

INTEL-IRRIS

Intelligent Irrigation System for Low-cost Autonomous Water Control
in Small-scale Agriculture



This project is part of the PRIMA
Programme supported by the
European Union



Intel-IrriS



PRIMA
PARTNERSHIP FOR RESEARCH AND INNOVATION
IN THE MEDITERRANEAN AREA

Intelligent Irrigation System for Low-cost Autonomous Water Control in Small-scale Agriculture



Building the INTEL-IRRIS IoT platform Annex-1: ordering PCBs, including PCBA

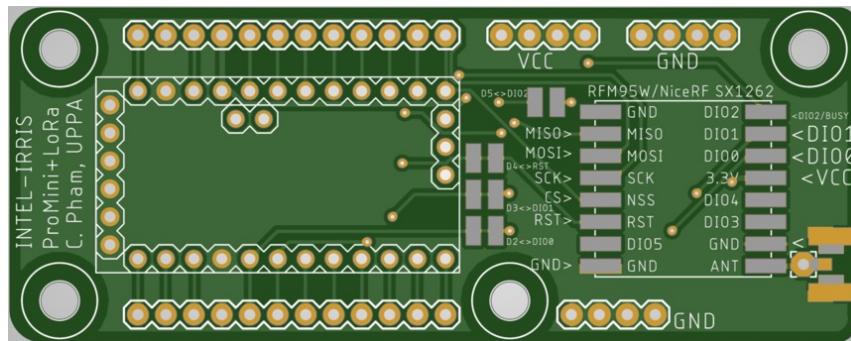


Prof. Congduc Pham
<http://www.univ-pau.fr/~cpham>
Université de Pau, France

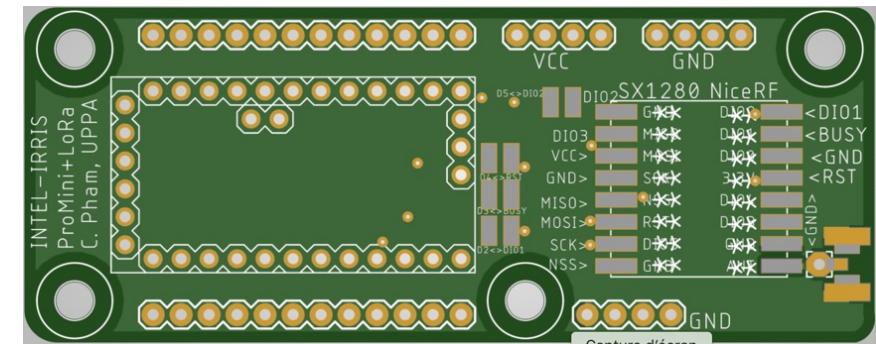


Various PCBs for soil device

Simple PCB v2



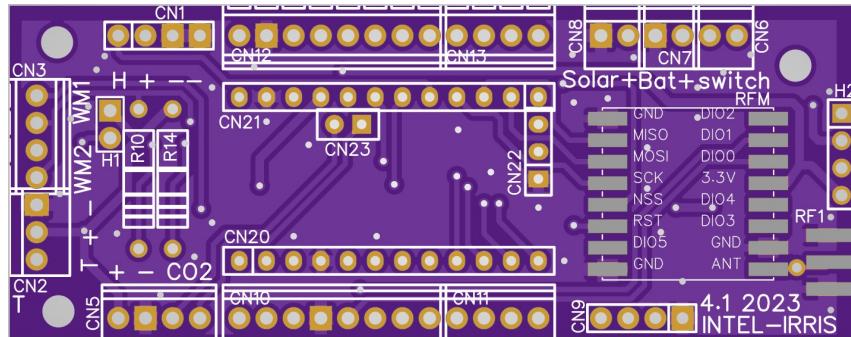
Arduino ProMini with
RFM95W (868MHz)
RFM96W (433MHz)
NiceRF SX1262 (868MHz)



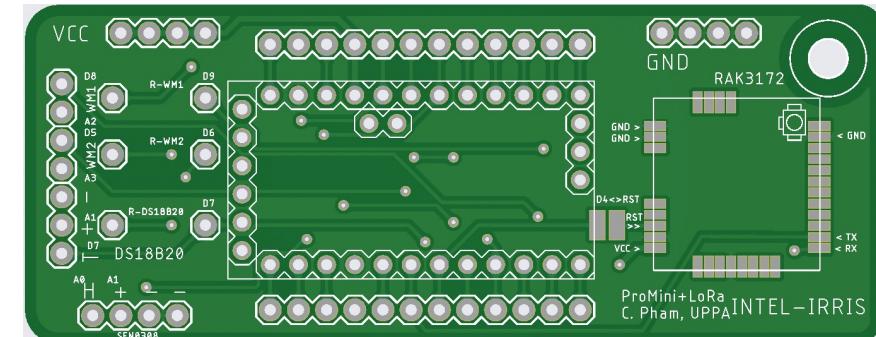
Arduino ProMini with NiceRF SX1280 (2.4GHz)

IRD PCB

v4.1



PCB for RAK3172



Download ProMini PCBs Gerber files

- <https://github.com/CongducPham/PRIMA-Intel-IrriS/tree/main/PCBs>

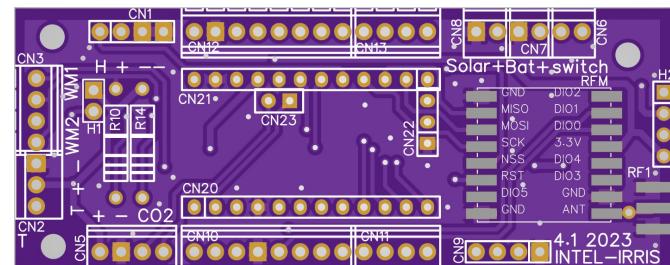
[PRIMA-Intel-IrriS](#) / [PCBs](#) / [...](#)



