

à la Une...



100% LUMiN

- LUMIN X1
- NEW LEEDH PROCESSING
- 2 x LUMIN AMP

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The Hong Kong based company and pioneer of DSD streaming has chosen to move from being a pure digital specialist to an audio generalist, enhancing a class AB amplifier prosaically named "Amp".

That move was made possible through a close partnership with Angus Leung, who decided to join Lumin and to design their first device belonging to the old analog world.

Angus Leung was indeed the owner of WestminsterLab company and the co-designer of a cost-no-object amplifier called "Unum".

Angus had also designed a few wires for Lumin, especially DC cables and power cords, to improve the performance of their network players.

As there was no preamplifier unit to be drafted shortly in the plans of Lumin's engineering staff, their streamers' built-in digital volume processing was the only way to keep 100% of the Lumin DNA before sending the signal to the loudspeakers.

Being personally involved into the innovative Leedh Digital Volume Processing tests since the early beginnings, I introduced Gilles Milot, CEO

of Acoustical Beauty, and owner of the Leedh brand, to Lumin's managing team, demonstrating them via a small prototype board how it was possible to improve their sound avoiding destructive dithering algorithms.

The difference between the built-in volume controller and Leedh's one wasn't small and Lumin was immediately convinced in the interest to remain within a pure digital path to enhance the less destructive volume controller achievable with reasonable means.

But Lumin had to work hard to be able to handle an additional digital processing which could apply to both PCM and DSD files without increasing too much their streamers' CPU load... As you may understand, sometime very simple ideas in theory can bring us to practically complex development frameworks. That what happened with Lumin...

So what stands behind this "magic lossless digital volume controller" designed by Leedh? It's clearly not easy to explain with simple words a technical matter dealing with maths. I will therefore do my best to tell you about this new way to set the volume in the digital domain.

Most of the time, digital signals are encoded in a 16-bit PCM format in regular definition or in a 24-bit PCM format for high definition audio files. A very small part of the digital music offering comes through 1-bit DSD files.

The best D/A converters available to the market are able to convert without any loss a digital signal into an analog signal since it doesn't exceed a length of 20 bits.

These DACs are therefore capable of converting standard red book signals into analog signals without any loss, and with "acceptable" loss for high resolution signals. Indeed, if the digital signal is coded on more than 20 bits, part of its information is lost when it is converted to analog, even if the DAC accepts input of 32-bit signals.

For the most efficient DACs on the market, this loss is inherent above 21 bits in the distortion of the DAC and above 23 bits in its background noise. Specialists consider it remains acceptable up to 24 bits, but the loss of information therefore becomes more and more important beyond 24 bits.

Despite that may seem counterintuitive, reducing the amplitude of a digital signal increases the number of bits with which the modified signal is encoded. Such an increase is therefore likely to cause a loss of information of the signal during its conversion to an analog form, if the number of coding bits of the modified signal exceeds by far 20 bits.

Basically, to attenuate the signal by circa -90dB, the standard volume settings are coded at least on 16 bits, and more generally on 32 bits. That is to say, the modified signal can undergo a maximum increase in the number of bits, with which it is coded, of 16 bits (ie $16 + 16 = 32$ theoretical bits in the case of a regular 16 bits resolution file). In fact, increasing the number of bits depends on the chosen attenuation value.

With a regular digital volume control, the attenuation values are chosen to be conventionally calibrated every dB or half a dB, generally requiring a high number of bits for a good approximation of the expected values. Thus, the required increase in the number of bits, depending on the related attenuation value, is usually more than a dozen bits.

That said, the signals encoded in 16 bits will exceed the "acceptable" limit by at least 4 bits and the signals encoded in 24 bits by 12 bits. These overruns will undoubtedly generate losses of information which are mostly audible and have made adverse publicity to the digital volume control techniques compared to the old analog volume knobs...

For signals encoded in DSD format, adjusting the volume of these signals brings them back to PCM format, so the problem of adjusting the volume of DSD signals is identical to that of PCM signals.

So, what does the Leedh Processing?
The Leedh Processing for volume control is based on a lower increase in the number of bits depending on the choice of attenuation values set every dB or half dB. The Leedh Processing consists in choosing attenuation values which allow keeping the lower number of additional bits with which the modified signal is encoded, even if it does not stall on conventional values and does not offer a constant attenuation step. These predetermined values limit the increase in the number of bits to 4 bits or less for the first range of signal attenuation from 0 to - 6.02dB.

Then, these optimised attenuation values allow to increase the number of coding bits of the modified signal only from 1 bit to 8 bits down to - 30dB, that is to say with an average saving of 8 coding bits, compared to a standard volume setting.

