

Prüfbericht - Nr.: Test Report No.:	50347534 001	Auftrags-Nr.: Order No.:	180118291	Seite 1 von 59 Page 1 of 59
Kunden-Referenz-Nr.: Client Reference No.:	N/A	Auftragsdatum: Order date:	19.12.2019	
Auftraggeber: Client:	TOPJET OPTOELECTRONIC CO., LTD No.13,PingDong 4th Rd Nanping S&T Industrial Park,Zhuhai 519060 Guangdong P. R. China			
Prüfgegenstand: Test item:	LED Downlight			
Bezeichnung / Typ-Nr. : Identification / Type No. :	Refer to pages 2-5			
Auftrags-Inhalt: Order content:	TÜV Rheinland – EMC Service			
Prüfgrundlage: Test specification:	EN 55015:2013+A1 EN 61547:2009 EN 61000-3-3:2013+A1 EN 61000-3-2:2014			
Wareneingangsdatum: Date of receipt:	03.01.2020			
Prüfmuster-Nr.: Test sample No.:	A001044232-001~008			
Prüfzeitraum: Testing period:	07.01.2020–05.03.2020			
Ort der Prüfung: Place of testing:	Refer to section 1.1			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland / CCIC (Ningbo) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von/ tested by:		kontrolliert von/ reviewed by:		
02.04.2020 Carrie Lei/PE 		02.04.2020 Tracy Zhang/TC 		
Datum Date	Name/Stellung Name/Position	Unterschrift Signature	Datum Date	Name/Stellung Name/Position
Sonstiges/ Other:				
Refer to pages 2-6 for more information.				
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery :		Prüfmuster vollständig und unbeschädigt Test item complete and undamaged		
*Legende:	1= Sehr gut P(ass)=entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail)= entspricht o.g. Prüfgrundlage(n)	3= befriedigend 3= satisfactory	4= ausreichend N/A = nicht anwendbar 4= sufficient N/A = not applicable
Legend:	1= very good P(ass)= passed a.m. test specification(s)	2 = good F(ail)= failed a.m. test specification(s)	3= satisfactory	5 = mangelhaft N/T =nicht getestet 5 = poor N/T = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i>				

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- Model List:

No.	Model name	Input voltage	Rated power
1.	RC-3-6W	AC 220-240V, 50/60Hz	6W
2.	RC-5-12W		12W
3.	RC-7-18W		18W
4.	RC-8-20W		20W
5.	RC-8-24W		24W
6.	SC-3-6W		6W
7.	SC-5-12W		12W
8.	SC-7-18W		18W
9.	SC-7-20W		20W
10.	SC-7-24W		24W
11.	RCN-3-6W		6W
12.	RCN-5-12W		12W
13.	RCN-7-18W		18W
14.	RCN-8-20W		20W
15.	RCN-8-24W		24W
16.	SCN-3-6W		6W
17.	SCN-5-12W		12W
18.	SCN-7-18W		18W
19.	SCN-7-20W		20W
20.	SCN-7-24W		24W
21.	RP-3-6W		6W
22.	RP-5-12W		12W
23.	RP-7-18W		18W
24.	RP-8-20W		20W
25.	RP-8-24W		24W
26.	SP-3-6W		6W
27.	SP-5-12W		12W
28.	SP-7-18W		18W
29.	SP-7-20W		20W
30.	SP-7-24W		24W
31.	RC-3-6W CCT		6W
32.	RC-5-12W CCT		12W
33.	RC-7-18W CCT		18W
34.	RC-8-20W CCT		20W
35.	RC-8-24W CCT		24W
36.	SC-3-6W CCT		6W
37.	SC-5-12W CCT		12W
38.	SC-7-18W CCT		18W
39.	SC-7-20W CCT		20W
40.	SC-7-24W CCT		24W
41.	RCN-3-6W CCT		6W
42.	RCN-5-12W CCT		12W
43.	RCN-7-18W CCT		18W
44.	RCN-8-20W CCT		20W

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45.	RCN-8-24W CCT	AC 220-240V, 50/60Hz	24W
46.	SCN-3-6W CCT		6W
47.	SCN-5-12W CCT		12W
48.	SCN-7-18W CCT		18W
49.	SCN-7-20W CCT		20W
50.	SCN-7-24W CCT		24W
51.	RP-3-6W CCT		6W
52.	RP-5-12W CCT		12W
53.	RP-7-18W CCT		18W
54.	RP-8-20W CCT		20W
55.	RP-8-24W CCT		24W
56.	SP-3-6W CCT		6W
57.	SP-5-12W CCT		12W
58.	SP-7-18W CCT		18W
59.	SP-7-20W CCT		20W
60.	SP-7-24W CCT		24W
61.	33366(EGLO)		6W
62.	33367(EGLO)		12W
63.	33368(EGLO)		18W
64.	203818(EGLO)		6W
65.	203819(EGLO)		12W
66.	203821(EGLO)		18W
67.	203822(EGLO)		6W
68.	203823(EGLO)		12W
69.	203824(EGLO)		18W
70.	PCB 170-12W		12W
71.	PCB 220-18W		18W
72.	PCB 330-24W		24W
73.	PCB 170-12W CCT		12W
74.	PCB 220-18W CCT		18W
75.	PCB 330-24W CCT		24W
76.	PCB 170-12W CCT+DIM		12W
77.	RC-3-6W CCT+DIM		6W
78.	RC-3-7.5W CCT+DIM		7.5W
79.	RC-5-12W CCT+DIM		12W
80.	SC-3-6W CCT+DIM		6W
81.	SC-5-12W CCT+DIM		12W

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82.	RCN-3-6W CCT+DIM	AC 220-240V, 50/60Hz	6W
83.	RCN-3-7.5W CCT+DIM		7.5W
84.	RCN-5-12W CCT+DIM		12W
85.	SCN-3-6W CCT+DIM		6W
86.	SCN-5-12W CCT+DIM		12W
87.	RP-3-6W CCT+DIM		6W
88.	RP-3-7.5W CCT+DIM		7.5W
89.	RP-5-12W CCT+DIM		12W
90.	SP-3-6W CCT+DIM		6W
91.	SP-5-12W CCT+DIM		12W
92.	PCB 220-18W CCT+DIM		18W
93.	PCB 330-24W CCT+DIM		24W
94.	PCB9 330-30W CCT+DIM		30W
95.	RC-7-18W CCT+DIM		18W
96.	RC-8-20W CCT+DIM		20W
97.	RC-8-24W CCT+DIM		24W
98.	SC-7-18W CCT+DIM		18W
99.	SC-7-20W CCT+DIM		20W
100.	SC-7-24W CCT+DIM		24W
101.	RCN-7-18W CCT+DIM		18W
102.	RCN-8-20W CCT+DIM		20W
103.	RCN-8-24W CCT+DIM		24W
104.	SCN-7-18W CCT+DIM		18W
105.	SCN-7-20W CCT+DIM		20W
106.	SCN-7-24W CCT+DIM		24W
107.	RP-7-18W CCT+DIM		18W
108.	RP-8-20W CCT+DIM		20W
109.	RP-8-24W CCT+DIM		24W
110.	SP-7-18W CCT+DIM		18W
111.	SP-7-20W CCT+DIM		20W
112.	SP-7-24W CCT+DIM		24W
113.	RC-5-12W Sensor		12W
114.	RC-7-18W Sensor		18W
115.	RC-8-24W Sensor		24W
116.	RCN-5-12W Sensor		12W
117.	RCN-7-18W Sensor		18W
118.	RCN-8-24W Sensor		24W

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119.	RP-5-12W Sensor	AC 220-240V, 50/60Hz	12W
120.	RP-7-18W Sensor		18W
121.	RP-8-24W Sensor		24W
122.	RC-5-12W CCT+Sensor		12W
123.	RC-7-18W CCT+Sensor		18W
124.	RC-8-24W CCT+Sensor		24W
125.	RCN-5-12W CCT+Sensor		12W
126.	RCN-7-18W CCT+Sensor		18W
127.	RCN-8-24W CCT+Sensor		24W
128.	RP-5-12W CCT+Sensor		12W
129.	RP-7-18W CCT+Sensor		18W
130.	RP-8-24W CCT+Sensor		24W
131.	PCB9 170-12W CCT		12W
132.	PCB9 220-18W CCT		18W
133.	PCB9 330-24W CCT		24W
134.	PCB9 330-30W CCT		30W
135.	PCB9 330-30W		30W
136.	PCB 220-18W CCT+PC		18W
137.	PCB 330-30W CCT+PC		30W

Other aspects:

1. For models from No.1-No.75, they are based on similar circuit diagram.
2. For models from No.76-No.91, they are based on similar circuit diagram.
3. For models from No.92-No.112, they are based on similar circuit diagram.
4. For models from No.113-No.130, they are based on similar circuit diagram.
5. For models PCB9 170-12W CCT and PCB9 220-18W CCT, they are based on similar circuit diagram.
6. For models PCB9 330-24W CCT, PCB9 330-30W CCT and PCB9 330-30W, they are based on similar circuit diagram.
7. The models' name with "CCT" mean the products have color temperature regulation function.
8. The models' name with "PC" mean the products have power regulation function.
9. The models' name with "sensor" are equipped with same sensor.

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10. Therefore, EMC tests were performed as below table. The symbol “√” means the testing item was performed.

Model	CE	3-loop	CDN	Har	Flick	ESD	EFT	RS	Surge	CS	Dips
PCB 330-30W CCT+PC	√	√	√	√		√	√	√	√	√	√
PCB 220-18W CCT+PC	√		√			√	√	√	√	√	√
PCB9 330-30W CCT	√		√	√		√	√	√	√	√	√
PCB9 220-18W CCT	√		√			√	√	√	√	√	√
RC-8-24W CCT+Sensor	√		√			√	√	√	√	√	√
PCB9 330-30W CCT+DIM	√		√	√		√	√	√	√	√	√
PCB 170-12W CCT+DIM	√		√			√	√	√	√	√	√
PCB 330-24W CCT	√		√			√	√	√	√	√	√

TEST SUMMARY

4.1.1 HARMONICS ON AC MAINS

Result:

Pass

4.1.2 VOLTAGE CHANGES, VOLTAGE FLUCTUATIONS AND FLICKER ON AC MAINS

Result:

Pass

4.1.3 MAINS TERMINAL CONTINUOUS DISTURBANCE VOLTAGE

Result:

Pass

4.1.4 RADIATED ELECTROMAGNETIC DISTURBANCE

Result:

Pass

4.2.1 RADIATED DISTURBANCE

Result:

Pass

5.1.1 ELECTROSTATIC DISCHARGE

Result:

Pass

5.1.2 RADIO FREQUENCY ELECTROMAGNETIC FIELD

Result:

Pass

5.2.1 FAST TRANSIENTS ON INPUT AND OUTPUT AC POWER LINES

Result:

Pass

5.2.2 INJECTED CURRENT INTO INPUT AND OUTPUT AC POWER PORT

Result:

Pass

5.2.3 SURGES TO AC POWER PORT

Result:

Pass

5.2.4 VOLTAGE DIPS AND INTERRUPTIONS TO AC POWER PORT

Result:

Pass

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1 Test Sites

1.1 Test Facilities

Laboratory A: TÜV Rheinland /CCIC(Ningbo) Co., Ltd.

1st Floor, Building 11, Scholar Innovation Park, No.1188 Zhongguan Road, Zhenhai District, Ningbo 315200 P.R. China.

Laboratory B: Ningbo Joysun Product Testing Service Co., Ltd.

No.66, Qingyi Road, Hi-Tech District, Ningbo, Zhejiang, China

The used test equipment is in accordance with CISPR 16-1 series standards for measurement of radio interference.

1.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment of Laboratory A

No.	Equipment	Model	Serial no.	Cal. due date
1.	EMI test receiver	ESR3	102331	2020.11.24
2.	LISN	ENV216	102250	2020.11.24
3.	EMI test receiver	ESR3	102362	2020.11.24
4.	CDNE	CDNE M210	46722	2020.11.26
5.	Triple loop antenna	HM020	101000	2020.11.06
6.	ESD generator	NX30.1	11744	2020.11.26
7.	EFT/Surge/PFM/Dips Immunity test system	Compact NX5 bsp-1-300-16	P1725200261	2020.11.24
8.	CS immunity test	NSG 4070C-80	47606	2020.11.24
9.	CDN	CDN M016S	47812	2020.11.24
10.	Attenuator	ATN 6150	17032903	N/A
11.	Amplifier	BBA150-BC250	102749	2020.11.24
12.	Signal generator	SMB100A	180488	2020.11.24
13.	Stacked Log-Per Antenna	STLP 9128 ES	219	N/A
14.	Harmonic power supply	5001IX-CTS-400-413	1735A02292	2020.11.10
15.	Harmonics/voltage fluctuation Analyser	PACS-1	1736A00799	2020.11.10

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Table 2: List of Test and Measurement Equipments of Laboratory B

No.	Equipment	Model	Inventory no.	Cal. due date
1.	Integrated measurement system	IMS	100012	2021.02.12
2.	CDN	FCC-801-M2/M3-16A	7079	2021.02.12
3.	6 dB Attenuator	75-A-FFN-06	141733	2021.02.12

1.3 Measurement Uncertainty

Table 3: Measurement Uncertainty of Laboratory A

Test Item	Expanded Measurement Uncertainty (k=2)
Conducted Emission (9-150kHz)	3.70dB
Conducted Emission (150k-30MHz)	3.30dB
Disturbance Power	4.27dB
Radiated Emission (30-1000MHz)	4.52dB
Radiated Emission (1-18GHz)	4.37dB

Table 4: Measurement Uncertainty of Laboratory B

Test Item	Expanded Measurement Uncertainty (k=2)
Conducted Emission (150k-30MHz)	2.14dB
Disturbance Power (30MHz-80MHz)	2.68dB
Disturbance Power (80MHz-300MHz)	3.5dB
Radiated Emission (30-1000MHz)	3.68dB

2 General Product Information

2.1 Product Function and Intended Use

The EUT (equipment under test) is an ordinary LED Downlight for Lighting and similar use.
For the further information, refer to the user's manual.

2.2 Ratings and System Details

System input voltage	: Refer to pages 2-5	For all models
Frequency	: Refer to pages 2-5	For all models
Rated output power	: Refer to pages 2-5	For all models
Protection Class	: Class II	For all models

Refer to the User Manual for further information.

2.3 Independent Operation Modes

The basic operation modes are: "On" or "Off".

Refer to the User Manual for further information.

2.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram for further information.

2.5 Submitted Documents

Circuit diagram, label, user manual etc.

3 Test Set-up and Operation Modes

3.1 Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test conditions were adapted accordingly in reference to the instructions for use.

Refer to the related paragraph of this report.

Immunity: The equipment under test (EUT) was configured to have its highest possible susceptibility against the tested phenomena. The test conditions were adapted accordingly in reference to the instructions for use.

Refer to the related paragraph of this report.

3.2 Physical Configuration for Testing

Refer to the related paragraph of this report.

3.3 Test Operation and Test Software

Refer to the related paragraph of this report. No software was used.

3.4 Special Accessories and Auxiliary Equipment

None.

3.5 Countermeasures to achieve EMC Compliance

The tested sample contained noise suppression components as specified in the circuit diagram. No special measure is employed to achieve the requirement.

4 Test Results EMISSION

4.1 Emission in the Frequency Range up to 30 MHz

4.1.1 Harmonics on AC Mains

Result:	Pass
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Date of testing : 2020.01.07-2020.02.18
Test procedure : EN 61000-3-2:2014
Test duration : 2.5min
Harmonic order : 2 – 40th
Frequency range : 0 – 2kHz
Test voltage : 230V, 50Hz

The harmonics on AC Mains in the frequency from 0 to 2kHz were measured in accordance with EN 61000-3-2:2014.

The measurement was conducted with an automatic current harmonic analyzing system. This equipment is in compliance with the requirements of EN 61000-3-2:2014.

The results indicated in the following tables and figures were those measured and recorded by an automatic measuring system.

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Table 5: Harmonic currents measurement result for model PCB 330-30W CCT+PC

Equipment category: Class C;

Fundamental current I₁: 0.134A; Power factor: 0.948; Active input power: 29.5W.

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	0.003	N/A	0.001	0.004	N/A	Pass
3	0.016	0.038	42.4	0.018	0.057	30.9	Pass
4	0.001	0.000	N/A	0.001	0.000	N/A	Pass
5	0.009	0.013	67.7	0.009	0.020	46.5	Pass
6	0.000	0.000	N/A	0.000	0.000	N/A	Pass
7	0.007	0.009	72.7	0.007	0.014	51.3	Pass
8	0.000	0.000	N/A	0.000	0.000	N/A	Pass
9	0.004	0.007	N/A	0.004	0.010	N/A	Pass
10	0.000	0.000	N/A	0.000	0.000	N/A	Pass
11	0.002	0.004	N/A	0.002	0.006	N/A	Pass
12	0.000	0.000	N/A	0.000	0.000	N/A	Pass
13	0.002	0.004	N/A	0.002	0.006	N/A	Pass
14	0.000	0.000	N/A	0.000	0.000	N/A	Pass
15	0.002	0.004	N/A	0.002	0.006	N/A	Pass
16	0.000	0.000	N/A	0.000	0.000	N/A	Pass
17	0.002	0.004	N/A	0.002	0.006	N/A	Pass
18	0.000	0.000	N/A	0.000	0.000	N/A	Pass
19	0.001	0.004	N/A	0.001	0.006	N/A	Pass
20	0.000	0.000	N/A	0.000	0.000	N/A	Pass
21	0.001	0.004	N/A	0.001	0.006	N/A	Pass
22	0.000	0.000	N/A	0.000	0.000	N/A	Pass
23	0.000	0.004	N/A	0.001	0.006	N/A	Pass
24	0.000	0.000	N/A	0.000	0.000	N/A	Pass
25	0.001	0.004	N/A	0.001	0.006	N/A	Pass
26	0.000	0.000	N/A	0.000	0.000	N/A	Pass
27	0.001	0.004	N/A	0.001	0.006	N/A	Pass
28	0.000	0.000	N/A	0.000	0.000	N/A	Pass
29	0.001	0.004	N/A	0.001	0.006	N/A	Pass
30	0.000	0.000	N/A	0.000	0.000	N/A	Pass
31	0.001	0.004	N/A	0.001	0.006	N/A	Pass
32	0.000	0.000	N/A	0.000	0.000	N/A	Pass
33	0.000	0.004	N/A	0.000	0.006	N/A	Pass
34	0.000	0.000	N/A	0.000	0.000	N/A	Pass
35	0.001	0.004	N/A	0.001	0.006	N/A	Pass
36	0.000	0.000	N/A	0.000	0.000	N/A	Pass
37	0.001	0.004	N/A	0.001	0.006	N/A	Pass
38	0.000	0.000	N/A	0.000	0.000	N/A	Pass
39	0.001	0.004	N/A	0.001	0.006	N/A	Pass
40	0.000	0.000	N/A	0.000	0.000	N/A	Pass

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Table 6: Harmonic currents measurement result for model PCB9 330-30W CCT

Equipment category: Class C;

Fundamental current I₁: 0.127A; Power factor: 0.935; Active input power: 27.4W.

