Building instructions

Contents:

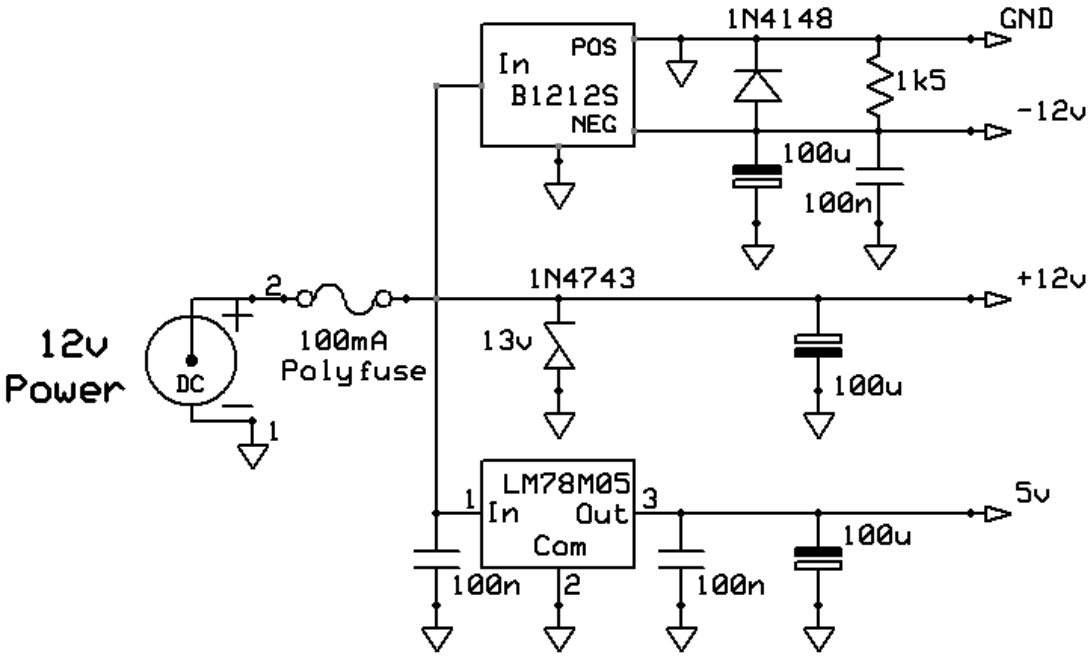
Power supply

Acceptable input voltage is **10.8-13.2 V** (determined by DC converter B1212S and OP-amp). The DC converter requires a minimum load of 8 mA, therefore a 1.5 kOhm resistor is added for dummy load.

All components are mounted closely to the copper tracks to make is as slim as possible.
All component wires are cut as short as possible on the non-copper side.
The 4 female Dupont terminals and soldered to the PCB. Insert a male connector during soldering to align the terminals and also avoid excessive solder.
The DC converter is soldered as close as possible to the top edge of the PCB (picture below).

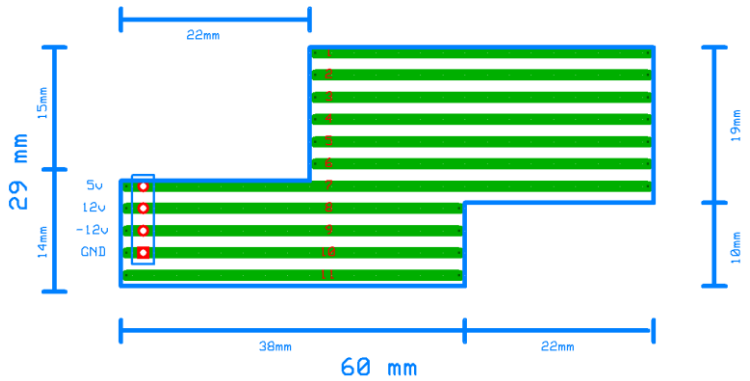
The power supply PCB is located on top of the resistors with a sheet of **thick plastic** as isolation.
The 12 Volt DC socket is glued to the main PCB. Insert a DC-plug for alignment to the enclosure.
A sheet of plastic is placed between the DSS PCB and the power supply PCB to avoid short circuits (same size as PCB).

