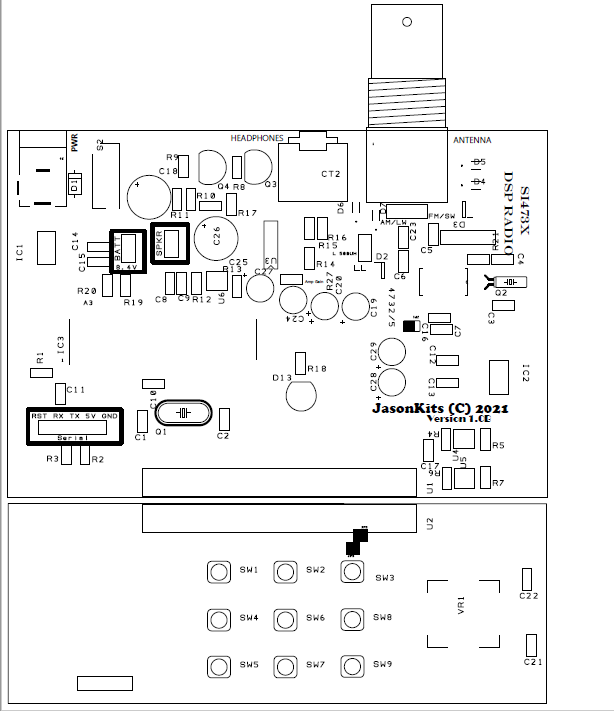
Arduino SI4635 DSP RADIO

Component Top Overlay



1-2-3

Jumper -

1-2 : MW/LW/SW

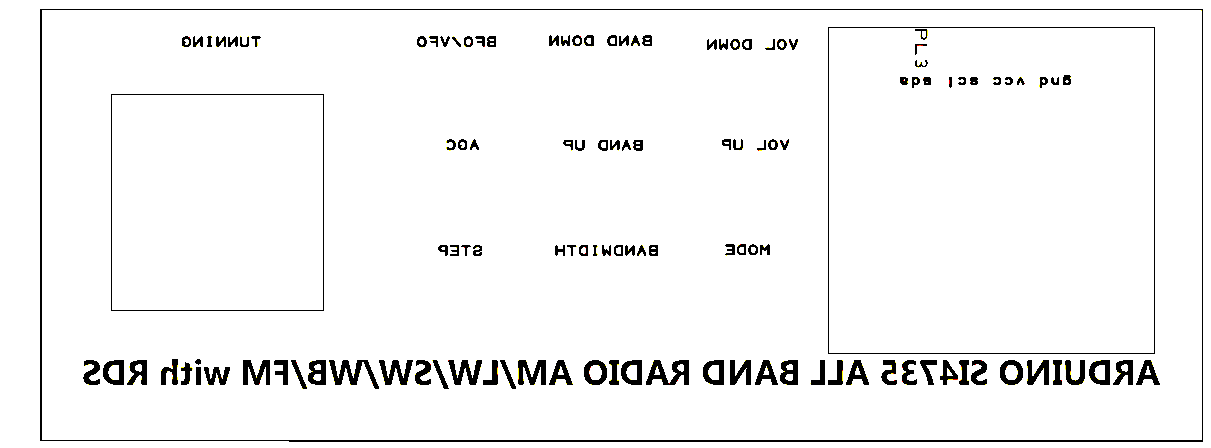
2-3: FM **Default**

AM -FM

-

+

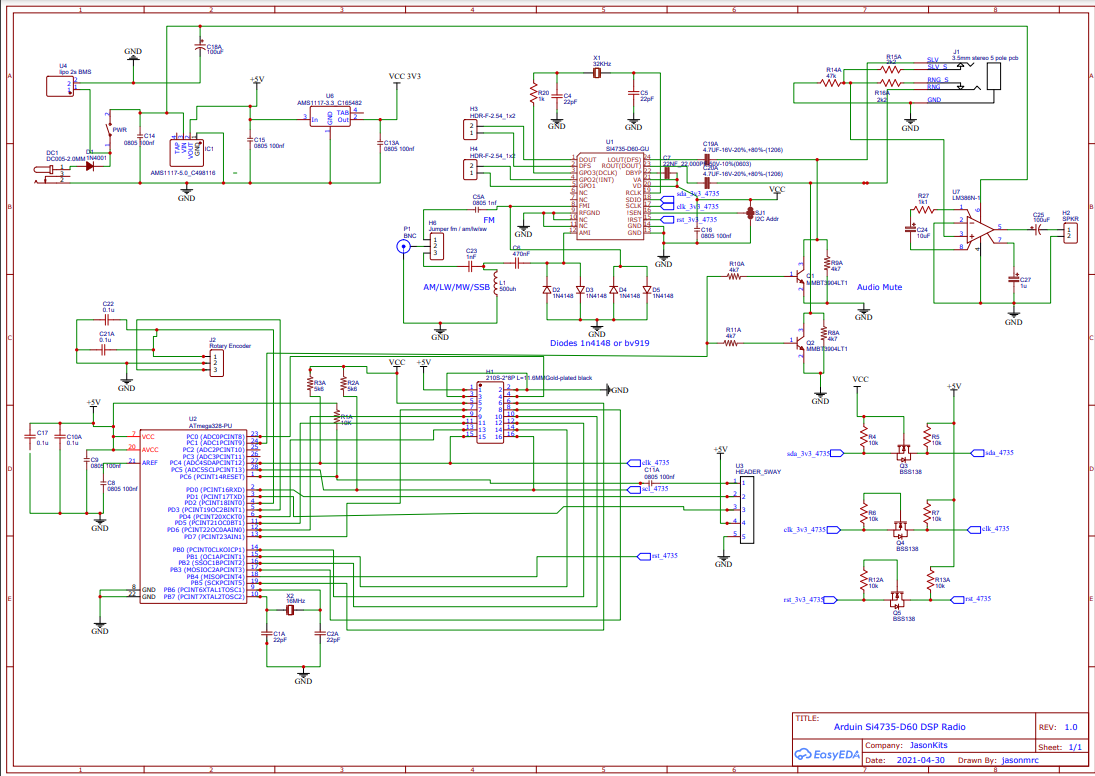
Front panel



Rotary Encoder

Oled 0.96”

Schematic Diagram



Diagram, schematic

Description automatically generated

Components list

|  |  |  |
| --- | --- | --- |
|  |  |  |
| Ref Name | Qty | Component |
| Q3 | 1 | 2N3904 |
| Q4 | 1 | 2N3904 |
| PL2 | 1 | 2WP |
| PL6 | 1 | 2WP |
| LL | 1 | 2WP |
| PL5 | 1 | 3WP |
| CT2 | 1 | 3.5mm Stereo |
| PL3 | 1 | 4WP |
| PL4 | 1 | 4WP |
| PL1 | 1 | 5WP |
| U3 | 1 | 8DIL |
| U1 | 1 | 20SIL |
| U2 | 1 | 20SIL |
| IC3 | 1 | ATMEGA328P-PU |
| D2 | 1 | BAV199,215 |
| D3 | 1 | BAV199,215 |
| 1 | 1 | BNCPTH |
| U4 | 1 | BSS123 |
| U5 | 1 | BSS123 |
| U6 | 1 | BSS123 |
| C1 | 1 | C0805 – 22PF |
| C2 | 1 | C0805 – 22PF |
| C3 | 1 | C0805 – 22PF |
| C4 | 1 | C0805 – 22PF |
| C5 | 1 | C0805 – 1NF |
| C6 | 1 | C0805 – 470NF |
| C7 | 1 | C0805 – 22NF |
| C8 | 1 | C0805 – 100NF |
| C9 | 1 | C0805 – 100NF |
| C10 | 1 | C0805 – 100NF |
| C11 | 1 | C0805 – 100NF |
| C12 | 1 | C0805 – 100NF |
| C13 | 1 | C0805 – 100NF |
| C14 | 1 | C0805 – 100NF |
| C15 | 1 | C0805 – 100NF |
| C16 | 1 | C0805 – 100NF |
| C17 | 1 | C0805 – 100NF |
| C21 | 1 | C0805 – 100NF |
| C22 | 1 | C0805 – 100NF |
| C23 | 1 | C0805 – 1NF |
| C26 | 1 | C0805 – 10NF \* |
| C18 | 1 | CP 1000UF 16V |
| C25 | 1 | CP 100UF 16V |
| C19 | 1 | CP1 4.7UF |
| C20 | 1 | CP1 4.7UF |
| C24 | 1 | CP1 10UF |
| C27 | 1 | CP1 10UF |
| C28 | 1 | CP1 10UF |
| C29 | 1 | CP1 10UF |
| Q1 | 1 | CRYSTALHC49UV 16MHZ |
| Q2 | 1 | CRYSTALTC26H 32.768 Khz |
| D1 | 1 | Diode 1N4001-7 |
| JP2 | 1 | JUMPER-2SMD-NC |
| JP3 | 1 | JUMPER-2SMD-NC |
| JP1 | 1 | JUMPER-3-OLD2-3 |
| S2 | 1 | LC1258EENP |
| D13 | 1 | LED |
| D4 | 1 | LL4148 – do not install if bav919 installed |
| D5 | 1 | LL4148– do not install if bav919 installed |
| D6 | 1 | LL4148– do not install if bav919 installed |
| D7 | 1 | LL4148– do not install if bav919 installed |
| VR1 | 1 | PEC11R-4220F-S0024 – rotary encoder |
| J4 | 1 | POWER\_JACKPTH\_LOCK |
| R1 | 1 | RESISTOR0805-RES 10K |
| R2 | 1 | RESISTOR0805-RES 5K6 \*do not install |
| R3 | 1 | RESISTOR0805-RES 5K6 \*do not install |
| R4 | 1 | RESISTOR0805-RES 10K \* |
| R5 | 1 | RESISTOR0805-RES 10K \* |
| R6 | 1 | RESISTOR0805-RES 10K \* |
| R7 | 1 | RESISTOR0805-RES 10K \* |
| R8 | 1 | RESISTOR0805-RES 4K7 |
| R9 | 1 | RESISTOR0805-RES 4K7 |
| R10 | 1 | RESISTOR0805-RES 4K7 |
| R11 | 1 | RESISTOR0805-RES 4K7 |
| R12 | 1 | RESISTOR0805-RES 10K |
| R13 | 1 | RESISTOR0805-RES 10K |
| R14 | 1 | RESISTOR0805-RES 47K |
| R15 | 1 | RESISTOR0805-RES 10K |
| R16 | 1 | RESISTOR0805-RES 10K |
| R17 | 1 | RESISTOR0805-RES 10R \* |
| R18 | 1 | RESISTOR0805-RES 1K |
| R19 | 1 | RESISTOR0805-RES 100K |
| R20 | 1 | RESISTOR0805-RES 10K |
| R27 | 1 | RESISTOR0805-RES 1K1 |
| R21 | 1 | RESISTOR0805-RES 2.2K |
| SW1 | 1 | SW\_FSM2JH tact switch |
| SW2 | 1 | SW\_FSM2JH tact switch |
| SW3 | 1 | SW\_FSM2JH tact switch |
| SW4 | 1 | SW\_FSM2JH tact switch |
| SW6 | 1 | SW\_FSM2JH tact switch |
| SW8 | 1 | SW\_FSM2JH tact switch |
| SW5 | 1 | SW\_FSM2JH tact switch |
| SW7 | 1 | SW\_FSM2JH tact switch |
| SW9 | 1 | SW\_FSM2JH tact switch |
| 4732/5 | 1 | SI4735-D60-GU OR GUR |
| IC1 | 1 | V\_REG\_LM1117SOT223 5V |
| IC2 | 1 | V\_REG\_LM1117SOT223 3V3 |
|  |  |  |

Note \*: Omit do not install.

Connectors:

Battery: Wire the 2-pin plug, the pins are shown in the table, rear most pin is positive.

|  |
| --- |
| + Positive |
| -Negative |

Speaker: Wire a 1-Watt speaker 8 ohm to the 2 pin Plug. The pins are shown in the table. rear most pin is negative ground.

|  |
| --- |
| -Negative |
| + Positive |

Assembling the board Instructions

Front Panel

1. Start by Installing the 9 switches on the side where the function is printed – bottom side.
2. Check that all switches are installed correctly pressed down and then proceed with the installation the OLED 0.96” display.
3. Handle with care the OLED display as it is very fragile and install the rotary encoder. Insert the 4 pin connector and solder on the pcb then level the OLED and solder the 4 terminals
4. Solder the two capacitors c22, c23 on the back side of the PCB.
5. Install the 20-pin connector and solder it to main board. The connector must be connected from the bottom side of the mainboard.

Main Board

1. Start by installing the surface mount capacitors 0805
2. Install the capacitors C1,C2,C3,C4 - 22pf
3. Install the capacitors decoupling C8,C9,C10,C11,C12,C13,C14,C15,C16,C17,C21,C22 - 100nf –
4. Install the capacitors C5,C23 – 1nF
5. Install the capacitors C6 – 470nF
6. Install the capacitors C7– 22nF 0603
7. Install the resistors R8,R9,R10,R11 - 4K7
8. Install the resistors R1,R15,R16,R19 - 10K
9. Install the resistors R20 - 100K
10. Install the resistors R12 - 1K
11. Install the voltage regulators 5v and 3.3v LM1117 , Take care to install IC1 with the 5v, and IC2 3.3v.
12. Install the si4735 chip. Observe pin 1 ! solder it with a hot air soldering iron and apply flux
13. Install the two crystals Q1-16Mhz , Q2 – 32.768Khz .
14. On the radio crystal secure it with a wire loop - pads are on the top part and solder each side
15. Install the smd mosfets U4,U5,U6- for version 1.0A the daughter board is already assembled.
16. For version 1.0A install 3.3v Zener in place of R13, Observe the polarity of the diode cathode to rear of board
17. Install the IC sockets 28 pin and 8 pin IC3, U3
18. Install the Q3, Q4 transistors, observe their pinout – emitter to ground.
19. Install the through hole capacitors C24,C27,C28,C29 – 10uF.
20. Install the through hole capacitors C19,C20 – 4.7uF.
21. Install the through hole capacitors C18 – 1000uF.
22. Install the through hole capacitors C25 – 100uF.
23. Install the protection diodes D2,D3 or else the individual diodes D4 to D7
24. For version 1.0A - Install the i2c level shifter See page 7
25. Install the remaining components, switch, connectors, plugs.

Once everything is installed – connect an 8.4v power source and measure the voltage on the tab on ic1 and ic2 – you should get 5v and 3v3, respectively.

Install the 28 pin chip, the firmware is already loaded, observe pin 1 facing c11

Power on and the display will show the splash screen and defaults to a radio mode.

Please visit Ricardo Page , where you will find a mine of resources.

Level Shifter installation Guide.

For version 1.0A

Although the i2c bus communication between the 5-volt Arduino and the 3v3 dsp chip was tested with a resistor in series 1k on the bus – it was noted that sometimes lockup of the chip was caused by this type of interfacing.

To have a reliable communication a level shifter is installed so as it will translate the 5v signal into a 3v3 signal making the interfacing of both devices more stable and safer.

The level shifter board interfaces to the SCL and SDA lines.

5 Volts

3.3Volts

A green electronic device

Description automatically generated with low confidence

3.3V\_SCL

3.3\_SDA

To A5 Arduino

To A4 Arduino

Arduino pin A4,A5 connect to the 5volt header and DSP chip pins SCL,SDA connect to the 3v3 header

Step 1 – prepare the board – apply solder to the four pins as per picture.

A close-up of a circuit board

Description automatically generated with medium confidence

Step 2 – prepare/cut three wires with length of 4.2cms and 1 wire bare of 2.5cms

A picture containing text, electronics, circuit

Description automatically generated

Step 3- prepare two bare wires of 1.5cms as per picture.

A picture containing text, electronics

Description automatically generated

Step 4- solder the pieces of wire to the pcb as per picture

A picture containing electronics, circuit

Description automatically generated

Step 5- place the level shifter board vertically with the 3v3 header facing the mainboard pcb as per picture.

Solder the three wires to the level shifter board.

A close-up of a circuit board

Description automatically generated with medium confidence

Note : R4 and R6 must be wired as per table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| R6 PIN | R6 PIN |  | R4 PIN | R4 PIN |
| 3V3\_I2c SCL pin 2 bottom side | 5V I2C SCL pin 2 top side |  | 3V3\_I2c SDA pin 3 bottom side | 5V I2C SDA pin 3  top side |

Step 6 – Insert the three wires into the 5 Volt header as per picture. First pin is the 5volts supply the two remaining wires follow the path from the bottom header pin 2 in – pin 2 out - pin 3 in – pin 3 out.

A picture containing electronics, circuit

Description automatically generated

Cut the excess wire and secure with some hot glue on the back. Apply some hot glue and install the printed cover onto the level shifter.

Button Mapping

|  |  |  |
| --- | --- | --- |
| Show Battery State | Soft Mute in AM/LW/SW | BFO/VFO |
| Volume control | Band control AM/LW/SW/FM | AGC |
| SSB MODE LSB/USB | Bandwidth | Step |