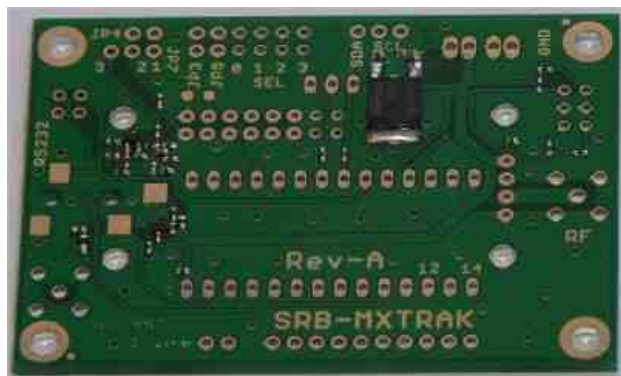


Small RF Budget **SRB-MXTRAK** Motherboard for **SRB-MX145H** V 1.0.0

Thank you for purchasing our motherboard for the SRB-MX145H 2m transmitter! This is a universal motherboard available in two versions which can be used to simply test the SRB-MX145H (or SRB-MX146LV) or to build small 2m transmitters up to a complete tracking unit. All variants come fully SMD assembled and with the required through-hole parts which have to be soldered on dependent on the desired version.



SMD assembled board



Assembled for OT1+SMT, 8-16VDC supply

SRB-MXTRAK-STD:

This is the standard version and is designed to be used for just the SRB-MX145 with direct audio input or input via a filter but an Argent Data OT1+SMT tracker can be installed to make it an almost complete tracker unit except for the GPS receiver.

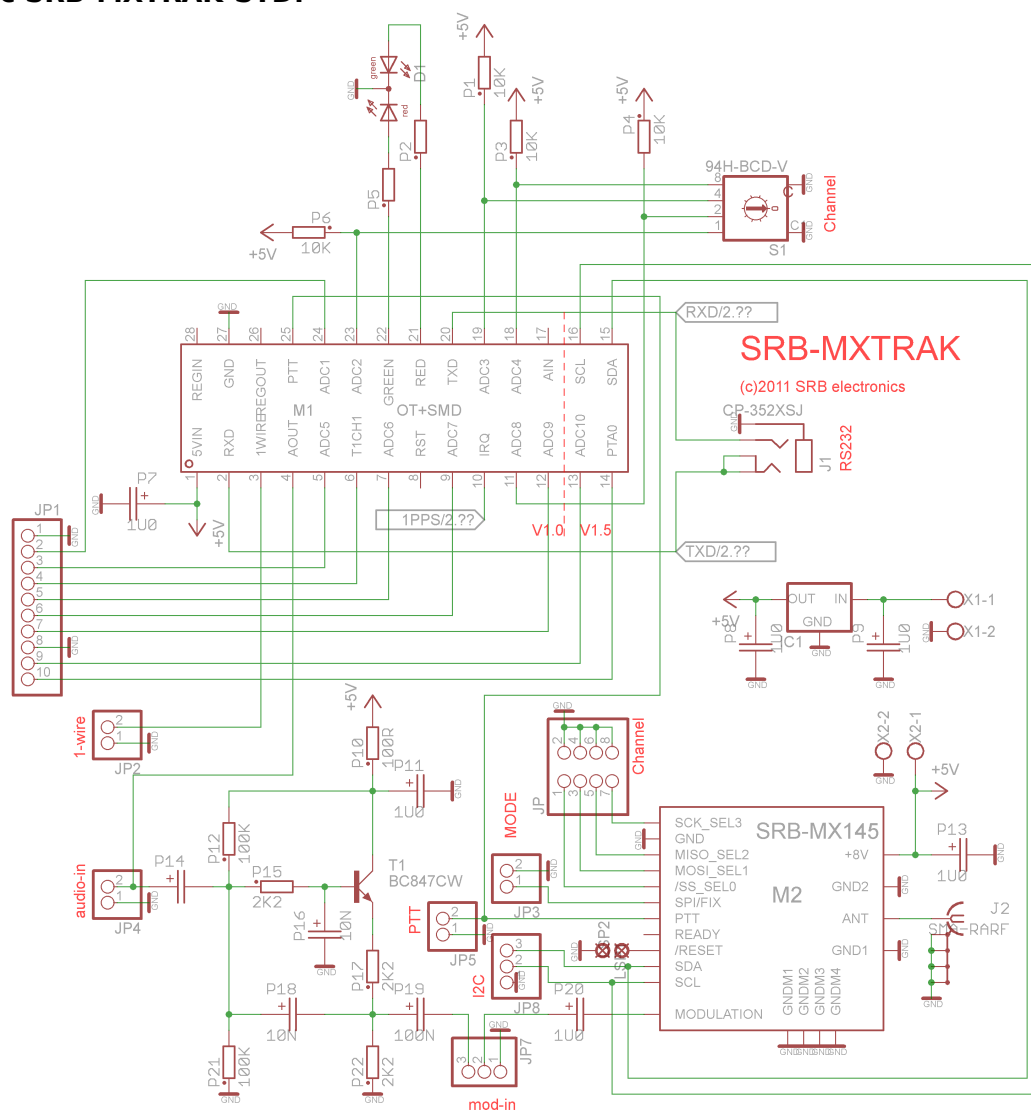
SRB-MXTRAK-GPS:

This is the same as above but with a GPS receiver installed on the bottom side of the board. By adding an SRB-MX145 transmitter module, an OT1+SMT (V1.0 or V1.5) and an active GPS antenna it forms a complete tracking solution. It comes with an additional SMA RF connector for the GPS antenna but not the encoder for OT1+SMT V1.5.

