LZ1AQ Amplifier Project

Making It Up

John VE6EY

http://play.fallows.ca

Introduction

Full credit to Chavdar Levkov LZ1AQ for his Wideband Active Small Magnetic Loop Antenna Amplifier Design.

As part of my exploration of wideband loop antennas, I built Chavdar's 2011 amplifier design. First I tested the circuit on a breadboard. Second, I designed a PCB to implement the amplifier using surface mount components.

The amplifier is mounted in a 1 meter loop, and connected to the shack through CAT7 cable. An optional balun is used at the receiver input.

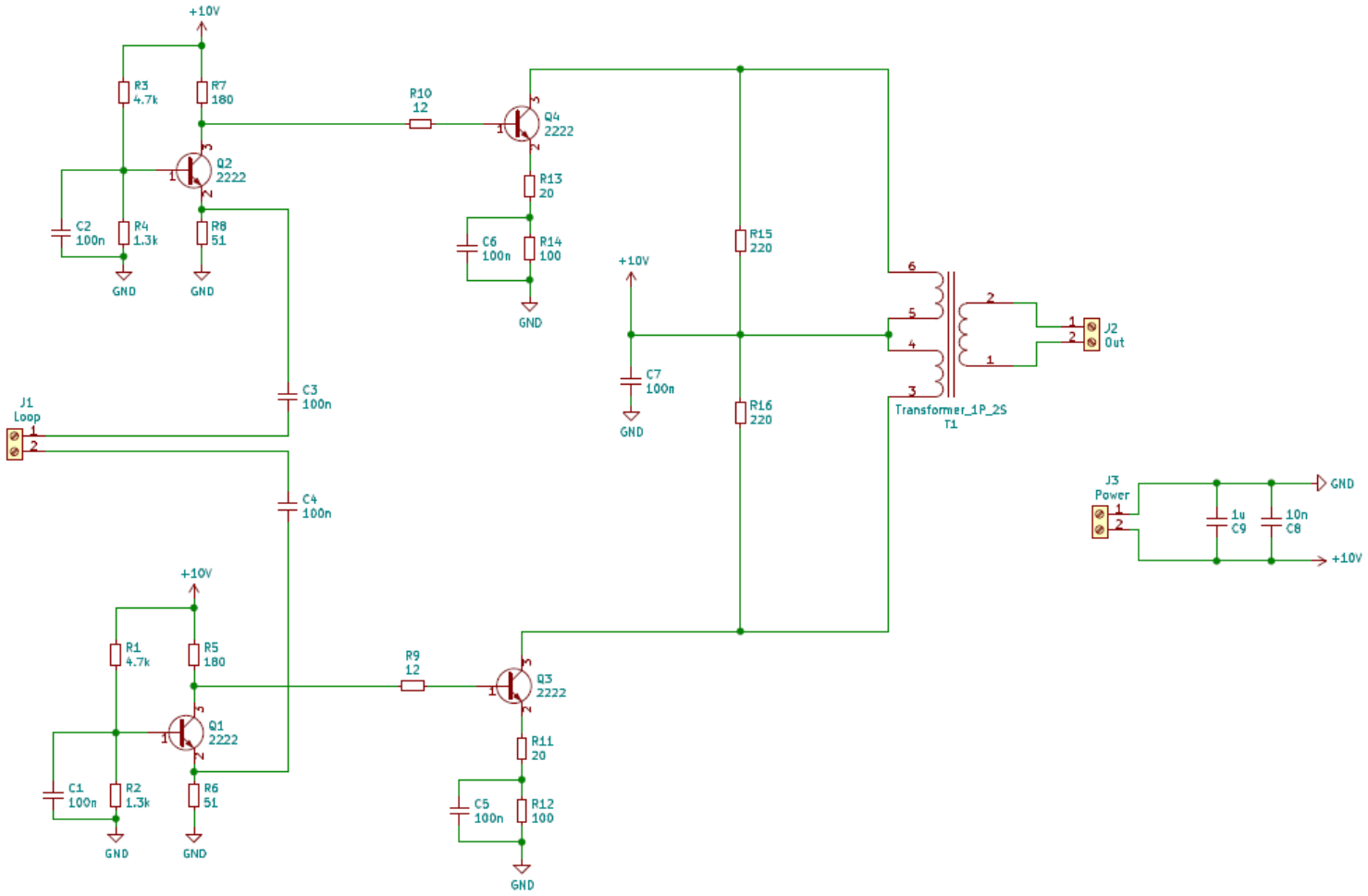
Here is the project documentation.

