

ULN2803 Breakout Shield

User Guide

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Introduction

Numato Lab's ULN Breakout Shield is Arduino Compatible, allows to interface low level signals (such as TTL signals) with higher voltage and current requirements of relays, motors or other similar inductive loads for a broad range of applications. The popular ULN2803 IC used in this shield consists of eight NPN Darling-ton transistor arrays each features open-collector outputs and free wheeling clamp diodes for transient suppression. Each output pin of the IC is provided with individual LED indicating the output power supply, in addition these pins are given out to male headers along with VDD for extended applications.

Some of the possible uses of this shield include

- Small scale Robotic Applications
- Industrial Applications
- Computer Applications
- Consumer Applications
- DIY and Hobby

Features

- Arduino Uno, Arduino Mega compatible shield.
- Array of 8 NPN Darling-ton transistors with free wheeling diodes.
- LED indication for each output channel.
- Optional external power supply for the board.
- Small size, Low cost and Less in weight.
- Compatible with Windows XP / Windows 7.

This shield is a versatile piece of hardware protects the Arduino board while driving large loads such as relays, motors, lamps, etc., The current provided by the micro controller I/O pins will not be sufficient to drive such large loads. ULN IC family resolves this problem using it's Darling-ton pair setup which provides higher output voltage up to 50V and 500mA collector current-continuously. The input pins of the ULN2803 IC is connected with the Arduino board digital pins(2-9), refer the schematic diagram for the IC connections provided in the end of the document. The board's digital circuitry can be powered either from Arduino DC jack or from external voltage source provided on screw terminals of the board. The Jumper is provided for the power selection, Jumper position on 5V provides power from Arduino board and on 12V provides power from external source.

How to use the shield

The following section describes how to use this shield.

Components/Tools required

Along with this shield, you may need the following items for easy and fast installation.

1. Arduino Uno / Arduino Mega / Compatible board.
2. 5-12V power supply that should connect to shield or to the Arduino DC jack.
3. Small screw driver.

Connection Details



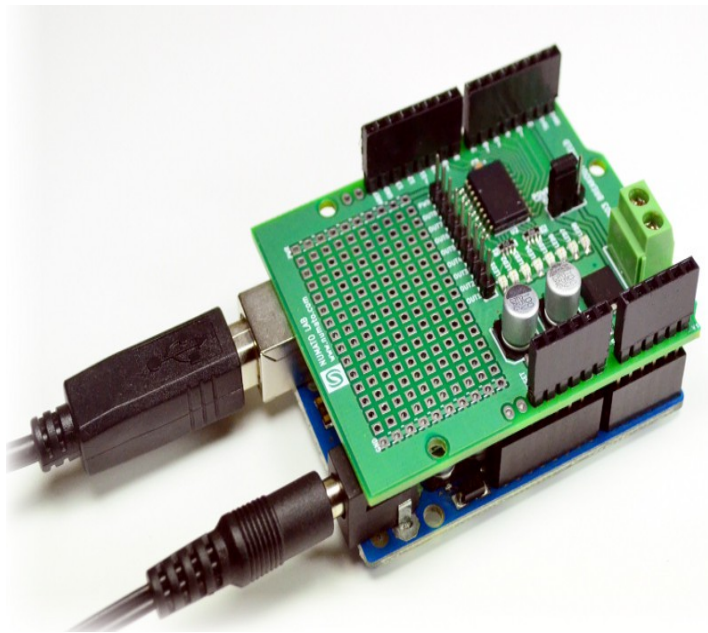
IMPORTANT Please exercise utmost caution while working with electrical mains or other high voltages. Failure to comply with safety regulations may result in injury and or death.

DC Power Supply

The board's digital circuitry can be powered either from Arduino DC jack or from external screw terminal on the board. The Jumper is provided for the power selection, Jumper position on 5V provides power from Arduino board and on 12V provides power from external source (**By default the board is shipped with Arduino power supply**). Connect 5-12V DC supply for Arduino DC jack or to the external screw terminal according to the jumper position. Any off the shelf DC power supply can be used for this purpose. Make sure to connect the power supply in correct polarity. Connect the **positive** terminal of the power supply to the '+' terminal on the shield. Connect **negative** terminal of the power supply to '-' terminal of the shield. Connecting power supply incorrectly can cause damage to the shield and or other devices. On board 7805 voltage regulator protects the digital circuitry from higher voltages.

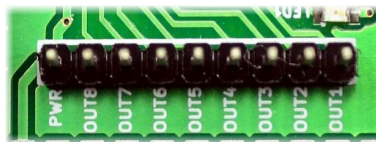


Connecting the shield to Arduino Uno



1. Plug ULN Breakout Shield on to Arduino Uno (or compatible) board.
2. Connect 5-12V DC power supply to the Arduino DC jack or to the screw terminals on the shield according to the jumper position.
3. Download the demo code for the shield from www.numato.com.
4. Open the demo code in Arduino IDE compile and upload to the Arduino Board.
5. Open serial monitor, control the OUT pins by sending simple numbers(ex: 11 to turn 'ON' OUT1 and 10 to turn 'OFF' OUT1).

Input Control



The Input pins of the ULN2803 IC is connected with the Arduino digital pins(2-9) in which four are PWM pins provided to control the duty cycle of ULN outputs according to the application requirement. Refer the schematic diagram in the end of the document for pin connection details. Each output pin is provided with an individual LED for indicating the ON/OFF state. The output pins are given out as male header on the board adding VDD for easy usage in some applications. Please consider some precautions while using this shield with high inductive loads. An extra free wheeling diode is also recommended in some applications.

Technical Specifications

Parameter *	Value	Unit
Basic Specifications		
Number of Output channels	8	
Digital circuit power supply voltage	5-12	V
Maximum current drawn by digital circuitry	95	mA
ULN2803 Specifications		
Output Voltage(V _O)	50	V
Input Voltage(V _I)	30	V
Collector current - continuous(I _C)	500	mA
Base current - continuous(I _B)	25	mA
Clamp Diode Forward Voltage(V _F)	1.5	V
Clamp Diode Leakage Current	50-100	μA
Operating Temperature Range	0-70°	C
Input and Enable High Current	30-100	μA

* All parameters considered nominal. Numato Systems Pvt Ltd reserve the right to modify products without notice.

FAQ

Q. What are the serial parameters I need to use when communicating with this board?

A. Since this module uses USB as the underlying transport mechanism, most of the serial parameters do not affect the communication. You can leave all parameters to any legal value (eg: 2400, 4800, 9600 etc... for baud rate) except Flow control. Flow control needs to be set to “None”.

Q. Where do I find Demo Code for this product?

A. Visit <http://numato.com> and navigate to the product page. There will be a link to download Demo code.

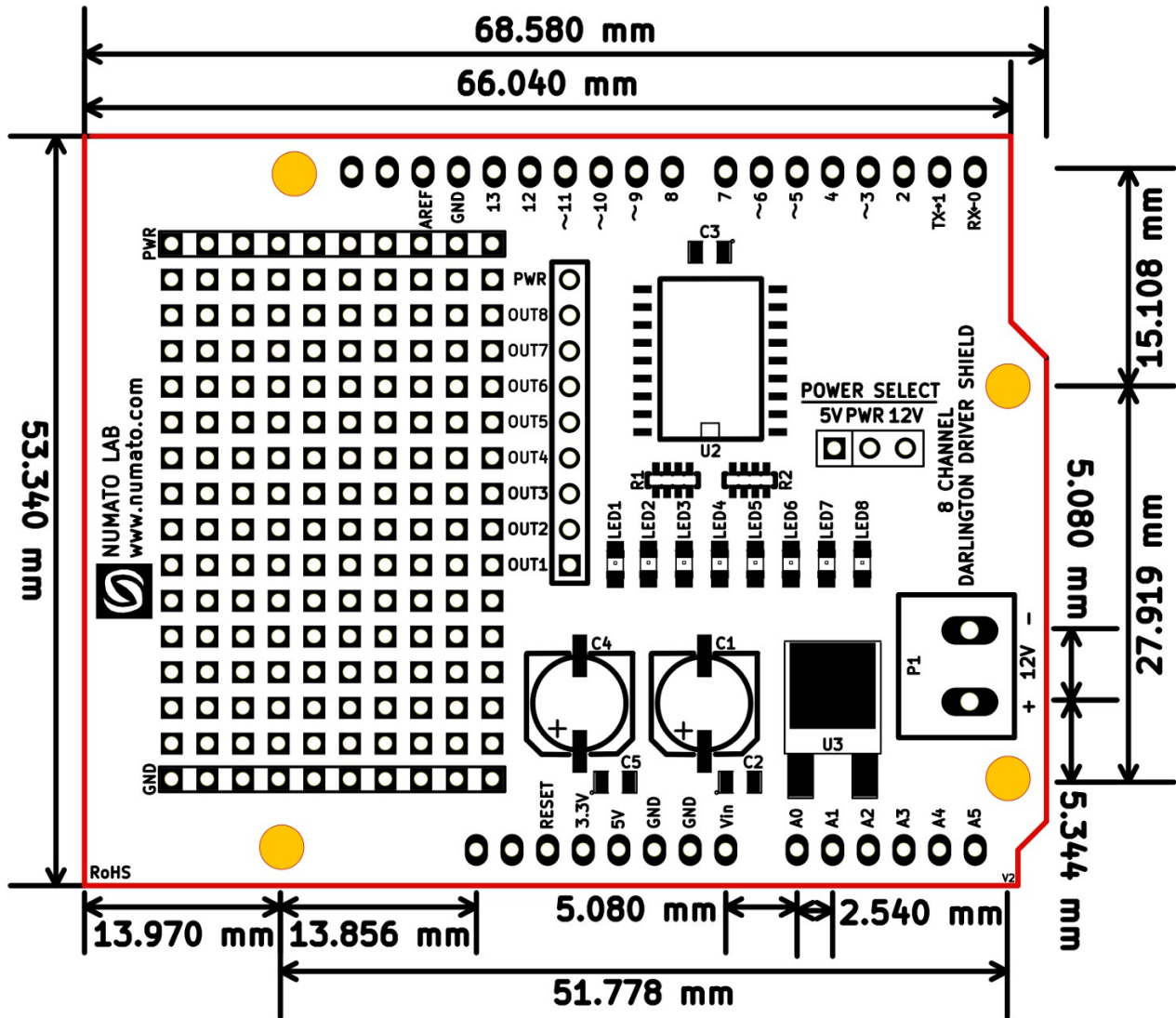
Q. I need a customized version of this product, can Numato do the customization for me?

A. Yes, we can definitely do customization but there may be minimum order requirements depending on the level of customization required. Please write to sales@numato.com for a quote.

Q. Where can I buy this product?

A. All Numato products can be ordered directly from our web store <http://www.numato.com>. We accept major credit cards and Paypal and ship to almost all countries with a few exceptions. We do have distributors in many countries where you can place your order. Please find the current list of distributors at <http://numato.com/distrib>.

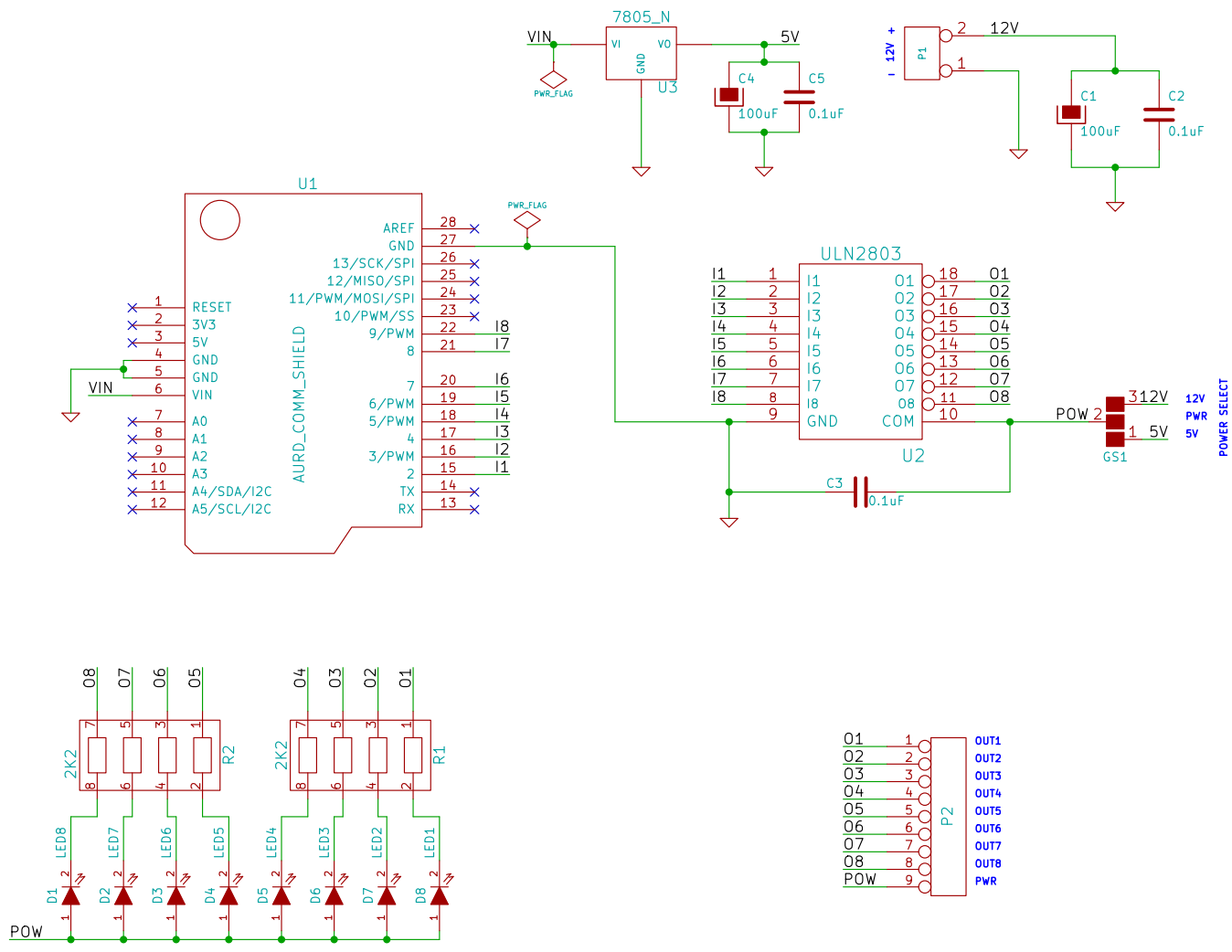
Physical Dimensions



L x W x H : 68.580 mm x 53.340 mm x 24 mm
 Mechanical Hole Diameter- 3.2 mm

Schematics

See next page.



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 Title: 8 Channel Darlington Pair Driver Shield
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