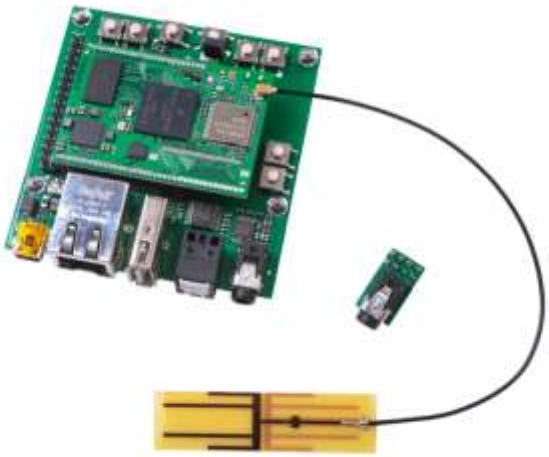
LinTech

Evaluation Board

HBM11



Date: 2024-10-08
Revision: 2

Contents

1 Overview 3

2 Interfaces 4

3 Components 5

4 Schematics 6

4.1 HBM11 6

4.2 Buttons 7

4.3 USB 8

4.4 Audio 9

4.5 RGB-LED 10

4.6 Ethernet 10

4.7 Jumpers 11

4.7.1 Standby Mode 11

4.7.2 Measuring Power Consumption 11

4.8 Expansion Header 11

5 Add-On Peripherals 13

5.1 I2S-ADC CS5343 13

List of Figures

Figure 1 – Top View of the Evaluation Boards Interfaces 4
Figure 2 – Evaluation Board Interface Components 5
Figure 3 – Evaluation Board Schematic – HBM11 6
Figure 4 – Evaluation Board Schematic – Buttons 7
Figure 5 – Evaluation Board Schematic – USB 8
Figure 6 – Evaluation Board Schematic – Audio 9
Figure 7 – Evaluation Board Schematic – LED 10
Figure 8 – Evaluation Board Schematic – Ethernet 10
Figure 9 – Evaluation Board Schematic – Jumper, Standby 11
Figure 10 – Evaluation Board Schematic – Expansion Header 11
Figure 11 – Pin Assignment of the Expansion Header 12
Figure 12 – Line-In Adapter (I2S-ADC CS5343) plugged onto Evaluation Board 13
Figure 13 – Required slots for the line-in adapter on the HBM11 evaluation expansion header 13
Figure 14 – Add-on Adapter I2S-ADC CS5343 14

1 Overview

The HBM11 evaluation board designed by LinTech GmbH is a cost-effecive hardware platform to evaluate the HBM11 module.

The board exposes a comprehensive set of peripherals and connectivity options, featuring:

- 2x USB
  - 1x USB 2.0 Host port
  - 1x USB 2.0 OTG port
- 1x 10/100 Mbps Ethernet (RJ45 jack)
- 2x Audio output port
  - 1x S/PDIF (TOSLINK)
  - 1x Analog audio out (3.5 mm jack)
- 1x RGB-Led
- 8x Buttons
- 2x Jumpers
  - 1x Measuring power consumption
  - 1x Standby mode
- 2x 2.0mm 30-pin expansion header
  - 1x Debug UART
  - 1x Application UART
  - 1x I2C
  - 1x I2S
  - 1x Audio line out (L/R)
  - 4x GPIO
  - 1x VDDIO (3.3 V)
  - 1x Ground
  - 2x Analog Ground

2 Interfaces

fFigure 1 show the top view of the HBM11 evaluation board including all provided interfaces.

