500 ~ 3500 MHz
- 5000 ~ 6000 MHz
- 8000 MHz
- 70 ~ 2700 MHz

### Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		900	
Gain	dB	13	14	
S11	dB		-11	
S22	dB		-16	
Output IP3	dBm	33	35	
Noise Figure	dB		5.0	5.5
Output P1dB	dBm	17	18	
Current	mA	68	73	90
Device Voltage	V		+4.8	

### Absolute Maximum Ratings

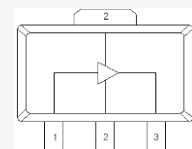
Parameters	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-40 to +150 °C
Device Voltage	+6 V
Operating Junction Temperature	+150 °C
Input RF Power (CW, 50 Ω matched)	+25 dBm
Thermal Resistance	158 °C/W

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

\* Refer to the max. input RF power data at [http://www.asb.co.kr/pdf/Maximum\\_Input\\_Power\\_Analysis.pdf](http://www.asb.co.kr/pdf/Maximum_Input_Power_Analysis.pdf).

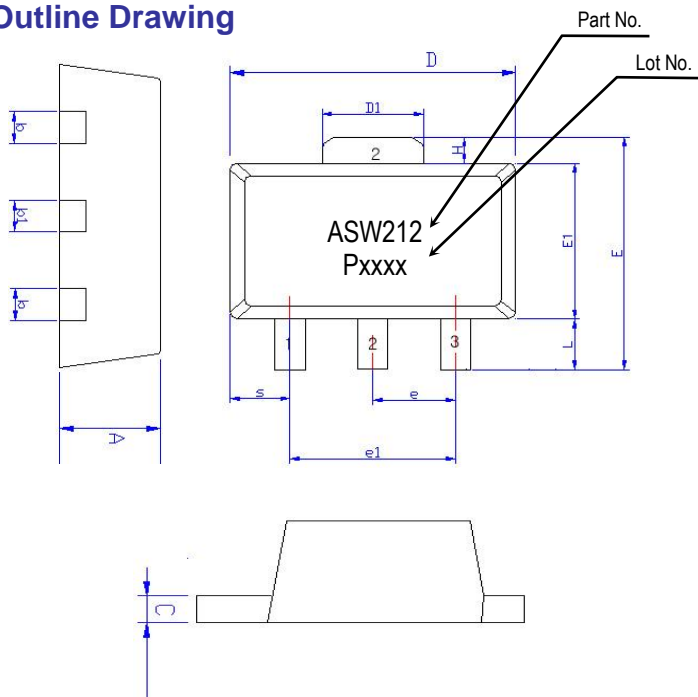
The max. input RF power, in principle, depends upon application frequency, matching circuit, and device voltage.

### Pin Configuration



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

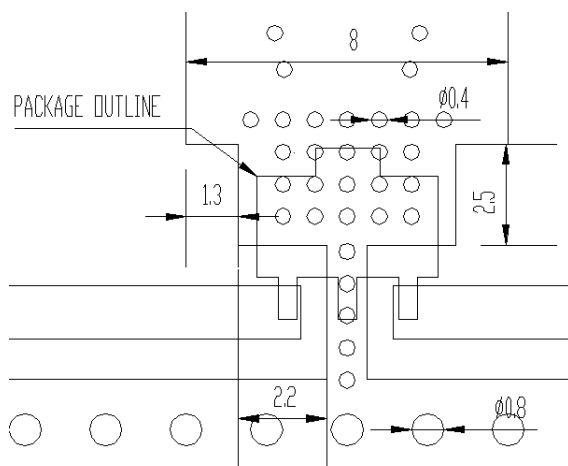
### Outline Drawing



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 1B Voltage Level: 500 V~1000 V
MM	Class A Voltage Level: <200 V

