Honeywell Laser Particle Sensor Module

HPM - Series

Datasheet

Description

The Honeywell HPM-Series Particle Sensor is a laser-based sensor which detects and counts particles with the concentration range between 0-1,000μg/m^3 in a given environment based on the light scattering method. The laser light source illuminates a particle as it is pulled through the detection chamber. As particles pass through the laser beam, the light source becomes obscured and is recorded on the photo or light detector. The light is then analyzed and converted to an electrical signal providing particulate size and quantity to calculate concentrations in real time.

The Honeywell particle sensor will provide information on the particle concentration for given particle detect range.

Value to Customers

- Enable products to monitor or control environmental particulate contamination accurately and cost effectively.
- Market-leading life expectancy (20000 hours of continuous use).
- Proven EMC performance enables products to perform accurately in a variety of heavy industrial environments, and ensure product capability

Differentiation

- Market leading operating lifetime, stable work for over 20000 hours of continuous use
- Proven EMC performance (based on IEC61000 stable operation performance standard), max 15% error band compared to reference
- High reliability, strictly test in different harsh environments
- Functionality includes options for both PM2.5 and PM10 output

Product Features

Laser Scatter Based Sensing
Sensing Range: 0 ~ 1000ug/m^3
Fully Calibrated
EMC: Heavy Industrial Level IEC61000
Response Time: <6S
Supply Current: Max 80 mA
Output Signal: I2C
PM10 Output (Optional)
RoHS and REACH Compliant

Potential Applications

- Air Cleaner
- Air Conditioner
- Car Air Cleaner
- Air Quality Monitor
- Environmental Monitoring
- Hand-held Air Quality Detector

Table 1. Specifications

Honeywell PM2.5 Sensor Specifications	
Working Principle	Laser Scattering
Detection Range	PM2.5, PM10 (Optional)
Concentration Range (Max)	<1000ug/m^3
Accuracy (Consistency)	>100 ug/m^3, ±15% <100 ug/m^3, ±15ug/m^3 Ambient Room Conditions
Response Time	6s
Supply Voltage	5V ± 0.2V
Standby Current	<20mA, Ambient Room Conditions
Supply Current	<80mA, Ambient Room Conditions
Operating Temperature and Humidity	-10~50° C, 0~95%RH
Storage Temperature and Humidity	-30~65° C, 0~95%RH
Output Data	PM2.5 (Default), PM10 (Optional), Concentration (unit ug/m^3)
Output Protocol	I2C Default address: 0*28
Operating Time	Continuous Mode: 20000H Intermittent Mode: Depending on Duty Cycle
Dimension	43 * 36 * 23.7mm

EMC Rating	
ESD	± 4 kV contact, ± 8 kV air as per IEC 61000-4-2
Radiated Immunity	1 V/m (80 MHz to 1000 MHz) as per IEC 61000-4-3
Fast Transient Burst	±0.5 kV as per IEC61000-4-4
Immunity to Conducted Disturbances	3 V as per IEC61000-4-6
Radiated Emissions	40 dB (30 MHz to 230 MHz); 47 dB (230 MHz to 1000 MHz) as per CISPR 14
Conducted Emissions	0.15M-30M as per CISPR 14

Table 2. PM2.5 Protocol

Command Format Description

Read Command Format

Start	A6	A5	A4	A3	A2	A1	A0	0	ACK	B0	B1	B2	B3	B4	B5	B6	ACK	Start	A6	A5	A4	A3	A2	A1	A0	1	ACK	B0	B1	B2	B3	B4	B5	B6	NACK	STOP
	Slave Address[6:0]							Write		Cmd									Slave Address[6:0]							Read		Data								

Send Command Format

Start	A6	A5	A4	A3	A2	A1	A0	0	ACK	B0	B1	B2	B3	B4	B5	B6	ACK	B0	B1	B2	B3	B4	B5	B6	1	ACK	NACK	STOP
	Slave Address[6:0]							Write		Cmd								Data							Read			

Sent by Host Sent by Slave

Read PM2.5 Count

																				Data0		Data1		Data2		Data3	
Start	A6	A5	A4	A3	A2	A1	A0	0	ACK	0xA1	ACK	Start	A6	A5	A4	A3	A2	A1	A0	1	ACK	PM25H	ACK	PM25L	ACK	PM10H	ACK	PM10L	NACK	STOP
	Slave Address[6:0]							Write		Cmd			Slave Address[6:0]							Read									

Field	Description
Cmd	Command：0xA1
Data0	PM2.5 DataH
Data1	PM2.5 DataL
Data2	PM10 DataH
Data3	PM10 DataL

Calculation Method：PM2.5 = PM2.5 DataH *256 + PM2.5 DataL PM10 = PM10 DataH * 256 + PM10 DataL

Start Measurement

Start	A6	A5	A4	A3	A2	A1	A0	0	ACK	0xA2	ACK	0x55	ACK	STOP
	Slave Address[6:0]							Write		Cmd		Data		

Field	Description
Cmd	Command ：0xA2
Data0	Start Measurement: :0x55

Stop Measurement

Start	A6	A5	A4	A3	A2	A1	A0	0	ACK	0xA2	ACK	0xAA	ACK	STOP
	Slave Address[6:0]							Write		Cmd		Data		

Field	Description
Cmd	Command: 0xA2
Data0	Stop Measurement 0xAA

Set Address

Start	A6	A5	A4	A3	A2	A1	A0	0	ACK	0xA3	ACK	B0	B1	B2	B3	B4	B5	B6	ACK	STOP
	Slave Address[6:0]							Write		Cmd		Addr								

Field	Description
Cmd	Command 0xA3
Data0	Modify I2C Address

8 Addresses Configurable as Follows:

Write Address	Read Address
0x30	0x31
0x32	0x33
0x34	0x35
0x36	0x37
0x38	0x39
0x3A	0x3B
0x3C	0x3D
0x3E	0x3F

Figure 1. Installation Guideline

When installing the product, both the inlet and outlet should be kept in a clear air flow and neither sides can be placed towards the mounting position (2 kinds of correct direction are shown below), so as to avoid the accumulation of particles in sensitive areas due to prolonged use to affect test accuracy

Correct Correct Wrong Wrong

Figure 2. Mounting Dimension

Mounting dimension shown as follows

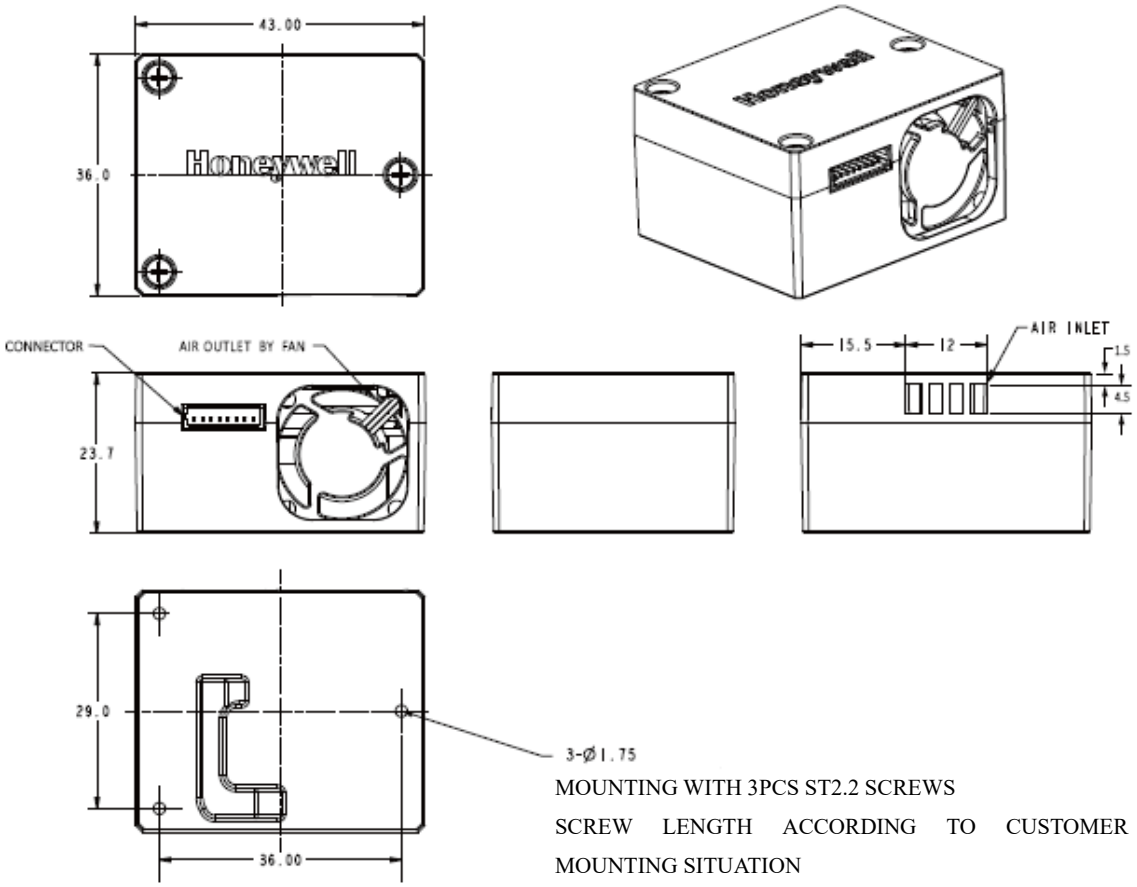


Figure 3. Nomenclature and Order Guide

Nomenclature – Particle Sensor

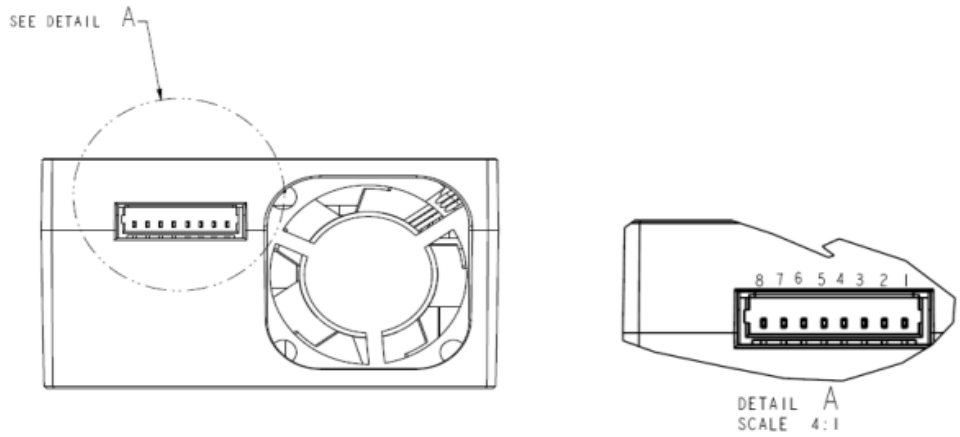
Series	Vertical	Output Type	Accuracy	Power	Housing	Additional Features	Custom Number
HPM	**A** Appliance	**1** UART	**1** ±15%	**3** 3.3V	**S** Standard	**0** None	XXX = General Type
	H HVT	**2** I²C	**2** ±10%	**5** 5V	**C** Compact	**T** Temperature and Humidity	001 = Customized
	D Heavy Industry			**A** 12V		**E** Economic	

Example:

HPM	A	1	1	5	S	0	XXX

= HPMA115S0-XXX

Figure 4. Pin Definitions



Connector P/N: 60511 08 2130J

Pin Definitions Table

No.	Item	Description
1	+3.3V	Power Output (+ 3.3v / 100mA)
2	5V	Power Input (5V)
3	SCL	SCL
4	SDA	SDA
5	TEST	For Testing (NA)
6	TX	UART-TX Output (0-3.3V)
7	RX	UART-RX Input (0-3.3V)
8	GND	Power Input (Ground Terminal)

Additional Information

The following associated literature is available on the Honeywell website at sensing.honeywell.com:

- Product Range Guide
- Product Line Guide
- Product Installation Instructions
- Technical Information

⚠ WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this datasheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury

Safety Alarm

The metal part of this product is connected to the internal circuit through DC GND. If anyone directly touches the DC GND of the machine, a safety issue will arise. Therefore, the sensor is required to be installed in a location where any human body cannot establish any direct contact, and can contact the sensor only after the power is disconnected. The product should not work in the condensation environment

Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing. Please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective.

The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.

While we provide application assistance personally through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Find out more

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest authorized distributor, please contact your local sales office.

To learn more about Honeywell Sensing and Productivity Solutions' products, please call

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