



FCC PART 15B
MEASUREMENT AND TEST REPORT

For

Communication Networks LLC

3 Corporate Drive, DANBURY, Connecticut, United States

FCC ID: 2ANZ6NW10

Report Type: Original Report	Product Type: Wireless AP
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Report Number: RKS170721003-00C	
Report Date: 2017-12-01	
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TABLE OF CONTENTS

GENERAL INFORMATION.....	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
OBJECTIVE	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST METHODOLOGY	3
TEST FACILITY	4
SYSTEM TEST CONFIGURATION.....	5
JUSTIFICATION	5
EUT EXERCISE SOFTWARE	5
SPECIAL ACCESSORIES.....	5
EQUIPMENT MODIFICATIONS	5
SUPPORT EQUIPMENT LIST AND DETAILS	5
EXTERNAL I/O CABLE.....	5
BLOCK DIAGRAM OF CONDUCTED EMISSIONS AND RADIATED EMISSIONS TEST SETUP	6
SUMMARY OF TEST RESULTS.....	8
FCC §15.107 –CONDUCTED EMISSIONS	9
APPLICABLE STANDARD	9
MEASUREMENT UNCERTAINTY	9
EUT SETUP	9
EMI TEST RECEIVER SETUP.....	10
TEST PROCEDURE	10
TEST EQUIPMENT LIST AND DETAILS.....	10
CORRECTED FACTOR & MARGIN CALCULATION	10
TEST DATA	11
FCC §15.109 - RADIATED EMISSIONS	17
APPLICABLE STANDARD	17
MEASUREMENT UNCERTAINTY.....	17
EUT SETUP	17
EMI TEST RECEIVER SETUP.....	18
TEST PROCEDURE	18
TEST EQUIPMENT LIST AND DETAILS.....	19
CORRECTED AMPLITUDE & MARGIN CALCULATION	19
TEST DATA	20

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Communication Networks LLC
Model	NW10
Series Model	NW10IN, NW10/M
Product	Wireless AP
Rate Voltage	DC 48-56V from POE
Dimension	45 mm(L)*15 mm(W)*35 mm(H)

POE Information:

Model: PSE801G

Input: AC100-240 V 50/60Hz

Output: DC48-56V

Note: The product's series model number: NW10IN, NW10/M. The difference between them was explained in the attached declaration letter, and we test them all.

** All measurement and test data in this report was gathered from production sample serial number: 20170721001. (Assigned by BACL, Kunshan). The EUT supplied by the applicant was received on 2017-07-21.*

Objective

This report is prepared on behalf of Communication Networks LLC in accordance with Part 2-Subpart J, and Part 15-Subparts A and B of the Federal Communication Commission's rules.

The objective of the manufacturer is to determine the compliance of EUT with FCC Part 15, Class B.

Related Submittal(s)/Grant(s)

FCC Part 15.407 NII and Part 90 TNB submission with FCC ID: 2ANZ6NW10.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road,Kunshan,Jiangsu province,China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

Test mode 1: RJ45 Data Transmission- NW10

Test mode 2: RJ45 Data Transmission- NW10IN

Test mode 3: RJ45 Data Transmission- NW10/M

EUT Exercise Software

Notebook executive “My Win” present “H” pattern on the monitor.
Data transfer with server.

Special Accessories

No special accessory was used.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Notebook	E6410	3094742521
Logitech	Keyboard	Y-U0009	1648MG010PW8
Logitech	Mouse	M-U0026	HS529HB
View Sonic	Monitor	VLCD523895-3W	/

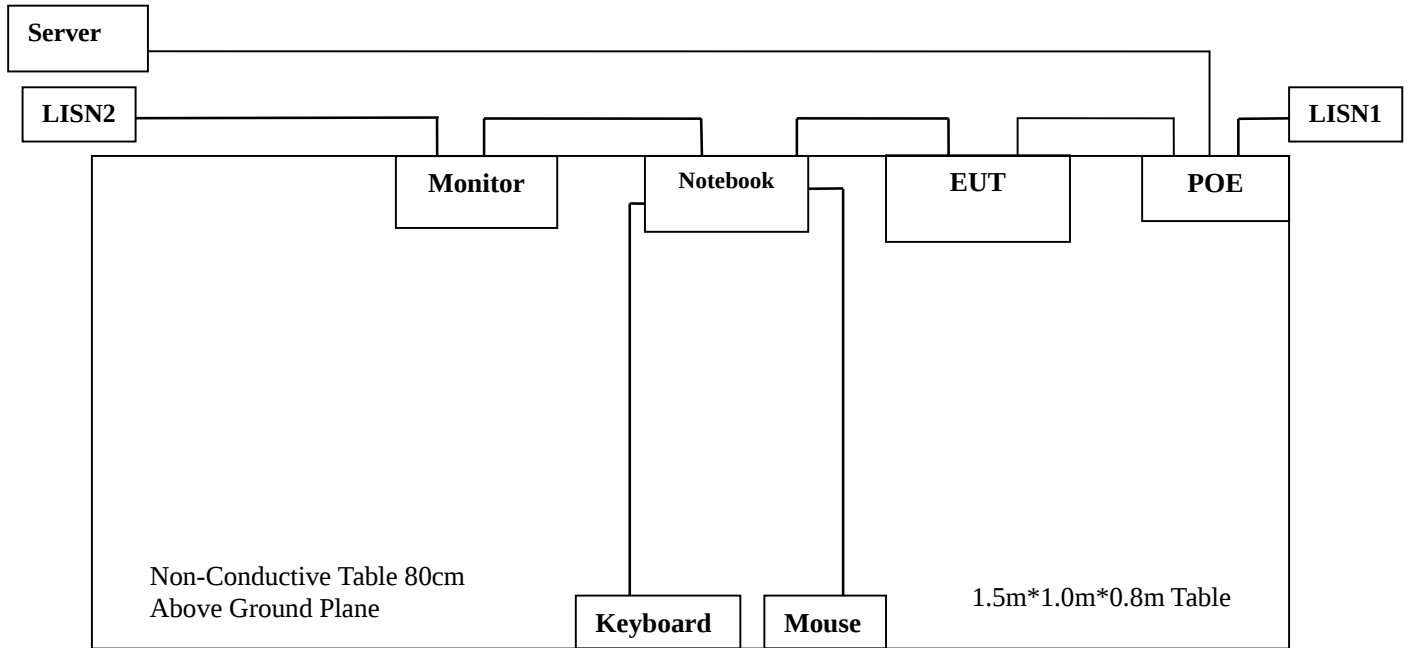
External I/O Cable

Cable Description	Length (m)	Shielding	From/Port	To
RJ45 Cable	1.0	No	EUT	POE
VGA Cable	1.5	Yes	Notebook	Monitor
RJ45 Cable	10.0	No	POE	Server
RJ45 Cable	0.8	No	Notebook	EUT
Keyboard USB Cable	1.5	No	Notebook	Keyboard
Mouse USB Cable	1.5	No	Notebook	Mouse
Power Cable	1.5	No	Monitor	LISN2
Power Cable	1.5	No	POE	LISN1

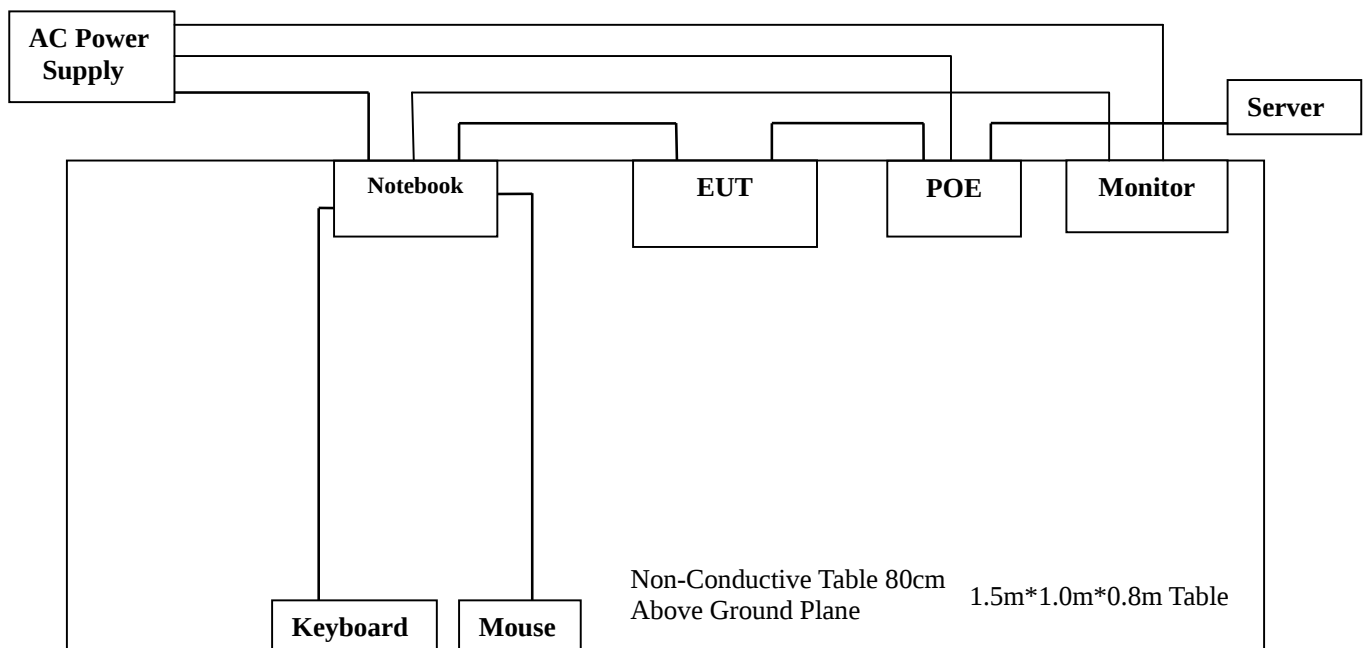
Block Diagram of Conducted Emissions and Radiated Emissions Test Setup

