

EMC Test Report

Applicant : PISMO LABS TECHNOLOGY LIMITED

Product Type : PEPWAVE / peplink Wireless Product

Trade Name : PEPWAVE, peplink

Model Number : AP One AX, AP One ENT AX, APO-ENT-AX, APO-AX, PRB-11AX,
Pepwave AP One AX, Pepwave AP One Enterprise AX,
Peplink AP One AX, Peplink AP One Enterprise AX,
AP One Enterprise AX

Applicable Standard : FCC 47 CFR PART 15 SUBPART B
ANSI C63.4: 2014

Received Date : May 13, 2020

Test Period : Jun. 11 ~ Jun. 16, 2020

Issued Date : Aug. 13, 2020

Issued by

A Test Lab Techno Corp.
No. 140-1, Changan Street, Bade District,
Taoyuan City 33465, Taiwan (R.O.C.)
Tel : +886-3-2710188 / Fax : +886-3-2710190



Taiwan Accreditation Foundation accreditation number: 1330
Test Firm MRA designation number: TW1062
Certified Scope: 9 kHz ~ 40 GHz

Note:

- 1.The test results are valid only for samples provided by customers and under the test conditions described in this report.
- 2.This report shall not be reproduced except in full, without the written approval of A Test Lab Technology Corporation.
- 3.The relevant information is provided by customers in this test report. According to the correctness, appropriateness or completeness of the information provided by the customer, if there is any doubt or error in the information which affects the validity of the test results, the laboratory does not take the responsibility.



Revision History

Rev.	Issued Date	Revisions	Revised By
00	Aug. 05, 2020	Initial Issue	Serene Yang
01	Aug. 13, 2020	Update chapter 2 (P.7)	Nina Lin

Verification of Compliance

Issued Date: Aug. 13, 2020

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Model Number : AP One AX, AP One ENT AX, APO-ENT-AX, APO-AX, PRB-11AX, Pepwave AP One AX, Pepwave AP One Enterprise AX, Peplink AP One AX, Peplink AP One Enterprise AX, AP One Enterprise AX

FCC ID : U8G-P1X02

EUT Rated Voltage : DC 12 V, 2.5 A (DC jack)
802.3 at POE

Test Voltage : 120 Vac / 60 Hz

Applicable Standard : FCC 47 CFR PART 15 SUBPART B
ANSI C63.4: 2014

Test Result : Complied

Performing Lab. : A Test Lab Techno Corp.
No. 140-1, Changan Street, Bade District,
Taoyuan City 33465, Taiwan (R.O.C.)
Tel : +886-3-2710188 / Fax : +886-3-2710190
Taiwan Accreditation Foundation accreditation number: 1330
<http://www.atl-lab.com.tw/e-index.htm>



The above equipment has been tested by A Test Lab Techno Corp., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved By : Terry Liao
(Manager) (Terry Liao)

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1 General Information

1.1. Summary of Test Result

Emission			
Standard	Item	Verdict	Remark
FCC 47 CFR PART 15 SUBPART B ANSI C63.4	Conducted Emission	PASS	Meet Class B limit
FCC 47 CFR PART 15 SUBPART B ANSI C63.4	Radiated Emission	PASS	Meet Class B limit

Decision Rule

☒ Uncertainty is not included.

☐ Uncertainty is included.

1.2. Testing Location

Site Name: A Test Lab Techno Corp.

<http://www.atl-lab.com.tw/e-index.htm>

Site Address: No. 140-1, Changan Street, Bade District, Taoyuan City 33465, Taiwan (R.O.C.)

Tel : +886-3-2710188

Fax : +886-3-2710190

1.3. Measurement Uncertainty

Test Item		Frequency Range	Uncertainty (dB)
Conducted Emission	AC Power Port	9 kHz ~ 150 kHz	± 2.7
		150 kHz ~ 30 MHz	± 2.7

Test Item	Test Site	Frequency Range		Uncertainty (dB)
Radiated Emission	TE06	30 MHz ~ 1000 MHz	Horizontal	± 4.4
			Vertical	± 4.5
	TE01	1000 MHz ~ 6000 MHz		± 5.2
		6000 MHz ~ 18000 MHz		± 5.5
		18000 MHz ~ 26500 MHz		± 4.8
		26500 MHz ~ 40000 MHz		± 5.4
	TE09	1000 MHz ~ 6000 MHz		± 5.0
		6000 MHz ~ 18000 MHz		± 5.3
		18000 MHz ~ 26500 MHz		± 4.5
		26500 MHz ~ 40000 MHz		± 5.4

Note: The Vertical and Horizontal measurement uncertainty of 1 GHz to 40 GHz is evaluated and choose which polarity is worst value.

1.4. Test Site Environment

Test Item	Items	Required (IEC 60068-1)	Actual
Conducted Emission	Temperature (°C)	15-35	15-30
	Humidity (%RH)	25-75	45-75
	Barometric pressure (mbar)	860-1060	990-1005
Radiated Emission	Temperature (°C)	15-35	15-30
	Humidity (%RH)	25-75	45-75
	Barometric pressure (mbar)	860-1060	990-1005

2 EUT Description

Applicant	PISMO LABS TECHNOLOGY LIMITED A8, 5/F, HK Spinners Industrial Building, Phase 6, 481 Castle Peak Road, Cheung Sha Wan, Hong Kong
Manufacturer	PISMO LABS TECHNOLOGY LIMITED A8, 5/F, HK Spinners Industrial Building, Phase 6, 481 Castle Peak Road, Cheung Sha Wan, Hong Kong
Product Type	PEPWAVE / peplink Wireless Product
Trade Name	PEPWAVE, peplink
Model Number	AP One AX, AP One ENT AX, APO-ENT-AX, APO-AX, PRB-11AX, Pepwave AP One AX, Pepwave AP One Enterprise AX, Peplink AP One AX, Peplink AP One Enterprise AX, AP One Enterprise AX
Difference description of product type/trade name/model number	Differences are due to selling region.
FCC ID	U8G-P1X02
Highest Operating Frequency	5850 MHz

EUT Modify Description :

Modify Description: (1)The differences between the original EUT and new one(Hardware removal only): - Remove a USB Port, a Ethernet RJ45 Port, HW Watchdog IC, Scanning Radio and Bluetooth LE function. - In new one, Flash NOR is 32 MB and DDR4 RAM is 1 GB. (2)Update applicant name, applicant address, manufacture name, manufacture address, product type, model number, trade name, FCC ID, EUT rated voltage and product's appearance. These differences do not influence the test results. Therefore, all test items we don't need to re-evaluated. All test data refer to the main model of original report and showed in this report. Original Report : 2006FE16 Rev.00 Modify: 2006FE22 Rev.01

I/O Port Description :

I/O Port Types	Q'TY	Test Description
1) Ethernet Port	1	Connected to Notebook/PoE Adapter
2) DC Power Port	1	Connected to AC Adapter

3 Test Methodology

3.1. Decision of Test Mode

3.1.1. The following test mode(s) were scanned during the preliminary test:

Pre-Test Mode	
Mode 1:	Wi-Fi 2.4 G + Wi-Fi 5 G + LAN link with AC Adapter mode
Mode 2:	Wi-Fi 2.4 G + Wi-Fi 5 G + LAN link with PoE Adapter mode (PoE: PD-9001GR/AC)
Mode 3:	Wi-Fi 2.4 G + Wi-Fi 5 G + LAN link with PoE Adapter mode (PoE: EPA5006GP)

3.1.2. After the preliminary scan, the following test mode was final mode and found to produce the highest emission level.

Final Test Mode			
Emission	Conducted Emission		Mode 1 / Mode 2 / Mode 3
	Radiated Emission	Below 1 GHz	Mode 1 / Mode 2 / Mode 3
		Above 1 GHz	Mode 1 / Mode 2 / Mode 3

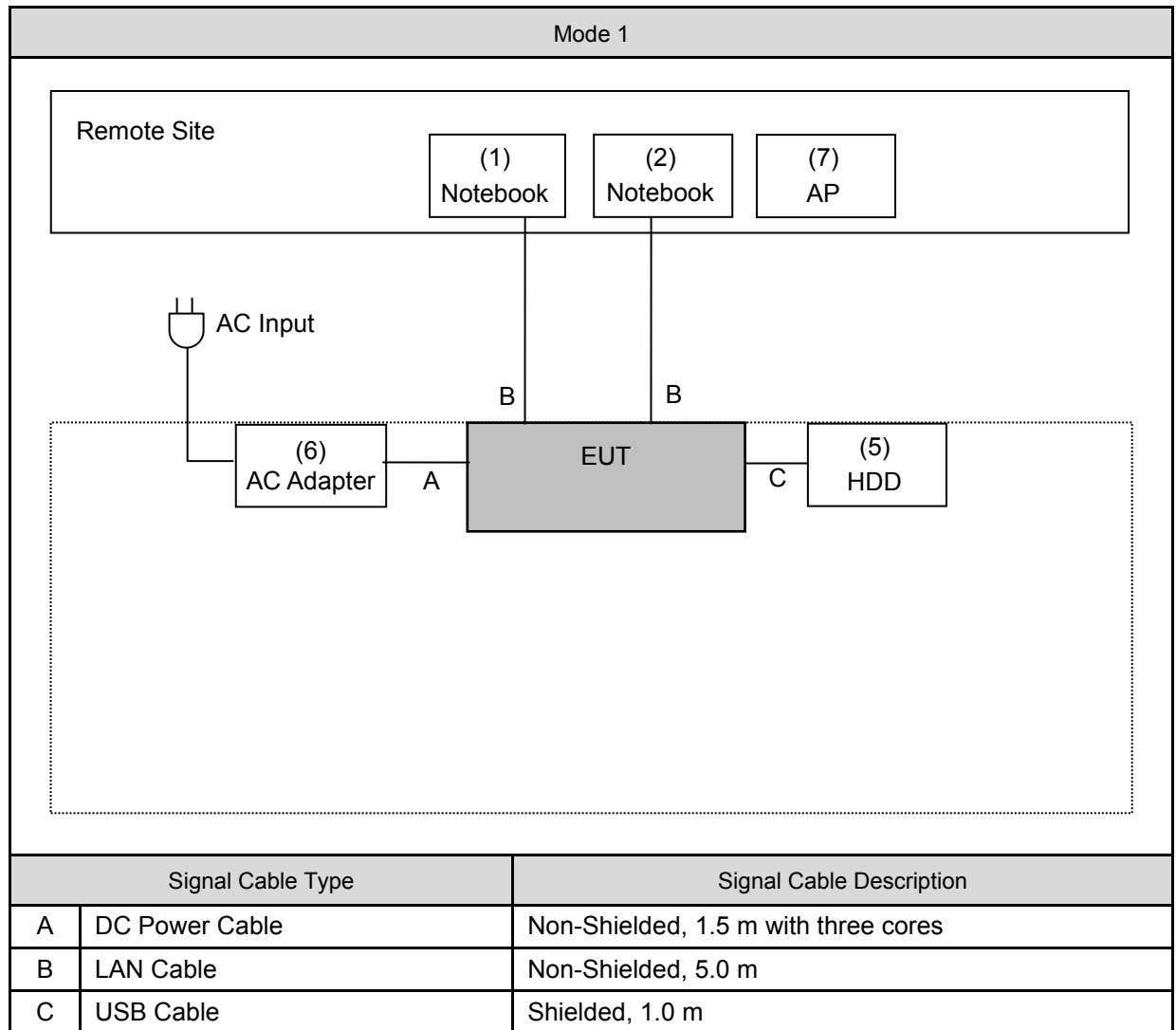
The above highest emission mode of the configuration of the EUT and cable was chosen for all final test items.

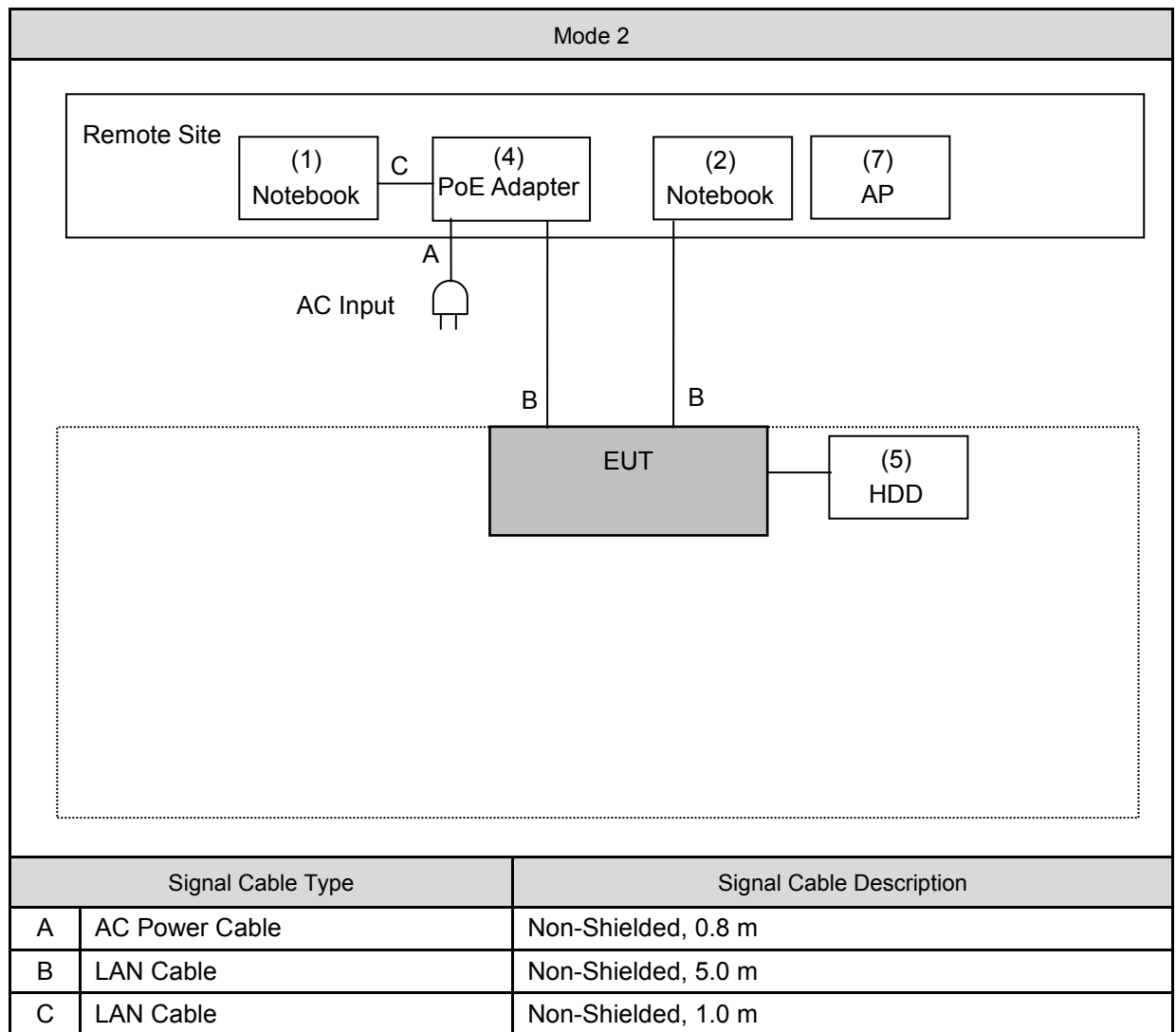
3.2. EUT Test Step

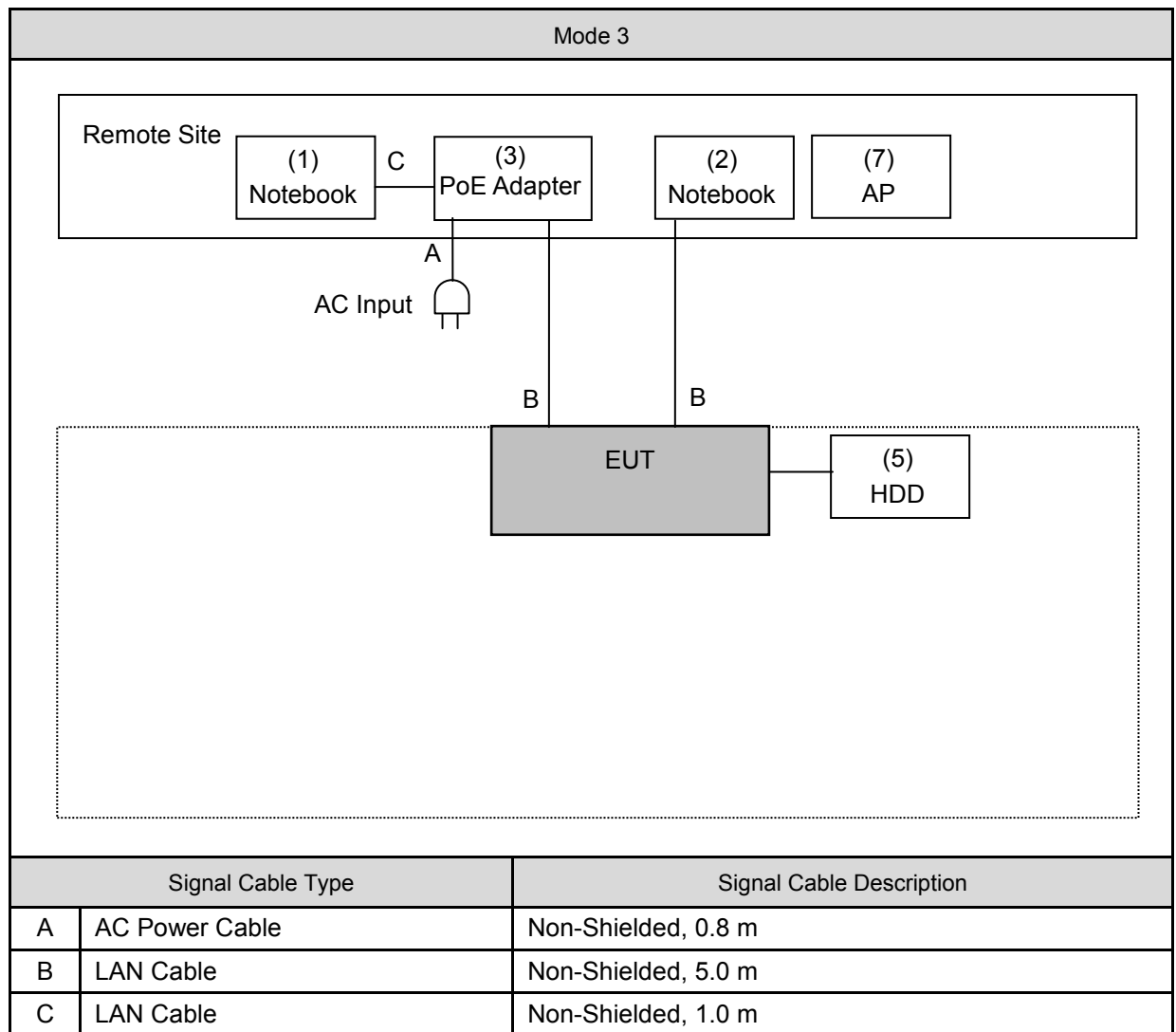
1	Setup the EUT and simulators as shown on 3.3.
2	Turn on the power of all equipment.
3	Notebook link to EUT by LAN.
4	Notebook link to EUT by Wi-Fi.
5	Data will be communicated between Notebook and Notebook through EUT that is connected to LAN port.
6	Start to test get the worst reading.

Measurement Software			
No.	Description	Software	Version
1	Conducted Emission	EZ EMC	1.1.4.3
2	Radiated Emission _ Below 1 GHz	EZ EMC	1.1.4.2
3	Radiated Emission _ Above 1 GHz	EZ EMC	1.1.4.4

3.3. Configuration of Test System Details







Devices Description					
	Product	Manufacturer	Model Number	Serial Number	Power Cord
(1)	Notebook	DELL	LATITUDE E5440	25627158361	Non-Shielded, 0.8 m
(2)	Notebook	DELL	LATITUDE E5440	6699565657	Non-Shielded, 0.8 m
(3)	PoE Adapter	emplus	EPA5006GP	172219562	Non-Shielded, 0.8 m
(4)	PoE Adapter	PowerDsine	PD-9001GR/AC	C11466561000001926	Non-Shielded, 0.8 m
(5)	HDD	Transcend	TS1TSJ25A3K-RU	E40246-0201	Power by EUT
(6)	AC Adapter	SPC	ZZU1588-250120-2A	N/A	Non-Shielded, 0.9 m with three cores
(7)	AP	ASUS	RT-AX88U	JCITHP000268	N/A

3.4. Test Instruments

Test Period : Jun. 15 ~ Jun. 16, 2020

Testing Engineer : Jacky Wu

Conducted Emission test site					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
Test Receiver	R&S	ESCI	100367	05/25/2020	1 year
LISN	R&S	ENV216	101040	03/23/2020	1 year
LISN	R&S	ENV216	101041	04/06/2020	1 year
Cable	Woken	00100D1380194M	TE-02-03 (CB-098)	05/26/2020	1 year
Test Site	ATL	TE02	TE02	N.C.R.	-----

Test Period : Jun. 11 ~ Jun. 16, 2020

Testing Engineer : Andy Liu

Radiated Emission - 10 Meter Chamber					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
Amplifier	EMCI	EMC9135	980298	10/30/2019	1 year
Amplifier	EMCI	EMC9135	980299	03/06/2020	1 year
Test Receiver	R&S	ESCI	100722	10/28/2019	1 year
Test Receiver	R&S	ESCI	101000	11/29/2019	1 year
Broadband Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	670	10/29/2019	1 year
Broadband Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	671	12/04/2019	1 year
RF Cable	EMC	EMC102-N-N-6000	TE06-H-1	02/16/2020	1 year
RF Cable	EMC	EMC102-N-N-7000	TE06-H-2	02/16/2020	1 year
RF Cable	EMC	EMC102-N-N-3000	TE06-H-3	02/16/2020	1 year
RF Cable	EMC	EMC102-N-N-1000	TE06-H-4	02/16/2020	1 year
RF Cable	EMC	EMC102-N-N-7000	TE06-V-2	02/16/2020	1 year
RF Cable	EMC	EMC102-N-N-3000	TE06-V-3	02/16/2020	1 year
RF Cable	EMC	EMC102-N-N-1000	TE06-V-4	02/16/2020	1 year
RF Cable	EMC	EMC104-N-N-6000	TE06-V-5	02/16/2020	1 year
Test Site	ATL	TE06	TE06	10/19/2019	1 year

Note: N.C.R. = No Calibration Request.



