ASL552

Wideband Linear Push-pull Amplifier MMIC

Features

- High Linearity 48 dBm OIP3
- Low Noise Figure 3.5 dB
- 26 dBm P1dB
- 75 Ω Input & Output Match
- Bandwidth 5 ~ 1200 MHz
- Single Supply +8 V

Description

The ASL552, a wideband linear push-pull amplifier MMIC, has a high linearity and low noise over a wide range of frequency 5 MHz to 1.2 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.

RoHS-compliant

Package Style: SOIC8

Typical Performance

(Supply Voltage = +8 V, T_A = +25 °C, Z_0 = 75 Ω)

Parameters	Units	Typical				
Frequency	MHz	50	500	860	1002	1200
Noise Figure	dB	3.5	3.5	3.5	3.8	3.7
Gain	dB	11.1	11.0	11.0	11.0	10.7
S11	dB	-18	-16	-16	-16	-15
S22	dB	-18	-16	-16	-16	-15
Output P1dB	dBm	26	26	26	26	26
Output IP3	dBm	44[2]	48[2]	46[1]	45[2]	46[2]
Output IP2[3] (dBm)	dBm	65				
CSO[4] (@ 543.25 MHz)	dBc	76				
CTB[4] (@ 543.25 MHz)	dBc	73				
Current	mA	240				
Device Voltage	V	+8				

1) OIP3 is measured with two tones at an output power of +14 dBm/tone separated by 6 MHz.
2) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 6 MHz.
3) OIP2 is measured with two tones at an output power of +14 dBm/tone at F1(400 MHz)+F2(450MHz).
4) 60 channels, +42 dBmV per channel (measured at output), measured at 543.25MHz.

Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		500	
Gain	dB		11.0	
S11	dB		-17	
S22	dB		-17	
Output IP3	dBm		46	
Noise Figure	dB		3.3	
Output P1dB	dBm		26	
Current	mA		240	
Device Voltage	V		+8	

Absolute Maximum Ratings, T_A = +25 °C

Parameters	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-40 to +150 °C
Device Voltage	+9 V
Operating Junction Temperature	+150 °C
Input RF Power (CW, 1:1 transformer, 75 Ω matched)*	+13 dBm
Maximum Current	500 mA
Thermal Resistance	18 °C/W

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

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

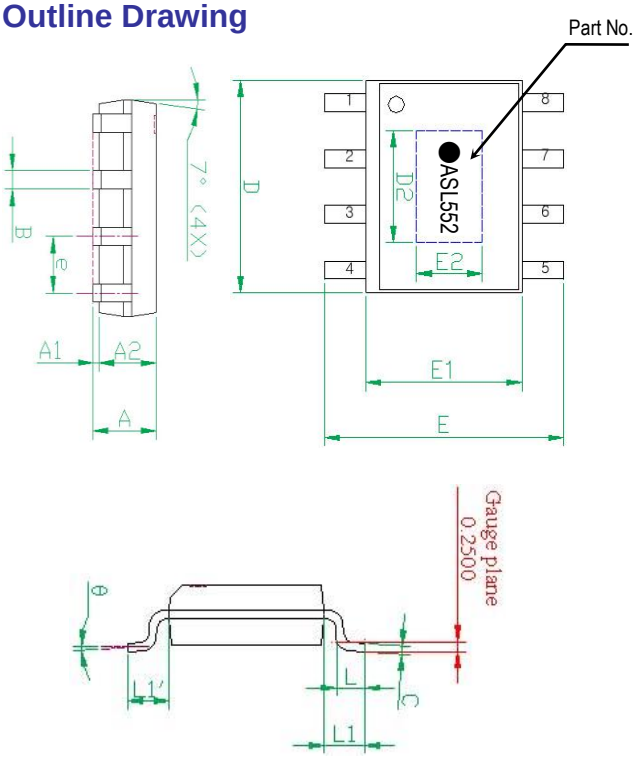
Application Circuit

- 50 ~ 1002 MHz (1:1 transformer)
- 50 ~ 1002 MHz (1:1 transformer)
- 50 ~ 1200 MHz (1:1 transformer)
- 50 ~ 1200 MHz (1:1 transformer)
- 50 ~ 860 MHz (1:1 transformer)
- 50 ~ 860 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

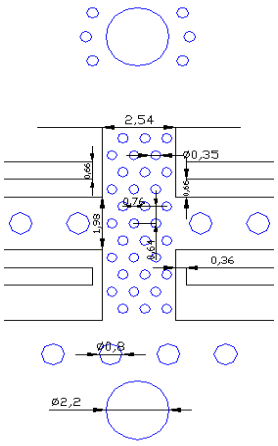


Symbols	Dimensions (In mm)		
	MIN	NOM	MAX
A	1.40	1.50	1.60
A1	0.00	---	0.10
A2	---	1.45	---
B	0.33	---	0.51
C	0.19	---	0.25
D	4.80	---	5.00
D2	3.20	3.30	3.40
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
E2	2.30	2.40	2.50
e	---	1.27	---
L	0.40	---	1.27
y	---	---	0.10
θ	0°	---	8°
|L1-L1'|	---	---	0.12
L1	1.04REF		

