

# CyberAtom X-200

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## Main Features

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### Output Data

Reported output data provides orientation information as:

- Quaternion
- Euler Angles

as well as actual rotation rate over local body axes.

In addition, internal sensor data readings are available in the form of:

- Raw Measurements
- Uncalibrated Measurements
- Calibrated Measurements
- Operating Temperature

### Output Data Update Rate

The X-200 device produce orientation data with 100 Hz update rate.

The device can be queried for the estimated orientation data and provide them on demand, or can be commanded to start broadcasting them in an continuous mode.

### UART Communication Interface

The device can be controlled over UART interface with configurable baud rate.

The factory default transmissions parameters are 57600 8-N-1.

### I2C Communication Interface

The device can be controlled over I2C bus where it acts as a slave device. The clock speed can be up to high-speed rate of 400 kHz.

The factory default I2C slave address for the device is 0x30.

The I2C slave address is configurable and can be changed to any value.

### Sensor Calibration

It is possible to easily calibrate standalone as well as assembled device to get best possible performance in it's operational environment.

Calibration takes such things into account as:

- Inertial sensor bias and its temperature drift
- Soft- and hard-iron effect on magnetometer sensor
- Sensor axes missalignments

### Performance Tuning

The device has configurable set of parameters that tune internal algorithm and make the sensor data processing to be tailored for specific needs.

### Breadboard-friendly Pinout

X-200 comes with pins organized in two rows in a distance and 2.54 mm pitch that is friendly for prototyping with breadboards.

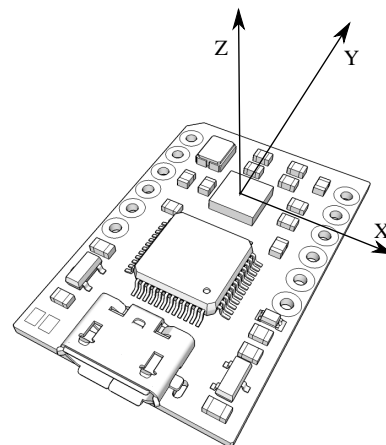
### Firmware Upgrade

It is possible to upgrade firmware with newly released and improved version if necessary.

## Axes Conventions

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CyberAtom device reports its orientation with regards to a reference frame following ENU axes conventions.



**Figure 1: Axes Conventions for X-200 device.**

## Technical Parameters

**Table 1: Technical parameters of the device.**

| <b>Electrical</b>                 | <b>Value</b>   | <b>Unit</b> |
|-----------------------------------|----------------|-------------|
| Supply Voltage                    | +3.3           | V           |
| Current Consumption               | 55             | mA          |
| Output Logic Level                | +3.3           | V           |
| Input Logic Level                 | +3.3 to +5.0   | V           |
| <b>Environmental</b>              | <b>Value</b>   | <b>Unit</b> |
| Operation temperature             | -35 up to +80  | °C          |
| Storage temperature               | -35 up to +80  | °C          |
| Temperature calibration range     | +24            | °C          |
| Shock survivability               | 100            | g           |
| <b>Accelerometer Sensor</b>       | <b>Value</b>   | <b>Unit</b> |
| Data measurement rate             | 100            | Hz          |
| Scale                             | 4              | g           |
| Resolution                        | 16             | bits        |
| <b>Magnetometer Sensor</b>        | <b>Value</b>   | <b>Unit</b> |
| Data measurement rate             | 100            | Hz          |
| Scale                             | 2              | Gauss       |
| Resolution                        | 16             | bits        |
| <b>Gyroscope Sensor</b>           | <b>Value</b>   | <b>Unit</b> |
| Data measurement rate             | 100            | Hz          |
| Scale                             | 2000           | deg/sec     |
| Resolution                        | 16             | bits        |
| <b>AHRS Output Data</b>           | <b>Value</b>   | <b>Unit</b> |
| Maximum output update rate        | 100            | Hz          |
| Quaternion output data format     | float IEEE754  |             |
| Euler angles output data format   | float IEEE754  |             |
| Maximum acceleration              | ±2             | g           |
| Maximum rotation rate             | 2000           | deg/sec     |
| <b>Communication</b>              | <b>Value</b>   | <b>Unit</b> |
| Communication interfaces          | I2C, UART, USB |             |
| Max I2C clock speed               | 400            | kHz         |
| Factory default I2C slave address | 0x30           |             |
| Max UART baud rate                | 230400         | bauds       |
| Factory default UART baud rate    | 57600          | bauds       |
| Firmware upgrade interface        | USB, UART      |             |
| Cable connector type              | -              |             |
| Data Ready output                 | yes            |             |
| Hard reset input line             | yes            |             |
| <b>Mechanical</b>                 | <b>Value</b>   | <b>Unit</b> |
| Width                             | 17.78          | mm          |
| Height                            | 26.7           | mm          |
| Depth                             | 4.5            | mm          |
| Weight                            | 3              | g           |

| Mechanical          | Value | Unit |
|---------------------|-------|------|
| Mounting technology | THT   |      |

## Mechanical Drawings

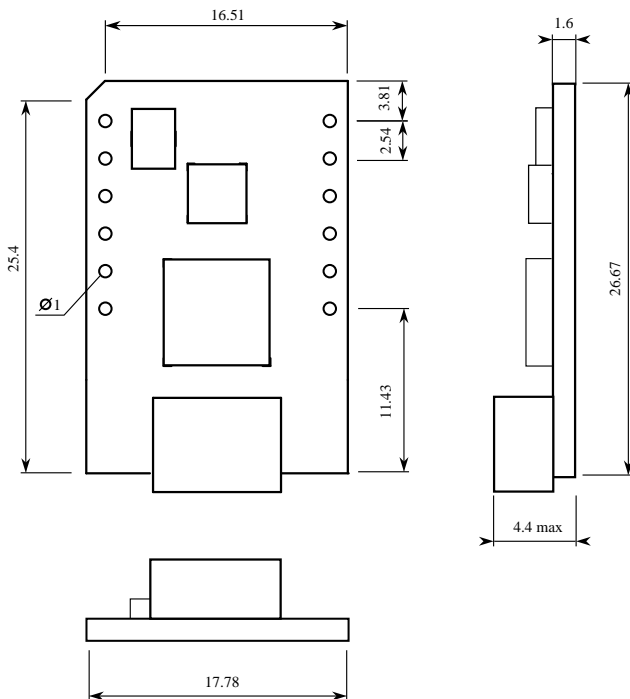


Figure 2: Outer dimensions. All values in millimeters.

## PCB Footprint

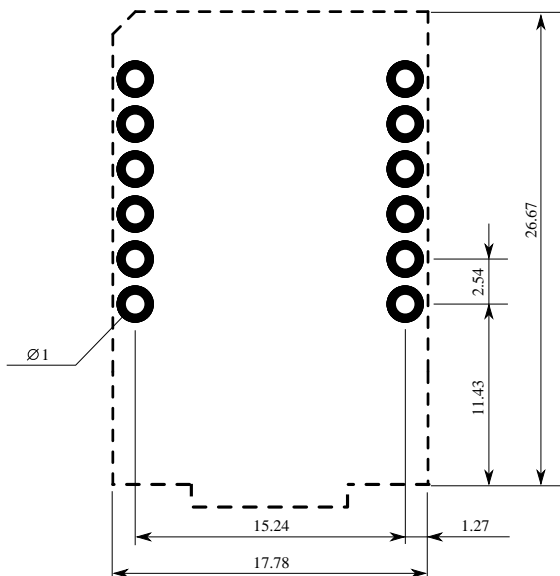
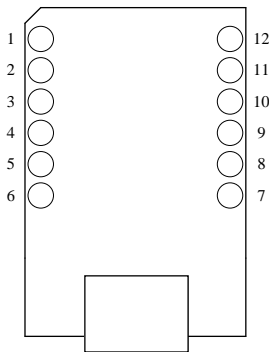


Figure 3: X-200 footprint for PCB design (view from top). All values are in millimeters.

## Pin Descriptions



**Figure 4: Pin numbering (view from top).**

**Table 2: Pins and signal names for X-200 device.**

| Number | Name  | Type         | Remarks  |
|--------|-------|--------------|--|
| 1      | GND   | Power Input  | Common ground signal.  |
| 2      | RESET | Input        | Resets the device (LOW) or normal operation (HIGH or unconnected). |
| 3      | TX    | Output       | UART (serial) port output line.                                    |
| 4      | RX    | Input        | UART (serial) port input line.                                     |
| 5      | DRDY  | Output       | Is set to LOW when new output data being ready for reading.        |
| 6      | VDD   | Power Input  | +3.3V power supply input.  |
| 7      | NC    | n.a          | Leave unconnected.   |
| 8      | NC    | n.a          | Leave unconnected.   |
| 9      | SDA   | Input/Output | I2C bus data line.   |
| 10     | SCL   | Input        | I2C bus clock input.   |
| 11     | GND   | Power Input  | Common ground signal.  |
| 12     | VDD   | Power Input  | +3.3V power supply input.  |

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