

REDx-DK 3.0

User guide

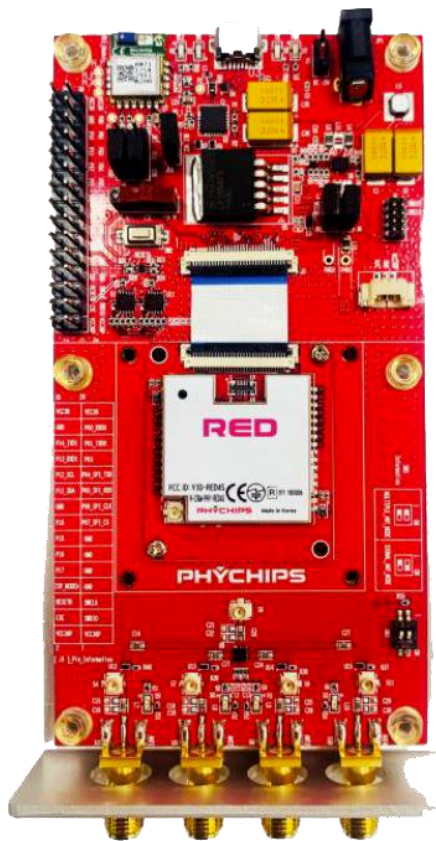


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1 Background

Description	Date	Version	Author	Auditor
First parution	26/05/2020	V1.0	CLO	ACA

2 Introduction

The REDx-DK consists of REDx module and RED_CTRL board. The RED_CTRL board supports DC power supply and PC interface. RED4S-DK includes RED4S and RED5-DK includes RED5.



Figure 1. RED_CTRL with RED4S module

RED□-DK-□

4S : with RED4S K : Korea
5 : with RED5 J : Japan
 E : EU
 U : US
 C : China

2.1 Package configuration

REDx-DK includes:

- RED4S (or RED5): RFID reader module
- RED_CTRL: PC interface board
- QUBE6015 and Ceramic2504 Antenna
- uFL to uFL antenna cable
- Tag Samples
- USB 5V DC adapter
- USB-to-DC cable
- Micro-USB cable

- USB memory
- FFC cable
- Velcro for attaching antenna
- Control board case

2.2 Basic feature of REDx-DK

2.2.1 Hardware

1) High performance PHYCHIPS module

- High power high performance new PHYCHIPS module
- Include leakage cancellation for good read range and sensitivity

2) Revise Control board for the latest PHYCHIPS module

- Change board structure for the convenience of users
- Hand-held RFID reader type configuration
- Easy to evaluate PHYCHIPS module with various antennas user want to use

2.2.2 Software

1) Updated firmware

- Optimize to new PHYCHIPS module including leakage cancellation algorithm
- Update Registry information

2) Extremely improved GUI: RED utility

- Modify user environments
- Very easy information log to help user understand module status and operation
- Add very useful functions: leakage RSSI Plot, Read range calculator
- Add user friendly Script: easy to use module and RFID operation
- Do not need install GUI drivers (for windows)

2.3 Configuration of REDx-DK

RED4S/5 is reference designed module of PR9200 and low cost components.

RED_CTRL is control board that connects Reader Module to PC, supporting USB-to-UART interface and DC power management for reader module.

RED4S (or RED5)

- EPC Gen2 support
- RCP protocol with CRC
- PR9200, TCXO, Coupler, Antenna port
- Module size: 24mm x 24mm
- U.FL connector for Antenna port (50ohm)
- Refer to RED4S (or RED5) spec sheet for the detailed information

RED_CTRL

- Board size: 68mm x 132mm (Control board case included)
- DC power supply to USB
- UART based PC interface
- Micro USB connector
- FFC connector for DC supplement & data interface
- 2.54mm pitch application connector
- SWD support

Firmware & Utility (GUI)

- RCP protocol with CRC
- Read, Write, access, lock, kill operation
- Bi-directional transfer to host microcontroller
- Bi-directional transfer via I2C interface
- Modular and easy to customize to final use case
- Easy to access to GPIOs

3 Hardware description

3.1 Block diagram of REDx-DK

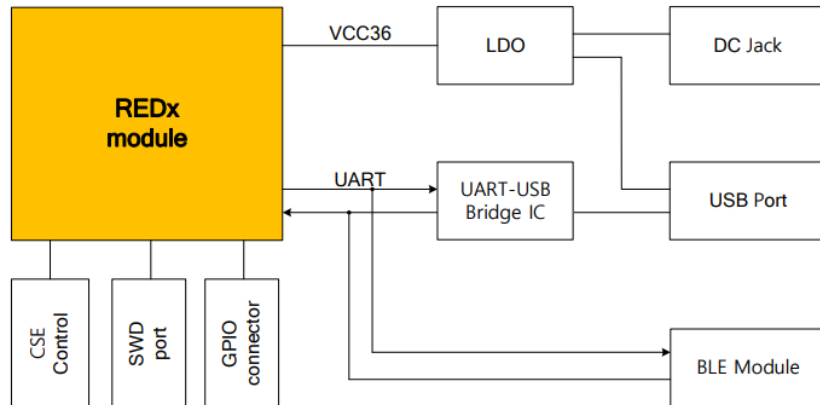


Figure 2. Block diagram of REDx-DK

The hardware of DK consists of a module and a control board. The control board have 3.6V LDO to supply DC power, UART-to-USB bridge IC to connect REDx module to PC, USB port, DC jack, BLE module, CSE control part, SWD port and GPIO connector. Figure 2. Block diagram of REDx-DK 2 shows the block diagram of DK hardware.

3.2 RED_CTRL operation

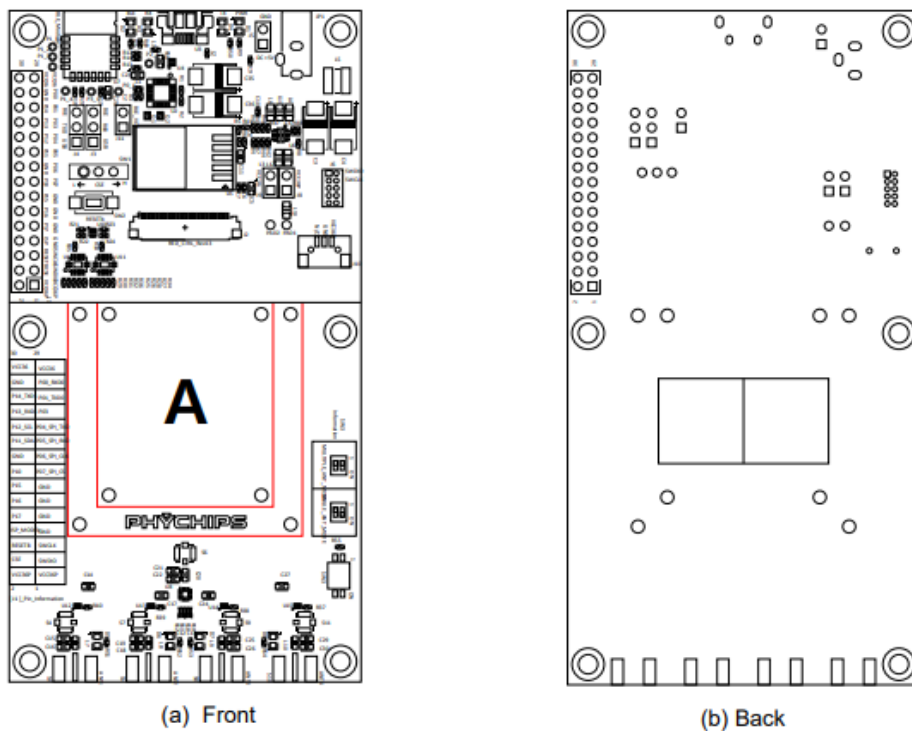


Figure 3. Configuration of RED_CTRL

Figure 3 shows parts location of RED_CTRL. RFID module (RED4S or RED5) can be located in A area. The module should be connected to RED_CTRL through FFC cable.