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: 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

Wideband Linear Push-pull Amplifier MMIC

APPLICATION CIRCUIT

CATV Push-Pull

1 : 1 transformer

High Linearity

50 ~ 1002 MHz

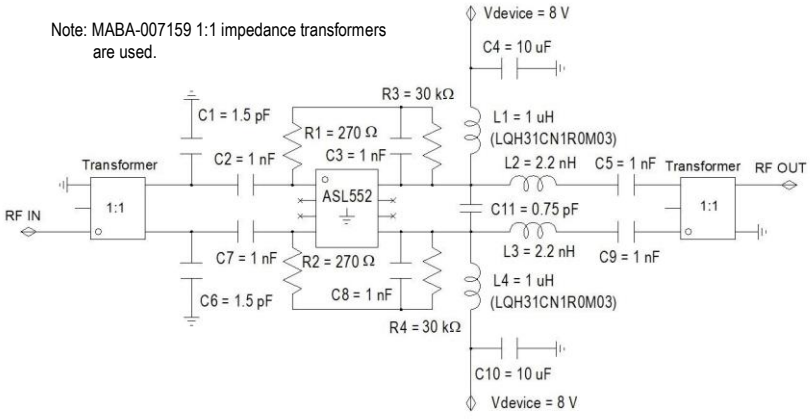
+8 V

Frequency (MHz)	50	500	1002
Noise Figure (dB)	3.5	3.5	3.8
Magnitude S21 (dB)	11.1	11.0	11.0
Magnitude S11 (dB)	-18	-16	-16
Magnitude S22 (dB)	-18	-16	-16
Output P1dB (dBm)	26	26	26
Output IP3[1] (dBm)	44	48	45
Output IP2[2] (dBm)	65		
CSO (dBc)	-		
CTB (dBc)	-		
Device Voltage (V)	+8		
Current (mA)	370		

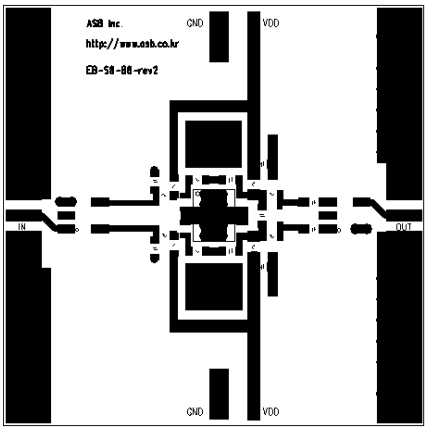
1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 6 MHz.
2) OIP2 is measured with two tones at an output power of +14 dBm/tone at F1(400 MHz)+F2(450MHz).

Schematic

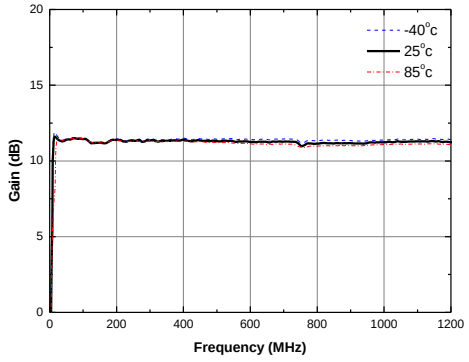
Note: MABA-007159 1:1 impedance transformers are used.

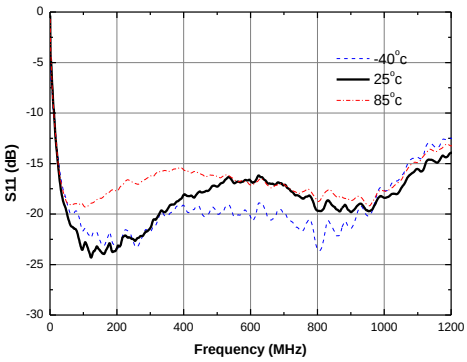


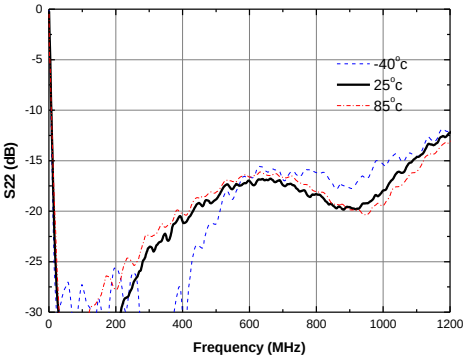
Board Layout (FR4, 40x40 mm², 0.8T)



