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Philips Shaver S7000 - update

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2021 Dec v 1.0

innovation you

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Introduction

About the Document

The goal of the presentation is to highlight differences in the current S7700 shaver serie (on PCBA design) based on the 15V inlet now in production compared to the S7700 update based on the 5V [USB] inlet. The focus is on the difference in the design in terms of the following;

- Schematic Design
- PCBA Layout Design
- PCB Specification – layer stack-up, material, etc.

Objective of Presentation

- The presentation intend to make the impact clear so an analysis can be done regarding current Bluetooth approbation

Overview of Schematic design update

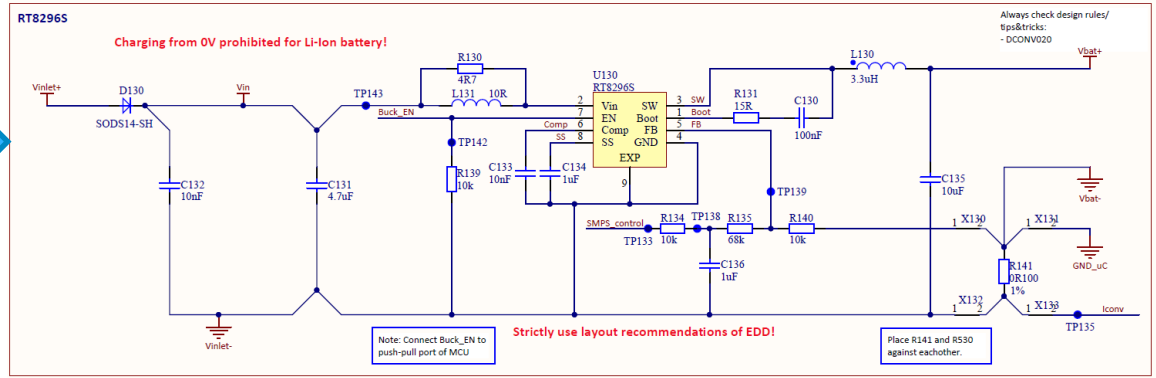
- From the electronic Architectural overview, the electronic design change is mainly in the **charging circuit module**.

- The electronics change from 15V inlet charge system designed around the Richteck RT8296S IC to 5V [USB-A] inlet charge system based on the ST1CC40DR with a synchronous input diode (SID).

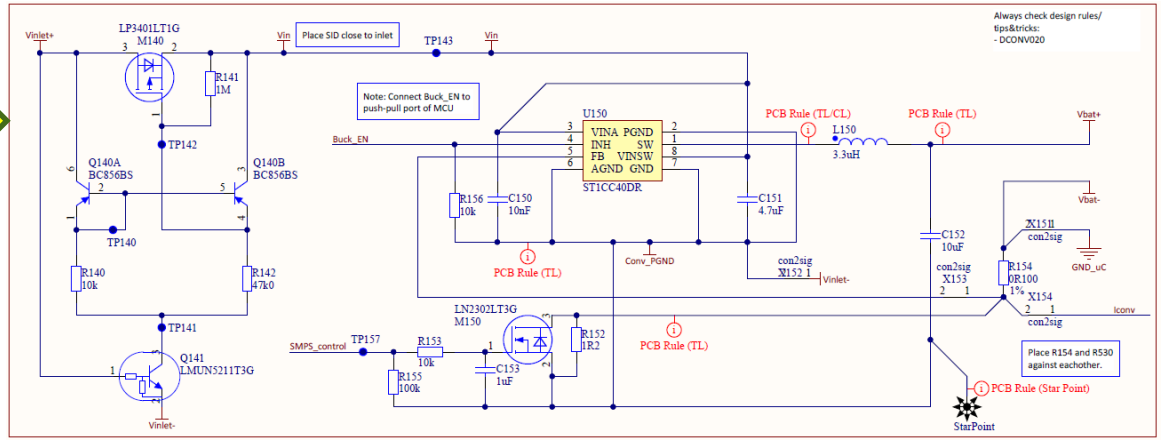
- Schematic diagrams for comparison between current and new versions;

Schematic for the Charging Circuit

- Charging Circuit in current S7700 shaver
  - *The change is regarding RT8296S Charge Module*

