The TROPHY (Talented Role-playing Technology with a Dual Polarity Sustainer in Hybrid Mono Board) Driving Method

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Abstract

We have developed a new driving method named TROPHY(Talented Role-playing Technology with Dual Polarity sustainer in Hybrid Mono board). In this method, the sustain voltage is halved compared to the conventional method and the number of power sources is reduced by voltage level unification during the reset, address and sustain period. The hybrid mono board was especially developed to implement those technologies. Therefore, we can lower the cost with the TROPHY compared to the conventional one. It is suitable technology to improve the reliability of circuit and image sticking problem. We can also reduce the number of driving boards and the EMI problem comparing to those of the conventional method.

1. Objectives and Background

Recent studies of PDP have been focused on developing larger size, higher definition, higher luminance and higher contrast ratio, etc. The larger display size and the higher definition would cause higher power consumption, worse image sticking and more severe EMI problem. The low voltage driving is one of the solutions to minimize the problems above. Therefore we propose the TROPHY method, having merits on the low cost, low power consumption, and image sticking. In addition, this method, using the low voltage switching devices by lowering the driving voltage, is recommended to reduce the EMI problem theoretically [1]. Contrary to the conventional sustain driving scheme, the TROPHY waveform, half level with reverse phase and dual polarity, is applied to scan and sustain (Y) electrode and common sustain (Z) electrode during sustain period, alternately [2]. We realized the hybrid mono board as shown in Figure 6.

2. Results

The new driving method of AC PDP, called TROPHY, which has lower driving voltage, lower cost driver, and lower EMI characteristic than those of conventional methods has been developed without changing the panel structure. The new driving waveforms having dual polarity with half level were applied to the Y and Z electrodes for sustain operation as shown in Figure 1. The conventional Energy Recovery Circuit (ERC) block was used [3]. However, the operation of ERC in TROPHY was adopted with a unique switching control scheme. In this method, sustain pulses with same voltage level and reversed phase were applied to Y and Z electrodes. Using proposed waveforms, it is possible to reduce the number of switching devices and DC power supplies. It has been tested on 42-inch XGA AC PDP.

In detail, to minimize the number of DC voltage sources, total setup level was added to +Vs/2, -Vs/2 and $V_{set\ up}$ during reset period. In address period, scan voltage, -Vy, was also set to -Vs/2 while +Vs/2 was applied to Z electrode. In sustain period, sustain pulses having +Vs/2 and –Vs/2 levels with reverse phase were applied to each sustain electrode, respectively. As a result, only four kinds of DC power sources, +Vs/2, -Vs/2, $V_{set\ up}$, and $V_{scan,}$ were needed.

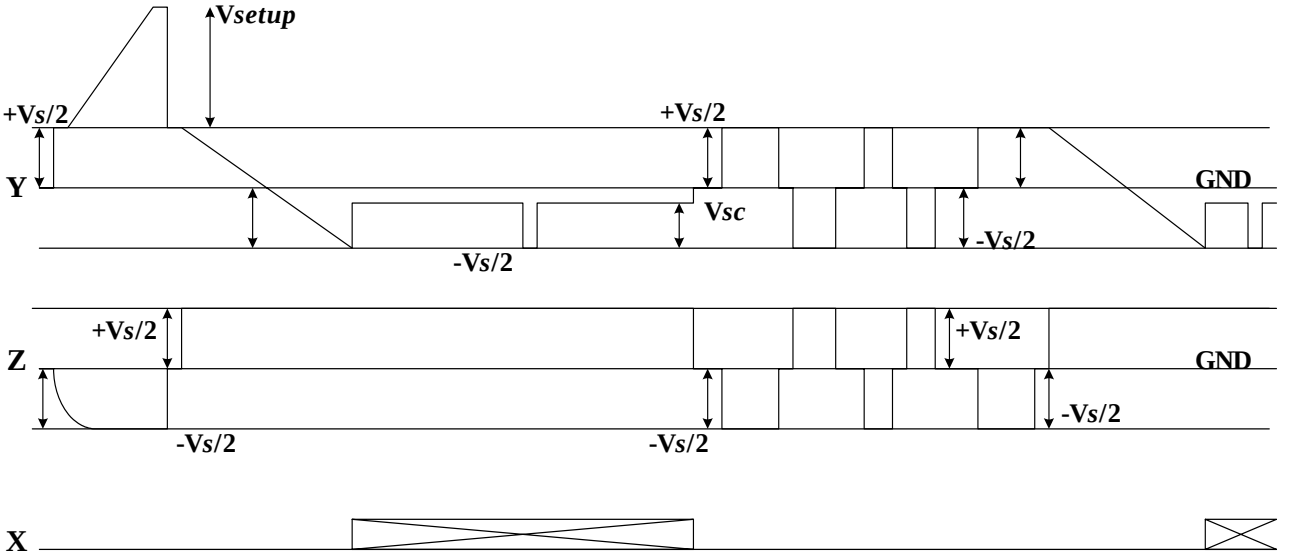

Figure 1. Waveform for operating the proposed circuit.

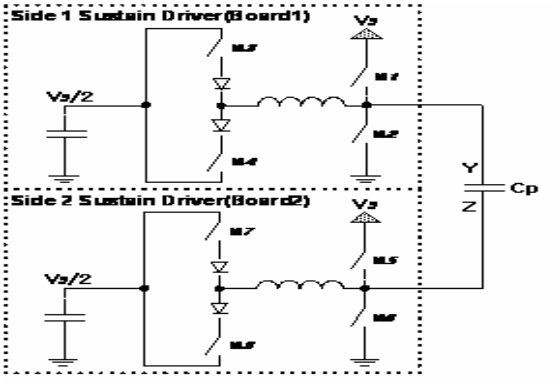

Figure 2. Block diagram of conventional sustain circuits.

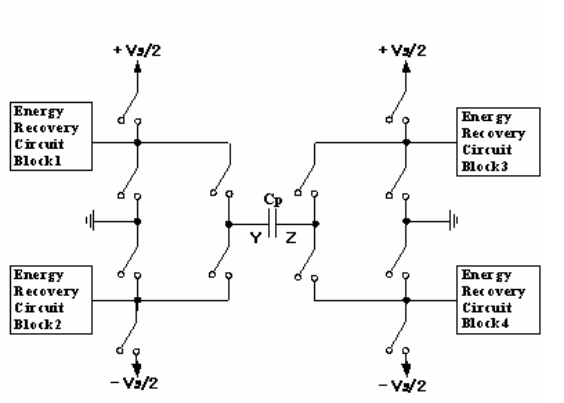

Figure 3. Sustain block diagram of the first invention of this method.

Figure 2 shows a block diagram of conventional sustain circuits. It has two sustain blocks with Vs level. Figure 3 shows a sustain block diagram of the first invention of this method. It consists of four sustain blocks.

Figure 4 shows a sustain block diagram and waveform of the second invention of this method. In order to generate proposed sustain pulse waveforms, Figure 5 only two sustain blocks were sufficient.

Therefore, this method has many advantages like low cost, switching loss and improved system reliability including EMI and image sticking.

Also, the electric field between sustain (Y & Z) electrodes and address (X) electrode was lower than conventional one during sustain period. Therefore, it is helpful for reducing the image sticking problem.

The proposed circuits are composed of driving parts A and B as shown in figure 4. These parts were integrated with the concept of hybrid mono board. Consequently, hybrid mono board driving is suitable for decreasing noise and driving loss. Furthermore, both simple design and high space flexibility have been achieved in Figure 6.

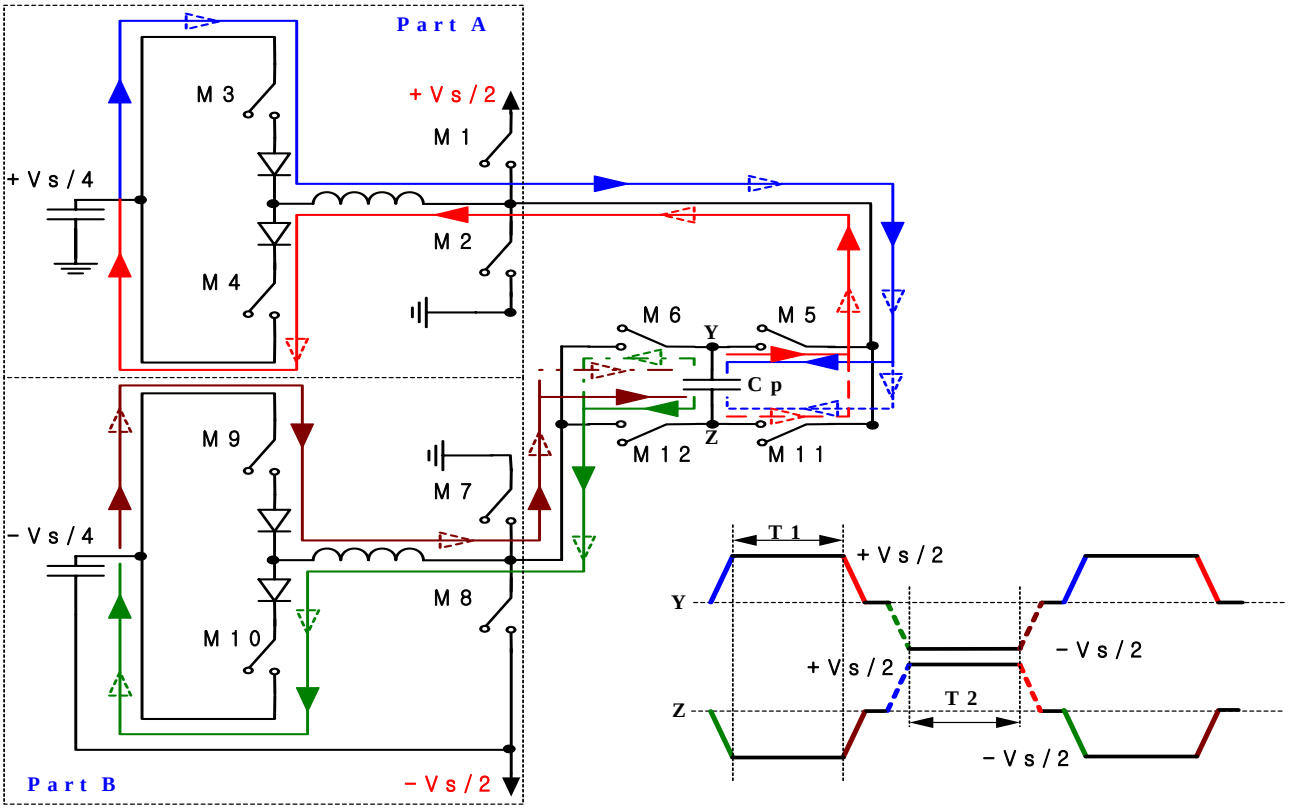

Figure 4. Sustain block diagram and waveform of the second invention of this method.

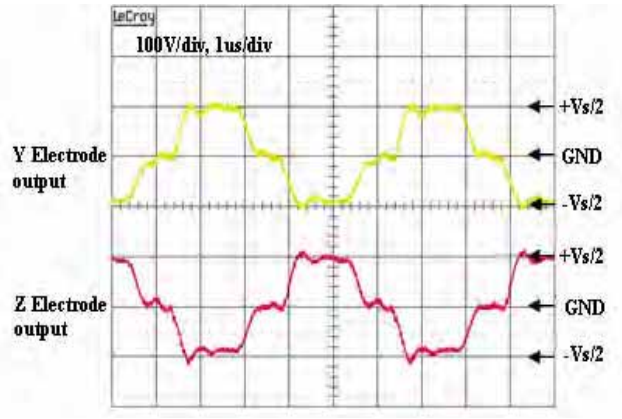

Figure 5. Experimental waveforms of sustain pulse. (4% window pattern)

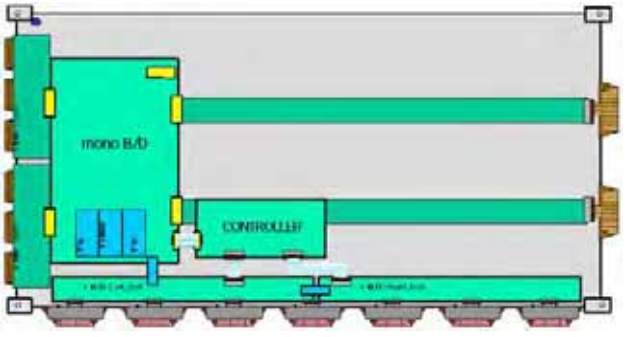

Figure 6. The concept of Hybrid mono board.

3. Impact

The new driving method, called TROPHY, was applied to 42-inch XGA. Higher system reliability (EMI, image sticking, etc.), higher luminous efficacy, lower power consumption, and lower circuit cost than those of conventional one have been achieved with new driving method.

4. Acknowledgement

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5. References

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