

## Features

- Same circuit over 800~2700 MHz
- 12.8 dB Gain at 1950 MHz
- 19.5 dBm P1dB at 1950 MHz
- 35 dBm Output IP3 at 1950 MHz
- 0.85 dB NF at 1950 MHz
- MTTF > 100 Years
- Single Supply

## Description

The ASL09C, a wideband linear low noise amplifier MMIC, has a low noise and high linearity at low bias current, being suitable for use in both receiver and transmitter of telecommunication systems up to 3.5 GHz. S11 down to -18 dB is easily achieved for low noise application to provide a good productivity. 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<sub>A</sub> = +25 °C, Z<sub>0</sub> = 50 Ω)

Parameters	Units	Typical			
Frequency	MHz	800	1950	2400	2700
Gain	dB	19.7	12.8	11.2	10.2
S11	dB	-19	-18	-18	-18
S22	dB	-10.5	-9.5	-11	-11
Output IP3 <sup>1)</sup>	dBm	33	35	36	36
Noise Figure	dB	0.8	0.85	1.05	1.1
Output P1dB	dBm	19.5	19.5	19.5	19.5
Current	mA	51			
Device Voltage	V	+4.5			

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

## Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		1950	
Gain	dB		12.8	
S11	dB		-18	
S22	dB		-9.5	
Output IP3	dBm		35	
Noise Figure	dB		0.85	
Output P1dB	dBm		19.5	
Current	mA		51	
Device Voltage	V		+4.5	

## Absolute Maximum Ratings

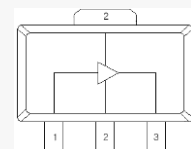
Parameters	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-40 to +150 °C
Device Voltage	+5.5 V
Operating Junction Temperature	+150 °C
Input RF Power (CW, 50ohm matched as in 1950 MHz application circuit)*	+20 dBm
Thermal Resistance	80 °C/W

\* Please find the max. input power data from [http://www.asb.co.kr/pdf/Maximum\\_Input\\_Power\\_Analysis.pdf](http://www.asb.co.kr/pdf/Maximum_Input_Power_Analysis.pdf)  
The max. input power, in principle, depends upon the application frequency and the matching circuit.

## Application Circuit

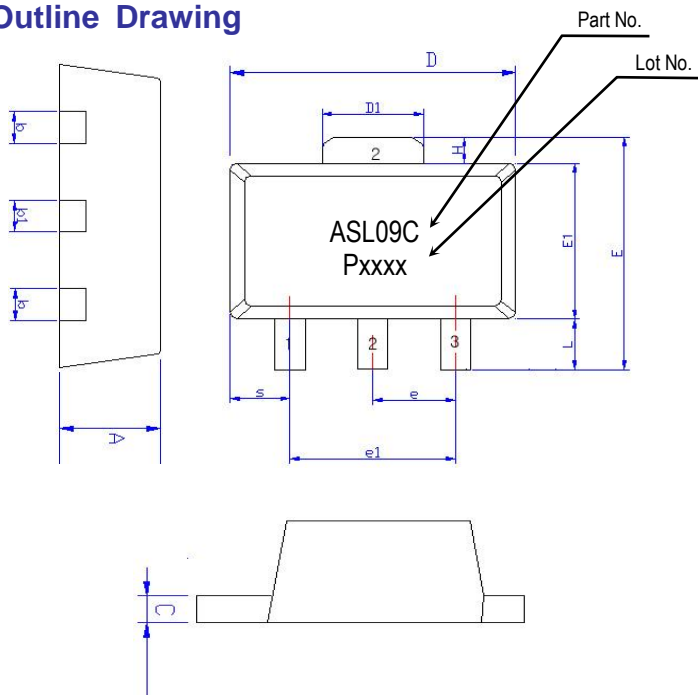
- Wide Band  
(800 ~ 2700 MHz, 5 V, 50 ohm)
- CATV  
(50 ~ 1000 MHz, 5 V, 75 ohm)
- CATV  
(50 ~ 1280 MHz, 5 V, 75 ohm)
- CATV  
(50 ~ 1000 MHz, 3 V, 75 ohm)
- CATV  
(50 ~ 1000 MHz, 5 V, 75 ohm)
- FTTH  
(5 ~ 300 MHz, 5 V, 75 ohm)

## Pin Configuration



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

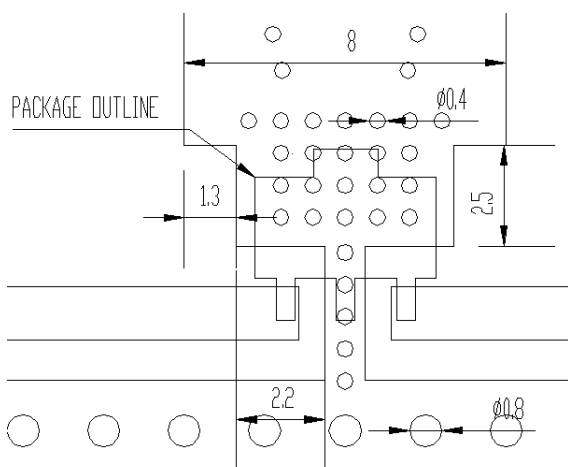
### Outline Drawing



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 1A

MM Class A

CAUTION: ESD-sensitive device!

#### Moisture Sensitivity Level (MSL)

Level 3 at 260°C reflow

**APPLICATION CIRCUIT**

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**Wide Band**

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**800 ~ 2700 MHz**

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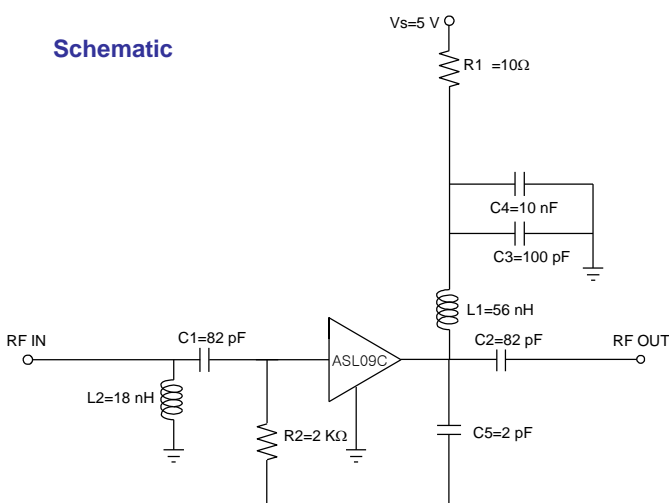
**+5 V**

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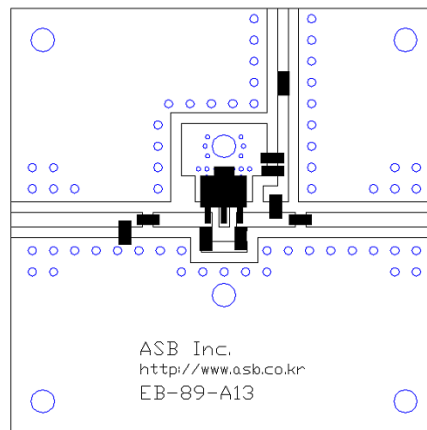
Frequency (MHz)	800	1950	2400	2700
Magnitude S21 (dB)	19.7	12.8	11.2	10.2
Magnitude S11 (dB)	-19	-18	-18	-18
Magnitude S22 (dB)	-10.5	-9.5	-11	-11
Output P1dB (dBm)	19.5	19.5	19.5	19.5
Output IP3 <sup>1)</sup> (dBm)	33	35	36	36
Noise Figure (dB)	0.8	0.85	1.05	1.1
Device Voltage (V)	+4.5			
Current (mA)	51			

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

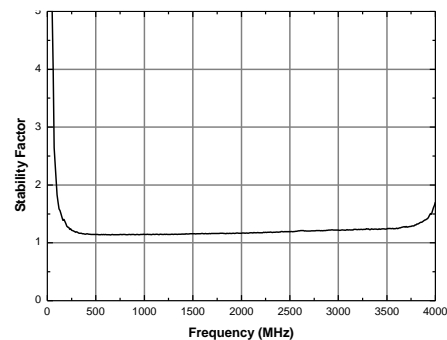
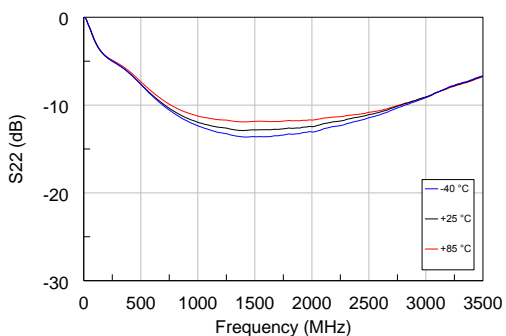
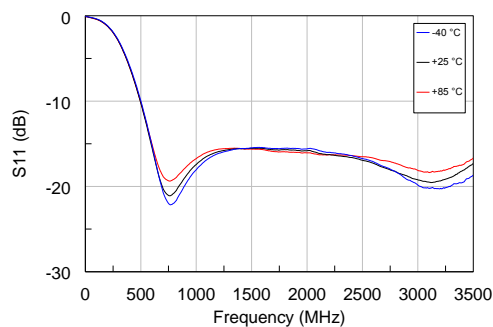
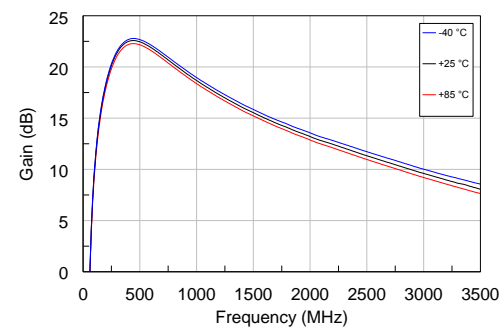
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)

