

LCD “BLU trends” Oct’09



Bruce Berkoff, Chairman of the LCD TV Association



San Diego CA, Oct.20, 2009

What makes a GREAT LCD TV??

THREE categories of “things” can determine an LCD TV’s performance overall:

- 1) IQ, or Image Quality (specs like contrast, black level, brightness, MPRT, etc.)**
- 2) WAF, or “wife acceptance factor”, which relates to all of the ID and design factors, such as thin & light, and narrow bezel, etc.**
- 3) “Green” factors, such as low energy usage, less packaging, less heavy metals and waste, and more recyclability, etc.**



Inform ◦ Promote ◦ Improve ◦ Connect



LED lighting “systems” for your LCD TV can help in ALL of these METRICS!!

THREE categories of “things” can determine an LCD TV’s performance overall:

**1) IQ, or Image Quality (specs like contrast, black level, brightness, MPRT, etc.)
→ LEDs can make better BLACKS, as well as broader color gamut and with regional dimming, lower power, improve MPRT and raise dynamic contrast as well !!!**

2) WAF, or “wife acceptance factor”, which relates to all of the ID and design factors, such as thin & light, and narrow bezel, etc.

→ LEDs can make sets thinner and lighter and enable narrow bezels, etc.!

3) “Green” factors, such as low energy usage, less packaging, less heavy metals and waste, and more recyclability, etc.

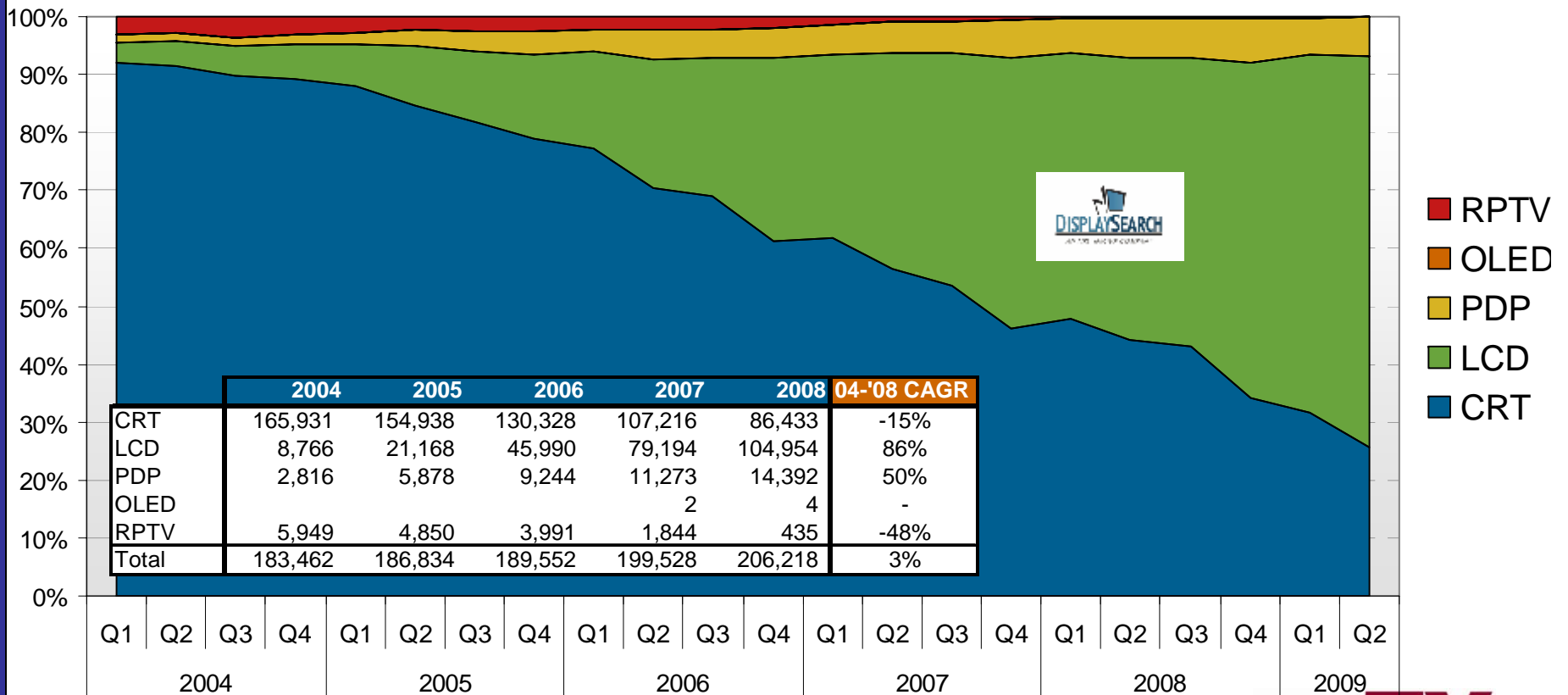
→ LEDs have no mercury (unlike CCFLs) and can lower power usage, etc.