CongducPham Update README.md

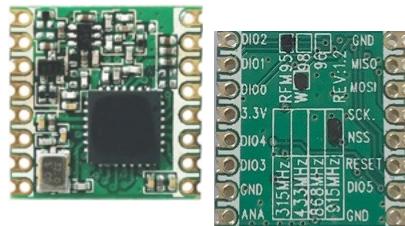
Name	Last commit message
..	
IRD_PCB_4_1	Update PCB files and tutorials
MySecondProMiniLoRaBreakout_2022-01-20.zip	Update PCB files
MySecondProMiniLoRaBreakout_RAK3172_2023-0...	Add new PCBs and update tutorials
MySecondProMiniLoRaBreakout_SX128X_2022-01-...	Update PCB files

**Latest and most achieved
PCB is IRD PCB v4.1
in folder IRD_PCB_4_1**



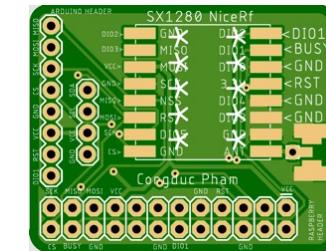
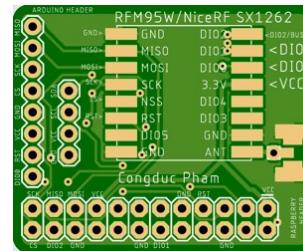
PCBs for LoRa hat, for the gateway

RFM95W
RFM96W
NiceRF SX1262
breakout

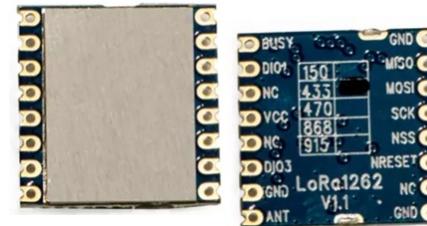


RFM95W (868MHz) | RFM96W (433MHz)

https://github.com/CongducPham/LowCostLoRaGw/blob/master/PCBs/RFM95Breakout_2020-11-14.zip

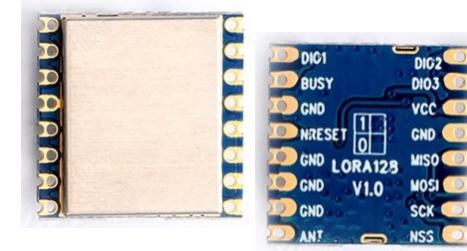


NiceRF SX1280
breakout

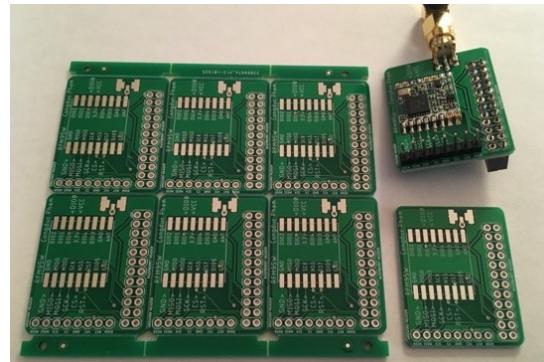


NiceRF SX1262 (868MHz)

https://github.com/CongducPham/LowCostLoRaGw/blob/master/PCBs/SX1280Breakout_2020-11-14.zip

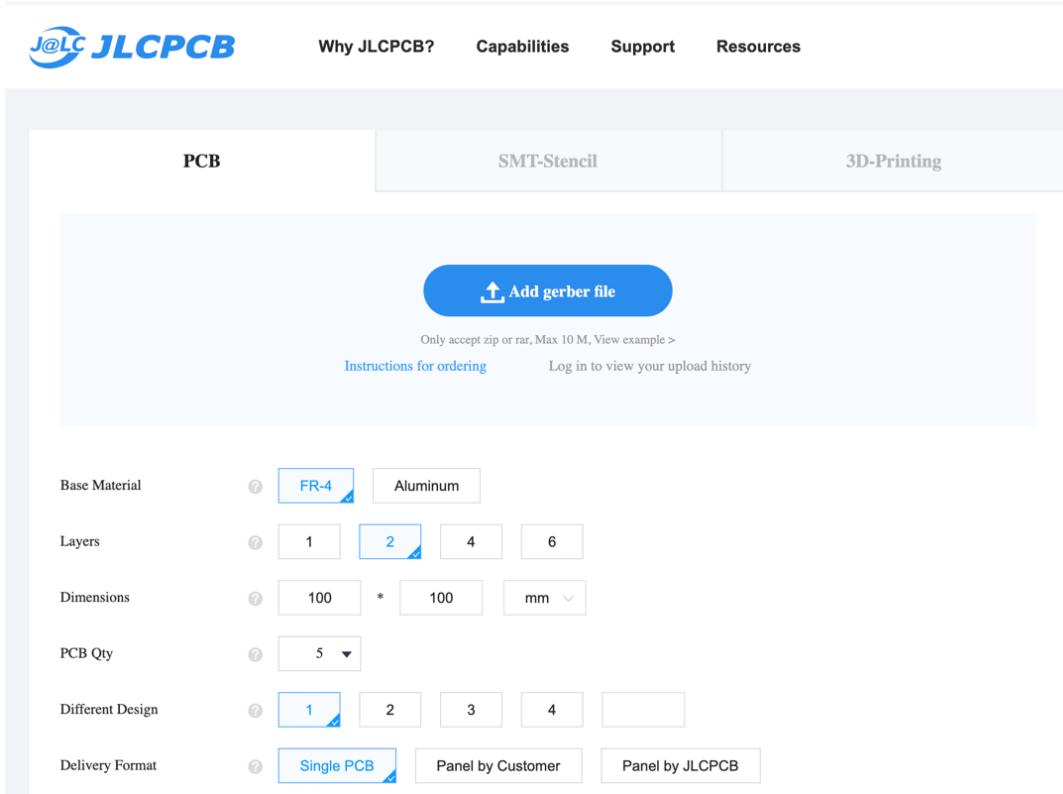


NiceRF SX1280 (2.4GHz)



Manufacture the PCBs

- Example: JLCPCB: <https://jlpcb.com/>
- Click on "Instant Quote"

