ASF255

5 ~ 3000 MHz MMIC Amplifier

Features

- 22.4 dB Gain at 150 MHz
- 23 dBm P1dB at 150 MHz
- 42 dBm Output IP3 at 150 MHz
- 2.2 dB NF at 150 MHz
- MTTF > 100 Years
- Single Supply
- Minimal External Components

Description

The ASF255, 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 3 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 = +5 V, T_A = +25 °C, Zo = 50 Ω)

Parameters	Units	Typical					
Frequency	MHz	70	150	300	450	900	150
Gain	dB	22.4	22.4	22.2	21.9	21.0	22.1
S11	dB	-15.5	-18.0	-18.0	-16.0	-11.0	-18.0
S22	dB	-15.5	-20.0	-20.0	-20.0	-13.0	-20.0
Output IP3[1)]	dBm	39.0	42.0	42.0	40.0	38.0	40.0
Noise Figure	dB	2.2	2.2	2.3	2.3	2.3	2.2
Output P1dB	dBm	22.5	23.0	23.0	23.0	22.5	22.0
Current	mA	103	103	103	103	103	90
Device Voltage	V	+5.0	+5.0	+5.0	+5.0	+5.0	+4.5

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

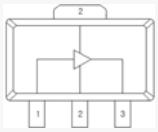
Application Circuit

- IF (50 ~ 1000 MHz, 5 V)
- IF (50 ~ 1000 MHz, 4.5 V, 90 mA)
- SMATV (50 ~ 2150 MHz, 5 V)
- IF (50 ~ 1000 MHz, 6 V)

Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		150	
Gain	dB		22.4	
S11	dB		-18	
S22	dB		-20	
Output IP3	dBm		42.0	
Noise Figure	dB		2.2	
Output P1dB	dBm		23.0	
Current	mA		103	
Device Voltage	V		+5.0	

Pin Configuration



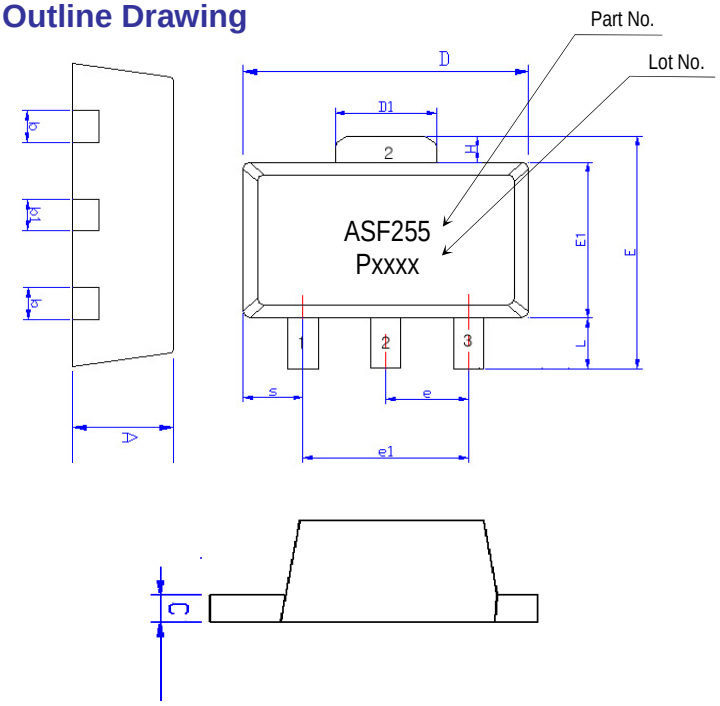
Pin No.	Function
1	RF IN
2	GND
3	RF OUT & Bias

Absolute Maximum Ratings

Parameters	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-40 to +150 °C
Device Voltage	+7 V
Operating Junction Temperature	+150 °C
Input RF Power (Continuous)[1)]	+23 dBm
Thermal Resistance	92 °C/W

