VCCI Test Report

Issued date: Sep. 14, 2022

Project No.: 22Q033002

Product : Network Video Recorder

Model : ND9542P, ND9442P

Applicant : VIVOTEK INC.

Address : 6F, No.192, Lien-Cheng Rd., Chung-Ho , New Taipei City, 235, Taiwan, R.O.C.

Report No: WD-EV-R-220292-A0

According to

VCCI-CISPR32: 2016, Class A

Authorized Signatory : / Ken Huang

Wendell Industrial Co., Ltd
Wendell EMC & RF Laboratory
Add: 5F-1, No. 188, Baoqiao Road, Xindian District, New Taipei City 23145, Taiwan R.O.C.

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History of this test report

Report No.	Issue date	Description
WD-EV-R-220292-A0	Sep. 14, 2022	Initial Issue

History of supplementary report

Report No.	Issue date	Description
WD-EV-R-220292-A0	Sep. 14, 2022	Original report

Declaration

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us.

1 Certification

Product: Network Video Recorder
Brand Name: VIVOTEK
Model: ND9542P, ND9442P
Applicant: VIVOTEK INC.
Tested: Aug. 30 ~ Sep. 05, 2022
Standard: VCCI-CISPR32: 2016, Class A

The above equipment (Model: ND9542P) has been tested by **Wendell EMC & RF Laboratory**, and found compliance with the requirement of the above standards. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Please note that the measurement uncertainty are provided for informational purpose only and are not used in determining the Pass/Fail results.

1.1 Summary of Test Result

The EUT has been tested according to the following specifications:

Emission				
Standard	**Test Item**	**Limit**	**Result**	**Remark**
VCCI-TECHNICAL REQUIREMENTS (VCCI-CISPR 32: 2016) CISPR 32: 2015	Conducted disturbance at mains terminals	Class A	Pass	Meets the requirements
	Conducted disturbance at telecommunication ports test	Class A	Pass	Meets the requirements
	Radiated disturbance	Class A	Pass	Meets the requirements

Note: Test record contained in the referenced test report relate only to the EUT sample and test item.

2 Test Configuration of Equipment Under Test

2.1 Test Facility

Conducted disturbance at mains terminals and Conducted disturbance at telecommunication ports Tests

W01: 5F-1, No.188, Baoqiao Rd., Xindian Dist., New Taipei City 23145, Taiwan (R.O.C)

Conducted disturbance at mains terminals, Conducted disturbance at telecommunication ports and Radiated emission (9*6*6 Chamber) Tests

W08: No.119, Wugong 3rd Rd., Wugu Dist., New Taipei City 248, Taiwan (R.O.C)

ACCREDITATIONS

The laboratories are accredited and approved by the TAF according to ISO/IEC 17025.

2.2 Measurement Uncertainty

The measurement instrumentation uncertainty is evaluated according to CISPR 16-4-2.

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Wendell EMC & RF Laboratory U_{lab} is less than U_{cispr}, therefore compliance or non-compliance with a disturbance limit shall be determined in the following manner.

– compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;

– non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

Please note that the measurement uncertainty (U_{lab}) is provided for informational purpose only and is not used in determining the Pass/Fail results.

2.2.1 Conducted Emission test

Test Site	Measurement Freq. Range	dB (U_{lab})	VCCI Site Registration No.	Note
W01	150 kHz~30 MHz	2.72	C-14684	N/A
W08	150 kHz ~ 30 MHz	2.70	C-20088	N/A

2.2.2 Conducted emission at telecom port test

Test Site	Measurement Freq. Range	dB (U_{lab})	VCCI Site Registration No.	Note
W01	150 kHz~30 MHz	2.72	T-12224	N/A
W08	150 kHz ~ 30 MHz	2.64	T-20089	N/A

2.2.3 Radiated Emission test

Test Site	Measurement Freq. Range	Ant	dB (U_{lab})	VCCI Site Registration No.	Note
W08	30 MHz ~ 200 MHz	V	3.68	R-20086	N/A
	30 MHz ~ 200 MHz	H	2.70		N/A
	200 MHz ~ 1000 MHz	V	5.19		N/A
	200 MHz ~ 1000 MHz	H	3.26		N/A
W08	1 GHz ~ 6 GHz	V	4.98	G-20086	N/A
	1 GHz ~ 6 GHz	H	5.07		N/A

3 General Information

3.1 Description of EUT

Product	Network Video Recorder
Brand	VIVOTEK
Model	ND9542P, ND9442P
Applicant	VIVOTEK INC.
Received Date	Aug. 16, 2022
EUT Power Rating	100-240Vac (from AC mains)
Model Differences	Refer to Note for more details
Operating System	N/A
Data Cable Supplied	N/A
Accessory Device	N/A
I/O Port	Please refer to the User's Manual

Note:

1. The following models are provided to this EUT. The series model information is provided by client.

Brand Name	Model	Difference
VIVOTEK	ND9542P	Channel: 32ch
	ND9442P	Channel: 16ch

2. The EUT's highest operating frequency is 1600MHz. Therefore the radiated emission is tested up to 6GHz.

3.2 Description of Test Modes

For conducted emission, the EUT has been pre-tested under the following test modes, and **test mode 1** was the worst case for final test.

Test Mode	Test Condition
1	Recording mode
2	Playing mode
3	Backup mode

For conducted emission test at telecom port, the EUT has been pre-tested under the following test modes, and **test mode 2 and 4** were the worst case for final test.

Test Mode	Test Condition
1	Recording mode, LAN (10Mbps/100Mbps/1Gbps)
2	Playing mode, LAN (10Mbps/100Mbps/1Gbps)
3	Backup mode, LAN (10Mbps/100Mbps/1Gbps)
4	Playing mode, POE (MAX)

For radiated emission, the EUT has been pre-tested under the following test modes, and **test mode 2** was the worst case for final test.

Test Mode	Test Condition
1	Recording mode
2	Playing mode
3	Backup mode

Test results are presented in the report as below.

Test Mode	Test Condition
Conducted emission test	
-	Recording mode
Conducted emission test at telecom port test	
A	Playing mode, LAN (10Mbps/100Mbps/1Gbps)
B	Playing mode, POE (MAX)
Radiated emission 30MHz ~ 1GHz test	
-	Playing mode
Radiated emission above 1GHz test	
-	Playing mode

Note:

1. For conducted emission, the EUT has been pre-tested frequency was 50Hz and 60Hz, and 60Hz was the worst case for final test.
2. For conducted emission test at telecom port, the EUT has been pre-tested frequency 50Hz and 60Hz, and 60Hz was the worst case for final test.
3. For radiated emission, the EUT has been pre-tested frequency was 50Hz and 60Hz, and 60Hz was the worst case for final test.

3.3 EUT Operating Condition

a. The EUT placed on test table.
b. Prepare PC to act as a communication partner and placed it outside of testing area.
c. The EUT was connected to the PC with LAN cable.
d. The communication partner sent data to EUT by command "ping" via LAN.
e. The EUT sent video signal to monitor and displayed on screen.
f. The IPCAM sent video signal to EUT through LAN cable.
g. The microphone sent voice signal to EUT.
h. The EUT sent voice signal to earphone.
i. The EUT write data with Internal HDD and External HDD.
j. Set the EUT on playing mode.

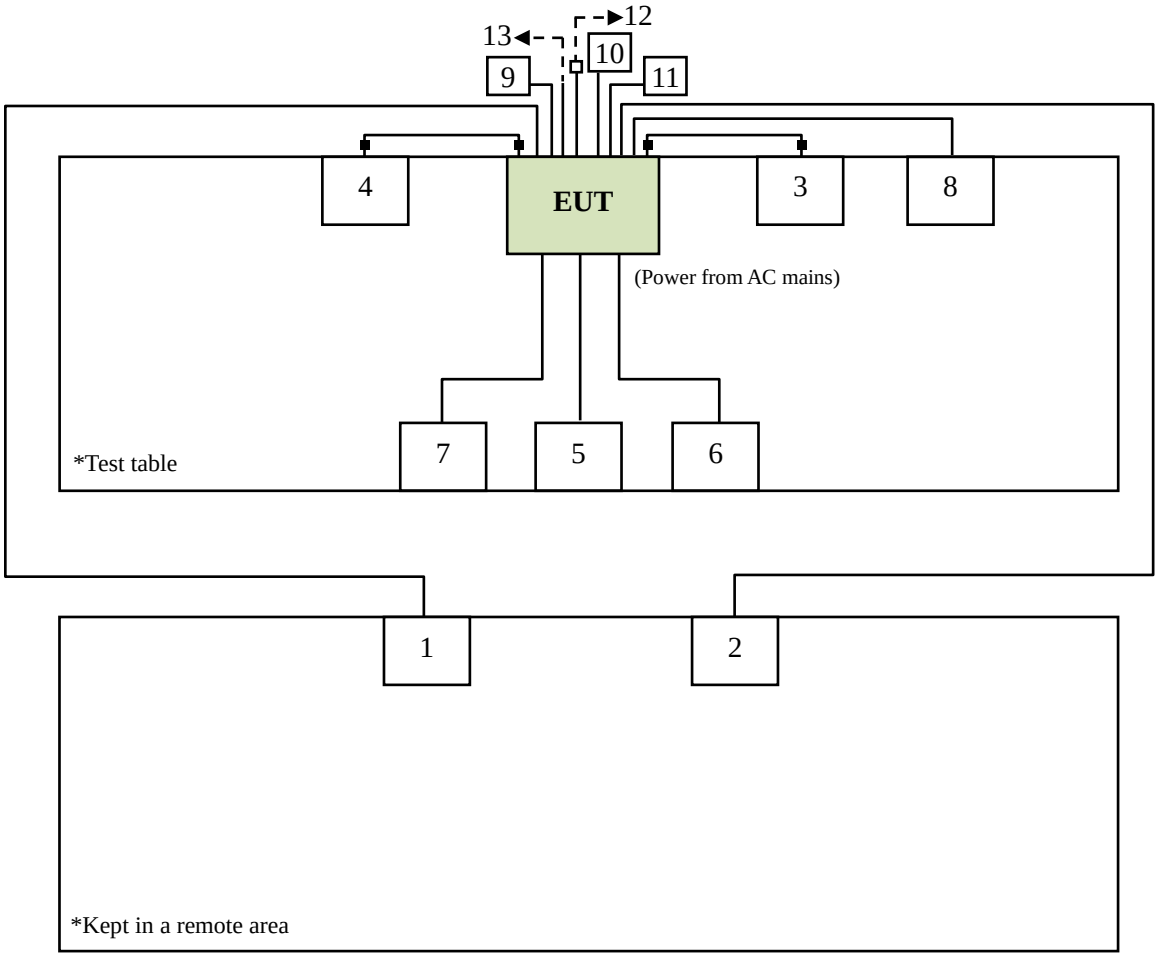
3.4 Description of Support Unit

The EUT has been conducted testing with other necessary accessories or support units.

Item	Equipment	Brand	Model No.	Serial No.	FCC ID	Data Cable	Power Cable	Remark
1	Desktop PC	DELL	D13M	H6K10 A00	FCC DoC Approved	20m CAT.5E non-shielded RJ45 cable	1.8m non-shielded cable	-
2	Notebook	acer	ZQ0	NXV9V TA01344718C4 B7600	FCC DoC Approved	20m CAT.5E non-shielded RJ45 cable	AC: 1m non-shielded cable DC: 1.4m non-shielded cable with 1 core	-
3	1080P Monitor	DELL	P2317H	CN-0PGX4T-Q DC00-7C6-OLE B-A05	FCC DoC Approved	1.5m shielded VGA cable with 2 cores	1.8m non-shielded cable	-
4	4K Monitor	HP	HP 27f 4k Display	3CM01916TF	FCC DoC Approved	1.5m shielded HDMI cable with 2 cores	AC: 1.8m non-shielded cable DC: 1.4m non-shielded cable with 1 core	-
5	Keyboard	Logitech	Y-U0009	1710SC500LA8	FCC DoC Approved	1.5m non-shielded cable	N/A	-
6	Mouse	Logitech	M-U0026	HS726HB	FCC DoC Approved	2m non-shielded cable	N/A	-
7	Earphone & Microphone	E-books	E-EPA057	N/A	N/A	1.4m non-shielded cable	N/A	-
8	External Hard Drive	Transcend	TS1TSJ25 C3N	D62397-0399	FCC DoC Approved	1m shielded cable	N/A	-
9	POE PD Fixture	NA	POE*8Port *30W-AT	N/A	N/A	1m CAT.5E non-shielded RJ45 cable (x6)	1.8m non-shielded cable	-
10	Network Camera	VIVOTEK	IT9380-H	N/A	N/A	1m CAT.5E non-shielded RJ45 cable	N/A	Supplied by client
11	Network Camera	VIVOTEK	IT9388-HT	N/A	N/A	1m CAT.5E non-shielded RJ45 cable	N/A	Supplied by client
12	RJ45 terminator (x8)	N/A	N/A	N/A	N/A	0.4m non-shielded cable	N/A	-
13	Multi conductor cable (x40)	N/A	N/A	N/A	N/A	0.4m non-shielded cable	N/A	-

Note: 1. The core(s) is(are) originally attached to the cable(s).
2. Item 1-2 acted as communication partners to transfer data.

