PHILIPS sense and simplicity

Our View on the Future of LEDs

Sean Zhou / Marketing Asia / Guangzhou Lighting Fair / Jun. 2010

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4

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What's your professional opinion?

YES

YES, BUT...

Is LED ready for general lighting?

NO







Elements of Quality of Light

- Consistency
 - Between different parts LED to LED
 - Over time
 - Depends on Spatial Frequency
- Uniformity
 - Color over angle
 - Uniformity within the source
- Color Rendering





Quality of Light

When does Quality of Light Matter?

Quality of	Light is main Priority	Quality of Light is secondary Priority
Tint is a prim When color Beam is pro- from nearby When cut-of and in close Color has to exaggeration	hary concern is selected before light output jected on the (vertical) surface f between beams can be abrupt proximity be represented accurately or in n	Lm output or low power consumption is primary concern Light source far away from illuminated surface
Application Examples		Application Examples
	Down	light

Quality of Light

LUXEON Rebel White ANSI Binning

LUXEON LEDs now have a complete Illumination Portfolio compliant to ANSI binning



Increased Color Control in high volume

Platform	LUXEON Rebel
Phosphor	Lumiramic TM
Color Binning	1/16 th ANSI bins

- Higher Flux
- Excellent color control

Quality of Light

• Improved CoA



Quality of Light

Improved Philips Lumileds Binning



Vision: Eliminate Binning









System Roadmap:

2010 → 2015 LED Retrofit Bulb cost improvement

Bulb: 10x Im/\$ Improvement

LED

Performance

LED: 20x Im/\$ Improvement

Mechanical Driver

Carton

Performance

Breakthrough in Forward Voltage "Less Power, more Light in the Application"



350 mA	Old Production	Current	Next
	Process	Process	Generation
Forward Voltage (V)	3.25	3.10	2.95

Benefits:

- 1. More Im/W
- 2. Less complex assembly (tighter distribution)

Industry Leading !

Performance

Improved Hot / Cold Factor "More Light in the Application"

Significantly improved usable light under normal operating conditions

- i.e. 100°C junction temperature
- Datasheet characteristics now include both mean and +/- 3 std dev distribution
 - Simpler design effort for luminaire manufacturer



Performance

Reducing Droop *"More Efficiency at High Currents"*

Lm/W







Lumen Maintenance

Reliability

- Exceed ENERGY STAR requirements
- Public LM 80 test report available
- Independent of ambient temperature

Cool-White LUXEON Rebel stressed at 85°C, 0.35A (Tjunction ≅ 98°C) Normalized to 1 at 24 hours



Reliability Modeling at System Level



Based on 700,000,000
device hours

Reliability

 Allows luminarie level lumen maintenance prediction

 Need to identify the weakest link in system – It is not the LED

 Overall understand the risk and ROI for a sustainable business





LUXEON Rebel Illumination Portfolio

Simplicity



Summary



