# DATA SHEET

## SN11121ASF

## USB AUDIO Controller

***Revision 0.3***

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# I. Description

**SONiX** SN11121ASF is an USB audio controller. It supports total 3 sampling rates including 32KHz, 44.1KHz and 48KHz in digital/analog playback.

In digital playback mode, it receives audio stream from PC via USB interface and transmits audio data according to the AES/EBU, IEC60958, S/PDIF consumer interface standards. In analog playback mode, it supports 2 channels Codec for analog playback.

Totally one control pipe, one isochronous pipe, and one interrupt pipe are supported by SN11121ASF.

# II. Features

- Supports AES/EBU, IEC60958, S/PDIF consumer formats for stereo PCM audio
- 32KHz, 44.1KHz and 48KHz sampling rates for 2 channels playback in digital/analog mode
- Conveys AC-3 data stream by S/PDIF output
- Compatible with Win98 SE/ WinME/ Win2000/ WinXP and MacOS 9.2.1/MacOS10.2 without additional driver
- Plug-and-Play operation with Microsoft OS or MacOS default drivers
- Compliant with USB specification v1.1
- Compliant with USB audio device class specification v1.0
- Supports USB full speed 12Mbits/s serial data transmission
- USB bus power or self power option
- Supports suspend/resume and remote wake-up
- 6MHz crystal input with on-chip PLL and embedded transceiver for USB
- On-chip PLL for synchronized with USB host for CODEC interface
- USB audio function topology has one input terminal, two output terminals, and one feature unit
- Alternate setting0 is a zero-bandwidth setting; used to release the claimed bandwidth on the bus when this device is inactive

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- Isochronous transfer uses adaptive, synchronous and asynchronous synchronization
- Supports AC'97 component specification v2.1 and v2.2; AC link interface for external AC97 audio Codec
- Supports 2ch Codec with I2S, Left-justified serial interface format
- Embedded Digital Volume Control of Line out for I2S interface mode
- Compliant with USB HID class specification v1.1; pin control for volume up / down, play mute
- Supports two wire series bus interface; slave only interface with transfer speed up to 400Kbps(Fast-mode)
- EEPROM interface for customized USB IDs and strings; Codec registers programming
- 3.3 V core operation and 5 V tolerant I/O
- Available in 48-pin LQFP(7x7 mm)
- System on chip solution: low cost and easy implementation without external memory
- LED indicator pins for playback and recording mute
- 4 GPIO pins controlled via USB HID
- Features programmable by jumper pins and EEPROM values

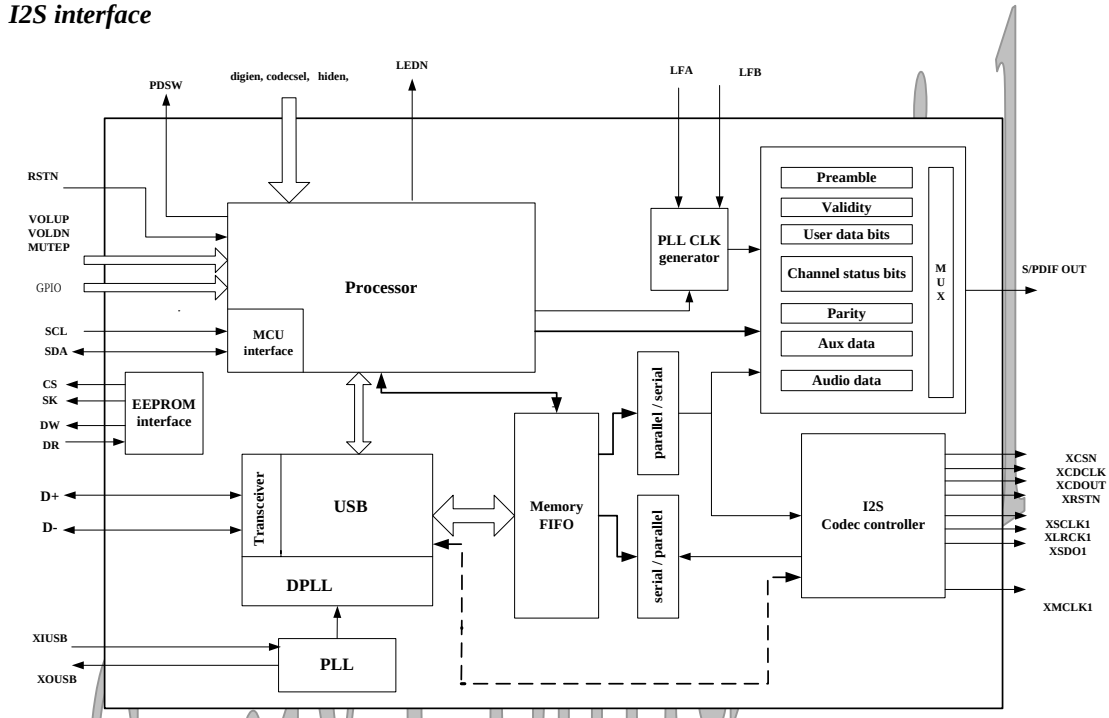
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## III. Ordering information

