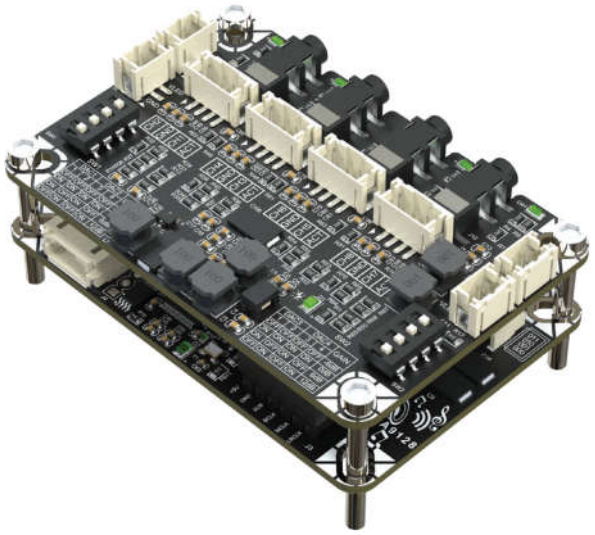
# UCM-D2A-SA9128

## USB Input, 8 Analog Outputs and 4 I²S Outputs

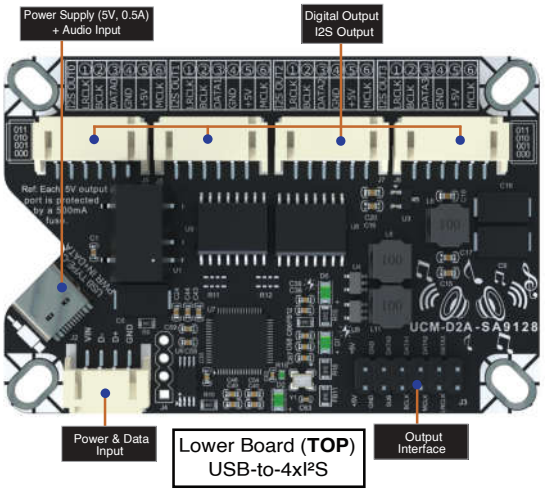


The USB 7.1 Audio Controller with 4 X I²S Digital Output & 8 X Single-Ended Analog Output is an audio digital-to-analog module that is designed to convert USB audio signals into 4-channel I2S outputs and subsequently into 8-channel single-ended analog audio, providing high-fidelity 7.1 surround sound for enhanced audio experiences in various applications.

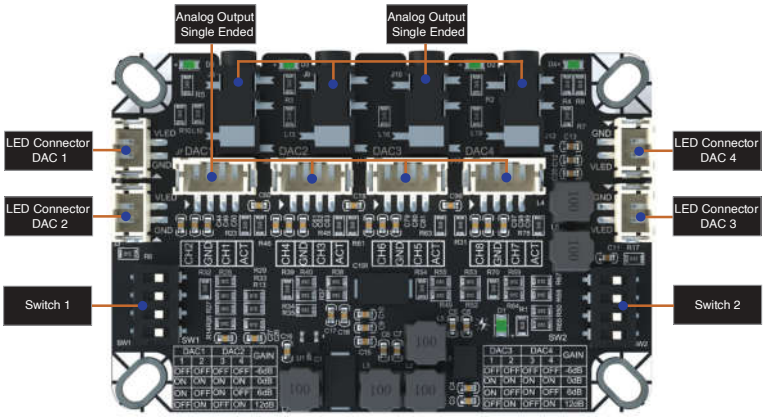
**Features:**
- Supports 7.1 surround sound configuration.
- Converts digital USB audio signals into high-quality analog outputs with Savitech SA9128.
- Handles up to 4 I²S outputs channels and outputs 8 Single-Ended analog audio channels.
- DACs provide superior sound quality with low noise and distortion from all PCM5122.

**Applications:**
- Home Theater
- Gaming
- DIY Audio

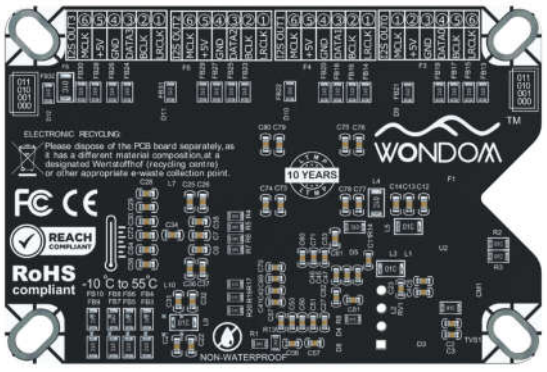
| Specification (s) : | |
|---|---|
| Supply Voltage | : 5V, 0.5A (USB Bus Power) |
| Power Connector | : 1) USB Type C (Power & Data Input)<br>2) PH-2mm-4 Circuits |
| Digital Output Connector | : PH-2mm-6 Circuits |
| Analog Output Connector | : 1) 3.5mm Audio Jack<br>2) PH-2mm-4 Circuits |
| Net Weight | : 60g ± 2g/2.1 oz ± 0.1oz |
| Product Size | : 76.2 (W) x 50.8 (D)x 12.0 (H) mm<br>3.00 (W) x 2.00 (D) x 0.47 (H) Inch |



