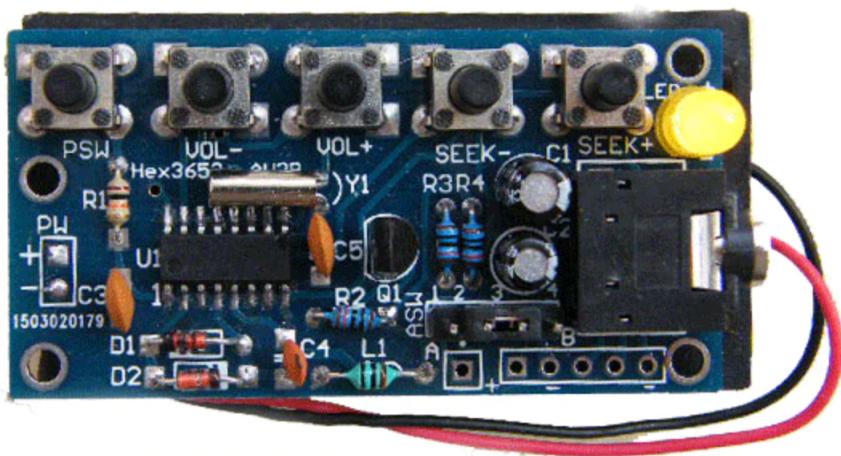


Hippo Bit

FM Radio Soldering Kit



Assemble Instruction

<http://amz.do/3MfuxP>

Revision 2021-05-01



HIPPO BIT

Table of contents

Welcome	2
Component diagram	3
How does it work	4
Antenna	4
Circuit	4
Component list	5
Assembly steps	7
Usage	8

Welcome

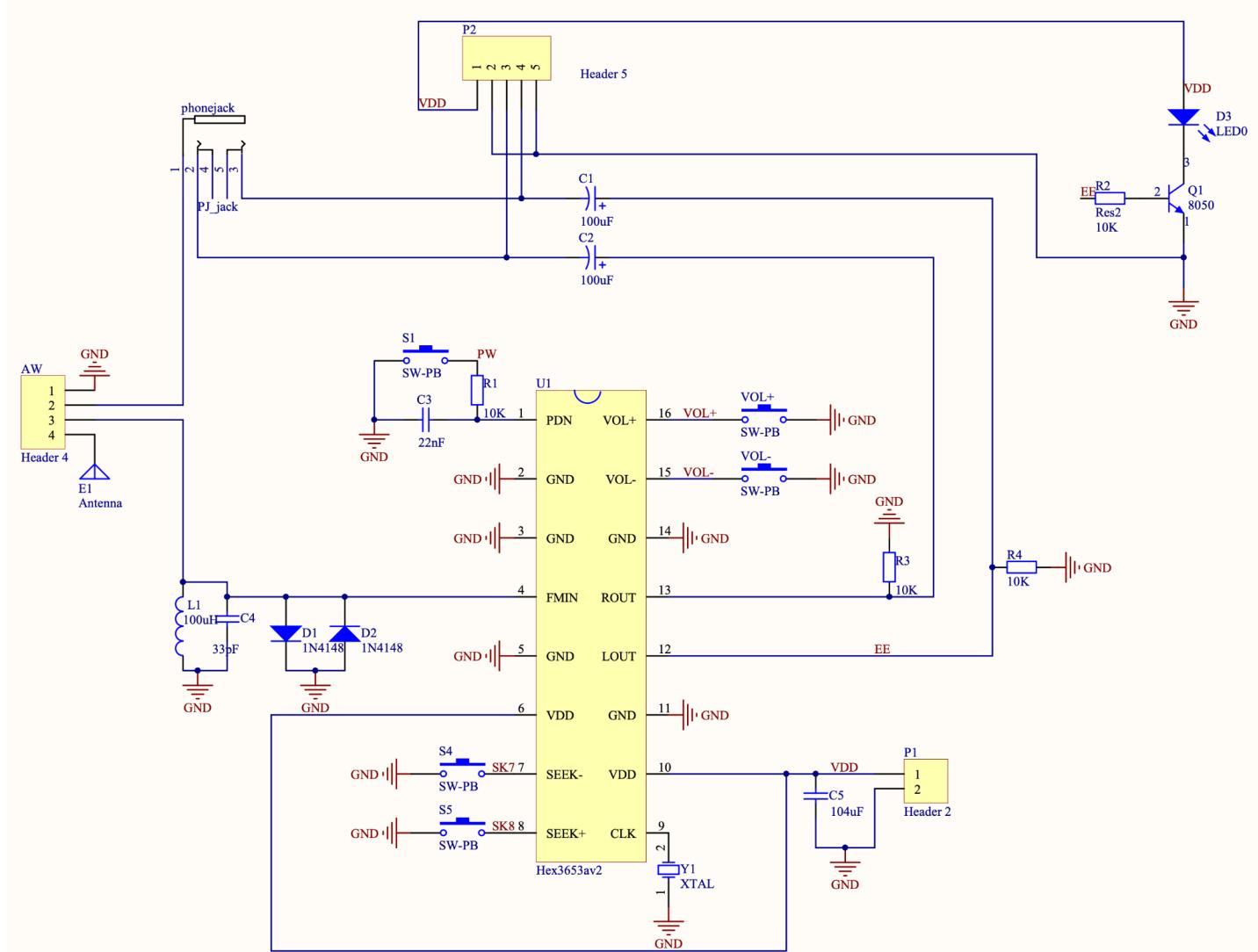
Welcome to your brand new DIY kit for FM Radio.

This kit, once assembled, is a fully functional FM radio receiving signal at 76MHz - 108MHz. It has 5 push buttons to control the power on/off, volume tuning and channel tuning.

It remembers the channel during each use so when power is turned on it immediately tunes to the last active channel.

If you like this product, please tell us by leaving customer reviews. Thank you and enjoy your journey to build your own FM radio!

Component diagram



How does it work

As illustrated on the diagram above, the circuit uses capacitors and resistors (RC filters) to provide high-quality audio when receiving FM signal.

Antenna

The ASW (Antenna Switch) header is used to choose the antenna. As radio waves are intercepted by the antenna, electrons in the antenna begin to vibrate.

Pin 1 on the header is for connection of an external antenna. Pin 2 is connected back to the HEX3653 chip. Pin 3 is connected to the 3.5mm audio socket antenna shield which allows the auxiliary cord to serve as an antenna.

By adding the jumper sleeve over pins 2 and 3, the auxiliary cord is used as an antenna. Adding the jumper sleeve over pin 1 and pin 2 allows us to use an external antenna.

At last, Pin 4 is connected to ground.

The default configuration puts the jumper on ASW pin 2 and pin 3, in which case the auxiliary cord or headphone cord functions as the antenna.

Circuit

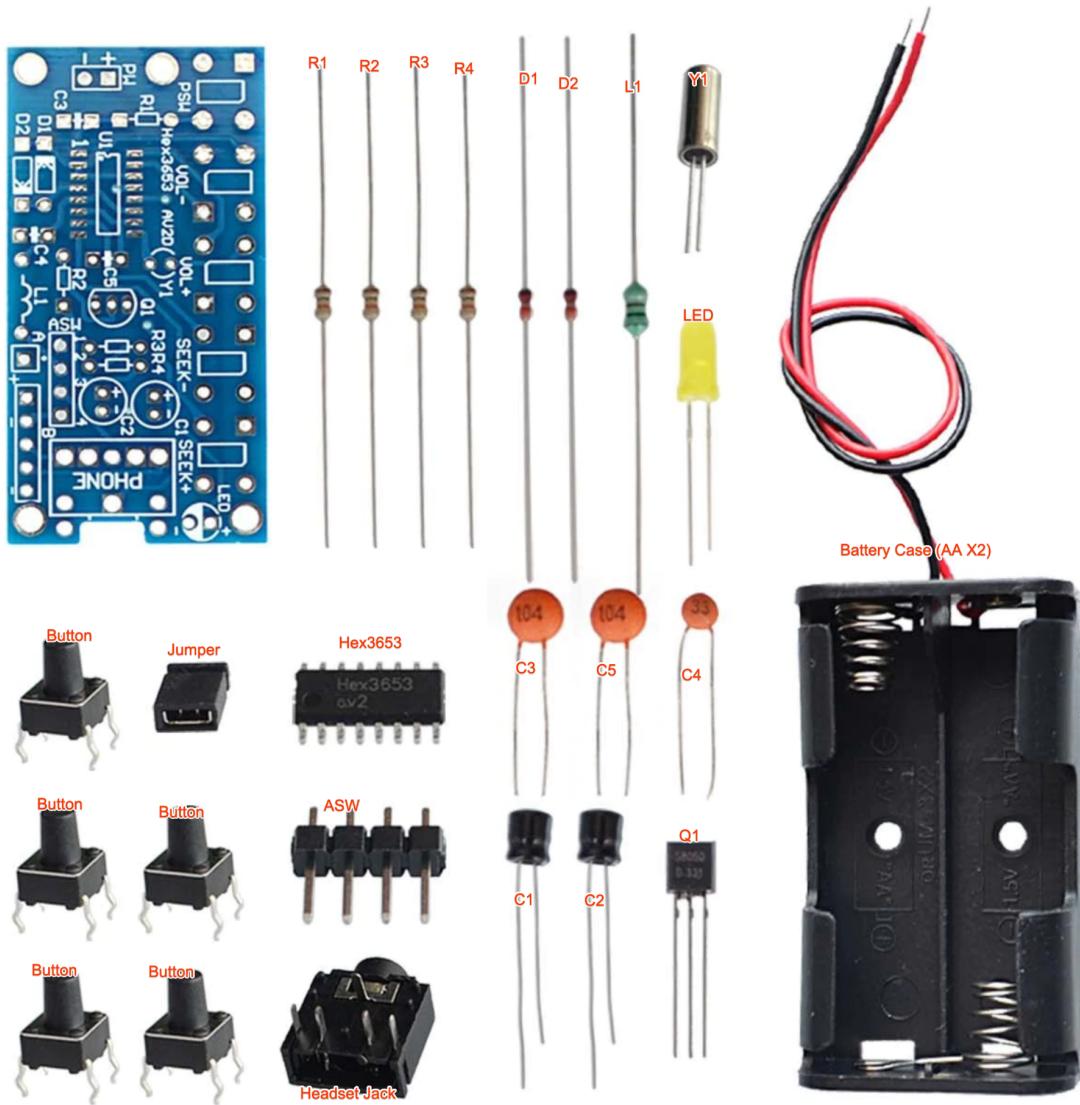
From the pin2 of the ASW header, the alternating current passes through the $10\mu\text{H}$ inductor (L1) and the 33pF capacitor (C4) as well as the 1N4148 diodes (D1 & D2) in order to limit the pin voltage to a safe range(0.3v) for the IC.

This signal enters the HEX3653 chip at pin 4 (FM IN). This signal is then compared to the reference signal received from the on-board antenna (32KHz crystal) connected to pin 9 (RCLK). The RCLK signal is controlled by the SEEK+ and SEEK- push buttons. The tuning, detection and the signal amplification is done by the HEX chip.

The audio output is at pin 12 (Lout) and 13 (Rout). Both signals are connected to the $10\text{K}\Omega$ resistors (R2, R3 and R4) and the DC blocking $100\mu\text{F}$ electrolytic capacitors (C1 & C2) to prevent any DC signals with 0Hz frequency from passing through and causing distortion. This RC network (resistor-capacitor) also functions as a high-pass filter that only allows the audio signal to pass through and removes any unwanted noise.

Component list

In your package, you will see the following parts



- 1x PCB
- 4x 10 kΩ ¼ Watt Resistors – R1 - R4
- 2x 1N4118 Diodes – D1, D2
- 2x 100µF 50V Polarized Capacitors – C1, C2
- 2x 100nF Ceramic Capacitors – C3, C5
- 1x 33pF Ceramic Capacitors – C4

- 1x 10 μ H Lead Axial Inductor – L1
- 1x SS8050 NPN Transistor – Q1
- 1x HEX3653 SOIC IC chip – U1
- 1x 32KHz Round Crystal – Y1
- 1x 3mm Yellow LED – LED
- 1x 3.5mm Stereo Audio Socket - Headset Jack
- 1x Single-row 4-pin Header with jumper – ASW
- 5x Push Buttons – PSW, VOL-, VOL+, SEEK-, SEEK+
- 1x 2-AA Series Battery Holder – Battery Case

On the back of the PCB, you will see the spec of each component listed as the following:

R1=R2=R3=R4: 10K Ω

C1=C2: 100 μ F

C3=C5: 104

C4: 33

D1=D2: 1N4148

Assembly steps

The front of PCB labels where each component should be soldered. For each part described in the component list, find the matching label on the PCB, and solder it with care.

Before soldering, please verify all components are present (refer to [Component List](#) section above)

It is recommended to solder the SMD HEX3653 chip first.

- Locate the dot mark on the corner of the IC. The pin directly below it is PIN 1.
- Locate the rectangle pad on the PCB. Pin 1 is marked on the PCB board.
- Match PIN1 of the IC with PIN1 of the PCB drawing and solder the IC carefully.