Test Period : Jun. 15 ~ Jun. 16, 2020

Testing Engineer : Brain Lin, Andy Liu

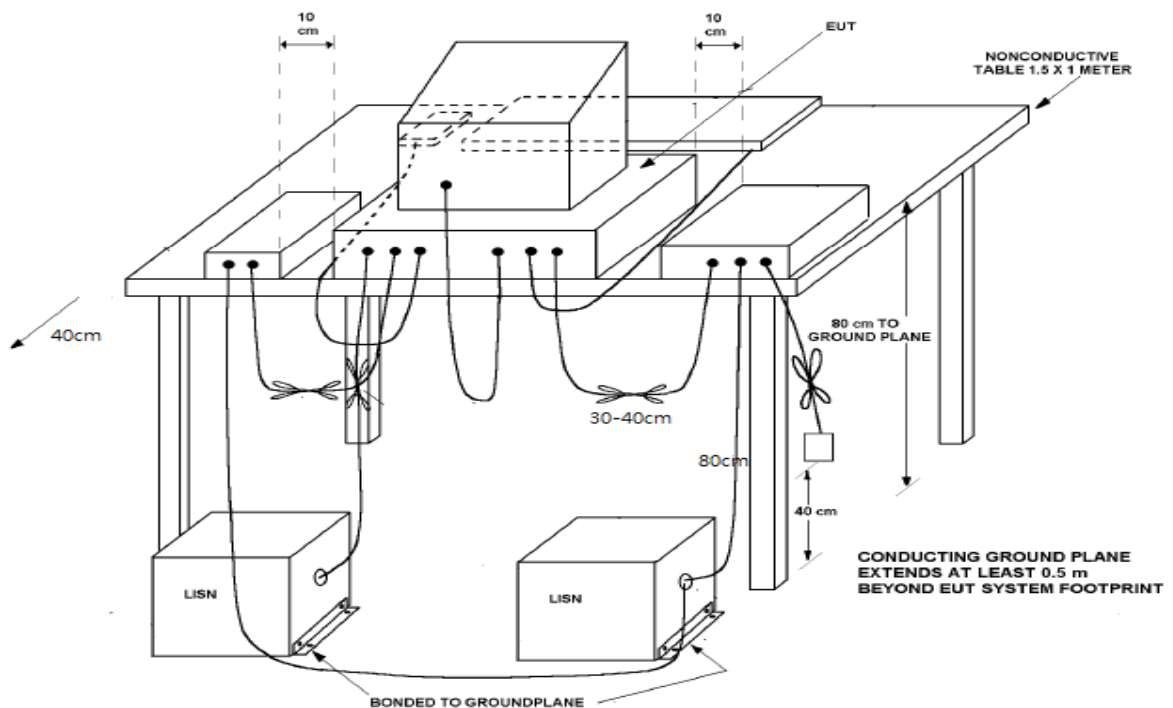
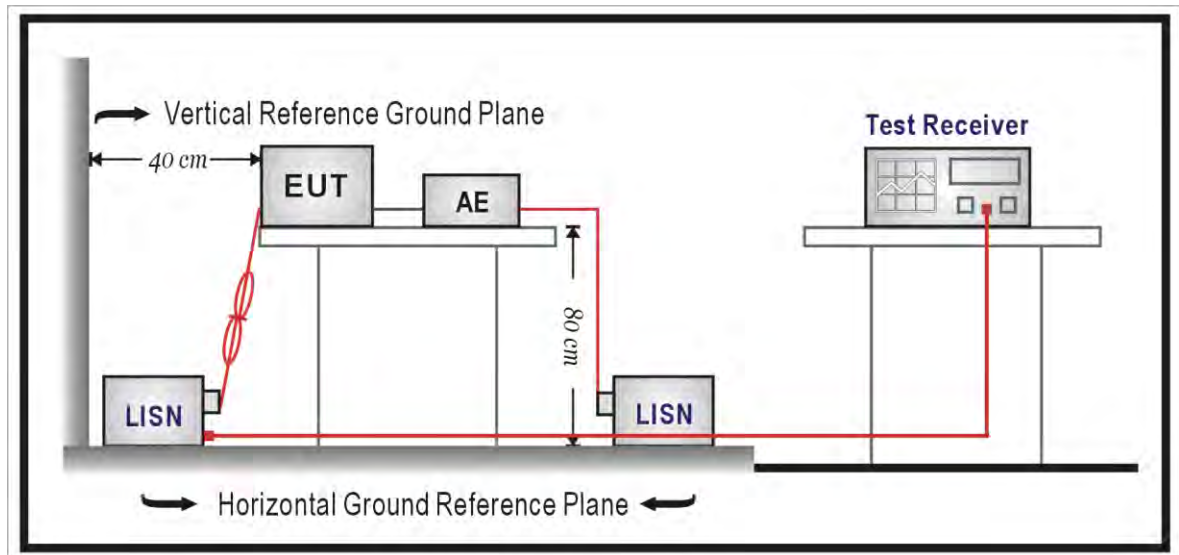
Radiated Emission - 3 Meter Chamber					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
Spectrum Analyzer	Agilent	E4445A	MY46181986	06/01/2020	1 year
Amplifier	Agilent	8449B	3008A02456	03/25/2020	1 year
Double Ridged Horn Antenna	ETS	3117	00152321	09/19/2019	1 year
Microwave Cable	EMCI	EMC104-SM-SM-1500	140303	02/18/2020	1 year
Microwave Cable	EMCI	EMC104-SM-SM-13000	150503	02/18/2020	1 year
Test Site(VSWR)	ATL	TE09	TE09	04/11/2020	1 year

Note: N.C.R. = No Calibration Request.

4 Measurement Procedure

4.1. Conducted Emission

■ Test Setup



■ Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a $50\ \Omega // 50\ \mu\text{H}$ coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a $50\ \Omega // 50\ \mu\text{H}$ coupling impedance with 50ohm termination.

Tabletop device shall be placed on a non-conducting platform, of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The wall of screened room shall be located 40cm to the rear of the EUT. Other surfaces of tabletop or floor standing EUT shall be at least 80cm from any other ground conducting surface including one or more LISNs. For floor-standing device shall be placed under the EUT with a 12 mm insulating material.

Conducted emissions were investigated over the frequency range from 0.15 MHz to 30 MHz using a resolution bandwidth of 9 kHz. The equipment under test (EUT) shall be meet the limits in section 4.1.1, as applicable, including the average limit and the quasi-peak limit when using respectively, an average detector and quasi-peak detector measured in accordance with the methods described of related standard. When all of peak value were complied with quasi-peak and average limit from 150 kHz to 30 MHz then quasi-peak and average measurement was unnecessary.

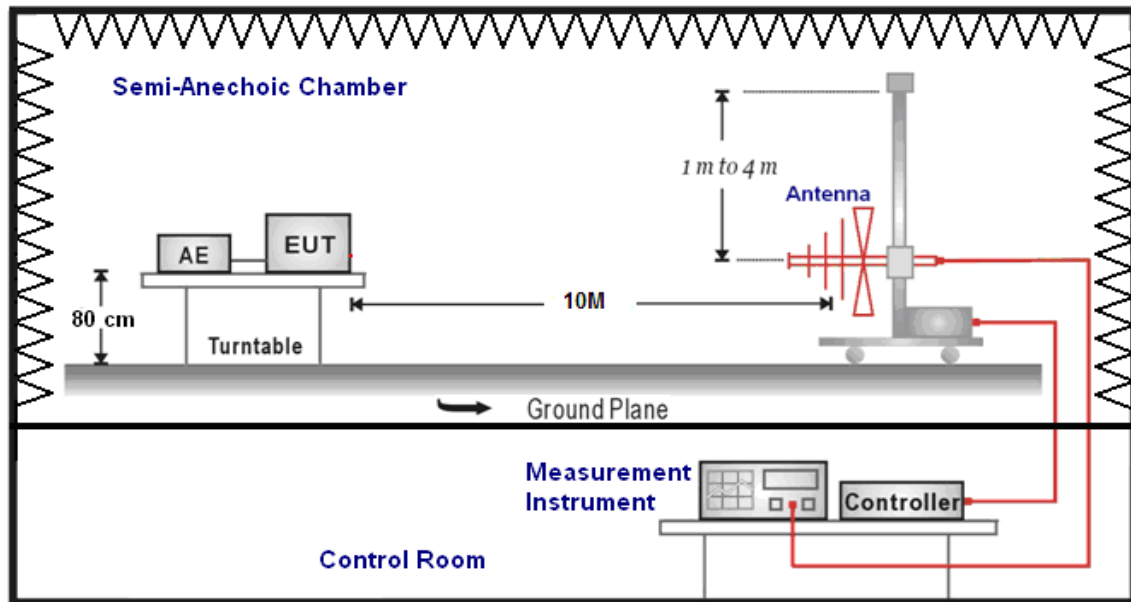
The AMN shall be placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane for AMNs mounted on top of the ground reference plane. This distance is between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment shall be at least 0,8 m from the AMN. If the mains power cable is longer than 1m then the cable shall be folded back and forth at the centre of the lead to form a bundle no longer than 0.4 m. All of interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long. All of EUT and AE shall be separate place more than 0.1 m. All $50\ \Omega$ ports of the LISN shall be resistively terminated into $50\ \Omega$ loads when not connected to the measuring instrument.

If the reading of the measuring receiver shows fluctuations close to the limit, the reading shall be observed for at least 15 s at each measurement frequency; the higher reading shall be recorded with the exception of any brief isolated high reading which shall be ignored.

4.2. Radiated Emission

■ Test Setup

Below 1 GHz



Above 1 GHz

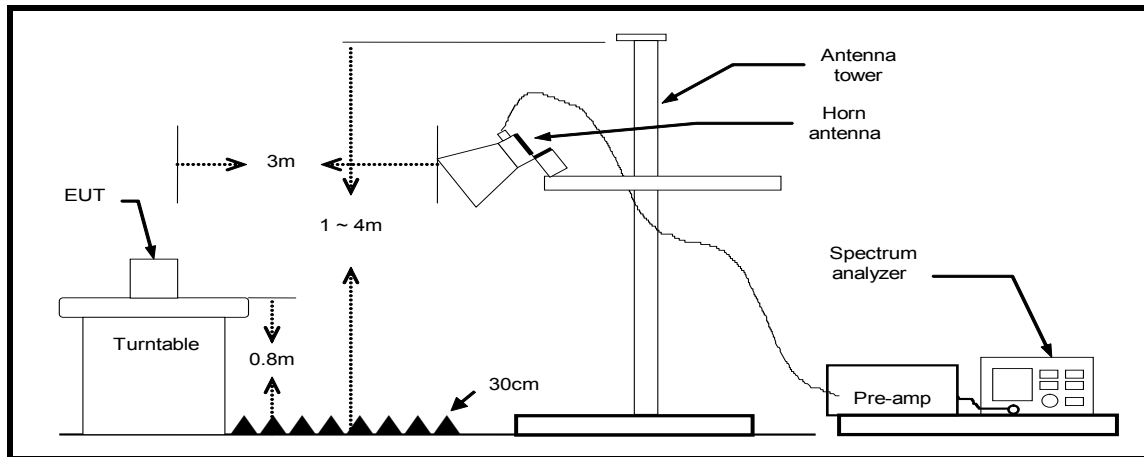


Diagram illustrating a test setup for EUT (Equipment Under Test) on a nonconductive table. The setup includes:

- NONCONDUCTIVE TABLE 1.5 X 1 METER**: The base surface.
- EUT**: The Equipment Under Test, shown as a rectangular block.
- 5**: Dimensions indicating 10 cm and 5 cm for the EUT and its supporting structure.
- 6**: Dimensions indicating 10 cm and 5 cm for the supporting structure.
- 7**: A vertical dimension of 80 cm TO GROUND PLANE.
- 8**: A vertical dimension of 40 cm.
- CONDUCTING GROUND PLANE EXTENDS 0.5 m BEYOND EUT SYSTEM**: A ground plane at the bottom.
- 3**: A small rectangular component on the ground plane.
- 4**: A vertical dimension of 80 cm TO GROUND PLANE.
- 1**: A vertical dimension of 40 cm.
- 2**: A small rectangular component on the ground plane.

■ Test Procedure

Below 1 GHz

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. When the EUT is floor-standing equipment, it is placed on the ground plane which has a 12 mm non-conductive covering to insulate the EUT from the ground plane.

The turn table is 0.8 m height and 2.0 m wide x 1.0 m deep size. It can rotate 360 degrees to determine the position of the maximum emission level. The spacing between the each equipment was 10 cm. The mains cables are dropped to floor and are round to receptacle. Interconnecting cables of table top equipment that hang closer than 0.4 m to the ground plane are folded back and forth forming a bundle 0.3 m to 0.4 m long, hanging approximately in the middle between ground plane and table. The EUT was positioned such that the distance from antenna to the EUT was 10 meters and the receive antenna was moved from 1 m to 4 m to investigate maximum highest emission at least 6 points over the frequency range from 30 MHz to 1 GHz using a resolution bandwidth of 120 kHz and measured by the quasi-peak detector.

According to this standard paragraph 15.109, as an alternative to the radiated emission limits, digital devices may be shown to comply with the standards contained in Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22, "Information Technology Equipment - Radio Disturbance Characteristics - Limits and Methods of Measurement".

Above 1 GHz

The Setup is same as Below 1 GHz placement. The turn table is 0.8 m height and 1.8 m wide x 1.0 m deep size. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meter for above 1 GHz, the highest frequency performed according to internal source frequency of the EUT, the specification was below:

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705 - 108	1000
108 - 500	2000
500 - 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

Absorber shall be spread between floor of a turn table and a receive antenna shown in 4.2.3. The antenna used boresight antenna master from 1 meter and 4 meters to find out the maximum emission level and find the highest emission at least 6 points. Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated on radiated measurement.

Radiated emissions were applied to above 1 GHz using a resolution bandwidth of 1 MHz and measured by the peak and average detector which antenna to the EUT distance was 3 meters. If the EUT was meet both limits and measurement with the average detector receiver is unnecessary.

5 Test Results

5.1. Conducted Emission

■ Limit

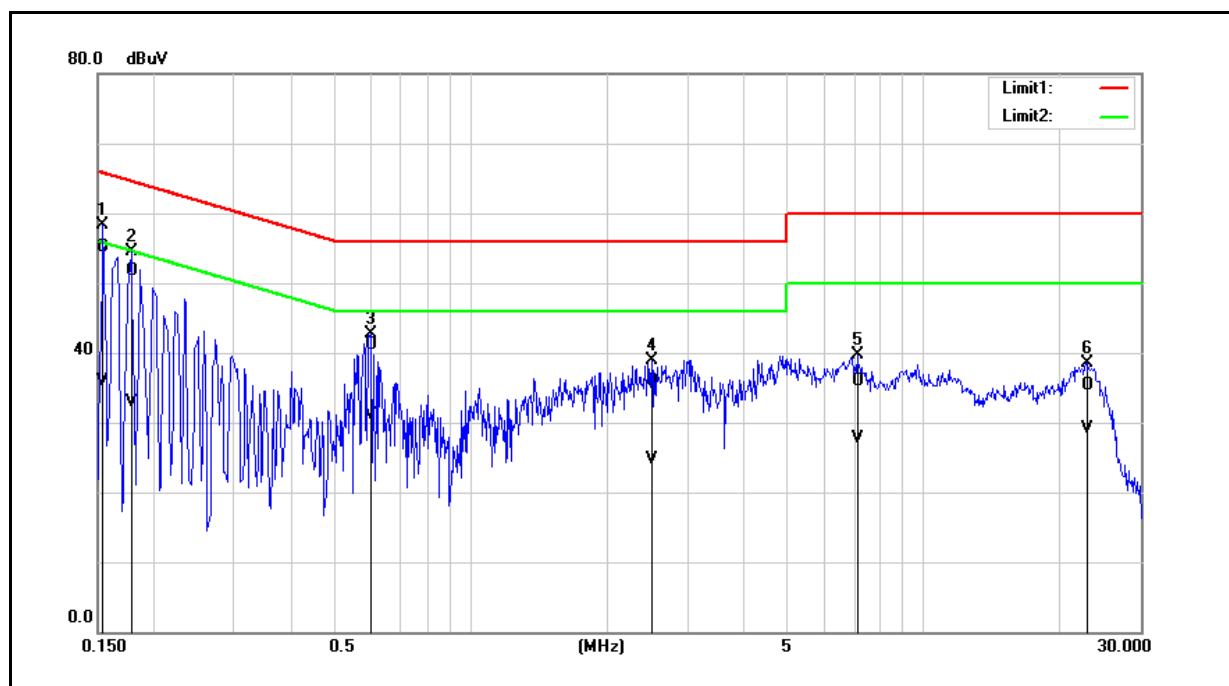
Frequency (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

Note: (1) The lower limit shall apply at the transition frequencies.

