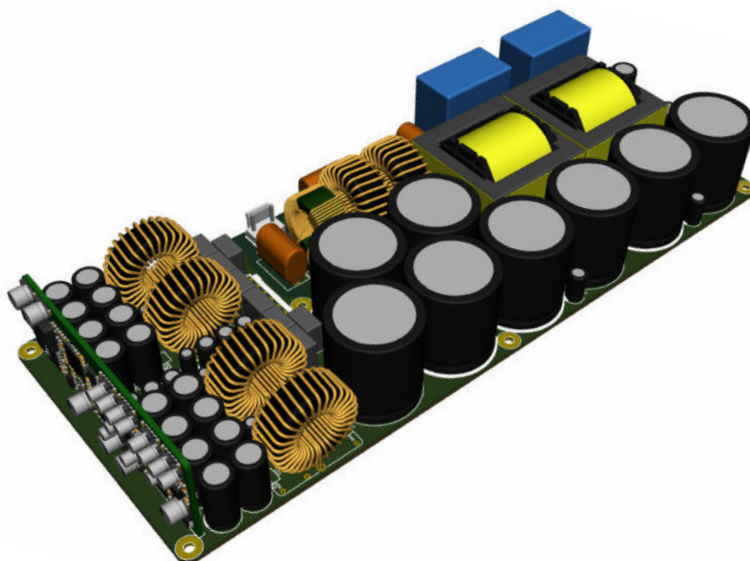


**SMA-2**High Efficiency 4-Channel  
Class-D Amplifier with DSP

DATASHEET



SMA-2 is a four channel amplifier module, providing an OEM solution for multi-way loudspeakers and subwoofers. The highly compact design is capable of delivering up to 3000W on a single 4ohm channel, granting the highest power available for driving all speakers on multi-way systems.

SMA-2 combines a switch mode power supply, two Class-D power amplifiers, a powerful Analog Devices ADAU1462 DSP supported by high performance ESS Technology Analog to Digital and Digital to Analog conversion stages and all the necessary analog circuitry, all on a single, compact PCBA.

The SMA-2 module features APEX's GlidePath direct drive technology. GlidePath is a proprietary Class-D technology where the DSP is an integral part of the amplifier system. Other than one capacitor at the audio input side to protect amplifying DC voltages, the audio signal path traveling through the ADCDSP-DAC-AMPLIFIER is completely DC coupled.

GlidePath direct drive technology delivers major advantages over regular Class-D amplifiers, including significant improvements in cone excursion and transient response. A module equipped with GlidePath will clip later as the peak levels on both sides of the sine wave are close to equal. In addition, GlidePath has more output at the initial impulse (+10%) and the cones swing less after the signal stops, even at 200Hz (-10% excursion). All these improvements are very clearly audible and result in a cleaner, more powerful low end experience compared to traditional Class-D designs.

The output power for each amplifier channel can be assigned through the software, creating numerous possibilities, from high power bridged submodules to 4 x identical power modules or a combination of different power options.

APEX SMA-2 is a turnkey power amplifier module for OEMs which enables a fast time to market. With its very small size of 100x250mm it fits even the smallest cabinets. SMA-2 features up to 8 preset selections and field firmware updates. The highly efficient double power supply (one PSU for 2 channels) with active PFC allows worldwide input voltage range. Custom printing is offered with a scratch-free polycarbonate overlay.

**FEATURES**

- Turnkey solution with integrated DSP
- Up to 3000W on a single 4 ohm channel
- Super compact design
- Built-in active PFC
- Versatile input configuration

### INPUT/INTERFACE PINOUT

Pin	Name	Description
1	AIN1P	Analog input CH1 Hot
2	GND	Ground
3	AIN1N	Analog input CH1 Cold
4	AIN2P	Analog input CH2 Hot
5	GND	Ground
6	AIN2N	Analog input CH2 Cold
7	AIN3P	Analog input CH3 Hot
8	GND	Ground
9	AIN3N	Analog input CH3 Cold
10	AIN4P	Analog input CH4 Hot
11	GND	Ground
12	AIN4N	Analog input CH4 Cold
13	BCLK_EXT2	Bitclock external I2S port 2
14	LRCLK_EXT2	Wordclock external I2S port 2, can alternatively be used as GPIO
15	SDIN_EXT2	Data input external I2S port 2
16	SDOUT_EXT2	Data output external I2S port 2
17	SDOUT_EXT1	Data output external I2S port 1
18	SPDIFIN	SPDIF input
19	BCLK_EXT1	Bitclock external I2S port 1
20	LRCLK_EXT1	Wordclock external I2S port 1, can alternatively be used as GPIO or Analog input (0 - 3.3V)
21	SDIN_EXT1	Data input external I2S port 1
22	GND	Ground
23	ENABLE	Turns on the module from standby. 0V = standBy, 3V3-15V = Module enable
24	SELFBOOT	0= Disabled, floating=Enabled (not allowed to supply voltage to this pin)
25	SS_ADDR0	I2C mode = ADDR0 selection / SPI mode = Chip Select
26	MOSI_ADDR1	I2C mode = ADDR1 selection / SPI mode = MOSI
27	MISO_SDA	I2C mode = SDA / SPI mode = MISO
28	SCLK_SCL	I2C mode = SCL / SPI mode = CLOCK
29	-12V	Switched +12V (Controlled by ENABLE input on pin 23)
30	-12V	Switched +12V (Controlled by ENABLE input on pin 23)
31	GND	Ground
32	GND	Ground
33	+12V	Switched +12V (Controlled by ENABLE input on pin 23)
34	+12V	Switched +12V (Controlled by ENABLE input on pin 23)
35	GND	Ground
36	GND	Ground
37	GND	Ground
38	+15V	+15V StandBy output
39	+15V	+15V StandBy output
40	+15V	+15V StandBy output

