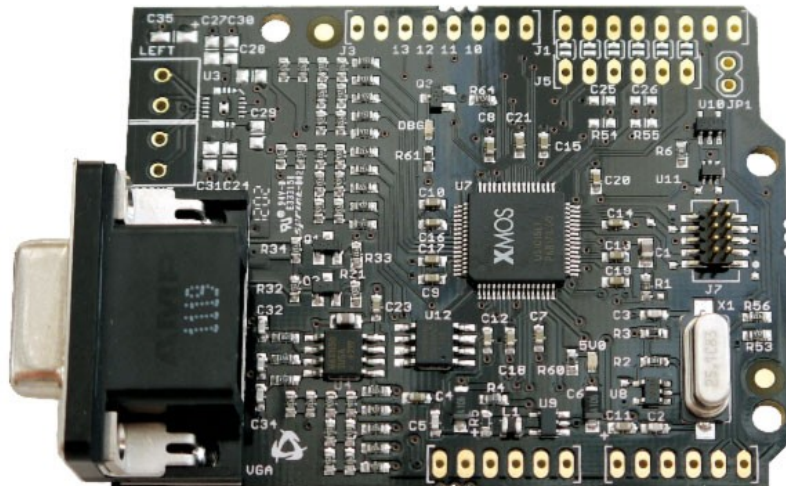




# SOLDERCORE

Arcade Shield

Issue: A (Preliminary)



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## Introduction

The Arcade Shield is a SolderCore and 3V3 Arduino compatible module. This plug-in PCB adds VGA and audio capability to SolderCore using a 4-wire SPI interface. The arcade shield is fully supported in CoreBASIC and can be utilized with the *INSTALL* "ARCADE-SHIELD" command.

### Features:

- 1) 400 MIP XMOS L1 Processor.
- 2) Outputs video in 320 x 240 resolution and stereo audio using a simple to use SPI protocol.
- 3) Standard 15 Pin VGA connector.
- 4) Screw terminal connectors for connecting left/right speakers.
- 5) On board 6-pin expansion headers for future modifications.
- 6) Supported by CoreBASIC.
- 7) 10-Pin JTAG connector for programming and debugging. (Free Software Development tools available from XMOS)
- 8) Debug and power LED

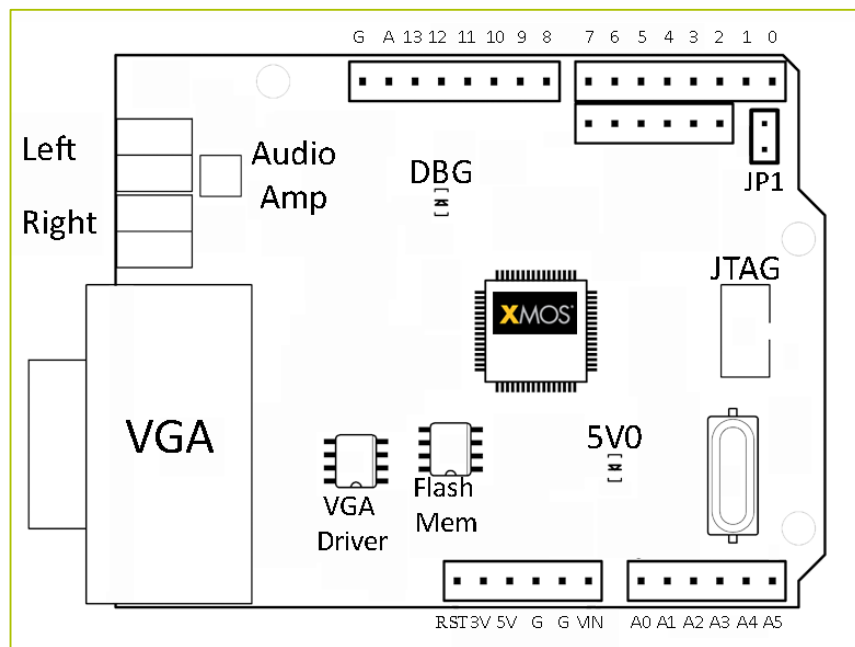


Figure 1 Arcade Shield Features

## Electrical Details

### Pin Information

The Arcade shield is an SPI slave device. Four signal lines are used to communicate and control the device. For details of the SPI protocol refer to the software manual. Table 1 details the position and function of the Arcade Shields I/O line.

Arcade Shield Pin Name	Schematic Conn Ref	Signal Name	Description
0	J1-1	NC	Not Connected
1	J1-2	NC	Not Connected
2	J1-3	NC	Default Not Connected. (P4E3 via SJ6)
3	J1-4	NC	Default Not Connected. (P4E2 via SJ5)
4	J1-5	NC	Default Not Connected. (P4E1 via SJ4)
5	J1-6	NC	Default Not Connected. (P4E0 via SJ3)
6	J1 -7	NC	P1I0 (XMOS)
7	J1-8	NC	P1J0(XMOS)
<b>Header 3</b>			
8	J3-1	NC	Not connected.
9	J3-2	NC	Not connected.
10	J3-3	CS	CS
11	J3-4	MOSI	SPI, Master Out Slave In.
12	J3-5	MISO	SPI, Master In Slave Out.
13	J3-6	SCK	SPI, Serial clock. Common to all devices.
G	J3-7	GND	Power return line
AREF	J3-8	NC	Not connected
<b>Header 2</b>			
A5	J2-1	SCL	I2C, serial clock. (Not used)
A4	J2-2	SDA	I2C, serial data. (Not used)
A3	J2-3	NC	Not Connected
A2	J2-4	NC	Not Connected
A1	J2-5	NC	Not Connected
A0	J2-6	NC	Not Connected
<b>Header 4</b>			
RST	J4-1	RST	Reset Signal.
3V	J4-2	3V3	3.3V Power Supply
5V	J4-3	5V0	5.0 V Power Supply
G	J4-4	GND	Power return.
G	J4-5	GND	Power return
VIN	J4-6	NC	No t Connected

**Table 1. Arcade Shield, Pin Out**

## Power

The Arcade shield is powered from the 3V3 and 5V0 rail supplied by the processor module. (Power Connector, Figure 1)

Current consumption will vary on application. Typical figures are shown in Table 2:

Supply Rail	Min I (ma)	Typ I(mA)	Max I(mA)
3.3	TBD	TBD	TBD
5.0	TBD	TBD	TBD

**Table 2 Current Consumption**

## User LED Information

There are two LEDs located on the Arcade Shield: a power LED to indicate 5V0 is present, and a debug LED. The debug LED is driven from the XMOS L1 processor (P1J0).

## Expansion Header

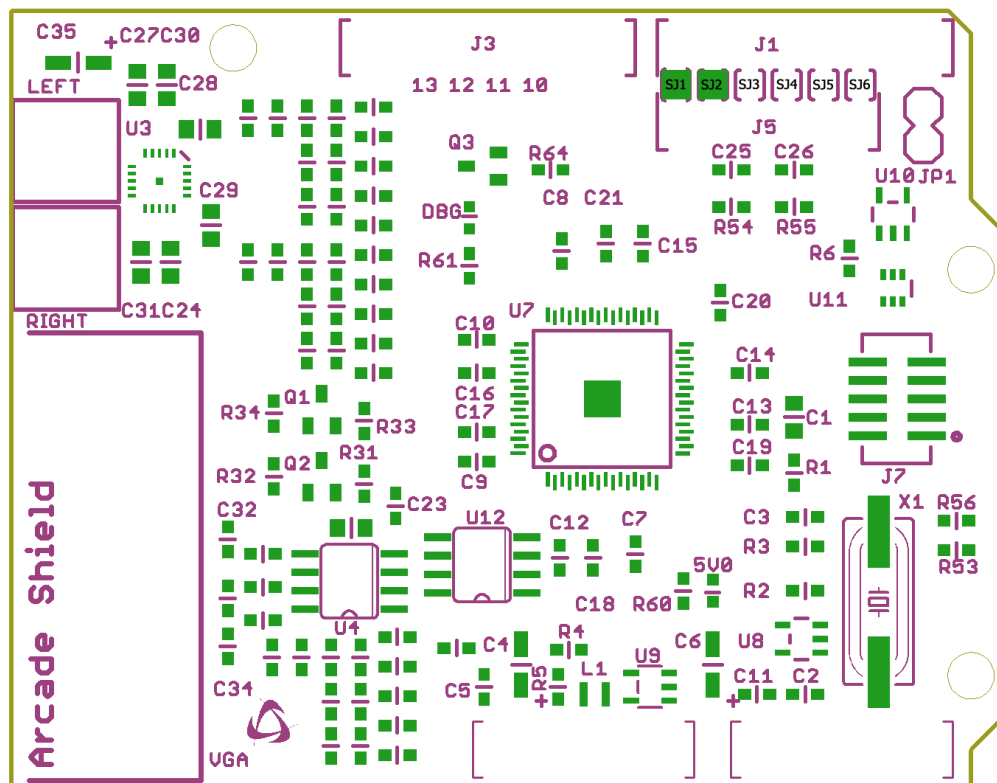
J5 provides access to XMOS pins not available on the standard SolderCore headers.

J5 Pin Number	XMOS Signal
1	P1J1
2	P1I0
3	P4E1
4	P4E2
5	P4E3
6	P4E4

**Table 3. J5 Expansion**

The extra signals may be connected to J1 pins 3 to 8 using the solder jumpers. By default J5-1 and J5-2 are connected to J1-8 and J1-7 respectively as SJ1 and SJ2 are shorted. (Top right Figure 2).

J5-1 is shared with a debug LED.



**Figure 2 Arcade Shield PCB default jumper configuration.**

## VGA

The Arcade shield outputs VGA signals via the VGA connector. The pin out of the VGA connector is detailed in Table 4

VGA Connector Pin Number	Description
1	Red Video Signal
2	Green Video Signal
3	Blue Video Signal
4, 9, 11, 12, 15,	Not Connected
13	Horizontal Sync
14	Vertical Sync
5, 6, 7, 8, 10	GND

**Table 4. VGA Connector Pin Out**

The arcade shield does not support DDC.

## Audio

**The audio circuit is not populated on the standard Arcade Shield. It may be populated on a later version.**

Audio signals are generated using high speed PWM signals from the XMOS L1 processor. The PWM is filtered and amplified. The audio amplifier can drive 4 or 8 Ohm speakers.

The audio amplifier can be controlled and read using I2C. The I2C signals (SCL, SDA) are taken to pins A4 and A5 of the Analog connector. The external processor board can configure various parameters of the amplifier including:

- Gain
- AGC parameters (hold and release time)
- Channel Enable.

For more information on the I2C protocol, refer to the TPA2016 data sheet from Texas Instruments.

## JTAG

The XMOS L1 device can be programmed using JTAG. The JTAG signals are routed to a 10 pin JTAG header (J7). Table 5 details the connector pin out.

Connector Pin Number	JTAG Signal Name
1	NC
2	TMS
3	GND
4	TCK
5	GND
6	TDO
7	DEGUG
8	TDI
9	TRST_N
10	RST_N

**Table 5. JTAG Connector Pin out**



## Mechanical Details

The SolderCore PCB has the same form factor as the popular Arduino module. PCB dimensions are shown in Figure 3.

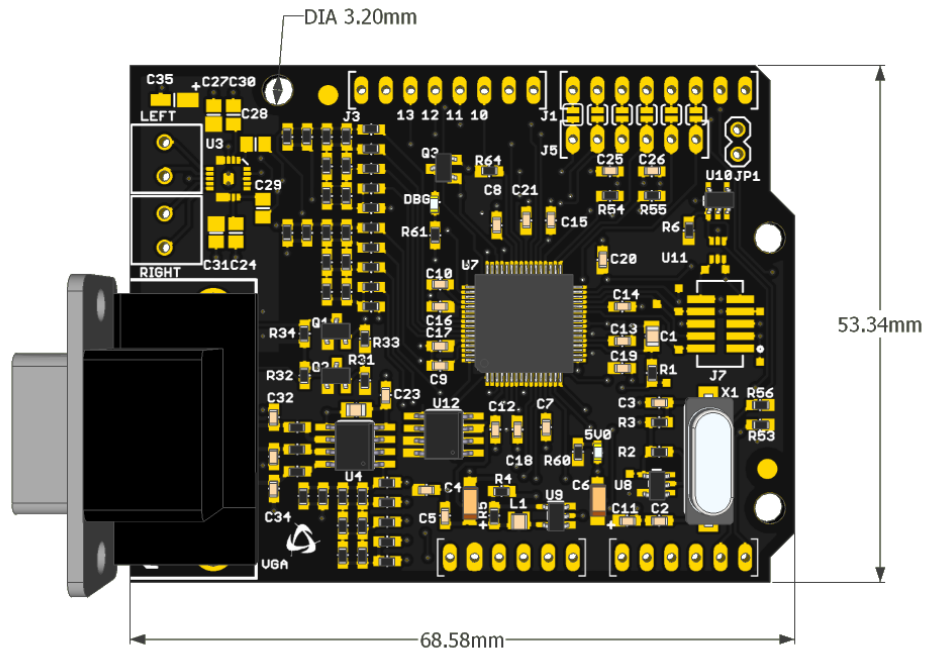


Figure 3. Arcade Shield PCB Outline.