REYAX
TECHNOLOGY CORPORATION, LTD

20-DEC-2022 56312E39

RYS8830

Small form factor & Ultra Low Power **1.8V** UART/I2C interface GNSS antenna module

Datasheet

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11*11*2.2mm



Represented by:

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PRODUCT DESCRIPTION

The REYAX RYS8830 **1.8V** GNSS module is built on the high performance of the SONY CXD5605AGF GNSS engine. The RYS8830 module utilize concurrent reception of GNSS systems offering high sensitivity in a small SMD form factor

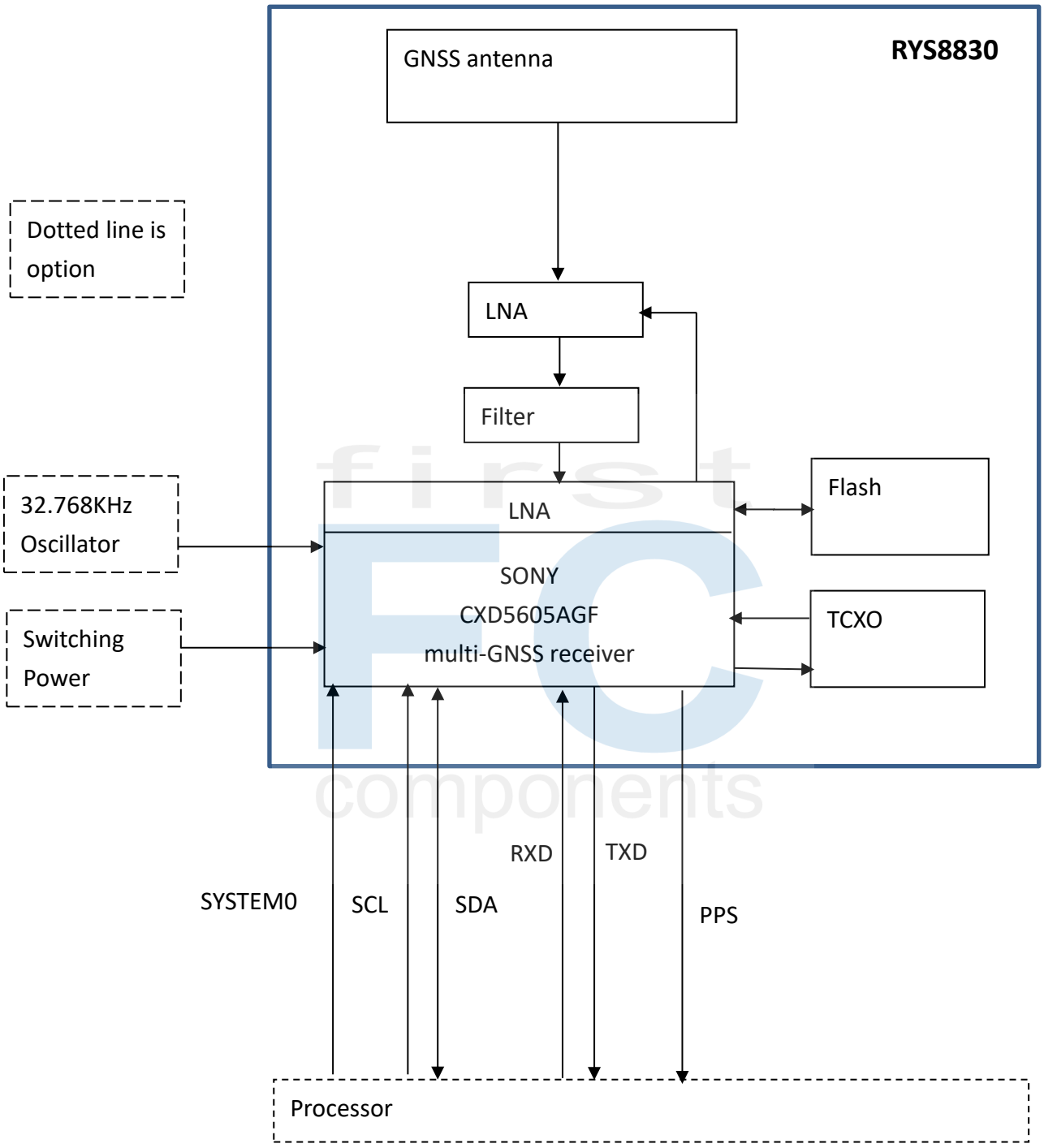
FEATURES

- SONY CXD5605AGF multi-GNSS receiver for GPS, GLONASS, SBAS, QZSS, BeiDou and Galileo
- Small SMD form factor 121mm^2
- Enhanced GNSS Filter and Low Noise Amplifier
- Ultra-low power consumption
- Up to Position accuracy 1.0 m CEP
- Embedded Antenna
- Optional external antenna

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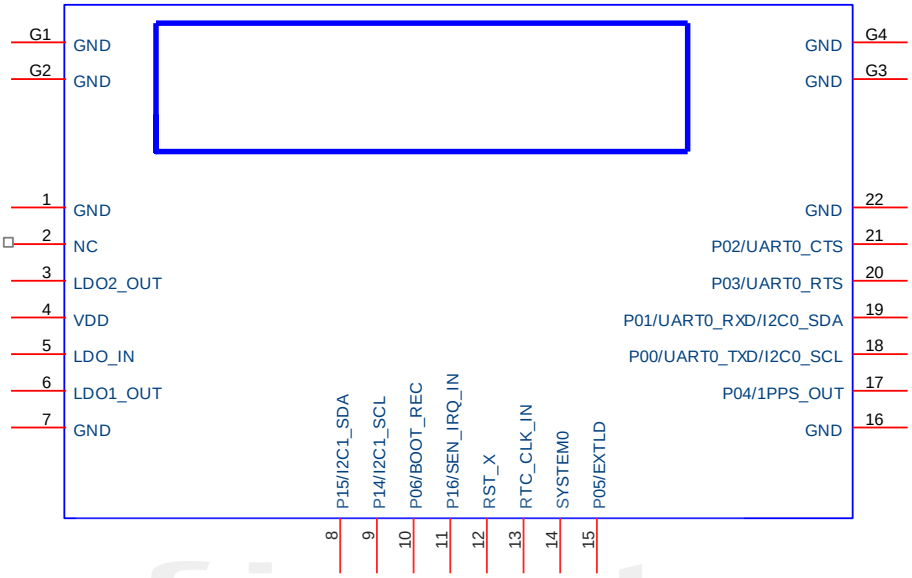
BLOCK DIAGRAM



