

## Product Details: Pebble

### Function:

- Human presence sensor.

### Typical use:

- Measure the occupancy and utilization of individual workspaces such as desk

### Operation:

- Pebbles use a low power microwave Doppler sensor to detect human presence
- Detection takes place in a sphere with a 600mm
- The signal is a low power (0.011 watts) non-ionizing 3.2 GHz radio wave
- The signal detects through materials such as wooden desktops and seating foam
- Battery life is extended by selecting optimal detection period and reporting intervals
- The standard operation is aligned with normal working hours
- Detection is completely anonymous and unintrusive.

### Dimensions:

100mm x 90mm x 25mm

### Weight:

100g

### Views:



### Measures:



Occupancy



People  
Counting



CO2



TVOC



Temperature



Humidity



Ambient  
Sound

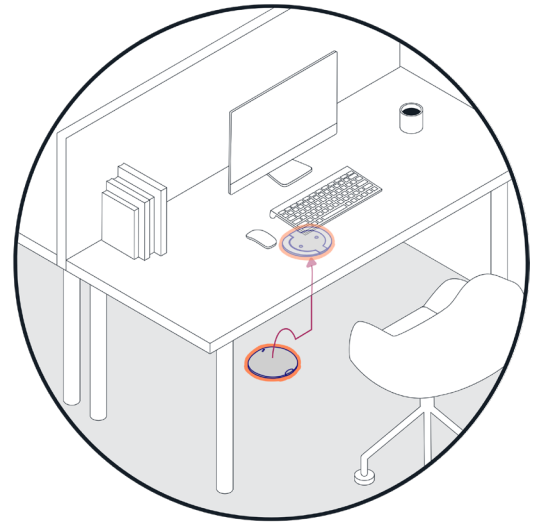


Light  
Lux



Particulate  
Matter

## Placement Example:



### Communication:

- The Pebble has an onboard Bluetooth LE Module
- The module enables communication with the Doc (gateway for delivering data to the Solutions Hub)
- A common ratio for deployment is 20 to 30 Pebbles to one Doc
- No connectivity or integration with client-side networks (LAN, Wi-Fi etc.)
- Low data volumes, cost effective & robust

### Power:

- Battery powered
- 3.7V LiPo battery
- Rechargeable via Micro USB
- Battery lifetime (12 to 18 months)

### Specifications:

|                       |                                  |
|-----------------------|----------------------------------|
| Operating Voltage     | 3.3-7V                           |
| Operating current     | <1uA-30mA                        |
| Power Supply          | 5V micro USB or 1 x LiPO battery |
| Operating Temperature | -5C-50C                          |
| Storage Temperature   | -20C-85C                         |

**General Sensor Operation:**

|                           |                                        |
|---------------------------|----------------------------------------|
| Battery power measurement | 0-100% (3.4-4.2V)                      |
| Occupancy/People counting | Sub GHz Doppler module presence sensor |

**Bluetooth Low Energy:**

|                           |                                                           |
|---------------------------|-----------------------------------------------------------|
| BLE version               | ver 4.1                                                   |
| RF frequency              | 2.4GHz                                                    |
| TX power                  | +4dBm                                                     |
| RX sensitivity            | -88dBm                                                    |
| BLE Module FCC Compliance | Part 15                                                   |
| BLE Module certification  | CE qualified                                              |
|                           | FCC, IC modular approval certified                        |
|                           | TELEC                                                     |
|                           | BQE qualified                                             |
| BLE antenna               | Onboard chip antenna                                      |
| Range                     | 5-10m individual node range in BLE mesh non line of sight |

**Bluetooth Low Energy Mesh:**

|                 |                                                                                                                                                             |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Provisioning    | Devices added to a network are provisioned using proven security algorithms using 256-bit elliptic curves                                                   |
|                 | Provisioning and network layer based on Mesh profile v1.0                                                                                                   |
| Communication   | All messages in the network are encrypted with AES-128 CCM mode                                                                                             |
| Privacy         | Privacy through obfuscation                                                                                                                                 |
| Data protection | Protected against security attacks like Brute-force, Bit-Flipping, Eaves Dropping, Replay, Trashcan, Man in the middle and physical insecure device attacks |

**Occupancy Sensor:**

|                             |                                        |
|-----------------------------|----------------------------------------|
| Sensor type                 | Microwave sensor                       |
| Transmitting frequency      | 3.2GHz                                 |
| Nominal power output        | 11.1mW                                 |
| Nominal current consumption | 3mA                                    |
| Nominal operating voltage   | 3.4-4.2V                               |
| Transmitting wave type      | Non-ionising extremely low energy wave |