

KTM1304 series

High sensitivity, Low Power, Omni-Polar TMR Switch



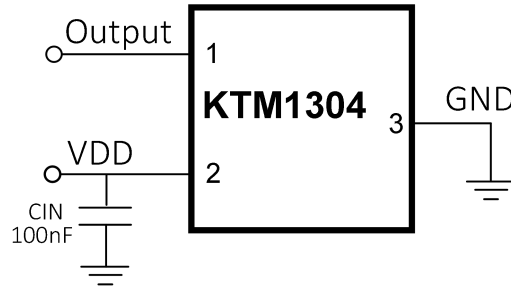
1 Features

- TMR+CMOS Monolithic Structure
- Low power Consumption
 - 50Hz Version: 160nA@3.0V (typical)
 - Continuous Version: 1.9uA@3.0V (typical)
- Supply Voltage: 1.8V~5.5V
- High Magnetic Sensitivity
 - BOP=±45Gs BRP=±36Gs
 - BOP=±30Gs BRP=±21Gs
 - BOP=±18Gs BRP=±12Gs
 - BOP=±9Gs BRP=±6Gs
 - BOP=±7Gs BRP=±4Gs
- Magnetic Type: Omni-polar
- Push-Pull CMOS Output
- Package: DFN2×2-3L
- Operating Temperature: -40°C~125°C
- High ESD Rating: HBM 8KV
- RoHS Compliant

2 Typical Application

- Water, Electric and Gas Utility Meters
- Non-Contact Detection
- Door, Lids and Tray Position Switches
- Cover Switch in Notebook PC/PAD
- TWS Earphones, Cellular Phones

3 Typical Application Circuit

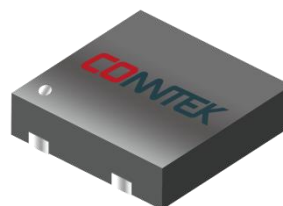


Note: C_{IN} is for stabilization and to strengthen the noise immunity, the recommended capacitance is 100nF typical and should be placed as close to the supply pin as possible.

4 Descriptions

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 . All package are RoHS compliant.



DFN2×2-3L

KTM1304 series

High sensitivity, Low Power, Omni-Polar TMR Switch



Catalog

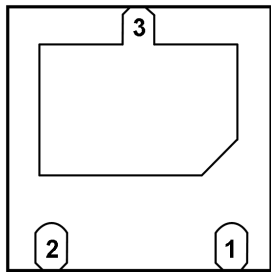
1 Features	1
2 Typical Application	1
3 Typical Application Circuit	1
4 Descriptions	1
5 Pin Configuration	3
6 Block Diagram	3
7 Output Switching Characteristics	4
8 Product Name Structure	5
9 Absolute Maximum Ratings	5
10 Recommended Operating Range	5
11 Electronics Characteristics	6
12 Magnetic Characteristics	6
13 Order Information	8
14 Package Outline Dimensions	9
15 Strap and Reel Information	10

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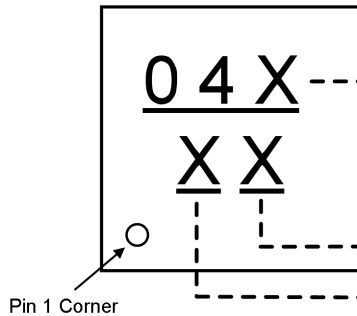
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5 Pin Configuration



BOTTOM VIEW



TOP VIEW

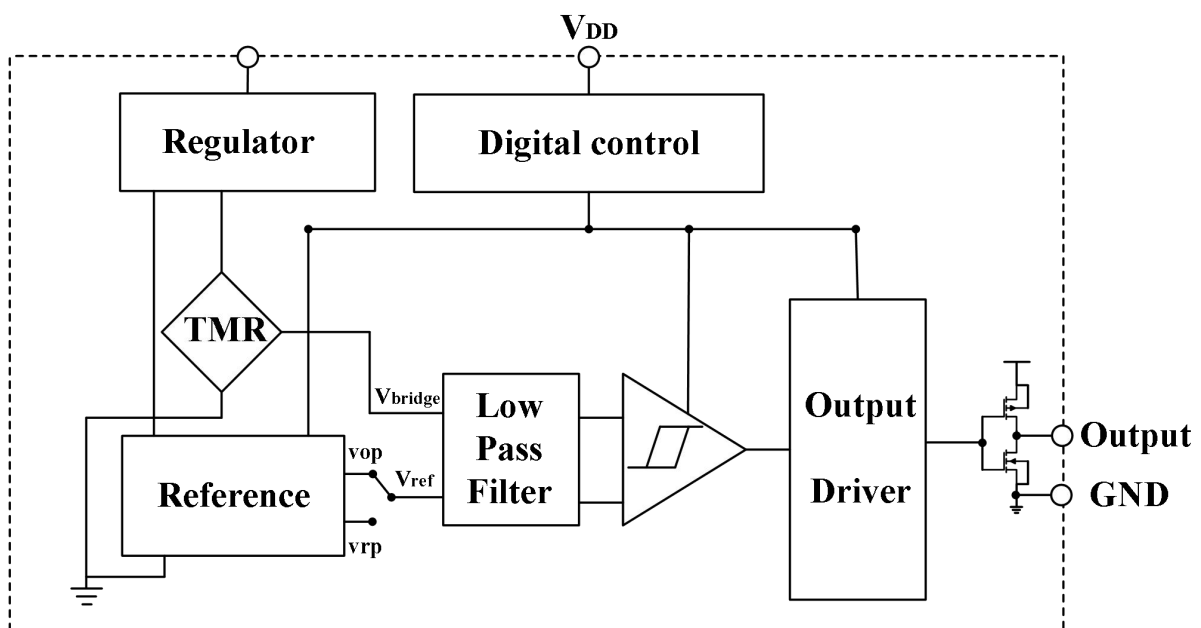
04X: Internal Code

X: Week
X: Year

DFN2*2-3L

Pin Name	Pin Number	Function
OUTPUT	1	Output Ground Pin
VDD	2	Power Supply Input
GND	3	Ground Pin

6 Block Diagram



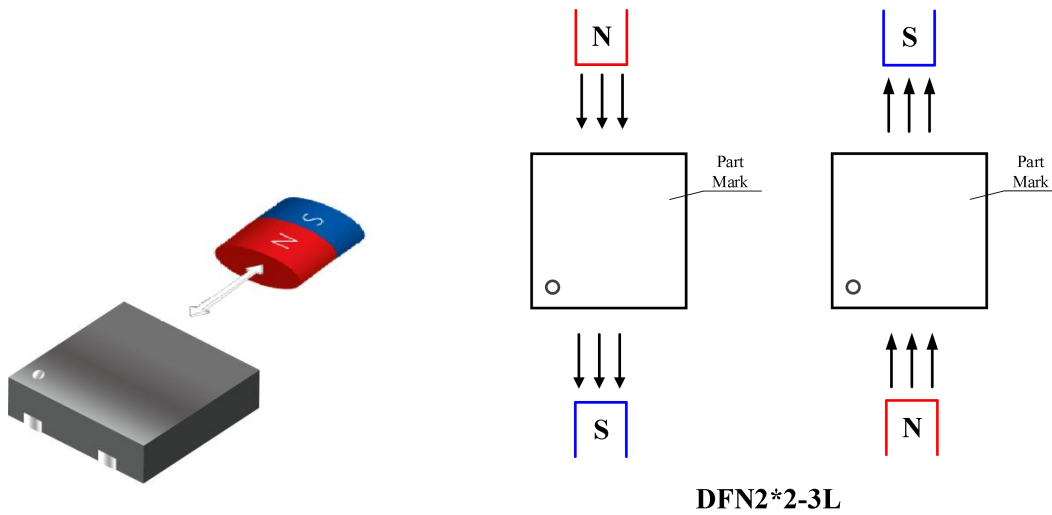
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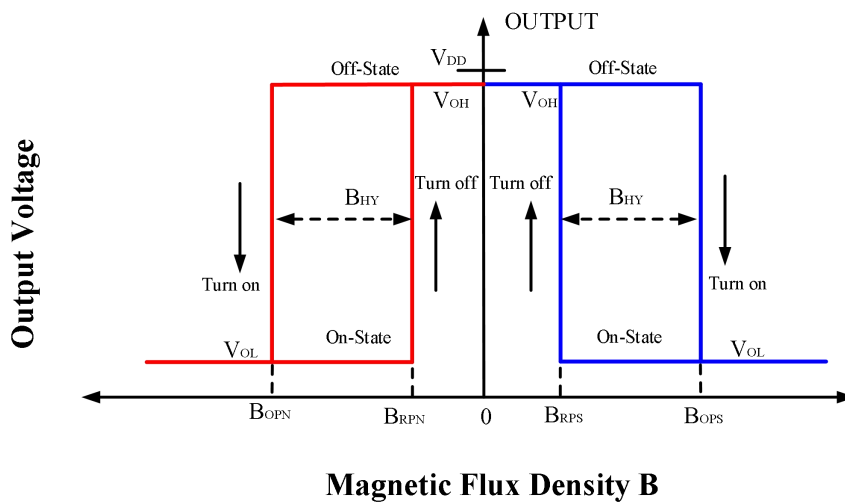
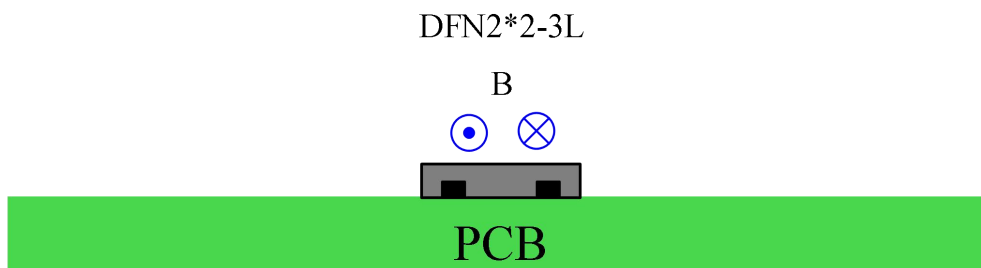


7 Output Switching Characteristics

To operate the TMR switch, the magnetic field should be applied to the sensor with sufficient magnetic flux density and correct direction.



As shown in the figure below, a horizontal magnetic field parallel to the package can be detected.

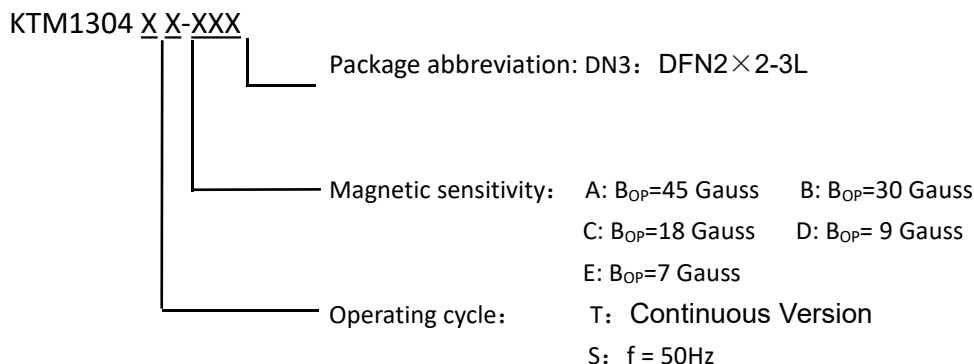


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High sensitivity, Low Power, Omni-Polar TMR Switch



8 Product Name Structure



9 Absolute Maximum Ratings (@TA=+25°C, unless otherwise specified)

Symbol	Parameter	Value	Unit
V _{DD}	Supply Voltage Dissipation	6	V
V _{DD_REV}	Reverse voltage (VDD)	-0.3	V
I _{OUTPUT}	Output Current	5	mA
B	Magnetic Flux Density	3000@<5min	Gauss
T _{STG}	Storage Temperature Range	-50~+150	°C
T _J	Maximum Junction Temperature	+150	°C
ESD HBM	Human Body Model ESD Capability	8000	V
T reflow	Reflow Temperature (MAX)	+260	°C

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

10 Recommended Operating Range (@TA=+25°C, unless otherwise specified)

Symbol	Parameter	Conditions	Value	Unit
V _{DD}	Supply Voltage	Operating	1.8~5.5	V
T _A	Operating temperature Range	Operating	-40~125	°C

KTM1304 series

High sensitivity, Low Power, Omni-Polar TMR Switch



11 Electronics Characteristics (@TA=+25°C, VDD=3.0V, unless otherwise specified)

KTM1304SX Series						
Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
VDD	Supply Voltage	Operating	1.8	—	5.5	V
VOL	Output Low Voltage (On)	I _{OUT} =1mA	—	0.008	0.05	V
VOH	Output High Voltage (Off)	I _{OUT} =1mA	V _{DD} -0.05	V _{DD} -0.045	—	V
I _{DD(AVG)}	Average Supply Current	TA=+25°C, VDD=3.0V	—	160	—	nA
I _{DD(Awake)}	Awake Supply Current	TA=+25°C, VDD=3.0V	—	1.9	—	μA
I _{DD(Sleep)}	Sleep Supply Current	TA=+25°C, VDD=3.0V	—	148	—	nA
T _{AWAKE}	Awake Time	Operating	—	40	—	μs
T _{PERIOD}	Period	Operating	—	20	—	ms

KTM1304TX Series						
Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
VDD	Supply Voltage	Operating	1.8	—	5.5	V
VOL	Output Low Voltage (On)	I _{OUT} =1mA	—	0.008	0.05	V
VOH	Output High Voltage (Off)	I _{OUT} =1mA	V _{DD} -0.05	V _{DD} -0.045	—	V
I _{DD(AVG)}	Awake Supply Current	TA=+25°C, VDD=3.0V	—	1.9	—	μA
F _S	Sampling Frequency	Operating	—	5000	—	Hz

12 Magnetic Characteristics (TA=25°C, VDD=3.0V, unless otherwise noted)

KTM1304XA Series						
Symbol	Characteristics	Condition	Min.	Typ.	Max.	Unit
B _{OPS}	Magnetic threshold operate point	TA=+25°C, VDD=3.0V	40	45	50	Gauss
B _{RPS}	Magnetic threshold release point	TA=+25°C, VDD=3.0V	31	36	41	
B _{OPN}	Magnetic threshold operate point	TA=+25°C, VDD=3.0V	-50	-45	-40	
B _{RPN}	Magnetic threshold release point	TA=+25°C, VDD=3.0V	-41	-36	-31	
B _{HY} (B _{OPX} - B _{RPX})	Magnetic hysteresis		-	9	-	

KTM1304 series

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KTM1304XB Series						
Symbol	Characteristics	Condition	Min.	Typ.	Max.	Unit
B _{OPS}	Magnetic threshold operate point	TA=+25°C, VDD=3.0V	26	30	36	Gauss
B _{RPS}	Magnetic threshold release point	TA=+25°C, VDD=3.0V	16	21	26	
B _{OPN}	Magnetic threshold operate point	TA=+25°C, VDD=3.0V	-36	-30	-26	
B _{RPN}	Magnetic threshold release point	TA=+25°C, VDD=3.0V	-26	-21	-16	
B _{HY} (B _{OPX} - B _{RPX})	Magnetic hysteresis		-	9	-	

KTM1304XC Series						
Symbol	Characteristics	Condition	Min.	Typ.	Max.	Unit
B _{OPS}	Magnetic threshold operate point	TA=+25°C, VDD=3.0V	15	18	24	Gauss
B _{RPS}	Magnetic threshold release point	TA=+25°C, VDD=3.0V	9	12	15	
B _{OPN}	Magnetic threshold operate point	TA=+25°C, VDD=3.0V	-24	-18	-15	
B _{RPN}	Magnetic threshold release point	TA=+25°C, VDD=3.0V	-15	-12	-9	
B _{HY} (B _{OPX} - B _{RPX})	Magnetic hysteresis		-	6	-	

KTM1304XD Series						
Symbol	Characteristics	Condition	Min.	Typ.	Max.	Unit
B _{OPS}	Magnetic threshold operate point	TA=+25°C, VDD=3.0V	6	9	12	Gauss
B _{RPS}	Magnetic threshold release point	TA=+25°C, VDD=3.0V	3	6	9	
B _{OPN}	Magnetic threshold operate point	TA=+25°C, VDD=3.0V	-12	-9	-6	
B _{RPN}	Magnetic threshold release point	TA=+25°C, VDD=3.0V	-9	-6	-3	
B _{HY} (B _{OPX} - B _{RPX})	Magnetic hysteresis		-	3	-	

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KTM1304XE Series						
Symbol	Characteristics	Condition	Min.	Typ.	Max.	Unit
B _{OPS}	Magnetic threshold operate point	TA=+25°C, VDD=3.0V	4	7	10	Gauss
B _{RPS}	Magnetic threshold release point	TA=+25°C, VDD=3.0V	1	4	7	
B _{OPN}	Magnetic threshold operate point	TA=+25°C, VDD=3.0V	-10	-7	-4	
B _{RPN}	Magnetic threshold release point	TA=+25°C, VDD=3.0V	-7	-4	-1	
B _{HY} (B _{OPX} - B _{RPX})	Magnetic hysteresis		-	3	-	

13 Order Information

Part Numbers	Package	Number of Pins	Bop	Operating Frequency	Temperature	Package Qty
KTM1304TA-DN3	DFN2×2-3L	3	45Gauss	Continuous	-40°C~125°C	4000
KTM1304TB-DN3	DFN2×2-3L	3	30Gauss	Continuous	-40°C~125°C	4000
KTM1304TC-DN3	DFN2×2-3L	3	18Gauss	Continuous	-40°C~125°C	4000
KTM1304TD-DN3	DFN2×2-3L	3	9Gauss	Continuous	-40°C~125°C	4000
KTM1304TE-DN3	DFN2×2-3L	3	7Gauss	Continuous	-40°C~125°C	4000
KTM1304SA-DN3	DFN2×2-3L	3	45Gauss	50Hz	-40°C~125°C	4000
KTM1304SB-DN3	DFN2×2-3L	3	30Gauss	50Hz	-40°C~125°C	4000
KTM1304SC-DN3	DFN2×2-3L	3	18Gauss	50Hz	-40°C~125°C	4000
KTM1304SD-DN3	DFN2×2-3L	3	9Gauss	50Hz	-40°C~125°C	4000
KTM1304SE-DN3	DFN2×2-3L	3	7Gauss	50Hz	-40°C~125°C	4000

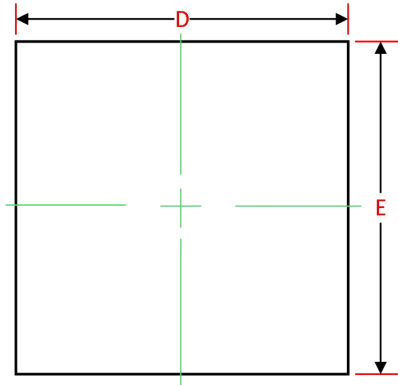
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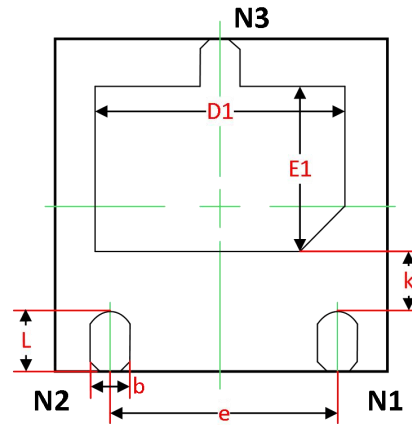


14 Package Outline Dimensions

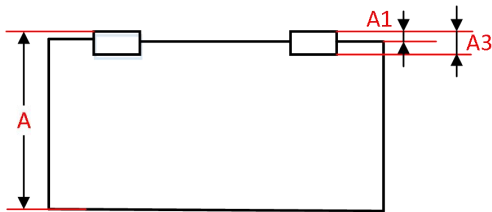
DFN2x2-3L



TOP VIEW



BOTTOM VIEW



SIDE VIEW

Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.500	-	0.600
A1	0.000	-	0.500
A2	0.152 REF.		
D	1.924	2.000	2.076
E	1.924	2.000	2.076
D1	1.400	-	1.600
E1	0.950	-	1.150
k	0.220 MIN.		
b	0.250	-	0.350
e	1.30 (BSC)		
L	0.330	-	0.430

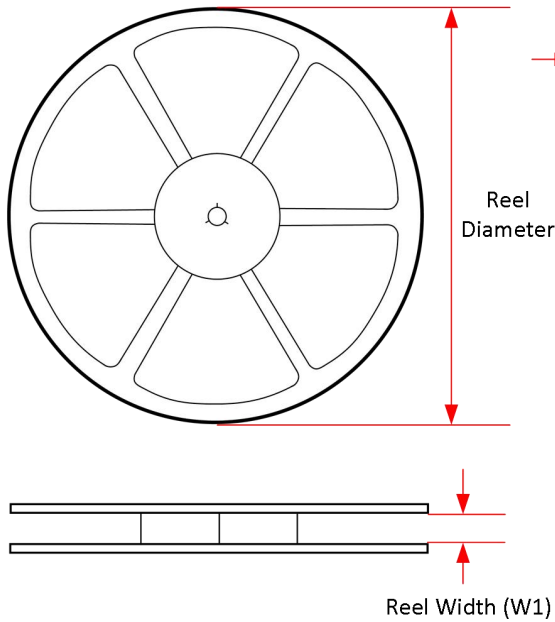
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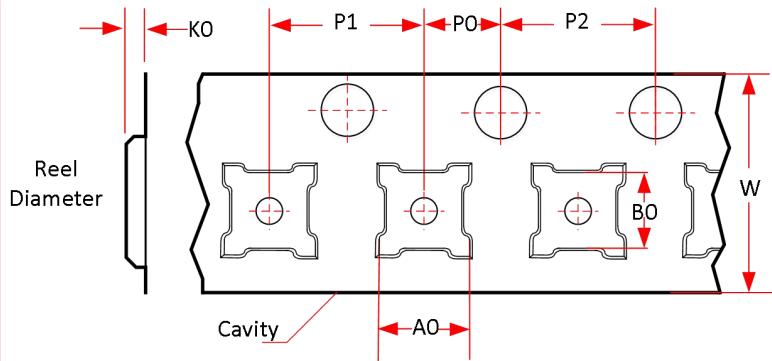


15 Strap and Reel Information

REEL DIMENSIONS

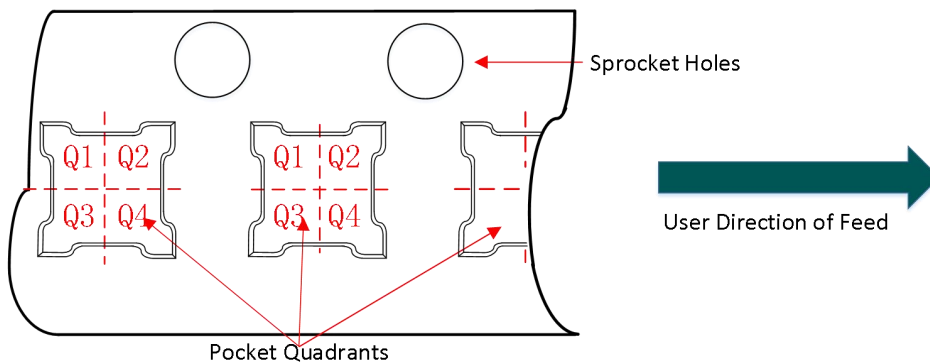


TAPE DIMENSIONS



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
DFN2x2-3L	3	4000	180	9.5	2.64	2.2	0.75	4.00	4.00	2.00	8.00	Q1