

Telink

Single-end Audio EVB User Guide

TLSR9517CDK56D

Telink Internal Only

2021-11-24



1. Product introduction

■ 1.1 General introduction

- ▣ This document describes the TLSR9517C General Starter Kit (hereafter referred to as the Starter Kit). This kit is used to verify the TLSR9x family of chips and to develop various 2.4 GHz wireless protocol products such as Bluetooth 5.2, BLE mesh, Zigbee 3.0, HomeKit, 6LoWPAN, Thread, 2.4 GHz and etc.

■ 1.2 Kit material list

- ▣ The ordering name of TLSR9517C General Starter Kit is TLSR9517CDK56D-KIT. The materials in the kit are listed below:
 - ▶ 1x TLSR9517CDK56D
 - ▶ 1x Burning EVK, including Dupont cable
 - ▶ 1x USB cable
 - ▶ 1x Whip antenna
 - ▶ 2x Audio cable, 3.5mm plug to two BNC female plugs



1. Product introduction – continued

■ 1.2 Kit material list – continued





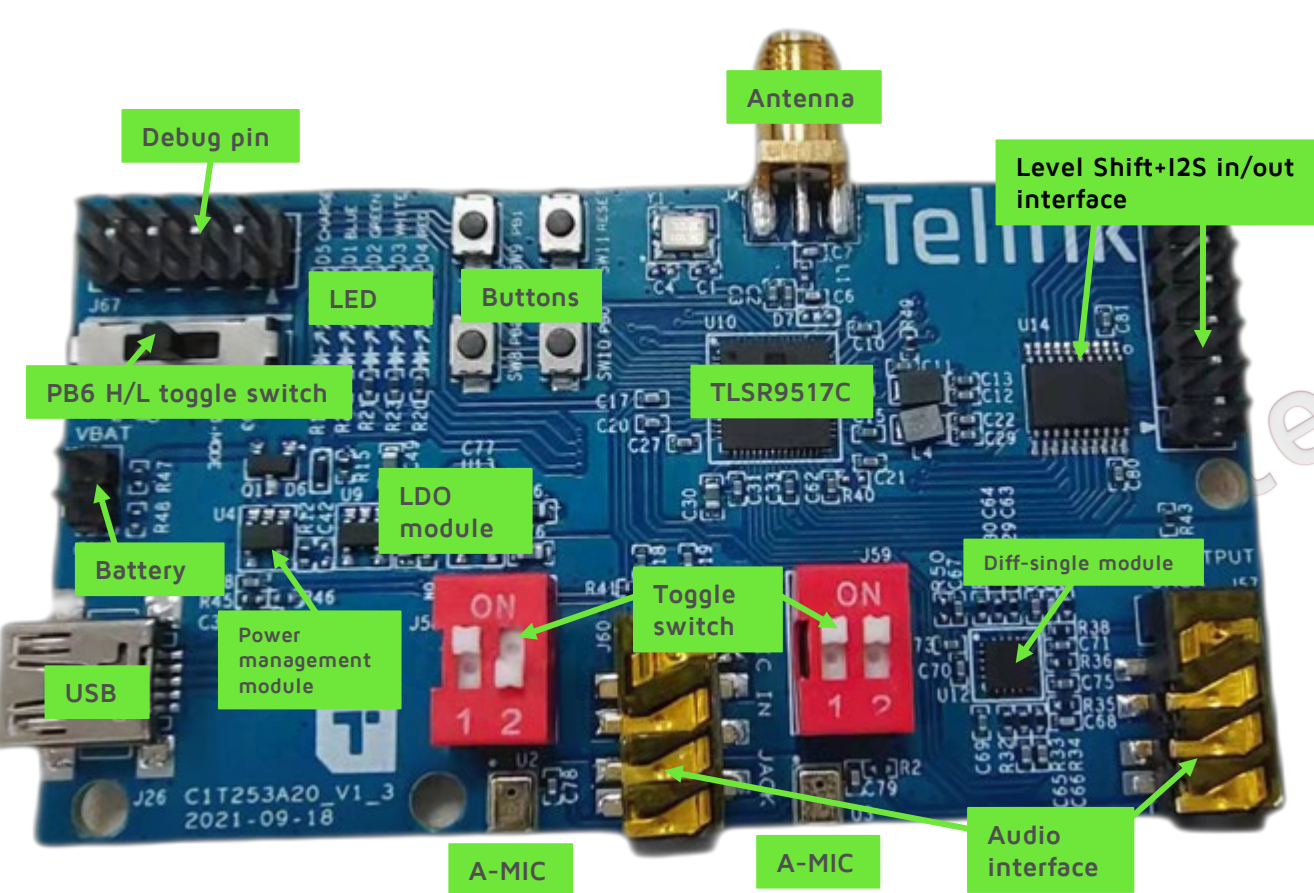
2. EVB introduction

■ 2.1 Single-end Audio EVB introduction

- Single-end Audio EVB is developed based on TLSR9517C chip, with the following features:
 - ▣ Integrated 32-bit RISC-V MCU
 - ▣ The built-in CODEC supports dual AMIC, dual DMIC and left & right channel differential outputs.
 - ▣ Supports standards and industrial alliance specifications including Bluetooth 5.2, basic rate (BR), enhanced data rate (EDR), low energy (LE), indoor positioning and BLE Mesh, Zigbee 3.0, HomeKit, 6LoWPAN, Thread and 2.4 GHz proprietary standard.
- The EVB has the following features:
 - ▣ New level shift converter chip and I2S interface, supporting I2S input and output.
 - ▣ New differential to single-ended chip and 8-pin audio header to support single-ended output of audio signal.
 - ▣ Two additional toggle switches to support three audio input and output modes.
 - ▣ Additional PB6 high/low level toggle switch to support software customization.
 - ▣ Power supply supports direct lithium battery supply.



2. EVB introduction - continued

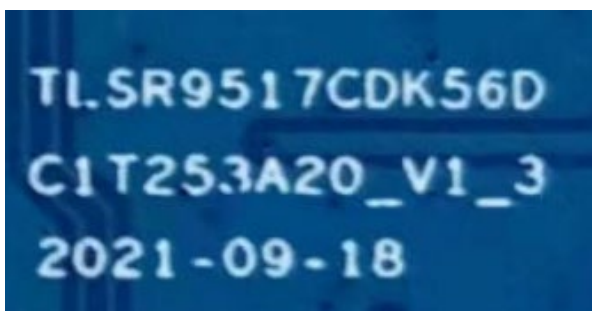




2. EVB introduction - continued

■ 2.1.2 EVB name

- ▣ The ordering name of the single-end Audio EVB is TLSR9517CDK56D and customers submit their orders under this name. The single-end Audio EVB has serial numbers on the board for version differentiation, the figure below shows the serial number of V1.3. The latest version of the single-end Audio EVB is V1.3.