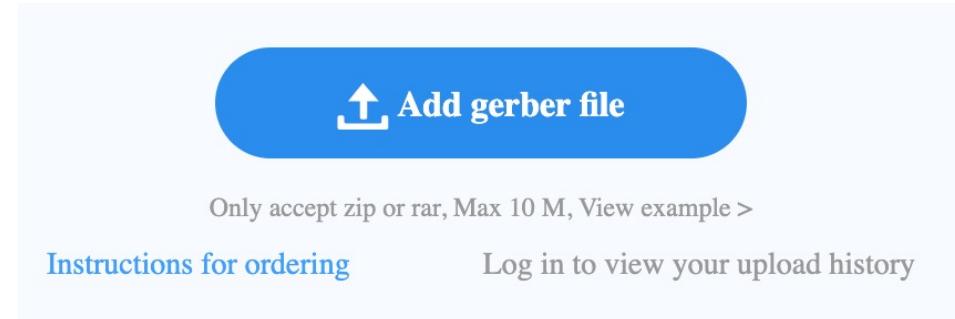


The screenshot shows the JLCPCB Instant Quote interface. At the top, there are tabs for PCB, SMT-Stencil, and 3D-Printing. Below the tabs is a large input field with a blue 'Add gerber file' button containing an upward arrow icon. Underneath the input field, there are instructions: 'Only accept zip or rar, Max 10 M, View example >' and links for 'Instructions for ordering' and 'Log in to view your upload history'. The main configuration area includes the following settings:

- Base Material: FR-4 (selected)
- Layers: 1, 2 (selected), 4, 6
- Dimensions: 100 * 100 mm
- PCB Qty: 5
- Different Design: 1 (selected), 2, 3, 4
- Delivery Format: Single PCB (selected)

Add your PCB Gerber files

- Click "Add gerber files" and select one of the PCB .zip files, do not unzip the downloaded file



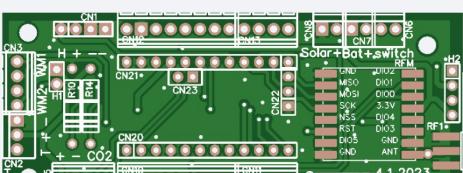
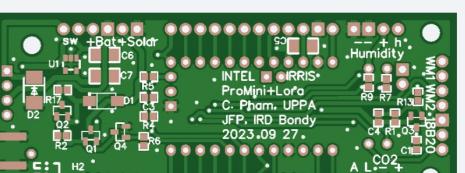
Processing Gerber files...



- Some parameters will be defined by the Gerber file itself, for instance the PCB size

J@LC JLCPCB ☰ EUR

- Standard PCB/PCBA
- Advanced PCB/PCBA
- SMT-Stencil
- 3D/CNC

[← Back to Upload File](#) Detected 2 layer board of 30.89x79.5mm(1.22x3.13 inches). [Gerber Viewer](#)

Base Material	FR-4	Flex	Aluminum	Copper Core	Rogers	PTFE Teflon							
Layers	1	2	4	High Precision PCB	6	8	10	12	14	16	18	20	
Dimensions	79.5	*	30.89	mm									
PCB Qty	5												
Product Type	Industrial/Consumer electronics	Aerospace	Medical										

Quantity and Panel format

- Change "PCB Qty" to 10 for instance and select "Panel by JLCPCB"
- Indicate 1 (column) by 3 (rows)

Dimensions 79.5 * 30.89 mm

Panel Qty **10** Panel Single Pieces Qty: 30

Product Type Industrial/Consumer electronics Aerospace Medical

PCB Specifications

Different Design **1** 2 3 4

Delivery Format Single PCB Panel by Customer **Panel by JLCPCB**

Panel Format Column : **1** 79.5mm Row : **3** 30.89mm

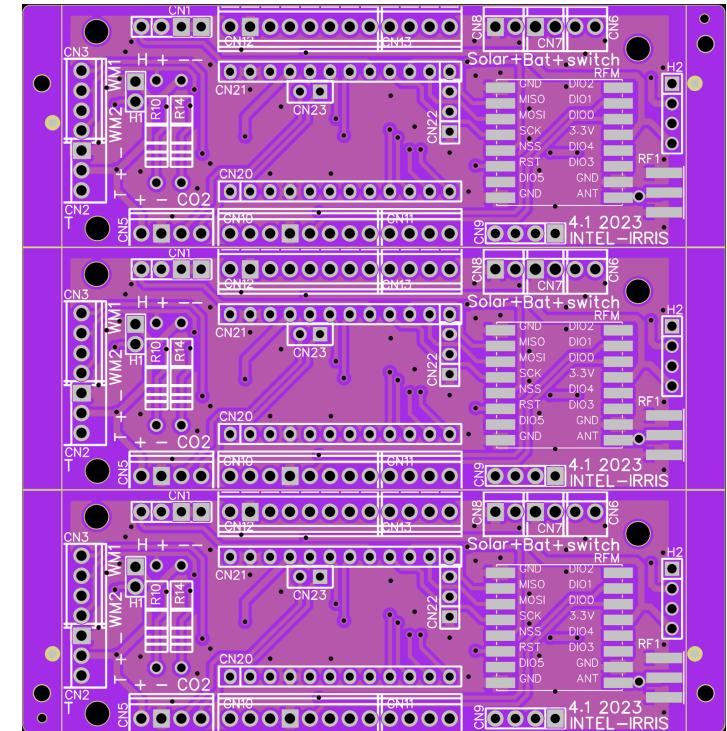
Edge Rails **No** On 2 Sides On 4 Sides

Panel size X : (79.5 x 1) = 79.500 mm Y : (30.89 x 3) = 92.670 mm

PCB Thickness **1.6** 0.4 0.6 0.8 1.0 1.2 2.0

What is "panelized"?

- Panelized will put several PCBs on the same PCB panel, with v-cut so that you will be able to easily separate them by hand
- For minimal cost, JLCPCB offers 10cm X 10cm PCB panel
- Here 1 x 3 will give 3 PCBs per PCB panel
- For radio breakout PCB, use 3 x 2 to have 6 PCB boards
- So if Qty=10, you will have
 - $10 \times 3 = 30$ for the ProMini PCB boards
 - $10 \times 6 = 60$ for the radio breakout PCBs



Save to cart

- You do not need to change the other parameters
- Save your board to cart
- Then, add another PCB .zip file and repeat the same procedure, if needed
- The shipping cost is probably the most expensive cost, so better to order all PCBs at the same time!
- You have several shipping option, you can select faster or cheaper options
- Once you are done, display your cart, review carefully your order and then checkout

Charge Details

Engineering fee	€3.54
Board	€5.22

Build Time ?

