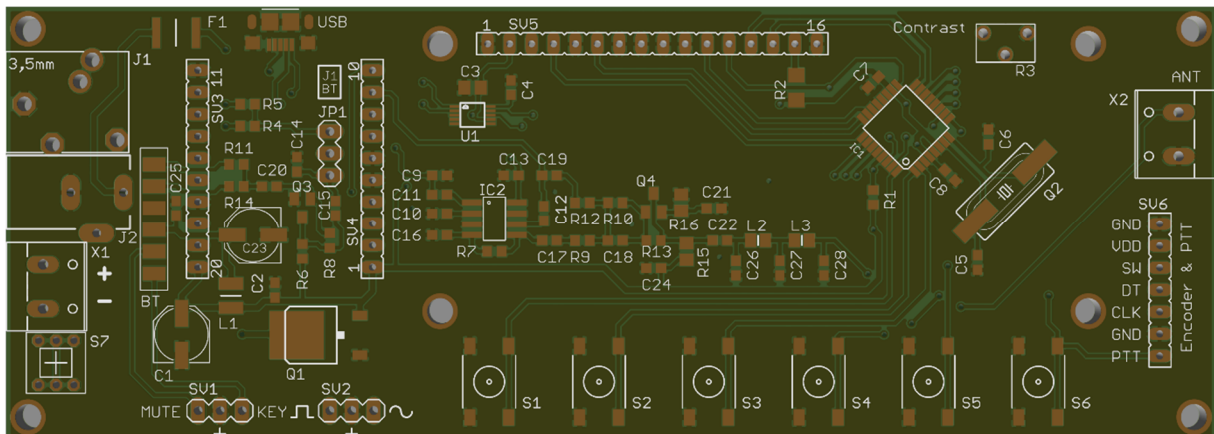
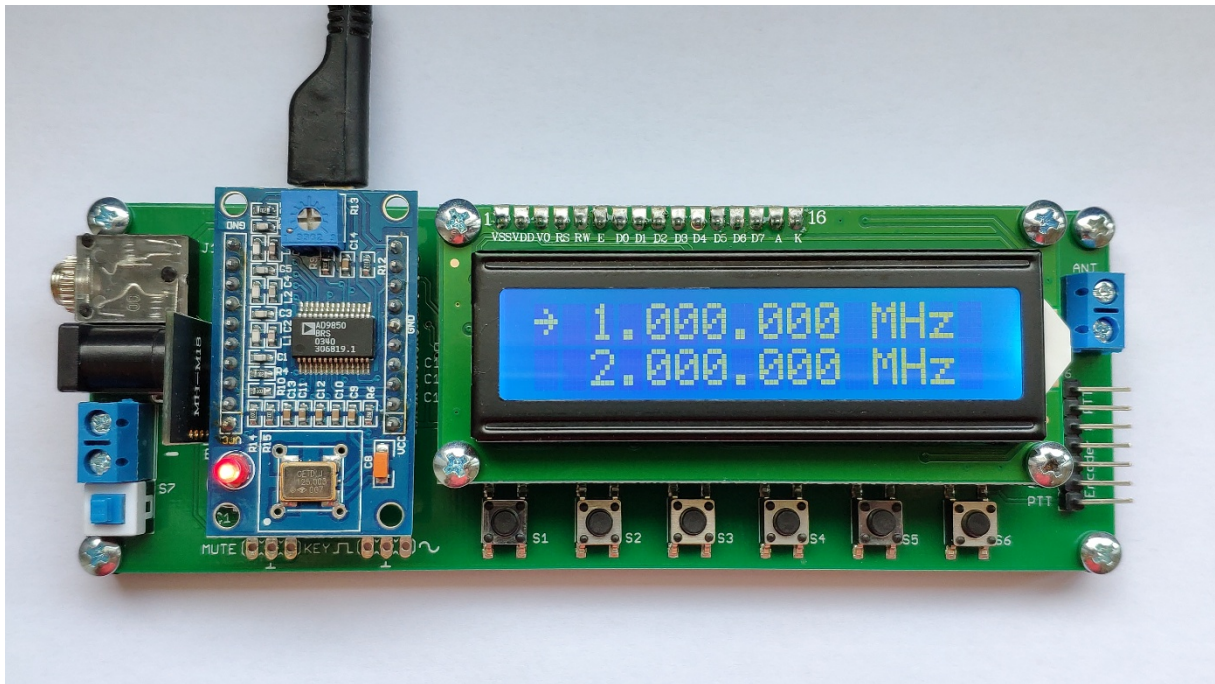