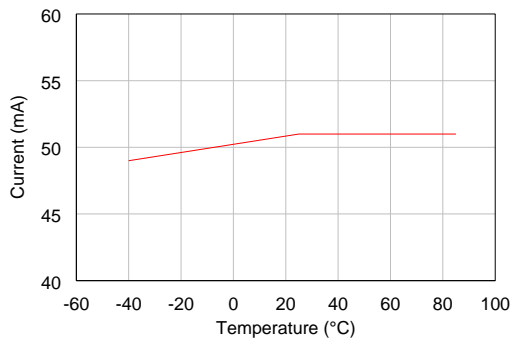


### S-parameters & K-factor

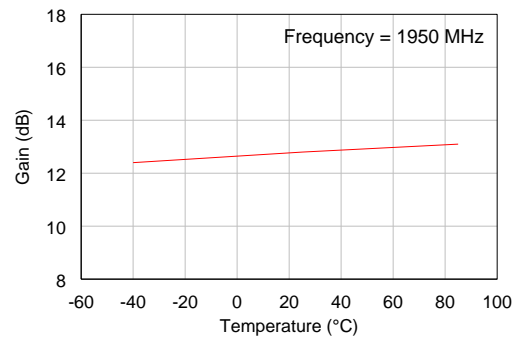


## 5 ~ 4000 MHz High Linearity LNA MMIC

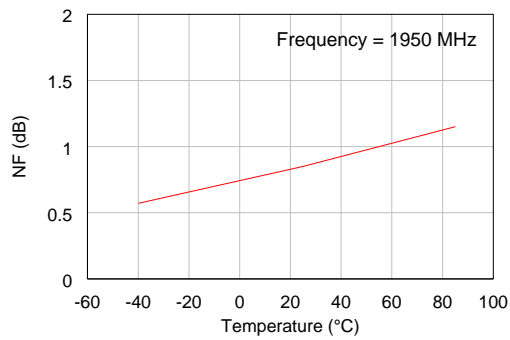
### Current vs. Temperature



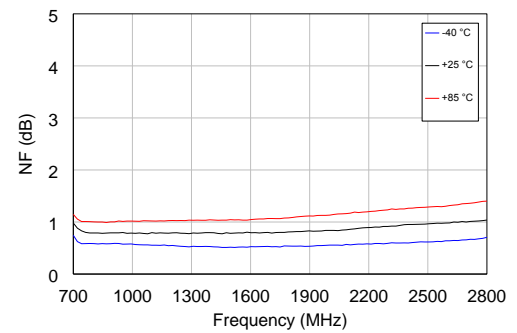
### Gain vs. Temperature



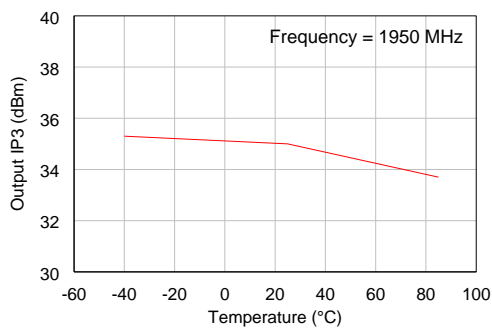
### NF vs. Temperature



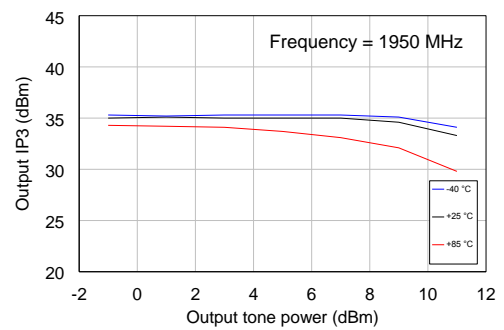
### NF vs. Frequency



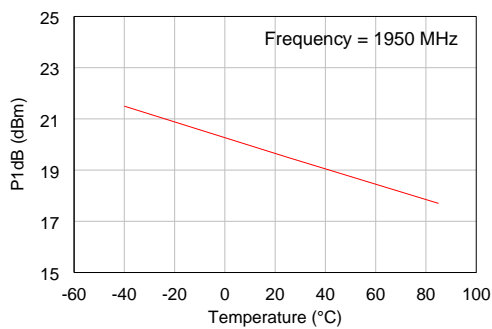
### Output IP3 vs. Temperature



### Output IP3 vs. Output tone power



### P1dB vs. Temperature



### APPLICATION CIRCUIT

CATV, 75 ohm

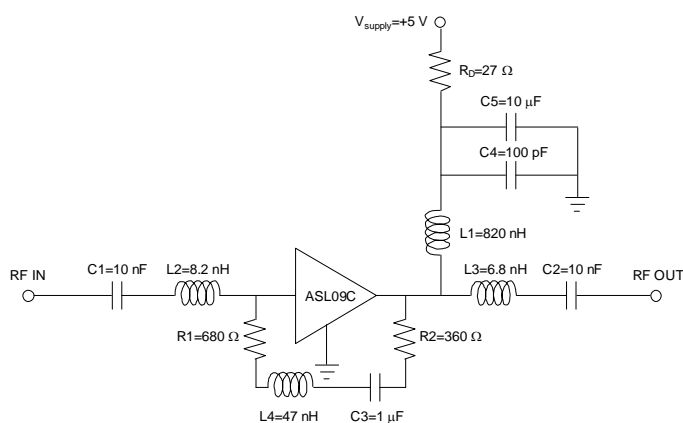
