ASF250

5 ~ 1000 MHz MMIC Amplifier

Features

- 16.9 dB Gain at 150 MHz
- 22 dBm P1dB at 150 MHz
- 43 dBm Output IP3 at 150 MHz
- 2.5 dB NF at 150 MHz
- MTTF > 100 Years
- Single Supply
- Minimal External Components

Description

The ASF250, a IF gain block 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 1 GHz. It has an active bias network for stable current over temperature and process variation. The amplifier is available in a SOT89 package and passes through the stringent DC, RF, and reliability tests.

RoHS-compliant GREEN Package

Package Style: SOT89

Typical Performance

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

Parameters	Units	Typical					
Frequency	MHz	70	150	300	450	900	150
Gain	dB	17.0	16.9	16.7	16.6	16.1	16.8
S11	dB	-15	-20	-20	-20	-14	-20
S22	dB	-16	-20	-20	-19	-13	-20
Output IP3	dBm	40.0[1)]	43.0[1)]	43.0[1)]	40.0[1)]	38.0[1)]	41.5[2)]
Noise Figure	dB	2.5	2.5	2.7	2.7	2.7	2.4
Output P1dB	dBm	22	22	22	22	22	21
Current	mA	98	98	98	98	98	90
Device Voltage	V	+5.0	+5.0	+5.0	+5.0	+5.0	+4.6

1) OIP3 is measured with two tones at an output power of +8 dBm/tone separated by 1 MHz
2) OIP3 is measured with two tones at an output power of +7 dBm/tone separated by 1 MHz.

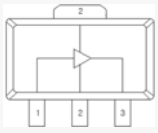
Application Circuit

- IF (50 ~ 1000 MHz, 5 V)
- IF (50 ~ 1000 MHz, 4.6 V, 90 mA)
- IF (350 ~ 470 MHz, 5V)
- IF (100 ~ 200 MHz, 5V)

Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		150	
Gain	dB		16.9	
S11	dB		-20	
S22	dB		-20	
Output IP3	dBm		43	
Noise Figure	dB		2.5	
Output P1dB	dBm		22	
Current	mA		98	
Device Voltage	V		+5	

Pin Configuration



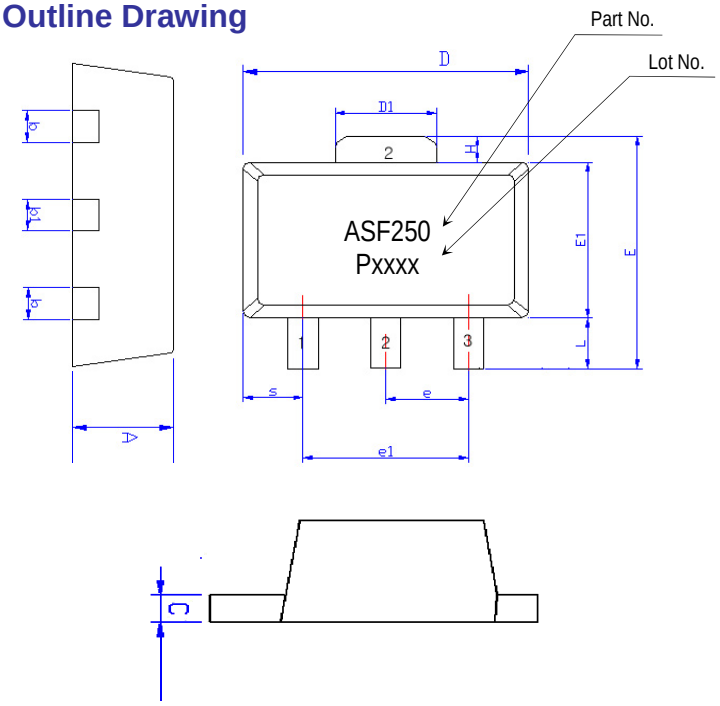
Pin No.	Function
1	RF IN
2	GND
3	RF OUT & Bias

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 (Continuous)[1)]	+20 dBm
Thermal Resistance	42 °C/W

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

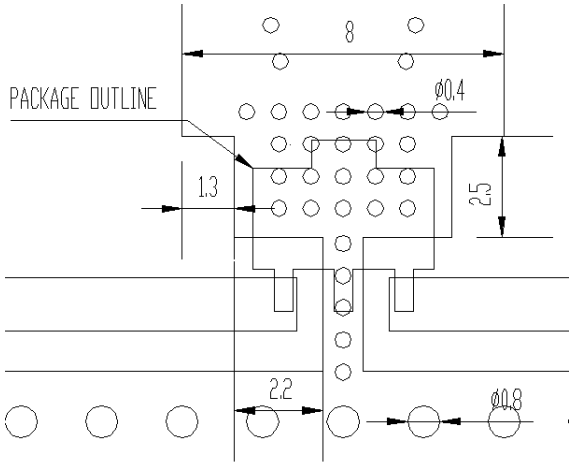
Outline Drawing



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

IF

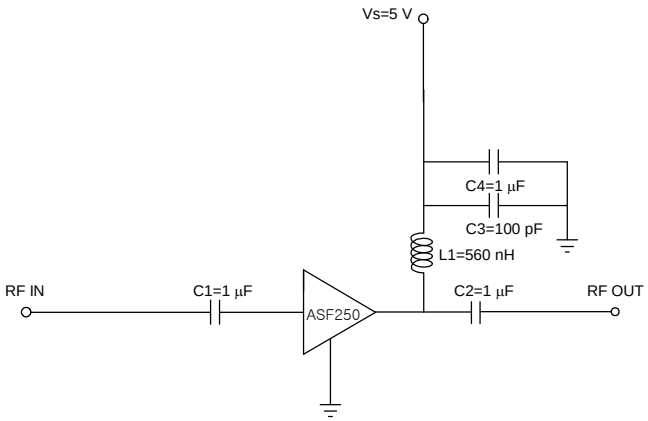
50 ~ 1000 MHz

+5 V

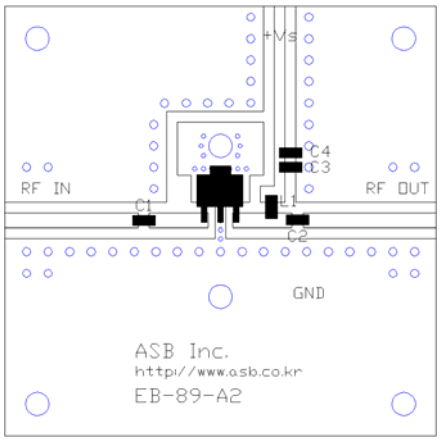
Frequency (MHz)	70	150	300	450	900
Magnitude S21 (dB)	17.0	16.9	16.7	16.6	16.1
Magnitude S11 (dB)	-15	-20	-20	-20	-14
Magnitude S22 (dB)	-16	-20	-20	-19	-13
Output P1dB (dBm)	22.0	22.0	22.0	22.0	22.0
Output IP3[1)] (dBm)	40.0	43.0	43.0	40.0	38.0
Noise Figure (dB)	2.5	2.5	2.7	2.7	2.7
Device Voltage (V)	+5	+5	+5	+5	+5
Device Current (mA)	98	98	98	98	98

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

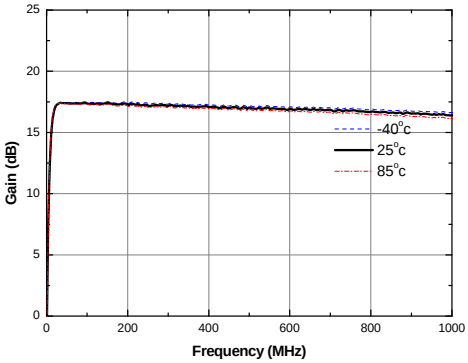
Schematic

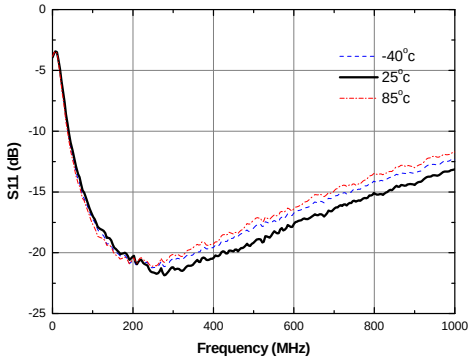


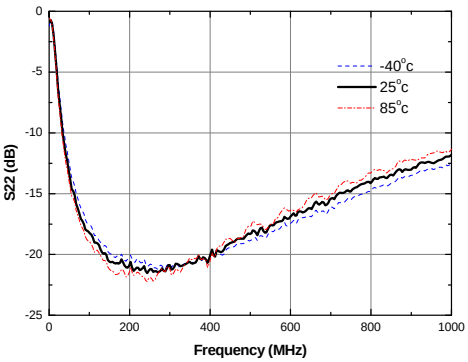
Board Layout (FR4, 40x40 mm², 0.8T)

