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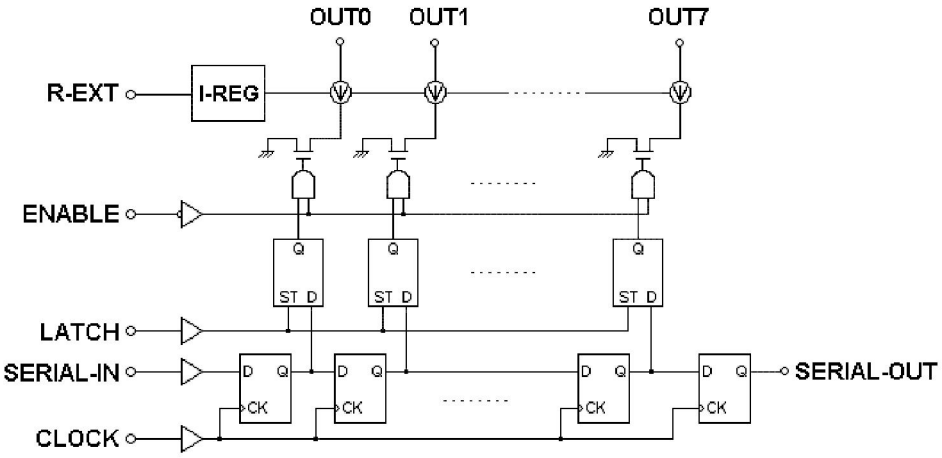
## 1. What is LED Constant Current Driver IC?

CHPLUS Constant Current Driver IC is an integrated circuitry device designed for LED applications, specifically suitable for LED signs and LED displays.

** Why need LED **Constant Current** Driver ICs?

The prominent characteristic of CS8818 is to provide the constant current source, which is able to guarantee the LED stable actuation, eliminates LED the scintillation, is LED demonstrates the high quality brightness the premise.
The chip has 3 kind of characteristics ： Current matching, Current Regulation, and Transient Response.

*CS8818 Block Diagram is as below--

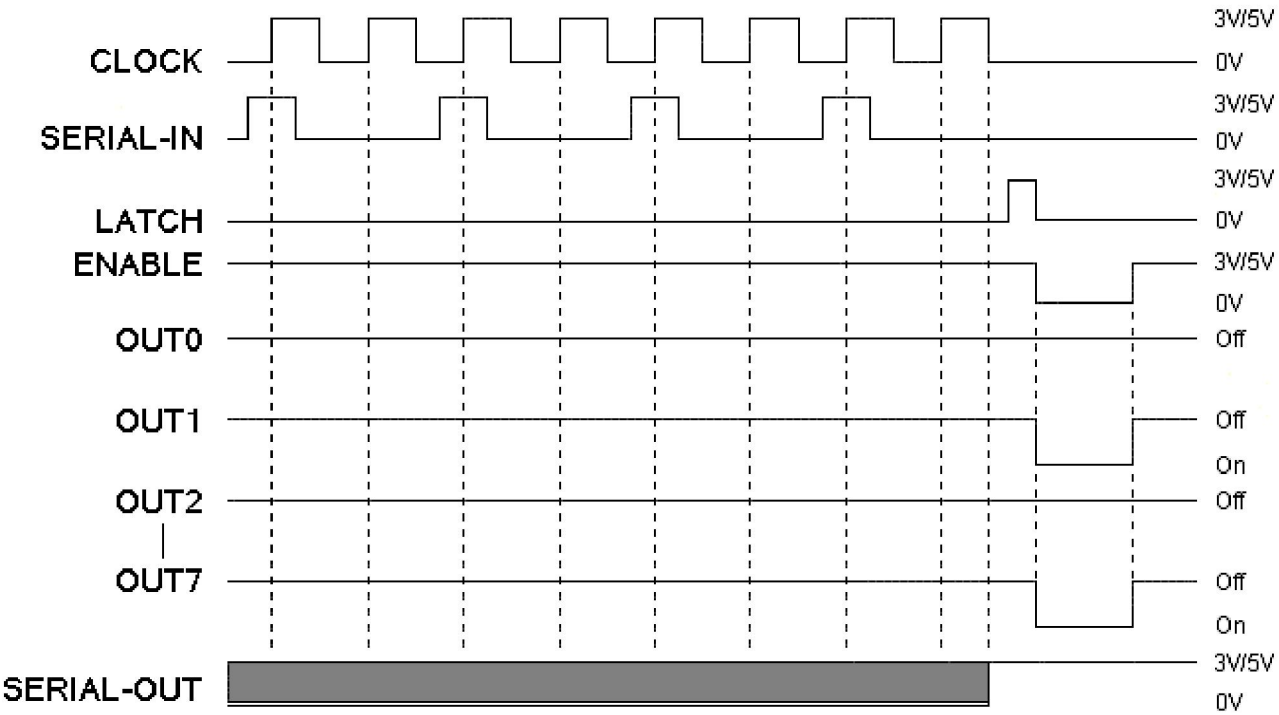


## 2. How to test/ use LED Constant Driver ?

Between Vss and Pin 15 of CS8818 is set by the external resistor(Rext) and force 5V to Vdd of CS8818. By using digital meter to measure voltage of Pin 15(Vrext). If Vrext of CS8818 is1.22V, this IC is working properly. If Vrext isn't equal to 1.22V, this IC might not work normally.

**How to control LED output current on/off?

Excluding Vrext=1.22V, format of input signal Pin goes as follows--




Please refer to the Figure 1 、Figure 2、Figure 3 below for the circuitry .

