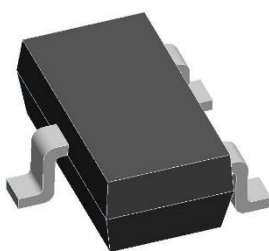


SWITCH SENSOR

PRODUCT SERIES:: KTM1312

VERSION: Ver 1.0



Sinomags Electronic Technology Co., Ltd.

Web site: www.sinomags.com

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typical and should be placed as close to the supply pin as possible.

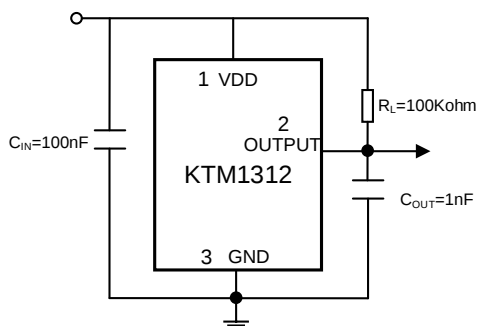
1.Features

- 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
 - B_{OPS}=45Gs B_{RPS}=36Gs
 - B_{OPS}=30Gs B_{RPS}=21Gs
 - B_{OPS}=18Gs B_{RPS}=12Gs
 - B_{OPS}=9 Gs B_{RPS}=6 Gs
- Magnetic Type: Unipolar (South-Pole)
- Push-Pull CMOS Output
- Package: SOT-23-3L (MSL1)
TO-92S
- Operating Temperature: -40℃~85℃
- High ESD Rating: HBM 8KV
- RoHS Compliant

2.Application

- Water, Electric and Gas Utility Meters
- Non-Contact Detection
- Door, Lids and Tray Position Switches
- Linear and Rotary Position Detection

3.Typical Application Circuit

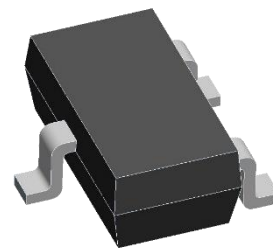


Note: C_{IN} is for stabilization and to strengthen the noise immunity, the recommended capacitance is 100nF

4.Descriptions

The KTM1312 is an unipolar(south-pole) 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 open drain output. If the magnetic flux density parallel to the part marking surface is larger than operating point (B_{OPS}), the output will be turned on; if it is less than releasing point (B_{RPS}), the output will be turned off.

The KTM1312 family provides a variety of package to customers: SOT-23-3L for surface mount and TO-92S flat for through-hole mount. All package are RoHS compliant.



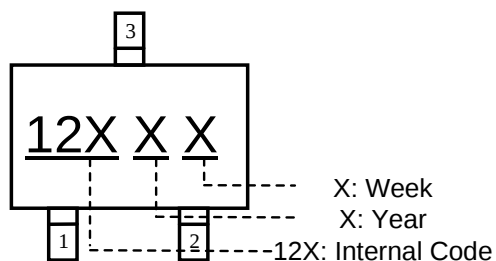
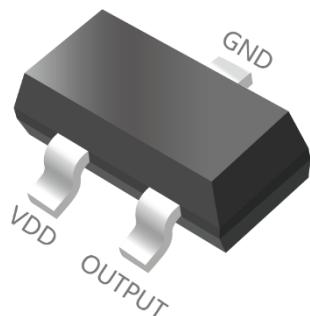
SOT-23-3L



TO-92S

5.Pin Descriptions

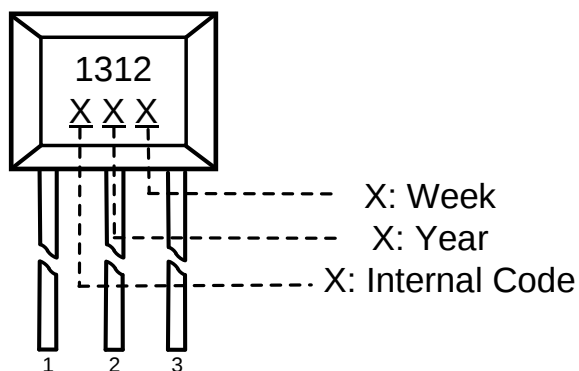
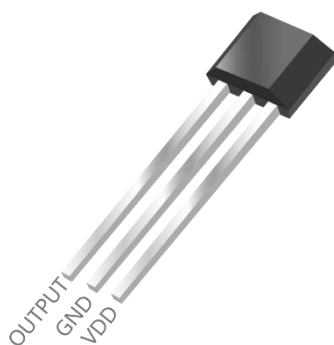
SOT-23-3L