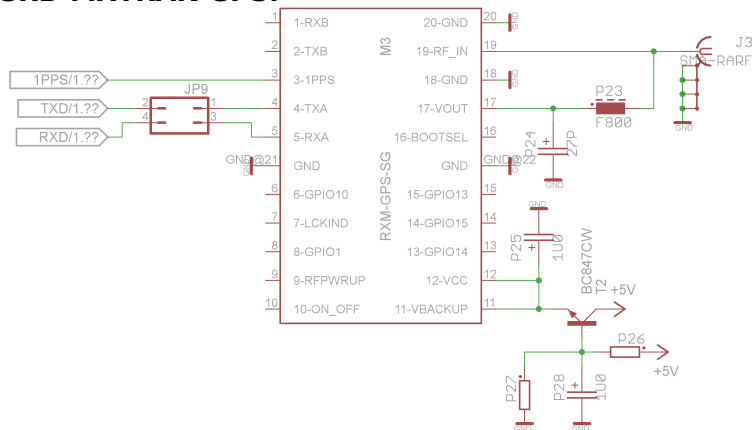
Note:

There is sufficient space under the SRB-MX145H module to install an IC socket (low profile) for the OT1+SMT modules. V1.0 requires a 24-pin socket and V1.5 a 28-pin socket (not included).

Schematic SRB-MXTRAK-STD:



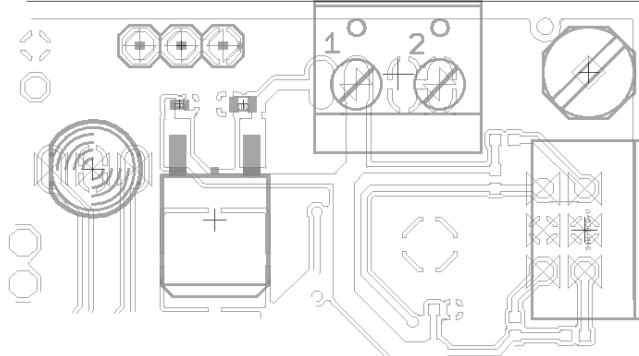
additional circuits SRB-MXTRAK-GPS:



The very first decision to make is what supply voltage the SRB-MXTRAK will be operated with.

The board allows for two options, 4.5VDC – 5.5VDC and 8VDC to 16VDC. **Please be aware that a voltage of more than 5.8VDC applied to a board which is wired for 4.5-5.5VDC will permanently destroy almost everything on the board!**

Power supply assembly for 5V nominal (4.5VDC to 5.5VDC):

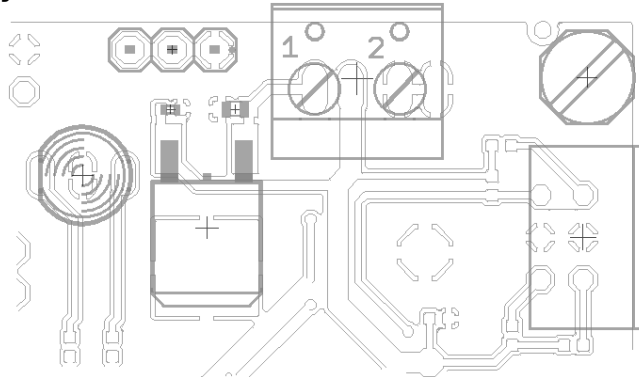


The power connector has to be soldered into the **RIGHT side pair of holes!**

IMPORTANT!

Except for the standard test board assembly (= no OT1+SMT and no GPS!) the supply voltage may **NEVER** exceed 5.8VDC!

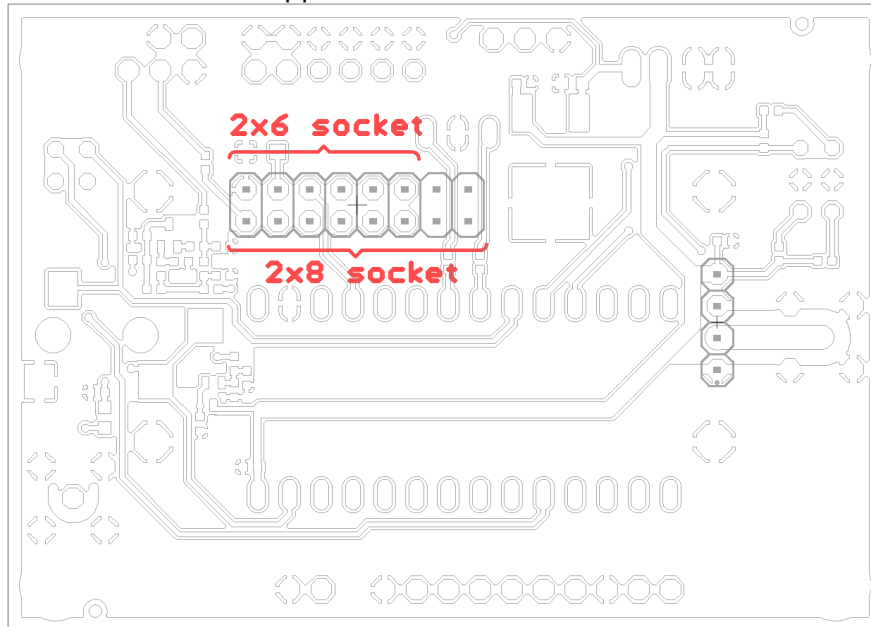
Power supply assembly for 12V nominal (8VDC to 16VDC):



The power connector has to be soldered into the **LEFT side pair of holes!** In this configuration the raw input voltage is connected to the OT1+SMT REG_IN pin which gets measured in the processor and can be transmitted.

