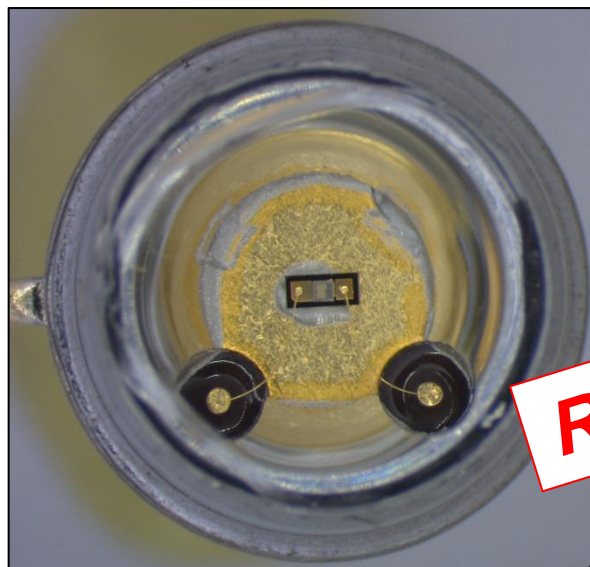


Reverse Costing analysis



Report Sample

SETI UV LED UVTOP (Ref. UVTOP270-BL-TO39)

October 2012 - Version 1
Written by: Sylvain HALLEREAU

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The reverse costing analysis is conducted in 3 phases:

- Package is analyzed and measured.
- The LED is extracted in order to get overall data: dimensions & technology.
- Set up of the manufacturing process.

Teardown
analysis

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

Costing
analysis

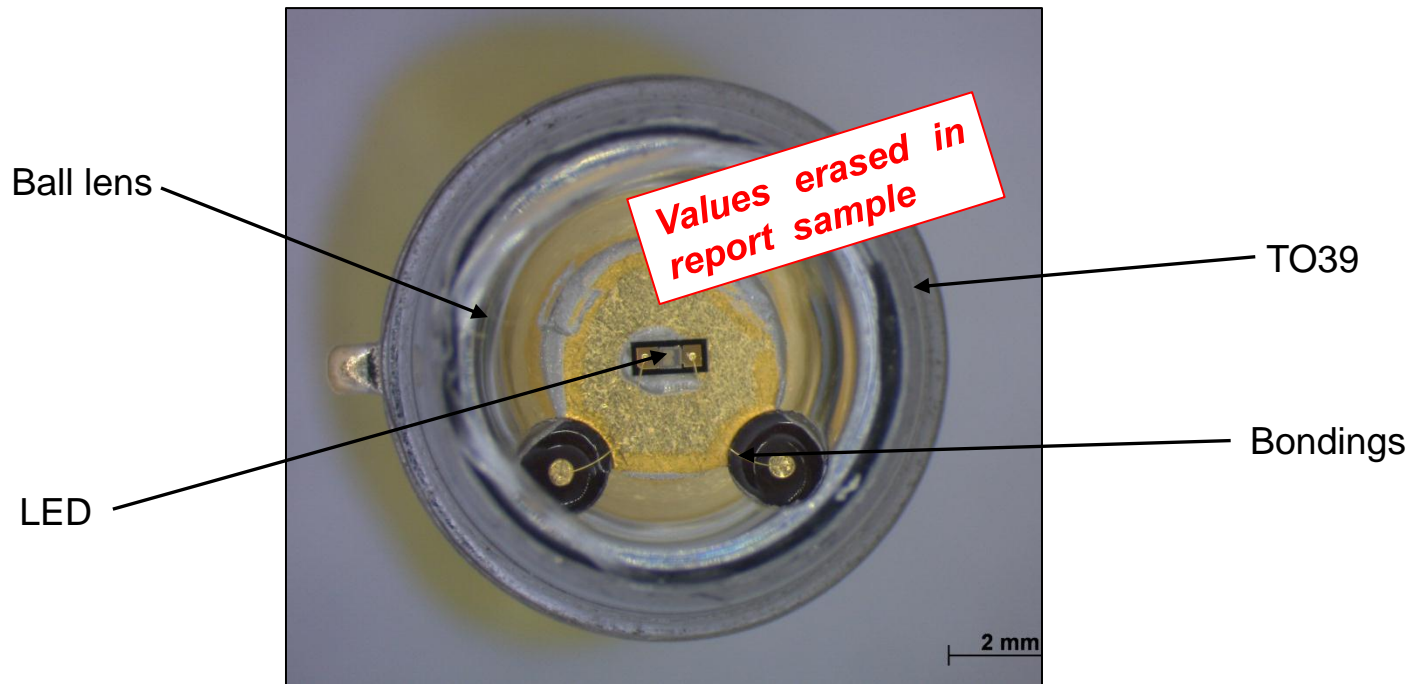
- Supply Chain Analysis
- Analysis of the selling price

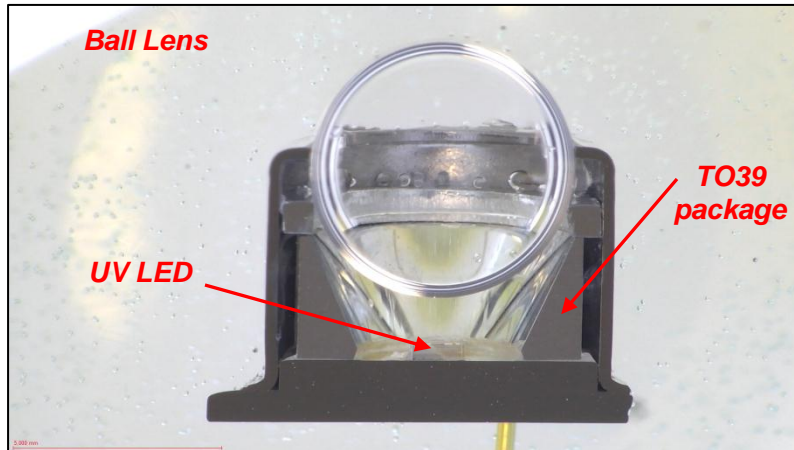
Selling price
analysis



Physical Analysis

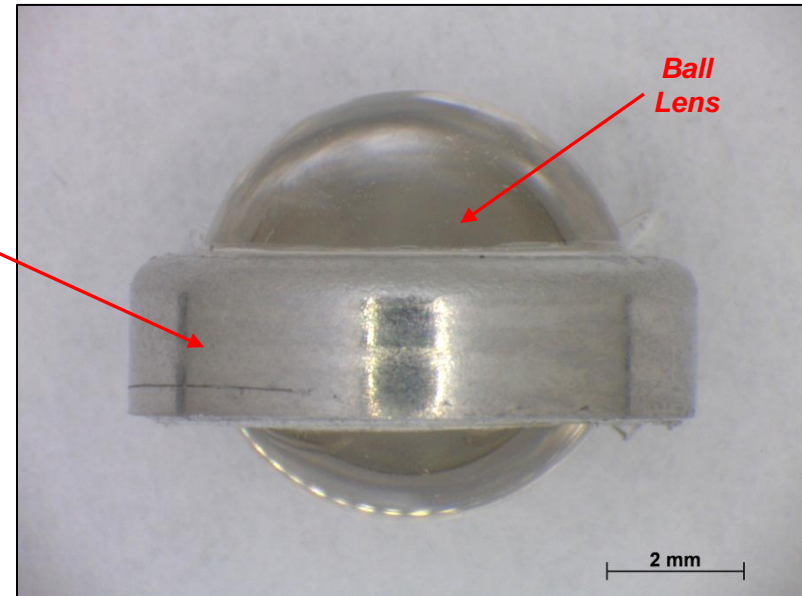
- Package is analyzed and measured.
- The package is opened to get overall die data: dimensions, main characteristics.
- Cross-sections of the complete device and of the die are done to analyze the technologies and the materials used.





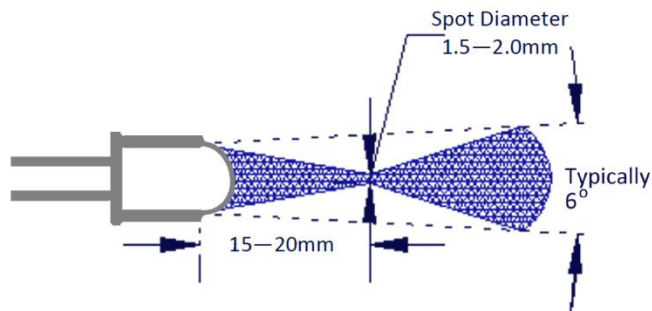
Optical view : Cross section

The ball lens is in sapphire and had a diameter of 6.35mm.



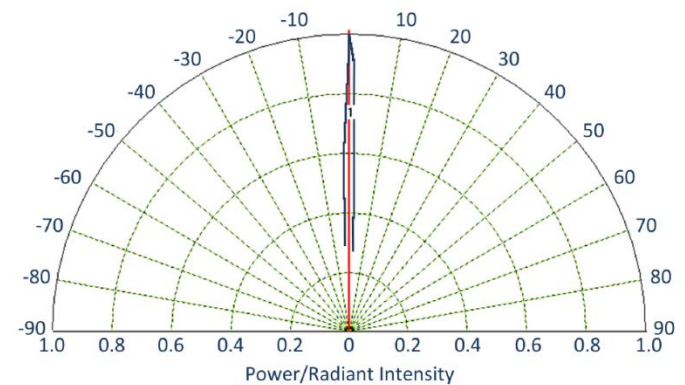
Ball lens extracted of the package Optical view :

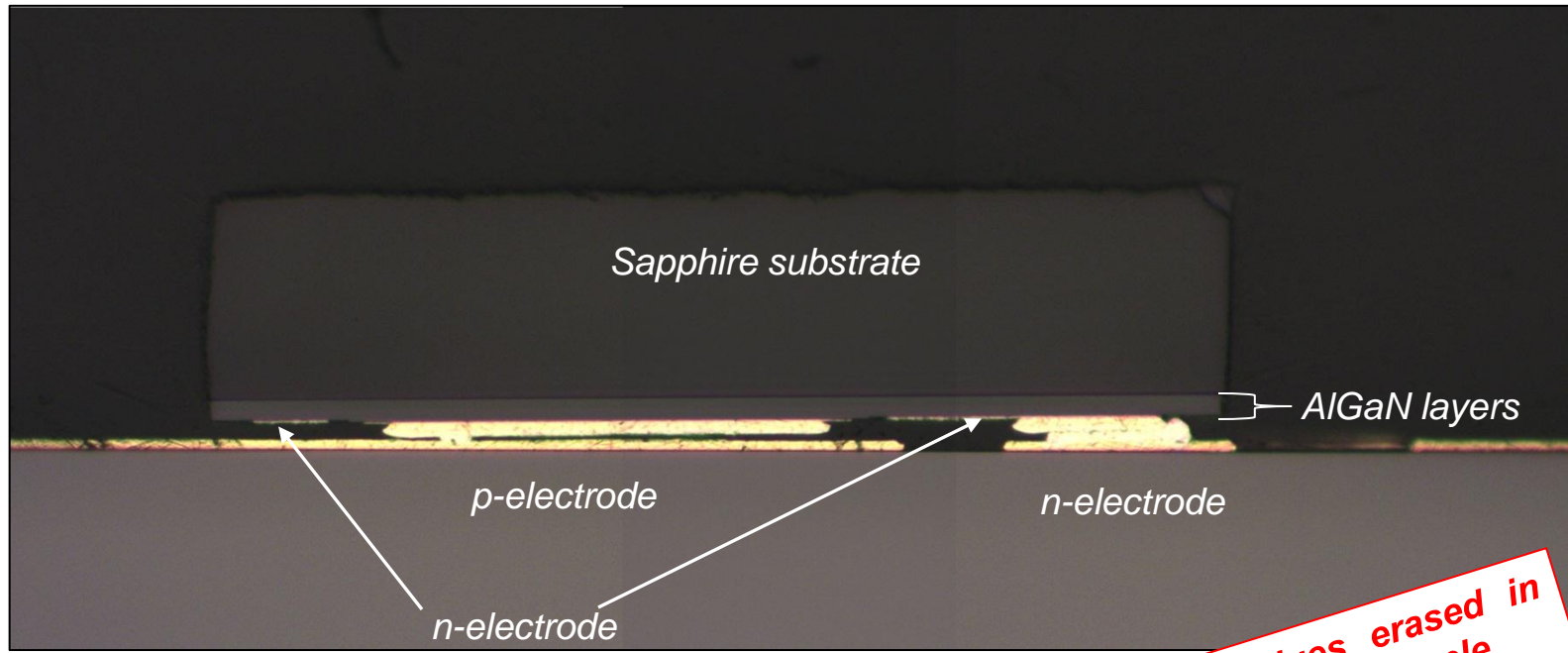
Typical Emission Pattern



Ball lens emission pattern, doc from SETI

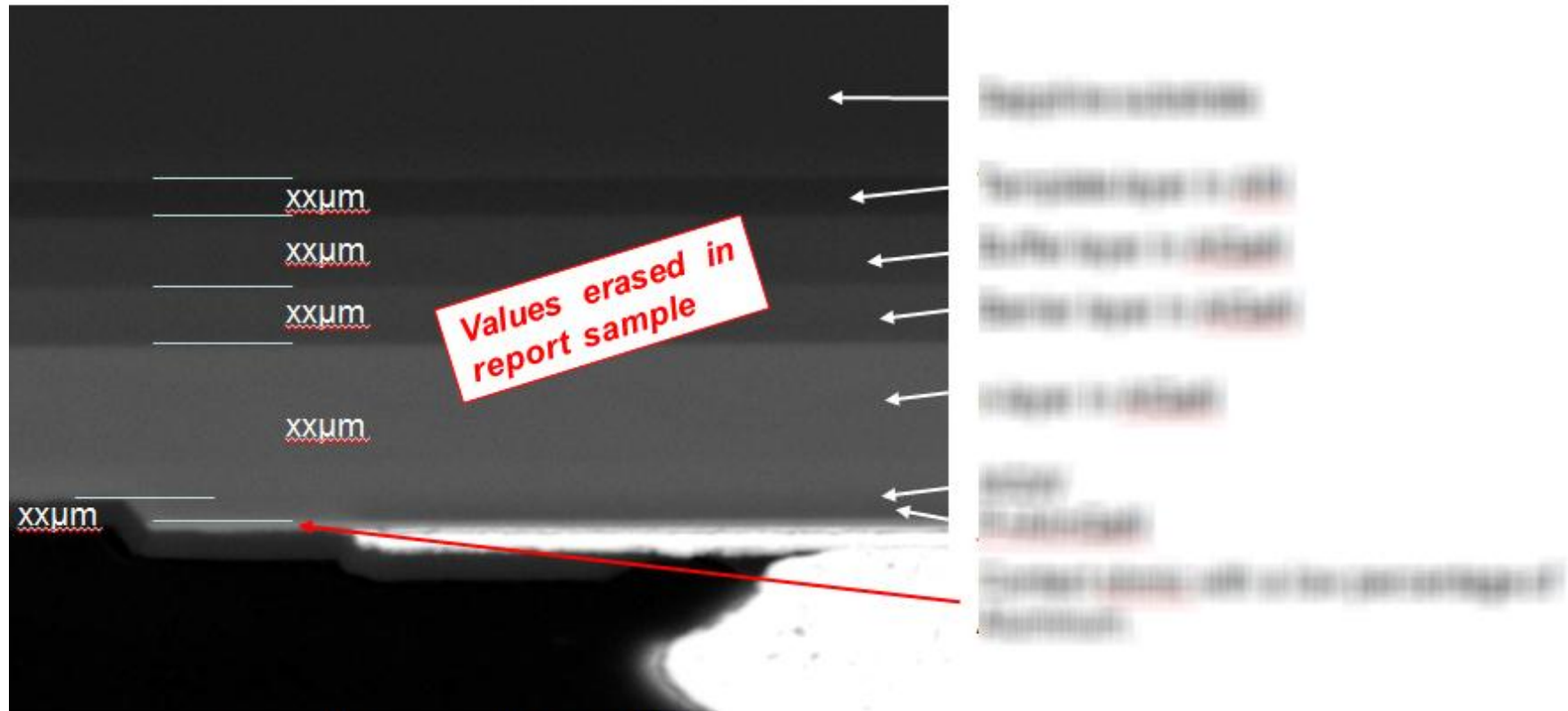
Typical Angular Diagram





LED die : optical Lateral view

Values erased in report sample



Epitaxy detail cross-section – SEM view

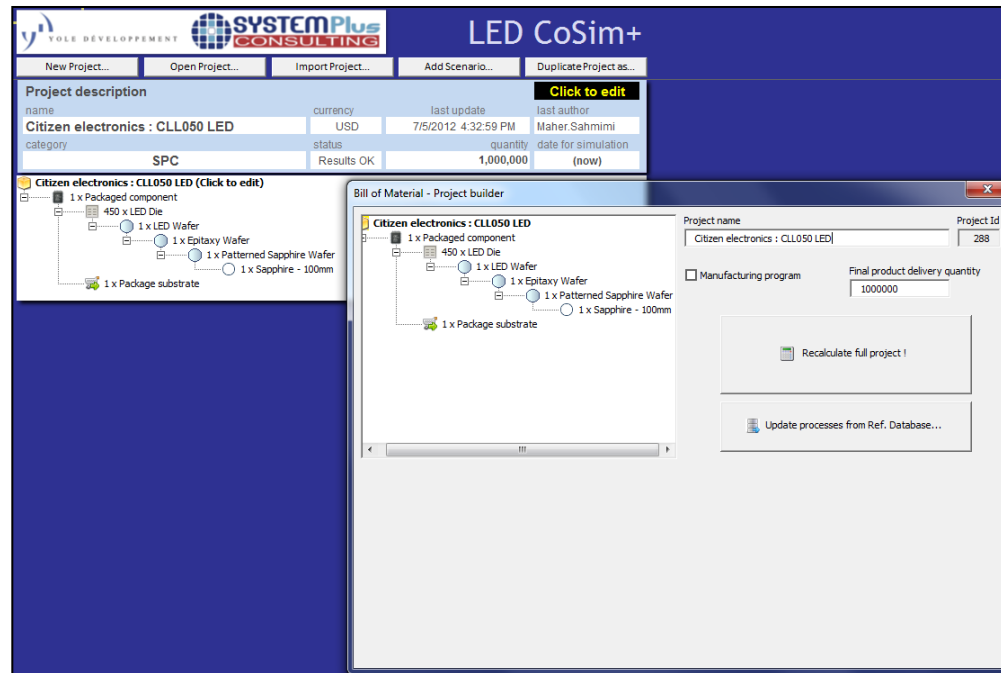
Cost Analysis

The LED Dies are manufactured by SETi

LED Die:

- ✓ Substrate: Sapphire wafer
- ✓ Process type: SETi Technology
- ✓ Active layers: AlGaIn
- ✓ Lithography steps: XX

We perform the economic analysis of the LED by simulating all the process flow with the **LED CoSim+** software.

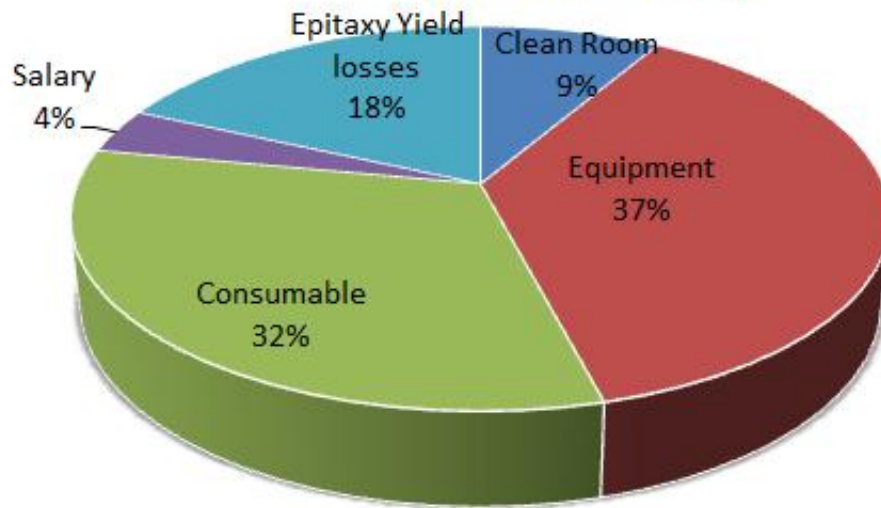


The Cost Simulation Tool « LED CoSim+ » developed by System Plus Consulting.

Epitaxy	Low Yield		Medium Yield		High Yield	
	Cost	Breakdown	Cost	Breakdown	Cost	Breakdown
Clean Room		7.9%		8.5%		9.1%
Equipment		34.9%		37.5%		40.1%
Consumable		29.9%		32.0%		34.3%
Salary		3.5%		3.8%		4.1%
Epitaxy Yield losses		23.8%		18.2%		12.4%
TOTAL Epitaxy Cost				100%		100%

Values Blurred in report sample

FE : Epitaxy Cost Breakdown (Medium Yield)

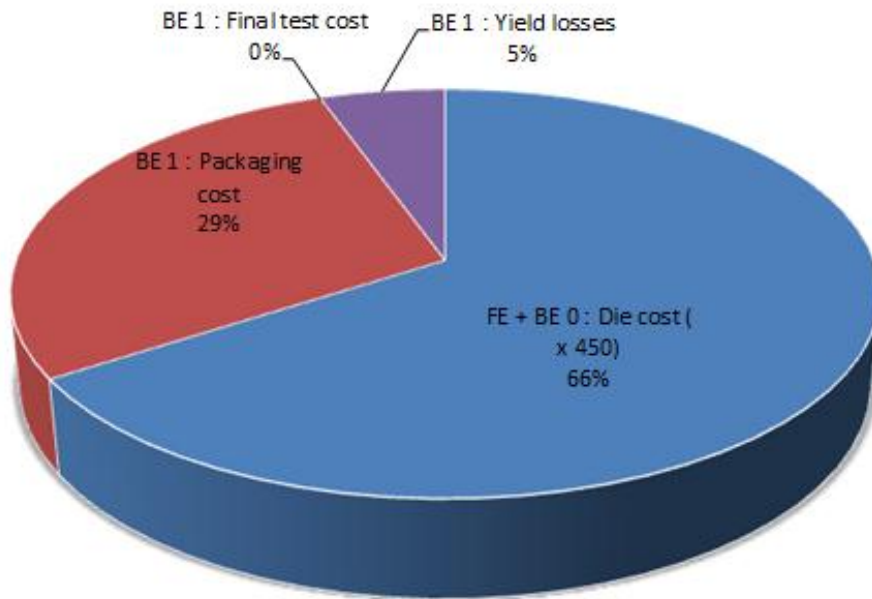


•The main part of the epitaxial wafer cost is due to the equipment cost (37.5%).

	Low Yield		Medium Yield		High Yield	
	Cost	Breakdown	Cost	Breakdown	Cost	Breakdown
FE + BE 0 : Die cost (x 450)		67.2%		65.8%		64.7%
BE 1 : Packaging cost		26.4%		30.7%		30.8%
BE 1 : Final test cost		0.0%		0.0%		0.0%
BE 1 : Yield losses		6.4%		3.5%		4.5%
Component cost		100%		100%		100%

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LED Cost Breakdown (Medium Yield Estimation)



- The component cost is between **64.7% and 67.2%** according to yield variations.
- The dies cost represents **66%** of the total manufacturing cost.
- The packaging cost represents **29%** of the total manufacturing cost.
- Final test cost and yield losses represent **6%** of the total manufacturing cost.

- This 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 LED with your information. Please contact us:



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