MLX90224

Dual Hall Effect Latch





Features and Benefits

- Chopper Stabilized Amplifier Stage
- CMOS for Optimum Stability, Quality and Cost
- Dual Outputs
- Phase/Direction Detection

Applications

- Direction Detector
- Speed Sensor
- Shaft Encoding
- Position Sensing

Ordering information

Product Code	Temperature Code	Package Code	Packing Form
MLX90224EVA-AAA-000-BU	E (-40°C to 85°C)	VA	BU (Bulk)

1. Functional Diagram



VDD

Out1

GND

Out2

2. General Description

The MLX90224 is a dual Hall effect latch. It includes two Hall effect latch functions of which typical thresholds are +/- 2.0 mT. In each latch, the magnetic flux detection is performed by a switched silicon Hall plate.

The MLX90224EVA-AAA output transistor will be "latched on" (B_{OP}) in the presence of a sufficiently strong South pole magnetic field facing the marked side of the package. Similarly, the output will be "latched off" (B_{RP}) in the presence of a North field. Spacing of the Hall plates is 1.85 mm.

The output structure is an Open-Drain NMOS transistor with a capability of 25 mA and protected against short-circuits.

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3. Glossary of Terms

Gauss, Tesla: Two units to quantify a magnetic flux density. Conversion: 1 mT = 10 Gauss

Bop: B Operating Point: When the magnetic flux density increases and reaches the Bop value, the output switches on. This value is in Gauss.

Brp: B Release Point: When the magnetic flux density decreases and reaches the Brp value, the output switches off. This value is in Gauss.

4. Absolute Maximum Ratings

Parameter	Symbol	Value	Units
Supply Voltage	V_{DD}	24 V	V
Supply Current	I _{DD}	50 mA	mA
Output Current	Ι _{ουτ}	40 mA	mA
Output Short-Circuit Current	I _{SCHORT}	150 mA	mA
Operating Temperature Range	T _A	-40 to 150	°C
Maximum Junction Temp	ΤJ	175	°C
Magnetic Flux Density	В	Unlimited	mT

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

5. MLX90224 Electrical Specifications

Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Units
Supply Voltage	V_{DD}	Operating	4.5		24	V
Supply Voltage Ramp up			1.5			V/ms
Supply Current	I _{DD}		5.0	7.5	10	mA
Output Current	I _{OUT}	B>B _{OP}			20	mA
Saturation Output Voltage	V_{SAT}	B>B _{OP} , I _{OUT} =20 mA		200	400	mV
Output Voltage	V _{OUT}	B <b<sub>RP</b<sub>			24	V
Output Leakage	I _{LEAK}				10	μΑ
Oscillator Frequency	Fosc			150		kHz
Refresh Time	Tr			10		μs

DC Operating Parameters $T_A = -40^{\circ}$ C to 85° C, $V_{DD} = 4.5$ V to 24V (unless otherwise specified)



6. MLX90224 Sensor Specific Specifications

DC Operating Parameters $T_A = -40^{\circ}$ C to 85° C, $V_{DD} = 4.5$ V to 16V (unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Тур	Max	Units
Operate Point	B _{OP}	-40°C to 85°C, V_{DD} = 4.5V to 16V	0.5	2.5	5.5	mT
Release Point	B _{RP}	-40°C to 85°C, V_{DD} = 4.5V to 16V	-5.5	-2.5	-0.5	mT
Hysteresis	B _{HYS}	-40° C to 85° C, V _{DD} = 4.5V to 16V	2.5	4.0	6.5	mT

Note:

1 mT = 10 Gauss

7. General Description

The MLX90224 Speed and Direction Sensor is designed for use with multipole ring magnet targets having evenly distributed North and South magnetic poles on the circumference of the magnet. An example of the basic physical arrangement of the sensor and magnet is shown in Fig. 1. The MLX90224 has two digital output signals. Output Out1 will provide a speed pulse from the changing magnetic flux at sensing element S1. Output Out2 will provide a phase shifted output identical in pulse width and period to Out1. The MLX90224EVA-ABA has latching magnetic Bop and Brp values of typically +/- 2mT.



Figure 1: Application with a multipole ring magnet



8. Performance Graphs













9. Applications Information







10. 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 (<u>Through Hole Devices</u>)

• 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: <u>http://www.melexis.com/quality.aspx</u>

11. ESD Precautions

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



12. Package Information





1-All Nominal measurements in mm.
2-Dimension "A" and "D" do not include mold flash protrusions & gate burrs
3-Dimension "A1" does not include gate burrs, but includes mold flash and interlead flash.
4-Dimension "D1" includes mold flahs at both ends.
5- Cotte burrs chall not succed 0.15 mm processor

5-Gate burrs shall not exceed 0.15mm measured from end of mold flash (flange).

This table in mm

Туре		А	A1	D	D1	E	J	J1	К	K1	L	L1	S	Т
1/0	min	3.30	3.63	5.08	5.33	1.10	4.10	1.00	0.00	0.25	17.5	-	0.24	0.61
VA	max	3.46	3.79	5.24	5.43	1.20	4.50	REF	0.15	0.35	18.5	1.00	0.29	0.66
		b1	b2	С	е	e1	θ1	θ2						
1/0	min	0.35	0.40	0.18	3.76	1.22								
VA	max	0.48	0.60	0.34	3.86	1.32	/ KEF	45 KEF						



13. Contact

For the latest version of this document, go to our website at <u>www.melexis.com.</u>

For additional information, please contact our Direct Sales team and get help for your specific needs:

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