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

#### Moisture Sensitivity Level (MSL)

Level 3 at 260 °C reflow

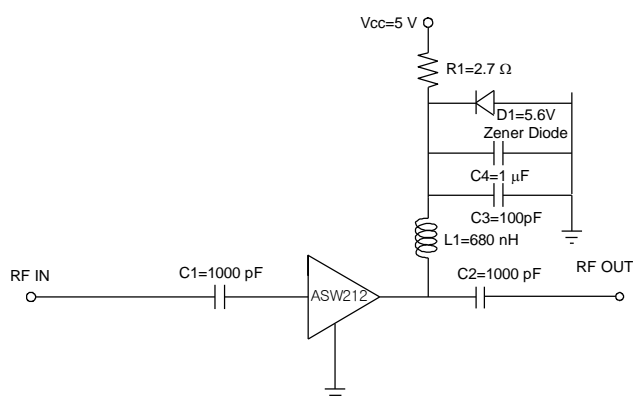
### APPLICATION CIRCUIT

IF  
 70 ~ 450 MHz  
 +5 V

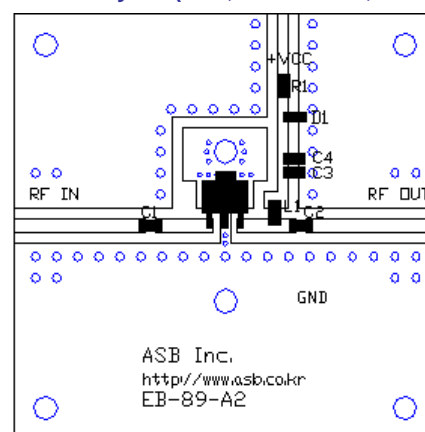
Frequency (MHz)	70	150	300	450
Magnitude S21 (dB)	17.0	17.0	16.0	15.5
Magnitude S11 (dB)	-18	-18	-15	-15
Magnitude S22 (dB)	-10	-10	-10	-10
Output P1dB (dBm)	18.5	18.5	18.0	18.0
Output IP3 <sup>1)</sup> (dBm)	36.0	36.5	37.0	37.0
Noise Figure (dB)	4.6	4.8	5.2	4.8
Device Voltage (V)	+4.8	+4.8	+4.8	+4.8
Current (mA)	73	73	73	73

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

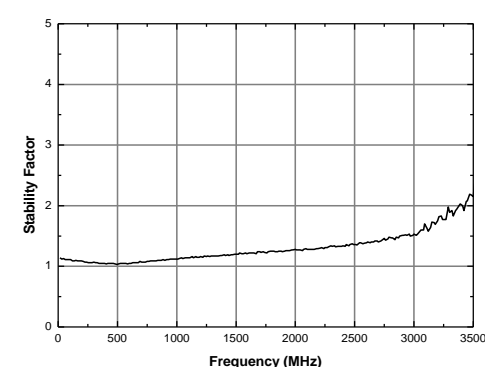
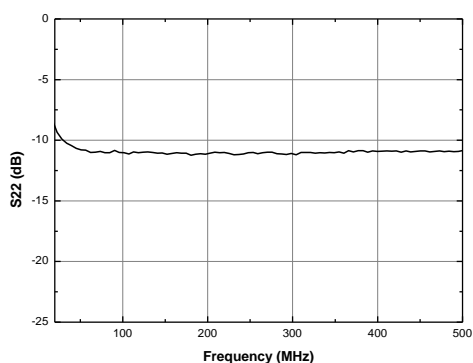
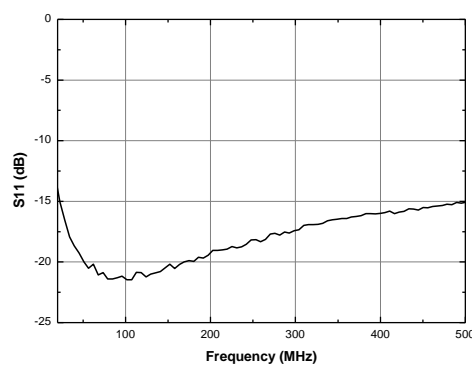
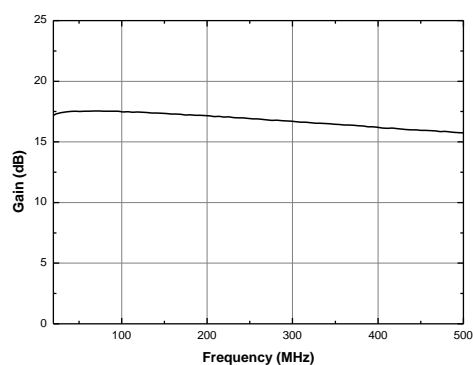
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters & K-factor



