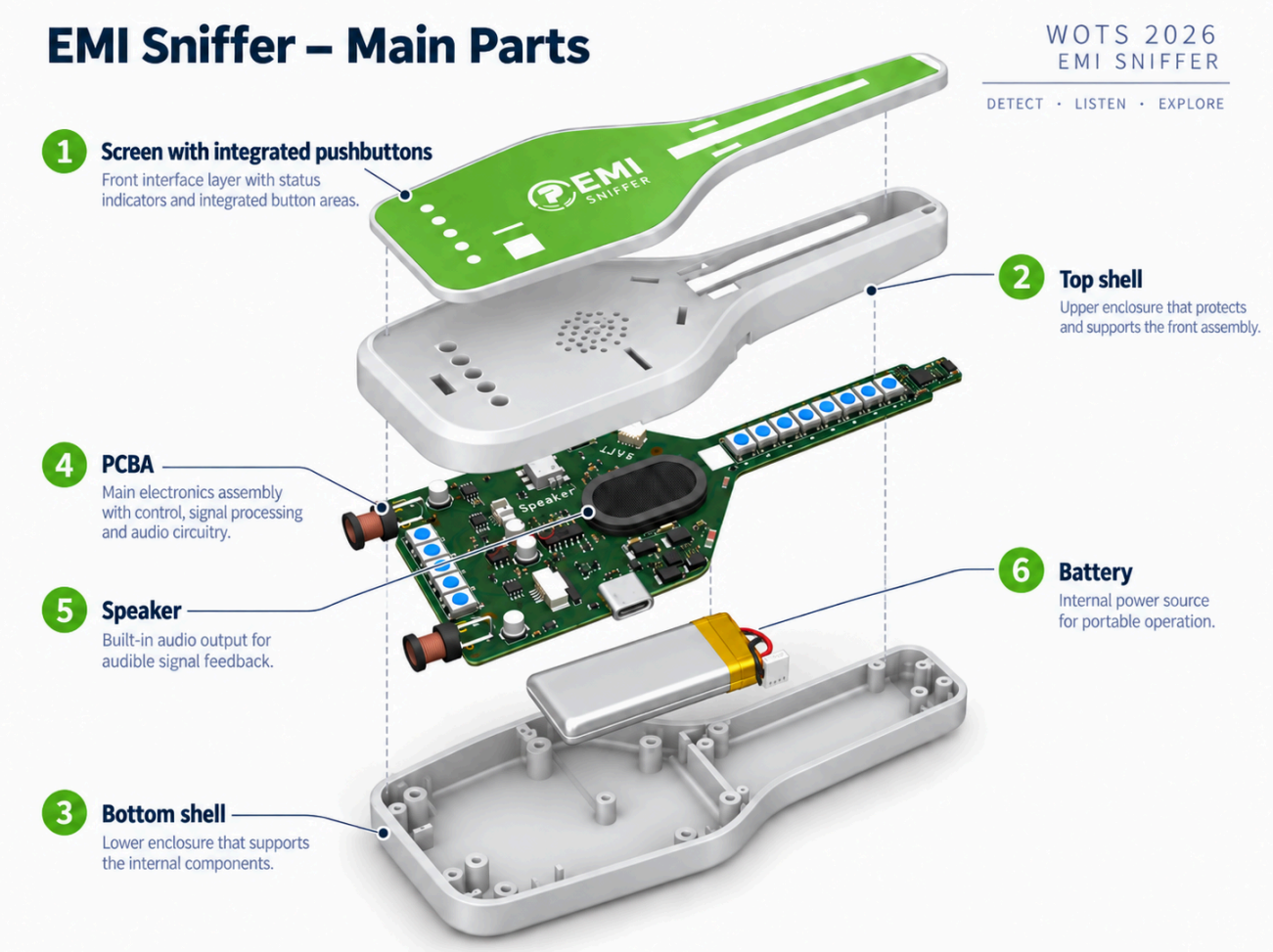
EMI Sniffer

User Manual

Official World of Electronics gadget • WoTS 2026

Designed by Arjen Bogerman of EVAbits



Contents

1. Meet the EMI Sniffer
2. Main Parts
3. PCBA Overview
4. Assembly
5. Usage
6. Controls, Charging & USB
7. Open Source & Project References
8. Sponsors & Project Partners

1. Meet the EMI Sniffer

The EMI Sniffer is a compact handheld instrument for exploring electromagnetic interference in and around electronic devices. Move the sniffer close to a circuit, cable or component and it helps you locate areas where electromagnetic emissions are present and compare their relative strength.



Designed by Arjen Bogerman of EVAbits, the EMI Sniffer is the official World of Electronics gadget for WoTS 2026. It provides immediate feedback through two LED indicator groups and sound. The built-in speaker lets you hear changes in the detected signal, while a headphone connection allows closer listening or use in a noisy environment.

The EMI Sniffer is intended as a practical engineering and educational tool. It can help locate potential sources of interference, compare design changes and build a better understanding of EMC behaviour.

Important The EMI Sniffer is a troubleshooting and comparative measurement tool. It is not a replacement for formal EMC compliance measurements in an accredited test environment.

Specifications

EMI probe (front of Sniffer)

- **Frequency range**: 40KHz - 200MHz
- **Field intensity:** 20 V/m - 80 V/m

Cable localization (rear of Sniffer)

- **Frequency range:** 30Hz - 40KHz
- **Field intensity:** Adjustable from 0-80V/m

2. Main Parts

The exploded view below shows the main mechanical and electronic parts of the EMI Sniffer.

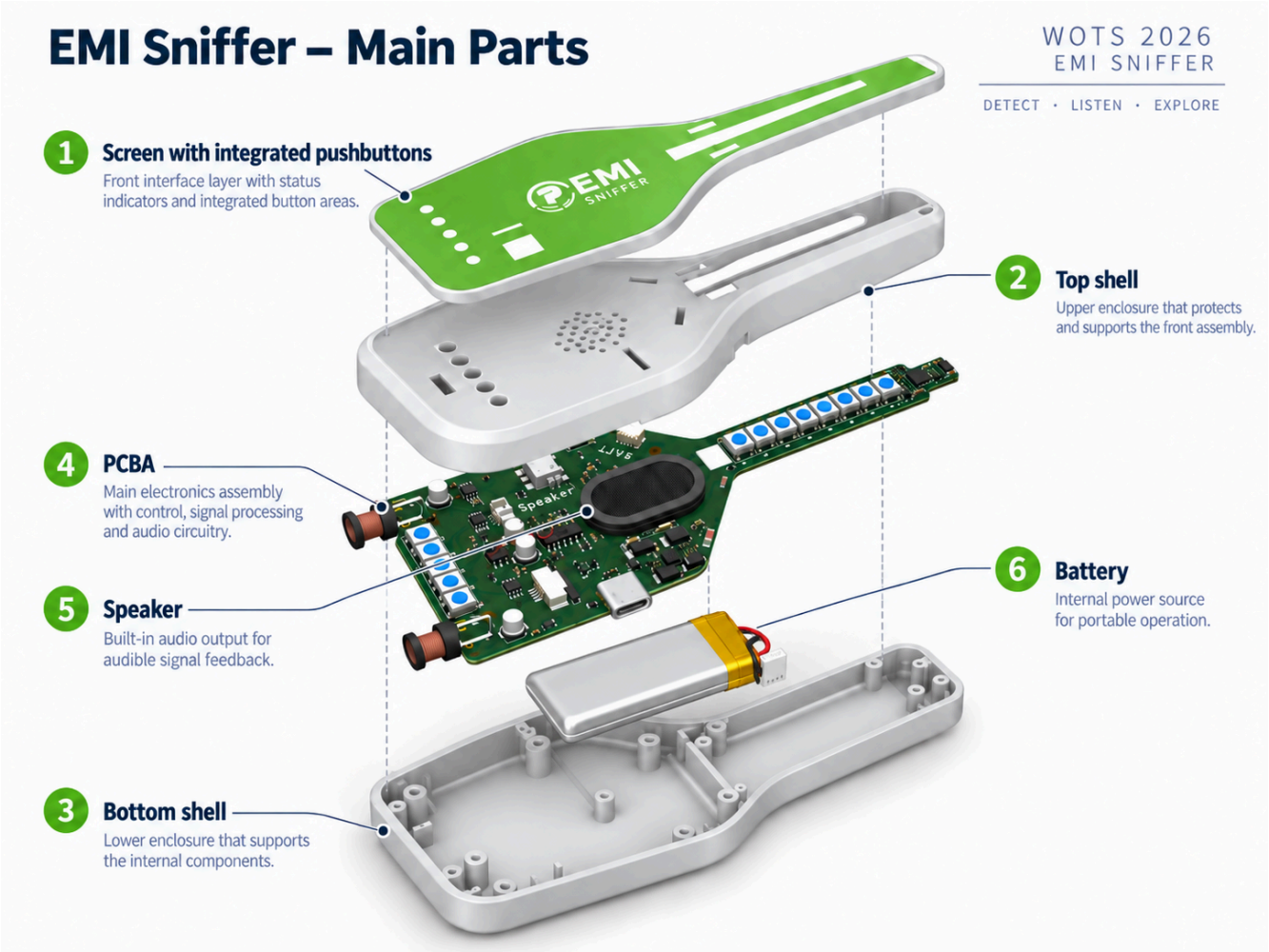


Figure 1 — Main parts of the EMI Sniffer.

1. Screen with integrated pushbuttons: Front interface layer with the integrated button areas and windows for the indicators.

2. Top shell: Upper enclosure that protects and supports the front assembly.

3. Bottom shell: Lower enclosure that supports the internal components.

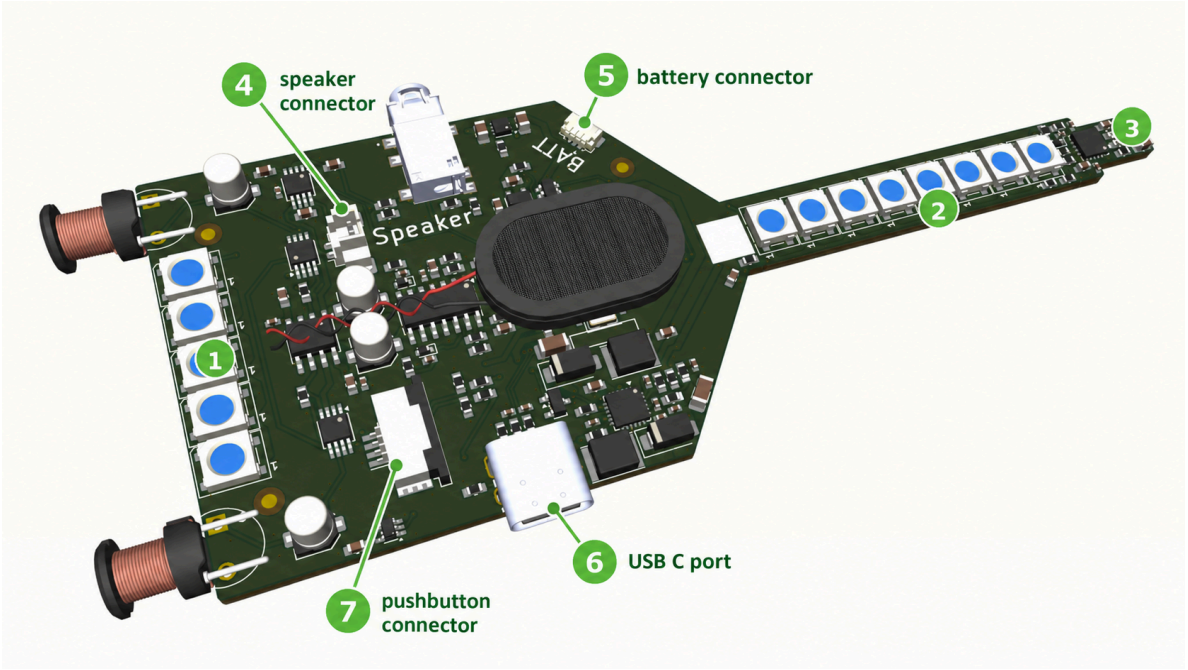
4. PCBA: Main electronics assembly containing the sensing, signal-processing, control, charging and audio circuitry.

5. Speaker: Mounted separately on the top shell, used for audible signal feedback. The audio represents a modulated audio frequency from the measurement of the low-frequency side of the Sniffer.

6. Battery: Internal rechargeable battery. The connector end is positioned on the right-hand side of the enclosure.

3. PCBA Overview

The PCBA combines the sensors, visual indicators, audio output, power management and the Raspberry Pi RP2354 microcontroller on a single assembly.



1	Five LEDs for cable localization — visual feedback used to help locate a cable.
2	Eight LEDs for EMI — visual indication of the relative EMI detection level.
3	Front EMI detection coil — sensing coil at the narrow front end of the PCBA.
4	Speaker connector
5	Battery connector
6	USB C port
7	Pushbutton connector

4. Assembly

Important

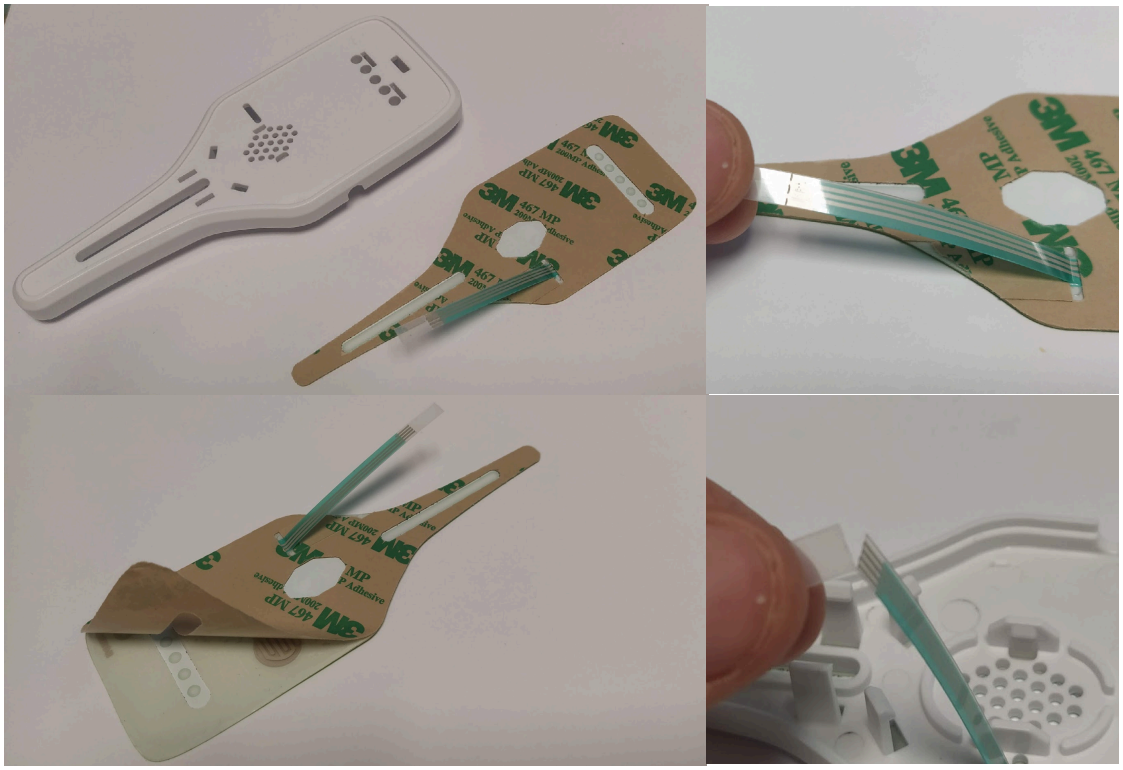
! Before the battery can be attached to the PCB, come by the EVAbits stand to program and test the PCBA. Here you will receive a double sided tape to mount the battery.

! Additionally, the battery must be connected before the Sniffer can be calibrated. This is because the calibration requires the battery to be chargeable through the USB port.

The EMI Sniffer consists of only a few main parts and is designed for straightforward assembly.

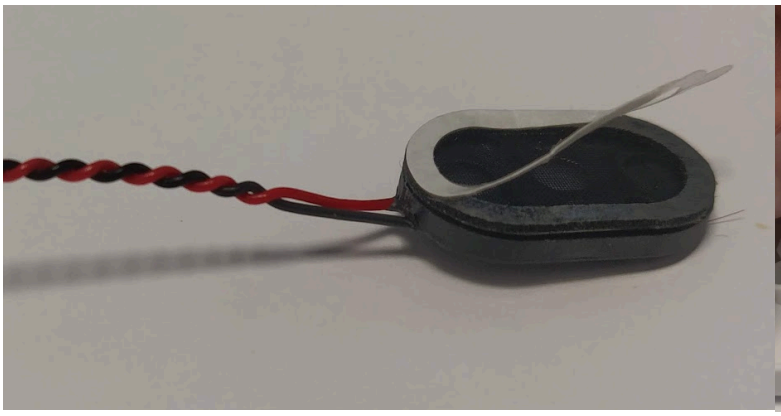
1. Fit the screen

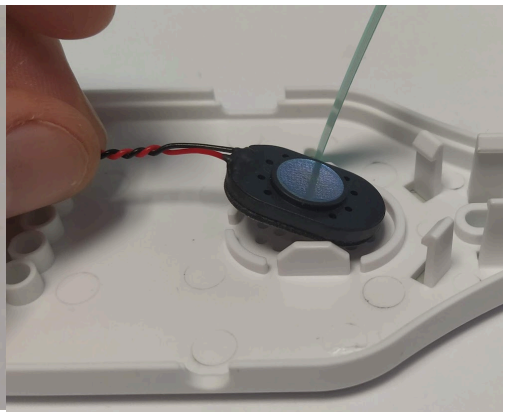
Position the screen with integrated push buttons on the top shell. Remove the backing to expose the adhesive side – Note that the protective layer is rather thin and flexible. Route the FPC connector through the top shell. Align the interface with the LED openings and the corresponding controls underneath and stick it on. Remove the protective, transparent, end-part of the FPC connector by carefully tearing it where the connector tracks end.



3. Fit the speaker

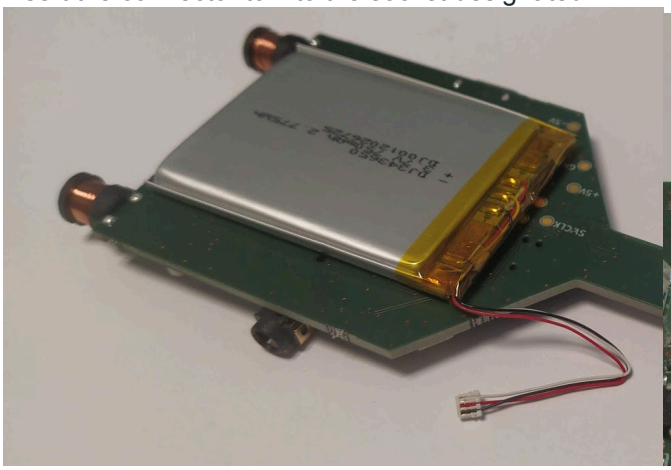
The speaker sits in a recess with clips + it has an adhesive edge. Remove the adhesive cover and push the speaker into its location with the wires to the back of the EMI sniffer.

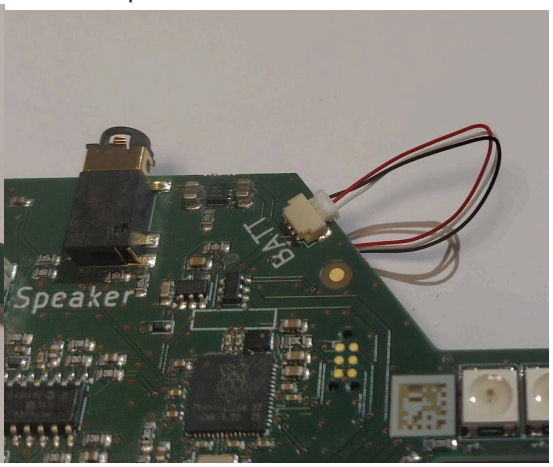




4. Install the battery

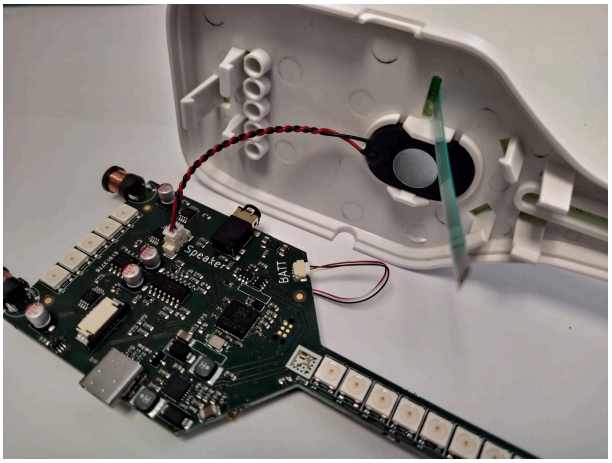
Use the double-sided tape to stick the battery to the bottom side of the PCBA, as shown. Make sure that at lease 4mm of the PCBA sticks out at the PCB edge between the coils. Guide the connector wires to the top and insert the connector to into the socket designated “BATT” on the top of the PCBA.

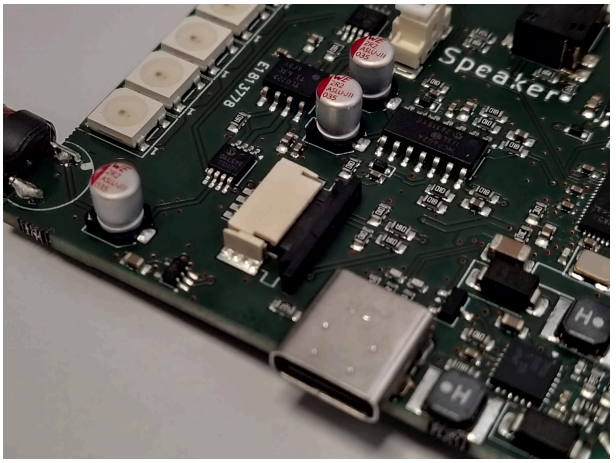


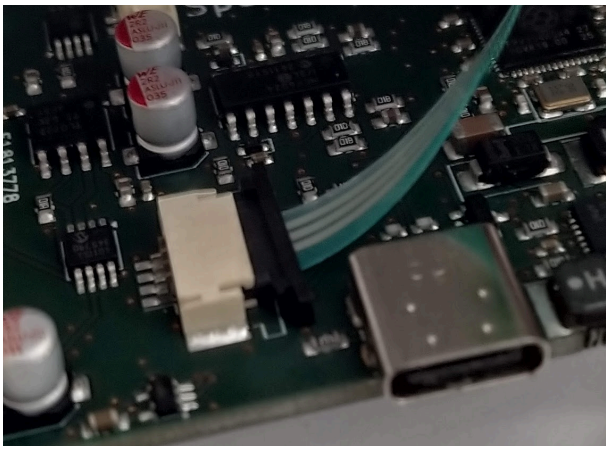


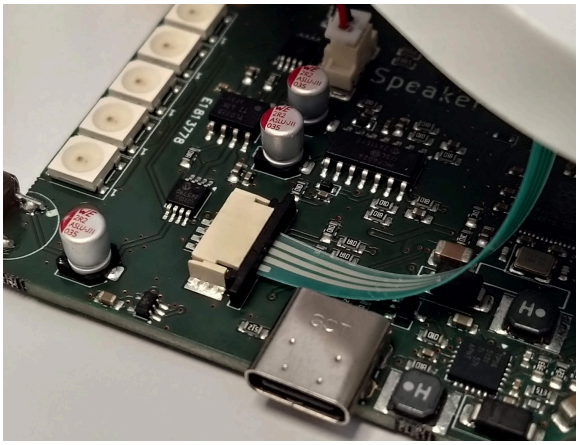
4. Fit the top shell

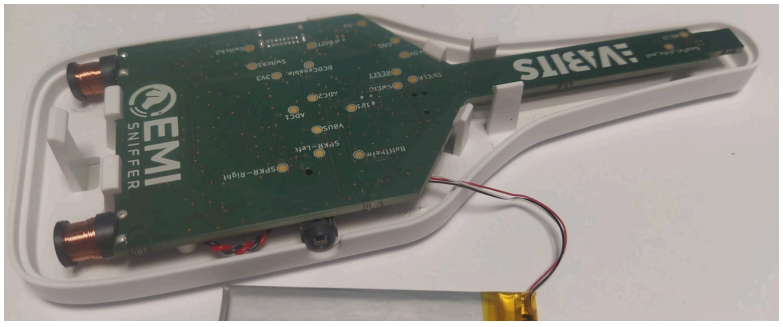
Place the top shell over the electronics, checking that the PCB, speaker and battery remain correctly seated and that all external connectors line up with their openings. Push the black locking bar out of the FPC connector on the PCBA. **Make sure the transparent protection piece is removed**, and insert the FPC strip, making sure that it goes all the way in. Lock the FPC connector by pushing the black licking bar into the white connector base. Click the PCBA into the top shell. Make sure that the speaker-wires are not in front of the 5 LEDs at the back.





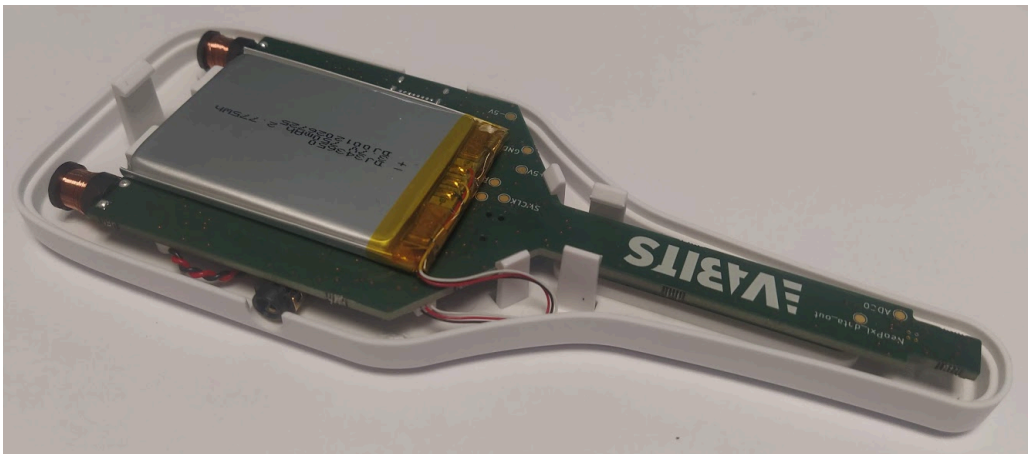


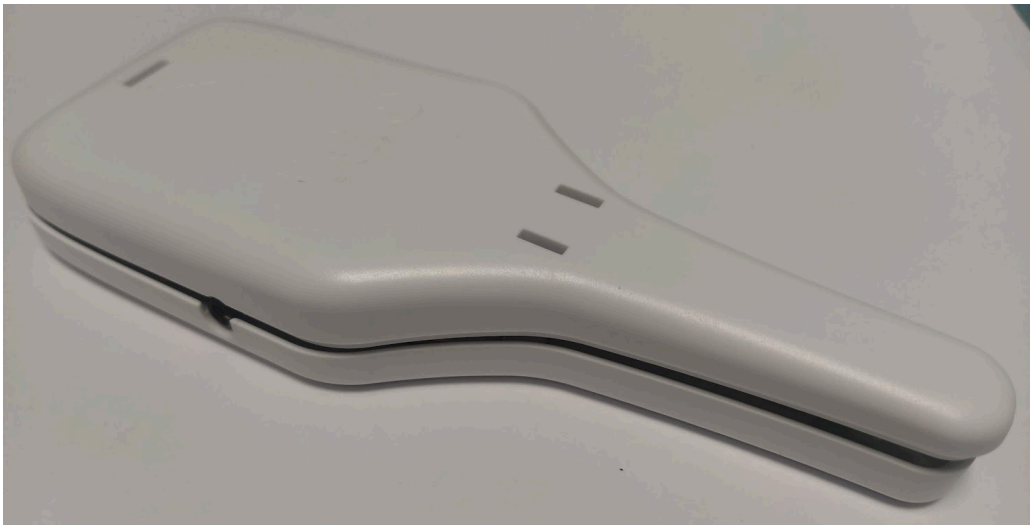




6. Place the bottom shell

Before closing the enclosure completely, check that the battery connector is fully seated, no wires are trapped between the shells and the PCBA is correctly positioned. Then click the bottom shell into place.





5. Usage

The EMI Sniffer has two main functions:

1. **detecting electromagnetic interference.** The LED bar at the top of the sniffer indicates the strength of the EMI source.
2. **locating cables.** Visual feedback is provided by the LED indicators at the bottom of the device, and detected signals can also be heard through the built-in speaker or optionally connected headphones.

EMI detection

The narrow front of the EMI Sniffer contains the EMI detection coil. Bring this end close to the circuit, component or cable you want to investigate.

Move the tip slowly and horizontally across the area being tested. The eight EMI LEDs indicate the relative strength of the detected signal. A stronger indication means that more electromagnetic activity is being detected at that position.

Because the sensor is intended for near-field measurements, distance and orientation have a strong effect on the indication. For useful comparisons, try to keep the position and orientation of the sniffer consistent.

Cable localization

The wider rear section of the EMI Sniffer contains two cable-detection coils. These are used to determine the position of a cable or conductor.

Move the rear of the sniffer across the area where the cable is expected to run. The five cable-localization LEDs provide visual feedback that helps indicate the cable position.

The detected signal is also converted to audio. Listen through the built-in speaker or connect headphones for more detailed listening or when working in a noisy environment.

For the most accurate localization, move the sniffer slowly and keep it at approximately the same distance from the surface.

Audio and headphones

The built-in speaker provides audible feedback from the detected signal. A headphone connection can be used instead of the speaker. This is useful when listening for small changes or when using the EMI Sniffer in a busy exhibition, workshop or laboratory environment.

Measurement note Use the EMI Sniffer for exploration, troubleshooting and comparative measurements. LED levels and audio feedback are useful for finding emission sources and comparing locations or design changes, but they do not constitute formal EMC compliance evidence.

6. Controls, Charging & USB

Controls

Turn on: Press the **(+)** button briefly.

Turn off: Press and hold the **(+)** button for 4 seconds.

Adjust sensitivity: Use the **(+)** and **(-)** buttons to adjust the sensitivity of the **cable detection only**. This also affects the audio volume. In an environment with no excess interference, make sure the bottom LEDs show **green**. A **red** LED means the sensitivity is too high: the LED should only be red when near a strong field. When a cable is detected, one of the LEDs will turn Red, depending on the angle. When the sensitivity is correctly set up, the device should make a clicking noise when held close to a running electronic device like a laptop, which is the sound of the switches on the device toggling.

Center cable detection: Press and hold the **(-)** button for 4 seconds to reset the cable detection.

Charging

Use the USB to charge the internal battery. The LEDs indicate the battery charge level. A walking LED pattern shows that charging is in progress.

USB connection

Connect the EMI sniffer via USB to charge the battery and access the EMI Sniffer digitally. Two USB functions become available:

- **Serial port:** A virtual serial port appears on the computer. The EMI Sniffer outputs debug messages here. This is particularly useful when developing or modifying the firmware.
- **Storage device:** A small USB storage volume also appears. The EMI Sniffer expects a file containing its calibration settings to be stored on this drive.

Calibration settings The calibration file name, format and example contents can be documented with the final firmware release. The USB storage volume is the location where the EMI Sniffer expects those settings.

7. Open Source

The EMI Sniffer is an open-source project. The PCB design, schematic and firmware source code are published by EVAbits so you can study the design, modify the software, experiment with the hardware, or build on the project yourself.

Project files: https://github.com/evabits/EMI_sniffer_beursgadget_WOTS_2026

Project references

Official WoTS 2026 EMI Sniffer page: FHI – World of Electronics beursgadget

8. Sponsors & Project Partners

The WoTS 2026 EMI Sniffer is a collaborative project covering engineering, components, enclosure design, PCB production and assembly, calibration, and production testing. Company names below link to their main websites.

	Company		Company
EVABITS	EVAbits	AVE	AVE BV
comdes components • design • support	Comdes Componenten	Avnet / Farnell	Avnet / Farnell
elektor	Elektor	binder	Binder Nederland
WÜRTH ELEKTRONIK MORE THAN YOU EXPECT	Würth Elektronik	DOBIT products	DOBIT
MICROCHIP	Microchip Technology	elincom	Elincom
raditeq	Raditeq	IDEETRON Electronics	IDEETRON
IW	InduCompWare	TFT Solutions	TFT-Solutions
EVAJIG	EVAjig	tti	TTI
MG DFT DESIGNED FOR TEST	MG Products	TDK	TDK-Lambda
EURO CIRCUITS	Eurocircuits	VDL	VDL
AMKOR	Amkor Zeefdruk	A1 ELECTRONICS	A1 Electronics Netherlands
cnrood	cnrood	MYbusinessmedia	MyBusinessMedia

Project organiser: FHI / World of Electronics, WoTS 2026.