URN etd-0407109-183705-294
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Statistics This thesis had been viewed 76 times. Download 0 times.
Department
Year 2005
Semester 1
Degree Master
Type of Document Master's Thesis
Language zh-TW.Big5 Chinese
Title Gamma Correction Circuit for TFT-LCD Source Driver IC
Date of Defense 0000-00-00
Page Count 100
Keyword
Gamma correction
TFT-LCD source driver IC
DAC

Abstract
This thesis is about source driver IC on TFT-LCD (Thin Film Transistor-Liquid Crystal Display, TFT-LCD), Regard implement TFT-LCD source driver IC as the purpose of studying, discuss the topical on gamma correction and have more precision driver IC.
In order to compensate the physical characteristic of the liquid-crystal display (LCD), we must correct the luminance as a non-linear curve. The general method adopted by modern TFT-LCD source driver IC is to use non-linear digital-to-analog converter (DAC) to convert linear input data by using piece-wise linear algorithm. However, such a design is not easy to realize the non-linear DAC. It also requires multiple reference voltages to adjust gamma value. In addition, the resistors required are also varied in sizes to meet the goal of non-linear transformation which increases design complexity.
Thus, we propose a refined design to process the mentioned gamma correction by using a novel digital circuit. The digital circuit proposed is capable to correct gamma values to fit NTSC gamma 2.5 specifications than the prior circuit. In our design, a linear DAC is used to replace the original non-linear DAC which makes the complexity of analog circuit is reduced as well as the area occupied by resistors is also minimized. Besides, only 2 external reference voltages are required in our design instead multiple reference voltages required in the prior designs. The resistors used in our design are the same in value which reduces design complexity and area. In short, the proposed design not only possesses the advantages of more accurate gamma correction but required less chip area than the prior design. Hence, our design can be a better alternative in LCD source driver design.
Advisory Committee Po-Ming Lee - advisor

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Date of Submission 2006-08-08