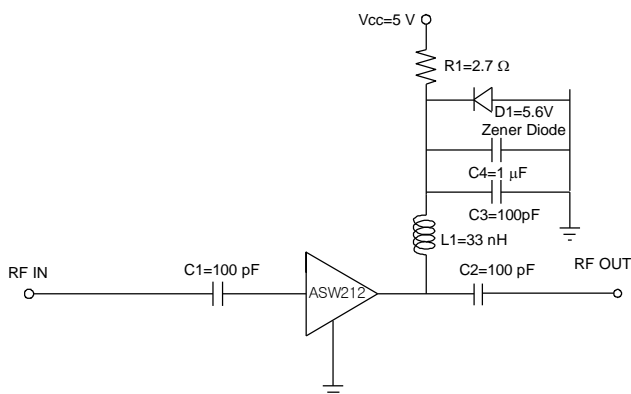
### APPLICATION CIRCUIT

Wide Band  
500 ~ 3500 MHz  
+5 V

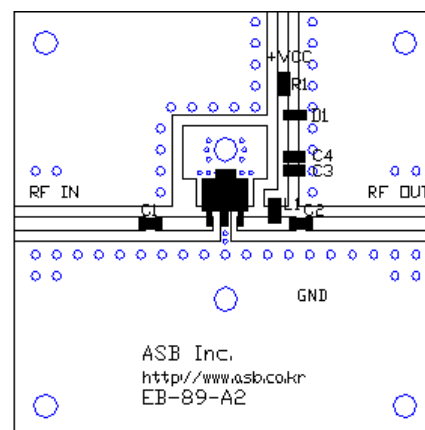
Frequency (MHz)	500	900	1750	2000	2400	2700	3500
Magnitude S21 (dB)	15.5	14.0	13.0	12.5	12.0	11.5	11.0
Magnitude S11 (dB)	-10.0	-11.0	-12.0	-11.0	-9.5	-9.0	-9.0
Magnitude S22 (dB)	-19	-16	-14	-14	-12	-12	-15
Output P1dB (dBm)	18	18	18	18	18	18	17
Output IP3 <sup>1)</sup> (dBm)	36.5	35.0	34.0	34.0	33.5	32.0	28.0
Noise Figure (dB)	5.0	5.0	5.3	5.5	5.5	5.7	5.9
Device Voltage (V)	+4.8						
Current (mA)	73						

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

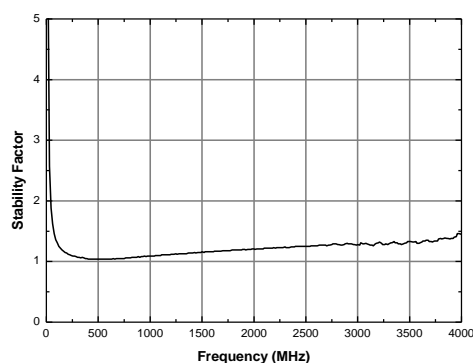
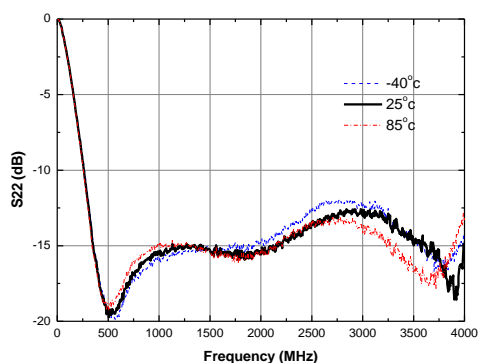
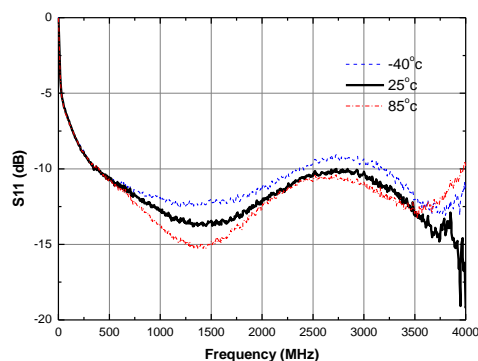
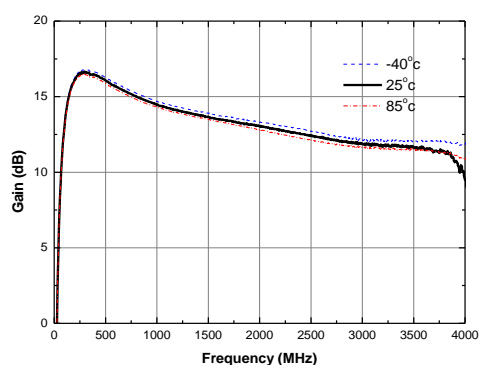
### Schematic



