



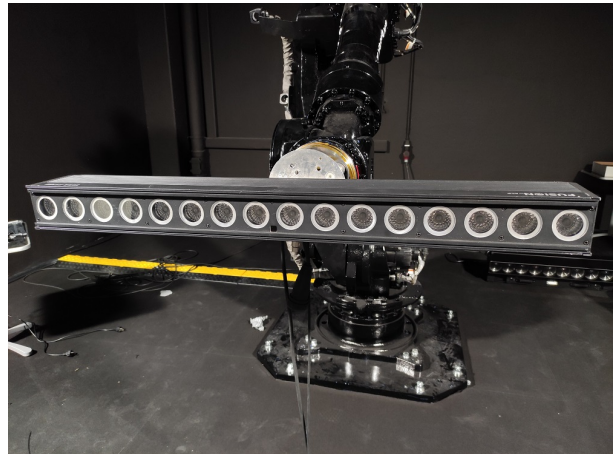
Fusion FS16Z Photometric Report

Report 2021-03-22-1

GLP German Light Products GmbH
GLP LightLab

Maximum Total Lumens	5890 lm
Maximum Intensity	157000 cd
CRI	70
Energy Efficiency Class	B
Energy Efficiency Index	0.77
Power Consumption	332 $\frac{\text{kWh}}{1000\text{h}}$

Measurement Date	2021-03-22 15:34
Analysis Date	2021-07-14 11:24
Analysis SW Version	2.4.1





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1 Light Distribution

Table 1: Summary of beam opening angles for different fixture configurations.

Beam	Beam Angle (50 %)		Field Angle (10 %)		Cutoff Angle (3 %)	
	C0	C90	C0	C90	C0	C90
Zoom Narrow, Full On	11°	9.3°	21°	19°	29°	27°
Zoom Medium, Full On	23°	22°	44°	44°	61°	61°
Zoom Wide, Full On	42°	41°	69°	70°	87°	88°

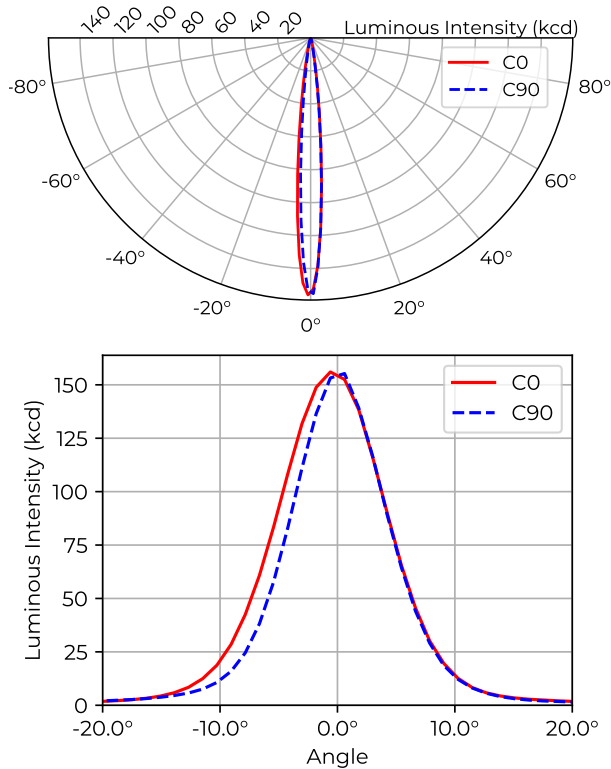
Table 2: Summary of luminous flux and intensity for different fixture configurations.

Beam	Total Lumen Output	Peak Luminous Intensity)
Zoom Narrow, Full On	5.89 klm	157 kcd
Zoom Medium, Full On	5.47 klm	28.9 kcd
Zoom Wide, Full On	5.41 klm	10.2 kcd

Table 3: Approximate illuminance and beam diameter at different projection distances, calculated with the inverse-square law. The approximation is valid only for large distances, compared to the size of the fixture output port.