3.2.1 DC Power connection

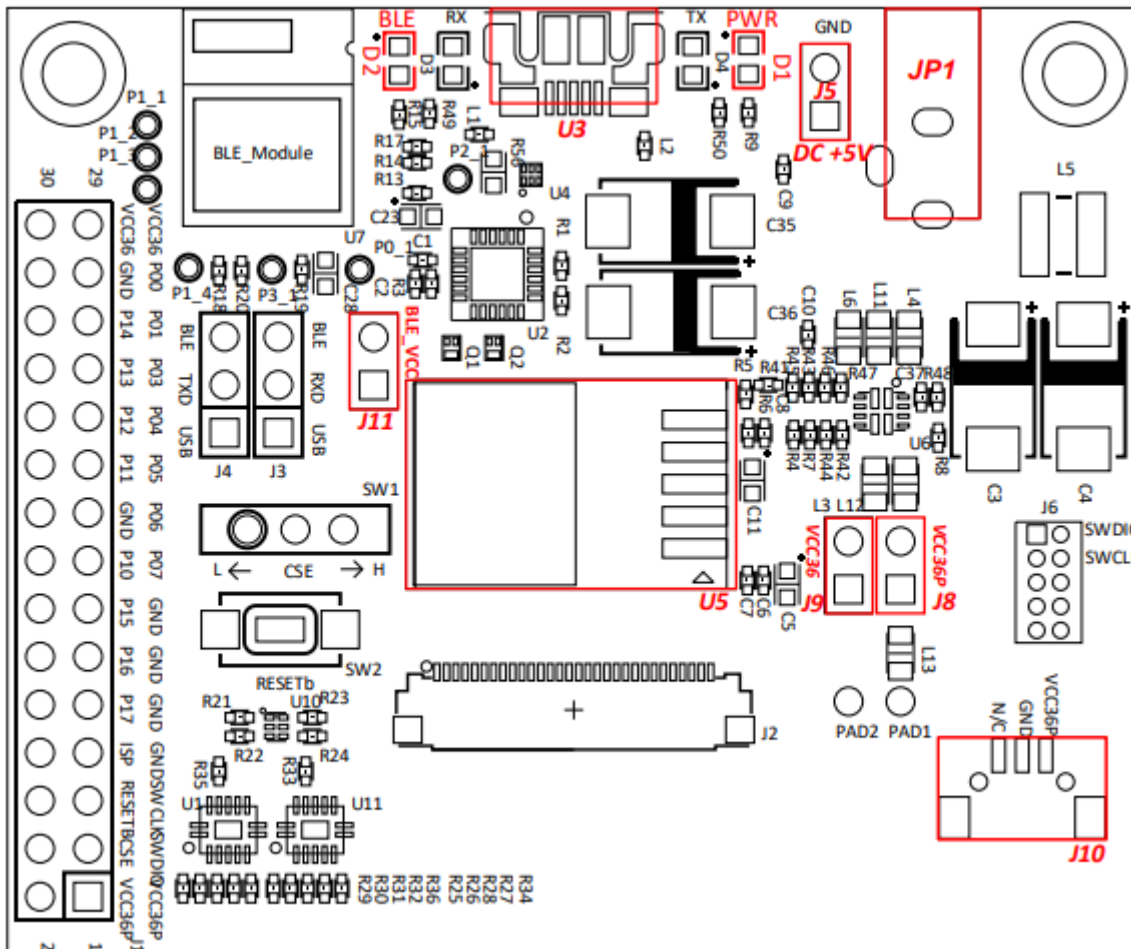


Figure 4. DC power connection parts

Part	Name	Function	Note
JP1	DC JACK	Connect 5V DC adaptor	5V DC adaptor should be connected
J5	DC +5V	If there is no DC adaptor, connect 5V DC voltage from power supply	
U3	Micro USB	Connect Micro USB cable USB can supply up to 500mA DC 5V	
U5	3.6V LDO	3.6V power supply for module	
J10	Power connector	Power connector for RED5	RED5 is supplied DC power from this connector. J10 should be connected to RED5 module
J8	VCC36P	VCC36P power supply series connection to measure current consumption	Short for normal operation
J9	VCC36	VCC36 power supply series connection to measure current consumption	Short for normal operation
J11	BLE VCC	To use BLE	Short for BLE power
D2	PWR LED	VCC36 voltage indicator	
D5	BLE LED	VCC36 voltage indicator	

[Note1] USB connector can supply DC power. But the current limit is usually 500mA usually. But RED4S' Tx max power is 27dBm and current consumption is over 500mA. so, you should use DC power to get max. power. RED5' current consumption is about 1.5A, you must connect DC adaptor to JP1 to be operated properly.

[Note2] If Both DC adaptor and USB are connected, module get DC power voltage from DC adaptor automatically.

