MODEL 71241
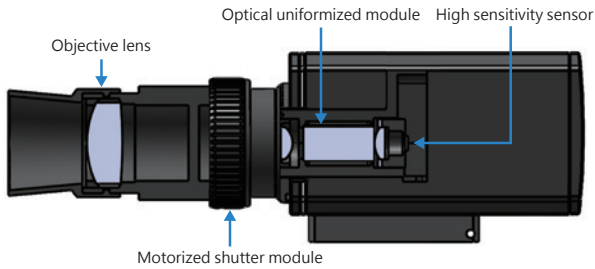
KEY FEATURES

- Luminance and chromaticity measurement of color displays:
  Low luminance measurement: $0.001 \ cd/m^2$
- Wide luminance display range:
  0.0001 to 6,000 cd/m^2
- High accuracy measurement:
  $\leq \pm 0.002 \ (> 0.1 \ cd/m^2)$
- Chromaticity coordinates presentation:
  xyY, T △ uvY, u' v' Y, XYZ
- FMA and FLVL for flicker measurements
- Memory storage of up to 100 sets of standard color values and calibration data
- Built-in flat display calibration data LED-D65 for express chromaticity measurement
- 0-Calibration remote control
- USB control interface for power supply
- Integrated host and probe

xyY	TΔuvY	u'v'Y	XYZ	FLVL	FMA	Contrast	Program

HIGH ACCURACY UNIVERSAL MEASURING PROBE MODEL 71241

Chroma 71241 High Accuracy Universal Measuring Probe is capable of testing the luminance and chromaticity of display panels via contactless measurements. Developed with the most advanced digital signal processor and optoelectronic conversion technology along with precision optical parts and circuit design, the probe performs high-speed, accurate, and stable color tests.

Chroma 71241 is equipped with a sensor that complies with the CIE1931 color matching functions and accurately measures the luminance and chromaticity of display panels. Users can easily switch between various types of chromaticity coordinates through the xyY, TΔuvY, u 'v' Y, and XYZ presentation methods, as well as FMA and FLVL flicker measurement modes. 71241 is designed to test the characteristics of LCD displays with LED backlight, and can perform low luminance test down to $0.001 cd/m^2$.

To streamline an automated test process, both the Chroma Video Pattern Generator[1] and the UUT can be controlled directly via Model 71241; by interfacing with a PC, the system can run contrast measurement, test result judgment, and programmable test items that streamlines a high efficiency mass production solution.

The Optical Measurement Software package of the Chroma 71241 is capable of testing chromaticity, luminance, Flicker, and Gamma measurements on PCs. The measured data can be presented in the CIE 1931 and CIE1976 UCS chromaticity coordinate chart. In addition to the function of drawing Gamma curve, the acquired information can also be stored on a PC or be exported for data analysis. The program template in optical measurement software also allows users to customize test programs base on their needs.

The 71241 has 100 channels of built-in memory for storing values of standard colors and calibration data. In addition, the Chroma 71241 also provides user-friendly interfaces for operation such as test data displays, push-button layouts, calibration period settings, reminder functions and other useful industrial features.

As flat displays technology and products are mainstream in today's market, manufacturers prefer selecting cost-efficient measurement solutions to raise their competitiveness; Chroma 71241 High Accuracy Universal Measuring Probe is an excellent choice for reducing capital investment while increasing productivity.

Chroma

Optical System Structure

Objective lens
Optical uniformized module   High sensitivity sensor
Motorized shutter module

The Optical System Structure of Chroma 71241 consist of 4 main elements:
1. Objective lens
2. Motorized shutter module
3. Optical uniformized module
4. High sensitivity sensor

The Optical system is not limited to a specific type of display, this rather technology agnostic solution can measure virtually every display device in today's marketplace. The light projected/emitted by the device to be measured, is captured into the optical uniformized module through the objective lens. After uniformizing the light of each dot on the area to be tested in the module, it projects equally to a probe device with X, Y, and Z filter compensation.

High Contrast Measurement

LED backlight matrix
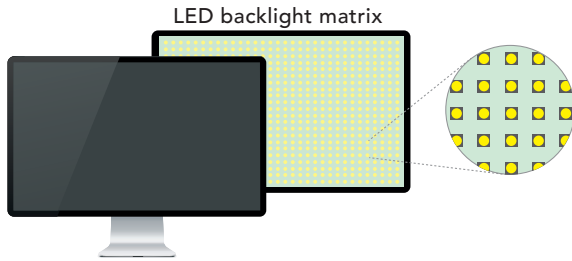
In recent years, the Video Electronics Standards Association (VESA) for the display industry gives clear DisplayHDR norms. Class standards ranging from entry-level HDR400 to high-end HDR1400. From the brightness $0.02cd/m^2 \sim 1400cd/m^2$ the higher the image contrast, the more realistic images appear to the viewer.

High dynamic range (HDR) makes the picture show a high-contrast display with brighter parts and darker parts. In addition, LCD with MiniLED backlighting is booming, and the demand for high-contrast measurement is gradually increasing. Chroma71241 is specially developed to meet this demand. It has the measurement capability of $0.001cd/m^2 \sim 6000cd/m^2$ wide brightness.

Optical Uniformized Module
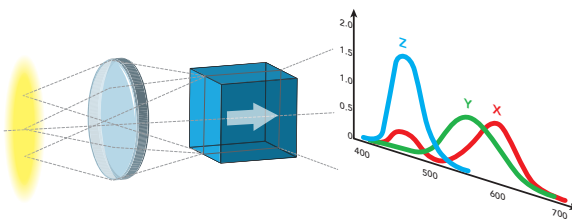
Reducing the light loss during transmission in the system hence increasing the use rate of input light quantity is the main factor that the system can accomplish rapid and accurate measures under low luminance measurement mode. The optical uniformized module implemented in 71241 not only uniformizes the input light quantity but also reduces its loss significantly due to transmission and raises the use rate. The high sensitive detection device of 71241 formed by a high transmission Y filter and high light sensitivity detector further increases the use rate of input light quantity for outputting accurate low-luminance test results.

Object-Side Telecentric Optical System
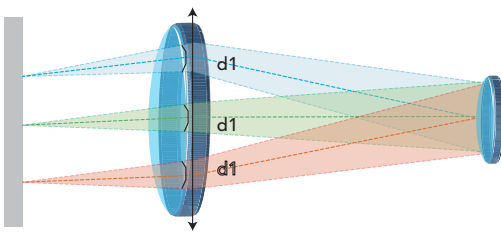
The probe design of the Chroma 71241 complies with the light acceptance angle of 5° stipulated on IEC 61747-6 and EIAJ ED-2522 standards. With the object-side telecentric optical system design, the light acceptance angle in the measurement range will show symmetry along the vertical flat surface of a display. Therefore, the light acceptance angle of Color Analyzer for the normal direction of display flat surface is ±2.5° only (as the figure shows.) Moreover, the telecentricity of Color Analyzer that is the middle line of light acceptance angle and the normally included angle of the device flat surface has an error less than 0.25°.

Application Architecture

Stand-alone: Control by Color Analysis Master software
1. Instant optical curve display
2. Multi-probe measurement supported
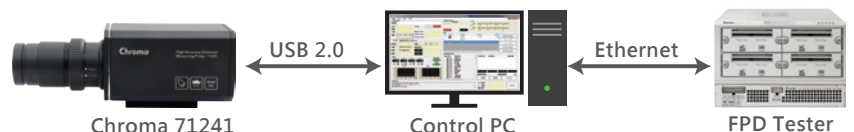3. Test results saved and statistics analysis

Chroma 71241   USB 2.0   Control PC

Display Application: Control by Video Pattern Generator
1. GUI interface
2. Programmable test items
3. Single-button report output

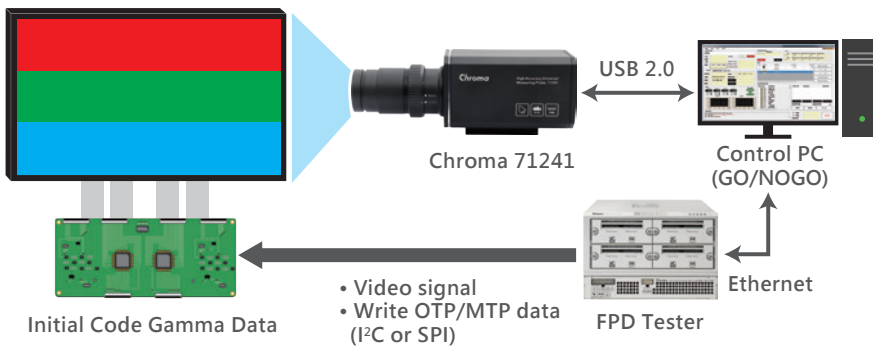Chroma 71241   USB 2.0   Video Pattern Generator   Export Report   USB

FPD Application: Control by GO/NOGO software
1. Auto Flicker measurement
2. Test results and diagram saved
3. Integrated generator and probe

Chroma 71241   USB 2.0   Control PC   Ethernet   FPD Tester

Flicker Measurement Structure

Chroma 71241

USB 2.0

Control PC
(GO/NOGO)

Initial Code Gamma Data

• Video signal
• Write OTP/MTP data
(I²C or SPI)

Ethernet

FPD Tester

The Chroma 71241 complies with the FMA (Flicker Modulation Amplitude) standards defined by VESA (Video Electronics Standards Association) and JEITA (Japan Electronics Information Technology Industries Association) for flicker measurement. The system can also be paired with Chroma's FPD Tester for a completely automated flicker adjustment.

Optical Measurement Software

Chroma 71241 Display Color Analyzer features an optical measurement software which streamlines storing the measured data into PC with EXCEL® exporting capabilities. The software also features sample programs of optical measurement for users to swiftly develop and tailor a program that suits their needs.
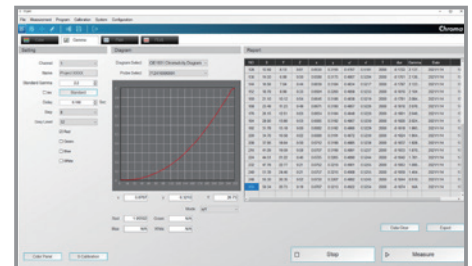
Color Measurement

The user interface shows digital and analog color measurements simultaneously, values can also be shown as xyY, T△uvY, u´ v´ Y, XYZ. There are four configurable display modes available such as single or continuous sampling.
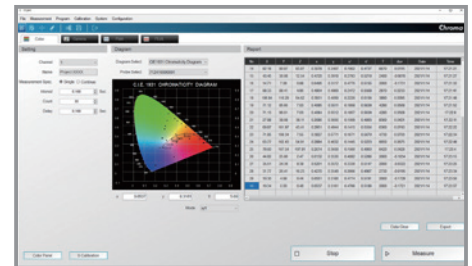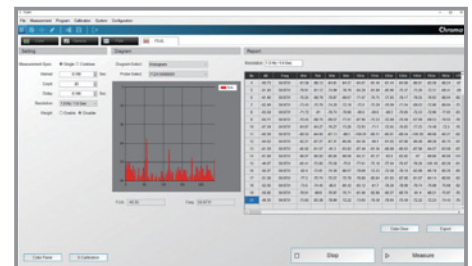

Color Measurement

Gamma Measurement

Gamma values for red, green, blue, and white four colors can be measured while connected to Chroma's Video Pattern Generator. The measurement can be configured as standard Gamma curve or shown the Gamma curve and value of each tested color up to 4096 (12bit) levels.

Flicker Measurement

The 71241 probe supports FMA and FLVL Flicker measurement modes. The FMA Flicker measurement can see the ratio of luminance change (AC) and fundamental quantity (DC) (AC/DC); while the FLVL (JEITA/VESA) Flicker measurement can separate the AC quantity of all different frequencies. With the Optical Measurement Software the Flicker of each frequency can be shown on the graph and it makes the frequency spot that generates the Flicker easily identified.

Gamma Measurement

Color Calibration

For calibration requirements, the Optical Measurement Software is able to read the UUT readings directly and save the work from copying data by the user also prevent the problem caused by copy error to improve the calibration efficiency and accuracy.
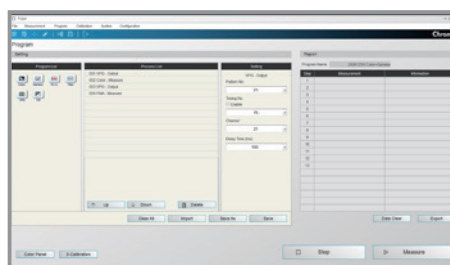
Program Editing

The editable test item functions simplifies the programming either on the main unit or via PC; the user friendly interface allows saving edited test programs which can be exported and shared with other test systems.
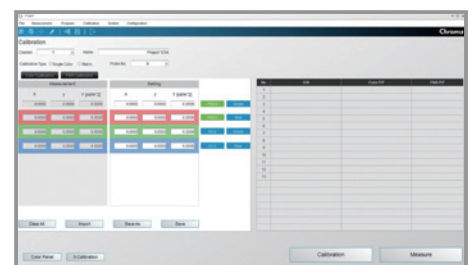

Flicker Measurement

Software Development Kit (SDK)

Example Program:
》 Color Measurement
》 Gamma Measurement
》 Color Calibration
》 Multiple Control
》 API Development Library

Program Editing

Color Calibration

Specifications

Model			71241
Measurement Area			Ø27mm / 1.06 inch
Measurement Distance			30 ±10 mm
Display Range	Luminance		0.0001 to 6,000 cd/m²
	Chromaticity		4 or 3 digits display
Luminance [2]	Measurement Range		0.001 to 6,000 cd/m²
	Accuracy	0.001 to 0.009 cd/m²	±9%
		0.01 to 0.09 cd/m²	±2%
		0.1 to 0.9 cd/m²	±1.5%
		1 to 9 cd/m²	±1.5%
		10 to 99 cd/m²	±1.5%
		>100 cd/m²	±1.5%
	Repeatability	0.01 to 0.09 cd/m²	10%
		0.1 to 0.9 cd/m²	1%
		1 to 9 cd/m²	0.40%
		10 to 99 cd/m²	0.10%
		>100 cd/m²	0.10%
Chromaticity [2]	Measurement Range		0.01 to 6,000 cd/m²
	Accuracy	0.01 to 0.09 cd/m²	±0.003
		0.1 to 0.9 cd/m²	±0.002
		1 to 9 cd/m²	±0.002
		10 to 99 cd/m²	±0.002
		>100 cd/m²	±0.002
	Repeatability	0.01 to 0.09 cd/m²	0.0035
		0.1 to 0.9 cd/m²	0.0015
		1 to 9 cd/m²	0.0004
		10 to 99 cd/m²	0.0003
		>100 cd/m²	0.0002
Flicker - Contrast Method (FMA)	Measurement Range		5 cd/m² or higher
	Accuracy		±0.4% (Flicker frequency:30 Hz AC/DC 10 % sine wave) ±0.7% (Flicker frequency:60 Hz AC/DC 10 % sine wave)
	Repeatability (2σ)		0.3% (Flicker frequency:20 to 65 Hz AC/DC 10 % sine wave)
Flicker - JEITA/VESA Method [2]	Measurement Range		5 cd/m² or higher
	Display Range		6~240Hz
	Accuracy		±0.35dB (Flicker frequency: 30 Hz AC/DC 4 % sine wave) ±0.35dB (Flicker frequency: 30 Hz AC/DC 1.2 % sine wave)
	Repeatability (2σ)		0.1dB (Flicker frequency: 30 Hz AC/DC 4% sine wave) 0.3dB (Flicker frequency: 30 Hz AC/DC 1.2% sine wave)
Measurement Speed	xyY		0.15 cd/m² or less : 1 time/sec. 0.15 cd/m² or higher: 6 times/sec. 2 cd/m² or higher : 18 times/sec.
	FMA		20 times/sec.
	JEITA/VESA		1 time/sec. (at 1 Hz pitch) ; 3 times/sec. (at 10 Hz pitch)
Sync Mode			NTSC,PAL,EXT,UNIV,INT,M (2ms to 4s)
Memory Channel			100 channels
Operating Temperature/Humidity Range			10°C to 30°C (50°F to 86°F)：less than 75% relative humidity (with no condensation)
Storage Temperature /Humidity Range			0°C to 40°C (32°F to 104°F)：less than 75% relative humidity (with no condensation)
Input Voltage Range			5V (USB2.0)
Dimension (HxWxD)			60 x 60 x 184 mm / 2.4 x 2.4 x 7.2 inch
Weight			0.7 Kg / 1.54 lb

*1: Correspond with Chroma's video pattern generator .
*2: Used for test according to Chroma's test condition. *Reference standards: IEC 61747-6, EIAJ ED-2522, ASTM E455-03, VESA Standard
*All specifications are subject to change without prior notices.

Ordering Information

71241: High Accuracy Universal Measuring Probe
2238: Video Pattern Generator (option)
2918: Flat Panel Display Test Solutions (option)

Get more product and distributor information in Chroma ATE APP

Chroma

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