Helen

FAQ

Q: Can Helen be used between DSD/DMP if input and output are both connected through HDMI? Is Helen's HDMI interface definition the same as PS Audio's? Does the industry have a uniform definition of HDMI transmitting I2S signals?

A: Different manufacturers have different standards of HDMI Over PCM/DSD. Titans Audio is using its own standard (please check the manual for the details). HDMI Over PCM/DSD is not a choice of high-performance transmission. 3-Wire or 4-Wire BNC/SMA is. Our design uses LVDS level standard which is compatible with other devices. However LVDS is not the choice of lowest phase noise transmission, but only a low-cost differential design. So we support 4-Wire SMA output besides HDMI Over PCM/DSD.

Note: Titans Audio standard is not compatible with PS Audio. In fact, the industry doesn't have a uniform HDMI Over PCM/DSD standard.

Q: How is Helen's power? It looks cheap. Will there be improvement if I change it to a linear power?

A: Every part of Helen pursues using the best materials, so does power supply. Helen chose the same brand and same series of product that professional phase noise testers use. This switching power supply is more expensive than many high-end industrial frequency transformers. Moreover, Helen handles well with the internal power source. It also can be seen from the final measurement that, the phase noise result is good. If you want to improve the power quality, please use spiral battery or gel battery directly.

Q: Many audiophiles and audio designers think traditional SPDIF transmission is the bottleneck and there will be loss of sound quality through no matter optical or coaxial. The best transmission interface should be I2S or USD. Is that true?

A: Optical (Toslink) or AES3 (AES/EBU) or coaxial are the same thing in essence. Their underlying protocol is S/PDIF, which is based on Bi-Phase, and in theory will lead to jitter degradation, because after resolution the clock will have several edges and it easily introduces jitter. The inherent jitter of coding can be almost eliminated completely. As for introduced jitter, it depends. Most of it can be eliminated too. Therefore, the quality of the transmission cables is very important.

We found that many customers prefer the cables that are actually more likely to introduce jitter, because they sound "warmer". In essence, more introduced jitter will lower sound clarity and cover the defects of the front-end system. When it comes to a system with good resolution, that would be found a "problem", while for some systems it is regarded as a "pleasure" to the ear. It varies from person to person. Usually new audiophiles tend to make that

mistake, but we found senior audiophiles would all finally prefer the sound of genuine low jitter.

Q: Why doesn't Helen be integrated in a digital players or a DAC?

A: Let's start with Helen's product definition. Why did we create Helen? We have developed it for years, so our team has an expectation rather than just sell things for short-term interest. The reason is Titans Audio founder's complex extension of professional audio equipment. It is also something our friends would like to have. Many people want some high-end audio equipment to improve the clock, but those professional devices are expensive and not easy to use. So we made Helen. It's a product with Titans Audio's complex.

Q: Can Helen be updated through firmwares?

A: Helen needs to be back to factory for update. However, it does not need update for quite a long time, for many of its designs have already exceeded the mainstream specifications at present.

Q: Will there be more troubles as Helen connected in series in a system? Will it be better if multiple sets of Helen connected in series?

A: Why can Helen improve the system rather than get into troubles? It's because in the past, serial-in signal handling is only constant tone changing, which didn't solve clock jitter problem fundamentally. Helen can improve sound quality for 2 reasons: first, it's a pure digital device. In most cases, digital devices have no problem with no matter how many series connections, as long as the last one is perfect. Second, Helen is essentially an instrument, and its clock output can work as audio phase noise tester's local reference source. So Helen does

genuinely improve jitter frequency spectrum, thus sound quality improvement is achieved.

Q: What does Helen do with the signals?

A: Helen's signal path is through Bit-Perfect transmission. Completely lossless. Helen does not do anything that damages the signals.

Q: Is Helen the same as a USB processor?

A: They are completely two different things from principles to functions. Whoever's interested can do A/B tests using ears or testers.

Q: In what aspects does Helen's sound quality improvement capability demonstrate?

A: Helen's inherent jitter is ultra low, so in sounding, the behavior is that full frequency-domain resolution is improved, sound is clearer, bass is deeper and more cohesive, treble is more penetrative and natural. Of course, hearing words description can never compare to experiencing it yourself.

Q: A digital cable is needed once a Helen is purchased. Any advice on the digital cable? If I only have one high-end digital cable, should I use it for Helen's input or output? Is HDMI better than AES/EBU, and AES/EBU better than coaxial, and coaxial better than optical, if they are all same quality?