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	0.003	N/A	0.001	0.004	N/A	Pass
3	0.016	0.035	46.0	0.018	0.053	33.7	Pass
4	0.001	0.000	N/A	0.001	0.000	N/A	Pass
5	0.007	0.013	57.0	0.007	0.019	39.5	Pass
6	0.000	0.000	N/A	0.000	0.000	N/A	Pass
7	0.006	0.009	63.3	0.006	0.013	45.0	Pass
8	0.000	0.000	N/A	0.000	0.000	N/A	Pass
9	0.004	0.006	N/A	0.004	0.009	N/A	Pass
10	0.000	0.000	N/A	0.000	0.000	N/A	Pass
11	0.003	0.004	N/A	0.003	0.006	N/A	Pass
12	0.000	0.000	N/A	0.000	0.000	N/A	Pass
13	0.001	0.004	N/A	0.002	0.006	N/A	Pass
14	0.000	0.000	N/A	0.000	0.000	N/A	Pass
15	0.001	0.004	N/A	0.001	0.006	N/A	Pass
16	0.000	0.000	N/A	0.000	0.000	N/A	Pass
17	0.001	0.004	N/A	0.001	0.006	N/A	Pass
18	0.000	0.000	N/A	0.000	0.000	N/A	Pass
19	0.001	0.004	N/A	0.001	0.006	N/A	Pass
20	0.000	0.000	N/A	0.000	0.000	N/A	Pass
21	0.001	0.004	N/A	0.001	0.006	N/A	Pass
22	0.000	0.000	N/A	0.000	0.000	N/A	Pass
23	0.001	0.004	N/A	0.001	0.006	N/A	Pass
24	0.000	0.000	N/A	0.000	0.000	N/A	Pass
25	0.001	0.004	N/A	0.001	0.006	N/A	Pass
26	0.000	0.000	N/A	0.000	0.000	N/A	Pass
27	0.000	0.004	N/A	0.001	0.006	N/A	Pass
28	0.000	0.000	N/A	0.000	0.000	N/A	Pass
29	0.000	0.004	N/A	0.000	0.006	N/A	Pass
30	0.000	0.000	N/A	0.000	0.000	N/A	Pass
31	0.000	0.004	N/A	0.000	0.006	N/A	Pass
32	0.000	0.000	N/A	0.000	0.000	N/A	Pass
33	0.000	0.004	N/A	0.000	0.006	N/A	Pass
34	0.000	0.000	N/A	0.000	0.000	N/A	Pass
35	0.000	0.004	N/A	0.000	0.006	N/A	Pass
36	0.000	0.000	N/A	0.000	0.000	N/A	Pass
37	0.000	0.004	N/A	0.000	0.006	N/A	Pass
38	0.000	0.000	N/A	0.000	0.000	N/A	Pass
39	0.000	0.004	N/A	0.000	0.006	N/A	Pass
40	0.000	0.000	N/A	0.000	0.000	N/A	Pass

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Table 7: Harmonic currents measurement result for model PCB9 330-30W CCT+DIM

Equipment category: Class C;

Fundamental current I₁: 0.121A; Power factor: 0.971; Active input power: 27.7W.

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	0.008	N/A	0.001	0.012	N/A	Pass
3	0.111	0.115	96.5	0.112	0.172	65.3	Pass
4	0.001	0.000	N/A	0.001	0.000	N/A	Pass
5	0.016	0.040	40.6	0.017	0.060	27.7	Pass
6	0.000	0.000	N/A	0.000	0.000	N/A	Pass
7	0.001	0.028	N/A	0.001	0.042	N/A	Pass
8	0.000	0.000	N/A	0.000	0.000	N/A	Pass
9	0.004	0.020	N/A	0.004	0.030	N/A	Pass
10	0.000	0.000	N/A	0.000	0.000	N/A	Pass
11	0.006	0.012	52.2	0.006	0.018	36.0	Pass
12	0.000	0.000	N/A	0.000	0.000	N/A	Pass
13	0.007	0.012	57.5	0.007	0.018	39.1	Pass
14	0.000	0.000	N/A	0.000	0.000	N/A	Pass
15	0.006	0.012	51.6	0.006	0.018	35.0	Pass
16	0.000	0.000	N/A	0.000	0.000	N/A	Pass
17	0.006	0.012	48.6	0.006	0.018	32.7	Pass
18	0.000	0.000	N/A	0.000	0.000	N/A	Pass
19	0.002	0.012	N/A	0.002	0.018	N/A	Pass
20	0.000	0.000	N/A	0.000	0.000	N/A	Pass
21	0.002	0.012	N/A	0.002	0.018	N/A	Pass
22	0.000	0.000	N/A	0.000	0.000	N/A	Pass
23	0.004	0.012	N/A	0.004	0.018	N/A	Pass
24	0.000	0.000	N/A	0.000	0.000	N/A	Pass
25	0.002	0.012	N/A	0.002	0.018	N/A	Pass
26	0.000	0.000	N/A	0.000	0.000	N/A	Pass
27	0.010	0.012	85.5	0.011	0.018	58.9	Pass
28	0.000	0.000	N/A	0.000	0.000	N/A	Pass
29	0.008	0.012	70.4	0.009	0.018	48.1	Pass
30	0.000	0.000	N/A	0.000	0.000	N/A	Pass
31	0.001	0.012	N/A	0.001	0.018	N/A	Pass
32	0.000	0.000	N/A	0.000	0.000	N/A	Pass
33	0.004	0.012	N/A	0.004	0.018	N/A	Pass
34	0.000	0.000	N/A	0.000	0.000	N/A	Pass
35	0.005	0.012	N/A	0.005	0.018	N/A	Pass
36	0.000	0.000	N/A	0.000	0.000	N/A	Pass
37	0.004	0.012	N/A	0.004	0.018	N/A	Pass
38	0.000	0.000	N/A	0.000	0.000	N/A	Pass
39	0.001	0.012	N/A	0.001	0.018	N/A	Pass
40	0.000	0.000	N/A	0.000	0.000	N/A	Pass

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4.1.2 Voltage changes, voltage fluctuations and flicker on AC mains

Result:	Pass
Test procedure : EN 61000-3-3:2013+A1	
According to the low power of the sample, it will not produce voltage fluctuation and flick, which might exceed the related limits.	

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4.1.3 Mains Terminal Continuous Disturbance Voltage

Result:	Pass
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Date of testing : 2020.01.13-2020.02.24
Kind of test site : EMC Shielding Room
Port : Mains
Basic Standard : EN 55015:2013+A1
Frequency Range : 9kHz – 30MHz
Limit : EN 55015:2013+A1, Clause 4.3

Test Setup

Input Voltage : AC 230V, 50Hz
Operational mode : ON
Earthing : No
Ambient Temp. : 20-23°C
Test Setup : According to Clause 8 of EN 55015:2013+A1

The measurement setup was made according to EN 55015:2013+A1 in an EMC shielding room.

The measurement equipment like test receiver, quasi-peak detector and Artificial Mains Network (AMN) are in compliance with CISPR 16-1 series standards and EN 55015:2013+A1. The tested object was operated under its rated voltage and its rated frequency.

Furthermore an internal calibration with the test receiver was conducted prior to and after each measurement.

The tested object was set-up on a wooden table and 0.8m away from the AMN. The length of the extension power cord of the tested object was about 0.8m.

The Disturbance Voltage was determined according to clause 8 of EN 55015:2013+A1 while measuring the line and neutral conductor by turns.

The following figures were those measured by an automatic measuring system. The disturbance voltage was scanned firstly with both Peak and Average detector and then a final measurement was performed with both Quasi-peak and Average detector at the frequencies which showed the Max. in a designated frequency sub-range. In the figures below, the higher curve is that of peak-value and the lower one is average-value. “♦” refers to Quasi-peak value and the Average value which were measured in the final measurement.

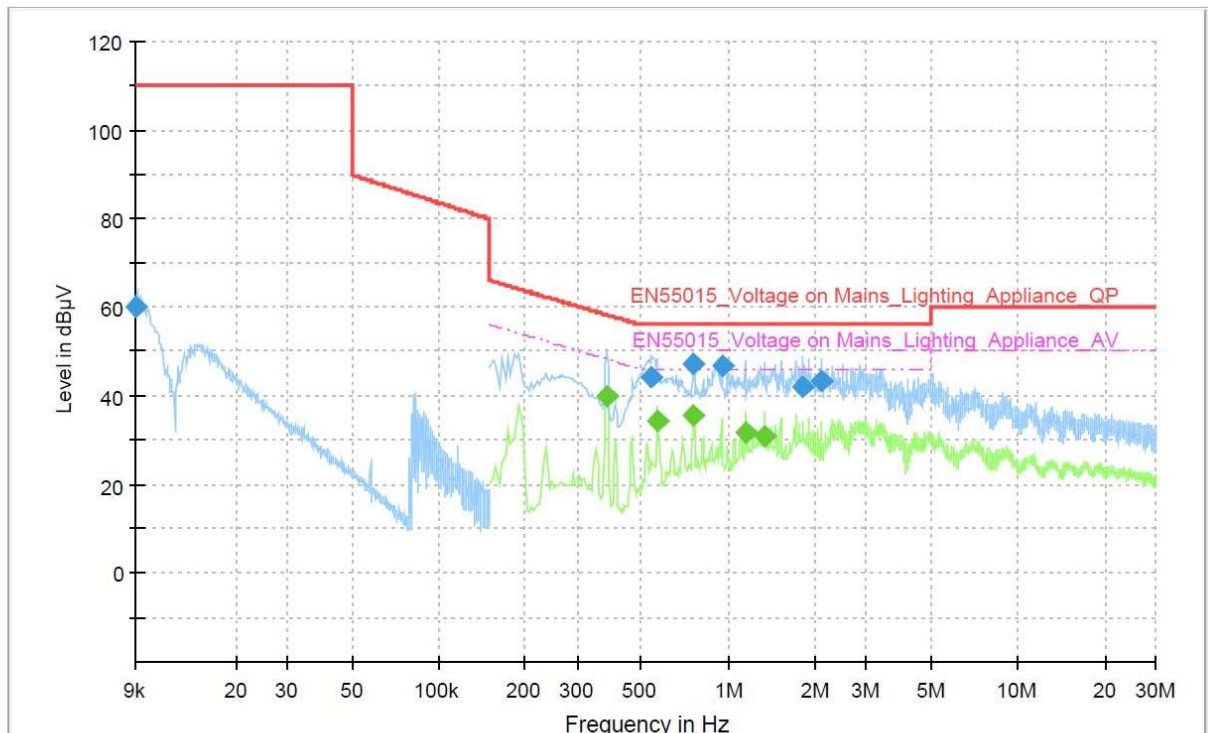
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Figure 1: Spectral Diagrams of disturbance voltage, 0.009-30MHz, L for model PCB 330-30W CCT+PC



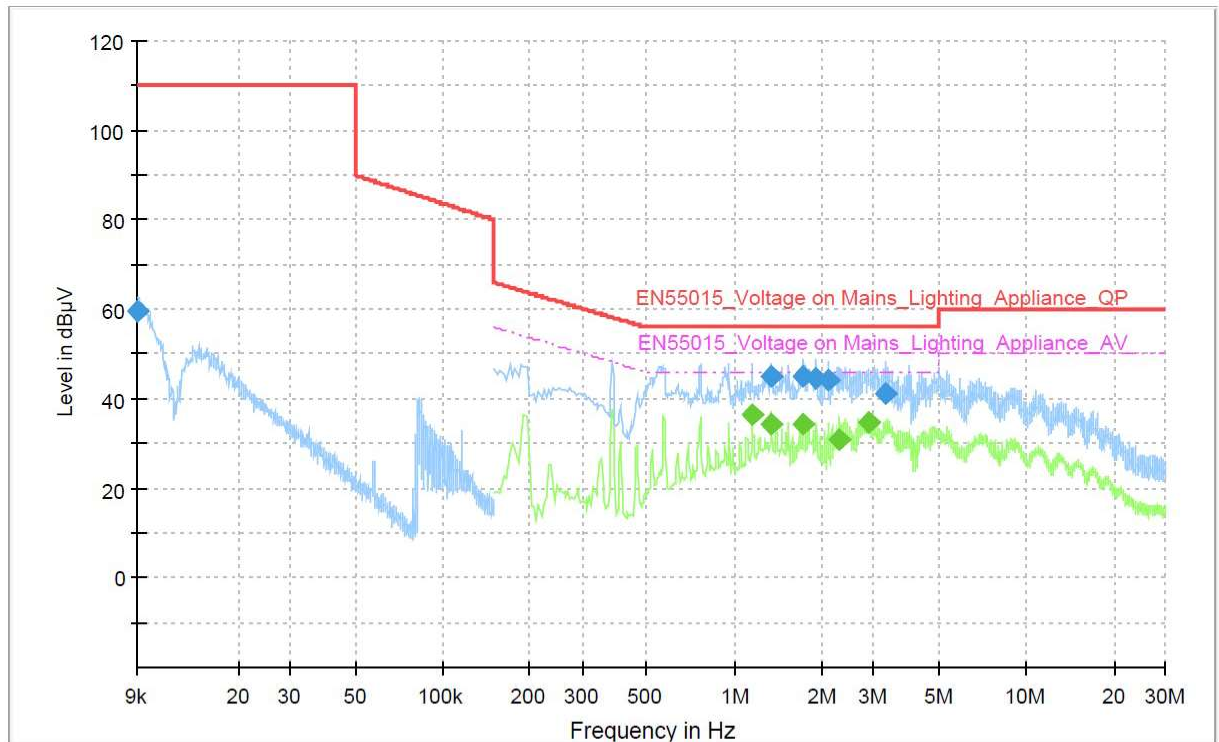
Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.009000	60.23	---	110.00	49.77	1000.0	0.200	L1	OFF	10.3
0.382000	---	39.97	48.24	8.26	1000.0	9.000	L1	OFF	9.9
0.546000	44.10	---	56.00	11.90	1000.0	9.000	L1	OFF	9.9
0.570000	---	34.17	46.00	11.83	1000.0	9.000	L1	OFF	9.9
0.762000	---	35.84	46.00	10.16	1000.0	9.000	L1	OFF	9.9
0.762000	47.33	---	56.00	8.67	1000.0	9.000	L1	OFF	9.9
0.954000	46.74	---	56.00	9.26	1000.0	9.000	L1	OFF	9.9
1.142000	---	31.99	46.00	14.01	1000.0	9.000	L1	OFF	10.0
1.330000	---	31.12	46.00	14.88	1000.0	9.000	L1	OFF	10.0
1.810000	42.13	---	56.00	13.87	1000.0	9.000	L1	OFF	10.0
2.102000	43.46	---	56.00	12.54	1000.0	9.000	L1	OFF	10.0

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Figure 2: Spectral Diagrams of disturbance voltage, 0.009-30MHz, N for model PCB 330-30W CCT+PC



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.009000	59.50	---	110.00	50.50	1000.0	0.200	N	OFF	10.3
1.150000	---	36.36	46.00	9.64	1000.0	9.000	N	OFF	10.0
1.338000	---	34.57	46.00	11.43	1000.0	9.000	N	OFF	10.0
1.342000	44.90	---	56.00	11.10	1000.0	9.000	N	OFF	10.0
1.722000	---	34.52	46.00	11.48	1000.0	9.000	N	OFF	10.1
1.726000	44.90	---	56.00	11.10	1000.0	9.000	N	OFF	10.1
1.914000	44.61	---	56.00	11.39	1000.0	9.000	N	OFF	10.1
2.110000	44.18	---	56.00	11.82	1000.0	9.000	N	OFF	10.1
2.286000	---	30.99	46.00	15.01	1000.0	9.000	N	OFF	10.1
2.890000	---	34.89	46.00	11.11	1000.0	9.000	N	OFF	10.1
3.314000	41.12	---	56.00	14.88	1000.0	9.000	N	OFF	10.1

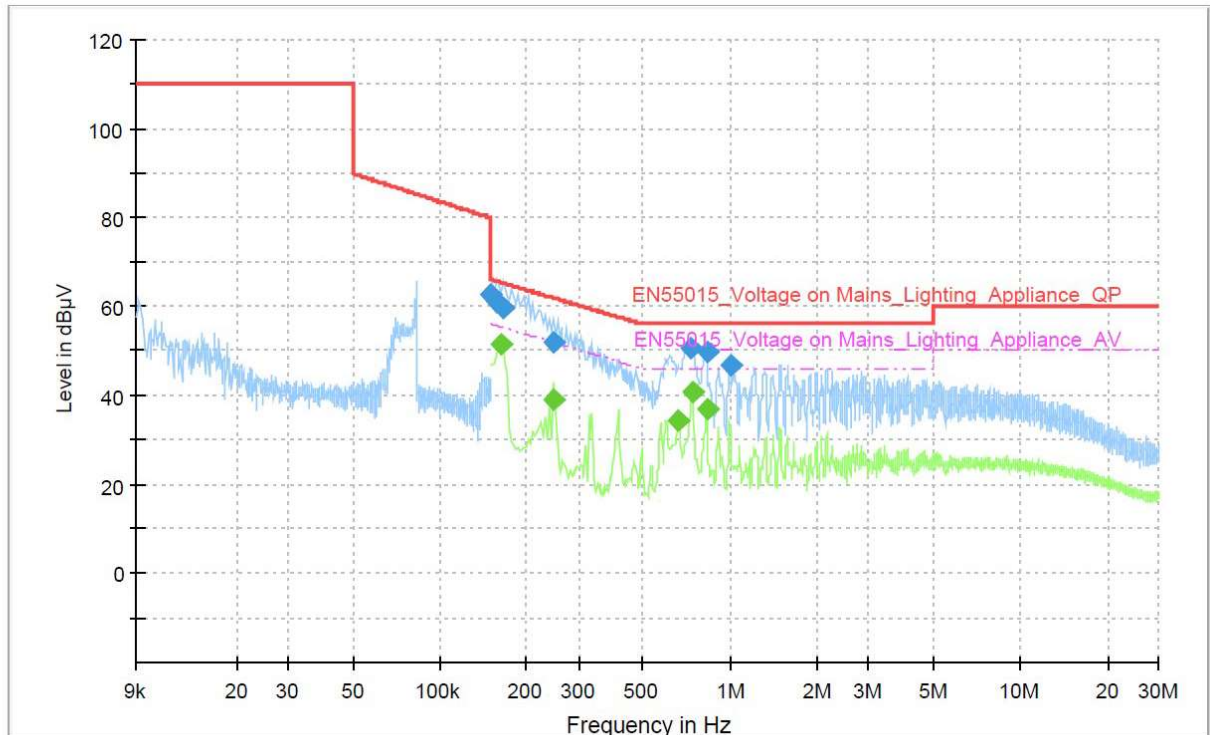
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Figure 3: Spectral Diagrams of disturbance voltage, 0.009-30MHz, L for model PCB 220-18W CCT+PC



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.150000	62.62	---	66.00	3.38	1000.0	9.000	L1	OFF	9.8
0.158000	61.12	---	65.57	4.45	1000.0	9.000	L1	OFF	9.8
0.162000	---	51.55	55.36	3.81	1000.0	9.000	L1	OFF	9.8
0.166000	59.52	---	65.16	5.64	1000.0	9.000	L1	OFF	9.8
0.246000	---	38.99	51.89	12.90	1000.0	9.000	L1	OFF	9.9
0.246000	51.83	---	61.89	10.06	1000.0	9.000	L1	OFF	9.9
0.666000	---	34.47	46.00	11.53	1000.0	9.000	L1	OFF	9.9
0.734000	50.52	---	56.00	5.48	1000.0	9.000	L1	OFF	9.9
0.742000	---	40.82	46.00	5.18	1000.0	9.000	L1	OFF	9.9
0.830000	---	36.79	46.00	9.21	1000.0	9.000	L1	OFF	9.9
0.830000	49.60	---	56.00	6.40	1000.0	9.000	L1	OFF	9.9
0.998000	46.61	---	56.00	9.39	1000.0	9.000	L1	OFF	10.0

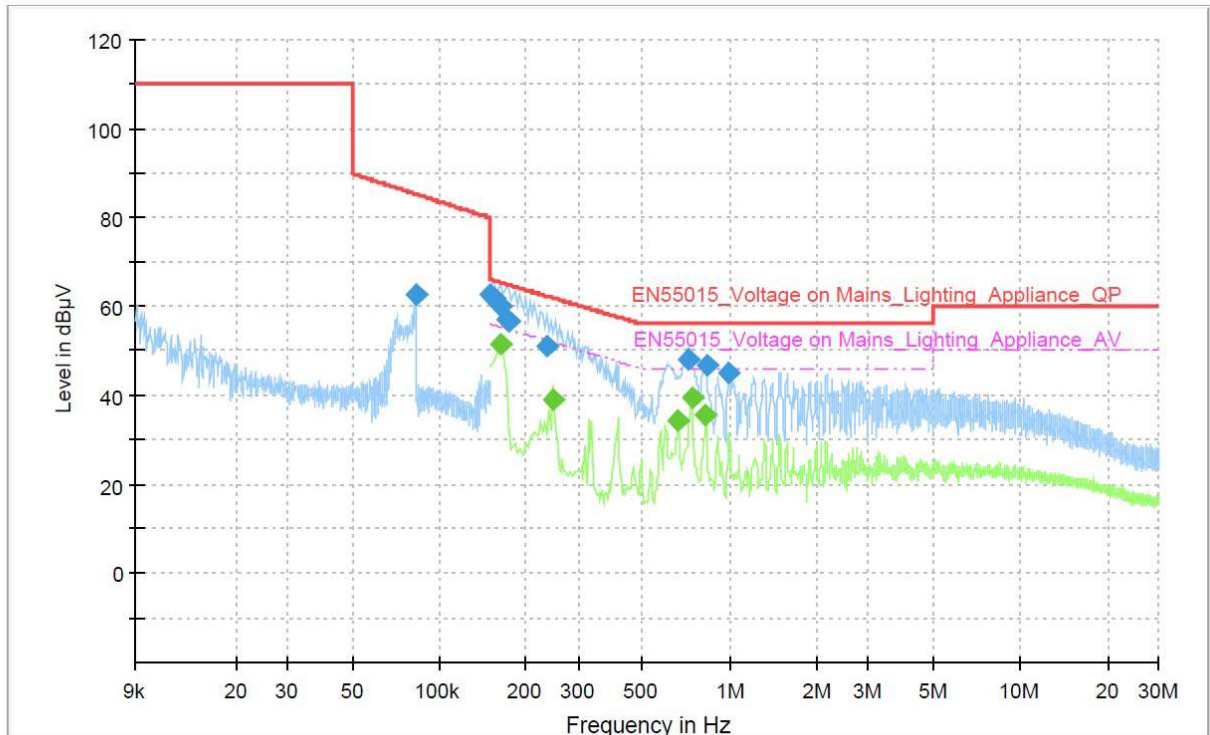
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Figure 4: Spectral Diagrams of disturbance voltage, 0.009-30MHz, N for model PCB 220-18W CCT+PC



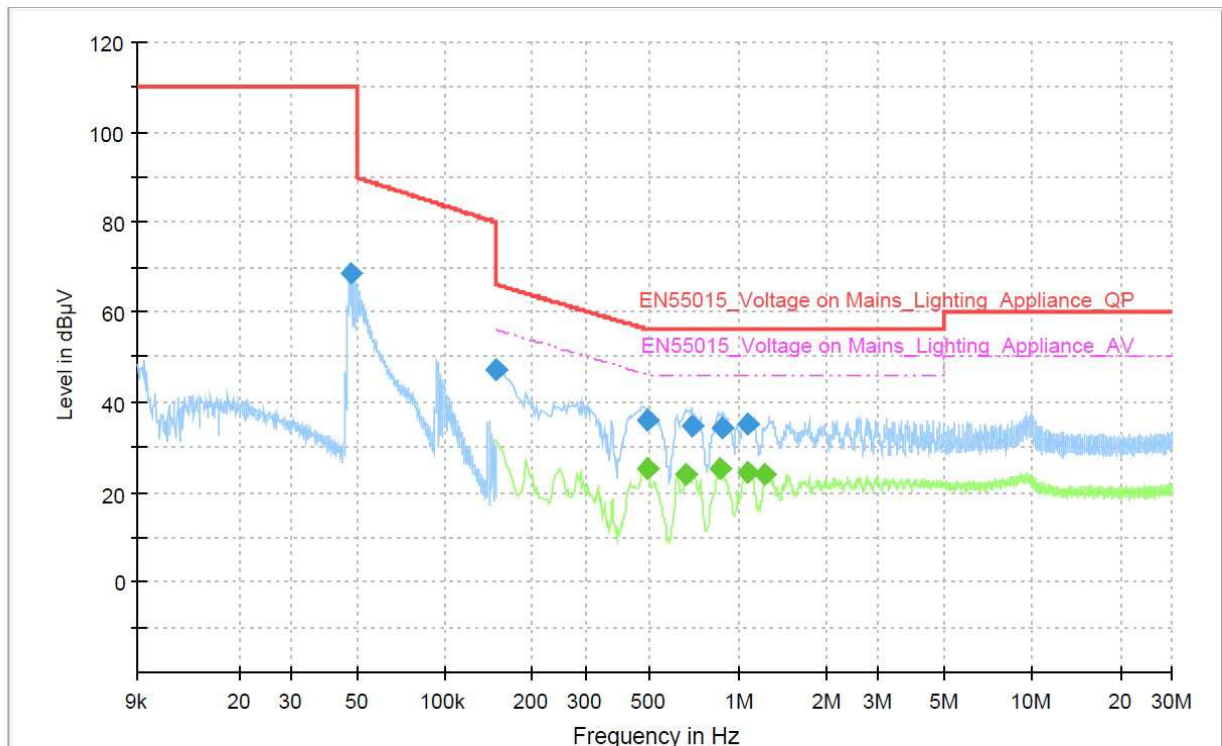
Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.082680	62.84	---	85.42	22.59	1000.0	0.200	N	OFF	9.8
0.150000	62.49	---	66.00	3.51	1000.0	9.000	N	OFF	9.8
0.154000	61.85	---	65.78	3.93	1000.0	9.000	N	OFF	9.8
0.162000	---	51.62	55.36	3.74	1000.0	9.000	N	OFF	9.8
0.162000	60.09	---	65.36	5.27	1000.0	9.000	N	OFF	9.8
0.170000	56.90	---	64.96	8.06	1000.0	9.000	N	OFF	9.8
0.174000	56.43	---	64.77	8.34	1000.0	9.000	N	OFF	9.8
0.234000	51.00	---	62.31	11.31	1000.0	9.000	N	OFF	9.9
0.246000	---	39.07	51.89	12.82	1000.0	9.000	N	OFF	9.9
0.662000	---	34.47	46.00	11.53	1000.0	9.000	N	OFF	10.0
0.726000	48.06	---	56.00	7.94	1000.0	9.000	N	OFF	10.0
0.742000	---	39.35	46.00	6.65	1000.0	9.000	N	OFF	10.0
0.826000	---	35.87	46.00	10.13	1000.0	9.000	N	OFF	10.0
0.830000	46.98	---	56.00	9.02	1000.0	9.000	N	OFF	10.0
0.994000	45.17	---	56.00	10.83	1000.0	9.000	N	OFF	10.0

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Figure 5: Spectral Diagrams of disturbance voltage, 0.009-30MHz, L for model PCB9 330-30W CCT



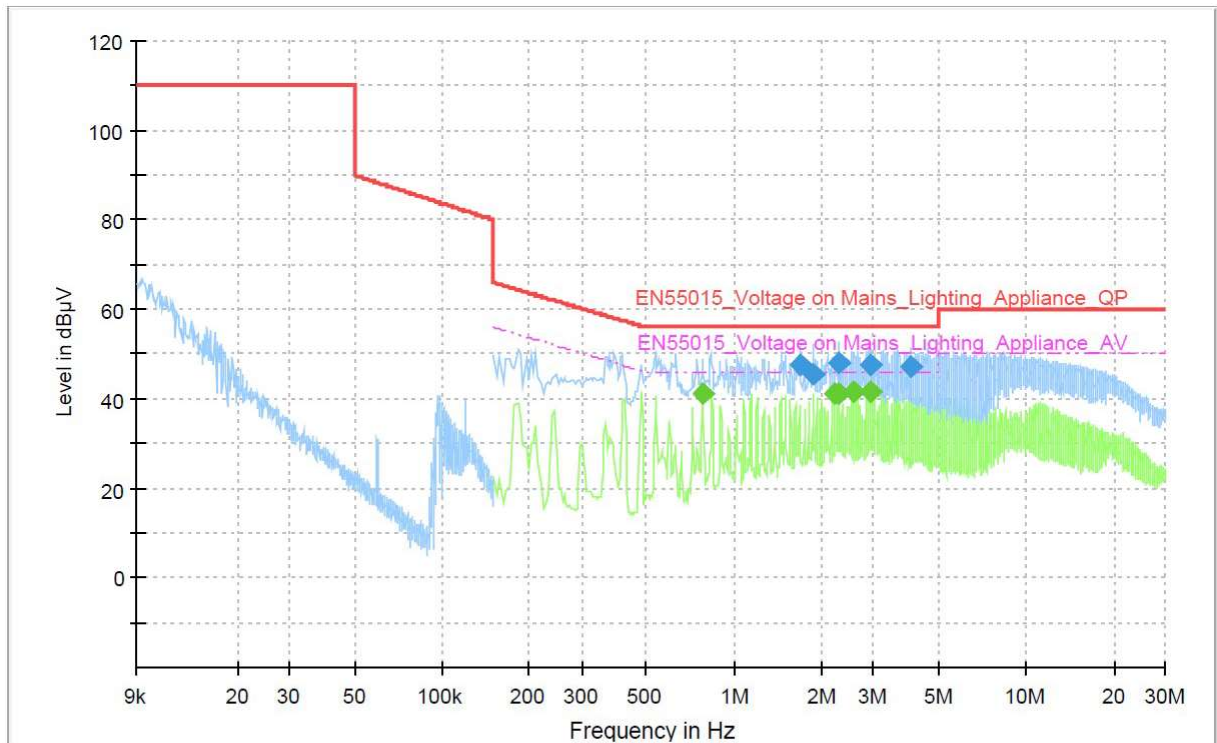
Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.047640	68.46	---	110.00	41.54	1000.0	0.200	L1	OFF	9.8
0.150000	47.14	---	66.00	18.86	1000.0	9.000	L1	OFF	9.8
0.494000	---	25.43	46.10	20.67	1000.0	9.000	L1	OFF	9.9
0.494000	36.20	---	56.10	19.90	1000.0	9.000	L1	OFF	9.9
0.662000	---	24.20	46.00	21.80	1000.0	9.000	L1	OFF	9.9
0.694000	34.98	---	56.00	21.02	1000.0	9.000	L1	OFF	9.9
0.866000	---	25.40	46.00	20.60	1000.0	9.000	L1	OFF	9.9
0.886000	34.53	---	56.00	21.47	1000.0	9.000	L1	OFF	9.9
1.082000	---	24.53	46.00	21.47	1000.0	9.000	L1	OFF	10.0
1.082000	35.16	---	56.00	20.84	1000.0	9.000	L1	OFF	10.0
1.238000	---	24.03	46.00	21.97	1000.0	9.000	L1	OFF	10.0

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Figure 6: Spectral Diagrams of disturbance voltage, 0.009-30MHz, N for model PCB9 330-30W CCT



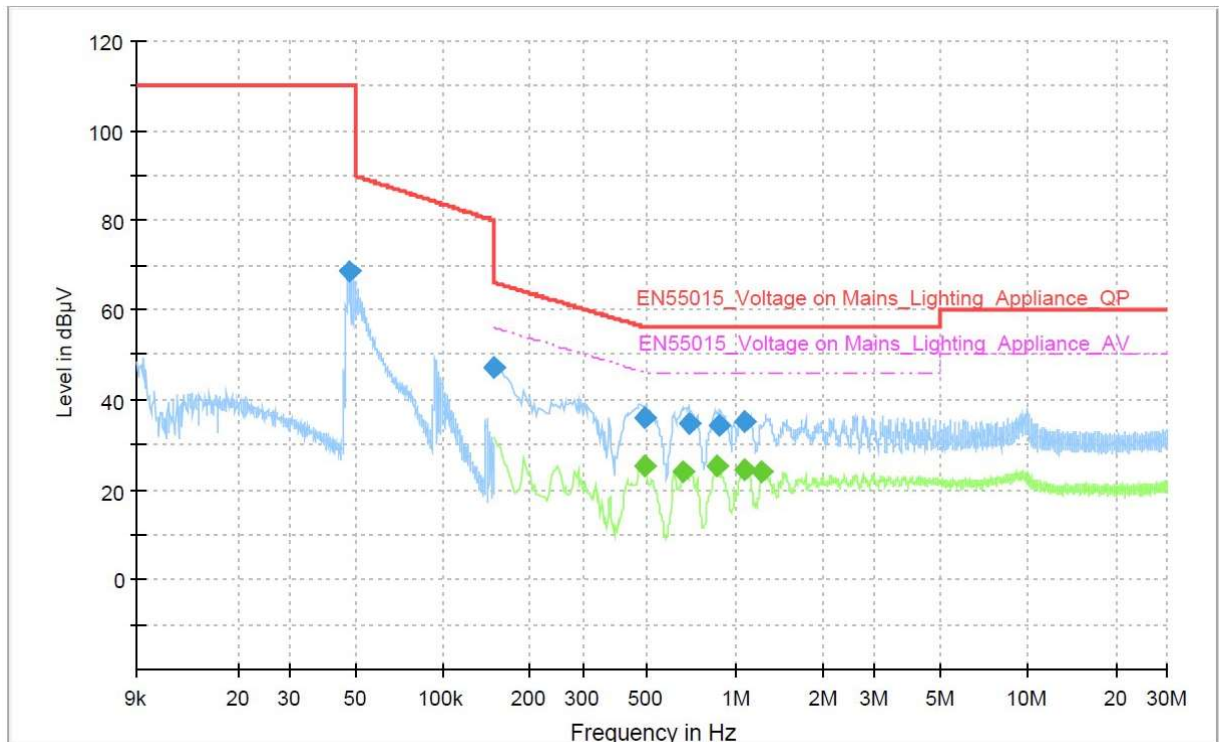
Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.782000	---	41.02	46.00	4.98	1000.0	9.000	N	OFF	10.0
1.686000	47.45	---	56.00	8.55	1000.0	9.000	N	OFF	10.1
1.858000	45.63	---	56.00	10.37	1000.0	9.000	N	OFF	10.1
2.226000	---	41.06	46.00	4.94	1000.0	9.000	N	OFF	10.1
2.286000	---	41.39	46.00	4.61	1000.0	9.000	N	OFF	10.1
2.286000	48.19	---	56.00	7.81	1000.0	9.000	N	OFF	10.1
2.586000	---	41.50	46.00	4.50	1000.0	9.000	N	OFF	10.1
2.950000	---	41.73	46.00	4.27	1000.0	9.000	N	OFF	10.1
2.954000	47.46	---	56.00	8.54	1000.0	9.000	N	OFF	10.1
4.030000	47.39	---	56.00	8.61	1000.0	9.000	N	OFF	10.2

