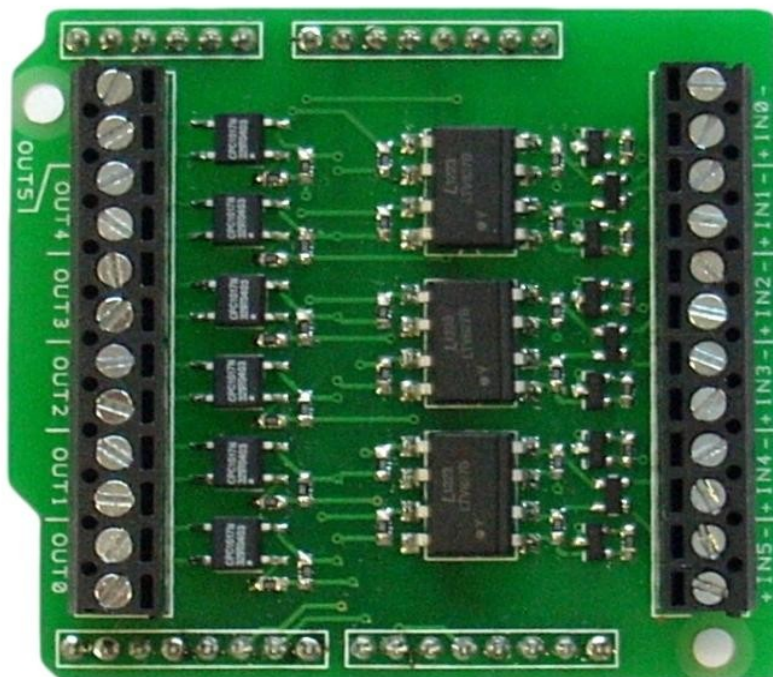


DAQ Shield



User's Guide

Introduction

The **DAQ Shield** is an Arduino compatible shield with six solid state relay outputs and six optoisolated digital inputs, which allows Arduino controlled switching of external devices and digital signals acquisition.

Outputs of the shield are designed with solid state technology, which means they do not have any moving parts like electromechanical relays do. Four main advantages of using SSR over electromechanical relay are unlimited relay life, faster switching time, bounce-free operation and quiet operation. AC or DC load may be connected with $60 V_{peak}$ and $100 mA_{max}$.

Inputs of the shield are fully optoisolated and the input range on each channel is $-60 V_{DC}$ to $+60 V_{DC}$.

Features

- 2 x 12 terminal block with screw terminal
- Fully isolated I/O
- Unlimited relay life
- Bounce-free outputs
- Current limited inputs

I/O Connector

The **DAQ Shield** ships with two terminal block for digital signals. Each individual terminal accepts a wire gauge between 16 AWG and 26 AWG.

Table 1 describes the signals available on the I/O connectors.

Table 1: Signal descriptions

Signal name	Direction	Description
OUT<0..5>	Output	Solid state relay output
IN<0..5>+/-	Input	Optically isolated digital input IN<0..5>+ corresponds to the positive input terminal IN<0..5>- corresponds to the negative input terminal

Input

The **DAQ Shield** provides six channels of isolated digital inputs. These inputs consist of an

optocoupler, a current limiting circuit and a reverse voltage protection diode.

Each channel has its own positive and negative terminal. The input range on each channel is -60 V_{DC} to $+60\text{ V}_{\text{DC}}$.

Each shield input detects a wide range of DC signals, from TTL logic levels to DC voltage levels up to $+60\text{ V}_{\text{DC}}$.

Applying a DC voltage of at least 3 V across two input terminals registers logic high. Applying no voltage or a voltage difference of 1V or less registers logic low. DC voltage between 1V and 3 V may not register a consistent value.

Figure 1 shows signal connections for a power supply and a load connected to an isolated input.

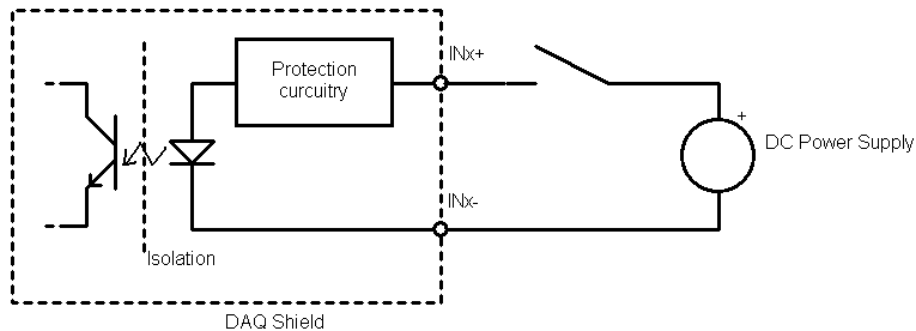


Figure 1: Connecting a switch to the isolated input

Output

The **DAQ Shield** provides six channels of optically isolated solid state relay outputs rated at 100 mA maximum current.

AC or DC load may be connected using outputs as switches to apply external power to loads.

The default power-on state of the solid state relays is open.

Connect the load to one of the leads of the power source. Connect a shield output terminal to the load and the other terminal to the other lead of the DC or AC power source. Figure 2 shows a possible configuration.

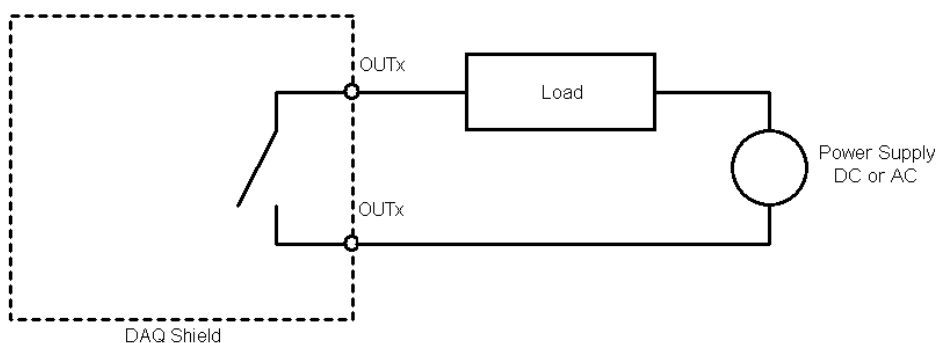


Figure 2: Connecting a load to the DAQ Shield output

Programming

The following sketch is an example on how to use **DAQ Shield**:

```

#define OUT0 8
#define OUT1 9
#define OUT2 10
#define OUT3 11
#define OUT4 12
#define OUT5 13

#define IN0 2
#define IN1 3
#define IN2 4
#define IN3 5
#define IN4 6
#define IN5 7

void setup() {
  pinMode(OUT0,OUTPUT);
  pinMode(OUT1,OUTPUT);
  pinMode(OUT2,OUTPUT);
  pinMode(OUT3,OUTPUT);
  pinMode(OUT4,OUTPUT);
  pinMode(OUT5,OUTPUT);

  pinMode(IN0,INPUT);
  pinMode(IN1,INPUT);
  pinMode(IN2,INPUT);
  pinMode(IN3,INPUT);
  pinMode(IN4,INPUT);
  pinMode(IN5,INPUT);

  digitalWrite(OUT0,LOW);
  digitalWrite(OUT1,LOW);
  digitalWrite(OUT2,LOW);
  digitalWrite(OUT3,LOW);
  digitalWrite(OUT4,LOW);
  digitalWrite(OUT5,LOW);
}

void loop() {
  if(digitalRead(IN0)==HIGH) digitalWrite(OUT0,HIGH); else digitalWrite(OUT0,LOW);
  if(digitalRead(IN1)==HIGH) digitalWrite(OUT1,HIGH); else digitalWrite(OUT1,LOW);
  if(digitalRead(IN2)==HIGH) digitalWrite(OUT2,HIGH); else digitalWrite(OUT2,LOW);
  if(digitalRead(IN3)==HIGH) digitalWrite(OUT3,HIGH); else digitalWrite(OUT3,LOW);
  if(digitalRead(IN4)==HIGH) digitalWrite(OUT4,HIGH); else digitalWrite(OUT4,LOW);
  if(digitalRead(IN5)==HIGH) digitalWrite(OUT5,HIGH); else digitalWrite(OUT5,LOW);
}

```

This example closes relay x when input x is at logic high and opens relay x when input x is at logic low.

Specifications

The following specifications are typical at 25 °C.

Isolated inputs

Number of input channels	6
Input voltage range	-60 V _{DC} to 60 V _{DC}
Input low voltage	-60 V _{DC} to 1 V _{DC}
Input high voltage	3 V _{DC} to 60 V _{DC}
Input current	3 mA max

Solid state relay outputs

Number of output channels	6
Relay type	Normally open solid state relay
Peak off-state voltage	60 V
Switching current	100 mA _{DC} /mA _{rms}
On resistance	16 Ω
Off-state leakage current	1 μ A

Physical characteristics

Dimensions	58.50 x 53.50 x 19.50 mm
Screw terminal wire size	16-26 AWG