



ICAC User Manual

**ICAC - (Intelligent Connection for
Alignment & Calibration)**

Setup

Calibration

Measurement

ICAC (Intelligent Connection for Alignment & Calibration)

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I. OVERVIEW

PLURA ICAC (Intelligent Connection for Alignment & Calibration) Freeware Tool was created, engineered and utilized to calibrate multiple color related elements in all Plura monitors automatically using recommended color probes.

1) Functions and Features

PLURA ICAC (Intelligent Connection for Alignment & Calibration) Tool can be used to measure, adjust and calibrate the items below:-

- Brightness levels
- Gamma
- Color Space levels
- Color temperature
- Back-light uniformity

The ICAC can load custom & save target levels as well as save measurement & calibration log files

2) Third-party integrated probes

The below third party probes has been integrated to calibrate & measure all Plura monitors automatically.

- Klein K-10
- Minolta CA-310
- Minolta CA-210
- Specbos 1201
- Spyder Elite

These above probes can also calibrate & color measure other third party monitors manually.*

(*Provided the third party monitor has manual color adjustment capabilities...)

3) System Requirements

- Operating System: MS Windows 2000, XP, Vista, 7, 10
- Display resolution: min. 1280*800

Note: - System requirements and software are subject to change based on ongoing application developments.

4) About

- Please make sure you are using the latest version number of this application - V18.2.



II. Components

1) Menu Tabs

- **Measure:** To measure the uniformity, white balance, Gamma and displays the graph associated with those measurements.
- **Setup:** Set the connection between monitor & probe.
- **Calibration:** Execute monitor calibration.

2) Control Section

This section provides:-

- Current connection status of the color probe and the monitor.
- Display and the calibration ID of the connected monitor.
- Display measured (x, y, u, v, Lv, T, and delta uv) values of the connected monitor..
- Display the probe position on the connected monitor.

3) Measurement Data Section

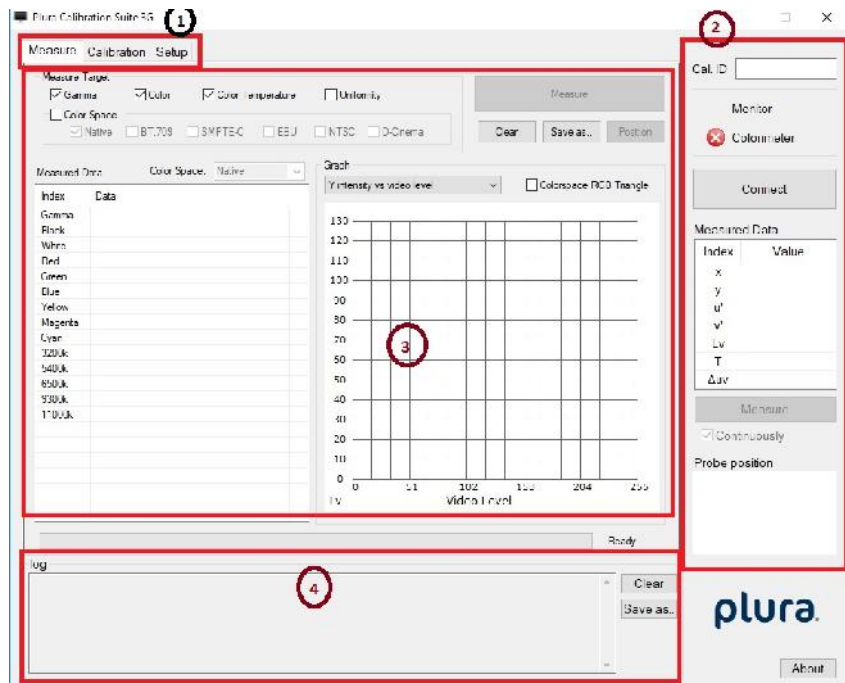
This section provides:-

- All measurement data after measurement process is completed.
- Gamma graphs.

4) Log Section

The section provides:-

- **Log window:** Displays all major logging data that took place during the measurements & calibration process.



- Clear Log: Clear the Log window.
- Save Log: Save the contents of Log windows to Txt file.

III. Setup & Status

1) Monitor

- Set the monitor serial port.

