E909.21 Evaluation Kit Getting Started Guide

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Getting Started with E909.21 Gesture Recognition Sensor

This guide provides step-by-step instructions on how to setup the Elmos *E909.21 Gesture Recognition Evaluation Kit*. The kit consists of one PCB, which represents a standalone sensor using the E909.21 Elmos IC. Included on the PCB is an external µC to establish the communication between the sensor IC and a standard PC via USB. This is to establish special setup features and to show the signals. The µC also controls the indication lights which allows it to be used as a standalone demonstrator.

Kit Contents

The evaluation kit includes a standard USB cable for power supply and signal evaluation. The related PC software is included on a USB stick.
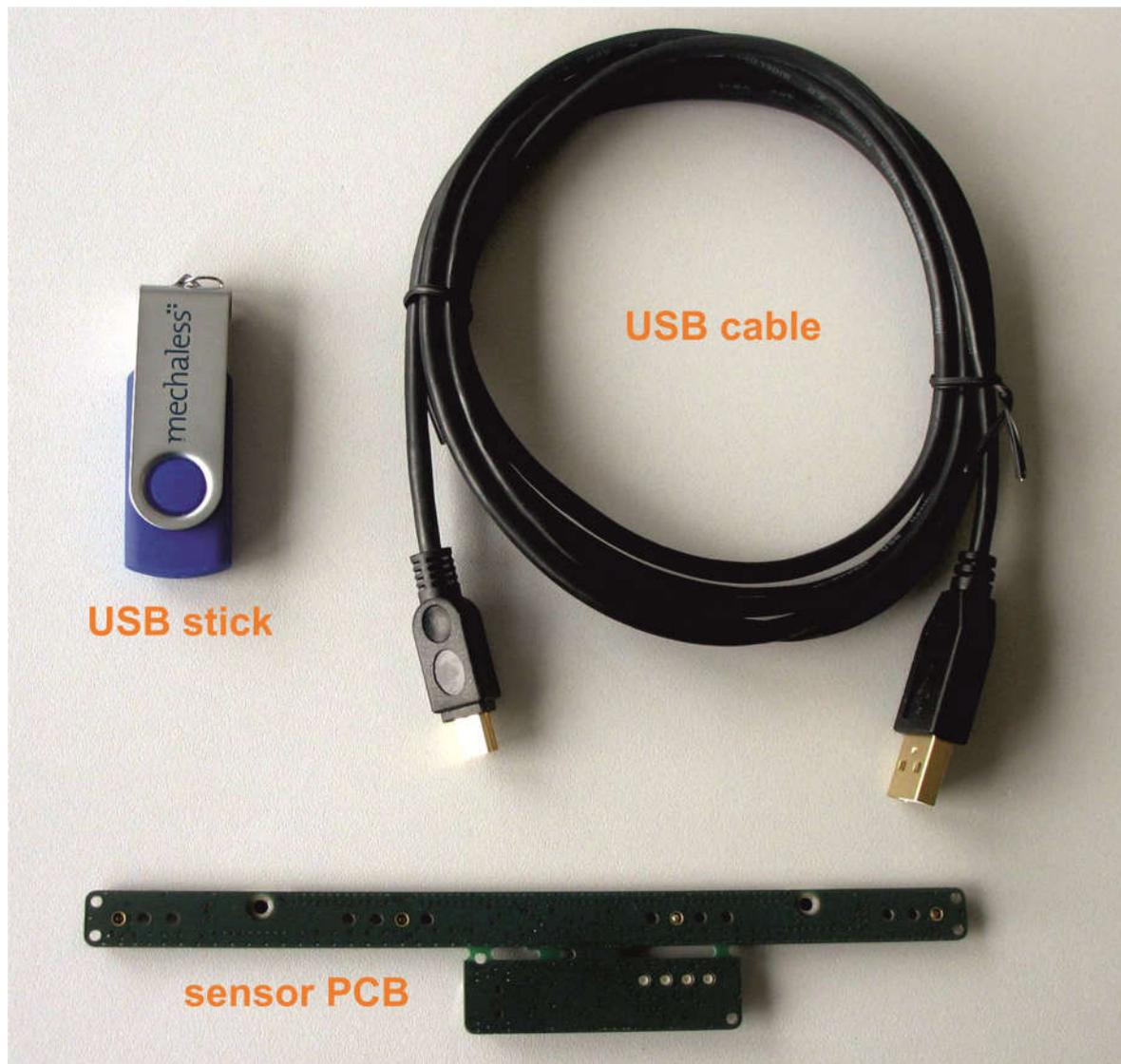
System Requirements

▸ Standard PC
▸ USB port
▸ Windows® 7 (or higher)
▸ .NET Framework v4.6 (or higher)

Start-Up of the Evaluation Kit

To set up the sensor you only need to connect the PCB to an appropriate USB port via the enclosed cable. You can either use a standard PC port or any external 5V power supply.

When you use a 5V power supply the sensor works as a standalone unit. All relevant gestures can be evaluated with the indication lights as a feedback.

When you establish a connection to your PC the raw sensor signals can be evaluated. Now you have the chance to check the performance of the real HALIOS® benefits: sensitivity, robustness and speed. You can also check the gestures we provide after processing the raw signal values directly in the E909.21 IC flash memory. For your benefit you have the possibility to even adjust the most important gesture parameters for your needs.

IMPORTANT NOTE

The connection via USB is not as fast as the original sensor sample time. Therefore our HACo tool shows only an indication of the real E909.21 IC inside signals. But that's a fairly good image to receive an impression how reliable the complete system is working.
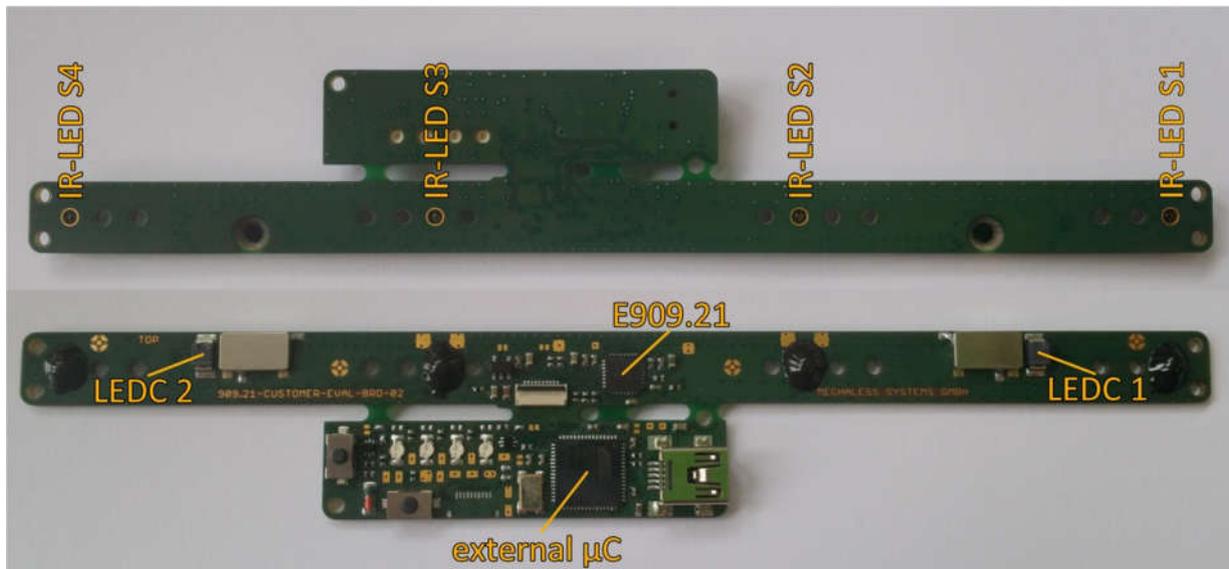
Evaluation Kit Hardware Setup

To use the sensor please place the PCB directly on the table. The IR-LEDs must look upwards. Now you can place your hand into the sensor area above the PCB and check the immediate response via the four indication lights.
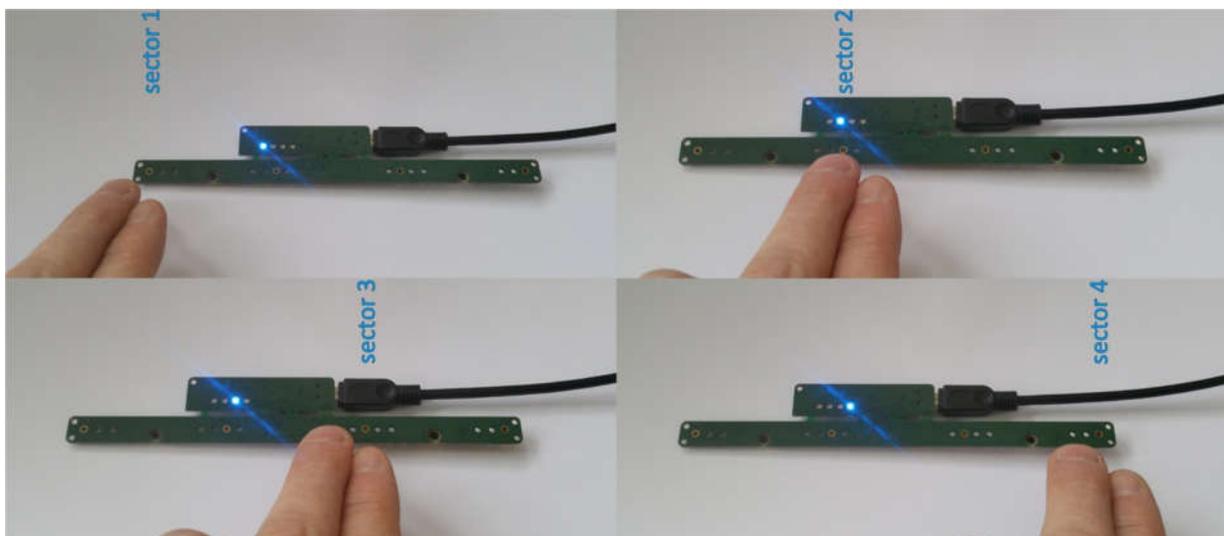
Each sensor IR-LED is assigned to a photodiode. IR-LEDs S3+S4 are assigned to PD2 and IR-LEDs S1+S2 are assigned to PD1. This results in the sequence of the sectors.

IR-LED (sender)	PD (receiver)	Result (sector)
4	2	1
3	2	2
2	1	3
1	1	4

The following picture illustrates a simple geometrical example. Looking at the angles of half intensity of the opto-electronic components gives you an overview of the sector allocation.
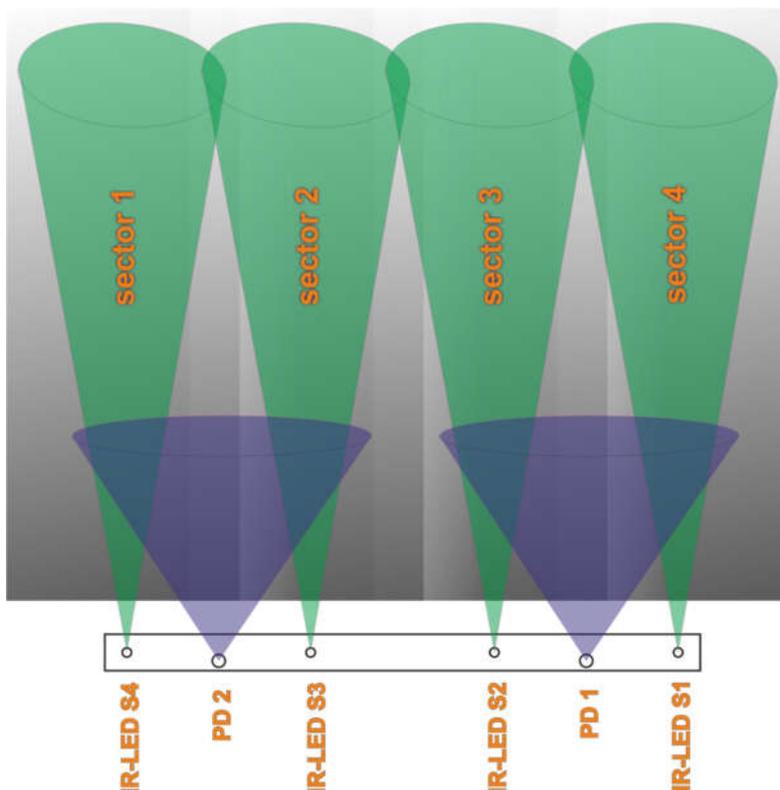
Evaluation Kit Software Setup

All required software and documentation can be found on the USB stick. Please copy the content of the USB stick to your PC and start our windows tool *HACo* from your PC. This is the tool we use to manage the parameters and to show the sensor signals in a virtual oscilloscope view. To start the tool simply double-click the HACo exe-file.


If all connections are correct, the PC should show up the HACo main window.
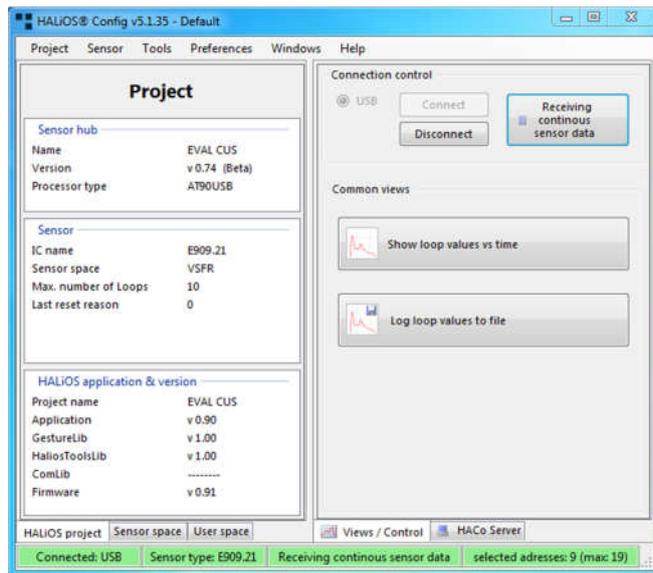
In the main window please click on the button *Show loop values vs time*. When you move your hand from the left to the right or vice versa, you can see the signals corresponding to the IR-LEDs.
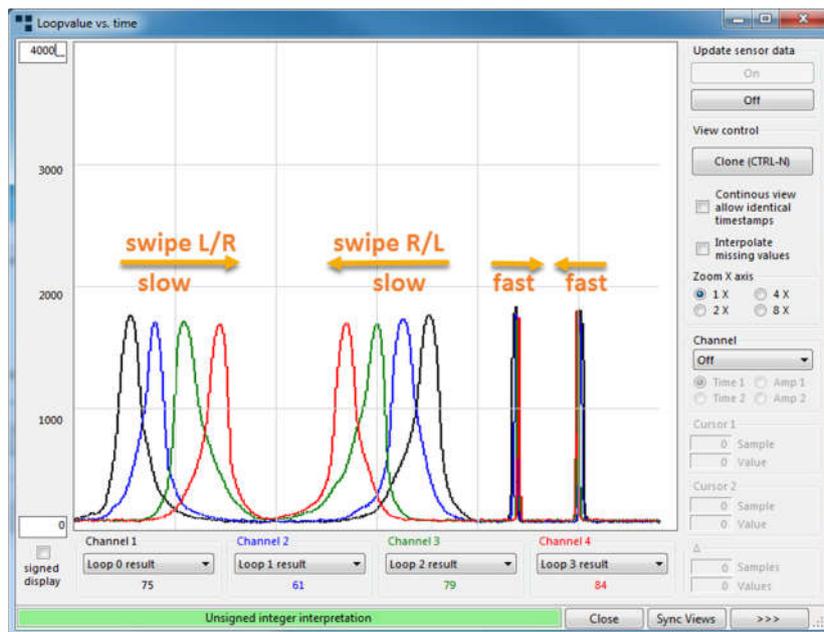
The next step is to get familiar with our *Gesture Debugger*. Please close the HACo tool and double-click the GestureDebugger exe-file. Running both tools at the same time can result in data loss.
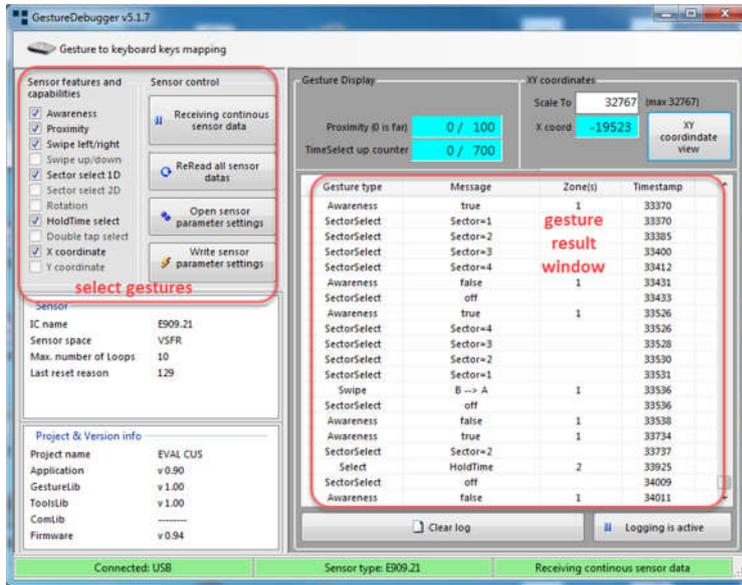
In this tool you can see the gestures as a result calculated with the raw signal values. All gesture algorithms are programmed inside the E909.21.

Select gestures to evaluate single gesture actions or some/all of them at the same time.

Click on *Open sensor parameter settings* to adjust the gesture parameters to suit your requirements.

Click on *Write sensor parameter settings* to store them permanently.

PWM Display Feature
The indication lights can be configured to show distance depending signals via PWM. The closer the object gets to the sensor, the brighter the sector indication light reacts. Also swiping in a constant distance, the indication light traces the object by reaction of PWM control.

To switch between *indication light standard* and *indication light PWM*, please change the data content of address 87 in HACo tool as follows.

In the menu bar click on *Tools* and choose *Direct memory access*. Or use the shortcut *Alt+M*.
Insert the address *87* and click on *Read*.
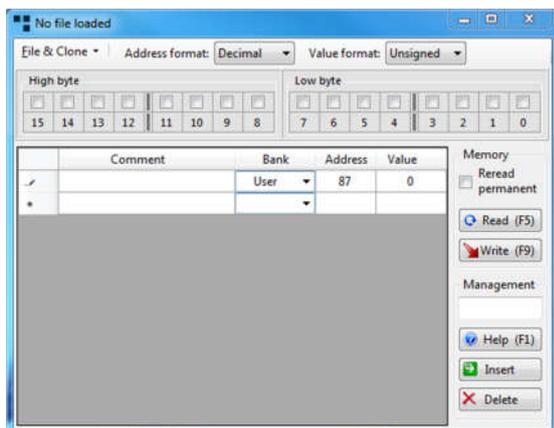
If the data content of address 87 is "0", the indication light reacts with "ON/OFF" (standard).

If the data content of address 87 is "1", the indication light reacts with "PWM".

To change the data content, just insert the value directly into the *Value* field and click on *Write*.

To change any data permanently, just click on *Sensor* in the menu bar and choose *Write parameters to flash*. Or use the shortcut *Alt+F*.

Evaluation Kit Notes

The E909.21 controls four single sender outputs labeled LED1..LED4 and two receiver inputs labeled AN1/CA1 and AN2/CA2. These in- and outputs are connected to the assigned IR-LEDs and PDs.
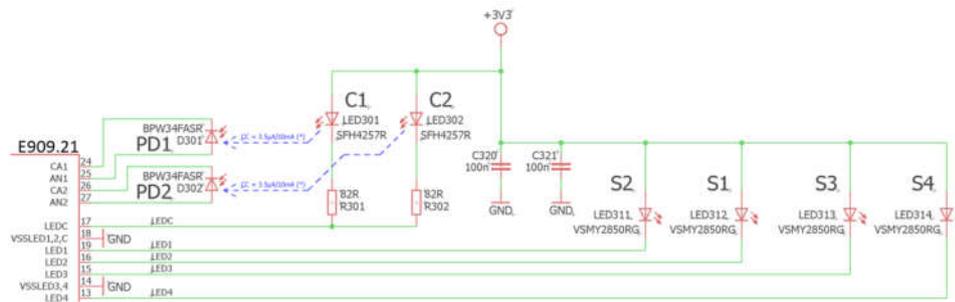

Via the internal SW sensor configuration you can set a couple of parameters relating to the internal assignment of inputs and outputs. Depending on the layout of the PCB and the placement of the components the assignment can easily be adapted using our HACo tool sensor configuration.

For each sensor loop we assigned one IR-LED to one PD. Because the hardware output LED1 is routed to IR-LED 2 (S2) and output LED2 is routed to IR-LED 1 (S1), we just rearranged the assignment with the SW parameters to get the final ascending order.

Please check the following table with respect to the schematics and SW configuration.

loop	LED output @ E909.21	IR-LED (sender)	PD (receiver)
0	LED4	S4	PD2
1	LED3	S3	PD2
2	LED1	S2	PD1
3	LED2	S1	PD1
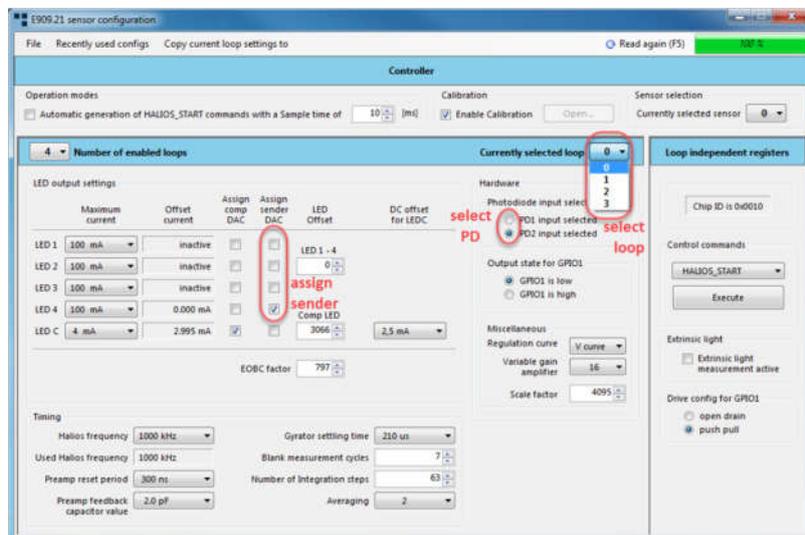
Usage Restrictions

Elmos Semiconductor AG provide the E909.21 Evaluation Kit simply and solely for IC evaluation purposes in laboratory. The Evaluation Kit or any part of the Evaluation Kit must not be used for other purposes or within non laboratory environments. Especially the use or the integration in production systems, appliances or other installations is prohibited. The PCBs are delivered to the customer for the purpose of testing, evaluation and development of the Elmos ICs only. Elmos will not assume any liability for additional applications of the PCB.

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