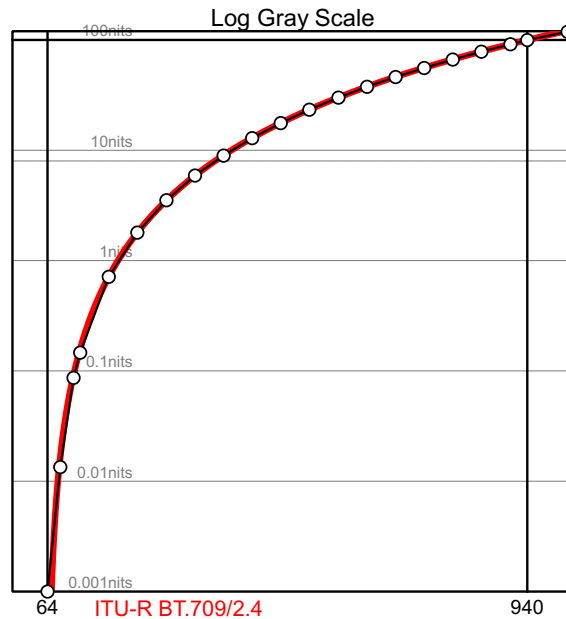
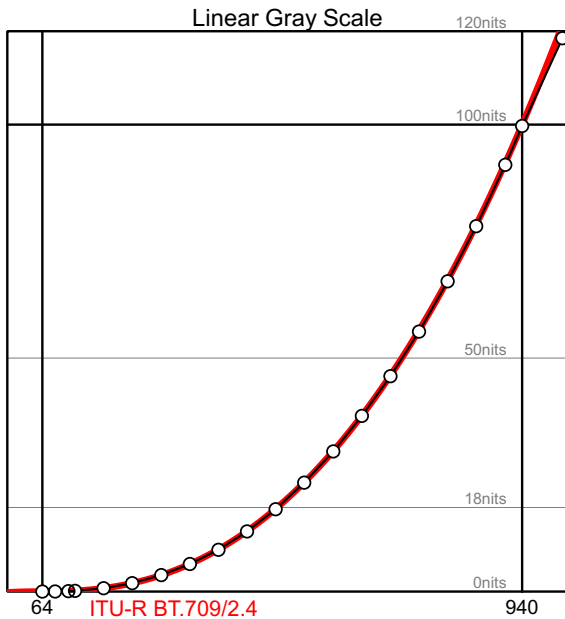


# TVLogic LUM-310X Calibration Report

Model	Serial No.	Date	Probe	Probe Serial	Probe Channel
LUM-310X	123456789012	2020/06/11 09:19	K-10A	U005310	Factory Cal File(0)
XYZ coefficient		Probe Calibration file			Measurement Limit(nit)
X=1.0384, Y=1.0000, Z=1.0099		LUM-310X_K-10A_U005310_20200605.probe			No information

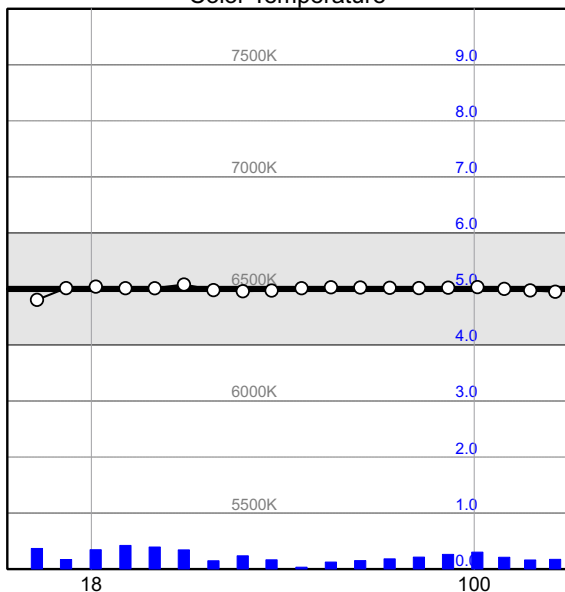
## Grayscale Tone Reproduction (SDR)



Linear graph helps to evaluate the accuracy of color reproduction in the highlight. Red solid line is target tone curve and white dots are the actual measurement result of the monitor.