3.5 Configuration of System Under Test



4 Emission Test

4.1 Conducted Emission Measurement (Frequency Range 150 KHz-30MHz)

4.1.1 Limit of Conducted Emission Measurement

Class A equipment:

Requirements for conducted emissions from the AC mains power ports of Class A equipment			
Frequency (MHz)	**Measurement**		**Class A limits dB(μV)**
	Coupling device	**Detector type/ bandwidth**	
0.15 to 0.5	AMN	Quasi Peak / 9 kHz	79
0.5 to 30			73
0.15 to 0.5	AMN	Average / 9 kHz	66
0.5 to 30			60

Class B equipment:

Requirements for conducted emissions from the AC mains power ports of Class B equipment			
Frequency (MHz)	**Measurement**		**Class B limits dB(μV)**
	Coupling device	**Detector type/ bandwidth**	
0.15 to 0.5	AMN	Quasi Peak / 9 kHz	66 to 56*
0.5 to 5			56
5 to 30			60
0.15 to 0.5	AMN	Average / 9 kHz	56 to 46*
0.5 to 5			46
5 to 30			50

***** Decreases with the logarithm of the frequency.

Note: 1. The lower limit shall apply at the transition frequencies.
2. Detector function in the form: PK = Peak, QP = Quasi Peak, AV = Average
3. The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correction Factor = Insertion loss of LISN + Cable loss + Transient Limiter (If use)
Margin Level = Measurement Value –Limit Value

4.1.2 Test Instrument

Test Site: W01-CE					
Item	**Equipment**	**Manufacturer**	**Model**	**Meter No.**	**Calibration Date**
1	TWO-LINE V-NETWORK	R&S	ENV216	CT-1-025-1	Jun. 05, 2022
2	Pulse limiter	R&S®	ESH3-Z2	CT-2-015	May 27, 2022
3	EMI Test Receiver	R&S	ESCI	CT-1-024	May 24, 2022
4	V-LISN	SCHWARZBECK	NSLK8127	CT-1-104-1	Jun. 05, 2022
5	Test Cable	Marvelous Microwave Inc	200200.400LL .500A	CT-10-048-1	May 27, 2022
6	50ohm Termination	N/A	N/A	CT-1-065-1	May 31, 2022
7	Measurement Software	EZ-EMC	Ver: EMC-CON 3A1	CT-3-012	No calibration request

Note: 1. The calibration interval of the above test instruments is 12 months.

Test Site: W08-CE					
Item	**Equipment**	**Manufacturer**	**Model**	**Meter No.**	**Calibration Date**
1	TWO-LINE V-NETWORK LISN	R&S®	ENV216	CT-1-025-2	Jun. 20, 2022
2	Test Cable	EMCI	EMCCFD300-BM-BM-5000	CT-1-107-2	Jun. 20, 2022
3	EMI Test Receiver	R&S	ESR3	CT-1-103	Jun. 15, 2022
4	LISN	SCHWARZBECK	NSLK 8127RC	CT-1-104-1RC	Jun. 20, 2022
5	Transient Limiter	EM Electronics Corporation	EM-7600	CT-1-026	Jun. 20, 2022
6	50ohm Termination	HUBER+SUHNER	N/A	CT-1-109-1	Jun. 17, 2022
7	Measurement Software	EZ-EMC	Ver: EMC-CON 3A1	CT-3-012	No calibration request

Note: 1. The calibration interval of the above test instruments is 12 months.

4.1.3 Test Procedure

a. The table-top EUT was placed 0.8 meter height wooden table from the horizontal ground plane with EUT being connected to power source through a line impedance stabilization network (LISN). The floor-standing EUT was placed insulation support unit from the horizontal ground plane. The LISN at least be 80 cm from nearest chassis of EUT.

b. The line impedance stabilization network (LISN) provides 50 ohm/50uH of coupling impedance for the measuring instrument. All other support equipments powered from additional LISN(s).

c. Interrelating cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle. All I/O cables were positioned to simulate typical usage.

d. All I/O cables that are not connected to a peripheral shall be bundle in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

e. The EMI test receiver connected to LISN powering the EUT. The actual test configuration, please refer to EUT test photos.

f. The receiver scanned from 150kHz to 30MHz for emissions in each of test modes. A scan was taken on both power lines, Line and Neutral, recording at least six highest emissions.

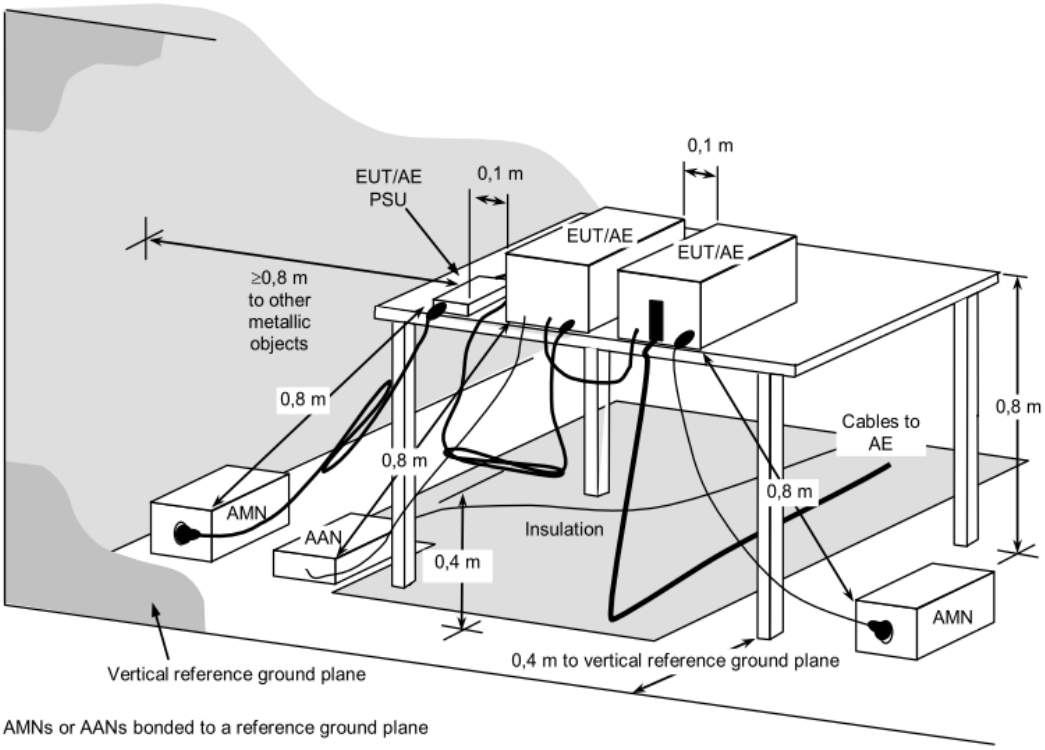
g. The EUT and cable configuration of the above highest emission levels were recorded. The test data of the worst case was recorded.

4.1.4 Deviation from Test Standard

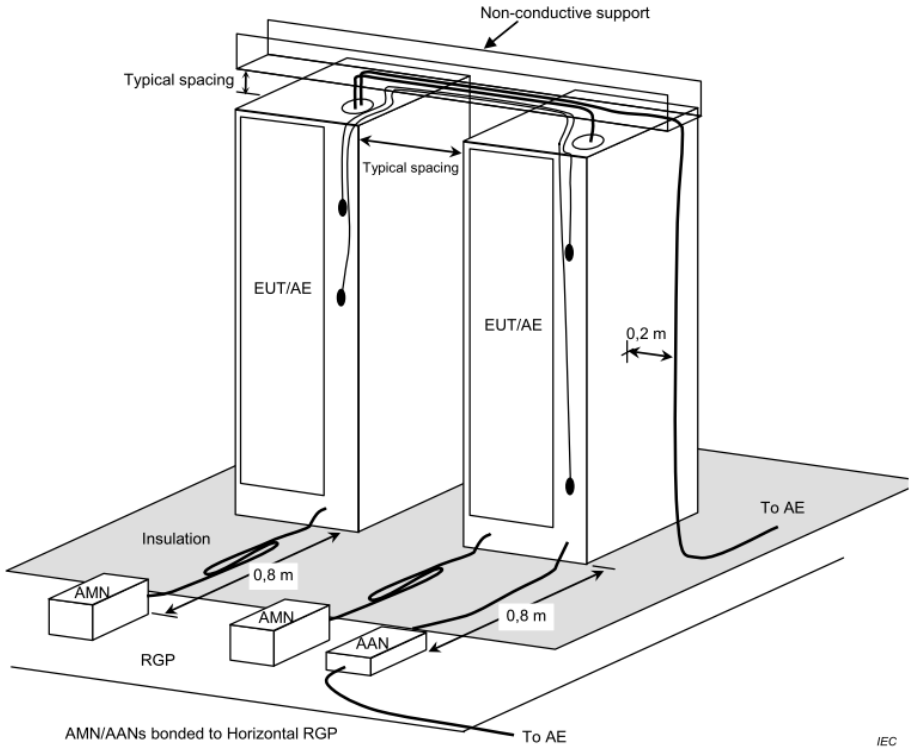
No deviation

4.1.5 Test Setup

< Table-Top equipment >



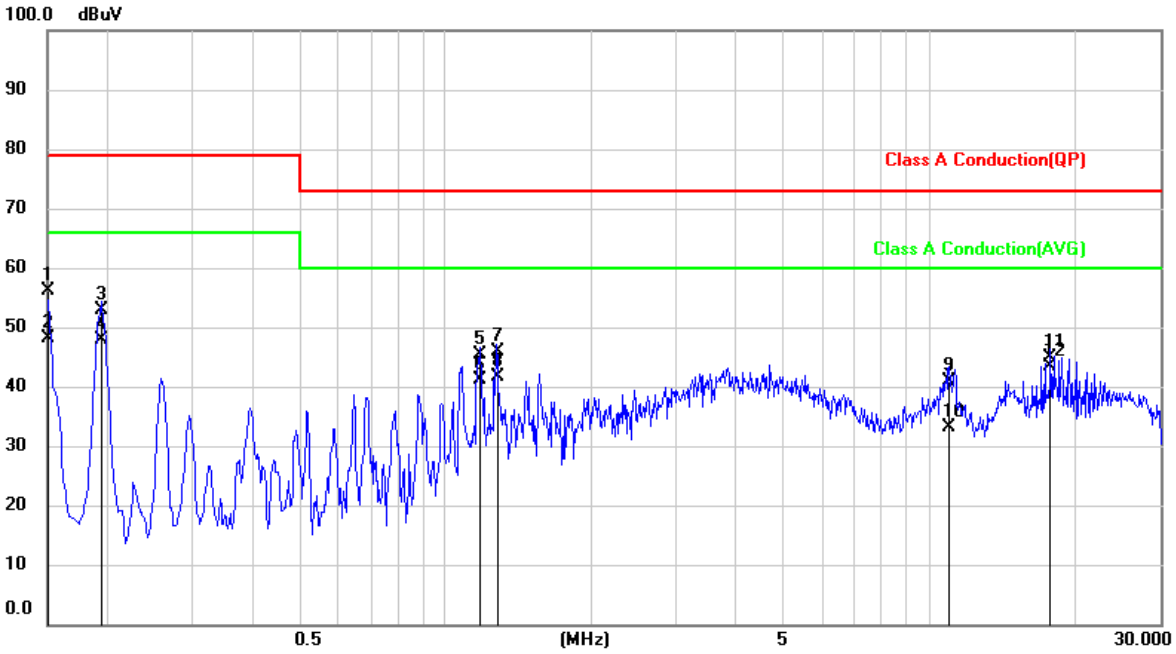
< Floor-Standing equipment >



Note: Please refer to 4.1.7 for the actual test configuration.