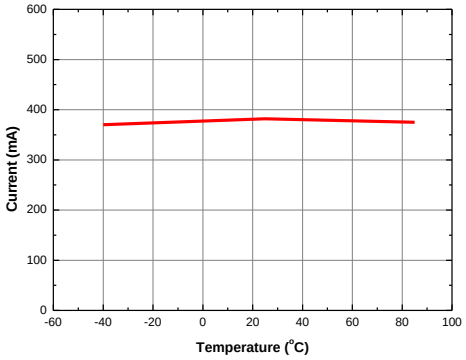
S-parameters



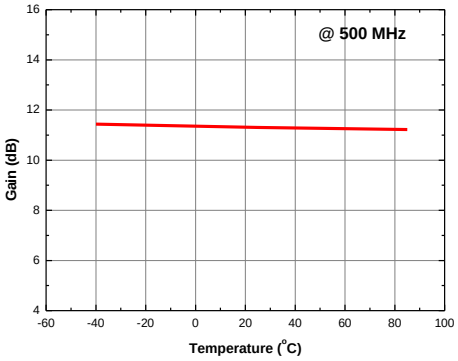




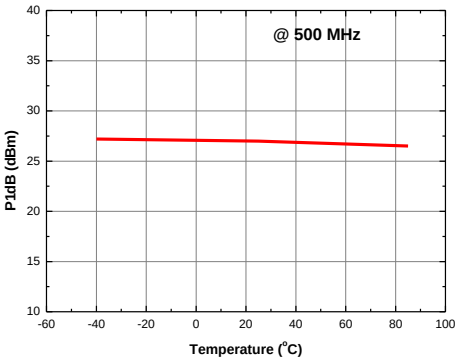
Current vs. Temperature



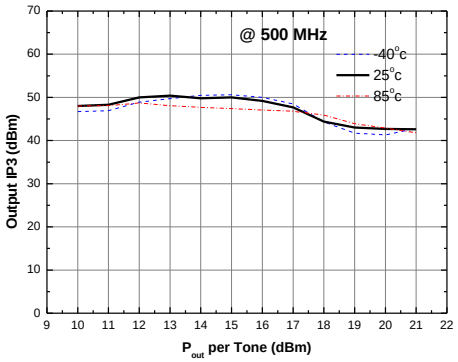
Gain vs. Temperature



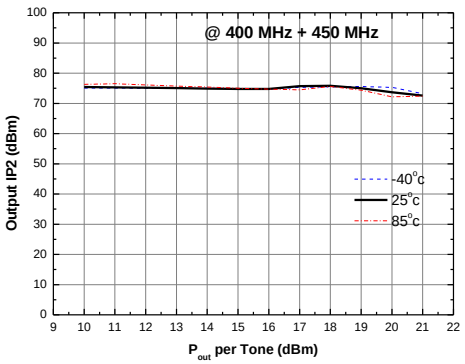
P1dB vs. Temperature



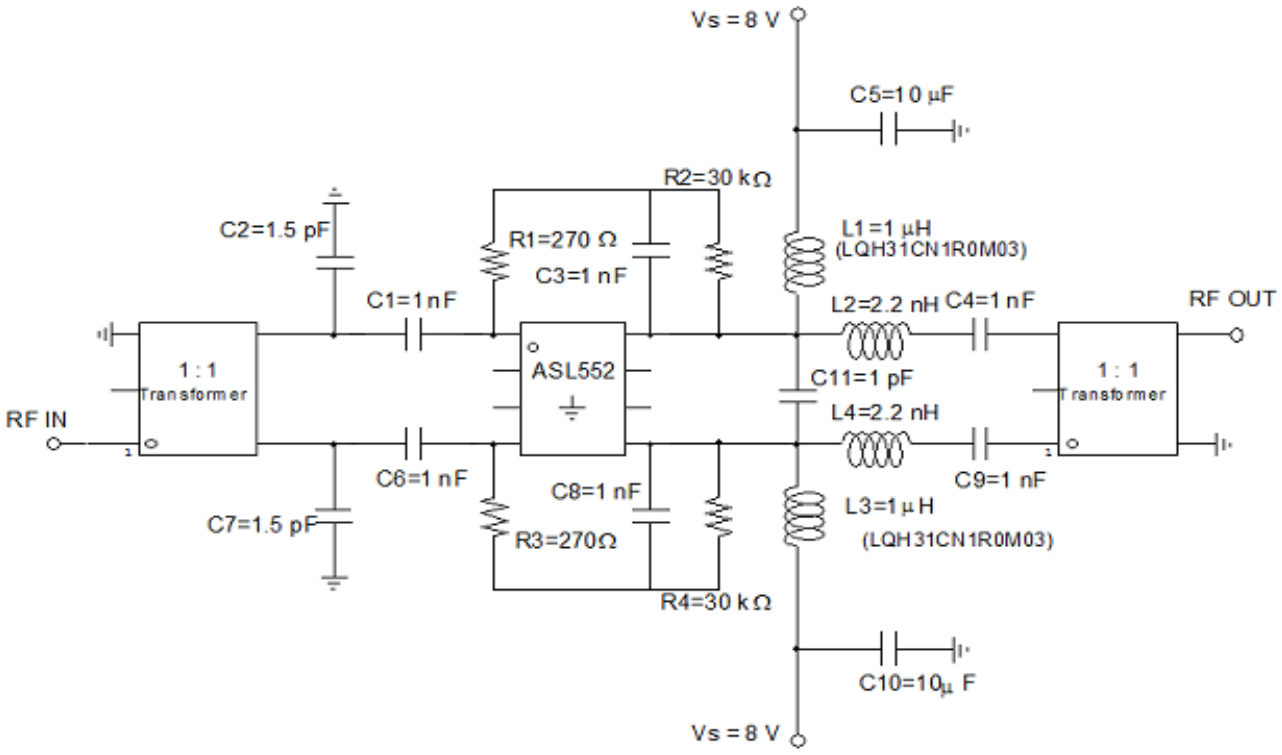
Output IP3 vs. Tone Power



Output IP2 vs. Tone Power



ALTERNATIVE APPLICATION CIRCUIT



Wideband Linear Push-pull Amplifier MMIC

APPLICATION CIRCUIT

CATV Push-Pull

1 : 1 transformer

50 ~ 1002 MHz

