

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.



Package Style: SOT89

Typical Performance

(Supply Voltage = +5 V, T_A = +25 °C, Z₀ = 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

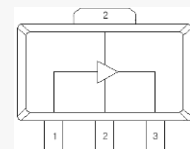
The operation of this device in excess of any of these limits may cause permanent damage.

* Refer to the max. input RF power data at http://www.asb.co.kr/pdf/Maximum_Input_Power_Analysis.pdf. The max. input RF power, in principle, depends upon application frequency, matching circuit, and device voltage.

Application Circuit

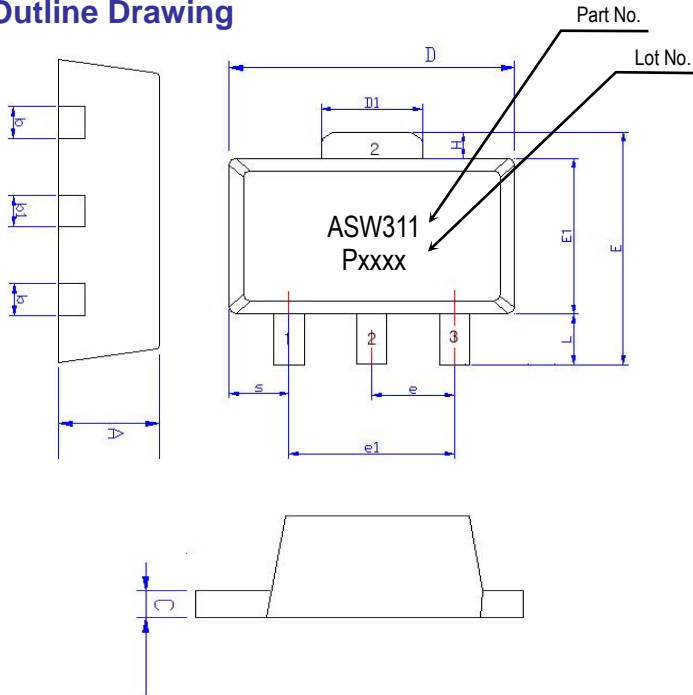
- IF
- 150 ~ 450 MHz
- 500 ~ 3500 MHz
- 380 ~ 2170 MHz
- 50 ~ 1000 MHz (75 Ω)

Pin Configuration



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

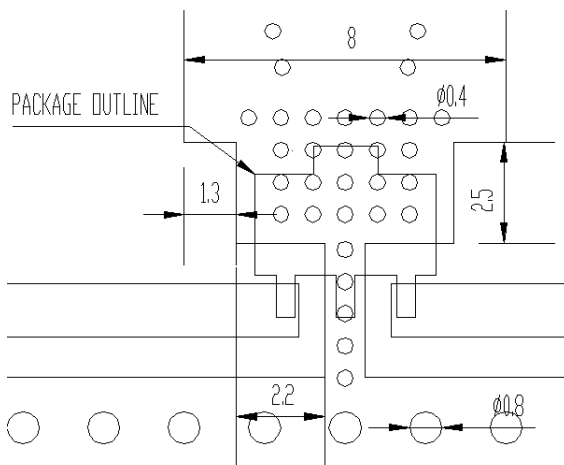
Outline Drawing



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

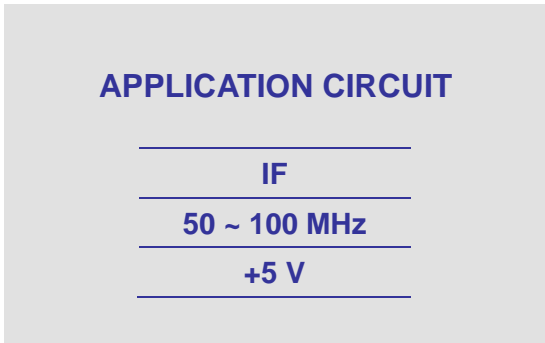
ESD Classification

HBM	Class 1B Voltage Level: 550 V
MM	Class A Voltage Level: 50 V

CAUTION: 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)