A: The cable from Helen to the DAC is very important, which is where the cable should be the best. And the length should be as short as possible, to reduce loss and interference. As for the cable from the source to Helen, it depends to

you. If you pursue perfection, you can use high-end cables here. If you cannot afford so many high-end cables, you can use some cost-effective and qualified cables. "Qualified" means the cables' impedance characteristics meet digital audio transmission's requirements.

Helen's design is to reduce jitter from front-end to the lowest. So no matter you use HDMI or S/PDIF, the results would be the same, but in sounding there would be a little difference. Because S/PDIF cables and HDMI cables are different in jitter introduction. HDMI tends to introduce less jitter, for its cables are made according to standards, while many of S/PDIF cables are DIY products and the quality is not guaranteed.

The difference between S/PDIF and AES3 is that AES3 is better for long-distance transmission, so basically professional audio all uses it. Many devices are distant from each other and need long cables, and AES based on differential design has its advantage. But audiophiles usually don't have that problem, and now rear-end device's performance basically depends on the design level of the digital audio receiver. But for high frequency, BNC or SMA's single-end coaxial transmission is the best. Differential transmitting high-frequency signal would easily result in phase difference, which is determined by differential signal's essence, so in RF area it's necessary to use single-end coaxial transmission, and there is very high demand of connectors and cables, which is why Helen's I2S output applys 4-Wire SMA design.

Q: Where did Helen's tech specs come from? It doesn't look like they are from an audio analyzer.

A: Most of Helen's measurements are based on PNA, DSA and high-performance PSA. A few used the audio analyzer. Mainly because almost all Helen's tech specs exceed the audio analyzer's. We can only use higher-lever testing instruments for measurements and comparative validation.

Q: If the digital transport has precise clock output (like some high-end transport with external reference clock), would Helen be unnecessary?

A: To see whether clock is good or not, there are many aspects to be checked. For example, ES9018S's official THD+n says -120 dB, but so few complete machines truly reach -120 dB. Clock is the same. You may buy a good crystal with good specs, but chances are a bad circuit may degrade it by 10 dB or even 20dB, which is quite common.

High-end transport's reference clock is usually good-quality as many are purchased from instrument suppliers, but the terrible circuits would degrade the signals to a horrible extent. It's a typical cask situation, especially for clock. Most companies don't want to buy instrument specifically for clock measurement for comparative validation, which is the root cause of those problems. This is when Titans Audio's advantage shines. We have not only testing instruments but also engineers proficient in using them.

Helen has positive effects on many high-end transports on the market, as their clock is not perfect. We are using some of the high-end transports ourselves and we use external constant temperature crystals for reference. In fact there

will be obvious sound quality improvement when a Helen is added between a CD transport and a DAC.

Q: What did Helen change to improve sound quality?

A: Helen drastically improves short-term stability (AKA frequency's quick change. Quicker frequency change is, in essence, phase noise). Long-term stability (AKA frequency's slow change) still depends on source, but the fact is that the sound quality we judge by ears is short-term stability, AKA quick frequency change. For example, when you run on a treadmill, if you set that the incline gradually changes from 0 to15% through 2 hours, you won't feel the incline for the change is too slow. On the contrary, if you set the period to 10 seconds, you will feel the intense discomfort immediately.

Q: If the converter can store input signals in the cache, and then read it according to its clock, would Helen be necessary? Would there still be improvement by Helen? Why?

A: This should be split into two situations: synchronous design and non-synchronous design.

Synchronous: FIFO size doesn't matter because of the clock after it (It must be a PLL, otherwise it cannot sync). At this time, Helen can, to the maximum extent, make the PLL near-end come close to free oscillation and far-end work in the state of noise floor, and thus achieves sound quality/performance improvement. It's essentially a two-stage PLL.

Non-synchronous: it's a kind of SRC, which is an oversimplified and crude way. In most cases it badly degrades sound quality, so whether Helen can improve

the sound quality of the system can not be guaranteed. It depends on the system.

Here we'd like to talk about another design which uses large cache and local crystal. First it needs to be made clear that the local crystal must do better than Helen in residual phase noise, otherwise there will be only degradation instead of optimization. If the crystal is better than Helen, then there's not point using Helen, because the data Async FIFO completely isolates is better isolated by clock (they are 2 clocks). But this kind of design is not very high-tech and not so strict. If data source clock skews a lot, for example some old CD players can reach +/-1000 ppm, then when we play a piece of CD/HD WAV disc with one track, there will be popping when the track is not finished. The higher sample rate is, the more dangerous. Because FIFO is more likely to underload or overflow. It's a design depending on luck.

At present, Helen's application is for DAC with mediocre internal PLL, so Helen will first reject almost all the jitter, and the DAC's PLL will work in the best state thus the sound quality is improved.