MODEL 71242

KEY FEATURES

- Measurement of brightness and color of small-sized displays
- Four display modes for color coordinates: xyY, T△uvY, u'v'Y, XYZ
- Customizable Delta E measurement with RGB editing table
- Gamma measurement results displayed as Broken-Line Graph
- Support for FMA and FLVL flicker measurement
- Intuitive display of Color Gamut measurement percentages
- Low brightness measurement performance of 0.001 cd/m²
- High-contrast measurement range: 0.0001 to 3,000 cd/m²
- High-precision measurement ≤ ±0.002 (>0.1 cd/m²)
- Motorized shutter module
- Optical uniformizing module enhances light input efficiency
- 20-bit analog-to-digital converter (ADC)
- Built-in memory for storing 100 sets of standard color values and calibration data
- Calibration values for flat panel displays (LED-D65) can be immediately applied to color measurement for this display type
- Remote zero-point calibration
- USB control interface for power supply and PC operation
- Integrated design of main unit and probe

xyY	T△uvY	u'v'Y	XYZ	FLVL	FMA	Contrast	Program

SMALL SIZE MEASURING PROBE MODEL 71242

Chroma 71242 Small Size Measuring Probe is designed with a light path that utilizes a lens module to accurately measure small-sized display devices such as smart wearables, mobile phones, and flexible displays. It employs a non-contact design to measure the brightness and color performance of small-sized panels. Using advanced digital signal processing and optoelectronic conversion technology, coupled with precise optical components and circuit design, the 71242 offers high-speed, precise, and stable color measurement and flicker testing.

The optical system architecture of the Chroma 71242 enables accurate measurements of a wide range of conventional and flexible display devices. Equipped with a compact and lightweight motorized shutter module, it directs the light emitted by the device under test through a condenser lens into the light uniformizing module. In this module, the light emitted from various points on the test area is mixed evenly and then projected onto the detection device with X, Y, and Z filter compensation. This significantly reduces the time and cost of manual calibration.

For automation, the 71242 Small Size Measuring Probe can be combined with Chroma's Video Signal Generator*1 or Flat Panel Display Tester to achieve automated testing without the need for a PC. The instrument can also be operated using a computer, with functions for contrast measurement, result judgement, and programmable testing items, meeting all requirements for automated testing and enhancing production efficiency.

The 71242 is equipped with a sensor that closely matches the CIE 1931 color-matching functions, enabling precise measurement of brightness and chromaticity in small-sized panels. Users can freely switch between various measurement modes, including chromaticity coordinates xyY, T△uvY, u'v'Y, XYZ, and flicker measurement methods FMA and FLVL. Chroma's included optical measurement software offers functionality for measuring chromaticity, brightness, flicker, gamma, Delta E, and color gamut. Measured data can be directly displayed on CIE 1931 and CIE 1976 UCS chromaticity coordinate graphs, and functions for plotting Gamma curves and saving measurement data as text reports are also provided. The included optical measurement SDK allows users to quickly develop test programs tailored to their needs. The Chroma 71242 Small Size Measuring Probe features a 20-bit multiplexed A/D converter and high-precision pA-level current measurement circuitry, significantly expanding the brightness and color measurement range. Combined with Chroma's purpose-built algorithms, this enables much faster conversion of analog values into precise digital values.

The 71242 main unit has built-in memory that can store up to 100 sets of configurations, allowing users to save their standard color values and calibration data. To better meet users' needs, Chroma 71242 offers a variety of user-centric features, such as options for displaying test data, strategic button placement, calibration interval settings, and reminder functions.

Chroma
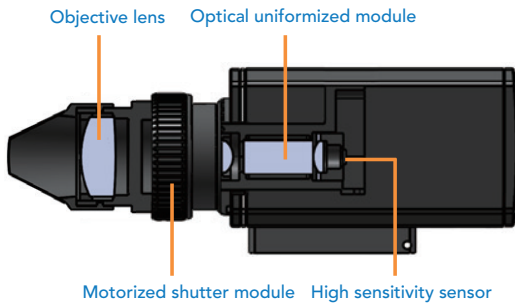Advancing Excellence

Optical System Structure

Objective lens **Optical uniformized module**

**Motorized shutter module** **High sensitivity sensor**

The optical system structure of the Chroma 71242 Small Size Measuring Probe consists of four main elements:
- Objective lens
- Motorized shutter module
- Optical uniformizing module
- High sensitivity sensor

This architecture allows for precise measurement of various display devices, including flexible displays.Light emitted from the light source under test converges through the objective lens and enters the optical uniformizing module. Within the module, the light emitted from various points on the test area is evenly mixed and then projected onto the detection device with X, Y, and Z filter compensation.