Log graph helps to evaluate the accuracy of color reproduction in the shadow (dark colors). Black level and in-frame dynamic range are decided by the specification of the display panel technology and backlight.

### Color Temperature

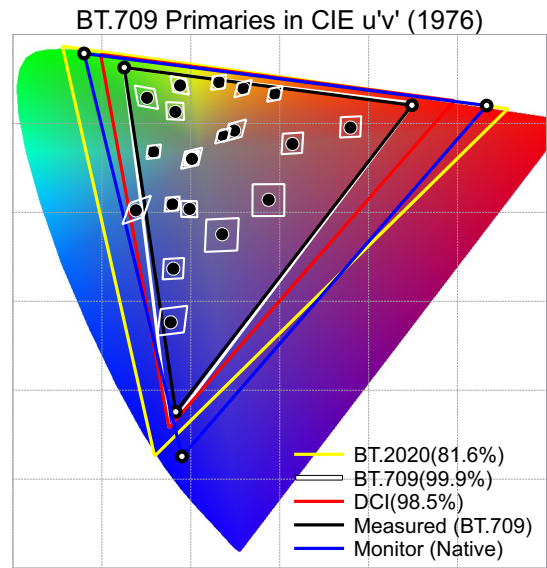
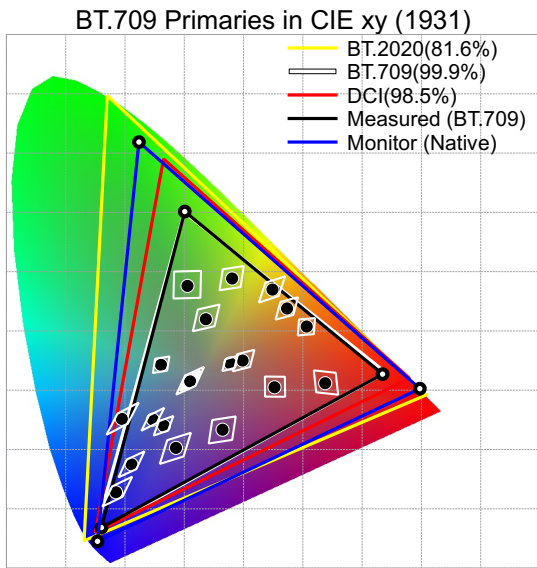


### Gray Scale Result Table

	Measured	Color Temp.	deltaE
Black	0.0002nits		
18 nits	17.9nits	6512K	0.3
30 nits	29.9nits	6498K	0.4
40 nits	40.0nits	6510K	0.2
50 nits	49.9nits	6490K	0.2
60 nits	59.9nits	6498K	0.1
70 nits	69.9nits	6507K	0.1
80 nits	79.8nits	6506K	0.2
90 nits	89.7nits	6504K	0.2
100 nits	99.7nits	6510K	0.3
Maximum	118.5nits	6486K	0.2

Target color temperature is D65 (Daylight 6500K) and the calibration tolerance is between 6250K and 6750K. Blue bars show the color difference (deltaE 2000) of actual measurement values from the target. Red bars and red numbers are also the color difference but the target is outside of the gamut. DeltaE values of Grade 1 monitors should be less than 1.0.

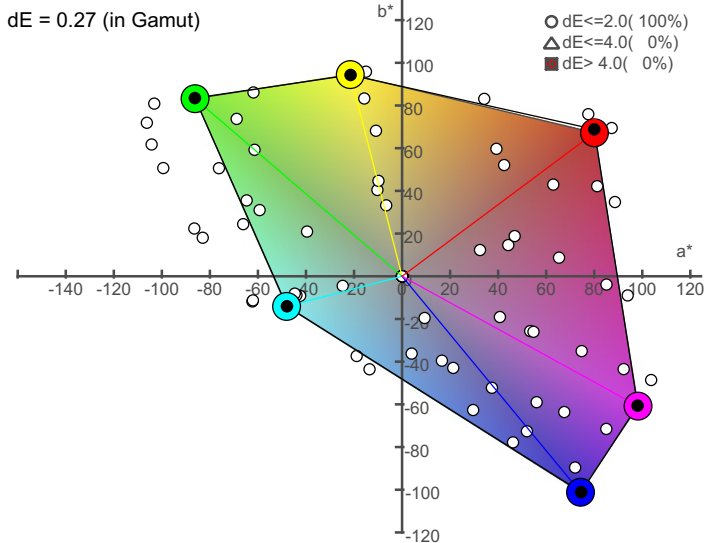
## Color Reproduction Evaluation (SDR)



