

## Features and Benefits

- Small Plastic Package (SOT-23, 4-SIP-VA, TO-92)
- Quad Switched Hall Plate / Chopper Stabilized Amplifier
- Ratiometric Output for A/D Interface
- Low Quiescent Voltage Thermal Drift

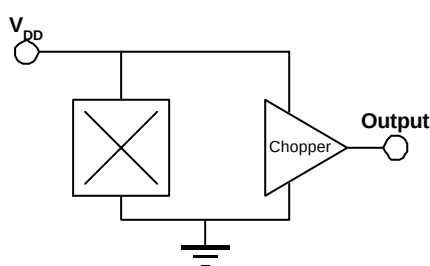
## Applications

- Linear Position Sensing
- Rotary Position Sensing
- Current Sensing

## Ordering Information

| Part No.         | Sensitivity                     | Voq    | TC                          | Temp. Range  | Package | Nb pins |
|------------------|---------------------------------|--------|-----------------------------|--------------|---------|---------|
| MLX90242LUA-CC03 | 40 mV/mT ( $\pm 500\text{G}$ )  | 2.50 V | 700 ppm/ $^{\circ}\text{C}$ | -40C to 150C | UA      | 3       |
| MLX90242LVA-CC03 | 40 mV/mT ( $\pm 500\text{G}$ )  | 2.50 V | 700 ppm/ $^{\circ}\text{C}$ | -40C to 150C | VA      | 4       |
| MLX90242ESO-BC03 | 15 mV/mT ( $\pm 1300\text{G}$ ) | 2.50 V | -                           | -40C to 85C  | SO      | 3       |
| MLX90242ESO-CC03 | 40 mV/mT ( $\pm 500\text{G}$ )  | 2.50 V | -                           | -40C to 85C  | SO      | 3       |

## 1. Functional Diagram



| Package | Pin1            | Pin2            | Pin 3           | Pin4 | Slope    |
|---------|-----------------|-----------------|-----------------|------|----------|
| SOT23   | V <sub>DD</sub> | Out             | V <sub>SS</sub> |      | Positive |
| UA      | V <sub>DD</sub> | V <sub>SS</sub> | Out             |      | Negative |
| VA      | V <sub>DD</sub> | n/c             | V <sub>SS</sub> | Out  | Positive |

## 2. Description

The MLX90242 is a CMOS Linear Hall Effect sensor IC. It possesses active error correction circuitry which virtually eliminates the offset errors normally associated with analog Hall Effect devices.

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. For a positive slope, the voltage at the output will increase as a South magnetic field is applied to the branded face of the MLX90242. Conversely, the voltage output will decrease in the presence of a North magnetic field. For a negative slope, the voltage at the output will increase as a North magnetic field is applied to the branded face of the MLX90242. Conversely, the voltage output will decrease in the presence of a South magnetic field.

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### **3. Glossary of Terms**

- Gauss, Tesla: Two units to quantify a magnetic flux density. Conversion: 1 mT = 10 Gauss
- Voq: Quiescent output voltage. Output voltage for B = 0.

### **4. Absolute Maximum Ratings**

|                                                |                |
|------------------------------------------------|----------------|
| Supply Voltage (Over Voltage), V <sub>DD</sub> | 7.0 V          |
| Output Current Short to V <sub>DD</sub>        | 5 mA           |
| Output Current Short to V <sub>SS</sub>        | 0.5 mA         |
| Output Pin Short to V <sub>SS</sub> Pin        | Infinite       |
| Output Over Voltage                            | 8 V            |
| Operating Temperature Range, T <sub>A</sub>    | -40°C to 150°C |
| Storage Temperature Range, T <sub>S</sub>      | -55°C to 150°C |
| Maximum Junction Temp, T <sub>J</sub>          | 170°C          |
| Magnetic Flux Density                          | Infinite       |

Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

### 5. MLX90242 Electrical Specifications

DC Operating Parameters. L:  $T_A = -40$  to  $150^\circ\text{C}$ , E:  $T_A = -40$  to  $85^\circ\text{C}$   
 $V_{DD} = 5.0\text{V}$  (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           | $I_{DD}$  | $B = 0$ , $V_{DD} = 5\text{V}$ , $I_{OUT} = 0$                                 | 1.8  | 2.5 | 4.5  | mA            |
| Output Current           | $I_{OUT}$ | $V_{DD} = 5\text{V}$<br>Pull-up = 5 k $\Omega$ , Pull-down = 50 k $\Omega$     | -1.0 | -   | 0.1  | mA            |
| Quiescent Output Voltage | $V_{OQ}$  | $B = 0$ , $T_A = 25^\circ\text{C}$                                             | 2.4  | 2.5 | 2.6  | V             |
| Output Voltage           | $V_{OH}$  | $V_{DD} = 5\text{V}$ , $I_{OUT} = -1.0\text{ mA}$                              | 4.75 |     |      | V             |
| Output Voltage           | $V_{OL}$  | $V_{DD} = 5\text{V}$ , $I_{OUT} = 0.1\text{ mA}$                               |      |     | 0.25 | V             |
| Response Time            | $t_r$     | $V_{DD} = 5\text{V}$ , $V_{OUT}$ from $V_{OQ}$ to $V_{OH}/V_{OL}$ without load |      | 400 | 800  | $\mu\text{s}$ |
| Noise (RMS)              |           |                                                                                |      | 5   | 10   | mV            |
| Output Resistance        | $R_{OUT}$ |                                                                                |      | 20  |      | $\Omega$      |
| Linearity Error          | $Le$      |                                                                                |      |     | 0.5  | % $V_{DD}$    |