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Figure 7: Spectral Diagrams of disturbance voltage, 0.009-30MHz, L for model PCB9 220-18W CCT



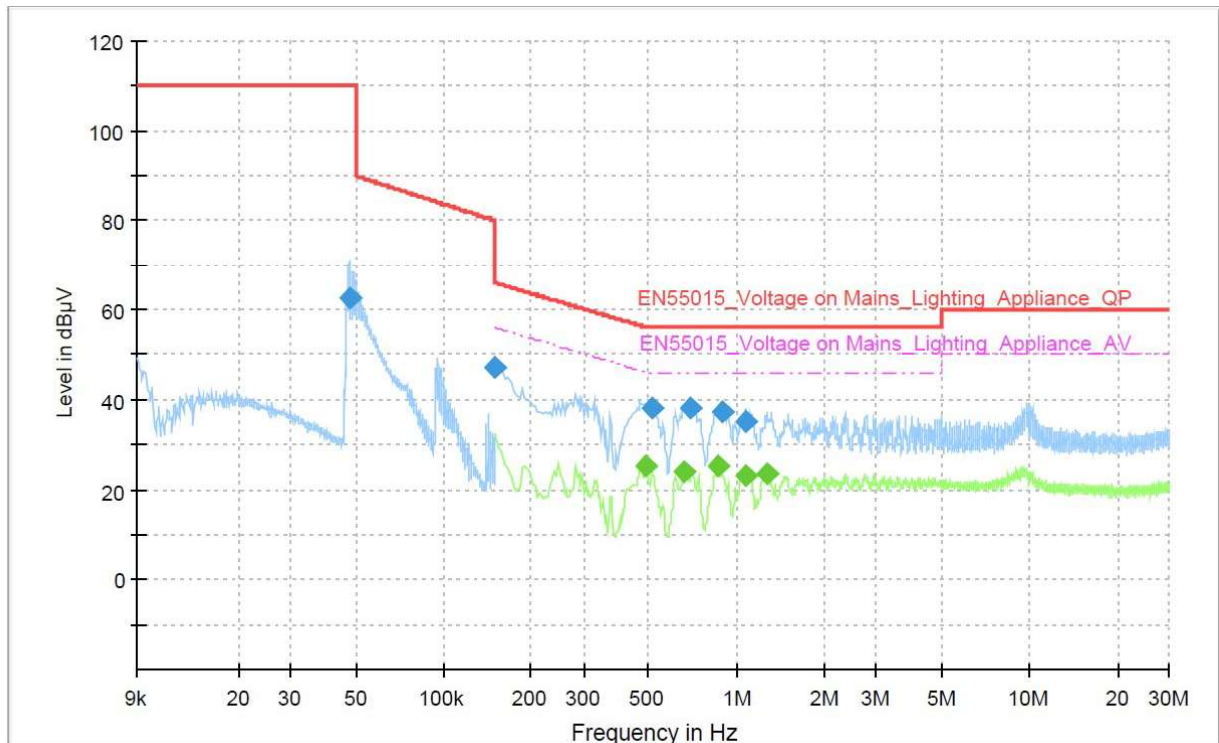
Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.047640	68.46	---	110.00	41.54	1000.0	0.200	L1	OFF	9.8
0.150000	47.14	---	66.00	18.86	1000.0	9.000	L1	OFF	9.8
0.494000	---	25.43	46.10	20.67	1000.0	9.000	L1	OFF	9.9
0.494000	36.20	---	56.10	19.90	1000.0	9.000	L1	OFF	9.9
0.662000	---	24.20	46.00	21.80	1000.0	9.000	L1	OFF	9.9
0.694000	34.98	---	56.00	21.02	1000.0	9.000	L1	OFF	9.9
0.866000	---	25.40	46.00	20.60	1000.0	9.000	L1	OFF	9.9
0.886000	34.53	---	56.00	21.47	1000.0	9.000	L1	OFF	9.9
1.082000	---	24.53	46.00	21.47	1000.0	9.000	L1	OFF	10.0
1.082000	35.16	---	56.00	20.84	1000.0	9.000	L1	OFF	10.0
1.238000	---	24.03	46.00	21.97	1000.0	9.000	L1	OFF	10.0

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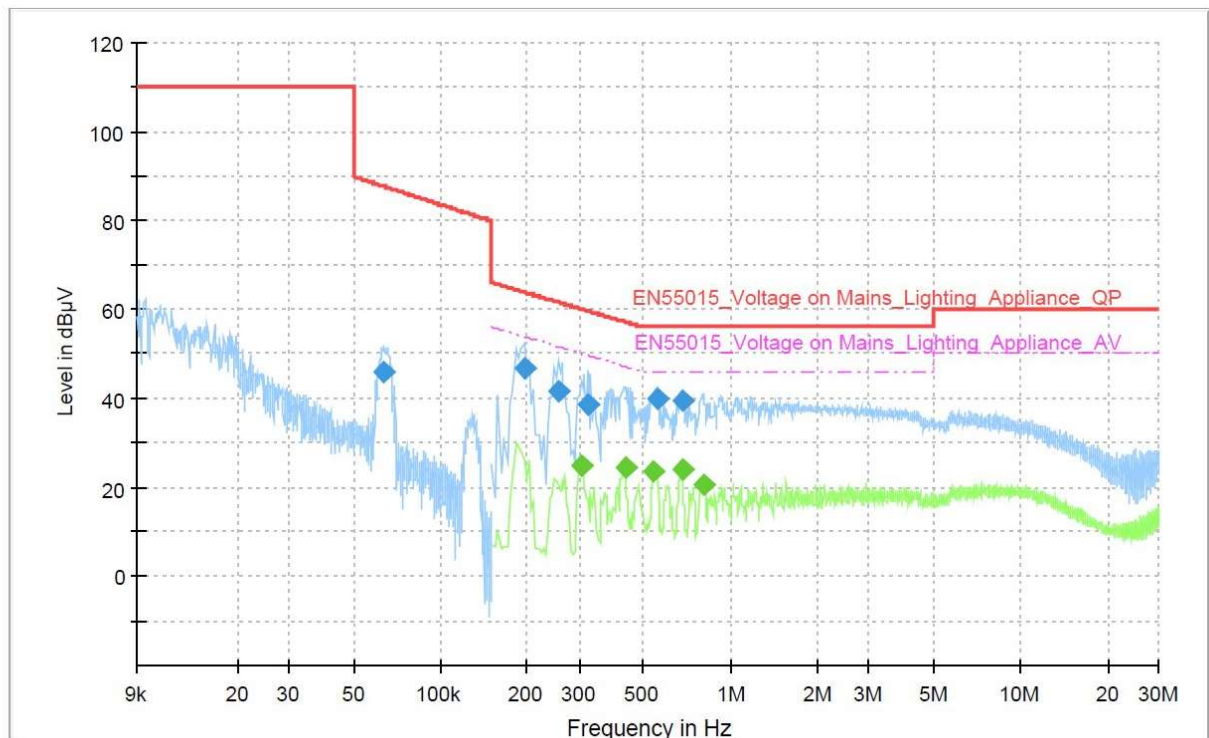
Figure 8: Spectral Diagrams of disturbance voltage, 0.009-30MHz, N for model PCB9 220-18W CCT



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.048120	62.60	---	110.00	47.40	1000.0	0.200	N	OFF	9.8
0.150000	47.03	---	66.00	18.97	1000.0	9.000	N	OFF	9.8
0.494000	---	25.35	46.10	20.75	1000.0	9.000	N	OFF	9.9
0.514000	38.03	---	56.00	17.97	1000.0	9.000	N	OFF	9.9
0.658000	---	24.00	46.00	22.00	1000.0	9.000	N	OFF	10.0
0.702000	38.28	---	56.00	17.72	1000.0	9.000	N	OFF	10.0
0.866000	---	25.40	46.00	20.60	1000.0	9.000	N	OFF	10.0
0.890000	37.52	---	56.00	18.48	1000.0	9.000	N	OFF	10.0
1.074000	---	23.12	46.00	22.88	1000.0	9.000	N	OFF	10.0
1.074000	35.27	---	56.00	20.73	1000.0	9.000	N	OFF	10.0
1.270000	---	23.81	46.00	22.19	1000.0	9.000	N	OFF	10.0

Figure 9: Spectral Diagrams of disturbance voltage, 0.009-30MHz, L for model RC-8-24W CCT+Sensor



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.063880	46.06	---	87.77	41.71	1000.0	0.200	L1	OFF	9.8
0.194000	46.79	---	63.86	17.07	1000.0	9.000	L1	OFF	9.9
0.254000	41.70	---	61.63	19.92	1000.0	9.000	L1	OFF	9.9
0.306000	---	24.76	50.08	25.32	1000.0	9.000	L1	OFF	9.9
0.322000	38.51	---	59.66	21.14	1000.0	9.000	L1	OFF	9.9
0.434000	---	24.43	47.18	22.75	1000.0	9.000	L1	OFF	9.9
0.546000	---	23.82	46.00	22.18	1000.0	9.000	L1	OFF	9.9
0.558000	39.99	---	56.00	16.01	1000.0	9.000	L1	OFF	9.9
0.682000	---	24.16	46.00	21.84	1000.0	9.000	L1	OFF	9.9
0.686000	39.39	---	56.00	16.61	1000.0	9.000	L1	OFF	9.9
0.806000	---	20.78	46.00	25.22	1000.0	9.000	L1	OFF	9.9

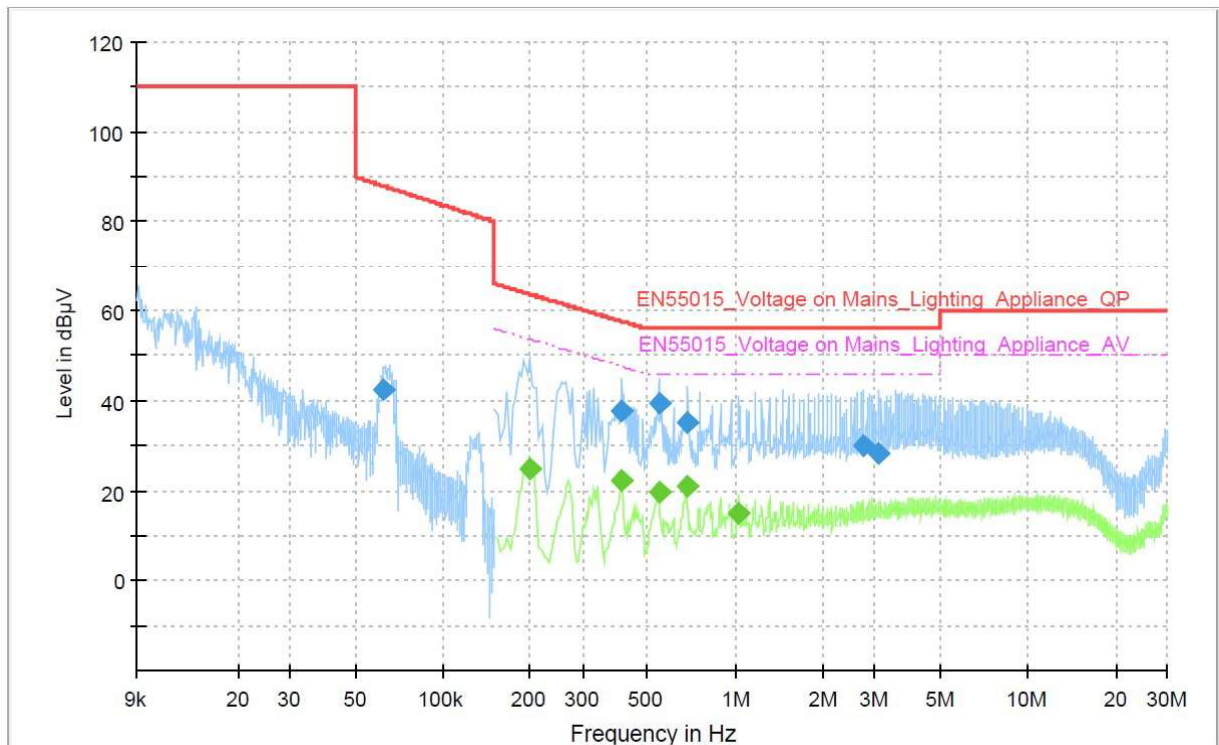
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Figure 10: Spectral Diagrams of disturbance voltage, 0.009-30MHz, N for model RC-8-24W CCT+Sensor



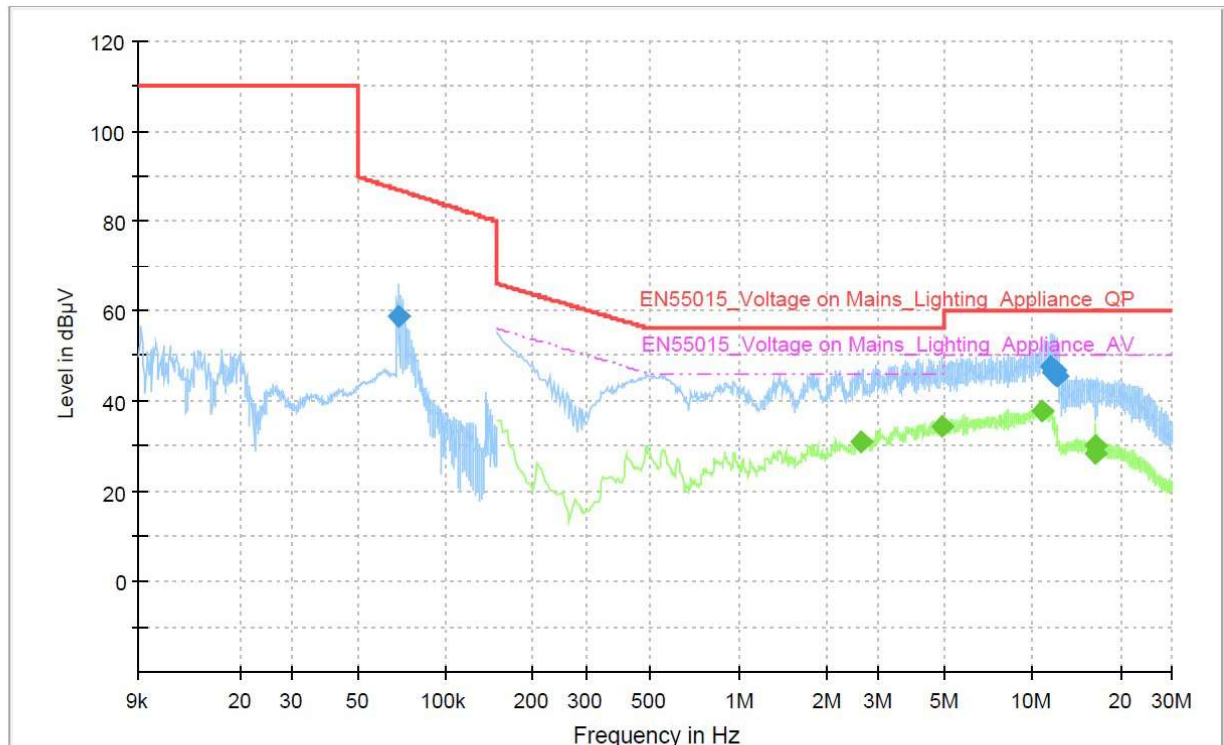
Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.063080	42.67	---	87.89	45.21	1000.0	0.200	N	OFF	9.8
0.198000	---	24.78	53.69	28.91	1000.0	9.000	N	OFF	9.8
0.410000	---	22.34	47.65	25.31	1000.0	9.000	N	OFF	9.9
0.410000	37.97	---	57.65	19.67	1000.0	9.000	N	OFF	9.9
0.550000	39.62	---	56.00	16.38	1000.0	9.000	N	OFF	9.9
0.550000	---	19.64	46.00	26.36	1000.0	9.000	N	OFF	9.9
0.682000	---	21.31	46.00	24.69	1000.0	9.000	N	OFF	10.0
0.690000	35.18	---	56.00	20.82	1000.0	9.000	N	OFF	10.0
1.030000	---	15.25	46.00	30.75	1000.0	9.000	N	OFF	10.0
2.754000	30.20	---	56.00	25.80	1000.0	9.000	N	OFF	10.1
3.094000	28.53	---	56.00	27.47	1000.0	9.000	N	OFF	10.1

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Figure 11: Spectral Diagrams of disturbance voltage, 0.009-30MHz, L for model PCB9 330-30W CCT+DIM