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

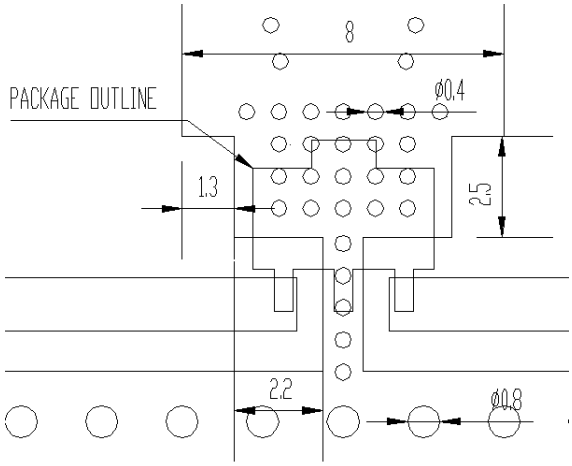
Outline Drawing



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

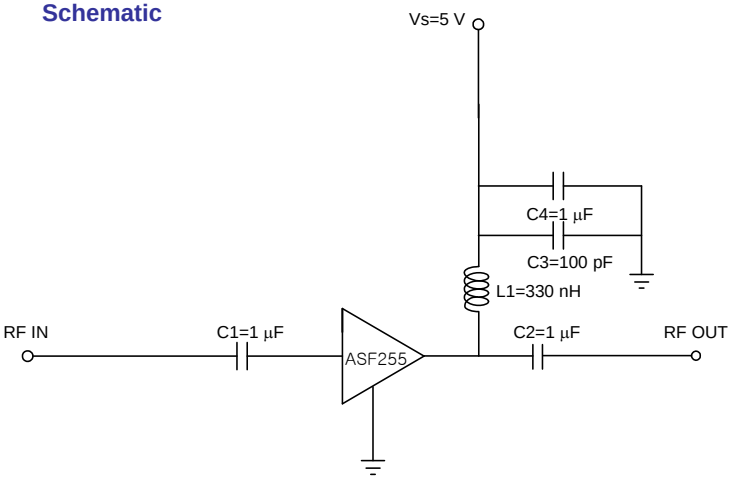
50 ~ 1000 MHz

+5 V

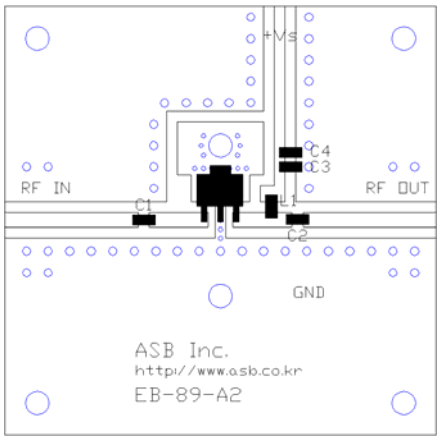
Frequency (MHz)	70	150	300	450	900
Magnitude S21 (dB)	22.4	22.4	22.2	21.9	21.0
Magnitude S11 (dB)	-15.5	-18.0	-18.0	-16.0	-11.0
Magnitude S22 (dB)	-15.5	-20.0	-20.0	-20.0	-13.0
Output P1dB (dBm)	22.5	23.0	23.0	23.0	22.5
Output IP3[1)] (dBm)	39.0	42.0	42.0	40.0	38.0
Noise Figure (dB)	2.2	2.2	2.3	2.3	2.3
Device Voltage (V)	+5	+5	+5	+5	+5
Device Current (mA)	103	103	103	103	103

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

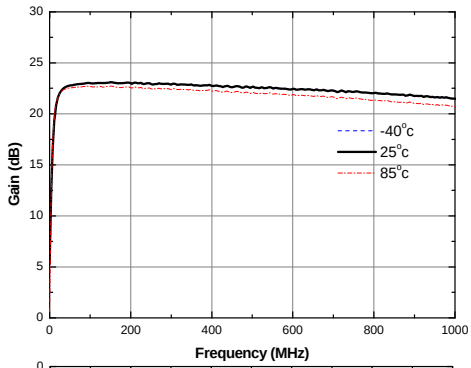
Schematic

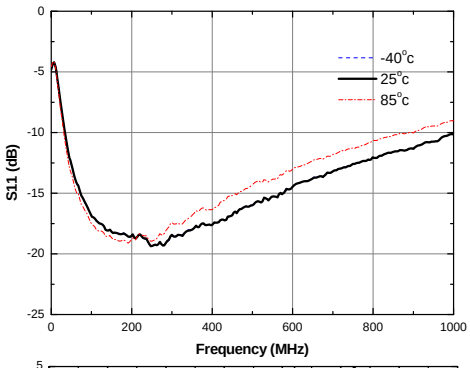


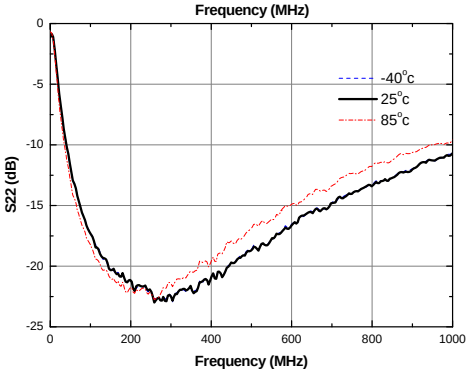
Board Layout (FR4, 40x40 mm², 0.8T)

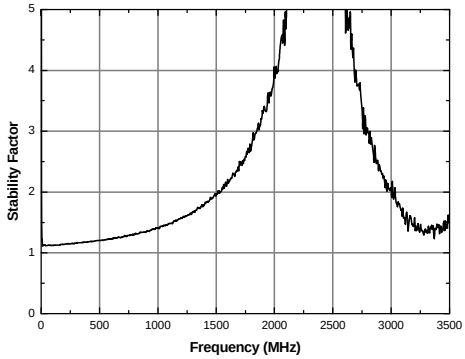


S-parameters & K-factor

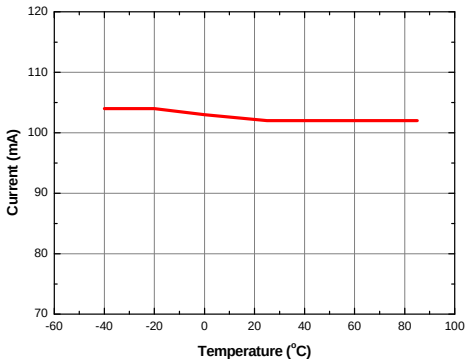




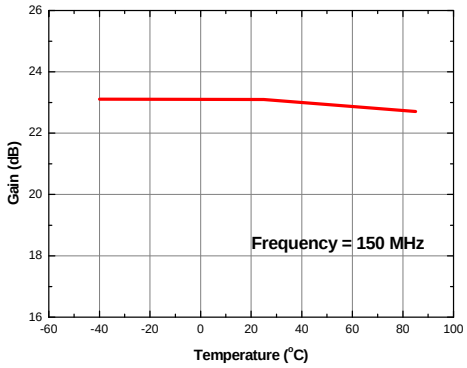




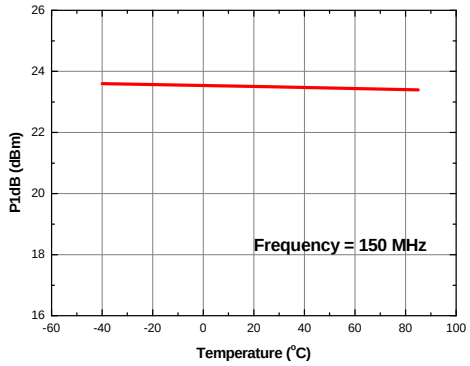
Current vs. Temperature



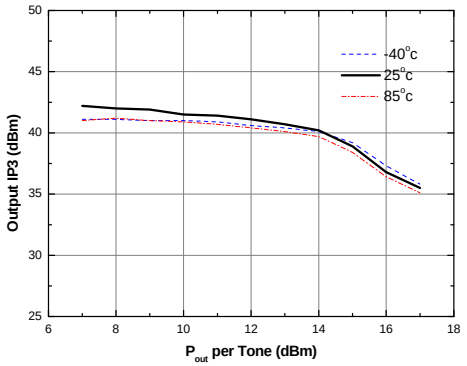
Gain vs. Temperature



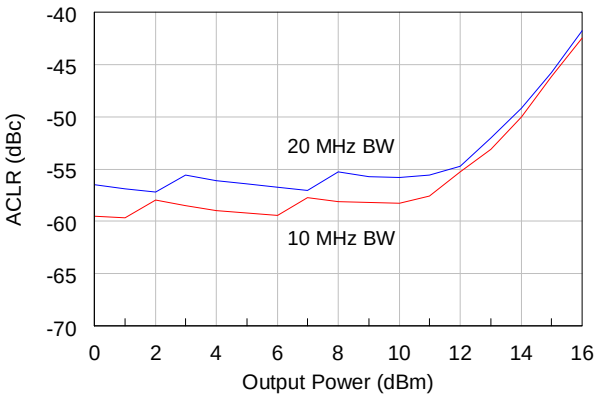
P1dB vs. Temperature

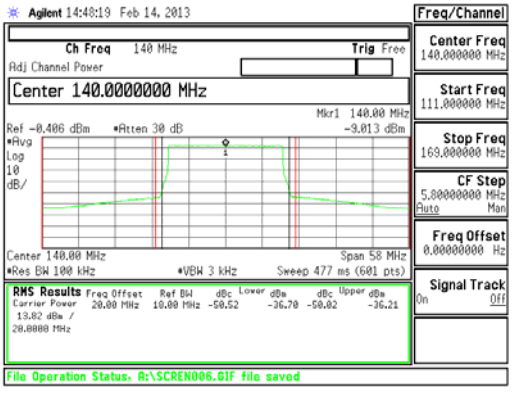


Output IP3 vs. Tone Power (Frequency = 150 MHz)



