

Introduction

Applications

The **DAC3** is a professional reference-grade audio digital to analog converter with Benchmark's **HPA2™** headphone amplifier. The **DAC3** supports 24-bit D/A conversion of PCM at sample rates up to 192 kHz. It also supports direct conversion of 1-bit DSD at a 2.8224 MHz sample rate. It is designed to be very transparent and this makes it well-suited for critical monitoring in studio control rooms and mastering rooms.

The **DAC3** is also well-suited for high-end hi-fi environments. It includes a generous collection of inputs and outputs and can serve as the central component in any stereo hi-fi system. The **DAC3** provides D/A conversion, source selection, volume control, and headphone amplification. A remote control, 12V trigger, and home theater bypass function provide the features needed in a home environment.

The **DAC3** is designed to directly drive a wide variety of power amplifiers and powered monitors. The balanced outputs include low-impedance passive pads that can be adjusted to optimize the interface between the **DAC3** and the power amplifier. This optimization can provide substantial improvements in the system-level SNR and THD+N performance.

DAC3 vs. DAC2

The **DAC3** builds upon Benchmark's highly successful **DAC2** product family. The **DAC3** maintains the familiar **DAC2** form factor, but adds the higher performance available from the new ES9028PRO D/A converter. The **DAC3** offers the following improvements over the **DAC2**:

- Active 2nd Harmonic Compensation
- Active 3rd Harmonic Compensation
- Lower THD
- Lower passband ripple
- Improved frequency response
- Increased Dynamic Range
- Faster PLL lock times
- Faster switching between inputs

DAC3 vs. DAC1

The **DAC3 and DAC2** add these features that are not found on the **DAC1**:

- Asynchronous 192kHz USB Audio 2.0
- 32-bit D/A conversion system
- Word Length Display
- Sample Rate Display
- Polarity Control
- Direct DSD D/A Conversion
- -20 dB DIM
- Bi-Directional 12V Trigger
- Power Switch with Auto-On Function
- Home Theater Bypass
- Digital Pass-Through
- High-Headroom DSP
- Dual-Domain Hybrid Gain Control
- Additional I/O

DAC3 Technologies

4:1 Parallel Conversion Structure

The conversion system in the **DAC3** achieves a 6 dB signal to noise improvement through the use of 4:1 summing. The ES9028PRO D/A is an 8-channel 32-bit converter. In the **DAC3**, four channels are summed in the analog domain to form each of the two output channels.

The 4:1 summing also improves the THD. The non-linearities in individual conversion channels are averaged across the four summed channels and incoherent non-linearities are attenuated by 6 dB.

Harmonic Compensation

The ES9028PRO has two distortion compensation systems that independently remove most of the 2nd and 3rd harmonic distortion in the D/A converter. Benchmark's ultra-clean analog output stages allow these systems to be fully leveraged in the **DAC3**.