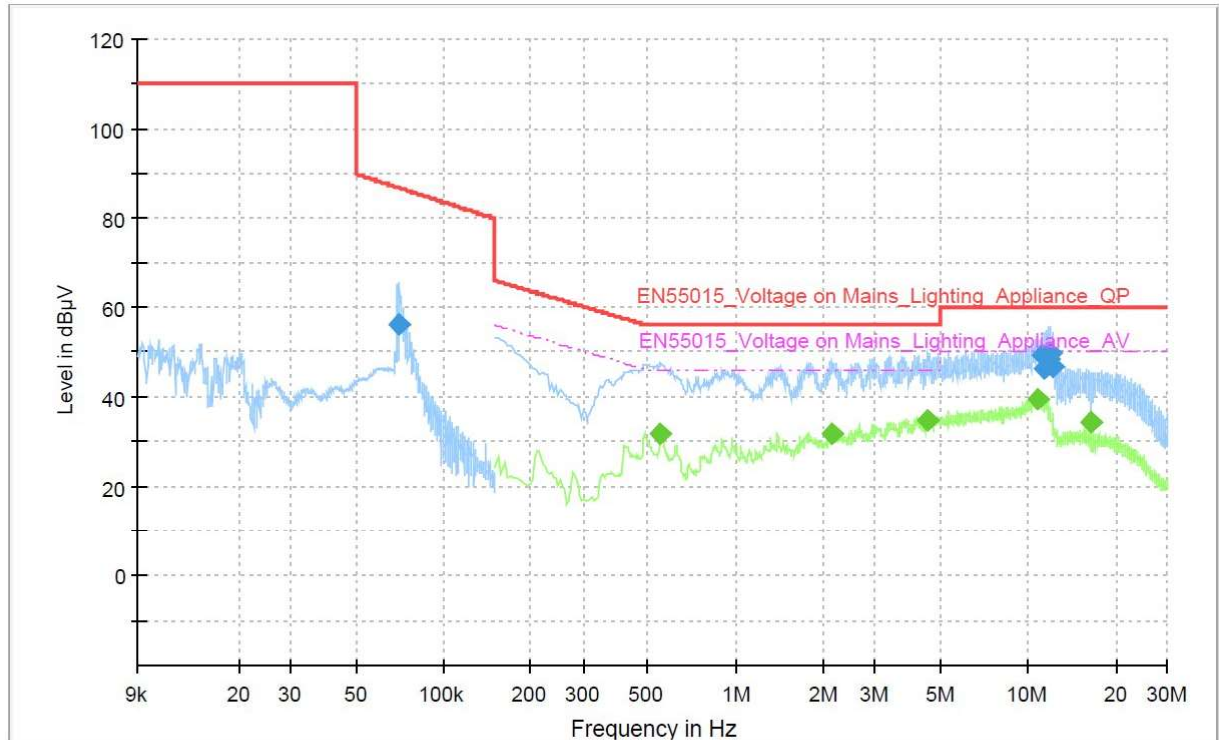
Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.069080	58.65	---	87.06	28.40	1000.0	0.200	L1	OFF	9.8
2.626000	---	31.10	46.00	14.90	1000.0	9.000	L1	OFF	10.0
4.918000	---	34.50	46.00	11.50	1000.0	9.000	L1	OFF	10.1
10.766000	---	37.87	50.00	12.13	1000.0	9.000	L1	OFF	10.2
11.598000	47.73	---	60.00	12.27	1000.0	9.000	L1	OFF	10.2
11.734000	46.57	---	60.00	13.43	1000.0	9.000	L1	OFF	10.2
11.918000	46.86	---	60.00	13.14	1000.0	9.000	L1	OFF	10.2
12.010000	46.10	---	60.00	13.90	1000.0	9.000	L1	OFF	10.2
12.082000	45.35	---	60.00	14.65	1000.0	9.000	L1	OFF	10.2
16.422000	---	30.19	50.00	19.81	1000.0	9.000	L1	OFF	10.3
16.498000	---	28.19	50.00	21.81	1000.0	9.000	L1	OFF	10.3

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Figure 12: Spectral Diagrams of disturbance voltage, 0.009-30MHz, N for model PCB9 330-30W CCT+DIM



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.070120	56.03	---	86.92	30.89	1000.0	0.200	N	OFF	9.8
0.554000	---	31.75	46.00	14.25	1000.0	9.000	N	OFF	9.9
2.150000	---	31.89	46.00	14.11	1000.0	9.000	N	OFF	10.1
4.510000	---	34.71	46.00	11.30	1000.0	9.000	N	OFF	10.2
10.786000	---	39.66	50.00	10.34	1000.0	9.000	N	OFF	10.3
11.134000	49.49	---	60.00	10.51	1000.0	9.000	N	OFF	10.3
11.386000	46.21	---	60.00	13.79	1000.0	9.000	N	OFF	10.3
11.670000	48.46	---	60.00	11.54	1000.0	9.000	N	OFF	10.3
11.918000	49.80	---	60.00	10.20	1000.0	9.000	N	OFF	10.3
12.078000	46.82	---	60.00	13.18	1000.0	9.000	N	OFF	10.3
16.526000	---	34.26	50.00	15.74	1000.0	9.000	N	OFF	10.4

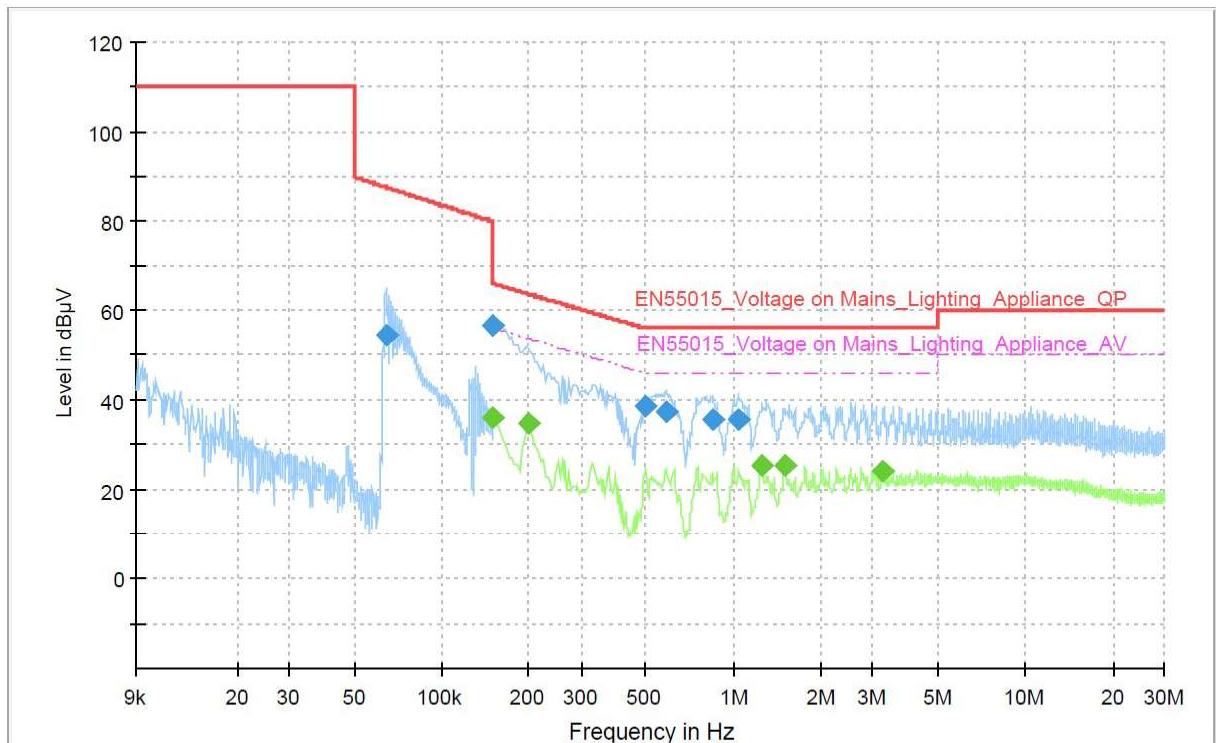
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Figure 13: Spectral Diagrams of disturbance voltage, 0.009-30MHz, L for model PCB 170-12W CCT+DIM



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.064840	54.41	---	87.63	33.22	1000.0	0.200	L1	OFF	9.8
0.150000	---	35.92	56.00	20.08	1000.0	9.000	L1	OFF	9.8
0.150000	56.49	---	66.00	9.51	1000.0	9.000	L1	OFF	9.8
0.198000	---	34.80	53.69	18.90	1000.0	9.000	L1	OFF	9.9
0.502000	38.76	---	56.00	17.24	1000.0	9.000	L1	OFF	9.9
0.586000	37.21	---	56.00	18.79	1000.0	9.000	L1	OFF	9.9
0.846000	35.57	---	56.00	20.43	1000.0	9.000	L1	OFF	9.9
1.034000	35.81	---	56.00	20.19	1000.0	9.000	L1	OFF	10.0
1.254000	---	25.35	46.00	20.65	1000.0	9.000	L1	OFF	10.0
1.506000	---	25.39	46.00	20.61	1000.0	9.000	L1	OFF	10.0
3.266000	---	24.04	46.00	21.96	1000.0	9.000	L1	OFF	10.1

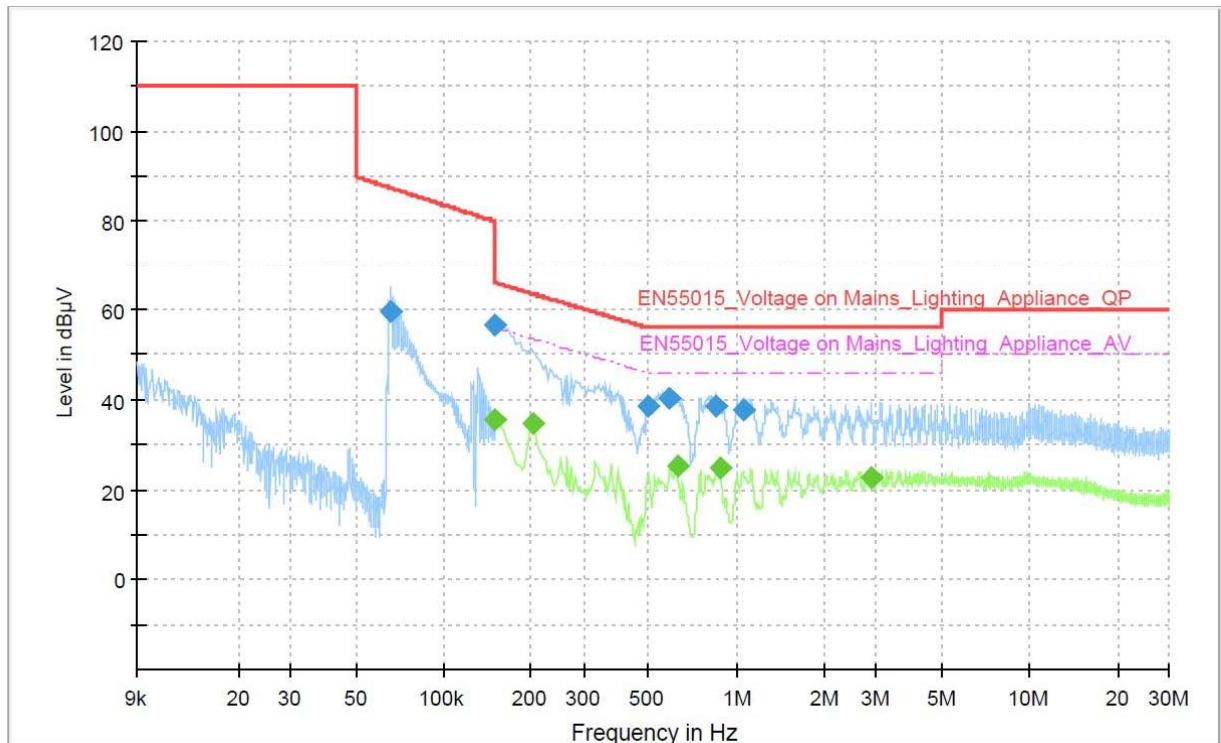
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Figure 14: Spectral Diagrams of disturbance voltage, 0.009-30MHz, N for model PCB 170-12W CCT+DIM



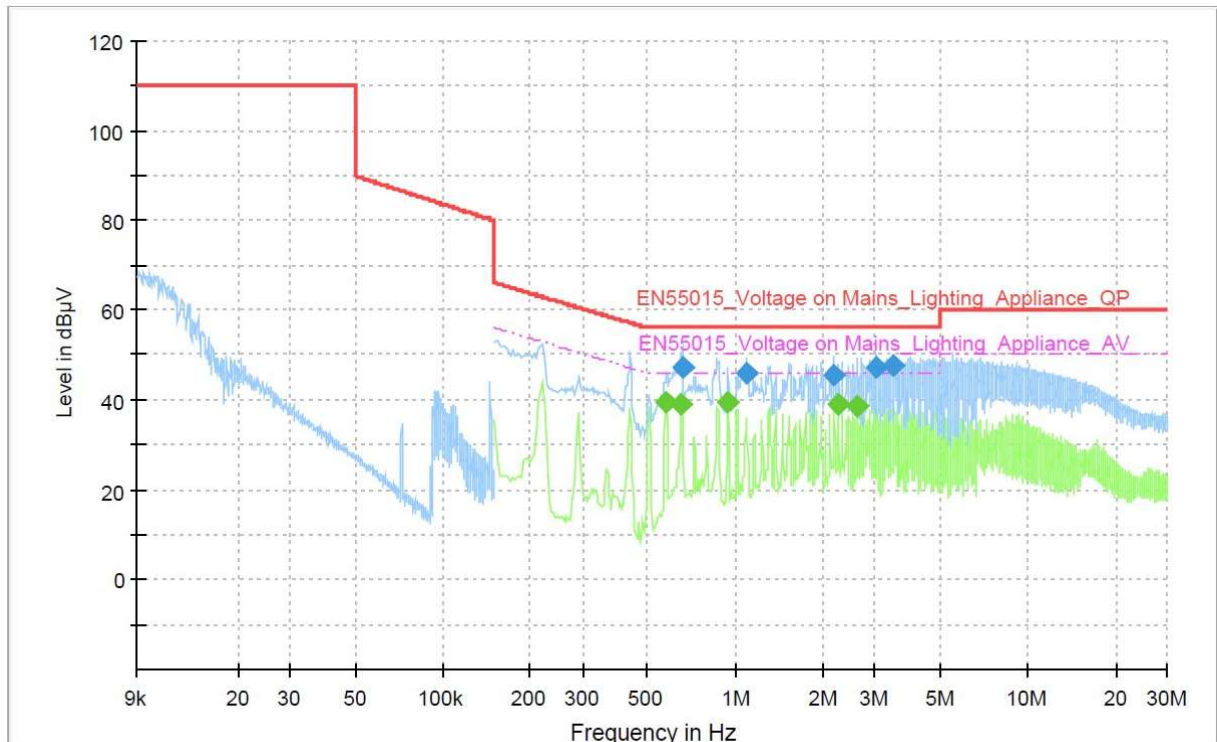
Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.065720	59.49	---	87.51	28.02	1000.0	0.200	N	OFF	9.8
0.150000	---	35.79	56.00	20.21	1000.0	9.000	N	OFF	9.8
0.150000	56.63	---	66.00	9.37	1000.0	9.000	N	OFF	9.8
0.202000	---	34.84	53.53	18.69	1000.0	9.000	N	OFF	9.8
0.502000	38.61	---	56.00	17.40	1000.0	9.000	N	OFF	9.9
0.590000	40.16	---	56.00	15.84	1000.0	9.000	N	OFF	9.9
0.626000	---	25.18	46.00	20.82	1000.0	9.000	N	OFF	10.0
0.858000	38.56	---	56.00	17.44	1000.0	9.000	N	OFF	10.0
0.878000	---	25.10	46.00	20.90	1000.0	9.000	N	OFF	10.0
1.050000	37.76	---	56.00	18.24	1000.0	9.000	N	OFF	10.0
2.874000	---	23.02	46.00	22.98	1000.0	9.000	N	OFF	10.1

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Figure 15: Spectral Diagrams of disturbance voltage, 0.009-30MHz, L for model PCB 330-24W CCT



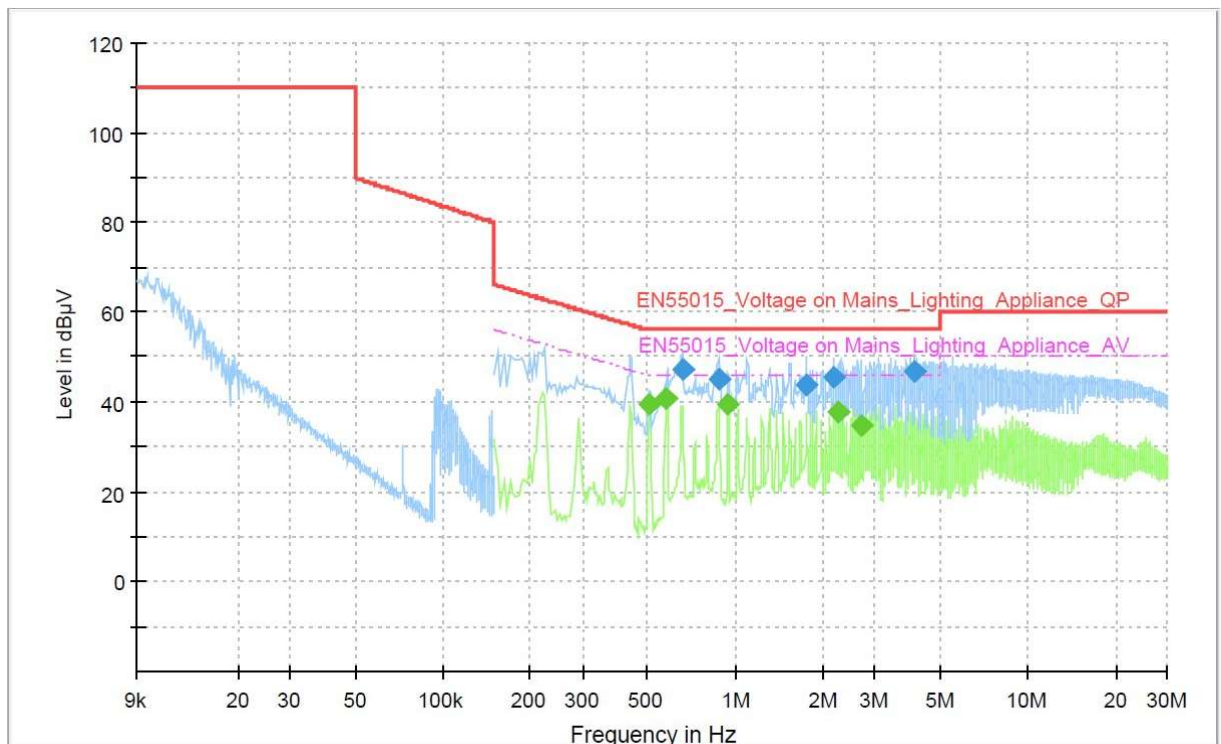
Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.582000	---	39.59	46.00	6.41	1000.0	9.000	L1	OFF	9.6
0.654000	---	38.95	46.00	7.05	1000.0	9.000	L1	OFF	9.6
0.658000	47.40	---	56.00	8.60	1000.0	9.000	L1	OFF	9.6
0.942000	---	39.58	46.00	6.42	1000.0	9.000	L1	OFF	9.6
1.098000	45.95	---	56.00	10.05	1000.0	9.000	L1	OFF	9.6
2.170000	45.65	---	56.00	10.35	1000.0	9.000	L1	OFF	9.7
2.254000	---	39.05	46.00	6.95	1000.0	9.000	L1	OFF	9.7
2.618000	---	38.76	46.00	7.24	1000.0	9.000	L1	OFF	9.7
3.058000	47.13	---	56.00	8.87	1000.0	9.000	L1	OFF	9.7
3.494000	47.57	---	56.00	8.43	1000.0	9.000	L1	OFF	9.7