Beam	Parameter	Factor	Projection Distance [m]									
			5	7.5	10	12.5	15	17.5	20	22.5	25	
Zoom Narrow, Full On	Diameter [m]	0.35	1.7	2.6	3.5	4.4	5.2	6.1	7.0	7.9	8.7	
	Illuminance [lx]	154k	6.2k	2.7k	1.5k	990	690	500	390	300	250	
Zoom Medium, Full On	Diameter [m]	0.80	4.0	6.0	8.0	9.9	12	14	16	18	20	
	Illuminance [lx]	28.7k	1.1k	510	290	180	130	94	72	57	46	
Zoom Wide, Full On	Diameter [m]	1.5	7.7	11	15	19	23	27	31	34	38	
	Illuminance [lx]	10.1k	400	180	100	65	45	33	25	20	16	

1.1 Zoom Narrow, Full On Beam



Type B measurement, 1296 data points.

Table 4: Opening angles for different intensity thresholds. Zoom Narrow, Full On

	C0	C90
Beam Angle 50 %	11°	9.3°
Field Angle 10 %	21°	19°
Cutoff Angle 3 %	29°	27°

Table 5: Luminous flux, integrated over the beam for several minimum threshold intensities. Zoom Narrow, Full On

	Flux (lm)
Half-Peak Output @50 %	2580
Tenth-Peak Output @10 %	5130
Total Lumen Output @3 %	5890

$$\text{diameter} = 0.35 \times \text{distance}$$

$$\text{illuminance} = \frac{154\,000 \text{ lx}}{(\text{distance [m]})^2}$$

Figure 1: Polar and cartesian light intensity distributions. Zoom Narrow, Full On

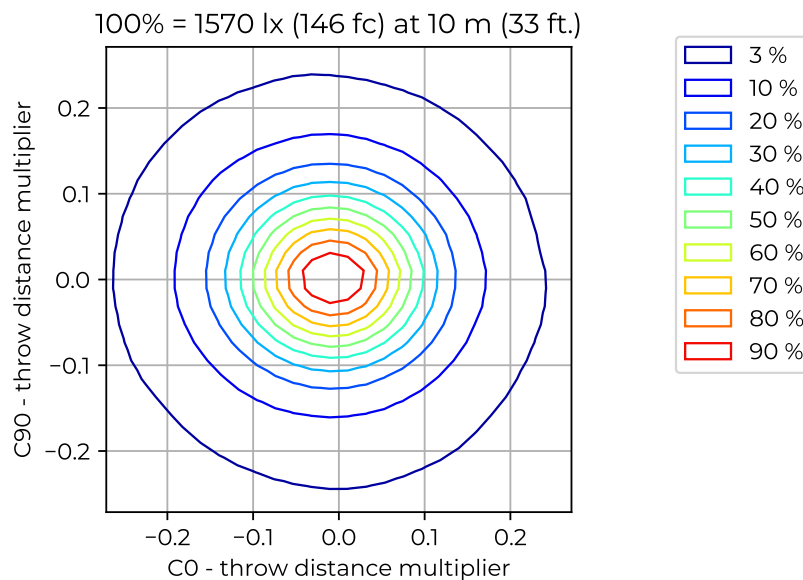
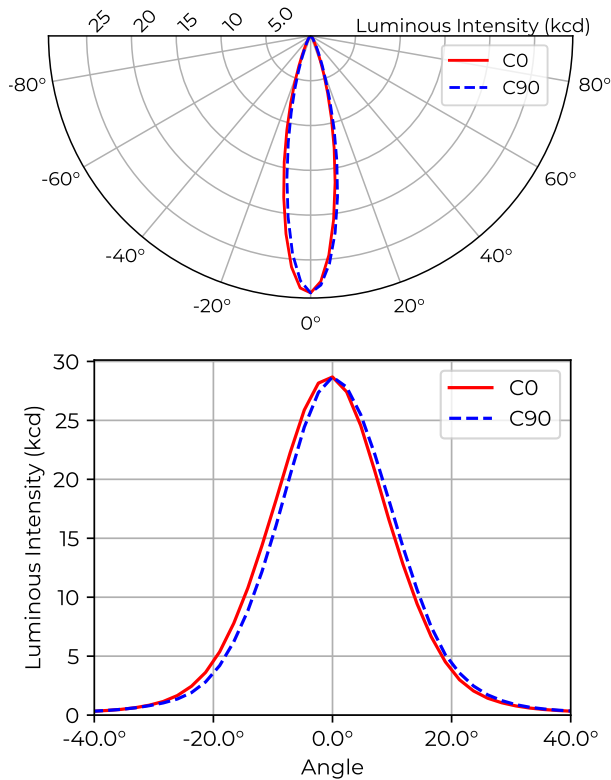