DDS AM Modulator 0-45MHz v3.0



Technical specifications:

Operating voltage: 5VDC (with polarity reversal protection)

Current consumption: 120-140mA

Transmit frequency: 0-45MHz

Transmission range: 5-200cm (range increases at higher frequencies)

Dimensions of the board: 140mm x 50mm

Features:

Tuning steps: 10MHz, 1MHz, 100kHz, 10kHz, 1kHz, 100Hz, 10Hz, 1Hz

AM-Modulation

Harmonic filter for 50MHz output

PTT mode / keypad

2 x 16-character LCD display

Stores frequency settings

Frequency sweep (frequency, time, step size, mode)

Supports rotary Digital encoder

Line IN / Bluetooth 4.2 audio interface

Remote access via computer (USB)

Parts list:

Component	Marking	Value	Quantity
J1	Audio jack	3.5mm	1
J2	DC hollow socket	2.1mm	1
X1, X2	Terminal block	2x1	2
SV3, SV4	Female connector	10x1	2
	DDS module	AD9850	1
SV5	Female connector	16x1	1
	Display	1602	1
	Pin header	16x1	1
SV6	Pin header 90°	7x1	1
	Encoder	KY-040	1
	Connection cable	7 pole	1
R3	Potentiometer	10KΩ	1
S7	Switch	7x7mm	1
JP1	Pin header	3x1	1
	Jumper	2x1	1
ANT	Cable	1m	1
BT	Bluetooth module	MH-M18	1
	PCB	140x50mm	1
	Threaded nut	6mm	4
	Threaded nut	12mm	4
	Screw	M3	12

Description

Thank you for purchasing the DDS AM Modulator Kit. By choosing this kit you have decided on a high-quality product, with which you will surely have a lot of fun. The Construction is easy, just install the components on the board according to the parts list.

However, there are a few things to consider:

- First solder the Bluetooth module on the left side of the circuit board, from both sides to the "BT" pads. Otherwise, it is no longer possible, to solder this later.
- A 4-cell AA battery holder can be connected to terminal block "X1". Only 1.2V batteries should be used in the battery holder. 1.5V batteries will provide more than 6V and will exceed the safe input voltage of the device. The Modulator is protected against polarity reversal.
- A standard 2.1mm hollow-tip power plug can be used to supply regulated 5V at "J1". Outside is ground, inside is positive voltage.
If possible, it shouldn't be used a switched-mode power supply, as this can cause interference with the transmission to a radio later.
- The DDS module must be installed with the LED toward "SV6" near the bottom of the board. Switch "S7" should be installed the two black notches on the side of the blue plastic button toward the left.

Under the audio socket there are two solder bridges for both audio channels that still have to be connected. Attach the 1m long antenna wire at "ANT", on Terminal Block "X2". To improve the range of the Modulator, a ground wire can be connected below "Ant", to the screw on a power socket, a water or heating pipe, etc. When all the parts are on the board and the antenna is attached, the Modulator is ready for use.

Commissioning the Modulator

When the Modulator is started for the first time, the contrast must be set using potentiometer "R3" for the display. To do this, connect the Modulator to a suitable power source. You can operate the DDS AM Modulator with a battery and a power pack at the same time - if the power pack is unplugged from the socket, the Modulator gets power from the battery compartment.

Change the frequency of the Modulator

When first starting the Modulator, the display will look like this:

→ 1.000.000 MHz
2.000.000 MHz

Press the "S6", the frequency set below is selected with →. Pressing the button again activates the frequency set above.

With the buttons "S1-S5" the frequency can be changed independently of the other numbers:

S1	Ten thousand	10 MHz
S2	Thousand	1 MHz
S3	Hundred	100 kHz
S4	Ten	10 kHz
S5	One	1 kHz

If you want to change the frequency range 100Hz, 10Hz and 1Hz, you also press "S1".

→ 12.000.000 MHz → → 12.000.000 MHz

With the buttons "S3-S5" the frequency can be changed independently of the other numbers:

S1+S3	Hundred	100 Hz
S1+S4	Ten	10 Hz
S1+S5	One	1 Hz

Save frequencies

The frequency in line 1 or 2 can be saved independently of each other. To do this, simply jump to the other line with the "S6" key.

→ 1.620.000 MHz
12.000.000 MHz → → 1.620.000 MHz 1.620.000MHz were saved.
→ 12.000.000 MHz

Playing music on a radio

Use your radio to find a free frequency on long wave, medium wave or short wave. Place the radio close to the Modulator, at a comfortable volume, the noise should be clearly audible. The transmission frequency is set using the table above.

Then a computer, smartphone or MP3 player can be connected to the audio socket "J1" on the circuit board and the volume can be turned up so that the music from the radio is not distorted.

Alternatively, the music can be transmitted to the Modulator via Bluetooth. For this you use e.g. a Bluetooth-enabled smartphone and pair it with the Modulator. You will find the Modulator with the designation "MH-M18" or "XFW-M18". If the connection from the smartphone to the Modulator is successful, a confirmation tone sounds on the radio.

Jumper positions:

Audio jack J1	JP1 above vertical
Bluetooth module BT	JP1 below vertical

DDS AM Modulator as a carrier frequency generator for transmitters and receivers

An external radio device with a PTT button can be connected to the "PTT" ("SV6"). The DDS AM Modulator is used as a transmission and reception frequency and provides an RX and TX frequency for a radio device.

→ 1.620.000 MHz → RX (receive)
12.000.000 MHz → TX (send)

If the external key is pressed *, 12MHz will be able at "SV2". When you release the button for receive, 1.62MHz will be output. Please note that "PTT" must be shorted to "GND" in order to change the output frequency.

* please refer: Push to talk – PTT

Push to talk – PTT

"Key" or "external" can be selected in the setup. If "key" is selected, each pulse from "S6" or "PTT" changes between the upper and lower frequency. If "external" is selected, the lower frequency is output as long as "S6" is pressed. It is the same with the external switching contact that is connected to "PTT".

SETUP – Preferences

The setup menu is used to set a few other operating parameters. To enter the Setup Menu, press and hold "S1" while turning on the Modulator. Continue Holding "S1" until the SETUP menu is displayed. Pressing "S3" or "S4" will change the parameters of each Setup menu item. "S6" switches to the next menu item. "S1" switches to the previous item. Changes are saved immediately

==== SETUP ====



Encoder >
disabled



Encoder >
enabled



<Encoder Timing>
164 3.19ms



< Encoder DIR >
Direction 1



< Encoder DIR >
direction 2



< PTT >
key



< PTT >
external



< Echo >
Off



< Echo >
On



< DE/EN >
Deutsch



< DE/EN >
English

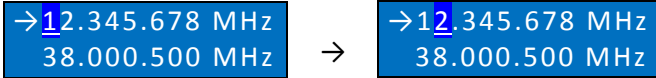


< exit >

Connect encoder for operation

An encoder (e.g. type KY-040, 20 Pulse) can be connected to "SV6" for operation and can be activated or deactivated via the SETUP. The encoder is queried over a preset time interval.

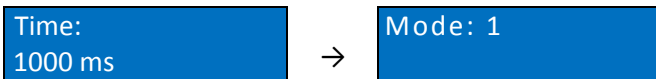
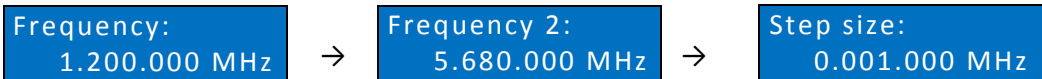
The "Encoder Timing" value can be changed if you want to use a different encoder or if switching (during rotation of the encoder knob) results in incorrect operation, the timing can be set adjusted between 1.01ms (1kHz) and 7.15ms (140Hz). The direction of rotation can be adjusted via "Encoder DIR".



