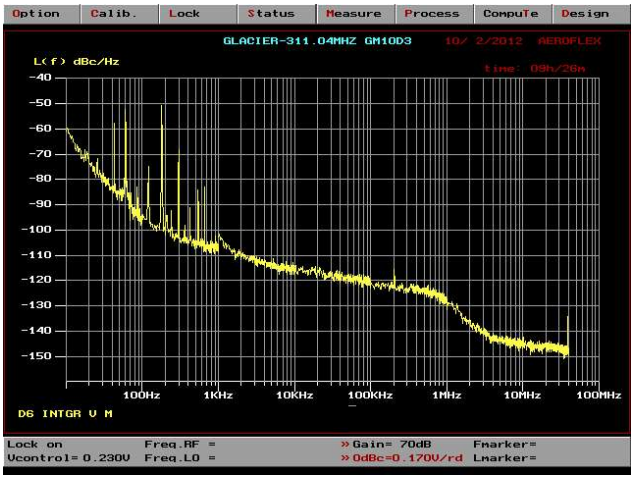
To Dan Edmunds, MSU
From Ed Miguel
Date June 26, 2013
Subject: VCXO's jitter and phase noise.

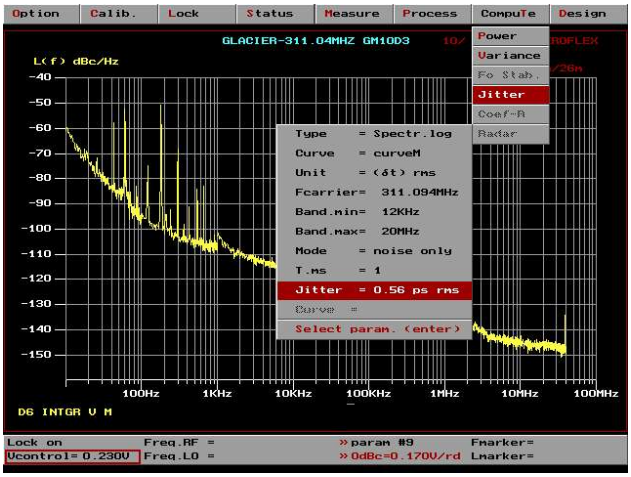
Hi Dan,
Please find below the differences in the two VCXO approaches considered for the SFX modules and my recommendation.

VG762 VCXO Integer mode Synthesized output
From a 38.88MHz crystal.

Typical phase noise @ 311.04 MHz



Typical Integrated jitter calculation



V777-311.04 MHz

VCXO Using a X2 muliplier
Typical phase noise

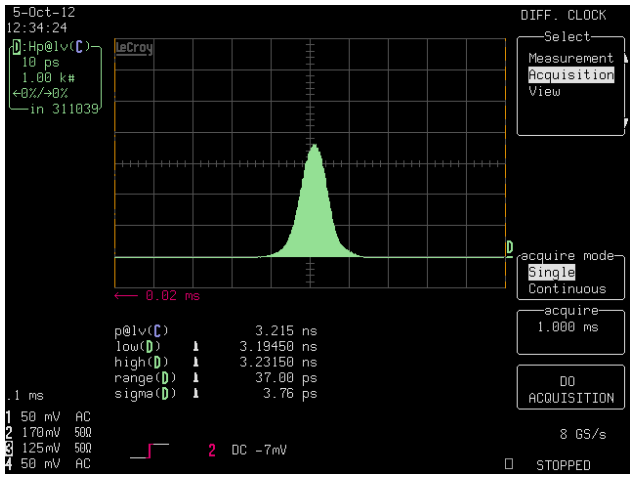
The typical integrated jitter for the VCXO above between 12KHz and 20 MHz is 0.100 ps rms

Analysis: Output phase noise for the V777 model looks to be better from 1kHz to 3 MHz. Integrated phase jitter is better though both are well below 1 ps rms.

