






RAK19016 Quick Start Guide

Prerequisite

What Do You Need?



Before going through each and every step on using the RAK19016 WisBlock 5-24V Power Slot Module, make sure to prepare the necessary items listed below:

Hardware

- [RAK19016 WisBlock 5-24V Power Slot Module](#) 
- Your choice of [WisBlock Base board with Power Slot](#) 
- Your choice of [WisBlock Core](#) 
- [Li-Ion/LiPo battery](#) 
- [RAK5804](#)  (Reprogramming of the WisBlock Core via USB of RAK5804)

Software

Arduino

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

Product Configuration

Hardware Setup

RAK19016 should be attached to the power slot connector of WisBlock Base board with power slot. The 5 V to 24 V DC input voltage must be connected to the 3-pin screw terminal connector. The LiPo/Li-Ion battery can be connected to the standard battery connector.

WARNING

RAK19016 **only** supports WisBlock Base boards with power slot. It is not compatible with all WisBlock Base boards.

For more information about RAK19016, refer to the [Datasheet](#).

RAK19016 Connection to WisBlock Base board with Power Slot

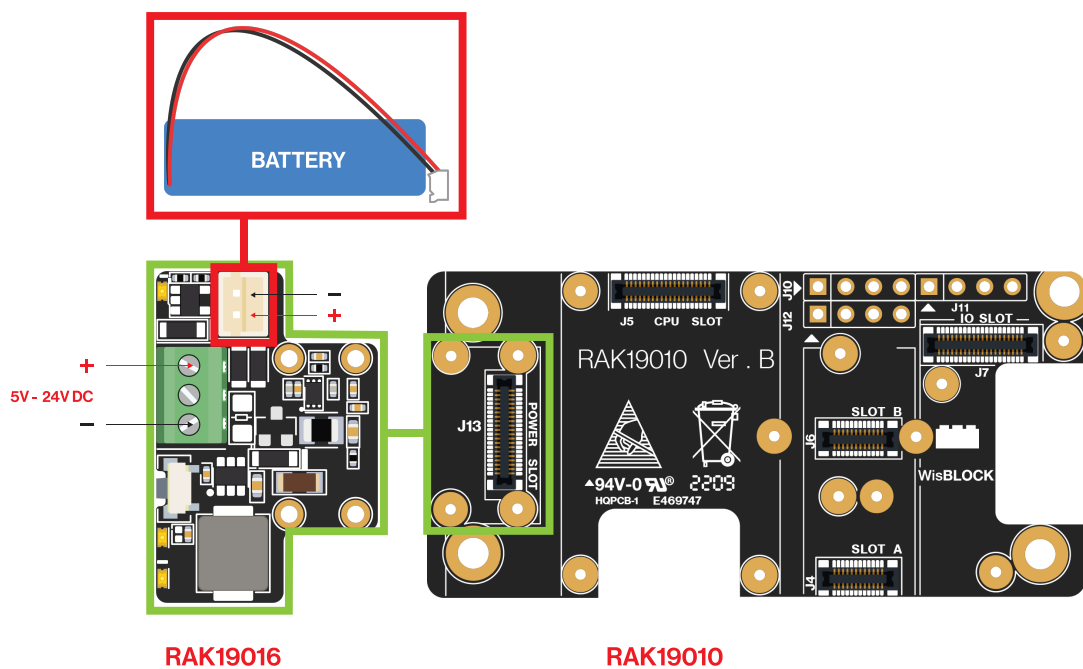


Figure 1: RAK19016 connected to a WisBlock Base board with Power Slot

NOTE

The voltage of the battery must not exceed 4.3 V.

RAK19016 Supplemented by RAK5804 to Support WisBlock Core Reprogramming

Since there is no USB connector on RAK19016, the only way to upload the code is by using RAK5804.

