

## Evaluation Kit Including the CRD42L42-MFi and CDB42L42-MFi

### Kit Features

- CRD board in compact form factor
- CDB board accommodates debug headers
- MCU example code
- iOS demonstration application

### CS42L42 Features

- Dual DAC and ADC with 114 dB dynamic range
- Integrated 35mW stereo headphone amplifier
- Low-noise microphone bias output
- Sidetone mixer with EQ

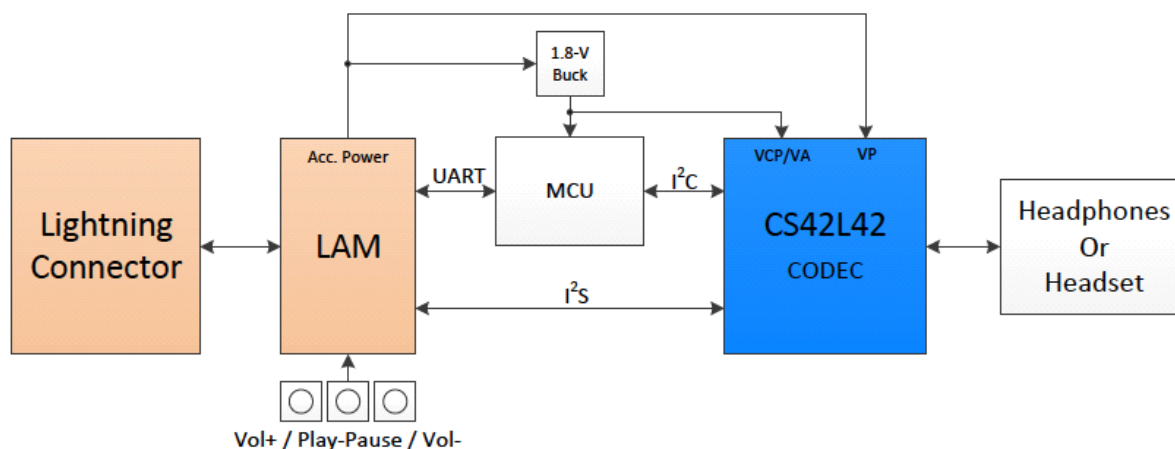
### Description

The CRD42L42-MFi board is a dedicated platform for developing headsets with the Apple® Lightning® connector. It uses the CS42L42 CODEC to enable a HiFi audio experience when listening to music, videos, or taking phone calls. MCU example code is included to accelerate development of an MFi-compliant product.

The CRD42L42-MFi also serves as a component layout and reference design for a CS42L42-based MFi product.

### Ordering Information

- CRD42L42-MFi Evaluation Kit



**CRD42L42-MFi Block Diagram**

### Target Product Information

This document contains information for a product under development. Cirrus Logic reserves the right to modify this product.

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## 1 Kit Overview

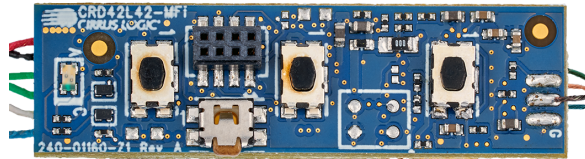
This kit includes an example form factor reference design (CRD) and development board (CDB). The CS42L42 CODEC combines a stereo DAC with headphone amplifiers and includes a microphone interface for headsets. Performance is enhanced by using the digital audio interface provided on iOS devices. System power is optimized by the four-level class H headphone amplifier.

These demonstration boards make use of the Apple Lightning Audio Module (LAM) to create accessories that plug into the Lightning connector on Apple devices running iOS 7.1 or later.

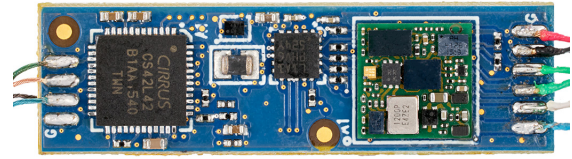
Included on the board is an MCU that interprets control messages from the LAM and configures the CS42L42 as shown in the [CRD42L42-MFi Block Diagram](#) on [p. 1](#).

The following items are included in the kit:

- CRD42L42-MFi (Fig. 1-1)
- CDB42L42-MFi (Fig. 1-2)
- Headset
- 3.5mm coupler
- Enclosure for CRD

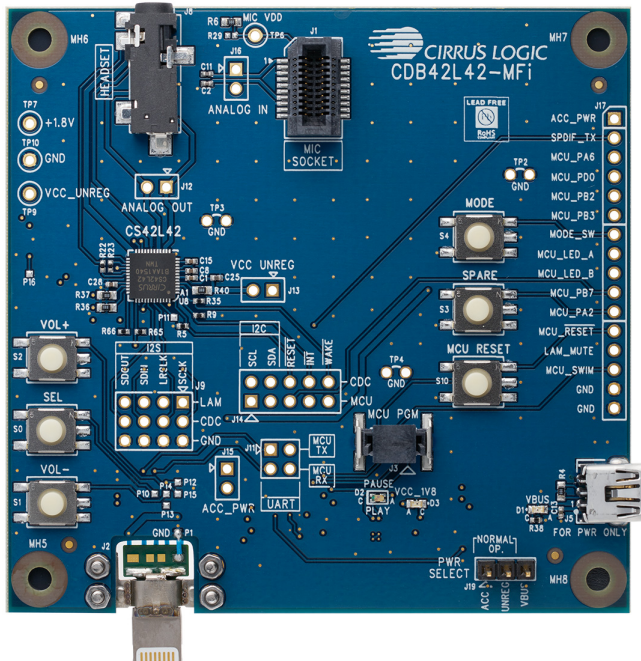


Top

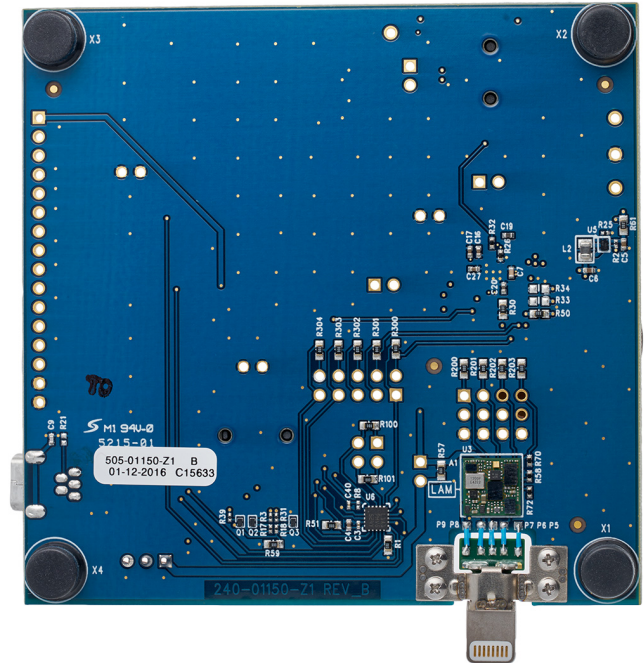


Bottom

Figure 1-1. CRD42L42-MFi



Top



Bottom

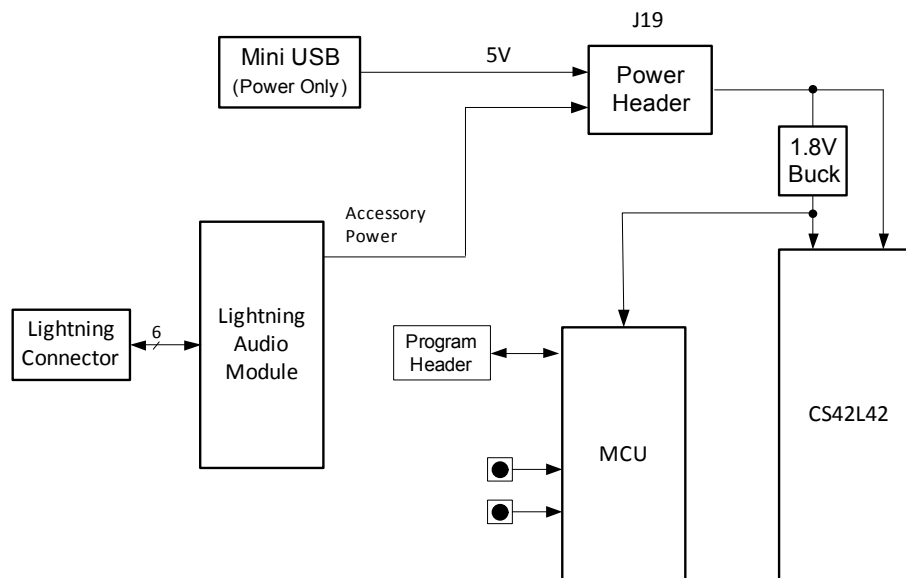
Figure 1-2. CDB42L42-MFi

## 2 Operation

The following sections describe the operating features of the boards.

### 2.1 Power

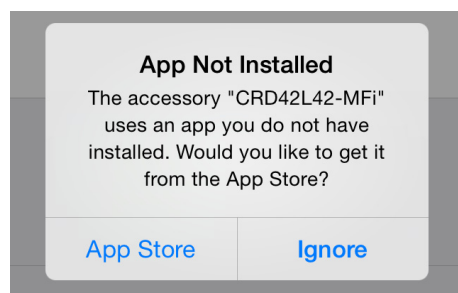
The LAM is powered via the Lightning Connector from the iOS device, which provides accessory power to the board. The CRD42L42-MFi includes a mini USB connector that is not used in normal operation.



**Figure 2-1. CDB Power Connections**

### 2.2 iOS Communication

Inserting the Lightning connector into an iOS device for the first time may cause the iOS device to display the “App Not Installed” message as shown in Fig. 2-2. This message can be ignored. The demonstration board pre-configures the LAM with the App Identifier Information (accPreferredAppBundleIdentifierInformation) instead of a null string.

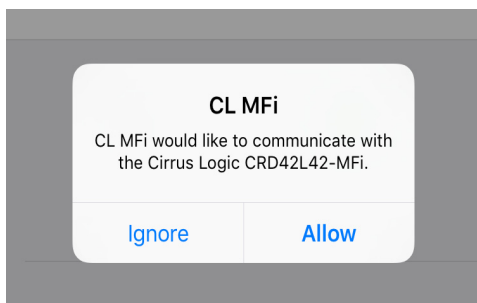


The MCU code configures the LAM with information regarding the preferred app and this causes the iOS device to display a message. This message can be ignored.

**Figure 2-2. App Not Installed Message**

Cirrus Logic has created an application (app) example to demonstrate how the accessory can request communication with the app. The app is not required for operation.

The source code for the app is included in the installer contents. The source code may be modified as required by opening the Xcode project. The app can be built and tested on your iOS device. After the app has been installed, pressing the MODE button on the CDB or CRD will cause the iOS device to prompt for allowing the app to communicate as shown in Fig. 2-3.



The MCU code sends a request for an APP launch when the side button is pressed on the CRD.

**Figure 2-3. Communication Request**

Press “Allow”, and the Cirrus Logic app opens as shown in [Fig. 2-4](#).



Cirrus Logic - CL MFi Application opening screen.

**Figure 2-4. CL MFi app**

## 2.3 LAM Controls

The following push switches connect directly to the LAM module and are provided for LAM control (See [Fig. 2-5](#)):

- Vol + (volume up)
- Vol – (volume down)
- SEL (Center - function select)

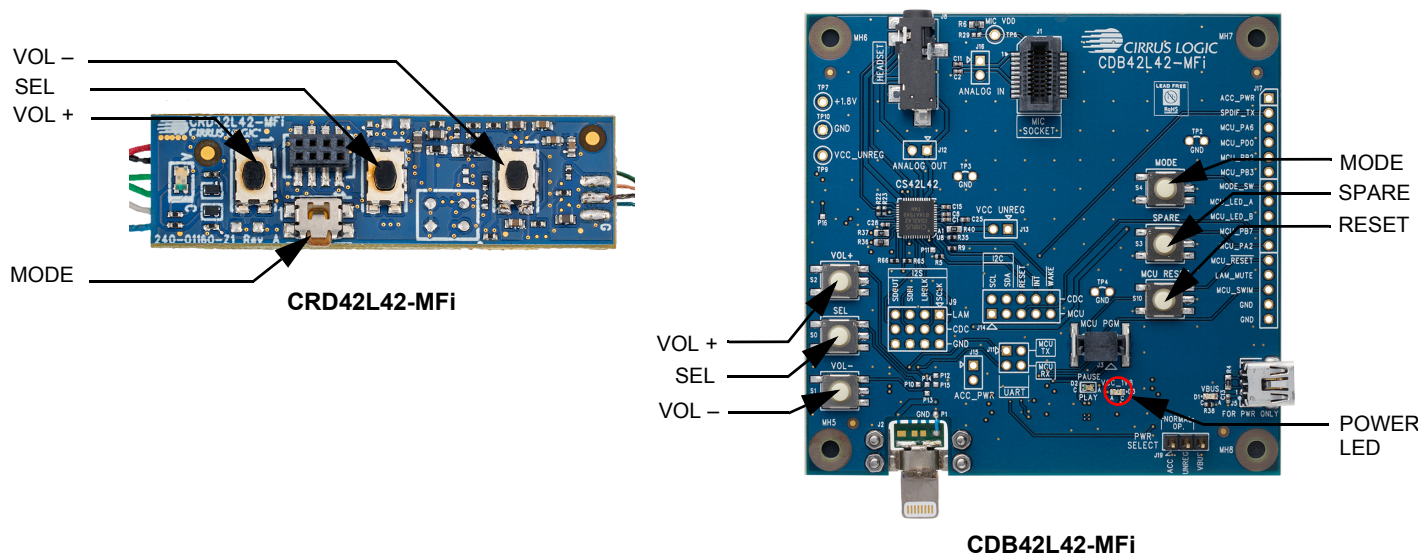
For more information on these controls, refer to the Accessory Interface Specification referenced in [Section 6](#).