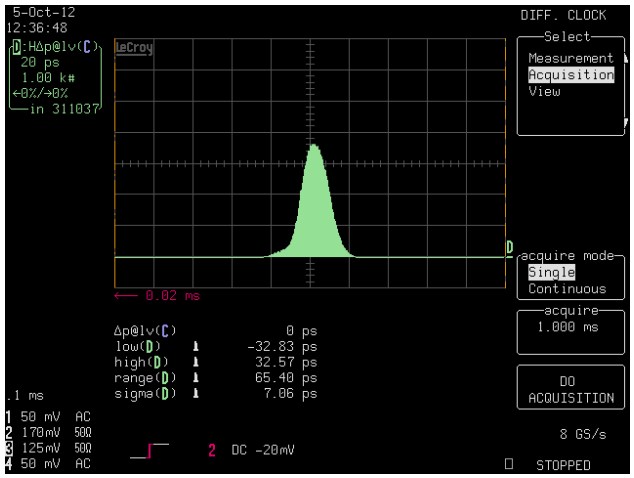
Subharmonics for the VG762-311.04

VG762-311.04 MHz Subharmonics (dBc)						
38.88M	77.76M	116.64M	155.52M	194.4M	233.28M	272.16M
-64.6	-47.7	-66.6	-67.8	-68.8	-54.8	-66.3

Period Jitter for the VG762-311.04



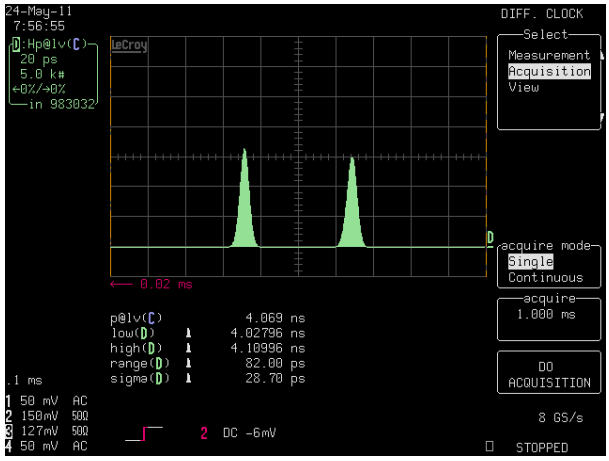
Cycle-cycle Jitter for the VG762-311.04



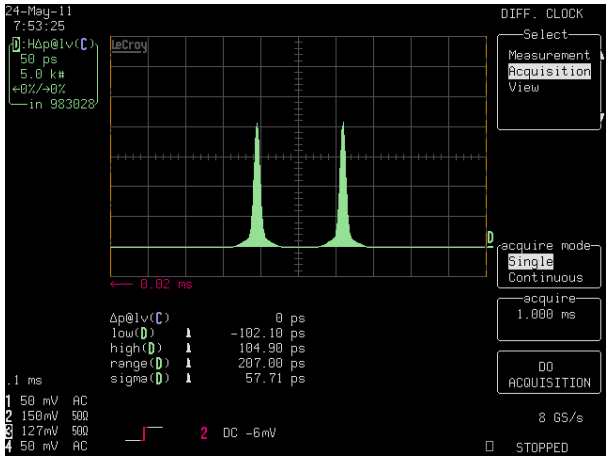
Subharmonics for the V777-311.04

Analysis: There are more sub-harmonics for the VG762 but they are very low.

