Super Dimmer Ancillary Components

Just when you thought the Super Dimmer was all it could be, here are a few ancillary boards and switch combinations that increase the usefulness even futher. I suppose I went overboard in designing these options – but they just show how flexible the dimmer is (and I could have even added more options).

To fully utilize these options, you need to load the ATTiny85 microcontrollers with version 1.4 or later of the Link Board Driver sketch. This file is available at rv-project.com.

That sketch has 4 options. By default, option 2 is selected as it is the most popular, but depending on the hardware you might want to add, you may need to change the option. This is fully documented in the sketch itself, but in summary:

Options:
Configuration 1: Override Switch.
Configuration 2: Auto-Off Timer enable.
Configuration 3: Remote Sensing.
Configuration 4: Relay Board.

Override Switch. This is the original configuration of the dimmer, and allows the remote (channel 3) input pins to override the other functions. In this option, use of the override switch turns the LEDs On or Off. Dimming and Auto Timeout functions are disabled.

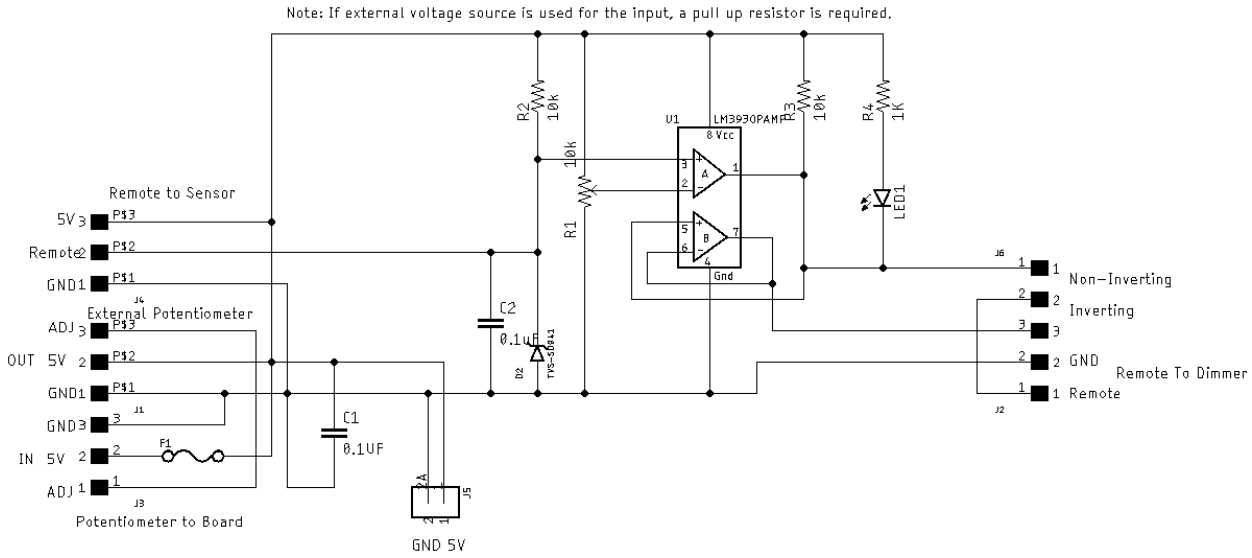
Auto-Off Timer enable. If selected by both DiP switch (timeout delay) and a switch across the remote (channel 3) input pins, the lights will timeout (turn off) 1, 2, or 4 hours after the lights are turned on or dimmed. This allows selection of the timeout feature from a control panel switch without having to access the DiP switch.

Remote Sensing. This mode allows the remote (channel 3) input to act as either an analog sensor when used with a photocell (or other analog sensor) or a full-blown third channel. This function requires an expansion board to be used – Aux Board A for photocells, or Aux Board B for the channel expansion.

Relay Board. This configuation is for the non-dimming relay board versions, and provides the same functionality as the dimmer (2 or 3 input channels) but without the dimmer functionality.

Aux Board A: Analog Sensor Board

This board is useful for detecting analog voltages, such as a photocell. This will allow the dimmer to turn the lights on or off at dusk or dawn. Modification of the sketch is required (fully documented in the sketch).

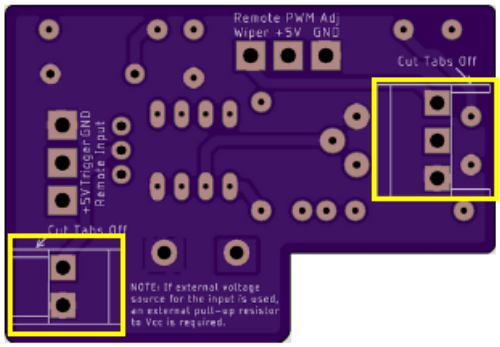


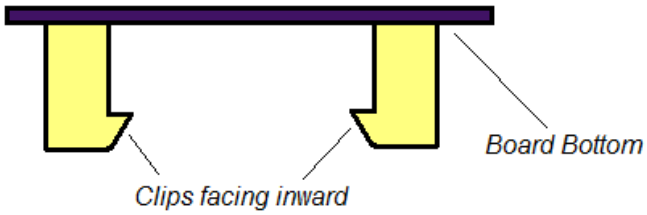
Bill of Materials

Item	Description	Part Number	Source
R1	10K Potentiometer	A-604	TaydaElectronics.Com
R2	10K 1/4W Carbon Film Resistor	A-2115	TaydaElectronics.Com
R3	10K 1/4W Carbon Film Resistor	A-2115	TaydaElectronics.Com
R4	1K 1/4W Carbon Film Resistsor	A-2123	TaydaElectronics.com
C1	0.1uF Monolythic Ceramic Capacitor	A-214	TaydaElectronics.Com
C2	0.1uF Monolythic Ceramic Capacitor	A-214	TaydaElectronics.Com
LED1	3mm Green LED	A-064	TaydaElectronics.Com
F1	0.5A Polyfuse	A-1388	TaydaElectronics.Com
D1	TVS Diode	P4KE20A	Digikey.Com
U1	LM393 Dual OpAmp	A-023	TaydaElectronics.Com
J1	3-Pin 3.96mm Wafer Connector	A-777	TaydaElectronics.Com

J2	2-Pin topboard 3.96mm Wafer Conn	09-48-4028	DigiKey.Com
J3	3-pin topboard 3.96mm Wafer Conn	0009484038	DigiKey.Com
J4	3-pin 3.96mm Wafer Connector	A-777	TaydaElectronics.Com
J5	2-pin Kf7.62 Terminal Block	KF7.62-2 3	Amazon.Com
J6	3-pin Header	A-197	TaydaElectronics.Com
Short	Shorting Block	A-1324	TaydaElectronics.Com
PCB	Dimmer Adapter Board	PAIB-1A	OSHPark.Com

Board Bottom

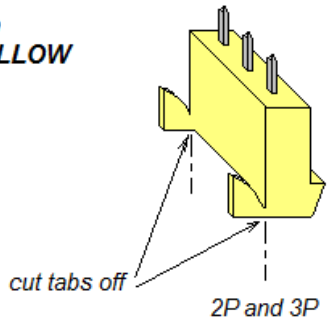




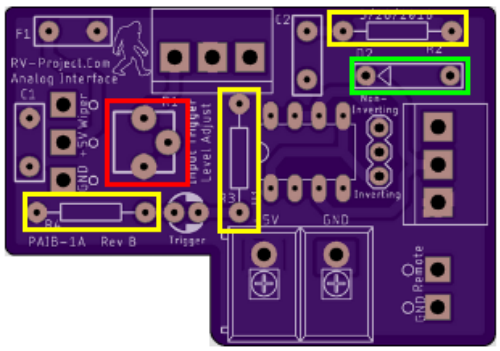
☐ ***Cut the tabs off both 2P and 3P connectors. Then insert them on the BOTTOM side of the board, with the attachment clips facing inward as shown in YELLOW***

(hint, install the connectors on the dimmer board first to provide the correct alignment and orientation)

☐ ***Optional - glue the tabs in place with fast cure 3M 5200 Adhesive/Sealant.***



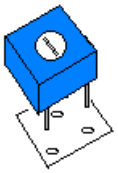
Board Top



Install the following resistors on the board as shown:

As shown in RED

- ☐ ***10K Trimmer Potentiometer (103)***



As shown in YELLOW

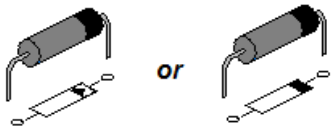
- ☐ ***R2 10K 1/4W (Brown-Black-Orange)***
- ☐ ***R3 10K 1/4W (Brown-Black-Orange)***
- ☐ ***R4 1K 1/4W (Brown-Black-Red)***

5% Carbon-Film Resistors

Install Diodes on the board as shown in GREEN

- ☐ ***P4KE20A TVS Diode***

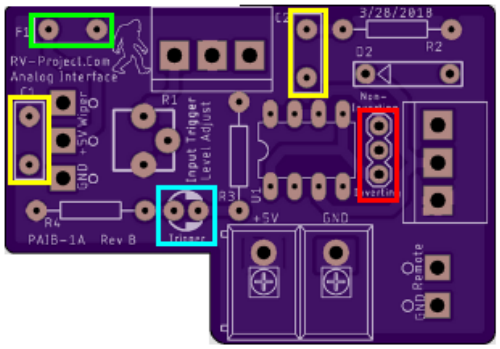
Note: Diodes have a band on one end. That band goes on the board as shown.



or

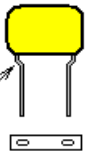
Arrow ***Band***

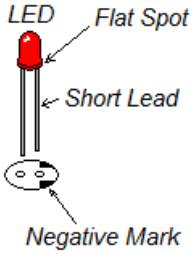
Board Top



- ☐ ***Install a 0.1uF Monolythic Ceramic Capacitor at C1 and C2 as shown in YELLOW.***
- ☐ ***Install a 0.5Amp Polyfuse at the location shown in GREEN. Note: the polyfuse looks a lot like a Ceramic Capacitor.***
- ☐ ***Install a 3 pin header at the location marked RED.***
- ☐ ***Insert a LED in the location marked LIGHT BLUE. Pay attention to the orientation.***

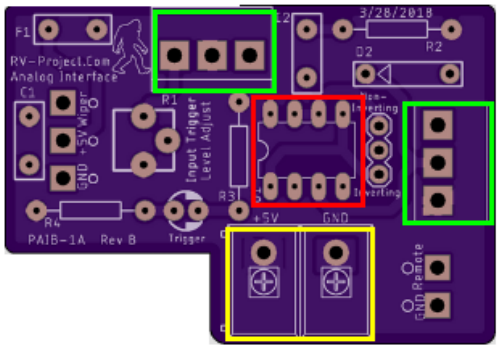
Sometimes Monolythic Capacitor leads are too wide to be inserted. In this case, slightly bend the leads in.





Break off 3 pins from a 0.1 header and insert on board as shown. Then put a shorting block in the "Inverting" position.

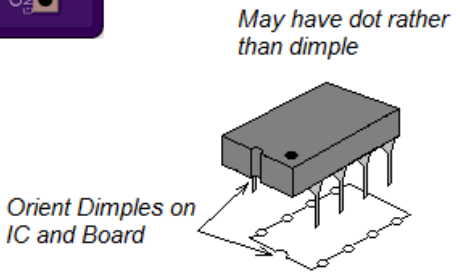
Board Top

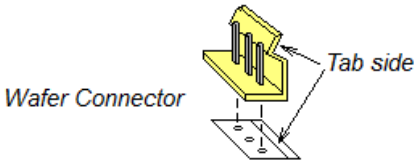


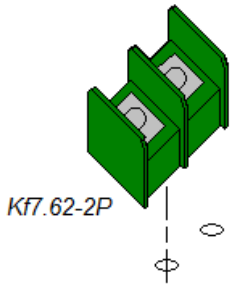
- ☐ ***Insert LM393 OpAmp at location shown in RED. Pay attention to orientation.***

- ☐ ***Insert two 3.96mm Wafer Connectors as shown in GREEN. Pay attention to orientation.***

- ☐ ***Insert a Kf7.62 two position terminal board as shown in YELLOW.***

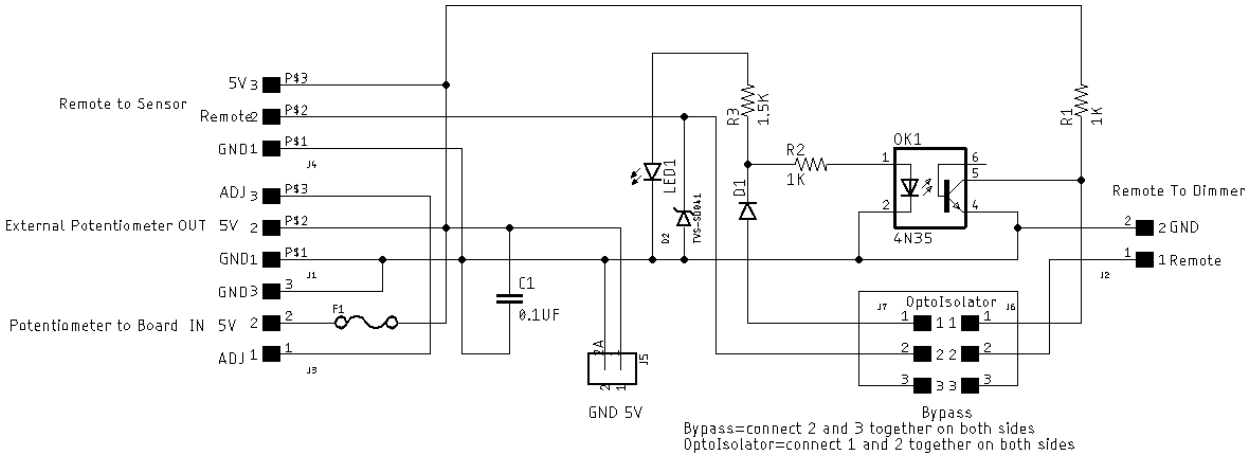






Aux Board B: Channel Expansion Board

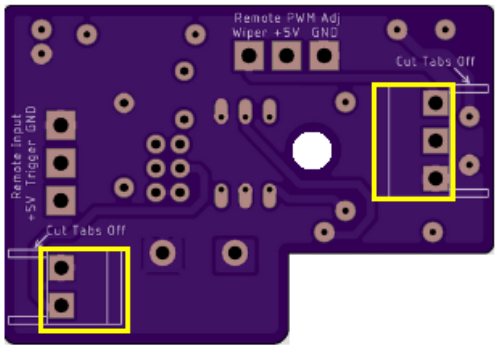
This module allows expansion of the dimmer to 3 independent control channels. Modification of the sketch is required (fully documented in the sketch).

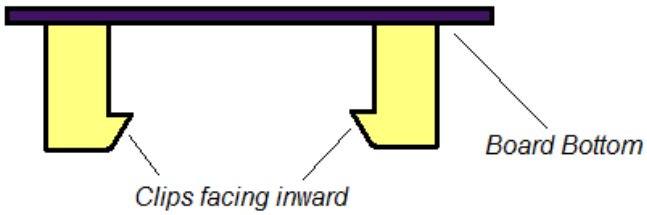


Bill of Materials

Item	Description	Part Number	Source
R1	1K 1/4W Carbon Film Resistor	A-2123	TaydaElectronics.com
R2	1K 1/4W Carbon Film Resistor	A-2123	TaydaElectronics.com
R3	1.5K 1/4W Carbon Film Resistor	A-2094	TaydaElectronics.Com
C1	0.1uF Monolythic Ceramic Capacitor	A-214	TaydaElectronics.Com
LED1	3mm Green LED	A-064	TaydaElectronics.Com
F1	0.5A Polyfuse	A-1388	TaydaElectronics.Com
D1	1N4148 Switching Diode	A-157	TaydaElectronics.Com
D2	TVS Diode	P4KE20A	Digikey.Com
OK1	4N35 OptoIsolator	A-035	TaydaElectronics.Com
J1	3-Pin 3.96mm Wafer Connector	A-777	TaydaElectronics.Com
J2	2-Pin topboard 3.96mm Wafer Conn	09-48-4028	DigiKey.Com
J3	3-pin topboard 3.96mm Wafer Conn	0009484038	DigiKey.Com
J4	3-pin 3.96mm Wafer Connector	A-777	TaydaElectronics.Com
J5	2-pin Kf7.62 Terminal Block	KF7.62-2 3	Amazon.Com
J6-J7	3-pin Header	A-197	TaydaElectronics.Com
Short	Shorting Block	A-1324	TaydaElectronics.Com
PCB	Dimmer Adapter Board	PDIB-1A	OSHPark.Com

