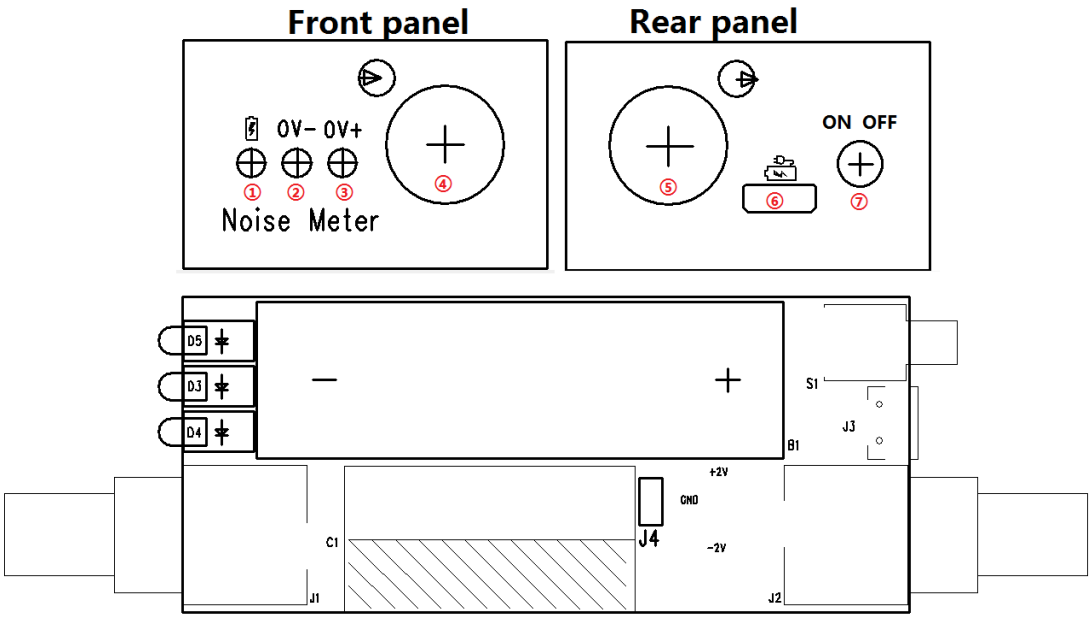
1. Introduction

This is an AC coupling low noise amplifier, and it is design for low frequency noise of voltage references measurement.

The typical noise floor of amplifier is 100nVpp; bandwidth is 0.1Hz to 10Hz.



① Charging LED

Continuous RED: Charging.

Continuous OFF or Dim: Charging complete if the battery in charging status.

② ③ Indicate the direction of the 'leakage' current of input Capacitor, and the saturation status of amplifier.

② OV-	③ OV+	Input Capacitor	Saturation status of AMP
RED	OFF	Discharging	negative saturation
OFF	RED	Charging	Positive saturation
RED	RED	Settle down	NOT IN Saturation status
Alternate RED AND OFF		Input over-load	

