Advanced Semiconductor Business Inc.

ASW215

5-4000 MHz MMIC Amplifier

Features

- 16 dB Gain at 900 MHz
- 19 dBm P1dB at 900 MHz
- 37 dBm Output IP3 at 900 MHz
- 3.8 dB NF at 900 MHz
- MTTF > 100 Years
- Single Supply

Description

The ASW215, 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 an SOT-89 package and passes through the stringent DC, RF, and reliability tests.

RoHS-compliant

Package Style: SOT-89

Typical Performance

Parameters	Units	Typical		
Frequency	MHz	900	2000	3500
Gain	dB	16	12	10
S11	dB	-18	-15	-18
S22	dB	-18	-18	-18
Output IP3[1)]	dBm	37	35	28
Noise Figure	dB	3.8	4.3	4.8
Output P1dB	dBm	19	19	16
Current	mA	83	83	83
Device Voltage	V	5	5	5

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

Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		900	
Gain	dB	15	16	
S11	dB		-18	
S22	dB		-18	
Output IP3	dBm	35	37	
Noise Figure	dB		3.8	4.0
Output P1dB	dBm	18	19	
Current	mA	78	83	90
Device Voltage	V		5	

Absolute Maximum Ratings

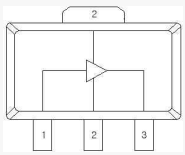
Parameters	Rating
Operating Case Temperature	-40 to +85°C
Storage Temperature	-40 to +150°C
Device Voltage	+6 V
Operating Junction Temperature	+150°C
Input RF Power (CW, 50ohm matched)*	25 dBm

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

Application Circuit

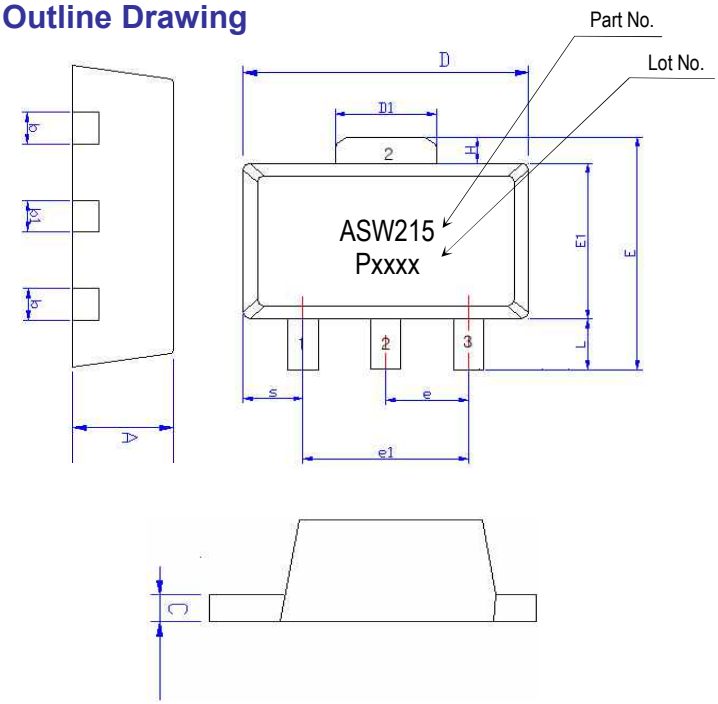
- 5 ~ 42 MHz
- IF
- 500 ~ 3500 MHz

Pin Configuration



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

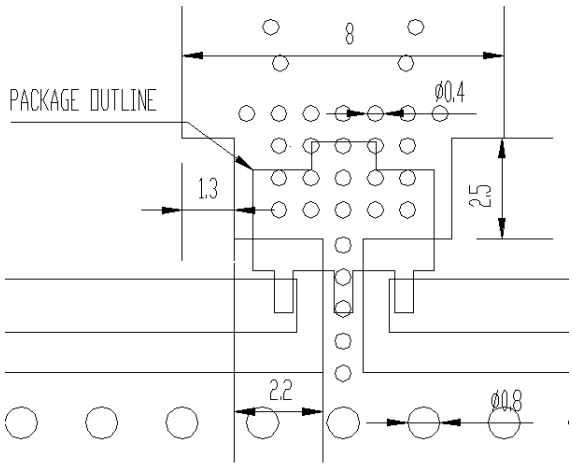
Outline Drawing



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: ESD-sensitive device!