PCB :	2-3 days	€0.00
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Calculated Price €8.76

Additional charges may apply for [special cases](#)

Weight ? 0.23kg

SAVE TO CART

Shipping Estimate	€11.66
▼ EuroPacket	8-12 business days

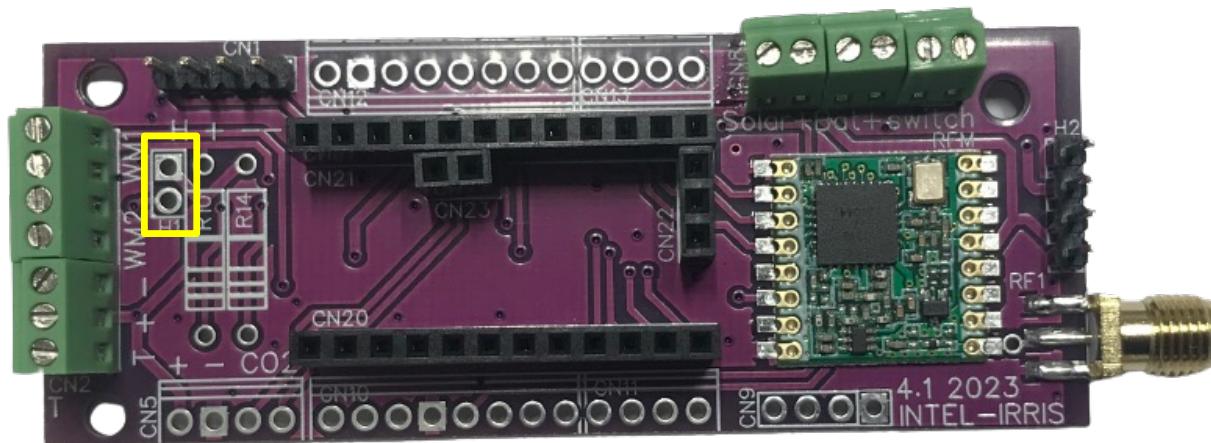
INTEL-IRRIS

Intelligent Irrigation System for Low-cost Autonomous Water Control
in Small-scale Agriculture

**PCBA FOR FULLY
ASSEMBLED**

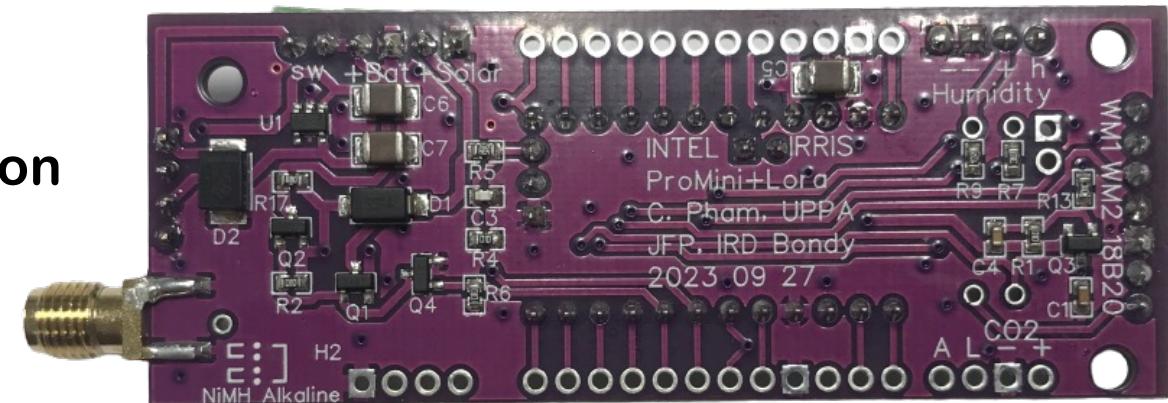
PCB Assembly

- The IRD PCB v4.1 is intended to be fully assembled by the PCB manufacturer in order to have the solar charging circuit



