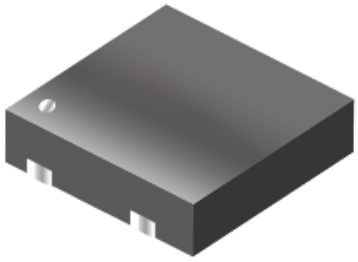
KTM1304

Omnipolar Switching Sensor with CMOS output interface

The KTM1304 is an Omnipolar magnetic switch integrated with Tunneling Magnetoresistance (TMR) technology and CMOS process for use in industrial and consumer switch applications. The IC internally includes a TMR bridge, a voltage regulator for operation with supply voltage from 1.8V to 5.5V, digital logic control module, threshold adjustment module, Schmitt trigger and a push-pull output. If the magnetic flux density parallel to the part marking surface is larger than operating point (BOP), the output will be turned on; if it is less than releasing point (BRP), the output will be turned off.
The KTM1304 family provides a variety of package to customers: DFN2×2-3L for surface mount .



Absolute Maximum Ratings

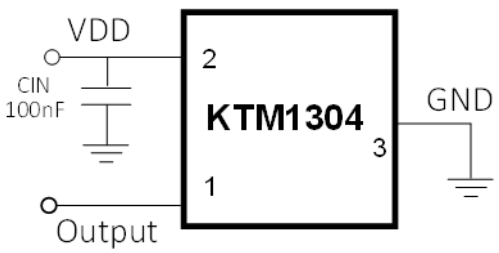
In accordance with the absolute maximum rating system (IEC60134).

Symbol	Parameter	Min.	Max.	Unit
V_{CC}	Supply voltage	-0.3	6.0	V
I_{Output}	Output drive current	-	5	mA
B	Withstand magnetic field <5 min	-	3000	G
$T_{junction}$	Maximum junction temperature	-	+150	°C
$T_{stg(others)}$	Storage temperature	-50	+150	°C
$T_{working}$	Working temperature	-40	+125	°C
T_{reflow}	Reflow soldering temperature	-	+260	°C
ESD_{HBM}	Human body model ESD	-	8000	V

Stresses beyond those listed under “Absolute maximum ratings” may cause permanent damage to the device.

This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Application circuit schematic



Note: C_{IN} is for stabilization and to strengthen the noise immunity, the recommended capacitance is 100nF typical and should be placed as close to the supply pin as possible.

Features

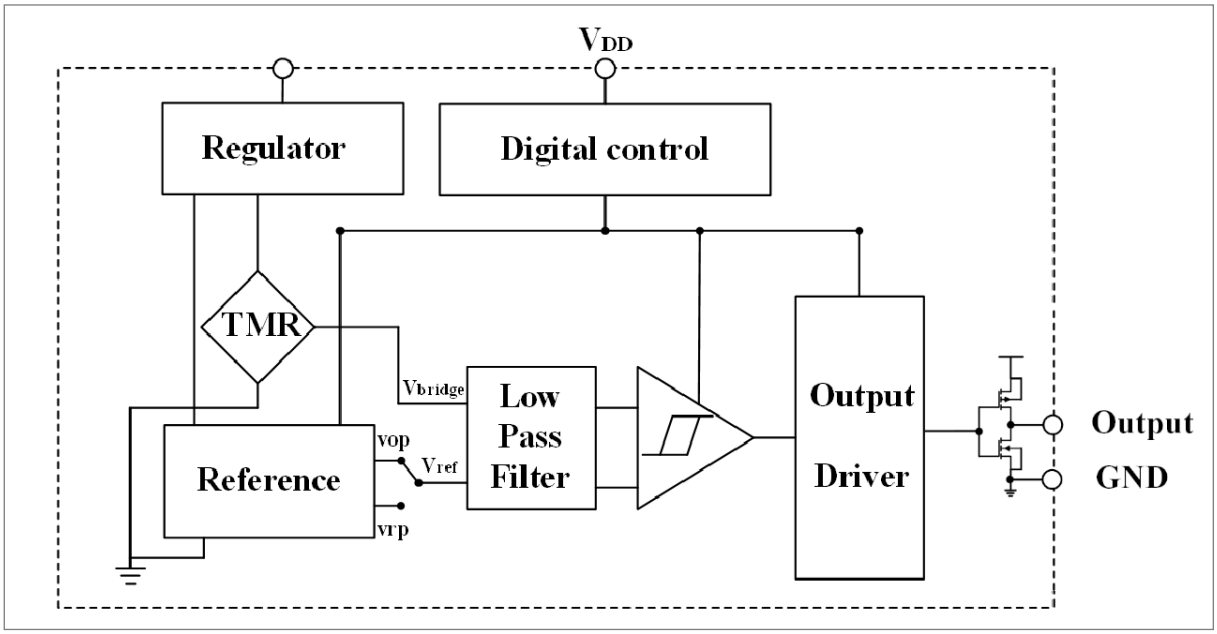
- TMR+CMOS Monolithic Structure
- Ultra low power consumption
- Wide operating voltage range
- Selectable Magnetic Field Threshold
- Magnetic Type: Omni-polar
- CMOS output interface
- Operation temperature range from -40°C to +125°C
- Excellent ESD performance