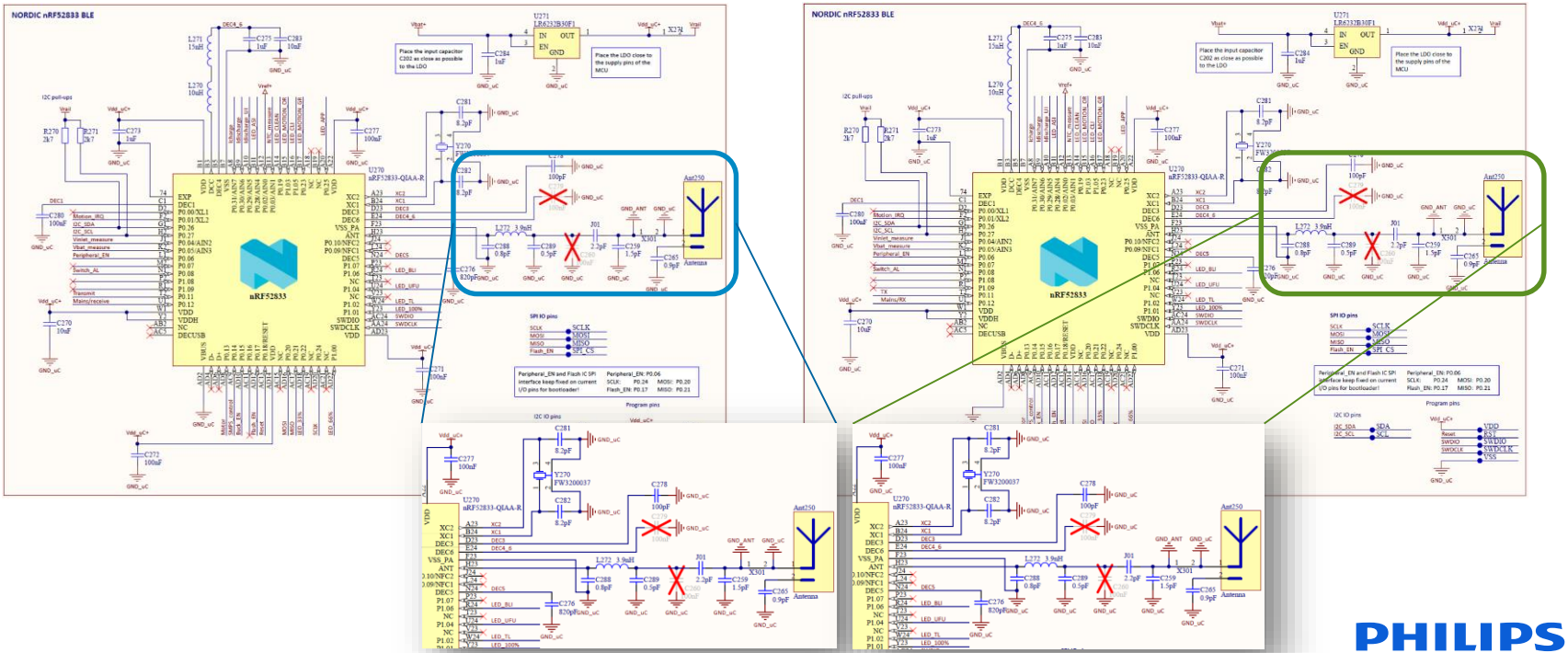


- Charging Circuit in update of S7700 shaver
  - *SID + ST1CC40DR Charge Module*



Nordic nRF52833 BLE – S7700 & S7700 update

- Closer look at the microcontroller with BLE module which is critical for the Bluetooth. Matching circuit components are **IDENTICAL** in both designs