(2) The limit decreases in line with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

■ Test Result

Test Standard:	FCC Part 15B	Power Line:	L1
Test Mode:	Mode 1	Test Power:	AC 120 V / 60 Hz
Description:			

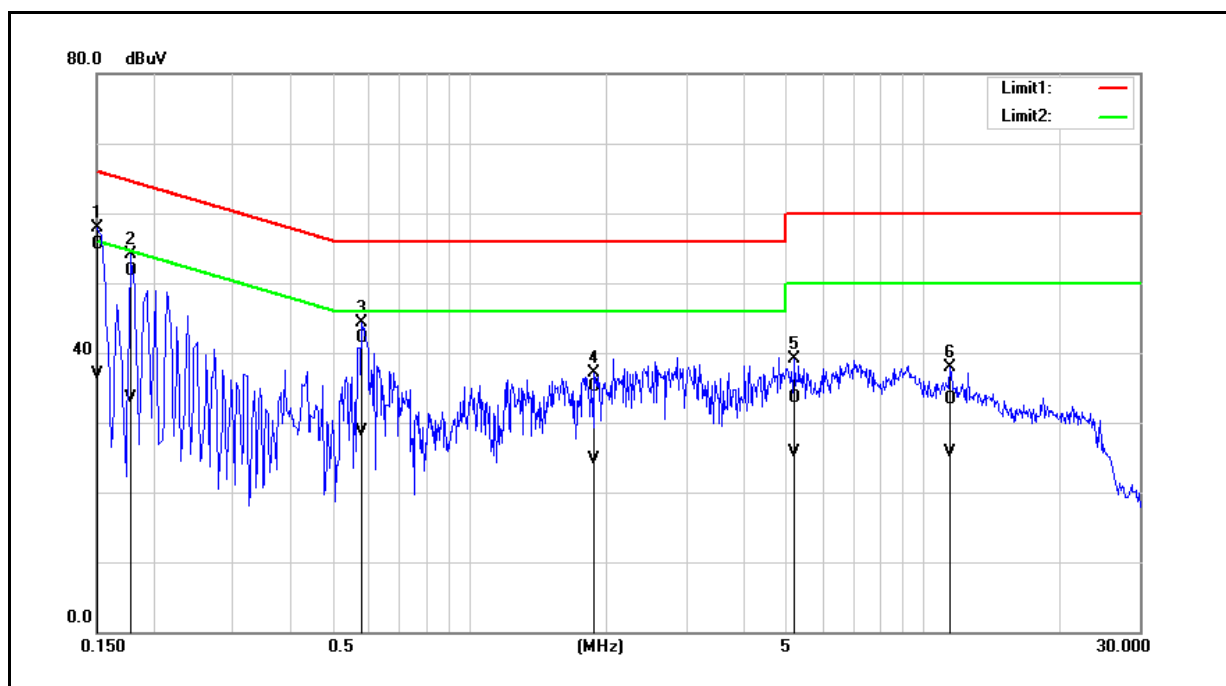


No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1540	45.42	26.19	9.70	55.12	35.89	65.78	55.78	-10.66	-19.89	Pass
2	0.1780	42.06	23.23	9.70	51.76	32.93	64.58	54.58	-12.82	-21.65	Pass
3	0.6020	31.35	21.42	9.71	41.06	31.13	56.00	46.00	-14.94	-14.87	Pass
4	2.5020	26.06	14.87	9.77	35.83	24.64	56.00	46.00	-20.17	-21.36	Pass
5	7.1340	26.04	17.96	9.84	35.88	27.80	60.00	50.00	-24.12	-22.20	Pass
6	22.8780	25.21	19.05	10.05	35.26	29.10	60.00	50.00	-24.74	-20.90	Pass

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).

Test Standard:	FCC Part 15B	Power Line:	N
Test Mode:	Mode 1	Test Power:	AC 120 V / 60 Hz
Description:			

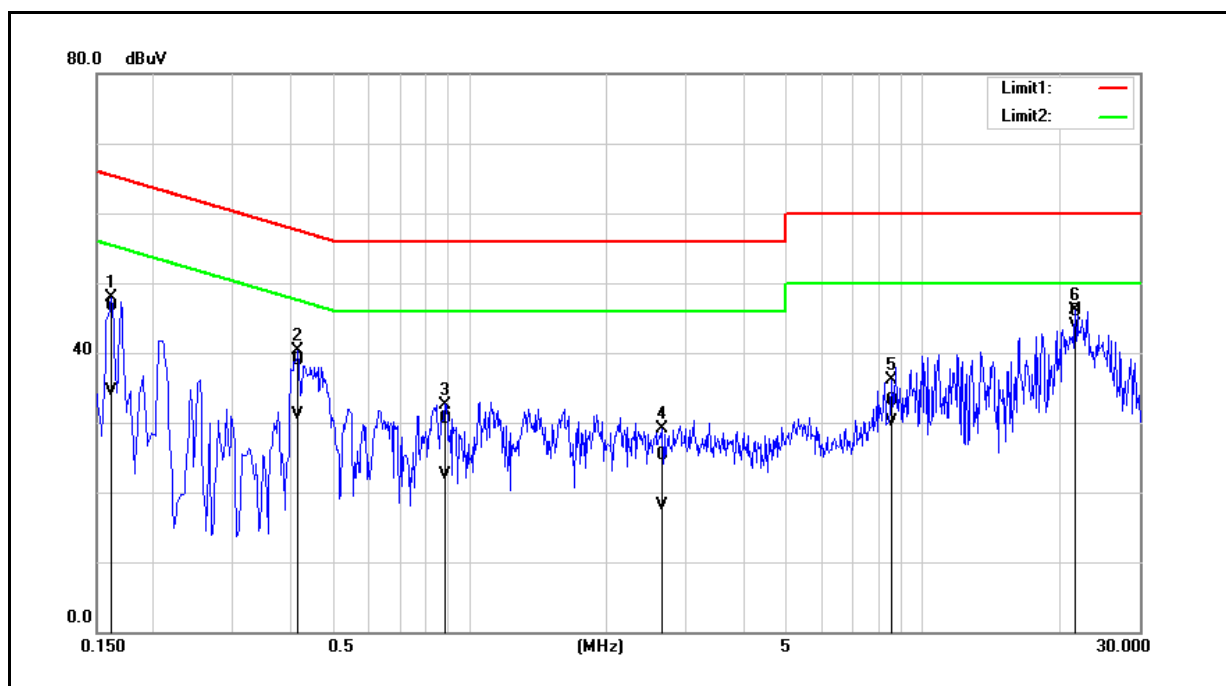


No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1500	45.84	27.15	9.69	55.53	36.84	66.00	56.00	-10.47	-19.16	Pass
2	0.1780	41.98	23.87	9.69	51.67	33.56	64.58	54.58	-12.91	-21.02	Pass
3	0.5780	32.31	18.93	9.70	42.01	28.63	56.00	46.00	-13.99	-17.37	Pass
4	1.8820	25.32	14.92	9.75	35.07	24.67	56.00	46.00	-20.93	-21.33	Pass
5	5.2060	23.74	15.92	9.81	33.55	25.73	60.00	50.00	-26.45	-24.27	Pass
6	11.4660	23.45	15.88	9.91	33.36	25.79	60.00	50.00	-26.64	-24.21	Pass

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).

Test Standard:	FCC Part 15B	Power Line:	L1
Test Mode:	Mode 2	Test Power:	AC 120 V / 60 Hz
Description:			

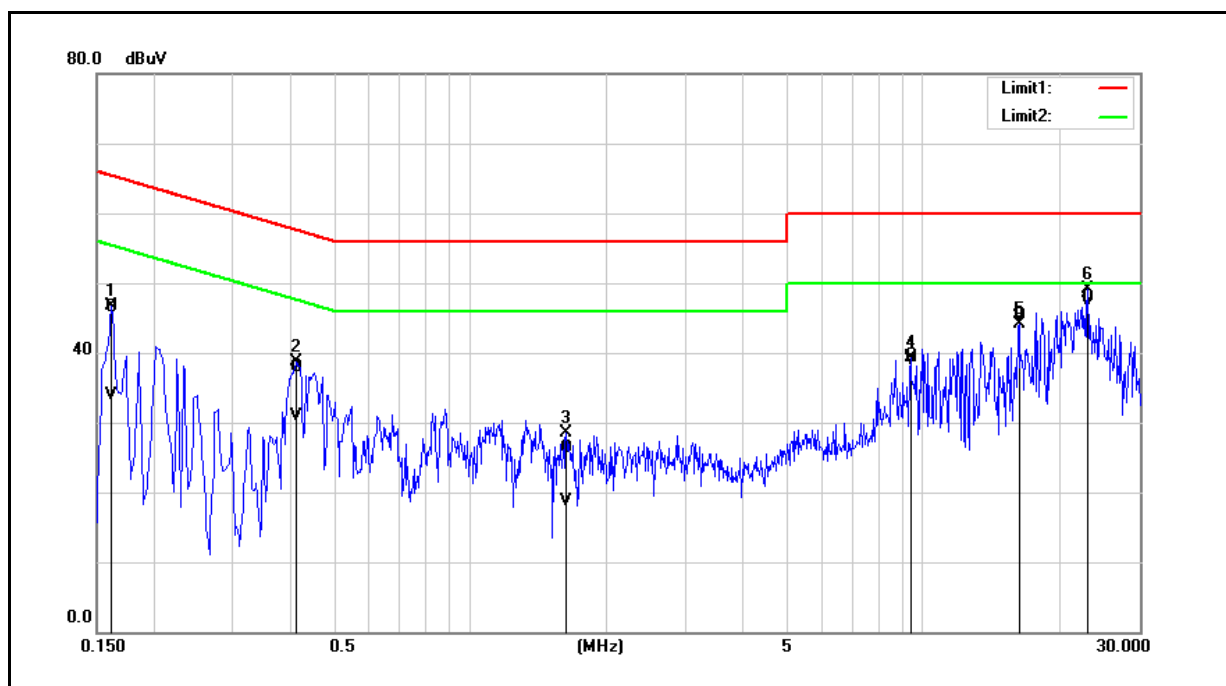


No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1620	37.02	24.88	9.70	46.72	34.58	65.36	55.36	-18.64	-20.78	Pass
2	0.4180	29.15	21.32	9.70	38.85	31.02	57.49	47.49	-18.64	-16.47	Pass
3	0.8820	20.72	12.75	9.71	30.43	22.46	56.00	46.00	-25.57	-23.54	Pass
4	2.6620	15.63	8.36	9.77	25.40	18.13	56.00	46.00	-30.60	-27.87	Pass
5	8.5060	23.24	20.31	9.87	33.11	30.18	60.00	50.00	-26.89	-19.82	Pass
6	21.6620	35.83	33.81	10.04	45.87	43.85	60.00	50.00	-14.13	-6.15	Pass

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).

Test Standard:	FCC Part 15B	Power Line:	N
Test Mode:	Mode 2	Test Power:	AC 120 V / 60 Hz
Description:			

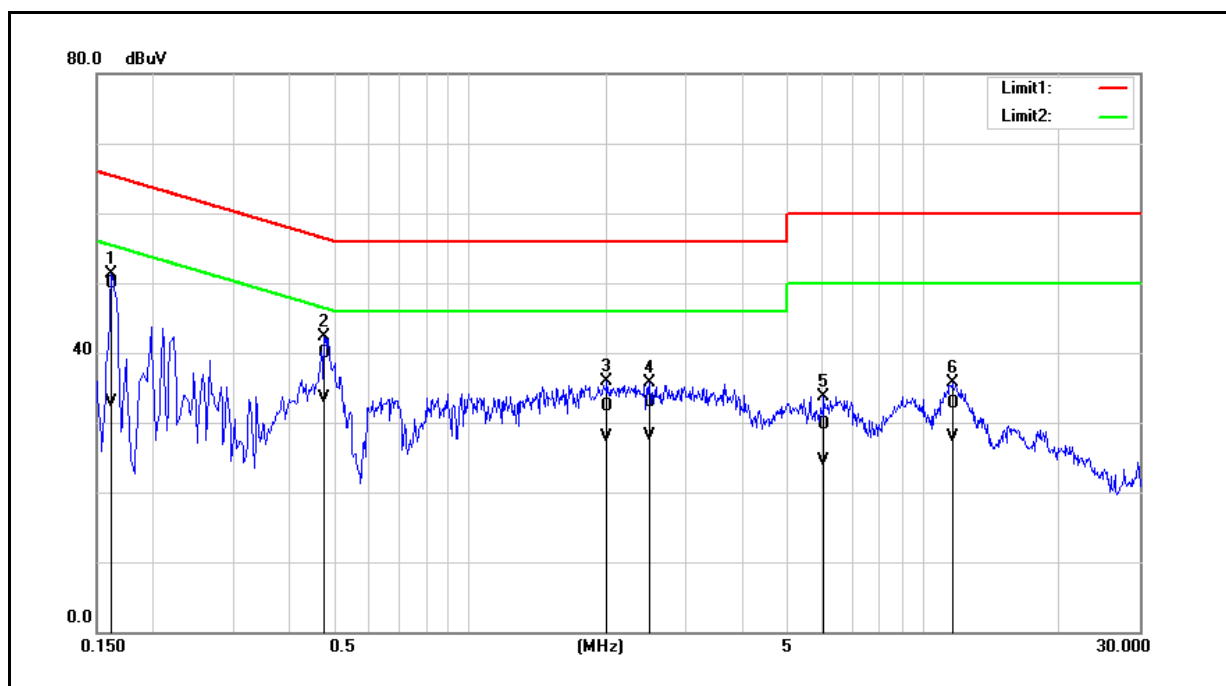


No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1620	36.75	24.28	9.69	46.44	33.97	65.36	55.36	-18.92	-21.39	Pass
2	0.4140	28.27	21.12	9.69	37.96	30.81	57.57	47.57	-19.61	-16.76	Pass
3	1.6340	16.51	8.97	9.74	26.25	18.71	56.00	46.00	-29.75	-27.29	Pass
4	9.3900	29.63	29.10	9.87	39.50	38.97	60.00	50.00	-20.50	-11.03	Pass
5	16.2300	35.40	35.12	10.00	45.40	45.12	60.00	50.00	-14.60	-4.88	Pass
6	23.1300	37.87	36.92	10.10	47.97	47.02	60.00	50.00	-12.03	-2.98	Pass

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).

Test Standard:	FCC Part 15B	Power Line:	L1
Test Mode:	Mode 3	Test Power:	AC 120 V / 60 Hz
Description:			

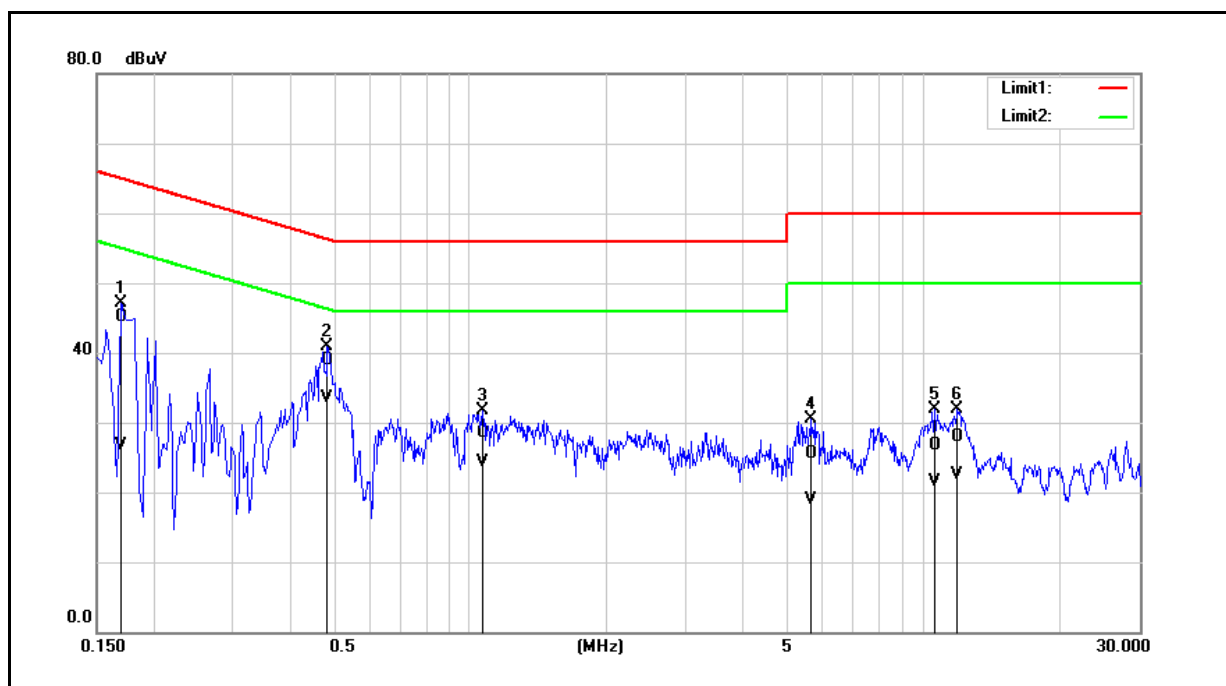


No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1620	40.16	23.19	9.70	49.86	32.89	65.36	55.36	-15.50	-22.47	Pass
2	0.4780	30.18	23.88	9.71	39.89	33.59	56.37	46.37	-16.48	-12.78	Pass
3	2.0100	22.63	18.11	9.76	32.39	27.87	56.00	46.00	-23.61	-18.13	Pass
4	2.4900	23.04	18.35	9.77	32.81	28.12	56.00	46.00	-23.19	-17.88	Pass
5	6.0260	19.90	14.71	9.83	29.73	24.54	60.00	50.00	-30.27	-25.46	Pass
6	11.5740	22.72	17.93	9.91	32.63	27.84	60.00	50.00	-27.37	-22.16	Pass

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).

Test Standard:	FCC Part 15B	Power Line:	N
Test Mode:	Mode 3	Test Power:	AC 120 V / 60 Hz
Description:			



No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1700	35.38	16.98	9.69	45.07	26.67	64.96	54.96	-19.89	-28.29	Pass
2	0.4860	29.14	23.90	9.70	38.84	33.60	56.24	46.24	-17.40	-12.64	Pass
3	1.0700	18.71	14.59	9.70	28.41	24.29	56.00	46.00	-27.59	-21.71	Pass
4	5.6780	15.63	9.06	9.83	25.46	18.89	60.00	50.00	-34.54	-31.11	Pass
5	10.5940	16.77	11.70	9.89	26.66	21.59	60.00	50.00	-33.34	-28.41	Pass
6	11.9140	17.94	12.51	9.92	27.86	22.43	60.00	50.00	-32.14	-27.57	Pass

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).

5.2. Radiated Emission

■ Limit

Under 1 GHz test shall not exceed following value

FCC 47 CFR PART 15 SUBPART B				
Frequency range (MHz)	Class A		Class B	
	Distance (m)	dBuV/m	Distance (m)	dBuV/m
30 to 88	10	39	3	40
88 to 216	10	43.5	3	43.5
216 to 960	10	46.4	3	46
Above 960	10	49.5	3	54

CISPR 22				
Frequency range (MHz)	Class A		Class B	
	Distance (m)	dBuV/m	Distance (m)	dBuV/m
30 to 230	10	40	10	30
230 to 1000	10	47	10	37

Above 1 GHz test shall not exceed following value

Frequency (MHz)	dBuV/m (Distance 3 m)			
	Class A		Class B	
	Average	Peak	Average	Peak
1000 ~ 40000	60	80	54	74

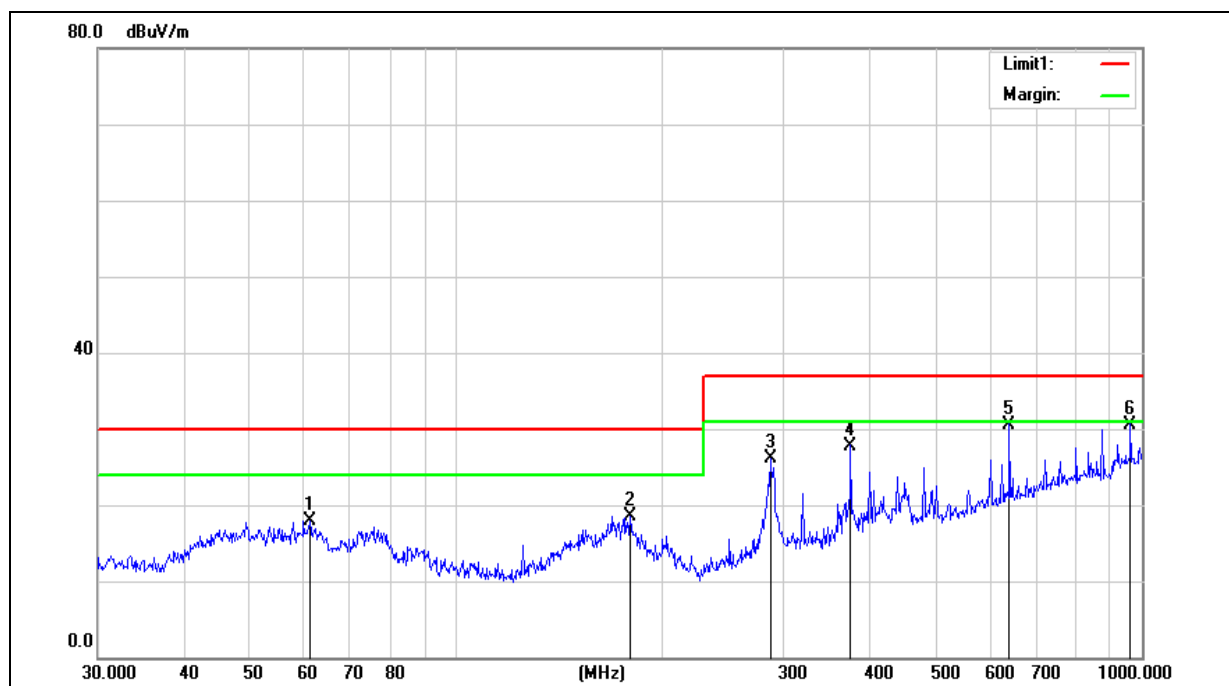
- Remark:
1. The tighter limit shall apply at the edge between two frequency bands.
 2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
 3. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)
 4. Peak detector limit is corresponding to 20 dB above the maximum permitted average limit.

According to FCC Part 15.33 (b), for an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

Highest frequency generated or used in the device or in which the device operated or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705-108	1000
108-500	2000
500-1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

■ Test Result

Test Standard:	FCC Part 15B (limit use CISPR 22)	Test Distance:	10 m
Test Mode:	Mode 1	Test Power:	AC 120 V / 60 Hz
Measurement Range:	30 MHz~1 GHz	Ant.Polar.:	Horizontal



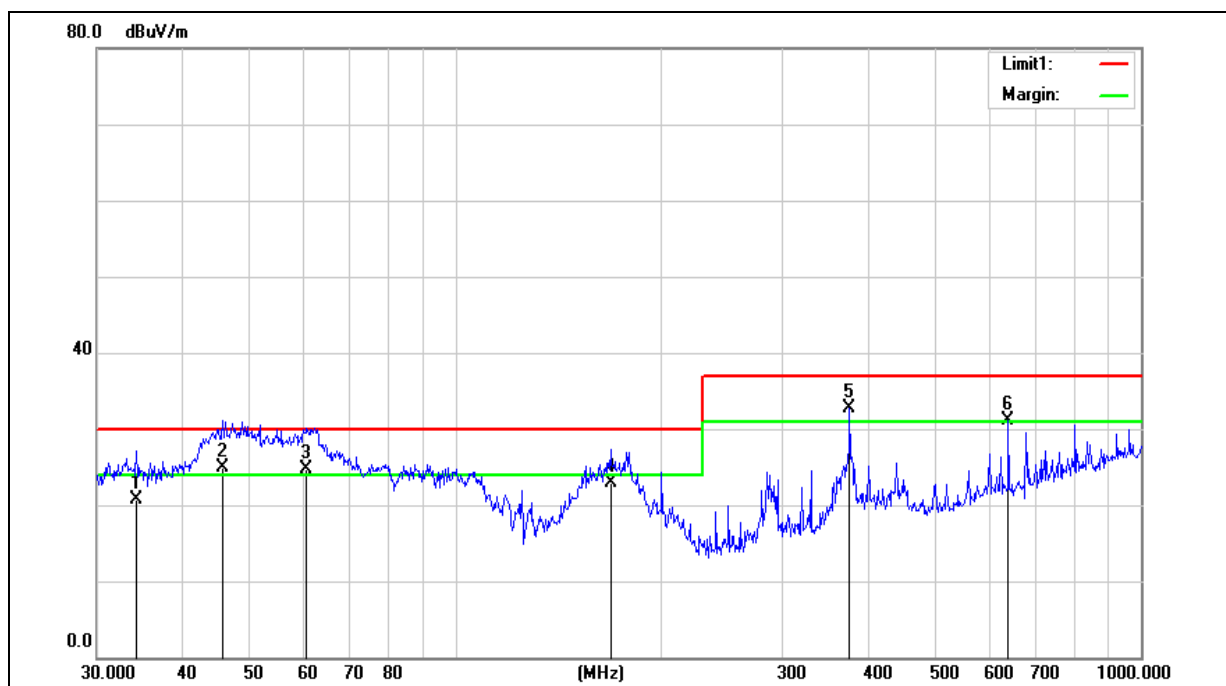
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	61.1316	36.42	-18.52	17.90	30.00	-12.10	200	0	QP
2	179.3863	36.88	-18.38	18.50	30.00	-11.50	400	270	QP
3	286.9823	42.40	-16.30	26.10	37.00	-10.90	400	243	QP
4	375.9385	42.01	-14.21	27.80	37.00	-9.20	200	49	QP
5	640.6110	39.63	-9.03	30.60	37.00	-6.40	100	231	QP
6	962.1623	35.07	-4.47	30.60	37.00	-6.40	100	311	QP

Note: 1. Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

Example: 17.90 = -18.52 + 36.42

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Test Standard:	FCC Part 15B (limit use CISPR 22)	Test Distance:	10 m
Test Mode:	Mode 1	Test Power:	AC 120 V / 60 Hz
Measurement Range:	30 MHz~1 GHz	Ant.Polar.:	Vertical



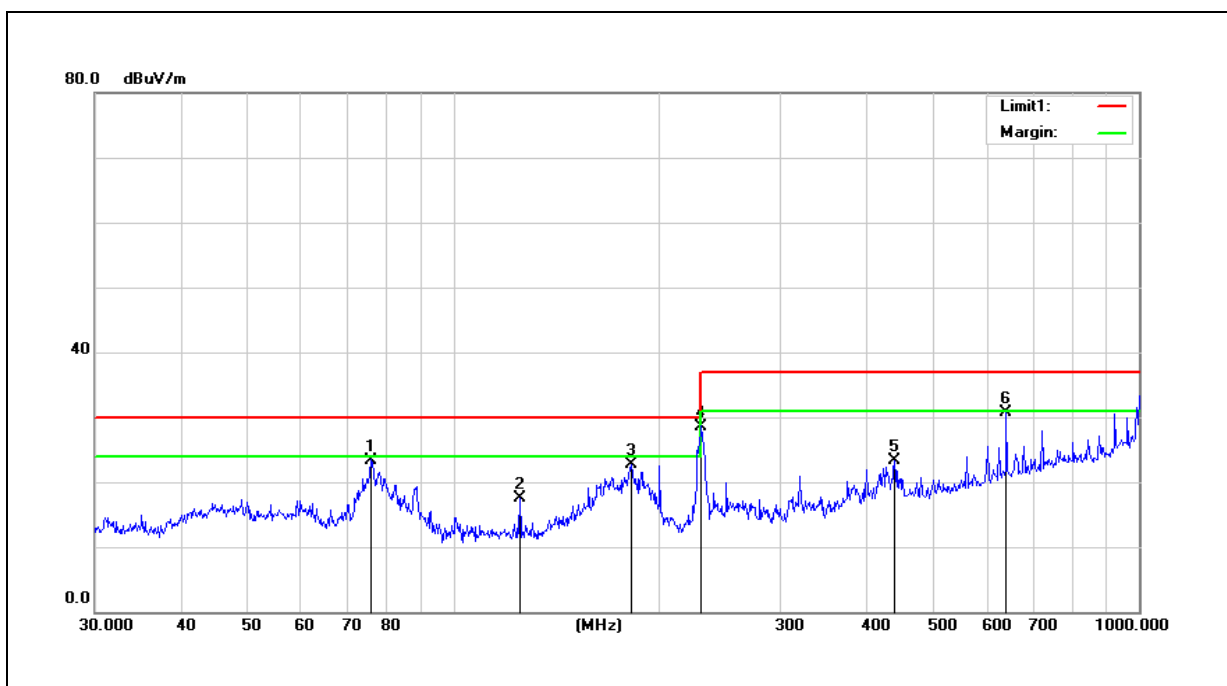
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	34.2760	38.51	-17.71	20.80	30.00	-9.20	299	111	QP
2	45.6948	41.30	-16.30	25.00	30.00	-5.00	199	359	QP
3	60.7044	41.43	-16.63	24.80	30.00	-5.20	200	0	QP
4	168.4138	38.10	-15.20	22.90	30.00	-7.10	100	301	QP
5	375.9385	44.85	-12.15	32.70	37.00	-4.30	399	266	QP
6	640.6110	37.33	-6.23	31.10	37.00	-5.90	299	179	QP

Note: 1. Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

Example: 20.80 = -17.71 + 38.51

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Test Standard:	FCC Part 15B (limit use CISPR 22)	Test Distance:	10 m
Test Mode:	Mode 2	Test Power:	AC 120 V / 60 Hz
Measurement Range:	30 MHz~1 GHz	Ant.Polar.:	Horizontal

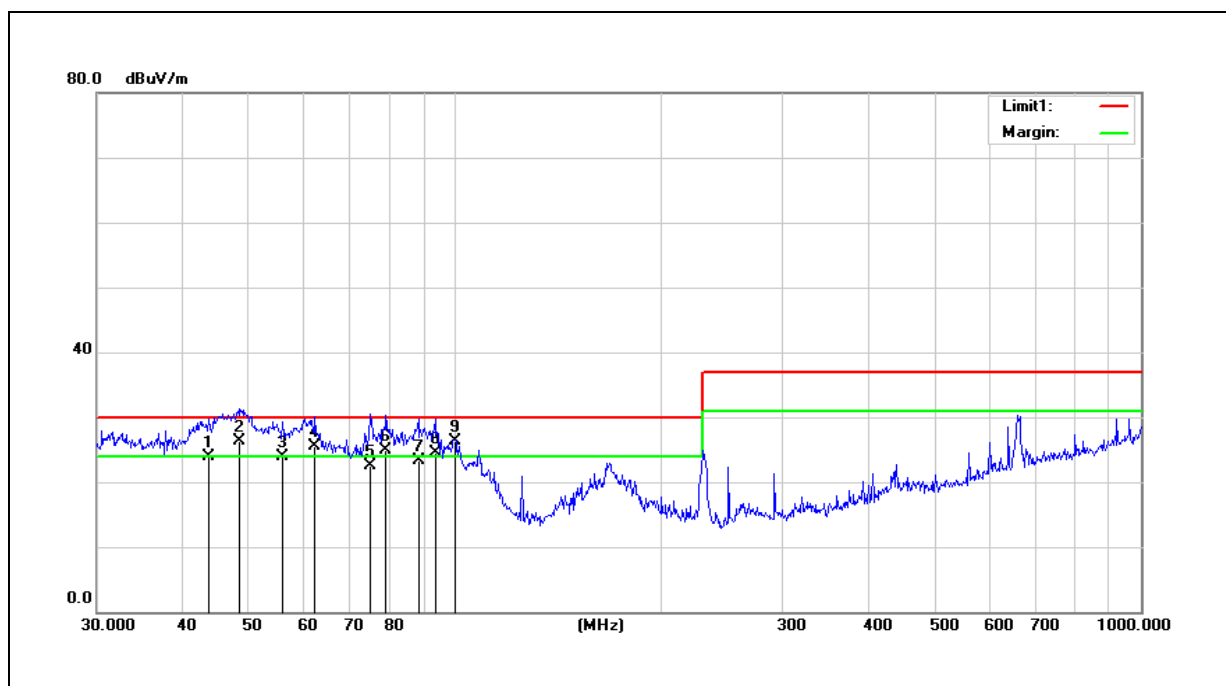


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	75.7114	44.39	-20.99	23.40	30.00	-6.60	400	63	QP
2	125.0066	36.67	-19.17	17.50	30.00	-12.50	400	299	QP
3	181.9202	41.36	-18.66	22.70	30.00	-7.30	400	111	QP
4	230.0985	47.77	-19.17	28.60	37.00	-8.40	300	41	QP
5	440.1963	35.66	-12.36	23.30	37.00	-13.70	300	136	QP
6	640.6110	39.73	-9.03	30.70	37.00	-6.30	200	171	QP

Note: 1. Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Test Standard:	FCC Part 15B (limit use CISPR 22)	Test Distance:	10 m
Test Mode:	Mode 2	Test Power:	AC 120 V / 60 Hz
Measurement Range:	30 MHz~1 GHz	Ant.Polar.:	Vertical

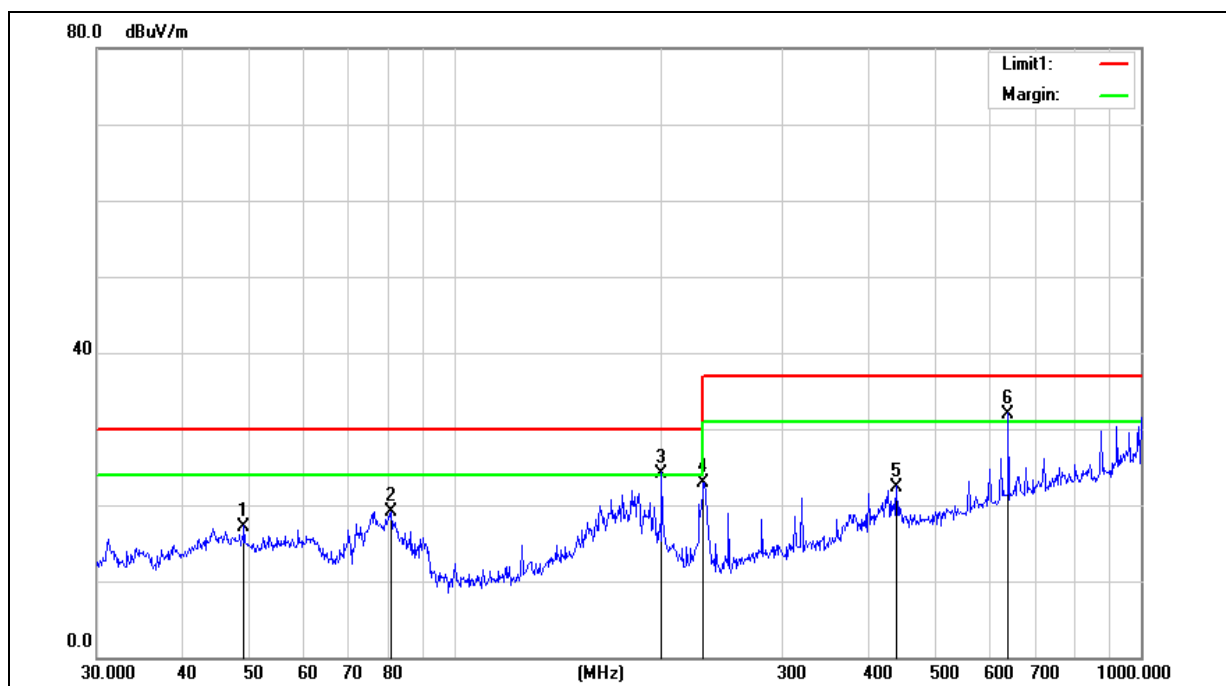


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	43.6584	40.41	-16.41	24.00	30.00	-6.00	100	35	QP
2	48.5016	42.59	-16.19	26.40	30.00	-3.60	100	360	QP
3	56.0007	40.23	-16.33	23.90	30.00	-6.10	199	1	QP
4	62.4314	42.43	-16.93	25.50	30.00	-4.50	288	0	QP
5	75.1822	41.84	-19.24	22.60	30.00	-7.40	100	278	QP
6	79.2426	45.16	-20.26	24.90	30.00	-5.10	100	197	QP
7	88.3421	44.98	-21.68	23.30	30.00	-6.70	200	0	QP
8	93.4402	45.86	-21.36	24.50	30.00	-5.50	122	360	QP
9	99.8777	46.75	-20.35	26.40	30.00	-3.60	200	0	QP

Note: 1. Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Test Standard:	FCC Part 15B (limit use CISPR 22)	Test Distance:	10 m
Test Mode:	Mode 3	Test Power:	AC 120 V / 60 Hz
Measurement Range:	30 MHz~1 GHz	Ant.Polar.:	Horizontal

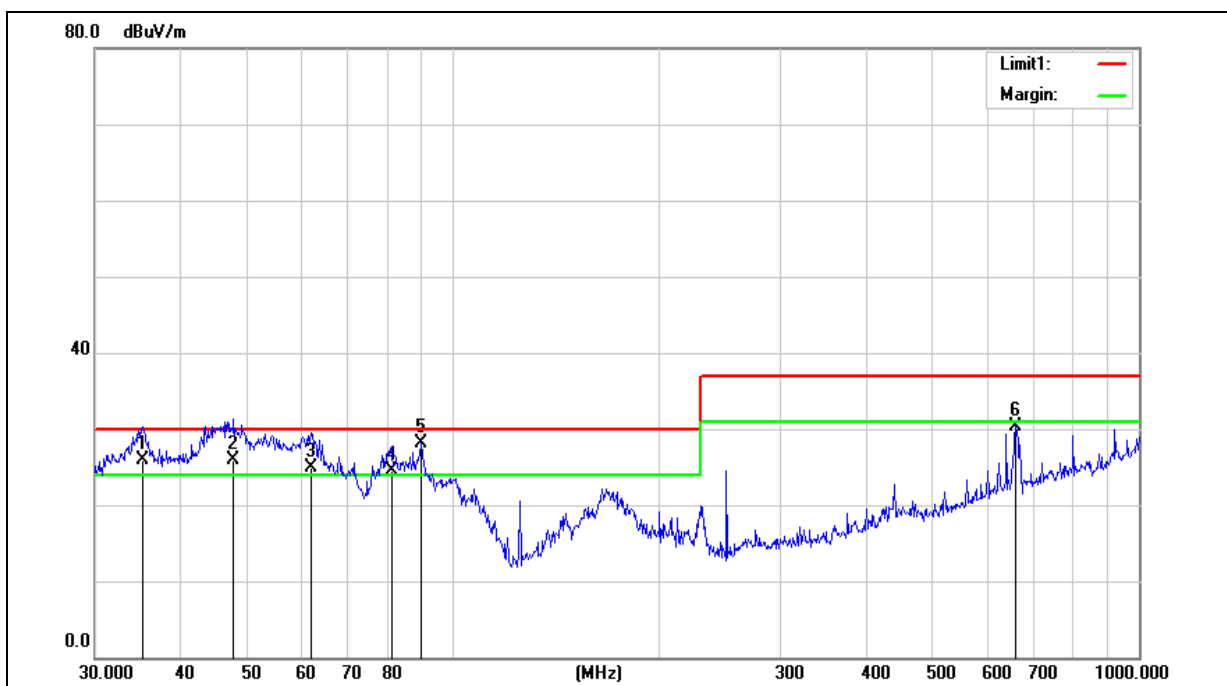


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	49.1865	34.67	-17.47	17.20	30.00	-12.80	400	123	QP
2	80.6442	41.44	-22.34	19.10	30.00	-10.90	300	70	QP
3	199.9856	43.73	-19.53	24.20	30.00	-5.80	300	280	QP
4	230.0985	42.07	-19.17	22.90	37.00	-14.10	400	0	QP
5	440.1963	34.76	-12.36	22.40	37.00	-14.60	199	134	QP
6	640.6110	41.03	-9.03	32.00	37.00	-5.00	100	235	QP

Note: 1. Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Test Standard:	FCC Part 15B (limit use CISPR 22)	Test Distance:	10 m
Test Mode:	Mode 3	Test Power:	AC 120 V / 60 Hz
Measurement Range:	30 MHz~1 GHz	Ant.Polar.:	Vertical

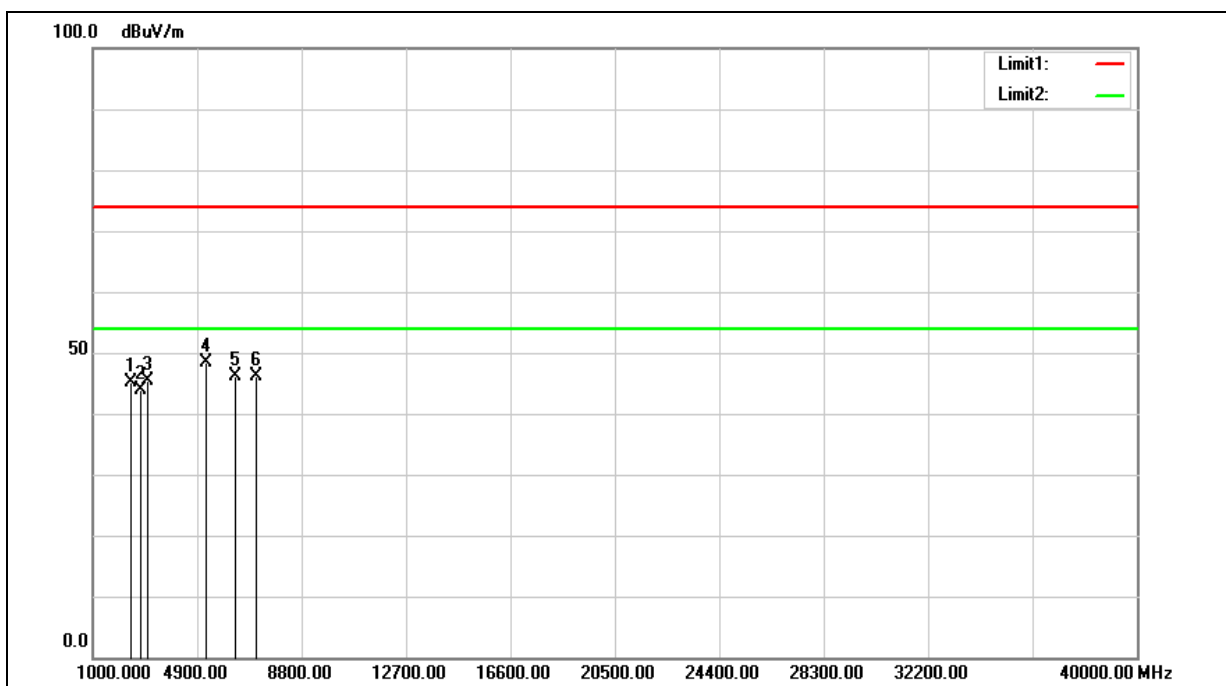


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	35.2512	43.42	-17.42	26.00	30.00	-4.00	299	107	QP
2	47.8260	42.19	-16.19	26.00	30.00	-4.00	100	359	QP
3	61.9951	41.98	-16.98	25.00	30.00	-5.00	299	42	QP
4	81.2117	45.31	-20.81	24.50	30.00	-5.50	199	149	QP
5	89.9047	49.84	-21.66	28.18	30.00	-1.82	100	28	QP
6	661.1505	36.26	-5.86	30.40	37.00	-6.60	299	181	QP

Note: 1. Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Test Standard:	FCC Part 15B	Test Distance:	3 m
Test Mode:	Mode 1	Test Power:	AC 120 V / 60 Hz
Measurement Range:	1 GHz~40 GHz	Ant.Polar.:	Horizontal



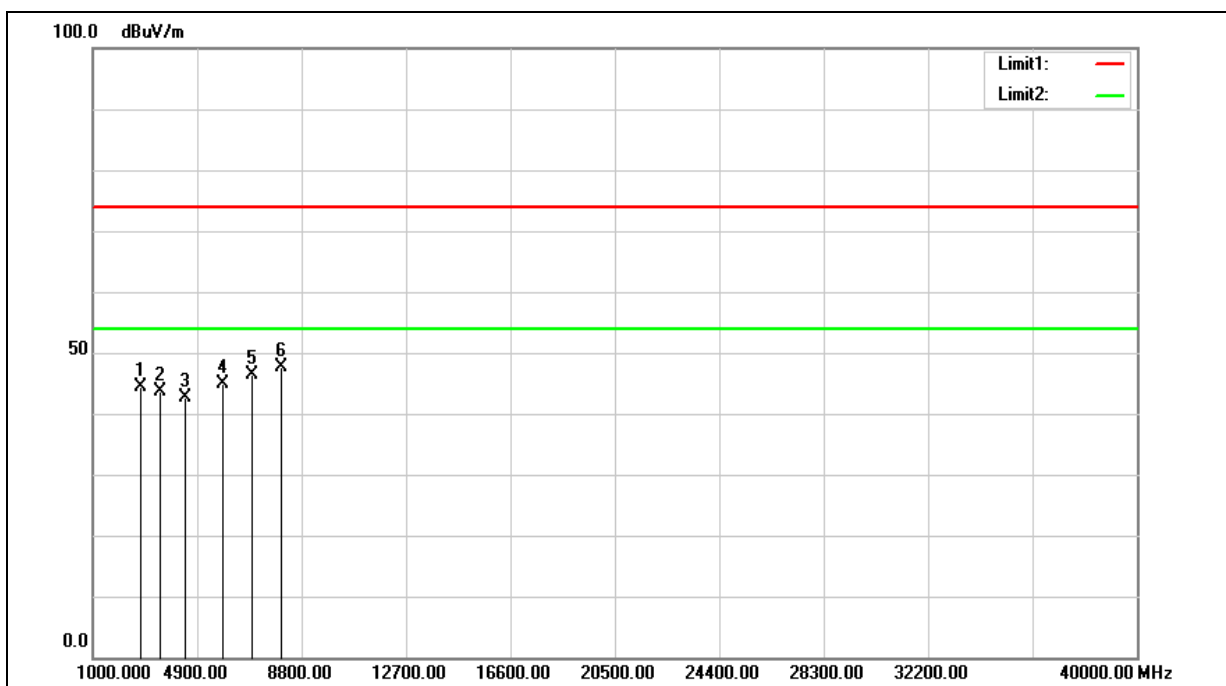
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2440.000	43.42	1.63	45.05	74.00	-28.95	100	112	peak
2	2764.000	41.19	2.61	43.80	74.00	-30.20	100	221	peak
3	2992.000	42.22	3.22	45.44	74.00	-28.56	100	105	peak
4	5212.000	41.45	7.04	48.49	74.00	-25.51	200	168	peak
5	6316.000	37.61	8.61	46.22	74.00	-27.78	200	136	peak
6	7084.000	36.95	9.29	46.24	74.00	-27.76	100	39	peak

Note: 1. Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

Example: 45.05 = 1.63 + 43.42

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Test Standard:	FCC Part 15B	Test Distance:	3 m
Test Mode:	Mode 1	Test Power:	AC 120 V / 60 Hz
Measurement Range:	1 GHz~40 GHz	Ant.Polar.:	Vertical



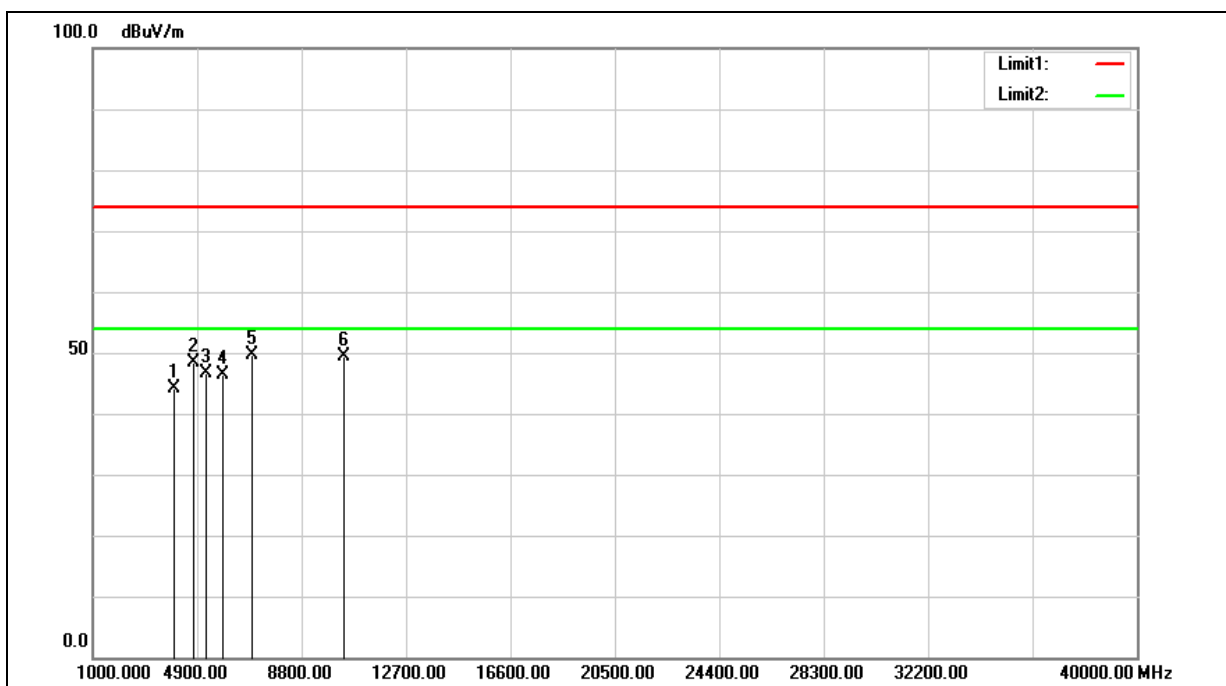
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2764.000	41.67	2.61	44.28	74.00	-29.72	200	360	peak
2	3472.000	39.78	3.77	43.55	74.00	-30.45	200	4	peak
3	4444.000	36.86	5.84	42.70	74.00	-31.30	200	2	peak
4	5872.000	36.92	7.90	44.82	74.00	-29.18	200	2	peak
5	6952.000	37.04	9.25	46.29	74.00	-27.71	200	13	peak
6	8044.000	37.79	9.88	47.67	74.00	-26.33	200	4	peak

Note: 1. Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

Example: 44.28 = 2.61 + 41.67

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Test Standard:	FCC Part 15B	Test Distance:	3 m
Test Mode:	Mode 2	Test Power:	AC 120 V / 60 Hz
Measurement Range:	1 GHz~40 GHz	Ant.Polar.:	Horizontal

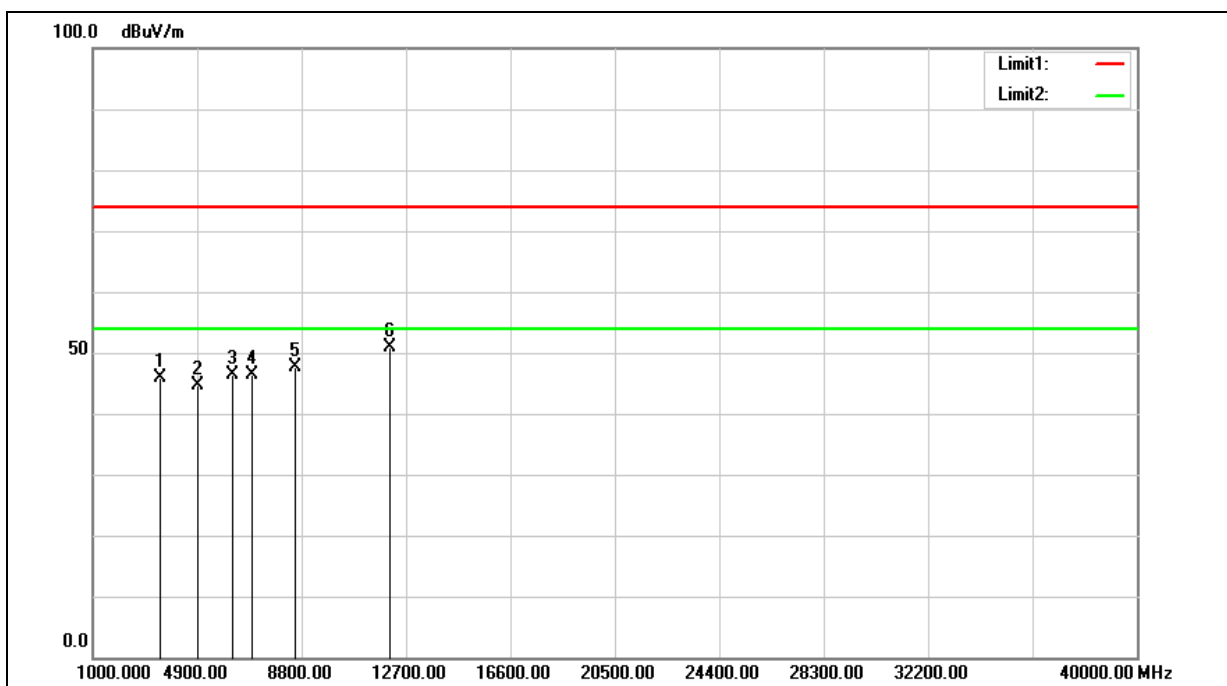


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	4024.000	39.03	5.18	44.21	74.00	-29.79	100	254	peak
2	4756.000	41.89	6.38	48.27	74.00	-25.73	100	84	peak
3	5188.000	39.72	7.01	46.73	74.00	-27.27	100	75	peak
4	5812.000	38.53	7.81	46.34	74.00	-27.66	199	360	peak
5	6952.000	40.41	9.25	49.66	74.00	-24.34	100	125	peak
6	10396.000	36.06	13.30	49.36	74.00	-24.64	100	142	peak

Note: 1. Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Test Standard:	FCC Part 15B	Test Distance:	3 m
Test Mode:	Mode 2	Test Power:	AC 120 V / 60 Hz
Measurement Range:	1 GHz~40 GHz	Ant.Polar.:	Vertical

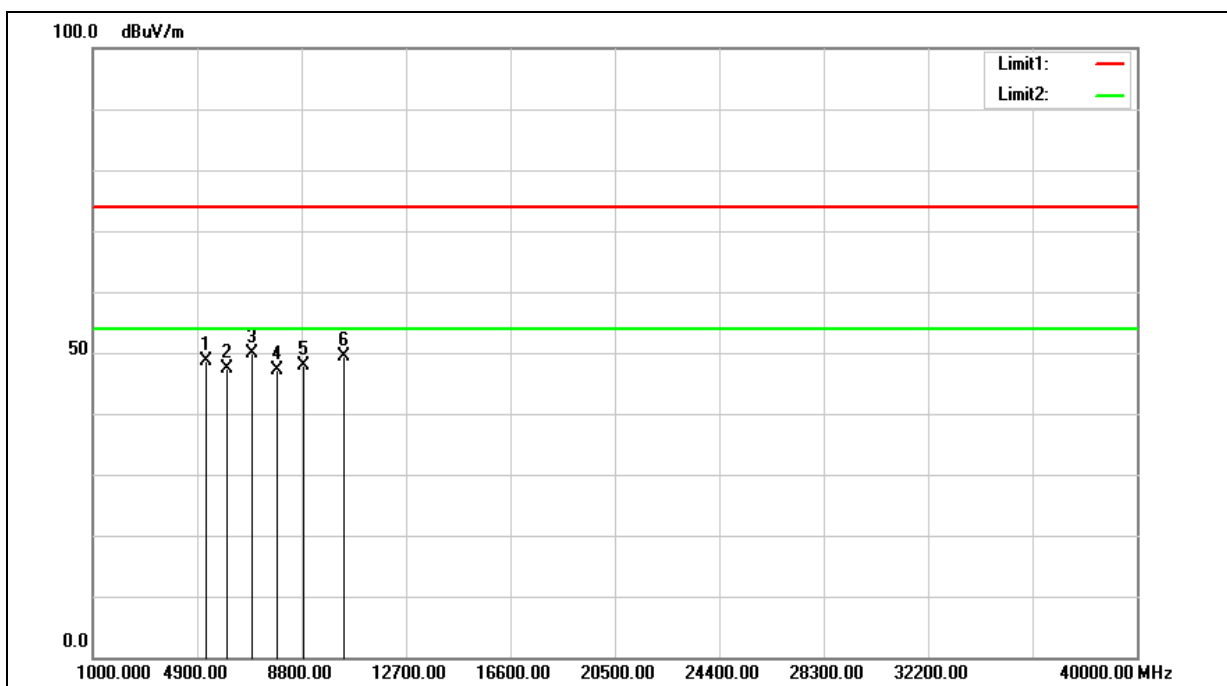


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	3472.000	42.03	3.77	45.80	74.00	-28.20	200	9	peak
2	4864.000	38.14	6.57	44.71	74.00	-29.29	200	62	peak
3	6220.000	37.82	8.44	46.26	74.00	-27.74	200	84	peak
4	6952.000	37.21	9.25	46.46	74.00	-27.54	200	13	peak
5	8536.000	37.49	10.02	47.51	74.00	-26.49	200	102	peak
6	12076.000	35.39	15.45	50.84	74.00	-23.16	200	133	peak

Note: 1. Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Test Standard:	FCC Part 15B	Test Distance:	3 m
Test Mode:	Mode 3	Test Power:	AC 120 V / 60 Hz
Measurement Range:	1 GHz~40 GHz	Ant.Polar.:	Horizontal

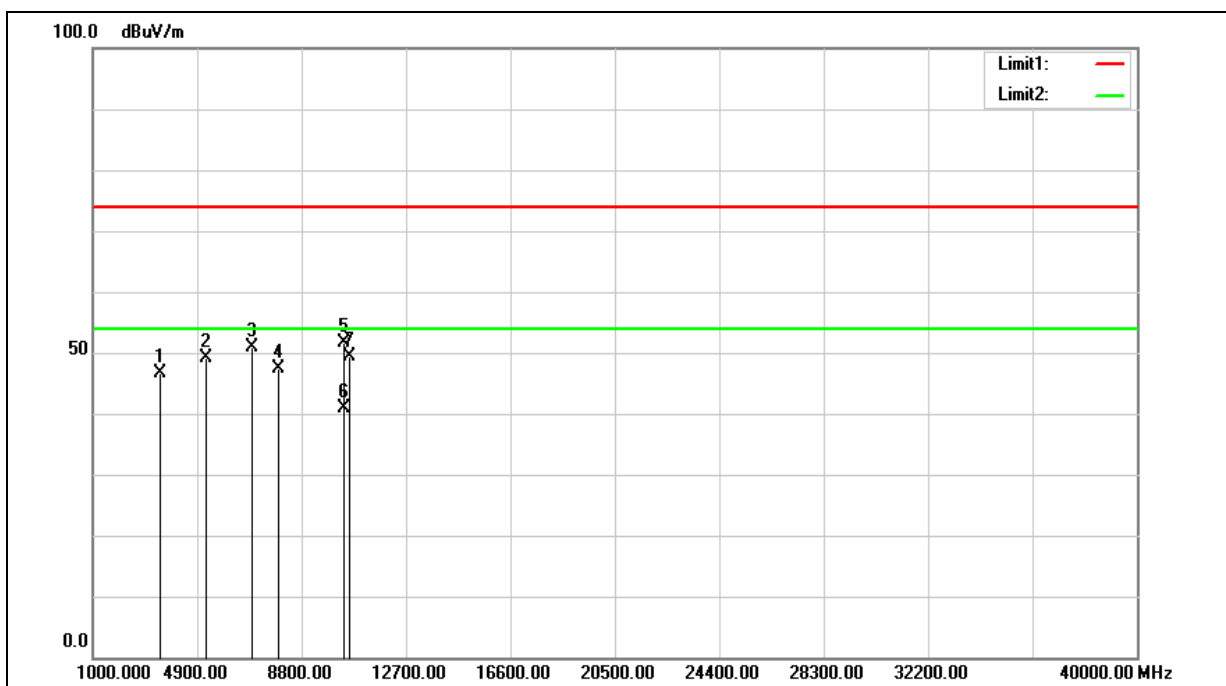


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	5212.000	41.47	7.04	48.51	74.00	-25.49	100	173	peak
2	5992.000	39.22	8.07	47.29	74.00	-26.71	100	119	peak
3	6952.000	40.72	9.25	49.97	74.00	-24.03	100	97	peak
4	7900.000	37.48	9.75	47.23	74.00	-26.77	100	150	peak
5	8860.000	37.57	10.29	47.86	74.00	-26.14	100	159	peak
6	10396.000	36.08	13.30	49.38	74.00	-24.62	200	213	peak

Note: 1. Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Test Standard:	FCC Part 15B	Test Distance:	3 m
Test Mode:	Mode 3	Test Power:	AC 120 V / 60 Hz
Measurement Range:	1 GHz~40 GHz	Ant.Polar.:	Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	3472.000	42.84	3.77	46.61	74.00	-27.39	100	210	peak
2	5212.000	41.98	7.04	49.02	74.00	-24.98	100	277	peak
3	6952.000	41.67	9.25	50.92	74.00	-23.08	100	152	peak
4	7924.000	37.59	9.78	47.37	74.00	-26.63	100	330	peak
5	10396.000	38.21	13.30	51.51	74.00	-22.49	200	243	peak
6	10396.000	27.55	13.30	40.85	54.00	-13.15	200	243	AVG
7	10588.000	35.60	13.67	49.27	74.00	-24.73	100	321	peak

Note: 1. Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

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