REYAX
TECHNOLOGY CORPORATION, LTD

8-MAY-2024 56312E39

RYS8830

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

Datasheet

11*11*2.2mm

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 Engine.
- A multi-GNSS module for GPS(L1 C/A), GLONASS(L1 OF), SBAS(L1 C/A), QZSS(L1 C/A), Galileo(E1 CBOC), and BeiDou(B1, specific Firmware).
- Small SMD form factor 121mm^2
- Including SAW filter, LNA and TCXO.
- Ultra-low power consumption
- Embedded Antenna.
- UART / I2C Interface optional.

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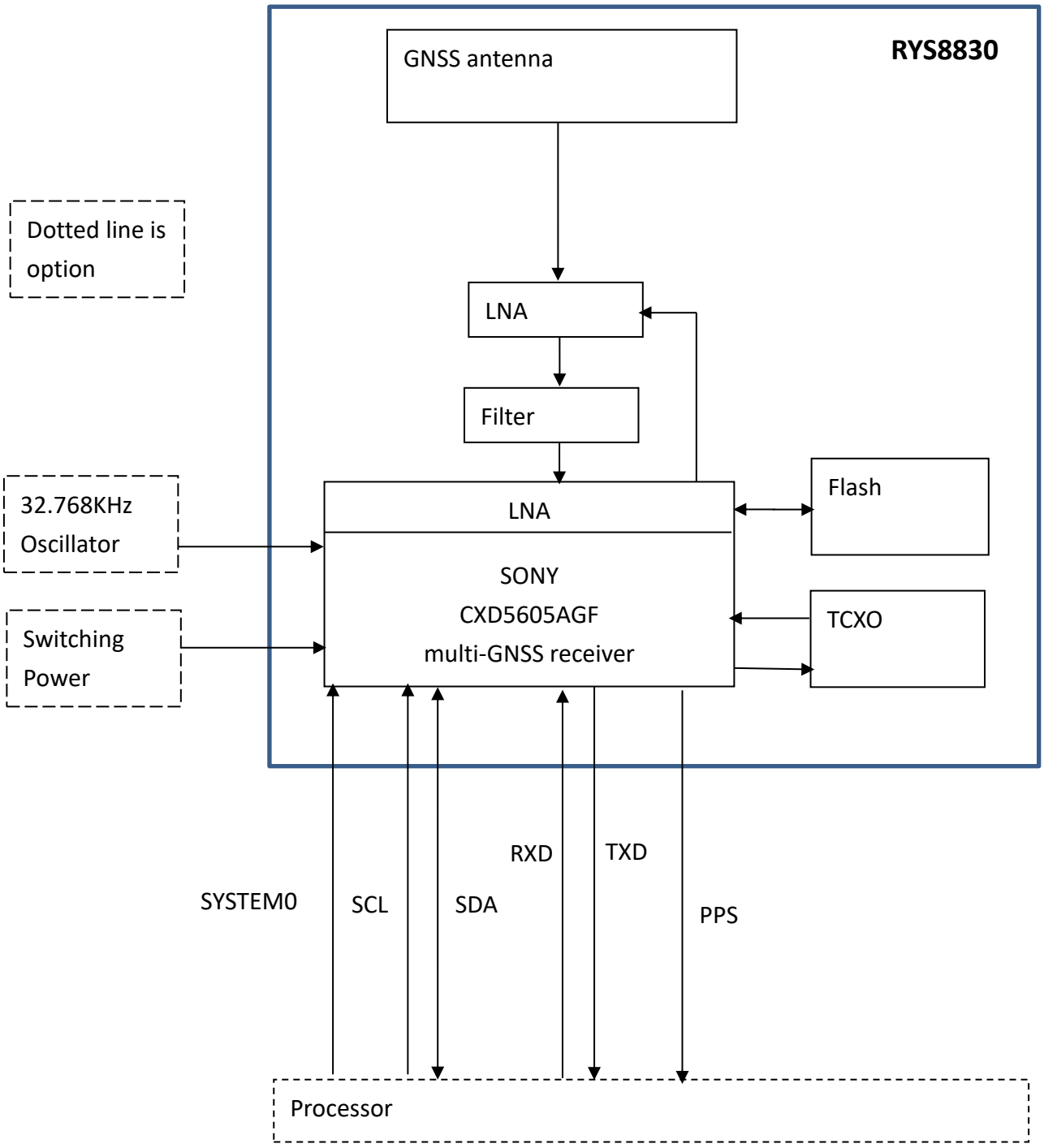
BLOCK DIAGRAM



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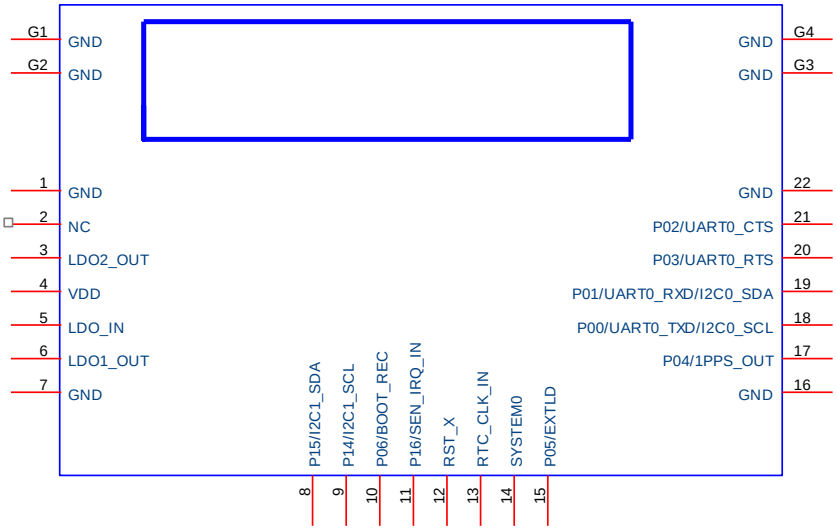
PIN DESCRIPTION



