LTPO technology presentation

TRULY WPD R&D

2026-4-3

Contents

01. Definition and background
What is LTPO？ Technology back ground and origin

02. Core strengths
Low-frequency display and extreme lower power consumption, extending battery life

03. Technical principles
In-depth analysis: why can lower frequency flickering be avoided?

04. Summary and planning
Technical value review and LTPO planning

01. Definition and background ：What is LTPO？

Low Temperature Polycrystalline Oxide Technology

Definition of LTPO

Definition and application

LTPO : Low Temperature Polycrystalline Oxide

It is a backplane driving technology that applies to AMOLED display, enabling more precise power consumption control.

Hybrid architecture technology

Instead of using a single new material, a hybrid architecture is adopted, where two different properties of TFTs are integrated onto the same substrate.

1. LTPS (Low temperature polycrystalline silicon): High-performance driving Oxide

2. Such as IGZO: Low leakage characteristics.

Technology background: The contradiction between high refresh rate and power consumption

Challenges of the traditional solution: High power consumption

For traditional LTPS-driven OLED display, when displaying static content such as reading or images. In order to avoid the problem of low frequency flickering, they still need to continuously refresh at a high rate, resulting in high power consumption and seriously of affecting the battery life of the device

LTPO solution: Achieving both display quality and low power consumption

The LTPO technology emerged as a solution to the contradiction between “high-quality display” and “low power consumption”, aiming to achieve a balance between user experience and low battery life

Core architecture: The “golden combination” of LTPS and Oxide

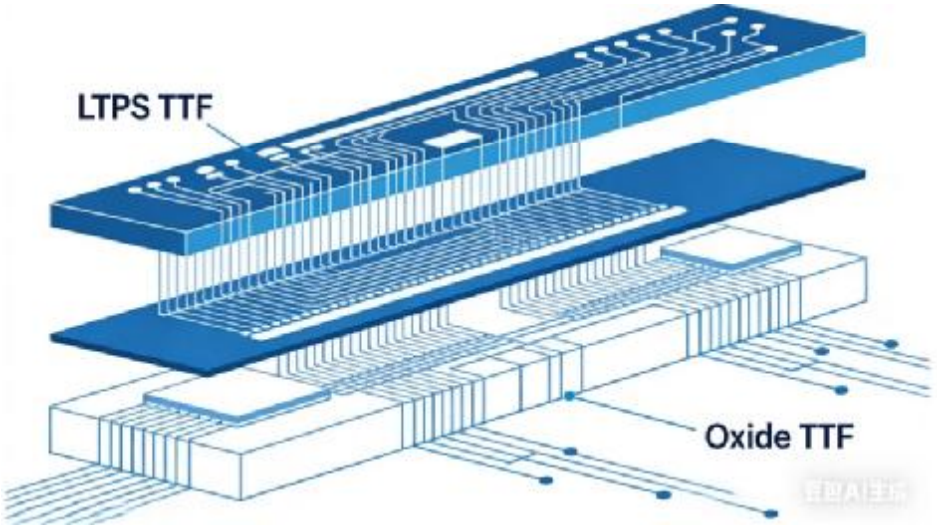
The core of LTPO is to integrate LTPS (low temperature polycrystalline silicon) and Oxide (oxide semiconductor) types of TFTs onto the same substrate, achieving complementary advantages.

LTPS TFT: High-speed response, high-brightness display

High electron mobility, responsible for the functional modules that require high-speed response (such as high refresh rate drivers), ensuring smooth screen display, and meeting the requirements of the high- brightness of AMOLED

Oxide TFT： Low power consumption, long battery life

The leakage current is extremely low, responsible for the continuous output and maintenance of the pixels, ensuring the stability and low power consumption during static display.



02

Core advantages: Low-frequency display and extreme power saving

Core advantage: supports 1 Hz frequency display

LTPO (Low-refresh-rate)

The LTPO screen supports a refresh rate as low as 1Hz, (refreshing data 1 time every 1 second), in scenarios such as displaying AOD mode or viewing static images, it achieves extremely low-frequency display.

Significantly reduced power consumption

Compared with the traditional 60Hz (refreshing 60 times per second), The power consumption can be significantly reduced in low frequency scenarios, thereby minimizing energy waste

Significantly extend battery life

By intelligently adjusting the refresh rate, the power management of the device has been greatly optimized. thereby significantly extending the overall battery life of the devices.

Power saving principle： Refresh rate is directly proportional to the power consumption.

Physical mechanism: positive correlation relationship.

Refresh rate and refresh count

the higher the refresh rate, the more times the screen updates the data such as images within a unit of time. And the greater the power consumption will be.。

Accumulation of energy consumption

Each time a switch operation is performed, a power consumption driver is required. A high-capacity refresh means continuous power output.

LTPO’ s core strategy: intelligent frequency control.