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PIN DESCRIPTION



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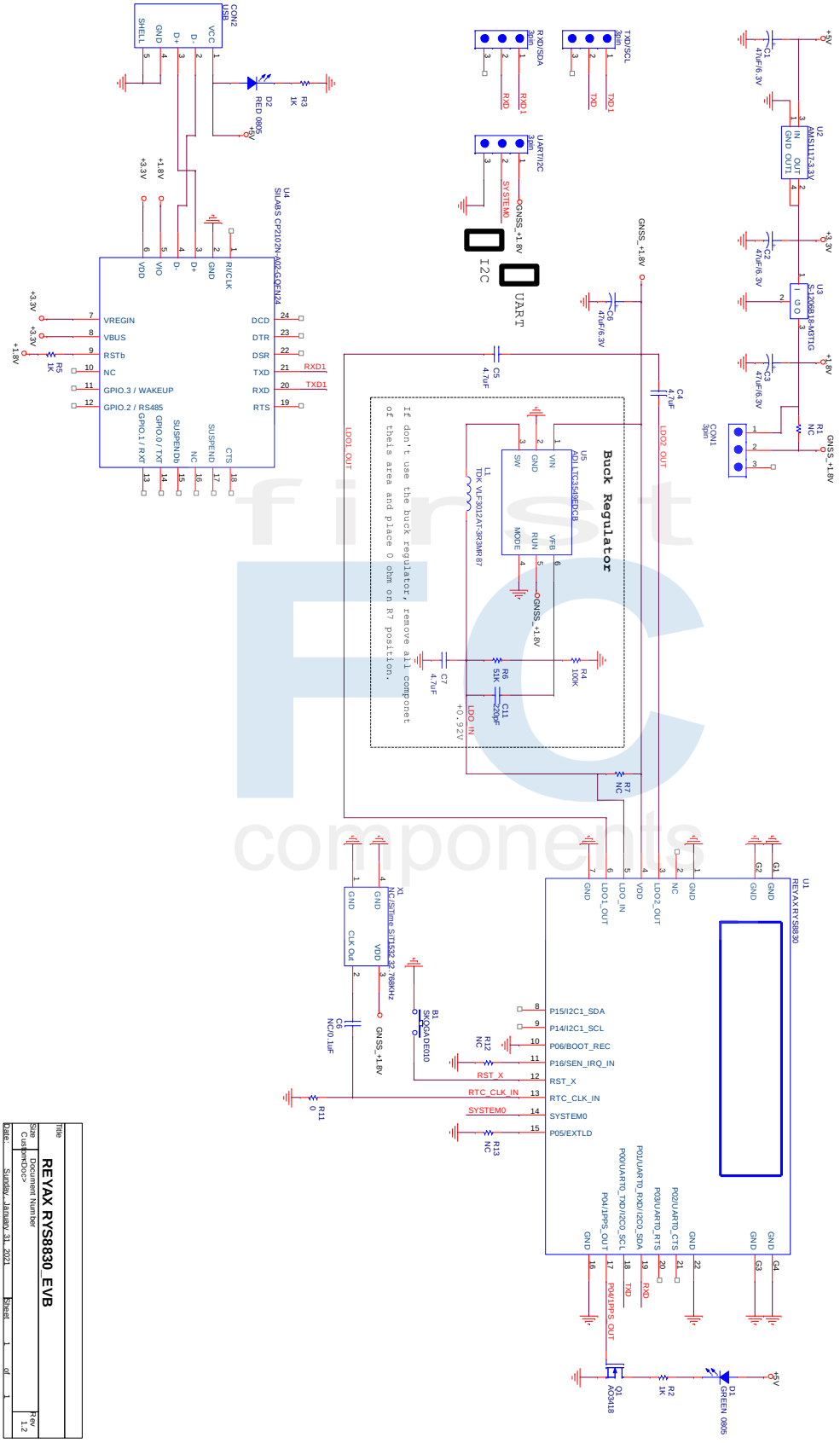
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Pin	Name	I/O	Condition
1	GND	-	Ground
2	Reversed	-	Leave Unconnected.
3	LDO2_OUT	O	LDO output for memory core blocks.
4	VDD	I	Power supply
5	LDO_IN	I	LDO0 / LDO1 Input
6	LDO1_OUT	O	LDO output for digital block.
7	GND	-	Ground
8	I2C_SDA	I/O	I2C SDA *If not used, Please Leave Unconnected.
9	I2C_SCL	I/O	I2C SCL *If not used, Please Leave Unconnected.
10	BOOT_REC	I/O	Reserved, Connect to GND.
11	SEN_IRQ_IN	I	Interrupt input. *If not used, Please Leave Unconnected.
12	RST_X	I	Low Reset
13	RTC_CLK_IN	I	RTC 32.768KHz clock input, The pin must be connected to GND, If not used.
14	SYSTEM0	I	H : UART L : I2C
15	EXTLD_IN	I	Timing signal input, from LTE module. *If not used, Please Leave Unconnected.
16	GND	-	Ground
17	P04/1PPS_OUT	O	Time pulse output, 1PPS output
18	TXD/SCL	O	Serial interface Output / I2C interface
19	RXD/SDA	I/O	Serial interface Input / I2C interface
20	Reversed	-	Leave Unconnected.
21	Reversed	-	Leave Unconnected.
22	GND	-	Ground
G1	GND	-	Ground
G2	GND	-	Ground
G3	GND	-	Ground
G4	GND	-	Ground

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APPLICATION SCHEMATIC



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SPECIFICATION

Item	Min.	Typical	Max.	Unit	Condition
Power Supply Voltage	1.71	1.8	1.89	V	VDD
	0.9	1.8	1.95	V	VDD_LDO_IN
GNSS continuous mode					
Satellite acquisition Current	16	19		mA	The typical value is field test.
Satellite tracking Current	9	13		mA	The typical value is field test.
Idle Current		3.7		mA	Waiting for command
Sleep2 mode current		200		uA	
Satellite acquisition Current		11.5		mA	Use buck regulator
Satellite tracking Current		8.2		mA	Use buck regulator
Idle Current		3.3		mA	Use buck regulator
Sleep0 mode current		0.5		mA	Use buck regulator
Sleep1 mode current		0.26		mA	Use buck regulator
Sleep2 mode current		0.26		mA	Use buck regulator
GNSS low power mode					
Satellite tracking average current	2.6		8.2	mA	Use buck regulator @GSOP command Sleep1 and normal mode cycle
I2C slave					I2C clock : 400kHz Address length : 7 bits Slave address : 0x24
Default Baud Rate		115200		bps	8,N,1
Digital input level high	0.7*VDD		VDD+0.3	V	VIH
Digital input level low	-0.3		0.3*VDD	V	VIL
Digital output level high	0.8*VDD		VDD	V	VOH 2mA
Digital output level low	0		0.2*VDD	V	VOL 2mA
Flash size		8		M-bit	
GNSS Center Frequency		1561.098 1575.42 1602.5625		MHz	BeiDou GPS Glonass
Navigation update rate		1		Hz	
Accuracy		1		M	Signal strength is -130dBm
Cold starts		35		Sec.	Signal strength is -130dBm
Hot starts		1		Sec.	
Tracking Sensitivity		-161		dBm	

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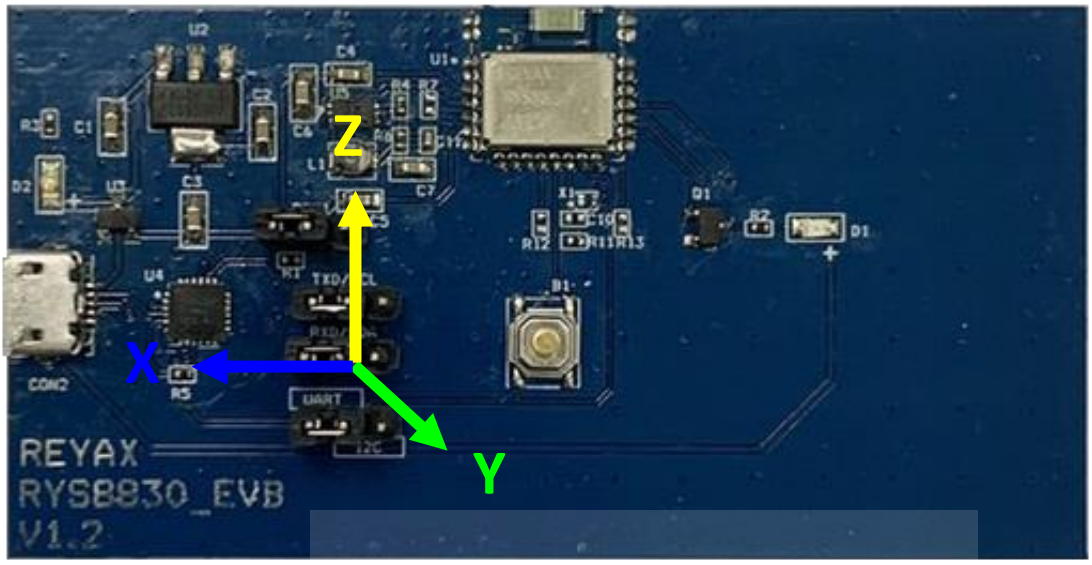
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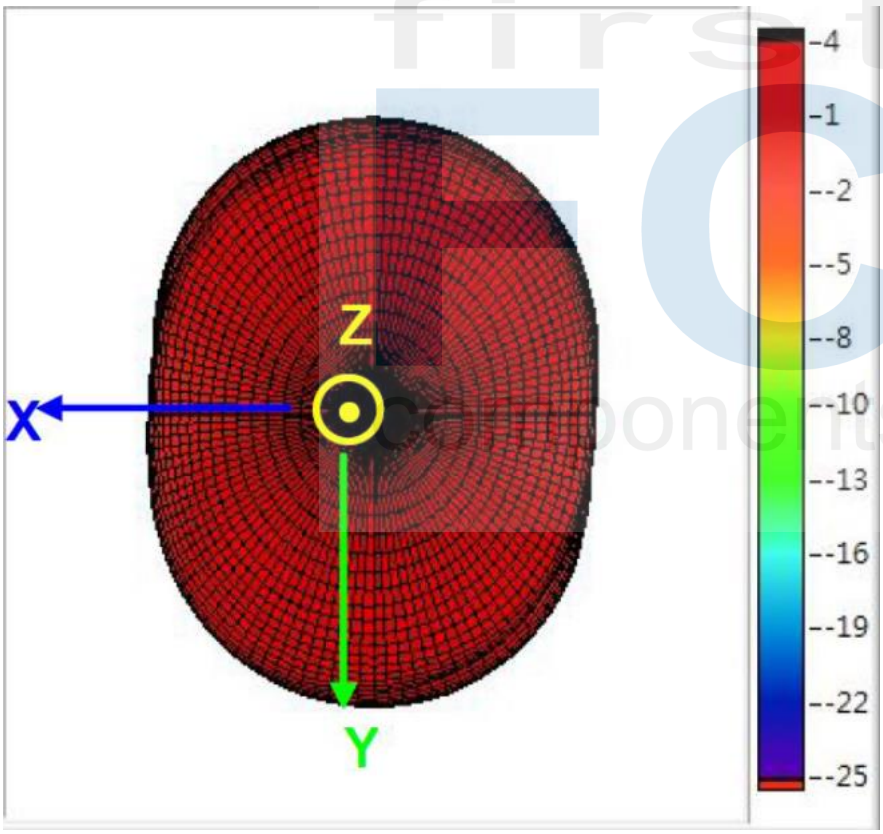
Hot starts Sensitivity		-160		dBm	
Cold starts Sensitivity		-147		dBm	
Velocity		<0.1		m/s	The measured value is based on the condition of measured with simulator, and receiver moved at the constant speed (20km/h)
Operating Temperature	-40	25	+85	˚C	
Dimensions					11mm*11mm*2.2mm
Weight		0.43		g	

