LN920 TLB

HW User Guide

1VV0301735 Rev. 0 – 2021-07-15

Telit Technical Documentation

APPLICABILITY TABLE

PRODUCTS	PART NUMBER
LN920A12-WW	TBD
LN920A6-WW	TBD

CONTENTS

1. INTRODUCTION

1.1. Scope

This document describes the LN920 TLB which is part of complete LN920 Development Kit (Dev-Kit).

1.2. Audience

This document is intended for system integrators that are using the Telit LN920 module Translation Level Board (TLB).

1.3. Contact Information, Support

For technical support please e-mail:

- *TS-EMEA@telit.com*
- *TS-AMERICAS@telit.com*
- *TS-APAC@telit.com*
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1.4. Symbol Conventions

Danger: This information MUST be followed or catastrophic equipment failure or personal injury may occur.

Warning: Alerts the user on important steps about the module integration.

	**Note/Tip:** Provides advice and suggestions that may be useful when integrating the module.
	**Electro-static Discharge:** Notifies the user to take proper grounding precautions before handling the product.

Table 1: Symbol Conventions

All dates are in ISO 8601 format, that is YYYY-MM-DD.

1.5. Related Documents

- LN920 HW User Guide, 1VV0301730
- Telit EVB (Evaluation Board) User Guide, 1VV0301249
- LN920 AT Commands Reference Guide, TBD

2. GENERAL PRODUCT DESCRIPTION

2.1. Overview

The Translation Board (TLB) is custom designed to interface the Telit LN920 M.2 data card with the Telit Generic Evaluation Board (EVB), thus forming the complete Development Kit of LN920.

The TLB provides mapping of Telit module signals and functions into the generic EVB signals and functions.

The LN920 TLB includes – among others - the following items:

- RF SMA connectors
- Board to Board connectors for interfacing to EVB main board
- Module specific circuitry which is not part of the generic circuitry of the EVB

The TLB includes a M.2 module socket, making the data card removable from the TLB.

The Power supply and control interface for the RF module is provided by the EVB through the B2B connectors, located on the bottom side of the TLB and connecting the TLB to the EVB.

The bottom plane solder-mask is cutout under the RF module to allow mounting a heatsink to cool the module through the PCB GND via's.

The board is designed to host M.2 modems using LN920 pin mapping (42.0 x 30.0 x 2.3mm, +/- 0.15 mm tolerance and 75 pins).

Board	PCB Code
TLB	CS2146
EVB	CS1984C or CS1742E
Module	LN920

Table 2: Latest PCB reference numbers

2.2. TLB View

The below pictures show the TLB top and bottom view.