When the Modulator is first turned on, the cursor is always positioned at the left most digit. The highlighted value can be changed from 0-9. Pressing the encoder knob moves the cursor 1 digit to the right.

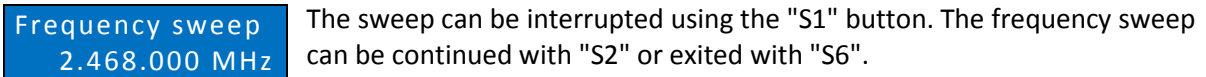
Frequency sweep

With the frequency sweep it is possible to output frequencies in a frequency range. The start frequency (frequency 1), end frequency (frequency 2), step size, time and mode can be defined in advance. To get into the menu, "S1" and then also "S2" must be pressed. The time can be changed up to 10ms with "S1" - "S4". With "S6" you change to the next parameter and the mode is defined with "S1" and "S2" and started with "S6".



In the example below, the DDS Modulator begins at 1.200.000MHz, waits 1000ms, and then adds 1 kHz to the readout. The mode defines the direction and what happens when the sweep is completed.

1	F1→F2, F2→F1, F1→F2, F2→F1...
2	F1→F2, F1→F2, F1→F2, F1→F2...

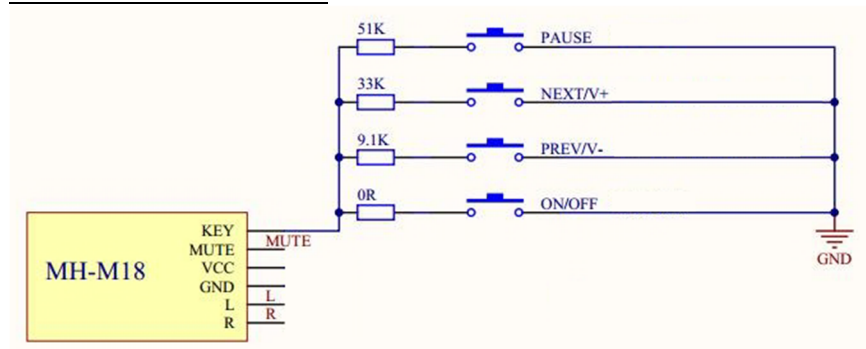


DDS AM Modulator as a frequency generator

At "SV2" the set frequency, which is shown on the display, can be picked up directly without modulation for external tasks. Left: rectangle, middle: ground, right: sine.

The sinus voltage is 1.0VPP (1MHz), but becomes lower and less clean at higher frequencies. The square-wave voltage 5.0VPP (1kHz), however, becomes lower and less clean at higher frequencies. With the potentiometer "R13" of the DDS module the pulse duty factor for rectangle can be set.

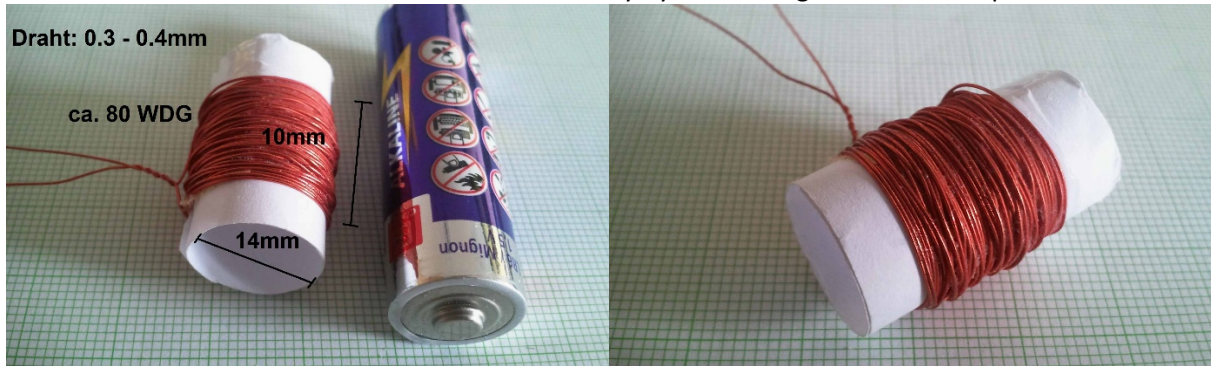
Control bluetooth module



It's possible to connect a combination of resistors and buttons to "SV1" in order to control the Bluetooth source remotely. The "Mute" output is high-active in the mute mode.

