RTK logger F9C setting manual

2020/04/20

TUMSAT GNSS Lab

1. About F9C

- ◆F9C is RTK data logger powered by ublox ZED-F9P.
- ♦ Contact "Sensorcomm" to purchase.

http://www.sensorcomm.co.jp/

ESP32 WiFi and Bluetooth module is included. (Case 2 and Case 3 are alternative)





1. About F9C

Power consumption

Tested with 10000mAh power bank.

(Bluetooth and WiFi power consumption depend on the signal environment)



F9C can't log data in factory default. You have to set it up yourself.

1. Install u-center, ublox GNSS software in your PC. https://www.u-blox.com/en/product/u-center



- 2. Connect GNSS Antenna.
- 3. Connect your PC and F9C by USB cable.





Select COM port and connect to F9P. 4.



UBX 00:02:5 01:03:1 @ In the second u-blox Generation 9 🕶 COM13 9600 No file open

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5. Download newest Firmware from u-blox web site.

https://www.u-blox.com/en/product/zed-f9p-module#tab-documentation-resources

Tools>Firmware Update 6. Product Change Note F9 and D9 Boot Loader Update 19-Dec-2019 133 KB 🗎 PDF Download Select image file you downloaded and click "GO". System/software design ZED-F9P Product Change 12-Jul-2019 105 KB 🗎 PDF Download Production Deployment **Conformity Declaration** 216 KB 🗎 PDF Download ZED-F9P Declaration of Conformity (RED) 16-Jul-2019 Certification **Firmware Update** Firmware UBX_F9_100_HPG_112_ZED_F9P 12-Jul-2019 102 MB @ LINK Download System/software design Deployment COM13 - u-center 20.01 - - verview Firmware Update Utility File Edit View Player Receiver Tools Window Help 3.51 MB 🗎 PDF Download ox Package Reference 03-Apr-2020 Firmware image Deployment 🗅 🔲 📂 🚽 🚑 Ra 🛛 X 🖻 🖻 Firmware Update... Ctrl+U **•** | blox_F9P¥ReceiverConfig¥UBX_F9_100_HPG_112_ZED_F9P.a26bfd! -Program FIS only Legacy Firmware opdate... Flash Information Structure (FIS) file / Flash Definiton File (FDF) 356 KB PDF Download SS product line card 18-Feb-2020 🛥 👻 🚾 👻 🗶 duct evaluation Dump Receiver Diagnostics... u-blox 7/8/M8 Retrieve Log... Use this baudrate for update Enter safeboot before update lox GNSS product overview 15-May-2019 548 KB 🗎 PDF Download AssistNow Offline 9600 Send training sequence AssistNow Online Use chip erase Receiver Configuration... Transfer image to RAM Hotkeys... Additional options Preferences... Command line C:¥Program Files (x86)¥u-blox¥u-center_v20.01¥ubxfwupdate.exe -p STDIO -b 9600:9600:9600 --no-f 1 "E:¥Document¥GNSS¥Ublox¥Ublox_F9P¥ReceiverConfig ¥UBX F9 100 HPG 112 ZED F9P.a26bfd58dfd11c233f8fdba6b99adc5a.bin

7. Download configuration sample file for F9C. <u>http://www.denshi.e.kaiyodai.ac.jp/gnss_tutor/pdf/F9C/F9C_5Hz_NMEA.txt</u>

Load configuration file from Tools>Receiver Configuration.

After loading configuration, don't forget to do "save config" before power off the receiver.

P COM13 - u-center 20.01	Load/Save Receiver Configuration X	P COM13 - u-center 20.01
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File Edit View Player Receiver Tools Window Help	Generation: Jubley Concertion 9	: 🗅 🛃 🚘 👻 📇 Connection > 👌 🖪 🗉 🖸 🖛 🔀 🕶 🖪
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Dump Receiver Diagnostics		Messages - UBX - MC NTRIP Client
u-blox 7/8/M8 Retrieve Log		E-LOG (Data Logg Autobauding tion View
AssistNow Offline >	Cave configuration	MGA (Multiple Debug Messages arch
AssistNow Online >		E-MON (Monitor)
Receiver Configuration	Hetries (for every message):	BATCH (Data
		COMMS (Co Protocol Filter OUT-UBX NAV ODO UART2 : U1
Hotkeys	Load configuration	EXCEPT (Exc Action > Hotstart
DOG (Data Log Preferences	Store configuration intoBBR/Flash	GNSS (Defau Differential GNSS Interface Warmstart
ש MGA (Multiple ש הכמייט MGA) (Multiple ש הכמייט ש	(non-volatile memory)	HW (Hardwa
MON (Monitor)		
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memaliocError No		

PATCH (Ins

RF (RF Infor

RXBUE (R)

Auto Detect

Get Information

- CFG-MS

💼 OFG-MS

7. Note: This sample configuration file output following sentence to USB memory and ESP32.
 • NMEA...GGA, RMC, VTG...5Hz

If you want other sentences, please customize yourself.