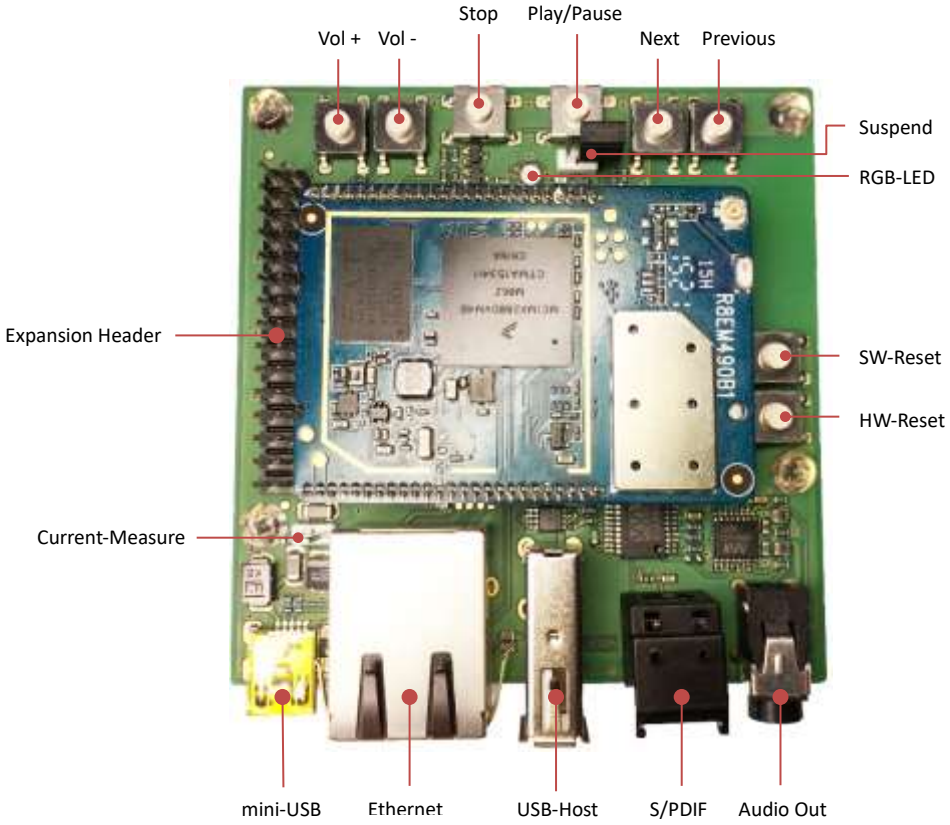
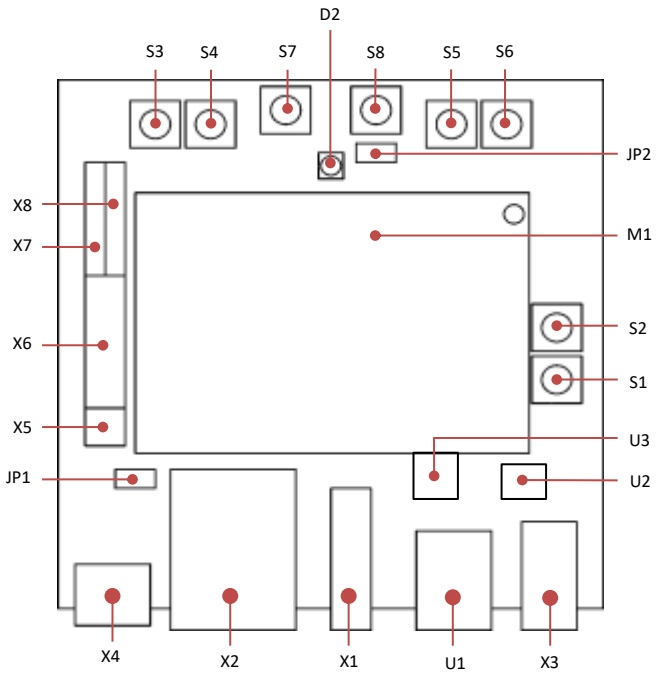


Figure 1 – Top View of the Evaluation Boards Interfaces

3 Components

Figure 2 shows the interface component labels of the evaluation board.



Label	Name
D2	RGB-LED
JP1	Current-Measure
JP2	Suspend
M1	HBM11
S1	HW_Reset
S2	SW_Reset
S3	Vol up
S4	Vol down
S5	Next
S6	Previous
S7	Stop
S8	Play/Pause
U1	SPDIF-Out
U2	WM8524
U3	WM8804
X1	USB Host
X2	Ethernet
X3	Audio Out
X4	Mini-USB (Power/Client)
X5	Audio Out
X6	Extension I2S/I2C/GPIO
X7	Debug and Application UART

Figure 2 – Evaluation Board Interface Components

4 Schematics

4.1 HBM11

The evaluation board is using the HBM11 module as the heart of the system. It is connected to the evaluation board through two 1.27 mm pitch 25-pin connectors. Figure 3 shows the schematic for the HBM11 component M1.

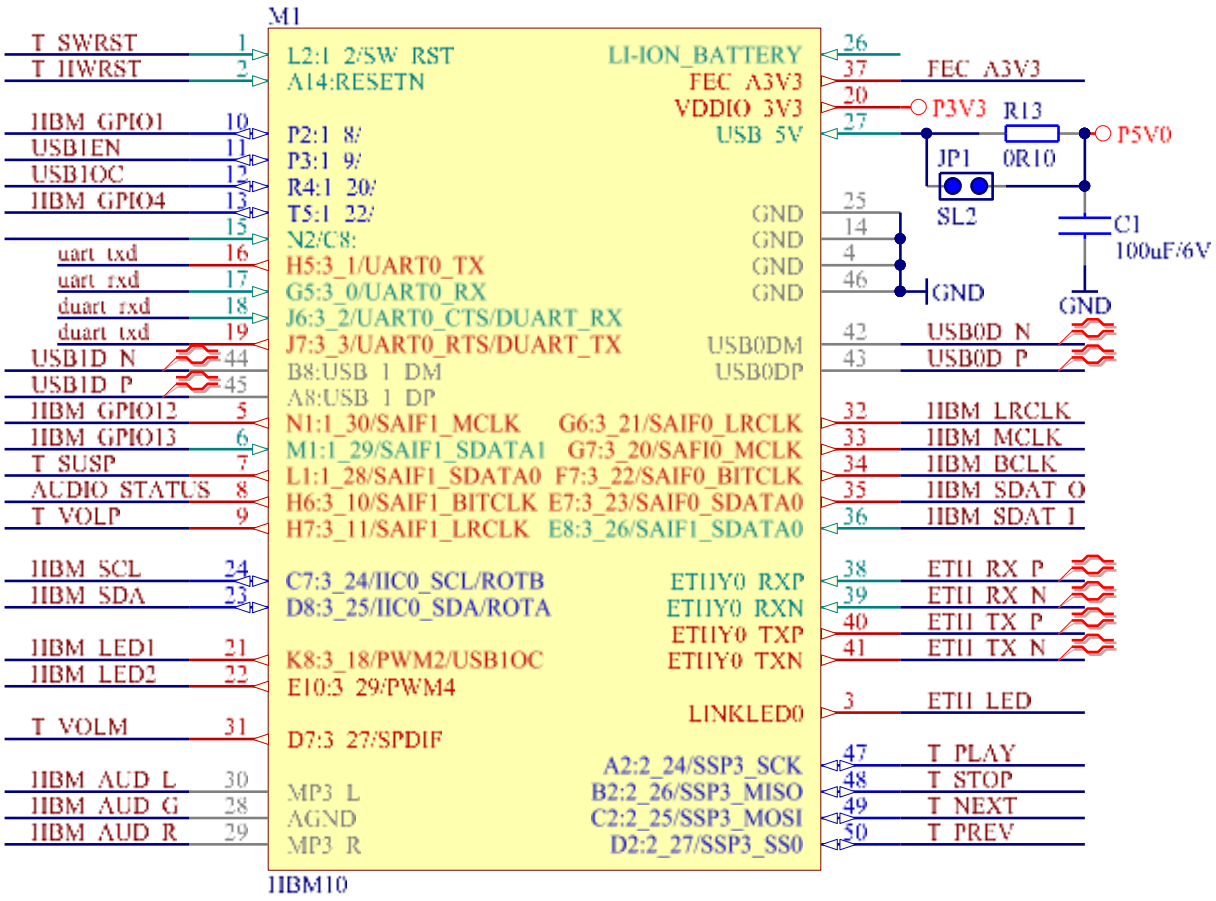


Figure 3 – Evaluation Board Schematic – HBM11

4.2 Buttons

There are eight user buttons on the evaluation board:

Label	Name in Schematic	HBM11 Pin	Description
S1	T_HWRST	2	Hardware reset
S2	T_SWRST	1	WPS (short-press < 6s) / Factory Reset (long-press > 6s)
S3	T_VOLP	9	Volume +
S4	T_VOLM	31	Volume -
S5	T_NEXT	49	Next
S6	T_PREV	50	Previous
S7	T_STOP	48	Stop
S8	T_PLAY	47	Play/Pause

Figure 4 shows the schematic for the buttons S1 to S8.

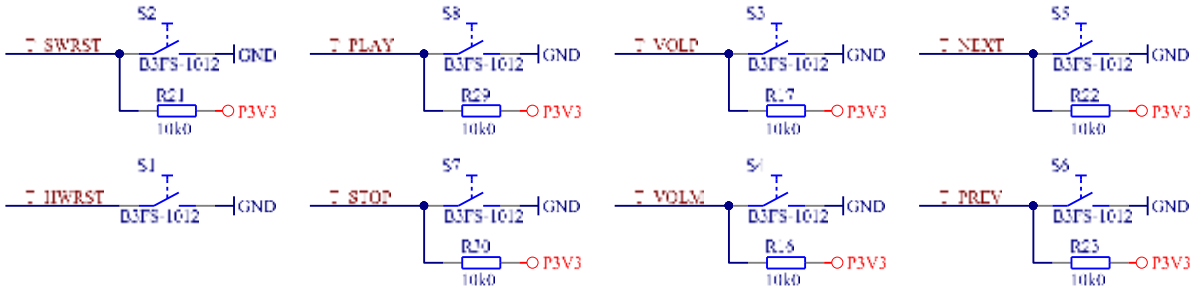


Figure 4 – Evaluation Board Schematic – Buttons

4.3 USB

The evaluation port is assembled with two USB ports:

- X1 is a USB plug type A receptacle for a USB 2.0 Host device.
- X4 is a USB plug mini-B receptacle providing a 5V DC power supply.

Figure 5 shows the schematic for the USB components X1 and X4.

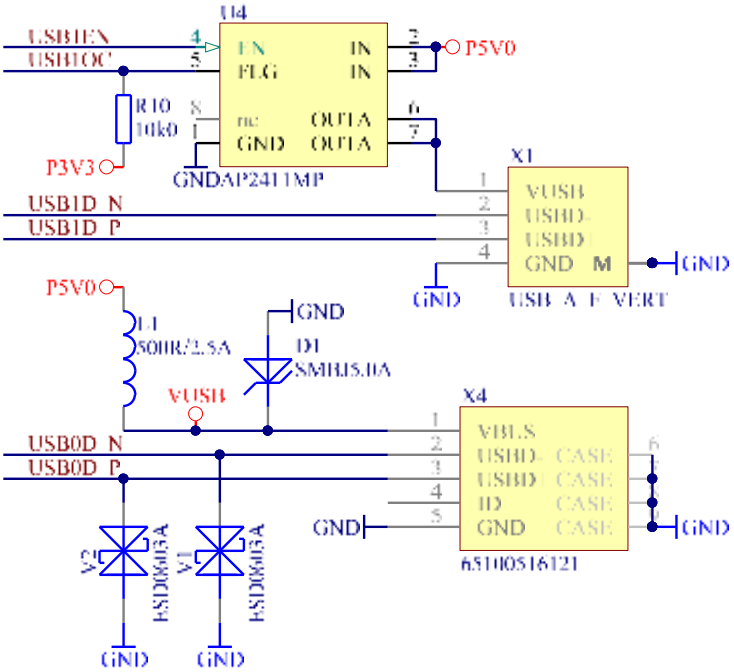


Figure 5 – Evaluation Board Schematic – USB

4.4 Audio

The evaluation board features two hardware audio codecs:

- a Wolfson WM8524 stereo DAC for analog audio output.
- a Wolfson WM8804 S/PDIF transceiver for digital audio output.

The analog output level of the WM8524 is set to **2V$_{rms}$** (typical) at 0dBFS.

Figure 6 shows the schematic for the audio components.