Power supply schematic



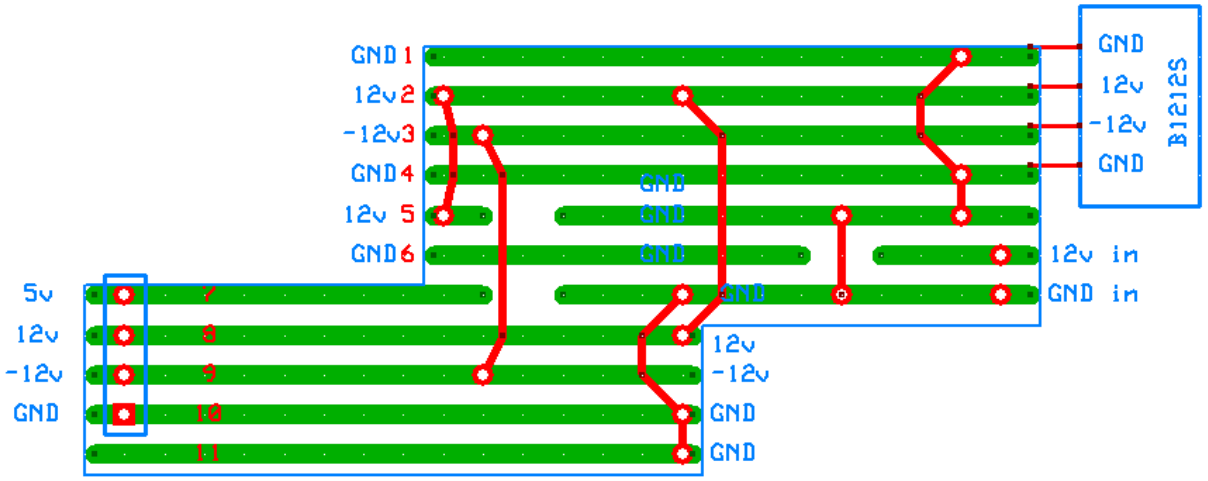
PCB size

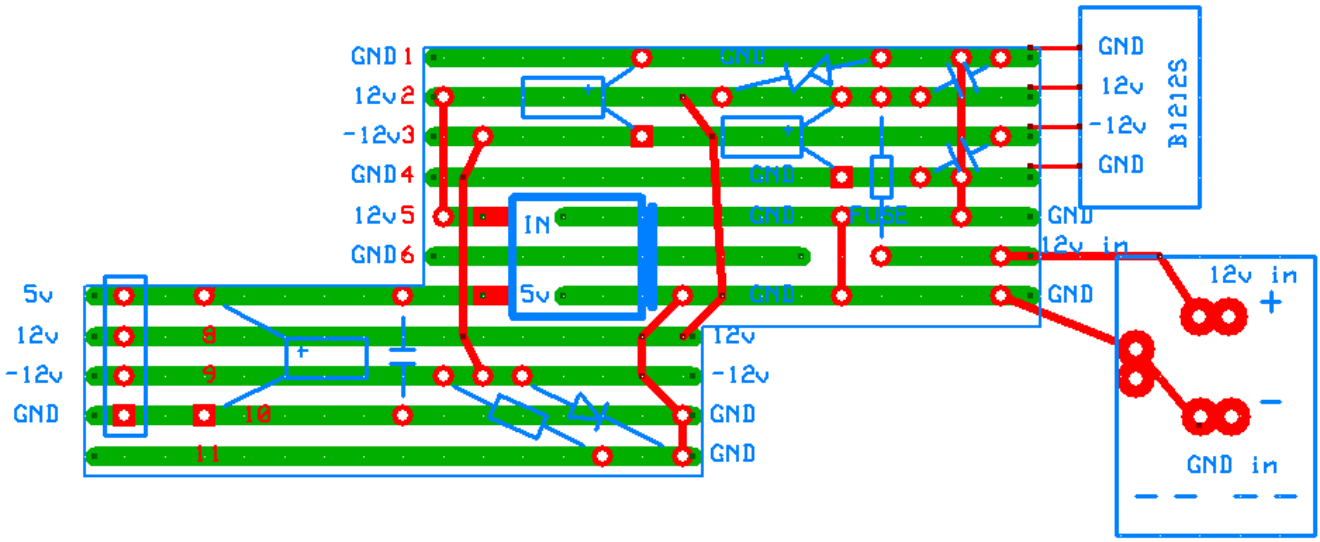
PCB is a Vero board:

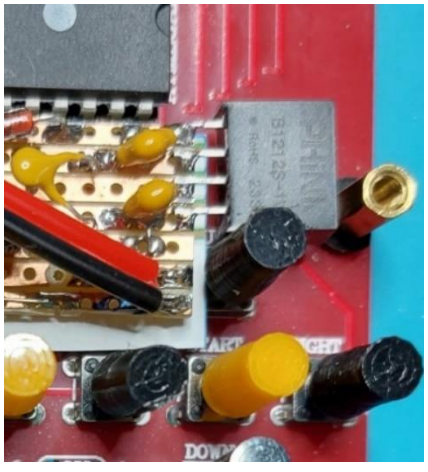


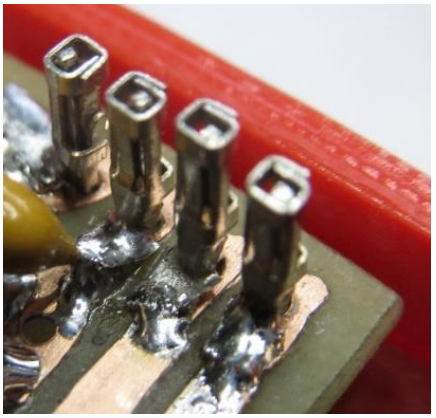
PCB layout:

Jumpers (marked RED) are placed as shown from “non-copper” side - **picture shown from copper side!**
Track brakes (3) might be made using a 4 mm drill.
All components are mounted on the **copper side!**









Parts list:

Part	Count
DDS generator kit	1
B1212S isolated dc/dc module	1
78M05 voltage regulator (SMD)	1
1N4743 zener 13V, 1W	1
1N4148 diode	1
Poly fuse 100mA XF010	1
Capacitors 100uF-16V	3
Capacitors 0.1uF	3
Resistor 1k5	1
Dupont terminal female	4
4-pin header 15mm	1
5.5 X 2.1 mm DC socket	1
Knob for potentiometer	2
PCB for power supply	1
Nylon spacer for display	2
3 mm screw	4
Cabinet (option)	1

Enclosure

The enclosure might be 3D-printed based on this project: https://www.thingiverse.com/thing:1380439
I have removed the cutout on the top for power inlet and made a hole for the DC connector on the back of the enclosure.
The buttons have been reduced in height and only one button is printed at a time (instead of 6) to get a better print.

The modified STL files are:

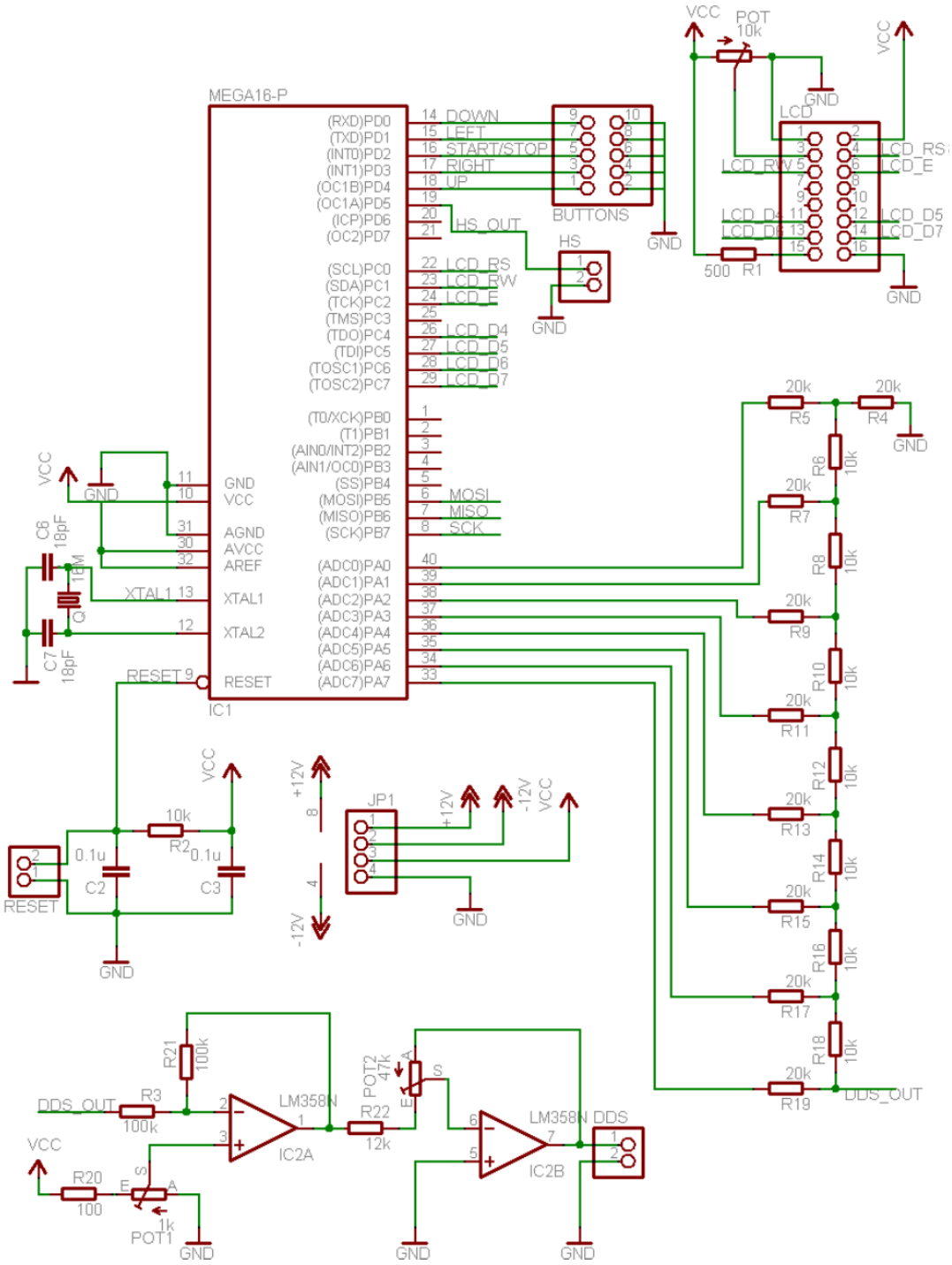
- AP-Top.stl
- AP-Bottom.stl
- AP-Button-1.stl

DDS module

Schematic

The circuit diagram of the AVR DDS generator (without power supply) uses the following building parts:

- AVR Atmega16A microcontroller clocked with 16MHz external crystal
- Standard HD44780-based 2×16 LCD module
- R2R DAC is made of standard resistors
- LM358N – a low power dual operational amplifier
- Two potentiometers (offset and volume)
- The power connector is replaced with one with 15 mm. long pins.

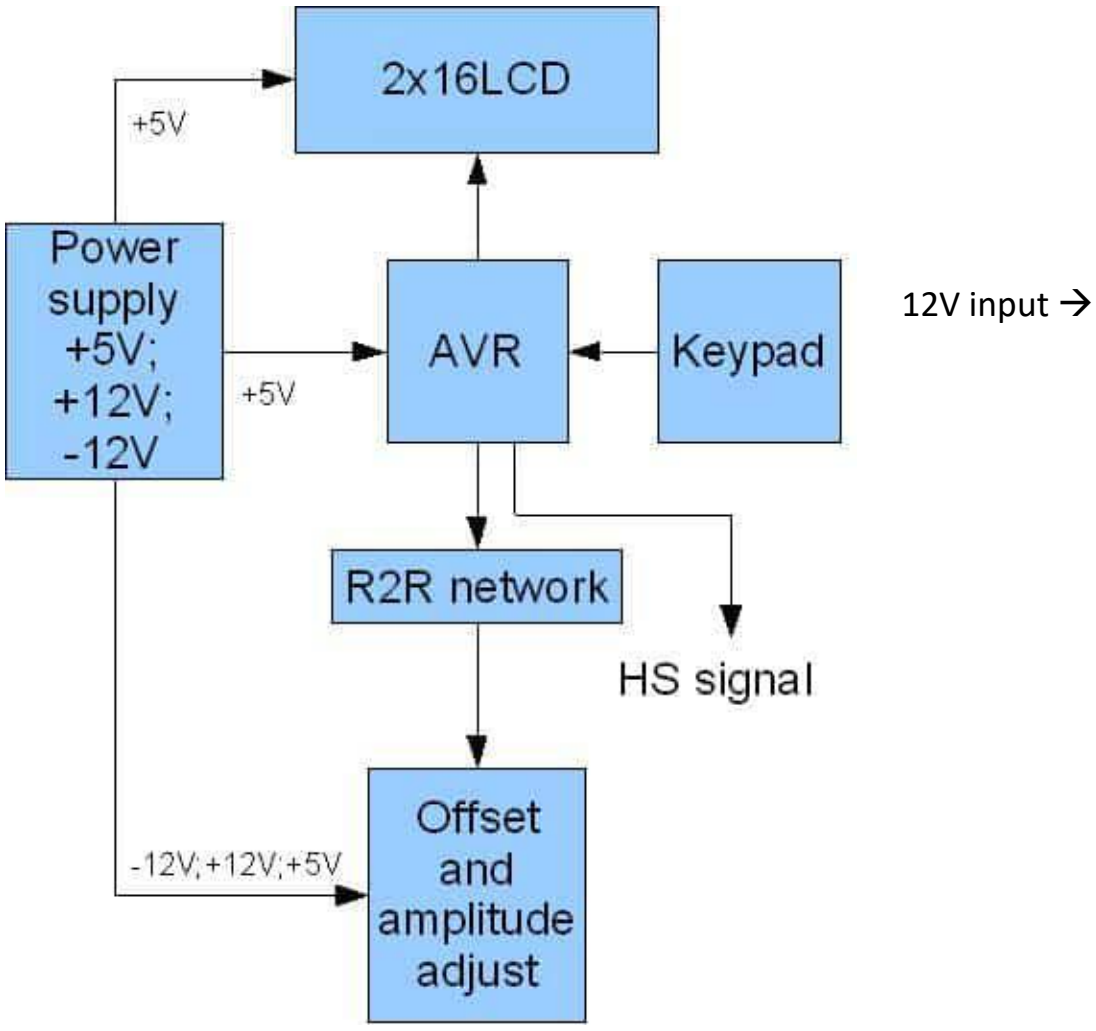


Description

AVR DDS signal generator V2.0 is a firmware-based DDS signal generator that uses a slightly modified Jesper's miniDDS algorithm adapted to AVR-GCC C code as in-line ASM.
The AVR DDS signal generator has two outputs – one for DDS signal and another for high speed [1 - 8MHz] square signal– which may be used to bring back to life microcontrollers with wrong fuse settings, or for other purposes where a high-speed square signal may be needed. The high-speed (HS) signal is output directly from the Atmega16 OC1A(PD5) pin.
The DDS output is used for all complex signals generated via the R2R resistor network and is adjusted via LM358N offset and amplitude regulating circuits. Two potentiometers can control offset and amplitude.
