



Analog Reinvented

# ES9281A/80A PRO

## High performance USB DAC with Headphone Amplifier, MQA, ADC, PLL, Jack Detect, Mic, and A/D Mixing Product Brief

The ES9281A/80A PRO is a feature-rich 32-bit, 2-channel USB audio D/A converter with headphone amplifier, PLL, Jack Detect, ADC and support for both analog and digital mics, and analog/digital mixing. It has been designed for professional applications (mixer consoles, digital audio workstations), audiophile-grade portable applications (headphones, headphone adapters and digital music players), and consumer applications (USB DACs and A/V receivers). Using the critically acclaimed ESS patented HyperStream® II QUAD DAC™ architecture and Time Domain Jitter Eliminator, and advanced SABRE32® technology, the ES9281A/80A PRO delivers a performance level that will satisfy the most demanding audio enthusiast.

The versatile audio input port accepts PCM, DSD, DoP, S/PDIF and MQA\* formats. The integrated SABRE® DAC supports up to 32-bit 384kHz PCM, 96k S/PDIF and DSD1024 audio data via master/slave interface in synchronous and asynchronous sampling modes. The ES9281A PRO is a licensed and standard-compliant MQA native hardware renderer. PCM Audio rates up to 768kHz are supported for USB-to-I²S mode and Native DSD is also supported over USB up to DSD512.

The integrated class-G SABRE Headphone Amp supports up to 2Vrms output. Programmable analog gain and integrated low-noise DAC reference regulator minimize noise gain at typical listening levels and reduce PCB area and BOM cost.

The Jack Detect feature automatically wakes the device, accurately measures load impedance and prevents false positives due to moisture infiltration without any support from the application processor.

FEATURE	DESCRIPTION
Patented 32-bit HyperStream® II QUAD DAC™ Architecture SABRE32® technology	32-bit mobile audio DAC/HPA with high dynamic range & ultra-low distortion
+130dB SNR, +122dBA DNR -112dB THD+N, 2.0Vrms into 100kΩ -110dB THD+N, 1.0Vrms into 32Ω	Supports synchronous and asynchronous sampling modes Experience Sabre32® technology all the way to headphones
Hardware MQA Renderer (*ES9281A PRO only)	Automatic stream lock to unfold decoded MQA stream Easily paired with software MQA core decoder Eliminates the need for complicated DAC filter tuning
Analog PLL	Simplifies clocking requirements and reduces PCB size and BOM cost
64-bit accumulator & 32-bit processing	Distortion free signal processing
Versatile digital audio input port	Supports master/slave PCM (I²S, LJ 16-32-bit), DSD, DoP, S/PDIF and MQA formats.
Customizable filter characteristics	3 preset filters, programmable filter coefficients for custom sound signature 2 audio signal processors for custom filter architectures and analog/digital mixing
Integrated ADCs for analog/digital mixing +102dBA DNR, -88dB THD+N 1V <sub>rms</sub>	2 stereo PDM inputs, 1 differential analog input, 2 single-ended analog inputs Mix mode for side-tone and sound overlay on digital audio
Integrated low noise DAC reference regulator	Programmable voltage, reduced BOM cost and improved DNR
Jack Detect with moisture protection	Dual pin jack detect can wake the ES9281A/80A PRO automatically and prevent false positives
Programmable analog gain	Lower noise gain at real-life listening levels Eliminates external thin film resistors, reduces PCB size and BOM cost
USB/I²S/DSD Bridge Mode	16 Channel I²S Bridge supports up to 8 input and 8 output channels simultaneously, including native DSD support
Patented Time Domain Jitter Eliminator	Unmatched audio clarity free from input clock jitter
USB 2.0 Hi-Speed Audio Rates Supported	PCM up to 768kHz, native DSD up to DSD512, USB-to-Serial output PCM up to 384kHz, native DSD up to DSD256, USB-to-DAC output



## APPLICATIONS

- USB Headphones, USB headphone adapters, Digital music players, Portable multimedia players
- Professional digital audio workstations and mixer consoles
- Consumer and Audiophile USB DAC headphone amplifiers and A/V receivers

## Typical Application

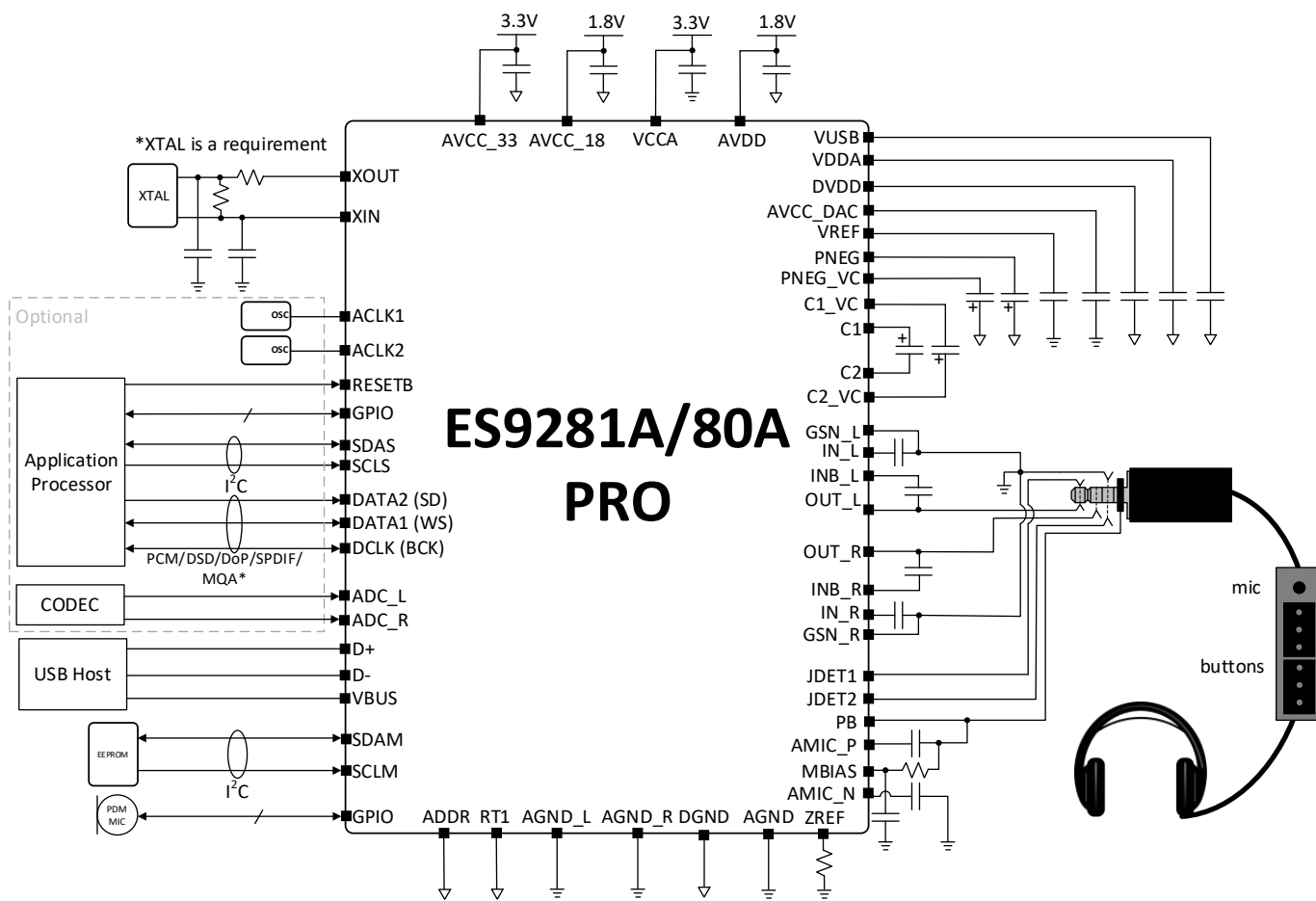


Figure 1 – ES9281A/80A PRO Typical Application Diagram

Note: Please see ES9281A/ES9280A PRO reference schematics for a more complete schematic.

\*MQA is only applicable to the ES9281A PRO.



ES9281A/80A PRO Product Brief

ES9281A/80A PRO Functional Block Diagram

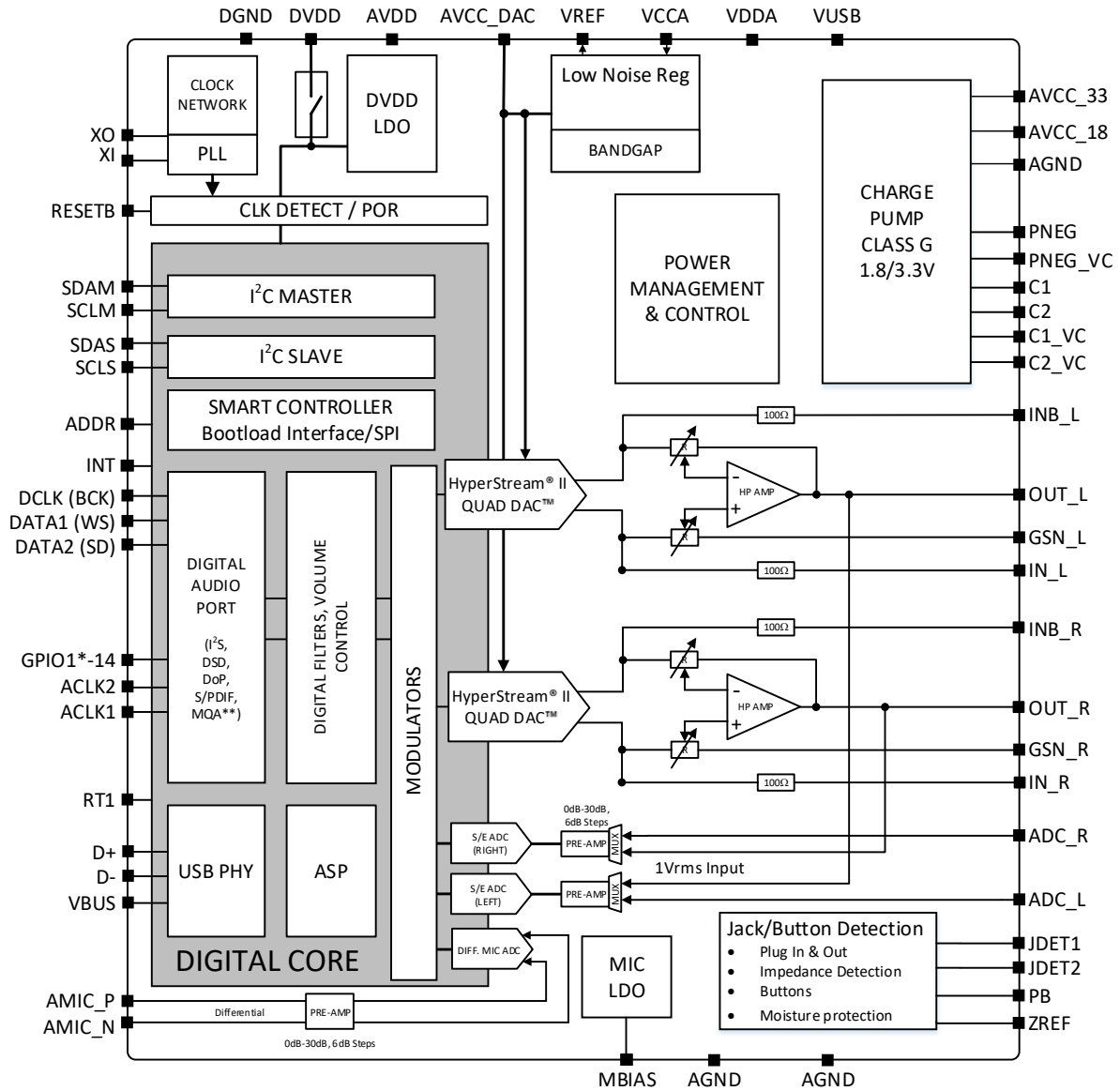


Figure 2 - ES9281A/80A PRO Block Diagram

Note: SCLK/GPIO1 (B1) is usable as a GPIO when USB port is not used.

\*\*MQA only available on ES9281A PRO



## Ordering Information

Part Number	Description	Package
ES9281AQPRO	SABRE 32-bit 2-channel USB audio D/A converter with headphone amplifier, PLL, Jack Detect, multiple ADCs, support for both analog and digital mics, and analog/digital mixing	88 WQFN
ES9280AQPRO	All ES9281A PRO functionality <u>except</u> MQA support	

## Revision History

Current Version 0.3.0

Rev.	Date	Notes
0.2.3	June 29, 2020	Initial release of PB
0.2.4	April 7, 2021	<ul style="list-style-type: none"> <li>Updated trademark in description &amp; functional block diagram</li> </ul>
0.2.5	April 13, 2021	<ul style="list-style-type: none"> <li>Minor wording updates</li> </ul>
0.3.0	January 17, 2025	<ul style="list-style-type: none"> <li>Formatting updates</li> </ul>

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