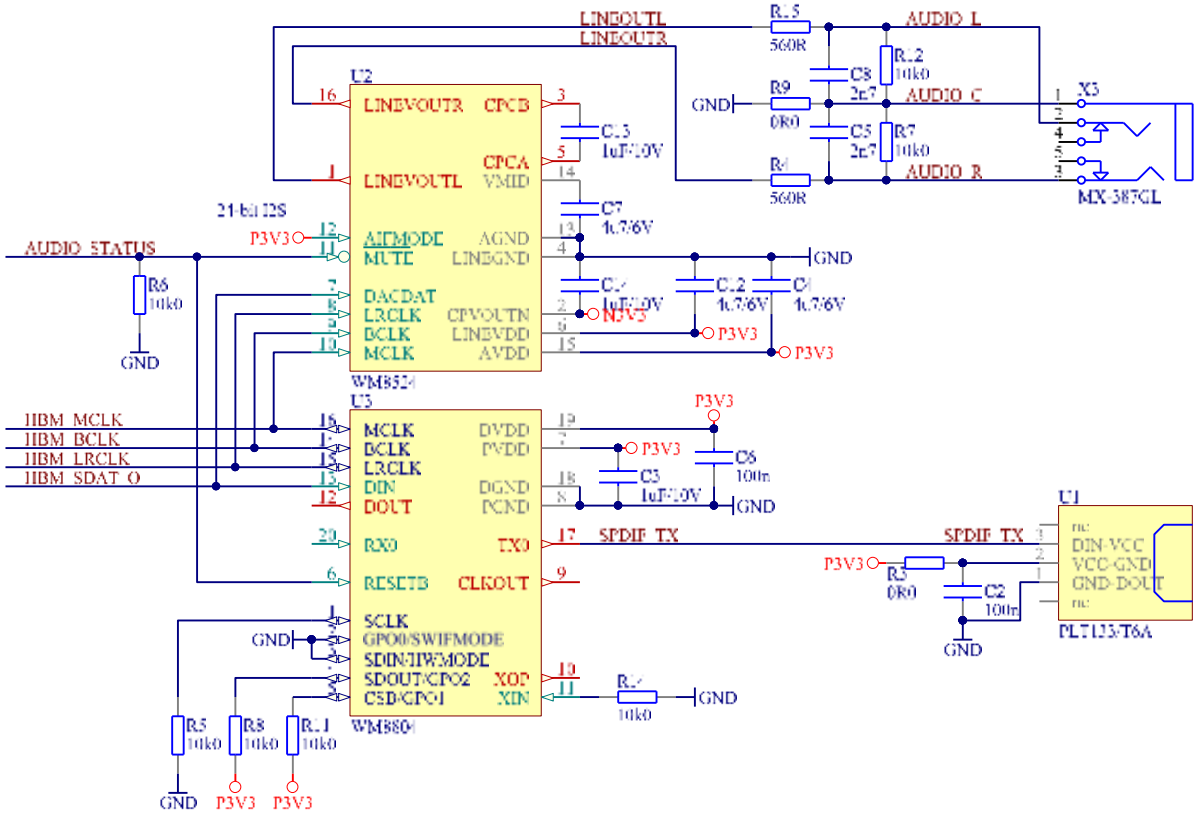


Figure 6 – Evaluation Board Schematic – Audio

4.5 RGB-LED

The RGB-LED is controlled by the HBM11 module:

- The green LED is driven by the AUDIO_STATUS pin indicating active audio output.
- The blue LED is PWM-driven by the LED1 pin indicating network station mode.
- The red LED is PWM-driven by the LED2 pin indicating network access point mode.

Figure 7 shows the schematic of the RGB-LED component.

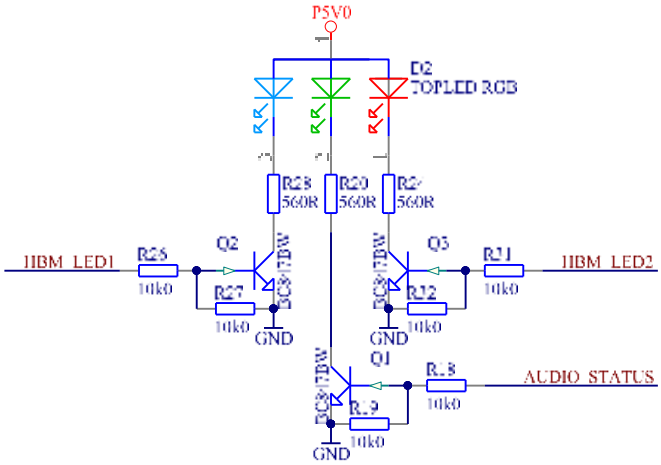


Figure 7 – Evaluation Board Schematic – LED

4.6 Ethernet

Figure 8 shows the schematic for the Ethernet component.

