

COMENTARIOS DRA818V/DRA818U

Advancement in chip technology and DSP allowed so we can have a complete 1W VHF transceiver in a small module.

The absence of special crystal and mechanical filters, discriminator coils etc, allowed for reducing costs too.

The DRA-818V module is one example, made in China, costs under USD 15.00, take a look at its specs:

Frequency Range: 134~174MHz

Tx/Rx frequency independent, can be the same or at any difference

Channel spacing: 12.5 or 25KHz

Configurable multi-channels

Receiver Sensitivity: -122 dBm

Output power: +27/30dBm (high/low as selected)

CTCSS / CDCSS codes built-in

8 volume levels controlled from the UART interface

8 squelch levels controlled from the UART interface

Simple 9600N81 UART interface to control

Operating Temperature: -20°C ~+70°C

TX current: 450/750mA

Supply voltage: 3.3~4.5V (5V absolute maximum).

Working with some of these, I have seen that they need a low-pass filter to reduce harmonic content of the transmitted signal, an external audio amplifier to drive a speaker and other than that, just adding a PTT switch and a microphone makes a complete VHF radio. There is a High/Low selection pin for the transmitter power which when grounded reduces TX power by 3dB. There is a Power Down input I have never used, a PTT input (low to transmit), a MIC input, around 100 mV is ok, an AF output and a Squelch output which goes LOW when the receiver detects a signal. I have used that output to light an LED and activate (power-up from standby mode) the audio amplifier. This way the power consumption is kept low. I have checked that the squelch sensitivity is 1-2 dB close to the 12 dB SINAD sensitivity, if the squelch level is set to 1. Setting it to 0, the squelch is off continuously.

When in receive mode. it draws under 9 mA at 4.2 VDC (4.2V is a fully charged Li-Po battery). On transmit, the specified current is 750mA but I have seen 1.15A max in some of them, without reaching 30 dBm exactly.

The PCB dimensions are 53 x 36.5 mm and it sure can be made smaller but I thought to place pin-headers for interfacing and some extra components like

chokes and capacitors to control RFI. A future plan is to make a second pcb of the same dimensions to hold an micro-controller with a small OLED display to show the RX and TX frequencies, selecting the sub-tones etc.

The RF output power is not as specified. It is close but always less than 1W. The photo I posted here shows +28.5 dBm instead of +30 dBm. The Hi/Lo pin if left unconnected forces the transmitter to output its higher power and when held to ground the output power drops 3 dB.

Although the receiver audio level is controlled via the UART in 8 levels and normally it does not need a volume control, I have included a small pot for adjusting the audio level more accurately if needed for a modem or APRS etc. The audio amplifier chip is the LM4871 and its gain is programmable with the external resistors. I have posted a photo of the distortion measurement at 1 KHZ at a high SINAD, is 2.76% max

The UHF version is the DRA-818U. The PCB I have prepared is the same except the Low-Pass filter.

Its transmitter RF output power is less, around 0.5...0.65W on HIGH. I have talked with the manufacturer and they said it is "normal" (in Chinese...). Of course is not a big issue, but don't expect tight tolerances.

The RX sensitivity on the other hand, is as specified. I have posted photos here with sensitivity measurements both for 12 dB SINAD and 20 dB SINAD.

The figures are -124 and -122 dBm respectively.