it measures the Luminance in cd/m²

Spectrometer

RDM

Research and Development in Microelectronics

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Product Presentation (v.1.0) 2009©

1. Presentation

SBM_1 is a spectrometer designed to measure the brightness of flat panel monitors and flat panel displays. It calculates the light power observed by the human eye in candela/m^2. This cd/m^2 unit is also known as Luminance.

On the market 19" and 22" flat panel monitors have a typical Luminance value of 300 cd/m^2. But this value is for the white color the monitor emits.

What will be the brightness of the dark colors, such as blue, green, and even black? What will be the brightness at the edge and in the centre of the monitor for one color, are they equal?

They are not! but why?

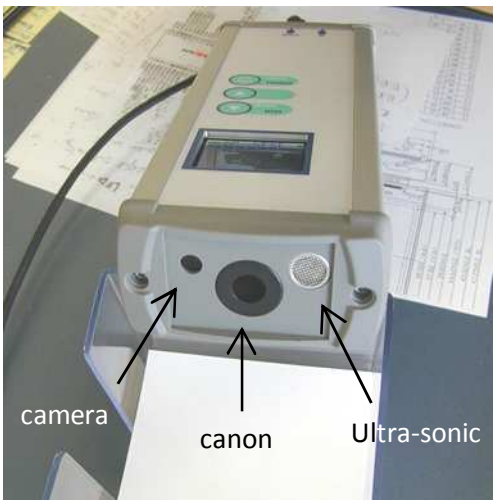
Because it is technology problem, and in flat panel monitors light is current converted, whatever the monitors are of LCD or plasma technologies. The spread of current through the monitor layers is however not uniform, due to the existence of resistance. Then the emitted light presents a variation in power throughout the surface of the monitor for a single color.

A good quality monitor is when the color is uniformly displayed.

This instrument is designed to respond to the questions above and to identify the anomaly existing in bad quality monitors.

2. Description and feature

The instrument contains a camera that continually catches 10 images/sec and displays them on a 2" TFT display (LCD); so that one can see the area of the monitor the instrument is oriented to. A small sign (a circle) is merged to the images to show exactly that area.



The instrument has a pipe (a canon) to receive the light power of the monitor under investigation, then calculates the power value into cd/m^2, then displays the result without interruption.

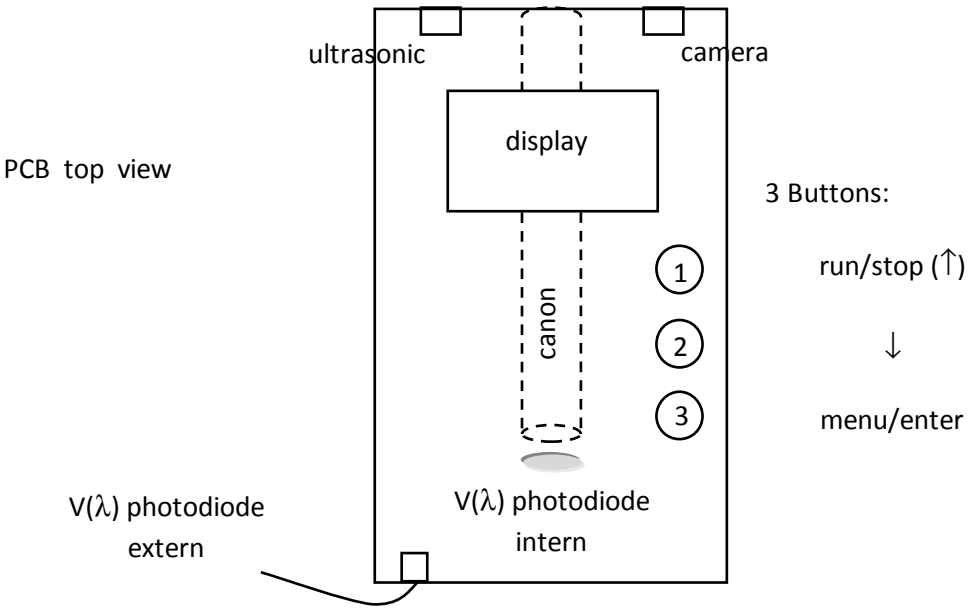
An Ultrasonic sensor is also integrated to measure the distance between the instrument and the monitor. An accurate measurement can be obtained when the instrument is at 50 cm from the monitor and at the normal to the monitor surface.

In fact the instrument performs 2 measurements: in contact to the monitor and at an optimum distance specified in a parameter, then calculate the Luminance value. Photonics algorithm in C code is loaded in the micro-controller to calculate in cd/m^2 the measured current power.

A tilt switch sensor is integrated for the deviation of the instrument to the horizontal. This sensor is optional to SBM_1.

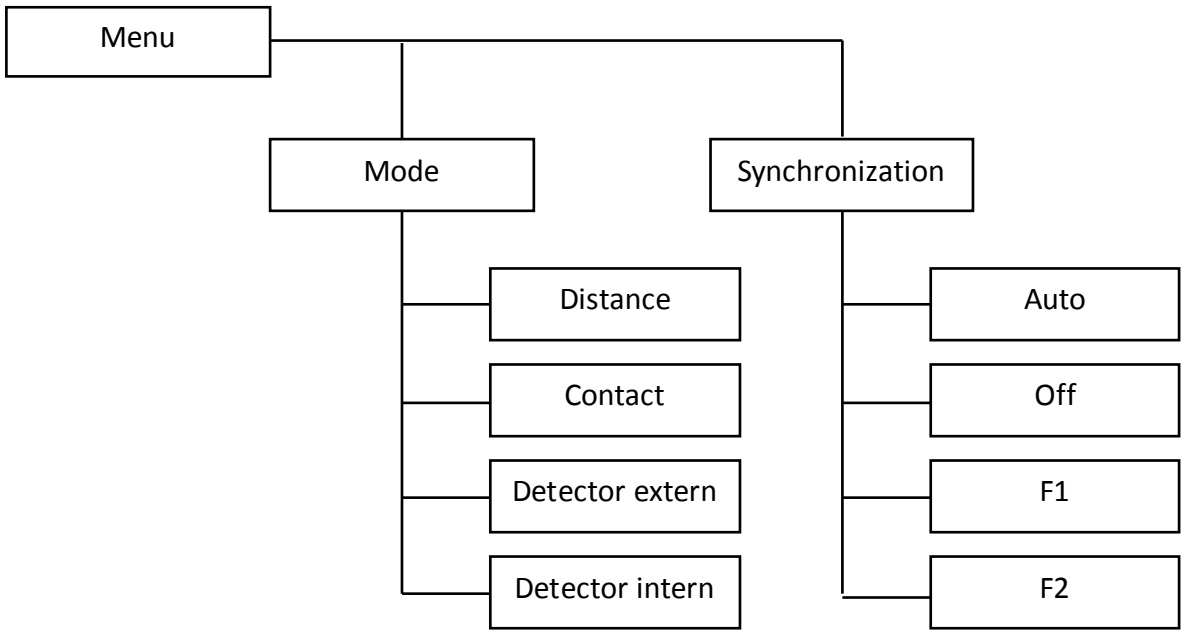
A high quality V(λ) photodiode of Hamamtsu is integrated in the instrument to convert the light of the monitor to current. This current is very little in the range of 0.1 pA to 1 µA, a special precaution is therefore paid to carefully amplify it through an Op-Amp. A good quality PCB is used to avoid a noisy system that could damage that measured weak current.

The instrument has plug in the rear for an external V(λ) photodiode, one can use his own detector to perform measurement with SBM_1.



3. Menu

SBM_1 has 3 buttons: run/stop (↑), and ↓, and menu/enter. Ones the menu is selected by click and hold the 3rd button, ↑ of the top button and ↓ of the middle button will be active to page through the menu lines, and the confirmation is with a short click on enter of the 3rd button.



4. Parameters

The parameters of the internal and external V(λ) photodiodes at distance and at contact to the monitor are stored in the EEPROM, these parameters are listed below.

- calibration factor
- temperature coefficient
- integration time
- reference value
- SN (serial number) of the instrument

Parameters to the other sensors and constraints are stored in the EEPROM and are listed below.

- alignment of the camera (x, y)
- center point of the circle on the LCD
- optimum distance to the display
- max and min working temperature
- calibration factor temperature
- offset of the Ultrasonic
- calibration factor of the Ultrasonic
- default mode
- default synchronization
- Firmware version

5. Use

The instrument is portable and weights 450g only, which make it simple to use. Just orient the front of the instrument to the monitor under investigation. The measured value is spontaneously displayed in cd/m^2. The Figures above are of the instrument oriented to a flat panel monitor with a photo of a car as the background. The instrument is measuring the color of the rear of that car.

The camera of the instrument displays a colored circle indicating the area the canon of the instrument is aligned to, and it is the area the instrument is measuring.

If the circle color is green, the instrument is at the optimum distance of 50 cm from the monitor. If red, the distance is above 50 cm and a red arrow is displayed asking to approach. If yellow, the instrument is closer than 50 cm.

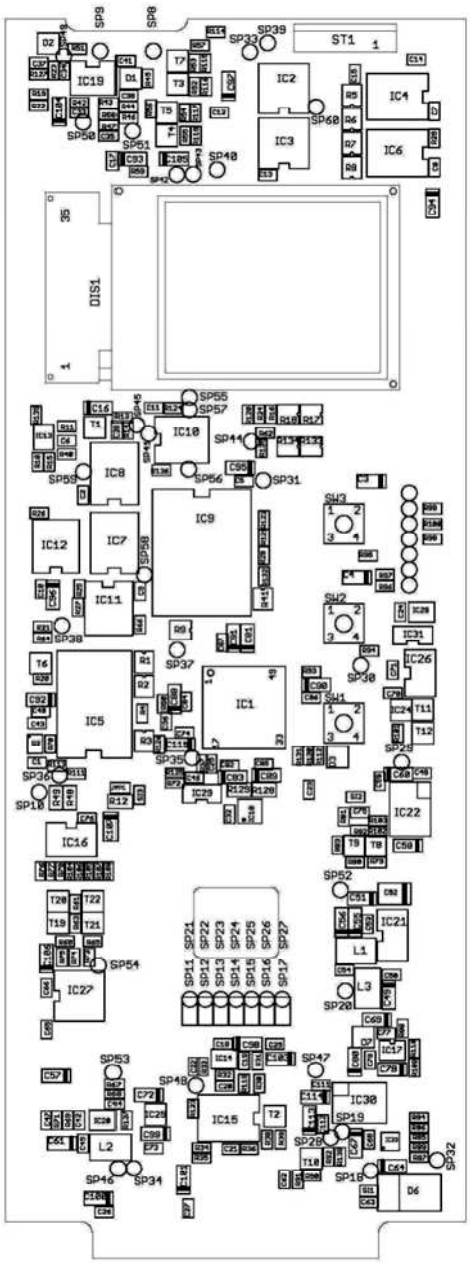
6. Who needs this instrument?

Many,

- the developers of flat panel monitors need to qualify their product and locate the anomaly
- the industries developing equipments for chirurgical and medical treatment need to integrate good monitor that is capable of identifying a small deference in color. That small variation in color is exactly the color of the illness, such as cancer
- in military and radar, a good monitor is vary needed to allow clear view of the movement in the sky

7. Package

The instrument is packaged in a 1 mm thickness Aluminum, and has the dimensions (L, l, t) of 200 x 85 x 45 mm and weight of 450g. The instrument is 3-V powered by 2 standard Batteries type AA.



Product categories:

Instruments

- SBM is a spectrometer for measuring the brightness of the monitors and flat displays.
- FLT is an instrument for measuring the factor of light transmitted into glass. Typical use: qualification of car and aircraft windscreens).

Consumer electronics

- House security system.
- Electronic watches and alarm clocks.

Electronic for automotive industry

- Crash system.
- Parking and alarm system equipped with TFT display, cameras and ultrasonic sensors.

Wireless

Network operating system, as big as an auto radio.

Device for satellite

Surveillance system against projectile moving at a velocity of up to 1000 kM/h.

Fiber to the Home networking

A prototype of 128 Gbit/s/chip optical networking system, for low cost fiber optic network by using short-wavelength laser light and CMOS photoreceivers. It is a project and we are looking for sponsors and investors.

Navigation control for military

Micro-controller base control system for small motors and rotors.

IT, Software tools and Measurement routines

MET is a MOS extractor tool for the characterization of the transistors and the extraction of their technology parameters. BSIM3 and 4 are implemented in MET. We also offer measurement routines to control instruments and wafer probe-stations, so that the measurement of transistors and ICs will be fully automatic. All runs on PC platform.

Technical Support

- Hotline and per e-mail for service and support: support@RDMicroelectronics.com
- Service and Maintenance Contracts.
- Component Testing and Repair.

Consulting and Service

- To the costumers, we design and make layout of CMOS and BiCMOS integrated circuits as well as microchips with Cadence and Mentor Graphics tools.
- Development of electronic devices according to specifications and timetable of our clients.
- Prototyping new ideas and conducting research in Microelectronics and Opto-electronics, in conjunction with our partners and research centers.

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