### 6. MLX90242 Magnetic Specifications

L:  $T_A = -40$  to  $150^\circ\text{C}$ , E:  $T_A = -40$  to  $85^\circ\text{C}$   
 $V_{DD} = 5.0\text{V}$  (Unless otherwise specified)

| Parameter                                        | Symbol       | MLX90242LUA-CC03 |      |      | MLX90242LVA-CC03 |      |      | MLX90242ESO-BC03      |     |      | MLX90242ESO-CC03      |      |      |
|--------------------------------------------------|--------------|------------------|------|------|------------------|------|------|-----------------------|-----|------|-----------------------|------|------|
|                                                  |              | Min              | Typ  | Max  | Min              | Typ  | Max  | Min                   | Typ | Max  | Min                   | Typ  | Max  |
| Thermal $V_{OQ}$ Drift <sup>(1)</sup><br>(mV)    | $D^T V_{OQ}$ | -25              |      | 25   | -25              |      | 25   | +/- 25 <sup>(2)</sup> |     |      | +/- 25 <sup>(2)</sup> |      |      |
| Sensitivity, $T_A = 25^\circ\text{C}$<br>(mV/mT) | S            | 33.2             | 39.0 | 44.9 | 35.3             | 41.5 | 47.7 | 11.5                  | 15  | 17.3 | 33.2                  | 39.0 | 44.9 |
| TC of Sensitivity<br>(ppm/ $^\circ\text{C}$ )    | $TC_S$       | 430              | 680  | 930  | 430              | 680  | 930  | 680 <sup>(2)</sup>    |     |      | 680 <sup>(2)</sup>    |      |      |

(1)  $B = 0$ ,  $T_A = -40$  to  $150^\circ\text{C}$

(2) For ESO package, TC of Sensitivity and Thermal  $V_{OQ}$  Drift are not fully tested and therefore cannot be specified. Characterization and statistic data can be provided by Melexis upon request.

## 7. Applications Information

C1 and C2 values can be trimmed to satisfied EMC requirements according to the environment (PCB, connectors,...).

The output rise time is affected for large capacitor C2, depending of the couple R1;C2.

## 8. Installation Comments

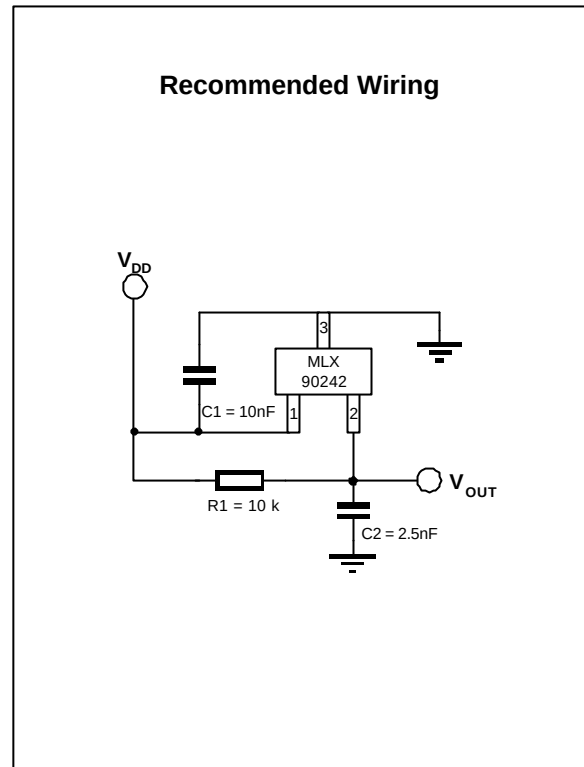
1.) Avoid mechanical stress on leads or package.

Stress may cause  $V_{OQ}$  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



## 9. Reliability Information

Melexis devices are classified and qualified regarding suitability for infrared, vapor phase and wave soldering with usual (63/37 SnPb-) solder (melting point at 183degC).

The following test methods are applied:

IPC/JEDEC J-STD-020A (issue April 1999)

Moisture/Reflow Sensitivity Classification For Nonhermetic Solid State Surface Mount Devices

CECC00802 (issue 1994)

Standard Method For The Specification of Surface Mounting Components (SMDs) of Assessed Quality

MIL 883 Method 2003 / JEDEC-STD-22 Test Method B102

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. For process using through hole components, a temperature profile of 235 Deg.C during 30 seconds maximum is tolerated.

The application of Wave Soldering for SMD's is allowed only after consulting Melexis regarding assurance of adhesive strength between device and board. Please contact MLX for Ua part used as SMD device.

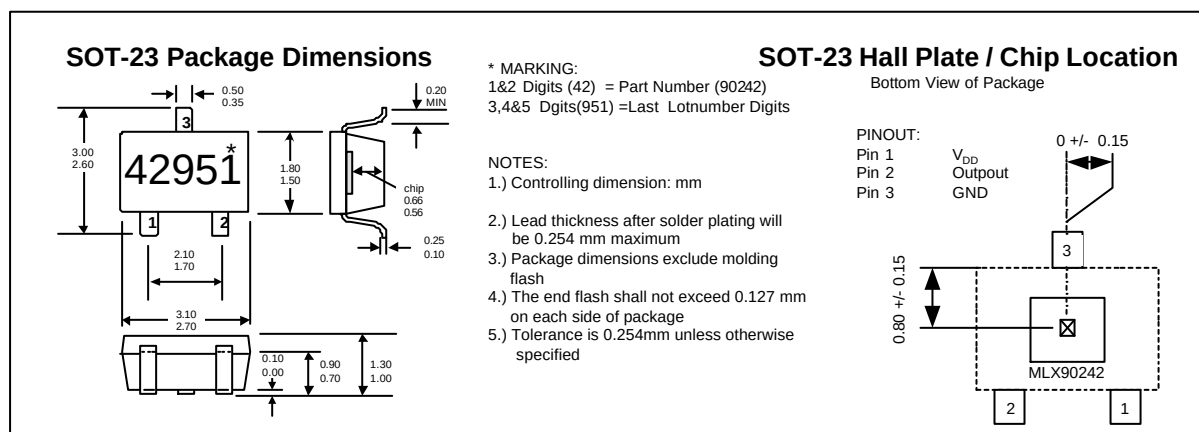
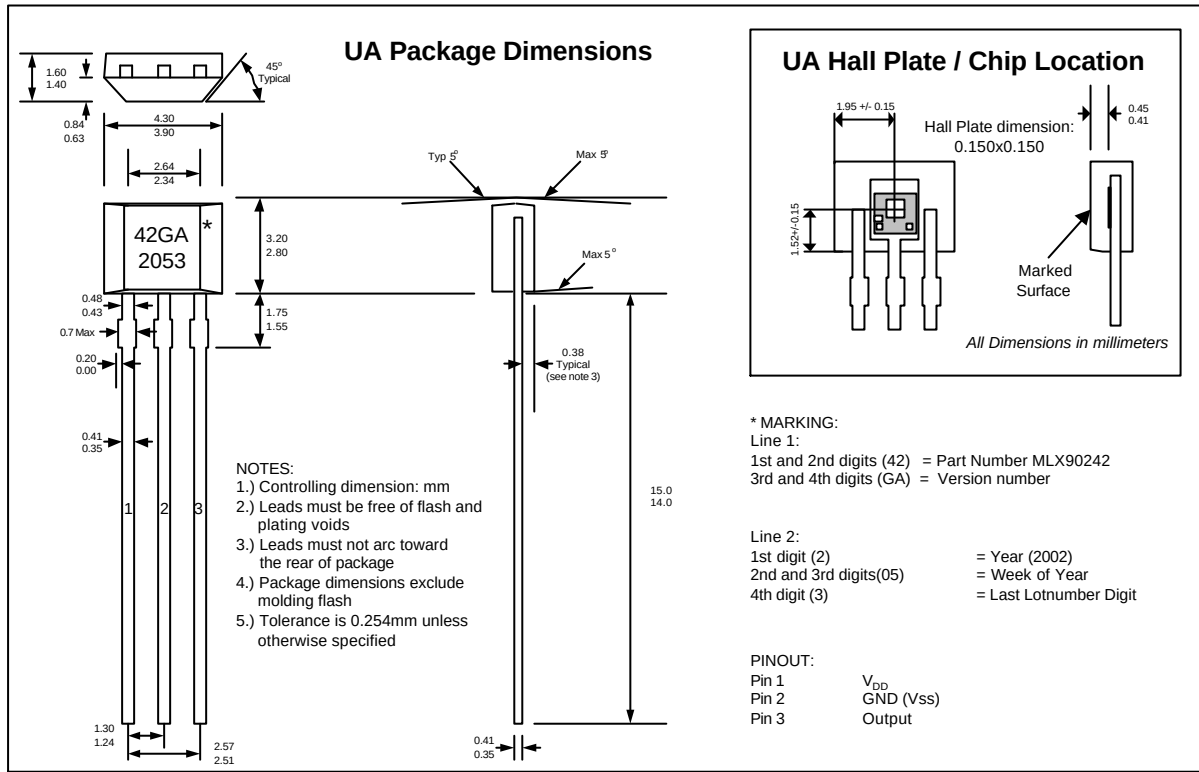
For more information on manufacturability/solderability see quality page at our website:

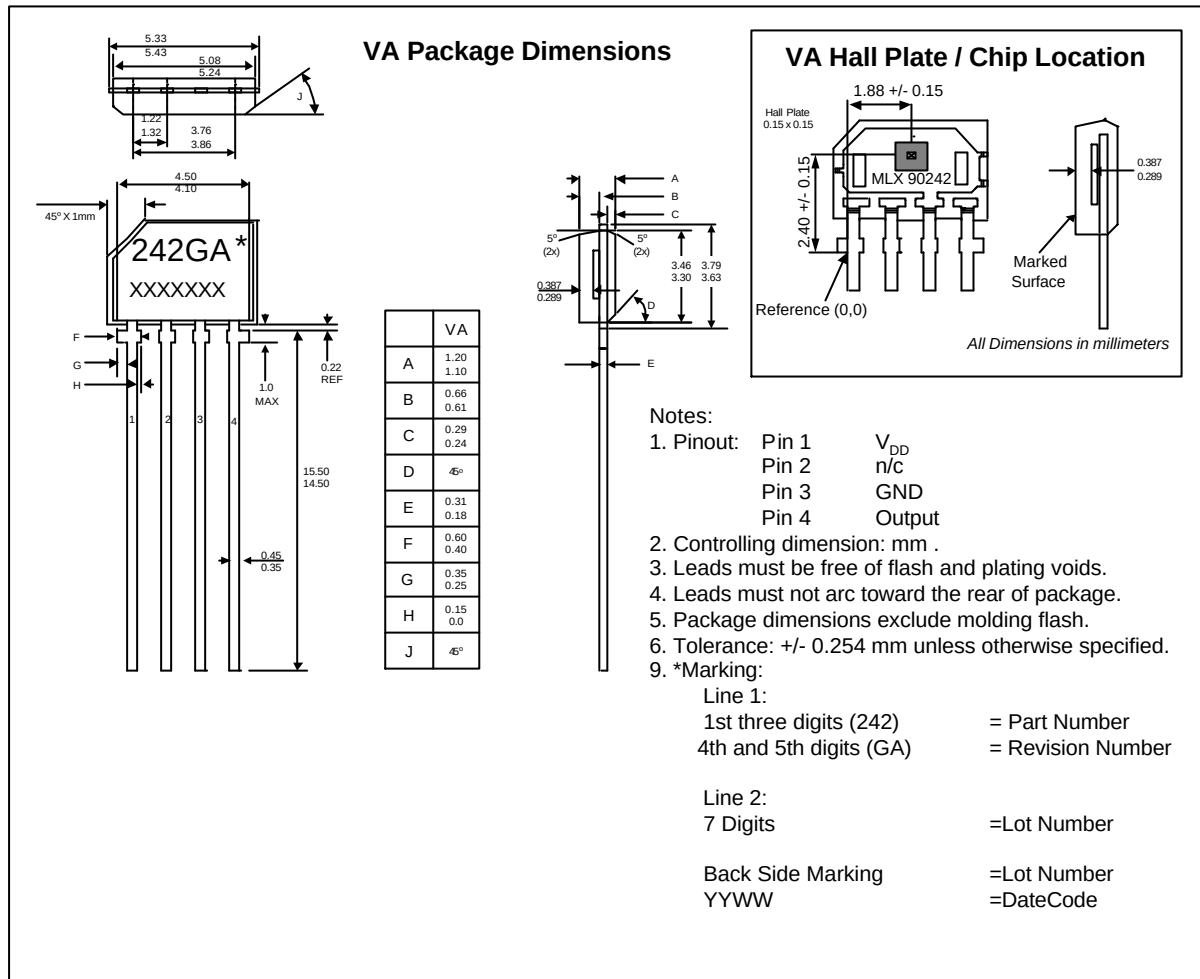
<http://www.melexis.com/>

## 10. ESD Precautions

Electronic semiconductor products are sensitive to Electro Static Discharge (ESD). Always observe Electro Static Discharge control procedures whenever handling semiconductor products.

## 11. Package Information





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