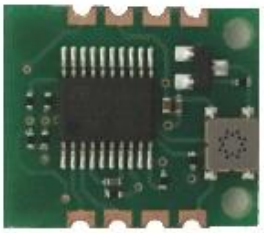
A1DU5P2CP008B

VOCs Sensor Module



Description

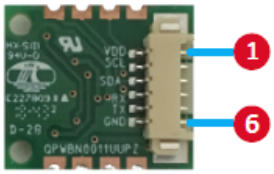
A1DU5P2CP008B is a new sensor module from Sharp Corporation for measuring the concentration of harmful substances in the air such as formaldehyde (HCHO) and TVOC (Total Volatile Organic Compounds).

The sensor module is designed to be used indoors and incorporates the latest in MEMS sensor technology.

Connector-based for easy field access and supports both I^2C and UART interface.

Applications

- Air purifier / air cleaner
- Air conditioner
- Portable air quality monitor
- Smart home / IoT sensor devices
- HVAC / ventilation
- Environmental monitoring



Pin number	Pin name
1	VDD
2	SCL
3	SDA
4	RX
5	TX
6	GND

Compliance

- Lead-free compliant
- RoHS directive compliant
- Compliant with RoHS 2011/65/EU
- Halogen-free compliant

Detect 4 types of substances

- TVOCs (Total Volatile Organic Compounds)
- HCHO (Formaldehyde)
- EtOH (Ethanol)
- CO_2 (Carbon Dioxide)

References

- A1DU5P2CP008B Specification
- Sharp VOCs Sensor Product Lineup
- Understanding Units of Measurement

Datasheet last updated: 2021-Oct-07

1 Scope and General Description

This specification applies to the TVOCs sensor module for the detection of volatile organic compounds.

This document is applicable for the air quality sensor module named: A1DU5P2CP008B

2 Ratings and Characteristics

2-1 Performance Specification

Default test condition: Ta=25℃ , Vcc=3.3V

Parameter	Specification
Sensor type	MEMS Metal oxide semiconductor sensor
Sensing range	400 – 4500 ppm CO_2
	0 – 50000 ug/m^3 EtOH
	0 – 50000 ug/m^3 TVOC
	0 – 2000 ug/m^3 HCHO
Pre-heating time	3 minutes
Interface	I^2C, UART
Calibration method	Intelligent automatic baseline calibration. The reference value can be stored and reset when the power is off.

2-2 Power Requirements

Parameter	Specification
Voltage	3.3V±0.1V, max. 20mV ripple
Power consumption	Max. 66mW@3.3VDC (20mA)
Measurement interval	1 second

2-3 UART Serial Communication

Parameter	Specification
Baud rate	9600 bits per second
Data bits	8
Parity bit	None
Stop bit	1
Communication protocol	1. The host sends 0xFF 61 02 01 9C to get a 13-byte data packet under the question-and-answer operation of the module. 2. The host sends 0xFF 52 01 01 AC to set the current measurement value as the reference value (baseline). 3. The host sends 0xFF 67 01 01 97 and the serial port starts to automatically send 13-byte data packets once per second. 4. The host sends 0xFF 67 00 00 99 to restore the question and answer mode.

2-4 I^2C Bus Communication

Parameter	Specification
Communication rate	Standard Mode: 100 kbits/s
Module address	0xA2 (7-bit address mode 0x51 shift left)
Module output	Get 13-byte data packet through read operation.
Benchmark reset	Set the current measurement value to the reference value by writing 0xFF 0x52 0x01 0x01 0xAC (5 bytes).

2-5 Data Packet Specification

Byte No.	Name	Description
0	Start byte	0xFF
1-2	eCO2 (ppm)	Data[1] * 2^8 + Data[2]
3	Status bit	0×00：OK , 0×01：Heating
4	Temperature (℃)	(Data[4] * 8 - 669) /10
5	Humidity (%RH)	(Data[5] * 8 - 125) /10
6-7	EtOH (ug/m³)	Data[6] * 2^8 + Data[7]
8-9	TVOC (ug/m³)	Data[8] * 2^8 + Data[9]
10-11	HCHO (ug/m³)	Data[10] * 2^8 + Data[11]
12	Checksum	sum(D[1]:D[11]) + 1 (take the last 8 digits)

3 Reliability

3-1 High temperature storage

The appearance and an electrical characteristic not having abnormality after leaving at normal temperature for 2 hours after leaving in the ambient temperature 70℃, 500 hours.

3-2 Low temperature storage

The appearance and an electrical characteristic not having abnormality after leaving at normal temperature for 2 hours after leaving in the ambient temperature -25℃, 500 hours.

3-3 High temperature high humidity storage

After leaving the unit in temperature 40℃ humidity 90％RH for 500 hours. The unit must be no abnormal status must be observed about its appearance and electrical characteristic.

3-4 High temperature operation

After operating the unit in temperature 60℃ with the condition for 500 hours · The unit must be no abnormal status must be observed about its appearance and electrical characteristic.

3-5 Thermal shock test

After leaving the unit under the following ambient temperature sequence, - 40℃ (0.5hour) 85℃ (0.5hour) slope (30 minutes) as one cycle, for 100 cycles. The unit must qualify no abnormal status must be observed about its appearance and electrical property.

3-6 Shock test

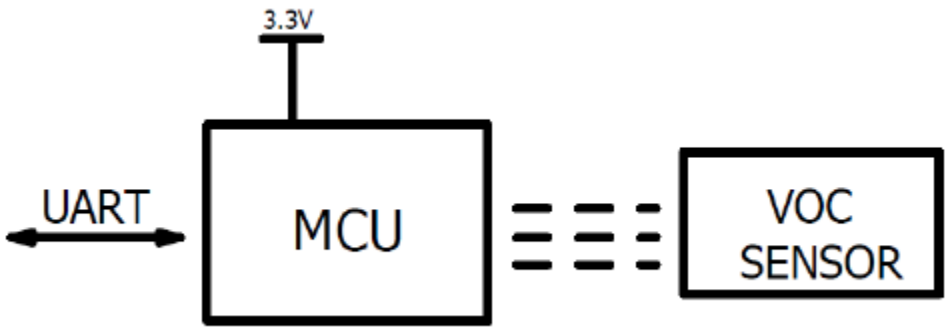
Falling from 30 cm height on a wooden board for 3 times.

4 Connector Specification

4-1 Connector pin assigment

Pin No.	Pin Name	Function
P1	VDD	Power supply voltage
P2	SCL	Serial clock line
P3	SDA	Data signal line
P4	RX	UART Receive data
P5	TX	UART Send data
P6	GND	Ground

4-2 Block diagram



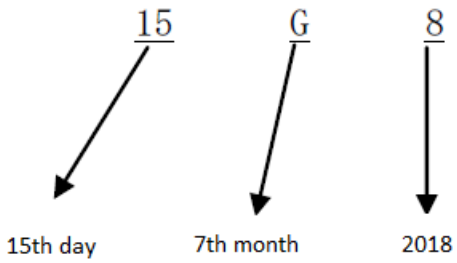
4-3 Label specifications

PCB printing specification: dd M Y

Month marking:

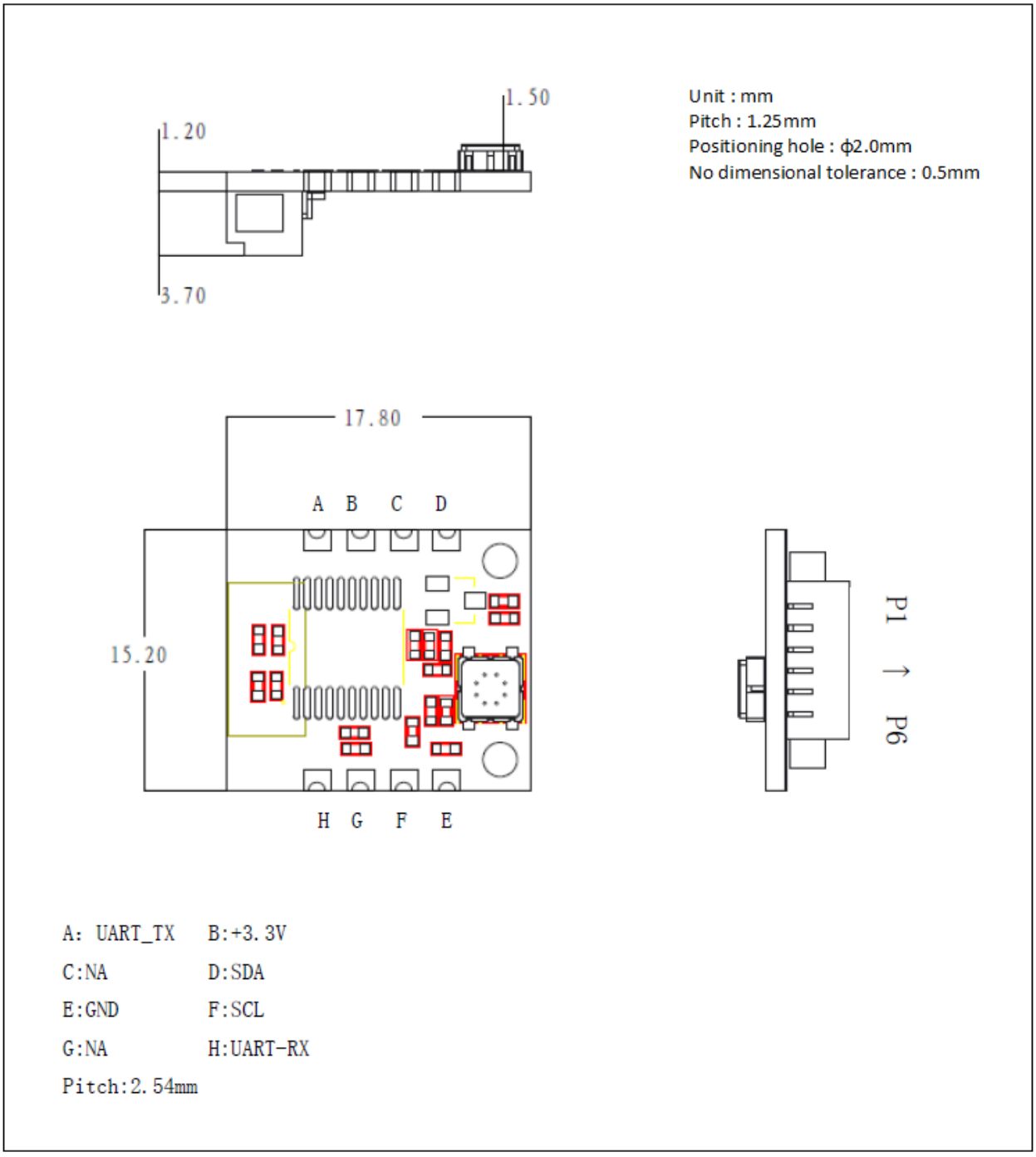
(A、B、C、D、E、F、G、H、J、 K、 L、 M)
1、2、3、4、5、6、7、8、9、10、11、12

Example:



5 Appearance and Structure

5-1 Outline Drawing



6 Shipment Inspection

6-1 Test content

Dimensions: The length, width and thickness will be checked

Apearance: The abnormal appearance such as dirt, scratches, shortage of parts will be checked.

6-2 Inspection criteria

Inspection Item	Level
Electrical performance	5PCS/LOT
Dimensions	
Appearance	

7 Important Notices for Use / Storage

7-1

Any usage not conforming to this document is not allowed, as we take no responsibility for any usage exceeding this specifications.

7-2

The ESD tolerance is 2kV(HBM). Please manage ESD when assembling.

The units must not be used in the environment with heavy dust. This product is not allowed to exposure directly to dust, salinities, and the gas such as SO2, H2S, Cl2 and NH3, acid, alkari, etc.

7-3

This product is designed for the indoor installation. Please use it after considering measures that moisture and a direct salt do not influence on the set side when setting it up in the place (salt damage region) where the influence of the sea breeze is received.

7-4

The units must not be applied with any dew, solvent or oil.

7-5

Preventive actions for dusts and metal pieces and insects needed.

7-6

This unit is designed for the consumer use only. Never use for those for medical application, for industrial application, for automobile application.

7-7

When the trouble according to the unit is occurred at the main system, please tell us before our mass product start.

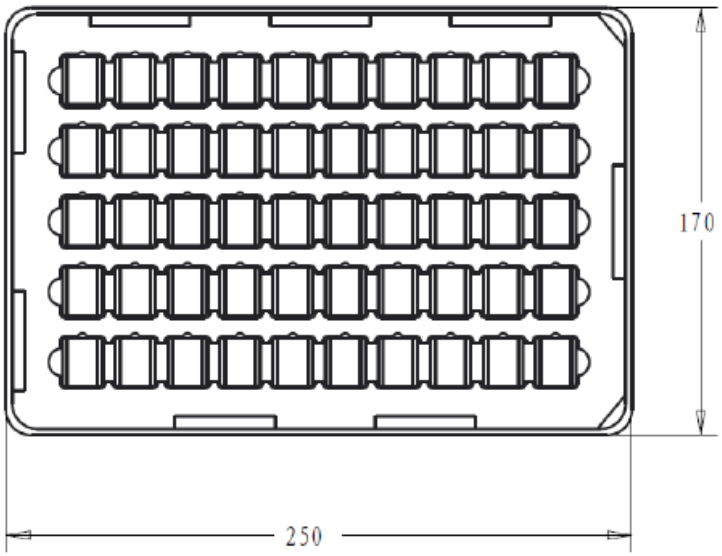
7-8

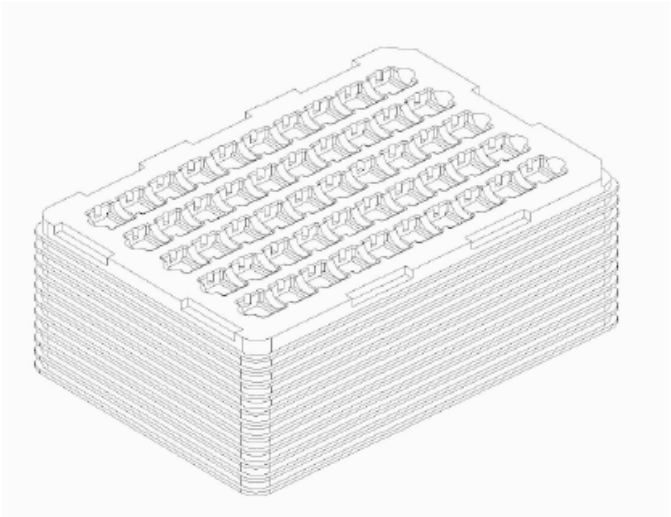
Period of guarantee: After delivery date : one year

8 Package Specifications

8-1 Products stored in tray

1. The products are stored in the shipment tray. （10PCS*5=50PCS）
2. The tray that stored the products is piled up by 10 pieces. An empty tray should be piled up to the highest rung.
3. After 11 steps are piled up, the center is fixed with stretch film.





8-2 Storage in outer carton

1. One packing storage in one carton: the maximum No. of storage products is 500PCS * 1 =500PCS
2. The buffer material of the cardboard material etc. is stuffs into the gap, and the products is prevented from moving.
3. Buffer material is packed when not coming up to maximum quantities.
4. The factory name (SHARP), parts No., and storage No. should be marked on the carton.
5. Products should be stored at an appropriate temperature and humidity (-25 to 70℃, 5 to 95%RH). Keep products away from chlorine and corrosive gas. The senor might be damaged when straged in improper condition or excluding this guarantee condition.

9 Priority

This specifications must be treated with the highest priority in the event of any contradictions, conflicts with the content of other documents.

10 Other Notes

1. If any doubt has been seen in this specifications, both parties will make the best efforts to resolve the problem in good faith ，and the revisions should be made through the mutual discussion by both parties.
2. We do not change any part of the specification without a previous notice.
3. Any ozone depleting substances (CFC's, HCFC class 1, Halon, Carbon tetrachloride,1.1.1-trichloroetahane) have not been used in the Units.
4. The unit does not contain the electrolytic capacitor which contains tetrachloride compound.
5. Bromine unflammability have not been used in the Units.
6. Manufacturing sites: WUXI SHARP ELECTRONIC COMPONENTS CO.,LTD
   Block C, No. 60, Minshan Road, High-tech Industrial Development Zone, Wuxi City, Jiangsu Province, China.
7. In case that there might happen any troubles about industrial property of the units, both parties will solve the troubles with responsibility.
8. Exportation trade control(corresponding uncorresponding determination)
   No. 1, 1~15 of the table: Appended table 1, section1~15: uncorresponding
   The corresponding section 2-36 judgment uncorresponding (corresponding section 2-36 judgment uncorresponding)
   Appended table 1, section 16: corresponding (DC power supply unit)
9. This product is RoHS compliant.
10. This product is halogen-free compliant.

11 Precautions

1. In making catalogue or instruction manual based on the specification sheets, please verify the validity of the catalogue or instruction manuals after assembling Sharp products in customer's products at the responsibility of customer.
2. This Sharp product is designed for use in the following application areas :
   - Computers
   - OA equipment
   - Telecommunication equipment (Terminal)
   - Measuring equipment
   - Tooling machines
   - Audio visual equipment
   - Home appliances

   If the use of the Sharp product in the above application areas is for equipment listed in paragraphs (3) or (4), please be sure to observe the precautions given in those respective paragraphs.
3. Appropriate measures, such as fail-safe design and redundant design considering the safety design of the overall system and equipment, should be taken to ensure reliability and safety when Sharp product is used for equipment in responsibility of customer which demands high reliability and safety in function and precision, such as :
   - Transportation control and safety equipment (aircraft, train, automobile etc.)
   - Traffic signals
   - Gas leakage sensor breakers
   - Rescue and security equipment
   - Other safety equipment
4. Sharp product is designed for consumer goods and controlled as consumer goods in production and quality.

   Please do not use this product for equipment which require extremely high reliability and safety in function and precision, such as :
   - Space equipment
   - Telecommunication equipment (for trunk lines)
   - Nuclear power control equipment

- Medical equipment

5. Please contact and consult with a Sharp sales representative if there are any question regarding interpretation of the above four paragraphs.

12 Disclaimer

The warranty period for Sharp product is one (1) year after shipment.

During the period, if there are any products problem, Sharp will repair (if applicable), replace or refund. Except the above, both parties will discuss to cope with the problems.

The failed Sharp product after the above one (1) year period will be coped with by Sharp, provided that both parties shall discuss and determine on sharing responsibility based on the analysis results thereof subject to the above scope of warranty.

The warranty described herein is only for Sharp product itself which are purchased by or delivered to customer. Damages arising from Sharp product malfunction or failure shall be excepted.

Sharp will not be responsible for the Sharp product due to the malfunction or failures thereof which are caused by:

(1) storage keep trouble during the inventory in the marketing channel.

(2) intentional act, negligence or wrong/poor handling.

(3) equipment which Sharp products are connected to or mounted in.

(4) disassembling, reforming or changing Sharp products.

(5) installation problem.

(6) act of God or other disaster (natural disaster, fire, flood, etc.)

(7) external factors (abnormal voltage, abnormal electromagnetic wave, fire, etc.)

(8) special environment (factory, coastal areas, hotspring area, etc.)

(9) phenomenon which cannot be foreseen based on the practical technologies at the time of shipment.

(10) the factors not included in the product specification sheet.

Please contact and consult with a Sharp sales representative for any questions about Sharp product.