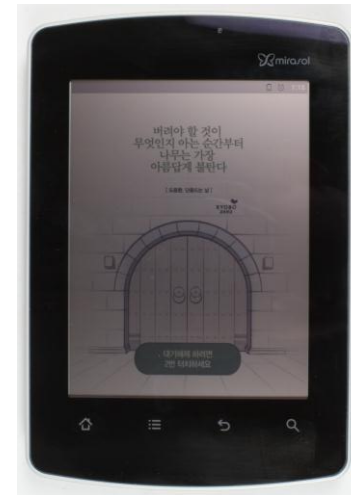
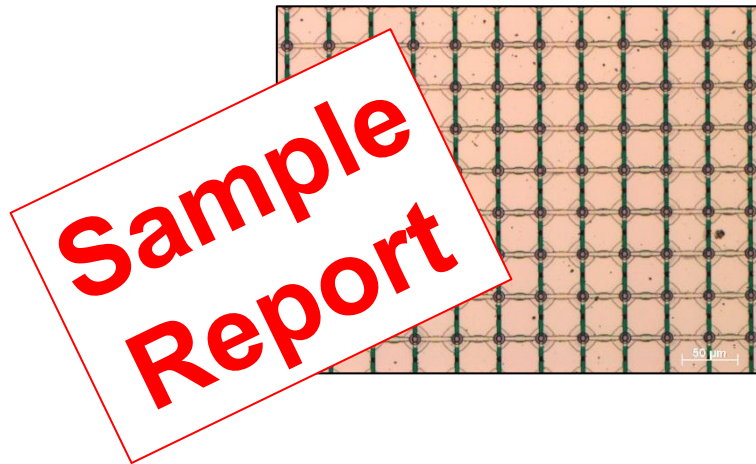


# Reverse Costing analysis



## Qualcomm MEMS Mirasol Interferometric Modulator Display

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- This full reverse costing study has been conducted to provide insight on technology data, manufacturing cost and selling price of a Qualcomm Mirasol display, a MEMS display using the Interferometric Modulator (IMOD) technology.
- The Display was extracted from a Kyobo eReader. It is a special version designed for the South Korea's Kyobo Book Centre.
- The Mirasol Display integrates an interferometric modulator display, 8 drivers and 4 flex circuits.
- The economic analysis is done according to 2 parameters:
  - the number of displays produced monthly
  - the manufacturing yield.The aim is to show changes in the cost of manufacturing from the introduction phase with low volumes and low yields to the production phase at full capacity.

The reverse costing analysis is conducted in 3 phases:

- System is analyzed and measured.
- The display is extracted in order to get overall data: dimensions, main blocks, pad number and pin out, marking
- Set up of the manufacturing process.

**Teardown  
analysis**

- Setup of the manufacturing environment
- Cost simulation of the process steps with different scenarios

