

# TEST REPORT

## CERTIFICATE OF CONFORMITY

**Standard:** ICES-003:2020 Issue 7, Class A

**ICES-Gen:**2018 Issue 1 +A1:2021

**ANSI C63.4-2014** amended as per ANSI C63.4a-2017

**Report No.:** CIBDAS-WTW-P22050452

**Model No.:** ODS-UHT

**Received Date:** 2022/5/13

**Test Date:** 2022/5/26 ~ 2022/8/1

**Issued Date:** 2022/9/26

**Applicant:** Radware Ltd.

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**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Lin Kou Laboratories

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**Approved by:** \_\_\_\_\_

Ace Wu / Project Engineer

**Date:** \_\_\_\_\_

2022/9/26

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**Prepared by :** Jessie Kuo / Specialist



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## Release Control Record

Issue No.	Description	Date Issued
CIBDAS-WTW-P22050452	Original release.	2022/9/26

## 1 Certificate

**Product:** Network Switch

**Brand:** RADWARE or  radware

**Test Model:** ODS-UHT

**Sample Status:** Engineering sample

**Applicant:** Radware Ltd.

**Test Date:** 2022/5/26 ~ 2022/8/1

**Standard:** ICES-003:2020 Issue 7, Class A  
ICES-Gen:2018 Issue 1 +A1:2021  
ANSI C63.4-2014 amended as per ANSI C63.4a-2017

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & 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.

## 2 Summary of Test Results

The test items that the EUT need to perform in accordance with its interfaces, evaluated functions, are as follows:

Standard	Test Item	Result	Remark
ICES-003	Conducted Emissions from Power Ports	Pass	Minimum passing Class A margin is -4.60 dB at 0.60200 MHz
ICES-003	Radiated Emissions up to 1 GHz	Pass	Minimum passing Class A margin is -3.20 dB at 30.44 MHz
ICES-003	Radiated Emissions above 1 GHz	Pass	Minimum passing Class A margin is -2.17 dB at 26562.36 MHz

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Specification	Expanded Uncertainty (k=2) (±)	Maximum allowable uncertainty (±)
Conducted Emissions from Power Ports	150 kHz ~ 30 MHz	2.79 dB	3.4 dB ( $U_{\text{CISPR}}$ )
Radiated Emissions up to 1 GHz	30 MHz ~ 1 GHz	4.14 dB	6.3 dB ( $U_{\text{CISPR}}$ )
Radiated Emissions above 1 GHz	1 GHz ~ 6 GHz	5.04 dB	5.2 dB ( $U_{\text{CISPR}}$ )
	6 GHz ~ 18 GHz	4.94 dB	5.5 dB ( $U_{\text{CISPR}}$ )


The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

### 2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

### 3 General Information

#### 3.1 Description of EUT

Product	Network Switch
Brand	RADWARE or  radware
Test Model	ODS-UHT
Status of EUT	Engineering sample
Operating Software	N/A
EUT Power Input Rating	100-127 / 200-240Vac or -48 - -60Vdc
Power Supply	AC Power, ARTESYN, CSU-2000AP-3-100 DC Power, Delta, DPS-1600AB-XX (X=0-9,A-Z or blank)
Accessory Device	N/A
Data Cable Supplied	N/A

#### 3.2 Primary Clock Frequencies of Internal Source

The highest frequency generated or used within the EUT or on which the EUT operates or tunes is 26.5625 GHz, provided by Radware Ltd., for detailed internal source, please refer to the manufacturer's specifications.

#### 3.3 Features of EUT

The tests reported herein were performed according to the method specified by Radware Ltd., for detailed feature description, please refer to the manufacturer's specifications or user's manual.

Please refer to appendix of the report if the applicant has provided additional descriptions of the EUT.

### 3.4 Operating Modes of EUT and Determination of Worst Case Operating Mode

The EUT has been pre-tested under following test modes.

Test Condition	
Mode	Conducted Emission
1	EUT + 400G Transceiver Loop + 100G Transceiver Loop + LAN 1Gbps Loop + USB with Flash R/W + Console + DC PSU (Dual power)
2	EUT + 400G Transceiver Loop + 100G Transceiver Loop + LAN 1Gbps Loop + USB with Flash R/W + Console + AC PSU (Dual power)
Note: 1. There are both DC -48V and DC -60V to be pre-tested then DC -60V has the highest emission value. 2. There are both AC 120V/60Hz and AC 240V/600Hz to be pre-tested then AC 240VHz has the highest emission value.	
Mode	Radiated Emissions up to 1 GHz
1	EUT + 400G Transceiver Loop + 100G Transceiver Loop + LAN 1Gbps Loop + USB with Flash R/W + Console + AC PSU (Dual power)
2	EUT + 400G Transceiver Loop + 100G Transceiver Loop + LAN 1Gbps Loop + USB with Flash R/W + Console + DC PSU (Dual power)
Note: There are both AC 120V/60Hz, AC 240V/60Hz and DC -48V, DC -60V to be pre-tested then AC 240V/60Hz has the highest emission value.	

Test modes are presented in the report as below.

Test Condition	
Mode	Conducted Emission
A	EUT + 400G Transceiver Loop + 100G Transceiver Loop + LAN 1Gbps Loop + USB with Flash R/W + Console + AC PSU (Dual power)
B	EUT + 400G Transceiver Loop + 100G Transceiver Loop + LAN 1Gbps Loop + USB with Flash R/W + Console + DC PSU (Dual power)
Mode	Radiated Emissions up to 1 GHz
A	EUT + 400G Transceiver Loop + 100G Transceiver Loop + LAN 1Gbps Loop + USB with Flash R/W + Console + AC PSU (Dual power)
B	EUT + 400G Transceiver Loop + 100G Transceiver Loop + LAN 1Gbps Loop + USB with Flash R/W + Console + DC PSU (Dual power)
Mode	Radiated Emissions above 1 GHz
A	EUT + 400G Transceiver Loop + 100G Transceiver Loop + LAN 1Gbps Loop + USB with Flash R/W + Console + AC PSU (Dual power)
B	EUT + 400G Transceiver Loop + 100G Transceiver Loop + LAN 1Gbps Loop + USB with Flash R/W + Console + DC PSU (Dual power)

### 3.5 Test Program Used and Operation Descriptions

#### Mode A

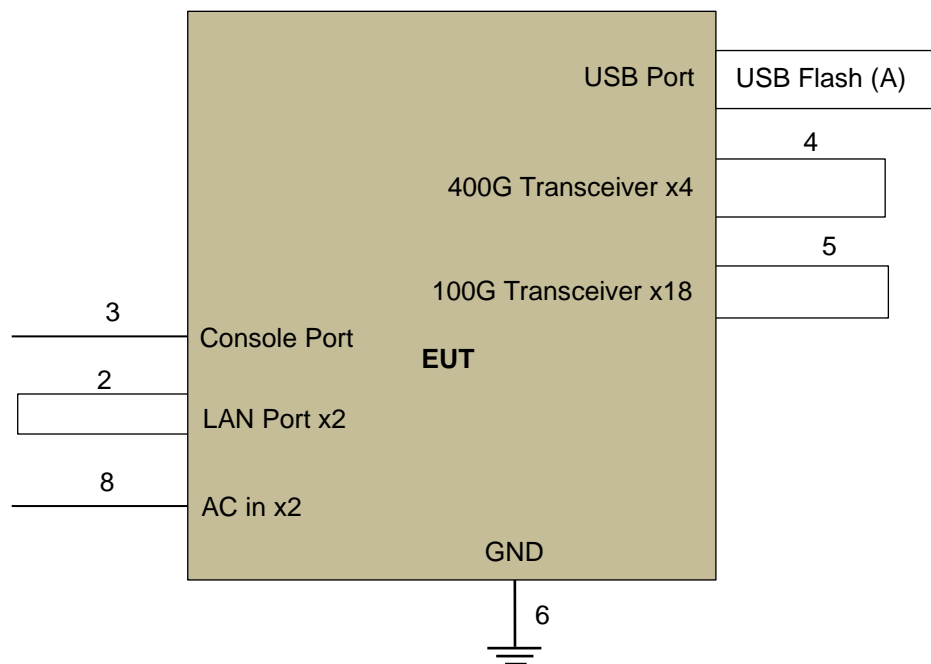
- The EUT was charged from AC Power source.
- The EUT's fiber optic cable and LAN cable have their own loops.
- The EUT read and wrote data with Flash.