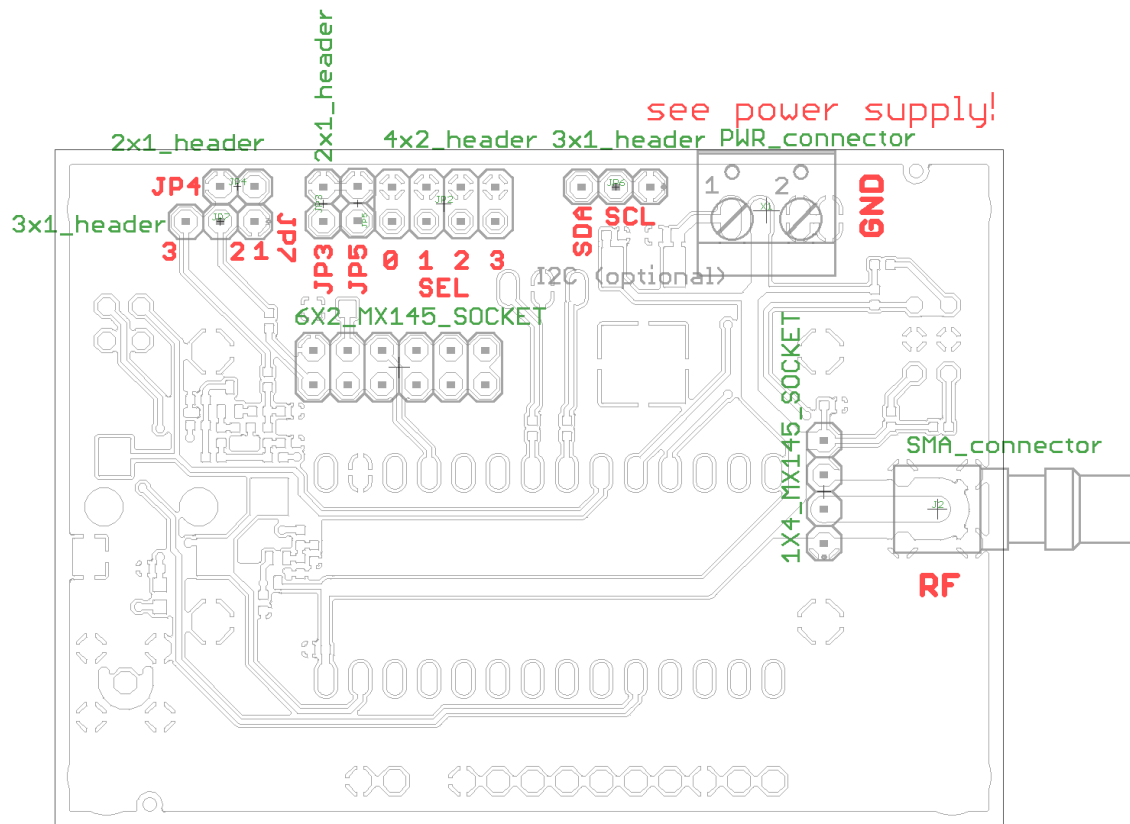
Sockets for TX module:

As 2x6 sockets for the SRB-MX145H are sometimes difficult to get the board has provisions for installing a 2x8 socket instead. 4 pins will not be used as the header in the SRB-MX145H only has 2x6 pins. The SRB-MXTRAK will be shipped with whatever is available at the time of packing.



The easiest way to install the sockets is to push them onto a SRB-MX145H or SRB-MX146LV module, insert them into the SRB-MXTRAK board and solder them in. This way the alignment will perfectly fit the module. As all modules are manufactured in a similar manner their sockets are always the same which makes it easy to exchange modules.

Assembly for a standard test board:



Components:

- 1pcs header 2x1 contacts (JP4)
- 2pcs header 3x1 contacts (JP7, I2C optional)
- 1pc header 6x2 contacts (JP3, JP5, SEL0-3)
- 1pc socket 4x1 (MX145)
- 1pc socket 6x2 (MX145)
- 1pc power connector
- 1pc right angle SMA connector

Solder all headers, the power connector and the right angle SMA connector to the board as shown in the above picture.

Take an SRB-MX145H (or SRB-MX146LV) and push the supplied sockets in the headers on the module. Insert the module into the motherboard and solder all pins of the sockets from the bottom side of the board. Using the SRB-MX145H as a “stencil” insures that the connectors are well aligned.

Ready to apply the supply voltage (without an OT1+SMT it can be 4.5VDC to 8VDC), modulation an antenna and the board is ready to go.

SEL 0-3 sets the transmit frequency according to the table shown in the SRB-MX145H datasheet or it can be used as a 3.3V CMOS level SPI I/O to communicate with the module. To use the jumper programming JP3 has to be shorted with a jumper, to use SPI mode leave open.

