

DURAVIT Proximity sensor

Specification

Ver. 0.4

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1. Change history

Version	Change	Name	Date
V00	Initial version	Fan Shuhai	2021-03-27
V01	Convert to English	Fan Shuhai	2021-06-04
V02	Delete 8.Application,Updata the 3D model	Li kemin	2021-11-18
V03	Add 4.3.2 Detectable distance Add 7 Definition of anti-interference capability.	Li kemin	2021-12-10
V04	In 4.3.1 add Module No., Power Supply and Band Weith.	Li kemin	2022-01-19

2. Abbreviations

- ISM band Industrial Scientific Medical band
- FMCW Frequency Modulated Continuous Wave
- AIP Antenna in Package
- FOV Field of view
- PC Polycarbonate
- TBD To be define
- HMI Human-machine Interface
- IOT Internet of things

3. Scope

Proximity sensor is a non-contact detector that used to detect human motion and distance. It could be used in different application, such as white goods, smart toilet and commercial equipment.

The sensor requested to be delivered as “Figure 1 Proximity sensor”:

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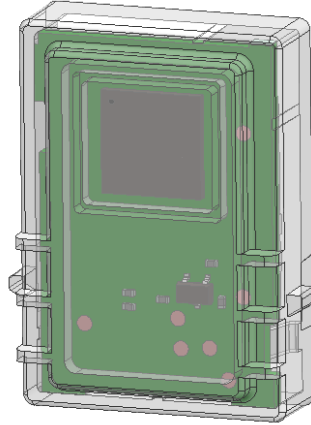
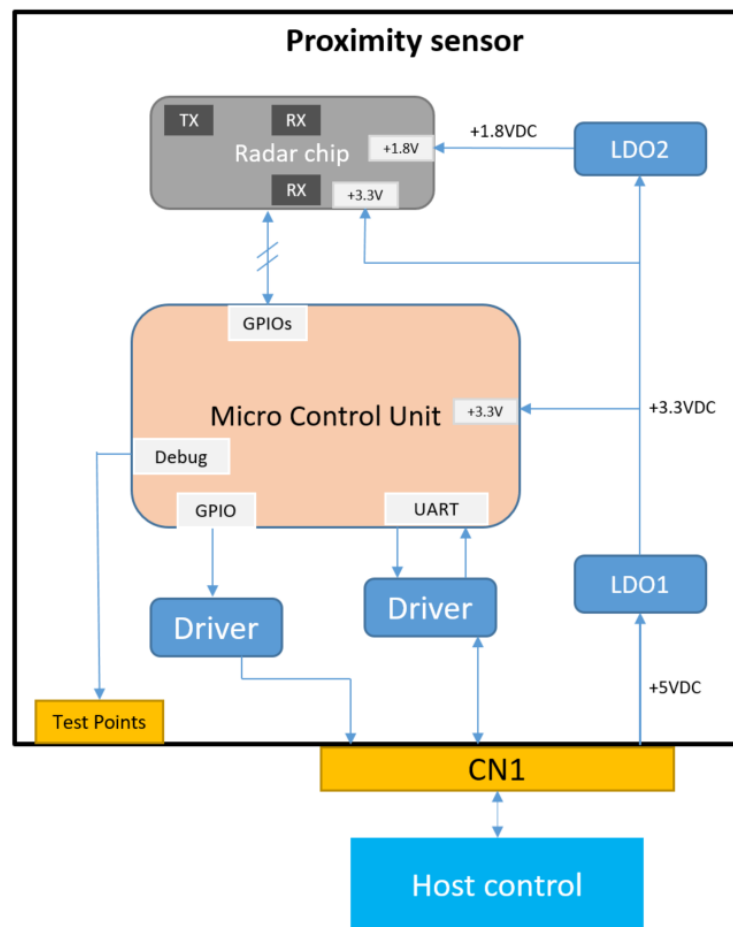


Figure 1 Proximity sensor

4. Description

4.1. Detail Block Schematic



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Figure 2 Proximity sensor Electric Block Schematic

4.2. Features

- 24GHz ISM band, FMCW radar operation.
- Integrated antennas in package, high consistency.
- High stability, not affected by light, temperature, dust and other external environment.
- Motion detection and distance detection;
- Suitable for panels of different nonmetal materials.
- Adjustable detection range, could be configuration by communication interface.
- Small size and easy to assembly.

4.3. Performance

4.3.1 Parameter

Item	Spec.	Remark
Module No.	805522	Model of finished product
Power Supply	Less than 5V 60mA	
Microwave Frequency	ISM band, 24~24.25GHz	24.06~24.24GHz
Band Width	1MHz to 180MHz	
Antenna	AIP	Transmitter*1; Receiver*2
RF transmit power	<13dBm	
FOV	80°	
Detectable distance	Adjustable	Be effected by structure

4.3.2 Detectable distance

Software setting value	Distance	Tolerance
60~200	0~1.5.m	±20cm

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4.3.3 Detection area

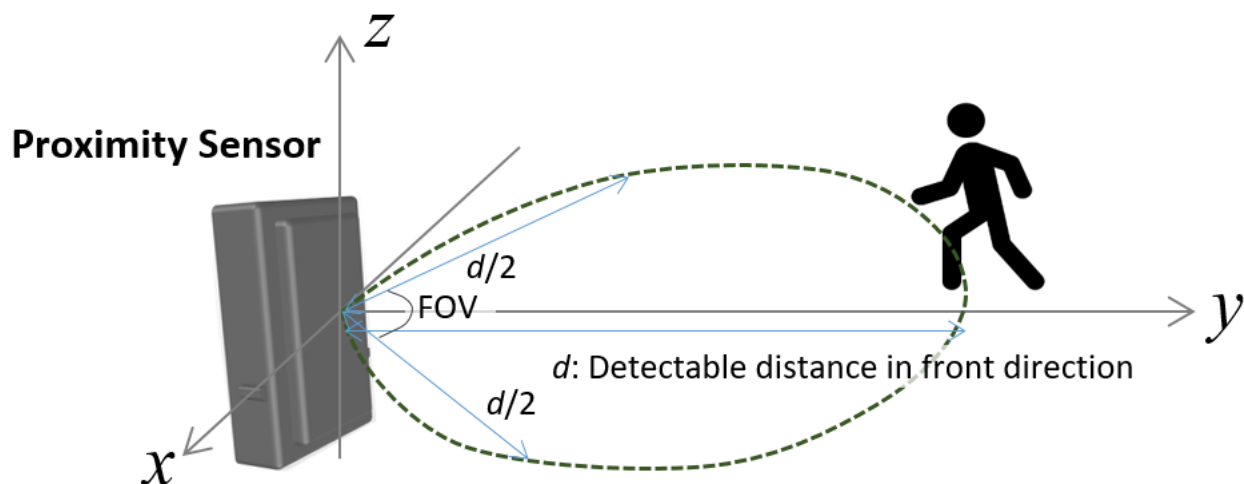


Figure 3 Relation between sensor placement & detection area

Remark: detection area is affected by assembly structure.

4.4. Environment conditions and lifecycle

- Protection class: min. IPx4
- Climate conditions:

Temperature range in operation:	0 ~ 60°C
Temperature range for transport/storage:	-20 ~ 70°C
Relative humidity (condensing):	10 ~ 90%
- Lifecycle: 10 years

5. Electrical Characteristics

5.1 Compliance to regulations

Proximity sensor must be compliant to the following regulations:

- CE-RED EN300440
- FCC Part 15.245 or 249
- ISED RSS-210

5.2 Interface Define

5.2.1 Overview

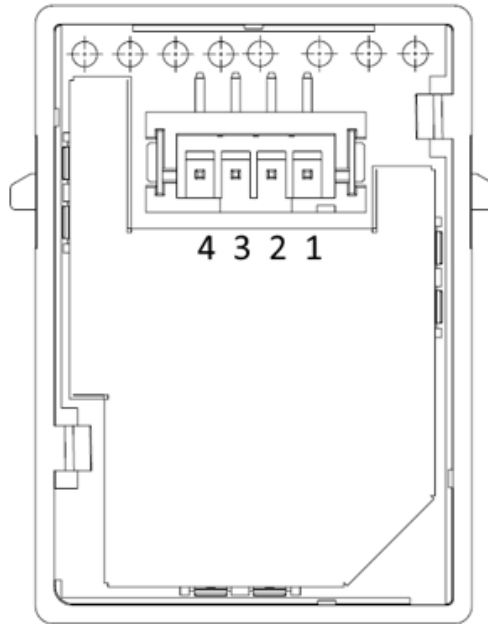
- Power supply: +5v, GND
- Output: OUT;
- Communication: TRX.

5.2.2 Connector

- Connector type: PH 2.0

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- Pin count: 4
- Pinout:
 - 1: +5VDC
 - 2: OUT (Normal 0, When detected 1)
 - 3: TRX (TTL)
 - 4: GND



5.2.3 Functional description

5.2.3.1 Power supply

Power supply interface, the voltage for proximity sensor should be 5VDC, the maximum operating current is 60mA.

5.2.3.2 OUT

The signal output interface, motion signal is high level (DC5V), maintained time should than 0.5s; No motion is low level (GND).

5.2.3.3 TRX

UART Communication interface, support half duplex serial communication. The communication voltage is DC5V.

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5.3 UART Communication command define

5.3.1 Configuration

Item	Format	Units	Remarks
Baud Rates	300	bps	Default 300bps, Can modify the value by Command
Data Bits	8	bits	
Stop Bits	1	Bits	
Parity	no	-	

5.3.2 Command format

Header	Type	Length	Op code	Data	Checksum
1 byte	1 byte	1 byte	1 byte	N byte	1 byte
0x55	Host request:0x35 Proximity sensor reply:0x45	Sum byte from "length" to "Checksum"	XX	XX XX	Sum value from "length" to "Data"

5.3.3 Control command

H: Host control board; S: Proximity sensor

Command	Op code	Direction	Command case	remark
Reading version	0x00	H->S	55 35 03 00 03	LL: data package length; xx: Microwave module software version; SS: checksum
		S->H	55 45 LL 00 xx xx xx SS	
Setting operating mode	0x01	H->S	55 35 04 01 xx SS	xx: Operating mode 00 Detecting mode 01 Sleeping mode
		S->H	55 45 04 01 xx SS	
Writing detecting value	0x02	H->S	55 35 05 02 xx xx SS	Xx xx: Setting value, 2bytes, little- endian
		S->H	55 45 05 02 xx xx SS	
Reading detecting value	0x03	H->S	55 35 03 03 06	xx xx: Setting value, 2bytes
		S->H	55 45 05 03 xx xx SS	
Modify baud rate	0x04	H->S	55 35 07 04 xx xx xx xx SS	H->S xx xx xx xx: New baud rate value S->H xx xx xx xx: New baud rate value Proximity sensor reply to host with old baud rate then switch to new baud rate on next communication cycles.
		S->H	55 45 07 04 xx xx xx xx SS	
Reading object distance	0x05	H->S	55 35 03 05 08	xx: Distance value
		S->H	55 45 05 05 xx xx SS	

TBD: May be modified after discussion.

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6. Appearance and Structure

6.1. Appearance

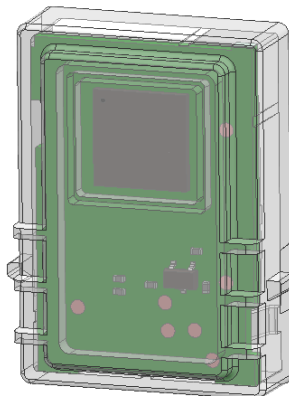


Figure 4 Proximity sensor appearance

6.2 Key size

- L*W*H: 34.5*24.4*9.5mm

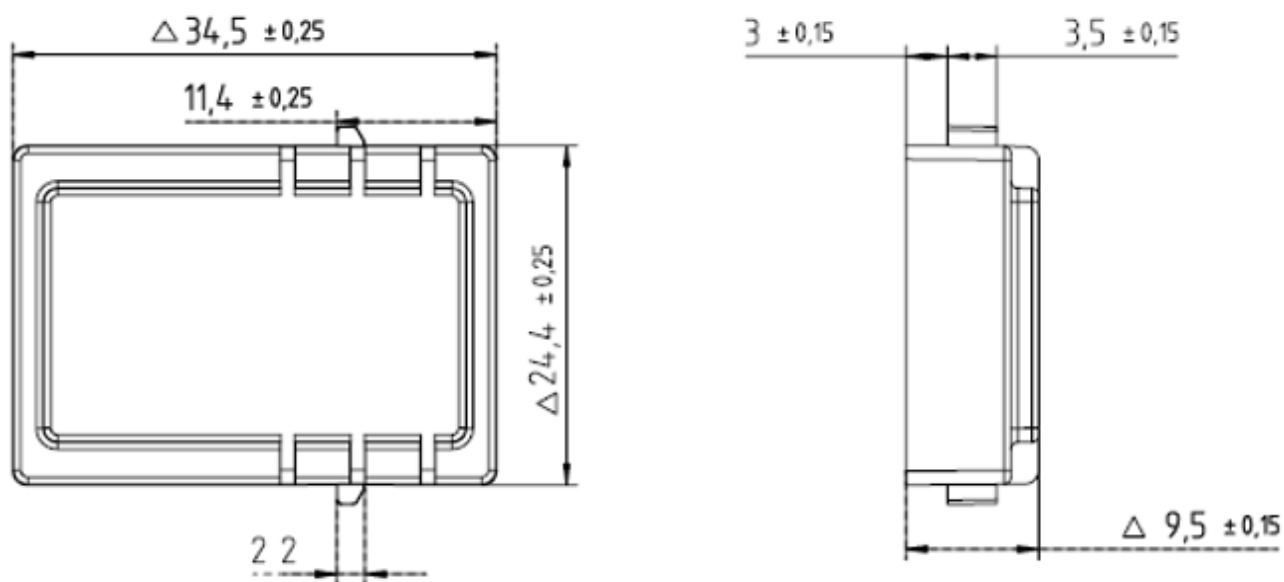


Figure 5 Proximity sensor outline

6.3 Material & specifications

- Housing: PC (Transparent)
- Shield cover: Copper alloy

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Remark: structural parts are confirmed by customer.

6.4 Waterproof method

- Gluing, TBD

6.5 Cable

- No cable supply.

6.6 Assembly requirements

- Assemble by hook.
- No relative motion with the panels after fix.
- Non-metallic panel.

7. Definition of anti-interference capability

This product is a sensor for detecting moving human body based on the detection of moving objects by microwave radar.

Software algorithms are used to reduce false triggering caused by other non-human objects in the environment.

Through the debugging of software algorithm, this product can adapt to the following situations and work normally.

- Interference caused by wind, rain, lightning and other natural factors in the environment.
- Interference caused by insects and other animals in the environment.
- Interference caused by load action (toilet water filling).
- Interference caused by sharing with other sensors.

However, a valid signal cannot be output in the face of the following situations.

- Within the detection distance, there is strong vibration (for example, vibration of condensate pipe, ventilation pipe and power line)
- Object movement (e.g. exhaust fan, etc.) within the detection distance

8. Consideration

- Proximity sensor is installed on the back of the panel. The thickness, material of the panel and assembly method may affected the maximum detectable distance and sensitivity.
- The dielectric constant of the panel may affected function, need to select panel material according to the actual situation.
- Severe vibration may affect the detection effect.

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9. Statement:

FCC Statement:

FCC ID:2A32Z-MDUF0001

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

This equipment can be installed and operated without minimum distance restriction between the radiator and user's

body. Because this equipment has been evaluated to meet general RF exposure requirement at 5millimeters distance.

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OEM Responsibilities to comply with FCC Regulations

The module has been certified for integration into products only by OEM integrators under the following conditions:

1. The antenna must be installed such that a minimum separation distance as stated above is maintained between the radiator (antenna) and all persons at all times.
2. The transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter.

End product labeling:

The final end product must be labeled in a visible area with the following:

"Contains Transmitter Module FCC ID: 2A32Z-MDUF0001"

Or "Contains FCC ID: 2A32Z-MDUF0001"

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IC Statement:

IC:28079-MDUI0001

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

CAN ICES-3(B)/NMB-3(B)

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- 1) L'appareil ne doit pas produire de brouillage;
- 2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

CAN ICES-3(B)/NMB-3(B)

The device meets the exemption from the routine evaluation limits in section 2.5 of RSS 102 and compliance with RSS-102 RF exposure, users can obtain Canadian information on RF exposure and compliance.

Le dispositif rencontre l'exemption des limites courantes d'évaluation dans la section 2.5 de RSS 102 et la conformité à l'exposition de RSS-102 rf, utilisateurs peut obtenir l'information canadienne sur l'exposition et la conformité de rf.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This equipment should be installed and operated with a minimum distance of 5 millimeters between the radiator and your body.

Cet émetteur ne doit pas être Co-placé ou ne fonctionnant en même temps qu'aucune autre antenne ou émetteur. Cet équipement devrait être installé et actionné avec une distance minimum de 5 millimètres entre le radiateur et votre corps.

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OEM Responsibilities to comply with IC Regulations

The module has been certified for integration into products only by OEM integrators under the following conditions:

1. The antenna must be installed such that a minimum separation distance as stated above is maintained between the radiator (antenna) and all persons at all times.
2. The transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter.

End product labeling:

The final end product must be labeled in a visible area with the following:

"Contains Transmitter Module IC: 28079-MDUI0001"

Or "Contains IC: 28079-MDUI0001"

Responsabilité de l'OEM en matière de conformité aux règlements d'IC

Ce module ne peut être intégré dans un produit que s'il est certifié par l'intégrateur OEM dans les conditions suivantes:

1. Lors de l'installation de l'antenne, la distance minimale d'espacement ci - dessus doit être maintenue entre les antennes Radiateur (antenne) et tout le personnel.
2. Le module émetteur ne doit pas être au même endroit ni fonctionner avec une autre antenne ou un autre émetteur.

Étiquette du produit final:

Le produit final doit porter l'étiquette suivante dans la zone visible:

"Contient le module émetteur IC: 28079-MDUI0001"

Ou "Contient IC: 28079-MDUI0001"

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