#### Mode B

- The EUT was charged from DC Power source.
- The EUT's fiber optic cable and LAN cable have their own loops.
- The EUT read and wrote data with Flash.

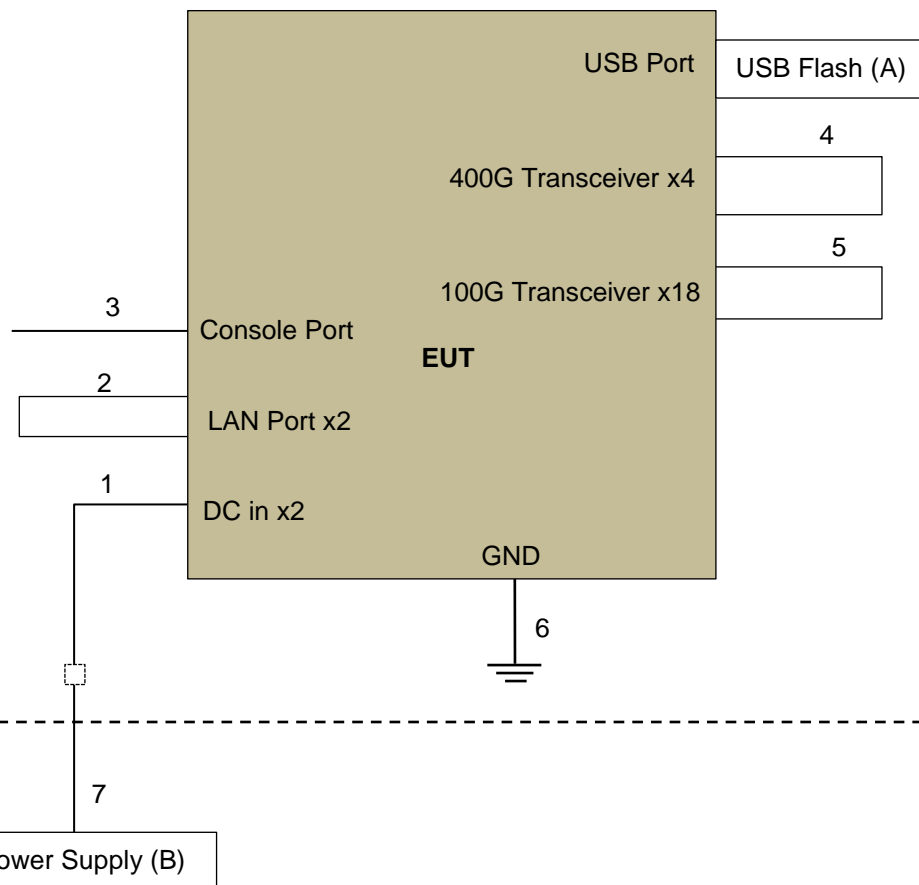
### 3.6 Connection Diagram of EUT and Peripheral Devices

#### Mode A



#### Remote Site

#### Mode B



#### Remote Site



### 3.7 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	USB Flash	Cruzer Blade 16GB	SDCZ50-016G	N/A	N/A	Supplied by applicant
B	DC Power Supply	Inspower	DC60-60D	212005	N/A	--

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	DC Power Cable	2	3	No	0	Supplied by applicant
2	LAN Cable	1	2	Yes	0	RJ45 Cat.5e, Supplied by applicant
3	Console Cable	1	1	No	0	Supplied by applicant
4	400G Fiber Cable	2	1	No	0	Supplied by applicant
5	100G Fiber Cable	9	1	No	0	Supplied by applicant
6	GND Cable	1	2	No	0	Supplied by applicant
7	DC Power Cable	2	10	No	0	--
8	Power Cable	2	1.8	No	0	--

## 4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.1 Conducted Emissions from Power Ports

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
DC-LISN SCHWARZBECK MESS- ELETRONIK	NNBM 8126G	8126G-069	2021/11/10	2022/11/9
LISN R&S	ESH2-Z5	100100	2022/2/17	2023/2/16
	ESH3-Z5	100312	2021/9/17	2022/9/16
RF Coaxial Cable WORKEN	5D-FB	Cable-cond2-01	2021/9/4	2022/9/3
Software BVADT	BVADT_Cond_ V7.3.7.4	N/A	N/A	N/A
Test Receiver R&S	ESR3	102783	2021/12/20	2022/12/19
V-LISN Schwarzbeck	NNBL 8226-2	8226-142	2021/8/20	2022/8/19

Notes:

1. The test was performed in HY - Conduction 2.
2. Tested Date: 2022/7/29.

### 4.2 Radiated Emissions up to 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower (H)	MFA-440	970705	N/A	N/A
Antenna Tower (V)	MFA-440	9707	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB9168	9168-148	2021/10/19	2022/10/18
		9168-156	2021/10/19	2022/10/18
Controller (H)	MF7802	08093	N/A	N/A
Controller (V)	MF7802	074	N/A	N/A
Pre_Amplifier Sonoma	310N	352924	2022/5/14	2023/5/13
		352923	2022/5/14	2023/5/13
RF Coaxial Cable TIMES	LMR-600(18M)+LMR-400 (7M)	CABLE-CH1(VER)-01	2021/9/4	2022/9/3
	LMR-600(11.8M)+LMR- 400 (7M)	CABLE-CH1(HOR)-01	2021/9/4	2022/9/3
Software	ADT_Radiated_V8.7.08	N/A	N/A	N/A
Test Receiver ESR7 R&S	ESR	101240	2021/11/3	2022/11/2
		101264	2022/4/11	2023/4/10
Turn Table	DS430	50303	N/A	N/A

Notes:

1. The test was performed in HY - 10M Chamber.
2. The test site validated date: 2021/8/07 (NSA)
3. Tested Date: 2022/5/26.

