ILD4035

RGB Wall Washer Using ILD4035

Application Note AN216

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RF and Protection Devices

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1   Introduction

This project combines three constant current "buck" converter ILD4035 to drive a 15W RGB Wall Washer using OSRAM high power RGB LEDs. By driving the red, green and blue LEDs with varying pulse widths, the controller can generate up to 16 million colors.

The circuit can drive 5 or 6 LEDs in each of the three channels and will also work with the LEDs from Cree, Nichia, Philips Lumileds, Seoul and others.

In this project, the use of surface mount components and the low power dissipation in the three current sources allows for a very compact design.

2 Application Information

2.1 Schematic

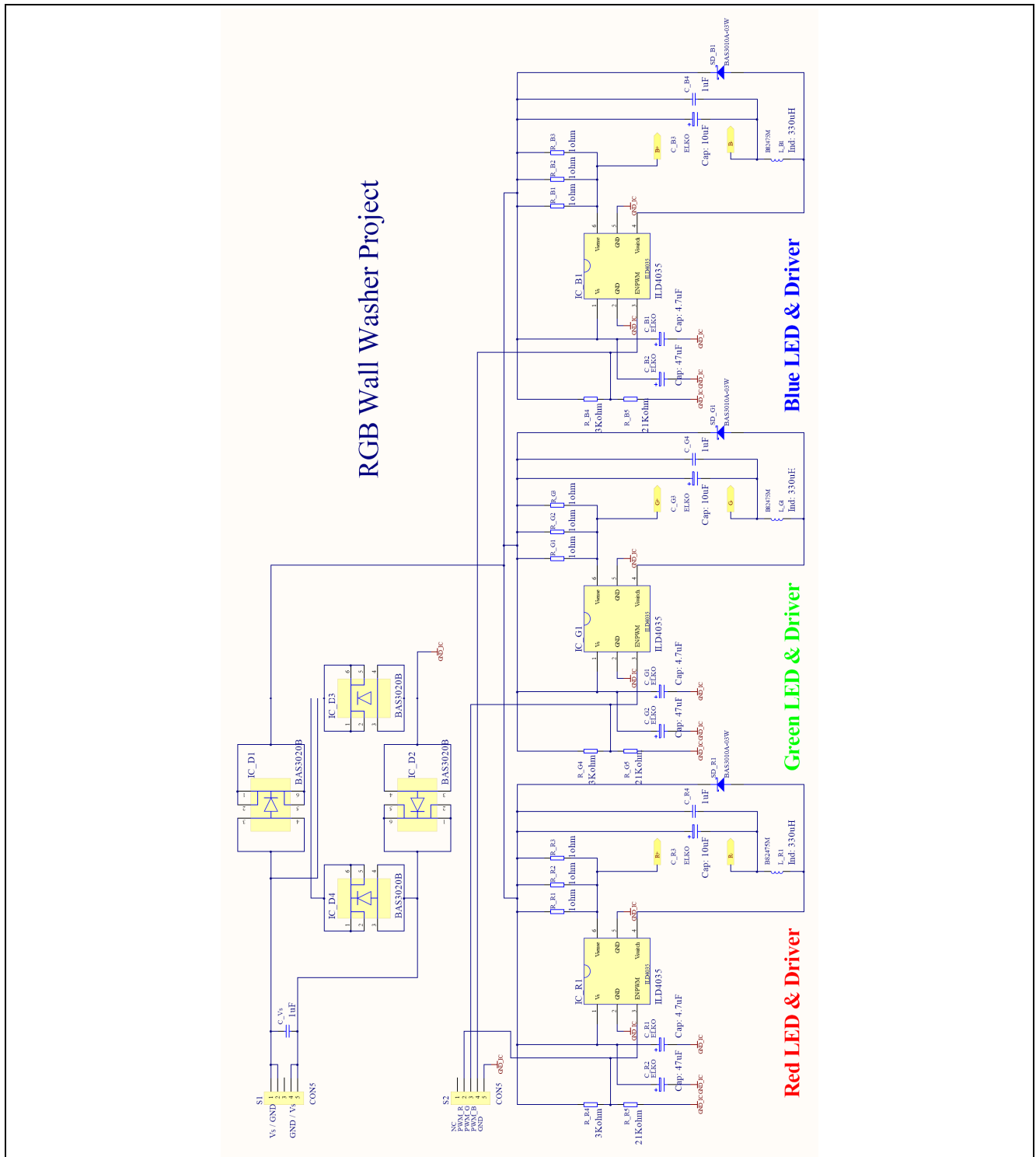The schematic of the RGB Wall Washer driver circuit as shown below:

Figure 1   RGB Wall Washer Schematic

The circuit consists of 3 LED drivers – ILD4035 which can drive the constant current up to 350mA. A diode bridge form by BAS3020B is needed for the purpose of reverse polarity protection. The operating voltage range for this circuit is from 24V ~ 30V, due to the reverse breakdown of the schottky diodes for the reverse polarity protection is up to 30V. In the case for the application which not requires the reverse polarity protection, the operating voltage range can go up to 40V.

The components list for the RGB Wall Washer driver:

1. BAS3020B   x 4
2. ILD4035   x 3
3. BAS3010A-03W   x 3
4. 330uH Inductor   x 3
5. 1.2Ω Resistor   x 9

The value of the sense resistor is chosen by the following equation:

$$R_{sense} = \frac{V_{sense}}{I_{LED}} = \frac{125mV}{I_{LED}}$$

By setting the I_{LED} to 350mA, the R_{sense} is equal to 0.35714Ω. In this project the R_{sense} is using three 1.2Ω resistors in parallel to obtain 0.4Ω resistance.

2.2   About ILD4035

The ILD4035 is a hysteretic buck LED controller IC capable to drive high current, high brightness LEDs up to 350mA. The IC incorporates a wide input voltage range, an internal power switch and the output current level can be adjusted with an external sense resistor. The IC is a step down converter tailored to drive the 1W LEDs.

According to the multifunctional control pin the IC can be switched on and off by an external signal, which is also suitable to regulate brightness of the LEDs by PWM or analog dimming.

The precise internal bandgap stabilizes the circuit and provides stable current conditions over temperature range.

Furthermore, over voltage protection and temperature shut down mechanism enforce the IC to protect attached LEDs.

For the application required to drive higher current than 350mA, should consider using the **ILD4001** or **ILD4120**. ILD4120 can drive the output current up to 1.2A and ILD4001 is also a step down converter, with the power MOSFET driver stage as an external part. The OptiMOS BSR302N or BSS306N are recommended for the external driver stage for ILD4001.

2.3   About BAS3020B

In this RGB wall washer application, four BAS3020B is use for the reverse polarity protection. In the case when the input voltage polarity is mistaken, the RGB wall washer can still function normally. BAS3020B is a schottky diode with a very low forward voltage, 0.53V @ 2A; low leakage current, 40uA @ 30V and low capacitance, 30pF.

Other than using as a reverse polarity protection, this schottky diode is also suitable for high efficiency DC/DC conversion, fast switching, rectification and clamping as well.

2.4 PCB Artwork

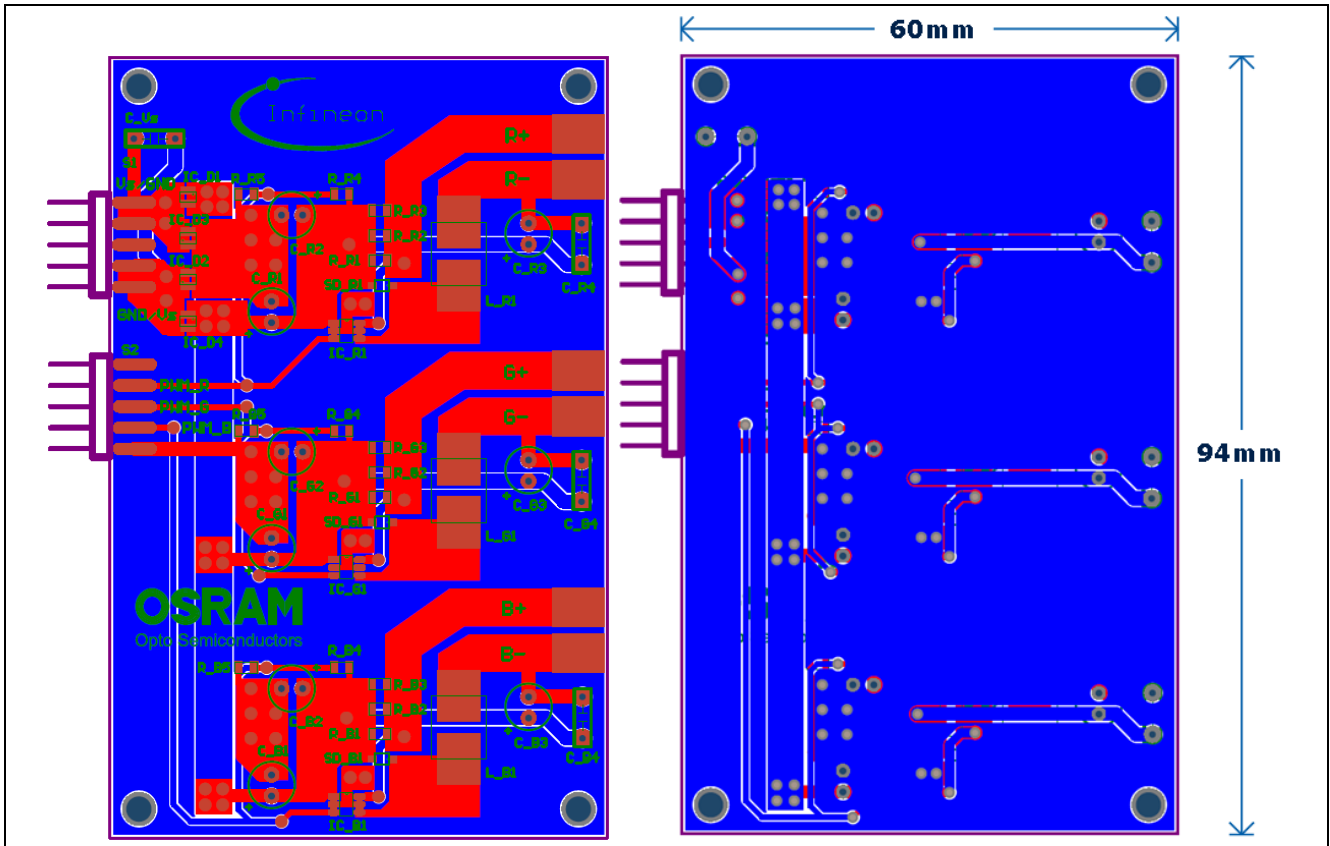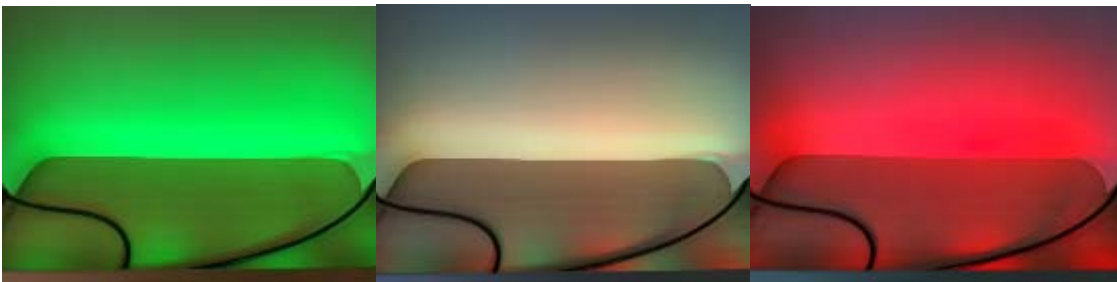PCB artwork of the RGB Wall Washer driver circuit as shown below:

Figure 2   PCB Art work of the top and bottom view of the RGB wall washer

2.5   High Power LED

The high power LEDs are LR W5SM, LB W5SM and LT W5SM from OSRAM. Warning: Do not look directly in the high brightness LED and it could damage your eyes.

15 LEDs (5 LEDs per channel) are biased at 350mA current in order to have a 15W output. The PWM signal from the touch wheel output control the duty cycle of the drivers hence the mixture of the RGB could produce 16millions of colors.

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