
uGreen DAB Board Instructions v3

1 Introduction

The DAB Board v3 is a revised and more efficient new version of the DAB Board. Its smaller layout allows a better integration into most Raspberry Pi enclosures. It is available in two versions: equipped with a wire antenna or a SMC connector.

This document describes

- the DAB Board features
- The pin-out layout
- the software for a terminal based radio
- document version history



2 Feature Description

- Silicon Labs Si4684 DAB and FM radio receiver with worldwide FM band support, RDS/RBDS decoder, HD-radio support, DAB/DAB+ support
- A 3.5 mm audio out to connect headphones or amplifiers.
- The 40 pin connector fits the Raspberry Pi 1 B+, Pi 2 B and Pi 3 boards. The Si4684 can be programmed using the SPI bus.
- Silicon Labs Firmware is integrated into the terminal software.
- The terminal software for Raspbian and Linux operation systems allows easy remote control of the DAB Board, for example through a ssh connection. It supports automatic station scanning and station list storage and fast station selection and volume control.

3 Electronic configuration

The board is connected to the Raspberry Pi via the SPI bus through pins 19 (MOSI), 21 (MISO), 23 (SCLK) and 24 (chip select). The detailed bus configuration can be found in the Si468x datasheets. It supports up to 10 MHz mode 0 and 3 SPI.

Physical pin 16 is reserved for the RSTB pin of the Si468x and cannot be used for other purposes. If this pin is driven low, the Si468x is reset. If the pin is high, any voltage fluctuations on the power inputs of the Si468x must be avoided, otherwise this can result in permanent damage of the Si468x.

Pin 22 is reserved for the INTB of the Si468x.

Pin description

Table 1 shows a summary of the pin configuration.

Table 1

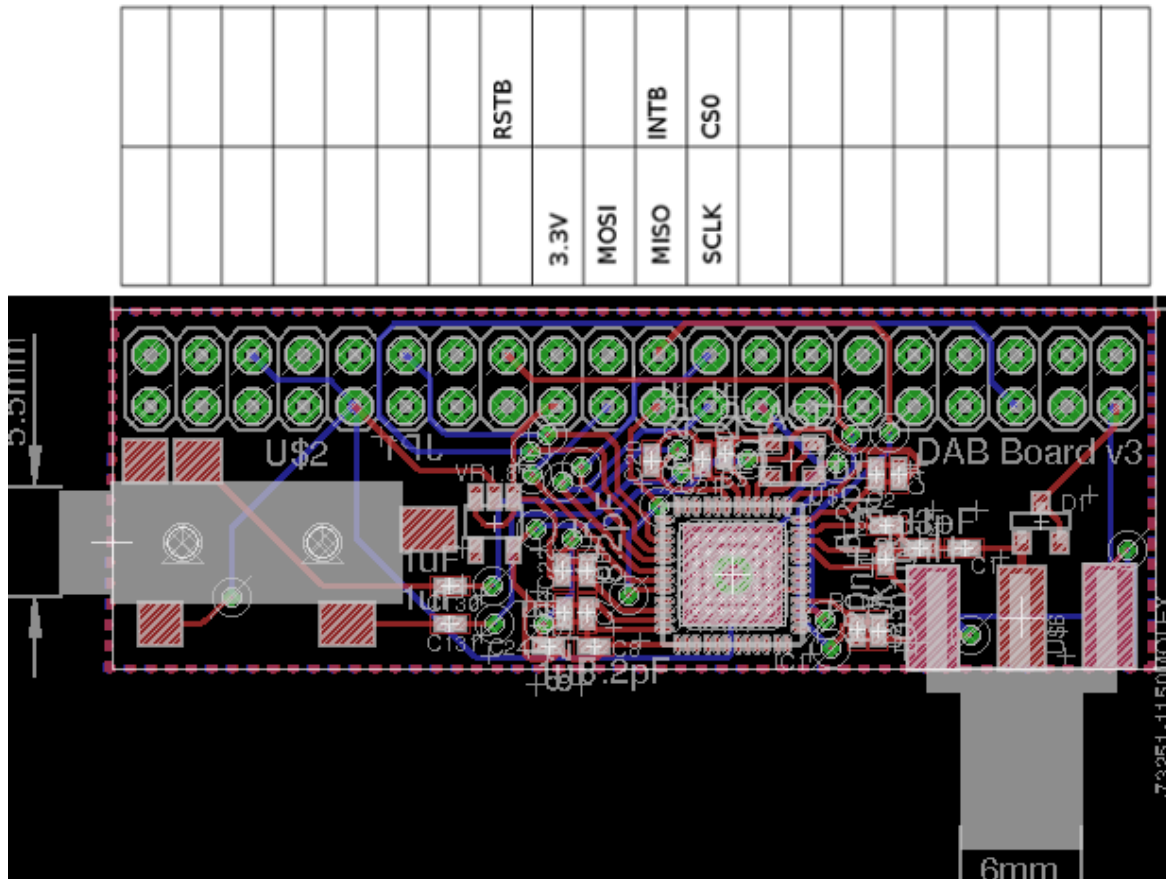
Raspberry Pi physical pin	Function	Description
16	Si468x RSTB	Si468x reset button
17	3.3 V	
19	Si468x MOSI	
21	Si468x MISO	
22	Si468x INTB	
23	Si468x SCLK	SPI clock
24	Si468x chip select	SPI chip select

DAB Board

Pin-out

Figure 2 shows the soldering bridges and pin-out. Pins not described here might be connected as well, please make sure not to connect any damaging voltages to these pins.

Figure 2



Important Remarks

- The Si468x features a RSTB which needs to be held low while supply voltage levels are not stable. Otherwise, the Si468x can be damaged. This is especially important if an application that holds RSTB high does not terminate correctly, without lowering RSTB again, while the board is unplugged.
- The board needs SPI to be enabled: type “sudo raspi-config” in a console and choose “Advanced Options” and enable “SPI”. The board not only requires SPI, but also general GPIO ports to set the RSTB pin, therefore any software to access the board needs root privileges.

DAB Board

DC characteristics

Table 3 shows the DC characteristics of the board

Table 3

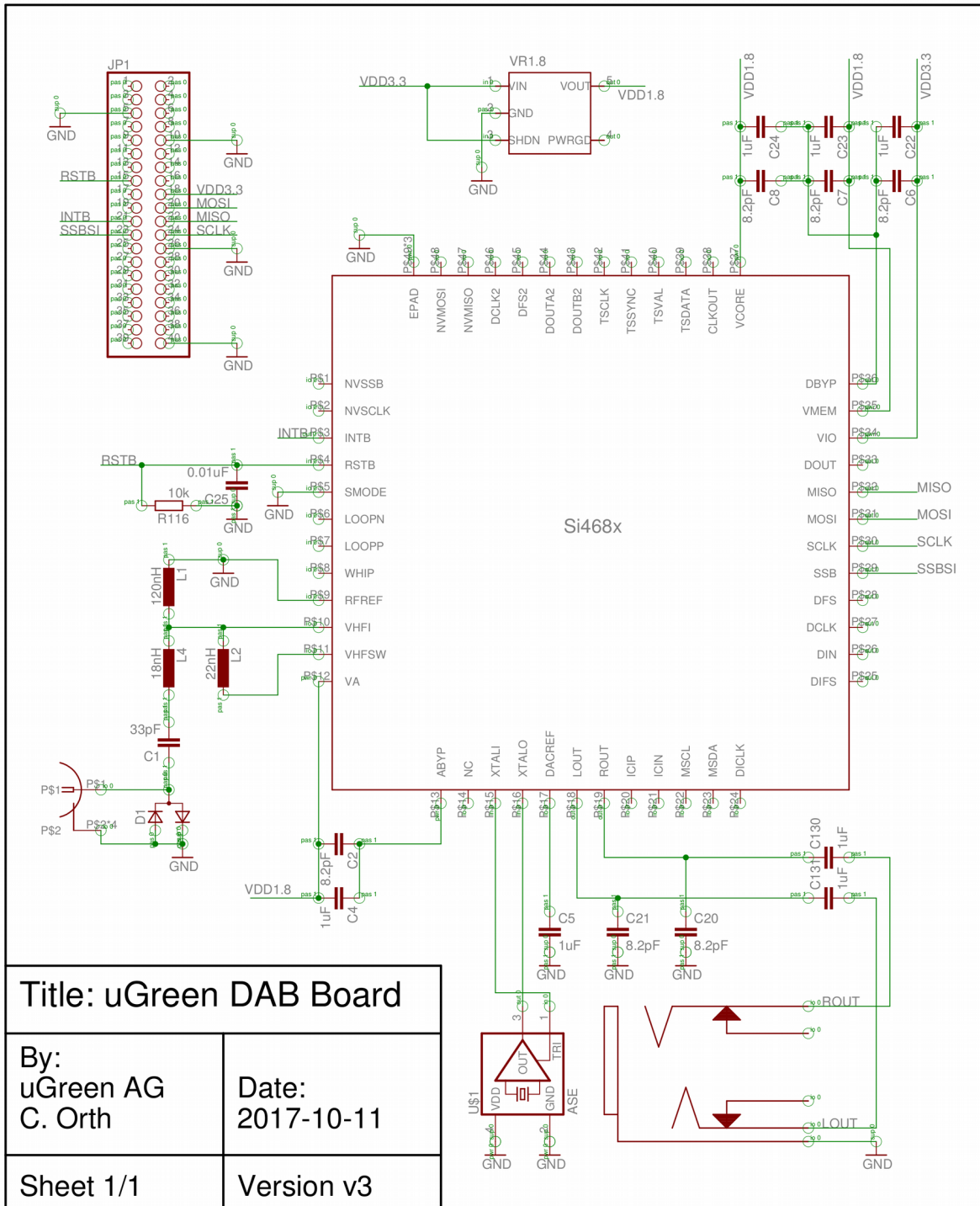
Parameter	Symbol	Test Condition	Min	Max	Unit
I total	I_T	Seperate 5V supply		60.9	mA
P total	P_T	Seperate 5V supply		296.0	mW
Supply Voltage 1	$I_{3.3}$		2.7	3.6	V
High Level Input Voltage	V_{IH}		2.3		V
Low Level Input Voltage	V_{IL}			1.0	V
High Level Output Voltage	V_{OH}		2.7		V
Low Level Output Voltage	V_{OL}			0.7	V

DAB Board

Schematic

Figure 4 shows the board schematic.

Figure 4



4 Terminal Software

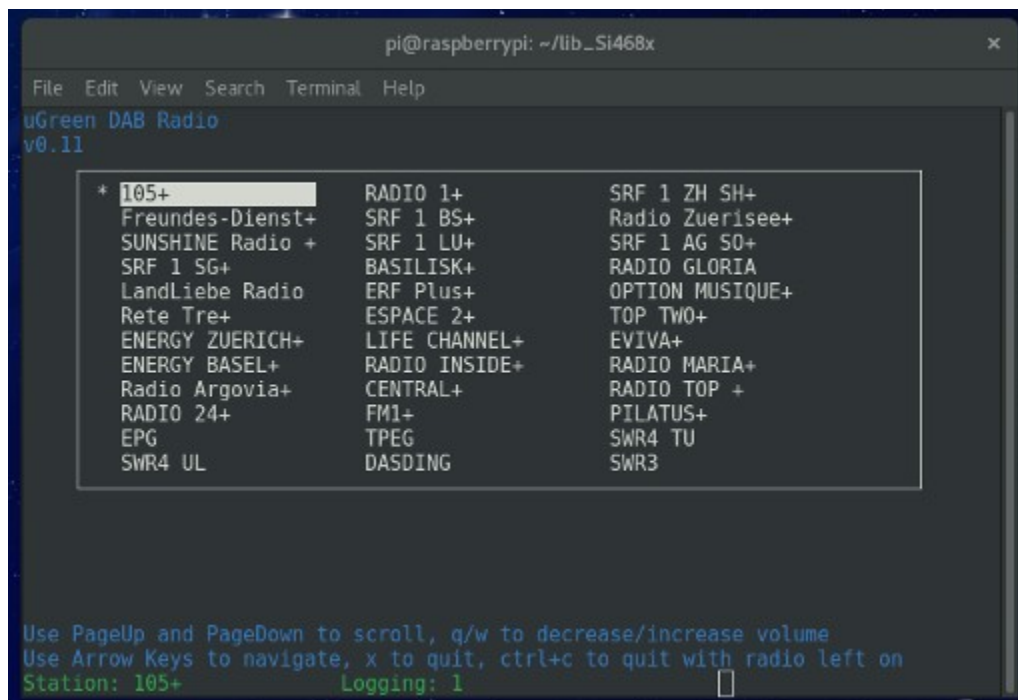
There is a proprietary software available as a terminal program which offers simple radio functionality – upload of the firmware, automated station scanning and station selection. For the software, please contact dabboard@ugreen.eu. The software requires the DAB board to be run and is available under proprietary license only. Copy, change and distribution of the software is not allowed, however, the software and any future updates are freely available for customers of the Raspberry Pi DAB Board. If you obtained a copy of the software not directly from uGreen AG, please contact dabboard@ugreen.eu. The Raspberry Pi DAB Board can be run with any other suiting 3rd party software as well.

The software was tested and developed for the Raspbian operating system. On the first start the software will perform an automatic frequency scan which will take up to a minute. After that, the main program will start (see picture) and list all available DAB stations. Use the arrow keys to navigate through the stations, enter to select a station for playing, x to quit, q/w to decrease/increase the volume and ctrl+c to return to the terminal with the radio left on.

The software stores the station list to a file (do not change that), so at the next start, the main program will start automatically and no station scan is performed. To do a station scan again (because the Raspberry Pi was moved to another place with different stations available), select Rescan from the main menu. The stations shown contain also non-audio, pure data stations, such as TPEG services. Playing these do not lead to an audio signal.

The software has to be run with root privileges to allow access to the GPIO pins of the Raspberry Pi. Start of the software is done by “sudo ./DABBoardRadio”. Optionally, a service ID of a station can be given as a command line argument to start the radio and automatically start playing a specific station. The available service IDs can be read off from the stationlist.txt file after a station scan has been performed. To run the radio with a service ID argument, use the command “sudo ./DABBoardRadio -S 12345”, where 12345 is an example of a service ID.

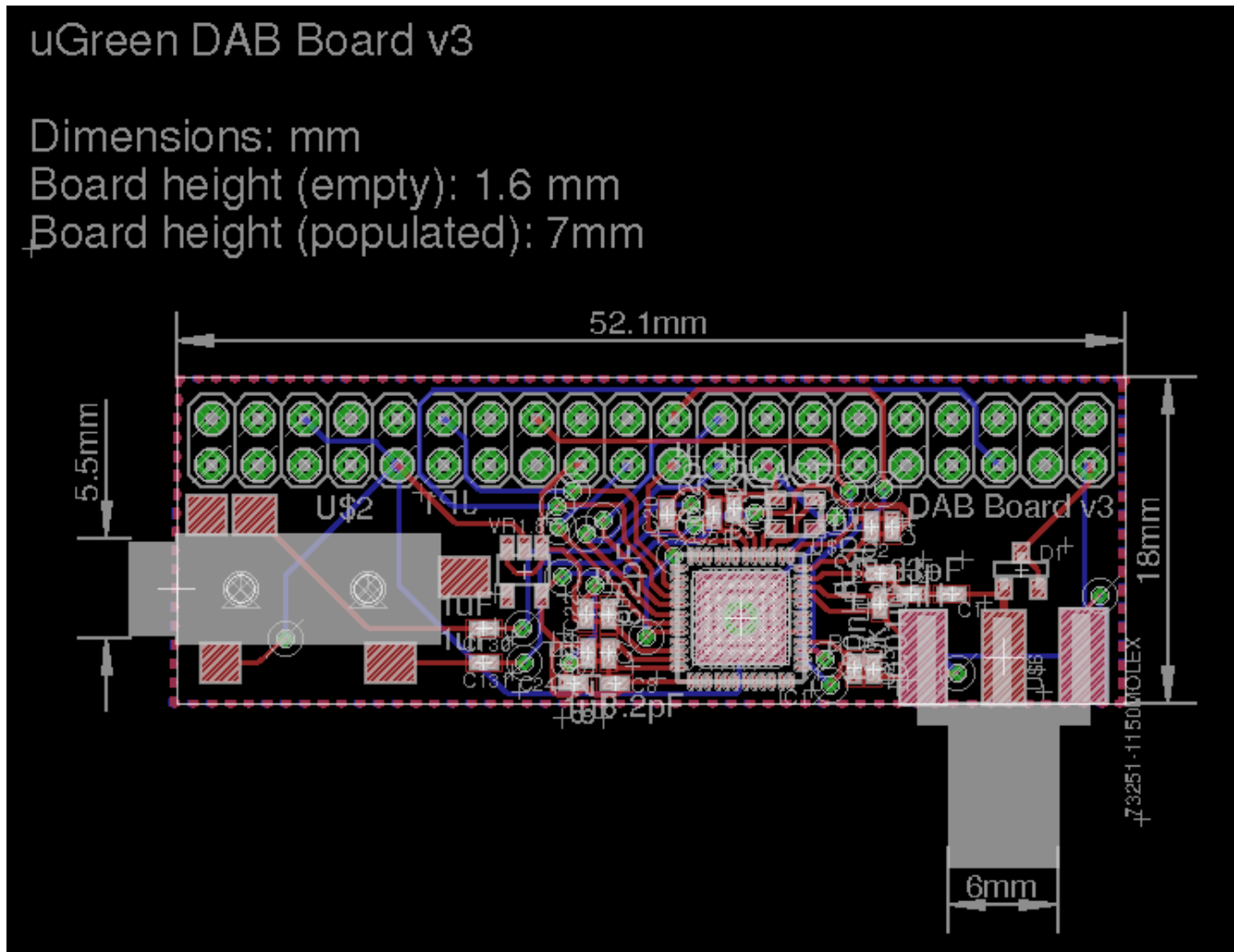
Figure 5



5 Board Dimensions

Figure 6 shows the board dimensions. The 6 mm wide area represents space needed for the SMC connector (not present in the wire antenna version), the 5.5 mm wide area space for the 3.5 mm phone connector.

Figure 6



6 Document Version History

Revision v3

- Adaptation to the new Board v3 Design

Revision v0.12

- Update of product picture.

Revision v0.11

- Added Figure 5 and board dimensions
- Added DC characteristics
- Added note on the start with station functionality of the software
- Updated function and pin description

Revision v0.1

- Non-production version

7 Contact Information

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