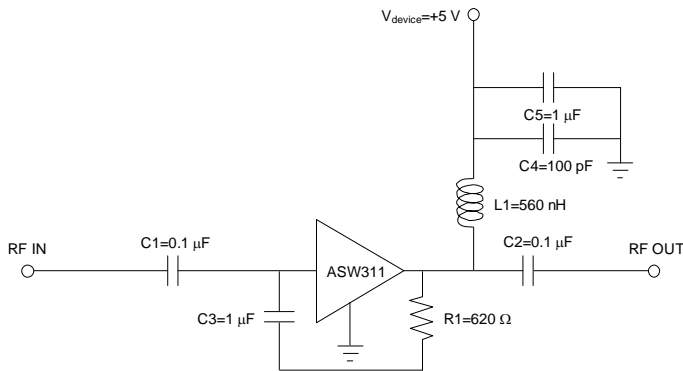
Level 3 at 260 °C reflow



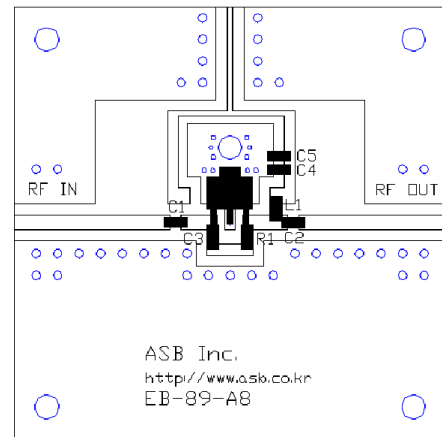
Frequency (MHz)	50 ~ 100
Magnitude S21 (dB)	15
Magnitude S11 (dB)	-11
Magnitude S22 (dB)	-18
Output P1dB (dBm)	23.5
Output IP3 ¹⁾ (dBm)	40
Noise Figure (dB)	2.2
Device Voltage (V)	+5
Current (mA)	120

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

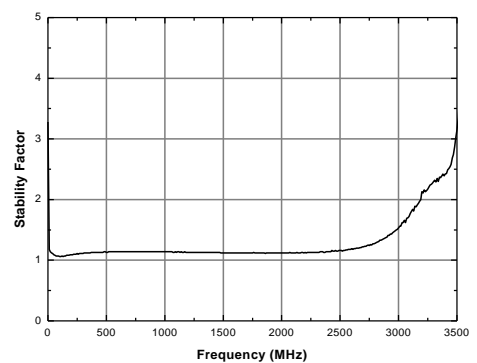
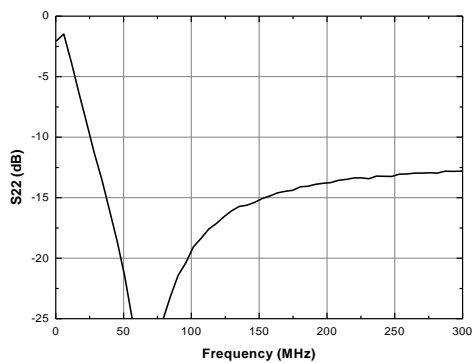
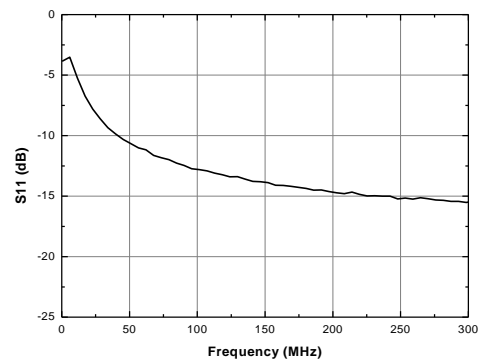
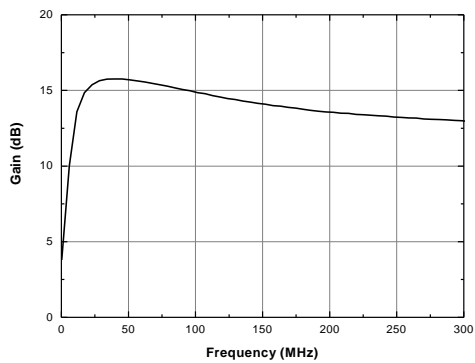
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