Pin	Name	I/O	Condition
1,7,16,22,G1,G2,G3,G4	GND	-	Ground
2	NC	-	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.
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	VDD : UART Interface, GND : I2C Interface.
15	EXTLD_IN	I	Timing signal input, from LTE module. *If not used, Please Leave Unconnected.
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	UART_RTS	I/O	UART_RTS
21	UART_CTS	I/O -	UART_CTS

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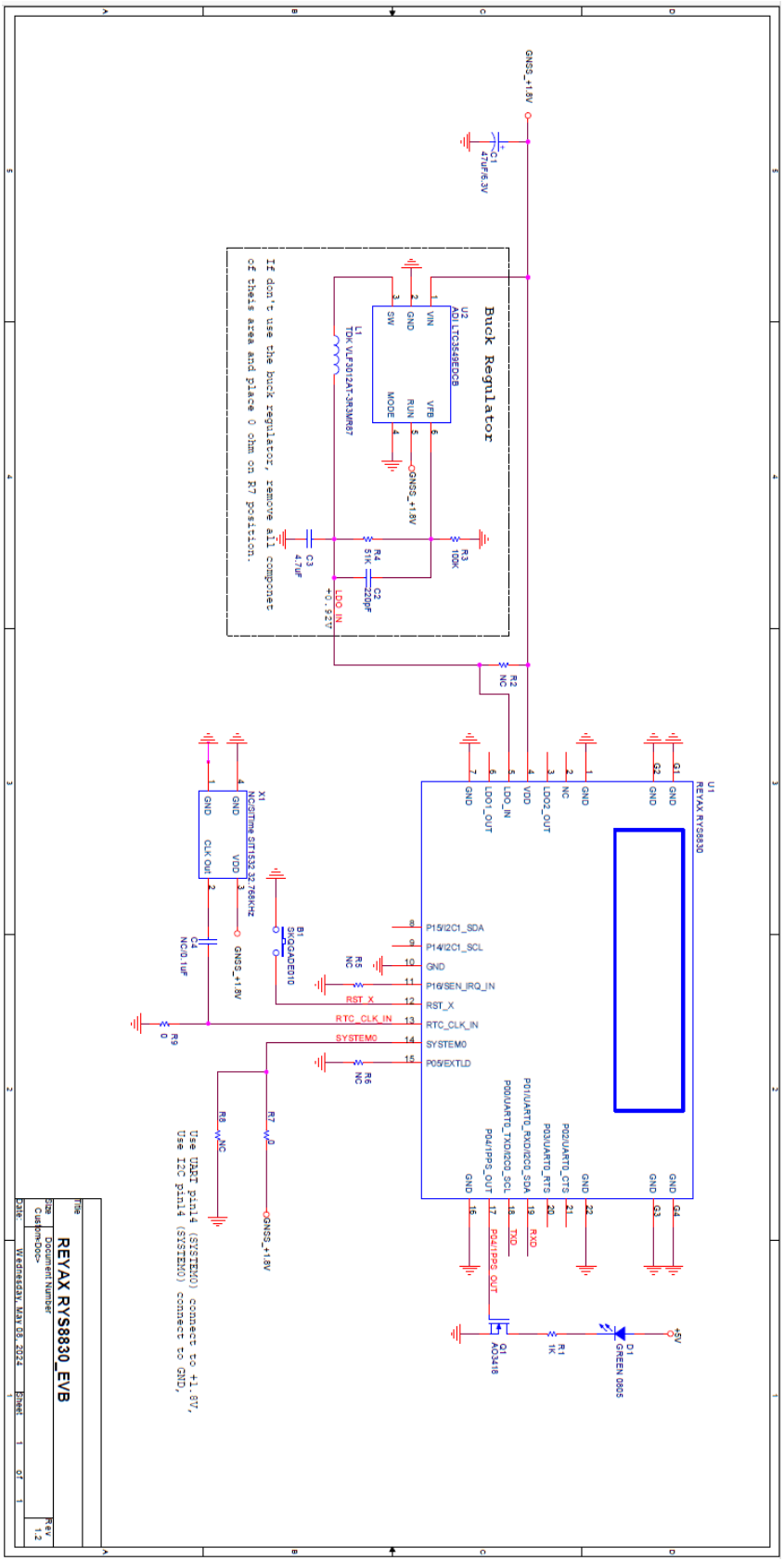
APPLICATION SCHEMATIC (VDD_LDO_IN = 0.92)



