
2x20W Stereo / 1x40W Mono Digital Audio Amplifier With 30 bands EQ and DRC Functions

Features

- Supply voltage
3.3V for digital circuit
8V~26V for loudspeaker driver
- Supports 2.0CH/Mono configuration
- Loudspeaker output power@12V for stereo
7W x 2CH into 8Ω <1% THD+N
10W x 2CH into 4Ω <1% THD+N
- Loudspeaker output power@18V for stereo
15W x 2CH into 8Ω <1% THD+N
- Loudspeaker output power@24V for stereo
20W x 2CH into 8Ω <1% THD+N
- 16/18/20/24-bits input with I²S, Left-alignment and Right-alignment data format
- Multiple sampling frequencies (Fs)
32kHz / 44.1kHz / 48kHz and
64kHz / 88.2kHz / 96kHz and
128kHz / 176.4kHz / 192kHz
- System clock = 64x, 128x, 192x, 256x, 384x, 512x, 576x, 768x, 1024x Fs
MCLK system:
64x~1024x Fs for 32kHz / 44.1kHz / 48kHz
64x~512x Fs for 64kHz / 88.2kHz / 96kHz
64x~256x Fs for 128kHz / 176.4kHz / 192kHz
BCLK system:
64x Fs for 32kHz / 44.1kHz / 48kHz
64x Fs for 64kHz / 88.2kHz / 96kHz
64x Fs for 128kHz / 176.4kHz / 192kHz
- Sound processing including :
30 bands parametric speaker EQ
Volume control (+24dB~-103dB, 0.125dB/step)
Dynamic range control
Three Band plus post Dynamic range control
Power Clipping
Programmed 3D surround sound
Channel mixing
Noise gate with hysteresis window
Bass/Treble tone control
DC-blocking high-pass filter
Pre-scale/post-scale

- Supports I²C control without clock
- I²C control interface with selectable device address
- I²S output with selectable Audio DSP point
- Support hardware and software reset
- Internal PLL
- Anti-pop design
- Level meter and power meter
- LV Under-voltage shutdown and HV Under-voltage detection
- Over voltage protection
- Short circuit and over-temperature protection

