



Asynchronous USB Ultra-Low Phase-Noise Clocks

Bel Canto delivers three new Asynchronous USB Converters, the [REFLink](#), [uLink](#) and [mLink](#) that isolate the music signal – and clocks – from the harsh, noisy electrical environments of computers and music servers.

It's All About the Clocks

Asynchronous USB does one thing really well; decoupling the critical audio clock from the music data just as you find in the pro audio world. As a result the new USB Link Converters' output noise and jitter is now entirely dependent on the quality of the clocks! Since the oscillators are now free-running and isolated from the incoming data stream the Low and Ultra-Low Phase-Noise Clocks now available make an astounding difference, turning the uLink and REFLink into essentially noise-free sources that take the digital out of digital sound!

Ultra-Low Phase-Noise Clocks

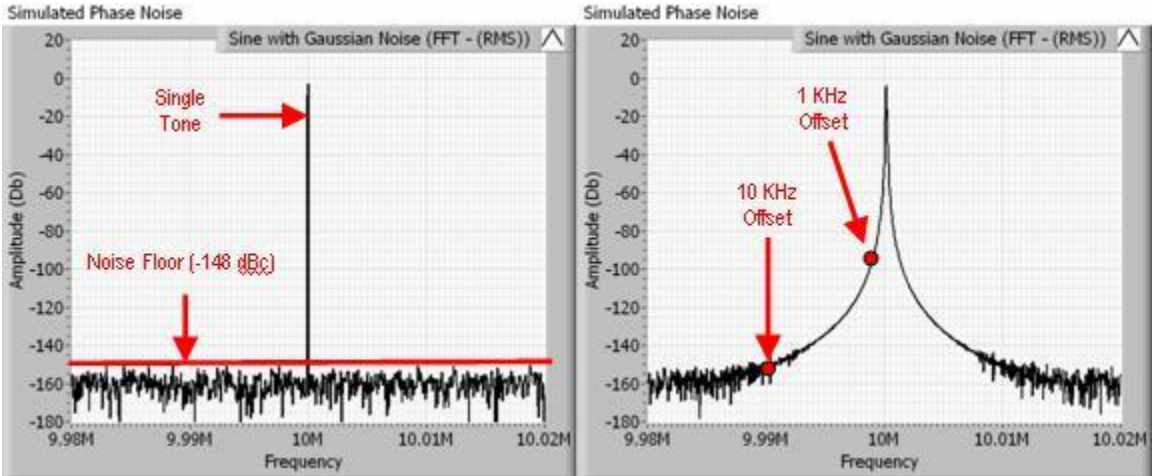


Figure 1a No Phase-Noise

Figure 1b Double-Sideband Phase-Noise

Figure 1a represents a theoretically perfect single tone clock with no additional phase noise. Actual crystal oscillators have phase noise more like that shown in Figure. 1b. Note the amplitude rising as the signal approaches the 10Mhz clock frequency The phase-noise is expressed as jitter or variations in the clock edge that's converted to noise in the output of an audio DAC. Lowering these sidebands lowers the noise and jitter resulting in cleaner output.

Low Phase-Noise mLink Clocks

Carefully chosen Low Phase-Noise Oscillators used in the mLink USB Converter already feature noise levels 10-to-100 times lower than typical oscillators. The phase-noise for the mLink oscillators is shown in figure 2 below.

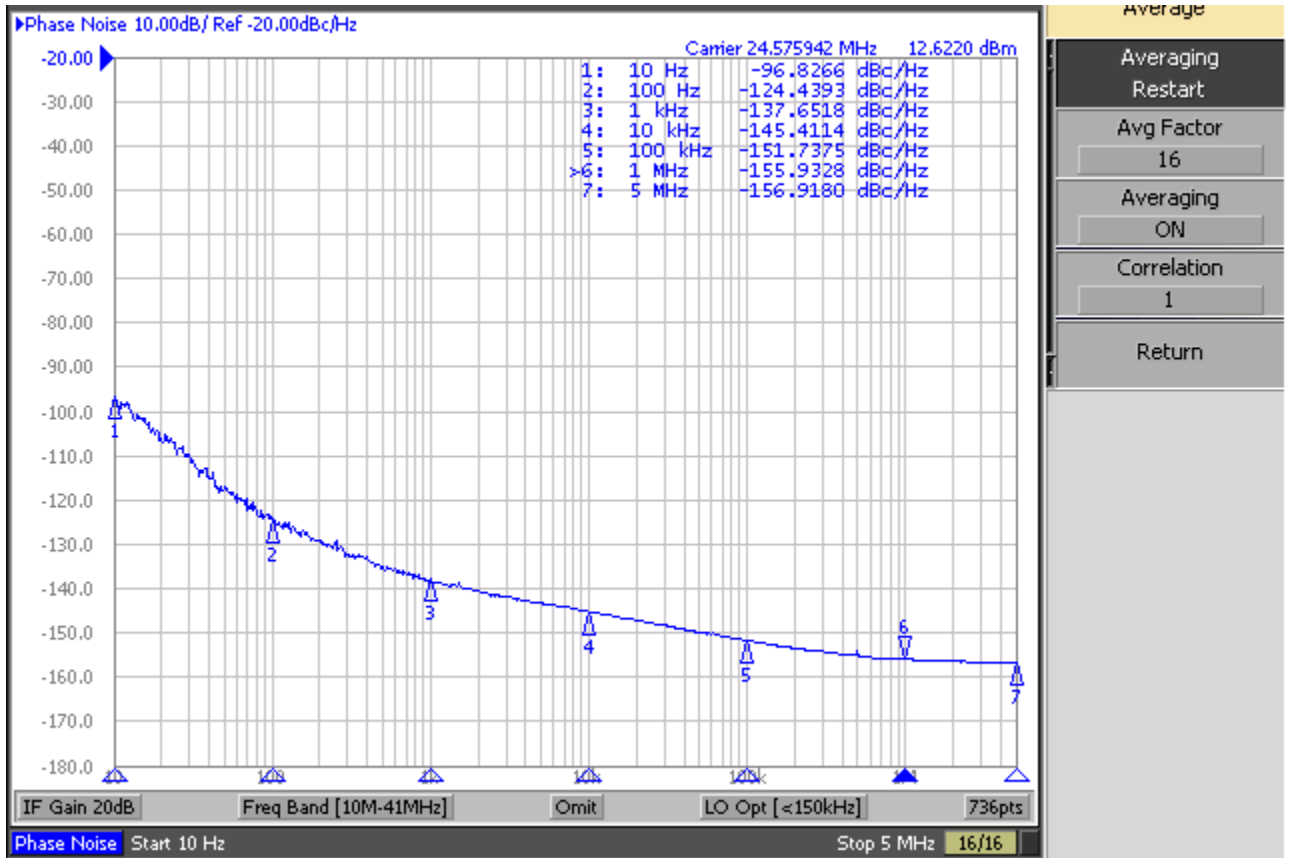


Figure 2 Demonstrates the Single-Sideband Phase-Noise of the Low Phase-Noise Oscillators used in the mLink. Note that integrated phase-noise from 100Hz-to-1MHz results in jitter levels of only 222 femtoseconds or 0.222pS picoseconds.

The Ultra-Low Phase-Noise uLink and REFLink Clocks

The performance of the Ultra-Low Phase-Noise Oscillators used in our new uLink and REFLink USB Converters are shown in Figure 3 below.

