






RAK19012 Quick Start Guide

Prerequisite

What Do You Need?

Before going through each and every step on using the RAK19012 WisBlock USB LiPo Solar Power Slot Module, make sure to prepare the necessary items listed below:

Hardware

- [RAK19012 WisBlock USB LiPo Solar Power Slot Module](#) 
- Your choice of [WisBlock Base board with Power Slot](#) 
- Your choice of [WisBlock Core](#) 
- [Li-Ion/LiPo battery](#) 
- [Solar charger](#) 

Software

Arduino

- Download and install the [Arduino IDE](#)  .
- To add the RAKwireless Core boards to your Arduino Boards Manager, install the [RAKwireless Arduino BSP](#)  .

Product Configuration

Hardware Setup

RAK19012 should be attached to the power slot connector of WisBlock Base board with power slot. It is a power board that provides the same features and interfaces that standard WisBlock Base boards provide - USB C connector, battery and solar panel connector, LED indicators, and reset button.

WARNING

RAK19012 **only** supports WisBlock Base boards with Power Slot. It is not compatible with all WisBlock Base boards.

For more information about RAK19012, refer to the [Datasheet](#).

RAK19012 Connection to WisBlock Base board with Power Slot

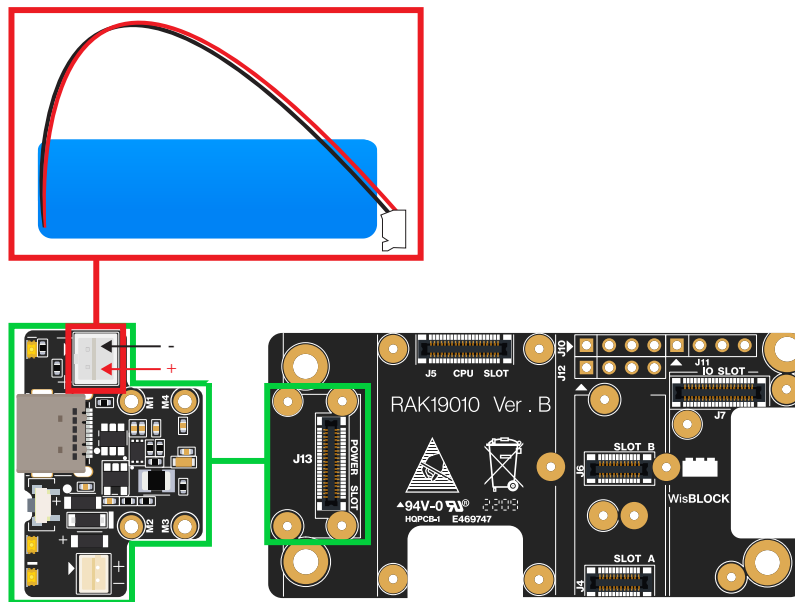


Figure 1: RAK19012 pinout and connector assignments

NOTE

The voltage of the battery must not exceed 4.3 V.

Assembling and Disassembling of WisBlock Modules

Assembling Procedure

RAK19012 module can be mounted on the power slot of the WisBlock Base board, as shown in **Figure 2**. Also, always secure the connection of the WisBlock module by using compatible screws.

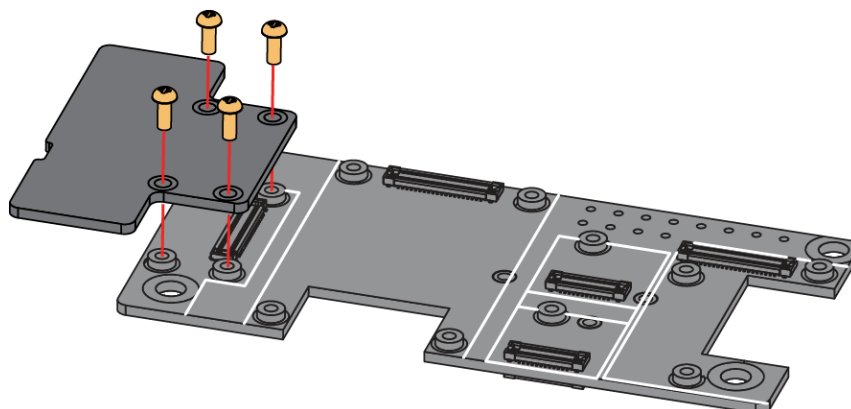


Figure 2: RAK19012 mounting connection to WisBlock Base module

Disassembling Procedure

The procedure in disassembling any type of WisBlock module is the same.

1. First, remove the screws.

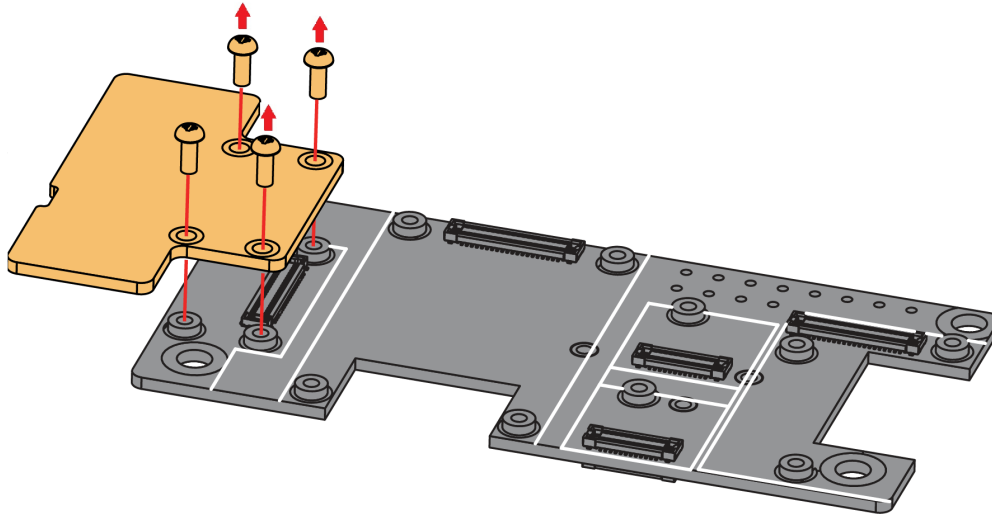


Figure 3: Removing screws from the WisBlock module

2. Once the screws are removed, check the silkscreen of the module to find the correct location where force can be applied.

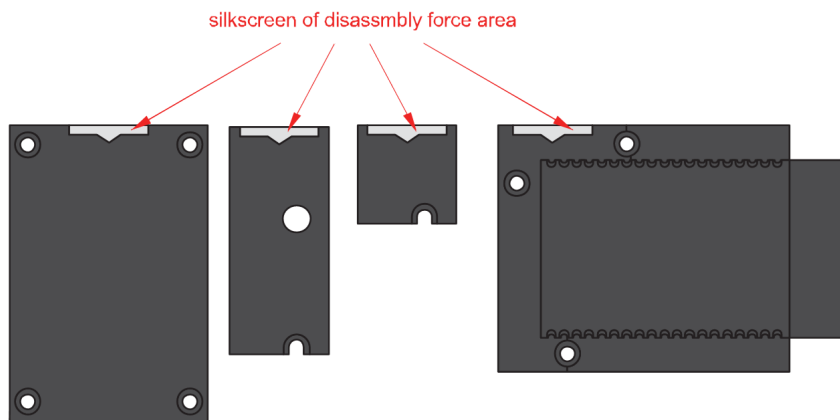


Figure 4: Detaching silkscreen on the WisBlock module

3. Apply force to the module at the position of the connector, as shown in **Figure 5**, to detach the module from the baseboard.

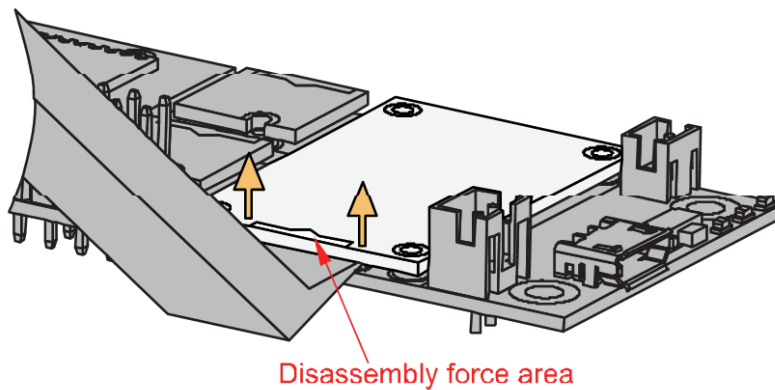


Figure 5: Applying even forces on the proper location of a WisBlock module

 NOTE

If you will connect other modules to the remaining WisBlock Base slots, check on the [WisBlock Pin Mapper](#) tool for possible conflicts.

Battery and Solar Panel Connector

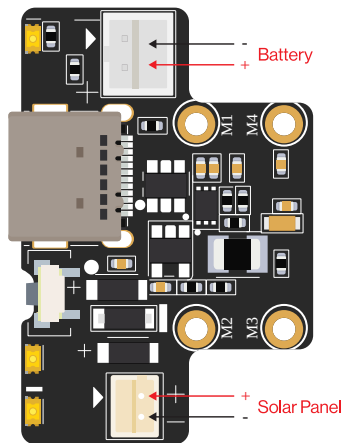


Figure 6: Battery and solar panel connectors polarity

Rechargeable Battery

RAK19012 can be powered by a rechargeable Li-Ion/LiPo battery via the dedicated connectors, as shown in **Figure 6**. The matching connector for the rechargeable battery wires is a [JST PHR-2 2 mm pitch female](#) . A cable assembly for the rechargeable battery connector is also available for purchase in [RAK store](#) .

⚠ WARNING

- Battery can cause harm if not handled properly.
- Only 3.7-4.2 V Rechargeable LiPo batteries are supported. It is highly recommended not to use other types of batteries with the system unless you know what you are doing.
- Make sure the battery wires, both rechargeable and non-rechargeable, match the polarity on the RAK19012 board. Not all batteries have the same wiring.

Solar Panel Connection

The battery can be recharged, as well, via a small Solar Panel, as shown in **Figure 6**. The matching connector for the solar panel wires is an [JST ZHR-2 1.5 mm pitch female](#) . A cable assembly for the solar panel connector is also available for purchase in [RAK store](#) .


⚠ WARNING

- Only 5 V solar panels are supported. Do not use 12 V solar panels. It will destroy the charging unit and eventually other electronic parts.
- The GND pin of the solar panel connector is located on edge of the board. Make sure the solar panel wires match the polarity on the RAK19012 board.

Software Setup

There is no software required to use RAK19012. But to control the two user LEDs and monitor the battery voltage, they must be attached to a WisBlock Base and WisBlock Core.

WisBlock Examples Repository

To quickly build your IoT device with less hassle, example codes for WisBlock Core are provided. You can access the codes on the [WisBlock Example code repository](#) . The example codes on folder `common` are compatible with RAK4631, RAK11200, and RAK11310 WisBlock Cores. The two user LEDs of RAK19012 can be accessed using macrodefinitions `LED_GREEN` / `PIN_LED1` for the green LED and `LED_BLUE` / `PIN_LED2` for the blue LED. For the battery voltage reading, `WB_A0` is used.

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RAK19012 WisBlock USB LiPo Solar Power Slot Module Datasheet

Overview

Description

RAK19012 WisBlock USB LiPo Solar Power Slot Module is a power board that comprises a USB C connector, battery connector with an onboard charger, solar panel connector, LED indicator for charge status, two user-configurable LEDs, a reset button, and a power connector that can connect with the WisBlock Base board. This power board allows debugging and uploading of firmware to the WisBlock Core via the USB C connector.

Features

- USB C connector for Programming and Debugging of WisBlock Core
- Compatible with LiPo rechargeable battery
- Solar panel connector for battery charging
- On-board battery charger chip
- LED for charging status and user-configurable LEDs
- Module size: 30 X 20 mm

Specifications

Overview

Board Overview

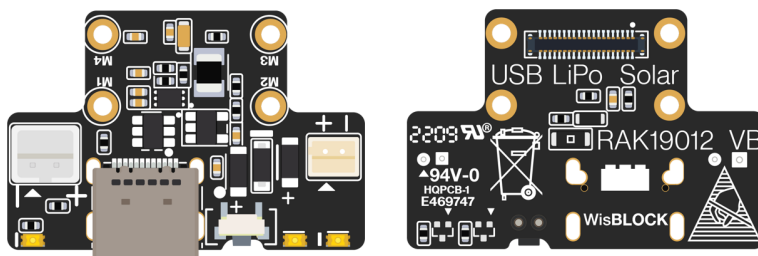


Figure 1: RAK19012 WisBlock Power Module top (left) and bottom (right) view

Mounting

The RAK19012 module can be mounted on the power slot of the WisBlock Base board with power slot. **Figure 2** shows the mounting mechanism of the RAK19012 on a WisBlock Base module, such as the RAK19010.

⚠ WARNING

RAK19012 **only** supports WisBlock Base boards with power slot. It is not compatible with all WisBlock Base boards.

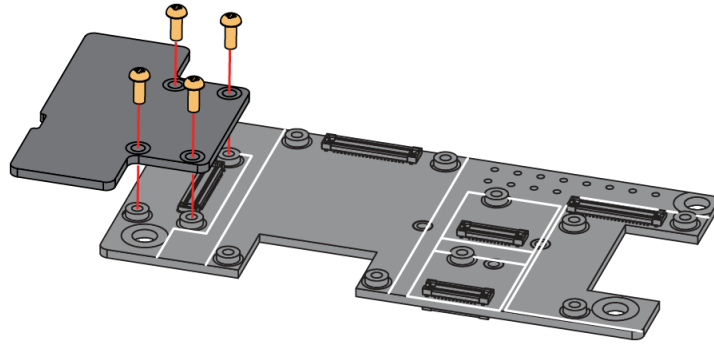


Figure 2: RAK19012 mounting mechanism on a WisBlock Base module

Hardware

The hardware specification is categorized into six parts. It discusses the interfacing, pinouts, and their corresponding functions and diagrams of the module. It also covers the electrical, mechanical, and environmental characteristics that include the tabular data of the functionalities and standard values of the RAK19012 WisBlock LiPo Solar Power Slot Module.

Interfaces

RAK19012 WisBlock LiPo Solar Power Slot Module provides the following interfaces:

- 1 WisBlock power module
- 2 Pin battery interface
- 2 Pin solar interface
- 3 LEDs
- 1 Reset button

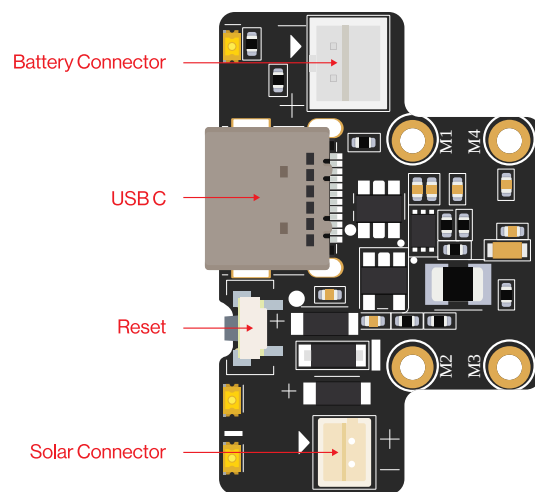


Figure 3: RAK19012 part labels

Battery and Solar Panel Connector

Figure 4 shows the polarity of battery and solar panel connectors.

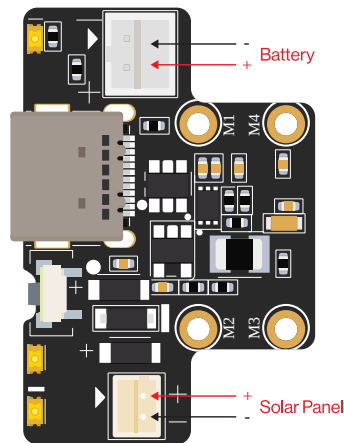


Figure 4: Battery and solar panel connector polarity

LEDs

Three LEDs are used to indicate the operating status. Below are the functions of the LEDs:

- **Red LED** - Connected to the charger chip to indicate the charger status. When the battery is charging, this red LED is on. When the battery is full, this LED is weak light or off.
- **Green LED** - Connected to the MCU module, controlled by MCU defined by the user.
- **Blue LED** - Connected to the MCU module, controlled by MCU defined by the user.

RESET Push Button

The Reset Push Button, as shown in [Figure 3](#), is connected to the MCU module. When pushed, it resets the MCU.

Pin Definition

The RAK19012 module has a 40-pin WisConnector that is compatible with the WisBlock Power Slot. The pin order of the connector and the pinout definition is shown in [Figure 5](#).

NOTE

VBAT, 3V3, RESET, LED1, LED2, ADC_VBAT, and GND are connected to the WisIO connector.

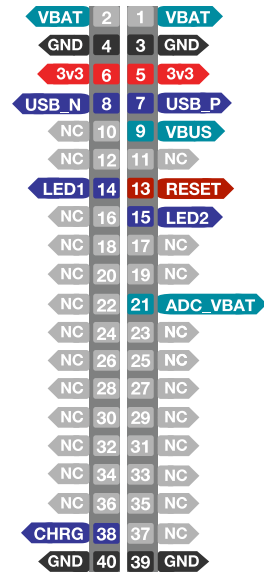
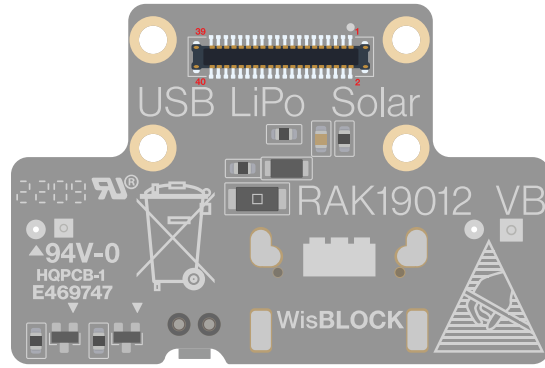


Figure 5: RAK19012 pinout diagram

Electrical Characteristics

Absolute Maximum Ratings

The Absolute Maximum Ratings of the device are shown in the table below. The stress ratings are the functional operation of the device.

⚠ WARNING

1. If the stress rating goes above what is listed, it may cause permanent damage to the device.
2. Exposure to maximum rating conditions may affect the device reliability.

Ratings	Maximum Value	Unit
Battery voltage (VBAT)	-0.3 to 4.3	V
Solar panel voltage (VIN)	-0.3 to 5.5	V
IOs of WisBlock Connector	-0.3 to VDD+0.3	V

Battery Specification

The RAK19012 USB LiPo Solar Power Slot Module can be powered by a battery, connected to the J4 connector. The nominal operating voltage of the battery should be within the range shown in the following table.

Minimum	Typical	Maximum	Unit
3.3	3.7	4.3	V

A suitable Li-Ion battery should have the following parameters as shown in the table below:

Parameter	Value
Standard voltage	3.7 V
Charging voltage	4.2 V
Capacity	As required
Discharge current	At least 500 mA

NOTE

When using a solar panel, you can't use a non-rechargeable battery.

Mechanical Characteristic

Board Dimensions

The mechanical dimensions of the RAK19012 module are shown in **Figure 6** below.

