

BH1417 FM Transmitter

This is the latest **BH1417 FM Transmitter** design from RHOM that includes a lot of features in one small package. It comes with pre-emphasis, limiter so that the music can be transmitted at the same audio level, stereo encoder for stereo transmission, low pass filter that blocks any audio signals above 15KHz to prevent any RF interference, PLL circuit that provides rock solid frequency transmission (no more frequency drift), FM oscillator and RF output buffer.

There are 14 possible transmission frequencies with 200KHz increments that users can select with a 4-DIP switch. Lower band frequencies start from 88.7 up to 89.9 MHz, and upper band frequencies start from 107.7 up to 108.9 MHz.

BH1417 can be supplied with 4 - 6 voltage and consumes only around 30mA, providing 20mW output RF power. **BH1417** provides 40dB channel separation which is pretty good, although older BA1404 FM Transmitter chip provides slightly better 45dB channel separation.

BH1417 is only available in SOP22 IC case so this may be an inconvenience for some folks. On the other hand, because the chip is smaller than regular DIP-based ICs it is possible to fit the entire transmitter on a small PCB.

The bad news is that BH1417 requires 7.6MHz crystal oscillator, which is very hard to find. The good news is that you can use 7.68 MHz crystal instead, which is easier to find. In fact our **BH1417** transmitter prototype (schematic shown above) uses 7.68 MHz crystal. This has absolutely no effect on stereo encoding process, we have tested it and stereo sound is crystal clear. The transmitted frequency on the other hand will be shifted up by exactly 1MHz (example: 88.1 MHz to 89.1 MHz) which is perfectly fine. The frequencies that are used in this project have been adjusted by 1MHz already so no additional conversion is necessary.

BH1417 chip may also be used a stand alone stereo encoder. The advantage of that is that you have full freedom of using a transmitter & amplifier of your choice. You will still have a pre-emphasis, limiter, stereo encoder and low pass filter in one small package because very few external components are required for these blocks.

PIN 5 is MPX output that can be directly connected to an external FM transmitter through a 10uF cap.

Frequency Selection / Calibration

Frequency selection is very straight forward. Simply select transmission frequency at which you would like to transmit, set the combination for 4-DIP switch and BH1417 will immediately tune to that frequency. If you can't hear the transmitted audio signal on your FM receiver then re-adjust 2.5 turn variable coil until you can hear the signal. If you have a laboratory power supply you may try to vary the voltage supply from 4 to 6V. While doing that BH1417 will automatically vary the voltage for MV2109 varicap diode making sure that there's no frequency drift.

S4	S3	S2	S1	Frequency
1	1	1	1	88.7 MHz
1	1	1	0	88.9 MHz
1	1	0	1	89.1 MHz
1	1	0	0	89.3 MHz
1	0	1	1	89.5 MHz
1	0	1	0	89.7 MHz
1	0	0	1	89.9 MHz
1 = ON, 0 = OFF				

You can connect an external amplifier based on the common 2N3866 / 2N4427 RF transistors. Please keep in mind that it is illegal to operate higher power transmitters in most of the countries without the proper license.