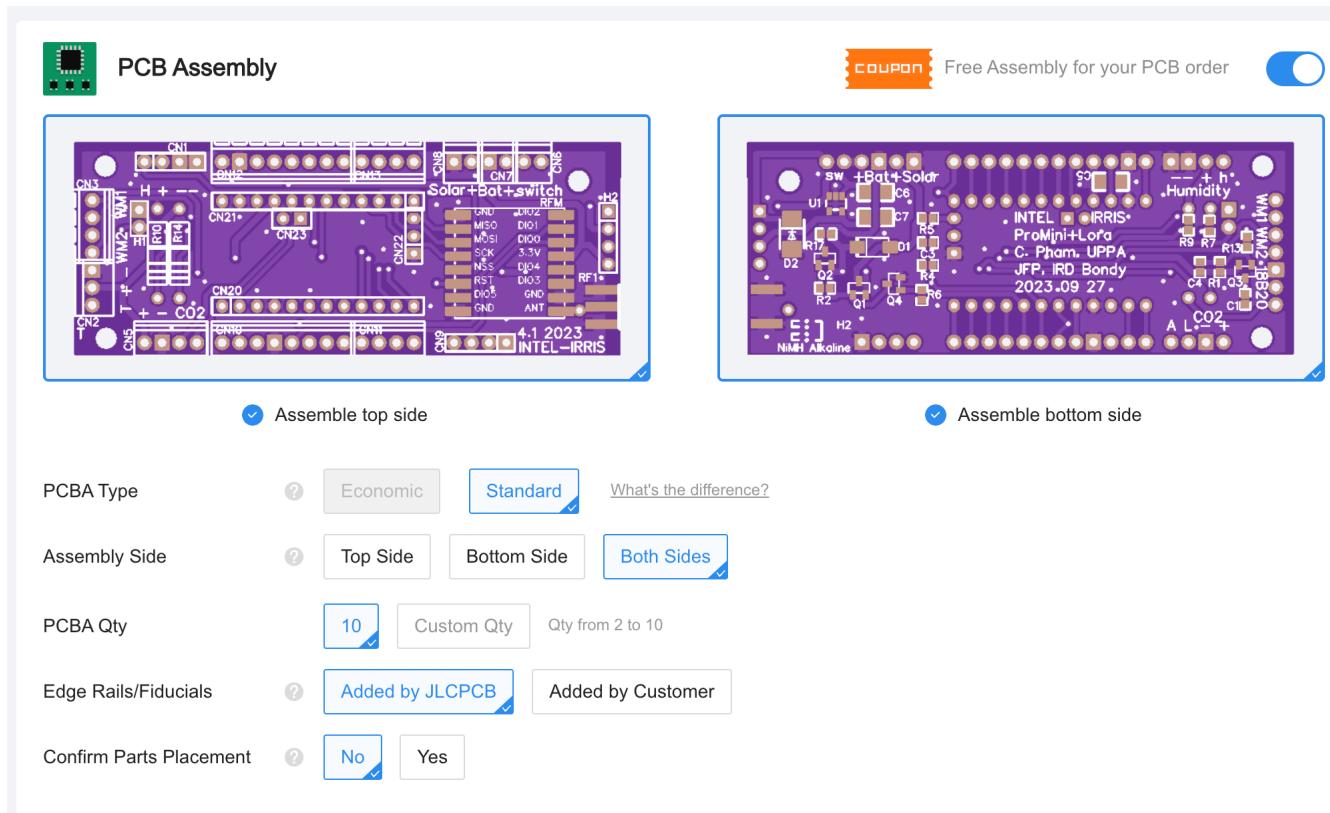
The full version
does not need to
have header for H1

The solar circuit is on
the back side



Enabling PCB assembly

- Click on PCBA to indicate you want PCB assembly
- Choose Standard PCBA type and select "Both sides" option



BOM & CPL

- BOM: Bill of Material file (2 files: RFM95W or RFM96W)
- CPL: Pick&Place file

PRIMA-Intel-IrriS / PCBs / IRD_PCB_4_1 / ...

 CongducPham Update PCB Gerber, BOM and CPL files for PCB Assembly 42cbaeb · 1 minute ago 

Name	Last commit message	Last commit date
..		
 BOM_SMT_TB_RF95_868_IISS_PCB4_1_wh2.xlsx	Update PCB Gerber, BOM and CPL files for PCB Assembly	1 minute ago
 BOM_SMT_TB_RF96_433_ISSI_PCB4_1_wh2.xlsx	Update PCB Gerber, BOM and CPL files for PCB Assembly	1 minute ago
 CPL.csv	Update PCB Gerber, BOM and CPL files for PCB Assembly	1 minute ago
 Gerber_PCB4_1_ISSI_2023_09_27.zip	Update PCB files and tutorials	2 weeks ago
 Schematic_ISSI_4_1_2023-09-27.pdf	Update PCB files and tutorials	2 weeks ago

- At next step, you will be invited to upload BOM & CPL files

 Why JLCPCB? Capabilities Support Resources Order now My file congd

Gerber_PCB4_1_ISSI_2023_09_27 Automatically saved, last update

PCB Bill of Materials Component Placements Quote & Order

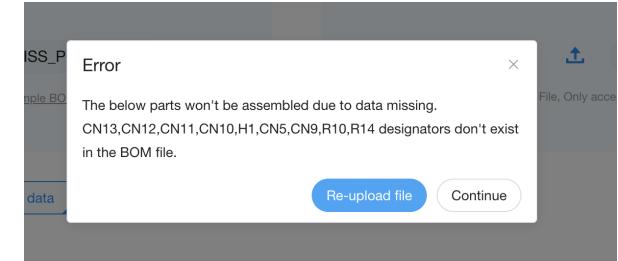
↑ Add BOM File ↑ Add CPL File

Only accept XLS,XLSX,CSV [View Sample BOM](#)

Pick&Place File, Only accept XLS,XLSX,CSV [View Sample CPL](#)

Check availability of components

- If you see this message, click on "Continue"
- Then, check that all components are available. Here, there are not enough components for CN23 (2-pin female header).
- You can wait until they are all available (recommended), or decide that you do not want to place them (you must know what you are doing then)
- You can also have the choice to replace by another similar component with  , if any



J@LC **JLCPBCB** Why JLCPBCB? Capabilities Support Resources Order now My file conduc.phm64 v0

Gerber_PCB4_1_IISS_2023_09_27

PCB Bill of Materials Component Placements Quote & Order Automatically saved, last updated on 28 October, 20:53

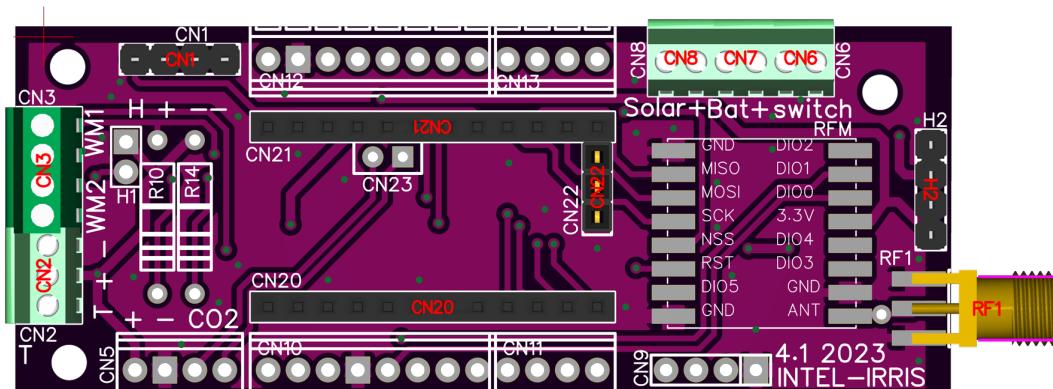
Both Sides Total 24 parts detected 23 Parts confirmed 1 parts Inventory shortage Upload BOM/CPL

