

User manual and technical description
LuXor Audio x2 & x4
digital loudspeakers

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Table of contents:

- 1. Active amplification**
- 2. Multi-way design**
- 3. DSP-based signal processing and control**
- 4. Manual control**
- 5. Connection options**
- 6. Software update**
- 7. Installation, placement, and maintenance recommendations**
- 8. Internal structure, technical description of modules**
- 9. Measurement results**
- 10. Technical data**

1. Active amplification

LuXor x2 and x4 speakers use active amplification technology with the built-in electronics providing the electrical power needed to drive the speakers eliminating the need for an external amplifier. This solution makes it possible to perfectly match the operation of the speakers and the electronics ensuring reliable operation and high efficiency.

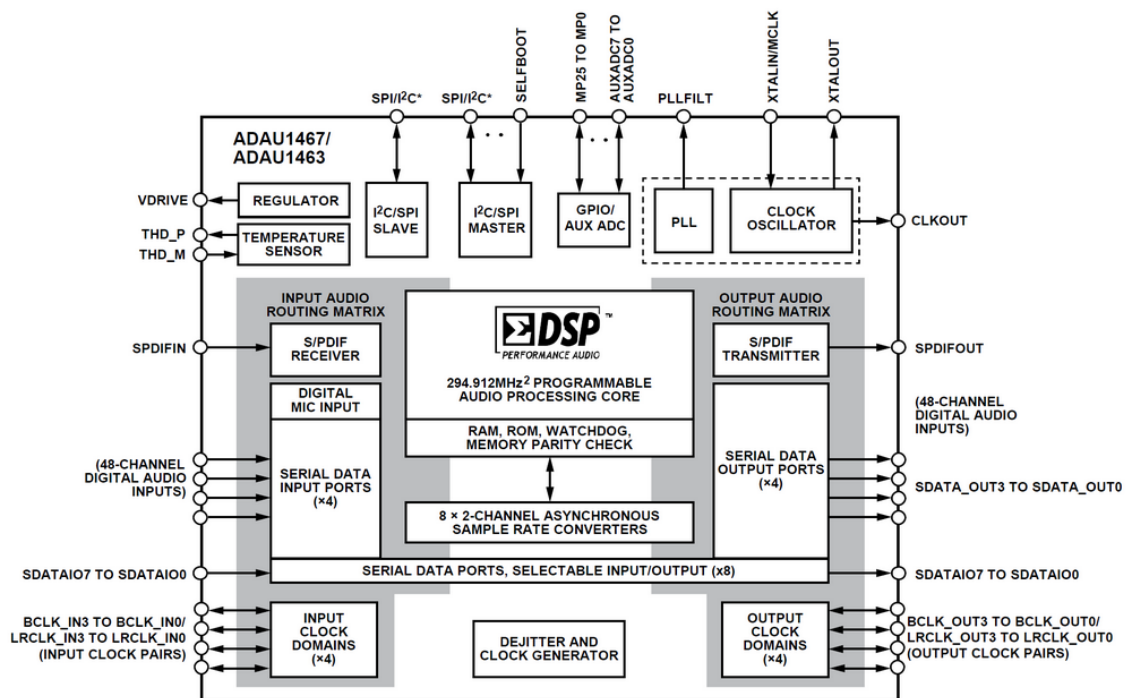
In active loudspeakers the power amplifier modules and the loudspeakers are directly connected to each other resulting in significantly lower electrical losses than those achieved with conventional passive solutions. Luxor loudspeakers are equipped with modern Class D amplifier modules with an efficiency of over 95% which are characterized by low heat generation even at high power levels.

2. Multi-way design

Our loudspeakers feature a multi-way design for high acoustic performance, low distortion and high sound quality. The entire audible frequency range is divided into 2-3 separate registers each with independent DSP channel, signal processor, amplifier circuit and loudspeaker. These are controlled and tuned in a digital signal processor to fully exploit the capabilities of the speakers and components used with the aim of ensuring reliable operation in accordance with the conditions on site.

3. DSP-based digital signal processing and control

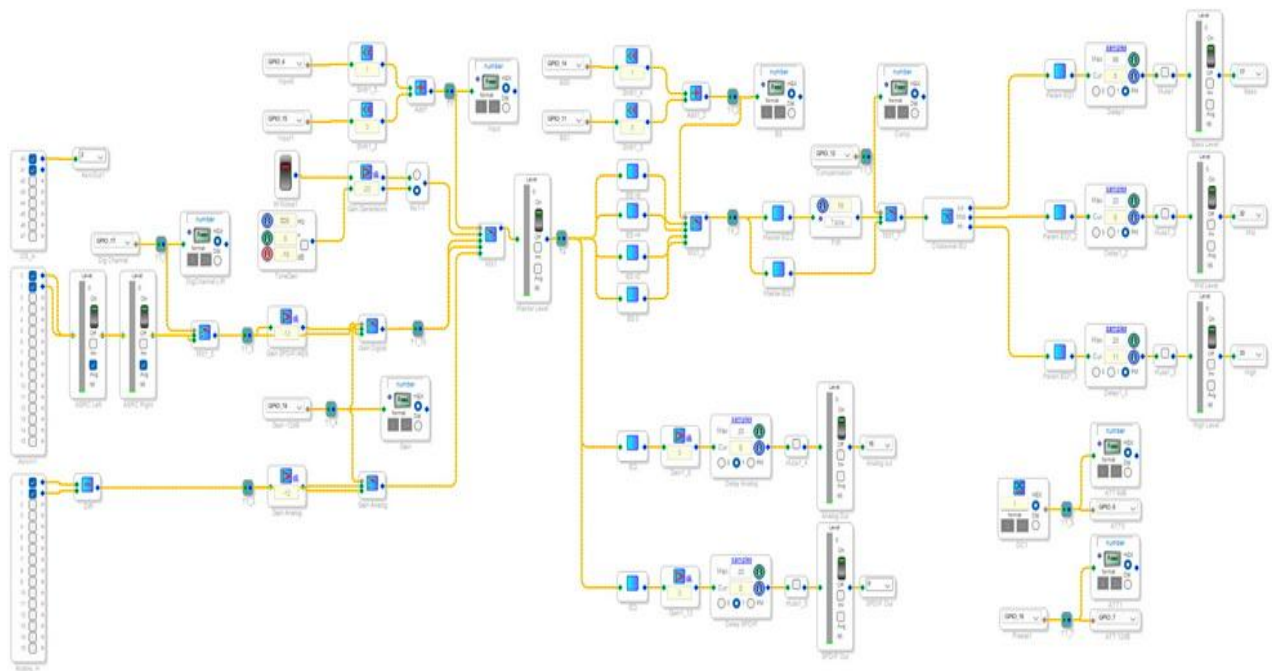
The control of LuXor loudspeakers, signal processing and optimization of sound reproduction parameters are performed by an ADI Sigma SHARC digital signal processor (DSP) at a core frequency of 300 MHz. The DSP operates based on digital program code developed by LuXor Audio which is individually tuned for each loudspeaker.



Modern digital technology allows for continuous monitoring and control of the parameters of speakers and built-in electronics. Part of the design concept of LuXor loudspeakers is to tailor the operation and sound of the loudspeakers to the conditions of use and the listener's taste. This is facilitated by multiple preset modes that can be stored in a memory block connected to the DSP which are digitally recorded during production but can be modified at any time during installation and use.

User presets are set using DSP programming software based on on-site measurements. The digital code we create cannot be modified by the user as this would void the product warranty.

Block diagram of our speakers' digital signal processing:



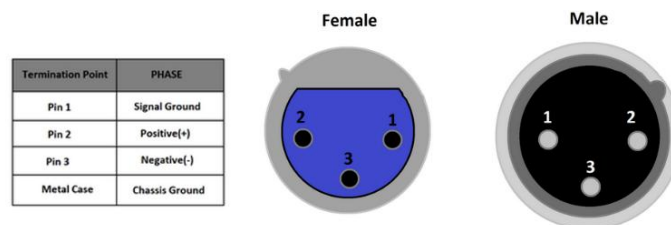
4. Connection options

Analog In

Input suitable for receiving analog audio signals for connecting devices with balanced analog signal outputs. Devices with unbalanced outputs can also be connected using a suitable conversion cable or adapter. (Optional) The input signal level and sensitivity can be adjusted using DIP-3 and DIP-4 on the rear switch row to achieve the desired listening volume, signal-to-noise ratio and dynamics.

Analog Out

Suitable for connecting analog devices with balanced inputs (active subwoofers, power amplifiers, etc.). The signal arriving at the Analog Out output can be freely filtered and corrected using the internal DSP. In the default setting, the audio band below 80 Hz appears at the output, facilitating the connection of an external subwoofer. Please contact us for assistance in modifying the settings. Wiring of the Analog In and Analog Out balanced XLR connectors:



S/PDIF Inputs

For connecting devices with S/PDIF digital PCM output with coaxial RCA and optical connections. The rear DIP-10 switch can be used to select whether the loudspeaker plays the left or right channel from the digital stereo signal.

AES/EBU In

Suitable for connecting devices with AES/EBU digital PCM balanced output. The rear DIP-10 switch can be used to select whether the loudspeaker plays the left or right channel from the digital stereo signal.

AES/EBU Out

For connecting devices with AES/EBU digital balanced input. Also suitable for digitally connecting the left and right boxes when using LuXor speakers in digital stereo mode. The DIP-9 switch on the rear panel can be used to select whether the AES/EBU output should present the selected input signal or the DSP's configurable audio output. In the first case both channels of the digital stereo signal appear on the AES/EBU output, while in the second case only the signal of the L/R channel selected with the DIP-10 switch is output.

Digital Link In/Out

RJ45 I2S connection for expanding LuXor speakers which can also be used as an I2S digital input for connecting devices with such a digital output.

Service USB

This connection can be used to program the built-in DSP and update the loudspeaker's software. Only software developed by Luxor Audio can be used for updates; other solutions will not work and will void the product warranty. The connector cannot be used for other functions (audio signal, external storage or connecting any USB device) and will not respond to them.

Power connection

The Luxor x2 speaker is equipped with a traditional IEC power connector socket. The Luxor x4 speaker is equipped with a Neutrik PowerCon power connector known in the Pro Audio world which is more tolerant of high current and mechanical stress than a standard IEC connection.

Analog and digital connectors and power cables for Luxor X loudspeakers are available in the desired size, design and with the desired connectors. Please contact us for assistance in converting your existing power cable to the PowerCon system.

5. Manual control

The main technical parameters of the loudspeaker can be modified without changing the digital control code using the manual DIP switch row located on the rear panel. These can be switched while the loudspeaker is powered on and under voltage; any slight popping noise heard from the speakers at this time is normal.



DIP Control

The upper (ON) position of the switches represents a value of 1, while the lower position represents a value of 0.

1 - 2	Input selection
00	Analog
01	S/PDIF
10	AES/EBU
11	I2S
3	Preset
0	Preset 0 (pure)
1	Preset 1 (user)
4	Analog input sensitivity
0	2Veff
1	4Veff
5	Brightness
0	0
1	+2dB
6	BS correction
0	BSC 0
1	BSC +
7	Bass boost
0	0
1	+3dB
8	Power mode
0	Low Power (max 150W)
1	High Power (max 300W)
9	AES/EBU output
0	DSP Out
1	Input Forward
10	Digital channel
0	Left
1	Right

*Luxor x2 loudspeakers Low Power (150W), High Power (300W)

*Luxor x4 loudspeakers Low Power (300W), High Power (600W)

5.1-2. Input selection

The speakers have 1 analog and 3 digital inputs which can be selected using the DIP-1 and DIP-2 switches according to the following logic:

- 00 - Analog (balanced XLR)
- 01 - S/PDIF (coaxial RCA and Toslink optical connection)
- 10 - AES/EBU (balanced digital XLR)
- 11 - I2S (RJ45 LAN)

5.3. Sonic presets

The DIP-3 switch offers a choice of sound colors including the factory setting (Preset 0 - Pure) which is adjusted to the specific loudspeaker during original calibration. It is also possible to use a custom correction (Preset 1 - Custom) which takes into account the acoustic properties of the listening environment and the user's individual expectations. Please contact us for assistance with custom correction settings. We will design and upload the necessary data to the speaker based on on-site measurements.

5.4. Analog input sensitivity

The input sensitivity of the analog signal receiver stage can be adjusted in 2 steps using the DIP-4 switch based on the following values.

- 0 - 2V_{eff}
- 1 - 4V_{eff}

The appropriate value should be selected based on the maximum output signal level of the source device connected to the loudspeaker. A setting that is too low can result overdriving the loudspeaker and causing annoying distortions, while a setting that is too high can result in reduced dynamics and high noise levels, so this parameter has a decisive influence on the sound.

If the output signal level of the playback device is unknown it is advisable to select the input sensitivity of the loudspeaker so that the volume control of the playback device is set to the middle position or to an output level of approximately -10 dB, to obtain the appropriate listening volume. This leaves room for listening to louder music on occasion but the drive and control of the speakers will not be too low.

5.5. Brightness

The DIP-5 switch allows you to tune the upper section of the sound. In the 0 position you get a slightly subdued sound, while in the 1 position you get a brighter, more detailed sound.

5.6. Baffle step correction

Depending on the placement of the speakers and the listener's expectations it is possible to change the tone of the sound by adjusting the proportion of lower frequencies in two steps: BSC0 and BSC+. In smaller rooms with speakers placed directly in a corner the DIP-6 switch in BSC0 may give satisfactory results, while in open larger spaces with speakers placed further away from walls we recommend values of BSC+.

In near-ideal conditions the BSC+ value provides the sound tone recommended by us and preferred by the majority of listeners.

5.7. Bass boost

Use the DIP-7 switch to set the sub-bass band response ratio. When the switch is set to 0, you get a restrained, linear response, while setting it to 1 slightly boosts the volume of the first two octaves. We have no recommendation for this parameter; set it according to your taste!

5.8. Power mode

Proper control of audio circuits is essential for full dynamics and high-clarity sound reproduction. In most cases listening to music at home only a fraction of the built-in power is needed to achieve the desired listening volume. In such cases conventional active speakers produce high noise levels, poor efficiency and reduced dynamics at low drive levels.

With the Luxor x2 and x4 models this problem can be eliminated by adjusting the power mode. In Low Power mode the power of the amplifiers driving the speakers can be reduced so that even with proper control of the circuits the sound volume (80-100 dB SPL) will not be disturbingly loud. In larger spaces it may be advisable to use High Power mode in which case a sound pressure level well above 100 dB SPL can be achieved.

5.9. Digital output source (AES/EBU)

The DIP-9 switch can be used to select whether the original input signal or the signal processed by the internal DSP is output via the AES/EBU digital XLR output. In the former case both channels of the digital stereo signal are output via the AES/EBU output; in the latter case only the signal of the channel selected with the DIP-10 switch appears at AES/EBU output.

5.10. Digital channel

Since S/PDIF and AES/EBU digital audio signals contain both the left and right components of the stereo program we need to specify which side the speakers should play depending on their placement. In the left position the DIP-10 switch must be set to 0 (Left) but in the right position it must be set to 1 (Right).

6. Software update

The Luxor x2 and x4 speakers are controlled by a digital code developed and continuously improved by us. Users can update this code themselves using a special software developed by Luxor Audio.

We will send the latest version of the control code (firmware) free of charge to the email address provided at the time of speaker's purchase. To upload the new firmware connect the speaker to a windows computer using a USB cable and then simply perform the update. Detailed instructions for the update procedure are sent along with the new version of the firmware.

7. Installation, placement and maintenance recommendations

Luxor X loudspeakers are capable of high technical and sound quality but can only demonstrate their full potential in a suitable acoustic and technical environment with careful installation and adjustment.

Avoid placing the speakers too close to acoustically hard, reflective surfaces; keep a distance of at least 30-50 cm to the sides and rear! Sound waves reflected from nearby surfaces and objects can reduce the clarity of the sound, upset the sound balance and impair the sound experience.

Do not place hard, heavy objects on top of the speaker. Their resonance can impair the sound experience and cause damage to the outer surface.

Ensure that the speaker is placed on a stable surface. Avoid placing it on carpeted floors or rugs. When adjusting the stand used for the x2 model aim for a perfect vertical position. (The use of a waterlevel is recommended.)

For the best spatial effect the listener and the speakers should form an equilateral triangle and the distance between the speakers should be similar to the listening distance. Do not place large objects or furniture between the listener and the speakers. Aim for a symmetrical arrangement; in a stereo system the listener should be positioned at an equal distance from the left and right speakers.

Ensure a suitable acoustic environment. Avoid large, bare, hard sound-reflecting surfaces and resonant furnishings and furniture in the listening room. Please feel free to contact us for acoustic advice, information and on-site assessment.

For everyday use it is not necessary to turn off the speaker but for longer periods of absence (travel, vacation) it is advisable to disconnect it from the power supply using the main switch.

The mechanical and electrical design of the speakers ensures long-term reliable operation. Never cover the openings on the rear panel as they are necessary for ventilation and adequate cooling of the built-in components. The speaker has built-in thermal protection; excessive heating due to inadequate ventilation can cause technical malfunctions and damage to the device. The product warranty does not cover such cases resulting from user negligence.

Do not expose the speaker to high humidity, direct heat or sunlight as this may damage the exterior of the cabinet and the coating of the metal components causing the structure to age faster than normal!

The front and rear panels of the speaker are laser-cut and painted aluminum mechanical structures. Do not remove, dismantle or clean them with chemicals, sharp or pointed objects! The other surfaces of the speaker are covered with natural wood veneer. When cleaning them avoid using strong chemicals; use only cleaning and care products recommended for natural wood.

Dust the built-in speaker's diaphragms regularly! (A soft fine-bristled brush is recommended.) Avoid wet tools and do not use hard, sharp objects. These can damage the diaphragm and suspension causing the speaker to malfunction. Damage caused by external influences is not covered by the product warranty.

2025.10.20.



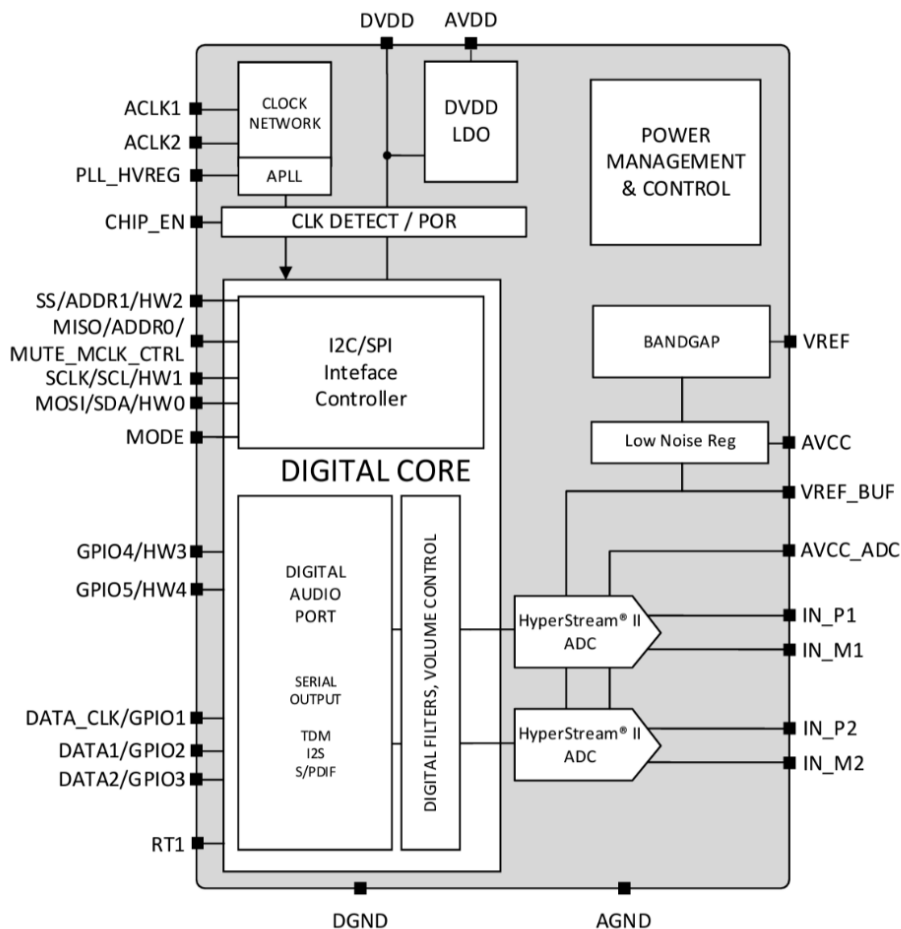
Papp László

AES audio engineer
acoustical designer
Luxor Audio CEO

8. Internal structure and modules

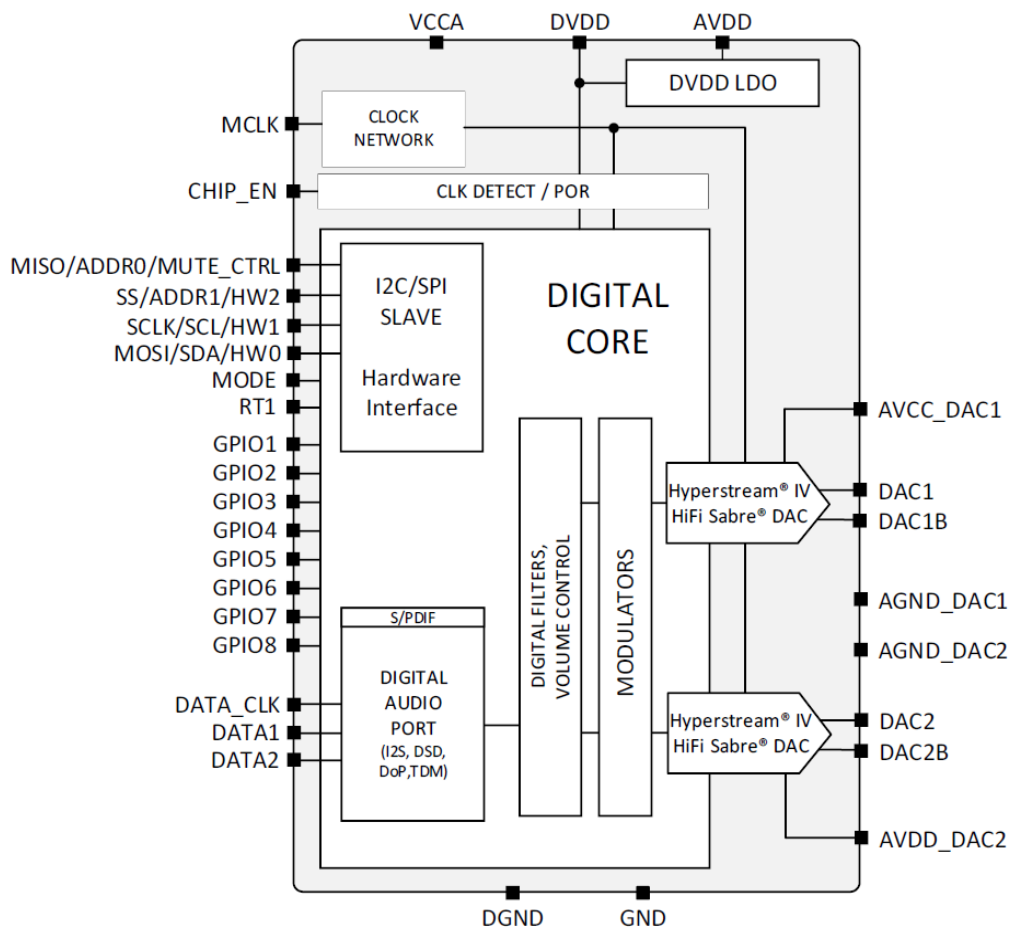
ESS Sabre ES9821Q Hyperstream II ADC – analog/digital converter

FEATURE	DESCRIPTION
+120dB DNR per Channel w/o PLL -112dB THD+N per Channel w/o PLL	Unprecedented Dynamic Range and Ultra-Low Distortion
High Sample Rates	Up to PCM 768kHz
Customizable Filter Characteristics	8 Presets of Digital Optimal Filters
Multiple Output Formats Available	PCM, TDM, and S/PDIF Outputs are Available
I ² C, SPI, and Hardware Interface Control	Configured by microcontroller or other I ² C/SPI master, or pins through Hardware Mode
Ultra-Low Noise Floor Bandwidth	200kHz Bandwidth Enabling Higher Resolution at Higher Sample Rates
Integrated Low Noise ADC Reference Regulators	Reduced BOM Cost, PCB Area and Improved DNR if Required
Low Power Consumption	Simplifies Power Supply Design
Low Pin Count Standardized Packaging	5mm x 5mm, 28 pin QFN



ESS Sabre ES9039Q2M Hyperstream IV DAC – digital/analog converter

FEATURE	DESCRIPTION
Patented 32-bit HyperStream® IV Architecture and Dual DAC™ Technology	32-bit audio DAC with very high dynamic range & ultra-low distortion
+130dB Dynamic Range (DNR) -126dB Total Harmonic Distortion (THD) -120dB Total Harmonic Distortion + Noise (THD+N)	High performance 32-bit audio DAC with unprecedented dynamic range and ultra-low distortion. Supports synchronous and asynchronous sampling modes
Integrated low noise digital regulator	Reduced BOM cost and improved DNR
32-bit processing	Distortion free signal processing
Versatile digital audio input port	Supports master/slave PCM (TDM, I2S, LJ, RJ), DSD, DoP, S/PDIF formats.
Customizable digital filter characteristics	8 preset filters and a programmable filter for custom sound signature
FIR & IIR filter bypass	To allow full customer ability to add custom filters



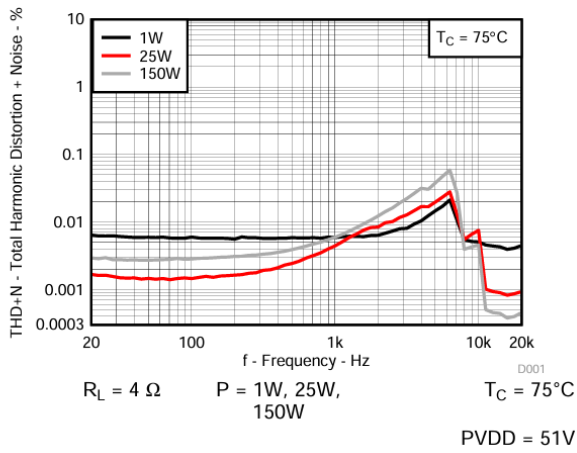


Figure 1. Total Harmonic Distortion+Noise vs Frequency

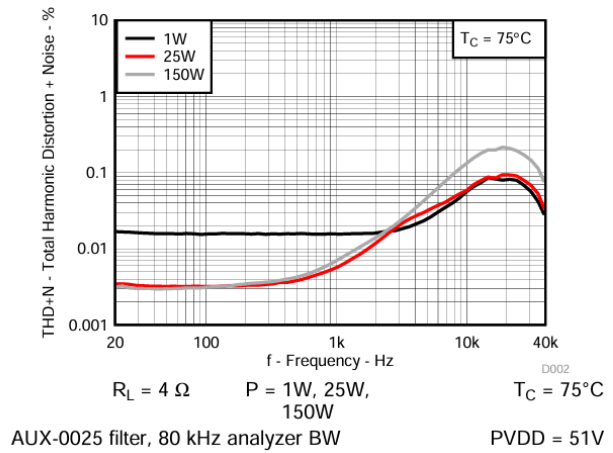


Figure 2. Total Harmonic Distortion+Noise vs Frequency

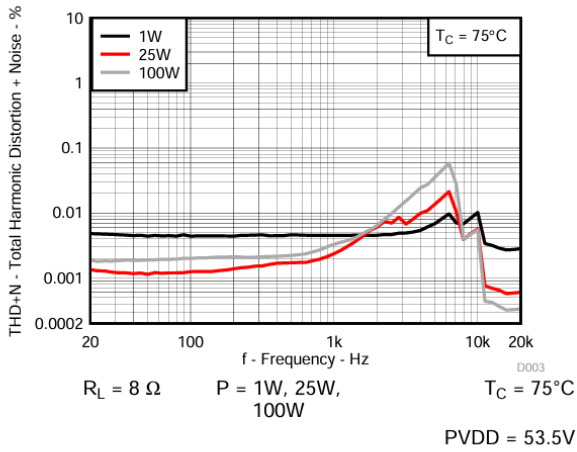


Figure 3. Total Harmonic Distortion+Noise vs Frequency

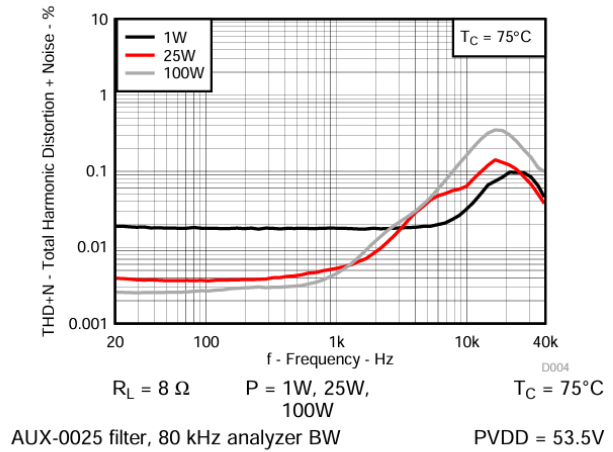


Figure 4. Total Harmonic Distortion+Noise vs Frequency

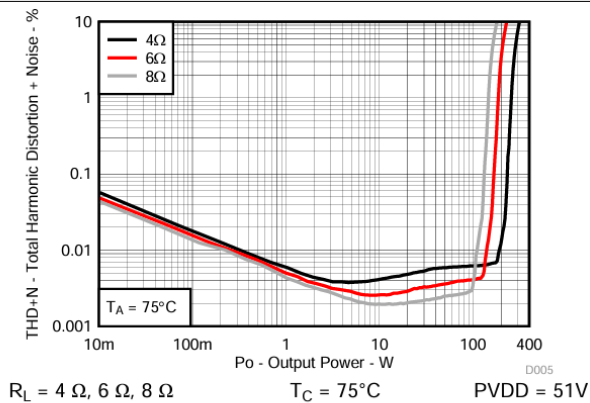


Figure 5. Total Harmonic Distortion + Noise vs Output Power

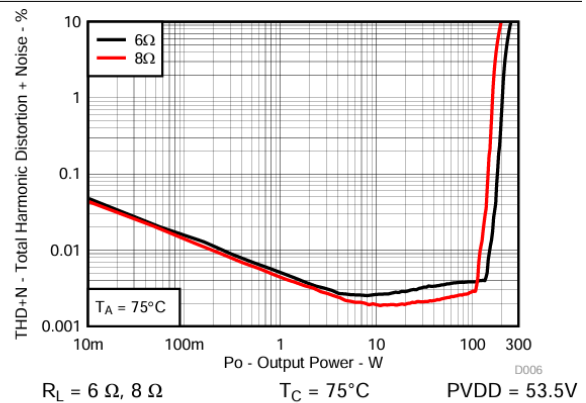
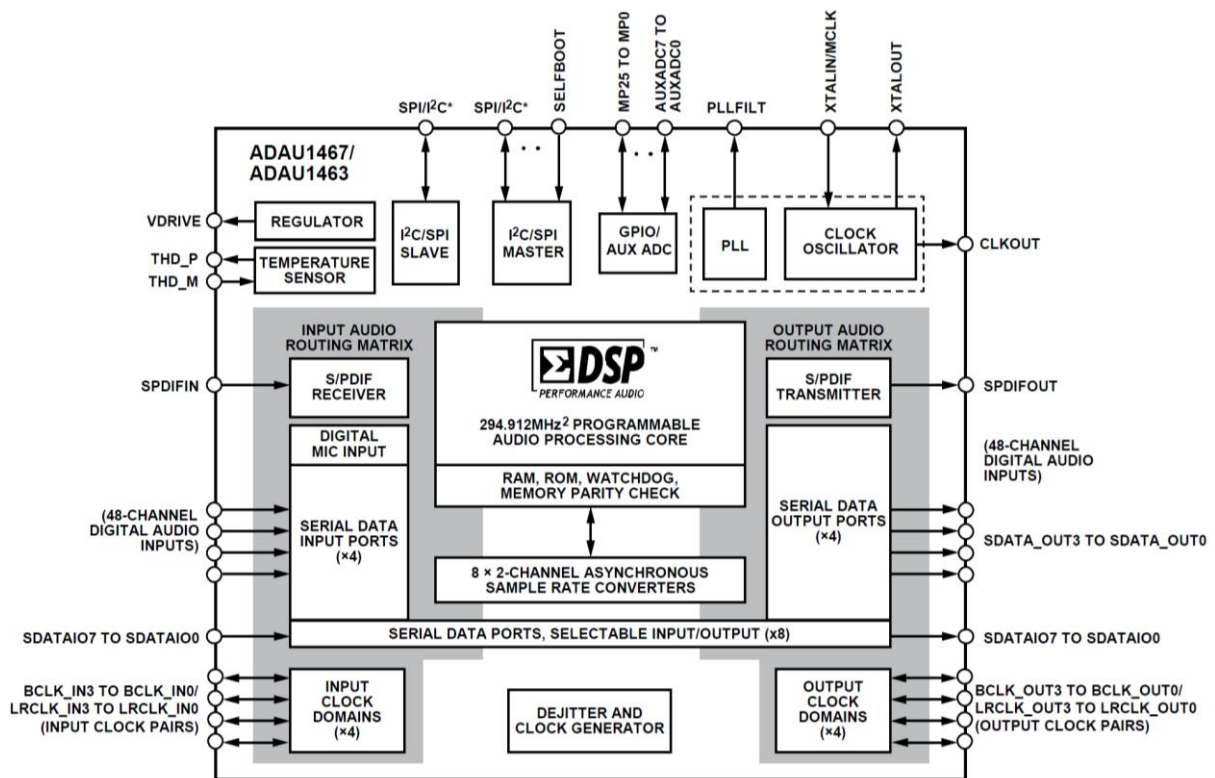
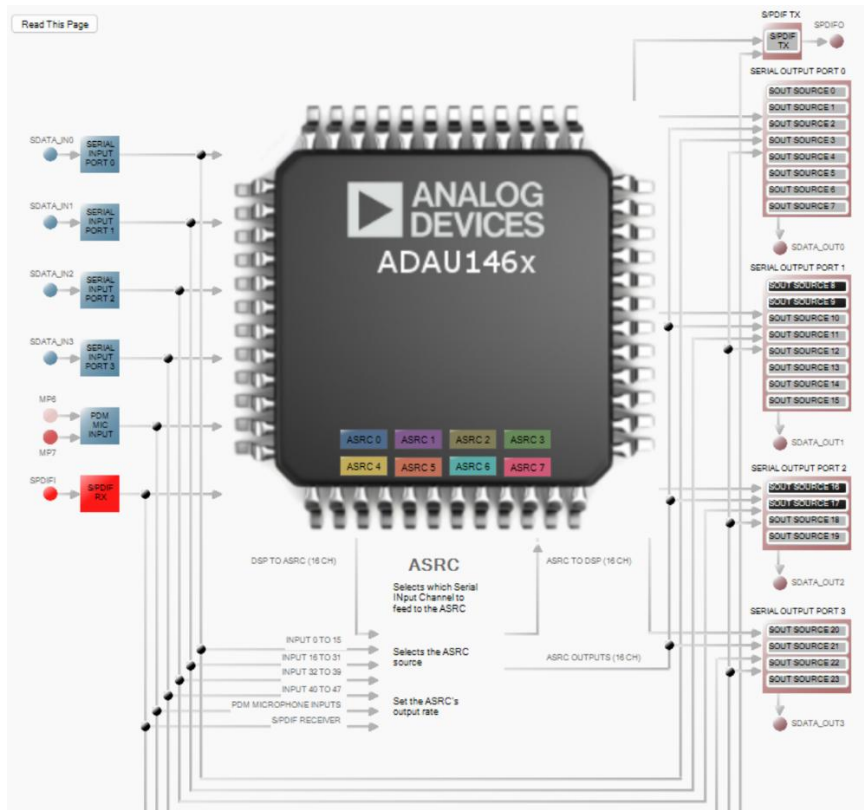


Figure 6. Total Harmonic Distortion + Noise vs Output Power

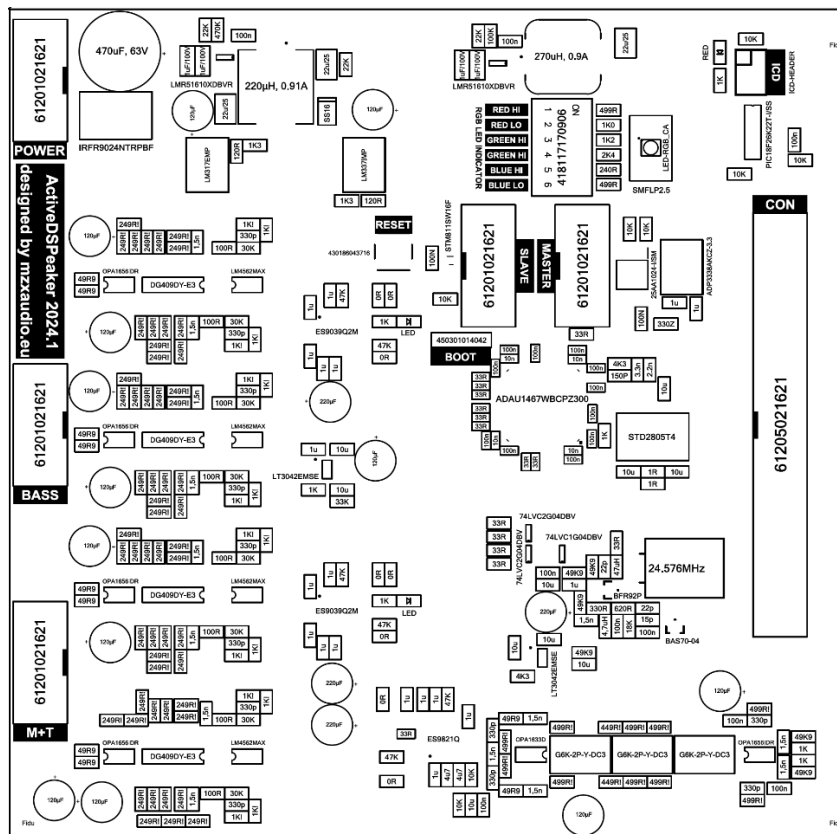
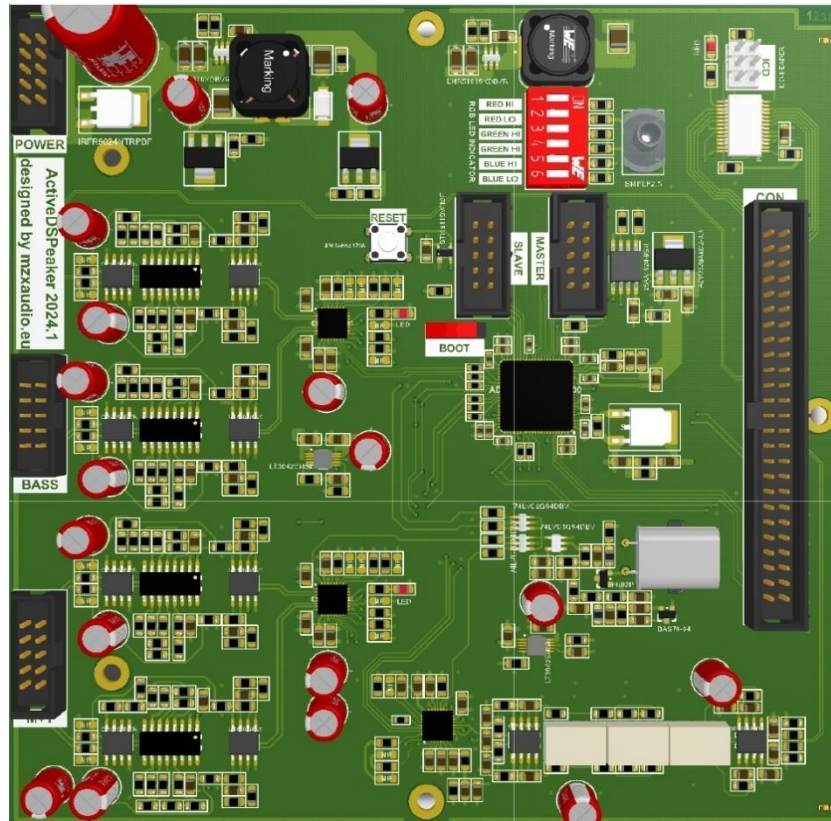
Analog Devices Sigma SHARC digital signal processor



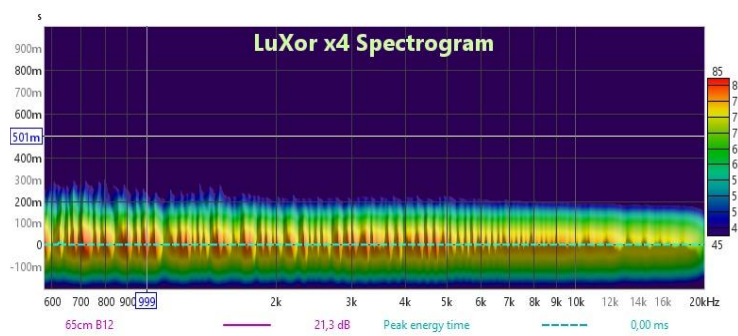
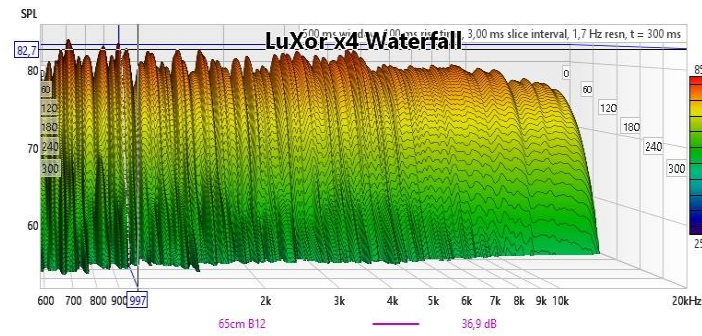
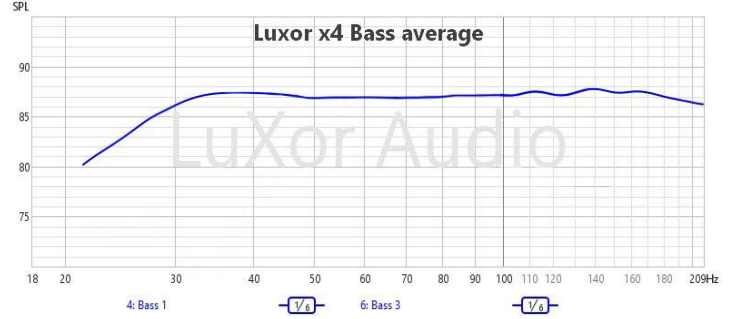
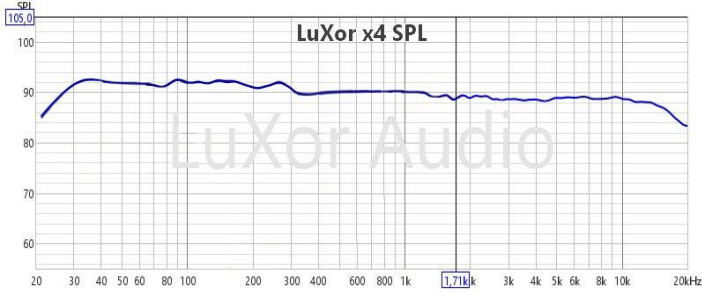
*SPI/I²C INCLUDES THE FOLLOWING PIN FUNCTIONS: SS_M, MOSI_M, SCL_M, SCLK_M, SDA_M, MISO_M, MISO, SDA, SCLK, SCL, MOSI, ADDR1, SS, AND ADDR0 PINS.

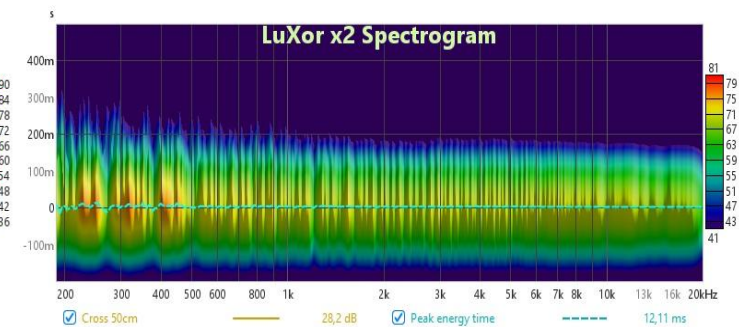
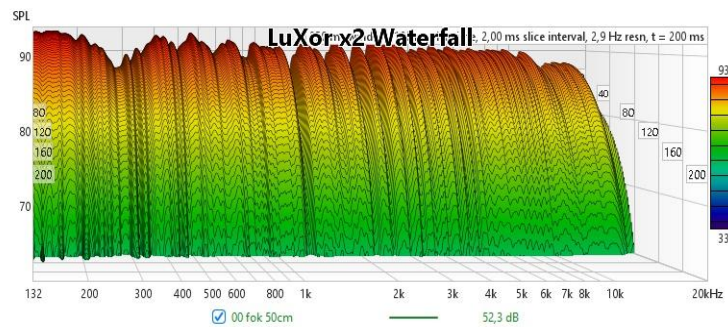
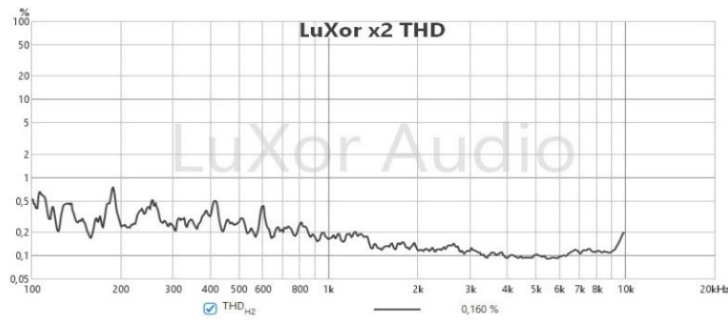
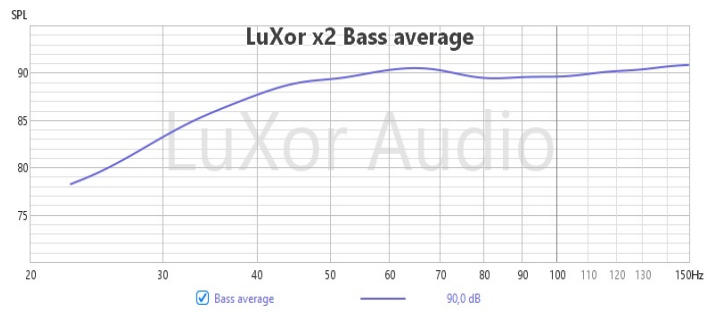
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Luxor Audio / MZX Audio active DSP electronics



9. Measurements





Luxor x4 3way active digital loudspeaker specifications

Analog input (balanced XLR)	Input sensitivity selectable	4V _{eff} / 2V _{eff}
	Input differential impedance	100kΩ
	ADC chipset	ES9821Q Hyperstream II
	DNR	122dB
Digital inputs	S/PDIF optical	Toslink
	S/PDIF coaxial	RCA (75Ω) (galvanic isolated)
	AES/EBU	XLR (110Ω) (galvanic isolated)
	I2S	RJ45 (STP) / LVDS 100Ω
	Supported sample rate by ASRC	max. 192kHz PCM
DSP	Chipset	Analog Devices Sigma SHARC
	Core frequency	300MHz
	Signal processing	96kHz/32bit
	Number of sonic presets	2
Analog output	Output full scale selectable	4V _{eff}
	Output differential impedance	100Ω
	DAC chipset	ES9039Q2M Hyperstream
	DNR	130dB
Digital output	AES/EBU	XLR / 110Ω (galvanic isolated)
Amplifiers	Operation mode	Class-D
	Continuous output power	250W(LF) + 250W(MF) + 100W(HF) 630W (Peak to peak)
Acoustics properties	Frequency response	24Hz – 22kHz (–6dB)
	Frequency response accuracy	±1,5dB (32Hz–15kHz)
	THD Harmonic distortion	<0.11% (1kHz), <0,5% (20–20k Hz)
	SPL max	121dB (1m, Pink noise 12dBFS)
	Drivers (3 way)	1" metal dome (180W) 6,5" midrange driver (300W) 2 x 10" bass driver (2x300W)
Protection	Overtemperature, clipping, overload	Auto retrial
Indicator	Power LED	Color RGB LED
Mains	Voltage range	85 – 264 VAC
	Mains frequency range	47 – 63 Hz
	Power consumption	5 W (bypass) max 550W (full drive)
	Power entry in 3 way model	Neutrik PowerCon
Enviroment	Operation temperature	+10 C° to +40 C°
	Operation humidity	20 to 90% RH, noncondensing
Mechanical properties	Dimensions	31 x 118 x 38 cm [W x H x D]
	Finishes	Walnut/cherry/wenge natural veneer
	Weight	51 kg (34 + 17 kg)

Luxor x2 2way active digital loudspeaker specifications

Analog input (balanced XLR)	Input sensitivity selectable	4V _{eff} / 2V _{eff}
	Input differential impedance	100kΩ
	ADC chipset	ES9821Q Hyperstream II
	DNR	122dB
Digital inputs	S/PDIF optical	Toslink
	S/PDIF coaxial	RCA (75Ω) (galvanic isolated)
	AES/EBU	XLR (110Ω) (galvanic isolated)
	I2S	RJ45 (STP) / LVDS 100Ω
	Supported sample rate by ASRC	max. 192kHz PCM
DSP	Chipset	Analog Devices Sigma SHARC
	Core frequency	300MHz
	Signal processing	96kHz/32bit
	Number of sonic presets	2
Analog output	Output full scale selectable	4V _{eff}
	Output differential impedance	100Ω
	DAC chipset	ES9039Q2M Hyperstream
	DNR	130dB
Digital output	AES/EBU	XLR / 110Ω (galvanic isolated)
Amplifiers	Operation mode	Class-D
	Continuous output power	250W(LF) + 100W(HF) 380W (Peak to peak)
Acoustics properties	Frequency response	32Hz - 22kHz (-6dB)
	Frequency response accuracy	±1,5dB (39Hz-15kHz)
	THD Harmonic distortion	<0.15% (1kHz), <0,5% (20-20k Hz)
	SPL max	118dB (1m, Pink noise 12dBFS)
	Drivers (2 way)	1" metal dome (180W) 8" bass driver (300W)
Protection	Overtemperature, clipping, overload	Auto retrial
Indicator	Power LED	Color RGB LED
Mains	Voltage range	85 - 264 VAC
	Mains frequency range	47 - 63 Hz
	Power consumption	5 W (bypass) max 330W (full drive)
	Power entry in 3 way model	Shurter IEC
Enviroment	Operation temperature	+10 C° to +40 C°
	Operation humidity	20 to 90% RH, noncondensing
Mechanical properties	Dimensions	27 x 40 x 38 cm [W x H x D]
	Finishes	Walnut/cherry/wenge natural veneer
	Weight	18 kg