ASW311

5 ~ 4000 MHz MMIC Amplifier

Features

- 14.3 dB Gain at 900 MHz
- 21.5 dBm P1dB at 900 MHz
- 41 dBm Output IP3 at 900 MHz
- 2.2 dB NF at 900 MHz
- MTTF > 100 Years
- Single Supply

Description

The ASW311, 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.

RoHS-compliant

Package Style: SOT89

Typical Performance

(Supply Voltage = +5 V, T_A = +25 °C, Z_0 = 50 Ω)

Parameters	Units	Typical	
Frequency	MHz	900	2000
Gain	dB	14.3	12.1
S11	dB	-13	-12
S22	dB	-14	-12
Output IP3[1)]	dBm	41	41
Noise Figure	dB	2.2	2.4
Output P1dB	dBm	21.5	21.0
Current	mA	120	120
Device Voltage	V	+5	+5

1) OIP3 is measured with two tones at an output power of +8 dBm/tone separated by 1 MHz.

Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		900	
Gain	dB	13.0	14.2	
S11	dB		-13	
S22	dB		-14	
Output IP3	dBm	38	41	
Noise Figure	dB		2.2	2.7
Output P1dB	dBm	20.0	21.5	
Current	mA	105	120	145
Device Voltage	V		+5	

Absolute Maximum Ratings

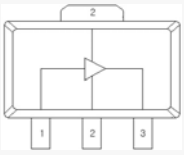
Parameters	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-40 to +150 °C
Device Voltage	+6 V
Operating Junction Temperature	+150 °C
Input RF Power (CW, 50 Ω matched)*	23 dBm

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

Application Circuit

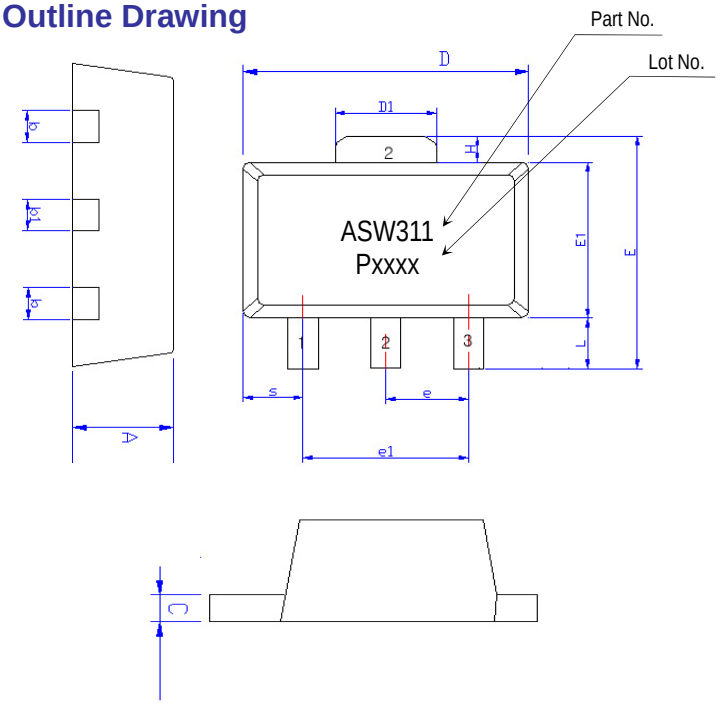
- IF
- 150 ~ 450 MHz
- 500 ~ 3500 MHz
- 380 ~ 2170 MHz
- 50 ~ 1000 MHz (75 Ω)

Pin Configuration



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

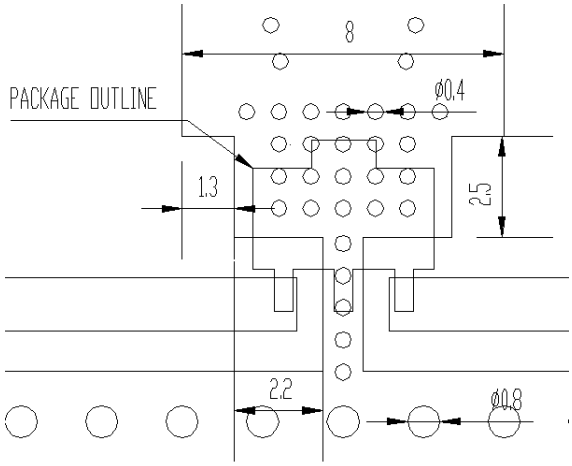
Outline Drawing



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: 550 V
MM	Class A
	Voltage Level: 50 V

CAUTION: ESD-sensitive device!