Uploaded BOM Data				Review Matched Parts						
Top Designator	Bottom Designa...	Comment	Footprint	Matched Part Detail		Qty	Source	Lib Type	Total Cost	Select
RFM	C4	33nF	C603	CC0063KRX7R9B8333	C106856	35	JLCPBCB	Extended	€0.0861	<input checked="" type="checkbox"/>
	R17	68	R603	RC0063FR-0710KL	C126362	35	JLCPBCB	Extended	€0.0364	<input checked="" type="checkbox"/>
	R1,R2,R4,R6	100K1%	R603	RC0063FR-0710KL	C14675	125	JLCPBCB	Extended	€0.1064	<input checked="" type="checkbox"/>
	C3	330pF	C603	CG0063KRNP09BN431	C2181158	35	JLCPBCB	Extended	€0.1358	<input checked="" type="checkbox"/>
	D1	SS14	SMAIDO-Z...	SS14	C2837270	32	JLCPBCB	Extended	€0.3179	<input checked="" type="checkbox"/>
		DL-RFM95-868M	DL-RFM...	DL-RFM95-868M	C2844472	30	JLCPBCB	Extended	€128.7106	<input checked="" type="checkbox"/>
		DL-RFM...	WIRELESS...							
	Q4	BSS113B	SOT-23	BSS113B	C2874697	32	JLCPBCB	Extended	€0.6358	<input checked="" type="checkbox"/>
	CN20,CN21	12P_F	KH-2.54FH...	KH-2.54FH...	C2905419	60	JLCPBCB	Extended	€4.3822	<input checked="" type="checkbox"/>
		100nF	C603	0603104M500NT	C2998	35	JLCPBCB	Extended	€0.0662	<input checked="" type="checkbox"/>
			50V 100nF Y5V ±20% 0603 Multilayer Cer...							
			SMBJ5.0A	C473804	32	JLCPBCB	Extended	€1.2414	<input checked="" type="checkbox"/>	
			9.2V 6.4V 5V SMBJ5.0A TVS ROHS							
			RC0063FR-07430KL	C482869	35	JLCPBCB	Extended	€0.0397	<input checked="" type="checkbox"/>	
CN1	PZ254V-11-04P	HDR-TH-4...	PZ254V-11-04P	C492403	61	JLCPBCB	Extended	€1.1313	<input checked="" type="checkbox"/>	
H2	PZ254V-...	HDR-TH-4...	PZ254V-11-04P	C492403	61	JLCPBCB	Extended	€1.1313	<input checked="" type="checkbox"/>	
RF1	RF1	SMA-SMD...	BN3844-NP-P001	C492560	30	JLCPBCB	Extended	€6.2137	<input checked="" type="checkbox"/>	
			1mm above SMA Board Edge Offset feet ...							
Q1,Q2,Q3	IRLML5203...	SOT-23	IRLML5203	C518778	92	JLCPBCB	Extended	€3.7083	<input checked="" type="checkbox"/>	
CN22	3P_F	PM254V-1...	PM254V-11-03-H85	C541850	31	JLCPBCB	Extended	€2.4727	<input checked="" type="checkbox"/>	
CN5,CN7,CN8	X1308-2...	X1308-2...	X1308-2-5...	C557685	90	JLCPBCB	Extended	€12.7907	<input checked="" type="checkbox"/>	
CN2	X1308-2...	CONN-TH...	X1308-2-5-3P	C557686	30	JLCPBCB	Extended	€7.9736	<input checked="" type="checkbox"/>	
			7.54mm 3.28mm 0.6mm A null 3 positive 5.5...							
U1	RT9080-33	TSOT-23-5	RT9080-330J5	C841192	32	JLCPBCB	Extended	€4.3480	<input checked="" type="checkbox"/>	
CN3	XY308-2...	CONN-TH...	XY308-2-5-4P	C841913	30	JLCPBCB	Extended	€7.5988	<input checked="" type="checkbox"/>	
			1x4P 6A 150V Green 18-26 straight pin 2...							
C5,C6,C7	4.7uF	C1206	TMK2584J75KN-T	C92837	92	JLCPBCB	Extended	€6.9553	<input checked="" type="checkbox"/>	
			20V 4.7uF X5R ±10% 1210 Multilayer Cer...							
R7,R13	10K1%	R603	RC0063FR-0710KL	C98220	65	JLCPBCB	Extended	€0.0554	<input checked="" type="checkbox"/>	
			100mW Thick Film Resistors ±100ppm/°C							
R9	4.7k	R603	RC0063FR-074K7L	C99782	35	JLCPBCB	Extended	€0.0397	<input checked="" type="checkbox"/>	
			100mW Thick Film Resistors ±100ppm/°C							
CN23	2P_F	PM254V-1...	PM254V-11-02-H85	C541849	31	14 JLCPBCB	Extended	€0.8425	<input checked="" type="checkbox"/> 17 shortfall	

Please carefully check the packages of selected parts before proceeding.

Customize your PCB Assembly

- You can also decide which component you actually do not want the manufacturer to assemble
- For instance, if you un-select the radio module (RFM), you will have a fully assembly board, but without the LoRa module



- This solution can be used to have a board where you will solder yourself the radio module (RFM95W 868/915/923 or RFM96W 433), according to the frequency band of the target countries

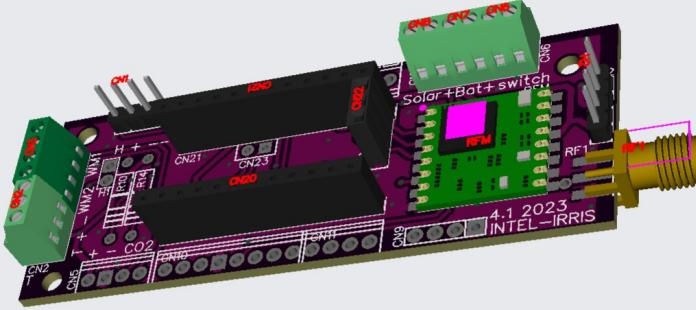
Checking the expected result

- At next step, you will be able to visually check the final result
- You can switch between 2D & 3D display
- Check top & bottom side (see next slide)

