IGNIS Innovation

Low Cost TV?

June 2016
Why do we need OLED TV?

After I saw an OLED TV, I said to myself that it is time to change my plasma TV since finally a TV with better image quality was available! (a customer)
1. Superior image quality: no matter how you want to look at it!

2. Enabling different possibilities

3. Lower power consumption

4. Black level matters more even in ambient conditions!
OLED TV looks good from any angle!
Why we do not get an OLED TV?

Too Expensive!
1. CAPEX: White OLED line requires significant capital investment

2. Material is expensive

3. Yield is an issue

4. Electronics
How to reduce the cost?

A generic solution that address all categories is needed.
Display Cost

\[
\frac{(C_{b}+C_{l})}{(Y_{b} \times Y_{l})} + C_{e}
\]

- Depreciation cost
- Material cost
- Operation cost
- IP cost

- Component cost
- Manufacturing cost
- IP cost
Yield and Repair

\[ \frac{C_b}{(Y_b+R_b)} + \frac{C_l}{Y_l} + C_e \]

35 %

Improving yield is crucial for cost reduction

Using proper inspection can improve the cost by repair and by eliminating the yield effecting forward stage
IGNIS MaxLife

A low cost electronic system and algorithm taking the burden off the backplane and OLED!
A pixel circuit allows the OLEDs and TFTs to be measured.

A measurement circuit built into the source driver measures the TFTs and OLEDs.

A timing controller stores the measurement data for every TFT and OLED in a lookup table (in DRAM, backed up using a FLASH memory). The controller then uses that data to boost the video data going to aged or non-uniform pixels.

Power board provides different voltage levels to the display and manage the power consumption.

Gate driver for controlling different operation mode.
Yield and Repair

IGNIS MaxLife System Increases the yield and enables repair
Solution for Yield and Resolution

IGNIS Simple Pixel

Complex Pixel
Soft Defect Compensation
(Emissive Device or Backplane)

No Comp.

Uniformity Comp.

Soft Defect Comp.

© 2015 Ignis Innovation
Hard Defect Compensation
(Emissive Device or Backplane)

IGNIS Full Solution

Other Solutions
Inspection Tool
Analyzing data and extracting process information
Inspection Tool

Identifying the source of defects for repair
Lower Cost Materials, Simple Devices, and Low Cost Fabrication Process

IGNIS MaxLife enables lower cost devices (both for TFT and OLED)
Low Cost Materials and Simple Devices

Lifetime is affected by low cost materials

Simple devices reduce the lifetime but result in lower costs
Low Cost Fabrication Process

Low cost process affects the lifetime!

Printing is one of the low cost process
IGNIS MaxLife Solves Lifetime Issue

- Enabling using low cost materials, devices, and fabrication processes
- At no extra cost to the system
- At no visible artifact on image quality
Solution for Longer Lifetime

OLED lifetime issue

Graph showing the comparison between IGNIS Full Solution and TFT only compensation over time.
OLED Burn-in Compensation ON/OFF!

IGNIS OLED burn-in solution is off (TFT is compensated)

IGNIS full solution (TFT and OLED burn-in are compensated)

Panel was aged with red, blue and green squares for different time (from right to left, the stress time is 1 day to 28 days)
IGNIS Demo of Printed Display 2008!
Still working fully with no sign of degradation.
Lower Cost Electronics

IGNIS MaxLife System achieves all these with simple electronic system
2-FPGA TCON for TV using external compensation
2-FPGA 2-ASIC TCON for TV using in-pixel compensation
There were two FPGA on the source driver board as well!
Low Cost Electronics

1-FPGA TCON using IGNIS MaxLife
It can be very easily used as SOC or integrated in driver for mobile phone as well
Due to its simplicity, IGNIS MaxLife is being used for the design of:

IT, Cellphone, Car, TV, VR, …
IGNIS Business Plan

Strategic Partnership with a few selected partners for 2017-2018
IGNIS Value Proposition

IGNIS has accumulated know-how & Intellectual Properties over past 10 years that enables its partners to develop high performance AMOLED displays resulting in:

- Faster time to market
- Wide range of products (TV, IT, car, virtual reality, tablet, phone)
- Lower cost
- Higher performance
- Longer lifetime
IGNIS Strategic Partnership

1. There is a significant gap between the existing capabilities in display companies and the final product development. Some of these issues are: TFT backplane requires AMOLED tuning, lots of defects, several reliability issues, and more.

2. IGNIS experience shows a higher chance of project success when IGNIS is more involved at different levels with its partners throughout the product development process.

3. However, IGNIS has limited resources and so needs to focus its effort on only a few of committed partners and develop commercial products in collaborations with them.