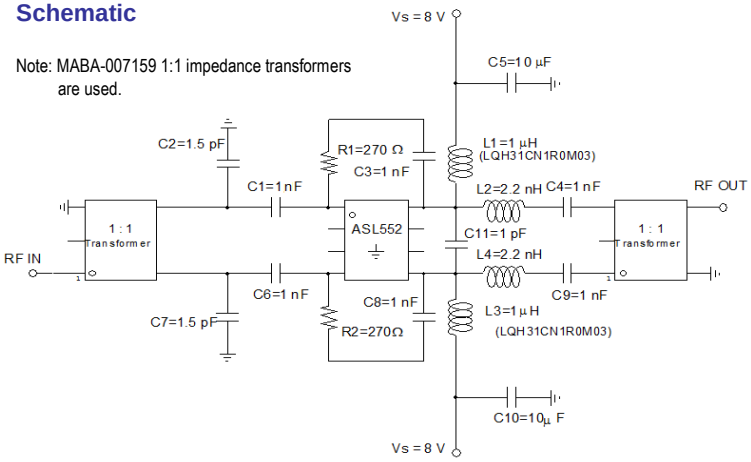
+8 V

Frequency (MHz)	50	500	1002
Noise Figure (dB)	3.5	3.5	3.8
Magnitude S21 (dB)	11.1	11.0	11.0
Magnitude S11 (dB)	-18	-16	-16
Magnitude S22 (dB)	-18	-16	-16
Output P1dB (dBm)	25	26	26
Output IP3[1] (dBm)	41	45	42
Output IP2[2] (dBm)	65		
CSO (dBc)	-		
CTB (dBc)	-		
Device Voltage (V)	+8		
Current (mA)	240		

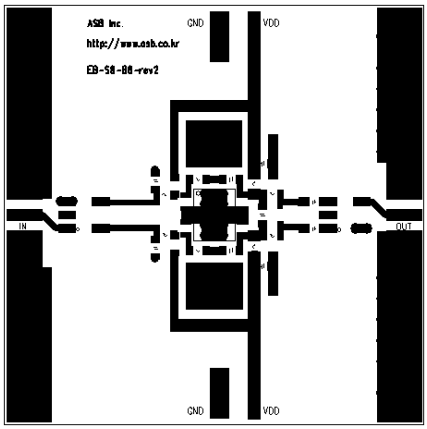
1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 6 MHz.

2) OIP2 is measured with two tones at an output power of +14 dBm/tone at F1(400 MHz)+F2(450MHz).