I2C programming can be done in both configuration. The SRB-MX145H already contains the pull-up resistors to 3.3V.

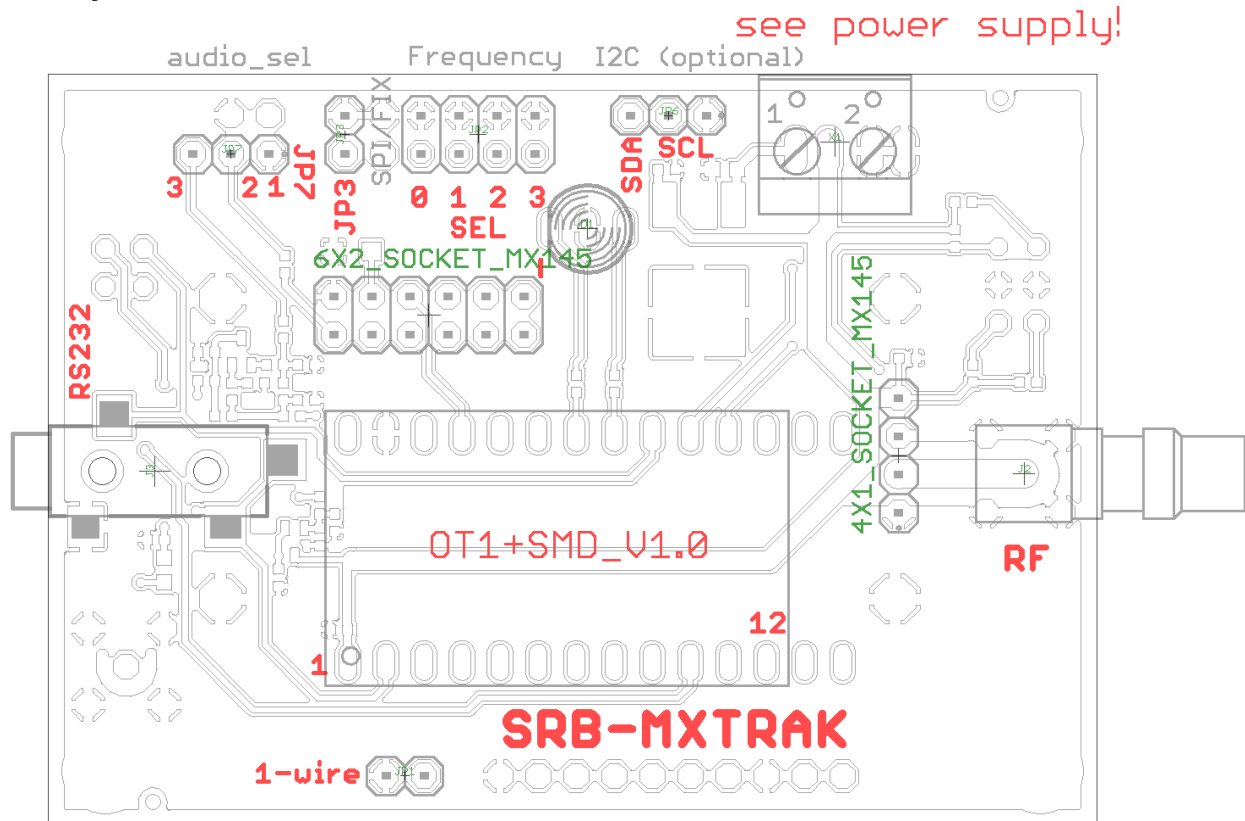
Audio can be supplied in two ways.

Direct input to the module is via JP7 with pin1=GND and pin2= audio-in.

Input via a lowpass filter via JP4 with pin2=GND and pin1= audio-in. JP7 has to have a jumper from pin2 to pin3 to connect the audio to the module.

JP5 is the PTT input, the pin towards the board edge is ground.

Assembly with OT1+SMT V1.0:



Components:

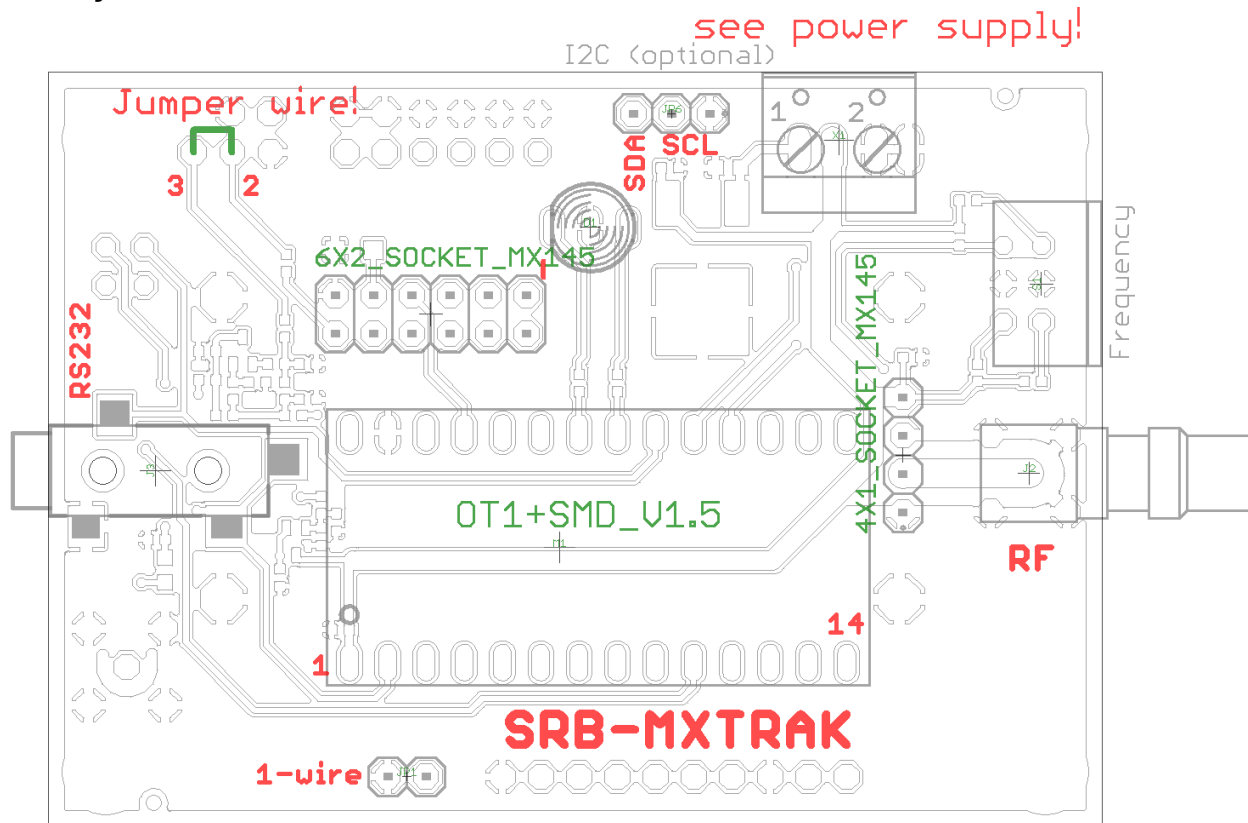
- 1pcs header 2x1 contacts (JP3)
- 2pcs header 3x1 contacts (JP7, I2C optional)
- 1pc header 4x2 contacts (SEL0-3)
- 1pc socket 4x1 (MX145)
- 1pc socket 6x2 (MX145)
- 1pc power connector
- 1pc right angle SMA connector
- 1pc 3.5mm coaxial socket (RS232)
- 1pc Duo-LED red/green
- 1pc OT1+SMT V1.0 (not included)

JP5 (PTT) can be installed if it is desired to use JP7 as a direct audio input and disable the audio coming from the filter. For normal operation JP7 needs a jumper connecting pin2 and 3.

Assemble all components as described above with the sockets for the SRB-MX145H last using the TX module as a stencil. Make sure the LED is inserted in the correct orientation with the flat side where the marking is on the board or red and green are reversed. OT1+SMT V1.0 has only 24pins! Make sure to install it all the way to the left and in the correct orientation. Pin 1 is bottom left.

Frequency programming can be done the same way as for the testboard either by putting a jumper on JP3 (SPI/FIX) and using jumpers on SEL0-3 or via SPI without a JP3 jumper. I2C programming is possible in both modes.

Assembly with OT1+SMT V1.5:



Components:

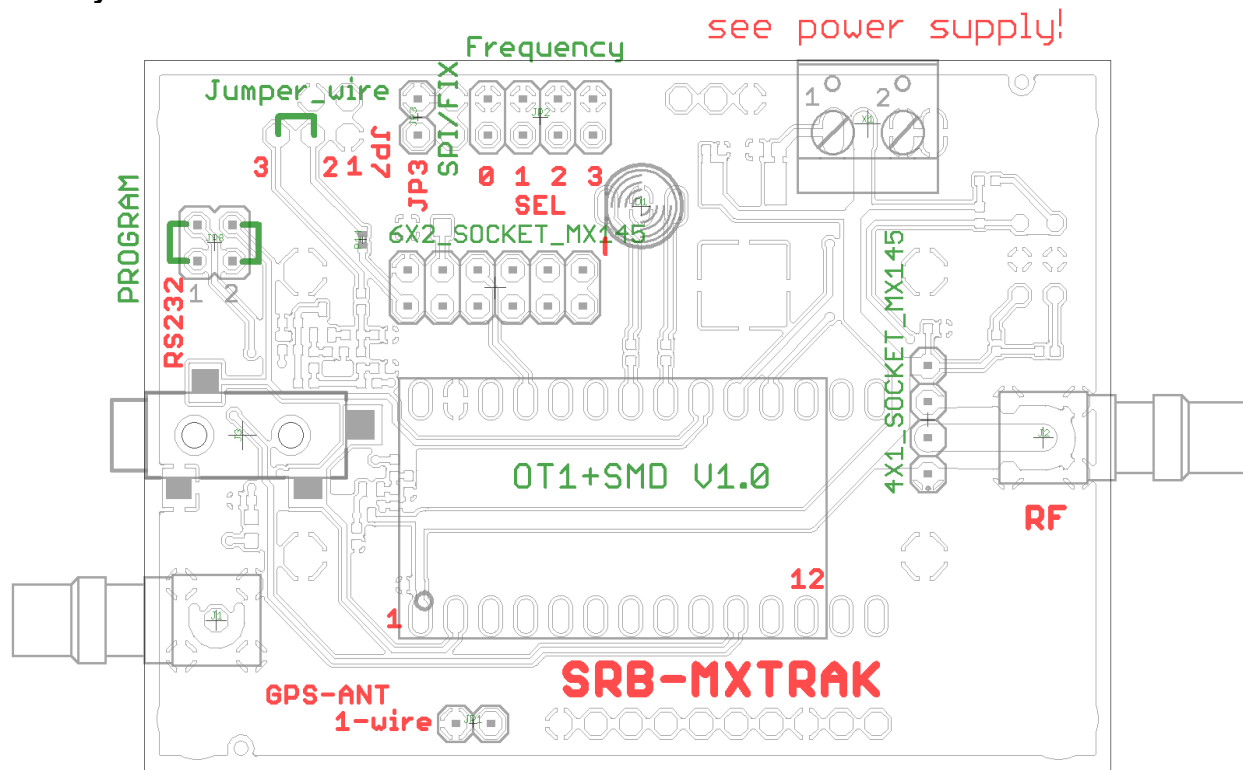
- 1pc header 3x1 contacts (I2C optional)
- 1pc socket 4x1 (MX145)
- 1pc socket 6x2 (MX145)
- 1pc power connector
- 1pc right angle SMA connector
- 1pc 3.5mm coaxial socket (RS232)
- 1pc Duo-LED red/green
- 1pc binary switch (not included), Greyhill 94HBB16RAT (Digikey GH7262-ND)
- 1pc OT1+SMT V1.5 (not included)