Example : output UBX-NAV-PVT

2. Change value and "Set in RAM" Value 1= output enable Value 0=output disable



3. Data logging

USB memory data logging will automatically start when you power on F9C. And disconnect power USB, it stop logging.





3. Data logging

You can salvage data from USB memory. (USB memory data format should be FAT32)

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動画	LOG0000.TXT	2020/03/30 8:08	2077 \$GNRMC,014303.40,A,3540.3349379,N,13948.7968845,E,0.019,,200420,,,F,V*12↓
PC	LOG0001.TXT	2020/03/30 8:12	2078 \$GNVTG,,T,,M,0.019,N,0.035,K,D*36↓
🧊 3D オブジェクト	LOG0002.TXT	2020/03/30 8:16	2080 \$GNRMC,014303.60,A,3540.3349440,N,13948.7968840,E,0.017,,200420,.,F,V*164
🚽 ダウンロード	LOG0003.TXT	2020/03/30 8:20	2081 \$GNVTG,,T,,M,0.017,N,0.032,K,D*3F4
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F+1X2F	LOG0005.TXT	2020/03/30 8:33	2084 \$GNVTG,,T,,M,0.031,N,0.058,K,D*37↓
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		2020/02/20 0.54	100 KB (132, 312 //11), 2,333 1]。 IEXL [1], IN] 日平前 (771 JIS) 0 X子 0/2,939 1]

You can get RTK position with your smartphone (Android).

1. Install Arduino IDE in your PC. https://www.arduino.cc/en/main/software



2. Download sketch for ESP32.

http://www.denshi.e.kaiyodai.ac.jp/gnss_tutor/pdf/F9C/ESP32_BT_F9C_v2.zip

- 3. Open downloaded sketch "ESP32_BT_F9C_v2.ino"
- 4. Install the library for ESP32.

Tool>Board>Board Manager. Then search by "esp32" and install the library.



5. Connect F9C with PC by USB cable.



6. Select board type as "ESP32 Dev Module" and COM port.

ESP32_BT_F9C_v2 | Arduino 1.8.12 ファイル 編集 スケッチ ツール ヘルプ 自動整形 Ctrl+T Ð スケッチをアーカイブする ESP32_BT_F9C_ エンコーディングを修正 //This example d ライブラリを管理... Ctrl+Shift+I //By Evandro Cop シリアルモニタ Ctrl+Shift+M 11 シリアルプロッタ Ctrl+Shift+L //This example c //and also demon WiFi101 / WiFiNINA Firmware Updater #include "Blueto ボード: "ESP32 Dev Module" #include "freert Upload Speed: "921600" #include "freert #include "Arduin CPU Frequency: "240MHz (WiFi/BT)" Flash Frequency: "80MHz" #if CONFIG FREER Flash Mode: "QIO" #define ARDUINO #else Flash Size: "4MB (32Mb)" #define ARDUINO Partition Scheme: "Default 4MB with spiffs (1.2MB APP/1.5MB SPIFFS)" #endif Core Debug Level: "なし" PSRAM: "Disabled" #if !defined(CON #error Bluetooth シリアルポート: "COM15" #endif ボード情報を取得 BluetoothSerial 書込装置: "AVRISP mkll" HardwareSerial u ブートローダを書き込む #define packTimeout 5 #define PACKET_SIZE 2048 byte bufl[PACKET_SIZE]; int i1=0; byte buf2[PACKET_SIZE]; int i2=0; int RTCM length=0; int bt_len=0; int bufsize=0;

void setup() {

- 7. Change Bluetooth device name as you like.
- Write sketch to the board.
 After writing completed you can disconnect USB from PC.



- 9. Power supply to F9C.
- 10. Pairing F9C with your smartphone.





11. Install "Lefebure NTRIP Client" from Google play store on your Android. Set receiver as F9C and configure NTRIP base station, Then click "Connect".

You can use RTK position on your smartphone app if you enable "GPS Mock Locations".