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

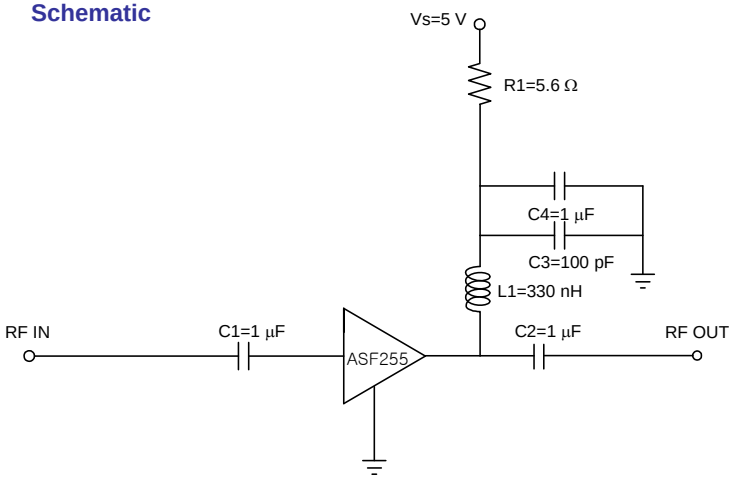
50 ~ 1000 MHz

+4.5 V, 90 mA

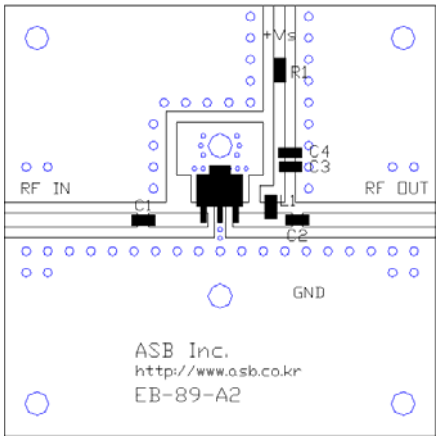
Frequency (MHz)	70	150	300	450	900
Magnitude S21 (dB)	22.2	22.1	21.9	21.7	20.8
Magnitude S11 (dB)	-15.5	-18.0	-18.0	-16.0	-11.0
Magnitude S22 (dB)	-15.5	-20.0	-20.0	-20.0	-13.0
Output P1dB (dBm)	21.5	22.0	22.0	22.0	21.0
Output IP3[1)] (dBm)	37.5	40.0	40.5	38.0	36.0
Noise Figure (dB)	2.2	2.2	2.3	2.3	2.3
Device Voltage (V)	+4.5	+4.5	+4.5	+4.5	+4.5
Device Current (mA)	90	90	90	90	90

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

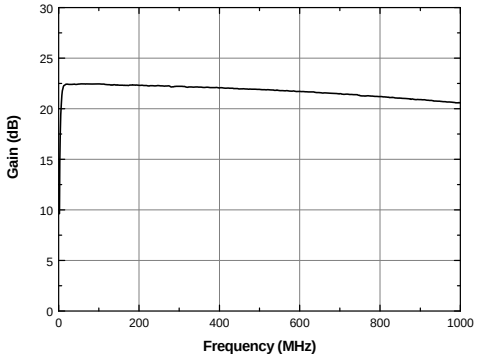
Schematic

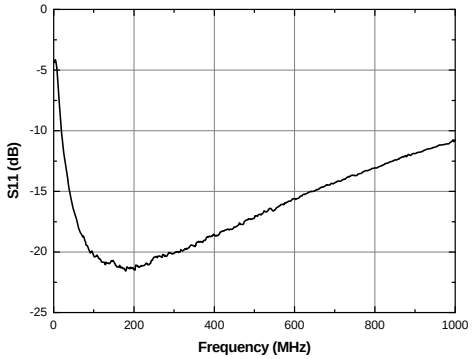


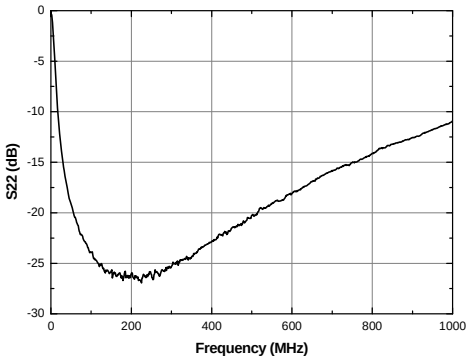
Board Layout (FR4, 40x40 mm², 0.8T)