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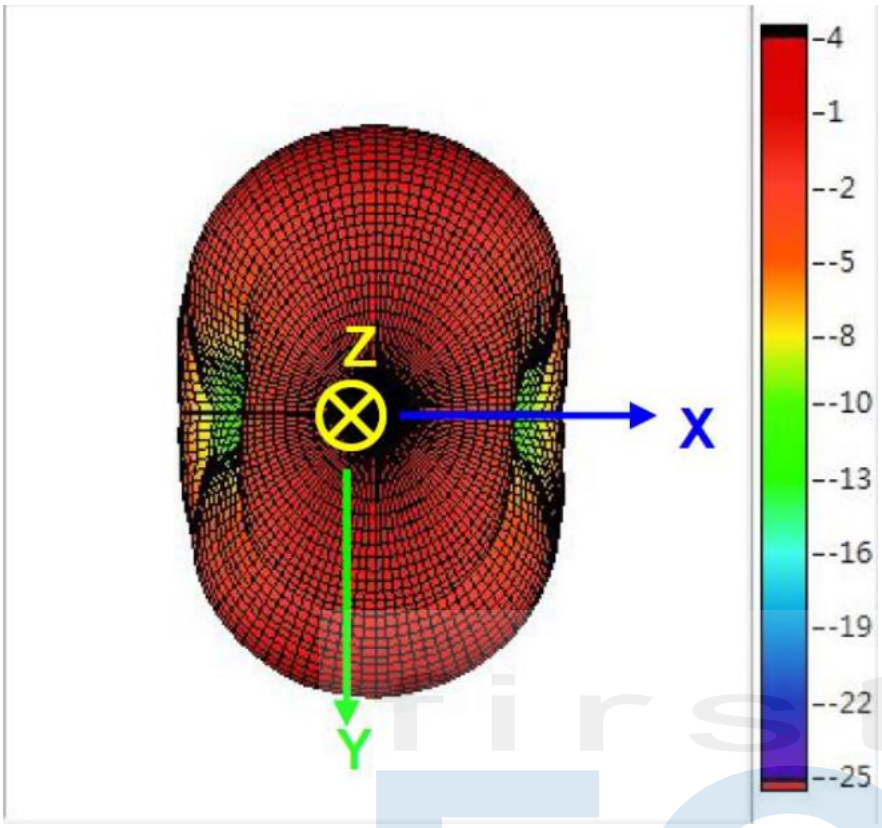
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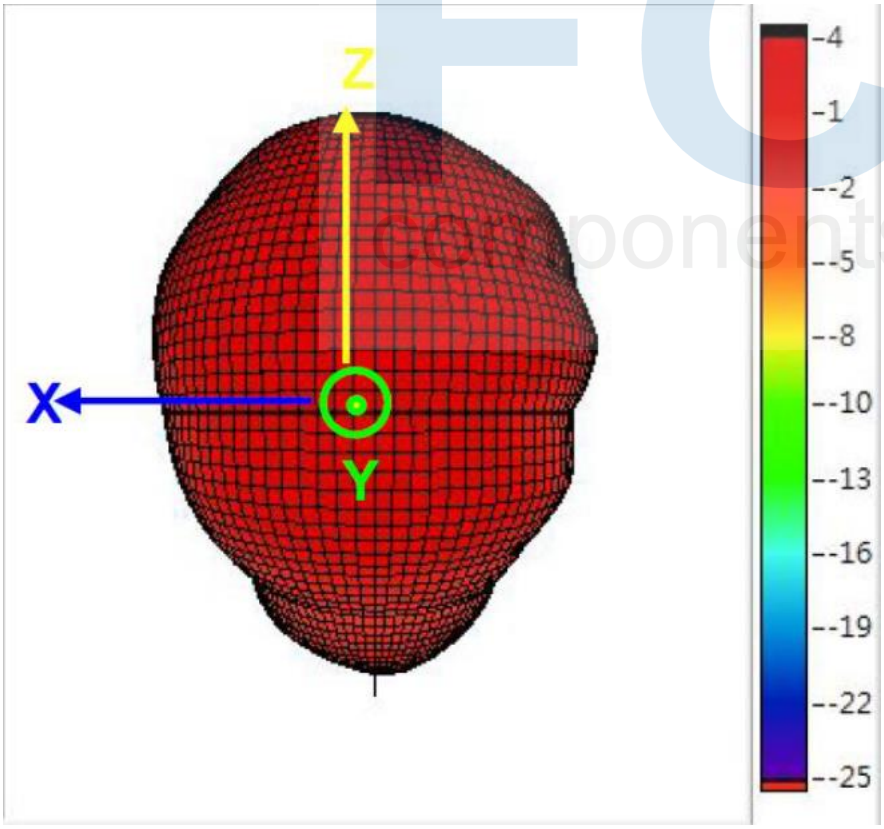
3D Antenna Radiation Pattern





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REFLOW SOLDERING

Consider the "IPC-7530 Guidelines for temperature profiling for mass soldering (reflow and wave) processes, published 2001. **Only single reflow soldering processes are recommended for REYAX modules. Repeated reflow soldering processes and soldering the module upside down are not recommended.**

Preheat phase

Initial heating of component leads and balls. Residual humidity will be dried out. Please note that this preheat phase will not replace prior baking procedures.

- Temperature rise rate: max. 3 °C/s If the temperature rise is too rapid in the preheat phase it may cause excessive slumping.
- Time: 60 - 120 s If the preheat is insufficient, rather large solder balls tend to be generated.
  Conversely, if performed excessively, fine balls and large balls will be generated in clusters.
- End Temperature: 150 - 200 °C If the temperature is too low, non-melting tends to be caused in
  areas containing large heat capacity.

Heating/ Reflow phase

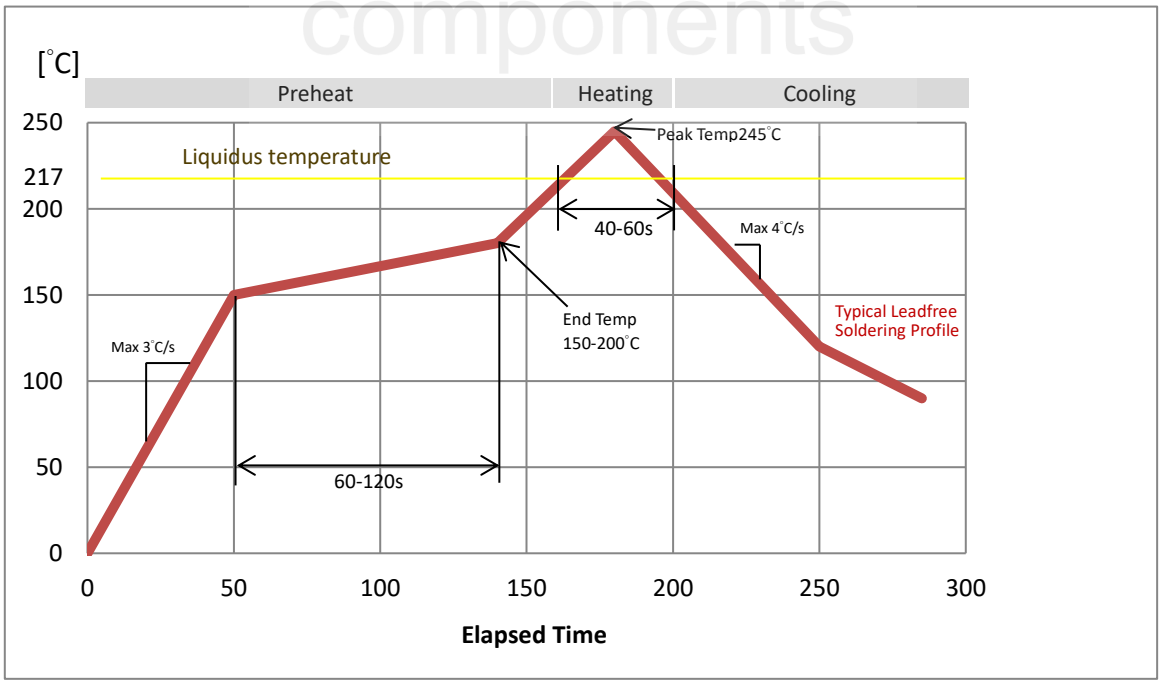
The temperature rises above the liquidus temperature of 217°C. Avoid a sudden rise in temperature as the slump of the paste could become worse.

- Limit time above 217 °C liquidus temperature: 40 - 60 s
- Peak reflow temperature: 245 °C

Cooling phase

A controlled cooling avoids negative metallurgical effects (solder becomes more brittle) of the solder and possible mechanical tensions in the products. Controlled cooling helps to achieve bright solder fillets with a good shape and low contact angle.

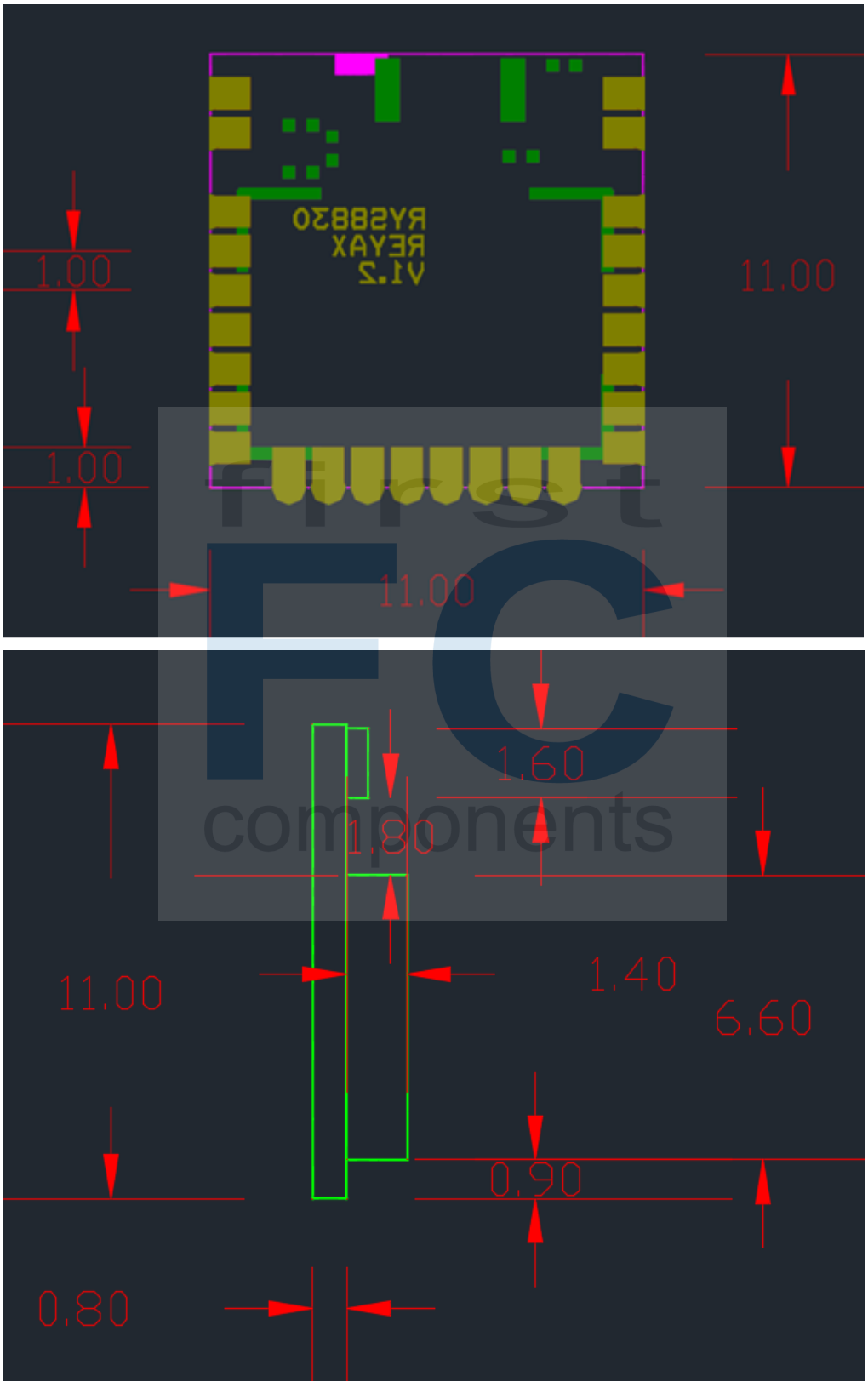
- Temperature fall rate: max 4 °C/s To avoid falling off, the REYAX module should be placed on the topside of the motherboard during soldering.



