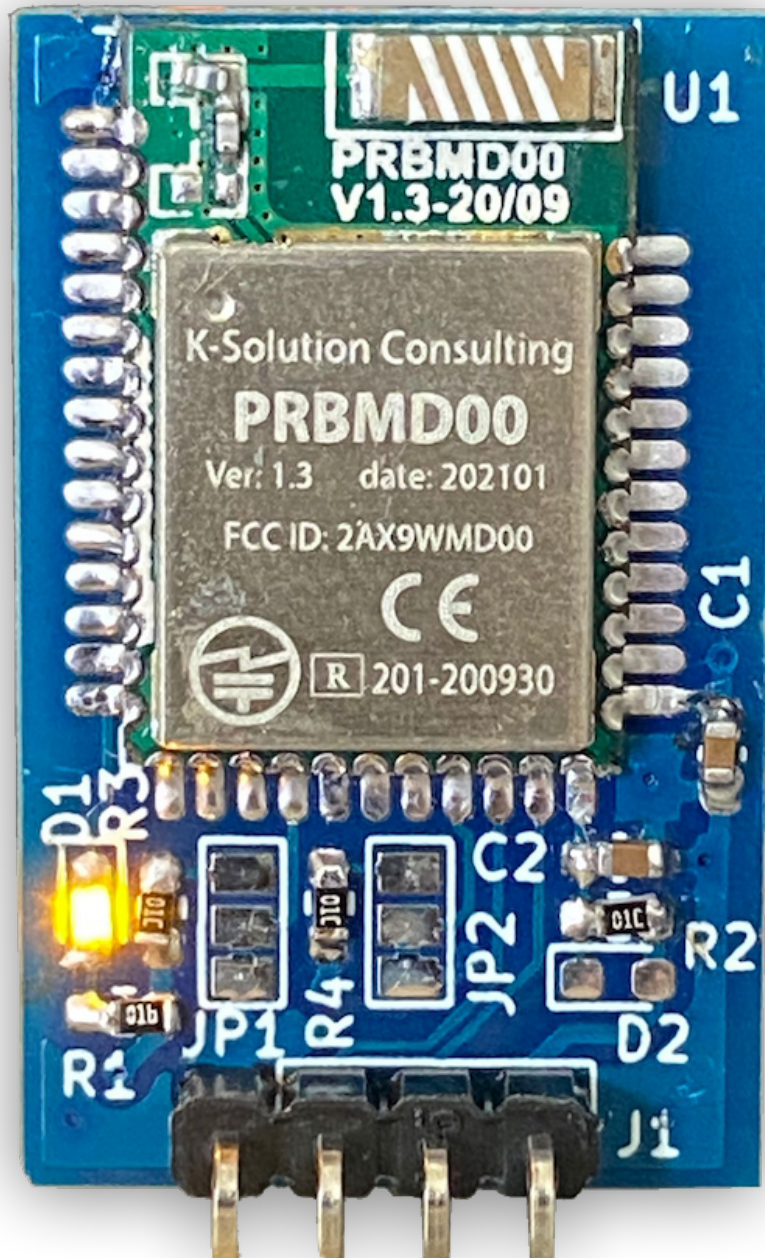# KSOL-BTU00 BT board

Data sheet version 1.1

Disclaimer

Liability Disclaimer
K-Solution Consulting Co. Ltd reserves the right to make changes without further notice to the product to improve reliability, function or design. K-Solution Consulting Co. Ltd does not assume any liability arising out of the application or use of any product or circuits described herein.

Life Support Applications
K-Solution Consulting Co. Ltd's products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. K-Solution Consulting Co. Ltd customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify K-Solution Consulting Co. Ltd for any damages resulting from such improper use or sale.

Introduction

Base on PRBMD00 Bluetooth module, KSOL-BTU00 ready module provides a simple BT5 solution, allowing user, even without any RF design experience, brings their their product or system, embedded with BT5 feature, to market in time.

KSOL-BTU00 is at HC-05 form factor, easily adapted by Arduino user.

With the power of PRBMD0, KSOL-BTU00 provide serial tunnelling feature between UART and BT, a quick solution to connect device with smart phone, tablet or PC through BT.

