

## Features

- 19.3 dB Gain at 900 MHz
- 17.5 dBm P1dB at 900 MHz
- 31.5 dBm Output IP3 at 900 MHz
- 1.7 dB NF at 900 MHz
- MTTF > 100 Years
- Single Supply

## Description

The ASW105, 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 4 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 = +3.3 V, T<sub>A</sub> = +25 °C, Z<sub>o</sub> = 50 Ω)

Parameters	Units	Typical		
Frequency	MHz	150	900	2000
Gain	dB	21.0	19.3	17.5
S11	dB	-12	-16	-16
S22	dB	-12	-11	-11
Output IP3 <sup>1)</sup>	dBm	32.0	31.5	31.5
Noise Figure	dB	1.7	1.7	1.8
Output P1dB	dBm	18.5	17.5	18.5
Current	mA	65	65	65
Device Voltage	V	+3.3	+3.3	+3.3

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

## Application Circuit

- 500 ~ 3500 MHz
- IF (50 ~ 450 MHz)
- DMB

## Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		900	
Gain	dB		19.3	
S11	dB		-16	
S22	dB		-11	
Output IP3	dBm		31.5	
Noise Figure	dB		1.7	
Output P1dB	dBm		17.5	
Current	mA		65	
Device Voltage	V		+3.3	

## Absolute Maximum Ratings

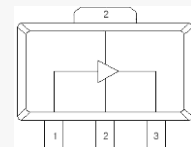
Parameters	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-40 to +150 °C
Device Voltage	+4.3 V
Operating Junction Temperature	+150 °C
Input RF Power (Continuous)*	+22 dBm
Thermal Resistance	182 °C/W

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).

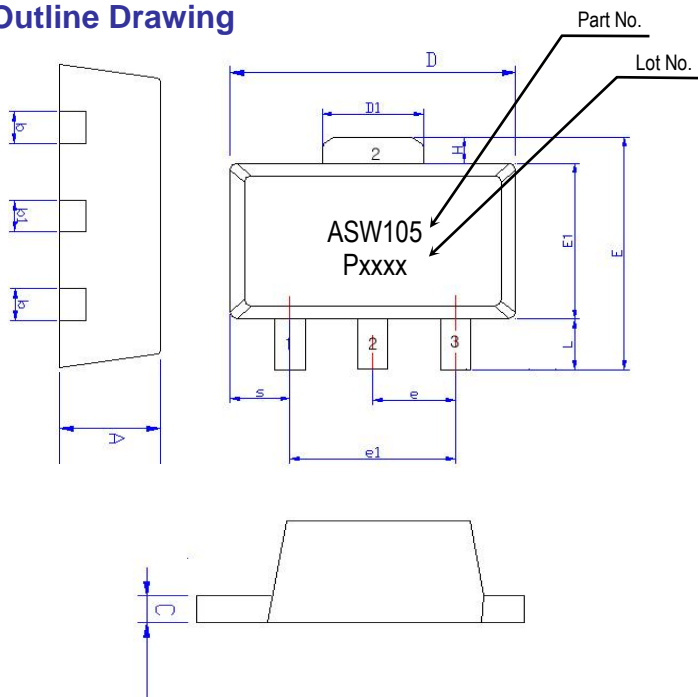
The max. input RF power, in principle, depends upon application frequency, matching circuit, and device voltage.

