CosmicWatch v3X Componet Placement Sheet

#	Component Identifier	Value	Component	Description	Notes	Link	Alt
Step 1: Break off SiPM PCB from the Main PCB (in Bag) and mount the following items in order.							
1	R24,R12,R22,R19,R17,R21,R25,R30	1k		RES SMD 1K OHM 1% 1/8W 0805			
2	R27	1.3k		RES SMD 1.3K OHM 1% 1/8W 0805			
3	R31	2k		RES SMD 2K OHM 1% 1/8W 0805			
4	R8,R18,R23,R28,R29, R9	100		RES SMD 100 OHM 1% 1/8W 0805			
5	R4	0		RES SMD 0 OHM	This is a short		
6	C2,C3,C19,C17,C20	4.7uF		CAP CER 4.7UF 50V X7R 0805			
7	C1,C14,C11,C21,C22,C18,C6	1uF		CAP CER 1UF 50V Y5V 0805			
8	C4,C12,C25,C16	0.1uF		CAP CER 0.1UF 50V X7R 0805			
9	FB1	Ferrite Bead		FB ULTRA 0805 31 OHM 6A .015DC			
10	U7	LM4040 2.5V		IC VREF SHUNT 0.5% SOT23	This component references the ADC to 2.5V		
11	U4	RP Pico		No Header Pins, just the board	Note direction.		
Step 2: The RP Pico powers the circit. The LM4040 generats 2.5V to reference the ADC and bias various parts of the circuit. Plug RP Pico in via the Micro USB cable into a USB port, and check that you get 2.5V across C25. If yes, unplug and continue.							
12	L1	47uH		FIXED IND 47UH 190MA 4.86OHM SMD			
13	Q2	2N7002		MOSFET SOT23 N 60V 5OHM 150C			
14	U2,U5	TPH2502		IC OPAMP 2 CIRCUIT	Note direction.		
15	U1	MAX5026		DC-DC Booster, IC REG BOOST ADJ 260MA SOT6	Note direction. This provides 29.5V to SiPM.		
16	R2	154k		RES SMD 154k OHM 0.1% 1/8W 0603	Smaller component to reduce ripple on DC-DC Booster		
17	R1	6.65k		RES SMD 6.65k OHM 0.1% 1/8W 0603	Smaller component to reduce ripple on DC-DC Booster		
18	D3	BAT54WS		DIODE SCHOTTKY 30V 200MA SOD323	Note direction.		
19	6-pin header	2.54mm 2x3 pin		CONN SOCKET 6POS 0.1 GOLD PCB	Make sure you put it on the correct side of the board. Top side of board with RP Pico.		
Step 3: Plug RP Pico. You just built the high voltage that is used to power the SiPM. Verify that you get +30V from the HV pin to GND on the 6-pin header. If yes, unplug and continue.							
20	R26, R10, R14	100k		RES SMD 100k OHM 1% 1/8W 0805			
21	R3	49.9		RES SMD 49.9 OHM 1% 1/8W 0805			
22	R5	620		RES SMD 620 OHM 1% 1/8W 0805			
23	R7	22.1k		RES SMD 22.1k OHM 1% 1/8W 0805			
25	C5,C13	200pF		CAP CER 200pF 50V Y5V 0805			
26	D1,D4	BAT54S		DIODE ARR SCHOT 30V 200MA SOT233	D1 is a voltage clamp. D4 is for the peak detector.		
27	BNC receptacle	BNC header		CONN BNC JACK R/A 50 OHM PCB	Mount on top side of board		
Step 4: If you have access to a working and SiPM-scintilaltor board already, plug into your main PCB. Power on the RP Pico in. Connect BNC connection into oscilloscope channel 1. Check for 10mV, 200ns pulses. Next add the digital components.							