Recommended soldering profile

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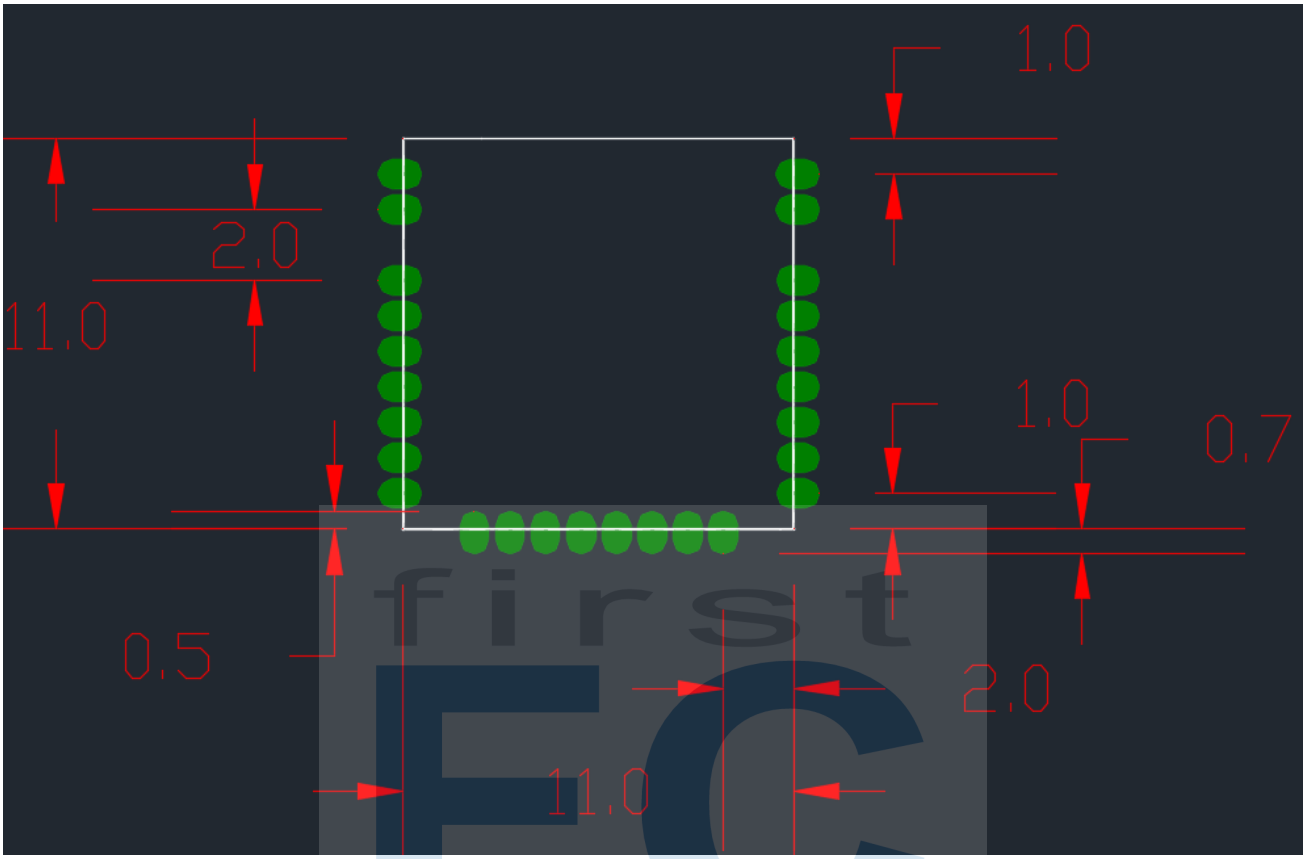
DIMENSIONS



Unit : mm

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PCB FOOTPRINT



Unit : mm

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PCB LAYOUT GUIDE

[1] Avoid placing any metal material between the RYS8830 and the sky.

[2] The best placement of the module is at the center of the PCB but close to the edge; keep at least 10 mm distance to the nearest ground plane corner.

[3] The height >2mm components should be placed at least 5 mm away from the RYS8830.

[4] The minimum distance between the plastic cover and the RYS8830 should be 1mm.

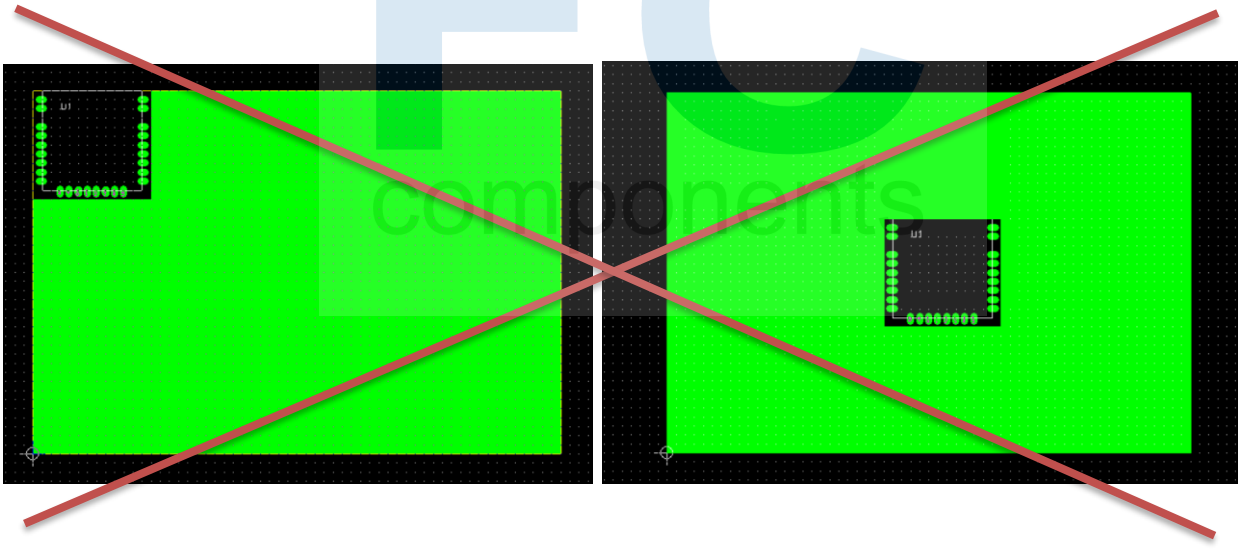
[5] The Placement of the module should keep a minimum distance of 5 mm from the human body or the animal.

[6] The optimum PCB size is 78x 40 mm, but a larger or smaller ground plane can be used. The suggested minimum ground plane size is 45 x 25mm.

[7] Place more GND via hole as close as possible to the RYS8830.

[8] Keep the VDD voltage ripple under 30mVpp.

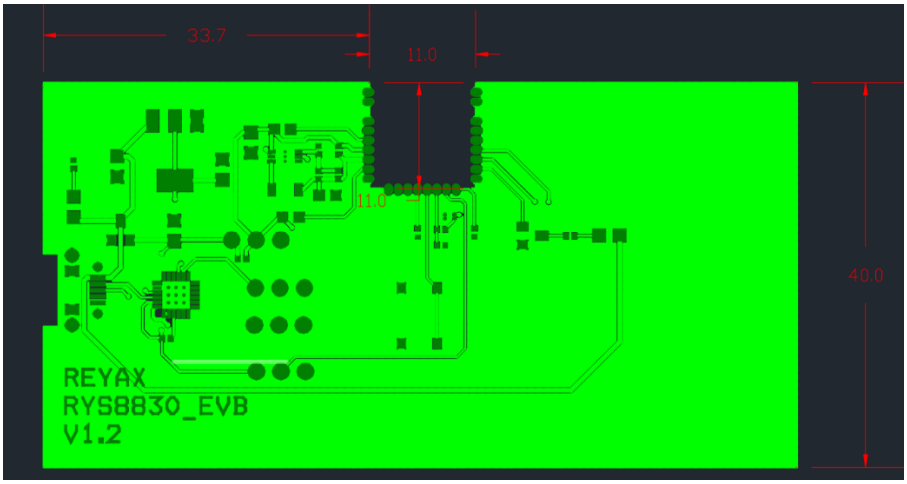
[9] Avoid placing the module at the corner and center of the PCB. This will reduce the efficiency of the signal.



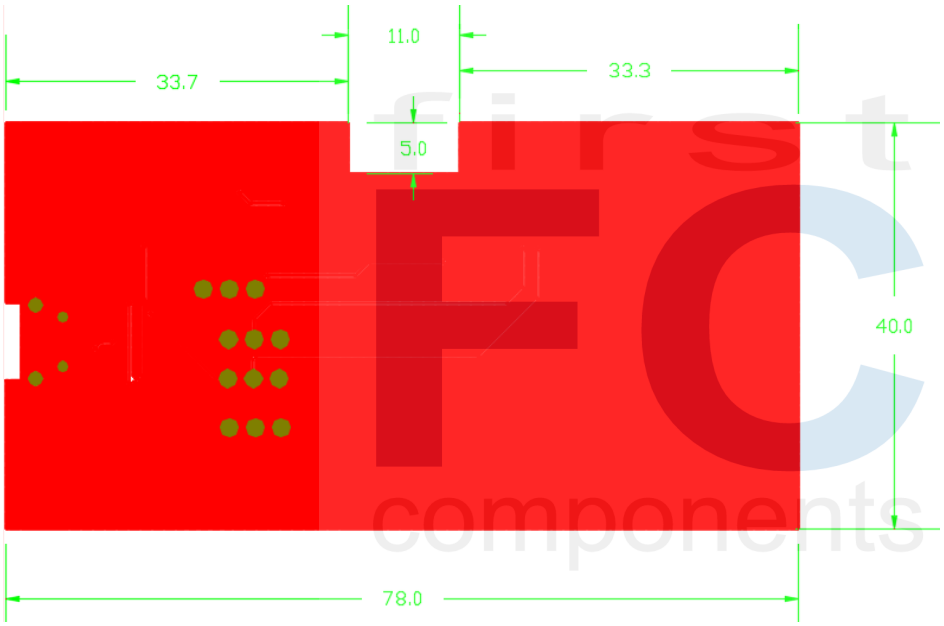
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PCB TOP LAYER



BOTTOM LAYER



Unit : mm

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GNSS Monitor software

STEP 1. INSTALL THE SOFTWARES

1.) Download the GNSS_Monitor2_ForCustomer_Setup(contact REYAX sales)