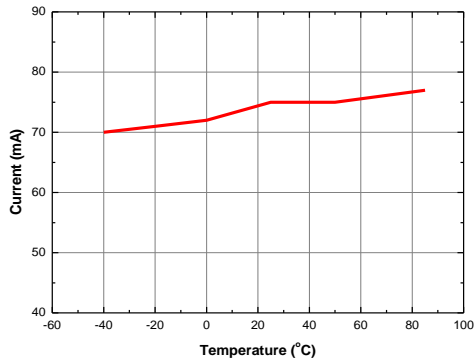
### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



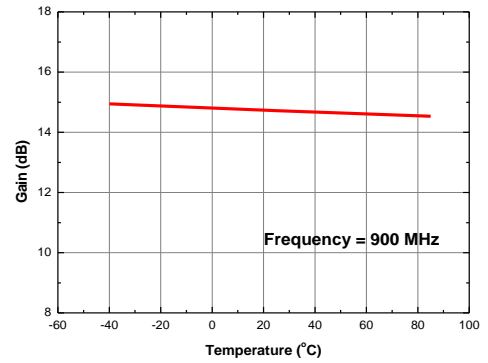
### S-parameters & K-factor



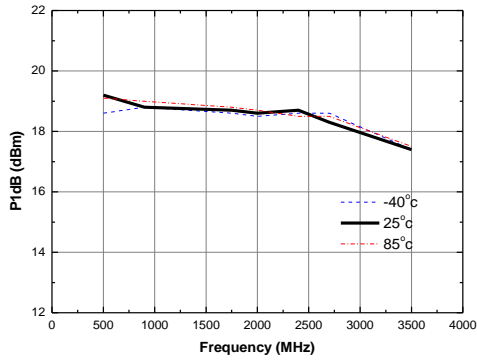
### Current vs. Temperature



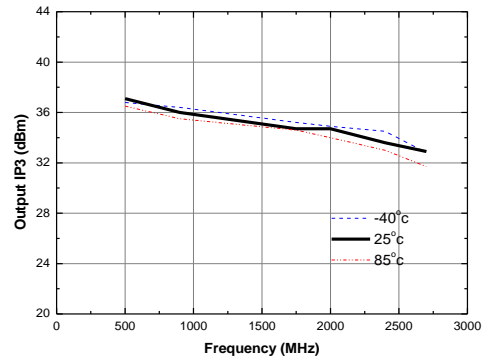
### Gain vs. Temperature



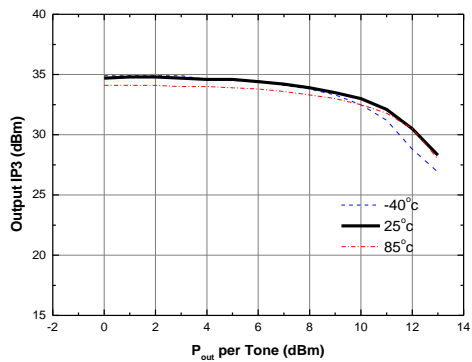
### P1dB vs. Frequency



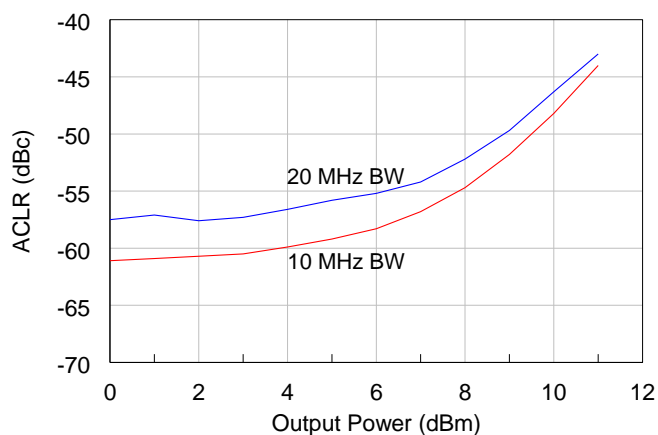
### Output IP3 vs. Frequency



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

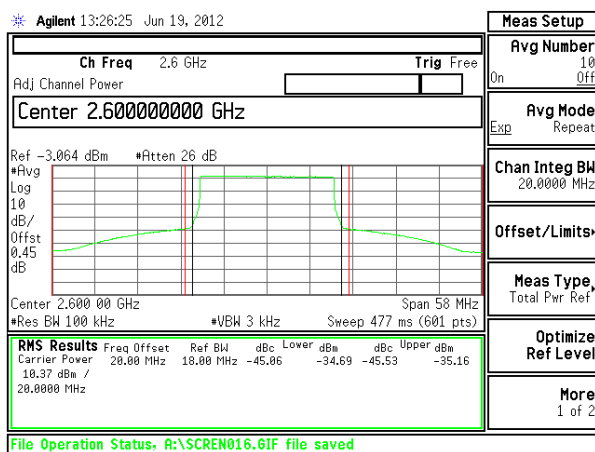


### LTE ACLR – 10 MHz & 20 MHz



1) Test Source : LTE\_FDD\_test model 3.1, BW: 10 MHz & 20 MHz, Test Frequency: 2.6 GHz

### LTE ACLR – 20 MHz



2) Test Source : LTE\_FDD\_test model 3.1, BW: 20 MHz, Test Frequency: 2.6 GHz

Performance with varying  $V_{\text{DEVICE}}$ 

$V_{\text{DEVICE}}$ (V)	Current (mA)	Freq. (MHz)	Gain (dB)	S11 (dB)	S22 (dB)	OIP3 <sup>1)</sup> (dBm)	P1dB (dBm)	NF (dB)
+4.8	73	900	14.6	-11.5	-16.3	36.2	18.6	4.80
