



COS

# D1

## DAC + Pre-Amplifier



D-1, a dapper unit in cool aluminum without a mark of alphabet or display except on the back panel, is a fusion of a digital-to-analog converter and a pre-amplifier. It manages and interprets digital music data, and sends them to a power amplifier, obliterating noise, distortion and jitters in the process.

When designing D1, we at COS Engineering intend to not only make music based on digital data pleasurable, but also meet the demand of those with willing and fastidious ears. This unit, crafted delicately and rich in features, is capable of rendering crystal clear, spacious and dynamic music.

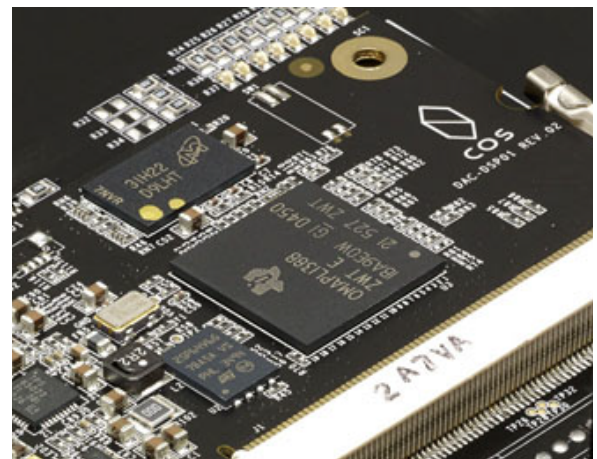
## STYLISH DESIGN

The exterior of D1, composed of aerospace grade aluminum alloy which seals off electric and magnetic interference from outside, is crafted finely to a style of its own. Except the back panel, there is nothing but the COS logo; no alphabet, no number, no indicator needle, no scale, no display. Other than the round knob, there is nothing but lines, straight lines. Simple. Uncluttered.



## COS ALGORITHM AND DSP

To interpret digital music data in a preferred way, we at COS Engineering have developed a proprietary algorithm, which up-samples original data to 176.4K or 192K, 24-bit by a process in an array of 4096 with 32-bit precision. Instead of the more computationally efficient IIR filter, which may contaminate phases, a linear-phase delay FIR filter is adopted. This massive computation is handled by a powerful DSP capable of 3648 MMAC (millions multiply and add) per second.



## BUFFER AND RE-CLOCKING

D1 takes a two-fork approach to jitters. It receives data from digital sources, whether a PC, a CD transport, or a mobile device, aligns them in exact frames with a one-second buffer, and sends them out for interpretation by the COS algorithm. The data so processed is then converted to analog signals, under the coordination of a crystal oscillator with a jitter precision less than 1ps and a dedicated re-clocking circuitry.



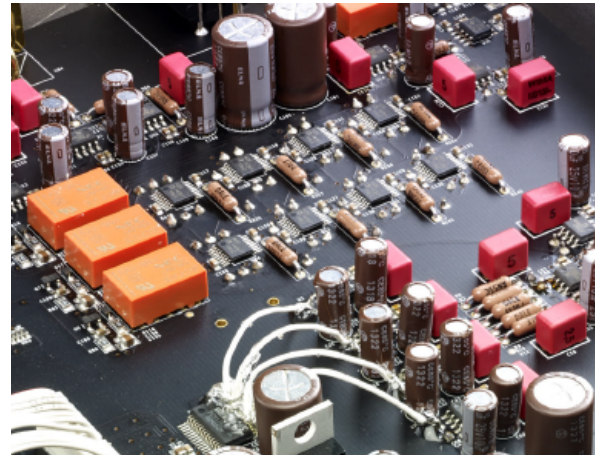
## DUAL POWER SUPPLY

D1 uses two-stage regulation to provide clean power. Two toroid transformers power the digital circuit and the analog circuit separately, thereby eliminating possible interferences.

## PARALLEL STRUCTURE WITH TUNING AND MATCHING

The analog circuit bifurcates into two boards for the left and the right channels. Each board features its own power regulation, filters, DAC chip, and volume control. These two pairs of current outputs are combined into one to improve signal to noise ratio.

The DAC chip on each board is a stereo, high-performance 24-bit chip, running as mono. We at COS Engineering manually tune and match those two pairs of output and secure a lower distortion more than 6 dB as compared to the chip's specification.

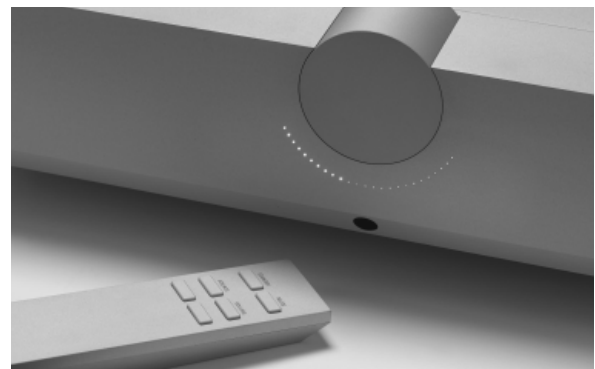


## FULLY BALANCED DESIGN

D1's all-the-way-through balanced design, including components, circuitry and layout, ensures that even harmonics match and are gracefully cancelled out. Distortions are low to the extent possible.

## VOLUME CONTROL

D1's volume control is composed of a ladder of high precision resistors and an array of analog switches which are low in resistance, noise, and distortion; no mechanical parts are used. Frequent use has no impact on the precision of volume control.



## Pre-Amplifier

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Analog Input	Balanced x 1, Unbalanced x 1
Analog Output	Balanced x 1, Unbalanced x 1
Residual Noise	< 2uV (-114dBV) / 20Hz~20KHz non-weighted, input terminated
Input Overload	16V (balanced), 8V (unbalanced) / THD < 1%
Input Impedance	100Kohm
Output Impedance	200 ohm (balanced), 100 ohm (unbalanced)
Maximum Output	16V (balanced), 8V (unbalanced) / THD < 1%
Voltage Gain	0dB
Frequency Response	± 0.1dB / 20Hz ~ 20KHz
THD+N	< 0.001% (-100dB) / 20Hz ~ 20KHz non-weighted
Signal To Noise Ratio	> 110dB / 20Hz ~ 20KHz non-weighted
Crosstalk	< -120dB
Volume	256 steps by 0.25dB/step, total range: 64dB / < ± 0.1dB accuracy

## DAC

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Digital Inputs	USB x 1, Asynchronous Audio Class 1.0/2.0; SPDIF x 2; TosLink x 2
Sampling Rate	up to 192 Ksps, 24-bit
Frequency Response	+ 0dB, -0.5dB / 20 Hz ~20KHz
Full Scale Output	2V (unbalanced), 4V (balanced)
THD+N	< 0.001% (- 100dB) / 192Ksps, 24-bit, 20Hz ~ 20KHz, A-weighted
Signal To Noise Ratio	> 110dB / 192Ksps, 24-bit, 20Hz ~ 20KHz, A-weighted
Digital-to-Analog Converter	24-bit DAC x 2 / up to 192Ksps, 24-bit
Digital Filter	COS Proprietary; Linear Phase Delay

## General

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Weight	8.6kg
Dimension	415mm (W) x 280mm (D) x 100mm (H)
Power	100 ~ 120VAC or 200 ~ 240VAC selectable Normal Operation < 50W; Standby < 5W



COS

[www.cosengineering.com](http://www.cosengineering.com)

COS Engineering is founded by three close friends who are serious about audio entertainment. With an aversion to cacophony, an aspiration for style and a penchant for simplicity, the founders have harnessed extensive knowledge and experience in mathematics, electronics and communication to research and design. The objective is to offer gears featuring musicality as well as aesthetics. D1, COS Engineering's first product, makes its debut in 2014.