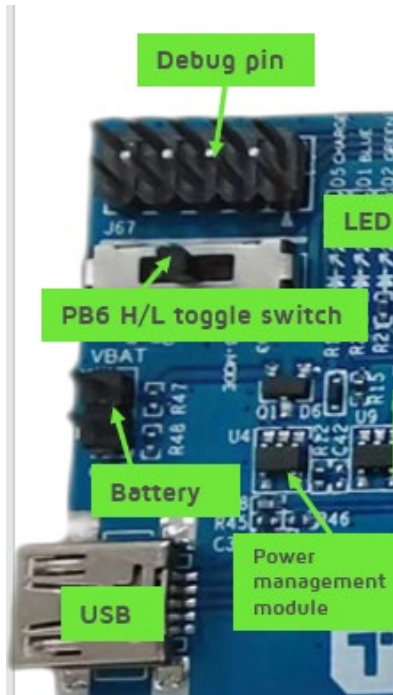




2. EVB introduction - continued

■ 2.1.3 Debug interface

- ▣ The debug interface is on the top left corner of the single-end Audio EVB board, which is shown in the figure below left. The debug pins assignment is shown in the figure below right.



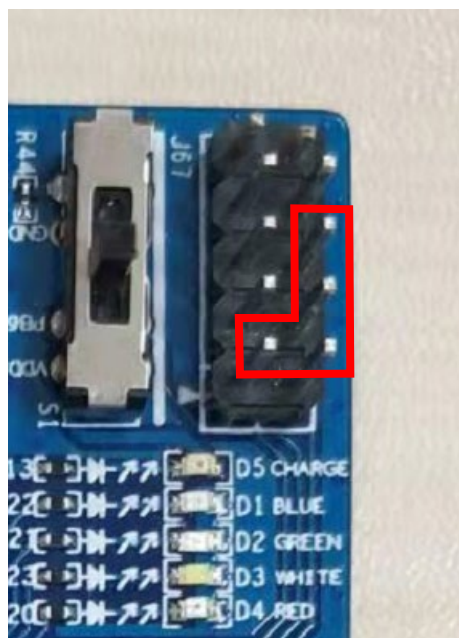
VBUS	GND
GND	GND
GND	GND
SWS	URX
VBAT	UTX



2. EVB introduction - continued

■ 2.1.3 Debug interface

- ▣ The serial communication pins are shown in the figure below.



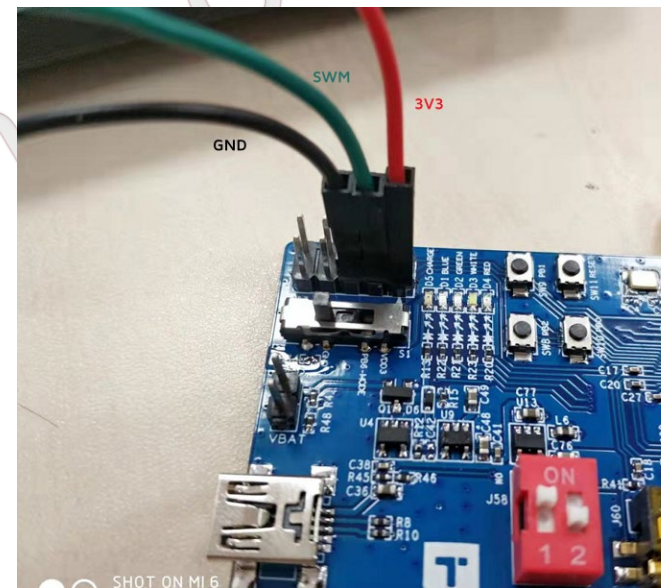
VBUS	GND
GND	GND
GND	GND
SWS	URX
VBAT	UTX



2. EVB introduction - continued

■ 2.1.3 Debug interface

- ▣ The SWS burn-in wiring is shown as below.



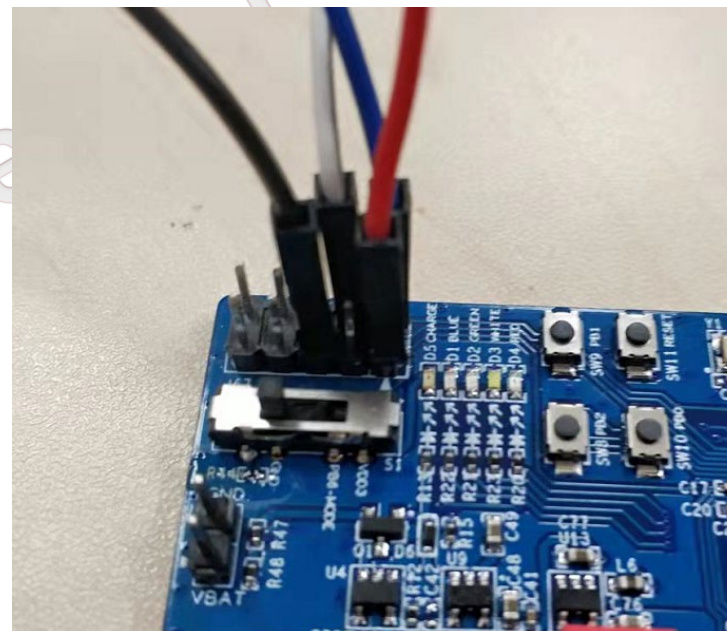
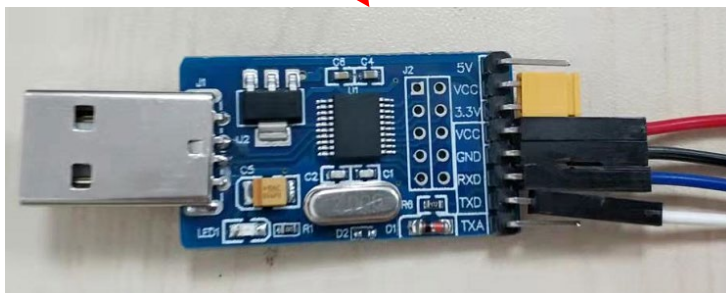


2. EVB introduction - continued

■ 2.1.3 Debug interface

- ▣ The serial communication wiring is shown as below.

This is a serial communication board.

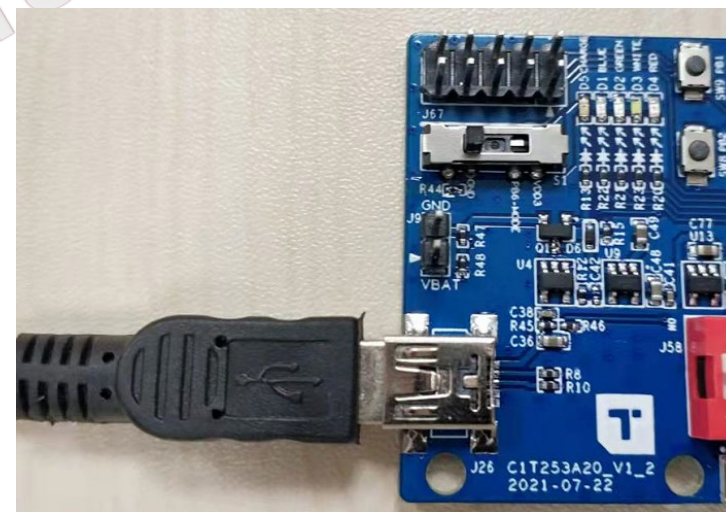
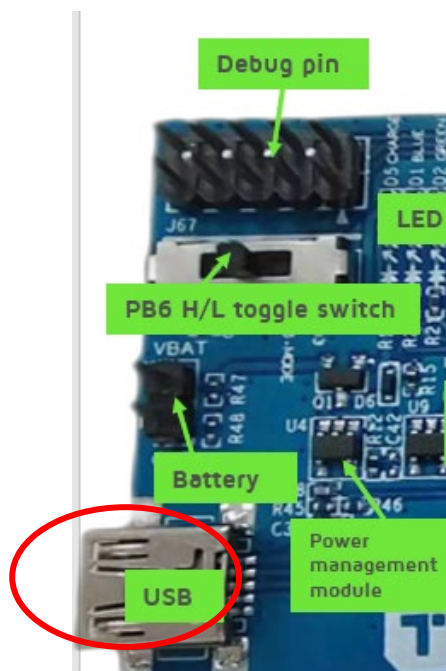




2. EVB introduction - continued

2.1.4 Power supply

- ▣ The single-end Audio EVB has two types of power supply, battery and USB 5V supply.
- ▣ (1) USB charging can be powered simply connecting the EVB's USB port via a USB cable, as shown below.



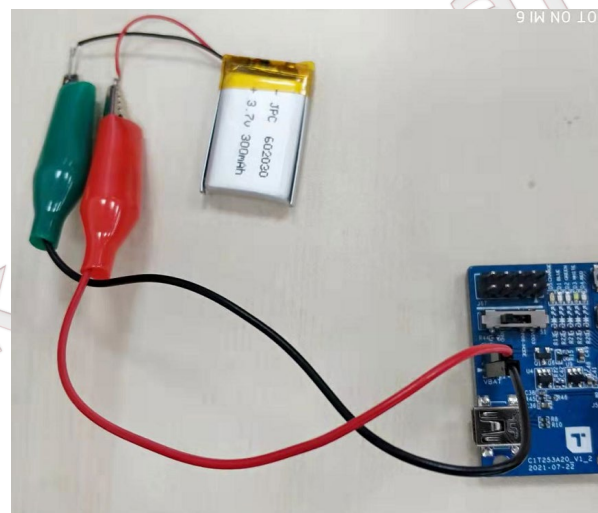
USB input 5V



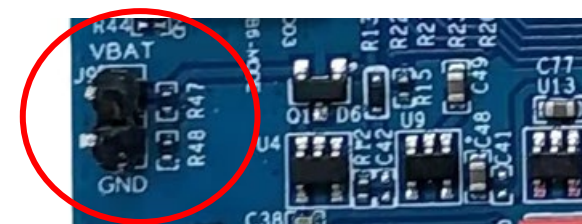
2. EVB introduction - continued

■ 2.1.4 Power supply

- (2) The single-end Audio EVB also supports Li-ion battery power supply. Due to the larger battery of the headset, the maximum charging current of the TLSR9 series chip is around 80mA. When connecting the Li-ion battery, we usually choose the external charge management chip for charging, the operation only needs to connect the positive and negative ends of the Li-ion battery to the battery connector, as shown in the figure below.



Battery input voltage: 4.2V



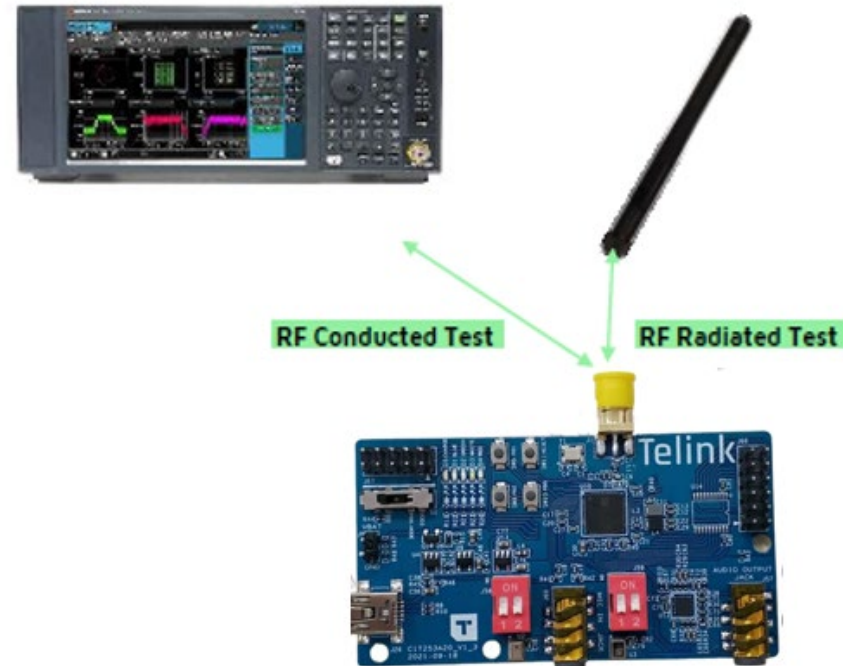
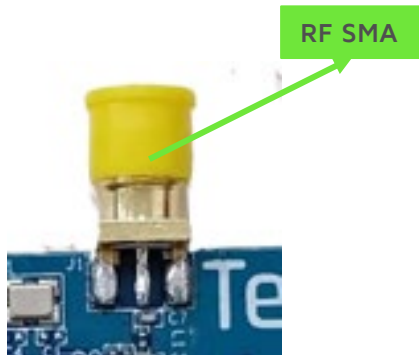
Note: These are the battery input pins, the upper pin connects to the positive end of the lithium battery, the lower pin connects to the negative end.



2. EVB introduction - continued

■ 2.1.5 RF connector

- ▣ The RF connector of the EVB is a 3.5mm SMA connector. Therefore, it supports direct connection to the instrument for RF conducted test as well as the connection of a whip antenna for radiation test.