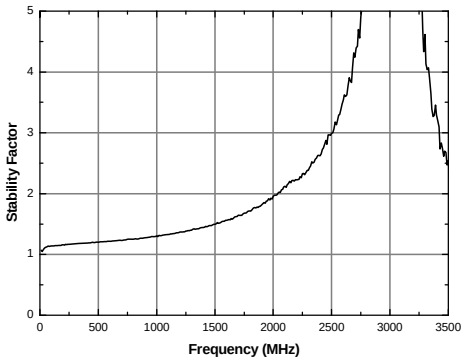


S-parameters & K-factor

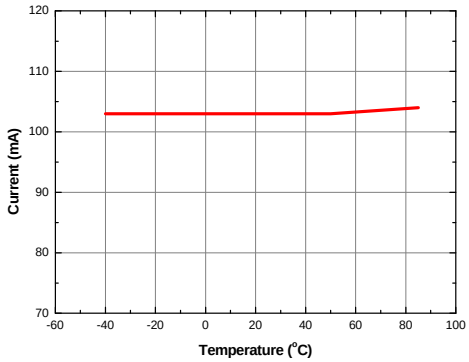




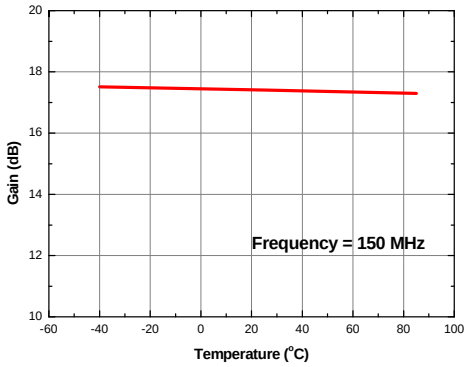




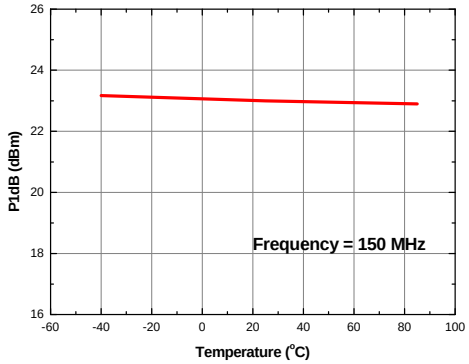
Current vs. Temperature



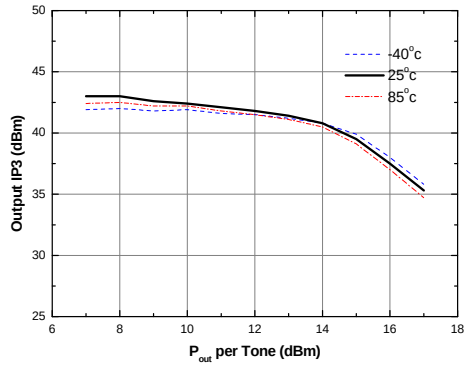
Gain vs. Temperature



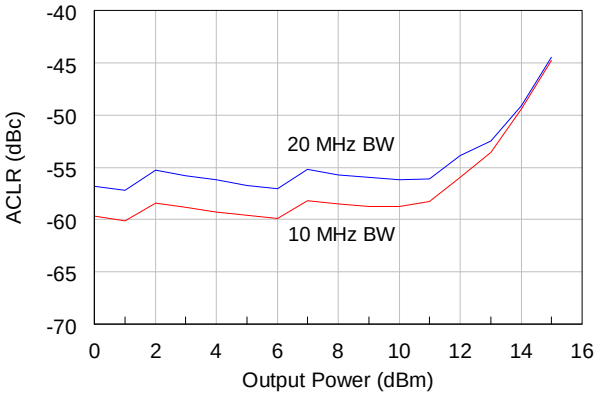
P1dB vs. Temperature

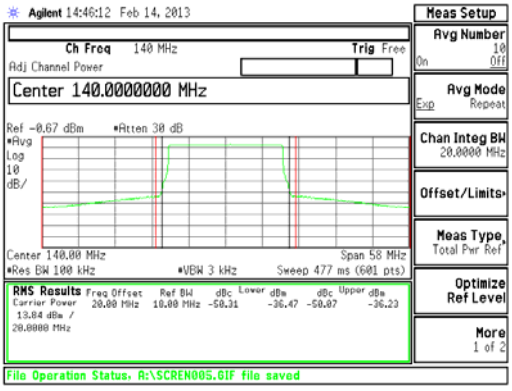


Output IP3 vs. Tone Power (Frequency = 150 MHz)



ACLR (LTE)





Note that ACLR test conditions are as follows;

1) Test Source: LTE_FDD_test model 3.1, BW: 10 MHz & 20 MHz, Test Frequency: 140 MHz

2) Test Source: LTE_FDD_test model 3.1, BW: 20 MHz, Test Frequency: 140 MHz

APPLICATION CIRCUIT

IF

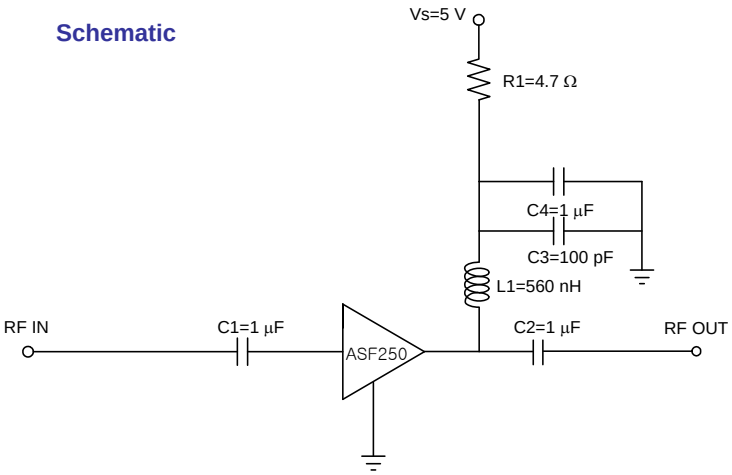
50 ~ 1000 MHz

+4.6 V, 90 mA

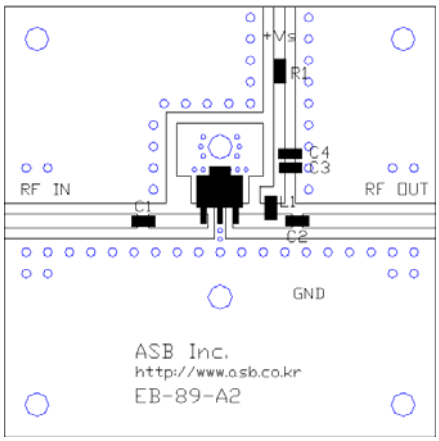
Frequency (MHz)	70	150	300	450	900
Magnitude S21 (dB)	17.0	16.8	16.7	16.5	16.0
Magnitude S11 (dB)	-15	-20	-20	-20	-14
Magnitude S22 (dB)	-16	-20	-20	-20	-13
Output P1dB (dBm)	21	21	21	21	21
Output IP3[1)] (dBm)	39.0	41.5	42.0	39.0	36.5
Noise Figure (dB)	2.4	2.4	2.6	2.6	2.6
Device Voltage (V)	+4.6	+4.6	+4.6	+4.6	+4.6
Device Current (mA)	90	90	90	90	90

1) OIP3 is measured with two tones at an output power of +7 dBm/tone separated by 1 MHz.

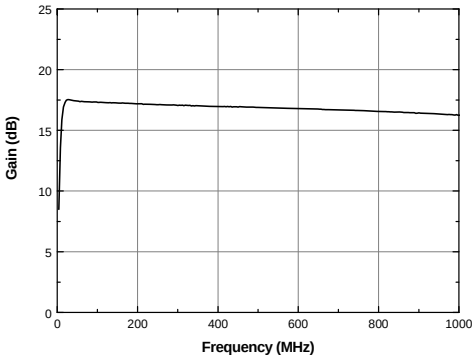
Schematic

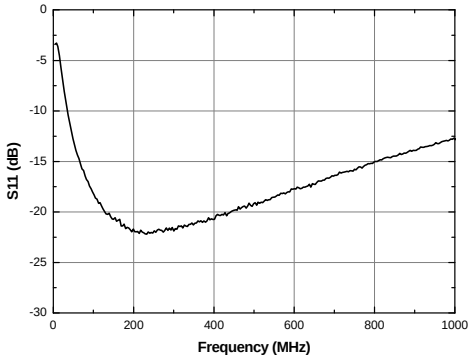


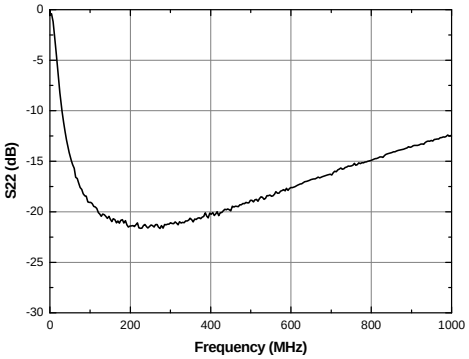
Board Layout (FR4, 40x40 mm², 0.8T)

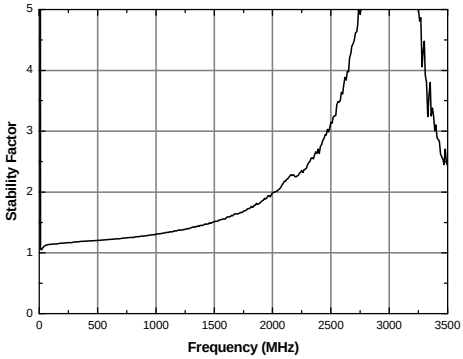


S-parameters & K-factor









APPLICATION CIRCUIT

IF

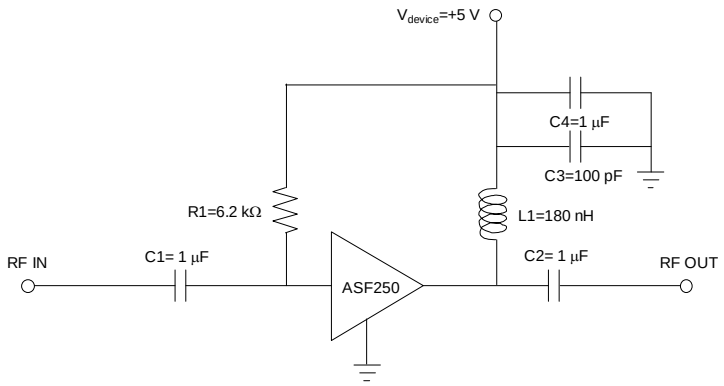
350 ~ 470 MHz

+5 V

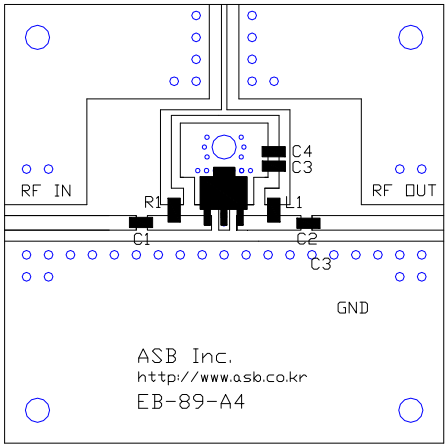
Frequency (MHz)	350	470
Magnitude S21 (dB)	17	17
Magnitude S11 (dB)	-18	-18
Magnitude S22 (dB)	-18	-20
Output P1dB (dBm)	23	23
Output IP3[1)] (dBm)	43.0	42.5
Noise Figure (dB)	2.7	2.7
Device Voltage (V)	5	5
Device Current (mA)	125	125

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

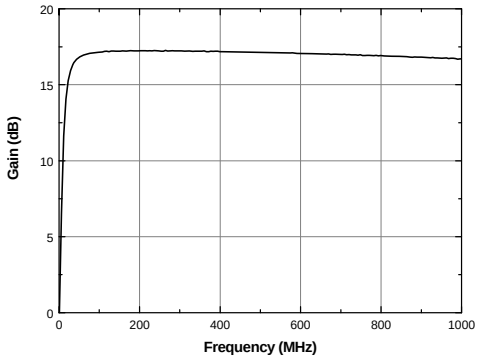
Schematic

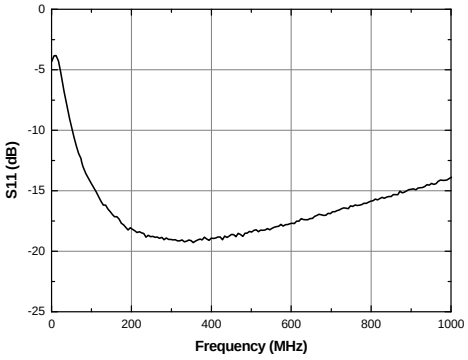


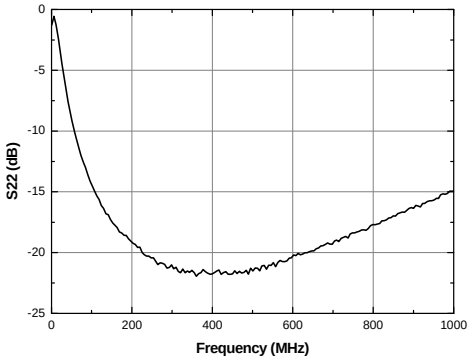
Board Layout (FR4, 40x40 mm², 0.8T)

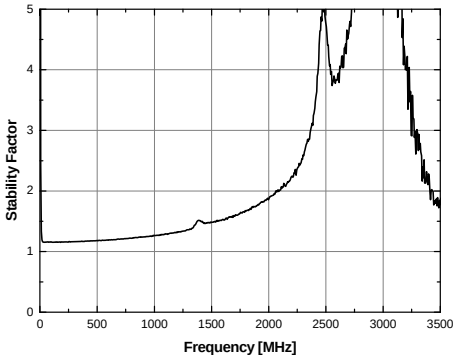


S-parameters & K-factor









APPLICATION CIRCUIT

IF

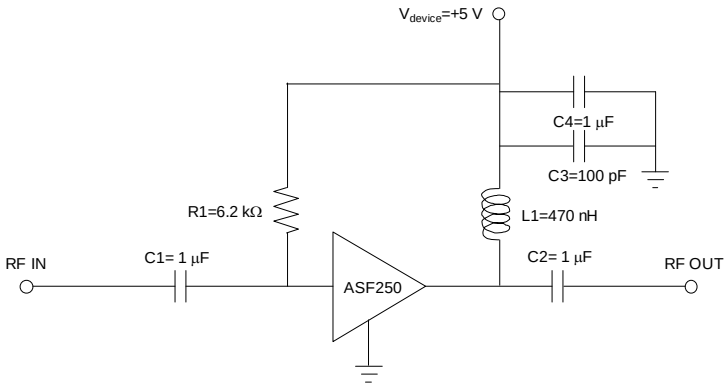
100 ~ 200 MHz

+5 V

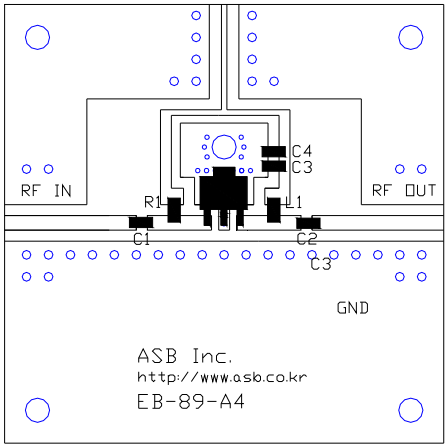
Frequency (MHz)	100	200
Magnitude S21 (dB)	17.1	17.0
Magnitude S11 (dB)	-19	-20
Magnitude S22 (dB)	-20	-20
Output P1dB (dBm)	23	23
Output IP3[1)] (dBm)	44.5	45.5
Noise Figure (dB)	2.6	2.6
Device Voltage (V)	5	5
Device Current (mA)	125	125

1) OIP3 is measured with two tones at an output power of +9 dBm/tone separated by 1 MHz.

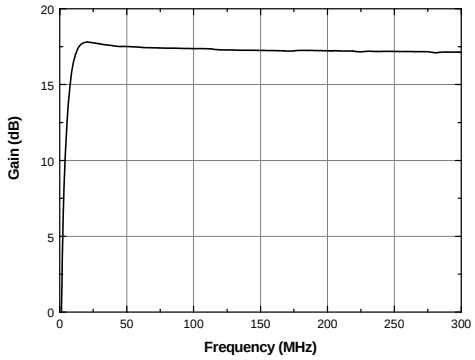
Schematic

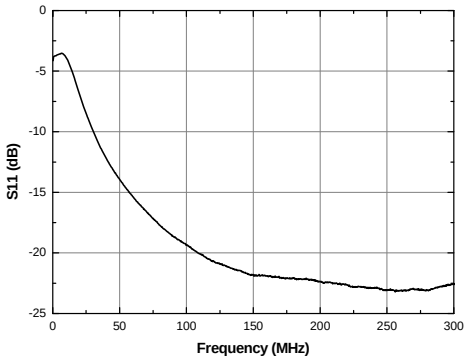


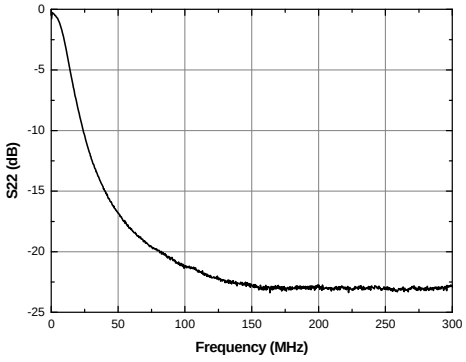
Board Layout (FR4, 40x40 mm², 0.8T)

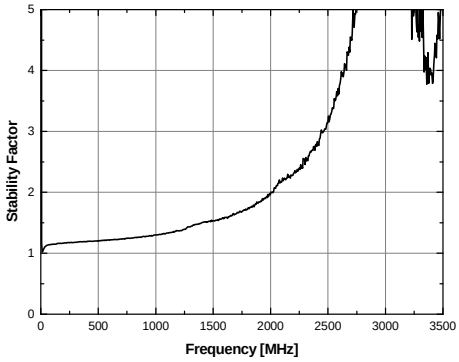


S-parameters & K-factor









Recommended Soldering Reflow Profile