④ Input Connector

⑤ Output Connector

⑥ Charge Port

⑦ Power Switch

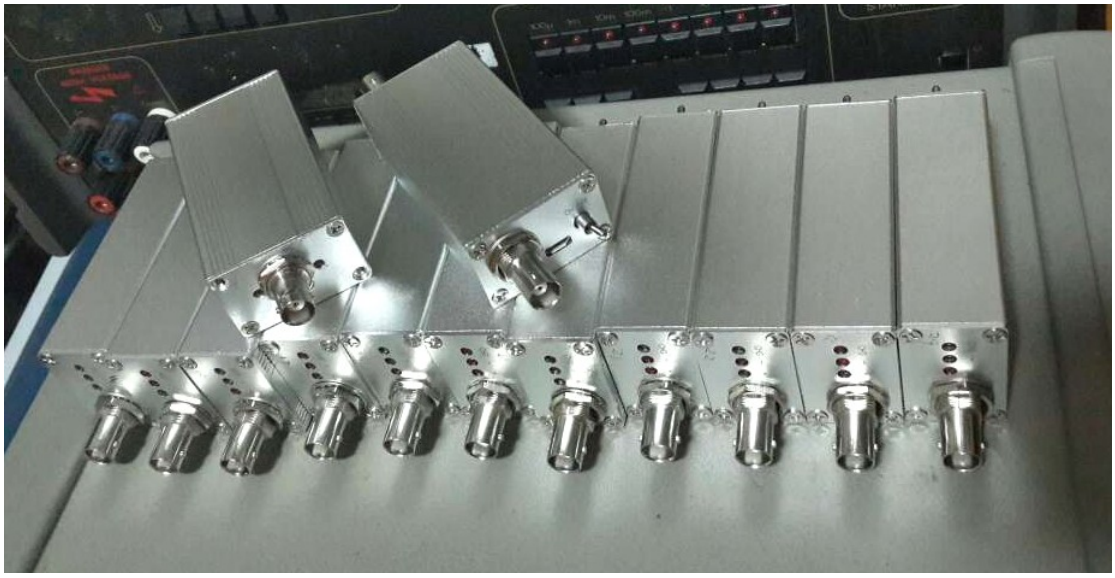


Figure 2 Version 1.1

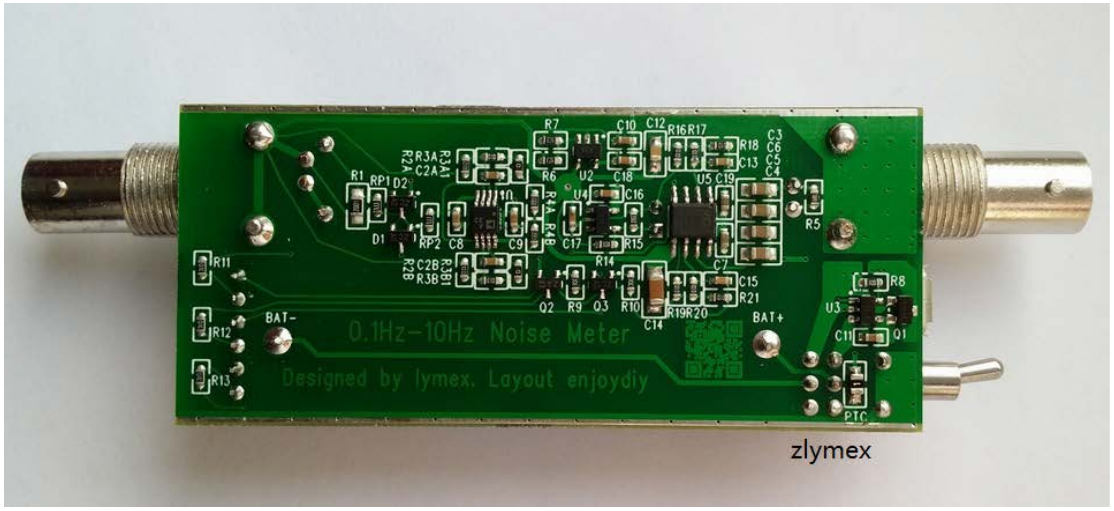


Figure 3 Version 1.1 internal Bottom

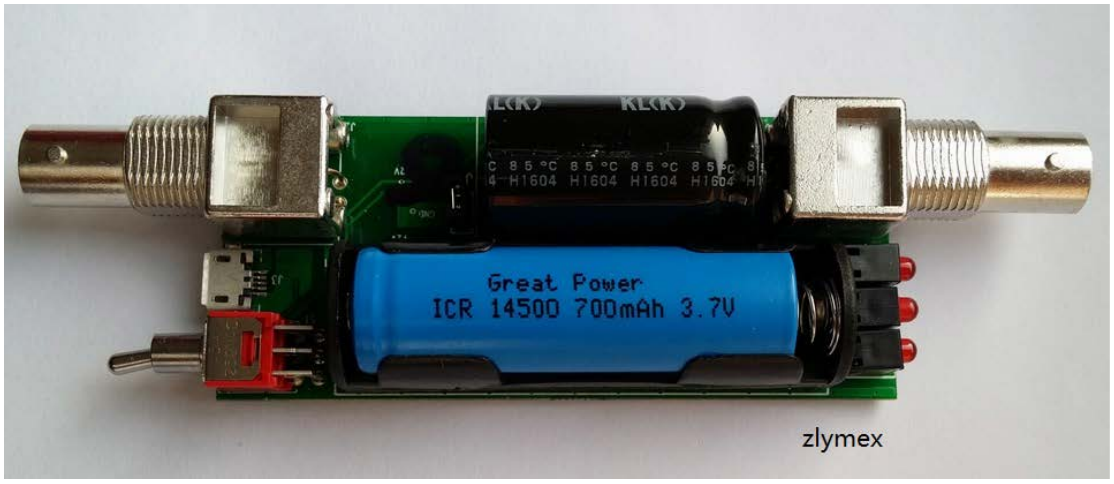


Figure 4 Version 1.1 Top

2. Specification

Noise floor	100nVpp
Bandwidth	0.1Hz to 10Hz (-3dB), -56dB at 50Hz
Gain	80dB
Maximum input	20V DC
Input impedance	2Kohm
Maximum Output	3Vpp into 1Mohm
Power requirements	one 14500 rechargeable Lithium battery
Charge current	less than 500mA
Charge voltage	5V (5.5V max)
Supply current	less than 8mA, 7.5mA typical
Charge port	Micro USB
Dimensions	40(W)*25(H)*120(L) mm

3. Basic operating instructions

Voltage Reference Noise Measurement:

Take 7V reference noise measurement for example

1. Prepare the DUT and the noise amplifier (check for battery, charge if necessary)

2. Disconnect anything from the BNC input of the noise amplifier, connect to oscilloscope, turn the meter on, both LEDs should be lit.

3. Connect the cable to DUT (no connection to the amplifier yet), measure the voltage from the BNC plug to confirm the test voltage

4. Measure the voltage of C1 from the BNC input socket of the amplifier, if the voltage low than 7V, than use a power supply to charge the capacitor to 8V for 5 minutes.

5. Short the BNC socket of the meter for 3 seconds. This will make the voltage of C1 drop to around 1V.