High-Contrast Measurement

Mini LED backlight matrix
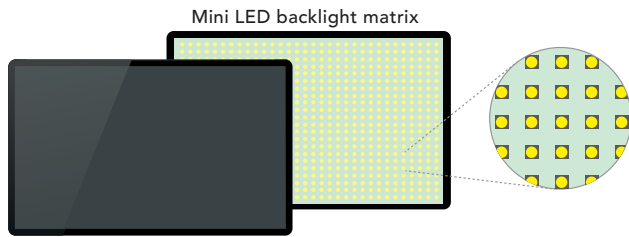
The Video Electronics Standards Association (VESA) has established clear standards for HDR performance, ranging from the entry-level DisplayHDR 400 to the high-end DisplayHDR 1400 performance level. These specifications cover black levels and brightness from 0.02 cd/m² to 1400 cd/m², with higher contrast ratios resulting in more realistic images. As these standards have been implemented, display screen performance has significantly improved.

High Dynamic Range (HDR) enables displays to show brighter light and deeper darkness. Along with the increasing number of LCDs using MiniLED backlighting, this is pushing demand for high-contrast measurement. Chroma 71242 Small Size Measuring Probe has been developed specifically to meet this need, capable of measuring brightness and black levels from 0.001 cd/m² to 3000 cd/m² with a contrast ratio of up to a million.

Optical Uniformizing Module
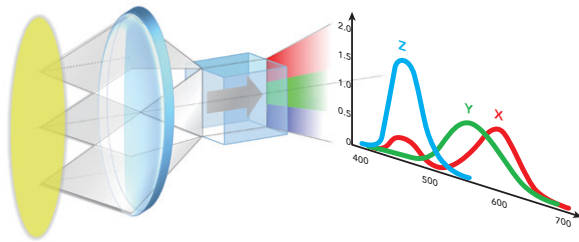
Minimizing light loss and increasing the utilization of incoming light are key factors in achieving rapid and accurate measurements in lower brightness measurement modes.

Chroma 71242's optical uniformizing module not only evens out the incoming light, but also significantly reduces the loss caused by transmission of light into the system, resulting in enhanced light utilization. Secondly, the detection device uses a high-transmittance Y filter and a high-sensitivity light detector to further improve light usage and achieve optimal measurement precision, especially in ultra-low brightness conditions.

Application Architecture

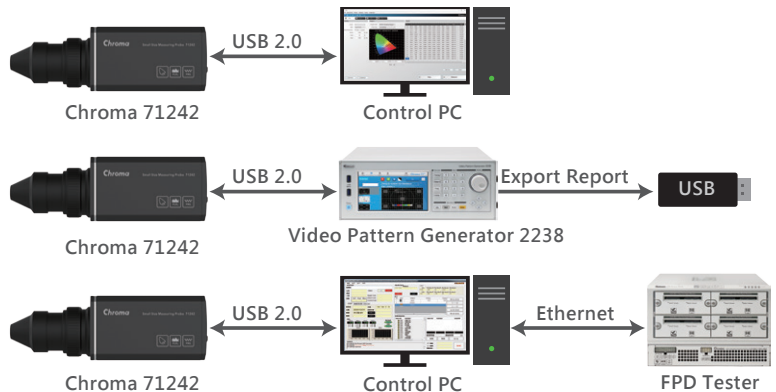**Standalone Unit**: Controlled via Color Analysis Master Software
1. Real-time display of measurement reports
2. Supports setting up multi-probe measurement
3. Analysis of stored test data

Chroma 71242 — USB 2.0 — Control PC

Display Applications: Controlled via Video Pattern Generator
1. Graphical user interface
2. Programmable test items
3. One-click report output

Chroma 71242 — USB 2.0 — Video Pattern Generator 2238 — Export Report — USB

Tablet Applications: Controlled via GO/NOGO Software
1. Automatic flicker test function
2. Storage of measurement images and data
3. Integrated signal source and measurement

Chroma 71242 — USB 2.0 — Control PC — Ethernet — FPD Tester

Flicker Measurement Architecture

USB 2.0

Chroma 71242

Control PC (GO/NOGO)

