DIGITAL DIMMER

ORDER CODE: RDL/LDC/13/001/V1.0

DOCUMENT VERSION: 2.0

- Switch off the supply voltage of this product as well as of attached devices before connecting or disconnecting them.
- Always use insulated tools while working.
- Do not touch any components of the board in open hand during power ON

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INTRODUCTION

The board uses BTA12-600B, Triac suitable for general purpose mains power AC switching. They can be used as ON/OFF function in applications such as static relays, heating regulation or induction motor starting circuit. They are also recommended for phase control operations in light dimmers and appliance motors speed controllers.

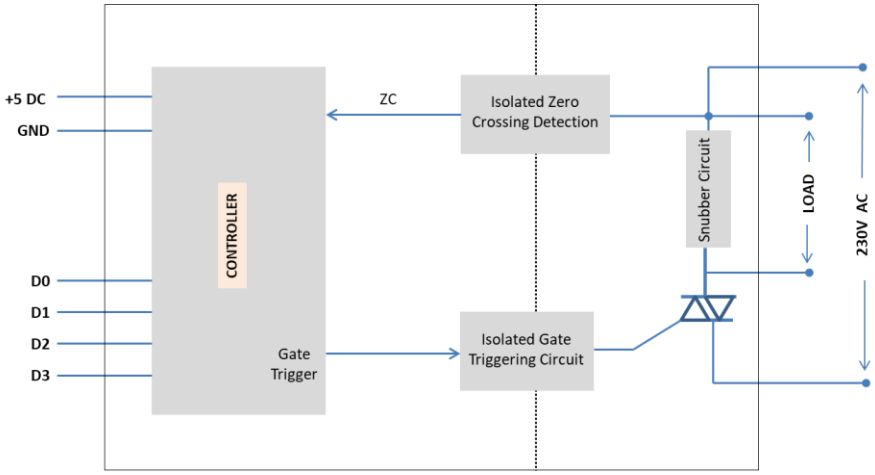
The dimmer board enabled with snubber circuit, especially recommended for use on inductive loads (Motor/Fan), because of their high commutation performance. The dimmer board controls up to 0-600V AC 50/60Hz.4 bit 16 levels of input can be given from any controllers/PLC to control dimming 0-100% or ON/OFF.

FEATURES

- **Dimming method: Phase dimming**
- On/Off and dimming control
- Circuit enabled with snubber
- Auto Zero cross detection
- Accurate firing angle control and smooth dimming
- Supply voltage +5 DC
- Isolated power section from the input
- Load Capacity 6 Amp AC (Up to 1500 Watt)
- Works from any microcontroller input.
- Control up to 250V

APPLICATIONS

- LED light dimming using phase control
- Motor/Fan speed control
- High speed ON/OFF control application
- Heater/Temperature control application
- PID Temperature Control System
- PID AC single phase speed control system



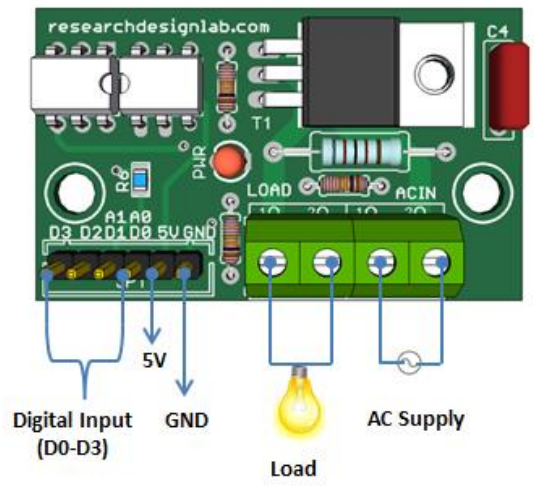
SPECIFICATIONS

Specifications	
Digital Input Voltage(D0-D1)	Max input voltage 5V
Operating Voltage	5V
Control level (0-100%)	16 level digital input
Triac Max Load current	6A
Max Voltage	250V
Frequency	50/60 Hz
Dimension (L * W)	50MM * 30MM
Weight	20g

ADVANTAGES

- Unlike electromechanical relays, there are no moving parts.
- Complete electrical isolation between input and output contacts.
- No contact bounces issues.
- AC loads can be easily controlled with a low current DC voltage using a solid state relay providing long life and high switching speeds.
- Zero voltage turn-on and zero current turn-off eliminating electrical noise and transient.
- Ability to switch OFF AC loads at the point of zero load current, thereby eliminating the arcing, electrical noise and contact bounce.