50 ~ 1000 MHz

+5 V

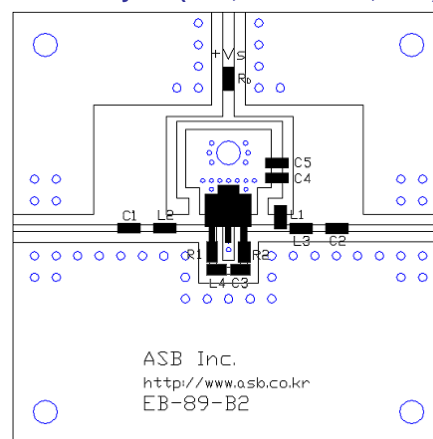
Frequency (MHz)	50	500	1000
Magnitude S21 (dB)	21.9	21.4	20.8
Magnitude S11 (dB)	-19	-20	-19
Magnitude S22 (dB)	-10	-13	-15
Output P1dB (dBm)	17.5	17.5	17.0
Output IP3 <sup>1)</sup> (dBm)	27.0	29.0	30.0
Noise Figure (dB)	1.2	1.0	1.1
Device Voltage (V)	+4.05		
Current (mA)	35		

1) OIP3 is measured with two tones at an output power of +0 dBm/tone separated by 6 MHz.

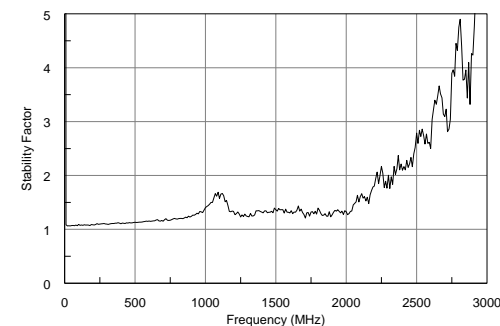
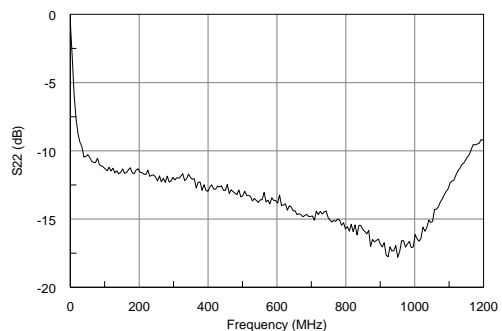
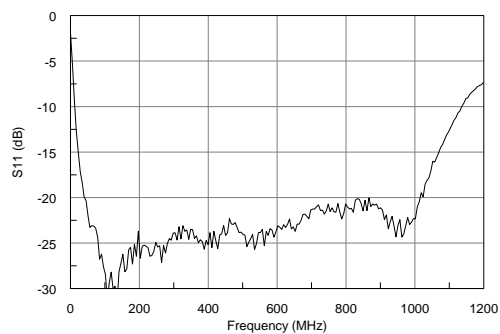
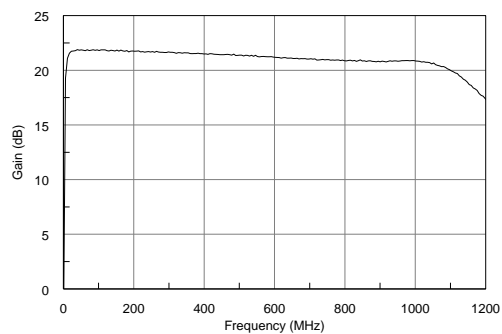
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters & K-factor