		2000	12.9	-11.7	-13.4	34.0	18.3	5.20
		3500	11.8	-12.6	-14.7	30.9	17.5	--
+4.5	60	900	14.5	-11.7	-16.3	33.1	17.1	4.78
		2000	12.8	-11.7	-13.3	31.8	16.6	5.17
		3500	11.6	-12.0	-14.8	29.7	15.9	--
+4.2	50	900	14.4	-12.0	-16.1	29.7	15.2	4.77
		2000	12.7	-12.3	-12.9	28.9	14.9	4.96
		3500	11.4	-12.1	-14.1	27.5	14.2	--
+3.9	38	900	14.1	-12.7	-15.8	23.5	11.7	4.72
		2000	12.4	-12.6	-12.8	22.3	11.4	5.04
		3500	11.1	-11.9	-13.7	21.5	11.1	--

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

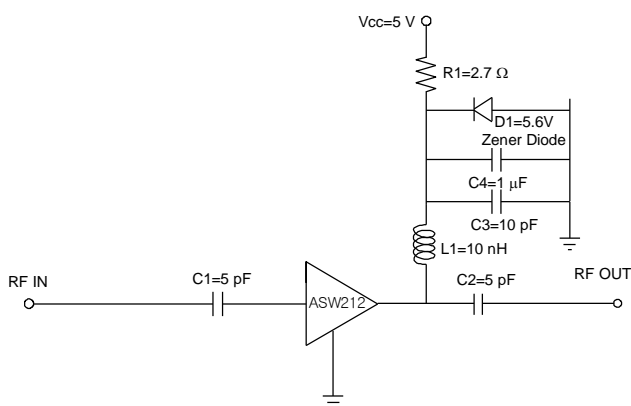
### APPLICATION CIRCUIT

**WLAN**  
**5000 ~ 6000 MHz**  
**+5 V**

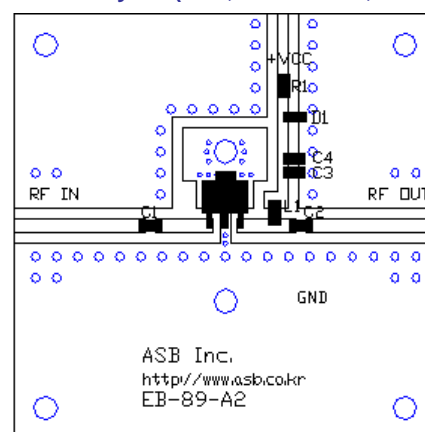
Frequency (MHz)	5000	5500	5800	6000
Magnitude S21 (dB)	11	11	11	11
Magnitude S11 (dB)	-14	-15	-18	-15
Magnitude S22 (dB)	-9	-12	-15	-15
Output P1dB (dBm)	16.0	17.0	16.0	15.5
Output IP3 <sup>1)</sup> (dBm)	27.0	27.0	26.5	26.5
Noise Figure (dB)	5.4	5.6	5.6	5.7
Device Voltage (V)	+4.8	+4.8	+4.8	+4.8
Current (mA)	73	73	73	73