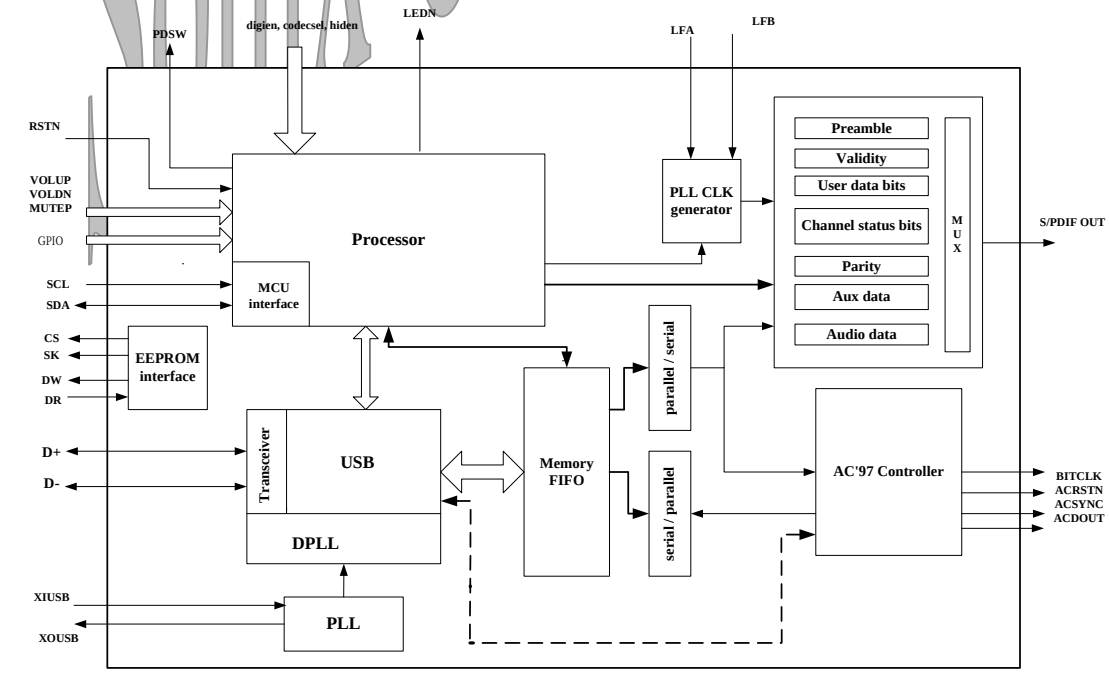
SN11121ASF : 48-pin LQFP (7x7x1.4 mm)

# IV. Block diagram

***I2S interface***

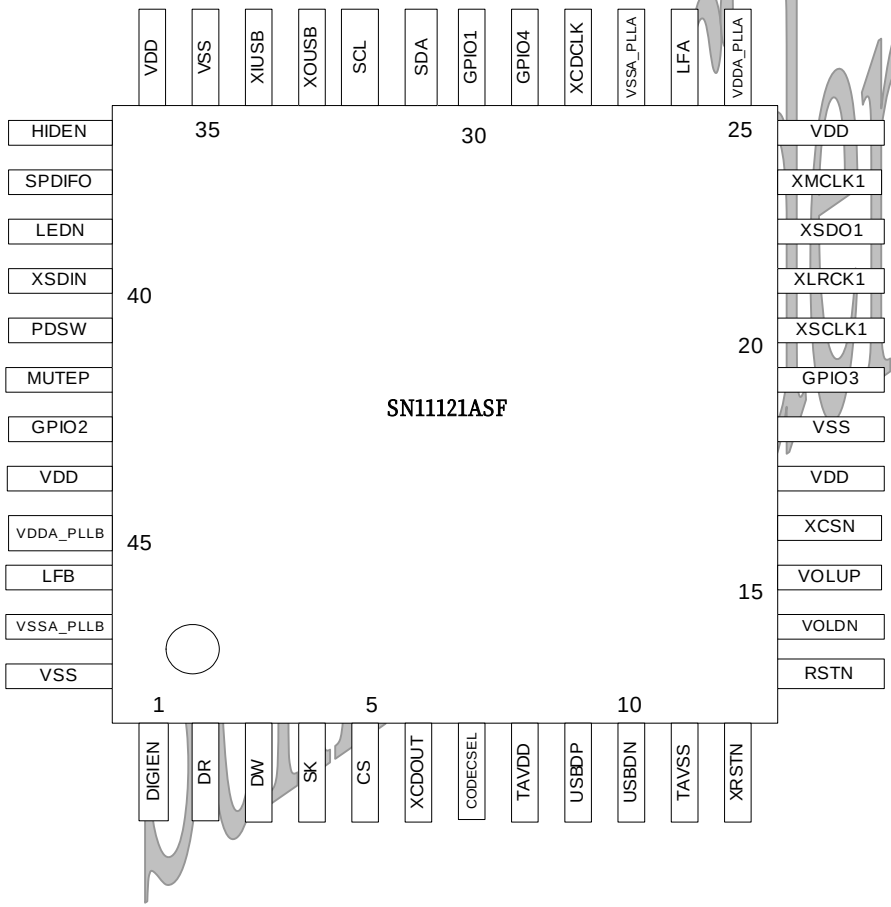



***AC'97 interface***



# V. Pin description

## 5.1 SN11121ASF pin chart (48-pin LQFP)




## 5.2 pin assignment and description (48-pin LQFP)

| Pin No. | Pad Name | Pin Type | Description |
|---|---|---|---|
| 1 | DIGIEN | I, ST | Enable SPDIF In/Out<br>1: enable ; 0: disable (analog only) |
| 2 | DR(EEPROM_ DO) | I, ST | EEPROM data input (Fixing this pin to H or L sets USB vendor ID to SONiX USB vendor ID (hex 0C45); PU or PD is used for different product ID |

| | | | |
|---|---|---|---|
| 3 | DW(EEPROM_ DI) | O, 4mA, SR | EEPROM data output |
| 4 | SK(EEPROM_ SK) | O, 4mA, SR | EEPROM clock pin |
| 5 | CS(EEPROM_ CS) | O, 4mA, SR | EEPROM chip select |
| 6 | XCDOUT(SPI_DIN ) | O, 4mA, SR | SPI Codec control data |
| 7 | CODECSEL | I, ST | Codec interface selection, 0: AC-link; 1: I2S |
| 8 | TAVDD/ AVDD | P | Power pin for USB transceiver |
| 9 | USBDP | I/O | USB data plus |
| 10 | USBDN | I/O | USB data minus |
| 11 | TAVSS /AVSS | P | GND pin for USB transceiver |
| 12 | XRSTN | O, 4mA, SR | Codec reset |
| 13 | RSTN | I, ST, PU | System reset pin, pull high to reset |
| 14 | VOLDN | I, ST | Volume down control, edge trigger with 64ms de-bouncing circuit |
| 15 | VOLUP | I, ST | Volume up control, edge trigger with 64ms de-bouncing circuit |
| 16 | XCSN(SPI_CS ) | O, 4mA, SR | SPI Codec chip select |
| 17 | VDD | P | 3.3 V power pin |
| 18 | VSS | P | GND pin |
| 19 | GPIO3 | I/O | General Purpose I/O 3 |
| 20 | XSCLK1 | O, 4mA, SR | I2S SCLK for play |
| 21 | XLRCK1/AC_ SYNC | O, 4mA, SR | I2S L/R frame for play / AC-link SYNC |
| 22 | XSDO1(XSD OUT/AC_DO UT) | O, 4mA, SR | I2S dout / AC-link dout |
| 23 | XMCLK1/AC _Bit_CLK | O, 8mA, SR | I2S Codec master clock for play / AC-link bit clock |
| 24 | VDD | P | 3.3V power pin |

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| | | | |
|---|---|---|---|
| 25 | VDDA_PLLA | P | Power pin for internal PLL |
| 26 | LFA | I/O | Filter for internal PLL |
| 27 | VSSA_PLLA | P | GND pin for internal PLL |
| 27 | VSS | P | GND pin |
| 28 | XCDCLK(SPI_CLK) | O, 4mA, SR | SPI Codec control clock |
| 29 | GPIO4 | I/O | General Purpose I/O 4 |
| 30 | GPIO1 | I/O | General Purpose I/O 1 |
| 31 | SDA | I/O, 4mA, SR | IIC data pin |
| 32 | SCL | I, ST | IIC clock pin for external MCU control |
| 33 | XOUSB | O | 6 MHz clock osc pin for USB PLL |
| 34 | XIUSB | I | 6 MHz clock osc pin for USB PLL |
| 35 | VSS | P | GND pin |
| 36 | VDD | P | 3.3V power pin |
| 37 | HIDEN | I, ST | USB HID enable, 1: enable, 0: disable |
| 38 | SPDIFO | O, 8mA, SR | SPDIF data output |
| 39 | LEDN | O, 8mA, SR | LED indicator pin, output low after power on reset, toggle during operation |
| 40 | XSDIN/AC_DIN | I, ST | I2D Din / AC-link Din |
| 41 | PDSW | O, 4mA, SR | Power down switch control -- 0: normal mode, 1: power down mode |
| 42 | MUTEP | I, ST | Playback mute control pin, edge trigger with 64ms de-bouncing circuit |
| 43 | GPIO2 | I/O | General Purpose I/O 2 |
| 44 | VDD | P | 3.3V Power pin |
| 45 | VDDA_PLLB | P | Power pin for internal PLL |
| 46 | LFB | I/O | Filter for internal PLL |
| 47 | VSSA_PLLB | P | GND pin for internal PLL |
| 48 | VSS | P | GND pin |