#### 4.3 Radiated Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower BVADT	AT100	AT93021702	N/A	N/A
BandPass Filter MICRO-TRONICS	BRM17690-01	003	2021/9/4	2022/9/3
	BRM50716-01	G011	2021/9/4	2022/9/3
Controller BVADT	SC100	SC93021702	N/A	N/A
Fix tool for Boresight antenna tower BV	BAF-01	2	N/A	N/A
Horn Antenna Schwarzbeck	BBHA 9120D	9120D-405	2021/11/14	2022/11/13
Pre-Amplifier Agilent	8449B	3008A01961	2021/9/4	2022/9/3
RF Coaxial Cable EMCI	EMC102-KM-KM-1000	170820	2022/1/15	2023/1/14
RF Coaxial Cable Rosnol	K1K50-UP0279-K1K50- 3000	181129-2	2022/1/15	2023/1/14
RF Coaxial Cable ATK+EMC	JUNFLON+EMC104- SM-SM-6000	Cable-CH2- 02(MWX3221308G003+130710)	2022/1/15	2023/1/14
Software BVADT	ADT_Radiated_V8.7.08	N/A	N/A	N/A
Spectrum Analyzer Agilent	E4446A	MY51100039	2021/12/7	2022/12/6
Turn Table BVADT	TT100	TT93021702	N/A	N/A

Notes:

1. The test was performed in HY - 966 chamber 1.
2. The test site validated date: 2022/1/8 (VSWR)
3. Tested Date: 2022/5/31 & 2022/8/1.

## 5 Limits of Test Items

### 5.1 Conducted Emissions from Power Ports

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

Notes: 1. The lower limit shall apply at the transition frequencies.  
 2. The limit decreases linearly with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

### 5.2 Radiated Emissions up to 1 GHz

Frequency range (MHz)	Class A (3 m) Quasi-peak dBμV/m	Class A (10 m) Quasi-peak dBμV/m	Class B (3 m) Quasi-peak dBμV/m	Class B (10 m) Quasi-peak dBμV/m
30-88	50.0	40.0	40.0	30.0
88-216	54.0	43.5	43.5	33.1
216-230	56.9	46.4	46.0	35.6
230-960	57.0	47.0	47.0	37.0
960-1000	60.0	49.5	54.0	43.5

Notes: 1. The lower limit shall apply at the transition frequencies.

### 5.3 Radiated Emissions above 1 GHz

Required highest measurement frequency

Highest internal frequency ( $F_x$ )	Highest measurement frequency ( $F_m$ ) (GHz)
$F_x \leq 108 \text{ MHz}$	1
$108 \text{ MHz} < F_x \leq 500 \text{ MHz}$	2
$500 \text{ MHz} < F_x \leq 1 \text{ GHz}$	5
$F_x > 1 \text{ GHz}$	$5 \times F_x$ up to a maximum of 40 GHz

$F_x$  is the highest fundamental frequency generated and/or used in the ITE or digital apparatus under test.

Radiated Emissions Limits at 3 meters (dBμV/m)		
Frequency range (GHz)	Class A	Class B
$1 - F_m$	Avg: 60 Peak: 80	Avg: 54 Peak: 74

Notes: 1. These limit levels apply for a measurement distance of 3 m. If using a different measurement distance, the measured levels shall be extrapolated to the 3 m limit distance using a factor of 20 dB per decade of distance. The measurement distance shall place the measurement antenna in the far field of the ITE or digital apparatus under test.

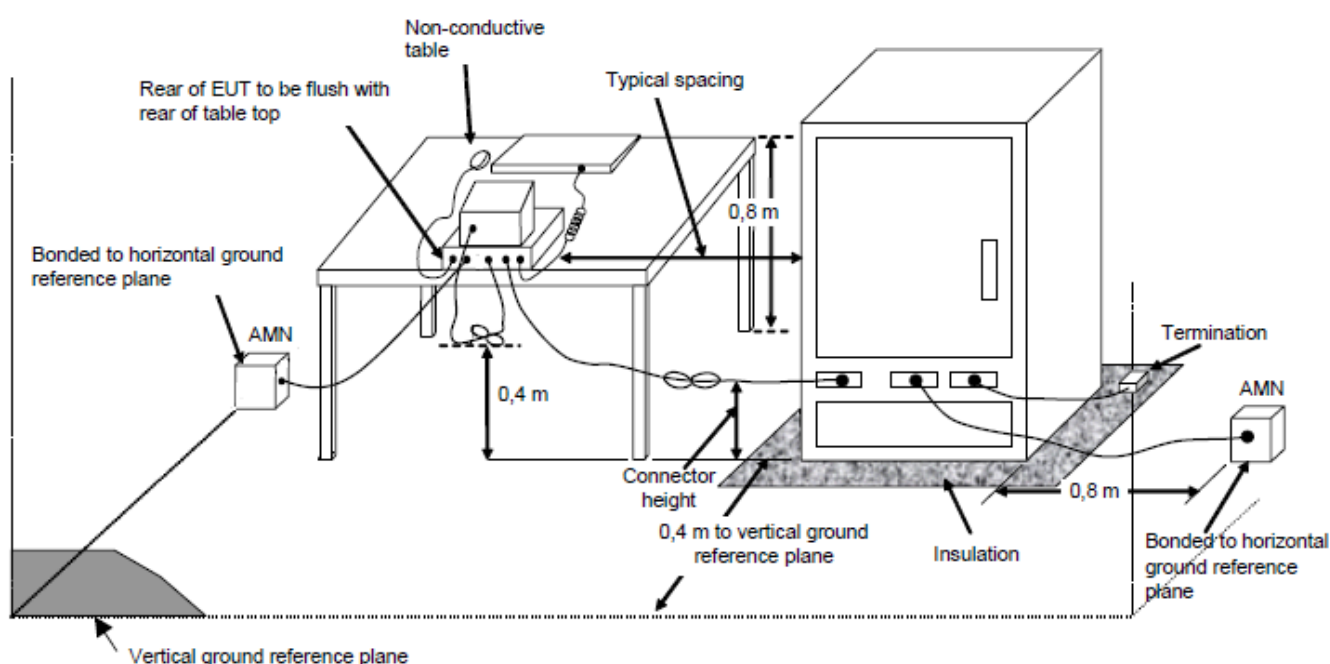
At and above 1 GHz, if the ITE or digital apparatus is an outdoor unit of home satellite receiving systems, it shall comply with the limits in Table A.7 in clause A.2 of CAN/CSA-CISPR 32:17 (in Annex A therein). For these types of ITE or digital apparatus, the highest measurement frequency shall be 18 GHz.

## 6 Test Arrangements

## 6.1 Conducted Emissions from Power Ports

- a. For the table-top EUT is placed on a 0.8 meter to the top of rotating table; for the the floor standing EUT shall be insulated (by insulation of 12 mm) from the horizontal reference ground plane. The EUT is placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units are connected to the power mains through another LISN. They provide coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak (mandatory) [and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

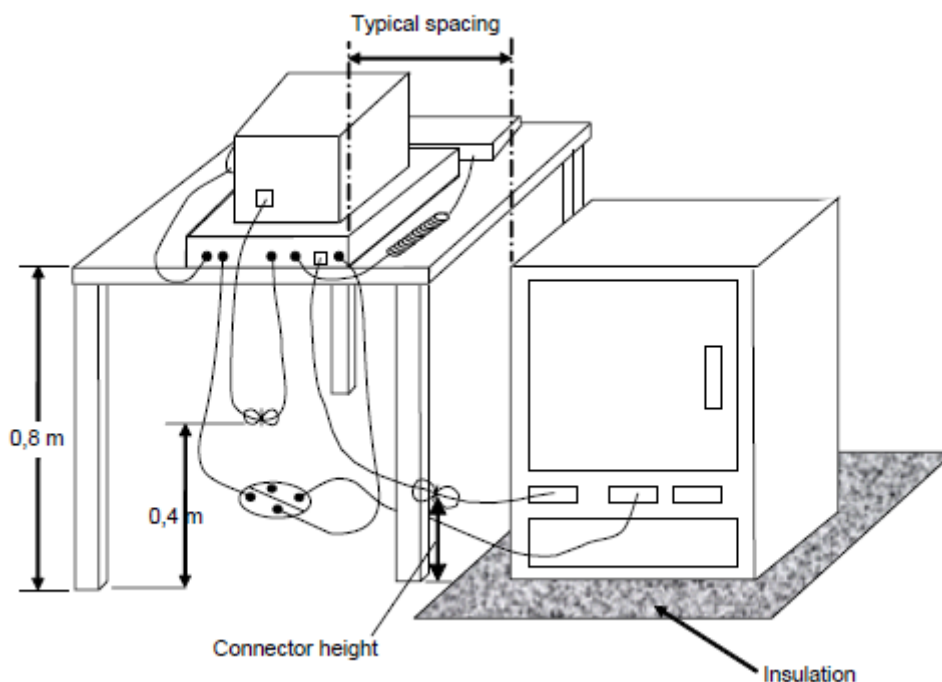


For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

## 6.2 Radiated Emissions up to 1 GHz

- For the table-top EUT is placed on a 0.8 meter to the top of rotating table; for the the floor standing EUT shall be insulated (by insulation of 12 mm) from the horizontal reference ground plane. The rotating table is rotated 360 degrees to determine the position of the highest radiation. If the equipment requires a dedicated ground connection, this shall be provided and bonded to the RGP.
- The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is up to 1 GHz.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection (QP) at frequency up to 1GHz.

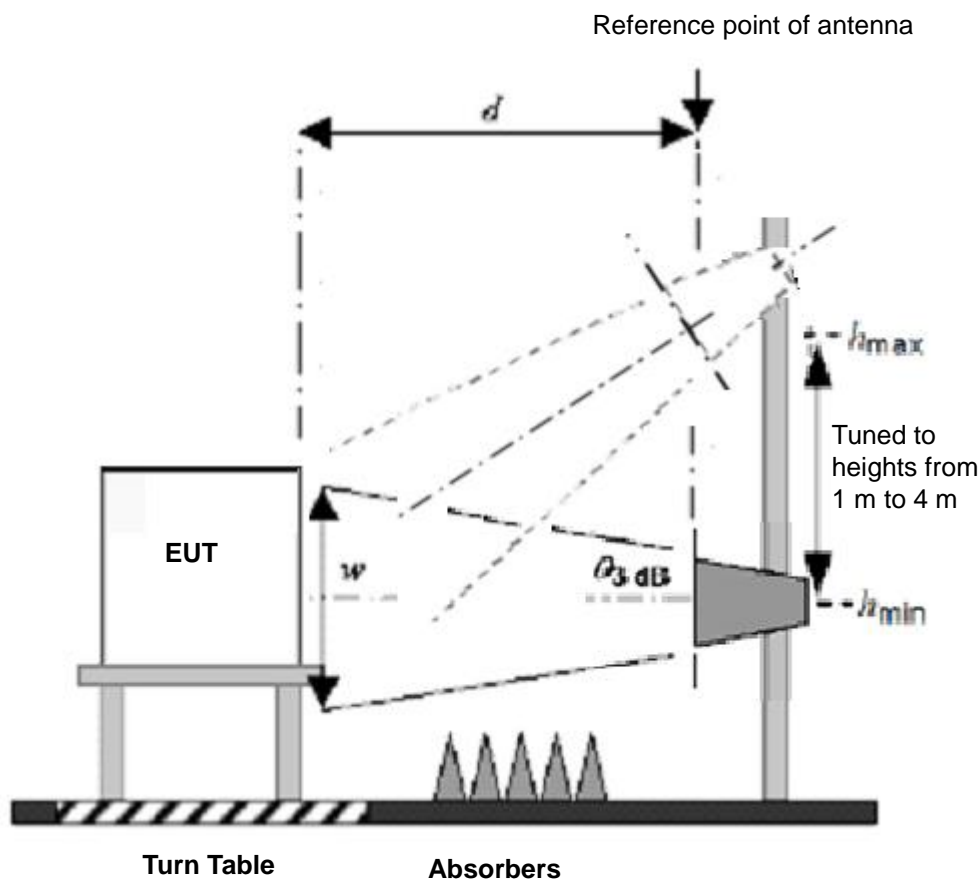


For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

### 6.3 Radiated Emissions above 1 GHz

- For the table-top EUT is placed on a 0.8 meter to the top of rotating table; for the the floor standing EUT shall be insulated (by insulation of 12 mm) from the horizontal reference ground plane. The rotating table is rotated 360 degrees to determine the position of the highest radiation. If the equipment requires a dedicated ground connection, this shall be provided and bonded to the RGP.
- The EUT was set  $d = 3$  meters for 1 GHz to 18 GHz and  $d = 1.5$  meters for 18 GHz to 40 GHz away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna can be varied from one meter to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The spectrum analyzer system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

Note: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection (PK) at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

## 7 Test Results of Test Item

### 7.1 Conducted Emissions from Power Ports

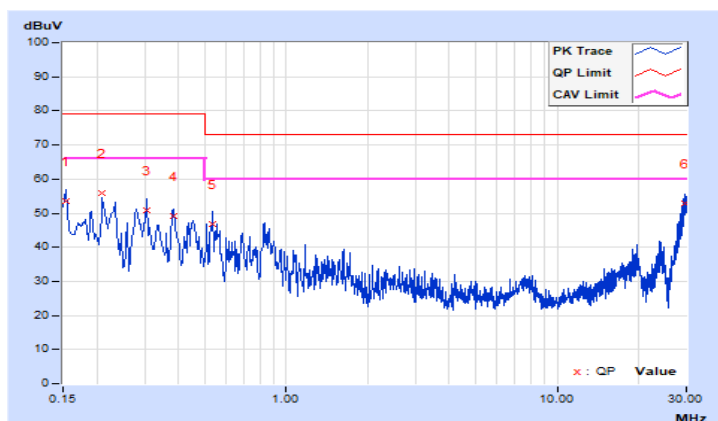
#### Mode A

Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	240 Vac, 60 Hz	Environmental Conditions	27°C, 75% RH
Tested by	Jim Lee		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15400	10.26	43.13	35.67	53.39	45.93	79.00	66.00	-25.61	-20.07
2	0.21000	10.24	45.67	36.89	55.91	47.13	79.00	66.00	-23.09	-18.87
3	0.30600	10.23	40.57	30.80	50.80	41.03	79.00	66.00	-28.20	-24.97
4	0.38200	10.23	39.03	30.73	49.26	40.96	79.00	66.00	-29.74	-25.04
5	0.53400	10.24	36.43	27.59	46.67	37.83	73.00	60.00	-26.33	-22.17
6	29.55000	22.49	30.41	24.04	52.90	46.53	73.00	60.00	-20.10	-13.47

#### Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



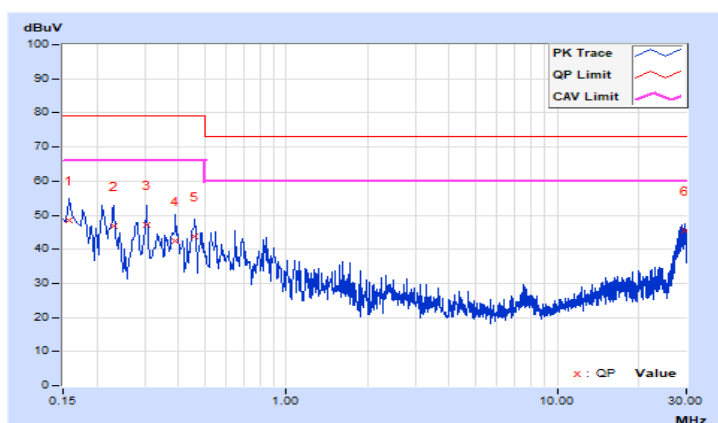


Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	240 Vac, 60 Hz	Environmental Conditions	27°C, 75% RH
Tested by	Jim Lee		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15800	10.28	38.31	26.62	48.59	36.90	79.00	66.00	-30.41	-29.10
2	0.22985	10.26	36.62	28.67	46.88	38.93	79.00	66.00	-32.12	-27.07
3	0.30600	10.25	36.95	28.07	47.20	38.32	79.00	66.00	-31.80	-27.68
4	0.39000	10.25	32.20	23.02	42.45	33.27	79.00	66.00	-36.55	-32.73
5	0.45800	10.25	33.62	25.25	43.87	35.50	79.00	66.00	-35.13	-30.50
6	29.54600	20.55	24.93	19.11	45.48	39.66	73.00	60.00	-27.52	-20.34

#### Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



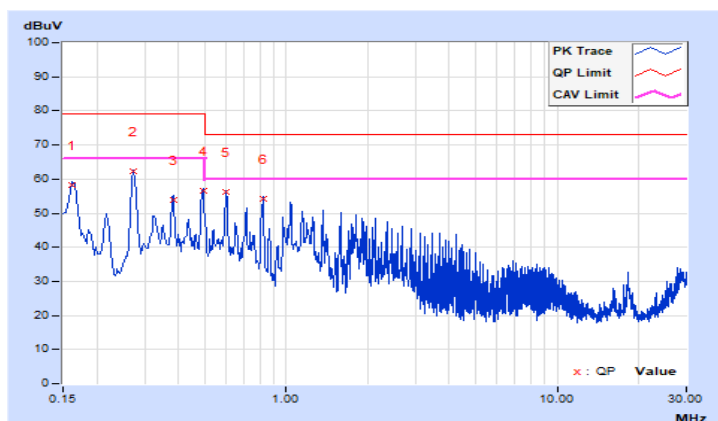
## Mode B

Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	60Vdc	Environmental Conditions	27°C, 75% RH
Tested by	Jim Lee		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16200	10.26	48.06	44.44	58.32	54.70	79.00	66.00	-20.68	-11.30
2	0.27300	10.24	52.03	50.03	62.27	60.27	79.00	66.00	-16.73	-5.73
3	0.38200	10.23	43.71	41.76	53.94	51.99	79.00	66.00	-25.06	-14.01
4	0.49246	10.23	46.49	45.53	56.72	55.76	79.00	66.00	-22.28	-10.24
5	<b>0.60200</b>	<b>10.24</b>	<b>45.98</b>	<b>45.16</b>	<b>56.22</b>	<b>55.40</b>	<b>73.00</b>	<b>60.00</b>	<b>-16.78</b>	<b>-4.60</b>
6	0.82100	10.25	44.00	43.54	54.25	53.79	73.00	60.00	-18.75	-6.21

### Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

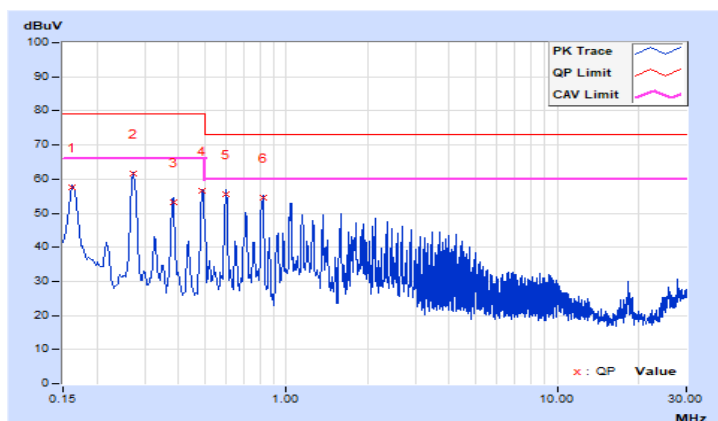


Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	60Vdc	Environmental Conditions	27°C, 75% RH
Tested by	Jim Lee		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16200	10.28	47.27	43.83	57.55	54.11	79.00	66.00	-21.45	-11.89
2	0.27350	10.26	51.51	49.54	61.77	59.80	79.00	66.00	-17.23	-6.20
3	0.38200	10.25	43.09	41.12	53.34	51.37	79.00	66.00	-25.66	-14.63
4	0.49200	10.25	46.25	45.00	56.50	55.25	79.00	66.00	-22.50	-10.75
5	0.60200	10.26	45.46	44.80	55.72	55.06	73.00	60.00	-17.28	-4.94
6	0.82200	10.27	44.17	43.76	54.44	54.03	73.00	60.00	-18.56	-5.97

#### Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



## 7.2 Radiated Emissions up to 1 GHz

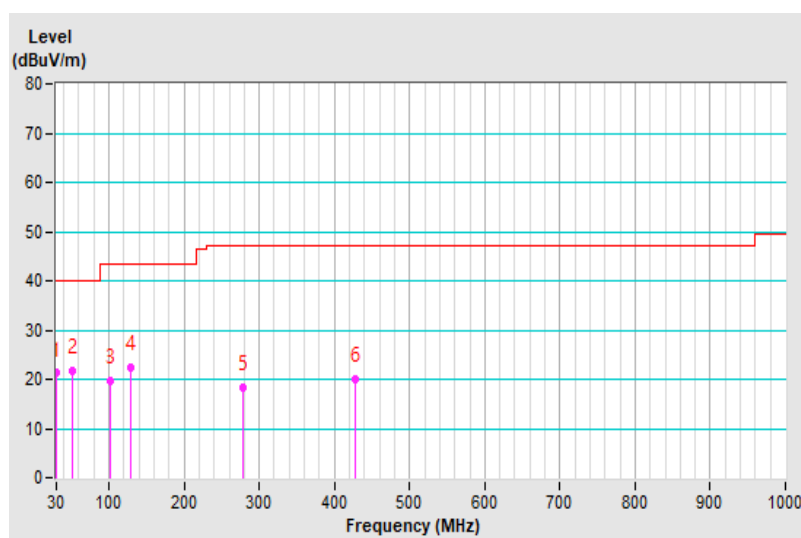
### Mode A

Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Tested By	Daniel Lin	Environmental Conditions	25°C, 62% RH

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	30.39	21.26 QP	40.00	-18.74	3.50 H	15	35.81	-14.55
2	50.37	21.74 QP	40.00	-18.26	3.50 H	20	34.52	-12.78
3	101.40	19.60 QP	43.50	-23.90	4.00 H	120	37.15	-17.55
4	129.67	22.43 QP	43.50	-21.07	3.00 H	278	37.39	-14.96
5	278.04	18.31 QP	47.00	-28.69	2.50 H	16	31.28	-12.97
6	427.14	19.99 QP	47.00	-27.01	3.50 H	15	29.00	-9.01

### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)  
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



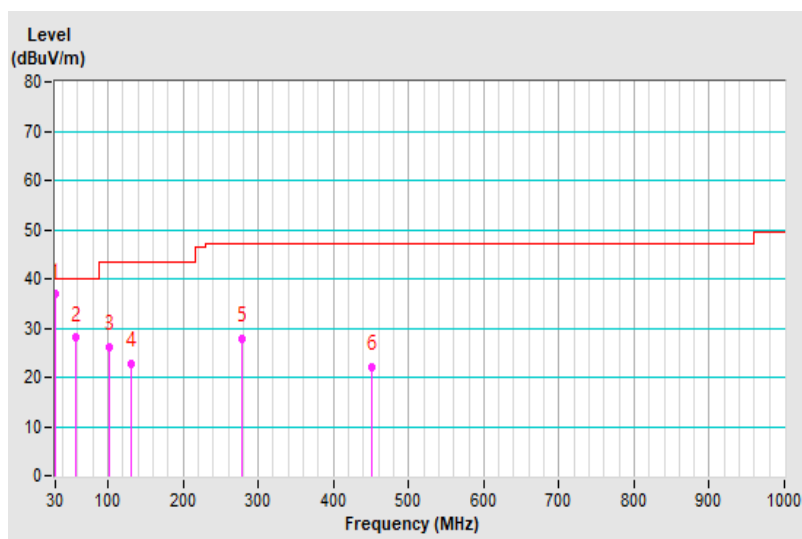
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Tested By	Daniel Lin	Environmental Conditions	25°C, 62% RH

### Antenna Polarity & Test Distance : Vertical at 10 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	30.44	36.80 QP	40.00	-3.20	2.00 V	359	51.93	-15.13
2	56.68	28.04 QP	40.00	-11.96	2.50 V	201	41.31	-13.27
3	101.98	26.17 QP	43.50	-17.33	1.00 V	233	43.87	-17.70
4	131.52	22.72 QP	43.50	-20.78	2.50 V	228	37.61	-14.89
5	279.16	27.78 QP	47.00	-19.22	1.00 V	347	40.31	-12.53
6	451.24	22.01 QP	47.00	-24.99	1.00 V	52	30.07	-8.06

### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)  
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



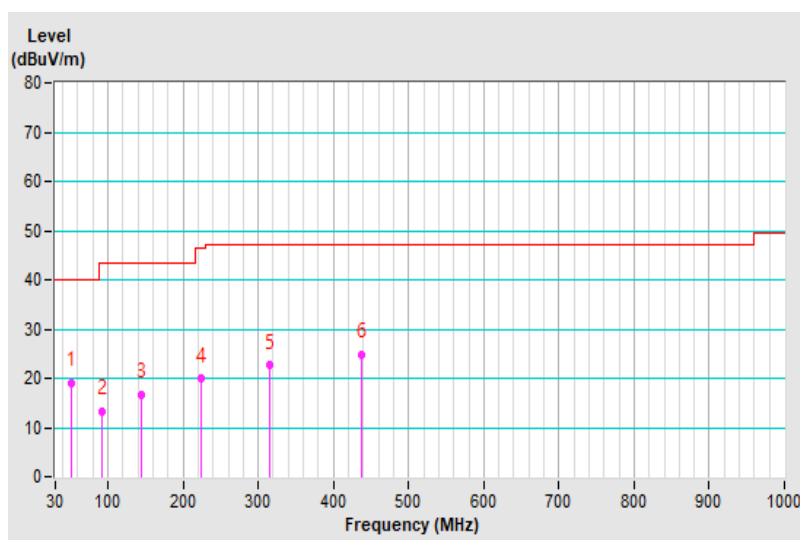
## Mode B

Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Tested By	Daniel Lin	Environmental Conditions	25°C, 62% RH

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	50.42	19.06 QP	40.00	-20.94	3.00 H	152	31.84	-12.78
2	91.11	13.31 QP	43.50	-30.19	2.00 H	16	32.10	-18.79
3	145.39	16.70 QP	43.50	-26.80	3.00 H	118	30.06	-13.36
4	223.09	19.86 QP	46.40	-26.54	3.00 H	84	36.05	-16.19
5	315.34	22.58 QP	47.00	-24.42	2.50 H	337	34.71	-12.13
6	437.27	24.81 QP	47.00	-22.19	2.00 H	16	33.48	-8.67

### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)  
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



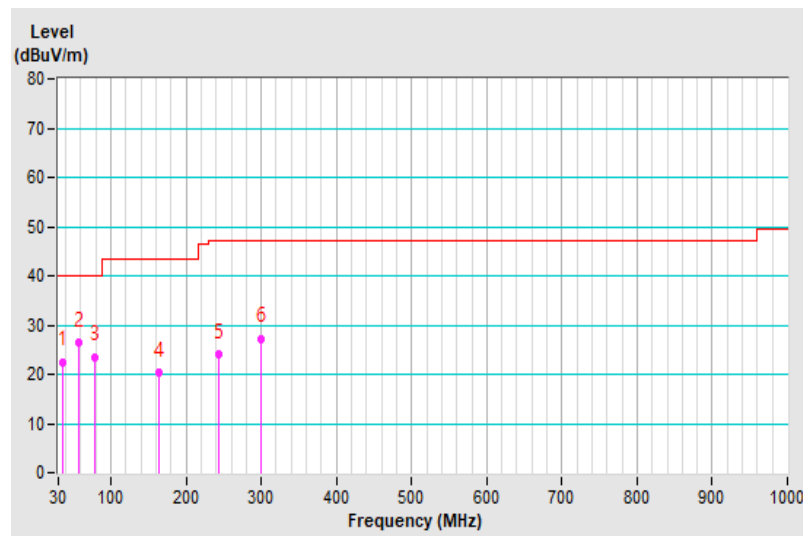
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Tested By	Daniel Lin	Environmental Conditions	25°C, 62% RH

**Antenna Polarity & Test Distance : Vertical at 10 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	35.43	22.52 QP	40.00	-17.48	1.50 V	342	37.31	-14.79
2	57.31	26.33 QP	40.00	-13.67	3.00 V	66	39.72	-13.39
3	78.89	23.48 QP	40.00	-16.52	2.00 V	45	41.08	-17.60
4	164.69	20.25 QP	43.50	-23.25	1.00 V	240	33.75	-13.50
5	243.60	23.98 QP	47.00	-23.02	1.00 V	191	38.17	-14.19
6	300.21	27.18 QP	47.00	-19.82	1.50 V	218	39.17	-11.99

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)  
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



### 7.3 Radiated Emissions above 1 GHz

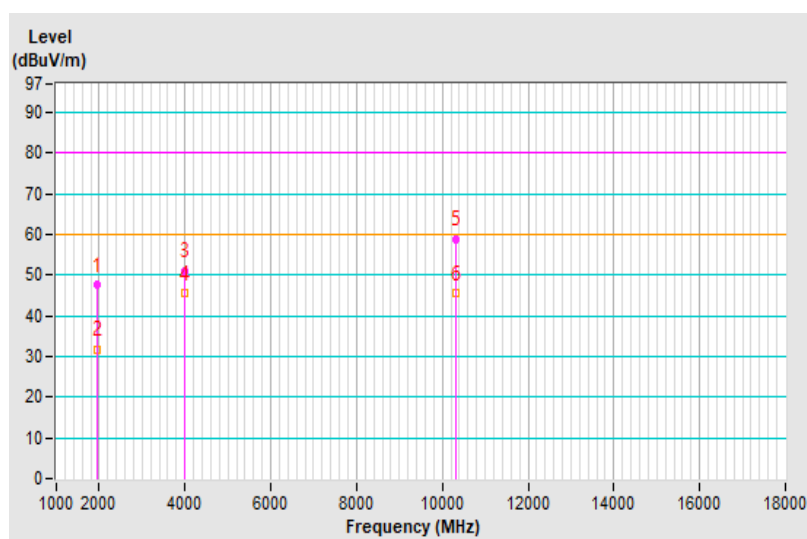
#### Mode A

Frequency Range	1GHz ~ 18GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested By	Jim Lee	Environmental Conditions	25°C, 74% RH

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1956.78	47.64 PK	80.00	-32.36	1.00 H	181	48.13	-0.49
2	1956.78	31.82 AV	60.00	-28.18	1.00 H	181	32.31	-0.49
3	4000.01	51.13 PK	80.00	-28.87	2.02 H	175	45.52	5.61
4	4000.01	45.52 AV	60.00	-14.48	2.02 H	175	39.91	5.61
5	10312.70	58.96 PK	80.00	-21.04	1.08 H	88	40.98	17.98
6	10312.70	45.48 AV	60.00	-14.52	1.08 H	88	27.50	17.98

#### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)  
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



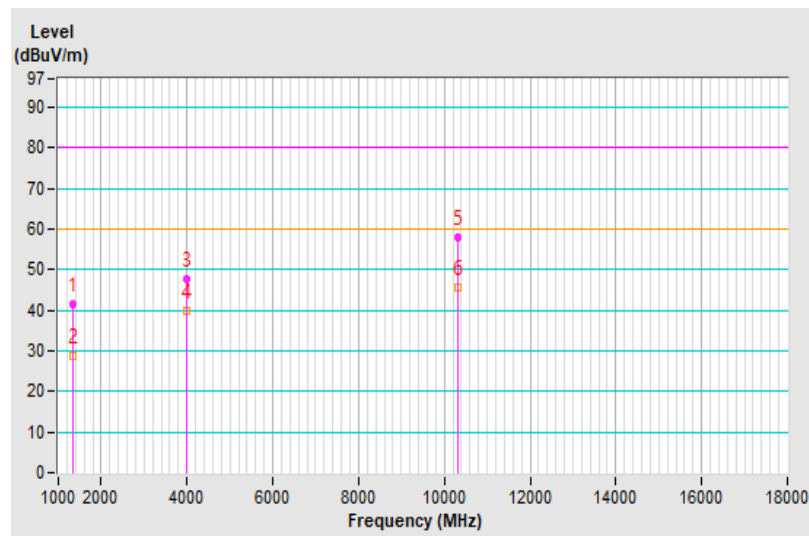


<b>Frequency Range</b>	1GHz ~ 18GHz	<b>Detector Function &amp; Resolution Bandwidth</b>	Peak (PK) / Average (AV), 1MHz
<b>Tested By</b>	Jim Lee	<b>Environmental Conditions</b>	25°C, 74% RH

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1334.15	41.62 PK	80.00	-38.38	1.95 V	18	43.85	-2.23
2	1334.15	28.75 AV	60.00	-31.25	1.95 V	18	30.98	-2.23
3	3999.99	47.52 PK	80.00	-32.48	1.00 V	188	41.91	5.61
4	3999.99	39.92 AV	60.00	-20.08	1.00 V	188	34.31	5.61
5	10313.30	58.09 PK	80.00	-21.91	1.13 V	120	40.11	17.98
6	10313.30	45.59 AV	60.00	-14.41	1.13 V	120	27.61	17.98

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)  
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

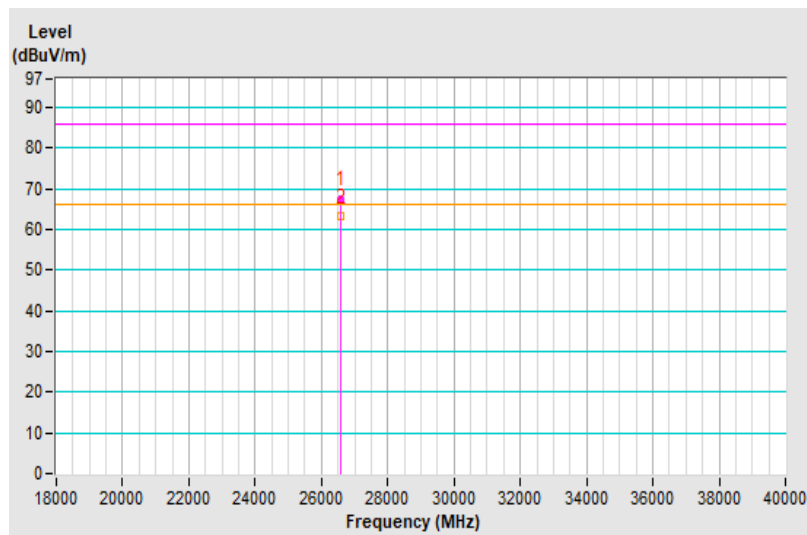


Frequency Range	18GHz ~ 40GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested By	Kai Chu	Environmental Conditions	26°C, 72% RH

Antenna Polarity & Test Distance : Horizontal at 1.5 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	26562.37	67.57 PK	86.00	-18.43	1.36 H	64	65.73	1.84
2	26562.37	63.38 AV	66.00	-2.62	1.36 H	64	61.54	1.84

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)  
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

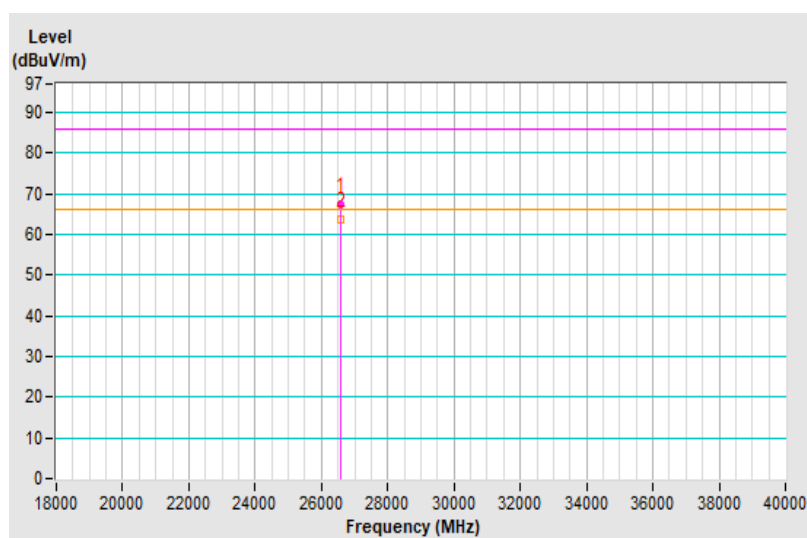


Frequency Range	18GHz ~ 40GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested By	Kai Chu	Environmental Conditions	26°C, 72% RH

Antenna Polarity & Test Distance : Vertical at 1.5 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	26562.36	67.54 PK	86.00	-18.46	1.42 V	339	65.70	1.84
2	26562.36	63.74 AV	66.00	-2.26	1.42 V	339	61.90	1.84

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)  
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



