

### Features

- 10.7 dB Gain at 500 Mz
- 24.5 dBm P1dB at 500 MHz
- 44.5 dBm Output IP3 at 500 MHz
- 3.2 dB NF at 500 MHz
- 75 Ohm Input / Output Match
- Bandwidth 5 ~ 1200 MHz
- Single Supply 5 V

### Description

The ASL362, a wideband linear push-pull amplifier MMIC, has a high linearity and low noise over a wide range of frequency 5 MHz to 1 GHz, being suitable for use in the fiber receiver, distribution amplifiers and drop amplifiers of CATV systems, and in the mobile wireless repeaters and BTS. The amplifier is available in a SOIC8 package and passes through the stringent DC, RF, and reliability tests.



Package Style: SOIC8

### Typical Performance

Parameters	Units	Typical				
Frequency	MHz	5	500	500	500	1200
Noise Figure	dB	2.0	3.2	3.1	3.1	3.8
Gain	dB	16.8	10.7	10.7	10.7	10.6
S11	dB	-18	-15	-15	-15	-12
S22	dB	-18	-15	-15	-15	-12
Output P1dB	dBm	23.0	24.5	26	26.5	27
Output IP3	dBm	43 <sup>1)</sup>	44.5 <sup>1)</sup>	46 <sup>1)</sup>	46 <sup>1)</sup>	40.5 <sup>2)</sup>
Output IP2 <sup>1),2),3)</sup>	dBm	77	74	75	76	49
CSO <sup>4)</sup>	dBc		70			
CTB <sup>4)</sup>	dBc		66			
Current	mA	220	220	290	320	320
Device Voltage	V	+5	+5	+6	+6.5	+6.5

1) OIP3 and OIP2 are measured with two tones at an output power of +10 dBm/tone separated by 1 MHz(up-link) or 6 MHz(down-link).

2) OIP3 and OIP2 are measured with two tones at an output power of +9 dBm/tone separated by 6 MHz

3) OIP2 is measured at F1+F2 Frequency.

4) 84 channels, +40 dBmV per channel (measured at output).

### Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		500	
Gain	dB		10.7	
S11	dB		-15	
S22	dB		-15	
Output IP3	dBm		44.5	
Noise Figure	dB		3.2	
Output P1dB	dBm		24.5	
Current	mA		220	
Device Voltage	V		+5	

### 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 (CW, 1:1 transformer, 75 ohm matched)	+5 dBm
Maximum Current	400 mA
Thermal Resistance	18 °C/W

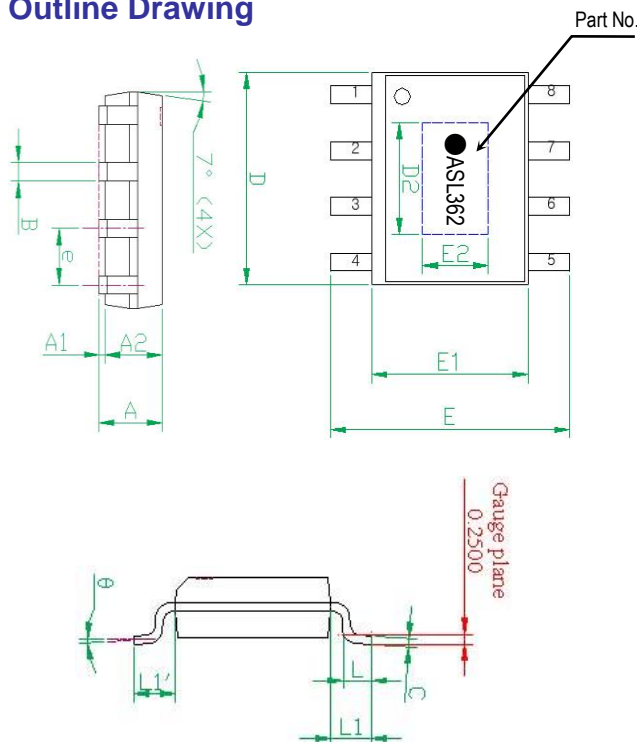
### Application Circuit

- 50 ~ 1000 MHz  
(5 V & 6 V & 6.5 V, 1:1 transformer)
- 50 ~ 1200 MHz (1:1 transformer)
- 50 ~ 1000 MHz (2:1 transformer)
- 5 ~ 200 MHz (2:1 transformer)
- 5 ~ 200 MHz (1:1 transformer)

### Pin Configuration

Pin No.	Function
1	RF IN 1
2,3,6,7	NC
4	RF IN 2
5	RF OUT 2
8	RF OUT 1

### Outline Drawing

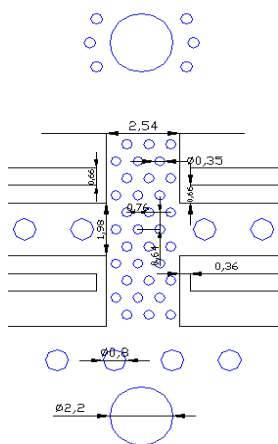


Symbols	Dimensions (In mm)		
	MIN	NOM	MAX
A	1.40	1.50	1.60
A1	0.00	---	0.10
A2	---	1.45	---
B	0.33	---	0.51
C	0.19	---	0.25
D	4.80	---	5.00
D2	3.20	3.30	3.40
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
E2	2.30	2.40	2.50
e	---	1.27	---
L	0.40	---	1.27
y	---	---	0.10
θ	0°	---	8°
L1-L1'	---	---	0.12
L1	1.04REF		

Pin No.	Function	Pin No.	Function.
1	RF IN 1	5	RF OUT 2
2	NC	6	NC
3	NC	7	NC
4	RF IN 2	8	RF OUT 1

Note: 1. Backside metal paddle is RF and DC ground.

### Mounting Recommendation (In mm)



- Note:**
1. Add as much copper as possible to inner and outer layers near the part to ensure optimal thermal performance.
  2. To ensure reliable operation, device ground paddle-to-ground pad soldering is critical.
  3. Add mounting screws near the part to fasten the board to a heat sinker. Ensure that the ground / thermal via region contacts the heat sinker.
  4. A proper heat dissipation path underneath the area of the PCB for the mounted device is strictly required for proper thermal operation. Damage to the device can result from inappropriate heat dissipation.

### 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

Wideband Linear Push-pull Amplifier MMIC

**APPLICATION CIRCUIT**

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**CATV Push-Pull**

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**1 : 1 transformer**

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**50 ~ 1000 MHz**

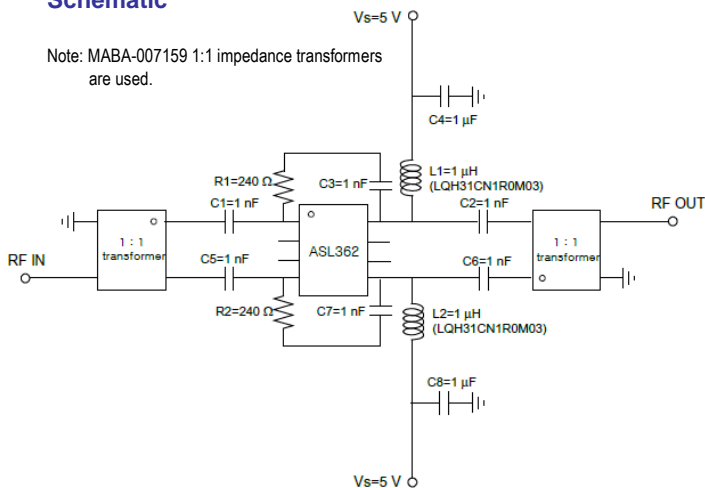
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**+5 V**

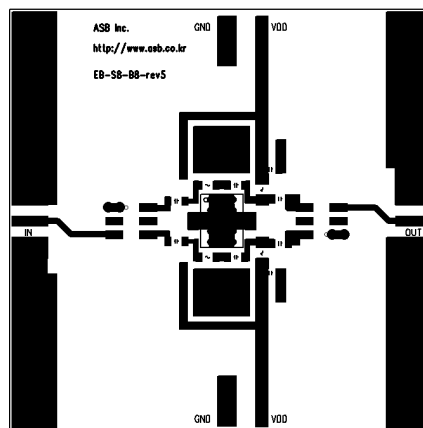
Frequency (MHz)	50	500	860
Noise Figure (dB)	3.0	3.2	3.3
Magnitude S21 (dB)	10.8	10.7	10.6
Magnitude S11 (dB)	-18	-15	-18
Magnitude S22 (dB)	-20	-15	-16
Output P1dB (dBm)	23.5	24.5	24.5
Output IP3 <sup>1)</sup> (dBm)	39.5	44.5	39.5
Output IP2 <sup>1),2)</sup> (dBm)	66	74	56
CSO <sup>3)</sup> (dBc)	70		
CTB <sup>3)</sup> (dBc)	66		
Device Voltage (V)	+5		
Current (mA)	220		

- 1) OIP3 and OIP2 are measured with two tones at an output power of +10 dBm/tone separated by 6 MHz.
- 2) OIP2 is measured at F1+F2 Frequency.
- 3) 84 channels, +40 dBmV per channel (measured at output).

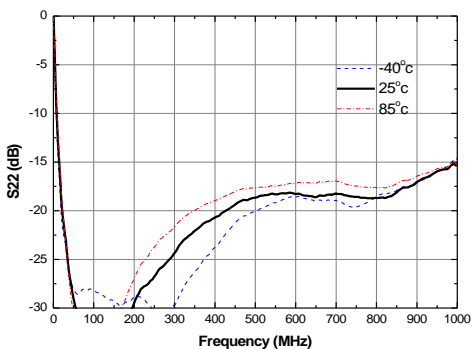
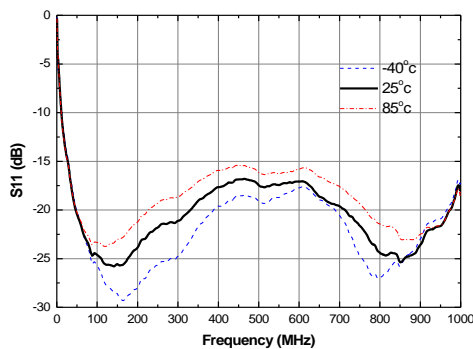
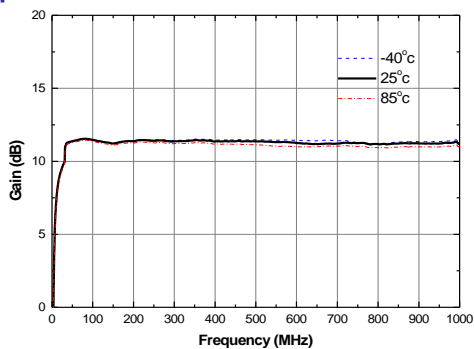
**Schematic**