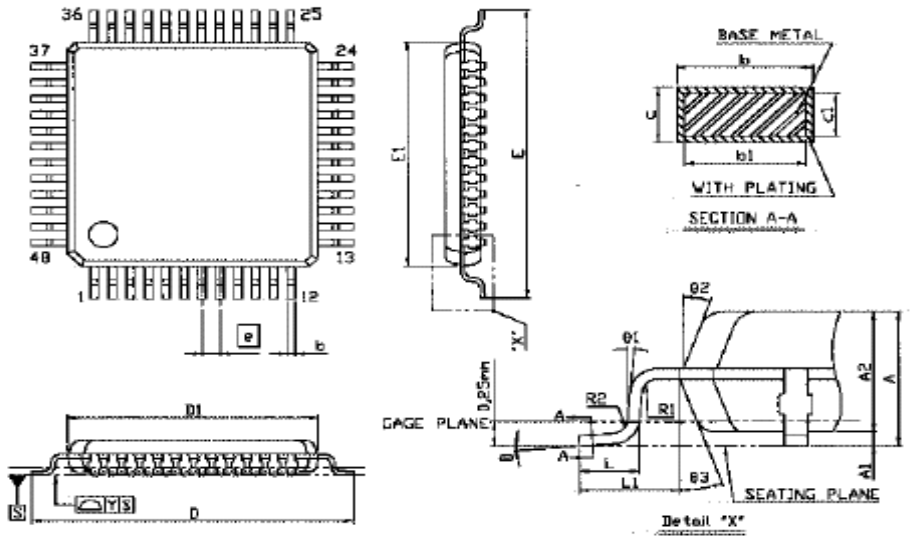
** All input pin are 5 volt tolerance, TTL level and Schmitt trigger

All output pins are slew rate control

I – input pin , O – output pin, P – power pin, ST – Schmitt trigger, SR – slew rate control, PU/PD – pull up or pull down

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## VI. Package dimension




| SYMBOL | DIMENSION (MM) | | | DIMENSION (MIL) | | |
|---|---|---|---|---|---|---|
| | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. |
| A | | | 1.60 | | | 63 |
| A1 | 0.05 | | 0.15 | 2 | | 6 |
| A2 | 1.35 | 1.40 | 1.45 | 53 | 55 | 57 |
| b | 0.17 | 0.22 | 0.27 | 7 | 9 | 11 |
| b1 | 0.17 | 0.20 | 0.23 | 7 | 8 | 12 |
| c | 0.09 | | 0.20 | 4 | | 8 |
| c1 | 0.09 | | 0.16 | 4 | | 6 |
| D | 9.00 BSC | | | 354 BSC | | |
| D1 | 7.00 BSC | | | 276 BSC | | |
| E | 9.00 BSC | | | 354 BSC | | |
| E1 | 7.00 BSC | | | 276 BSC | | |
| e | 0.50 BSC | | | 20 BSC | | |
| L | 0.45 | 0.60 | 0.75 | 18 | 24 | 30 |
| L1 | 1.00 REF | | | 39 REF | | |
| R1 | 0.08 | | | 3 | | |
| R2 | 0.08 | | 0.20 | 3 | | 8 |
| Y | | | 0.075 | | | 3 |
| θ | 0° | 3.5° | 7° | 0° | 3.5° | 7° |
| θ1 | 0° | | | 0° | | |
| θ2 | 11° | 12° | 13° | 11° | 12° | 13° |
| θ3 | 11° | 12° | 13° | 11° | 12° | 13° |

NOTE:
1.REFER TO JEDEC MS-026/BBC
2.DIMENSION D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION.
ALLOWABLE PROTRUSION IS 0.25mm PER SIDE D1 AND E1 ARE
MAXIMUM PLASTIC BODY SIZE DIMENSION INCLUDING MOLD MISMATCH.
3.DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE
DAMBAR PROTRUSION SHALL NOT CAUSE THE LEAD WIDTH TO EXCEED
THE MAXIMUM b DIMENSION BY MORE THAN 0.08mm.
4.ALL DIMENSIONS IN MILLIMETERS.

## Revision History

| *Revision* | *Revision Date* | *Description of changes* |
|---|---|---|
| Revision V0.2 | Jan 2, 2004 | Initial release. |
| Revision V0.3 | Jan 13, 2004 | Add package dimension |

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