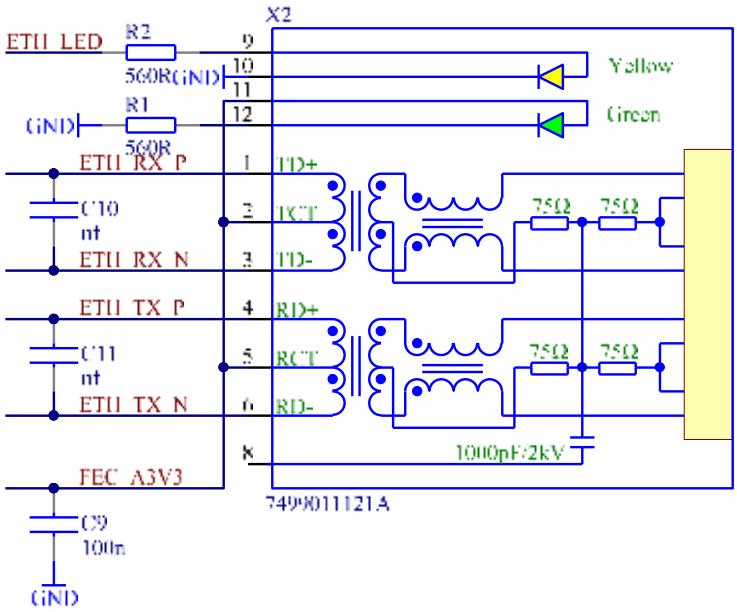


Figure 8 – Evaluation Board Schematic – Ethernet

The HBM11 is equipped with a Microchip LAN8720A Ethernet Transceiver.

4.7 Jumpers

4.7.1 Standby Mode

Figure 9 shows the schematic for the two pin jumper JP2.

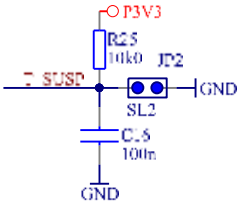


Figure 9 – Evaluation Board Schematic – Jumper, Standby

JP2 allows to put the HBM11 module into the standby mode.

4.7.2 Measuring Power Consumption

The two pin header JP1 allows power consumption measurement by connecting an ampermeter, whereas 100 mV compares to 1A.

4.8 Expansion Header

The expansion header can be used to integrate the HBM11 module into any custom design. The following interfaces are exposed by the header:

- 1x Application UART
- 1x I2C
- 1x I2S
- 1x Audio line out (L/R)
- 4x GPIO
- 1x VDDIO (3.3 V)
- 1x Ground
- 2x Analog Ground

Figure 10 shows the schematic of the expansion header.