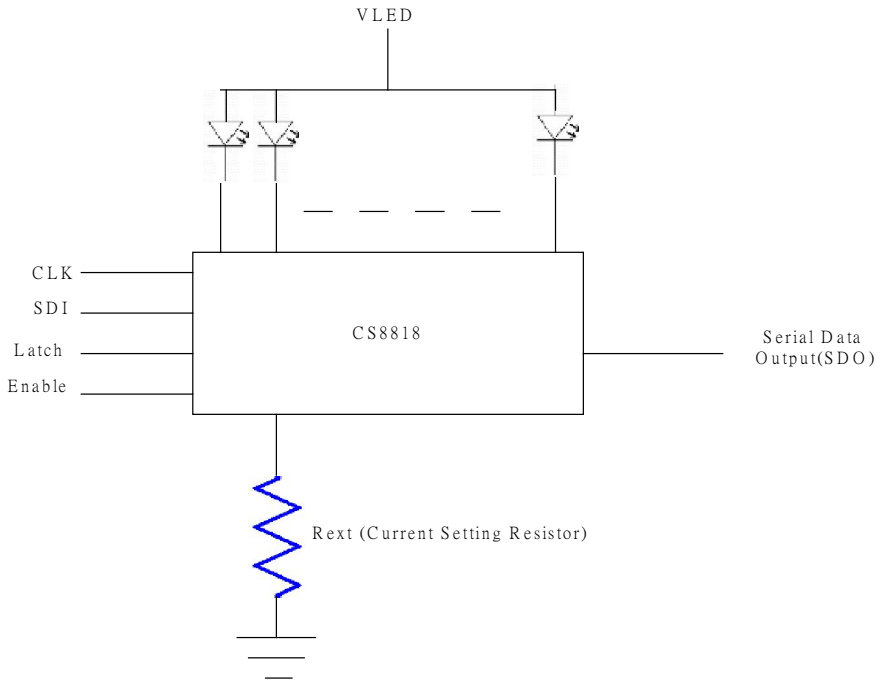



Figure 1: CS8818 Application Example Circuitry

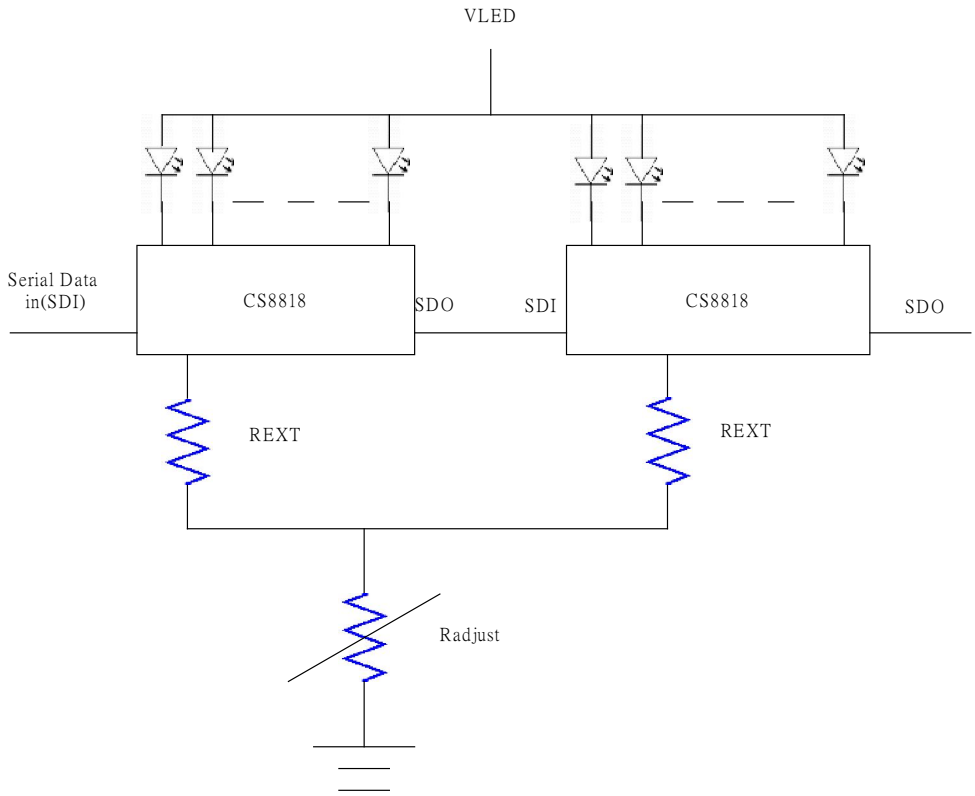



Figure 2: Monochromatic Display Module Example Circuitry

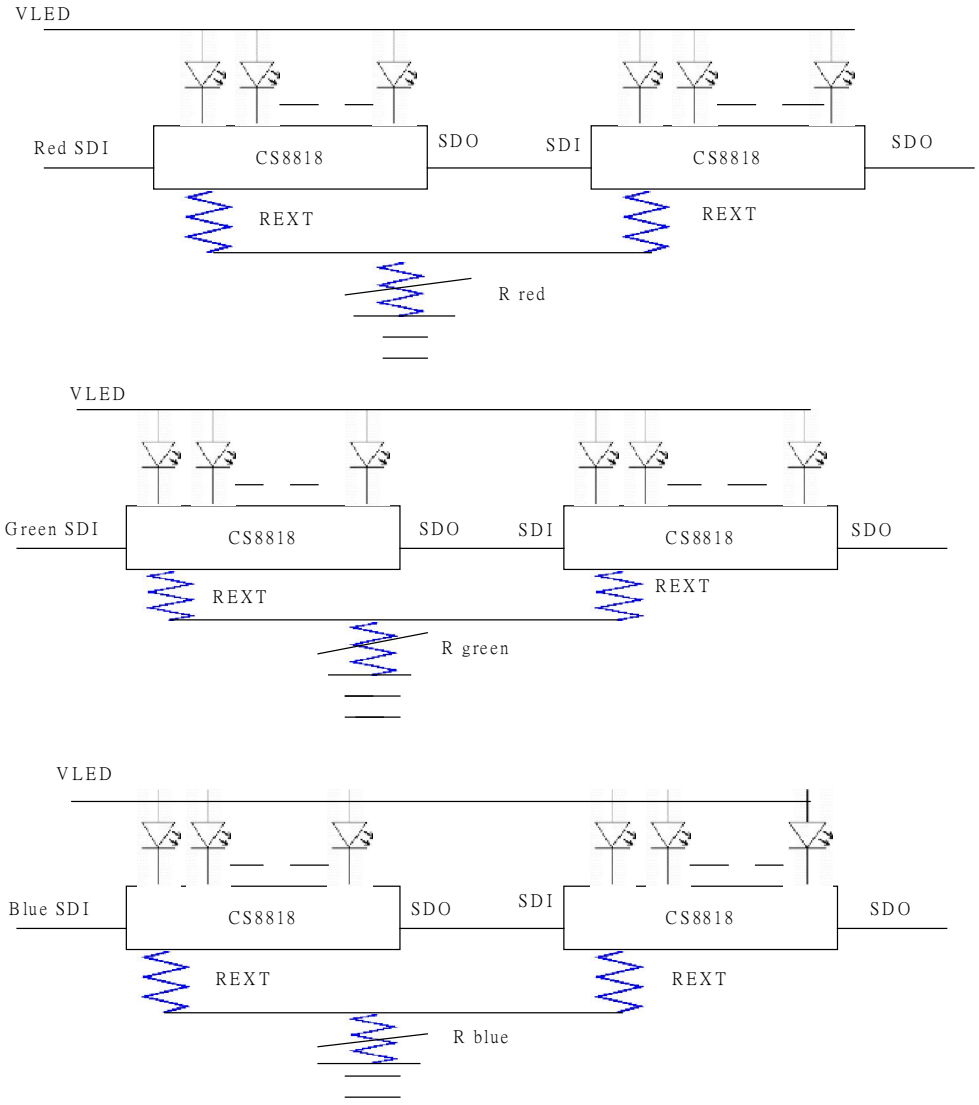



Figure 3: Full color Display Module Example Circuitry

## 3.How to select output current of LED Constant Current Driver ?

The intensity of output current is set by the external resistor(Rext).
The external resistor(Rext) is a key that determines the current flowing to each output.