4.1.6 Test Result

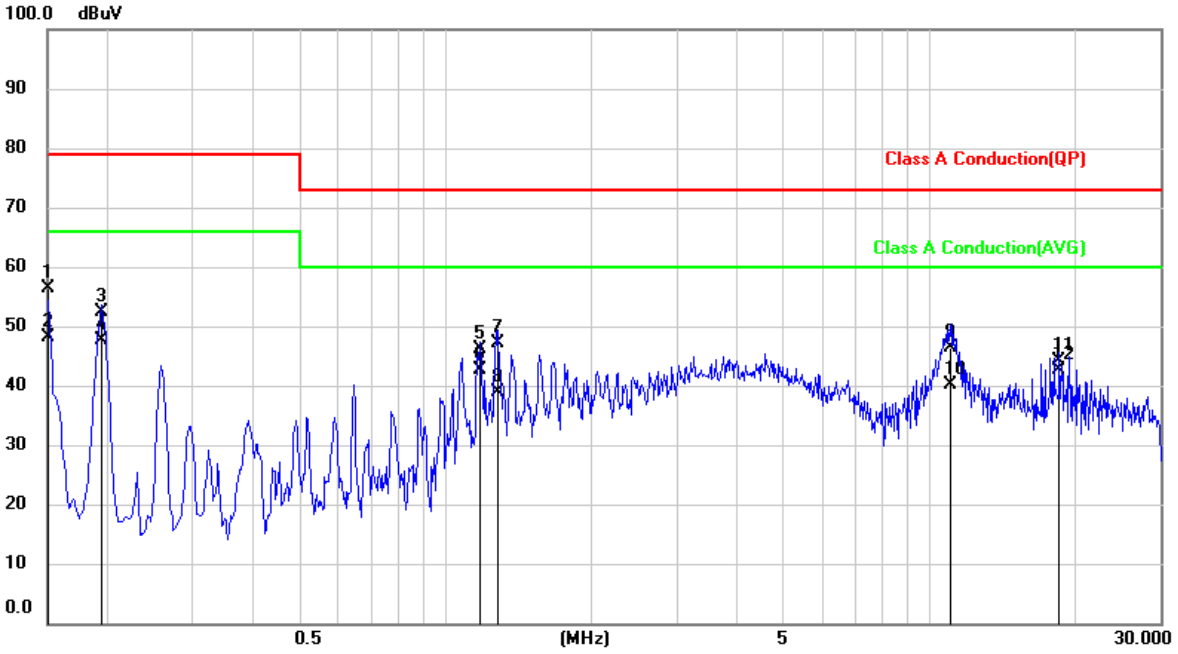
Test Voltage	100Vac, 60Hz	Frequency Range	0.15-30 MHz
Environmental Conditions	22℃, 50% RH	6dB Bandwidth	9 kHz
Test Date	2022/09/02	Phase	L
Tested by	Eric Hsieh	Test Site	W01



No.	Frequency (MHz)	Reading Level (dBµV)	Correct Factor (dB)	Measurement (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.1500	46.02	10.06	56.08	79.00	-22.92	QP
2	0.1500	37.97	10.06	48.03	66.00	-17.97	AVG
3	0.1935	42.88	10.06	52.94	79.00	-26.06	QP
4	0.1935	37.79	10.06	47.85	66.00	-18.15	AVG
5	1.1729	35.24	10.11	45.35	73.00	-27.65	QP
6	1.1729	31.04	10.11	41.15	60.00	-18.85	AVG
7	1.2787	35.79	10.11	45.90	73.00	-27.10	QP
8	1.2787	31.40	10.11	41.51	60.00	-18.49	AVG
9	10.9692	30.38	10.42	40.80	73.00	-32.20	QP
10	10.9692	22.62	10.42	33.04	60.00	-26.96	AVG
11	17.8229	34.44	10.56	45.00	73.00	-28.00	QP
12	17.8229	32.84	10.56	43.40	60.00	-16.60	AVG

Remark: 1. QP = Quasi Peak, AVG = Average
2. Correction Factor = Insertion loss of LISN + Cable loss + Transient Limiter (If use)
3. Measurement Value = Reading Level + Correct Factor
4. Margin Level = Measurement Value –Limit Value

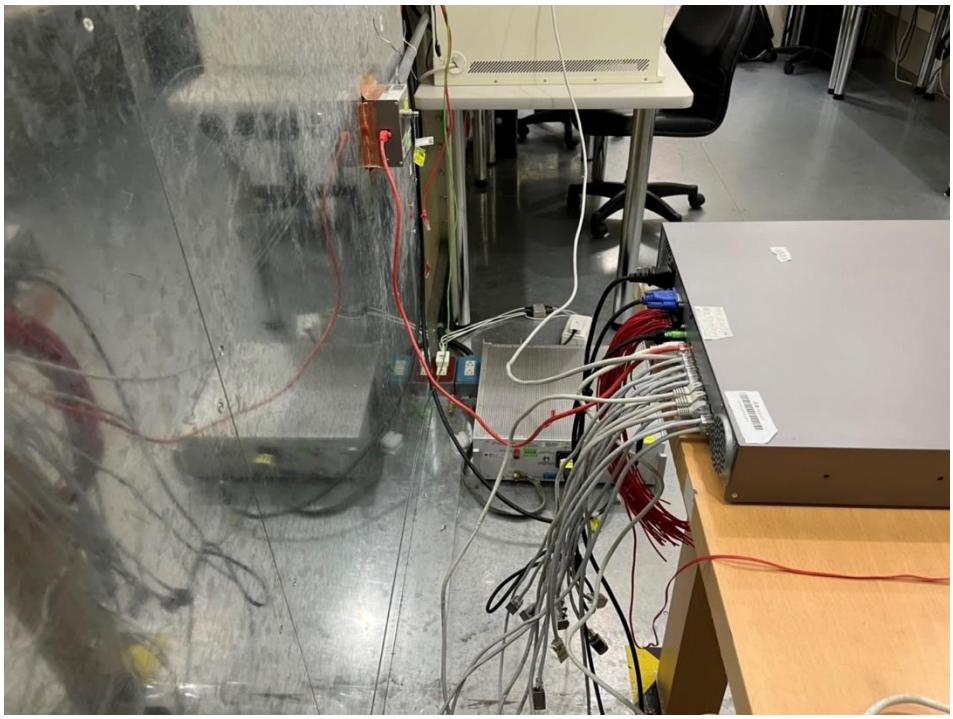
Test Voltage	100Vac, 60Hz	**Frequency Range**	0.15-30 MHz
Environmental Conditions	22℃, 50% RH	**6dB Bandwidth**	9 kHz
Test Date	2022/09/02	**Phase**	N
Tested by	Eric Hsieh	**Test Site**	W01



No.	Frequency (MHz)	Reading Level (dBµV)	Correct Factor (dB)	Measurement (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.1500	46.28	10.04	56.32	79.00	-22.68	QP
2	0.1500	38.00	10.04	48.04	66.00	-17.96	AVG
3	0.1931	42.37	10.04	52.41	79.00	-26.59	QP
4	0.1931	37.58	10.04	47.62	66.00	-18.38	AVG
5	1.1789	36.03	10.09	46.12	73.00	-26.88	QP
6	1.1789	32.59	10.09	42.68	60.00	-17.32	AVG
7	1.2845	37.00	10.10	47.10	73.00	-25.90	QP
8	1.2845	28.68	10.10	38.78	60.00	-21.22	AVG
9	11.0373	36.03	10.42	46.45	73.00	-26.55	QP
10	11.0373	29.63	10.42	40.05	60.00	-19.95	AVG
11	18.5476	33.54	10.56	44.10	73.00	-28.90	QP
12	18.5476	32.14	10.56	42.70	60.00	-17.30	AVG

Remark: 1. QP = Quasi Peak, AVG = Average
2. Correction Factor = Insertion loss of LISN + Cable loss + Transient Limiter (If use)
3. Measurement Value = Reading Level + Correct Factor
4. Margin Level = Measurement Value –Limit Value

4.1.7 Photographs of Test Configuration



4.2 Conducted Emission at Telecommunication Ports Test

4.2.1 Limit of Conducted Emission at Telecommunication Ports Test

Class A equipment:

Requirements for asymmetric mode conducted emissions from Class A equipment			
Frequency (MHz)	**Measurement**		**Class A limits dB(μV)**
	Coupling device	**Detector type/ bandwidth**	
0.15 to 0.5	AAN	Quasi Peak / 9 kHz	97 to 87*
0.5 to 30			87
0.15 to 0.5	AAN	Average / 9 kHz	84 to 74*
0.5 to 30			74

***** Decreases with the logarithm of the frequency.

Class B equipment:

Requirements for asymmetric mode conducted emissions from Class B equipment			
Frequency (MHz)	**Measurement**		**Class B limits dB(μV)**
	Coupling device	**Detector type/ bandwidth**	
0.15 to 0.5	AAN	Quasi Peak / 9 kHz	84 to 74*
0.5 to 30			74
0.15 to 0.5	AAN	Average / 9 kHz	74 to 64*
0.5 to 30			64

***** Decreases with the logarithm of the frequency.

Note: 1. The lower limit shall apply at the transition frequencies.
2. Detector function in the form: PK = Peak, QP = Quasi Peak, AV = Average
3. The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correction Factor = Insertion loss of ISN + Cable loss
Margin Level = Measurement Value –Limit Value

4.2.2 Test Instrument

Test Site: W01-CE					
Item	**Equipment**	**Manufacturer**	**Model**	**Meter No.**	**Calibration Date**
1	TWO-LINE V-NETWORK	R&S	ENV216	CT-1-025-1	Jun. 05, 2022
2	EMI Test Receiver	R&S	ESCI	CT-1-024	May 24, 2022
3	Impedance Stabilization Network	TESEQ	T8-CAT6	CT-1-105	Jun. 06, 2022
4	V-LISN	SCHWARZBECK	NSLK8127	CT-1-104-1	Jun. 05, 2022
5	Test Cable	Marvelous Microwave Inc	200200.400LL.500A	CT-10-048-1	May 27, 2022
6	50ohm Termination	N/A	N/A	CT-1-065-2	May 30, 2022
7	Measurement Software	EZ-EMC	Ver: EMC-CON 3A1	CT-3-012	No calibration request

Note: 1. The calibration interval of the above test instruments is 12 months.

Test Site: W08-CE					
Item	**Equipment**	**Manufacturer**	**Model**	**Meter No.**	**Calibration Date**
1	TWO-LINE V-NETWORK LISN	R&S®	ENV216	CT-1-025-2	Jun. 20, 2022
2	Test Cable	EMCI	EMCCFD300-BM-BM-5000	CT-1-107-2	Jun. 20, 2022
3	EMI Test Receiver	R&S	ESR3	CT-1-103	Jun. 15, 2022
4	LISN	SCHWARZBECK	NSLK 8127RC	CT-1-104-1RC	Jun. 20, 2022
5	ISN	FCC	F-071115-1057-1-09	CT-1-027	Jun. 20, 2022
6	50ohm Termination	HUBER+SUHNER	N/A	CT-1-109-2	Jun. 17, 2022
7	Measurement Software	EZ-EMC	Ver: EMC-CON 3A1	CT-3-012	No calibration request

Note: 1. The calibration interval of the above test instruments is 12 months.

4.2.3 Test Procedure

a. The table-top EUT was placed 0.8 meter height wooden table from the horizontal ground plane with EUT being connected to power source through a line impedance stabilization network (LISN). The floor-standing EUT was placed insulation support unit from the horizontal ground plane. The LISN at least be 80 cm from nearest chassis of EUT.

b. The line impedance stabilization network (LISN) provides 50 ohm/50uH of coupling impedance for the measuring instrument. All other support equipments powered from additional LISN(s).

c. Interrelating cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle. All I/O cables were positioned to simulate typical usage.

d. All I/O cables that are not connected to a peripheral shall be bundle in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

e. ISN at least 80 cm from nearest chassis of EUT. The communication function of EUT was executed in normal condition. ISN was connected between EUT and associated equipment and ISN was connected directly to reference ground plane. The actual test configuration, please refer to EUT test photos.

f. The receiver scanned from 150kHz to 30MHz for emissions in each of test modes. The test mode included 10Mbps, 100Mbps, 1Gbps, 10Gbps and POE mode. Emission frequency and amplitude were recorded, recording at least six highest emissions.

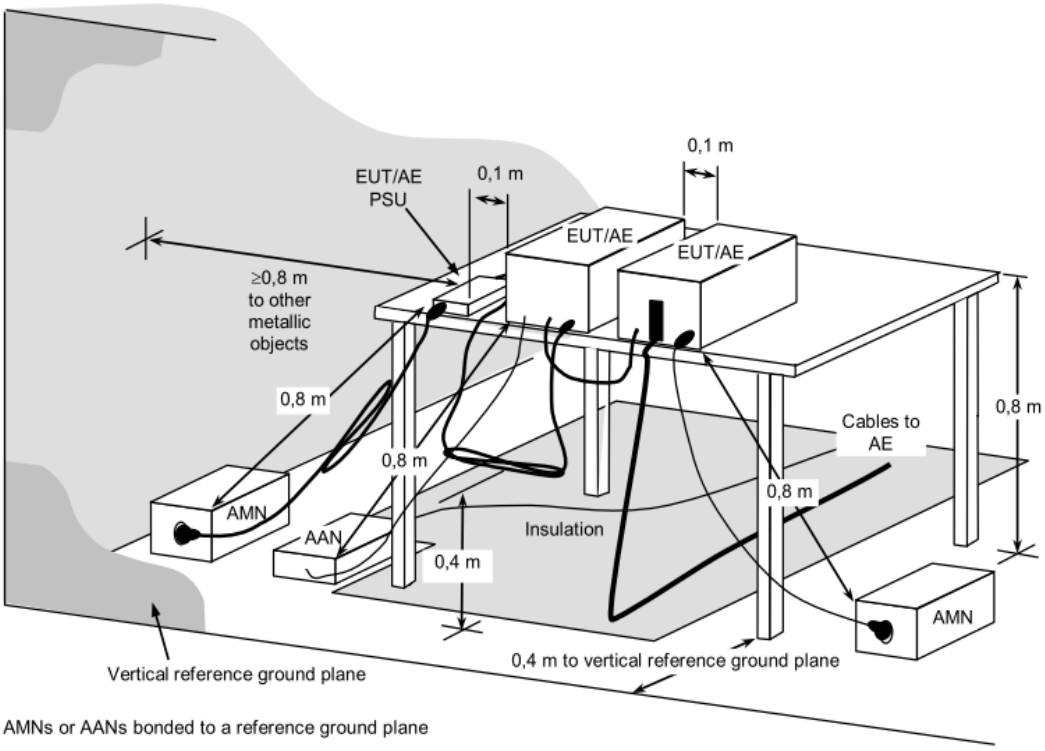
g. The EUT and cable configuration of the above highest emission levels were recorded. The test data of the worst case was recorded.

