



# Audio Codec Extension Card HW User Guide

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## APPLICABILITY TABLE

This documentation applies to the following product families:

Module Name	Description
LE910Cx	LE910C1-NA, LE910Cx-AP, LE910C1-NS, LE910Cx-EU, LE910Cx-NF, LE910Cx-LA, LE910C1-SA, LE910C1-SV, LE910C1-ST, LE910C4-CN

Table 1: Applicability Table

The features described by the present document are provided by the products equipped with the software versions equal or higher than the versions shown in the table.

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## 1. Introduction

### 1.1. Scope

The scope of this document is to describe the Audio Extension Card which is an optional part of the EVB Development Kit (Dev-Kit).

### 1.2. Contact Information, Support

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Alternatively, use:

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For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:

<http://www.telit.com>

Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.

Telit appreciates feedback from the users of our information.

### 1.3. Text Conventions

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**DANGER:**

Danger – This information **MUST** be followed or catastrophic equipment failure or bodily injury may occur.

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**WARNING:**

Caution or Warning – Alerts the user to important points about integrating the module, if these points are not followed, the module and end user equipment may fail or malfunction.

---

---



**NOTE:**

Tip or Information – Provides advice and suggestions that may be useful when integrating the module.

---

All dates are in ISO 8601 format, i.e. YYYY-MM-DD.



## 1.4. Related Documents

Document Title	Document Number
LE910C1 HW User Guide	1VV0301298
Generic Evaluation Board Hardware User Guide	1VV0301249
AT Commands Reference Guide	80490ST10778A

Table 2: Related Documents

## 1.5. Document Organization

Chapter 1: “Introduction” provides a scope for this document, target audience, contact and support information, and text conventions.

Chapter 2: “General description” provides an overview of the document.

Chapter 3: “120-Pin Board to board connectors” provides B2B pinout.

Chapter 4: “Component assembly diagram” provides layout placement information.

Chapter 5: “Schematics”.

Chapter 6: “Revision history”

## 1.6. Abbreviations and Acronyms

<b>Term</b>	<b>Definition</b>
<b>EVB</b>	<b>Evaluation Board</b>
<b>IFBD</b>	<b>Interface Board</b>
<b>GPIO</b>	<b>General-purpose input/output</b>
<b>SD</b>	<b>Secure Digital</b>
<b>UART</b>	<b>Universal asynchronous receiver transmitter</b>
<b>UMTS</b>	<b>Universal mobile telecommunications system</b>
<b>USB</b>	<b>Universal serial bus</b>

Table 3: Abbreviations

## 2. General description

The Audio Extension Card is an option available to provide the customer the means to evaluate the digital Audio interface capability of the LE910Cx. It is designed to interface the Telit module variant LE910Cx with the Telit Generic Evaluation Board (EVB) thus forming a complete Development Kit of LE910Cx.

The Audio Extension card includes the following parts:

- MAX9867 ultra-low power stereo audio codec.
- Headset socket connector, 3.5 millimeter, CTIA type.
- LED indicators for GPIO.
- GPIO to I2C selection matrix headers.

## 2.1. Audio Extension card view

The following pictures show the Audio Extension Card Top view:

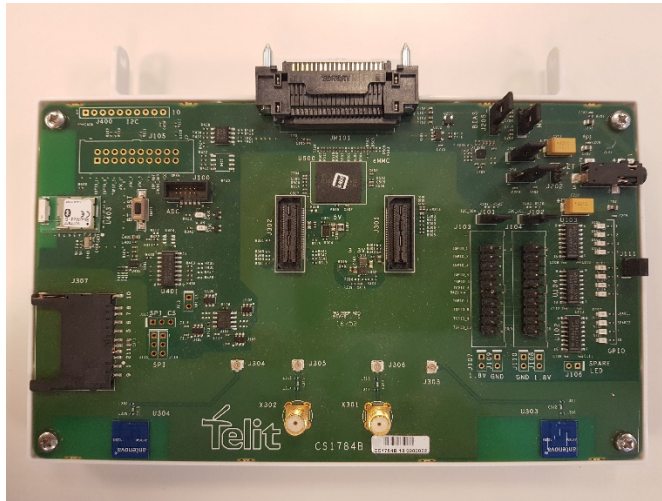


Figure 1 Audio Extension Card Top View

The card has no components on the bottom side.