73 John VE6EY
Calgary, Alberta
May 2019

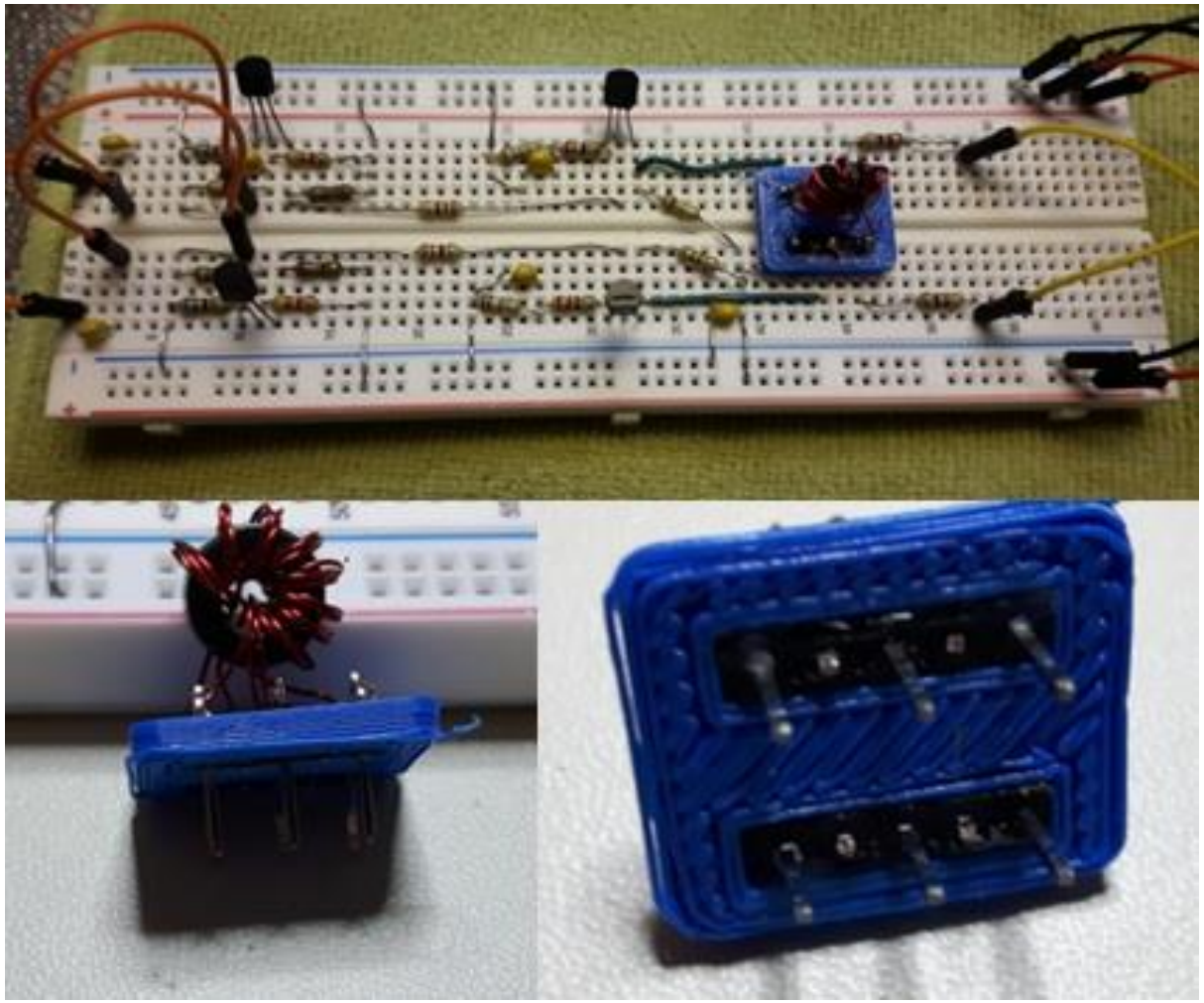
References

- Original LZ1AQ Design
- Obtain my PCB Design from OSH Park

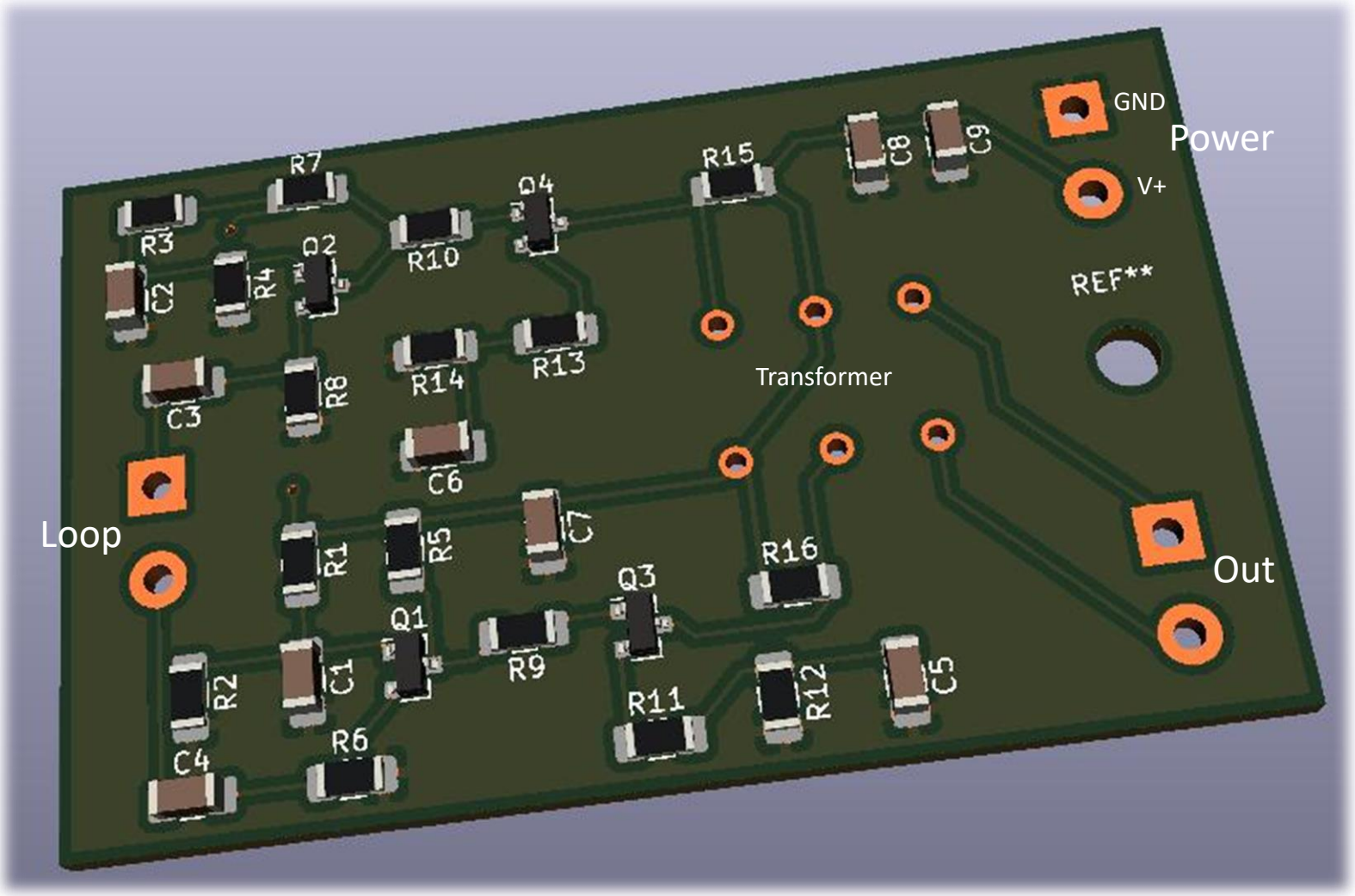
Schematic


+10V
R3
4.7k
R7
180
R10
12
Q4
2222
Q2
2222
R13
20
C2
100n
R4
1.3k
R8
51
C6
100n
R14
100
GND
GND
GND
+10V
R15
220
C7
100n
GND
R16
220
6
5
4
3
2
1
2
1
J2
Out
Transformer_1P_2S
T1
J1
Loop
C3
100n
C4
100n
J3
Power
1u
C9
10n
C8
GND
+10V
+10V
R1
4.7k
R5
180
R9
12
Q3
2222
Q1
2222
R11
20
C1
100n
R2
1.3k
R6
51
C5
100n
R12
100
GND
GND
GND

Breadboard



PCB Board


GND
Power
V+
REF**
Transformer
Loop
Out
R7
R15
C8
C9
R3
Q4
R10
Q2
C2
R4
R14
R13
C3
R8
C6
C7
R1
R5
R16
Q3
Q1
R9
R2
C1
R11
R12
C5
C4
R6