Moisture Sensitivity Level (MSL)

Level 3 at 260 °C reflow

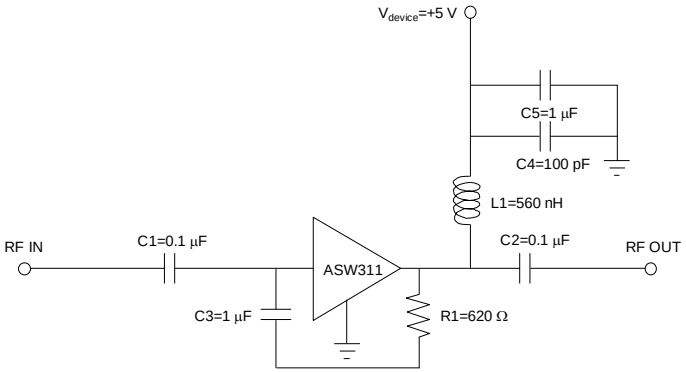
APPLICATION CIRCUIT

IF
50 ~ 100 MHz
+5 V

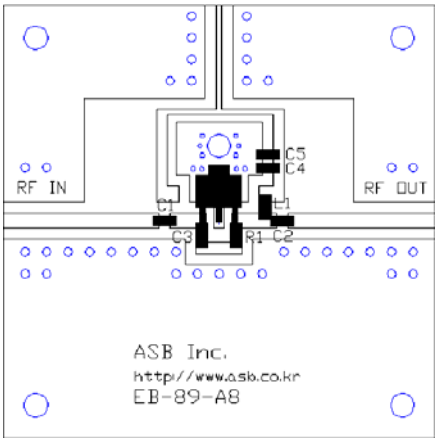
Frequency (MHz)	50 ~ 100
Magnitude S21 (dB)	15
Magnitude S11 (dB)	-11
Magnitude S22 (dB)	-18
Output P1dB (dBm)	23.5
Output IP3[1] (dBm)	40
Noise Figure (dB)	2.2
Device Voltage (V)	+5
Current (mA)	120

1) OIP3 is measured with two tones at an output power of +8 dBm/tone separated by 1 MHz.

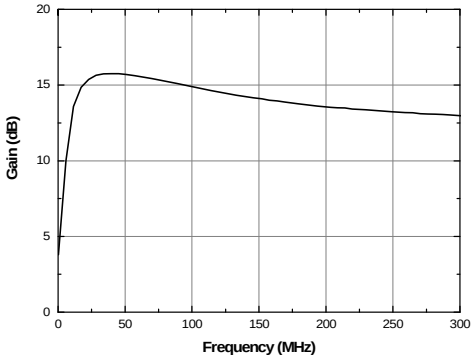
Schematic

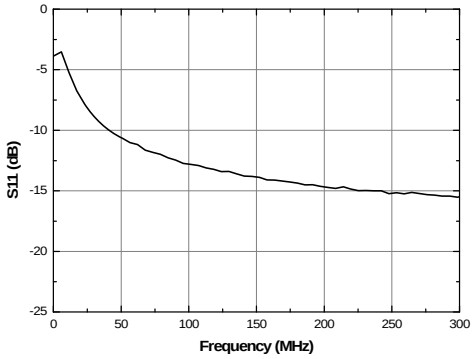


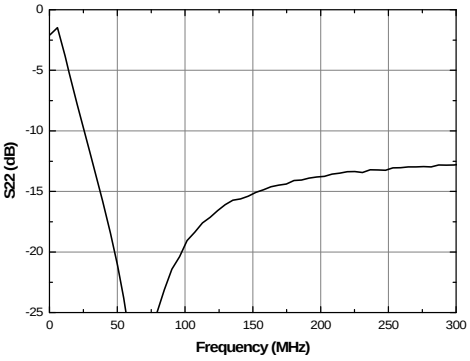
Board Layout (FR4, 40x40 mm², 0.8T)

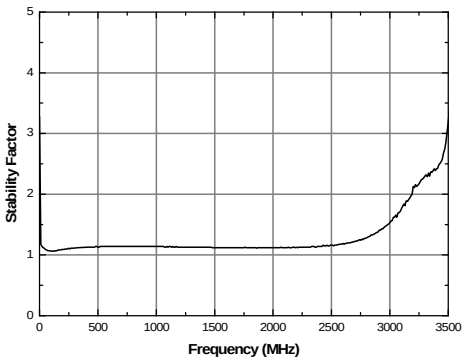


S-parameters & K-factor









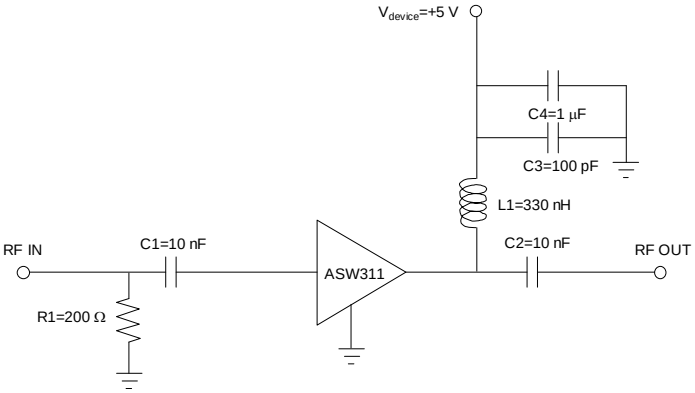
APPLICATION CIRCUIT

IF
150 ~ 450 MHz
+5 V

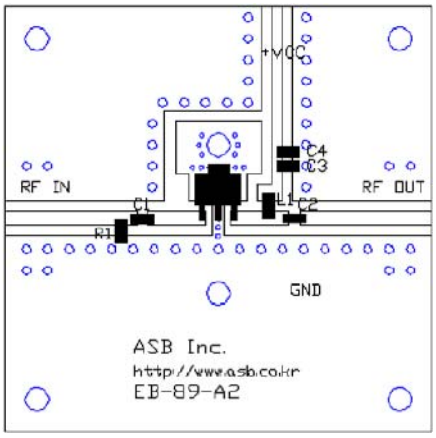
Frequency (MHz)	150	450
Magnitude S21 (dB)	14.5	13.5
Magnitude S11 (dB)	-12	-14
Magnitude S22 (dB)	-13	-13
Output P1dB (dBm)	21	
Output IP3[1] (dBm)	40	
Noise Figure (dB)	3.2	
Device Voltage (V)	+5	
Current (mA)	120	

1) OIP3 is measured with two tones at an output power of +8 dBm/tone separated by 1 MHz.