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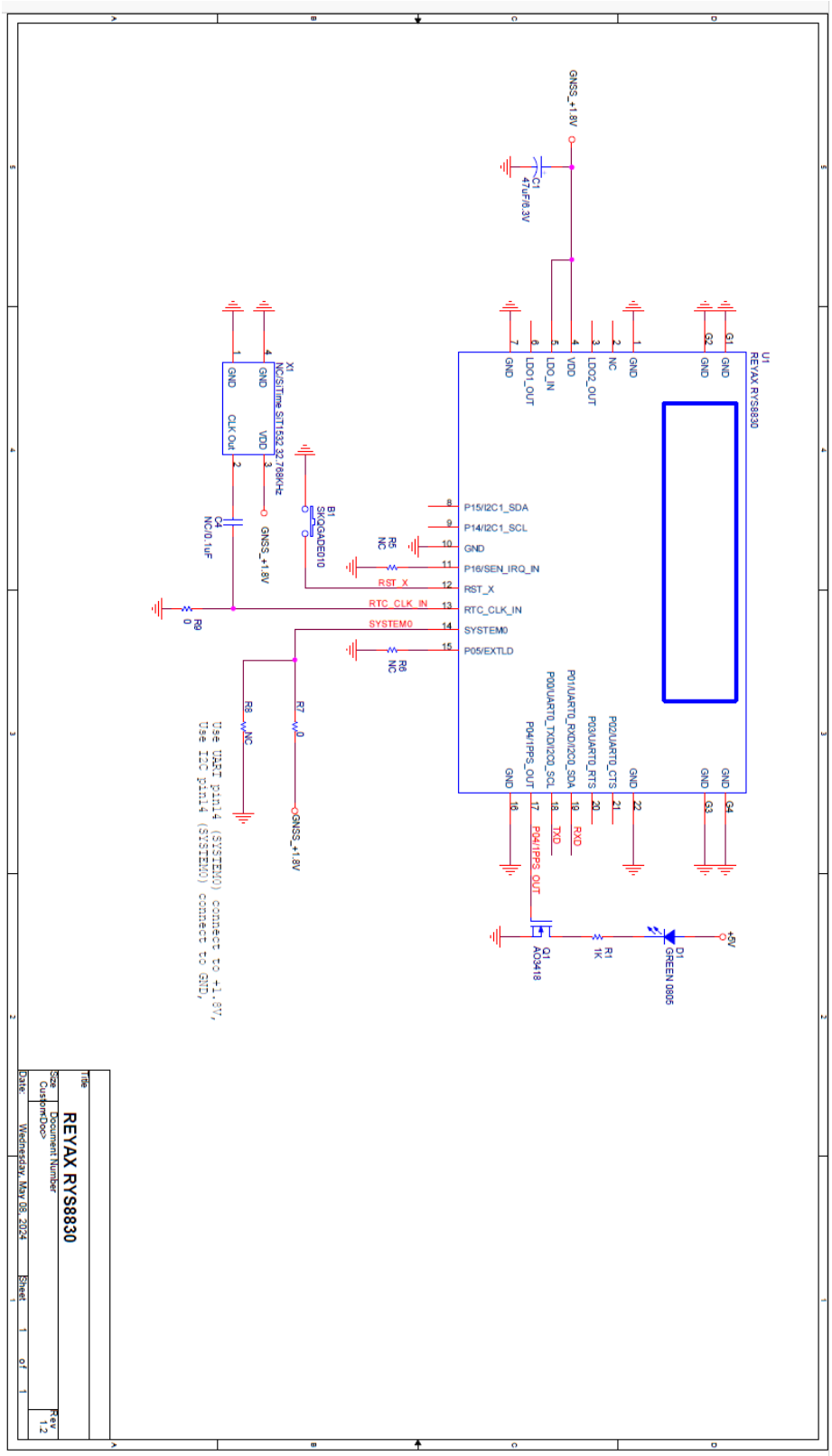
APPLICATION SCHEMATIC (VDD_LDO_IN = 1.8)



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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 Normal mode					
Idle Current		3.7		mA	(1)
Satellite acquisition Current	16	19		mA	(1)(3)
Satellite tracking Current	9	13		mA	(1)(3)
Idle Current		3.3		mA	(2)(4)
Satellite acquisition Current		11.5		mA	(2)(3)(4)
Satellite tracking Current		8.2		mA	(2)(3)(4)
Sleep0 mode current		0.5		mA	(2)(4)
Sleep1 mode current		0.26		mA	(2)(4)
Sleep2 mode current		0.26		mA	(2)(4)
GNSS low power mode					
Satellite tracking average current	2.6		8.2	mA	(2)(3)(4) @GSOP 2 1000 0
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(2DRMS)		1		M	Signal strength is -130dBm

(1) VDD_LDO_IN = 1.8V. (2) VDD_LDO_IN = 0.92V. (3) The typical value is field test. (4) Use buck regulator.

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Cold starts		35		Sec.	Signal strength is -130dBm
Hot starts		1		Sec.	
Tracking Sensitivity		-161		dBm	
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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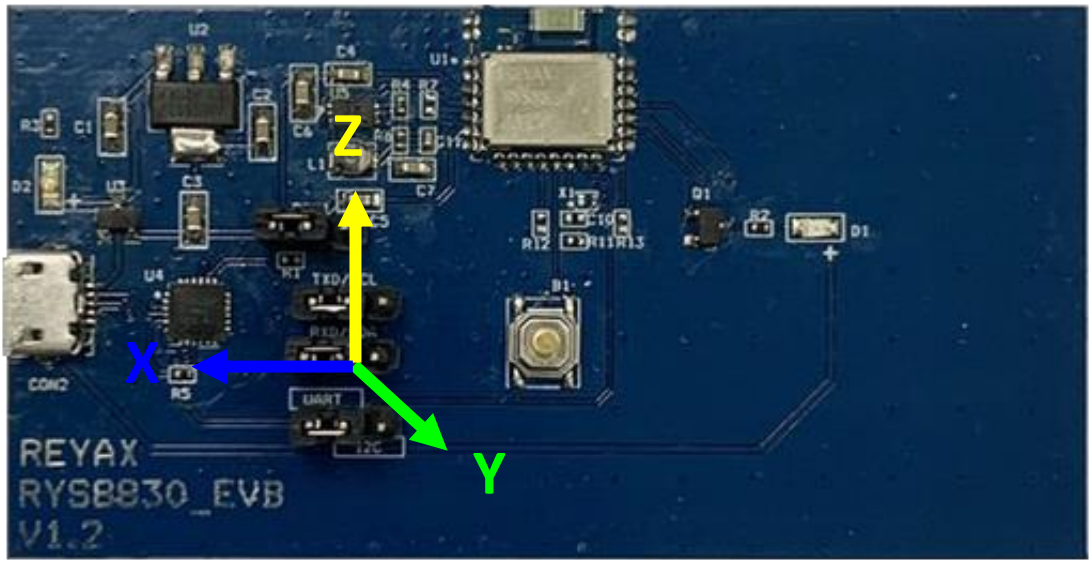
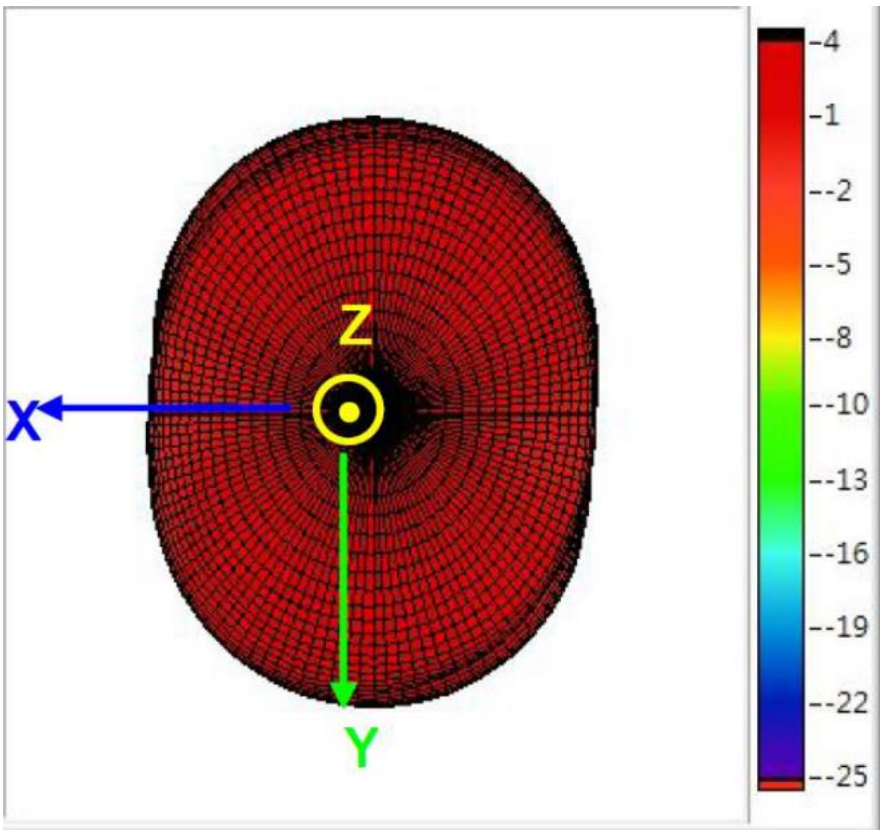
3D Antenna Radiation Pattern





