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**ÖLÇÜM RAPORU**  
**MEASUREMENT REPORT**

TL-806
19-TST-0095-132
06-19

**Müşterinin Adı Adresi**  
Customer name/address

: HERA EĞLENCE VE MİMARİ AYDINLATMA SİSTEMLERİ A.Ş.  
Güllübağlar Mah. Kahrmanlar Cad. No:3-1 34906 PENDİK-  
İSTANBUL/TÜRKİYE

**İstek Numarası**  
Order No

: 19-TST-0095

**Numunenin Adı ve Tarifi**  
Name and identity of test item

: 3D Vertical Tube Series RGBW

**Numunenin kabul tarihi**  
The date of receipt of test item

: 25.04.2019

**Açıklamalar**  
Remarks

: DGC'ye , IES LM-79-08 standardı uyarınca fotometrik ölçümler yapılmıştır.  
Photometric measurement has been applied to EUT according to IESNA LM-79-08

**Deneyin Yapıldığı Tarih**  
Date of Test

: 11.06.2019

**Raporun Sayfa Sayısı**  
Number of Pages of the Report

:20

Deney laboratuvarı olarak faaliyet gösteren TÜV AUSTRIA TURK, International Accreditation Service, Inc. (IAS) TL-806 ile TS EN ISO/IEC 17025 Nisan 2012 standardına göre akredite edilmiştir.

TÜV AUSTRIA TURK is accredited by International Accreditation Service, Inc. (IAS) under registration number TL-806 for TS EN ISO/IEC 17025 April 2012 as a test laboratory.

International Accreditation Service, Inc. (IAS) deney raporlarının tanınırlığı konusunda Avrupa Akreditasyon Birliği(EA) ile Çok Taraflı Anlaşma ve Uluslararası Laboratuvar Akreditasyon Birliği(ILAC) ile karşılıklı tanıma anlaşması imzalamıştır. International Accreditation Service, Inc. (IAS) is a signatory to the European co-operation for Accreditation (EA) Multilateral Agreement (MLA) and to the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA) for the recognition of test reports.

Deney ve /veya ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri ( olması halinde ) ve deney metotları bu sertifikanın tamamlayıcı kısmı olan takip eden sayfalarda verilmiştir.

The test and/or measurement results, the uncertainties ( if applicable ) with confidence probability and test methods are given on the following pages which are part of this report.

Bu rapor, laboratuvara gönderilen numunelere uygulanan deney/deneyler sonucu hazırlanmıştır. Müşteriye ait diğer numuneleri kapsamaz.

This report was prepared according to test results of specimens sent to laboratory. It doesn't contain other specimens belonging to customer.

**Mühür ve Tarih**

Seal and Date



**Deney Sorumlusu**

Person in charge of test

Gürhan CANSIZ

**Onaylayan**

Approval

Gürhan CANSIZ

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1.1

**DGC, Çevre Şartları ve Sembollerin Tanımları** (Description of the EUT, Environmental Conditions and Symbol Definitions)

<b>Markası / Brand</b>	: HERA
<b>Modeli / Model</b>	: 3D Vertical Tube Series RGBW
<b>Seri Numarası / Seril Number</b>	: P01041105
<b>Beyan Gücü / Rated Power</b>	: 20,7 W
<b>Beyan Gerilimi / Rated Voltage</b>	: 48 VDC
<b>Beyan Gerilimi / Rated Current</b>	: 0,43 A
<b>Sembollerin Tanımı / Definitions of Symbols</b>	DGC= Deneiden Geçen Cihaz EUT=Equipment Under Test



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**1.2 Deney Standartları (Test Standards)**

Deneyler aşağıdaki standartlara göre yapılmıştır (The tests were performed according to following standards):

**Standart / Standard**

- IESNA LM-79-08 Electrical and Photometric Measurements of Solid-State Lighting Products

**1.3 Deney Ekipmanları (Test Equipments)**

Kayıt No. (ID – No.)	Tip (Type)	Kalibrasyon Tarihi (Calibration Date)	Sonraki Kalibrasyon Tarihi (Next Calibration Date)	Kontrol (Check Point)
LAB-011	Goniophotometer	09.01.2019	09.01.2020	<input checked="" type="checkbox"/>
LAB-015	AC Power Supply	05.06.2018	05.06.2019	<input checked="" type="checkbox"/>
LAB-027	Powermeter	09.01.2019	09.01.2020	<input checked="" type="checkbox"/>
LAB-023	Standart Lamp	09.01.2019	09.01.2020	<input checked="" type="checkbox"/>
LAB-012	Integrating sphere	09.01.2019	09.01.2020	<input checked="" type="checkbox"/>

**1.3 Komponent listesi (Component list)**

Komponent (Components)	Üretici (Manufacturer)	Model (Model)	Teknik Veri (Technical Data)	Standart no. (Standart No.)
LED	Cree Inc	CLQ6A	Led-RGBW I F = 20 mA V R = 5 V φV= Initial Data x 0.7	Cree® LED Lamp Reliability Test Standard (JEITA ED-4701 100 105, MIL-STD-202G, JEITA ED-4701 200 201, JEITA ED-4701 100 103, JEITA ED-4701 200 202, IEC 60529:2011)
PCB	Beker Pcb Elektronik San. Ve Tic.Ltd.Şti.	C13090_R1.0	1.6mm FR44 Layers, 35+ 35 + 35 + 35um Cu, White Solder Resist, Black Solder Resist, Gold Surface Finish	-

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**2.1 Deney Sonuçları ( Test Results )**

**Elektriksel Ölçümler**

(Electrical Measurements)

<b>Ölçülen Güç (W)</b> (Input Power)	20,16
<b>Ölçülen Gerilim (V)</b> (Input Voltage)	48
<b>Ölçülen Akım (A)</b> (Input Current)	0,42
<b>Güç Faktörü (PF)</b> (Power Factor)	1
<b>Ölçülen Frekans (Hz)</b> (Input Frequency)	50
<b>Ortam Sıcaklığı / Bağıl Nem</b> (Ambient Temperature / Relative Humidity)	25,1 °C 48% Rh
<b>Stabilizasyon Süresi</b> (Stabilization Time)	60 dk ±5dk

**Fotometrik Ölçüm Sonuçları**

(Photometric Measurement Results)

<b>Toplam Işık Akısı</b> (Total Luminous Flux) (lm)	944,60
<b>Maksimum Işık Şiddeti</b> (Max. Light Intensity) (cd)	151,2
<b>Armatür Etkinliği</b> (Luminaire Efficacy) (lm/W)	46,86