## 2.4 MCU Controls

The following push switches connect directly to the MCU and are provided for MCU control (See [Fig. 2-5](#)):

- MODE (request the CL MFi app)
- RESET – MCU reset (CDB42L42-MFi only)
- Spare – available for use by customer software (CDB42L42-MFi only)





**Figure 2-5. LAM and MCU Controls**

## 2.5 Indicators

The CDB includes a green LED indicator that is on whenever the Lightning connector is inserted into a device that is powered.

The CRD and the CDB include a dual LED that can glow either green or red under control of the MCU.

- Inserting the Lightning connector into an iOS device that is using audio services causes the LED to light green when the audio is switched over to the accessory.
- Inserting the Lightning connector into an iOS device with a locked screen does not turn on the green or red indicators.
- Launching an app that uses audio turns on the green LED, and pausing the audio for a few seconds turns on the red LED. (If an app is keeping the microphone active, then the green LED will stay on and the red LED will not light. An example is a recording app that keeps the microphone active during playback of the recording.)
- After the iOS device has been idle (in terms of audio use) for several seconds, the LEDs are turned off to save power.

## 2.6 Headset Mode

The demonstration firmware that is programmed into the boards implements a digital headset. The CDB42L42-MFi will adapt to the type of headset that is plugged into the HEADSET jack, J8.

## 2.7 Microphone Evaluation

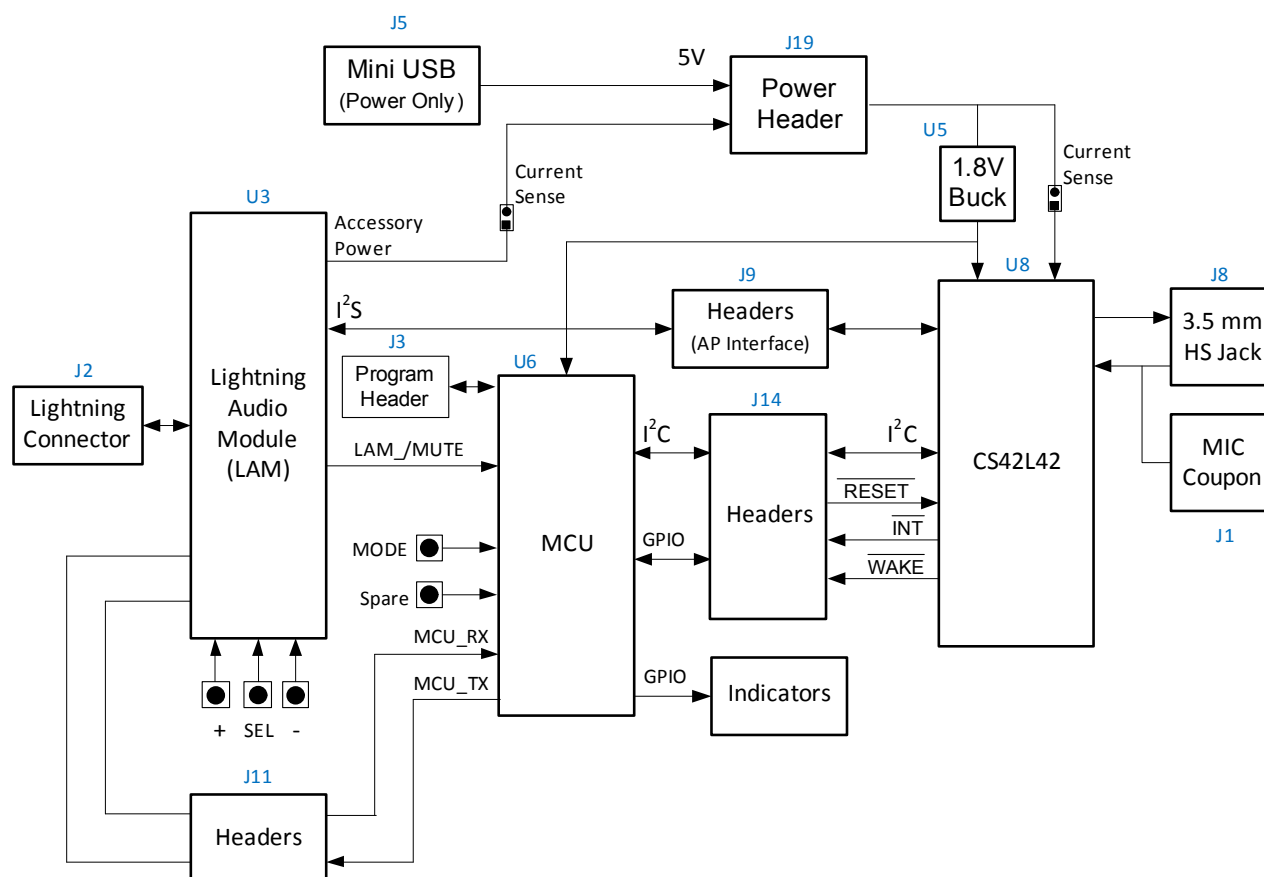
The demonstration system is designed to work with a headset that includes a microphone. When using headphones (that do not include the microphone), it is possible to add a microphone to the system. The CDB42L42-MFi includes a connector that mates with Cirrus Logic mini MEMS boards. Contact your Cirrus Logic representative for more information.

The CRD42L42-MFi schematic (See [Section 8.3](#)) shows how a MEMS microphone can be designed into the circuit. The microphone is not populated on the board.

## 2.8 CDB With External Control (advanced development only)

The CDB42L42-MFi is designed primarily to support MFi development, but is also useful for evaluating the CS42L42 using external controls. Using the headers and jumpers (see [Section 2.9](#)), the system may be reconfigured for control by an external MCU.

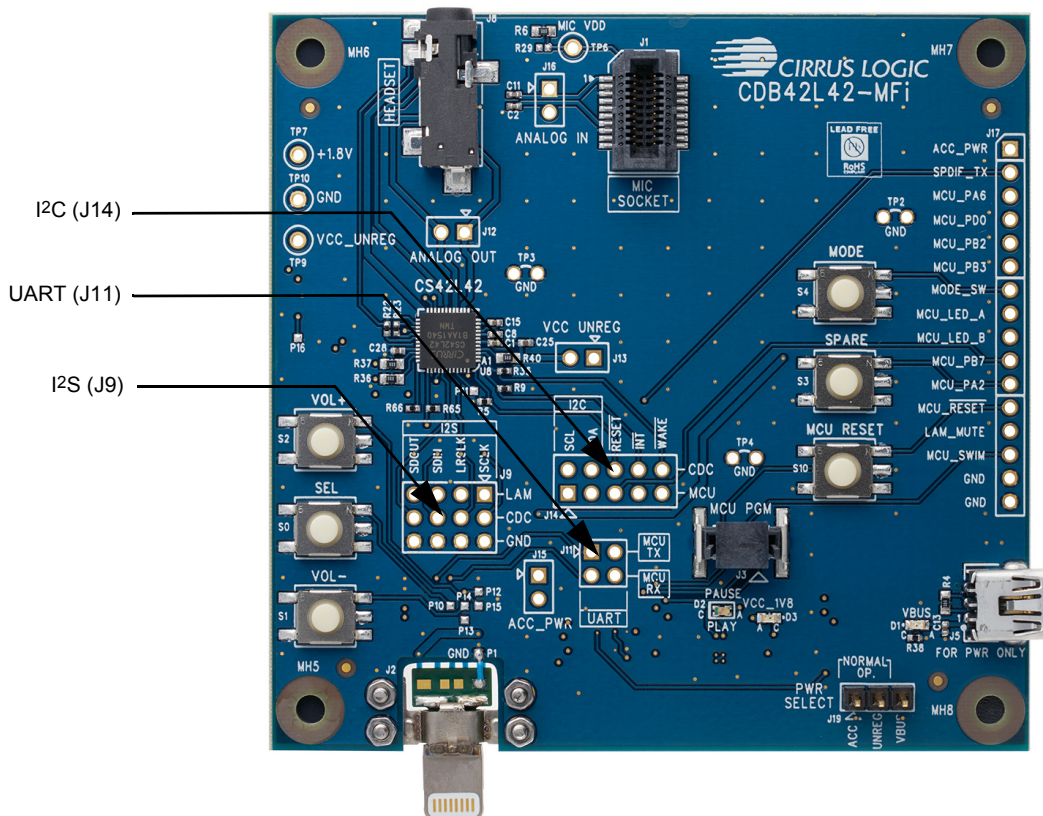
A block diagram of the entire board is shown in [Fig. 2-6](#).



**Figure 2-6. CDB42L42 MFi Block Diagram**

## 2.8.1 CDB External Signal Connections

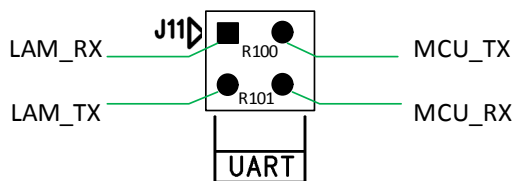
The following sections provide details of the connections between the LAM, the MCU, and the CS42L42. The general location of the jumpers discussed in [Section 2.8.2](#), [Section 2.8.3](#), and [Section 2.8.4](#) is shown in [Fig. 2-7](#).



**Figure 2-7. CDB Header Locations**

## 2.8.2 LAM to MCU Communication

The MCU and LAM communicate over a full duplex UART channel. The UART signals are available at J11 and are routed through R100 and R101 as shown on the schematic. Remove the resistors to break the connection between the LAM and the MCU to drive the signals externally. See [Section 8.3 - Obtaining Cirrus Logic App](#), [Fig. 2-8](#) and [Table 2-1](#).



**Figure 2-8. CDB42L42-MFi - J11 Connections**

**Table 2-1. LAM to MCU Communication Signals**

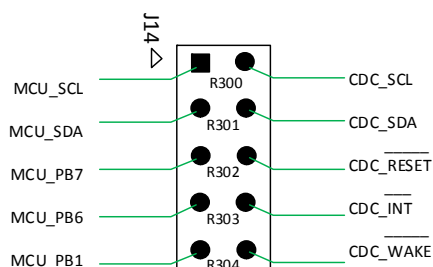
Name	Description	Ref	No. Pins	Pin	Signal
UART Header	Access to UART TX/RX Data <sup>1</sup>	J11	4	1	LAM_RX
				2	MCU_TX
				3	LAM_TX
				4	MCU_RX

1. Not populated at delivery. To use this feature, remove the indicated resistors (if any) and install the correct header.



### 2.8.3 MCU to CS42L42 Communication

The MCU and CS42L42 communicate over an I<sup>2</sup>C channel with the MCU as the master. These signals are accessible at J14 are routed through R300, R301, R302, R303, and R304 as shown in the schematic. Remove the resistors to break the connection between the CS42L42 and the MCU to drive the signals externally. See [Section 8.3 - Obtaining Cirrus Logic App](#), [Fig. 2-9](#) and [Table 2-2](#).



**Figure 2-9. CDB - J14 Connections**

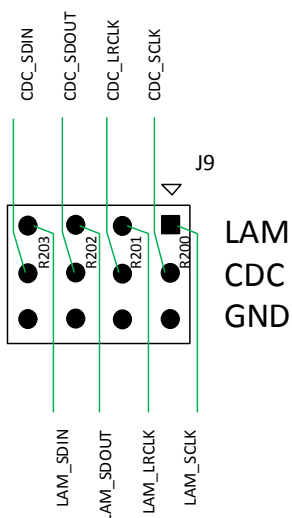
**Table 2-2. MCU to CS42L42 Communication Signals**

Name	Description	Ref	No. Pins	Pin	Signal
I <sup>2</sup> C and MCU GPIO	Access to I <sup>2</sup> C and MCU GPIO <sup>1</sup>	J14	10	1	MCU_SCL
				2	CDC_SCL
				3	MCU_SDA
				4	CDC_SDA
				5	MCU_PB7
				6	CDC_RESET
				7	MCU_PB0
				8	CDC_INT
				9	MCU_PB1
				10	CDC_WAKE

1. Not populated at delivery. To use this feature, remove the indicated resistors (if any) and install the correct header.