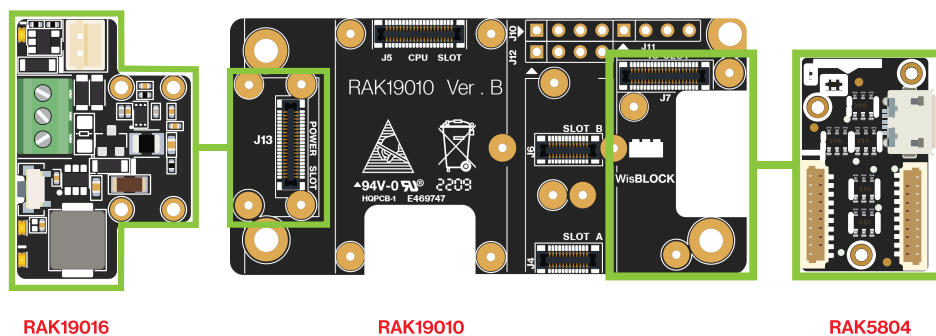


Figure 2: RAK19016 and RAK5804 connection to WisBlock Base

Assembling and Disassembling of WisBlock Modules

Assembling Procedure

The RAK19016 module can be mounted on the power slot of the WisBlock Base board, as shown in **Figure 3**. Also, always secure the connection of the WisBlock module by using compatible screws.