PRBMD00 is FCC, CE and Telec certified module, allows KSOL-BTU00 to be adapted in different countries
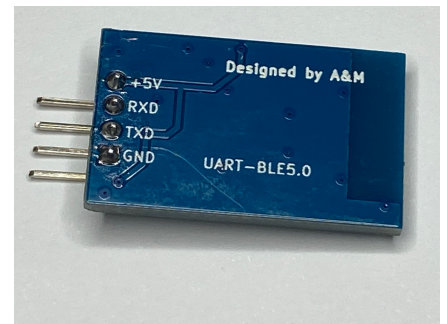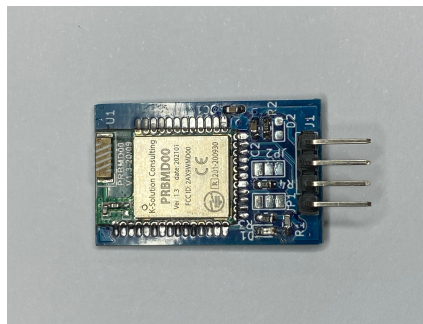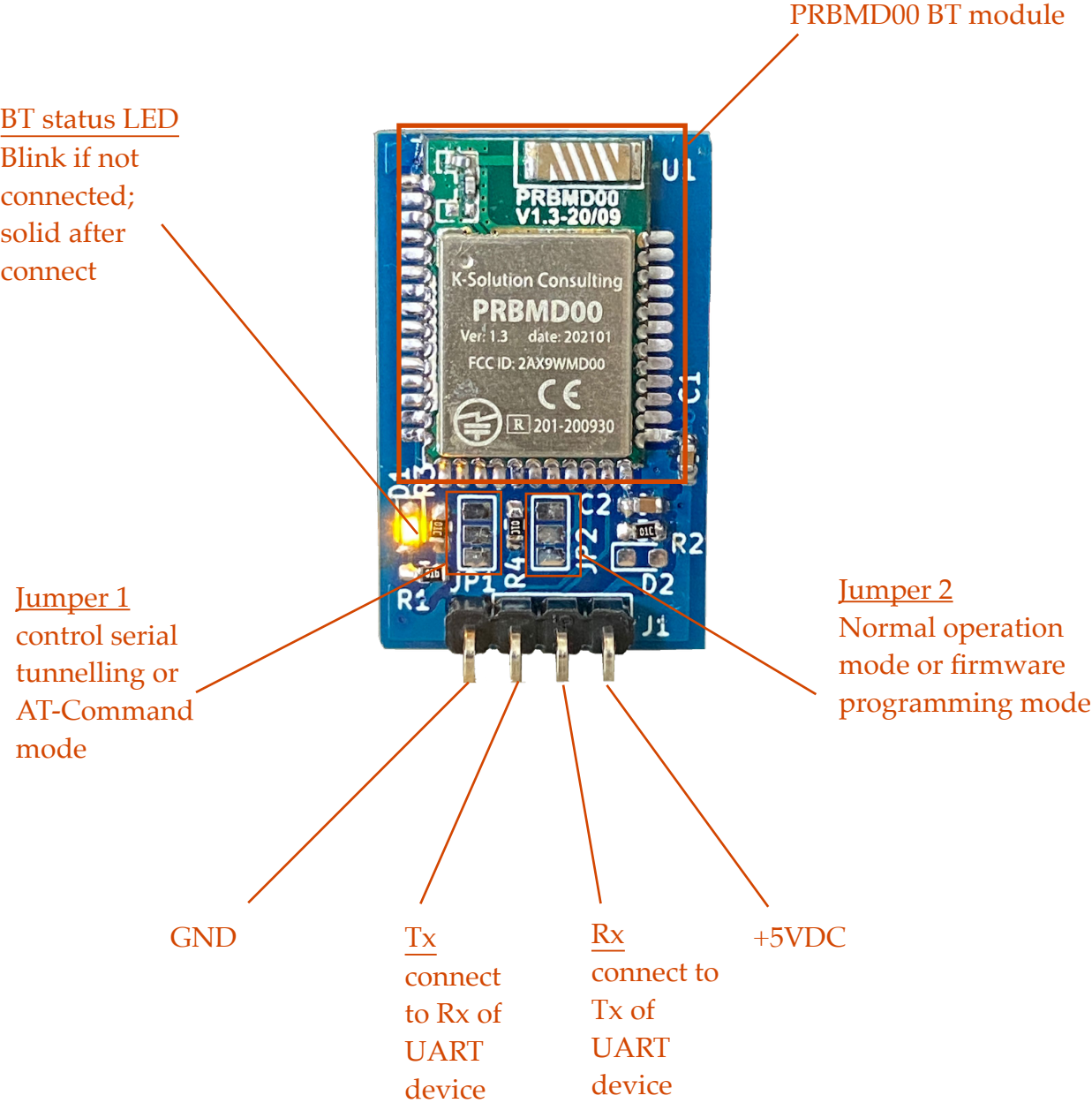

Applications

- Phone accessories
- Computer peripherals
- CE remote controls for TV, STB and media systems
- Beacons
- Proximity and security alert tags
- Sports and fitness sensors
- Healthcare and lifestyle sensors
- Game controllers
- Home Automation
- Smart RF tags for tracking and social interaction

*PHY62xx QDID is 112181

Hardware description

PRBMD00 BT module

BT status LED
Blink if not
connected;
solid after
connect

Jumper 1
control serial
tunnelling or
AT-Command
mode

Jumper 2
Normal operation
mode or firmware
programming mode

GND

Tx
connect
to Rx of
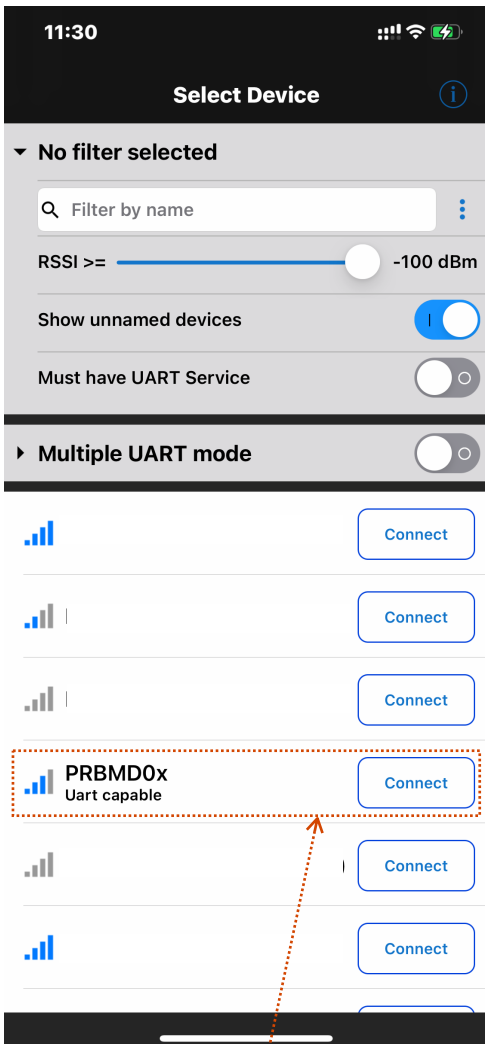UART
device

Rx
connect to
Tx of
UART
device

+5VDC

note: the UART setting will be 9600, 8, n, 1

Operation

KSOL-BTU00's default mode is serial tunnelling, and the operation is as following:

1. Power on the KSOL-BTU00
2. Connect the KSOL-BTU00 with UART device (or UART-USB dongle on a PC)
3. If using UART-USB dongle on a PC, open any serial terminal software
4. KSOL-BTU00 will advertise "PRBMD0x" name, and the LED blink
5. Open a UART BT APP, such as Nordic Toolbox, Bluefruit LE Connect from adafruit
6. Select "PRBMD0x" to connect, and the LED will become solid.
7. Select UART profile (depends on APP)
8. Now APP and the UART device (or PC terminal software) is able to exchange data

in this example, Bluefruit LE Connect APP is used.