6. Wait for 1 to 2 minutes so that C1 is 'reverse' exercised

7. Connect DUT, now the OV- LED should be out indicating the negative saturation of the U1.

8. Wait for 2 to 3 minutes, the OV- LED should be come back on. If the OV+ LED goes out quickly, C1 is not exercised enough, go to step 5

9. If the waiting is too long (>5 minutes), then the exercise is excessive. Disconnect the BNC plug from the amplifier, go to step 4, charge the C1 for 3 seconds, and plug the BNC back. This step can be repeated.

10. If both LEDs are on for sometimes, the measurement can be performed.

Reference:

http://www.eevblog.com/forum/metrology/diy-low-frenquency-noise-meter/

http://www.eevblog.com/forum/metrology/diy-low-frenquency-noise-meter/50/

http://bbs.38hot.net/forum.php?mod=viewthread&tid=159569

Battery Charge:

1. Disconnect anything from the BNC Connector of the noise amplifier.
2. Switch OFF the amplifier.
3. Use micro USB cable to connect the charge port to USB port (5V), and the Charging LED will lit, when the battery fully charge, the LED goes out or goes dim.

4. Revision history

1.0 initial version

Base on zlymex's designed.

1.1

4th Order LPF (Butterworth MFB) added, -3dB at 10Hz, -56dB at 50Hz

Battery charge circuit added

1.11

Modify the input protection circuit.

Battery protection added to protect lithium-ion battery from damage or overcharge, over-discharge, and overcurrent.

