## Outstanding audio and battery lifetime for wired and wireless headphones

From gaming and virtual reality to watching movies and listening to music, people are enjoying audio on the move more and more. And they expect crystal-clear sound everywhere. The SmartBeat™ DA7402 lets you deliver high-resolution headphones and headsets to impress even the most demanding user. It combines industry leading audio and wideband hybrid digital active noise cancellation (ANC) in a space-saving solution whose low power consumption could enable longer playback times.
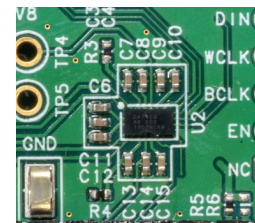
The SmartBeat™ DA7402 is a high-performance, ultra-low-power stereo hi-fi codec. Featuring Dialog's custom digital hybrid ANC technology, it offers stronger suppression of ambient noise over a wider range of frequencies for the best user experience in any environment.

With its integrated audio processor, the DA7402 delivers excellent audio performance including dynamic ranges for playback of 115 dB and sampling rates up to 384 kHz. It also offers 40 kHz audio bandwidth to support Hi-Res Audio. All this while consuming just 8.5 mW during stereo playback with ANC.

The SmartBeat™ DA7402 is available in a choice of compact packages to meet the needs of even the most space-constrained applications. Moreover, it is part of a family of pin-compatible codecs, making it easier for you to develop a complete portfolio of headphone, headset and earbud solutions for any application.

Applications
- Wireless (Bluetooth) over- and on-ear headphones
- Wired (USB-C) over- and on-ear headphones

Benefits
- Superior audio performance
- World-class magnitude and range of ambient noise suppression
- Class-leading low power consumption
- Highly compact footprint
- Minimal external component count
- Development kit including extensive tooling to speed up product development
- Family of pin-compatible variants

Wideband digital hybrid ANC

The DA7402 features our proprietary digital ANC technology that can be configured to work in feedback, feedforward or a novel hybrid mode. In hybrid mode it delivers best-in-class ambient noise suppression in terms of both magnitude (upto 35 dB at 100 Hz) and frequency range (over 2.5 kHz).
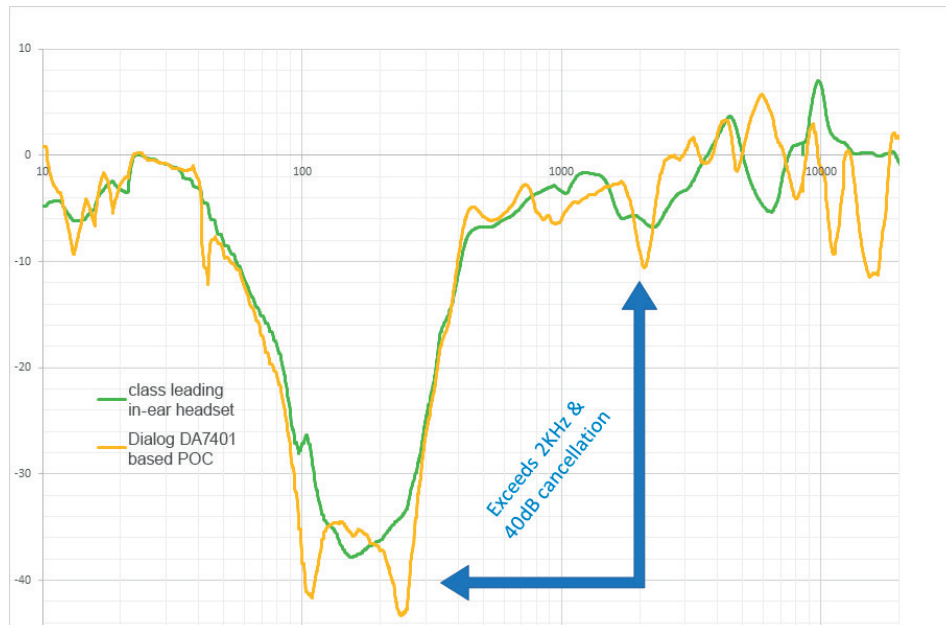

Key to this performance is a custom DSP that is optimized for ANC and enables an input-to-output latency of just 25 µs. Meanwhile a dedicated fast equalization (FEQ) path operating at the digital microphone (DMIC) clock rate improves cancellation at high frequencies.
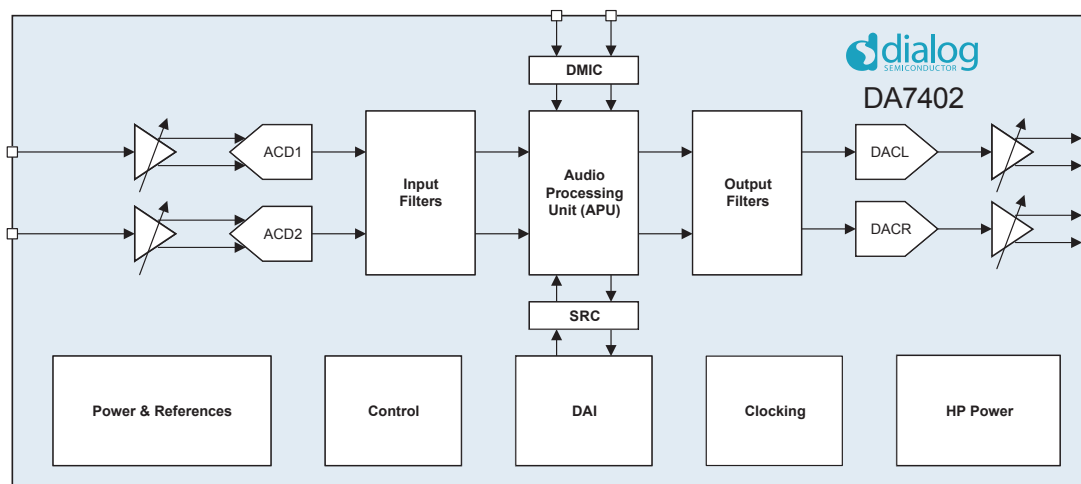
Tailored support

Dialog offers all the tools and support you need to develop new DA7402-based applications fast. This includes the option for hand-on support from experts in our audio labs in Europe and South East Asia.
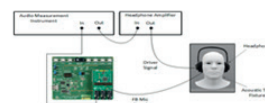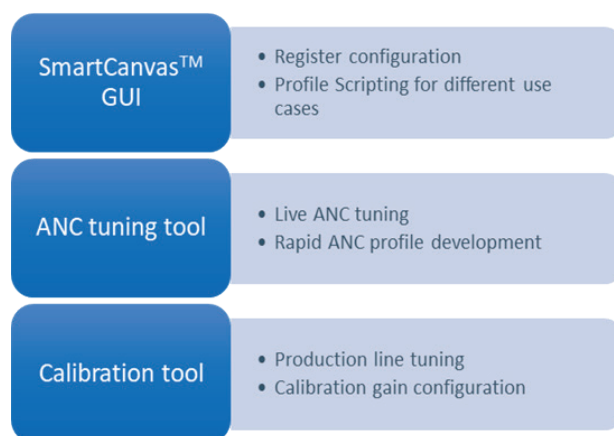

Typical application design
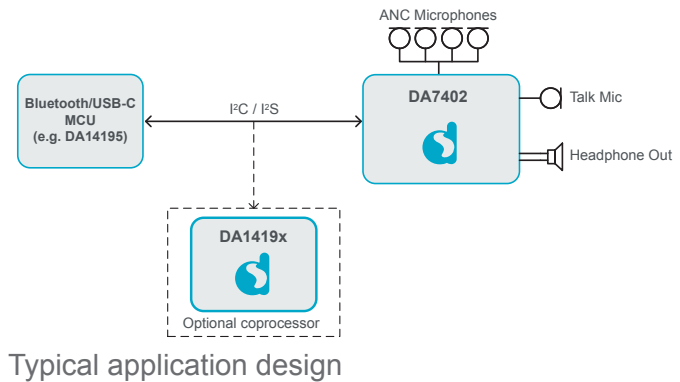
Development kit

The DA7402 development kit contains all the hardware you need to explore the potential of this high-performance ANC codec for yourself. The motherboard includes the codec and a DA14195 co-processor, while the daughterboard features the DA7402 in your choice of package.
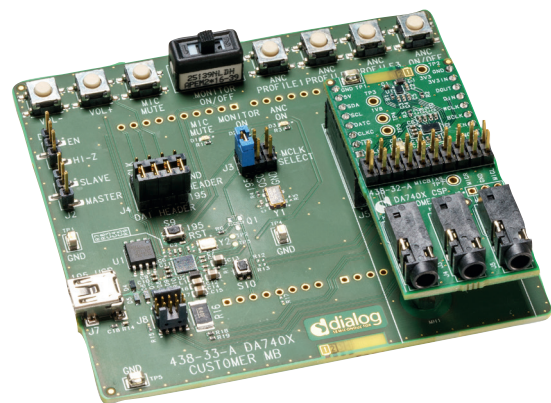
Development tools

We also offer an extensive range of tools covering the whole development cycle to help you design and tune your hardware and software. They include a semi-automatic ANC tuning tool to simplify and speed up the optimization of your ANC configuration. In addition, an easy-to-use production line calibration tool helps you compensate for tolerances within commercial microphones to ensure consistently great performance in every product you make.

SmartCanvas™ GUI	• Register configuration • Profile Scripting for different use cases
ANC tuning tool	• Live ANC tuning • Rapid ANC profile development
Calibration tool	• Production line tuning • Calibration gain configuration

Key features

- Wideband digital active noise cancellation:
  - Supports hybrid, feedforward and feedback topologies
  - Upto 35 dB cancellation at 200 Hz
  - Over 2.5 kHz suppression range
  - 25 µs input-to-output latency
  - Dedicated fast equalization path for higher frequency noise canceling
  - Dedicated calibration and tuning tool
- Ultra-low power consumption
  - 8.5 mW stereo hybrid ANC playback
- Enhanced audio performance
  - 115 dB playback dynamic range
  - 40 kHz bandwidth supports Hi-Res Audio
- 4-wire digital audio interface with support for I2S, TDM and other common audio formats
  - Up to 32 bits per channel
  - Up to 384 kHz sample rate support

- Three stereo PDM inputs for digital microphones and low latency connection from host processors
- Integrated low-noise microphone bias
- Flexible DSP supporting mixing, gain, equalization, sidetone, and automatic gain control
- Bypassable asynchronous sample-rate converters
- Clocking
  - Programmable fractional-N phase-locked loop (PLL)
  - Sample rate tracking
- 2-wire I2C compatible control interface
- WLCSP package:
  - 32-ball 3.26 mm x 1.72 mm, 0.4 mm pitch WLCSP

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