Conducted Emissions of test Setup

Test mode1& Test mode2

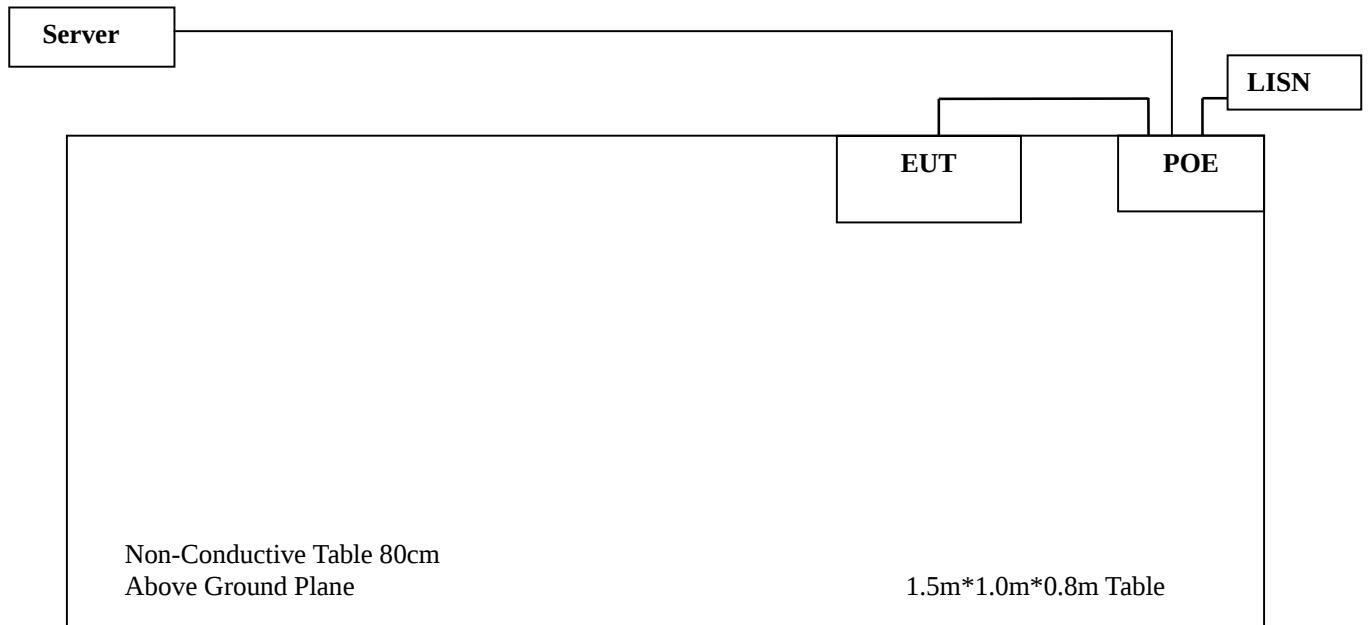


Radiated Emissions of test Setup

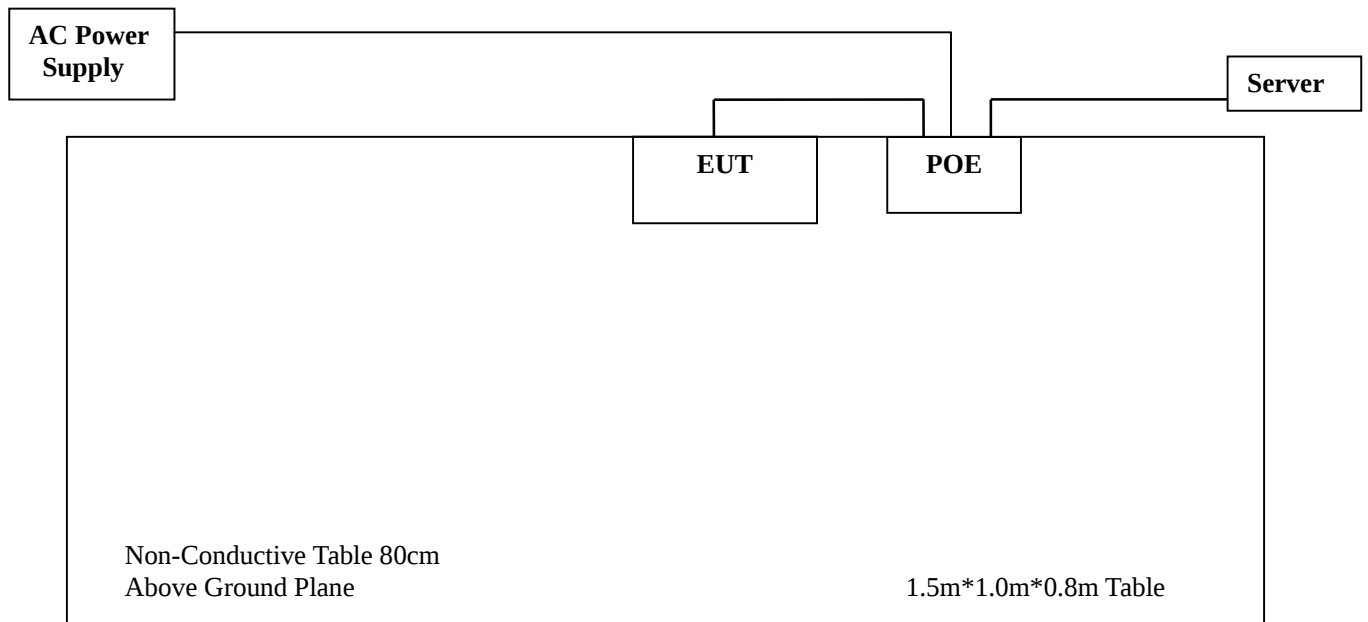


Conducted Emissions of test Setup

Test mode3



Radiated Emissions of test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.107	Conducted Emissions	Compliance
§15.109	Radiated Emissions	Compliance

FCC §15.107 –CONDUCTED EMISSIONS

Applicable Standard

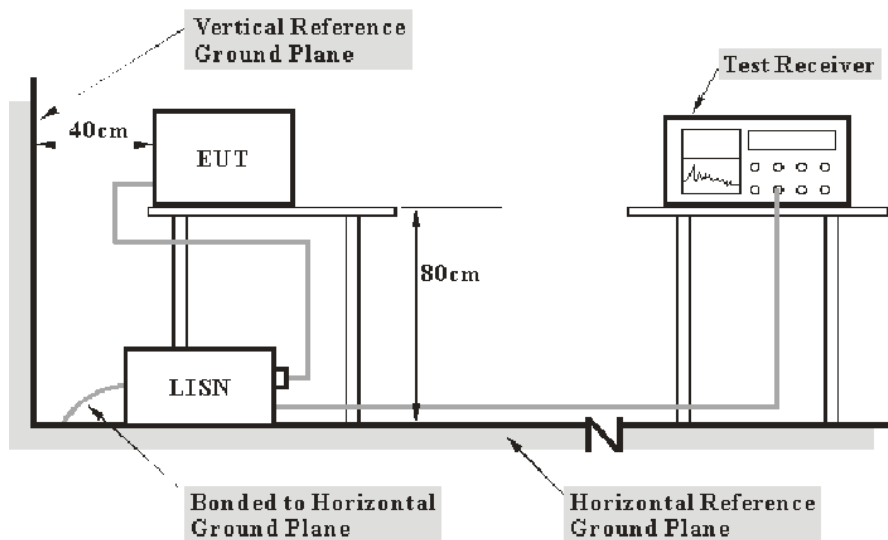
According to FCC§15.107

Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements may be receiver reading, attenuation of the connection between LISN and receiver, LISN voltage division factor, LISN VDF frequency interpolation and receiver related input quantities, etc.

Item		Measurement Uncertainty	U_{cispr}
AMN	150kHz~30MHz	3.19 dB	3.4 dB

EUT Setup



- Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The measurement procedure of EUT setup is according with ANSI C63.4-2014. The related limit was specified in FCC Part 15.107 Class B.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	834115/007	2017-11-12	2018-11-11
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2017-11-12	2018-11-11
ROHDE&SCHWARZ	LISN	ENV216	3560655016	2017-11-12	2018-11-11
Rohde & Schwarz	CE Test software	EMC 32	100357	--	--
MICRO-COAX	Coaxial Cable	Cable-6	006	2017-09-08	2018-09-07

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{VDF} + \text{Cable Loss}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Data**Environmental Conditions**

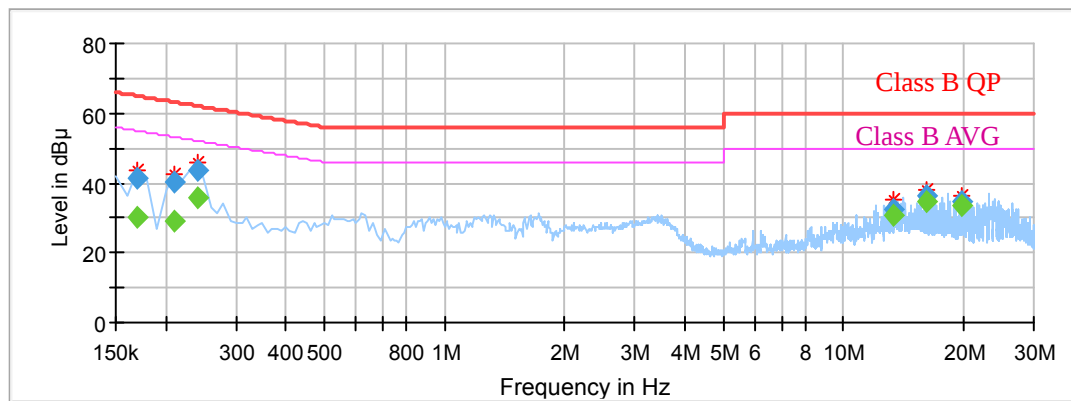
Temperature:	22
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Phil Zhu on 2017-12-06.

Test mode 1

Line

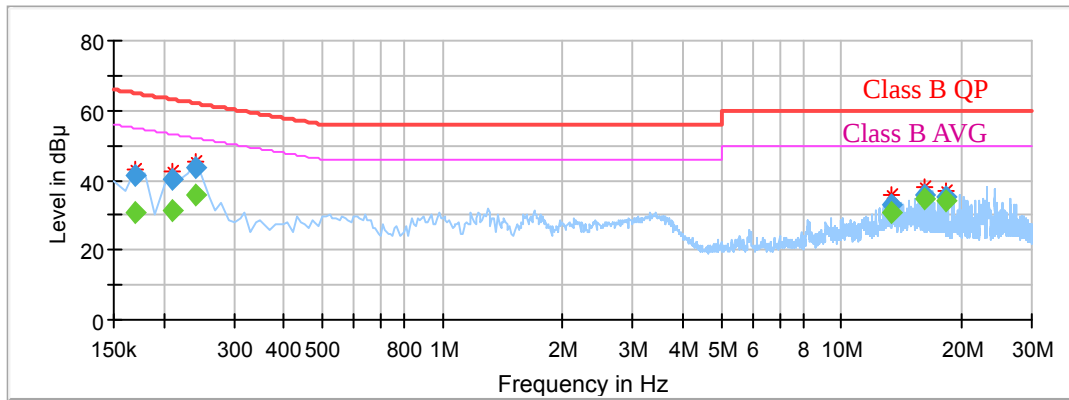
Full Spectrum



Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Line	Corr. (dB)
0.170000	41.67	---	64.96	23.29	L1	16.1
0.170000	---	30.15	54.96	24.81	L1	16.1
0.210000	40.52	---	63.21	22.69	L1	16.1
0.210000	---	28.87	53.21	24.34	L1	16.1
0.240000	43.43	---	62.10	18.67	L1	16.1
0.240000	---	36.03	52.10	16.07	L1	16.1
13.420000	32.72	---	60.00	27.28	L1	16.0
13.420000	---	30.63	50.00	19.37	L1	16.0
16.230000	36.11	---	60.00	23.89	L1	16.1
16.230000	---	34.96	50.00	15.04	L1	16.1
19.710000	---	33.56	50.00	16.44	L1	16.2
19.710000	34.79	---	60.00	25.21	L1	16.2

Neutral

Full Spectrum

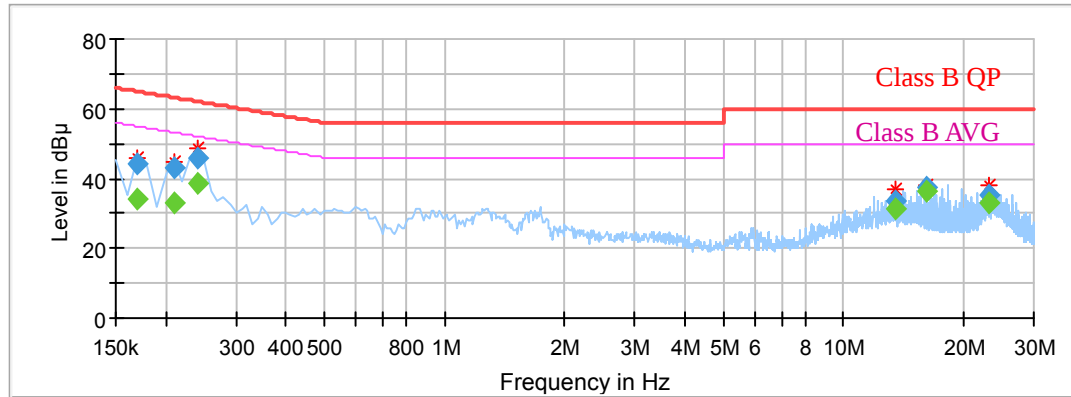


Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Line	Corr. (dB)
0.170000	---	30.49	54.96	24.47	N	16.1
0.170000	41.45	---	64.96	23.51	N	16.1
0.210000	---	31.22	53.21	21.99	N	16.1
0.210000	40.18	---	63.21	23.03	N	16.1
0.240000	---	35.73	52.10	16.37	N	16.1
0.240000	43.39	---	62.10	18.71	N	16.1
13.420000	---	30.57	50.00	19.43	N	16.0
13.420000	32.80	---	60.00	27.20	N	16.0
16.230000	---	34.88	50.00	15.12	N	16.1
16.230000	35.83	---	60.00	24.17	N	16.1
18.240000	---	34.21	50.00	15.79	N	16.1
18.240000	35.14	---	60.00	24.86	N	16.1

