

System platform with multiconnectivity and multisensors for IIoT application



Fully assembled board developed for performance evaluation only,
not available for sale

Features

- Industrial sensor node platform based on multiconnectivity and multisensors for condition-based maintenance and structural health monitoring
- Flexible and modular platform based on:
 - One main board built around a solderable PCB module with **STM32WB5MMG** 2.4 GHz wireless dual core SoC module, as main application processor, supporting Bluetooth, and **STM32WL55JC** Sub 1-GHz wireless dual core SoC, as network processor, supporting multimodulation (LoRa and GFSK)
 - Two expansion boards embedding motion, inclinometer, and environmental sensors: **IIS3DWB**, **ISM330DHCX**, **IIS2ICLX**, **STTS22H**, **ILPS22QS**, with customized connector for mounting stacked on top of the main or remotely with a flexible PCB
 - Power management system architecture optimized to extend battery life and to handle the following supply voltages: industrial bus from 12 to 48 V, controlled by the **L7983** switching regulator; USB Type-C®: 5 V; primary battery: 3.6 to 4.5 V
- Range connectivity compatible with the **STBLESensor** app (Android and iOS) for nearby control and monitoring, and firmware update via fast FUOTA
- Long-range connectivity, based on LoRaWAN®, compatible with the **DSH-PREDMNT** AWS cloud-based web application for condition and structural monitoring

Description

Industrial IoT (IIoT) is driving technological innovation and progress in machinery and production systems. IIoT becomes more connected, with greater flexibility and control. The same technologies are gaining interest in structural health monitoring (SHM).

The **STDES-CBMLoRaBLE** proposes an innovative modular system platform, which incorporates multiple sensors, allowing many application scenarios.

The platform is based on sensors monitor vibration, environmental, inclinometer, and multiple wireless connectivities, short and long range.

The main applications fields are industry and energy farms (when performing condition-based monitoring), telecommunication applications (used for pointing, leveling, and stabilizing radars and antennas), smart buildings, and infrastructure (used for leveling and structural health inclination).

The hardware design consists of three boards: one main board and two expansion boards with sensors.

The modularity allows the user to place the expansion close to the equipment, using an easy-to-use PCB flexible expansion cable.

Monitoring is based on the edge processing running on the **STM32WB5MMG** microcontroller. This is the key element for all large-scale applications.

Raw data streams can easily exceed the bandwidth limits of the technology used, or even the processing capabilities of the servers network and cloud systems.

For these reasons, short and long-range connectivity have been considered (Bluetooth® Low Energy and LoRa) featured by an **STM32WB5MMG** module and an **STM32WL55JC** SoC. They enable nearby and remote monitoring via the **STBLESensor** mobile app and the **DSH-PREDMNT** AWS dashboard.

Product summary	
System platform with multiconnectivity and multisensors for IIoT application	STDES-CBMLoRaBLE
Multiconnectivity and multisensors industrial IoT application for condition based maintenance and structural health monitoring	STSW-CBMLoRaBLE
Ultra-wide bandwidth, low-noise, 3-axis digital vibration sensor	IIS3DWBTR
High-accuracy, High-resolution, Low-power, 2-axis Digital Inclinometer with Embedded Machine Learning Core	IIS2ICLXTR
iNEMO inertial module with Machine Learning Core	ISM330DHCXTR
Low-voltage, ultra-low-power, 0.5°C accuracy I²C/SMBus 3.0 temperature sensor	STTS22HTR
Dual full-scale, 1260 hPa and 4060	ILPS22QSTR

Product summary	
hPa, absolute digital output barometer with embedded Qvar electrostatic sensor	
60 V 300 mA synchronous step-down switching regulator with 10 μ A quiescent current	L7983PUR
Applications	Smart Industry/ Smart Farming/ Smart Home and City

These technologies can be used at the same time, via their user interfaces, for monitoring and setup purposes.

1 Block diagrams

Figure 1. Block diagram

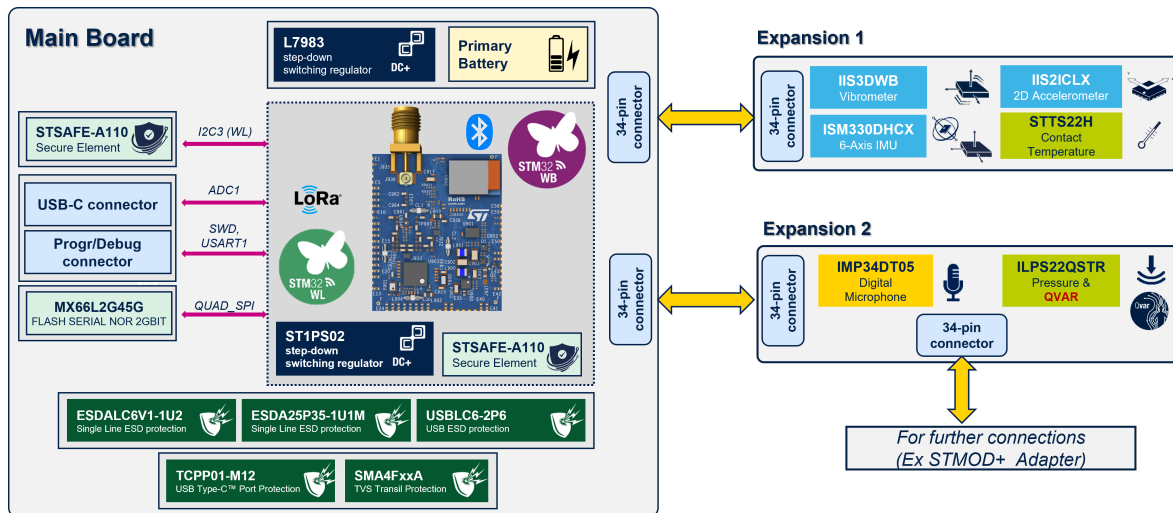


Figure 2. STDES-CBMLoRaBLE stacked assembly



Schematic diagrams

Figure 3. STDES-CBMLoRaBLE schematic diagram (1 of 10) – Main board/Top view

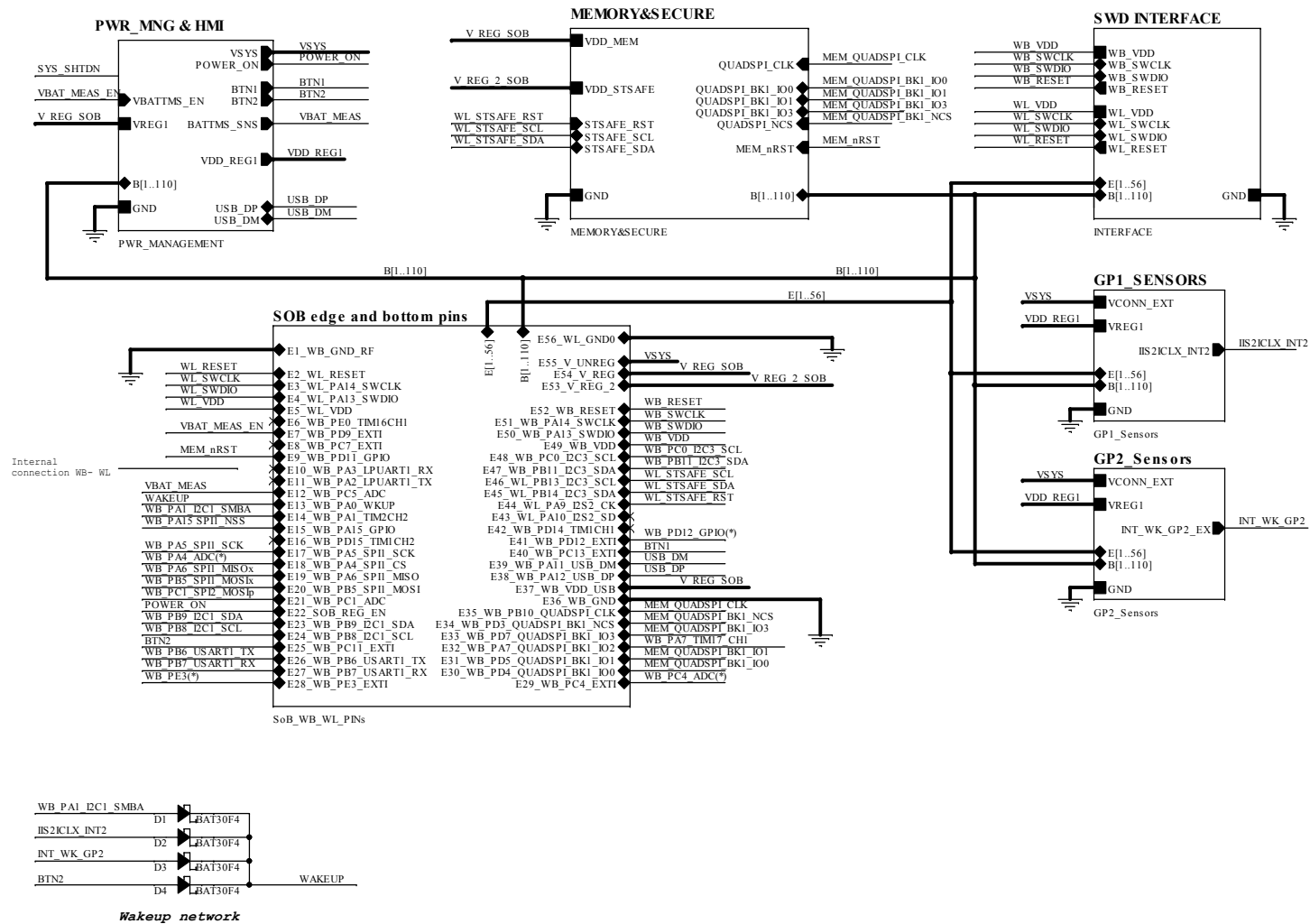
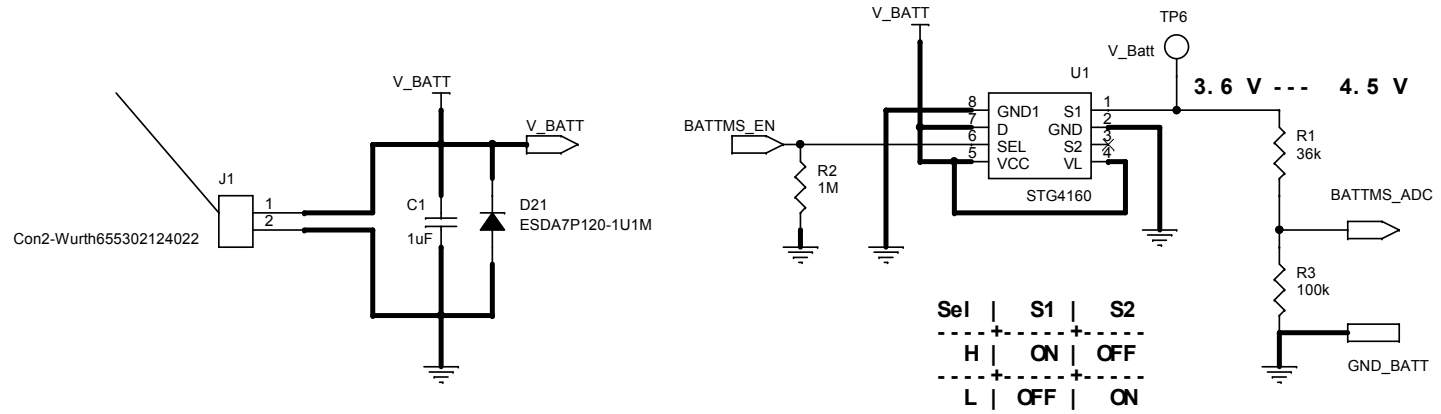


Figure 4. STDES-CBMLoRaBLE schematic diagram (2 of 10) – Main board/Battery



Voltage addressed:

Min -> 3.6 V

Max -> 4.5 V

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Schematic diagrams



Figure 6. STDES-CBMLoRaBLE schematic diagram (4 of 10) – Main board/GP2_Sensors

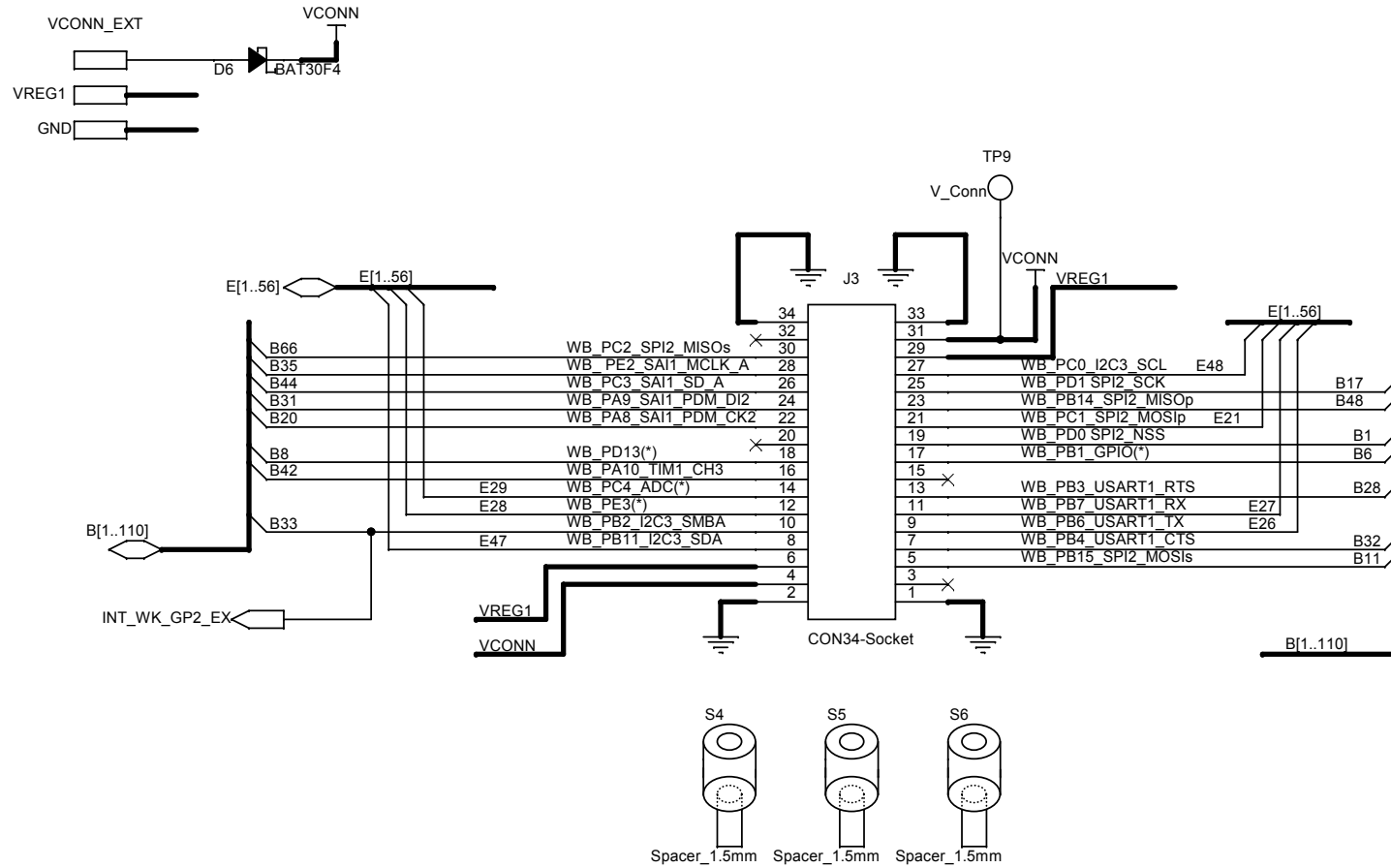


Figure 7. STDES-CBMLoRaBLE schematic diagram (5 of 10) – Main board/Interface

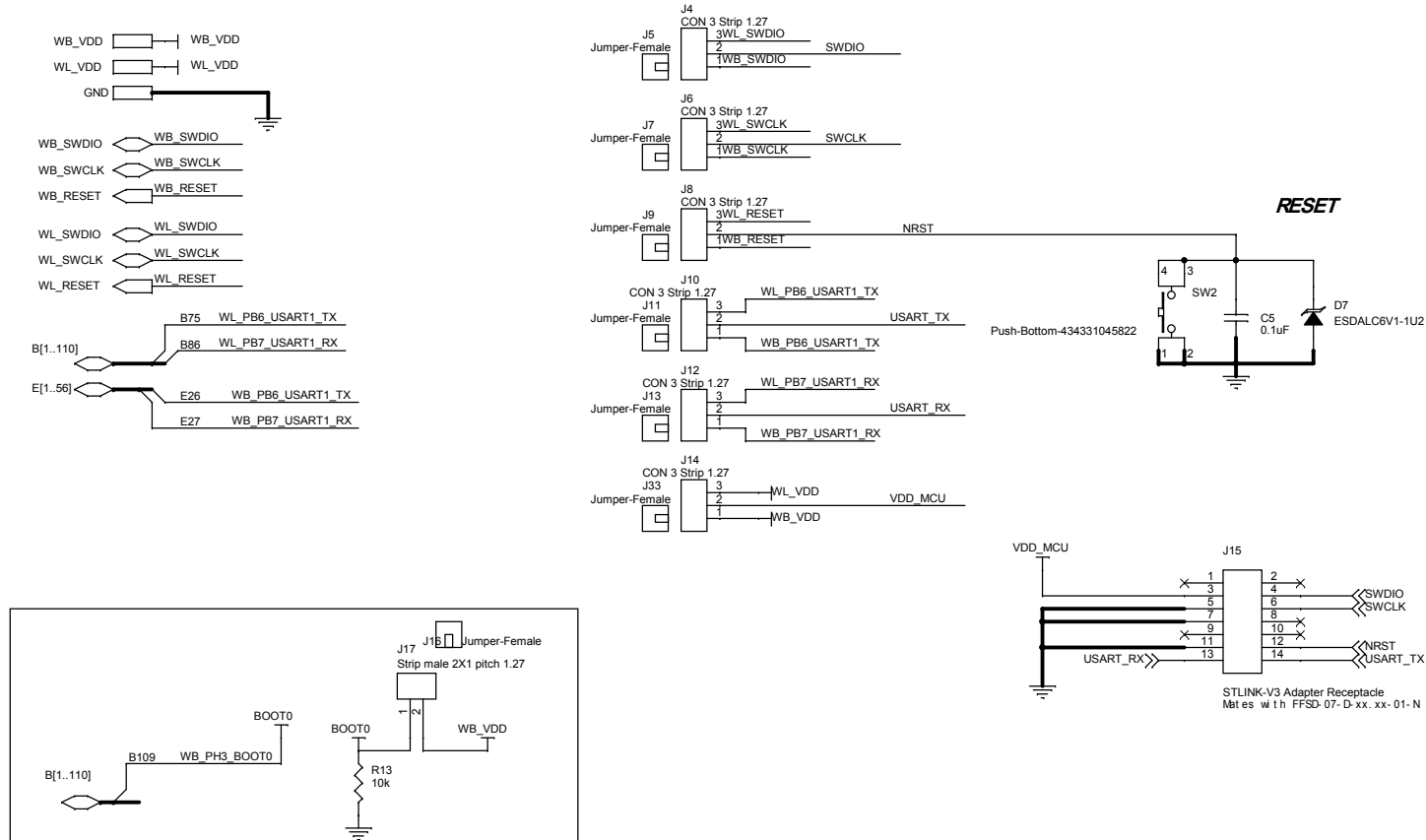


Figure 8. STDES-CBMLoRaBLE schematic diagram (6 of 10) – Main board/Memory&Secure

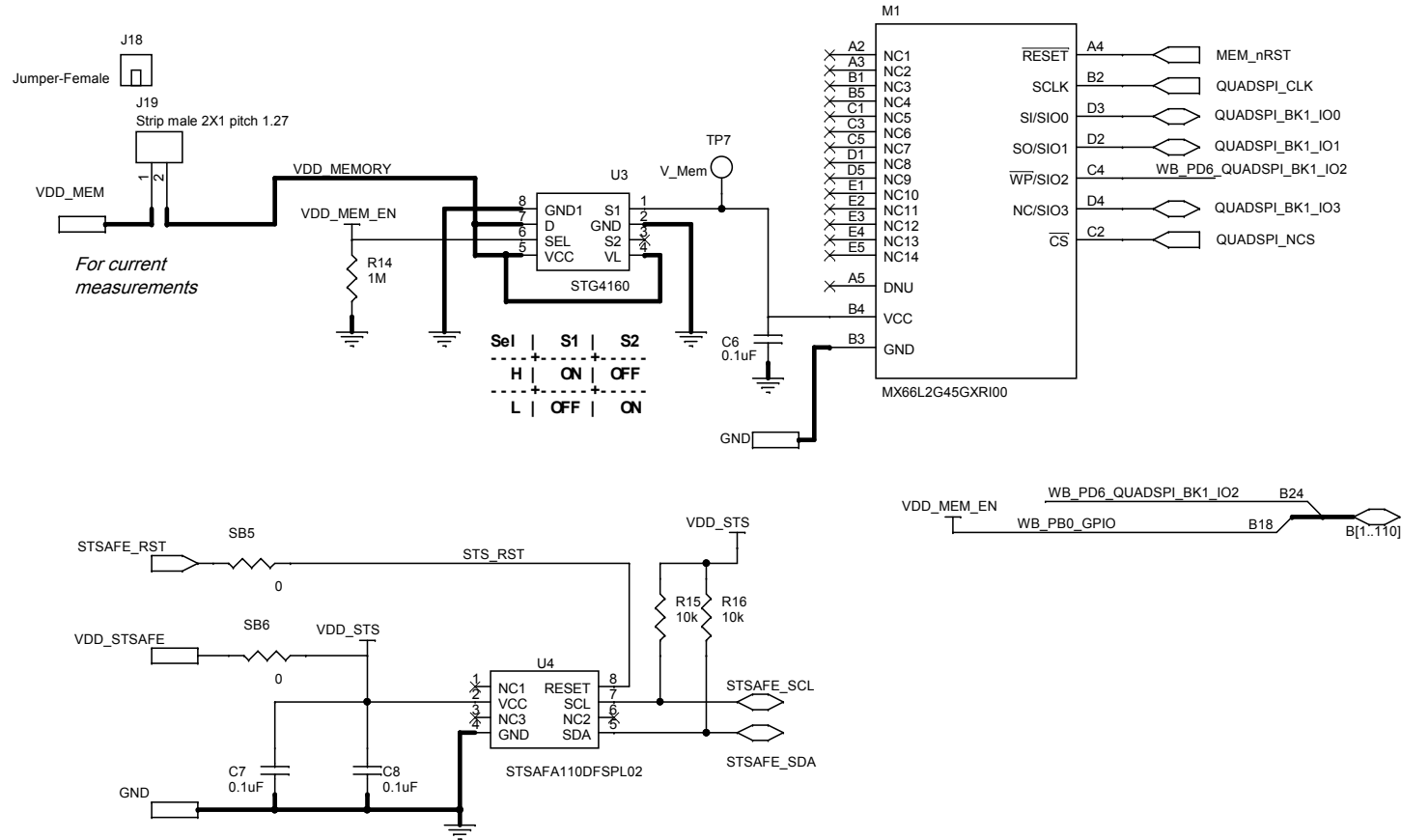


Figure 9. STDES-CBMLoRaBLE schematic diagram (7 of 10) – Main board/PW_IND

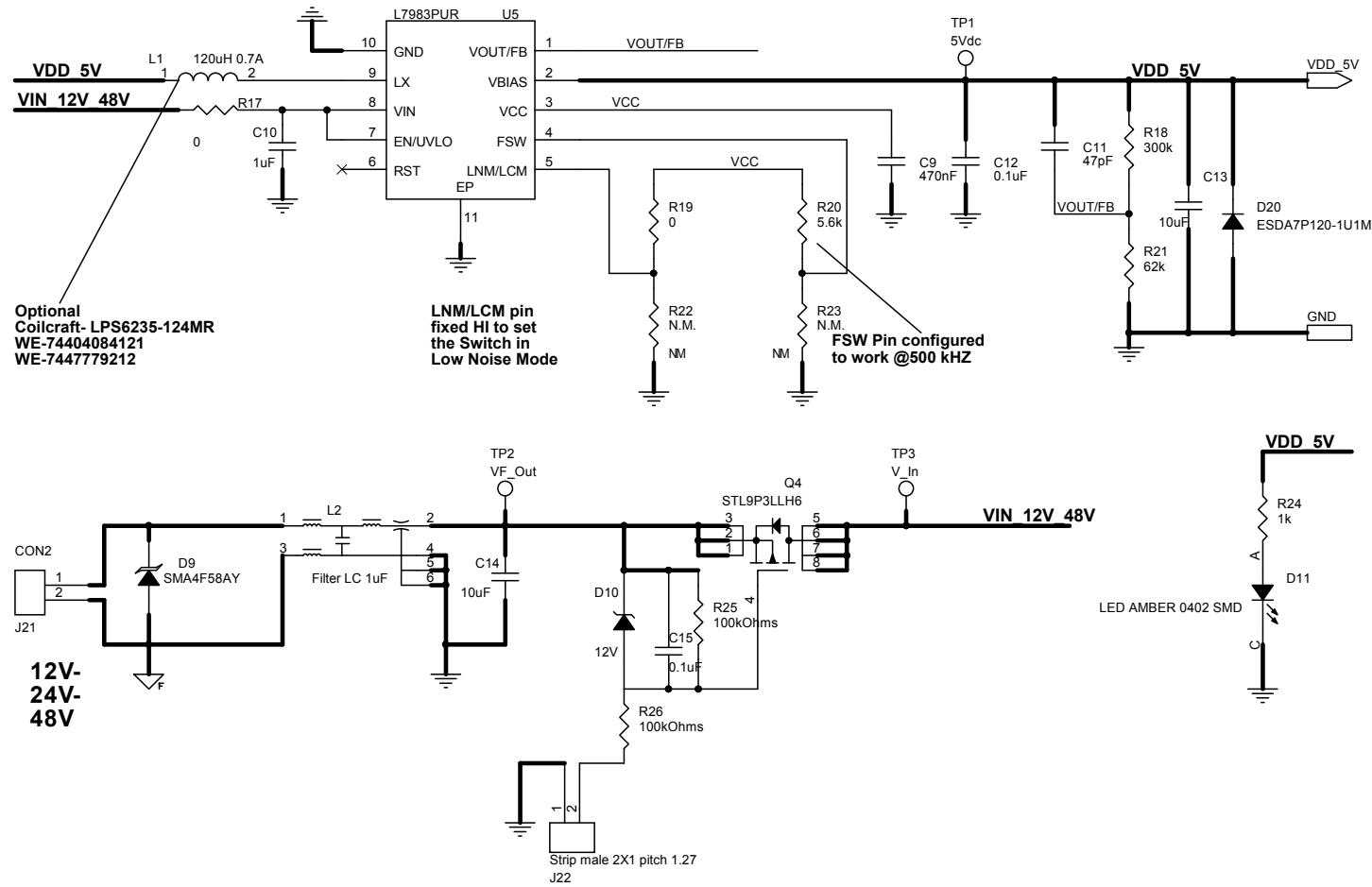


Figure 10. STDES-CBMLoRaBLE schematic diagram (8 of 10) – Main board/PWR_TOP

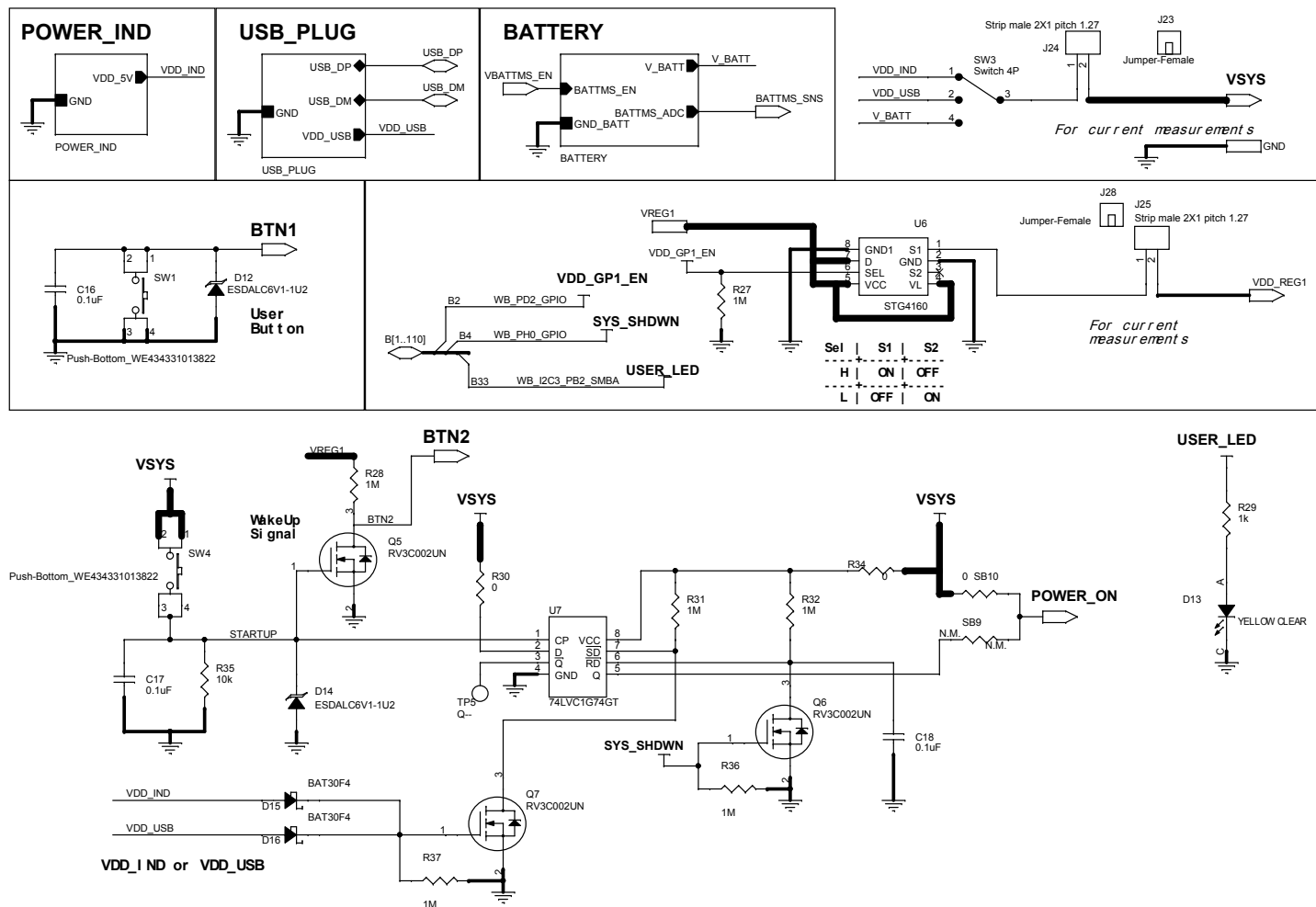
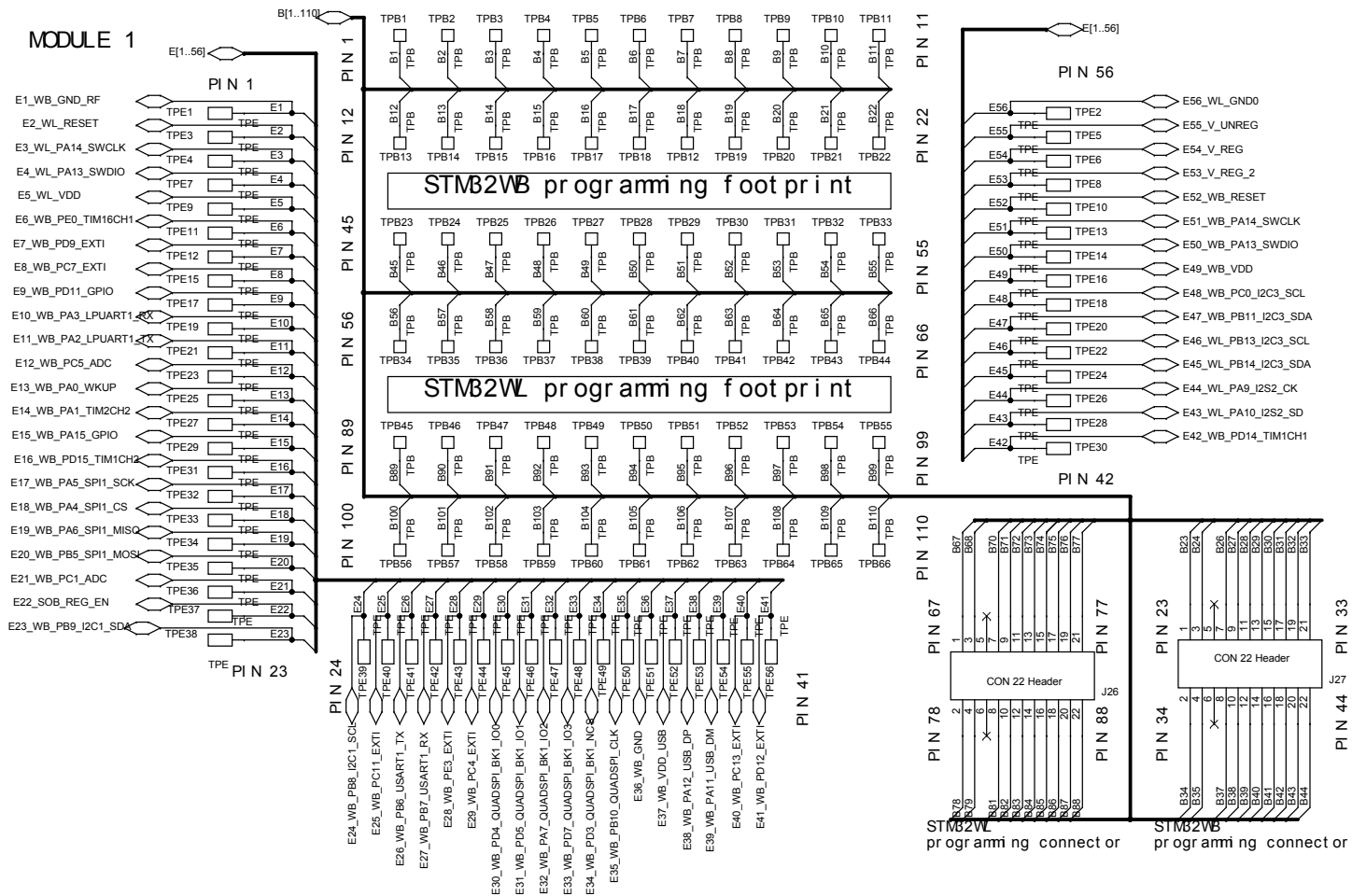


Figure 11. STDES-CBMLoRaBLE schematic diagram (9 of 10) – Main board/SoB_WB_WL



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Schematic diagrams



Figure 13. STDES-CBMLoRaBLE Schematic – Expansion board 1

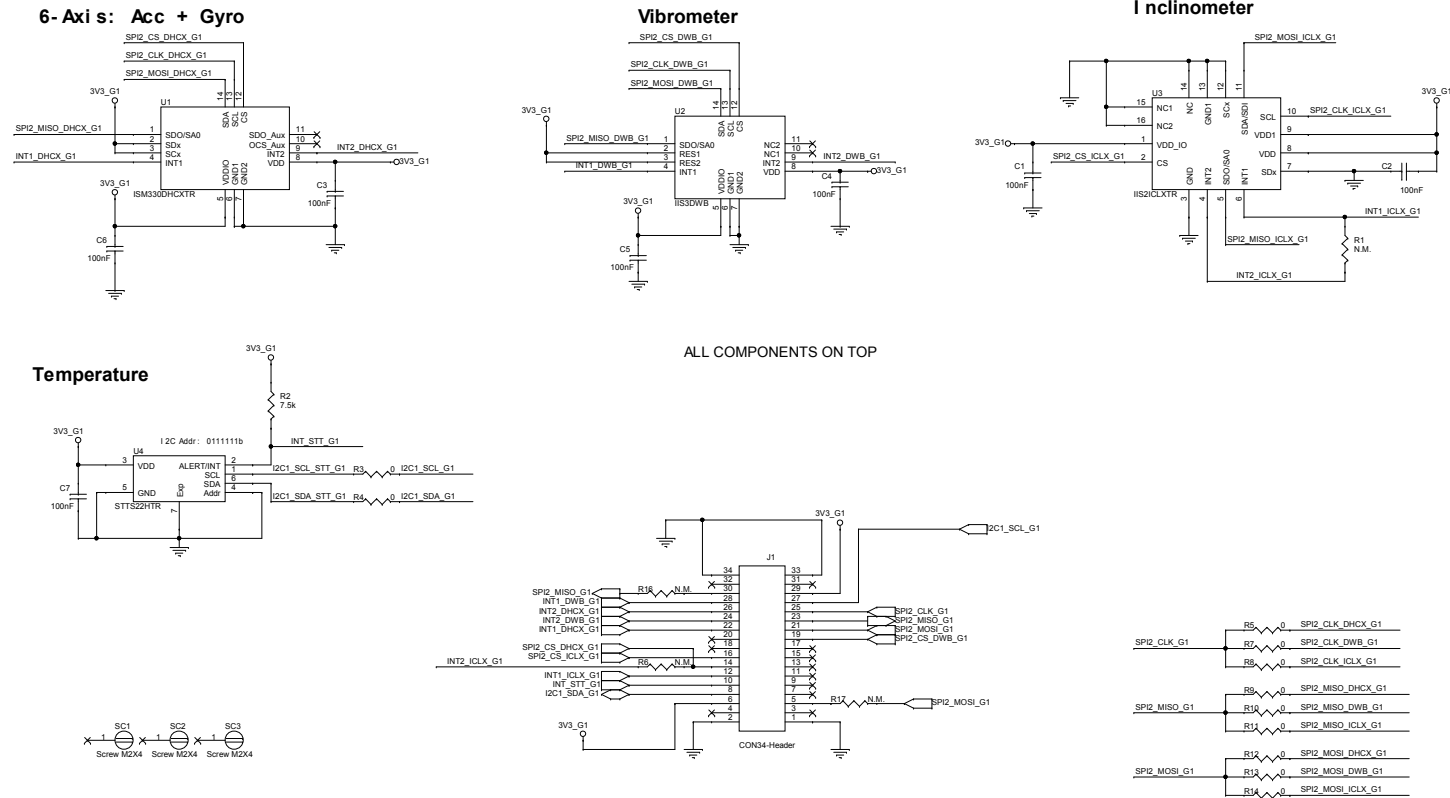


Figure 14. STDES-CBMLoRaBLE Schematic – Expansion board 2

Digital microphone

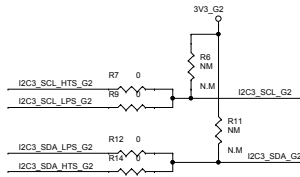
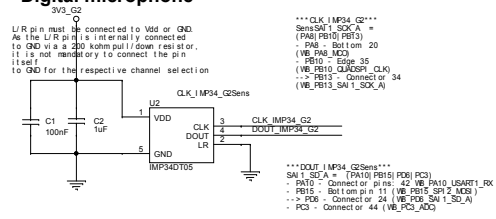


Figure 15. System on board circuit schematic (1 of 9)

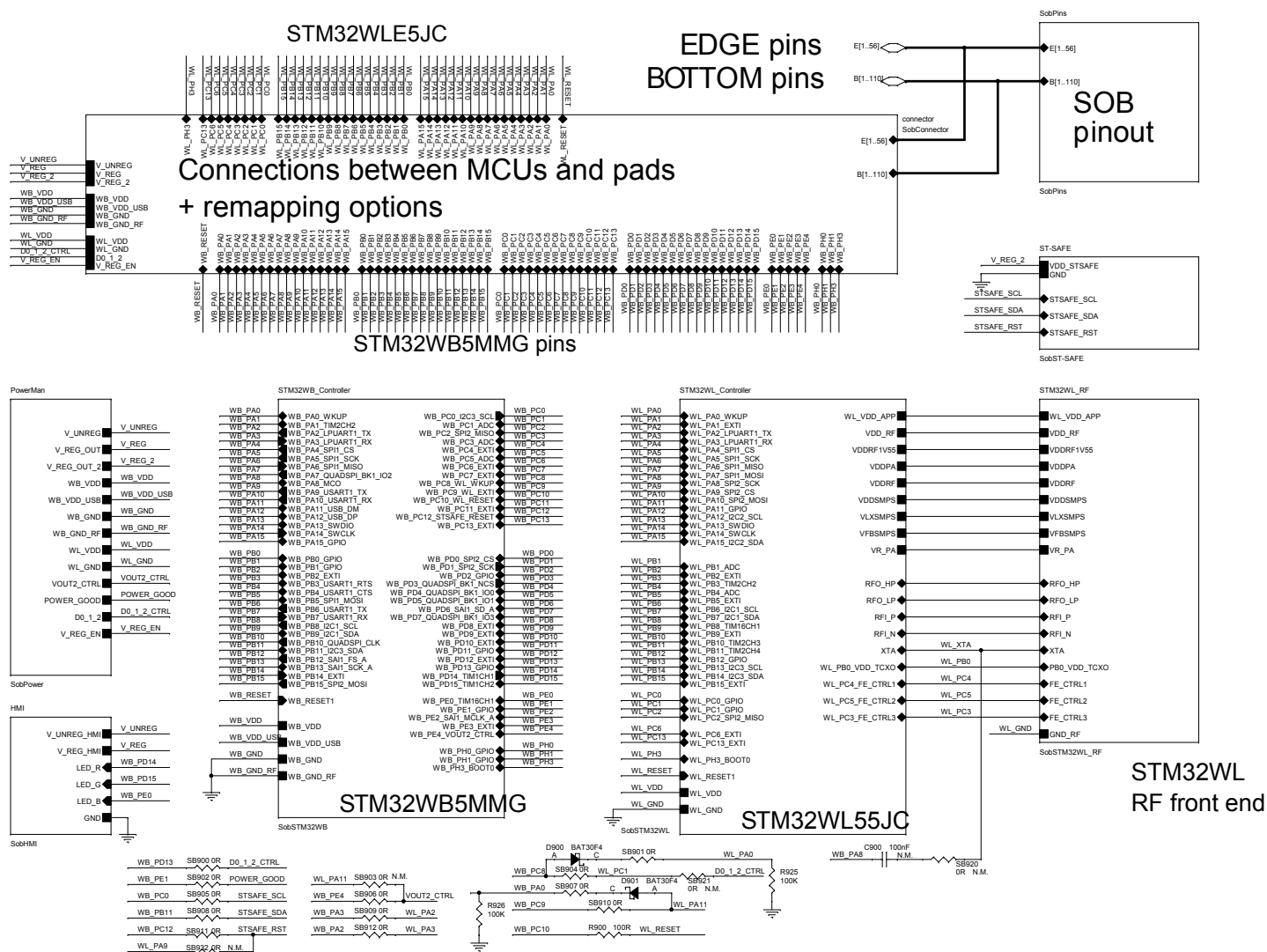




Figure 18. System on board circuit schematic (4 of 9)

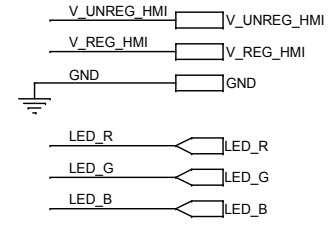
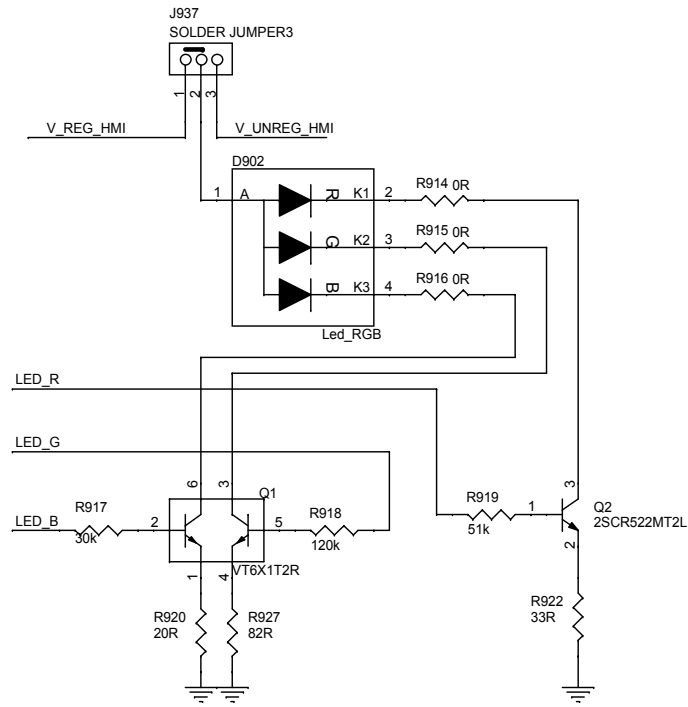


Figure 19. System on board circuit schematic (5 of 9)

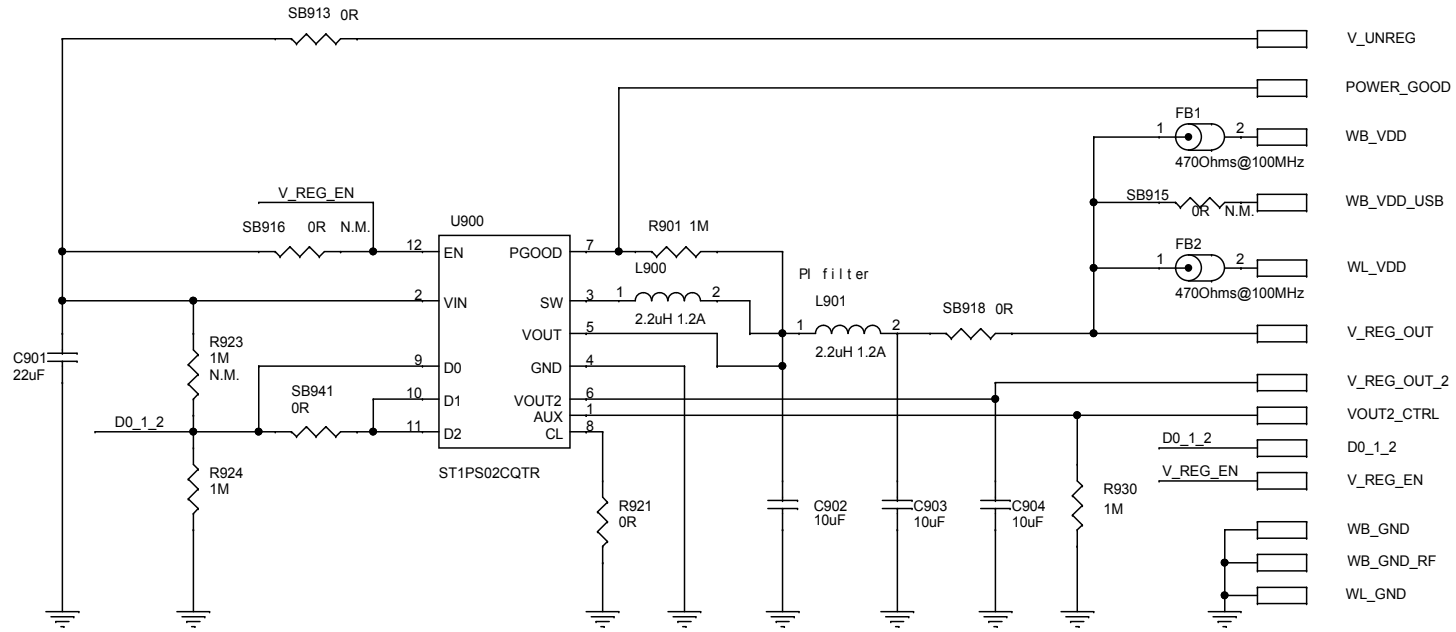


Figure 20. System on board circuit schematic (6 of 9)

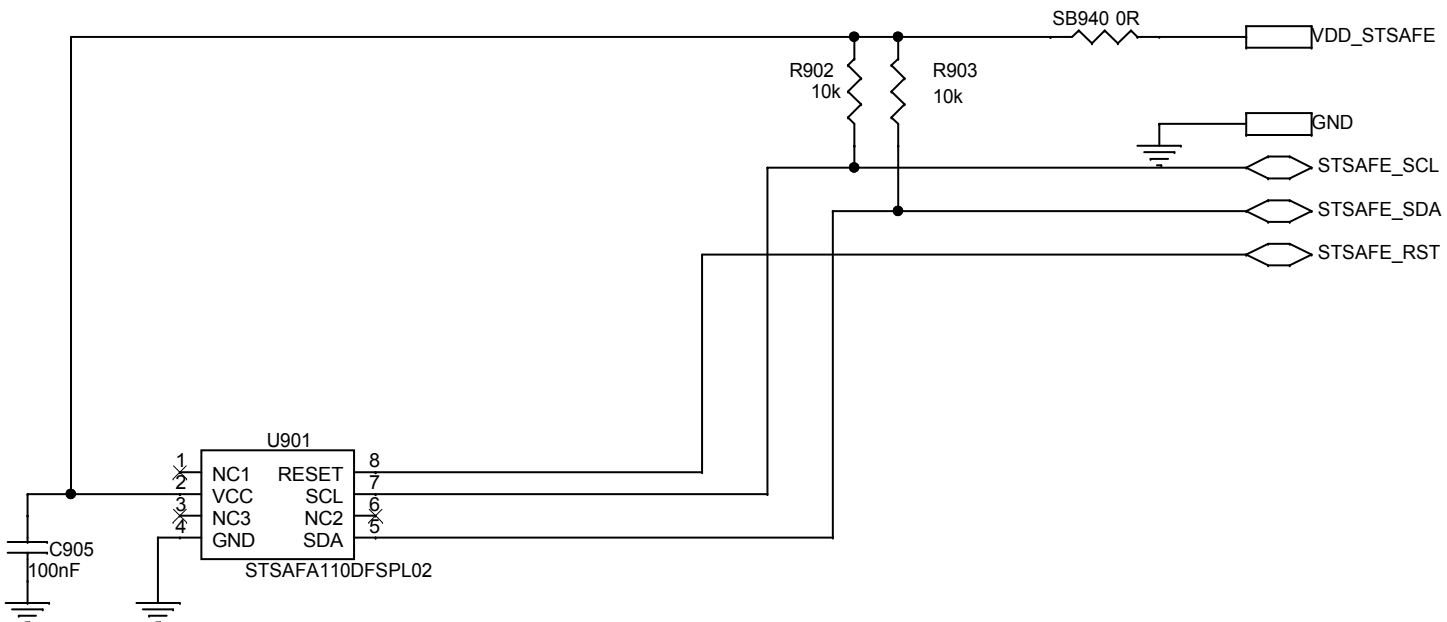


Figure 21. System on board circuit schematic (7 of 9)

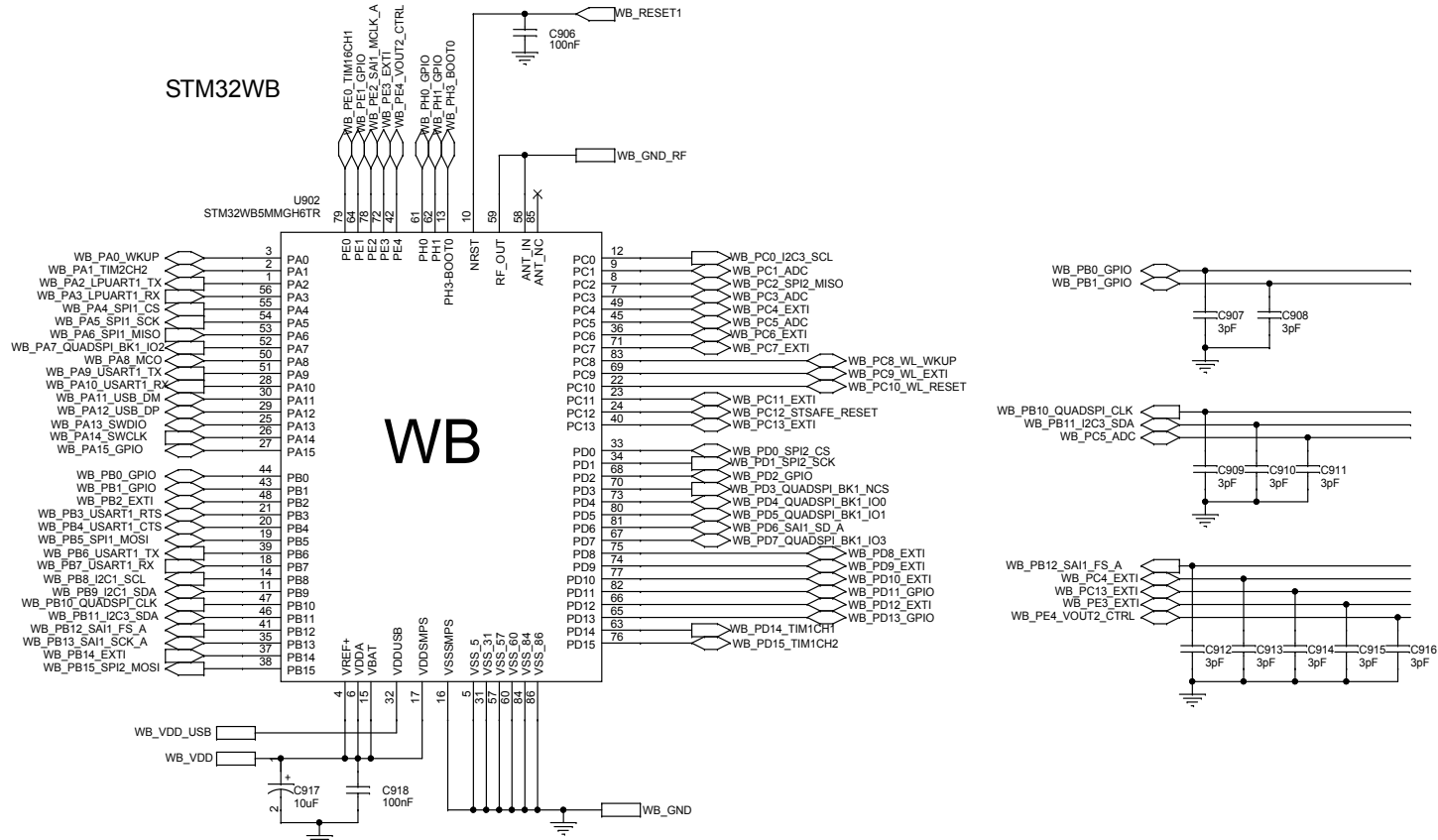


Figure 22. System on board circuit schematic (8 of 9)

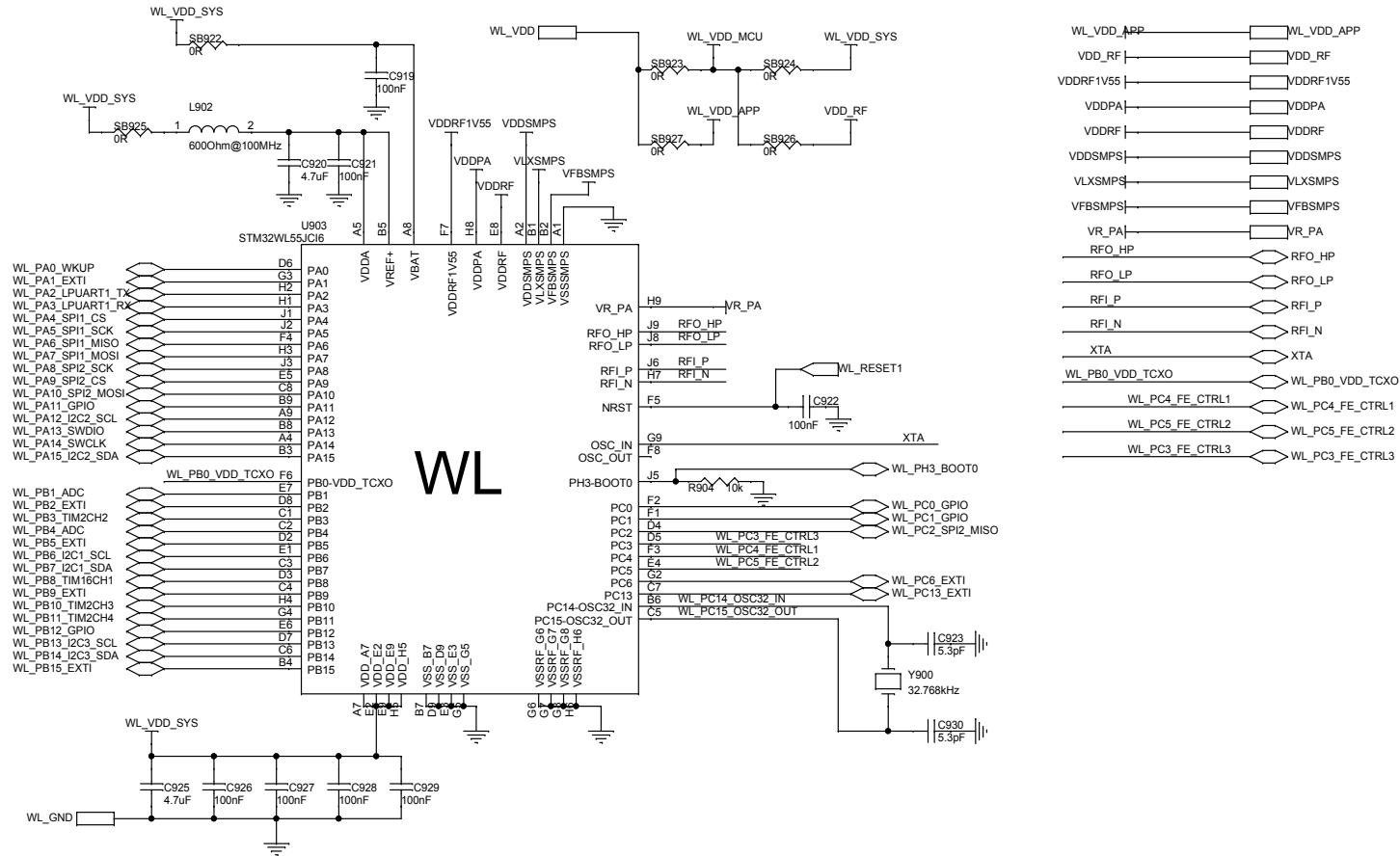


Figure 23. System on board circuit schematic (9 of 9)

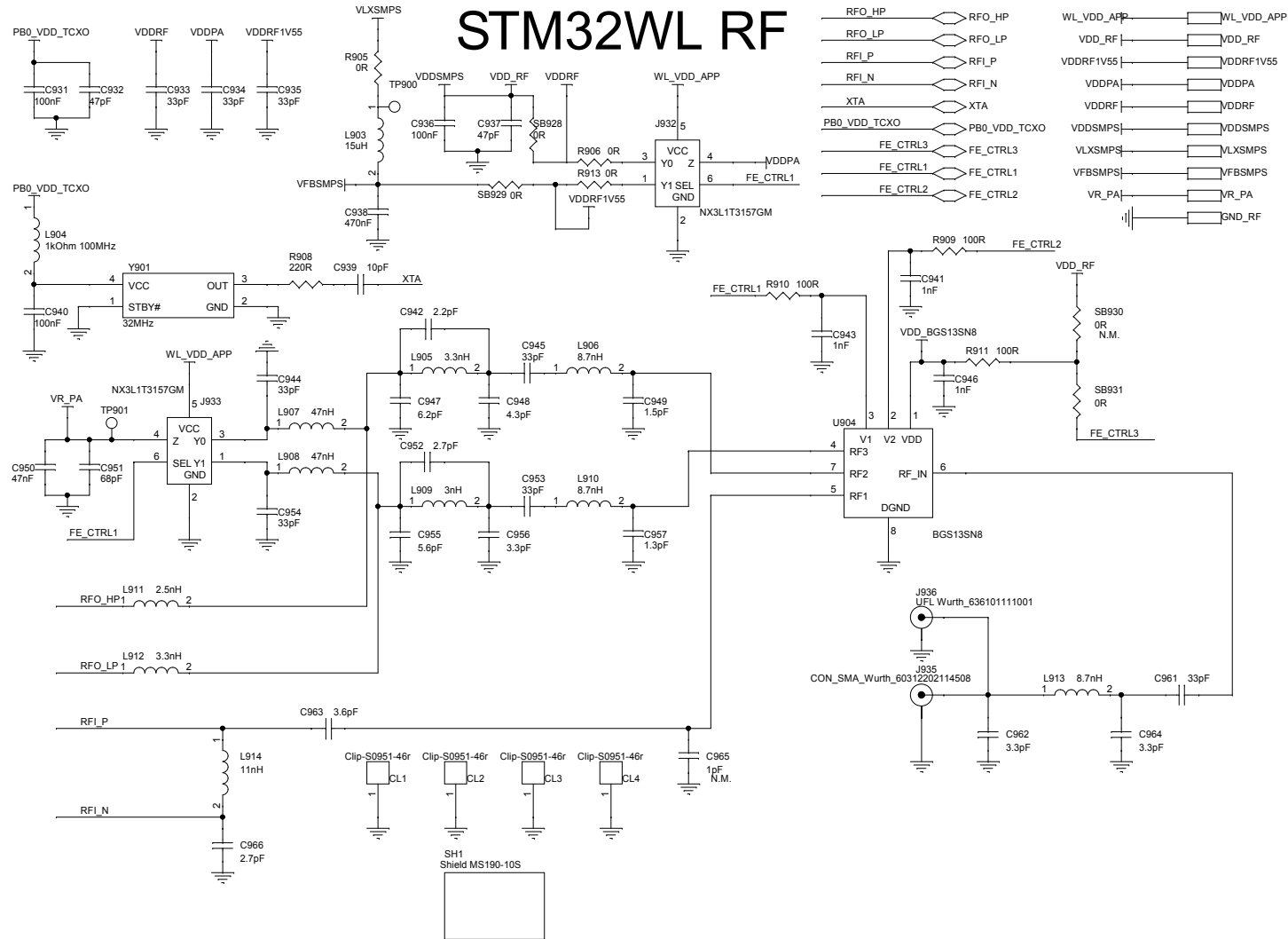


Figure 24. Flexible cable 1 circuit schematic

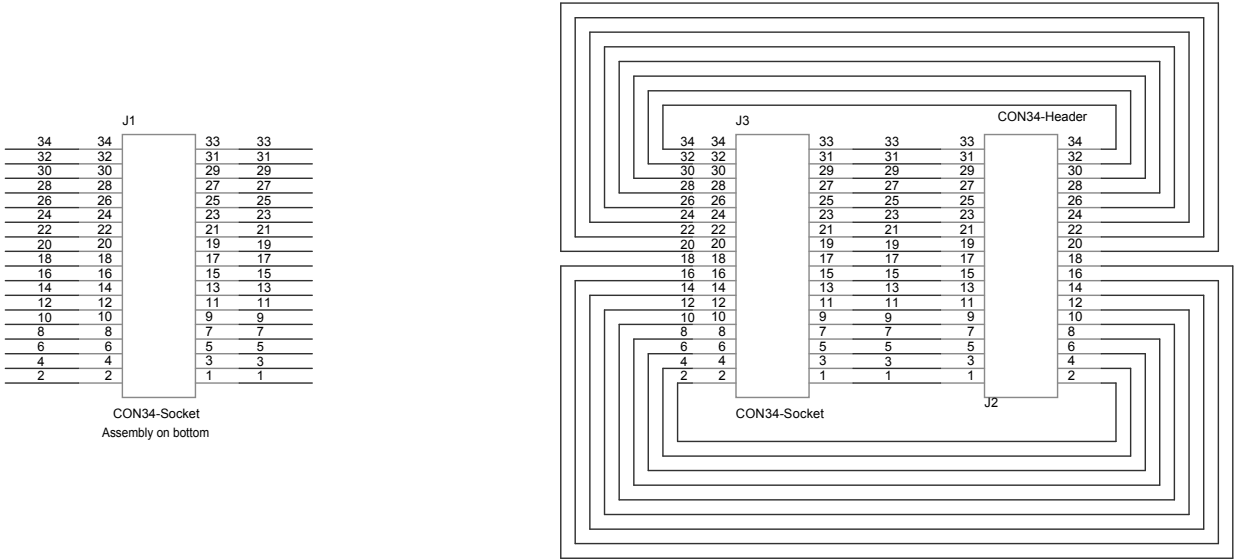
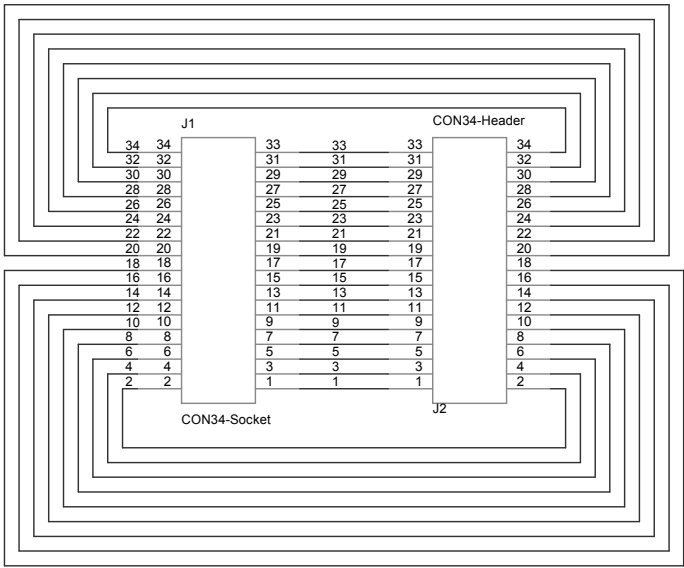


Figure 25. Flexible cable 2 circuit schematic



Revision history

Table 1. Document revision history

Date	Revision	Changes
03-Nov-2022	1	Initial release.
14-Nov-2022	2	Updated product summary.

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