The US082-OB1203EVZ Board enables quick prototyping for a custom system design with the OB1203, a multi-channel light sensor (LS/CS), proximity sensor (PS), and photoplethysmography sensor (PPG). The board provides a standard Pmod™ Type 6A (Extended I²C) connection for the on-board sensor to plug into any MCU evaluation kit with a matching connector.

The US082-OB1203EVZ features Pmod connectors on both sides of the board allowing additional Type 6/6A boards to be connected in a daisy-chained solution with multiple sensors on the same MCU Pmod connector. Because of the standard connector and software support, the US082-OB1203EVZ is the best choice to rapidly create an IoT system with the Renesas Quick-Connect IoT.

Features
- OB1203 sensor sample mounted:
  - Fully integrated and trimmed module that includes two LEDs, 250mA maximum drive current, and photodetectors for SpO₂ measurements
  - High lux accuracy over different light sources, with absolute sensitivity of 0.06 lux to >150000 lux
  - Four parallel channels for measuring red, green, blue, and clear with accurate correlated color temperature (CCT) and CIE 1931 XYZ (RGB) color measurement
  - Object movement detection (in/out)
- Standardized Type 6A Pmod connector supports I²C Extended interface
- Dual connectors allow pass-through signals for daisy-chained solutions

Board Contents
- US082-OB1203EVZ Board

Figure 1. US082-OB1203EVZ Pmod Board
Contents

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1. Functional Description

The US082-OB1203EVZ functions as a sensor building block to create a custom system solution. Use the board individually or with a combination of other sensors by using the Pmod Type 6A interface. (See the Renesas Quick-Connect IoT web page for a list of available sensor Pmod boards.)

2. Setup

2.1 Required or Recommended User Equipment

The following additional lab equipment (sold separately) is required for using the board:

- Any MCU board that supports a Type 6A Pmod.
- The US082-INTERPEVZ interposer board when using one of the Renesas MCU kits shown in Table 1.

Table 1. Renesas MCU Evaluation Kits[1] that support a Type 6A Pmod when used with the US082-INTERPEVZ

<table>
<thead>
<tr>
<th>RA</th>
<th>RX</th>
<th>Synergy</th>
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<tbody>
<tr>
<td>EK-RA4W1</td>
<td>RX111-Starter-Kit</td>
<td>PK-S5D9</td>
</tr>
<tr>
<td>EK-RA2A1</td>
<td>RX231-Starter-Kit</td>
<td>DK-S3A7</td>
</tr>
<tr>
<td>EK-RA4M1</td>
<td>RX23W-Starter-Kit</td>
<td>DK-S128</td>
</tr>
<tr>
<td>EK-RA6M1</td>
<td>RX23T-Starter-Kit</td>
<td>TB-S1JA</td>
</tr>
<tr>
<td>EK-RA6M2</td>
<td>RX24T-Starter-Kit</td>
<td>TB-S3A6</td>
</tr>
<tr>
<td>EK-RA6M3</td>
<td>RX24U-Starter-Kit</td>
<td>DK-S7G2</td>
</tr>
<tr>
<td>EK-RA6M3G</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. This table is not a comprehensive list of supported MCU Kits. See the evaluation kit hardware manual to confirm Pmod pinout.
2.2 Software Installation and Usage

See the Renesas website for the latest version of the e² studio installer. The minimum FSP version supporting sensor blocks is FSP 3.1.0. For the latest sensor support, ensure you are using the latest release.

Visit Renesas Quick-Connect IoT for more information about creating your customized system solution.

2.3 Kit Hardware Connections

Follow these procedures to set up the kit as shown on Figure 2.

1. Ensure the MCU evaluation kit being used has a Pmod connector set to Type 6A (refer to the kit hardware manual if unsure).
   a. If no Type 6A Pmod is available, ensure the MCU evaluation kit can use the US082-INTERPEVZ interposer board and insert the board into the MCU connector before adding any sensor boards.
2. Plug in the US082-OB1203EVZ to the Type 6A connector, being careful to align Pin 1 on the sensor board and MCU kit.
3. Connect the J3, J4, and J5 jumpers to place 4.7k pull-up resistors on the I²C bus lines, respectively.
   a. Only one set of pull-up resistors should be used on the I²C bus and the interrupt line. If multiple sensor boards are used, only one board should have the jumpers present.
   b. MCU kits typically do not have pull-up resistors present on these lines but be sure to check for them.
4. The sensor is now ready to be used in the system. Follow the MCU kit instructions for connecting and powering up the evaluation kit.

![Figure 3. US082-OB1203EVZ Pmod Board](image-url)
2.4 Schematic Diagram

![Schematic Diagram](image)

Figure 4. US082-OB1203EVZ Application Schematic

2.5 Bill of Materials

<table>
<thead>
<tr>
<th>Qty</th>
<th>Reference</th>
<th>Description</th>
<th>Value</th>
<th>PCB Footprint</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>C1, C2, C3, C4</td>
<td>Capacitor, 0.1µF, 50V, 0603</td>
<td>0.1µF</td>
<td>0603</td>
<td>C0603C104J5RACTU</td>
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<tr>
<td>1</td>
<td>J1</td>
<td>Male Header 0.1&quot; pitch PMOD 2x6 Right Angle</td>
<td>Pmod™</td>
<td>PMOD-MALE-TOP</td>
<td>M20-9950645</td>
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<tr>
<td>1</td>
<td>J2</td>
<td>Female Header 0.1&quot; pitch PMOD 2x6 Right Angle</td>
<td>CON-000050-01</td>
<td>SSW-106-02-F-D-RA</td>
<td></td>
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<tr>
<td>3</td>
<td>J3, J4, J5</td>
<td>CONN HEADER VERT 2POS 1.27 MM</td>
<td>HDR-1X2-FTS</td>
<td>FTS-102-01-L-S</td>
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</tr>
<tr>
<td>3</td>
<td>R1, R2, R3</td>
<td>Resistor, 0Ω, 0603</td>
<td>0Ω</td>
<td>0603</td>
<td>RC0603JR-074K7L</td>
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<tr>
<td>1</td>
<td>R4</td>
<td>Resistor, 4.7k, 0603</td>
<td>4.7k</td>
<td>0603</td>
<td>RT0603DRD07560RL</td>
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<tr>
<td>1</td>
<td>U1</td>
<td>Sensor Digital RGB / IR / Proximity / Pulse Oximeter / Heart-Rate</td>
<td>OB1203-LGA14</td>
<td>OB1203SD-C4</td>
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</tr>
<tr>
<td>3</td>
<td>J3, J4, J5</td>
<td>1.27&quot; 1x2 Jumper with Grip, Gold</td>
<td>NPB02SVFN-RC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>3D printed Finger Support, blue</td>
<td>NPB02SVFN-RC</td>
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2.6 Board Layout

Figure 5. Silkscreen Top

Figure 6. Copper Top

Figure 7. Copper L1 Layer

Figure 8. Copper L2 Layer

Figure 9. Copper Bottom

Figure 10. Silkscreen Bottom
3. Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>US082-OB1203EVZ</td>
<td>OB1203 Pmod Board</td>
</tr>
<tr>
<td>US082-INTERPEVZ</td>
<td>Pmod interposer board to convert Type 2A and 3A to Type 6A on older Renesas MCU kits.</td>
</tr>
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</table>

4. Revision History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Jun 15, 2021</td>
<td>Initial release</td>
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