### APPLICATION CIRCUIT

CATV, 75 ohm

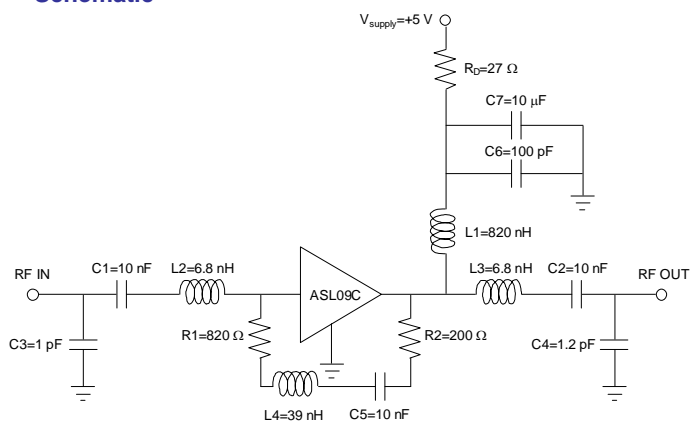
50 ~ 1280 MHz

+5 V

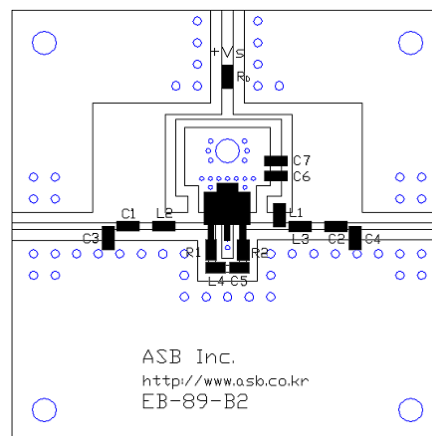
Frequency (MHz)	50	500	1000	1280
Magnitude S21 (dB)	21.8	21.0	19.4	19.6
Magnitude S11 (dB)	-19	-19	-17	-14
Magnitude S22 (dB)	-10	-18	-10	-12
Output P1dB (dBm)	17.5	16.3	16.8	18.0
Output IP3 <sup>1)</sup> (dBm)	29.0	28.5	29.0	31.0
Noise Figure (dB)	1.05	1.0	0.95	0.9
Device Voltage (V)	+4.05			
Current (mA)	35			

1) OIP3 is measured with two tones at an output power of +0 dBm/tone separated by 6 MHz.

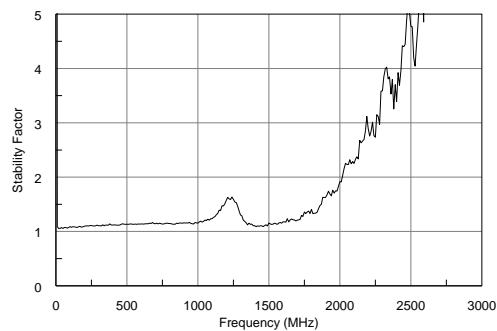
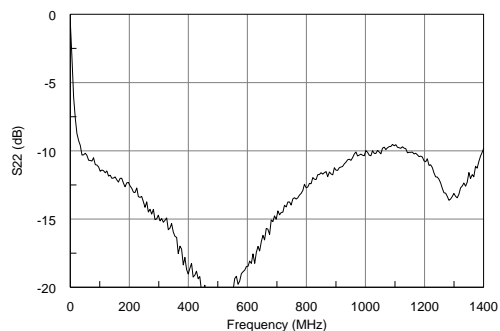
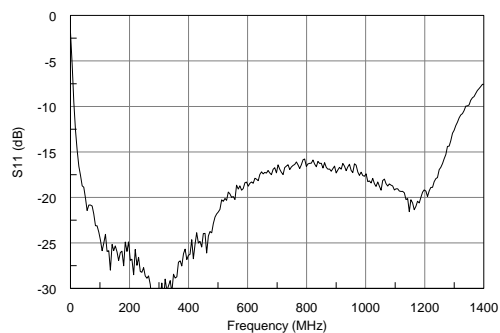
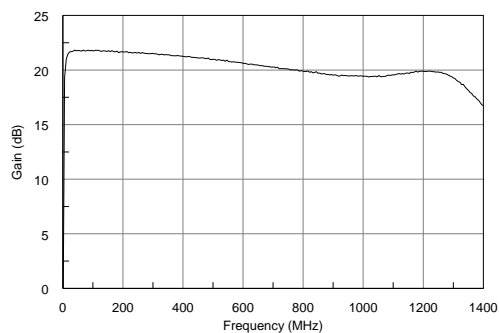
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters & K-factor



### APPLICATION CIRCUIT

CATV, 75 ohm

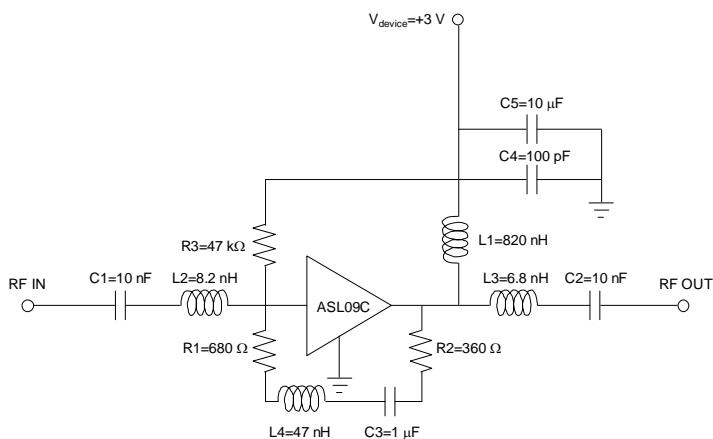
50 ~ 1000 MHz

+3 V

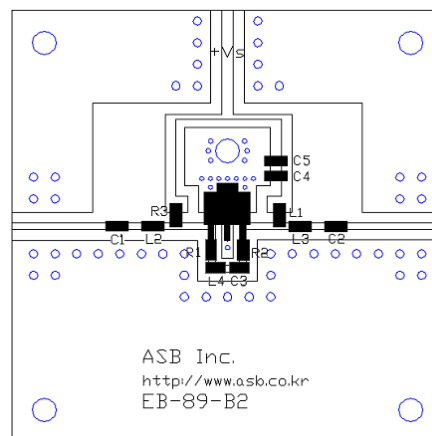
Frequency (MHz)	50	500	1000
Magnitude S21 (dB)	22.5	21.9	21.1
Magnitude S11 (dB)	-18	-18	-15
Magnitude S22 (dB)	-9	-10	-18
Output P1dB (dBm)	17.0	17.0	16.0
Output IP3 <sup>1)</sup> (dBm)	32.5	33.0	33.0
Noise Figure (dB)	0.85	0.95	1.05
Device Voltage (V)	+3		
Current (mA)	45		

1) OIP3 is measured with two tones at an output power of +5 dBm/tone separated by 6 MHz.

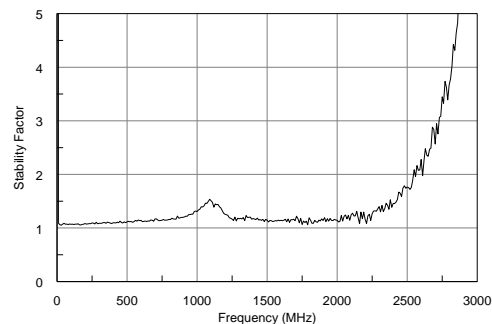
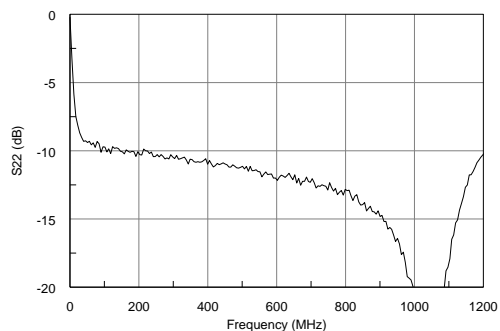
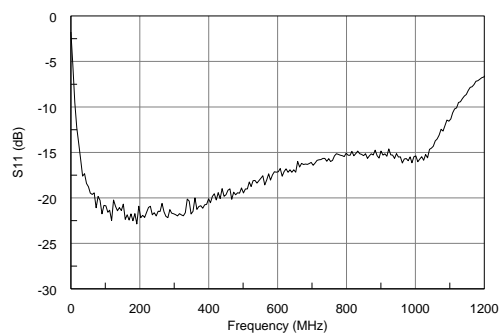
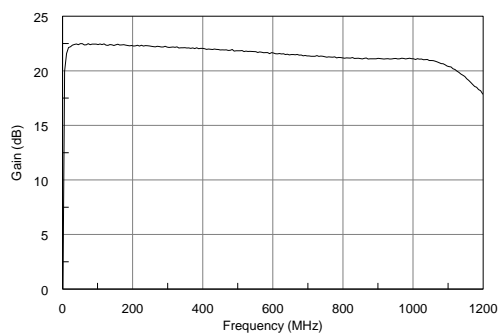
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters & K-factor



### APPLICATION CIRCUIT

CATV, 75 ohm

50 ~ 1000 MHz

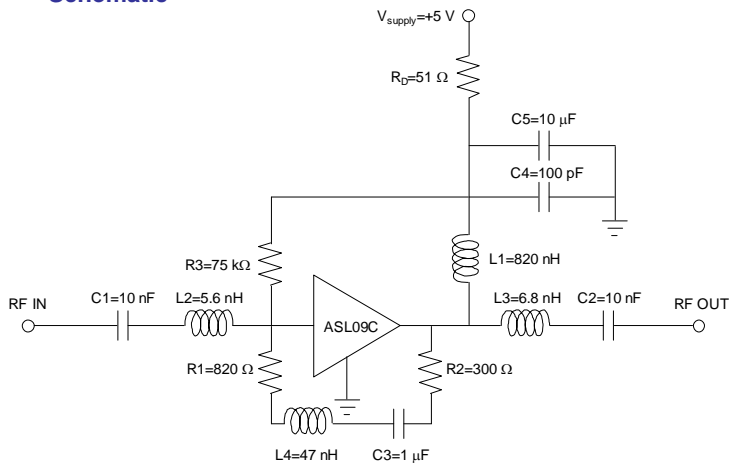
(Low Noise)

+5 V

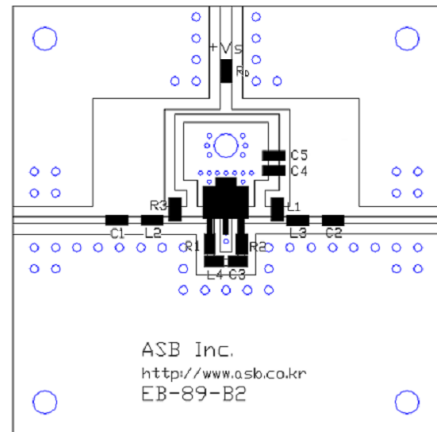
Frequency (MHz)	50	500	1000
Magnitude S21 (dB)	22.5	21.7	20.9
Magnitude S11 (dB)	-18	-18	-18
Magnitude S22 (dB)	-10	-12	-15
Output P1dB (dBm)	17.0	16.5	16.0
Output IP3 <sup>1)</sup> (dBm)	29.0	30.0	30.0
Noise Figure (dB)	0.85	0.95	0.90
Device Voltage (V)	+3.3		
Current (mA)	35		

1) OIP3 is measured with two tones at an output power of +0 dBm/tone separated by 6 MHz.

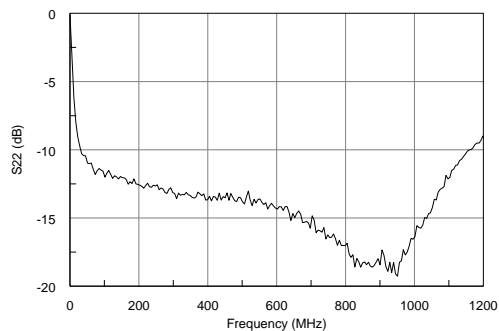
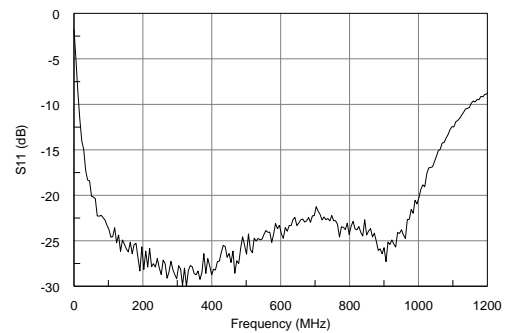
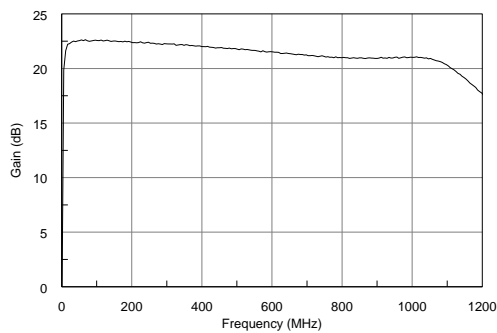
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters & K-factor



### APPLICATION CIRCUIT

FTTH, 75 ohm

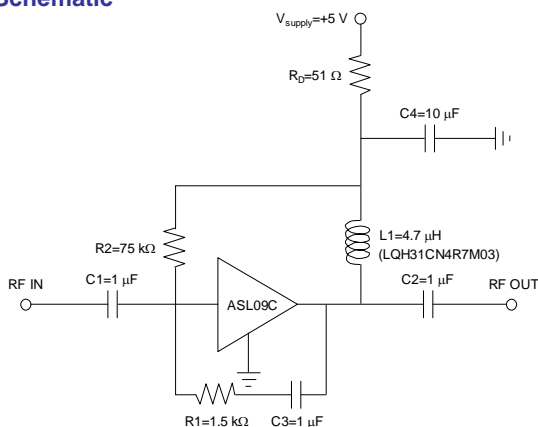
5 ~ 300 MHz

+5 V

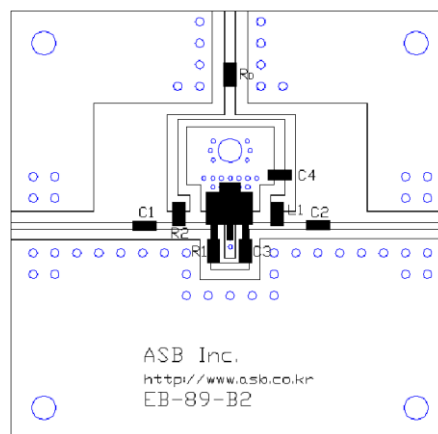
Frequency (MHz)	5	50	300
Magnitude S21 (dB)	23.6	23.7	22.1
Magnitude S11 (dB)	-13	-18	-15
Magnitude S22 (dB)	-12	-18	-13
Output P1dB (dBm)	15	16	15
Output IP3 <sup>1)</sup> (dBm)	24	28	27
Noise Figure (dB)	-	0.8	1.0
Device Voltage (V)	+3.3		
Current (mA)	35		

1) OIP3 is measured with two tones at an output power of +0 dBm/tone separated by 6 MHz.

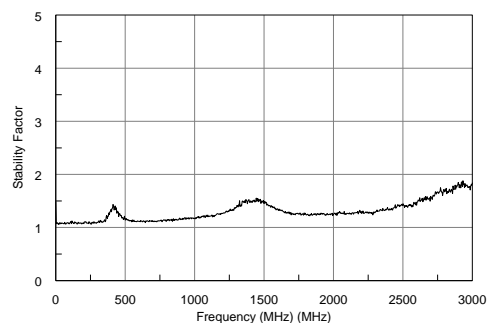
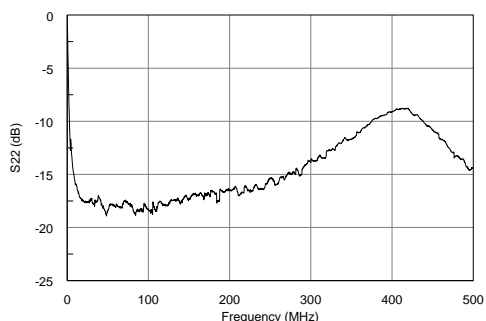
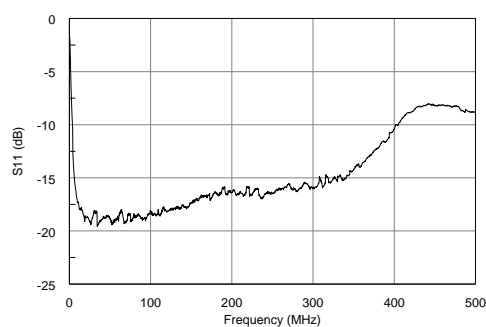
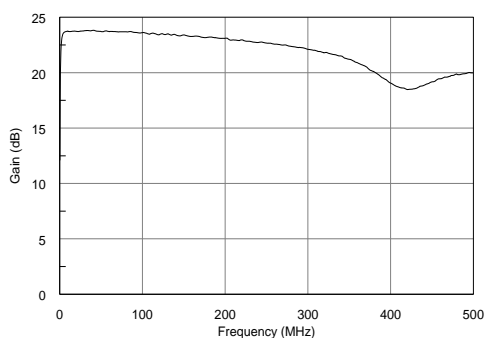
### Schematic

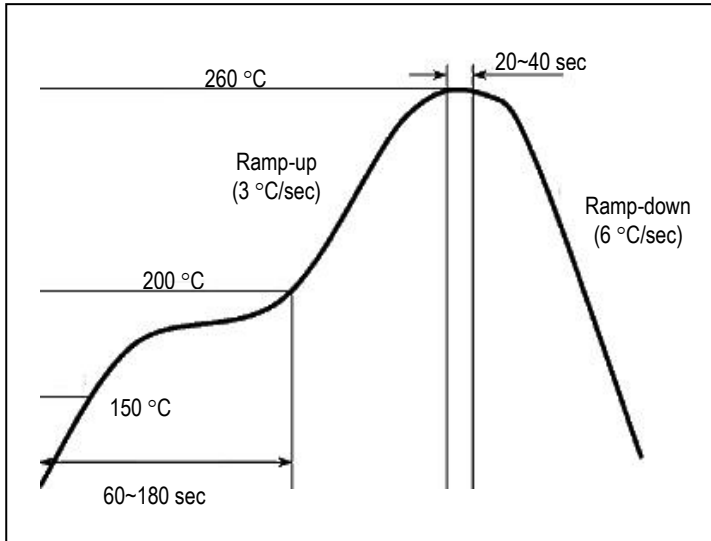


### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters & K-factor



**Recommended Soldering Reflow Profile**

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