## Scope

The MLX90129 from Melexis is a sensor IC with an integrated 13.56 MHz high frequency (HF) interface that allows sensor data to be read with a HF radio frequency identification (RFID) reader. The DVK90129web is a development kit designed to assist developers explore the features of the MLX90129.

This user manual provides guidelines for use of the DVK90129web development kit. It also provides guidelines for the EVB90129 datalogger / sensor tag based on the Melexis 90129 sensor IC and the Dacom EVB90130web RFID reader. The DVK90129web development kit along with user friendly evaluation software will decrease sensor IC evaluation time to improve your development cycle and time to market. The dedicated Application Programming Interface (API) provides a quick start for developing custom applications.

Related Melexis Products

Part No.	Comments
MLX90129	Sensor tag / RFID datalogger IC
EVB90129	Evaluation Board for MLX90129
DVK90129web	Development kit for MLX90129
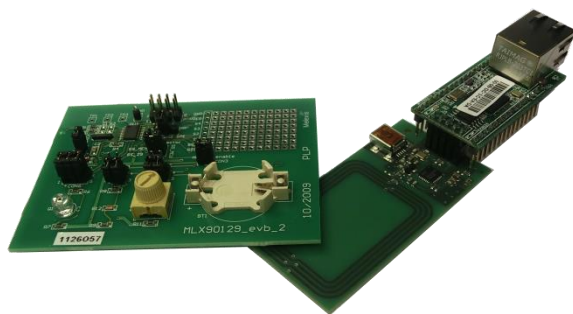
Introduction

The DVK90129web development kit has been developed by Melexis in partnership with Dacom West. It provides a unique platform to evaluate and develop applications based on the MLX90129 sensor IC. By following the guidelines provided in this manual, the sensor tag and data logging application can be implemented very quickly. The web browser based EVB90130web reader and application oriented user interface are customized for the EVB90129 evaluation board. Pre-programmed settings for the EVB90129 sensors along with external memory help developers discover and apply features found in the MLX90129 sensor IC. The CSV based configuration file and export tools allow users to characterize the sensors and fine tune the MLX90129 settings and share these settings with other users. This documentation gives instructions for web browser software and network reader configuration plus guidance on features found in the evaluation software to help developers practice with the tools.

Contents

1. Kit content

The DVK90129web is composed of

- ❑ EVB90129 sensor tag
- ❑ EVB90130web reader
- ❑ WIZ922PoE Internet Gateway
- ❑ USB cable

Figure 1: EVB90130web reader with WIZ922PoE Internet Gateway

Figure 2: EVB90129

2. Hardware and software installation

The followings paragraphs describe how to connect the hardware and configure the user interface software.

2.1. Hardware installation

The WIZ922PoE Internet Gateway has a Cortex-M3 that runs a webserver. It has to connect to your local network via Ethernet cable. The direct LAN connection of the PC and the WIZ922PoE Internet Gateway module is possible. The module and the PC will negotiate the IP addresses automatically.

2.1.1. Connect the EVB90130web reader

Connect the WIZ922PoE Internet Gateway with the EVB90130web module. The power is supplied through the EVB90130web, the power supply needed is 5V/250mA totally for both PCBs. There is a 3.3V regulator on the WIZ922PoE to supply both boards with 3.3V where needed.

There are three possibilities for the power supply:
- ❑   USB 2.0 (connected to a PC/laptop or USB hub)
- ❑   5V external supply (connected to the supply pad of the EVB90130web reader)
- ❑   Ethernet 5V PoE (additional PoE supply injector required)

The DHCP client of the MCU will automatically request an IP-address. Make sure the module is powered and that the LEDs of the WIZnet module and the Ethernet plug are blinking. After about 30 seconds the module will have configured its network setting and is now reachable via web browser.
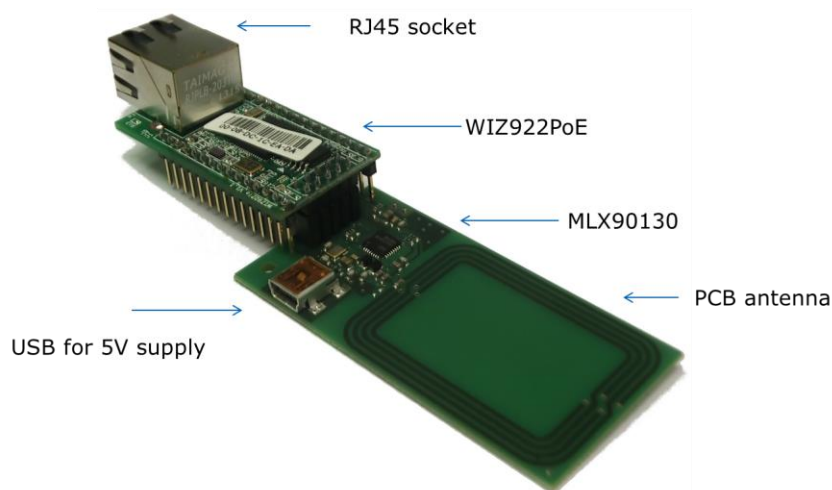

Figure 3: EVB90130web with WIZ922PoE

2.2. Software installation

No software installation is required. Open a HTML5 capable web browser (Updated versions of Chrome, Firefox or Opera are recommended). Make sure JavaScript is enabled. Type the hostname of the module "DVK90129/" into the address bar.

The web browser will load the DVK90129web webpages which contains the user interface for the DVK90129web. This website is navigated by tabs. Refreshing the site will reset all option and configurations.

2.3. Check the network configuration

In case of a failing network connection check the cable link of the WIZ922PoE Internet Gateway. To exclude software related network problems deactivate the proxy setting in your browser and deactivate the Windows Firewall. To disable the Windows 7 Firewall open the Control Panel and click on the category System and Security. The subcategory Windows Firewall opens the overview of the current Firewall settings. Click on the navigation in the left column to turn off the Windows Firewall.
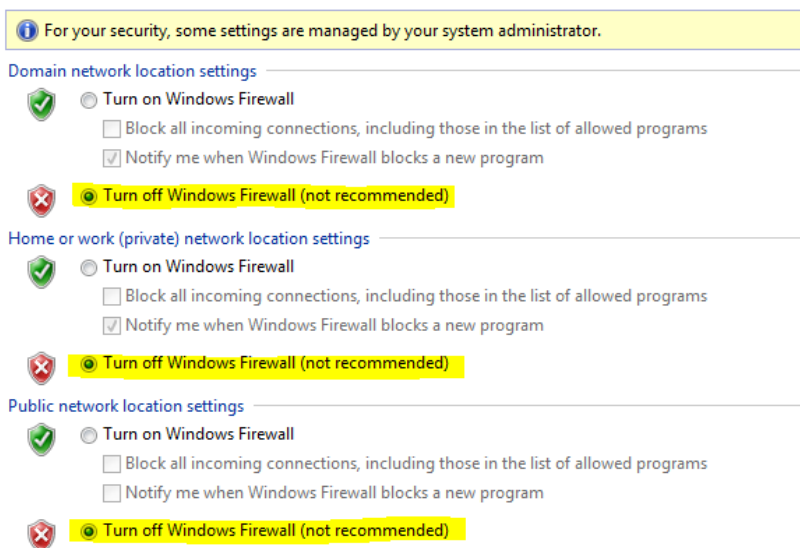

Figure 4: Windows Firewall

Figure 5: Turn off Firewall for Public network

After disconnecting the WIZ922PoE Internet Gateway please reactivate the Windows Firewall to recover the network security.

3. Getting Started

3.1. Open the web interface

Once the module is installed and the reader is connected, the DVK90129web User Interface can be started by opening a web browser and type in "DVK90129/".
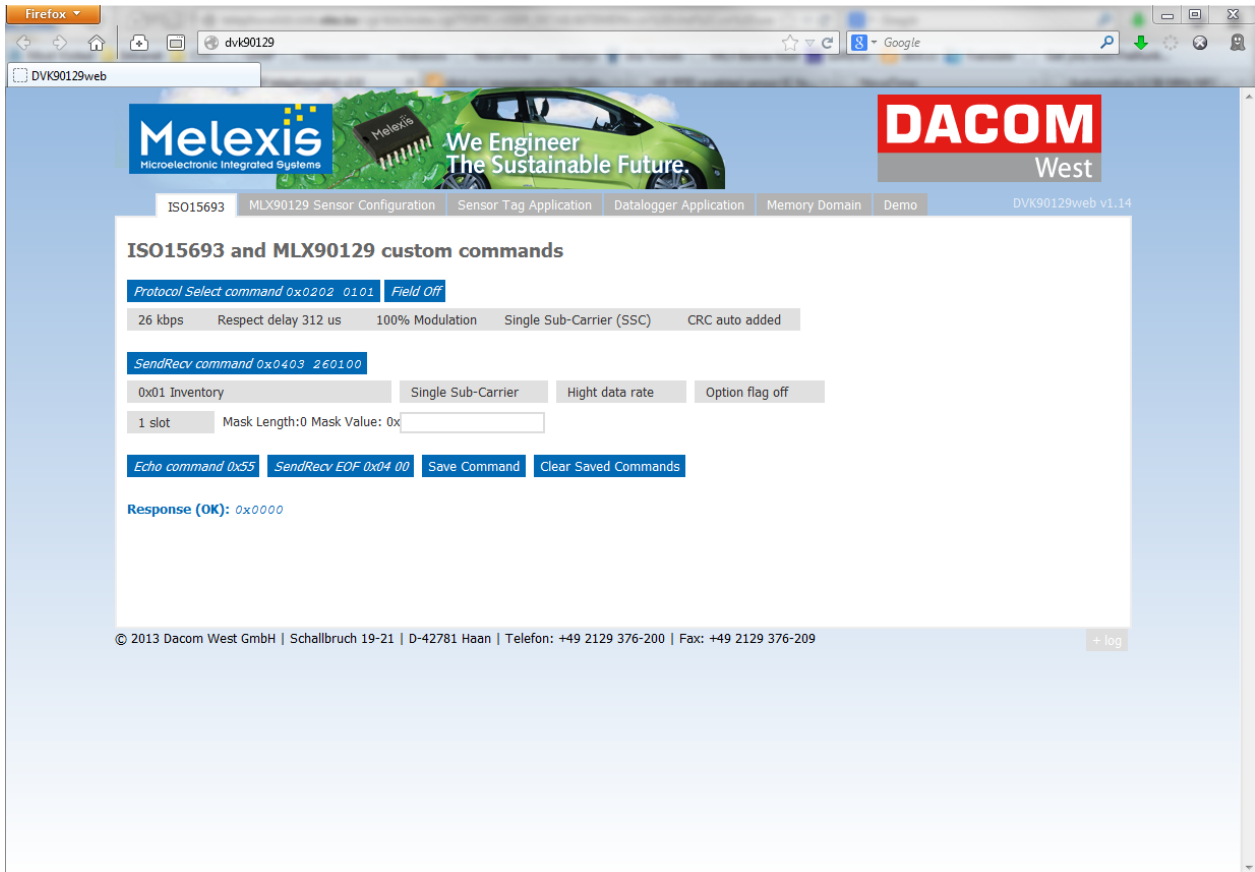

Figure 6: DVK90129 web interface in Mozilla Firefox

4.Tabs description

The following paragraphs describe the features of each tab.

4.1. RFID configuration

You can select ISO15693 communications modes via the "ISO15693" tab. This tab also allows you to send ISO15693 RFID commands and custom MLX90129 commands. For more information about ISO15693 modes and commands, please refer to the MLX90129 datasheet and to the ISO web site www.iso.org.

WARNING: Only an experienced MLX90129 user should be allowed to send ISO15693 and MLX90129 commands. Incorrect manipulation or bad parameters could result in locking the MLX90129 chip.
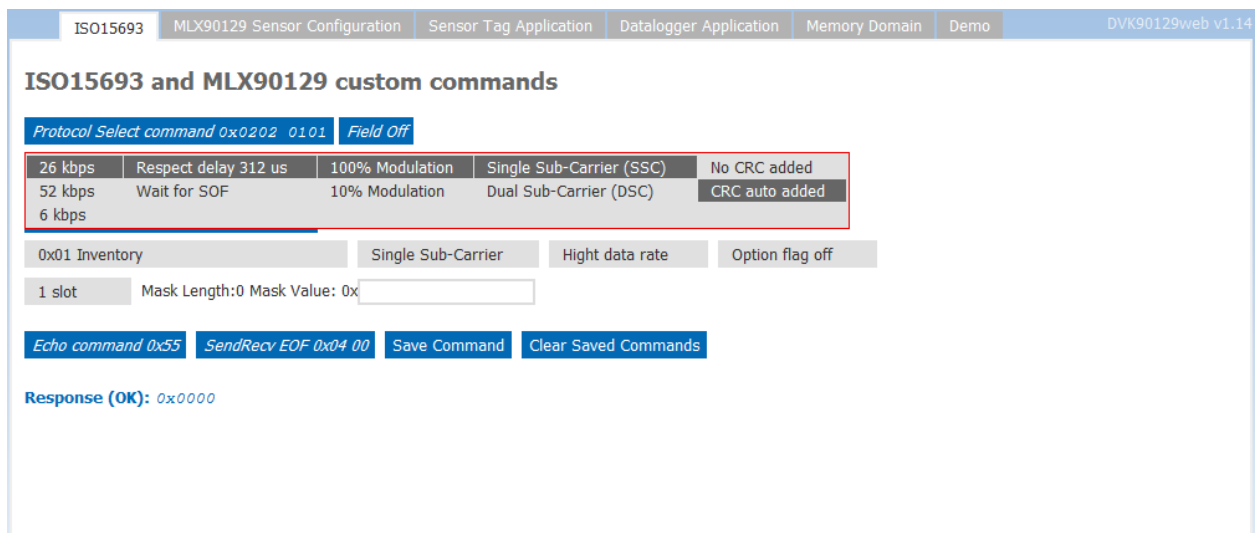

Figure 7: ISO 15693 tab with custom RFID commands

4.2. Sensor configuration

The "Sensor Configuration" tab allows you to configure up to three sensors differently. The "Sensor common configuration" contains settings which are applied to all the sensors. Examples of changes you can make are: the value of the internal resistor can be selected or the MLX90129 low volt supply can be enabled. NOTE: The "Vreg_Low voltage" option is linked to bit 3 of the internal device #04 and the "Disconnect field supply" impacts bit 15 of the internal device #03.

The configuration for sensor 0, sensor 1 or sensor 2 includes ADC, acquisition chain, thresholds and connections settings. Threshold value and offset are to be filled with hexadecimal data. Detailed information is provided in the datasheet. The preprogrammed configurations of the following EVB90129 sensors are available by clicking on the dedicated buttons:

- Internal temperature sensor
- External temperature sensor
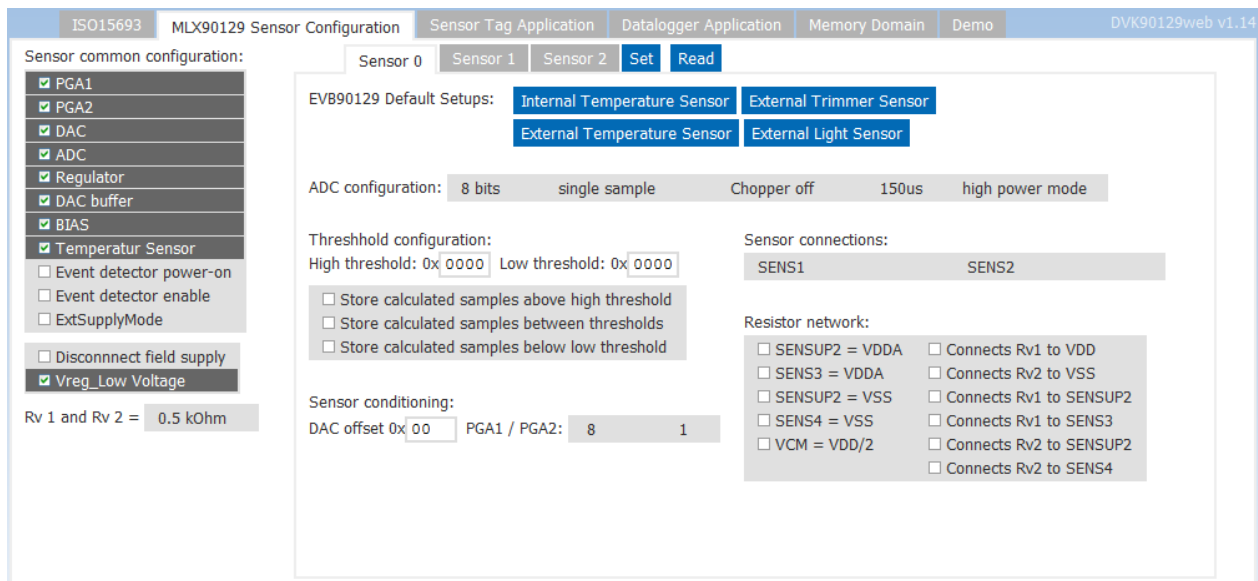- External trimmer sensor
- External light sensor

Figure 8: Sensor configuration tab with default setups

4.3. Sensor Tag Application

The "Sensor Tag Application" tab allows reading of the MLX90129 sensor IC values with HF RFID. Setup allows you to select which sensor(s) are to be read and the time between two consecutive measurements. Data for each sensor are shown in the dedicated windows. Data can be saved in CSV format.
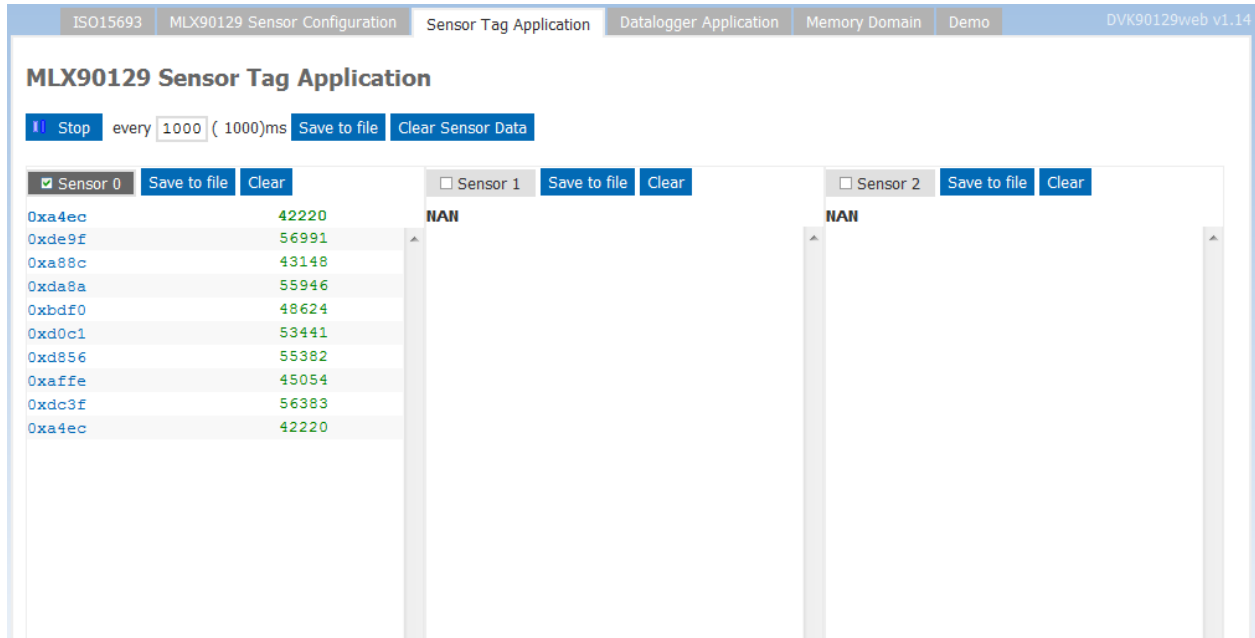

Figure 9: Sensor Tag Application tab with Sensor 0 data

4.4. Datalogger Application

The "Datalogger Application" tab is comprised of two sub tabs which allow configuration of datalogger parameters and provides a read-out of datalogging results.

Figure 10: Datalogger Application tab

4.4.1. Datalogger configuration

The configuration tab defines all the parameters for a datalogging application. First, select the data to be saved (sensor 0, sensor 1, sensor 2 and timestamp).
For each sensor used during the datalogging, take care to note the threshold parameters available in the tab "Sensor configuration".

The destination of the data (sensors, values and timestamp) can be either to the MLX90129 internal memory or to optional SPI external memory. In both cases, the start address (hexadecimal value), the number of data (decimal value) and the period of measurement must be provided. The required memory area is calculated and provided (hexadecimal value).

When using the internal memory, the start address is 0x29 in order to prevent overwriting the configuration data. Choose the clock source for the period, either the MLX90129 embedded oscillator (LFO) or the external oscillator (XLFO).

When using the external memory, fill in the communication parameters in "External Memory Configuration" or click on the "EVB90129 External memory" button to apply the recommended settings for the external memory of the EVB90129.

There are several options for datalogging:

❑ The setting "enable stand by mode once ended" allows the unit to go into stand by mode (lowest power consumption) after completion of the datalogging cycle.

❑ The option "enable data logging loop" automatically restarts the data logging cycle, overwriting the previous data.

❑ The "disable automatic loading" option is linked to bit 7 of the internal device #03 (cf datasheet).

There are two options to start data acquisition:

❑ The option "As soon as the MLX90129 is powered" means bit 2 of the EEPROM#10 "automatic logging mode enable" is set to '1'. This means that as soon as the MLX90129 is powered, the configuration is loaded into the register file and the datalogging application starts.

❑ The option "By RFID command" means bit 2 of the EEPROM#10 "automatic logging mode enabled" is set to '0'. This means that even if the MLX90129 is powered, the datalogging application does not start. To start it, it is necessary to set this bit to 1 in the Register File #10. This command is sent by pressing the button "start datalogging" in the "Application" tab.
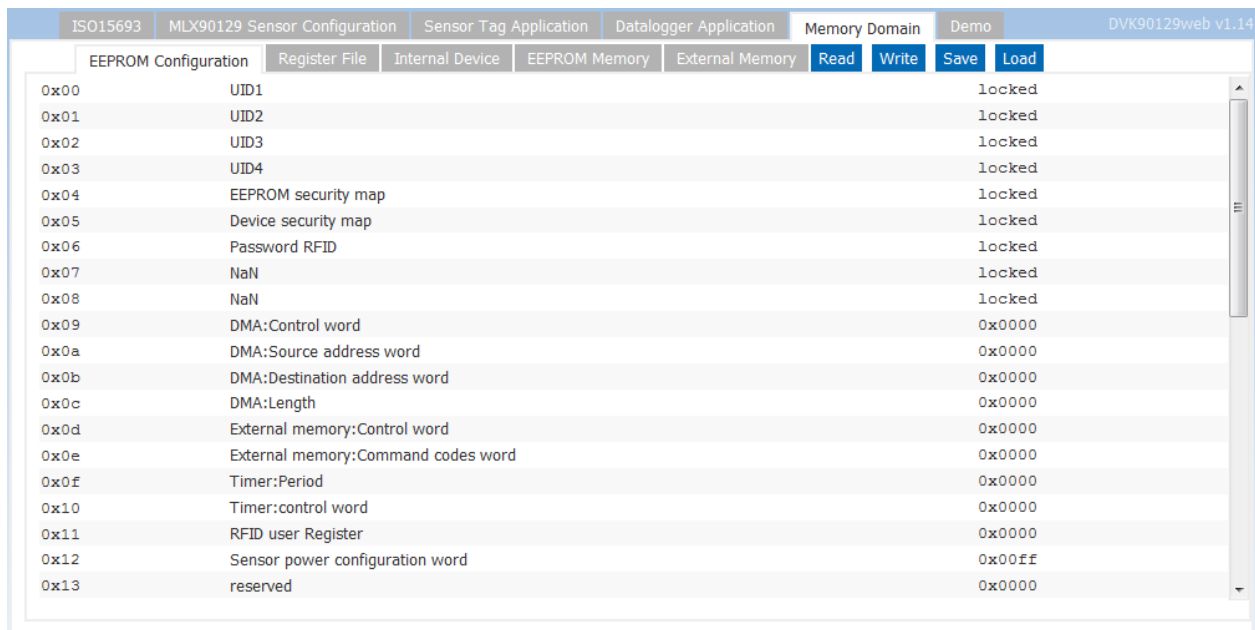
4.5. Memory Domain

The "Memory Domain" tab is comprised of several sub tabs which correspond to the memory domain available in the MLX90129. The memory domain is for displaying device configuration (MLX90129 EEPROM / Register file / Internal device) and data storage (MLX90129 Internal EEPROM / External Memory).

Modifications made in the configuration tabs (Sensor / Datalogger) automatically update the corresponding bits in the EEPROM or in the register file. The bit level impact of modifying the settings is displayed in this tab.

Only the Register File is accessible for write operation to avoid any bad manipulation in the EEPROM. (Register files are cleared after resetting the MLX90129). Storage memories can be read. The "initialize" button will write 0xFFFF values to the EEPROM or External Memory..

WARNING: The external memory can only be read if the correct memory settings are programmed in the "Datalogger Application" tab.

0x00	UID1	locked
0x01	UID2	locked
0x02	UID3	locked
0x03	UID4	locked
0x04	EEPROM security map	locked
0x05	Device security map	locked
0x06	Password RFID	locked
0x07	NaN	locked
0x08	NaN	locked
0x09	DMA:Control word	0x0000
0x0a	DMA:Source address word	0x0000
0x0b	DMA:Destination address word	0x0000
0x0c	DMA:Length	0x0000
0x0d	External memory:Control word	0x0000
0x0e	External memory:Command codes word	0x0000
0x0f	Timer:Period	0x0000
0x10	Timer:control word	0x0000
0x11	RFID user Register	0x0000
0x12	Sensor power configuration word	0x00ff
0x13	reserved	0x0000

Figure 11: Memory Domain tab with EEPROM Configuration

4.6. Demo

The "Demo" tab allows for easy demonstration of EVB90129 sensing features. It is important to note that the sensors are for demonstration only and are not calibrated or set for granular measurement. Sensor configurations are preprogrammed and available by choosing the sensor icon on the free sensor area.

There are configurations available for:
- ❑ MLX90129 Internal temperature sensor (thermometer)
- ❑ External temperature sensor (thermometer)
- ❑ External trimmer sensor (gauge)
- ❑ External light sensor (bulb)

Once the icon has been selected in the sensor area, the demo can be started by pressing "Start" button and stopped by pressing the "Stop" button.
The demo reads sensor values continuously and provides a graphical display of the value with an animated picture. The sensor configuration can be removed deselecting the specific sensor.

NOTE: The given temperature is a rough estimation because the sensors are not calibrated.
NOTE: The bulb will only light if a direct light is applied very close to the sensor.
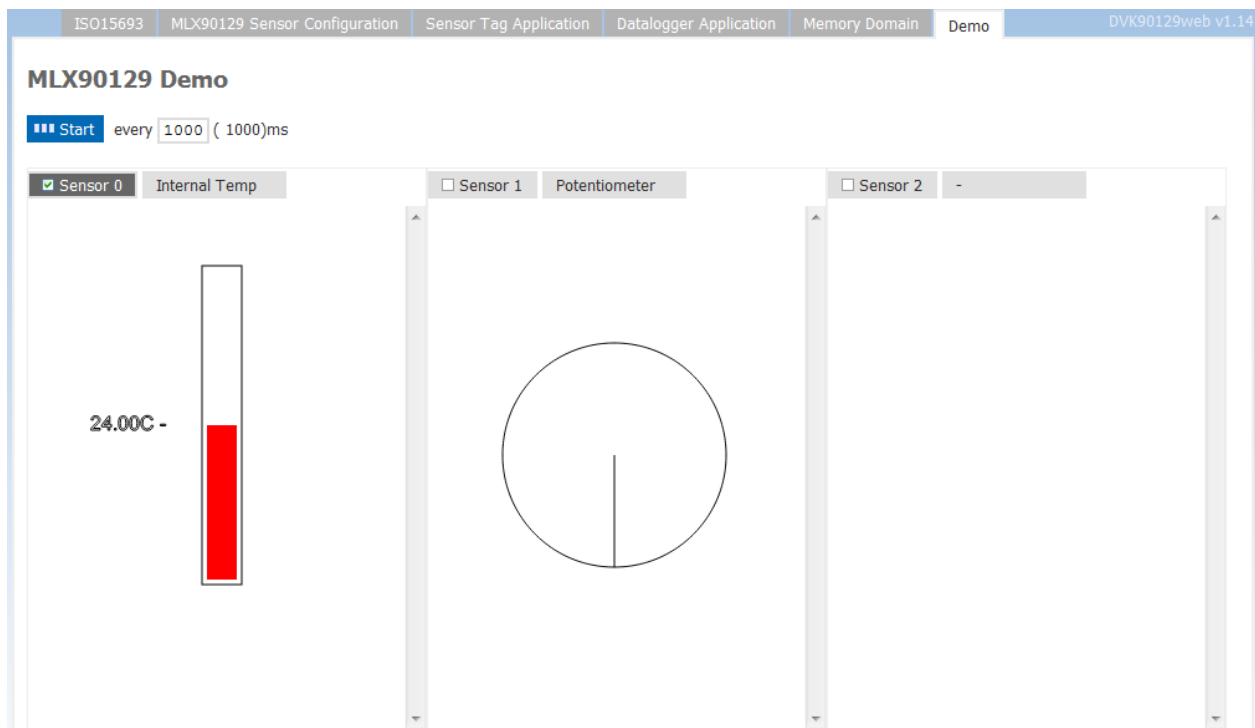

Figure 12: Demo tab with temperature and trimmer sensor

5. Contact Information

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