Figure 2: Iso-illuminance diagram of projected beam. Zoom Narrow, Full On
dist. from origin = throw dist. × throw dist. multiplier

Table 6: Quick calculation diagram for illuminance and beam diameter. Zoom Narrow, Full On

Parameter	Factor	Projection Distance [m]								
		5	7.5	10	12.5	15	17.5	20	22.5	25
Diameter [m]	0.35	1.7	2.6	3.5	4.4	5.2	6.1	7.0	7.9	8.7
Illuminance [lx]	154k	6.2k	2.7k	1.5k	990	690	500	390	300	250

1.2 Zoom Medium, Full On Beam



Type B measurement, 1296 data points.

Table 7: Opening angles for different intensity thresholds. Zoom Medium, Full On

		C0	C90
Beam Angle	50 %	23°	22°
Field Angle	10 %	44°	44°
Cutoff Angle	3 %	61°	61°

Table 8: Luminous flux, integrated over the beam for several minimum threshold intensities. Zoom Medium, Full On

		Flux (lm)
Half-Peak Output	@50 %	2460
Tenth-Peak Output	@10 %	4830
Total Lumen Output	@3 %	5470

$$\text{diameter} = 0.80 \times \text{distance}$$

$$\text{illuminance} = \frac{28\,700 \text{ lx}}{(\text{distance [m]})^2}$$

Figure 3: Polar and cartesian light intensity distributions. Zoom Medium, Full On

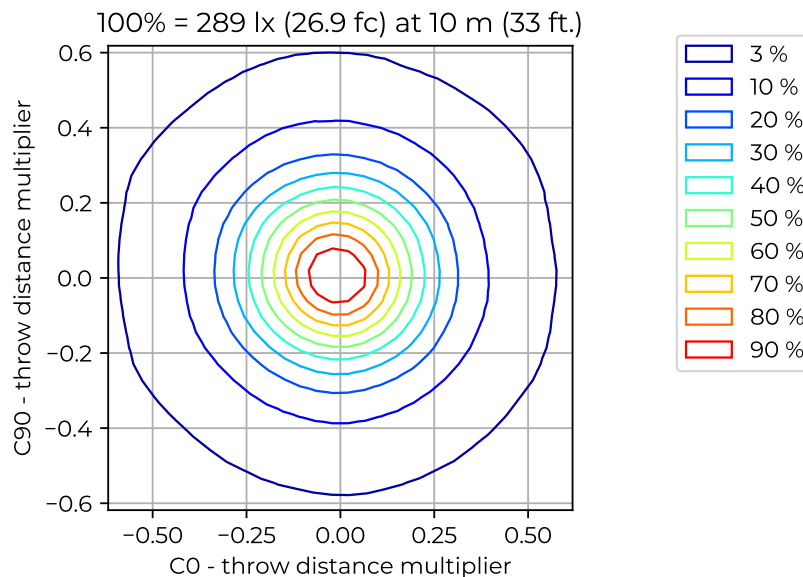
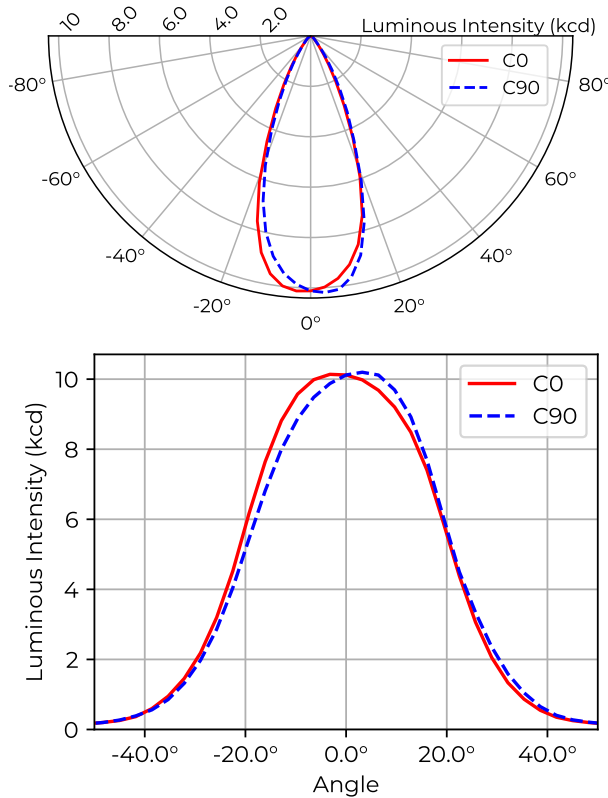