Inductive transmission with coil and capacitor

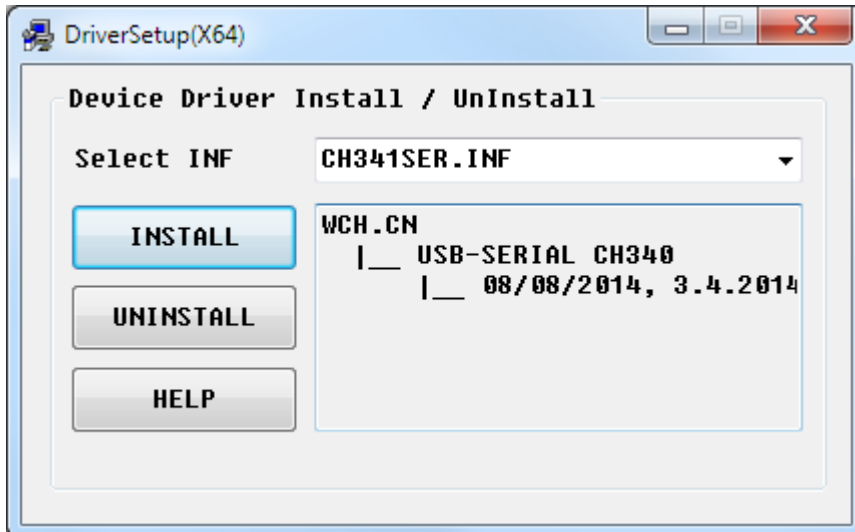
The DDS AM Modulator can also transmit inductively by connecting a coil with a capacitor.



A ceramic capacitor with 1nF should also be connected in series with the coil to ground. Connect the other end to "ANT" (X2). The resonance frequency is 1.7MHz. That ranges from long wave to short wave. At higher frequencies the coil or capacitor should be adapted.

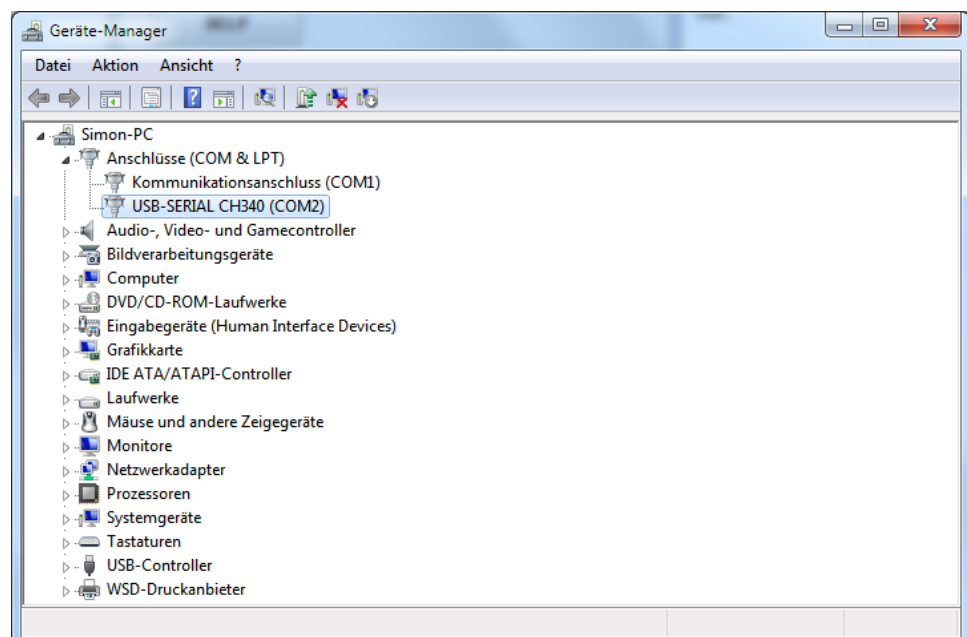
Install device drivers

The Modulator can't only be supplied with power via the micro-USB socket, but also e.g. controlled from a computer. In Windows, first install the verified driver from WCH. Alternatively, you can download the current driver from the [official website](#).