Offering a quite perfect attenuation of a 16-bit signal without the slightest loss after analog conversion performed with the best DACs, it is therefore as such that the Leedh Processing claims to be lossless compared to the existing best analog and digital volume controllers.

Lumin decided to enhance first this technology on their X1 flagship (and simultaneously on their digital transporter U1 as both devices share the same firmware). It had to be done on both analog and digital outputs and for PCM and DSD playback. Obviously, DSD digital processing calls for a prior DSD to PCM conversion and for the X1 digital USB output, Lumin engineers have to output within their FPGA a 352.8 kHz PCM signal instead of a pure native DSD form, and only for DSD 64 and DSD 128 as the Lumin CPU had not enough processing power to handle heavy conversion work on the fly for higher DSD multiples.





For the analog outputs, Lumin benefited from the ESS Sabre chipset powerful digital capabilities and they could therefore apply the Leedh Processing on the whole set of DSD and PCM frequencies. I assume Lumin as achieved to date the most complex and performing adaptation of this breakthrough technique of volume control in the digital domain.

Focusing now on the amplifier, the Lumin Class A-B "Amp" is a fully balanced dual mono circuitry, that should theoretically achieve excellent channel separation and low output impedance. It is really nicely built. The dual mono circuitry is supplied by a big 600VA Plitron toroidal transformer. The voltage gain and current gain consist of three stages composed of discrete transistors and resistors for optimal performance. The Lumin Amp is fully DC coupled and there is no single capacitor within the signal path, another promise of very low distortion and high neutrality...

The left and right channels supply distribution have each 40,000 μ F filtering capacity totalising 4 capacitors of 63V / 10000 μ F.

The Lumin Amp specs an innovating and proprietary bias which eliminates the crossover distortion, monitors and varies the bias, depending on the load and the temperature for a truly intelligent class A-B management.

In terms of power supply, the Amp totalises 2 transformers and 13 points of regulation. The CNC single billet aluminium chassis has been designed to match the shape of the Lumin network players.

Like the other devices designed by Lumin, you will find no joints and no screws except on the hidden bottom plate. The chassis acts as a passive heatsink and will turn from lukewarm to very hot, according to the load and the polarisation.

As the Amp has been thought to be directly connected to the Lumin streamers, it

features a high input impedance and sensitivity, so there is no reason to add one further preamplifier in the game...

Like most of my power amplifiers (i.e. Luxman M800A, SPEC RPA-W3 EX, and Red Dragon S500), the Lumin Amps can be operated in different operation mode : Stereo, Dual Mono and Bridged Tied Load. At the contrary of my Luxman and SPEC amplifiers, the standard output is already comfortable with 160W under a 8 Ohms load and 320W under 4 Ohms. The class AB dual mono design makes it quite stable under very low impedances. So the 640W at 8 Ohms in BTL operations are only useful for very low sensitivity systems ideally with friendly impedance curves.

As we are dealing now with specifications, it may be useful to precise that the Lumin Amp has ultra flat and extended frequency response from 20 Hz up to 40,000 Hz @ \pm 0.1 dB.



The signal to noise ratio (unweighted) is given for a realistic 103 dB. Input impedance for balanced operations is 200 k Ω (100 k Ω unbalanced). Output impedance is rather low (0.1 Ω) and input sensitivity is 1.16 Vrms. Gain in stereo and dual mono operations is given at +26 dB, and +32 dB in BTL mode.

The rear panel organisation is guided by the dual mono circuitry and you find at the centre the IEC inlet and on its top two switches, the upper for enabling balanced / single-ended inputs and the lower for activating, stereo, monaural or bridged settings. Clear indications for connections are provided to run the BTL or dual mono modes properly. The four binding posts are from Furutech's high performance series, and the balanced / unbalanced inputs are set from each part of the back panel with sufficient space to avoid any potential contact issue.

For a short reminder about the X1's main features, it sports two ESS Sabre ES9038Pro D/A converters which allows a dynamic range of 140 dB, and displays a THD + N of circa - 122 dB, compared to the 135 dB of Dynamic Range and -120 of THD + N of the ES9018 chips used on the previous flagship S1.

The choice of the latest ESS Technology chip allows to simplify the circuitry and to benefit from a less energy-consuming assembly compared to the S1 which had to manage 4 ES9018 chips.

On the clock side, the X1 features a Femto master-clock controlled under FPGA and composed of two Crystek CCHD-957-25 oscillators with fixed frequency and ultra low phase noise.

In terms of performance, the new Crystek oscillators integrate more efficiently with the Lumin FPGA.