## 2.8.4 LAM to CS42L42 Digital Audio

The digital audio signals between the LAM and the CS42L42 (CDC) are available at J9 and are routed through R200, R201, R202, and R203 as shown on the schematic. Remove the resistors to break the connection between the CS42L42 and the LAM to drive the signals externally. See [Section 8.3 - Obtaining Cirrus Logic App](#), [Fig. 2-10](#) and [Table 2-3](#).



**Figure 2-10. CDB - J9 Connections**

**Table 2-3. LAM to CS42L42 Digital Audio Signals**

Name	Description	Ref	No. Pins	Pin	Signal
Audio Serial Port	Access to Serial Audio data <sup>1</sup>	J9	12	1	LAM_SCLK
				2	CDC_SCLK
				3	GND
				4	LAM_LRCLK
				5	CDC_LRCLK
				6	GND
				7	LAM_SDOUT
				8	CDC_SDIN
				9	GND
				10	LAM_SDIN
				11	CDC_SDOUT
				12	GND

<sup>1</sup>. Not populated at delivery. To use this feature, remove the indicated resistors (if any) and install the correct header.

## 2.9 Other CDB Headers and Jumpers

This section contains information for additional jumpers and headers implemented on the CDB42L42-MFi.

**Table 2-4. Jumpers**

Name	Description	Ref	No. Pins	Selection	Configuration
ACC_PWR	Test Point	J15	2	1-2 (default)	Remove jumper and R57 for ACC_PWR current measurement.
VCC_UNREG	Test Point	J13	2	1-2 (default)	Remove jumper and R40 for VDD_UNREG current measurement.
PWR_SELECT	VCC Power Selection	J19	3	1-2 (default) 2-3	Select VCC from LAM interface Select VCC from USB interface

**Table 2-5. Headers**

Name	Description	Ref	No. Pins	Pin	Signal
MCU_PGM	MCU Programming Interface – This connector is designed to be compatible with the programming device ST-LINK/V2 available from ST Microelectronics.	J3	4	1	VCC_1V8
				2	MCU_SWIM <sup>1</sup>
				3	GND
				4	MCU_RESET
USB_MINI	USB connector – As described in <a href="#">Section 2.1</a> , this connector is not normally used. It can be used to provide power to the MCU for programming. Power source selection is made by configuring jumper J19 PWR SELECT (see <a href="#">Table 2-4</a> ). When the mini USB source is selected by J19, the LAM is not powered and cannot be configured by configuration packets received from the MCU.	J5	7	1	VBUS
				2	D–
				3	D+
				4	ID
				5	GND
				6	SHIELD
				7	SHIELD
J17	Test Points <sup>2</sup>	J17	16	1	ACC_PWR
				2	SPDIF_TX
				3	MCU_PA6
				4	MCU_PD0
				5	MCU_PB2
				6	MCU_PB3
				7	MODE_SW
				8	MCU_LED_A
				9	MCU_LED_B
				10	MCU_PB7
				11	MCU_PA2
				12	MCU_RESET
				13	LAM_MUTE
				14	MCU_SWIM
				15	GND
				16	GND

**Table 2-5. Headers**

Name	Description	Ref	No. Pins	Pin	Signal
MIC	MIC coupon slot – This connector may be used as described in <a href="#">Section 2.7</a> .	J1	20	1	HSIN+
				3	VCC_1V8
				5	GND
				13	HSIN–
				15	GND
				2,4,6,7,8,9,10,11,12,14, 16, 17, 18, 19, 20	N/C
ANALOG_OUT	Headphone analog audio output test points <sup>2</sup>	J12	2	1	OUTA_TP
				2	OUTB_TP
MIC	MIC analog audio test points <sup>2</sup>	J16	2	1	MICP_TP
				2	MICN_TP

1. Single Wire Interface Module for programming and debugging MCU. See [Section 6](#) for MCU resources.

2. Not populated at delivery. To use this feature, remove the indicated resistors (if any) and install the correct header.

## 3 Firmware

The Accessory Interface Specification is the source of information for using the Apple Lightning Audio Module (LAM) to create an accessory. The MCU on both the CRD42L42-MFi and the CDB42L42-MFi is delivered pre-programmed with default firmware that supports demonstration of a digital headset using the LAM. The MCU executes this software at power on and autonomously configures the CS42L42 and manages the LAM to CS42L42 I2C control interface.

### 3.1 MCU Overview

The STM8L101F3U6ATR from ST Microelectronics is the MCU implemented in the CDB42L42-MFi.

#### 3.1.1 GPIO Connections

[Table 3-1](#) lists the I/O used in this application.

**Table 3-1. MCU GPIO Assignments**

Port	Function	Jumper Number		Notes	I/O
		CDB	CRD		
GPIOA, GPIO_Pin_2	SPARE button input	J17-11	P7	(CDB only)	I
GPIOA, GPIO_Pin_6	Test Point	J17-3	P22		I
GPIOB, GPIO_Pin_0	monitor /INT	J14-7	/INT		I
GPIOB, GPIO_Pin_1	monitor /WAKE	J14-9	/WAKE		I
GPIOB, GPIO_Pin_2	test output **DEBUG	J17-5	NC		O
GPIOB, GPIO_Pin_3	test output **DEBUG	J17-6, GND (R1)	NC	GND on CDB	*
GPIOB, GPIO_Pin_4	MODE button input	J17-7	side button		I
GPIOB, GPIO_Pin_5	LED_A out, RED	J17-8	RED		O
GPIOB, GPIO_Pin_6	LED_B out, GREEN	J17-9	GREEN		O
GPIOB, GPIO_Pin_7	output /RESET	J17-10, J14-5	/RESET		O
GPIOC, GPIO_Pin_4	Monitor LAM_/MUTE	J17-11	LAM_/MUTE		I
GPIOD, GPIO_Pin_0	ADC test mode	J17-4	J1-2		I

### 3.1.2 Serial Interface to LAM

The default serial interface mode of the LAM is 57600 bps using 8 data bits, no parity bits and one stop bit. This information is provided in the Accessory Interface Specification (See [Section 6](#) for more information about the Accessory Interface Specification)

### 3.1.3 I2C Master

The CS42L42 is configured to communicate as an I2C slave. The CS42L42 address is 0x48 as shown in Section 4.16.1 of the CS42L42 datasheet.

## 3.2 Bootloader

As detailed in the Accessory Interface Specification (Section 4.13.6 - Firmware Update), the accessory's firmware can be updated by an end user from an Apple product (running iOS or OSX).

The app described in [Section 2.2](#) may be modified to perform a firmware update. After the Xcode project has been built (including the new.s19 file), the Update feature will load the new firmware into the CDB or CRD.

The MCU on both the CRD42L42-MFi and the CDB42L42-MFi is delivered pre-programmed with default firmware that implements a custom bootloader. This bootloader (BL) is permanently write-protected in the user boot code (UBC) area of the MCU. The BL manages MCU memory to ensure that under all conditions the accessory's firmware can be updated via the Lightning interface.

Starting Address	Starting Block	Total Bytes	Name	Protected?
0x8000	1	128	Interrupt Vector Table (IVT)	Yes
0x8080	3	2112	Bootloader (BL)	Yes
0x88C0	35	128	FC Interrupt Vector Table (FC IVT)	No
0x8940	37	5760	Firmware Code (FC)	No
0x9FC0	128	64	EEPROM	No

**Figure 3-1. Memory Map**

The BL code is always executed immediately after MCU reset. Under normal conditions, the BL will then transfer control to the Firmware Code (FC). In the event that the integrity of the FC cannot be assured, the system will enter a mode that is waiting for an update from the CL MFi app on the iOS device.

To determine the integrity of the FC, the BL reads several locations in the FC IVT (See [Fig. 3-1](#)) to verify that the FC has been properly loaded. The FC IVT is always the last location programmed when new FC is loaded.

After the code has successfully loaded during a firmware update, the host and the BL agree that the FC has been properly loaded and then the BL transfers control to the FC.

## 3.3 Initialization

The MCU includes an internal power on reset (POR) circuit. At a POR event, the MCU firmware executes and the following actions occur:

- LAM Initialization Packets

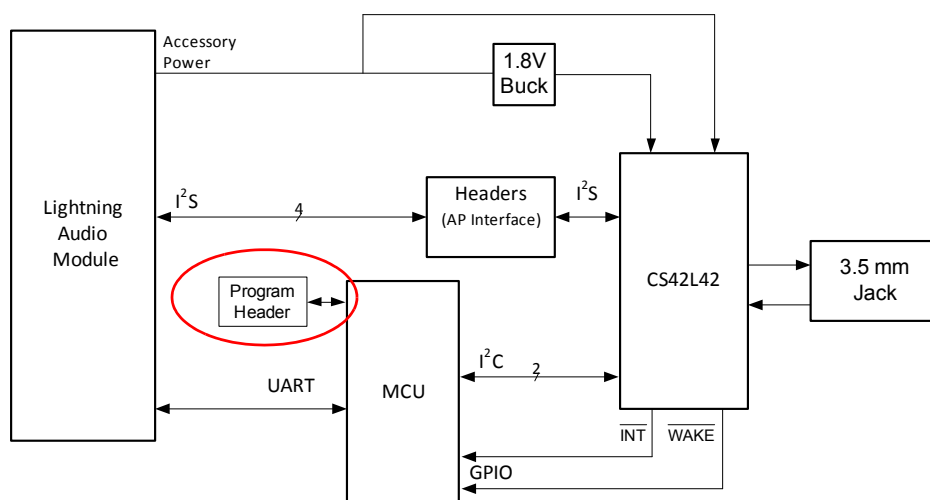
As detailed in The Accessory Interface Specification, the MCU confirms the operating state of the LAM by sending the accReady packet once a second until a lamReady packet is received in response. The LAM is configured to "I2S role (host)" in accConfigurationInformation.



- **GPIO**  
The MCU configures the GPIO for use as described in [Table 3-1](#).
- **CS42L42 Initialization**  
The MCU brings the CS42L42 out of reset and initializes it to the correct operational configuration.
- **Volume**  
The MCU only applies a volume setting when a volume change is received from the LAM.
- **Plug detect**  
The MCU configures the CS42L42 for plug detection so that the  $\overline{\text{WAKE}}$  pin indicates the plug status.

## 3.4 Firmware Customization

The user can change the MCU program for product differentiation. An MCU programming header/interface is provided on the CDB42L42-MFi as shown in [Fig. 3-2](#). This allows a convenient and rapid development environment for prototyping and testing MCU software.



**Figure 3-2. CBD42L42-MFi MCU Programming Header**

The STM8L101F3 MCU provided on the CRD42L42-MFi and CDB42L42-MFi is not supported directly by Cirrus Logic; however, information about development tools and technical support is available at the manufacturer's web site.

See [Section 6](#) for more information about the MCU.

### 3.4.1 Customer Specific Firmware

The LAM includes non-volatile memory that must be configured. This is performed during factory test of the board. Company and product specific information is stored in the accessory as shown in [Section 3-3](#). This information must be customized to create production firmware. The configuration information can be customized by editing the appropriate fields in the source firmware and re-compiling the code. Contact your Cirrus Logic representative for additional information.



**Figure 3-3. Company and Product Specific Information**

## 4 CRD42L42-MFi Connections

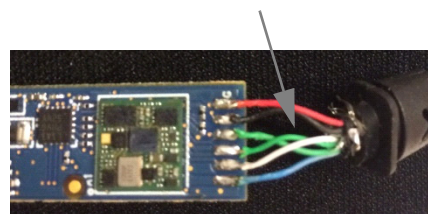
This section provides details about the connection of the headset/headphone and LAM cables to the CRD42L42-MFi board and information about the MCU programming interface. These cables are attached the CRD42L42-MFi at the factory.

### 4.1 Lightning Cable Connections

A diagram showing how the wires from the Lightning interface cable attach to the CRD is shown in [Fig. 4-1](#).



Trim all shield material leaving only the six colored wires as shown.



**Figure 4-1. Wiring Diagram – Lightning Cable to CRD42L42-MFi**

The cable includes two green wires, and it is necessary to distinguish the twisted pair made up of one green wire and one white wire. The wires must be soldered to the pads on the pendant style CRD42L42-MFi as described in [Table 4-1](#).

**Table 4-1. Lightning Cable Wiring Definition**

Schematic	U1 Pad	Signal Name	Color	Notes
P6	A1 (GND)	Ground 1	Red	
P4	E4	LAM_DW	Black	
P5	D5	LAM_GND	Green	

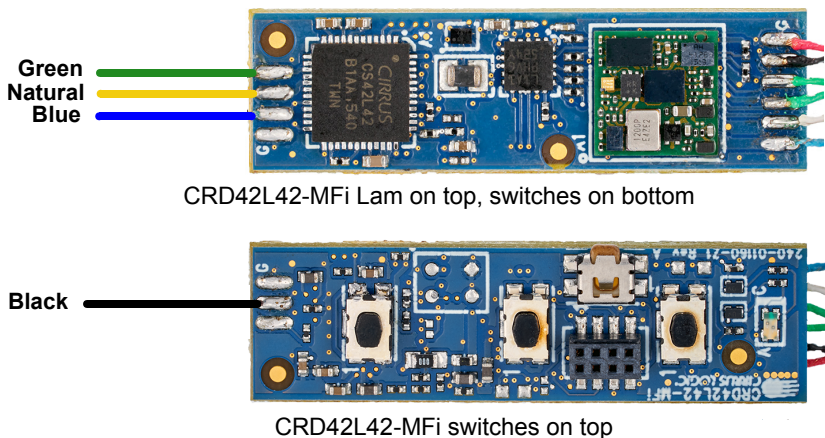
**Table 4-1. Lightning Cable Wiring Definition**

P3	C5	LAM D-	Green	Twisted Pair
P2	B5	LAM D+	White	
P1	A5	LAM_PWR	Blue	

**Note:** Referenced Schematic: Part No. LTN1000-001, REV.X7  
See [Section 8.1.1](#) for this document.

## 4.2 Headset Cable Connections

The CRD42L42-MFi headset connections are shown in [Fig. 4-2](#).


**Figure 4-2. Wiring Diagram - Headset to CRD42L42-MFi**
**Table 4-2. CRD42L42-MFi Headset Wiring Definition**

Schematic	U8 Pin	Signal Name	Color	TRRS Name
P11	15	OUTA	Green	Tip
P10	16	OUTB	Natural	Ring
P9	24	HS3	Black	Ring2
P8	28	HS4	Blue	Sleeve

**Note:** Referenced Schematic: Part No. LTN1000-004, REV.X2  
See [Section 8.1.2](#) for this document.

## 5 CRD42L42-MFi - Enclosure Assembly

The CRD42L42-MFi is provided with an enclosure assembly in a pendant form factor. Mechanical drawings for the enclosure assembly are found in [Section 8.1.3](#). Refer to these drawings when assembling the housing.



## 6 References

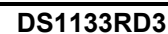
- Cirrus Logic CS42L42: <http://www.cirrus.com/en/products>
- The Accessory Interface Specification can found at <https://developer.apple.com/programs/mfi/>.
- MCU Information: <http://www.st.com/web/catalog/mmc/FM141/SC1244/SS1336/LN1003/PF219711>
- ST-LINK/V2 information: <http://www.st.com/web/catalog/tools/FM146/CL1984/SC724/SS1677/PF251168?sc=internet/evalboard/product/251168.jsp>

## 7 Revision History

Release	Changes
RD1 Feb '16	<ul style="list-style-type: none"><li>• Initial release - Rev RD1</li></ul>
RD2 Mar '16	<ul style="list-style-type: none"><li>• Updated and added text in <a href="#">Section 3.2</a>.</li><li>• Various replacement screen caps in <a href="#">Fig. 2-2</a>, <a href="#">Fig. 2-3</a>, <a href="#">Fig. 2-4</a>.</li><li>• Added <a href="#">Fig. 3-1</a>.</li><li>• Updated BOM in <a href="#">Section 8.2.1</a>.</li><li>• Updated link to Accessory Interface Specification in <a href="#">Section 6</a>.</li></ul>
RD3 Apr '16	<ul style="list-style-type: none"><li>• Updated text in <a href="#">Section 2.2</a> and <a href="#">Section 3.2</a>.</li><li>• Added <a href="#">Section 8.3</a>.</li></ul>

### 8.1.1 LTN1000-001\_REVX.7

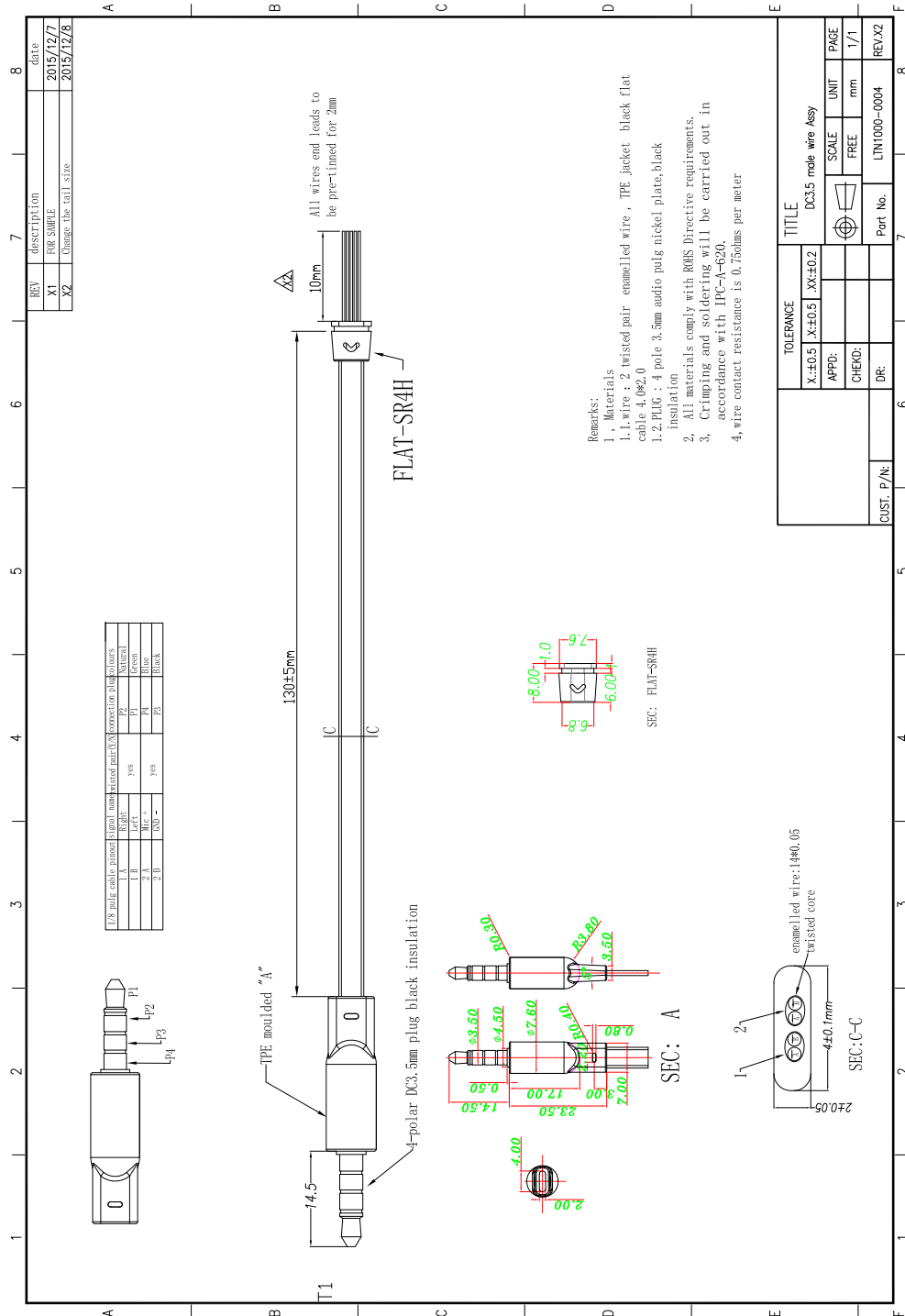
This cable is used on the CRD for the Lightning connector.

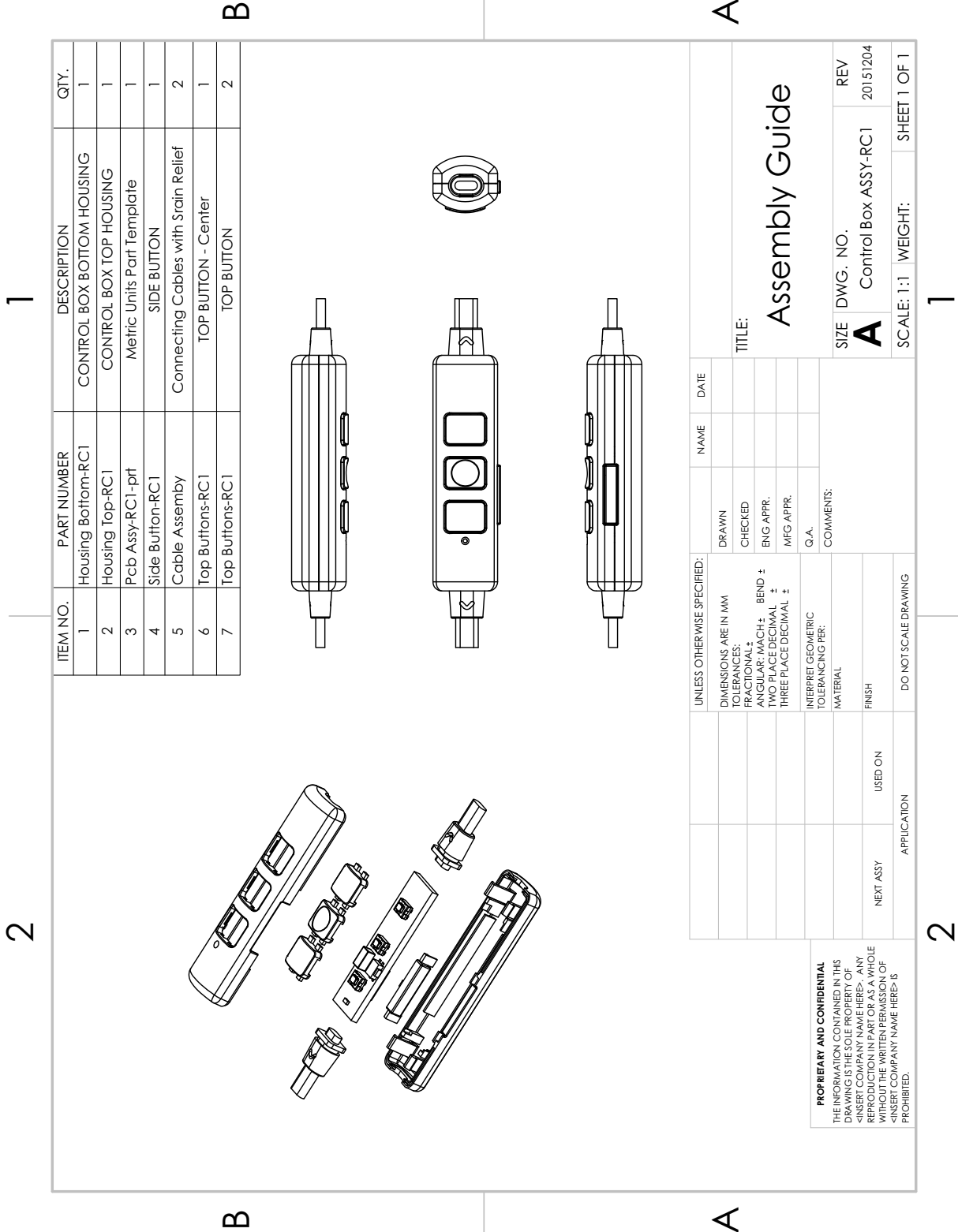




**8.1.2 LTN1000-004\_REVX.2**

This cable is used on the CRD for the audio connection.