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Figure 16: Spectral Diagrams of disturbance voltage, 0.009-30MHz, N for model PCB 330-24W CCT



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.510000	---	39.43	46.00	6.57	1000.0	9.000	N	OFF	9.6
0.582000	---	40.65	46.00	5.35	1000.0	9.000	N	OFF	9.6
0.662000	47.35	---	56.00	8.65	1000.0	9.000	N	OFF	9.6
0.874000	45.26	---	56.00	10.74	1000.0	9.000	N	OFF	9.6
0.946000	---	39.58	46.00	6.42	1000.0	9.000	N	OFF	9.6
1.742000	43.79	---	56.00	12.21	1000.0	9.000	N	OFF	9.7
2.178000	45.54	---	56.00	10.46	1000.0	9.000	N	OFF	9.7
2.262000	---	37.72	46.00	8.28	1000.0	9.000	N	OFF	9.7
2.702000	---	34.61	46.00	11.39	1000.0	9.000	N	OFF	9.7
4.130000	46.76	---	56.00	9.24	1000.0	9.000	N	OFF	9.8

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4.1.4 Radiated Electromagnetic Disturbance

Result:	Pass
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Date of testing : 2020.01.14
Port : Enclosure
Basic standard : EN 55015:2013+A1
Frequency range : 9kHz – 30MHz
Limit : EN 55015:2013+A1, clause 4.4

Test Setup

Operational Mode : ON
Earthing : No
Test Site : EMC shielding room

Measuring configuration and description

The measurement equipment like test receiver, loop antenna and coaxial switch are in compliance with the CISPR 16-1 series standards. The test setup was made according to Clause 9 of EN 55015:2013+A1.

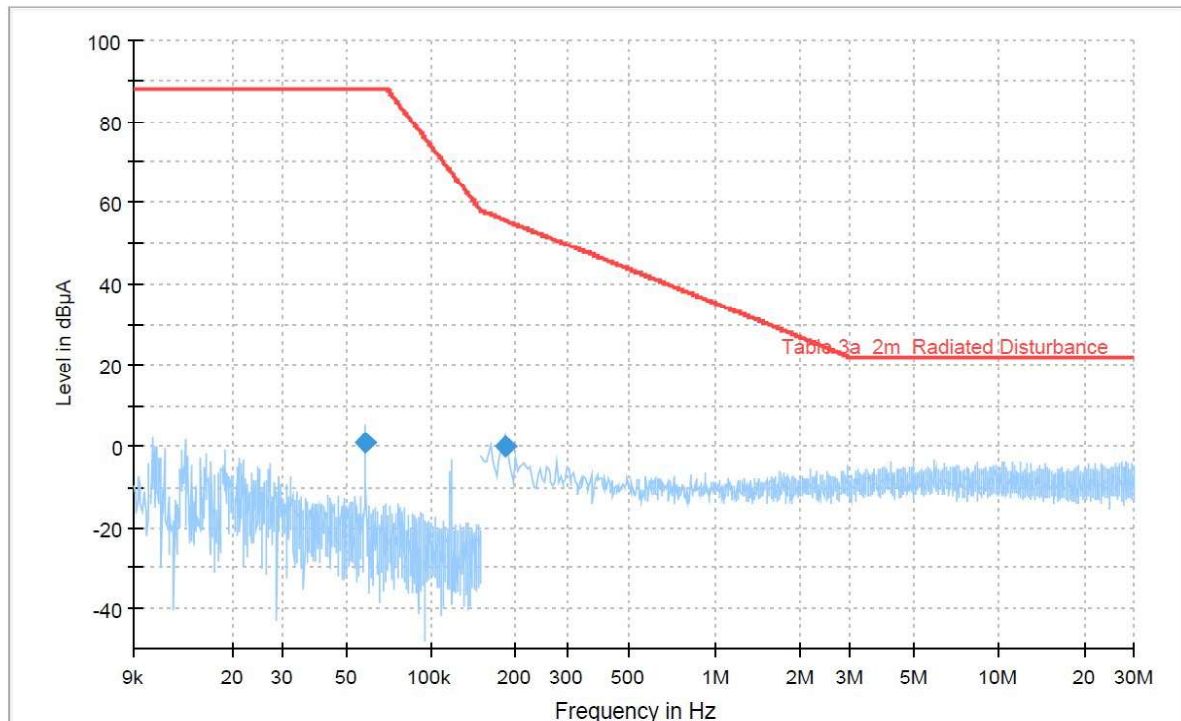
The EUT operated in ON mode and at its rated voltage. The EUT is put on a wooden table in the center of the loop antenna. Before a measurement the EUT was operated for about 20 min.

Induced current in the loop antenna was measured by means of a current probe (1V/A) according to clause 9 of EN 55015:2013+A1. The three field components were measured in sequence by means of a coaxial switch (loop antenna controller).

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Figure 17: Graphic description of radiated electromagnetic disturbances for X direction



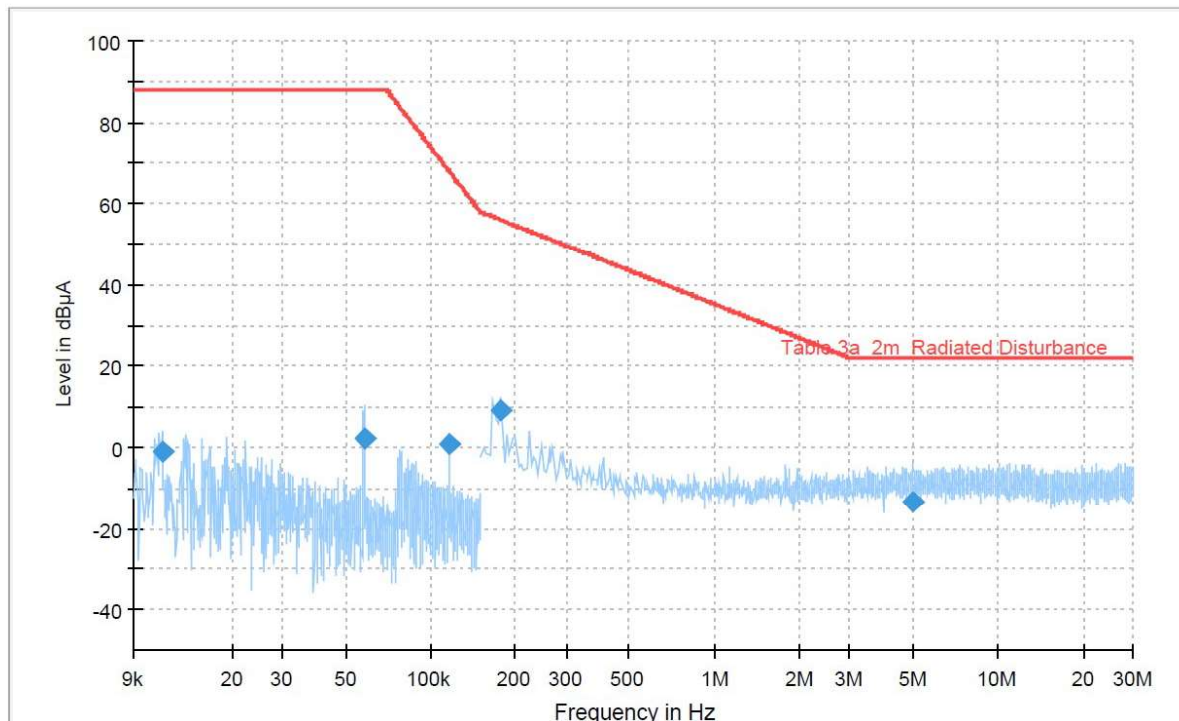
Final Result

Frequency (MHz)	QuasiPeak (dBμA)	CAverage (dBμA)	Limit (dBμA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)	Comment
0.058440	0.97	---	88.00	87.03	1000.0	0.200	X	0.1	
0.182000	-0.12	---	55.68	55.80	1000.0	9.000	X	0.1	

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Figure 18: Graphic description of radiated electromagnetic disturbances for Y direction



Final Result

Frequency (MHz)	QuasiPeak (dBμA)	CAverage (dBμA)	Limit (dBμA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)	Comment
0.011320	-0.77	---	88.00	88.77	1000.0	0.200	Y	0.1	
0.058520	2.49	---	88.00	85.51	1000.0	0.200	Y	0.1	
0.116040	0.91	---	68.10	67.19	1000.0	0.200	Y	0.1	
0.178000	8.96	---	55.94	46.98	1000.0	9.000	Y	0.1	
5.014000	-13.34	---	22.00	35.34	1000.0	9.000	Y	0.1	

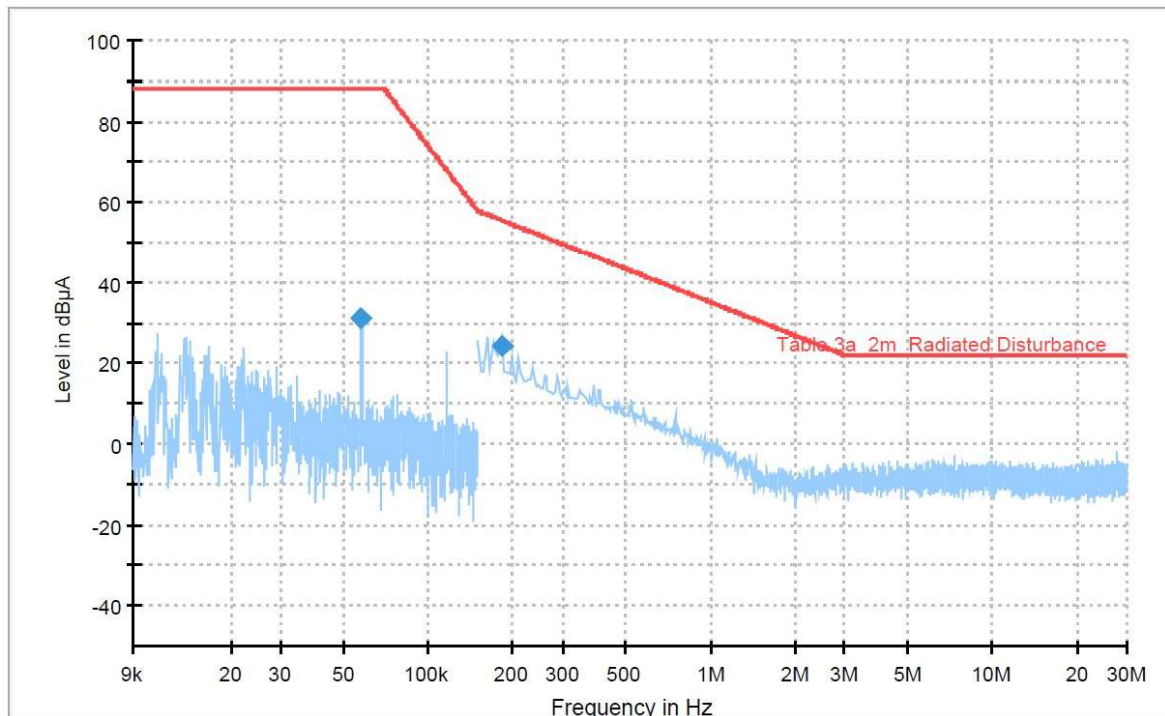
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Figure 19: Graphic description of radiated electromagnetic disturbances for Z direction



Final Result

Frequency (MHz)	QuasiPeak (dBμA)	CAverage (dBμA)	Limit (dBμA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)	Comment
0.057880	31.24	---	88.00	56.76	1000.0	0.200	Z	0.1	
0.182000	24.31	---	55.68	31.37	1000.0	9.000	Z	0.1	

4.2 Emission in the Frequency Range above 30 MHz

4.2.1 Radiated disturbance

Result:	Pass
Date of testing	: 2020.01.07-2020.02.24
Test procedure	: EN 55015:2013+A1 Annex B CDN method
Frequency range	: 30-300MHz
Kind of test site	: Shielding Room
Limit	: EN 55015:2013+A1 Table B.1
Quasi-peak limits:	
30-100MHz, 64-54dB μ V; 100-230MHz, 54 dB μ V;	
230-300MHz, 61dB μ V	

Test Setup

Input voltage	: AC 230V, 50Hz
Operational mode	: ON
Temperature	: 20-22°C
Relative humidity	: 50-63%

Measuring configuration and description

If the EUT complies with the requirements of Annex B of EN 55015:2013+A1, it is deemed to comply with the radiated disturbances requirements in the frequency range 30MHz to 300MHz specified in 4.4.2 of EN 55015:2013+A1.

The Conducted RF emission test was measured in the frequency range from 30MHz to 300MHz according to EN 55015:2013+A1. The measurement was performed in accordance with the method specified in Annex B of EN 55015:2013+A1.

The Conducted RF emission test was performed in a shielding room with a CDN FCC-801-M2/M3-16A. The EUT is placed on one non-conducting block with a height of (10 $\pm$ 0.2) cm which in turn are placed on an earthed metal plate with dimensions at least 20 cm larger than the lighting equipment.

The EUT is connected via a mains supply cable with a length of (20 $\pm$ 10) cm to the CDN. The distance of the cable to the metal plate should be (4 $\pm$ 1) cm. The CDN is mounted on the metal plate.

Each tested EUT was operated for at least 30min before test.

The following figures were those measured and recorded by a test receiver. The curves in the figure were those measured with a Peak detector. The symbol “◆” refers to Quasi-peak values which were measured in the final measurement.

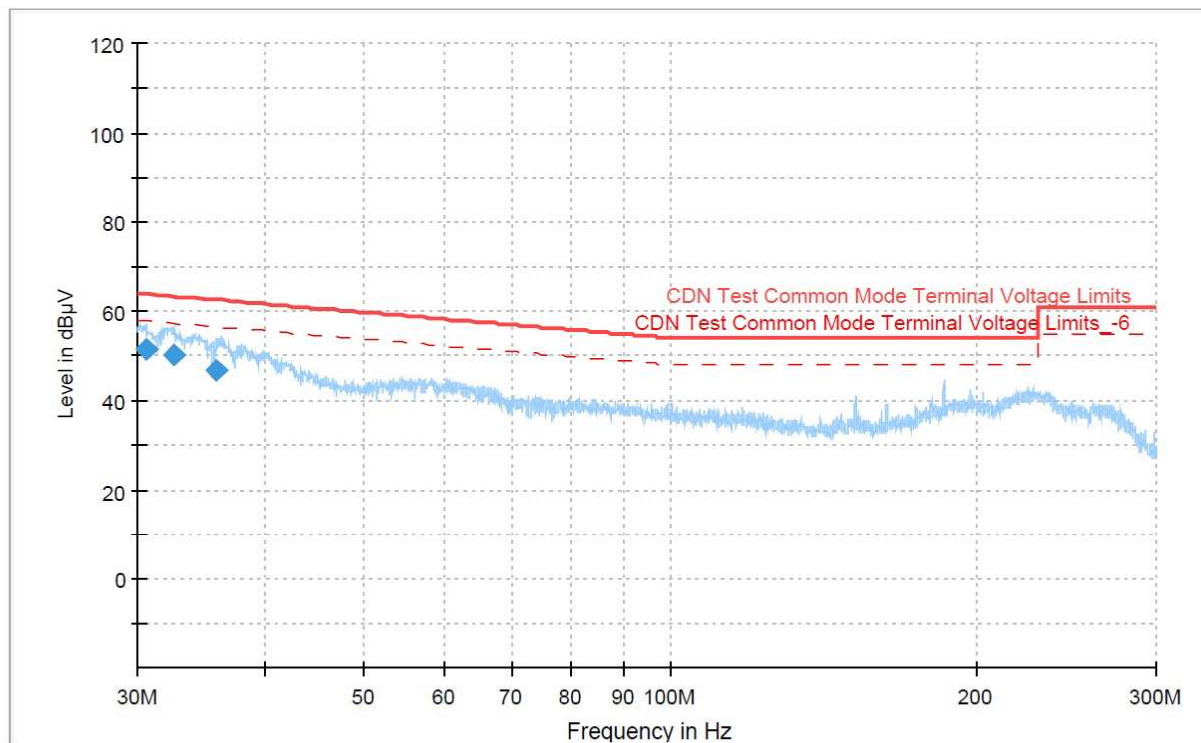
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Figure 20: Spectral Diagrams, RF Emission for model PCB 330-30W CCT+PC



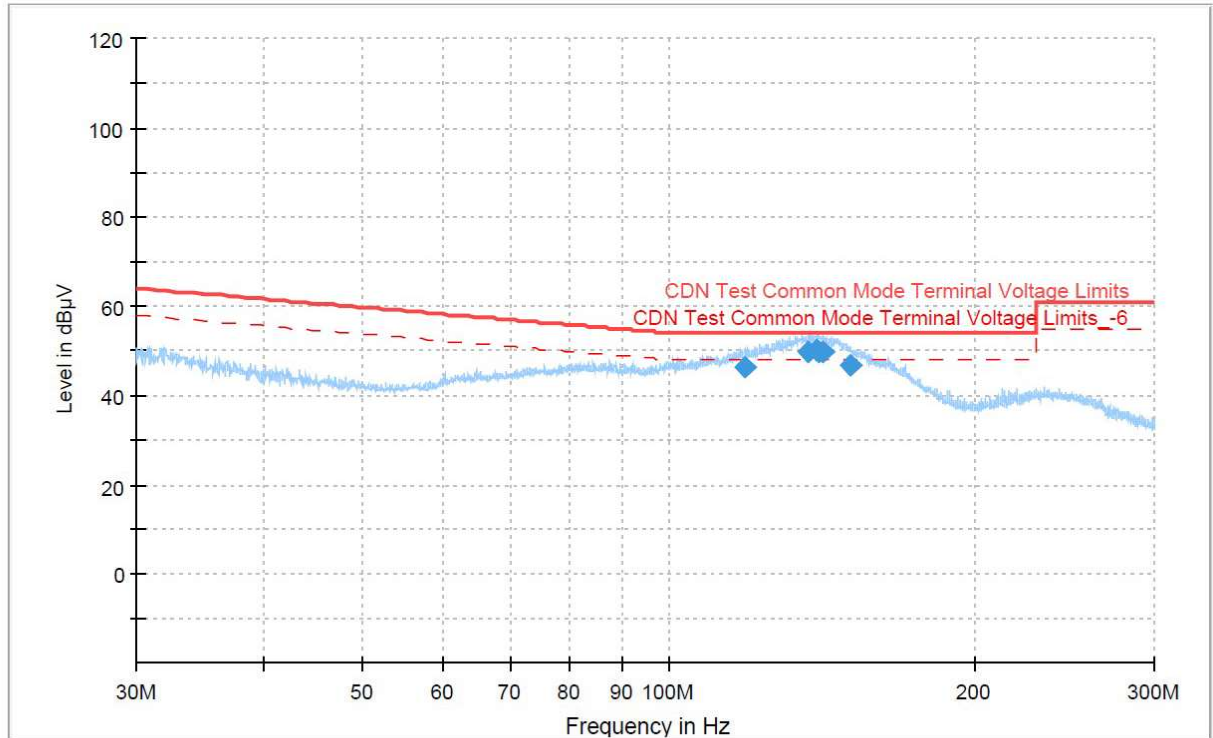
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
30.600000	51.44	63.84	12.39	1000.0	120.000	Single Line	20.1
32.600000	50.40	63.31	12.90	1000.0	120.000	Single Line	20.0
35.760000	46.91	62.54	15.63	1000.0	120.000	Single Line	20.1

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Figure 21: Spectral Diagrams, RF Emission for model PCB 220-18W CCT+PC



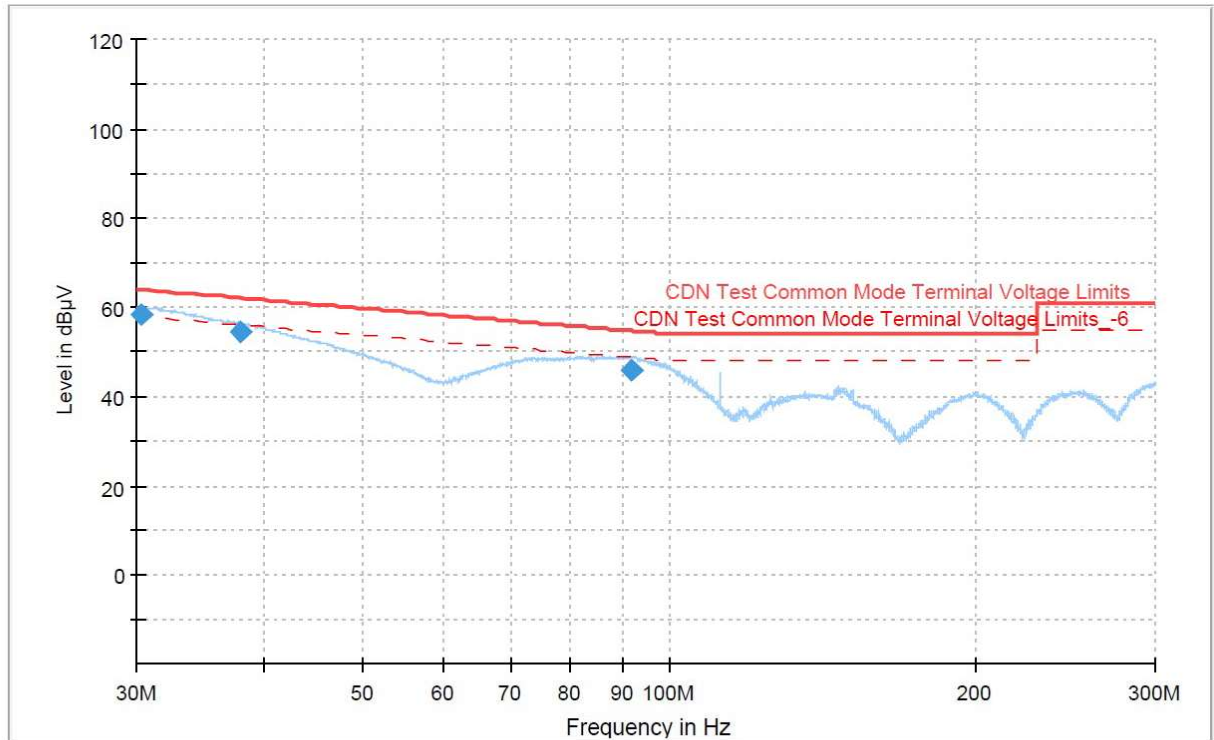
Final Result

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
118.880000	46.18	54.00	7.82	1000.0	120.000	Single Line	20.1
137.320000	49.94	54.00	4.06	1000.0	120.000	Single Line	20.2
139.560000	50.01	54.00	3.99	1000.0	120.000	Single Line	20.2
140.360000	49.96	54.00	4.04	1000.0	120.000	Single Line	20.2
141.520000	49.77	54.00	4.23	1000.0	120.000	Single Line	20.2
150.960000	46.79	54.00	7.21	1000.0	120.000	Single Line	20.2

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Figure 22: Spectral Diagrams, RF Emission for model PCB9 330-30W CCT



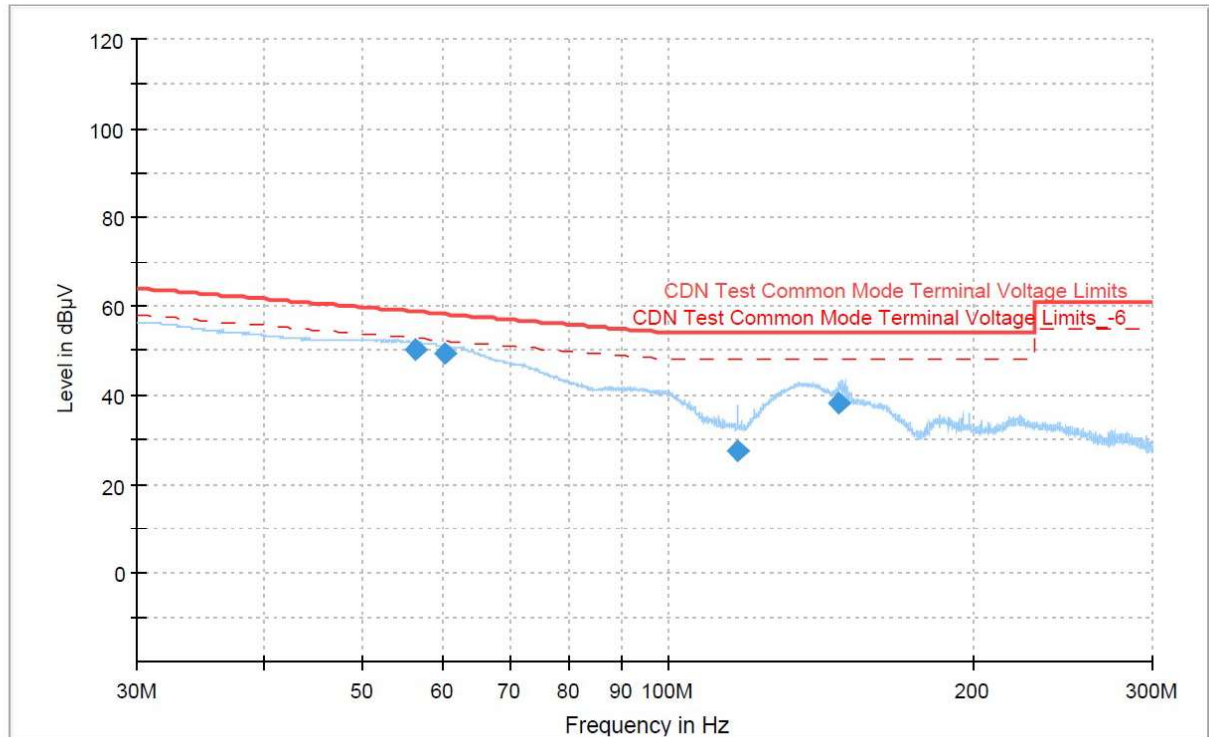
Final Result

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
30.360000	58.25	63.90	5.65	1000.0	120.000	Single Line	20.1
37.920000	54.38	62.05	7.67	1000.0	120.000	Single Line	20.1
91.960000	46.04	54.70	8.66	1000.0	120.000	Single Line	20.1

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Figure 23: Spectral Diagrams, RF Emission for model PCB9 220-18W CCT



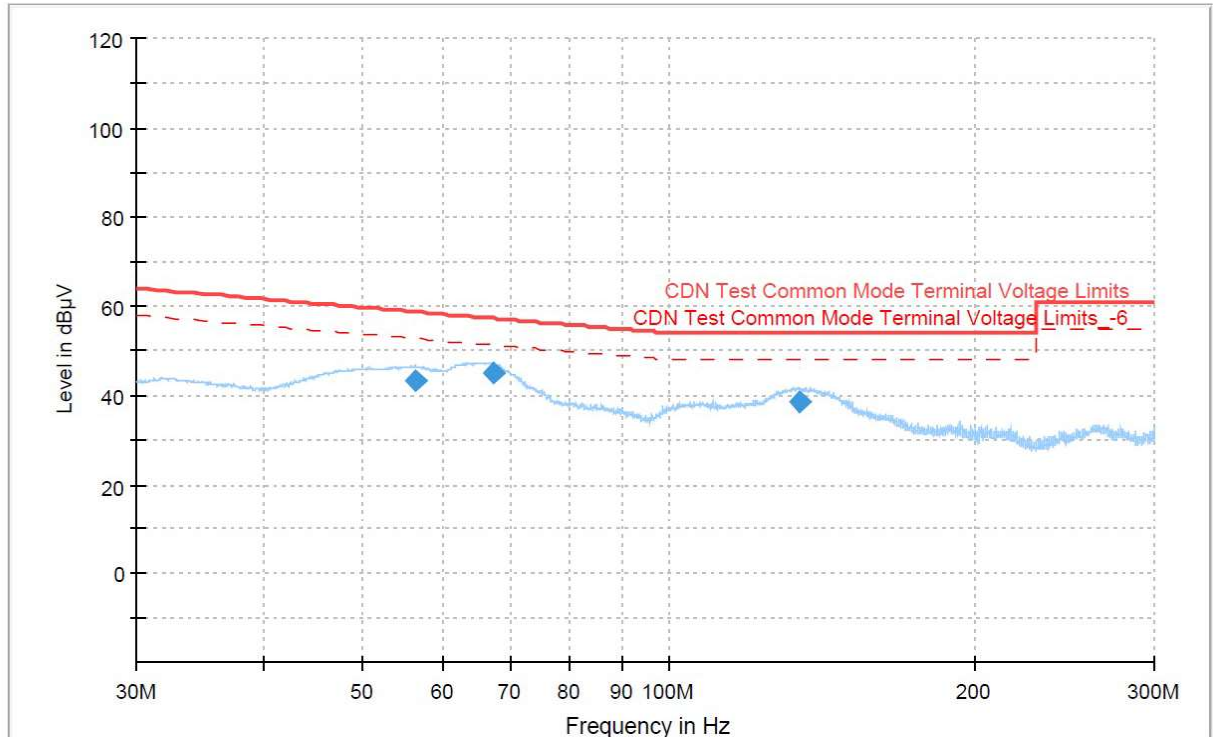
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
56.280000	50.23	58.77	8.55	1000.0	120.000	Single Line	20.1
60.120000	49.30	58.23	8.93	1000.0	120.000	Single Line	20.1
117.080000	27.55	54.00	26.45	1000.0	120.000	Single Line	20.2
147.280000	38.12	54.00	15.88	1000.0	120.000	Single Line	20.2

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Figure 24: Spectral Diagrams, RF Emission for model RC-8-24W CCT+Sensor



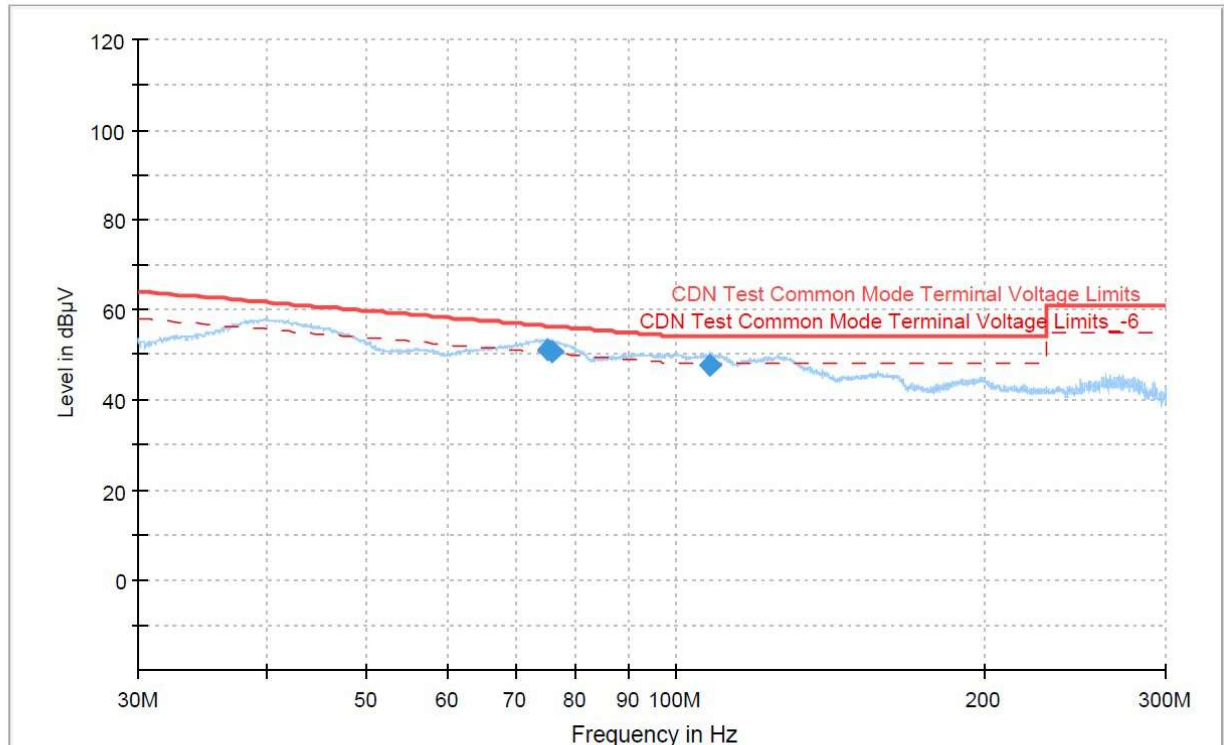
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
56.240000	43.56	58.78	15.22	1000.0	120.000	Single Line	20.1
67.240000	44.98	57.30	12.32	1000.0	120.000	Single Line	20.1
134.560000	38.48	54.00	15.52	1000.0	120.000	Single Line	20.1

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Figure 25: Spectral Diagrams, RF Emission for model PCB9 330-30W CCT+DIM



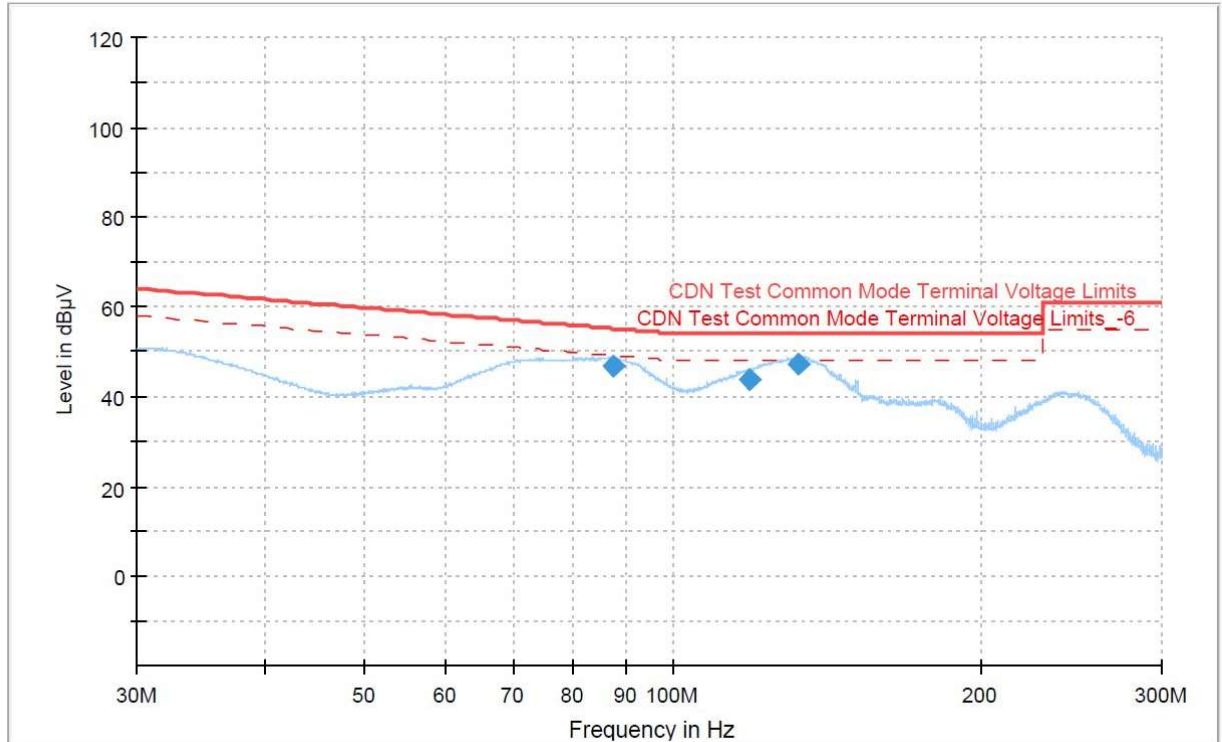
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
74.920000	50.91	56.40	5.49	1000.0	120.000	Single Line	20.2
75.640000	50.71	56.32	5.61	1000.0	120.000	Single Line	20.1
108.000000	47.62	54.00	6.38	1000.0	120.000	Single Line	20.2