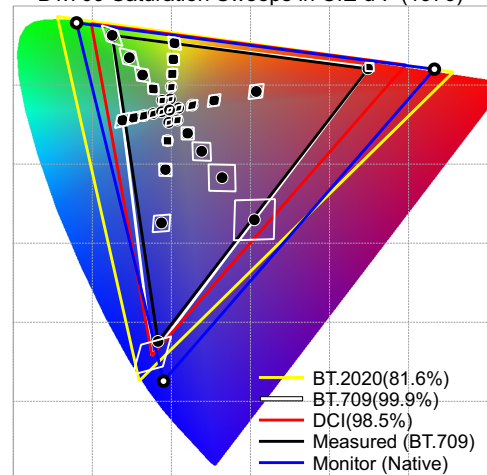
Black dots are measured values of 24 colors from Gretag-Macbeth color chart after calibration. Tetragonals show the areas within deltaE 4.0. Percentage number in legends are gamut covering ratios calculated by actual measurements.

### BT.709 Evaluation in CIE LAB (1976)

Big Circle (BT.709), Small black Circle (Measured)



### BT.709 Saturation Sweeps in CIE u'v' (1976)



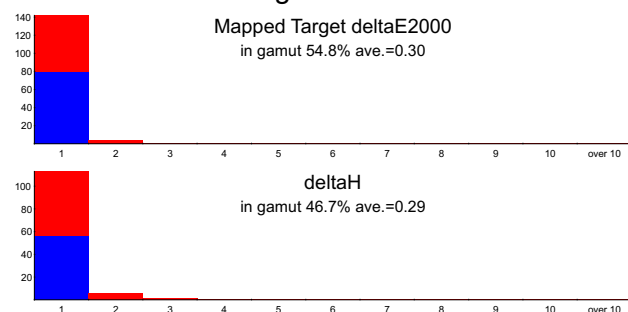
This graph helps to evaluate if the primary and sub-primary colors are accurately reproduced.

### Primary and Secondary Colors

R	Red (940, 64, 64)	dE= 0.7	
G	Green (64, 940, 64)	dE= 0.1	
B	Blue (64, 64, 940)	dE= 1.3	
C	Cyan (64, 940, 940)	dE= 0.1	
M	Magenta (940, 64, 940)	dE= 0.1	
Y	Yellow (940, 940, 64)	dE= 0.1	

Colored area with big circles of RGB & CMY is the target (BT.709). Small black circles with hexagonal lines are measured. Small white dots are measured colors with less than deltaE 2.0 errors.

### Calibration Error Histogram for 146 colors



Upper is deltaE2000, lower is dH(hue angle error) distribution. Blue bar is in gamut colors, red bar is for color outside of the gamut, calculated the error with mapped target.

## Color Checker Evaluation (SDR)

Gretag-Macbeth 24 Colors(deltaE 2000)

Macbeth1	dark skin (496, 371, 339)	dE= 0.3			
Macbeth2	light skin (759, 598, 559)	dE= 0.1			
Macbeth3	blue sky (434, 506, 649)	dE= 0.2			
Macbeth4	foliage (402, 461, 333)	dE= 0.3			
Macbeth5	blue flower (552, 527, 718)	dE= 0.2			
Macbeth6	bluish green (464, 726, 696)	dE= 0.1			
Macbeth7	orange (827, 516, 260)	dE= 0.2			
Macbeth8	purplish blue (361, 403, 679)	dE= 0.1			
Macbeth9	moderate red (756, 391, 451)	dE= 0.2			
Macbeth10	purple (422, 294, 482)	dE= 0.1			
Macbeth11	yellow green (646, 722, 324)	dE= 0.2			
Macbeth12	orange yellow (863, 637, 269)	dE= 0.1			
Macbeth13	blue (271, 298, 619)	dE= 0.4			
Macbeth14	green (355, 593, 358)	dE= 0.3			
Macbeth15	red (696, 299, 309)	dE= 0.3			
Macbeth16	yellow (889, 756, 235)	dE= 0.2			
Macbeth17	magenta (735, 379, 622)	dE= 0.1			
Macbeth18	cyan (64, 548, 678)	dE= 0.3			
Macbeth19	white (920, 893, 937)	dE= 0.2			
Macbeth20	neutral 8 (783, 760, 797)	dE= 0.3			
Macbeth21	neutral 6.5 (650, 631, 661)	dE= 0.2			
Macbeth22	neutral 5 (520, 505, 528)	dE= 0.1			
Macbeth23	neutral 3.5 (392, 382, 398)	dE= 0.0			
Macbeth24	black (274, 268, 278)	dE= 0.3			