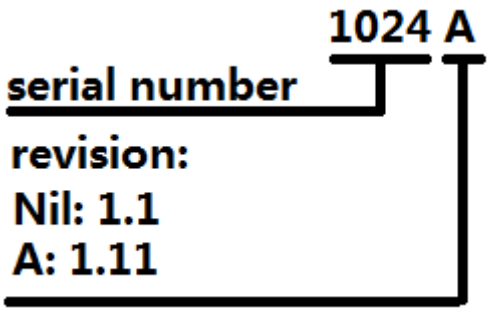


Figure 5 revision

INTRODUCTION AND SETUP

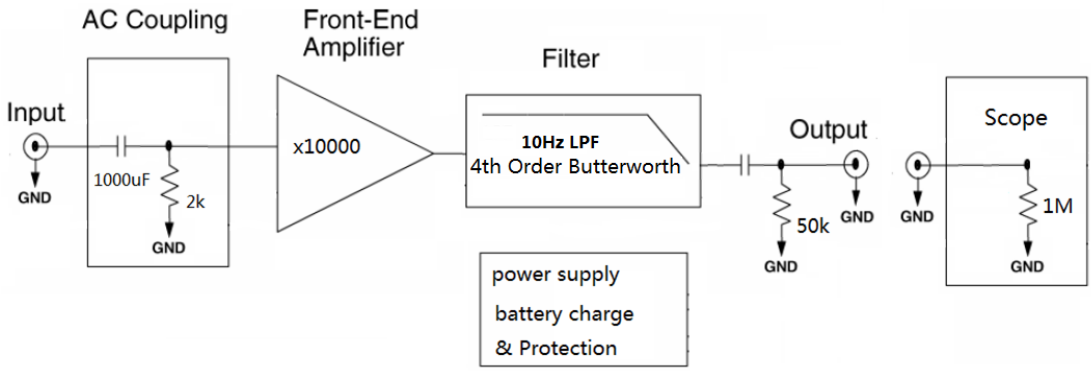


Figure 6 setup

APPENDIX A

Measurement:

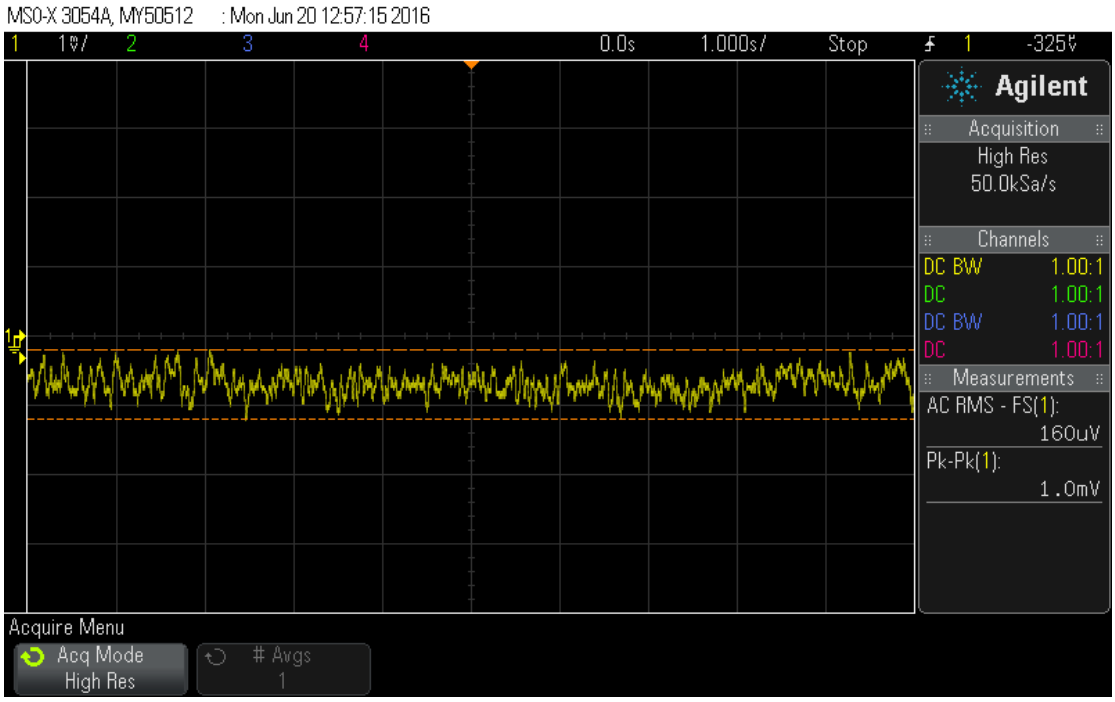


Figure 7 Typical noise performances

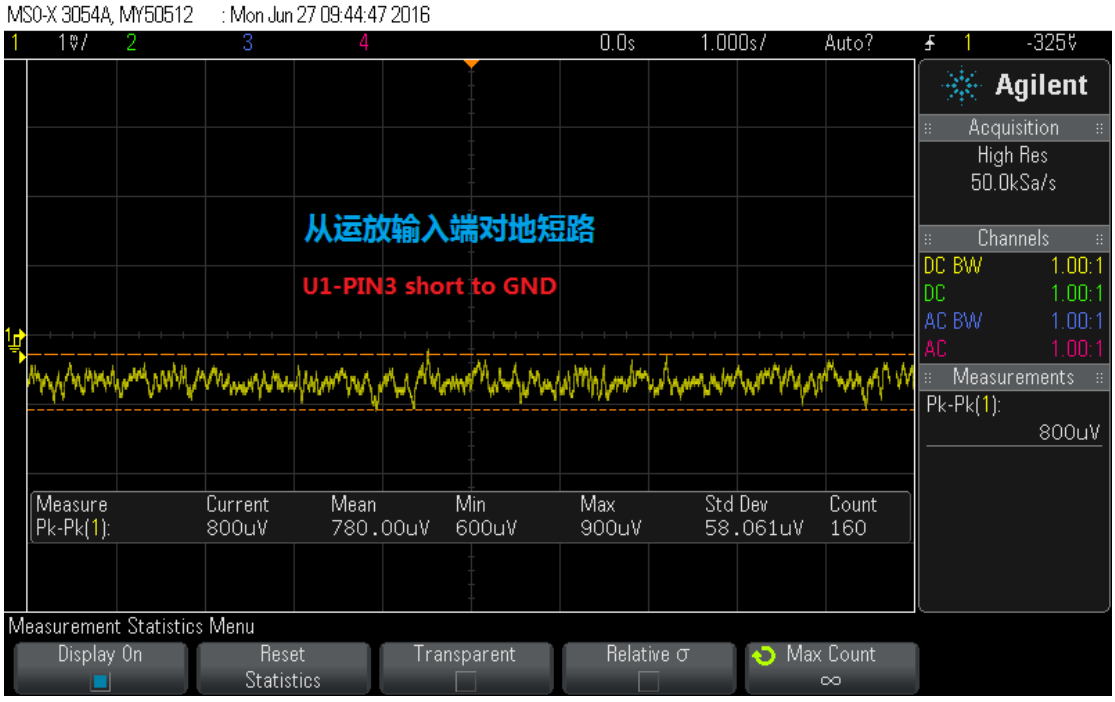


Figure 7 U1-PIN3 connect to GND