LN920 TLB Top View

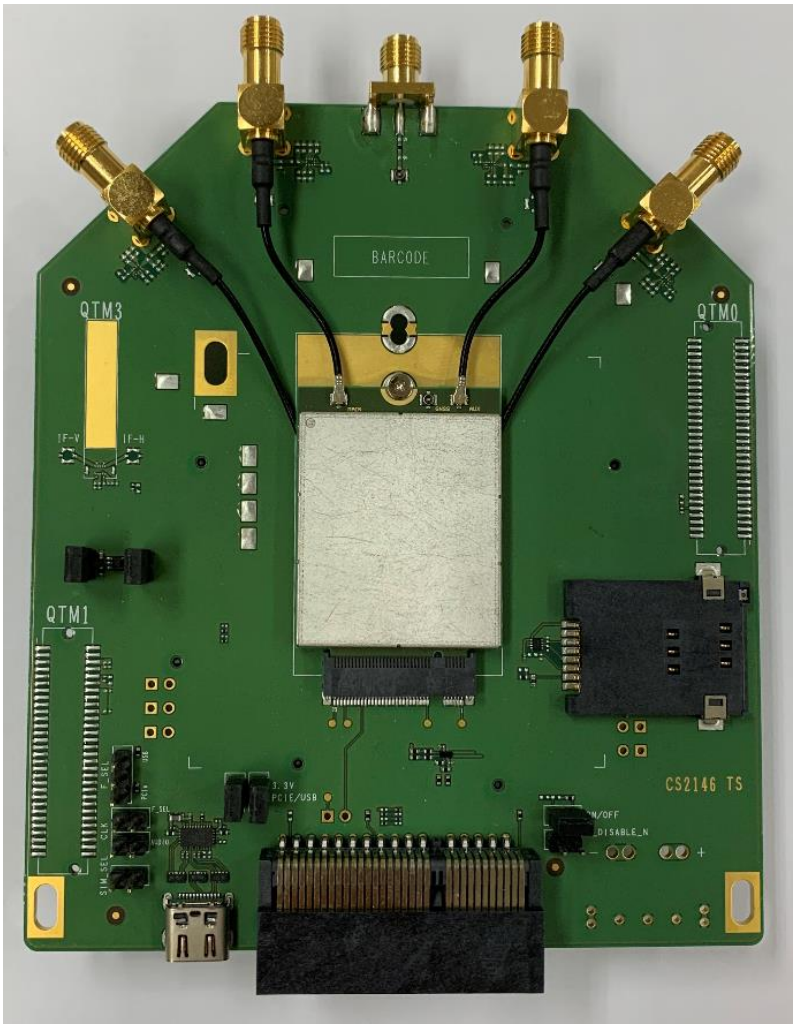

Figure 1: TLB Top View

LN920 TLB Bottom View

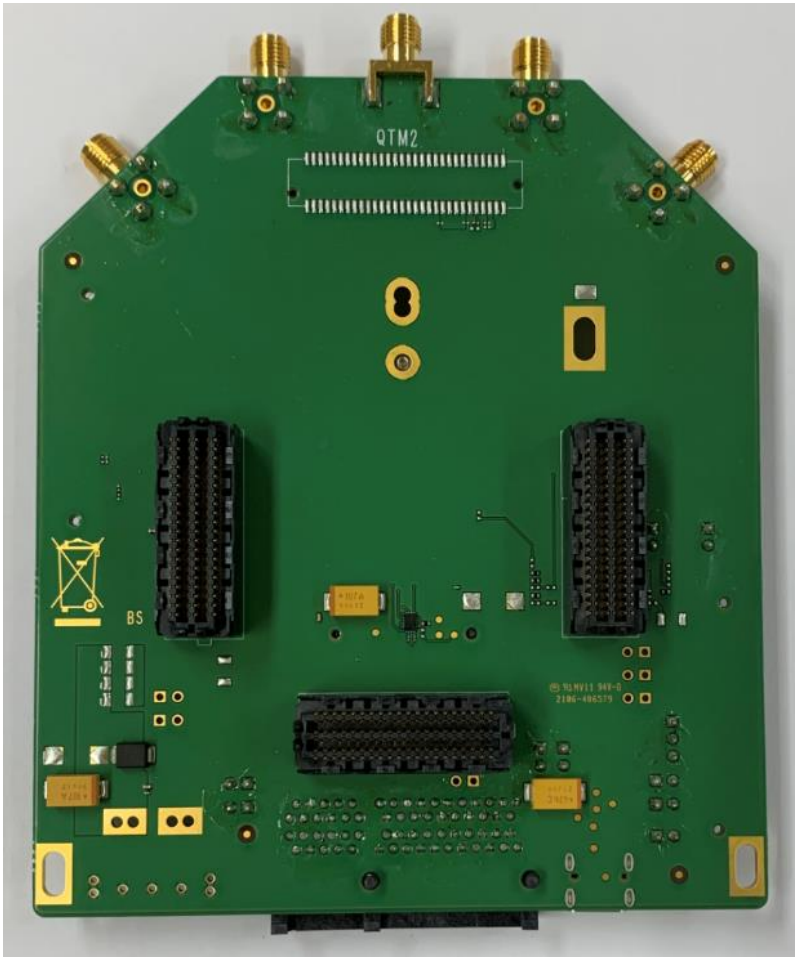

Figure 2: TLB Bottom View

2.3. TLB Description

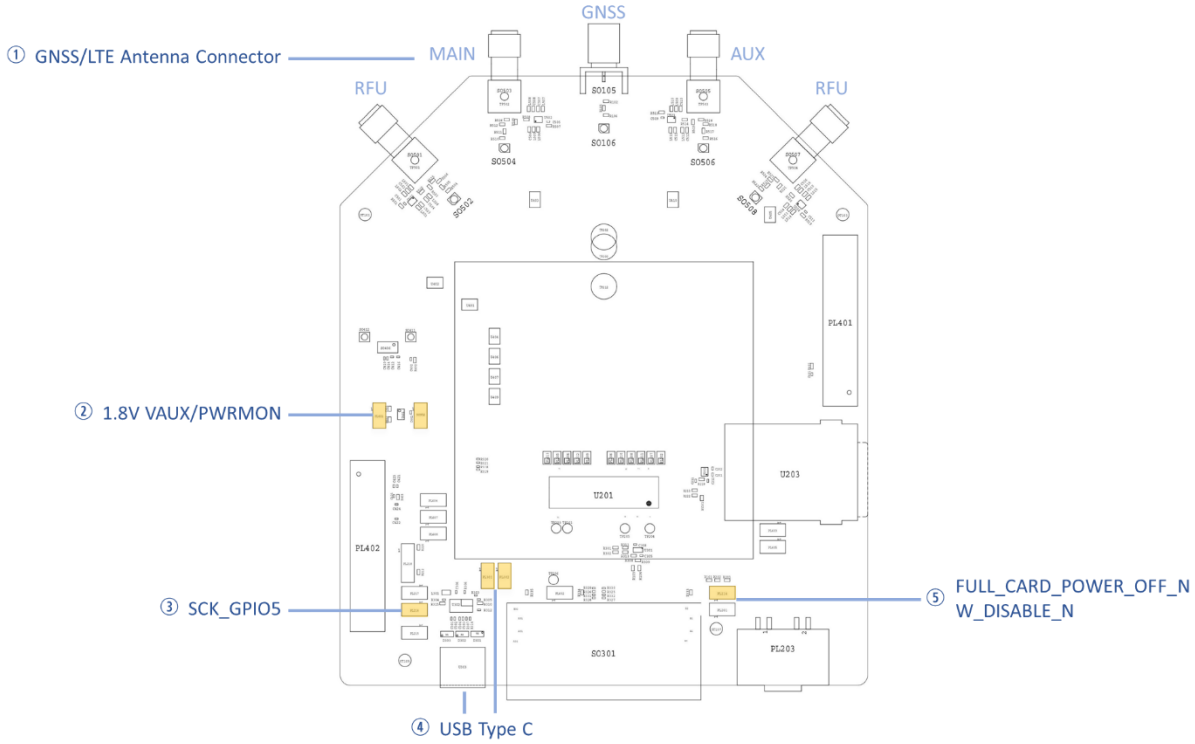

Figure 3: TLB Description

(1) GNSS/LTE Antenna Connector

In case of LN920, only 2 out of 4 LTE antenna connectors are used. The central RF connector is dedicated to GNSS, while the secondary cellular LTE antenna can be shared between cellular AUX antenna and GNSS receiver.

The other two RF connectors – if mounted - are reserved for other Telit M.2 products.

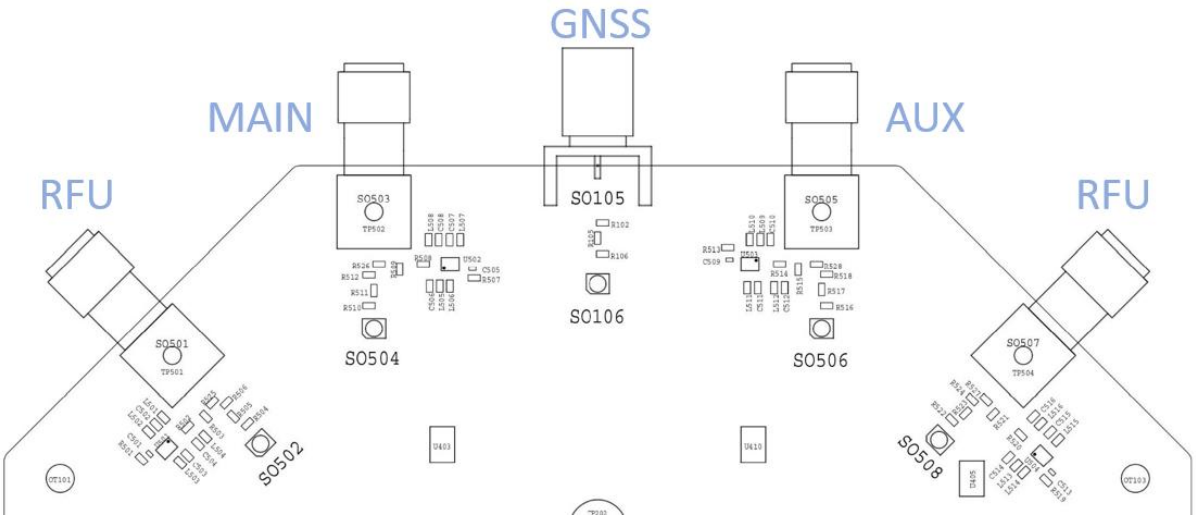

Figure 4: Antenna Connector Description

(2) 1.8V VAUX/PWRMON (PL601/PL606)

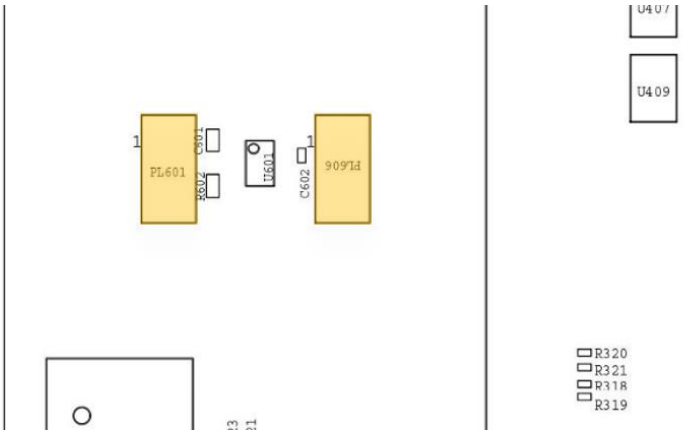

Figure 5: 1.8V VAUX/PWRMON

The Jumper PL601/PL606 allows to supply 1.8V I/O power to the Telit EVB.
Place jumpers on PL601 1-2 and PL606 1-2 as indicated in Table 3.

(3) SCK_GPIO5 (PL216)

The Jumper PL216 allows to connect SCK_GPIO5 (M.2 pin 20) to general EVB.
Place jumpers on PL216 1-2 and PL606 1-2 as indicated in Table 3.

(4) USB Type C (U303/PL301/PL302)

The Jumper PL301/PL302 allows to supply 3.3V power to the USB switch blockto support USB 3.1 gen1 by using USB Type C connector. (U303)
Place jumpers on PL301 1-2 and PL302 1-2 as indicated in Table 3.

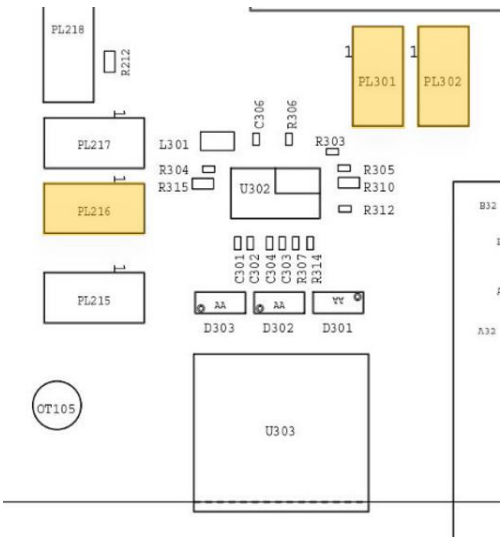

Figure 6: SCK_GPIO5 and USB Type C

(5) FULL_CARD_POWER_OFF_N / W_DISABLE_N

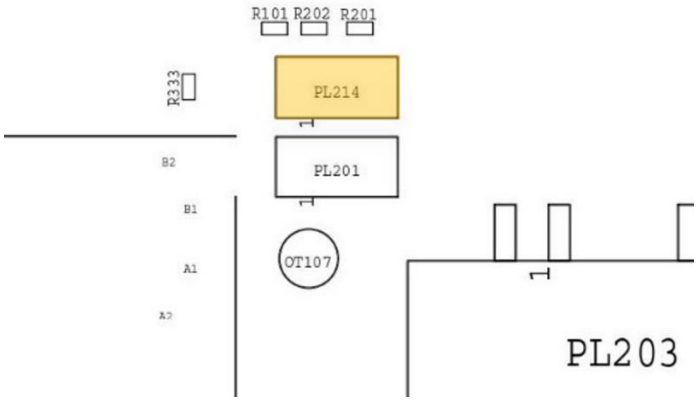

Figure 7: Auto Power ON / W_DISABLE_N

- FULL_CARD_POWER_OFF_N

Place jumper on PL214 1-2: LN920 Power ON

Remove jumper from PL214: LN920 Power OFF

- W_DISABLE_N

Connecting a jumper to PL201 activates the W_DISABLE_N function. (Power Saving Mode).

Please refer to the AT#PSMWDISACFG section of the LN920 AT Commands Reference Guide.

(6) Other Jumpers and Connectors

All other Jumpers and Connectors are reserved for other Telit M.2 products or for future use.

