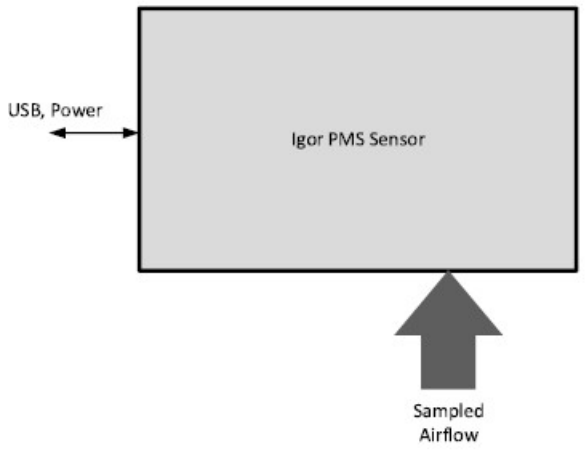
# Igor® Particulate Matter 2.5 IAQ Sensor

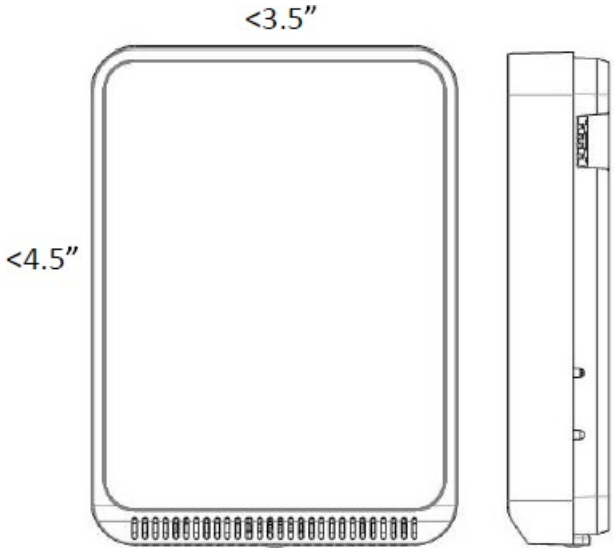
## Model: ISPM-U-U

The Igor Particulate Matter 2.5 IAQ Sensor (Model ISPM-U-U) is mounted in its own standalone plastic case and is meant to connect to a nearby Igor Node via USB. The ISPM-U-U receives power and transmits data over the USB connection.

## General

- USB power and communication, under 2.5W total power draw
- Embedded Sensor
- Mass Concentration Size PM2.5 (particles that have a diameter less than 2.5 micrometers)
- Long term reliability; 10-year operation expected
- Wall mounted



# Product Specifications

Unless otherwise stated, default conditions of 25±2 $^0$C, 50±10% relative humidity, and 5V supply voltage apply. "typ" = typical and % m.v. = % of measured value.

| Parameter | Conditions | Value | Units |
|---|---|---|---|
| **Mass concentration range** | - | 0 to 1,000 | µg/m$^3$ |
| **Mass concentration size range** | PM2.5 | 0.3 to 2.5 | µm |
| **Mass concentration precision[1] for PM2.5[2]** | 0 to 100 µg/m$^3$ | ±10 | µg/m$^3$ |
| | 100 to 1000 µg/m$^3$ | ±10 | % m.v. |
| **Maximum long-term mass concentration precision limit drift** | 0 to 100 µg/m$^3$ | ±1.25 | µg/m3 / year |
| | 100 to 1000 µg/m$^3$ | ±1.25 | % m.v. / year |
| **Number concentration range** | - | 0 to 3,000 | #/cm$^3$ |
| **Number concentration size range** | Pm2.5 | 0.3 to 2.5 | µm |
| **Number concentration precision[1] for PM2.5[2]** | 0 to 1000 #/cm$^3$ | ±100 | #/cm$^3$ |
| | 1000 to 3000 #/cm$^3$ | ±10 | % m.v. |
| **Maximum long-term number concentration precision limit drift** | 0 to 1000 #/cm$^3$ | ±12.5 | #/cm$^3$ / year |
| | 1000 to 3000 #/cm$^3$ | ±1.25 | % m.v. / year |
| **Sampling interval** | - | 1±0.04 | seconds |
| **Typical start-up time[3]** **number concentration** | 200 – 3000 #/cm$^3$ | 8 | seconds |
| | 100 – 200 #/cm$^3$ | 16 | seconds |
| | 50 – 100 #/cm$^3$ | 30 | seconds |
| **Sensor output characteristics** | PM2.5 mass concentration | Calibrated to TSI DustTrak™ DRX 8533 Ambient Mode | |
| | PM2.5 number concentration | Calibrated to TSI OPS 3330 | |
| **Lifetime[4]** | 24 h/day operation | > 10 years | |
| **Acoustic emission level** | 0.2 m (maximum) | 25 | dB(A) |
| **Long-term acoustic emission level drift** | 0.2 m (maximum) | +0.5 | dB(A). / year |
| **Additional T-dependent mass and number concentration precision limit drift** | Temperature difference to 25°C typ. | ±0.5 | % m.v. /°C |
| **Weight** | - | 26.3±0.3 | g |

1. Also referred to as “between-parts variation” or “device-to-device variation.”

2. Verification Aerosol for PM2.5 is a 3% atomized KCl solution. Deviation to reference instrument is verified in end-tests for every sensor after calibration.
3. Time after starting Measurement-Mode, until a stable measurement is obtained.
4. Lifetime is based on mean-time-to-failure (MTTF) calculation. Lifetime might vary depending on different operating conditions.

# Electrical Specifications

## Electrical Characteristics

Electrical specifications at 25°C.

| Parameter | Conditions | Value | | | Unit |
|---|---|---|---|---|---|
| | | Min | Typ | Max | |
| **Supply voltage** | - | 4.5 | 5.0 | 5.5 | V |
| **Supply current** | Sleep-Mode | - | 38 | 50 | µA |
| | Idle-Mode | 300 | 330 | 360 | |
| | Measurement-Mode | 45 | 55 | 65 | mA |
| | Measurement Mode, first 200ms (fan start) | - | - | 80 | |
| **Input high level voltage ($V_{IH}$)** | - | 2.31 | - | 5.5 | V |
| **Input low level voltage ($V_{IL}$)** | - | 0 | - | 0.99 | |
| **Output high level voltage ($V_{OH}$)** | - | 2.9 | 3.3 | 3.37 | |
| **Output low level voltage ($V_{OL}$)** | - | 0 | 0 | 0.4 | |

## Absolute Minimum and Maximum Ratings

Stress levels beyond those listed in the table below may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these conditions cannot be guaranteed. Exposure to the absolute maximum rating conditions for extended periods may affect the reliability of the device.

| Parameter | Min | Max | Unit |
|---|---|---|---|
| **Supply voltage VDD** | --0.3 | 5.5 | V |
| **Interface Select SEL** | --0.3 | 4.0 | |
| **I/O pins (RX/SDA, TX/SCL)** | --0.3 | 5.5 | |
| **Max. current on any I/o pin** | -16 | 16 | mA |
| **Operating temperature range** | -10 | 60 | °C |
| **Storage temperature range** | -40 | 70 | |
| **Operating humidity range** | 0 | 95 | % RH |

# ESD / EMC Ratings

## Immunity (Industrial Level)

| Description | Standard | Rating |
|---|---|---|
| **Electro Static Discharge** | IEC 61000-4-2 | ±4 kV contact, ±8 kV air |
| **Power-Frequency Magnetic Field** | IEC 61000-4-8 | 30A/m, 50Hz, and 60Hz |
| **Radio-Frequency EM-Field AM-modulated** | IEC 61000-4-3 | 80MHz - 1000MHz, 10V/m, 80% AM @1kHz |
| **Radio Frequency EM-Field AM-modulated** | IEC 61000-4-3 | 1.4GHz - 6GHz, 3V/m, 80% AM@1kHz |

## Emission (residential level)

| Description | Standard | Rating |
|---|---|---|
| **Emission in SAC for 30MHz to 230MHz** | IEC/CISPR 16 | 40dB(µV/m) QP @ 3m |
| **Emission in SAC for 230MHz to 1000MHz** | IEC/CISPR 16 | 47dB(µV/m) QP @ 3m |
| **Emission in SAC for 1GHz to 3GHz** | IEC/CISPR 16 | 70dB(µV/m) P, 50dB(µVm) AP @3m |
| **Emission in SAC for 3GHz to 6GHz** | IEC/CISPR 16 | 74dB(µV/m) P, 54dB(µVm) AP @3m |

# Who to Contact

## Igor Technical Services

For technical assistance, please contact Igor Technical Services. Our Technical Services phone line is staffed from 7:00 A.M. to 5:00 P.M. Central time, Monday through Friday, except for U.S. holidays. If arranged in advance, we can have an engineer available during local business hours.

**Phone:** 515-661-4412 | 1-877-588-2650

**Email:** support@igor-tech.com

## Inquiries

For other inquiries, please contact us here:

**Email:** info@igor-tech.com

**Phone:** 1-877-588-2650

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