PIN DETAILS



NAME	DETAILS
GND	Power supply Ground
+5V	Power Supply
D0	Data 0
D1	Data 1
D2	Data 2
D3	Data 3

WORKING

Another common type of triac switching circuit uses phase control to vary the amount of power applied to a load. In this case a load, for both the positive and negative halves of the input waveform can be controlled. Inductive or Resistive load gives a fully variable and linear control of the voltage can be adjusted from zero to the maximum applied voltage as shownin Fig A), Fig B) and Fig C).

This basic phase triggering circuit uses the triac in series with the load across an AC sinusoidal supply. The 16 level of digital input can control the firing angle of triac, which in turn controls the amount of voltage applied to the load.

SCREENSHOTS

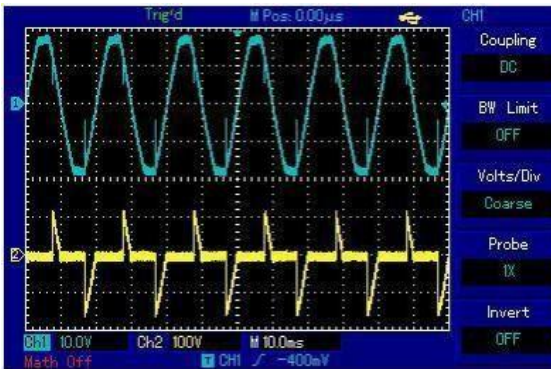


Fig A) shows 25% Dimming for given voltage when D3=1, D2=0, D1=1, D0=0

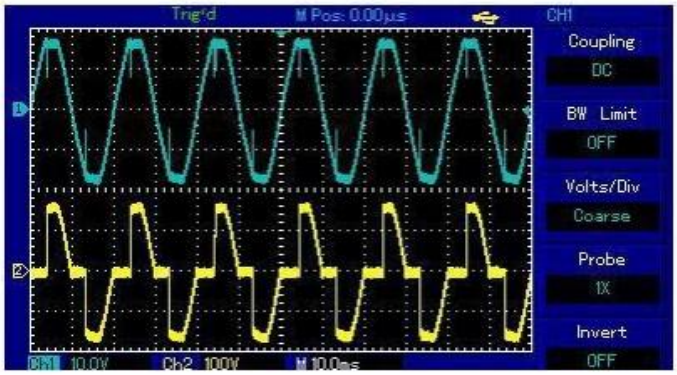


Fig B) shows 50% Dimming for given voltage when D3=0, D2=1, D1=1, D0=1

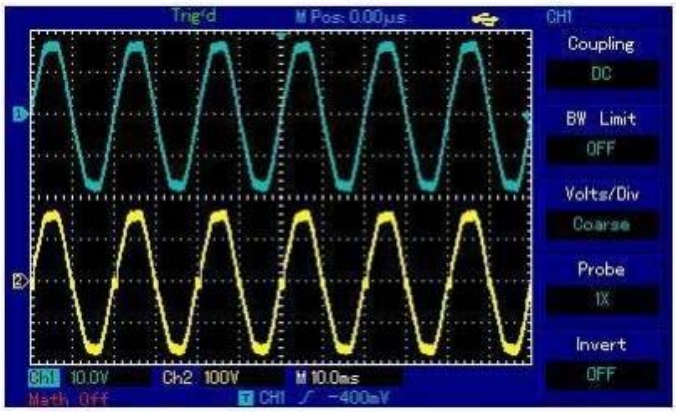


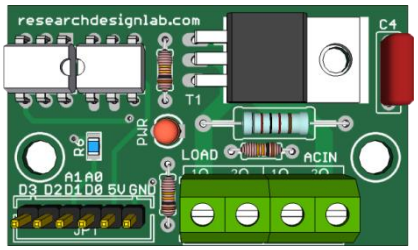
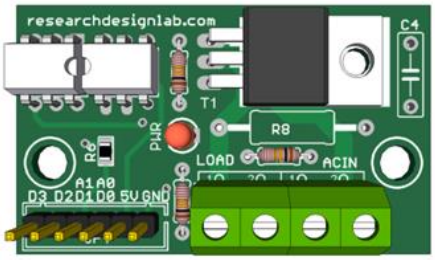
Fig C) shows 100% Dimming for given voltage when D3=0, D2=0, D1=0, D0=0

DIMMER MODULE - CONTROL INPUT TABLE

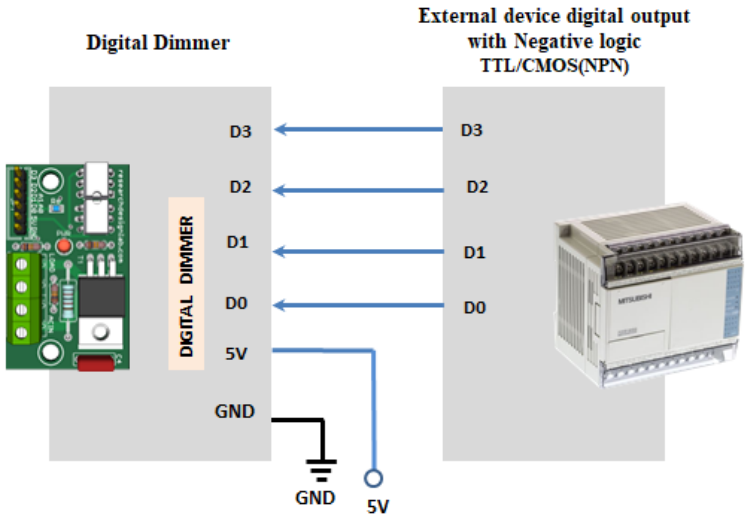
Table shows 16 level of dimming control of load 0-100%

INPUT				OUTPUT
D3	**D2**	**D1**	**D0**	**Dimming %**
1	1	1	1	0%
1	1	1	0	5%
1	1	0	1	10%
1	1	0	0	15%
1	0	1	1	20%
1	0	1	0	25%
1	0	0	1	30%
1	0	0	0	40%
0	1	1	1	50%
0	1	1	0	60%
0	1	0	1	65%
0	1	0	0	70%
0	0	1	1	75%
0	0	1	0	80%
0	0	0	1	85%
0	0	0	0	100%

Digital Dimmer with Snubber and without Snubber circuit

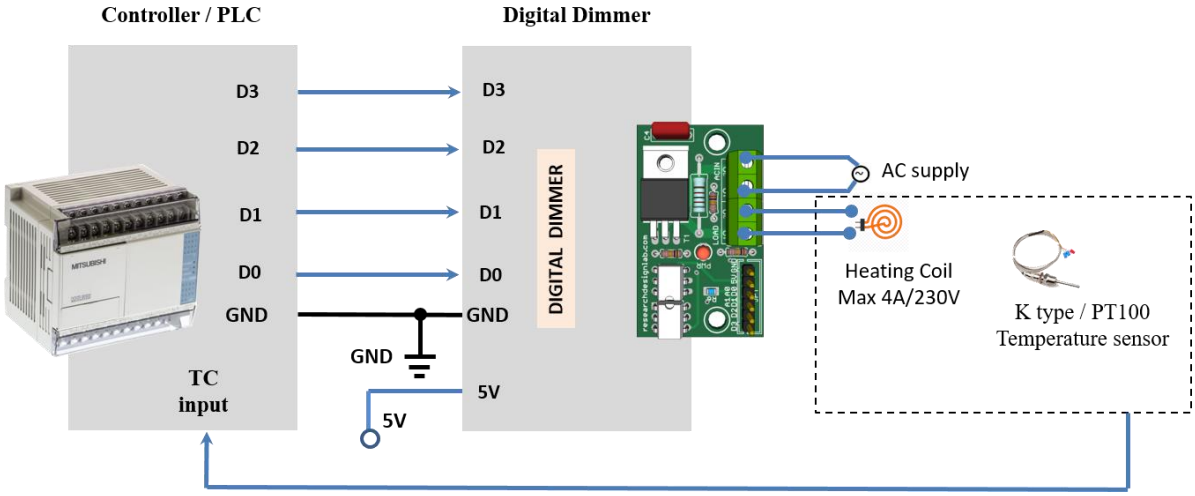
Image		
Order Code	RDL/LDC/13/001/V1.0	RDL/LDC/13/001/V1.0-A
Snubber Circuit	Enabled	Disabled
Application	Suitable for Inductive Load	Suitable for LED ON/OFF and phase dimming

APPLICATION WIRING DIAGRAM FOR DIMMER AND PLC INTERFACE



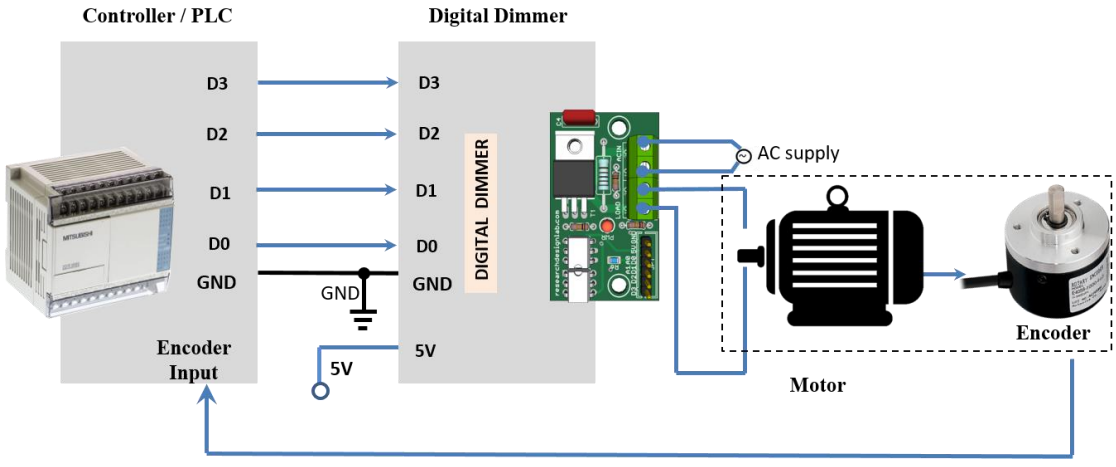
PID TEMPERATURE CONTROL SYSTEM

16 level of temperature control can be achieved with respect to different set of temperature.
In case of linear control use Analog SSR 230V Dimmer (RDL804)

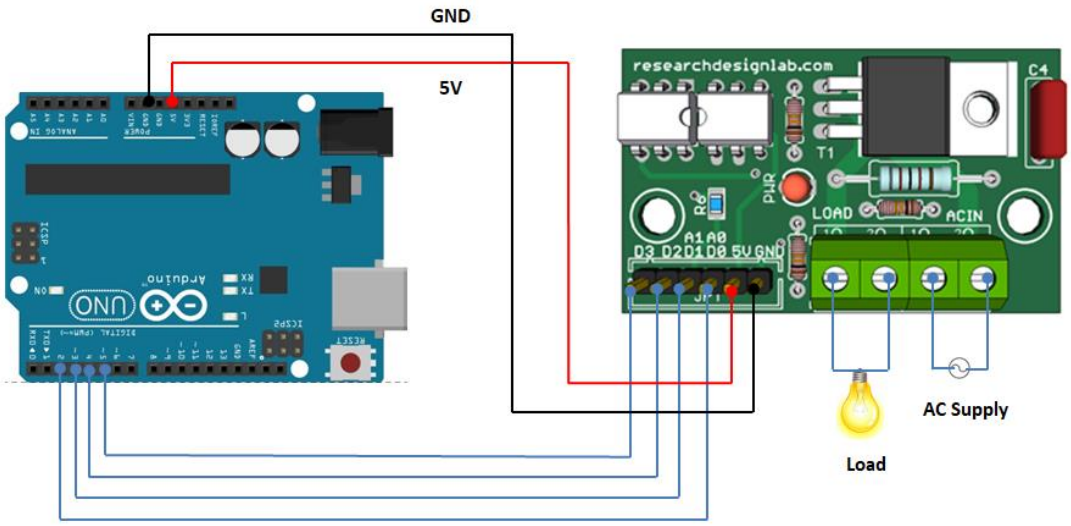


PID AC SINGLE PHASE SPEED CONTROL SYSTEM

16 level of speed control can be achieved with respect to different encoder frequency.
In case of linear control use Analog SSR 230V Dimmer (RDL804)



SAMPLE CODE AND WIRING DIAGRAM



Arduino program to control the dimmer 0-100% using simple IO handling

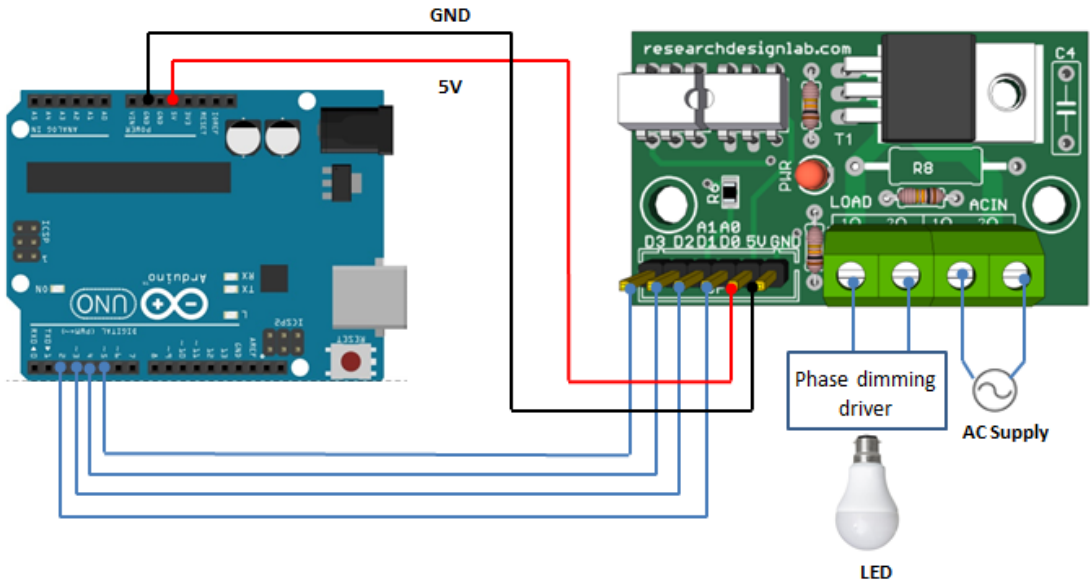
```
const int D3 = 5;
const int D2 = 4;
const int D1 = 3;
const int D0 = 2;
const int Pins[4]={D3, D2, D1, D0};
int n=2;  //change delay value here
int count;

void setup()
{
 Serial.begin(115200);
 Serial.println("Initializing the state of Pins as Output");
  for (int pin =0; pin < 4; pin++)
 {
   pinMode (Pins[pin], OUTPUT);
 }
}
void loop()
{
for ( count = 0; count < 16; count++)
{
```

```
Dimming();
  delay (n*1000); //To change the delay simply change the n value in the program(n x 1sec).
}
}

void Dimming()
{
 digitalWrite (Pins[3], boolean ((count & 8)>>3));
 digitalWrite (Pins[2], boolean ((count & 4)>>2));
 digitalWrite (Pins[1], boolean ((count & 2)>>1));
 digitalWrite (Pins[0], boolean (count & 1));
}
```

Controlling Dimmer converting decimal value to binary method:



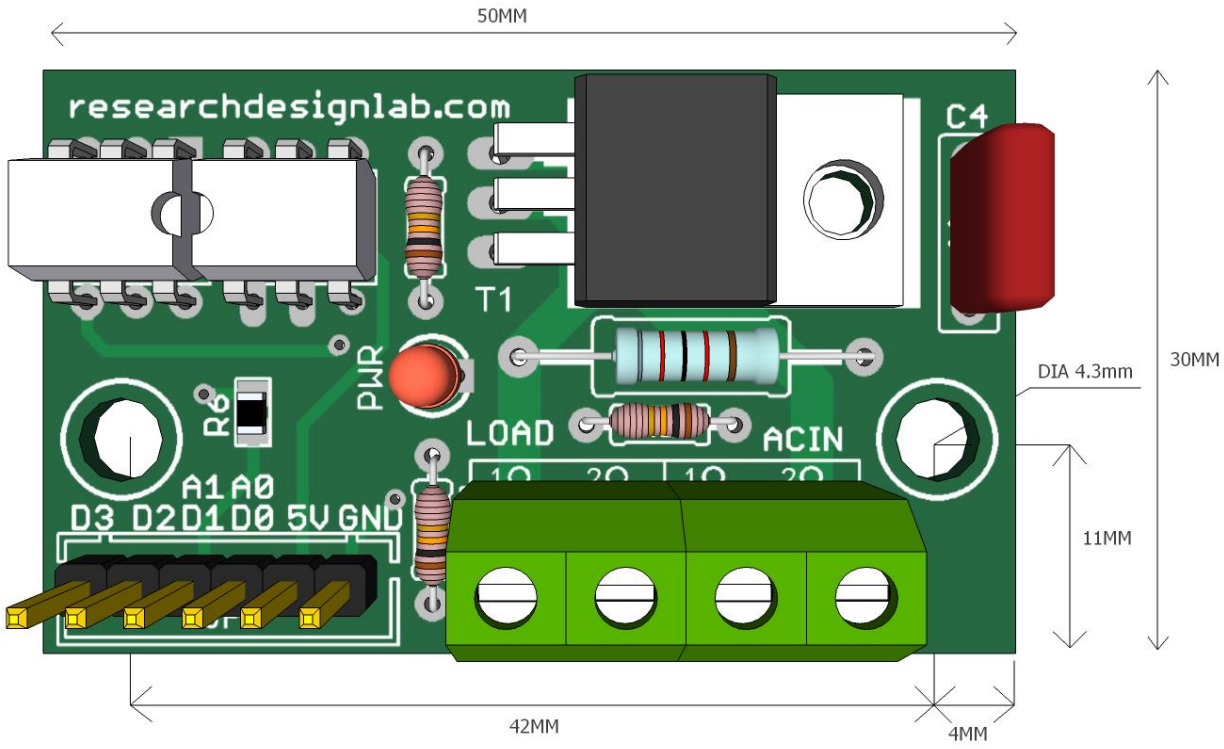

```
#include<SoftwareSerial.h>
SoftwareSerial mySerial(10, 11); // RX, TX
Void setup()
{
// Open serial communications and wait for port to open:
Serial.begin(9600);
while (!Serial) {
; // wait for serial port to connect.
```

```
}
Serial.println("Starting Program!");
//Up all the relays connected serial to the Dimmer
pinMode(5,OUTPUT);
pinMode(6,OUTPUT);
pinMode(7,OUTPUT);
digitalWrite(5,HIGH);
digitalWrite(6,HIGH);
digitalWrite(7,HIGH);
// set the data rate for the Software Serial port
mySerial.begin(9600);
Serial.write('S');
mySerial.write('S');
delay(1000);
}
Void loop() // run over and over
{
for(int i=0; i<10; i++) {
int percentageVal= i* 10;
CONVERT_DISPLAY('B',percentageVal);
delay(5*1000);
}
delay(2000);
}
void CONVERT_DISPLAY(unsignedchar val,unsignedint d)
{
unsignedchar dig1,dig2,dig3,dig[3];
unsignedchar x;
unsignedchar temp;
temp=d;
temp=temp/10;
dig1=d%10;
dig2=temp%10;
dig3=temp/10;
dig[0]=dig3;
dig[1]=dig2;
dig[2]=dig1;
```

```
        Serial.write(val);
        mySerial.write(val);
        for(x=0;x<3;x++)
        {
        temp=dig[x]|0x30;
        Serial.write(temp);
        mySerial.write(temp);

        }
}
```

DIMENSIONS



RELATED PRODUCTS

Serial 3 Channel AC 230VSSR

ORDER CODE: RDL/3SD/13/001/V1.0

Wi-Fi Dimmer SSR 230V 8A-ESP8266

ORDER CODE: RDL621

Analog SSR 230V Dimmer Module

ORDER CODE: RDL804

Analog SSR 230V 8A Dimmer Module

ORDER CODE: RDL802

SSR 230V 8A Dimmer-ON/OFF Switch

ORDER CODE: RDL628

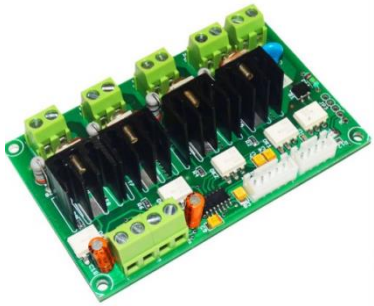
SSR 230V 4A Dimmer-ON OFF Switch

ORDER CODE: RDL677

Wi-Fi Dimmer SSR 230V 4A-ESP8266

ORDER CODE: RDL688

4 Channel SSR 230V 8A Dimmer Module



ORDER CODE: RDL811