

SSBC™ Licensing

*System Synchronized Brightness Control
The IP Gateway to
Dynamic Contrast Ratio*

July 2009

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Outline of Presentation

- SSBC IP: Gateway to Dynamic Contrast Ratio (DCR) and High Dynamic Range (HDR) Displays
 - Marketplace view and application to current products
 - Future applications and Improvements
- SSBC Licensing Program
 - Current Licensees
 - Outlook for 2008
 - Market Trends
- Technology and IP related to HDR Displays
 - Issued and allowed patents and claims
 - Other related filings
- Licensing Terms

SSBC: Gateway to DCR & HDR

What does SSBC do?

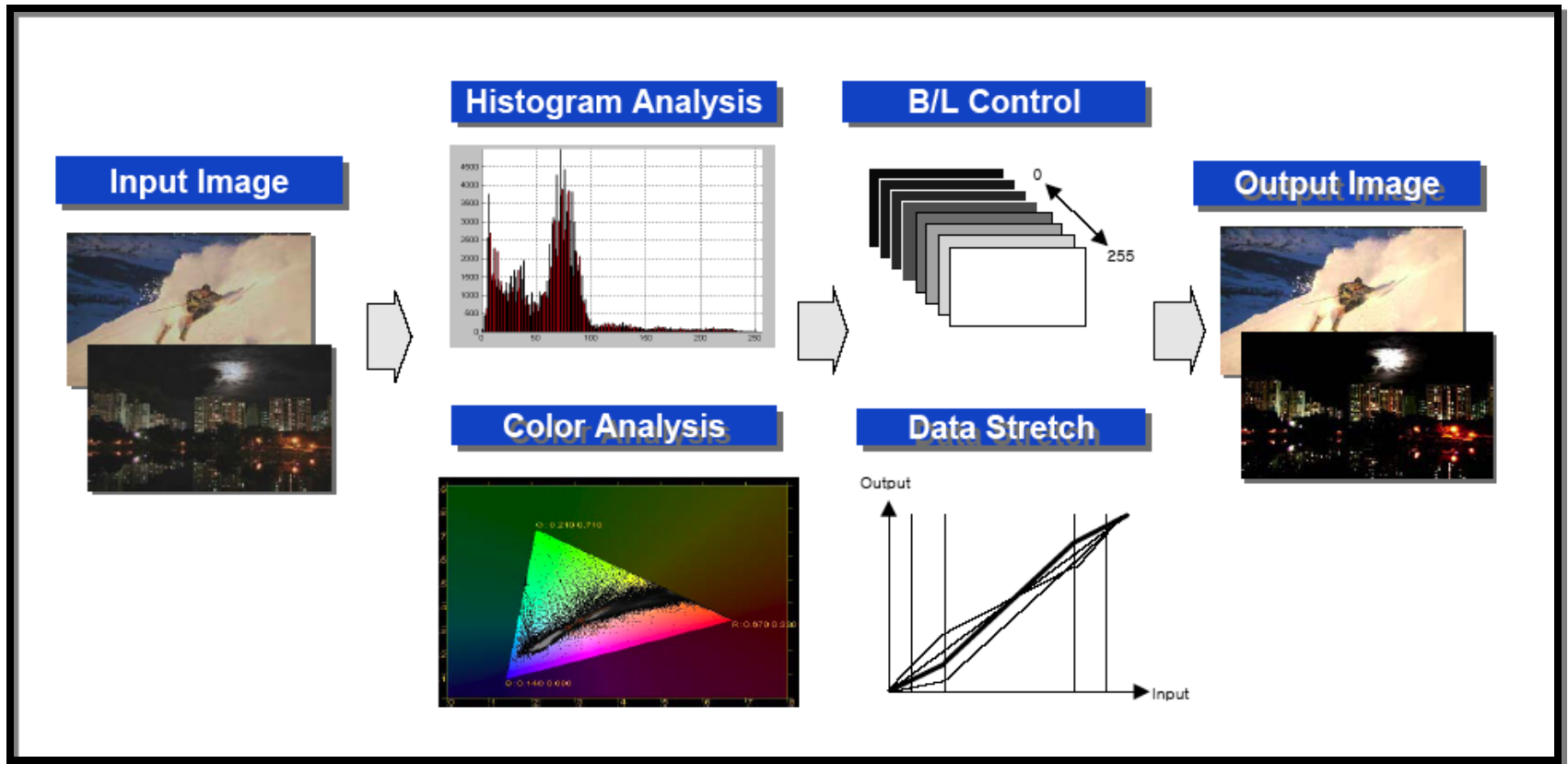
System Synchronized Brightness Control™ (SSBC)

