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1 Features

- ❑ Micro-Power consumption – ideal for battery operation
- ❑ Functional Safety level ASIL B capable, the product is developed according ISO 26262
- ❑ Customer End-Of-Line programming via output pin in the application module for system optimization
- ❑ Wide range for fine programming of both magnetic operating points from -90mT to +90mT
- ❑ Programmable permanent magnet Temperature Coefficient compensation - from 0 to -2400ppm/ºC
- ❑ Programmable Switch or Latch sensor function
- ❑ Programmable output function – direct or inverted
- ❑ Version with Lateral magnetic sensitivity
- ❑ Programmable operating period for power consumption optimization vs output update period
- ❑ Fast response Mode with programmable diagnostic period in Fail Safe state
- ❑ Flexible technical safety requirements
- ❑ Integrated self-diagnostic functions activating predefined Safe Message
- ❑ Unique identification number (ID) for device traceability
- ❑ Wide temperature range – suitable for automotive applications
- ❑ Wide operating voltage range : from 3.3V(tbd) to 18V, Load Dump 32V (target 40V)
- ❑ Under-Voltage Lockout (UVL, Under-Voltage detection)
- ❑ Reverse supply voltage protection
- ❑ Thermal protection
- ❑ High ESD rating
- ❑ SE (TSOT-3L) green compliant package and UA (TO92-3L) package

Absolute Maximum Ratings

Parameter	Symbol	Value	Units
Supply voltage[1, 2]	V_{DD}	+28V	V
Supply voltage (Load Dump)[1, 4]	V_{DD}	+40V	V
Supply current[1, 2, 3]	I_{DD}	+20	mA
Supply current[1, 3, 4]	I_{DD}	+50	mA
Reverse supply voltage[1, 2]	V_{DDREV}	-24	V
Reverse supply voltage[1, 4]	V_{DDREV}	-30	V
Reverse supply current[1, 2, 5]	I_{DDREV}	-20	mA
Reverse supply current[1, 4, 5]	I_{DDREV}	-50	mA
Output voltage[1, 2]	V_{OUT}	+28	V
Output current[1, 2, 5]	I_{OUT}	+20	mA
Reverse output voltage[1]	V_{OUTREV}	-0.5	V
Reverse output current[1, 2]	I_{OUTREV}	-50	mA
Maximum junction temperature[6]	T_J	+165	°C
ESD sensitivity – HBM[7]	-	8	kV
ESD sensitivity – CDM[8]	-	1000	V
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.

[1] The maximum junction temperature should not be exceeded
[2] For maximum 1 hour
[3] Including current through protection device
[4] For maximum 500ms
[5] Through protection device
[6] For 1000 hours.
[7] Human Body Model according AEC-Q100-002 standard
[8] Charged Device Model according AEC-Q100-011 standard

2 General Electrical Specifications

DC Operating Parameters V_{DD} = 3.3V to 18V, T_A = -40°C to 150°C (unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ(1)	Max	Units
Output leakage	I_{OFF}	V_{OUT} =12V, T_A= -40..85°C	—	0.01	1	µA
Output leakage	I_{OFF}	V_{OUT} =18V	—	—	10	µA
Output saturation voltage	V_{OL}	µ-Power Mode, I_{OL} =6mA	—	0.15	0.4	V
Output current limit	I_{CL}	µ-Power Mode, V_{OUT} =12V		20		mA
Power-On state	-	Output state during t_{ON}		High		—
Output update period	T_{UPD}	Fast Mode	—	48		µs
Step response time(2)	t_{RESP}	Fast Mode	—	60		µs
Programmable operating (output update) period	T_{OP}	µ-Power Mode, V_{DD} =12V, T_A =25°C	0.2	—	250	ms
Active phase duration	t_{ACT}	µ-Power Mode, defined at I_{DD} > 1mA	—	40	—	µs
Operating period ratio tolerance	R_{TOL}	T_{OP}/t_{ACT} , µ-Power Mode, T_A = -40..85°C	-10	0	10	%
Active phase supply current (average value)	I_{DDACT}	µ-Power Mode	1.7	2.6	3.1	mA
Standby phase supply current	I_{DDSTBY}	V_{DD} ≤ 15V, T_A = -40..85°C	—	6.5	9	µA
Fast Mode supply current	I_{DDFAST}		2	3.1	3.7	mA
Reverse supply current	I_{DDREV}	V_{DD} = -16V	-1	—	0	mA
Thermal Protection Activation	T_{PROT}		—	190(6)	—	°C
Thermal Protection Release	T_{REL}		—	180(6)	—	°C
UA package thermal resistance	R_{THJA}	Single layer PCB, JEDEC standard test boards, still air (LFPM=0)	—	200	—	°C/W
SE package thermal resistance	R_{THJA}	Single layer PCB, JEDEC standard test boards, still air (LFPM=0)	—	300	—	°C/W

1 Unless otherwise specified the typical values are defined at T_A = +25ºC and V_{DD} = 12V
2 Guaranteed by design and verified by characterization, not production tested
3 The Power-On Time represents the time from reaching V_{DD} = 3.3V(tbd) to the first refresh of the output state.
4 Power-On Slew Rate is not critical for the proper device start-up.
5 R_{PU} and V_{PU} are respectively the external pull-up resistor and pull-up power supply
6 T_{PROT} and T_{REL} are the corresponding junction temperature values

3 Magnetic Specifications – Normal (vertical) Sensitive Version

DC Operating Parameters V_{DD} = 3.3V to 18V, T_A = -40°C to 150°C (unless otherwise specified)

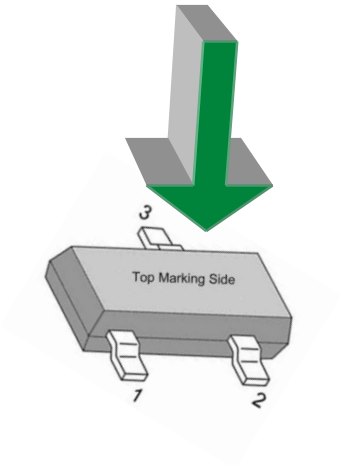
Parameter	Symbol	Test Conditions	Min	Typ[2]	Max	Units
Operating Point programming range[2]	B_{OP}	V_{DD} =12V, T_A =25°C	-90	—	90	mT
Release Point programming range[2]	B_{RP}	V_{DD} =12V, T_A =25°C	-90	—	90	mT
Operating Point magnitude programming[3, 4]	B_{OP}		—	12	—	bit
Release Point magnitude programming[3, 4]	B_{RP}		—	12	—	bit
Operating Point polarity selection	B_{OP}		—	1	—	bit
Release Point polarity selection	B_{RP}		—	1	—	bit
Direct or inverted output selection			—	1	—	bit
Factory pre-programmed Operating Point, Latch	B_{OP}	V_{DD} =12V, T_A =25°C, programming target 28mT	26	28	30	mT
Factory pre-programmed Release Point, Latch	B_{RP}	V_{DD} =12V, T_A =25°C, programming target -28mT	-26	-28	-30	mT
Temperature Coefficient programming range[5, 6]	TC	V_{DD} =12V, Latch with B_{OP} =28mT, B_{RP} = -28mT	-2400		0	ppm/ºC
Temperature Coefficient selection			—	5	—	bit

Notes:

1. Unless otherwise specified the typical values are defined at T_A = +25ºC and V_{DD} = 12V
2. Guaranteed by correlation with production test at B=28mT and verified by characterization
3. The programming step is <0.5% of the programmed B_{OP} value for $|B_{OP}| \geq 6$mT and <0.02mT for $|B_{OP}| \leq 6$mT at T_A = +25ºC
4. Programming of very low hysteresis magnitude ($B_{OP} - B_{RP} < 1$mT) could lead to output toggling due to noise and mechanical looseness in the magnetic system.
5. TC target values
6. The Temperature Coefficient is calculated using the following formula:

$$TC = \frac{(B_{OPTA2} - B_{RPTA2}) - (B_{OPTA1} - B_{RPTA1})}{(B_{OPTA1} - B_{RPTA1}) * (T_{A2} - T_{A1})} * 10^6, \text{ppm/ºC}; T_{A1} = 25^{o}\text{C}; T_{A2} = 150^{o}\text{C}$$

The factory pre-programmed target TC value is 0ppm/ºC.



4 Magnetic Specifications – Lateral Sensitive Version

DC Operating Parameters V_{DD} = 3.3V to 18V, T_A = -40°C to 150°C (unless otherwise specified)

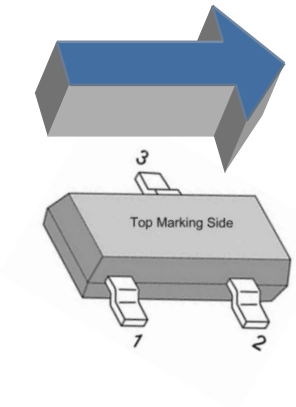
Parameter	Symbol	Test Conditions	Min	Typ[3]	Max	Units
Operating Point programming range[2]	B_{OP}	V_{DD} =12V, T_A =25°C	-40	—	40	mT
Release Point programming range[2]	B_{RP}	V_{DD} =12V, T_A =25°C	-40	—	40	mT
Operating Point magnitude programming[3, 4]	B_{OP}		—	12	—	bit
Release Point magnitude programming[3, 4]	B_{RP}		—	12	—	bit
Operating Point polarity selection	B_{OP}		—	1	—	bit
Release Point polarity selection	B_{RP}		—	1	—	bit
Direct or inverted output selection			—	1	—	bit
Temperature Coefficient programming range[5, 6]	TC	V_{DD} =12V, Latch with B_{OP} =tbd, B_{RP} = tbd	-2400		0	ppm/ºC
Temperature Coefficient selection			—	5	—	bit

Notes:

1. Unless otherwise specified the typical values are defined at T_A = +25ºC and V_{DD} = 12V
2. Guaranteed by correlation with production test at B=12mT and verified by characterization
3. The programming step is <0.5% of the programmed B_{OP} value for $|B_{OP}| \geq 6$mT and <0.02mT for $|B_{OP}| \leq 6$mT at T_A = +25ºC
4. Programming of very low hysteresis magnitude (B_{OP} - B_{OP} < 1mT) could lead to output toggling due to noise and mechanical looseness in the magnetic system.
5. TC target values
6. The Temperature Coefficient is calculated using the following formula:

$$TC = \frac{(B_{OPTA2} - B_{RPTA2}) - (B_{OPTA1} - B_{RPTA1})}{(B_{OPTA1} - B_{RPTA1}) * (T_{A2} - T_{A1})} * 10^6, \text{ppm/}^o\text{C}; T_{A1} = 25^o\text{C}; T_{A2} = 150^o\text{C}$$

The factory pre-programmed target TC value is 0ppm/ºC.



5 Magnetic Behaviour

5.1 Latch Sensor

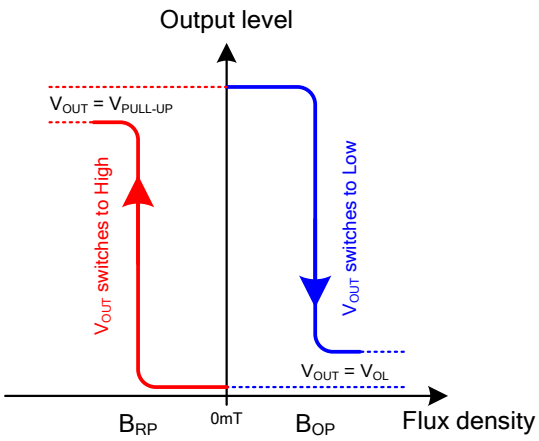


Fig.1 – Direct Output Latch

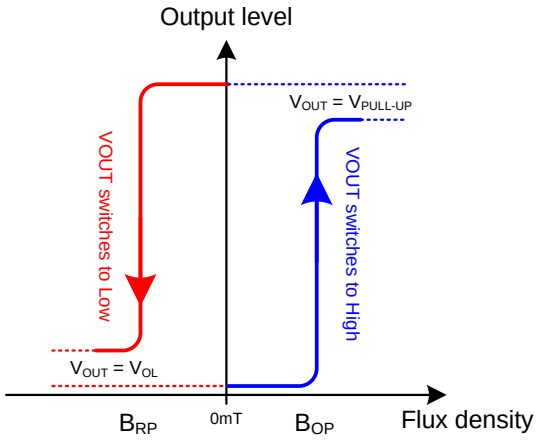


Fig.2 – Inverted Output Latch

5.2 Unipolar Switch Sensor

Magnetic Field	Output Polarity	Remark
South	Direct South Switch	Fig.1
South	Inverted South Switch	Fig.2
North	Direct North Switch	Fig.3
North	Inverted North Switch	Fig.4

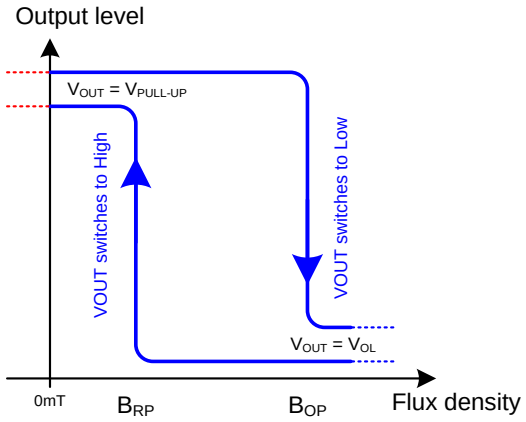


Fig.1 – Direct South Switch

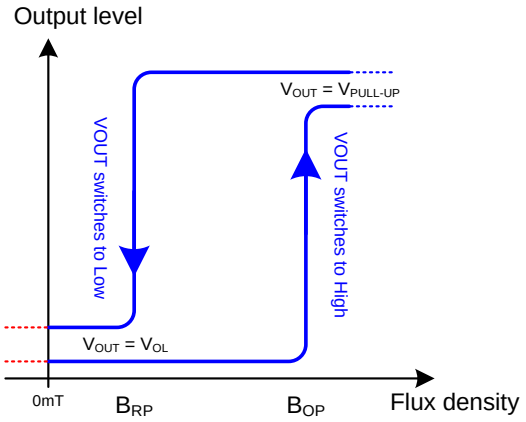


Fig.2 – Inverted South Switch

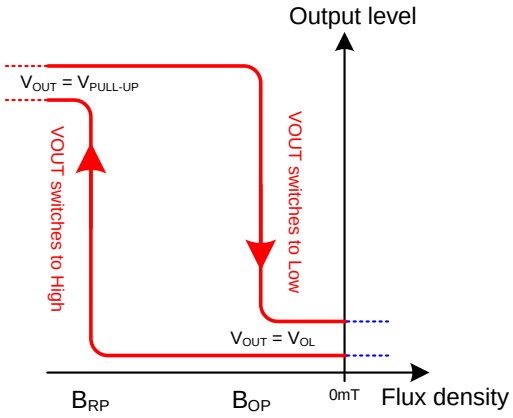


Fig.3 – Direct North Switch

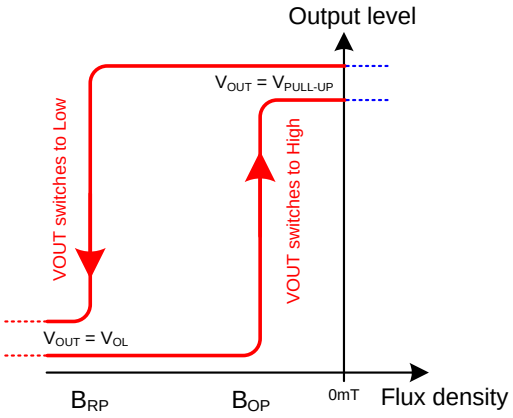
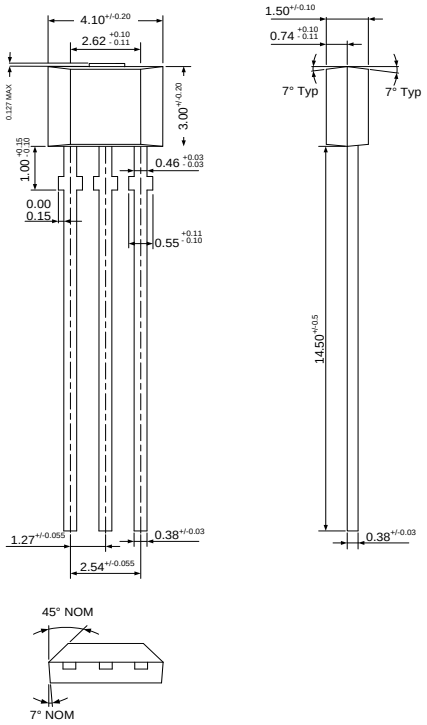


Fig.4 – Inverted North Switch

6 Package Information

6.1 UA (TO92-3L) Package Information



Notes:

1. All dimensions are in millimeters
2. Package dimension exclusive molding flash.
3. The end flash shall not exceed 0.127 mm on the top side.

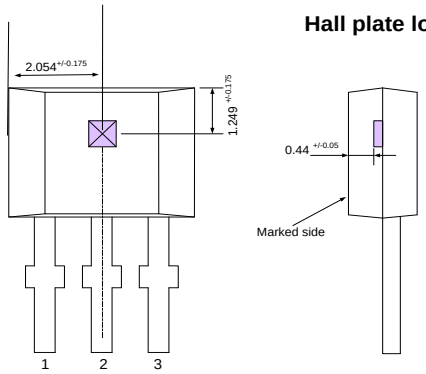
Marking:

1st Line : xxx – last three digits from lot number

2nd Line : yww

y - last digit of year
ww - calendar week

Hall plate location

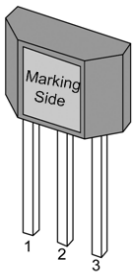


Notes:

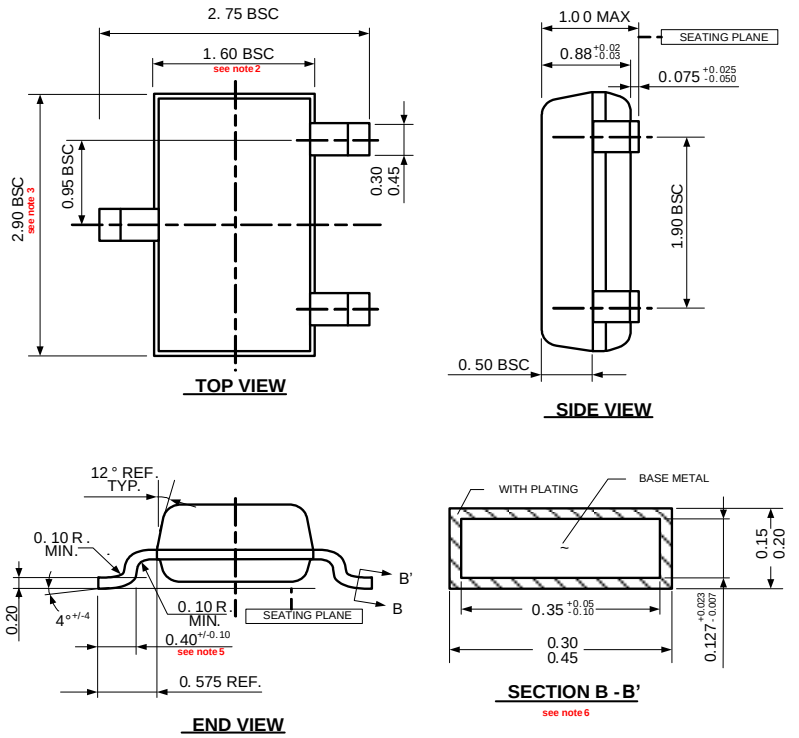
1. All dimensions are in millimeters

UA Pin №	Name	Type	Function
1	VDD	Supply	Supply Voltage pin
2	GND	Ground	Ground pin
3	OUT	I/O	Output&Test I/O

Table 1: UA Package pinout



6.2 SE (TSOT-3L) Package Information



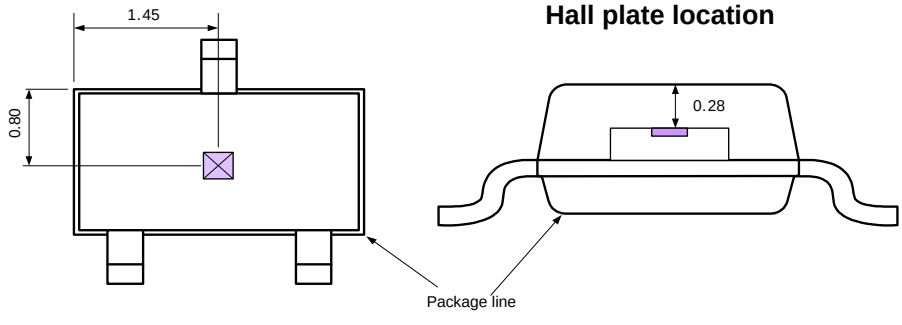
Notes:

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 0.15 mm per side.
3. Outermost plastic extreme length does not include mold flash or protrusions. Mold flash and protrusions shall not exceed 0.25 mm per side.
4. The lead width dimension does not include dambar protrusion. Allowable dambar protrusion shall be 0.07 mm 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' applies to the flat section of the lead between 0.08 mm and 0.15 mm from the lead tip.
7. Formed lead shall be planar with respect to one another with 0.076 mm at seating plane.

Marking:

TBD

Hall plate location

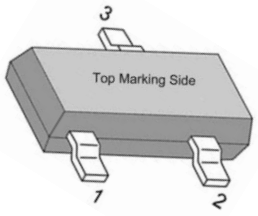


Notes:

1. All dimensions are in millimeters

SE Pin №	Name	Type	Function
1	VDD	Supply	Supply Voltage pin
2	OUT	I/O	Output&Test I/O
3	GND	Ground	Ground pin

Table 2: SE Package pinout



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

Or for additional information contact Melexis Direct:

Europe, Africa, Asia:
Phone: +32 1367 0495
E-mail: sales_europe@melexis.com

America:
Phone: +1 248 306 5400
E-mail: sales_usa@melexis.com

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