3.2.2 Module control

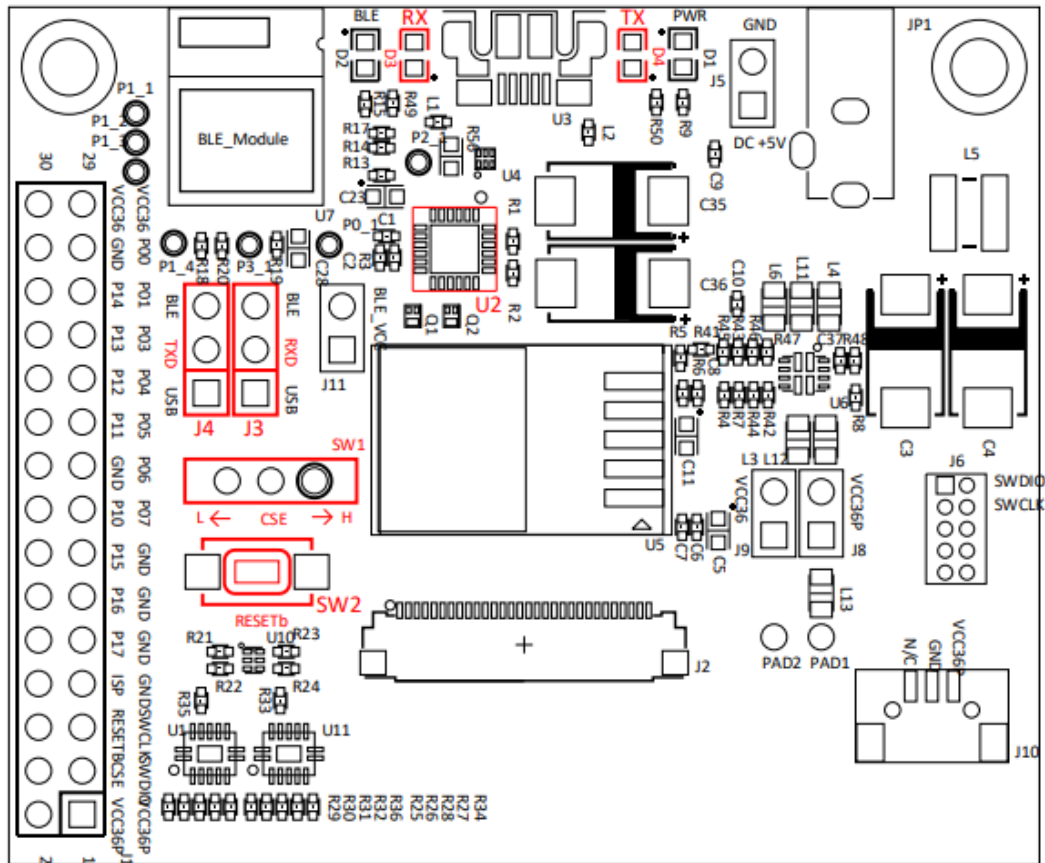


Figure 5. Module control parts

part	name	Function	Note
U2	CP2102N	USB-to-UART bridge IC	
D3	RX LED	UART operation indicator LED	
D4	TX LED	UART operation indicator LED	
J3	P00_RXD0	UART0 series connection from CP2102N to REDx module	When user want to use BLE interface, connect short cap at BLE pin.
J4	P01_TXD0	UART0 series connection from CP2102N to REDx module	
SW1	CSE	Low : module disable High : module enable	
SW2	RESETb	RESET switch of the module	