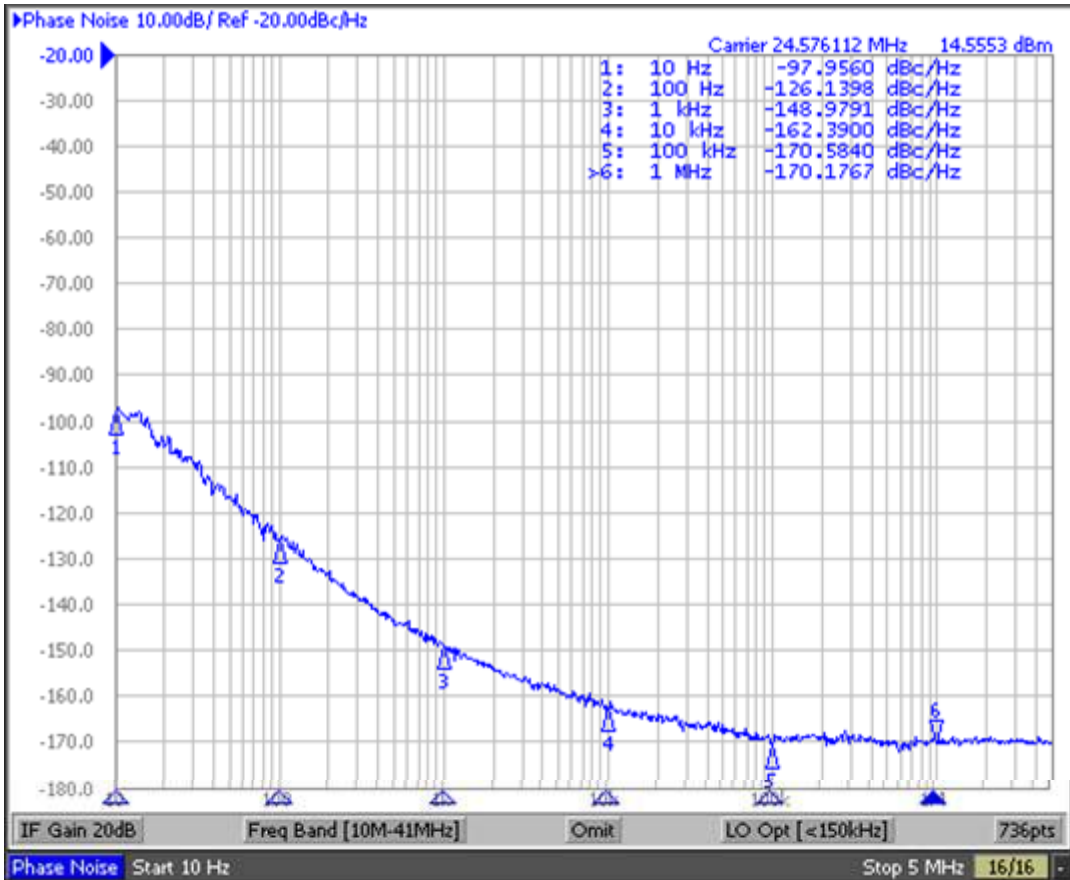


Figure 3 shows the Single-Sideband Phase-Noise of our Ultra-Low Phase-Noise Oscillator. Note the extremely low -170dBc noise floor that's critical for the clock's best sound quality. Integrated phase noise from 100Hz-to-1MHz is only 50fS (femtoseconds) or 0.05pS (picoseconds) and that's 100-to-1000 times lower than typical audio clocks! The Ultra-Low Phase-Noise Clock performance makes the Bel Canto uLink and REFLink essentially noise-free sources that take the digital out of digital sound!

mLink

You have a TON of downloaded and ripped music on hard disk and you're putting together a compact, economical audio system or trying to make the one you have sound better... a lot better. Bel Canto has you covered with the mLink USB converter. It uses Dual Low-Noise Clocks that are 10-to-100 times lower noise than typical oscillators! The compact mLink takes its power from the USB connection applying filtering and multiple dedicated supplies and outputs SPDIF on a BNC connector. Its compact dimensions make it easy to place and you'll be agog at the difference for the better. [Read more here!](#)

uLink

uLink audiophiles are much like mLinkers but with somewhat better-developed and higher-resolution systems. As the clocks are isolated from the audio signal they control the sound and the uLink steps up with Dual Ultra-Low Phase-Noise Clocks, Ultra-Low defining the difference between the mLink and uLink's clocks. The uLink's oscillators are more costly and deliver even lower jitter and noise which enhances the Bel Canto Jaw-Dropping Effect! Your friends will come to see if you're okay after it happens the first time.

The uLink also takes power from the USB connection so its compact dimensions make it easy to place. Like the mLink the power supply is filtered with multiple dedicated supplies. The uLink outputs SPDIF on a BNC connector and a ST Fiber Output compatible with the DAC3.5VB Mk II which sounds fantastic with a uLink and master-tape vivid with a REFLink! [Read more here!](#)

REFLink

The REFLink, John Stronczer at his engineering best. Audiophiles are a savvy lot assembling sophisticated computer-based systems because of convenience... and sound of course. REFLinkers have already ripped – or had ripped for them – a huge collection of music to external hard drives and probably use Audirvana, Pure Music or Amarra with iTunes for bit-perfect playback.