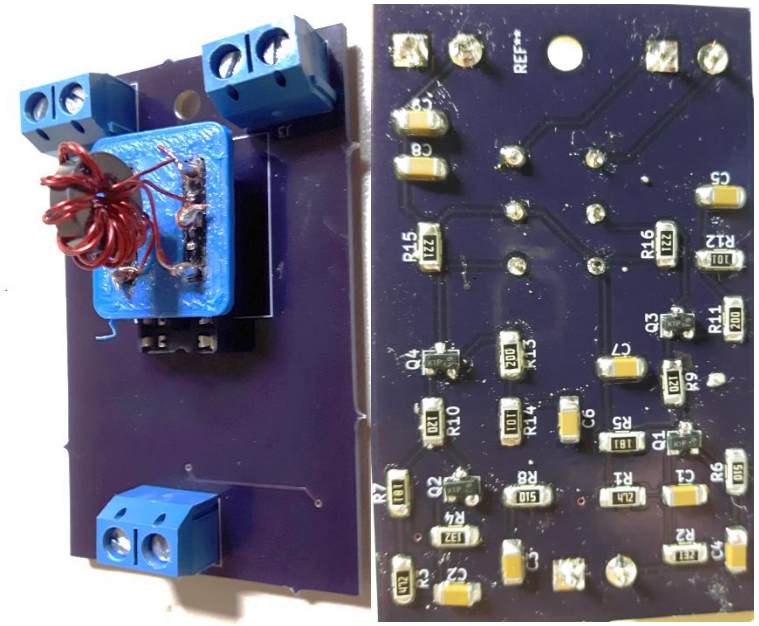
Bill of Materials

Part	Description	Cost
PCB	LZ1AQ_2 PCB from OSH Park, 3 for $17.50	6.00
Transistors	(4) MMBT2222A-7-F, SOT23 version of 2N222A, 40V 300mW	1.00
Resistors	(2) Each of 12, 20, 51, 100, 180, 220, 1.3K and 4.7K Ω SMD 1206 5% ¼ Watt	0.50
Capacitors	(7) 100nF (1) 1uF (1) 10nF SMD 1206 20% 50V	3.00
Transformer	Eight trifilar turns of magnet wire on a FT37-43 core. Mounted on a modified DIP Socket, row spacing 7.62 mm, pin pitch 2.54 mm. (Use 16 pin DIP and cut off pins not needed.)	0.50
Hardware	(3) Screw Terminals with 5.08 mm pin spacing	0.50

