

MLX90224

Dual Hall Effect Latch

Features and Benefits

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

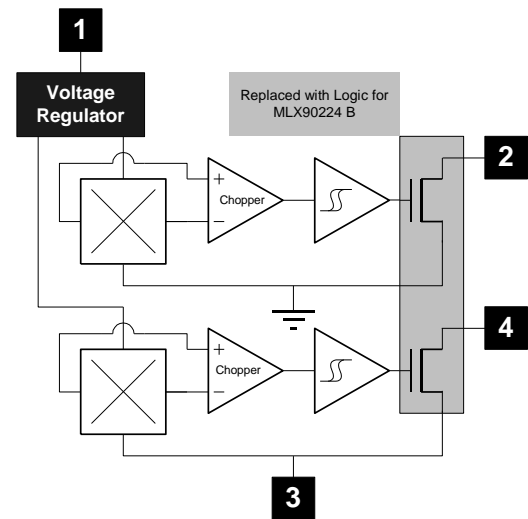
Applications

- 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



Pin #	Name
1	VDD
2	Out1
3	GND
4	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.

Contents

Features and Benefits.....1

Applications.....1

Ordering information1

1. Functional Diagram1

2. General Description.....1

3. Glossary of Terms.....3

4. Absolute Maximum Ratings.....3

5. MLX90224 Electrical Specifications3

6. MLX90224 Sensor Specific Specifications4

7. General Description.....4

8. Performance Graphs5

9. Applications Information6

10. Standard information regarding manufacturability of Melexis products with different soldering processes.....7

11. ESD Precautions7

12. Package Information8

13. Contact.....9

14. Disclaimer.....9

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	I_{OUT}	40 mA	mA
Output Short-Circuit Current	I_{SHORT}	150 mA	mA
Operating Temperature Range	T_A	-40 to 150	°C
Maximum Junction Temp	T_J	175	°C
Magnetic Flux Density	B	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

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

Parameter	Symbol	Test Conditions	Min.	Typ.	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}	$B > B_{OP}$, $I_{OUT}=20\text{ mA}$		200	400	mV
Output Voltage	V_{OUT}	$B < B_{RP}$			24	V
Output Leakage	I_{LEAK}				10	μA
Oscillator Frequency	F_{OSC}			150		kHz
Refresh Time	T_r			10		μs

6. MLX90224 Sensor Specific Specifications

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Operate Point	B_{OP}	-40°C to 85°C , $V_{DD} = 4.5\text{V}$ to 16V	0.5	2.5	5.5	mT
Release Point	B_{RP}	-40°C to 85°C , $V_{DD} = 4.5\text{V}$ to 16V	-5.5	-2.5	-0.5	mT
Hysteresis	B_{HYS}	-40°C to 85°C , $V_{DD} = 4.5\text{V}$ 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.

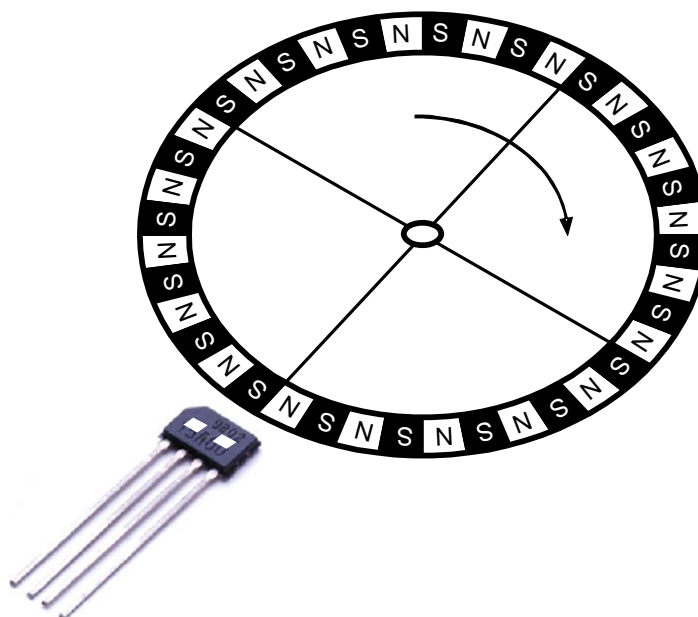
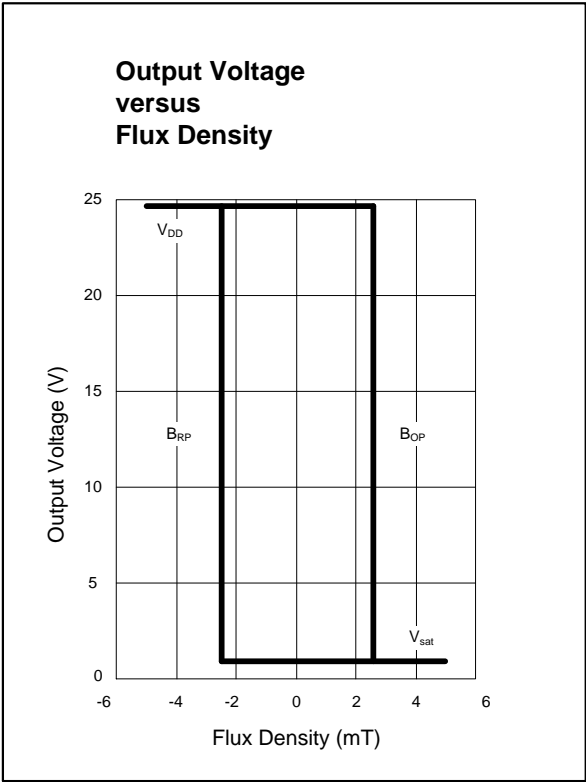
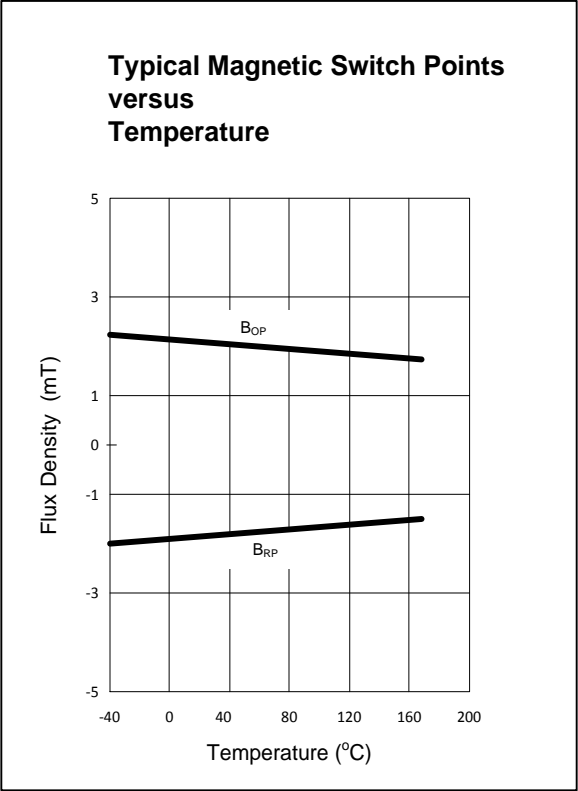
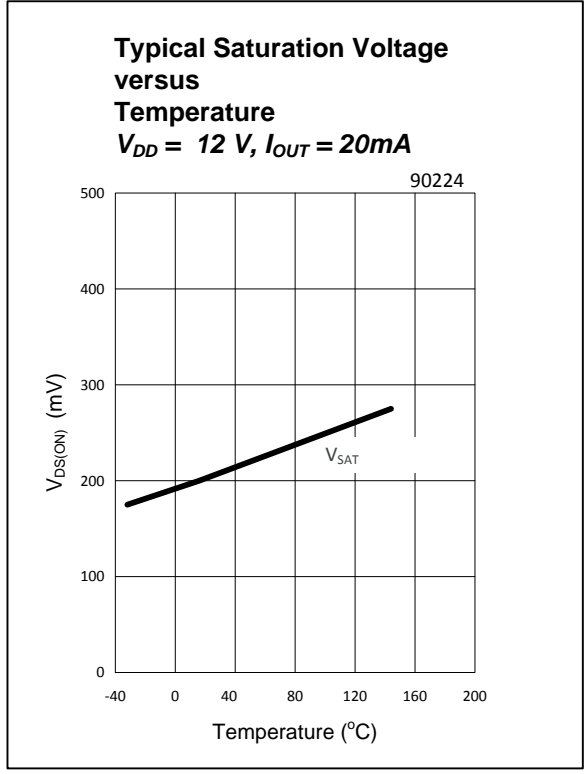
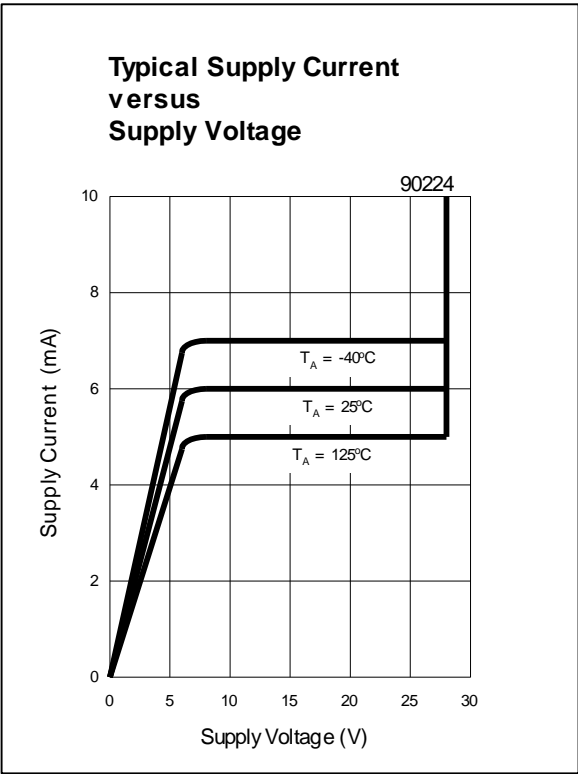


Figure 1: Application with a multipole ring magnet

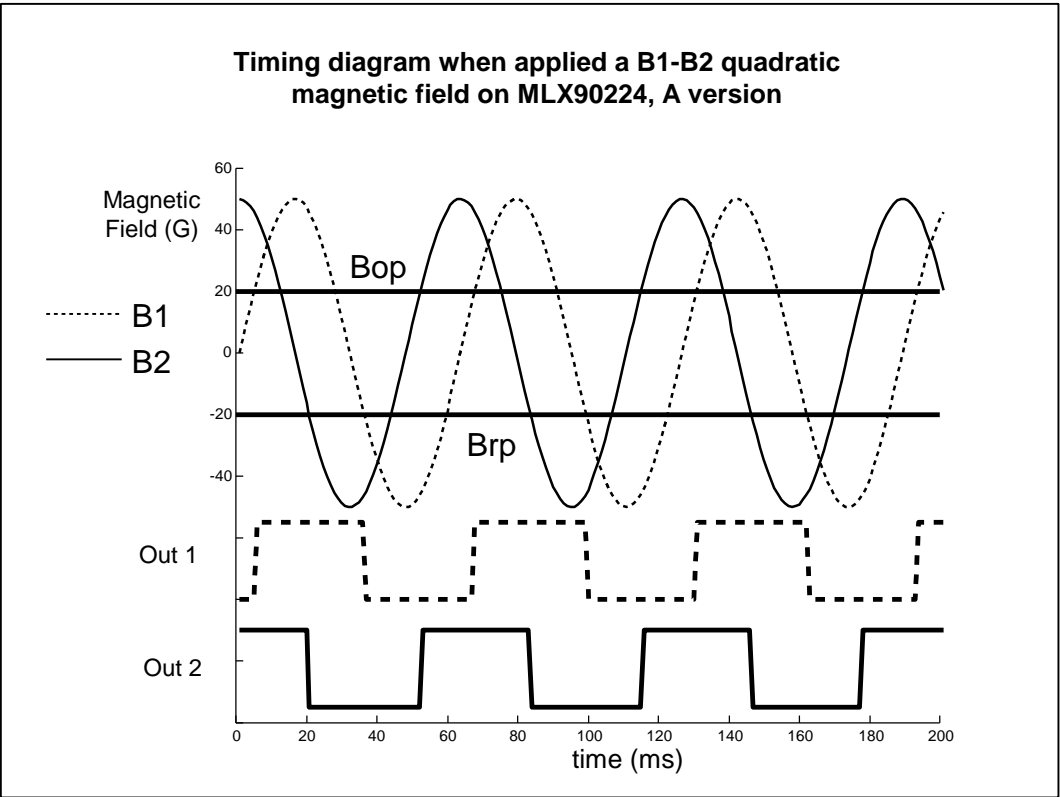
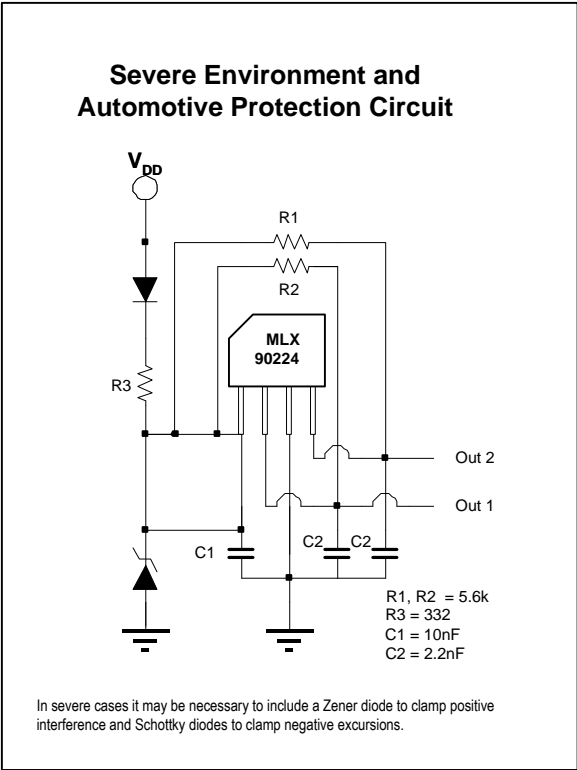
8. Performance Graphs



V_{SAT}



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 Device)s

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

- 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 Device)s

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

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

- 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.

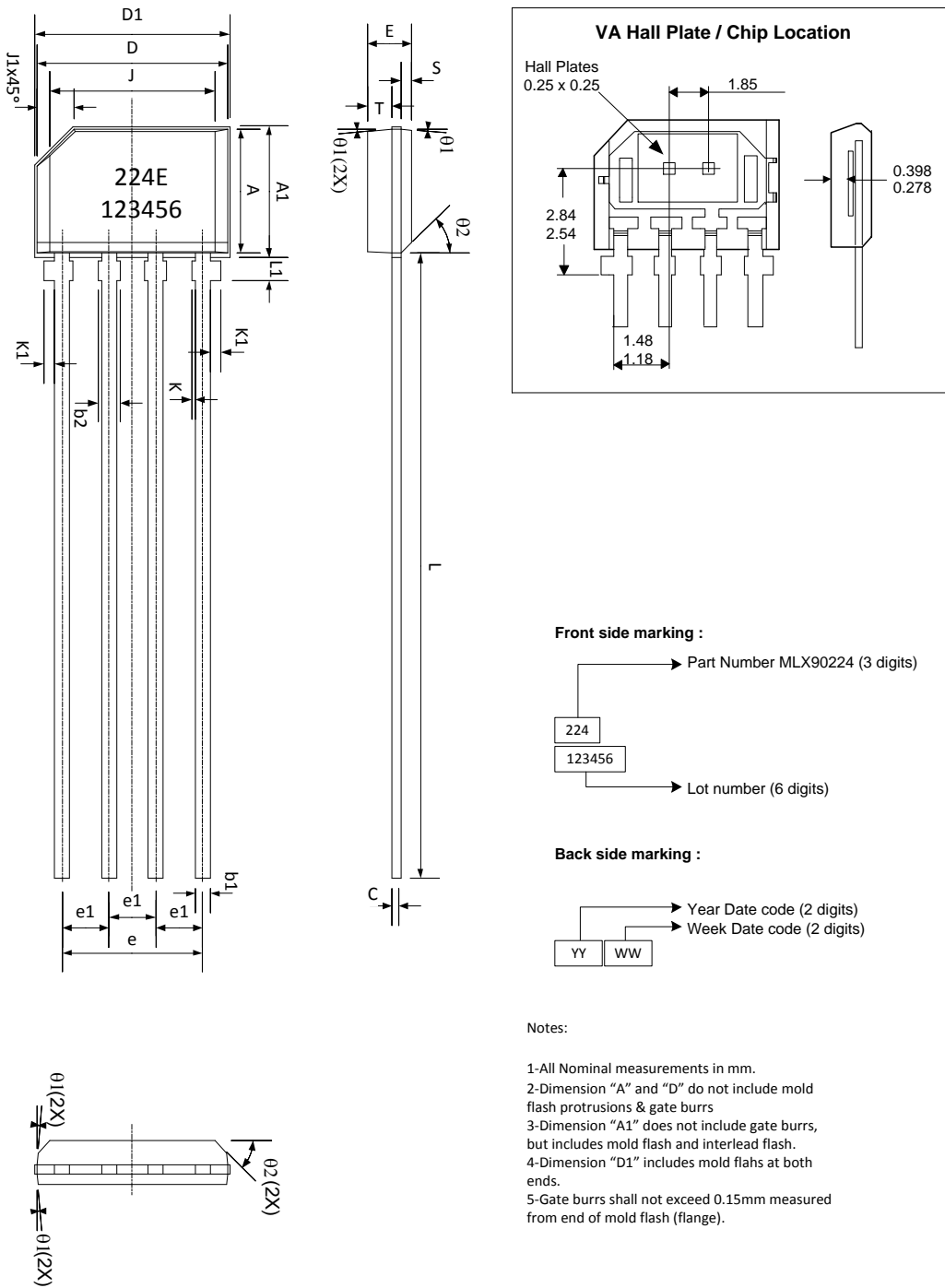
Melexis is contributing to global environmental conservation by promoting **lead free** solutions. For more information on qualifications of **RoHS** compliant products (RoHS = European directive on the Restriction Of the use of certain Hazardous Substances) please visit the quality page on our website: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

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



This table in mm

Type		A	A1	D	D1	E	J	J1	K	K1	L	L1	S	T
VA	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
	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	c	e	e1	θ1	θ2						
VA	min	0.35	0.40	0.18	3.76	1.22	7° REF	45° REF						
	max	0.48	0.60	0.34	3.86	1.32								

13. Contact

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

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

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