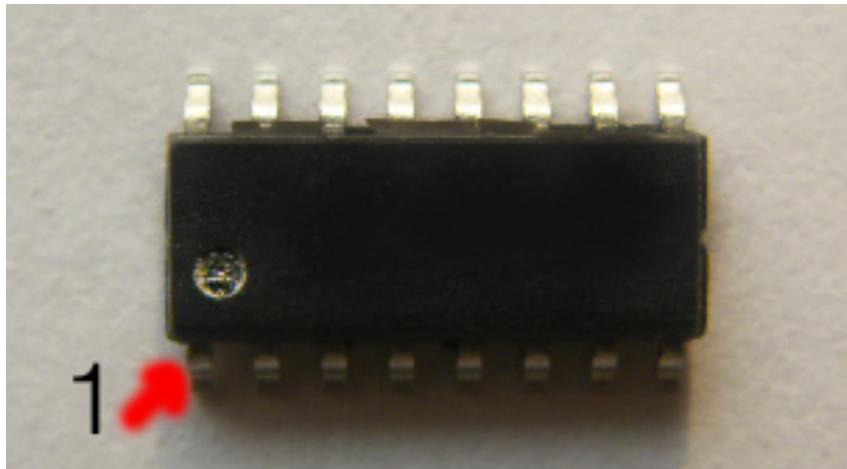


Illustration of PIN1

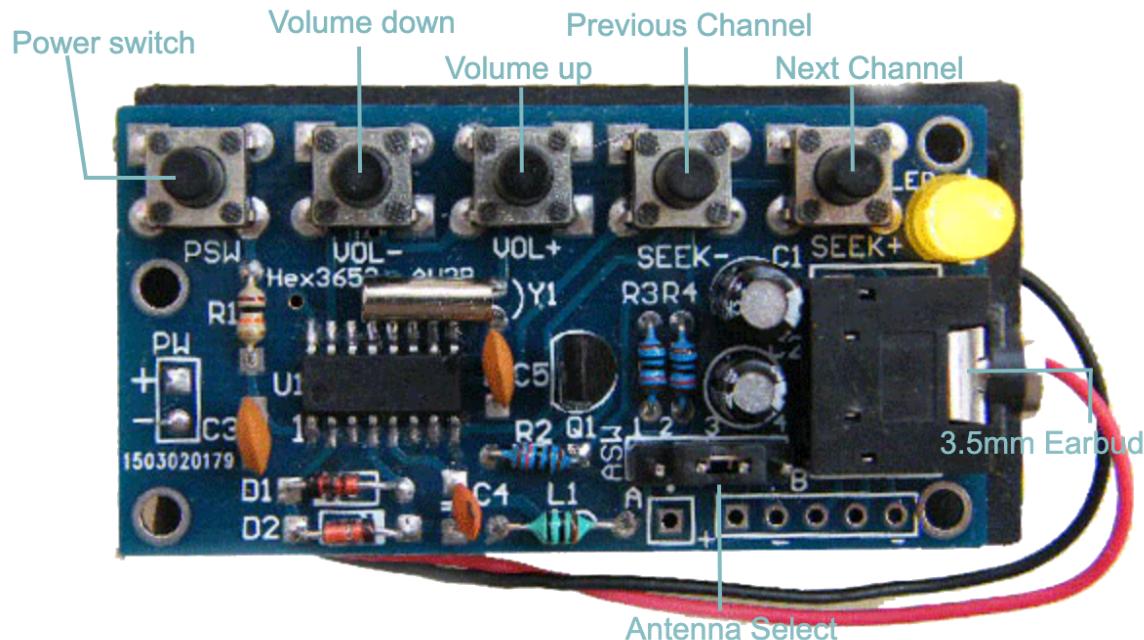
Once IC is soldered onto the PCB, solder the rest items to the board.

It is recommended to solder small components before bigger ones. Recommended sequence is:

- Resistors
- Inductors
- Diodes
- Crystal
- Capacitors
- Headset Jack
- Triode
- LED
- Push buttons
- Jumper header
- Battery Case

Usage

This kit is a stereo auto-scanning FM receiver based on a single HEX3653 chip that uses push buttons to adjust the volume, scan FM channels and power ON/OFF. It requires two AA 1.5V batteries to power up.



There are 5 buttons on the radio

- POW: Power button
- VOL-: Volume down
- VOL+: Volume up
- SEEK-: Seek backward
- SEEK+: Seek forward

Check the ASW jumper position to ensure the desired antenna configuration is selected (see [How does it work](#) section for details).

Once the power switch is pressed, the yellow LED should turn on to indicate the circuit is now functional. Adjust volume/channel and enjoy your newest project.

If you like this product, please send us a review and share with your friends <http://amz.do/3MfuxP>.