EBU 15 Colors (deltaE 2000)

EBU1	Dark Skin (483, 358, 305)	dE= 0.2			
EBU2	Light Skin (770, 606, 536)	dE= 0.2			
EBU3	Light Greyish Red (705, 552, 520)	dE= 0.2			
EBU4	Light Yellow Green (528, 623, 265)	dE= 0.1			
EBU5	Light Bluish Green (423, 619, 637)	dE= 0.3			
EBU6	Light Violet (634, 556, 740)	dE= 0.1			
EBU7	Foliage (395, 497, 308)	dE= 0.3			
EBU8	Medium Red (754, 381, 375)	dE= 0.2			
EBU9	Medium Green (439, 747, 419)	dE= 0.1			
EBU10	Medium Blue (402, 467, 700)	dE= 0.2			
EBU11	Dark Red (479, 275, 279)	dE= 0.2			
EBU12	Dark Green (368, 557, 324)	dE= 0.3			
EBU13	Dark Blue (289, 311, 511)	dE= 0.4			
EBU14	Medium Yellow Red (903, 611, 359)	dE= 0.2			
EBU15	Medium Purple (619, 441, 655)	dE= 0.1			

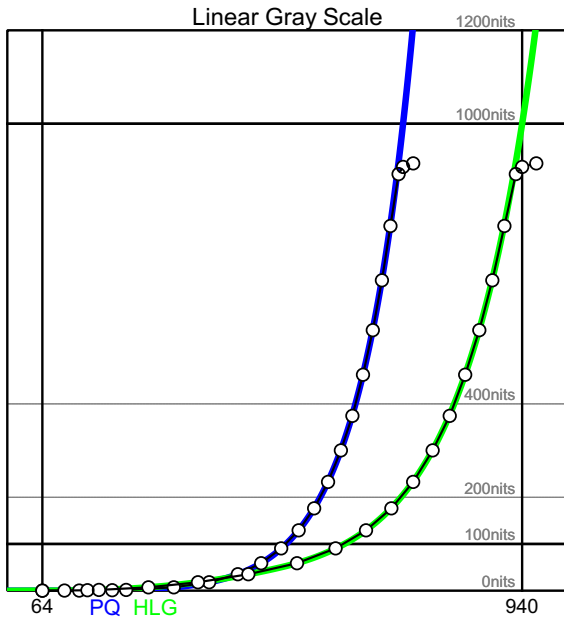
EBU 15 Colors (deltaE L\*u\*v\*)

EBU1	Dark Skin (483, 358, 305)	dE= 0.3			
EBU2	Light Skin (770, 606, 536)	dE= 0.5			
EBU3	Light Greyish Red (705, 552, 520)	dE= 0.3			
EBU4	Light Yellow Green (528, 623, 265)	dE= 0.3			
EBU5	Light Bluish Green (423, 619, 637)	dE= 0.5			
EBU6	Light Violet (634, 556, 740)	dE= 0.2			
EBU7	Foliage (395, 497, 308)	dE= 0.7			
EBU8	Medium Red (754, 381, 375)	dE= 0.5			
EBU9	Medium Green (439, 747, 419)	dE= 0.3			
EBU10	Medium Blue (402, 467, 700)	dE= 0.3			
EBU11	Dark Red (479, 275, 279)	dE= 0.3			
EBU12	Dark Green (368, 557, 324)	dE= 1.0			
EBU13	Dark Blue (289, 311, 511)	dE= 0.5			
EBU14	Medium Yellow Red (903, 611, 359)	dE= 0.3			
EBU15	Medium Purple (619, 441, 655)	dE= 0.3			

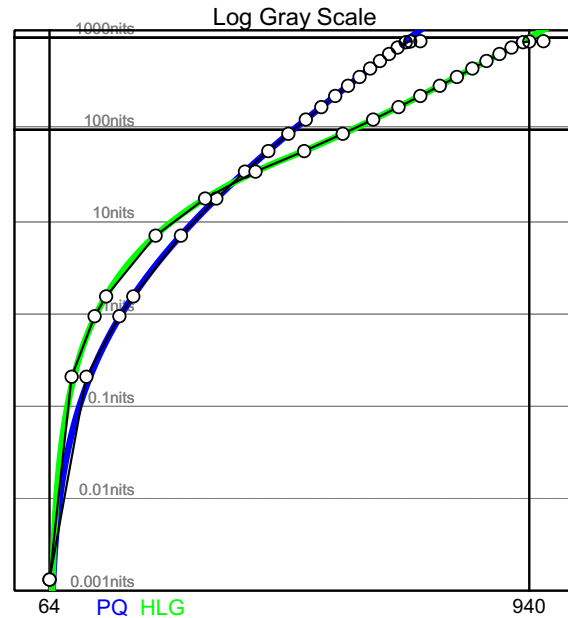
EBU 15 colors are from EBU-Tech. 3325 (Sep. 2008) Table 8.

# TVLogic LUM-310X Calibration Report (HDR)

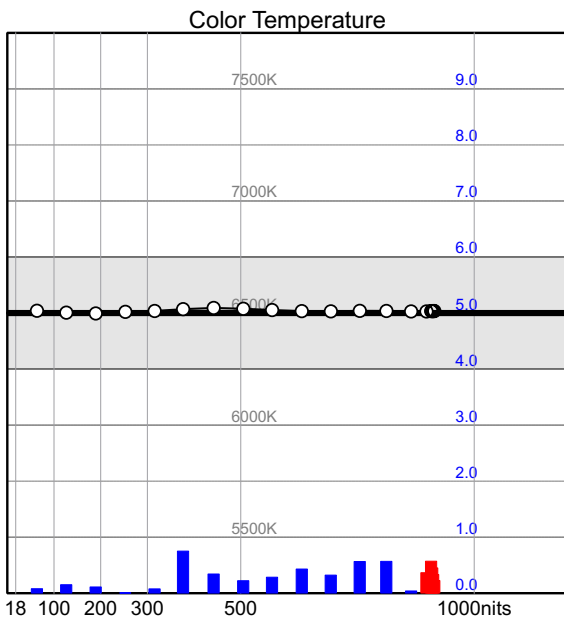
## Grayscale Tone Reproduction (HDR)



Linear graph helps to evaluate the accuracy of color reproduction in the highlight. Red solid line is target tone curve and white dots are the actual measurement result of the monitor.



Log graph helps to evaluate the accuracy of color reproduction in the shadow (dark colors). Black level and in-frame dynamic range are decided by the specification of the display panel technology and backlight.



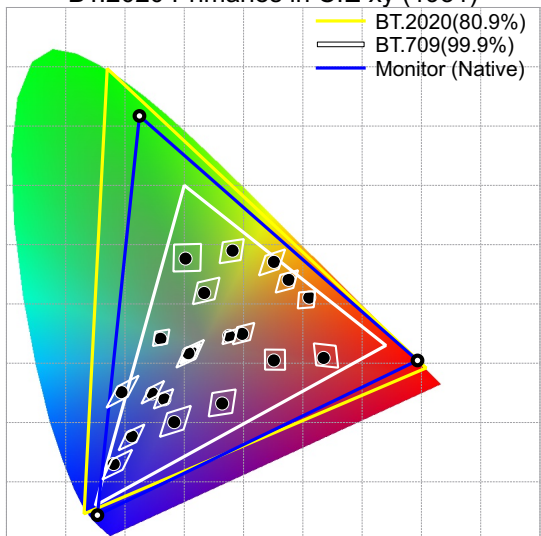
Target color temperature is D65 (Daylight 6500K) and the calibration tolerance is between 6250K and 6750K. Blue bars show the color difference (deltaE 2000) of actual measurement values from the target. Red bars and red numbers are also the color difference but the target is outside of the gamut. DeltaE values of Grade 1 monitors should be less than 1.0.