The external power supply has also been

improved through a distribution made on 3 separate rails instead of two on the previous models (A1, S1, T1). The X1 thus has a separate regulated power supply for the digital part and for each channel of the analog stage.

The separation of the left and right channels is supposed to bring a significant improvement in sound quality compared to previous models.

Inside the separate power supply casing there are two Plitron toroidal transformers. Linear Technology voltage regulators were chosen for their very low noise and very fast response time.

UCV aluminium electrolytic capacitors from Nichicon were also selected for their very low impedance.



Sound:

I think that Li On and Nelson Choi were interested in a "two Amps" listening test as I already use alternatively in my playback chain two Luxman and two SPEC stereo power amps. So, why not using now two Lumin Amps?

That proposal was making sense indeed and it was undoubtedly more equitable comparing similar configurations than different ones. And when you receive for review purposes one stereo amplifier which can operate in three different configurations (stereo, monaural and bridged tied load), it is always frustrating testing only one mode among the three possible...

That said, the Luxman M800a unit outputs 60 W under a 8 Ohms load in stereo mode, quite the same level as the SPEC RPA-W3 EX, whilst the Lumin Amp delivers some generous 180 W (always on 8 Ohms) in stereo operations.

Only one Luxman or SPEC power amplifier is certainly not enough to achieve the sonic performance one could expect with my big and expensive full range loudspeakers. The use of two units is thus quite mandatory, that is obviously not the case of the Lumin Amp which can already deliver a lot of power within a regular stereo setup.

The use of two Amps with my G1 Spirit pair or my Harp loaners did not change drastically the overall result. They added a bit more precision and dynamics within a slightly wider soundstage. On one hand, I could enjoy a very comparable performance to the one I am used to (especially in monaural operations), that is already an achievement for a new comer in analog amplification manufacturing.

On the other hand, the sound in BTL mode was a bit taut and edgy compared to the result achieved with one sole Lumin Amp, as this configuration usually tends to lower the loads' impedance.

I had to replace these big speakers with a lighter pair, like my Leedh E2 Glass, to understand what could be the real interest of acquiring two Amps for BTL operations. Indeed the Leedh speakers have a very low sensitivity of 83 dB and definitely need power, whilst keeping a friendly impedance. That's in fact my more demanding pair of loudspeakers regardless of its size...

The bridged tied load setup had a real impact on the soundstage which became significantly wider and deeper compared to the simple stereo configuration. The level of detail also improved at a much higher scale.



I did not hear any adverse effect or drawbacks of the BTL mode operated with the Leedh E2 Glass. My understanding is that their friendly impedance curve did not suffer from the halved load. It was a quite perfect association : obvious benefits on the low sensitivity and no drawbacks on impedance...

The monaural setup did not bring such significant difference compared to the simple stereo mode on the Leedh E2 Glass speakers. It provided a noticeable improvement with the Vivid Audio and the Lawrence Audio speakers but I am not fully convinced it is really worthwhile. As above mentioned, one sole Amp already delivers enough current and power to drive efficiently many mid-sensitivity loads.

I would personally point on one single Lumin Amp with the Lawrence Audio Harps, while I could consider to adopt the monaural setup with the Vivid G1 Spirit. But I would certainly point on the BTL setting for the Leedh speakers. Three speakers and three different possibilities, hoping you won't get lost in such labyrinthine assessment...

The key point should be nevertheless based on the fact one sole Amp should comply with most of the loudspeakers available to the high-end market.

On the Leedh E2 Glass speakers, and compared to my two SPEC power amplifiers RPA W3 EX, one sole Lumin Amp provided a less vivid sound, perhaps a bit more on the neutral side, my Japanese contenders having this warm vintage coloured fingerprint. I must acknowledge the Hong Kong boys neither sounded cold nor lacked tonal density.

On big orchestral works, like the Sen Cha's performance on "Memories Lost" with the Taipei Chinese Orchestra, the SPEC combo pushed far away the front wall, offering an unusual depth. In comparison, the Lumin Amp provided a closer and slightly narrower soundstage. In terms of dynamics, the liveliness of the SPEC amps, especially in the bass and low mids, is quite unrivaled. But in the upper bandwidth, there was more life with the Lumin Amp and perhaps also a bit more transparency.

What happened then bringing a second Amp into the arena?

It wasn't so spectacular I would understate what I just have written before. Nevertheless, two Amps, instead of one, increased the overall energy and liveliness of the music, at such an extent they performed slightly above my SPEC amps



and were almost on par with my bridged Luxman M800a power amps. That very satisfying and impressive result was achieved in BTL mode with the Leedh E2 Glass.