## Pin Configuration



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

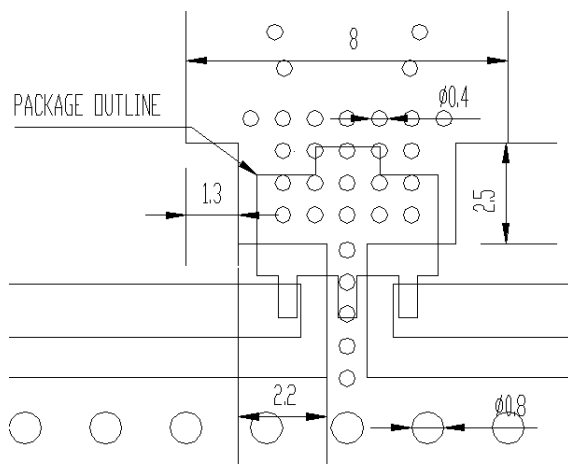
### Outline Drawing



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

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

#### Moisture Sensitivity Level (MSL)

Level 3 at 260 °C reflow

**APPLICATION CIRCUIT**

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**Wide Band**

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**500 ~ 3500 MHz**

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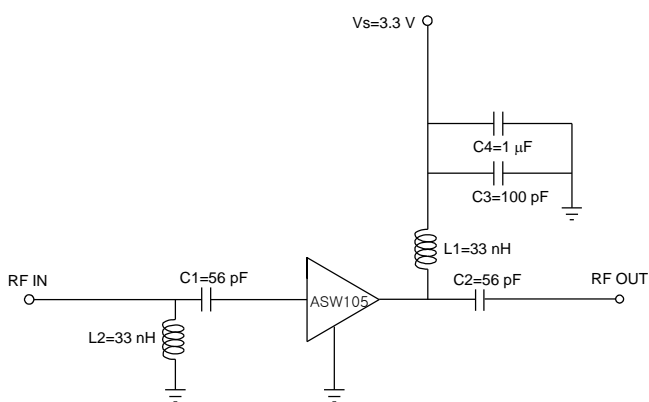
**+3.3 V**

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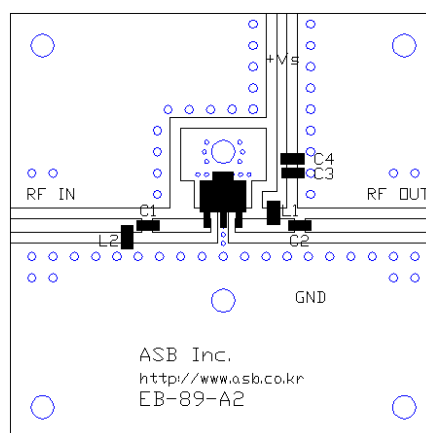
Frequency (MHz)	900	2000	2400	2700	3200	3500
Magnitude S21 (dB)	19.3	17.5	16.9	16.3	16.0	15.7
Magnitude S11 (dB)	-16	-16	-18	-18	-16	-14
Magnitude S22 (dB)	-11	-11	-10	-10	-9	-9
Output P1dB (dBm)	17.5	18.5	17.5	17.5	17.5	17.5
Output IP3 <sup>1)</sup> (dBm)	31.5	31.5	32.0	33.5	31.0	31.0
Noise Figure (dB)	1.7	1.8	1.8	2.0	2.2	2.3
Device Voltage (V)	+3.3	+3.3	+3.3	+3.3	+3.3	+3.3
Current (mA)	65	65	65	65	65	65

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

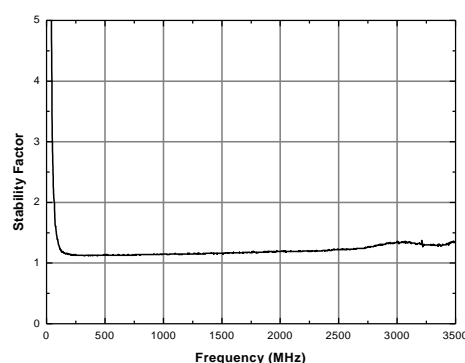
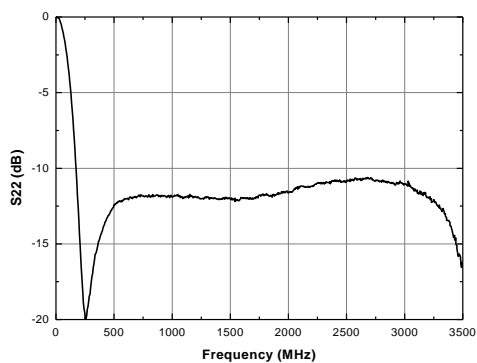
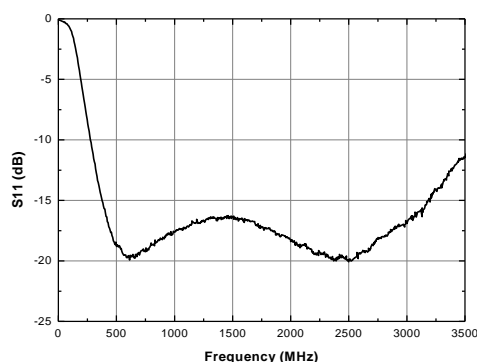
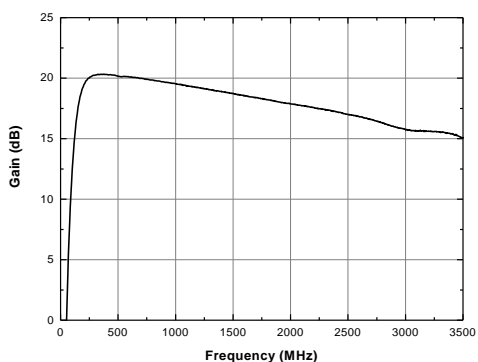
### Schematic



