



CIRCUIT, SYSTEM AND METHOD FOR THIN-FILM TRANSISTOR LOGIC GATES

Background

Thin-film transistors (TFT) are widely used in large-area electronics, such as flat-panel displays and medical imagers. Owing to being a low-cost, simpler technology, only simple circuits can be fabricated in a typical TFT process.

Some attempts by others have been made to realize digital logic circuits in a TFT process for smart flat panel applications. However these have always come at a great cost and substantial, wasted power consumption that reduces energy efficiency for portable electronics.

Our approach results in a low-cost, energy efficient realization of digital logic circuits in a TFT process. It utilizes, a minimal number with none of the associated wasted power consumption.

Description of the invention

The invention is a thin-film transistor-based inverter and digital logic gate family. Our technology provides a simple and cost effective means of including a logic circuit in a TFT which enables the reduction and elimination of wasted leakage power consumption. The circuit does not need any additional biasing or clock input and only requires input data signals, one power supply, and ground.

Advantages

The invention provides solution for low-power full swing logic gates for thin-film large-area electronics applications using only one type of thin-film transistor devices and conventional microfabrication techniques. The invention enables higher energy efficiency (up to 90% reduction in power consumption), faster switching speed, and smaller circuit footprint compared current thin-film circuit technologies.

Potential applications

The invention will enable new functionality and performance in:

- Energy-efficient portable consumer electronics such as tablets and smart phones.
- Memory and logic circuits in pixel technology for flat panel displays.
- Smart panels for large-area sensing and data storage.
- High-performance flexible electronics.
- Organic electronic-based memory and logic circuit technology.

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Stage of development

Prototype fabricated and tested

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