3.2.3 Connection part

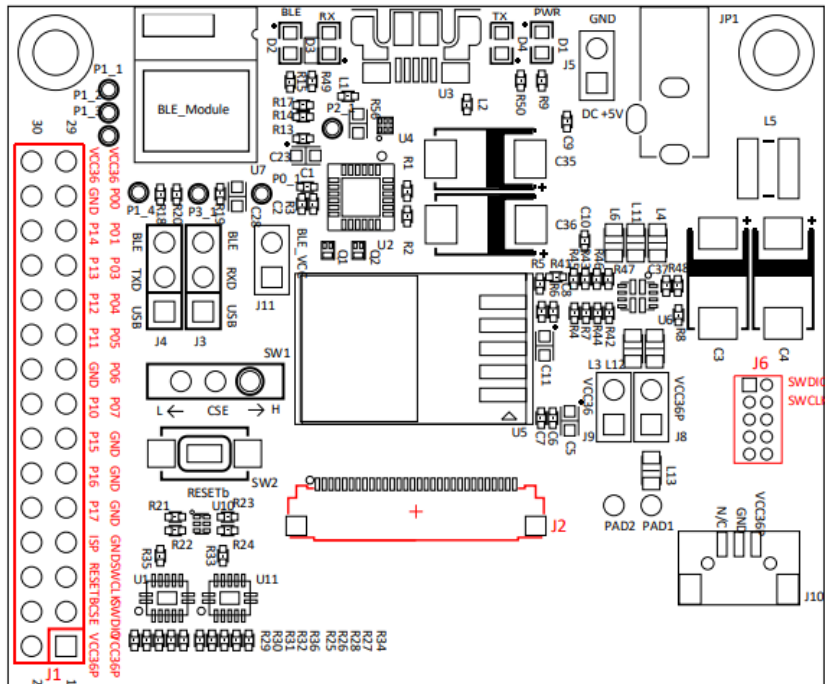


Figure 6. Connection parts

part	name	Function	Connector type
J1	Application connector	GPIO and serial interface connector for user Refer to RED4S or RED5 spec sheet to check available GPIO	2.54mm pitch 30pin header
J2	FFC connector	Control board to module connector	05002HR-30CE, 30pin Yeonho electronics
J6	SWD	Debugger port or download firmware this SWD port is connected to H/W debugger such as ULINK2. Figure 7 show pin diagram of J6	1.27mm pitch 10pin connector

[Note] SWD port power (3.3V) is provided by ULINK2 adapter.

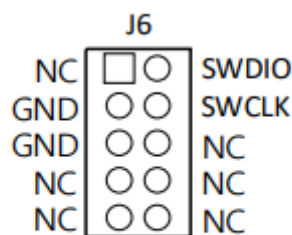


Figure 7. Debugger port

3.2.4 Default hardware setting

Figure 8 shows default setting of control board.

