

Development of a 200MHz Clock Generation Module

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Introduction

This document describes the development of a 200MHz clock generation module. The 200MHz clock will be used as the sampling frequency in the digital receiver of a proposed L-band microwave radiometer. The 200MHz will have an output level capable of driving a TTL/CMOS/ECL input at 50Ω. The completed module is shown in Figure 1.



Figure 1: The clock generator module and power supply setup. The generator requires $\pm 15V$ power supply to operate.

1 Development of the Clock Module

The clock module is based around an available 100MHz Vectron Oscillator TCXO [1]. This TCXO has a very weak sinusoidal output which is first amplified by 13dB in two separate gain stages of a wide band amplifier [2]. This 100MHz output is available on the front panel of the clock module. The output power of the 100MHz output is +9dBm, which corresponds to a $1.6V_{p-p}$ sinusoid. This is typically not enough to drive a TTL/CMOS/ECL gate. Unfortunately this is the maximum output amplitude of the wide band amplifier.

Another identical 13dB amplifier stage also produces a +9dBm 100MHz output which is fed into an Anzac Frequency Doubler which results in a +3dBm 200MHz output. This signal is filtered using a Mini-circuits 150MHz high pass filter to remove the 100MHz component. The signal is then attenuated 3dB and fed into a ZFL-1000 amplifier with 20dB of gain [3]. The resulting signal is available on the front panel with an output power of +20dBm, or $4.5V_{p-p}$. This signal has ample amplitude to drive a TTL/CMOS/ECL gate.

A photo of the inside of the clock module is shown in Figure 2. The module requires +15V@280mA and $-15V@50mA$ to operate. A model 578 Source Locking Microwave Counter was used to measure the output frequency of the clock module. The frequency measured was 199,997,514 Hz, which corresponds to an error of 12ppm. The output frequency seemed quite stable versus time.

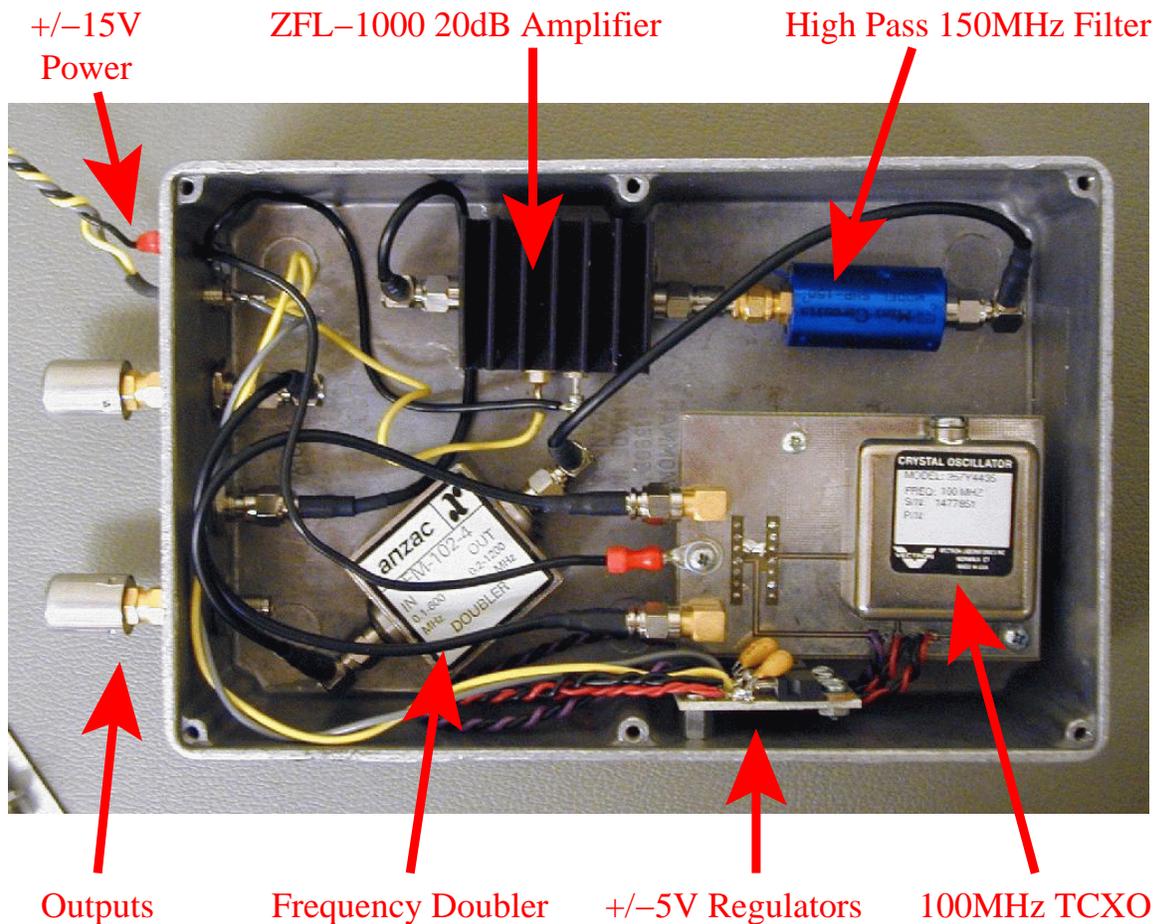


Figure 2: Internal photograph of the 200MHz clock module.

2 Conclusions

This document has shown the development of a 200MHz clock module capable of producing a +20dBm 200MHz output. The output frequency has an error of 12ppm.

References

- [1] *Vectron Temperature Compensated Crystal Oscillators*, Vectron, 2002.
http://www.vectron.com/products/tcxo/tcxo_index.htm.
- [2] *CLC415 Quad, Wideband Monolithic Op Amp*, National Semiconductor, December 2001. <http://www.national.com/ds/CL/CLC415.pdf>.
- [3] *Low Power Broadband Linear Amplifiers: ZFL-1000VH*, Mini-Circuits, 2002.
<http://www.minicircuits.com/dg02-144.pdf>.