I honestly think that the proposal of acquiring two Amps instead of one single stereo unit can be contemplated if your speakers really need power (that's obviously the case, as far as I am concerned, for my Giya Spirits which can receive 800 W per channel and for my low sensitivity Leedh speakers).

With the Vivid Spirit and the Lawrence Audio Harp, the very good performance of one sole Amp, used as a single stereo amplifier, was also boosted by the substitution of the regular power cord with more expensive cables, and also by replacing the regular fuse with an audiophile grade loaner provided by Aqvox.

On the other hand, I have reached the best sonic results using two bridged Amps with their regular power cords and fuses. That was not a surprise as my Luxmans behave exactly the same way when used as monaural amps or in BTL operations...

Compared to my Luxman combo, the two Lumin Amp provided incredible speed on transients. Considering the Luxman

M800a being on the warm side of neutrality, the Amps are excessively neutral.

They do not deliver as much gravitas as the Luxman can provide. Snare or kick drums' impacts are not as impressive as with my Japanese boys for instance. But tones sound slightly more accurate and, as it is the case for the whole range of Lumin streamers, the quality of soundstage is quite unique. That definitely seems to be Lumin's DNA.

The Lumin Amp provided in fact a very honest and realistic performance. It is one of the very few amplifiers I have tested so far which do not give the sensation of making up or falsifying the truth. And at the same time, it doesn't sound sterile or clinical like it is very often the case with many Ice Power or Hypex designs which claim the highest transparency.

That's indeed very surprising to highlight such a convincing performance from the first generation of amplifiers released by a specialist of network players... although the first amplifier designed by Lumin was in fact the M1, but it was at that time fully digital technology.

The complementary of the X1 network player with the Lumin Amps has been unequivocal during these last months



passed with the Lumin combo. The slight tendency to deliver quite saturated tones of the Sabre D/A converter completely fits the clarity and tonal accuracy of the Lumin Amp.

So if you already owns the X1 or S1, the Lumin Amp could really be a perfect choice, especially in this price range.

But the most impressive feature of the Lumin combo was hidden inside the X1 streamer itself.

The implementation of the Leedh Processing has been indeed a very important step forward, as it was the opportunity to cancel any need for a preamplifier, as good as it could have been...

As I was part of the early testers of such technology, it wasn't a real surprise to my ears but more a confirmation that "the less is more".

Whatever volume controller you might use, from the best analog beasts such as Robert Koda's Takumi or Ypsilon PST 100 to the more convincing digital algorithms like those used inside the Mola Mola Tambaqui or by the big Soullution D/A converters, the Leedh Processing revealed

how destructive the usual volume controllers can be.

Thus trying the lossless Leedh Processing is a trip with no return ticket.

Soulution engineers have been among the firsts to understand the necessity of adopting such technology inside their two D/A converters and Lumin will become undoubtedly the manufacturer that will popularize the Leedh Processing for both PCM and DSD files inside far more affordable gears.

The Leedh Processing significantly boosts the performance of the Lumin network players. There is more clarity, more details, better tones, higher dynamics, less distortion...

It's a bit complicated to explain exactly what happens but, as soon as you try, you understand to what extent the usual preamplifiers add their own filters, coloration to the sound.

Imagine you visit the Louvre museum and stand in front of the Mona Lisa with your favorite pair of sunglasses. The Leedh Processing just allows you to admire the Leonardo da Vinci's masterpiece with your own eyes, and without any additional filter. Then you understand the complex work of lights, colors, the art of "sfumato"...

Why should you spend so much to acquire a device which will only distort the truth ?

Lumin has definitely chosen to exclude the



analog preamplifier from the high fidelity circle and that's perhaps one of the greatest achievements to get as close to the recordings as you never have been before...

Before having experienced the new Lumin X1, I would never have considered my own Coincident Speaker Technology Line Stage as a component degrading the overall transparency of my system. It has always been one of the few analog preamps I was

considering as utterly transparent, to the extent I have sold my own Coincident Statement Line Stage to acquire the MK2 upgrade. And now, this device just sounds to my ears as an additional distortion to the sound...

The benefit of such impressive transparency applied to both X1's analog and digital outputs. I was quite sceptical about sending an attenuated digital signal into my Mola Mola DAC which applies thereafter its own upsampling.