4.2.4 Deviation from Test Standard

No deviation

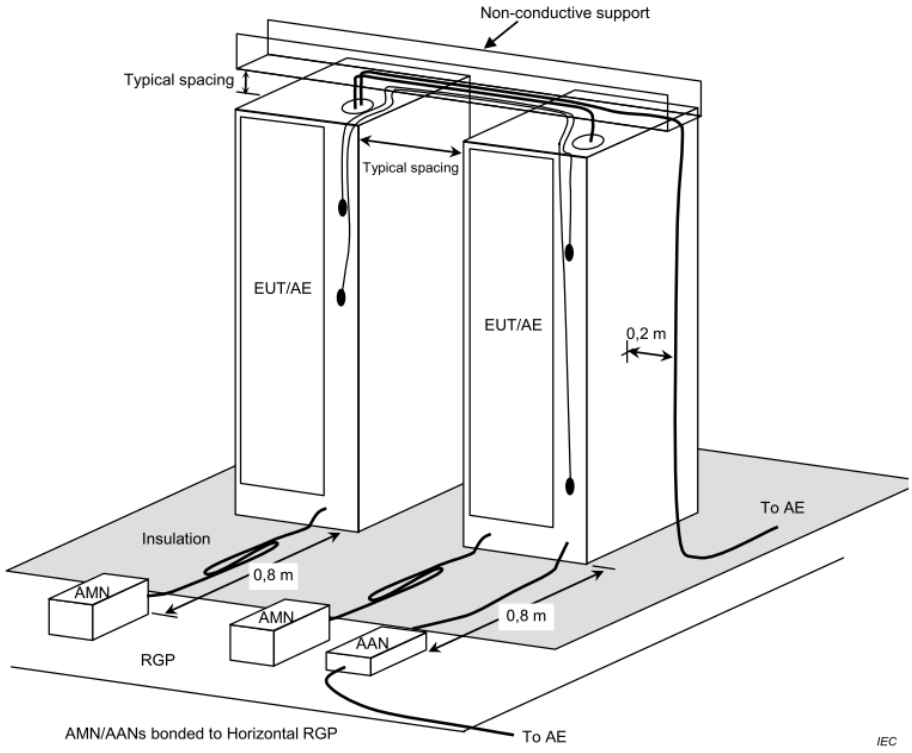
4.2.5 Test Setup

< Table-Top equipment >



AMNs or AANs bonded to a reference ground plane

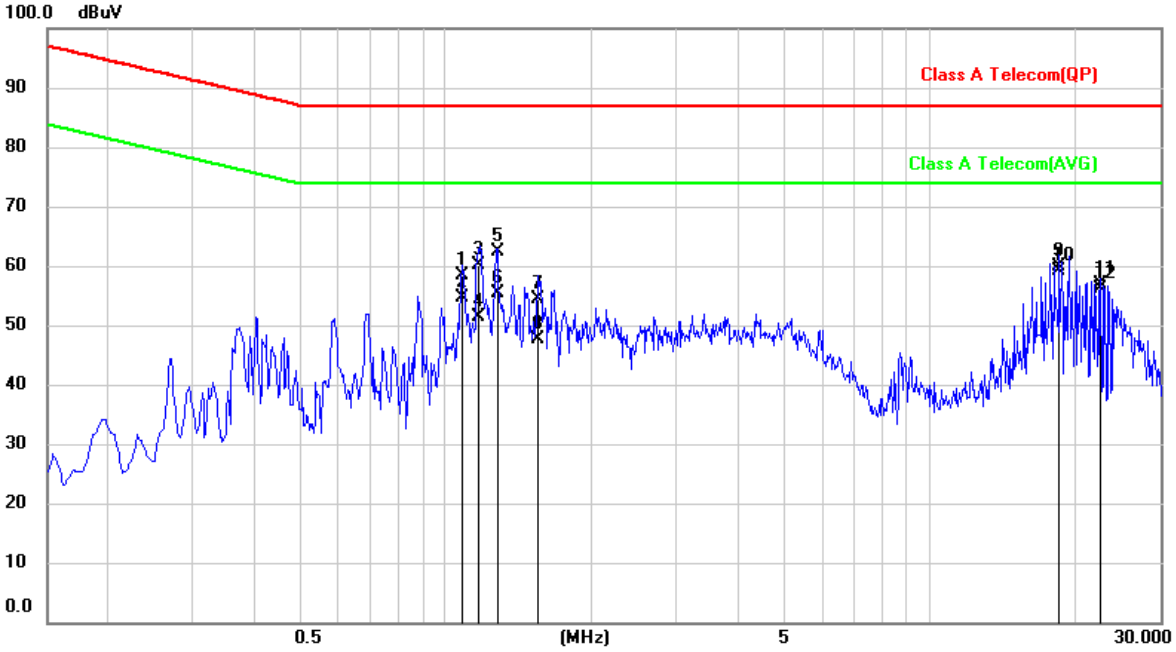
< Floor-Standing equipment >



Note: Please refer to the 4.2.7 for the actual test configuration.

4.2.6 Test Result

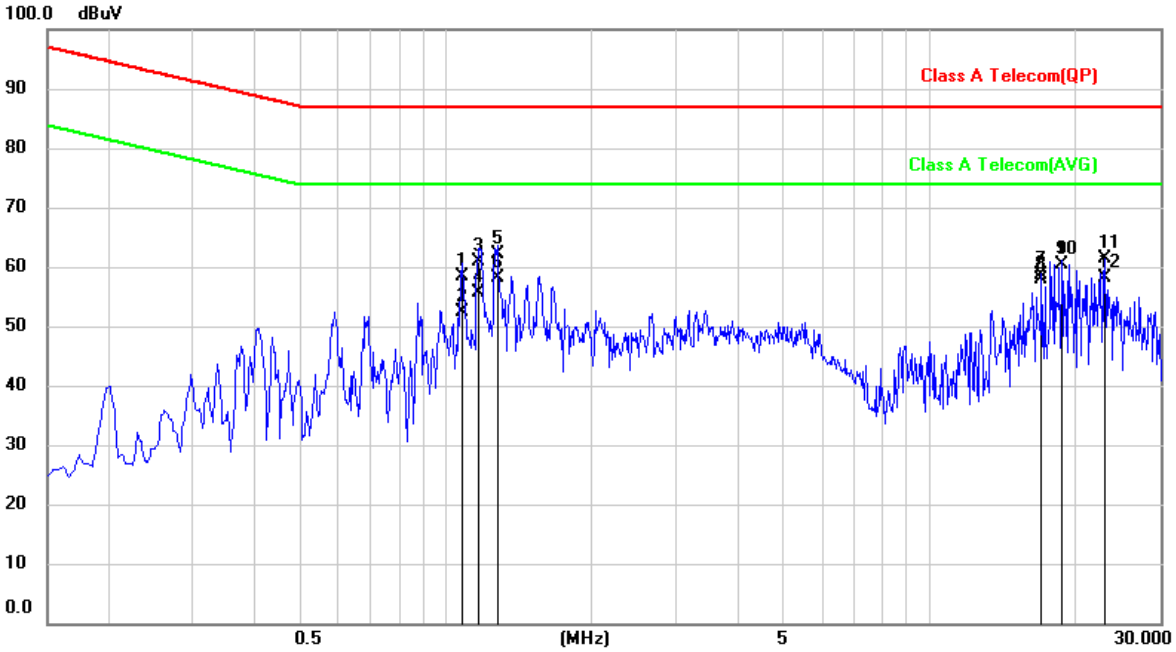
Test Voltage	100Vac, 60Hz	**Frequency Range**	0.15-30 MHz
Environmental Conditions	22°C, 50% RH	**6dB Bandwidth**	9 kHz
Test Date	2022/09/02	**Test Condition**	LAN port with ISN (10Mbps)
Tested by	Eric Hsieh	**Test Site**	W01
Test Mode	A		



No.	Frequency (MHz)	Reading Level (dBµV)	Correct Factor (dB)	Measurement (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	1.0785	38.81	19.54	58.35	87.00	-28.65	QP
2	1.0785	35.02	19.54	54.56	74.00	-19.44	AVG
3	1.1657	40.50	19.53	60.03	87.00	-26.97	QP
4	1.1657	31.73	19.53	51.26	74.00	-22.74	AVG
5	1.2835	42.87	19.53	62.40	87.00	-24.60	QP
6	1.2835	35.80	19.53	55.33	74.00	-18.67	AVG
7	1.5497	34.87	19.53	54.40	87.00	-32.60	QP
8	1.5497	28.04	19.53	47.57	74.00	-26.43	AVG
9	18.5486	40.26	19.68	59.94	87.00	-27.06	QP
10	18.5486	39.37	19.68	59.05	74.00	-14.95	AVG
11	22.6431	37.24	19.74	56.98	87.00	-30.02	QP
12	22.6431	36.49	19.74	56.23	74.00	-17.77	AVG

Remark: 1. QP = Quasi Peak, AVG = Average
2. Correction Factor = Insertion loss of ISN + Cable loss
3. Measurement Value = Reading Level + Correct Factor
4. Margin Level = Measurement Value –Limit Value

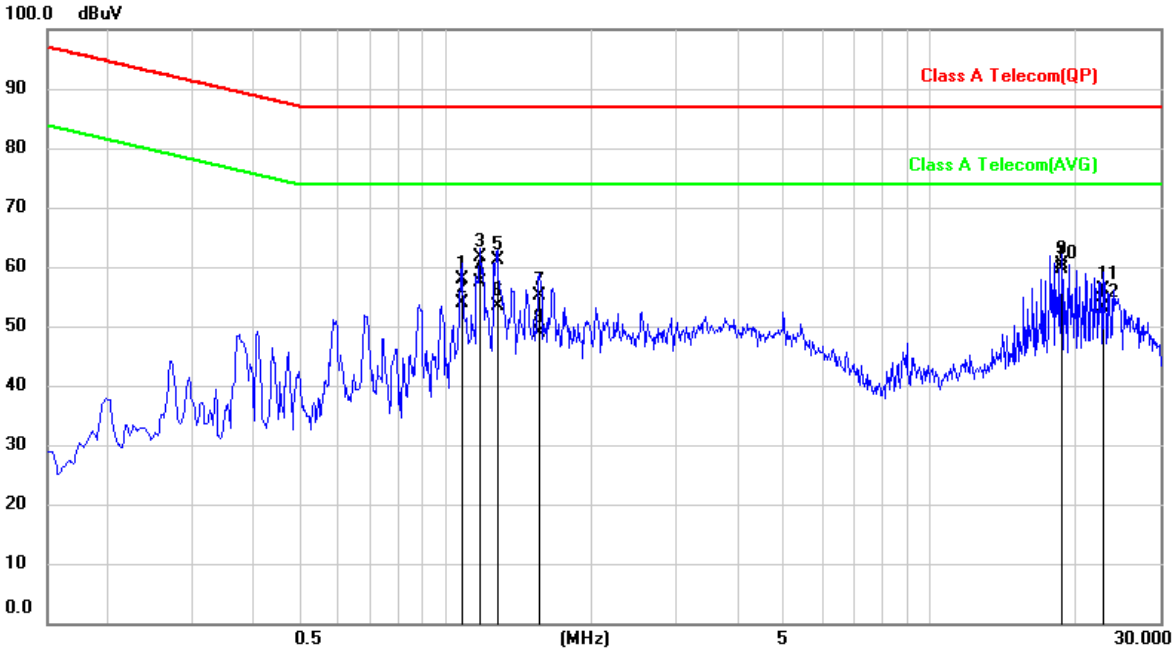
Test Voltage	100Vac, 60Hz	**Frequency Range**	0.15-30 MHz
Environmental Conditions	22°C, 50% RH	**6dB Bandwidth**	9 kHz
Test Date	2022/09/02	**Test Condition**	LAN port with ISN (100Mbps)
Tested by	Eric Hsieh	**Test Site**	W01
Test Mode	A		



No.	Frequency (MHz)	Reading Level (dBµV)	Correct Factor (dB)	Measurement (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	1.0862	38.97	19.53	58.50	87.00	-28.50	QP
2	1.0862	32.74	19.53	52.27	74.00	-21.73	AVG
3	1.1730	41.35	19.54	60.89	87.00	-26.11	QP
4	1.1730	35.99	19.54	55.53	74.00	-18.47	AVG
5	1.2772	42.54	19.53	62.07	87.00	-24.93	QP
6	1.2772	38.59	19.53	58.12	74.00	-15.88	AVG
7	17.1016	38.85	19.67	58.52	87.00	-28.48	QP
8	17.1016	38.22	19.67	57.89	74.00	-16.11	AVG
9	18.7887	40.75	19.70	60.45	87.00	-26.55	QP
10	18.7887	40.60	19.70	60.30	74.00	-13.70	AVG
11	23.1278	41.72	19.75	61.47	87.00	-25.53	QP
12	23.1278	38.38	19.75	58.13	74.00	-15.87	AVG

