

Arduino Nano-Switching ON/OFF Appliances Using Infra-Red Remote (Two Channel)

The project presented here is a two-channel infrared remote ON/OFF switch that can be used to control home appliances, Lights, Fans, Water Pumps, Aquarium pumps, Ovens, Heaters, etc. This open-source project contains 2 x SSR (Solid State Relay), Arduino Nano, and TSOP1838 infrared receiver, keeping safety in mind, optically isolated SSR (Solid State Relay) is used to have isolation between high voltage AC circuitry and Arduino Nano. The operation of the circuit is pretty simple, TSOP1838/TSOP38238 IR Sensor receives the infrared signal from IR remote, Arduino Nano decodes the IR signal which is connected to digital pin D2 and provides latch outputs on digital pins D5, and D6 in respect to IR code received from IR remote. These two digital outputs D5, D6 drive the SSR using 2 x BC847 BJT transistors. CPC1998J optically isolated solid-state relays from IXYS Integrated Circuits drive the AC loads. We have tested this board with 500W/230V AC lamps, however, the load capacity of SSR is 20A. A snubber circuit is provided across the SSR-Traic which helps driving inductive loads. Heat-sink on SSR is not required for loads up to 5A, but for higher load, it is advisable to mount a heatsink on SSR.

Components Functions: U2 & U3 SSR Relay AC Load driver, U4 TSOP1838/TSOP38238 IR Sensor, R1 & R4 Current limiting resistor for SSR LED, Q1 & Q2 LED Driver of SSR, D1 & D2 Protection Diode for SSR LED, C1 & C2 + R1 & R5 Snubber Circuit for AC Inductive Load.

Connections: CN2 AC Input 110V-220V AC, CN1 Load, CN3 Load, CN4 5V DC Supply If Arduino Nano USB power is not available, CN5 DC Power (Optional) 7V to 12V if USB/5V power is not available.

Power Supply DC: The Arduino Nano can be powered via the Mini-B USB connection, 7-12V unregulated external power supply (CN5), or 5V regulated external power supply (Cn4).

CPC1998J is an AC Solid State Switch utilizing dual power SCR outputs. This device also includes zero-cross turn-on circuitry and is specified with an 800VP blocking voltage. Tightly controlled zero-cross circuitry ensures low noise switching of AC loads by minimizing the generation of transients. The optically coupled input and output circuits provide exceptional noise immunity and 2500Vrms of isolation between the control and the output. As a result, the CPC1998J is well suited for industrial environments where electromagnetic interference would disrupt the operation of plant facility communications and control systems









Arduino Pin configurations: Digital Pin D2 TSOP1838 Infra-Red Receiver, Digital Pin D5 and D5 outputs

Note 1: This board can accommodate other SSR like S216S02 from Sharp, CPC1998J from IXYS or KSD215AC3 available from http://www.cosmo-ic.com

Note 2: This project also can be used for many other applications that require 2 x SSR, Optional U5 connector is provided to interface analog/digital device or sensor

Code

Arduino Example code is provided to test the project, Code is compatible and paired for Spark Fun Remote Model COM-14865, Switch A and Switch C defined for Load1 and Load2, more info on remote available here.

https://www.sparkfun.com/products/14865 https://learn.sparkfun.com/tutorials/ir-control-kit-hookup-guide

This project can support other IR remotes, to lean more follow bellow link. <u>https://randomnerdtutorials.com/arduino-ir-remote-control/</u>

Features

- Operating Supply DC circuit 5V CN4, USB Arduino Nano or 7-12V Unregulated Cn5
- Operating Supply AC Supply 110v-230V AC
- Load up to 500W Each Channel (SSR Maximum Current rating 20Amps)
- TSOP38238 or TSOP1838 IR Receiver
- Snubber Circuit across the SSR-Traic to Drive Inductive load
- Arduino Code Compatible with Spark Fun COM-14865 IR Remote
- PCB Dimensions 98.43 x 50.80 mm









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ВОМ				
NO	QNTY	REF	DESC	SUPPLIER/MANUFACTURER
1	1	CN1	2 PIN SCREW TERMINAL 5.08MM PITCH	DIGIKEY 277-1247-ND
2	1	CN2	2 PIN SCREW TERMINAL 5.08MM PITCH	DIGIKEY 277-1247-ND
3	1	CN3	2 PIN SCREW TERMINAL 5.08MM PITCH	DIGIKEY 277-1247-ND
4	1	CN4	4 PIN MALE HEADER 2.54MM PITCH	DIGIKEY S1011EC-40-ND
5	1	CN5	4 PIN MALE HEADER 2.54MM PITCH	DIGIKEY S1011EC-40-ND
6	2	C1,C2	0.01uF/275V X2	DIGIKEY 399-11811-ND
7	1	C3	10uF/10V SMD SIZE 0805	YAGEO
8	2	C4,C6	0.1uF/50V SMD SIZE 0805	YAGEO
9	4	U5,C5,R9,R10	DNP	OMIT
10	2	D1,D2	1N4148	DIGIKEY 1N4148UR-1-ND
11	2	Q1,Q2	BC847AL	DIGIKEY 1727-2924-1-ND
12	2	R1,R4	470E 5% SMD SIZE 0805	YAGEO
13	2	R2,R5	39E 5% 1W THT	DIGIKEY PPC39W-1CT-ND
14	2	R3,R6	1K 5% SMD SIZE 0805	YAGEO
15	1	R7	10K 5% SMD SIZE 0805	YAGEO
16	1	R8	10E 5% SMD SIZE 0805	YAGEO
17	1	U1	ARDUINO NANO	DIGIKEY 1050-1001-ND
18	2	U2,U3	CPC1998J	DIGIKEY CLA368-ND
19	1	U4	TSOP38238 OR TSOP1838	DIGIKEY 751-1227-ND



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