Test mode 2

Line

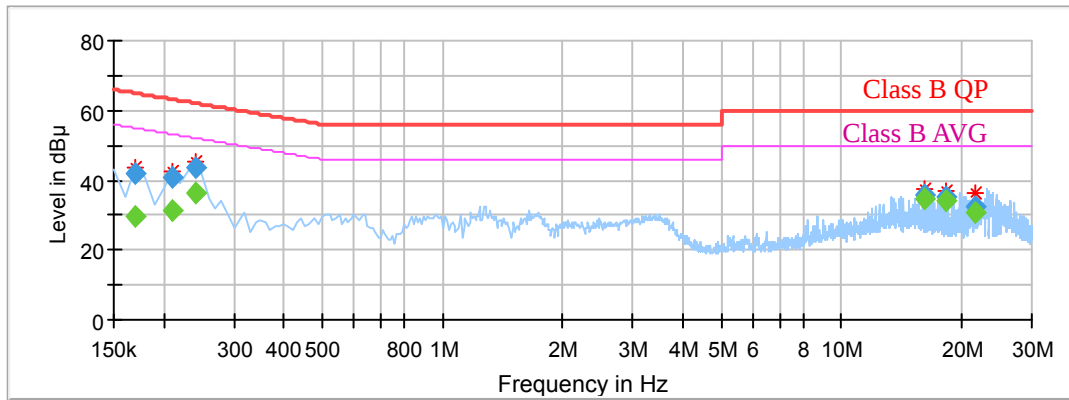
Full Spectrum



Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Line	Corr. (dB)
0.170000	---	34.20	54.96	20.76	L1	16.1
0.170000	44.33	---	64.96	20.63	L1	16.1
0.210000	---	32.87	53.21	20.34	L1	16.0
0.210000	42.92	---	63.21	20.29	L1	16.0
0.240000	---	38.80	52.10	13.30	L1	16.0
0.240000	45.93	---	62.10	16.17	L1	16.0
13.480000	---	31.50	50.00	18.50	L1	16.2
13.480000	33.67	---	60.00	26.33	L1	16.2
16.230000	---	36.22	50.00	13.78	L1	16.3
16.230000	37.29	---	60.00	22.71	L1	16.3
23.130000	---	33.04	50.00	16.96	L1	16.5
23.130000	35.27	---	60.00	24.73	L1	16.5

Neutral

Full Spectrum

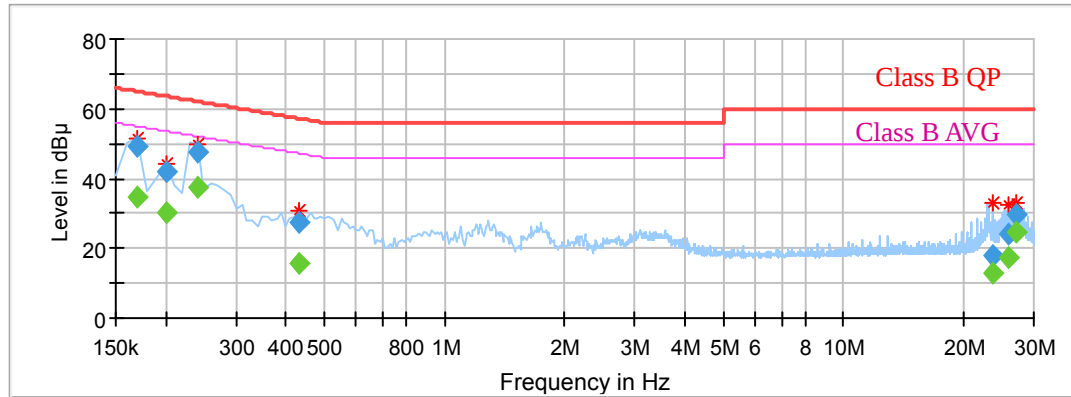


Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Line	Corr. (dB)
0.170000	41.85	---	64.96	23.11	N	16.1
0.170000	---	29.71	54.96	25.25	N	16.1
0.210000	40.70	---	63.21	22.51	N	16.1
0.210000	---	31.22	53.21	21.99	N	16.1
0.240000	43.43	---	62.10	18.67	N	16.1
0.240000	---	36.58	52.10	15.52	N	16.1
16.230000	35.87	---	60.00	24.13	N	16.1
16.230000	---	34.80	50.00	15.20	N	16.1
18.240000	35.12	---	60.00	24.88	N	16.1
18.240000	---	34.21	50.00	15.79	N	16.1
21.660000	---	30.77	50.00	19.23	N	16.2
21.660000	32.42	---	60.00	27.58	N	16.2

Test mode 3

Line

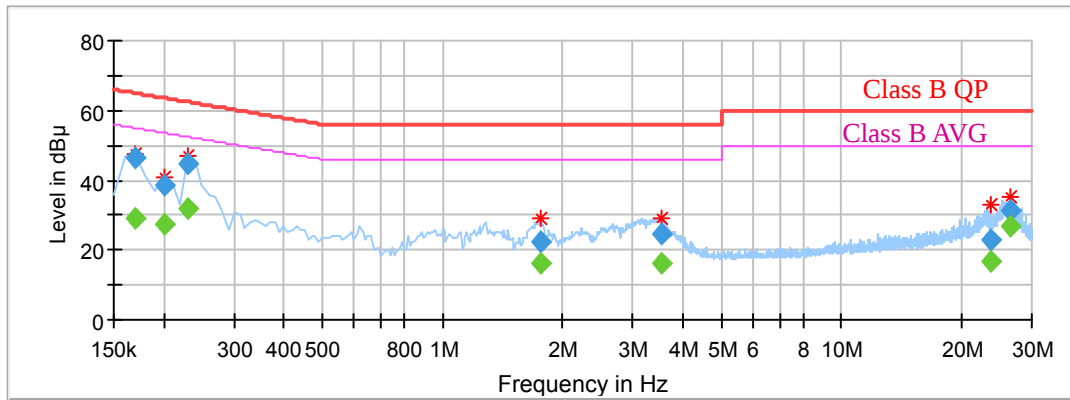
Full Spectrum



Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Line	Corr. (dB)
0.170000	---	34.92	54.96	20.04	L1	16.1
0.170000	49.35	---	64.96	15.61	L1	16.1
0.200000	---	30.40	53.61	23.21	L1	16.0
0.200000	41.86	---	63.61	21.75	L1	16.0
0.240000	---	37.64	52.10	14.46	L1	16.0
0.240000	47.39	---	62.10	14.71	L1	16.0
0.430000	---	15.64	47.25	31.61	L1	16.1
0.430000	27.53	---	57.25	29.72	L1	16.1
23.640000	---	12.84	50.00	37.16	L1	16.5
23.640000	17.67	---	60.00	42.33	L1	16.5
26.000000	---	17.45	50.00	32.55	L1	16.5
26.000000	24.32	---	60.00	35.68	L1	16.5
27.150000	---	24.69	50.00	25.31	L1	16.5
27.150000	29.39	---	60.00	30.61	L1	16.5

Neutral

Full Spectrum



Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Line	Corr. (dB)
0.170000	---	29.10	54.96	25.86	N	16.1
0.170000	46.19	---	64.96	18.77	N	16.1
0.200000	---	27.35	53.61	26.26	N	16.1
0.200000	38.60	---	63.61	25.01	N	16.1
0.230000	---	31.81	52.45	20.64	N	16.1
0.230000	44.57	---	62.45	17.88	N	16.1
1.770000	---	16.08	46.00	29.92	N	15.9
1.770000	22.34	---	56.00	33.66	N	15.9
3.540000	---	15.95	46.00	30.05	N	15.9
3.540000	24.72	---	56.00	31.28	N	15.9
23.630000	---	16.80	50.00	33.20	N	16.2
23.630000	22.70	---	60.00	37.30	N	16.2
26.540000	---	26.99	50.00	23.01	N	16.2
26.540000	31.41	---	60.00	28.59	N	16.2

FCC §15.109 - RADIATED EMISSIONS

Applicable Standard

FCC §15.109

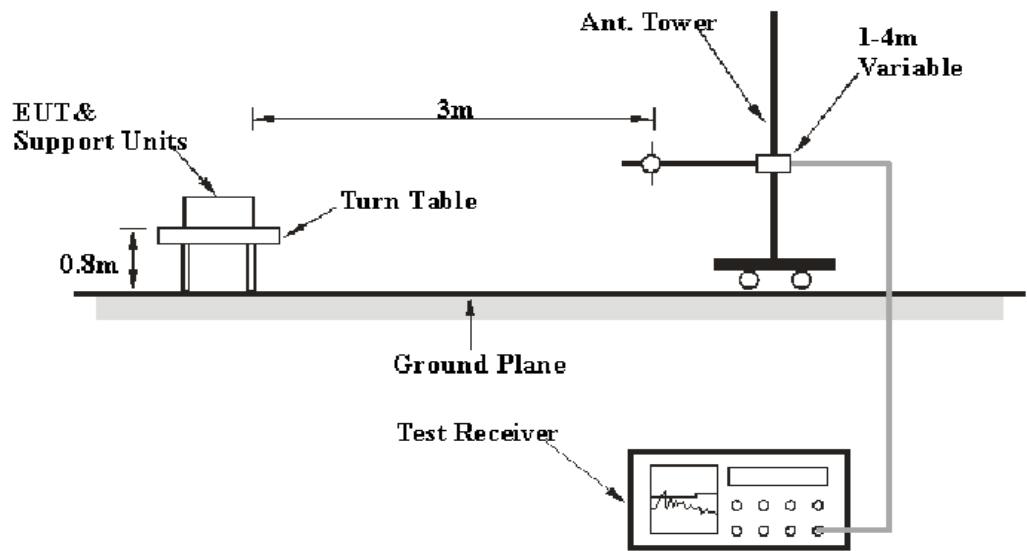
Measurement Uncertainty

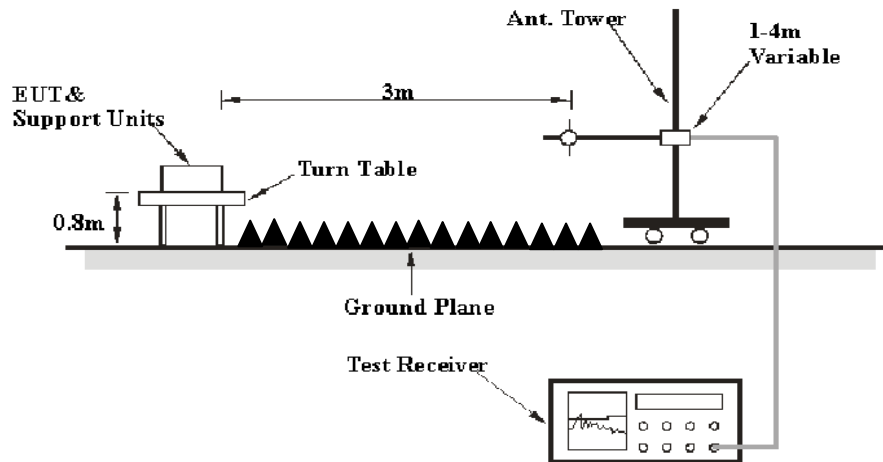
All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Item		Measurement Uncertainty	U_{cispr}
Radiated Emission	30MHz~1GHz	6.11dB	6.3 dB
	1GHz~6GHz	4.45dB	5.2 dB
	6 GHz ~18 GHz	5.23dB	5.5 dB
	18 GHz ~40 GHz	4.88dB	/

EUT Setup

Below 1GHz:



Above 1GHz:

The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2014. The specification used was the FCC Part 15.109 Class B limits.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 30 GHz.

During the radiated emission test, the EMI test receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30MHz – 1000 MHz	120 kHz	300 kHz	120kHz	QP
Above 1 GHz	1MHz	3 MHz	/	Peak
	1MHz	1 Hz	/	Av

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz, Peak and average detection mode above 1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sonoma Instrument	Amplifier	310N	171205	2017-08-14	2018-08-13
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2017-11-12	2018-11-11
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
Champrotek	Chamber	Chamber A	T-KSEMC049	-	-
R&S	Auto test Software	EMC32	100361	-	-
ETS	Horn Antenna	3115	6229	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-10-18	2019-10-18
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2017-08-27	2018-08-26
Heatsink Required	Amplifier	QLW-18405536-J0	15964001009	2016-12-12	2017-12-11
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-8	001	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-9	002	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-10	003	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-4	004	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-5	005	2016-12-12	2017-12-11

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

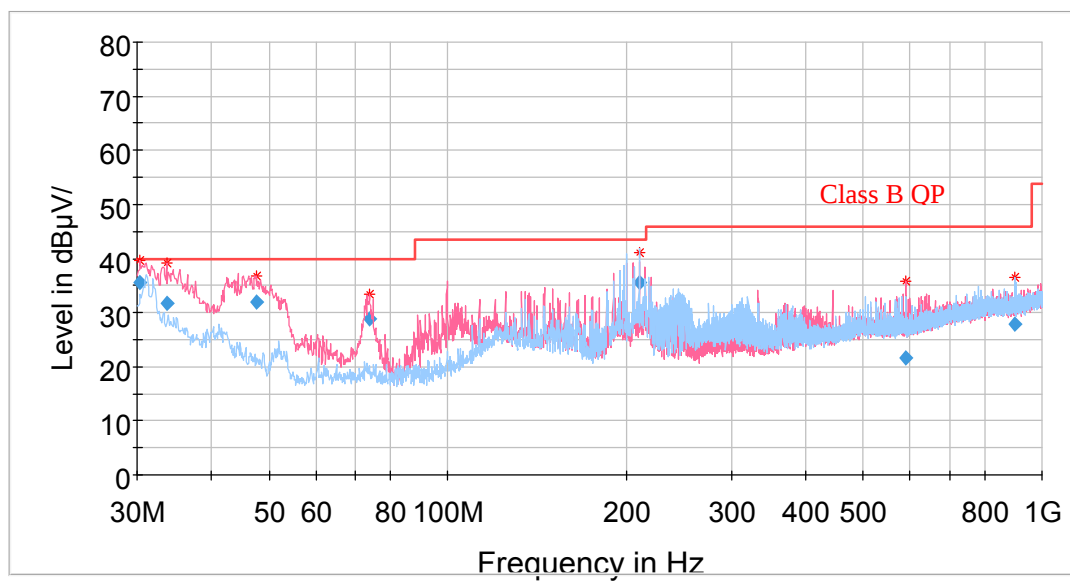
Test Data**Environmental Conditions**

Temperature:	27
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Phil Zhu on 2017-11-30.

Test mode 1

30MHz ~ 1GHz:



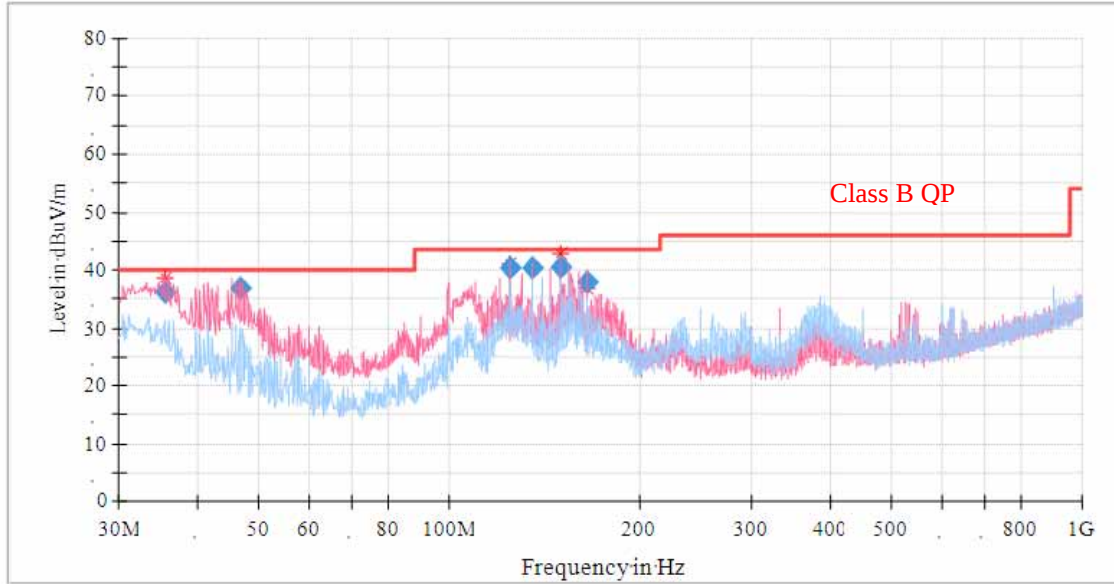
Frequency (MHz)	Quasi Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.363750	35.49	40.00	4.51	101.0	V	178.0	7.8
33.637500	31.79	40.00	8.21	101.0	V	187.0	5.3
47.581250	32.05	40.00	7.95	101.0	V	51.0	-4.1
73.771250	28.73	40.00	11.27	101.0	V	140.0	-5.4
210.056250	35.49	43.50	8.01	101.0	H	194.0	-1.5
590.781250	21.63	46.00	24.37	101.0	V	300.0	6.1
900.090000	27.94	46.00	18.06	101.0	H	208.0	10.3

Above 1 GHz:

Frequency (MHz)	Max Peak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1608.600000	---	26.85	54.00	27.15	100.0	H	30.0	-9.8
1608.600000	46.94	---	74.00	27.06	100.0	H	30.0	-9.8
3607.700000	---	30.35	54.00	23.65	200.0	V	294.0	-3.6
3607.700000	40.36	---	74.00	33.64	200.0	V	294.0	-3.6
4869.200000	---	30.57	54.00	23.43	200.0	V	262.0	-0.4
4869.200000	40.03	---	74.00	33.97	200.0	V	262.0	-0.4
7776.300000	---	33.65	54.00	20.35	200.0	V	251.0	7.5
7776.300000	43.51	---	74.00	30.49	200.0	V	251.0	7.5
10062.100000	---	34.77	54.00	19.23	100.0	V	241.0	9.1
10062.100000	45.81	---	74.00	28.19	100.0	V	241.0	9.1
14565.900000	46.91	---	74.00	27.09	200.0	H	157.0	16.7
14565.900000	---	40.07	54.00	13.93	200.0	H	157.0	16.7

Test mode 2

30MHz ~ 1GHz:



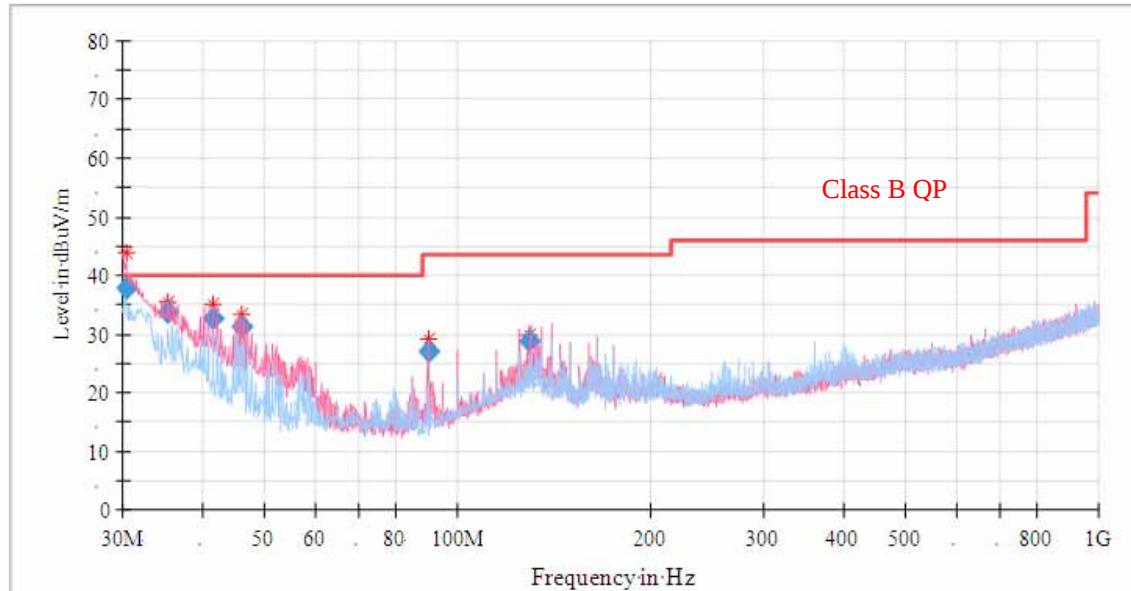
Frequency (MHz)	Quasi Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
35.459920	36.12	40.00	3.88	101.0	V	69.0	-8.1
46.662320	36.76	40.00	3.24	101.0	V	145.0	-15.7
124.992210	40.48	43.50	3.02	101.0	V	247.0	-11.8
134.976100	40.43	43.50	3.07	101.0	V	176.0	-12.2
150.002050	40.41	43.50	3.09	101.0	V	180.0	-12.8
164.999760	37.92	43.50	5.58	101.0	V	175.0	-13.4

Above 1 GHz:

Frequency (MHz)	Max Peak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1285.600000	---	21.78	54.00	32.22	150.0	H	252.0	-11.5
1285.600000	29.89	---	74.00	44.11	150.0	H	252.0	-11.5
2305.600000	---	24.17	54.00	29.83	100.0	V	49.0	-7.6
2305.600000	33.85	---	74.00	40.15	150.0	V	0.0	-7.6
4138.200000	---	30.76	54.00	23.24	200.0	V	129.0	-2.0
4138.200000	41.07	---	74.00	32.93	100.0	V	38.0	-2.0
6776.600000	---	36.69	54.00	17.31	100.0	H	145.0	5.5
6776.600000	47.54	---	74.00	26.46	100.0	H	145.0	5.5
9438.800000	---	39.36	54.00	14.64	150.0	V	216.0	8.6
9438.800000	50.75	---	74.00	23.25	100.0	V	92.0	8.6
13600.400000	---	35.19	54.00	18.81	200.0	H	119.0	17.2
13600.400000	46.48	---	74.00	27.52	200.0	H	119.0	17.2

Test mode 3

30MHz ~ 1GHz:



Frequency (MHz)	Quasi Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.399135	36.97	40.00	3.03	101.0	V	154.0	-4.7
35.388500	33.71	40.00	6.29	101.0	V	140.0	-8.0
41.588420	32.80	40.00	7.20	101.0	V	161.0	-12.3
45.947440	31.33	40.00	8.67	101.0	V	166.0	-15.2
90.020730	26.91	43.50	16.59	199.0	V	231.0	-17.9
129.199510	28.79	43.50	14.71	101.0	V	107.0	-12.0

Above 1 GHz:

Frequency (MHz)	Max Peak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1346.800000	---	30.75	54.00	23.25	100.0	H	65.0	-11.2
1346.800000	41.32	---	74.00	32.68	100.0	H	65.0	-11.2
2247.800000	---	37.91	54.00	16.09	150.0	H	18.0	-7.7
2247.800000	46.41	---	74.00	27.59	150.0	H	18.0	-7.7
3883.200000	---	33.25	54.00	20.75	150.0	V	61.0	-2.7
3883.200000	42.66	---	74.00	31.34	150.0	V	61.0	-2.7
5151.400000	---	37.77	54.00	16.23	150.0	H	258.0	0.4
5154.800000	46.76	---	74.00	27.24	150.0	H	258.0	0.4
7766.000000	---	41.16	54.00	12.84	150.0	V	0.0	7.5
7766.000000	52.08	---	74.00	21.92	150.0	V	0.0	7.5
15728.800000	---	40.40	54.00	13.60	200.0	V	52.0	15.1
15728.800000	49.61	---	74.00	24.39	200.0	V	52.0	15.1

******* END OF REPORT *******