

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, 4-SIP-VA, TO-92)
- RoHS compliant TSOT package

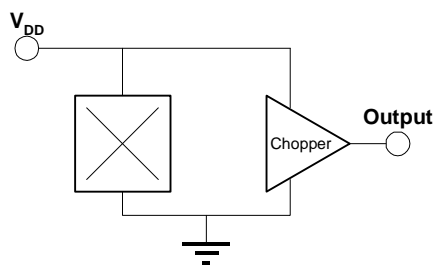
Applications

- 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 ($\pm 500G$)	2.50 V	700 ppm/ $^{\circ}C$	-40C to 150C	UA	3
MLX90242LVA-CC03	40 mV/mT ($\pm 500G$)	2.50 V	700 ppm/ $^{\circ}C$	-40C to 150C	VA	4
MLX90242ESE-BC03	15 mV/mT ($\pm 1300G$)	2.50 V	-	-40C to 85C	TSOT	3
MLX90242ESE-CC03	40 mV/mT ($\pm 500G$)	2.50 V	-	-40C to 85C	TSOT	3

1. Functional Diagram



Package	Pin1	Pin2	Pin 3	Pin4	Slope
TSOT	V _{DD}	Out	V _{SS}		Positive
UA	V _{DD}	V _{SS}	Out		Negative
VA	V _{DD}	n/c	V _{SS}	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 _{DD}	7.0 V
Output Current Short to V _{DD}	5 mA
Output Current Short to V _{SS}	0.5 mA
Output Pin Short to V _{SS} Pin	Infinite
Output Over Voltage	8 V
Operating Temperature Range, T _A	-40°C to 150°C
Storage Temperature Range, T _S	-55°C to 150°C
Maximum Junction Temp, T _J	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°C , E: $T_A = -40$ to 85°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}	$V_{DD} = 5\text{V}$ Pull-up = $5\text{ k}\Omega$, Pull-down = $50\text{ k}\Omega$	-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	μS
Noise (RMS)				5	10	mV
Output Resistance	R_{OUT}			20		Ω
Linearity Error	Le				0.5	%Vdd

6. MLX90242 Magnetic Specifications

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

Parameter	Symbol	MLX90242LUA-CC03			MLX90242LVA-CC03			MLX90242ESE-BC03			MLX90242ESE-CC03		
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max
Thermal V_{OQ} Drift ⁽¹⁾ (mV)	$\Delta^T V_{OQ}$	-25		25	-25		25	+/- 25 ⁽²⁾			+/- 25 ⁽²⁾		
Sensitivity, $T_A = 25^\circ\text{C}$ (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 (ppm/ $^\circ\text{C}$)	TC_S	430	680	930	430	680	930	680 ⁽²⁾			680 ⁽²⁾		

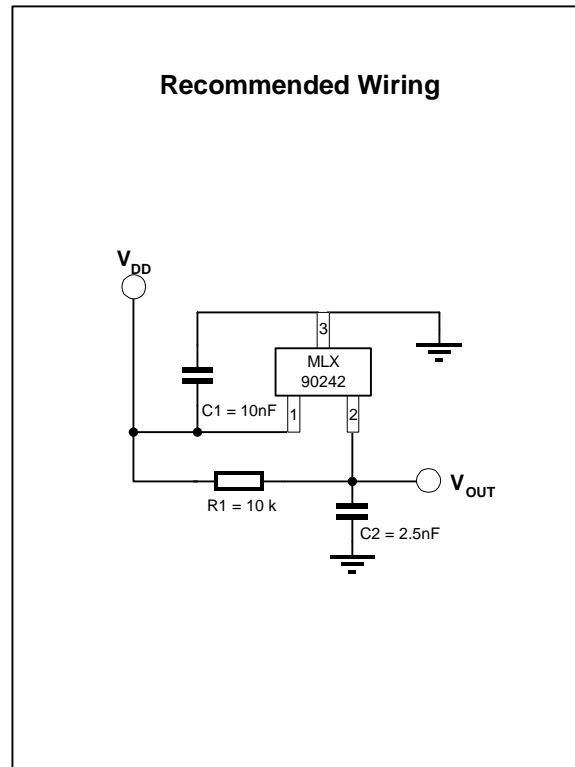
(1) $B = 0$, $T_A = -40$ to 150°C

(2) For TSOT 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. 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 Devices)

- 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 Devices) and THD's (Through Hole Devices)

- 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 Devices)

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

Solderability SMD's (Surface Mount Devices) and THD's (Through Hole Devices)

- 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.