Top view

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

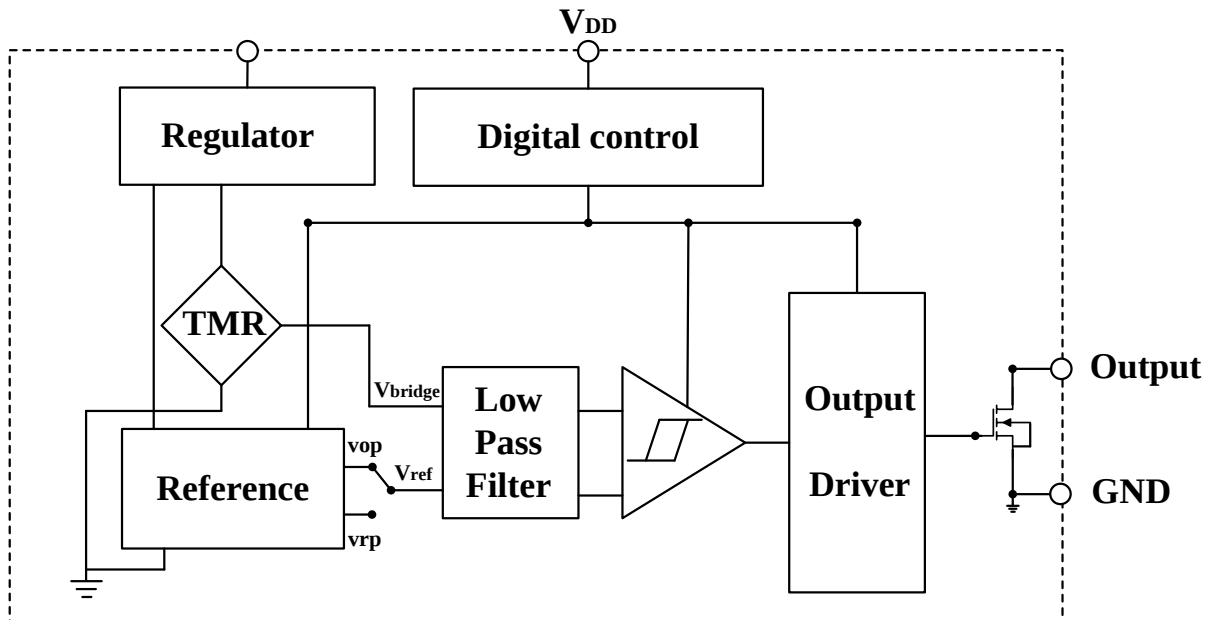
TO-92S



Top view

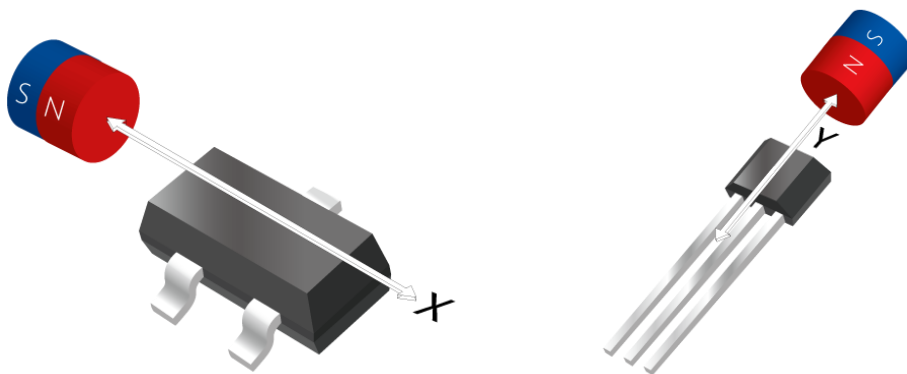
Pin Name	Pin Number	Function
VDD	3	Power Supply Input
GND	2	Ground Pin
OUTPUT	1	Output Pin

6. Block Diagram

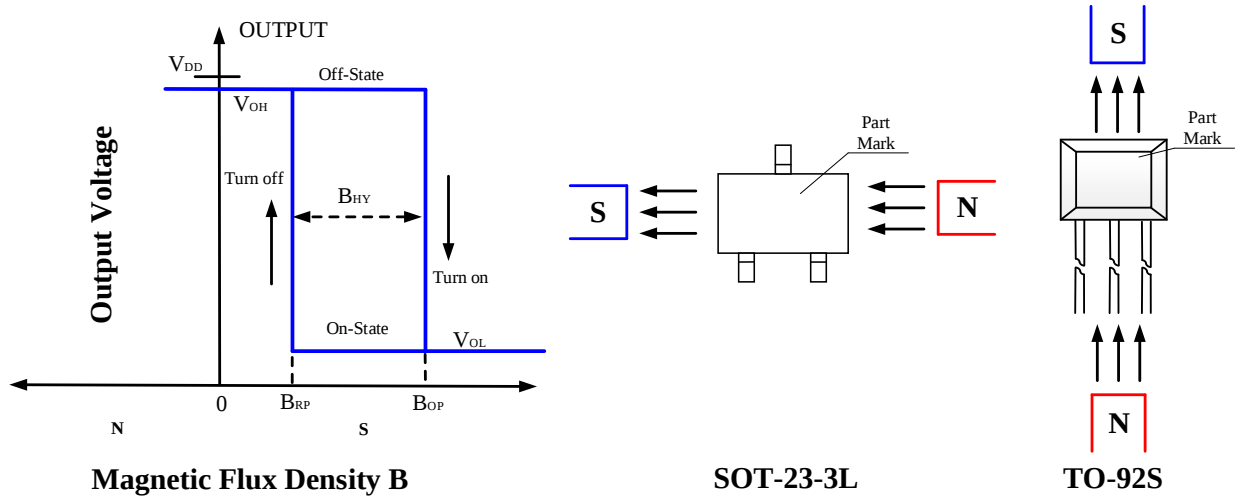
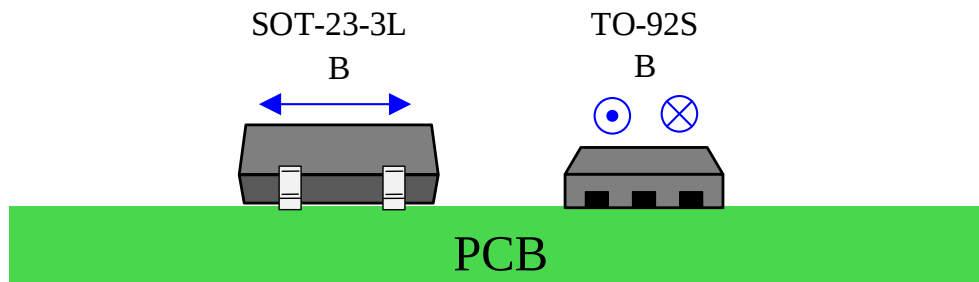


7. Output Switching Characteristics

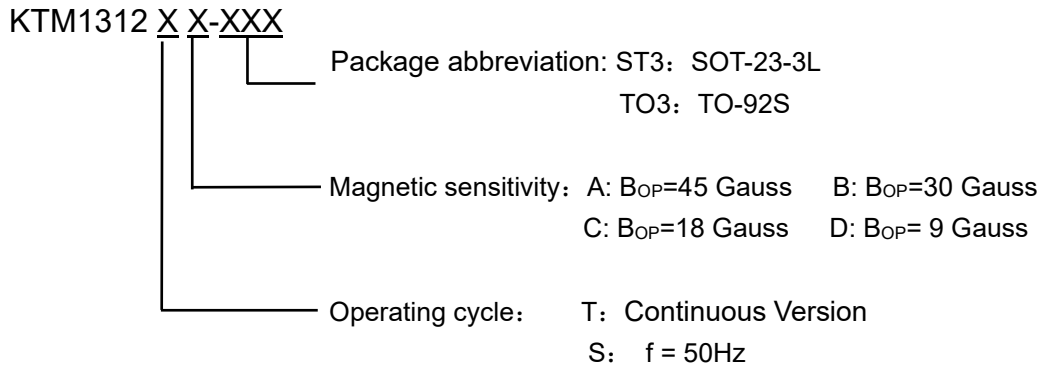
To operate the TMR switch, the magnetic field should be applied to the sensor with sufficient magnetic flux density and correct direction.



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



8.Product Name Structure



9.Absolute Maximum Ratings (@ $T_A=+25^{\circ}\text{C}$, 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	$^{\circ}\text{C}$
T_J	Maximum Junction Temperature	+150	$^{\circ}\text{C}$
ESD HBM	Human Body Model ESD Capability	8000	V
T reflow	Reflow Temperature (MAX)	+260	$^{\circ}\text{C}$

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	-40~85	°C

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

KTM1312SX Series						
Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V _{DD}	Supply Voltage	Operating	1.8	—	5.5	V
V _{OL}	Output Low Voltage (On)	I _{OUT} =1mA	—	0.008	0.05	V
V _{OH}	Output High Voltage (Off)	I _{OUT} =1mA	V _{DD} -0.05	V _{DD} -0.015	—	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

KTM1312TX Series						
Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V _{DD}	Supply Voltage	Operating	1.8	—	5.5	V
V _{OL}	Output Low Voltage (On)	I _{OUT} =1mA	—	0.008	0.05	V
V _{OH}	Output High Voltage (Off)	I _{OUT} =1mA	V _{DD} -0.05	V _{DD} -0.015	—	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)

Symbol	Characteristics	Condition	Min.	Typ.	Max.	Unit
KTM1312XA Series						
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 _{HY} (B _{OPX} - B _{RPX})	Magnetic hysteresis		-	9	-	

Symbol	Characteristics	Condition	Min.	Typ.	Max.	Unit
KTM1312XB Series						
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 _{HY} (B _{OPX} - B _{RPX})	Magnetic hysteresis		-	9	-	

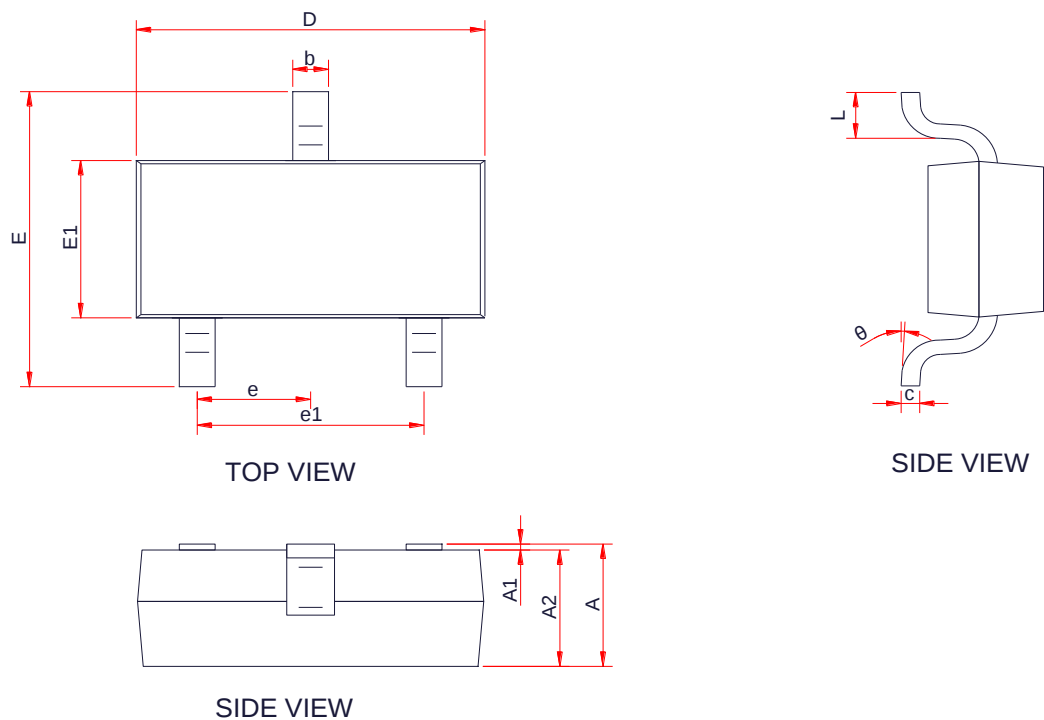
Symbol	Characteristics	Condition	Min.	Typ.	Max.	Unit
KTM1312XC Series						
B _{OPS}	Magnetic threshold operate point	TA=+25°C, VDD=3.0V	15	18	24	Gauss
B _{RPS}	Magnetic threshold release point	TA=+25°C, VDD=3.0V	9	12	15	
B _{HY} (B _{OPX} - B _{RPX})	Magnetic hysteresis		-	6	-	

Symbol	Characteristics	Condition	Min.	Typ.	Max.	Unit
KTM1312XD Series						
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 _{HY} (B _{OPX} - B _{RPS})	Magnetic hysteresis		-	3	-	

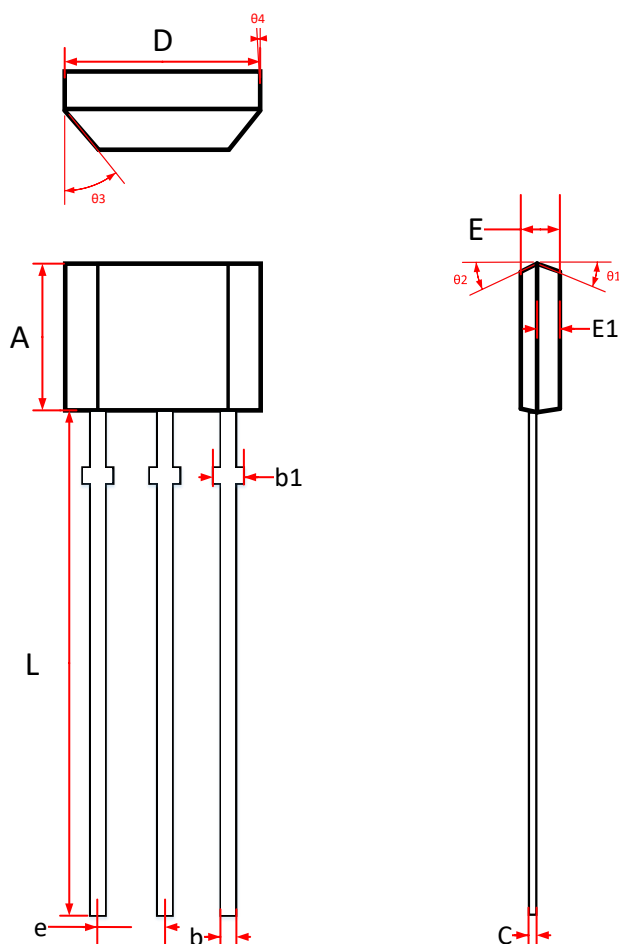
13.Order Information

Part Numbers	Package	Number of Pins	Bop	Operating Frequency	Temperature
KTM1312TA-ST3	SOT-23-3L	3	45Gauss	Continuous	-40°C~85°C
KTM1312TB-ST3	SOT-23-3L	3	30Gauss	Continuous	-40°C~85°C
KTM1312TC-ST3	SOT-23-3L	3	18Gauss	Continuous	-40°C~85°C
KTM1312TD-ST3	SOT-23-3L	3	9Gauss	Continuous	-40°C~85°C
KTM1312SA-ST3	SOT-23-3L	3	45Gauss	50Hz	-40°C~85°C
KTM1312SB-ST3	SOT-23-3L	3	30Gauss	50Hz	-40°C~85°C
KTM1312SC-ST3	SOT-23-3L	3	18Gauss	50Hz	-40°C~85°C
KTM1312SD-ST3	SOT-23-3L	3	9Gauss	50Hz	-40°C~85°C
KTM1312TA-TO3	TO-92S	3	45Gauss	Continuous	-40°C~85°C
KTM1312TB-TO3	TO-92S	3	30Gauss	Continuous	-40°C~85°C
KTM1312TC-TO3	TO-92S	3	18Gauss	Continuous	-40°C~85°C
KTM1312TD-TO3	TO-92S	3	9Gauss	Continuous	-40°C~85°C
KTM1312SA-TO3	TO-92S	3	45Gauss	50Hz	-40°C~85°C
KTM1312SB-TO3	TO-92S	3	30Gauss	50Hz	-40°C~85°C
KTM1312SC-TO3	TO-92S	3	18Gauss	50Hz	-40°C~85°C
KTM1312SD-TO3	TO-92S	3	9Gauss	50Hz	-40°C~85°C

PACKAGE OUTLINE DIMENSIONS
SOT-23-3L


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 °

TO-92S



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
E1		0.75	
e	1.27 TYP		
L	13.50	14.50	15.50
$\theta 1$		6°	
$\theta 2$		3°	
$\theta 3$		45°	
$\theta 4$		3°	