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



### S-parameters & K-factor



**APPLICATION CIRCUIT**

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**IF**

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**50 ~ 450 MHz**

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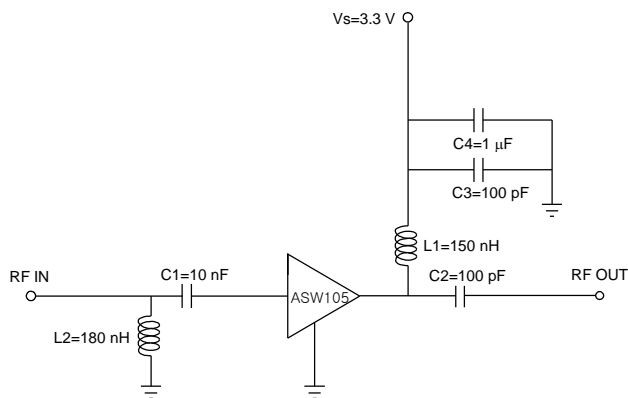
**+3.3 V**

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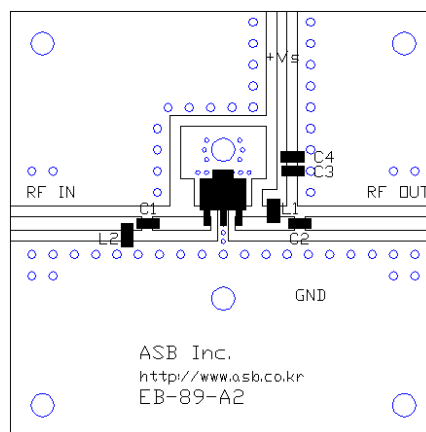
Frequency (MHz)	70	150	300	450
Magnitude S21 (dB)	22	21	20	20
Magnitude S11 (dB)	-6	-12	-14	-15
Magnitude S22 (dB)	-18	-12	-12	-12
Output P1dB (dBm)	18.5	18.5	18.5	18.5
Output IP3 <sup>1)</sup> (dBm)	31.5	32.5	33.5	33.5
Noise Figure (dB)	2.1	1.7	1.7	1.7
Device Voltage (V)	+3.3	+3.3	+3.3	+3.3
Current (mA)	65	65	65	65

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

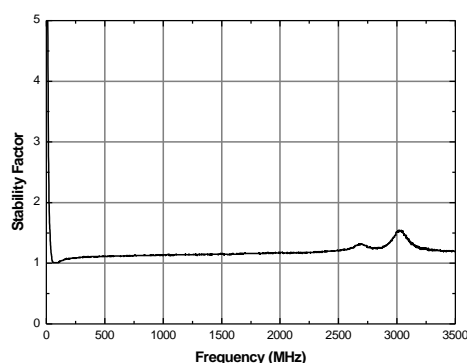
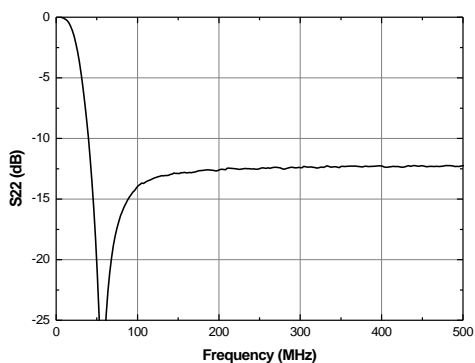
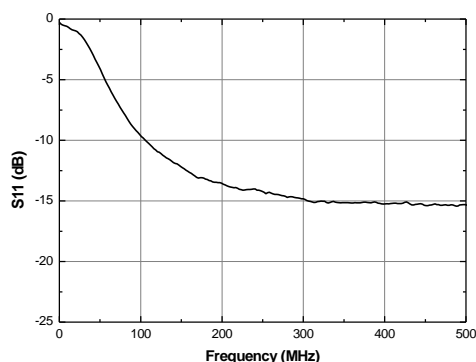
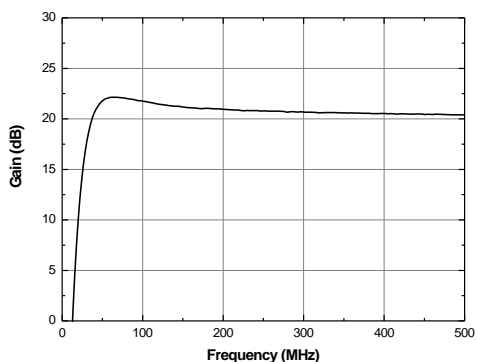
### Schematic



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



### S-parameters & K-factor



### APPLICATION CIRCUIT

DMB

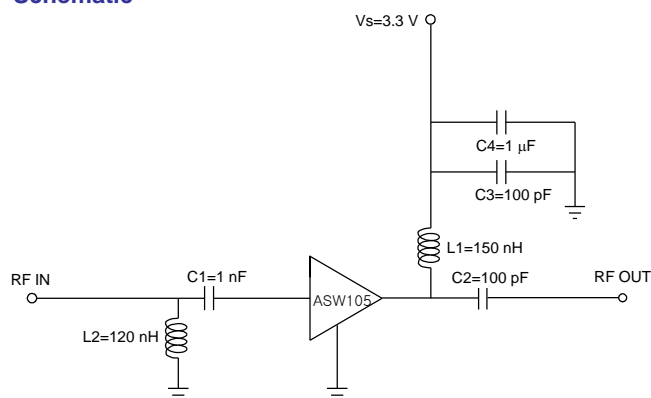
145 ~ 245 MHz

+3.3 V

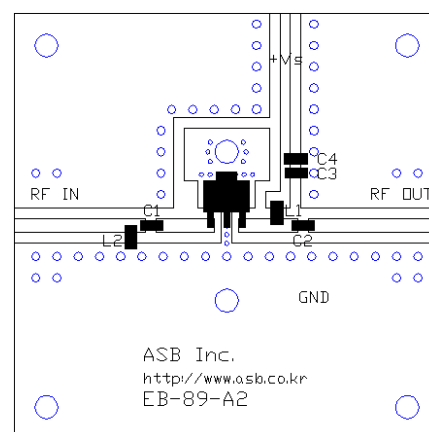
Frequency (MHz)	145	245
Magnitude S21 (dB)	21.0	20.5
Magnitude S11 (dB)	-12	-14
Magnitude S22 (dB)	-12	-12
Output P1dB (dBm)	18	18
Output IP3 <sup>1)</sup> (dBm)	31.5	32.0
Noise Figure (dB)	1.9	1.8
Device Voltage (V)	+3.3	+3.3
Current (mA)	65	65