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

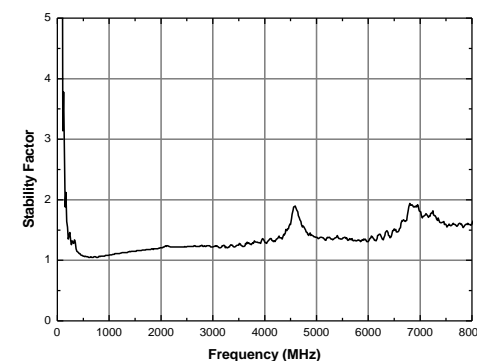
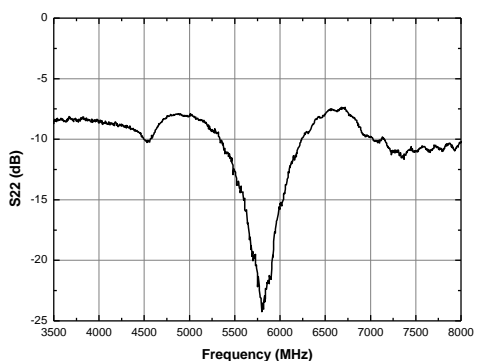
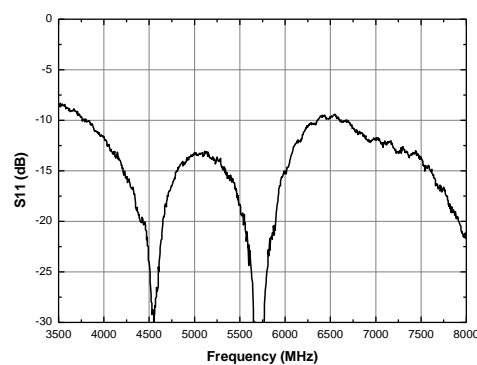
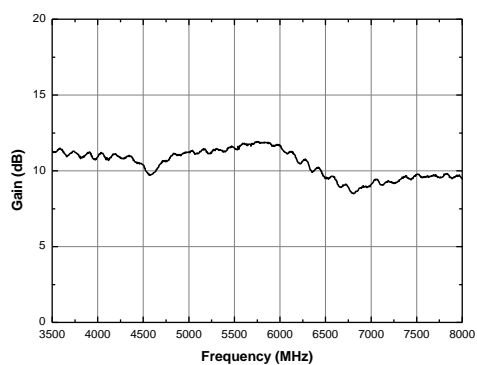
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters & K-factor





### APPLICATION CIRCUIT

C-Band

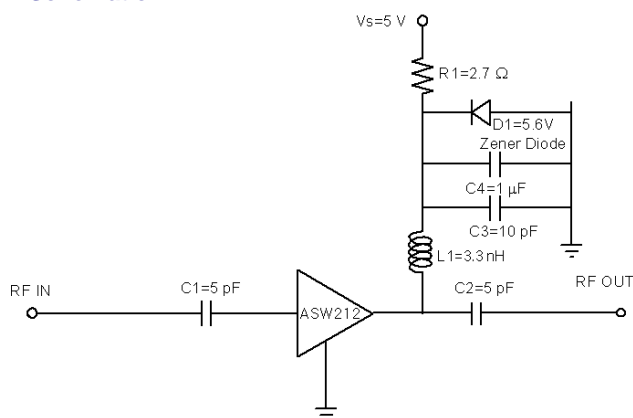
8000 MHz

+5 V

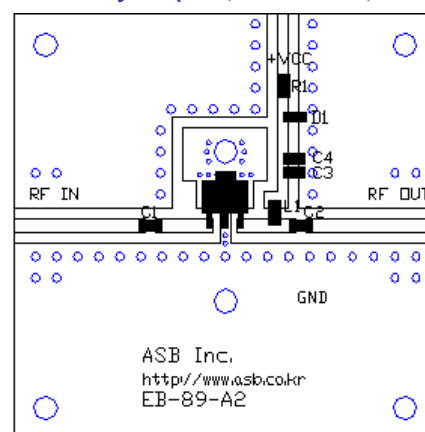
Frequency (MHz)	8000
Magnitude S21 (dB)	9.5
Magnitude S11 (dB)	-13
Magnitude S22 (dB)	-12
Output P1dB (dBm)	12
Output IP3 <sup>1)</sup> (dBm)	23
Noise Figure (dB)	6.5
Device Voltage (V)	+4.8
Current (mA)	73

