NOTE
All numerical values are in metric units [with U.S. customary units in brackets]. Dimensions are in millimeters [and inches]. Unless otherwise specified, dimensions have a tolerance of ±0.13 [±.005] and angles have a tolerance of ±2°. Figures and illustrations are for identification only and are not drawn to scale.

1. INTRODUCTION

This specification covers the requirements for application of the knock sensor module.

1.1. Hardware Block

Sensor module inner hardware block:

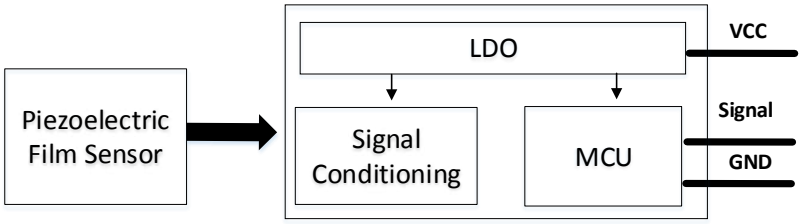


Figure 1 Hardware Block

As shown in the figure 1, the sensor module uses the piezo electric film to sense the knock action and there's a PCBA circuit to handle the output signal from the film. MCU inner the PCBA judges the knock times and trigger voltage level by software algorithm.

1.2. Working Sequence

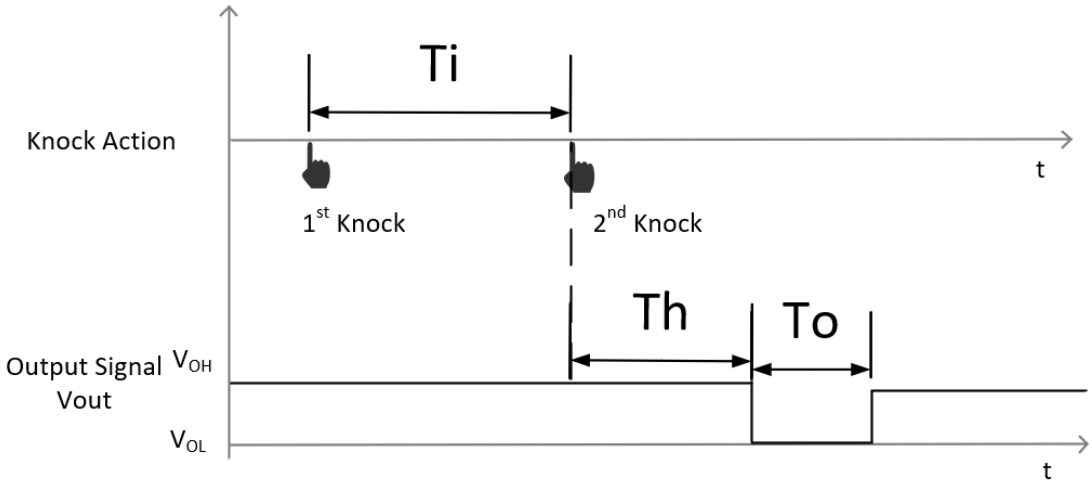


Figure 2 Working Sequence

Notes:
- This sensor output is active only when the double knock action is happened. Ti is the time during 2 times knock actions. 1 time or 3 times knock actions all can't active the sensor output.
- Vout is the output signal of the sensor module.
- The sensor's output signal is high (voltage is Vo) when the sensor is not active.
- To is the low-level voltage time when sensor output is validated.
- Th is the time between the low voltage output and the last knock action.

1.3. Key Electronic Parameters

Characteristics	Symbol	Min	Type	Max	Unit
Voltage Supply	V_{cc}	8	12	16	V_{dc}
Nominal Output High Voltage	V_{oH}	-	Vcc	-	V
Nominal Output Low Voltage	V_{oL}	0	-	0.7	V
Current Consumption	I_{cc}	-	20	30	mA dc
Output Impedance	Imp_{out}		5.4K		Ω
Input current on any pin		-10		+10	mA
No knock or other knock (1 time or >2 times) action output voltage	Vout	-	V_{oH}	-	V
Low voltage output time after monitoring double knock action.	To	-	100	-	ms
Double knock interval time	Ti	100	250	500	ms
Pulse happen time after knock action	Th	-	Ti + 80	-	ms
Temperature Operating Range	T_a	-20		70	°C

1.4. Interface

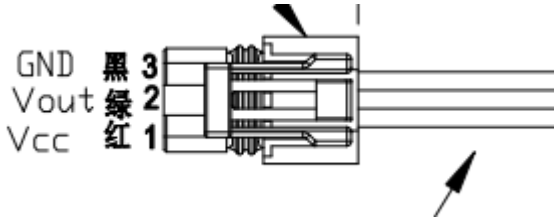


Figure 3 Connector Definition

Pin descriptions：

Pin No. (see drawing connector)	TE (internal)	Remarks
1	Vcc	Voltage Supply (Red)
2	Vout	Output Signal (Green)
3	GND	Ground (Black)

1.5. Mechanical characteristics

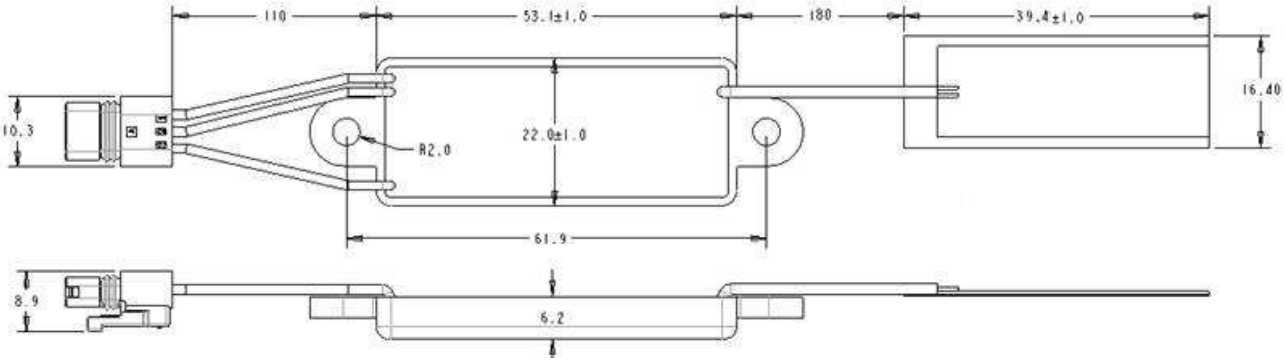


Figure 4 Mechanical Outline

Mechanical symbol characteristics:

Symbol	Characteristics	Notes
Wiring Cable	Length 110mm, AWG24, UL1569	
Connector	TE Connectivity 2321916-3	Customer can use TE 2321923-3 or 2321925-3 to connect it.

1.6. Applications

The sensor is designed for appliance device to monitor the knock event happened on the machine.

- Appliance Machine knock open door.
- Appliance Machine knock open light.
- Appliance Machine knock start operate.

2. REFERENCE MATERIAL

2.1. Revision Summary

This paragraph is reserved for a revision summary covering the most recent additions and changes made to this specification which include the following:

Revisions to this application specification include:

- Updated document to corporate requirements

2.2. Customer Assistance

2.3. Drawings

Customer drawings for product part numbers are available from www.te.com. Information contained in the customer drawing takes priority.

2.4. Specifications

Product Specification 108-106435 and Product Performance Test Report 501-106435 provide product performance and test results.

3. REQUIREMENTS

3.1. Application Circuit (For reference only)

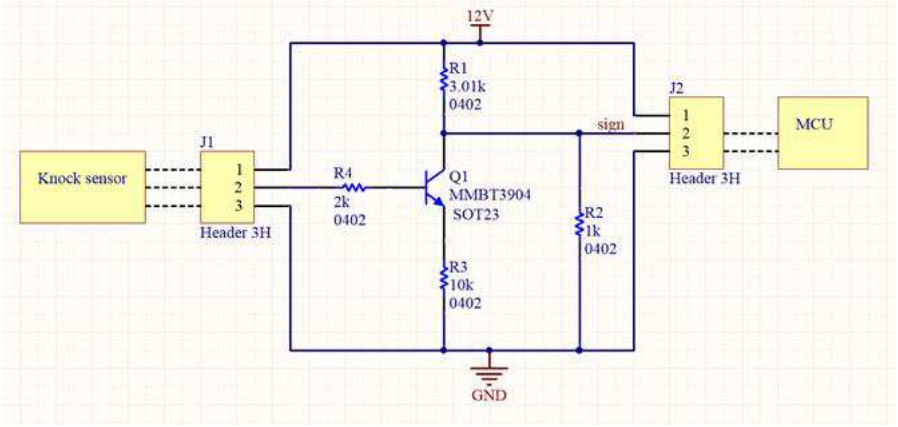


Figure 5 Reference Connection

Interface circuit inside the sensor module.

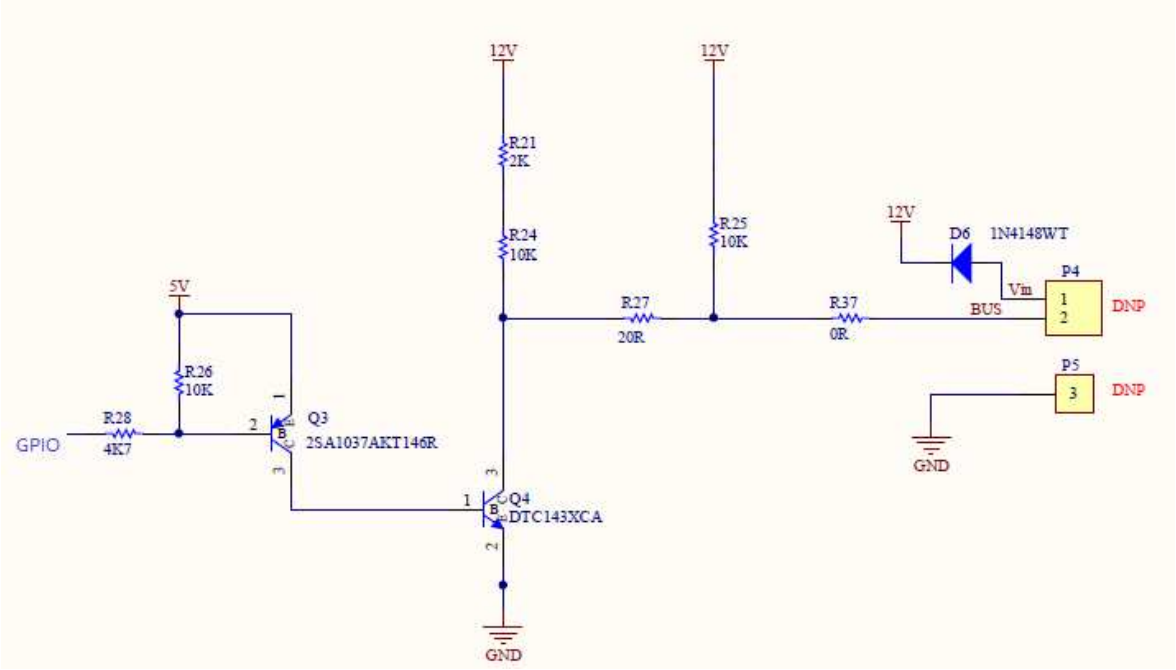
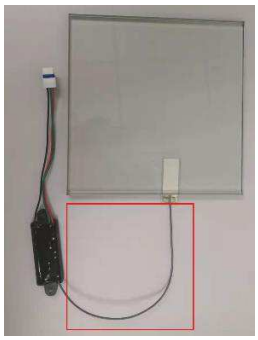


Figure 6 Sensor Output Signal Circuit Inside of the Module

3.2. Assembly Tips

1. The shield cable between the piezo film to the PCBA can't be hang in the air. The cable's sway may generate the noise.

☒ It's bad when sensor cable is sway.

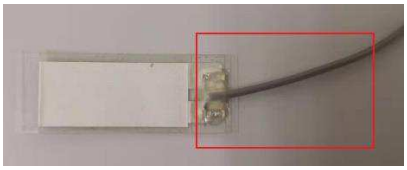


☑ It's better to fix the sensor cable.

2. The film uses the double-side tape to stick on the surface of the surface. The paste push force must more than 10N/cm^2.

Knock force is 50-500N/cm2. Test condition: Using knuckle finger to knock on 15mm*15mm acylic board.

3. The force of the cable welding on the piezo film is 25N. Can't pull this cable beyond this limit.



3.3. Storage

A. Temperature

Please follow the product spec. to storage the production.

B. Others

Don't fold the piezo film.

4. VISUAL AID

The illustration below shows a typical application of this product. This illustration should be used by production personnel to ensure a correctly applied product. Applications which do not appear correct should be inspected using the information in the preceding pages of this specification and in the instructional material shipped with the product or tooling.

Figure 7