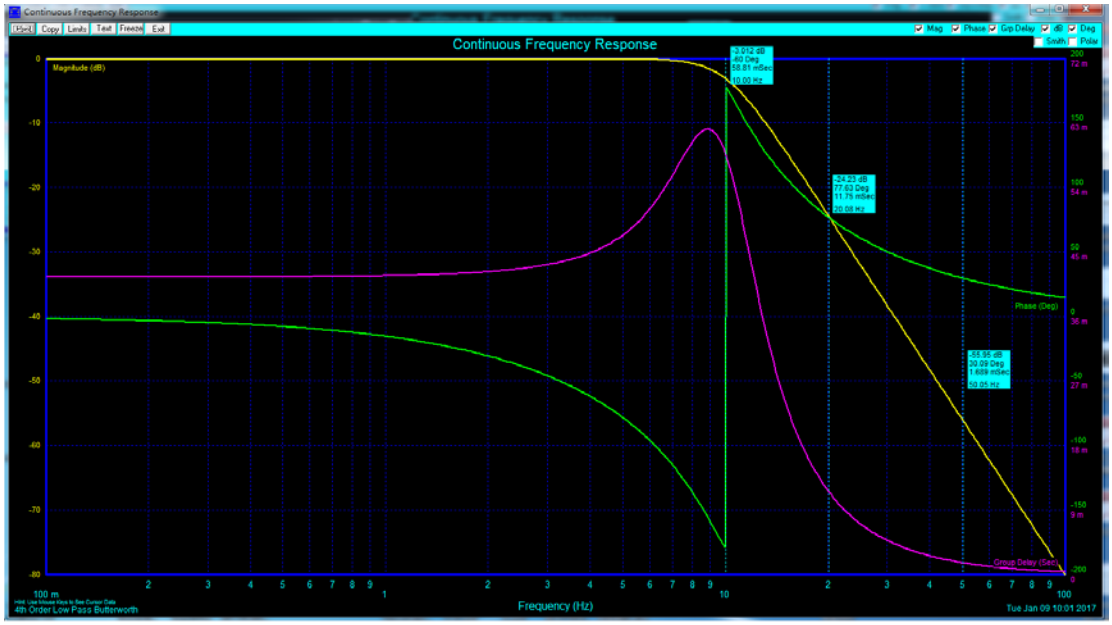


Figure 8 frequency response simulations

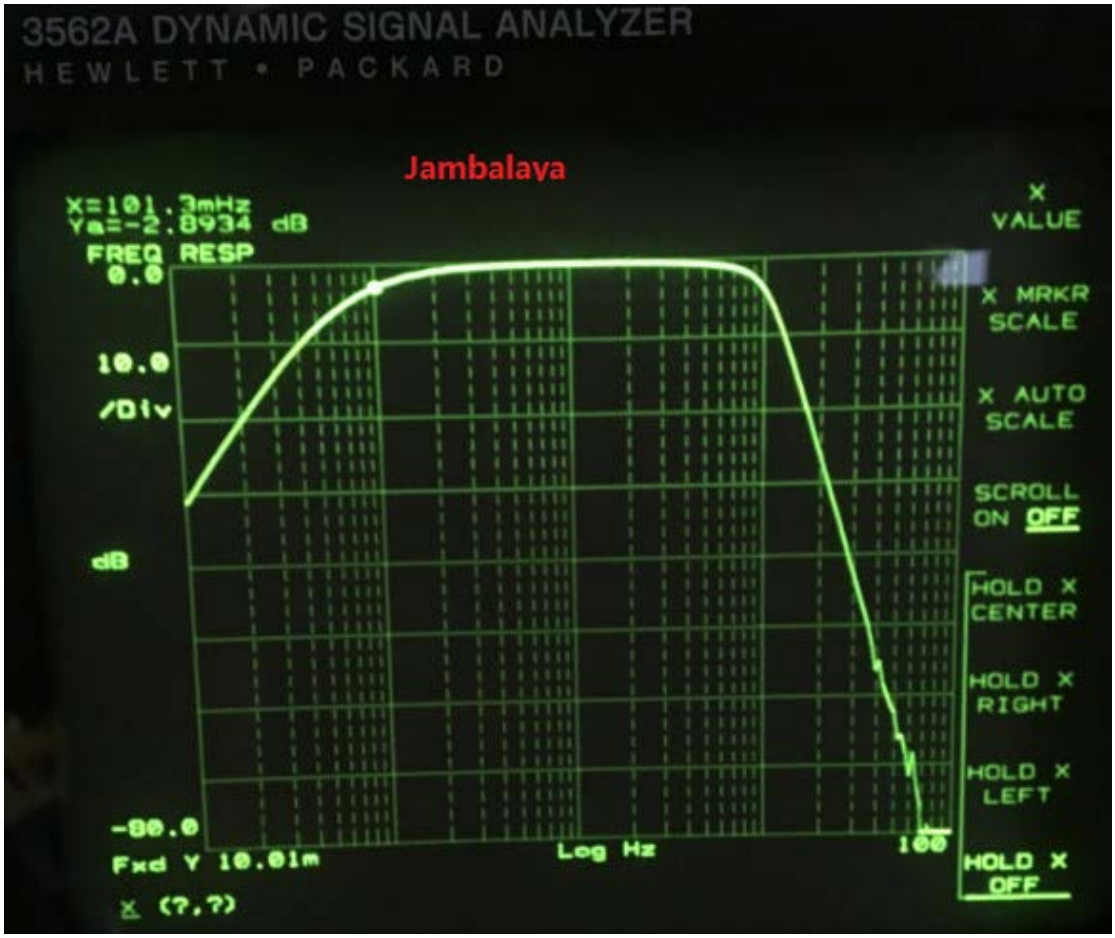


Figure 9 -2.89dB at 0.1Hz

Figure 10 -3dB at 9.444Hz