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

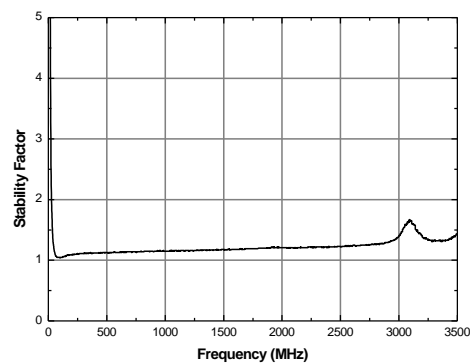
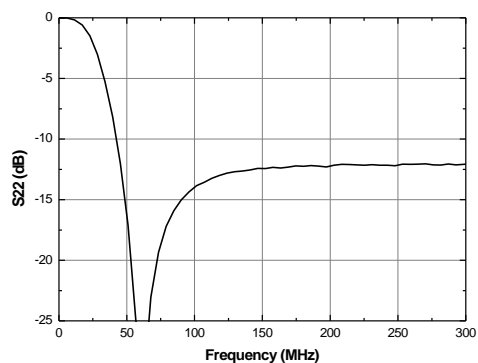
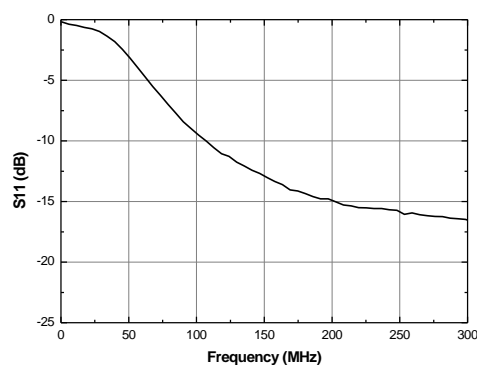
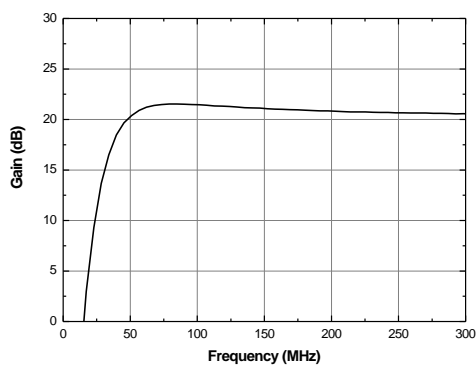
### Schematic



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



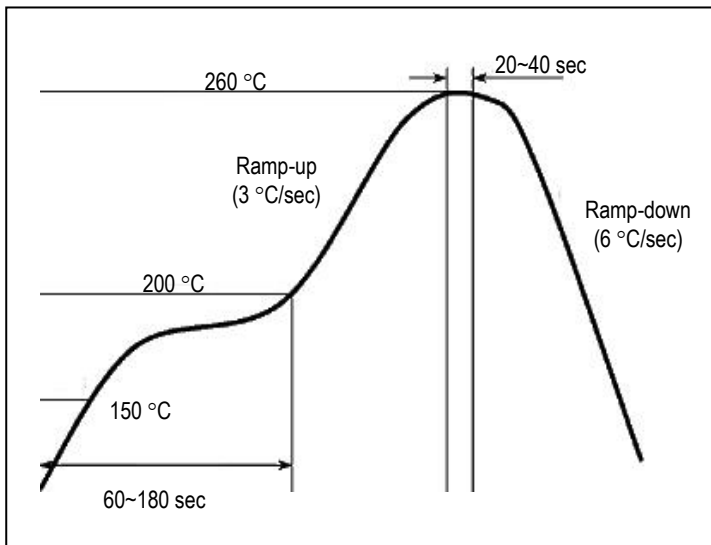
### S-parameters & K-factor



## Performance with varying Current

V <sub>DEVICE</sub> (V)	R <sub>D</sub> (ohm)	Current (mA)	Freq. (MHz)	Gain (dB)	S11 (dB)	S22 (dB)	OIP3 (dBm)	P1dB (dBm)	NF (dB)
+3.3	0	66	900	19.7	-19.6	-10.8	34.1	18.3	1.28
			2000	17.8	-17.1	-12.2	33.5	19.1	1.39
			2700	16.6	-21.2	-10.6	34.7	18.3	1.56
			3500	15.6	-23.2	-11.4	32.2	18.9	1.65
+3.3	3.3	50	900	19.4	-17.5	-12.1	31.7	17.5	1.25
			2000	17.6	-15.5	-12.4	31.2	18.0	1.36
			2700	16.3	-18.3	-10.7	32.4	17.4	1.51
			3500	15.3	-20.6	-11.4	30.2	17.7	1.60
+3.3	7.5	39	900	18.9	-15.2	-14.2	29.1	16.2	1.26
			2000	17.1	-13.8	-12.9	28.3	16.1	1.35
			2700	16.0	-16.5	-10.8	29.8	16.2	1.50
			3500	15.1	-18.0	-11.2	28.2	15.7	1.58
+3.3	18	26	900	17.6	-11.5	-18.7	28.6	14.2	1.27
			2000	16.1	-10.8	-12.6	28.0	12.1	1.37
			2700	15.1	-12.7	-10.4	28.1	13.3	1.55
			3500	14.3	-13.7	-10.3	29.7	12.3	1.62

### Recommended Soldering Reflow Profile



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