A wire jumper has to be soldered into the holes of JP7 connecting 2 and 3!!

Assemble all components as described above with the sockets for the SRB-MX145H last using the TX module as a stencil. Make sure the LED is inserted in the correct orientation with the flat side where the marking is on the board or red and green are reversed.

Frequency selection is done via the OT1+SMT V1.5 with the binary encoder.

Assembly SRB-MXTRAK-GPS with OT1+SMT V1.0:



Components:

- 1pcs header 2x1 contacts (JP3)
- 1pc header 4x2 contacts (SEL0-3)
- 1pc header 2x2 (PROGRAM)
- 1pc socket 4x1 (MX145)
- 1pc socket 6x2 (MX145)
- 1pc power connector
- 2pcs right angle SMA connector
- 1pc 3.5mm coaxial socket (RS232)
- 1pc Duo-LED red/green
- 1pc OT1+SMT V1.0 (not included)

A wire jumper has to be soldered into the holes of JP7 connecting 2 and 3!!

Assemble all components as described above with the sockets for the SRB-MX145H last using the TX module as a stencil. Make sure the LED is inserted in the correct orientation with the flat side where the marking is on the board or red and green are reversed.

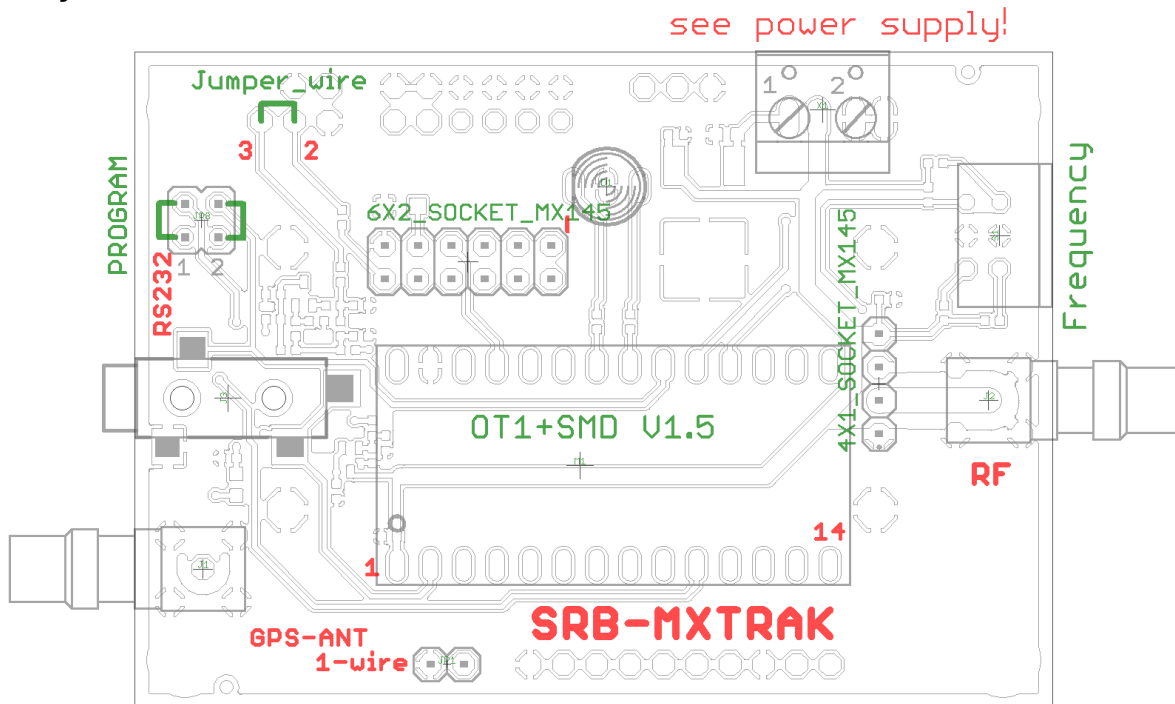
OT1+SMT V1.0 has only 24pins! Make sure to install it all the way to the left and in the correct orientation. Pin 1 is bottom left.