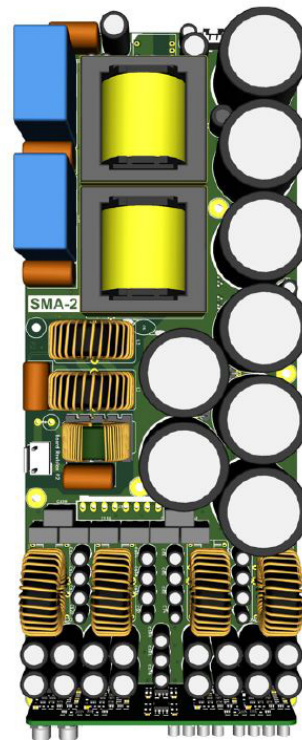
### SPEAKER OUTPUT CONNECTOR J3

Pin	Name	Description
1	CH1OUT-N	CH1 Loudspeaker Output (Cold)
2	CH1OUT-P	CH1 Loudspeaker Output (Hot)
3	CH2OUT-N	CH2 Loudspeaker Output (Cold)
4	CH2OUT-P	CH2 Loudspeaker Output (Hot)
5	CH3OUT-N	CH3 Loudspeaker Output (Cold)
6	CH3OUT-P	CH3 Loudspeaker Output (Hot)
7	CH4OUT-N	CH4 Loudspeaker Output (Cold)
8	CH4OUT-P	CH4 Loudspeaker Output (Cold)



#### Safety Warning:

These units operate directly from the mains and carry hazardous voltages at accessible parts. It is mandatory to make sure none of these parts are exposed to inadvertent touch. Observe extreme care during installation and pay attention to never touch ANY parts of the unit while it is connected to the mains. Wait at least 1 minute after disconnecting the mains cord before touching or handling the unit Connector Pinout.



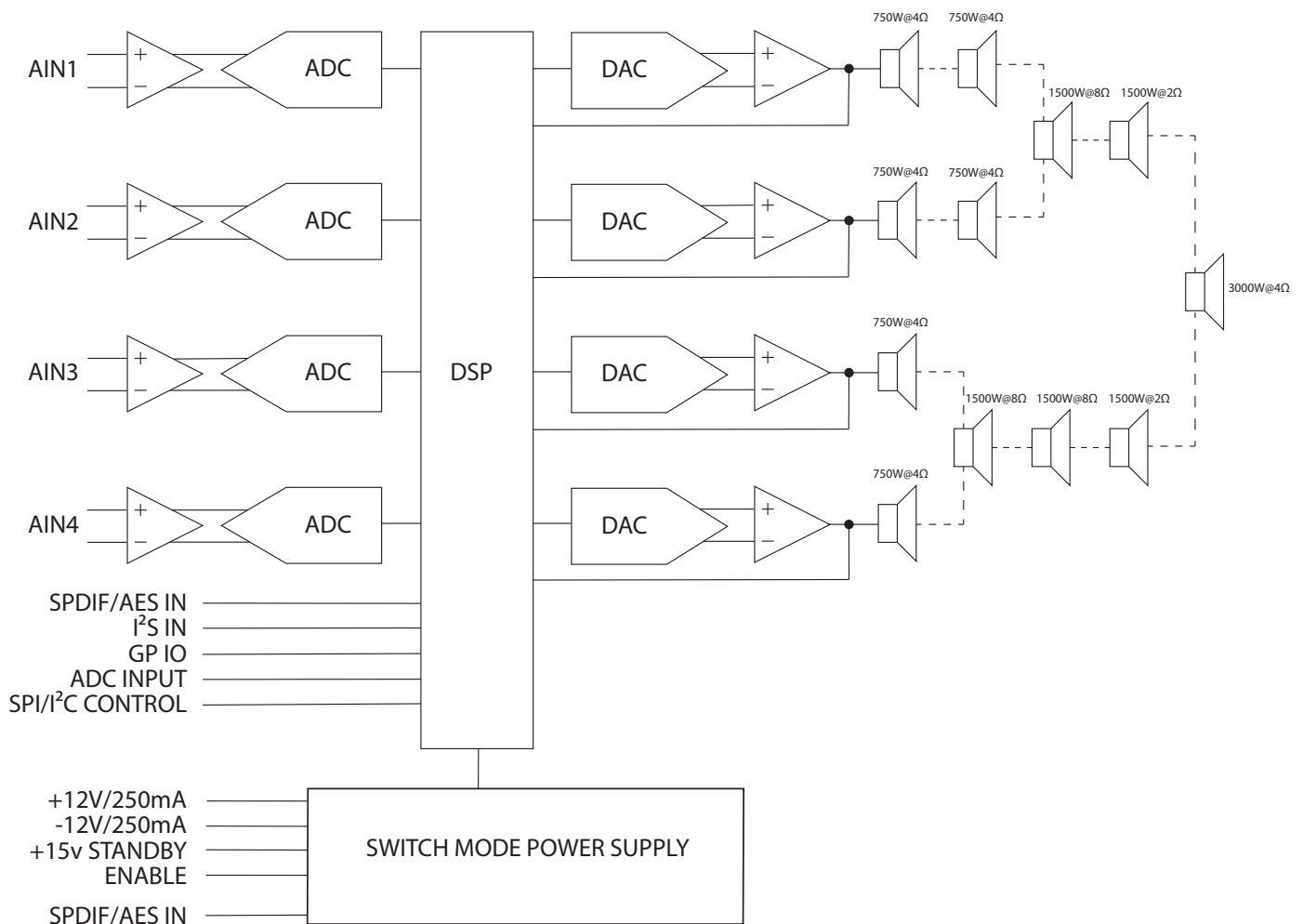
## BLOCK DIAGRAM

The illustration below shows a block diagram of the SMA-2 hardware. The heart of the system is the DSP, which processes the audio signals according to the needs of the user and controls the internal operation of the whole module, ensuring worry-free, reliable use under all conditions.

The module has four balanced analog line inputs, plus one digital SPDIF/AES and I2S input and output, all of which can be processed simultaneously by the DSP.

Lines to enable external control of the module are also provided. There are general purpose I/O lines which can be used to connect external switches or LED indicators, ADC inputs for applications such as the connection of an external volume control potentiometer, and a user selectable SPI/I2C serial interface to enable external communication in more advanced user applications.

The SMA-2 also accommodates auxiliary standby power for powering optional user applications (+/- 15V). Four Digital to Analog converters are used to drive their corresponding Class-D amplifiers. Output current for all channels is sensed and fed back into the DSP, which uses this internally for protection purposes to ensure maximum reliability.



Specification	Value		Notes
<b>GENERAL</b>			
Operating temperature range	0 to +50°C		Full load over entire voltage range
Isolation	3000 VAC		Class I construction
Max. operational altitude	< 2000m		
Max. StandBy power	< 500mW		Module in StandBy mode; User application < 10mW
Max. active idle power	< 20W		Amplifier active; Channels not driven
<b>MAINS INPUT</b>			
Input voltage range	100 - 240 VAC		
Input frequency	50 - 60Hz		
Input current	< 12A @ 230 VAC		
Inrush current	< 80A		Over entire voltage range
Input protection	Internal T6.3AH/250VAC fuse		
<b>ANALOG AUDIO INPUT</b>			
Input impedance	20k		
Max. full scale input voltage	21dBu		
<b>DIGITAL AUDIO INPUT</b>			
Digital I/O voltage levels	3.3V		
Max. sample rate	192 kHz		
<b>AUDIO OUTPUT CHANNELS: 1kHz, 1% THD</b>			
4x SE	750W @4ohm*		
2x PTL	1500W @2ohm*		
2x BTL	1500W @4ohm*		
1x PBTL	3000W @4ohm*		
1x PTL + 2x SE	1500W @2ohm + 2 x 750W @4ohm*		
1x BTL + 2x SE	1500W @4/8ohm + 2 x 750W @4ohm*		
	SE	BTL	PTL PBTL
Maximum output voltage (typ.)	90V <sub>peak</sub>	180V <sub>peak</sub>	90V <sub>peak</sub> 180V <sub>peak</sub>
Maximum output current (typ.)	30A <sub>peak</sub>	30A <sub>peak</sub>	60A <sub>peak</sub> 60A <sub>peak</sub>
Max. THD+N	0.01%		20Hz - 20kHz; Pout < Pr/2
Typ. CMRR	70dB		
Max. output noise	70uV		20Hz - 20kHz
Min. SN Ratio	100dB		
Frequency response	20Hz - 20kHz		
<b>AUXILIARY OUTPUT VOLTAGES</b>			
Typ. auxiliary output voltage 1	12V +/- 1V		Disabled in StandBy
Typ. auxiliary output voltage 2	12V +/- 1V		Disabled in StandBy
Typ. auxiliary output current	250mA		Disabled in StandBy
<b>CONSTRUCTION</b>			
Dimensions	110 x 290 x 43 mm		4.33" x 11.42" x 1.69"
Weight	1500 g		53 oz

\* Total output power can not exceed 1500W for SMA2-1,5kW