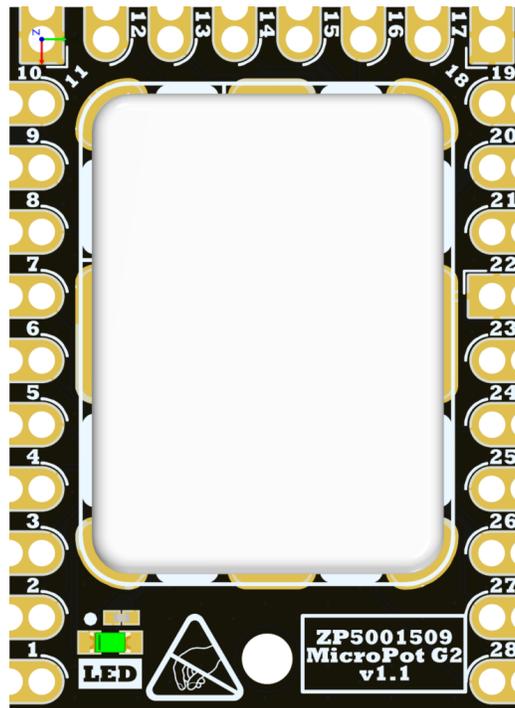


<b>Document Type</b> REC	<b>Document ID</b> REC-1377	<b>Version</b> 0.2	<b>Page</b> 1 of 13
<b>Document Title</b> ZP5001509 – ZP MicroPot G2 Data Sheet			



ZP5001509 – ZP MicroPot G2 Data Sheet

Version:0.2



Document Type	Document ID	Version	Page
REC	REC-1377	1.0	2 of 13
<b>Document Title</b>			
ZP5001509 – ZP MicroPot G2 Data Sheet			



## Table of Contents

General Description .....	3
Target Applications .....	3
Terminology .....	4
1. Board Overview.....	5
2. Board Header & Pinouts .....	6
3. Electrical Specifications.....	8
3.1. Absolute Maximum Ratings .....	8
4. Application Example .....	9
4.1. Reference Circuit.....	9
4.2. Application Workflow – Data logging .....	10
4.3. Live Data Visualization .....	11
5. Mechanical Drawing .....	12
6. Useful Links .....	13
7. Document History .....	13

Document Type	Document ID	Version	Page
REC	REC-1377	1.0	3 of 13
<b>Document Title</b> ZP5001509 – ZP MicroPot G2 Data Sheet			



## General Description

The MicroPot G2 is a dual channel OEM potentiostat designed for integrating electrochemical measurement capability to products. The MicroPot G2 consists of an on-board Arm® Cortex™-M3 processor embedded microcontroller and analog front end (AFE) to perform majority of the main potentiostatic measurement techniques. The on-chip system can control and measures electrochemical sensors and biosensors seamlessly using current, voltage, and impedance measurement capability.

In addition to the electrochemical measurement capability, MicroPot G2 also provides additional GPIOs, and communication interface for expanding the application features. For communication with external devices or existing applications, digital communication peripherals (UART, I2C & SPI) and general-purpose input/output (GPIO) ports can be configured as required. The on-board power management system support two different power inputs through different terminal for 3.3 or 5VDC for operation. The normal operating condition is specified over a temperature range of  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ .

## Target Applications

- Gas detection
- Food quality
- Environmental sensing (air, water, and soil)
- Blood glucose meters
- Life sciences and biosensing analysis
- Bioimpedance measurements
- General Amperometry, voltammetry, and impedance spectroscopy functions

<b>Document Type</b> REC	<b>Document ID</b> REC-1377	<b>Version</b> 1.0	<b>Page</b> 4 of 13
<b>Document Title</b> ZP5001509 – ZP MicroPot G2 Data Sheet			



## Terminology

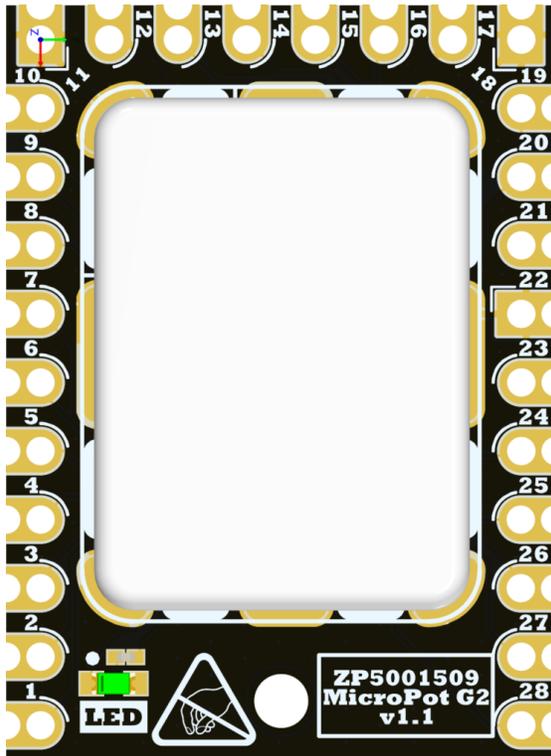
<b>Term or Abbreviation</b>	<b>Description</b>
VDC	Voltage DC
GPIO	General Purpose Input Output
AFE	Analog Front End
ESD	Electrostatic Discharge

*Table 1 Terminology*

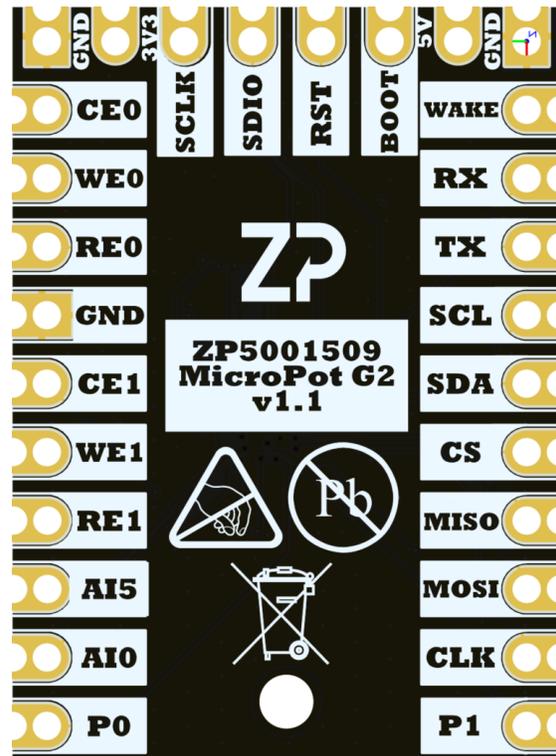
Document Type	Document ID	Version	Page
REC	REC-1377	1.0	5 of 13
Document Title			
ZP5001509 – ZP MicroPot G2 Data Sheet			



## 1. Board Overview



TOP VIEW



BOTTOM VIEW

### ESD CAUTION



**ESD (Electrostatic discharge) sensitive device.**

The MicroPot G2 features protection circuitry for safe operation at most use cases. However high energy ESD due to improper handling may cause damage. Therefore, proper ESD precautions should be take to prevent to avoid performance degradation or loss of functionality.

<b>Document Type</b> REC	<b>Document ID</b> REC-1377	<b>Version</b> 1.0	<b>Page</b> 6 of 13
<b>Document Title</b> ZP5001509 – ZP MicroPot G2 Data Sheet			



## 2. Board Header & Pinouts

Pin No.	Pin Name	Type	Description
1	P1	DIO/PWM	General-Purpose Input/Output Port (GPIO1)/PWM Output (PWM1). Pin defaults as tristate.
2	CLK	DIO/SPI	General-Purpose Input/Output Port 0.0/SPI Clock (SPI0_CLK). Pin defaults as tristate.
3	MOSI	DIO/SPI	General-Purpose Input/Output Port 0.1/SPI MOSI. Pin defaults as tristate.
4	MISO	DIO/SPI	General-Purpose Input/Output Port 0.2/SPI MISO. Pin defaults as tristate.
5	CS	DIO/SPI	General-Purpose Input/Output Port 0.3/SPI Chip Select. Pin defaults as tristate.
6	SDA	DIO/I2C	General-Purpose Input/Output Port 0.5/ I2C SDA. Pin defaults as tristate.
7	SCL	DIO/I2C	General-Purpose Input/Output Port 0.4/I2C SCL. Pin defaults as tristate.
8	TX	DIO/UART	General-Purpose Input/Output Port 0.10/UART Transmit. Pin defaults as tristate.
9	RX	DIO/UART	General-Purpose Input/Output Port 0.11/UART Receive. Pin defaults as tristate.
10	WAKE	DIO	General-Purpose Input/Output Port 1.0/External Interrupt Signal. This pin is capable of waking the device from hibernate or shutdown modes. Pin defaults as tristate.
11	GND	Power	Power supply common GND.
12	5V	Power	5V external power input referenced to common GND. Connect only one of 5V or 3.3V power input and not together.
13	BOOT	DIO	Boot Mode (BM)/General-Purpose Input/Output Port 1.1. Enters firmware download mode if active low on exiting reset.

<b>Document Type</b> REC	<b>Document ID</b> REC-1377	<b>Version</b> 1.0	<b>Page</b> 7 of 13
<b>Document Title</b> ZP5001509 – ZP MicroPot G2 Data Sheet			



<b>14</b>	RST	DIO	Reset Input (Active Low). An internal pull-up is included and enabled by default on this pin.
<b>15</b>	SDIO	DIO	Serial Wire Debug (SWD) Data Input/Output Pin. An internal pull-up resistor is enabled by default on this pin
<b>16</b>	SCLK	DIO	Serial Wire Debug (SWD) Clock Input Pin. An internal pull-up resistor is enabled by default on this pin.
<b>17</b>	3V3	Power	3.3V external power input referenced to common GND. Connect only one of 5V or 3.3V power input and not together. Do not use this pin as a voltage source for an external circuit.
<b>18</b>	GND	Power	Power supply common GND.
<b>19</b>	CE0	Electrode	Counter Electrode connection for Potentiostat 0. If unused, it is recommended to connect this pin to GND.
<b>20</b>	WE0	Electrode	Working/Sensing Electrode connection for Potentiostat 0. If unused, it is recommended to connect this pin to GND.
<b>21</b>	RE0	Electrode	Reference Electrode connection for Potentiostat 0. If unused, it is recommended to connect this pin to GND.
<b>22</b>	GND	Power	Power supply common GND.
<b>23</b>	CE1	Electrode	Counter Electrode connection for Potentiostat 1. If unused, it is recommended to connect this pin to GND.
<b>24</b>	WE1	Electrode	Working/Sensing Electrode connection for Potentiostat 1. If unused, it is recommended to connect this pin to GND.
<b>25</b>	RE1	Electrode	Reference Electrode connection for Potentiostat 1. If unused, it is recommended to connect this pin to GND.
<b>26</b>	AI5	AI	ADC Input.
<b>27</b>	AIO	AI	ADC Input.
<b>28</b>	P0	DIO/PWM	General-Purpose Input/Output Port (GPIO0)/PWM Output (PWM0). Pin defaults to an output driven high.

<b>Document Type</b>	<b>Document ID</b>	<b>Version</b>	<b>Page</b>
REC	REC-1377	1.0	8 of 13
<b>Document Title</b>			
ZP5001509 – ZP MicroPot G2 Data Sheet			



### 3. Electrical Specifications

#### 3.1. Absolute Maximum Ratings

Parameter	Rating
5V to GND (Pin 12)	-0.3 V to +6 V
3.3V to GND (Pin 17)	-0.3 V to +3.6 V
I <sub>max</sub> , Maximum Current consumption	250 mA
Analog Input Voltage to GND	2.8 V to 3.6 V
Digital Input Voltage to GND	2.8 V to 3.6 V
Digital Output Voltage to GND	2.8 V to 3.6 V
GPIO Pins Current	0 mA to 30 mA
Storage Temperature Range	-65°C to +150°C
Operating Temperature Range	-40°C to +85°C
Reflow Temperature	260°C (20sec to 30sec)
Junction Temperature	150°C
ESD - Human Body Model (HBM)	4 kV
ESD - Field-Induced Charged Device Model (FICDM)	1kV

Stresses at or above those listed under Absolute Maximum Ratings may cause permanent damage to the product. This is a stress rating only; functional operation of the product at these or any other conditions above those indicated in the operational section of this specification is not implied. Operation beyond the maximum operating conditions for extended periods may affect product reliability.

Document Type	Document ID	Version	Page
REC	REC-1377	1.0	9 of 13
Document Title			
ZP5001509 – ZP MicroPot G2 Data Sheet			



## 4. Application Example

The MicroPot G2 currently supports the following measurement methods. Additional measurements can be supported and optimized for specific sensors based upon customer request.

- Open Circuit Potential (OCP)
- Amperometry
- Cyclic Voltammetry
- Squarewave Voltammetry
- Electro Impedance Spectroscopy (EIS)

### 4.1. Reference Circuit

The ZP MicroPot G2 is designed with castellation pins to be easily integrated to customer systems and surface mounted on PCBs with minimal external components for electrochemical sensing applications.

For basic testing of 3 electrode electrochemical sensor, test setup shown in **Figure 1** can be used. For 2 electrodes sensors, make sure to short the CE and RE electrodes externally.

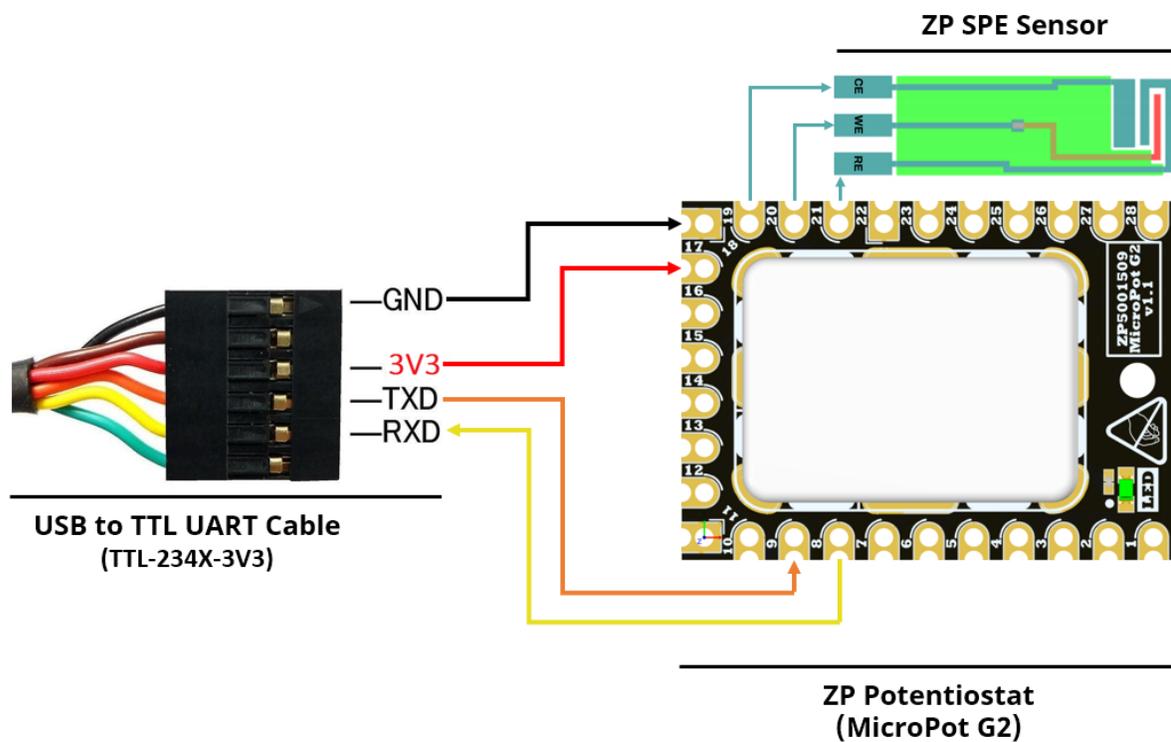


Figure 1. Basic MicroPot G2 Test Setup

Document Type	Document ID	Version	Page
REC	REC-1377	1.0	10 of 13
<b>Document Title</b>			
ZP5001509 – ZP MicroPot G2 Data Sheet			



## 4.2. Application Workflow – Data logging

The generic application that comes with MicroPot G2 is the open circuit potential measurement (OCP), useful for electrochemical measurements like pH measurement. The instruction to perform pH measurement using the MicroPot G2 and [ZP pH sensors](#) is as below.

1. Connect the SPE ZP pH sensor to the Potentiostat 0 electrode pins on MicroPot G2 (CE0, WE0 & RE0).  
**Note:** Checkout the [SPE connectors](#) that can be soldered directly on electrode pins for easier and more reliable sensor connection.
2. Connect the MicroPot G2 using a FTDI cable to the PC.  
Note: Make sure to connect to the appropriate power input based on the FTDI power output. We suggest using [TTL-234X-3V3 USB to TTL UART Cables from FTDI](#).
3. To verify if the device is connected properly and enumerated as a COM port, open Control Panel → Device Manager → Port and find COM number (COM5 in this case).

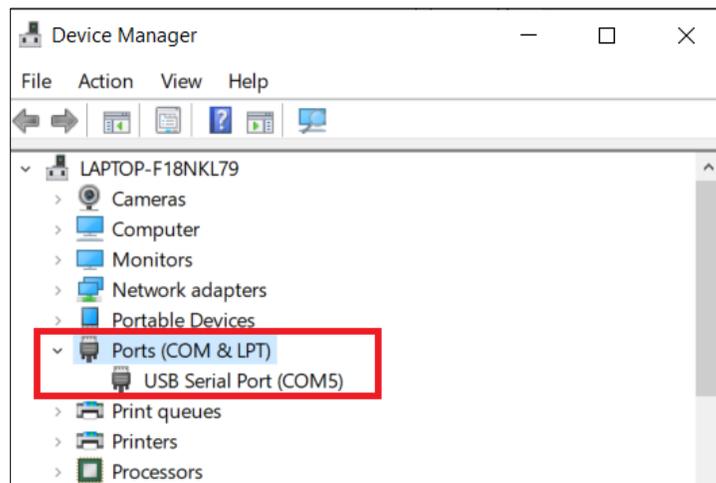


Figure 2. Device Manager COM Port enumeration

4. Open any terminal application such as TeraTerm (<https://osdn.net/projects/ttssh2/releases/>) to view the data from the MicroPot G2. The baud rate must be set 57600 bps (see image).

Document Type	Document ID	Version	Page
REC	REC-1377	1.0	11 of 13
<b>Document Title</b>			
ZP5001509 – ZP MicroPot G2 Data Sheet			

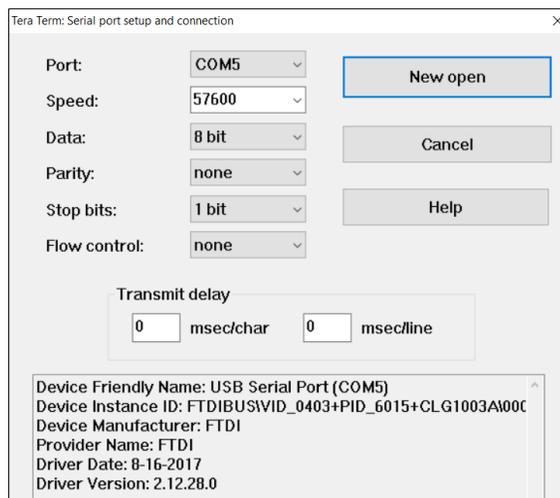


Figure 3. TeraTerm setting window for COM port connection

- Once the device is connected the user can see the pH measurement values in milli volts displayed in the user interface (see image). The data can be later used in Microsoft Excel or python script for further processing and visualization.

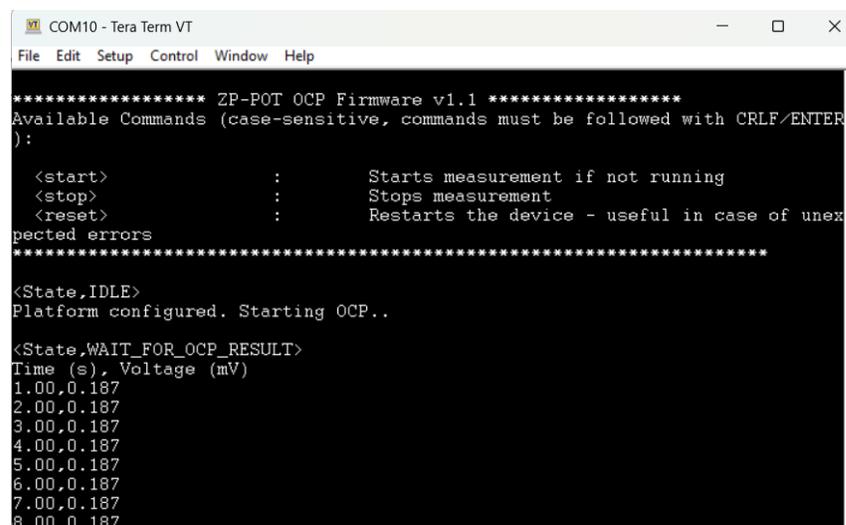


Figure 4. pH measurement data with index from MicroPot G2

### 4.3. Live Data Visualization

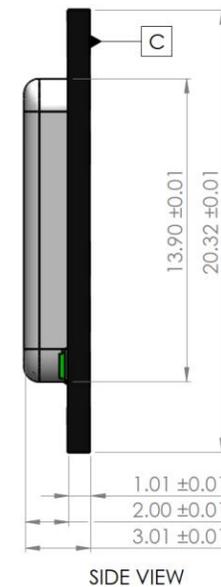
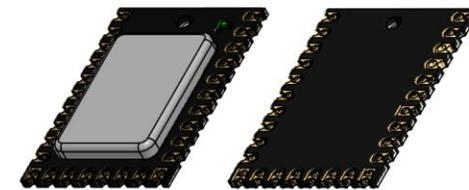
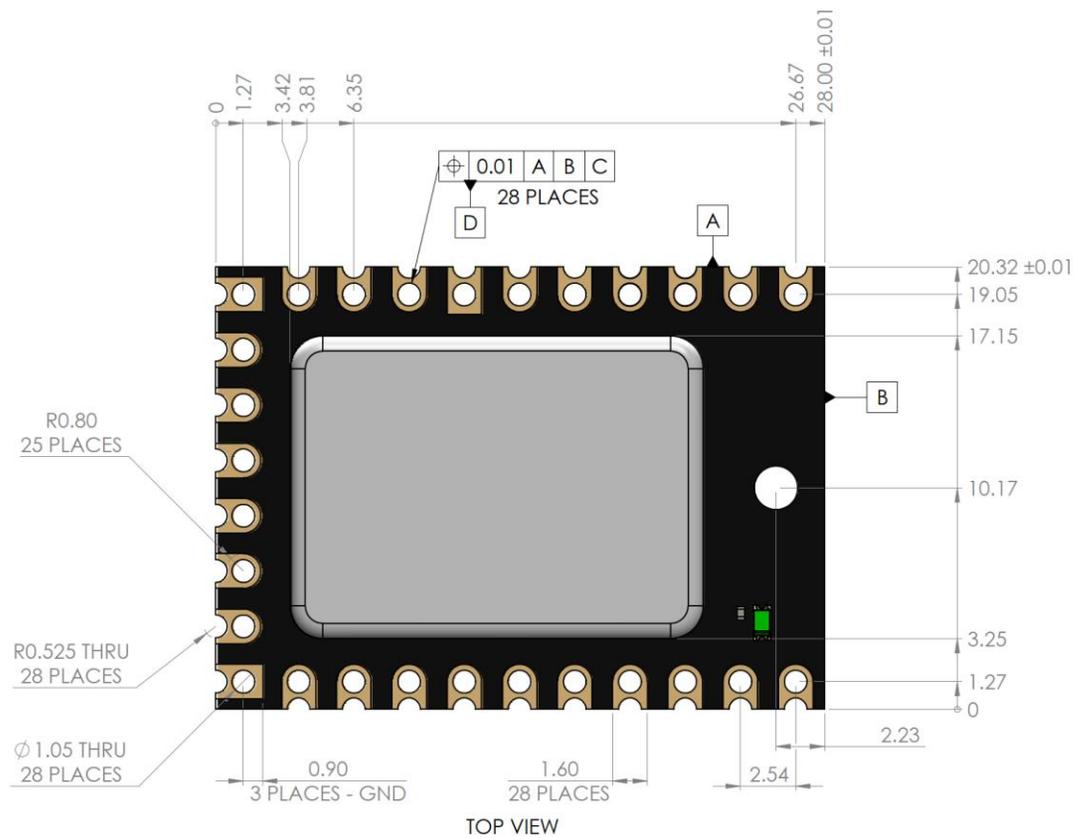
For displaying data from MicroPot G2 in a live chart a serial interface plotting tool can be created using python, Qt, .NET, nodejs, Microsoft Excel, or use readily available open-source projects.

<b>Document Type</b>	<b>Document ID</b>	<b>Version</b>	<b>Page</b>
REC	REC-1377	0.2	12 of 13
<b>Document Title</b>			
ZP5001509 – ZP MicroPot G2 Data Sheet			



## 5. Mechanical Drawing

All dimensions are in millimetres unless otherwise specified.



<b>Document Type</b>	<b>Document ID</b>	<b>Version</b>	<b>Page</b>
REC	REC-1377	0.2	13 of 13
<b>Document Title</b>			
ZP5001509 – ZP MicroPot G2 Data Sheet			



## 6. Useful Links

- MicroPot G2 OEM: <https://www.zimmerpeacocktech.com/2021/07/16/ise-oem-electronics/>
- SPE Connector: <https://shop.zimmerpeacock.com/en-gb/products/spe-connector-angled-3-pin>
- SPE Connector Cable: <https://shop.zimmerpeacock.com/en-no/products/spe-connector-cable>
- pH Sensors: <https://shop.zimmerpeacock.com/en-no/collections/ph>
- FTDI Cable: [DigiKey Link](#)

## 7. Document History

Version	Description	Name	Date
0.1	Initial Version	SP	25-06-2023
0.2	Reviewed	TB	28-07-2023

Table 3 Document History