	₩ ⁴⁶	86 11:23		86) 11:23	
NTRIP Client	Receiver Settings		NTRIP Settings		
RTK:12 Age: 0.6s	Receiver Connection External via Bluetooth		Network Protocol NTRIP v1.0		
35.6722 539(B 1326198	Bluetooth Device F9C_No1		Caster IP 153.121.59.53	The mount p	oint should broadcast minimal
152,365 Bytes 11:23:57 Service Started 11:23:57 GPS Mock Location Disabled	Bluetooth Connection Method Secure		Caster Port 2101	Unnecessary Bluetooth co	messages will cause a stack of mmunication.
11:23:57 Device: F9C_No1 11:23:57 Trying to Connect 11:23:59 Bluetooth Device Connected 11:23:59 Fix type is now GPS	Auto-Enable Bluetooth Automatically switch bluetooth on/off		Username	Example :	
11:23:59 Using 12 satellites 11:24:01 Network: Connecting 11:24:01 NTRIP: Connected to caster	Auto-Configure Receiver No Auto-Config		Password	RTCM 1006 (24): sta RTCM 1230 (15): RTCM 1074 (193): sta	aid= 0 pos=35.55193529 139.64700590 94.419 anth=0.000 aid= 0 2020/04/20 02:43:47.00 nsat= 9 nsig= 4 iod= 0 ncell=24 sync=1
11:24:02 Fix type is now DGPS 11:24:02 Fix type is now FloatRTK 11:26:26 GPS Mock Location Disabled 11:27:21 Fix type is now RTK	Antenna Height No Offset		Data Stream K0J27	RTCM 1004 (120): sta RTCM 1094 (83): sta RTCM 1114 (66): sta RTCM 1124 (137): sta	aid= 0 2020/04/20 02:43:47.00 nsat= 4 nsig= 2 id= 0 ncell= 8 sync=1 aid= 0 2020/04/20 02:43:47.00 nsat= 2 nid= 0 ncell= 8 sync=1 aid= 0 2020/04/20 02:43:47.00 nsat= 2 nsig= 3 id= 0 ncell= 6 sync=1 aid= 0 2020/04/20 02:43:47.00 nsat= 9 nsig= 2 id= 0 ncell= 6 sync=1 aid= 0 2020/04/20 02:43:47.00 nsat= 9 nsig= 2 id= 0 ncell= 6 sync=1
	Save GPS Data to File		Reported Location Get from External Receiver		
	Save NTRIP Data to File		Saved Profiles		
	GPS Mock Locations Allow external GPS data to be used by other Android Apps		_		
				\triangleleft	

F9C logger can get RTK position and store it in wifi coverage. The other device in the same LAN can monitor F9C status.





With mobile router



OR



RTK in Wifi coverage field

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1. Install Arduino IDE in your PC.

https://www.arduino.cc/en/main/software

- 2. Download the sketch for ESP32 and open the sketch "ESP32_WifiUDP_Ntrip.ino" . <u>http://www.denshi.e.kaiyodai.ac.jp/gnss_tutor/pdf/F9C/ESP32_WifiUDP_Ntrip.zip</u>
- 3. Install the library for ESP32.

Tool>Board>Board Manager. Then search by "esp32" and install the library.



4. Install the library "Ntrip-clilent-for-Arduino-master.zip" from zip file. (In the download folder)

💿 ESP32_WifiUDP_Ntrip Arduino 1.8.12		🥺 インストールする	ライブラリを含むZIPファイルまたはフォルダを指定してください。		×
ファイル 編集 スケッチ ツール ヘルプ		ファイルの場所(1):	ESP32_WifiUDP_Ntrip	✓ Ø №	
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int httpPc スケッチのフォルダを表示 Ctrl+K char* mntr char* user char* pass ファイルを追加	ct of NTRIP caster A ライブラリを管理 Ctrl+Shift+I	اللاتية اللاتية			
NTRIPClient ntrip_c; WiFiUDP wifiUdp; static const int target_port = 60000; //送信先 static const int my_port = 60000; //自身のポー IPAddress ip;	.ZIP形式のライブラリをインストール Arduino ライブラリ Bridge Esplora	PC ネッ・ワーク	ファイル・名(型): NTRIP-client-for-Arduino-masterzip ファイルのタイプ(I): ZIPファイルまたはフォルダ	~	開く取消
<pre>HardwareSerial uart(2);//F9P UART1 byte buf1[PACKET SIZE];</pre>	Ethernet Firmata GSM				
<pre>int il=0; byte buf2[PACKET_SIZE]; int i2=0;</pre>	Keyboard LiquidCrystal Mouse				
<pre>int cnt=0; int uart_len=0; int tcp_flag=0;</pre>	Robot Control Robot IR Remote Robot Motor				
<pre>void setup() { // put your setup code here, to run once: Serial.begin(115200);</pre>	Servo SpacebrewYun				

 Connect F9C with PC by USB cable.
 Select board type as "ESP32 Dev Module" and COM port.



ESP32_BT_F9C_v2 | Arduino 1.8.12 ファイル 編集 スケッチ <mark>ツール</mark> ヘルプ 自動整形 Ctrl+T Ð ~) スケッチをアーカイブする ESP32_BT_F9C_ エンコーディングを修正 //This example d ライブラリを管理... Ctrl+Shift+I //By Evandro Cop シリアルモニタ Ctrl+Shift+M 11 シリアルプロッタ Ctrl+Shift+L //This example c //and also demon WiFi101 / WiFiNINA Firmware Updater #include "Blueto ボード: "ESP32 Dev Module" #include "freert Upload Speed: "921600" #include "freert #include "Arduin CPU Frequency: "240MHz (WiFi/BT)" Flash Frequency: "80MHz" #if CONFIG_FREER Flash Mode: "QIO" #define ARDUINO #else Flash Size: "4MB (32Mb)" #define ARDUINO Partition Scheme: "Default 4MB with spiffs (1.2MB APP/1.5MB SPIFFS)" #endif Core Debug Level: "なし" PSRAM: "Disabled" #if !defined(CON #error Bluetooth シリアルポート: "COM15" #endif ボード情報を取得 BluetoothSerial 書込装置: "AVRISP mkll" HardwareSerial u ブートローダを書き込む #define packTimeout 5 #define PACKET_SIZE 2048 byte bufl[PACKET_SIZE]; int i1=0; byte buf2[PACKET_SIZE]; int i2=0; int RTCM length=0; int bt_len=0; int bufsize=0;

void setup() {

- 6. Change following line in the sketch.
 - WiFi SSID (2.4GHz)
 - WiFi password
 - Ntrip Server IP address
 - Ntrip Mount Point
 - Ntrip User name and password (Set blank it when you use Mount Point which don't require user name and password)

FSP32 WifiUDP Ntrip Arduino 1.8.12	_		×
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			P
ESP32_WifiUDP_Ntrip §			
<pre>#include <ntripclient.h> #include <wifi.h> #include <wifi.h> #include <wifiudp.h> #include "freertos/FreeRTOS.h" #include "freertos/task.h" #include "Arduino.h"</wifiudp.h></wifi.h></wifi.h></ntripclient.h></pre>			^
<pre>#if CONFIG_FREERTOS_UNICORE #define ARDUINO_RUNNING_CORE 0 #else #define ARDUINO_RUNNING_CORE 1 #endif</pre>			1
<pre>#define packTimeout 5 #define PACKET_SIZE 4096</pre>	_		
<pre>const char* ssid = "*****";//2.4GHz Wifi SSID const char* password = "*****";//Wifi password</pre>			
<pre>char* host = "153.121.59.53";//Ntrip server xxx.xxx.xxx.xxx int httpPort = 2101; //port 2101 is default port of NTRIP caster char* mntpnt = "***";//Mount Point Name char* user = "*****";//User Name char* passwd = "*****";//Password</pre>			
NTRIPClient ntrip_c; WiFiUDp wifiUdp; static const int target_port = 60000; //送信先のポート static const int my_port = 60000; //自身のポート IPAddress ip; IPAddress target_ip;			
HardwareSerial uart(2);//F9P UART1			
<pre>byte buf1[PACKET_SIZE]; int i1=0;</pre>			~
「NTRIP-client-for-Arduino-master」というライブラリはすでに存在します。	エラーメッセー	-ジをコピ、	ーする
5	COM15ØESP	32 Dev M	lodule

7. Write the sketch to F9C.

You can found the IP address of F9C on Arduino IDE serial monitor after writing the sketch.

When F9C is power supplied in the WiFi coverage, it automatically start RTK and store its result.



 If you want to monitor RTK result, listen UDP 60000 port in the same LAN as F9C. Here, we show the example using RTKLIB and u-center on PC. (F9C will broadcast data to xxx.xxx.255 of your LAN. Some firewall setting to allow UDP broadcasting may be required on your WiFi router or PC)



6. Erase the sketch of ESP32

How to put back F9C to not use WiFi or Bluetooth

Connect F9C to PC by USB cable and open Arduino IDE.

>ublic Domain (or CCO licensed, at your option.)

between Serial and Classical Bluetooth (SPP)

- Create new sketch from File>New File. 2
- Write the null sketch to ESP32. 3.

Ctrl+N

Ctrl+O

Ctrl+W

Ctrl+S

Ctrl+P

Ctrl+カンマ

#if !defined(CONFIG BT ENABLED) || !defined(CONFIG BLUEDROID ENABLED) #error Bluetooth is not enabled! Please run `make menuconfig` to and enable it

Ctrl+O

#define ARDUINO RUNNING CORE 1

Ctrl+Shift+S

Ctrl+Shift+P

00 ESP32_BT_F9C_v2 | Arduino 1.8.12

ファイル 編集 スケッチ ツール ヘルプ

最近使った項目を開く スケッチブック

名前を付けて保存

プリンタの設定...

新規ファイル

開<...

スケッチ例 閉じる

保存

印刷....

終了

#endif

#endif

環境設定



