

Light quality and efficiency of solid state lighting products

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Publication date:
2013

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Citation (APA):

Dam-Hansen, C. (2013). Light quality and efficiency of solid state lighting products [Sound/Visual production (digital)]. DTU International Energy Conference 2013, Lyngby, Denmark, 10/09/2013, http://www.natlab.dtu.dk/Energikonferencer/DTU_International_Energy_Conference_2013

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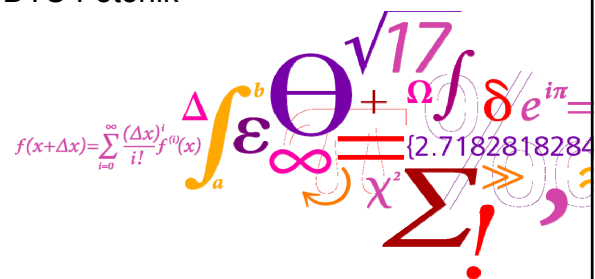
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Light quality and efficiency of solid state lighting products

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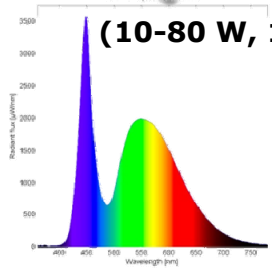
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Current status, LED packages

Packaged LEDs



3 mm
(~ 1-5 W, ~400 lm)

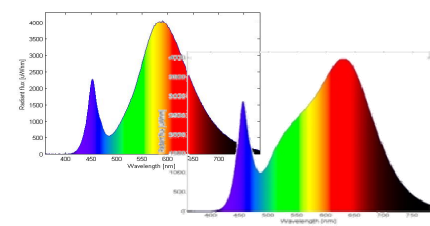
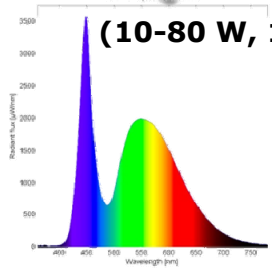


(10-80 W, 1500-6000 lm)

Color temperature

2700 - 3500 K > 5000 K

Efficiency:
123 lm @ 350 mA ~ 117 lm/W

160 lm @ 350 mA ~ 152 lm/W (@ 25 °C)
139 lm @ 350 mA ~ 132 lm/W (@ 85 °C)

Lab results: 231 lm/W

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Current status, SSL products

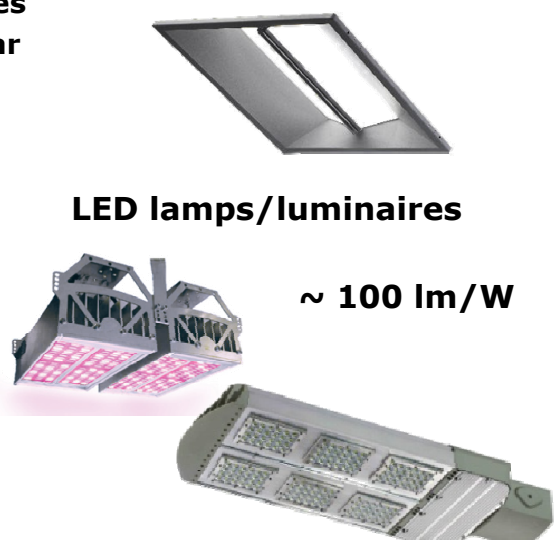
SSL products is based on LED packages including optics, heatsink, control gear

Retrofit products



50-80 lm/W

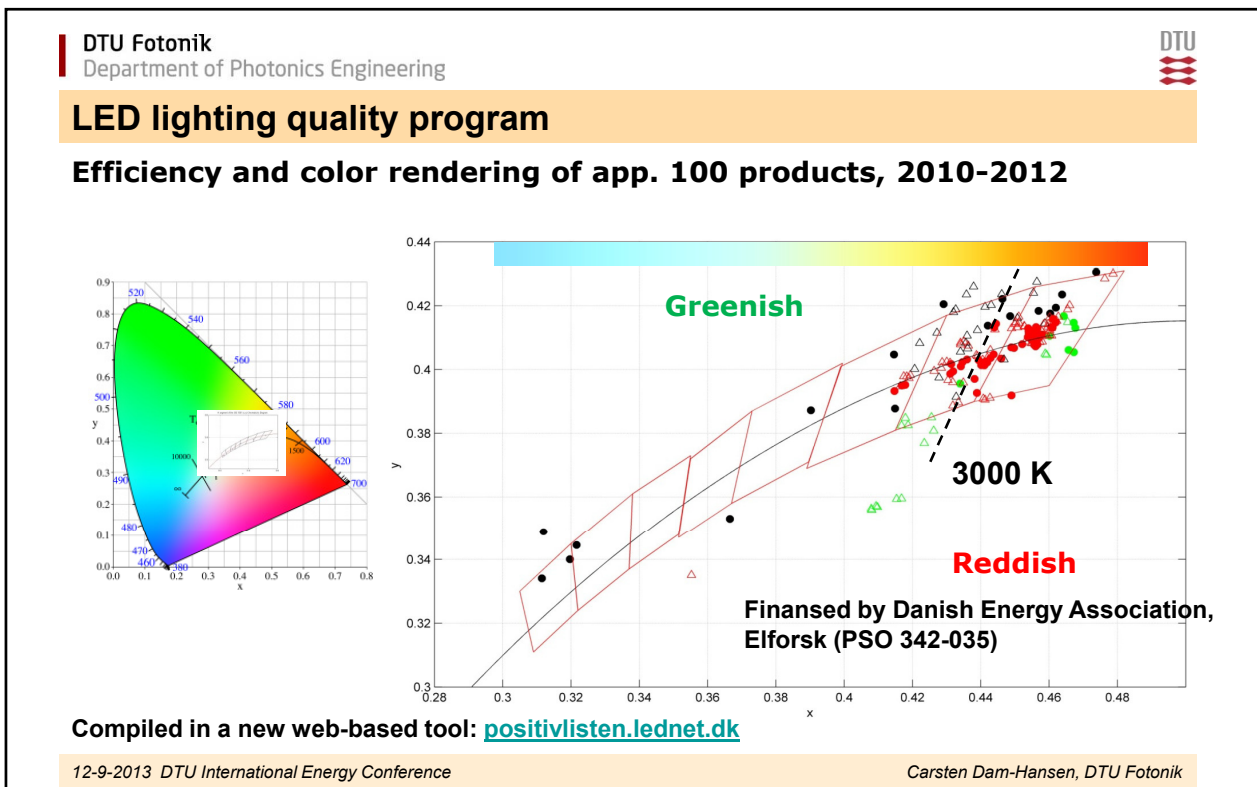
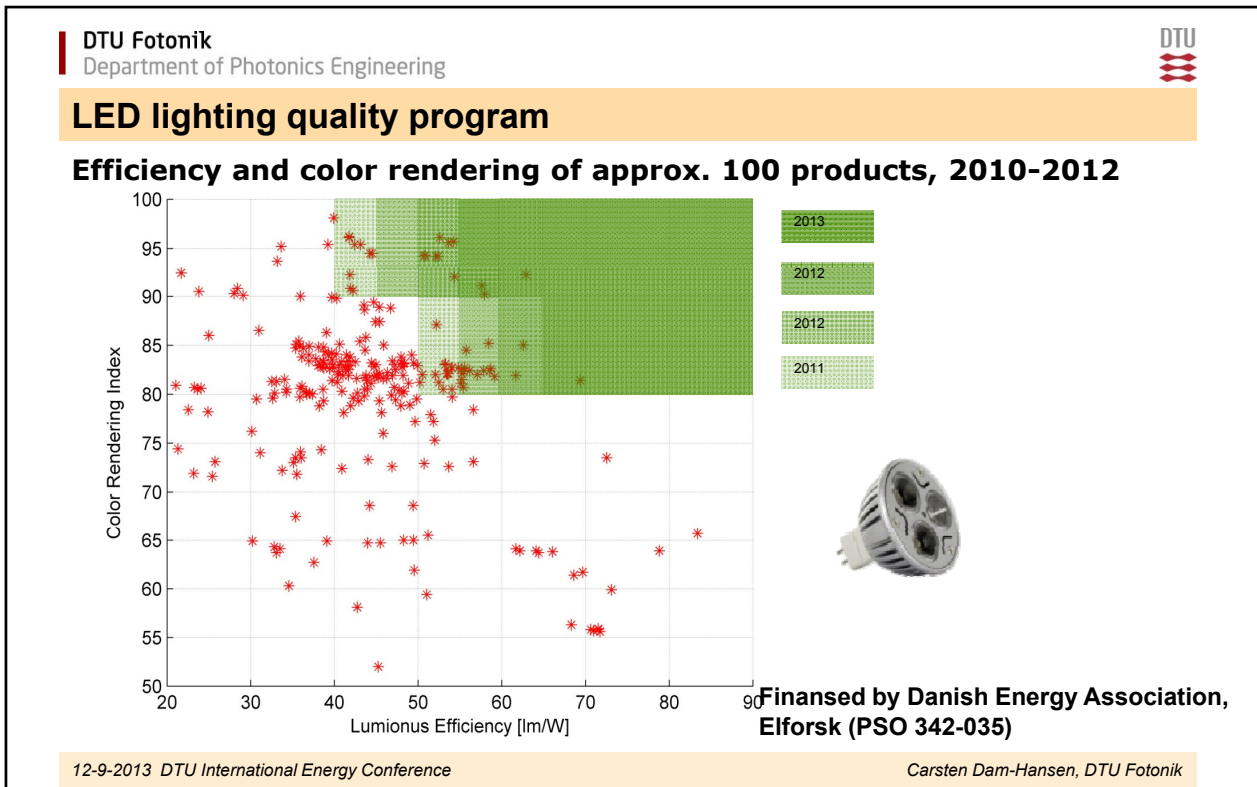
LED lamps/luminaires



~ 100 lm/W

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LED lighting quality program

Lumen and color maintenance measurement over 6000 h, extrapolation to max. 36.000 h

No standard for this only for LED packages

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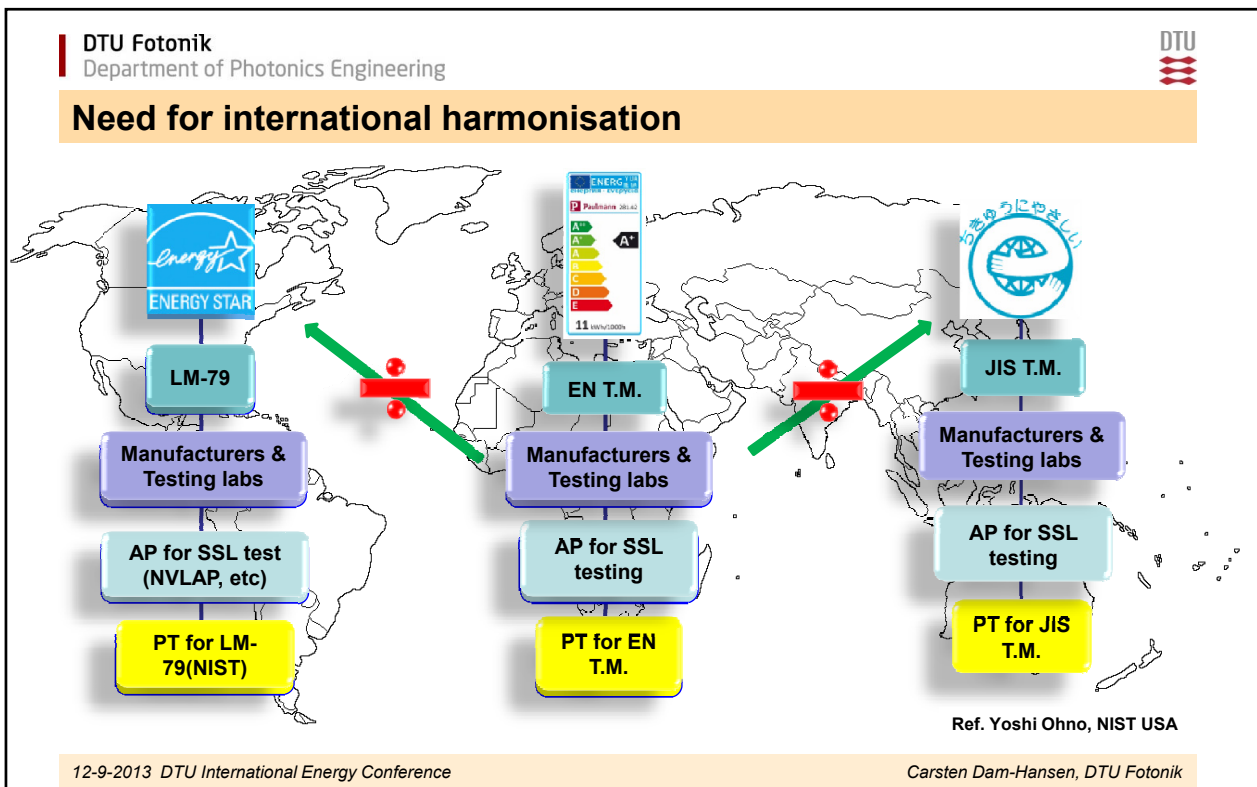
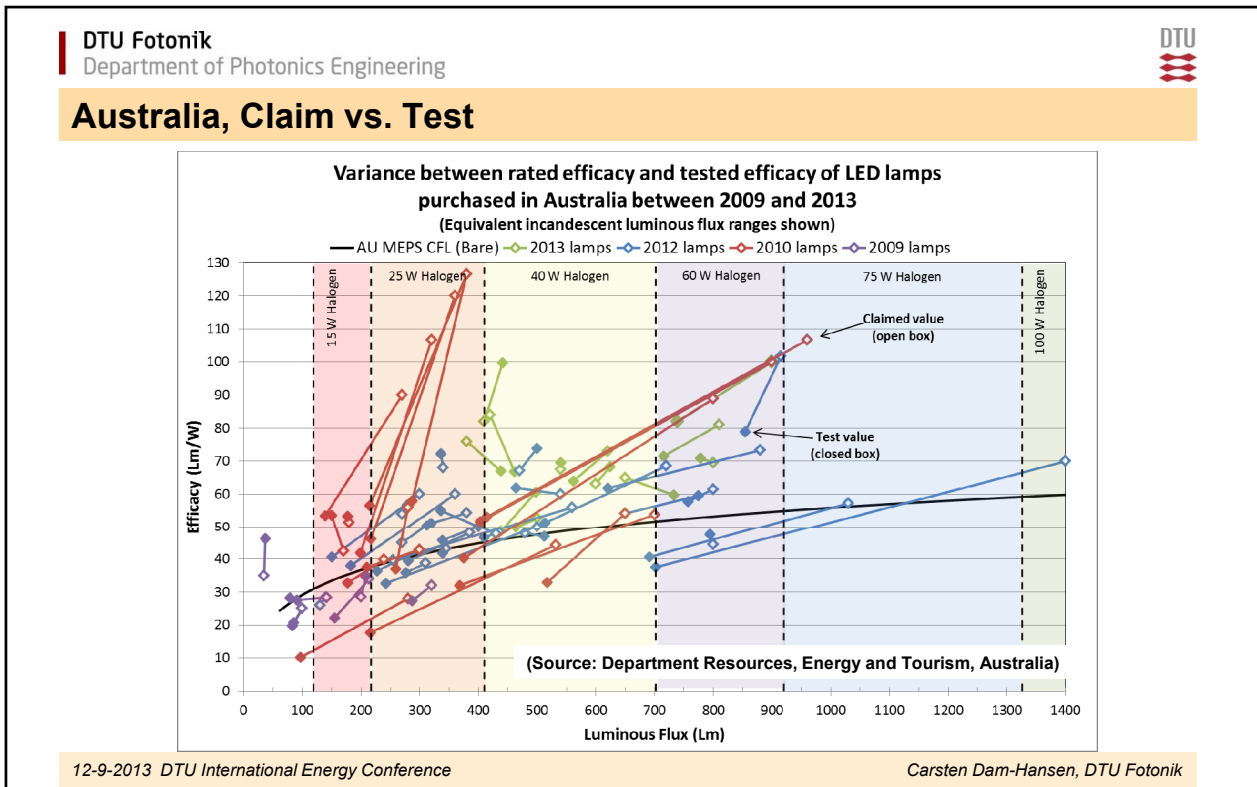
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Australia


Performance of LED directional lamp technologies purchased in Australia between 2009 and 2013

(Source: Department Resources, Energy and Tourism, Australia)


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IEA SSL Annex




IEA SSL Annex, 2010-2014
Efficient Electrical End-Use Equipment
International Energy Agency

Aim is to provide "tools" for governments to assess the performance of SSL products harmonise test methods and accreditation


- 1) **Develop performance criteria for quality assurance in SSL products, published on <http://ssl.iea-4e.org/task-1-quality-assurance>**
- 2) **Determine the robustness of SSL test procedures through international laboratory testing campaigns (IC2013)**
- 3) **Recommend suitable accreditation frameworks for SSL testing laboratories.**

To increase confidence in SSL products in the marketplace



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IC2013

IEA 4E SSL Annex, 2013 Interlaboratory Comparison open Oct. 2012 for all countries

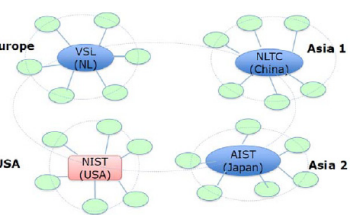
Defining the most stringent SSL test procedure,
[IEA 4E SSL Annex Interlaboratory Comparison Test Method version 1.0](#)

Star type measurement campaign on 5-6 difficult to measure LED artefacts.

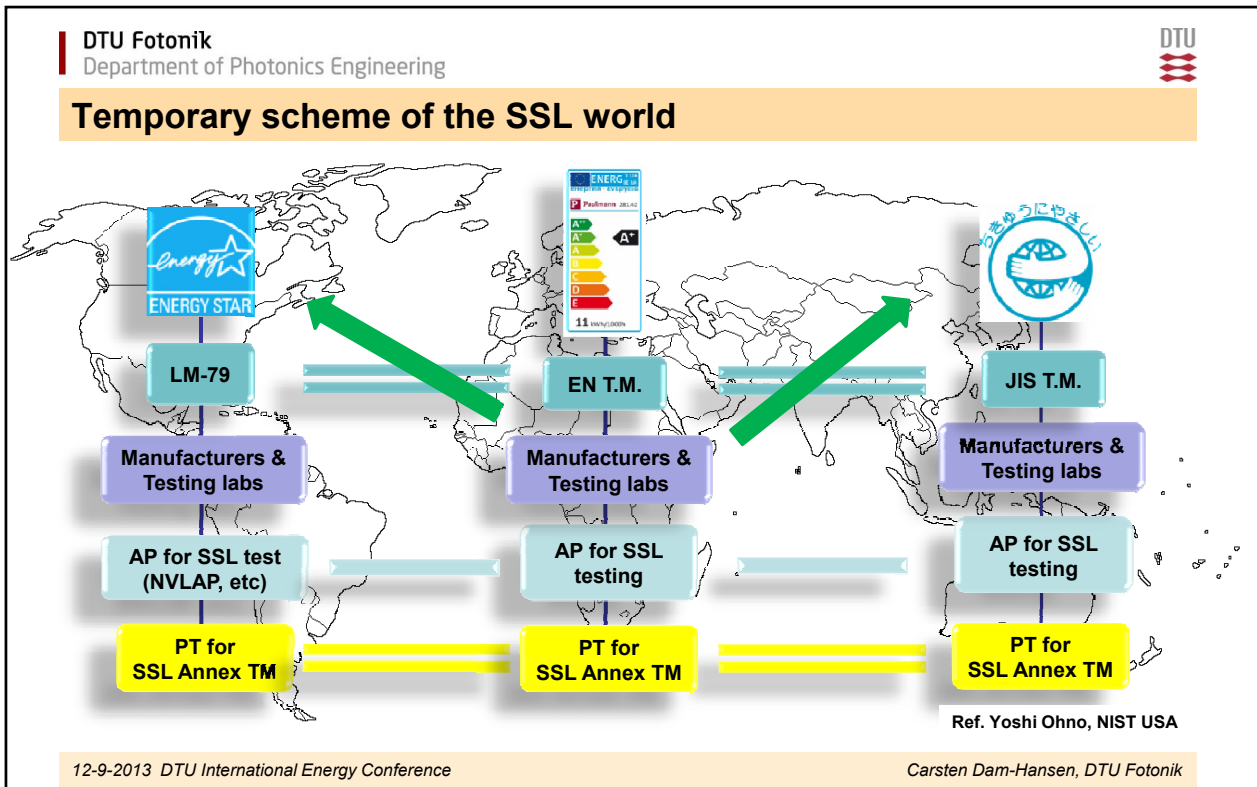
Closed in Sept. 2013,

54 labs from 17 countries participated + 4 nucleous + 35 linked labs = grand total of 93 labs incl. 2 danish labs.

Designed to be recognized as Proficiency Testing for any SSL test method



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International Test Standard

There is an urgent need for an international test standard for SSL products
CIE TC2-71, Chair, Yoshi Ohno (US)
CEN TC169 WG7, Chair, Guy Vandermeersch (BE)

jointly developing the draft:

EN 13032 Lighting Applications — Measurement and presentation of photometric data of lamps and luminaires — Part 4: LED lamps, modules and luminaires

CIE S-xx Standard on Test Method for LED lamps, luminaires, and modules

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