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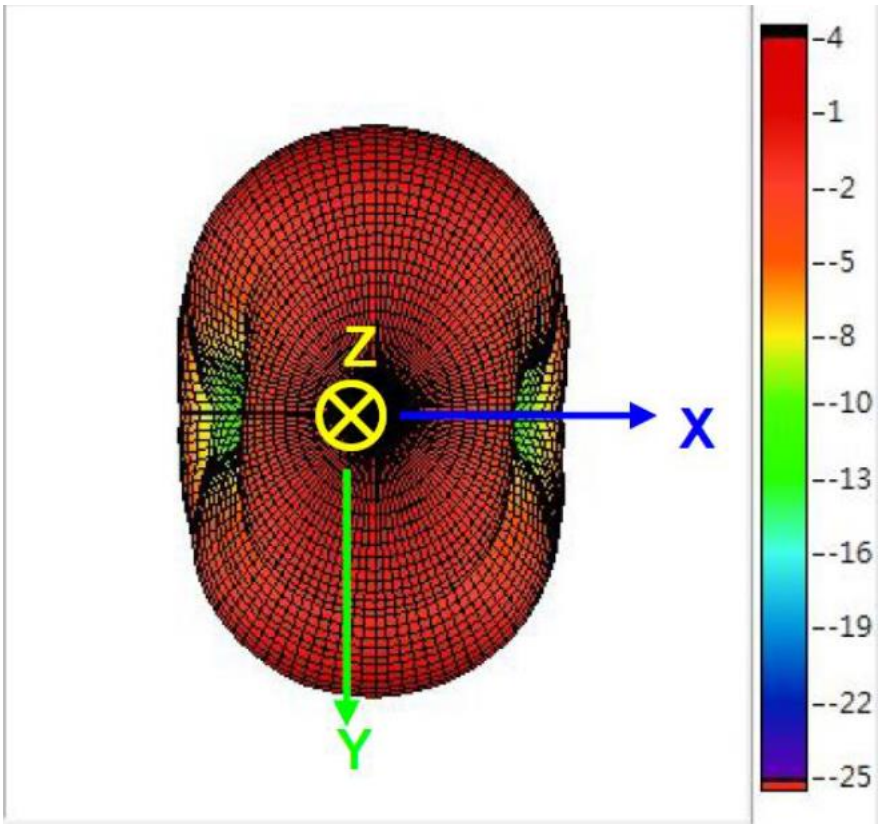

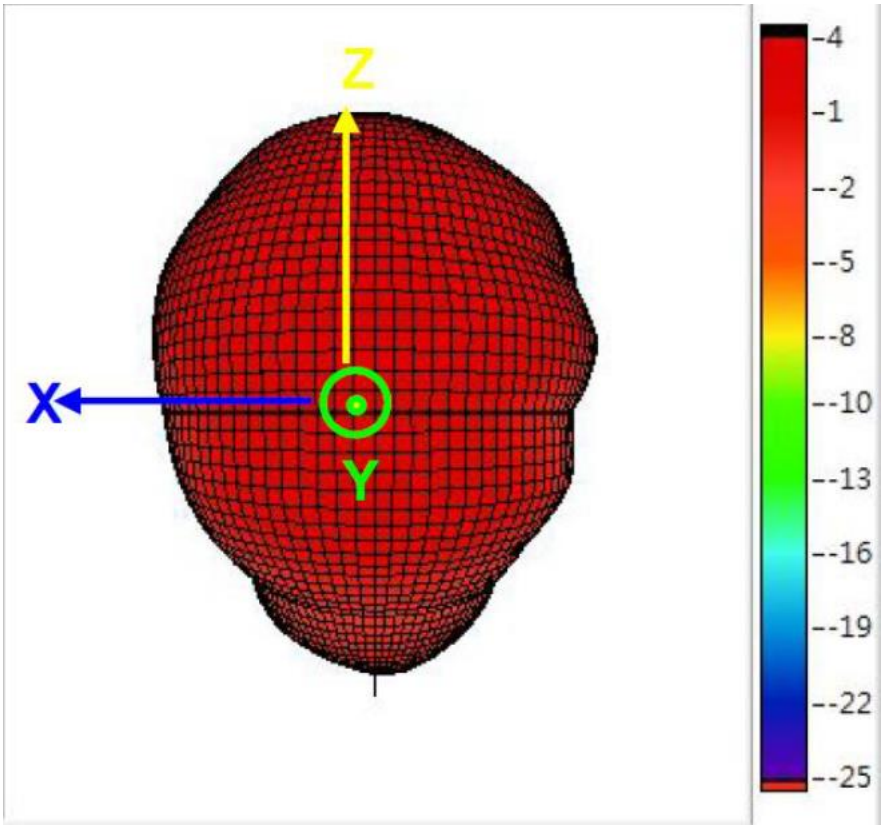

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REFLOW SOLDERING

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

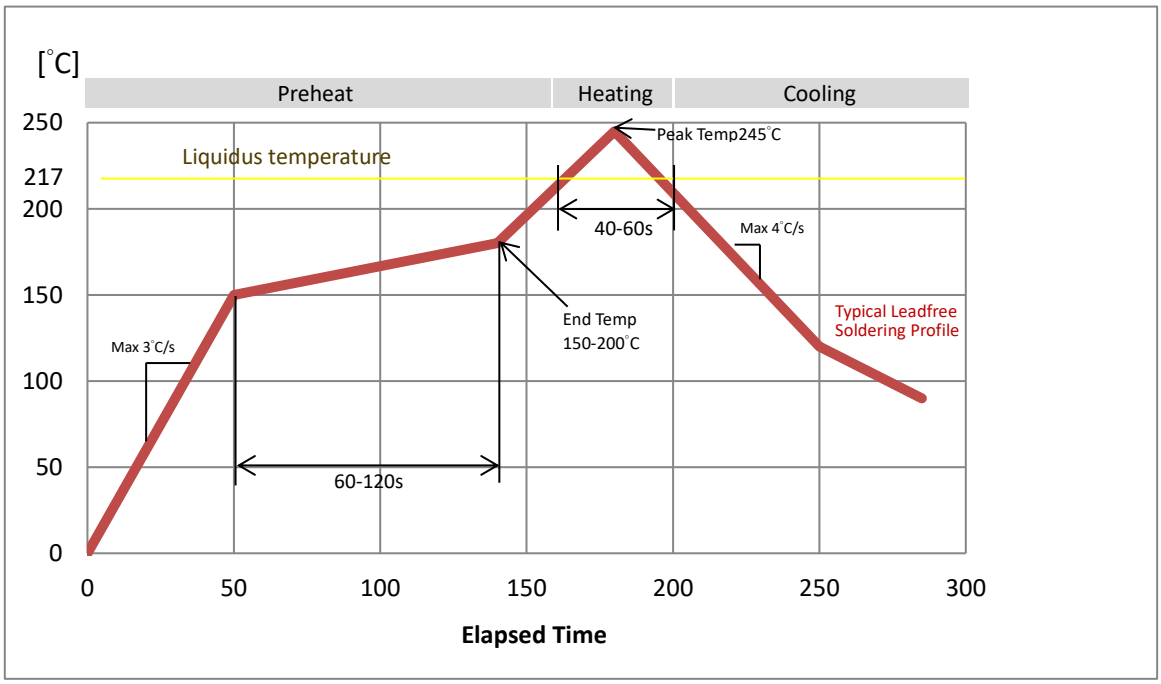
The temperature rises above the liquidus temperature of 217°C. Avoid a sudden rise in temperature as the slump of the paste could become worse.

- 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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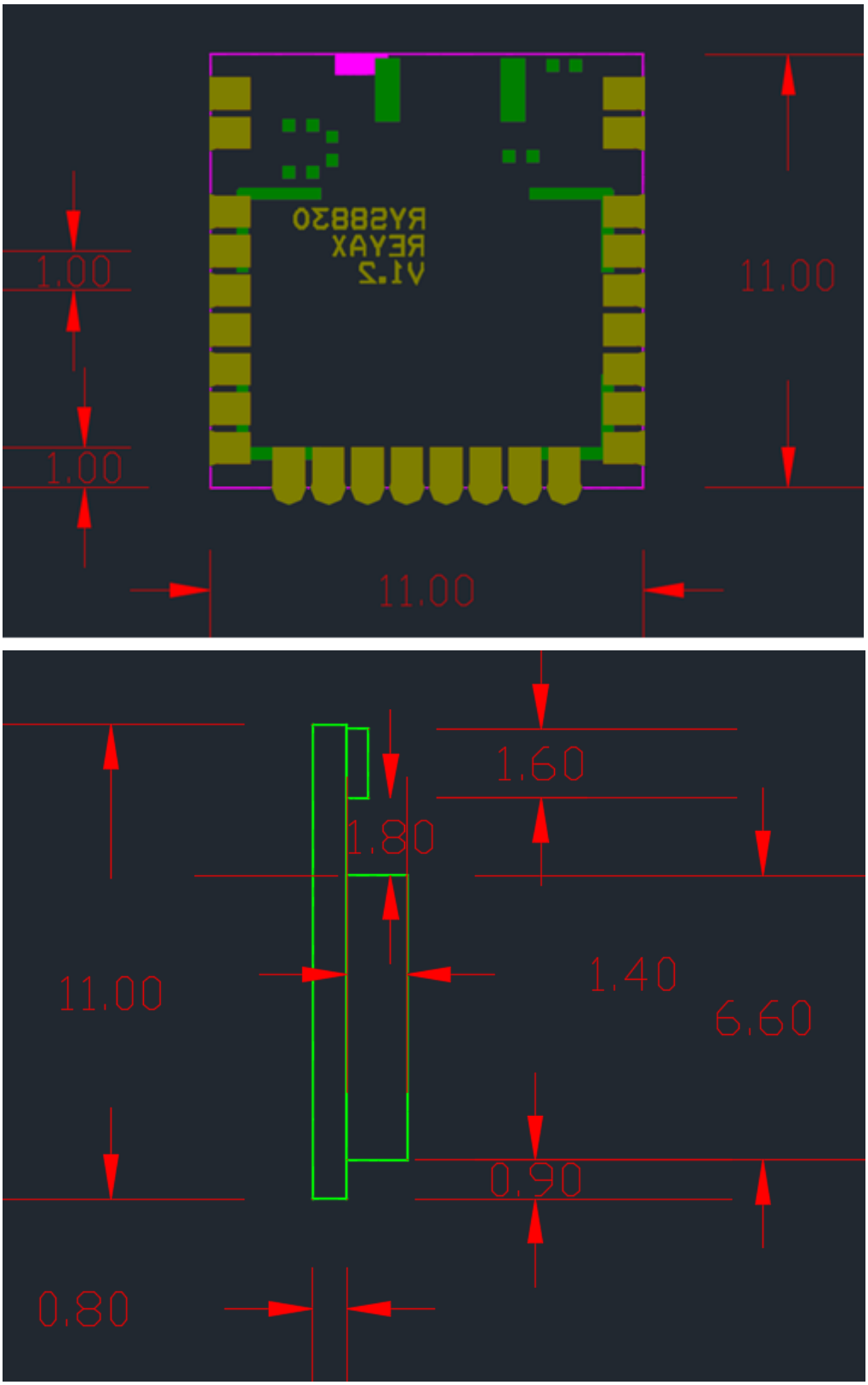
DIMENSIONS