Remark: 1. QP = Quasi Peak, AVG = Average
2. Correction Factor = Insertion loss of ISN + Cable loss
3. Measurement Value = Reading Level + Correct Factor
4. Margin Level = Measurement Value –Limit Value

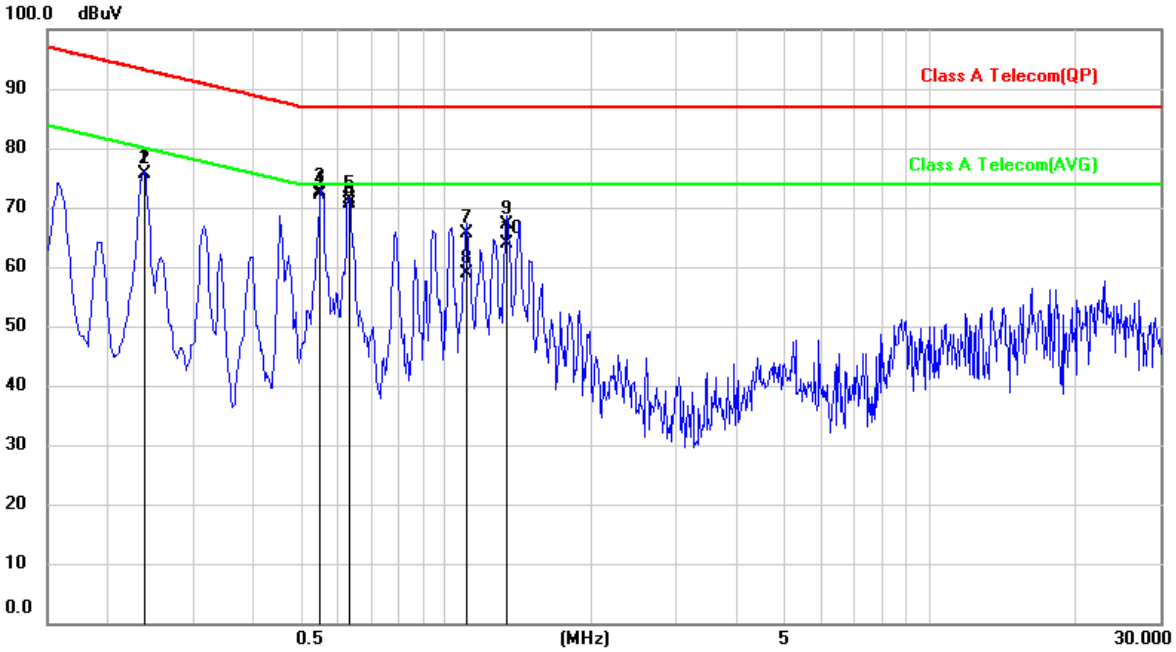
Test Voltage	100Vac, 60Hz	**Frequency Range**	0.15-30 MHz
Environmental Conditions	22°C, 50% RH	**6dB Bandwidth**	9 kHz
Test Date	2022/09/02	**Test Condition**	LAN port with ISN (1Gbps)
Tested by	Eric Hsieh	**Test Site**	W01
Test Mode	A		



No.	Frequency (MHz)	Reading Level (dBµV)	Correct Factor (dB)	Measurement (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	1.0775	38.42	19.54	57.96	87.00	-29.04	QP
2	1.0775	34.27	19.54	53.81	74.00	-20.19	AVG
3	1.1812	42.06	19.54	61.60	87.00	-25.40	QP
4	1.1812	37.85	19.54	57.39	74.00	-16.61	AVG
5	1.2861	41.67	19.53	61.20	87.00	-25.80	QP
6	1.2861	33.76	19.53	53.29	74.00	-20.71	AVG
7	1.5635	35.55	19.53	55.08	87.00	-31.92	QP
8	1.5635	29.36	19.53	48.89	74.00	-25.11	AVG
9	18.7873	40.67	19.70	60.37	87.00	-26.63	QP
10	18.7873	39.89	19.70	59.59	74.00	-14.41	AVG
11	22.8822	36.39	19.74	56.13	87.00	-30.87	QP
12	22.8822	33.36	19.74	53.10	74.00	-20.90	AVG

Remark: 1. QP = Quasi Peak, AVG = Average
2. Correction Factor = Insertion loss of ISN + Cable loss
3. Measurement Value = Reading Level + Correct Factor
4. Margin Level = Measurement Value –Limit Value

Test Voltage	100Vac, 60Hz	**Frequency Range**	0.15-30 MHz
Environmental Conditions	22°C, 50% RH	**6dB Bandwidth**	9 kHz
Test Date	2022/09/05	**Test Condition**	LAN port with ISN (PoE MAX)
Tested by	Eric Hsieh	**Test Site**	W01
Test Mode	B		

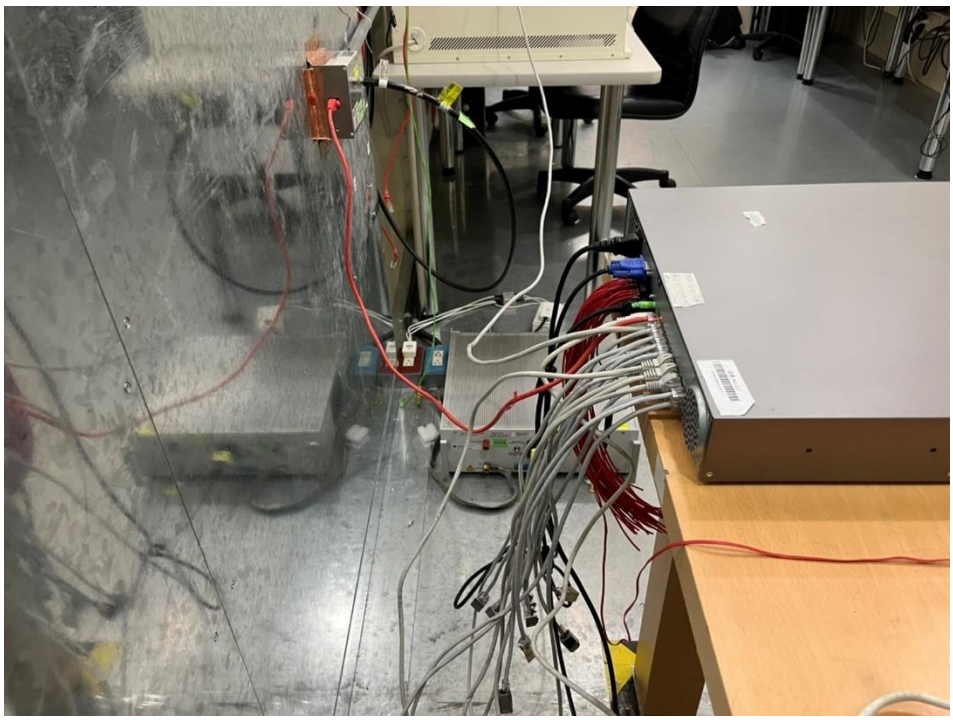


No.	Frequency (MHz)	Reading Level (dBµV)	Correct Factor (dB)	Measurement (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.2371	55.91	19.78	75.69	93.20	-17.51	QP
2	0.2371	55.82	19.78	75.60	80.20	-4.60	AVG
3	0.5526	53.12	19.60	72.72	87.00	-14.28	QP
4	0.5526	52.64	19.60	72.24	74.00	-1.76	AVG
5	0.6318	51.79	19.59	71.38	87.00	-15.62	QP
6	0.6318	50.92	19.59	70.51	74.00	-3.49	AVG
7	1.1111	46.05	19.53	65.58	87.00	-21.42	QP
8	1.1111	39.45	19.53	58.98	74.00	-15.02	AVG
9	1.3414	47.69	19.53	67.22	87.00	-19.78	QP
10	1.3414	44.38	19.53	63.91	74.00	-10.09	AVG

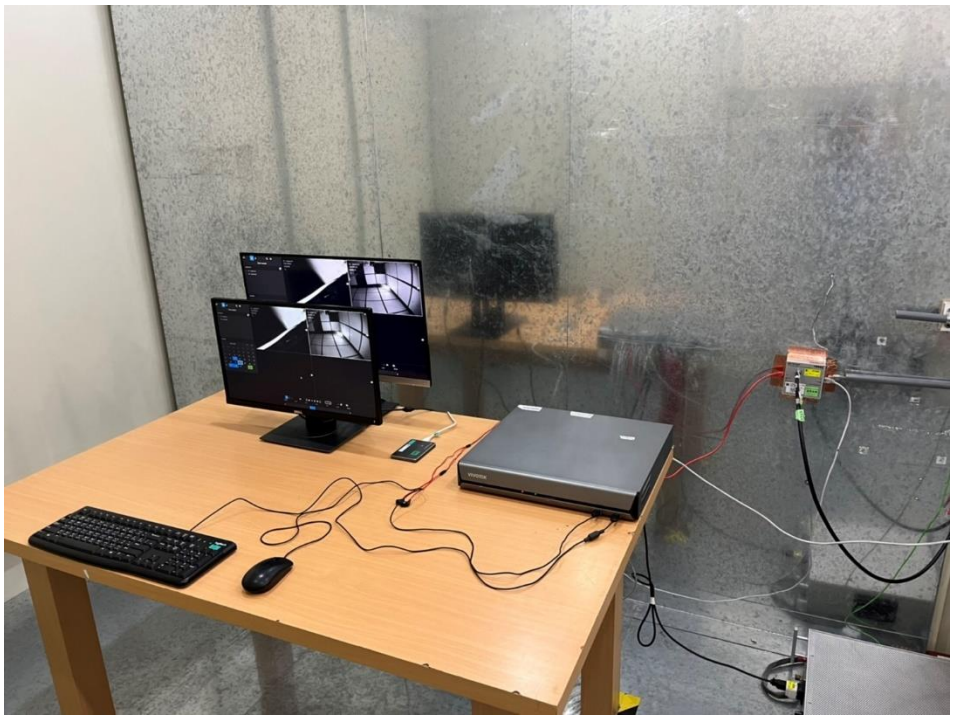
Remark: 1. QP = Quasi Peak, AVG = Average
2. Correction Factor = Insertion loss of ISN + Cable loss
3. Measurement Value = Reading Level + Correct Factor
4. Margin Level = Measurement Value –Limit Value

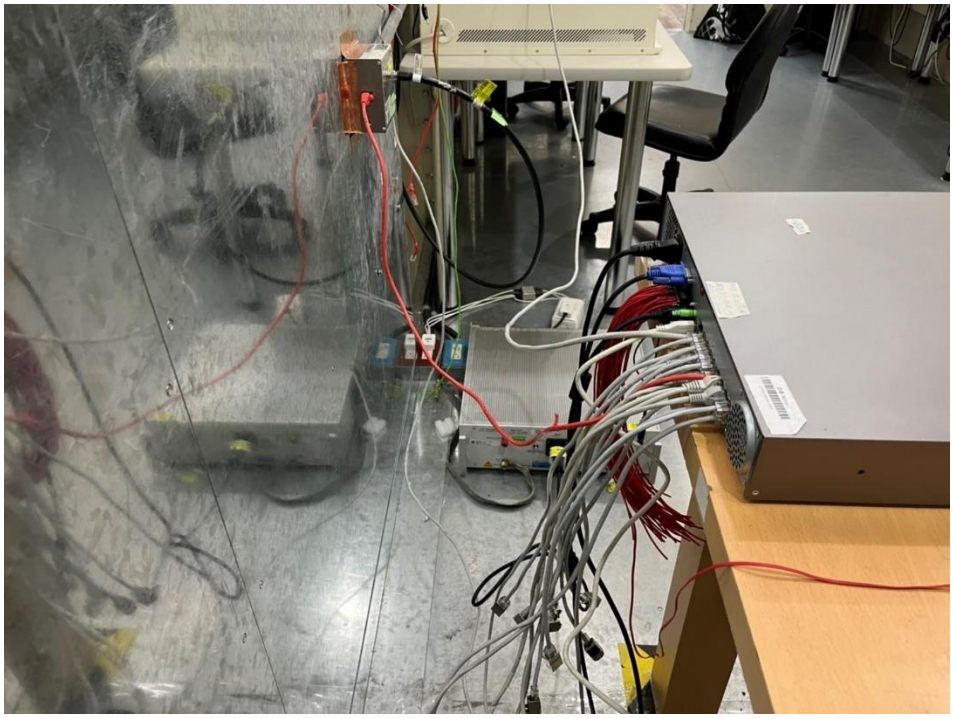
4.2.7 Photographs of Test Configuration

Test mode A



Test mode B





4.3 Radiated Emission Measurement

4.3.1 Limits of Radiated Emission Measurement

According to VCCI-CISPR32 table1 - Required highest frequency for radiated measurement:

Highest internal frequency (F_x)	Highest measured frequency
$F_x \leq 108$ MHz	1 GHz
108 MHz < $F_x \leq 500$ MHz	2 GHz
500 MHz < $F_x \leq 1$ GHz	5 GHz
$F_x > 1$ GHz	$5 \times F_x$ up to a maximum of 6 GHz

Remark:

1. Fx : highest fundamental frequency generated or used within the EUT or highest frequency at which it operates.
2. Where Fx is unknown, the radiated emission measurements shall be performed up to 6 GHz.