Figure 4: Iso-illuminance diagram of projected beam. Zoom Medium, Full On
dist. from origin = throw dist. × throw dist. multiplier

Table 9: Quick calculation diagram for illuminance and beam diameter. Zoom Medium, Full On

Parameter	Factor	Projection Distance [m]									
		5	7.5	10	12.5	15	17.5	20	22.5	25	
Diameter [m]	0.80	4.0	6.0	8.0	9.9	12	14	16	18	20	
Illuminance [lx]	28.7k	1.1k	510	290	180	130	94	72	57	46	

1.3 Zoom Wide, Full On Beam



Type B measurement, 1296 data points.

Table 10: Opening angles for different intensity thresholds. Zoom Wide, Full On

		C0	C90
Beam Angle	50 %	42°	41°
Field Angle	10 %	69°	70°
Cutoff Angle	3 %	87°	88°

Table 11: Luminous flux, integrated over the beam for several minimum threshold intensities. Zoom Wide, Full On

		Flux (lm)
Half-Peak Output	@50 %	3290
Tenth-Peak Output	@10 %	5060
Total Lumen Output	@3 %	5410

$$\text{diameter} = 1.5 \times \text{distance}$$

$$\text{illuminance} = \frac{10100 \text{ lx}}{(\text{distance [m]})^2}$$

Figure 5: Polar and cartesian light intensity distributions. Zoom Wide, Full On

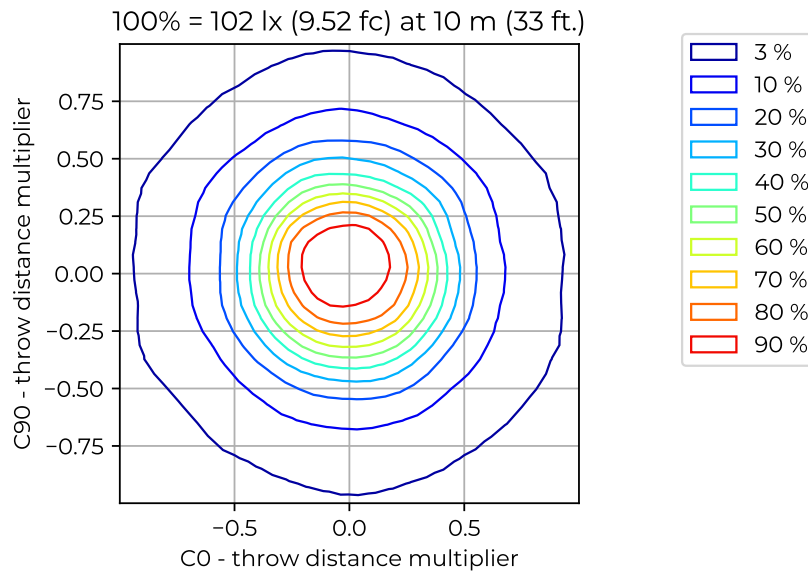


Figure 6: Iso-illuminance diagram of projected beam. Zoom Wide, Full On
dist. from origin = throw dist. × throw dist. multiplier

Table 12: Quick calculation diagram for illuminance and beam diameter. Zoom Wide, Full On

Parameter	Factor	Projection Distance [m]								
		5	7.5	10	12.5	15	17.5	20	22.5	25
Diameter [m]	1.5	7.7	11	15	19	23	27	31	34	38
Illuminance [lx]	10.1k	400	180	100	65	45	33	25	20	16

2 White Quality

Table 13: Summary for spectral measurement results and color metrics.

