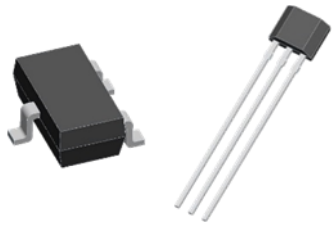
SENSITEC
MAGNETORESISTIVE SENSORS

KTM1301

Omnipolar Switching Sensor with CMOS output interface

KTM1301 is a magnetic switch sensor integrating tunneling magnetoresistance (TMR) technology and CMOS technology. With the characteristics of high precision, high speed, low power consumption and high sensitivity, it is suitable for magnetic field switch detection of industrial electronics and consumer electronics. The internal circuit of the chip includes a voltage generator, a comparator, a digital logic control module, a threshold trimming module and a CMOS output circuit. KTM1301 has wide working voltage range and wide working temperature range. This series of chips can provide a variety of magnetic field thresholds, switching operating frequencies and packaging forms to suit various applications.

KTM1301 is an omnipolar magnetic field detection switch, which can provide omnipolar magnetic response with extremely low current consumption. It detects the magnetic field parallel to the surface of the chip package. When the magnetic field strength is greater than the operating point (B_{OP}), the switch outputs a low level; when the magnetic field strength is lower than the release point (B_{RP}), the switch outputs a high level . The chip can operate from a supply voltage range of 1.8V to 5.5V and comes in standard SOT-23-3L and TO-92S packages.



Features

- 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 +85 °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

Absolute Maximum Ratings

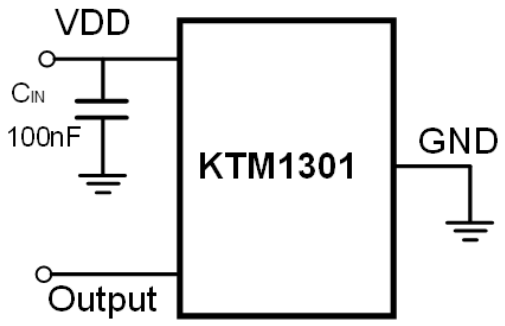
In accordance with the absolute maximum rating system (IEC60134).

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
PD	Package power consumption	-	400	W
$T_{junction}$	Maximum junction temperature	-	+150	°C
$T_{stg(others)}$	Storage temperature	-50	+150	°C
$T_{working}$	Working temperature	-40	+85	°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.

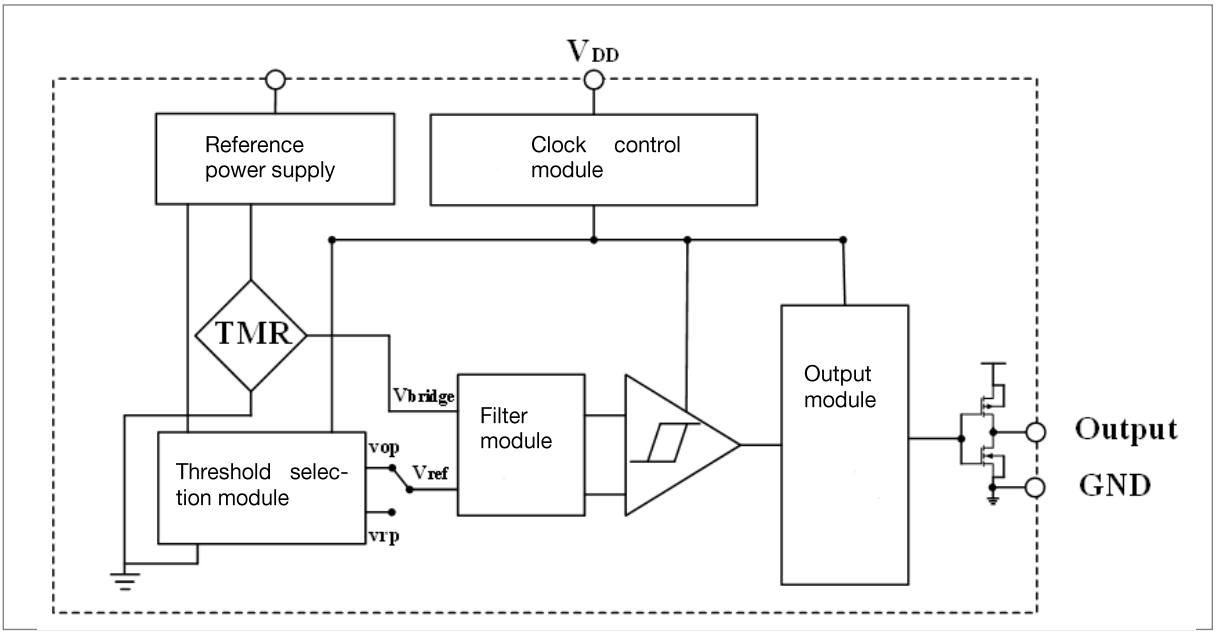
Application circuit schematic



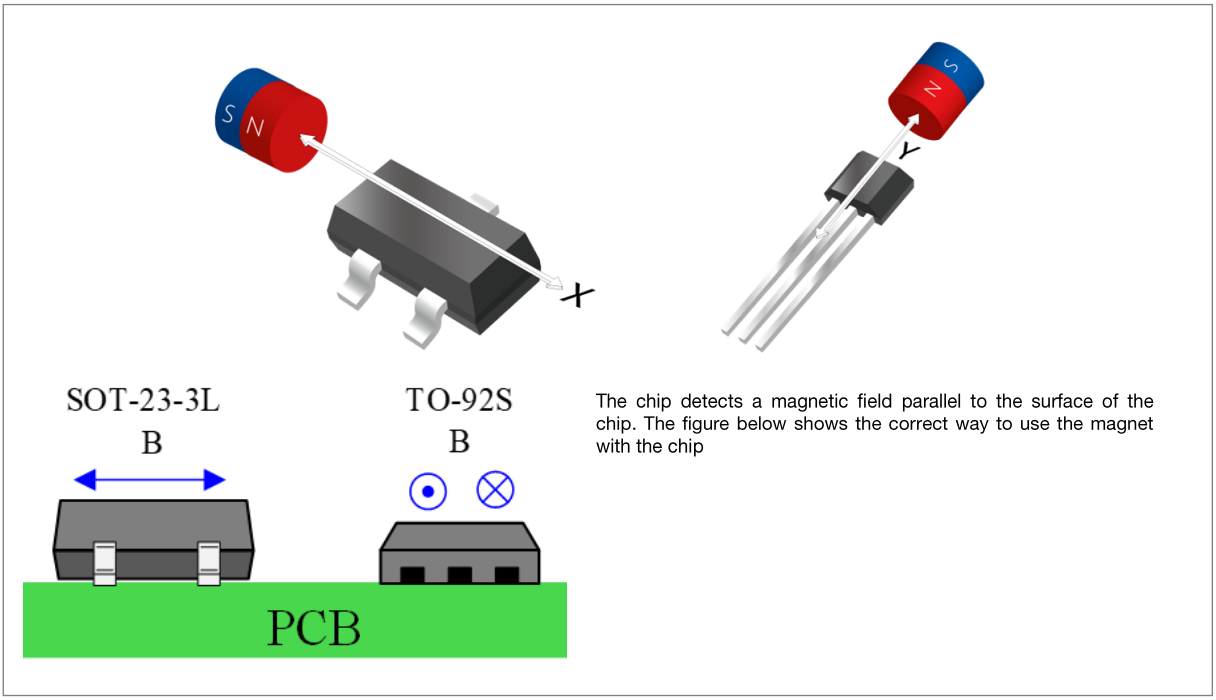
Note: In order to filter the noise at the power supply end of the chip, a 100nF capacitor, and the capacitor should be as close as possible to the VDD pin.

