

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 software network browser and reader configuration plus guidance on features found in the evaluation software to help developers practice with the tools.





Contents

1. Kit con	tents	2
2. Hardwa	are and software installation	3
2.1.	Hardware installation	3
2.1.	1. Connect the EVB90130web reader	3
2.2.	Software installation	3
2.3.	Check the network configuration	4
3. Getting	Started	5
3.1.	Open the web interface	5
4. Tabs d	escription	6
4.1.	RFID configuration	6
4.2.	Sensor configuration	7
4.3.	Sensor Tag Application	8
4.4.	Datalogger Application	9
4.4.	1. Datalogger configuration	9
4.5.	Memory Domain	11
4.6.	Demo	12
5. Contac	t Information	13

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.

Control Panel Home	Help protect your computer with Windows Firewall						
Allow a program or feature through Windows Firewall	Windows Firewall can help prevent hackers or malicious software from through the Internet or a network.	gaining access to your computer					
🚱 Change notification settings	How does a firewall help protect my computer?	How does a firewall help protect my computer?					
 Turn Windows Firewall on or off Restore defaults 	What are network locations? For your security, some settings are managed by your system adm	ninistrator.					
Advanced settings Troubleshoot my network	Domain networks	Not Connected 📎					
	Home or work (private) networks	Connected 🔗					
	Networks at home or work where you know and trust the people and	devices on the network					

Figure 4: Windows Firewall

Customize settings for each type of network You can modify the firewall settings for each type of network location that you use. What are network locations? (i) For your security, some settings are managed by your system administrator. Domain network location settings Turn on Windows Firewall Block all incoming connections, including those in the list of allowed programs Votify me when Windows Firewall blocks a new program Turn off Windows Firewall (not recommended) Home or work (private) network location settings Turn on Windows Firewall V Block all incoming connections, including those in the list of allowed programs Votify me when Windows Firewall blocks a new program Turn off Windows Firewall (not recommended) Public network location settings Turn on Windows Firewall Block all incoming connections, including those in the list of allowed programs Notify me when Windows Firewall blocks a new program Turn off Windows Firewall (not recommended)

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/".

Firefox 🔻	ann ar all and a failers () + @	
	☆ マ C 🛛 🗧 Google	ନ 🕈 🖓 🛱
DVK90129web	and the second sec	- Company and the second second
Melecular Microselectionic Integrated Systeme ISO15693 MLX90129 Sensor Configuration Sensor Tag Application	E Future Datalogger Application Memory Domain Demo	West
ISO15693 and MLX90129 custom commands		
Protocol Select command 0x0202 0101 Field Off		
26 kbps Respect delay 312 us 100% Modulation Single Sub-Carrie	er (SSC) CRC auto added	
SendRecv command 0x0403 260100		
0x01 Inventory Single Sub-Carrier Hight of	data rate Option flag off	
1 slot Mask Length:0 Mask Value: 0x		
Echo command 0x55 SendRecv EOF 0x04 00 Save Command Clear Save	d Commands	
Response (OK): 0x0000		
© 2013 Dacom West GmbH Schallbruch 19-21 D-42781 Haan Telefon: +49 212	9 376-200 Fax: +49 2129 376-209	

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.

	ISO15693	MLX90129 Sensor (Configuration Se	nsor Tag Application	Datalogger Ap	plication Me	mory Domain	Demo	DVK90129web v1.14
ISC	1569 3	and MLX9012	9 custom co	ommands					
Prot	ocol Select	command 0x0202 01	01 Field Off						
26 52 6 k	kbps F kbps \ bps	Respect delay 312 us Nait for SOF	100% Modulation 10% Modulation	Single Sub-Carri Dual Sub-Carrier	er (SSC) N (DSC) C	o CRC added RC auto added			
0x0	1 Inventory	,	Single Sub	Carrier Hight	data rate	Option flag of	f		
1 sl	ot	Mask Length:0 Mask Val	lue: 0x						
Echo	o command	0x55 SendRecv EOF	0x04 00 Save Co	mmand Clear Save	d Commands				
Resp	onse (OK)	: 0x0000							

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

ISO15693 MLX90129 Senso	or Configuration Sensor Tag Application	Datalogger Applica	ation Memory Domai	n Demo	DVK90129web v1.14
Sensor common configuration:	Sensor 0 Sensor 1 Sensor 2	2 Set Read			
PGA1 PGA2 DAC ADC	EVB90129 Default Setups: Internal Te External Te	mperature Sensor mperature Sensor	External Trimmer Sense External Light Sensor	pr	
 Regulator DAC buffer 	ADC configuration: 8 bits single	sample Ch	opper off 150u	s high power mode	
BIAS	Threshhold configuration:	s	Sensor connections:		
Event detector power-on	High threshold: 0x 0000 Low threshold	0x 0000	SENS1	SENS2	
 Event detector enable ExtSupplyMode 	 Store calculated samples above high Store calculated samples between the 	threshold resholds F	Resistor network:		
Disconnect field supply	□ Store calculated samples below low	threshold	SENSUP2 = VDDA SENS3 = VDDA	 Connects Rv1 to VDD Connects Rv2 to VSS 	
$rac{1}{2}$ and $Ry 2 = 0.5 kOhm$	Sensor conditioning:		SENSUP2 = VSS	Connects Rv1 to SENS	JP2
	DAC offset 0x 00 PGA1 / PGA2: 8	1	\Box VCM = VDD/2	Connects Rv2 to SENSI Connects Rv2 to SENSI Connects Rv2 to SENSI	у ЛР2 4

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.

ISO15693	MLX90129 Sensor Configuration	Sensor Tag Application	Datalogger Application	Memory Domain	Demo	DVK90129web v1.14
MLX90129	Sensor Tag Applicati	on				
II Stop every	1000 (1000)ms Save to file (Clear Sensor Data				
Sensor 0	Save to file Clear	Sensor 1 Save to	file Clear	Sensor 2	Save to file Clear	
0xa4ec	42220	NAN		NAN		
0xde9f	56991	*		~		~
0xa88c	43148					
0xda8a	55946					
0xbdf0	48624					
0xd0c1	53441					
0xd856	55382					
Oxaffe	45054					
0xdc3f	56383					
0xa4ec	42220					

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.

ISO15693	MLX90129 Sensor Configuration	Sensor Tag Application	Datalogger Application Memory Domain Demo DVK90129web v1.14
Configuratio	on Application		
Set Application	Set Standard Read		
Include:	Select data destination:	Internal memory	DMA Options:
Sensor 0 Sensor 1 Sensor 2	Sensor 0 DMA_Destination_Address 0x 0029 Sensor 1 Log data every 1 Timestamp Log data 1		 DMA_LoopEn: Enable data logging loop DMA_IrqDataReady_En: Enable stand by mode once ended
			DMA_FirstWordMask: Dot not copy the MSByte of the first word in the dataloggin sequence in the external
	Required memory:	0	EEPROM DMA_FirstWordMask: Do not copy the LSByte of the last word in the dataloggin sequence in the external EEPROM WUT_AutoStandby_En WUT_AutoILog_En WUT_Irq_En: Timer IRQ enabled
DMA_Processing_0	Control: Start the acquisition: by	RFID command	
External Memory C	Configuration:		
SPI_AddressMode	16-bit addresss is used	Enable burst mode	
SPI_WriteEn_Code	0x 06 SPI_WriteEn_Ctrl	before every write operati	on SPI_WriteDelay 7 ms
SPI_KeadCode	0x 03		

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.

		MLX90129 Ser			Application		gger Application	Memory	Domain	Demo			
	EEPROM	Configuration	Register File In	ternal Device	EEPROM N	lemory	External Memory	Read	Write	Save	Load		
0x	00	UID1								100	ked:		*
0x	01	UID2								100	ked :		
0x	:02	UID3								100	ked :		
0x	:03	UID4								100	ked :		
0x	:04	EEPRO	OM security map							100	ked:		
0x	:05	Devic	e security map							loc	ked :		-
0x	06	Passv	vord RFID							100	ked :		
0x	07	NaN								100	ked :		
0x	08	NaN								100	ked :		
0 x	09	DMA:	Control word							0x0	0000		-
0x	0a	DMA:	DMA:Source address word 0x0000										
0x	:0b	DMA:	DMA:Destination address word 0x0000										
0x	0c	DMA:	DMA:Length 0x0000										
0 x	.0d	Extern	External memory:Control word 0x0000										
0x	:0e	Extern	nal memory:Comma	and codes word						0x0	0000		
0x	Of	Timer	r:Period							0x0	0000		
0x	10	Timer	r:control word							0x0	000		
0x	11	RFID	user Register							0x0	000		
0x	12	Senso	or power configurati	on word						0x0	0ff		
0x	13	resen	ved							0x0	0000		Ŧ

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

For the latest version of this document, go to our website at www.melexis.com

Or for additional information contact Melexis Direct:

Europe, Africa, Asia	America
Phone: +32 1367 0495	Phone: +1 248 306 5400
E-mail: sales_europe@melexis.com	E-mail: sales_usa@melexis.com