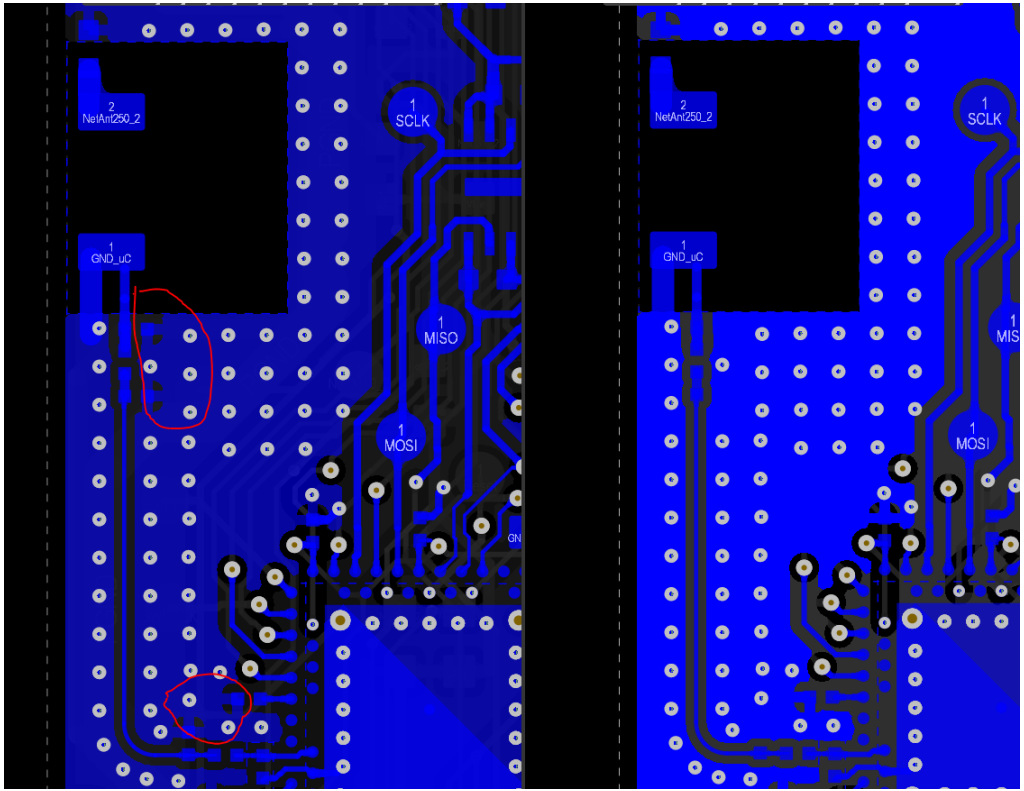


PCB Layout Delta Analysis (1)

Introduction
The next four slides will compare the layout for the S7700 shaver & it's update.

The PCB design is scanned with focus on the four (4) layers around the BLE antenna.

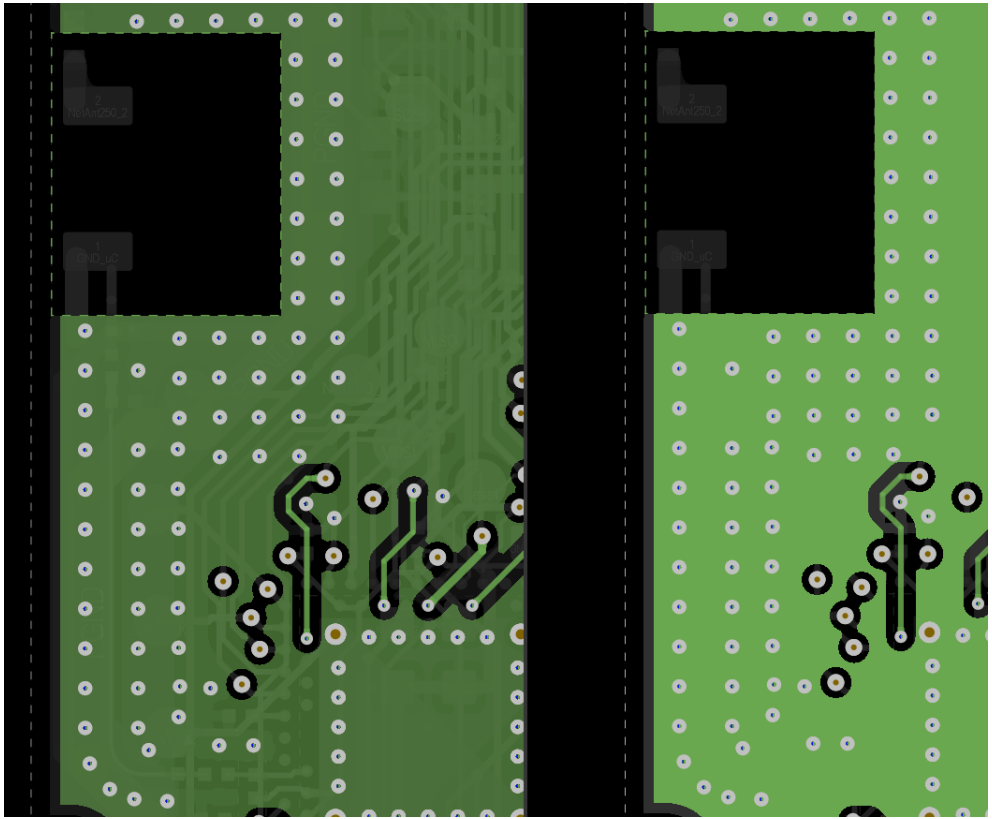
First PCB Layer (L1)
Small GND improvement on thermal reliefs:



PCB Layout Delta Analysis (2)

Second PCB Layer (L2)

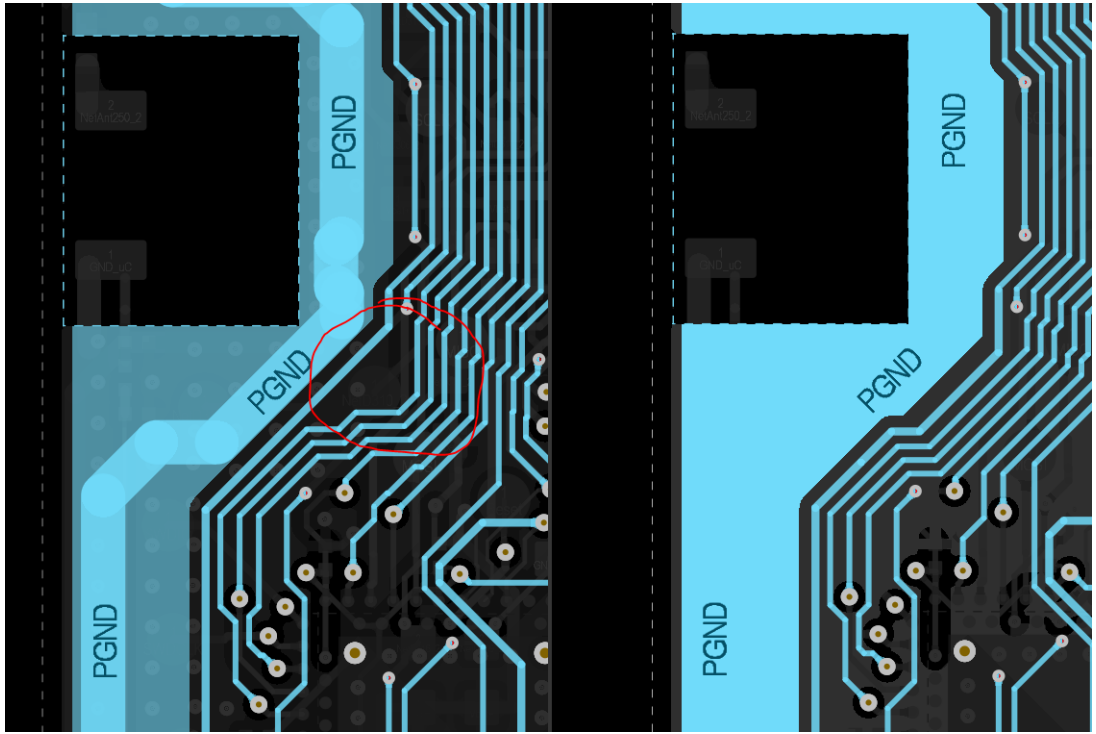
L2 both designs are **IDENTICAL** with perfect GND plane:



PCB Layout Delta Analysis (3)

Third PCB Layer (L3)

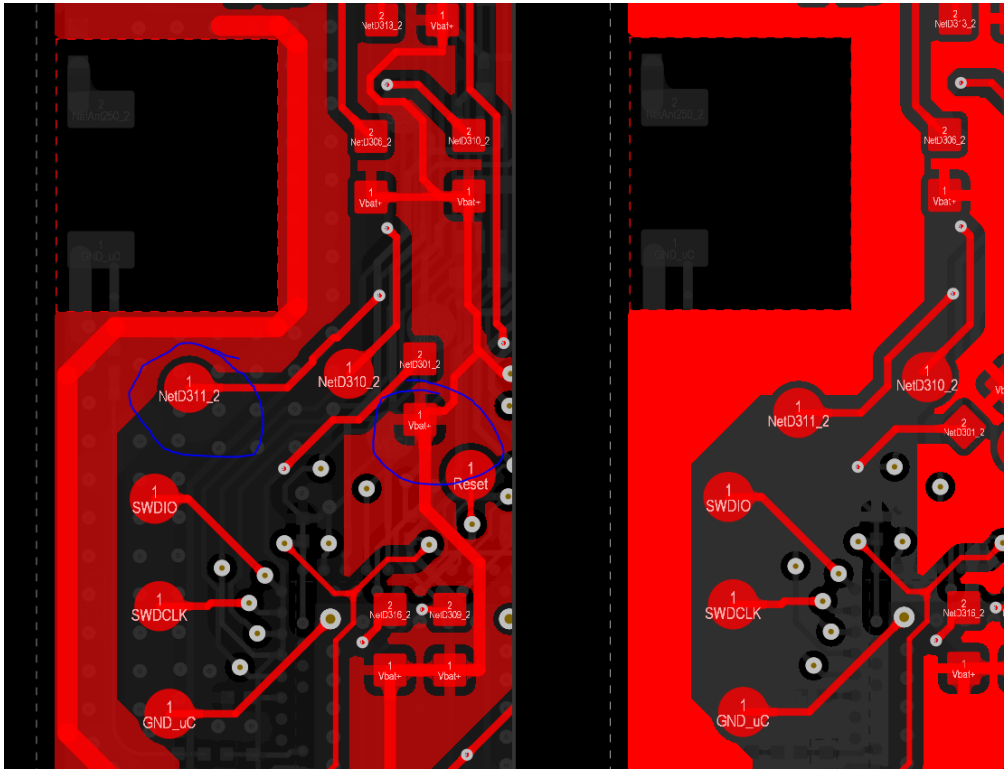
Minimal routing change, will **NOT** affect antenna circuit:



PCB Layout Delta Analysis (4)

Fourth PCB Layer (L4)
Small changes, TP7 moved and D301 45 degrees rotated.

Also, minimal routing change, which will **NOT** affect antenna circuit.



PCB Specification

- The **same** PCB materials, stack up and layers are the used across our designs thereby giving us the same PCB board properties

Layer
Name

Layer	Name	Material	Thickness	Constant	Board Layer Stack
	Top Overlay				
	Top Solder	Solder Resist	0.010mm	3.5	
1	Top Layer	Copper	0.025mm		
	Prepreg	FR-4	0.075mm	4.2	
2	Mid-Layer 1	Copper	0.025mm		
	Core	FR-4	0.830mm	4.2	
3	Mid-Layer 2	Copper	0.025mm		
	Prepreg	FR-4	0.075mm	4.2	
4	Bottom Layer	Copper	0.025mm		
	Bottom Solder	Solder Resist	0.010mm	3.5	
	Bottom Overlay				

CHN | SETNAME

UN-D-28 | TOLERANCES UNLESS OTHERWISE STATED
TOLERANTIES TENZIJ ANDERS VERMELD
DIMENSION MAAT 0.15 | ANGLE HOEK

Ra IN um (micron)

ITEM STUK | ASSEMBLY NO. SAMENSTELLINGS NR. | QUANTITY AANTAL

GENERAL ROUGHNESS ALGEMENE RUWHEID

UNIT EENH. mm

MATERIAL MATERIAAL: FR-4 UL-94V0 1.20 mm -0.12 +0.10 Max Oper. Temp. >= 90°C (UL-ANSI).
Solder resist: Green, preferably matte or semi-matte, Halogen Free
Silkscreen: white
Laminate HF: Sheng Yi S1150G for High Frequency boards

PATTERN NO. / MODEL NR.

SCALE SCHAAL 1 : 1

PROJECTION PROJECTIE

TREATMENT BEHANDELING: OSP: Entek Plus HT (original Enthone)
Alternative finishing Shikoku Glicoat SMD (F2)

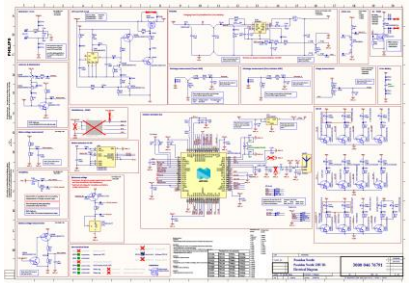
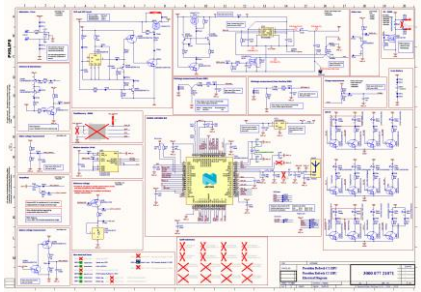
ORDER NO. / ORDER NR. | QUANTITY AANTAL

