Low Power Driver Circuit Design for Liquid Crystal Display

蔡宗志、盧志文 ; 洪進華

E-mail: 9019860@mail.dyu.edu.tw

ABSTRACT

A high speed, low power output buffer circuit, which is suitable for the liquid-crystal display application is proposed. We add a comparator and one pair charging/discharging transistors to a two-stage conventional amplifier, by employing a comparator circuit to sense the transients of the input to turn on charging/discharging transistors, which are statically “ off ” when no input is applied. This increases the speed of the circuit without increasing too much static power consumption. The circuit also features a wide input voltage range, a large output swing. The output swing is from 0.5V to 4V and the operation frequency is 100KHz under a 680 PF capacitance load. Rise time and full time are 0.6 and 0.4us. The measured maximum static current is 55uA. This buffer has an improved driving capability during transients but draws little current during static. It is demonstrated in the TSMC 0.6um CMOS technology.

Keywords : buffer ; LCD

Table of Contents

REFERENCES

[1]陳燕晟, "薄膜電晶體液晶顯示器驅動系統之設計", 電子發展月刊, 第161期, pp 2-13, 1991.

[2]周秀光, "液晶顯示器之顯示原理", 電子技術雜誌, pp 82-88,1999.

[3]馮明憲、梁佳文, "液晶顯示器技術原理及其應用", 電子月刊, 第一卷第2期, pp 8-17, 1995.

[4]戴亞翔, "淺論薄膜電晶體型液晶顯示器之畫素陣列設計", 電子月刊, 第六卷第11期, pp. 130-138, 2000.

[5]周煌程, "CMOS輸出緩衝器的設計", 電腦與通訊, 第52期, pp. 72-77, 1996.

[6]C.-C. Wang, J.-C. Wu and C.-M. Huang, “ Data line driver design for a 10 ” 480 × 460 × 3 color FED, “ in Proc. 9th Int. Vacuum

Microelectronics Conf., St. Petersburg, FL, July pp. 557-561, 1996.
[7]Y. Takahashi et al.,“ Multimedia projector using 720 × 480 pixel a-Si TFT-LCD ’ s and a high-speed analogue driver LSI, ” Displays: Technology & Application, Vol. 13, No. 1, pp. 5-30, Jan., 1992.
[8]Hitachi Corp., Hitachi LCD Controller/Driver LSI, 1993.
[9]B. W. Lee and B. J. Sheu,“ A high-speed CMOS amplifier with dynamic frequency compensation, ” in Proc. IEEE CICC 1990, New York, May 1990, pp. 8.4.1-8.4.4.
[10]H. Khorramabadi,“ A CMOS line driver with 80 dB linearity for ISDN application, ” in 1991 Symp. VLSI Circuits Dig. Tech. Papers, June pp. 75-76, 1991.
[11]Pang-Cheng Yu and Jiin-Chuan Wu,“ A Class-B Output Buffer for Flat-Panel-Display Column Driver ”, IEEE Journal of Solid-State Circuits, Vol. 34, No.1, Jan. pp. 116-119, 1999.
[12]Hassan Elwan,“ A Low Voltage CMOS Class-AB Transconductance Amplifier ”