**Costing  
analysis**

- Supply Chain Analysis
- Analysis of the selling price

**Selling price  
analysis**

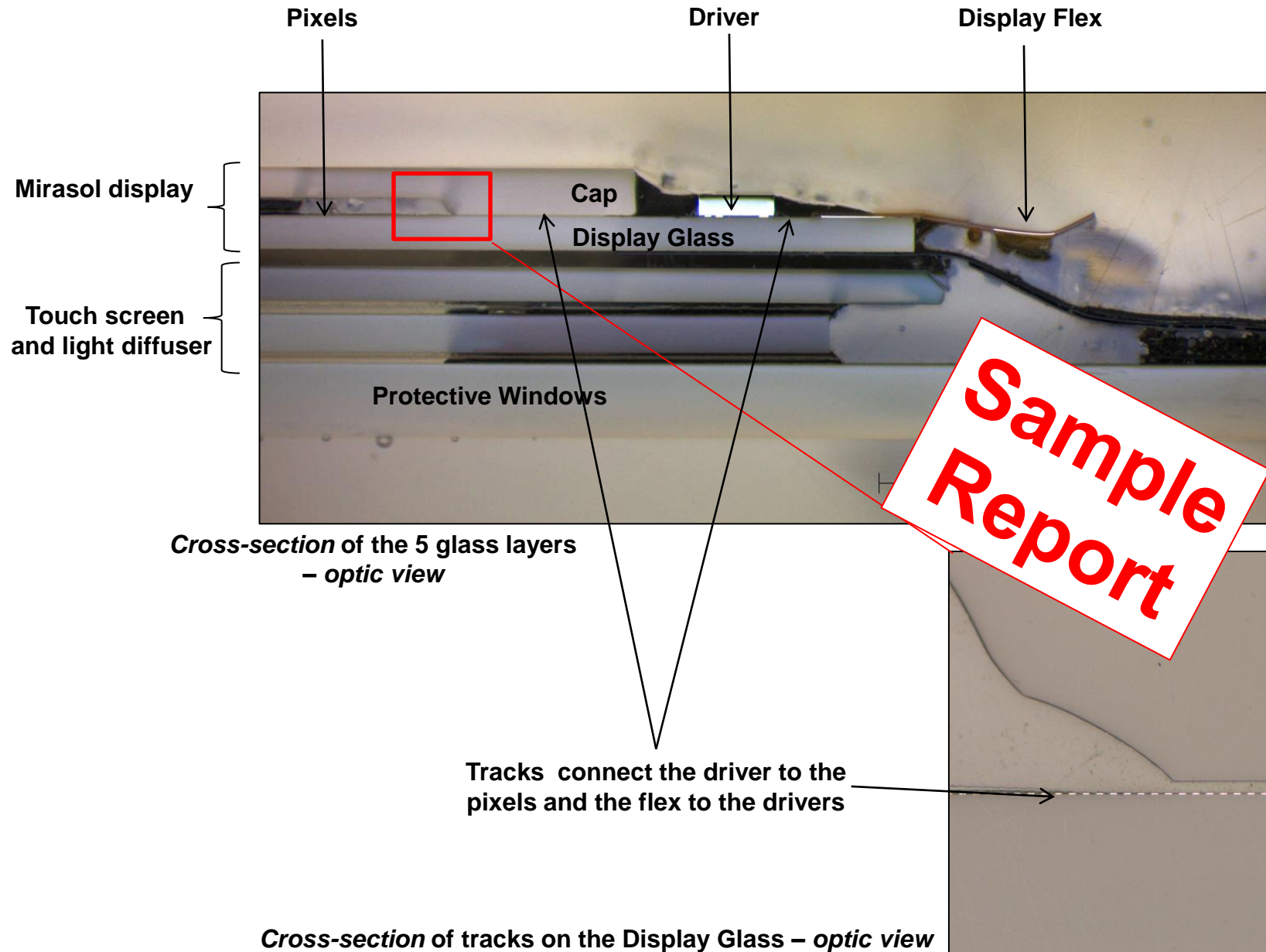


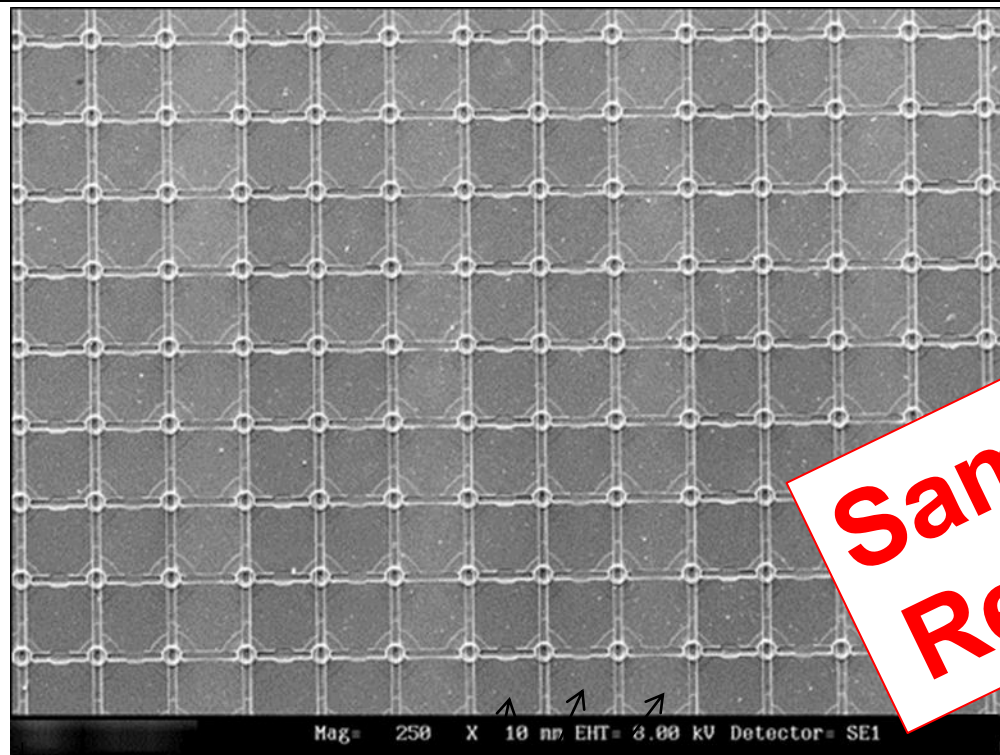


이것은 전자책의 혁신이다!  
전자책을 읽는 새로운 방법  
**KYOBO eReader**

- 5.7 inches
- XGA (1024 x 768 pixels)
- Power consumption lower than for standard LCD
- 30 frames per second.