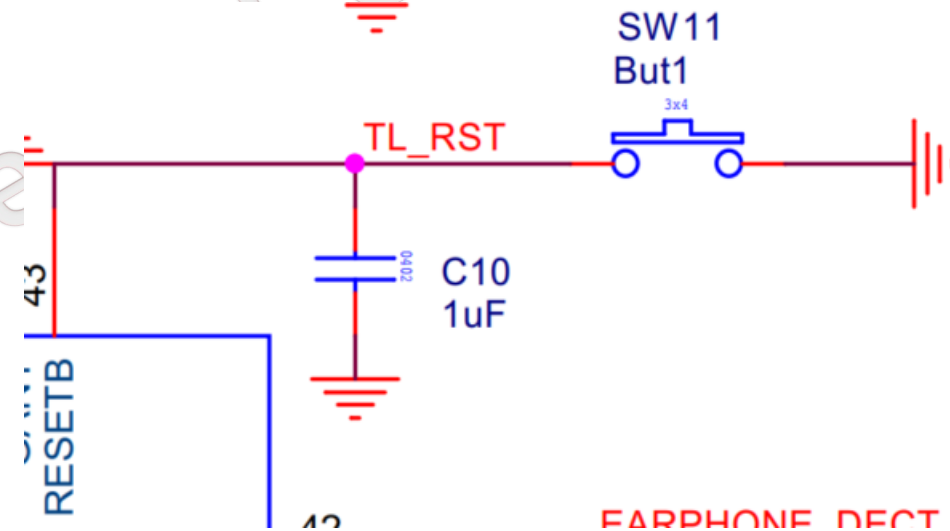
2. EVB introduction - continued

■ 2.1.6 Reset button

- Considering some unexpected cases in development, the single-end Audio EVB is equipped with a chip reset button.



Reset button





2. EVB introduction - continued

■ 2.1.7 Other buttons

- ▣ The single-end Audio EVB is equipped with 3 buttons, which can be customized by software according to each button's IO port shown as below.



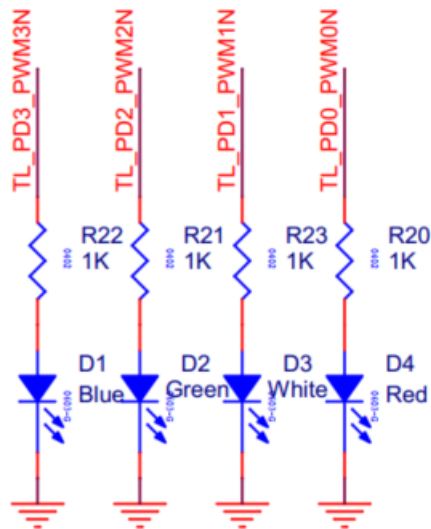
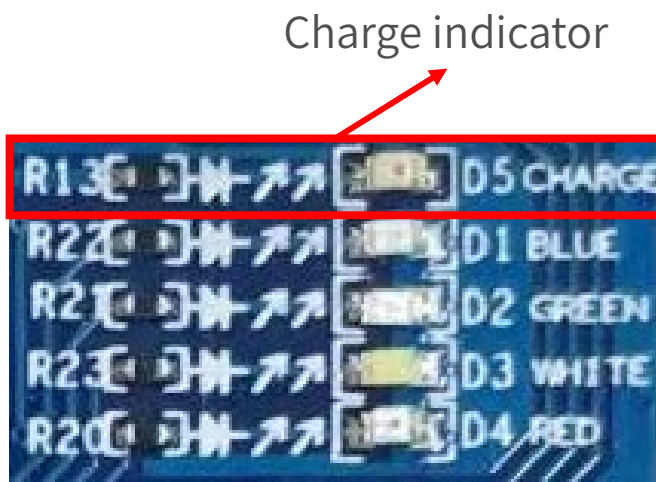
TL_PB0_KEY3	2	PA[7]
TL_PB1_KEY2	3	PB[0]
TL_PB2_KEY1	4	PB[1]
TL_PB3_VBATDET	5	PB[2]



2. EVB introduction - continued

■ 2.1.8 LED

- ▣ The single-end Audio EVB is equipped with one charge indicator and four configurable LEDs as shown below.



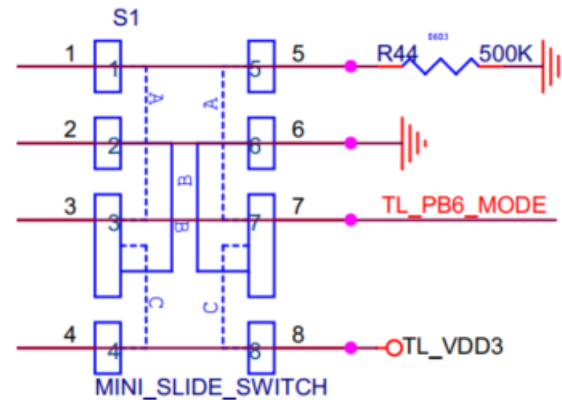
PD[4]	39	TL_PD3_PWM3N
PD[3]	38	TL_PD2_PWM2N
PD[2]	37	TL_PD1_PWM1N
PD[1]	36	TL_PD0_PWM0N
PD[0]	25	



2. EVB introduction - continued

■ 2.1.9 PB6 high/low toggle switch

- ▣ The PB6 port on the single-end Audio EVB is set to a toggle switch that can switch among high, middle and low levels, which can be customized by the software. It is shown as below.

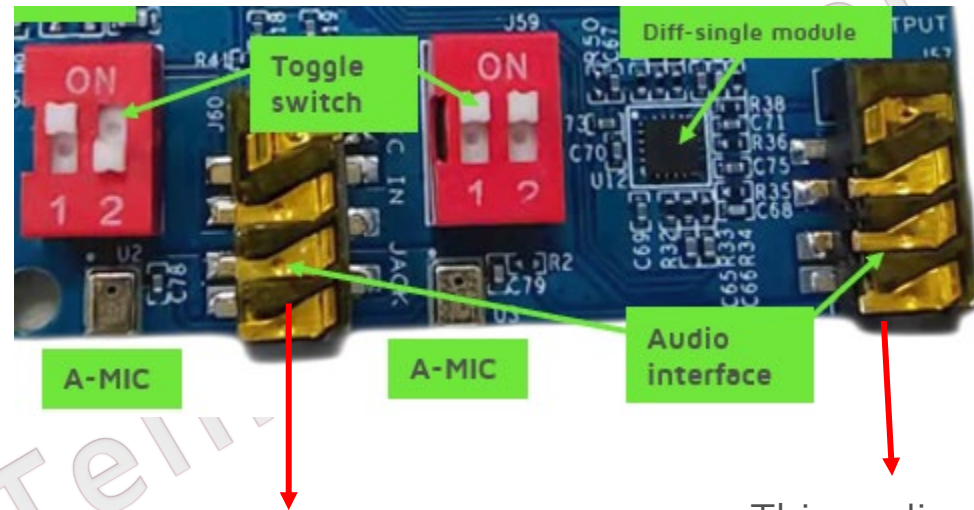


TL_PB6_MODE	7	PB[4]
	8	PB[6]

2. EVB introduction - continued

■ 2.1.10 Audio in/out module

- ▣ The audio module includes a Line-in audio input socket, a stereo output socket, a differential to single-end chip, on-board SMD A-MIC and two control switches.



