

# MLX90242

## Linear Hall Effect Sensor

### Features and Benefits

- Quad Switched Hall Plate / Chopper Stabilized Amplifier
- Ratiometric Output for A/D Interface
- Low Quiescent Voltage Thermal Drift
- Small Plastic Packages (TSOT, TO-92)
- RoHS compliant TSOT package

### Applications

- Linear Position Sensing
- Rotary Position Sensing
- Current Sensing

### Ordering information

Product Code	Temperature Code	Package Code	Option Code	Packing Form Code
MLX90242	L	UA	GAA-000	BU
MLX90242	L	UA	GAA-000	RE
MLX90242	L	UC	GAA-000	WB
MLX90242	E	SE	GAA-000	RE
MLX90242	E	SE	GDA-000	RE
MLX90242	E	UC	GAA-000	WB

#### **Legend:**

Temperature Code: L for Temperature Range -40°C to 150°C  
E for Temperature Range -40°C to 85°C

Package Code: SE for TSOT, UA for TO-92, UC for Die on wafer

Option Code: AAA-xxx: Die version  
xxx-000: Standard version

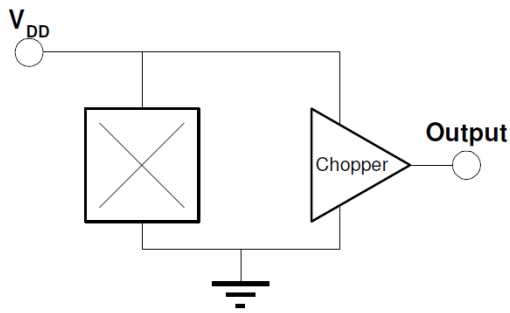
Packing Form: RE for Reel  
BU for Bulk  
WB for Waferbox

Ordering example: MLX90242LUA-GAA-000-RE

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## 1. Functional Diagram



Package	Pin1	Pin2	Pin 3	Slope
TSOT	V <sub>DD</sub>	Out	V <sub>SS</sub>	Positive
UA	V <sub>DD</sub>	V <sub>SS</sub>	Out	Negative

## 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.

## 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 = 0mT.

## 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	VDD	Operating	4.5	5.0	5.5	V
Supply Current	IDD	B = 0mT, VDD = 5V, IOU <sub>T</sub> = 0mA VDD = 5V	1.8	2.5	4.5	mA
Output Current	IOU <sub>T</sub>	Pull-up = 5 k $\Omega$ , Pull-down = 50 k $\Omega$	-1.0	-	0.1	mA
Quiescent Output Voltage	VOQ	B = 0mT, T <sub>A</sub> = 25 $^\circ\text{C}$	2.4	2.5	2.6	V
Output Voltage	VOH	VDD = 5V, IOU <sub>T</sub> = -1.0 mA	4.75			V
Output Voltage	VOL	VDD = 5V, IOU <sub>T</sub> = 0.1 mA			0.25	V
Response Time	tr	VDD=5V, Vout from VOQ to VOH/VOL without load		400	800	$\mu\text{s}$
Noise (RMS)				5	10	mV
Output Resistance	ROUT			20		$\Omega$
Linearity Error	Le				0.5	%Vdd

## 6. MLX90242 Magnetic Specifications

$V_{DD} = 5.0\text{V}$  (Unless otherwise specified)

Parameter	Symbol	MLX90242 LUA-GAA-000			MLX90242 ESE-GDA-000			MLX90242 ESE-GAA-000		
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max
Thermal Voq Drift (1) (mV)	$\Delta\text{TVOQ}$	-25		25		$\pm 25$ (2)			$\pm 25$ (2)	
Sensitivity, T <sub>A</sub> = 25 $^\circ\text{C}$ (mV/mT)	S	33.2	39.0	44.9	11.5	15	17.3	33.2	39.0	44.9
TC of Sensitivity (ppm/ $^\circ\text{C}$ )	TCS	430	680	930		680 (2)			680 (2)	

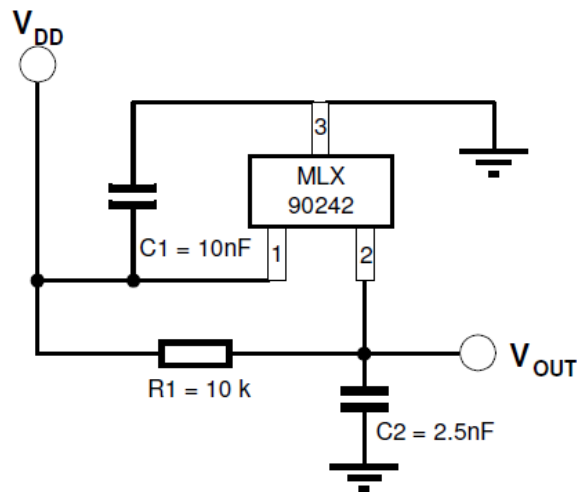
(1) B = 0 Gauss

(2) For TSOT package, TC of Sensitivity and Thermal Voq 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 and C2.

### Recommended Wiring



## 8. Standard Information

Our products are classified and qualified regarding soldering technology, solderability and moisture sensitivity level according to standards in place in Semiconductor industry.

For further details about test method references and for compliance verification of selected soldering method for product integration, Melexis recommends reviewing on our web site the General Guidelines [soldering recommendation](#). For all soldering technologies deviating from the one mentioned in above document (regarding peak temperature, temperature gradient, temperature profile etc), additional classification and qualification tests have to be agreed upon with Melexis.

For package technology embedding trim and form post-delivery capability, Melexis recommends to consult the dedicated trim&form recommendation application note: [lead trimming and forming recommendations](#).

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/en/quality-environment>

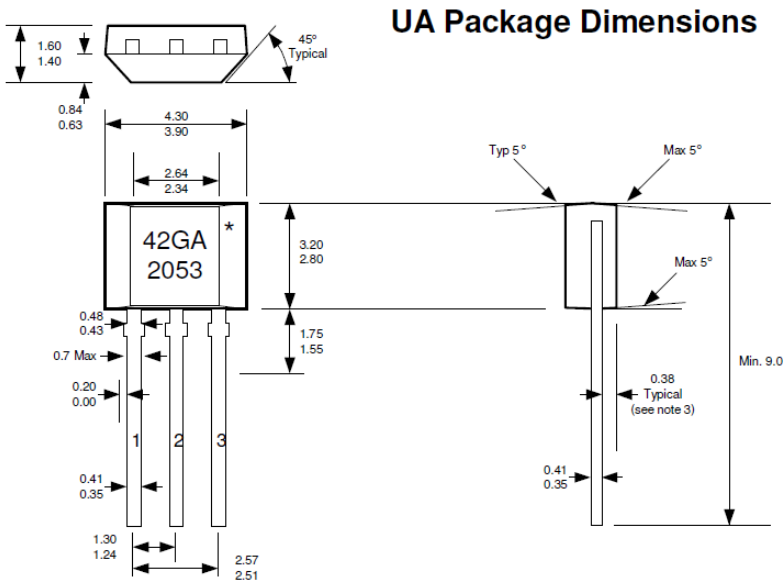
## 9. ESD Precautions

Electronic semiconductor products are sensitive to Electro Static Discharge (ESD).

Always observe Electro Static Discharge control procedures whenever handling semiconductor products.

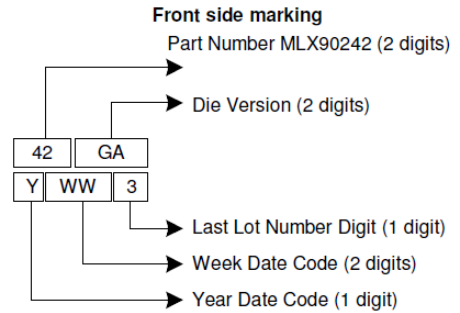
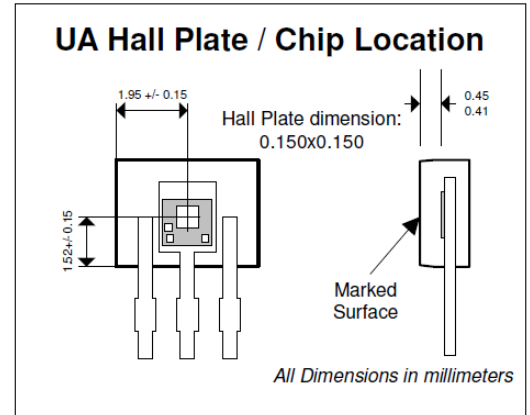
## 10. Package Information

### 10.1. UA Package

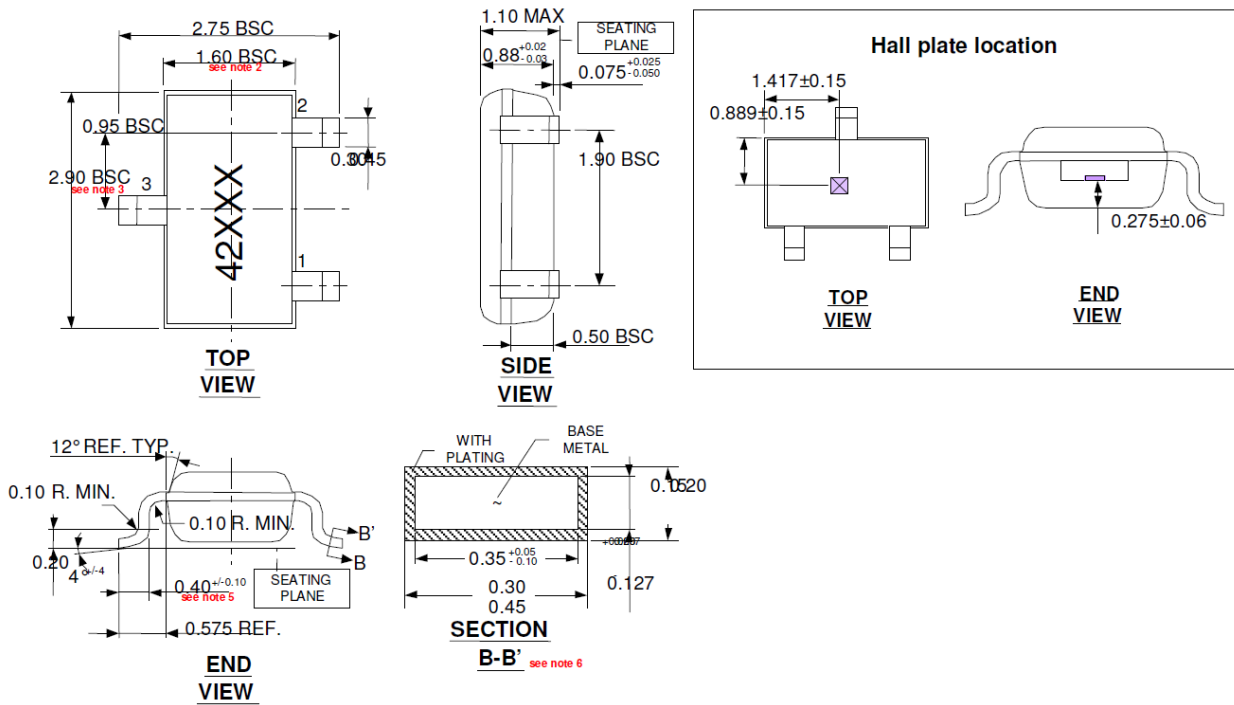


**PINOUT:**  
Pin 1  $V_{DD}$   
Pin 2 GND (Vss)  
Pin 3 Output

- NOTES:**
- 1.) Controlling dimension: mm
  - 2.) Leads must be free of flash and plating voids
  - 3.) Leads must not arc toward the rear of package
  - 4.) Package dimensions exclude molding flash
  - 5.) Tolerance is 0.254mm unless otherwise specified



## 10.2. TSOT Package (RoHS compliant)



**Notes:**

1. All dimensions are in millimeters
2. Outermost plastic extreme width does not include mold flash or protrusions. Mold flash and protrusions shall not exceed 0.15mm per side.
3. Outermost plastic extreme length does not include mold flash or protrusions. Mold flash and protrusions shall not exceed 0.25mm per side.
4. The lead width dimension does not include dambar protrusion. Allowable dambar protrusion shall be 0.07mm total in excess of the lead width dimension at maximum material condition.
5. Dimension is the length of terminal for soldering to a substrate.
6. Dimension on SECTION B-B are apply to the flat section of the lead between 0.08mm and 0.15mm from the lead tip.
7. Formed lead shall be planar with respect to one another with 0.076mm at seating plane.

**Top Side Marking:**

42XXX: 3 last digits of lotnumber (XXX)

**Bottom Side Marking:**

YYWW : Year (YY) - Week (WW)



## 11. Contact

For the latest version of this document, go to our website at [www.melexis.com](http://www.melexis.com).

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