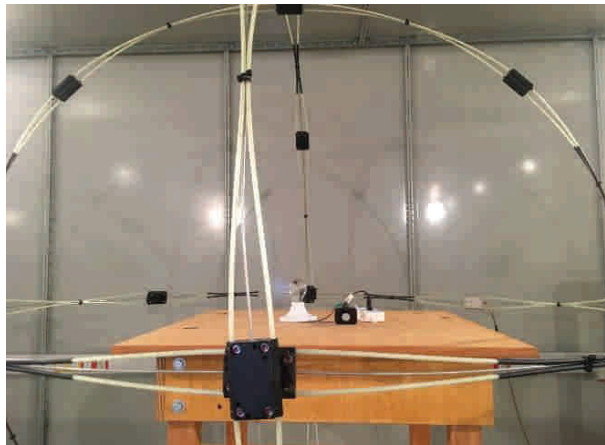


Prüfbericht - Nr.: <i>Test Report No.:</i>	50220706 001	Auftrags-Nr.: <i>Order No.:</i>	1160041428 1160051327	Seite 1 von 75 Page 1 of 75
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	29.11.2017	
Auftraggeber: <i>Client:</i>	NINGBO ENERGYLUX OPTOELECTRONICS TECHNOLOGY CO., LTD. No.518, Fangshan Road, Qiaotouhu, Ninghai, Ningbo, Zhejiang 315600 P.R. China			
Prüfgegenstand: <i>Test item:</i>	Motion Sensor			
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	Refer to pages 2-3			
Auftrags-Inhalt: <i>Order content:</i>	TÜV Rheinland – EMC Service			
Prüfgrundlage: <i>Test specification:</i>	EN 55015:2013+A1 EN 61547:2009 EN 61000-3-3:2013 EN 61000-3-2:2014			
Wareneingangsdatum: <i>Date of receipt:</i>	15.12.2017			
Prüfmuster-Nr.: <i>Test sample No.:</i>	A000665946-001~007			
Prüfzeitraum: <i>Testing period:</i>	15.12.2017-09.01.2019			
Ort der Prüfung: <i>Place of testing:</i>	Refer to section 1.1			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland / CCIC (Ningbo) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von/ tested by:		kontrolliert von/ reviewed by:		
01.02.2019	Elva Zhang/PE	01.02.2019	Feng Liang/TC	
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>
Sonstiges/ Other:				
Refer to pages 2-3 for more information.				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
*Legende: 1= Sehr gut 2= gut 3= befriedigend 4= ausreichend 5= mangelhaft P(ass)=entspricht o.g. Prüfgrundlage(n) F(ail)= entspricht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T =nicht getestet Legend: 1= very good 2= good 3= satisfactory 4= sufficient 5= poor P(ass) = passed a.m. test specification(s) F(ail)= failed a.m. test specification(s) N/A = not applicable 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	Rated Load (W)	Remark
1	ES-P01E	100W for Incandescent lamp 100W for energy saving lamp	PCB1
2	ES-P01F		
3	ES-P01MK-104		PCB2
4	ES-P01MK-105		
5	ES-P01M-94		
6	ES-P01M-95		
7	ES-P01M-124		
8	ES-P01M-125		PCB3
9	ES-P01SD		
10	ES-P01SX		
11	ES-P01VD		
12	ES-P01VX		PCB4
13	ES-P01C-94		
14	ES-P01C-95		
15	ES-P01C-124		
16	ES-P01C-125		
17	ES-P01D-94		
18	ES-P01D-95		
19	ES-P01D-124		
20	ES-P01D-125		
21	ES-P01H-124		
22	ES-P01H-125		PCB5
23	ES-P01K-104		
24	ES-P01K-105		
25	ES-P01X-94		
26	ES-P01X-95		
27	ES-P01X-124		
28	ES-P01X-125		
29	ES-P01RK-104		
30	ES-P01RK-105		
31	ES-P01R-94		

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32	ES-P01R-95		PCB6
33	ES-P01R-124		
34	ES-P01R-125		
35	ES-P01B4		
36	ES-P01B5		
37	ES-P01A-X4		
38	ES-P01A-X5		
39	ES-P01A-K4		
40	ES-P01A-K5		
41	ES-P01P4		
42	ES-P01P5		PCB7
43	ES-P12C	1200W for Incandescent lamp 300W for energy saving lamp	the same PCB as ES-P12A be approved in test reports 14717080 001-003

Other aspects:

1. The rated input voltage and frequency for all models is "220-240VAC, 50/60Hz".
2. In electrical characteristics, models no.1-no.42 is are based on the same circuit diagram. The differences among them are PCB layout and in the mechanical aspects. There are seven types of PCB used in the models no.1-no.42. For models no.1-no.2, there is a through ground wire between the input port and the output port.
3. In electrical characteristics, model ES-P12C is the same as model ES-P12A which has been EMC approved in test reports 14717080 001-003 except mechanical aspects.
4. According to the conditions mentioned above, all EMC tests were performed as the following table. The symbol "√" means the testing item was conducted. For more information, refer to the related paragraph of this report.

Model	DV	RE	3-loop	ESD	EFT	RS	Surge	CS	Dips
ES-P01E	√	√	√	√	√	√	√	√	√
ES-P01MK-104	√	√	√	√	√	√	√	√	
ES-P01SD	√	√	√	√	√	√	√	√	
ES-P01C-94	√	√	√	√	√	√	√	√	
ES-P01K-104	√	√	√	√	√	√	√	√	
ES-P01B4	√	√	√	√	√	√	√	√	
ES-P01P4	√	√	√	√	√	√	√	√	

5. This report is valid with the reports 14717080 001-003.

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

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

No.	Equipment	Model	Serial no.	Cal. due date
1.	EMI test receiver	ESR3	102331	2019.11.25
2.	LISN	ENV216	102250	2019.11.25
3.	EMI test receiver	ESR7	101929	2019.11.25
4.	Bilog Antenna	CBL6112D	49033	2021.04.12
5.	Triple loop antenna	HM020	101000	2020.11.06
6.	ESD generator	NX30.1	11744	2019.12.10
7.	CS immunity test	NSG 4070C-80	47606	2019.11.25
8.	CDN	CDN M016S	47812	2019.11.25
9.	Attenuator	ATN 6150	17032903	N/A
10.	EFT & Surge & Dips Immunity test system	IMU4000F-S-D-V	1574	2019.11.25
11.	Stacked Log-Per Antenna	STLP 9128 ES	00219	N/A
12.	Signal generator	SMB100A	180488	2019.11.25
13.	Power Amplifier	BBA150-BC250	102749	2019.11.25

1.3 Measurement Uncertainty

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

2 General Product Information

2.1 Product Function and Intended Use

The EUT (equipment under test) is an ordinary Motion Sensor 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 2-3	For all models
Frequency	: Refer to pages 2-3	For all models
Rated power	: Refer to pages 2-3	For all models
Protection Class	: Class I	For models ES-P01E and ES-P01F
	Class II	For other 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, PCB photograph, 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

A 60W incandescent bulb was used as the load of the sensor in the test.

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
----------------	-------------

Test procedure : EN 61000-3-2:2014
Harmonic order : 2 – 40th
Frequency range : 0 – 2kHz

According to the Clause 7.3 in the EN 61000-3-2:2014

Limits for Class C equipment

b) Active input power ≤ 25 W

- Discharge lighting equipment having an active input power smaller than or equal to 25 W shall comply with one of the following two sets of requirements:
The harmonic currents shall not exceed the power-related limits of Table 3, column 2, or:
the third harmonic current,

The maximum rated input of the samples is less than 25W and not belongs to Discharge lighting equipment, so the limits of harmonics on AC main are not applied to the samples.

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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

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
----------------	-------------

Date of testing : 2018.01.03-2018.01.05
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 : Yes, for model ES-P01E
No, for other models
Ambient Temp. : 19°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.

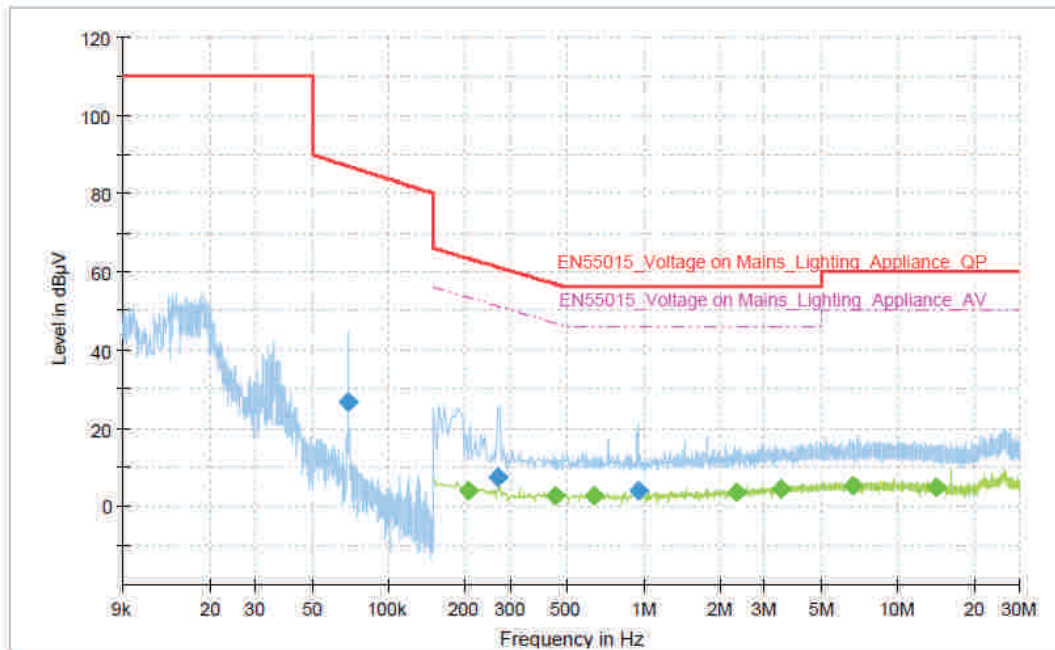
The tested object was set-up on a wooden table and 0.8m away from the AMN. The length of the extension power cord of the tested object was about 0.8m.

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.

Figure 1: Spectral Diagrams of disturbance voltage, 0.009-30MHz, L for ES-P01E

Full Spectrum



Final Result

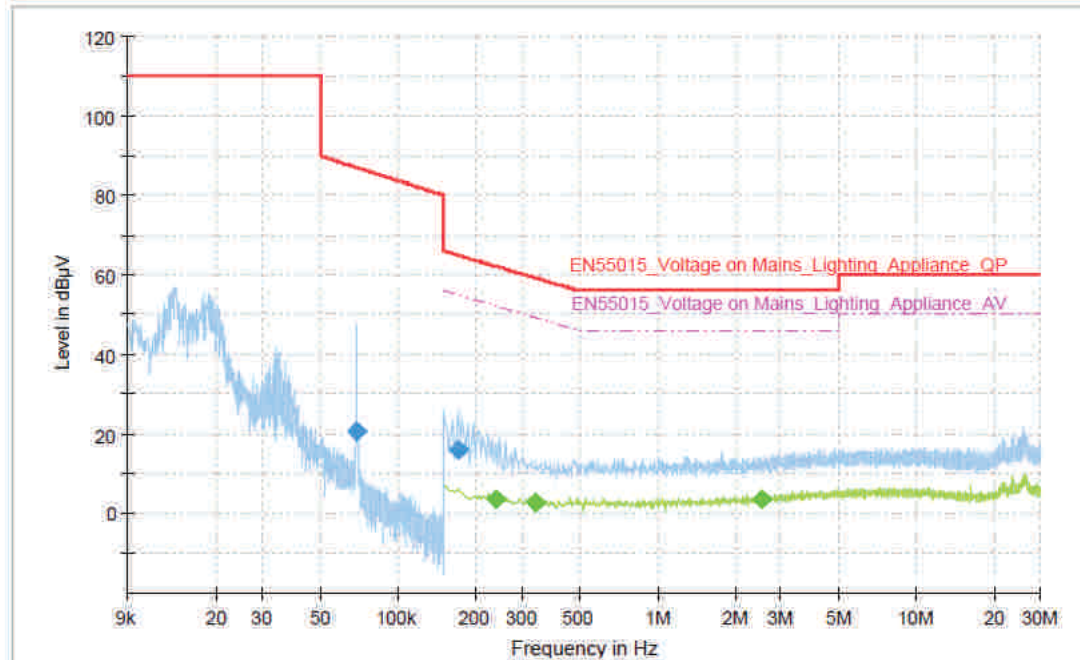
Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.069160	26.51	---	87.05	60.54	1000.0	0.200	L1	OFF
0.206000	---	4.07	53.37	49.30	1000.0	9.000	L1	OFF
0.270000	7.21	---	61.12	53.91	1000.0	9.000	L1	OFF
0.454000	---	2.72	46.80	44.08	1000.0	9.000	L1	OFF
0.642000	---	2.67	46.00	43.33	1000.0	9.000	L1	OFF
0.954000	3.96	---	56.00	52.04	1000.0	9.000	L1	OFF
2.338000	---	3.43	46.00	42.57	1000.0	9.000	L1	OFF
3.442000	---	4.30	46.00	41.70	1000.0	9.000	L1	OFF
6.622000	---	5.43	50.00	44.57	1000.0	9.000	L1	OFF
14.046000	---	4.64	50.00	45.36	1000.0	9.000	L1	OFF

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Figure 2: Spectral Diagrams of disturbance voltage, 0.009-30MHz, N for ES-P01E

Full Spectrum

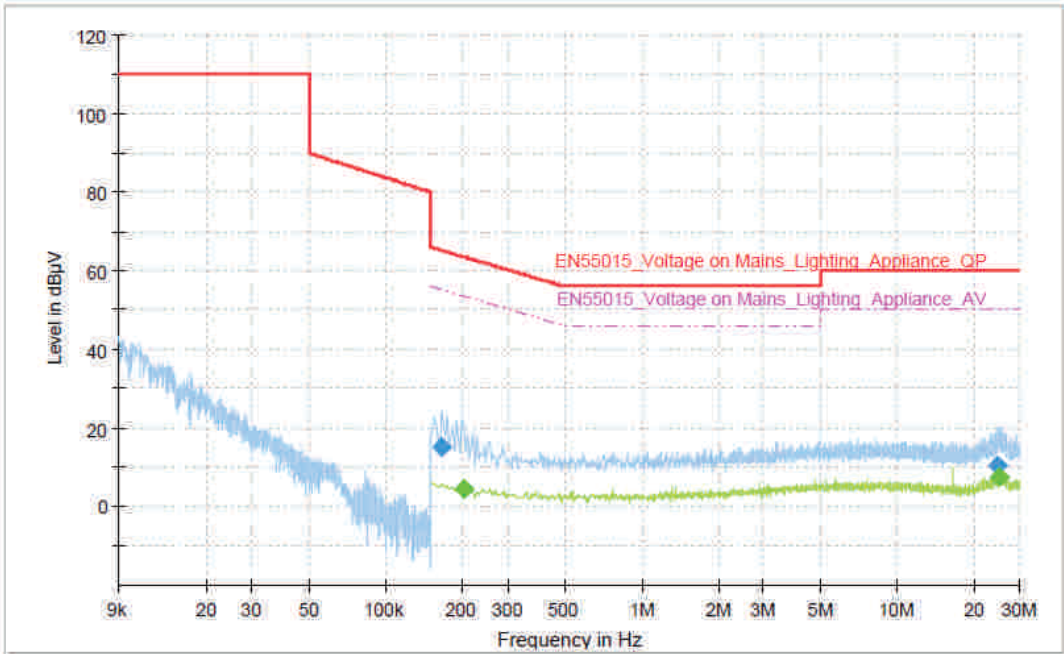


Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.069160	20.64	---	87.05	66.41	1000.0	0.200	N	OFF
0.170000	15.81	---	64.96	49.15	1000.0	9.000	N	OFF
0.238000	---	3.61	52.17	48.55	1000.0	9.000	N	OFF
0.342000	---	2.81	49.16	46.34	1000.0	9.000	N	OFF
2.526000	---	3.59	46.00	42.41	1000.0	9.000	N	OFF

Figure 3: Spectral Diagrams of disturbance voltage, 0.009-30MHz, L for ES-P01MK-104

Full Spectrum

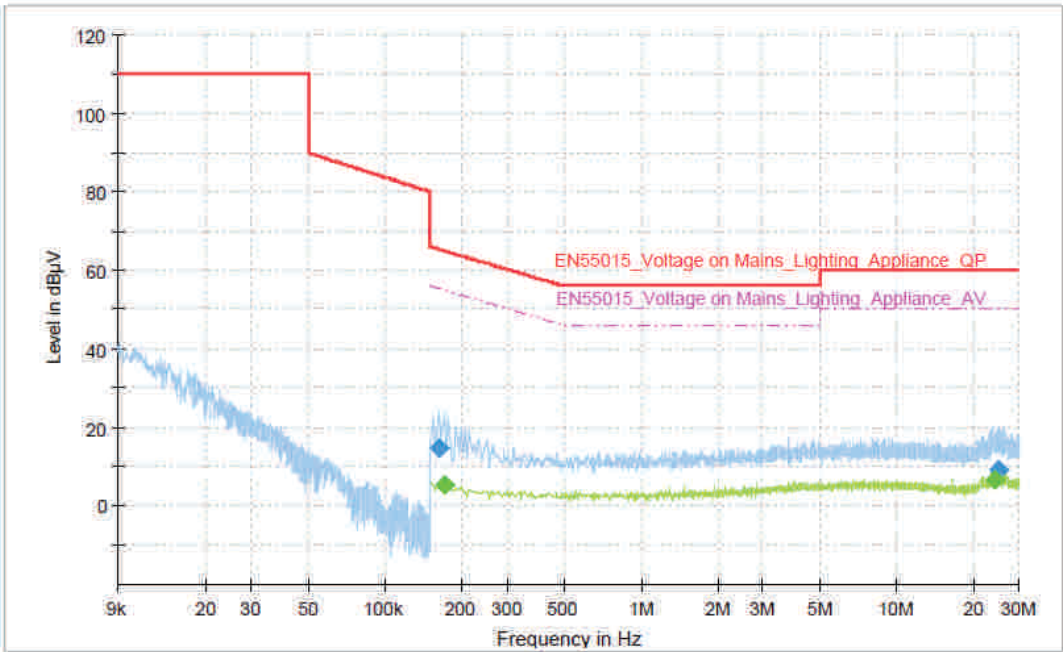


Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.166000	15.00	---	65.16	50.16	1000.0	9.000	L1	OFF
0.202000	---	4.22	53.53	49.31	1000.0	9.000	L1	OFF
24.738000	10.36	---	60.00	49.64	1000.0	9.000	L1	OFF
24.790000	---	7.41	50.00	42.59	1000.0	9.000	L1	OFF

Figure 4: Spectral Diagrams of disturbance voltage, 0.009-30MHz, N for ES-P01MK-104

