

Application note

MLX91218-19 programmable items

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1 Scope

This application note lists EEPROM parameters and their effect on MLX91218 and MLX91219 sensors behaviour. These values can be read and modified through the Melexis Programmable Toolbox (MPT), a PTC04 programmer and a DB-Hall05 daughter board.

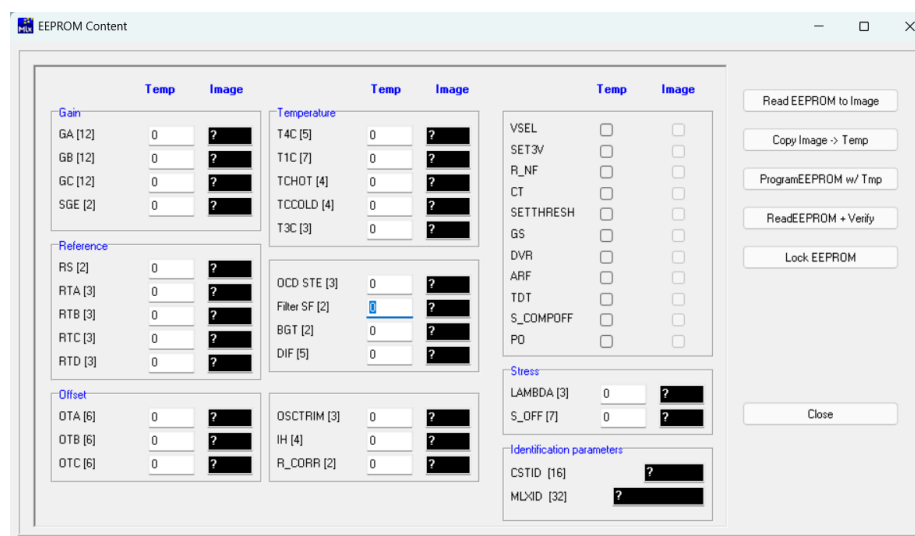


Figure 1: Melexis Programmable Toolbox EEPROM configuration window

2 Explanation

2.1 Parameters table

Parameter	Bits	Factory Setting	Comment
Gx	12	trimmed*	Rough gain adjustment
GS	1	0	1 inverses the output polarity
SGE	2		Gain selection between GA, GB and GC
RS	2		Reference Select (Vref level selection)
RTA	3	trimmed*	Vref trimming for 2.5V
RTB	3	trimmed*	Vref trimming for 1.65V
RTC	3	trimmed*	Vref trimming for 1.5V
RTD	3	trimmed*	Vref trimming for 0.5V
OTA	6	trimmed*	VOQ trimming for 2.5V
OTB	6	trimmed*	VOQ trimming for 1.5V and 1.65V
OTC	6	trimmed*	VOQ trimming for 0.5V
R_NF	1	0	0 : Fixed mode
		1	1 : Ratiometric mode
SET3V	1	0	0 : 5VDD
		1	1 : 3.3VDD
STE	3		Internal OCD (OCD_INT) level selection
SETTHRESH	1	=G9	Fixed at G9 for proper OCD functioning
SF	2	1	Output filter bandwidth selection
LOCK	1	0	Lock EEPROM to prevent modifications
MLXID	32	programmed	Melexis traceability ID

* depending on the Vref chosen, only the corresponding Gx, RTx and OTx is trimmed

Table 1: Customer programmable items

2.2 Sensitivity programming (Gx)

The sensitivity of the MLX91219 can be programmed from 5 to 105 mV/mT. This is configured using one of three 12-bit gain registers, **GA**, **GB** or **GC**. The selection of the gain calibration setting used by the sensor is determined by the SGE parameter during sensor startup. These gain settings follow a piecewise exponential curve (as shown in Figure 2).

For the MLX91218, the sensitivity ranges from 12 mV/mT to 600 mV/mT. The specific range depends on the Integrated Magnetic Concentrator (IMC) gain of your sensor (LF, VHF, XHF).

For assistance with calibration, please refer to the [Current sensors programming and calibration](#) application note. Additionally, the [Melexis current sensor calibrator](#) webtool is available to support blind calibration.

Note: Melexis recommends to stay on the same exponential curve when retrimming the sensor.

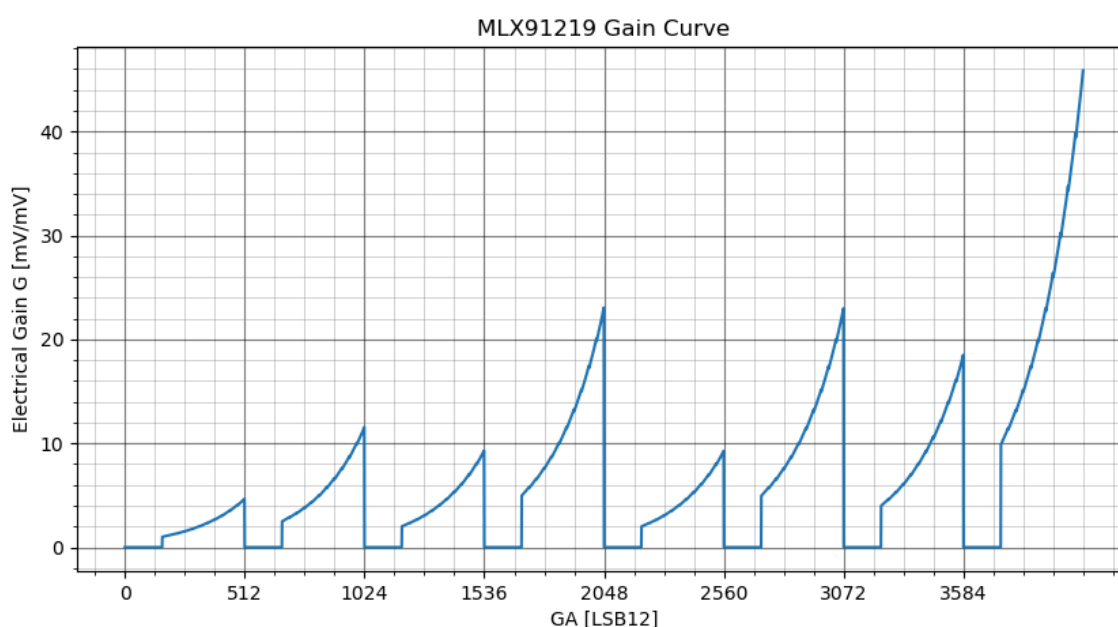


Figure 2: Relative gain curve of the MLX91218-219 products (without IMC)

2.3 Sensor polarity (GS)

If you inadvertently put the sensor in the wrong direction or wish to change the sensor polarity, you can flip the GS bit and set it to 1.

2.4 Gain selection (SGE)

The **SGE** setting allows selection between the gain values GA, GB, or GC.

The reference voltage (Vref) is set by the reference select (RS) value, which must be selected first based on your requirements. RS defines which OTx is effective (see [OTx section](#)). Since OTx and Gx values must share the same letter designation, the corresponding gain (GA, GB, or GC) has to be chosen depending on the Vref initial decision.

SGE value	Selection	Vref level
0 or 3	GA and OTA	2.5V
1	GB and OTB	1.5V and 1.65V
2	GC and OTC	0.5V

Table 2: Gain parameter selection from SGE values

2.5 Reference select (RS)

The **RS** setting selects the coarse voltage reference (Vref) level. The reference should then be fine tuned using RTx parameters.

Note: When the sensor is operating in ratiometric mode ($R_NF = 1$), the only possible settings are:

- RS = 0: This selects a Vref of 2.5V and is used when Vdd is 5V.
- RS = 1: This selects a Vref of 1.65V and is used when Vdd is 3.3V.

RS value	Vref	Required SGE
0	2.5V	0 or 3
1	1.65V	1
2	1.5V	1
3	0.5V	2

Table 3: Vref voltage from RS values

2.6 Vref trimming (RTx)

After selecting RS, the reference voltage (Vref) can be trimmed using one of four EEPROM parameters (**RTA**, **RTB**, **RTC**, or **RTD**), depending on the chosen Vref level. Each parameter offers eight levels, providing approximately 22mV trimming steps. These A, B, C, and D parameters are distinct from those used for OTx and Gx, which are SGE-driven.

Note: Trimming the reference (RTx) may require reviewing the offset (OTx) trimming and could impact factory temperature trimming accuracy.

RTx	role
RTA	Vref trimming of 2.5V
RTB	Vref trimming of 1.65V
RTC	Vref trimming of 1.5V
RTD	Vref trimming of 0.5V

Table 4: Vref trimming parameter for the selected Vref voltage

Below is an example of the voltages obtained with all the possible RTA values. The behaviour is similar for RTB, RTC and RTD.

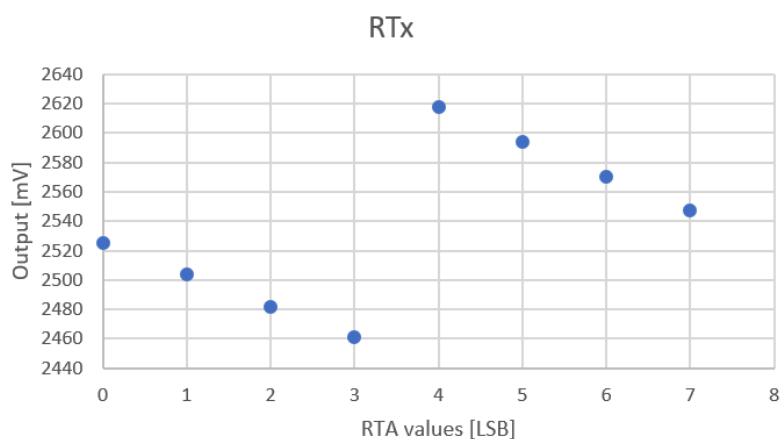


Figure 3: Vref behaviour when sweeping RTA values

2.7 Output offset trimming (OTx)

The **OTA**, **OTB**, and **OTC** parameters are 6-bit values used to fine-tune the output voltage (V_{out}) with a resolution of around 2.3 mV/LSB. The OTx register that trims the output voltage depends on the selected reference voltage level (RS).

In ratiometric mode, V_{out} should be trimmed directly with OTx to the desired quiescent output voltage (e.g., 2.5 V for a 5 V supply or 1.65 V for a 3.3 V supply) without changing RTx, while in fixed mode, the output should be trimmed as close as possible to V_{ref} , which has to be selected with RS and adjusted with RTx before configuring OTx.

OTx	role	Linked to RS value
OTA	Vout trimming of 2.5V	0
OTB	Vout trimming of 1.5V	2
OTB	Vout trimming of 1.65V	1
OTC	Vout trimming of 0.5V	3

Table 5: Vout trimming parameter from the selected Vref voltage

Below is an example of the voltages obtained with all the possible OTA values. The behaviour is similar for OTB and OTC.

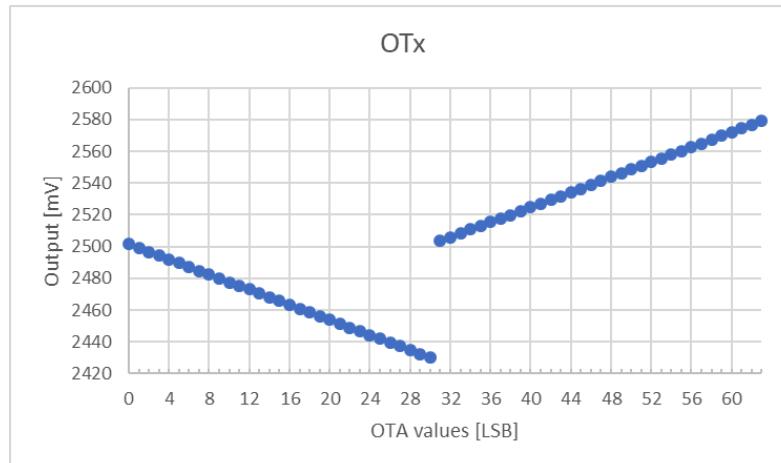


Figure 4: Vout behaviour when sweeping OTA values

2.8 Fixed / ratiometric mode (R_NF)

The **R_NF** parameter selects the sensor's output mode.

- **R_NF** = 0: Selects fixed mode.
- **R_NF** = 1: Selects ratiometric mode.

Note: The unipolar configuration is not available in ratiometric mode. Only 50%VDD quiescent output voltage is available in this case meaning:

- A 5V supply (Vdd) with a 2.5V reference (Vref).
- A 3.3V supply (Vdd) with a 1.65V reference (Vref).

2.9 5V / 3.3V supply (SET3V)

The **SET3V** parameter sets the sensor's operating supply voltage.

- **SET3V** = 0: Configures the sensor for a 5V supply.
- **SET3V** = 1: Configures the sensor for a 3.3V supply.

Note: Changing the supply voltage affects the sensor's full-scale range, as it is 2000mV for 5Vdd and 1250mV for 3.3Vdd. This change also impacts the sensor's sensitivity and the factory temperature trimming accuracy.

2.10 Internal OCD level selection (STE)

The **STE** parameter configures the threshold for the internal Overcurrent Detection (OCD) feature. The specific threshold level, expressed as a percentage of the electrical full scale, is dependent on the sensor's selected supply voltage. The table below is for bipolar configuration only.

Important: The value of the SETTHRESHOLD bit must always be identical to the value of the G9 bit (G0 is the LSB of Gx) in the sensor's gain configuration.

STE	OCD_int threshold 5V supply	OCD_int threshold 3.3V supply
0	63.3%	101.3%
1	88.2%	141.1%
2	108.5%	173.6%
3	133.4%	213.4%
4	149.2%	238.8%
5	177.5%	284.0%
6	195.6%	312.9%
7	215.9%	345.5%

Table 6: OCD_INT threshold values ($\pm 10\%$ typical accuracy) from STE values in % of electrical full scale
Bipolar configuration only

2.11 Set threshold (SETTHRESH)

For correct OCD operation, **SETTHRESH** must match the value of G9, which is the 10th bit of the gain Gx. G0 is the LSB and G11 is the MSB.

2.12 Output filter bandwidth selection (SF)

The **SF** parameter selects the sensor's output filter bandwidth from three available settings. Choosing a lower SF value results in a higher bandwidth and a faster response time.

SF value	Typical bandwidth	Max step response time
1	400 kHz	2 μ s
2	200 kHz	3.5 μ s
3	100 kHz	6 μ s

Table 7: Output filter bandwidth and response time from SF values

2.13 Melexis identification code (MLXID)

The **MLXID** is a 48-bit value used by Melexis as a unique identification code for the device.

3 Revision history

Revision	Date	Change history
001	03-Oct-25	Document creation
002	10-Mar-2026	Added GS polarity and corrected the OCD threshold values

Table 8 – Revision history

4 Disclaimer

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