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Figure 26: Spectral Diagrams, RF Emission for model PCB 170-12W CCT+DIM



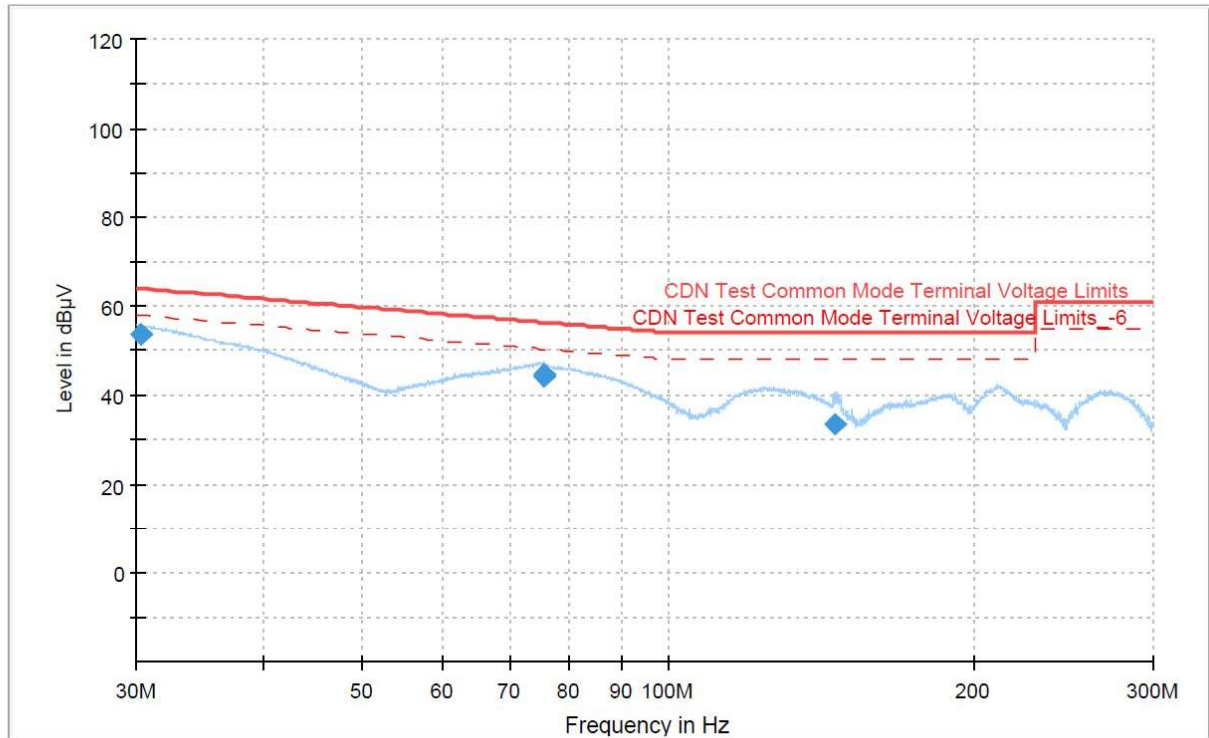
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
87.280000	46.69	55.13	8.44	1000.0	120.000	Single Line	20.1
118.880000	43.98	54.00	10.02	1000.0	120.000	Single Line	20.2
132.840000	47.02	54.00	6.98	1000.0	120.000	Single Line	20.1

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Figure 27: Spectral Diagrams, RF Emission for model PCB 330-24W CCT



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
30.240000	53.62	63.93	10.32	1000.0	120.000	Single Line	20.2
75.320000	44.42	56.35	11.94	1000.0	120.000	Single Line	20.3
75.440000	44.54	56.34	11.80	1000.0	120.000	Single Line	20.3
146.080000	33.43	54.00	20.57	1000.0	120.000	Single Line	20.2

5 Test Results I M M U N I T Y

During the immunity tests, the EUT was operated under conditions specified by clause 3.1 of this report.

Performance criterion A: During the test no change of the luminous intensity shall be observed and the regulating control, if any, shall operate during the test as intended.

Performance criterion B: During the test the luminous intensity may change to any value. After the test the luminous intensity shall be restored to its initial value within 1 min.

Regulating controls need not function during the test, but after the test the mode of the control shall be the same as before the test provided that during the test no mode changing commands.

Performance criterion C: During and after the test any change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to normal if necessary by temporary interruption of the mains supply and/or operating the regulating control.

The EMC immunity performances of the EUT were tested according to EN 61547:2009.

Testing date: 2020.01.07-2020.03.05

Room temperature: 20-23°C

Relative Humidity: 50-57%

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5.1 Enclosure

5.1.1 Electrostatic Discharge

Result:	Pass
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The immunity against electrostatic discharge was tested in accordance EN 61547:2009. Test setup and ESD-Generator are according to IEC 61000-4-2 which is specified under EN 61547:2009. The EUT was placed on an insulation lining of 0.5mm thick. Between the insulation lining and the wooden table, there was a horizontal coupling plane (HCP) of 1.6×0.8m. The EUT and its power supply cord were isolated from the HCP by the insulating lining.

Charge voltage	: ±4.0kV (Conducted Discharge) ±8.0kV (Air Discharge)
Polarity	: positive / negative
Number of discharges	: >10
Performance criteria	: B

Table 8: ESD, Positive / Negative Polarity

Position	Kind of Discharge	Remarks	Result
Nonmetal enclosure	Air discharge ±8kV	No change of luminous intensity	Pass
Coupling plane (Both HCP and VCP)	Contact discharge ±4kV	No change of luminous intensity	Pass

5.1.2 Radio Frequency Electromagnetic Field

Result:	Pass
----------------	-------------

The immunity against radio-frequency electromagnetic fields in the frequency range between 80MHz and 1000MHz was tested in accordance to IEC 61000-4-3 which is specified by clause 5.3 in EN 61547:2009.

The test was performed inside a 3m modified semi-anechoic chamber. During the test the part of the ground plane between the field generating antenna and the equipment under test was covered by absorbing material. The distance between the tip of the antenna and the side of the system tested is 3m. The field uniformity of the 1.5mx1.5m plane where the surface of the EUT tested coincides with is regularly calibrated to ensure the 0-6 dB field uniformity criterion as specified by IEC 61000-4-3 is met.

Test Level	: 3V/m
Frequency Range	: 80-1000MHz
Modulation	: 80%AM, 1kHz
Frequency Sweep Speed	: ≤0.005 octave/s (1.5×1E−3 decades/s)
Performance Criteria	: A

Table 9: Radiated Susceptibility, Field Strength 3V/m

Position	Observation	Result
Antenna in vertical orientation	No change of luminous intensity	Pass
Antenna in horizontal orientation	No change of luminous intensity	Pass

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5.2 Input and Output AC Power Ports

5.2.1 Fast Transients on Input and Output AC Power Lines

Result:	Pass
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The immunity against fast transients on AC power lines was tested in accordance to EN 61000-4-4 which is specified by clause 5.5 in EN 61547:2009.

Test setup and the fast transient noise generator was according to IEC 61000-4-4 which is specified by EN 61547:2009. The EUT was placed on a wooden table 0.1m above the reference ground plane of aluminum and was insulated from it by an insulating support 0.1m thick.

Test Voltage	:	±1kV
Polarity	:	negative/positive
Repetition frequency	:	5kHz
Test duration	:	≥120sec
Tr/Tn	:	5ns/50ns
Severity level	:	2
Performance criteria	:	B

Table 10: Burst, Input AC Power lines, Positive/Negative Polarity

Coupling Method: Direct Injection		
Coupling Port	Test Voltage / Result	Remark
AC mains: L1 (L), L2 (N), --	±1000V Pass	No change of luminous intensity

5.2.2 Injected Current into Input and Output AC Power Port

Result:

Pass

The immunity against injected current into AC power port was tested according to EN 61547:2009 in a shielded room.

The test setup and the test generator was according to IEC 61000-4-6 which is specified by EN 61547:2009. The EUT was placed on a small wooden support 0.1m above a reference ground plane that is of aluminum. The coupling and decoupling networks was inserted on the power supply connection. The coupling and decoupling networks was placed on the ground reference plane, making direct contact with it at about 0.1 – 0.3 meters from EUT. The height of cable between the EUT and the coupling and decoupling networks above the ground reference plane was 50mm.

Voltage Level	: 3V(rms)(unmodulated)
Environmental phenomena	: r.f. current, common mode, 1kHz, 80%AM
Source impedance	: 150 Ω
Frequency range	: 0.15 – 80 MHz
Sweeping rate	: $\leq 1,5 \times 10^{-3}$ decades/s
Performance criteria	: A

Table 11: Injected current, AC Power lines

Coupling Port	Coupling Method:	Result	Remark
AC mains: L1 (L), L2 (N), --	CDN M-2	Pass	No change of luminous intensity

5.2.3 Surges to AC Power Port

Result:	Pass
----------------	-------------

The immunity against surges to AC power port was tested in accordance to IEC 61000-4-5 which is specified by clause 5.7 in EN 61547:2009.

Test setup and the Combination Wave Generator (CWG) was according to IEC 61000-4-5. The decoupling network is incorporated in the CWG.

Test Level	: phase to neutral	$\pm 0.5\text{kV}/\pm 1.0\text{kV}$
	For models PCB 330-30W CCT+PC, PCB9 330-30W CCT and PCB9 330-30W CCT+DIM	
	phase to neutral	$\pm 0.5\text{kV}$
	For other models	
Tr/Tn	: 1.2/50 μs (open-circuit voltage)	
	8/20 μs (short-circuit current)	
Test numbers	: 5 positive and 5 negative pulses at phases of $\pm\pi/2$	
Repetition rate	: 1/min	
Performance criteria	: C	

Table 12: Surges to AC Power lines, positive/negative for models for models PCB 330-30W CCT+PC, PCB9 330-30W CCT and PCB9 330-30W CCT+DIM

Line	Tested Voltage/coupling phase	Observation	Result
Phase to neutral	+0.5kV, $+\pi/2$ (5 times)	No change of luminous intensity	Pass
	-0.5kV, $-\pi/2$ (5 times)	No change of luminous intensity	Pass
Phase to neutral	+1.0kV, $+\pi/2$ (5 times)	No change of luminous intensity	Pass
	-1.0kV, $-\pi/2$ (5 times)	No change of luminous intensity	Pass

Table 13: Surges to AC Power lines, positive/negative for models for other models

Line	Tested Voltage/coupling phase	Observation	Result
Phase to neutral	+0.5kV, $+\pi/2$ (5 times)	No change of luminous intensity	Pass
	-0.5kV, $-\pi/2$ (5 times)	No change of luminous intensity	Pass

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5.2.4 Voltage dips and interruptions to AC Power Port

Result:	Pass
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The immunity against voltage dips and interruptions to AC power port was tested in accordance to EN 61000-4-11 which is specified by clause 5.8 in EN 61547:2009.

Test setup and the test generator was according to IEC 61000-4-11.

Table 14: Test condition and Test result for Voltage Dips

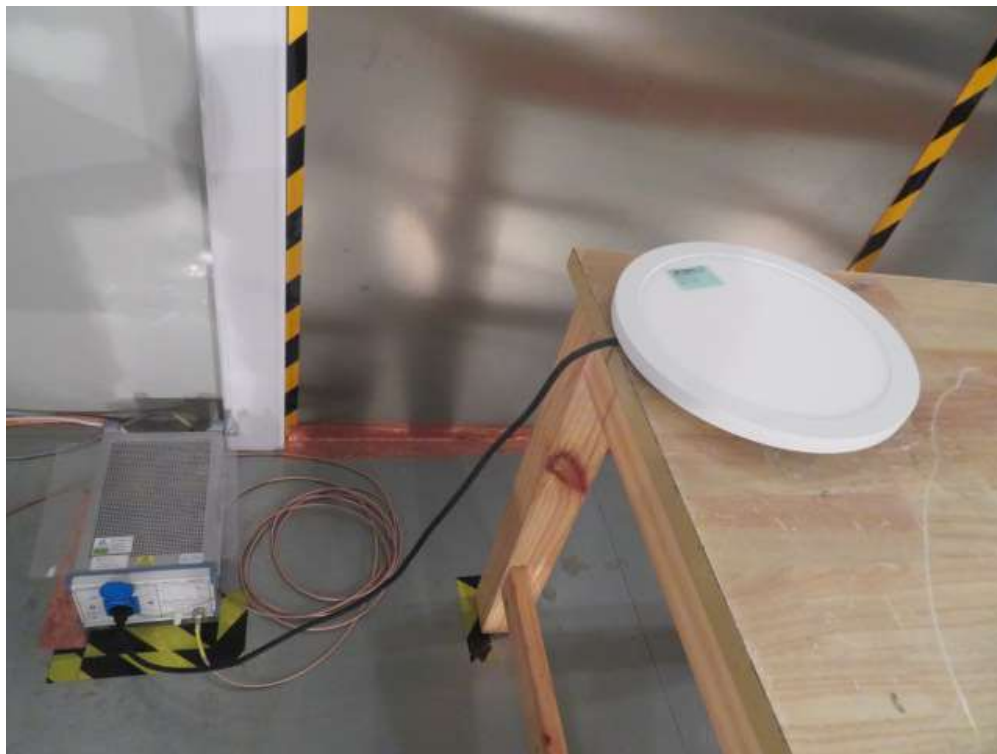
Environmental Phenomena	Test level (in % UT)	Duration (in period of the rated frequency)	Performance criteria	Result
Interruptions	0	0.5 (10ms)	B	Pass
Voltage dips (in % UT) 30	70	10 (200ms)	C	Pass

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6 Photographs of the Test Set-Up

Photograph 1: Set-up for Conducted Emission



Photograph 2: Set-up for Radiated Emission (CDN Method)



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Photograph 3: Set-up for Electrostatic Discharge



Photograph 4: Set-up for Fast Transient Burst, Surges and Voltage Dips



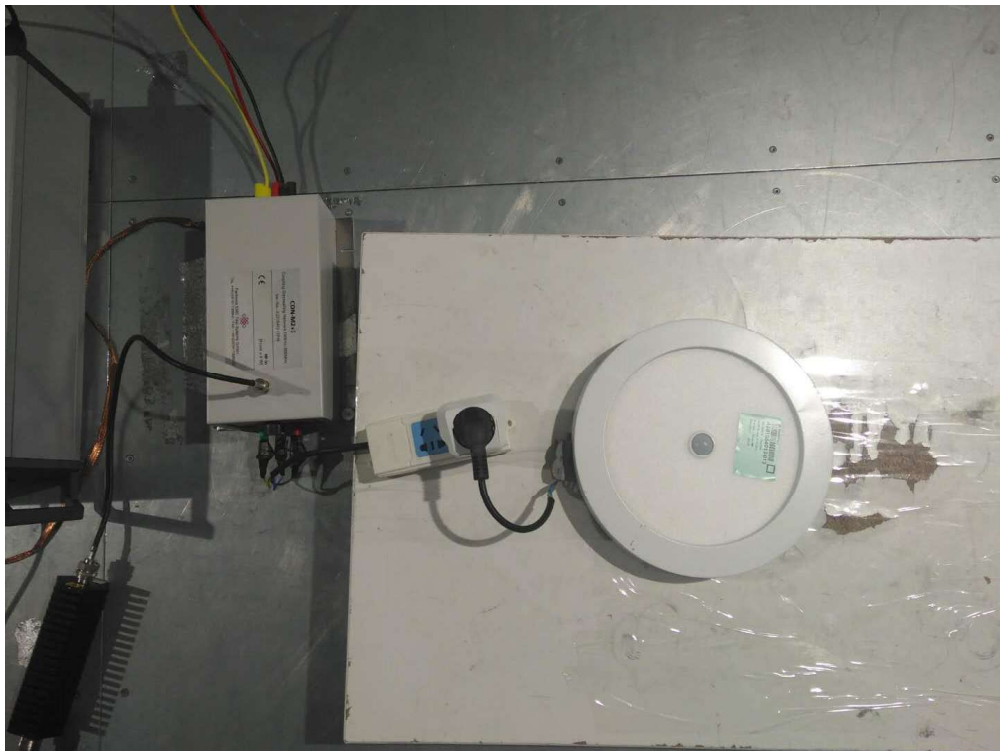
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Photograph 5: Set-up for Radiated Susceptibility



Photograph 6: Set-up for Injected Current



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Photograph 7: Set-up for Radiated electromagnetic disturbances



Photograph 8: Set-up for Harmonics



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