

User Manual

FC920 USB-HEAR DevKit
Version 1.0.0

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Build 2
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USB audio firmware and driver technology
www.thesycon.de

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1 Overview

The FC920 USB-HEAR DevKit is a development kit in Raspberry Pi format for fast and easy start using FC301 USB-HEAR Module and compatible connector for different DAC's.

The FC920 USB-HEAR DevKit includes pre-soldered Module and cables.

All details on supported audio formats and use cases can be found on the FC301 USB-HEAR Module Flyer.

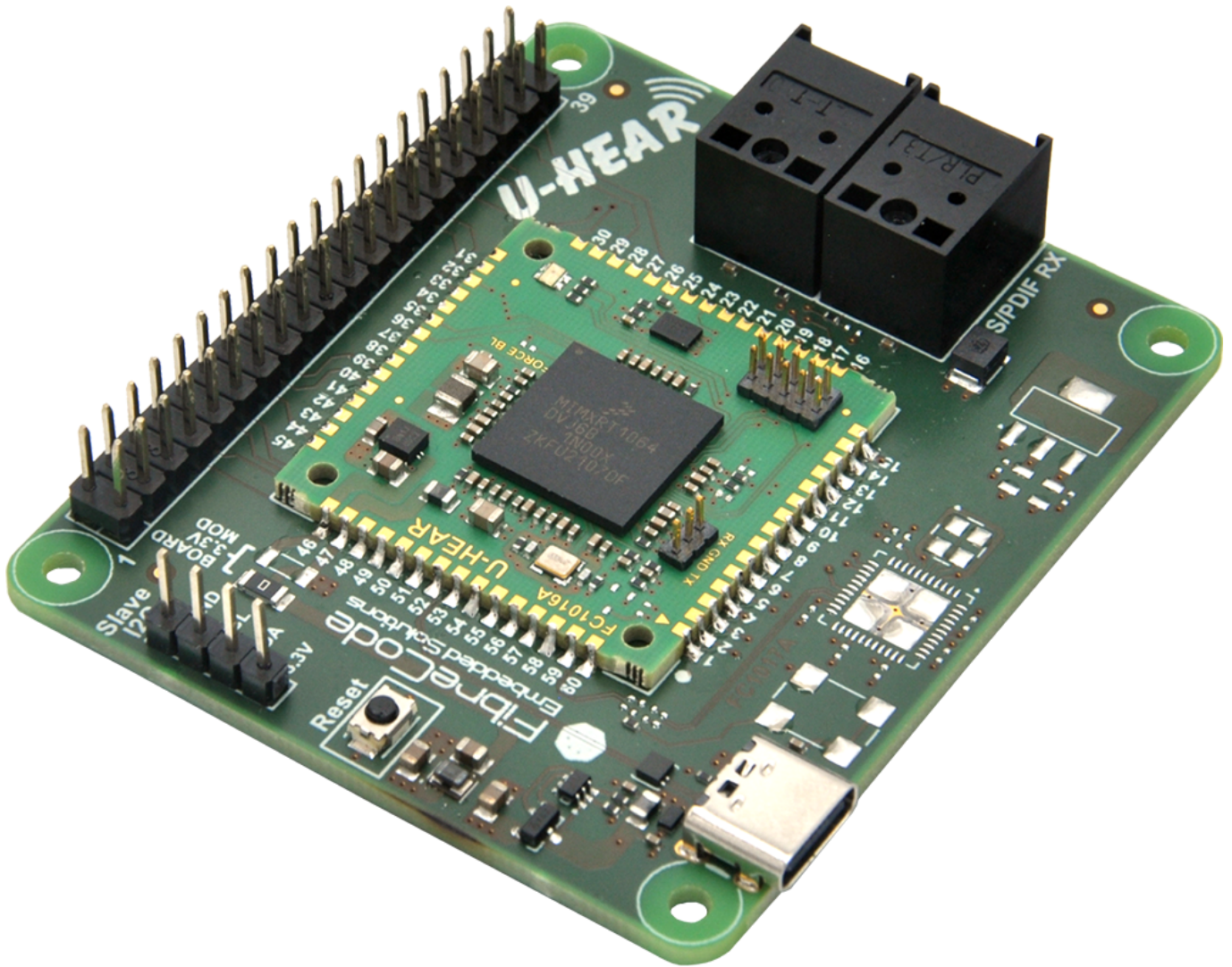


Figure 1: FC920 USB-HEAR DevKit

1.1 Block diagram

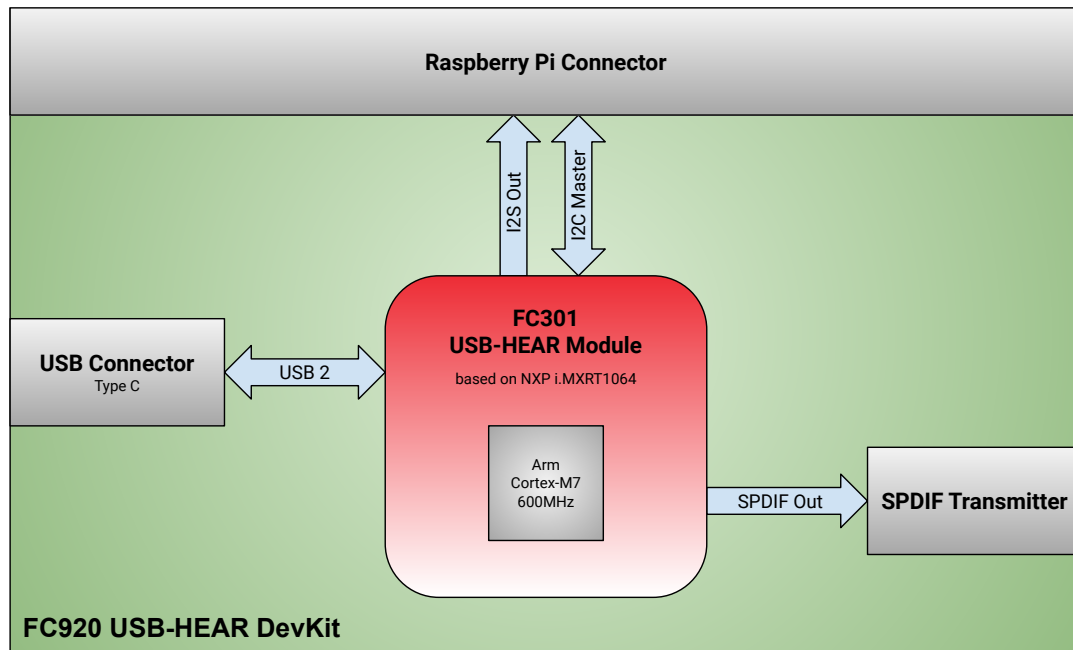


Figure 2: FC920 USB-HEAR DevKit Block diagram

1.2 Key Features

- Direct usage of pre-tested Raspberry Pi Add-on boards
- SPDIF optical Out
- Multimedia key events based on USB HID Consumer Control (For example: Volume Up, Volume Down, ...)
- Firmware update via USB supported on Windows, macOS, and Linux

1.3 Supported Operating Systems

USB-HEAR works with built-in drivers on Windows 11, Windows 10, macOS and Linux. To enable the full feature set, specifically native DSD playback, a custom driver is available for Windows 11/10.

2 Pinout Raspberry Pi Connector

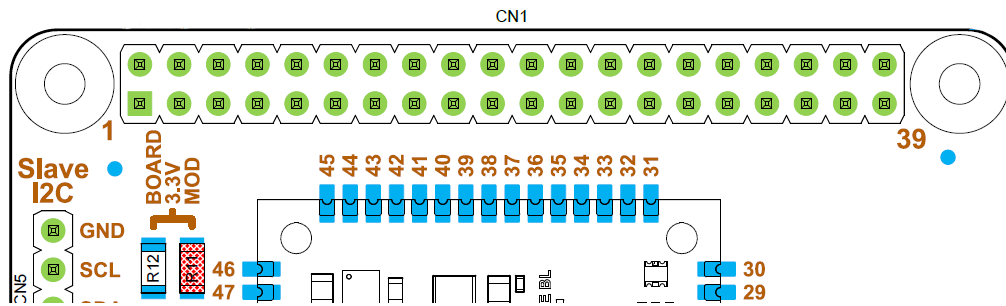


Figure 3: Raspberry Pi Connector

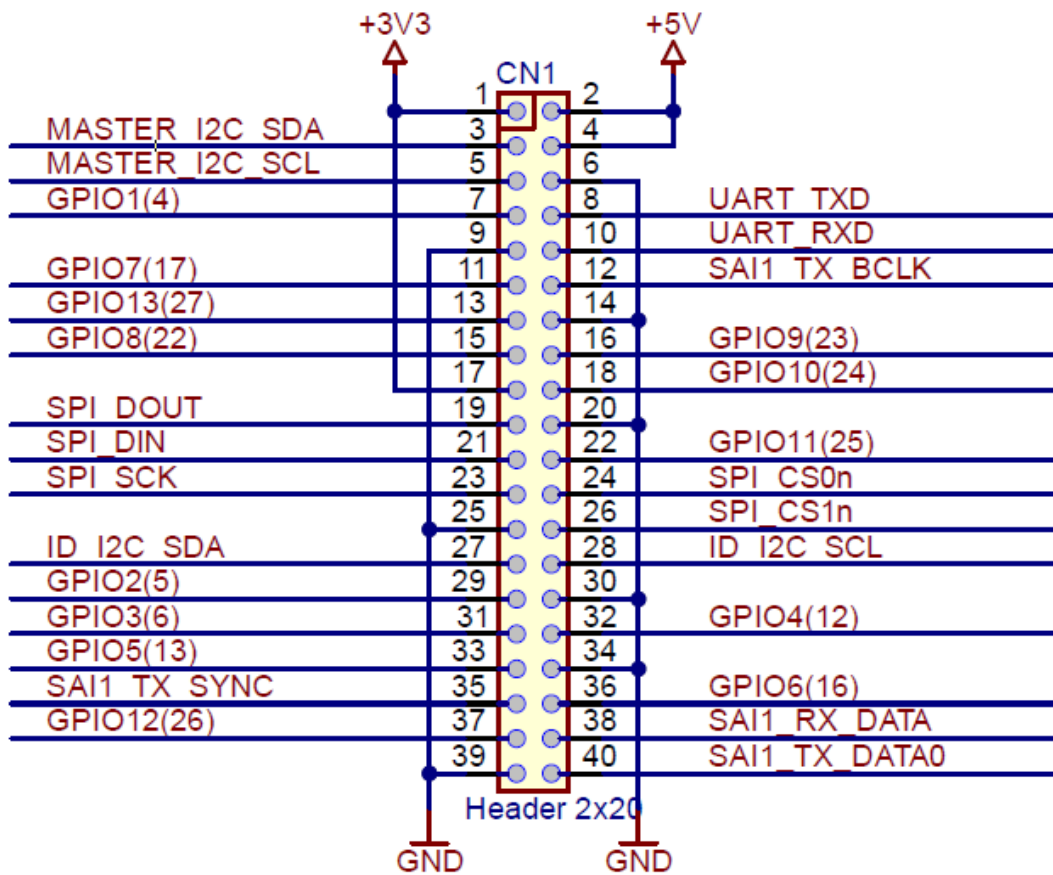
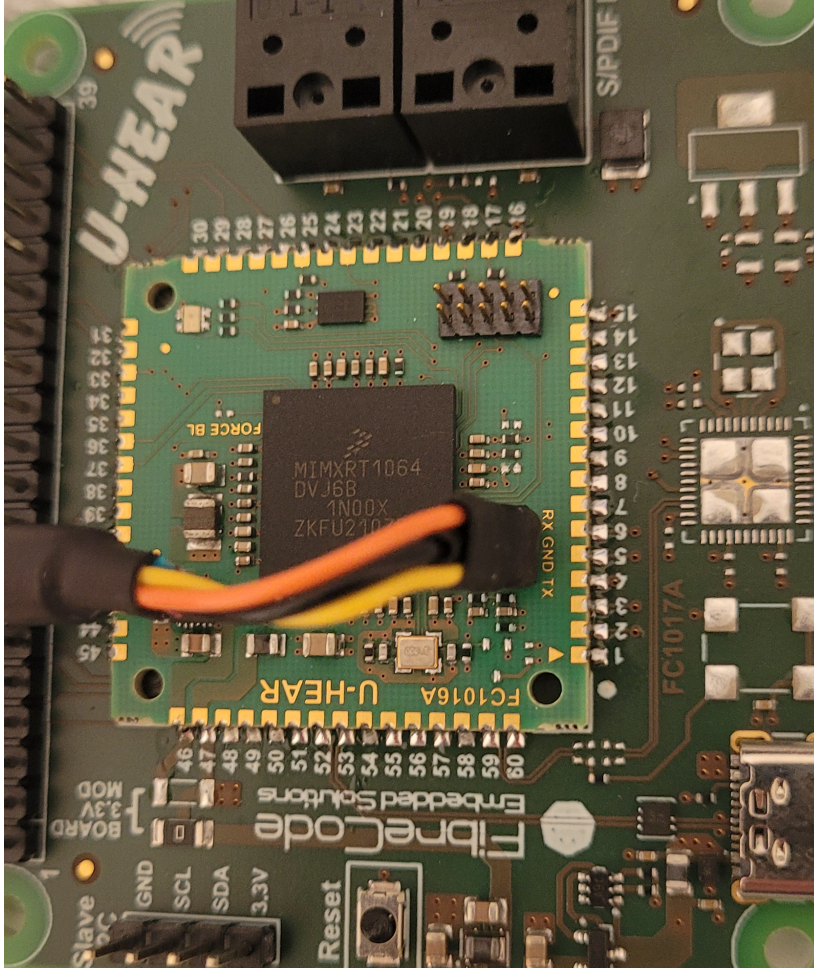


Figure 4: Raspberry Pi Connector Pinout

3 Hardware

3.1 UART-Interface

For debugging/trace purpose, FC301 has UART on Mini-3-pin interface which is already assembled using FC920 DevKit.



Signal	Color	FibreCode Board Pin
TXD (output)	Orange	RX
GND (ground)	Black	GND
RXD (input)	Yellow	TX

UART settings: 921600 baud, 8 data bits, no parity, 1 stop bit (8N1).
Using putty and terminal settings with CR/LF checked on:

```
COM11 - PuTTY
0.000389
0.000532
0.000675 INFO: *** startup ***
0.001053 INFO: XTAL = 24000000 Hz
0.001471 INFO: CPU = 396000000 Hz
0.001891 INFO: USB1_PLL_CLK = 480000000 Hz
0.002451 INFO: USB1_PLL_PFD0_CLK = 664615368 Hz
0.003012 INFO: FLEXSPI2_CLK_ROOT = 132923073 Hz
0.003568
0.003712 INFO: *****
0.004471 INFO: Thesycon U-HEAR Demo BOOTLOADER (debug)
0.005130 INFO: Version 0.10
0.005494 INFO: Compile Time Nov 5 2021 13:17:35
0.006110 INFO: *****
0.006868
0.069688 INFO: SearchAndValidateAppImage: no metadata found
0.070368 INFO: Operating in bootloader mode...
0.000007 INFO: XTAL = 24000000 Hz
0.000409 INFO: CPU = 600000000 Hz
0.000821 INFO: USB1_PLL_CLK = 480000000 Hz
0.001373 INFO: USB1_PLL_PFD0_CLK = 664615368 Hz
0.001926 INFO: FLEXSPI2_CLK_ROOT = 132923073 Hz
0.013502 INFO: VerifyDeviceConfig: no metadata found
0.014095 WARN: no device config present at 0x7001e000, st=0xE0000038
```

3.2 Supported Audio HATs

- HIFIBERRY DAC+ STANDARD
- HIFIBERRY DAC2 PRO

3.3 HIFIBERRY DAC+ STANDARD

HiFiBerry DAC+ comes with a pair of RCA jacks. It can be simply plugged onto your Raspberry Pi, without any soldering. Equipped with a 192kHz/24bit Burr-Brown digital-to-analog converter it offers high-end sound quality.

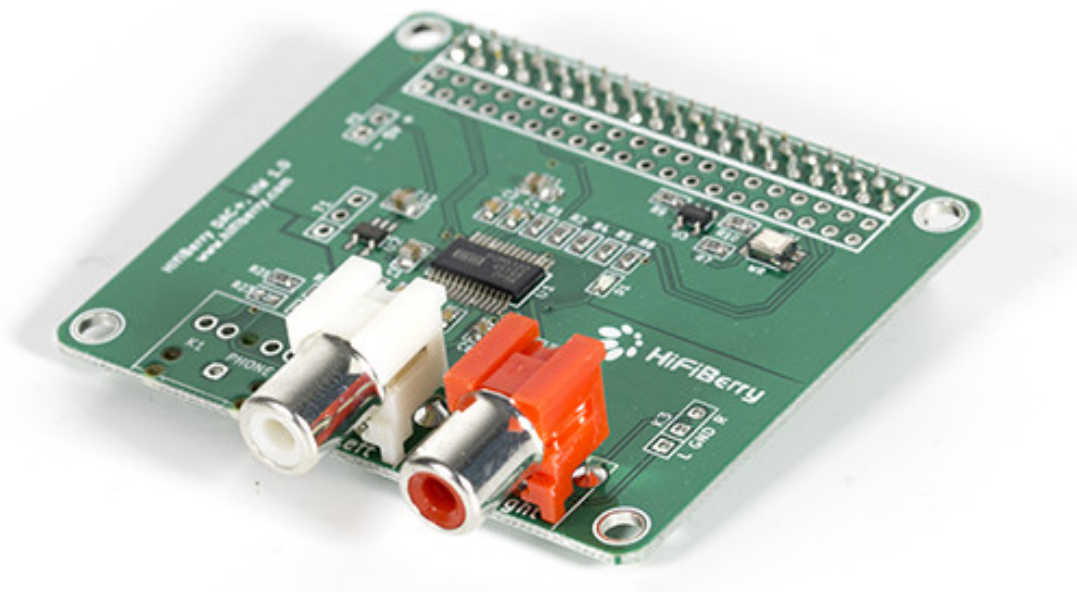


Figure 5: HIFIBERRY DAC+ STANDARD (source: www.hifiberry.com)

More information: hifiberry.com

3.4 HIFIBERRY DAC2 PRO

HiFiBerry DAC2 Pro is the successor of your popular DAC+ Pro. It comes with integrated dual-domain low-jitter clocks and gold-plated RCA connectors. It features an on-board headphone amplifier and can be upgraded with the DSP add-on module. It can be simply plugged onto your Raspberry Pi, without any soldering.

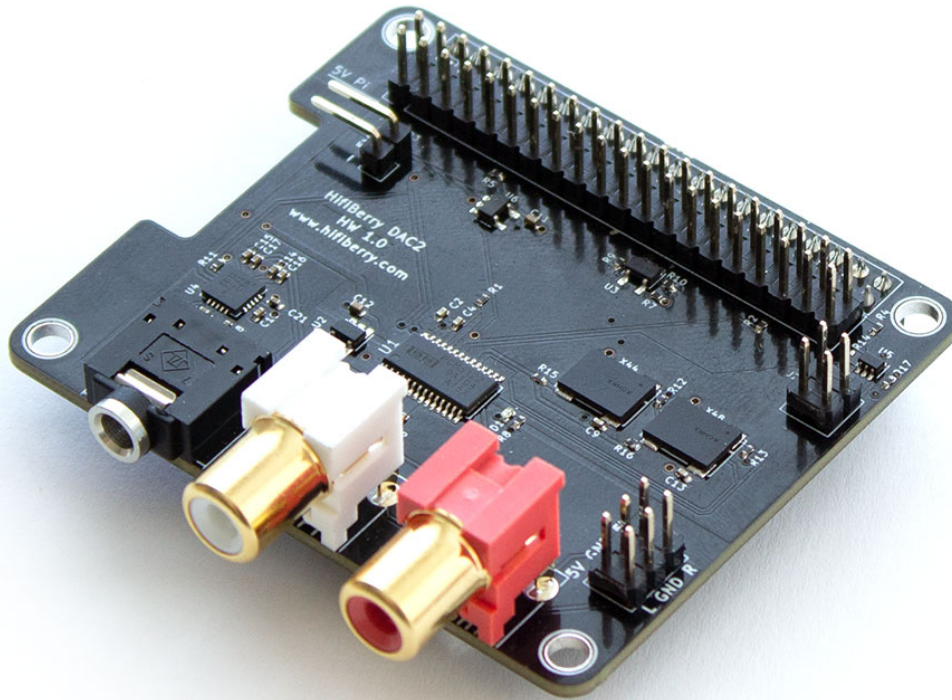


Figure 6: HIFIBERRY DAC2 PRO (source: www.hifiberry.com)

More information: hifiberry.com

3.5 SPDIF Output

Simple start without adding Audio-Hat is option to use build-in S/PDIF Output already connected to optical output on the FC920 USB-HEAR DevKit.

Test-Setup to use:

- Raspberry Pi 3/4 as USB-Host
- FC920 USB-HEAR DevKit connected via USB to Raspberry Pi
- AV-Receiver or similar optical SPDIF input to Amplifier/Speaker output

Find attached also devices:

```
> aplay -l
```

To use aplay for playing PCM, wav-files with 32-bit resolutions must be used. To create one out of mp3 material use:

```
> ffmpeg -i input.mp3 -c:a pcm_s32le output.wav
```

Now, this 32-bit wav can be played using:

```
> aplay output.wav -D hw=1,0
```

After installation of mplayer:

```
> sudo apt-get install mplayer
```

This one enables direct conversion from mp3 (44.1kHz/16Bit) to 44.1kHz/32-Bit.

```
> mplayer <filename>.mp3 -ao alsa:device=hw=1.0 -format s32le
```

4 Audio HAT Setup

Detailed step by step instructions: [HiFiBerry Setup](#)

5 Physical Dimensions

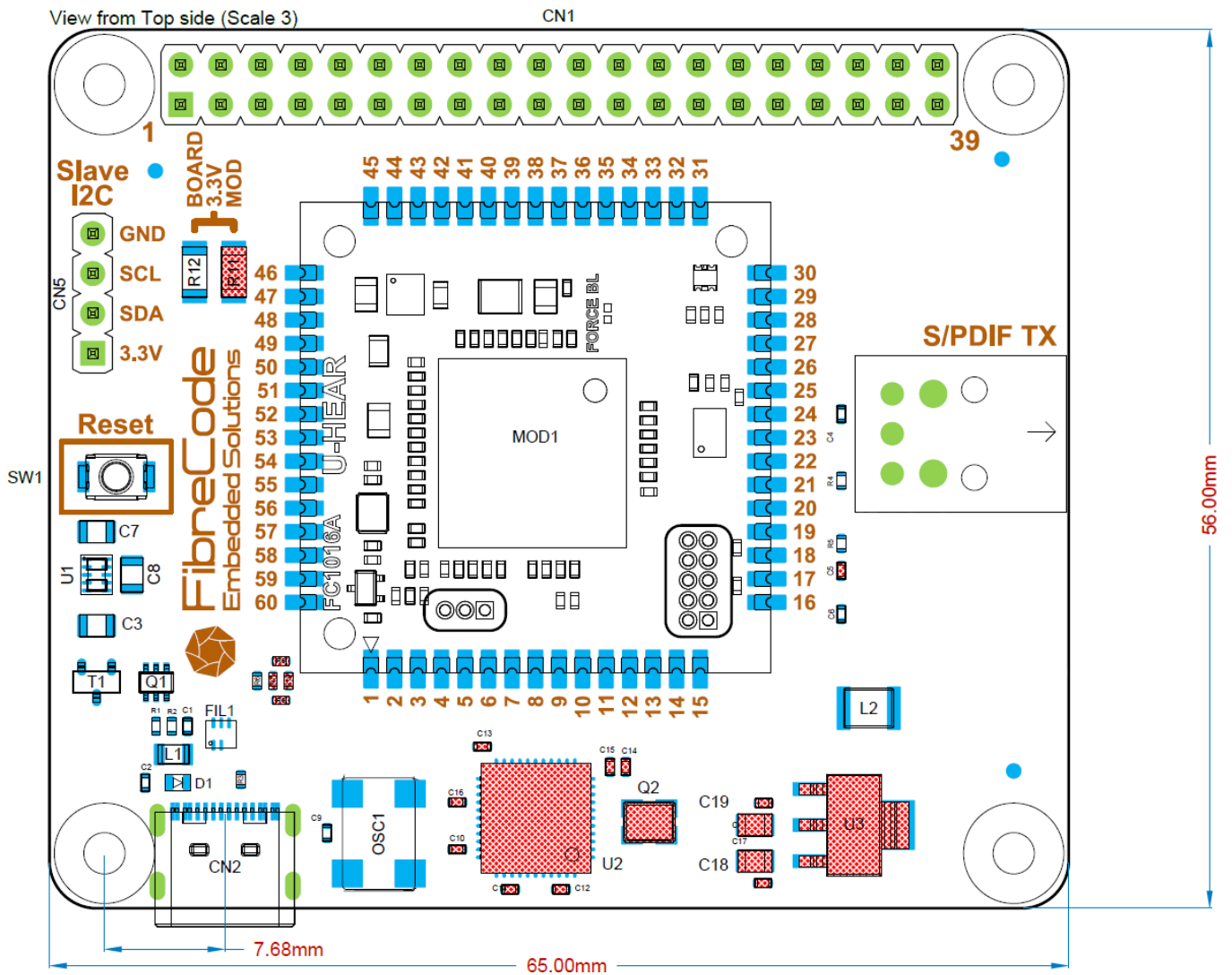


Figure 7: FC920 USB-HEAR DevKit top view