Frequency Doubler and 10MHz Reference Distribution Amplifier

G4JNT Dec 2013

This 10MHz doubler and distribution amp takes in 5MHz from a frequency standard and delivers several 10MHz mutually isolated outputs.

A diode full-wave frequency doubler suppresses even order products, this is followed by a three section bandpass filter. 5MHz leakage at the output of the amplifiers is better than -80dBc, at 15MHz it is about -75dBc.

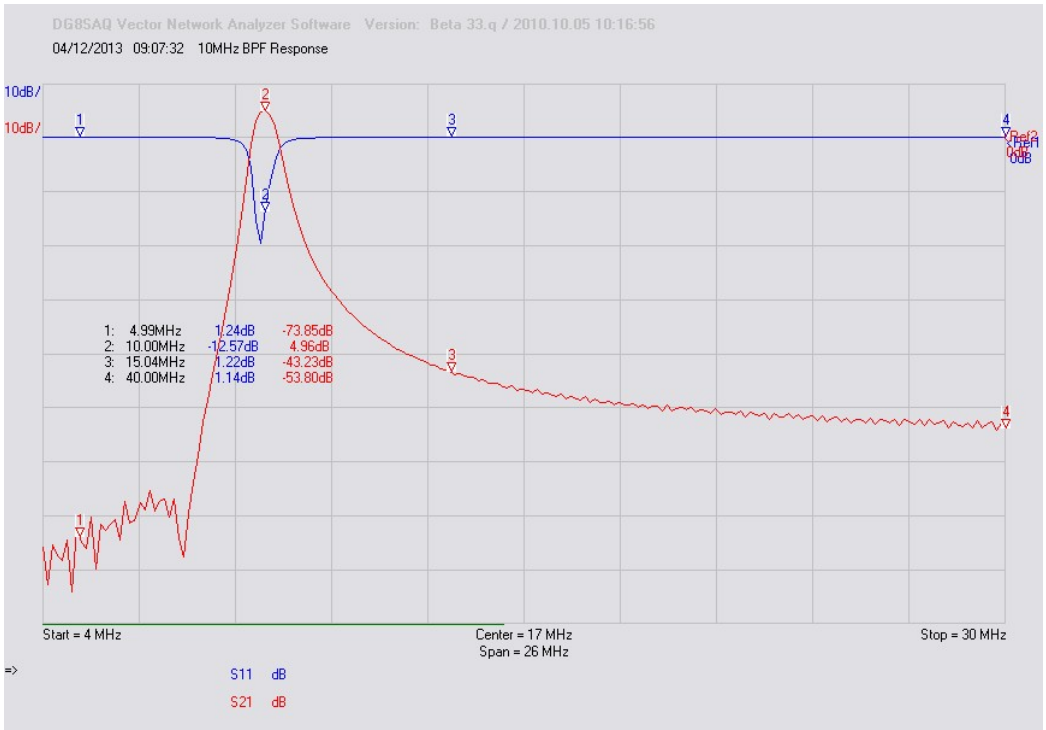
The amplifier stages are based around LM7171 high speed opamps. Since these chips can drive a 50Ω load, the configuration here allows each one to drive two matched outputs. Output amplitude is +5dBm per port, but can be altered by adjusting the feedback resistors up to around +10dBm each. As the amplifiers are essentially high input impedance, advantage is taken to provide “voltage gain” in the filter stages by matching to a higher output impedance – around 300Ω

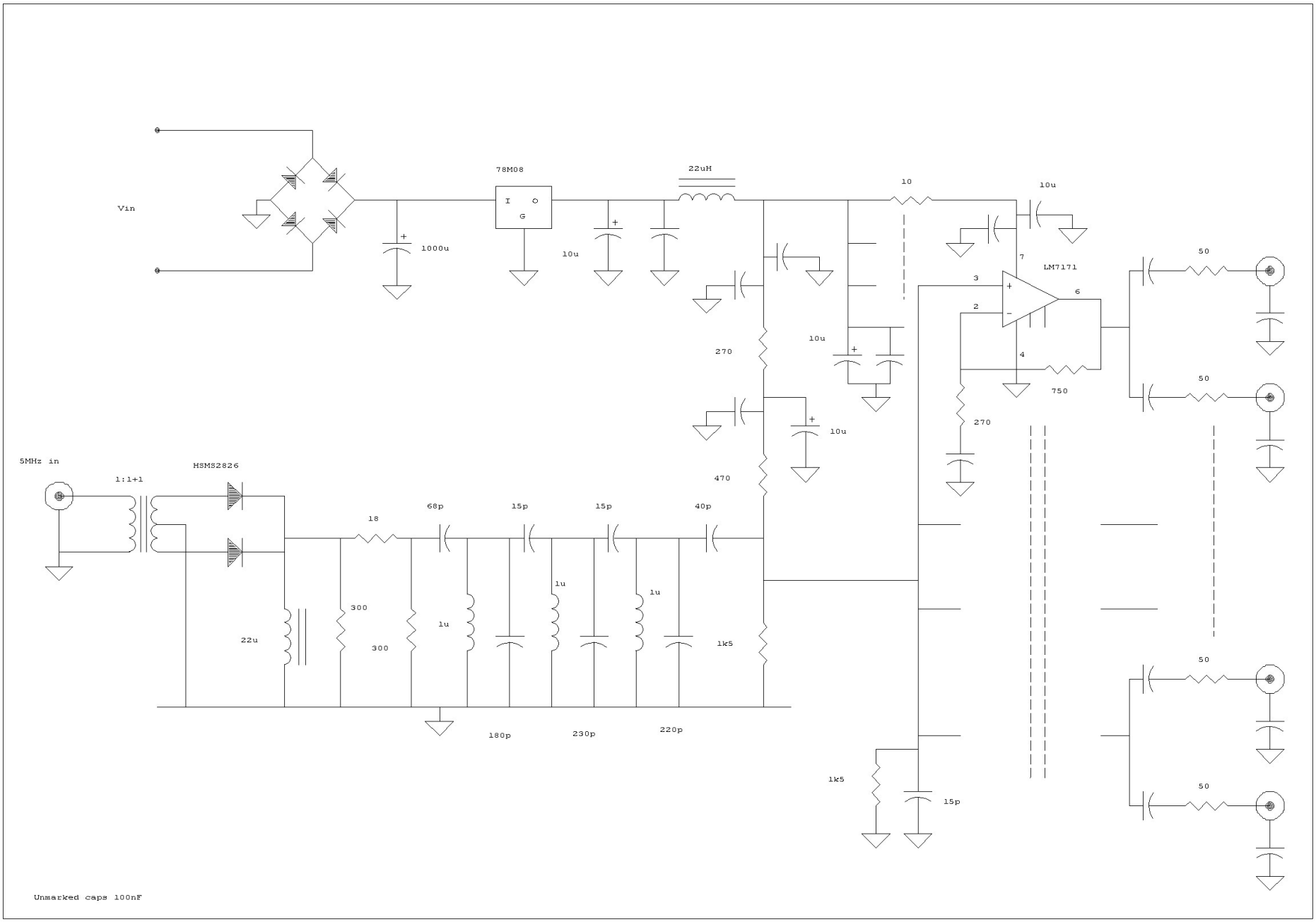
Interport isolation is essential here as I have a few items of test equipment that put logic generated noise back out of their 10MHz reference input ports. This was very noticeable on the old distribution amp based around a passive splitter with only 20 - 30dB port-to-port isolation when used to drive a synthesizer chip directly.

In this design, isolation between ports driven from separate op-amps is unmeasurable (although that between each port on a common chip is only in the region of 20dB)

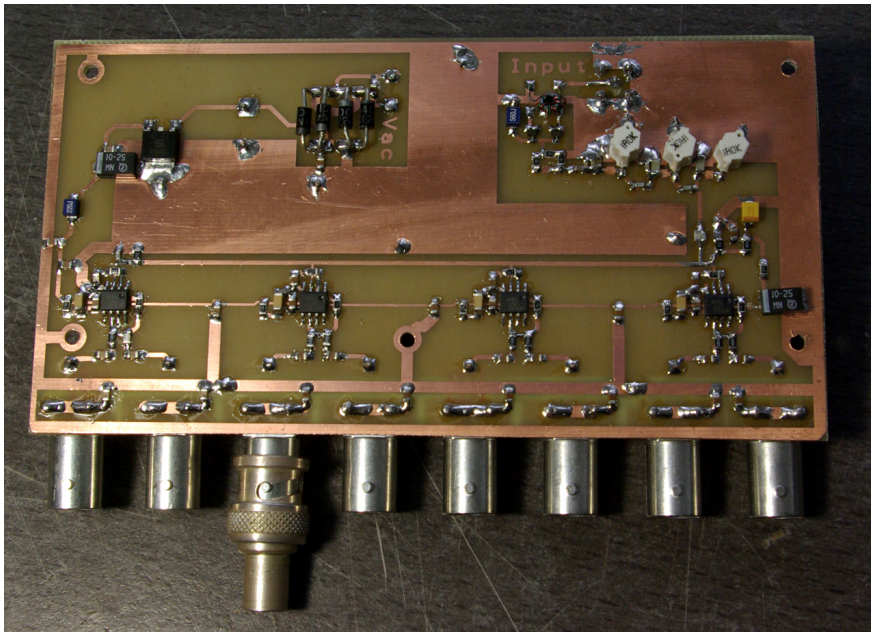
Each output BNC is isolated from ground at DC to prevent hum loops and DC flow.

Gerber files for the PCB can be found at at http://g4jnt.com/10MHzDist_G4JNT.zip





Unmarked caps 100nF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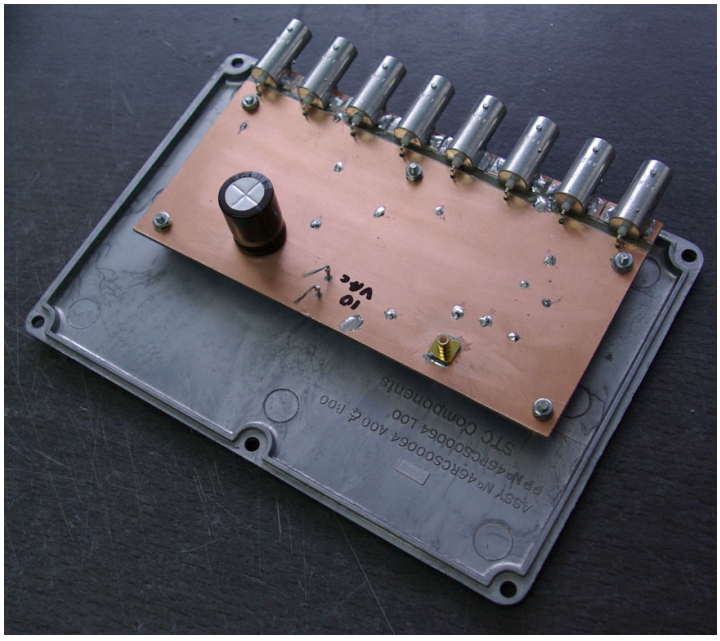
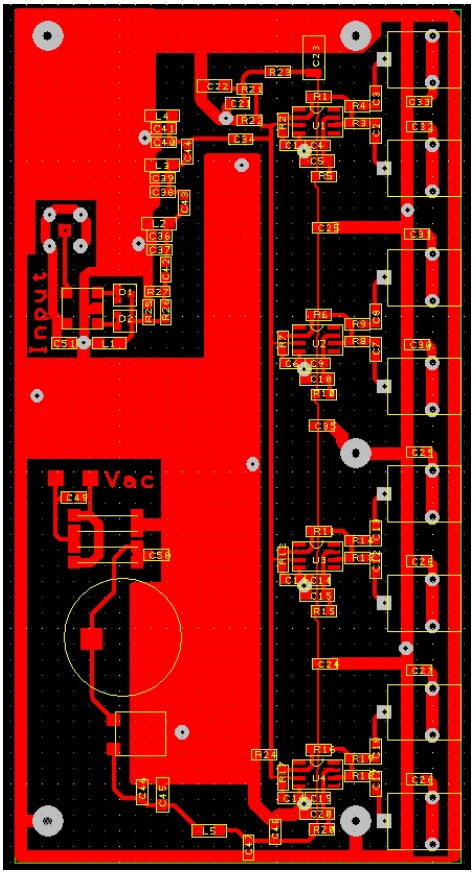

10 Vac


Input
Vac