



## Introduction

This document describes changes of the CTL-2000 Product HW revision from Rev 01.00 (PCB v1.3) to Rev 01.10 (PCB v1.7).

- Changes to the Main Board PCB Rev1.4, Rev1.5 and Rev1.7 are compared with Rev1.3.
- Changes to the LED Board and EPA Board are provided.
- Device Mechanical Changes are also provided.

## Device description

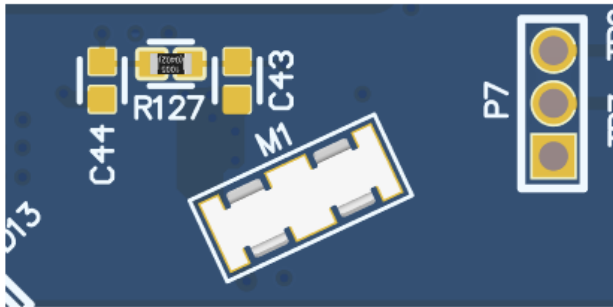
<b>Product Description:</b> CTL-2000 Main Board & Device	
<b>Product HW Revision:</b> Rev 01.00 to Rev 01.10	
<b>PCB Number:</b> EPCB-00156-001 Rev1.3, Rev1.4, Rev1.5, Rev1.7	
<b>PCBA Number:</b> EPCA-00125-101 rev 1.7	
<b>Instruction prepared by:</b>  Maryam Mesgari John Lopes	<b>Instruction date:</b>  5 / 10 / 2023

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## Changes applied to Rev1.4 compare with Rev1.3:

- 1- SD\_CLK and SD\_CMD connections to ESP32 GPIO pins swapped  
Only change in routing
- 2- R177=0R link added between ESP32 GPIO and PHY TXC pin

**Rev1.3**

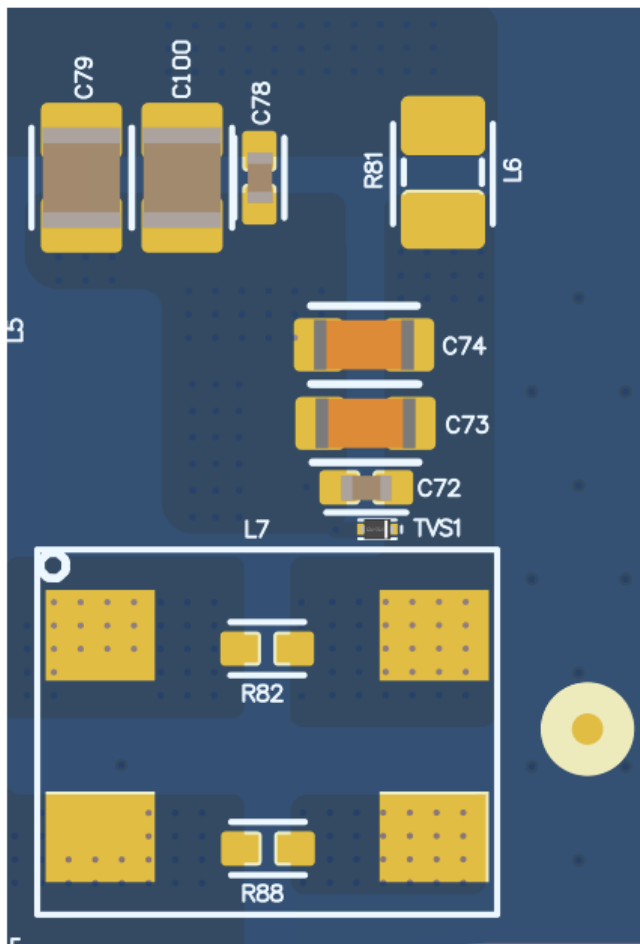


**Rev1.4**

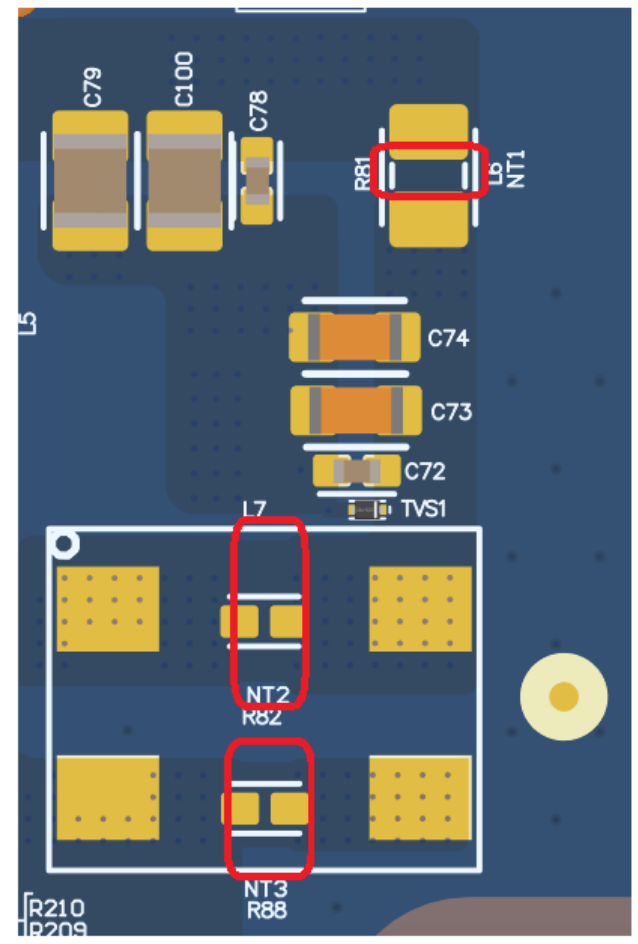


- 3- L6 and L7 are bypassed by Net-Tie

**Rev1.3**

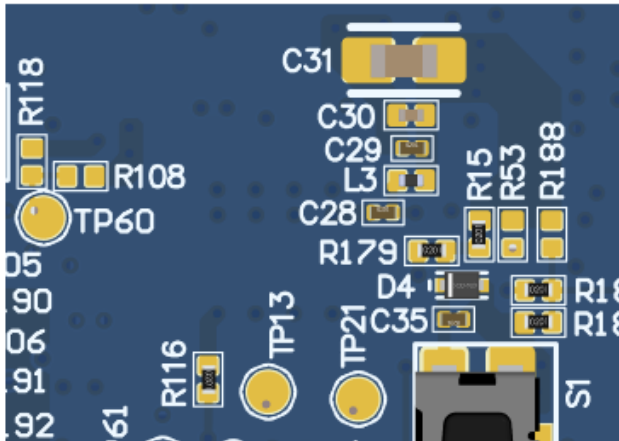


**Rev1.4**

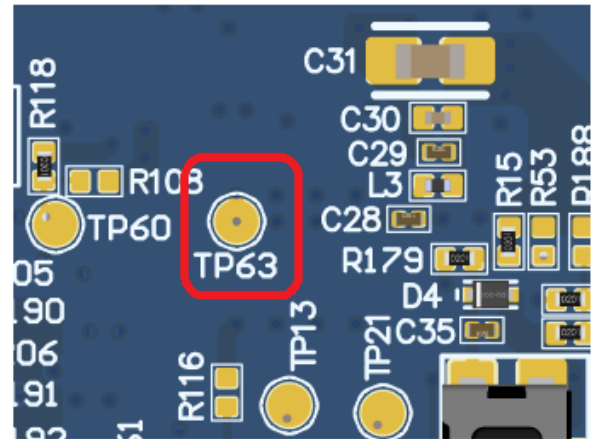


4- TP63 added on top of GND vias

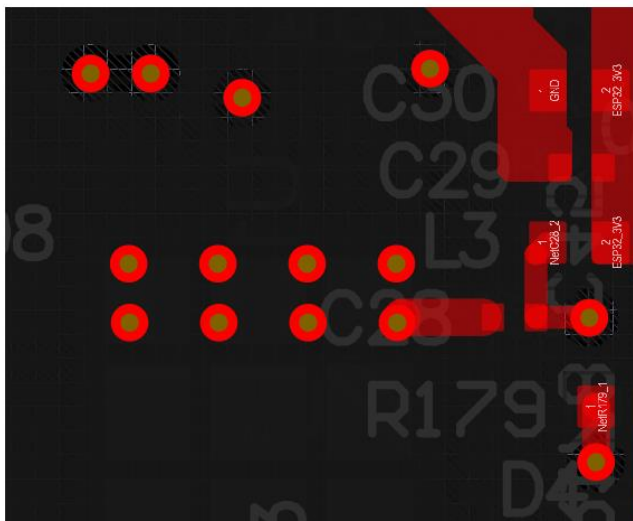
**Rev1.3**



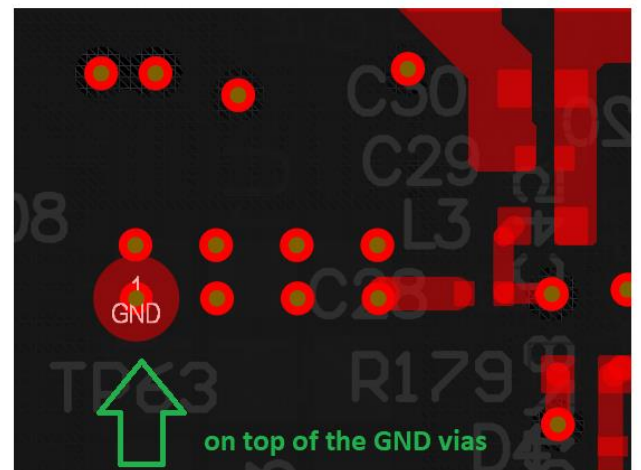
**Rev1.4**



**Rev1.3**



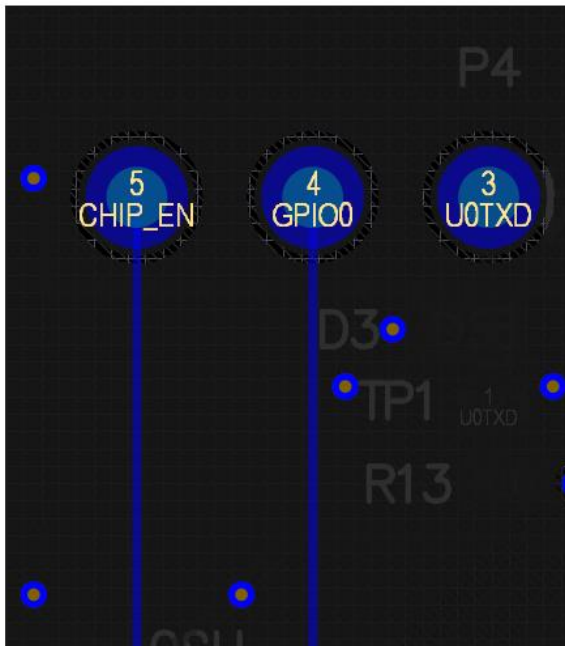
**Rev1.4**



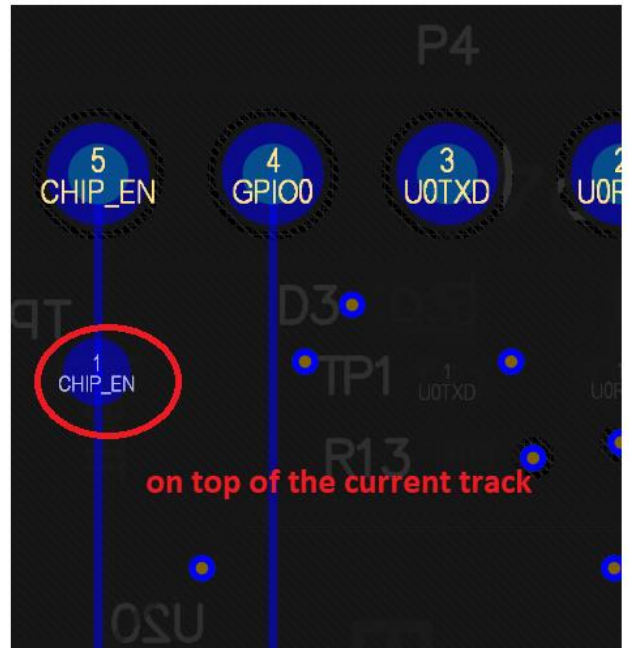