Gerber_PCB4_1_IISS_2023_09_27 

PCB Bill of Materials Component Placements Quote & Order

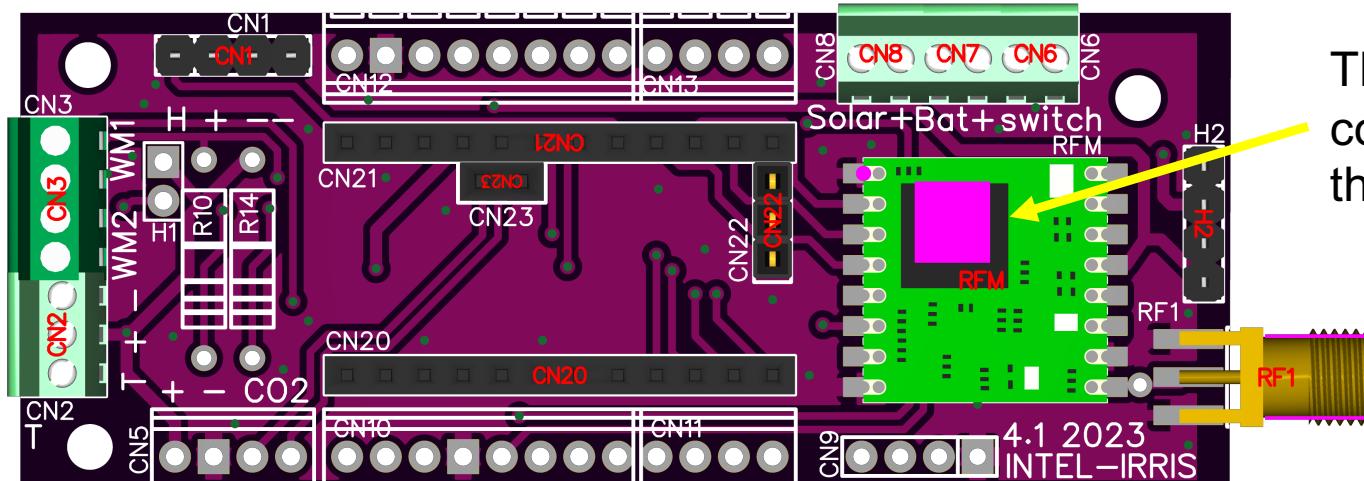
Automatically saved, last updated on 28 October, 21:24



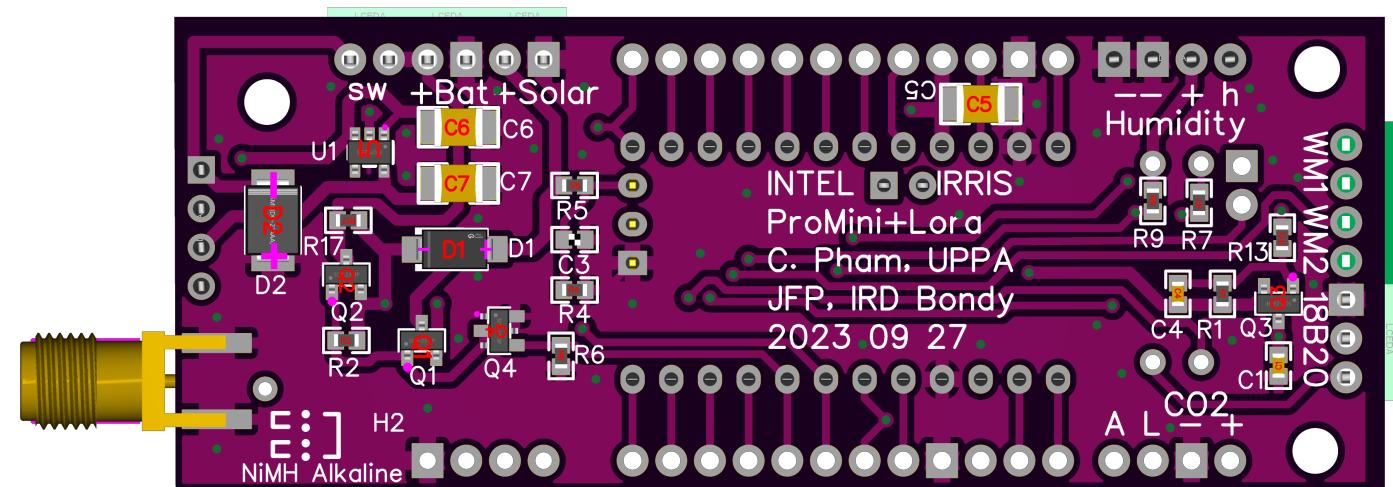
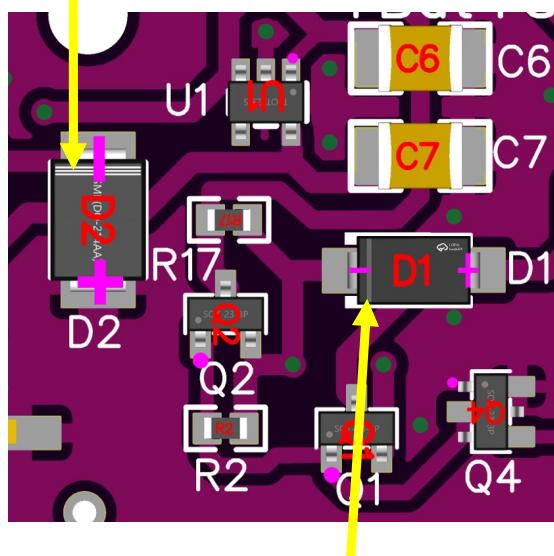
Top Designator	JLCPCB Part #	Comment	Footprint
RFM	C2844472	DL-RFM9...	WIRELES...
CN20,CN21	C2905419	12P_F	KH-2.54F...
CN1	C492403	PZ254V...	HDR-TH...
H2	C492403	PZ254V...	HDR-TH...
RF1	C496550	RF1	SMA-SM...
CN22	C541850	3P_F	PM254V...
CN6,CN7,CN8	C557685	XY308-2....	XY308-2....
CN2	C557686	XY308-2....	CONN-T...
CN3	C915913	XY308-2....	CONN-T...

