Multiband LO box Misc Notes:

6/2019

I asked about the ability to program any frequency I wanted to turn it into a RF signal generator and Sweep generator but there is no API for that in the current DigiLo firmware. Would have to bypass the onboard CPU and talk to the PLL chip (Max2870) direct. A bit messy. For $52 on eBay there is a Chinese Max2870 module of the same size as the attenuator and RF switch modules so they would stack up nice and it has a fast VCO lock jumper option. I might play with one of them this summer.

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The prototype was built around what was in my junk box, so mechanical attenuators and switches. With this PCB version I shifted to serial I2C LCD display connection to free up some IO pins and I tried out inexpensive solid state 6HGz attenuator, 6GHz wideband amplifier, and 3GHz RF switch modules, found on eBay from China so there is 2 weeks lead time. This is all built around the DigiLo PLL from DEMI/Q5 Signal so is easy to get. Power measurements were completed and with the parts chosen, I get very little loss between 100 and 2GHz, then certain parts, mostly the 3GHz rated SP6T switch start to roll off up to 7dB loss, but still useful to 6GHz it seems.

The 6Ghz wideband amp rolls off over 4GHz up to 8dB loss. I do not have a spectrum analyzer so cannot evaluate those aspects. The DigiLO accepts an external 10MHz OCXO/GPSDO for the final step.

The PCB itself is mostly connectors acting as a breakout for the $10 CPU dev board and all parts are available from Digikey. The CPU (Cypress PSoC 5LP) does most of the hardware circuit functions. Software is available of course. It is written in C and leverages the Cypress PSoC IDE (Integrated Development Environment). No programming/coding experience required, anyone can easily load this up and program their CPU with just a Windows computer and USB2.0 cable. The software handles configuration via a menu system for just about most anything you might connect to this. If you run into something it does not handle, it is easily changed, both the software features and IO pin configurations.

My home transverter stack is now running off of the prototype with 10MHz OCXO, mechanical attenuator, wideband amp module, and SP6T coax switch. It is receiving band decode output from my radio (BCD or per line, no serial decode yet), selects to the correct LO frequency at the desired level, auto switches among 6 remote antennas in a tree from 50Mhz to 1296Mhz for the last month. The PCB version using solid state modules and is packaged smaller, uses less power, has less heat, and is running my 10GHz system for starters. GPS (if connected) info is displayed for 8 digit grid square, lat/lon and time.

The programmable step attenuators come in different sizes and I happen to have a largish sized one from years ago that was 127dB in 1dB steps, I only need 31dB of it, but might use the rest of the attenuation for use as a weak signal source and test bench RF source. My testing found this one which I believe is rated to 1.8GHz for < 1dB loss to have <1dB loss up to around 2 or 2.5GHz then usable to 3.4G with <5dB loss.  At 5.7 it has around 35db loss – good enough for use as a weak signal source. I also have a 20dBm amplified source feeding this, less at 5.7G. My 10G system has a x4 multiplier in to so I only use up to 2.5G or someday 3.4G LO source.

I happen to have a 12V SP6T TTL controlled coax switch which makes things easy but others can be adapted OK.  The OXCO is standard surplus fare.  I split the 12V power to run the oven off 12VDC and I run a regulated and filters 9VDC to the oscillator portion.  I found during low battery voltage tests I could run this down to about 7 volts but the frequency was sensitive to larger voltage changes.  I run all critical stuff that I can off 9V using low dropout regulators as I expect to use this at times in the field next to a tripod with gel cell batteries.