Moisture Sensitivity Level (MSL)	
	Level 3 at 260°C reflow

APPLICATION CIRCUIT

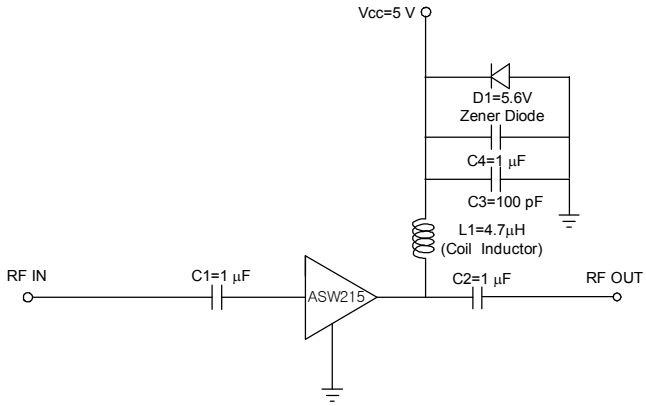
5 ~ 42 MHz

+5 V

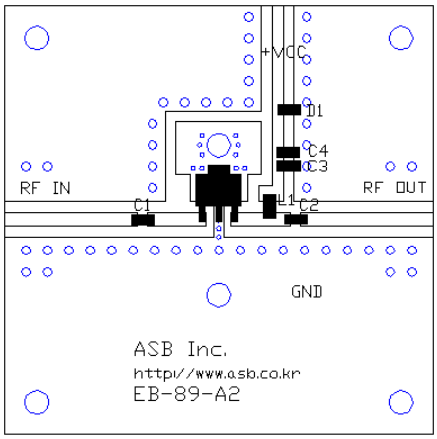
Frequency (MHz)	5	42
Magnitude S21 (dB)	18.5	18.5
Magnitude S11 (dB)	-14	-16
Magnitude S22 (dB)	-11	-14
Output P1dB (dBm)	19	19
Output IP3[1)] (dBm)	37	37
Noise Figure (dB)	3.4	3.4
Device Voltage (V)	5	5
Current (mA)	83	83

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

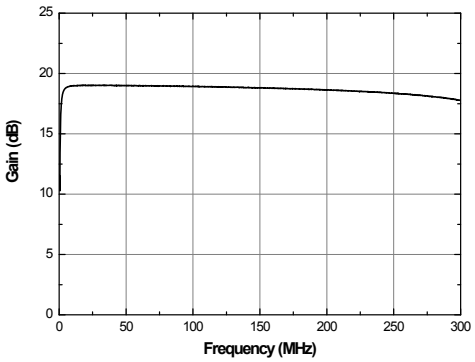
Schematic

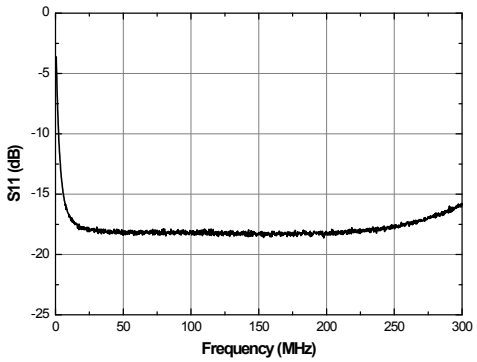


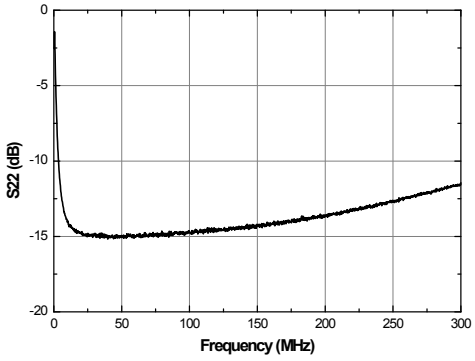
Board Layout (FR4, 40x40 mm^2, 0.8T)

