Network-attached player/DAC
Made by: Pixel Magic Systems Ltd, Hong Kong
Supplied by: Sound Design Distribution Ltd, Cardiff
Telephone: 0800 009 6213
Web: www.luminmusic.com; www.sounddesigndistribution.co.uk
Price: £12,995



# Lumin X2

Hong Kong-based Pixel Magic waves its digital wand over a bespoke, FPGA-based DAC solution inside its new flagship streamer. A significant departure, so how does it sound? Review: **Andrew Everard** Lab: **Paul Miller**

Here's one in the eye for anyone still convinced that hi-fi is being taken over by unknown brands bringing in cut-priced equipment. Not only is Lumin very well-established, having launched its range back in 2012, it's been expanding that lineup ever since to cover a wide range of market sectors. Lumin now has a half-dozen network players, three music transports, two dedicated music servers and an all-in-one player/amp system – while continually developing its in-house technologies.

It's a trend becoming increasingly common as brands that once entered the market as disruptors, challenging the status quo, are now expanding their offering and becoming ever more ambitious. So, while the Lumin range may start below £2000 with the U2 Mini network transport, it now extends all the way up to the X2 player here, at a decidedly upmarket £12,995.

## FRESH TECHNOLOGY

Yes, it still has the compact form-factor that's a Lumin hallmark, with the milled-from-billet alloy casework just 35cm wide, and the company's in-house operating system complete with a matching app for control, but much here is new. Fresh technology starts with an upgraded processing core and runs through to the company's own discrete DAC, designed and implemented on high-speed FPGAs [see picture, opposite] rather than adopting one of the popular third-party solutions found in many a rival player.

What is the X2? Well, it's a complete network playback solution, powered from an off-board PSU housed in a slender second chassis, just under 11cm wide and linked to the main unit via a multicore umbilical cable. In an enclosure of thick aluminium, just like the main player, the power supply uses dual toroidal transformers to deliver separate feeds to the analogue and digital sections of the X2. The whole system is available in either black or raw (silver) anodised finishes, and the main player section sits on isolating feet from IsoAcoustics.

