



# DATASHEET

## **4D SYSTEMS** *TURNING TECHNOLOGY INTO ART*

### **'ADAM' Arduino Display Adaptor Module**

**Arduino™ Compatible Shield**

**P/N: 4Display-Shield-FT843**

**For the 4D Systems 4DLCD-FT843 Display**

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## 1. Description

The ADAM (Arduino\* Display Adaptor Module) is an Arduino Compatible Shield, designed specifically to interface the 4D Systems 4DLCD-FT843 Display (see 4D Systems' website) directly with an Arduino, providing the Arduino with a SPI Display powered by the FTDI FT800 Video Engine. The FT800 Video Engine features EVE (Embedded Video Engine), which takes care of many of the graphics functions from the Arduino.

On the ADAM module is a micro-SD card, which provides the Arduino with a storage device, and also provides the 4DLCD-FT843 display a way to retrieve images, sounds etc. It also features a Reset button for the Arduino, and the 10 way FPC connection to attach the 4DLCD-FT843 Display.

Communication between the Arduino and the 4DLCD-FT843 display (via ADAM) is by the SPI Bus, along with 4 digitals. The SPI Bus is connected to the ICSP connector of the Arduino, which is in a common location on many Arduino boards.

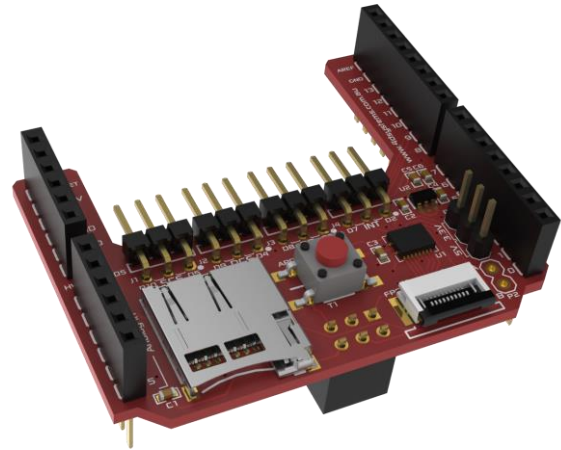
The 4DLCD-FT843 features 4 sets of jumpers, which allows the user to change the digitals used on the Arduino, to have a better chance of being compatible with other shields.

The Chip Select (CS) for the micro-SD card, the Chip Select (CS) for the Display, the Power Down (PD) for the Display, and the Host Interrupt (INT) for the Display, are the 4 jumpers. The two CS pins are required to be used for the micro-SD and Display, however the PD and INT pins are optional features however may be required for some functionality.

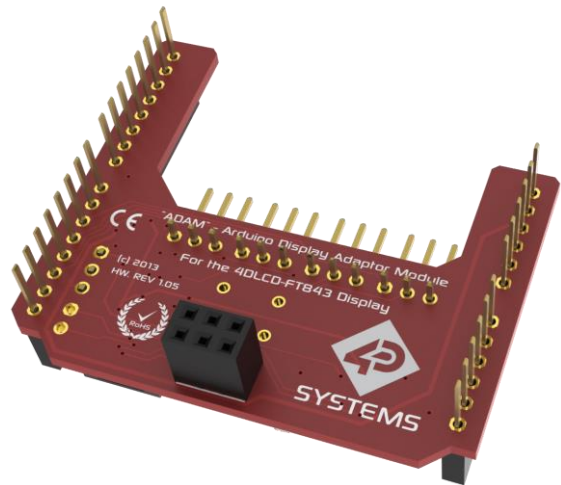
The 4DLCD-FT843 also breaks out the Audio from the FT800 Processor, and presents it on a 2 pin header which can then be connected to an external filter and amplifier circuit if the user wishes to take advantage of this feature.

Power for ADAM is supplied from the Arduino's 5V bus, which in turn regulates this to 3.3V for the 4DLCD-FT843 Display. All 5V SPI signals from the Arduino are buffered and converted to 3.3V levels so they are suitable for both the micro-SD card and the display.

All software support for the 4DLCD-FT843 is provided directly from FTDI, who also write and supply the library and demos for this shield/display combo. Hardware support is provided by 4D Systems.