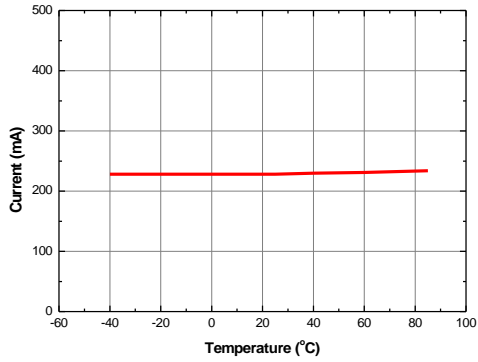
**Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)**



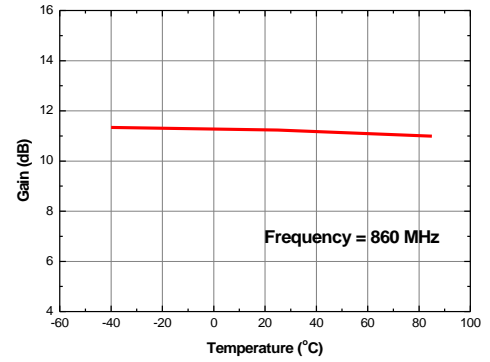
**S-parameters**



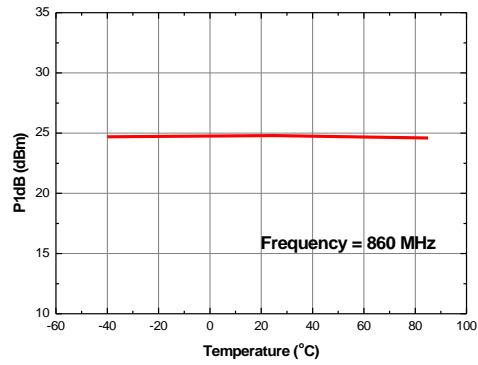
### Current vs. Temperature



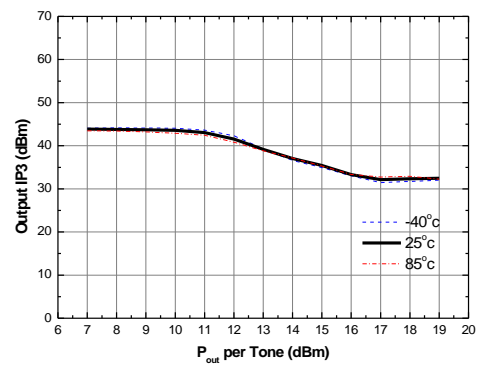
### Gain vs. Temperature



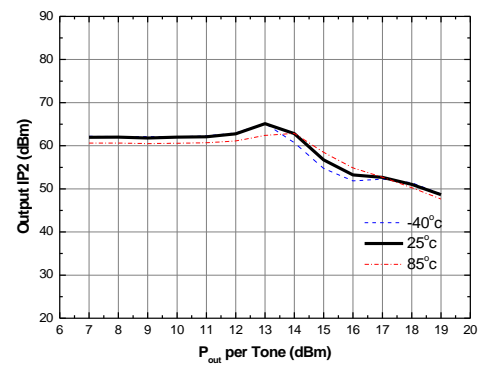
### P1dB vs. Temperature



### Output IP3 vs. Tone Power (Frequency = 860 MHz)



### Output IP2 vs. Tone Power (Frequency = 860 MHz)



## Wideband Linear Push-pull Amplifier MMIC

### APPLICATION CIRCUIT

CATV Push-Pull

1 : 1 transformer

50 ~ 1000 MHz

+6 V

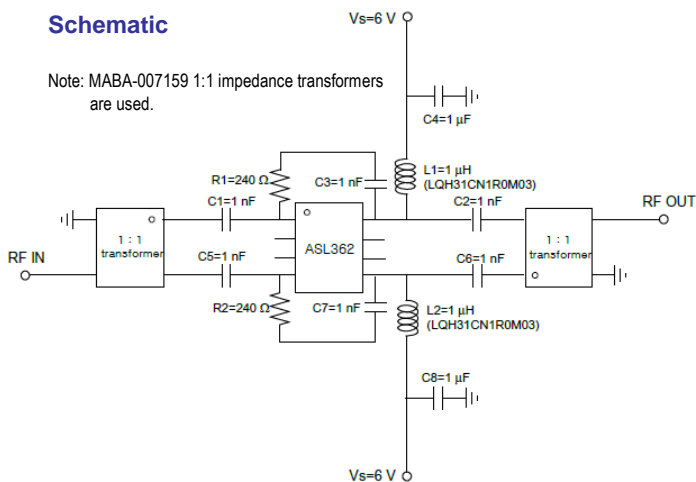
Frequency (MHz)	50	500	860
Noise Figure (dB)	3.1	3.1	3.1
Magnitude S21 (dB)	10.8	10.7	10.6
Magnitude S11 (dB)	-18	-15	-18
Magnitude S22 (dB)	-20	-15	-16
Output P1dB (dBm)	26	26	26
Output IP3 <sup>1)</sup> (dBm)	41	46	45
Output IP2 <sup>1),2)</sup> (dBm)	66	75	65
CSO (dBc)			
CTB (dBc)			
Device Voltage (V)	+6		
Current (mA)	290		

1) OIP3 and OIP2 are measured with two tones at an output power of +10 dBm/tone separated by 6 MHz.

