Low-Cost 10 Ghz Receivers Using Consumer Electronics

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GM8BJF

Getting on 10 GHz

- Traditionally expensive and difficult
- Frequency accuracy
- Construction difficult
- Tuning up frequency multipliers
- Am I on the correct harmonic ??
- Etc etc ......

Solution- Buy one of these

…and one of these

And wire them up like this...
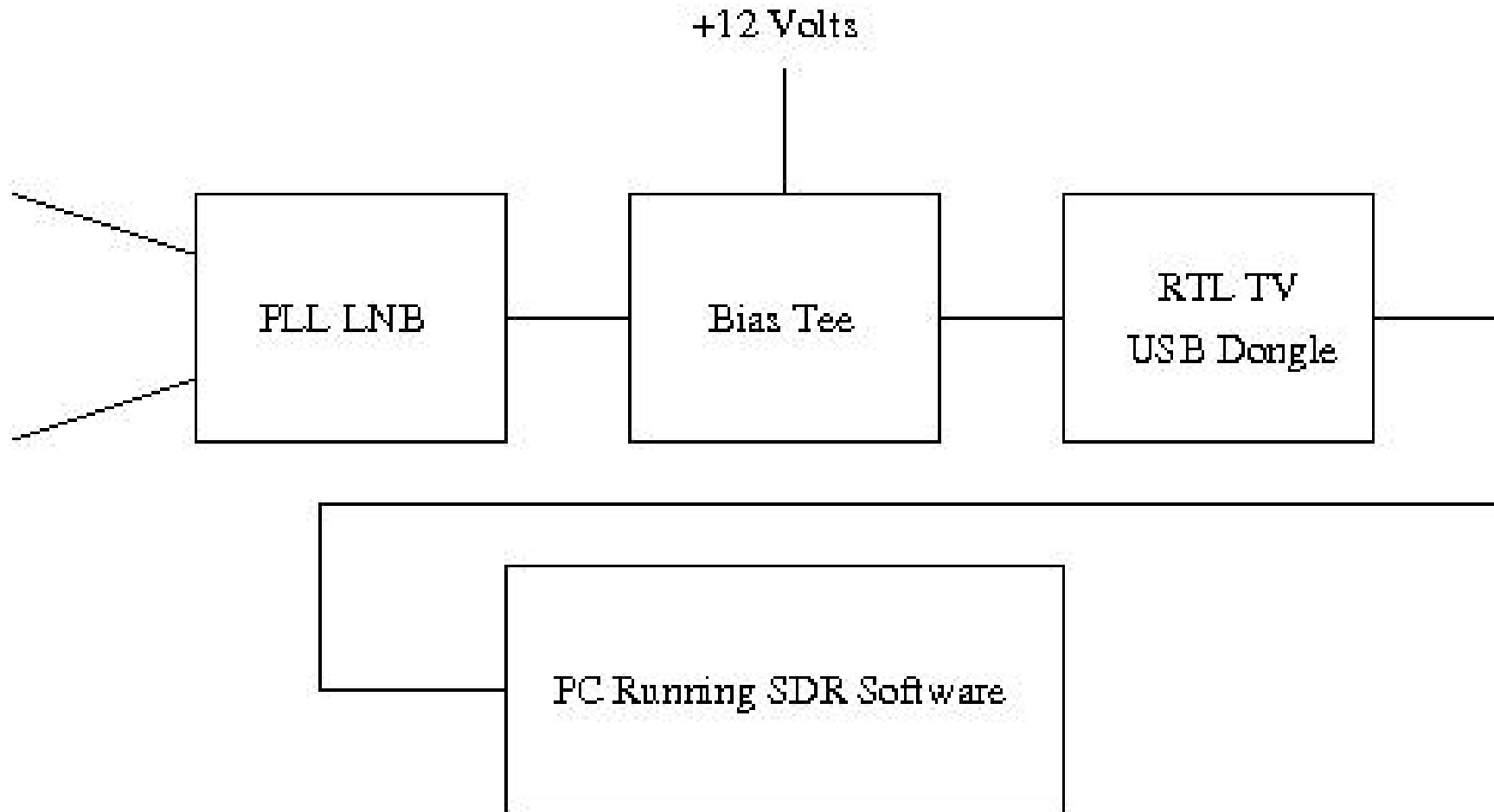
PLL LNB Specifications

- Features & Specifications:

  * PLL technology
  * Excellent noise figure up to 0.1dB
  * Gain 60 ~ 65dB
  * Very low power consumption
  * Extreme cold and heat resistant
  * Very high polarization decoupling
  * High frequency stability
  * Feed diameter 40mm
  * 3 year warranty
  * Weatherproof
  * DVB-S2 compatible
  * Freq. 10.70 - 12.75 GHz
  * L.O. 9.75 / 10.6 GHz

LNB on 10 GHz??

- LNB specified to cover 10.7 to 12.75 GHz
- NB amateur allocation is at 10.368 GHz
- LNB still has great sensitivity in amateur band
- LO at 9.750 GHz
- 10.368 GHz comes out at an IF of 618 MHz
- Although out of band it still performs well
- PLL LNB stable enough for SSB/CW reception
- LO locked to a crystal.

LNB Guts

USB TV Dongle

- Intended for terrestrial digital TV reception

- Coverage is from about 25 MHz to 1.7 GHz

- Outputs digitised I and Q data stream on USB

- "Undocumented feature" of the RTL chip
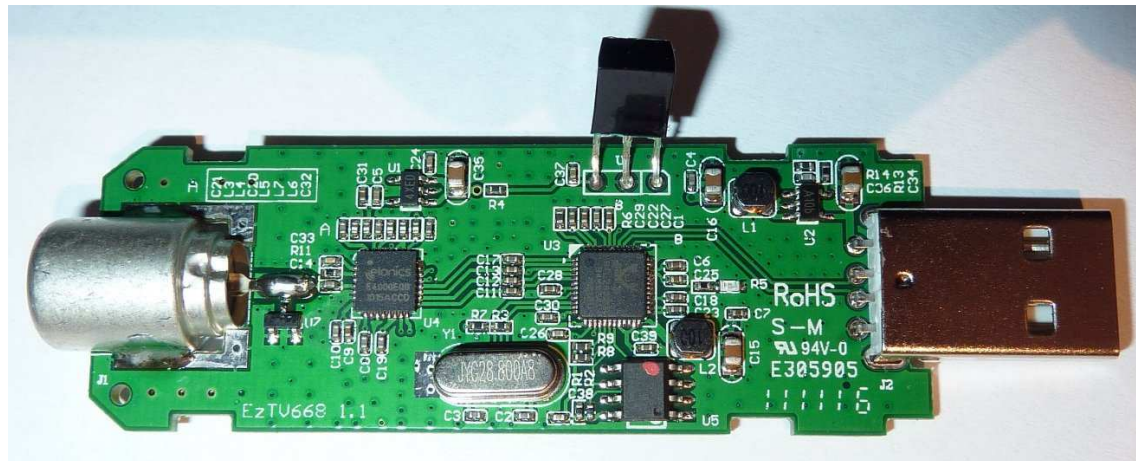
Elonics (RIP) E4000 Tuner chip
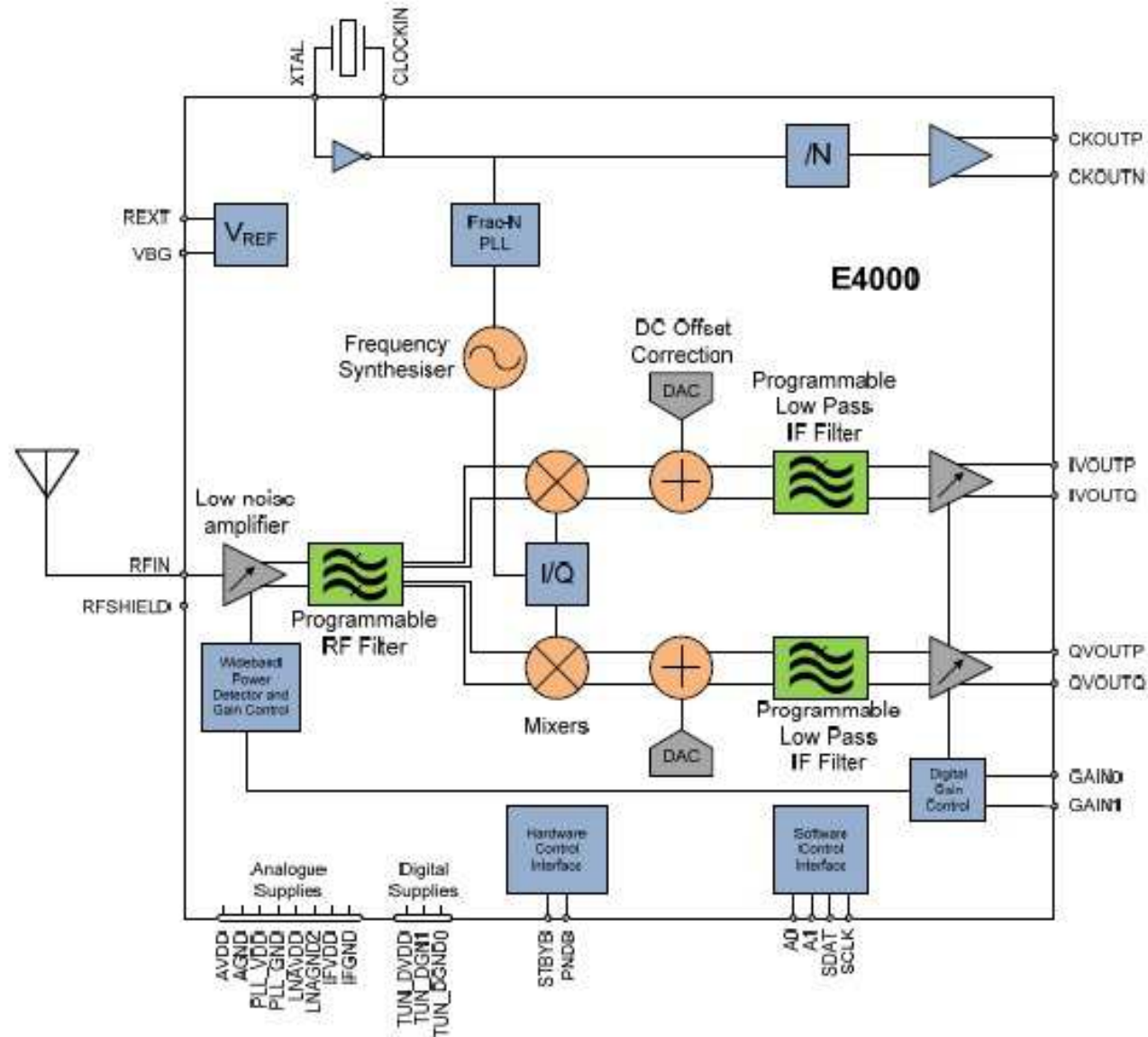
Realtek RTL2382U Chip

- Check that the dongle you get uses this chip
- Designed for streaming TV data
- Takes the analogue I and Q signals from tuner chip and digitises them and does all the "USB stuff".

Close-up
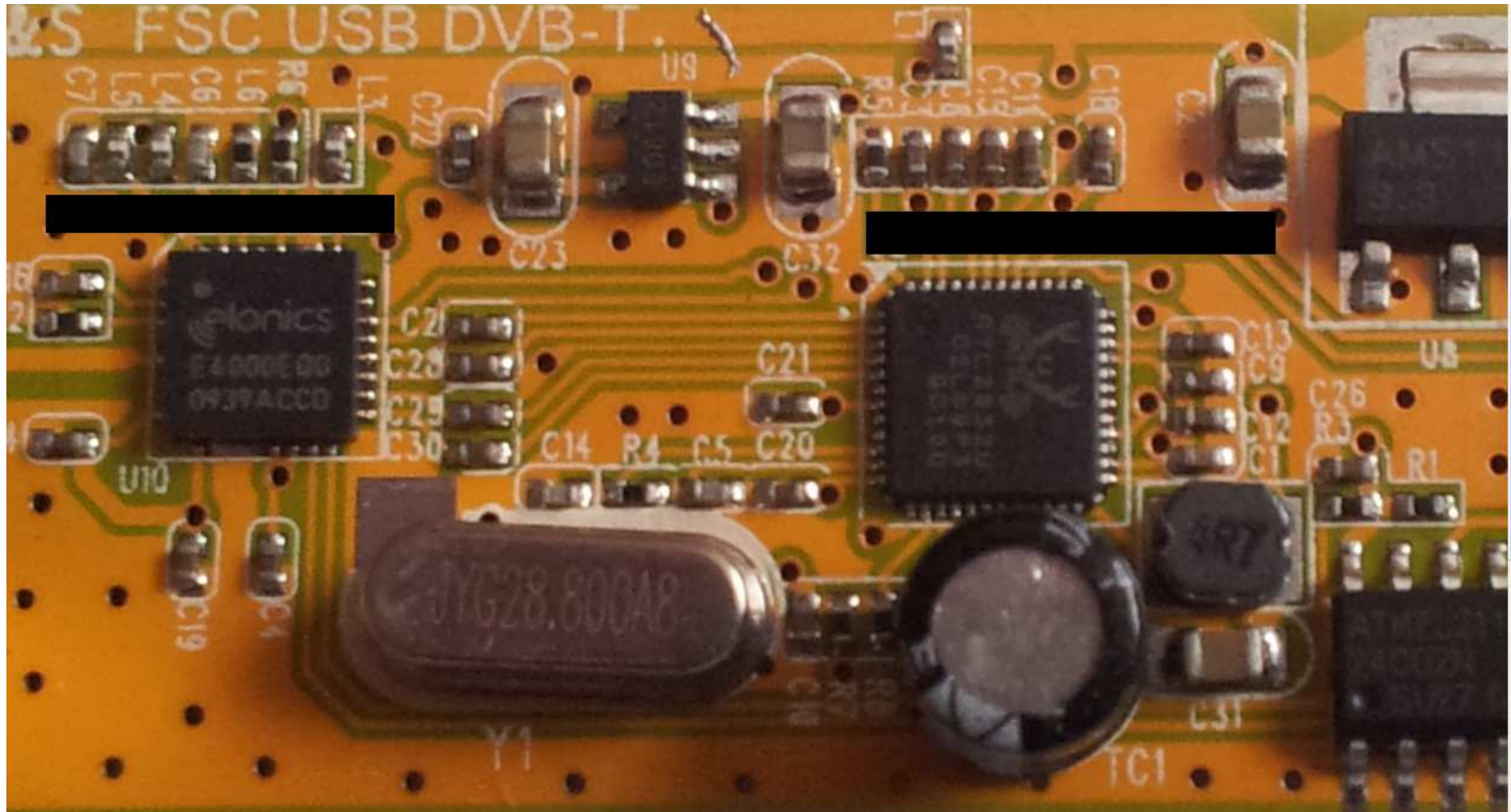
SDR Software

- Recommend that you use SDR#
- Available for Windoze, Linux and Mac.
- Fairly basic, but does a good job
- Freely downloadable
- Zero cost!
- Need to install Zadig USB drivers
- Installation well documented on internet

Other Possiblities

- USB TV dongle can be run with a Raspberry Pi as a SDR server on the internet

- Allows the remote operation of receivers provided an internet connection is available.

- Spectrum surveillance – possible to record 2 MHz chunks of spectrum for later analysis.

- Ideal for contests when signals are missed in the heat of battle!

Demonstrations

- GM8BJF personal beacon on 10G
- GM4CXM/B from Glasgow
- GB3TC CSFMG 10 G beacon/repeater output on 10,471.3 MHz, note FM keying on trace
- Located at Berryhill farm site near Kilsyth.