2.4. Jumpers Setting Guidelines

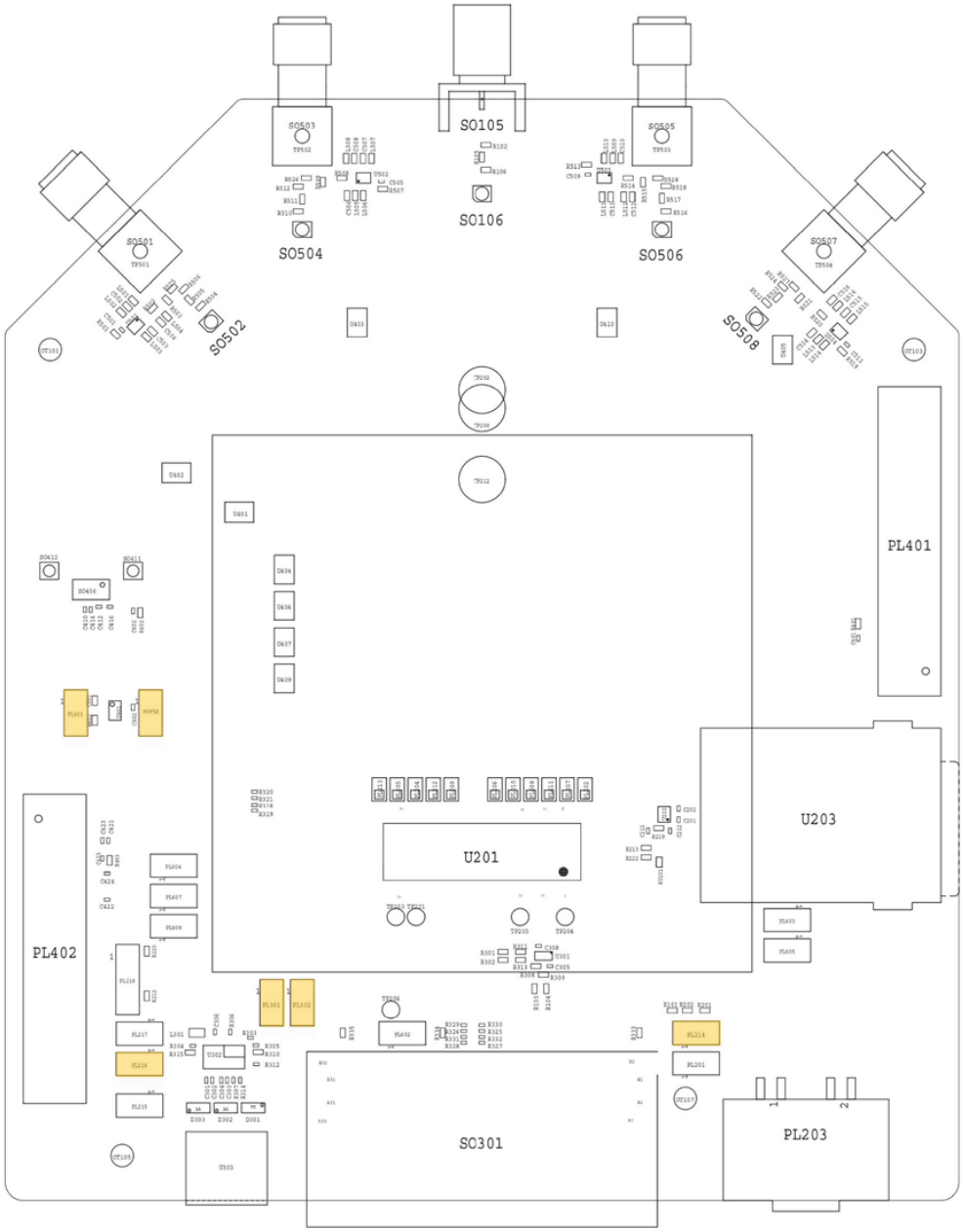

Figure 8: Default Jumper Setting of TLB

Jumper	Jumper Type	Set Position	Description
PL214	2.54 mm	1-2	Power ON
PL301/PL302	2.54 mm	1-2	3.3V Power for USB type C
PL216	2.54 mm	1-2	Connect SCK_GPIO5 to EVB main board
PL601/PL606	2.54 mm	1-2	1.8V Power for 1.8V I/O circuitry (VAUX/PWRMON)

Table 3: Default Jumper Setting of TLB and Description

2.5. Antenna Ports

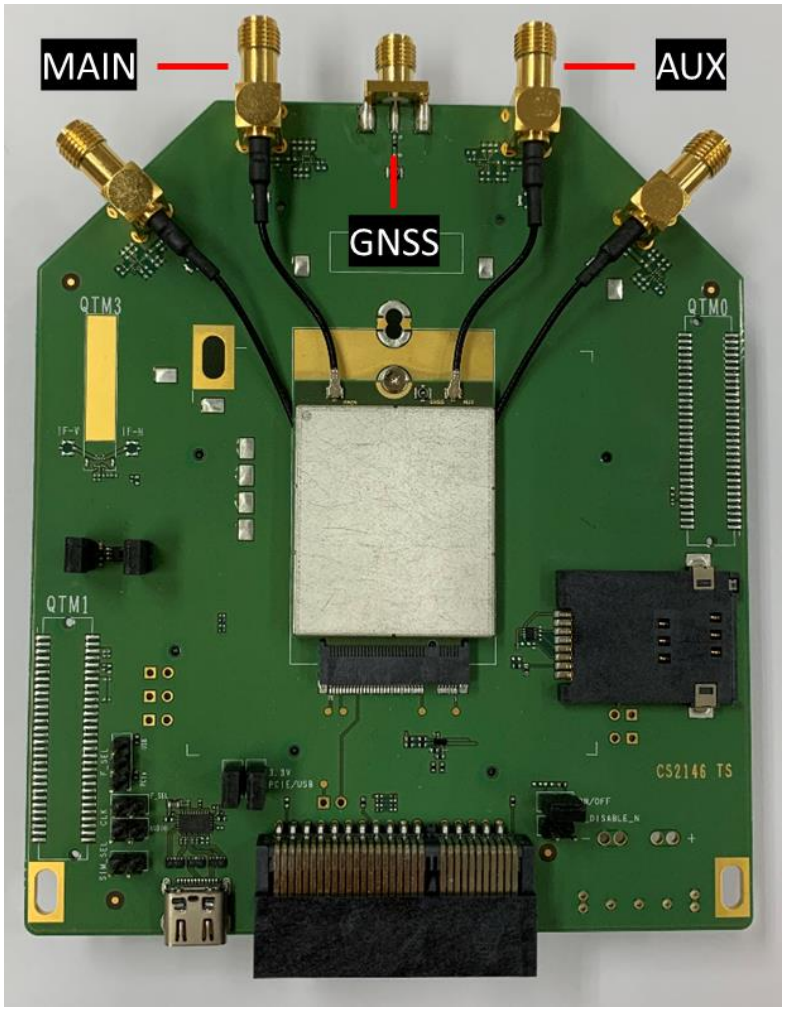

Figure 9: Antenna Ports

Note: For more detailed information on Antenna ports, please refer to the LN920 HW User Guide, 1VV0301730, Chapter 7.1 Antenna Interface.

Warning: Be careful not to damage cables and RF connectors assembly when connecting the Antenna cables.

2.6. Guidance for Evaluation Board Configuration

The EVB can be configured for different power supply sources depending on the required use case.

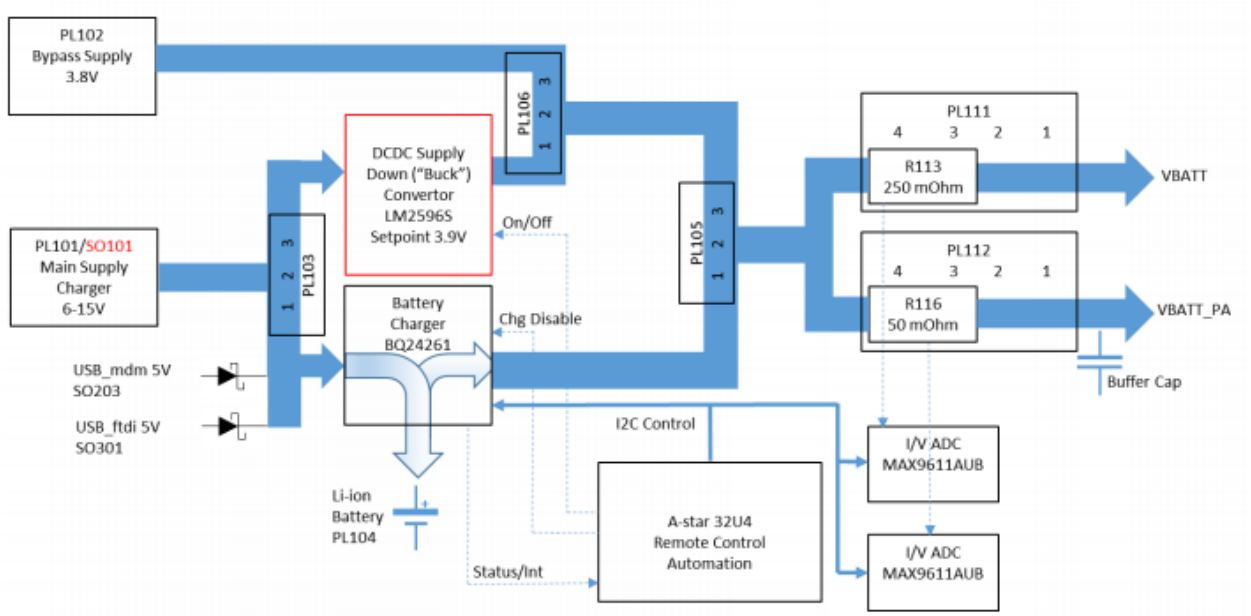

Figure 10: EVB Power Supply

The EVB main power connector is PL101/SO101 with an input range of 6-15V.

Normally (i.e. in a typical SW developers setup), the EVB is supplied from the main power connector, and a DC-DC buck supply with a set point of 3.9V is used to provide the system VBAT. Thus, the default jumper configuration is as follows: PL103/2-3; PL106/1-2; PL105/2-3.

PL102 allows an external configurable power supply to feed directly the VBAT input supply to the LN920, while all the auxiliary peripherals are fed through the main power connector.

Note: For more detailed information of power supply source selection, please refer to 1VV0301249 Telit Evaluation Board (EVB) HW User Guide, Chapter 3.1 Supply Source Selection.

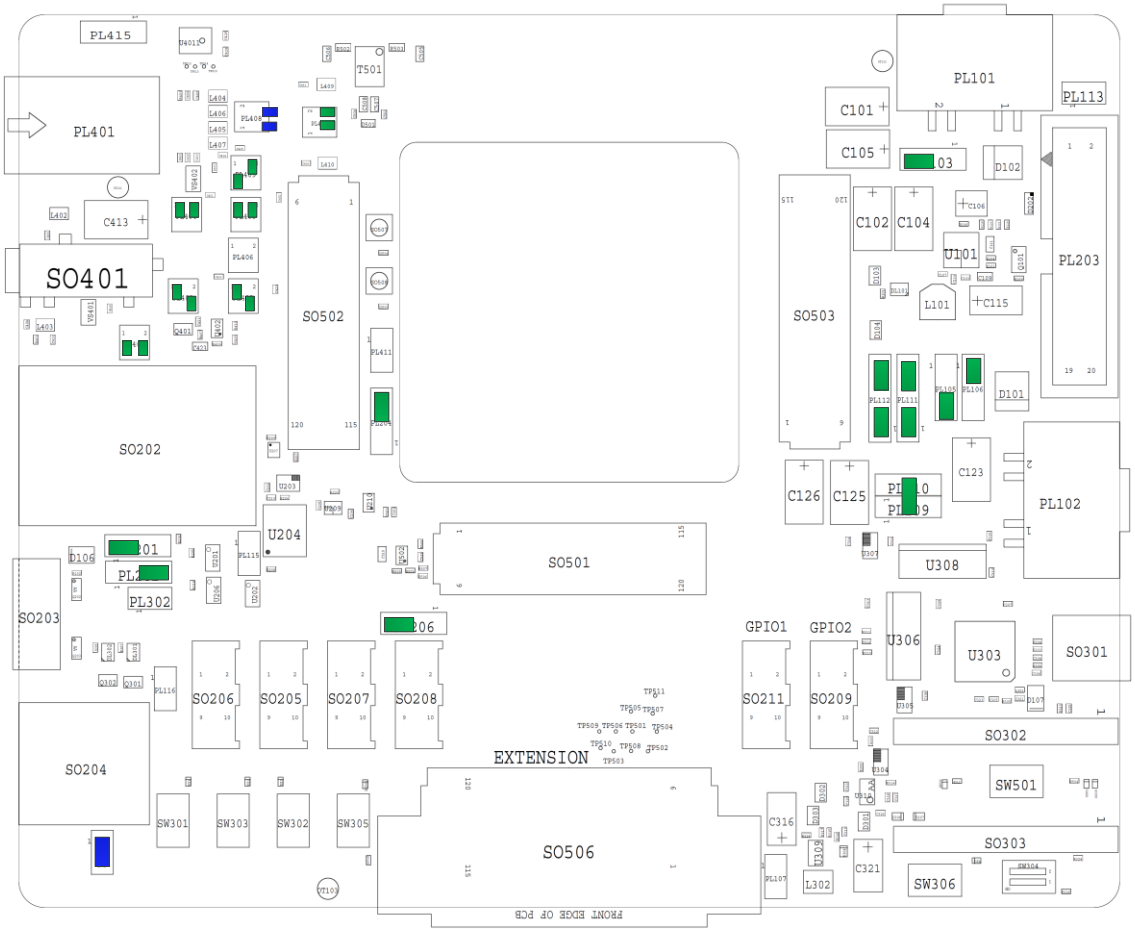

Figure 11: Default Jumper Setting of Telit EVB

2.6.1. Bypass Setting

Power Supply	Value
Voltage / Max.Current	3.3 V ± 5 % / TBD A

Table 4: Power Supply Requirement

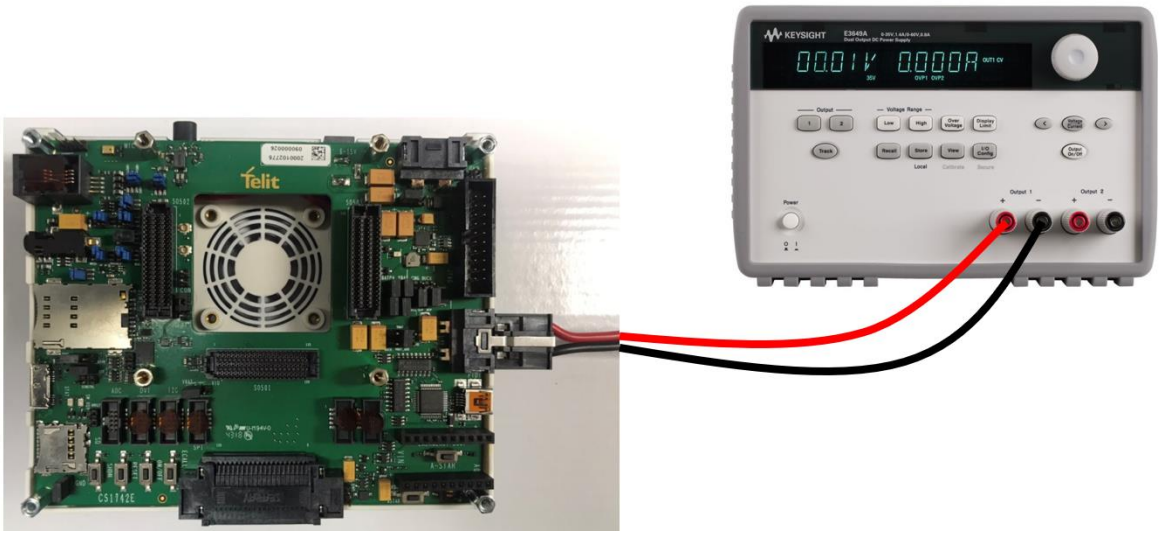

Figure 12: Connecting Power Supply and Telit EVB

2.6.1.1. Jumper Setting for Bypass Mode

PL106/2-3

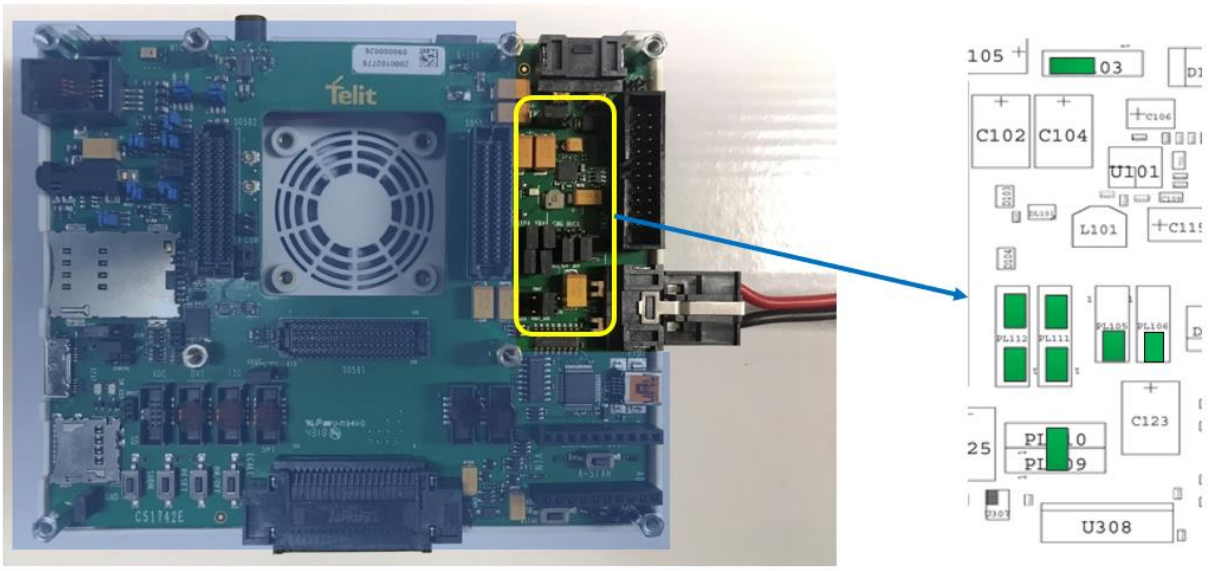

Figure 13: Jumper Setting of Telit EVB for Bypass Mode

2.6.2. 6-15V Setting

The EVB main power connector is PL101/SO101, with an input range of 6-15V DC.

It is usually connected to a DC power supply or power adapter.

6-15V DC input power is connected to DC-DC converter block and step down to 3.9V to supply the LN920 module.

The output voltage of DC-DC converter is designed as 3.9V and it does not meet the LN920 M.2 card power supply specification.

Therefore, it is necessary to proceed with a modificatio to supply 3.3V power through the process described below (2.6.2.1 Guidelines of ECO for 3.3V Output).

2.6.2.1. Guidelines of ECO for 3.3V Output of DC-DC Converter

- Step 1

  When using a supply 6-15V or 12V adapter, please change the header as highlighted in red in the image below (PL106/1-2)

  PL101: Power Supply Connector

  Power source by adjustable power supply: 6-15V

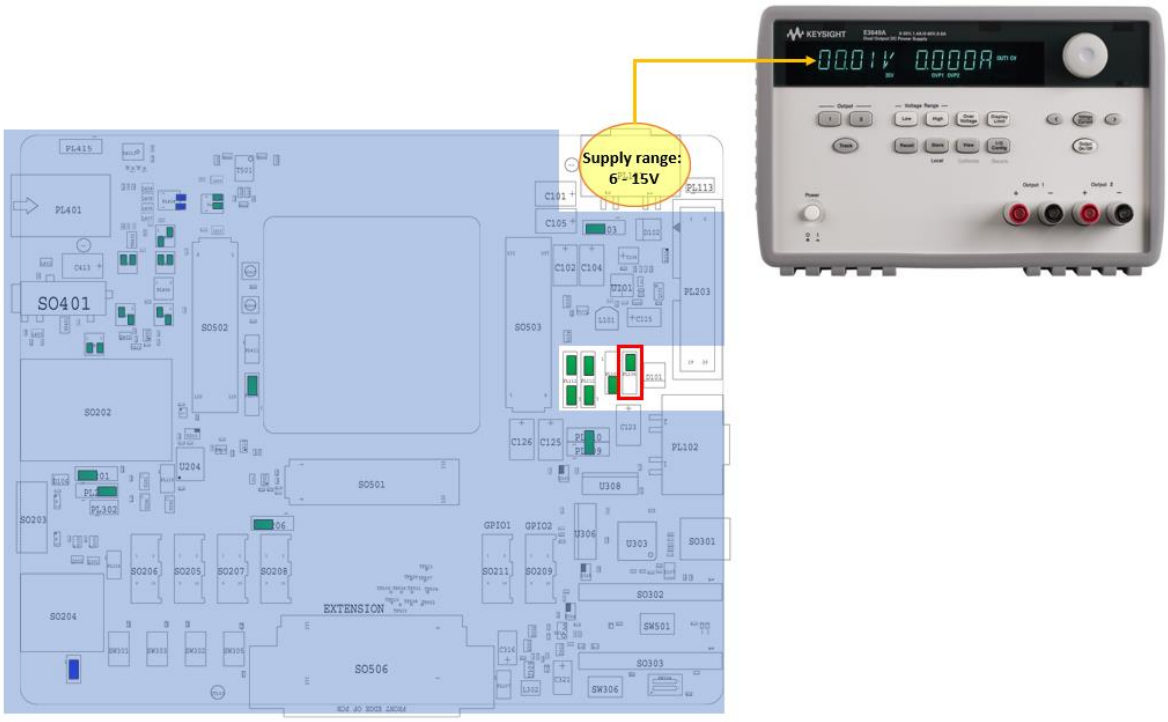

Figure 14: Power Supply Connector

SO101: 12V adapter connector

Power source from 12V adapter, such as the one supplied with Telit EVB

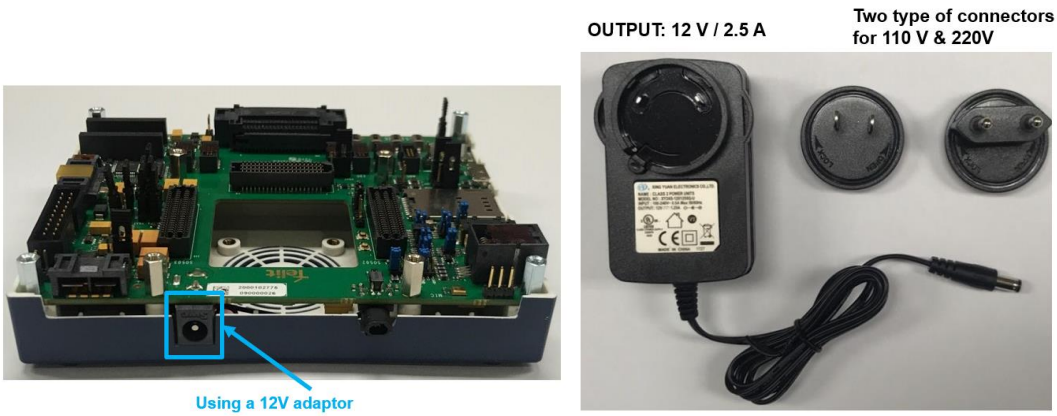

Figure 15: 12V adaptor connector

- **Step 2**

  Power source by DC-DC convertor is supplied from PL101/SO101.

  As previously mentioned, the output voltage for which the DC-DC converter is designed is 3.9 V and it does not meet the LN920 M.2 card power supply specification.

  To change the 3.3 V output of DC-DC converter for LN920 module, it is **MANDATORY to** change **R107,** which is a **1.69 K ohm** general 0402 resistor.

Note: It is highly recommended to use a 1.69 KOhm, 1/16W, 0402 inch resistor with 1% tolerance for stable 3.3V output.

<Bottom View of PCB, CS1742E>

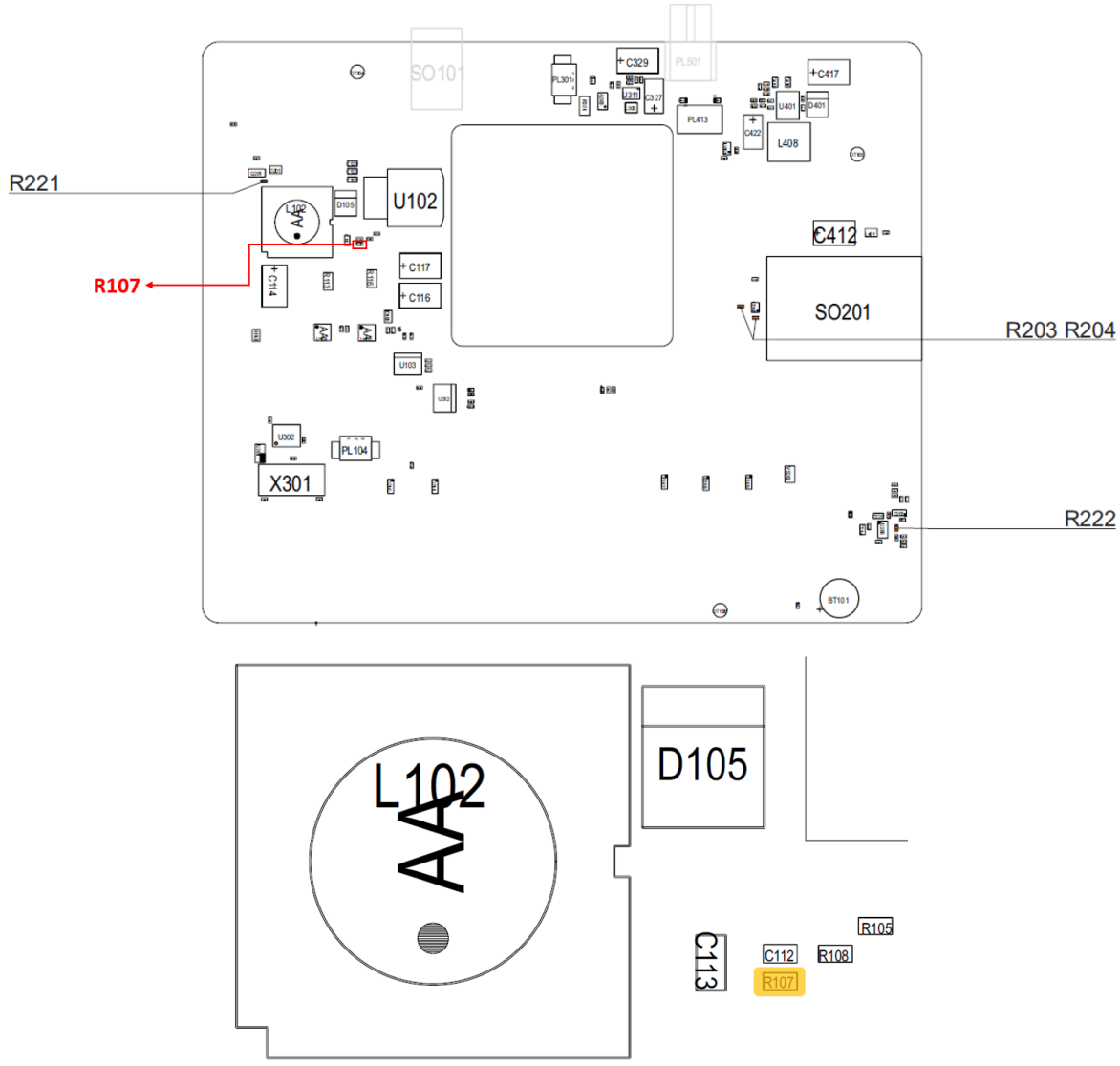

Figure 16: Bottom View of PCB, CS1742E

3. COMPONENT ASSEMBLY DIAGRAM

3.1. Layout

Component Diagram Top View

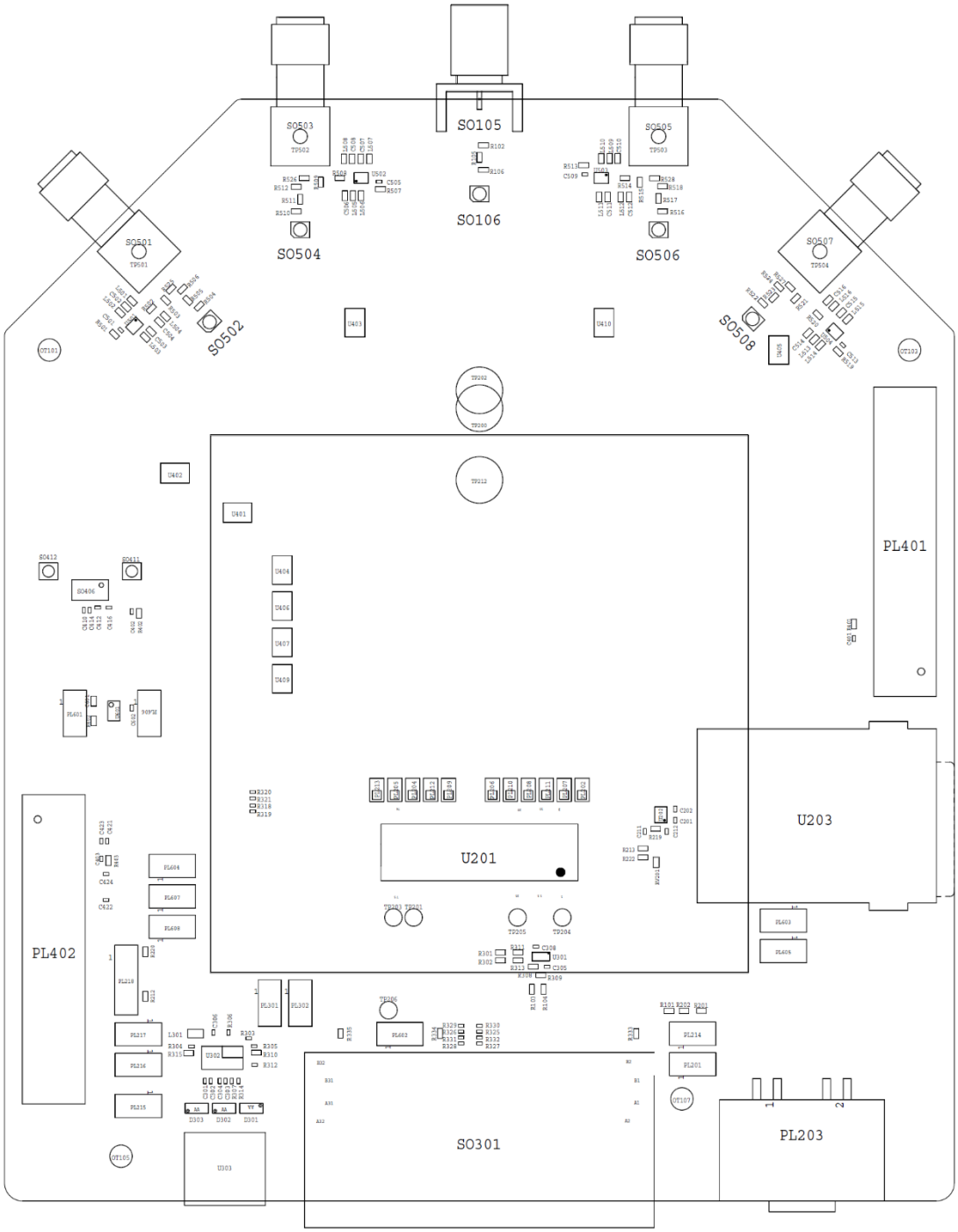

Figure 17: Component Diagram Top View

Component Diagram Bottom View

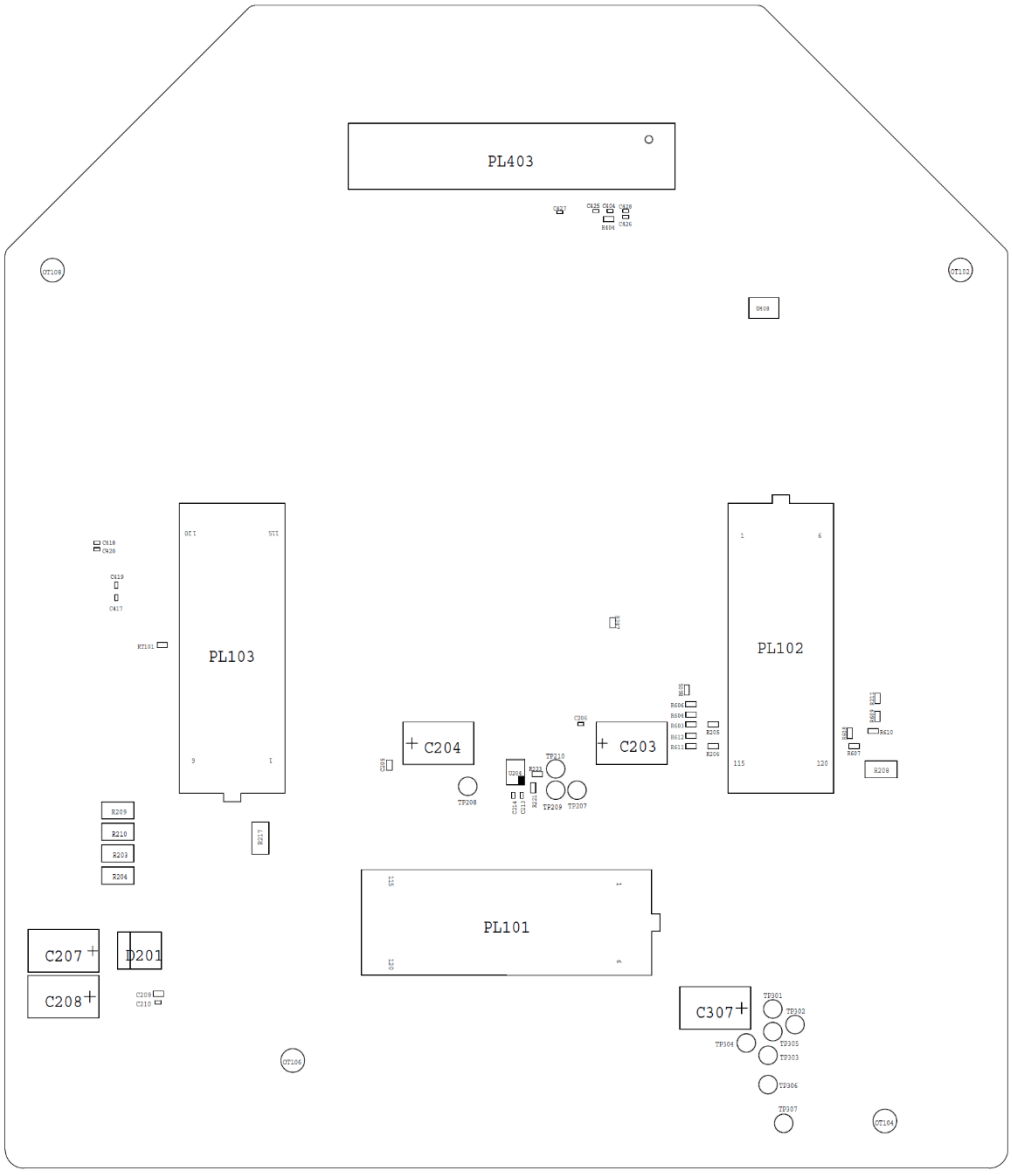

Figure 18: Component Diagram Bottom View

4. SCHEMATICS

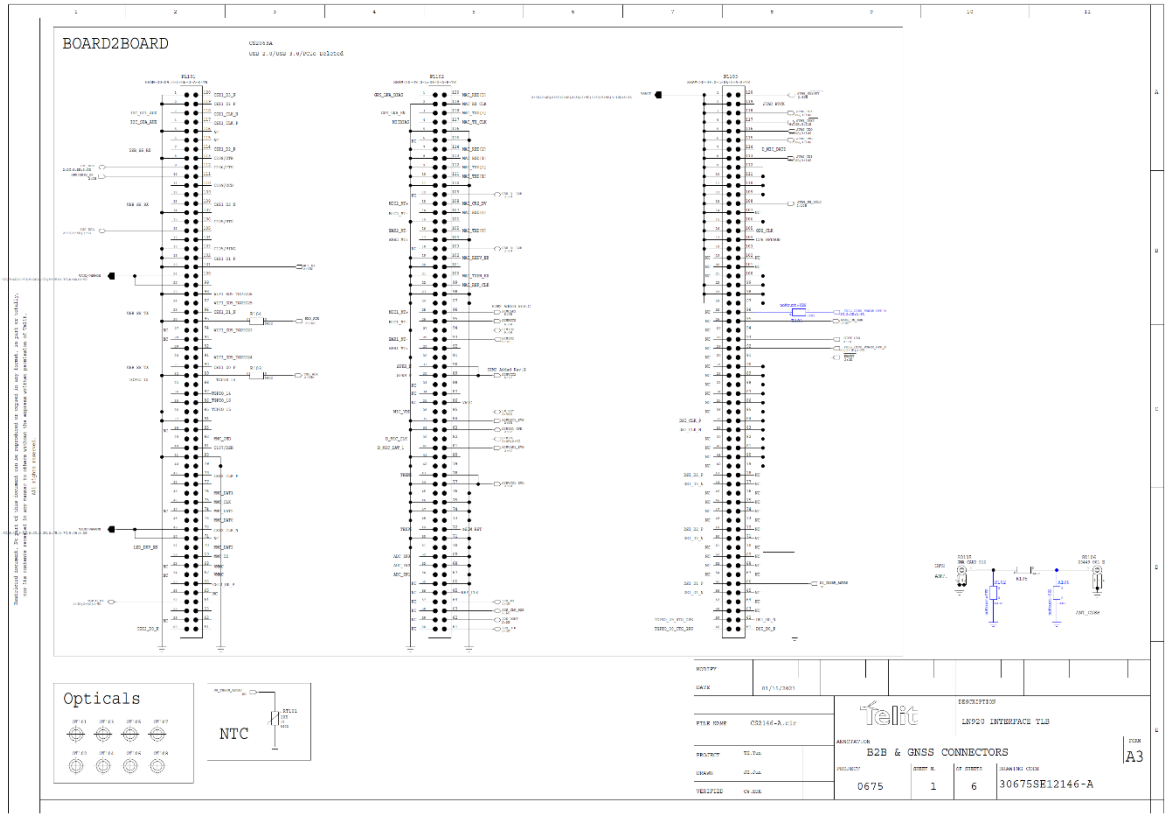

Figure 19: Page 1

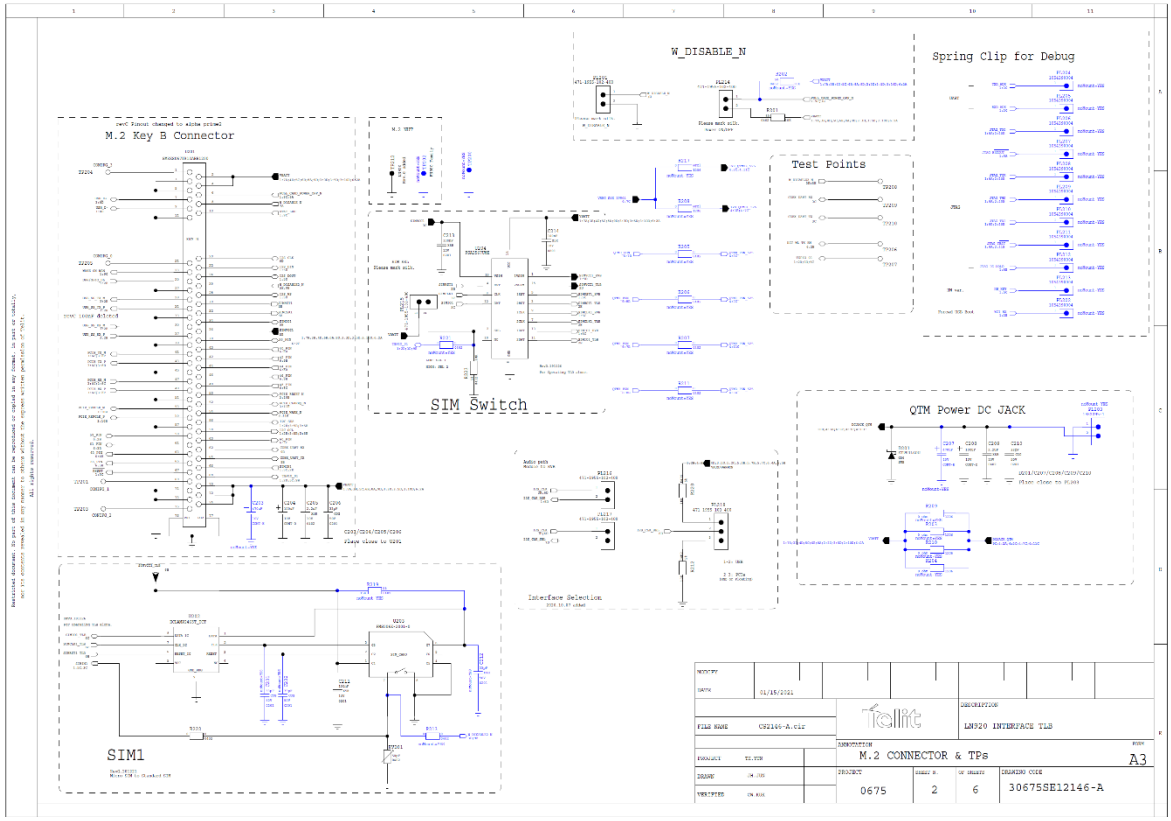

Figure 20: Page 2

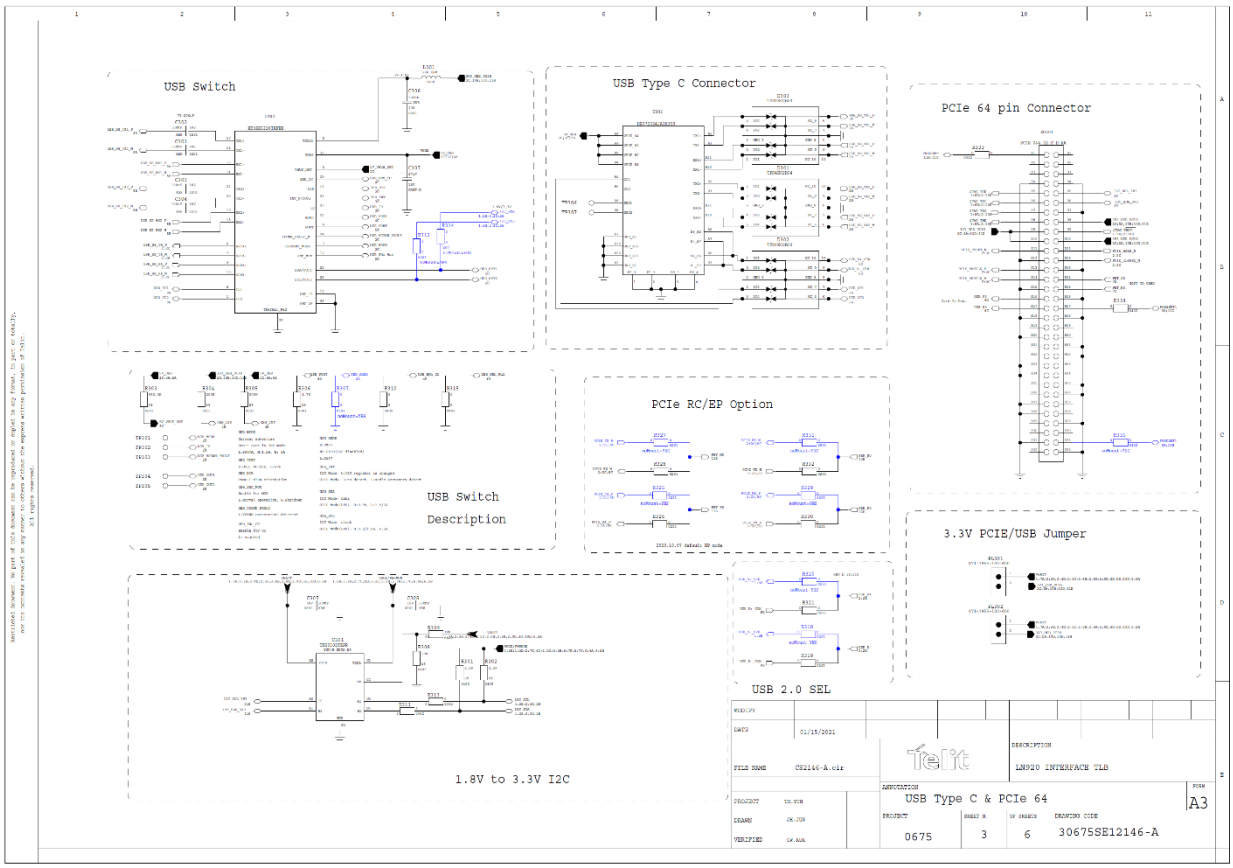

Figure 21: Page 3

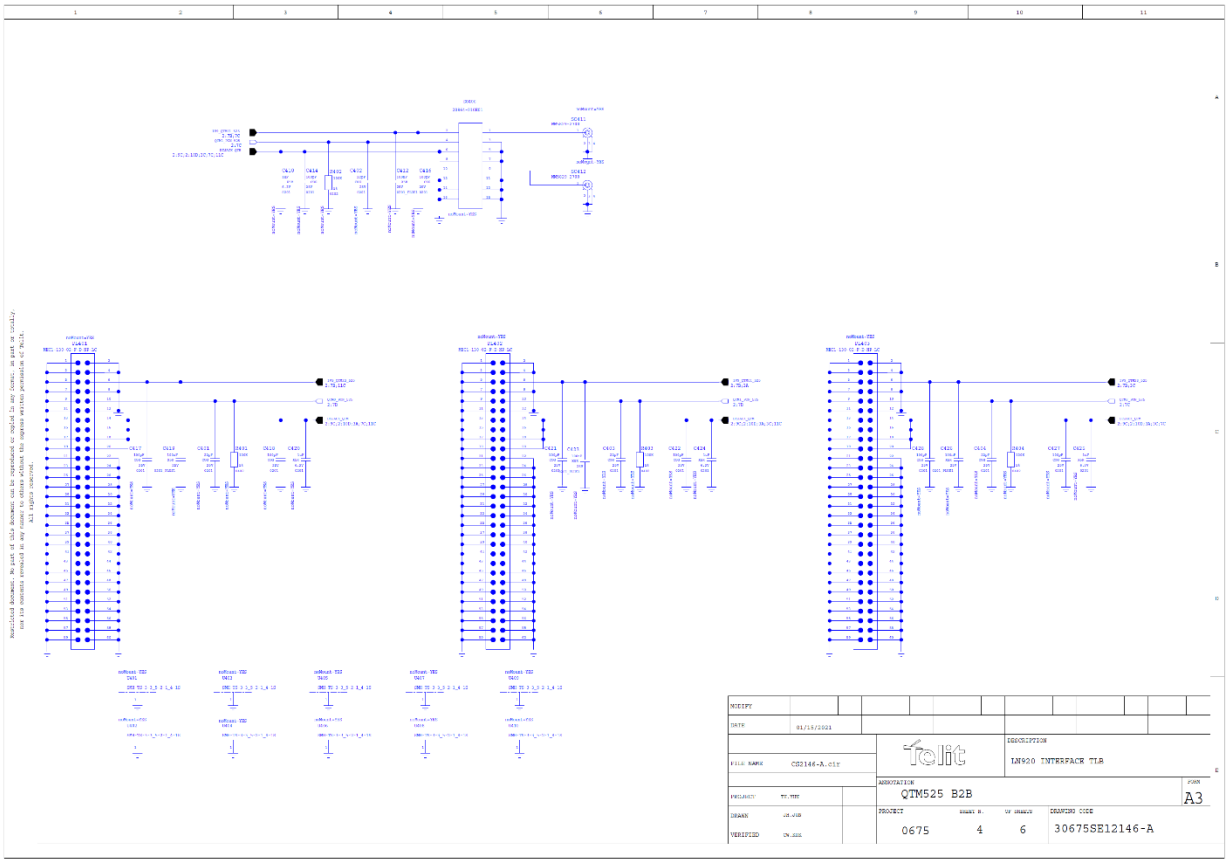

Figure 22: Page 4

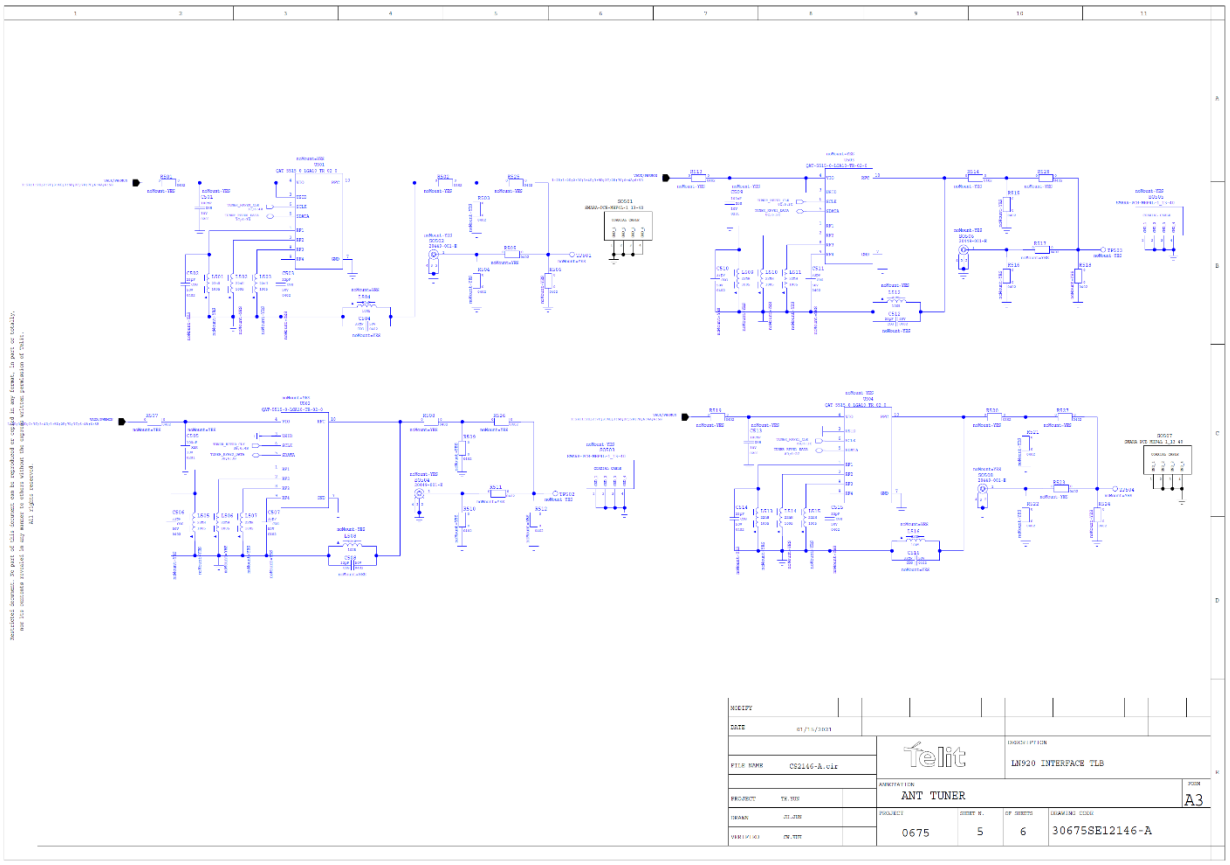

Figure 23: Page 5

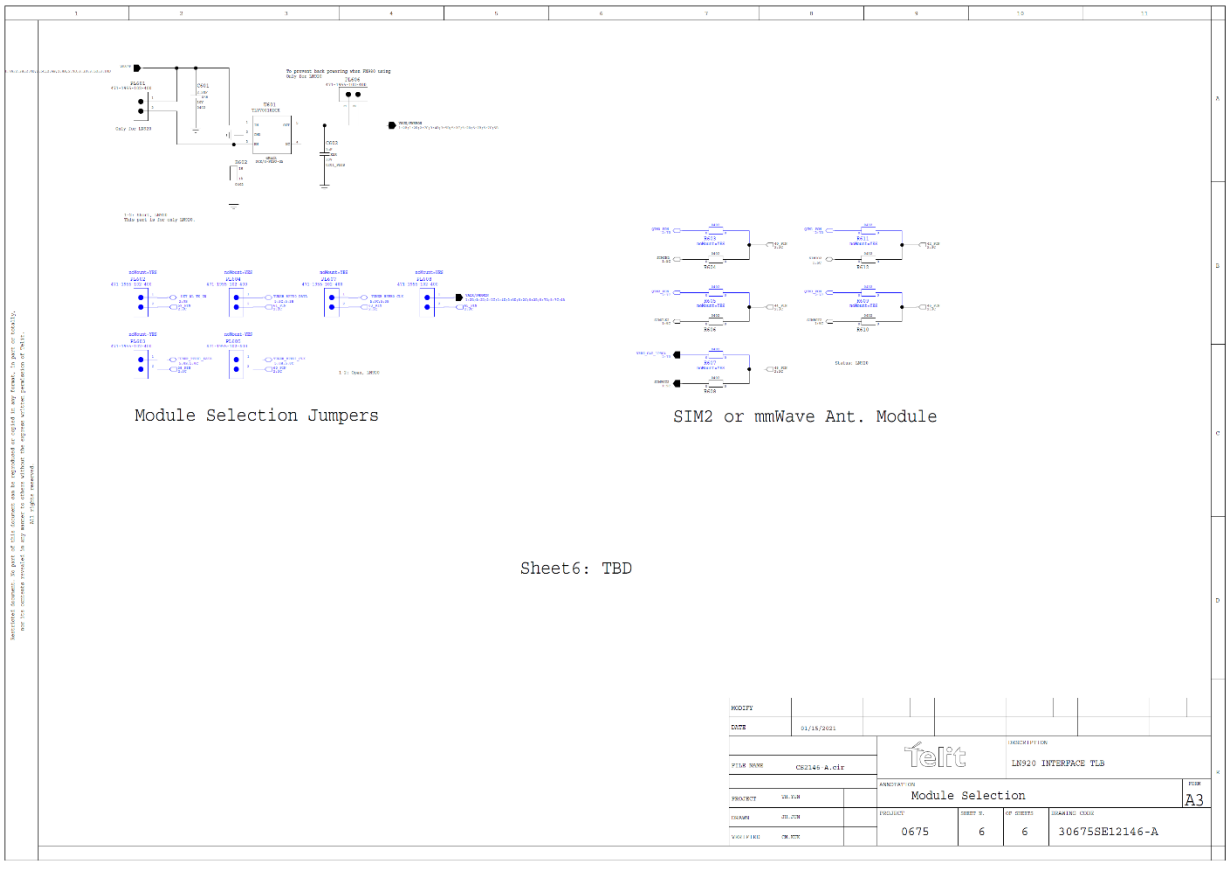

Figure 24: Page 6

Note: For a higher resolution picture of schematic, please contact Telit technical at:

- *TS-EMEA@telit.com*
- *TS-AMERICAS@telit.com*
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5. CHANGE LIST

This section will explain the changes from the previous TLB.

There are some differences which are described in the table below.

PCB Code	Change List
CS2064	Prototype.

Table 5: Changes from the Previous TLB

6. PRODUCT AND SAFETY INFORMATION

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6.3. Safety Recommendations