**8.1.3 CRD42L42-MFi Plastics Assembly**


## 8.2 Bill of Materials

### 8.2.1 CRD42L42-MFi

CIRRUS LOGIC CRD42L42-MFi\_Rev\_A2.bom

**BILL OF MATERIAL**

Item	Rev	Description	Qty	Reference Designator	MFG	MFG P/N	Notes
1		CAP 2.2uF ±10% 10V X5R NPb 0402	7	C1 C8 C9 C15 C16 C17 C28	TDK	C1005X5R1A225K050BC	
2		CAP 1uF ±10% 6.3V X5R NPb 0201	0	C2	AVX	NP-02016D105KAT2A	NOPOP
3		CAP 0.1uF ±10% 6.3V X5R NPb 0201	3	C3 C10 C40	MURATA	GRM033R60J104KE19D	
4		CAP 1uF ±20% 6.3V X5R CER NPb 0402	1	C4	TDK	C1005X5R0J105M050BB	
5		CAP 4.7uF ±20% 10V X5R NPb 0402	2	C5 C6	TDK	C1005X5R1A475M050BC	
6		CAP 10uF ±20% 6.3V X5R CER NPb 0402	1	C7	TDK	C1005X5R0J106M050BC	
7		CAP 1uF ±10% 6.3V X5R NPb 0201	1	C11	AVX	02016D105KAT2A	
8		CAP 4.7uF ±10% 6.3V X5R NPb 0402	1	C19	TDK	C1005X5R0J475K050BC	
9		CAP 4.7uF ±10% 10V X5R NPb 0402	1	C25	TDK	C1005X5R1A475K050BC	
10		LED GN 2.2V RED 1.95V 20mA NPb 0603	1	D1	AVAGO TECHNOLOGIES	H5MF-C165	
11		CON RCPT 8POS LOPRO 1mm PCH NPb 5M	1	J1	SAMTEC	CLM-104-02-L-D	
12		MIC -38dBV ANALOG MEMS TOP PORT NPb	1	J3	CIRRUS LOGIC	NP-WM7121PE	NOPOP
13		IND 1uH 1.3A ±30% SHLD NPb 0805	1	L3	MURATA	LQM21PN1R0NGR	
14		TRAN MOSFET nCH 0.3A 30V NPb DFN3	2	Q2 Q3	DIODES INC	DMN32D2LFB4-7	
15		RES 0 OHM 1/10W ±5% NPb 0603 FILM	1	R1	DALE	CRCW0603000020EA	
16		RES 0 OHM 1/20W NPb 0201	15	R2 R6 R7 R10 R11 R13 R14 R15 R19 R22 R23 R25 R28 R32 R50	YAGEO	RC0201JR-070RL	
17		RES 330 OHM 1/20W ±5% NPb 0201	2	R3 R31	PANASONIC	ERJ1GEJ331C	
18		RES 10.0K OHM 1/20W ±1% NPb 0201	1	R5	DALE	CRCW020110K0FKED	
19		NO POP RES NPb 0201	0	R8	NO POP	NP-RES-0201	DO NOT POPULATE
20		RES 47.0K OHM 1/20W ±1% NPb 0201	4	R9 R20 R21 R72	DALE	CRCW020147K0FKED	
21		RES 4.7K OHM 1/20W ±1% NPb 0201	5	R12 R16 R17 R18 R58	YAGEO	RC0201FR-074K7L	
22		RES 0 OHM 1/16W JUMPER NPb 0402	1	R61	DALE	CRCW0402000020ED	
23		SWT SPST-NO MOM-OFF 200gf NPb 5M	3	S0 S1 S2	C&K	KMR221GLFS	
24		SWT SPST-NO MOM-OFF 220gf NPb 5M	1	S4	C&K	PTS840 GK SMTR LFS	
25		IC LIGHTNING AUDIO MODULE NPb LGA25	1	U1	CIRRUS LOGIC	639-5179-18	
26		IC MCU 8K 8BIT FLASH NPb UFQFPN20	1	U4	ST MICROELECTRONICS	STM8L101F3U6ATR	
27		IC REG BCK SYN 1.8V 0.6A NPb D5BGA6	1	U6	TEXAS INSTRUMENTS	TPS62621YFFR	
28	B1	IC CRS LPR ADEC-IPS/TDM NPb QFN48	1	U8	CIRRUS LOGIC	CS42L42-CN2/B1	
29		PCB	1	ZZ1	CIRRUS LOGIC	240-01160-Z1	
30		SCHEMATIC DRAWING	1	ZZ2	CIRRUS LOGIC	600-01160-Z1	
31		AssyDwg	1	ZZ3	CIRRUS LOGIC	603-01160-Z1	
32		LBL PRODUCT ID AND REV	1	ZZ4	CIRRUS LOGIC	422-00013-01	

## 8.2.2 CDB42L42-MFi

CIRRUS LOGIC  
CDB42L42-MFi\_Rev\_B.bom

### BILL OF MATERIAL

Item	Rev	Description	Qty	Reference Designator	MFG	MFG P/N	Notes
1		CAP 2.2uF ±10% 10V X5R NPb 0402	8	C1 C8 C13 C15 C16 C17 C27 C28	TDK	C1005X5R1A225K050BC	
2		CAP 1uF ±20% 6.3V X5R CER NPb 0402	3	C2 C4 C11	TDK	C1005X5R01105M050B8	
3		CAP 0.1uF ±10% 6.3V X5R NPb 0201	2	C3 C40	MURATA	GRM033R60J104KE19D	
4		CAP 4.7uF ±20% 10V X5R NPb 0402	2	C5 C6	TDK	C1005X5R1A475M050BC	
5		CAP 10uF ±20% 6.3V X5R CER NPb 0402	1	C7	TDK	C1005X5R01106M050BC	
6		CAP 1000pF ±5% 50V CDG NPb 0402	1	C9	MURATA	GRM1555C1H102JA01	
7		CAP 4.7uF ±10% 6.3V X5R NPb 0402	1	C19	TDK	C1005X5R0J475K050BC	
8		CAP 0.1uF ±10% 10V X5R NPb 0402	1	C20	Kemet	C0402C104K8PAC	
9		CAP 4.7uF ±10% 10V X5R NPb 0402	1	C25	TDK	C1005X5R1A475K050BC	
10		LED GRN 12.5mcd 20mA NPb 0603	2	D1 D3	EVERLIGHT	EL-19-21VGC/TR8	
11		LED GN 2.2V RED 1.95V 20mA NPb 0603	1	D2	AVAGO TECHNOLOGIES	HSMF-C165	
12		SCREW M1.6X0.35X5MM L PH SSTEEL NPb	4	H1 H2 H3 H4	McMASTER-CARR	92000A003	SCREWS FOR J2
13		NUT M1.6X0.35 1.3MM SS HEX NPb	4	H5 H6 H7 H8	McMASTER-CARR	91828A006	NUTS FOR J2
14		CON EDGE CARD 20POS VERT SLOT NPb SM	1	J1	SAMTEC	MEC8-110-02-L-DV	
15		CON LIGHTNING HORIZ MALE NPb C11E	1	J2	CIRRUS LOGIC	C11E	REQUIRES # M1.6-X/XL SCREW & NUT
16		HDR 4x1 MALE VERT 1.27mm CTR NPb SM	1	J3	ERNI	284697	
17		CON USB RCPT RA 5POS MINI-B NPb TH	1	J5	MOLEX	54819-0519	
18		JACK AUD 3.5mm 4COND 1SW NPb SM	1	J8	CUI INC	SI-43515TS-SMT	
19		HDR 4x3 ML 1" CTR 062 S GLD NPb	1	J9	SAMTEC	NP-TSW-104-07-G-T	NO POP
20		HDR 2x2 ML 1" 093BD ST GLD NPb TH	1	J11	SAMTEC	NP-TSW-102-08-G-D	NO POP
21		HDR 2x1 ML 1" 093BD ST GLD NPb TH	4	J12 J13 J15 J16	SAMTEC	NP-TSW-102-08-G-S	NO POP
22		HDR 5x2 ML 1" 093BD ST GLD NPb TH	1	J14	SAMTEC	NP-TSW-105-08-G-D	NO POP
23		HDR 16X1 FML ST 0.1" CTR GLD NPb	1	J17	SAMTEC	NP-SSW-116-01-G-S	NO POP
24		HDR 3x1 ML 1" 093BD ST GLD NPb TH	1	J19	SAMTEC	TSW-103-08-G-S	
25		IND 1uH 1.3A ±30% SHLD NPb 0805	1	L2	MURATA	LQM21PN1R0NGR	
26		SPCR STANDOFF NYL HEX 375/4-40TH	4	MH5 MH6 MH7 MH8	KEYSTONE	NP-1902B	NO POP
27		TRAN MOSFET nCH 0.3A 30V NPb DFN3	3	Q1 Q2 Q3	DIODES INC	DMN32D2LFB4-7	
28		RES 0 OHM 1/10W ±5% NPb 0603 FILM	23	R1 R4 R6 R30 R36 R37 R40 R50 R51 R57 R59 R61 R100 R101 R200 R201 R202 R203 R300 R301 R302 R303 R304	DALE	CRCW06030000Z0EA	
29		RES 4.7 OHM 1/20W ±5% NPb 0201 FILM	1	R2	PANASONIC	ERJ1GEJ4R7C	
30		RES 330 OHM 1/20W ±5% NPb 0201	3	R3 R31 R39	PANASONIC	ERJ1GEJ331C	
31		RES 10k OHM 1/16W ±1% NPb 0402	1	R5	DALE	CRCW040210K0FKEA	
32		NO POP RES NPb 0201	1	R8	NO POP	NP-RES-0201	DO NOT POPULATE
33		RES 47k OHM 1/16W ±5% NPb 0402 FILM	5	R9 R26 R35 R70 R72	DALE	CRCW040247K0JNED	
34		RES 4.7k OHM 1/20W ±5% NPb 0201	2	R17 R18	DALE	CRCW02014K70JNED	
35		NO POP RES NPb 0402	2	R21 R29	NO POP	NP-RES-0402	DO NOT POPULATE
36		RES 0 OHM 1/16W JUMPER NPb 0402	3	R22 R23 R32	DALE	CRCW04020000Z0ED	
37		RES 0 OHM 1/20W NPb 0201	1	R25	YAGEO	RC0201JR-070RL	
38		NO POP RES NPb 0603	2	R33 R34	NO POP	NP-RES-0603	DO NOT POPULATE
39		RES 174 OHM 1/16W ±1% NPb 0402	1	R38	DALE	CRCW0402174RFKED	
40		RES 4.7k OHM 1/16W ±5% NPb 0402	3	R58 R65 R66	DALE	CRCW04024K70JNED	
41		SWT LT WHT 1.3N 3.1mm NPb SM	6	S0 S1 S2 S3 S4 S10	PANASONIC	EVQ02K03W	INSTALL AFTER WASH PROCESS
42		WIRE JUMPER 2P .1" BRASS NPb	3	TP2 TP3 TP4	COMPONENTS CORPORATION	NP-TP-101-10	NO POP
43		CON TEST PT .1" CTR TIN PLATE NPb BLK	4	TP6 TP7 TP9 TP10	KEYSTONE	NP-5001	NO POP
44		IC LIGHTNING AUDIO MODULE NPb LGA25	1	U3	CIRRUS LOGIC	639-5179-18	
45		IC REG BCK SYN 1.8V 0.6A NPb DSBGA6	1	U5	TEXAS INSTRUMENTS	TPS62621YFRR	
46		IC MCU 8K 8BIT FLASH NPb UFQFPN20	1	U6	ST MICROELECTRONICS	STM8L101F3U6ATR	
47	B1	IC CRS LPR ADEC-IP5/TDM NPb QFN48	1	U8	CIRRUS LOGIC	CS42L42-CN2/B1	
48		FEET PROT ADH BACK .312"x.200" BLK	4	X1 X2 X3 X4	3M	SJ61A1	
49		WIRE 28/1 AWG, KYNAR MOD, 50OFT	1	XJ2	SQUIRES	L 500 UL1422 28/1 BLU	CUT WIRE TO THE APPROPRIATE LENGTHS AS REQUIRED TO SOLDER TO J2
50		CON SHUNT 2P .1" CTR BLK NPb	1		MOLEX	15-29-1025	
51		PCB	1		CIRRUS LOGIC	240-01150-Z1	
52		SCHEMATIC	1		CIRRUS LOGIC	600-01150-Z1	
53		assy	1		CIRRUS LOGIC	603-01150-Z1	
54		LBL PRODUCT ID AND REV	1		CIRRUS LOGIC	422-00013-01	

## 8.3 Obtaining Cirrus Logic App

The source code for the iOS app is included in the installer contents. The source code should be modified as required for your specific requirements. A functional version of the Cirrus Logic app may be requested from Cirrus Logic and is not available on the Apple App store. It is a development tool and is therefore distributed using TestFlight.

To obtain the app:

Provide the email address of the person who will be performing the test to your Cirrus Logic representative. An invitation to join as a beta tester will be sent to your email after Cirrus Logic has entered your information. You will be prompted to install the free TestFlight app from the App Store on your iPhone, iPad, or iPod touch.