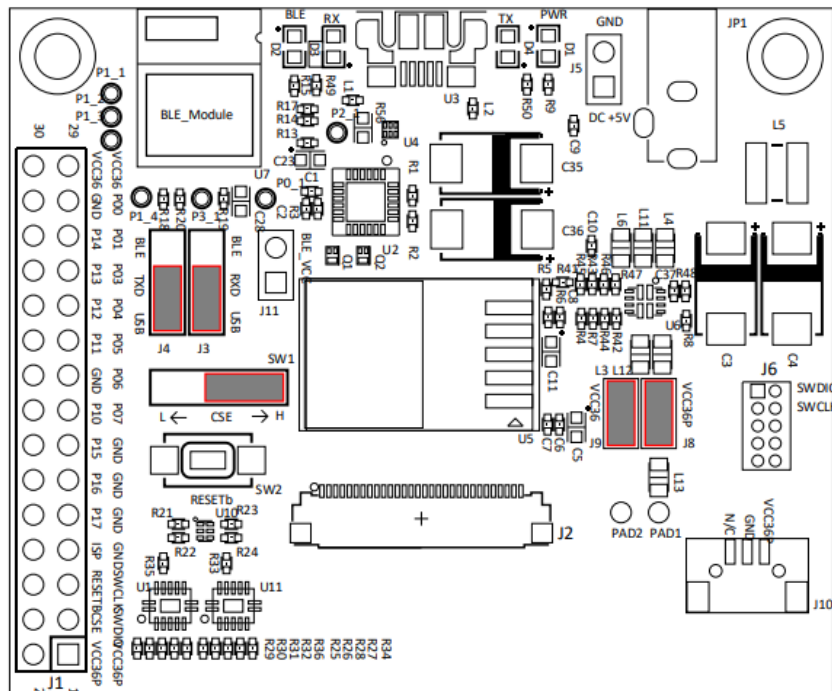


Figure 8. Default Hardware setting

3.2.5 BLE connection

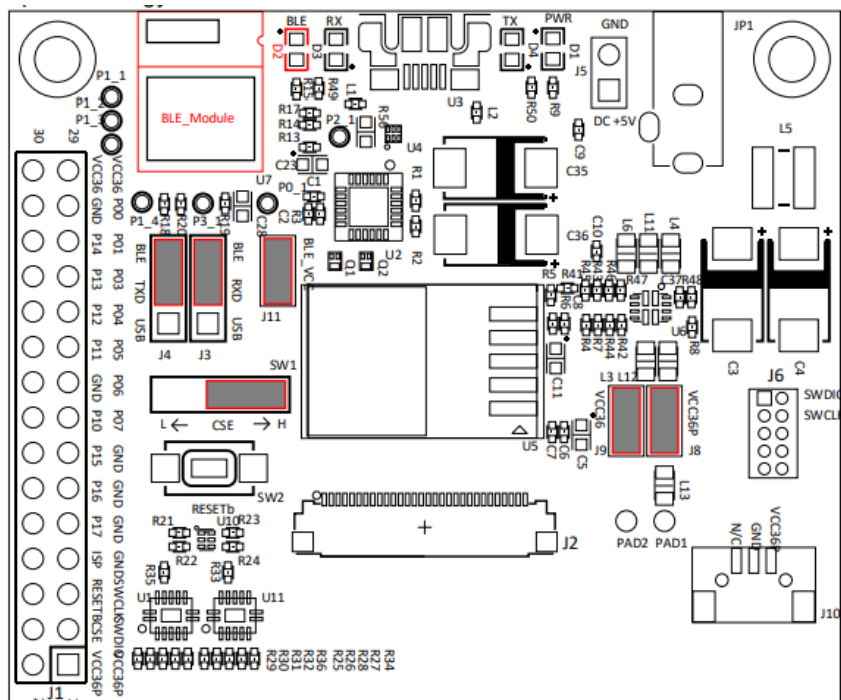


Figure 9. BLE hardware setting

Figure 8 shows BLE module connection setting of control board. BLE module is product BM71BLES1FC2.

3.2.6 UART connection

Figure 10 shows external UART connection setting of control board. After removing the short caps of J3, J4, connect P00, P01 and GND pins of J1 2.54mm pitch 30p header.

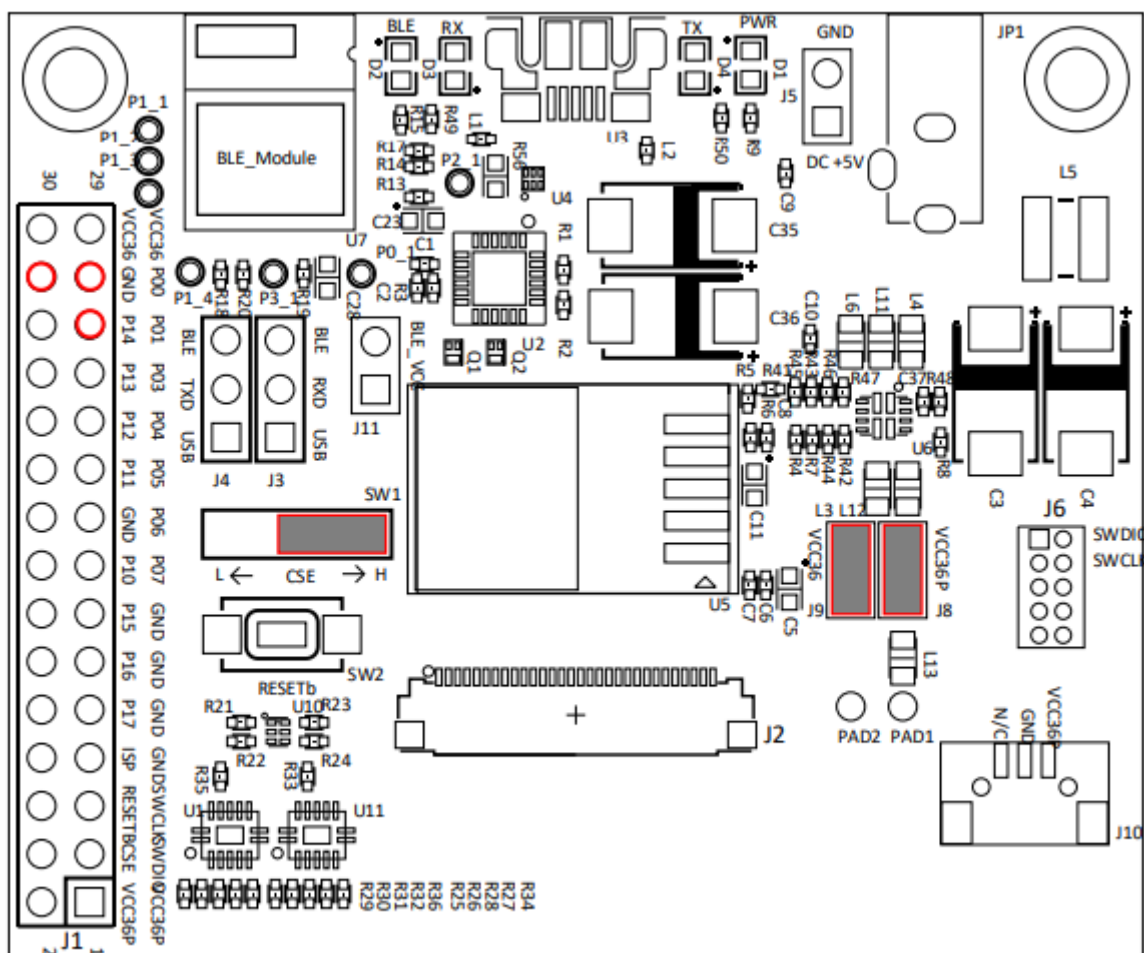


Figure 10. UART hardware setting

3.3 Specifications

Parameter	Symbol	Min	Typ	Max	Unit
RED_CTRL supply voltage	DC +5V		5		V
RED_CTRL output voltage	VDD36		3.6		V
	VDD36P		3.6		
RED_CTRL Current consumption (without module)	I _{CTRL}		7.0		mA

3.4 Connection of Antenna

REDx-DK includes QUBE6015 and ceramic2504 antenna. User can use this or another antenna you select to the SMA antenna 4 ports. Figure 11 shows block diagram of REDx-DK and antenna connections. REDx-DK antenna consists of SP4P switch and 4 SMA antenna ports for multi antenna. The selection of antenna can be selected by RED Utility. SW3 is an antenna selection switch and should be set as shown figure 12.

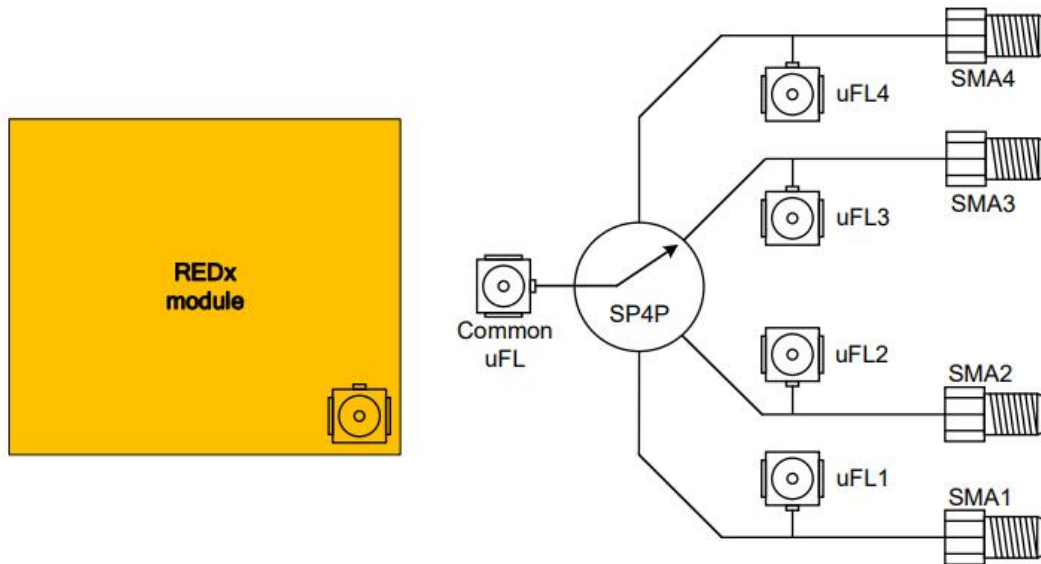


Figure 11. Block diagram of REDx-DK antenna



(a) Single antenna selection

(b) Multiple antenna selection

Figure 12. Antenna selection switch

3.4.1 Single antenna connection

The single antenna connections can be connected either directly to the PHYCHIPS antenna or to the SMA antenna 4 ports as shown below figure 13.



(a) Module to PHYCHIPS antenna



(b) Module to SMA port

Figure 13. Single antenna connection

3.4.2 Multi antenna connection

The multi antenna connections can be connected S6 uFL port as shown below figure 14. The selection of antenna port can be made in RED Utility.



Figure 14. Multi antenna connection

4 Schematics