2) Colorimeter / Probe

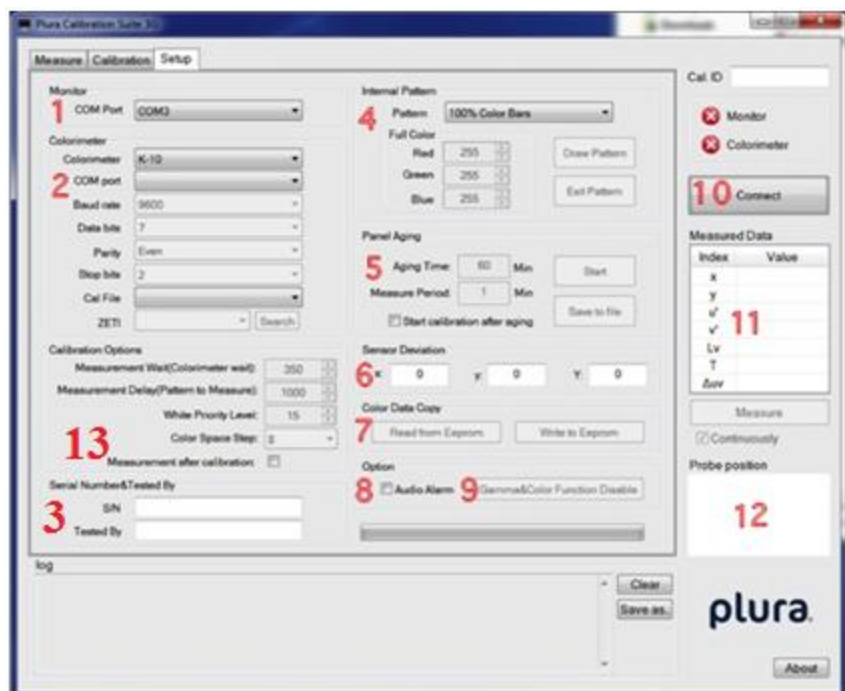
- Select the correct probe type.
- Set the serial settings for the probe.
- Baud rate, Data, Parity, Stop bits will be applied Automatically

As an example

k-10: 9600, 8, none, 1

CA-210 & CA-310: 9600, 7, even, 2

Jeti probe connects using USB and set up automatically



3) Information

- Monitor S/N and Calibration Info.

4) Pattern

- Internal Pattern settings.

We recommend the below aging times based on the monitors series

(PBM, LCM Series) – 1 Hour

(PRM-3G) – 2 Hours

The aging process is an essential part to stabilize the luminance levels of the backlight and luminance values of the monitor to ensure an accurate calibration process and results.

5) Panel Aging

- Monitor aging settings prior calibration.

6) Sensor Deviation

- Deviation corrections between different probes such as CA-310, K-10 & Jeti.

7) Color Data Copy

- User can copy calibration data between multiple monitors.

8) Audio Alarm

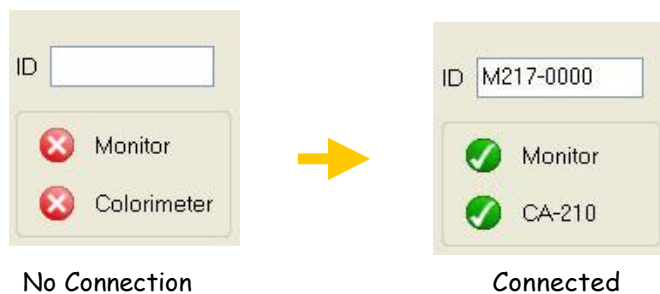
- Audio alarm option when calibration process is complete.

9) Gamma & Color Function Disable

- Panel default gamma and color values are enabled when selecting this option.

10) Connect

- Select this button to start communicating with the monitor & probe. Once connected successfully, the icon turns from red to green as shown below picture. The calibration ID and version of connected monitor will be displayed.



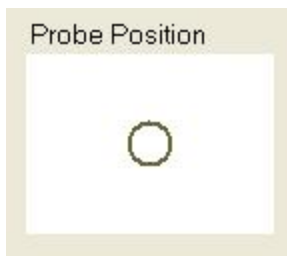
11) Measured Data

- Shows the Color values in real time.

Measure Datas	
index	value
x	0.274
y	0.285
u'	0.187
v'	0.437
Lv	105.000
T	11180
Δuv	0.001

12) Probe Position

- Indicates where the probe position should be placed on the monitor screen.