## 8.4 Schematics

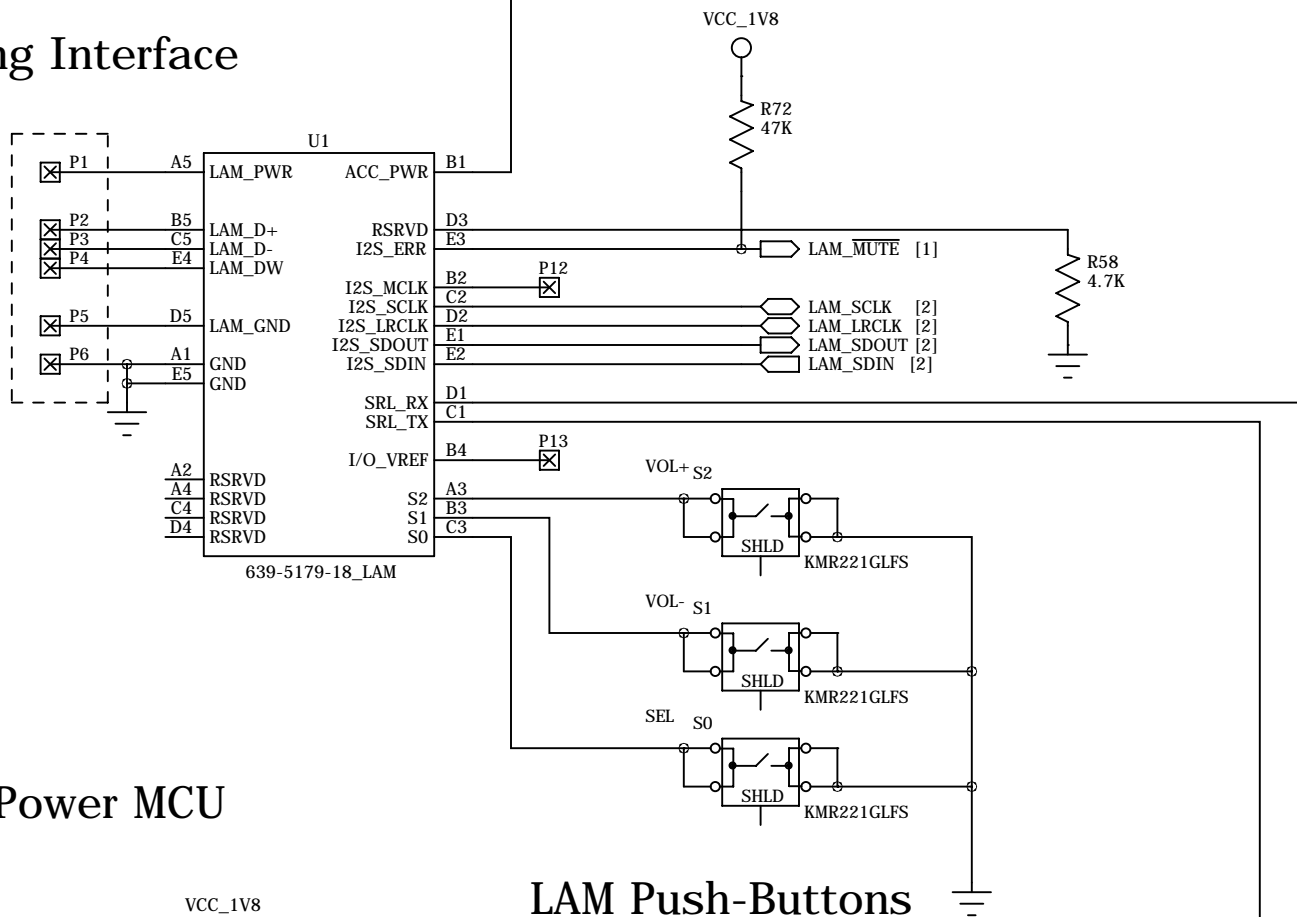
This section contains schematics for these products:

- CRD42L42-MFi — Customer Reference Design
- CDB42L42-MFi — Customer Development Board



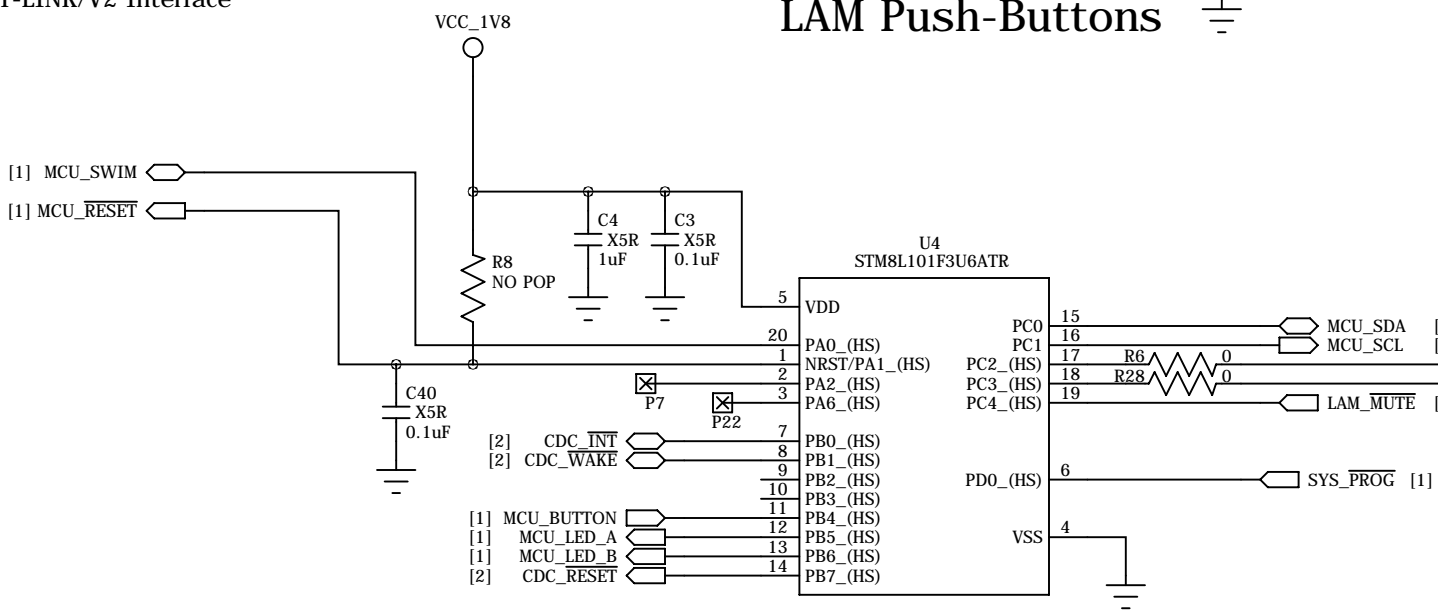
# CRD42L42-MFi

## Lightning Interface

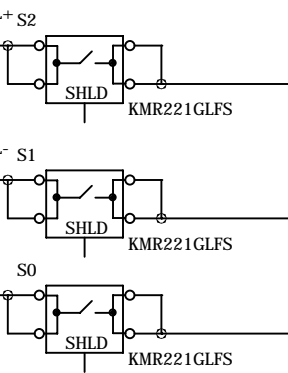


## STM8L101 Low-Power MCU

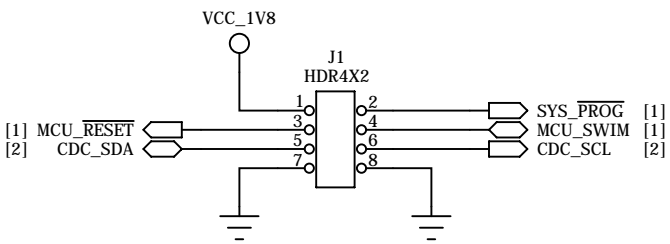
ST-LINK/V2 Interface



## LAM Push-Buttons



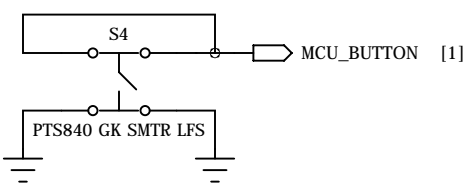
## Programming Interface



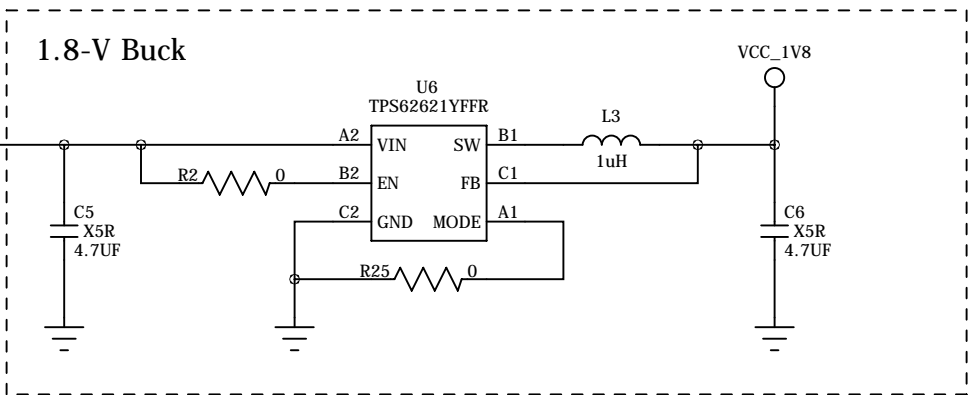
NOTES: UNLESS OTHERWISE SPECIFIED;