Period jitter for the V777-311.04

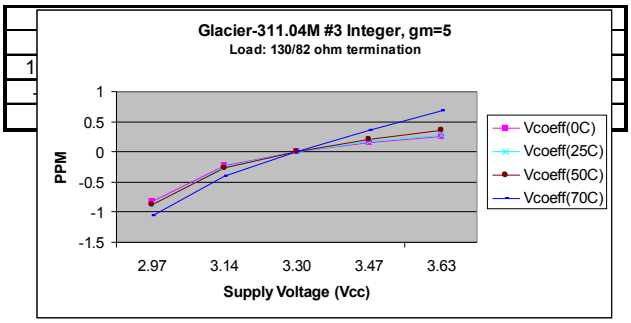


Cycle-cycle jitter for the V777-311.04

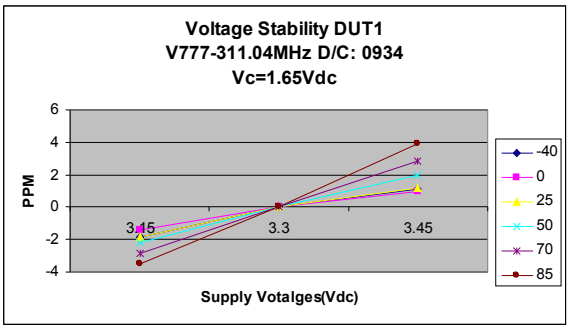


Analysis: The V777 jitter has a deterministic element to it due to the x2 multiplication scheme.

Voltage coefficient for the VG762-311.04



Voltage coefficient for the V777-311.04



Analysis: The voltage coefficient is much better for the VG762.

Conclusion: It is recommended that we use the VG762 type VCXO. While the jitter and phase noise are higher, it is still less than 1 ps which should be acceptable for data rates of 10 GB or less.

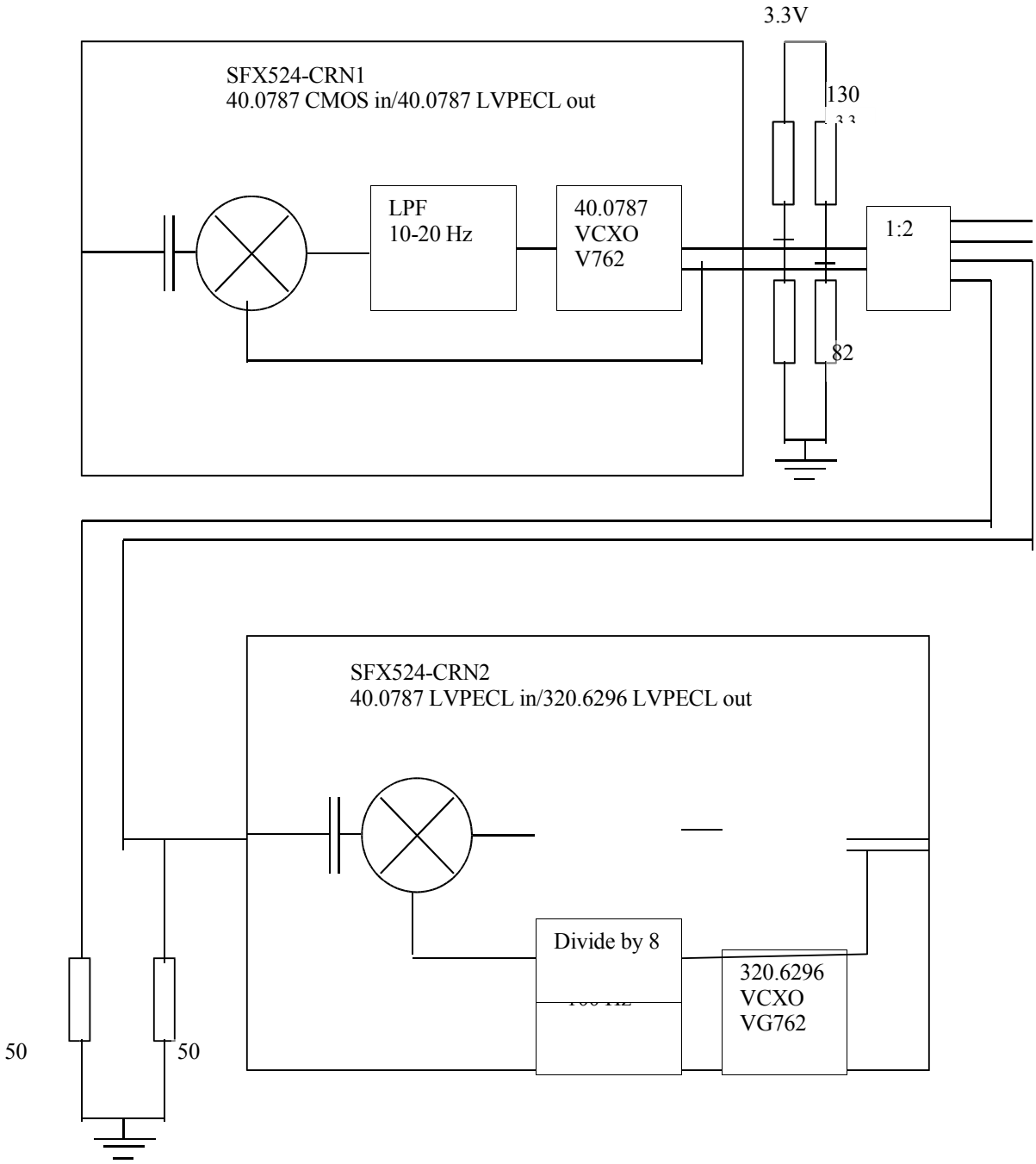
The VG762 performance, in all the other categories, is better especially in the period jitter and the cycle-cycle jitter where the V777 showed some deterministic jitter due to cross coupling of the fundamental frequency with the multiplied output. The voltage coefficient is also better with the VG762.

Therefore the SFX524-CRN2 modules will use the VG762 VCXO's and are quoted as such.

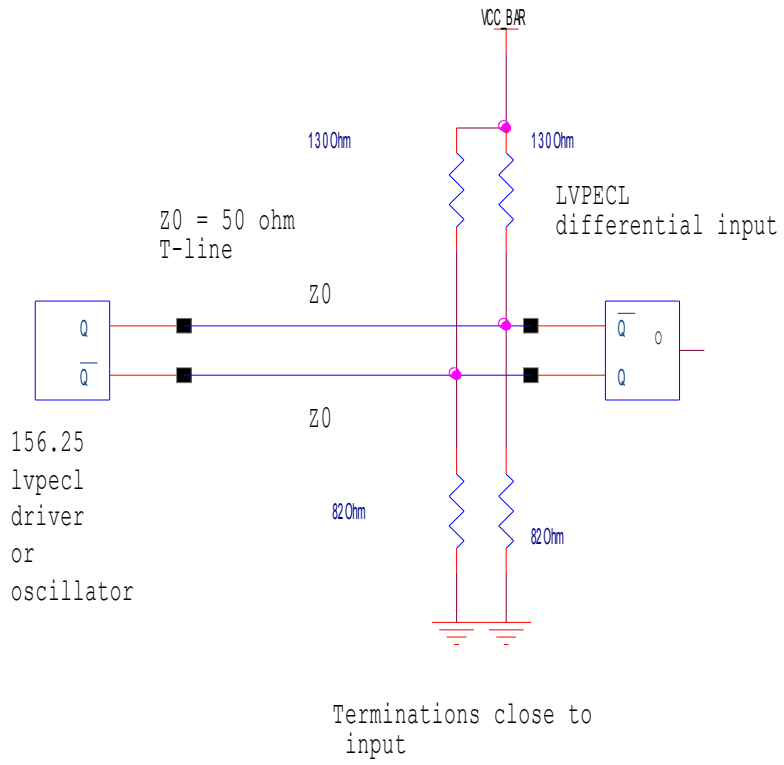
Should there be any further questions please feel free to contact me.

Ed Miguel
Product Line Strategist and Technical Marketing
Emiguel@conwin.com
630-851-4722 ext 4258

Cascaded Block Diagrams



LVPECL to LVPECL termination scheme



LVPECL to SFX524 input termination scheme