IF

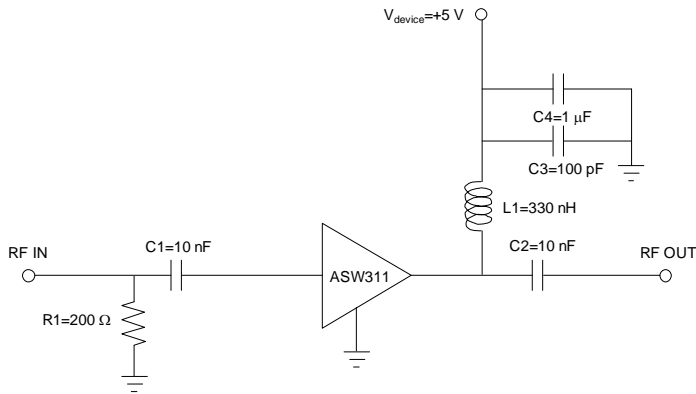
150 ~ 450 MHz

+5 V

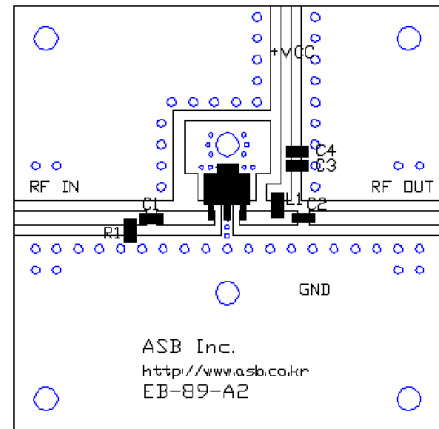
Frequency (MHz)	150	450
Magnitude S21 (dB)	14.5	13.5
Magnitude S11 (dB)	-12	-14
Magnitude S22 (dB)	-13	-13
Output P1dB (dBm)	21	
Output IP3 ¹⁾ (dBm)	40	
Noise Figure (dB)	3.2	
Device Voltage (V)	+5	
Current (mA)	120	

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

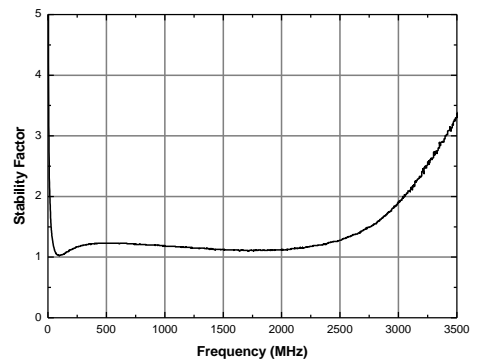
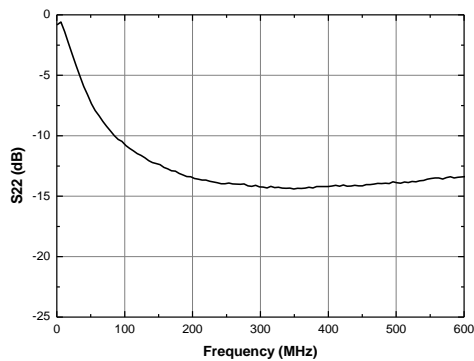
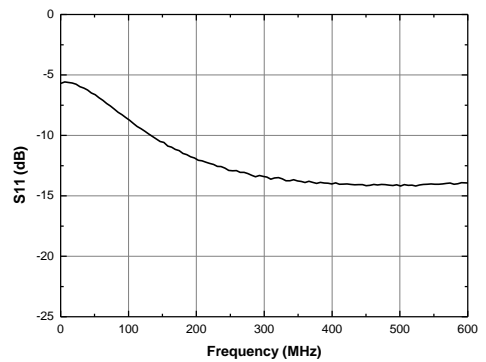
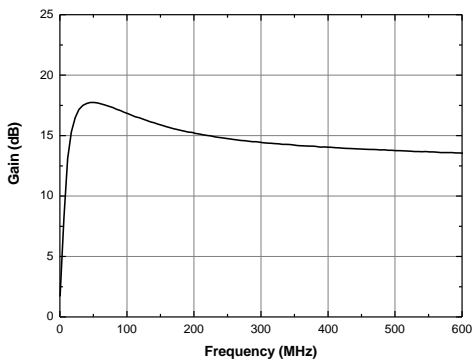
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