- **Improves the utilization of gray level capability, increases contrast, and expands the dynamic range and color rendition for video and still images in LCD and projection displays**
- **Adds intensity to bright scenes and increases image detail and improves black level in dark scenes**
- **Decrease LCD power consumption.**

How does SSBC work?

- **The SSBC technology dynamically, frame by frame, characterizes the brightness of a video input image using an embedded algorithm.**
- **A digital microprocessor chip uses the frame pixel information to synchronously set the brightness of the LCD backlight or arc lamp as well as optimize the gray level utilization of the image input to the passive LCD display module**
- **SSBC enables a displayed image with a much broader dynamic range of frame brightness while optimizing image detail and contrast within each frame**

SSBC Process



Graphic from LG.Philips LCD SID04 Presentation

Commercial Status of SSBC Today

- Widely integrated into LCD TV and 3LCD projection TV
 - Marketed and promoted as High Dynamic Range (HDR)
 - Used across the entire spectrum of LCD TVs: all brands, sizes, and price points
- Increasing use in large desktop monitors, notebooks, and cellular telephone LCD modules
- High Dynamic Range specmanship
 - HDR contrast claims escalate from 3000:1 to > 50000:1
 - Widely promoted in TV data sheets and specifications
- Branders promote range of HDR features
 - Improved black levels, contrast, and low power consumption

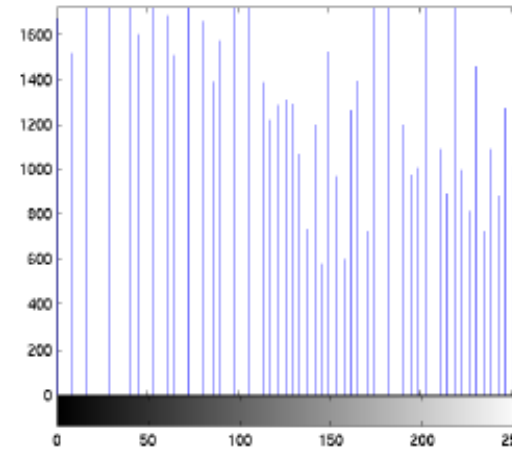
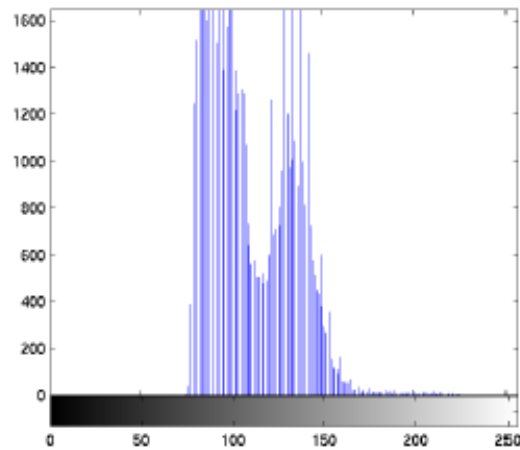
TV HDR Promotion in the U.S.

Company	LCDTV Feature Branding	LCDTV Marketing Contrast	RPTV Feature Branding	RPTV Marketing Contrast
Sharp	Dynamic Contrast	15000:1	Front Projectin	12000:1
LGE	Digital Fine Contrast	3000:1 Digital Fine Contrast	na	na
Panasonic	AI=ActLight+ActGam Scene-Adaptive	Not quoted	3LCD and DLP	Up to 12000:1
JVC	Dynamic Gamma Correct	1200:1 contrast	3LCOS ILA & 3LCD Optical Iris System Dynamic Gamma Correction	Not quoted
Sanyo	No Dynamic claim	800:1	3LCD Twin Iris	10000:1
Philips	Dynamic Screen Contrast	4000:1	DLP and CRT	No contrast claim
Sony	Dynamic Contrast Ratio ACE Advanced Contrast Enhancement	7000:1	3LCOS SXRD & 3LCD Advanced Iris	Up to 10000:1
Samsung	Dynamic Contrast Ratio	6000:1	DLP Exclusively	10000:1
Toshiba	DynaLight™ PixelPure™ histogram HD Dynamic Control	5X contrast	DLP Dynamic Contrast 3LCD Cinema Pro Series	Not quoted
Mitsubishi	High Contrast Picture	Not quoted	3LCD SmartShutter DLP: Complete stable No Contrast Spec	Not quoted
Hitachi	PictureMaster HDIII	Not quoted	3LCD PictureMaster™ Histogram	Not quoted
Syntax Brilliant	Olevia Dynamic Cont	1600:1	Brilliant 3LCOS	Up to 4000:1

SSBC IP is the Gateway to DCR & HDR

- The SSBC Process
 - Digital computer analysis of input video signal
 - Modulation of video signal to increase gray scale utilization
 - Modulation of backlight levels
- Backlight control alone does not achieve HDR
 - Adjusting backlight brightness alone does not improve contrast
 - Gray level equalization, stretching, clipping can be applied simultaneously and synchronously with backlight modulation
- HDR 1.0 Imaging combines both lighting modulation and input image processing

Examples of Histogram Equalization



(From Matlab Image
Toolbox Guide
Fig.10-10 & 10-11)

Generations of White HDR Displays

Generation	HDR 1.0	HDR 2.0	HDR 3.0
Spatial Control	Uniform Dimming (0D)	Line Dimming (1D)	Local Dimming (2D)
Status	Full Production	Engineering	Early Production
Lamp Technology	CCFL edge/cavity White LED Edge	CCFL Cavity	White LED Cavity
Contrast	<20,000 Dynamic	<20,000 Frame	>100,000 Frame
Value Proposition	Dark scene detail Power Savings	Dark scene detail Power Savings	Dark scene detail Power Savings
Color Status	Not Justified	Not Justified	Development Impractical today
Cost	Very Low	Low in small displays	Significant Premium

Current Trends

- LCD Television and Projection
 - Gen 1.0 HDR has become a standard (CCFL backlights)
 - Gen 3.0 HDR being introduced with white LED backlights
- Monitors
 - Leading branders promoting HDR on large wide screen monitors
- Mobile
 - HDR feature promoted by top LCD module makers
- Module Integration
 - LGD introduced HDR modules in Q4 for TV and monitors
 - Korean and Taiwanese LCD module makers expanding HDR into monitors, notebooks and mobile applications

Outlook for Future Generations

- HDR 2.0 RGB LED edge lit
 - Current mobile HDR uses white LED lamps
 - Several LCD module makers introducing color LED edge lights
- Samsung leading introduction of HDR 3.0 in high end LCD TVs
 - Dramatic improvement in contrast and color
 - Not yet cost effective for use in price sensitive market segment
- Use of computers and notebooks for video is driving HDR demand in widescreen monitors and notebook modules

SSBC Intellectual Property

SSBC Inventor: Dr. James L. Fergason

- Liquid Crystal and Display Inventor
 - Widely recognized as leading pioneer and inventor of LCDs and displays
 - Independent inventor with >150 patents related to LCD and displays
 - Pioneered major branches of LCD technology
 - Twisted nematic, surface mode (OCB), Polymer dispersed liquid crystal (PDLC), StereoMirror® 3D monitors, RetroVue™ head-mounted projectors, and System synchronized brightness control (SSBC™) HDR LCDs and projectors
- Recognized as leading US Inventor
 - 2008 IEEE Nishizawa Medal for pioneering development of twisted nematic LCD
 - 2007 David Richardson Medal for pioneering contributions to LCD technology
 - 2006 Lemelsen Prize for Invention
 - 2000 Civilian Advisor to the US Patent and Trademark Office
 - 1998 National Inventors Hall of Fame
 - 1986 SID Francis Rice Darne Award for outstanding technical achievement
 - 1997 Fellow of Society of Information Display
- SSBC technology is licensed by Fergason Patent Properties

FPP Issued Patents

- US Patent 5,717,422
 - Filed 11/16/95
 - Issued: 2/10/98
 - Inventor: James L. Ferguson
 - Assignee: Ferguson Patent Properties
- US Patent 6,816,141
 - Filed 10/2/00
 - Issued: 11/9/04
 - Inventor: James L. Ferguson
 - Assignee: Ferguson Patent Properties
- US Patent 7,352,347
 - Filed 11/8/04
 - Issued: 4/1/08
 - Inventor: James L. Ferguson
 - Assignee: Ferguson Patent Properties
- Additional continuations are pending

Foreign Pending Patent Filings

- European Patent EP1111575
 - Filed 10/25/95
 - Issued: 8/20/08
 - Inventor: James L. Fergason
 - Assignee: Fergason Patent Properties
- Japan
 - Application number 2006-281613
 - Application number 2006-28614
 - Examination report received June 2008

Example of Claims

- Independent claims for both devices and methods are filed
- Independent claims describe SSBC process as:
 - Computer control processing of brightness and color information of an input signal
 - Determining the shades and range of gray used in the input signal
 - Controlling the video signal to increase the number of shades of gray used to display the image
 - Controlling the brightness of the illuminating light source based on the image brightness and color information
- Additional independent claims include
 - Independently adjusting gray levels by color component
 - Control of illumination sources with independently adjustable colors
 - Setting levels based on ambient lighting

SSBC Licensing Program

FPP Licensees for SSBC™ IP

Company	Licensed:	Products
Panasonic	2001	LCDTV and Projectors
LG Display	2003	All LCD modules
Seiko Epson	2004	Projectors and Engines
Sharp	2005	LCDTV
Samsung	2006	All LCD modules
Chinontec	2006	Projectors and Engine
Sanyo	2007	Projectors
JVC	2007	LCDTV and RPTV
Sony	2008	LCDTV, RPTV, Modules
AG Neovo	2008	LCD Monitors
Viewsonic	2008	LCD Monitors
Lite-On	2008	LCD Monitors
Epson Imaging Devices	2008	Mobile LCD Modules
AUO	2008	All LCD modules
Sharp	2008	Mobile LCD Modules
NEC	2009	LCD Monitors and Projectors
Philips	2009	LCDTV TV, Monitors, and Projectors
Funai	2009	LCDTV

System and Module Licenses

- Television, Projector, and Monitor System Licenses
 - Available to branders and makers of complete systems
 - Royalty payable on shipments to territories with issued claims
- LCD Module and Projector Engine Licenses
 - Available to manufacturers of modules and engines with integrated SSBC
 - Royalty payable on all WW shipments

Typical License Terms

- All SSBC™ technology and patents
- Defined group of licensed products
- License Grant: nonexclusive, non-sublicenseable worldwide
- Territory: Worldwide
- Life of the patents term
- Royalty rates defined by product and size
- Licensee is offered four prepayment options
 - No prepayment option results in highest royalty rates
 - Large prepayment results in > 50% reduction in royalty rates
- Initial Payment releases licensee from any claims prior to license
- Options for lump sum, installment payments,

Summary

- HDR 1.0 has become a TV standard and is already raising the bar of LCD and projection video performance. Adoption in monitors and notebooks and mobile products is following
- HDR 2.0 and 3.0 with LED backlights will elevate LCD technology to the pinnacle of image quality
- FPP's SSBC IP has been widely recognized as the gateway to HDR and more than fifteen major companies have already licensed the technology, recognizing the validity of our patents
- FPP offers licensing programs for both display systems and modules. Royalty rates vary by display size and discounted rates are tied to prepayments.

About Fergason Patent Properties (FPP)

- Business Model
 - Develop, demonstrate, and license display related IP
 - Current Programs: SSBC™, StereoMirror™, and RetroVue™
- About Dr. James L. Fergason
 - Independent inventor of the TN LCD in 1970s
 - Licensed portfolio of PDLC patents to Raychem in early 1980s
 - Prevailed in litigation against Tektronix regarding surface mode fast switching nematics
 - Recognized by USPTO as leading independent inventor
 - 2006 MIT-Lemelson Prize for Invention
- More information and contacts
 - www.fergasonpatents.com
 - Licensing Agent: Charles McLaughlin, 650.323.7155
 - FPP Managing Director: Jeffrey Fergason, 650.575.5423