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Honeywell Laser Particle Sensor Module

HPM-Series HPMD115S0-XXX

Datasheet

DESCRIPTION

The Honeywell HPM-Series Particle Sensor is a laser-based sensor which detects and counts particles with the PM10 range between 0-2,000µg/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 contaminates accurately and cost effectively
- Easy to be integrated

DIFFERENTIATION

- Small form factor
- High consistency
- High Reliability, strictly test in different harsh environment
- Functionality includes options for PM1.0/PM2.5/PM10 outputs in UART

KEY FEATURES

Laser scatter based sensing

Sensing Range: PM2.5(0~1000µg/m^3), PM10(0-2000µg/m^3)

Fully calibrated

Response time: <6s

Supply Current: Max 120mA

Output Signal: UART

RoHS, REACH compliant

POTENTIAL APPLICATIONS

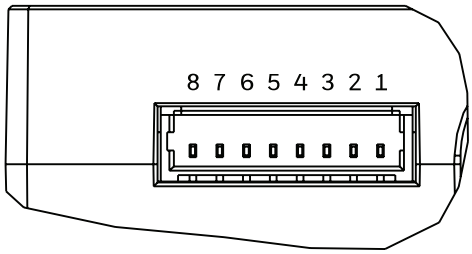
- Air Cleaner
- Air Conditioner
- Air quality Monitor
- Environmental Monitoring
- Handhold Air quality Detector

Table 1. SPECIFICATIONS

Honeywell PM10 Sensor Spec	
Working principle	Laser scattering
Detect range	PM0.3 - 10
Concentration Range(max)	PM2.5<1000ug/m^3, PM10<2000ug/m^3
Consistency	PM2.5 100-1000ug/m^3, ±15%; <100ug/m^3, ±15ug/m^3 PM10 100-1000ug/m^3, ±25%; <100ug/m^3, ±25ug/m^3
Response time	6s
Supply voltage	5V±0.2V
Standby current	<20mA (Ambient Room Conditions)
Supply current	<120mA(Ambient Room Conditions)
Operate temp & humidity	-20~60°C, 0~95%RH(No condensation)
Storage temp & humidity	-40~85°C, 0~95%RH
Output data	PM1.0, PM2.5, PM10 concentration (unit ug/m^3)
Output protocol	UART(default)
Lifetime	3 years
Warranty	1 year
Dimension	43*36*24mm

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

Figure 1. Pin definitions



PIN CONFIGURATION		
PIN No.	**PIN**	**DESCRIPTION**
1	V_{OUT}	Power output(+3.3V)
2	V_{CC}	Power input(+5v)
3	N/A	N/A
4	N/A	N/A
5	RESETS	For testing (NA)
6	TX	UART-TX output(0-3.3V)
7	RX	UART-RX input(0-3.3V)
8	GND	Ground

Table 2. Customer protocol

Command Length (Bytes)	HEAD	LEN	CMD	Data	CS	Example
Read Particle Measuring Results						
Send	0x68	0x01	0x04	NA	CS = MOD ((65536-(HEAD+LEN+CMD+DATA)), 256)	68 01 04 93
Response, Pos ACK	0x40	0x10	0x04	DF1-DF6, DF6-DF12 reserved PM1.0 = DF1 * 256 + DF2 PM2.5 = DF3 * 256 + DF4 PM10 = DF5 * 256 + DF6	CS = MOD ((65536-(HEAD+LEN+CMD+DATA)), 256)	40 10 04 00 1A 00 25 00 2C 00 1A 00 25 00 2C 4A
Response, Neg ACK	0x9696					
Read Particle Measuring Results (Unlimited PM10 range)						
Send	0x68	0x01	0x44	NA	CS = MOD ((65536-(HEAD+LEN+CMD+DATA)), 256)	68 01 44 53
Response, Pos ACK	0x40	0x10	0x44	DF1-DF6, DF6-DF12 reserved PM1.0 = DF1 * 256 + DF2 PM2.5 = DF3 * 256 + DF4 PM10 = DF5 * 256 + DF6 (Unlimited)	CS = MOD ((65536-(HEAD+LEN+CMD+DATA)), 256)	40 10 04 00 1A 00 25 00 2C 00 1A 00 25 00 2C 4A
Response, Neg ACK	0x9696					
Start Particle Measurement						
Send	0x68	0x01	0x01	NA	CS = MOD ((65536-(HEAD+LEN+CMD+DATA)), 256)	68 01 01 96
Response, Pos ACK	0xA5A5					
Response, Neg ACK	0x9696					
Stop Particle Measurement						
Send	0x68	0x01	0x02	NA	CS = MOD ((65536-(HEAD+LEN+CMD+DATA)), 256)	68 01 02 95
Response, Pos ACK	0xA5A5					
Response, Neg ACK	0x9696					
Stop Auto Send						
Send	0x68	0x01	0x20	NA	CS = MOD ((65536-(HEAD+LEN+CMD+DATA)), 256)	68 01 20 77
Response, Pos ACK	0xA5A5					
Response, Neg ACK	0x9696					

Enable Auto Send						
Send	0x68	0x01	0x40	NA	CS = MOD ((65536-(HEAD+LEN+CMD+DATA)), 256)	68 01 40 57
Response, Pos ACK	0xA5A5					
Response, Neg ACK	0x9696					

Table 3. Autosend protocol

Byte Number	Head0	Head0	Head0
Byte0	Head0	0x42	fixed
Byte1	Head1	0x4d	
Byte2	Len_H	...	Frame Length = 2x13+2(data length + checksum length)
Byte3	Len_L	...	
Byte4	Data0_H	...	PM1.0 concentration
Byte5	Data0_L	...	
Byte6	Data1_H	...	PM2.5 concentration
Byte7	Data1_L	...	
Byte8	Data2_H	...	PM10 concentration
Byte9	Data2_L	...	
Byte10	Data3_H	...	PM1.0 number
Byte11	Data3_L	...	
Byte12	Data4_H	...	PM2.5 number
Byte13	Data4_L	...	
Byte14	Data5_H	...	PM10 number
Byte15	Data5_L	...	
Byte16	Data6_H	...	reserve
Byte17	Data6_L	...	
Byte18	Data7_H	...	reserve
Byte19	Data7_L	...	
Byte20	Data8_H	...	reserve
Byte21	Data8_L	...	
Byte22	Data9_H	...	reserve
Byte23	Data9_L	...	
Byte24	Data10_H	...	reserve
Byte25	Data10_L	...	
Byte26	Data11_H	...	reserve
Byte27	Data11_L	...	
Byte28	Data12_H	...	reserve
Byte29	Data12_L	...	
Byte30	CheckSum_H	...	Checksum = Head0+Head1+Len_H+Len_L+Data0_H
Byte31	CheckSum_L	...	Data0_L+...+Data12_L

NOTICE

IMPROPER INSTALLATION

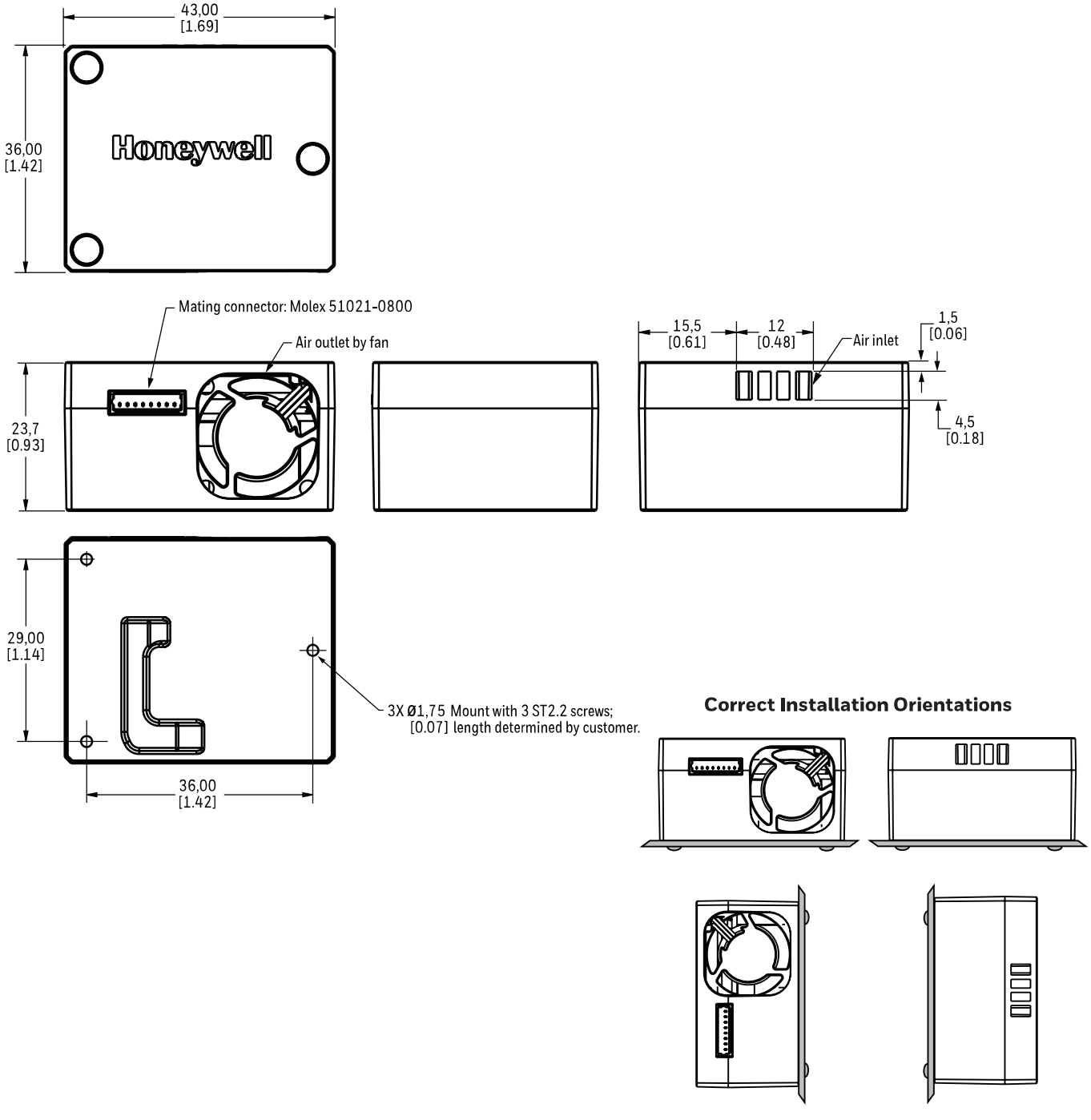
To avoid particulate settling or accumulation at the air outlet or air inlet, which may affect product sensitivity and accuracy, ensure that the HPM Series Particle Sensor:

- Is installed correctly according to Figure 1.
- Is installed such that the air inlet and air outlets are not blocked and that the flow of air through the sensor is neither reduced nor increased.

Product Installation

Install the product to the desired surface using the screw size shown in the applicable figure.

Figure 2. Standard Mounting Dimensions and Correct Installation Orientations



ADDITIONAL INFORMATION

The following associated literature is available on the Honeywell web site 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 power is disconnected.

Product should not work in the condensation environment

Security Notes: The product provides a standard serial port for data reading, please take the necessary security measures to prevent unauthorized use of unauthorized personnel

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, contact your local sales office.

To learn more about Honeywell Sensing and Productivity Solutions' products, call **+1-815-235-6847** or **1-800-537-6945,** visit **sensing.honeywell.com**, or e-mail inquiries to **info.sc@honeywell.com**

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