Wide Band

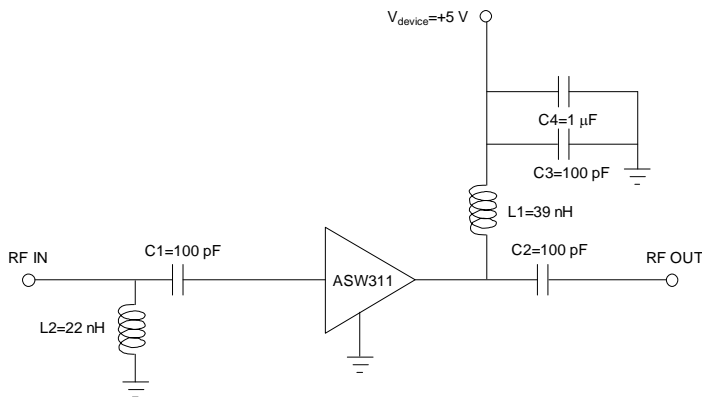
500 ~ 3500 MHz

+5 V

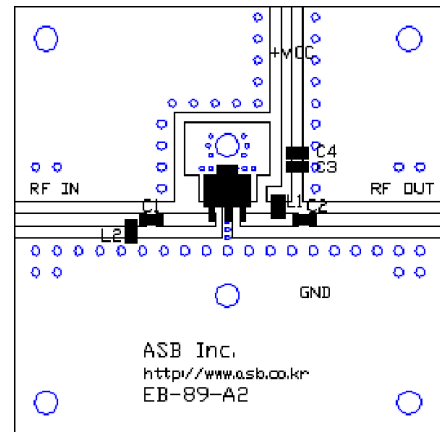
Frequency (MHz)	900	2000
Magnitude S21 (dB)	14.3	12.1
Magnitude S11 (dB)	-13	-12
Magnitude S22 (dB)	-14	-12
Output P1dB (dBm)	21.5	21.0
Output IP3 ¹⁾ (dBm)	41	41
Noise Figure (dB)	2.2	2.4
Device Voltage (V)	+5	+5
Current (mA)	120	120

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

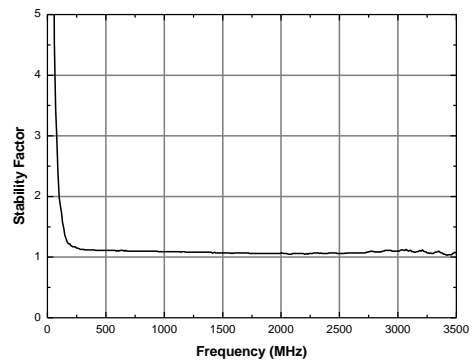
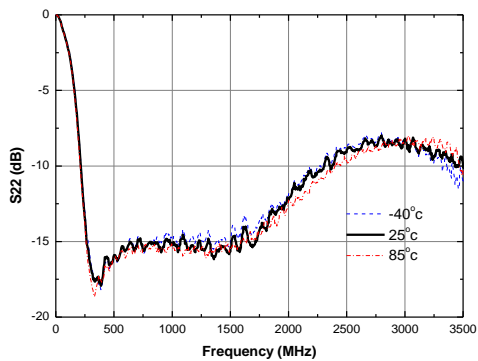
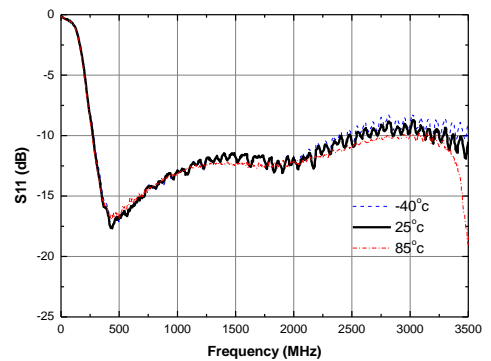
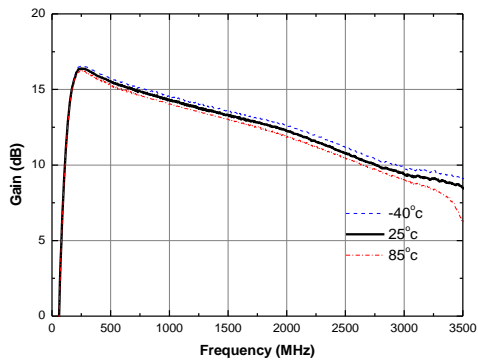
Schematic



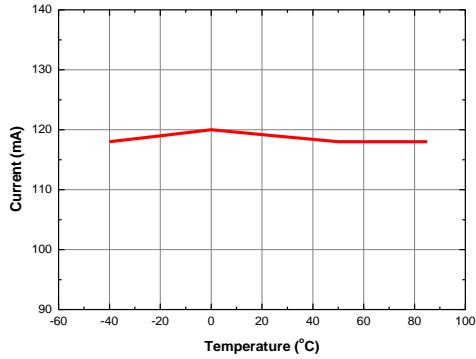
Board Layout (FR4, 40x40 mm², 0.8T)