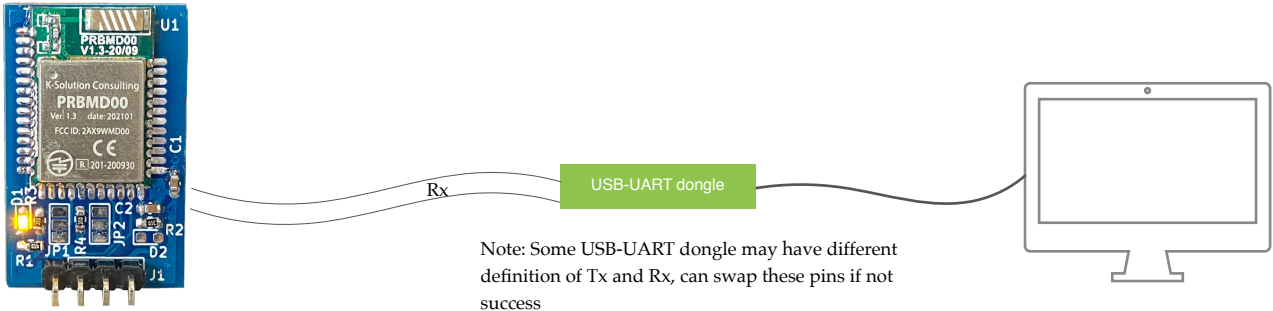Select to connect
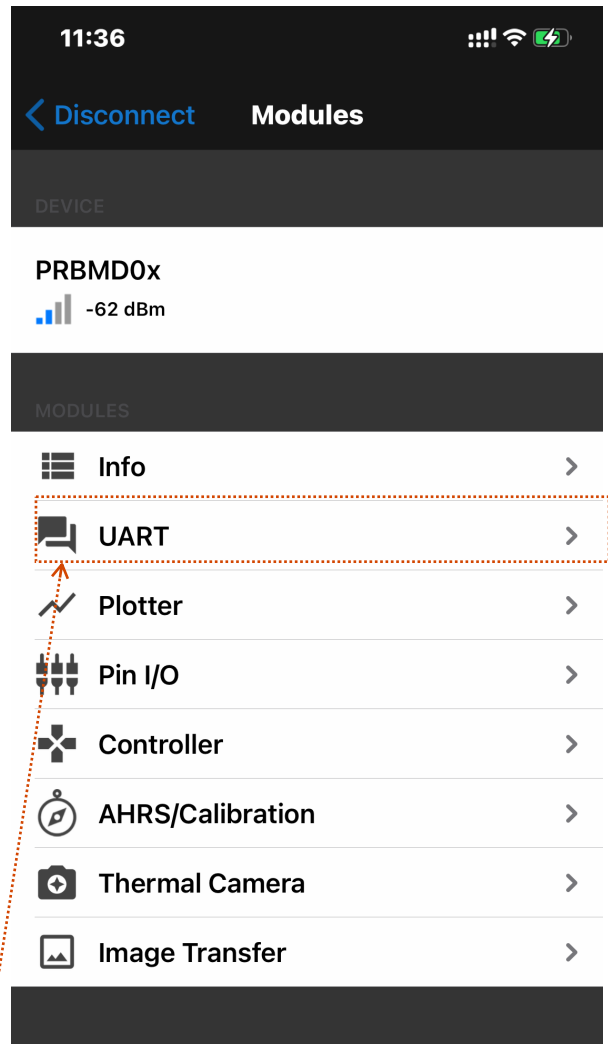
Select UART profile

AT-command mode

KSOL-BUT00 will be in AT-command mode in the first 10 sec. after reset or power up, user can send out the following AT-command mode within this 10 sec. window. If user send out command AT+HIGH (make all GPIO at high), KSOL-BUT00 will then stay at AT-command mode even after this 10 sec. window.

Other method to put KSOL-BUT00 into AT-command mode is changing JP1 (to be described in Jumper section).

	Action	enquiry	return value	set	return value
System	**MAC addr ***	**AT+ID?**	Current address		
	Help	**AT+HELP**	All AT commands		
	Reset			**AT+RESET**	
	Factory Default			**AT+DEFAULT**	- BAUD = 115200, TXP = 0, NAME = PRBMD00, Flow control disabled
	Exit AT-CMD mode			**AT+EXIT** - enter transparent mode from AT-CMD	
BLE	**Change name**	**AT+NAME?**	- current name Default:PRBMD00	**AT+NAME= New name**	
	Start advertising			**AT+BDCS**	
	Stop advertising			**AT+BDCE**	
UART and GPIO	**BAUD rate**	**AT+SPEED?**	Current baud	**AT+SPEED=BAUD**, BAUD = 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200	- New BAUD if success note: data byte, parity and stop bit are fixed at 8,N,1
	Turn P34 off			**AT+LEDOFF** - turn P34 off; P34 will turn on once it is connected, use this command to turn it off for saving power	
	Read and set IO pin	**AT+GPIOxx=?** xx:04-33	level of the GPIO pin	**AT+GPIOxx=y** xx:04-33	y= 0 or 1, where 0 is low level and 1 is high level
RF test	**Set all GPIO high**			**AT+HIGH**	
	Set all GPIO low			**AT+LOW**	

	Fix a Tx channel #			**AT+TXa=b**
				a= modulation data,
				  0: PRBS9
				  1: 1111000
				  2: 10101010
				b= 0-39 Tx channel
				i.e.: AT+TX1=20	

	Fix a Rx channel#			**AT+RX=c** c=0-39 channel	
	TX power	**AT+TXP?**	Current TX Power value	**AT+TXP= p** p : -20, -15, -10, -6, -5, -3, 0, 3, 4, 5	- new value