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5- TP64 added on top of the current track

**Rev1.3**

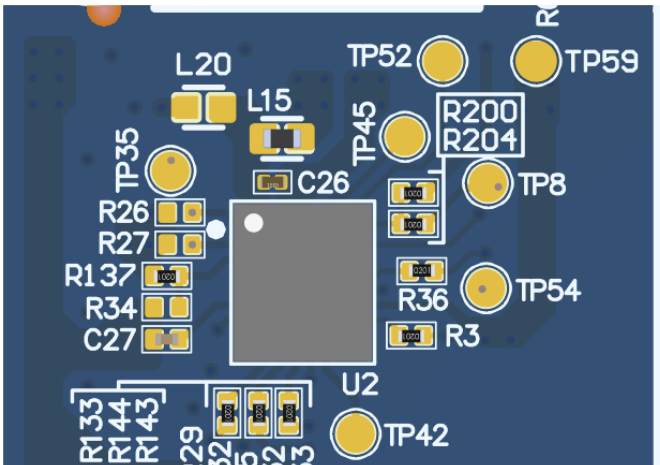


**Rev1.4**

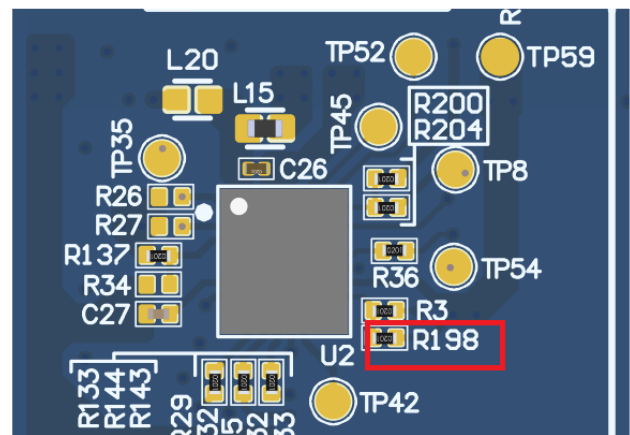


6- 10K pull-down resistor added for Sensor GPIO

**Rev1.3**



**Rev1.4**

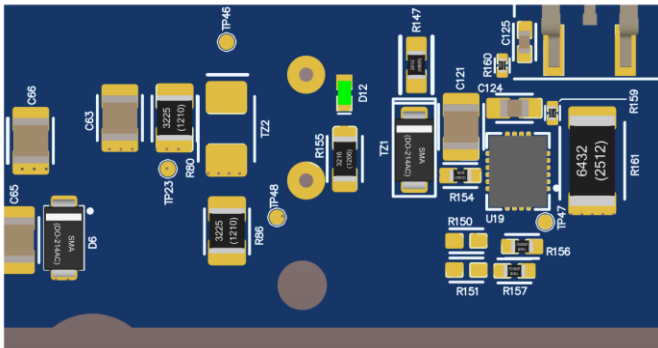


## Changes applied to Rev1.5 compare with Rev1.4:

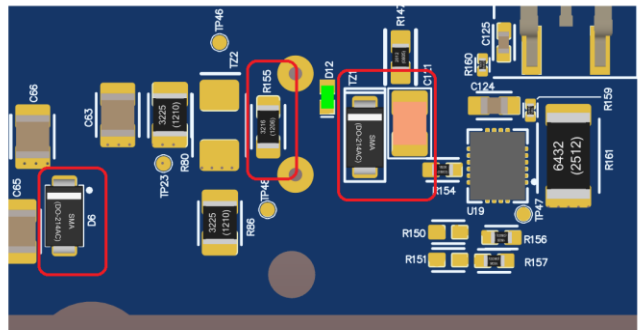
Rev1.5 release to address some mechanical interferences with components. Therefore, some components are moved away from holes and edge.

- 1- C121 had interference with heatsink (Shown in photo below)
- 2- 4 big Holes clearance should have been considered (3mm from the center on Top layer, and 4mm from the center on Bottom layer).

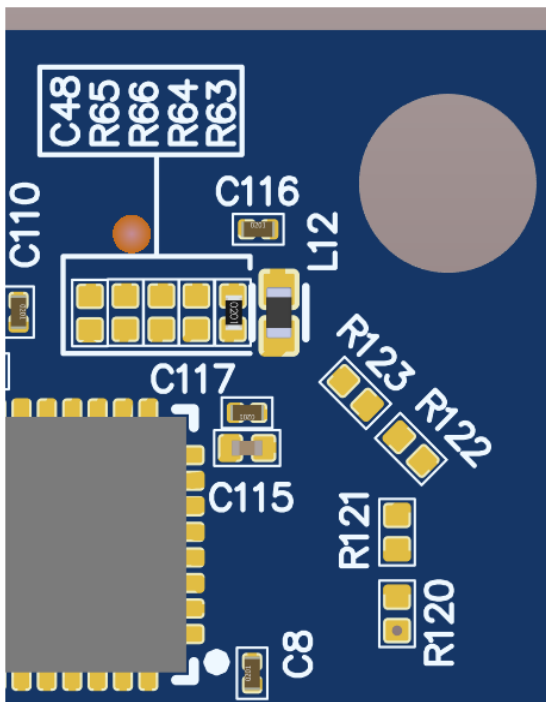
Rev1.4



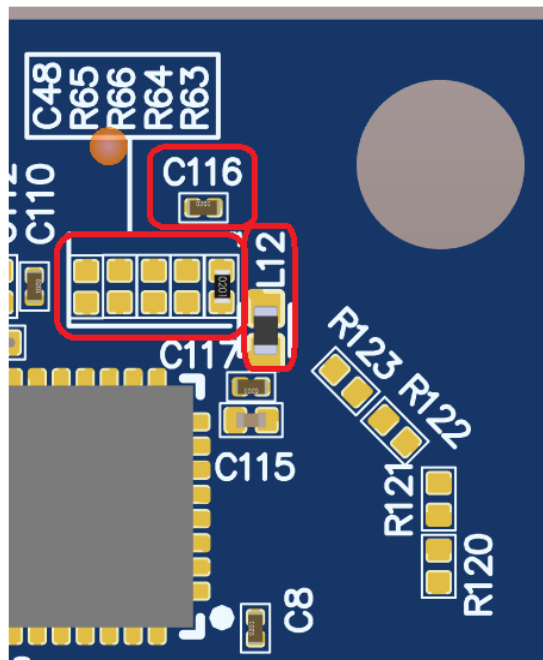
Rev1.5 Some components' locations shifted



Rev1.4

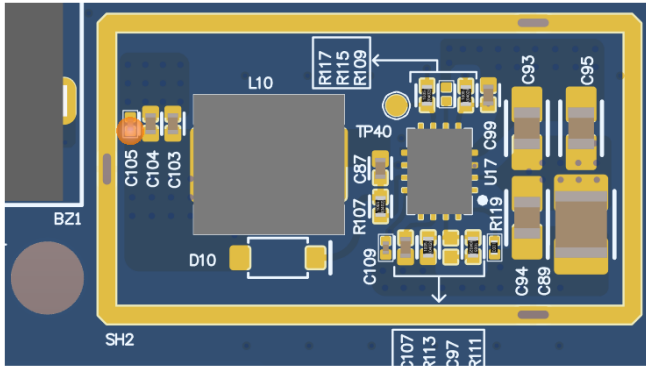


Rev1.5 (some components are slightly shifted)

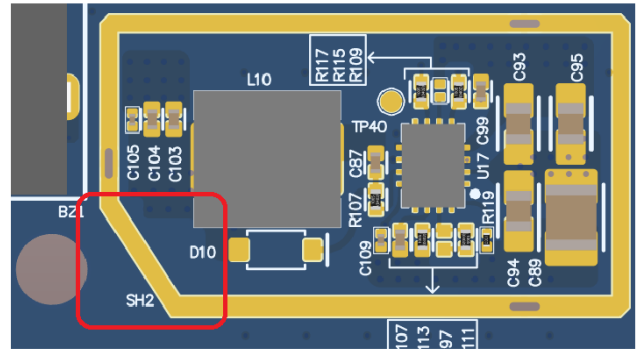




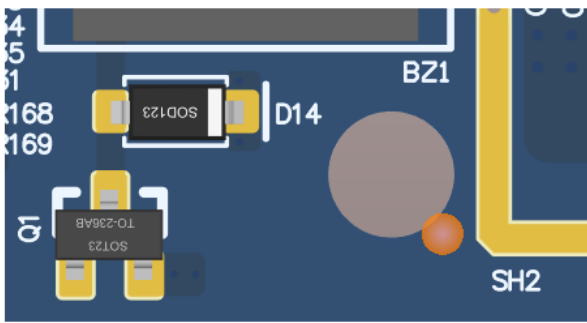
Rev1.4



Rev1.5 (Shield can corner re-shaped)



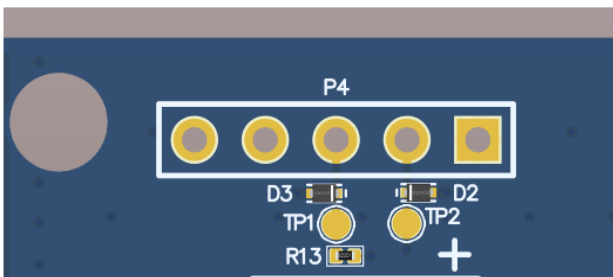
Rev1.4



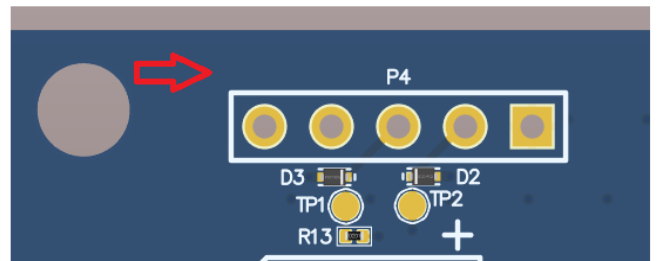
Rev1.5 (D14 slightly moved)



Rev1.4

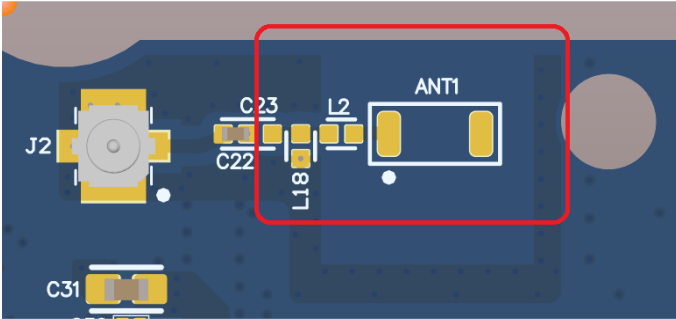


Rev1.5 (Header slightly moved)

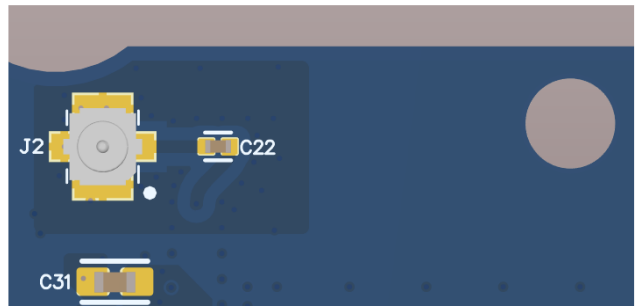


3- SMD chip antenna circuitry totally deleted. These parts were DNP on Rev1.4

Rev1.4

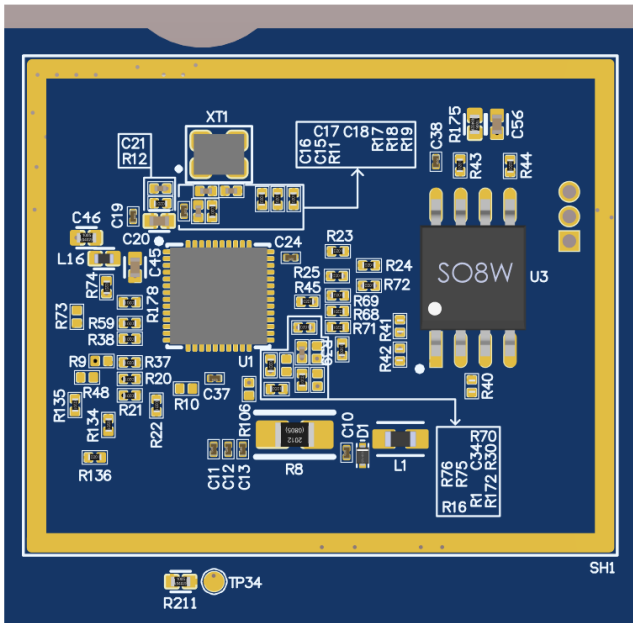


Rev1.5



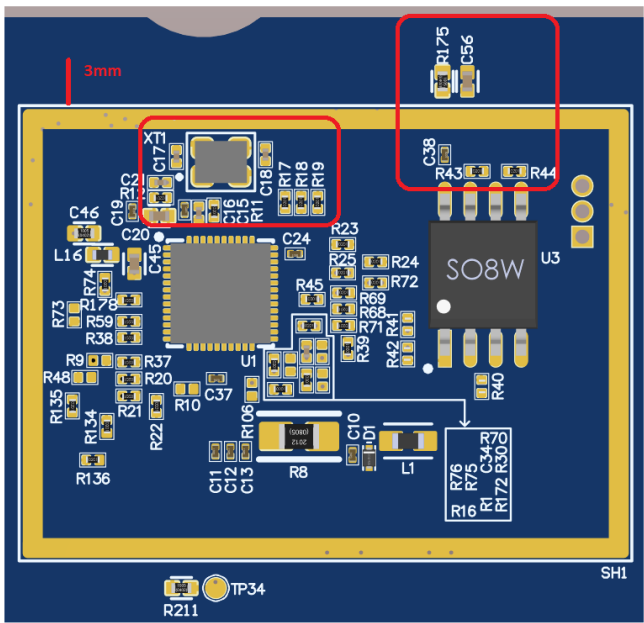
4- ESP32 shield can dimension reduced to remove the clashes

Rev1.4



Rev1.5

(some components had to be shifted)