Application

- Water meter, gas meter, flow meter
- non-contact detection
- Electronic lock, valve position detection
- Laptop and Tablet Switch Detection
- TWS headset, mobile phone

ESD

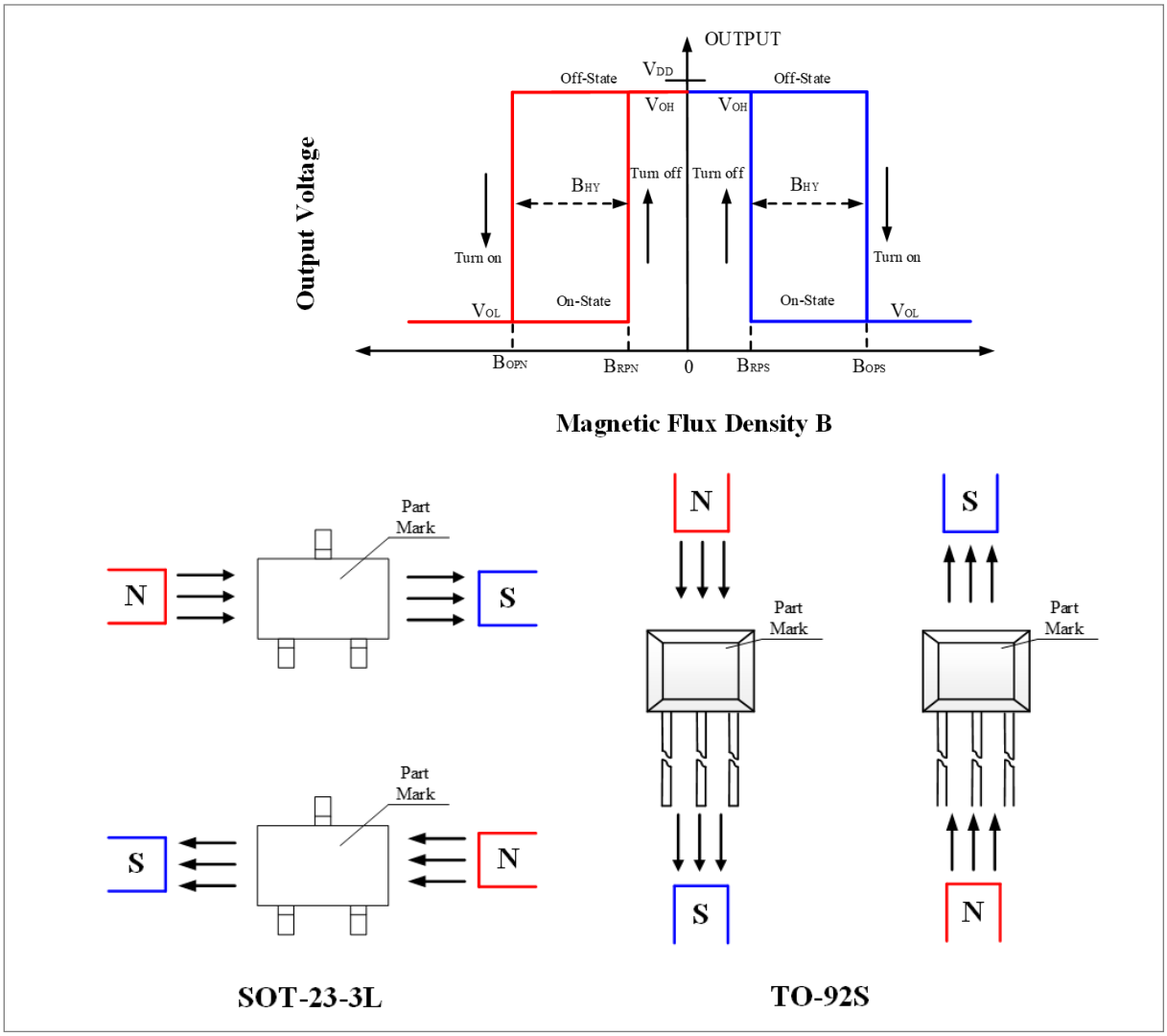
Functional block diagram



Switching output characteristics

To operate the TMR switch, the magnetic field should be applied to the sensor with sufficient magnetic flux density and correct direction. A horizontal magnetic field parallel to the package can be detected.

Output characteristics



Electrical Data

T_{amb} = +25°C, V_{DD} = 3.0 V; unless otherwise specified.

Symbol	Parameter	Conditions	min.	typ.	max.	Unit
V_{CC}	Supply voltage	Working status	1.8	5.0	5.5	V
V_{OL}	Output low level	I_{OUT} = 1mA	-	0.008	0.05	V
V_{OH}	Output high level	I_{OUT} = 1mA	V_{DD} - 0.05	V_{DD} - 0.045	-	V
$I_{DD,Avg}$	Average current [1]	TA=+25 °C , V_{DD} = 3.0 V	-	160.0	-	nA
$I_{DD,Awake}$	Awake state current [1]	TA=+25 °C , V_{DD} = 3.0 V	-	1.9	-	µA
$I_{DD,Sleep}$	Sleep state current [1]	TA=+25 °C , V_{DD} = 3.0 V	-	148.0	-	nA
T_{Awake}	Wake up time [1]	Working status	-	40.0	-	µs
T_{Period}	Cycle [1]	Working status	-	20.0	-	ms
$I_{DD,Avg}$	Average current [2]	TA=+25 °C , V_{DD} = 3.0 V	-	1.9	-	µA
F_S	Operating frequency [2]	Working status	-	5.0	-	kHz

[1] Only for low speed version.

[2] Only for continous working version.

Magnetic parameters

T_{amb} = +25°C, V_{CC} = 3.0 V; unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
KTM1304XA series						
B_{OPS}	Magnetic field operating point	TA=+25°C , VDD = 3.0V	40	45	50	Gauss
B_{RPS}	Magnetic release point	TA=+25°C , VDD = 3.0V	31	36	41	
B_{OPN}	Magnetic field operating point	TA=+25°C , VDD = 3.0V	-50	-45	-40	
B_{RPN}	Magnetic release point	TA=+25°C , VDD = 3.0V	-41	-36	-31	
B_{HY} ($\lvert B_{OPX}\rvert$-$\lvert B_{RPX}\rvert$)	Hysteresis		-	9	-	
KTM1304XB series						
B_{OPS}	Magnetic field operating point	TA=+25°C , VDD = 3.0V	26	30	36	Gauss
B_{RPS}	Magnetic release point	TA=+25°C , VDD = 3.0V	16	21	26	
B_{OPN}	Magnetic field operating point	TA=+25°C , VDD = 3.0V	-36	-30	-26	
B_{RPN}	Magnetic release point	TA=+25°C , VDD = 3.0V	-26	-21	-16	
B_{HY} ($\lvert B_{OPX}\rvert$-$\lvert B_{RPX}\rvert$)	Hysteresis		-	9	-	
KTM1304XC series						
B_{OPS}	Magnetic field operating point	TA=+25°C , VDD = 3.0V	15	18	24	Gauss
B_{RPS}	Magnetic release point	TA=+25°C , VDD = 3.0V	9	12	15	
B_{OPN}	Magnetic field operating point	TA=+25°C , VDD = 3.0V	-24	-18	-15	
B_{RPN}	Magnetic release point	TA=+25°C , VDD = 3.0V	-15	-12	-9	
B_{HY} ($\lvert B_{OPX}\rvert$-$\lvert B_{RPX}\rvert$)	Hysteresis		-	6	-	
KTM1304XD series						
B_{OPS}	Magnetic field operating point	TA=+25°C , VDD = 3.0V	6	9	12	Gauss
B_{RPS}	Magnetic release point	TA=+25°C , VDD = 3.0V	3	6	9	
B_{OPN}	Magnetic field operating point	TA=+25°C , VDD = 3.0V	-12	-9	-6	
B_{RPN}	Magnetic release point	TA=+25°C , VDD = 3.0V	-9	-6	-3	
B_{HY} ($\lvert B_{OPX}\rvert$-$\lvert B_{RPX}\rvert$)	Hysteresis		-	3	-	
KTM1304XE series						
B_{OPS}	Magnetic field operating point	TA=+25°C , VDD = 3.0V	4	7	10	Gauss
B_{RPS}	Magnetic release point	TA=+25°C , VDD = 3.0V	1	4	7	
B_{OPN}	Magnetic field operating point	TA=+25°C , VDD = 3.0V	-10	-7	-4	
B_{RPN}	Magnetic release point	TA=+25°C , VDD = 3.0V	-7	-4	-1	
B_{HY} ($\lvert B_{OPX}\rvert$-$\lvert B_{RPX}\rvert$)	Hysteresis		-	3	-	

DFN2x2-3L

Pinout

Pad	Symbol	Parameter
1	VDD	Supply voltage
2	Output	Output volage
3	GND	Ground

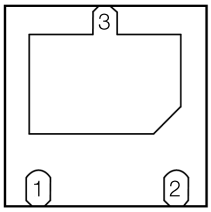
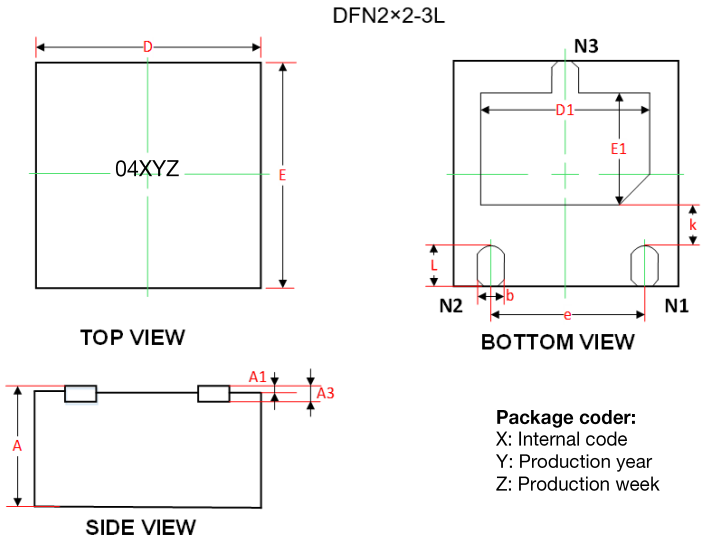


Fig. 1: Pinout of the DFN2x2-3L package

Dimensions

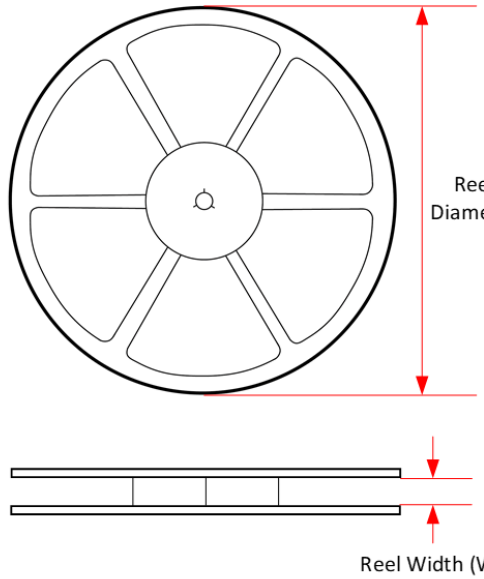


Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.5	-	0.6
A1	0.0	-	0.5
A2	0.157 Ref.		
D	1.924	2.000	2.076
E	1.924	2.000	2.076
D1	1.4	-	1.6
E1	0.95	-	1.15
k	0.22 Min.		
b	0.25	-	0.25
e	1.30 (BSC)		
L	0.33	-	0.43

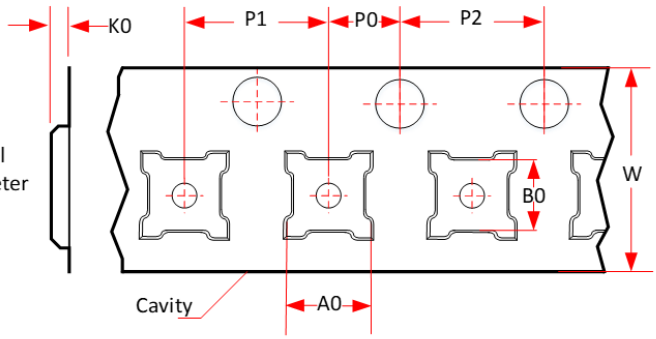
Fig. 2: Dimensions for DFN2x2-3L package.

Tape and Reel information

REEL DIMENSIONS

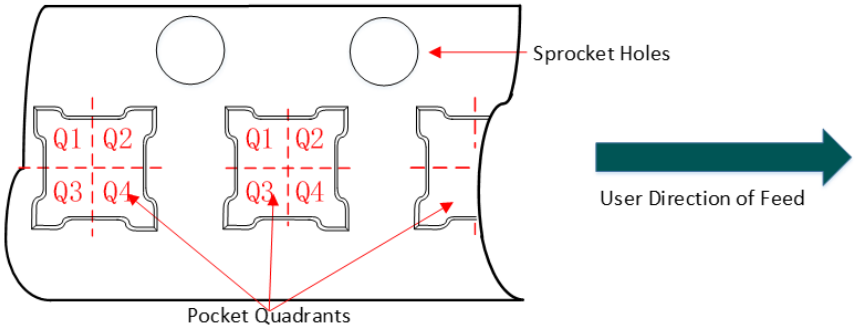


TAPE DIMENSIONS



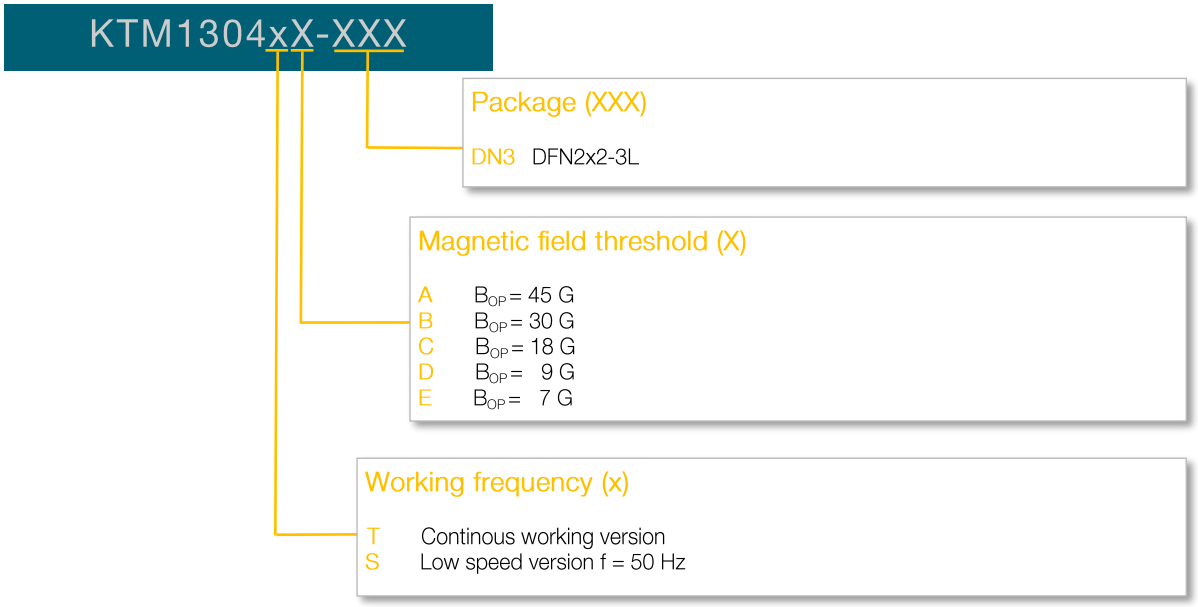
AO	Dimension designed to accommodate the component width
BO	Dimension designed to accommodate the component length
KO	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



Package Type	Pins	SPQ	Reel Diameter	Reel Inside Width	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	P2 (mm)	P0 (mm)	W (mm)	Pin1 Direction
DFN2×2-3L	3	4000	180	9.5	2.64	2.2	0.75	4.00	4.00	2.00	8.00	Q1

Additional Information on Ordering Code



Ordering information

Model	Package form	Pin count	Magnetic Field Threshold (Bop)	Operating frequency	Temperature
KTM1304TA-DN3	DFN2x2-3L	3	45 Gauss	Continuous	-40°C to +125°C
KTM1304TB-DN3	DFN2x2-3L	3	30 Gauss	Continuous	-40°C to +125°C
KTM1304TC-DN3	DFN2x2-3L	3	18 Gauss	Continuous	-40°C to +125°C
KTM1304TD-DN3	DFN2x2-3L	3	9 Gauss	Continuous	-40°C to +125°C
KTM1304TE-DN3	DFN2x2-3L	3	7 Gauss	Continuous	-40°C to +125°C
KTM1304SA-DN3	DFN2x2-3L	3	45 Gauss	50 Hz	-40°C to +125°C
KTM1304SB-DN3	DFN2x2-3L	3	30 Gauss	50 Hz	-40°C to +125°C
KTM1304SC-DN3	DFN2x2-3L	3	18 Gauss	50 Hz	-40°C to +125°C
KTM1304SD-DN3	DFN2x2-3L	3	9 Gauss	50 Hz	-40°C to +125°C
KTM1304SE-DN3	DFN2x2-3L	3	7 Gauss	50 Hz	-40°C to +125°C

General Information

Product Status

Article	Status
KTM1304	The product is in series production.
Note	The status of the product may have changed since this data sheet was published. The latest information is available on the internet at www.sensitec.com.

Disclaimer

General Information

Application Information

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Life Critical Applications

These products are not qualified for use in life support appliances, aeronautical applications or devices or systems where malfunction of these products can reasonably be expected to result in personal injury.

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Changelist

Version	Description of the Change	Date
KTM1304.DSE.01	Distinction between continuous and low speed version added to electrical data	11/2024
KTM1304.DSE.00	Original (pp. 1-9)	09/2014

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