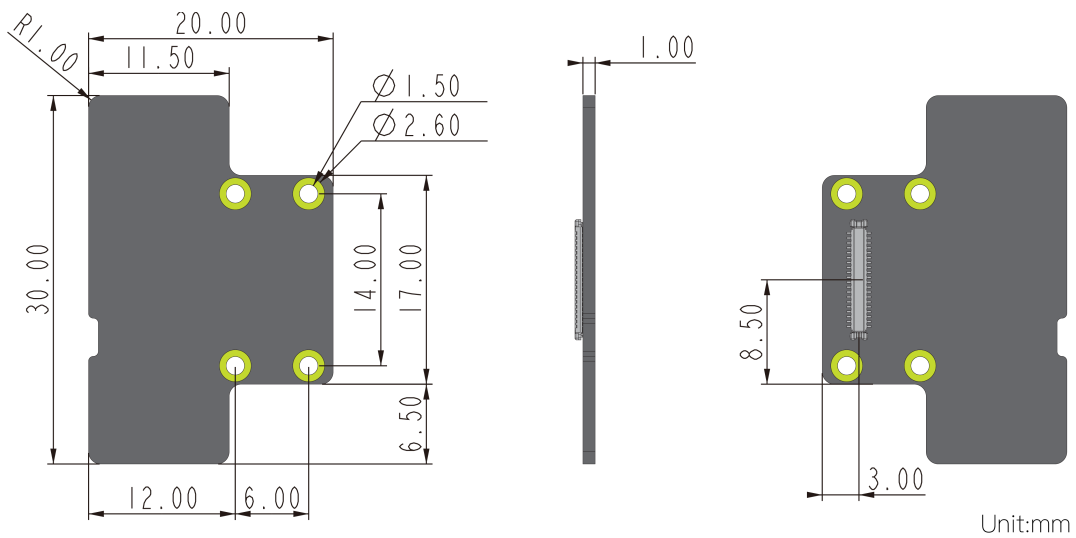


Figure 6: RAK19012 mechanical dimensions

WisConnector PCB Layout

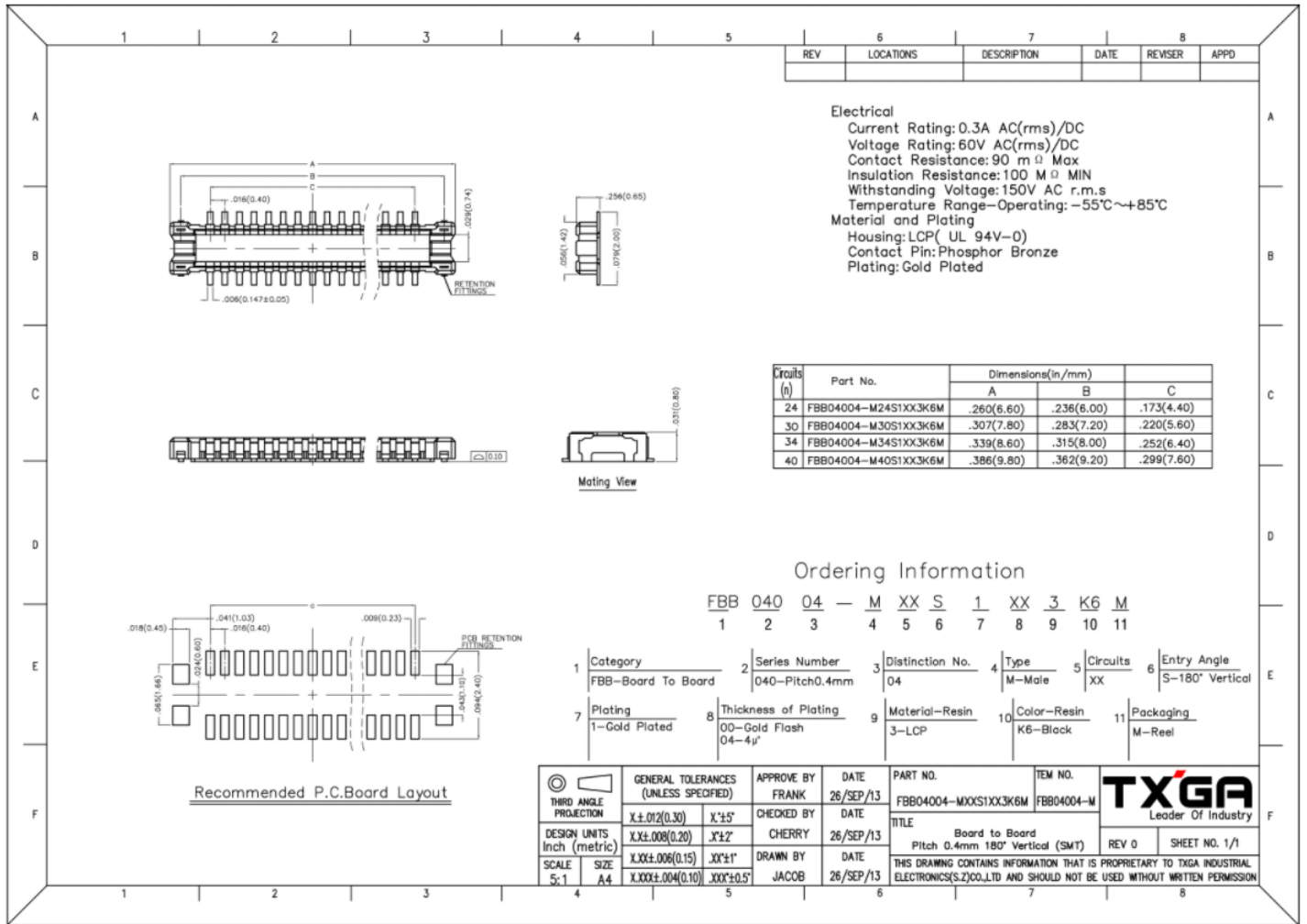


Figure 7: WisConnector PCB footprint and recommendations

Environmental Characteristics

The table below lists the operation and storage temperature requirements of RAK19012:

Parameter	Minimum	Typical	Maximum
Operational temperature range	-35 °C	+25 °C	+75 °C
Extended temperature range	-40 °C	+25 °C	+80 °C
Storage temperature range	-40 °C	+25 °C	+80 °C

Schematic Diagram

Figure 8 shows the schematic of the RAK19012 USB LiPo Solar Power Slot Module.