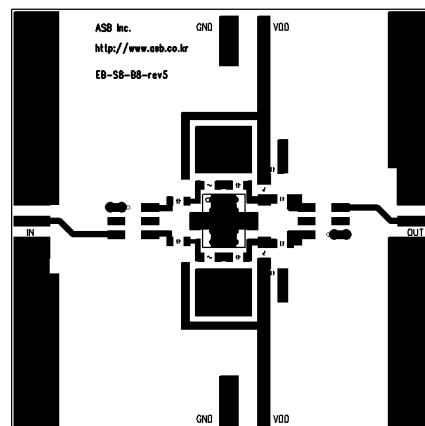
2) OIP2 is measured at F1+F2 Frequency.

### Schematic

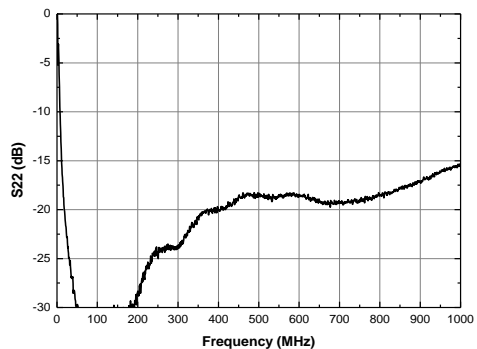
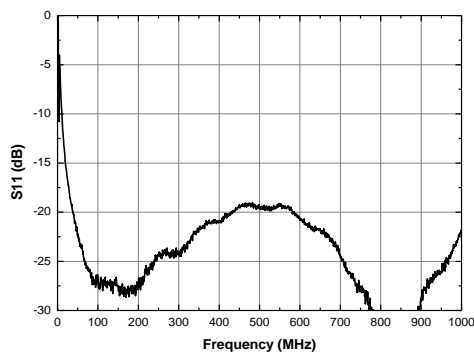
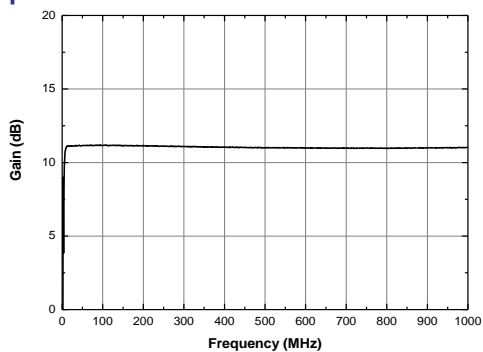
Note: MABA-007159 1:1 impedance transformers are used.



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



### S-parameters



## Wideband Linear Push-pull Amplifier MMIC

### APPLICATION CIRCUIT

CATV Push-Pull

1 : 1 transformer

50 ~ 1000 MHz

+6.5 V

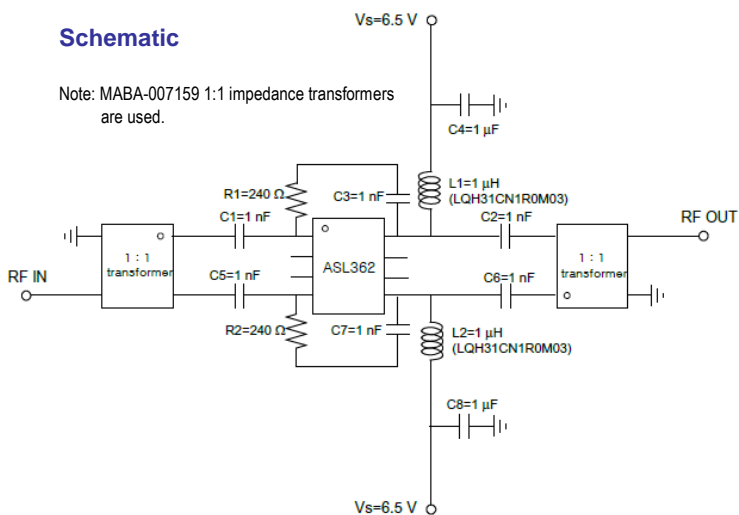
Frequency (MHz)	50	500	860
Noise Figure (dB)	3.2	3.1	3.1
Magnitude S21 (dB)	10.8	10.7	10.6
Magnitude S11 (dB)	-18	-15	-18
Magnitude S22 (dB)	-20	-15	-16
Output P1dB (dBm)	26.5	26.5	27
Output IP3 <sup>1)</sup> (dBm)	43.5	46	46.5
Output IP2 <sup>1),2)</sup> (dBm)	67	77	67
CSO (dBc)			
CTB (dBc)			
Device Voltage (V)	+6.5		
Current (mA)	320		

1) OIP3 and OIP2 are measured with two tones at an output power of +10 dBm/tone separated by 6 MHz.

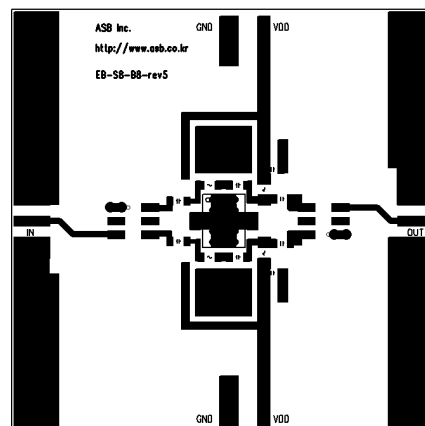
2) OIP2 is measured at F1+F2 Frequency.

### Schematic

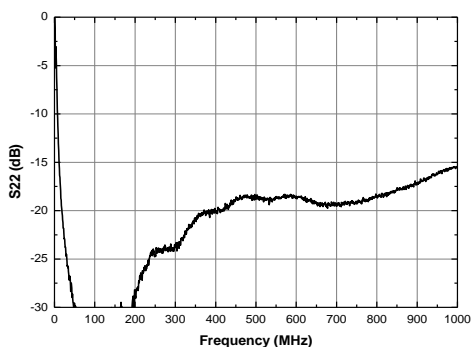
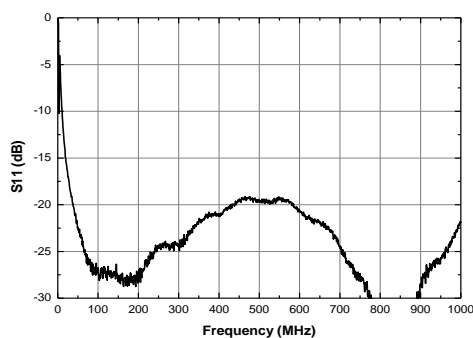
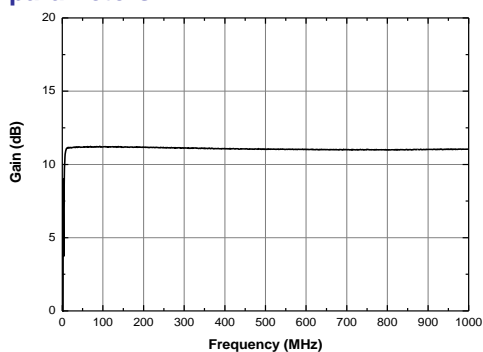
Note: MABA-007159 1:1 impedance transformers are used.



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



### S-parameters



## Wideband Linear Push-pull Amplifier MMIC

### APPLICATION CIRCUIT

CATV Push-Pull

1 : 1 transformer

50 ~ 1200 MHz

+6.5 V

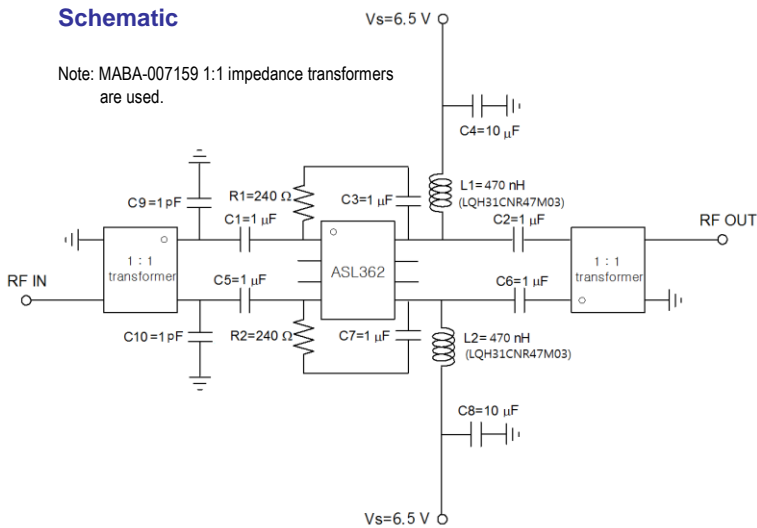
Frequency (MHz)	50	500	1200
Noise Figure (dB)	3.2	3.1	3.8
Magnitude S21 (dB)	10.6	10.4	10.6
Magnitude S11 (dB)	-16	-11	-12
Magnitude S22 (dB)	-16	-12	-12
Output P1dB (dBm)	26.5	26.5	27
Output IP3 <sup>1)</sup> (dBm)	43.0	46.0	40.5
Output IP2 <sup>1),2)</sup> (dBm)	67	68	49
CSO (dBc)			
CTB (dBc)			
Device Voltage (V)	+6.5		
Current (mA)	320		

1) OIP3 and OIP2 are measured with two tones at an output power of +9 dBm/tone separated by 6 MHz.

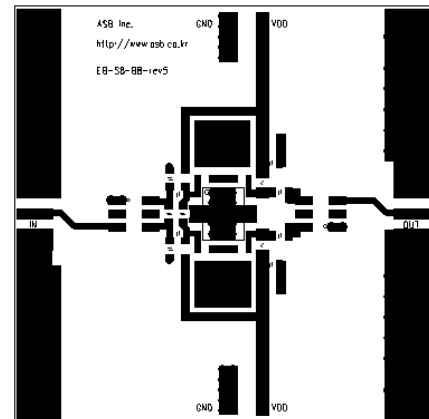
2) OIP2 is measured at F1+F2 Frequency.