Check top & bottom

The diode D2 has the horizontal line on the top



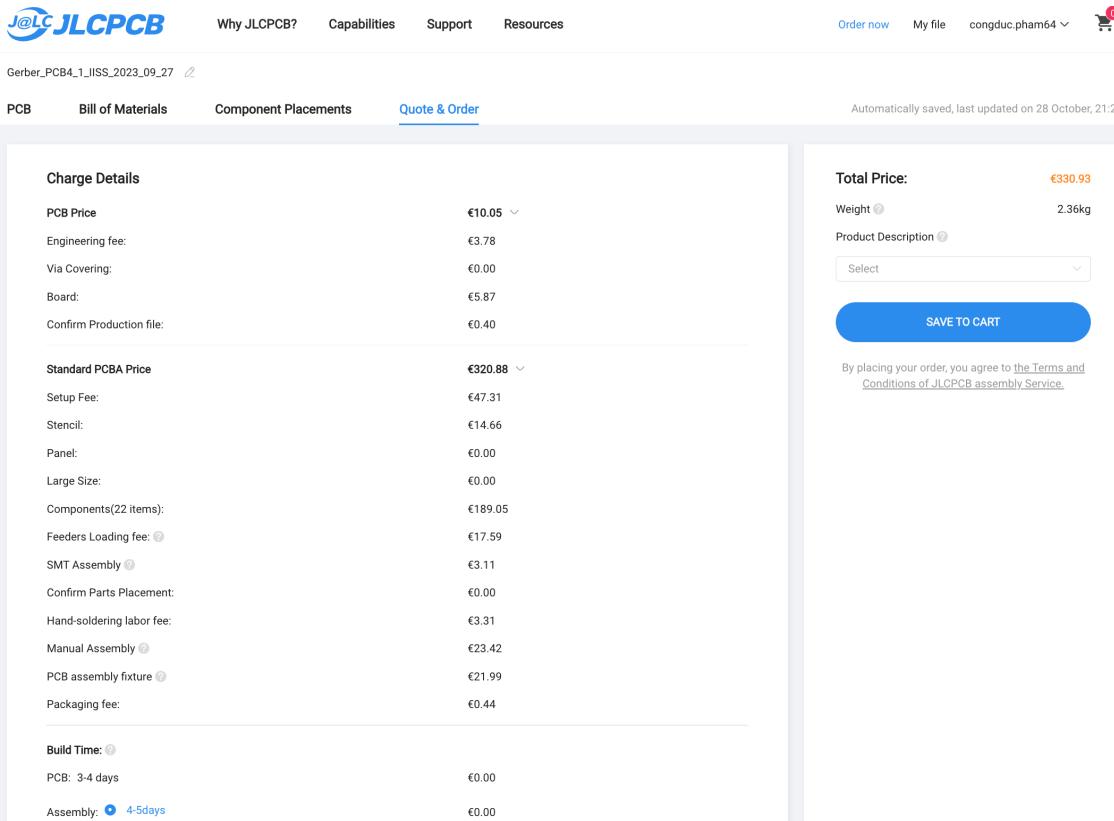
The RFM is correctly placed this way



The diode D1 has the vertical line on the left

Saving to cart

- ➊ Finally, you will be able to save the configured PCBA to cart
- ➋ You will also have the detail of all the pricing



The screenshot shows the JLCPCB Quote & Order interface. At the top, there are navigation links: Why JLCPCB?, Capabilities, Support, Resources, Order now, My file, congduc.pham64, and a shopping cart icon.

The main content area has tabs: PCB, Bill of Materials, Component Placements, and Quote & Order (which is selected). Below these tabs, it says "Automatically saved, last updated on 28 October, 21:27".

The left panel displays "Charge Details" with two sections: "PCB Price" and "Standard PCBA Price". The right panel shows the "Total Price: €330.93" with fields for "Weight" (2.36kg) and "Product Description" (Select), and a large blue "SAVE TO CART" button. Below the button, a small note states: "By placing your order, you agree to the [Terms and Conditions of JLCPCB assembly Service](#)".

Charge Details	
PCB Price	€10.05
Engineering fee:	€3.78
Via Covering:	€0.00
Board:	€5.87
Confirm Production file:	€0.40
Standard PCBA Price	€320.88
Setup Fee:	€47.31
Stencil:	€14.66
Panel:	€0.00
Large Size:	€0.00
Components(22 items):	€189.05
Feeders Loading fee:	€17.59
SMT Assembly	€3.11
Confirm Parts Placement:	€0.00
Hand-soldering labor fee:	€3.31
Manual Assembly	€23.42
PCB assembly fixture	€21.99
Packaging fee:	€0.44
Build Time:	PCB: 3-4 days
	Assembly: 4-5 days

Final step, pay to order!

- This is the final step, pay to order your PCBA
- You will be able to choose the shipping methods and other details

JLC Mechanical Services: 3D Printing | CNC Machining | Mechatronic Parts \$? FR

JLCPCB Why JLCPCB? Capabilities Support Resources Order now My file congduc.pham64 ▾ 2

SHOPPING CART

All	PCB/PCBA/Stencil	3D Printing	CNC Machining	Mechatronic Parts
<input checked="" type="checkbox"/> Item				
		Qty	Price	
<input checked="" type="checkbox"/>		Gerber_PCB4_1_IISS_2023_09_27_Y50 PCB prototype:Y50-2389907A Purple, 1.6 thickness, HASL(with lead) 3-4...	10	€10.05
		Product Details Edit Order		
<input checked="" type="checkbox"/>		Gerber_PCB4_1_IISS_2023_09_27_Y50 Standard PCBA: SMT02310281452645-23... Assemble Both Sides, 4-5days	10	€320.88
		Product Details		

SUMMARY (2 items)

Subtotal	€330.93
Weight	2.36kg
Shipping calculated at checkout	
Secure Checkout	
+ Add new item	
     	
SSL ENCRYPTED PAYMENT	

Receiving your PCBA!