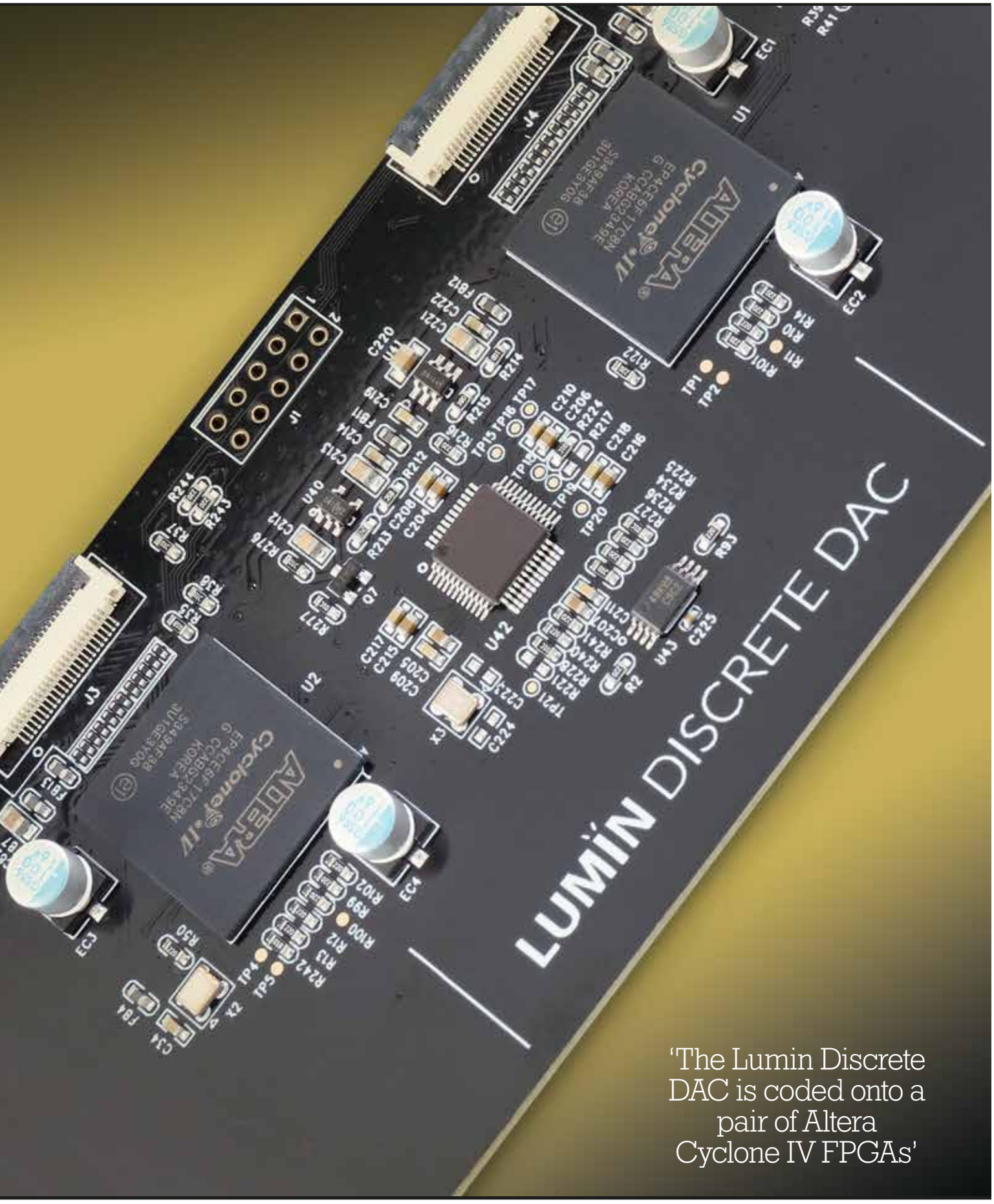
> 'It works its magic from BBC Radio 3 to Sinatra'

Freed from the need for, and potential disadvantages of, an internal power supply, the X2 player uses Lumin's usual 'upside down' layout, in which the baseplate forms the 'lid', and all the circuitry within is hung from that substantial one-piece aluminium case [see p87]. The custom DAC endows the player with the ability to handle file formats all the way up to 768kHz LPCM and DSD512, making it pretty well future-proofed for anything the user may choose to play. Data flow is governed by dual 'Femto clock oscillators' and the output from Lumin's ultra-high-speed FPGA DAC flows through a similarly bespoke, dual-mono analogue buffer stage with, unusually, a Lundahl transformer-coupled output.

## RINGING ENDORSEMENT

If that mix of in-house digital technology and artisan thinking wasn't enough, the X2 also offers an MQA-developed Qrono d2a filter option. This digital filter, with its own noise-shaping, uses what are described as 'specialised minimum phase filters to eliminate time-domain distortion and ringing to improve sound quality'. PM delves deeper [see boxout, p87], but I'm not too sure what it's doing in this player, given Lumin's claims for its own digital ⇨


**BELOW: Available in black or natural finishes, and with the PSU atop, the X2 mirrors the older X1's understated simplicity. Display brightness is adjusted, like all features, via Lumin's app**




'The Lumin Discrete DAC is coded onto a pair of Altera Cyclone IV FPGAs'


**RIGHT: Separate supplies from the outboard PSU feed the X2's digital/streaming mainboard [right] and the analogue PCB [left] with its Cyclone IV FPGA-based DAC [top], balanced line stage and transformer-coupled output [bottom]**

processing and conversion. Still, Qrono is there if you want to give it a try.

The X2 also allows upsampling to a maximum of DSD256 or 384kHz for all files, accessed via the Lumin control app, which is available for Android, Apple iOS on handheld devices and Macs, and Google Chromebooks. Compatibility here includes UPnP, Amazon Music, the Connect versions of Qobuz, Spotify and Tidal, TuneIn Radio and AirPlay. The player is also Roon Ready and Audirvana-friendly.