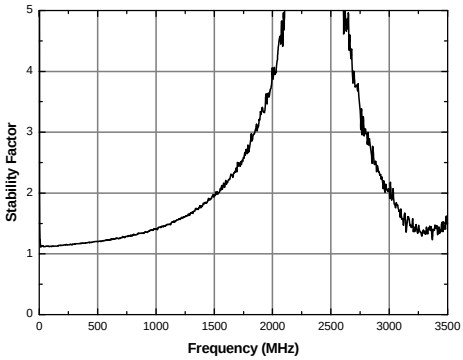


S-parameters & K-factor









APPLICATION CIRCUIT

SMATV

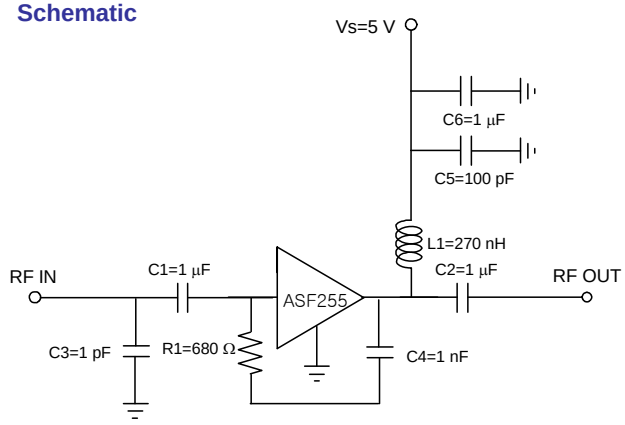
50 ~ 2150 MHz

+5 V

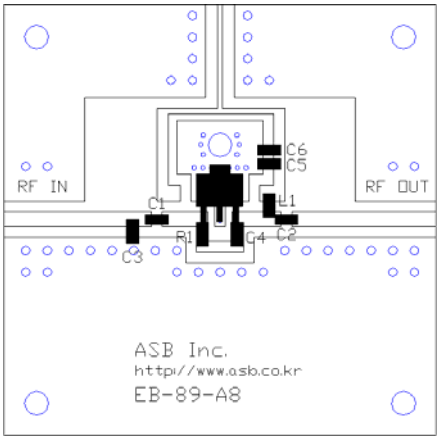
Frequency (MHz)	50	1000	2150
Magnitude S21 (dB)	18.2	18.4	18.1
Magnitude S11 (dB)	-8.0	-10.0	-14.0
Magnitude S22 (dB)	-8.0	-17.0	-7.0
Output P1dB (dBm)	21.5	21.5	20.0
Output IP3[1)] (dBm)	38.0	37.0	34.0
Noise Figure (dB)	2.5	2.6	3.0
Supply Voltage (V)	+5	+5	+5
Current (mA)	104	104	104

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

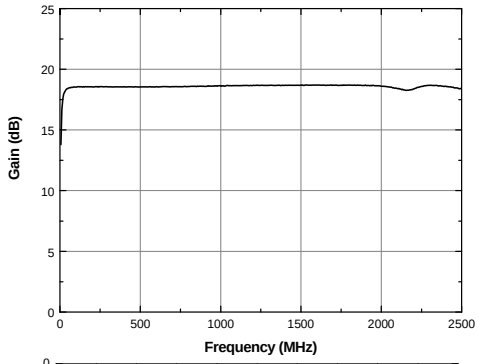
Schematic

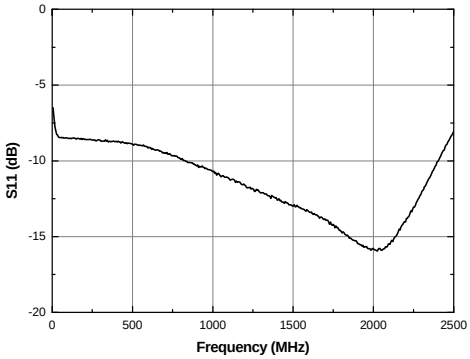


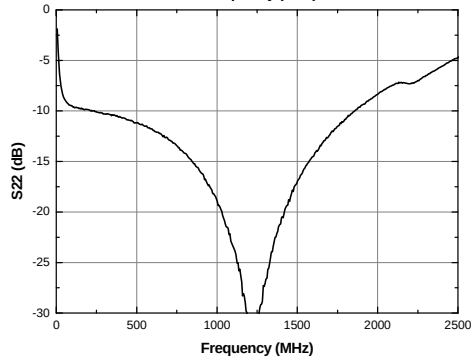
Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor







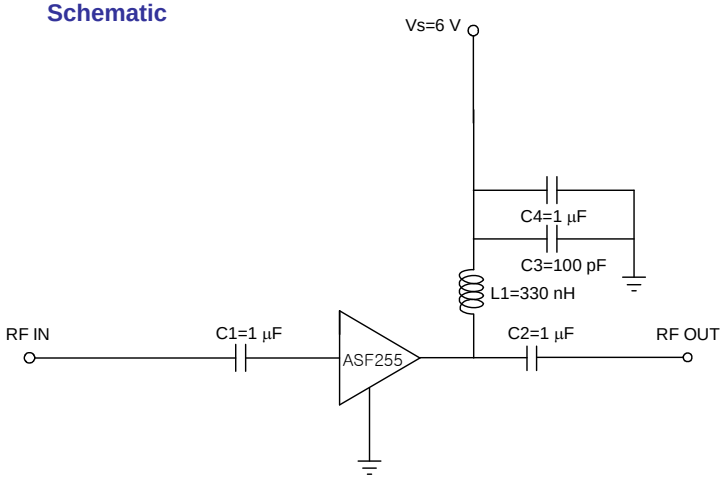
APPLICATION CIRCUIT

IF
50 ~ 1000
+6 V

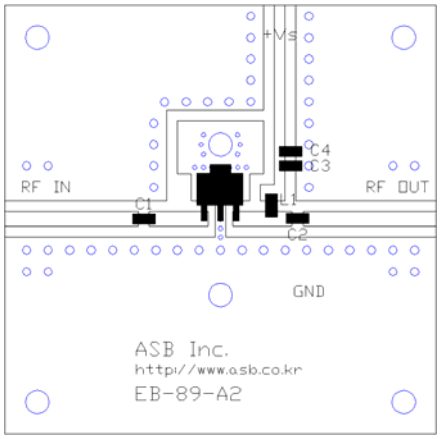
Frequency (MHz)	70	150	300	450	900
Magnitude S21 (dB)	22.9	22.8	22.7	22.4	21.4
Magnitude S11 (dB)	-15	-18	-18	-15	-10
Magnitude S22 (dB)	-15	-20	-20	-18	-11
Output P1dB (dBm)	24	24.5	24.5	24.5	24.5
Output IP3[1)] (dBm)	39.5	42.5	42	40.5	38.5
Noise Figure (dB)	2.4	2.4	2.5	2.5	2.5
Device Voltage (V)	6	6	6	6	6
Device Current (mA)	123	123	123	123	123

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

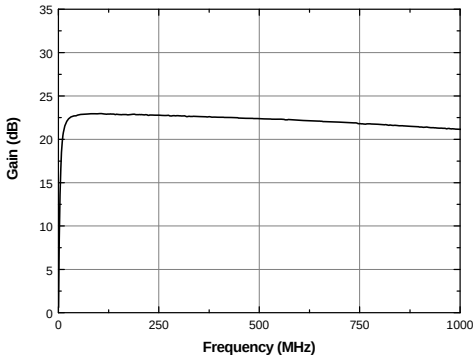
Schematic

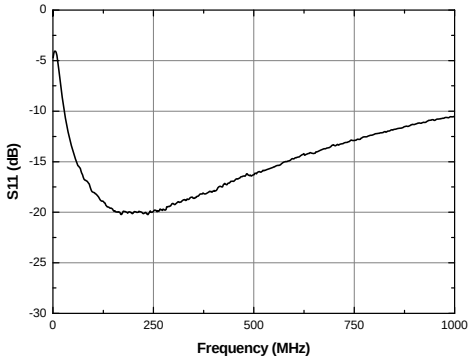


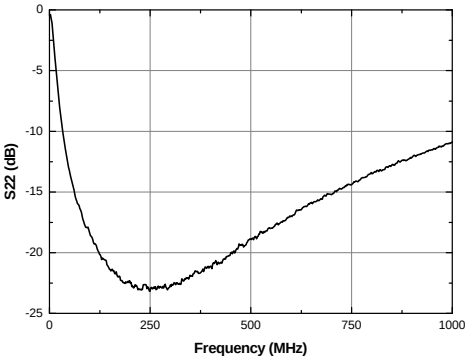
Board Layout (FR4, 40x40 mm², 0.8T)

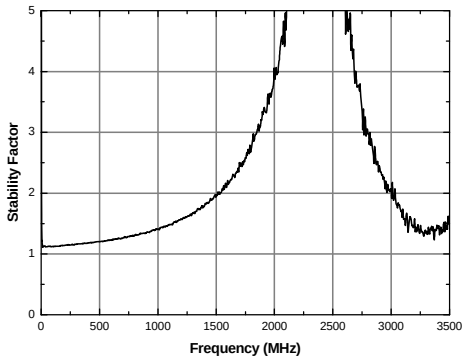


S-parameters & K-factor









Recommended Soldering Reflow Profile