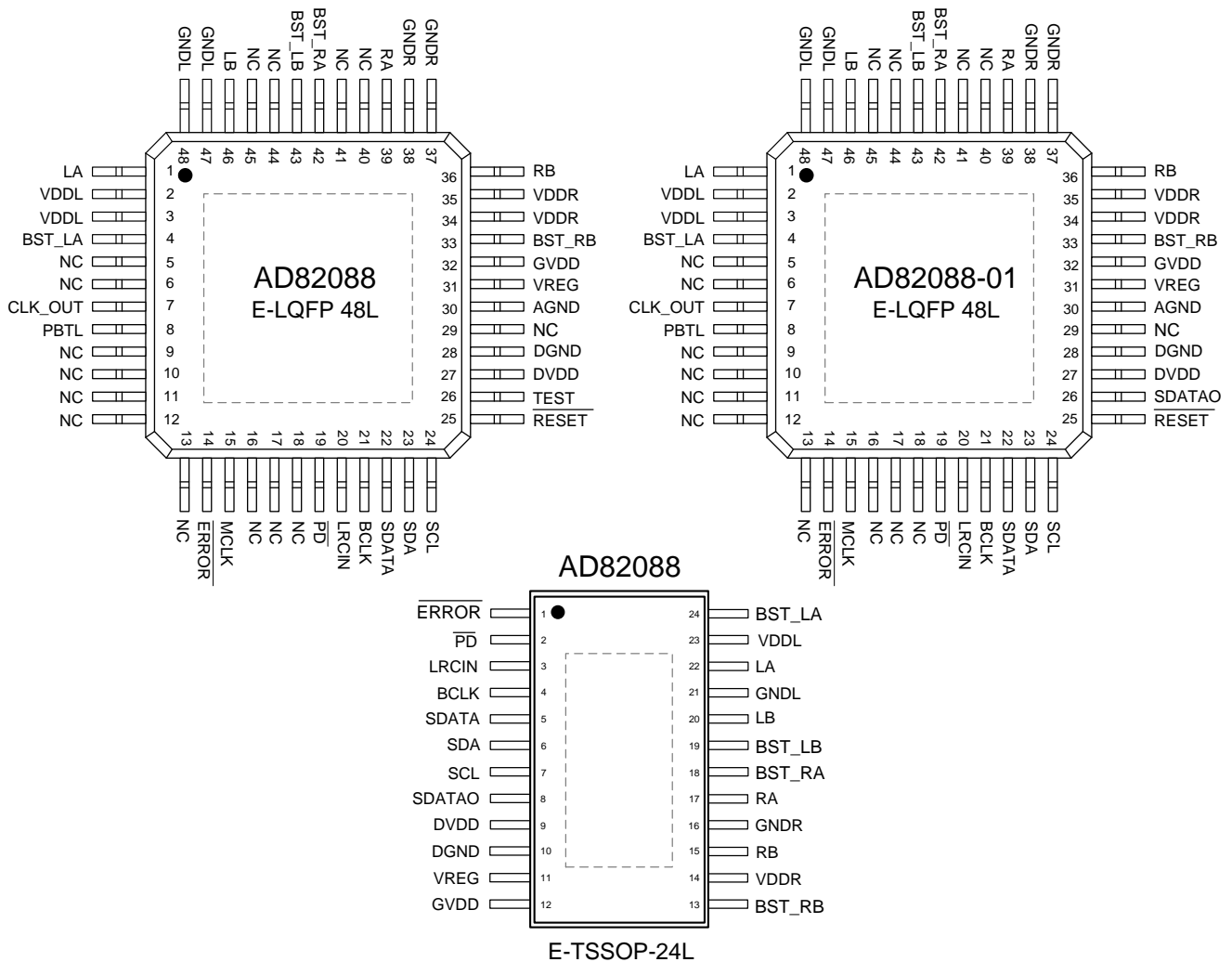
Applications

- TV audio

Description

AD82088 is a digital audio amplifier capable of driving 20W (BTL) each to a pair of 8Ω load speaker and 40W (PBTL) to a 4Ω load speaker operating at 24V supply without external heat-sink or fan requirement with play music. AD82088 provides advanced audio processing functions, such as volume control, 30 EQ bands, audio mixing, 3D surround sound and Dynamic Range Control (DRC). These are fully programmable via a simple I²C control interface. Robust protection circuits are provided to protect AD82088 from damage due to accidental erroneous operating condition. The full digital circuit design of AD82088 is more tolerant to noise and PVT (Process, Voltage, and Temperature) variation than the analog class-AB or class-D audio amplifier counterpart implemented by analog circuit design. AD82088 is pop free during instantaneous power on/off or mute/shut down switching because of its robust built-in anti-pop circuit.

Pin Assignment



Pin Description (E-LQFP 48L)

PIN	NAME	TYPE	DESCRIPTION	CHARACTERISTICS
1	LA	O	Left channel output A.	
2	VDDL	P	Left channel supply.	
3	VDDL	P	Left channel supply.	
4	BST_LA	P	Bootstrap supply for left channel output A.	
5	NC		Not connected.	
6	NC		Not connected.	
7	CLK_OUT	I/O	PLL ratio setting pin during power up, this pin is monitored on the rising edge of reset. PMF register will be default set at 1 or 16 times PLL ratio.	TTL output buffer, internal pull Low with a 100Kohm resistor.

			High: PMF [3:0] = [0000], 1 time of PLL ratio to avoid system BCLK over flow. Low: PMF [3:0] = [0001], 16 times of PLL ratio. This pin could be clock output pin also during normal operating if EN_CLK_OUT register bit is enabled.	
8	PBTL	I	Stereo/Mono configuration pin. (Low: Stereo ; High: Mono)	TTL output buffer, internal pull Low with a 100Kohm resistor.
9	NC		Not connected.	
10	NC		Not connected.	
11	NC		Not connected.	
12	NC		Not connected.	
13	NC		Not connected.	
14	$\overline{\text{ERROR}}$	I/O	$\overline{\text{ERROR}}$ pin is a dual function pin. One is I ² C address setting during power up. The other one is error status report (low active), It sets by register of A_SEL_FAULT at address 0x1C B[6] to enable it.	This pin is monitored on the rising edge of reset. A value of Low (15-k Ω pull down) sets the I ² C device address to 0x30 and a value of High (15-k Ω pull up) sets it to 0x31.
15	MCLK	I	Master clock input.	Schmitt trigger TTL input buffer, internal pull Low with a 100Kohm resistor.
16	NC		Not connected.	
17	NC		Not connected.	
18	NC		Not connected.	
19	$\overline{\text{PD}}$	I	Power down, low active.	Schmitt trigger TTL input buffer, internal pull High with a 330Kohm resistor.
20	LRCIN	I	Left/Right clock input (Fs).	Schmitt trigger TTL input buffer, internal pull Low with a 100Kohm resistor.
21	BCLK	I	Bit clock input (64Fs).	Schmitt trigger TTL input buffer, internal pull Low with a 100Kohm resistor.
22	SDATA	I	Serial audio data input.	Schmitt trigger TTL input buffer
23	SDA	I/O	I ² C bi-directional serial data.	Schmitt trigger TTL input buffer
24	SCL	I	I ² C serial clock input.	Schmitt trigger TTL input buffer

25	$\overline{\text{RESET}}$	I	Reset, low active.	Schmitt trigger TTL input buffer, internal pull High with a 330Kohm resistor.
26	TEST	I	This pin must connect to GND.	
27	DVDD	P	Digital Power.	
28	DGND	P	Digital Ground.	
29	NC		Not connected.	
30	AGND	P	Analog Ground.	
31	VREG	O	1.8V Regulator voltage output.	
32	GVDD	O	5V Regulator voltage output. This pin must not be used to drive external devices.	
33	BST_RB	P	Bootstrap supply for right channel output B.	
34	VDDR	P	Right channel supply.	
35	VDDR	P	Right channel supply.	
36	RB	O	Right channel output B.	
37	GNDR	P	Right channel ground.	
38	GNDR	P	Right channel ground.	
39	RA	O	Right channel output A.	
40	NC		Not connected.	
41	NC		Not connected.	
42	BST_RA	P	Bootstrap supply for right channel output A.	
43	BST_LB	P	Bootstrap supply for left channel output B.	
44	NC		Not connected.	
45	NC		Not connected.	
46	LB	O	Left channel output B.	
47	GNDL	P	Left channel ground.	
48	GNDL	P	Left channel ground.	

Pin Description (01-E-LQFP 48L)

PIN	NAME	TYPE	DESCRIPTION	CHARACTERISTICS
1	LA	O	Left channel output A.	
2	VDDL	P	Left channel supply.	
3	VDDL	P	Left channel supply.	
4	BST_LA	P	Bootstrap supply for left channel output A.	
5	NC		Not connected.	
6	NC		Not connected.	

7	CLK_OUT	I/O	<p>PLL ratio setting pin during power up, this pin is monitored on the rising edge of reset. PMF register will be default set at 1 or 16 times PLL ratio.</p> <p>High: PMF [3:0] = [0000], 1 time of PLL ratio to avoid system BCLK over flow.</p> <p>Low: PMF [3:0] = [0001], 16 times of PLL ratio.</p> <p>This pin could be clock output pin also during normal operating if EN_CLK_OUT register bit is enabled.</p>	TTL output buffer, internal pull Low with a 100Kohm resistor.
8	PBTL	I	<p>Stereo/Mono configuration pin. (Low: Stereo ; High: Mono)</p>	TTL output buffer, internal pull Low with a 100Kohm resistor.
9	NC		Not connected.	
10	NC		Not connected.	
11	NC		Not connected.	
12	NC		Not connected.	
13	NC		Not connected.	
14	$\overline{\text{ERROR}}$	I/O	<p>$\overline{\text{ERROR}}$ pin is a dual function pin. One is I^2C address setting during power up. The other one is error status report (low active), It sets by register of A_SEL_FAULT at address 0x1C B[6] to enable it.</p>	This pin is monitored on the rising edge of reset. A value of Low (15-k Ω pull down) sets the I^2C device address to 0x30 and a value of High (15-k Ω pull up) sets it to 0x31.
15	MCLK	I	Master clock input.	Schmitt trigger TTL input buffer, internal pull Low with a 100Kohm resistor.
16	NC		Not connected.	
17	NC		Not connected.	
18	NC		Not connected.	
19	$\overline{\text{PD}}$	I	Power down, low active.	Schmitt trigger TTL input buffer, internal pull High with a 330Kohm resistor.
20	LRCIN	I	Left/Right clock input (Fs).	Schmitt trigger TTL input buffer, internal pull Low with a 100Kohm resistor.
21	BCLK	I	Bit clock input (64Fs).	Schmitt trigger TTL input buffer, internal pull Low with a 100Kohm

				resistor.
22	SDATA	I	Serial audio data input.	Schmitt trigger TTL input buffer
23	SDA	I/O	I ² C bi-directional serial data.	Schmitt trigger TTL input buffer
24	SCL	I	I ² C serial clock input.	Schmitt trigger TTL input buffer
25	$\overline{\text{RESET}}$	I	Reset, low active.	Schmitt trigger TTL input buffer, internal pull High with a 330Kohm resistor.
26	SDATAO	O	Serial audio data output.	Schmitt trigger TTL input buffer
27	DVDD	P	Digital Power.	
28	DGND	P	Digital Ground.	
29	NC		Not connected.	
30	AGND	P	Analog Ground.	
31	VREG	O	1.8V Regulator voltage output.	
32	GVDD	O	5V Regulator voltage output. This pin must not be used to drive external devices.	
33	BST_RB	P	Bootstrap supply for right channel output B.	
34	VDDR	P	Right channel supply.	
35	VDDR	P	Right channel supply.	
36	RB	O	Right channel output B.	
37	GNDR	P	Right channel ground.	
38	GNDR	P	Right channel ground.	
39	RA	O	Right channel output A.	
40	NC		Not connected.	
41	NC		Not connected.	
42	BST_RA	P	Bootstrap supply for right channel output A.	
43	BST_LB	P	Bootstrap supply for left channel output B.	
44	NC		Not connected.	
45	NC		Not connected.	
46	LB	O	Left channel output B.	
47	GNDL	P	Left channel ground.	
48	GNDL	P	Left channel ground.	

Pin Description (E-TSSOP 24L)

PIN	NAME	TYPE	DESCRIPTION	CHARACTERISTICS
1	$\overline{\text{ERROR}}$	I/O	$\overline{\text{ERROR}}$ pin is a dual function pin. One is I ² C address setting during power up. The other one is error status report (low active), It sets by register of A_SEL_FAULT at address 0x1C B[6] to enable it.	This pin is monitored on the rising edge of reset. A value of Low (15-kΩ pull down) sets the I ² C device address to 0x30 and a value of High (15-kΩ pull up) sets it to 0x31.
2	$\overline{\text{PD}}$	I	Power down, low active.	Schmitt trigger TTL input buffer, internal pull High with a 330Kohm resistor.
3	LRCIN	I	Left/Right clock input (Fs).	Schmitt trigger TTL input buffer, internal pull Low with a 100Kohm resistor.
4	BCLK	I	Bit clock input (64Fs).	Schmitt trigger TTL input buffer, internal pull Low with a 100Kohm resistor.
5	SDATA	I	Serial audio data input.	Schmitt trigger TTL input buffer
6	SDA	I/O	I ² C bi-directional serial data.	Schmitt trigger TTL input buffer
7	SCL	I	I ² C serial clock input.	Schmitt trigger TTL input buffer
8	SDATAO	O	Serial audio data output.	Schmitt trigger TTL input buffer
9	DVDD	P	Digital Power.	
10	DGND	P	Digital Ground.	
11	VREG	O	1.8V Regulator voltage output.	
12	GVDD	O	5V Regulator voltage output. This pin must not be used to drive external devices.	
13	BST_RB	P	Bootstrap supply for right channel output B.	
14	VDDR	P	Right channel supply.	
15	RB	O	Right channel output B.	
16	GNDR	P	Right channel ground.	
17	RA	O	Right channel output A.	
18	BST_RA	P	Bootstrap supply for right channel output A.	
19	BST_LB	P	Bootstrap supply for left channel output B.	
20	LB	O	Left channel output B.	
21	GNDL	P	Left channel ground.	
22	LA	O	Left channel output A.	
23	VDDL	P	Left channel supply.	
24	BST_LA	P	Bootstrap supply for left channel output A.	