Senoko PVT ECO List

From Studio Kousagi Wiki

This is a list of all the changes applied to the board from DVT to PVT (Crowd Supply initial campaign) release. If it's not on this list, it didn't happen.

Each change has the format of issue summary/resolution, and specific change

Contents

ECO 1: Improve inductor clearance

The ferrite MSS1260 used as the primary power inductor is a bit too tall and large. Use a composite molded core XAL7030 which is a bit more compact.

Pros/cons: XAL7030 has a better rated Irms than MSS1260, but seems mostly due to better heat conduction out of the package, not due to better electrical performance. The DCR of XAL7030 is 19.5mOhm, MSS1260 is 12.60mOhm, so conduction losses are greater. Isat of the XAL7030 is better due to soft-saturating characteristic of the composite core. Overall, I expect there to be very little change in practical circuit performance, perhaps a little extra heat during peak battery charging situations.

The MSS1260 isn't removed from the PCB layout. Instead, XAL7030 shall be fitted inside the footprint of the MSS1260. This allows for going back to the original inductor in case there is a design issue with the XAL7030.

This change is coordinated onto Novena BOM as well.

DVT	PVT	Notes
L200 3.3uH, MSS1260-332NL	L200 3.3uH, MSS1260-332NL (DNP)	remove from BOM but leave footprint
add	L200B 3.3uH, XAL7030-332MEC	add inductor within old footprint

ECO 2: Route power switch to mainboard

Power switch pin is routed to mainboard for pass-through to front panel.

Pin 14 (previously an NC 3.3V pin) is now dedicated to CHG_PWRSWITCH.

DVT	PVT	Notes
add	R120 330, 1%	ballast resistor

ECO 3: Add power supply detection hooks

Per xobs' request, a spare ADC and UART TX/RX pin is routed to a test point, to enable auto-detection of power supplies that offer such a feature.

Conveniently, USART2_TX is multiplexed with an ADC inside the STM32. This means we can have one connector to do it all.

P102 is re-purposed from a general analog input to use as an ADC/one-wire interface. In order to make this work, a 4.7k pull-up is added to 3.3V_UC.

The header is also replaced to be a JST-B2B-EH-A type connector, which offers a friction-lock modular solution for wiring, as opposed to the current rather slippery pin header.

DVT	PVT	Notes
add	R121 4.7k, 1%	
P102 Male 2.4mm 2x1 right angle header	P102 JST B2B-EH-A	

ECO 4: Remove JTAG and replace with test pads

Remove the JTAG header to make space for other mods. We've never really used it anyways.

DVT	PVT	Notes
P100 Male 2.54mm 10x2 header	removed	
R115 10k, 1%	removed	
add	several test points, no BOM impact	

ECO 5: Add notch for case support

A small rib is added near Senoko to prevent the lid from pushing in when a lot of force is applied on it. This requires a notch to be put into the Senoko PCB to accommodate. Some small components are moved, no BOM change.

ECO 6: Upgrade thermal sensor connectors

P302/P303 are currently right-angle headers, which have no friction lock.

Upgrade to JST EH series with friction lock.

The downside is bypassing the thermal sensor requires a cable assembly instead of a simple header. But ideally, we should be using the thermal sensor capability on the battery pack for safety's sake. RC packs

don't include a thermal sensor but most likely we'll include a cable assembly with a thermal sensor that can be taped onto the battery pack as a recommended best practice.

DVT	PVT	Notes
P302 Male 2.54mm 3x1 right angle header	P302 JST B3B-EH-A	
P303 Male 2.54mm 3x1 right angle header	P303 JST B3B-EH-A	

ECO 7: Upgrade DAC output header

While we're at it, might as well make the DAC output header a "real" connector as well. We have no use for this header right now, but maybe someone will find one.

DVT	PVT	Notes
P101 Male 2.54mm 2x1 right angle header	P101 JST B2B-EH-A	

ECO 8: Fix BQ29412DCT EOL issue

BQ29412DCT is EOL in a pretty bad way.

Unfortunately, there are no pin-compatible substitutes, so the secondary protection network has to be redesigned.

Use the bq77PL157A4225 instead. It's fairly similar, and it offers a driver for a low-side NFET that can disconnect battery pack ground in case of failure. This obviates the need of keeping the microcontroller in the loop for disconnecting the pack in case of catastrophic failure, which arguably makes this a safer design.

Furthermore, the form factor of the battery board is extended slightly to accommodate the larger protection circuit.

This is considered to be a high-risk change, and must be re-qualified for production.

DVT	PVT	Notes
U300 BQ29412DCT	U300 bq77PL157A4225	
added	R339 1k, 1% (DNP)	
added	U302 NTMFS4C35NT1G	

ECO 9: Make programming header DNP

We program via the serial interface, not SWD. No need for header.

DVT	PVT	Notes
J101 Male 2.54mm 5x1 header	J101 Male 2.54mm 5x1 header (DNP)	

ECO 10: Add IRQ line

Compliment of IRQ line ECO on Novena. Adding IRQ line because it's too hard to write a console driver to recognize data coming across the UART into the CPU. 1

DVT	PVT	Notes
added	R115 330, 1%	