Gray Scale Result Table(HDR)

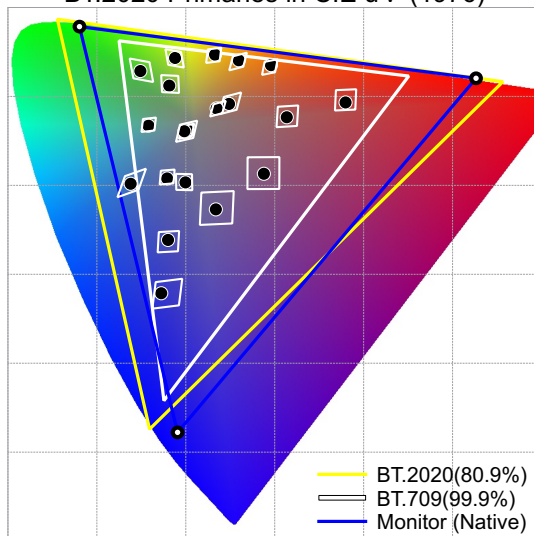
	Measured	Color Temp.	deltaE
Black	0.0013nits		
100 nits	101.0nits	6502K	0.2
200 nits	200.3nits	6500K	0.1
300 nits	299.5nits	6507K	0.3
400 nits	399.0nits	6519K	0.4
500 nits	500.3nits	6520K	0.3
600 nits	599.4nits	6511K	0.1
700 nits	698.3nits	6508K	0.2
800 nits	793.8nits	6510K	0.8
900 nits	877.8nits	6507K	0.1
1000 nits	907.5nits	6509K	0.6
Maximum	915.0nits	6509K	0.2

## Color Reproduction Evaluation (HLG)

BT.2020 Primaries in CIE xy (1931)



BT.2020 Primaries in CIE u'v' (1976)

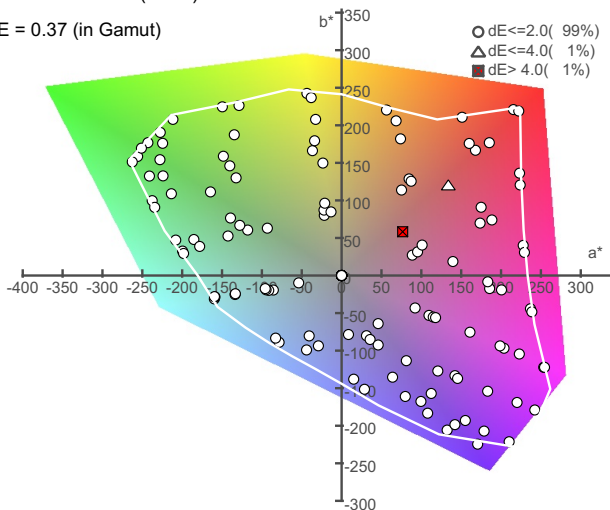


Black dots are measured values of 24 colors from Gretag-Macbeth color chart after calibration. Tetragons show the areas within  $\Delta E$  4.0. Blue triangle is the gamut of this monitor. All BT.2020 colors will be decently mapped inside of this gamut by the calibration.

### HLG/BT.2020 Evaluation in CIE LAB (1976)

Monitor Gamut(white) and Error distribution

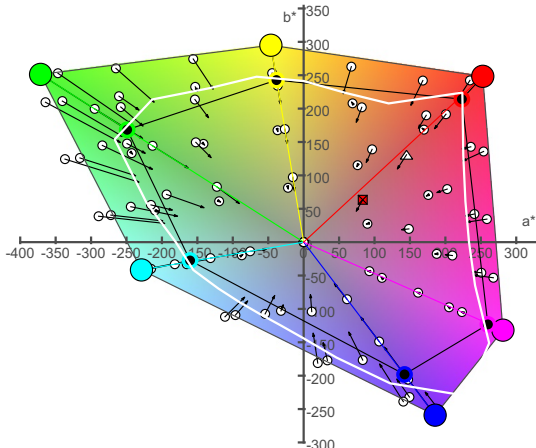
$dE = 0.37$  (in Gamut)



Colored area is the BT.2020 color gamut. White solid line shows the boundary of the monitor's color gamut. Small white dots are measured colors with less than  $\Delta E$  2.0 errors.