ESD

Functional block diagram

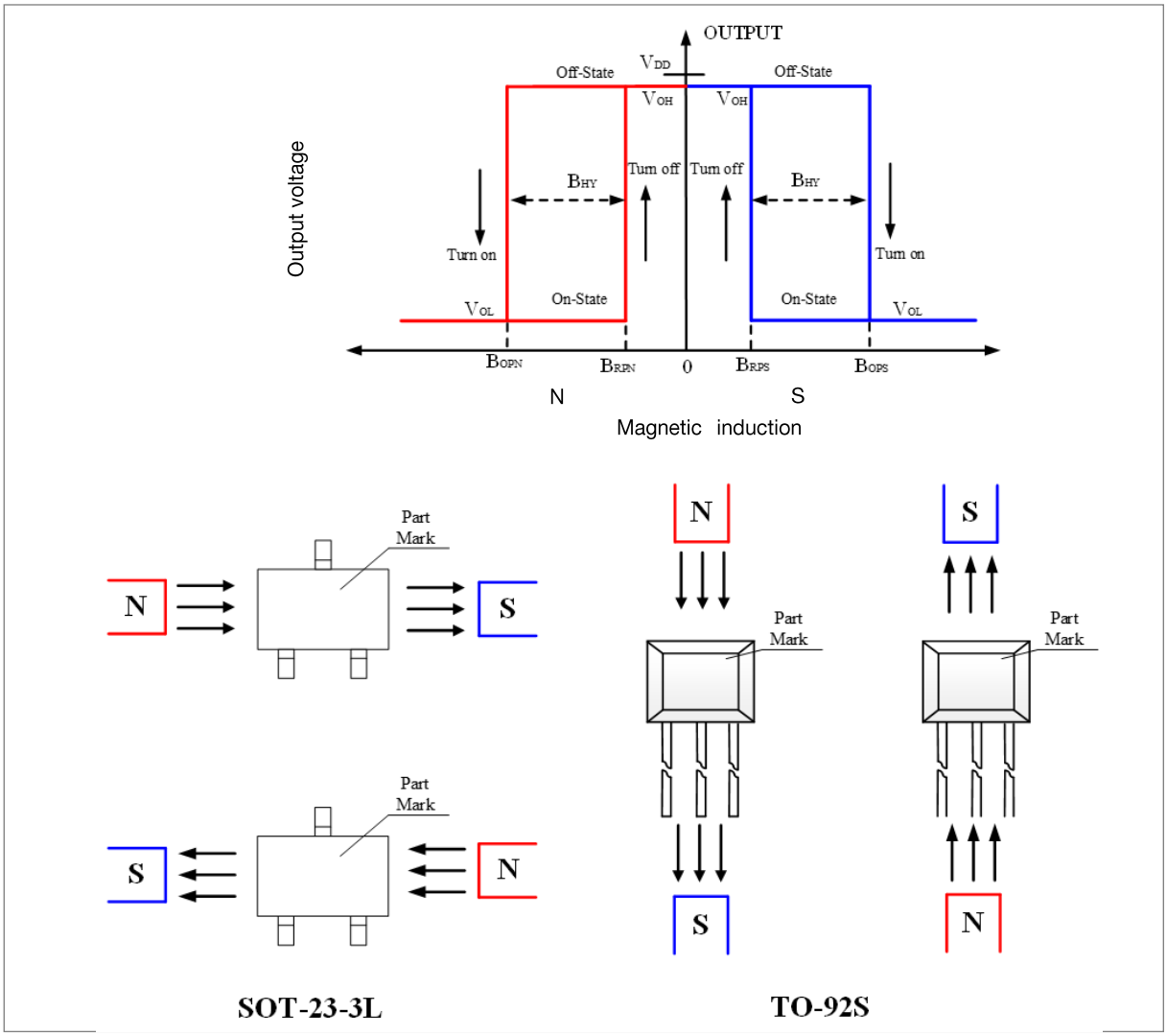


Switching output characteristics



The chip detects a magnetic field parallel to the surface of the chip. The figure below shows the correct way to use the magnet with the chip

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	-	0.015	0.1	V
V_{OH}	Output high level	I_{OUT} = 1mA	V_{DD} - 0.1	V_{DD} - 0.005	-	V
$I_{DD,Avg}$	Average current	TA=+25 °C , V_{DD} = 3.0 V	-	160.0	-	nA
$I_{DD,Awake}$	Awake state current	TA=+25 °C , V_{DD} = 3.0 V	-	1.9	-	µA
$I_{DD,Sleep}$	Sleep state current	TA=+25 °C , V_{DD} = 3.0 V	-	148.0	-	nA
T_{Awake}	Wake up time	Working status	-	40.0	-	µs
T_{Period}	Cycle	Working status	-	20.0	-	ms
F_S	Operating frequency [1]	Working status	-	5000	-	Hz

[1] .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
KTM1301XA 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} ($\|B_{OPX}\|$-$\|B_{RPX}\|$)	Hysteresis		-	9	-	
KTM1301XB series						
B_{OPS}	Magnetic field operating point	TA=+25°C , VDD = 3.0V	28	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} ($\|B_{OPX}\|$-$\|B_{RPX}\|$)	Hysteresis		-	9	-	
KTM1301XC 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} ($\|B_{OPX}\|$-$\|B_{RPX}\|$)	Hysteresis		-	6	-	
KTM1301XD 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} ($\|B_{OPX}\|$-$\|B_{RPX}\|$)	Hysteresis		-	3	-	

SOT-23-3L

Pinout

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

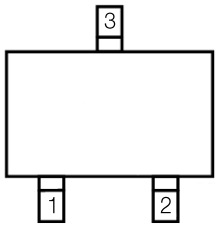
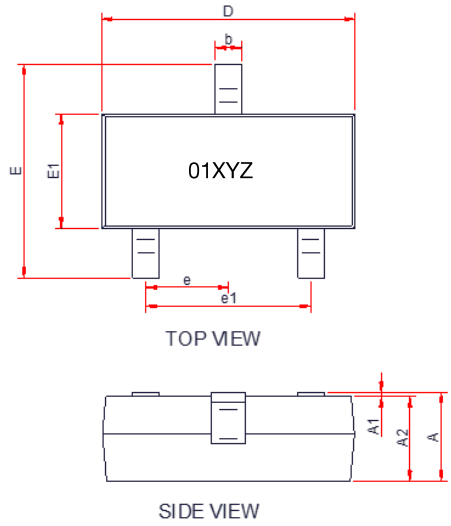
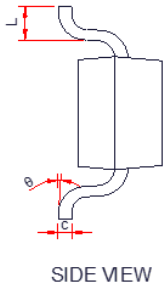


Fig. 4: Pinout of the SOT-23-3L package

Dimensions





Package coder:
X: Internal code
Y: Production year
Z: Production week

Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	-	-	1.25
A1	0.00	-	0.1
A2	1.00	1.10	1.15
b	0.30	-	0.50
c	0.10	-	0.20
D	2.82	2.95	3.02
E	2.65	2.80	2.95
E1	1.50	1.65	1.70
e	0.85	0.95	1.05
e1	1.80	1.90	2.00
L	0.30	0.45	0.60
θ	0°	-	8°

Fig. 5: Dimensions for SOT-23-3L package.

TO-92S

Pinout

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

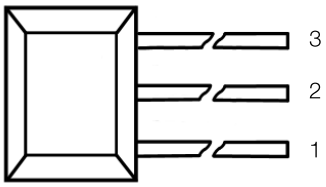
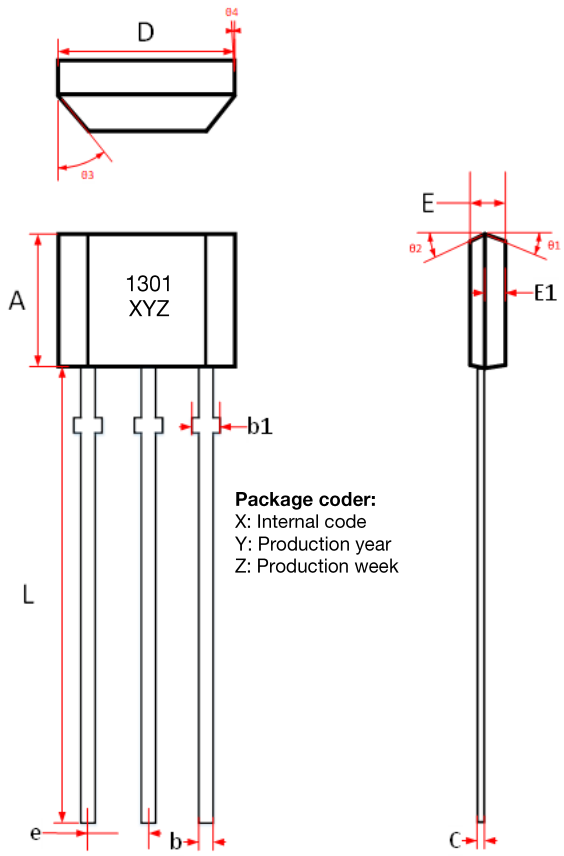


Fig. 4: Pinout of the TO-92S package

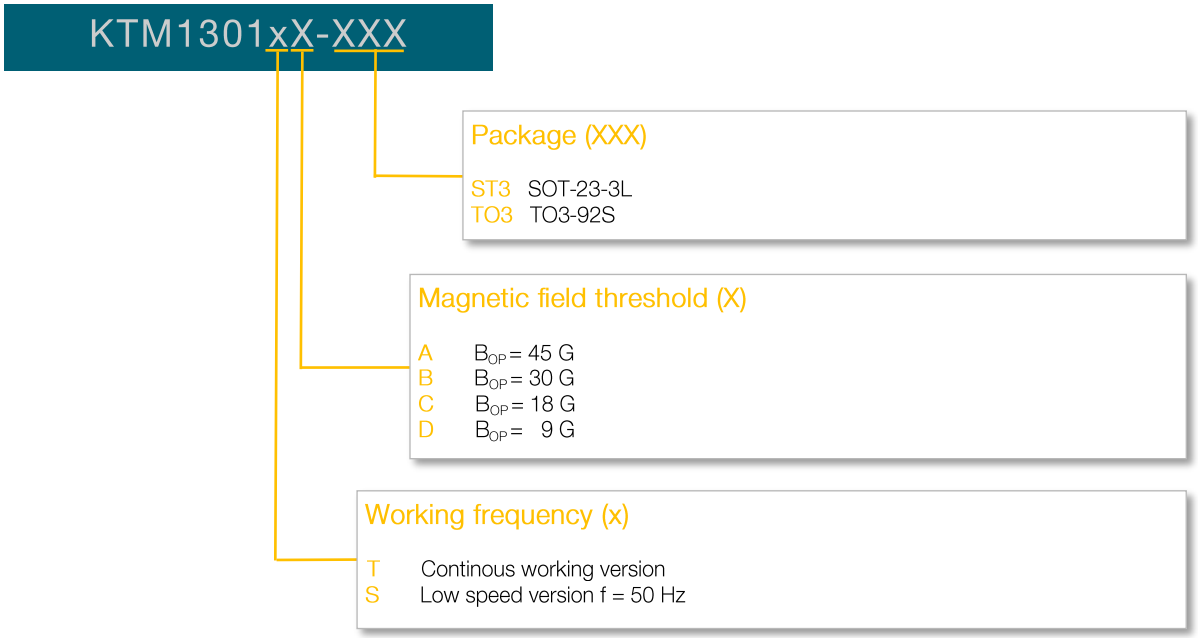
Dimensions



Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	2.90	3.00	3.10
b	0.35	0.39	0.50
b1	0.40	0.44	0.55
C	0.36	0.38	0.45
D	3.90	4.00	4.10
E	1.42	1.52	1.62
E 1		0.75	
e	1.27 TYPE		
L	13.50	14.50	15.50
θ_1		6°	
θ_2		3°	
θ_3		45°	
θ_4		3°	

Fig. 5: Dimensions for TO-92S package.

Additional Information on Ordering Code



Ordering information

Model	Package form	Pin count	Magnetic Field Threshold (Bop)	Operating frequency	Temperature
KTM1301TA -ST3	SOT-23-3L	3	45 Gauss	Continuous	-40°C to +85°C
KTM1301TB-ST3	SOT-23-3L	3	30Gauss	Continuous	-40°C to +85°C
KTM1301TC-ST3	SOT-23-3L	3	18 Gauss	Continuous	-40°C to +85°C
KTM1301TD-ST3	SOT-23-3L	3	9 Gauss	Continuous	-40°C to +85°C
KTM1301SA-ST3	SOT-23-3L	3	45 Gauss	50Hz	-40°C to +85°C
KTM1301SB-ST3	SOT-23-3L	3	30 Gauss	50Hz	-40°C to +85°C
KTM1301SC-ST3	SOT-23-3L	3	18 Gauss	50Hz	-40°C to +85°C
KTM1301SD-ST3	SOT-23-3L	3	9 Gauss	50Hz	-40°C to +85°C
KTM1301TA-TO3	TO-92S	3	45 Gauss	Continuous	-40°C to +85°C
KTM1301TB-TO3	TO-92S	3	30 Gauss	Continuous	-40°C to +85°C
KTM1301TC-TO3	TO-92S	3	18 Gauss	Continuous	-40°C to +85°C
KTM1301TD-TO3	TO-92S	3	9 Gauss	Continuous	-40°C to +85°C
KTM1301SA-TO3	TO-92S	3	45 Gauss	50Hz	-40°C to +85°C
KTM1301SB-TO3	TO-92S	3	30 Gauss	50Hz	-40°C to +85°C
KTM1301SC-TO3	TO-92S	3	18 Gauss	50Hz	-40°C to +85°C
KTM1301SD-TO3	TO-92S	3	9 Gauss	50Hz	-40°C to +85°C

General Information

Product Status

Article	Status
KTM1301	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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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
KTM1301.DSE.00	Original (pp. 1-7)	09/2014

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