Maryam

17 Feb 2023



## Changes applied to Rev1.7 compared with Rev1.5:

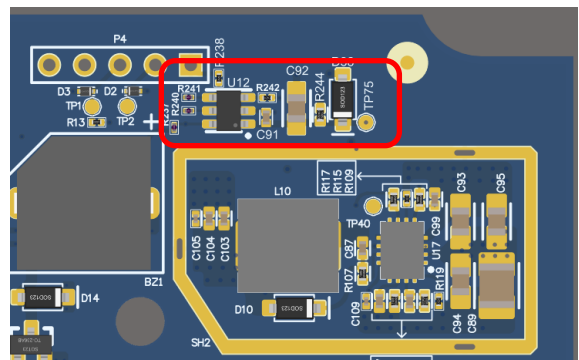
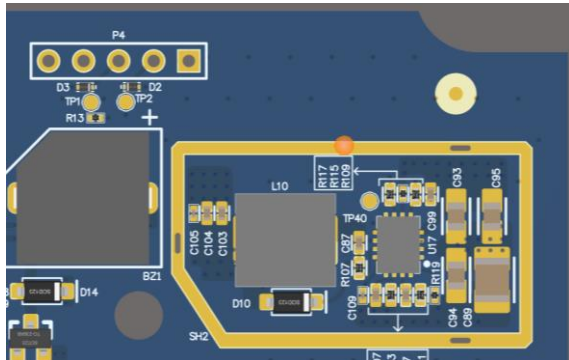
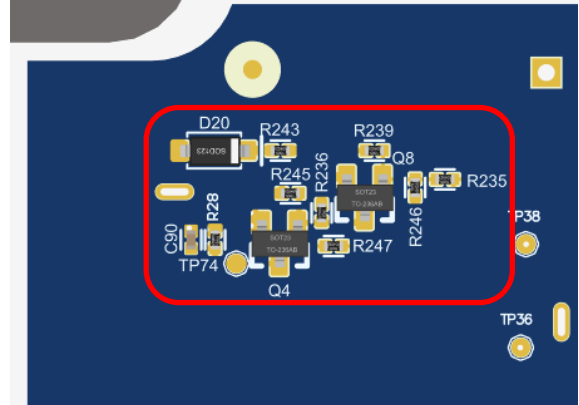
Rev1.7 release included a number of updates and are described below with captures of layout changes with reference to Rev1.5:

1. Hardware watchdog circuit (U12) and associated components added to recover from SW lockup.

**Rev1.5**



**Rev1.7**



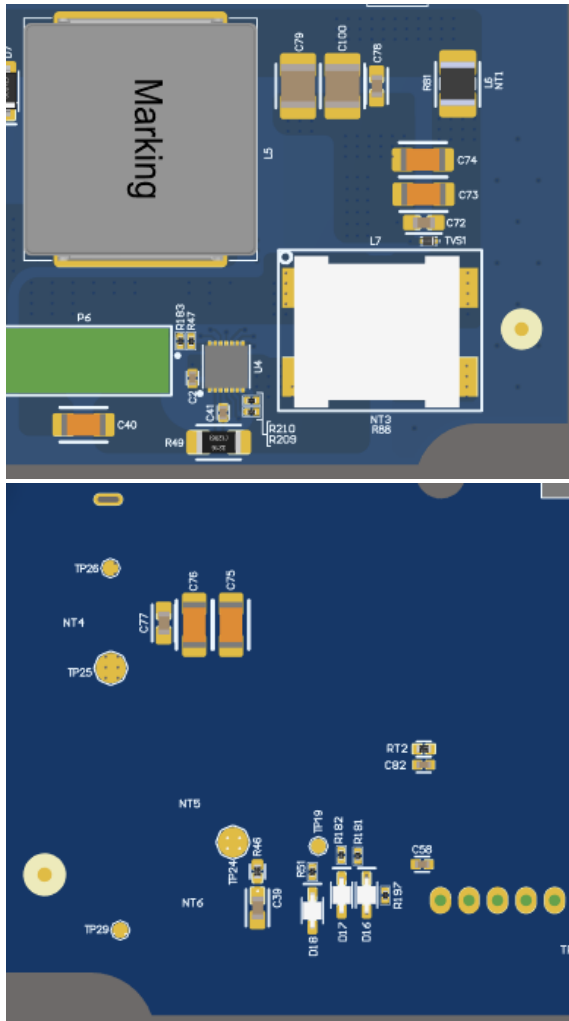




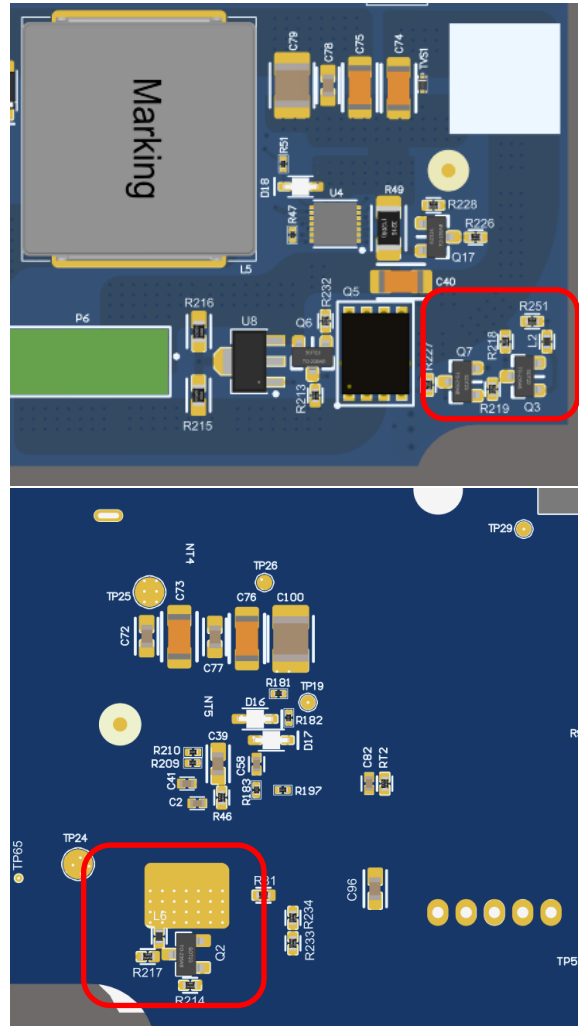
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- FET power control circuit added (including components Q2, Q3, Q7) to LED board Connector added to save battery power in low power mode.

**Rev1.5**



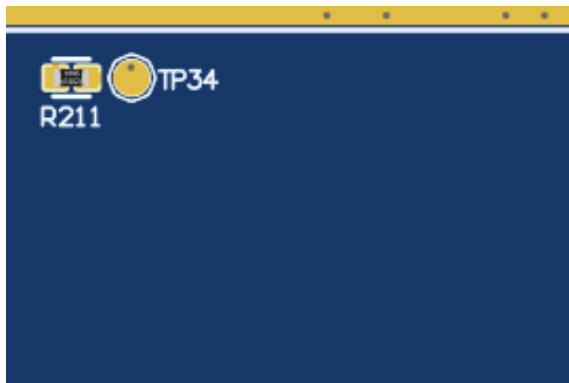
**Rev1.7**



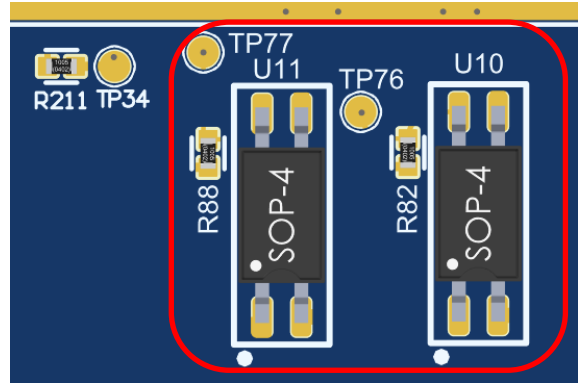


- 2 x Optocouplers (U11, U10) added to detect POE status.

Rev1.5

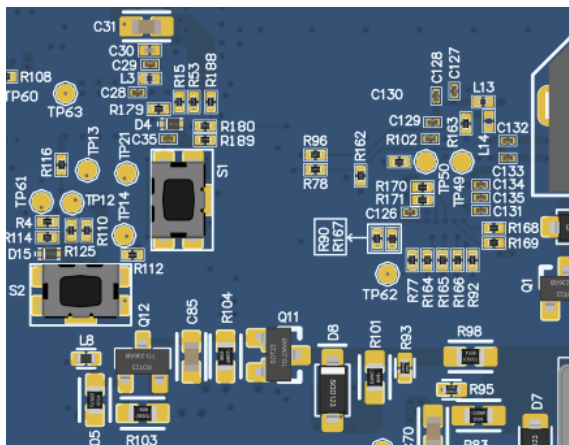


Rev1.7

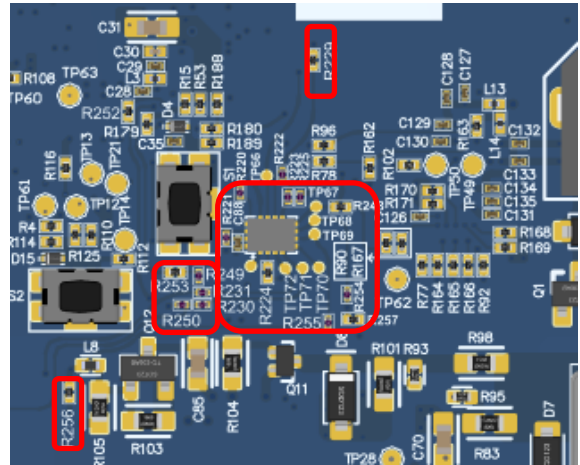


- I2C GPIO expander (U9) added to existing I2C bus to support additional GPIO for LED board FET control and HW Watchdog.