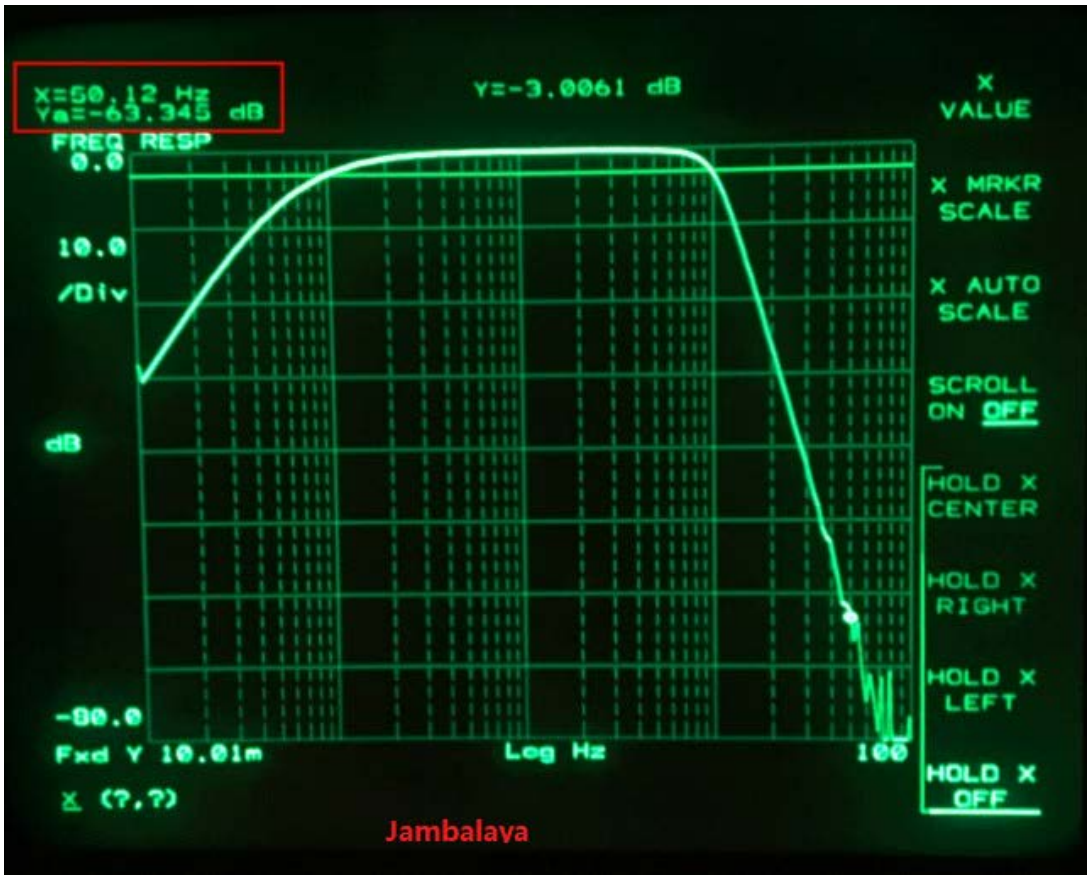
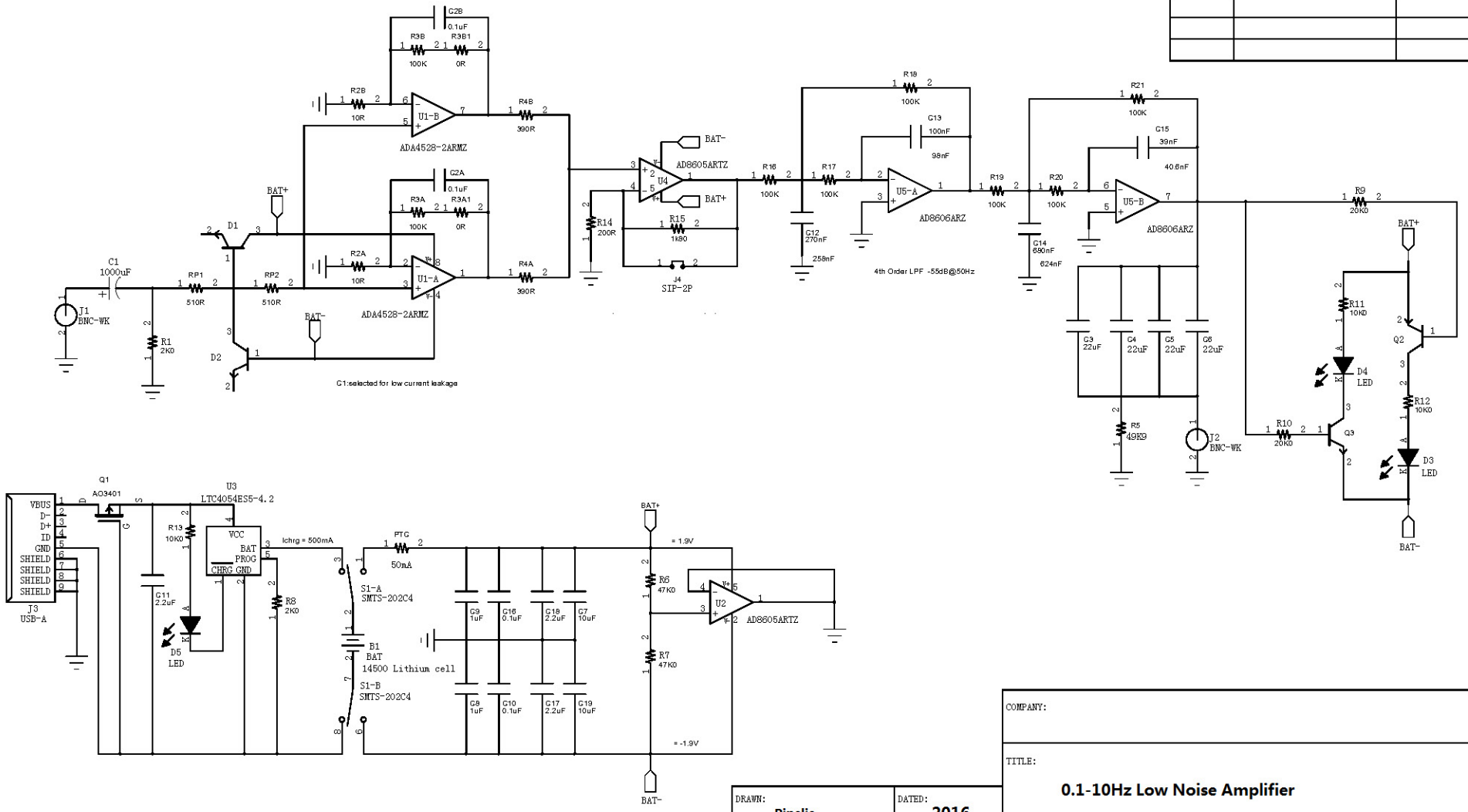


Figure 11 -63dB at 50 Hz

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:



DRAWN: Pipelie	DATED: 2016
CHECKED:	DATED:
QUALITY CONTROL:	DATED:
RELEASED:	DATED:

COMPANY:

TITLE: **0.1-10Hz Low Noise Amplifier**

CODE:	SIZE:	DRAWING NO:	REV:
	B		1.1

SCALE:

SHEET: 1 OF 1