Adjust the refresh rate as need

in the AOD mode. The refresh rate will be reduced to 1 Hz

Root-level power saving.

Avoid excessive and ineffective waste, reduce energy consumption through mechanism, and achieve precise control.

Ø DDIC power consumption: 60HZ：6.8mW è 15HZ:3.4mW è 1HZ:2.3mW

03 . Technical principle: Why can LTPO avoid flicker at low frequencies

The architectural innovation from LTPS to LTPO

Key difference: Leakage characteristics of TFT

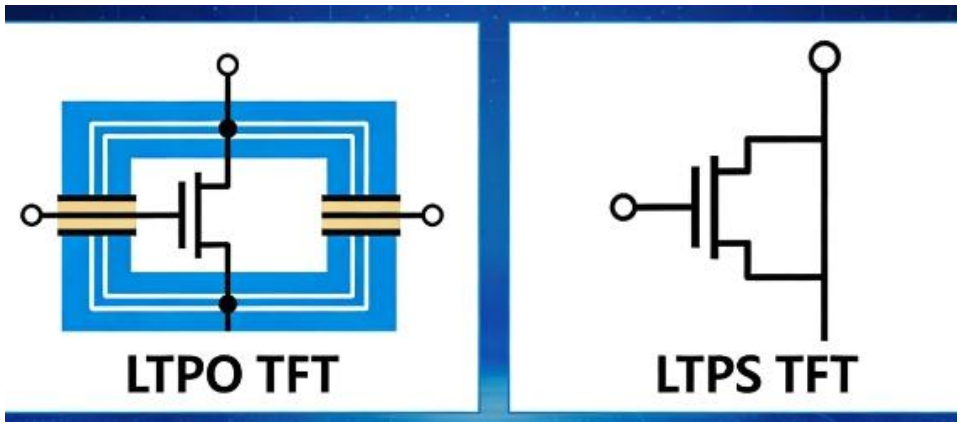
LTPO (Oxide TFT)

Using materials such as IGZO, it has extremely low leakage current. The voltage can be maintained stably for a long time. Without the need for frequent refreshing and power consumption is low.

LTPS (Traditional polycrystalline silicon)

The leakage column is relatively large, and the pixel voltage is difficult to be maintained for a long time. It is necessary to constantly refresh a high refresh rate to ensure the stability of the picture, otherwise flickering may occur.

Comparison of leakage current between LTPO TFT and LTPS TFT



Leakage current low → LTPO TFT high

LTPO TFT leakage < LTPS TFT leakage

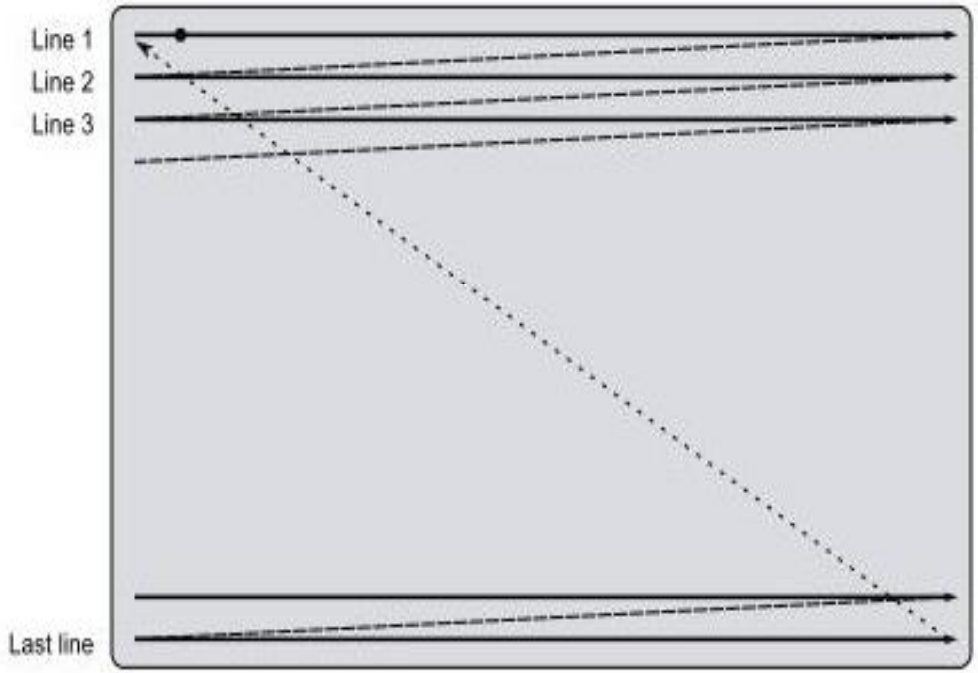
AMOLED’s GOA line-by-line scanning

Technical principle

The AMOLED screen adopts the GOA (gate on array) technology, where the gate driving circuits are directly fabricated on the array substrate

Line-by-line scanning mechanism

The driving circuit sequentially lights up each row of pixels from top to bottom, this characteristic provides the foundation for LTPO to achieve low frequency display



LTPO: The voltage stabilization of pixels

Built-in storage capacitor

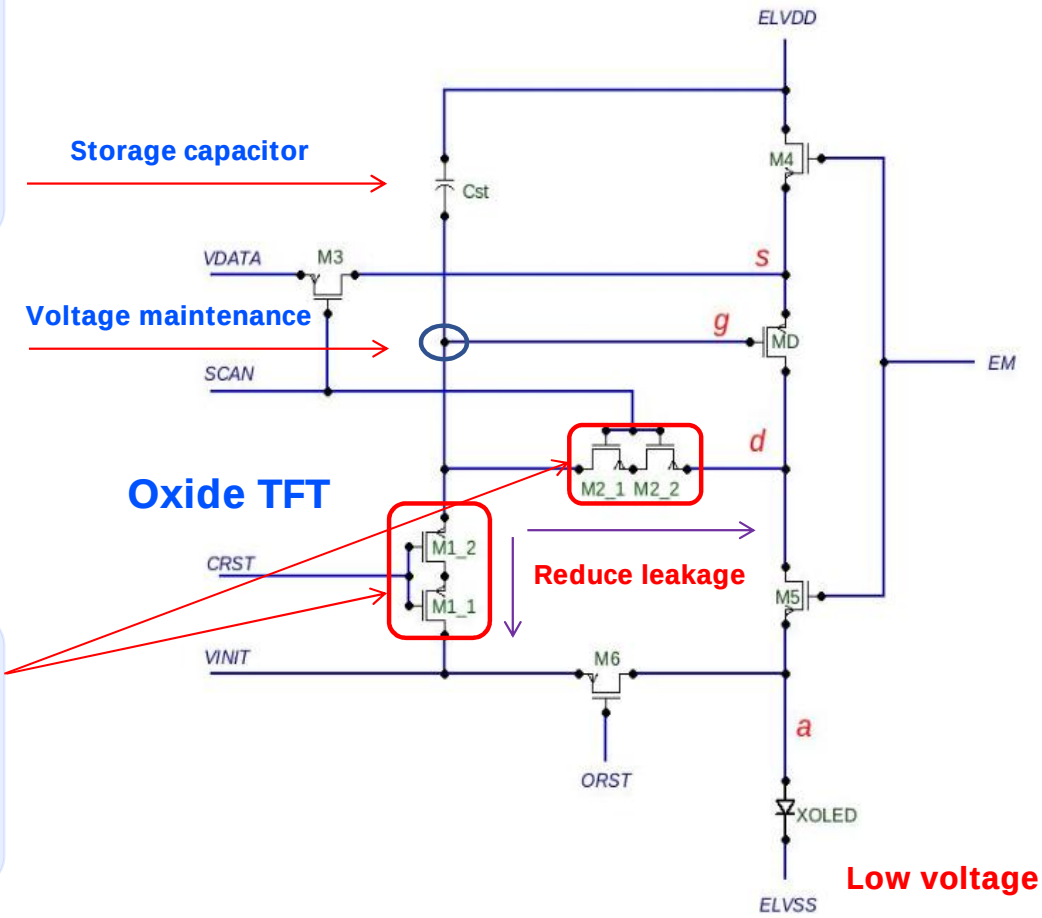
Each pixel unit is internally integrated with a storage capacitor. After scanning it will remember and maintain the applied voltage

Continuous illumination and stable refresh rate

Ensure that the pixels continue to emit light during the interval between two scans unit the next refresh, maintaining the stability of the screen brightness.

LTPO low leakage co-operation

Combining with the low leakage characteristics of LTPO, it can effectively prevent voltage fluctuations even at low frequencies, achieving flicker-free display



04. Summary: Technical value and planning

Summary

Hybrid drive architecture

LTPO is a hybrid driving technology that combines the advantages of LTPS and Oxide semiconductors, featuring high-performance display characteristics.

Ultra-low power consumption

By supporting adaptive dynamic refresh rate display, it significantly reduces power consumption and enables the ultimate battery life experience for display devices.

Overall architectural advantages

Based on the super leakage characteristics of Oxide TFT, LTPO display panels can support 1 Hz AOD display for wearable products, achieving a balance between display effect and low power consumption.

LTPO project schedule

TRULY (Huizhou) intelligent display co., Ltd. LTPO AMOELD production line plan
Mother glass production capacity: 4K
Glass substrate size: G4.5, 730*920mm

March 2026

Equipment relocation

July 2026

Samples production

Sep 2026

Pilot run production

Nov 2026

Mass production

Thank you