Firmware programming

User is possible to program his own firmware into KSOL-BTU00 by changing JP2 setting. The connection is as following:

Rx   USB-UART dongle

Note: Some USB-UART dongle may have different definition of Tx and Rx, can swap these pins if not success

PHYPlusKits is a Window base application as shown, it can be download from our web site or contact us for latest version:
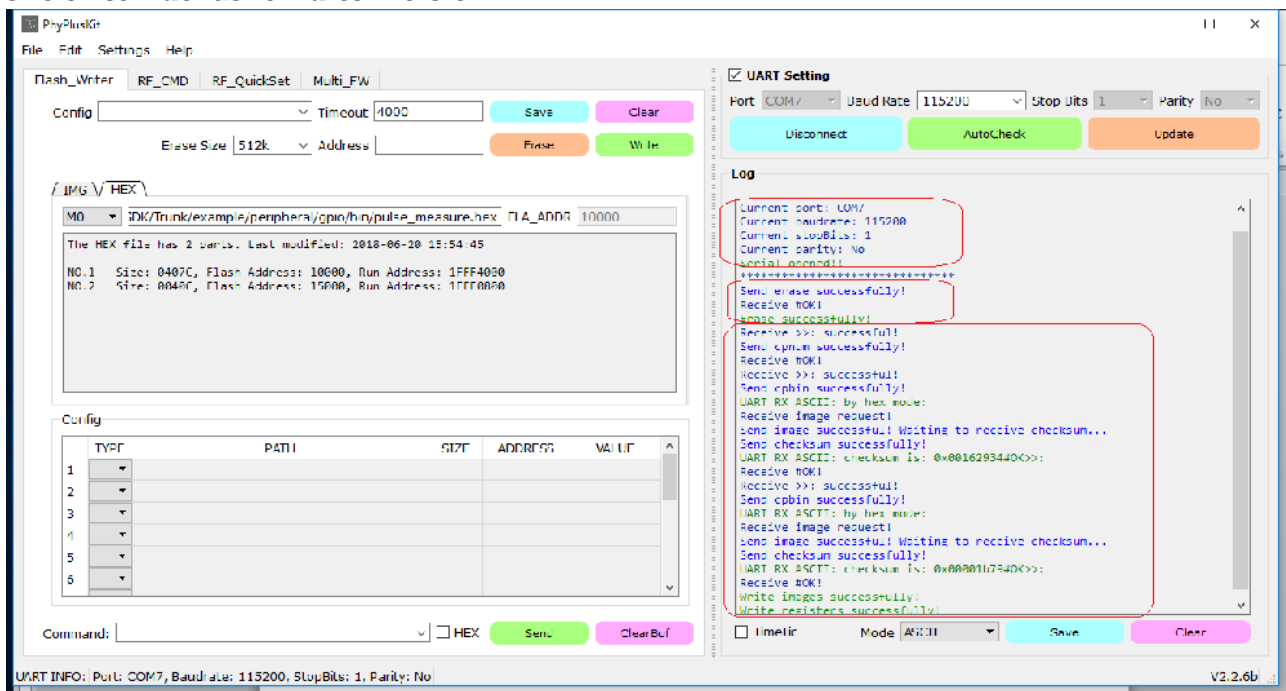

PhyPlusKit interface

User can also program their MAC address obtained from Bluetooth SIG through PHYPlusKit. Please note that KSOL-BTU00 shipped out without any MAC address pre-programmed, and also, MAC address field can be programmed one time only.

	TYPE	PATH	SIZE	ADDRESS	VALUE	
1	MAC ▼				56:78:90:98:76:54	←
2	▼					
3	▼					
4	▼					

* MAC address can be programmed by PHY Plus Kit only, and it can be programmed for one time only.
\# Reset is needed to leave the AT+RX=c and AT+TXa=b command.

Jumpers

JP1 and JP2 of KSOL-BTU00 are connected to VCC by default, which set it as serial-tunnelling and normal operation mode.