Class A equipment:

Requirements for radiated emissions at frequencies up to 1 GHz for Class A equipment			
Frequency (MHz)	Measurement		Class A limits dB(μV/m)
	Distance (m)	Detector type/ bandwidth	OATS/SAC
30 to 230	10	Quasi Peak / 120 kHz	40
230 to 1000			47
30 to 230	3		50
230 to 1000			57

Requirements for radiated emissions at frequencies above 1 GHz for Class A equipment			
Frequency (MHz)	Measurement		Class A limits dB(μV/m)
	Distance (m)	Detector type/ bandwidth	FSOATS
1000 to 3000	3	Average / 1 MHz	56
3000 to 6000			60
1000 to 3000		Peak / 1 MHz	76
3000 to 6000			80

Class B equipment:

Requirements for radiated emissions at frequencies up to 1 GHz for Class B equipment			
Frequency (MHz)	**Measurement**		**Class B limits dB(μV/m)**
	Distance (m)	**Detector type/ bandwidth**	**OATS/SAC**
30 to 230	10	Quasi Peak / 120 kHz	30
230 to 1000			37
30 to 230	3		40
230 to 1000			47

Requirements for radiated emissions at frequencies above 1 GHz for Class B equipment			
Frequency (MHz)	**Measurement**		**Class B limits dB(μV/m)**
	Distance (m)	**Detector type/ bandwidth**	**FSOATS**
1000 to 3000	3	Average / 1 MHz	50
3000 to 6000			54
1000 to 3000		Peak / 1 MHz	70
3000 to 6000			74

Note: 1. The lower limit shall apply at the transition frequency.
2. Detector function in the form: PK = Peak, QP = Quasi Peak, AV = Average
3. The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correction Factor = Antenna factor + Cable loss (Antenna to preamplifier) - preamplifier Gain + Cable loss (preamplifier to receiver)
Margin Level = Measurement Value - Limit Value

4.3.2 Test Instrument

Test Site: W08-966					
Item	**Equipment**	**Manufacturer**	**Model**	**Meter No.**	**Calibration Date**
1	Horn Antenna	Schwarzbeck	BBHA 9120D	CT-9-031	Aug. 09, 2022
2	Horn Antenna	Schwarzbeck	BBHA 9170	CT-9-032	Aug. 29, 2022
3	TRILOG Broadband Antenna with 5 dB Attenuator	Schwarzbeck	VULB 9168 & MVE2251-06	CT-1-096-1	Aug. 04, 2022
4	EXA Signal Analyzer	Keysight	N9010A	CT-1-093	Aug. 16, 2022
5	EMI Test Receiver	Keysight	N9038A	CT-9-007	Jul. 28, 2022
6	Preamplifier	EM	EM 330	CT-9-024	Jul. 28, 2022
7	Preamplifier	SGH & MCL	SGH118 & BW-S15W2+	CT-9-071	Jul. 28, 2022
8	Preamplifier	EMCI	EMC184045SE	CT-9-013	Aug. 18, 2022
9	Test Cable	EMCI	EMCCFD400-NM-NM-1000	CT-1-132	Jul. 28, 2022
10	Test Cable	PEWC	CFD400NL-LW-NM-NM-3000	CT-1-141	Jul. 28, 2022
11	Test Cable	EMCI	EMCCFD400-NM-NM-15000	CT-1-133	Jul. 28, 2022
12	Test Cable	EMCI	EMC104-SM-35M-600	CT-1-134	Jul. 28, 2022
13	Test Cable	MVE	280280.LL266.1400	CT-9-072	Jul. 28, 2022
14	Test Cable	EMCI	EMC102-KM-KM-600	CT-1-136	Aug. 17, 2022
15	Measurement Software	EZ-EMC	Ver :WD-03A1-1	CT-3-012	No calibration request

Note: 1. The calibration interval of the above test instruments is 12 months.

4.3.3 Test Procedure

a. The table-top EUT was placed on the top of a turntable 0.8 meters above the ground at 3 m 966 chamber. The floor-standing EUT was placed insulation support unit from the horizontal ground plane. The table was rotated 360 degrees to determine the position of the high radiation emissions.

b. The height of the test antenna shall vary between 1 m to 4 m. Both vertical and horizontal polarizations of the antenna were set to make the measurement.

c. The EUT was set up as per the test configuration to simulate typical usage per the user's manual. All I/O cables were positioned to simulate typical usage. The actual test configuration, please refer to EUT test photos.

d. The initial step in collecting radiated emission data is a Spectrum Mode scanning the measurement frequency range.

Below 1GHz:

Reading in which marked as QP or Peak means measurements by using Spectrum Mode with detector RBW=120kHz.

If the Spectrum Mode measured peak value compliance with and lower than Quasi Peak Limit, the EUT shall be deemed to meet QP Limits.

Above 1GHz:

Reading in which marked as Peak & AVG means measurements by using Spectrum Mode with setting in RBW=1MHz.

If the Spectrum Mode measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak and AVG Limits.

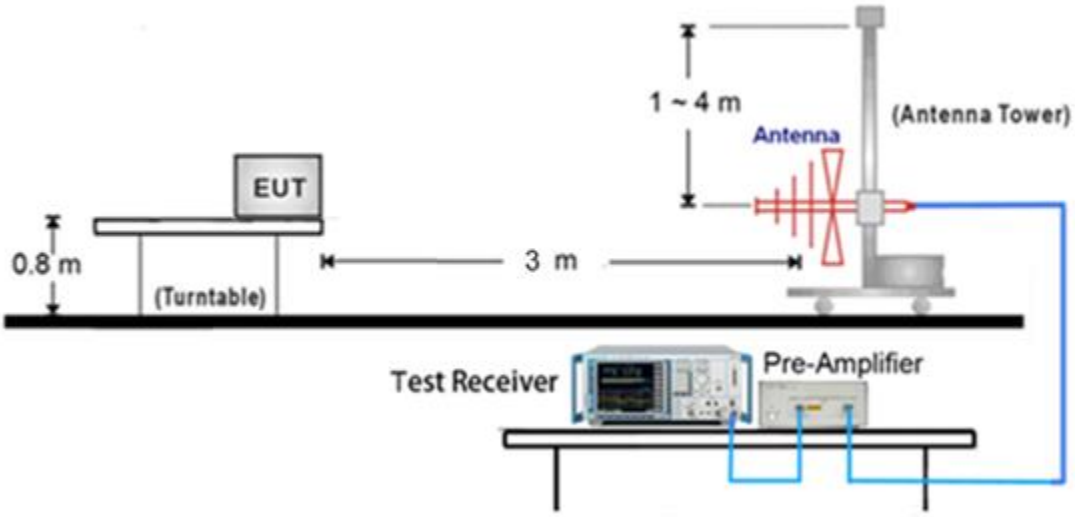
e. Emission frequency and amplitude were recorded, recording at least six highest emissions. The EUT and cable configuration of the above highest emission levels were recorded. The test data of the worst case was recorded.

4.3.4 Deviation from Test Standard

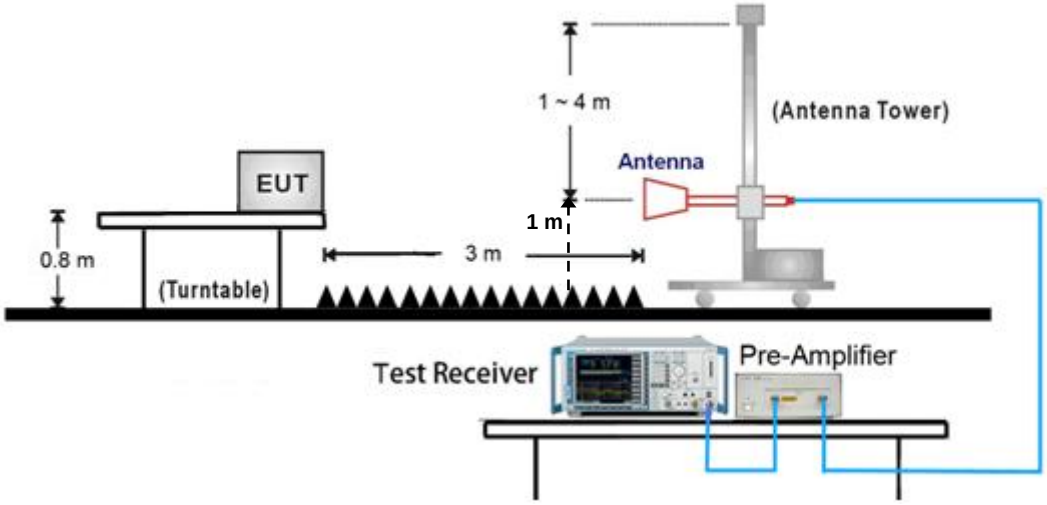
No deviation

4.3.5 Test Setup

< Radiated Emissions Frequency: 30 MHz to 1000 MHz >



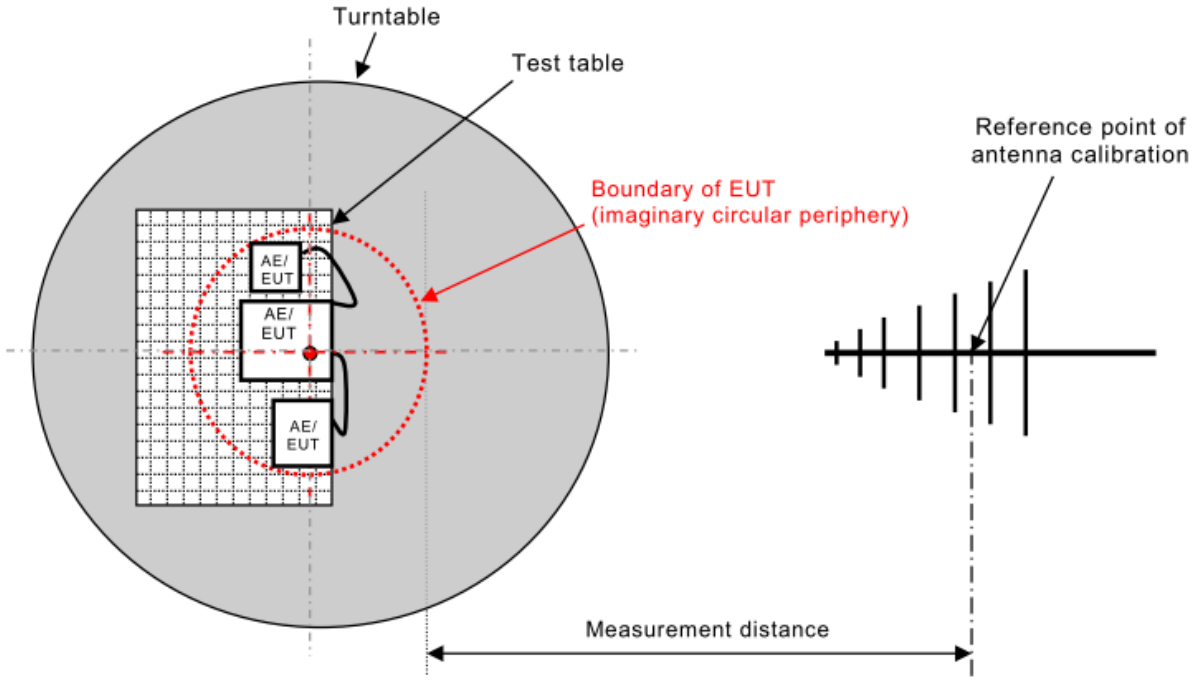
< Radiated Emissions Frequency: above 1GHz >