Networking is via Ethernet, either using conventional or fibre connections. A USB-A port, to which storage devices can be connected, also doubles as a digital audio output, should you feel the need to use the X2 into an external DAC. There's also an S/PDIF digital output on a BNC connection.

Analogue outputs on both unbalanced RCAs and balanced XLRs deliver either a fixed level for use into a preamp or integrated amplifier, or variable using the familiar Leedh digital volume solution.

## NOTHING TO SEE HERE

The Lumin app makes setting up the player simple and using it a pleasure. Indeed, while an IR remote is offered as an extra, the app is a must-have as the X2 itself only has a no-frills blue on black display [see pic, p84] set into its thick front-panel.

The sound is also remarkably simple, in that it's simply remarkable. The X2 is a classic 'get out the way of the content' device, so with high-quality recordings it can sound absolutely stunning, while with so-so or poor engineering and/or mastering, it takes no prisoners.

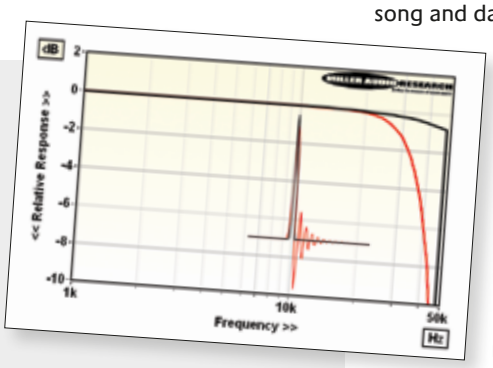
For example, with Leif Ove Andsnes's glorious recording of works by Norwegian composer Geirr Tveitt [Simax Classics PSC1418], the scale of the piano and its presence in a well-judged acoustic were wonderfully realised. The sound had warmth but also a level of definition that was almost nonchalant – it was just there, without any sense of the player making a song and dance of how well it's doing.

Even with the occasional roughness of the monumental *Wings Over America* live set from 1976 [MPL/Capitol UICY-80472/3] – think 'Live And Let Die' with everything turned up to 11 – the ability of this Lumin player to present the music with total conviction proved hard to resist. And that was as true with the belting 'we're a rock band, honest' numbers as it was with the cutesy but crowd-pleasing retro-Beatles sequence, including a clean and simple version – could it be otherwise? – of 'Blackbird'.

## NO FEAR

The resolution offered by the X2 was also clear to hear with the prog/jazz fusion of Soft Machine's recently released *Thirteen* [Dyad Records DY034]. Yes, it may be a half-century since the band was formed but their sound remains vibrant – the powerhouse drumming, tight, funky bass and soaring guitar (plus a whole lot more) clearly held no fears for this Lumin player. It got into the groove while giving ⇨

## QRONO FILTER




**Custom DAC solutions, typically implemented on configurable silicon, are becoming more popular as brands look to separate themselves from the legion of 'off-the-peg DAC chip' streamers. In this instance the two ES9038PRO DACs used in Lumin's X1 streamer are superseded by a 'Lumin Discrete DAC' coded onto a pair of Altera Cyclone IV FPGAs [see pic, p85]. These programmable ICs are also favoured for their on-chip 'Femto' clock support with throughput for DSD512 (22.6MHz) and PCM 768kHz/32-bit, although Lumin's 'Analog Audio Resampling' is still limited to DSD256/384kHz.**

**Also implemented here is a user-selectable 'Qrono' filter, one of a series of software products developed by the engineers behind MQA (now owned by Canada's Lenbrook). Lumin's own 'Discrete DAC' shows minimum time domain distortion [black trace, inset, including response with 96kHz PCM] while switching in the Qrono option brings a medium-tap minimum phase filter into play [red traces]. The 'shape' of the post-event ringing here is not a million miles off that seen with the original MQA filter or, indeed, the bypass 'upsampling' filter in the popular ES9038/9039 DACs, though its precise tap configuration and noise-shaping will be bespoke. Do note, however, that Qrono cannot be applied in conjunction with Lumin's 'Analog Audio Resampling'. If you want to synchronously or asynchronously upsample/downsample the incoming PCM, or format-convert between LPCM and DSD, then the Qrono filter must be disabled and Resampling enabled. The LeedH volume option works in either mode. PM**

