
USB Audio Controller & Line-in Interface With Class-D Power Amplifier and Headphone Driver

Features

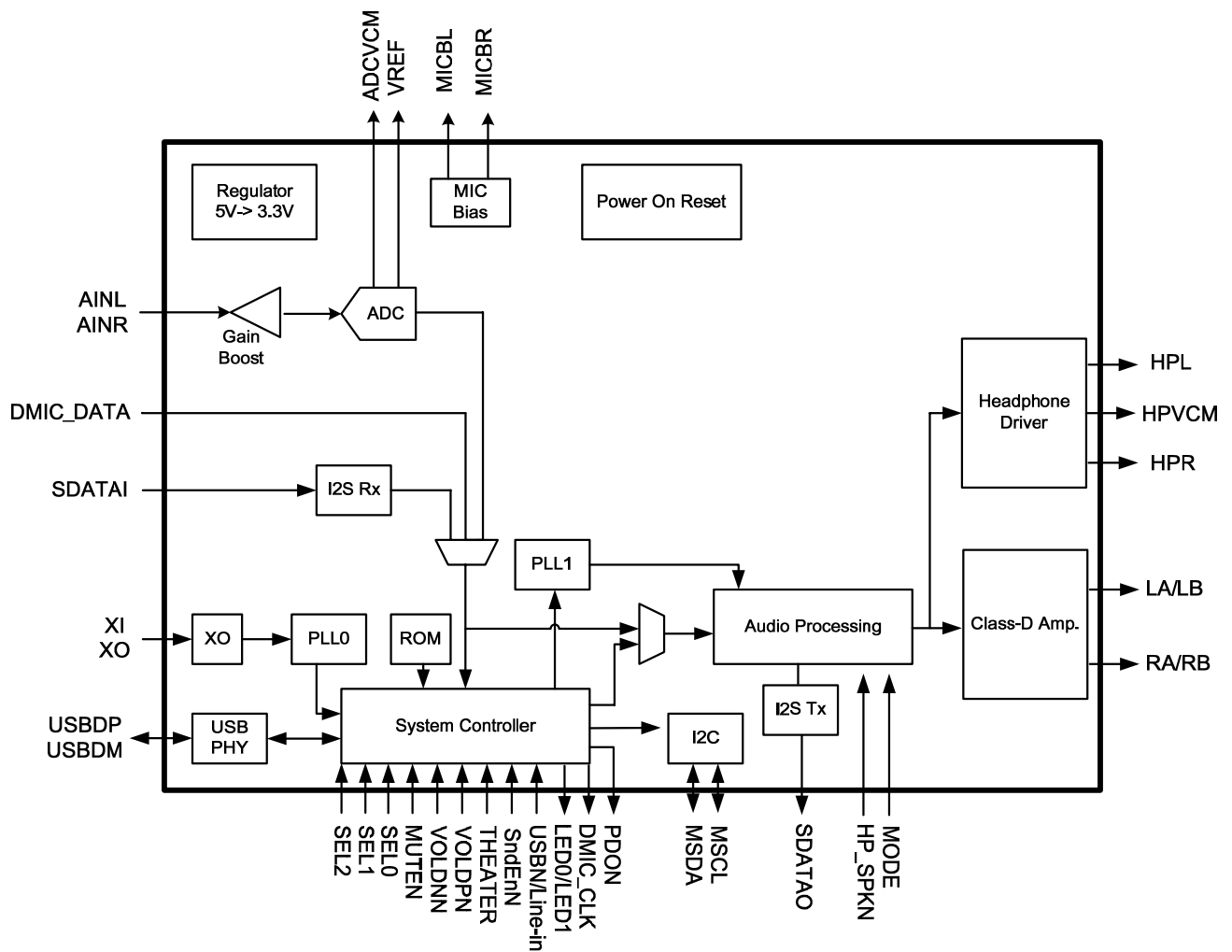
- Compliant with USB Specification v1.1, and USB 2.0 full speed
- Compliant with USB 3.0 super speed operation
- Embedded high efficiency, high performance class-D stereo amplifier
- Embedded headphone driver
- Loudspeaker PSNR & DR (A-weighting, I²S input)
88dB (PSNR), 91dB (DR) with bead filter@8ohm
- Headphone PSNR & DR (A-weighting, I²S input)
91dB (PSNR), 91dB (DR) with @32ohm
- Embedded stereo ADC with microphone boost
- Embedded Power-On-Reset circuit
- Support I²S input (master and slave mode) and I²S output interface (master mode)
- +6dB gain enhancement (Theater function)
- Support sampling frequency 44.1/48KHz for playback and recording
- Pin to set recording source from internal ADC or external ADC
- Pin to set speaker or headphone mode
- Support microphone and line-in function switching
- Support volume/mute control with external button
- LED indicator function for playback, mute and recording mute
- Support 3D surround sound
- Support microphone bias
- Support digital microphone interface for recording
- Power Clipping function for speaker protection
- External EEPROM interface for vendor specific and hardware configuration via I²C
- I²S input port allows AD62553 to receive ESMT's high performance ADC (i.e. AD12250)
- I²S output port allows AD62553 to control ESMT's high performance audio devices (i.e. AD82586/AD83586/AD82581)
- PWM output port to drive ESMT's high performance PWM class-D audio device (i.e. AD9258)

- Loudspeaker output power with external power
2.1W x2CH into 4Ω@10% THD+N
1.4W x2CH into 8Ω@10% THD+N
- Efficiency with bead filter
75% for 8Ω load @ Po = 1.4W x 2CH
70% for 4Ω load @ Po = 2.1W x 2CH
- Built-in 5V to 3.3V regulator for internal device operation
- Anti-pop design
- Over-temperature protection
- Under-voltage shutdown
- Short-circuit detection
- Single 12 MHz crystal input
- 3.3V operation with 5V tolerate I/O
- Supports Windows Me/2000/XP/Vista/7, Linux and Mac OS
- Integration circuit quality meet Win7 and Win8 *Hardware Logo* requirement
- 64-pin LQFP (7mmx7mm) package

Description

AD62553 is a highly integrated USB single chip for Stereo/Mono speaker or headphone. Many useful features are programmable with pins or I²C control. When using the power supplied from the USB port (USB 3.0), AD62553 can drive a pair of up to 2.1W into 4ohm speakers due to the built-in, high efficiency and high performance class-D amplifiers. The device also has an I²S input port and I²S output port interface. The I²S input port allows other external audio sources to use the class-D amplifier to share the speakers. The I²S output port allows other high performance or high output power audio device requirement (i.e. AD82586/AD83586/AD82587).

Functional Block Diagram



Order Informaton

Product ID	Package	Packing / MPQ	Comments
AD62553-LH64NAY	LQFP-64L (7x7 mm)	2.5K Units / Small Box (250 Units / Tray, 10 Trays / Small Box)	Green

Available Package

Package Type	Device No.	θ_{ja} (°C/W)	Ψ_{jt} (°C/W)	θ_{jt} (°C/W)	Exposed Thermal Pad
LQFP-64L	AD62553	27.4	1.33	6.0	Yes (Note1)

Note 1.1: The thermal pad is located at the bottom of the package. To optimize thermal performance, soldering the thermal pad to the PCB's ground plane is suggested.

Note 1.2: θ_{ja} is measured on a room temperature ($T_A=25^\circ\text{C}$), natural convection environment test board, which is constructed with a thermally efficient, 4-layers PCB (2S2P). The measurement is tested using the JEDEC51-5 thermal measurement standard.

Note 1.3: θ_{jt} represents the heat resistance for the heat flow between the chip and the package's top surface.

Note 1.4: Ψ_{jt} represents the heat resistance for the heat flow between the chip and the package's top surface center.

Marking Information

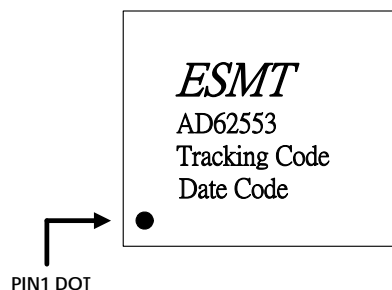
AD62553

Line 1 : LOGO

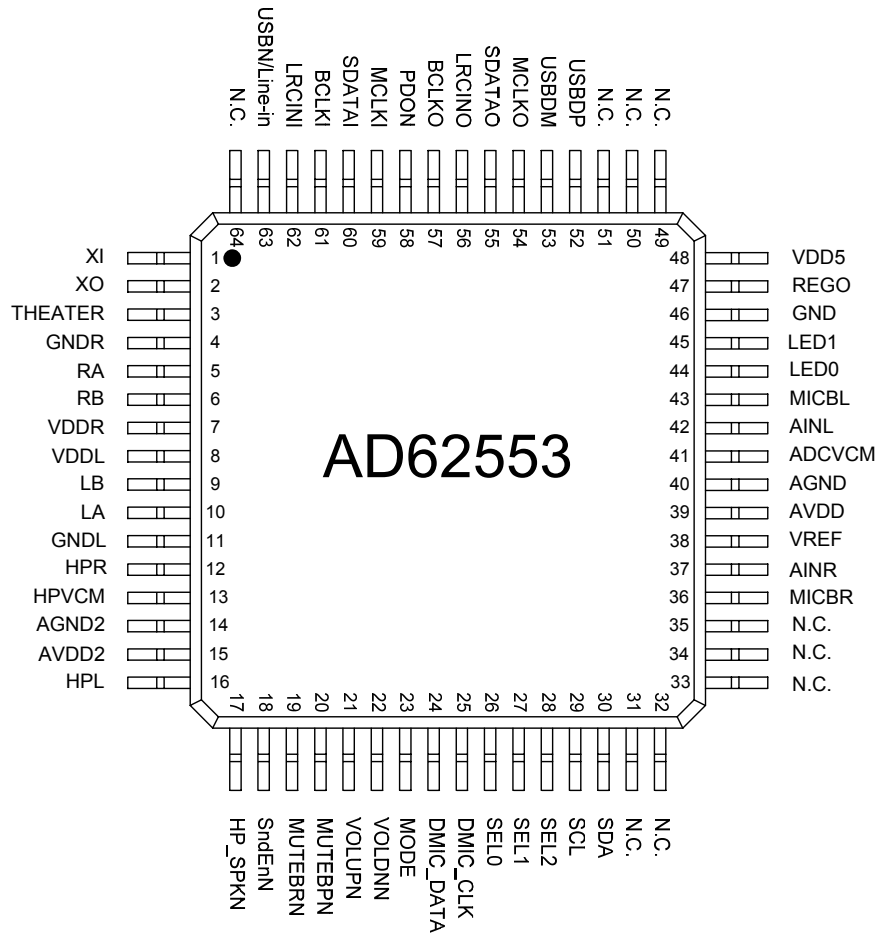
Line 2 : Product no.

Line 3 : Tracking Code

Line 4 : Date Code



Pin Assignment



Pin Description

Pin	Name	Type	Description	Characteristics
1	XI	I	Crystal input	With internal 1Mohm resistor connected to the pin of XO
2	XO	O	Crystal output	
3	THEATER	I	Theater mode, high active	5V tolerant Schmitt trigger TTL input buffer
4	GNDR	P	Ground for right channel	
5	RA	O	Right channel output+	
6	RB	O	Right channel output-	
7	VDDR	P	Supply for right channel	
8	VDDL	P	Supply for left channel	
9	LB	O	Left channel output-	
10	LA	O	Left channel output+	
11	GNDL	P	Ground for left channel	

12	HPR	O	Headphone right channel output	
13	HPVCM	O	Headphone common-mode voltage decoupling pin	
14	AGND2	P	Headphone ground	
15	AVDD2	O	Headphone 5V supply	
16	HPL	O	Headphone left channel output	
17	HP_SPKN	I	0: Speaker mode + I2S output mode 1: Headphone mode	3.3V tolerant Schmitt trigger TTL input buffer
18	SndEnN	I	Surround enable, low active	With internal 100kohm pull-up resistor
19	MUTEBRN	I	Recording mute, low active	With internal 100kohm pull-up resistor
20	MUTEBPN	I	Power-down and mute of Class D, low active	With internal 100kohm pull-up resistor
21	VOLUPN	I	Volume up, low active	With internal 100kohm pull-up resistor
22	VOLDNN	I	Volume down, low active	With internal 100kohm pull-up resistor
23	MODE	I	0 : Output depend HP_SPKN setting 1: Both of speaker & headphone output simultaneously	With internal 100kohm pull-up resistor
24	DMIC_DATA	I	Data input to AD3150	3.3V tolerant Schmitt trigger TTL input buffer
25	DMIC_CLK	O	Clock output to AD3150	
26	SEL0	I	0:AD82581 1:AD82586/AD83586	
27	SEL1	I	0: internal ADC 1: external ADC	
28	SEL2	I	SEL1 : 0 → 1 : ADC as Microphone; 0: ADC as Line-in SEL1 : 1 → 1 : Use DMIC ; 0: Use AD12250	
29	SCL	I/O	I ² C's SCL, with a 4.7kohm pull high (this pin floating is prohibited)	
30	SDA	I/O	I ² C's SDA, with a 4.7kohm pull high (this pin floating is prohibited)	
31	N.C.		Not connected	
32	N.C.		Not connected	
33	N.C.		Not connected	
34	N.C.		Not connected	

35	N.C.		Not connected	
36	MICBR	O	Microphone right channel voltage supply (3mA)	
37	AINR	I	Analog signal right channel	
38	VREF	O	Reference voltage	
39	AVDD	P	ADC's 3.3V supply	
40	AGND	P	ADC's Ground	
41	ADCVCM	O	ADC common mode voltage decoupling pin	
42	AINL	I	Analog signal left channel	
43	MICBL	O	Microphone Left channel voltage supply (3mA)	
44	LED0	O	LED indicator for playback	
45	LED1	O	LED indicator for recording	
46	GND	P	Ground	
47	REGO	P	Regulator output	
48	VDD5	P	5V supply voltage	
49	N.C.		Not connected	
50	N.C.		Not connected	
51	N.C.		Not connected	
52	USBDP	I/O	USB data D+	With internal 1.5kohm pull-up resistor
53	USBDM	I/O	USB data D-	
54	MCLKO	O	AD8XXX series Master clock(256xFs)	
55	SDATAO	O	AD8XXX series Serial audio output	
56	LRCINO	O	AD8XXX series L/R clock output	
57	BCLKO	O	AD8XXX series BCLK output	
58	PDON	O	Power-down output indicator pin $\overline{\text{USBLineIn}} = 0$; $\overline{\text{PDO}} = \text{Low}$ during USB device unconfiguration $\overline{\text{PDO}} = \text{High}$ during USB device configuration $\overline{\text{USBLineIn}} = 1$; $\overline{\text{PDO}} = \text{Low}$ during D+/D- at reset state (USBDP=0, USBDM=0)	

			PDO = High during D+/D- at non-reset state	
59	MCLKI	I/O	ADC I2S Master clock (256xFs) input port	
60	SDATAI	I	Serial audio data input	3.3V tolerant Schmitt trigger TTL input buffer
61	BCLKI	I/O	ADC I2S BCLK inout port	
62	LRCINI	I/O	ADC I2S L/R clock inout port	
63	USBN/Line-in	I	Output source select pin; 0: USB mode 1: Line-in mode	3.3V tolerant Schmitt trigger TTL input buffer
64	N.C.		Not connected	