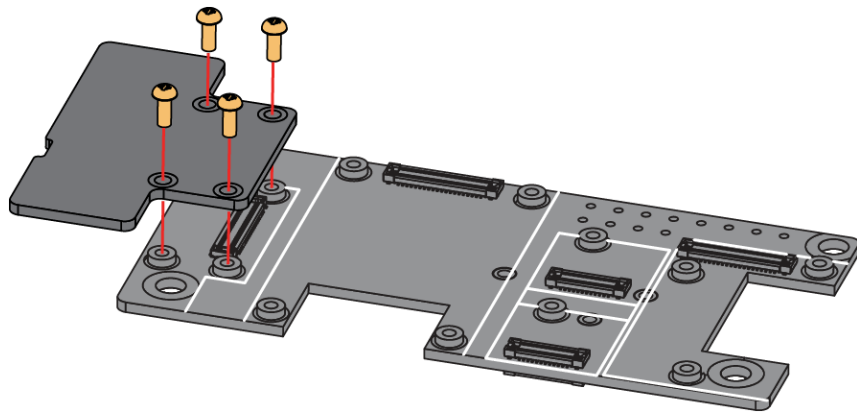


Figure 3: RAK19016 mounting connection to WisBlock Base module

Disassembling Procedure

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

1. First, remove the screws.

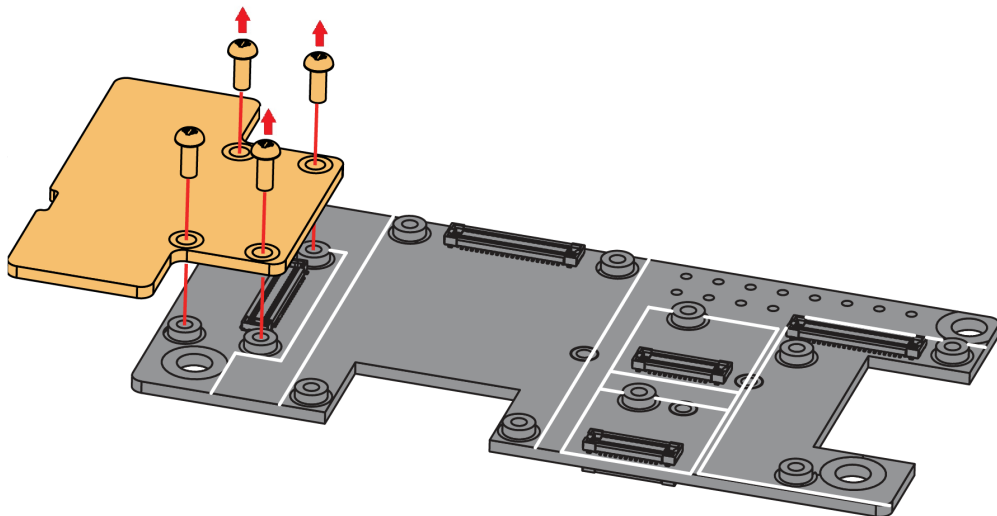


Figure 4: Removing screws from the WisBlock module

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

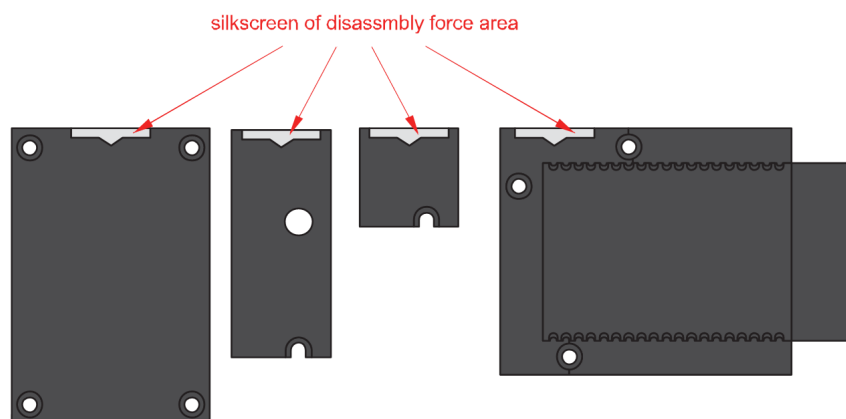


Figure 5: Detaching silkscreen on the WisBlock module

3. Apply force to the module at the position of the connector, as shown in **Figure 6**, to detach the module from the baseboard.

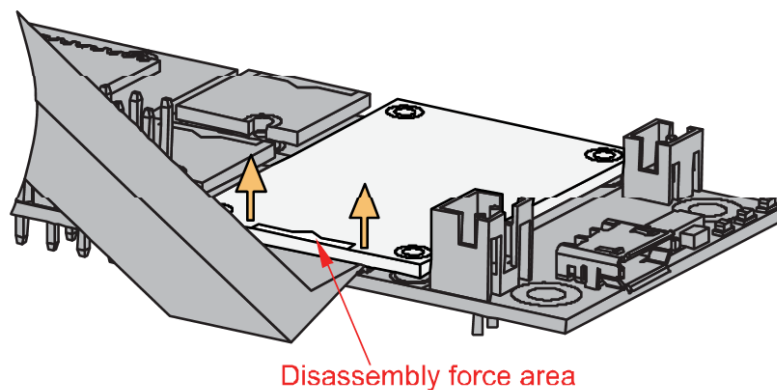


Figure 6: Applying even forces on the proper location of a WisBlock module

NOTE

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

Battery Connector

Rechargeable Battery

RAK19016 supports a rechargeable Li-Ion/LiPo battery via the dedicated connector. The battery and external 5-24 V DC input can simultaneously be connected to provide power to all WisBlock modules. The 5-24 V_{DC} goes to a buck converter with 4.4 V_{DC} output which is higher than the max 4.2 of LiPo battery. 5-24_{DC}V DC is the primary power source and also charges the LiPo battery at the same time.

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 RAK19016 board. Not all batteries have the same wiring.

Software Setup

There is no software required to use RAK19016. But to control the two user LEDs and monitor the battery voltage, it 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 RAK19016 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.

RAK19016 WisBlock 5-24V Power Slot Module

Datasheet

Overview

Description

RAK19016 is a WisBlock 5-24 V Power Slot Module that comprises a 3-pin screw terminal connector, LiPo battery connector with an on-board charger, LED indicator for charge status, two user-configurable LEDs, reset button, and a power connector that can be connected with the WisBlock Base board with Power Slot.

This power module is designed to enable WisBlock to be powered by higher voltage levels up to 24 V DC. It also has a LiPo battery connector which allows the battery as a power source or as a backup secondary supply.

Features

- Supports 5 V to 24 V DC voltage supply input
- Uses three-pin screw terminal connector
- Compatible with LiPo rechargeable battery
- On-board battery charger chip
- LED for charging status and user-configurable LEDs
- Applicable to industrial and enterprise setting
- Module size: 30 x 20 mm

Specifications

Overview

Board Overview

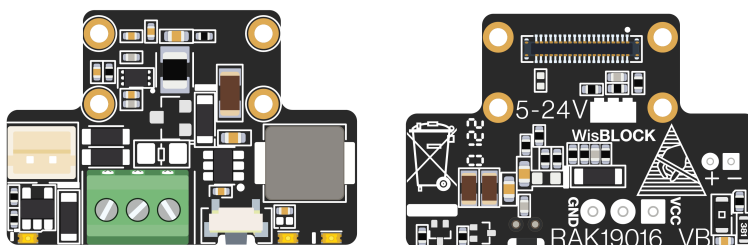


Figure 1: RAK19016 WisBlock Power Module top (left) and bottom (right) view

Mounting

The RAK19016 module can be mounted on the power slot of the WisBlock Base board. **Figure 2** shows the mounting mechanism of the RAK19016 on a WisBlock Base module with a power slot, such as the RAK19010.

⚠ WARNING

RAK19016 **only** supports WisBlock Base boards with Power Slot. It is not compatible with all WisBlock Base boards.

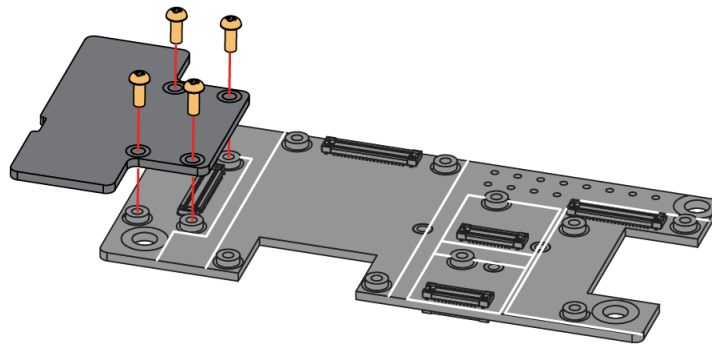


Figure 2: RAK19016 mounting mechanism on a WisBlock Base board with Power Slot

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 RAK19016 WisBlock 5-24V Power Slot Module.

Interfaces

RAK19016 WisBlock 5-24V Power Slot Module provides the following interfaces:

- Three-pin Screw Terminal Connector
- Battery Connector
- LEDs - one for charging status and two for user
- Reset button

NOTE

RAK19016 doesn't have a USB connector. So when RAK19016 is used together with WisBlock Base board with power slot, it is not possible to program the core (unless via SWD pins using external tools like Jlink and RAKDAP1). If you want to program the WisBlock Core via USB, you need the RAK5804. Then you can use the USB connector of RAK5804 to program the WisBlock Core.

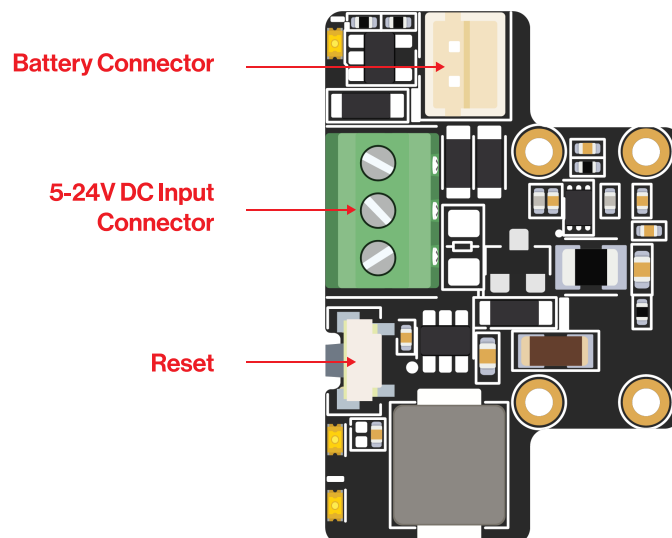


Figure 3: RAK19016 part labels

5-24V DC and Battery Connector

Figure 4 shows the polarity of 5-24 V DC input and battery connector V+ (VBAT) and V- (GND).

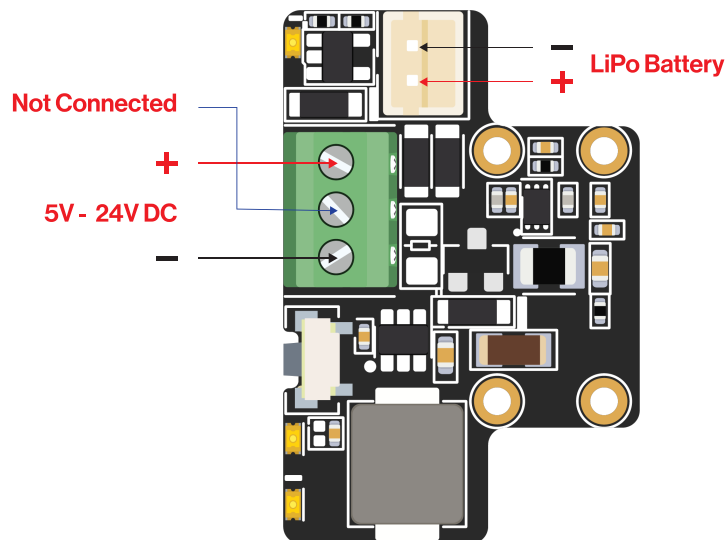


Figure 4: 5-24V DC and Battery connector pins

NOTE

The voltage of the battery must not exceed 4.3 V.

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

Pin Definition

The RAK19016 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 have connected to WisBlock 40-pin connector.

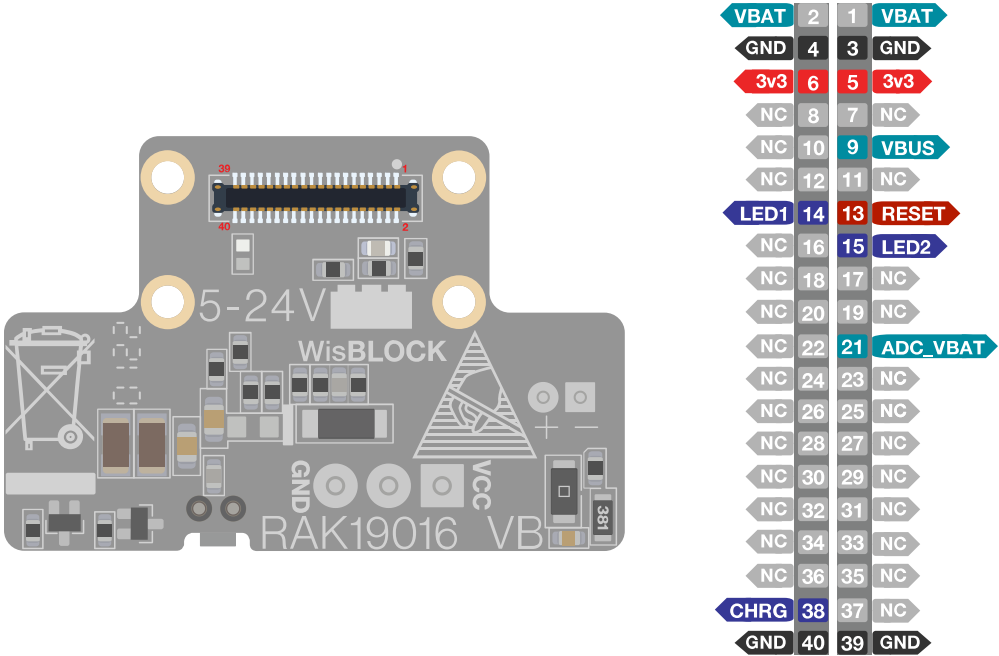



Figure 5: RAK19016 pinout diagram

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
Input voltage in 3-pin terminal connector (VCC-IN)	5 to 24	V
Battery voltage (VBAT)	−0.3 to 4.3	V
IOs of WisBlock connector	−0.3 to VDD+0.3	V

Voltage Specifications

The RAK19016 WisBlock 5-24V Power Slot Module is suitable for external input voltage supply. The nominal input operating voltage should be within the range shown in the following table.

Minimum	Typical	Maximum	Unit
5	-	24	V

The RAK19016 supported battery should have nominal operating voltage 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

Mechanical Characteristic

Board Dimensions

The mechanical dimensions of the RAK19016 module are shown in **Figure 6** below.

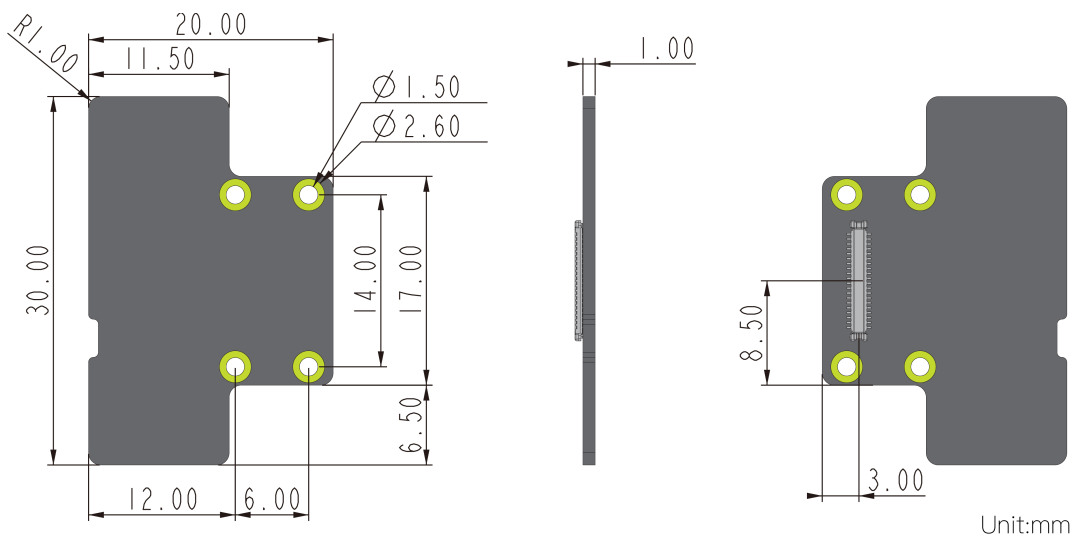


Figure 6: RAK19016 mechanical dimensions

WisConnector PCB Layout

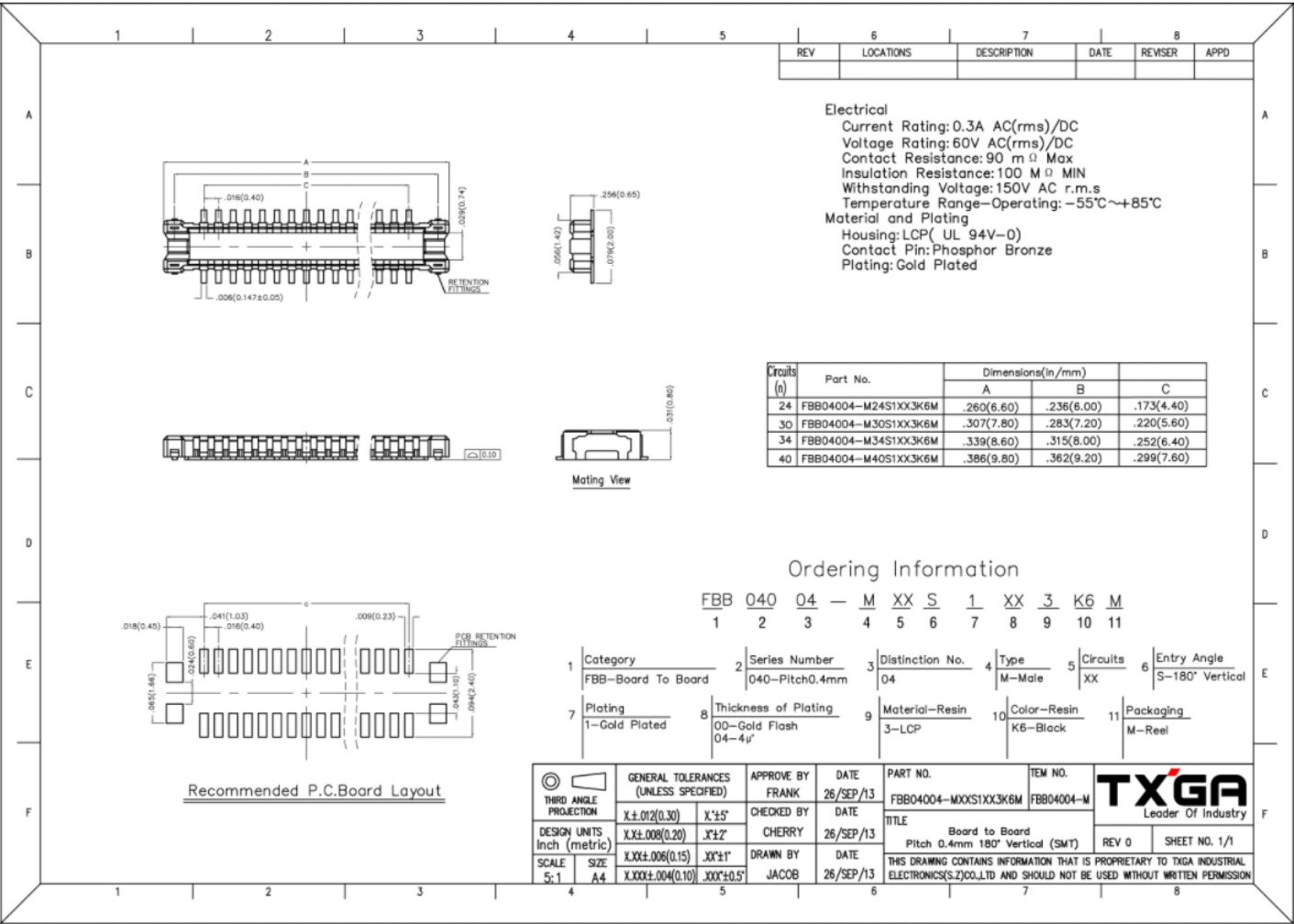


Figure 7: WisConnector PCB footprint and recommendations

Environmental Characteristics

The table below lists the operation and storage temperature requirements of RAK19016:

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 WisBlock 5-24V Power Slot Module.