Unit : mm

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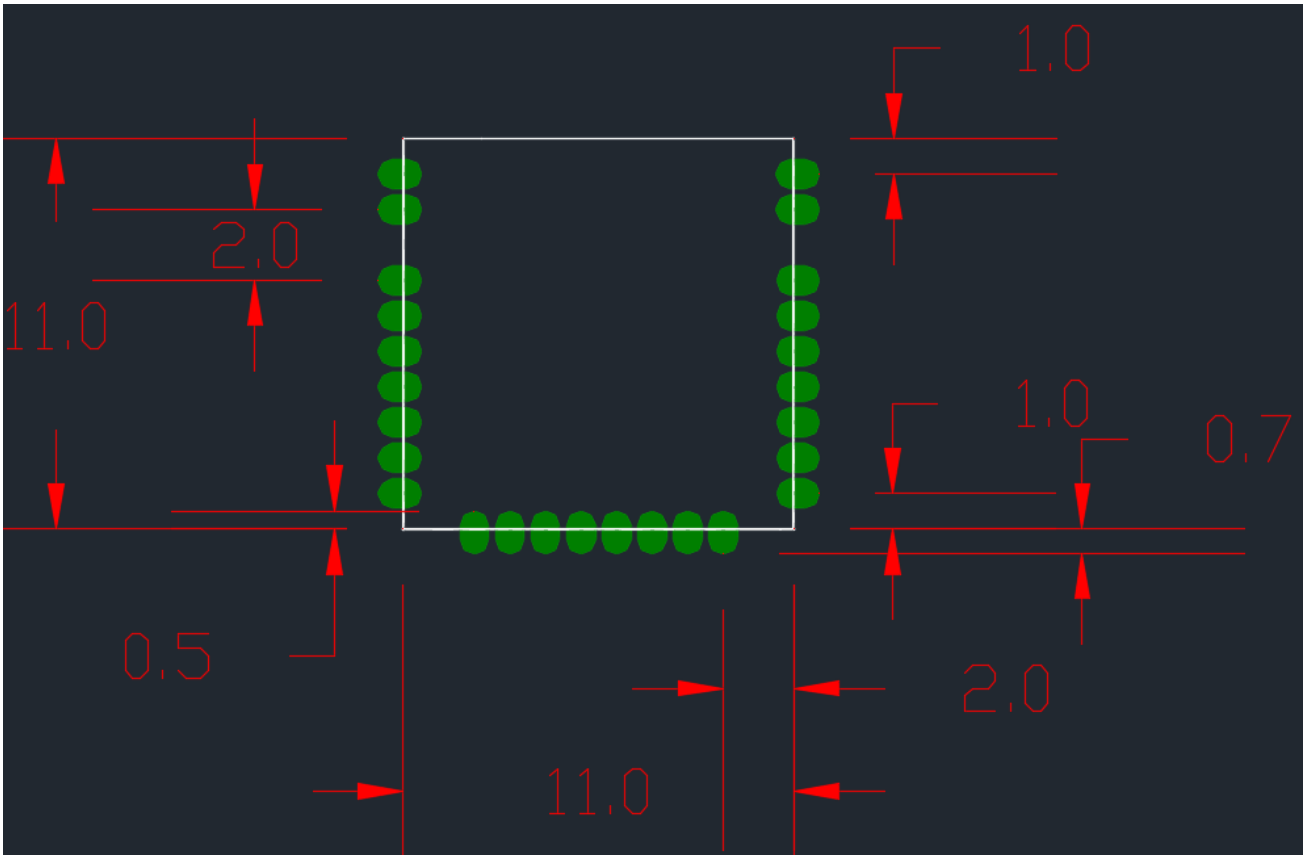
PCB FOOTPRINT



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.