Summary

- The electronic hardware design was **limited to the charge circuit module** which is a section on the board, while the remainder of the design is identical to the original S7700 series.
- Similarly changes in the layout design was limited to the charge circuit, while the critical circuit for the BLE is the **same** as the original S7700 shaver series.
- Since the shaver housing **remains the same** and no other source of disturbance are introduced
- From the software perspective, we made **no changes** to the Bluetooth module giving us the same function and performance as the original S7700 shaver series

Appendix

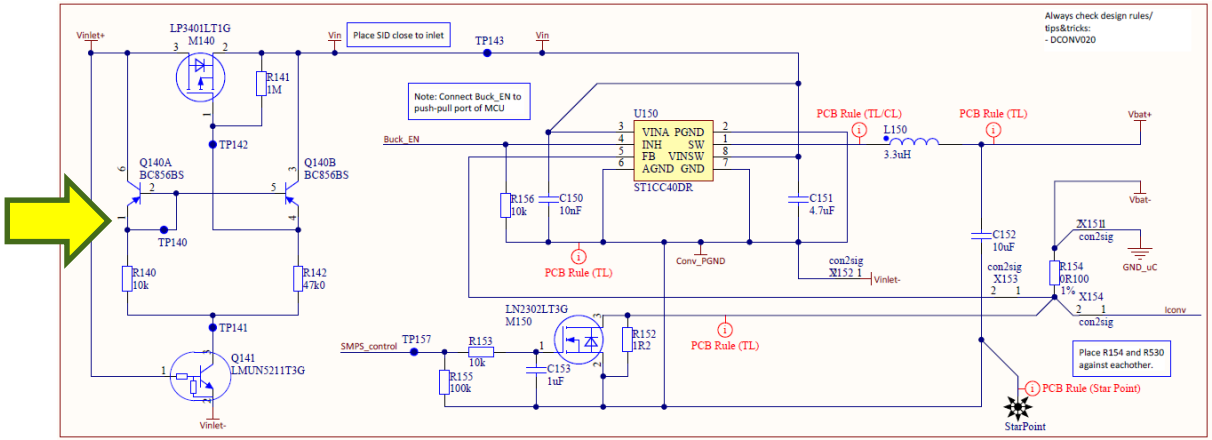
- Schematic File for old and new designs (*click images*)

S7700 Current	S7700 update
	

Poseidon S7700 update second source

Schematic for the Charging Circuit Poseidon Nordic update

- Updated Charging Circuit in S7700
  - *SID + ST1CC40DR Charge Module*
- **5 Volt**
- Supplier: **ST**

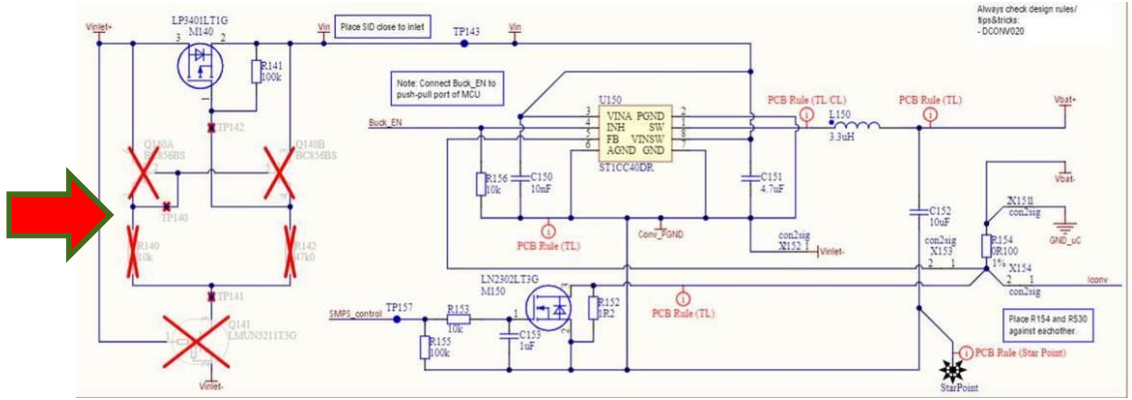


Schematic for the Charging Circuit Poseidon Nordic update + second source

- Updated Charging Circuit in S7700
  - *ST1CC40DR Charge Module. SID circuit is removed for 15V*

- **15 Volt**

- Supplier: ST

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