Metric	Value
CCT	6076 K
CCT D_{UV}	-0.0054
CRI R_a	70
CRI R_g	-16
TLCI-2015	42
TM-30-15 R_f	97
TM-30-15 R_g	62
CIE 1931 x	0.321
CIE 1931 y	0.321
CIE 1960 u	0.207
CIE 1960 v	0.310

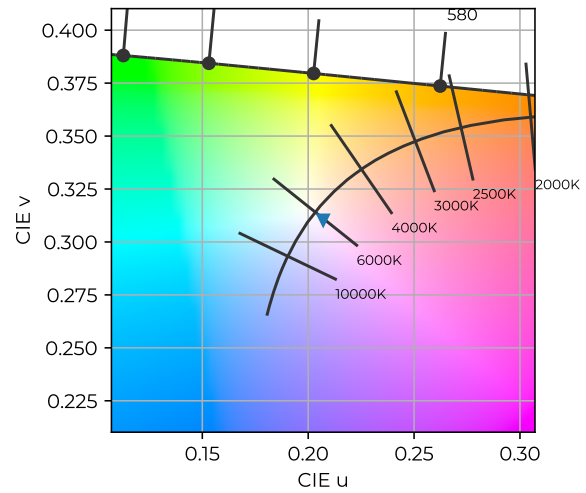


Figure 7: Color coordinates in CIE 1960 chromaticity diagram.

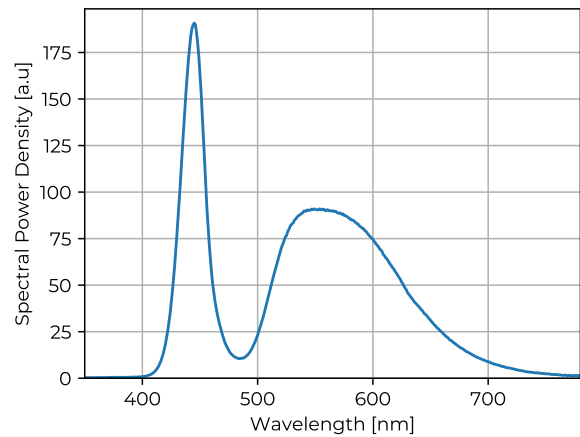
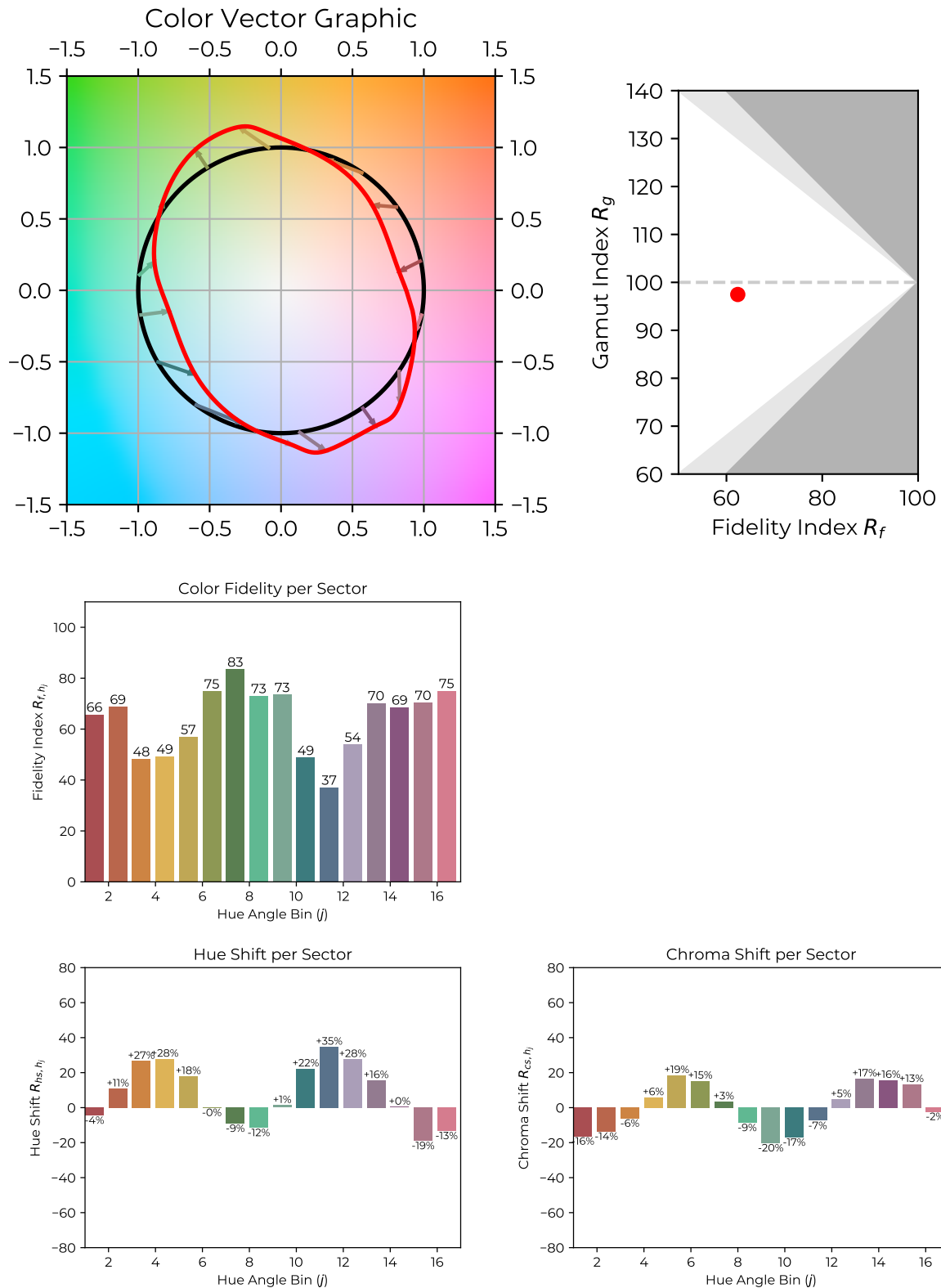
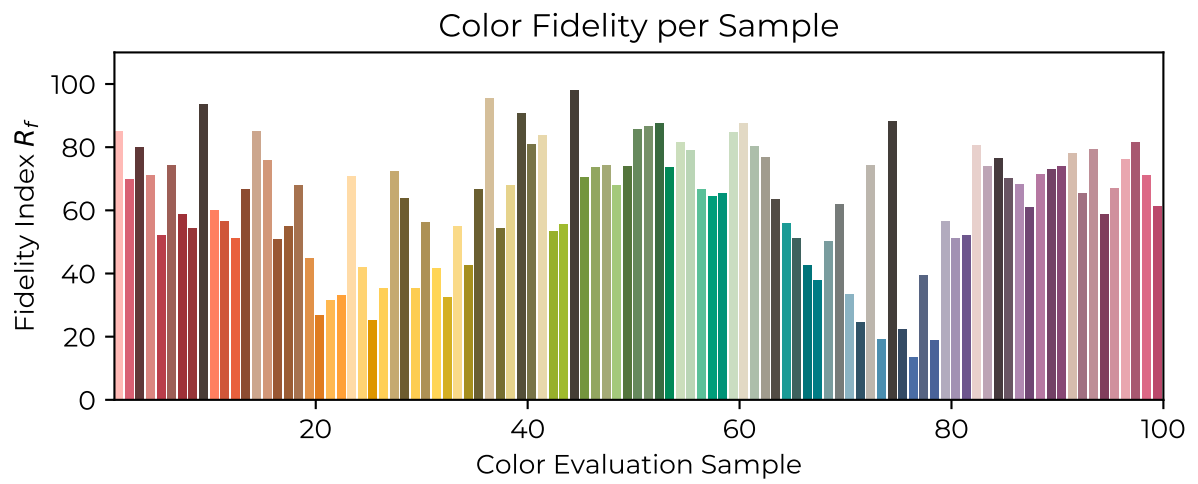


Figure 8: Measured Spectral Power Distribution of light source.

