Analog Reinvented

ES9039MPRO & ES9039PRO
32-bit Flagship Ultra High Performance 8-Channel DAC
Product Brief

The ESS Sabre® ES9039MPRO & ES9039PRO are the fully redesigned flagship 32-bit 8 Channel digital-to-analog converters (DAC) that target high end consumer devices, professional audio applications such as recording systems, mixer consoles and digital audio workstations (DAW), test equipment, instruments, audio processors applications. It was designed to create the new generation of the world's highest performing audio DAC.

The ES9039PRO has 8 integrated DACs which use ESS' patented Hyperstream® IV DAC Architecture. Using the QUAD modulator architecture, it delivers unprecedented audio sound quality and specifications, including a world class +132dB DNR per channel, +140dB DNR and a THD+N of -122dB in mono mode.

The ES9039PRO SABRE® DAC improves on previous designs to include:

- MQA Hardware renderer (ES9039MPRO) to reveal the original master resolution
- TDM & SPI support for more options in connectively
- Lower power consumption than previous generations, including the Hyperstream IV DAC modulator
- New Hardware mode for simplified programming.

TDM, DSD, DoP, and I2S, LJ, RJ master/slave interfaces as well as synchronous S/PDIF are supported

The ES9039PRO has 7 built-in pre-programmed and programmable digital filters which allows the most discerning user to tune the SABRE sound to their own personal sound signature.

The ES9039MPRO includes a built-in stereo hardware MQA renderer that helps recreate the natural sound of the recording.

FEATURE	DESCRIPTION
Patented 32-bit HyperStream® IV Architecture DAC Technology	32-bit audio DAC with ultra high dynamic range & ultra-low distortion
+140dB DNR mono mode +132db DNR per channel -122dB THD+N mono	Unprecedented dynamic range and ultra-low distortion
MQA Renderer (ES9039MPRO only)	Stereo MQA Renderer Built-In Easily paired with software MQA core decoder Eliminates the need for complicated DAC filter tuning
High Sample Rates	Up to PCM 768kHz & native DSD1024
Customizable filter characteristics	7 presets of digital optimal filters, with custom filter programmability for each channel to allow for a unique sound signature
Multiple Input formats are available	I2S, LJ, RJ, TDM, DSD, DoP and S/PDIF
I2C, SPI, and Hardware interface control	Configured by microcontroller or other I2C/SPI source, or pins through Hardware Mode
Lower Power Consumption than Previous Gen	Simplifies power supply design
Standardized Packaging	10mm x 10mm, 64 pin QFP for reduced PCB board space

APPLICATIONS

- Professional digital audio workstations (DAW) Audio Playback
- A/V Receivers
- Personal Audio Devices & Media Streamers
- High End Audiophile Equipment
- Any equipment that requires the very best audio digital to analog conversion

Functional Block Diagram

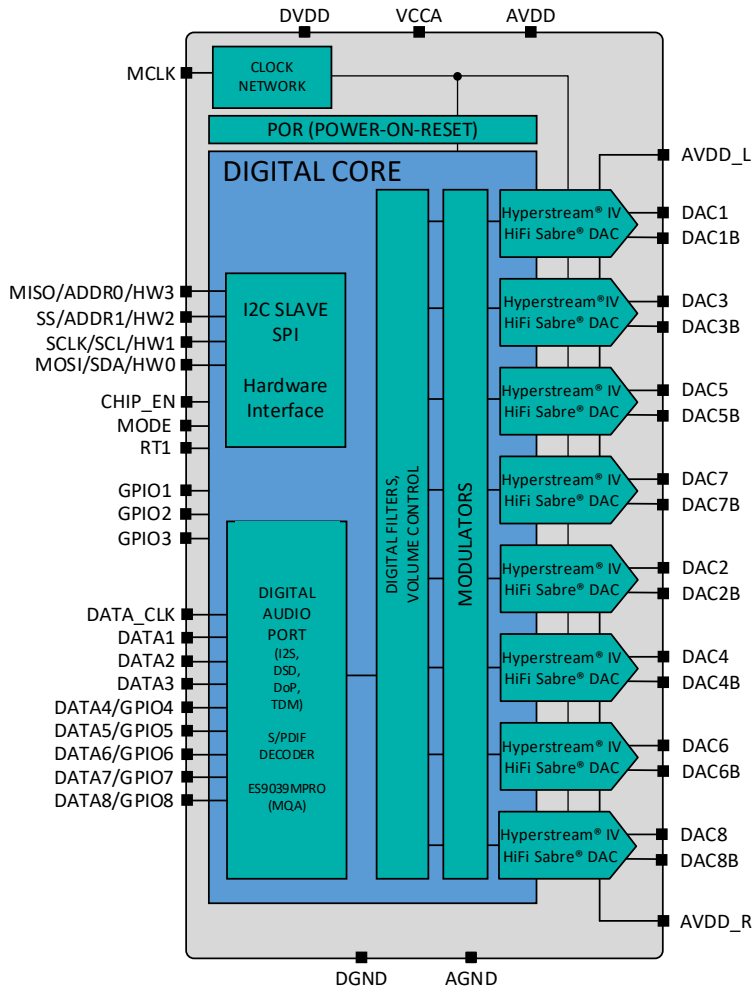
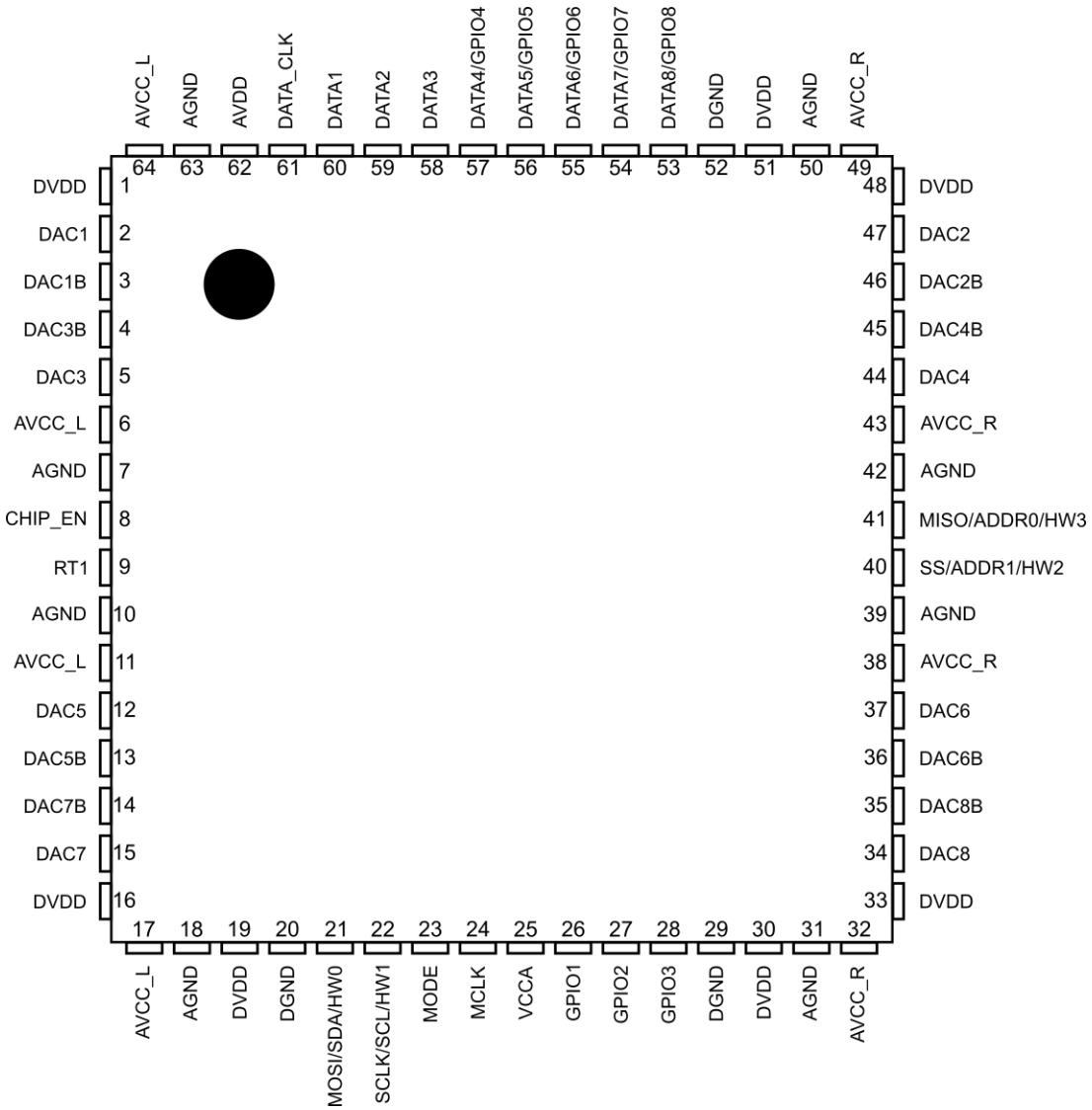


Figure 1. ES9039MPRO & ES9039PRO Block Diagram

ES9039SPRO Pinout



Note: Pin 65 is a package pad, used for AGND, and should be connected to Analog Ground

64 QFP Pin Descriptions

Pin	Name	Pin Type	Reset State	Pin Description
1	DVDD	Power	Power	Digital Core Supply, 1.2V
2	DAC1	AO	Ground	Differential Positive Output for Channel 1
3	DAC1B	AO	Ground	Differential Negative Output for Channel 1
4	DAC3B	AO	Ground	Differential Negative Output for Channel 3
5	DAC3	AO	Ground	Differential Positive Output for Channel 3
6	AVCC_L	Power	Power	3.3V DAC analog output stage reference supply for the Left side
7	AGND	Ground	Ground	DAC analog output stage ground
8	CHIP_EN	I	HiZ	Active-high Chip Enable
9	RT1	I	HiZ	Reserved. Must be connected to DGND for normal operation.
10	AGND	Ground	Ground	DAC analog output stage ground
11	AVCC_L	Power	Power	3.3V DAC analog output stage reference supply for the Left side
12	DAC5	AO	Ground	Differential Positive Output for Channel 5
13	DAC5B	AO	Ground	Differential Negative Output for Channel 5
14	DAC7B	AO	Ground	Differential Negative Output for Channel 7
15	DAC7	AO	Ground	Differential Positive Output for Channel 7
16	DVDD	Power	Power	Digital Core Supply, 1.2V
17	AVCC_L	Power	Power	3.3V DAC analog output stage reference supply for the Left side
18	AGND	Ground	Ground	DAC analog output stage ground
19	DVDD	Power	Power	Digital Core Supply, 1.2V
20	DGND	Ground	Ground	Digital Ground
21	MOSI/SDA/HW0	I	HiZ	Serial communication for SPI/I2C & HW0 interface pin, controlled by MODE
22	SCLK/SCL/HW1	I	HiZ	Serial Clock for SCLK (SPI), SCL (I2C), also HW1 controlled by MODE pin
23	MODE	I	HiZ	I2C/SPI Control selection or HW mode
24	MCLK	I	HiZ	Oscillator input
25	VCCA	Power	Power	Analog Supply, 3.3V
26	GPIO1	I/O	HiZ	General I/O w/extended functions
27	GPIO2	I/O	HiZ	General I/O w/extended functions
28	GPIO3	I/O	HiZ	General I/O w/extended functions
29	DGND	Ground	Ground	Digital Ground
30	DVDD	Power	Power	Digital Supply, 1.2V
31	AGND	Ground	Ground	DAC analog output stage ground
32	AVCC_R	Power	Power	3.3V DAC analog output stage reference supply for the Right side
33	DVDD	Power	Power	Digital Supply, 1.2V
34	DAC8	AO	Ground	Differential Positive Output for Channel 8
35	DAC8B	AO	Ground	Differential Negative Output for Channel 8
36	DAC6B	AO	Ground	Differential Negative Output for Channel 6
37	DAC6	AO	Ground	Differential Positive Output for Channel 6
38	AVCC_R	Power	Power	3.3V DAC analog output stage reference supply for the Right side
39	AGND	Ground	Ground	DAC analog output stage ground
40	SS/ADDR1/HW2	I	HiZ	Serial communication for SPI/I2C & HW2 interface pin, controlled by MODE pin
41	MISO/ADDR0/HW3	I	HiZ	Serial communication for SPI/I2C & HW3 interface pin, controlled by MODE pin
42	AGND_R	Ground	Ground	DAC analog output stage ground for the Right Side
43	AVCC_R	Power	Power	3.3V DAC analog output stage reference supply for the Right side
44	DAC4	AO	Ground	Differential Positive Output for Channel 4
45	DAC4B	AO	Ground	Differential Negative Output for Channel 4
46	DAC2B	AO	Ground	Differential Negative Output for Channel 2
47	DAC2	AO	Ground	Differential Positive Output for Channel 2
48	DVDD	Power	Power	Digital Supply, 1.2V
49	AGND	Ground	Ground	DAC analog output stage ground
50	AVCC_R	Power	Power	3.3V DAC analog output stage reference supply for the Right side
51	DVDD	Power	Power	Digital Supply, 1.2V

52	DGND	Ground	Ground	Digital Core Ground
53	DATA8/GPIO8	I/O	HiZ	Serial DATA8, General I/O 8
54	DATA7/GPIO7	I/O	HiZ	Serial DATA7, General I/O 7
55	DATA6/GPIO6	I/O	HiZ	Serial DATA6, General I/O 6
56	DATA5/GPIO5	I/O	HiZ	Serial DATA5, General I/O 5
57	DATA4/GPIO4	I/O	HiZ	Serial DATA4, General I/O 4
58	DATA3	I	HiZ	Serial DATA3 pin
59	DATA2	I	HiZ	Serial DATA2 pin
60	DATA1	I	HiZ	Serial DATA1 pin
61	DATA_CLK	I	HiZ	Serial Data Clock pin
62	AVDD	Power	Power	3.3V I/O Supply
63	AGND	Ground	Ground	DAC analog output stage ground
64	AVCC_L	Power	Power	3.3V DAC analog output stage reference supply for the Left side
65*	Package Pad	AGND	AGND	Must be connected to AGND

* Note: Pin 65 is the package pad and should be connected to AGND, AO = Analog Output, I = Digital Input, I/O = Digital Input/Output, AGND = Analog Ground, DGND = Digital Ground

Ordering Information

Part Number	Description	Package
ES9039MSPRO	SABRE PRO 32-bit 8 Channel Flagship DAC and MQA renderer	10mm x 10mm 64 QFP
ES9039SPRO	SABRE PRO 32-bit 8 Channel Flagship DAC	

Revision History

Current Version 0.3

Rev.	Date	Notes
0.1	Feb 21st,2022	Initial release
0.1.1	April 4, 2022	• Updated ES9039 nomenclature to reflect QFP package • Updated Feature list
0.2.1	May 13, 2022	• Updated Feature list
0.3	June 30th, 2022	• Updated Block diagram • Updated Feature list