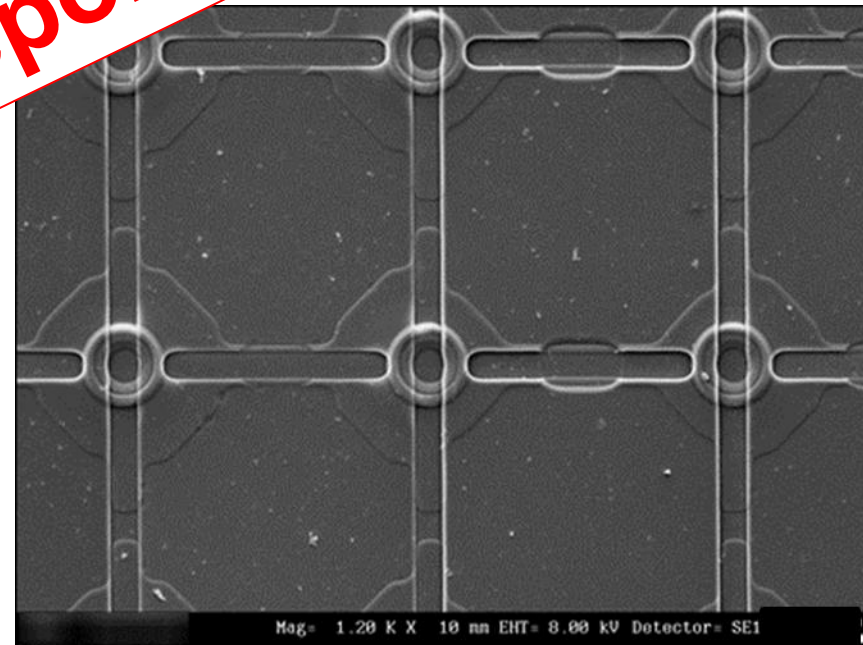
*Pixel matrix – SEM view*

The mirrors are built on the display glass

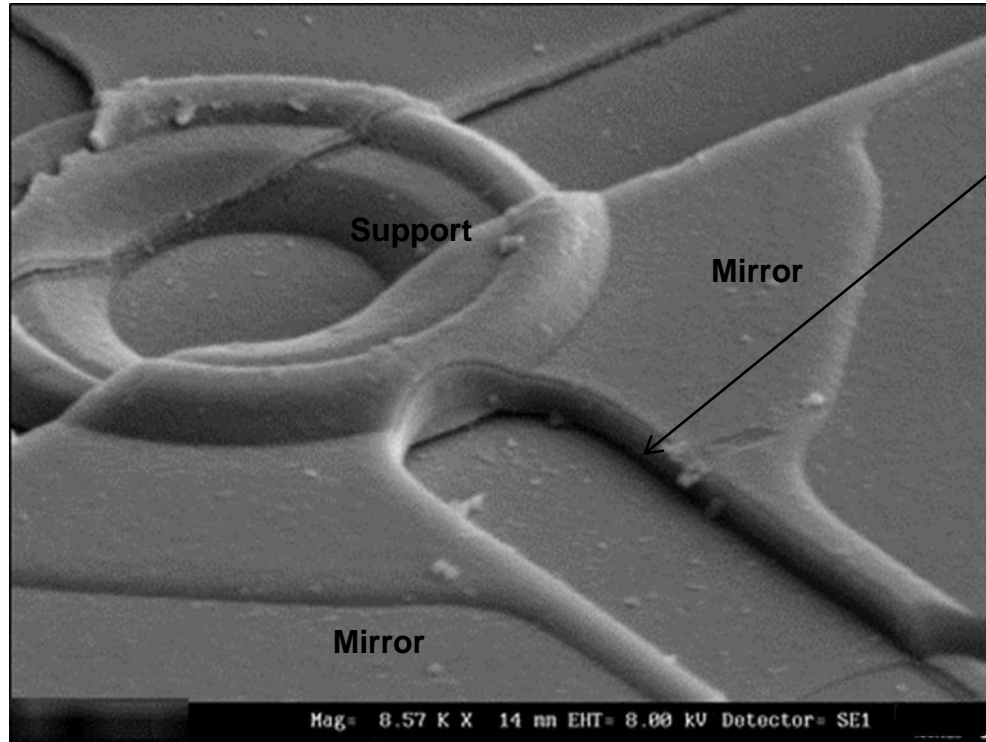
**Sample Report**

1 column  
= 1 color

The color is defined by the thickness of the gap.



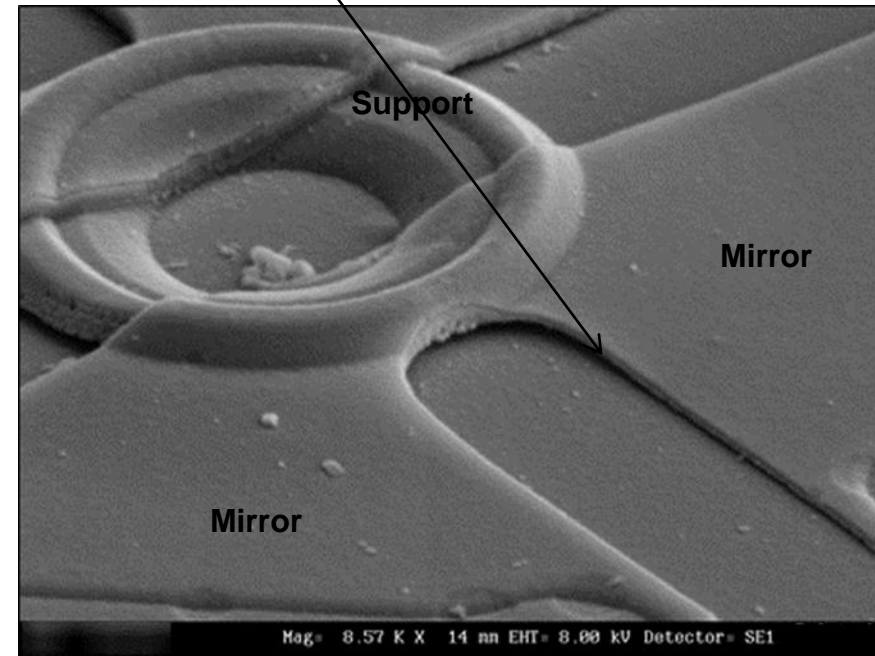
*Pixel matrix – SEM view*



*Mirror – tilted SEM view*

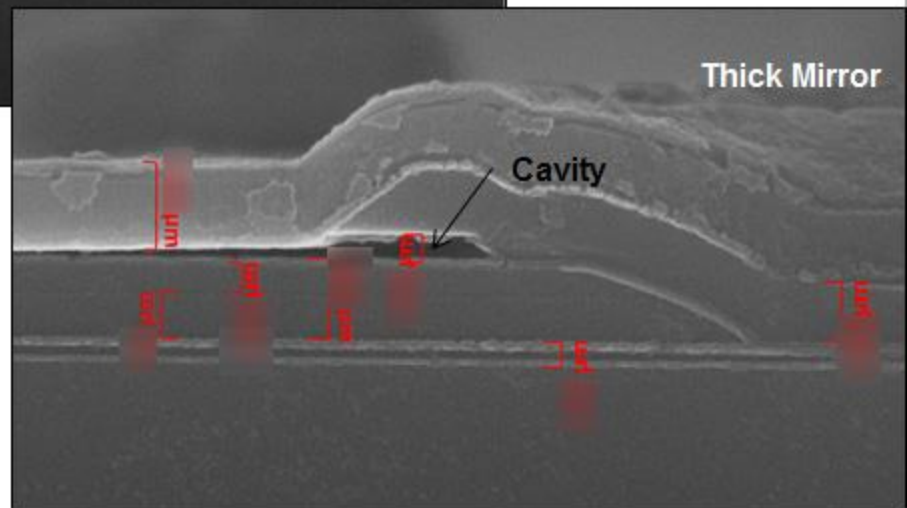
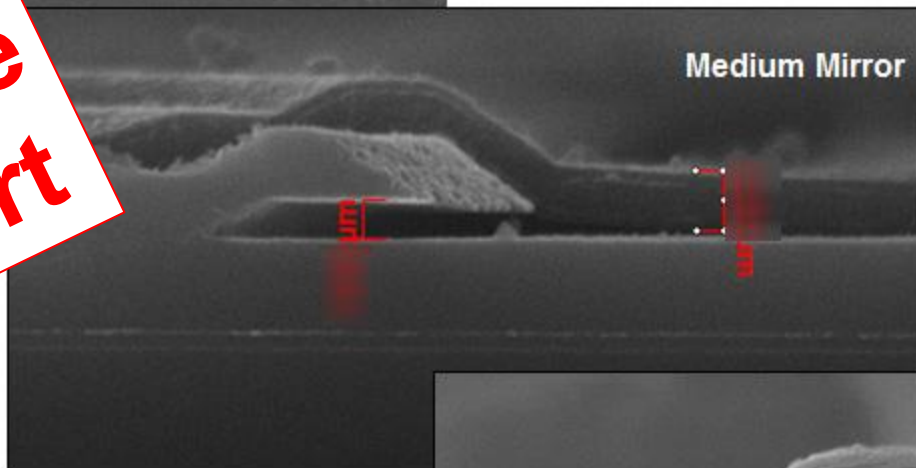
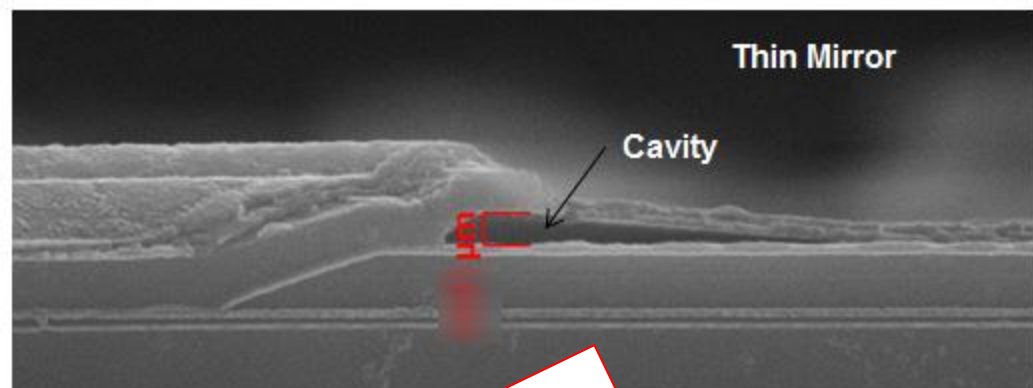
Thickness of the mirrors is function of the pixel color:

- Thick
- Thin



*Mirror – tilted SEM view*

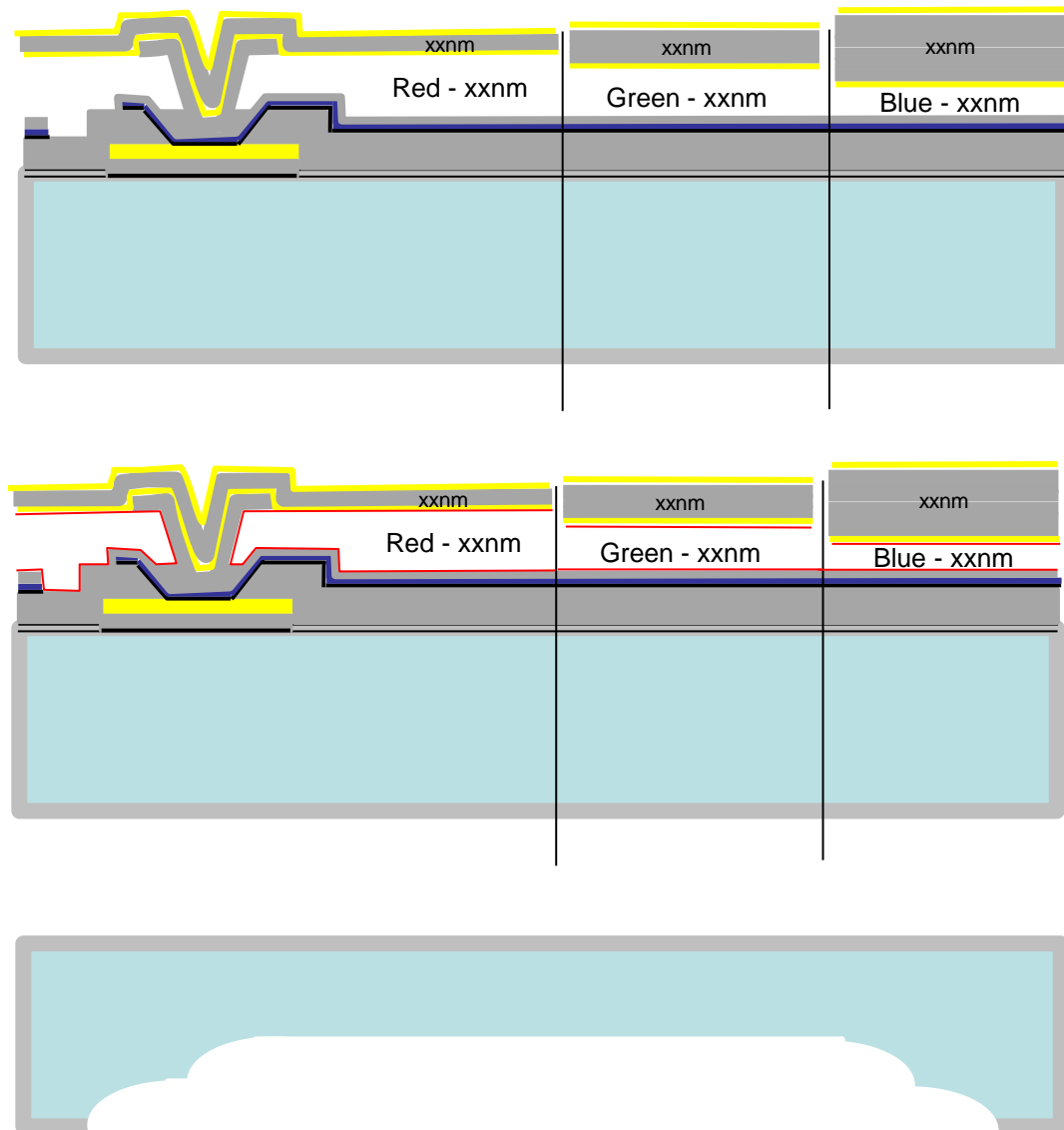
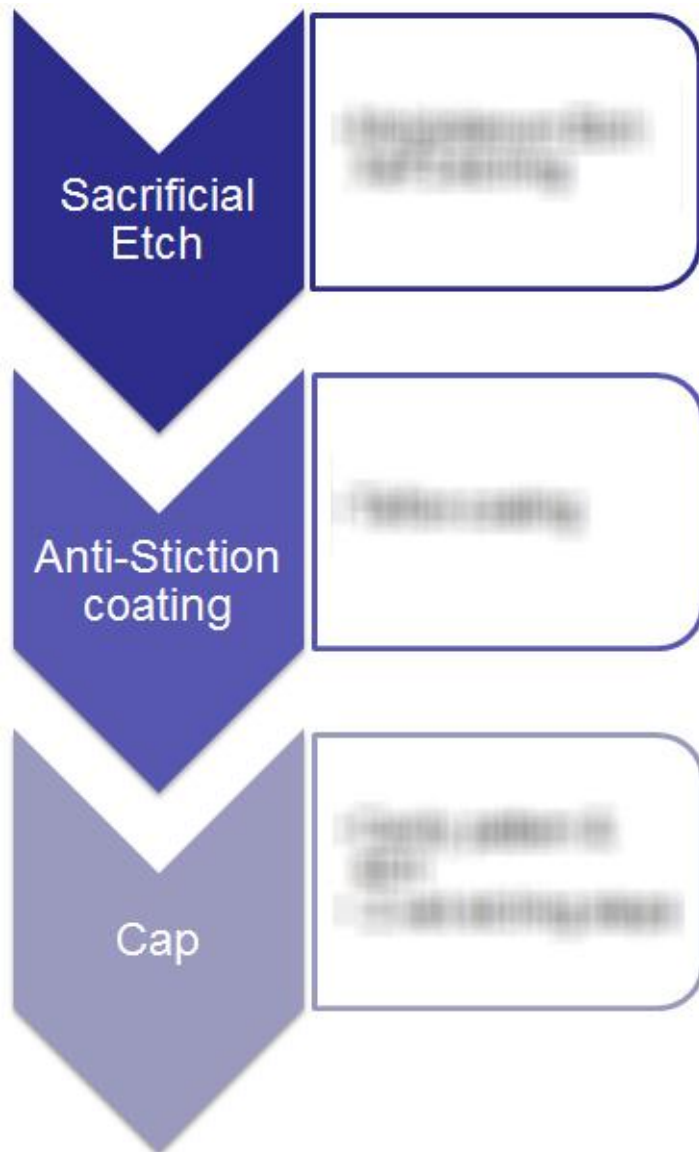




Cross-section

**Sample Report**

- Cavity thickness:
- Thin mirror:
  - Medium mirror:
  - Thick mirror:



Drawing not to Scale

Consumable Cost	Per Mother Glass	Per Display	Breakdown	Per Display	Breakdown	Per Display	Breakdown
2 Mother Glasses							
Molybdenum							
XeF2 (sacrificial etching agent)							
Getter (x8)							
other (Estimation)							
<b>Total Consumable Cost</b>							
<b>Display Cost without the drivers</b>							

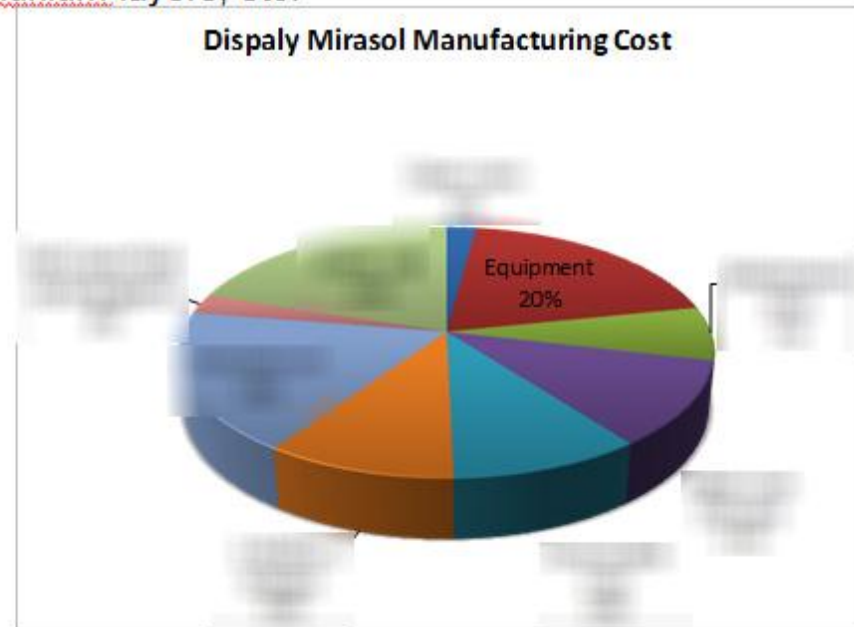
• The Main consumables are :

- The Mother glasses for the display and the cap.
- The molybdenum for the sacrificial layer
- The XeF2 (expensive material used to etch the sacrificial layer)
- Other = SiO2 and SiON layers, MoCr thin layers, Aluminium layers, etc.

• The consumable cost is [blurred]

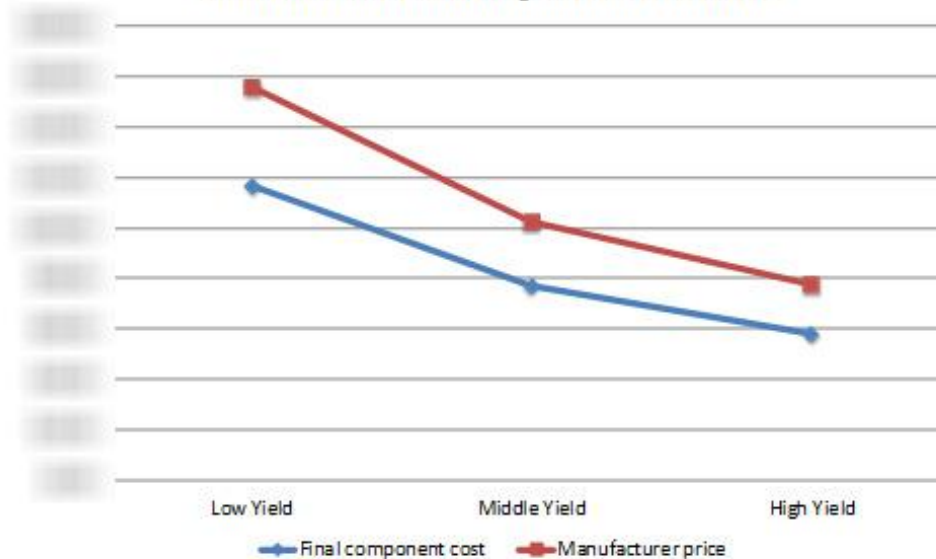
• The consumable part is between [blurred] and [blurred] of the display cost according to the number of displays manufactured by month.

• The final cost of the display is between [blurred] and [blurred] according to the number of displays manufactured by month.



Yield	Final component cost	Floor price	Manufacturer price
Low Yield	14.11000	14.11000	14.11000
Middle Yield	12.11000	12.11000	12.11000
High Yield	10.11000	10.11000	10.11000

*Cost and Price according to Yield Variation*



- The component manufacturing cost ranges from 10.11000 according to yield variations and the number of displays manufactured by month.
- The selling price by Qualcomm should be between 14.11000