## 2.2. Connecting Audio Extension card with EVB

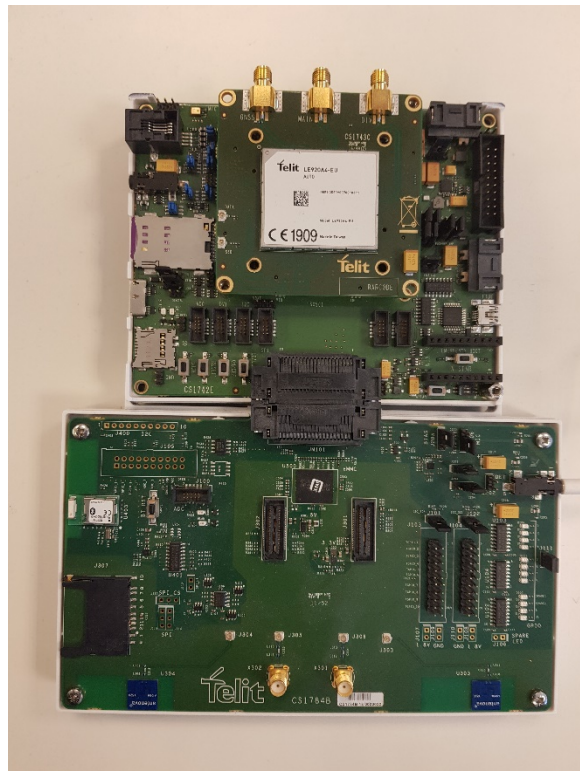


Figure 2 EVB with Audio Extension card

## 2.3. Detailed Usage and Configuration

This section will describe the Audio codec card configuration and jumpers setting for the various configuration available by software.

### 2.3.1. Audio Codec Control

The control interface of the Audio Codec is an I2C bus.  
The Codec card supports 2 options for interfacing the codec I2C:"

- Using the dedicated I2C of the Host
- Using GPIO emulated I2C via the Host GPIO's

### 2.3.2. Audio Codec Control via dedicated I2C

The extension card default jumpers configuration assumes that the interface used to set the audio codec configuration is the module dedicated I2C port.  
When using this mode, the configuration is sent to the codec via an AT command.  
The AT command used to configure the external codec MAX9867 is AT#DVI=0.  
When executing this AT command, the module software configures the audio codec as a slave PCM device through the dedicated I2C interface.  
Once codec is configured, an audio call can be established.

### 2.3.3. Audio Codec configuration via GPIO's

The MAX9867 can also be configured by the customer independently from the default software configuration set by sending the AT#DVI=0 command.  
This option uses any pair of GPIO's forming an emulated I2C.  
The I2C bus can be connected to any module GPIO pin by a jumper setting.  
The LE910C1 software emulates an I2C interface by toggling the GPIO pins according to the I2C standard protocol (For more information, please refer to the LE910Cx HW User Guide).

For enabling this option, the jumper settings on the extension card should be changed.  
The below example describes how to setup the board for using I2C on GPIO\_2 & GPIO\_3

- GPIO\_2 acts as I2C\_SCL.
- GPIO\_3 acts as I2C\_SDA.

The jumpers should be set as follows:

- Remove jumper shunts from J101, J102.
- Place a jumper shunt in J103 on pins 5-6.
- Place a jumper shunt in J104 on pins 3-4.

Once the board is set, the AT#I2CWR command can be used for setting the Audio codec  
After sending this command you will be presented with the ">" prompt indicating that the I2C data bytes should be sent.

After the sequence is sent the CTRL+Z keys should be sent to terminate the command and send the data.

```
AT#I2CWR=3,2,30,4,19  
>001020000400330000330C0C09092424400060  
Cntrl+Z
```

For reference and details on the AT command syntax, please see the AT commands reference guide document.

For reference on the Audio Codec registers settings please refer to the Audio Codec datasheet on Maxim Integrated web site:

<https://www.maximintegrated.com/en/products/analog/audio/MAX9867.html>

### 3. 120-Pin Board to Board Connectors

The interface between Codec Extension Card and the Generic EVB is implemented via a 120p (20p x 6 rows) SAMTEC SEARAY 1.27mm High Speed/High Density B2B right angle (edge) connector.

The below table describes the connector pin naming as well as the mapping and usage of each signal inside the Codec card.