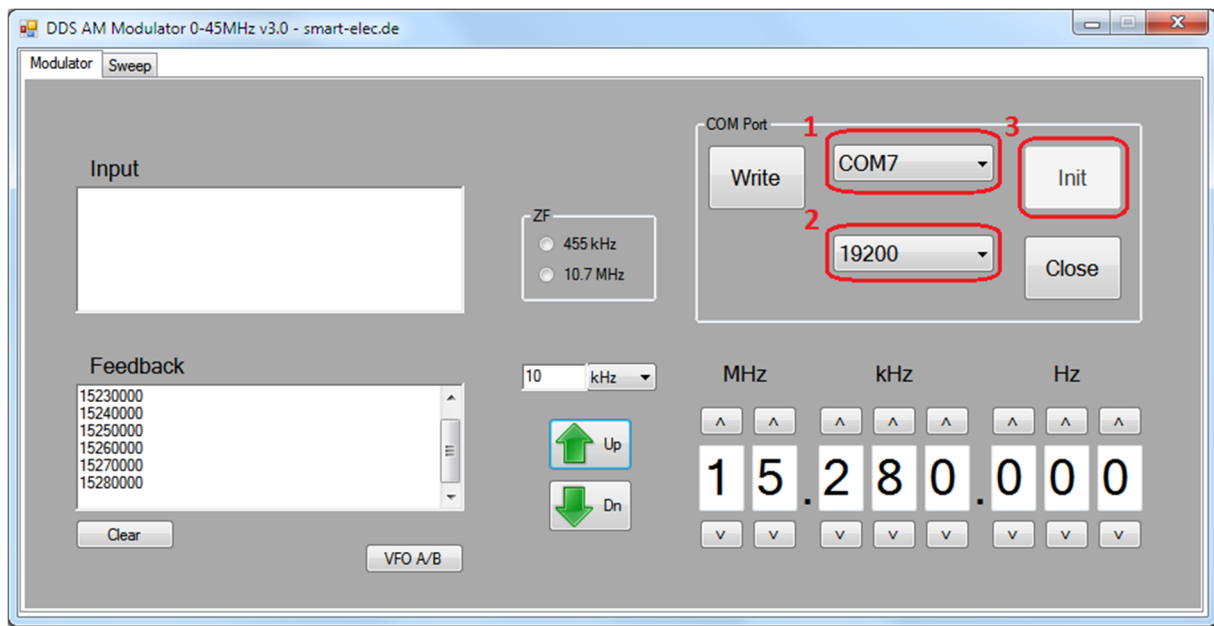


Connect the Modulator to a free USB port on your computer. Open the program and first press on uninstall, then on install. Now a message appears stating that the installation was successful.

Open the device manager in the control panel and read off the COM port which the Modulator is connected.



Windows application for the DDS AM Modulator



First, plug the Modulator into a free USB port on your computer, press "S2" and then switch on the Modulator. Then open the enclosed program. First, select the correct COM port, which you have read in the device manager beforehand, and set the speed to 19200 baud. To establish a connection from the computer to the Modulator, press "Init". The connection can be disconnected via "Close".

On the first tab you can change the frequency with the arrow keys. Use the "VFO A/B" button to choose between the upper and lower frequencies. If Echo was activated in the SETUP of the Modulator, the output frequency is sent to the Modulator as feedback back to the computer. In the input field, the frequency can be entered manually and is transferred using the "Write" button.



On the second page you have the option to have frequencies output periodically via a frequency sweep.

The operation should be self-explanatory. All parameters of the program are stored in a text file "AD9850.ini", which is in the same directory, as the program was started.

Alternatively, you can send a number for the output frequency to the modulator with any other terminal program: **Baud rate 19200, Parity None, Databits 8, Stopbits 1, Handshaking None.**