TLC6C598-Q1 and TLC5912-Q1

This document presents the reference design of 8- and 12-bit shift-register LED drivers TLC6C598QPWRQ1 and TLC6C5912QPWRQ1. The device contains an 8- or 12-bit serial-in, parallel-out shift register that feeds an 8- or 12-bit D-type storage register.

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1 Introduction

SER IN is the serial data input. Data on SER IN loads into the internal register on each rising edge of SRCK. RCK is the storage-register clock. The data in each shift register stage transfers to the storage register at the rising edge of RCK.

Data in the storage register appears at the output whenever the output-enable G input signal is high. The use of CLR clears all the registers. The storage register transfers data to the output buffer when the shift-register clear (CLR) signal is high. When CLR is low, all registers in the device are cleared. An external resistor adjusts the current passing through the external LED. Each channel has a resistor to control the current separately.

Calculate the current using the following formula:

$$I_{LED} = (Vbat - n \times V_{LED}) / R$$

V_{LED} represents the voltage drop across the LED, which is a fixed parameter of the LED; n means the number of LEDs. Figure 1 shows a typical application circuit of the TLC6C598-Q1.

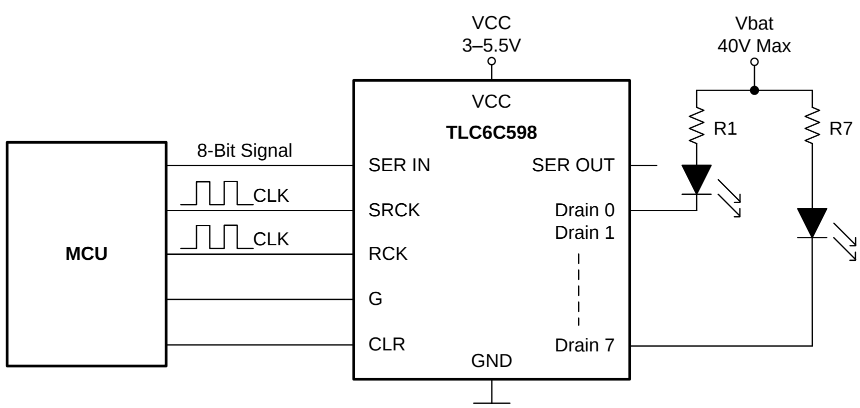

Figure 1. TLC6C598-Q1 Application Circuit

2 Reference EVM schematic

Figure 2 shows the schematic of the TLC6C598-Q1 EVM as a design reference.

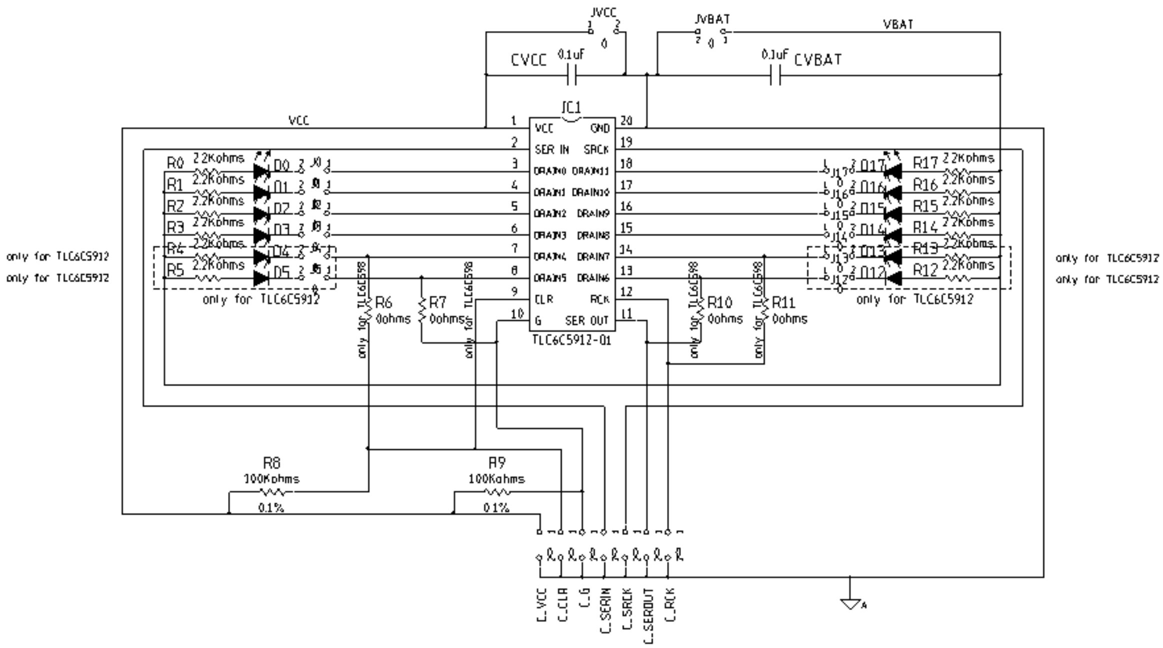

Figure 2. TLC6C598-Q1 and TLC6C5912-Q1 Reference EVM Schematic

Here are the descriptions for the connectors:

- JVCC is the protected power input for the device. Iin 1 of jumper JVCC allows the user to measure the input voltage of VCC.
- JVBAT is the protected power input for the external LEDs. Pin 1 of jumper JBAT allows the user to measure the input voltage of VBAT.
- C_VCC is the alternative input-power jumper for the device when JVCC is not used. Pin 1 of jumper C_VCC allows the user to measure the input voltage of VBAT.
- C_CLR is a jumper used for controlling the state of CLR. CLR is high when C_CLR is open and the storage register transfers data to the output buffer. Shorting this jumper sets CLR low, clearing all registers in the device.
- C_G is a jumper used to enable and disable LED channels. Having C_G connected enables all drain channels according to output-latch register content. When C_G is open, all channels are off.
- C_SERIN is a jumper used to enter serial data into the device. Pin 1 allows the user to attach an oscilloscope to view the serial-in data.
- C_SRCK is the serial clock input. An external clock can connect to pin 1 of C_SRCK; data transfers from SER IN to the internal serial shift registers on each rising SRCK edge.
- C_SEROUT is the serial output of the 8-bit serial shift register; the user can connect this pin to C_SERIN of the next cascaded device on the serial bus.
- C_RCK is the input point for the storage-register clock. The data in each shift-register stage transfers to the storage register at the rising edge of RCK.
- GND is the ground return for the regulator. The EVM provides three GND test points to allow the user to power the EVM, connect the load, and attach an oscilloscope ground lead.
- J0–J5 are jumpers used for enabling and disabling the LEDs on channel 0 to channel 5. Leaving a jumper open disables its channel.
- J12–J17 are jumpers used for enabling and disabling the LEDs on channel 6 to channel 11. Shorting a jumper enables its channel.

3 Reference PCB Layout

Figure 3 and Figure 4 show the board layout for the TLC6C59xx EVM PWB as a reference.

The device pins must be soldered to the copper landing on the PCB for optimal performance. The PCB provides 2-oz. (0.071-mm thick) copper planes on the top and bottom to dissipate heat.

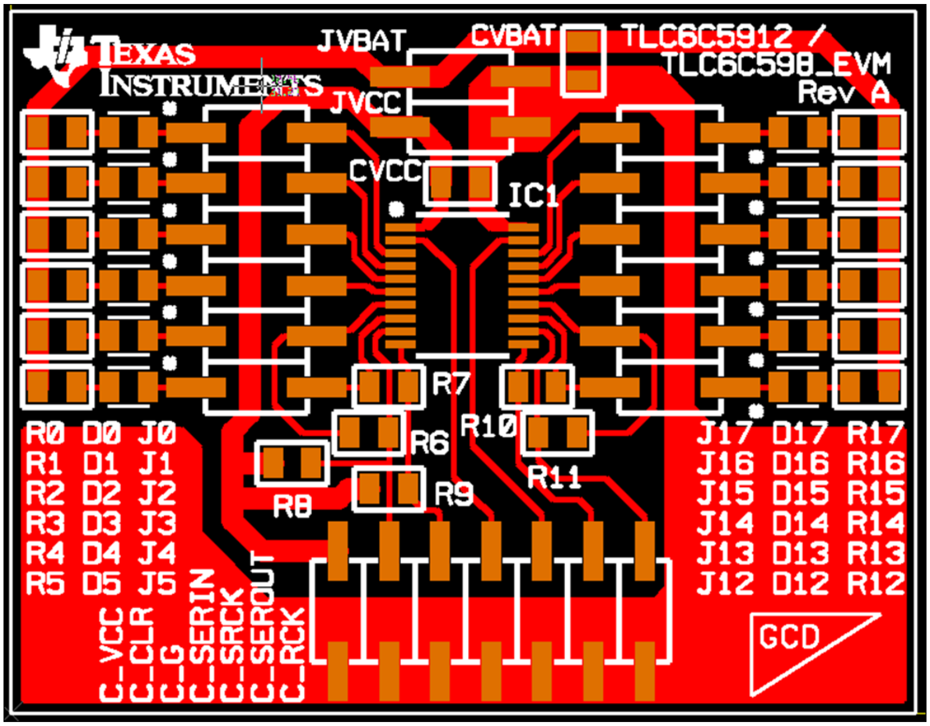

Figure 3. Top Assembly Layer

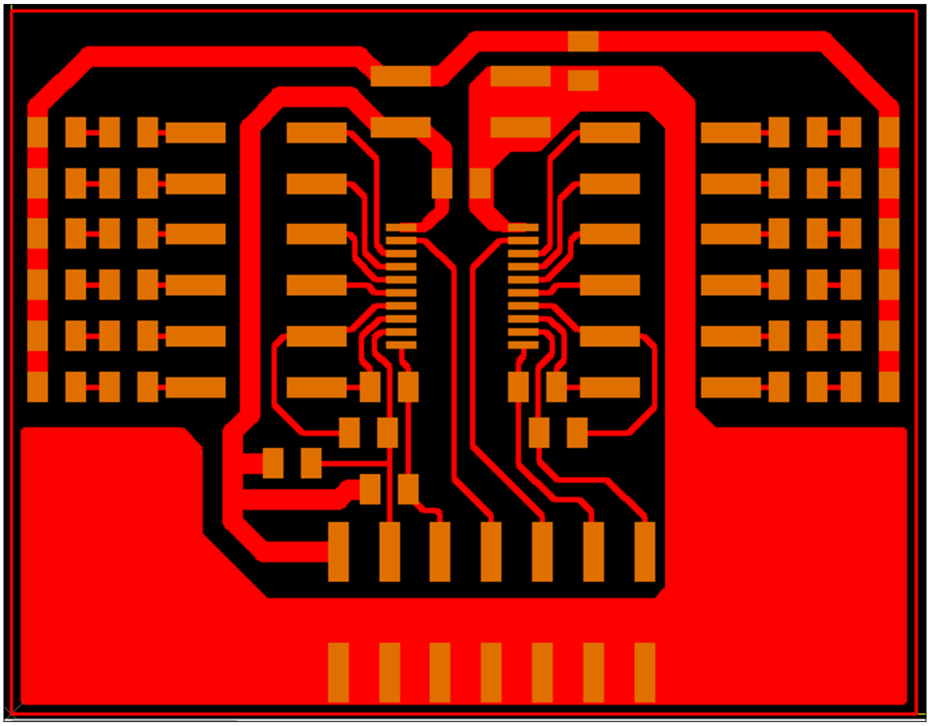

Figure 4. Top Layer Routing

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