User Manual

Hardware Guide OpenD: CVMDECT + MMI

UM-D-007

Abstract

The abstract must describe the target hardware or software and the purpose of this document. Optionally the measurement method, results and conclusions can be added when applicable.

Contents

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Tables

1 Terms and Definitions

FP	Fixed Part
MMI	Man-Machine Interface
PP	Portable Part
RPI	Raspberry Pi

2 References

[1] https://www.raspberrypi.org/

[2] https://www.st.com/en/evaluation-tools/stm32-nucleo-boards.html

[3] https://www.st.com/content/st_com/en/products/evaluation-tools/product-evaluation-tools/mcu-mpu-eval-tools/stm32-mcu-mpu-eval-tools/stm32-nucleo-boards/nucleo-l476rg.html

[4] Schematic CVM DECT development board

[5] Schematic MMI board

[6] AN-D-235_CVM_Module_Reprogramming_Guide

3 Introduction

The OpenD development hardware has 2 different setups targeting 2 host processors, being a Raspberry Pi or a Nucleo. The Raspberry Pi (RPI) setup is used for a Fixed Part (FP) implementation, while the Nucleo setup targets Portable Part (PP) applications. Both setup use 3 boards:

RPI setup:

- SC14CVMDECT_DB development board
- SC14CVMDECT_DB_MMI_vC (RPI mount)
- Raspberry Pi 3 model B

Nucleo setup:

- SC14CVMDECT_DB development board
- SC14CVMDECT_DB_MMI_vC (Nucleo mount)
- Nucleo L476RG development board

For both solutions the SC1CVMDECT_DB and SC14CVMDECT_DB_MMI_vC boards are the same, the SC14CVMDECT_DB_MMI_vC has 2 different mount options targeting the corresponding host processor.

SC14CVMDECT_DB: Development board containing the SC14CVMDECT module, handling DECT communication.

SC14CVMDECT_DB_MMI_vC: Board that contains MMI functionality (LEDs, buttons etc.) but also handles the interfacing to the host processor.

From development kit perspective these board sets can be ordered in 2 flavours, being the RPI setup or the Nucleo setup. The RPI or Nucleo itself are not included in the kit and should be ordered separately.

This document describes the HW setup of the SC14CVMDECT_DB development board, the SC14CVMDECT_DB_MMI_vC board and the interface of both boards towards the RPI and Nucleo. The RPI and Nucleo themselves are not further explained in detail.

4 User scenarios

This section describes the user scenarios of the development units.

Following scenarios are described:

- Normal operating mode RPI setup
- Normal operating mode Nucleo setup
- Reprogramming CVMDECT_DB

4.1 Normal operating mode RPI/Nucleo setup

The MMI board gives a lot of flexibility with respect to the connections between the module board and the RPI/Nucleo. Basic (default) control is handled via UART, which is connected via the jumpers on J6 of the MMI board. These jumpers connect the UART from the RPI/Nucleo to the UART of the Module board and for normal operation need to be mounted.

The powering of the RPI setup is handled by the USB connector of the RPI, which is the standard RPI adapter (5V/2.5A). Powering of the Nucleo board takes place via the standard USB connection of the Nucleo board. It is important to mount the IDD jumper [2] on the Nucleo board in order to provide maximum current.

The MMI board uses U2 to regulate this voltage down to VBAT_SUP being the 3.3V power supply for the CVMDECT module. For this purpose, the default configuration has R36 and R37 mounted.

To be able to have user interface options different LED and push buttons are available on the MMI board. These can be configured to the wishes of the user, however, might require changes of resistor mountings. As a default setup the following setup is chosen and mounted accordingly:

Table 1: Push buttons

	RPI/Nucleo	CVMDECT module board	Setup
SW1	yes	no	R28(1K), R51 mounted, R21(0R) not mounted
SW2	yes	no	R27(1K), R52 mounted, R22(0R) not mounted
SW3	no	no	R26(1K/18K) not mounted See Note 1 for more information.
SW4	no	yes	R25(18K) mounted, R24(0R) mounted
SW5	no	no	R20(0R), R29(1K/18K) not mounted
SW6	yes	no	Nucleo only

Note 1 R26/R29 value depends on RPI/Nucleo usage versus CVMDECT usage as a push button. For RPI/Nucleo usage the value is 1K and the associated paths towards RPI/Nucleo via GPIO25/26 should be configured as input, while R54/R53 should be mounted and R20/R23 should not be mounted. For CVMDECT usage the value is 18K and then R20/R23 should be mounted while R53/R54 should be unmounted.