serial tunnelling or AT-CMD mode

normal operation mode
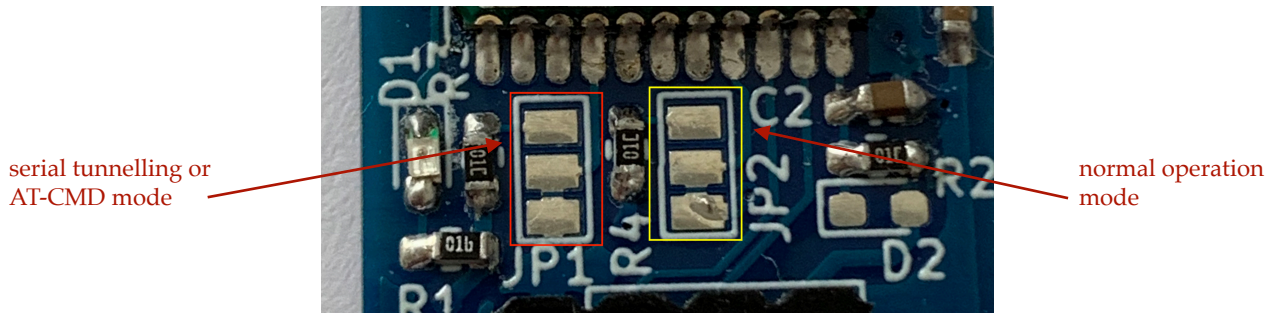
JP1: In order to fix KSOL-BTU00 to AT-CMD for good, user can do the following:
   1. cut the PCB connection of JP1

Cut this connection

Connect the upper part
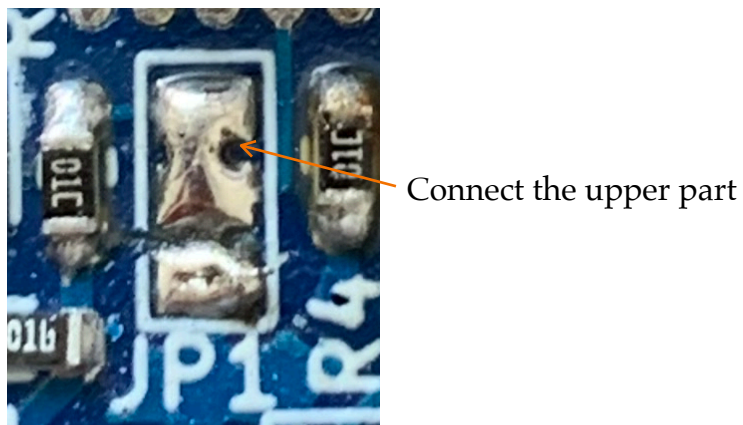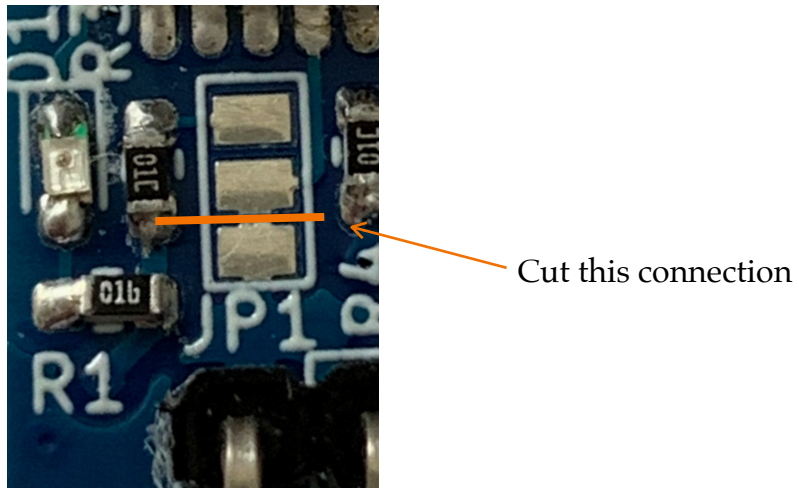
JP2: If user wants to program firmware or their own MAC address through PHYPLUS kit, the default connection of JP2 needs to be cut and connects to other way:
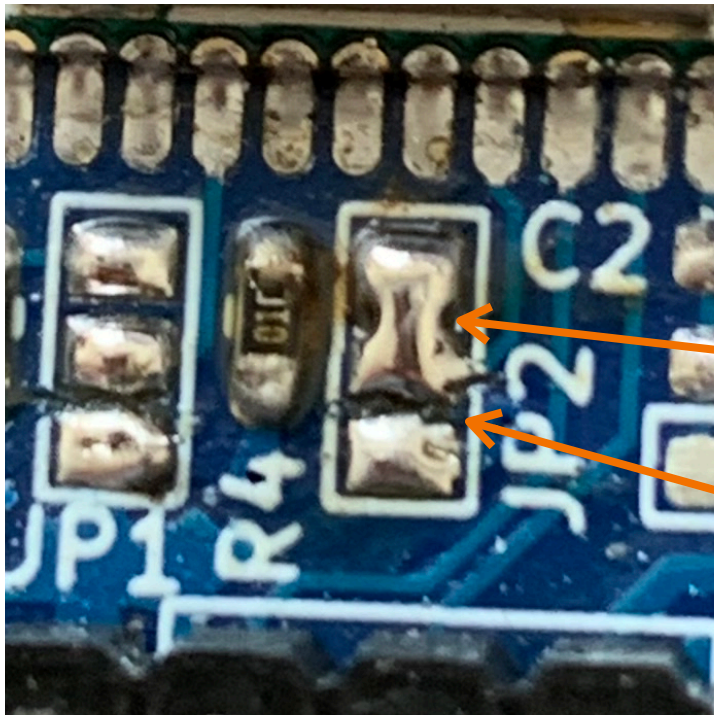
Connect the upper part