28	Reset Button	Reset Button		SWITCH TACTILE SPST-NO 6x6x9mm	Top side		
29	Coincidence connector	RJ45		RJ45, 8p8c right angle	Top side		

30	Buzzer	Buzzer		BUZZER MAGNETIC	Top side, note + direction		
31	Temp/Pressure sensor	BMP280		BMP280-3.3V	Bottom side of board. Align VCC pin.		
32	Accelerometer	MPU-6050		3-axis Gyrometer-Accelerometer	Uses same pins as BMP280, although on other side of board. Careful with direction. Sensor faces into the PCB.		
33	LED 3mm	LED 3mm		3mm LED	Top Side, note how far to put it in		
34	LED 5mm	LED 5mm		5mm LED	Top Side, not how far to put it in		
35	OLED screen	OLED screen		128x64 Yellow Blue OLED	Top side. Note GND connection of OLED must be one of the side pins.		
36	U8	SD Card socket		Micro SD Memory Card Slot Holder Sockets	Bottom side		
Step 5: You should now be able to upload the firmare. Hold the bootselect button on the RP Pico while plugging it into your computer. Release it, and it will appear as a mountable drive. Drag and drop the .uf2 file into the drive.							
37	C10,C23	10pF		CAP CER 10PF 50V C0G/NP0 0805			
38	C9,C15	10nF		CAP CER 10000PF 50V X7R 0805			
39	C24,C8	0.1uF		CAP CER 0.1UF 50V X7R 0805			
40	R11	10		RES SMD 10 OHM 1% 1/8W 0805			
41	R13	100		RES SMD 100 OHM 1% 1/8W 0805			
42	6 pin SMT (on SiPM board)	2x3 pins		CONN HEADER SMD 6POS 2.54MM	SiPM PCB, align it well with the footprint.		
43	U6	SiPM		SiPM_MicroFJ-60035-TSV	Very important, F6 pin on SiPM is fiducial mark. Note direction.		
44	2x Standoffs on SiPM PCB	Standoff		1/8" Hex Size, 7/16"" Length, 0-80 Thread Size	Mount on bottom side (non SiPM side), inner two holes (91780A029)		
45	2x screws to mount the standoffs to SiPM board	Standoff		0-80 Thread Size, 1/4" Long	Screw through SiPM side in board.		
Step 6: Wrap scintillator in aluminum foil from Bag, leaving a hole for the SiPM face. Add small mount of optical gel to SiPM surface, and a silicon pad. Screw PCB board in place with #2 screws from bag. Optically isolate the scintillator using the black electrical tape. Please do the best job you can!							
46	Plastic Scintillator	50x50x10mm		Drill holes for #2 screws using #48 bit, diameter = 1.93mm, 30mm apart, in a square.			
47	Reflective foil	Alum foil		Reflective foil for scintillator	Simple alum foil works as well.		
48	Optical Gel	Optical gel			Add gel to SIPM surface		
49	Silicon pad	0.3mm thick silicon		Optical coupling (optional)	Sheet for optical coupling between SiPM and scintillator		
50	#2 screw for SiPM PCB/scintillator	#2 5/16"		18-8 Stainless Steel, Number 2 Size, 5/16" Long	Screw through SiPM side in board.		
51	Black electrical tape	Tape		Black tape	Optical isolation		
52	Coincidence cable	CAT6 cable		15cm (or longer) CAT6 Cable	Needed for coincidence detection		
53	Electronics Case (optional)	2506-2.9		Aluminium case: 2506-2.9			
54	Rubber feet for case (optional)	8x4mm circular		8x4 mm rubber bumpers 50pcs			
55	5mm LED holder (optional)	5mm Plastic E		5mm Plastic E			
56	3mm LED holder (optional)	3mm Plastic E		3mm Plastic E			
57	Face plates for case (optional)	Acrylic		10cm x 15cm x 2.5mm acrylic end plates.	Laser cut by uploading Enclosures/Faceplates.zip file to elecrow.com		
58	BNC cable for readout (optional)	1m BNC cable		1m BNC cable			