Table 2: LEDs

	RPI/Nucleo	CVMDECT module board	Setup
D1	no	yes	R15(0R) mounted
D2	no	yes	R16(0R) mounted
D3	yes	no	R17(0R), R54(0R) mounted
D4	yes	no	R18(0R), R51(0R) mounted
D5	yes	no	R19(0R), R53(0R) mounted, R23(0R) not mounted

Next to the UART connection and MMI possibilities, more interfaces are possible between the CVM module board and the host processor boards. These will be explained in the separate sections. See Section 7 and Section 8.

4.2 Reprogramming of CVMDECT module board.

Due to the existence of different stacks for different application areas it might be needed to reprogram the stack of the CVMDECT module board. The following flavors exist:

Fixed Part application (implemented on RPI setup)

- FP Legacy stack (default)
- FP Hanfun stack

Portable part application (implemented on Nucleo setup)

- PP Legacy stack (default)
- PP Hanfun stack

If the user wants to change stack dependent on the intended application, stack needs to be reprogrammed. There is no risk of ending up with a useless device as you can always reprogram back to the previous stack.

For reprograming the CVMDECT module board needs to be taken off of the MMI board, so it can operate stand-alone.

The powering will be handled directly by the USB connection on the CVMDECT module board. In order make this connection active 2 jumpers on the CVMDECT board need to be mounted (J3). Please check the picture below for the correct HW setup for reprogramming.

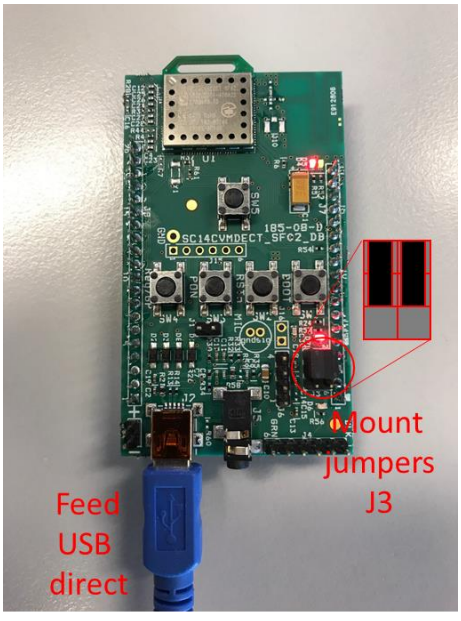

Figure 1 Connection setup for reprogramming

The details for reprogramming can be found here [6].

Once the programming has taken place be sure to unmount the jumpers again!

5 SC14CVMDECT_SF01_DB

Figure 2 shows the top side of SC14CVMDECT_SF01_DB. All relevant interfaces are indicated