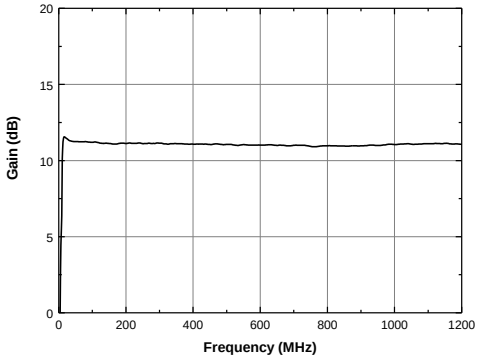
Schematic

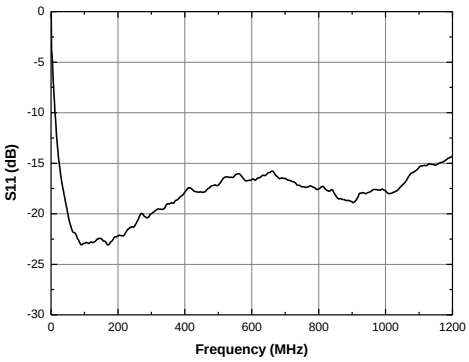


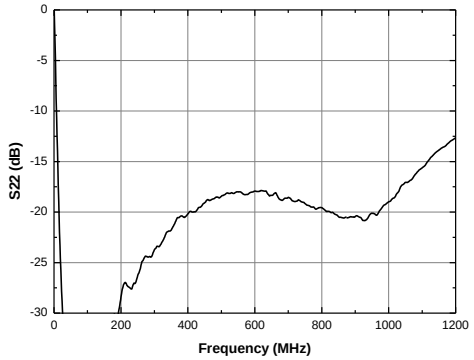
Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters







Wideband Linear Push-pull Amplifier MMIC

APPLICATION CIRCUIT

CATV Push-Pull

1 : 1 transformer

High Linearity

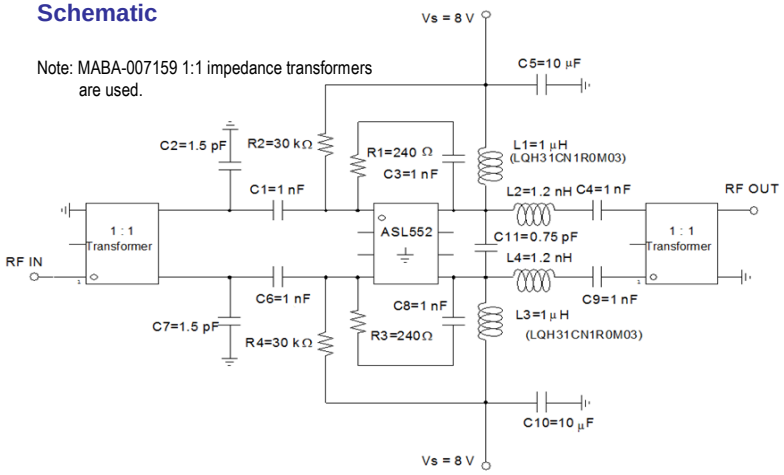
50 ~ 1200 MHz

+8 V

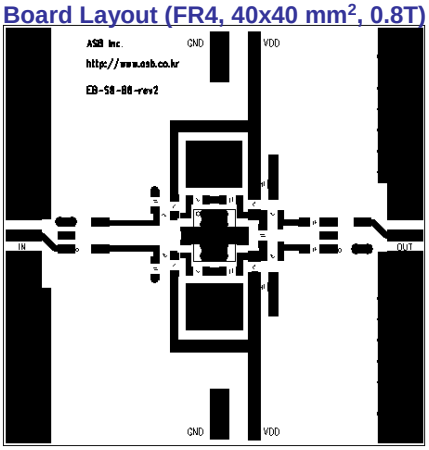
Frequency (MHz)	50	500	1200
Noise Figure (dB)	3.5	3.5	3.7
Magnitude S21 (dB)	10.4	10.3	10.7
Magnitude S11 (dB)	-18	-16	-15
Magnitude S22 (dB)	-18	-16	-15
Output P1dB (dBm)	26	26	26
Output IP3[1] (dBm)	44	47	46
Output IP2[2] (dBm)	65		
CSO (dBc)	-		
CTB (dBc)	-		
Device Voltage (V)	+8		
Current (mA)	370		

1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 6 MHz.
2) OIP2 is measured with two tones at an output power of +14 dBm/tone at F1(400 MHz)+F2(450MHz).

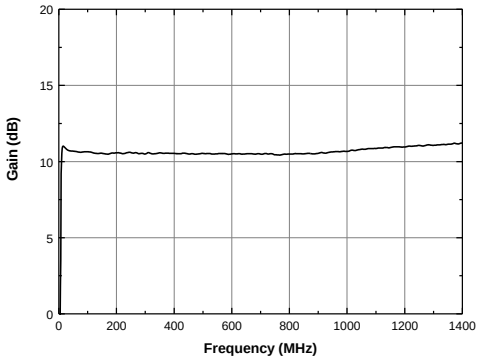
Schematic

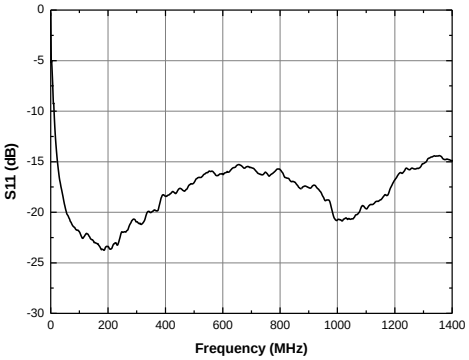


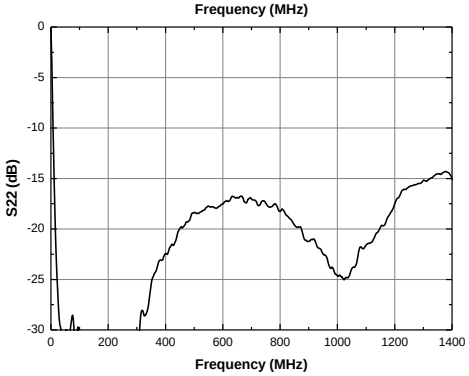
Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters







Wideband Linear Push-pull Amplifier MMIC

APPLICATION CIRCUIT

CATV Push-Pull

1 : 1 transformer

50 ~ 1200 MHz

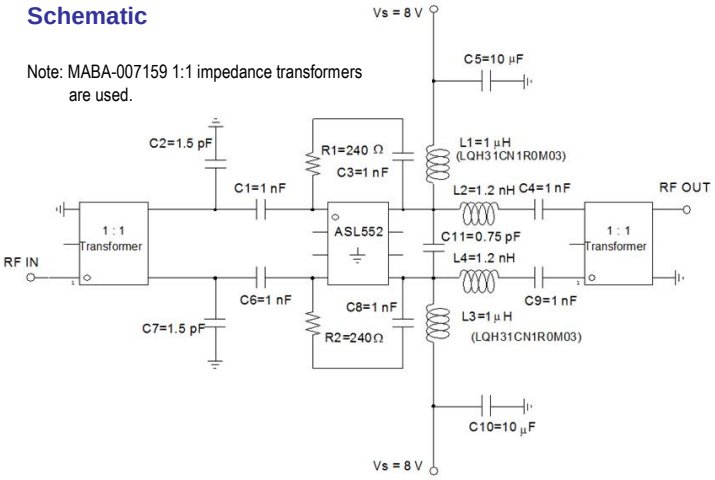
+8 V

Frequency (MHz)	50	500	1200
Noise Figure (dB)	3.5	3.5	3.7
Magnitude S21 (dB)	10.3	10.2	10.6
Magnitude S11 (dB)	-18	-16	-15
Magnitude S22 (dB)	-18	-16	-15
Output P1dB (dBm)	25	26	26
Output IP3[1] (dBm)	41	45	42
Output IP2[2] (dBm)	65		
CSO (dBc)	-		
CTB (dBc)	-		
Device Voltage (V)	+8		
Current (mA)	240		

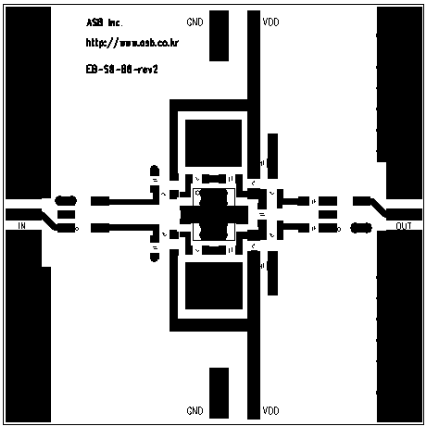
1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 6 MHz.

2) OIP2 is measured with two tones at an output power of +14 dBm/tone at F1(400 MHz)+F2(450MHz).

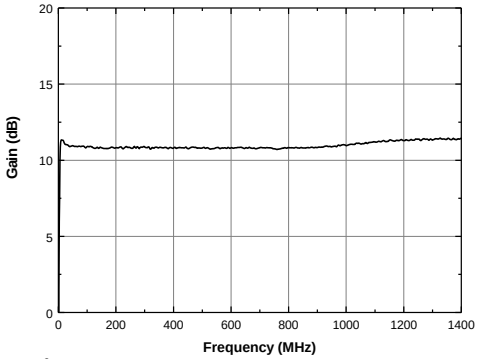
Schematic

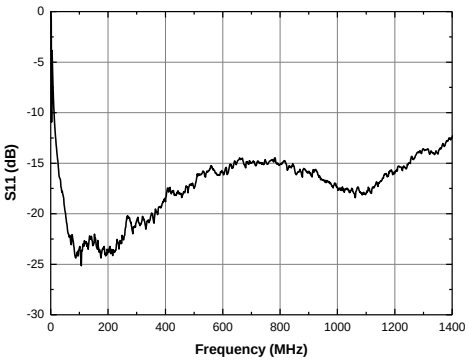


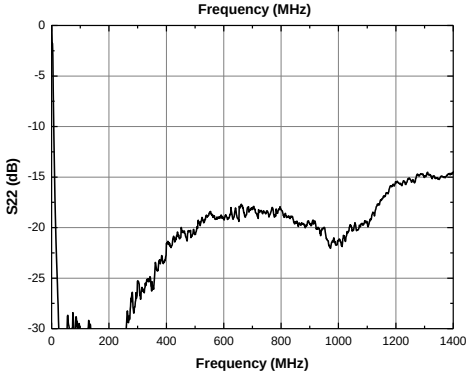
Board Layout (FR4, 40x40 mm^2, 0.8T)