### Schematic

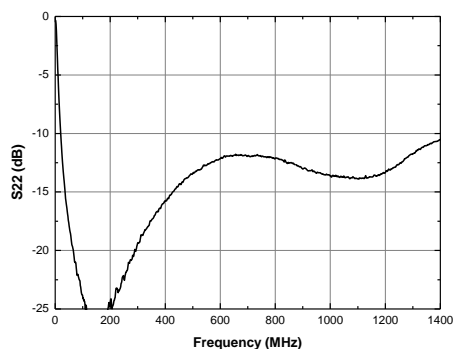
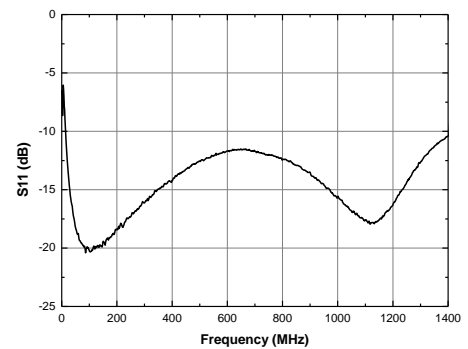
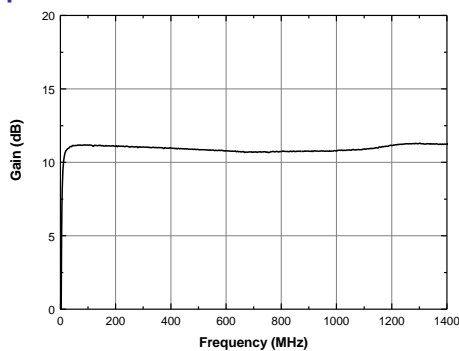
Note: MABA-007159 1:1 impedance transformers are used.



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



### S-parameters



Wideband Linear Push-pull Amplifier MMIC

APPLICATION CIRCUIT

CATV Push-Pull

2 : 1 transformer

50 ~ 1000 MHz

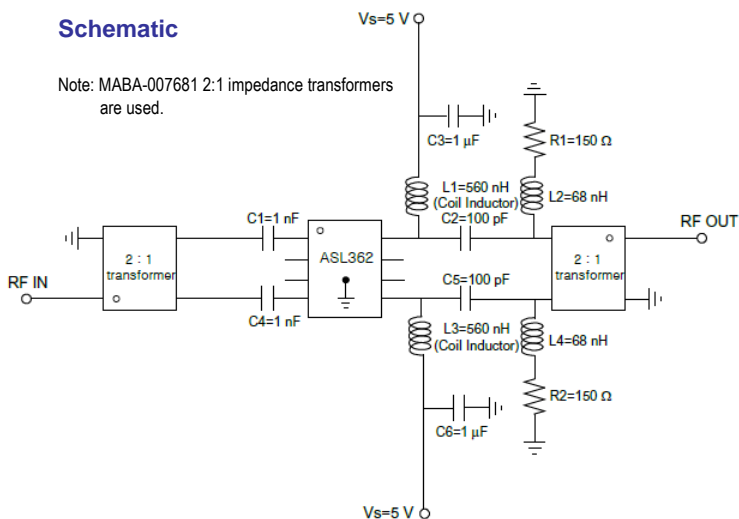
+5 V

Frequency (MHz)	50	500	860
Noise Figure (dB)	1.8	2.4	2.9
Magnitude S21 (dB)	16	16	15
Magnitude S11 (dB)	-18	-12	-18
Magnitude S22 (dB)	-12	-18	-20
Output P1dB (dBm)	23	23	22
Output IP3 <sup>1)</sup> (dBm)	41	40	40
Output IP2 <sup>1),2)</sup> (dBm)	75	65	71
CSO <sup>3)</sup> (dBc)	70		
CTB <sup>3)</sup> (dBc)	66		
Device Voltage (V)	+5		
Current (mA)	220		

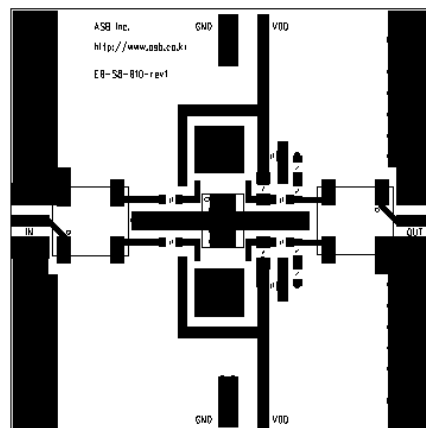
- 1) OIP3 and OIP2 are measured with two tones at an output power of +5 dBm/tone separated by 6 MHz.
- 2) OIP2 is measured at F1+F2 Frequency.
- 3) 84 channels, +35 dBmV per channel (measured at output).

Schematic

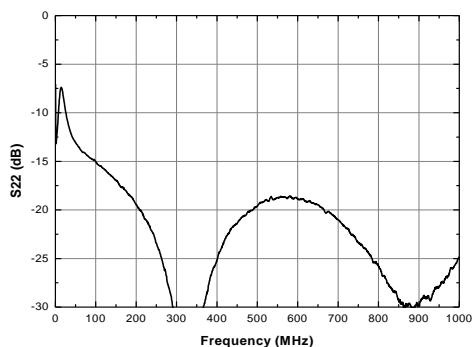
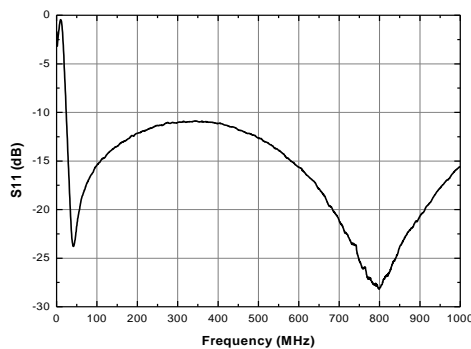
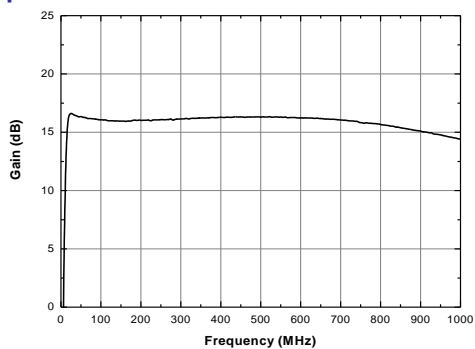
Note: MABA-007681 2:1 impedance transformers are used.



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



S-parameters





## Wideband Linear Push-pull Amplifier MMIC

### APPLICATION CIRCUIT

CATV Push-Pull

2 : 1 transformer

5 ~ 200 MHz

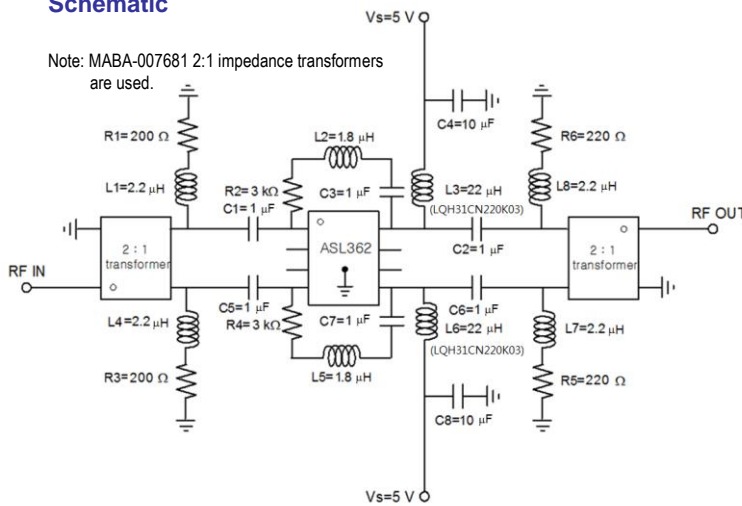
+5 V

Frequency (MHz)	5	50	200
Noise Figure (dB)	2.0	2.1	2.2
Magnitude S21 (dB)	16.8	16.5	16.0
Magnitude S11 (dB)	-18	-18	-18
Magnitude S22 (dB)	-18	-18	-16
Output P1dB (dBm)	23.0	23.5	23.0
Output IP3 <sup>1)</sup> (dBm)	43	41	43
Output IP2 <sup>1),2)</sup> (dBm)	77	78	79
Device Voltage (V)	+5		
Current (mA)	220		

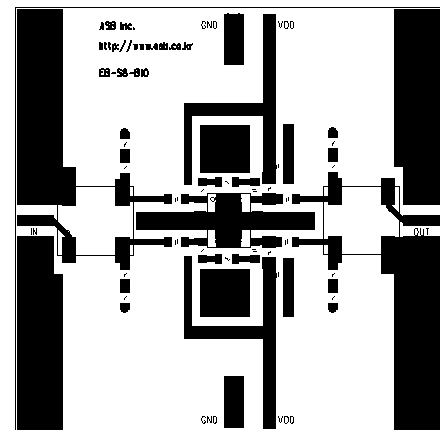
1) OIP3 and OIP2 are measured with two tones at an output power of +8 dBm/tone separated by 1 MHz.

2) OIP2 is measured at F1+F2 Frequency.

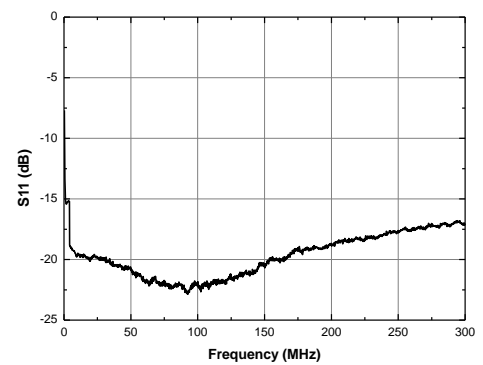
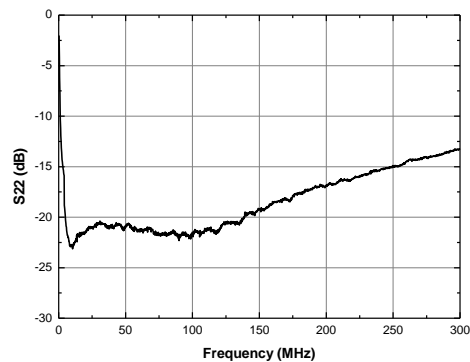
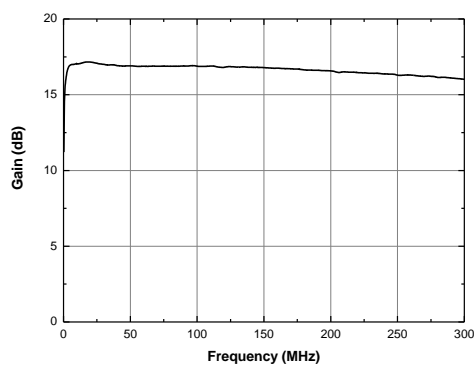
### Schematic



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



### S-parameters



## Wideband Linear Push-pull Amplifier MMIC

### APPLICATION CIRCUIT

CATV Push-Pull

1 : 1 transformer

5 ~ 200 MHz

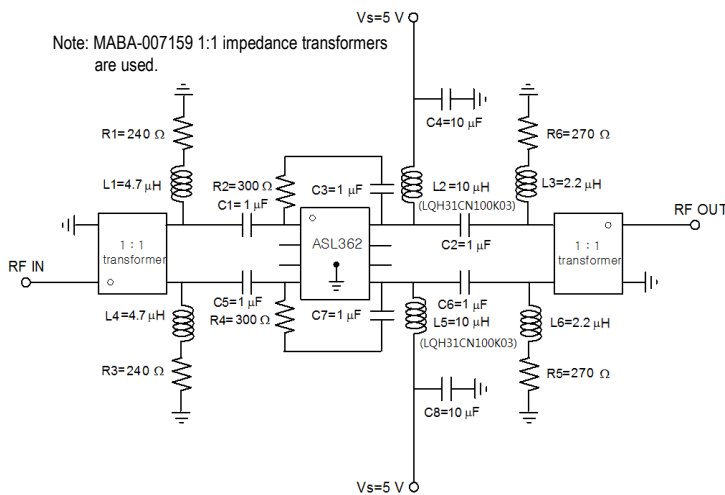
+5 V

Frequency (MHz)	5	50	200
Magnitude S21 (dB)	12.0	11.8	11.5
Magnitude S11 (dB)	-17	-18	-18
Magnitude S22 (dB)	-17	-18	-16
Output P1dB (dBm)	24.0	25.0	25.5
Output IP3 <sup>1)</sup> (dBm)	38.0	41.0	44.0
Output IP2 <sup>1),2)</sup> (dBm)	62	66	75
Noise Figure (dB)	3.1	2.9	2.9
Device Voltage (V)	+5		
Current (mA)	220		

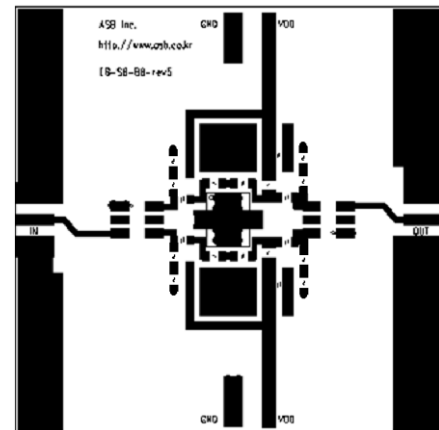
1) OIP3 and OIP2 are measured with two tones at an output power of +9 dBm/tone separated by 1 MHz.

2) OIP2 is measured at F1+F2 Frequency.

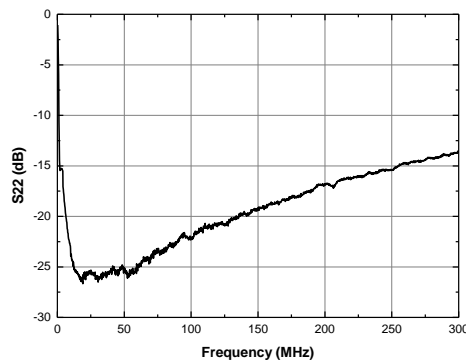
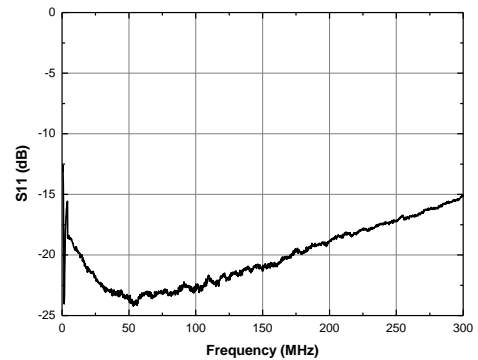
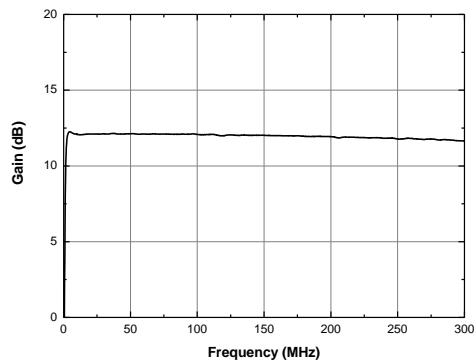
### Schematic

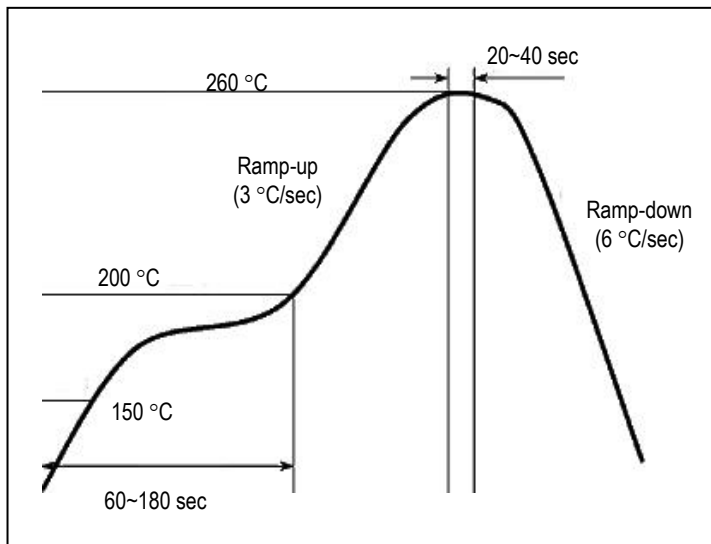


### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters



**Recommended Soldering Reflow Profile**

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