which current flow then continues the excursion passing the output pins to the ground.

Different resistor correspond to different scales of output current (Iout).
The Output Constant Current range of CS8818 is 5~70mA.

The relationship between Iout and Rext is shown in the following Figure 4.

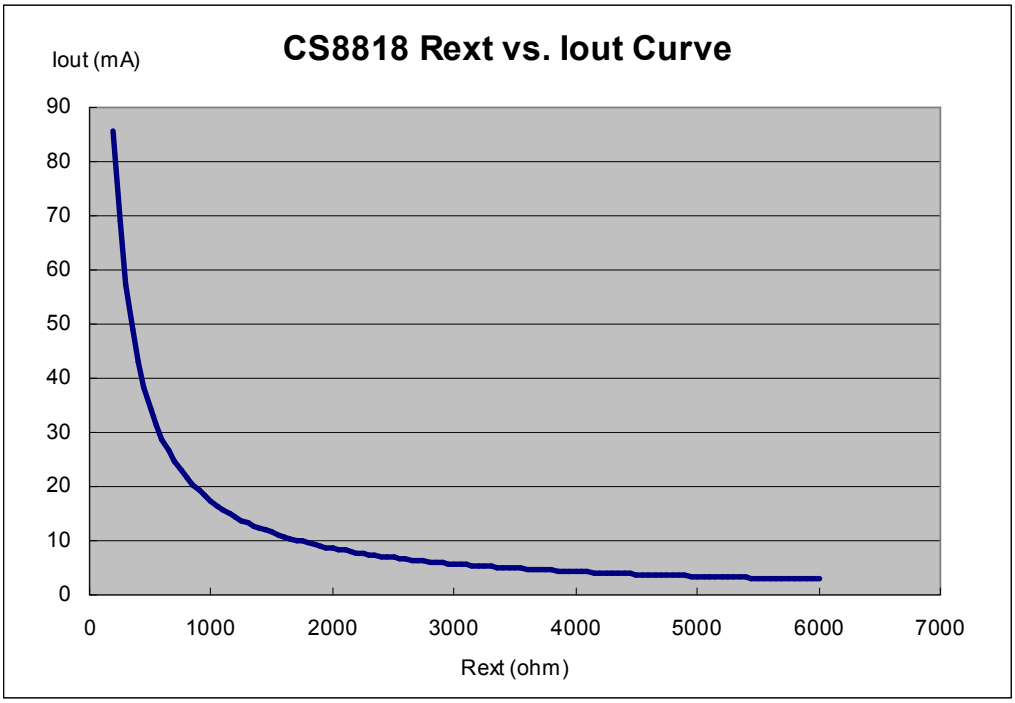



Figure 4: Iout and Rext Relationship Curve

Also，the output current can be calculated from the following equation ：

***Iout = (VRext / Rext) x Current Gain***

Vrext=1.22V ； Current Gain=14.62 (These value are both constant.)

Rext ： It is the resistance of the external resistor between CS8818 Pin 15 and ground.

Vrext ： It is the voltage of R-EXT to Ground terminal.

The magnitude of current(as a function of Rext) is around 25mA at 713Ω .

## CS8818 Rext and Iout Relationship Table is as bellow.

| Rext(ohm) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Iout(mA) | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| CS8818 | 3.57K | 2.97K | 2.55K | 2.23K | 1.98K | 1.78K | 1.62K | 1.49K |
| Iout(mA) | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| CS8818 | 1.37K | 1.27K | 1.19K | 1.11K | 1.05K | 991 | 939 | 892 |
| Iout(mA) | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| CS8818 | 849 | 811 | 775 | 743 | 713 | 686 | 661 | 637 |
| Iout(mA) | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
| CS8818 | 615 | 594 | 575 | 557 | 540 | 525 | 510 | 495 |
| Iout(mA) | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 |
| CS8818 | 482 | 469 | 457 | 446 | 435 | 425 | 415 | 405 |
| Iout(mA) | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 |
| CS8818 | 396 | 387 | 379 | 372 | 364 | 357 | 350 | 343 |
| Iout(mA) | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| CS8818 | 337 | 330 | 324 | 319 | 313 | 308 | 302 | 297 |
| Iout(mA) | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 |
| CS8818 | 292 | 288 | 283 | 279 | 274 | 270 | 266 | 262 |
| Iout(mA) | 69 | 70 | | | | | | |
| CS8818 | 259 | 255 | | | | | | |

After appropriate Iout value is selected, an adequate scale of Vds(Output LED power) is then required to ensure the stable operation at saturation.
In general, for programmed current 25mA , a minimum Vds of 0.7V is highly recommended for proper current regulation. For programmed currents of 25mA or above，a minimum Vds of 1.0V is in instead suggested. Figure 5 illustrates the relationship between Vds and Iout curve.

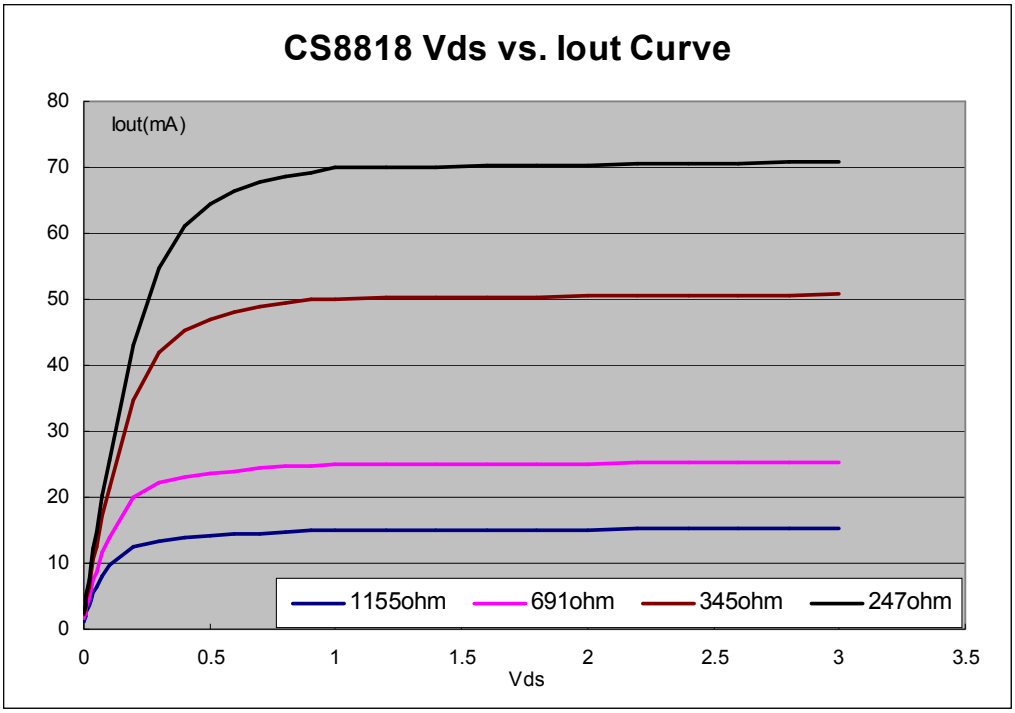



Figure 5 Iout vs Vds Relationship Curve

## 4. Notice for PCB layout:

In LED application circuitry, electromagnetic effect is mostly resulted from the board layout. The current flow,the on-off switching characteristic and the power regulation may cause the Driver IC malfunction.

The Driver IC may be damaged by the over-voltage stress owing to the parasitical inductance, LED and power supply, in output terminals. In addition, the unstable supplying voltage will obviously influence the quality of image.

In order to improve these abnormal operation, CHIPLUS give example circuitry for reference application only. Please refer to Figure 6, Figure 7, and Figure 8 in below. Whose brief introduction goes--

A.PNP BJT of Figure 6、Figure 7、Figure 8, the main chip could control the scanning function on different LED cells simultaneously.

B. R1 of Figure 6、Figure 7、Figure 8, the setup resistance for the setup of output current of every IC.

C. R2 of Figure 6、Figure 7、Figure 8, the variable resistance for the brightness control of every LED module.

D. Zener Diode of Figure 7, the unnecessary voltage is one effective technique as to making the voltage descend With the Zener Diode.

E. R3 of Figure 8, it can improve on surplus Vout causes an IC fever and the useless consumption Electric power

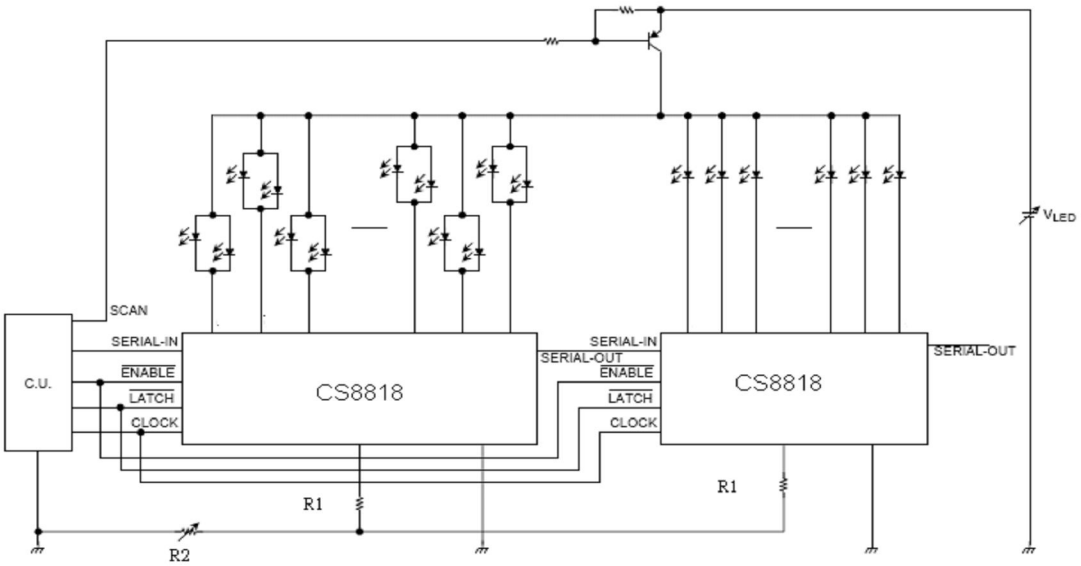



Figure 6: The general circuitry

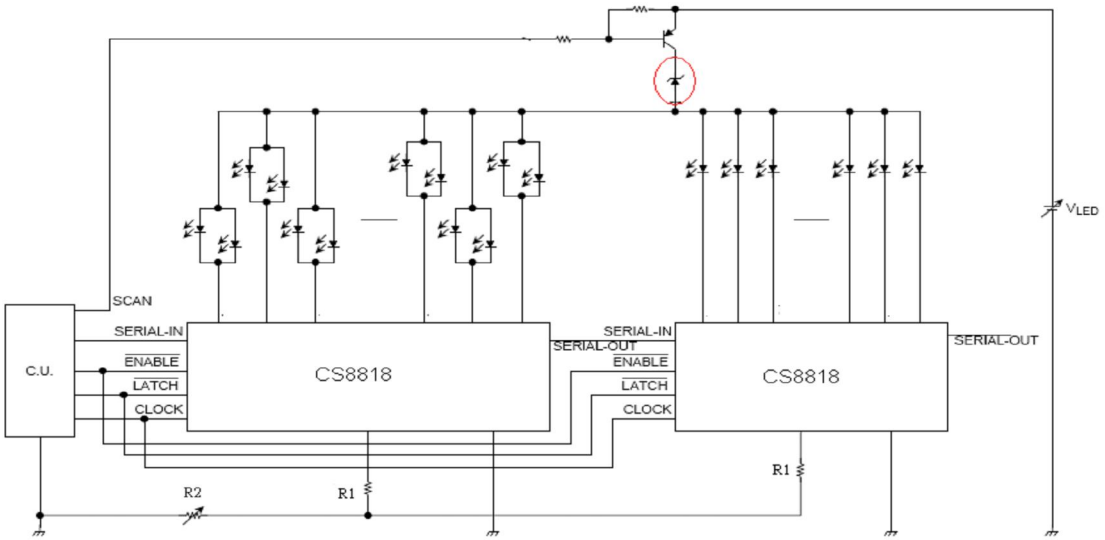



Figure 7: Addition of Zener Diode

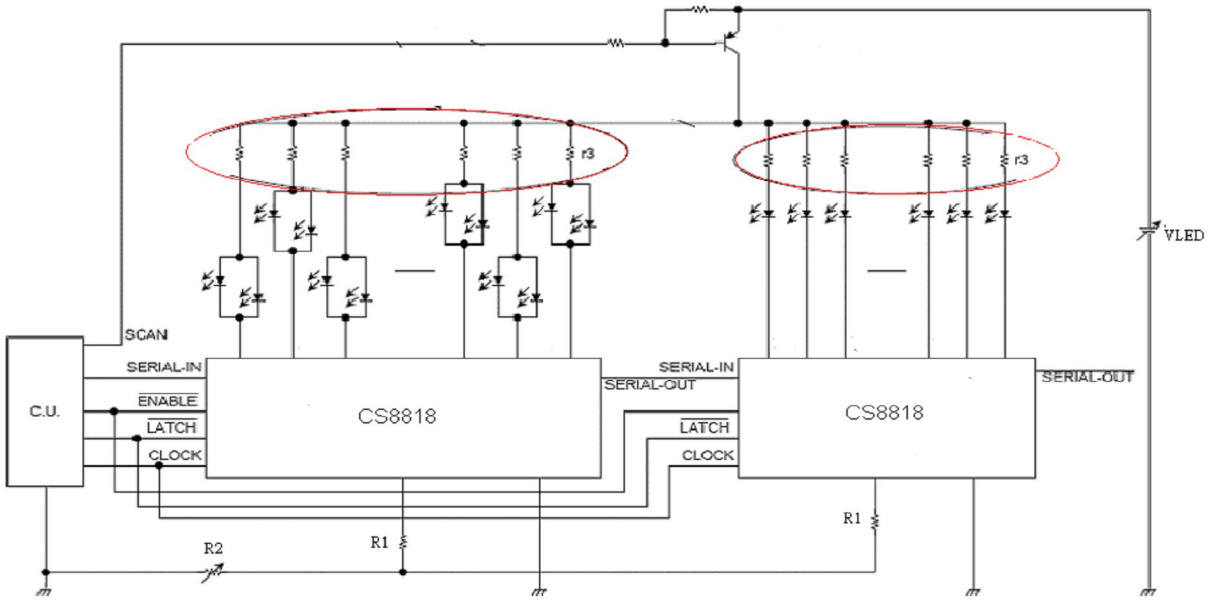



Figure 8: Addition of R3