Pin #	Connector Pin Name	Description / Usage
1	VBATT_AUX	Supply from main board
2	VBATT_AUX	Supply from main board
3	NC	N/A
4	NC	N/A
5	NC	N/A
6	NC	N/A
7	GND	GND
8	GND	GND
9	NC	N/A
10	WIFI_SDCMD	Unused
11	WCI_RX_HOST	Unused
12	NC	N/A
13	1V8_OUT	Unused
14	WIFI_SD4	Unused
15	NC	N/A
16	WIFI_SDCLK	Unused
17	TGPIO_30_CTS_GPS	Unused
18	NC	N/A
19	1.8V	1.8V supply for Codec
20	WIFI_SD4	Unused
21	NC	N/A
22	WIFI_SD7	Unused
23	NC	N/A
24	NC	N/A
25	WCI_TX_HOST	Unused
26	WIFI_REF_CLK	Unused
27	WIFI_SD2	Unused
28	WIFI_SD5	Unused
29	NC	N/A
30	NC	N/A
31	I2C_SCL_AUX	Unused
32	I2C_SDA_AUX	Unused
33	WIFI_SD0	Unused
34	WIFI_SD1	Unused
35	NC	N/A
36	NC	N/A
37	I2C_SCL	I2C Port of Host
38	I2C_SDA	
39	WIFI_SD6	Unused
40	WIFI_SDRST	Unused
41	NC	N/A

Pin #	Connector Pin Name	Description / Usage
42	NC	N/A
43	TGPIO20	Unused
44	TGPIO1	TGPIO1 of LE910Cx
45	TGPIO2	TGPIO2 of LE910Cx
46	TGPIO3	TGPIO3 of LE910Cx
47	NC	N/A
48	NC	N/A
49	TGPIO21	Unused
50	TGPIO4	TGPIO4 of LE910Cx
51	TGPIO5	TGPIO5 of LE910Cx
52	TGPIO6	TGPIO6 of LE910Cx
53	NC	N/A
54	NC	N/A
55	TGPIO22	Unused
56	TGPIO7	TGPIO7 of LE910Cx
57	TGPIO8	TGPIO8 of LE910Cx
58	TGPIO9	TGPIO9 of LE910Cx
59	NC	N/A
60	NC	N/A
61	NC	N/A
62	TGPIO10	TGPIO10 of LE910Cx
63	TGPIO11	Unused
64	TGPIO12	Unused
65	NC	N/A
66	NC	N/A
67	NC	N/A
68	NC	N/A
69	NC	N/A
70	NC	N/A
71	NC	N/A
72	NC	N/A
73	NC	N/A
74	NC	N/A
75	GPS_RTS	Unused
76	GPS_RXD	Unused
77	GPS_TXD	Unused
78	NC	N/A
79	NC	N/A
80	NC	N/A
81	CP_32K_OUT	Unused
82	DVI_REF_CLK	Main Clock for Codec
83	GND	GND
84	NC	N/A
85	NC	N/A
86	NC	N/A
87	DVI_CLK	Codec PCM Clock
88	DVI_CS	Codec PCM Frame Sync
89	NC	N/A
90	GND	GND

Pin #	Connector Pin Name	Description / Usage
91	NC	N/A
92	NC	N/A
93	DVI_RX	PCM RXD (Host side)
94	DVI_TX	PCM TXD (Host side)
95	NC	N/A
96	NC	N/A
97	NC	N/A
98	NC	N/A
99	SPI_CLK	Unused
100	SPI_CS	Unused
101	GND	GND
102	NC	N/A
103	NC	N/A
104	NC	N/A
105	SPI_MISO	Unused
106	SPI_MOSI	Unused
107	NC	N/A
108	GND	GND
109	NC	N/A
110	NC	N/A
111	GND	GND
112	GND	GND
113	NC	N/A
114	NC	N/A
115	NC	N/A
116	NC	N/A
117	NC	N/A
118	NC	N/A
119	GND	GND
120	NC	N/A

Table 4: Board to Board Connector (JM101)



## 4. Component Assembly Diagram

Searchable Layout:



Adobe Acrobat  
Document

### 4.1. Component Assembly Diagram

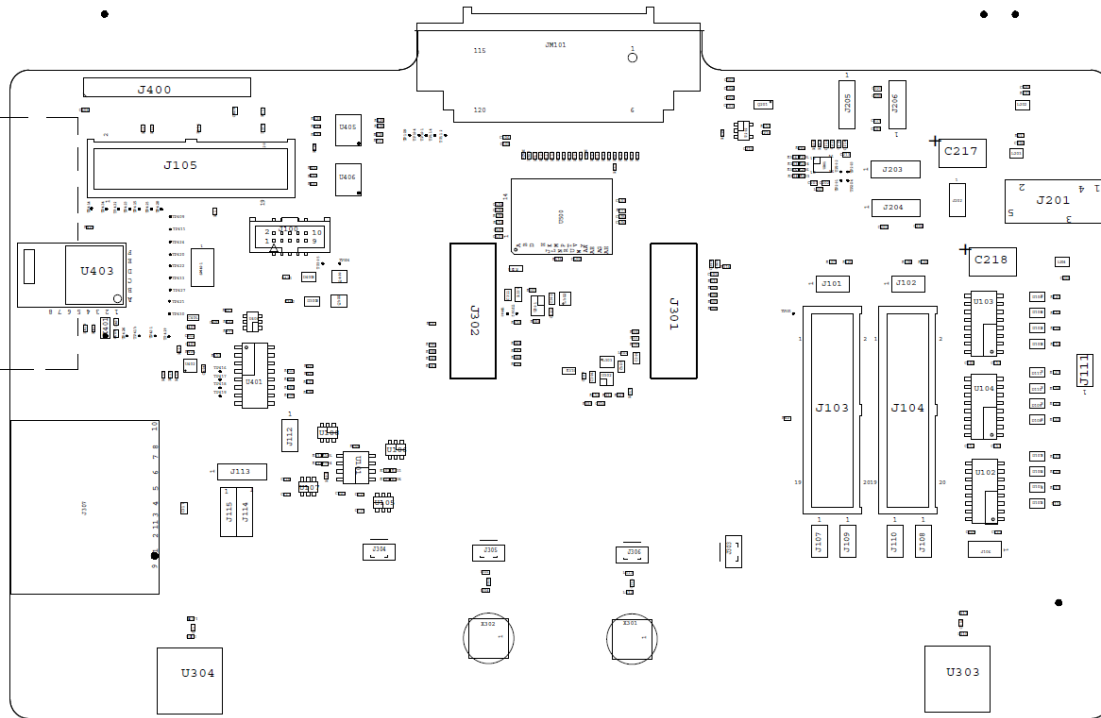


Figure 3 Component Diagram TOP View

## 4.2. Default Jumpers Assembly

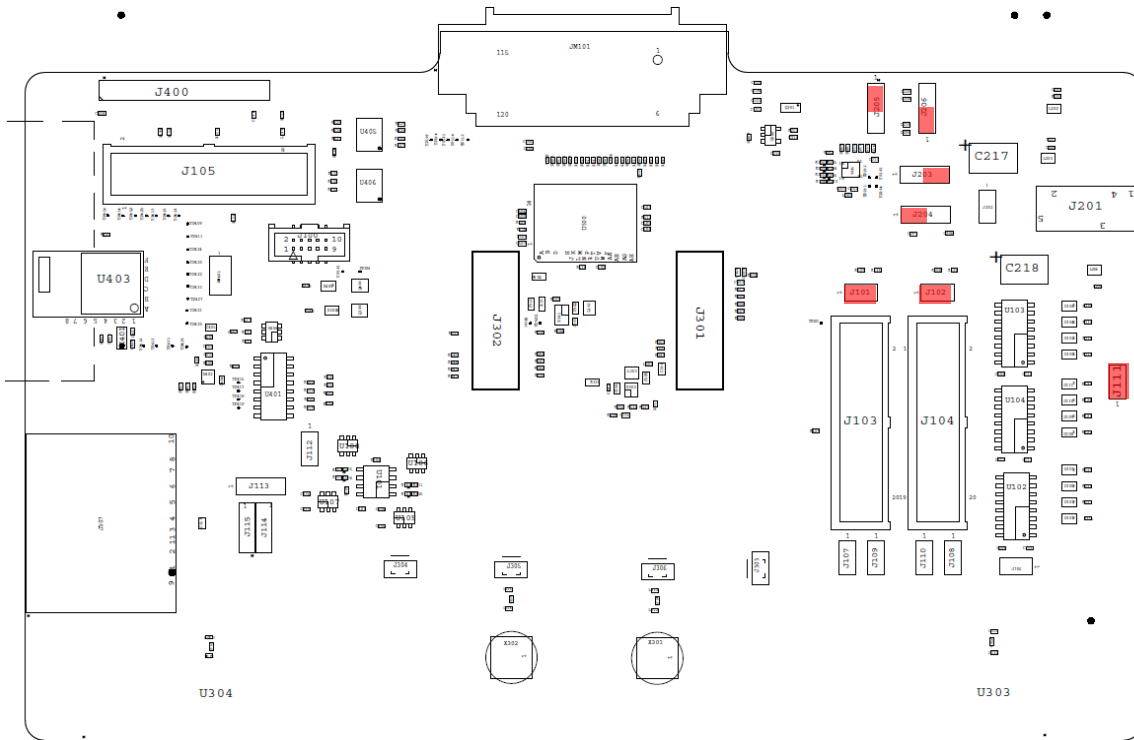


Figure 4 Default Jumpers assembly locations

Jumper Reference	Function Description
J101	Connects module I2C_SDA to Audio Codec I2C_SDA.
J102	Connects module I2C_SCL to Audio Codec I2C_SCL.
J111	Enables the LED to GPIO indicators power.
J203 (2-3)	Connects Codec EAR1(pos) output to headset Left.
J204 (1-2)	Connects Codec EAR2(pos) output to headset Right.
J205 (1-2)	Connects External MIC Bias power supply to headset MIC.
J206 (1-2)	Connects Codec MIC1(pos) input to headset MIC.

Table 5 Default Jumper Locations

## 5. Schematics

Searchable PDF:



Adobe Acrobat Document

Please note that the main relevant schematic pages out of the attached PDF, are page 1 & 2 only. The remaining pages (page 3 to page 5) are used as optional components assembled only on specific hardware versions used internally for the validation of the module.

Parts which are labelled as “DNP” in the schematic are not assembled.

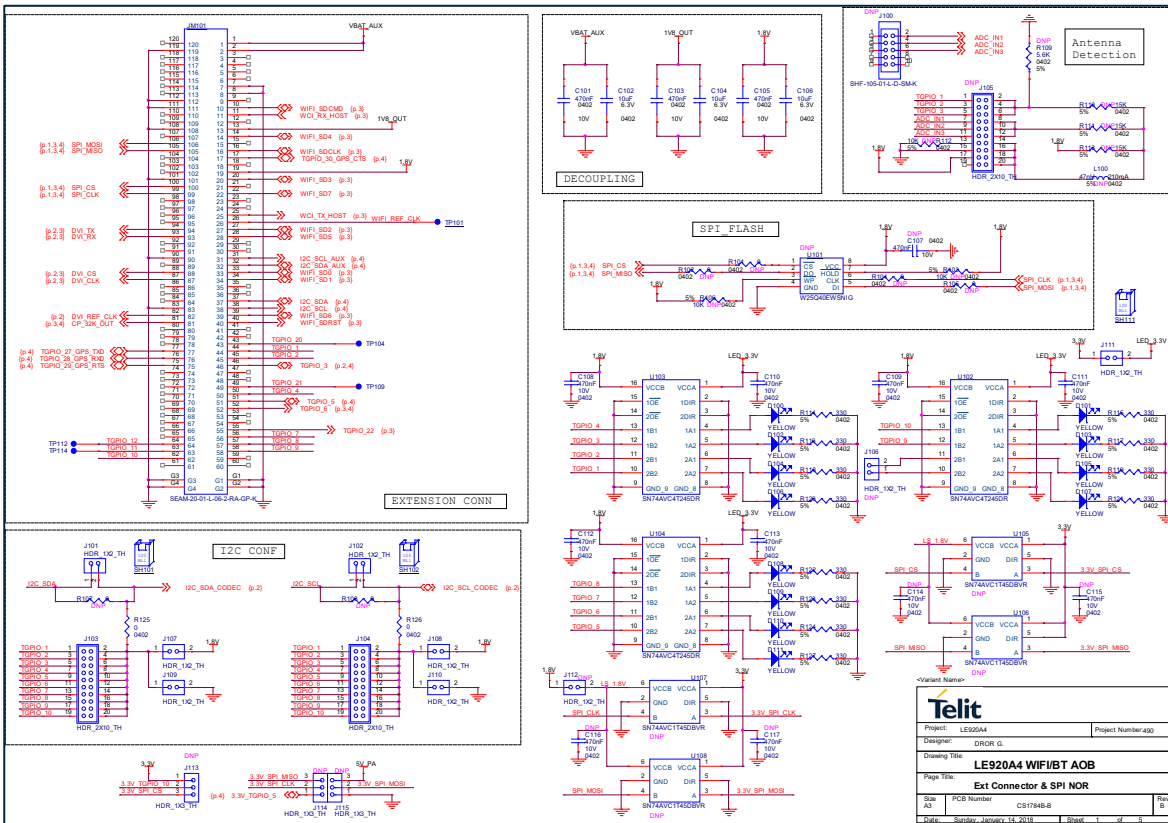
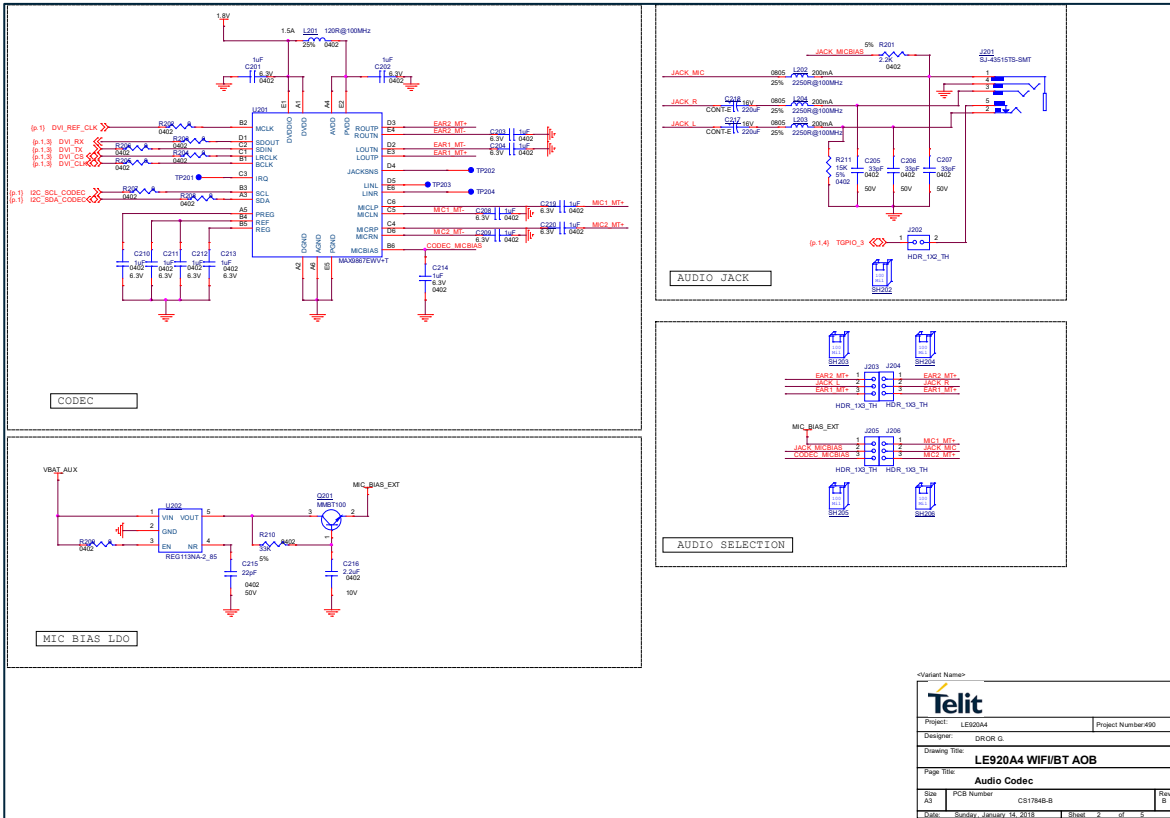


Figure 5 Schematic page 1



Telit	
Project: LE920A4	Project Number: 490
Designer: DROR G.	
Drawing Title: LE920A4 WIFI/BT AOB	
Page Title: Audio Codec	
Size: A3	PCB Number: CS174B-B
Date: Sunday, January 14, 2018	Sheet: 2 of 5

Figure 6 Schematic page 2

## 6. Revision History

REV	DATE	CHANGES
1	2018-03-07	Initial Version

Table 6: Revision History



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