GWS CLOUD

Part Number: SSD009

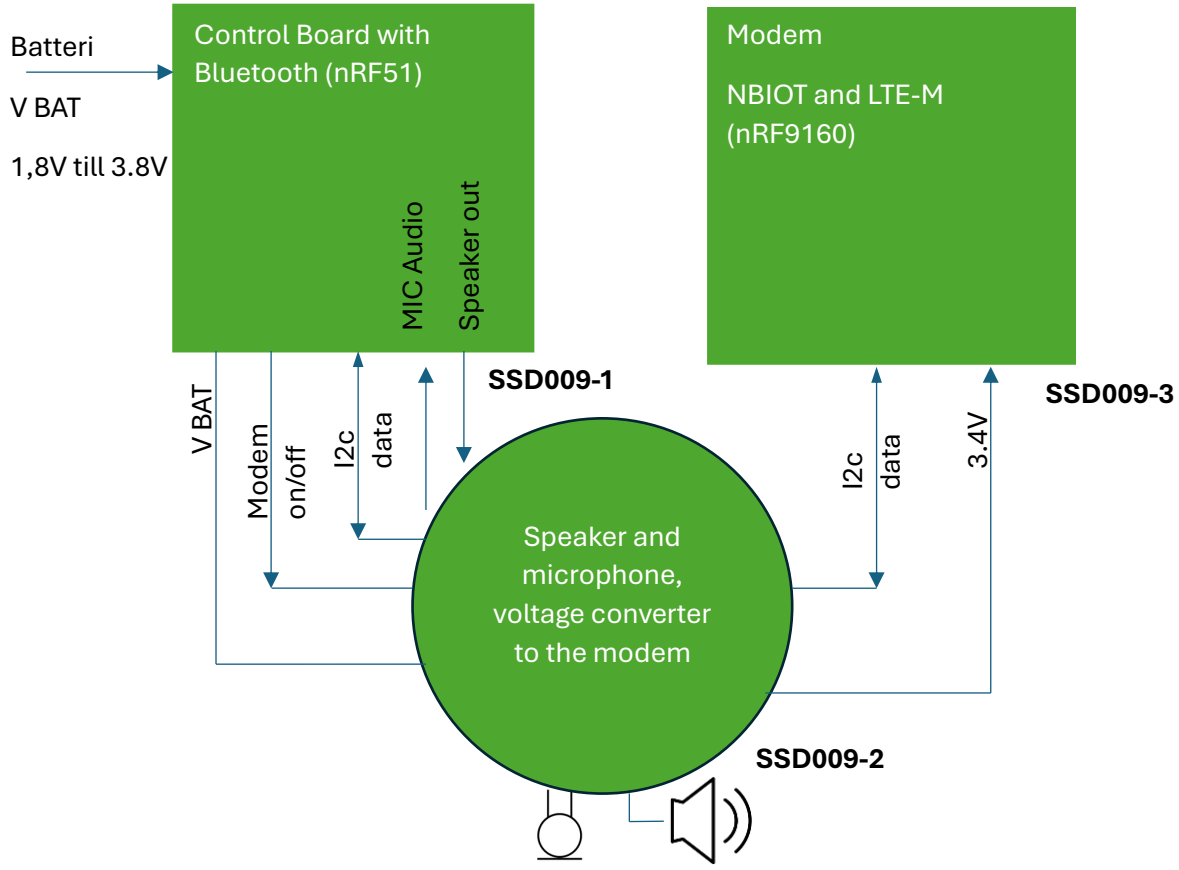
The Ground Water level Sensor (GWS) is based on three PCB as a modular approach. This is also done to fit into the mechanical casing, that is already fabricated.

Block diagram

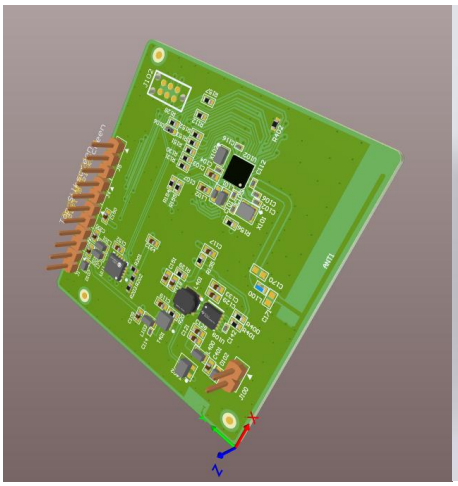
Control Board (**SSD009-1**) has the input power connector to a 3,0V battery and is also connected to the Sensor Board. The Bluetooth micro-Processor is from Nordic Semiconductor (nRF52832 and runs directly from the battery. The micro-Processor calculates the depth in a pipe by generating a tone in a speaker and then receive the echo with a microphone. An Audio power amplifier is used to connect to the speaker on the sensor board.

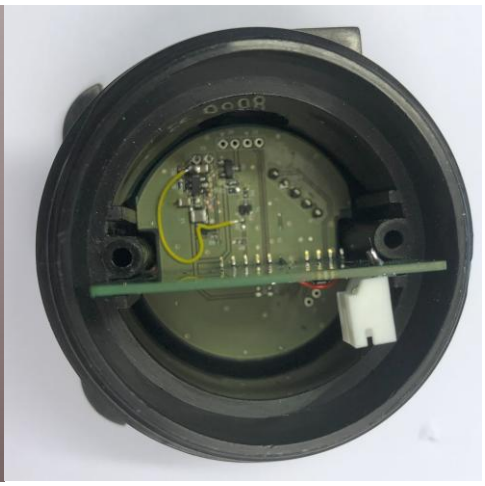
The Sensor board (**SSD009-2**) contains a speaker and an I2S microphone. It also converts battery voltage to a stable 3,4V for the modem.

Modem board (**SSD009-3**) has a LPWAN modem from Nordic Semiconductor (nRF9160) och SIM card holder, it is used to connect to cloud with LTE-M CAT M1 network.



Control board with Bluetooth Low Energy (**SSD009-1**)





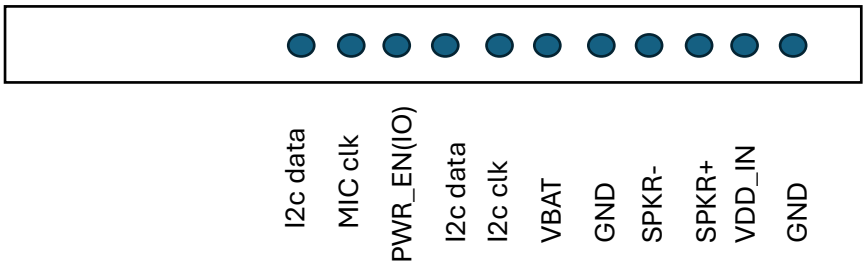
The Control board contains a Microcontroller (nrf532) that runs the algorithm that calculates the depth in a pipe. The board has also a PDM Audio Power amplifier to amplify the tones.

The board calculates the depth in the pipe and send the data to the modem on the i2C bus.

nRF52 pin configuration

P0.29	I2C SDA - i2c Slave to NBIOT modem
P0.28	I2C SCL - i2c Slave to NBIOT modem
P0.20	SD MODE - OUTPUT (init)
P0.18	LRCK -
P0.16	i2s data SPKR
P0.15	i2a clk SPKR
P0.14	pdm clk MIC
P0.13	pdm data MIC
P0.12	PWR_EN(IO)
P0.08	LED

Signals on the Connector towards the Sensor Board SSD009-2, Pin pitch 2.0 mm

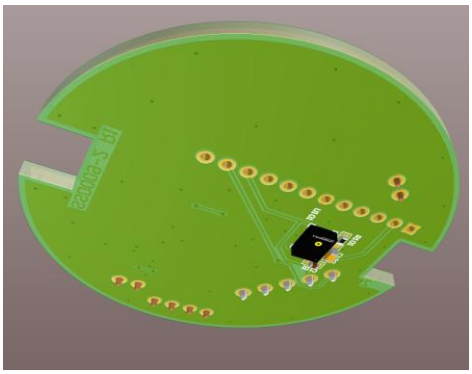


Sensor Board. (**SSD009-2**)

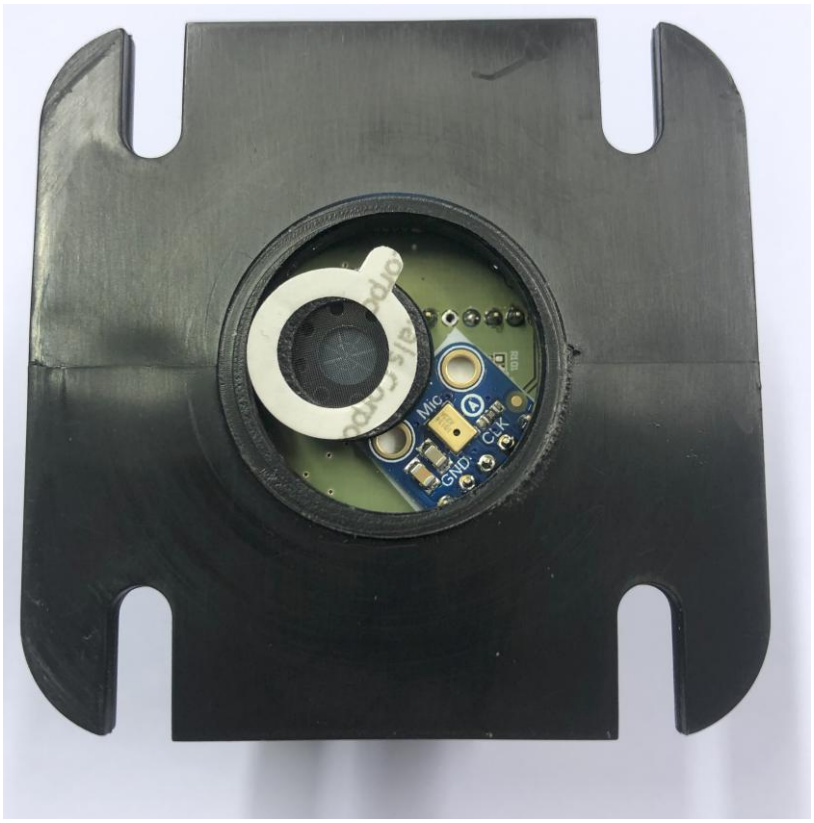
The sensor board contain the SMD microphone and the speaker.

The board has a voltage converter that convert the battery voltage into a stable 3.4V (**TLV61220**) (input voltage range: +1,8V till +3,0V). The voltage coverte can be shoutdown and the input voltage is disconnected from the ouput.

There is a power switch that also disconnect the VDDIO voltage to the modem-

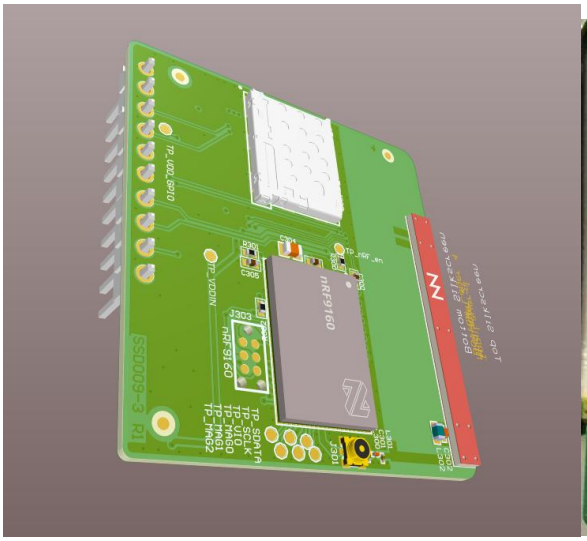


microphone and speaker



Modem Board (SSD009-3).

Cloud connectivity LTE-M / NB-IOT modem



The board contains a modem module from Nordic Semiconductor (nRF9160),a multi-band Antenna and Sim holder. The board has two input voltage VDD at 3,4V and VDDIO that will be the battery voltage.

Modem Chip: nRF9160

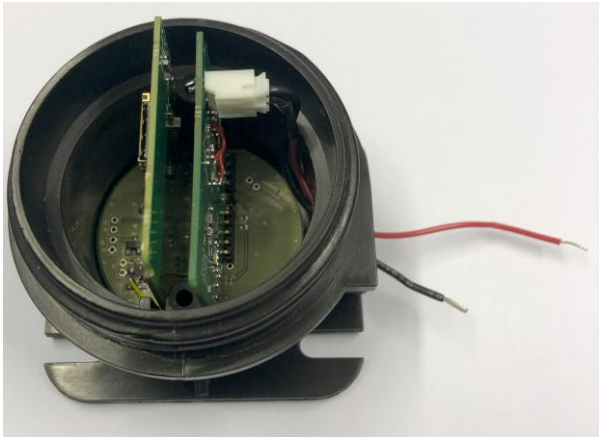
Port	pin	Name
PO.00	95	UART1_RX
PO.01	96	UART1_TX
PO.02	97	RGB_BLUE
PO.03	99	RGB_GREEN
PO.04	100	RGB_BLUE
PO.05	2	LED GREEN
PO.06	3	N/A
PO.07	4	n/A
PO.28	86	UART0_RX
PO.29	87	UART0_TX
PO.30	88	I2c_scl
PO.31	89	I2c_sda

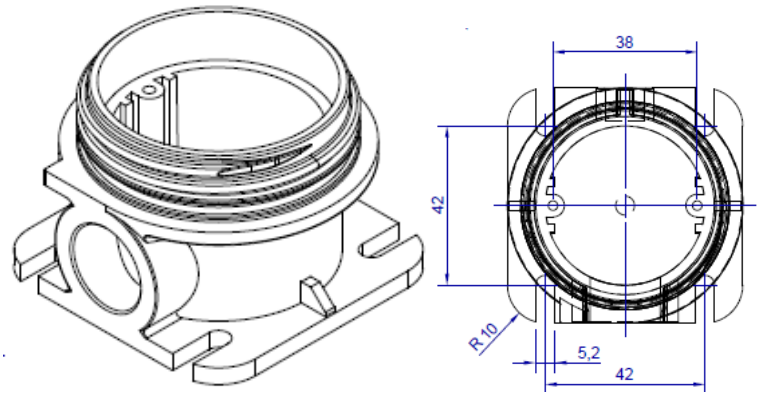
The picture shows the final assembly of all thee boards into the mechanical housing

Battery

Battery is at the side and should be a 3,0V Lithium ex. GP Lithium CR123A Capacitet: 2800 mAh.
Size: approx. 34.5 x 17mm

The battery has cable with connector and connect directly to the control board.

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