ADAM – Adaptor Shield Top

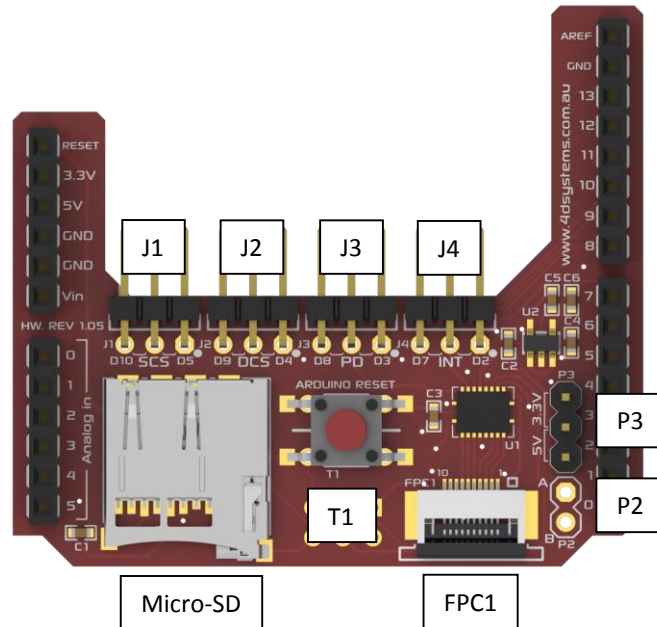


ADAM – Adaptor Shield Bottom

**Note (\*):** Arduino remains the property of the Arduino Team. All references to the word Arduino and Arduino Hardware are licensed under the Creative Commons Attribution Share-Alike license

## 2. Configuration Options

On the 4D Arduino Adaptor, four jumpers (J1, J2, J3 and J4) have been added to provide flexibility to the Users' Arduino project, to enable I/O to be changed or disabled as required.



### 2.1. Jumper 1 (J1)

**Jumper 1 (J1)** is used to select the Digital Output on the Arduino which is used for the Chip Select for the micro-SD Card. 'SCS' refers to 'SD card Chip Select'. This can be selected between D10 and D5 on the Arduino, to assist with compatibility with other shields that may be used in the Arduino project. This Jumper is required to be used as without it communication with the micro-SD card is not possible.

### 2.2. Jumper 2 (J2)

**Jumper 2 (J2)** is used to select the Digital Output on the Arduino which is used for the Chip Select for the Display. 'DCS' refers to 'Display Chip Select'. This can be selected between D9 and D4 on the Arduino. This jumper is required to be used as without it communication with the 4DLCD-FT843 Display is not possible.

### 2.3. Jumper 3 (J3)

**Jumper 3 (J3)** is used to select the Digital Output on the Arduino which is used for the Power Down function of the display. Power Down (PD) enables the Arduino to tell the FT800 on the 4DLCD-DT843 Display to shut down and go into the Power Down mode, which is useful for low power applications. This pin can also be used to reset the display.

The PD pin requires the Arduino to send a minimum 5mS Low Pulse to the display, which will cause the display to reset. This is useful if the display needs to be reset for whatever reason.

If the PD pin is held Low, this causes the 4DLCD-FT843 display to shutdown and stay in Power Down mode, until such a time that the PD pin is driven High again.

## 2.4. Jumper 4 (J4)

**Jumper 4 (J4)** is used to select the digital Input on the Arduino which is used for receiving the INT (Interrupt) from the Display. The INT from the display can be set up with a number of options, so the display can interrupt the Arduino based on a specified condition, such as 'Screen Touch Detected' or 'Sound Ended'. For a complete list of available interrupts, please refer to the 4DLCD-FT843 Display Datasheet and FTDI FT800 Datasheet.

## 2.5. Arduino Reset Button (T1)

**T1** is a reset button for the Arduino, not for the display. This allows access to the Arduino's reset button which is covered up when a shield is placed on top of the Arduino for a number of the Arduino models.

## 2.6. Display Flex Connector (FPC1)

**FPC1** is a 10 way Bottom Contact FPC connector, for connecting directly to the 4DLCD-FT843 displays flex. When connecting the display flex to the FPC connector, please ensure the display flex is located as far into the connector as possible, however ensure this is done with care as to not damage the delicate display flex.

**NOTE:** Please ensure the component section of the flex is not handled excessively and is not bent nor twisted, otherwise damage may result and the display will no longer function correctly. The thin portion of the flex which is used to connect to the ADAM Shield should also be handled with care, and not subjected to strain or excessive twisting and bending else damage could occur.

## 2.7. Micro-SD

The **micro-SD** socket on the ADAM Shield enables the Arduino to access files for use with the FT800 Graphics Controller, along with being a storage media for general storage used by the Arduino.

The Arduino communicates to both the 4DLCD-FT843 Display and micro-SD over SPI, and some of the communication from the display may request the Arduino for information which is stored on a file on the micro-SD card. The Arduino will then access the information on the micro-SD card and send the information to the 4DLCD-FT843 Display.

**NOTE:** The 4DLCD-FT843 Display cannot directly access the micro-SD card, and is reliant on the Arduino to do so, even though both the micro-SD and the display are on the same SPI Bus. The FT800 requires the Host (The Arduino) to do this on its behalf.

**NOTE:** If a microSD card is inserted into the ADAM then it MUST be initialised in code, so the microSD card is correctly initialised into SPI Mode. Failure to do so could mean the microSD card 'chatters' on the SPI bus, even if it is not being specifically talked to, as it could be in SD mode. This may cause the display to have corruption and work incorrectly.

## 2.8. Audio Connector (P2)

The **P2** connector is a 2.54mm pitch 2 pin male pin header, which is used for attaching an external amplifier if the application requires audio.

Jumper wires can be attached directly, which can then be attached to a separate amplifier PCB or shield as required.

The P2 connector features the Audio pin, which is marked as the pin with the 'B' next to it. This pin outputs a 3.3V PWM which needs to be filtered and amplified for audible audio to be heard. Please refer to the amplifier circuit in Section 6.0 as an example of a suitable circuit. This is a Push/Pull output, with 16mA Source/Sink capability from the FT800 Graphics Processor on the 4DLCD-FT843 Display.

The P2 connector also features the Audio Shutdown pin, which is marked as the pin with an 'A' next to it. This pin outputs 3.3V when Audio is enabled by the FT800 graphics processor on the 4DLCD-FT843 Display, and GND when audio is disabled. This is typically used to enable/disable an external amplifier however is optional, depending on the external circuit used.

## 2.9. SPI Bus Voltage Connector (P3)

The **P3** connector is used with a simple 2 pin jumper shunt, to select between a 5V and a 3.3V SPI System. When using 'standard' Arduino boards, such as the Duemilanove, Uno, Mega etc, the 5V option should be selected as these boards are 5V boards. When using the Arduino Due for example, the 3.3V option should be selected as the Due is a 3.3V board.

**NOTE:** Failure to have this selected on the appropriate setting may damage your Arduino, or cause the display communications to not work. It is especially critical to note when using this Shield on a 3.3V Arduino, that the Shield is not selected to 5V, as 5V will damage the Arduino.

The P3 connector changes the secondary side of the logic buffer from being 5V or 3.3V, which either boosts the 3.3V logic coming from the micro-SD card and Display to be 5V, or simply buffers it and leaves it at 3.3V levels. This is the case for the MOSI, MISO, SCK, Display CS, Micro-SD CS, Display PD and Display INT signals.

## 3. Software Support

All software relating to the 4DLCD-FT843 Display and the Arduino are supplied from FTDI Directly, and are not created nor maintained by 4D Systems.

4D Systems has created the ADAM Shield and the 4DLCD-FT843 Display hardware, however all software relating to these products are provided by FTDI. For any software support relating to these products, please contact the FTDI Support team, <http://www.ftdichip.com/FTContact.htm>

Information about EVE can be found from the FTDI website, [www.ftdichip.com/EVE.htm](http://www.ftdichip.com/EVE.htm)

## 4. Hardware Support

The 4DLCD-FT843 Display and the ADAM shield hardware are supported by 4D Systems. Any issues regarding the hardware itself, please contact the 4D Systems Support team via the 4D Systems website, or on the 4D Systems Forum (also accessible from the 4D Systems website). [www.4dsystems.com.au](http://www.4dsystems.com.au)

## 5. Compatible Arduino's

The ADAM Shield is compatible with a wide range of Arduino and Arduino clones, however there are some which are not compatible. The ADAM Shield requires 5V to be supplied from the Arduino itself, and some Arduino clones, specifically 3.3V versions such as the Arduino Pro 3.3V, feature 3.3V on the pin typically specified as being 5V. These 3.3V varieties are **not compatible** as 5V is required for the ADAM Shield itself. It also requires the ICSP/SPI header to be populated with a 2x3 2.54mm pitch male pin header, which on most genuine Arduino's is the case. A number of clones do not include this header, and therefore one is required to be added for it to be compatible.

The Arduino Due, which is a 3.3V device, is compatible with the ADAM Shield. It is a 3.3V device but still features 5V on the 5V pin. See Section 2.9 on how to change the logic selection to be 3.3V.

### Known compatible Arduino's for the ADAM Shield:

Duemilanove

Uno

Leonardo

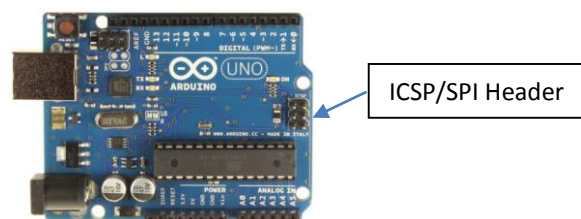
Mega 1280

Mega 2560

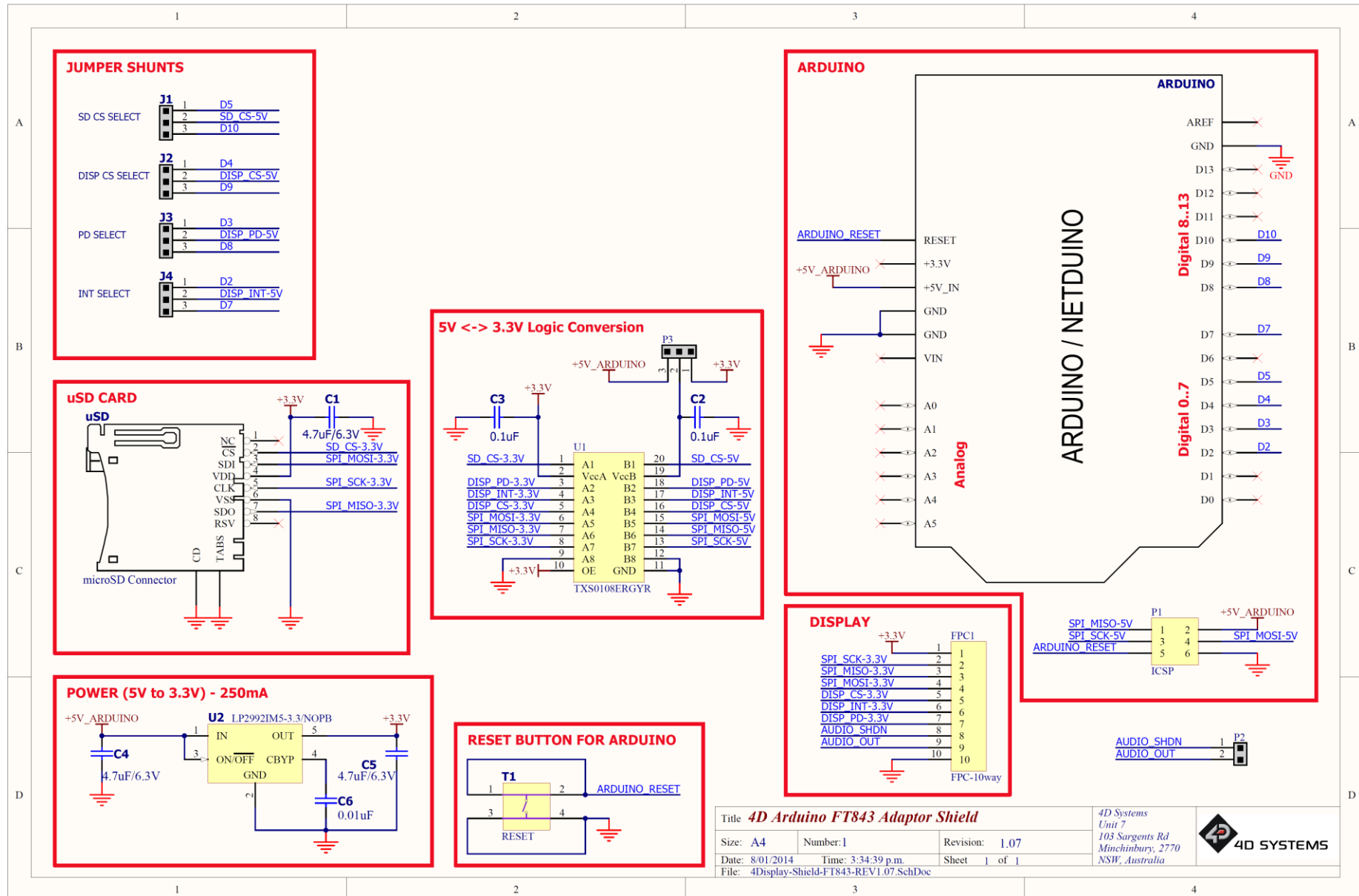
Due (IDE still in development)

Arduino Pro 5V

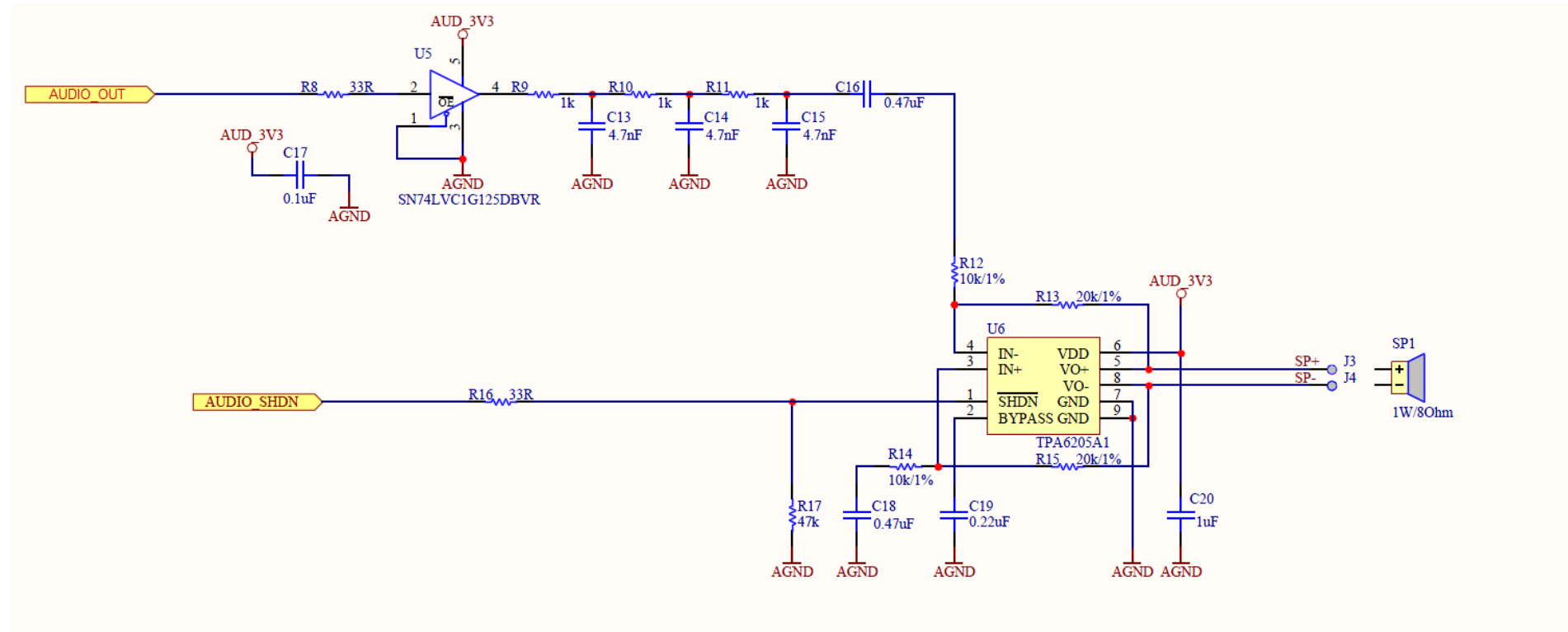
(Others may be compatible also)



## 6. Schematic Diagram



## 7. Audio Filter and Amplifier Reference Circuit





## 8. Specifications and Ratings

RECOMMENDED OPERATING CONDITIONS					
Parameter	Conditions	Min	Typ	Max	Units
Supply Voltage (VCC)		4.5	--	5.5	V
Operating Temperature		-10	--	+70	°C

ORDERING INFORMATION	
<b>Order Code:</b> 4Display-Shield-FT843	
<b>Packaging:</b> Module sealed in antistatic foam padded 4D Systems Box	

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