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## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China





# MLX90215

*Position Programmable  
Linear Hall Effect Sensor*

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## Features and Benefits

- Programmable Linear Hall IC
- Quad Switched / Chopper Stabilized
- Ratiometric Output for A/D Interface
- Adjustable Quiescent Voltage ( $V_{OQ}$ )
- Very Low Quiescent Voltage  
Temperature Drift
- Adjustable Sensitivity
- Adjustable Temperature  
Compensation of Sensitivity

## Application Examples

- Rotary position sensor
- Linear position sensor
- Current sensing

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## Ordering Code

| Product Code | Temperature Code | Package Code | Option Code | Packing Form Code |
|--------------|------------------|--------------|-------------|-------------------|
| MLX90215     | E                | VA           | AAA-106     | BU                |
| MLX90215     | L                | VA           | AAA-111     | BU                |

### LEGEND:

**Temp. Code:** E for Temperature Range: -40C to +85C  
L for Temperature Range: -40C to +150C

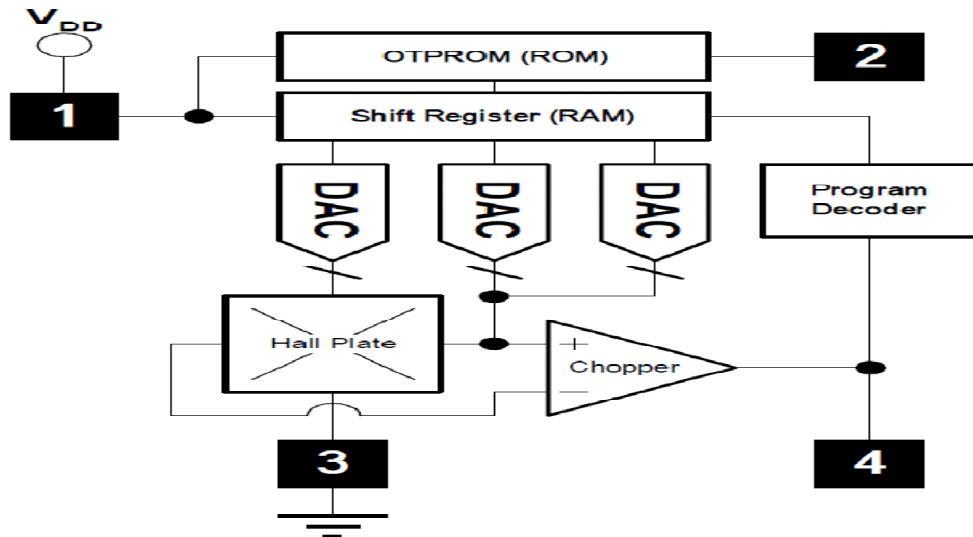
**Package Code:** VA for Plastic Single in Line Thickness 1.5mm- 1.6mm

**Packing Form Code:** BU for bulk

**Ordering Example:** MLX90215EVA-AAA-106-BU

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**1 Functional Diagram**



## 2 Description

The MLX90215 is a Programmable Linear Hall Effect sensor IC fabricated utilizing silicon-CMOS technology.

It possesses active error correction circuitry which virtually eliminates the offset errors normally associated with analog Hall Effect devices. All magnetic response functions of the MLX90215 are fully programmable for even greater versatility. The VOQ (VOUT @ B=0), sensitivity, direction of slope and the magnitude of sensitivity drift over temperature, are all programmable. The ratiometric output voltage is proportional to the supply voltage. When using the supply voltage as a reference for an A/D converter, fluctuations of  $\pm 10\%$  in supply voltage will not affect accuracy. When programmed for a conventional sensitivity (with a positive gain), the voltage at the output will increase as a South magnetic field is applied to the branded face of the MLX90215.

Conversely, the voltage output will decrease in the presence of a North magnetic field. The MLX90215 has a sensitivity drift of less than +1% error, and VOQ stability drift of less than +0.4% error, over a broad temperature range.

## 3 Electrical specifications

DC Operating Parameters  $T_A = -40^\circ\text{C}$  to  $150^\circ\text{C}$ ,  $V_{DD} = 5.0\text{V}$  (Unless otherwise specified)