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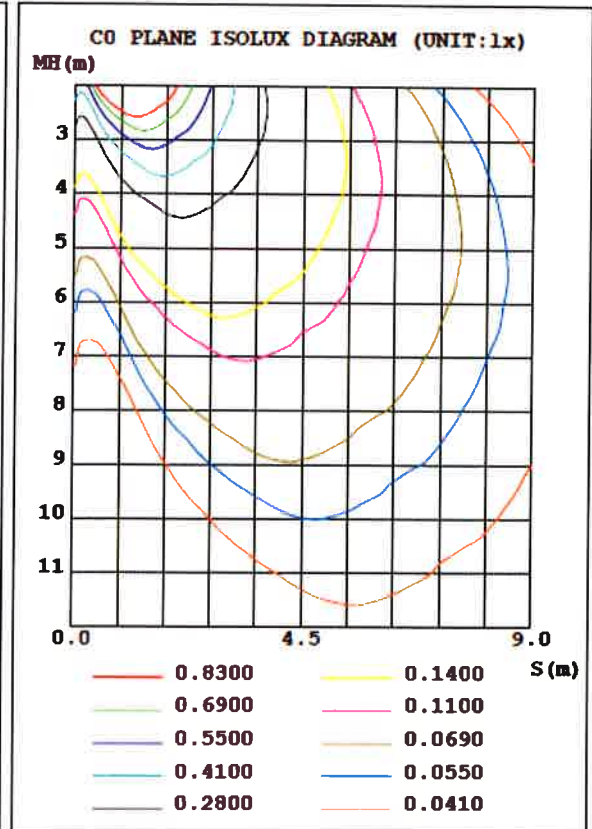
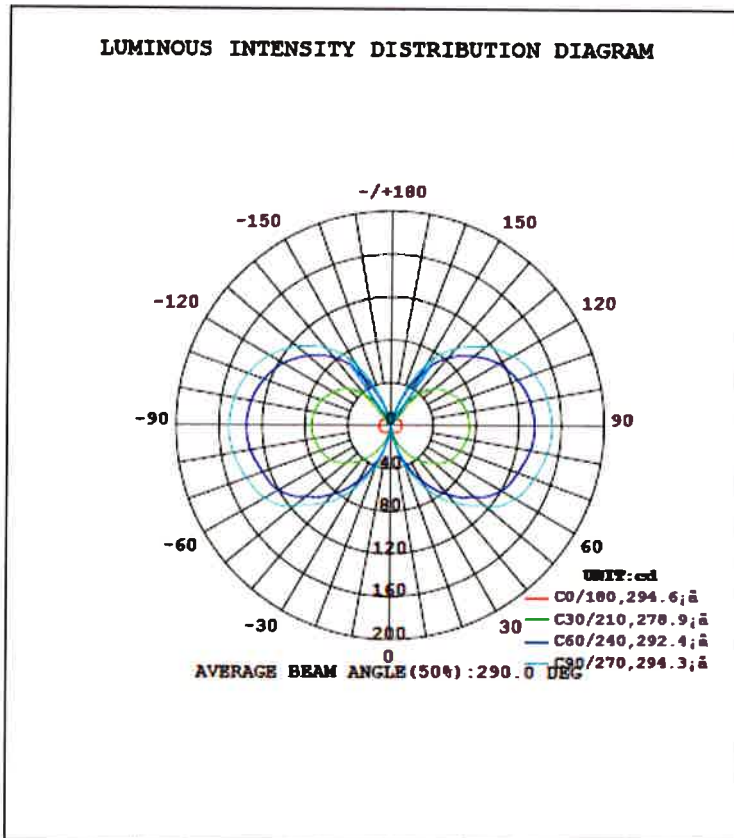
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**2.1 RGBW Renk Fotometrik Deney Sonuçları (Photometric Test Results of RGBW)**



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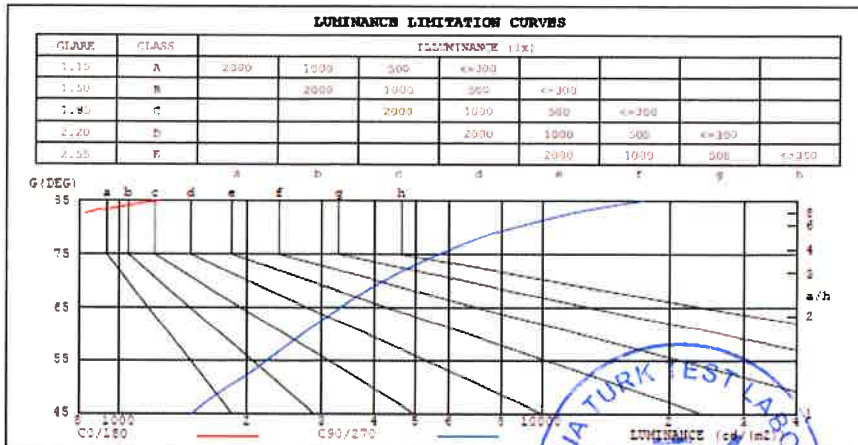
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**2.1 RGBW Renk Fotometrik Deney Sonuçları (Photometric Test Results of RGBW)**

**ZONAL FLUX DIAGRAM  
AND LUMINANCE LIMITATION CURVES**

**ZONAL FLUX DIAGRAM:**

y	C0	C45	C90	C135	C180	C225	C270	C315	y	☉ zone	☉ total	lum. lamp
5	1.963	2.996	5.016	2.996	1.963	2.996	5.016	2.996	0- 5	0.0748	0.0748	0.01,0.01
10	2.074	5.897	11.87	5.897	2.074	5.897	11.87	5.897	5- 10	0.4148	0.4896	0.05,0.05
15	4.827	17.24	24.99	17.24	4.827	17.24	24.99	17.24	10- 15	1.400	1.889	0.20,0.20
20	5.984	28.89	40.83	28.89	5.984	28.89	40.83	28.89	15- 20	2.803	3.392	0.37,0.37
25	7.295	38.94	54.04	38.94	7.295	38.94	54.04	38.94	20- 25	6.209	11.70	1.24,1.24
30	8.041	49.22	68.21	49.22	8.041	49.22	68.21	49.22	25- 30	10.01	21.72	2.3,2.3
35	8.474	59.92	82.27	59.92	8.474	59.92	82.27	59.92	30- 35	14.24	26.06	3.82,3.82
40	9.042	68.48	92.79	68.48	9.042	68.48	92.79	68.48	35- 40	19.14	35.22	5.85,5.85
45	9.278	77.29	105.0	77.29	9.278	77.29	105.0	77.29	40- 45	24.01	39.23	6.39,6.39
50	9.730	85.44	116.5	85.44	9.730	85.44	116.5	85.44	45- 50	29.13	109.4	11.8,11.8
55	10.19	92.80	128.5	92.80	10.19	92.80	128.5	92.80	50- 55	34.62	143.0	15.1,15.1
60	10.47	99.18	135.8	99.18	10.47	99.18	135.8	99.18	55- 60	29.62	162.6	19.3,19.3
65	10.60	102.8	140.1	102.8	10.60	102.8	140.1	102.8	60- 65	43.63	226.2	24.24
70	10.71	108.4	143.4	105.4	10.71	105.4	143.4	105.4	65- 70	46.74	273.0	28.9,28.9
75	10.84	107.5	146.4	107.5	10.84	107.5	146.4	107.5	70- 75	49.28	322.4	34.1,34.1
80	10.82	109.3	149.2	109.3	10.82	109.3	149.2	109.3	75- 80	51.60	374.0	39.6,39.6
85	10.76	110.3	150.8	110.3	10.76	110.3	150.8	110.3	80- 85	52.18	427.1	45.2,45.2
90	10.69	110.7	151.1	110.7	10.69	110.7	151.1	110.7	85- 90	52.89	481.0	50.9,50.9
95	10.84	110.3	150.0	110.3	10.84	110.3	150.0	110.3	90- 95	52.79	524.8	56.6,56.6
100	10.49	109.1	148.4	109.1	10.49	109.1	148.4	109.1	95-100	52.82	567.7	62.2,62.2
105	10.50	107.5	145.6	107.5	10.50	107.5	145.6	107.5	100-105	51.35	609.1	67.7,67.7
110	10.27	104.4	141.6	104.4	10.27	104.4	141.6	104.4	105-110	49.04	648.1	72.9,72.9
115	10.20	100.6	137.0	100.6	10.20	100.6	137.0	100.6	110-115	46.02	724.2	77.7,77.7
120	10.07	95.82	129.7	95.82	10.07	95.82	129.7	95.82	115-120	42.25	776.8	82.2,82.2
125	9.687	90.62	123.4	90.62	9.687	90.62	123.4	90.62	120-125	38.23	814.8	86.3,86.3
130	8.895	84.05	114.9	84.05	8.895	84.05	114.9	84.05	125-130	33.68	848.4	89.5,89.5
135	7.980	75.96	104.0	75.96	7.980	75.96	104.0	75.96	130-135	28.62	877.1	92.8,92.8
140	7.457	67.25	92.85	67.25	7.457	67.25	92.85	67.25	135-140	23.33	900.4	95.2,95.2
145	6.841	58.49	81.39	58.49	6.841	58.49	81.39	58.49	140-145	18.01	918.4	97.2,97.2
150	4.426	40.24	65.57	40.24	4.426	40.24	65.57	40.24	145-150	12.75	921.1	98.6,98.6
155	3.062	25.95	45.42	25.95	3.062	25.95	45.42	25.95	150-155	7.814	929.0	99.4,99.4
160	1.215	13.09	25.82	13.09	1.215	13.09	25.82	13.09	155-160	2.962	942.9	99.8,99.8
165	0.0062	2.729	11.15	2.729	0.0062	2.729	11.15	2.729	160-165	1.429	944.4	100,100
170	0	0	1.146	0	0	0	1.146	0	165-170	0.2292	944.6	100,100
175	0	0	0	0	0	0	0	0	170-175	0.0014	944.6	100,100
180	0	0	0	0	0	0	0	0	175-180	0	944.6	100,100
DEG												



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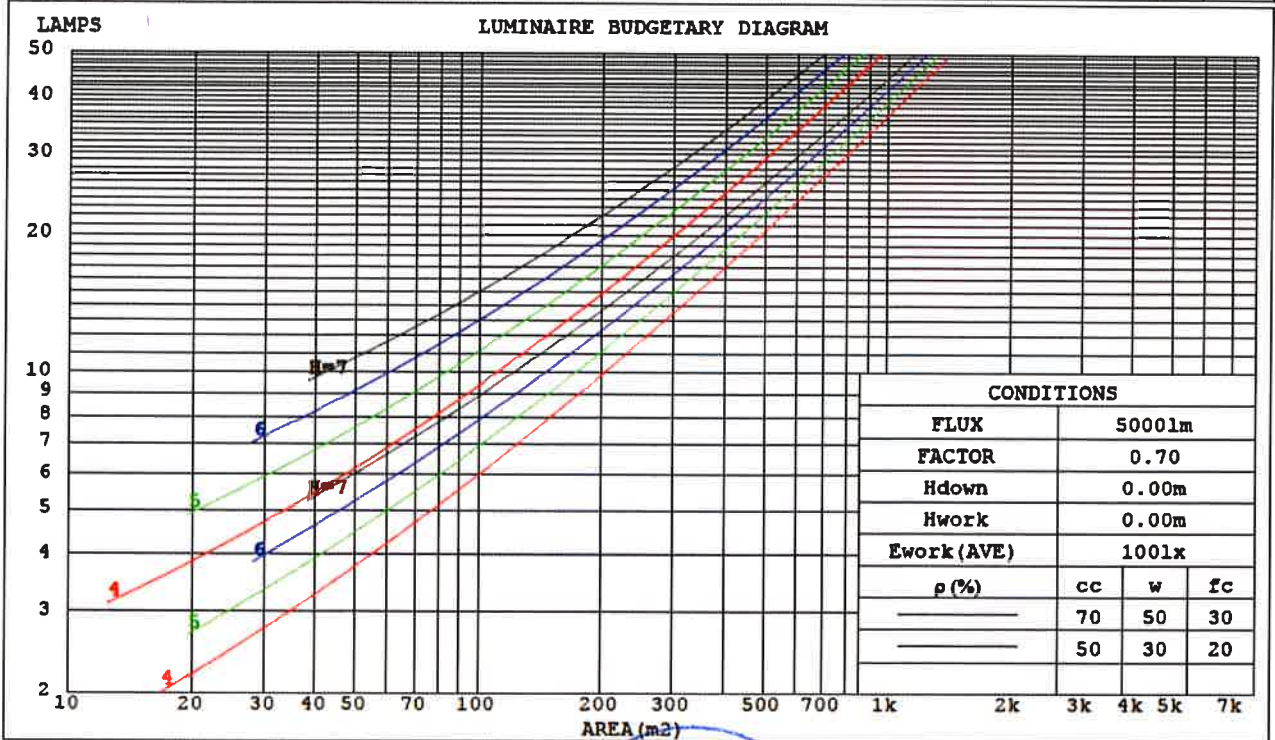
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**2.1 RGBW Renk Fotometrik Deney Sonuçları (Photometric Test Results of RGBW)**

**CU AND LUMINAIRE BUDGETARY ESTIMATE DIAGRAM**

pcc	80%			70%			50%			30%			10%			0
	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	0
p <sub>w</sub>	20%			20%			20%			20%			20%			0
p <sub>fc</sub>	20%			20%			20%			20%			20%			0
RCR	RCR:Room Cavity Ratio						Coefficients of Utilization (CU)									
0.0	1.07	1.07	1.07	.99	.99	.99	.84	.84	.84	.70	.70	.70	.57	.57	.57	.51
1.0	.85	.79	.74	.78	.73	.68	.65	.61	.57	.52	.49	.46	.41	.39	.36	.31
2.0	.71	.63	.55	.65	.57	.51	.53	.47	.42	.43	.38	.34	.33	.29	.26	.21
3.0	.61	.51	.43	.55	.47	.40	.45	.38	.33	.36	.31	.26	.27	.23	.20	.15
4.0	.52	.43	.35	.48	.39	.32	.39	.32	.26	.31	.25	.21	.23	.19	.15	.11
5.0	.46	.36	.29	.42	.33	.26	.34	.27	.22	.27	.21	.17	.20	.16	.12	.09
6.0	.40	.31	.24	.37	.28	.22	.30	.23	.18	.24	.18	.14	.18	.14	.10	.07
7.0	.36	.27	.20	.33	.25	.19	.27	.20	.15	.21	.16	.12	.16	.12	.08	.06
8.0	.32	.24	.18	.30	.22	.16	.24	.18	.13	.19	.14	.10	.14	.10	.07	.05
9.0	.29	.21	.15	.27	.19	.14	.22	.16	.11	.17	.12	.09	.13	.09	.06	.04
10.0	.27	.19	.13	.24	.17	.12	.20	.14	.10	.16	.11	.08	.12	.08	.05	.03



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**2.1 RGBW Renk Fotometrik Deney Sonuçları (Photometric Test Results of RGBW)**

**WEC AND CCEC**

$\rho_{cc}$	80%			70%			50%			30%			10%			0
$\rho_w$	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	0
$\rho_{fc}$	20%			20%			20%			20%			20%			0
RCR	RCR:Room Cavity Ratio						Wall Exitance Coefficients(WEC)									
0.0																
1.0	.441	.251	.079	.419	.239	.076	.377	.216	.069	.339	.195	.063	.303	.176	.057	
2.0	.363	.199	.061	.343	.189	.058	.305	.169	.053	.269	.151	.047	.237	.134	.042	
3.0	.314	.167	.050	.295	.158	.048	.260	.141	.043	.228	.125	.038	.198	.110	.034	
4.0	.278	.144	.042	.261	.136	.040	.229	.121	.036	.199	.107	.032	.171	.093	.028	
5.0	.249	.127	.037	.234	.120	.035	.204	.106	.031	.177	.093	.028	.151	.081	.024	
6.0	.226	.113	.032	.212	.107	.031	.185	.095	.028	.159	.083	.024	.136	.071	.021	
7.0	.207	.102	.029	.194	.097	.028	.169	.085	.025	.145	.074	.022	.123	.064	.019	
8.0	.191	.093	.026	.179	.088	.025	.155	.078	.022	.133	.068	.020	.113	.058	.017	
9.0	.177	.086	.024	.166	.081	.023	.144	.071	.020	.124	.062	.018	.104	.053	.015	
10.0	.165	.079	.022	.154	.075	.021	.134	.066	.019	.115	.057	.016	.097	.049	.014	

$\rho_{cc}$	80%			70%			50%			30%			10%			0
$\rho_w$	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	0
$\rho_{fc}$	20%			20%			20%			20%			20%			0
RCR	RCR:Room Cavity Ratio						Ceiling Cavity Exitance Coefficients(CCEC)									
0.0	.564	.564	.564	.482	.482	.482	.329	.329	.329	.189	.189	.189	.060	.060	.060	
1.0	.566	.532	.501	.485	.457	.431	.331	.314	.298	.191	.182	.173	.061	.059	.056	
2.0	.561	.511	.469	.481	.440	.405	.329	.304	.283	.190	.177	.166	.061	.057	.054	
3.0	.555	.496	.450	.475	.428	.390	.326	.297	.273	.189	.174	.161	.061	.056	.053	
4.0	.547	.485	.437	.469	.419	.380	.323	.292	.268	.187	.171	.158	.060	.056	.052	
5.0	.540	.476	.429	.463	.412	.373	.319	.288	.264	.185	.169	.156	.060	.055	.052	
6.0	.532	.469	.423	.458	.406	.368	.316	.284	.261	.183	.167	.155	.059	.055	.051	
7.0	.525	.463	.419	.452	.401	.365	.312	.281	.259	.181	.166	.154	.059	.054	.051	
8.0	.519	.457	.416	.446	.397	.362	.309	.279	.257	.180	.164	.153	.058	.054	.051	
9.0	.512	.453	.413	.441	.393	.360	.306	.276	.256	.178	.163	.153	.058	.054	.051	
10.0	.507	.449	.411	.437	.390	.359	.303	.274	.255	.177	.162	.152	.057	.053	.050	



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## ÖLÇÜM RAPORU MEASUREMENT REPORT

### 2.1 RGBW Renk Fotometrik Deney Sonuçları (Photometric Test Results of RGBW)

#### Uncorrected UGR Table

ceiling/cavity	0.7	0.7	0.5	0.5	0.3	0.7	0.7	0.5	0.5	0.3
walls	0.5	0.3	0.5	0.3	0.3	0.5	0.3	0.5	0.3	0.3
working plane	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Room dimensions	Viewed crosswise					Viewed endwise				
x = 2H y = 2H	6.9	8.1	7.8	9.0	10.1	14.0	15.2	14.9	16.1	17.2
3H	8.8	9.9	9.7	10.8	12.0	17.7	18.8	18.6	19.7	20.9
4H	9.8	10.7	10.6	11.7	12.9	19.8	20.7	20.7	21.7	22.9
6H	10.6	11.6	11.6	12.5	13.7	22.0	22.9	22.9	23.8	25.1
8H	11.1	12.0	12.0	13.0	14.2	23.2	24.1	24.1	25.0	26.3
12H	11.6	12.5	12.6	13.4	14.7	24.6	25.4	25.5	26.4	27.6
4H 2H	10.8	11.8	11.7	12.7	13.9	14.6	15.6	15.5	16.5	17.7
3H	13.0	13.8	13.9	14.8	16.0	18.6	19.4	19.5	20.4	21.6
4H	14.1	14.8	15.0	15.8	17.1	20.8	21.6	21.7	22.5	23.8
6H	15.1	15.8	16.0	16.8	18.0	23.2	23.9	24.2	24.9	26.2
8H	15.5	16.2	16.5	17.2	18.5	24.6	25.2	25.5	26.2	27.5
12H	15.9	16.5	16.9	17.5	18.9	26.1	26.7	27.1	27.7	29.0
8H 4H	16.8	17.4	17.7	18.4	19.7	21.2	21.8	22.1	22.8	24.1
6H	18.3	18.9	19.3	19.9	21.2	24.0	24.5	24.9	25.5	26.9
8H	19.0	19.5	20.0	20.5	21.9	25.5	26.0	26.5	27.1	28.4
12H	19.7	20.1	20.7	21.2	22.5	27.3	27.8	28.3	28.8	30.1
12H 4H	17.6	18.2	18.6	19.2	20.5	21.2	21.8	22.2	22.8	24.1
6H	19.5	20.0	20.5	21.0	22.4	24.1	24.6	25.1	25.6	27.0
8H	20.5	20.9	21.5	22.0	23.3	25.8	26.3	26.8	27.3	28.6
Variations with the observer position at spacings:										
S = 1.0H	+ 0.1 / - 0.1					+ 0.1 / - 0.1				
1.5H	+ 0.2 / - 0.2					+ 0.2 / - 0.3				
2.0H	+ 0.3 / - 0.3					+ 0.3 / - 0.4				

CIE Pub.117 Corrected 944.6 lm Total Lamp Luminous Flux. (8log(F/F0) = -0.2)



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**2.1 RGBW Renk Fotometrik Deney Sonuçları (Photometric Test Results of RGBW)****UTILIZATION FACTORS TABLE**

REFLECTANCE										
Ceiling	0.8	0.8	0.8	0.7	0.7	0.7	0.5	0.5	0.5	0
Walls	0.7	0.5	0.3	0.7	0.5	0.3	0.7	0.5	0.3	0
Working plane	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0
ROOM INDEX	UTILIZATION FACTORS (PERCENT) $k(RI) \times RCR = 5$									
$k = 0.60$	33	20	13	32	19	12	28	18	11	4
0.80	42	27	19	39	26	18	34	23	16	6
1.00	49	34	25	46	32	23	40	30	21	9
1.25	56	41	31	52	38	29	45	34	26	12
1.50	61	47	36	57	44	34	49	38	30	15
2.00	69	56	45	64	52	43	54	45	37	19
2.50	75	62	52	69	57	49	58	49	42	22
3.00	79	67	58	73	62	54	61	53	46	25
4.00	84	74	66	78	69	61	66	58	52	29
5.00	88	79	71	81	73	66	68	62	57	31
ROOM INDEX	UF(total)									Direct
According to DIN EN 13032-2 2004			Suspended				SHRNM = 1.25			



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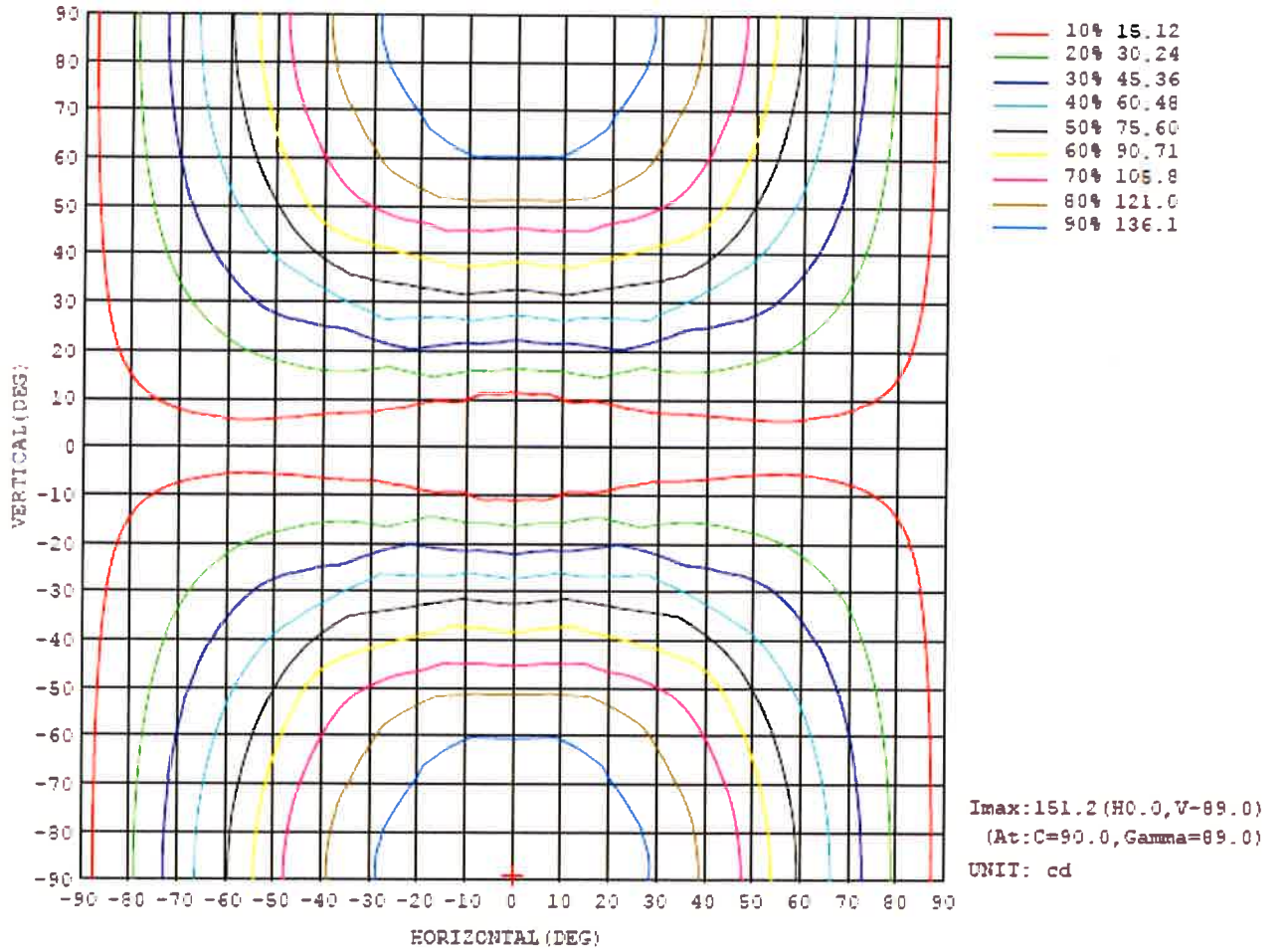
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**2.1 RGBW Renk Fotometrik Deney Sonuçları (Photometric Test Results of RGBW)**

**ISOCANDELA DIAGRAM**



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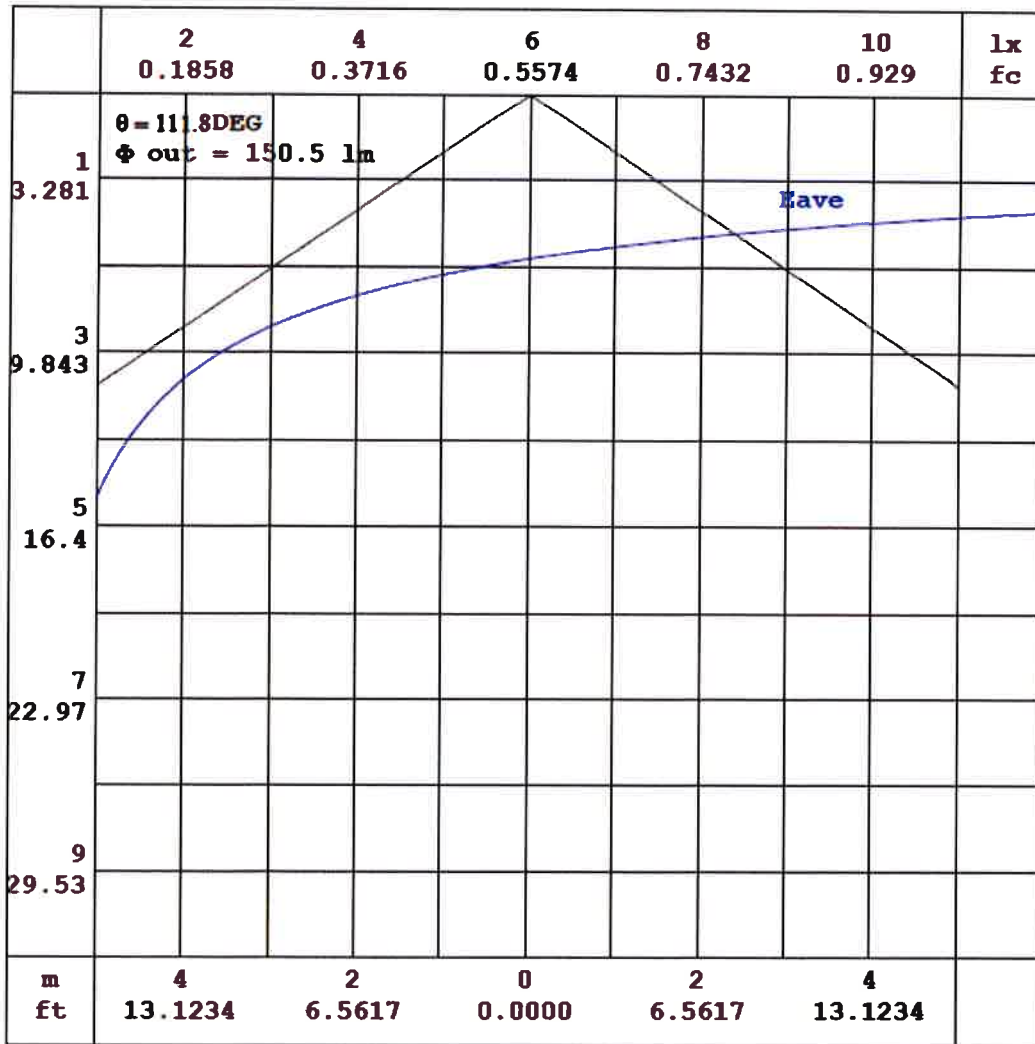
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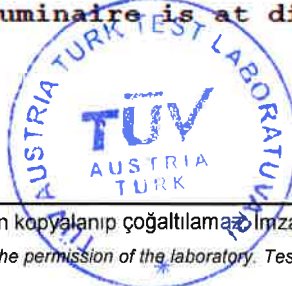
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**2.1 RGBW Renk Fotometrik Deney Sonuçları (Photometric Test Results of RGBW)**

**AAI CURVES**



**Note:**The Curves indicate the illuminated area and the average illumination when the luminaire is at different distance.



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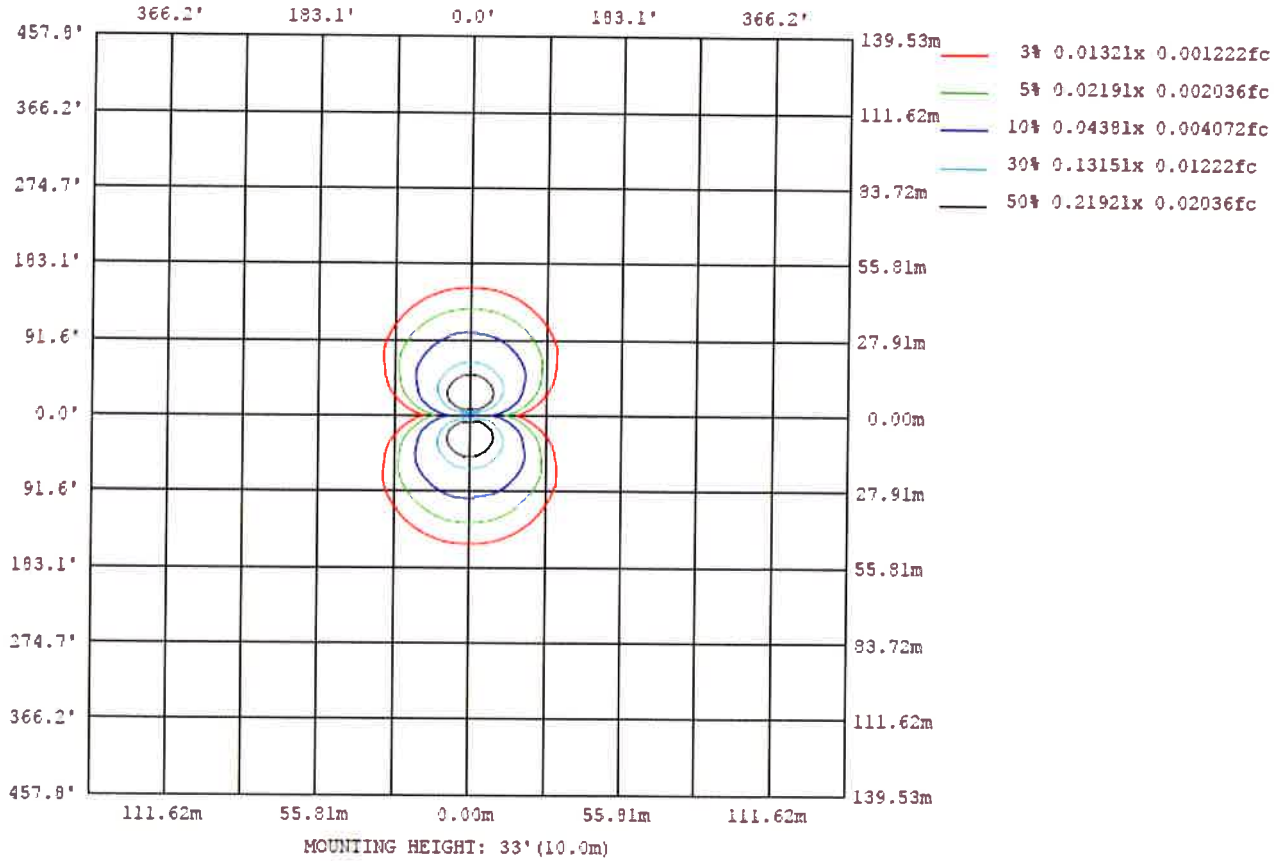
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**2.1 RGBW Renk Fotometrik Deney Sonuçları (Photometric Test Results of RGBW)**

**ISOLUX DIAGRAM**



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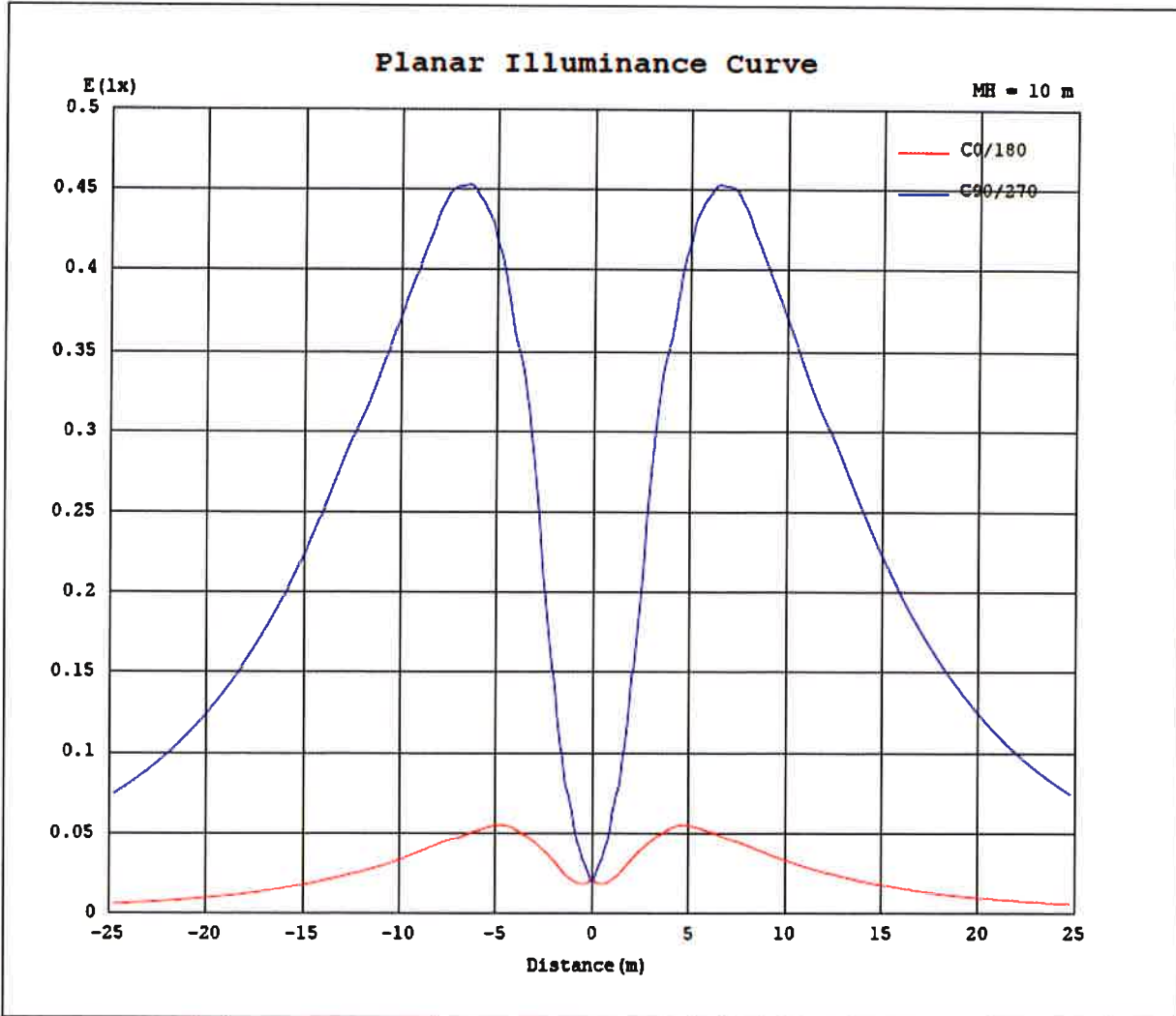
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**2.1 RGBW Renk Fotometrik Deney Sonuçları (Photometric Test Results of RGBW)**



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**2.2 RGBW Renk Spektrokolorimetrik Deney Sonuçları (spectrocolorimetric Test Results of RGBW)****Elektriksel Ölçümler**  
(Electrical Measurements)

Ölçülen Güç (W) (Input Power)	20,16
Ölçülen Gerilim (V) (Input Voltage)	48
Ölçülen Akım (A) (Input Current)	0,42
Güç Faktörü (PF) (Power Factor)	1
Ölçülen Frekans (Hz) (Input Frequency)	50
Ortam Sıcaklığı / Bağıl Nem (Ambient Temperature / Relative Humidity)	25 °C 48% Rh
Stabilizasyon Süresi (Stabilization Time)	60 dk ±5dk

**Spektrokolorimetrik Ölçüm Sonuçları**  
(Spectrocolorimetric Measurement Results)

Chrom x	0,2649
Chrom y	0,3086
Duv	0,0197
Chrom u'	0,1717
Chrom v'	0,4499
Peak	466 nm
Dominant	487 nm
CCT	10522 K
Nominal CCT	10000
Ra(CRI)	84
R9	-2
S/P Ratio	3,2
Preburning time	1 hr
Test Configuration	4π