Make sure the use of this product is allowed in your country and in the environment required. The use of this product may be dangerous and has to be avoided in areas where:

- it can interfere with other electronic devices, particularly in environments such as hospitals, airports, aircrafts, etc.
- there is a risk of explosion such as gasoline stations, oil refineries, etc. It is the responsibility of the user to enforce the country regulation and the specific environment regulation.

Do not disassemble the product; any mark of tampering will compromise the warranty validity. We recommend following the instructions of the hardware user guides for correct wiring of the product. The product has to be supplied with a stabilized voltage source and the wiring has to be conformed to the security and fire prevention regulations. The product has to be handled with care, avoiding any contact with the pins because electrostatic discharges may damage the product itself. Same cautions have to be taken for the SIM, checking carefully the instruction for its use. Do not insert or remove the SIM when the product is in power saving mode.

The system integrator is responsible for the functioning of the final product. Therefore, the external components of the module, as well as any project or installation issue, have to be handled with care. Any interference may cause the risk of disturbing the GSM network or external devices or having an impact on the security system. Should there be any doubt, please refer to the technical documentation and the regulations in force. Every module has to be equipped with a proper antenna with specific characteristics. The antenna has to be installed carefully in order to avoid any interference with other electronic devices and has to guarantee a minimum distance from the body (20 cm). In case this requirement cannot be satisfied, the system integrator has to assess the final product against the SAR regulation.

The equipment is intended to be installed in a restricted area location.

The equipment must be supplied by an external specific limited power source in compliance with the standard EN 62368-1:2014.

The European Community provides some Directives for the electronic equipment introduced on the market. All of the relevant information is available on the European Community website:

https://ec.europa.eu/growth/sectors/electrical-engineering_en

7. GLOSSARY

ECO	Engineering Change Order
EVB	Evaluation Board
IFBD	Interface Board
PCB	Printed Circuit Board
SDK	Software Development Kit
SIM	Subscriber Identification Module
TIM	Thermal Interface Material
TLB	Translation Board
USB	Universal serial bus

8. DOCUMENT HISTORY

Revision	Date	Changes
0	2021-07-15	Initial release

From Mod.0818 rev.4

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