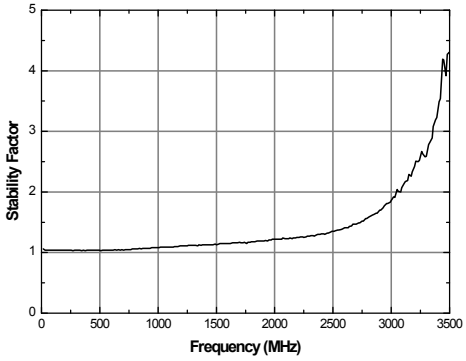


S-parameters & K-factor









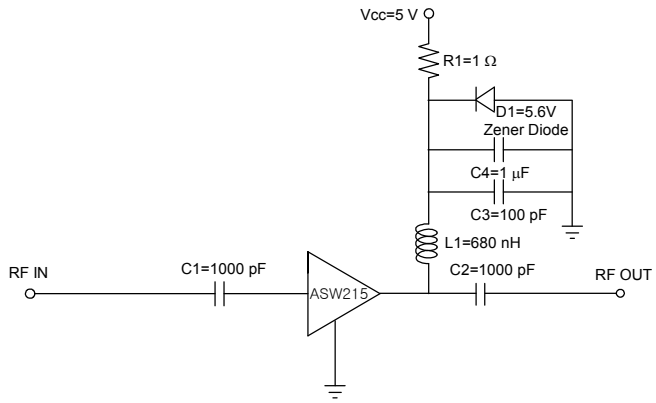
APPLICATION CIRCUIT

IF
70 ~ 450 MHz
+5 V

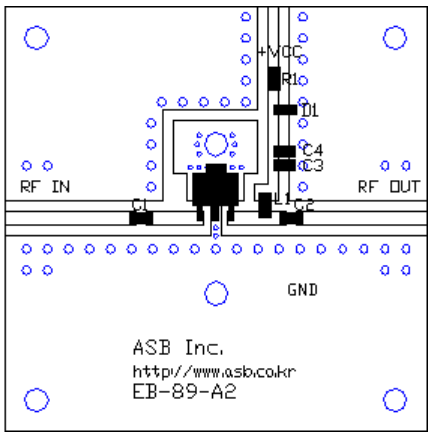
Frequency (MHz)	70	150	300	450
Magnitude S21 (dB)	18.5	18.5	18	17.5
Magnitude S11 (dB)	-15	-15	-18	-18
Magnitude S22 (dB)	-14	-14	-14	-13.5
Output P1dB (dBm)	19	19	19	19
Output IP3[1)] (dBm)	37.5	38	38	38
Noise Figure (dB)	3.5	3.5	4.3	3.5
Device Voltage (V)	5	5	5	5
Current (mA)	83	83	83	83

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

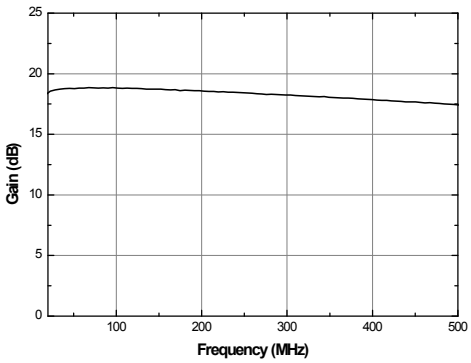
Schematic

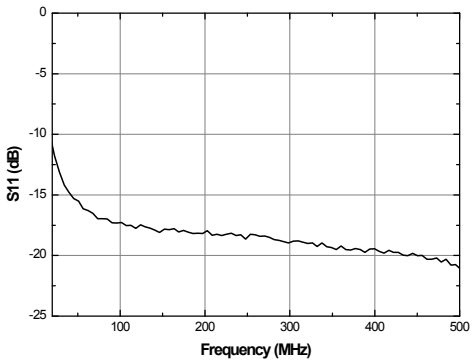


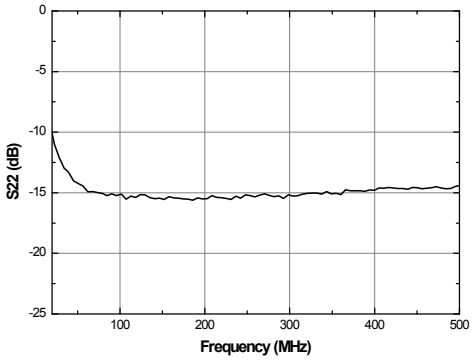
Board Layout (FR4, 40x40 mm^2, 0.8T)