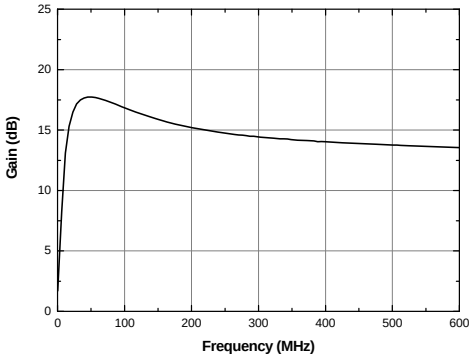
Schematic

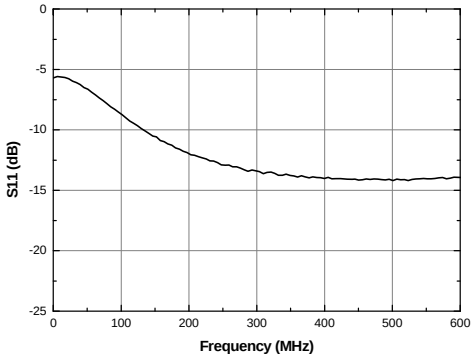


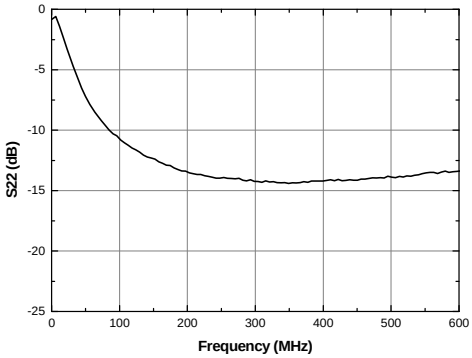
Board Layout (FR4, 40x40 mm², 0.8T)

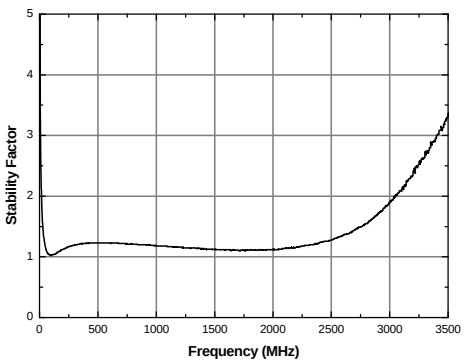


S-parameters & K-factor









APPLICATION CIRCUIT

Wide Band

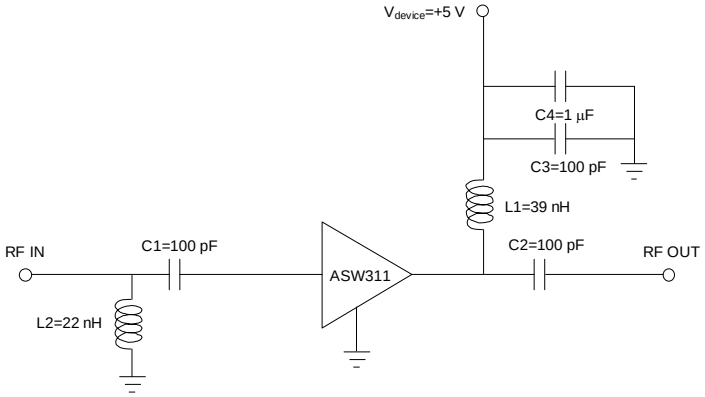
500 ~ 3500 MHz

+5 V

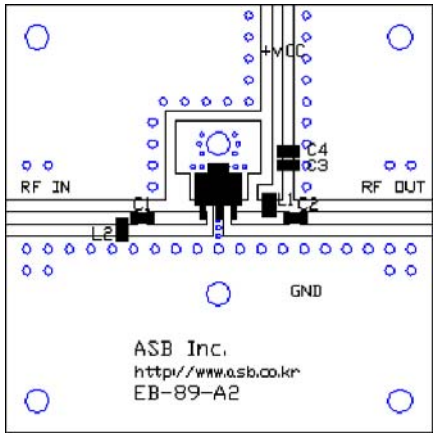
Frequency (MHz)	900	2000
Magnitude S21 (dB)	14.3	12.1
Magnitude S11 (dB)	-13	-12
Magnitude S22 (dB)	-14	-12
Output P1dB (dBm)	21.5	21.0
Output IP3[1)] (dBm)	41	41
Noise Figure (dB)	2.2	2.4
Device Voltage (V)	+5	+5
Current (mA)	120	120

1) OIP3 is measured with two tones at an output power of +8 dBm/tone separated by 1 MHz.

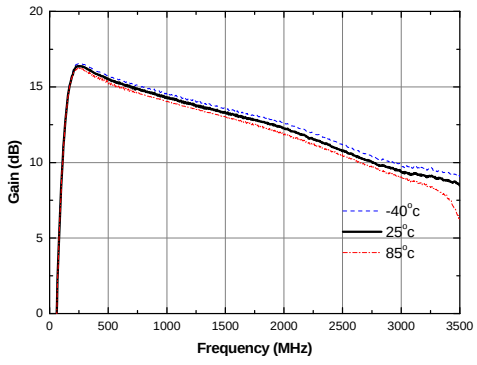
Schematic

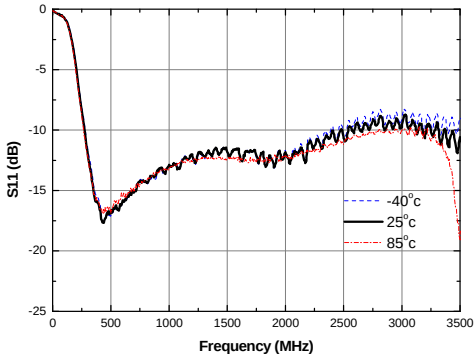


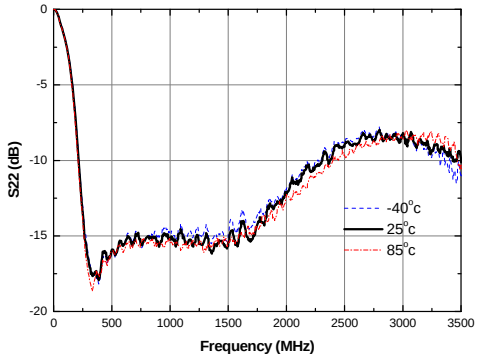
Board Layout (FR4, 40x40 mm², 0.8T)

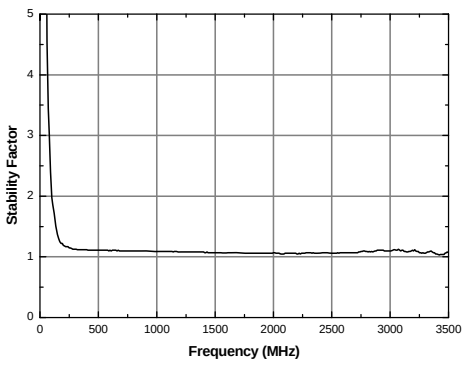


S-parameters & K-factor

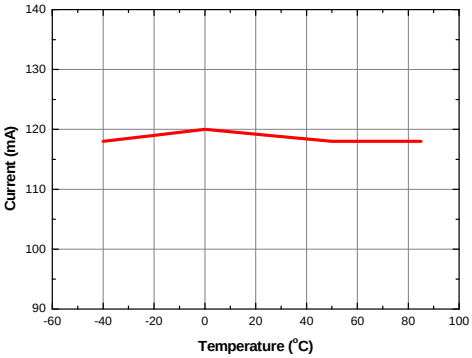




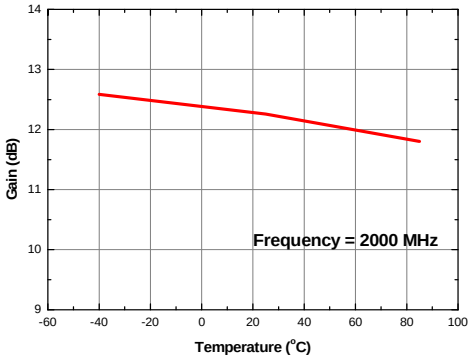




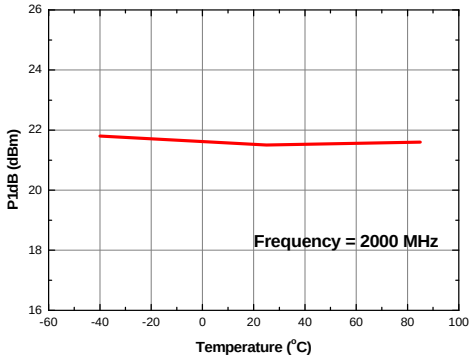
Current vs. Temperature



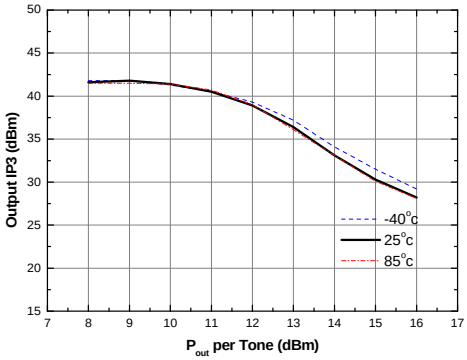
Gain vs. Temperature



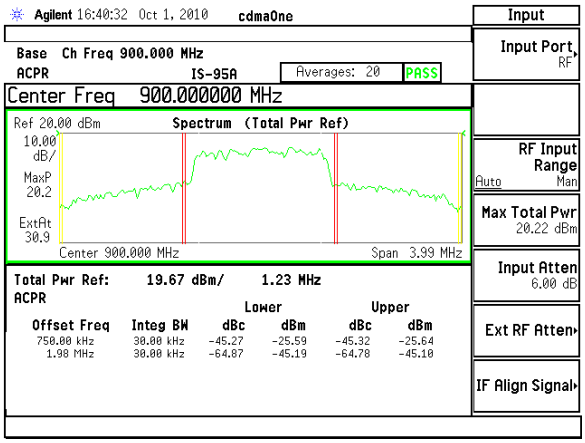
P1dB vs. Temperature

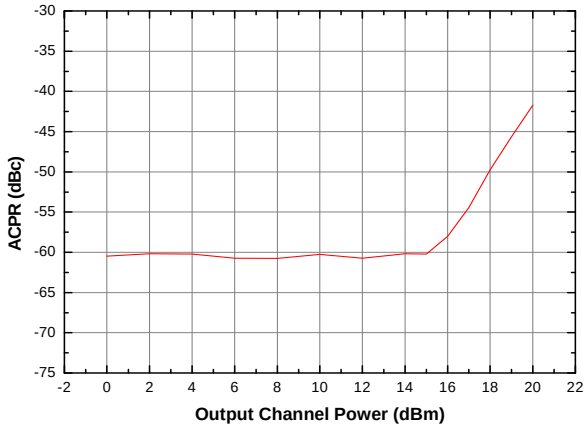


Output IP3 vs. Tone Power (Frequency = 2000 MHz)



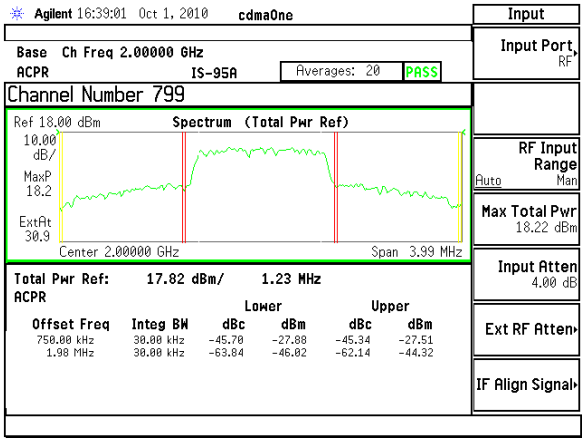
CDMA ACPR – 1FA

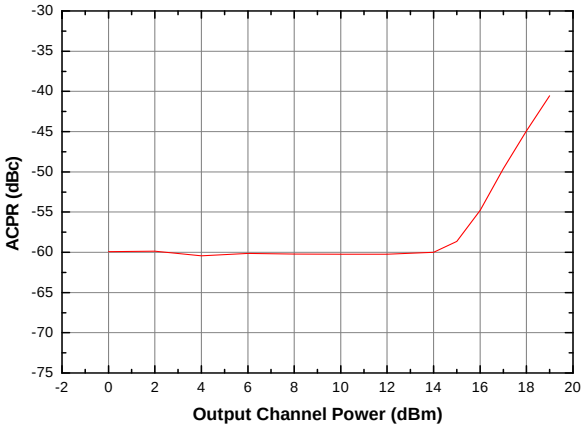




* Test Source : IS-95, 9 ch. Forward 30kHz Meas BW, 900 MHz / 750 kHz offset

WCDMA ACPR – 1FA





* Test Source : IS-95, 9 ch. Forward 30kHz Meas BW, 2000 MHz / 750 kHz offset

APPLICATION CIRCUIT

Wide Band

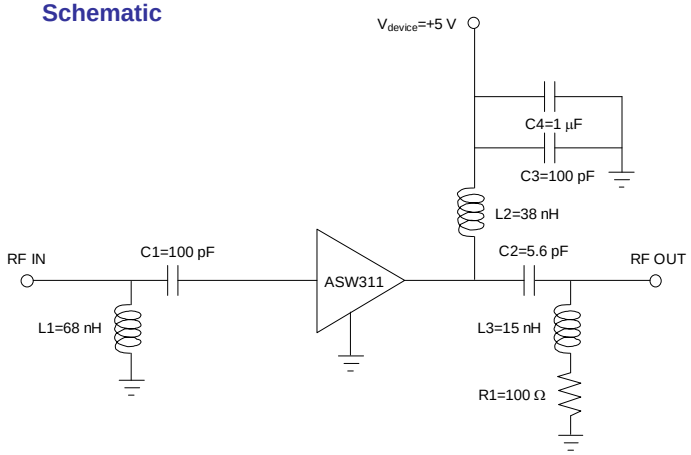
380 ~ 2170 MHz

+5 V & +4V

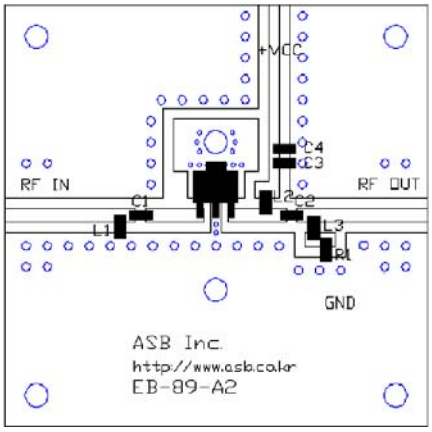
Frequency (MHz)	380	1000	2170	380	1000	2170
Magnitude S21 (dB)	11.7	13.0	11.7	11.5	12.7	11.5
Magnitude S11 (dB)	-15	-13	-15	-16	-13	-15
Magnitude S22 (dB)	-12	-12	-15	-12	-12	-14
Output P1dB (dBm)	16.0	22.0	21.5	14.0	19.0	19.0
Output IP3[1)] (dBm)	36.0	39.5	41.0	36.5	35.0	36.5
Noise Figure (dB)	2.4	2.2	2.3	2.4	2.1	2.3
Gain Flatness (dB)	1.6			1.6		
Device Voltage (V)	+5			+4		
Current (mA)	120			80		

1) OIP3 is measured with two tones at an output power of +5 dBm/tone(at 5 V) / +3 dBm/tone(at 4 V) separated by 1 MHz.

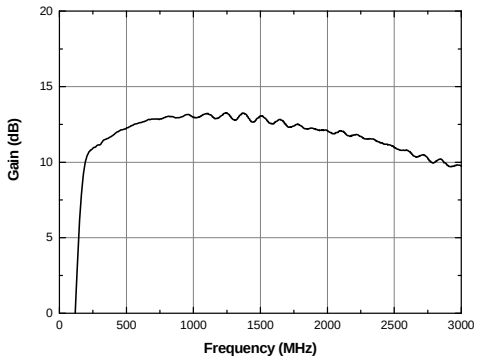
Schematic

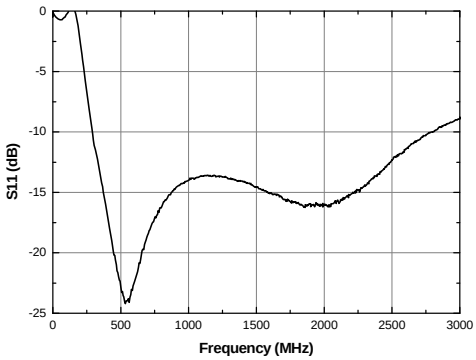


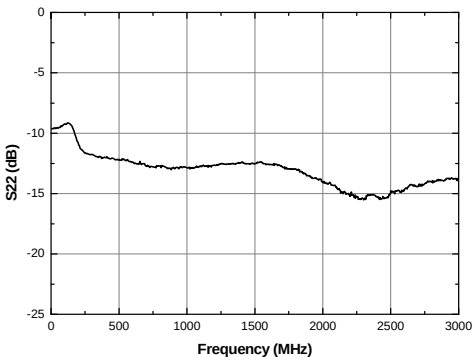
Board Layout (FR4, 40x40 mm², 0.8T)