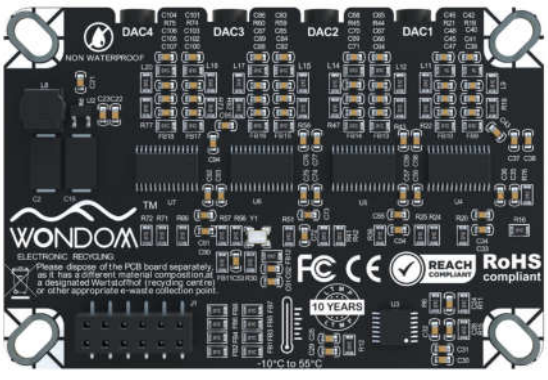

Lower Board (**TOP**)
USB-to-4xI²S




Upper Board (**TOP**)
4xI²S-to-8xSE Audio




Lower Board (**BOTTOM**)
USB-to-4xI²S




Upper Board (**BOTTOM**)
4xI²S-to-8xSE Audio


For more information please visit **www.wondom.com**
Ver 1.10

# Mechanical Drawing

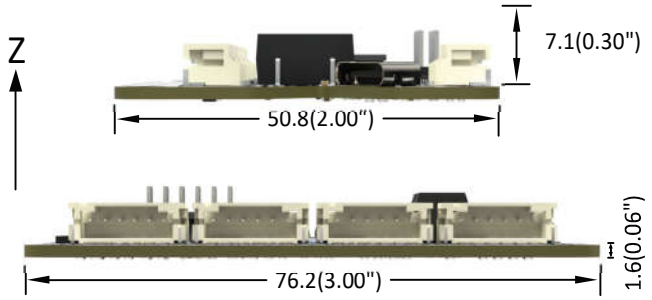
(Nominal Dimension, mm(inch))

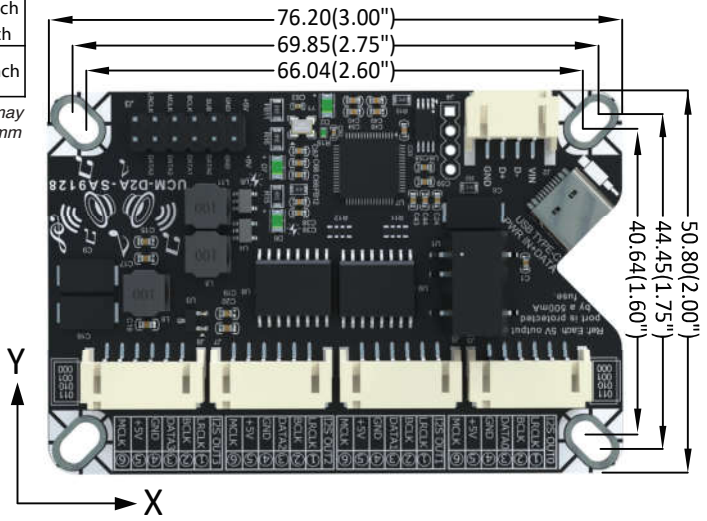
***Note:*** *Designed to be compatible with 0.125" to 0.20" with screw installation hole towards the corner on the PCB board.*

| | Tolerance |
|---|---|
| Z-axis direction (Components) | +0.5mm/+0.02inch -0.0mm/-0.00inch |
| X,Y-axis direction (PCB Outline) | +0.0mm/+0.00inch -0.5mm/-0.02inch |
| X,Y-axis direction (Vias & Holes) | ± 0.1mm/0.004inch |

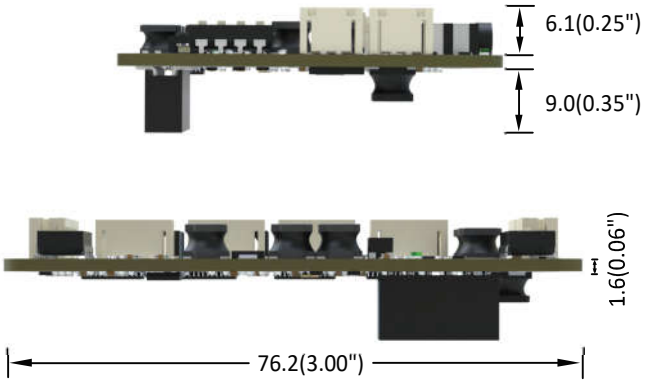
** Due to version both variations, PCB may have two thickness: 1.6 mm and 2.0 mm*

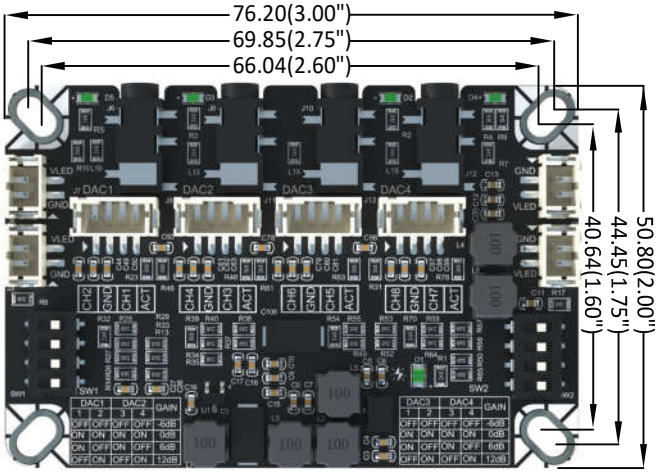
## Lower Board USB-to-4xI²S



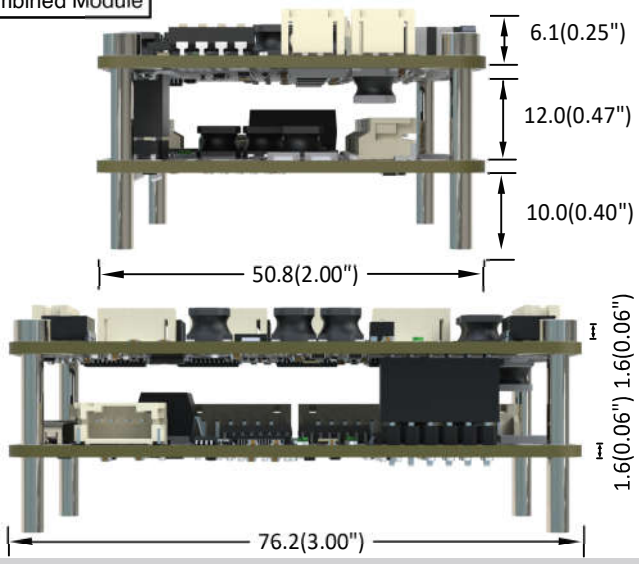



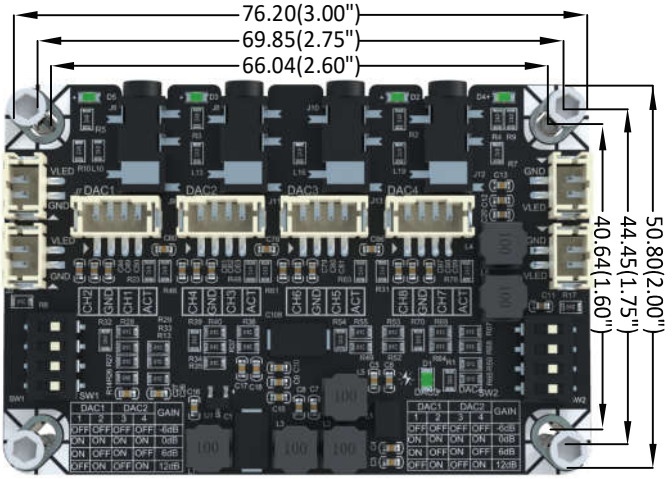

## Upper Board 4xI²S-to-8xSE Audio




## Combined Module



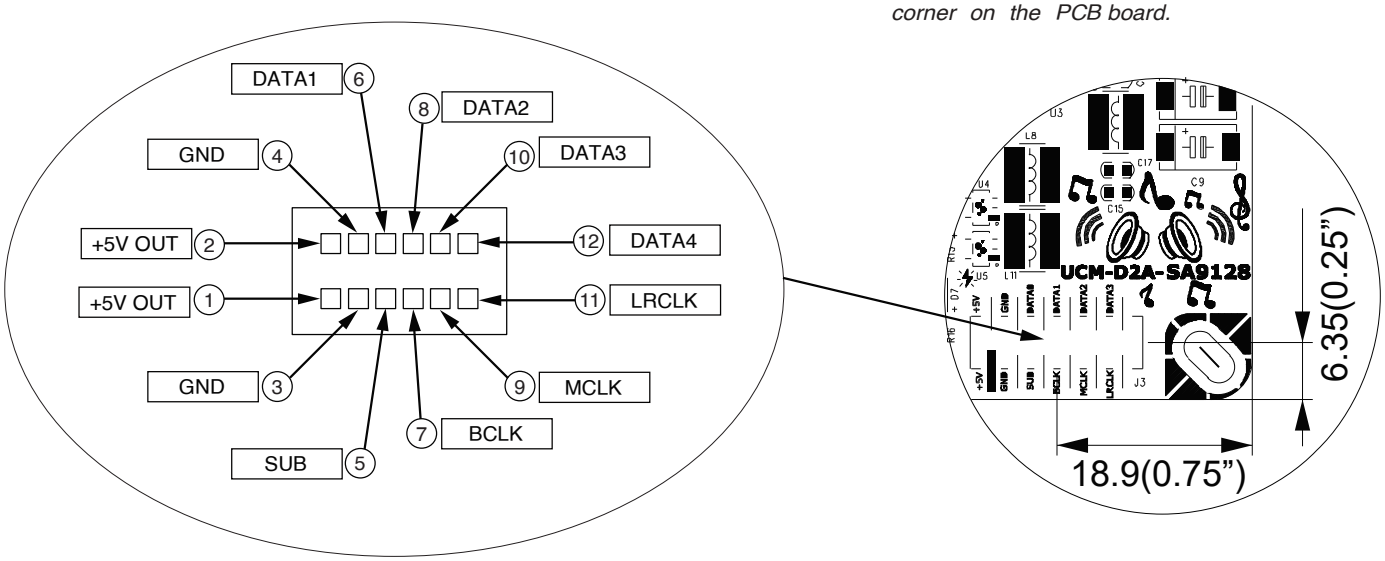




***Note:*** *Please ensure that the printing configuration is set to 1:1 ratio to maintain accurate document proportions.*

## 2X6 Dual Pin Header

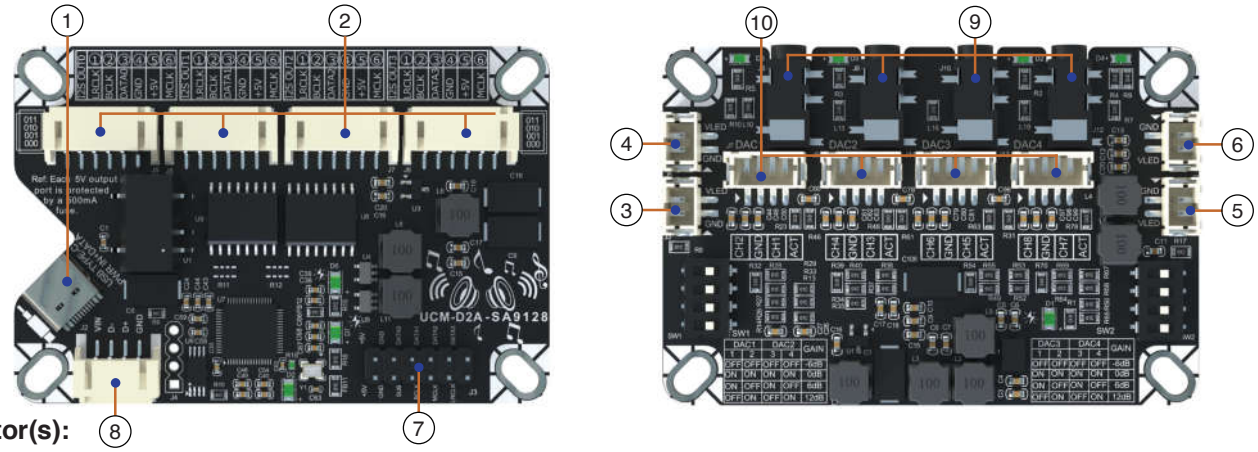
(Nominal Dimension, mm(inch))

***Note:*** *Designed to be compatible with 0.125" to 0.20" with screw installation hole towards the corner on the PCB board.*




## Connector(s) Layout

USB Input, 8 Analog Outputs and 4 I²S Outputs - UCM-D2A-SA9128




**Connector(s):**

**1. Power Supply & Audio Input (USB Type-C):**
- Supply voltage with 5V for 0.5A.
- Able to handle high-speed data transfer.

**2. Digital Output (PH-2mm-6 Circuits):**
- Used for digital Inter-Integrated Circuit Sound (I2S) audio output.
- High-quality digital audio data.

**3. LED Connector for DAC 1 (PH-2mm-2 Circuits):**
- Used to indicate output for Data1.

**4. LED Connector for DAC 2 (PH-2mm-2 Circuits):**
- Used to indicate output for Data2.

**5. LED Connector for DAC 3 (PH-2mm-2 Circuits):**
- Used to indicate output for Data3.

**6. LED Connector for DAC 4 (PH-2mm-2 Circuits):**
- Used to indicate output for Data4.

**7. I2S Signal Peripheral (2x6 Dual Pin Header):**
- Used as an interface connector to upper board
- High-quality digital audio data.

**8. External Power & Data Input (PH-2mm-4 Circuits):**
- Supply voltage with 5V for 0.5A.
- Able to handle high-speed data transfer.

**9. Analog Output (3.5mm Audio Jack):**
- Provides 7.1 or 5.1 channel configuration.
- Commonly used for headphones, speaker or other playback devices.

**10. Analog Output (PH-2mm-4 Circuits):**
- Provides 7.1 or 5.1 channel configuration.
- Commonly used for headphones, speaker or other playback devices.

# Port(s) Layout

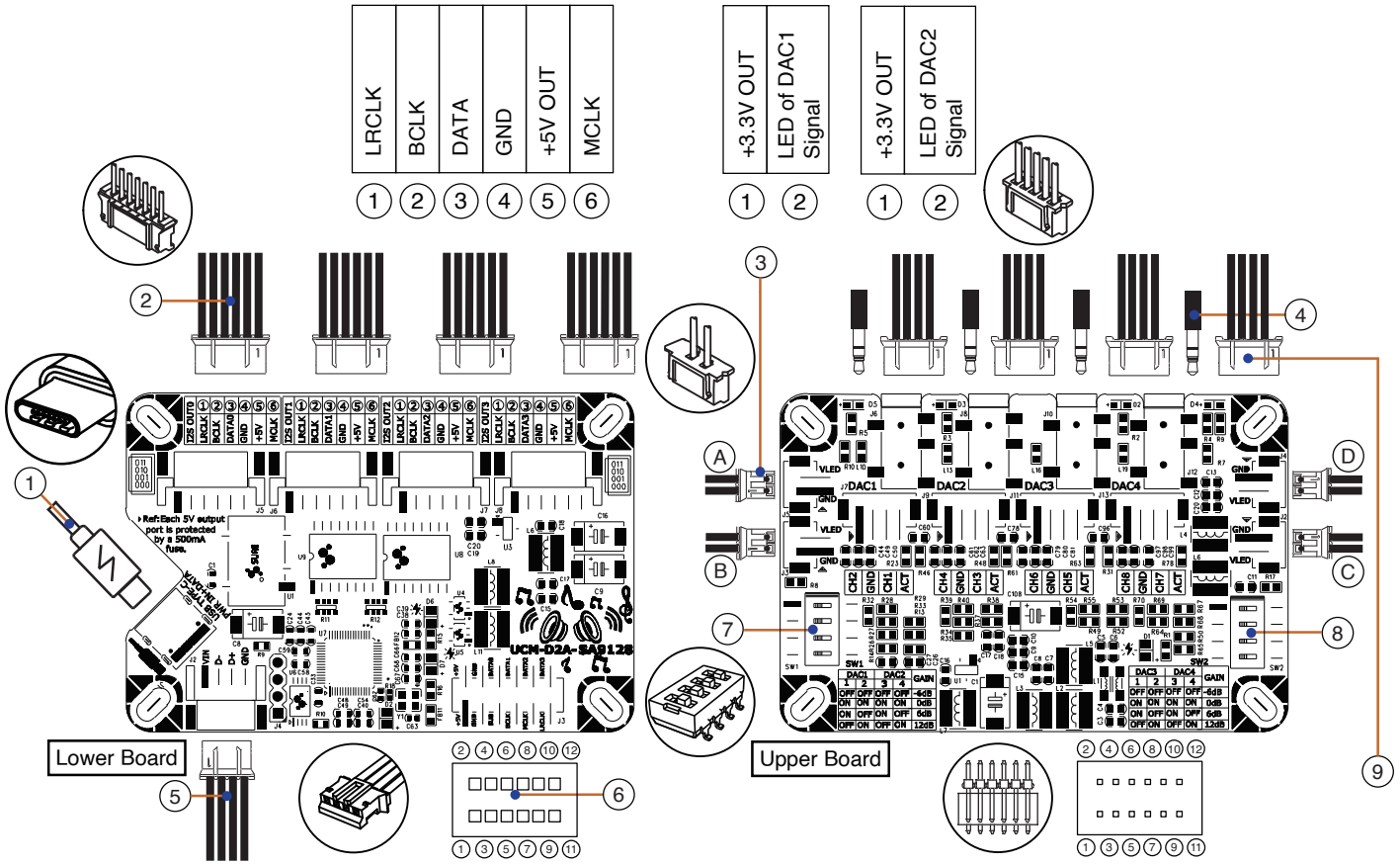
USB Input, 8 Analog Outputs and 4 I²S Outputs - UCM-D2A-SA9128

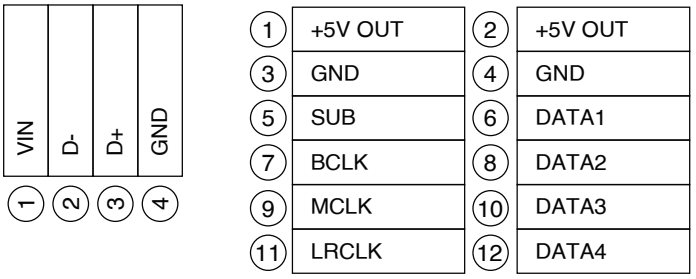
**1. USB Type-C**
- Supply voltage with 5V, 0.5A and used for audio input.

**2. PH-2mm-6 Circuits**
- Digital Inter-Integrated Circuit Sound (I2S) audio output.

**3. PH-2mm-2 Circuits**
- To indicate output for Data1, Data2, Data3 and Data4 for:
  Ⓐ- DATA1,Ⓑ- DATA2,Ⓒ- DATA3,Ⓓ- DATA4

**4. 3.5mm-Audio Jack**
- Input audio source.




**5. PH-2mm-4 Circuits**
- Supply voltage with 5V, 0.5A and used for audio input.

**6. 2X6 2mm Pin Header**
- Interface connector to upper board (4-channel I2S to 8-Channel Single Ended)

**7. 4-position DIP switch (SW1)**
- Used to set output gain by controlling DAC channel for DAC1 and DAC2.

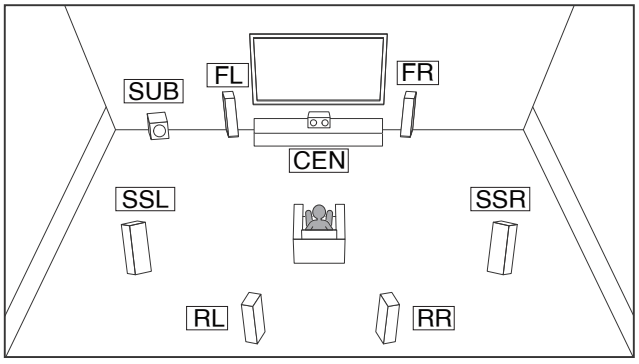
**8. 4-position DIP switch (SW2)**
- Used to set output gain by controlling DAC channel for DAC3 and DAC4.

**9. PH-2mm-4 Circuits**
- Input audio source .

## Speaker Configurations

Location of Each Speaker

### 7.1-Channel Speaker System




DAC1: $CH_2$ : Front Right (FR) & $CH_1$ : Front Left (FL)

DAC2: $CH_4$ :Subwoofer (SUB) & $CH_3$ : Center (CEN)

DAC3: $CH_6$ :Rear Right (RR) & $CH_5$ : Rear Left (RL)

DAC4: $CH_8$ :Side Surround Right (SSR) &
$CH_7$ :Side Surround Left (SSL)

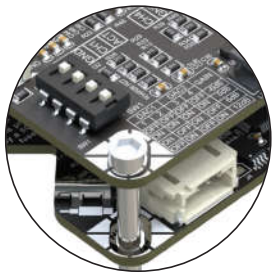
Note: When you connect only one rear speaker, place the rear speaker directly behind the listening position.
As the subwoofer (SUB) does not emit highly directional signals. you can place it wherever you want.

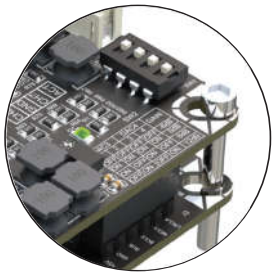
### Names And Function of Each Speaker

| Abbreviations used | Speaker Name | Functions |
|---|---|---|
| FL ($CH_1$) | Front Left Speaker | Produces stereo sounds from front left/right channel |
| FR ($CH_2$) | Front Right Speaker | |
| CEN ($CH_3$) | Center Speaker | Produces vocal sounds from center channel |
| SUB ($CH_4$) | Subwoofer | Produces LFE (low frequency effect) channel sounds and reinforces bass parts of other channels |
| RL ($CH_5$) | Rear Left Speaker | Produces sounds from rear left/right channel |
| RR ($CH_6$) | Rear Right Speaker | |
| SSL ($CH_7$) | Side Surround Left Speaker | Produces sounds from side surrounds left/right channel |
| SSR ($CH_8$) | Side Surround Right Speaker | |

## Switch

DAC Gain Configuration





**Switch 1 (SW1)**

| DAC 1 | | DAC 2 | | GAIN |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | |
| OFF | OFF | OFF | OFF | -6dB |
| ON | ON | ON | ON | 0dB |
| ON | OFF | ON | OFF | 6dB |
| OFF | ON | OFF | ON | 12dB |

**Switch 2 (SW2)**

| DAC 3 | | DAC 4 | | GAIN |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | |
| OFF | OFF | OFF | OFF | -6dB |
| ON | ON | ON | ON | 0dB |
| ON | OFF | ON | OFF | 6dB |
| OFF | ON | OFF | ON | 12dB |

**All switches OFF**
= Lowest output level (-6dB)

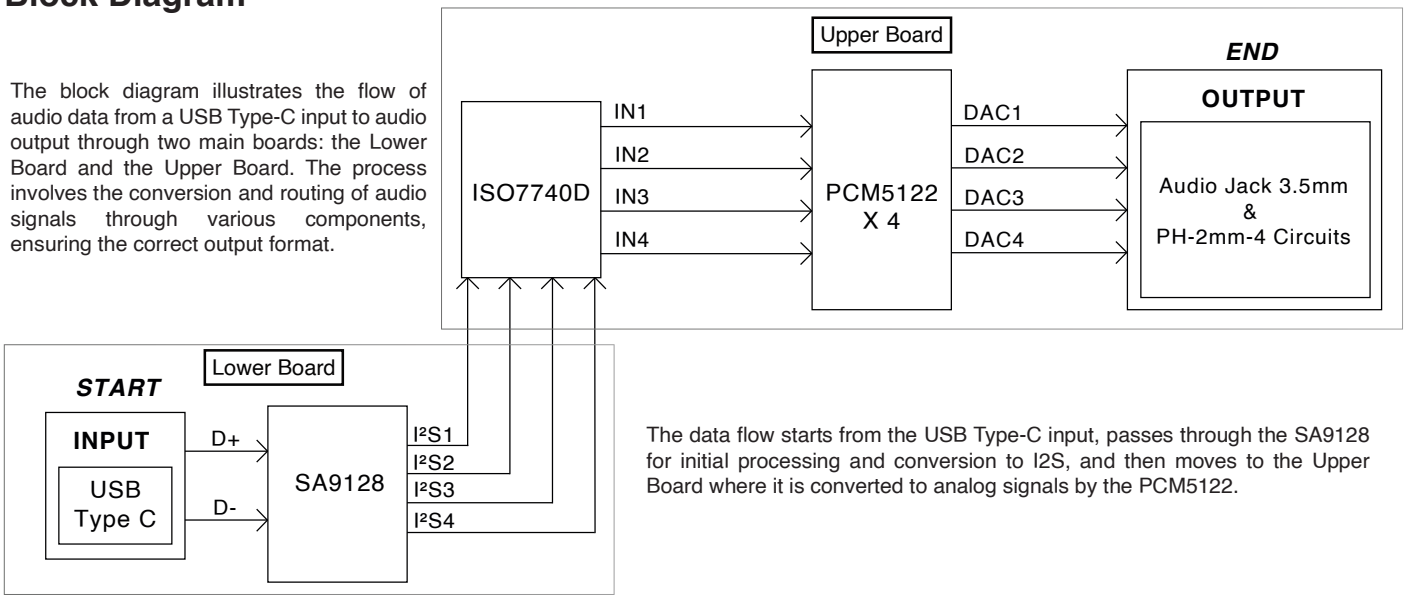
**All switches ON**
= Normal output level (0dB)

**Odd numbered switches ON (1 & 3)**
= Output gain increases by +6dB

**Even numbered switches ON (2 & 4)**
= Maximum output gain of +12dB

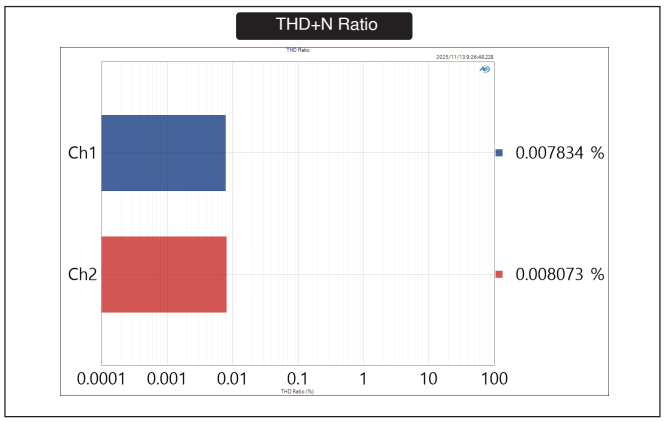
## Block Diagram

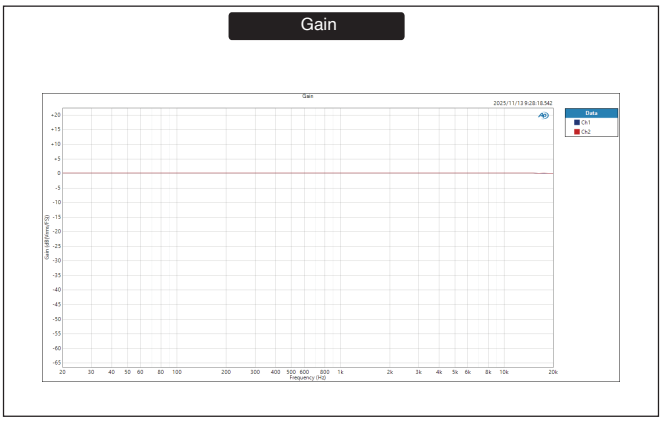
The block diagram illustrates the flow of audio data from a USB Type-C input to audio output through two main boards: the Lower Board and the Upper Board. The process involves the conversion and routing of audio signals through various components, ensuring the correct output format.

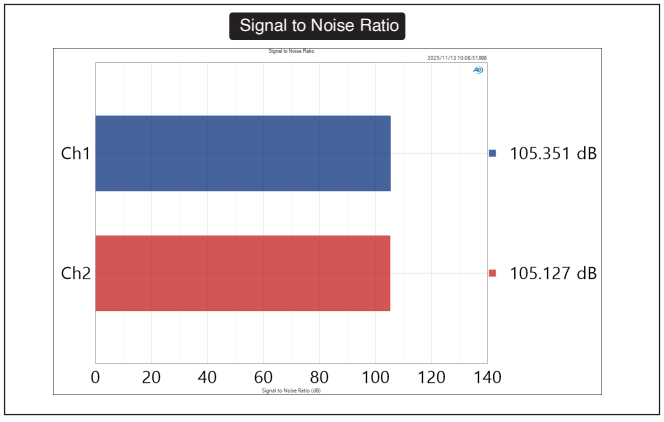


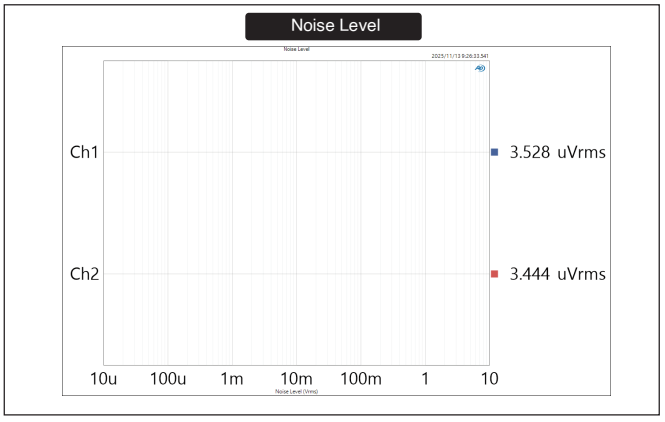

The data flow starts from the USB Type-C input, passes through the SA9128 for initial processing and conversion to I2S, and then moves to the Upper Board where it is converted to analog signals by the PCM5122.

## UCM-D2A-SA9128 Performance Graph



## Electrical and Audio Performance Parameters

UCM-D2A-SA9128 Electrical Performance Parameters

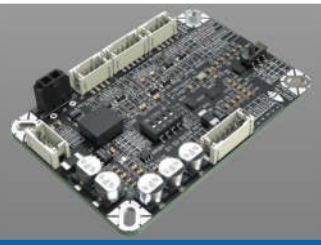
| Parameters | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Power Supply Voltage | Supplied by USB Type-C or J2(4-pin PH) | 4.5 | 5.0 | 5.5 | VDC |
| Idle Current | Power supply=5V, tested via USB Type-C after 20 seconds without input signal | 0.07 | 0.09 | 0.11 | A |
| Working Current | Power supply=5V, tested via USB Type-C with input signal | 0.08 | 0.11 | 0.13 | A |
| Idle Power | Power supply=5V, tested via USB Type-C after 20 seconds without input signal | 0.36 | 0.45 | 0.54 | W |
| Working Power | Power supply=5V, tested via USB Type-C with input signal | 0.44 | 0.60 | 0.66 | W |
| Operating Temperature | - | -20 | - | 65 | °C |
| Storage Temperature | - | -10 | - | 45 | °C |

UCM-D2A-SA9128 Audio Performance Parameters

| Parameters | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Analog Output Voltage | @0dBFS, 1kHz, Input signal via USB Typer-C, ASIO driver, Gain=-6dB | - | - | 0.5 | Vrms |
| | @0dBFS, 1kHz, Input signal via USB Typer-C, Gain=0dB, 6dB, 12dB, THS=D+N<1%, ASIO driver | - | - | 1.0 | Vrms |
| Noise Level | @Analog output, 1kHz, -100dBFS, Input signal via USB Type-C, ASIO driver, A-weighted | 2.6 | 3.4 | 5.7 | uVrms |
| Total Harmonic Distortion (THD + N) | @1kHz, analog Vout=500mVrms or 1Vrms, load resistance=10kΩ, Input signal via USB Type-C, A-weighted, ASIO driver | 0.006 | 0.007 | 0.009 | % |
| Crosstalk | @1kHz,0 dbFS, load resistance=10kΩ, Input signal via USB Type-C, ASIO driver | -66 | -72 | - | dB |
| Signal-to-Noise Ratio (SNR) | @1kHz,0 dbFS, load resistance=10kΩ, Input signal via USB Type-C, A-weighted, ASIO driver | 96.0 (Gain=12dB) 102.0 (Gain=0dB) | 99.5 (Gain=12dB) 105.3 (Gain=0dB) | - | dB |
| Frequency Response | @-12dBFS, 20Hz-20kHz, load resistance= 10kΩ, Input signal via USB Type-C, Gain=-6dB, 0dB, 6dB, 12dB, ASIO driver | - | ±0.1 | ±0.2 | dB (Vrms/FS) |
| DAC Characteristic | Resolution, only supporting 48kHz | 16 | 24 | 24 | Bits |

⚠ Note: The USB sound card only support 48kHz/16 Bits or 48kHz/24 Bits. All performance parameters were tested at 48kHz/24 Bits. Performance will be slightly degraded at 48kHz/16 Bits.

# Audio Signal Converter & USB Codec Module Series

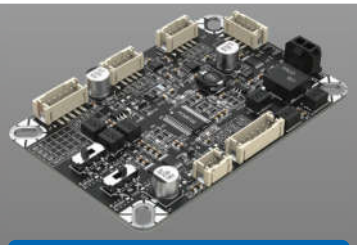


**ASCM-A2D-PCM1822**

**Transceiver IC:** PCM1822

**Input: Analog**
- ***Single-Ended*** *(JST PH 5 Circuits)*
- ***Differential*** *(JST PH 4 Circuits)*

**Output: Digital**
- ***I2S*** *(JST PH 6 Circuits)*

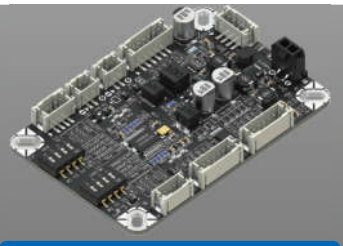


**ASCM-D2A-PCM5122**

**Transceiver IC:** PCM5122

**Input: Digital**
- ***I2S*** *(JST PH 6 Circuits)*

**Output: Analog**
- ***Single-Ended*** *(JST PH 5 Circuits)*
- ***Differential*** *(JST PH 4 Circuits)*

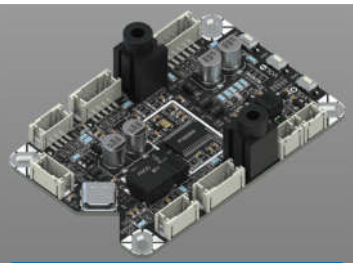


**ASCM-DST-WM8804**

**Transceiver IC:** WM8804

**Input: Digital**
- ***I2S*** *(JST PH 6 Circuits)*
- ***S/PDIF*** *(JST PH 4 Circuits)*

**Output: Digital**
- ***I2S*** *(JST PH 6 Circuits)*
- ***S/PDIF*** *(JST PH 4 Circuits)*



**UCM-PCM2906C**

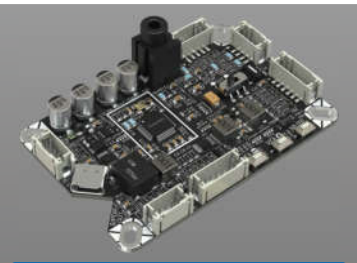
**Transceiver IC:** PCM2906

**Input: Digital**
- ***USB Type-C***
- ***S/PDIF*** *(JST PH 4 Circuits)*

**Output: Digital**
- ***S/PDIF*** *(JST PH 4 Circuits)*

**Input: Analog**
- ***Single-Ended*** *(3.5mm Socket & JST PH 5 Circuits)*

**Output: Analog**
- ***Single-Ended*** *(3.5mm Socket & JST PH 5 Circuits)*



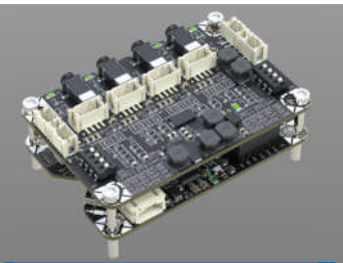
**UCM-PCM2706C**

**Transceiver IC:** PCM2706

**Input: Digital**
- ***USB Type-C***

**Output: Digital**
- ***S/PDIF*** *(JST PH 4 Circuits)*
- ***I2S*** *(JST PH 6 Circuits)*

**Output: Analog**
- ***Single-Ended*** *(3.5mm Socket & JST PH 5 Circuits)*



**UCM-D2A-SA9128**

**Transceiver IC: SA9128 & PCM5122**

**Input: Digital**
- ***USB Type-C***
- ***External Connector for USB*** *(JST PH 4 Circuits)*

**Output: Analog**
- *4 x* ***Single-Ended*** *(3.5mm Socket & JST PH 4 Circuits)*

Note: Kindly be aware that this display features only selected product series and does not include our entire collection.
For more information or any inquiry, please contact us through email info@sure-electronic.com

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## Warranty Terms and Product Usage Restrictions

Wondom products come with a one-year warranty starting from the date of purchase. Customers are responsible for the cost of returning the goods to the seller, and by making a purchase, you agree to this condition. Due to the nature of DIY products, visible damage or use on screw holes or tinning of solder pads directly invalidates the warranty. Damage caused by the use of incorrect power sources, such as exceeding the specified voltage range or reverse polarity, is not covered under warranty. All Wondom products undergo through testing before shipment. We do not accept bulk returns after a bulk purchase. If you are unsure of the quantity you need, please purchase the appropriate quantity as needed. The rated operating temperature range is -20°C to 65°C.

## Origin and Design Location

All WONDOM products are designed, manufactured, and assembled in Malaysia. They may be shipped from either Malaysia or China. The country of origin for these product is Malaysia.