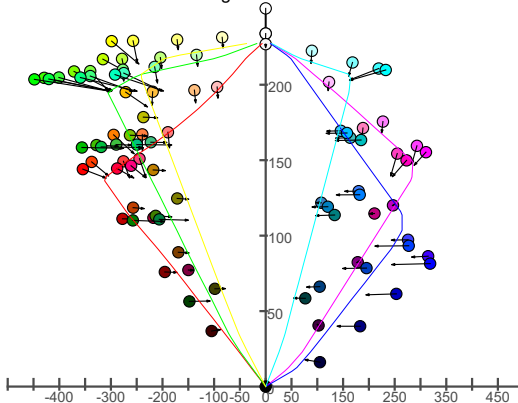
### Colors outside of the monitor's gamut

Viewed from top of the gamut



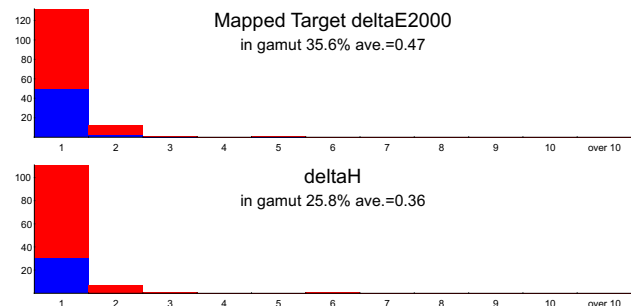
### Colors outside of the monitor's gamut

Viewed from side of the gamut



The two graphs above shows how the colors outside of the monitor's color gamut are mapped onto the monitor's gamut surface. For these colors outside the monitor's color gamut, the brightness and/or saturation are reduced while preserving the same color hue.

### Calibration Error Histogram for 146 colors



Upper is  $\Delta E_{2000}$ , lower is  $dH$  (hue angle error) distribution. Blue bar is in gamut colors, red bar is for color outside of the gamut, calculated the error with mapped target.

## Color Checker Evaluation (HLG)

Gretag-Macbeth 24 Colors (deltaE 2000)

Macbeth1	dark skin (331, 272, 244)	dE= 0.3		
Macbeth2	light skin (499, 424, 389)	dE= 0.7		
Macbeth3	blue sky (330, 356, 463)	dE= 0.3		
Macbeth4	foliage (298, 326, 243)	dE= 0.7		
Macbeth5	blue flower (389, 372, 511)	dE= 0.6		
Macbeth6	bluish green (396, 499, 485)	dE= 0.5		
Macbeth7	orange (526, 377, 214)	dE= 1.0		
Macbeth8	purplish blue (202, 268, 489)	dE= 0.4		
Macbeth9	moderate red (481, 301, 316)	dE= 0.3		
Macbeth10	purple (287, 222, 353)	dE= 0.3		
Macbeth11	yellow green (459, 499, 260)	dE= 0.3		
Macbeth12	orange yellow (551, 452, 232)	dE= 0.6		
Macbeth13	blue (225, 219, 468)	dE= 1.8		
Macbeth14	green (315, 411, 264)	dE= 0.5		
Macbeth15	red (442, 230, 222)	dE= 1.0		
Macbeth16	yellow (572, 526, 238)	dE= 0.5		
Macbeth17	magenta (471, 294, 440)	dE= 0.3		
Macbeth18	cyan (257, 379, 486)	dE= 0.3		
Macbeth19	white (604, 595, 615)	dE= 0.2		
Macbeth20	neutral 8 (535, 525, 547)	dE= 0.3		
Macbeth21	neutral 6.5 (450, 441, 461)	dE= 0.9		
Macbeth22	neutral 5 (364, 357, 373)	dE= 0.4		
Macbeth23	neutral 3.5 (280, 275, 286)	dE= 0.5		
Macbeth24	black (203, 199, 207)	dE= 1.0		

EBU 15 + 10 Colors (deltaE 2000)

EBU1	Dark Skin (321, 271, 235)	dE= 0.7		
EBU2	Light Skin (476, 413, 366)	dE= 0.3		
EBU3	Light Greyish Red (443, 382, 357)	dE= 0.4		
EBU4	Light Yellow Green (376, 416, 230)	dE= 0.2		
EBU5	Light Bluish Green (346, 412, 429)	dE= 1.2		
EBU6	Light Violet (417, 382, 493)	dE= 0.5		
EBU7	Foliage (297, 323, 239)	dE= 0.5		
EBU8	Medium Red (454, 297, 273)	dE= 1.1		
EBU9	Medium Green (375, 484, 307)	dE= 0.1		
EBU10	Medium Blue (312, 328, 479)	dE= 0.6		
EBU11	Dark Red (313, 228, 220)	dE= 0.6		
EBU12	Dark Green (291, 377, 251)	dE= 0.7		
EBU13	Dark Blue (239, 240, 370)	dE= 0.5		
EBU14	Medium Yellow Red (536, 421, 274)	dE= 0.6		
EBU15	Medium Purple (396, 320, 445)	dE= 0.4		
HDR1	Luminous Bright Orange (786, 621, 258)	dE= 0.7		
HDR2	Carnation Pink (832, 780, 785)	dE= 0.4		
HDR3	Canary (623, 772, 334)	dE= 0.4		
HDR4	Lush Green (346, 580, 389)	dE= 0.2		
HDR5	Luminous Bright Red (738, 361, 227)	dE= 0.6		
HDR6	Luminous Green (439, 739, 346)	dE= 0.3		
HDR7	Blueish Purple (658, 244, 745)	dE= 0.4		
HDR8	Reddish Purple (735, 307, 626)	dE= 0.5		
HDR9	Anchusa (319, 605, 635)	dE= 0.5		
HDR10	*True Blue (269, 287, 772)	dE= 1.8 *dE= 0.6		

EBU 15 + 10 Colors (deltaE L\*u\*v\*)

EBU1	Dark Skin (321, 271, 235)	dE= 1.4		
EBU2	Light Skin (476, 413, 366)	dE= 0.7		
EBU3	Light Greyish Red (443, 382, 357)	dE= 0.5		
EBU4	Light Yellow Green (376, 416, 230)	dE= 0.7		
EBU5	Light Bluish Green (346, 412, 429)	dE= 2.6		
EBU6	Light Violet (417, 382, 493)	dE= 1.2		
EBU7	Foliage (297, 323, 239)	dE= 1.1		
EBU8	Medium Red (454, 297, 273)	dE= 2.6		
EBU9	Medium Green (375, 484, 307)	dE= 0.5		
EBU10	Medium Blue (312, 328, 479)	dE= 1.5		
EBU11	Dark Red (313, 228, 220)	dE= 1.7		
EBU12	Dark Green (291, 377, 251)	dE= 1.8		
EBU13	Dark Blue (239, 240, 370)	dE= 1.0		
EBU14	Medium Yellow Red (536, 421, 274)	dE= 1.4		
EBU15	Medium Purple (396, 320, 445)	dE= 1.2		
HDR1	Luminous Bright Orange (786, 621, 258)	dE= 1.2		
HDR2	Carnation Pink (832, 780, 785)	dE= 1.2		
HDR3	Canary (623, 772, 334)	dE= 1.6		
HDR4	Lush Green (346, 580, 389)	dE= 1.0		
HDR5	Luminous Bright Red (738, 361, 227)	dE= 1.2		
HDR6	Luminous Green (439, 739, 346)	dE= 1.0		
HDR7	Blueish Purple (658, 244, 745)	dE= 0.8		
HDR8	Reddish Purple (735, 307, 626)	dE= 2.8		
HDR9	Anchusa (319, 605, 635)	dE= 1.1		
HDR10	*True Blue (269, 287, 772)	dE= 12.7 *dE= 1.5		

EBU 15 colors are from EBU-Tech. 3325 (Sep. 2008) and EBU 10 HDR colors are from EBU-Tech.3325 s1 (Sep. 2019). The name of the colors in red are test colors which are outside of the monitor's gamut. These test colors are mapped onto the monitor's gamut surface, and the deltaE between the mapped target color and actual measurement is shown as \*dE and red bar.