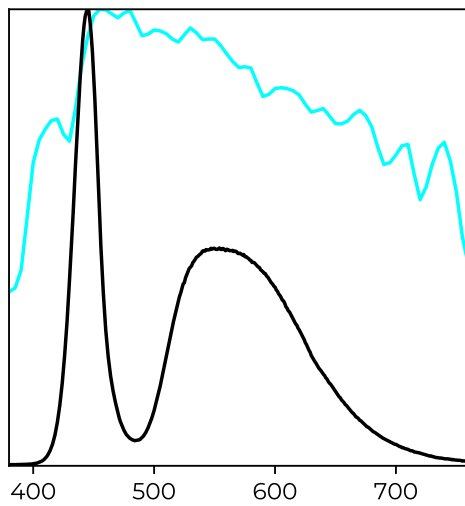
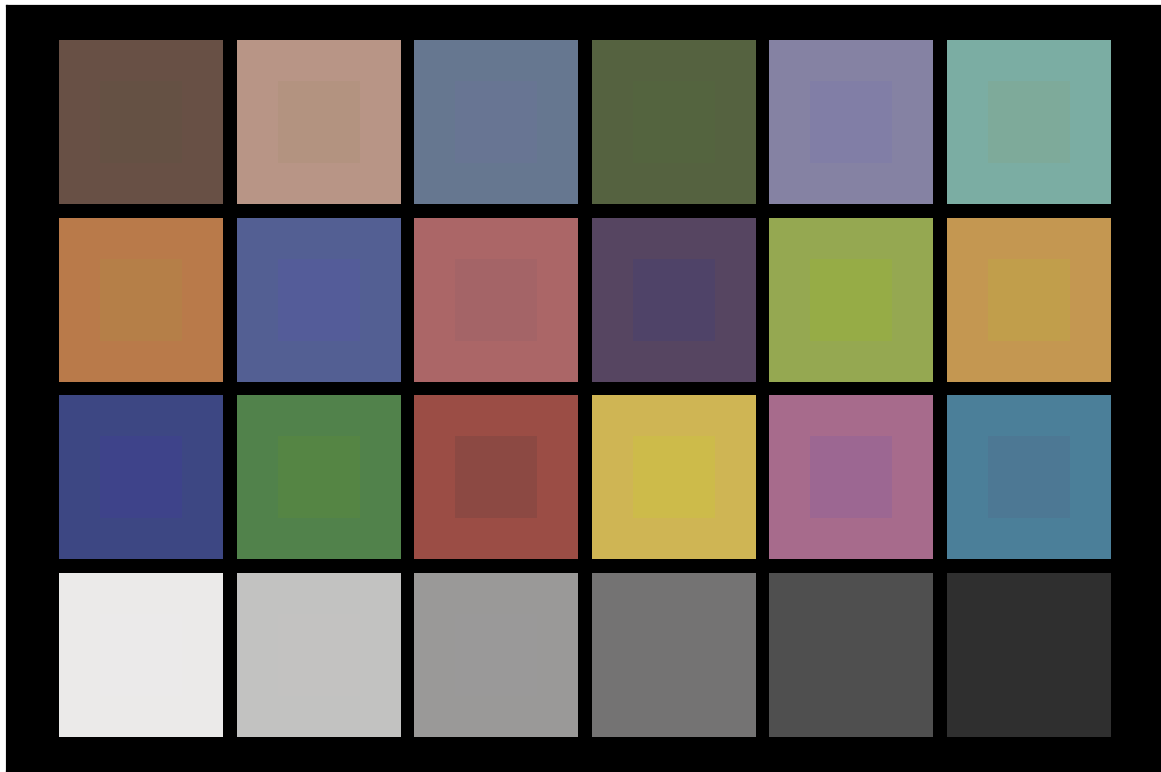
2.1 TM-30-15 Detail Plots





2.2 TLCI-2012 Results

Fusion FS16Z : CCT = D6079 -1.6, TLCI = 42



Sector	Lightness	Chroma	Hue
R	6	6	6
R/Y	4	4	4
Y	2	2	2
Y/G	3	3	3
G	5	5	5
G/C	6	6	6
C	6	6	6
C/B	6	6	6
B	4	4	4
B/M	6	6	6
M	8	8	8
M/R	7	7	7

3 Colors

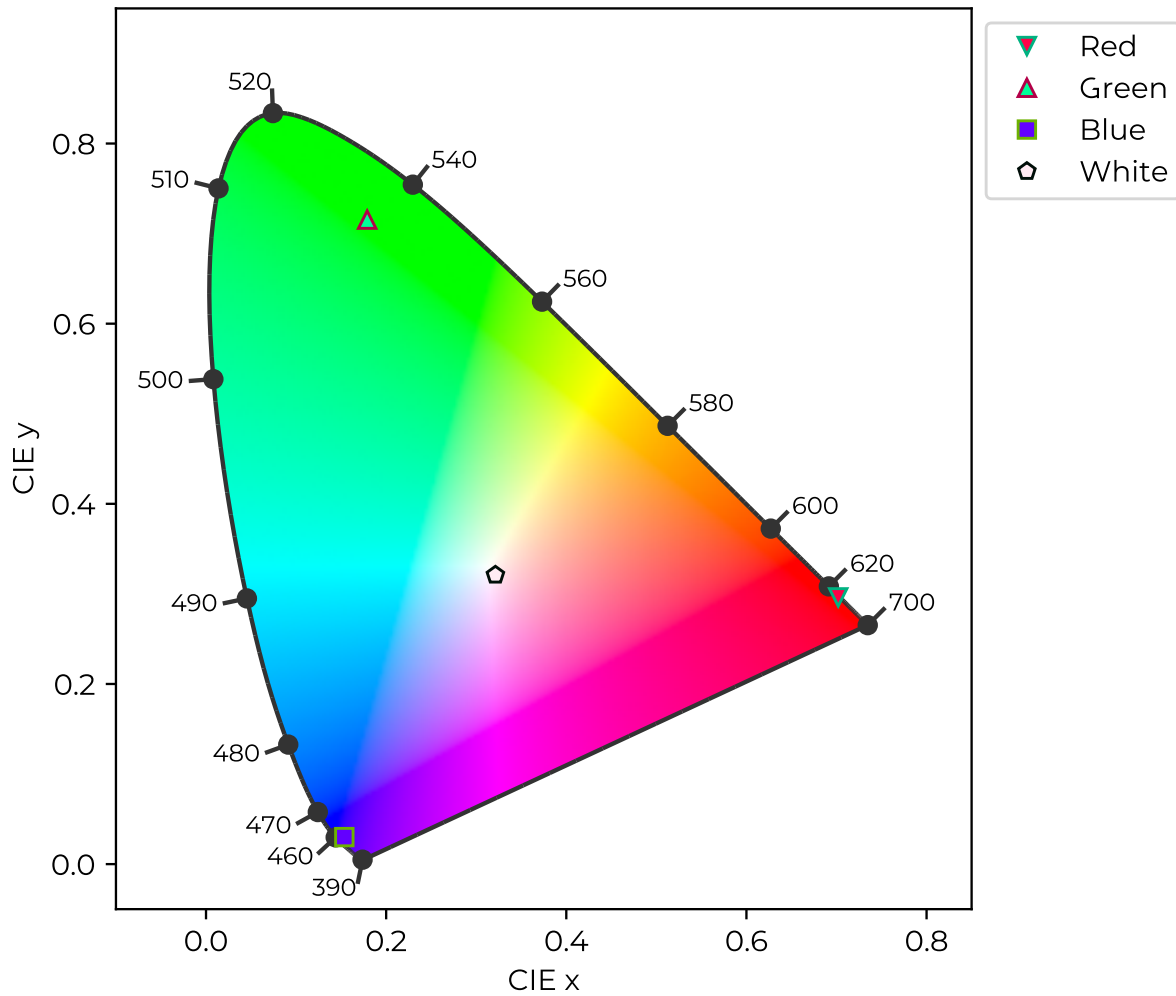


Figure 9: Chromaticity coordinates of device colors in a CIE 1931 chromaticity diagram.

Table 14: Chromaticity coordinates for figure 9, in CIE 1931 xy and CIE 1960 UCS uv coordinates. Color swatches are illustrative only, limited by screen and print color space. Color appearance will be different when used for illumination.

Color	xy	uv
■ Red	0.702, 0.296	0.545, 0.345
■ Green	0.179, 0.716	0.0637, 0.382
■ Blue	0.154, 0.03	0.201, 0.059
■ White	0.321, 0.321	0.207, 0.31