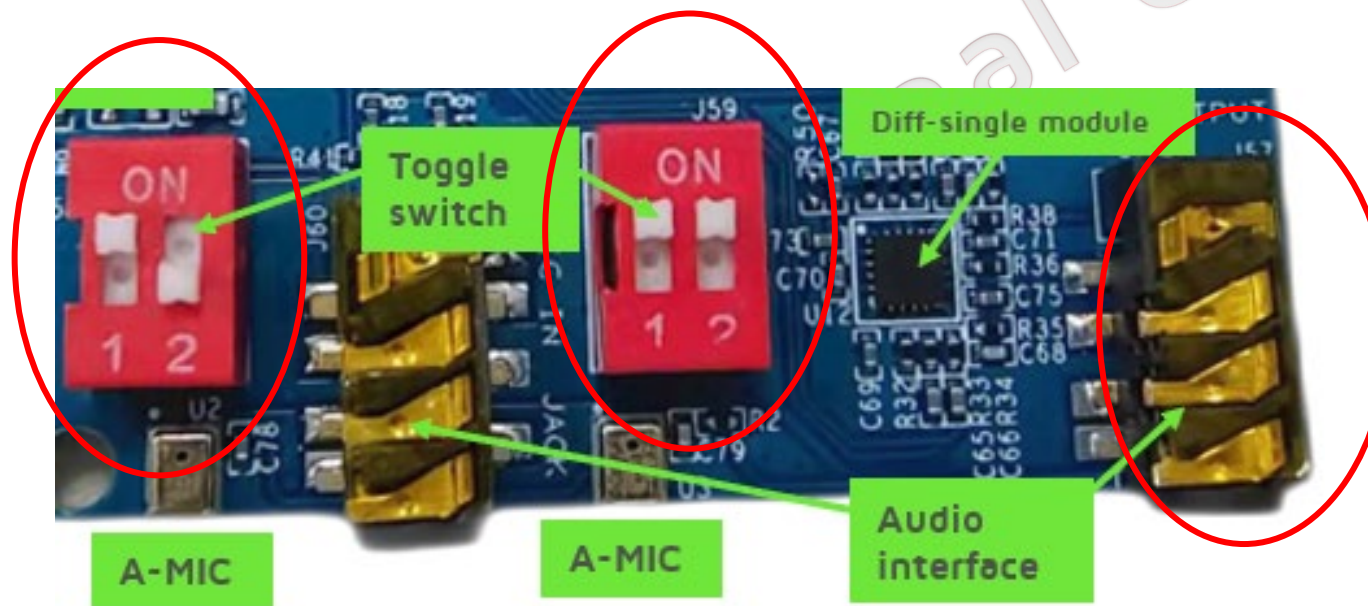
This audio socket is for test,
Not controlled by the switches,
Not supported for headphone,
Supports instrument input such as AP.

This audio socket supports single-end
headphone output, on-board A-MIC
input and headphone MIC input. The
mode switching refers to the next slide.

2. EVB introduction - continued

■ 2.1.11 Audio in/out mode

- ▣ Two control switches control the mode of the output audio socket on the right side of the picture below, supporting four modes in total.



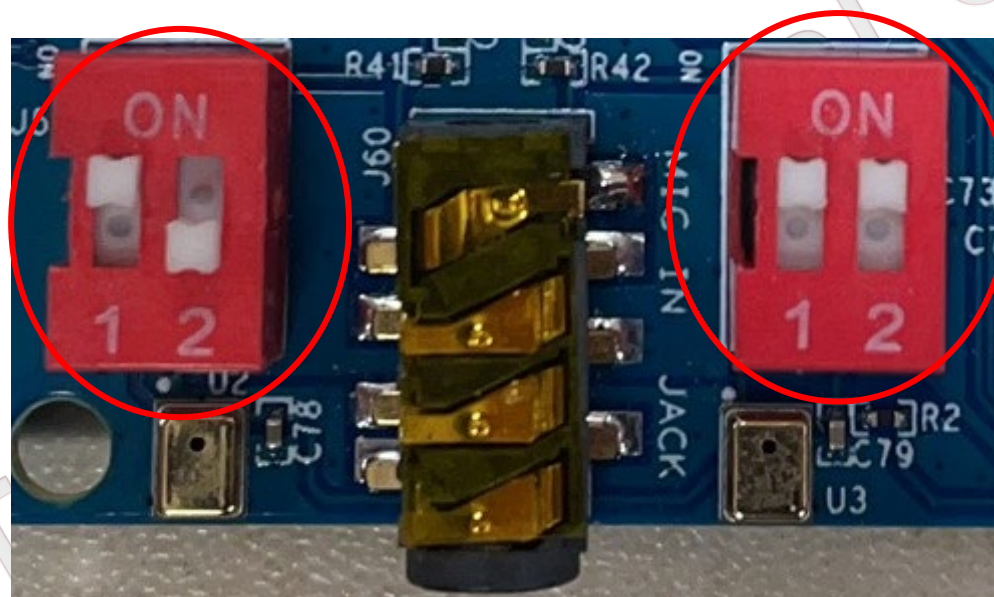


2. EVB introduction - continued

■ 2.1.11 Audio in/out mode

- ▣ Mode 1 (Default): this mode supports audio output, on-board A-MIC input.

- Note: two control switches control the output audio socket on the right side only.



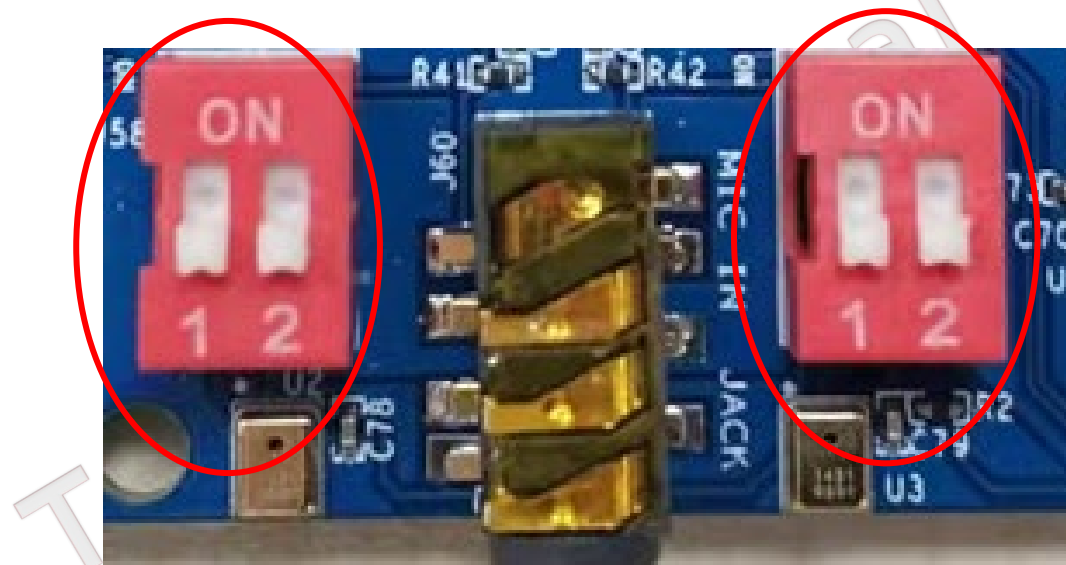


2. EVB introduction - continued

■ 2.1.11 Audio in/out mode

- ▣ Mode 2: this mode only supports audio output, no audio input.

- Note: two control switches control the output audio socket on the right side only.

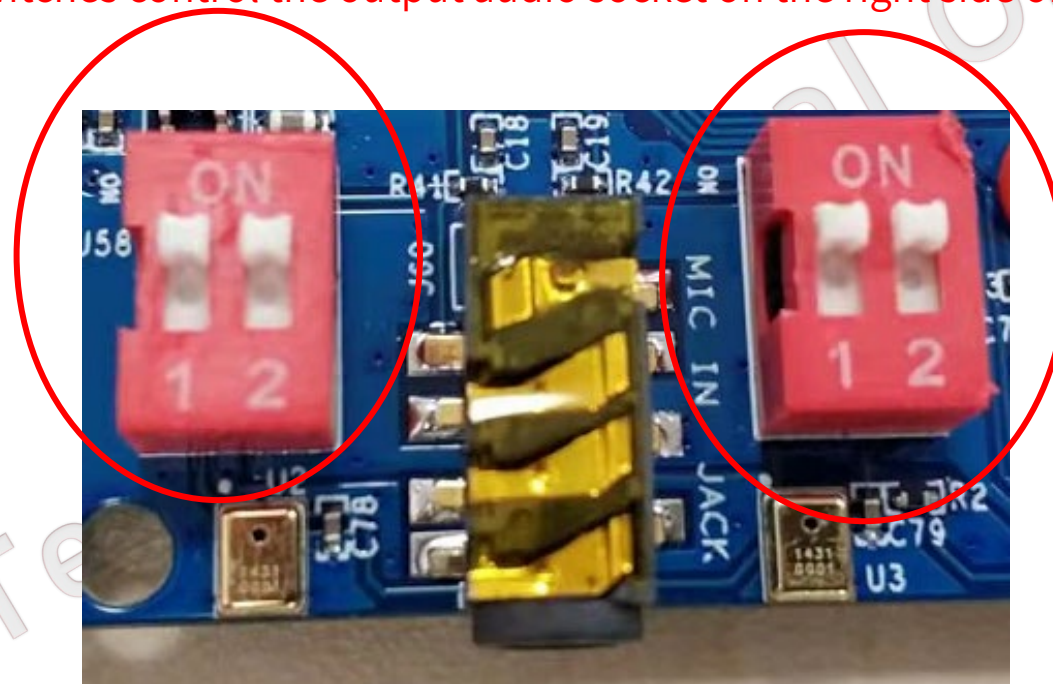




2. EVB introduction - continued

■ 2.1.11 Audio in/out mode

- ▣ Mode 3: this mode supports audio output, headphone MIC input and on-board A-MIC input.
 - Note: two control switches control the output audio socket on the right side only.

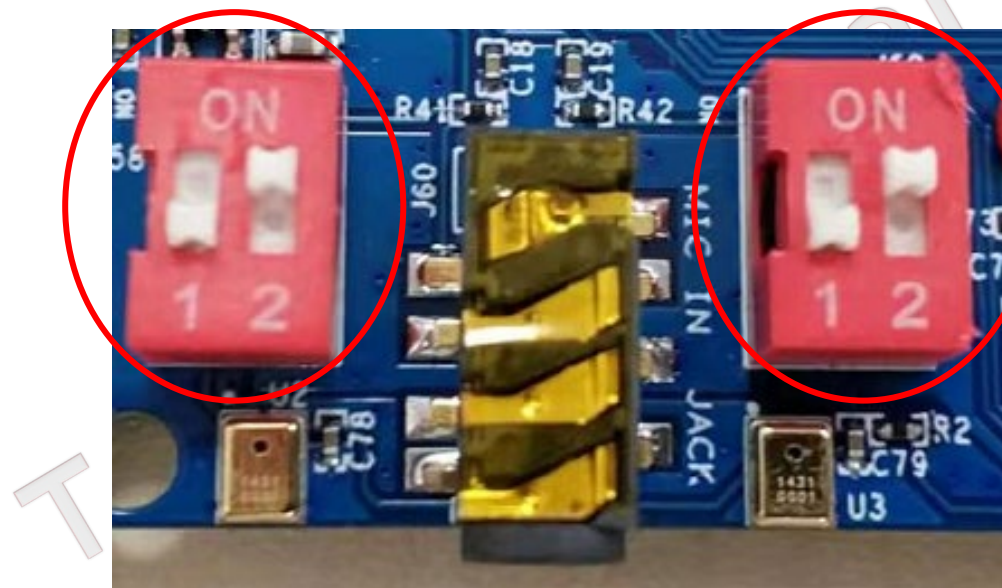




2. EVB introduction - continued

■ 2.1.11 Audio in/out mode

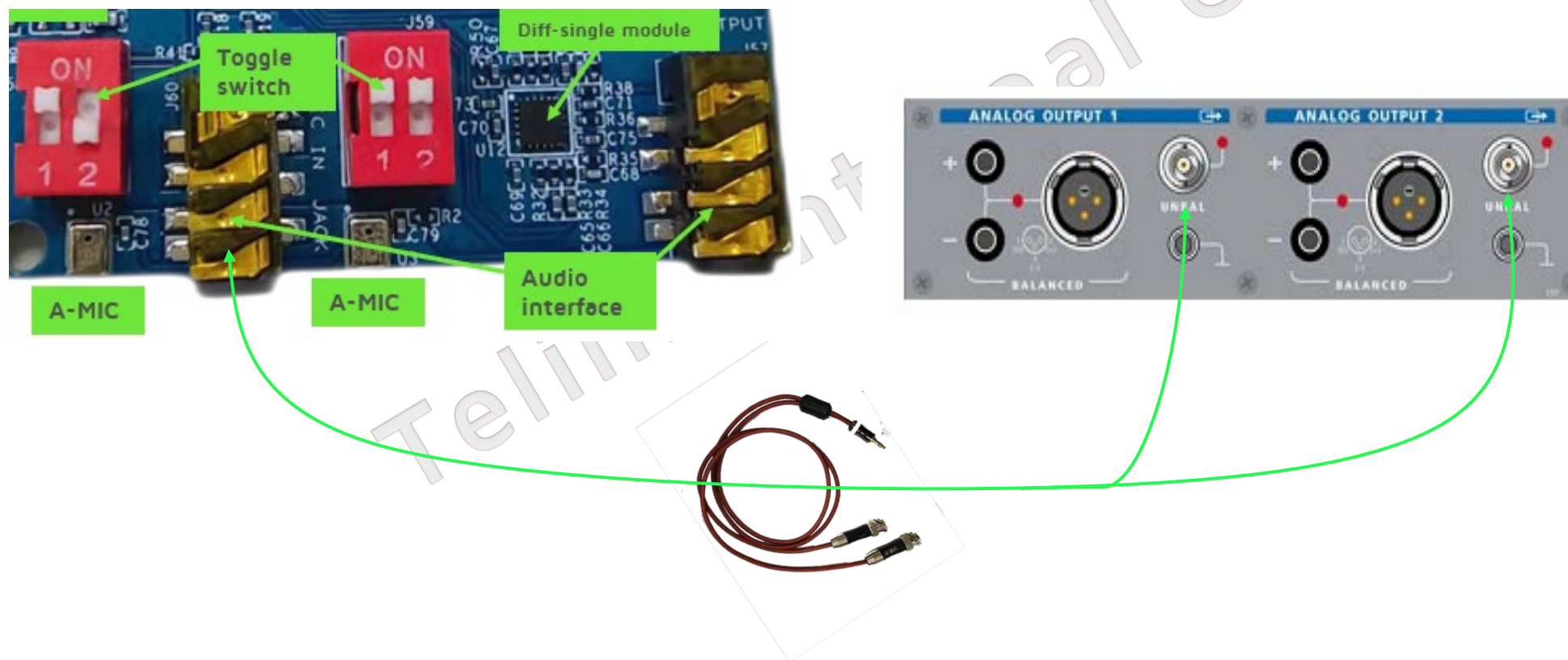
- ▣ Mode 4: this mode supports audio output, headphone MIC input.
 - Note: two control switches control the output audio socket on the right side only.



2. EVB introduction - continued

■ 2.1.12 Connection of audio input path test

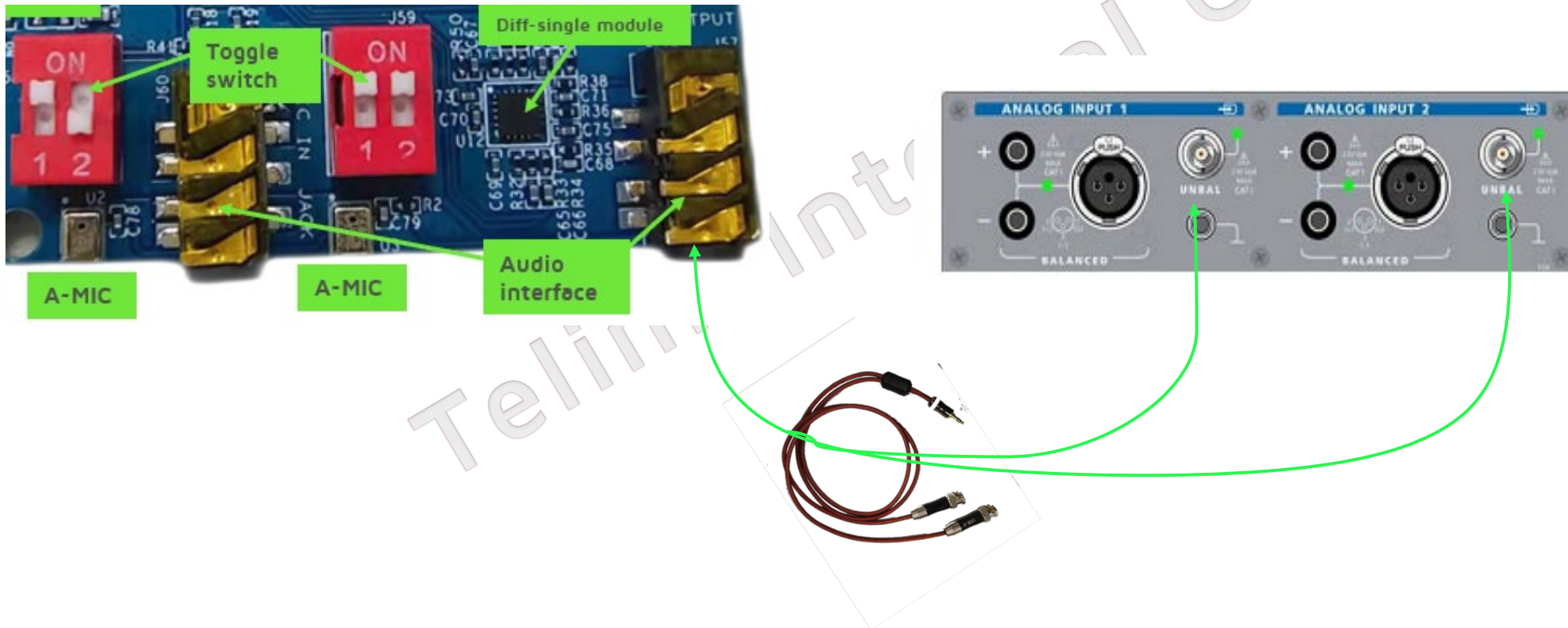
- Ensure that the jumper is connected as follows, using a double-ended cable to connect the audio BNC input socket to the audio test instrument.



2. EVB introduction - continued

■ 2.1.13 Connection of audio output path test

- ▣ Use a double-ended cable to connect the audio BNC input socket to the audio test instrument.



2. EVB introduction - continued

■ 2.1.14 I2S interface + level shift chip

- ▣ I2S in/out interface is shown as below.
- ▣ The level shift chip is to solve the problem of mismatch between the I2S input and output logic levels and the chip IO port, as shown on the right.



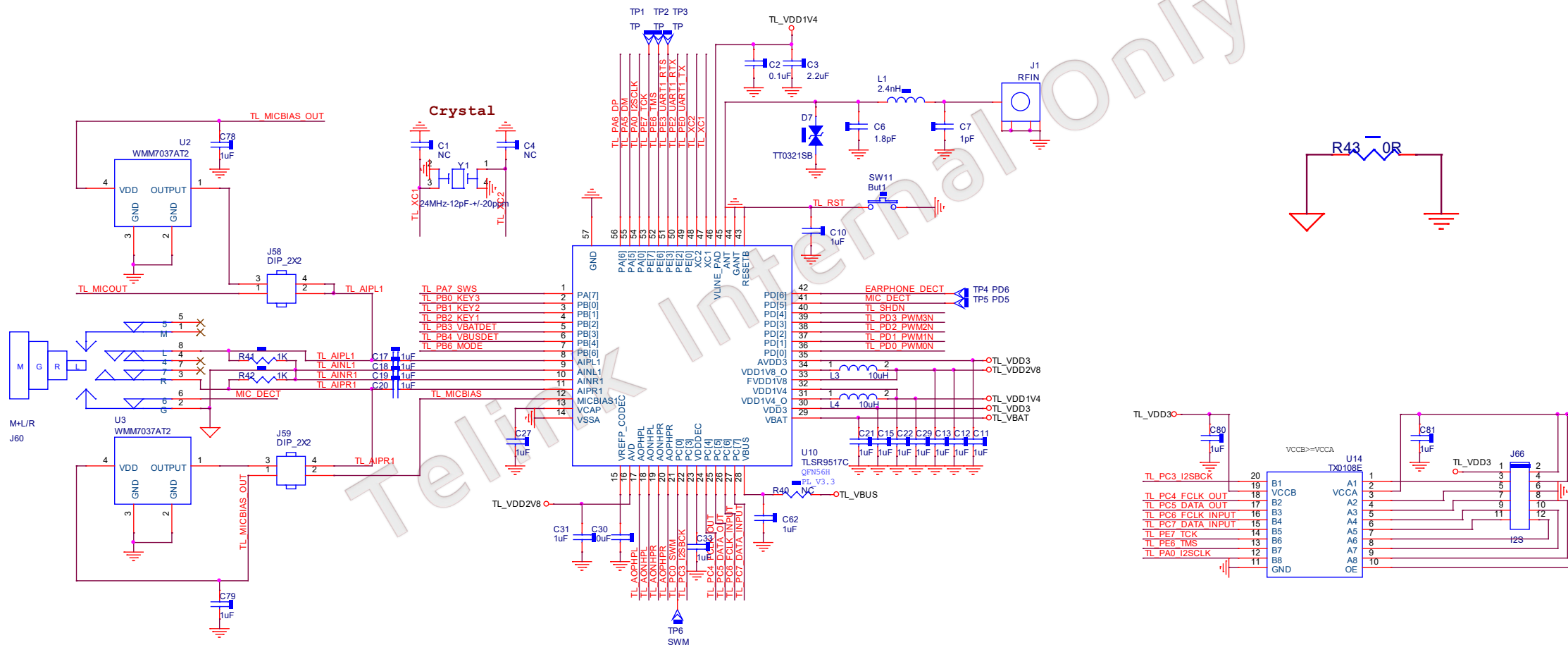
DATA_INPUT	TCK
FCLK_INPUT	TMS
DATA_OUT	I2SCLK
FCLK_OUT	GND
I2SBCK	VCCA
VDD3	VCCA



I2S in connects DATA_INPUT, FCLK_INPUT, I2SBCK, GND
 I2S out connects DATA_OUT, FCLK_OUT, I2SBCK, GND

3. Appendix – continued

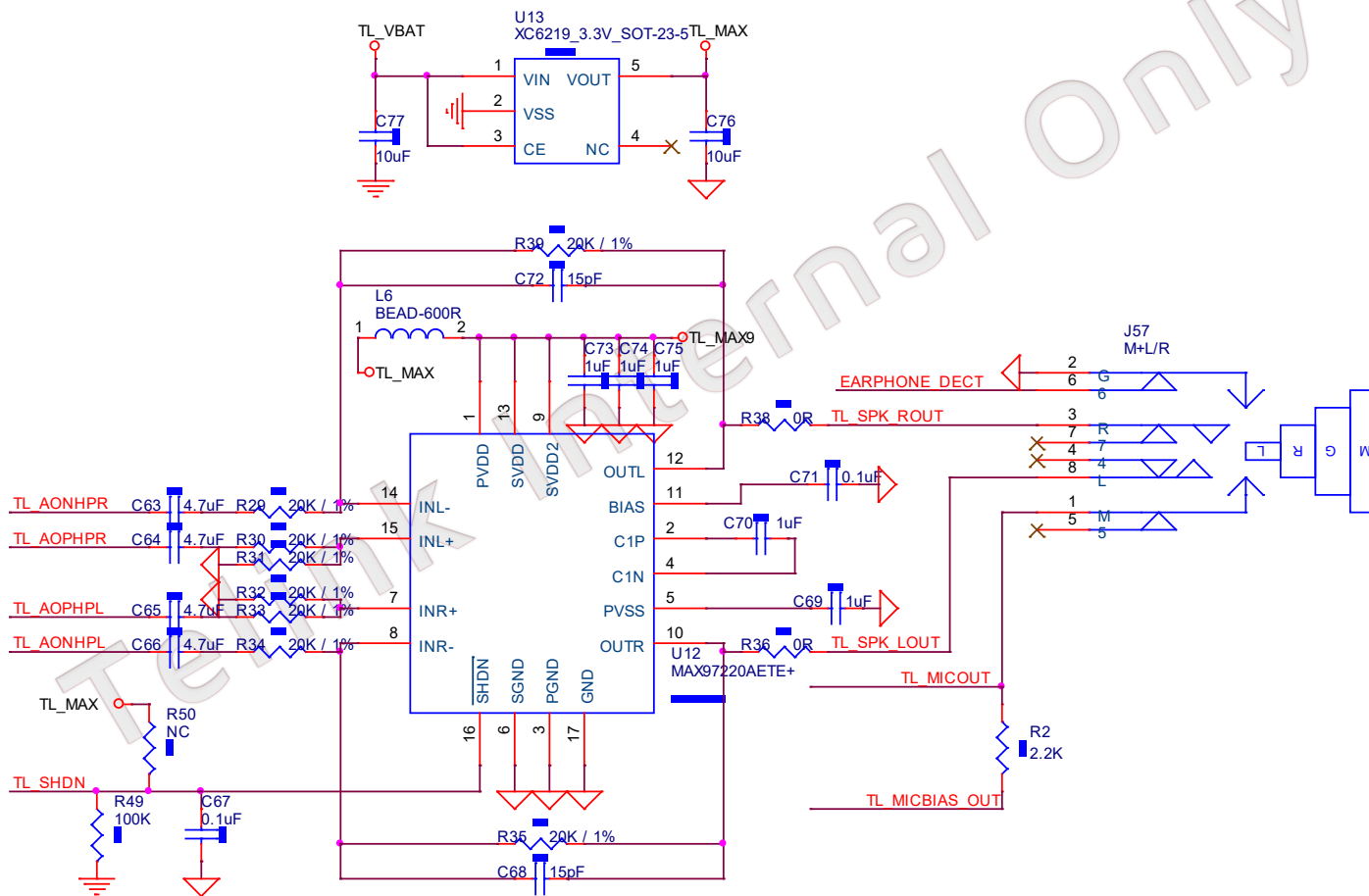
■ 3.1 Single-end Audio EVB V1.3 schematic – part 1





3. Appendix – continued

■ 3.1 Single-end Audio EVB V1.3 schematic – part 2



3. Appendix – continued

■ 3.1 Single-end Audio EVB V1.3 schematic –part 3