**ABOVE: The Lumin X2 includes a USB-A host port for external drives, wired and optical Ethernet inputs (768kHz/32-bit; DSD512) alongside an S/PDIF output on BNC (192kHz/24-bit), and balanced/single-ended preamp outputs on XLR/RCAs**

the listener a clear view into the complexities of the tracks.

Fed with something seemingly simpler but perhaps even more challenging – the vocal intricacies of the Tallis Scholars ensemble on their new set of compositions by Nico Muhly [*No Resting Place*; Linn Records CKD790] – the sense of the X2 relishing the sheer quality of the recording was almost palpable. The 11 voices intertwined deliciously in the reverberant space of the Chapel of Merton College, Oxford, captured in exemplary fashion by Philip Hobbs, and the result was as spine-tingling as the promise of the album's chilly cover image of a wall of ice.

## BEST OF BRITTEN

Striking, too, is the power and passion of the 1965 Britten/Richter recording of Schubert piano duets, recorded in Aldeburgh's Jubilee Hall for Decca and re-released, remastered, in 2000 [466 822-2]. Here, the Lumin X2 positively shone in its depiction of the playing and mastery of the two performers. Maybe the recording is just a little too close-up, but it's hard not to like the intimacy of the music-making in this relatively compact venue.

Similarly, Japanese/American singer Hikaru Utada's *Live Sessions From AIR Studios* 2022 set [Sony Music Labels, Inc., via Tidal] sounded totally radiant. The stripped-back 'Beautiful World', at first ethereal and luminous then slipping into a relaxed groove with a tight bassline, was splendidly handled by this assured digital player.

Transparency aside, this isn't one of those hi-fi products that's entirely dependent on state-of-the-art recordings – though it sounded magnificent with Truls Mørk's reading of Kodaly's *Sonata For Solo Cello* [2L-177; 352.8kHz/24-bit]. Instead, the Lumin X2 proved capable of working its magic with everything from streams of BBC Radio 3's Music Map series to the warm glow of Sinatra's 1961 *Ring-A-Ding-Ding!* album [UMG 0602527800394]. The voice, the lush arrangements and fine musicianship were all so easily rendered here that it was hard not to make this the jumping-off point for a deeper dive into the Sinatra catalogue – which I think equals very much 'job done' for the X2.

## FILTER FEELINGS

After several days of auditioning the player, and confident of its qualities, I allowed myself briefly to be distracted by the MQA Qrono d2a filter option. Its impact was not consistent across all recordings – more a case of 'different', rather than the revelatory experience some commenters seem to find it. Arguably, the basics of the X2 are so good that this kind of 'fiddle factor' is rendered superfluous. Frankly, the best approach here is to hook up the player (I found the fibre optic connection from my router to the Lumin X2 offered marginal gains in transparency over conventional wired Ethernet), sit back and enjoy.

So that's what I did, taking in the dark drama of Sondheim's musical *Assassins* in the original 1991 off-Broadway cast recording [RCA/Victor RD60737]. And yes, through Lumin's X2, it sounded twisted, ominous and unnerving – perfect.

## HI-FI NEWS VERDICT

**Undoubtedly brilliant but equally unashamedly expensive? That's one way of viewing this flagship player from Lumin, but the former consideration more than justifies the latter, at least in a suitably revealing system, so transparent and entirely musical does it sound. By all means play with the options available if you must – but you'd do just as well simply to sit back and allow its remarkable abilities to wash over you.**