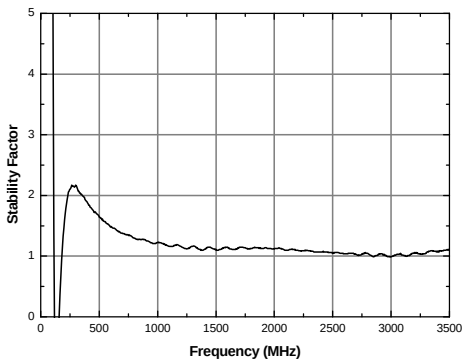


S-parameters & K-factor









APPLICATION CIRCUIT

CATV Push-Pull (75 Ω)

50 ~ 1000 MHz

+5 V

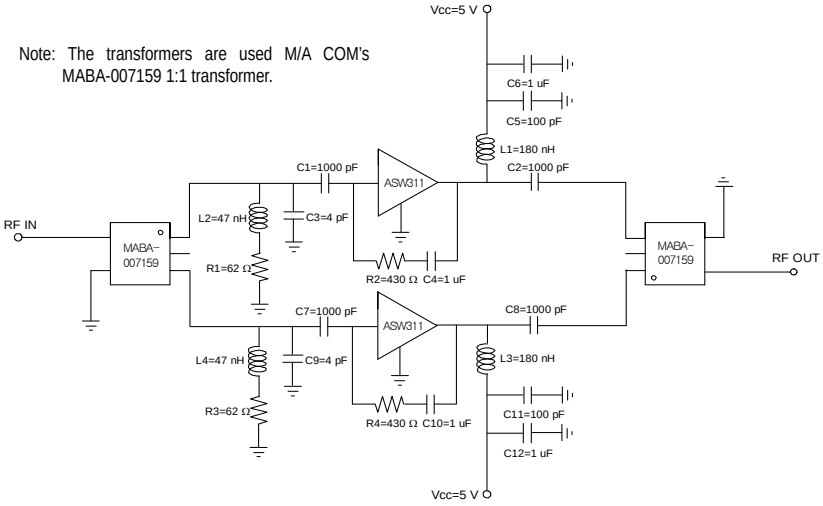
Frequency (MHz)	50	500	860
Magnitude S21 (dB)	10.5	10.8	10.5
Magnitude S11 (dB)	-18	-12	-15
Magnitude S22 (dB)	-9	-15	-11
Output P1dB (dBm)	24	24	25
Output IP3[1)] (dBm)	38	43	40
Output IP2[1),2)] (dBm)	65	71	84
Noise Figure (dB)	5.2	3.5	3.8
Device Voltage (V)	+5	+5	+5
Current (mA)	240	240	240

1) OIP3 and OIP2 are measured with two tones at an output power of +8 dBm/tone separated by 6 MHz.

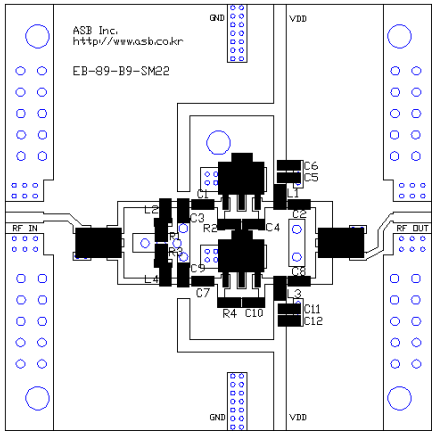
2) OIP2 is measured at F1+F2 Frequency.

Schematic

Note: The transformers are used M/A COM's MABA-007159 1:1 transformer.



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters