

# LAMPIRAN

	<b>KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET, DAN TEKNOLOGI</b> <b>DIREKTORAT PENDIDIKAN TINGGI VOKASI</b> <b>POLITEKNIK NEGERI SRIWIJAYA</b> Jalan Srijaya Negara, Palembang 30139 Telp. 0711-353414 Fax. 0711-355918 Website : www.polisriwijaya.ac.id E-mail : info@polsri.ac.id	 
	<b>KESEPAKATAN BIMBINGAN LAPORAN AKHIR (LA)</b>	

Kami yang bertanda tangan di bawah ini,

**Pihak Pertama**

Nama : Lyra Aurellia Rivanka  
 NIM : 062030331184  
 Jurusan : Teknik Elektro  
 Program Studi : D3 Teknik Telekomunikasi

**Pihak Kedua**

Nama : Dr.Ing.H Ahmad Taqwa, M.T.  
 NIP : 196812041997031001  
 Jurusan : Teknik Elektro  
 Program Studi : D3 Teknik Telekomunikasi

Pada hari ini ..... tanggal ..... telah sepakat untuk melakukan konsultasi bimbingan Laporan Akhir.

Konsultasi bimbingan sekurang-kurangnya 1 (satu) kali dalam satu minggu. Pelaksanaan bimbingan pada setiap hari ..... pukul ....., tempat di Politeknik Negeri Sriwijaya.

Demikianlah kesepakatan ini dibuat dengan penuh kesadaran guna kelancaran penyelesaian Laporan Akhir.

Pihak Pertama,



(Lyra Aurellia Rivanka)  
 NIM 062030331184

Palembang, 04 April 2023

Pihak Kedua,



(Dr. Ing. H. Ahmad Taqwa, M.T.)  
 NIP 196812041997031001

Mengetahui,  
 Ketua Jurusan



(Ir. Iskandar Luthfi, M.T.)  
 NIP 196301291991031002

	<b>KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET, DAN TEKNOLOGI</b> <b>DIREKTORAT PENDIDIKAN TINGGI VOKASI</b> <b>POLITEKNIK NEGERI SRIWIJAYA</b> Jalan Srijaya Negara, Palembang 30139 Telp. 0711-353414 Fax. 0711-355918 Website : www.polisriwijaya.ac.id E-mail : info@polsri.ac.id	 
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**Pihak Pertama**

Nama : Lyra Aurellia Rivanka  
NIM : 062030331184  
Jurusan : Teknik Elektro  
Program Studi : D3 Teknik Telekomunikasi

**Pihak Kedua**

Nama : Hj. Adewasti, ST.,M.Kom.  
NIP : 197201142001122001  
Jurusan : Teknik Elektro  
Program Studi : D3 Teknik Telekomunikasi

Pada hari ini Selasa tanggal 04 April 2023 telah sepakat untuk melakukan konsultasi bimbingan Laporan Akhir.

Konsultasi bimbingan sekurang-kurangnya 1 (satu) kali dalam satu minggu. Pelaksanaan bimbingan pada setiap hari Senin pukul 10.00 Wib, tempat di Politeknik Negeri Sriwijaya.


Demikianlah kesepakatan ini dibuat dengan penuh kesadaran guna kelancaran penyelesaian Laporan Akhir.

Pihak Pertama,

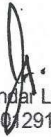
  
(Lyra Aurellia Rivanka)  
NIM 062030331184

Palembang, 04 April 2023

Pihak Kedua

  
(Hj Adewasti, ST.,M.Kom)  
NIP 197201142001122001

Mengetahui,  
Ketua Jurusan

  
(Ir. Iskandar Luthfi, M.T.)  
NIP 196501291991031002



KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET, DAN TEKNOLOGI

DIREKTORAT PENDIDIKAN TINGGI VOKASI

POLITEKNIK NEGERI SRIWIJAYA

Jalan Srijaya Negara, Palembang 30139

Telp. 0711-353414 Fax. 0711-355918

Website: [www.polisriwijaya.ac.id](http://www.polisriwijaya.ac.id) E-mail : [info@polsri.ac.id](mailto:info@polsri.ac.id)

LEMBAR BIMBINGAN LAPORAN AKHIR

Lembar: 1

Nama : Lyra Aurellia Rivanka  
 NIM : 062030331184  
 Jurusan/Program Studi : Teknik Elektro/D-III Teknik Telekomunikasi  
 Judul Laporan Akhir : Rancang Bangun Perangkat Keras Mesin Pembuat Popcorn  
 Otomatis Menggunakan *Internet of Things (IoT)*  
 Pembimbing-I : Dr. Ing. H. Ahmad Taqwa, M.T

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
1.			
2.			
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LEMBAR BIMBINGAN LAPORAN AKHIR

Lembar: 2

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
8.			
9.			
10.			
11.			
12.			
13.			
14.			
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17.			



KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET, DAN TEKNOLOGI

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LEMBAR BIMBINGAN LAPORAN AKHIR

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
18.			
19.			
20.			

Palembang, 02-08-2023

Mengetahui,

Koordinator Program Studi  
DIII Teknik Telekomunikasi

Ciksadan, S.T., M.Kom

NIP 196809071993031003

**Catatan:**

\*) melingkari angka yang sesuai.

Ketua Jurusan/Ketua Program Studi harus memeriksa jumlah pelaksanaan bimbingan sesuai yang dipersyaratkan dalam Pedoman Laporan Akhir sebelum menandatangani lembar bimbingan ini.

Lembar pembimbingan LA ini harus dilampirkan dalam Laporan Akhir.



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 DIREKTORAT PENDIDIKAN TINGGI VOKASI  
 POLITEKNIK NEGERI SRIWIJAYA

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**LEMBAR BIMBINGAN LAPORAN AKHIR**

Lembar : 1

Nama : Lyra Aurellia Rivanka  
 NIM : 062030331184  
 Jurusan/Program Studi : Teknik Elektro/D-III Teknik Telekomunikasi  
 Judul Laporan Akhir : Rancang Bangun Perangkat Keras Mesin Pembuat Popcorn  
 Otomatis Menggunakan *Internet of Things* (IoT)  
 Pembimbing II : Hj. Adewasti, S.T., M.Kom.

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
1.	10-12-2009	PENGASUAN PROPOSAL	
2.	20-01-2009	ACC PROPOSAL	
3.	15-05-2009	BAB I - BATASAN MASALAH - PERBAIKI	
4.		BAB II - TABEL PENELITIAN SEJENIS - SUMBER PERULIS	
5.	29-05-2009	BAB I : ACC BAB II : ACC	
6.	05-06-2009	BAB III : - SOFTWARE GARIS BESAR	
7.	26-07-2009	BAB IV : ACC BAB V : DATA HASIL PENGUJIAN BAB VI : ACC	



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Website : www.polisriwijaya.ac.id E-mail : info@polsri.ac.id



**LEMBAR BIMBINGAN LAPORAN AKHIR**

Lembar : 2

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
8.		Lengkapi semua persyaratan	
9.	31-07-2023	BAB IV: Ape Ape mengikuti sidang LA	
10.			
11.			
12.			
13.			
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17.			



KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET, DAN TEKNOLOGI

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**LEMBAR BIMBINGAN LAPORAN AKHIR**

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
18.			
19.			
20.			

Palembang, 02-08-2023

Mengetahui,

**Koordinator Program Studi  
DIII Teknik Telekomunikasi**

**Ciksadan, S.T., M.Kom**  
NIP 196809071993031003

**Catatan:**

\*) melingkari angka yang sesuai.

Ketua Jurusan/Ketua Program Studi harus memeriksa jumlah pelaksanaan bimbingan sesuai yang dipersyaratkan dalam Pedoman Laporan Akhir sebelum menandatangani lembar bimbingan ini.  
Lembar pembimbingan LA ini harus dilampirkan dalam Laporan Akhir.



	<b>KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET, DAN TEKNOLOGI</b> <b>DIREKTORAT PENDIDIKAN TINGGI VOKASI</b> <b>POLITEKNIK NEGERI SRIWIJAYA</b> Jalan Srijaya Negara, Palembang 30139 Telp. 0711-353414 Fax. 0711-355918 Website : <a href="http://www.polisriwijaya.ac.id">www.polisriwijaya.ac.id</a> E-mail : <a href="mailto:info@polsri.ac.id">info@polsri.ac.id</a>	 
	<b>REKOMENDASI UJIAN LAPORAN AKHIR (LA)</b>	


Pembimbing Laporan Akhir memberikan rekomendasi kepada,

Nama : Lyra Aurellia Rivanka  
NIM : 062030331184  
Jurusan/Program Studi : Teknik Elektro / D3 Teknik Telekomunikasi  
Judul Laporan Akhir : Rancang Bangun Perangkat Keras Mesin Pembuat  
Popcorn Otomatis Menggunakan *Internet Of Things*


Mahasiswa tersebut telah memenuhi persyaratan dan dapat mengikuti Ujian Laporan Akhir (LA) pada Tahun Akademik 2022/2023

Palembang, 31 Juli 2023

Pembimbing I,

  
(Dr. Ing. A. Ahmad Taqwa, M.T.)  
NIP.196812041997031001




Pembimbing II,

  
(Hj. Adewasti, S.T., M.Kom.)  
NIP.197201142001122001

	<b>KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN, RISET DAN TEKNOLOGI</b> <b>POLITEKNIK NEGERI SRIWIJAYA</b> Jalan Srijaya Negara, Palembang 30139 Telp. 0711-353414 Fax. 0711-355918 Website : www.polisriwijaya.ac.id E-mail : info@polsri.ac.id	
	<b>PELAKSANAAN REVISI LAPORAN AKHIR</b>	

Nama Mahasiswa : Lyra Aurellia Rivanka  
 NIM : 062030331184  
 Jurusan/Program Studi : Teknik Elektro / DIII Teknik Telekomunikasi  
 Judul Laporan Akhir : Rancang Bangun Perangkat Keras Mesin Pembuat Popcorn Otomatis Menggunakan *Internet of Things*

Telah melaksanakan revisi terhadap Laporan Akhir yang diujikan pada hari Rabu Tanggal 09 bulan Agustus tahun 2023 Pelaksanaan revisi terhadap Laporan Akhir tersebut telah disetujui oleh Dosen Penguji yang memberikan revisi:

No.	Komentar	Nama Dosen *)	Tanggal	Tanda Tangan
	Acc	Ciksadan, S.T., M.Kom. NIP. 196809071993031003	29/8/2023	
		Dr. Dipl. Ing. Ahmad Taqwa, M.T. NIP. 196812041997031001		
	Acc	Hj. Adewasti, S.T., M.Kom. NIP. 197201142001122001	29/8/2023	
	Acc	Hj. Lindawati, S.T., M.T.I. NIP. 197105282006042001	29/8-'23	

Palembang, 09 Agustus 2023

Ketua Penguji \*\*),



Ciksadan, S.T., M.Kom.  
NIP. 196809071993031003

**Catatan:**

- \*) Dosen penguji yang memberikan revisi saat ujian laporan akhir.
  - \*\*\*) Dosen penguji yang ditugaskan sebagai Ketua Penguji saat ujian LA.
- Lembaran pelaksanaan revisi ini harus dilampirkan dalam Laporan Akhir.



	<b>KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET, DAN TEKNOLOGI</b> <b>DIREKTORAT PENDIDIKAN TINGGI VOKASI</b> <b>POLITEKNIK NEGERI SRIWIJAYA</b> Jalan Srijaya Negara, Palembang 30139 Telp. 0711-353414 Fax. 0711-355918 Website : www.polisriwijaya.ac.id E-mail : info@polsri.ac.id	 
	<b>BUKTI PENYERAHAN HASIL KARYA/RANCANG BANGUN</b>	

Pada hari ini Rabu tanggal 09 bulan Agustus tahun 2023 telah diserahkan seperangkat karya/rancang bangun kepada Jurusan Teknik Elektro Program Studi D3 Teknik Telekomunikasi di Politeknik Negeri Sriwijaya,

Nama Perangkat	Spesifikasi
Mesin Pembuat Popcorn Otomatis Menggunakan Internet Of Things	Perangkat yang menggunakan Mikrokontroler NodeMCU 32 , Driver motor L298N , Motor servo dan Pemantik otomatis serta Aplikasi sebagai kontrol otomatis pada Mesin Pembuat Popcorn Otomatis Menggunakan Internet Of Things

Hasil karya/rancang bangun dari,

Nama	NIM	Nama Pembimbing
Lyra Aurellia Rivanka	062030331184	Dr.Ing.H. Ahmad Taqwa,M.T. NIP.196812041997031001
		Hj.Adewasti,S.T.,M.Kom NIP.197201142001122001

Yang menerima \*)

  
(Eka Sisanti, S.T.,M.Kom.)  
NIP.197812172000122001

Palembang, 25 Agustus 2023  
Yang menyerahkan \*\*),

  
(Lyra Aurellia Rivanka)  
NIM.062030331184

Mengetahui,  
Ketua Jurusan/KPS,

  
(Ciksadan, S.T.,M.kom.)  
NIP.19680907199303100

\*) pejabat Jurusan/PS yang ditunjuk (Kepala Lab./Bengkel atau Kepala Seksi)  
\*\*) perwakilan mahasiswa dari pembuat karya/rancang bangun.





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**BUKTI PENYERAHAN HASIL KARYA/RANCANG BANGUN PADA  
LABORATORIUM TELEKOMUNIKASI**

Pada hari ini Rabu tanggal 09 bulan Agustus tahun 2023 telah diserahkan seperangkat karya/rancang bangun kepada Jurusan Teknik Elektro Program Studi D3 Teknik Telekomunikasi di Politeknik Negeri Sriwijaya dan seperangkat Karya/Rancang Bangun tersebut telah diserahkan kepada Ibu Eka Susanti S.T.,M.Kom.

Nama Perangkat	Spesifikasi
Mesin Pembuat Popcorn Otomatis Menggunakan Internet Of Things	Perangkat yang menggunakan Mikrokontroler NodeMCU 32 , Driver motor L298N , Motor servo dan Pemantik otomatis serta Aplikasi sebagai kontrol otomatis pada Mesin Pembuat Popcorn Otomatis Menggunakan Internet Of Things

Hasil karya/rancang bangun dari,

Nama	NIM	Nama Pembimbing
Lyra Aurellia Rivanka	062030331184	Dr.Ing.H. Ahmad Taqwa,M.T. NIP.196812041997031001
		Hj.Adewasti,S.T.,M.Kom NIP.197201142001122001

Mengetahui,  
Teknisi Laboratorium

Rapiko Duri,S.Kom.,M.Kom.  
NIP 197802162001122003



## ADIY 2 CHANNEL RELAY - 5V (With Optocoupler)



### Description:

2 Channel 5V Relay Module is an interface board and can be controlled directly by a wide range of microcontrollers such as Arduino, AVR, PIC, ARM, and so on. With digital outputs to control larger loads and devices like AC or DC Motors, electromagnets, solenoids, and incandescent light bulbs.

This module is designed to be integrated with 2 relays that it is capable of controlling 2 relays.

5V 10A 2 Channel Relay Module Shield for Arduino ARM PIC AVR DSP Electronic relay is a 24V 2-channel relay interface board. If you have ever had a project that required an interface with a high power device that needed AC or DC voltage and high current levels you have probably already discovered that attempting to control those devices directly with your Arduino, Raspberry PI, or other Microcontroller/Microprocessor can be a real challenge. This board is designed to interface easily with your 5V IOs without consuming much current on your IO pins.

### Features:

- It can control both AC and DC appliances such as Solenoids, Motors, lights, fans, etc
- High-quality screw terminals (Terminal Block) provided (C, NC, NO) for quick and easy connection
- A freewheeling diode to protect your microcontroller
- Input Signal Pin connected to Burg stick for easy accessibility



- LED status indicators to indicate the relay ON/OFF status
- Mounting holes provided
- Signal input with a high-level signal, the common and often start conduction
- The relay can directly control all kinds of equipment and load

### Specifications:

- Channel – 2
- Operating Voltage(VDC) – 5V
- Current Capacity at AC250V – 10A
- Current Capacity at DC30V – 10A
- Dimensions: Length×Width×Height (mm)=34×50×16

### Pin Description:

**C=Common:** This is the commonly terminal. This terminal will be connected to either of other 2 terminals (NO or NC) based on the state of relay.

**NO=Normally Open:** As the name indicates this is normally open terminal, i.e. if the relay is not energized (not ON), this pin will be open. We can say that the switch is OFF by default and when the relay is energized it will become ON.

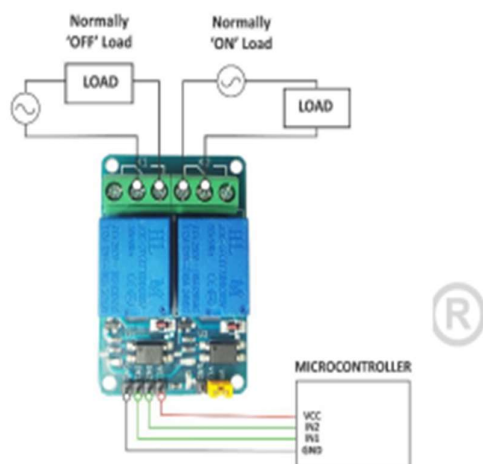
**NC=Normally Close:** As the name indicates it is normally closed terminal, i.e. if the relay is not energized (not ON), this pin will be closed. We can say that the switch is ON by default and when the relay is energized it will become OFF.

### How to work:

The dual-channel relay module can be used to switch mains powered loads from the pins of microcontroller. Since there are two channels on the same board, two separate loads can be powered. This is useful for home automation.



The loads can be connected as follows:



In this diagram, the relay on the left (channel 1) is connected in a regular fashion with the load and source going between common and normally open, so when the relay is activated, the load is powered. On the right channel (channel 2), the load and source are connected between common and normally closed, which means that the load is powered by default till the relay is activated.

If the load is connected to the normally closed contact, then the input polarity 'reversal' can be fixed – the load is powered on when the input is high, and the load is powered off when the input is low. This method, however, wastes some current since the relay coil draws current when the load is switched off.

### Dual-Channel Relay Module Basic Troubleshooting

If either of the relays does not turn on:

- The contacts might be welded due to overcurrent/arcing. Shaking the module firmly might help unstick the contacts
- The driver circuitry might have been damaged due to overvoltage.
- Input polarity might be incorrect.
- Jumper might not have been moved to the correct position.



**Applications:**

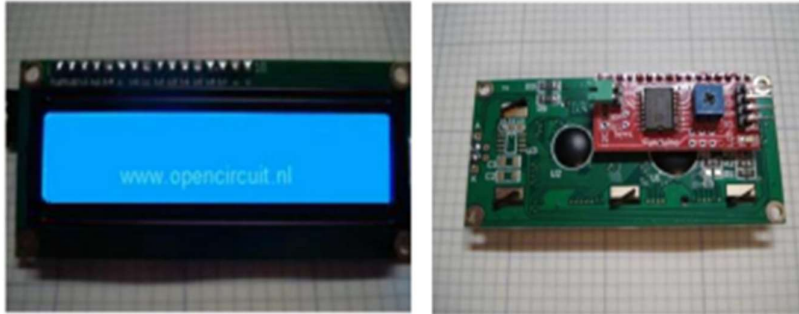
- To control high voltage
- To control high current load such as motor
- To control solenoid valves
- To control lamps and AC load





# Datasheet

## I2C 1602 Serial LCD Module



### Product features:

The I2C 1602 LCD module is a 2 line by 16 character display interfaced to an I2C daughter board. The I2C interface only requires 2 data connections, +5 VDC and GND to operate

For in depth information on I2C interface and history, visit: <http://www.wikipedia/wiki/I2c>

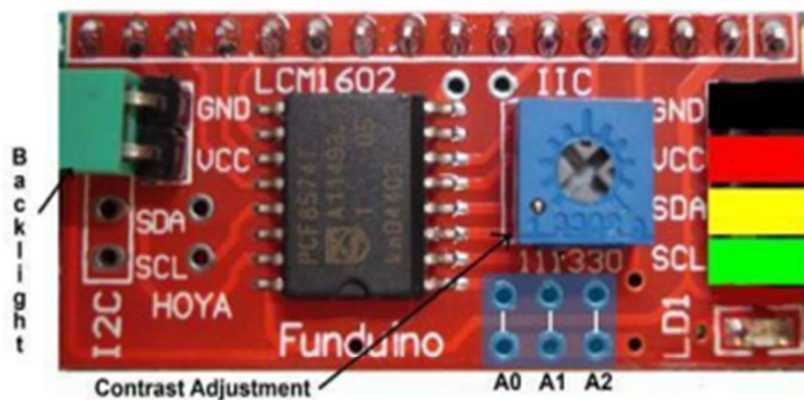
### Specifications:

I2C Address Range	2 lines by 16 character 0x20 to 0x27 (Default=0x27, addressable)
Operating Voltage	5 Vdc
Backlight	White
Contrast	Adjustable by potentiometer on I2c
Size	interface 80mm x 36mm x 20 mm 66mm x
Viewable area	16mm

### Power:

The device is powered by a single 5Vdc connection.

## Pinout Diagram:



## Pin/Control Descriptions:

Pin #	Name	Type	Description
1	GND	Power	Supply & Logic ground
2	VCC	Power	Digital V0 0 or RX (serial receive)
3	SDA	I/O	Serial Data line
4	SCL	CLK	Serial Clock line
A0	A0	Jumper	Optional address selection A0 - see below
A1	A1	Jumper	Optional address selection A1 - see below
A2	A2	Jumper	Optional address selection A2 - see below
Backlight		Jumper	Jumpered - enable backlight, Open - disable backlight
Contrast		Pot	Adjust for best viewing

## Addressing:

A0	A1	A2	Address
Open	Open	Open	0x27
Jumper	Open	Open	0x26
Open	Jumper	Open	0x25
Jumper	Jumper	Open	0x24
Open	Open	Jumper	0x23
Jumper	Open	Jumper	0x22
Open	Jumper	Jumper	0x21
Jumper	Jumper	Jumper	0x20

---

## Software:

Download the required LCD Arduino™ library for this device from:

<http://www.circuitattic.com/downloads/category/3-sample-code.html?download=9%3Aanother-i2c-library-easier-to-use>

Replace current liquid crystal library found in the Arduino library directory with the above  
(Note: If you use the examples included with the library, be sure to change address to 0x27)

Simple example using library above.

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
#if defined(ARDUINO) && ARDUINO >= 100
#define printByte(args) write(args);
#else
#define printByte(args) print(args,BYTE);
#endif
LiquidCrystal_I2C lcd(0x27,16,2); // set the LCD address to 0x27 for a
//chars and 2-line display
void setup()
{
    lcd.init(); // initialize the lcd
    lcd.backlight();
    lcd.clear();
    delay(100);
    for(int i = 0; i < 3; i++)
    {
        lcd.backlight();
        delay(250);
        lcd.noBacklight();
        delay(250);
    }
    lcd.backlight();
}

void loop()
{
    int x=0;
    lcd.clear();
    lcd.setCursor(2,0); //Start at character 0 on line 0
    lcd.print("Hello World");
    lcd.setCursor(0,1); //Start at character 0 on line 1
    lcd.print(" opencircuit.nl");
    delay(3000); //Wait 3 seconds
    lcd.clear();
    lcd.setCursor(0,0); //Start at character 0 on line 0
    lcd.print("Cursor Blink");
    lcd.blink();
    delay(2000);
    lcd.setCursor(0,0);
    lcd.print("Cursor noBlink");
    lcd.noBlink();
    delay(2000);
}
```





(images/product/ASLONG JGY 370 12V motor.jpg)

## **ASLONG JGY-370 12V DC Worm Gear Motor**

**SKU: 108990007**



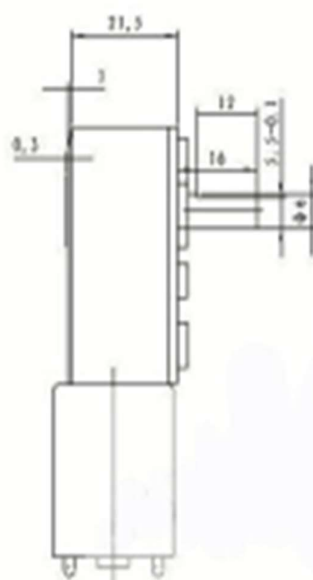
**WI-FI LINK Is LIVE at Kickstarter!**

([https://www.kickstarter.com/projects/seed/wi-fi-link-3-steps-5-minutes-build-your-iot-applicat/description?ref=banner\\_depot](https://www.kickstarter.com/projects/seed/wi-fi-link-3-steps-5-minutes-build-your-iot-applicat/description?ref=banner_depot))

### Description

Mainly used in robot platform and car provide power, Good quality and long lifetime, High torque and Low noise. It's running at 160RPM.

## Specifications



- Rated Voltage: DC 12V
- No load speed: 160rpm
- No Load Current: 35mA
- load torque: 0.55kg.cm
- load Speed: 128rpm
- load Current: 180mA
- load out put: 1.1w
- Stall torque: 2.2kg.cm
- Stall Current: 1A
- Ratio: 37.3
- Weight:165g

For any technical support or suggestion, please kindly go to our forum (<http://www.seeedstudio.com/forum/viewforum.php?f=57>).

## Overview



(<http://www.seeedstudio.com/depot/Shenzhen-2U-t-11.html?ref=pinfo>)

Designer:  
Others  
Other  
Products

From This Designer (<http://www.seeedstudio.com/depot/Others-m-24.html?ref=pinfo>)

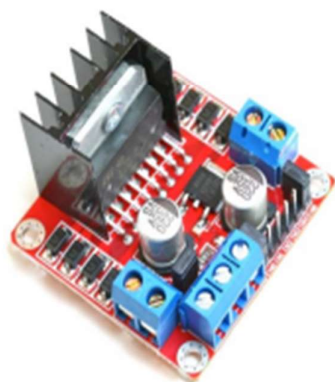
Weight: 156 g



## User Guide

### L298N Dual H-Bridge Motor Driver

This dual bidirectional motor driver, is based on the very popular L298 Dual H-Bridge Motor Driver Integrated Circuit. The circuit will allow you to easily and independently control two motors of up to 2A each in both directions. It is ideal for robotic applications and well suited for connection to a microcontroller requiring just a couple of control lines per motor. It can also be interfaced with simple manual switches, TTL logic gates, relays, etc. This board equipped with power LED indicators, on-board +5V regulator and protection diodes.

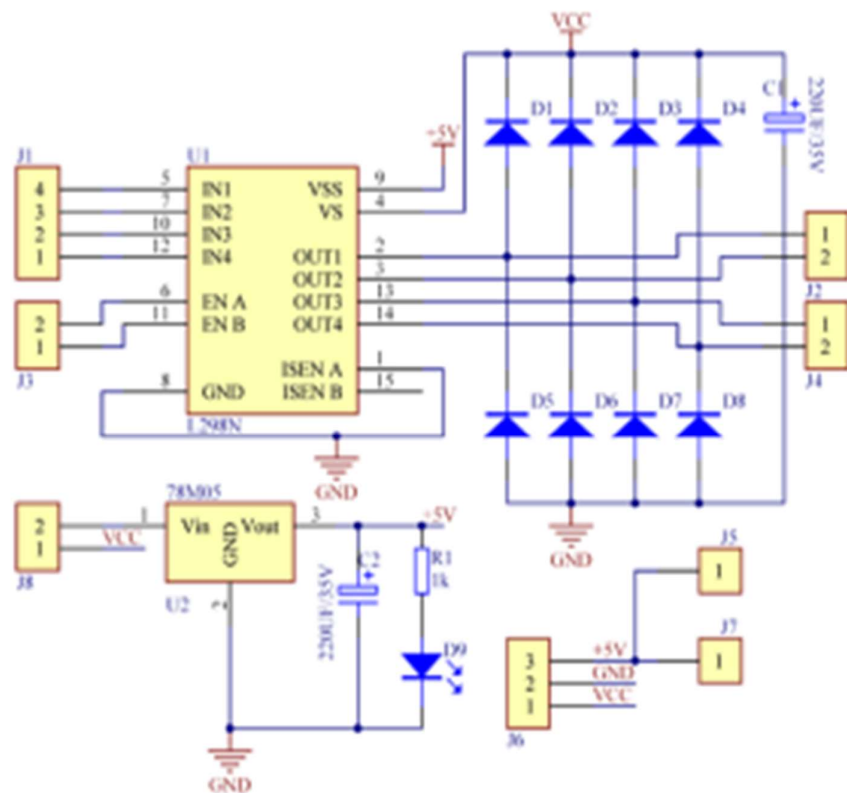


**SKU: MDU-1049**

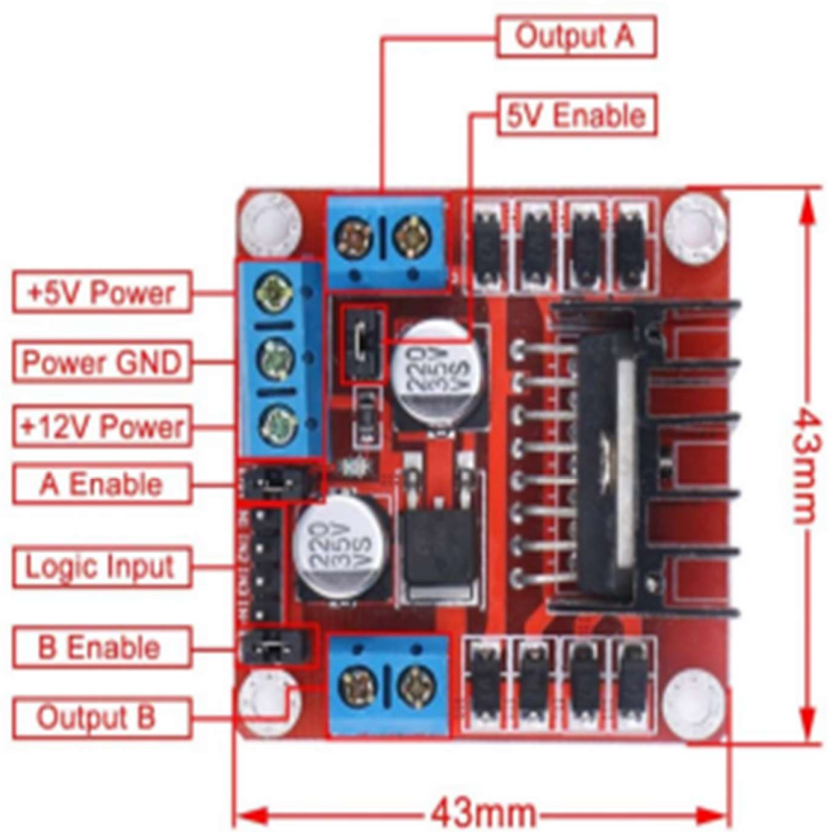
#### Brief Data:

- Input Voltage: 3.2V~40Vdc.
- Driver: L298N Dual H Bridge DC Motor Driver
- Power Supply: DC 5 V - 35 V
- Peak current: 2 Amp
- Operating current range: 0 ~ 36mA
- Control signal input voltage range :
- Low:  $-0.3V \leq V_{in} \leq 1.5V$ .
- High:  $2.3V \leq V_{in} \leq V_{ss}$ .
- Enable signal input voltage range :
  - Low:  $-0.3 \leq V_{in} \leq 1.5V$  (control signal is invalid).
  - High:  $2.3V \leq V_{in} \leq V_{ss}$  (control signal active).
- Maximum power consumption: 20W (when the temperature  $T = 75\text{ }^{\circ}\text{C}$ ).
- Storage temperature:  $-25\text{ }^{\circ}\text{C} \sim +130\text{ }^{\circ}\text{C}$ .
- On-board +5V regulated Output supply (supply to controller board i.e. Arduino).
- Size: 3.4cm x 4.3cm x 2.7cm

**Schematic Diagram:**



**Board Dimension & Pins Function:**





# NodeMCU ESP32

Microcontroller Development Board



## Technical Specifications

Model	NodeMCU ESP32
Article No.	SBC-NodeMCU-ESP32
Type	ESP32
Processor	Tensilica LX6 Dual-Core
Clock Frequency	240 MHz
SRAM	512 kB
Memory	4 MB
Wireless Standard	802.11 b/g/n
Frequency	2.4 GHz
Bluetooth	Classic / LE
Data Interfaces	UART / I2C / SPI / DAC / ADC
Operating Voltage	3,3V (operable via 5V-microUSB)
Operating Temperature	-40°C - 125°C
Dimensions (W x D x H)	48 x 26 x 11.5 mm
Scope Of Delivery	NodeMCU ESP32
EAN	4250236816104

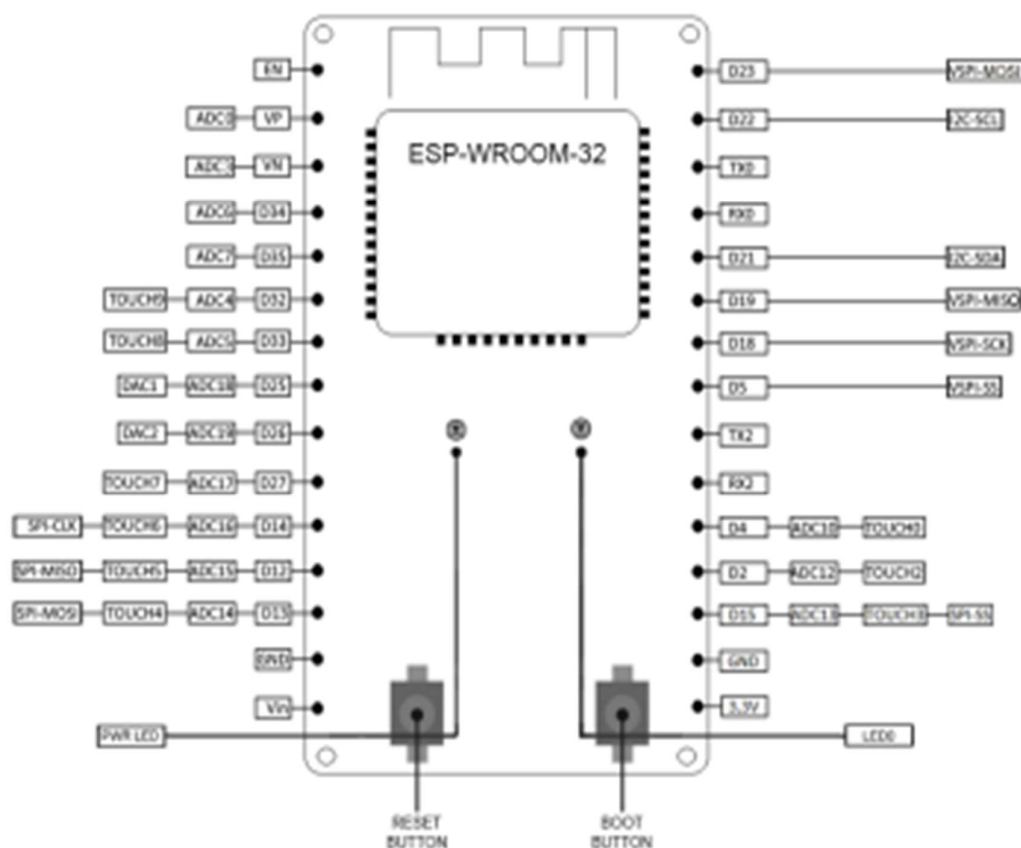


# NodeMCU ESP32

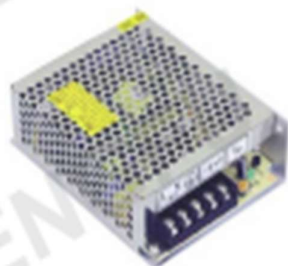
## Microcontroller Development Board

An overview of the available pins can be seen in the following figure:

2x DAC	15x ADC	1x SPI
1x I <sup>2</sup> C	2x UART	





**HENGFU CORPORATION**Established in 1992, [www.hengfu.com](http://www.hengfu.com)**30W Single Output Switching Power Supply****HF30W-SF Series****FEATURES**

- AC input range selected by switch
- Japanese brand components for key parts
- Electrolytic capacitors all 105°C
- 100% full load burn-in test
- Approvals: CE
- Protections: overload/ over voltage/ short circuit
- 5 years limited warranty
- F603 129 x 98 x 40mm

**SPECIFICATIONS**

Input Voltage	85~132/170~264VAC switchable
Input Current	1.0A/115V; 0.5A/230V
Input Frequency	47~63Hz
Inrush Current	cold start, 25A/115V, 40A/230V
Input Leakage Current	≤ 1mA/230VAC
Line Regulation (full load)	± 0.5%
Voltage Adjust Range	± 10%
Output Overload Protection	105~105%
Output Over Voltage Protection	115~150%, shut off, re-power on to recover
Short Circuit Protection	auto recovery
Rise Time	50ms @full load (typical)
Hold up Time	20ms @full load (typical)
Mechanical Feature	enclosed
Dimensions	129 x 98 x 40mm (L x W x H)

Operating Temperature	-20°C ~+70°C(ref. derating curve)
Storage Temperature	-20°C ~+85°C
Operating Humidity	20%~93%RH(non condensing)
Storage Humidity	20%~95%RH(non condensing)
MTBF	>100,000 hours
Cooling	convection
Safety Standards	GB4943, UL60950, EN60950
EMC Standards	GB9254, EN55022 Class B, EN55024, EN61000-3-2,3, EN61000-4-2,3,4,5,6,8,11
Withstand Voltage	IP-OIP: 3.0KVAC/1min IP-PE: 1.5KVAC/1min OIP-PE: 0.5KVAC/1min
Vibration	10~150Hz, 2G 10min/cycle, 30min each along X, Y, Z axis
Connection	5P/9.5mm screw terminal block
Packing	0.38kgs, 42pcs/18kgs/0.045CBM per carton

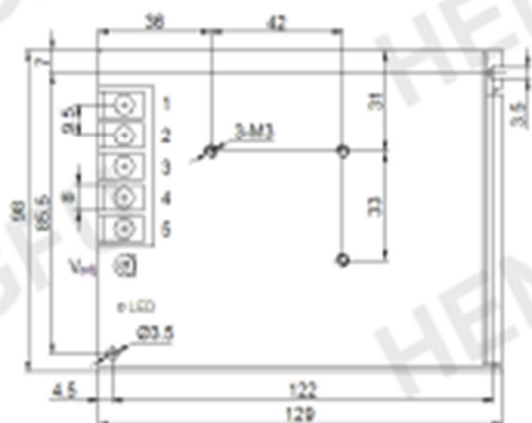
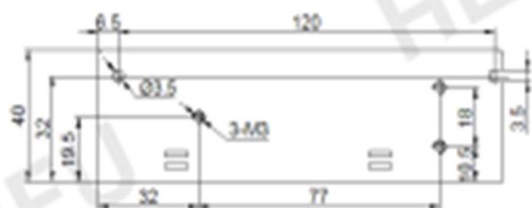
Model No.	DC Output	Rated Power	Load Regulation	Voltage Tolerance	Ripple & Noise (max.)	Efficiency <sup>1)</sup>
HF30W-SF-5	5V 6.0A	30.0W	0.5%	± 2%	80mVp-p	67%
HF30W-SF-12	12V 2.5A	30.0W	0.5%	± 1%	120mVp-p	72%
HF30W-SF-15	15V 2.0A	30.0W	0.5%	± 1%	120mVp-p	73%
HF30W-SF-24	24V 1.3A	31.2W	0.5%	± 1%	150mVp-p	75%
HF30W-SF-48	48V 0.6A	28.8W	0.5%	± 1%	150mVp-p	78%

\* 3~48VDC output all available

**NOTE**

1. All parameters are measured at 230VAC input, rated load and 25°C of ambient temperature.
2. Line regulation is measured from low line to high line at rated load.
3. Load regulation is measured from 0% to 100% of rated load for single output models. For multi-output models, it is measured from 20% to 100% of rated load, and other output at 60% rated load.
4. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uF & 47uF parallel capacitor.
5. The power supply is regarded as a component which will be installed into a final equipment. The final equipment must be re-confirmed that it still meets EMC directives.

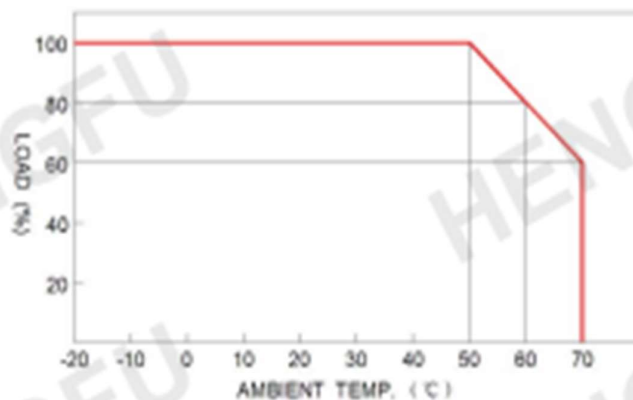


**Drawing**


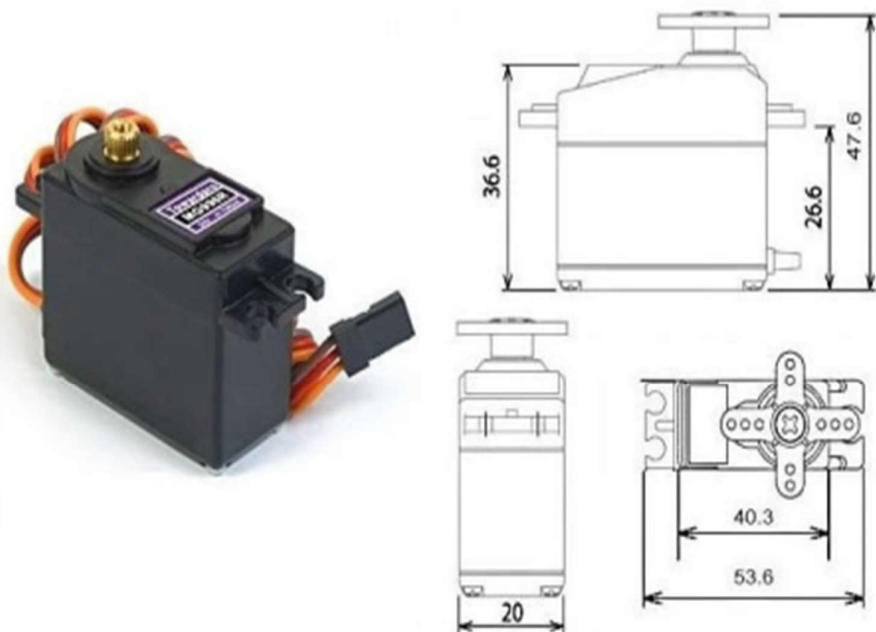
Length of assembly screw: max. 6mm

Terminal Pin No. Assignment

Pin No.	Assignment	Pin No.	Assignment
1	ACIL	4	DC OUTPUT -V
2	ACIN	5	DC OUTPUT +V
3	PE		

**Derating Curve**


## MG996R High Torque Metal Gear Dual Ball Bearing Servo



This High-Torque MG996R Digital Servo features metal gearing resulting in extra high 10kg stalling torque in a tiny package. The MG996R is essentially an upgraded version of the famous MG995 servo, and features upgraded shock-proofing and a redesigned PCB and IC control system that make it much more accurate than its predecessor. The gearing and motor have also been upgraded to improve dead bandwidth and centering. The unit comes complete with 30cm wire and 3 pin 'S' type female header connector that fits most receivers, including Futaba, JR, GWS, Cirrus, Blue Bird, Blue Arrow, Corona, Berg, Spektrum and Hitec.

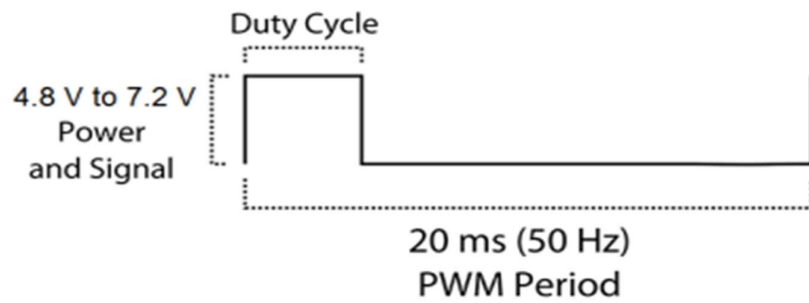
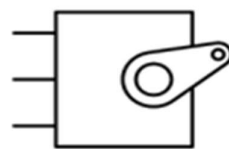
This high-torque standard servo can rotate approximately 120 degrees (60 in each direction). You can use any servo code, hardware or library to control these servos, so it's great for beginners who want to make stuff move without building a motor controller with feedback & gear box, especially since it will fit in small places. The MG996R Metal Gear Servo also comes with a selection of arms and hardware to get you set up nice and fast!

### Specifications

- Weight: 55 g
- Dimension: 40.7 x 19.7 x 42.9 mm approx.
- Stall torque: 9.4 kgf·cm (4.8 V), 11 kgf·cm (6 V)
- Operating speed: 0.17 s/60° (4.8 V), 0.14 s/60° (6 V)

- Operating voltage: 4.8 V a 7.2 V
- Running Current 500 mA – 900 mA (6V)
- Stall Current 2.5 A (6V)
- Dead band width: 5  $\mu$ s
- Stable and shock proof double ball bearing design
- Temperature range: 0  $^{\circ}$ C – 55  $^{\circ}$ C

PWM=Orange (  $\square$  )  
Vcc = Red ( + )  
Ground = Brown ( - )



**Features**

- Wide 5V to 32V Input Voltage Range
- Output Adjustable from 0.8V to 30V
- Maximum Duty Cycle 100%
- Minimum Drop Out 0.6V
- Fixed 300KHz Switching Frequency
- 5A Constant Output Current Capability
- Internal Optimize Power MOSFET
- High efficiency
- Excellent line and load regulation
- TTL shutdown capability
- EN pin with hysteresis function
- Built in thermal shutdown function
- Built in current limit function
- Built in output short protection function
- Available in TO-263 package

**Applications**

- LCD Monitor and LCD TV
- Digital Photo Frame
- Set-up Box
- ADSL Modem
- Telecom / Networking Equipment

**General Description**

The XL4005 is a 300KHz fixed frequency PWM buck (step-down) DC/DC converter, capable of driving a 5A load with high efficiency, low ripple and excellent line and load regulation. Requiring a minimum number of external components, the regulator is simple to use and include internal frequency compensation and a fixed-frequency oscillator.

The PWM control circuit is able to adjust the duty ratio linearly from 0 to 100%. An enable function, an over current protection function is built inside. When short protection function happens, the operation frequency will be reduced from 300KHz to 60KHz. An internal compensation block is built in to minimize external component count.

**TO263-5L**

Figure1. Package Type of XL4005

## Pin Configurations

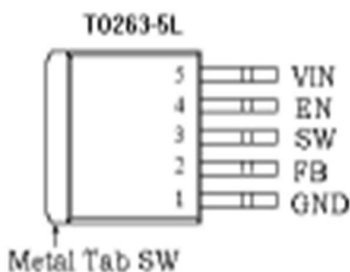


Figure2. Pin Configuration of XL4005 (Top View)

Table 1 Pin Description

Pin Number	Pin Name	Description
1	GND	Ground Pin. Care must be taken in layout. This pin should be placed outside of the Schottky Diode to output capacitor ground path to prevent switching current spikes from inducing voltage noise into XL4005.
2	FB	Feedback Pin (FB). Through an external resistor divider network, FB senses the output voltage and regulates it. The feedback threshold voltage is 0.8V.
3	SW	Power Switch Output Pin (SW). SW is the switch node that supplies power to the output.
4	EN	Enable Pin. Drive EN pin high to turn on the device, drive it low to turn it off.
5	VIN	Supply Voltage Input Pin. XL4005 operates from a 5V to 32V DC voltage. Bypass Vin to GND with a suitably large capacitor to eliminate noise on the input.

## Function Block

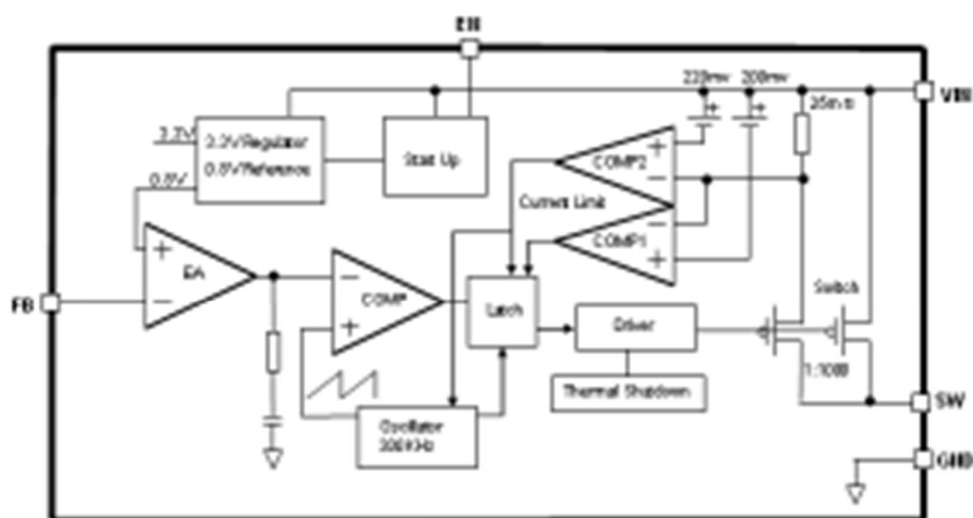


Figure3. Function Block Diagram of XL4005

## Typical Application Circuit

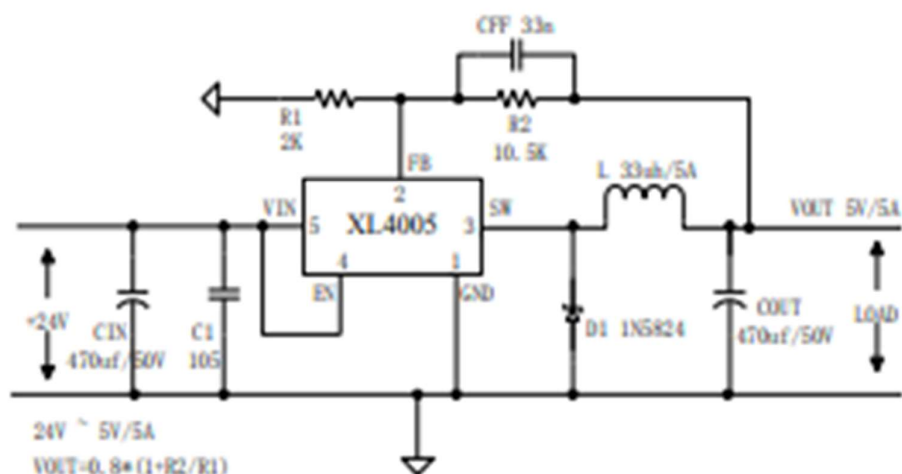


Figure4. XL4005 Typical Application Circuit 24V~5V/5A

## PROGRAM ALAT

```
#define pembalik 4
#define gas 5
#define COUNT_LOW 1638
#define COUNT_HIGH 7864
#define TIMER_WIDTH 16
#include "esp32-hal-ledc.h"
int nilai_pwm_pembalik = COUNT_LOW;
int nilai_pwm_gas = COUNT_LOW;
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27, 16, 2);
#define pinPemantik 26
#define LED_GPIO2 27
#define PWM2_Ch 3
#define PWM2_Res 8
#define PWM2_Freq 1000
#include <WiFi.h>
#include "Adafruit_MQTT.h"
#include "Adafruit_MQTT_Client.h"
/***** WiFi Access Point *****/
#define WLAN_SSID "ta.popcorn2023"
#define WLAN_PASS "popcorn2023"
/***** Adafruit.io Setup *****/
#define AIO_SERVER "io.adafruit.com"
#define AIO_SERVERPORT 1883 // use 8883 for SSL
#define AIO_USERNAME "Ririsjuniarni"
#define AIO_KEY "aio_MIA122oQ6nnftJHvtbi821stNUIA"
/***** Global State (you don't need to change this!) *****/
WiFiClient client;
```



```

Adafruit_MQTT_Client mqtt(&client, AIO_SERVER, AIO_SERVERPORT,
AIO_USERNAME, AIO_KEY);

Adafruit_MQTT_Publish online = Adafruit_MQTT_Publish(&mqtt, AIO_USERNAME
"/feeds/online");

Adafruit_MQTT_Subscribe iot_waktu = Adafruit_MQTT_Subscribe(&mqtt,
AIO_USERNAME "/feeds/waktu");

Adafruit_MQTT_Subscribe iot_kec = Adafruit_MQTT_Subscribe(&mqtt,
AIO_USERNAME "/feeds/kecepatan");

void MQTT_connect();

#include "BluetoothSerial.h"

#if !defined(CONFIG_BT_ENABLED) || !defined(CONFIG_BLUEDROID_ENABLED)
#error Bluetooth is not enabled! Please run `make menuconfig` to and enable it
#endif

BluetoothSerial SerialBT;

char dataBT ;

String data_kec, data_reciver, data_sistem, data_waktu;

int kec;

int sistem;

unsigned long previousMillis = 0; // will store last time LED was updated

// constants won't change:
const long interval = 1000;

int count, count1, waktu;

void setup() {
  ledcSetup(4, 50, TIMER_WIDTH); // channel 4, 50 Hz, 16-bit width
  ledcAttachPin(33, 4); // GPIO 18 assigned to channel 4
  ledcWrite(33, COUNT_LOW);
  ledcSetup(5, 50, TIMER_WIDTH); // channel 4, 50 Hz, 16-bit width
  ledcAttachPin(32, 5); // GPIO 18 assigned to channel 4
  gerak(gas, 90);
  delay(1000);
  lcd.begin();
  lcd.backlight();
  pinMode(pinPemantik, OUTPUT);

```



```

digitalWrite(pinPemantik, HIGH);
pinMode(15, INPUT_PULLUP);
pinMode(4, INPUT_PULLUP);
ledcAttachPin(LED_GPIO2, PWM2_Ch);
ledcSetup(PWM2_Ch, PWM2_Freq, PWM2_Res);
SerialBT.begin("Bluetooth popcorn"); //Bluetooth device name
Serial.begin(115200);
Serial.println(F("Adafruit MQTT demo"));
Serial.println("The device started, now you can pair it with bluetooth!");
Serial.print("Connecting to ");
Serial.println(WLAN_SSID);
WiFi.begin(WLAN_SSID, WLAN_PASS);
while (WiFi.status() != WL_CONNECTED) {
  lcd.print(".");
  Serial.print(".");
  delay(200);
  baca_bluetooth();
}
Serial.println();
Serial.println("WiFi connected");
Serial.println("IP address: "); Serial.println(WiFi.localIP());
mqtt.subscribe(&iot_kec);
mqtt.subscribe(&iot_waktu);
delay(10);
}
String mode;
uint32_t x = 0;
bool reset_iot = 0;
unsigned long currentMillis;
bool kondisi_awal;
bool kondisi_drop;
void loop() {

```

```

mode_input();
tampil();
if (mode == "tombol") {
  if (kondisi_awal == 0) {
    lcd.clear();
    for (int i = 0; i < 3; i++) {
      ledcWrite(PWM2_Ch, 0);
      lcd.home();
      lcd.print(count);
      count++;
      gerak(gas, 10);
      digitalWrite(pinPemantik, LOW);
      delay(1000);
    }
    kondisi_awal = 1;
  }
  ledcWrite(PWM2_Ch, 150);
}
else {
  if (mode == "BLU") {
    baca_bluethooth();
  }
  else if (mode == "IOT") {
    baca_IOT();
  }
}
currentMillis = millis();
if (currentMillis - previousMillis >= interval) {
  mulai();
  previousMillis = currentMillis;
  if (count >= 8) {
    if (waktu != 0) {

```

```

    if (! online.publish(waktu)) {
        Serial.println(F("Failed"));
    } else {
        Serial.println(F("OK!"));
    }
}
else {
    if (! online.publish(x++)) {
        Serial.println(F("Failed"));
    } else {
        Serial.println(F("OK!"));
    }
}
count = 0;
}
}
}

```

```

void mulai() {
    count++;
    count1++;
    if (waktu > 0) {
        tampil();
        if (count1 <= 3) {
            gerak(gas, 10);
            kondisi_drop = 1;
            Serial.println("pemanitik ON");
            digitalWrite(pinPemanitik, LOW);
            ledcWrite(PWM2_Ch, 0);
        }
    } else {
        Serial.println("Motor muter");
    }
}

```

```

    digitalWrite(pinPemantik, HIGH);
    ledcWrite(PWM2_Ch, kec);
}
waktu--;
}
else if (waktu <= 0) {
    if (kondisi_drop == 1) {
        drop();
        kondisi_drop = 0;
        kec = 0;
    }
    count1 = 0;
    count = 0;
    digitalWrite(pinPemantik, HIGH);
    ledcWrite(PWM2_Ch, 0);
}
}
void tampil() {
    Serial.print("Mode = ");
    Serial.print(mode);
    Serial.print(" || waktu = ");
    Serial.print(waktu);
    Serial.print(" || kec = ");
    Serial.print(kec);
    Serial.println();
    lcd.home();
    lcd.print("M: ");
    lcd.print(mode);
    lcd.print(" ");
    lcd.setCursor(0, 1);
    lcd.print("K: ");
    lcd.print(kec);
}

```

```

lcd.print(" ");
lcd.setCursor(9, 1);
lcd.print("W: ");
lcd.print(waktu);
lcd.print(" ");
}
void baca_bluethooth() {
  tampil();
  unsigned long currentMillis = millis();
  if (currentMillis - previousMillis >= interval) {
    mulai();
    previousMillis = currentMillis;
  }

  if (SerialBT.available()) {
    dataBT = SerialBT.read();
    if (dataBT == 'k') {
      data_kec = data_reciver;
      data_reciver = "";
      kec = data_kec.toInt();
    }
    else if (dataBT == 'w') {
      data_waktu = data_reciver;;
      waktu = data_waktu.toInt();
      data_reciver = "";
    }
    else if (dataBT == 'R') {
      ESP.restart();
    }
    else {
      data_reciver += dataBT;
    }
  }
}

```

```

    Serial.println(dataBT);
}
}
void baca_IOT() {
    MQTT_connect();
    Adafruit_MQTT_Subscribe *subscription;
    while ((subscription = mqtt.readSubscription(1000)) {
        if (subscription == &iot_waktu) {
            Serial.print(F("waktu: "));
            Serial.println((char *)iot_waktu.lastread);
            data_waktu = (char *)iot_waktu.lastread;
            waktu = data_waktu.toInt();
        }
        if (subscription == &iot_kec) {
            Serial.print(F("kec: "));
            Serial.println((char *)iot_kec.lastread);
            data_kec = (char *)iot_kec.lastread;
            kec = data_kec.toInt();
        }
    }
}
void MQTT_connect() {
    int8_t ret;
    if (mqtt.connected()) {
        return;
    }
    Serial.print("Connecting to MQTT... ");
    uint8_t retries = 5;
    while ((ret = mqtt.connect()) != 0) { // connect will return 0 for connected
        Serial.println(mqtt.connectErrorString(ret));
        Serial.println("Retrying MQTT connection in 5 seconds...");
        lcd.clear();
    }
}

```

```

    lcd.print("reconnect");
    mqtt.disconnect();
    for (int i = 0; i <= 10; i++) {
        Serial.println(".");
        delay(500);
    }
    retries--;
    if (retries == 0) {
        ESP.restart();
    }
}
Serial.println("MQTT Connected!");
}

```

```

void drop() {
    ledcWrite(PWM2_Ch, 0);
    gerak(gas, 90);
    delay(600);
    gerak(pembalik, 70);
    delay(5000);
    gerak(pembalik, 10);
    delay(1000);
}

void mode_input() {
    if (digitalRead(4) == HIGH) { // jika tombol tidak di tekan
        if (kondisi_awal == 1) {
            drop();
            kondisi_awal = 0;
        }
        if (digitalRead(15) == LOW) { // jika saklar ke atas
            mode = "BLU";
            reset_iot = 1;
        }
    }
}

```

```

}
else { // saklar ke bawah
  if (reset_iot == 1) {
    ESP.restart();
  }
  mode = "IOT";
}
}
else { // mode tombol
  mode = "tombol";
}
}
void gerak(int chanel , int sudut) {
  sudut = map(sudut, 0, 180, COUNT_LOW, COUNT_HIGH);
  Serial.print("Sudut : ");
  Serial.print(sudut);
  Serial.print(" || chanel : ");
  Serial.print(chanel);
  Serial.print(" || PWM : ");
  Serial.print(nilai_pwm_pembalikan);
  Serial.println();
  if (chanel == 4) {
    if (nilai_pwm_pembalikan < sudut) {
      for (int i = nilai_pwm_pembalikan ; i < sudut ; i = i + 200)
      {
        ledcWrite(chanel, i);    // sweep the servo
        delay(50);
      }
    }
    else if (nilai_pwm_pembalikan > sudut) {
      for (int i = nilai_pwm_pembalikan ; i > sudut ; i = i - 200)
      {

```



```
    ledcWrite(chanel, i);    // sweep the servo
    delay(50);
}
}
nilai_pwm_pembalik = sudut;
}
if (chanel == 5) {
    if (nilai_pwm_gas < sudut) {
        for (int i = nilai_pwm_gas ; i < sudut ; i = i + 200)
        {
            ledcWrite(chanel, i);    // sweep the servo
            delay(50);
        }
    }
    else if (nilai_pwm_gas > sudut) {
        for (int i = nilai_pwm_gas ; i > sudut ; i = i - 200)
        {
            ledcWrite(chanel, i);    // sweep the servo
            delay(50);
        }
    }
    nilai_pwm_gas = sudut;
}
}
```