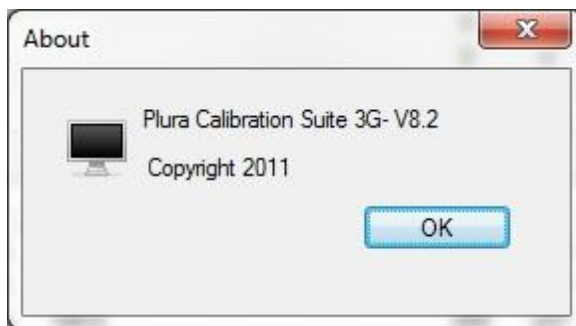


13) Calibration Options

- Other calibration options such as Delay, white priority levels, etc...

14) About

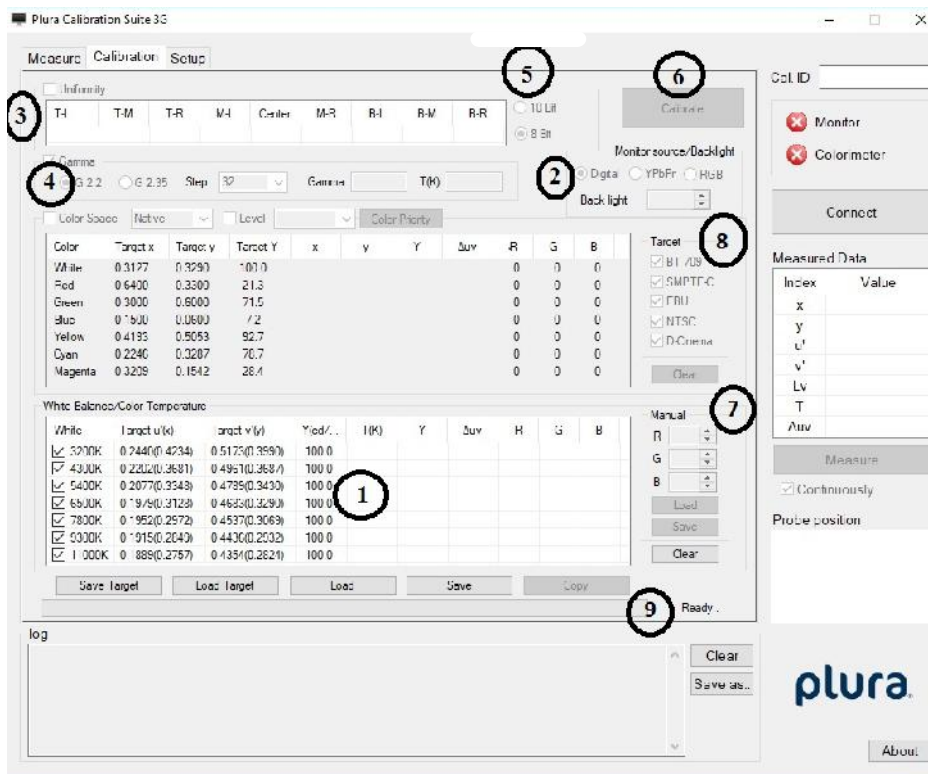
- Software information – V8.2



IV. Calibration

15) Calibration setup

- Once the connection has been established, please follow the below steps 1-12



1. Color Temperature Target levels:

- Select and set the color Temperature target levels

White	Target u'(x)	Target v'(y)	Y(cd...)
3200K	0.2440(0.4234)	0.5173(0.3990)	100.0
4300K	0.2202(0.3681)	0.4961(0.3687)	100.0
5400K	0.2077(0.3348)	0.4789(0.3430)	100.0
6500K	0.1979(0.3128)	0.4683(0.3290)	100.0
7800K	0.1952(0.2972)	0.4537(0.3069)	100.0
9300K	0.1915(0.2849)	0.4436(0.2932)	100.0
11000K	0.1889(0.2757)	0.4354(0.2824)	100.0

- Check all required color temperature selections that you want the monitor to calibrate to.
- Each Color Temperature has u (x), v (y), Luminance target values.
- Save the target values
- Load the target values

** PRM-3G & PBM-224-3G-10E, please deselect 1100K option.

2. Target Source

- Select the monitor input source.

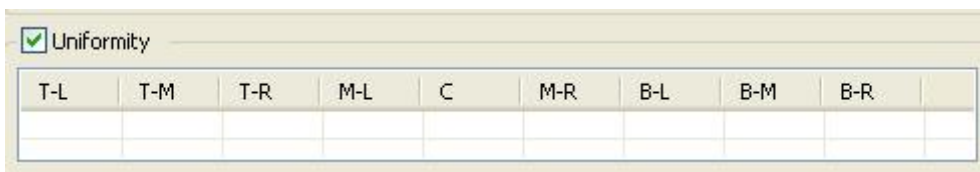


- Digital: Will include calibration to all inputs (SDI, DVI & HDMI).
- YPbPr: Will calibrate white balance to YPbPr input.
- RGB: Will calibrate white balance to RGB input.

**RGB & YPbPr selection will ONLY calibrate the white balance.

3. Panel Uniformity

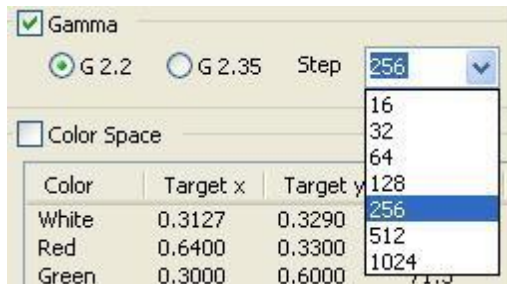
- When selected, panel uniformity is performed.



- The panel is divided into 9 sections. During this process the program will prompt you to move the probe towards all 9 sections sequentially. The probe will read values from each section and will adjust it accordingly to improve the panel uniformity within 10% delta range.

4. Gamma

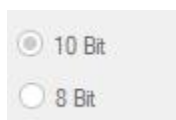
- When selected, gamma adjustment is performed.



- Gamma calibration will be executed when the box is checked
- Select one of the Gamma target levels G 2.2 or G 2.35. When the Gamma calibration process is successfully completed, the monitor's default Gamma would be set to the specified Gamma target level.
- Step settings should correspond to the native color depth of the monitor panel you are about to calibrate. i.e. 10 bit select 1024, 8 bit select 256. The higher the step level the longer the calibration process will take to complete.
"As an example the calibration process for PRM-224-3G-O with 1024 step takes up to 2 hours."

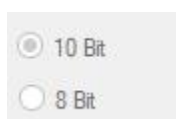
5. Color Depth

- This only applies to PRM-224-3G-10 & PRM-224-3G-O



6. Auto Calibration

- This only applies to PRM-224-3G-10 & PRM-224-3G-O

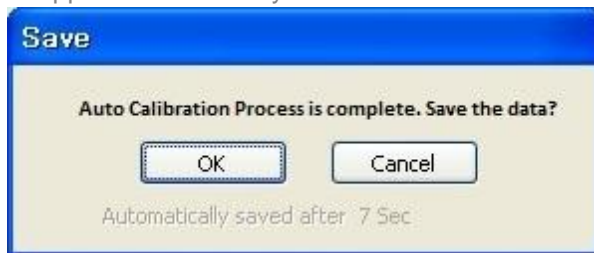


16) Calibration results

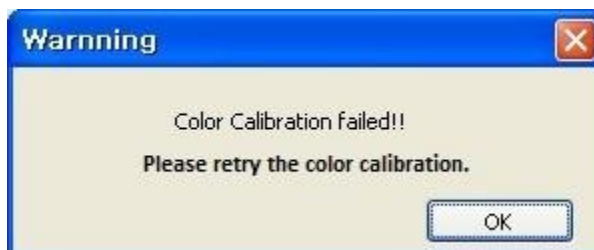
- Once the calibration process is complete the below monitor RGB values should be populated within the monitor section as below.

Monitor								
White	T(K)	L(cd/...	Δuv	ΔE	R	G	B	
<input checked="" type="checkbox"/> 3200K	3216	98.0	0.0003	1.0609	245	176	113	<input type="button" value="Clear Data"/> <input type="button" value="Save to eeprom"/>
<input checked="" type="checkbox"/> 4300K	4269	100.5	0.0003	1.1088	232	184	157	
<input checked="" type="checkbox"/> 5400K	5424	99.5	0.0003	0.6090	220	186	182	
<input checked="" type="checkbox"/> 6500K	6459	100.2	0.0004	0.9296	214	188	200	
<input checked="" type="checkbox"/> 7800K	7784	100.9	0.0007	0.9089	208	190	216	
<input checked="" type="checkbox"/> 9300K	9263	101.6	0.0009	1.3437	204	191	229	
<input checked="" type="checkbox"/> 11000K	10862	100.4	0.0004	0.9284	200	190	237	

- All boxes that are checked across from the color temperature means that these values been applied and stored to the monitor.
- During the calibration process, you can see the range of correction in all fields T, L, Δuv , ΔE .
- The final R, G & B levels shown are the current values been applied to the monitor.
- RGB gain can be adjusted manually if needed, see below "Manual Gain Control"
- When color calibration process is completed successfully a pop up window will be displayed as below. If you don't select OK to save data within 15 sec the data will be saved and window will disappear automatically.



- If the calibration process is failed for any reason, a pop up window will be displayed as below.



7. Manual Gain Adjustments

- You can adjust the color temperature and white balance manually.

White Balance/Color Temperature

Save Target Load Target

White	Target u'(x)	Target v'(y)	Y(cd...)	T(K)	Y	Δuv	R	G	B
<input checked="" type="checkbox"/> 3200K	0.2440(0.4234)	0.5173(0.3990)	100.0						
<input checked="" type="checkbox"/> 4300K	0.2202(0.3681)	0.4961(0.3687)	100.0						
<input checked="" type="checkbox"/> 5400K	0.2077(0.3348)	0.4789(0.3430)	100.0						
<input checked="" type="checkbox"/> 6500K	0.1979(0.3128)	0.4683(0.3290)	100.0						
<input checked="" type="checkbox"/> 7800K	0.1952(0.2972)	0.4537(0.3069)	100.0						
<input checked="" type="checkbox"/> 9300K	0.1915(0.2849)	0.4436(0.2932)	100.0						
<input checked="" type="checkbox"/> 11000K	0.1889(0.2757)	0.4354(0.2824)	100.0						

Manual

R

G

B

Load

Save

Clear

- To change the color temperature manually, click on the color temperature in monitor list and enter the required RGB gain values. RGB gain values should be (0~255).
- Load button allows you to load the RGB values from the connected monitor to the calibration suite.
- Save button allows you to save the RGB values back to the connected monitor.

8. Color Space Adjustments for PRM

- This option is ONLY available when you are calibrating PRM monitor series.

☒ Color Space

Color	Target x	Target y	Target Y	x	y	Y	Δuv	R	G	B
White	0.3127	0.3290	100.0							
Red	0.6400	0.3300	21.3							
Green	0.3000	0.6000	71.5							
Blue	0.1500	0.0600	7.2							
Yellow	0.4193	0.5053	92.7							
Cyan	0.2246	0.3287	78.7							
Magenta	0.3209	0.1542	28.4							

BT.709

Target

☒ BT-709

☒ SMPTE-C

☒ EBU

☒ NTSC

☒ D-Cinema

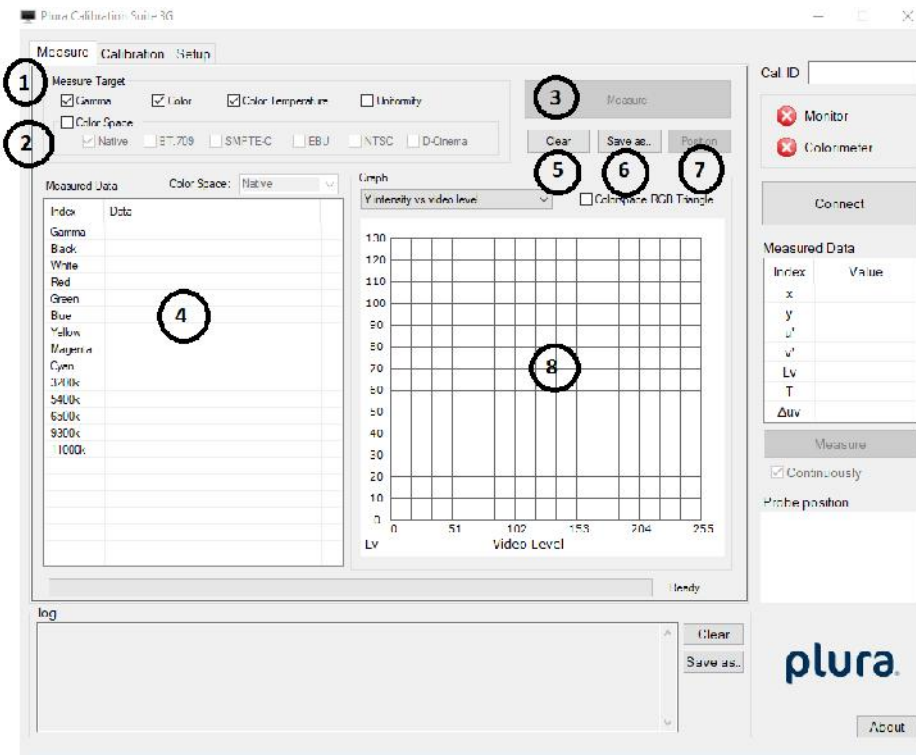
Clear

9. Progress Bar

- This shows the calibration progress.



V. Measurement



- This page will allow you to measure, save all the below measurements data as TXT file to any monitor and display the associated graphs with the measured data.
 - o Uniformity
 - o White Balance
 - o Gamma
 - o Color Space

1) Target

- Select the items you need to measure from the list shown.

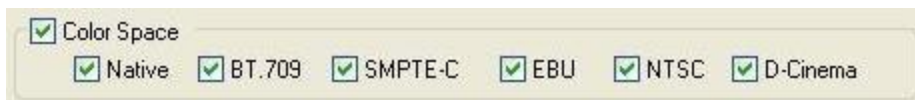


- Gamma: Measure gamma of the panel 0-256 steps
- Color: Measure the color space for White, Black, Red, Green & Blue o the c Select the items you need to measure from the list shown.
- Gamma: Measure the color temperature at 3200K, 4500K, 6500K, 9300K and 11000K.

- Uniformity: Measure panel uniformity.

2) Color Space

- Select the required color space you need to measure. Select all only when measuring a PRM-3G monitor.



3) Measure

- Select measure when you want to start the measuring process.

4) Report Window

- The measured values will be displayed in this area as shown below

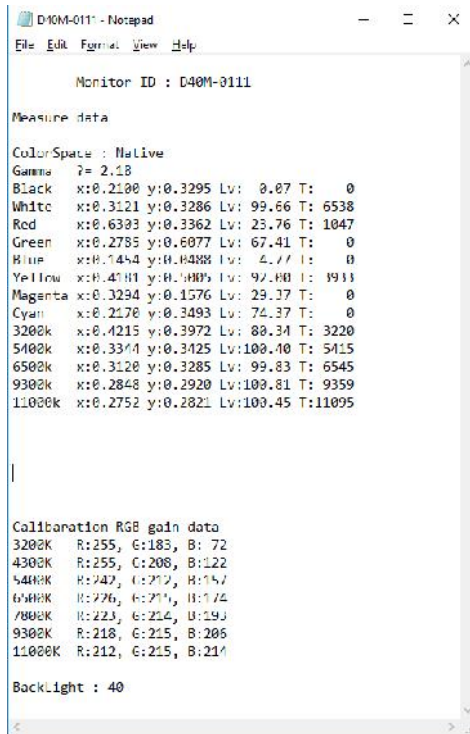
Index	Data
Gamma	r= 2.18
Black	x:0.0003 y:0.0003 L*:107.00 T: 0 Δuv:0...
White	x:0.3130 y:0.3280 L*:107.00 T: 6500 Δuv:...
Red	x:0.6280 y:0.3390 L*: 26.60 T: 0 Δuv:0...
Green	x:0.2830 y:0.6020 L*: 71.30 T: 0 Δuv:0...
Blue	x:0.1470 y:0.0650 L*: 8.25 T: 0 Δuv:0...
3200k	x:0.4240 y:0.4000 L*:113.00 T: 3190 Δuv:...
5400k	x:0.3350 y:0.3480 L*:109.00 T: 5390 Δuv:...
6500k	x:0.3130 y:0.3280 L*:107.00 T: 6500 Δuv:...
9300k	x:0.2840 y:0.2970 L*:105.00 T: 9240 Δuv:...
11000k	x:0.2740 y:0.2850 L*:105.00 T:11180 Δu...
C	x:0.3130 y:0.3280 L*:107.00 T: 6500 Δuv:...
L-T	
C-T	
R-T	
L-M	
R-M	
L-B	
C-B	
R-B	

5) Clear Report

- Select this button to clear the measured values from the report window.

6) Save Report

- Save the measured values to Txt file. As shown below



7) Position

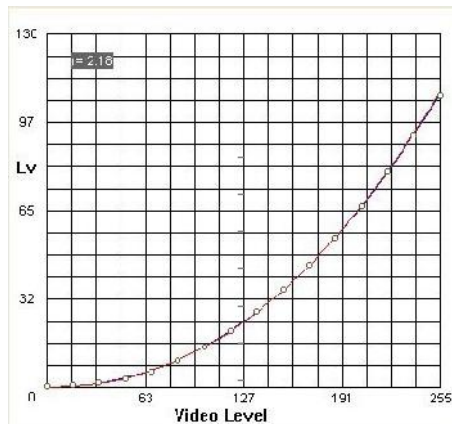
- To change probe position manually when measuring the uniformity. Once position is selected you SHOULD select measure button to restart the measurement process.

8) Graph

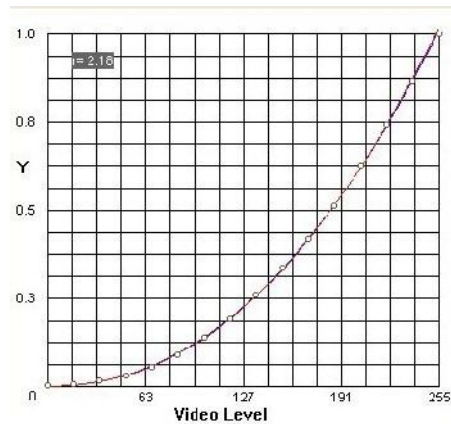
- The measure data will be displayed in the graph section and you can select from the below options



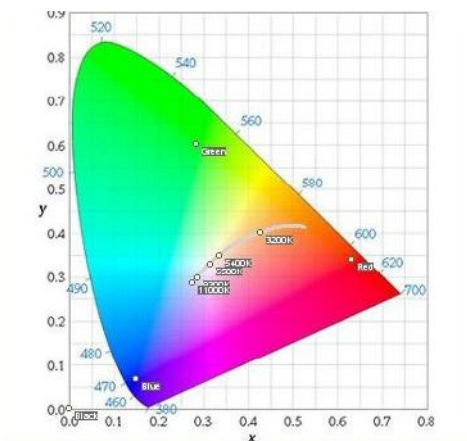
1- Y intensity vs video level



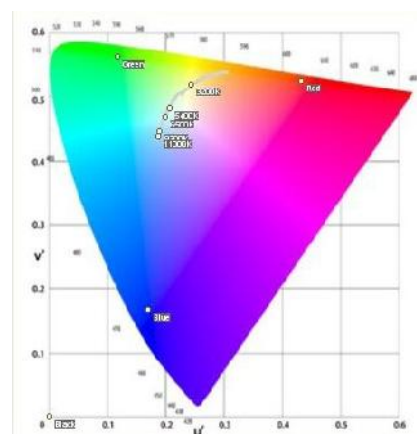
2- Y/Ymax vs Video Level



3-CIE chart (xy Plot)



4-CIE chart(u v plot)



- Graphs 1 & 2 above are displayed when the Gamma is measured. When Target Gamma is selected to 2.2, the blue line represents the 2.2 Gamma level and the red line represents the actual measured Gamma level. When the blue & red lines are matched then the measured monitor Gamma level is correct and set to 2.2.
- Graphs 3 & 4 above are displayed when the color space & color temperature been measured.

VI. Target and Tolerance Values

- This tool is set to the default color calibration target and tolerance values as shown below.

- 1- Gamma: White 2.20+/-0.02 or 2.35+/-0.02

2- Color temperature target levels

Color Temperature	x	y	u	v
3200K	0.4234	0.3990	0.2440	0.5173
5400K	0.3348	0.3430	0.2077	0.4789
6500K	0.3128	0.3290	0.1979	0.4683
9300K	0.2849	0.2932	0.1915	0.4436

3- Color Temperature tolerance

x	y	u v	Y (%)
±0.005	±0.005	0.006	±10

4- Luminance: 100 cd+/- 2

5- Uniformity: 10%

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