Frequency programming can be done the same way as for the testboard either by putting a jumper on JP3 (SPI/FIX) and using jumpers on SEL0-3 or via SPI without a JP3 jumper.

IMPORTANT!

The RS232 interface can only be used to program the OT1+SMT via it's user interface! To do this no jumpers may be installed on the header named PROGRAM!!! For normal operation, not programming, 2 jumpers have to be installed as shown on the assembly plan.

Assembly SRB-MXTRAK-GPS with OT1+SMT V1.5:



Components:

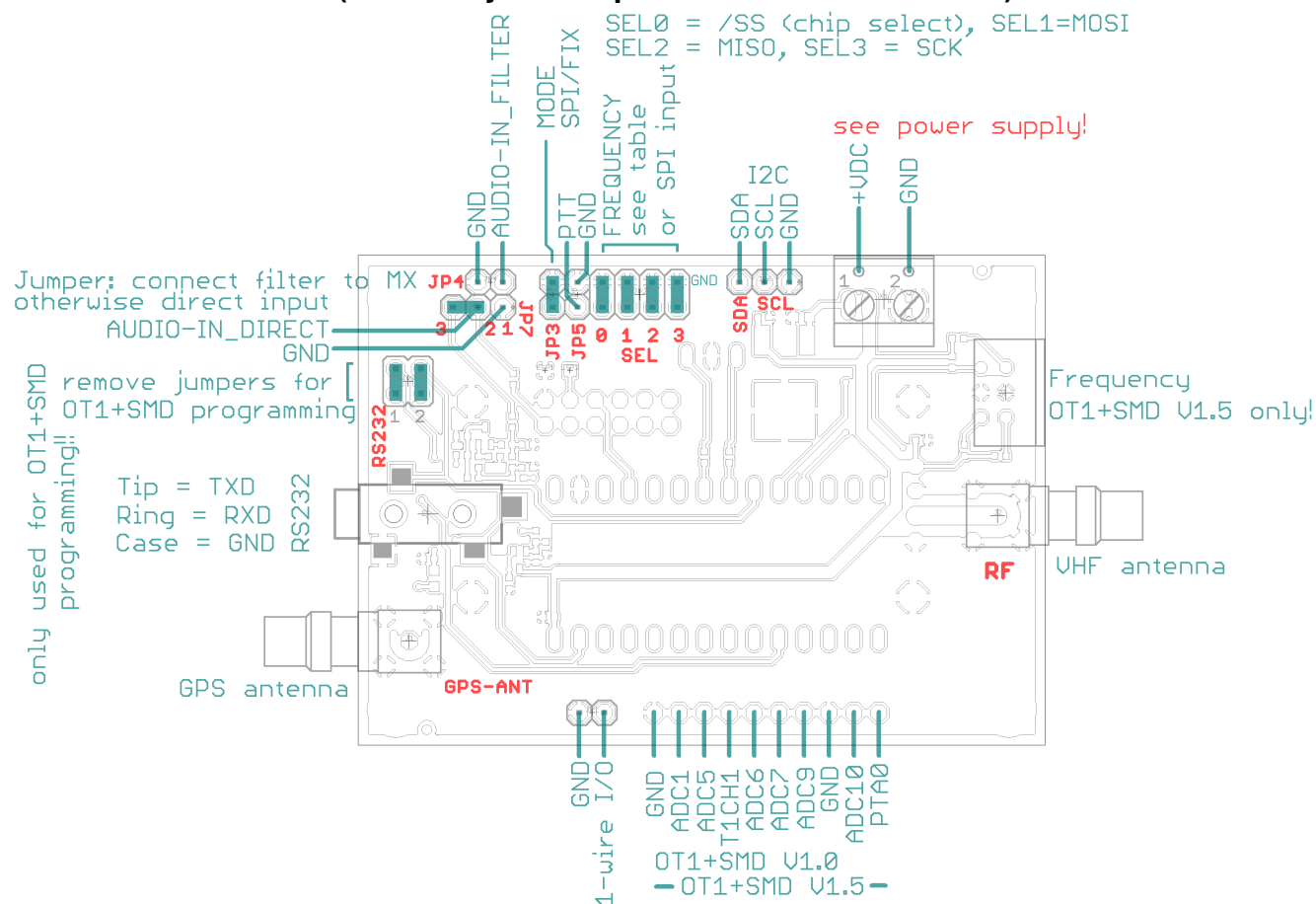
- 1pc header 2x2 (PROGRAM)
- 1pc socket 4x1 (MX145)
- 1pc socket 6x2 (MX145)
- 1pc power connector
- 2pcs right angle SMA connector
- 1pc 3.5mm coaxial socket (RS232)
- 1pc Duo-LED red/green
- 1pc OT1+SMT V1.5 (not included)
- 1pc binary switch (not included), Greyhill 94HBB16RAT (Digikey GH7262-ND)

A wire jumper has to be soldered into the holes of JP7 connecting 2 and 3!!

Assemble all components as described above with the sockets for the SRB-MX145H last using the TX module as a stencil. Make sure the LED is inserted in the correct orientation with the flat side where the marking is on the board or red and green are reversed.

Frequency selection is done via the OT1+SMT V1.5 with the binary encoder (not included).

External connections (some may not be present in some versions!):



IMPORTANT! SRB-MXTRAK-GPS only.

The RS232 interface can only be used to program the OT1+SMT via it's user interface! To do this no jumpers may be installed on the header named PROGRAM!!! For normal operation, not programming, 2 jumpers have to be installed as shown in the connection plan.

Factory pre-programmed frequencies, can be changed by user:

2	0010	144.9900	MHz
3	0011	144.3500	MHz
4	0100	144.8000	MHz
5	0101	145.1750	MHz
6	0110	144.5750	MHz
7	0111	144.9300	MHz
8	1000	144.6400	MHz
9	1001	144.6600	MHz
A	1010	147.7000	MHz
B	1011	144.0000	MHz
C	1100	145.0075	MHz
D	1101	146.0050	MHz
E	1110	147.0025	MHz
F	1111	148.0000	MHz

Sequence:
SEL3 SEL2 SEL1 SEL0

An easy way to supply the SRB-MXTRAK from a 12V supply (i.e. car) is to buy one of these cigarette lighter plugs for charging cellphones with USB (mini or micro) connector. Cut off the USB connector, determine the polarity and hook it up.

Specification (all):

Board dimensions:	70*50mm (~2.75"*2")
RF connector VHF:	SMA female 50R
Supply voltage:	5VDC nominal, 4.5VDC to 5.5VDC
RS232 connector:	3.5mm coaxial. Tip = TXD, Ring = RXD, Case = GND
Headers:	2.54mm (0.1") spacing
Power supply connection:	screw terminal, 5.08mm (0.2")
Operating temperature range:	-30C to +85C

Content:	SMD assembled PCB
	2x8 header (break into required length)
	1x20 header (break into required length)
	2x6 pin socket (or 2x8 pin socket)
	1x4 pin socket
	SMA right angle connectors
	0.2" screw terminal
	6 jumpers
	3.5mm coaxial socket
	1 duo LED red/green

Specification (SRB-MXTRAK-GPS only):

same as above

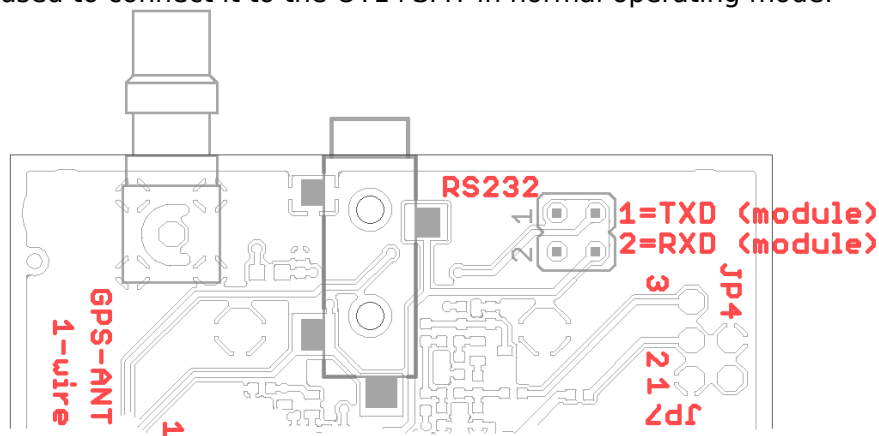
GPS engine:	Linx Technologies RXM-GPS-SG (SiRF Star III)
Receiver type :	20 Channels; GPS L1 frequency, C/A Code
Time-To-First-Fix:	Cold Start (Autonomous): 35s
	Hot Start (outdoor): 2s
	Hot Start (indoor): 15s
Sensitivity:	Tracking & Navigation: -159 dBm
	Cold Start (Autonomous): -144 dBm
Operational limits:	Altitude 60000 ft
	Velocity 1000 knots
Position Accuracy	
Autonomous	10m
SBAS	5m
additional content:	2 jumpers
	SMA right angle connector

Optional parts (not included):

- SRB-MX145H
- OT1+SMT Version 1.0 or 1.5 (Argent Data Systems)
- IC socket for OT1+SMT (V1.0 = 24-pin, V1.5 = 28-pin)
- GPS receiver (with OT1+SMT and -STD only)
- active GPS antenna, 3.3V/50mA max, SMA plug (-GPS only)
- Encoder Greyhill 94HBB16RAT (Digikey GH7262-ND, OT1+SMT V1.5 only!)
- RS232 3.5mm to DB9 cable
- 2m antenna
- 4pcs M2.5, 18-20mm long, Nylon screws and 12pcs Nylon nuts to secure the SRB-MX145 module

Communicating with the GPS module (SRB-MXTRAK-GPS only):

This is only for test purposes and not for normal use as the OT1+SMT usually communicates directly with the GPS module. TXD and RXD (3V CMOS level!) of the GPS module can be accessed via the headers used to connect it to the OT1+SMT in normal operating mode.



Ground has to be connected to one of the ground pins on other headers or to the outside of the SMA connector. **Make sure to use a level converter to connect to a regular RS232 port!!** The module can NOT handle the +/-5V to 15V swing of such a port.

A control program can be found on the website of the module manufacturer: <http://www.linxtechnologies.com> for the GPS module RXM-GPS-SG.

