



Revision History

<u>Rev. No.</u>	<u>History</u>	<u>Issue Date</u>
1.0	Initial Issue	July 31, 2008

CS8803 Application Note

■ Product Description

CS8803 is a 3-channel constant-current RGB LED driver IC, which is designed for LED lighting or display applications. At CS8803 output channel, 3-channel current value set is adjustable with three corresponding external resistors, and each output provides the maximum 60mA constant current.

■ LED Cluster

The LED clusters are usually connected in series with hundreds of cluster units. The LED clusters are cascaded by transmission line. At CS8803, ENBO, LTO, SDO and CKO pins are designed for cascading next chip. Fig.1 shows the typical structure of an LED cluster signage.

The structure is composed of power supply, control board, transmission line and cascaded cluster, which includes CS8803 and RGB LEDs.

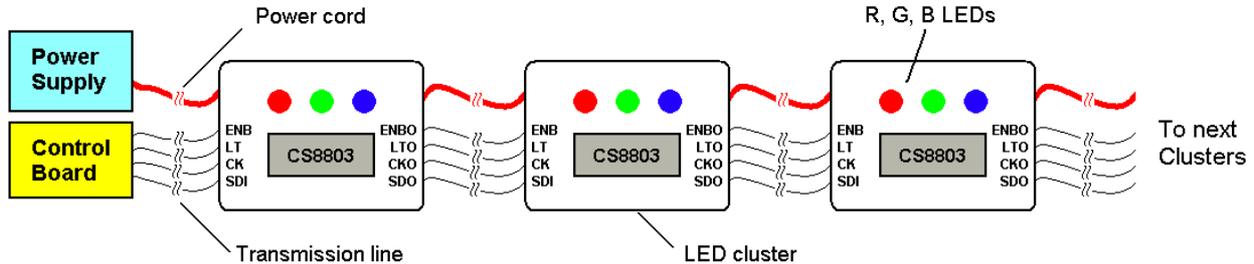


Fig.1 The typical structure of LED cluster signage

■ Signal Transmission

The quality of the signals on the transmission lines depends on the stability of supplied voltage and the length of transmission lines. When several clusters are powered by a single power supply, the voltage applied to the CS8803 usually ripples or spikes and thus impacts the voltage stability. In addition, the length of transmission lines also influences the signal quality. The signal transmission frequency is limited to avoid the signal crosstalk and impedance mismatch. For example, the CS8803 can run more than 20MHz. However, if clusters are connected with 2-meter cable, the signal transmission frequency between two clusters may be limited to 10MHz, depending on the quality of

transmission lines.

To assure the signal quality, several methods are suggested:

1. As shown in Fig.2, the users need connect CAP pin with an adequate capacitor to stabilize the voltage from spike. Fig.3 shows the voltage waveform at CAP pin.

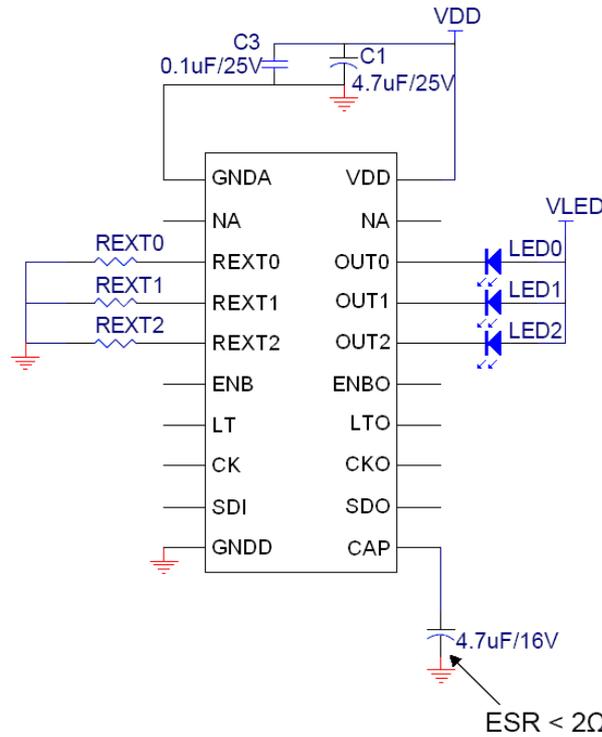


Fig.2 Connecting CAP with adequate capacitor to stabilize the signal

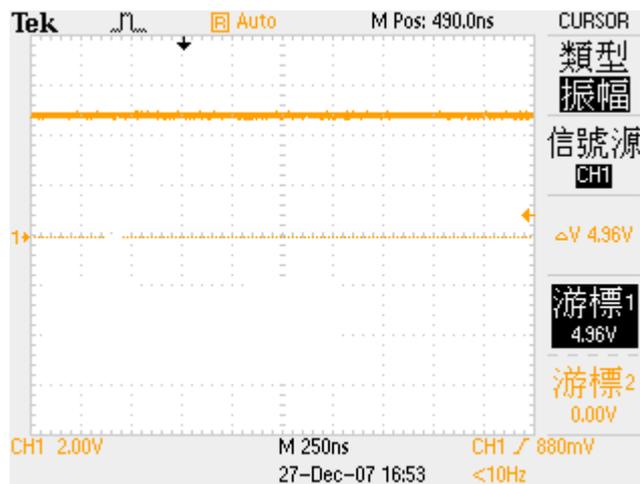


Fig.3 The voltage waveform at CAP

Note: Several capacitors are chosen for this experiment.

Capacitors	Capacitance	CAP Voltage Spike	Working at 20MHz
A	2.2uF	Fair (<0.5V)	Yes
B	3.3uF	Fair (<0.5V)	Yes
C	4.7uF	Fair (<0.5V)	Yes
D	6.8uF	Fair (<0.5V)	Yes

2. To reduce cross-talk effect, the shielded transmission line is suggested. If the users use multi-core flat cables as transmission lines, the noise may be induced from the adjacent lines. As shown in Fig.4, the shielding of transmission line is achieved by interleaving the transmission lines with GND.

Fig.5 and Fig.6 show the SDI voltage waveform before and after shielding respectively.



Fig.4 Separating the transmission lines with GND wires

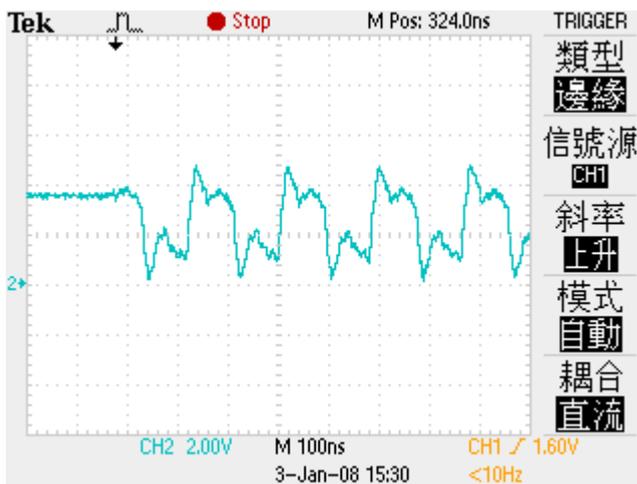


Fig.5 The SDI waveform before shielding

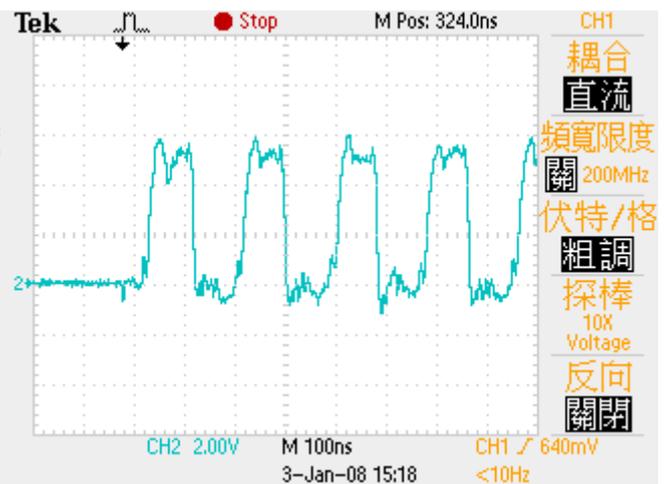


Fig.6 The SDI waveform after shielding

3. When the signal is bounced from the receiver end to the transmitter end, the superposed signal disturbs the internal function of the CS8803. To prevent the

overshoot and undershoot generated by the inductance effect, it is effective to add RC low-pass circuits at the four terminals, CK, SDI, LT and ENB, as shown in Fig.7. Fig.8 shows the stable input signal at receiver end of the CS8803.

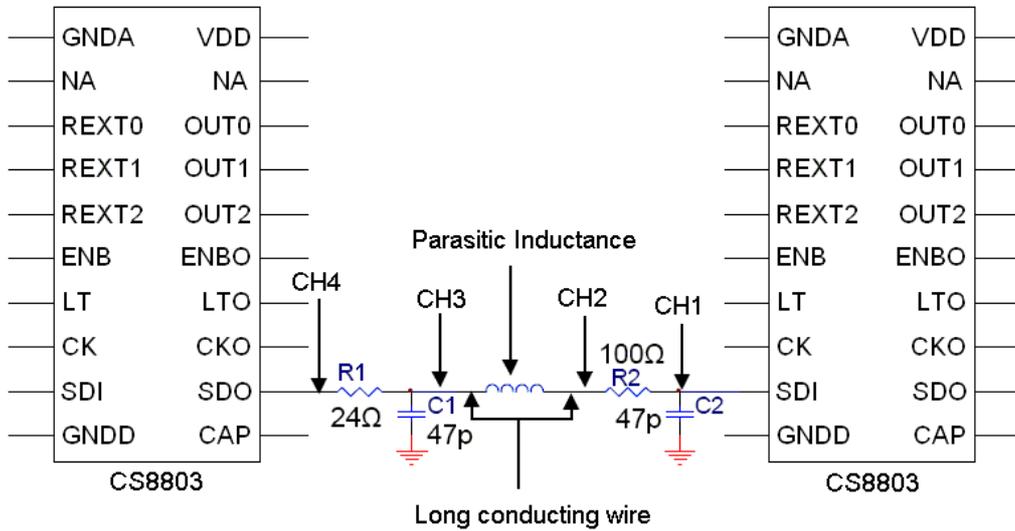


Fig.7 Compensation circuit with low-pass RC

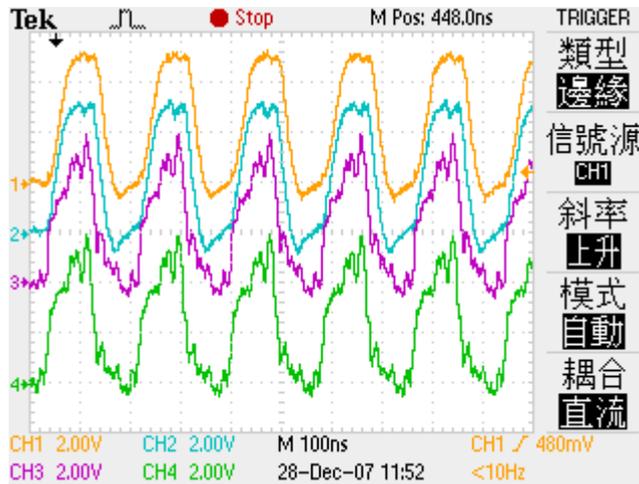


Fig.8 The waveform variation of the four nodes in Fig.7