Board Bottom

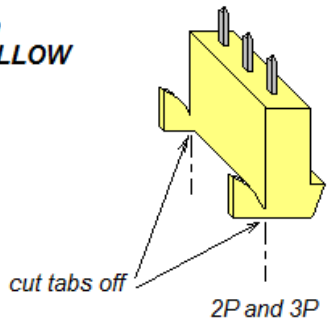




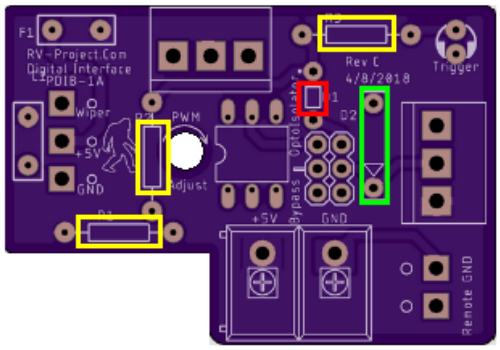
☐ ***Cut the tabs off both 2P and 3P connectors. Then insert them on the BOTTOM side of the board, with the attachment clips facing inward as shown in YELLOW***

(hint, install the connectors on the dimmer board first to provide the correct alignment and orientation)

☐ ***Optional - glue the tabs in place with fast cure 3M 5200 Adhesive/Sealant.***



Board Top



Install the following resistors on the board as shown:

As shown in YELLOW

- ☐ ***R1 1K 1/4Watt (Brown - Black - Red)***
- ☐ ***R2 1K 1/4Watt (Brown - Black - Red)***
- ☐ ***R3 1.5K 1/4Watt (Brown - Green - Red)***

5% Carbon-Film Resistors

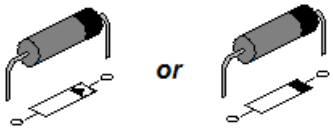
Install Diode on the board as shown in GREEN

- ☐ ***P4KE20A TVS Diode***

Note: Diodes have a band on one end. That band goes on the board as shown.

Install Diode on the board shown in RED

- ☐ ***1N4148***

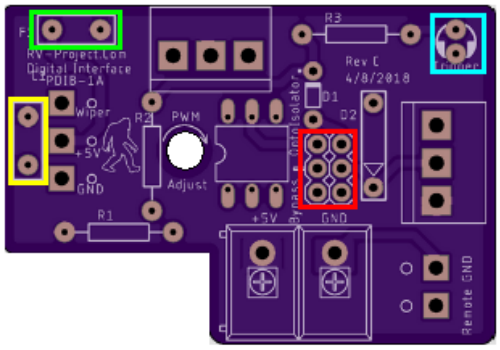


or

Arrow ***Band***

1N4148 typically has a glass body

Board Top



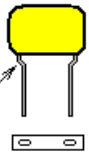
☐ ***Install a 0.1uF Monolythic Ceramic Capacitor at C1 as shown in YELLOW.***

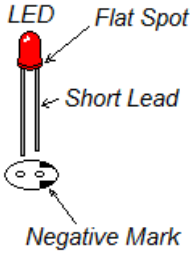
☐ ***Install a 0.5Amp Polyfuse at the location shown in GREEN. Note: the polyfuse looks a lot like a Ceramic Capacitor.***

☐ ***Install two 3pin headers in the location marked in RED.***

☐ ***Insert a LED in the location marked LIGHT BLUE. Pay attention to the orientation.***

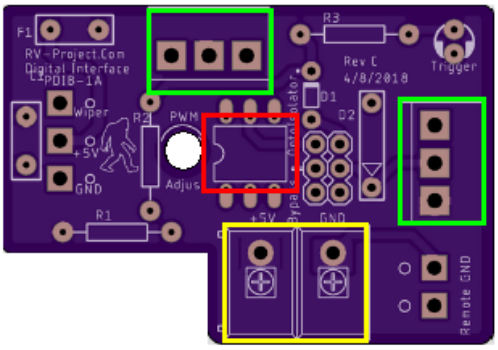
Sometimes Monolythic Capacitor leads are too wide to be inserted. In this case, slightly bend the leads in.



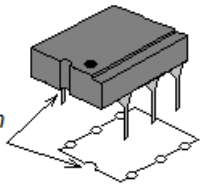


Break off 3 pins from a 0.1 header and insert on board as shown. Then put two shorting blocks in the Optoisolator position.

Board Top



May have dot or depressed side rather than dimple

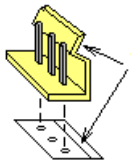


Orient Dimples on IC and Board

☐ ***Insert 4N35 Optolsolator at location shown in RED. Pay attention to orientation.***

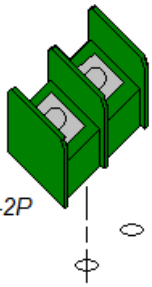
☐ ***Insert two 3.96mm Wafer Connectors as shown in GREEN. Pay attention to orientation.***

☐ ***Insert a Kf7.62 two position terminal board as shown in YELLOW.***



Wafer Connector

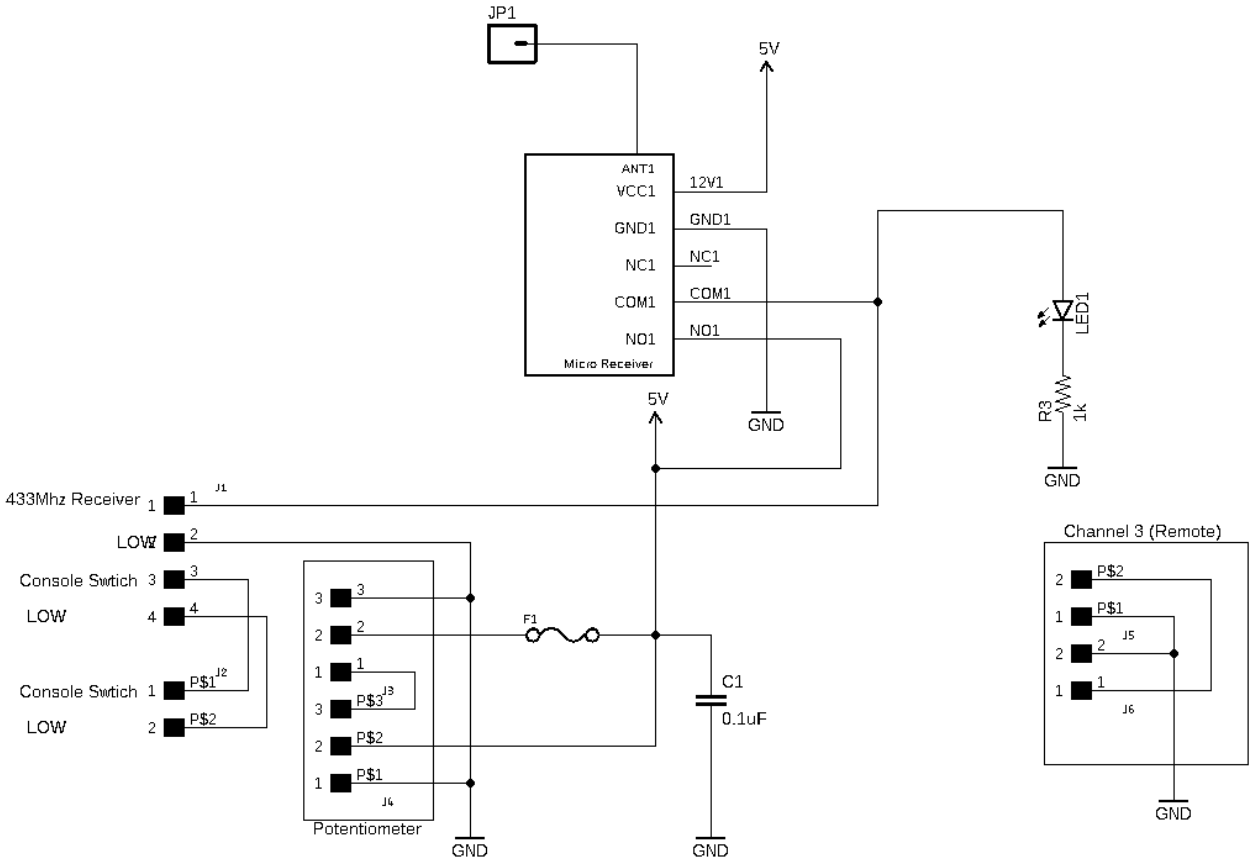
Tab side



Kf7.62-2P

Aux Board C: 433Mhz Receiver Board

This adapter board adds remote control via 433Mhz transmitter on Channel 1. Channel 2 is still available for a switch.

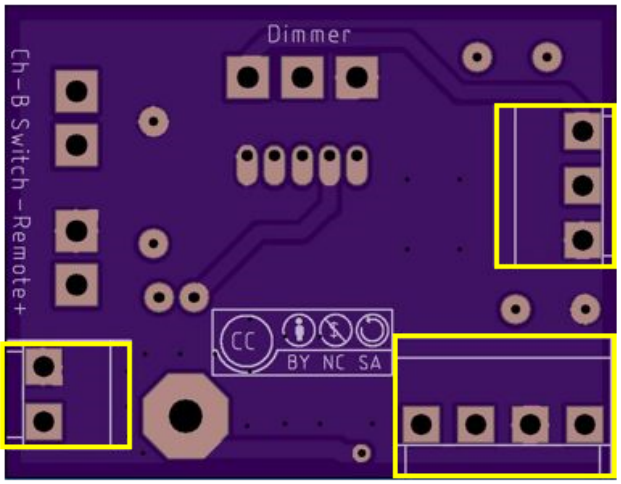


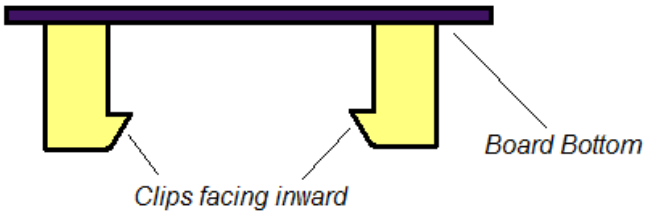
Bill of Materials

Item	Description	Part Number	Source
R3	1K 1/4W Carbon Film Resistor	A-2123	TaydaElectronics.com
C1	0.1uF Monolythic Ceramic Capacitor	A-214	TaydaElectronics.Com
LED1	3mm Green LED	A-064	TaydaElectronics.Com
F1	0.5A Polyfuse	A-1388	TaydaElectronics.Com
J1	4-pin topboard 3.96mm Wafer Conn	0009484048	DigiKey.Com
J2	2-Pin 3.96mm Wafer Connector	A-776	TaydaElectronics.Com
J3	3-pin topboard 3.96mm Wafer Conn	0009484038	DigiKey.Com
J4	3-Pin 3.96mm Wafer Connector	A-777	TaydaElectronics.Com

J5	2-Pin 3.96mm Wafer Connector	A-776	TaydaElectronics.Com
J6	2-Pin topboard 3.96mm Wafer Conn	09-48-4028	DigiKey.Com
J7	5-pin Header (2mm) 0.79”Pitch	M22-2512005	DigiKey.Com
RX	433Mhz Micro Receiver - Relay	Generic	Amazon
Ant	2mm Banana Jack (optional)	Generic	Amazon.Com
Ant	2mm Banana Plug (optional)	Generic	Amazon.Com
PCB	Dimmer Adapter Board	Receive Board CR	OSHPark.Com

Board Bottom

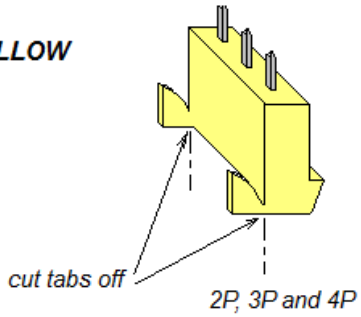




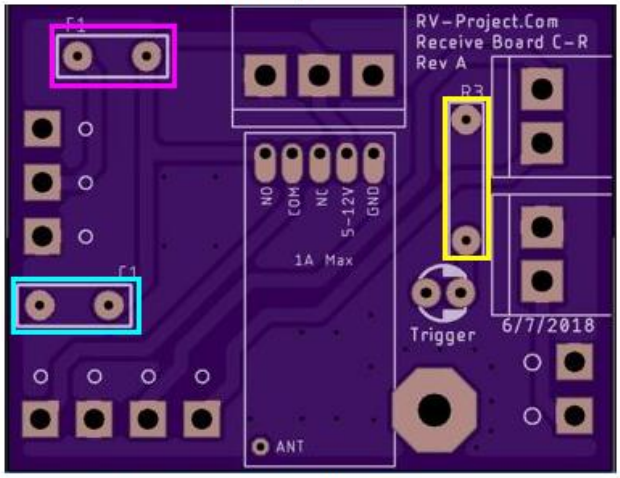
☐ ***Cut the tabs off***
insert them on the BOTTOM side of the board, with the attachment clips facing inward as shown in YELLOW

(hint, install the connectors on the dimmer board first to provide the correct alignment and orientation)

☐ ***Optional - glue the tabs in place with fast cure 3M 5200 Adhesive/Sealant.***



Board Top



Install the following resistor on the board as shown:

Note: R1 and R2 not used.

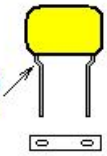
☐ ***R3 1K (Red-Black-Brown) as shown in Yellow***

5% Carbon-Film Resistors

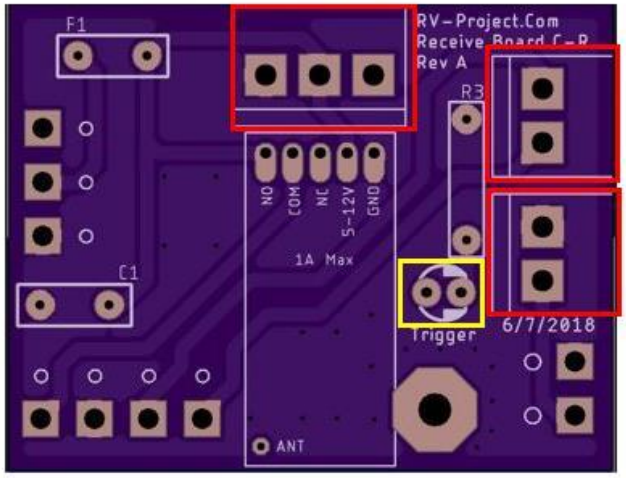
☐ ***C1 0.1uF Monolythic Ceramic Capacitor shown in Blue***

☐ ***F1 0.5A Polyfuse as shown in Violet. Note, the fuse looks similar to a Monolythic Capacitor.***

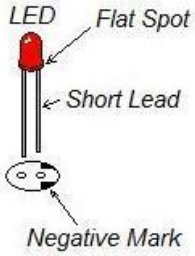
Sometimes Monolythic Capacitor leads are too wide to be inserted. In this case, slightly bend the leads in.

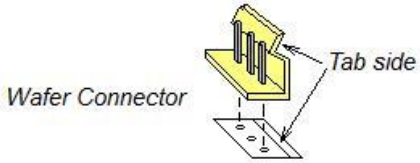


Board Top

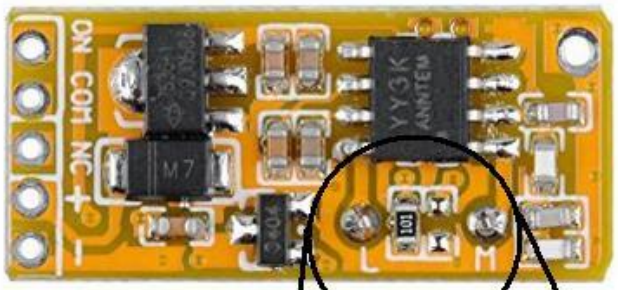


- ☐ ***Install a LED shown in location Yellow.***
- ☐ ***Install 2 and 3 pin wafer connectors in location Red.***

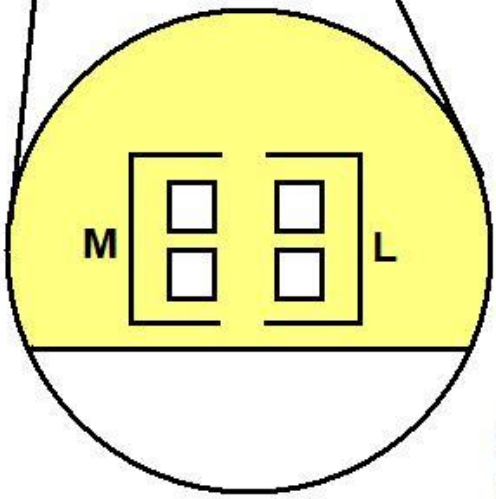




Setup the Wireless Relay receiver so it is in MOMENTARY mode. This requires removing the short from the “L” short, and placing it across the “M” pads:



In this photo, there is a 100 ohm (101) resistor shorting across the "L" pads. That is the factory default latching mode.



Some boards have a resistor (value varies) on the M or L pads; other boards just have a solder bridge.

For Latching, short across the "L" pads.

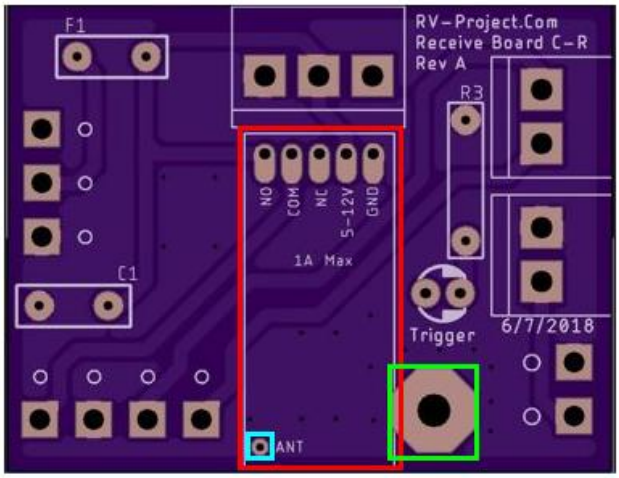
For Momentary, remove the "L" shord and short across the "M" pads.

For Toggle, remove short from both "L" and "M" pads.

Even though the board may have a resistor rather than a solder bridge, the manufacturer has stated that a solder bridge can be used (without the resistor).

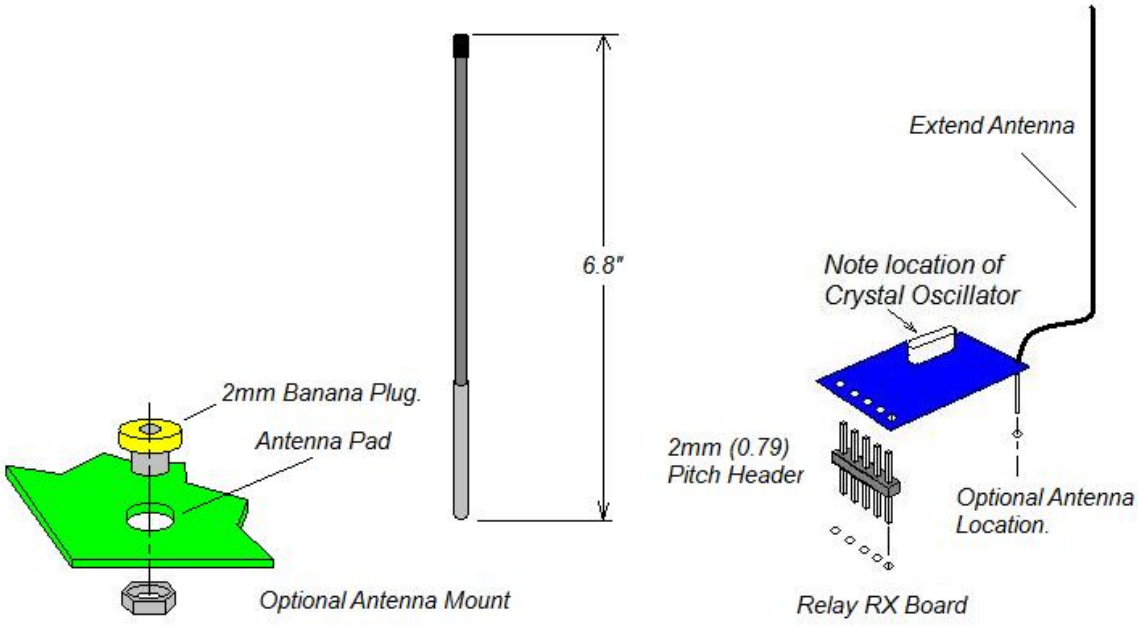
I don't know why a resistor is sometimes used.

Board Top

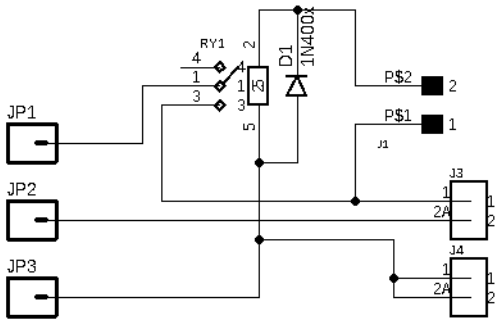


- ***After setting up the Micro Receiver board for Momentary operation, install it in location shown in Red. At this point, decide if you want to leave the antenna as is or remote the antenna to the location provided in Green.***

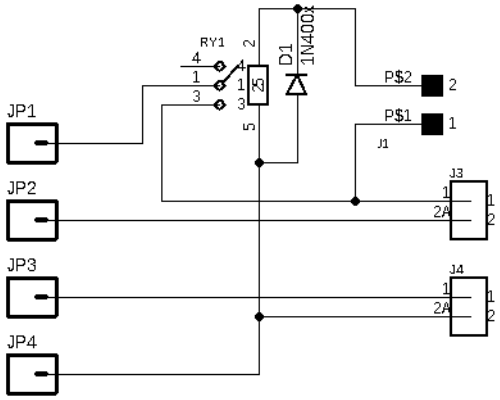
- ***If using remote antena, cut the existing antenna to 1/2" long, remove the insulation, and solder to location shown in Blue***



Power Relay Adapter Board



High-Side Adapter Board



Low-Side Adapter Board

These adapter boards are used to create a 0mA Idle current (standby) for the dimmers. Typically they consume 7mA~10mA in standby. However, in a boondocking situation, every bit of power consumption adds up, so these boards allow a zero standby mode.

When building the boards, the relay is optional. Typically the on-off switches used in a potentiometer have a 1A current limit, so if you are controlling multiple LED puck-lights, you will want to use a relay. However, if you are using a single LED

strip that consumes less than 1A, or a heavy-duty switch, you can bypass the relay with a Jumper as shown on the board.

The relay adds about 30mA to the current consumption of the board; so you have a 7mA idle current (not using a power adapter board) vs. +30mA during operation (using the adapter board with relay).

However, even with the 30mA overhead, in a boondocking situation you are still ahead if you are dimming the lights, as the power savings by dimming the LED outweighs the 30mA additional penalty.

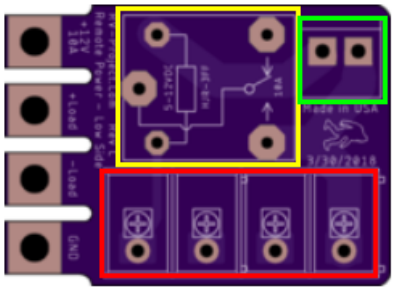
Bill of Materials

Item	Description	Part Number	Source
RY1	12V SPDT Mini-Relay	A-5014	TaydaElectronics.com
D1	1A 1206 General Purpose Diode	478-7805-1-ND	DigiKey.Com
J1	2-Pin 3.96mm Wafer Connector	A-776	TaydaElectronics.Com
J2	2-pin Kf7.62 Terminal Block (Note 1)	KF7.62-2 3	Amazon.Com
J3	3-pin Kf7.62 Terminal Block (Note 2)	KF7.62-3	Amazon.Com
PCB	High-Side PCB (Note 3)	Remote Power High	OSHPark.Com
PCB	Low-Side PCB (Note 3)	Remote Power Low	OSHPark.Com

Note 1: QTY 2 – for low-side only.
Note 2: QTY1 – for high-side only.
Note 3: Select low-side or high-side version.

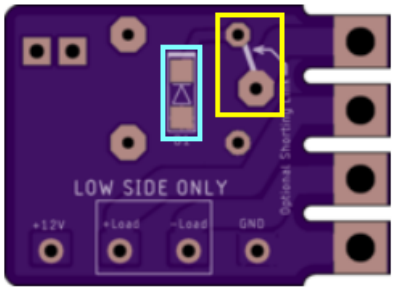
There are versions for both High Side and Low Side dimmers. The only differnce is the input terminals (3 terminals vs. 4 terminals). The assembly is identical for both boards.

Low Side Version



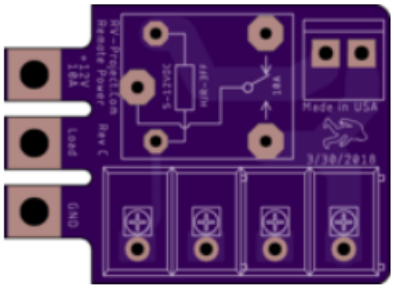
Front

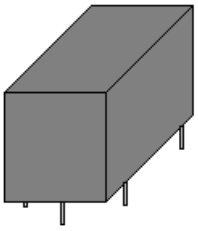
Low Side Version



Back

High Side Version

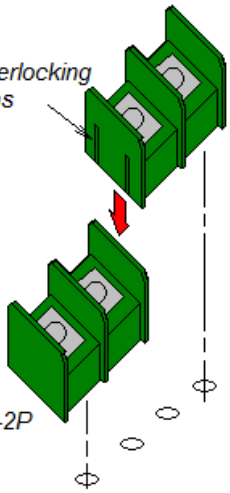




Relay

Kf7.62-2P

Interlocking pins



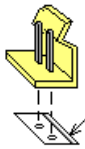
Kf7.62-2P

This board can be assembled for a High Current (over 2Amps) or low current (under 2Amps) configuration. The proper configuration depends on the On-Off switch (how many boards it will control) and the load on each board (number of LED lights).

- ☐ ***For high current applications, install Relay in the YELLOW marked area. For lower current applications, install a jumper on the back side of the board.***
- ☐ ***Assemble a 4 position Kf7.62 terminal and install at location shown in RED***
- ☐ ***Install 2Pin Wafer connector as shown in GREEN.***
- ☐ ***Install Diode in area shown in LIGHT BLUE, Pay attention to the orientation mark.***

Slide one 2Pin connector into the other to create a 4Pin connector.

Wafer Connector



Note Orientation Mark

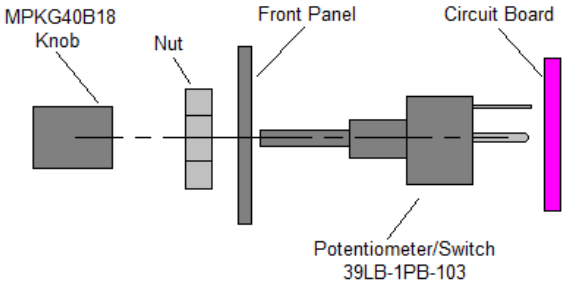
Diode

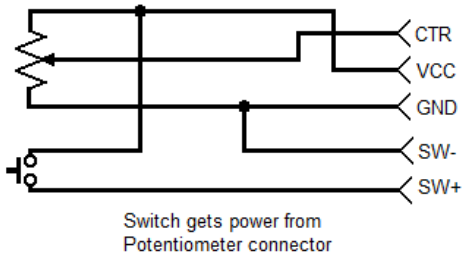
One of two orientation marks - or both.

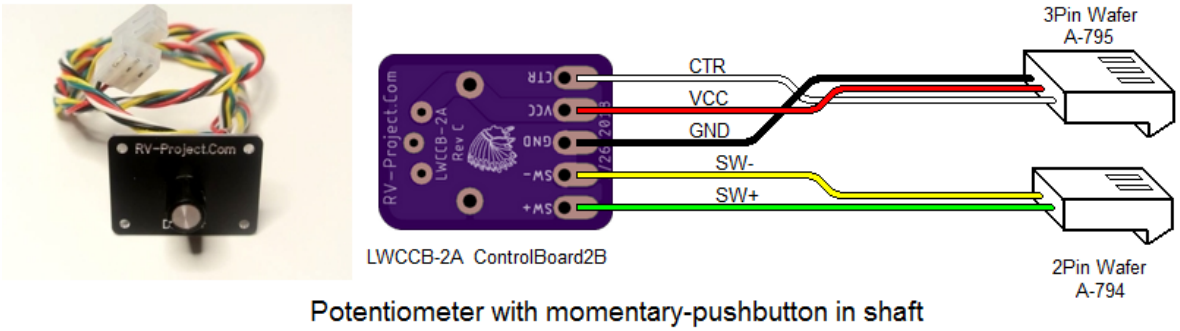
Wiring Harnesses

This section contains the various wiring harnesses with attached switches and potentiometers to provide a varied human interface. These are all optional, and remember, the minimum requirement for an operating system is to have a single momentary switch.

Front Panel Express Panel DP-1





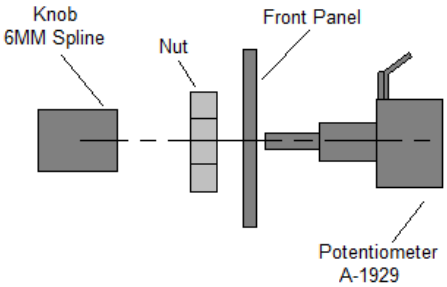


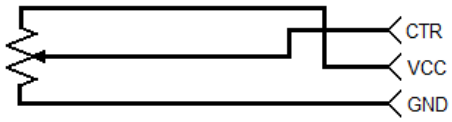
Potentiometer with momentary-pushbutton in shaft

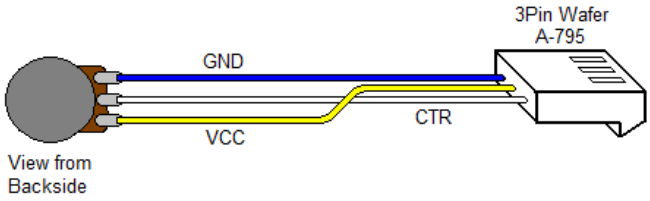
Bill of Materials

Item	Description	Part Number	Source
R1	10K Potentiometer/Switch	39LB-1PB-103	DigiKey.Com
J1	3-Pin 3.96mm Wafer Connector	A-795	TaydaElectronics.Com
J2	2-Pin 3.96mm Wafer Connector	A-794	TaydaElectronics.Com
Pins	Connector Pins (purchase extra)	A-803	TaydaElectronics.Com
PCB	Printed Circuit Board	LWCCB-2A	OSHPark.Com

Front Panel Express Panel DP-2





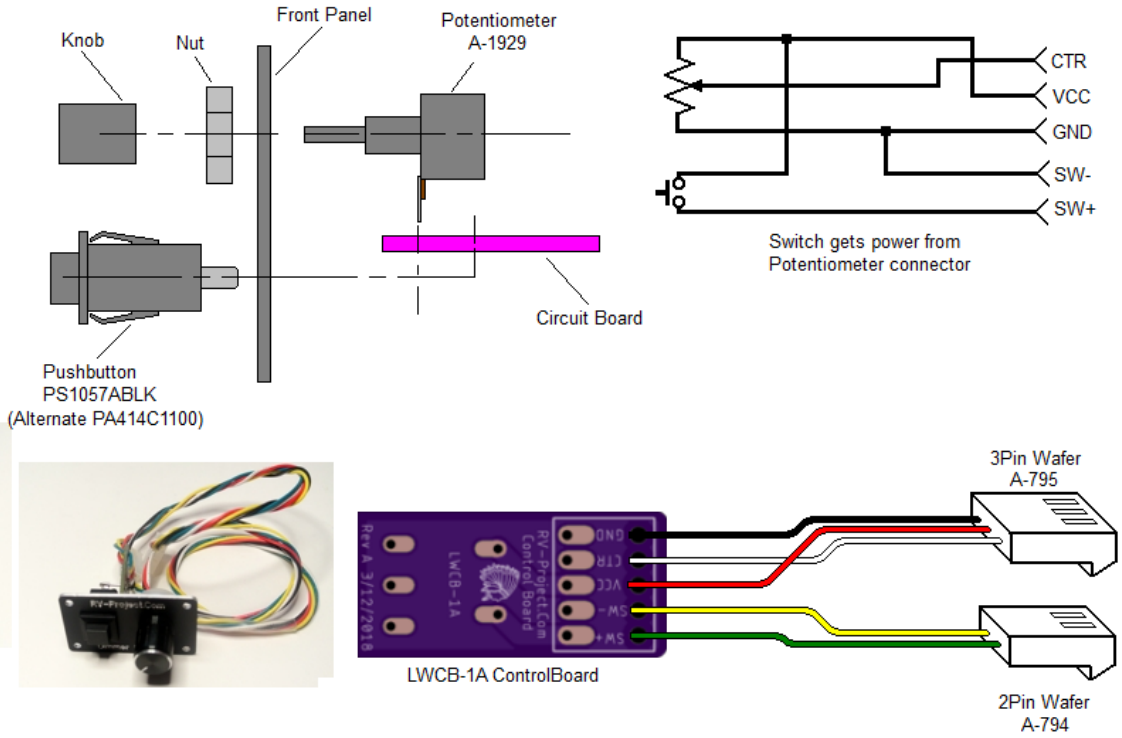


Potentiometer Dimmer Control

Bill of Materials

Item	Description	Part Number	Source
R1	10K Potentiometer	A-1929	TaydaElectronics.Com
J1	3-Pin 3.96mm Wafer Connector	A-795	TaydaElectronics.Com
Pins	Connector Pins (purchase extra)	A-803	TaydaElectronics.Com

Front Panel Express Panel DP-3

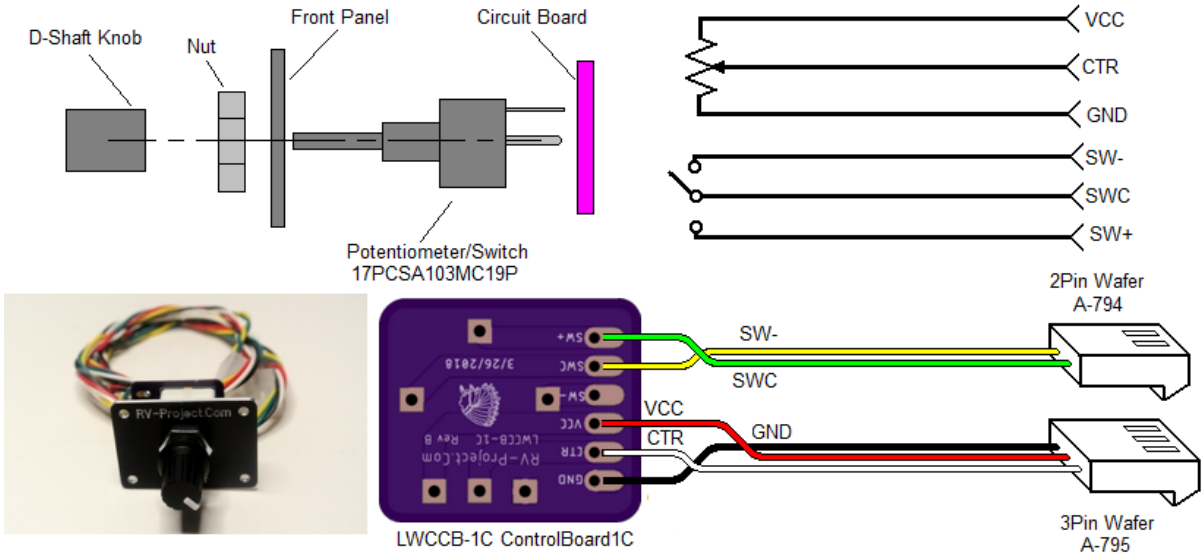


Potentiometer with adjacent momentary-pushbutton

Bill of Materials

Item	Description	Part Number	Source
R1	10K Potentiometer	A-1929	TaydaElectronics.Com
J1	3-Pin 3.96mm Wafer Connector	A-795	TaydaElectronics.Com
J2	2-Pin 3.96mm Wafer Connector	A-794	TaydaElectronics.Com
Pins	Connector Pins (purchase extra)	A-803	TaydaElectronics.Com
SW1	Pushbutton Switch	PS1057ABLK	DigiKey.Com
PCB	Circuit Board	LWCB-1A	OSHPark.Com

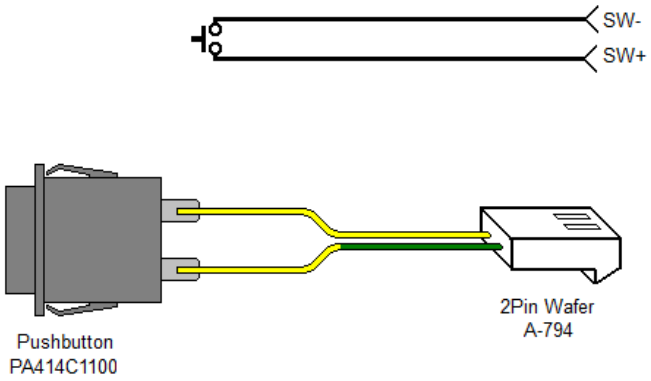
Front Panel Express Panel DP-4



Potentiometer with Push-On/Push-Off Pushbutton in Shaft

Bill of Materials

Item	Description	Part Number	Source
R1	10K Potentiometer/Switch	17PCSA103MC19P	DigiKey.Com
J1	3-Pin 3.96mm Wafer Connector	A-795	TaydaElectronics.Com
J2	2-Pin 3.96mm Wafer Connector	A-794	TaydaElectronics.Com
Pins	Connector Pins (purchase extra)	A-803	TaydaElectronics.Com
PCB	Circuit Board	LWCCB-1C	OSHPark.Com



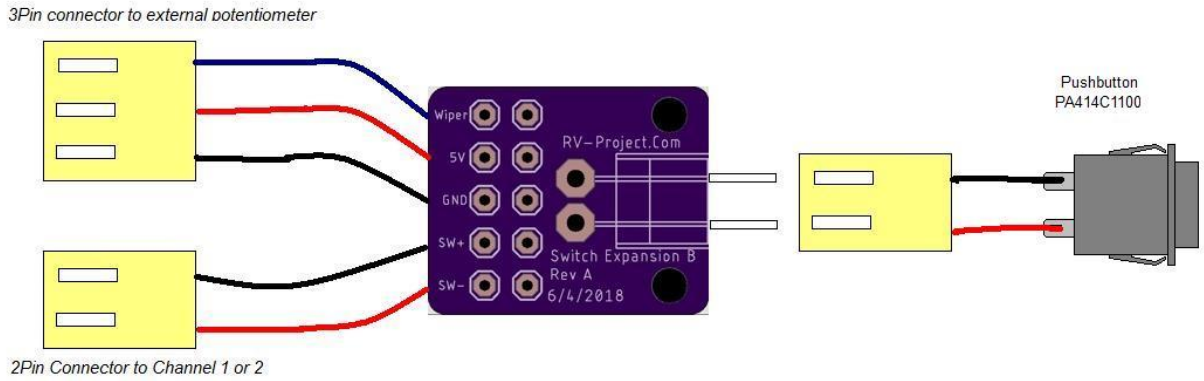
Panel Mount Pushbutton Switch

Bill of Materials

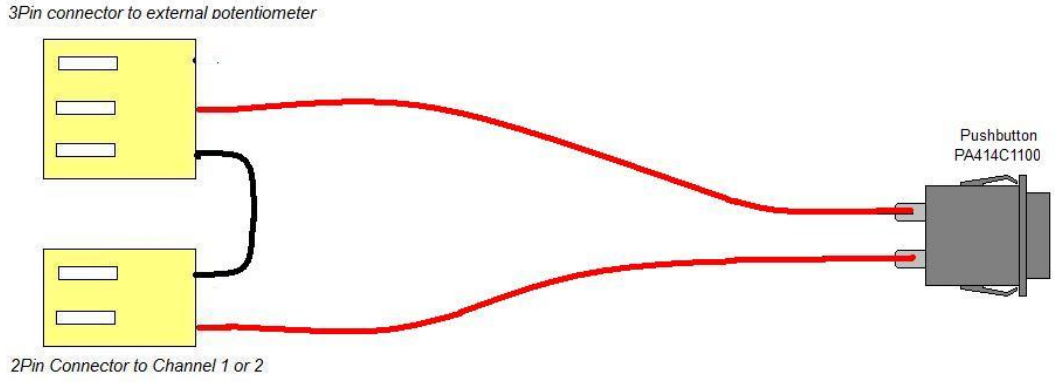
Item	Description	Part Number	Source
SW1	Pushbutton Switch	PA414C1100	DigiKey.Com
J1	2-Pin 3.96mm Wafer Connector	A-794	TaydaElectronics.Com
Pins	Connector Pins (purchase extra)	A-803	TaydaElectronics.Com

Note: The dimmers require 12V and GND to appear on the inputs. For this reason, if the switch is used in a stand-alone configuration (i.e. no other items are attached to the dimmer), a method of attaching 12V and GND is required. This can be accomplished by either an adapter board or modification of the wiring harness.

The following two graphics show how to connect a push button switch to the dimmer when it is the only device. It gets the required 12V and GND from the potentiometer connector.



Wiring Harness Adapter



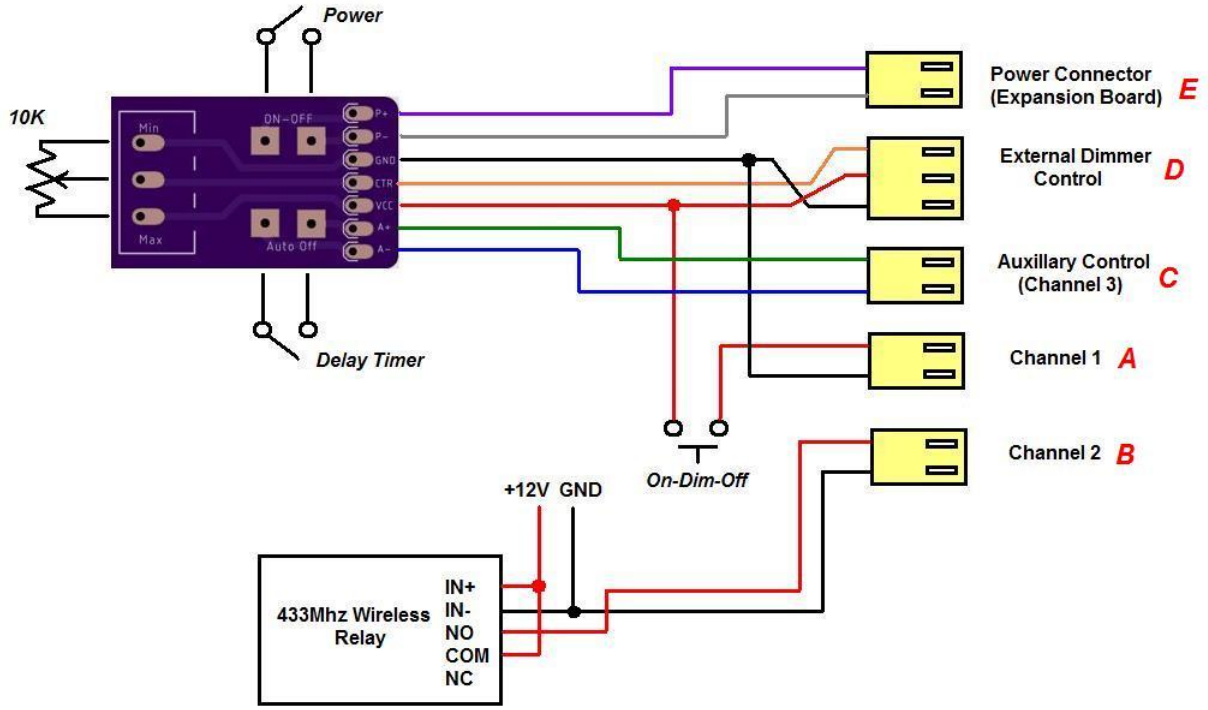
Wiring the Pushbutton Switch as the only device used on the dimmer.

Bill of Materials

Item	Description	Part Number	Source
SW1	Pushbutton Switch	PA414C1100	DigiKey.Com
J1	3-Pin 3.96mm Wafer Connector	A-795	TaydaElectronics.Com
J2	2-Pin 3.96mm Wafer Connector	A-794	TaydaElectronics.Com
J3	2-Pin 3.96mm Wafer Connector	A-794	TaydaElectronics.Com
Pins	Connector Pins (purchase extra)	A-803	TaydaElectronics.Com
PCB	Circuit Board	Switch Expansion B	OSHPark.Com

Wiring Scenario for Maximum Capability.

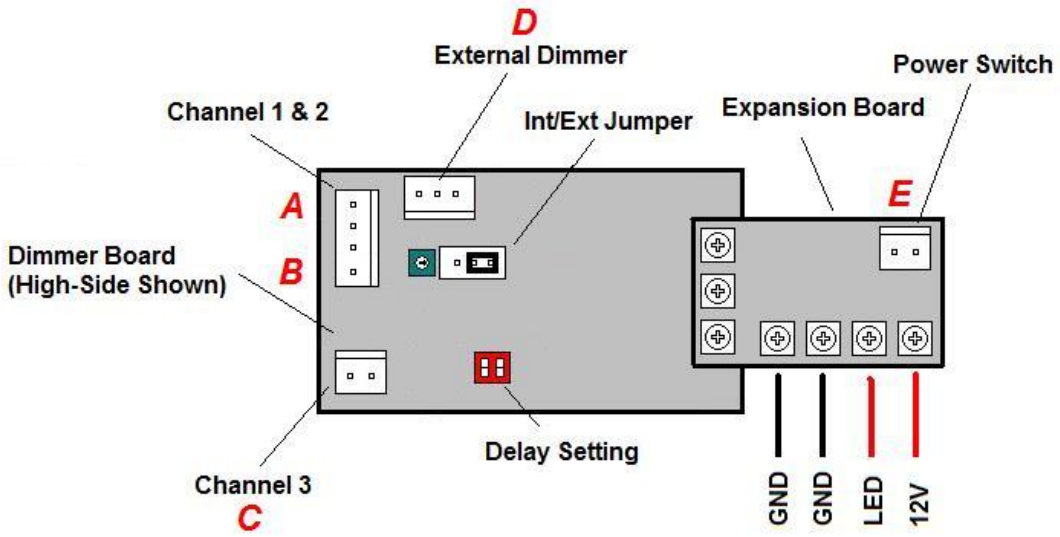
In this connection scheme, a 10K Potentiometer, Delay switch, and Power switch are attached to a front panel. A momentary switch replaces the original light control switch.



Bill of Materials

Item	Description	Part Number	Source
R1	10K Potentiometer/Switch	A-4184	TaydaElectronics.Com
SW1	Pushbutton Switch	PA414C1100	DigiKey.Com
SW2	Rocker Switch (for Auto Off function)	GRS-4011-1600	DigiKey.Com
J1	3-Pin 3.96mm Wafer Connector	A-795	TaydaElectronics.Com
J2	2-Pin 3.96mm Wafer Connector	A-794	TaydaElectronics.Com
J3	2-Pin 3.96mm Wafer Connector	A-794	TaydaElectronics.Com
J4	2-Pin 3.96mm Wafer Connector	A-794	TaydaElectronics.Com
J5	2-Pin 3.96mm Wafer Connector	A-794	TaydaElectronics.Com
Pins	Connector Pins (purchase extra)	A-803	TaydaElectronics.Com
PCB	Circuit Board	Control Board 3B	OSHPark.Com

Front Panel Express Panel DP-5



Notes: Be sure to put the Int/Ext Jumper into the EXT position.

Delay Setting :

0 = disabled
1 = 1hr
2 = 2 hr
1 +2 = 4Hr

Requires Linc Board Driver sketch version 1.4, with Option 2 selected.

Delay switch functionality. When delay switch (labeled AutoOff) is turned off, delay is disabled. When AutoOff is turned on, the light will automatically turn off after the elapsed time set with the dip switch has been exceeded. This works in either full on or dim setting. If the mode is changed (i.e. full on to dim), then the delay timer is reset.

Front Panels

All front panels shown in this document are listed on RV-Project.Com, with the corresponding panel code shown in this document.See website for ordering information.