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

Display unit

FPD Tester

Ethernet
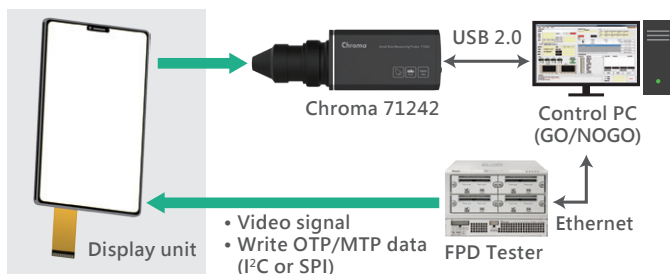
The Chroma 71242 Small Size Measuring Probe follows the FMA (Flicker Modulation Amplitude) measurement method specified by the VESA and the JEITA for measuring flicker intensity. Automatic flicker adjustment can be achieved by using this instrument in conjunction with the Chroma FPD Tester Series.

Optical Measurement Software

Chroma 71242 comes with the Color Analysis Master optical measurement software, which can extract the data measured by the probe, store it on the computer, and compile it into a report for further processing. Additionally, the included software development kit (SDK) provides templates for color measurement, gamma measurement, color calibration, an application programming interface (API), and control of multiple 71242 units. This toolset allows users to quickly develop test programs tailored to their needs.

Color Measurement

Color Analysis Master enables simultaneous digital and analog display, offering four different display modes: xyY, T△uvY, u'v'Y, and XYZ. The measured color coordinates can be displayed in real-time on the CIE 1931 chart. Users can select the desired measurement mode and set it for single or continuous measurement as per their needs.
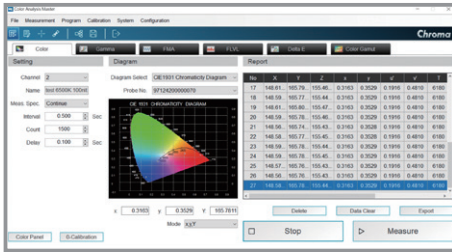
Gamma Measurement

By connecting the probe to Chroma's Video Pattern Generator (controlled via the VPG's own software), gamma measurements are available for red, green, blue, and white. In addition to displaying standard gamma curves, display gamma curves and gamma values can be displayed after each color measurement is completed. Depending on user requirements, the instrument can measure up to 4096 (12-bit) steps.
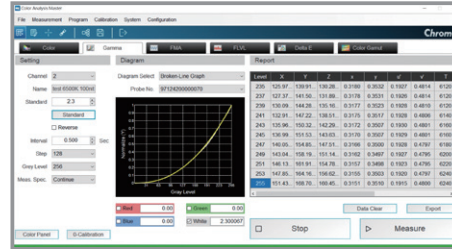
Flicker Measurement

The 71242 Small Size Measuring Probe supports two flicker measurement modes: FMA and FLVL. The FMA flicker measurement mode reveals the ratio (AC/DC) of brightness variation (AC) to the fundamental quantity (DC). The FLVL (JEITA/VESA) flicker measurement mode separates all AC quantities at different frequencies. The Color Analysis Master software provides charts that display the flicker values for each frequency, making it easier to determine where the flicker frequency points are.
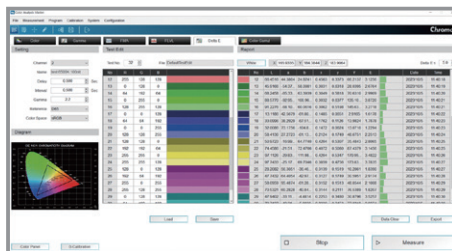

FMA Measurement

FLVL Measurement

Delta E (∆E) Measurement

The 71242 supports Delta E 2000 measurement and allows users to customize a list of primary colors ranging from 0 to 255. This can be used in conjunction with color gamut, gamma values, and reference white point measurements. Setting the Delta E upper limit control value helps users to quickly assess whether the color difference meets the specifications. The measured color coordinates are displayed in real-time on the CIE 1931 chart for closer examination. Standard image output from Chroma's Video Pattern Generator 2238 for measurement is also supported.


Color Gamut Measurement

Multiple color gamuts are available for selection, including B.T. 2020, Adobe RGB, NTSC, and others. The measured values are displayed through color coordinates as well as a triangular frame on the CIE 1931 chart, which makes viewing the results much more intuitive. After measurement, the software instantly calculates the percentage covered by the device under test in each color gamut.
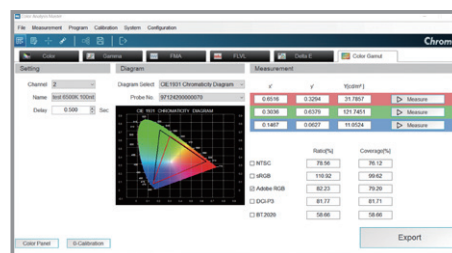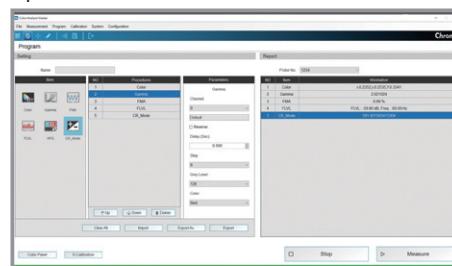

Color Calibration

Color Analysis Master provides a function that directly reads the values of the device under calibration. This eliminates the need for users to transcribe data, avoiding human error and enhancing calibration efficiency and accuracy.
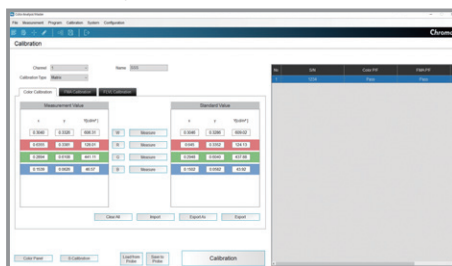
Test Program Editing

The software enables users to program their own test items and inspection specifications, either directly on the main unit or via a PC. Edited test programs can be saved for use on other units without the need for reprogramming, resulting in convenient and efficient operation.

SPECIFICATIONS

Model			71242
Measurement Area			Ø10mm / 0.39 inch
Measurement Distance			30 ±10 mm
Display Range	Luminance		0.0001 to 3,000 cd/m^2
	Chromaticity		4 or 3 digits display
Luminance [*2]	Measurement Range		0.001 to 3,000 cd/m^2
	Accuracy	0.001 to 0.009 cd/m^2	±9%
		0.01 to 0.09 cd/m^2	±2.5%
		0.1 to 0.9 cd/m^2	±2.0%
		1 to 9 cd/m^2	±2.0%
		10 to 99 cd/m^2	±1.5%
		>100 cd/m^2	±1.5%
	Repeatability	0.001 to 0.009 cd/m^2	7%
		0.01 to 0.09 cd/m^2	1%
		0.1 to 0.9 cd/m^2	0.25%
		1 to 99 cd/m^2	0.10%
		>100 cd/m^2	0.10%
Chromaticity [*2]	Measurement Range		0.01 to 3,000 cd/m^2
	Accuracy	0.01 to 0.09 cd/m^2	±0.003
		0.1 to 0.9 cd/m^2	±0.002
		1 to 9 cd/m^2	±0.002
		10 to 99 cd/m^2	±0.002
		>100 cd/m^2	±0.002
	Repeatability	0.01 to 0.09 cd/m^2	0.0020
		0.1 to 0.9 cd/m^2	0.0008
		1 to 9 cd/m^2	0.0003
		10 to 99 cd/m^2	0.0002
		>100 cd/m^2	0.0002
Flicker - Contrast Method (FMA)	Measurement Range		5 cd/m^2 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/m^2 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/m^2 or less: 1 time/sec. 0.15 cd/m^2 or higher: 6 times/sec. 2 cd/m^2 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 (4ms to 4s)
User Calibration Channels			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)
Dimensions (HxWxD)			60 x 60 x 184 mm / 2.4 x 2.4 x 7.26 inch
Weight			0.64 Kg / 1.41 lb

*1:Signal output and probe measurement functions can be controlled through a compatible video signal generator from Chroma.

*2: Based on Chroma's testing conditions. Reference Standards: IEC 61747-6, EIAJ ED-2522, ASTM E455-03, VESA Standard.

* All specifications are subject to change without notice.

ORDERING INFORMATION

71242: Small Size Measurement Probe
71241: High Accuracy Universal Measuring Probe
2238: Video Pattern Generator (optional)
2918: Flat Panel Display Tester (optional)

Get more product and distributor information in Chroma ATE APP
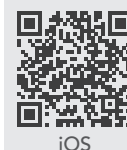
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