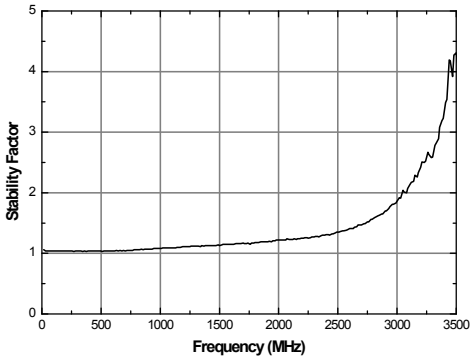


S-parameters & K-factor









APPLICATION CIRCUIT

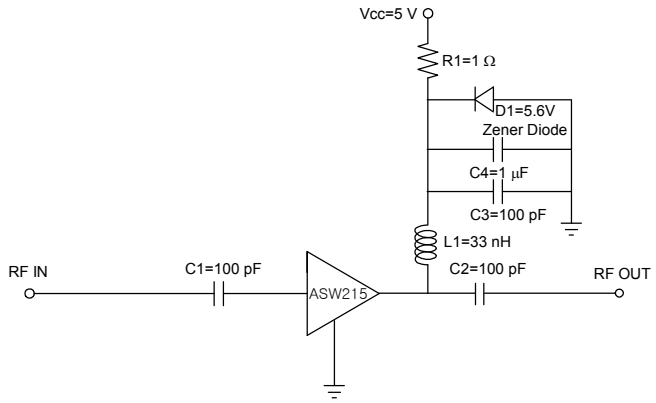
500 ~ 3500 MHz

+5 V

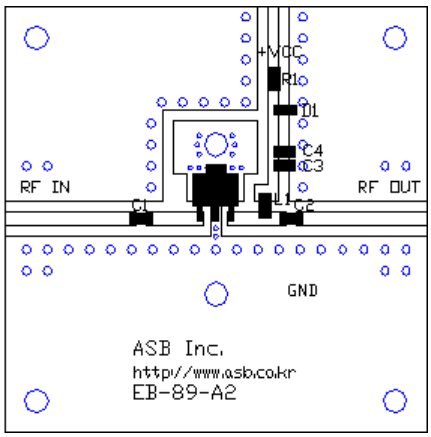
Frequency (MHz)	500	900	1750	2000	2400	2700	3500
Magnitude S21 (dB)	17	16	13	12	11.5	11	10
Magnitude S11 (dB)	-12	-18	-18	-15	-15	-15	-18
Magnitude S22 (dB)	-18	-18	-18	-18	-18	-18	-18
Output P1dB (dBm)	19	19	19	19	18	17	16
Output IP3[1)] (dBm)	37	37	35	35	33	32	28
Noise Figure (dB)	3.8	3.8	4.0	4.3	4.3	4.5	4.8
Device Voltage (V)	5						
Current (mA)	83						

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

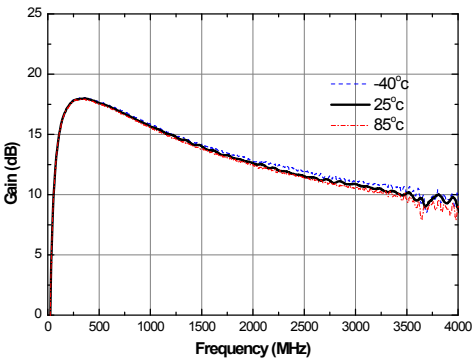
Schematic

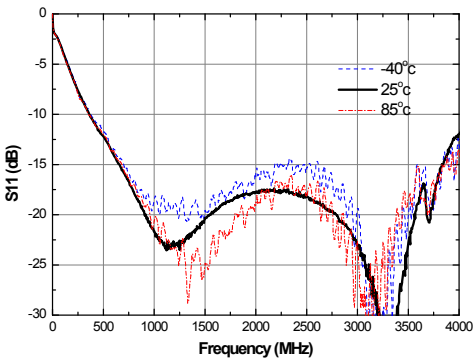


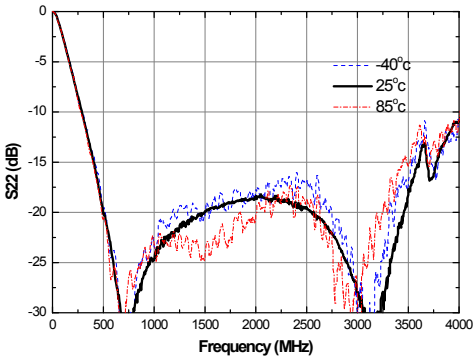
Board Layout (FR4, 40x40 mm^2, 0.8T)

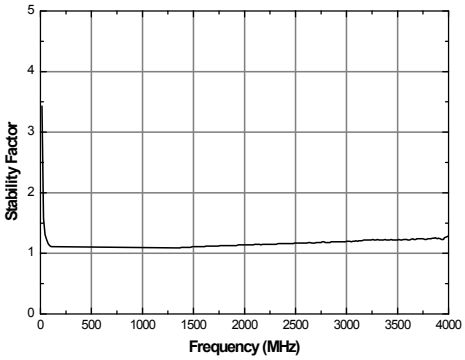


S-parameters & K-factor

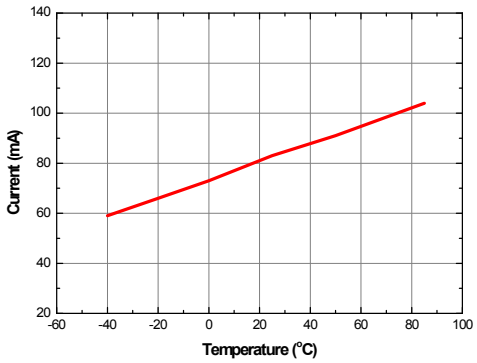




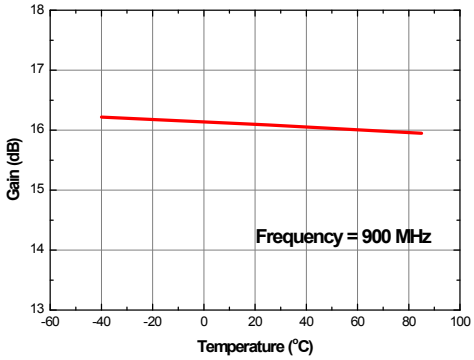




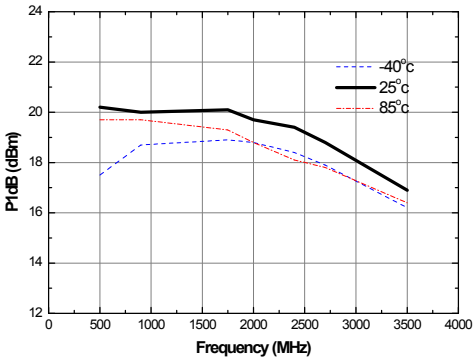
Current vs. Temperature



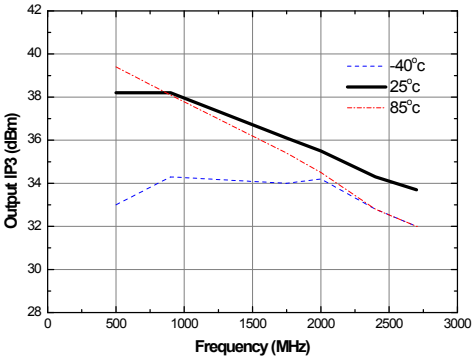
Gain vs. Temperature



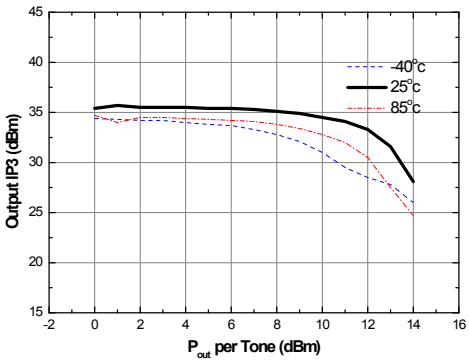
P1dB vs. Frequency



Output IP3 vs. Frequency



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



Performance with varying V_{DEVICE}

V_{DEVICE} (V)	Current (mA)	Freq. (MHz)	Gain (dB)	S11 (dB)	S22 (dB)	OIP3[1)] (dBm)	P1dB (dBm)	NF (dB)
4.9	85	900	16	-16.6	-23.8	37.3	19.2	3.5
		2000	12.8	-18.8	-17.3	34.7	18.6	4.06
		3500	10.5	-17.9	-22.5	30.4	16.8	--
4.7	69	900	15.9	-16.2	-23	34.8	18.2	3.57
		2000	12.7	-19.8	-17.2	33.4	17.8	3.96
		3500	10.4	-17.3	-21.8	29.7	16	--
4.55	52	900	15.7	-15.7	-21.8	30	15.2	3.46
		2000	12.6	-21.2	-17.3	30	16.3	3.8
		3500	10.3	-16.6	-22.4	28	14.5	--
4.4	37	900	15.1	-14.3	-18.6	21	9	3.37
		2000	12.2	-25.7	-17.1	21.8	11.2	3.62
		3500	10	-15.2	-21.9	22.6	12	--

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