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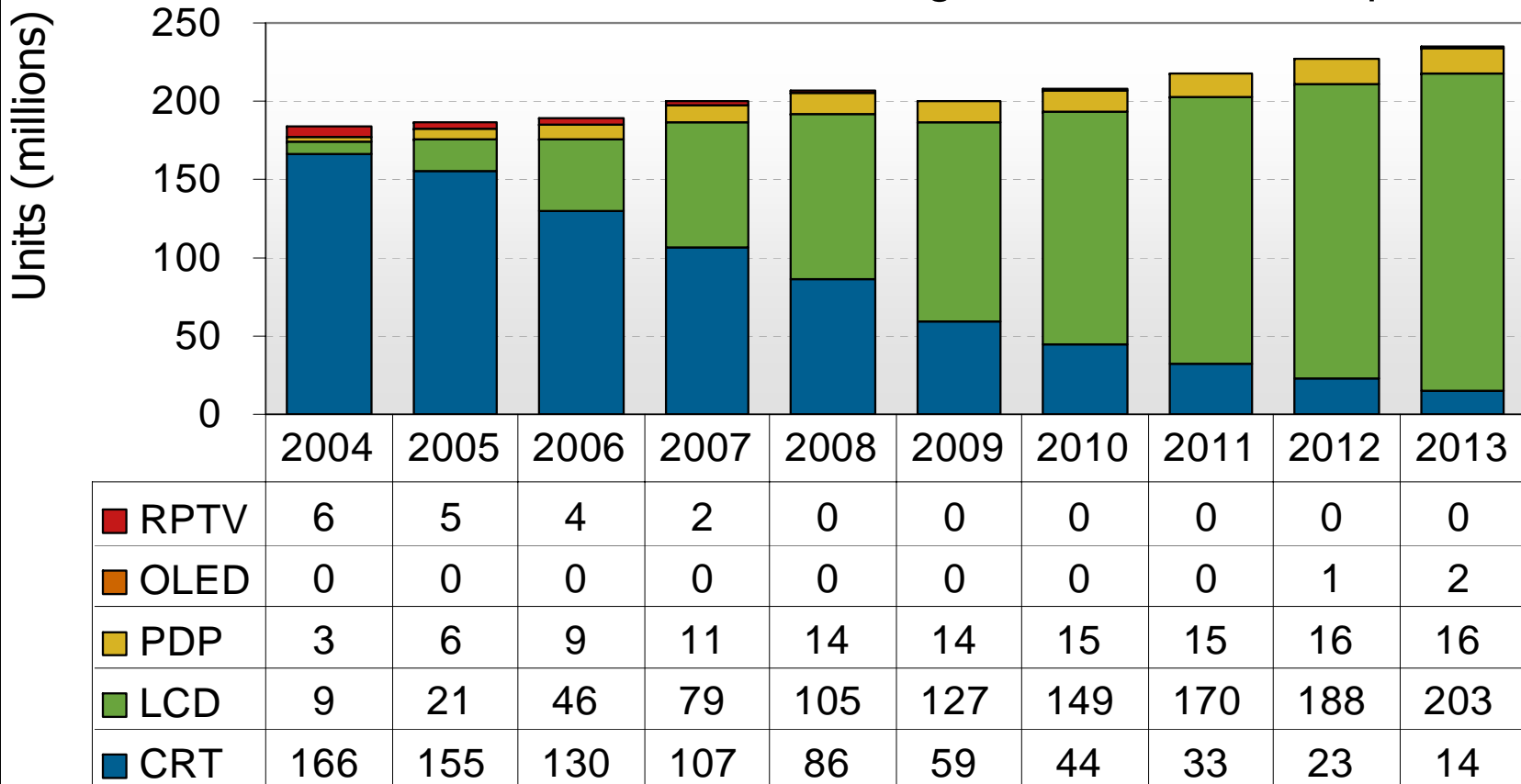


LCDs Overtook CRTs as Top Global TV Technology in 2008, and will continue their marketshare growth (and absolute growth too) for some time!



Overall TV Market Demonstrates Steady Unit Growth

- average rate of growth from 2004 to 2012, and especially beyond to 2015 is underestimated by ALL forecasters....
- In BRIC and VISTA countries, ROI higher than for indoor plumbing!!



Source: DisplaySearch Quarterly Global TV Shipment and Forecast Report



LCD TVs styles are evolving and changing, beyond WAF...UI, color, touch, energy.



A look BACK in TIME, to CES 2008....

LCD TV – Product Specs & Differentiation for Image Quality +?

- For National & Regional Channels
- FHD w/ HDTV Built In
- ATi 245 Video Processor
- SRS TruSurround XT Audio Processor
- 120Hz ME/MC Optional
- 1 ATSC/NTSC Tuner, 3 HDMI (Video & PC Compatible), 1 Component, 1 S-Video/Composite (Shared Audio), 1 VGA (Video & F C Compatible)
- Picture in Picture/Split Screen
- Universal Learning Remote Included
- Boots to home mode native color temp with emphasized red's and blues w/6500 & all video modes available
- Quick Start Guide / Hard Copy User Manual
- 1 Year Parts & Labor w/ 1 Year On-Site



CES '08, World's largest LCD touch screen... NBC, Google Earth, new interfaces, UI, etc... (is 3D next... well, not my house...)



Multi Touch System, concept ...

(CES08 again..., but PD market takes time!)

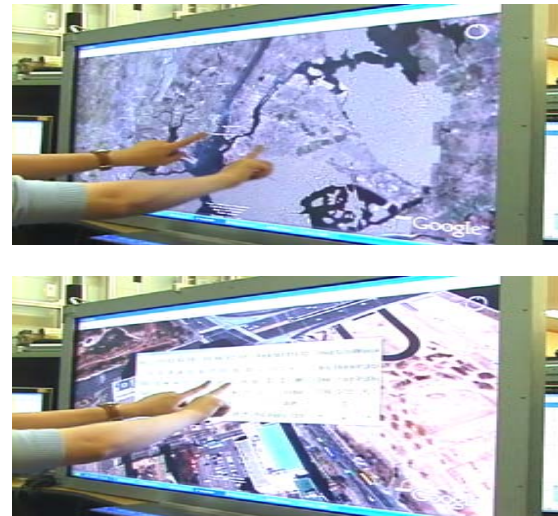
- **52-inch multi touch screen LCD**
- **Integrated multi touch function with LCD**

Normal Drive



All in one
Touch panel

Replacing Mouse & keyboard



- Touch function Integrated in LCD.
- Dual touch , area, gesture recognition.
- All PC applications can be used.

Interactive & Public Display... CES08... big WALL of Touch PD panels...

long life lighting??

42 inch 2-by-2-tiled LCD Module with Multi Touch Recognition (CES'08)

42" 2x2 (84") Multi-vision Multi-touch System

- Outline Dimension : 1954.7 (W) X 1179.1 (H) X 73.1 (D) mm
- Resolution : 1920 X RGB X 1080 (>2 Megapixels)
- Number of Colors : 16.7M (RGB 8 bit)
- Brightness : 500 cd/m²
- Viewing Angle : 180°, 180° (U/D, R/L)

-
- Bezel Width* : 15.0mm
 - Multi-vision Resolution : 3840 X RGB X 2160
 - Touch Points : 1~2
 - Touch Response Time : 60Hz

Note: * Bezel width refers to of central area

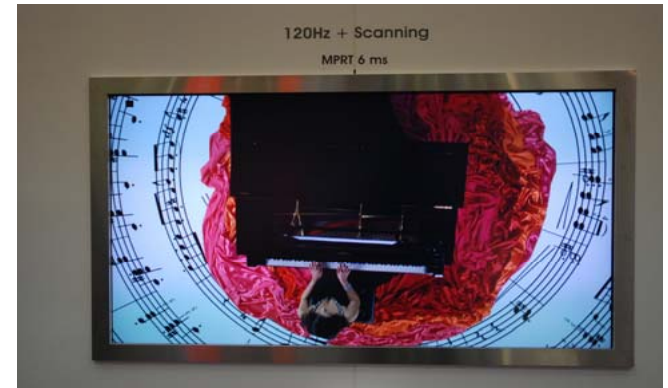


LCD TV
Association
A great TV in every room!

Scanning Backlight Technology (CES'08)

STROBING LIGHTS reduce PERCEIVED MPRT!!!

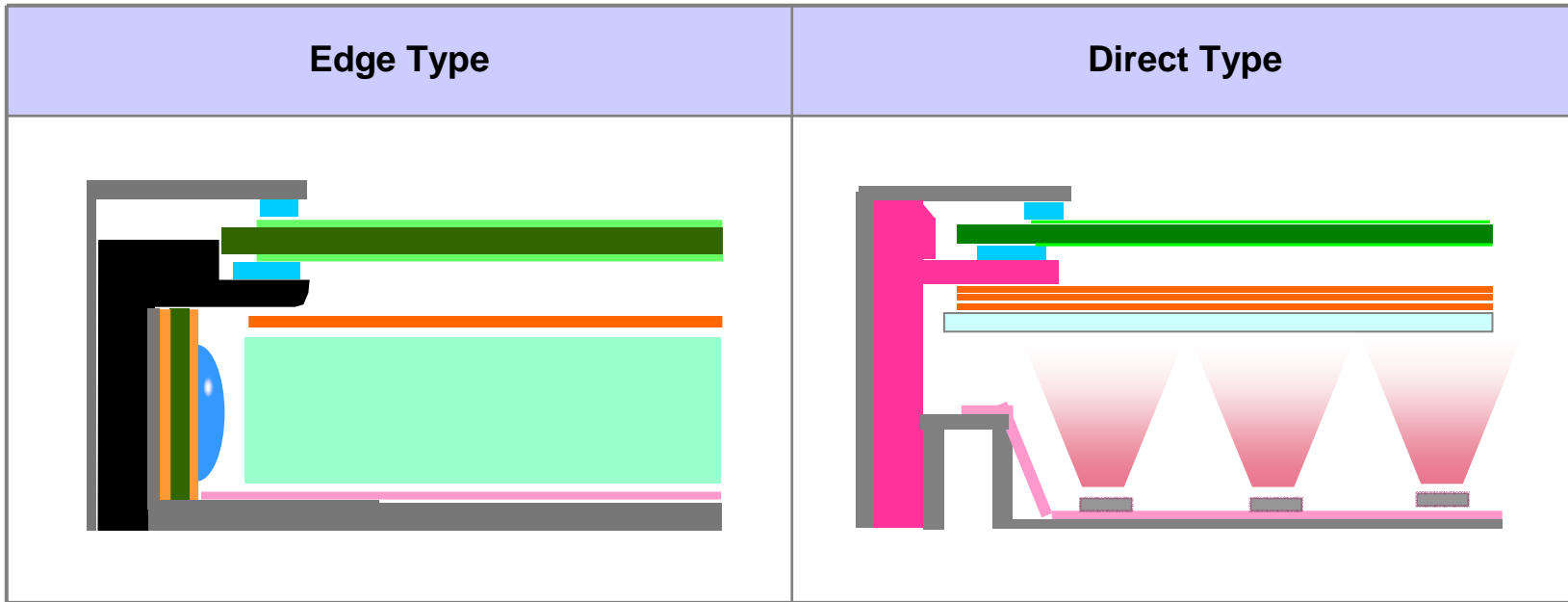
47 inch F-HD Scanning Backlight LCD



- Outline Dimension : 1096 (W) X 640 (H) X 55 (D) mm
- Resolution : 1920 X RGB X 1080
- Number of Colors : 1.07B (RGB 10 bit)
- Color Gamut : 92%
- Color Temperature : 10,000K
- Brightness : 500 cd/m²
- Contrast Ratio : 6000 : 1(Dynamic)
- Display Mode : S-IPS
- Viewing Angle : 178°, 178° (U/D, R/L)
- MPRT* : 6 ms

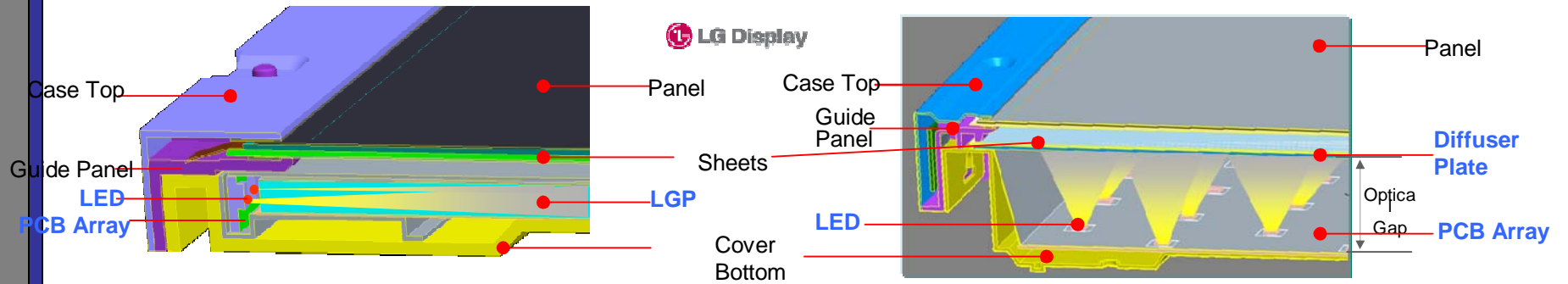


LEDs, some various common BLU "Types": "edge" and "direct"



Edge Type

Direct Type



Effect of Local or “Regional” Dimming

Less power consumption and Improvement of picture quality by “Local Dimming”



Non-Dimming	BLU				1-D Dimming	BLU			
	Power	100%	100%	100%		70%	80%	90%	
	LCM								
C/R	1,200:1	1,200:1	1,200:1	2,000:1	5,000:1	2,000:1			
0-D* Dimming	BLU				2-D Dimming	BLU			
	Power	80%	90%	100%		60%	70%	85%	
	LCM								
C/R	1,200:1	1,200:1	1,200:1	4,000:1	10,000:1	3,000:1			

※ Power Consumption & CR data are conceptual values

※ D: Dimension

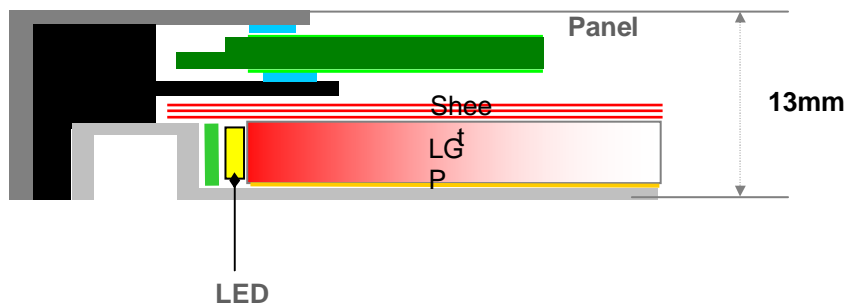
Example... CES'09, 47" Super Slim & Narrow LCD Module

- Ultra Slim & Narrow White LED Backlight
 - Body thickness: 11.9mm, Bezel width: 18mm

Edge LED B/L for Slim Design

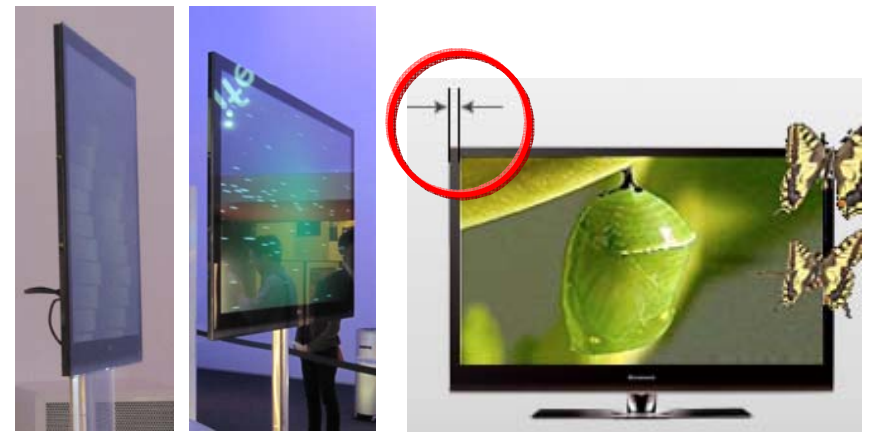


LGE Set Design



Edge Slim LED BLU

- *New Backlight System*
- *Ultra Slim & Narrow design applied*

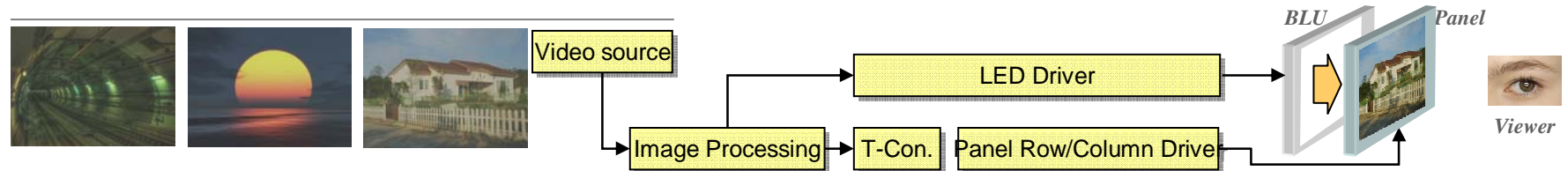
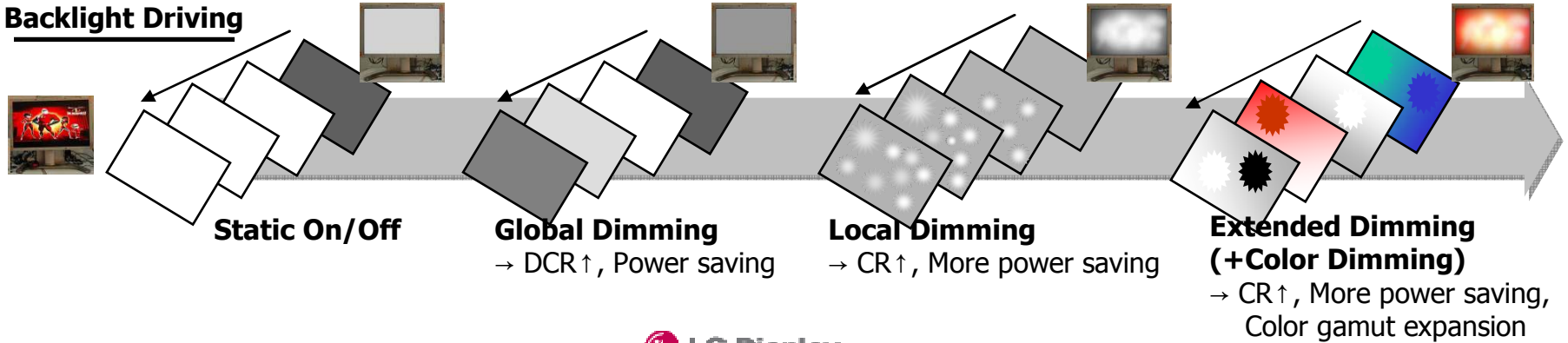


Borderless & Narrow
Bezel

Effects of Local Dimming (1), and extended dimming too...

◆ Contrast Ratio/Power consumption

Backlight Driving



	Non-Dimming			Local Dimming		
	BLU	BLU	BLU	BLU	BLU	BLU
Power	100%	100%	100%	70%	80%	95%
LCM						
C/R*	1200:1	1200:1	1200:1	40000:1	100000:1	6000:1

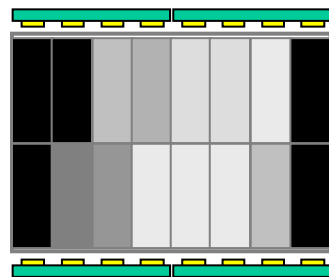
1D-Local Dimming (V5)

Operate LED Array separately by data to realize Local Dimming

● Concept



Horizontal 2 Edge LED



- 2 Edge LED Local Dimmable Backlight System
- Expanded 1D Dimming

● Feature





		55" Edge Normal	55" Edge L/D (16blocks)
IEC 62087 Standard (Based on Full white 400nit)		Ref.	35%↓
	Luminance	90.18 / 0.27	62.86 / 0.07
	C/R	334:1	898:1
	Power	Ref.	64%↓
	Luminance	357.2 / 0.30	340.5 / 0.01
	C/R	1190:1	34050:1
	Power	Ref.	60%↓

Power Consumption Comparison,

LESS is More! (and good)

BLU Power Comparison

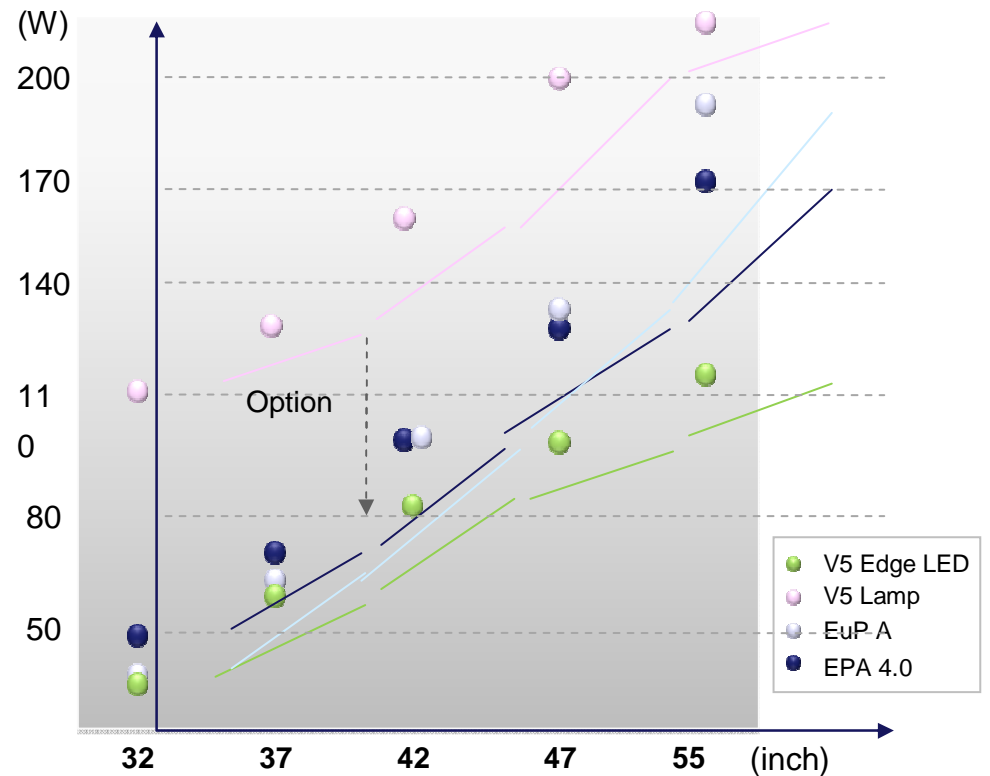
Size	EuP Class 		EPA 	
	LED	Lamp	LED	Lamp
55	A1	C	4.0	3.0
47	A	C	4.0	3.0
42	A	C	4.0	3.0
37	A	D	4.0	3.0
32	A	D	4.0	3.0

* Based on BLU

Power



* EPA 3.0: Current, EPA 4.0: Effective '10 May



➤ LED Models meet EPA 4.0 & EuP Class A

➤ Lamp Models are cost driven (Provide Low power as an option with price premium)



**A recent “new” LED lit LCD TV
(note, these should NOT really be called LED TVs),
Very “Thin” but “direct” with regional dimming....**



 **LG Electronics**

LED BLU Type – Direct /Edge/ Modular



Trade off abound... lots of fun engineering questions...

Type	Direct	Edge	Modular
Structure	<p>Diffuser Plate Optical Sheets LED Array LED</p> <p>Panel Transmission Light Expansion Degree of Angle</p>	<p>Optical Sheets LGP LED Array LED</p> <p>Panel Transmission Light Expansion Dot Pattern Light Guide Plate</p>	<p>Modular assemble</p> <p>Modular Unit</p> <p>Panel Reflector LED PCB LGP Plate & Sheet</p>
Design	△	⊙	⊙
Picture Quality	⊙	○	⊙
Cost	○	⊙	△
Status	55/47/42	47/42 55/37/32 (TBD)	R&D

⊙Best ○Better △Good

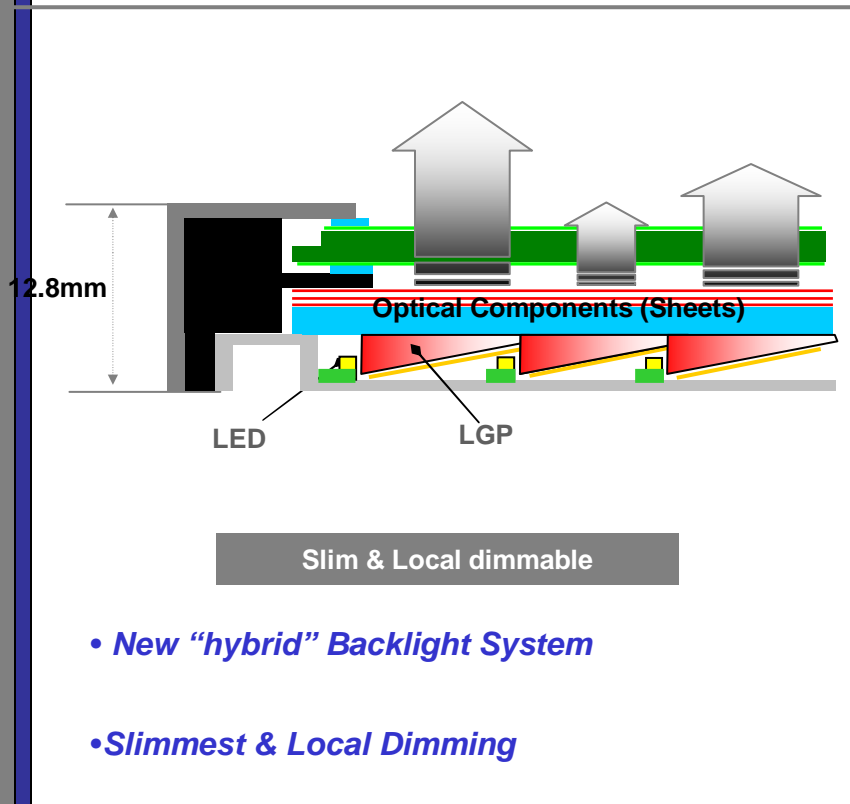
47" World's Slimmest Modular LED Backlight (demo CES'09)



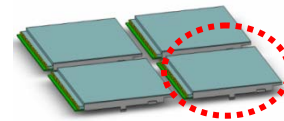
- Slimmest local dimming-enabled LED Backlight: Thickness 12.8mm

Modular LED
B/L

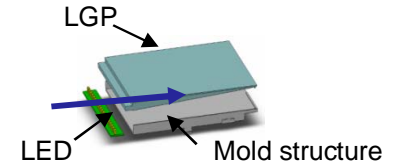
Concept



Modular Type

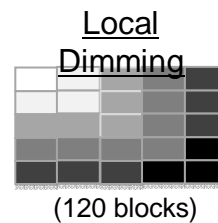


Modular assemble



Modular Unit

Advantage



Wow, thin and narrow edge “sleek” TV (LGE’s in Korea)



 **LG Electronics**

“GREEN is good” !
(for planet, for waste stream, for economy, politics, & bottom line...)



now in over 450 cities worldwide
green drinks
find one near you
networking for eco minded people

Why this logo should be on your next TV ...
green TV
brought to you by the LCD TV Association



Green: World's Lowest Power (White+)- not just behind the TFT..

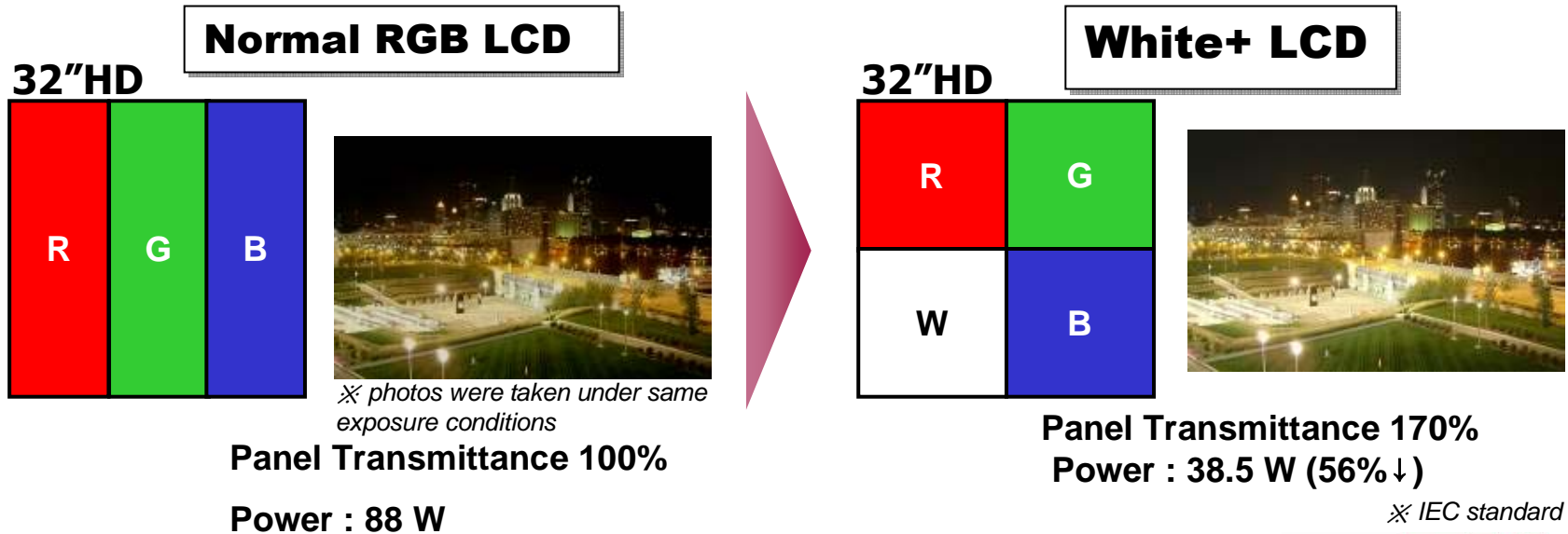
• Features

- W+ Panel : - Change pixel structure from RGB to RGBW
 - Maximize panel transmittance
- Backlight system : - Optimum optical sheet structure
 - Lamp spectrum tuning
- Dynamic power control : - W+ encoding algorithm
 - Optimum backlight power control



• Concepts (shown CES '09 as well)

- Addition of white sub-pixel increases white luminance by **70%**, reducing power consumption by Max. **56%**



Many Digital Devices Depend on TFT-LCDs for Styling



But LEDs enable sleek new PHONE, NOTEBOOK, MONITOR, and now even HDTV designs... of ALL SIZES!!!

**LCD TVs of all sizes just get BETTER
with LED lighting systems!**

**This is the “world premier” of a photo of Vizio’s new 19”
wide “RAZOR LED HDTV”,
a new, sleek, small, LED lit LCD TV !
Many more cool things to come,
from all over the world. I am sure....**



What's "NEXT" big thing in LCD TVs,
perhaps, the "connected TV" ...
i.e. new Industry-Standard User Interface,
from RallyPoint TV, cool "overlay" ...
(on top of Yahoo widgets...)



Rallypoint provides a "widget browser" for the TV, which enables a Web 2.0 community connection while watching TV and IPTV that combines the best of full-screen broadcast television, IPTV and the interactive and community aspects of the Internet.

BUT NOTE: WHAT should VENDORS remember????

**Focus on the user, and their needs !
(and UI!!.. S/W sells H/W!!**

PEOPLE will be PEOPLE...and my mom has MANY pictures of her EAR, on her phone, to prove it !!!)

© Cartoonbank.com



“Can you hang on a sec? I think I just took another picture of my ear.”

The goal is to *Inform, Promote, Improve, and Connect.*

LCD TV Association Sustaining Members Thank you !!!



The goal is to *Inform, Promote, Improve, and Connect.*

We will **Inform** the public on the many benefits of LCD technology v CRT, Plasma or PDP, and the various types of rear-projection TVs, (RPTV. The LCD TV Association will **Promote** the industry and techr speeches, debates, interviews, PR, white papers and research (on various technological specifications) which help to achieve these goals.

We will help **Improve** the product features and functions, by inventing and promoting new specifications and features. For example, we have created a "Green TV" logo for those TVs which can monitor external ambient light and save energy and prevent eyestrain in a dark room by lowering backlight power

(this example is. A major goal is to add perceived value for little or no cost, and to help promote them via press reviews and branding. This can only help decrease the relentless downward pressure on margins while making better products available for consumers.



The LCD TV Association serves to **Connect** the industry supply chain, via our web site, publications and research, as well as face-to face meetings, speeches, white papers, quarterly newsletters, etc. In addition, our "limited" Sustaining Member Advisory Board, has quarterly meetings to set priorities and address issues, as well as to facilitate win/win relationships among our industry partners. We will help many of the latest start-ups with great technology related to LCD TVs (from better backlight controls to wireless audio, etc.), speed their time to market with better features and functions, as this could also help create more value for the TV vendors while even lowering prices for consumers.



LCDTV Association

Inform ◦ Promote ◦ Improve ◦ Connect



A great TV in every room!!!