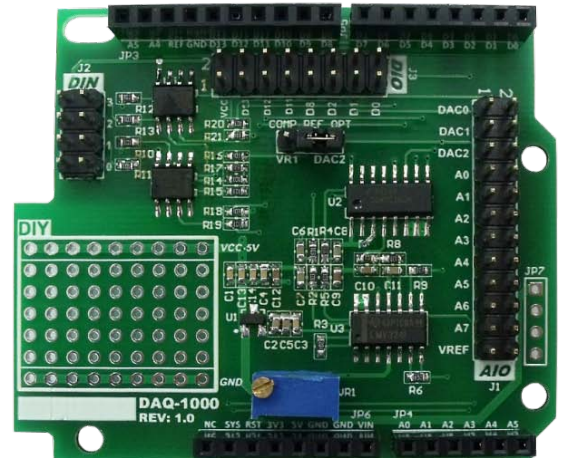


Using the Arduino as a Really Inexpensive DAQ !



Features

Low Cost Arduino UNO Data Acquisition Shield

Using the Arduino as a Really Inexpensive DAQ , Arduino UNO compatible.

8-CH 10bit (or 12bit) ADC

INHAOS Buono UNO R3 provide 8CH ADC interface, some compatible UNO only provided 6-CH ADC interface.

Most Arduino UNO R3 derivative board using Atmega328P as the main controller , which can be provided 10bit ADC resolutions.

Massduino UNO R3 LC using MD328D as the main controller , it's provided 12bit ADC resolutions.

7-CH Digital IO (Can be used for SPI interface)

Standard UNO pinout , used for standard IO or SPI interface.

Onboard 4.096V Precision Voltage Reference

Using Microchip MCP1541 4.096V precision voltage reference , with +/-50ppm temperature drift and max +/-1% initial accuracy.

3-CH PWM DAC

3-CH PWM DAC , Arduino **Pin_10** for **DAC0**, **Pin_9** for **DAC1** and **Pin_3** for **DAC2**, **DAC2** is **fixed 8bit** resolutions and **DAC0/1** is **15bit** resolutions.

The DAC2 can be configuration as the threshold source for Digital input.

4-CH Digital Input

Provided 4-CH digital input , with adjustable reference , two reference can be selectable , one is a multi ring precision potentiometer with manual adjust and one is **DAC CH2**, the reference voltage is select by a 3Pin jumper wire.

Specifications

Signal Inputs

Analog Inputs

Number of Channels :	6 or 8 (depend UNO main board)
Full Scale Range :	0 to 4.096V
Resolutions :	10Bits (UNO With ATmega328P) 12Bits (UNO LC with MD328D)

Digital Inputs

Number of Channels :	4
Input threshold :	0 to 4.096V adjustable by DAC2 0 to 5V adjustable by manual
Operation Range:	0 to 5V
Absolute max Value:	0 to 32V

Digital IOs

Number of Channels :	7 (Can be configuration as SPI interface)
Voltage Level :	TTL-5V

Signal Outputs

Analog Outputs

Number of Channels :	3
Full Scale Range :	0 to 4.096V
Resolutions :	CH2 : 8Bits (16mV) CH0/1 : 15Bits (0.125mV)

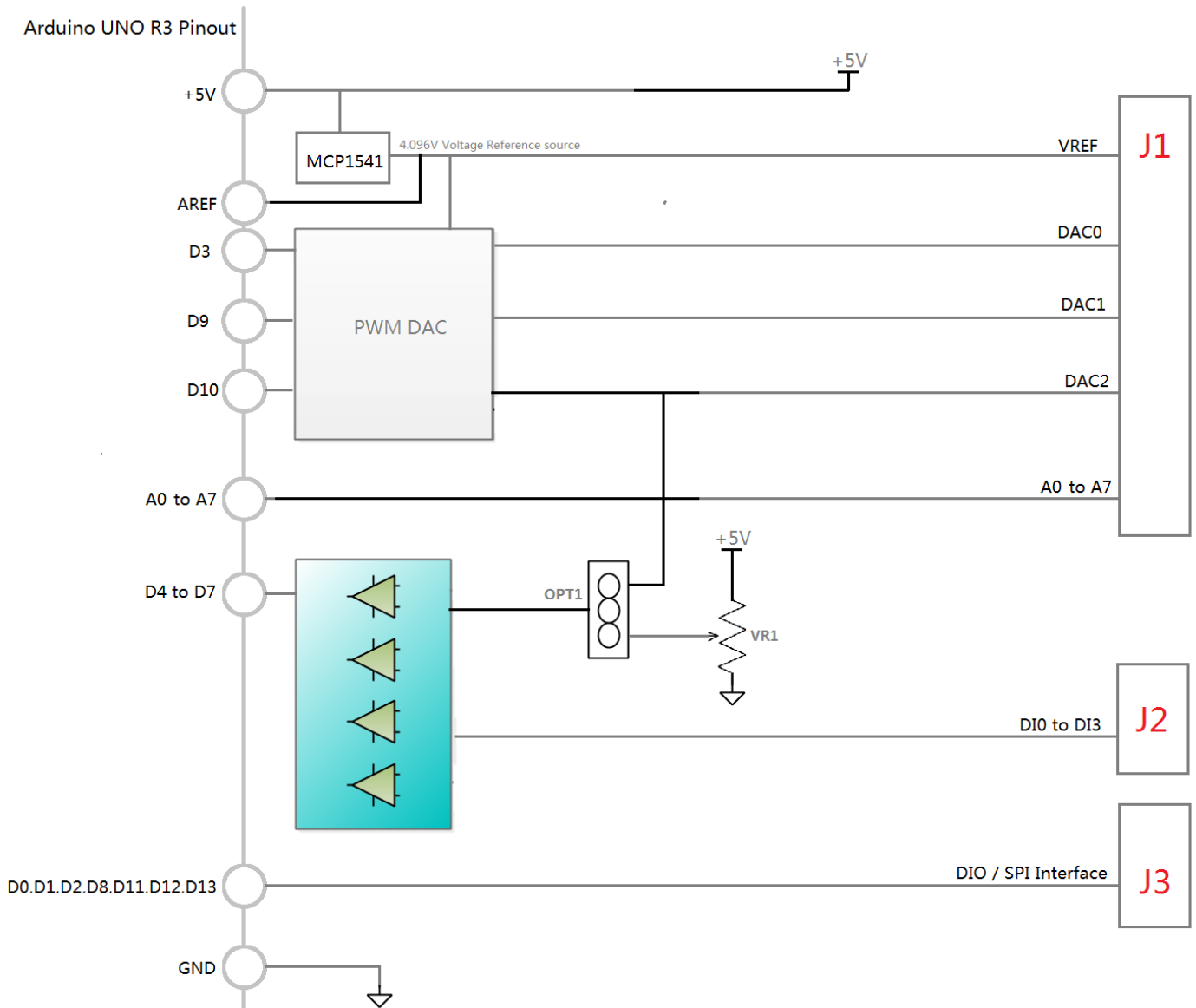
Voltage Reference Source

Output Voltage :	4.096V (4.055 to 4.137V)
Output Voltage Drift :	Max 50ppm/°C
Chips :	Microchip MCP1541 SOT-23

Environmental

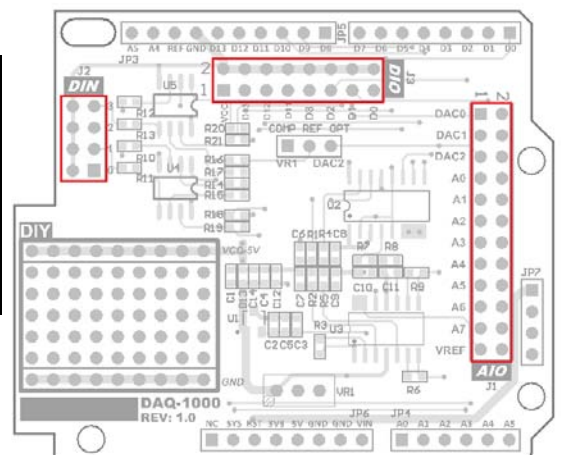
Operation Temperature :	0°C to 55°C
Operating Humidity :	0 to 90% non-condensing
Storage Temperature :	-20°C to 65°C

Block Diagram



Connector Description

NO.	Designator	Function
1	J1	AIO , Analog input and output
2	J2	DIN , Digital input
3	J3	DIO , Digital input and output / SPI interface
4	OPT	Select DIN threshold between VR1 and DAC2
5	VR1	DIN threshold manual adjust



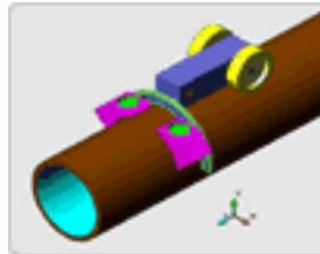
Arduino IO Configuration

No.	Arduino Pin No.	DAQ Pin Define	I/O	Analog or Digital	Function	Remark
1	+5V	+5V	P	P	Power supply for DAQ	
2	A0	AIN0	I	A	Analog input CH0	Full scale 0 to 4.096V
3	A1	AIN1	I	A	Analog input CH1	Full scale 0 to 4.096V
4	A2	AIN2	I	A	Analog input CH2	Full scale 0 to 4.096V
5	A3	AIN3	I	A	Analog input CH3	Full scale 0 to 4.096V
6	A4	AIN4	I	A	Analog input CH4	Full scale 0 to 4.096V
7	A5	AIN5	I	A	Analog input CH5	Full scale 0 to 4.096V
8	A6	AIN6	I	A	Analog input CH6	Most Arduino main board do not have this pin , BUONO UNO supported
9	A7	AIN7	I	A	Analog input CH7	Most Arduino main board do not have this pin , BUONO UNO supported
10	D0 D1 D2 D8 D11(MOSI) D12(MISO) D13(SCK))	D0 D1 D2 D3 D11 D12 D13	IO	D	Digital IOs	Digital IOs , can be configuration as SPI interface
11	D10 D9 D3	PWM_DAC0 PWM_DAC1 PWM_DAC2	O	D	PWM output for DAC0 to DAC2	The D3 only support 8bit PWM , D9/D10 support 15Bit PWM The DAC output Full scale is 0 to 4.096V
12	D4 D5 D6 D7	D10 D11 D12 D13	I	D	Digital Input	Different from normal digital input port , the D10 to D14 support adjustable threshold , and the threshold source can be selectable between VR2 and DAC2
13	AREF	AREF	I	A	4.096V Reference	4.096V reference source for ADC

Applications

Research and Analysis

- Characterizing and logging behaviors or properties
- Discovering scientific phenomena
- Systematically investigating new products and designs



Diagnostics and Repair

- Identifying the cause of failure
- Manual and ad-hoc troubleshooting
- Characterizing malfunctioning systems

Design Validation and Verification

- Confirming that a system meets initial design specifications
- Establishing evidence that a product meets its users' needs
- Testing adherence to an industry standard



Asset Condition Monitoring

- Long-term, continuous monitoring of equipment
- Identifying problems before failure occurs
- Trending, logging, and alarming in the event of error conditions

Manufacturing and Quality Test

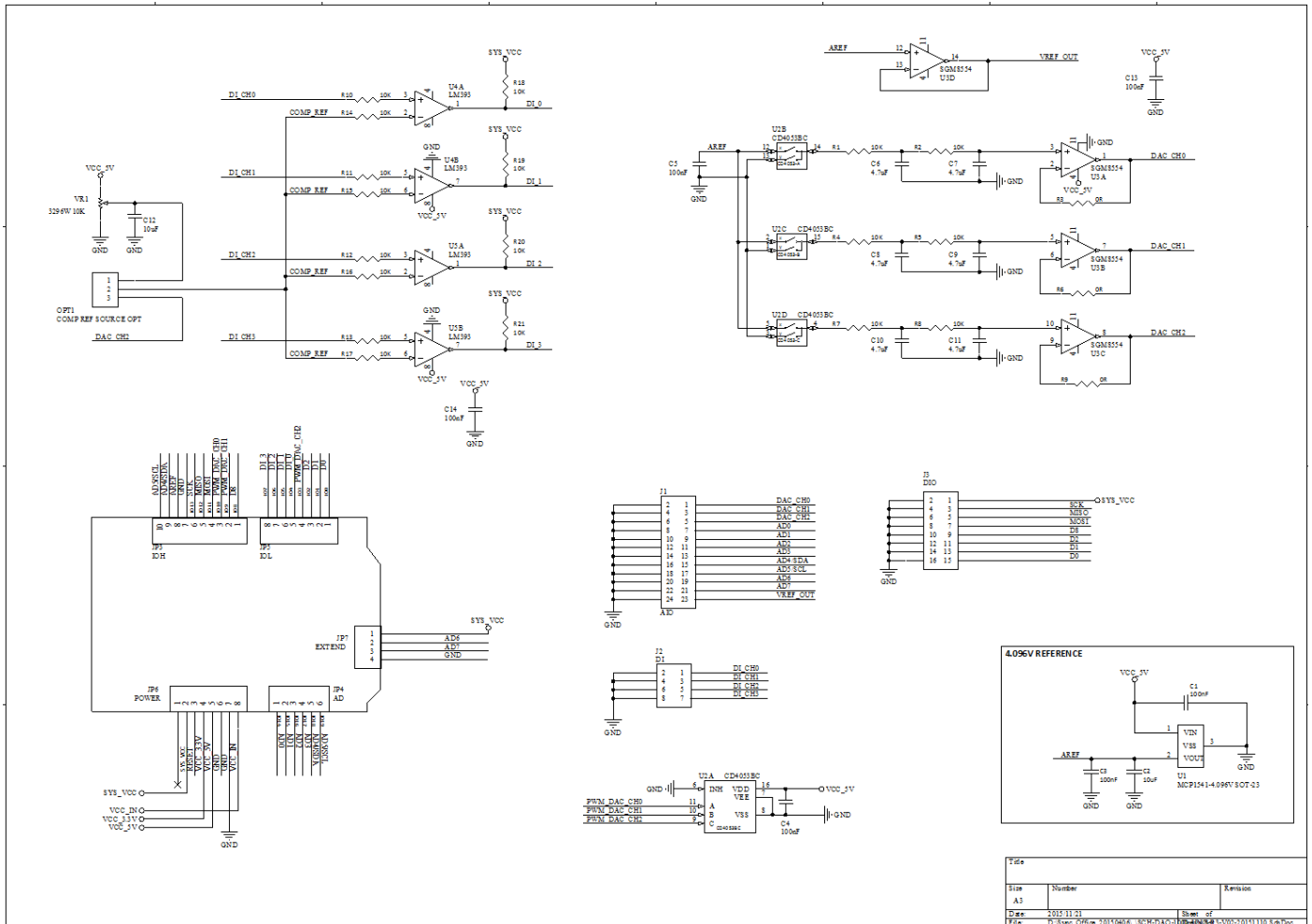
- Performing functional and system-level product test
- End-of-line pass/fail quality testing
- Checking for defective products and subsystems



PC-Based Control and Automation

- Controlling processes without human interaction
- Automating the operation of machinery
- Performing open-loop and closed-loop control, such as PID

Schematic



How to choice Arduino UNO Main board

Most Arduino UNO R3 derivative board using DC2DC as the 5V power supply to get higher current capability, the DC2DC power supply have better efficiency but worse noise than the linear regulator , this will impact analog circuit working. INHAOS BUONO UNO LC series using linear regulator in the 5V power circuit , it's better for the analog performance.

If your Arduino mainboard have 5V and 3.3V power supply selection , please using 5V for the system power since the AREF is 4.096V and the power supply have to higher than the AREF pin. and please remember configuration the ADC Reference source to EXTANAL.

INHAOS BUONO UNO LC series also have another option on the main controller , the ATmega328P have ADC with 10bit resolution . and the MD328D provided 12bit ADC resolution , this will help for analog input performance.

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