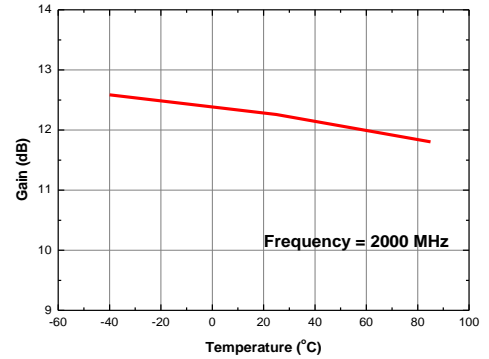
S-parameters & K-factor



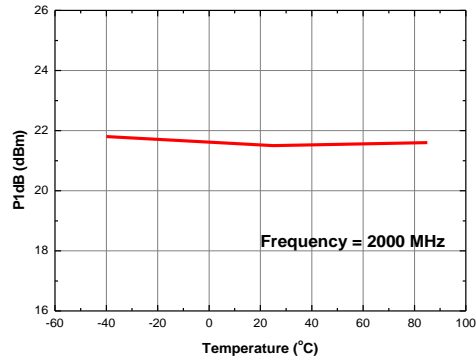
Current vs. Temperature



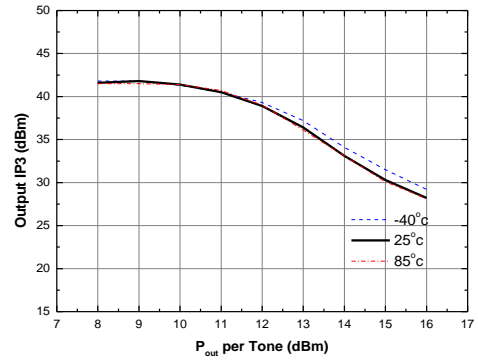
Gain vs. Temperature



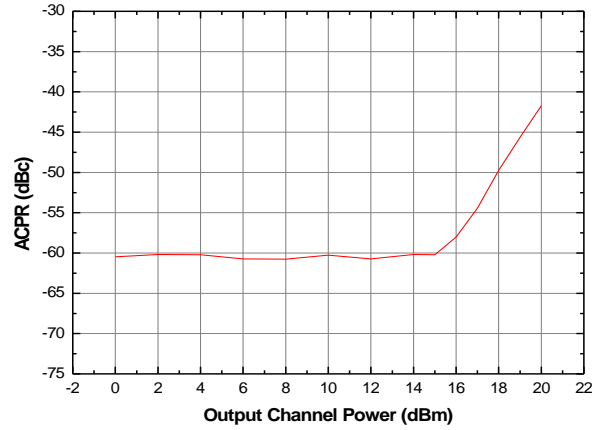
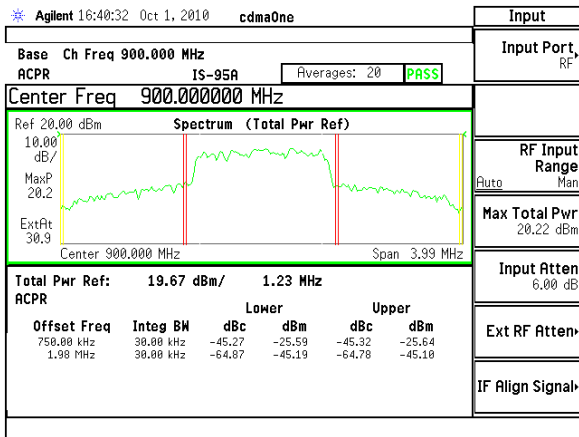
P1dB vs. Temperature



