



# A NEW REFERENCE STANDARD IN STREAMING DACs



## LINN KLIMAX DSM NETWORK AUDIO PLAYER

BY STEPHEN SCHARF PHOTOS BY MATT WRIGHT-STEEL

# WITH THE

ever-increasing range and depth of digital music currently available as files ripped from traditional media, downloads, or on-demand high-resolution content from streaming services, many audiophiles are transitioning away from physical media to what could be broadly classified as “network audio.” The next-generation Klimax

DSM is Linn’s latest and most sophisticated network-audio player to date, a state-of-the-art attempt to capitalize upon the paradigm shift away from physical source material, integrating both streaming and D/A conversion functions, as well as an innovative and, as we shall see, powerful technology for correcting room modes.

In addition to functioning as a streamer/DAC, the Klimax DSM can be used as a preamp, as it offers analog-component inputs and, with its sophisticated digital volume-control, can output directly to your amplifier of choice.

### DESIGN

The Klimax DSM is just what one would expect from Linn: a superbly constructed and engineered device, which is evident as soon as you remove it from its shipping box. The chassis is made of one-half-inch-thick billet aluminum on all sides, with a bow to Linn’s classic LP12 turntable in the diamond-cut, LP-like pattern of lines CNC’d into its top plate. The Klimax’s sheer mass, coupled with its internal damping, provides vibration isolation, and precision-cut internal partitions separate and protect each functional subsystem.

A beautiful, top-mounted, glass control knob is illuminated with 100 status lights in an etched, backlit display. It’s very pretty and pretty rad! A set of thin metal buttons, referred to by Linn as “Pins,” are arrayed along the top, allowing the user to access custom-set functions or inputs with a touch. The front panel is flat-out gorgeous, resembling a partially silvered mirror. In addition to its striking looks, it displays information ranging from sources, functions, and volume to track and artist being played. The DSM rests on three large footers that are designed to minimize the impact of vibration into the chassis. For a component of its dimensions, the DSM is quite heavy at just over 36 pounds (16.4kg). The overall presentation is really stunning, exuding the class and quality befitting its \$39,000 price.

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### FUNCTIONS AND FEATURES

There are three variants of Klimax DSM: the Music variant, the Hub variant, and the A/V variant, which is the model reviewed here. They differ primarily in the outputs supported, the Music variant supporting only analog outputs, the Hub variant designed for Linn’s proprietary Exakt Link to their integrated intelligent loudspeakers, and the A/V variant supporting both analog and HDMI output. The A/V version and the Hub can also be upgraded for surround-sound processing.

In addition to functioning as a streamer and DAC, the DSM also features a sophisticated A/D converter supporting analog sources, such as the Linn Klimax LP12 turntable with Urika phono-stage, via two pairs of single-ended and one pair of balanced inputs. As mentioned in the introduction, the Klimax DSM is also a preamplifier and can output directly to an amplifier via two pairs of single-ended or a pair of balanced outputs. Moreover, the sophisticated Klimax knob can control volume and selection of digital content. There is also a pair of Exakt Link interfaces for connection

to Linn’s Exaktbox digital crossover or Exakt active speakers.

The Klimax DSM can handle a wide range of analog and digital music-content formats, and supports wireless connectivity to your network for flexibility and convenience with streaming content. Its connectivity interfaces include USB, SPDIF, Wi-Fi, and Bluetooth; it even sports an SFP cage for optical connections. This gives you a lot of choices for accessing and streaming digital content via your network or network-attached devices, e.g., smartphones or tablets. For example, connected to your local





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wireless network with WPA protocol, the DSM supports streaming content via AirPlay, Tidal, Qobuz, or Spotify, as well as Internet radio stations such as TuneIn and Calm Radio. Most importantly for me personally, it functions as a Roon endpoint, which is how I primarily used it for this review.

## ORGANIK DAC DESIGN PRINCIPLES

The heart of the Klimax DSM is Linn's new Organik DAC, which is the company's first-ever, "all-Linn" digital-to-analog converter. The DAC system supports digital formats up to 24-bit/384kHz and DSD256. The Organik DAC is a new, ground-up design, engineered entirely in-house rather than being built from off-the-shelf chips. The digital-to-analog conversion process uses a combination of FPGA processing and a discrete conversion stage. Specifically, it makes use of three stages for D/A conversion.

A digital signal is first processed by an upsampler, where audio data is up-sampled to 98.304MHz, a frequency that allows the unit's pulse-width modulator to function without adding distortion. The upsampled audio data is then converted to a PWM signal using a special type of delta-sigma modulator. The PWM signal has only two levels, but has 5 bits of resolution in the time-domain (32 time-steps). The Discrete Conversion Stage is constructed from 32 discrete flip-flops (in digital electronics, a flip-flop is a device that stores a single bit of data in one of two states, either a "one" or a "zero") and precision resistors, which together form an Analog Finite Impulse Response (AFIR) filter. The AFIR conversion stage transforms the 32 time-steps in the PWM signal into 32 voltage-steps. A final filtering stage then removes the shaped noise from the modulator to resolve the analog signal. While there are many different types of "discrete" DACs (such as R2R or multibit), just making a DAC discrete doesn't necessarily guarantee optimal audio performance. In Linn's view, the performance advantage of the Organik DAC comes from its unique combination of PWM delta-sigma modulation *and* the discrete AFIR conversion stage.

The advantage of using the PWM modulator and AFIR conversion stage together is that they are immune to many of the problems that affect other discrete designs, such as small errors in switching times or resistor values, which can generate distortion. However, in order to realize the full potential of this D/A conversion approach, Linn has also paid special attention to other key factors such as power supply, clocking, and the physical layout of the circuit board. The Organik DAC uses an 8-layer circuit board that enables power and clocking to be optimally delivered to the DAC. Power for the conversion stage is generated by a discrete regulator and delivered using multiple internal power planes. Linn also matches the clock traces

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to within fractions of a millimeter to ensure that every part of the DAC receives its clocking signal at exactly the same time. All these elements work together synergistically to create an analog signal with very low levels of noise and distortion.

The advanced analog-to-digital conversion (A/D) subsystem also has its own dedicated circuit board and power supply, and is also fully isolated from the D/A subsystem.

## INNOVATIVE CONTROL AND VOLUME KNOB

One of the innovations on the Klimax DSM is the control knob. This knob functions to choose sources (e.g., selecting Wi-Fi networks) and make track selections, but it also controls volume when the Klimax is being operated as a preamplifier. From a circuit topology perspective, the digital volume control is positioned at the end of the upsampling chain, just before the PWM modulator. This maximizes the precision of the upsampling process. To be able to do this, the volume control is implemented in an FPGA, using a custom-designed algorithm running at the modulator sample rate of 98.304MHz. This allows the volume control output to maintain 48-bits of precision, which provides proper dithering to ensure no information is lost.

## SETUP AND OPERATION

Using WPA to connect the Klimax to your network, you can set up and configure various digital music sources, such as your streaming accounts, as well as any Wi-Fi or Bluetooth-connected sources. Connection to your network can also be done via Ethernet or optical interfaces. For example, you can make music selections from Qobuz using

your smartphone via Wi-Fi, and selections from a music server functioning as a Roon Core via Ethernet or optical.

Users can also configure a 'pin', which is a button on the front panel that functions as a shortcut on the DSM that allows you to quickly select content from various inputs, such as radio stations, specific albums, or subscription services such as Tidal, Qobuz, Calm Radio, etc. Phonostages can be connected to the analog inputs, and, if desired, your amp can be connected directly via either the single-ended or balanced outputs.





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The Klimax supports music streaming from a number of streaming applications, including the older Linn Kazoo app, the newer “Linn App” for iOS devices, as well as MinimServer, Asset UPnP, and Roon. The Linn App also allows streaming from Tidal, Qobuz, Spotify, etc. For the purposes of this review, I used Roon with content streamed from my Mac Mini Roon Core via optical fiber to the optical transceiver of an UpTone Audio EtherREGEN Ethernet switch. A Shunyata Research Omega Ethernet cable connected the EtherREGEN to the Ethernet port of the DSM to provide network connectivity. The Klimax DSM was powered with a Shunyata QR-s power cable (which was specifically designed for products such as DACs) connected to a Shunyata Everest 8000 power distributor. For this review, the Klimax DSM was connected using Shunyata Omega RCA interconnects to either with my First Sound Presence Deluxe preamp or connected directly to a Conrad-Johnson ART 150 stereo amplifier that was in for review.

### SPACE OPTIMISATION

One of the most compelling features of the Klimax DSM is Linn’s proprietary Space Optimisation. The interactions between your speakers and the size, shape, and boundaries of your room can notably impact the frequency response as well as the soundstage and imaging of the presentation. Historically, users have had limited choices: Place your speakers in the ideal location in the room for sound, or choose a more practical location that often compromises sound quality. For example, it’s well known that placing a speaker close to a wall can add energy to the low frequencies, which may mask other parts of the frequency range or degrade imaging. Space Optimisation uses a sophisticated program to build a complete picture of your room, windows, door, and speakers—their placement and how they interact to impact imaging and soundstaging. Space Optimisation then models these interactions by taking account of the characteristics of your speakers, such as the position of each drive unit and the response of bass-reflex ports, etc. Linn has a database of many speakers from different manufacturers, and end-users can select their speakers so that the most accurate model can be generated.

The Space Optimisation software identifies the frequencies that are affected or distorted by the room, and then builds an acoustic model to correct for these anomalies. The advantage of Space Optimisation is its ability to recreate the sound of ideally placed speakers in an ideal room, even from what may be the preferred and most practical location. This gives users a lot of flexibility in placing speakers to best meet their aesthetic needs and still enjoy great performance. For the purposes of this review, I used

THE OVERALL TONAL PRESENTATION OF THE DSM IS NEUTRAL WITHOUT SOUNDING COOL, THIN, SPARE, OR ANALYTICAL.

my Harbeth 30.2s as the selected speaker, which was on Linn’s list of supported speakers.

### LISTENING IMPRESSIONS

The first thing that springs to mind listening to the Klimax DSM is the adjective “organic.” The name “Organik DAC” is very aptly chosen. There is an exceptional lifelikeness and organic quality to the Klimax that is so immediately captivating that it initially catches you off-guard, as you quickly become immersed in the music. There is virtually none of the hardness, stridency, or dreaded glare that can make digital music uninvolved and tiring. Detail, transparency, and resolution are world class, as good as I’ve ever heard.

The overall tonal presentation of the DSM is neutral without sounding cool, thin, spare, or analytical. Rather, there is weight, heft, and body to the presentation, and beauty in the rendering and layering of fine inner details and instrumental and vocal timbre and texture. A real strength is the DSM’s ability to balance authority and dynamics within the larger scale without masking the nuance, gesture, and delicacy of the smaller scale. Thus, Ludovico Einaudi’s piano in *Night* [Elements Ponderosa B0145UQSHE] has the appropriate power and weight on fundamentals without any veiling of the piano’s harmonics and overtones (or those of the accompanying synthesizers and strings).

*Fernando Sor: Early Works* [Linn Records CKD 343] by virtuoso classical guitarist William Carter is a revelation. Recorded in a nearly perfect space, St. Martens Church in East Woodhay, UK, the presentation is flat-out gorgeous. The DSM’s Space Optimisation recreates the church’s beautiful acoustics, reverberance, and decay with such

verisimilitude that you seem to be in St. Martens with Carter. Here the reproduction of his guitar’s woody timbre and low-level micro-details, such as the texture of the guitar strings, is exceptional, revealing fine subtleties in Carter’s virtuosic technique.

Changing gears, a real treat that took me back to my college days was “Foreplay/Long Time” on Boston’s eponymous first album. Here the Klimax DSM flat kicks ass. On “Foreplay,” the drums and bass support the electric piano to ground the rhythm with force and weight in counterpoint to the

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WHAT OBSESSION SOUNDS LIKE



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frenzied guitar power chords. Once “Long Time” fires up, the Klimax’s propulsive rhythmic drive and dynamic control powers the song forward like a Porsche GT2 RS coming out of the Carousel at Nürburgring. Wow!

On Chet Baker’s instrumental album *Chet* [Riverside VICJ-23678], Baker’s playing has a mellowness and lit-from-within quality that is sweet and brassy, but never biting. The backing instruments play their supporting roles in the mix, but the Klimax’s precise detail and spatial rendering allow the subtlety of tones and harmonics to come through clearly resolved, without overwhelming the sound of Baker’s trumpet. Imaging is well defined and focused, and the instrumental “vapor trail,” that ephemeral decay of notes trailing languidly off into space, is the best I’ve ever heard. This ability to unfold previously hidden inner layers of detail and articulation are a strong suit of the Klimax DSM.

The DSM’s propulsive dynamics, imaging prowess, and instrumental resolution are on full display on another Linn recording, Beethoven: Piano Concertos Nos. 3, 4, and 5 [Linn Records BKD 336] with pianist Artur Pizarro and Charles Mackerras conducting the Scottish Chamber Orchestra. In piano concerto No. 5 in E-Flat Major (*Emperor*), Pizarro’s technique is as virtuosic as ever, but the real star is the Scottish Chamber Orchestra, and its ability to play both the leading and supporting roles in point/counterpoint with the piano. Beethoven is beloved for the interplay between softness and delicacy and power and dynamics in his compositions, and, once again, the DSM’s extraordinary ability to manage the balancing act of providing “dynamic slam” and immediacy while retaining subtlety, nuance, and textural resolution are on fullest display. At the end of the first movement Allegro, as the notes of Pizarro’s piano solo trail off into space, grounded by continuo of the string section, the French horns come in, sounding so beautiful, delicate, and pure they gave me goosebumps.

As noted, the Klimax DSM also has the ability to function as a preamplifier. For this configuration, I connected it directly to the Conrad-Johnson ART 150 amplifier with Shunyata’s amazing new Omega interconnects. In this setup, it sounded excellent, better than any “DAC-to-amp” configuration I’ve heard to date. Personally, though, I preferred using it with my First Sound preamp, which provided more warmth, naturalness, and three-dimensionality than the direct DAC-to-amp connection. My recommendation for potential customers is to try it both ways, and see what works best in your own system.

ONE OF THE FINEST  
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ly engaging and involving listening experiences, experiences that take you out of “audiophile analysis” into the more compelling, immersive, and, ultimately, meaningful experience of the performance itself.

Summing up: If the Linn Klimax DSM is in your price range, you should definitely take advantage of Linn’s Silver Service and arrange for an extended audition in your system. The Linn Klimax DSM is one of the finest DACs I’ve had the pleasure to audition, and unquestionably the best combination DAC/streamer I’ve ever heard, bar none.

WHAT’S NOTABLE IN PARTICULAR ABOUT THE KLIMAX IS ITS UNCANNY ABILITY TO ACCURATELY PORTRAY A CONSTELLATION OF AUDIO ATTRIBUTES.

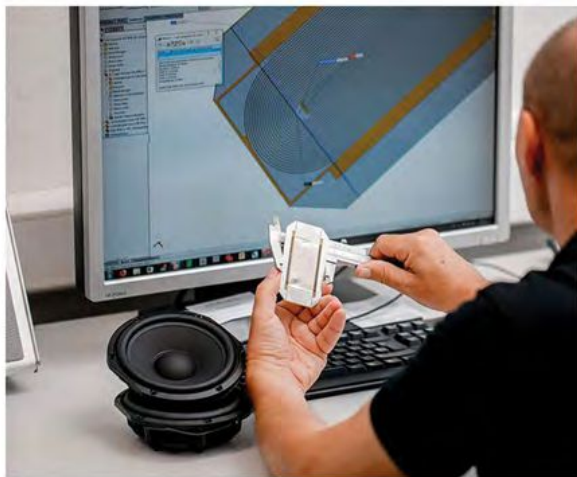
## CONCLUSIONS

The next-generation Linn Klimax DSM is a remarkable streamer/DAC. In my experience, it breaks new ground for this class of component, both in its sophisticated engineering and in the lengths that Linn has gone to maximizing power-supply, streaming, and digital-to-analog-conversion performance, while minimizing the impact of the functional conflicts these subsystems often impose upon each other. And then there’s Linn’s Space Optimisation, which provides flexibility in the placement of speakers, allowing the listener to hear the true image and soundstage within the recording, rather than the impact of speaker positioning and room anomalies. The Klimax DSM also provides a considerable amount of flexibility with respect to sourcing and streaming digital content.

What’s notable in particular about the Klimax is its uncanny ability to accurately portray a constellation of audio attributes in a musical galaxy. It has plenty of horsepower to provide force, intensity, and “dynamic slam,” retaining the ability to scale from *pianissimo* to *fortissimo* with immediacy without sacrificing tonal or harmonic accuracy, nuance, texture, micro-dynamics, or mellifluousness. The Klimax DSM resolves low-level information and inner detail in a way that reminds me of a flamenco dancer opening her decorated fan: As the fan opens, the detail, art, and beauty hidden in the musical folds reveal themselves. Most important, though, is that the Linn Klimax DSM creates high-



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### SPECS & PRICING

**INPUTS:** TosLink x1, SPDIF x2, balanced XLR x1 pair, RCA x2 pairs, USB Type B x1, HDMI x4 (AV + Hub only), eARC x1 (via HDMI output)

**OUTPUTS:** Balanced XLR x1 pair, RCA x1 pair, Linn Exakt Link x2, HDMI x1 (A/V + Hub only)

**RESOLUTION:** Up to 24-bit 384kHz

**INTEGRATED SERVICES:** Tidal, Qobuz, Spotify Connect, AirPlay, Roon, Tunes, Calm Radio

**AUDIO FORMATS:** FLAC, Apple Lossless, WAV, DSD (64/128/256), MP3, WMA (except lossless), AIFF, AAC, OGG

**BLUETOOTH:** 4.2

**DIMENSIONS:** 13.8" x 4.9" x 13.8"

**WEIGHT:** 36.1 lbs.

**PRICE:** \$39,000

linn.co.uk

### Associated Equipment

**DIGITAL SOURCES:** Linn Klimax DSM/3, Mac Mini Roon Core Server, Sonore opticalModule fiber-media converter, UpTone Audio EtherREGEN Ethernet switch, UpTone Audio LPS-1.2 linear power supply

**ANALOG SOURCE:** Michell Gyro SE, SME V, Bob's Devices Cinemag step-up transformer, Uni-Pro protractor

**PHONOSTAGE:** E.A.R. 324

**PREAMPLIFIER:** First Sound Presence Deluxe 4.0 SE MkIII-SI active preamp with Paramount Special Edition Upgrade

**POWER AMPLIFIER:** Conrad-Johnson ART150S

**LOUDSPEAKERS:** Harbeth 40<sup>th</sup> Anniversary 30.2, Dynaudio Contour S3.4 with Esotar 2 tweeters, REL R-305 subwoofer

**CABLES:** Shunyata Research Sigma XC and NR V2 (Everest & power amp), Alpha NR V2 (preamp and phonostage), Shunyata Omega QR-s (DAC), V14D Digital (digital components) power cables, Shunyata Omega and Sigma interconnects, Omega Ethernet cable, Shunyata Alpha V2 VTX-Ag speaker cables, Shunyata DF-SS cable elevators

**A/C POWER:** Shunyata Research Everest 8000 and SR-Z1 wall outlet