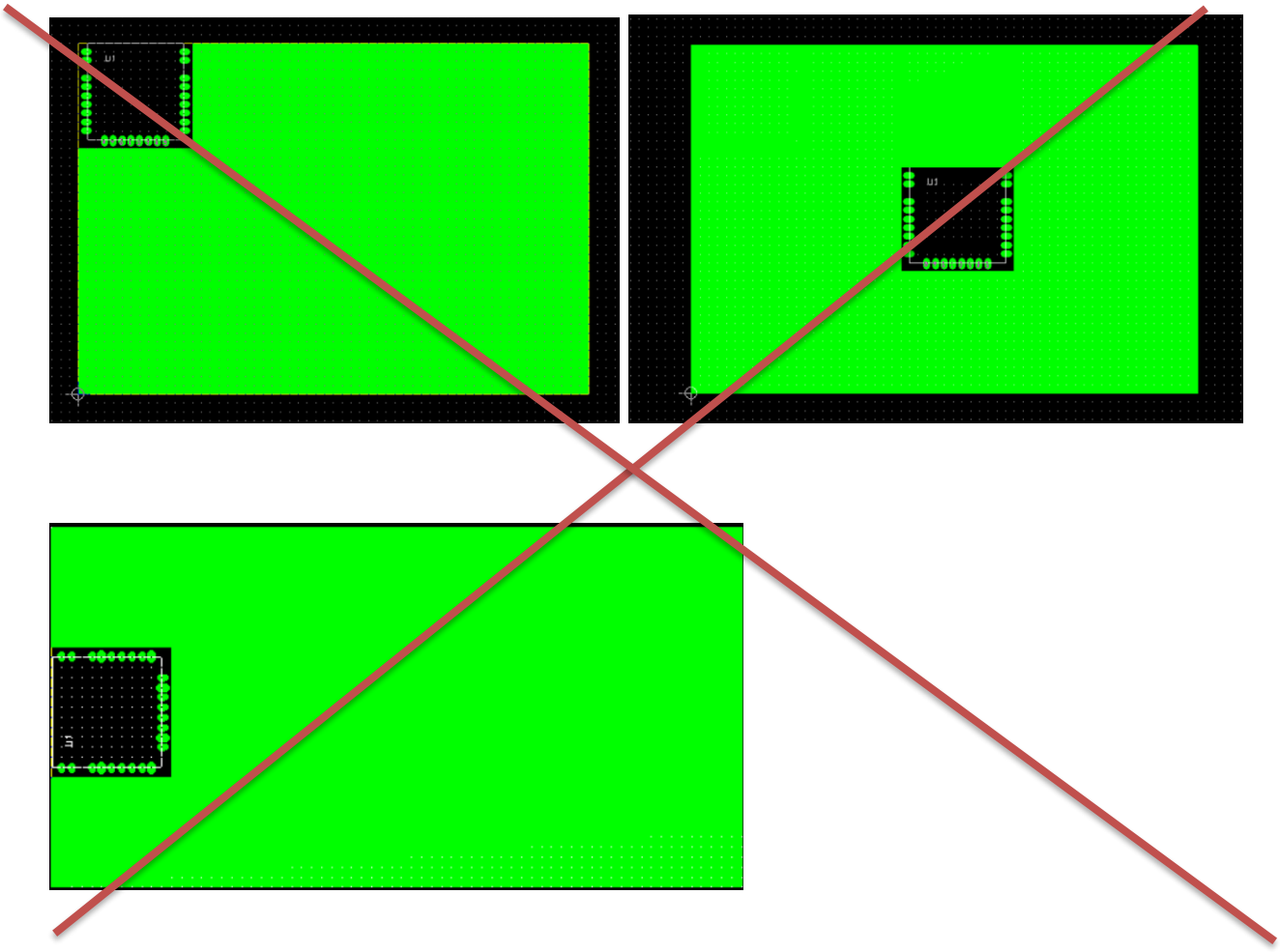
[5] The Placement of the module should keep a minimum distance of 5 mm from the human body or the animal.

[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、center and short side of the PCB. This will reduce the efficiency of the signal.



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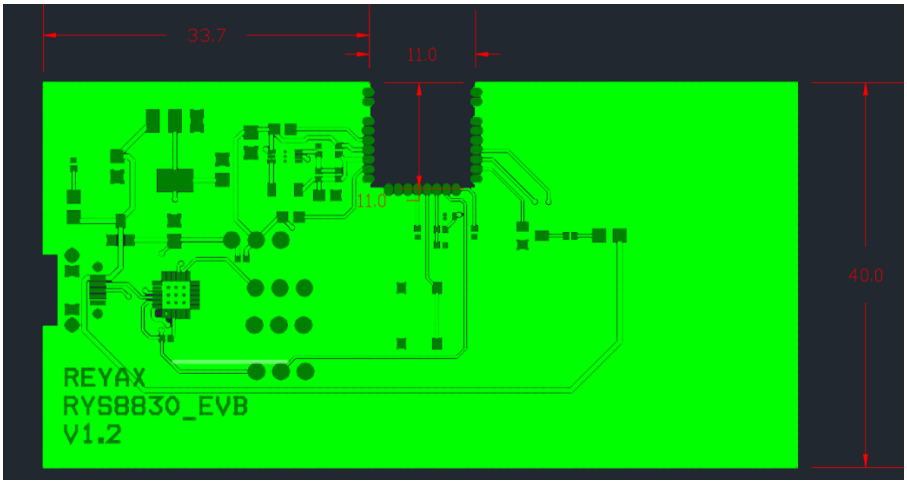
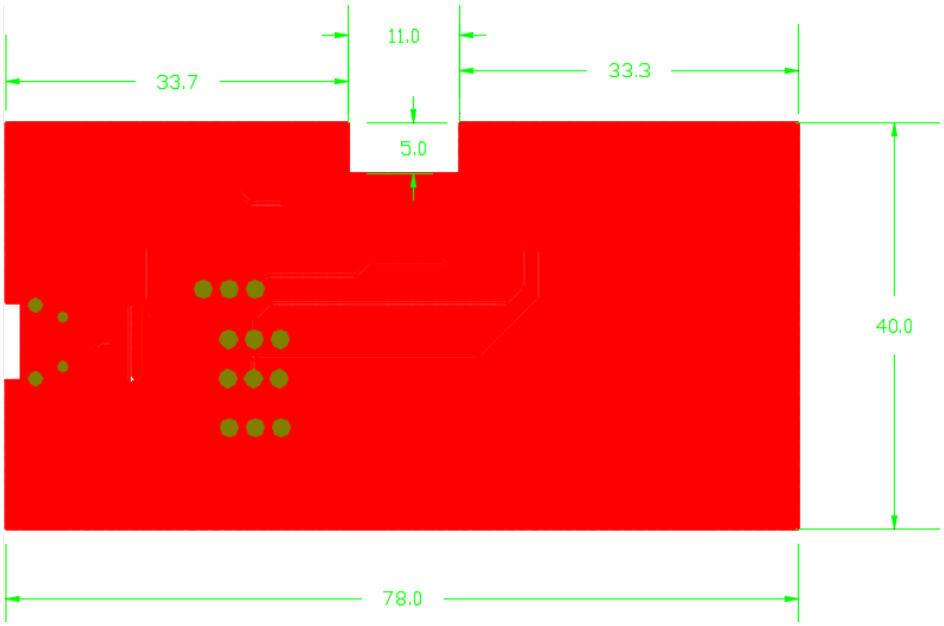
PCB TOP LAYER



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

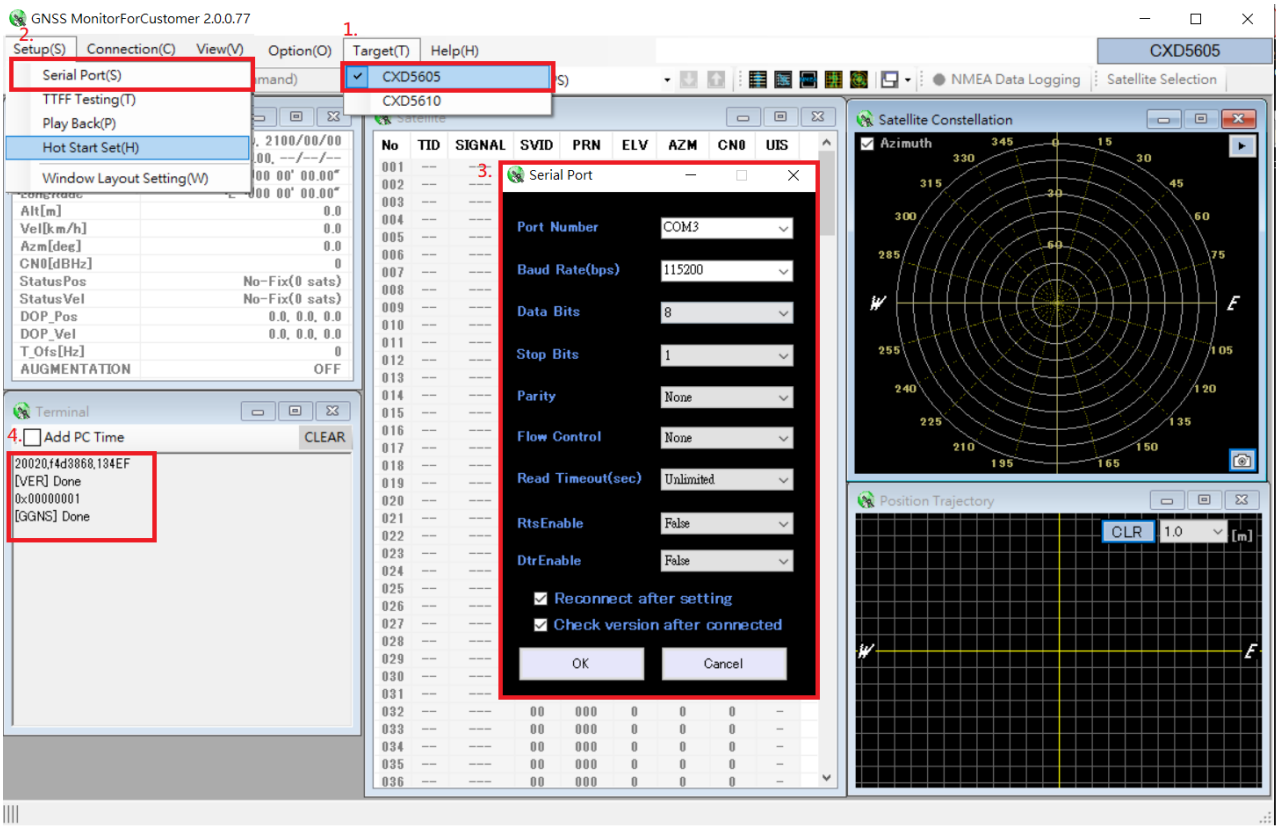
Plug USB to TTL cable to connect the RYS8830_EVB and the PC.

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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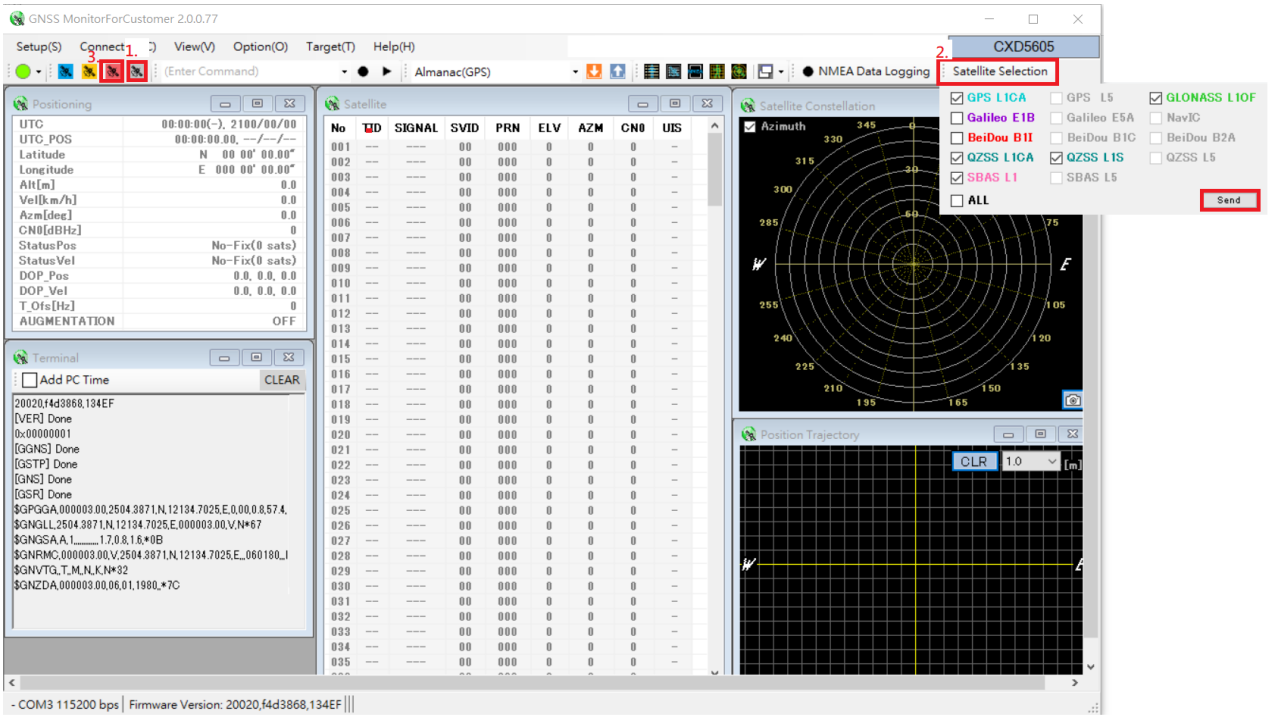
STEP 3. Command input setting

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 7 // Positioning-use satellite use GPS + GLONASS + SBAS

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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