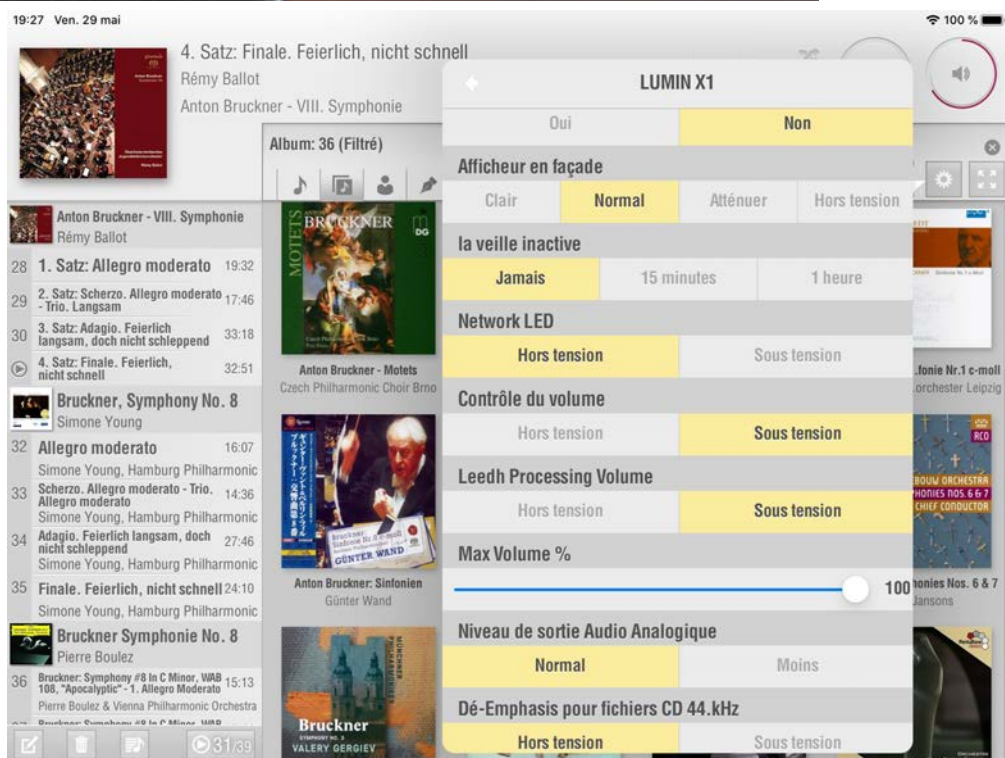
But my listening tests were all positive : the Lumin / Leedh digital volume processing was far more accurate than the Tambaqui's dithering, despite the latter is already very good. And the result achieved with the two Lumin Amps, the Lumin X1 used as a pure digital drive, and the Mola Mola Tambaqui D/A converter, was perhaps one of the very best results I had ever obtained in my room.

It remains in my opinion a matter of choice, as the X1 provides a more precise soundstage through its own dual ESS Sabre D/A converter. On the other hand, the Tambaqui delivers more accurate tones and a slightly more liquid result. But sincerely, the intrinsic performance of the X1 is already so impressive, it's a pity to use it as a simple digital transport... Especially if you consider that DSD streaming with the Leedh Processing on its digital output is limited to DSD 128 whilst you can easily go up to DSD 512 through the analog output...

The Lumin X1 was already a very good network player. Now, it becomes a serious matter of concern for all the competitors that do not benefit from the Leedh technology, and indirectly for all the analog preamplifiers' manufacturers...

Lumin has also decided to implement the Leedh Processing on the whole lineup, and even the full digital amplifier M1 now operates the Leedh's volume setting, not so shabby for such entry-line device... This evolution comes surprisingly for free, through a firmware and app's update for all the existing and future Lumin customers.

It is still possible to come back to the original volume setting via an option in the settings of of the Lumin app's last version (6.1.16), just for an A-B comparison, because it seems a complete non sense to use now the old volume processing. Lumin has also implemented a "max volume setting" that allow to redefine the 0-100 Leedh attenuation range in order to avoid any disastrous consequences of sending 100% of the power to your loudspeakers .



Conclusion:

The tonal accuracy / neutrality of the Lumin Amp summed to the lossless digital volume setting of the X1 makes it a very enjoyable combo for who looks for the ultimate transparency. I would not have expected that level of refinement from a 100% solid state playback chain but I must confess that everything I loved in tube preamplifiers is now outclassed by the outstanding integration by Lumin of the Leedh Processing.

I will keep my Coincident Line Stage for review purposes, as I still own my Esoteric CD player for the same reason. But they look today more like museum pieces than everyday objects. Simplicity and perfect integration with an amazingly good amplifier: Lumin has achieved something truly special. This combo can easily compete with the very best proposals from CH Precision or Constellation Audio, at a fraction of their asked price. That clearly deserves our best recognition and award...

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Lumin Amp : € 15,000

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