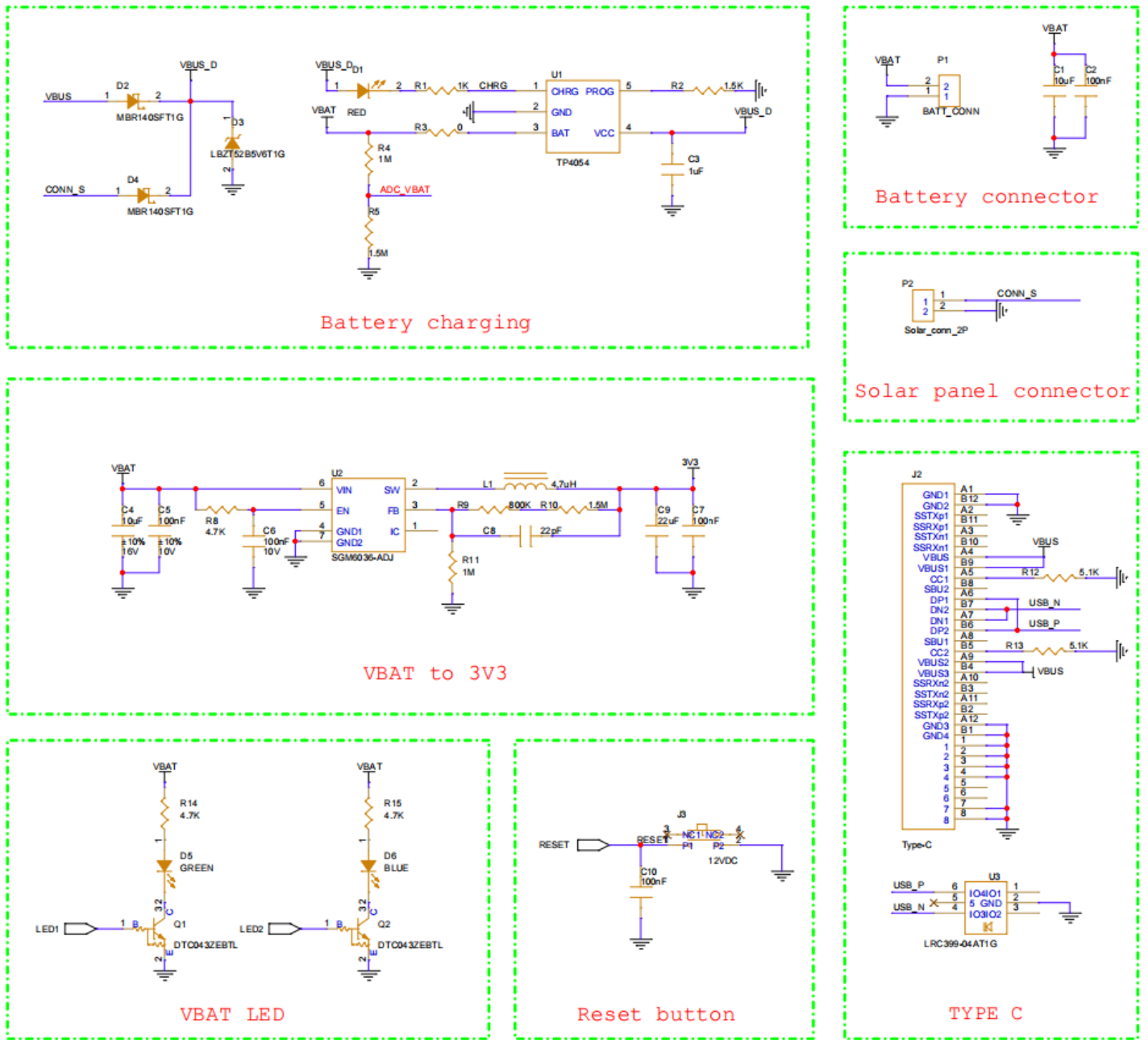


Figure 8: RAK19012 USB LiPo Solar Power Slot Module schematics