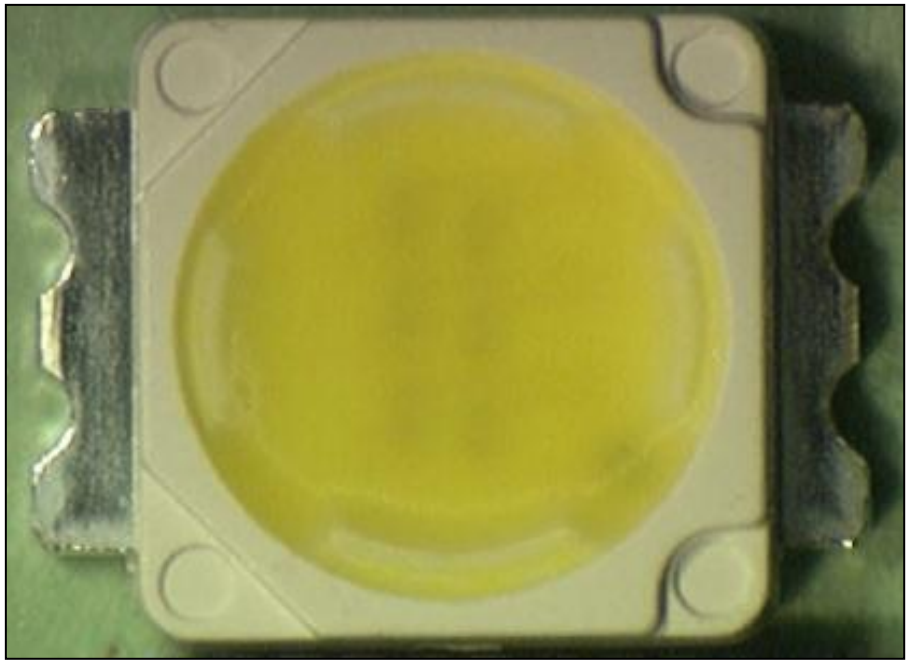
9 rue Alfred Kastler - BP 10748 - 44307 Nantes Cedex 3 - France
Phone : +33 (0) 240 180 916 - email : info@systemplus.fr - website : www.systemplus.fr

Reverse Costing analysis



Nichia
NS6W183T

August 2010 - Version 2

Written by: Sylvain HALLEREAU

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Version 2 : We have add one slide on the active layers thicknesses (slide 28). The new picture give more precise measures of MQW and p-GaN layers thicknesses. With the new data, we have re-calculate the epitaxy step cost (slide 51).

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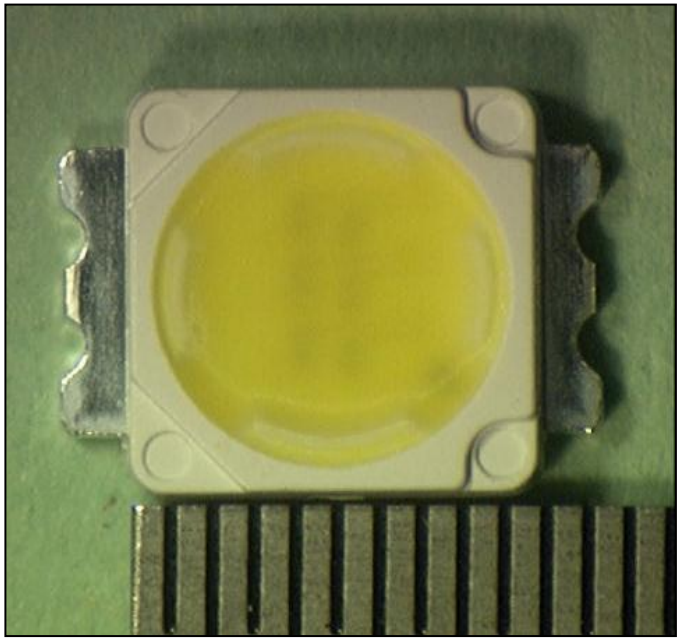
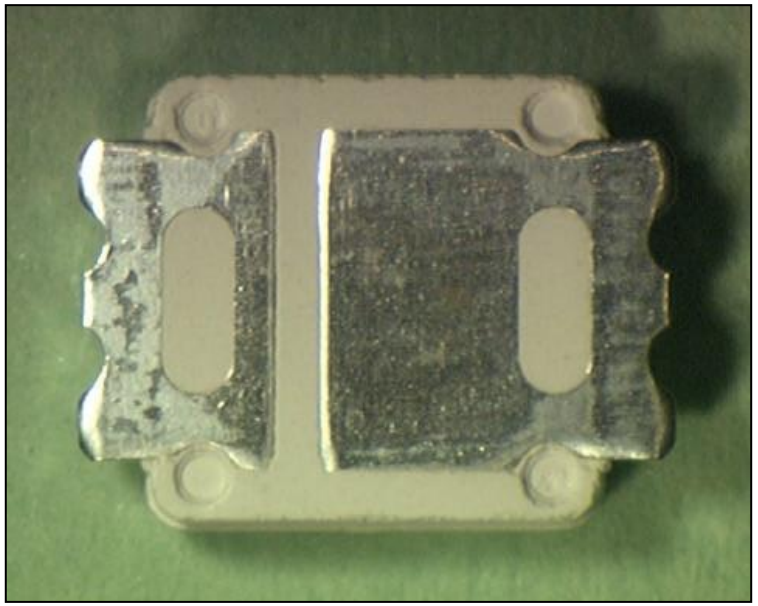
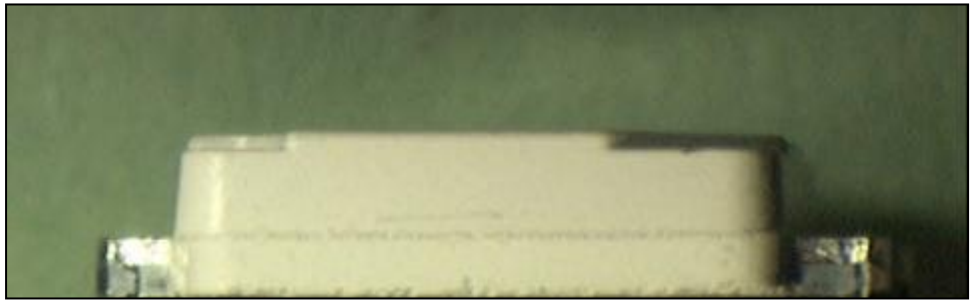
Package Views



Top view of the NS6W183T. The NS6W183T package is 6.5 x 4.3mm in dimension.

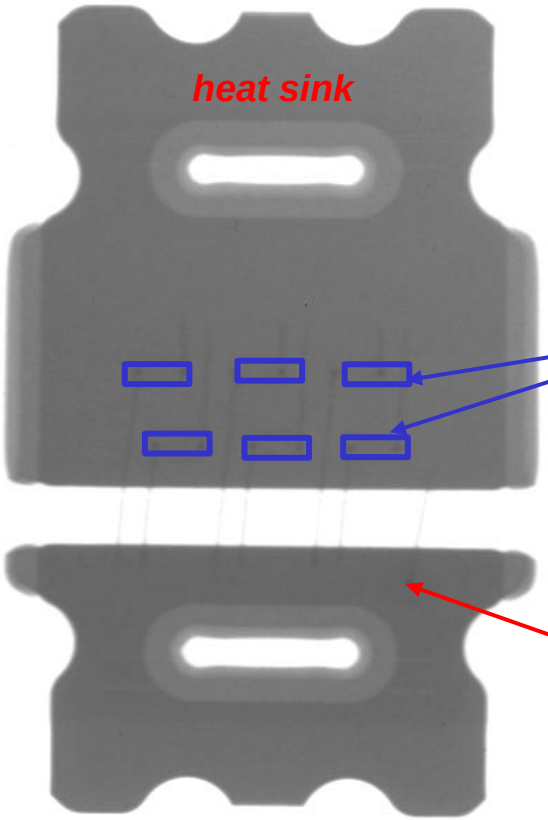


Underside view of the NS6W183T.

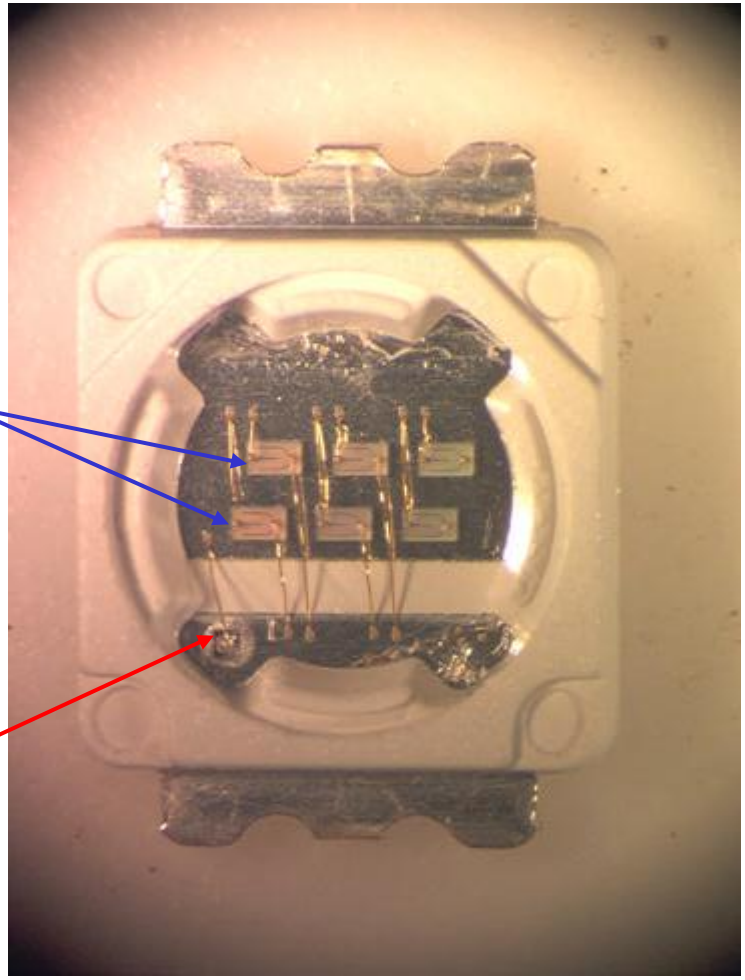


Edge view of the NS6W183T

Package X-Ray

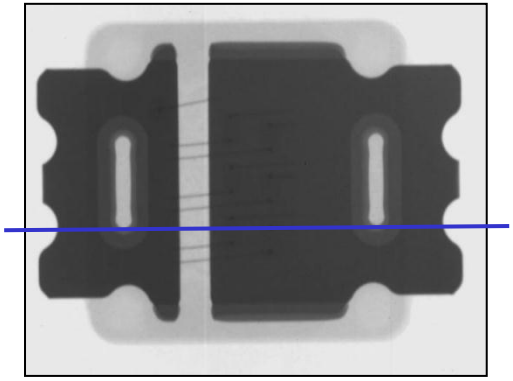


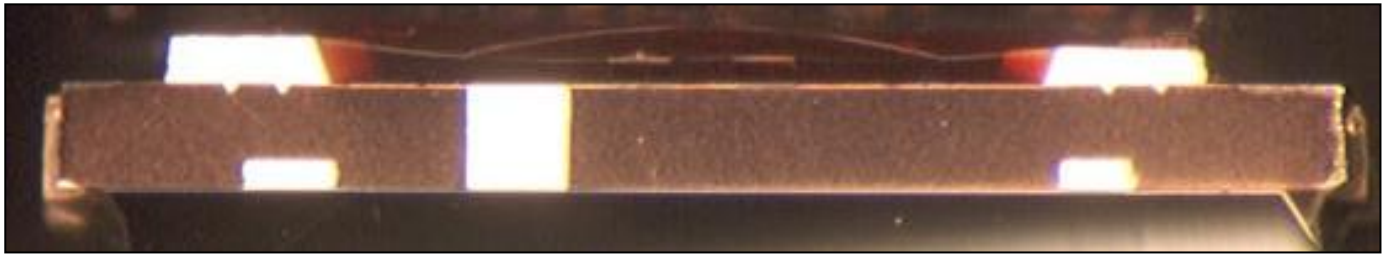
Plan view XRAY image shows the lead frame configuration.



Top view with fluorescent medium removed

Package Cross-Section

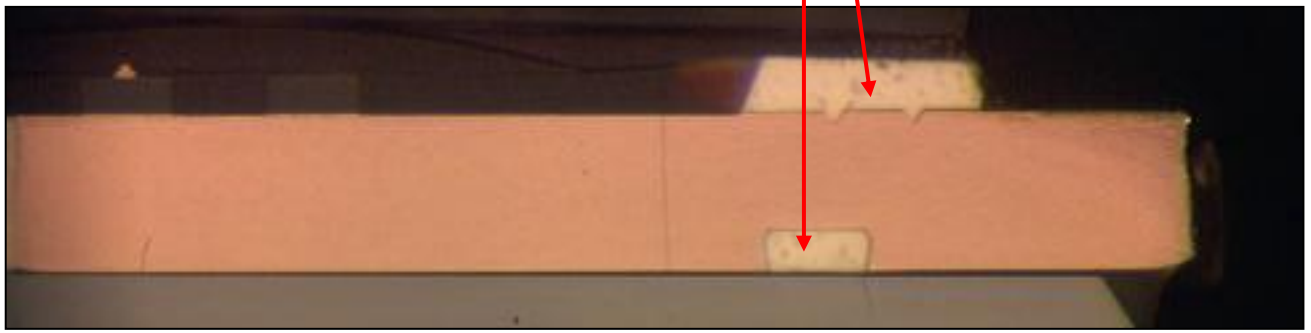




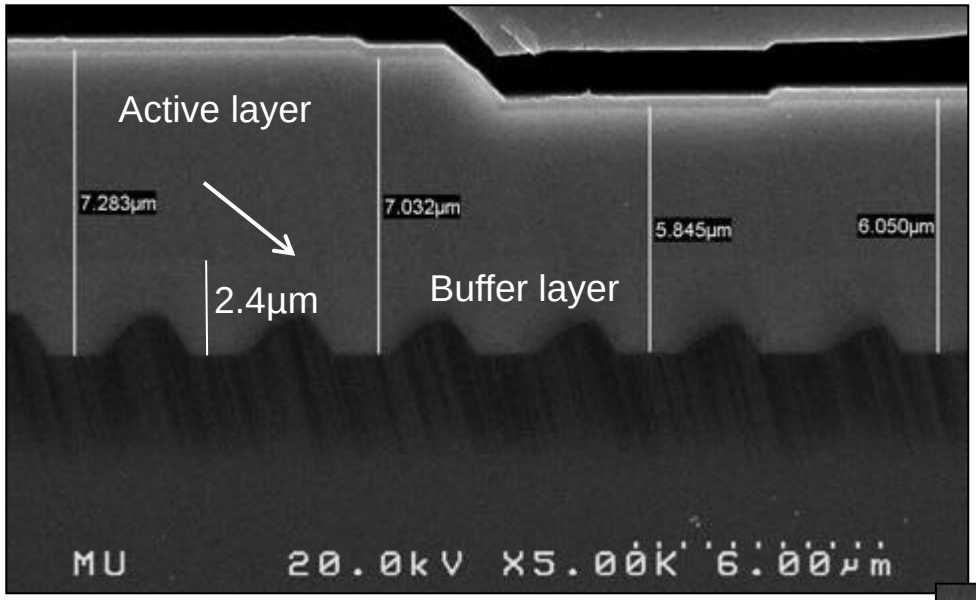
Package cross-section, roughly at the line in the XRAY above.

Epoxy molded around two 2 metal electrodes acting as heat sink

Higher magnification images of the cross-section.

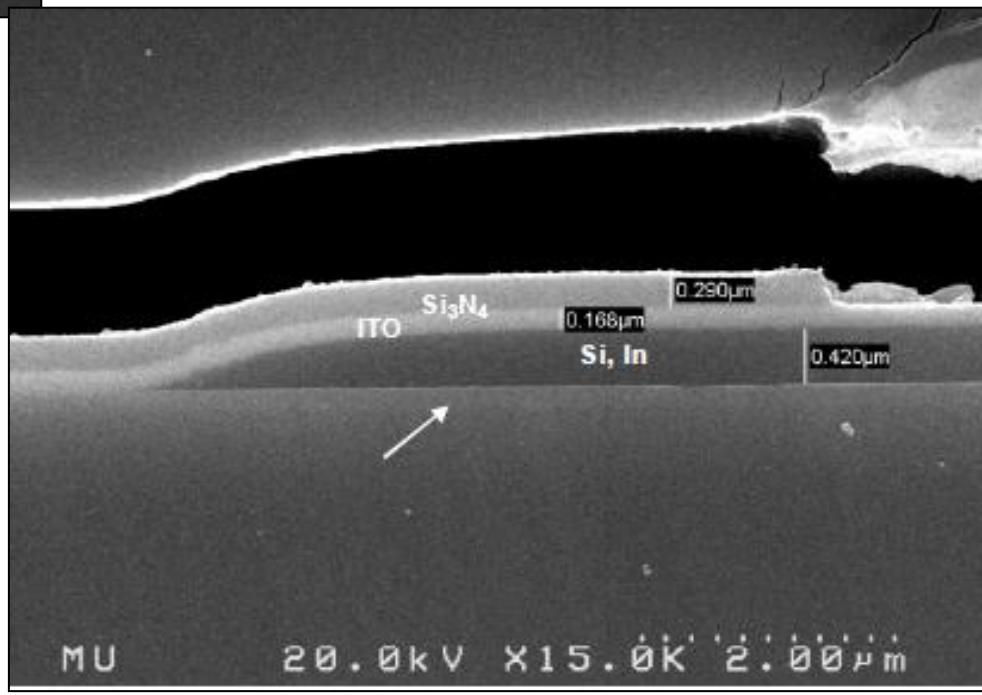


Active Layers Thicknesses

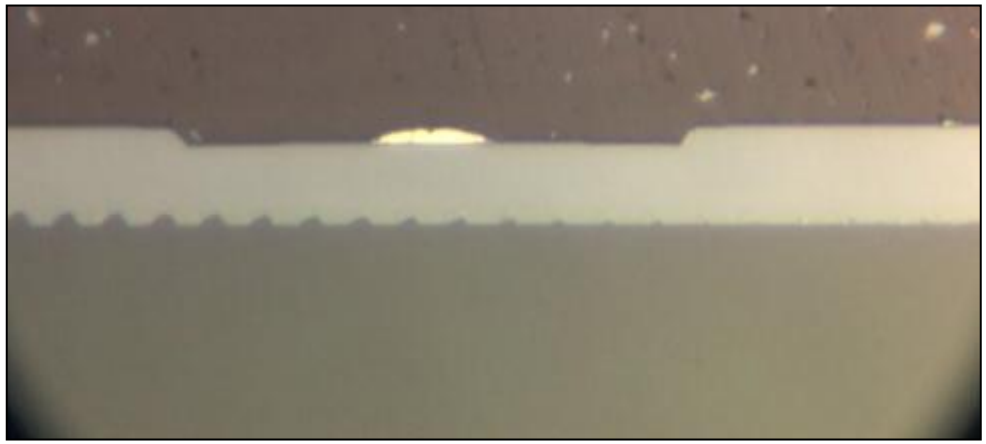


SEM view : Thickness of the active GaN Layer. The white arrow points to border between the buffer layer (2.4µm) and the active layer.

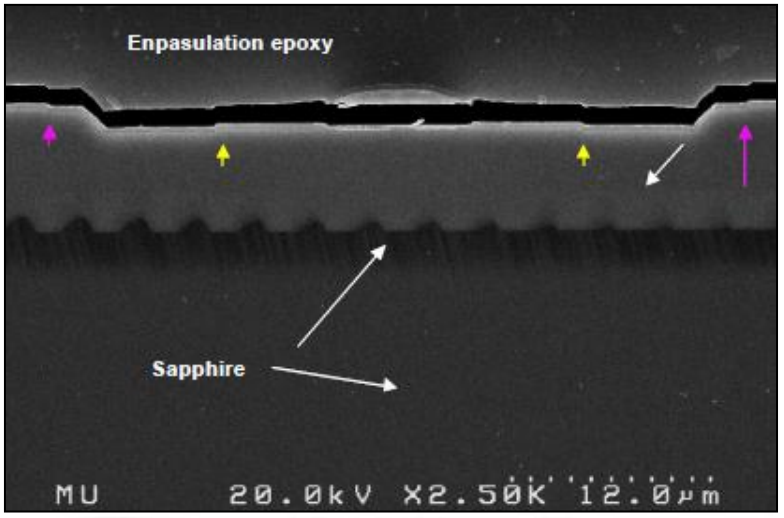
SEM view : The white arrow points to a faint line in the GaN substrate, the MQW.



Cathode Electrode

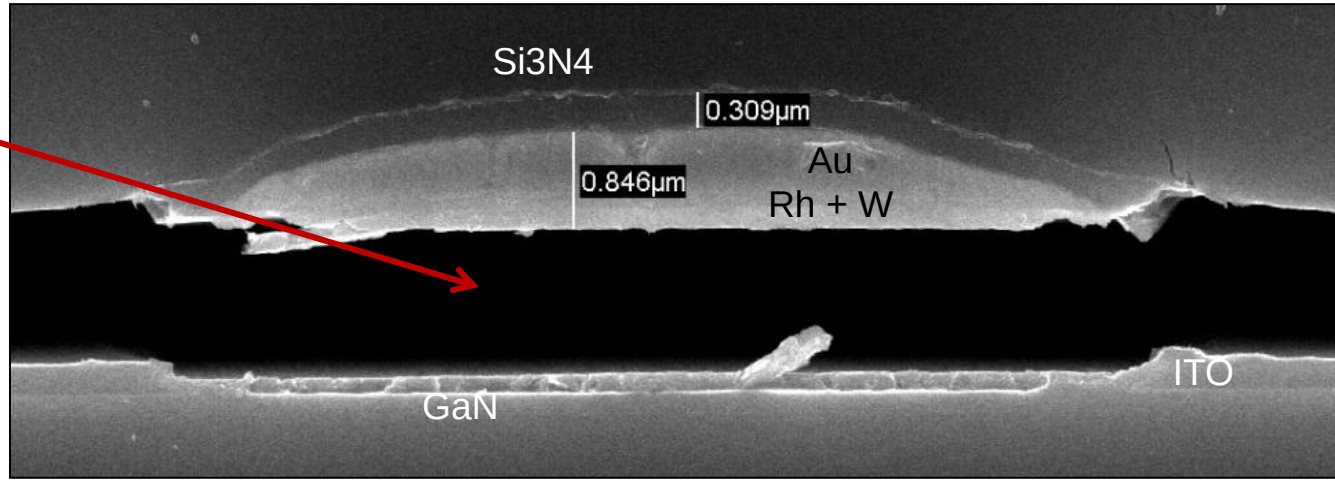


Optical image : the cathode



The polishing has caused the gold trace to lift.

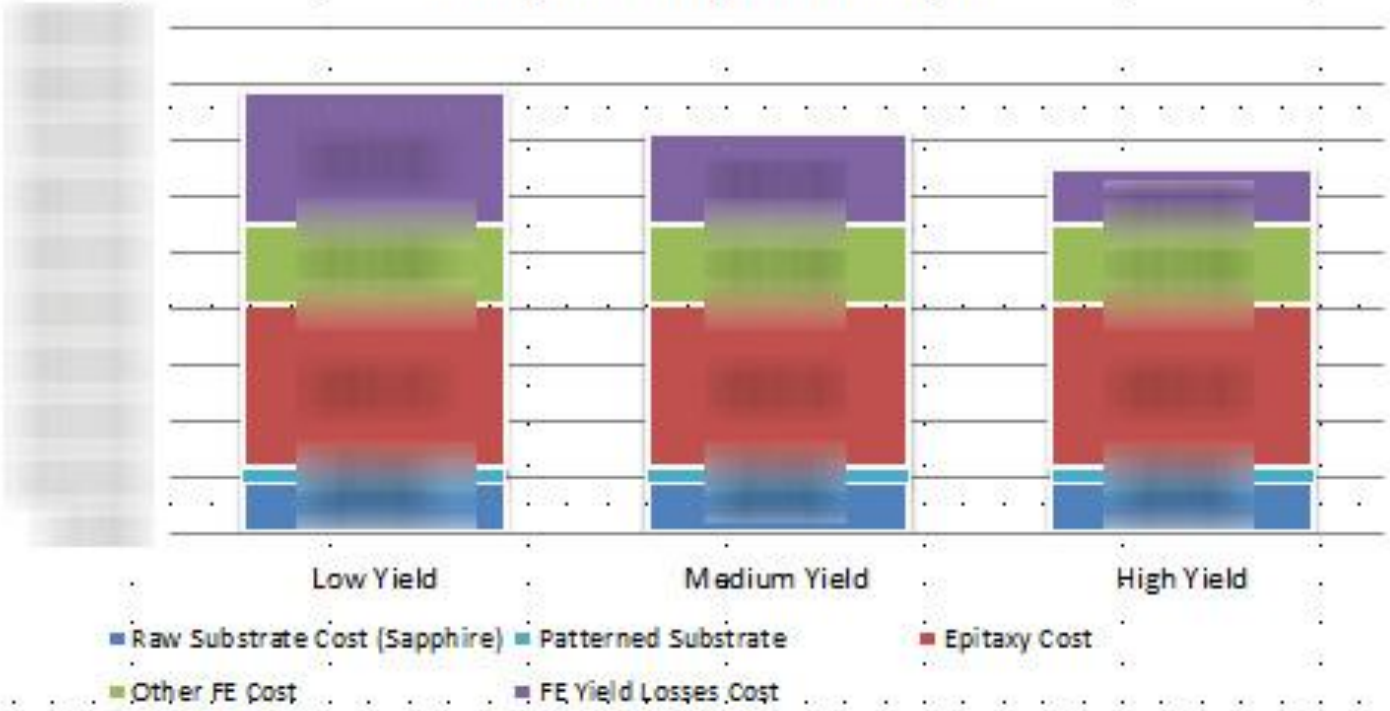
Cathode trace in gold. It sits directly on ITO. A thin W-Rh adhesion layers for the gold traces is deposited.



LED Front-End Cost

Total Front-End	Low Yield		Medium Yield		High Yield	
	Cost	Breakdown	Cost	Breakdown	Cost	Breakdown
Raw Substrate Cost (Sapphire)						
Patterned Substrate						
Epitaxy Cost						
Other FE Cost						
FE Yield Losses Cost						
TOTAL Front-End Cost						

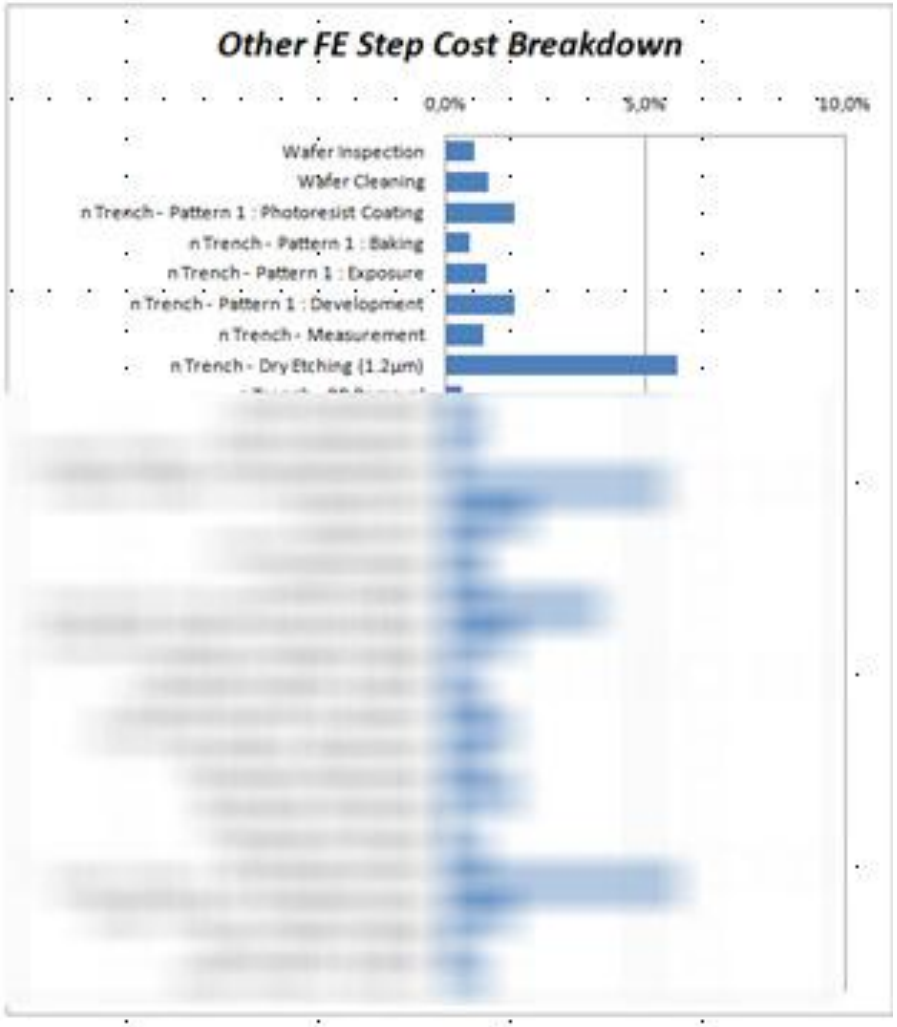
Front-End Cost Breakdown



Front-End : Other Front-end Cost per Steps

- Details of the equipment cost per step are given in the Excel Spreadsheet.

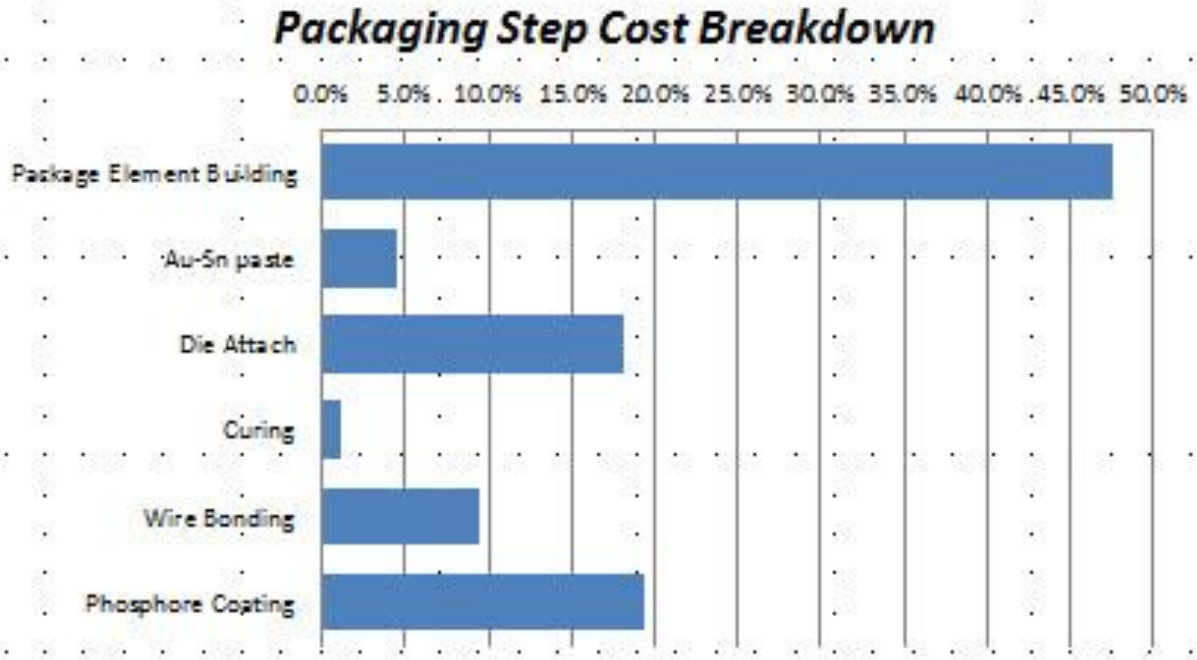
Other FE Steps	Cost	Breakdown
Wafer Inspection		
Wafer Cleaning		
n Trench - Pattern 1 : Photoresist Coating		
n Trench - Pattern 1 : Baking		
n Trench - Pattern 1 : Exposure		
n Trench - Pattern 1 : Development		
n Trench - Measurement		
n Trench - Dry Etching (1.2µm)		
n Trench - PR Removal		
n Trench - Measurement		



Back-End 1 : Packaging Cost Details

Packaging Process Step	Cost	Breakdown
Package Element Building		
Au-Sn paste		
Die Attach		
Curing		
Wire Bonding		
Phosphore Coating		
TOTAL		

- The total packaging cost is estimated to
- The cost by step includes the equipment cost, the material cost and the labour cost.



Ideal Manufacturer Price

Versions	Final component cost	Ideal Floor price	Ideal Manufacturer price
Low Yield			
Middle Yield			
High Yield			

The ideal manufacturer price is obtained for a binning yield of 100%.

Relevance to have Multiple LEDs

Advantages :

•The probe yield is better.

• 6 LEDs could be selected to get the right brightness, color. The final binning can be improved.

Inconvenients :

• The multiple LEDs solution increases the probe test and dicing cost.

•Reverse costing analysis represents the best cost/price evaluation given the publically available data, completed with industry expert estimates.

• These results are open for discussion. We can re-evaluate this circuit with your information. Please contact us: