



## User Guide

UG000452

# AS621x

## Eval Kit

AS6212-EK, AS6214-EK & AS6218-EK

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# Content Guide

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# 1 Introduction

The AS621x Eval Kit is a small PCB allowing a simple and quick evaluation of the AS621x digital temperature sensors without the need to design a custom PCB. This small form factor board is fully assembled with the AS621x temperature sensor and its necessary external components.

## 1.1 Kit Content

This kit contains following material listed in Figure 1

**Figure 1:**  
**Kit Content**

| Pos. | Item      | Comment  |
|------|-----------|----------|
| 1    | AS621x-EK | Eval Kit |

## 1.2 Ordering Information

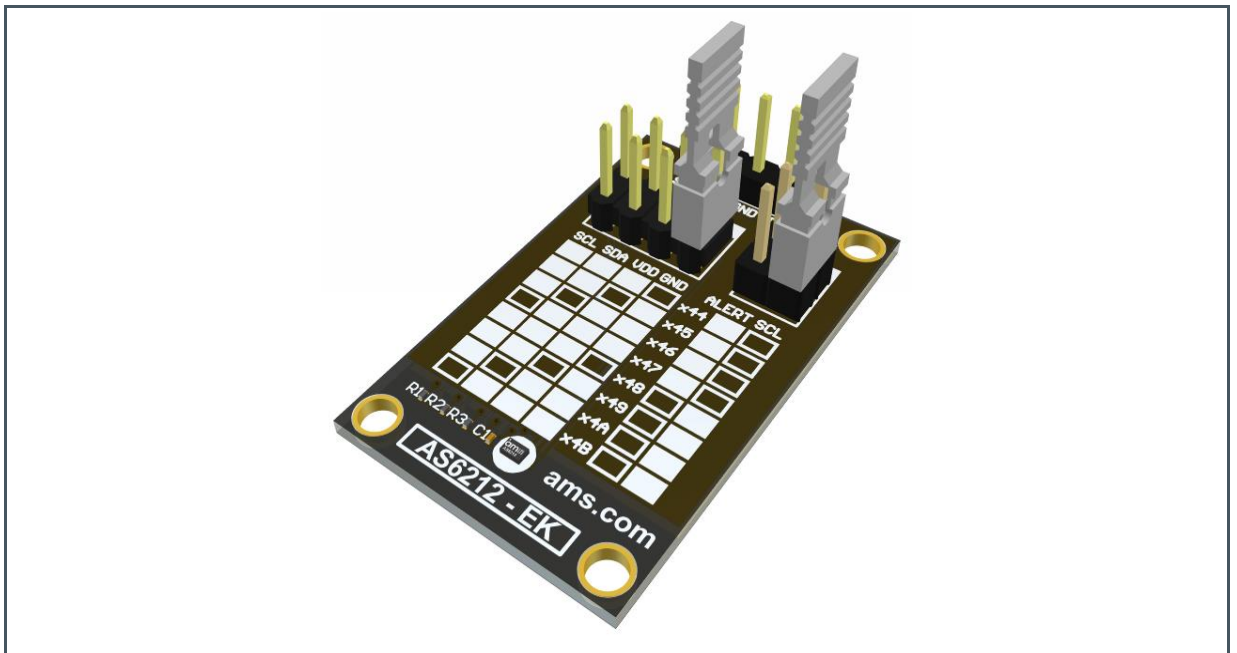
**Figure 2:**  
**Ordering Code**

| Ordering Code | Description                           |
|---------------|---------------------------------------|
| AS6212-EK     | AS6212 Eval Kit up to 0.2 °C accuracy |
| AS6214-EK     | AS6214 Eval Kit up to 0.4 °C accuracy |
| AS6218-EK     | AS6218 Eval Kit up to 0.8 °C accuracy |

## 2 Getting Started

The AS621x Eval Kit is ideal for rapid setup of a digital temperature sensor. To get started connect the board to your microcontroller as described in Figure 4. Add a command in your source code to request two bytes from the selected I<sup>2</sup>C address. Finally convert the returned data as described in chapter 4.2 to get the actual temperature value.

**Figure 3:**  
Eval Kit



## 3 Hardware Description

The P1 connector does provide all relevant signals, which can be easily wired to a microcontroller and to the power supply.

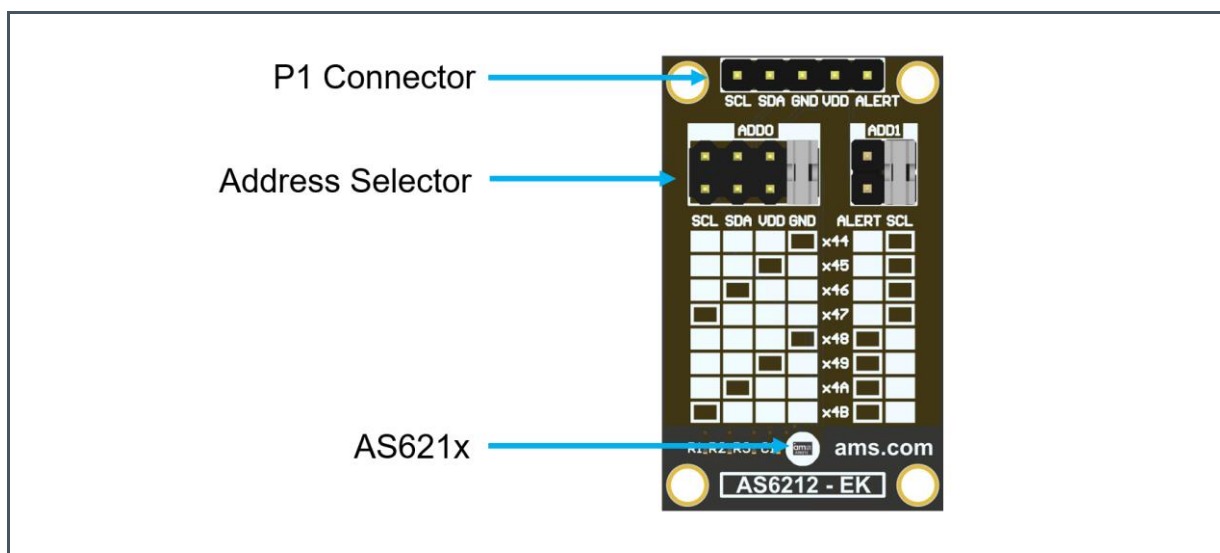
**Figure 4:**  
Eval Kit Pin-Out

| Pin              | Symbol | Description            | Info                          |
|------------------|--------|------------------------|-------------------------------|
| 1                | SCL    | I <sup>2</sup> C clock | Use R1 if pull-up is required |
| 2                | SDA    | I <sup>2</sup> C data  | Use R2 if pull-up is required |
| 3                | GND    | Ground                 |                               |
| 4                | VDD    | Power supply           | According datasheet           |
| 5 <sup>(1)</sup> | ALERT  | Digital output pin     | Alert interrupt output        |

(1) Do not connect pin 5 to VSS. This pin should only be used for the ALERT functionality

### 3.1 Hardware Architecture

**Figure 5:**  
AS621x Eval Kit

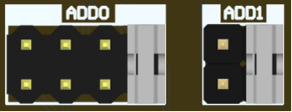








R1, R2 and R3 are pull-up resistors for the I<sup>2</sup>C interface and the ALERT pin. Depending on the application, it is recommended to either populate the decoupling capacitor C1.

## 3.2 AS621x Configuration

With the address selector, it is possible to choose the I<sup>2</sup>C address of the device. The included jumpers are an easy way of setting the I<sup>2</sup>C address of the sensor. Both address selectors must not be left open.

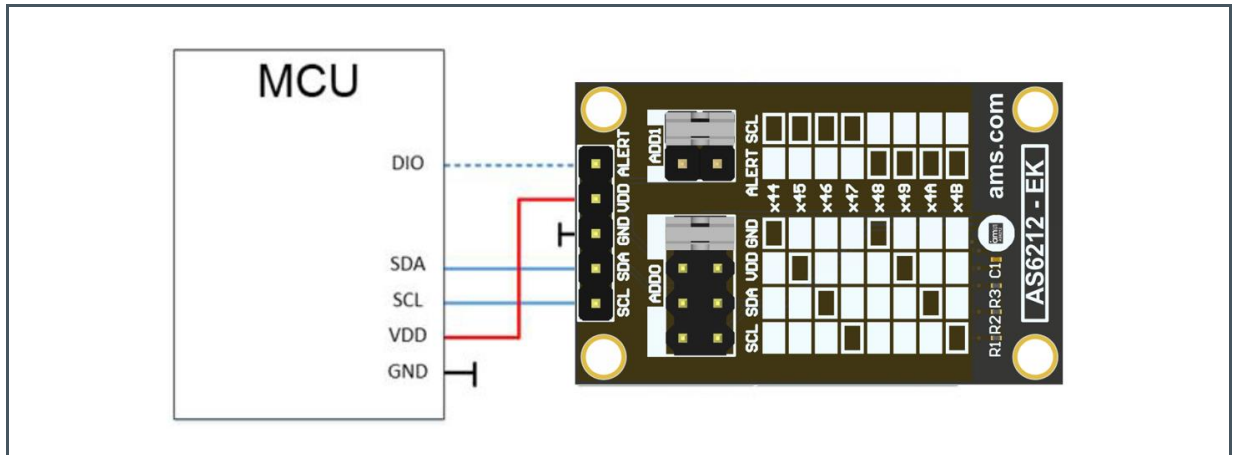
**Figure 6:**  
I<sup>2</sup>C Address

| Jumper Settings   | Address Selector ADD0 | Address Selector ADD1 | Device Address Binary | HEX  |
|---|-----------------------|-----------------------|-----------------------|------|
|    | GND                   | SCL                   | 100 0100              | 0x44 |
|    | VDD                   | SCL                   | 100 0101              | 0x45 |
|   | SDA                   | SCL                   | 100 0110              | 0x46 |
|  | SCL                   | SCL                   | 100 0111              | 0x47 |
|  | GND                   | ALERT functionality   | 100 1000              | 0x48 |
|  | VDD                   | ALERT functionality   | 100 1001              | 0x49 |
|  | SDA                   | ALERT functionality   | 100 1010              | 0x4A |
|  | SCL                   | ALERT functionality   | 100 1011              | 0x4B |

### 3.3 Power Supply and Connections

The PCB has to be connected to an external microcontroller. P1 is populated with a 1x5 pin header and is required for power supply as well as I<sup>2</sup>C communication. In addition to that, it can be used to monitor the interrupt status via pin 5 (IRQ).

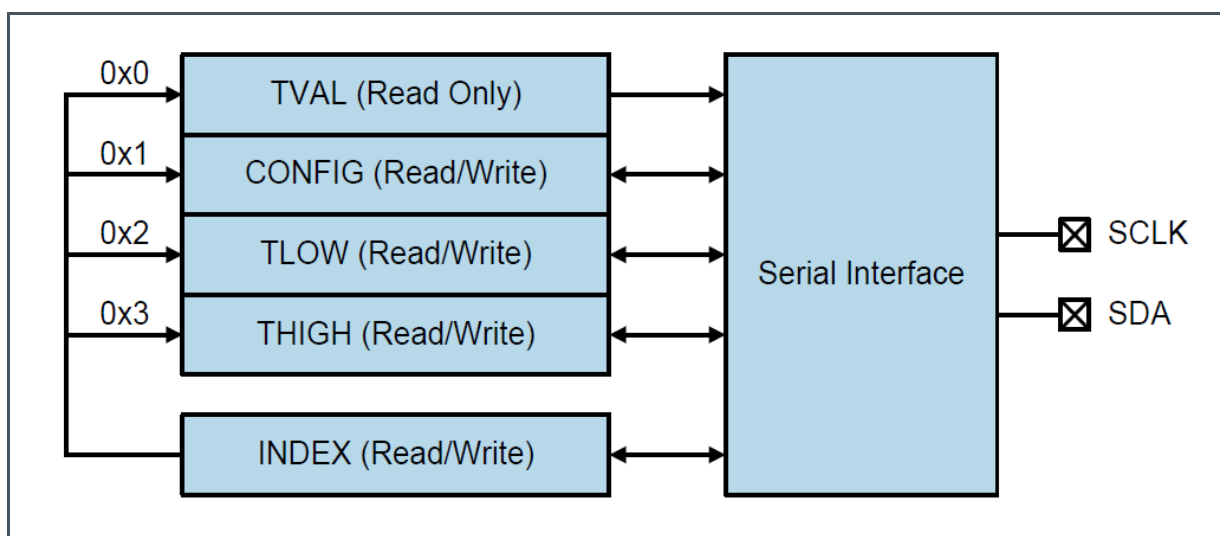
**Figure 7:**  
**MCU and AS621x Connections**



## 4 Software Description

The AS621x has 4 data registers. With the use of the index register, it is possible to address the specific data register. When powered up the address register is set to 0x0.

**Figure 8:**  
Data Registers



For additional configuration settings, the Config register (0x1) has to be addressed. Please refer to the datasheet for details.

**Figure 9:**  
Configuration Register

| Address | Symbol | Register                   | Description                                      |
|---------|--------|----------------------------|--|
| 0x0     | TVAL   |                            | Contains the temperature value                   |
| 0x1     | CONFIG | Configuration Register     | Configuration settings of the temperature sensor |
| 0x2     | TLOW   | T <sub>LOW</sub> Register  | Low temperature threshold value                  |
| 0x3     | THIGH  | T <sub>HIGH</sub> Register | High temperature threshold value                 |

### 4.1 Index Register

The index register contains 8-bit, but only D0 and D1 are used.

**Figure 10:**  
**Index Register**

| Bit   | D7 | D6 | D5 | D4 | D3 | D2 | D1           | D0 |
|-------|----|----|----|----|----|----|--------------|----|
| Value | 0  | 0  | 0  | 0  | 0  | 0  | Address Bits |    |

## 4.2 Temperature Register

**Figure 11:**  
**Temperature Register**

| D15      | D14 | D13 | D12 | D11 | D10 | D9 | D8 | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----------|-----|-----|-----|-----|-----|----|----|----------|----|----|----|----|----|----|----|
| T15      | T14 | T13 | T12 | T11 | T10 | T9 | T8 | T7       | T6 | T5 | T4 | T3 | T2 | T1 | T0 |
| MSB Byte |     |     |     |     |     |    |    | LSB Byte |    |    |    |    |    |    |    |

The temperature register contains the digitally converted temperature value. It consists of 2 bytes and can be converted according to the following formula:

Positive values=  $|Value| / LSB$

Negative values=  $\text{Complement}(|Value| / LSB) + 1$

### Example +75°C

$75^{\circ}\text{C} / 0.0078125^{\circ}\text{C} = 9600 = \text{Binary } 0010\ 0101\ 1000\ 0000 = \text{Hex } 2800$

### Example -40°C

$|-40^{\circ}\text{C} / 0.0078125^{\circ}\text{C} + 1 = \overline{5120} + 1 = \text{Binary } \overline{0001\ 0100\ 0000\ 0000} + 1 = 1110\ 1100\ 0000\ 0000 = \text{Hex } EC00$

**Figure 12**  
**Temperature Conversion Examples**

| Temperature (°C) | Digital Output (Binary) | Digital Output (Hex) |
|------------------|-------------------------|----------------------|
| 100.0            | 0011 0010 0000 0000     | 3200                 |
| 75.0             | 0010 0101 1000 0000     | 2580                 |
| 50.0             | 0001 1001 0000 0000     | 1900                 |
| 25.0             | 0000 1100 1000 0000     | 0C80                 |
| 0.125            | 0000 0000 0001 0000     | 0010                 |
| 0.0078125        | 0000 0000 0000 0001     | 0001                 |
| 0.0              | 0000 0000 0000 0000     | 0000                 |
| -0.0078125       | 1111 1111 1111 1111     | FFFF                 |
| -0.125           | 1111 1111 1111 0000     | FFF0                 |
| -25.0            | 1111 0011 1000 0000     | F380                 |
| -40.0            | 1110 1100 0000 0000     | EC00                 |

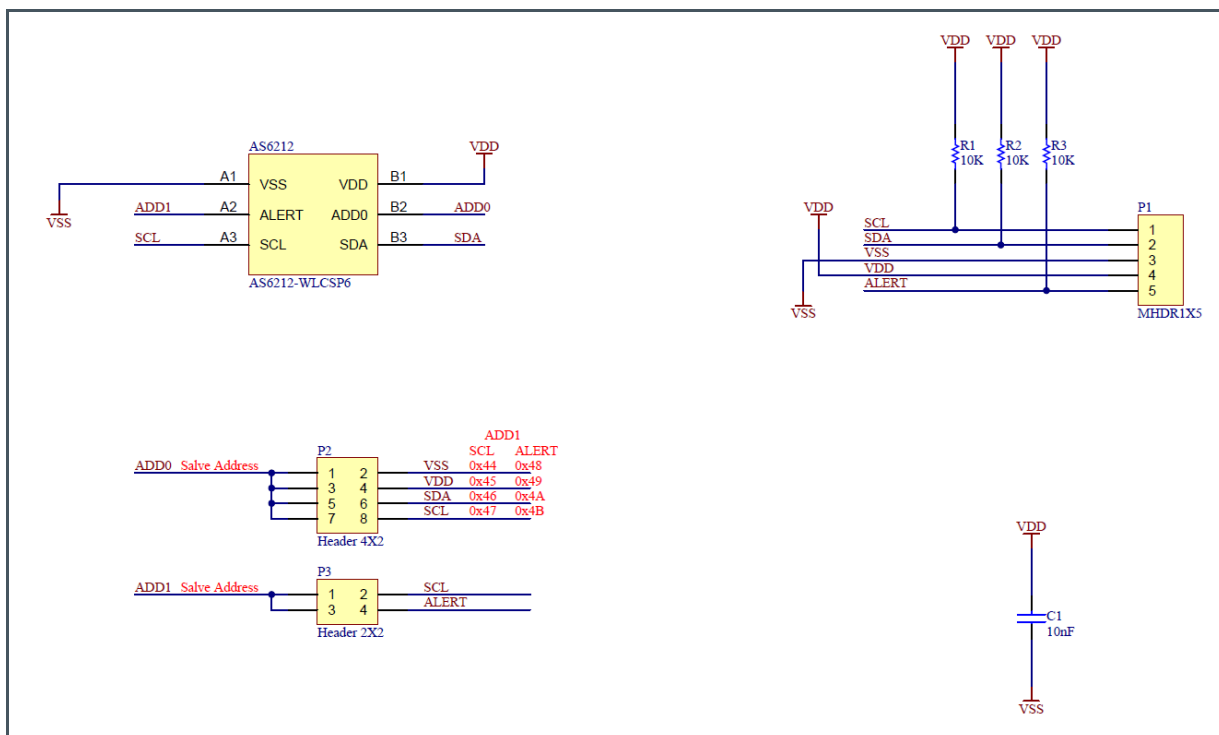
## 5 Schematics, Layers and BOM

The schematics, layout and BOM of the adapter board are shown below for reference.

### 5.1 Schematics

The schematics of the board is shown below in Figure 13:

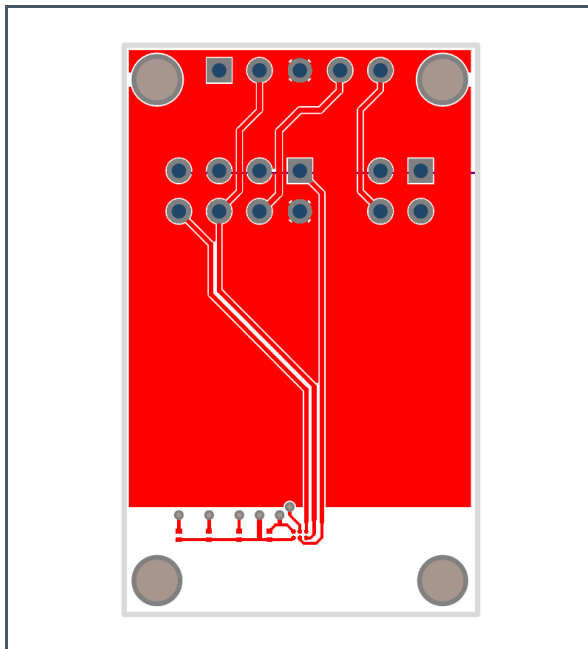
**Figure 13:**  
**Schematics**



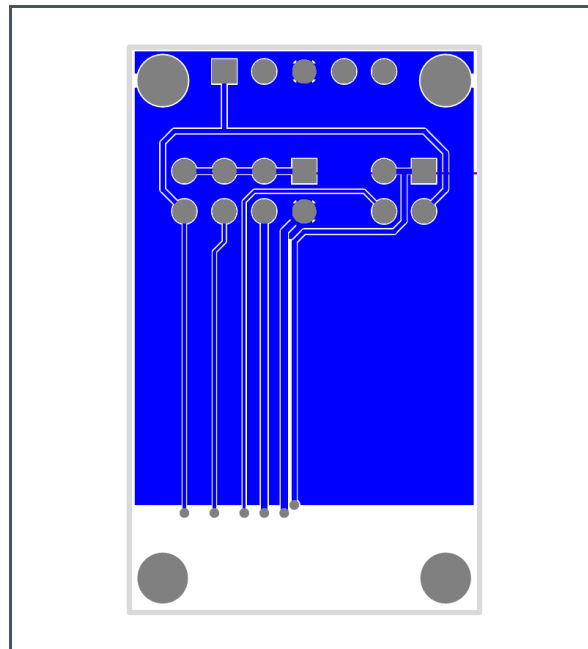
### 5.2 Layout and Board Dimensions.

The PCB layout is shown below in Figure 14 and Figure 15

**Figure 14:**  
**Top Layer**

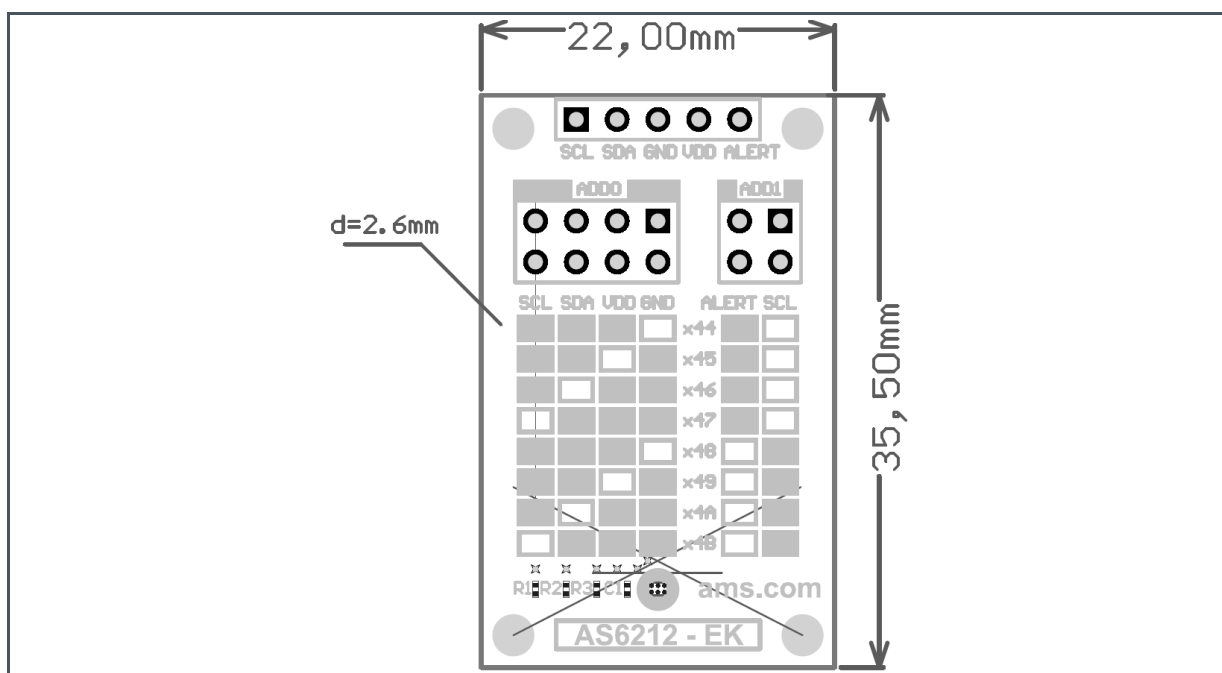


**Figure 15:**  
**Bottom Layer**



The board dimensions are shown below in Figure 16

**Figure 16:**  
**Dimensions**



## 5.3 Bill of Materials

The BOM of the Board is shown below in Figure 17

**Figure 17:**  
**BOM**

| Position | Name   | Value         |
|----------|--------|---------------|
| 1        | R3     | 10K           |
| 2        | R2     | 10K           |
| 3        | R1     | 10K           |
| 4        | P3     | Header 2X2    |
| 5        | P2     | Header 4X2    |
| 6        | P1     | Header 1X5    |
| 7        | C1     | 10nF          |
| 8        | AS621x | AS621x-WLCSP6 |

# 6 Revision Information

| Changes from previous version to current revision v1-01 | Page |
|---|------|
| Initial version   |      |
|   |      |
|   |      |
|   |      |
|   |      |
|   |      |
|   |      |

- Page and figure numbers for the previous version may differ from page and figure numbers in the current revision.
- Correction of typographical errors is not explicitly mentioned.

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