| Parameter  | Symbol                   | Test Conditions  | Min          | Typ  | Max        | Units         |
|--|--------------------------|--|--------------|------|------------|---------------|
| Supply Voltage                                       | $V_{DD}$                 | Operating  | 4.5          | 5.0  | 5.5        | V             |
| Supply Current                                       | $I_{DD}$                 | $B = 0$ , $V_{DD} = 5\text{V}$ , $I_{OUT} = 0$   | 2.5          | 4.0  | 6.5        | mA            |
| Output Current <sup>(1)</sup>                        | $I_{OUT}$                | $V_{DD} = 5\text{V} \pm 10\%$  | -2           | -    | 2          | mA            |
| Quiescent Output Voltage <sup>(2)</sup>              | $V_{OQ}$                 | 10-Bit Programmable, $B = 0$   | 0.5          | -    | 4.5        | V             |
| Output Voltage <sup>(1)</sup>                        | $V_{OH}$                 | $V_{DD} = 5\text{V}$ , $I_{OUT} = -2\text{mA}$   | 4.50         | 4.65 |            | V             |
| Output Voltage <sup>(1)</sup>                        | $V_{OL}$                 | $V_{DD} = 5\text{V}$ , $I_{OUT} = 2\text{mA}$  |              | 0.35 | 0.50       | V             |
| Sampling Rate  | $f_{SAMP}$               | RoughGain @ Max and Min  | 4            | -    | 40         | kHz           |
| Bandwidth <sup>(3)</sup>                             | BW                       | RoughGain @ Min  |              | -    | 1.300      | kHz           |
| Bandwidth <sup>(3)</sup>                             | BW                       | RoughGain @ Max  | 0.130        | -    |            | kHz           |
| Step Response Time <sup>(6)</sup>                    | $T_{RMIN}$               | RoughGain @ Min  | 25           | -    |            | $\mu\text{s}$ |
| Step Response Time <sup>(6)</sup>                    | $T_{RMIN}$               | RoughGain @ Max  | 250          |      |            | $\mu\text{s}$ |
| Offset Voltage Adjustment Resolution                 | $\Delta V_{OQ}$          | $B = 0$ , $T_A = 25^\circ\text{C}$ , $1/2 V_{DD} - 1$<br>$B = 0$ , $T_A = 25^\circ\text{C}$ , $1/2 V_{DD} = 0$ | -1.5<br>-6.0 | -    | 1.5<br>6.0 | mV<br>mV      |
| Offset Voltage Drift over Temperature                | $\Delta V_{OQ}/\Delta T$ | $B = 0$ , $T_A = -40^\circ\text{C}$ to $150^\circ\text{C}$<br>$S < 100\text{mV/mT}$ & $V_{OQ} > 0.75\text{V}$  | -20          | -    | 20         | mV            |
| Offset Voltage Drift <sup>(2)</sup> over Temperature | $\Delta V_{OQ}/\Delta T$ | $B = 0$ , $T_A = -40^\circ\text{C}$ to $150^\circ\text{C}$<br>$S > 100\text{mV/mT}$ & $V_{OQ} < 0.75\text{V}$  | -40          | -    | 40         | mV            |
| Range of Sensitivity <sup>(7)</sup>                  | $s$                      | 13-Bit Programmable  | 5            | -    | 140        | mV/mT         |
| Peak to Peak Noise <sup>(4)</sup>                    |                          |  | 8            | 25   | 60         | mV            |
| Output Resistance                                    | $R_{OUT}$                |  |              | 6    |            | $\Omega$      |
| Sensitivity Drift <sup>(5)</sup>                     |                          | $T_A = 25^\circ\text{C}$   | -1           | -    | 1          | %             |

## Notes:

- (1) If output current and voltage specifications are exceeded, linearity will be degraded.
- (2) If  $V_{OQ}$  is programmed beyond these limits, the temperature compensation may become a problem at high temperatures. It is not recommended to program values of  $V_{OQ}$  below 1V or above 4V when sensitivity exceeds 100 mV/mT. Temperature instability can occur on some devices under these conditions.
- (3) Bandwidth is related to the sample rate and ROUGHGAIN. Bandwidth is estimated by (sample rate / 30)
- (4) Peak to Peak Noise is a function of ROUGHGAIN setting. See page 5, Peak to Peak Noise versus Sensitivity.
- (5) Sensitivity drift is independent of other parameters and does not include individual tolerances ( $\Delta V_{OQ}$  or  $\Delta V_{OQ}/\Delta T$ ). The tolerance for sensitivity  $\pm 1\%$  of its initial value. This does not include tolerance stack-up.
- (6) If the step input occurs in the middle of a sample interval, the small signal response delay will double. For ROUGHGAIN values less than or equal to 3, response time may be limited by the slew rate.
- (7) 1 mT = 10 Gauss

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## 4 How does it work?

The MLX90215 programming is done through the output pin, by changing supply voltage levels. Please note that the  $V_{DD}$  is raised to approximately 13V and 18V during programming. **Any connected components must also tolerate this voltage excursion.** When the supply voltage is at 4.5V to 5.5V, the output behaves normally. If the supply voltage is raised to 13V, the output then behaves as an input, or LOAD mode, allowing the 37-bit word to be clocked in. All data is loaded through a single line, with no dedicated clock signal. Clock and data are integrated into one signal which is initiated with the beginning of the LOAD sequence, then clocked with the positive edge of each bit. Variables are changed with the PC software and loaded into the temporary register of the device (RAM) via the timings of the programmer's microcontroller. Data can be loaded as many times as desired while in LOAD mode. Once a word is loaded, results are checked by observing the output voltage. This can be done with an external Voltmeter attached directly to pin 4 of the device, or with the internal ADC of the programmer. Once the desired program is loaded, the word can be "Zapped" permanently into ROM. This is done when the supply voltage rises above 18V, or ZAP mode, creating enough current to "Zap" 31 zener diodes which correspond to the temporary register. The ZAP function is a one-time function and cannot be erased. The above description is only for reference. The voltage levels and data transfer rates are completely controlled by the ASIC programmer. For more information on the programmer hardware, contact Melexis and request a datasheet for the SDAP programmer.

**Programming The Quiescent Offset Voltage ( $V_{OQ}$ )** 10 bits, 1024 steps of resolution, are allotted to adjust the Quiescent Offset Voltage ( $V_{OQ}$ ). By utilizing the HALFVDD function, the  $V_{OQ}$  can be set to one of two ranges. With the HALFVDD function disabled, the  $V_{OQ}$  can be programmed within a range of 10% to 90%  $V_{DD}$  with about 5mV per step resolution. With the HALFVDD function enabled, the device may be programmed within a 2V to 3V window with less than 1mV per step resolution.

### Programming the Sensitivity (Gain)

The sensitivity is programmed with a ROUGHGAIN and a FINEGAIN adjustment. The ROUGHGAIN is adjusted by utilizing three bits, or 8 increments. The FINEGAIN is programmed with 10 bits or 1024 increments. The sensitivity can be programmed within a range of 5mV/mT to 140mV/mT. Another 1-bit function allows the direction of the sensitivity to be reversed. The INVERTSLOPE function, when activated, will cause the Voltage output of the MLX90215 to decrease in the presence of a South magnetic field, and to increase in the presence of a North magnetic field. Table 2 expresses examples of sensitivity resulting from programming ROUGH GAIN and FINE GAIN codes, with the INVERT SLOPE function turned off.

**Note:** Tables 1 and 2 are examples how various codes affect the device. Output voltage will vary slightly from device to device. Use these tables for reference only.

**Table 1 - Programming Offset Voltage (V<sub>oq</sub>)**

| HalfVDD | OffsetDAC | Output | Units |
|---------|-----------|--------|-------|
| 0       | 0         | 4.97   | V     |
| 0       | 512       | 2.47   | V     |
| 0       | 1023      | 0.03   | V     |
| 1       | 0         | 3.07   | V     |
| 1       | 512       | 2.45   | V     |
| 1       | 1023      | 1.83   | V     |

**Table 2 - Programming Sensitivity**

| RoughGain | FineGain | Output | Units |
|-----------|----------|--------|-------|
| 0         | 0        | 4.1    | mV/mT |
| 0         | 1023     | 9.4    | mV/mT |
| 1         | 0        | 6.2    | mV/mT |
| 1         | 1023     | 14.6   | mV/mT |
| 2         | 0        | 9.5    | mV/mT |
| 2         | 1023     | 22.4   | mV/mT |
| 3         | 0        | 14.2   | mV/mT |
| 3         | 1023     | 33.1   | mV/mT |
| 4         | 0        | 21.5   | mV/mT |
| 4         | 1023     | 50.4   | mV/mT |
| 5         | 0        | 31.3   | mV/mT |
| 5         | 1023     | 72.5   | mV/mT |
| 6         | 0        | 46.2   | mV/mT |
| 6         | 1023     | 107    | mV/mT |
| 7         | 0        | 68.9   | mV/mT |
| 7         | 1023     | 140    | mV/mT |

### Temperature Compensation

Temperature compensation (TC) is defined as the change in sensitivity over temperature. Expressed in (Parts Per Million per Degree Celcius) ppm/°C.

$$TC = \frac{Sens_{T1} - Sens_{T2}}{Sens_{25}} * \frac{1}{T1 - T2} * 10^6 \frac{ppm}{^{\circ}C}$$

Sens<sub>T1</sub> = Sensitivity measured at Temperature 1 (T1)

Sens<sub>T2</sub> = Sensitivity measured at Temperature 2 (T2)

Sens<sub>25</sub> = Initial Sensitivity measured at 25°C

### Programming the Temperature Compensation

The MLX90215 has a 5-bit (32 step) programmable adjustment that changes its sensitivity drift over a given temperature range. By adjusting the TC code the sensitivity can be programmed to increase as temperature increases to counteract the decrease in magnetic flux most magnets display over temperature.

For example a SmCo (Samarium Cobalt) magnet has a temperature coefficient of approximately -300 ppm/°C.

The MLX90215 can be programmed with a TC of 300 ppm/°C to counteract the TC of the magnet and greatly improve linearity in the application over temperature.

**Table 3 - Temperature Compensation**

| TC Code | Min  | Typical | Max  | Units  |
|---------|------|---------|------|--------|
| 0       | -700 | -550    | -350 | ppm/°C |
| 1       | -625 | -450    | -275 | ppm/°C |
| 2       | -525 | -375    | -175 | ppm/°C |
| 3       | -450 | -300    | -100 | ppm/°C |
| 4       | -350 | -200    | -25  | ppm/°C |
| 5       | -275 | -125    | 50   | ppm/°C |
| 6       | -200 | -50     | 125  | ppm/°C |
| 7       | -100 | 25      | 225  | ppm/°C |
| 8       | 125  | 275     | 425  | ppm/°C |
| 9       | 225  | 350     | 525  | ppm/°C |
| 10      | 300  | 425     | 600  | ppm/°C |
| 11      | 375  | 525     | 700  | ppm/°C |
| 12      | 450  | 600     | 775  | ppm/°C |
| 13      | 525  | 675     | 850  | ppm/°C |
| 14      | 600  | 775     | 950  | ppm/°C |
| 15      | 675  | 850     | 1025 | ppm/°C |
| 16      | 975  | 1300    | 1550 | ppm/°C |
| 17      | 1025 | 1375    | 1650 | ppm/°C |
| 18      | 1125 | 1470    | 1750 | ppm/°C |
| 19      | 1200 | 1550    | 1825 | ppm/°C |
| 20      | 1275 | 1650    | 1950 | ppm/°C |
| 21      | 1325 | 1725    | 2025 | ppm/°C |
| 22      | 1425 | 1800    | 2125 | ppm/°C |
| 23      | 1475 | 1900    | 2200 | ppm/°C |
| 24      | 1500 | 2000    | 2425 | ppm/°C |
| 25      | 1550 | 2100    | 2525 | ppm/°C |
| 26      | 1600 | 2200    | 2625 | ppm/°C |
| 27      | 1675 | 2275    | 2700 | ppm/°C |
| 28      | 1750 | 2375    | 2825 | ppm/°C |
| 29      | 1825 | 2450    | 2925 | ppm/°C |
| 30      | 1900 | 2550    | 3025 | ppm/°C |
| 31      | 1950 | 2650    | 3125 | ppm/°C |

**Table 3** (left) illustrates the way the TC code affects the sensitivity temperature drift. Also note in Table 3, the overlap in TC codes. The numbers in the table represent typical results and are for reference only. For accurate results the TC code must be determined experimentally.

This TC code map applies to MLX90215's with a first line brand showing "215DB"

**Special Note**

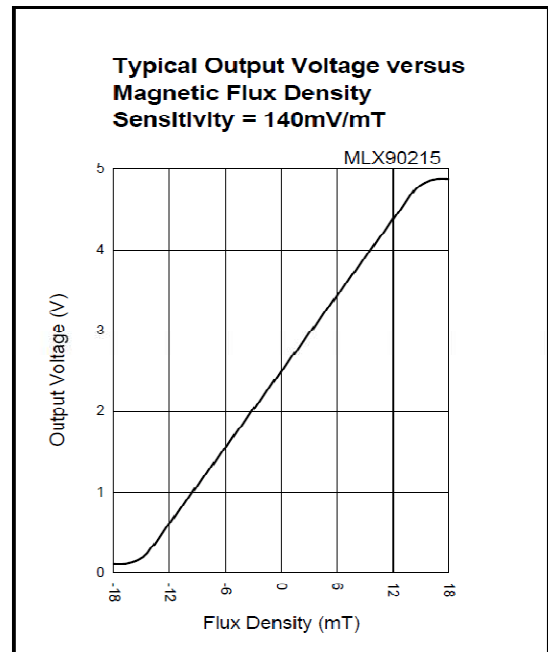
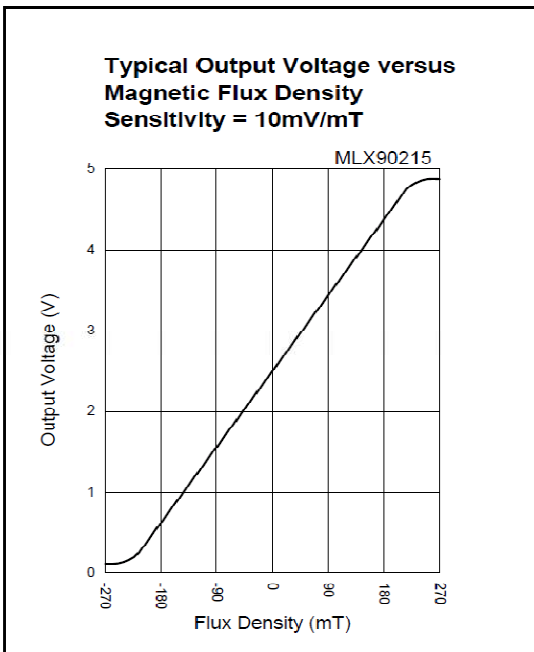
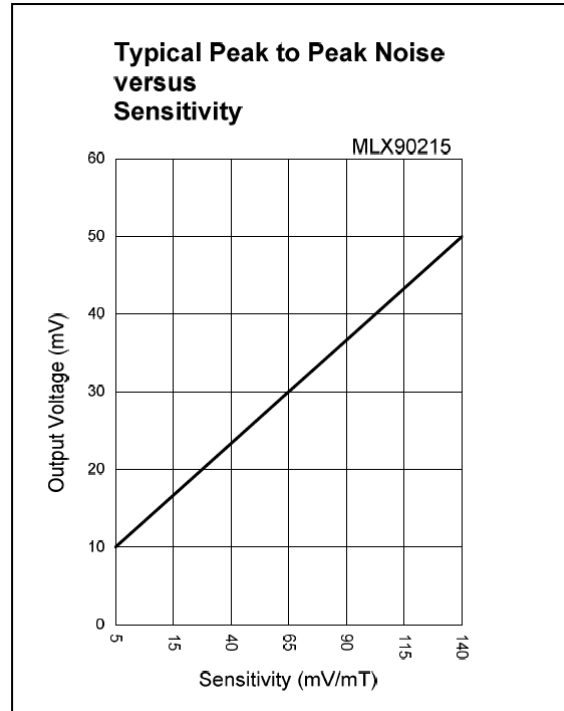
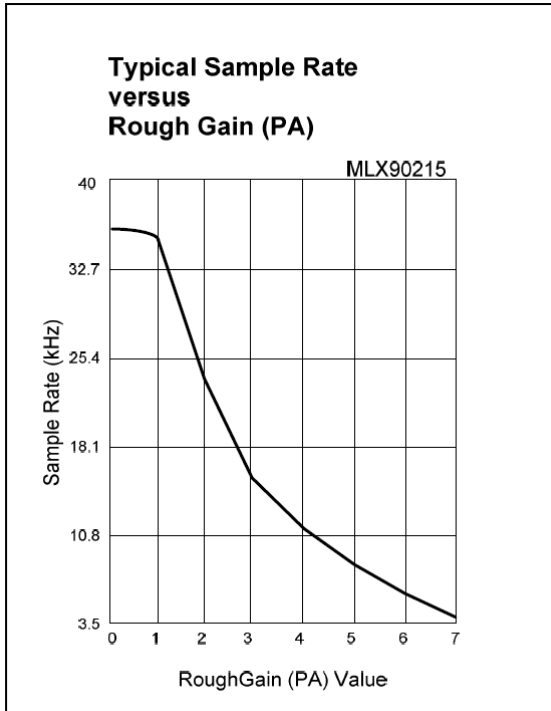
The MLX90215 programmed with a zero TC code (default) has a typical TC value between the range of –300 to –600 ppm/°C. This means sensitivity will decrease slightly as temperature increases. The slightly negative initial TC value allows the MLX90215 to be accurately programmed up to 0 TC. Almost all magnets have a naturally negative TC code. The natural TC of a magnet added with the initial negative TC value of the

MLX90215 could degrade linearity over a large temperature span. Using a TC code of 6, 7, or 8 will give the MLX90215 a slightly positive TC code.

Previous revisions of the MLX90215 with second line brand of "15AXX" or "15DXX" should refer to factory for TC code maps.

| Condition  | Output Level                          |
|--|---------------------------------------|
| $V_{OUT}$ Shorted to $V_{DD}$                    | $V_{OUT} = V_{DD}$                    |
| $V_{OUT}$ Shorted to $V_{SS}$                    | $V_{OUT} = V_{SS}$                    |
| $V_{OUT}$ open with pull up load                 | $V_{OUT} = V_{DD}$                    |
| $V_{OUT}$ open with pull down load               | $V_{OUT} = V_{SS}$                    |
| $V_{SS}$ open with pull up load                  | $V_{OUT} = V_{DD}$                    |
| $V_{SS}$ open with pull down load<br>> 10 K Ohms | $V_{OUT} = V_{DD}$<br>or 94% $V_{DD}$ |
| $V_{DD}$ open with pull up load<br>> 4.7 K Ohms  | $V_{OUT} = V_{SS}$<br>or 3% $V_{DD}$  |
| $V_{DD}$ open with pull down load                | $V_{OUT} = V_{SS}$                    |

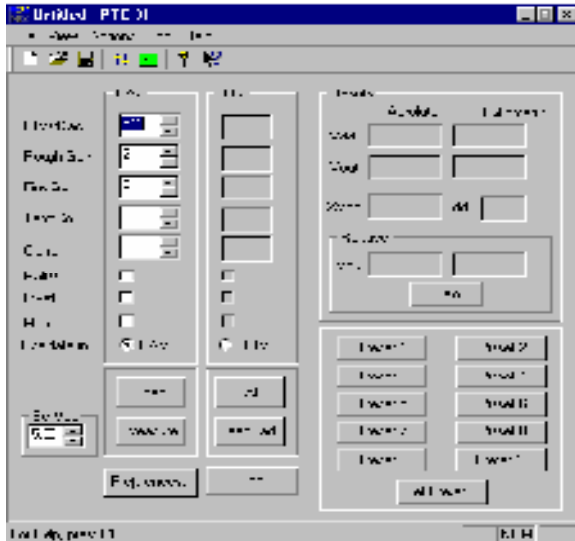
## 5 MLX90215 Performance





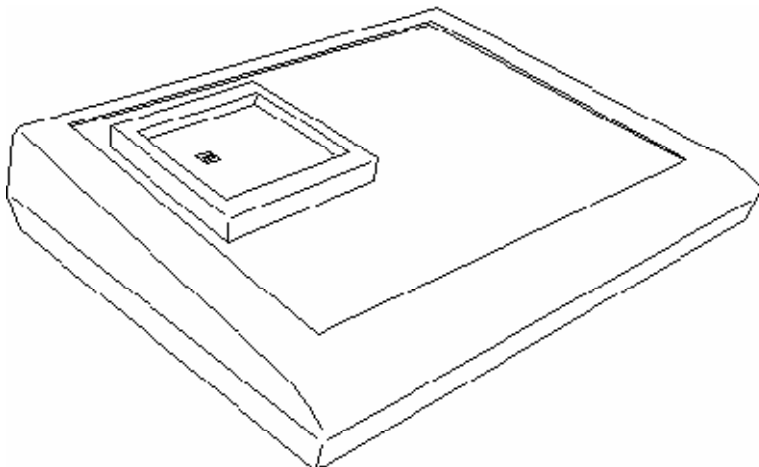
## 6 Melexis Programmer

Melexis offers a programmer (PTC-01) for programming the MLX90215. The PTC-01 comes complete with windows based software that makes programming the MLX90215 simple. The programmer communicates with a PC via a RS232 serial interface. The programmer and software allows users to load settings in the MLX90215, take measurements, calibrate sensors, and program the MLX90215. For more information the PTC-01 goto [www.melexis.com](http://www.melexis.com), or contact Melexis.



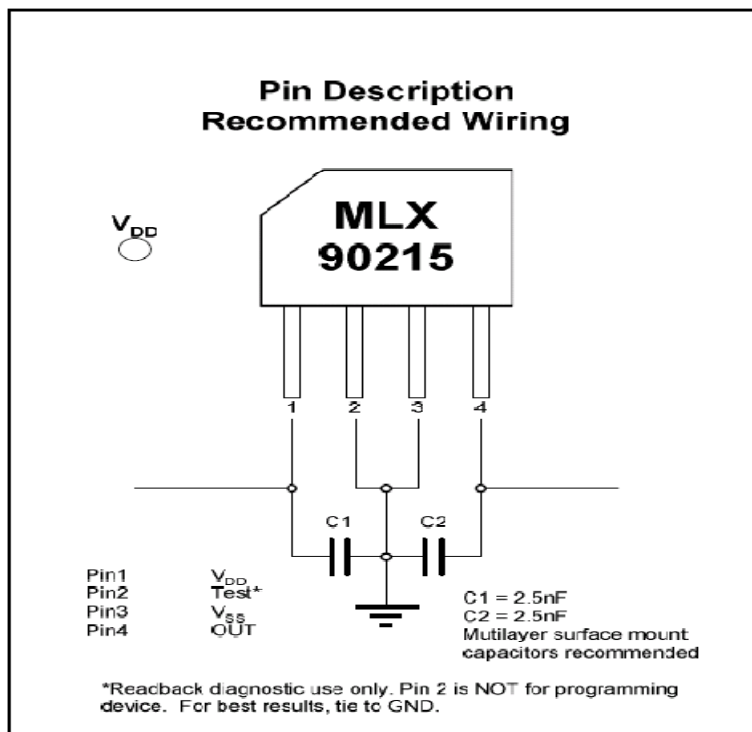
*Left, PTC-01 windows based software. Works with any 9 Pin Serial Port equipped PC running windows 9x, W2000 or XP.*

## Melexis PTC-01 Programmer



## 7 Absolute Maximum Ratings

|   |                |
|---|----------------|
| Supply Voltage (Over Voltage)               | 18V            |
| Supply Voltage (Operating)                  | 5V $\pm$ 10%   |
| Reverse Voltage Protection                  | -14.5V         |
| Magnetic Flux Density                       | Unlimited      |
| Supply Current, I <sub>DD</sub>             | 6.5 mA         |
| Output Current (Short to V <sub>DD</sub> )  | +12 mA         |
| Output Current (Short to V <sub>SS</sub> )  | -12 mA         |
| Operating Temperature Range, T <sub>A</sub> | -40°C to 150°C |
| Storage Temperature Range, T <sub>S</sub>   | -55°C to 165°C |
| ESD Sensitivity                             | $\pm$ 5kV      |



## 8 Clamping the Output Voltage

The MLX90215 has a 2-bit CLAMP feature which allows four output voltage options. The CLAMP feature is independent of the gain, and will not effect sensitivity of the device. The table below illustrates limits for each of the four options.

| Bit Value | Limits (% V <sub>DD</sub> ) |
|-----------|-----------------------------|
| 0         | (default) no clamp          |
| 1         | 5 to 45                     |
| 2         | 10 to 90                    |
| 3         | 5 to 95                     |

## 9 Application comments

The following is a list of recommended operating parameters that will help to ensure the accuracy and stability of the MLX90215. These are not the absolute programming limits of the device.

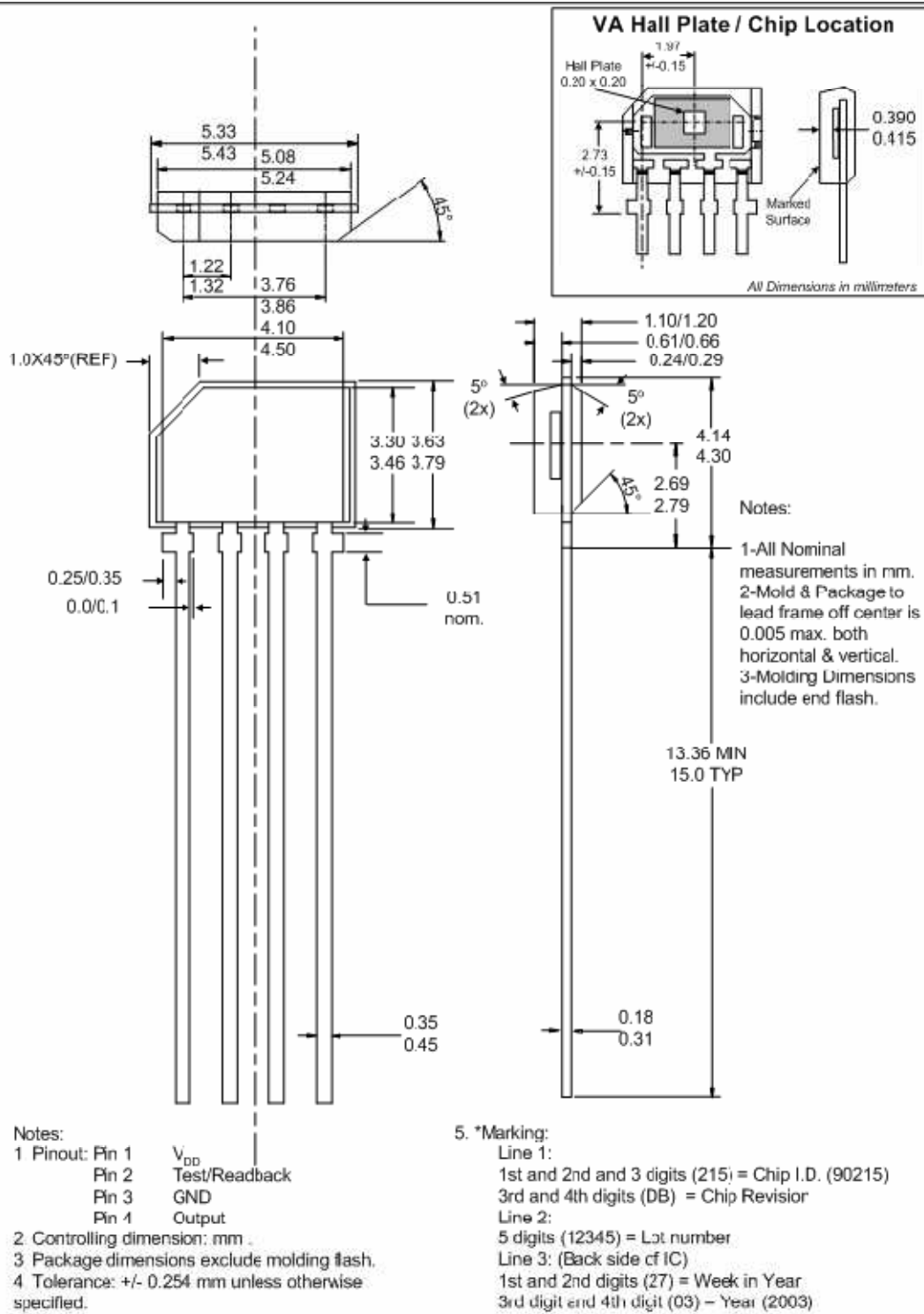
- 1.) V<sub>OQ</sub> is best programmed in the absence of any magnetic influence and to voltages closest to 1/2 V<sub>DD</sub>, where temperature drift will be +/-0.4% or less. It is not recommended to use V<sub>OQ</sub> values close to 0 volts or V<sub>DD</sub> when programming extremely high sensitivity (> 100 mV/mT) values. Temperature instability may be observed on some devices under these conditions.
- 2.) Best linearity of sensitivity is obtained when V<sub>OQ</sub> is programmed at 1/2V<sub>DD</sub>. This is with the 1/2V<sub>DD</sub> function enabled.
- 3.) Best linearity of sensitivity is obtained when the gain is programmed between 5mV/mT and 100mV/mT.
- 4.) Best temperature stability is realized when the temperature compensation function is programmed to zero ppm/°C.
- 5.) The Test/Readback pin is for diagnostic use only. This pin is normally tied to GND. Contact Melexis for more details on programming this device.

## 10 Installation Comments

- 1.) Avoid mechanical stress on leads or package. Stress may cause V<sub>OQ</sub> shift.
  - A.) Avoid bending leads at the package interface.
  - B.) Support the leads by clamping, when bending.
  - C.) Avoid gluing device to another material. This may cause temperature-related stress.
- 2.) CMOS products are static sensitive devices, please observe ESD precautions.
- 3.) Observe temperature limits during soldering

| Bit | Function    |
|-----|-------------|
| 1   | INVERTSLOPE |
| 2   | OFFSETDAC 5 |
| 3   | OFFSETDAC 6 |
| 4   | OFFSETDAC 7 |
| 5   | OFFSETDAC 8 |
| 6   | OFFSETDAC 9 |
| 7   | OFFSETDAC 4 |
| 8   | OFFSETDAC 3 |
| 9   | OFFSETDAC 2 |
| 10  | OFFSETDAC 1 |
| 11  | OFFSETDAC 0 |
| 12  | FINEGAIN 0  |
| 13  | FINEGAIN 1  |
| 14  | FINEGAIN 2  |
| 15  | HALFVDD     |
| 16  | FINEGAIN 3  |
| 17  | FINEGAIN 4  |
| 18  | FINEGAIN 5  |
| 19  | FINEGAIN 8  |
| 20  | FINEGAIN 9  |
| 21  | FINEGAIN 6  |
| 22  | FINEGAIN 7  |
| 23  | ROUGHGAIN 2 |
| 24  | ROUGHGAIN 1 |
| 25  | ROUGHGAIN 0 |
| 26  | TEMP CO 0   |
| 27  | TEMP CO 1   |
| 28  | TEMP CO 2   |
| 29  | TEMP CO 3   |
| 30  | TEMP CO 4   |
| 31  | CLAMP 1     |
| 32  | CLAMP 0     |
| 33  | MEMLOCK     |
| 34  | TEST 0      |
| 35  | TEST 1      |
| 36  | TEST 2      |
| 37  | TEST 3      |

## 11 Physical Characteristics



## 12 Application Notes

### Linear Precision Current Sensor

The Programmable gain, offset, and temperature compensation of MLX90215 allows great flexibility in the design of a current sensor.

Current flowing through a conductor can produce a proportional magnet field. The MLX90215 can then produce an output voltage proportional to the current. Using the programmable gain and offset function the output of the MLX90215 can be adjusted to sense a wide range of current allowing for a flexible design.

**Slotted Torroid Example** Assuming infinite permeability of the core, the magnetic field through the air gap produced by a single wire turn is given by equation 2

#### Equation 2

Where: I = current in Amperes

B = magnetic field in Tesla

$l_g$  = length of air gap in Meters

$\mu_0$  = Permeability of free space ( $4\pi \cdot 10^{-7} \text{H/m}$ )

This equation is a close estimate for the field in the air gap, but does not take into account magnetic losses in the core, fringing effects, and mechanical tolerances of the air gap. The programmable MLX90215 can be adjusted to compensate for these errors simplifying the design. The temperature compensation of MLX90215 can also be adjusted to counteract temperature losses of core.

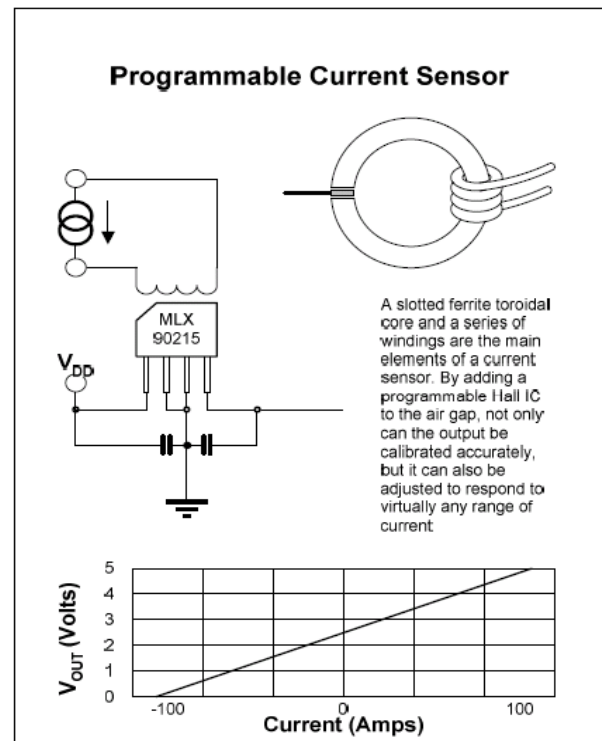
For sensing a current  $\pm 100\text{A}$ , with an air gap of 2mm equation 2 yields a magnetic field range of  $\pm 63\text{mT}$ . The output range of the MLX90215 is 0.5V to 4.5V (4V full scale). Equations 3a and 3b yield a sensitivity of 32mV/mT and a  $V_{oq}$  of 2.5V.

#### Equation 3

a)  $S = 4000\text{mV} / 126\text{mT}$

b)  $V_{oq} = 4\text{V}/2 + 0.5\text{V}$

The resulting gain of the current sensor is 20mV/A with an offset of 2.5V. For best results it is recommend that MLX90215 be programmed with a  $V_{oq}$  of 50%  $V_{dd}$  1/2  $V_{dd}$  bit set.



Magnetic Suppliers:

Elna Ferrites Technologies Inc  
Eastern Components  
Fair Rite Products Corp

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### **13 Standard information regarding manufacturability of Melexis products with different soldering processes**

Our products are classified and qualified regarding soldering technology, solderability and moisture sensitivity level according to following test methods:

#### **Reflow Soldering SMD's (Surface Mount Developments)**

- IPC/JEDEC J-STD-020  
Moisture/Reflow Sensitivity Classification for Nonhermetic Solid State Surface Mount Devices (classification reflow profiles according to table 5-2)
- EIA/JEDEC JESD22-A113  
Preconditioning of Nonhermetic Surface Mount Devices Prior to Reliability Testing (reflow profiles according to table 2)

#### **Wave Soldering SMD's (Surface Mount Developments) and THD's (Through Hole Developments)**

- EN60749-20  
Resistance of plastic- encapsulated SMD's to combined effect of moisture and soldering heat
- EIA/JEDEC JESD22-B106 and EN60749-15  
Resistance to soldering temperature for through-hole mounted devices

#### **Iron Soldering THD's (Through Hole Developments)**

- EN60749-15  
Resistance to soldering temperature for through-hole mounted devices

#### **Solderability SMD's (Surface Mount Developments) and THD's (Through Hole Developments)**

- EIA/JEDEC JESD22-B102 and EN60749-21  
Solderability

For all soldering technologies deviating from above mentioned standard conditions (regarding peak temperature, temperature gradient, temperature profile etc) additional classification and qualification tests have to be agreed upon with Melexis.

The application of Wave Soldering for SMD's is allowed only after consulting Melexis regarding assurance of adhesive strength between device and board.

Melexis recommends reviewing on our web site the General Guidelines [soldering recommendation](http://www.melexis.com/Quality_soldering.aspx) ([http://www.melexis.com/Quality\\_soldering.aspx](http://www.melexis.com/Quality_soldering.aspx)) as well as [trim&form recommendations](http://www.melexis.com/Assets/Trim-and-form-recommendations-5565.aspx) (<http://www.melexis.com/Assets/Trim-and-form-recommendations-5565.aspx>).

Melexis is contributing to global environmental conservation by promoting lead free solutions. For more information on qualifications of RoHS compliant products (RoHS = European directive on the Restriction Of the use of certain Hazardous Substances) please visit the quality page on our website: <http://www.melexis.com/quality.aspx>

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|  |  |
|--|--|
| <b>Europe, Africa, Asia:</b>   | <b>America:</b>  |
| Phone: +32 1367 0495   | Phone: +1 248 306 5400   |
| E-mail: <a href="mailto:sales_europe@melexis.com">sales_europe@melexis.com</a> | E-mail: <a href="mailto:sales_usa@melexis.com">sales_usa@melexis.com</a> |

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