Cut this connection

Reference

1. PRBMD00 datasheet (http://www.k-sol.com.hk/assets/prmbd00-datasheet-v1_75.pdf)
2. PRBMD00 product page (http://www.k-sol.com.hk/prbmd0x.html)
3. PRBMD0x related document (http://www.k-sol.com.hk/prbmd0x-document.html)

Certifications (PRBMD00)

telefication

TCB

TCB

GRANT OF EQUIPMENT
AUTHORIZATION
Certification
Issued Under the Authority of the
Federal Communications Commission
By:

Telefication B.V.
Edisonstraat 12a
Zevenaar, NL-6902 PK
Netherlands

Date of Grant: 12/10/2020

Application
Dated: 12/08/2020

K-Solution Consulting Co. Ltd.
Blk. H, 11/f, Yuet Wah mansion
39 Yuet Wah street, KwunTong
HK,
China

Attention: Au King Shing

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named
GRANTEE, and is VALID ONLY for the equipment identified hereon for
use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: 2AX9WMD00
Name of Grantee: K-Solution Consulting Co. Ltd.
Equipment Class: Digital Transmission System
Notes: PRBMD00 EVK
Modular Type: Single Modular

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	15C	2402.0 - 2480.0	0.0023		

Modular Approval. Power output listed is conducted. This grant is valid only when the module is sold to OEM
integrators and must be installed by the OEM or OEM integrators. The antennas used for this transmitter as shown
in this filing must be installed to provide a separation distance of at least 20 cm from all persons and must not be
co-located or operating in conjunction with any other antenna or transmitter. End-users may not be provided with
the module installation instructions.OEM integrators and end-users must be provided with transmitter operating
conditions for satisfying RF exposure compliance.

Certificate No.: 202181074/AA/00	Ramy Nabod Product Assessor	

telefication bv
The Netherlands
Chamber of Commerce
51565536
www.telefication.com

telefication

Certificate
of
Radio Equipment in JAPAN

No: 201-200930 / 00

Telefication, operating as Conformity Assessment Body (CAB ID Number: 201) with respect to Japan, declares that the listed product complies with the Technical Regulations Conformity Certification of Specified Radio equipment (ordinance of MPT N° 37,1981)

Product description: **PRBMD00 EVK**
Trademark: **K-Solution**
Type designation: **PRBMD00**
Hardware / Software version: **V1.1 / 1.0**

Manufacturer: **K-Solution Consulting Co.,Ltd**
Address: **Blk. H, 11/F, Yuet Wah mansion, 39 Yuet Wah street, Kwuntong**
City: **Hong Kong**
Country: **China**

This certificate is granted to:

Name: **K-Solution Consulting Co.,Ltd**
Address: **Blk. H, 11/F, Yuet Wah mansion, 39 Yuet Wah street, Kwuntong**
City: **Hong Kong**
Country: **China**

This certificate has THREE Annexes.

Zevenaar, 09 December 2020

CAB

David Chen

David Chen
Product Assessor

PRODUCTS
RvA C 224

laboratory   certification   approvals

telefication bv
The Netherlands
Chamber of Commerce
51565536
www.telefication.com

telefication

EU-type examination (Module B)
certificate

No: 202140637/AA/00

In compliance with the procedure specified in RD_061, Telefication declares as designated Notified Body 0560 for the European Radio Equipment Directive, that the stated product, complies with the essential requirements, in accordance with Article 3 of Directive 2014/53/EU, as indicated under Annex 1 of this certificate, based on the applicable Technical Standards and Specifications as listed under Annex 2 of this Certificate.