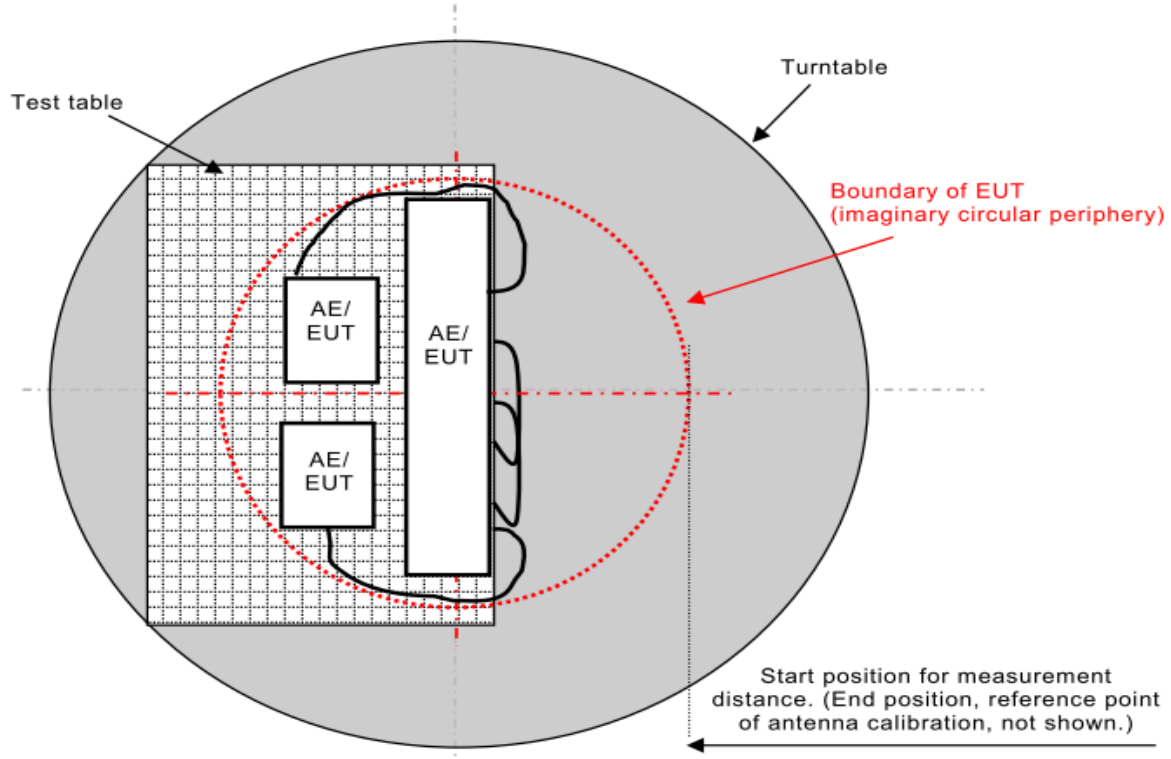
Note:

(1) Please refer to the 4.3.7 for the actual test configuration.
(2) The formula of measured value as: Test Result = Reading + Correction Factor
(3) Detector function in the form: PK = Peak, QP = Quasi Peak, AV = Average
(4) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain (if use)
Margin Level = Measurement Value - Limit Value

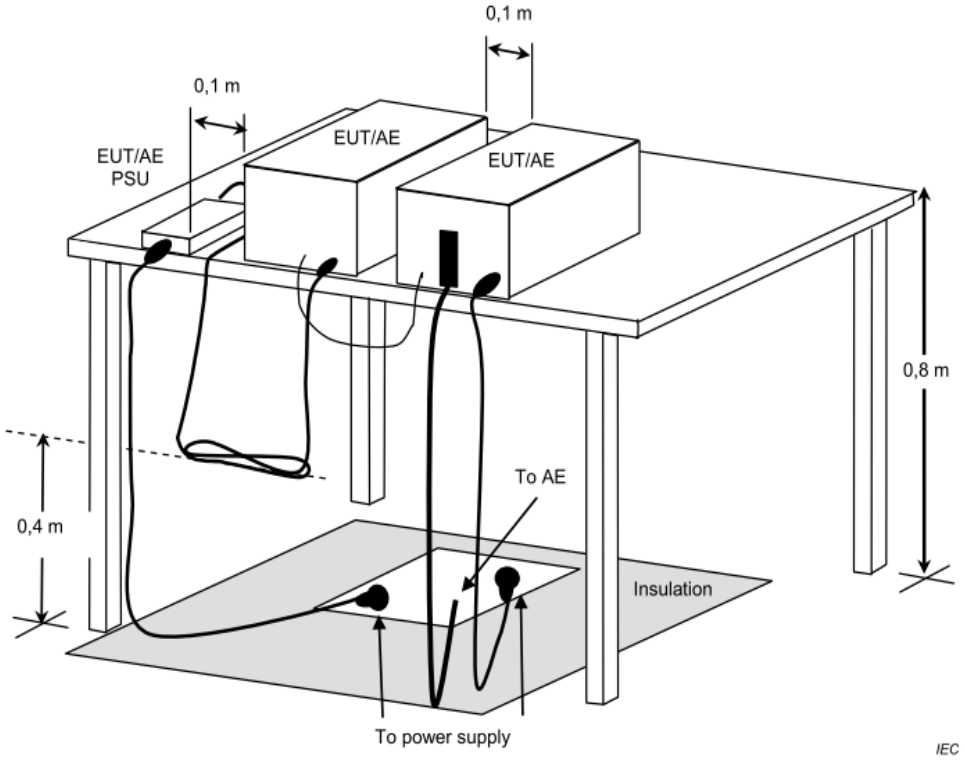
< EUT placement top view and measurement distance >



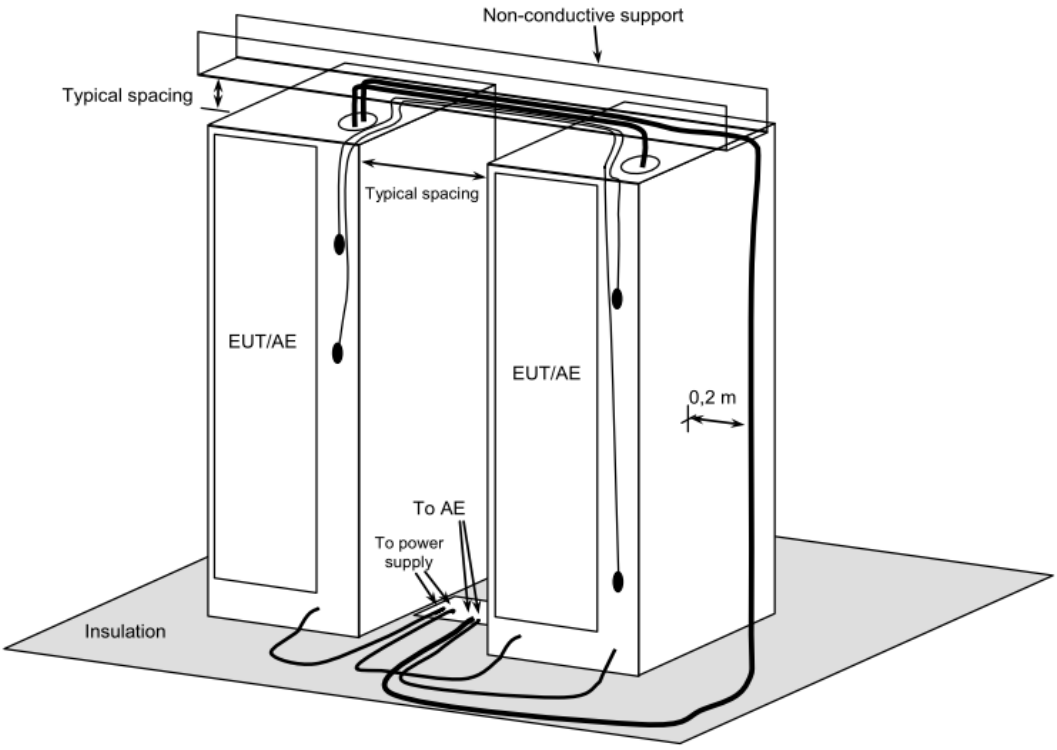
< Boundary of EUT, Local AE and associated cabling >



< Table-Top equipment >



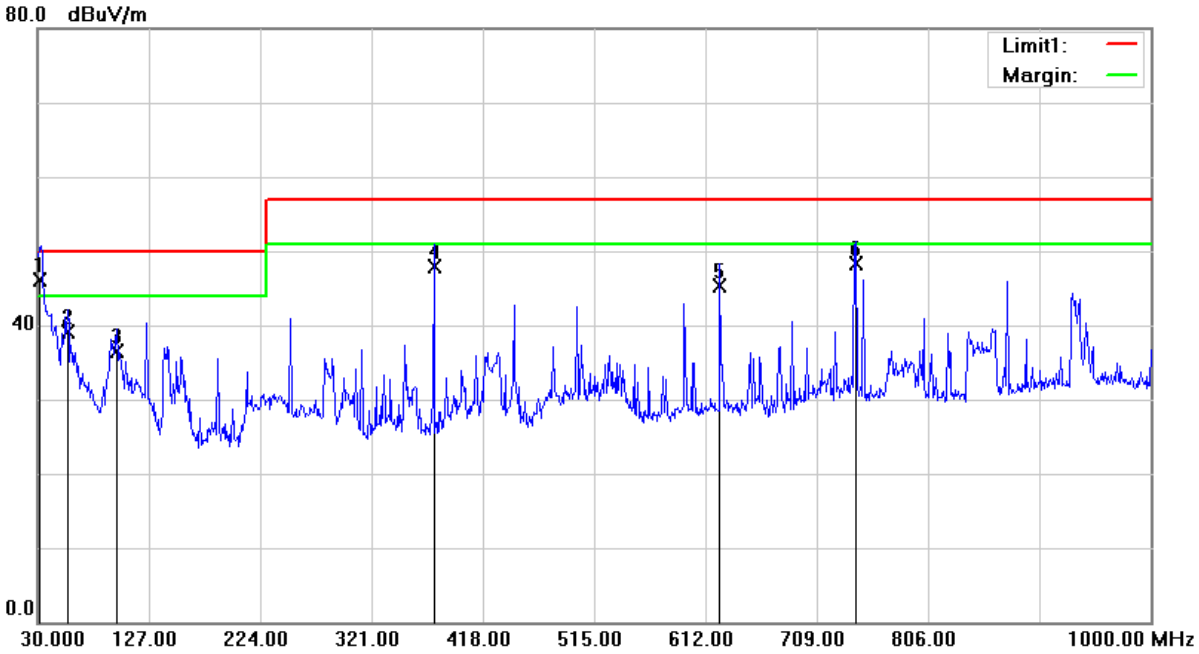
< Floor-Standing equipment >



Note: Please refer to the 4.3.7 for the actual test configuration.

4.3.6 Test Result

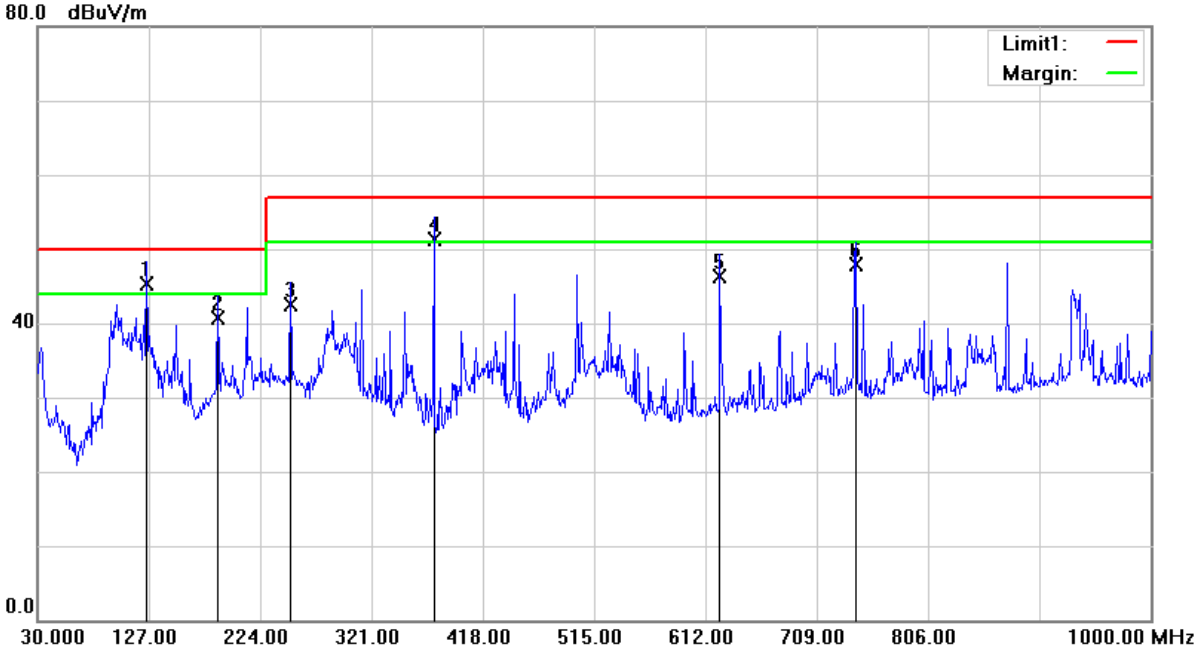
Test Voltage	100Vac, 60Hz	**Frequency Range**	30 – 1000 MHz
Environmental Conditions	26°C, 46% RH	**6dB Bandwidth**	120 kHz
Test Date	2022/08/30	**Test Distance**	3m
Tested by	Karwin Kao	**Polarization**	Vertical
Test Site	W08		



No.	Frequency (MHz)	Reading Level (dBµV)	Correct Factor (dB/m)	Measurement (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Table Degree (degree)	Antenna Height (cm)	Detector
1	32.4800	57.52	-11.47	46.05	50.00	-3.95	130	100	QP
2	56.1900	49.01	-9.93	39.08	50.00	-10.92	221	100	QP
3	98.8700	51.19	-14.74	36.45	50.00	-13.55	30	100	QP
4	375.3200	54.47	-6.53	47.94	57.00	-9.06	21	200	QP
5	624.6100	45.44	-0.14	45.30	57.00	-11.70	191	100	QP
6	742.9500	46.10	2.14	48.24	57.00	-8.76	284	100	QP

Remark: 1. QP = Quasi Peak
2. Correction Factor = Antenna factor + Cable loss (Antenna to preamplifier) - preamplifier Gain + Cable loss (preamplifier to receiver)
3. Measurement Value = Reading Level + Correct Factor
4. Margin Level = Measurement Value - Limit Value

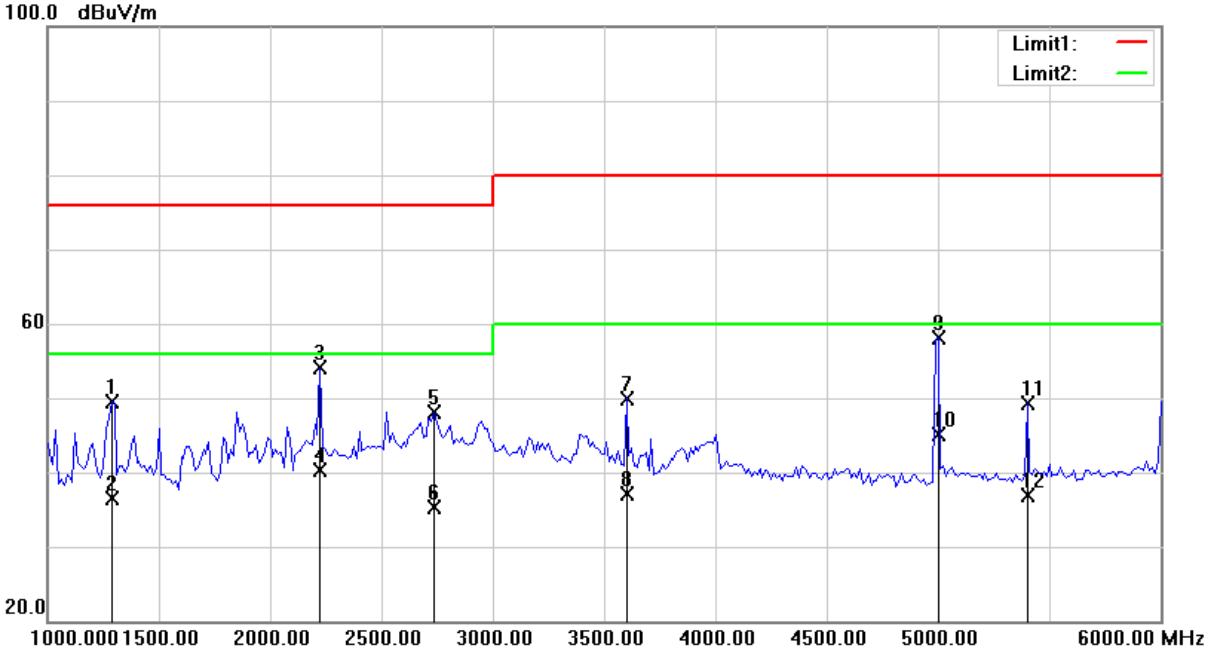
Test Voltage	100Vac, 60Hz	**Frequency Range**	30 – 1000 MHz
Environmental Conditions	26°C, 46% RH	**6dB Bandwidth**	120 kHz
Test Date	2022/08/30	**Test Distance**	3m
Tested by	Karwin Kao	**Polarization**	Horizontal
Test Site	W08		



No.	Frequency (MHz)	Reading Level (dBµV)	Correct Factor (dB/m)	Measurement (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Table Degree (degree)	Antenna Height (cm)	Detector
1	125.0600	57.12	-11.86	45.26	50.00	-4.74	181	200	QP
2	187.1400	52.62	-11.95	40.67	50.00	-9.33	334	200	QP
3	250.1900	53.09	-10.57	42.52	57.00	-14.48	308	100	QP
4	375.3200	57.79	-6.53	51.26	57.00	-5.74	85	100	QP
5	624.6100	46.51	-0.14	46.37	57.00	-10.63	218	100	QP
6	742.9500	45.70	2.14	47.84	57.00	-9.16	182	100	QP

Remark: 1. QP = Quasi Peak
2. Correction Factor = Antenna factor + Cable loss (Antenna to preamplifier) - preamplifier Gain + Cable loss (preamplifier to receiver)
3. Measurement Value = Reading Level + Correct Factor
4. Margin Level = Measurement Value - Limit Value

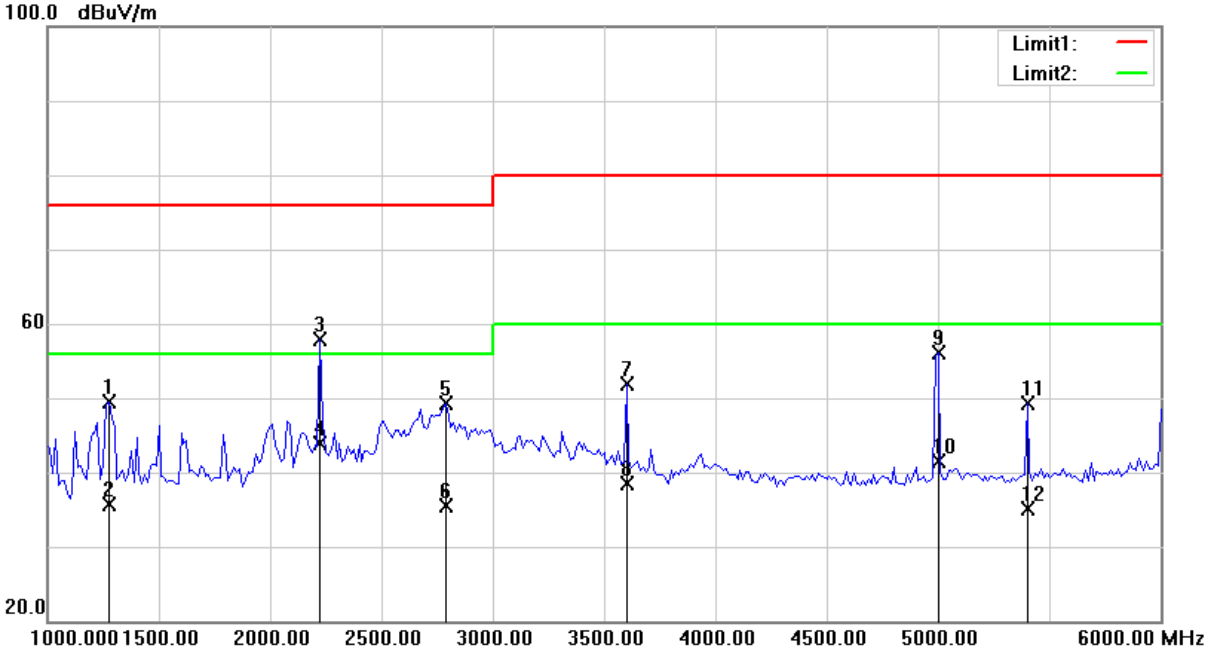
Test Voltage	100Vac, 60Hz	**Frequency Range**	1 – 6GHz
Environmental Conditions	26°C, 46% RH	**6dB Bandwidth**	1MHz
Test Date	2022/08/30	**Test Distance**	3m
Tested by	Karwin Kao	**Polarization**	Vertical
Test Site	W08		



No.	Frequency (MHz)	Reading Level (dBµV)	Correct Factor (dB/m)	Measurement (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Table Degree (degree)	Antenna Height (cm)	Detector
1	1287.500	68.24	-18.83	49.41	76.00	-26.59	143	100	peak
2	1287.500	55.33	-18.83	36.50	56.00	-19.50	143	100	AVG
3	2225.000	68.98	-14.95	54.03	76.00	-21.97	193	100	peak
4	2225.000	55.28	-14.95	40.33	56.00	-15.67	193	100	AVG
5	2737.500	62.57	-14.50	48.07	76.00	-27.93	200	100	peak
6	2737.500	49.87	-14.50	35.37	56.00	-20.63	200	100	AVG
7	3600.000	62.22	-12.22	50.00	80.00	-30.00	320	100	peak
8	3600.000	49.33	-12.22	37.11	60.00	-22.89	320	100	AVG
9	5000.000	66.79	-8.72	58.07	80.00	-21.93	168	100	peak
10	5000.000	53.87	-8.72	45.15	60.00	-14.85	168	100	AVG
11	5400.000	57.45	-8.14	49.31	80.00	-30.69	197	100	peak
12	5400.000	44.98	-8.14	36.84	60.00	-23.16	197	100	AVG

Remark: 1. peak = Peak, AVG = Average
2. Correction Factor = Antenna factor + Cable loss (Antenna to preamplifier) - preamplifier Gain + Cable loss (preamplifier to receiver)
3. Measurement Value = Reading Level + Correct Factor
4. Margin Level = Measurement Value - Limit Value

Test Voltage	100Vac, 60Hz	**Frequency Range**	1 – 6GHz
Environmental Conditions	26°C, 46% RH	**6dB Bandwidth**	1MHz
Test Date	2022/08/30	**Test Distance**	3m
Tested by	Karwin Kao	**Polarization**	Horizontal
Test Site	W08		



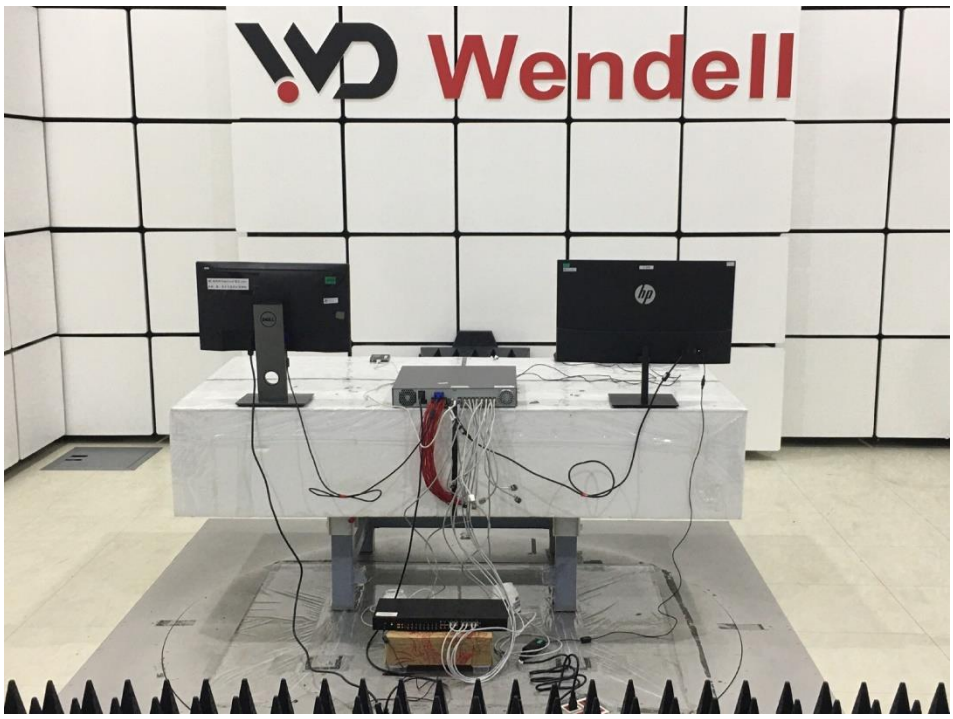
No.	Frequency (MHz)	Reading Level (dBµV)	Correct Factor (dB/m)	Measurement (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Table Degree (degree)	Antenna Height (cm)	Detector
1	1275.000	68.39	-18.93	49.46	76.00	-26.54	207	100	peak
2	1275.000	54.71	-18.93	35.78	56.00	-20.22	207	100	AVG
3	2225.000	72.82	-14.95	57.87	76.00	-18.13	172	100	peak
4	2225.000	58.93	-14.95	43.98	56.00	-12.02	172	100	AVG
5	2787.500	63.51	-14.17	49.34	76.00	-26.66	125	100	peak
6	2787.500	49.58	-14.17	35.41	56.00	-20.59	125	100	AVG
7	3600.000	64.11	-12.22	51.89	80.00	-28.11	150	100	peak
8	3600.000	50.72	-12.22	38.50	60.00	-21.50	150	100	AVG
9	5000.000	64.81	-8.72	56.09	80.00	-23.91	169	100	peak
10	5000.000	50.20	-8.72	41.48	60.00	-18.52	169	100	AVG
11	5400.000	57.43	-8.14	49.29	80.00	-30.71	198	100	peak
12	5400.000	43.15	-8.14	35.01	60.00	-24.99	198	100	AVG

Remark: 1. peak = Peak, AVG = Average
2. Correction Factor = Antenna factor + Cable loss (Antenna to preamplifier) - preamplifier Gain + Cable loss (preamplifier to receiver)
3. Measurement Value = Reading Level + Correct Factor
4. Margin Level = Measurement Value - Limit Value

4.3.7 Photographs of Test Configuration

Radiated Emission Test (30MHz~1GHz)

Radiated Emission Test (Above 1GHz)



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