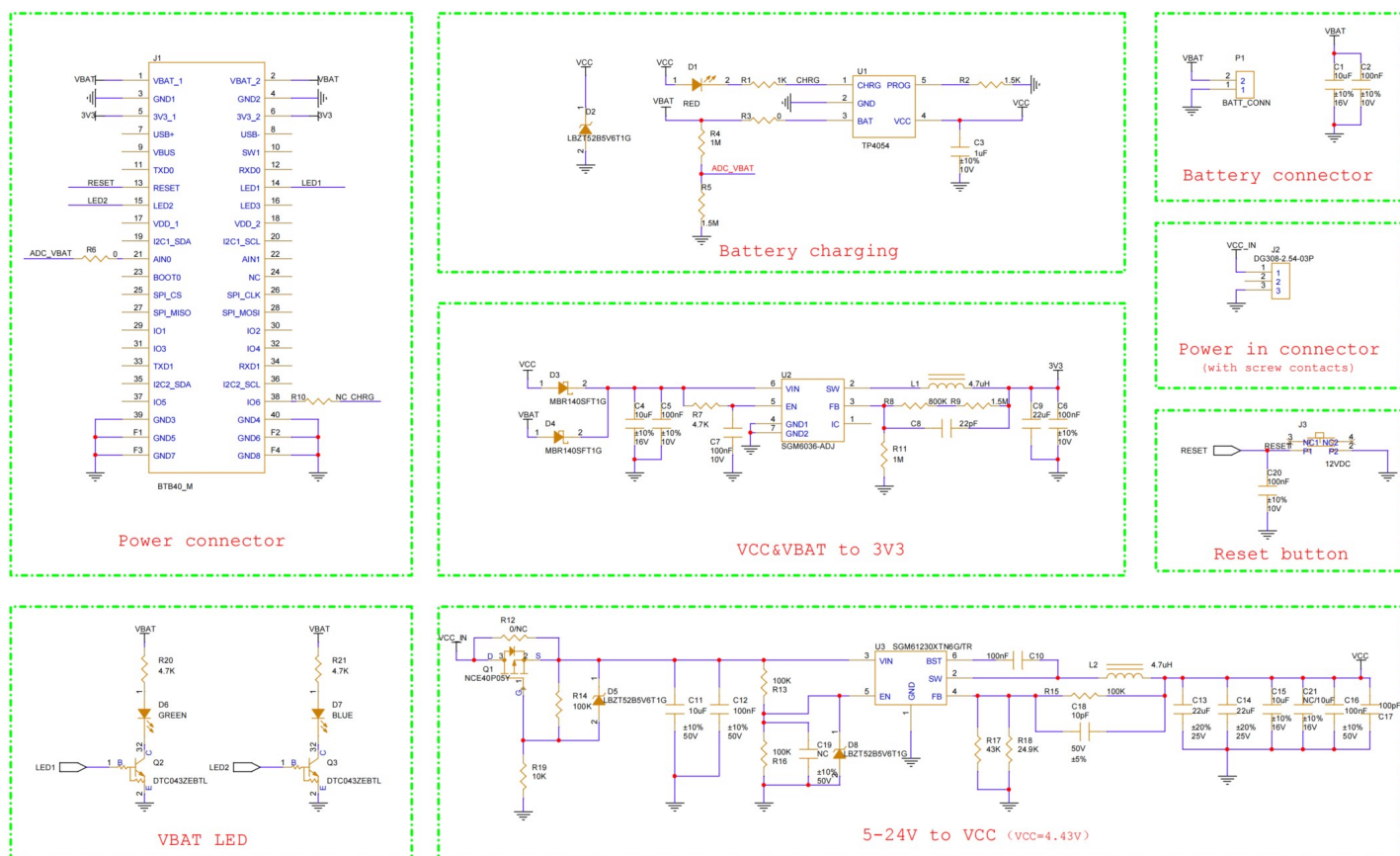


Figure 8: RAK19016 5-24V Power Slot Module schematics