Full Spectrum

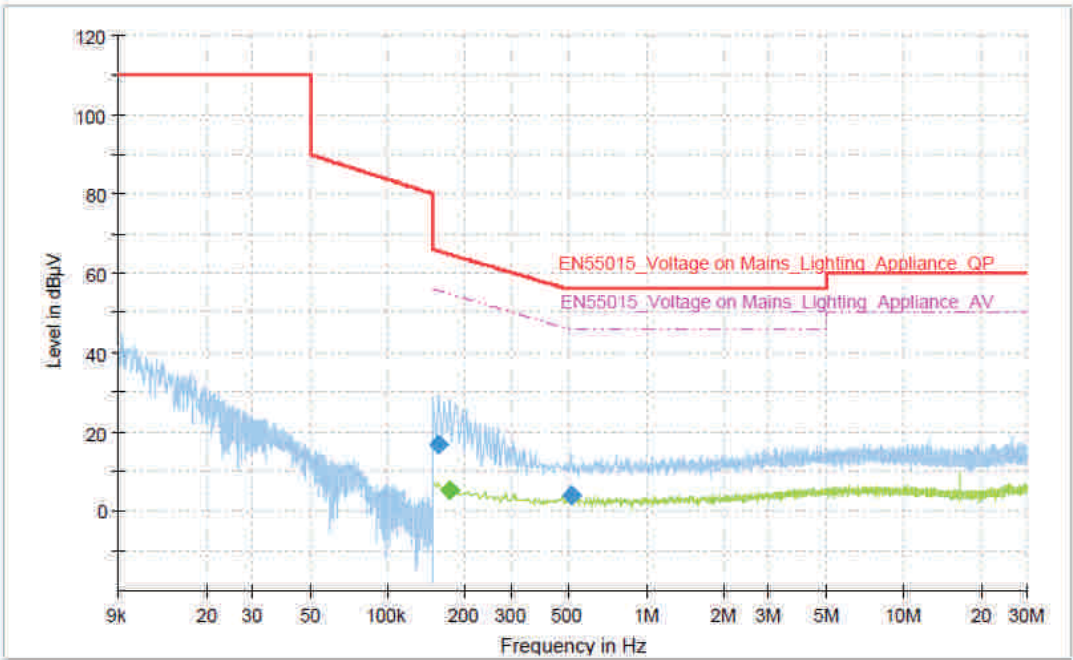


Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAve rage (dBµ V)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.162000	14.52	---	65.36	50.84	1000.0	9.000	N	OFF
0.170000	---	5.18	54.96	49.78	1000.0	9.000	N	OFF
24.194000	---	6.63	50.00	43.37	1000.0	9.000	N	OFF
24.934000	9.00	---	60.00	51.00	1000.0	9.000	N	OFF

Figure 5: Spectral Diagrams of disturbance voltage, 0.009-30MHz, L for ES-P01SD

Full Spectrum

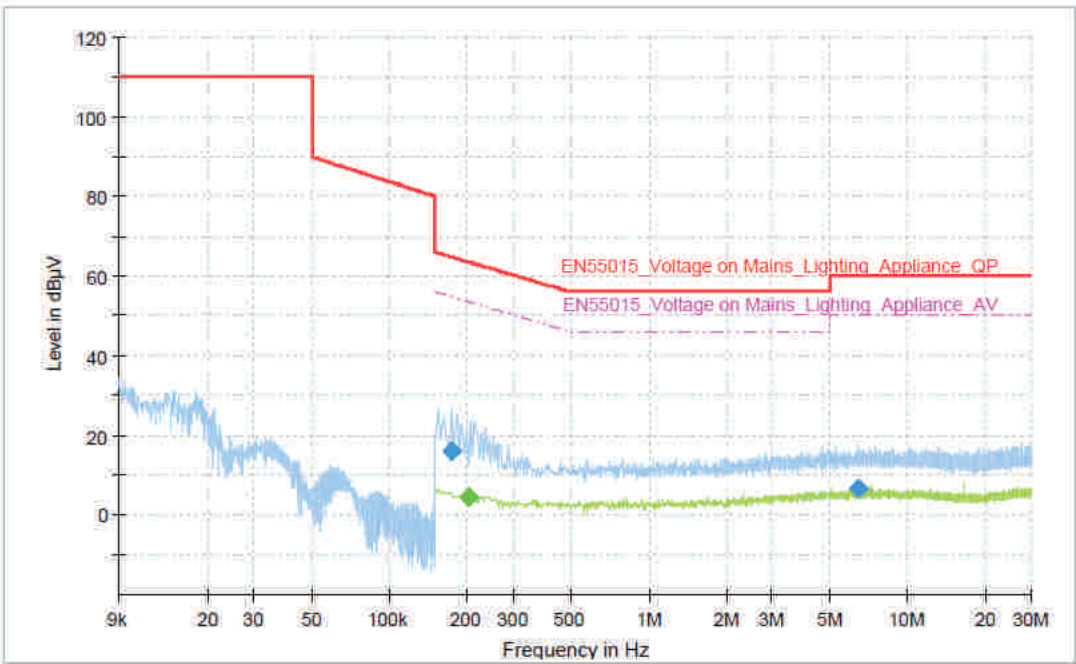


Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.158000	16.75	---	65.57	48.82	1000.0	9.000	L1	OFF
0.174000	---	5.21	54.77	49.56	1000.0	9.000	L1	OFF
0.514000	4.07	---	56.00	51.93	1000.0	9.000	L1	OFF

Figure 6: Spectral Diagrams of disturbance voltage, 0.009-30MHz, N for ES-P01SD

Full Spectrum

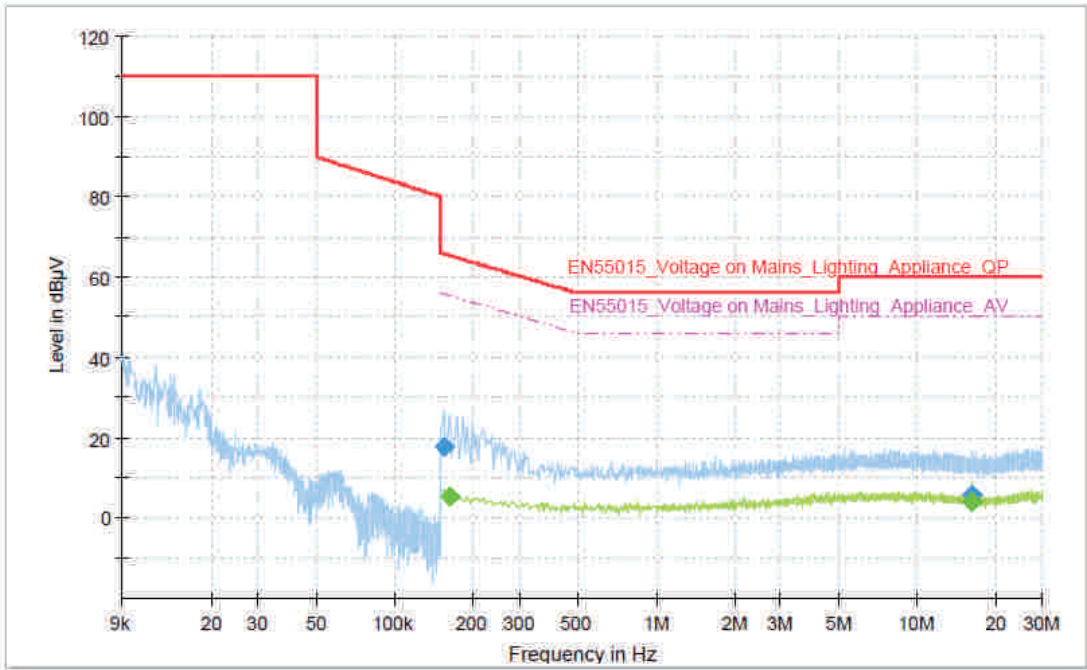


Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.174000	15.90	---	64.77	48.86	1000.0	9.000	N	OFF
0.202000	---	4.26	53.53	49.27	1000.0	9.000	N	OFF
6.410000	6.43	---	60.00	53.57	1000.0	9.000	N	OFF

Figure 7: Spectral Diagrams of disturbance voltage, 0.009-30MHz, L for ES-P01C-94

Full Spectrum

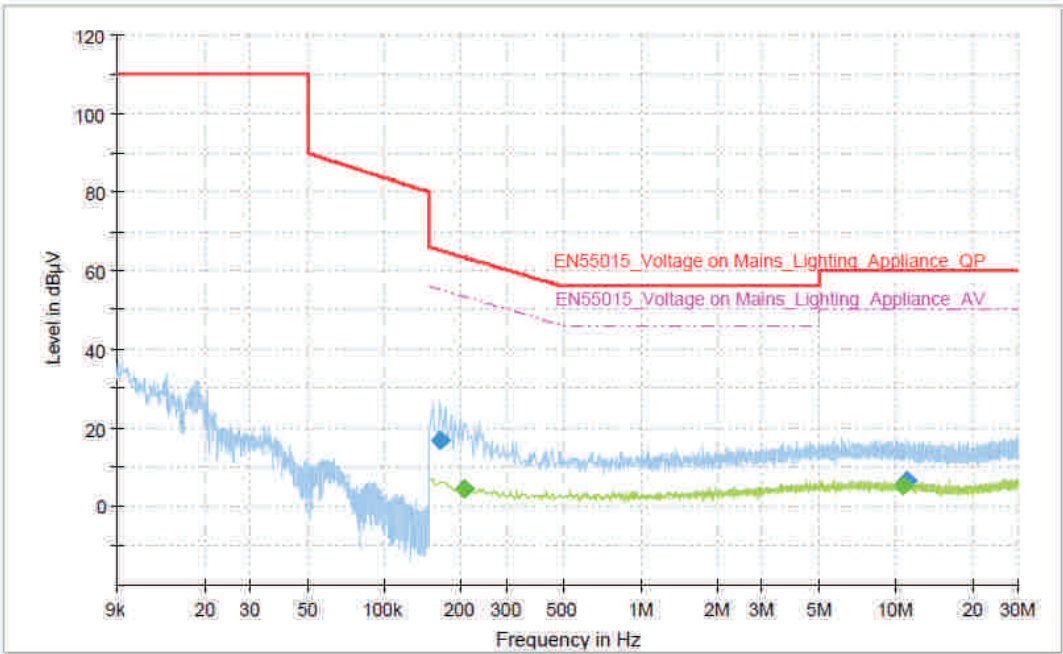


Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAve rage (dBµ V)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.154000	17.75	---	65.78	48.03	1000.0	9.000	L1	OFF
0.162000	---	5.47	55.36	49.89	1000.0	9.000	L1	OFF
16.082000	5.50	---	60.00	54.50	1000.0	9.000	L1	OFF
16.082000	---	4.13	50.00	45.87	1000.0	9.000	L1	OFF

Figure 8: Spectral Diagrams of disturbance voltage, 0.009-30MHz, N for ES-P01C-94

Full Spectrum

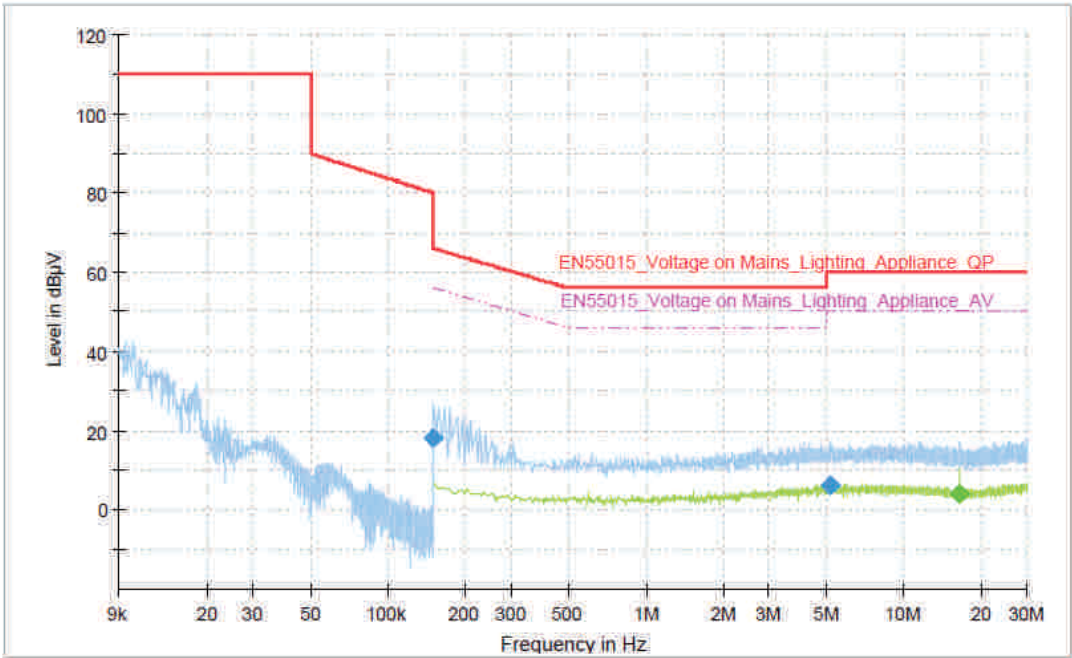


Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAve rage (dBµ V)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.166000	16.99	---	65.16	48.17	1000.0	9.000	N	OFF
0.206000	---	4.27	53.37	49.10	1000.0	9.000	N	OFF
10.610000	---	5.12	50.00	44.88	1000.0	9.000	N	OFF
11.010000	6.68	---	60.00	53.32	1000.0	9.000	N	OFF

Figure 9: Spectral Diagrams of disturbance voltage, 0.009-30MHz, L for ES-P01K-104

Full Spectrum

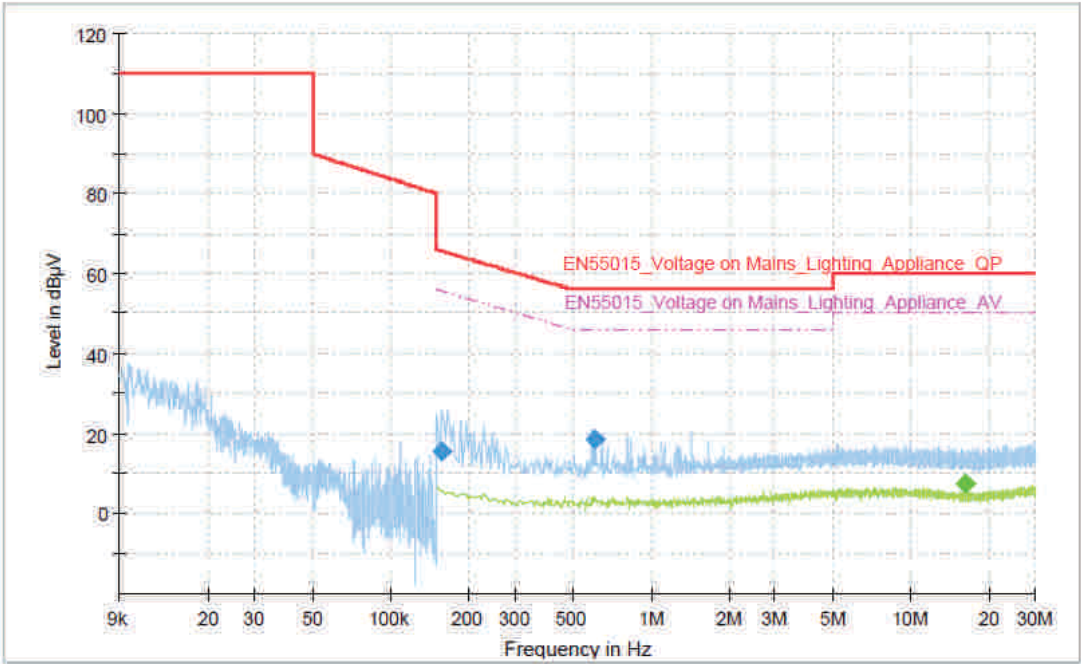


Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAve rage (dBµ V)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.150000	17.95	---	66.00	48.05	1000.0	9.000	L1	OFF
5.178000	6.25	---	60.00	53.76	1000.0	9.000	L1	OFF
16.334000	---	4.09	50.00	45.91	1000.0	9.000	L1	OFF

Figure 10: Spectral Diagrams of disturbance voltage, 0.009-30MHz, N for ES-P01K-104

Full Spectrum

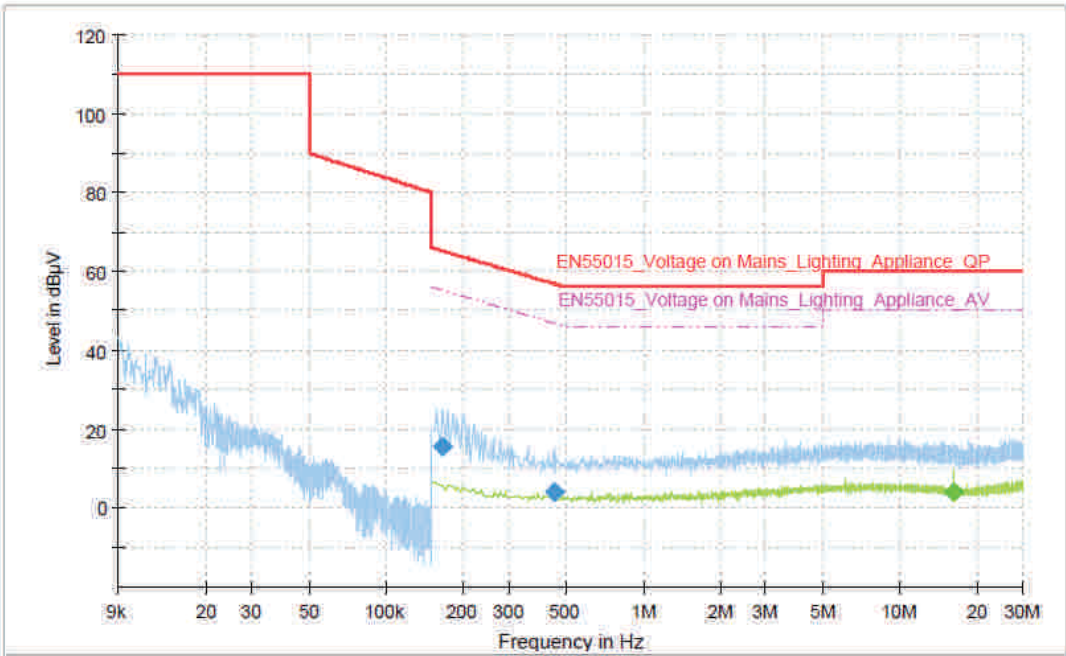


Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAve rage (dBµ V)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.158000	15.54	---	65.57	50.03	1000.0	9.000	N	OFF
0.614000	18.53	---	56.00	37.47	1000.0	9.000	N	OFF
16.254000	---	7.56	50.00	42.44	1000.0	9.000	N	OFF

Figure 11: Spectral Diagrams of disturbance voltage, 0.009-30MHz, L for ES-P01B4

Full Spectrum

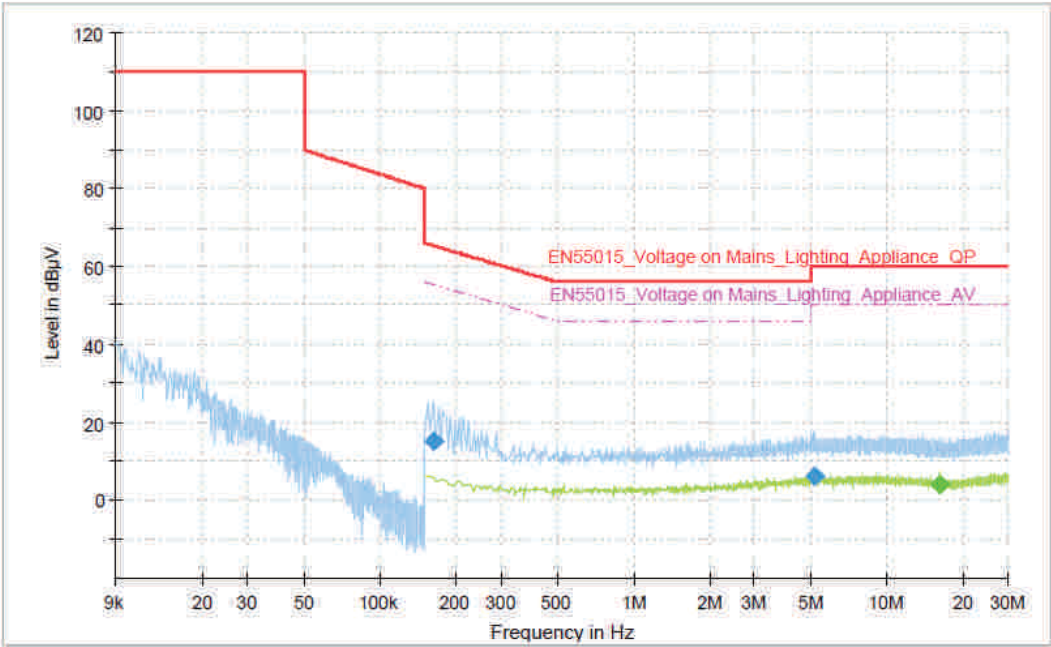


Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.166000	15.35	---	65.16	49.80	1000.0	9.000	L1	OFF
0.450000	4.04	---	56.88	52.83	1000.0	9.000	L1	OFF
16.214000	---	4.13	50.00	45.87	1000.0	9.000	L1	OFF

Figure 12: Spectral Diagrams of disturbance voltage, 0.009-30MHz, N for ES-P01B4

Full Spectrum

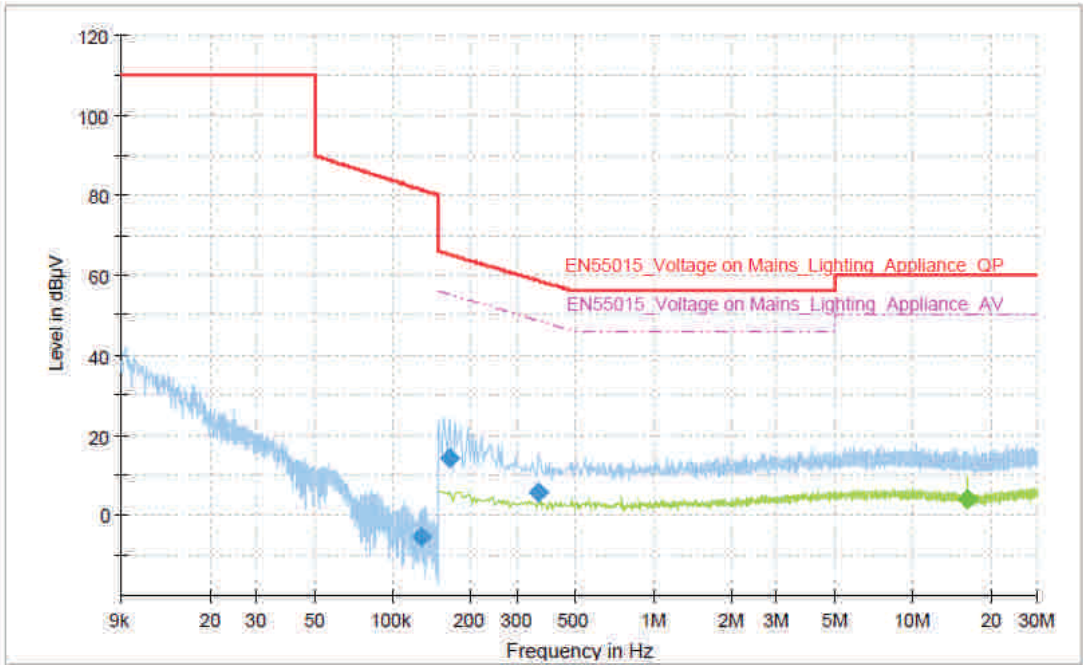


Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.162000	15.27	---	65.36	50.09	1000.0	9.000	N	OFF
5.162000	6.21	---	60.00	53.79	1000.0	9.000	N	OFF
16.202000	---	4.15	50.00	45.85	1000.0	9.000	N	OFF

Figure 13: Spectral Diagrams of disturbance voltage, 0.009-30MHz, L for ES-P01P4

Full Spectrum

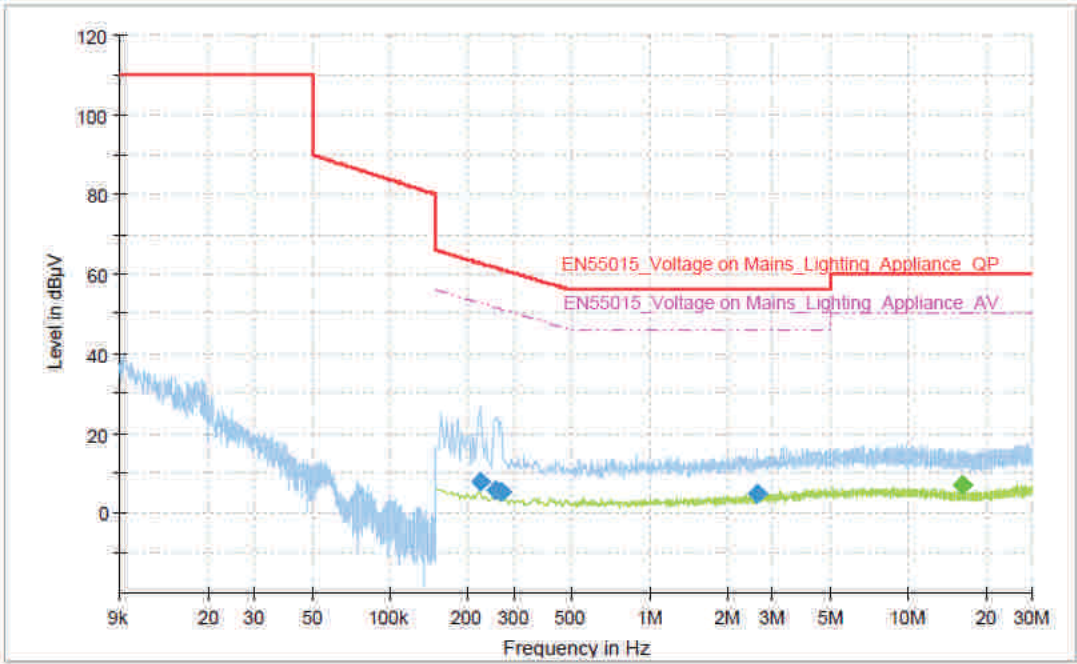


Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAve rage (dBµ V)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.128920	-5.46	---	81.38	86.84	1000.0	0.200	L1	OFF
0.166000	14.43	---	65.16	50.73	1000.0	9.000	L1	OFF
0.362000	5.69	---	58.68	52.99	1000.0	9.000	L1	OFF
16.226000	---	4.09	50.00	45.91	1000.0	9.000	L1	OFF

Figure 14: Spectral Diagrams of disturbance voltage, 0.009-30MHz, N for ES-P01P4

Full Spectrum



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.222000	7.87	---	62.74	54.87	1000.0	9.000	N	OFF
0.254000	5.83	---	61.63	55.79	1000.0	9.000	N	OFF
0.270000	5.13	---	61.12	55.99	1000.0	9.000	N	OFF
2.622000	4.96	---	56.00	51.04	1000.0	9.000	N	OFF
16.242000	---	6.88	50.00	43.12	1000.0	9.000	N	OFF

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4.1.4 Radiated Electromagnetic Disturbance

Result:	Pass
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Date of testing : 2018.01.04-2018.01.05
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 : Yes, for model ES-P01E
: No, for other models
Test Site : EMC chamber

Measuring configuration and description

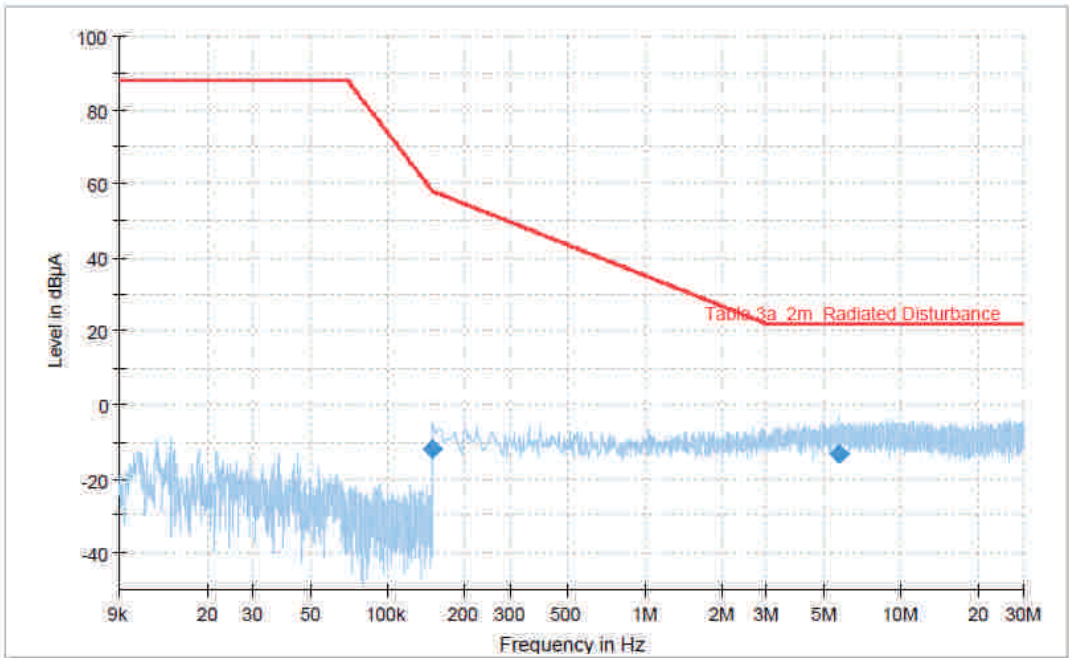
The measurement equipment like test receiver, loop antenna and coaxial switch are in compliance with the CISPR 16-1 series standards. The test setup was made according to Clause 9 of EN 55015:2013+A1.

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).

Figure 15: Graphic description of radiated electromagnetic disturbances for X direction, for ES-P01E

Full Spectrum

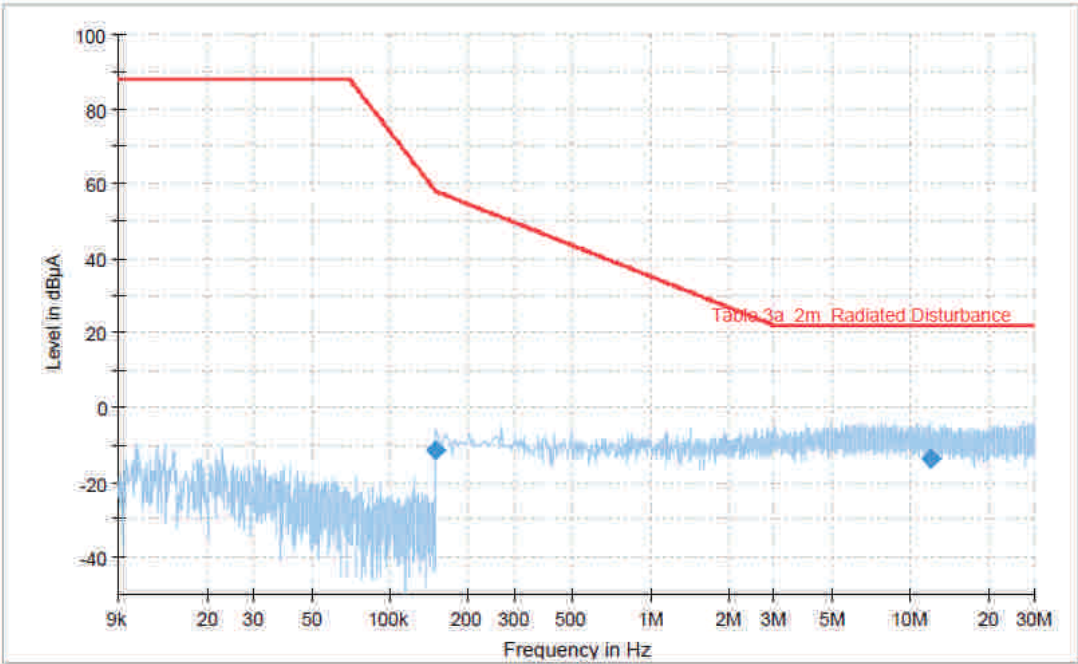


Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAverage (dBµA)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.150000	-11.81	---	58.00	69.81	1000.0	9.000	X	0.1
5.770000	-13.32	---	22.00	35.32	1000.0	9.000	X	0.1

Figure 16: Graphic description of radiated electromagnetic disturbances for Y direction, for ES-P01E

Full Spectrum

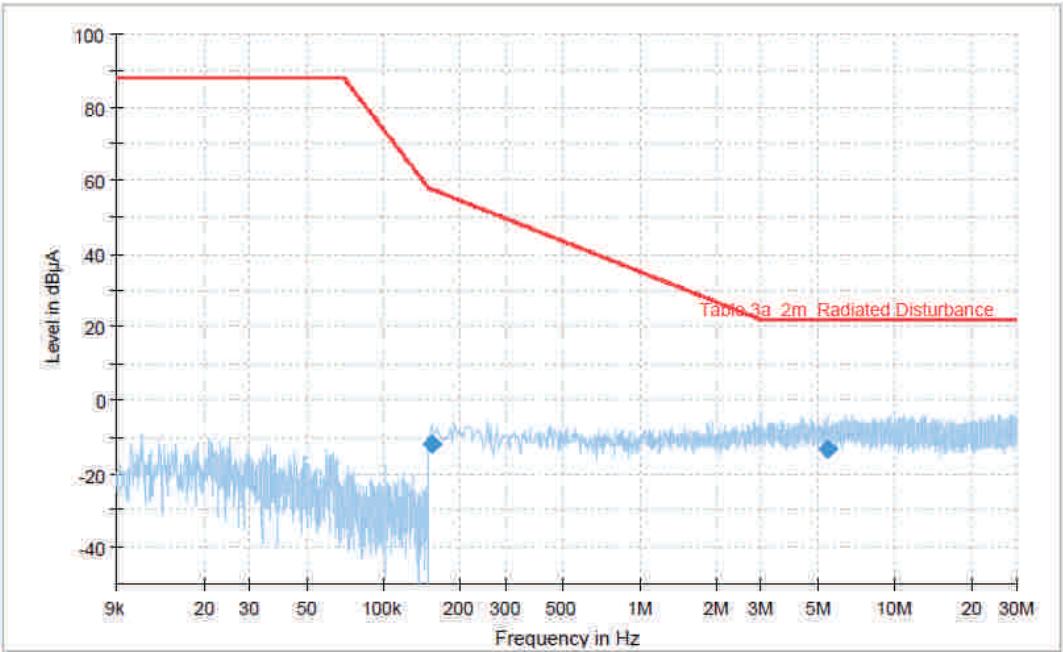


Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAverage (dBµA)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.150000	-11.56	---	58.00	69.56	1000.0	9.000	Y	0.1
11.870000	-13.60	---	22.00	35.60	1000.0	9.000	Y	0.1

Figure 17: Graphic description of radiated electromagnetic disturbances for Z direction, for ES-P01E

Full Spectrum

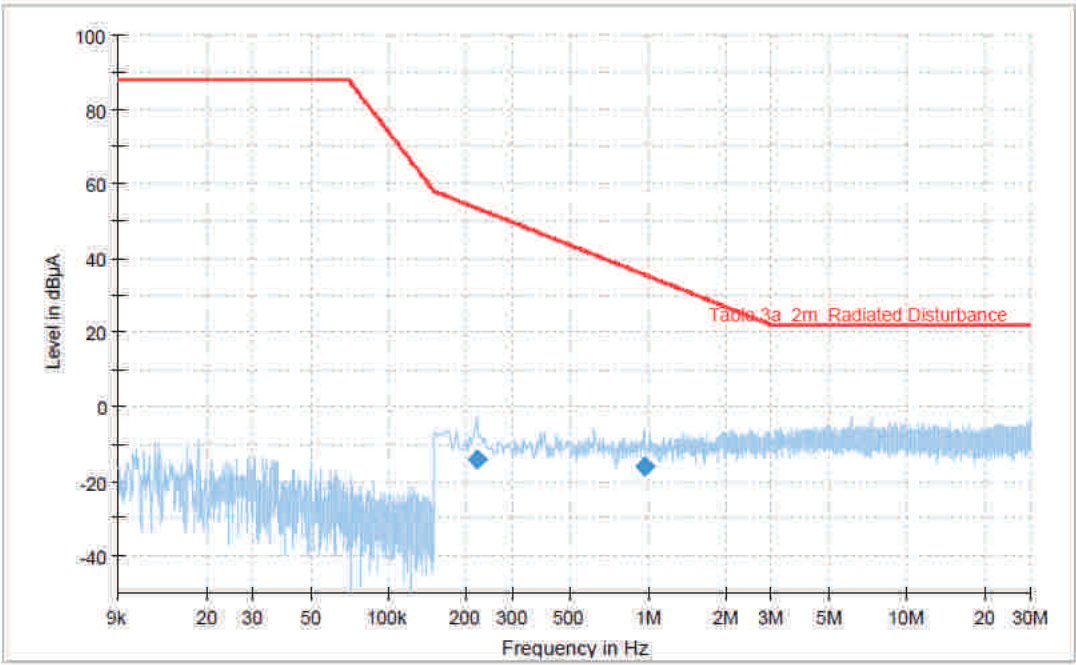


Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAve rage (dBµ A)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.154000	-11.79	---	57.68	69.47	1000.0	9.000	Z	0.1
5.434000	-13.44	---	22.00	35.44	1000.0	9.000	Z	0.1

Figure 18: Graphic description of radiated electromagnetic disturbances for X direction, for ES-P01MK-104

Full Spectrum

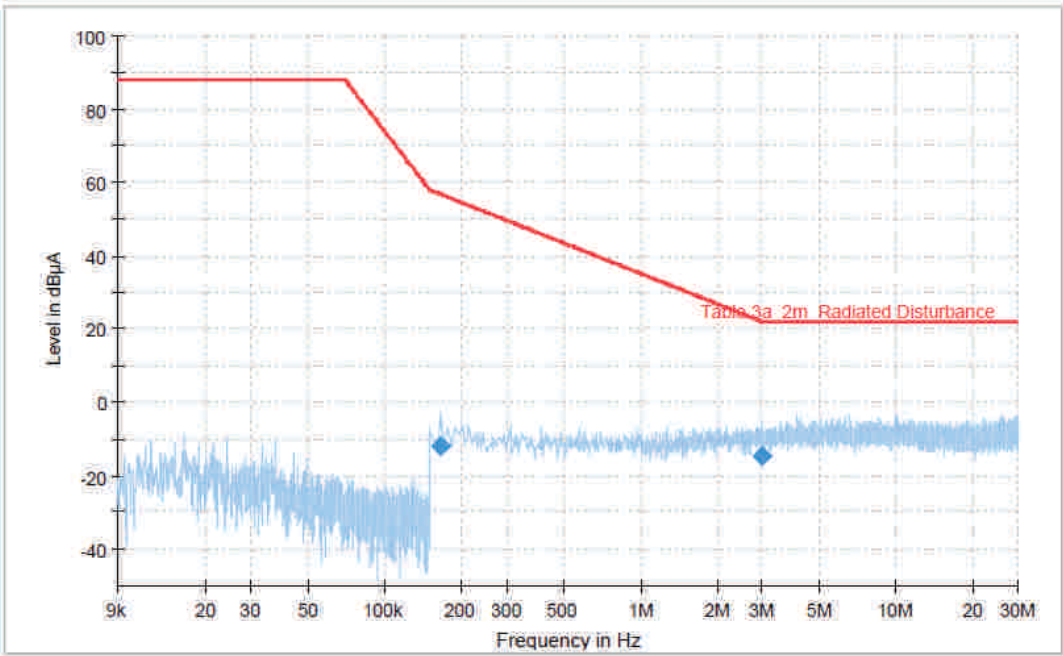


Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAverage (dBµA)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.218000	-14.24	---	53.51	67.75	1000.0	9.000	X	0.1
0.966000	-15.84	---	35.62	51.46	1000.0	9.000	X	0.1

Figure 19: Graphic description of radiated electromagnetic disturbances for Y direction, for ES-P01MK-104

Full Spectrum

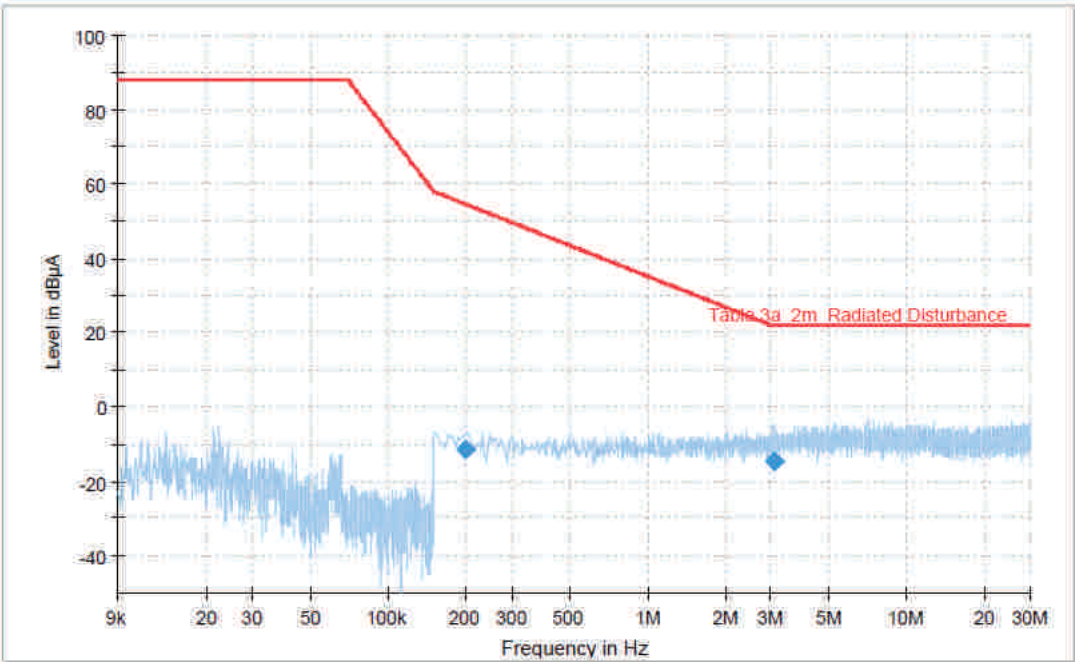


Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAverage (dBµA)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.166000	-11.95	---	56.78	68.73	1000.0	9.000	Y	0.1
2.990000	-14.47	---	22.04	36.51	1000.0	9.000	Y	0.1

Figure 20: Graphic description of radiated electromagnetic disturbances for Z direction, for ES-P01MK-104

Full Spectrum

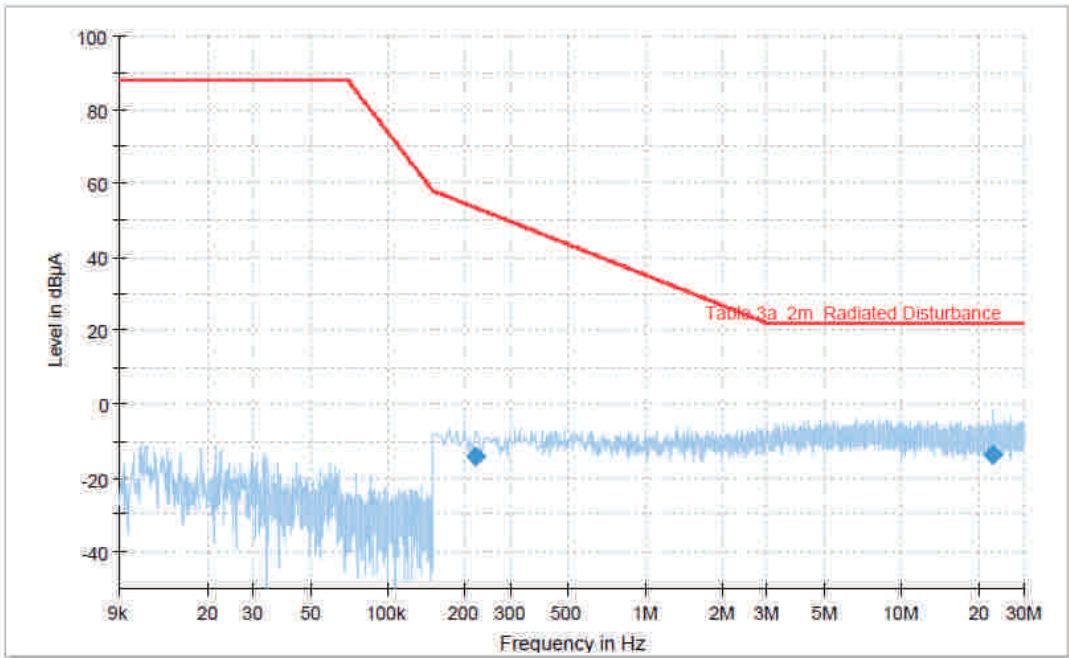


Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAverage (dBµA)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.198000	-11.43	---	54.66	66.09	1000.0	9.000	Z	0.1
3.098000	-14.45	---	22.00	36.45	1000.0	9.000	Z	0.1

Figure 21: Graphic description of radiated electromagnetic disturbances for X direction, for ES-P01SD

Full Spectrum

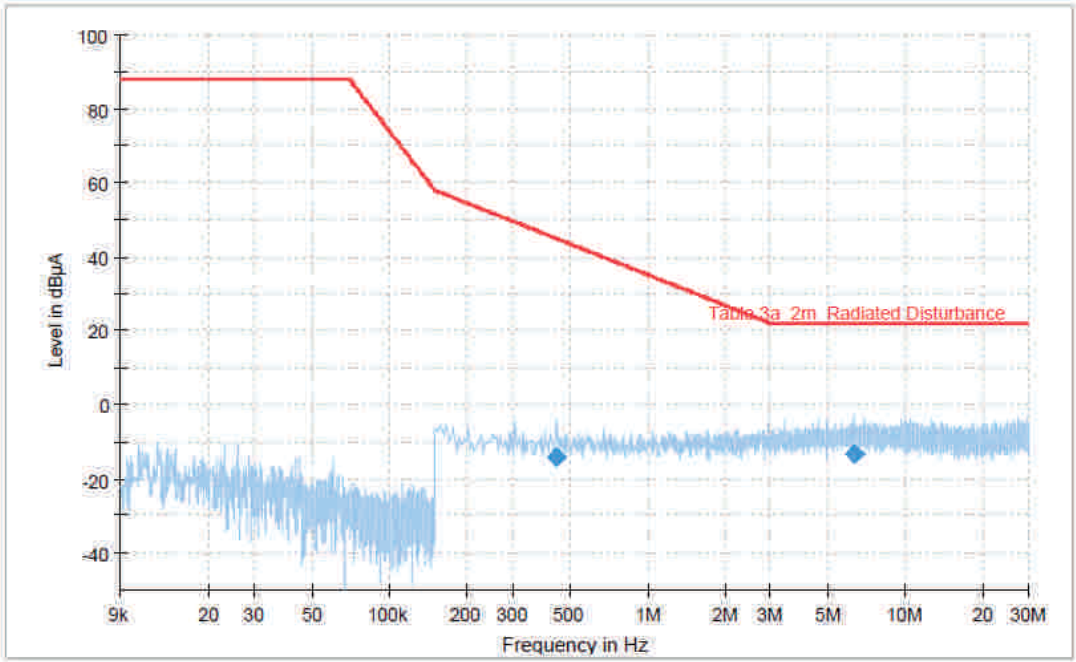


Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAverage (dBµA)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.218000	-14.10	---	53.51	67.61	1000.0	9.000	X	0.1
22.714000	-13.94	---	22.00	35.94	1000.0	9.000	X	0.1

Figure 22: Graphic description of radiated electromagnetic disturbances for Y direction, for ES-P01SD

Full Spectrum

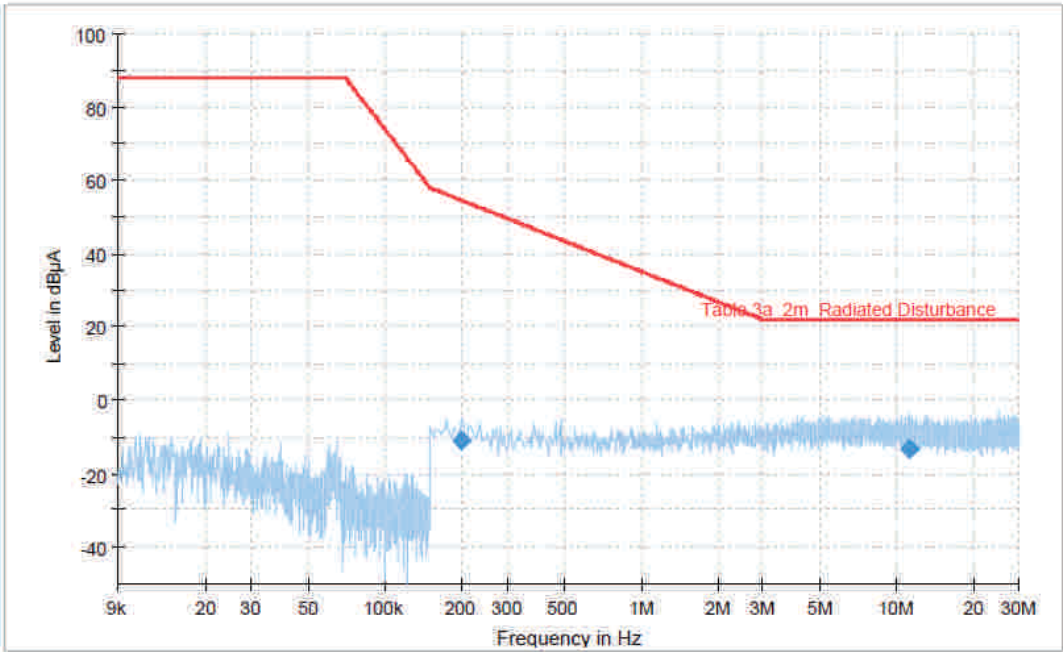


Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAverage (dBµA)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.446000	-14.38	---	44.91	59.29	1000.0	9.000	Y	0.1
6.334000	-13.40	---	22.00	35.40	1000.0	9.000	Y	0.1

Figure 23: Graphic description of radiated electromagnetic disturbances for Z direction, for ES-P01SD

Full Spectrum

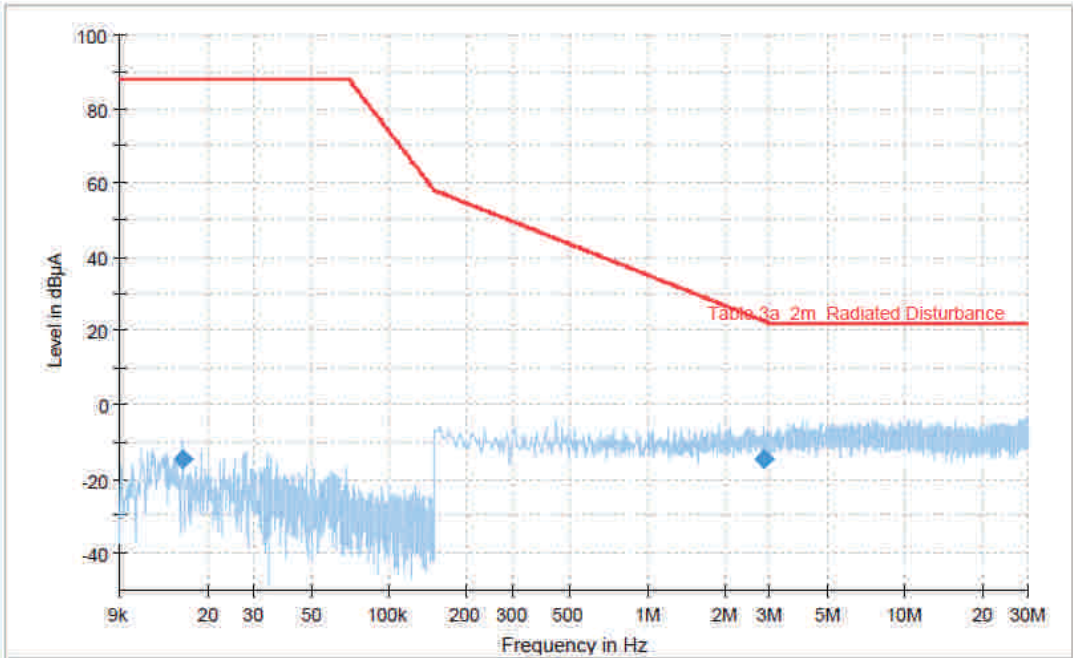


Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAverage (dBµA)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.198000	-11.21	---	54.66	65.87	1000.0	9.000	Z	0.1
11.266000	-13.23	---	22.00	35.23	1000.0	9.000	Z	0.1

Figure 24: Graphic description of radiated electromagnetic disturbances for X direction, for ES-P01C-94

Full Spectrum

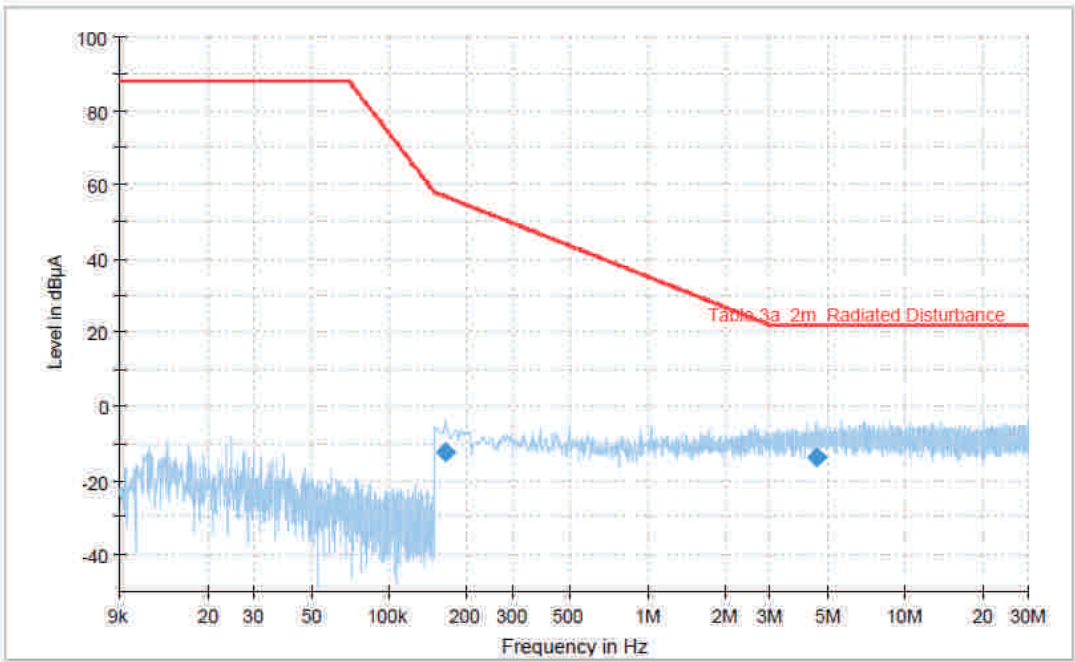


Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAverage (dBµA)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.015960	-14.67	---	88.00	102.67	1000.0	0.200	X	0.1
2.814000	-14.64	---	22.77	37.41	1000.0	9.000	X	0.1

Figure 25: Graphic description of radiated electromagnetic disturbances for Y direction, for ES-P01C-94

Full Spectrum

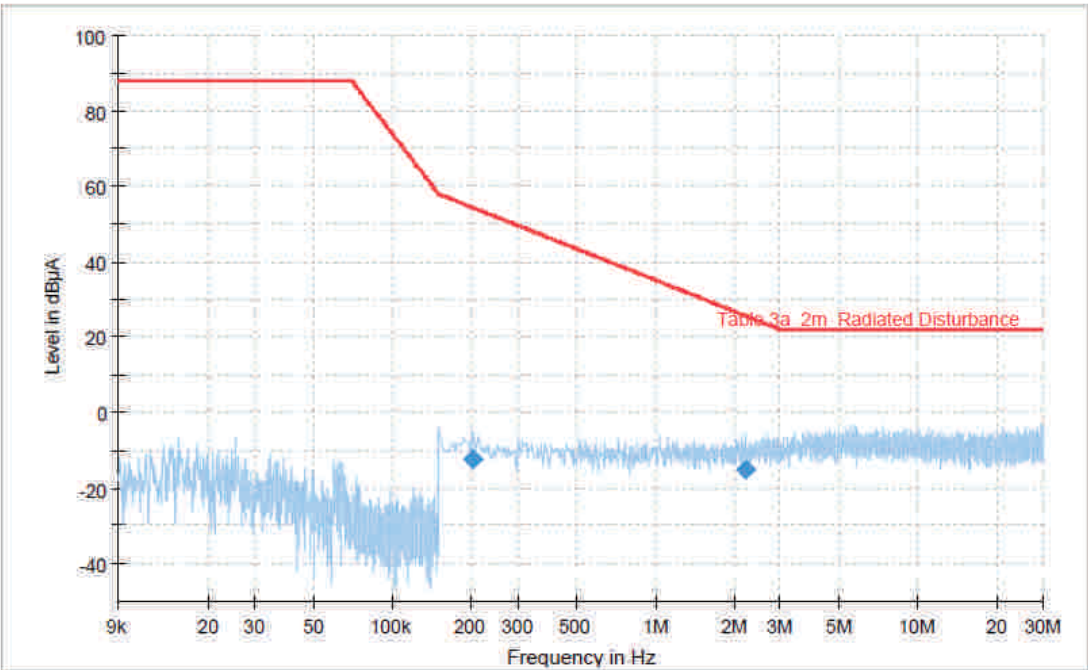


Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAverage (dBµA)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.166000	-12.53	---	56.78	69.31	1000.0	9.000	Y	0.1
4.498000	-13.68	---	22.00	35.68	1000.0	9.000	Y	0.1

Figure 26: Graphic description of radiated electromagnetic disturbances for Z direction, for ES-P01C-94

Full Spectrum

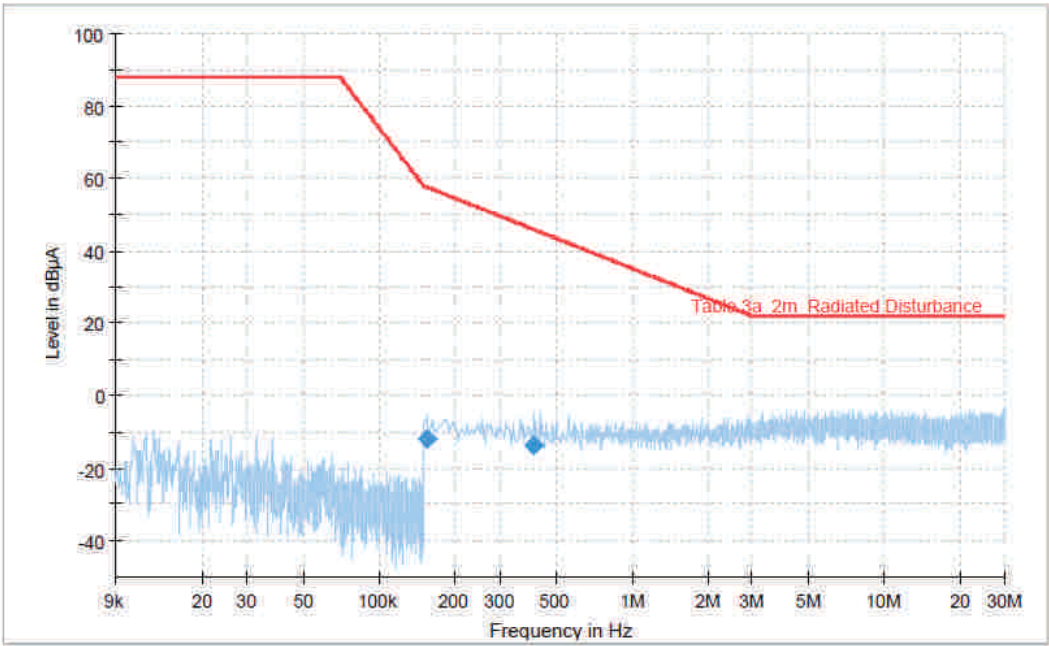


Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAverage (dBµA)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.202000	-12.39	---	54.42	66.81	1000.0	9.000	Z	0.1
2.210000	-14.98	---	25.67	40.65	1000.0	9.000	Z	0.1

Figure 27: Graphic description of radiated electromagnetic disturbances for X direction, for ES-P01K-104

Full Spectrum

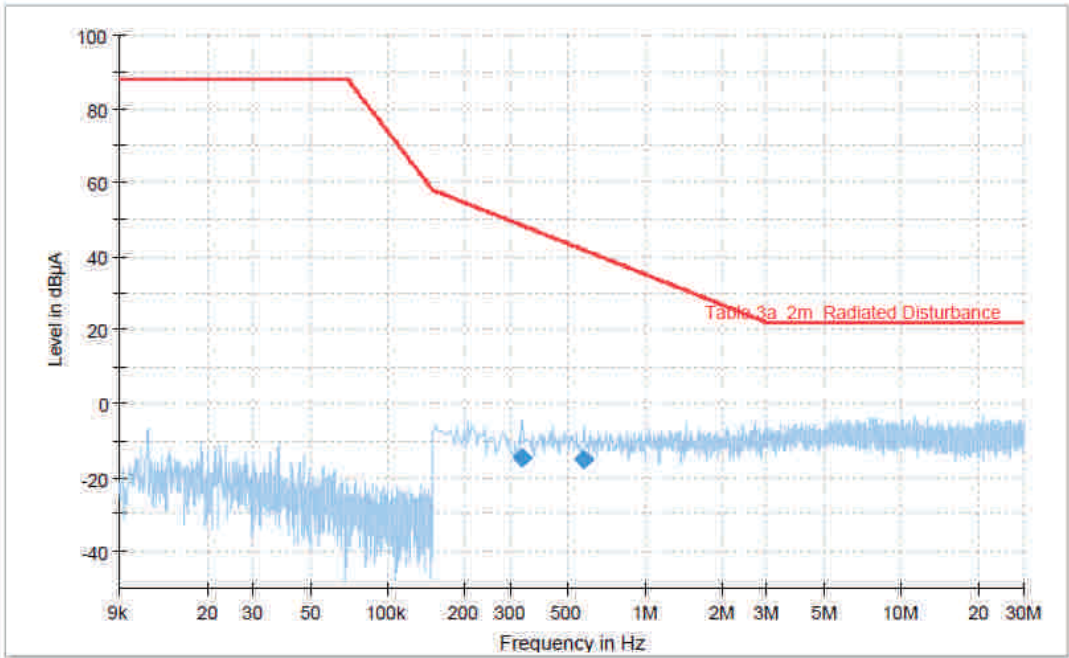


Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAverage (dBµA)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.154000	-11.95	---	57.68	69.63	1000.0	9.000	X	0.1
0.410000	-13.55	---	45.92	59.47	1000.0	9.000	X	0.1

Figure 28: Graphic description of radiated electromagnetic disturbances for Y direction, for ES-P01K-104

Full Spectrum

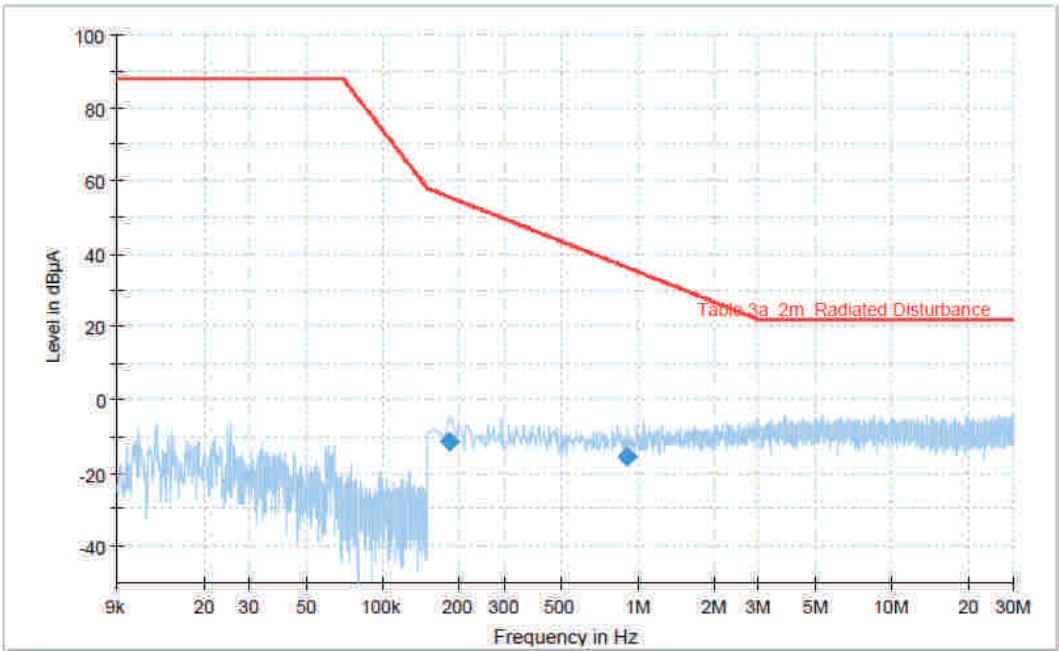


Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAverage (dBµA)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.334000	-14.45	---	48.38	62.83	1000.0	9.000	Y	0.1
0.582000	-14.94	---	41.71	56.65	1000.0	9.000	Y	0.1

Figure 29: Graphic description of radiated electromagnetic disturbances for Z direction, for ES-P01K-104

Full Spectrum

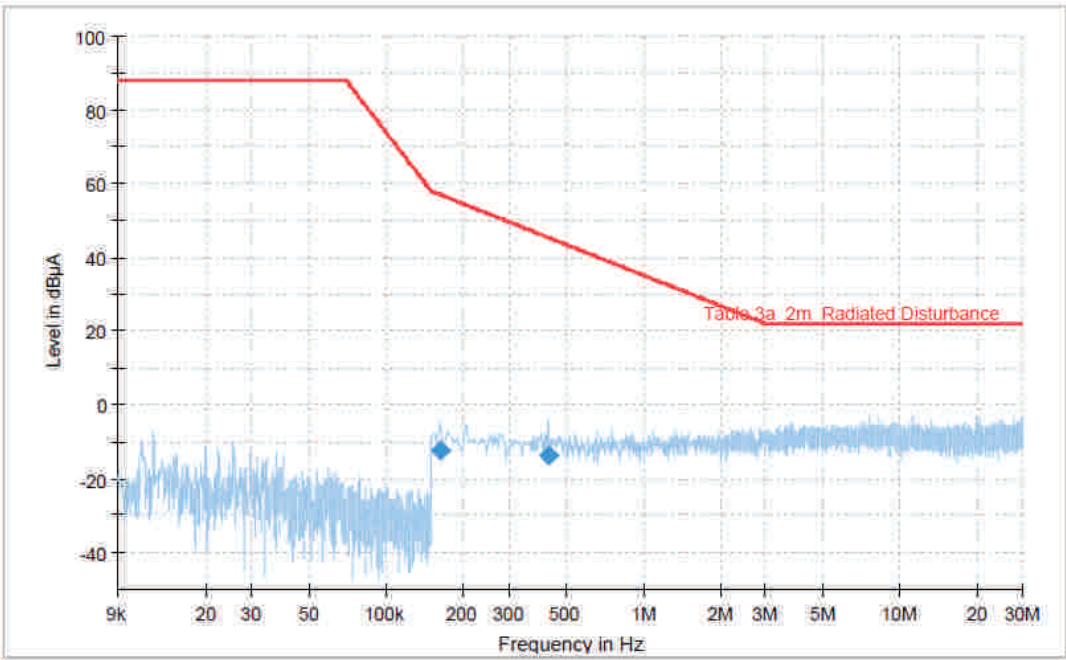


Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAverage (dBµA)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.182000	-11.62	---	55.68	67.30	1000.0	9.000	Z	0.1
0.910000	-15.59	---	36.34	51.93	1000.0	9.000	Z	0.1

Figure 30: Graphic description of radiated electromagnetic disturbances for X direction, for ES-P01B4

Full Spectrum

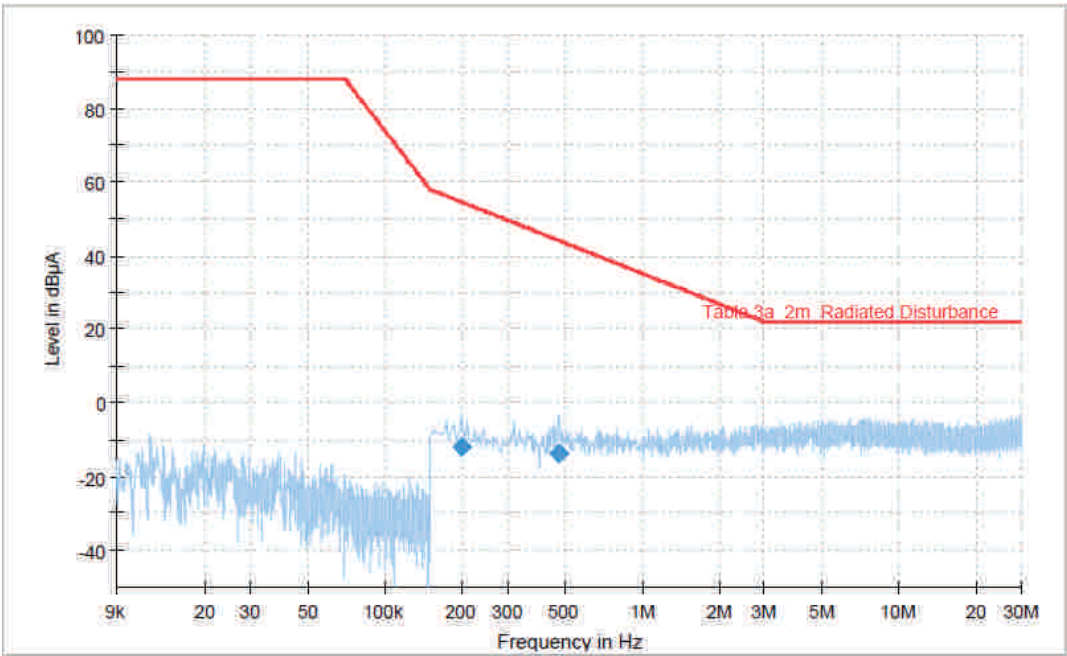


Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAve rage (dBµA)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.162000	-12.35	---	57.08	69.43	1000.0	9.000	X	0.1
0.426000	-13.71	---	45.46	59.17	1000.0	9.000	X	0.1

Figure 31: Graphic description of radiated electromagnetic disturbances for Y direction, for ES-P01B4

Full Spectrum

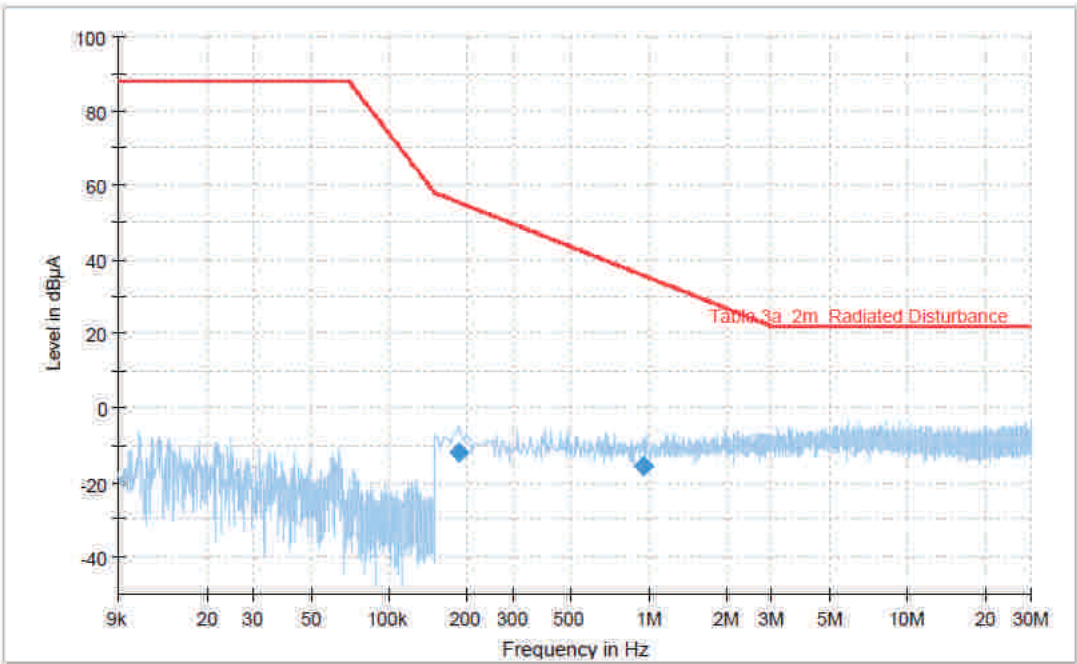


Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAverage (dBµA)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.198000	-11.85	---	54.66	66.51	1000.0	9.000	Y	0.1
0.474000	-13.82	---	44.17	57.99	1000.0	9.000	Y	0.1

Figure 32: Graphic description of radiated electromagnetic disturbances for Z direction, for ES-P01B4

Full Spectrum

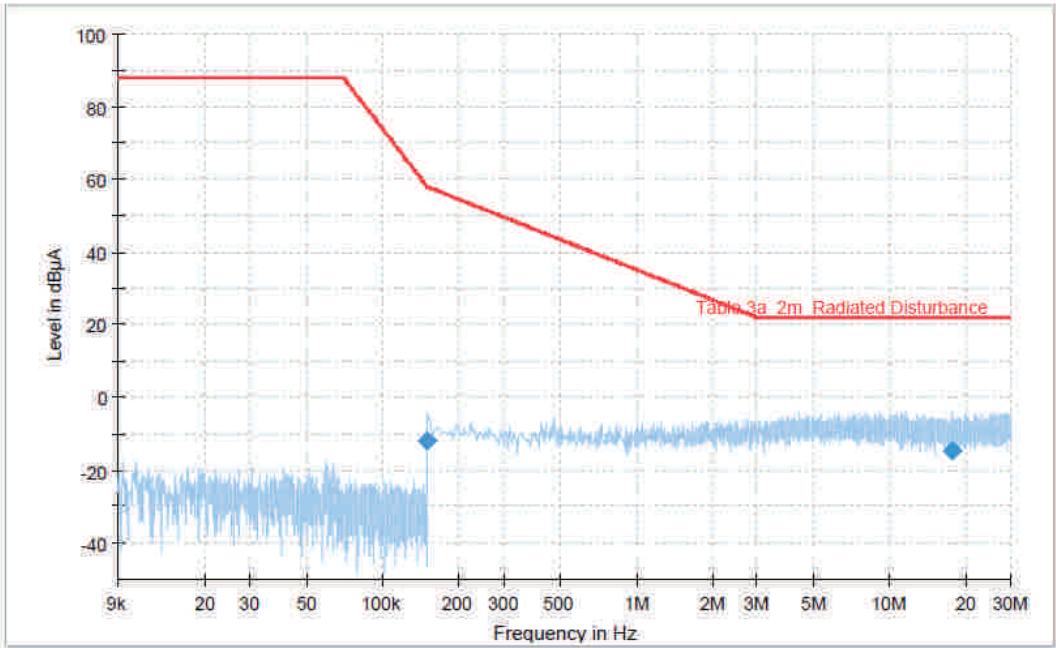


Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAverage (dBµA)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.186000	-11.88	---	55.42	67.30	1000.0	9.000	Z	0.1
0.962000	-15.65	---	35.67	51.32	1000.0	9.000	Z	0.1

Figure 33: Graphic description of radiated electromagnetic disturbances for X direction, for ES-P01P4

Full Spectrum

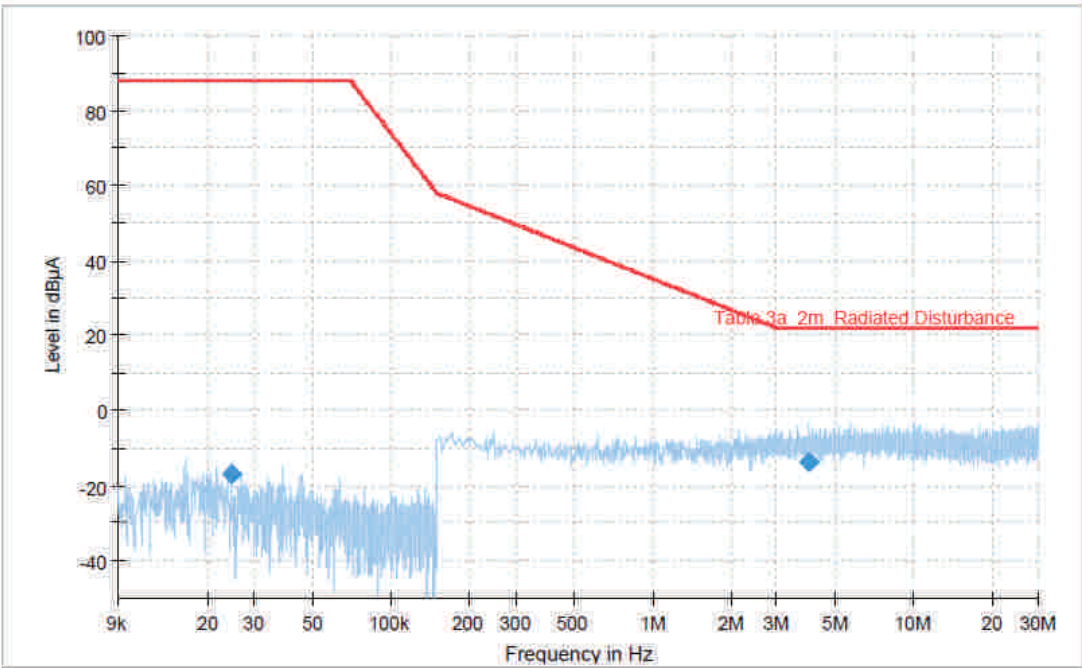


Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAverage (dBµA)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.150000	-11.88	---	58.00	69.88	1000.0	9.000	X	0.1
17.522000	-14.48	---	22.00	36.48	1000.0	9.000	X	0.1

Figure 34: Graphic description of radiated electromagnetic disturbances for Y direction, for ES-P01P4

Full Spectrum

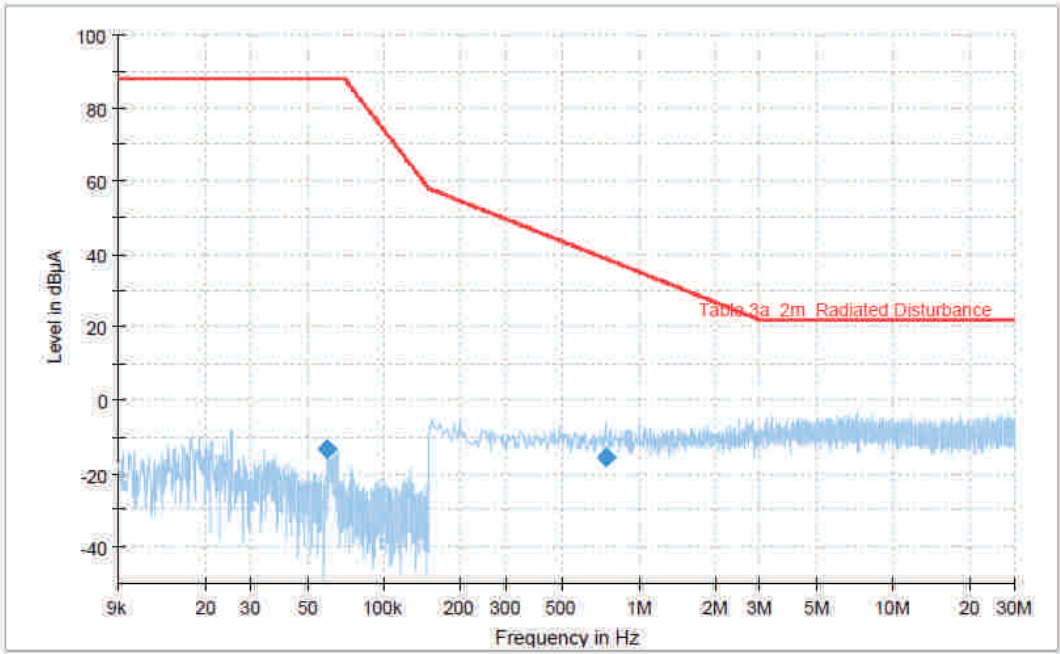


Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAverage (dBµA)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.024520	-16.79	---	88.00	104.79	1000.0	0.200	Y	0.1
3.982000	-13.82	---	22.00	35.82	1000.0	9.000	Y	0.1

Figure 35: Graphic description of radiated electromagnetic disturbances for Z direction, for ES-P01P4

Full Spectrum



Final Result

Frequency (MHz)	QuasiPeak (dBµA)	CAverage (dBµA)	Limit (dBµA)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Axis	Corr. (dB)
0.059960	-13.36	---	88.00	101.36	1000.0	0.200	Z	0.1
0.742000	-15.65	---	38.79	54.44	1000.0	9.000	Z	0.1

4.2 Emission in the Frequency Range above 30 MHz

4.2.1 Radiated disturbance

Result:	Pass
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Date of testing	:	2018.01.04-2018.01.05
Test procedure	:	EN 55015:2013+A1 & CISPR 32
Frequency range	:	30-300MHz
Kind of test site	:	Semi-anechoic Chamber
Measurement Distance	:	3m
Polarization of Antenna	:	Both horizontal and vertical
Limit	:	EN 55015:2013+A1 Clause 4 Table3b

Quasi-peak limits (3m test distance):
30-230MHz, 40dB μ V/m;
230-300MHz, 47dB μ V/m

Test Setup

Input voltage	:	AC 230V, 50Hz
Operational mode	:	ON
Temperature	:	23°C
Relative humidity	:	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.

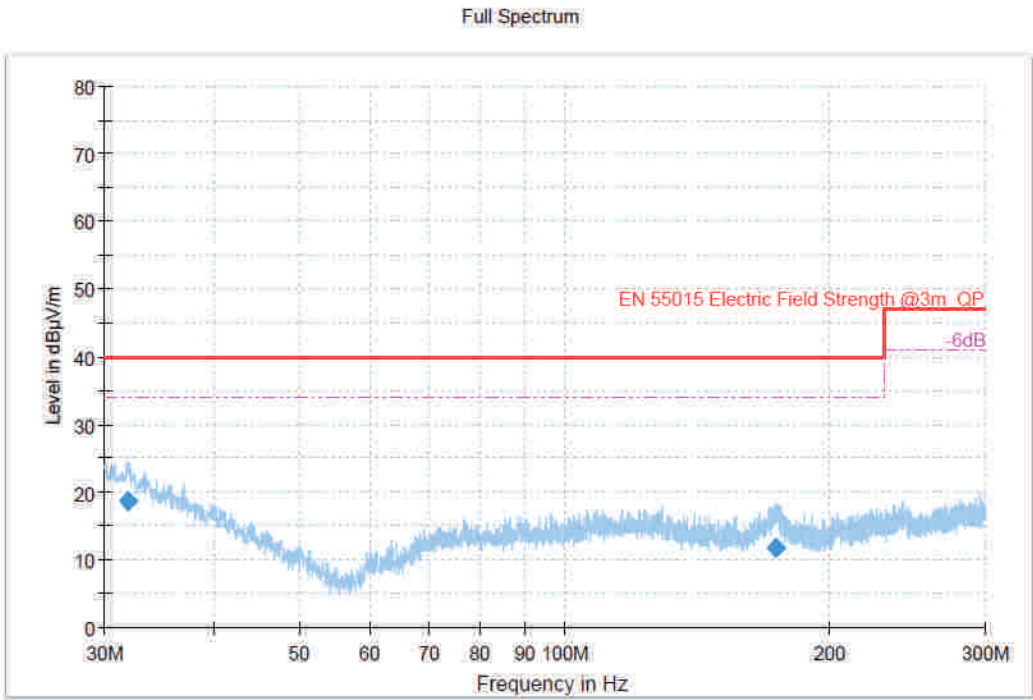
The Conducted RF emission test was performed in a shielding room with a CDN FCC-801-M2/M3-16A. The EUT is placed on one non-conducting block with a height of (10 $\pm$ 0.2) cm which in turn are placed on an earthed metal plate with dimensions at least 20 cm larger than the lighting equipment.

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.

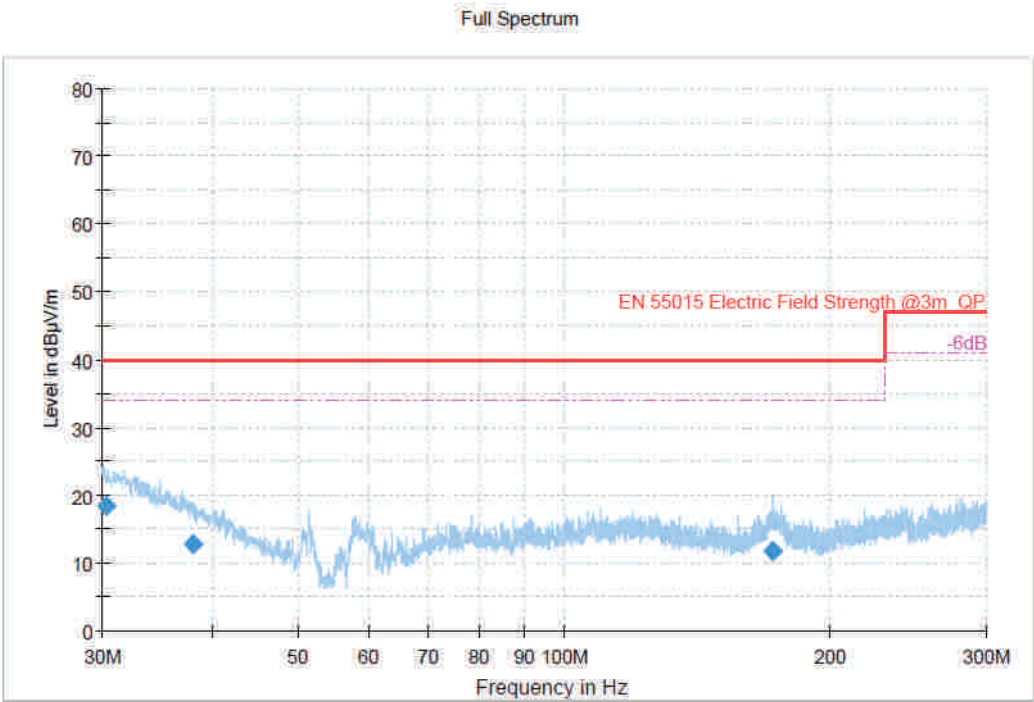
Figure 36: Spectral Diagrams, Radiated disturbance, horizontal, for ES-P01E



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.825000	18.71	40.00	21.29	1000.0	120.000	133.0	H	193.0	17.8
173.880000	11.80	40.00	28.20	1000.0	120.000	260.0	H	212.0	12.5

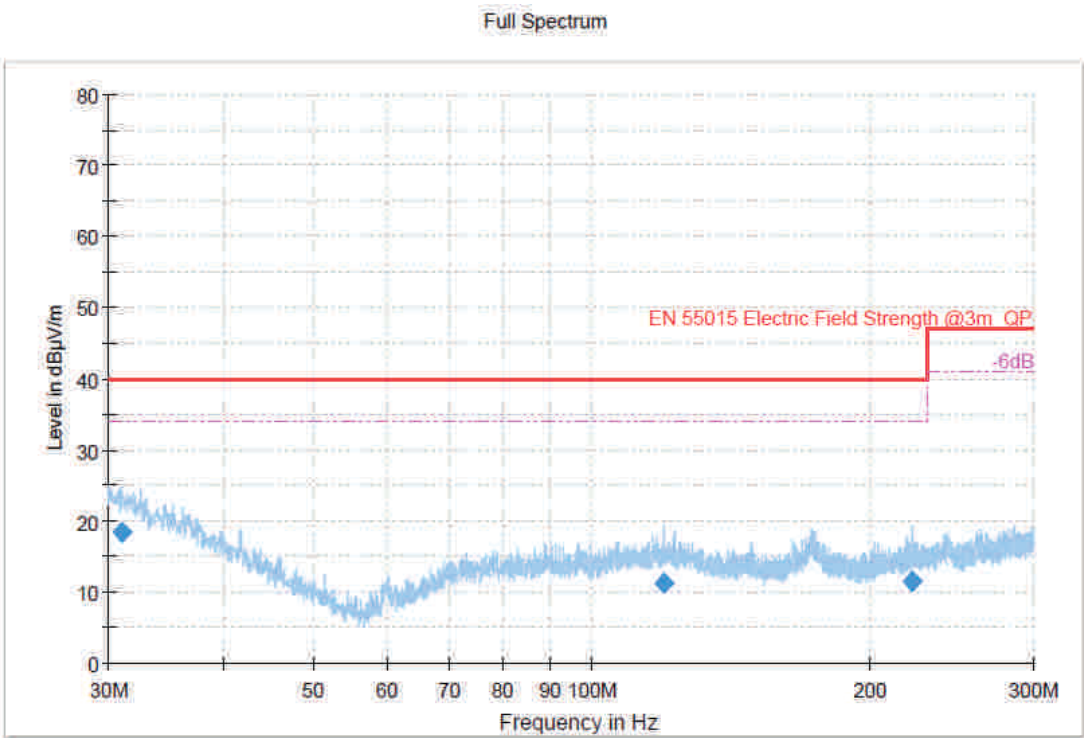
Figure 37: Spectral Diagrams, Radiated disturbance, vertical, for ES-P01E



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.320000	18.35	40.00	21.65	1000.0	120.000	289.0	V	318.0	18.6
37.950000	12.75	40.00	27.25	1000.0	120.000	123.0	V	129.0	14.6
172.300000	11.63	40.00	28.37	1000.0	120.000	176.0	V	250.0	12.3

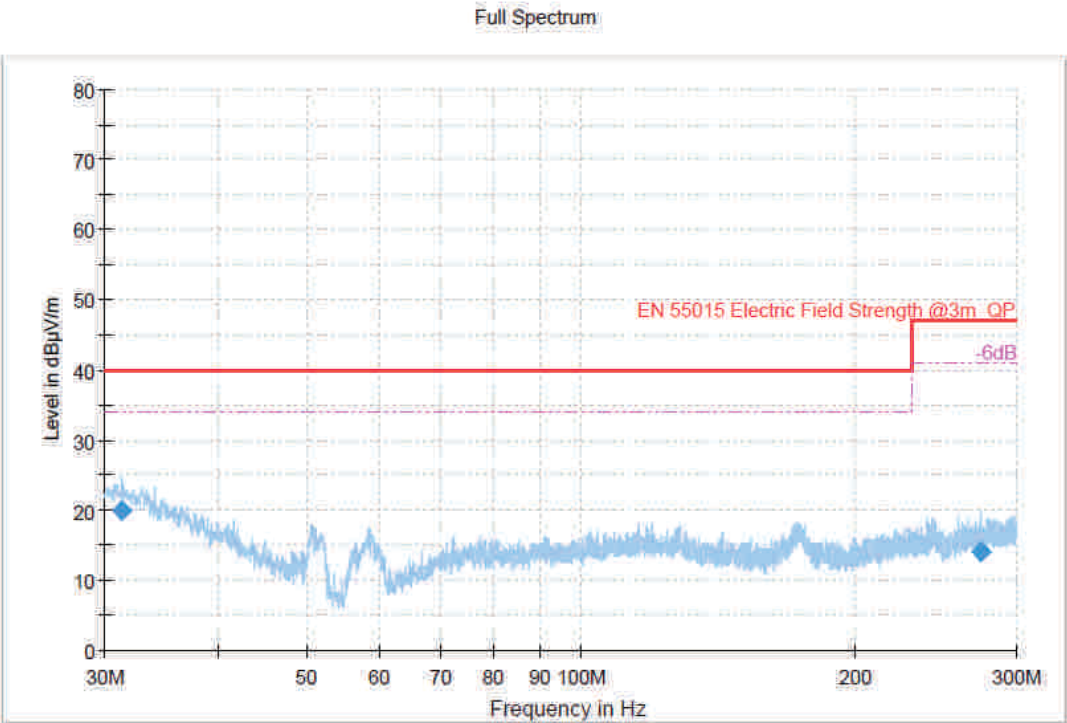
Figure 38: Spectral Diagrams, Radiated disturbance, horizontal, for ES-P01MK-104



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.945000	18.31	40.00	21.69	1000.0	120.000	100.0	H	163.0	18.7
119.415000	11.26	40.00	28.74	1000.0	120.000	400.0	H	48.0	11.5
221.995000	11.61	40.00	28.39	1000.0	120.000	363.0	H	8.0	9.8

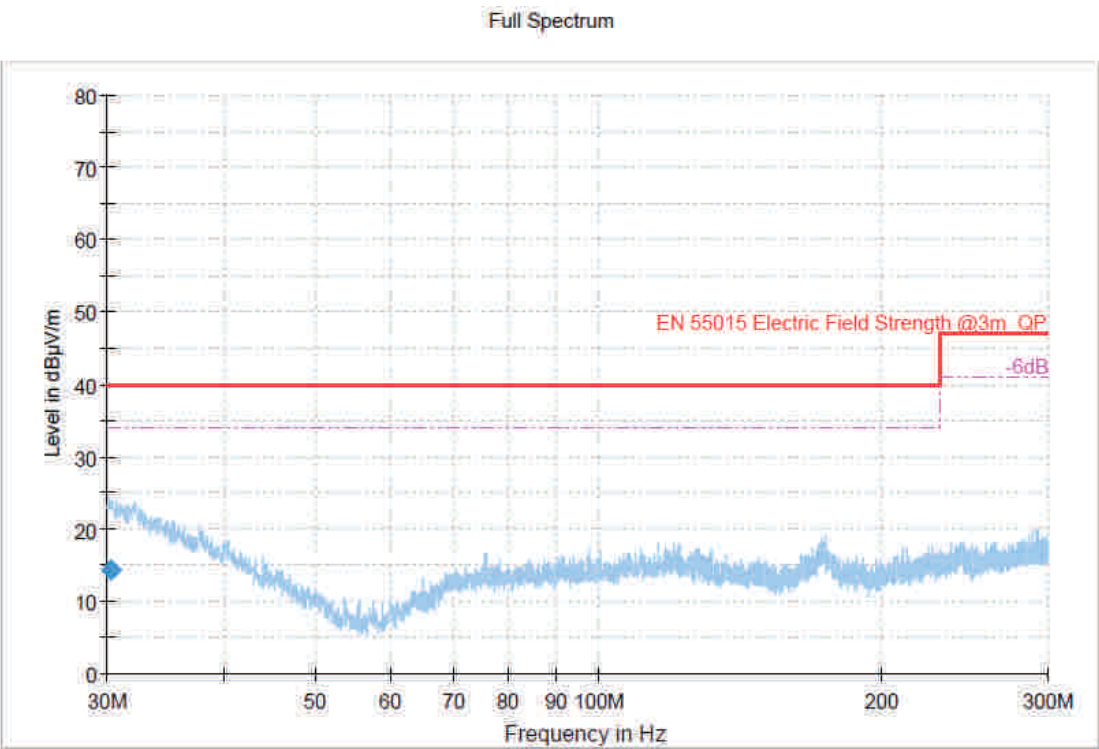
Figure 39: Spectral Diagrams, Radiated disturbance, vertical, for ES-P01MK-104



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.355000	19.90	40.00	20.10	1000.0	120.000	239.0	V	15.0	18.1
273.695000	13.93	47.00	23.07	1000.0	120.000	400.0	V	178.0	11.7

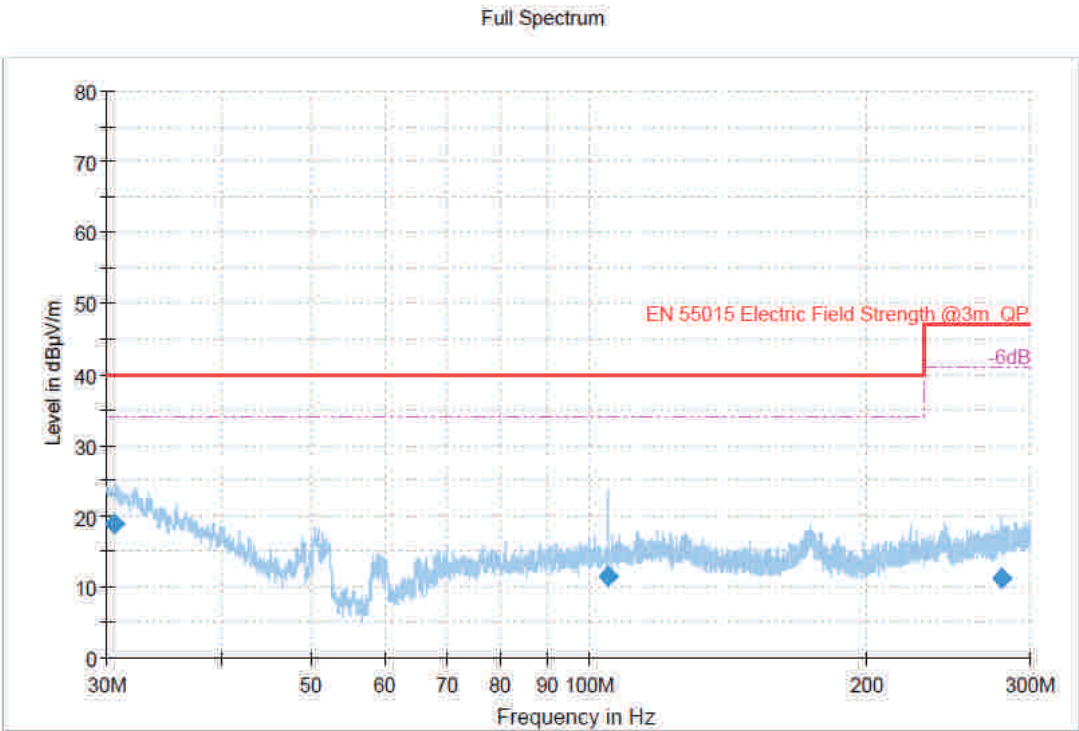
Figure 40: Spectral Diagrams, Radiated disturbance, horizontal, for ES-P01SD



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.280000	14.36	40.00	25.64	1000.0	120.000	114.0	H	75.0	18.6

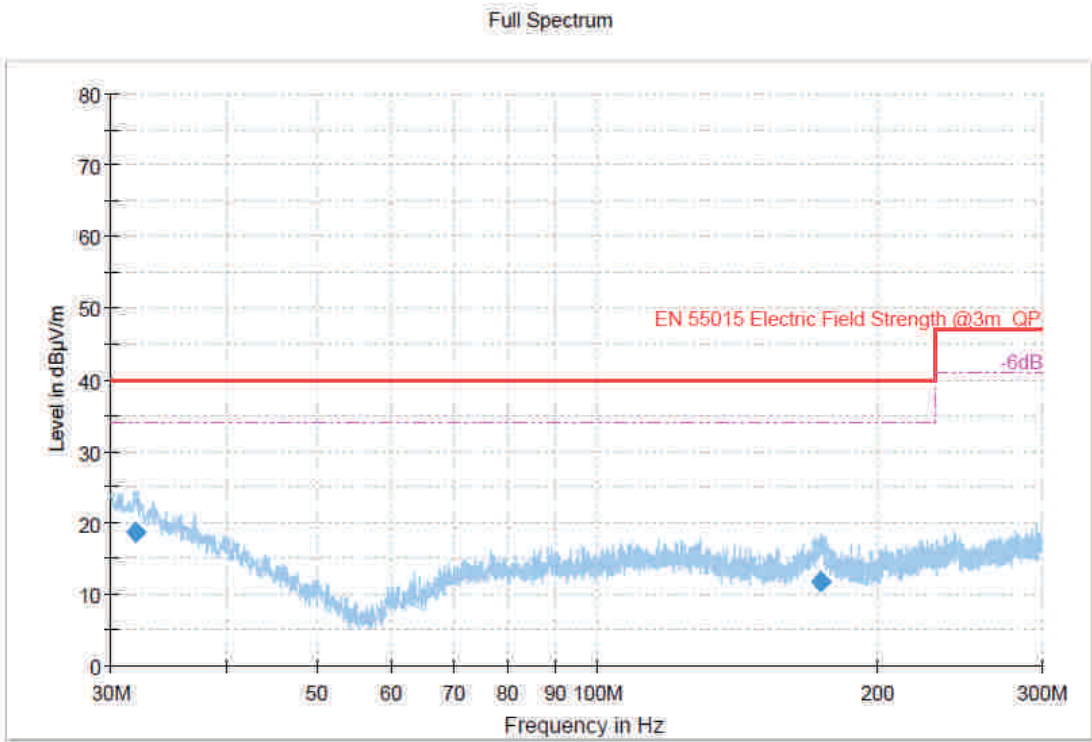
Figure 41: Spectral Diagrams, Radiated disturbance, vertical, for ES-P01SD



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.515000	19.00	40.00	20.00	1000.0	120.000	114.0	V	179.0	18.5
104.775000	11.56	40.00	28.44	1000.0	120.000	180.0	V	-15.0	10.6
278.935000	11.18	47.00	35.82	1000.0	120.000	342.0	V	9.0	11.9

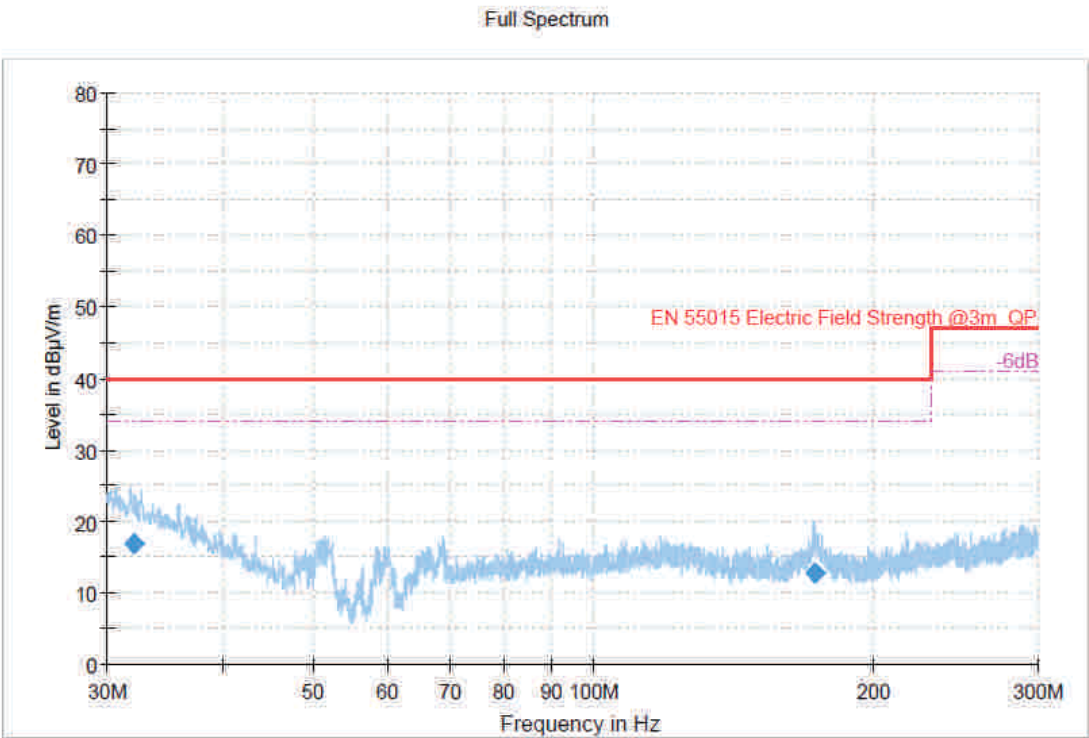
Figure 42: Spectral Diagrams, Radiated disturbance, horizontal, for ES-P01C-94



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.885000	14.17	40.00	25.83	1000.0	120.000	254.0	H	262.0	18.3
174.290000	8.68	40.00	31.32	1000.0	120.000	139.0	H	297.0	12.3

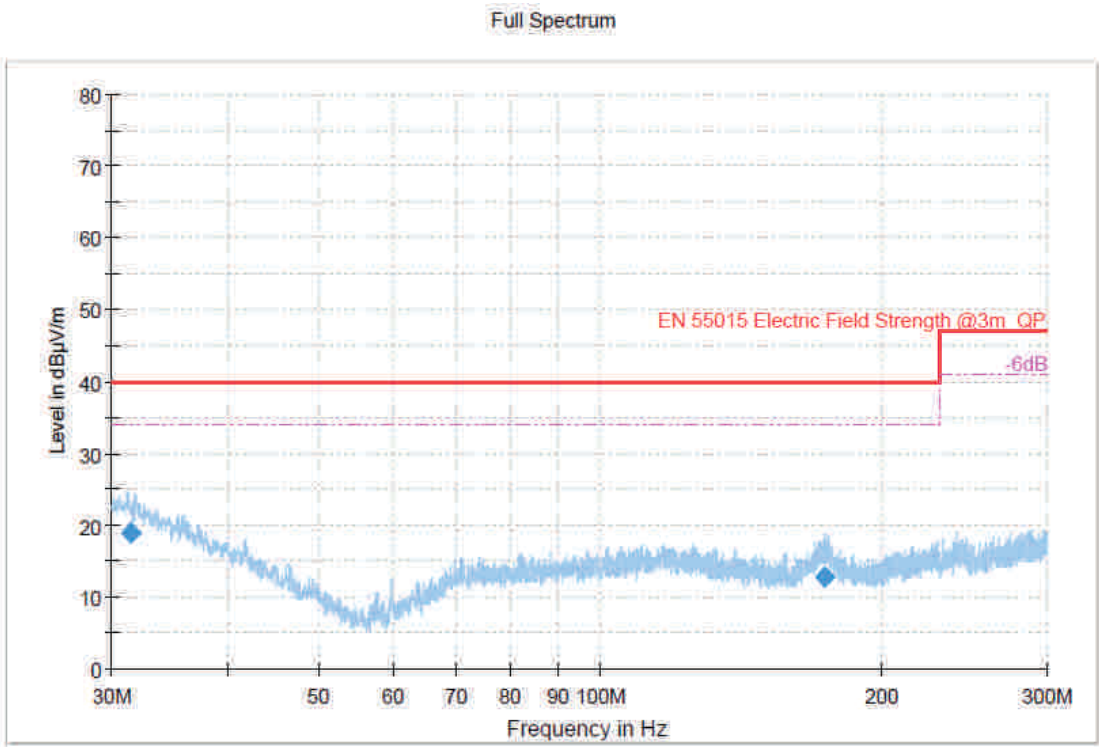
Figure 43: Spectral Diagrams, Radiated disturbance, vertical, for ES-P01C-94



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.980000	16.77	40.00	23.23	1000.0	120.000	373.0	V	295.0	17.8
172.340000	12.68	40.00	27.32	1000.0	120.000	376.0	V	236.0	12.3

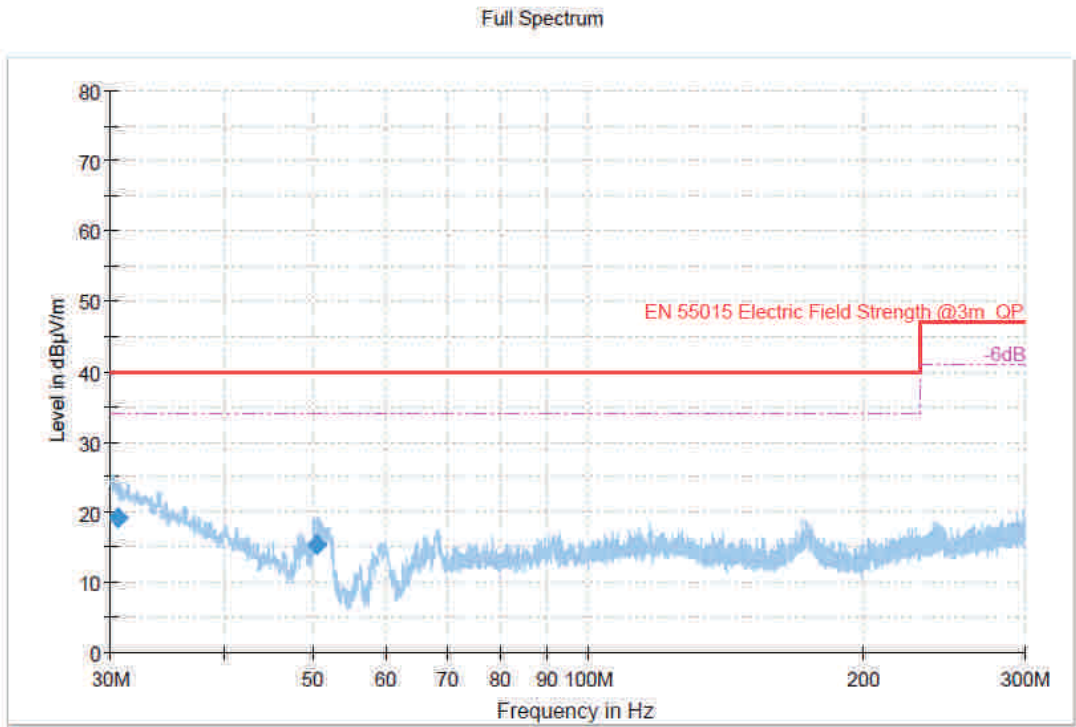
Figure 44: Spectral Diagrams, Radiated disturbance, horizontal, for ES-P01K-104



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.505000	18.97	40.00	21.03	1000.0	120.000	389.0	H	342.0	18.0
173.565000	12.89	40.00	27.11	1000.0	120.000	364.0	H	186.0	12.5

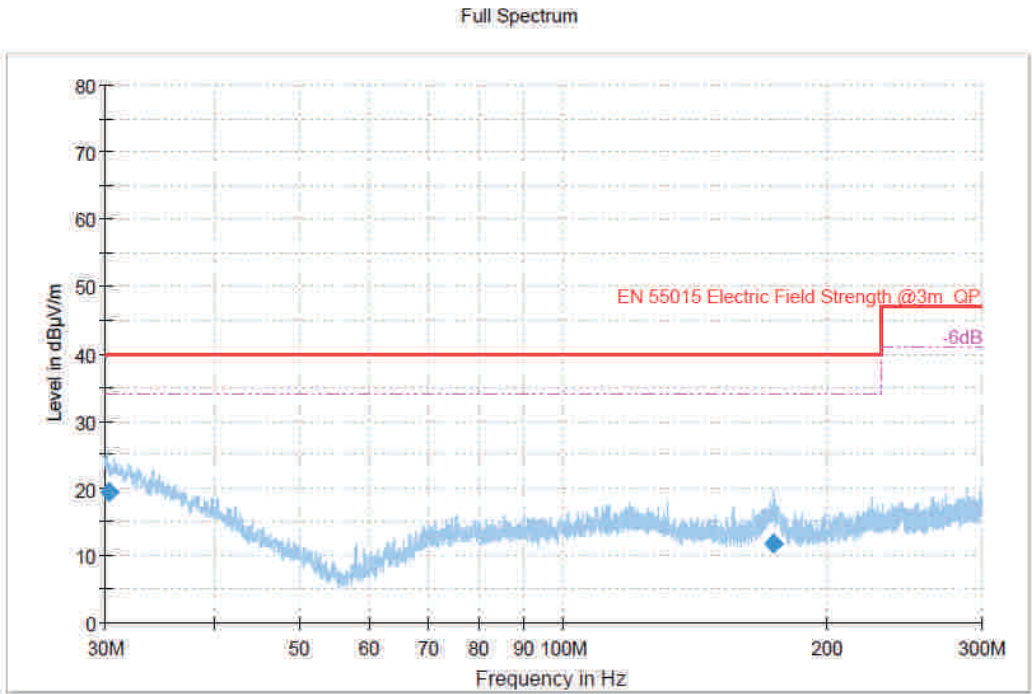
Figure 45: Spectral Diagrams, Radiated disturbance, vertical, for ES-P01K-104



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.575000	19.22	40.00	20.78	1000.0	120.000	386.0	V	141.0	18.5
50.515000	15.38	40.00	24.62	1000.0	120.000	100.0	V	105.0	6.4

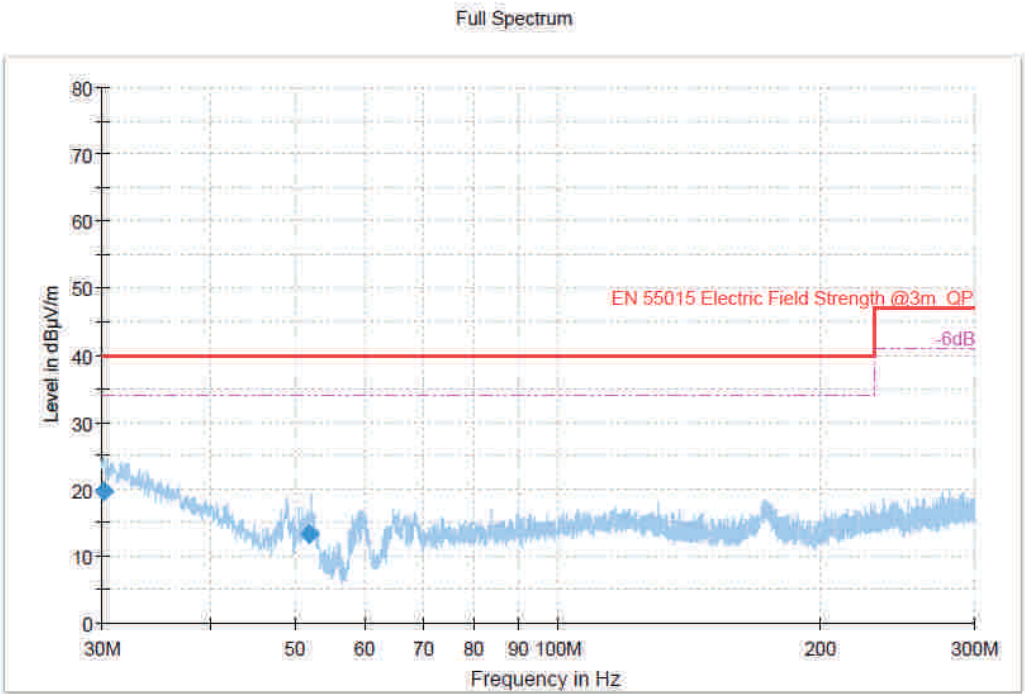
Figure 46: Spectral Diagrams, Radiated disturbance, horizontal, for ES-P01B4



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.280000	19.33	40.00	21.67	1000.0	120.000	385.0	H	330.0	18.6
173.580000	11.87	40.00	29.13	1000.0	120.000	250.0	H	40.0	12.5

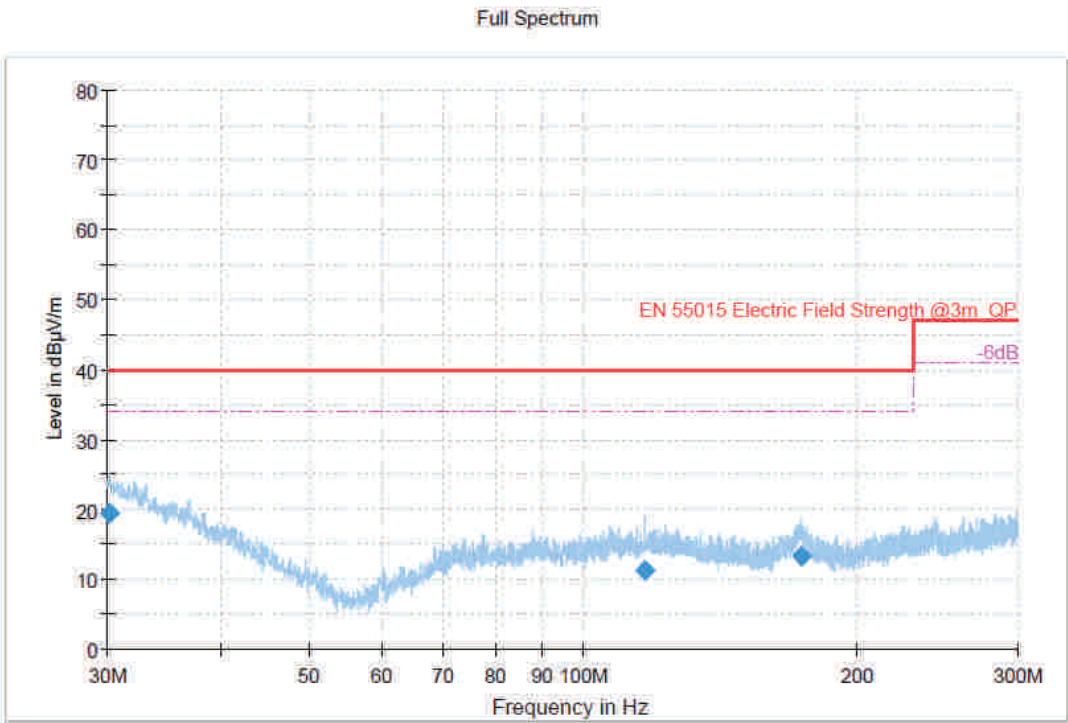
Figure 47: Spectral Diagrams, Radiated disturbance, vertical, for ES-P01B4



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.160000	19.62	40.00	20.38	1000.0	120.000	100.0	V	155.0	18.7
51.890000	13.38	40.00	26.62	1000.0	120.000	100.0	V	282.0	5.5

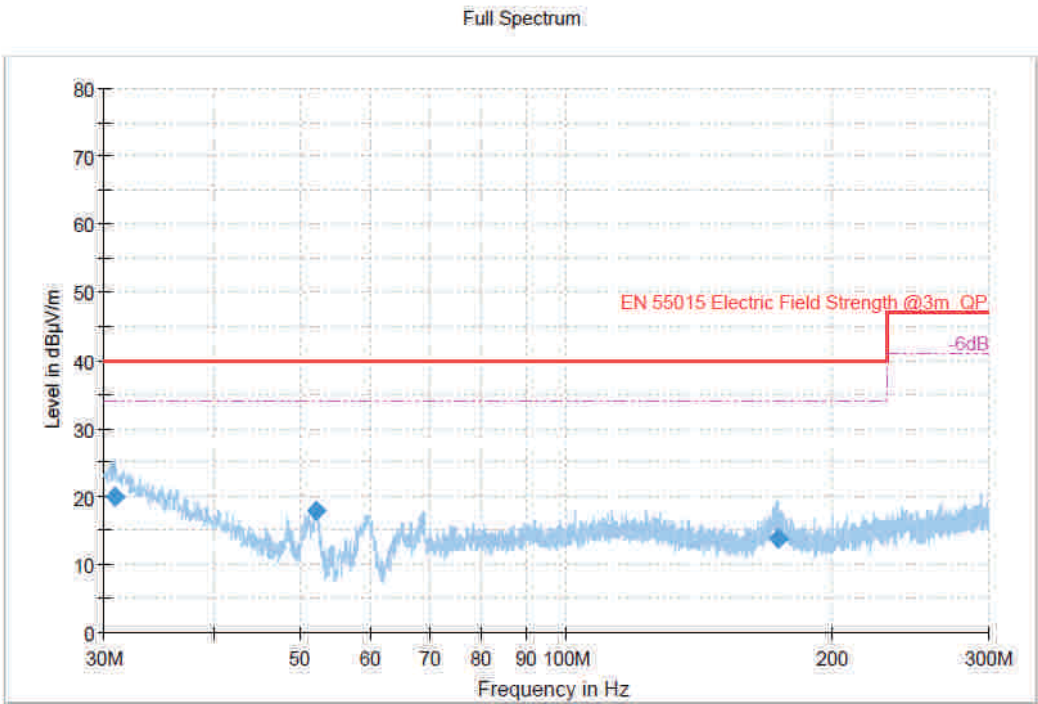
Figure 48: Spectral Diagrams, Radiated disturbance, horizontal, for ES-P01P4



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.120000	19.31	40.00	20.69	1000.0	120.000	400.0	H	218.0	18.7
116.745000	11.37	40.00	28.63	1000.0	120.000	245.0	H	248.0	11.5
173.190000	13.37	40.00	26.63	1000.0	120.000	245.0	H	248.0	11.5

Figure 49: Spectral Diagrams, Radiated disturbance, vertical, for ES-P01P4



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.900000	19.91	40.00	20.09	1000.0	120.000	367.0	V	153.0	18.1
51.990000	17.91	40.00	22.09	1000.0	120.000	367.0	V	153.0	18.1
173.525000	13.78	40.00	26.22	1000.0	120.000	344.0	V	4.0	12.5

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: 2017.12.15-2019.01.09

Room temperature: 15-25°C

Relative Humidity: 50-59%

5.1 Enclosure

5.1.1 Electrostatic Discharge

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

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 : $\pm 4.0\text{kV}$ (Conducted Discharge)
 $\pm 8.0\text{kV}$ (Air Discharge)

Polarity : positive / negative

Number of discharges : >10

Performance criteria	: B
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Table 2: ESD, Positive / Negative Polarity

Position	Kind of Discharge	Remarks	Result
Nonmetal enclosure	Air discharge $\pm 8\text{kV}$	No change of luminous intensity	Pass
Button	Air discharge $\pm 8\text{kV}$	No change of luminous intensity	Pass
Coupling plane (Both HCP and VCP)	Contact discharge $\pm 4\text{kV}$	No change of luminous intensity	Pass

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5.1.2 Radio Frequency Electromagnetic Field

Result:	Pass
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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 3: 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

5.2 Input and Output AC Power Ports

5.2.1 Fast Transients on Input and Output AC Power Lines

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

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	: $\pm 1\text{kV}$
Polarity	: negative/positive
Repetition frequency	: 5kHz
Test duration	: $\geq 120\text{sec}$
Tr/Tn	: 5ns/50ns
Severity level	: 2
Performance criteria	: B

Table 4: Burst, Input AC Power lines, Positive/Negative Polarity for ES-P01E

Coupling Method: Direct Injection		
Coupling Port	Test Voltage / Result	Remark
AC mains: L1 (L), L2 (N), PE	$\pm 1000\text{V}$ Pass	No change of luminous intensity

Table 5: Burst, Input AC Power lines, Positive/Negative Polarity for other models

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

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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 6: Injected current, AC Power lines for model ES-P01E

Coupling Port	Coupling Method:	Result	Remark
AC mains: L1 (L), L2 (N), PE	CDN M-3	Pass	No change of luminous intensity

Table 7: Injected current, AC Power lines for other models

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

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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 $\pm 0.5\text{kV}$, $\pm 1\text{kV}$
phase to PE $\pm 0.5\text{kV}$, $\pm 1\text{kV}$, 2kV
neutral to PE $\pm 0.5\text{kV}$, $\pm 1\text{kV}$, 2kV
Tr/Tn : $1.2/50\mu\text{s}$ (open-circuit voltage)
 $8/20\mu\text{s}$ (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 8: Surges to AC Power lines, positive/negative for model ES-P01E

Line	Tested Voltage/coupling phase	Observation	Result
Phase to neutral	$+0.5\text{kV}$, $+1.0\text{kV}$, $+\pi/2$ (5 times)	No change of luminous intensity	Pass
	-0.5kV , -1.0kV , $-\pi/2$ (5 times)		Pass
phase to PE	$+0.5\text{kV}$, $+1.0\text{kV}$, $+2.0\text{kV}$, $+\pi/2$ (5 times)	No change of luminous intensity	Pass
	-0.5kV , -1.0kV , -2.0kV , $-\pi/2$ (5 times)		Pass
neutral to PE	$+0.5\text{kV}$, $+1.0\text{kV}$, $+2.0\text{kV}$, $+\pi/2$ (5 times)	No change of luminous intensity	Pass
	-0.5kV , -1.0kV , -2.0kV , $-\pi/2$ (5 times)		Pass

Table 9: Surges to AC Power lines, positive/negative for other models

Line	Tested Voltage/coupling phase	Observation	Result
Phase to neutral	$+0.5\text{kV}$, $+1.0\text{kV}$, $+\pi/2$ (5 times)	No change of luminous intensity	Pass
	-0.5kV , -1.0kV , $-\pi/2$ (5 times)		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 10: Test condition and Test result for Voltage Dips

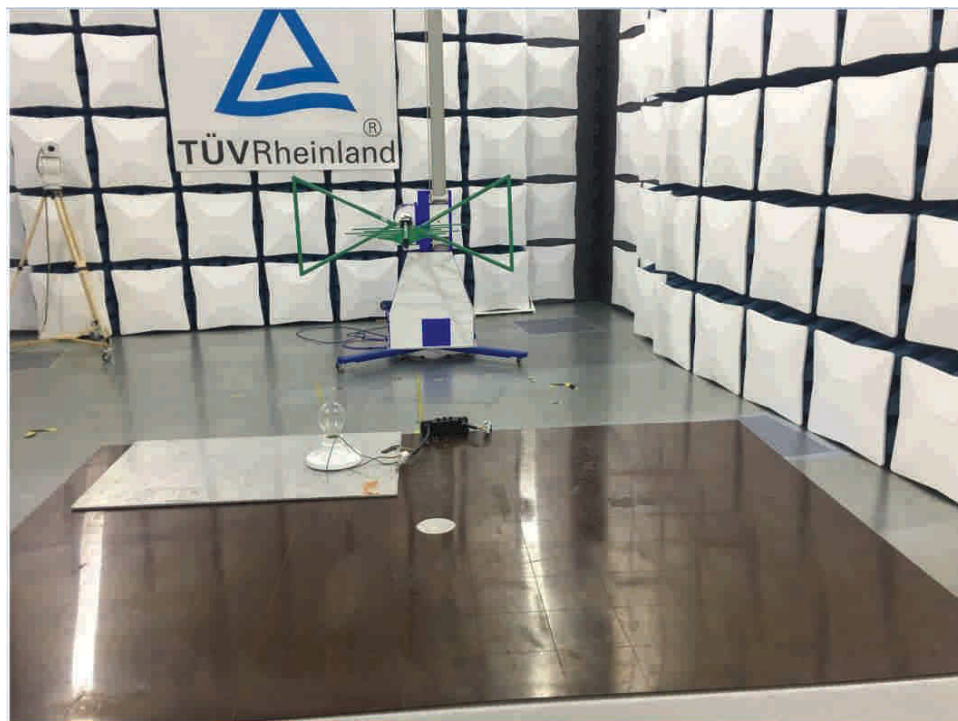
Environmental Phenomena	Test level (in % UT)	Duration (in period of the rated frequency)	Performance criteria	Result
Interruptions	0	0.5 (10ms)	B	Pass
Voltage dips (in % UT) 30	70	10 (200ms)	C	Pass

6 Photographs of the Test Set-Up

Photograph 1: Set-up for Conducted Emission



Photograph 2: Set-up for Radiated Emission



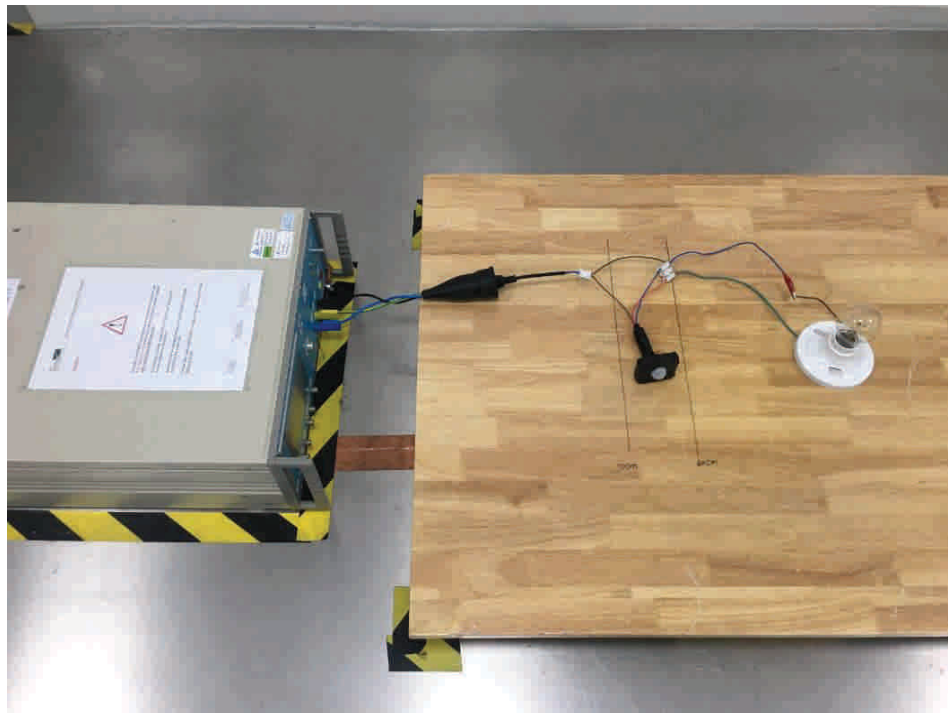
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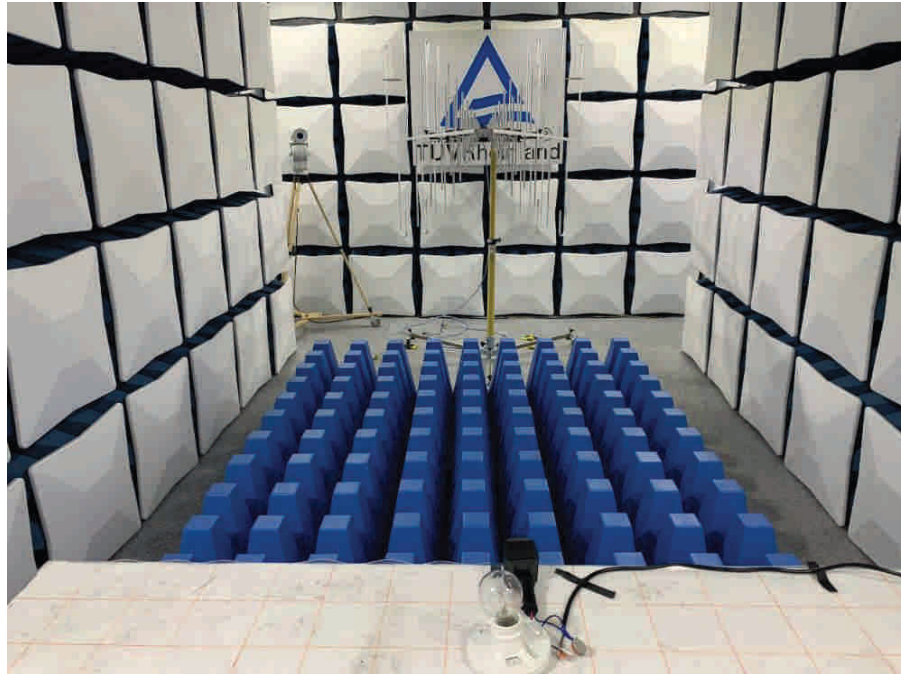
Photograph 3: Set-up for Electrostatic Discharge



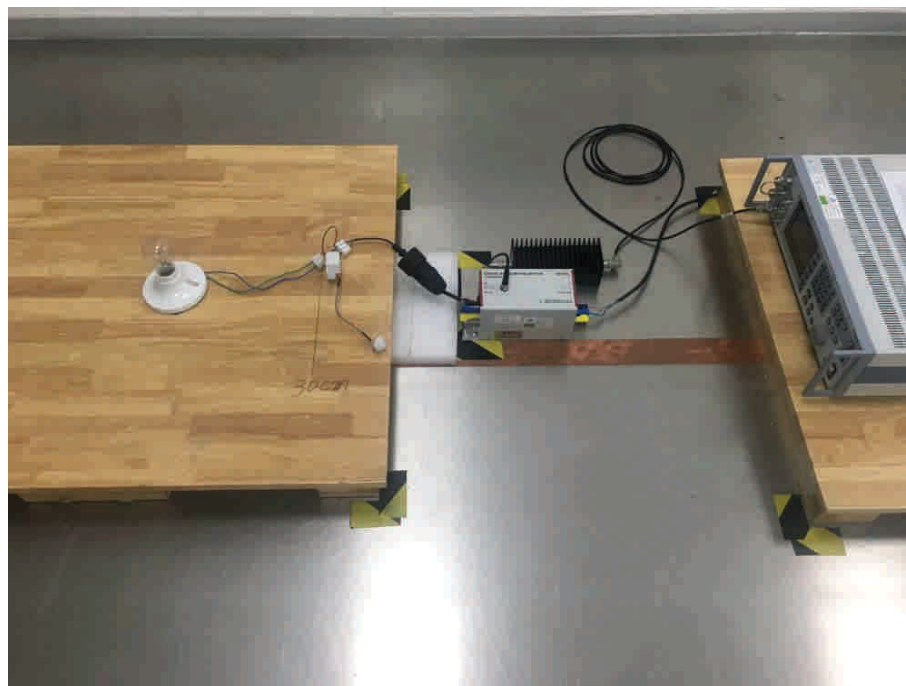
Photograph 4: Set-up for Fast Transient Burst, Surges and Voltage Dips



Photograph 5: Set-up for Radiated Susceptibility



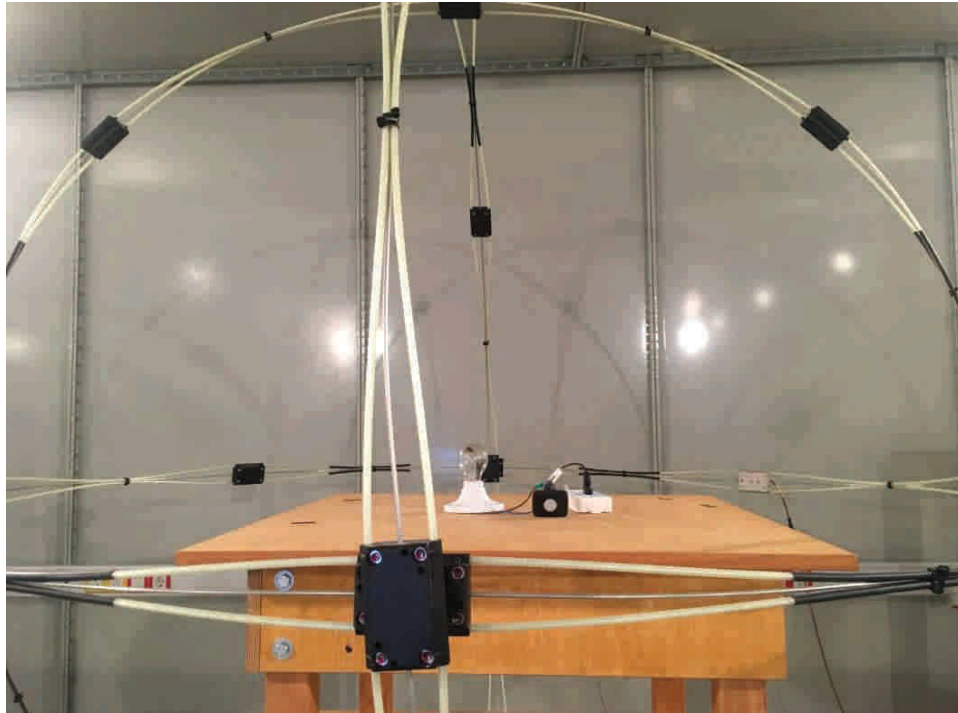
Photograph 6: Set-up for Injected Current



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