Product description: **PRBMD00 EVK**
Trademark: **K-Solution**
Type designation: **PRBMD00**
Hardware / Software version: **V1.1 / 1.0**

This certificate is granted to manufacturer:

Name: **K-Solution Consulting Co.,Ltd**
Address: **Blk. H, 11/F, Yuet Wah mansion, 39 Yuet Wah street, Kwuntong**
City: **Hong Kong**
Country: **China**

This certificate remains valid as long as the stated product stays in compliance with the essential requirements of the Radio Equipment Directive.

This certificate has THREE Annexes.

Zevenaar, 09 December 2020

Ramy Nabod
Product Assessor

PRODUCTS
RvA C 224

laboratory   *certification*   *approvals*

Conformity

FCC regulatory conformance：
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two
conditions:
(1) This device may not cause harmful interference.
(2) This device must accept any interference received, including interference that may cause
undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B
digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide
reasonable protection against harmful interference in a residential installation.
This equipment generates uses and can radiate radio frequency energy and, if not
installed and used in accordance with the instructions, may cause harmful interference to
radio communications. However, there is no guarantee that interference will not occur in
a particular installation. If this equipment does cause harmful interference to radio or
television reception, which can be determined by turning the equipment off and on, the
user is encouraged to try to correct the interference by one or more of the following
measures:
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
-Connect the equipment into an outlet on a circuit different from that to which the receiver
is connected.
-Consult the dealer or an experienced radio/TV technician for help

NOTE: The manufacturer is not responsible for any radio or TV interference caused by
unauthorized modifications to this equipment. Such modifications could void the user's
authority to operate the equipment.

RF Exposure
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled
environment.

ORIGINAL EQUIPMENT MANUFACTURER (OEM) NOTES

The OEM must certify the final end product to comply with unintentional radiators (FCC Sections 15.107 and 15.109) before declaring compliance of the final product to Part 15 of the FCC rules and regulations. Integration into devices that are directly or indirectly connected to AC lines must add with Class II Permissive Change.

The OEM must comply with the FCC labeling requirements. If the module's label is not visible when installed, then an additional permanent label must be applied on the outside of the finished product which states: "Contains transmitter module FCC ID: **2AX9WMD00**". Additionally, the following statement should be included on the label and in the final product's user manual: "This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interferences, and
(2) this device must accept any interference received, including interference that may cause undesired operation."

The module is limited to installation in mobile or fixed applications. Separate approval is required for all other operating configurations, including portable configuration with respect to Part 2.1093 and different antenna configurations.

A module or modules can only be used without additional authorizations if they have been tested and granted under the same intended end‑use operational conditions, including simultaneous transmission operations. When they have not been tested and granted in this manner, additional testing and/or FCC application filing may be required. The most straightforward approach to address additional testing conditions is to have the grantee responsible for the certification of at least one of the modules submit a permissive change application. When having a module grantee file a permissive change is not practical or feasible, the following guidance provides some additional options for host manufacturers. Integrations using modules where additional testing and/or FCC application filing(s) may be required are: (A) a module used in devices requiring additional RF exposure compliance information (e.g., MPE evaluation or SAR testing); (B) limited and/or split modules not meeting all of the module requirements; and (C) simultaneous transmissions for independent collocated transmitters not previously granted together.

This Module is full modular approval, it is limited to OEM installation ONLY.
Integration into devices that are directly or indirectly connected to AC lines must add with Class II Permissive Change. (OEM) Integrator has to assure compliance of the entire end product include the integrated Module. Additional measurements (15B) and/or equipment authorizations (e.g. Verification) may need to be addressed depending on co-location or simultaneous transmission issues if applicable. (OEM) Integrator is reminded to assure that these installation instructions will not be made available to the end user

Operating Frequency：（Bluetooth LE）2402-2480MHz
RF output power(Max)：4dBm

Manufacturer information:
Company name: K-Solution Consulting Co. Ltd
Address：Blk. H, 11/f, Yuet Wah mansion, 39 Yuet Wah street, KwunTong, HK
CAUTION：
1. EUT Temperature: 0°C ~ +50°C.
2. Input: DC 3.3V
3. The device complies with RF specifications when the device used at 5 mm from your body, and the holder must not be of metal composition.

RF exposure information: The EIRP power of the device at maximal case is below the exempt condition, 20mW specified in EN62479: 2010. RF exposure assessment has been performed to prove that this unit will not generate the harmful EM emission above the reference level as specified in EC Council Recommendation(1999/519/EC).

Hereby, K-Solution Consulting Co. Ltd. declares that the radio equipment type PRBMD00 is in compliance with Directive 2014/53/EU.The full text of the EU declaration of conformity is available at the following internet address: www.k-sol.com.hk

Contact information

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E-mail: sales@k-sol.com.hk