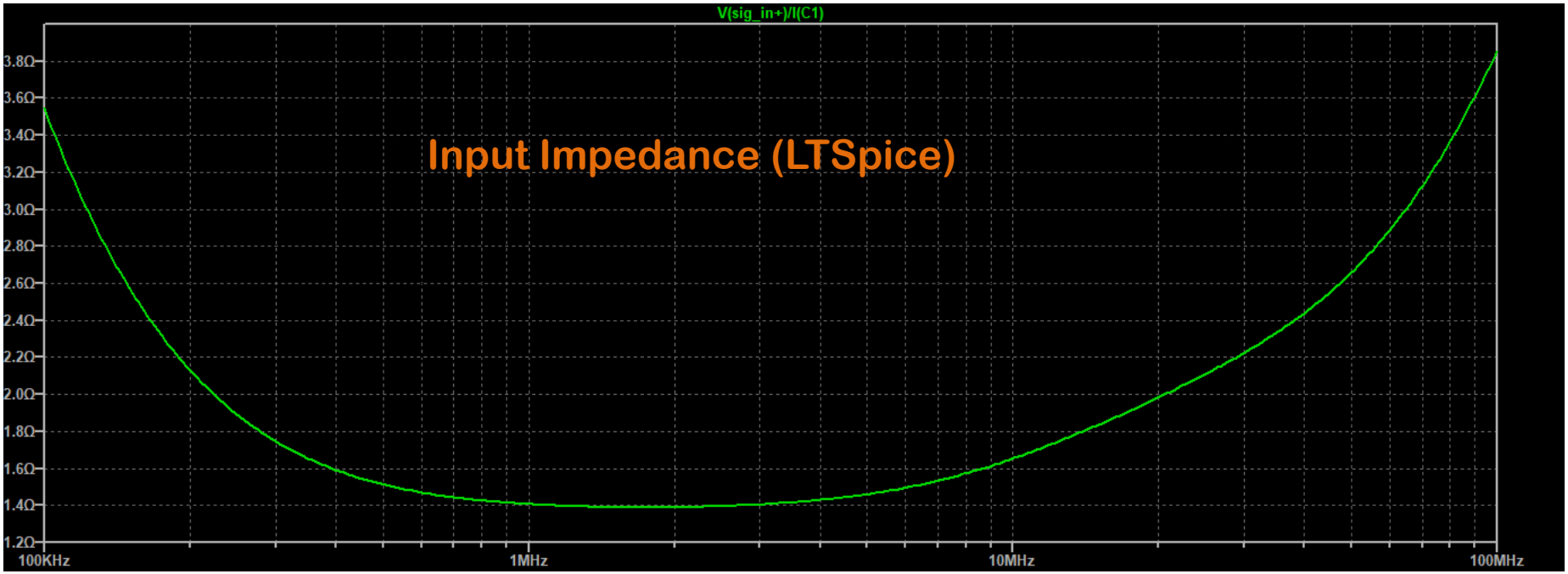
US Dollars, Total $11.50

Power
GND V+

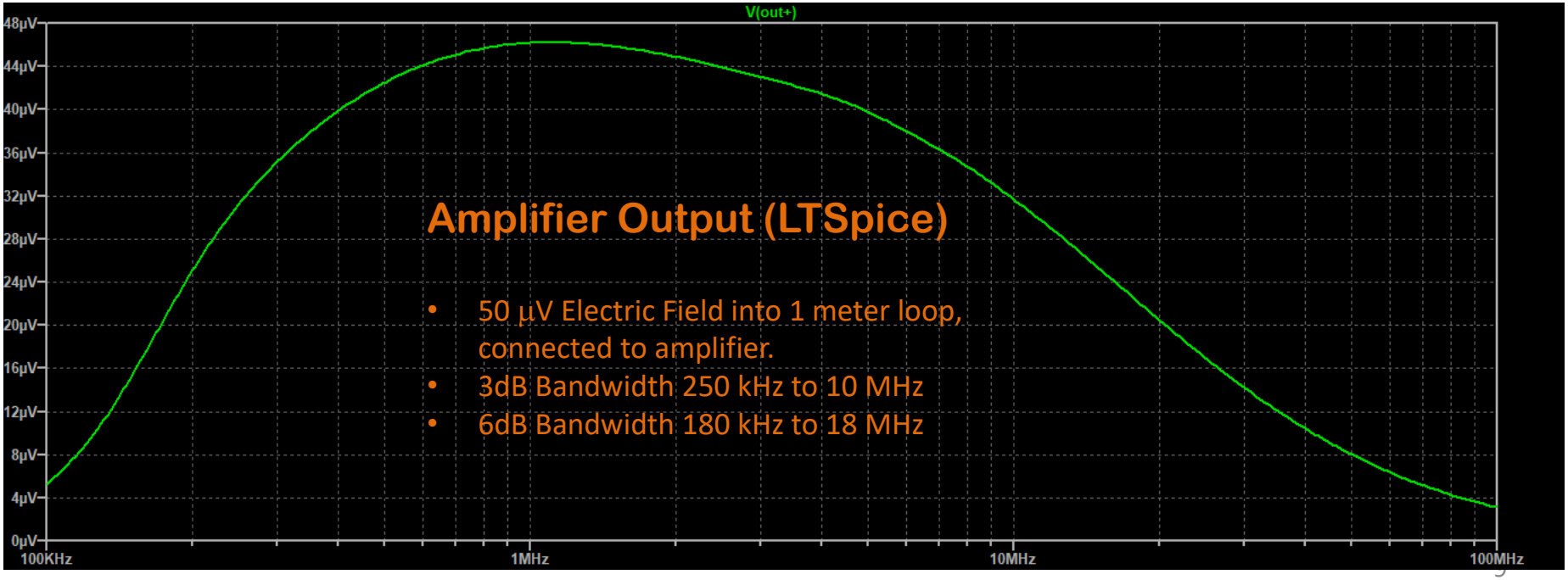
Output
100Ω Bal



Loop In



Input Impedance (LTSpice)



Amplifier Output (LTSpice)

- 50 µV Electric Field into 1 meter loop, connected to amplifier.
- 3dB Bandwidth 250 kHz to 10 MHz
- 6dB Bandwidth 180 kHz to 18 MHz