

When converting passenger car sets to led lighting, the observation car taillight and rear markers are typically done by hand wiring 3 bright white leds with a load resistor. But this is a somewhat tedious procedure. This handy little board just makes the process much faster and easier.

It's 31 x 55 mm overall size, with pads to solder in a rear led, and two alternate locations for side marker leds. Which ones to use will depend on what fits the particular car best. Only one set of the side marker pads should be used because they are wired in parallel on the board.

The board includes a spot for a series load resistor R1. Something in the range of 220-470 ohms seems to work nicely when connecting the board to an overhead strip of 3528 leds powered by a constant current regulator board, set at say 25-30 ma output. Alternatively you can install a 500R trim pot such as a Bourns 3362P style in the spot marked R2, and adjust it to get the desired intensity. Do not use both R1 and R2.

Here is a table of R1 values and approx. currents for 3 x white leds:

R1 ohms	470	330	220	150	47	0
I; ma	2.2	3.0	4.0	5.0	8.0	11

There is also a series pad for a 1N4148 or similar GP diode, to protect the leds from track AC if no constant current board is used in the car. In this case the value of R1 will be higher than above and you may need to experiment or use a 1.5K R2 pot per above. This would also apply if the board is used in a caboose.

Ordinarily when used with a constant current board, you should simply omit diode D1 and jumper the pads. An easy way to handle lighting a drumhead led is to attach its wiring to an unused led pad like D3 or D5. This seems to work well and either a 220 or 330 ohm R1 will likely be fine.

First solder the three 3mm flat face white leds in with the leads full length, along with the other components. Observe led polarity by aligning the flat on the plastic lens with the flat on the silkscreened pattern. You can use a standard 0.1" pitch 2 pin header and connector for wiring, such as JST-EH or Dupont style. But simply soldering 2 short lengths (3" +/-) of #30 wire is an easy way to connect it to a nearby pair of +/- pads on the led strip lighting, observing polarity.

Mount the board up inside the car roof, to best fit the locations of the three existing red marker bezels. Use double sided foam adhesive tape, CA glue, or similar. Once the glue is dry use needle nose pliers to bend the led leads as needed, so that they shine directly onto the flat inner end of the bezels when the car is re-assembled. You can still use a full length strip of 3528 led lighting in the car by affixing the end section to the center open area of the board, which is left open for this purpose.

Some observation cars have a single roof mounting pedestal which attaches to the roof about 1-1/2" in front of the rear marker led. You should find that you can drill a suitable 3/8" or so clearance hole for this pedestal in the "V" shaped back open area of the board. A step drill bit is recommended for this. For two side-mounted pedestals the "V" shaped rear part of the board should fit between them nicely.

There is no 22uH DCS inductor on the board. Usually you would power the board from an led lighting strip powered by a constant current lighting board, which already has the inductor built in; so there is no need. Besides there is nothing about this simple circuit that might create DCS interference even if connected directly to track power. The constant current board is a better way to go though, as it is full wave rectified DC, has a filter cap to mitigate flicker, and adjustable regulated current output, as well as the inductor.

A good plan is to pre-build a few of these at a time, so they are ready to drop in and hookup whenever converting an observation car to led lighting. You can also use them to convert caboose to 2/3 led marker lighting, they will work for that purpose too. Make sure to include D1 for use with AC track power. RDS