1. ALL RESISTOR VALUES ARE IN OHMS.

## Mode Button



## 1.8-V Buck

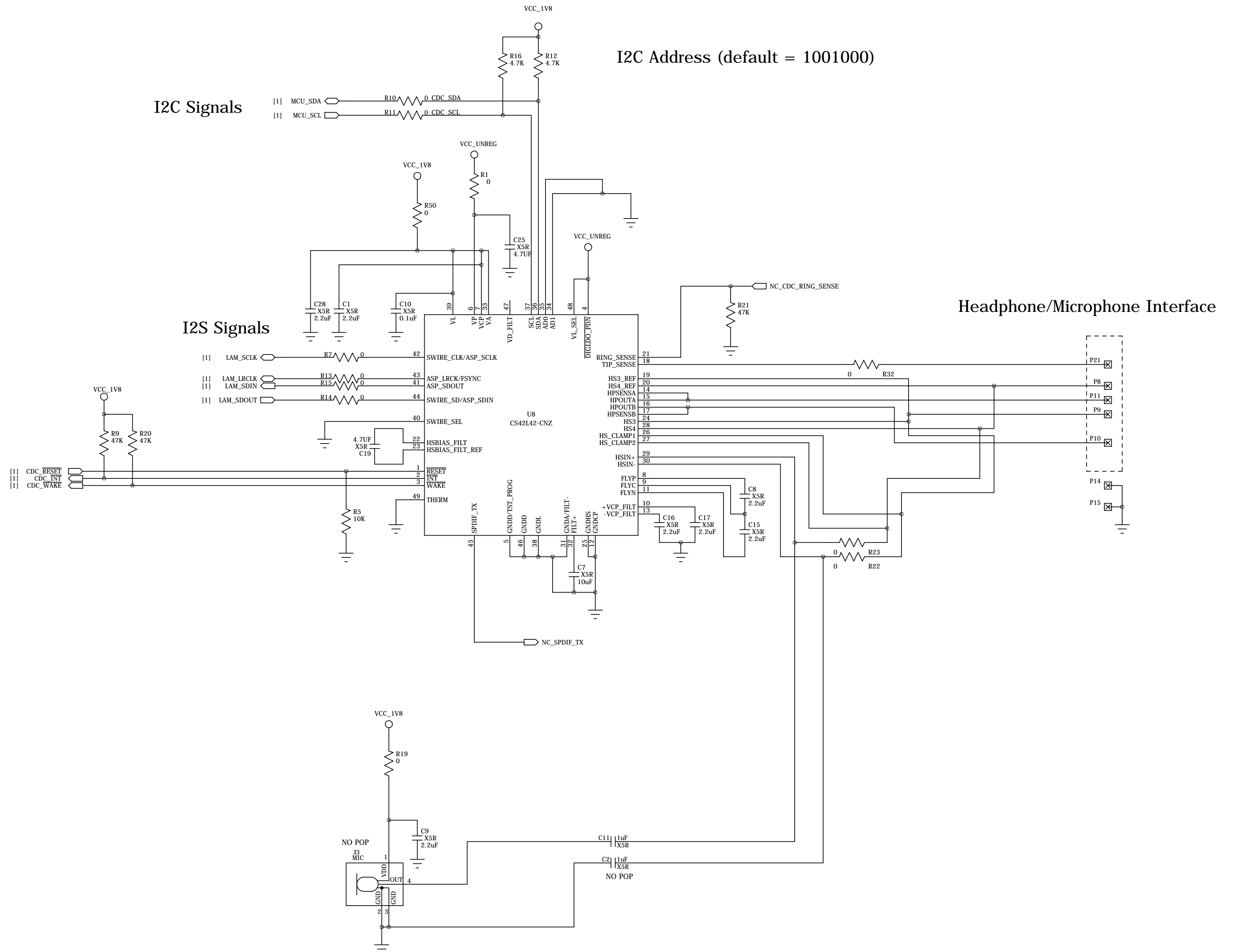


## RELATED DOCUMENTS:

PCB DWG-	240-01160-Z1
SCHEMATIC DWG	600-01160-Z1
ASSY DWG-	603-01160-Z1
LBL SUBASSY PROD ID AND REV	422-00013-01

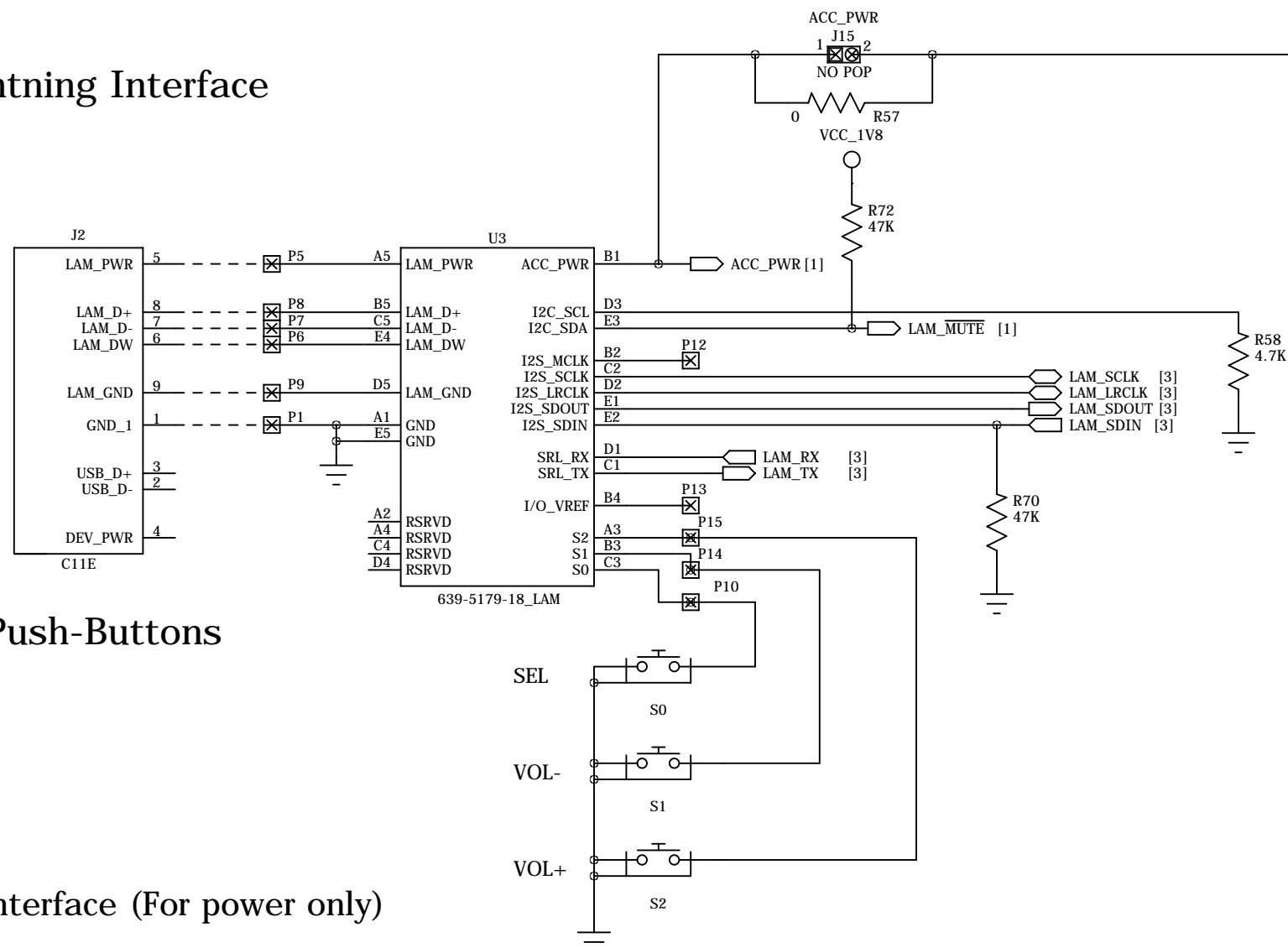
SHEET TITLE	02_LIGHTNING_MCU_PWR		
PART #	600-01160-Z1_REV_A2		
DRAWN BY	J. Meiss	ENGINEER	J. Meiss
DATE	2/8/2016	SHEET	1 OF 2
		SHEET SIZE	C

## CRD42L42-MFi



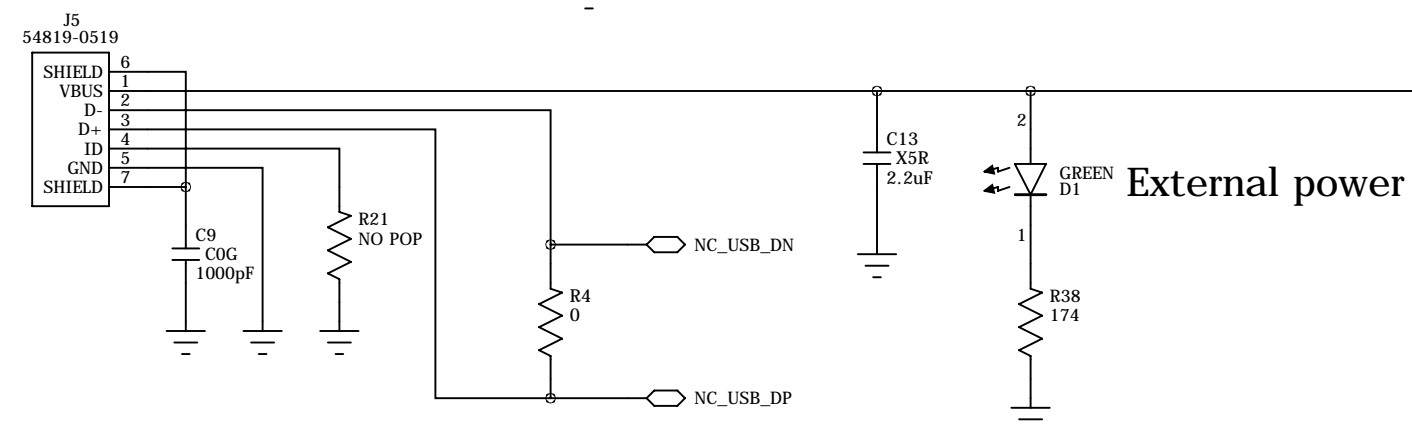
# CDB42L42-MFi

## Lightning Interface

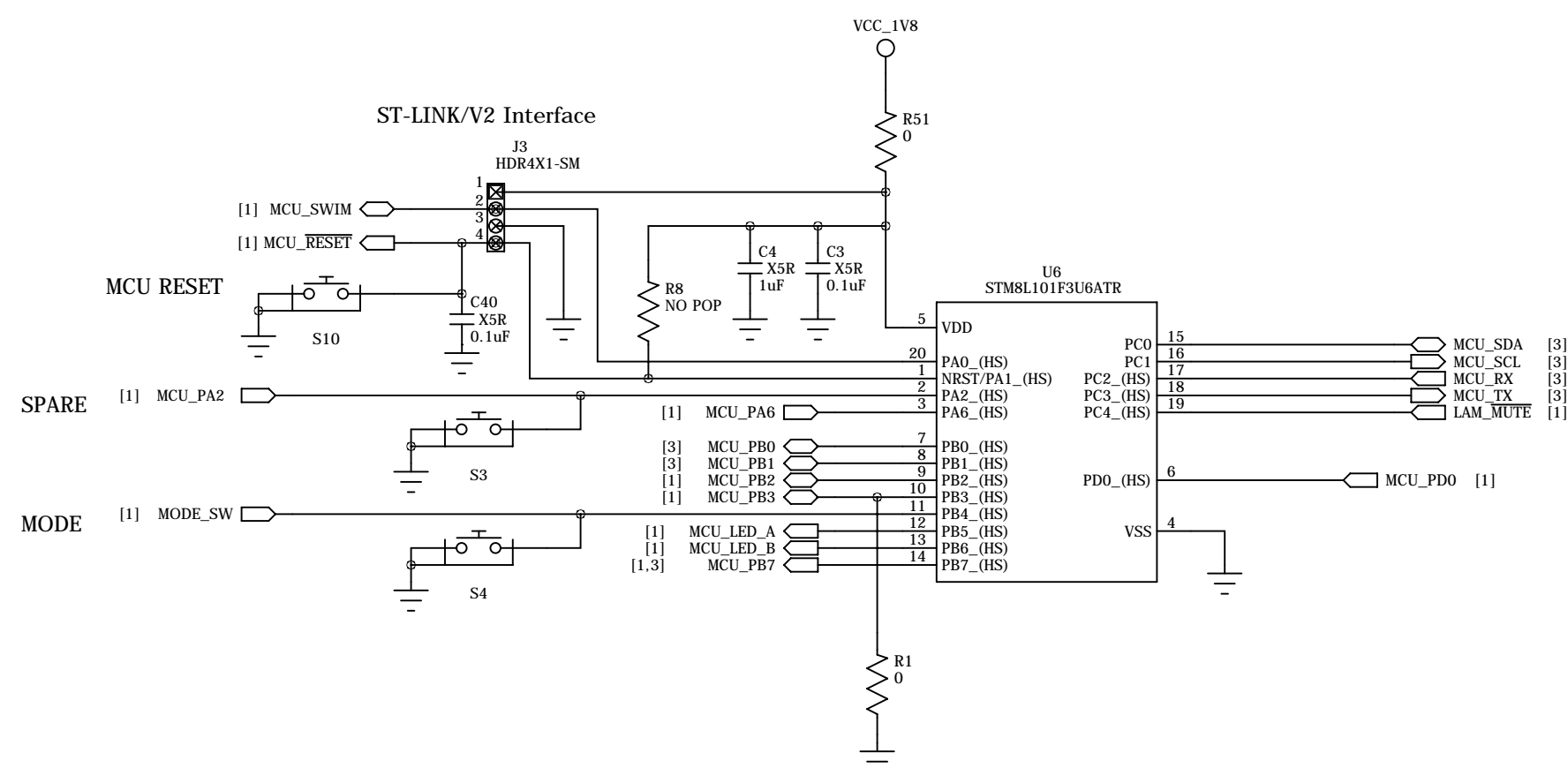


## LAM Push-Buttons

USB Interface (For power only)



# STM8L101 Low-Power MCU

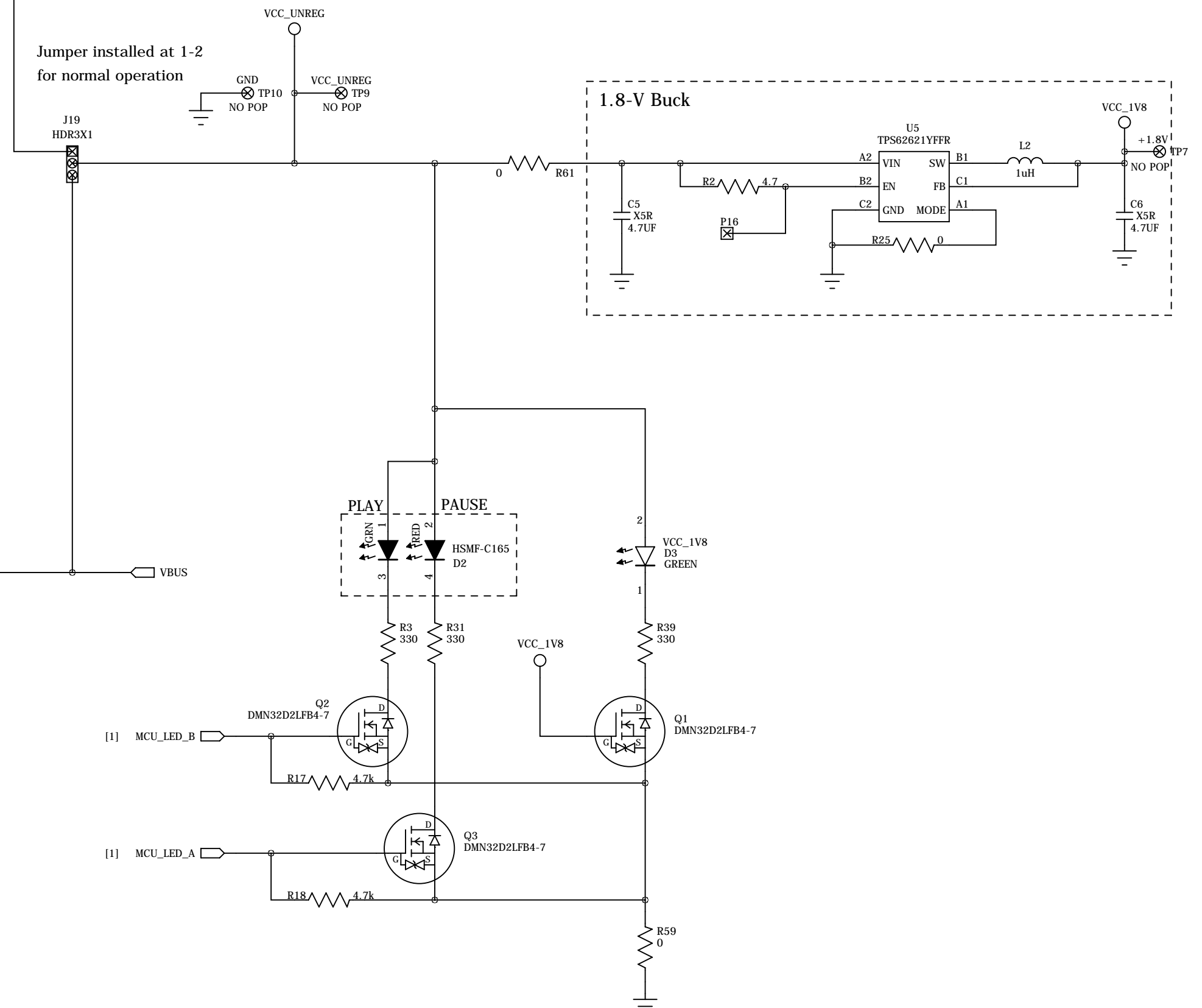


NOTES: UNLESS OTHERWISE SPECIFIED:

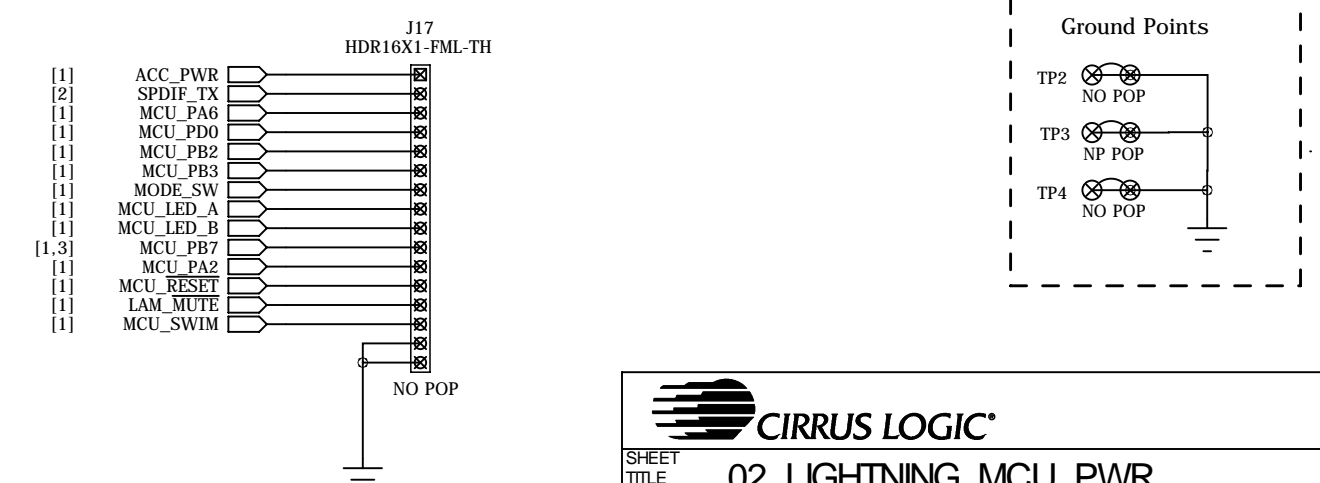
1. ALL RESISTOR VALUES ARE IN OHMS.

Layout note - add jumper to BOM

Jumper installed at 1-2  
for normal operation



Remove R to stop LED current.



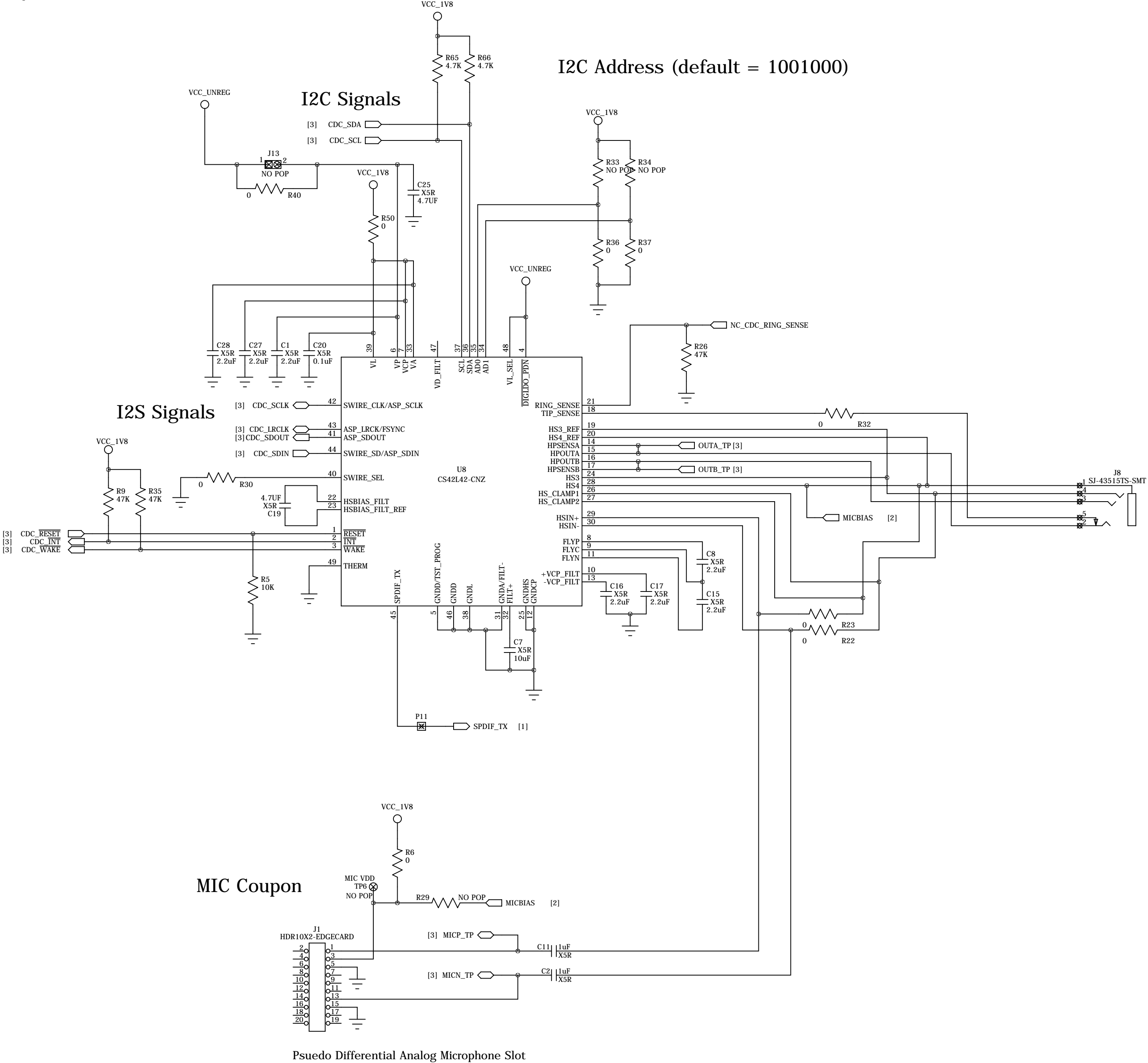
SHEET TITLE	02 LIGHTNING MCU PWR
----------------	----------------------

PART# 600-01150-Z1 REV B

DRAWN BY	J. Meiss	ENGINEER	J. Meiss
----------	----------	----------	----------

DATE	2/8/2016	SHEET	1	OF	3	SHEET	
						SIZE	C

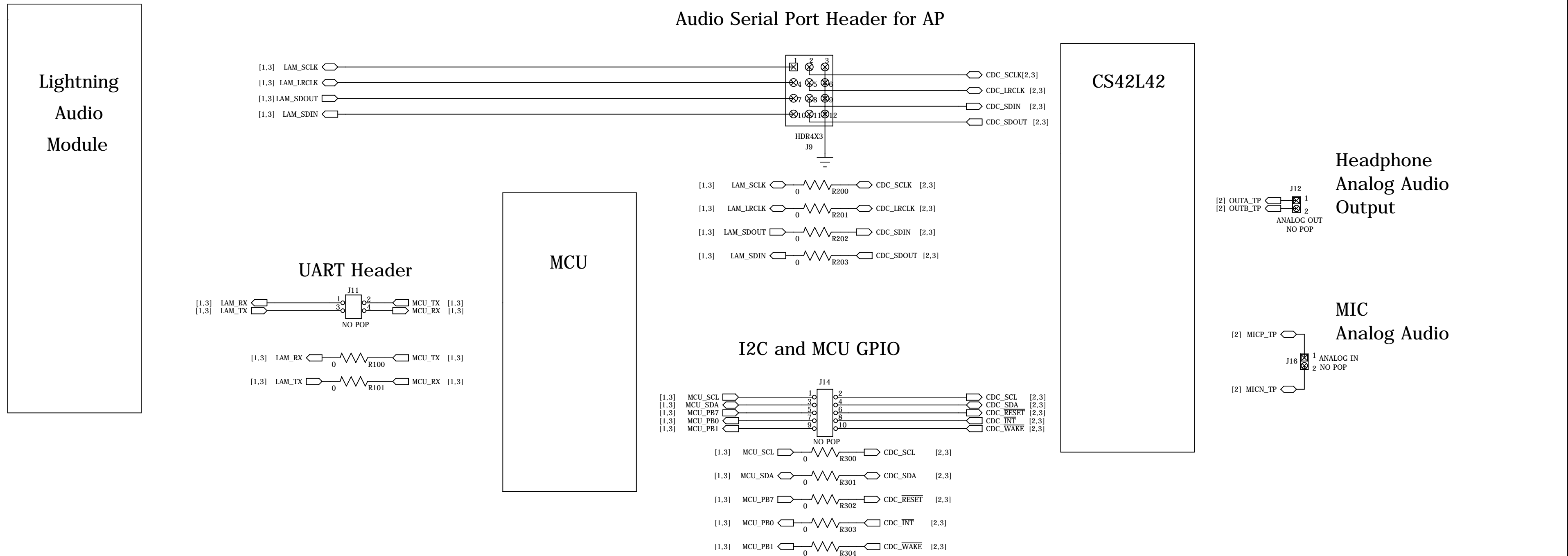
# CDB42L42-MFi











SHEET TITLE	03_CODEC
PART #	600-01150-Z1_REV_B
DRAWN BY	J. Meiss
DATE	2/8/2016
ENGINEER	J. Meiss
SHEET	2 OF 3
SHEET SIZE	C

# CDB42L42-MFi

R100-R101, R200-R203, R300-R304 are installed in manufacturing. Remove these resistors to open the signal path. Jumpers may then be used.



## AUXILIARY HARDWARE AND RELATED DOCUMENTS:

SCREW-PHILIPS-M1.6X0.35x5MM-PH-SS-Z	92000A003	SCREW DWG- 600-01150-Z1	
SCREW-PHILIPS-M1.6X0.35x5MM-PH-SS-Z	92000A003	PCB DWG- 240-01150-Z1	
SCREW-PHILIPS-M1.6X0.35x5MM-PH-SS-Z	92000A003	ASSY DWG- 600-01150-Z1	
SCREW-PHILIPS-M1.6X0.35x5MM-PH-SS-Z	92000A003	LBL SUBASSY PROD ID AND REV	
		SHUNT 2P-	15-29-1025
NUT STEEL M1.6X0.35 THR HEX SS	91828A006	 MH5	 MH7
NUT STEEL M1.6X0.35 THR HEX SS	91828A006		
NUT STEEL M1.6X0.35 THR HEX SS	91828A006		
NUT STEEL M1.6X0.35 THR HEX SS	91828A006	 MH6	 MH8
XJ2 WIRE-BLUE-INSULATED-28AWG	L 500 UL1422 28/1 BLU	 X1	 X3
		 X2	 X4



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## Contacting Cirrus Logic Support

For all product questions and inquiries, contact a Cirrus Logic Sales Representative.

To find the one nearest you, go to [www.cirrus.com](http://www.cirrus.com).

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### IMPORTANT NOTICE

"Target" product information describes products that are in development and subject to substantial development changes.

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