The ST Fiber output features the best isolation and speed for anyone with a Bel Canto 3.5VB Mk II or you can run SPDIF on BNC or AES/EBU to any other DAC for an experience you won't forget! The REFLink features Dual Ultra-Low Phase-Noise Clocks and triple galvanic isolation.

The REFLink is a masterpiece of engineering in a full AC-powered e.One chassis using the same LNS (Low Noise Supply) as the DAC2.5. As lowered noise allows clocks to dominate the sound, the LNS dramatically lowers line noise with multiple stages of isolated power that drive individual sections of the circuit. The output clocks and line-drivers are powered by a separate low-noise power supply. [Read More Here!](#)

Immediate Gratification!

The sonic impact of lowering noise to this degree is stunning; a highly organic analog-like presentation predominates. You'll enjoy improved soundstaging and spatial positioning, fully-developed micro- and macro-dynamics that give music life, tighter, more controlled bass, a beguiling midrange and a sense of openness and air in the high frequencies that will put you in close contact with your music again and again!

Bel Canto recommends Audirvana, Pure Music or Amarra with iTunes for bit-perfect playback and it's compatible with Macintosh 10.6 or later using native USB 2.0 audio drivers. The new mLink, uLink and REFLink converters appear as "Bel Canto uLinkUSB2.0" in the Sound application and should be selected as your default playback device.

JRiver Media Center works extremely well for PCs and ensures best audio quality with bit-perfect playback. Be sure to use WASAPI – Event Style for the Audio Output (Options/Audio/Audio Output/Output Mode) and make sure No Change is selected for all sample rates, what comes in goes out up to 192Ks/s. (Options/Audio/Settings/DSP & Output Format)

You'll have to install custom PC drivers for Windows Vista/7 available at www.belcantodesign.com/Support.html. When installation completes you select "Bel Canto uLinkUSB2.0" in the Sound application. Once you've set up your PC or MAC computer you can connect to your DAC of choice, no doubt a Bel Canto!



	mLink	uLink	REFLink
Proprietary 500MHz DSP Bel Canto Asynchronous USB Core	Yes	Yes	Yes
Dual Ultra-Low Phase-Noise Clocks		Yes	Yes
Dual Low Phase-Noise Clocks	Yes		
Dedicated Low-Noise Power Supplies			Yes
USB Buss Power, LC Filters and Local Power Regulation	Yes	Yes	
Multi-Stage Galvanic Isolation			Yes
Single-Stage Galvanic Isolation	Yes	Yes	
Native Drivers with Mac OSX 10.6 or Later	Yes	Yes	Yes
Custom driver for Windows 7 or XP	Yes	Yes	Yes
Input High Speed USB Type-B Receptacle	Yes	Yes	Yes
Output Coaxial SPDIF on BNC	Yes	Yes	Yes
Output LightLink ST on ST Fiber		Yes	Yes
Output Balanced AES/EBU on XLR			Yes
BNC/RCA Adapter Included	Yes	Yes	Yes
Supported sampling Rates: 44.1, 48, 88.2, 96, 176.4 and 192kHz	Yes	Yes	Yes
Supported Word Lengths: Up to 24-bits	Yes	Yes	Yes
Full e.One Chassis and Front Panel Sample Rate Display			Yes
Sample Rate LEDs Indicate 44.1, 48, 88.2, 96, 176.4 and 192kHz			Yes
On/Off Power Switch			Yes
Power Requirement 120VAC/60Hz or 240VAC/50Hz Set Internally			Yes
Dimensions 8.5 W x 12.5 D x 3.5-inches H (216 x 318 x 88mm)			Yes
Weight 14lbs. (6.5 kg)			Yes
Dimensions 4 W x 4.75 D x 1.2-inch H (103 x 120 x 30mm)	Yes	Yes	
Weight 1lb. (0.45kg)	Yes	Yes	
USB Cable	No	No	No