S-parameters







Wideband Linear Push-pull Amplifier MMIC

APPLICATION CIRCUIT

CATV Push-Pull

1 : 1 transformer

High Linearity

50 ~ 860 MHz

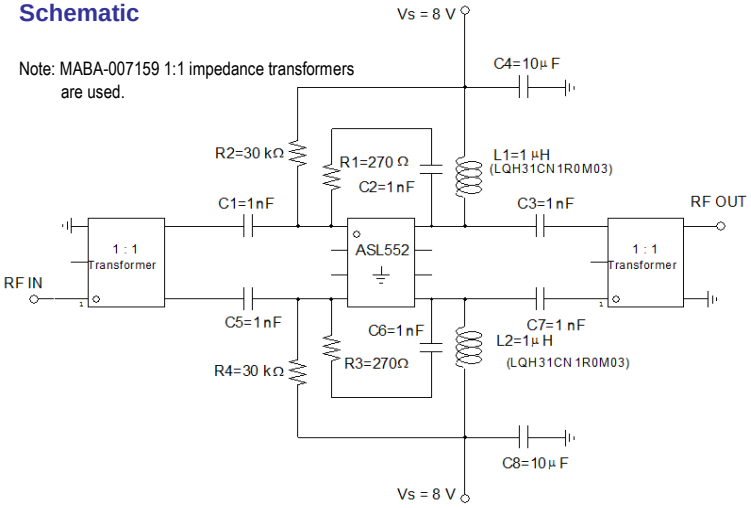
+8 V

Frequency (MHz)	50	500	860
Noise Figure (dB)	3.3	3.3	3.5
Magnitude S21 (dB)	11.2	10.0	11.0
Magnitude S11 (dB)	-18	-17	-16
Magnitude S22 (dB)	-18	-17	-16
Output P1dB (dBm)	26	26	26
Output IP3[1] (dBm)	44	48	46
Output IP2[2] (dBm)	67		
CSO (dBc)	-		
CTB (dBc)	-		
Device Voltage (V)	+8		
Current (mA)	370		

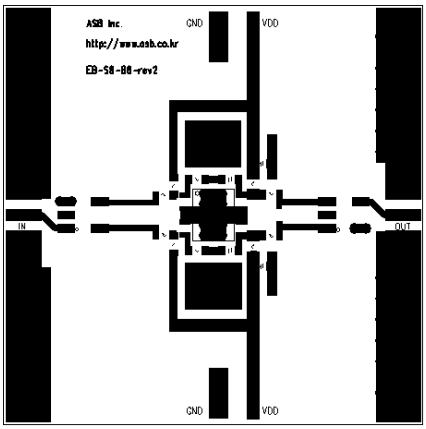
1) OIP3 ids measured with two tones at an output power of +14 dBm/tone separated by 6 MHz.

2) OIP2 is measured with two tones at an output power of +14 dBm/tone at F1(400 MHz)+F2(450MHz).

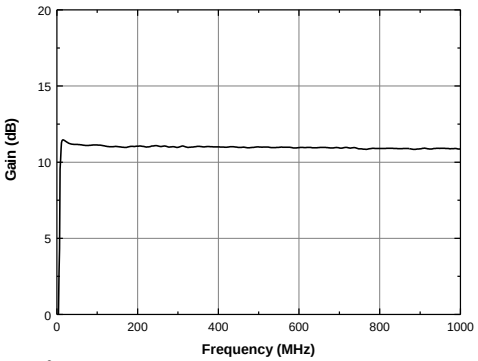
Schematic

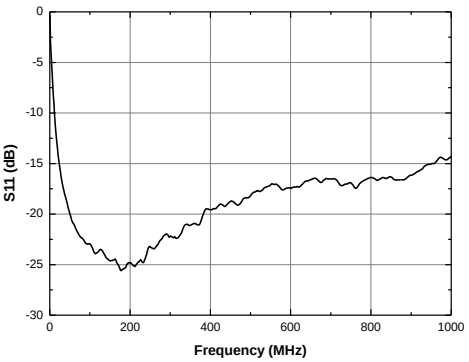


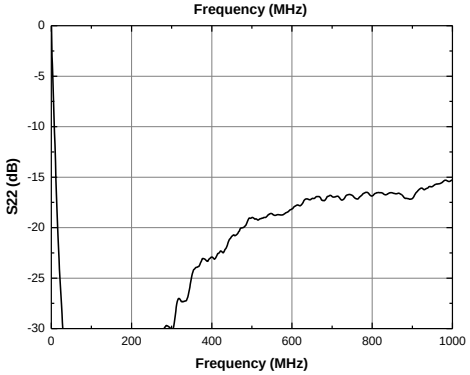
Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters







Wideband Linear Push-pull Amplifier MMIC

APPLICATION CIRCUIT

CATV Push-Pull

1 : 1 transformer

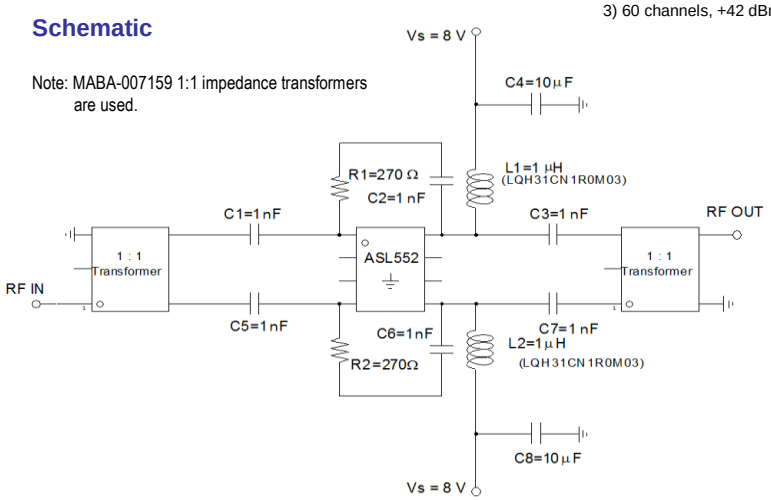
50 ~ 860 MHz

+8 V

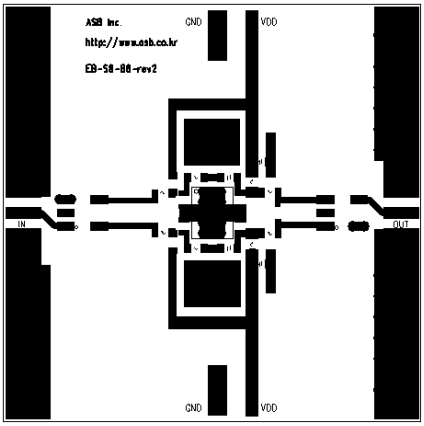
Frequency (MHz)	50	500	860
Noise Figure (dB)	3.3	3.3	3.5
Magnitude S21 (dB)	11.2	11.0	11.0
Magnitude S11 (dB)	-18	-17	-16
Magnitude S22 (dB)	-18	-17	-16
Output P1dB (dBm)	26	26	26
Output IP3[1] (dBm)	41	46	42
Output IP2[2] (dBm)	64		
CSO[3] (dBc)	76		
CTB[3] (dBc)	73		
Device Voltage (V)	+8		
Current (mA)	240		

1) OIP3 is measured with two tones at an output power of +14 dBm/tone separated by 6 MHz.
2) OIP2 is measured with two tones at an output power of +14 dBm/tone at F1(400 MHz)+F2(450MHz).
3) 60 channels, +42 dBmV per channel (measured at output), measured at 543.25MHz.

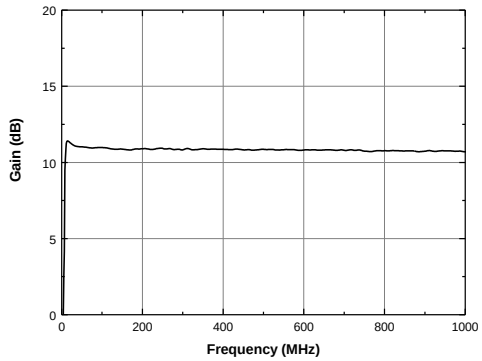
Schematic

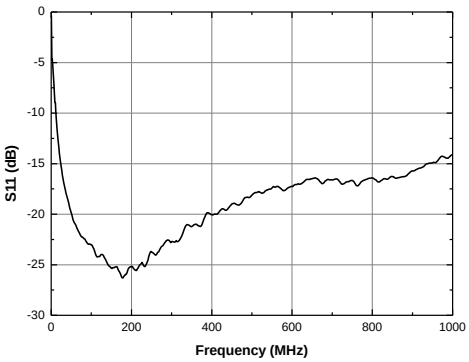


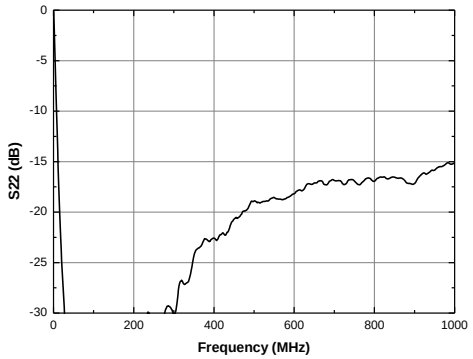
Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters







Recommended Soldering Reflow Profile