Rev1.5



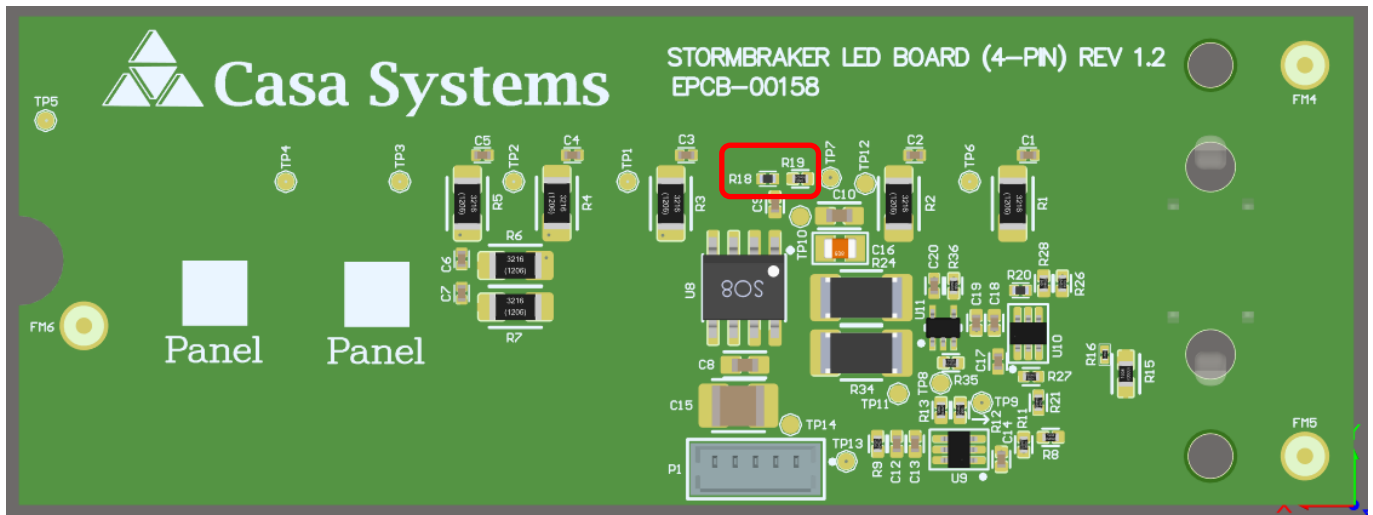
Rev1.7



## Additional changes

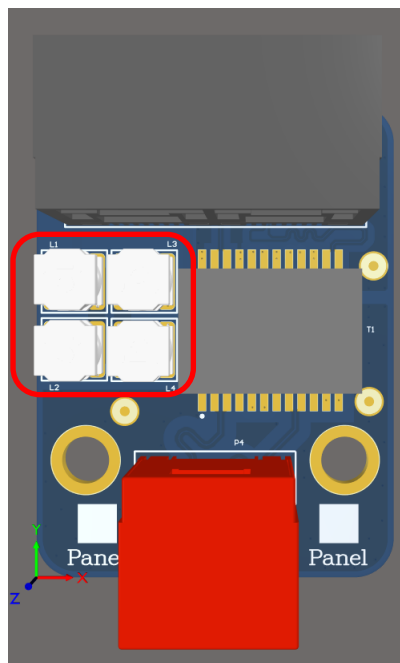
### LED Board Changes

1. Resistor value changes (R18, R19) in linear voltage regulator circuit to reduce quiescent current draw.



### EPA Board Changes

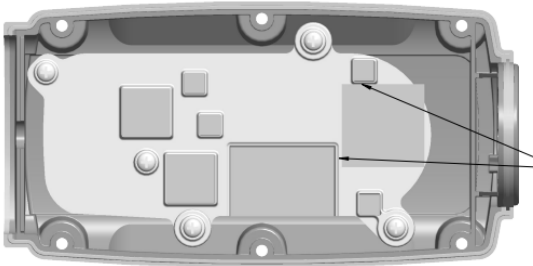
2. 4 x 150uH inductors (L1, L2, L3, L4) replaced with OR Resistors



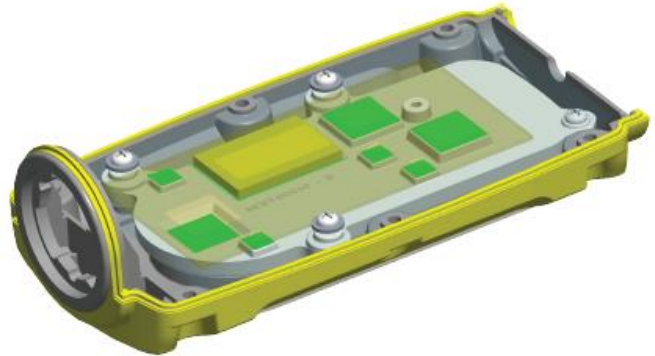
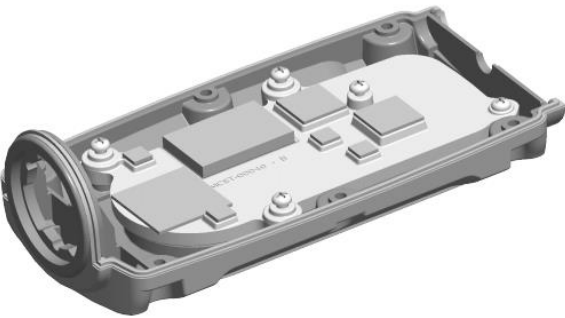
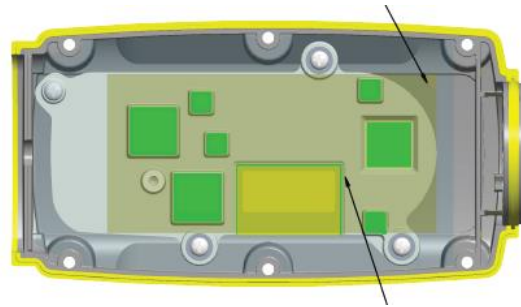
### Device Mechanical Changes

3. Plastic Isolation barrier sheet added and thermal pads updated from multiple small pads to one large pad between heatsink and PCBA.

#### Rev 1.0



#### Rev1.1



4. Housing colour update. Updated top and bottom case is yellow only.

**Rev 1.0**



**Rev1.1**





Summary view of Changes:

