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I. Measurements
   A. W,B,RGB with and without ambient light (printed in lab).
   B. Gray scale(0, 2, 4, 8, 16, 32, 128, 255)
   C. Uniformity by CR-200
   D. Horizontal viewing angle (0, 10, 20, 30, 40, 50, 60, 70)

II. Discussions

(2) Report the luminance and chromaticity coordinates for each case as in the following table.

Full screen center performance with ambient light			
	L (cd/m^2)	CIE x	CIE y
White	578.70	0.3130	0.3364
Black	38.61	0.3324	0.3550
Contrast	14.99		
Red	82.04	0.5037	0.3478
Green	218.23	0.3221	0.5144
Blue	58.74	0.2004	0.1684
Gamut Area	9.46		

Full screen center performance with ambient light			
	L (cd/m^2)	CIE x	CIE y
White	537.84	0.3117	0.3358
Black	2.57	0.2805	0.2969
Contrast	209.28		
Red	46.63	0.6283	0.3421
Green	185.25	0.3174	0.5628
Blue	22.92	0.1458	0.0920
Gamut Area	25.06		

(3) **Contrast Ratio**

Contrast is defined and calculated as L_w/L_b .

	With ambient light	Without ambient light
Contrast	14.99	209.28

(4)**Color Gamut**

Please calculate the color gamut area.

CIE 1976 (u′, v′) coordinates are related to (x, y) as follows:

$$u'=4x/(3+12y-2x)$$

$$v'=9y/(3+12y-2x)$$

The gamut area can be calculated by

$$A=256.1|(u'_R-u'_B)(v'_G-v'_B)-(u'_G-u'_B)(v'_R-v'_B)|$$

(5) **Gray Scale**

(a)Plot the measured gray-level luminance vs. command-level values (L vs. V).

(b)Plot the relationship in log vs. log graph. Assume $L=aV^{\gamma}+L_b$, Please determine a and γ.

(6) **Uniformity**

(a)From the measured set of sampled luminance value $L_{w,i}$ (I=1,…,5 or 9) determine the minimum luminance L_{min}, the maximum luminance L_{max}. Calculate the non-uniformity according to

$$\text{Non-uniformity} = (L_{max}-L_{min})/L_{max}*100\%$$

Determine the largest color difference between the pairs of the sampled colors of white

$$\Delta u'v'=[(u'_1-u'_2)^2+(v'_1-v'_2)^2]^{1/2}$$

(7) **Horizontal Viewing Angle**

Plot the measured screen-center luminance as a function of horizontal viewing angle.

Greyscale Measurements

Command Level	Luminance (L)
256	535.89
128	508.56
64	493.02
32	467.76
16	400.61
8	290.99
4	130.46
2	36.90
1	2.75

Uniformity Measurements

1	2	3
4	5	6
7	8	9

Position	Luminance (L)	CIE x	CIE y
1	339.38	0.3142	0.3398
2	390.53	0.3133	0.3380
3	371.75	0.3136	0.3408
4	462.25	0.3133	0.3366
5	540.34	0.3118	0.3358
6	491.66	0.3110	0.3403
7	537.75	0.3119	0.3356
8	575.30	0.3113	0.3350
9	382.54	0.3136	0.3399

Horizontal Viewing Angle

Angle	Luminance (L)	CIE x	CIE y
0	537.04	0.3116	0.3354
10	354.43	0.3163	0.3412
20	243.82	0.3202	0.3457
30	213.36	0.3221	0.3479
40	207.11	0.3232	0.3489
50	213.62	0.3221	0.3481
60	221.97	0.3216	0.3473
70	213.72	0.3215	0.3478