

RGB LED Coaster using a PIC

Revision 1 - November 2018

Description

There are 8 RGB LED positioned around the edge of the board and their colour is controlled by a PIC microprocessor. There are two modes one auto cycles through a range of colours and a manual override that stays on one colour.

The board will remember what it was doing including modes during a power off and on again cycle. However when the board is first powered after programming it flashes the Red LED's ten times to indicate that the EEPROM data is invalid and that new data has been written. Once the new board is initialized with the default values this does not appear again.

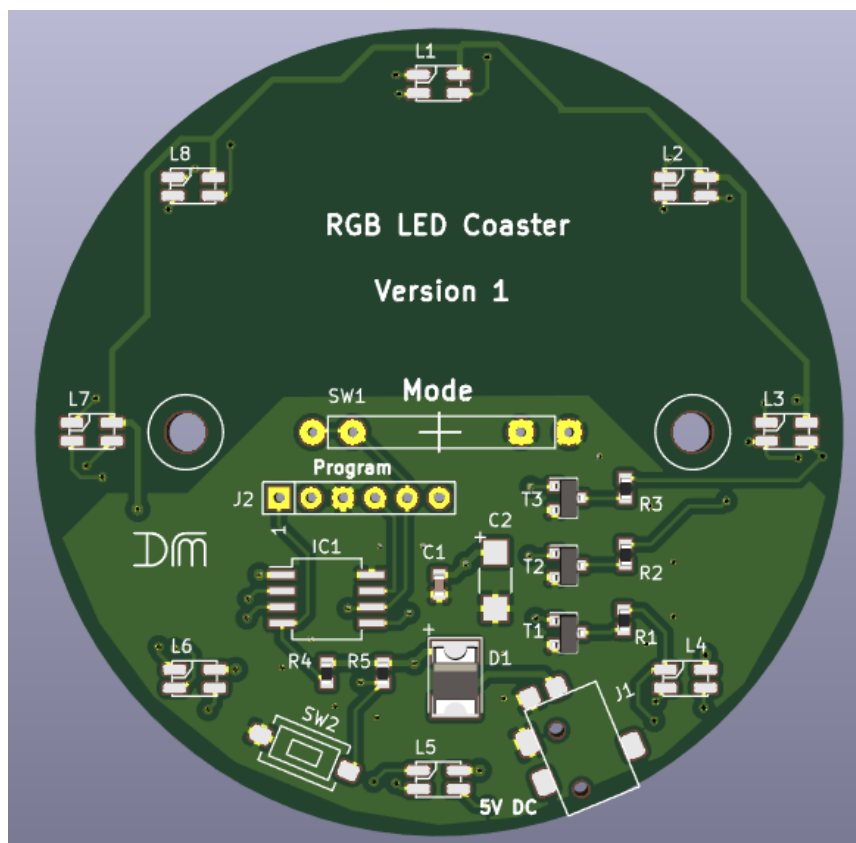
A push button is used to set the mode/colour, also an optional read switch does that same thing. The read switch allows the board to be hidden inside a clear case and a magnet is used to select the boards functions.

Operation

Manual hold, single colour: Press and hold the button and the colour change cycling runs faster, release when the desired colour is found, the light blinks briefly as the new colour and mode is set in the EEPROM.

Auto colour changing mode: When the fixed colour mode is selected (above) press and hold the button until the lights go out, the colour changing mode is now selected and stored. The auto mode starts the cycle with a red colour.

N.B. If the power is interrupted to the board it will power up in the same mode as select above.



Firmware PWM (See Fig 1)

Because the PIC does not have the needed hardware PWM outputs the PWM dimming function is done in firmware.

The program continuously calls the function "PWM_Start" which loops and ramps the register PWM_Counter down from FFh to 00h, this is done as fast as the chip can run with no added delays. One cycle takes approximately 3.4mS with the PIC using it's internal oscillator running at 4MHz. This cycle is also used as the programs timebase as it also resets the watchdog timer. All timings including switch debounce use this timebase as it's timing reference.

The colour value registers Red_Val, Green_Val and Blue_Val are constitutently tested against the PWM_Counter and if the PWM_Counter's value is lower than the colour registers value then that colours LED output is turned on. Once the PWM_Counter(Ramp) reaches 00h then all LED outputs are turned off. So the greater the colour registers value the longer the LED is lit for and so the brighter the LED appears to be. With a 3.4mS cycle time the PMW frequency is around 290Hz, fast enough not to cause the LED's to flicker.

Fig. 1