Sound Quality: 90%

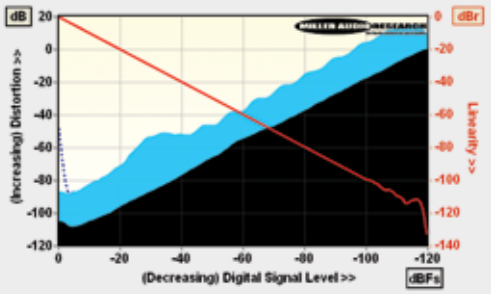
0 - - - - - - - - - 100

# LAB REPORT

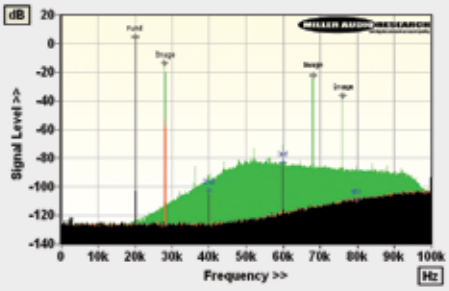
## LUMIN X2

Lumin's new custom DAC renders comparison of the X2 with any previous Wolfson- [*HFN* Jul '20] or ESS-based units [*HFN* Jul '22 & Apr '24] redundant. Distortion, noise and even the behaviour of Lumin's 'Resampler' are all fundamentally different. For example, the X2 has a uniformly higher noise floor than previous streamer/DACs with a sub-16-bit 94dB A-wtd S/N ratio. However, this noise will be inaudible, and its subjective impact on 'digital grain' may be no bad thing. Distortion is low through bass and mid, hitting a minimum of 0.0004% over the top 10dB of its dynamic range [black, Graph 1] but it increases more markedly at 20kHz [cyan] where it ranges from 0.004% at the peak 5.9V balanced output to 0.2% some –30dB down. With the Qrono filter engaged [see boxout, p87] the DAC clips at 20kHz/0dBFs [dashed blue trace] – the 'native' DAC mode possesses higher digital headroom. There is no significant difference in distortion with Qrono engaged but the A-wtd S/N falls further to 93dB; jitter is very slightly higher at 50psec vs. ~10psec; and there's a more pronounced HF roll-off of –0.1dB to –0.5dB/20kHz, –0.8dB to –10dB/45kHz and –6dB to –10dB/90kHz with 48kHz, 96kHz and 192kHz files, respectively.

Lumin's 'Analog Audio Resampling' is entirely synchronous, but in all instances there's now an alias component popping up that was not seen in earlier implementations. It's seen here as a 28kHz peak alongside a 20kHz signal upsampled from 48kHz to 96kHz [red spectrum, Graph 2]. This same signal converted to DSD64 [green spectrum] shows higher and additional alias images (and requantisation noise) while the native 48kHz/24-bit signal is the 'cleanest' [black spectrum]. **PM**




**ABOVE: Distortion vs. 48kHz/24-bit signal level over a 120dB range (1kHz, black; 20kHz, cyan; Qrono, blue dashed) plus linearity (1kHz, red trace and Y axis)**




**ABOVE: High resolution 20kHz (48kHz/24-bit) THD spectrum (native, black; upsampled to 96kHz, red; format converted to DSD64, green, with markers)**

## HI-FI NEWS SPECIFICATIONS

| | |
|---|---|
| **Maximum output level / Impedance** | 5.9Vrms / 18ohm (XLR out) |
| **A-wtd S/N ratio** (Qrono Off/On) | 94.0dB / 92.8dB |
| **Distortion** (1kHz, 0dBFs/–30dBFs) | 0.0006% / 0.004% |
| **Distortion & Noise** (20kHz, 0dBFs/–30dBFs) | 0.004% / 0.22% |
| **Freq. resp.** (20Hz-20kHz/45kHz/90kHz) | +0.0 to –0.1dB/–0.8dB/–6.0dB |
| **Digital jitter** (48kHz / 96kHz / 192kHz) | <10psec / <10psec / 17psec |
| **Resolution** (1kHz @ –100dBFs/–110dBFs) | ±0.4dB / ±0.6dB |
| **Power consumption** | 14W (12W standby) |
| **Dimensions** (WHD) / **Weight** | 350x77x345mm / 8kg |