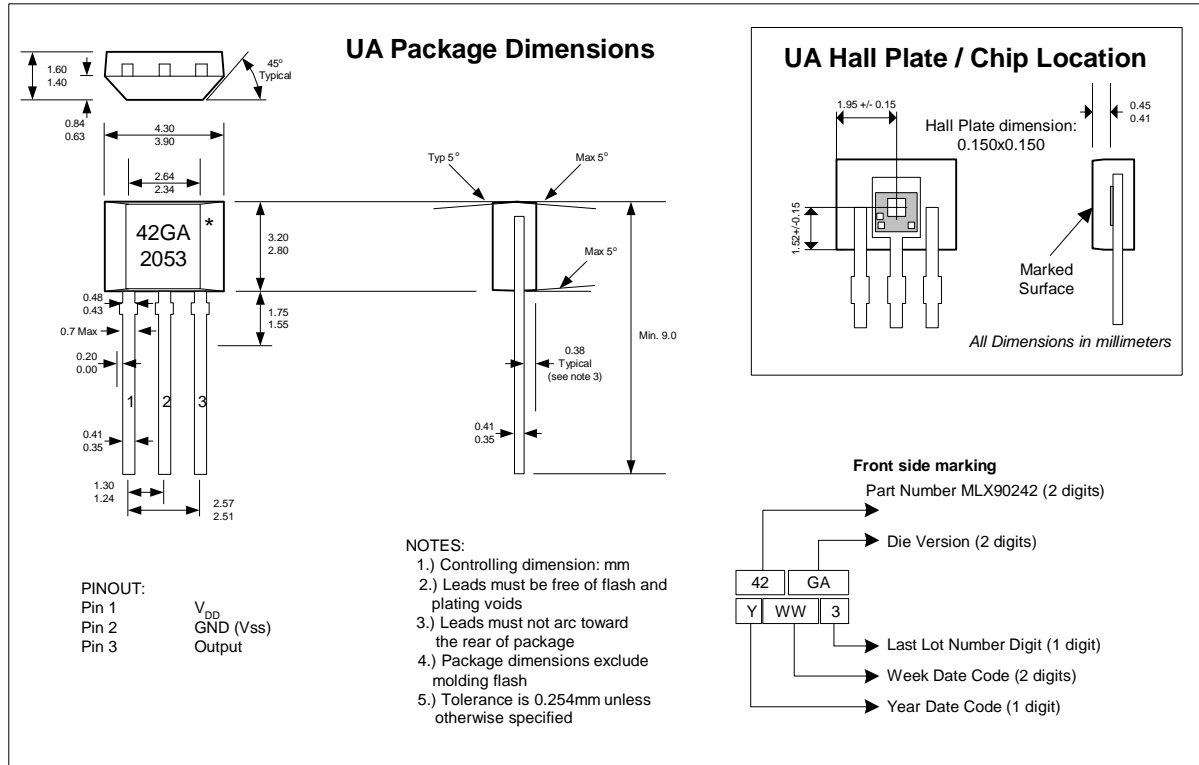
Melexis is contributing to global environmental conservation by promoting **lead free** solutions. For more information on qualifications of **RoHS** compliant products (RoHS = European directive on the Restriction Of the use of certain Hazardous Substances) please visit the quality page on our website: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

10. ESD Precautions

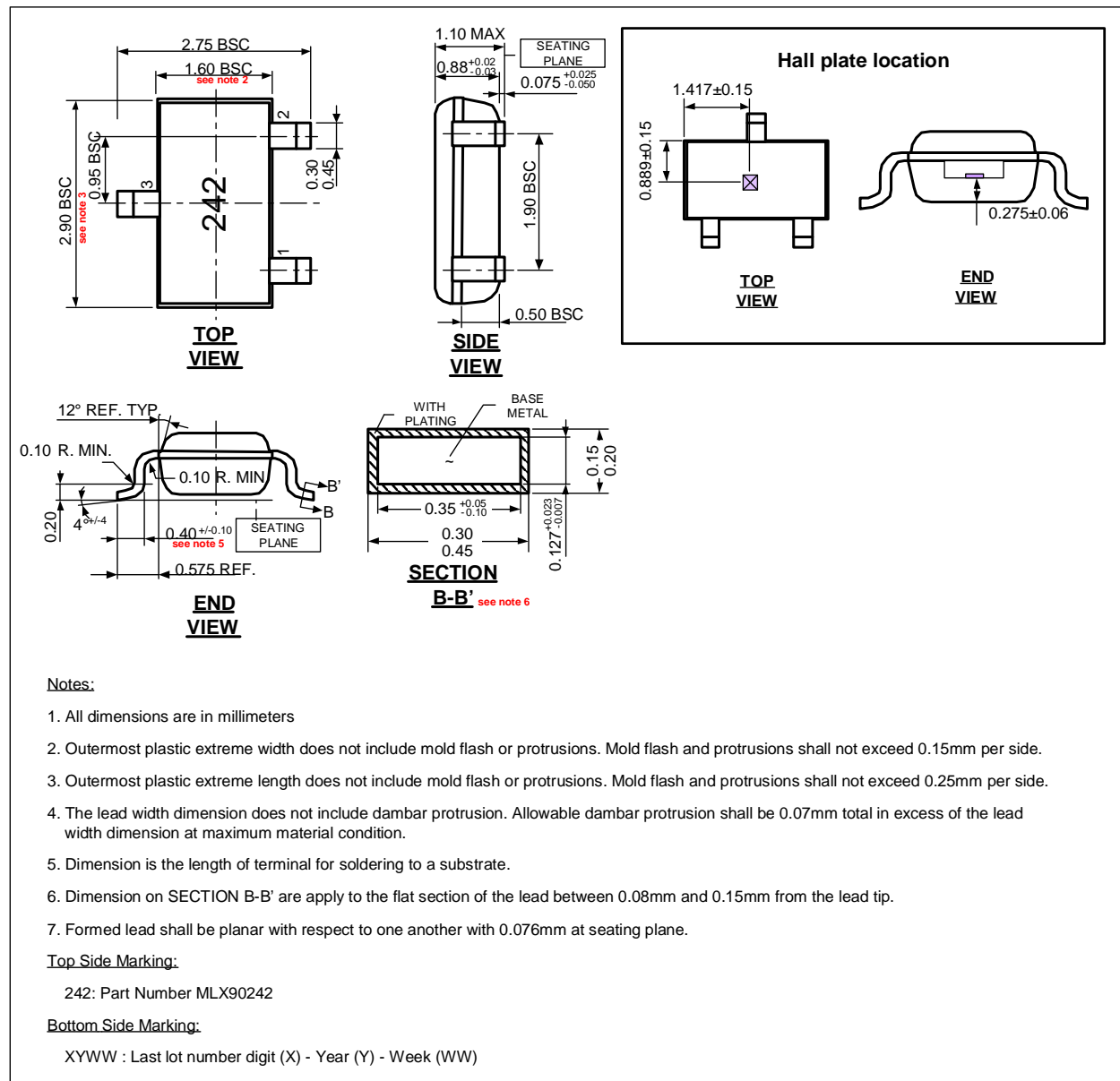
Electronic semiconductor products are sensitive to Electro Static Discharge (ESD). Always observe Electro Static Discharge control procedures whenever handling semiconductor products.

11. Package Information

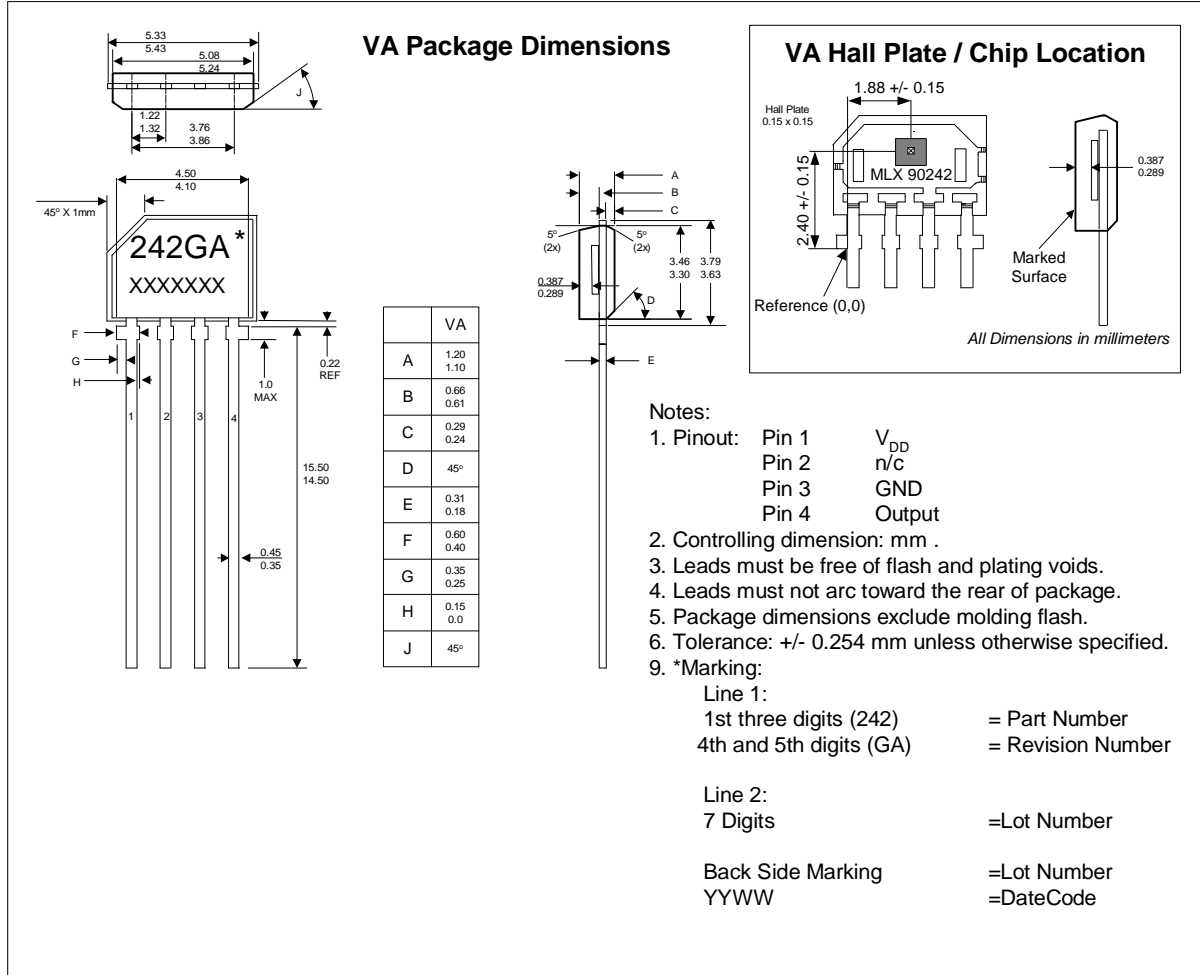
11.1. UA Package



11.2. TSOT Package (RoHS compliant)



11.3. VA Package



12. Disclaimer

Devices sold by Melexis are covered by the warranty and patent indemnification provisions appearing in its Term of Sale. Melexis makes no warranty, express, statutory, implied, or by description regarding the information set forth herein or regarding the freedom of the described devices from patent infringement. Melexis reserves the right to change specifications and prices at any time and without notice. Therefore, prior to designing this product into a system, it is necessary to check with Melexis for current information. This product is intended for use in normal commercial applications. Applications requiring extended temperature range, unusual environmental requirements, or high reliability applications, such as military, medical life-support or life-sustaining equipment are specifically not recommended without additional processing by Melexis for each application.

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