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

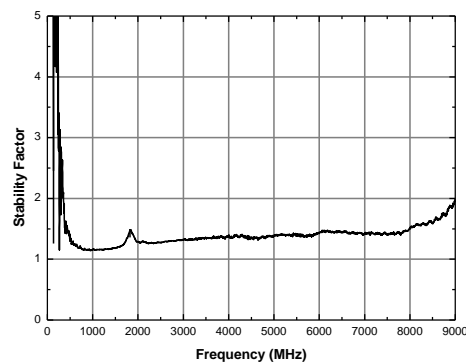
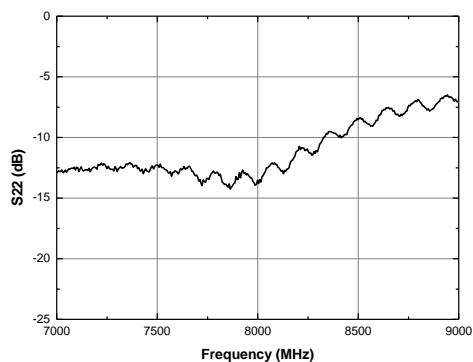
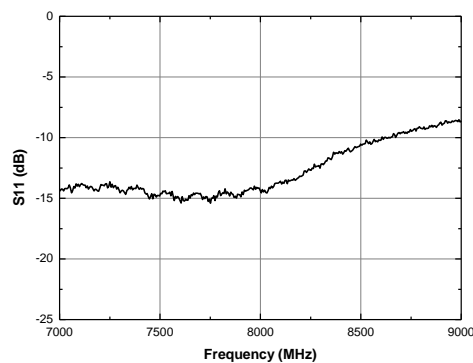
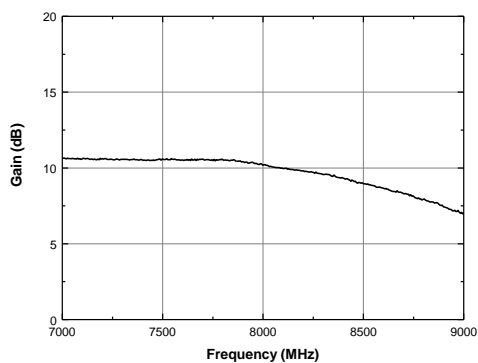
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters & K-factor



### APPLICATION CIRCUIT

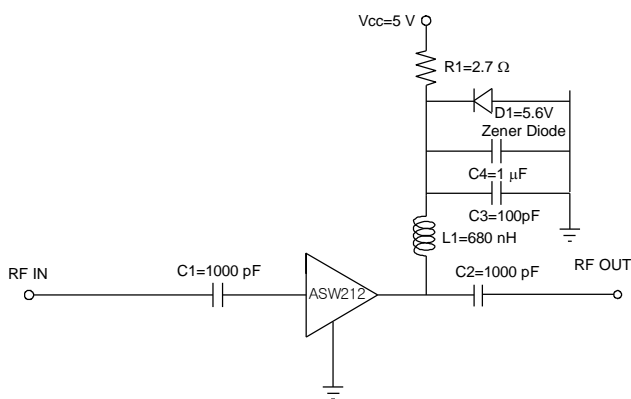
ONU  
70 ~ 2700 MHz  
+5 V

Frequency (MHz)	70	900	1800	2700
Magnitude S21 (dB)	17.5	14.0	12.5	11.5
Magnitude S11 (dB)	-18	-13	-14	-10
Magnitude S22 (dB)	-11	-11	-12	-14
Output P1dB (dBm)	18	18	17.5	18
Output IP3 <sup>1)</sup> (dBm)	36	35	34	33
Output IP2 <sup>2)</sup> (dBm)	52			
Noise Figure (dB)	4.7	5.1	5.5	5.6
Device Voltage (V)	+4.8	+4.8	+4.8	+4.8
Current (mA)	73	73	73	73

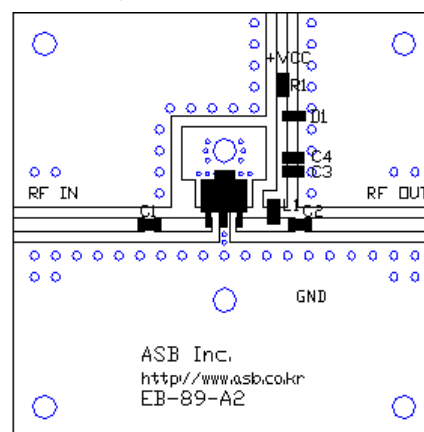
1) OIP3 is measured with two tones at an output power of +3 dBm/tone separated by 1 MHz.