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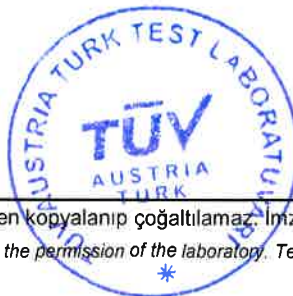
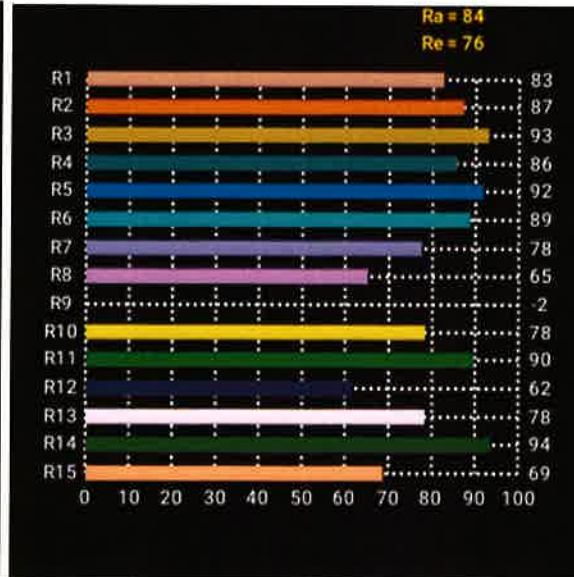
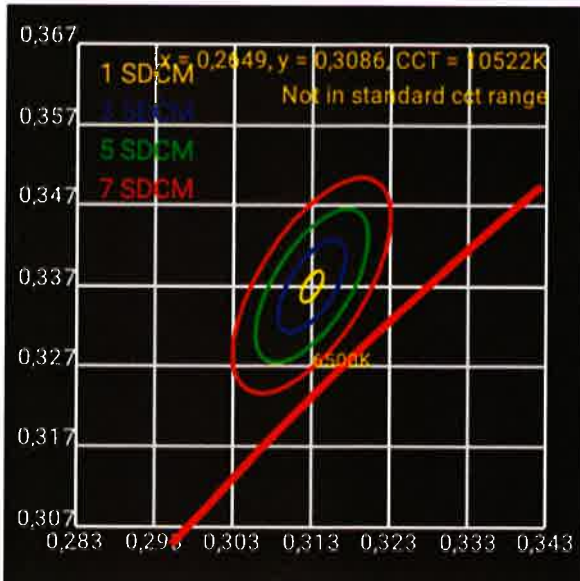
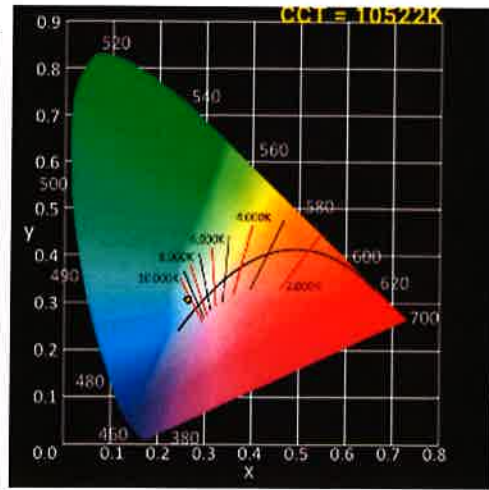
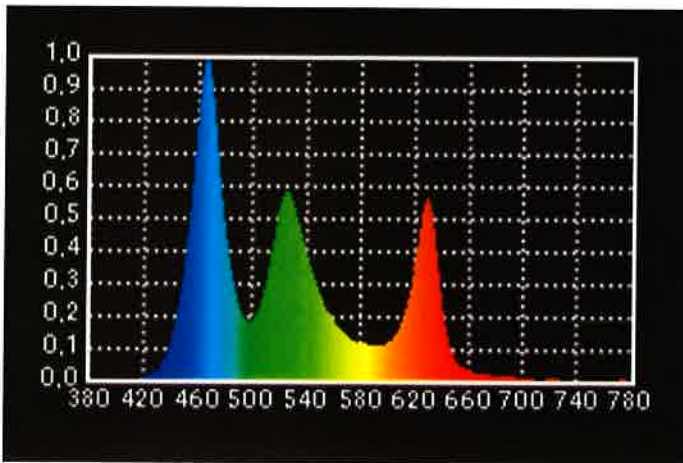
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**2.2 RGBW renk Spektrokolorimetrik Deney Sonuçları (Spectrocolorimetric Test Results of RGBW)**

**Spectral Power Distribution**



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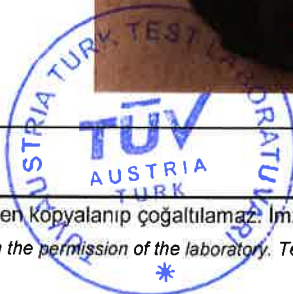
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**3.1 DGC'nin Fotoğrafları (Photos of EUT)**



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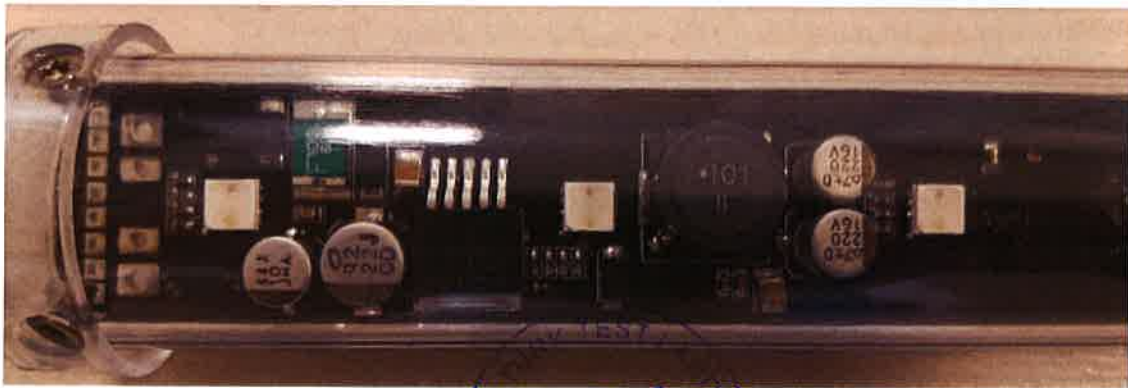
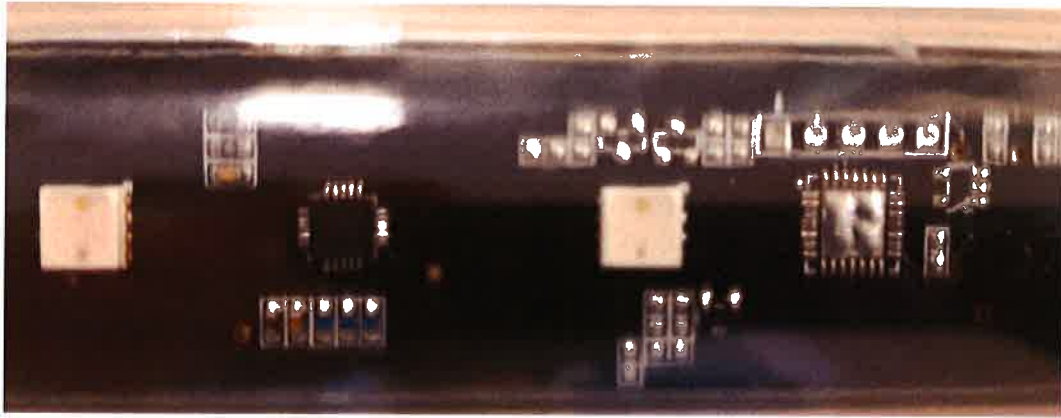
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**3.1 DGC'nin Fotoğrafları (Photos of EUT)**



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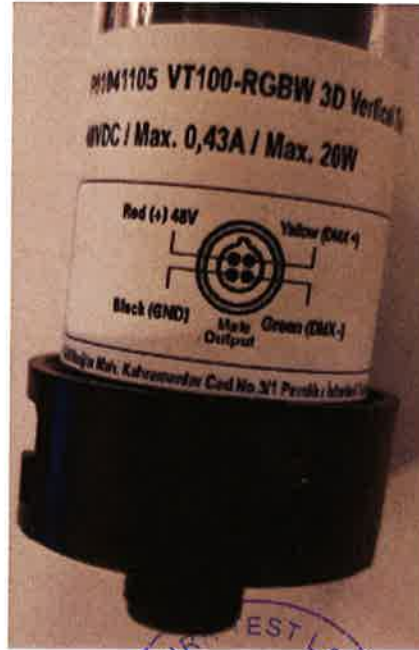
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**3.1 DGC'nin Fotoğrafları (Photos of EUT)**



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