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

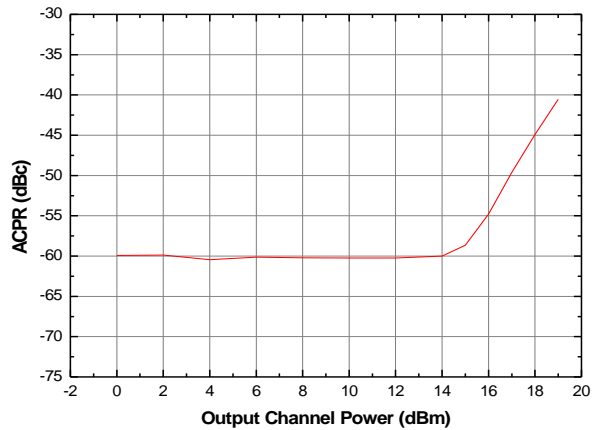
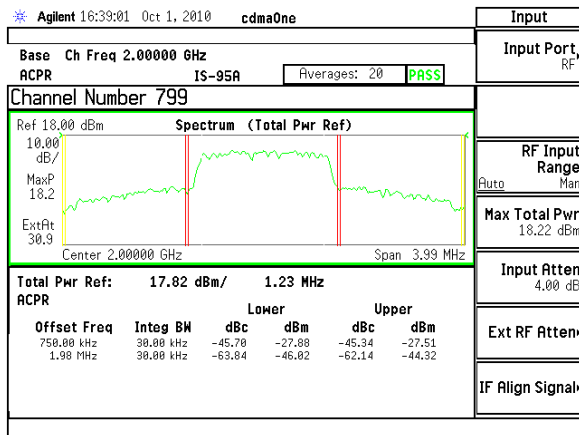


CDMA ACPR – 1FA



* 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

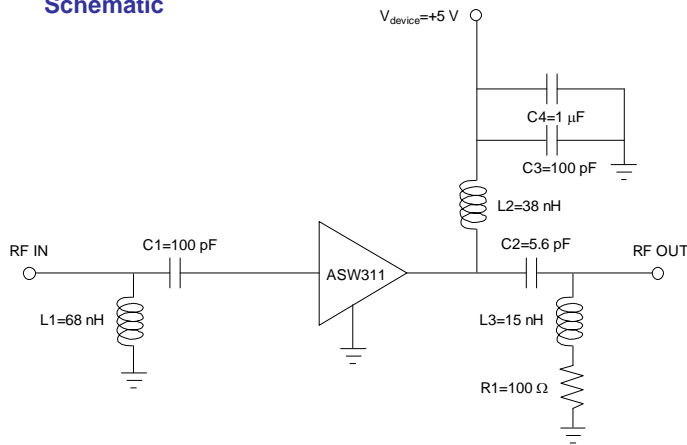
380 ~ 2170 MHz

+5 V & +4V

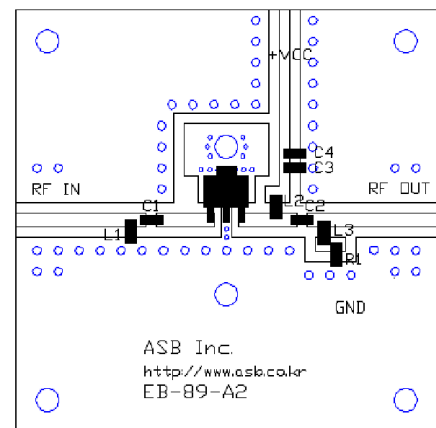
Frequency (MHz)	380	1000	2170	380	1000	2170
Magnitude S21 (dB)	11.7	13.0	11.7	11.5	12.7	11.5
Magnitude S11 (dB)	-15	-13	-15	-16	-13	-15
Magnitude S22 (dB)	-12	-12	-15	-12	-12	-14
Output P1dB (dBm)	16.0	22.0	21.5	14.0	19.0	19.0
Output IP3 ¹⁾ (dBm)	36.0	39.5	41.0	36.5	35.0	36.5
Noise Figure (dB)	2.4	2.2	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.

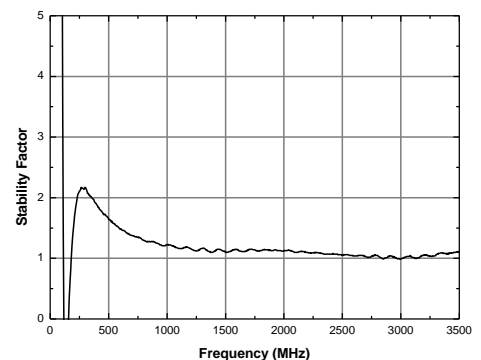
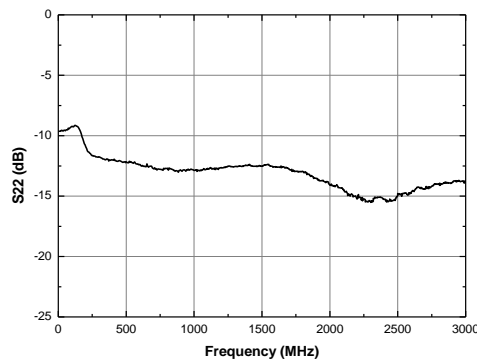
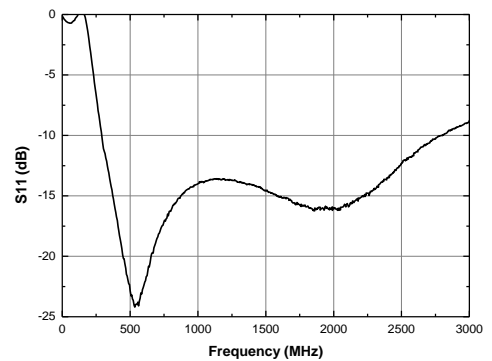
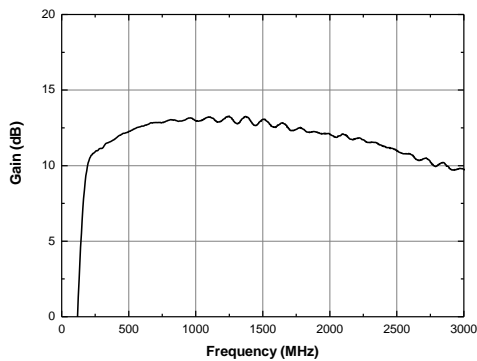
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

CATV Push-Pull (75 Ω)

50 ~ 1000 MHz

+5 V

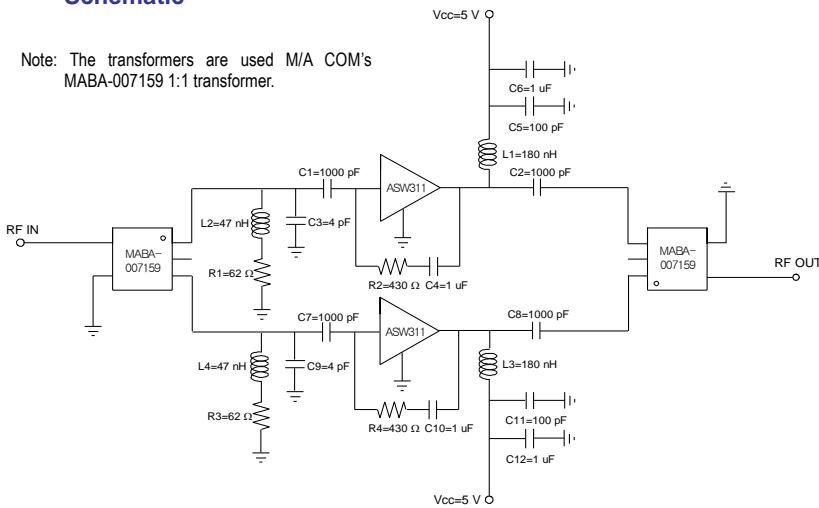
Frequency (MHz)	50	500	860
Magnitude S21 (dB)	10.5	10.8	10.5
Magnitude S11 (dB)	-18	-12	-15
Magnitude S22 (dB)	-9	-15	-11
Output P1dB (dBm)	24	24	25
Output IP3 ¹⁾ (dBm)	38	43	40
Output IP2 ^{1),2)} (dBm)	65	71	84
Noise Figure (dB)	5.2	3.5	3.8
Device Voltage (V)	+5	+5	+5
Current (mA)	240	240	240

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

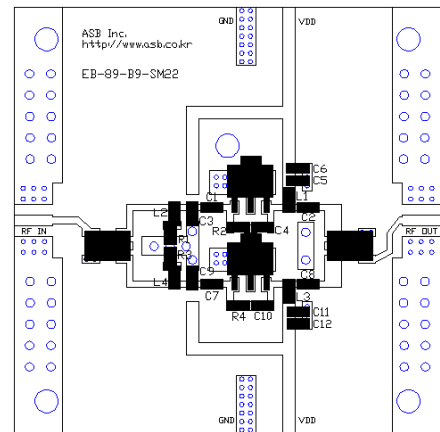
2) OIP2 is measured at F1+F2 Frequency.

Schematic

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



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters