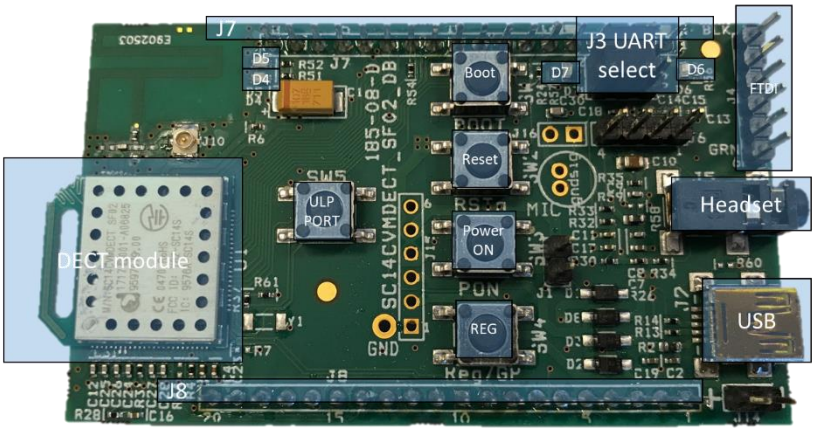

Figure 2 Overview of the SC14CVMDECT_DB_SF01

5.1 HW components

(Mini) USB: Powers the board (5Volt) and assigns a virtual com port to the development board (using on-board FTDI chip that converts from USB to UART, so FTDI driver must be installed). To be able to communicate over this interface the jumpers must be set to left positions (close to the Boot button). When the board is mounted on the MMI board in combination with an RPI or Nucleo no jumpers should be placed as the UART is connected to the respective host processor.

FTDI: FTDI cable is required for this interface. When using this FTDI cable the board is powered (5Volt) and a virtual comport is assigned to the development board (FTDI driver must be installed). To be able to communicate over this interface the jumpers must be shifted to the right position (close to the FTDI connector). When the board is mounted on the MMI board in combination with an RPI or Nucleo no jumpers should be placed as the UART is connected to the respective host processor.

Headset: A headset can be connected to this connected for using the audio channels.

J7, J8: General Purpose connectors, these connectors can be used to solder wires or components or to piggy bag the development board onto the MMI board.

Buttons: There are five buttons on the SC14CVMDECT_DB; in following order:

PON	Power-ON button
Reset	Reset button
Reg/GP	General Purpose

Boot	Boot button
SW5	ULP port button

LEDs: There are three red LEDs and one green LED on the board. The red ones are power LEDs:

D4	(Red) Indicating that the Module is powered
D7	(Red) Indicating that the USB connector is powered
D6	(Red) Indicating that the FTDI connector is powered
D5	(Green) General purpose

Jumpers: The jumpers are used to select the UART-communication port. There are three options:

Jumpers on the side of the Boot button: USB port selected

Jumpers on the side of the FTDI connector: FTDI port selected

No jumpers: only communication with MMI board possible, intended mode for RPI/Nucleo setup

5.2 Schematic

Further details of the board are given in the schematic [4].