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

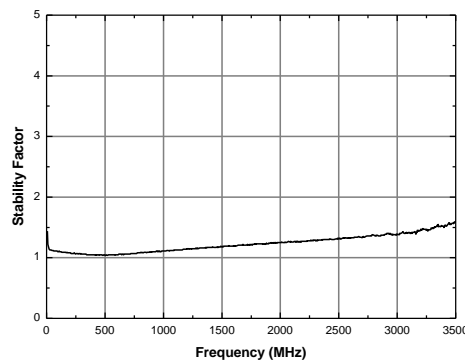
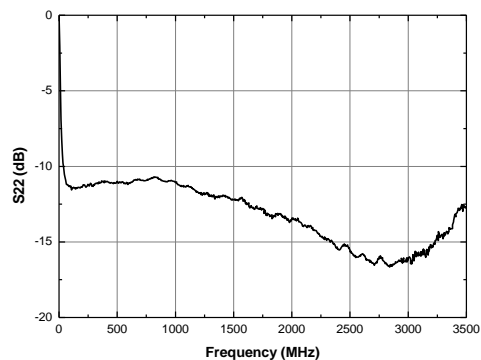
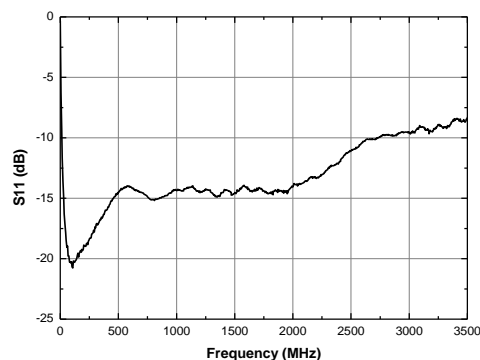
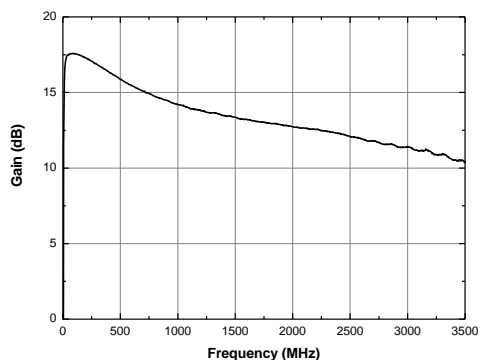
### Schematic

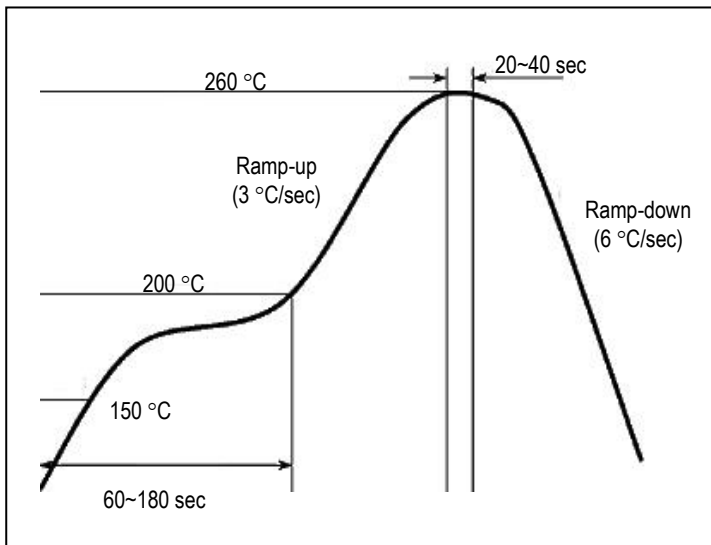


### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters & K-factor



**Recommended Soldering Reflow Profile**

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