STEP 2. CONNECTION SETTING

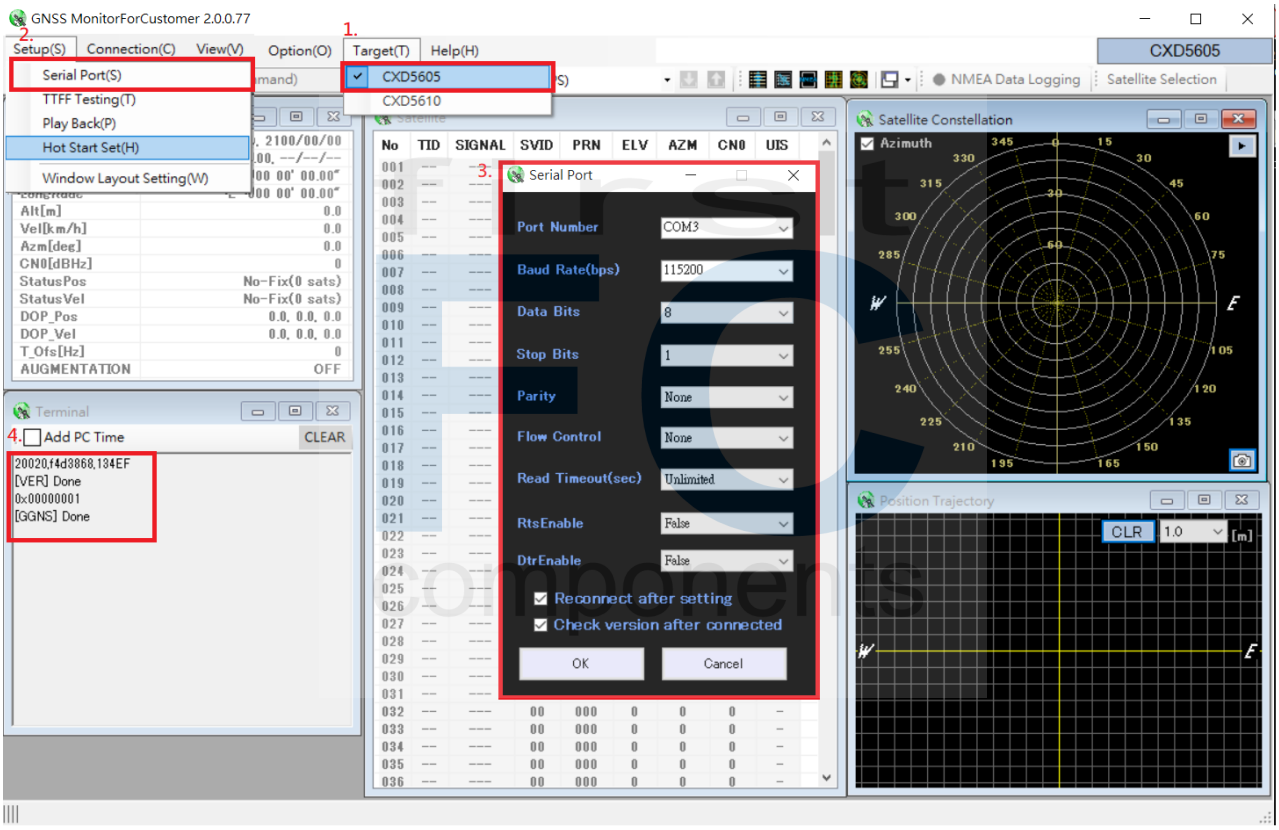
Plug USB to TTL cable to connect the RYS8830_EVBand the PC.

1.) Open the software GNSS_Monitor2_ForCustomer Target →RYS8830 select CXD5605

2.) Open the Serial Port setting

3.) Set the COM port number and the baud rate (Default is 115200bps).

4.) If connection successful, will show FW version message.



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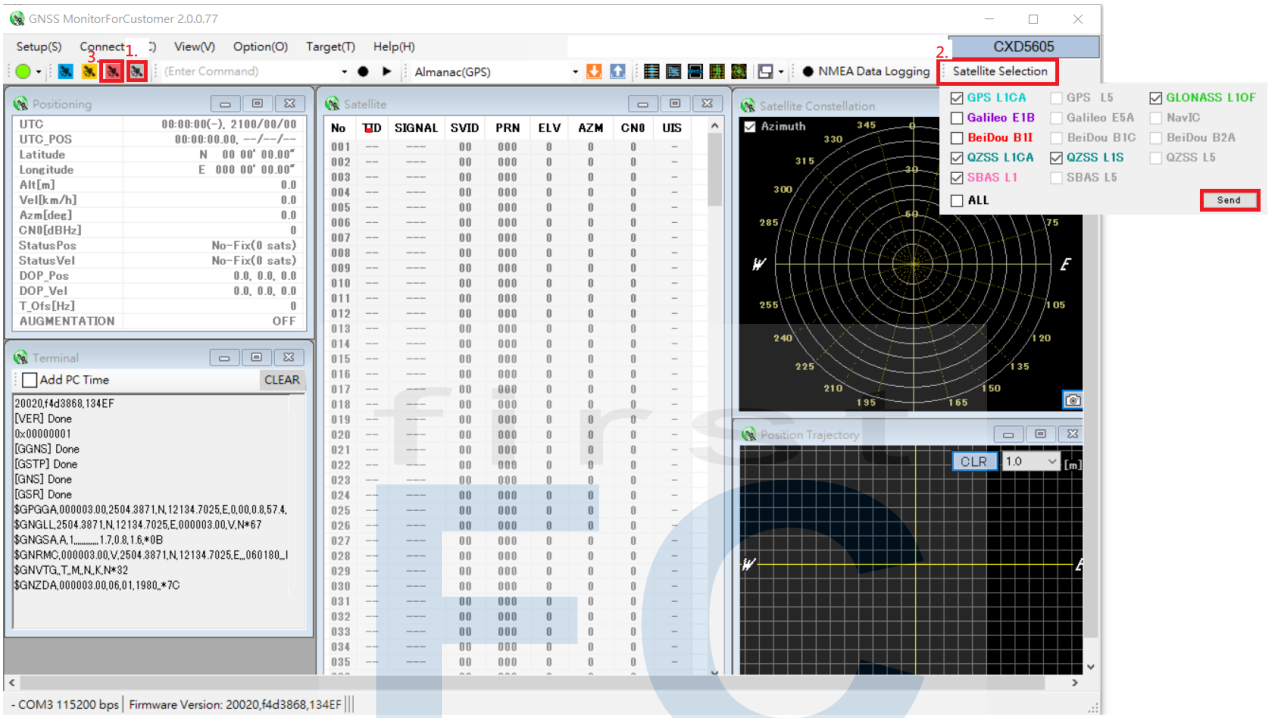
STEP 3. Command input setting

1.) Click “IDLE” button, Terminal window will show [GSTP]Done.

2.) Click “Satellite Selection” button, after select Satellite and click “Send”. Terminal window will show [GNS]Done.

3.) Click “Hot start” button, Terminal window will show [GSR]Done. Module start output NMEA log.

4.) If want to stop tracking, click “IDLE” button.



*For detailed command user guide, please refer to RYS8830_RYS8833_Software_Guide

QUICK START GUIDE

STEP 1. Power on module

STEP 2. Issue command

1.) @GSTP // Positioning stop

2.) @GNS 47 // Positioning-use satellite use GPS + GLONASS + SBAS + QZSS L1-CA + QZSS L1-S

3.) @GTIM 2022 12 20 00 00 00 // inject UTC time

4.) @GPPS 1 // enable 1PPS function

5.) @GSR // hot start

*For detailed command user guide, please refer to RYS8830_RYS8833_Software_Guide

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