6 SC14CVMDECT_DB_MMI

Figure 3 shows a visual presentation of the MMI board

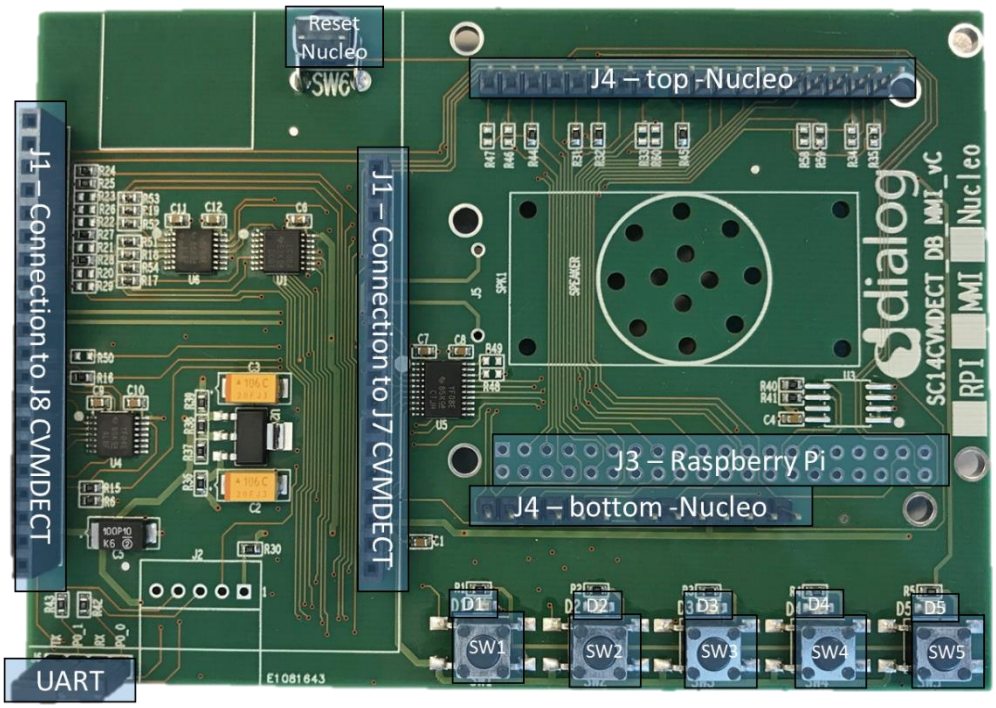

Figure 3 Overview of the SC14CVMDECT_DB_MMI

6.1 HW components

J1: These headers are used to piggy bag the MMI board and the CVMDECT development board. The component consists of 2 separate connectors, to be place on J7 and J8 of the CVMDECT board respectively.

J3: Header to connect to Raspberry Pi. Only placed in case of RPI setup.

J4: This component uses 2 headers to connect to a Nucleo host processor board. During development of the OpenD, the Nucleo-L476RG has been used.[3] Only placed in case of Nucleo setup.

UART: This header connects the UART of the MMI board of the UART of RPI and Nucleo respectively. For host processor control these jumpers need to be placed (defaulted in the kit)

Buttons: All buttons, except SW6, are general purpose, but may require dedicated resistor placement. For the default setup and the possible options, please refer to Section 4.1. SW6 is only used for Nucleo setup and is implemented as a reset button. In case of the Nucleo setup this button is mounted, for RPI it is omitted.

LEDs: All LEDs are general purpose but may require dedicated resistor placement. For the default setup and the possible options, please refer to Section 4.1.

Speaker: The speaker is connected to the CLASSD outputs of the SC14CVMDECT module. This allows the user to produce loud audio for ringer sounds, hands free calling, etc.…

6.2 Schematic

Further details of the board are given in the schematic [5].

7 RPI setup

Figure 4 shows the full Raspberry PI setup, having both CVM DECT module board and RPI mounted on the MMI board.

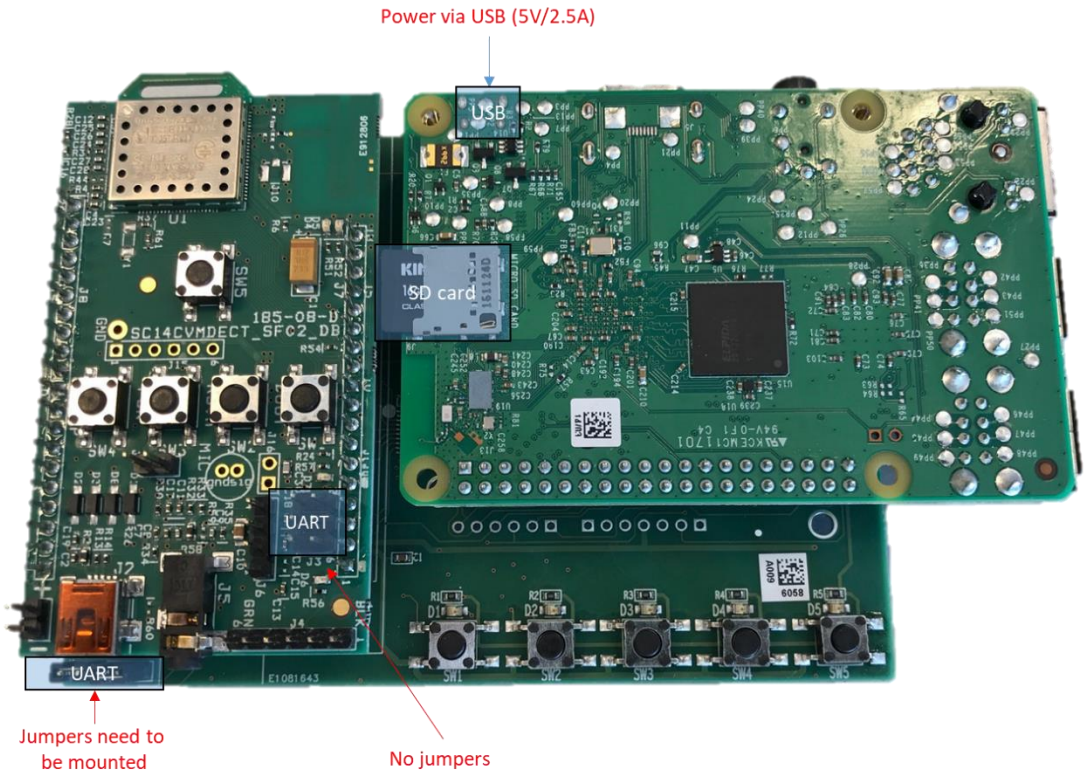

Figure 4 Full Raspberry Pi setup

The setup is powered via the USB of the RPI. For the correct UART connections the jumpers on the MMI board should be mounted, while the CVMDECT module board should have no jumpers installed.

8 Nucleo setup

Figure 5Figure 4 shows the full Raspberry PI setup, having both CVM DECT module board and RPI mounted on the MMI board.

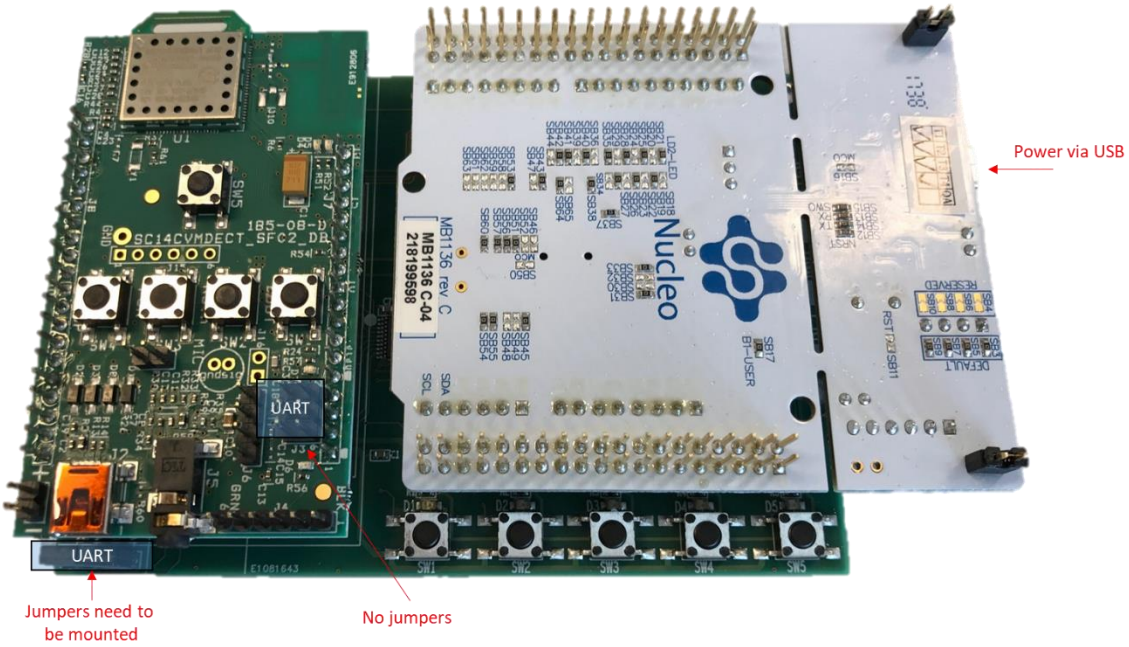

Figure 5 Full Nucleo setup

The setup is powered via the USB of the Nucleo. For the correct UART connections the jumpers on the MMI board should be mounted, while the CVMDECT module board should have no jumpers installed.

Revision History

Revision	Date	Description
1.1	19-Jan-2022	Updated logo, disclaimer, copyright.
1.0	13-Sep-2019	Initial version.

Status Definitions

Status	Definition
DRAFT	The content of this document is under review and subject to formal approval, which may result in modifications or additions.
APPROVED or unmarked	The content of this document has been approved for publication.