The offset can be controlled in range +5V/-5V while magnitude in range 0-10V.
DDS frequency range is from 0 to 65534Hz which is more than enough for testing audio circuits and other purposes.
Main AVR DDS V2.0 signal generator features:

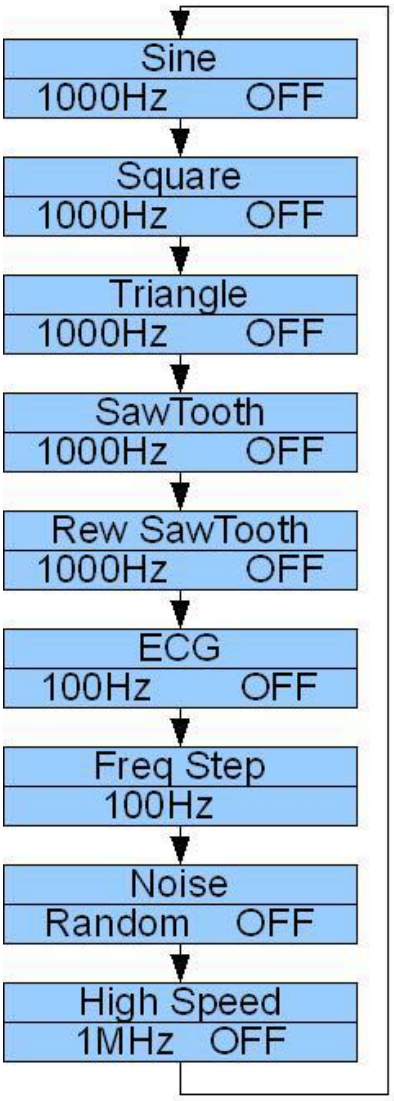
- Single-sided PCB;
- In a box power supply with an external AC plug;
- Dedicated high speed (HS) signal output up to 8MHz;
- DDS signal with variable amplitude and offset;
- DDS signals: sine, square, saw, rev saw, triangle, ECG, and noise.
- 2×16 LCD menu;
- Intuitive five-button keypad plus reset.
- Frequency adjusting steps: 1, 10, 100, 1.000, 10.000Hz;
- Restoring the last configuration after power-up.

Block diagram



Menu system

A complete menu system of the signal generator:



1, 10, 100, 1.000 or 10.000

1, 2, 4 and 8 MHz

Links

Description & Firmware: https://scienceprog.com/avr-dds-signal-generator-v20/
Seller: https://www.aliexpress.com/ - search for “AVR DDS kit”
ExpressPCB (Classic version): http://www.expresspcb.com/