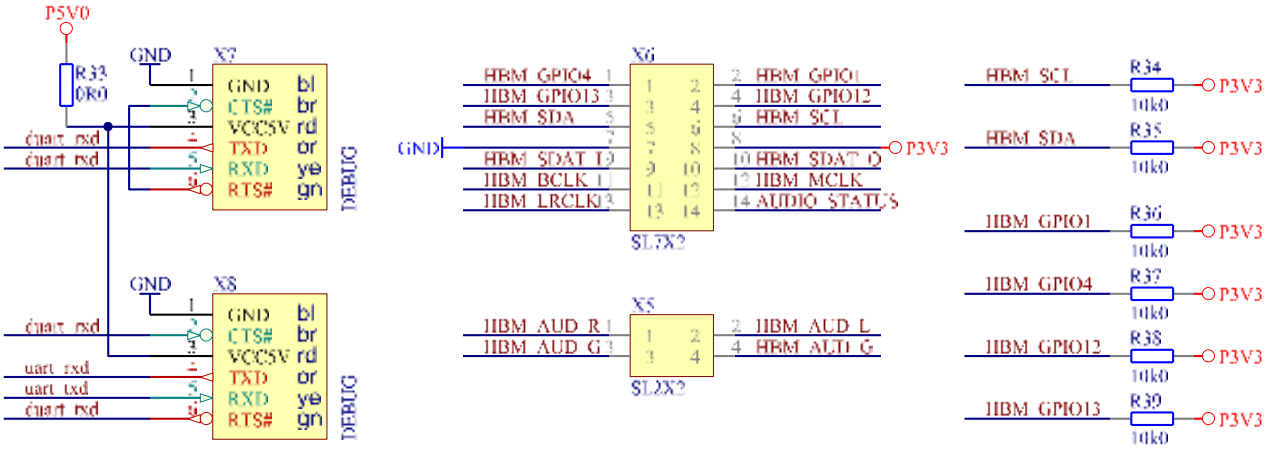
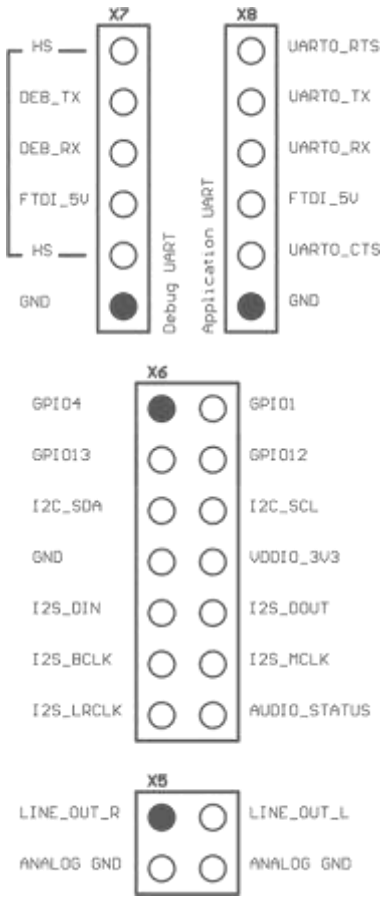


Figure 10 – Evaluation Board Schematic – Expansion Header

Figure 11 shows the pin assignment of the expansion header.



X8	HBM11 Pin Number
UART0_RTS	19
UART0_TX	16
UART0_RX	17
FTDI_5V	27
UART0_CTS	18
GND	4, 14, 25, 46

X6	
GPIO4	13
GPIO1	10
GPIO13	6
GPIO12	5
I2C_SDA	23
I2C_SCL	24
GND	4, 14, 25, 46
VDDIO_3V3	20
I2S_DIN	36
I2S_DOUT	35
I2S_BCLK	34
I2S_MCLK	33
I2S_LRCLK	32
AUDIO_STATUS	8

X5	
LINE_OUT_R	29
LINE_OUT_L	30
ANALOG GND	28
ANALOG GND	28

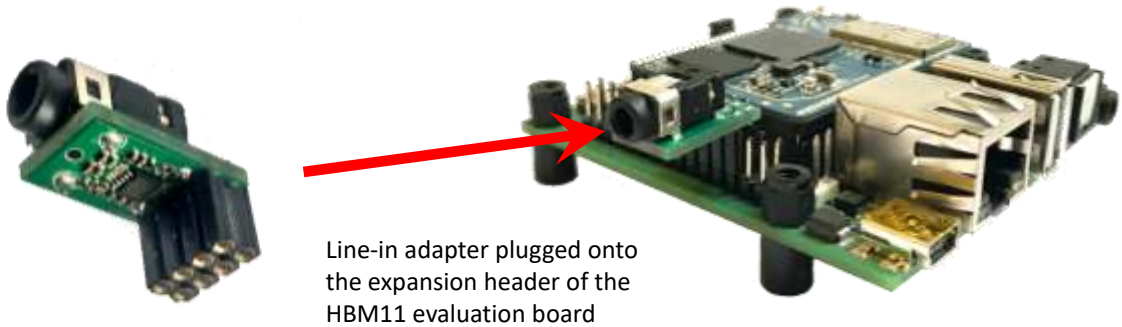
Figure 11 – Pin Assignment of the Expansion Header

Note that the Debug UART (X7) is meant for internal usage only.

5 Add-On Peripherals

5.1 I2S-ADC CS5343

The HBM11 module supports the I2S-ADC CS5343 adapter for easily enabling audio input on the HBM11 evaluation board.



Line-in adapter plugged onto the expansion header of the HBM11 evaluation board

Figure 12 – Line-In Adapter (I2S-ADC CS5343) plugged onto Evaluation Board

The line-in adapter can be easily plugged onto the expansion header X6 of the HBM11 evaluation board as shown in:

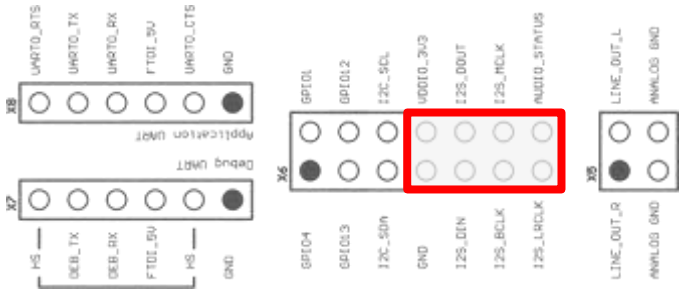


Figure 13 – Required slots for the line-in adapter on the HBM11 evaluation expansion header

The CS5343 from CIRRUS LOGIC is an audio A/D Converter supporting the I2S audio format. It is operating as a clock slave. The HBM11 audio module by default supports the following audio sampling format:

- **Sampling frequency:**
  - 44100 Hz when broadcasting the audio stream
  - 48000 Hz when playing locally on the device
- **Bit depth:** 16 bit, little endian
- **Channels:** 2 (stereo)

If your application requires any other samling format for the line-in, please contact the LinTech support team.

Figure 14 shows the schematic of the adapter for including the an line-in option for the HBM11 module in your custom hardware design.

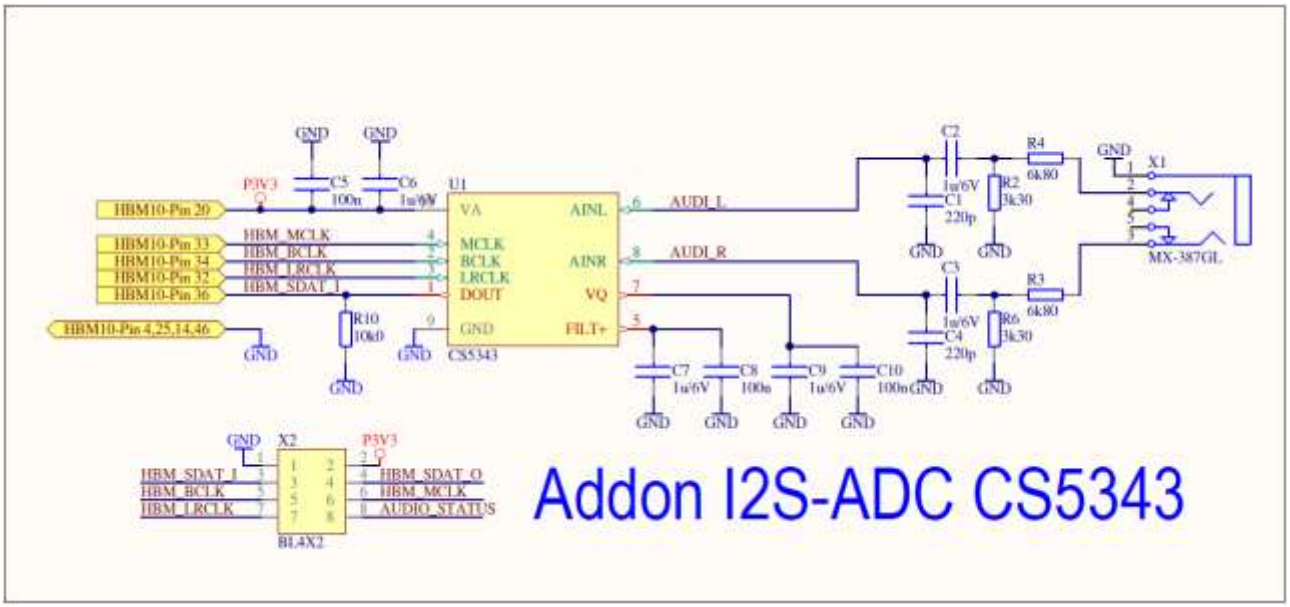


Figure 14 – Add-on Adapter I2S-ADC CS5343