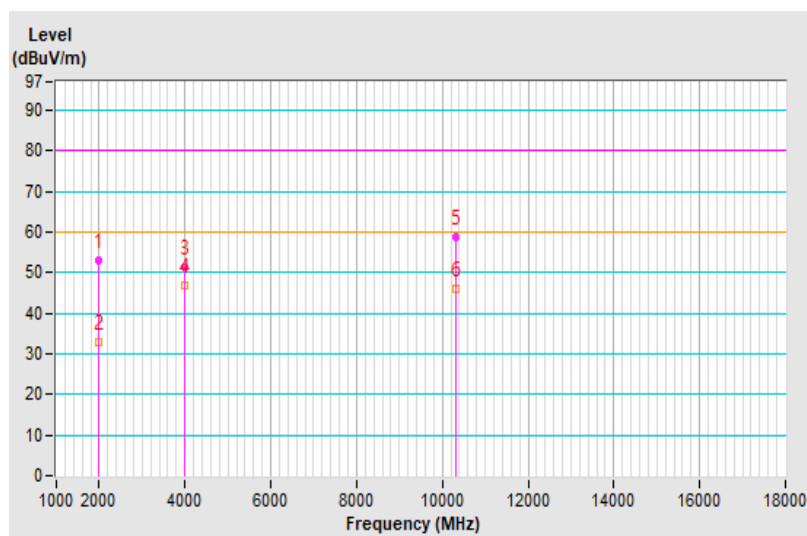
## Mode B

Frequency Range	1GHz ~ 18GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested By	Jim Lee	Environmental Conditions	25°C, 74% RH

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2000.37	52.86 PK	80.00	-27.14	1.15 H	160	52.84	0.02
2	2000.37	32.82 AV	60.00	-27.18	1.15 H	160	32.80	0.02
3	3999.93	51.38 PK	80.00	-28.62	1.00 H	155	45.77	5.61
4	3999.93	46.98 AV	60.00	-13.02	1.00 H	155	41.37	5.61
5	10312.60	58.82 PK	80.00	-21.18	1.99 H	314	40.84	17.98
6	10312.60	45.89 AV	60.00	-14.11	1.99 H	314	27.91	17.98

### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)  
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

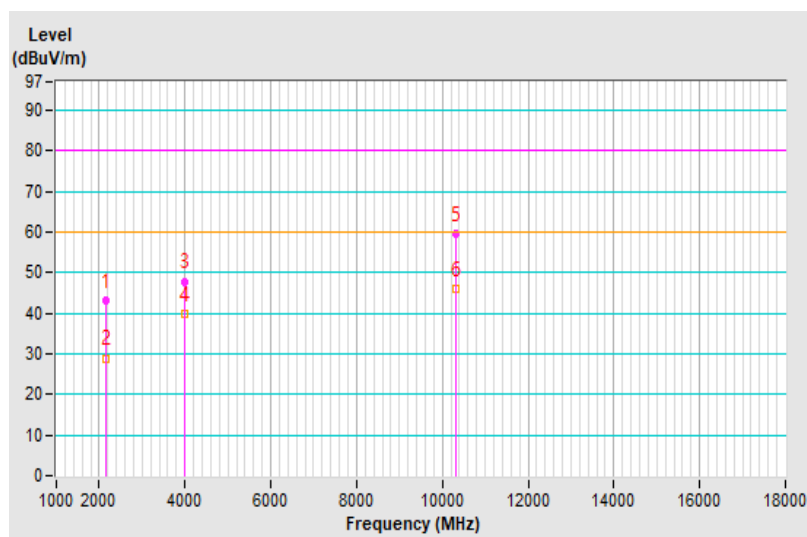


Frequency Range	1GHz ~ 18GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested By	Jim Lee	Environmental Conditions	25°C, 74% RH

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2157.99	43.02 PK	80.00	-36.98	2.14 V	335	40.91	2.11
2	2157.99	28.93 AV	60.00	-31.07	2.14 V	335	26.82	2.11
3	3999.99	47.82 PK	80.00	-32.18	1.00 V	188	42.21	5.61
4	3999.99	39.87 AV	60.00	-20.13	1.00 V	188	34.26	5.61
5	10312.60	59.45 PK	80.00	-20.55	1.00 V	203	41.47	17.98
6	10312.60	46.09 AV	60.00	-13.91	1.00 V	203	28.11	17.98

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)  
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

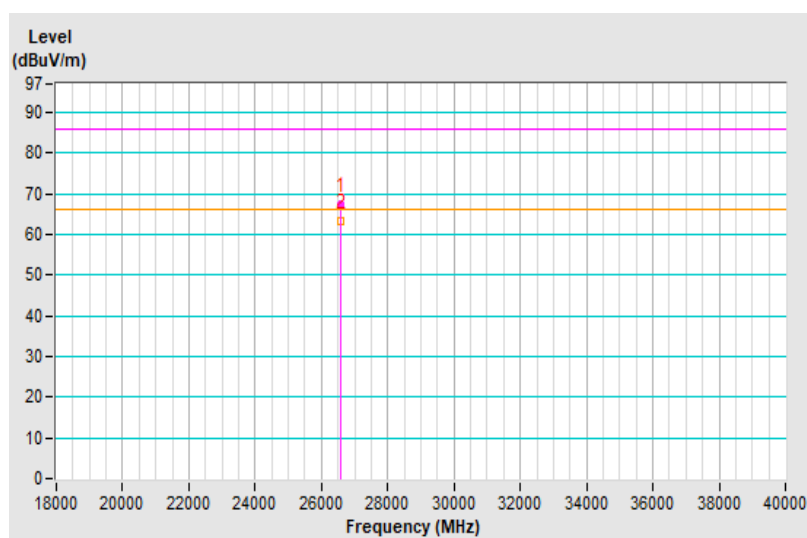


Frequency Range	18GHz ~ 40GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested By	Kai Chu	Environmental Conditions	26°C, 72% RH

Antenna Polarity & Test Distance : Horizontal at 1.5 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	26562.37	67.49 PK	86.00	-18.51	1.32 H	66	65.65	1.84
2	26562.37	63.33 AV	66.00	-2.67	1.32 H	66	61.49	1.84

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)  
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

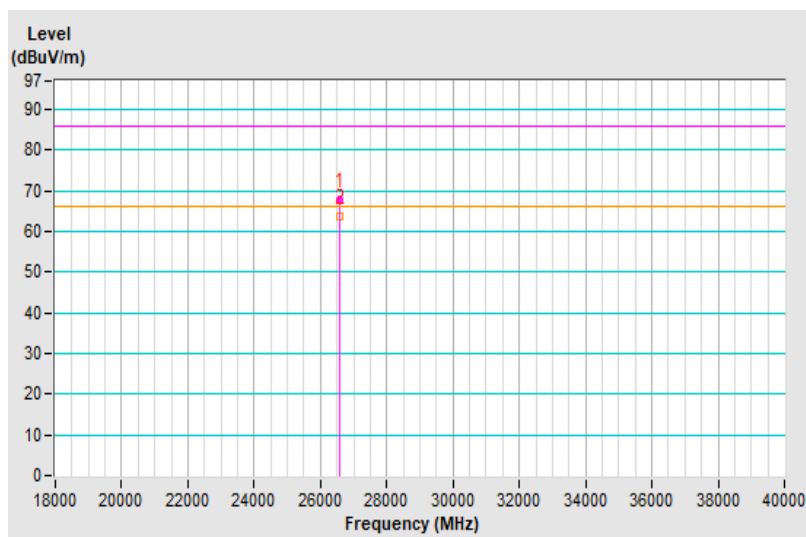


Frequency Range	18GHz ~ 40GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested By	Kai Chu	Environmental Conditions	26°C, 72% RH

Antenna Polarity & Test Distance : Vertical at 1.5 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	26562.36	67.71 PK	86.00	-18.29	1.44 V	337	65.87	1.84
2	26562.36	63.83 AV	66.00	-2.17	1.44 V	337	61.99	1.84

**Remarks:**

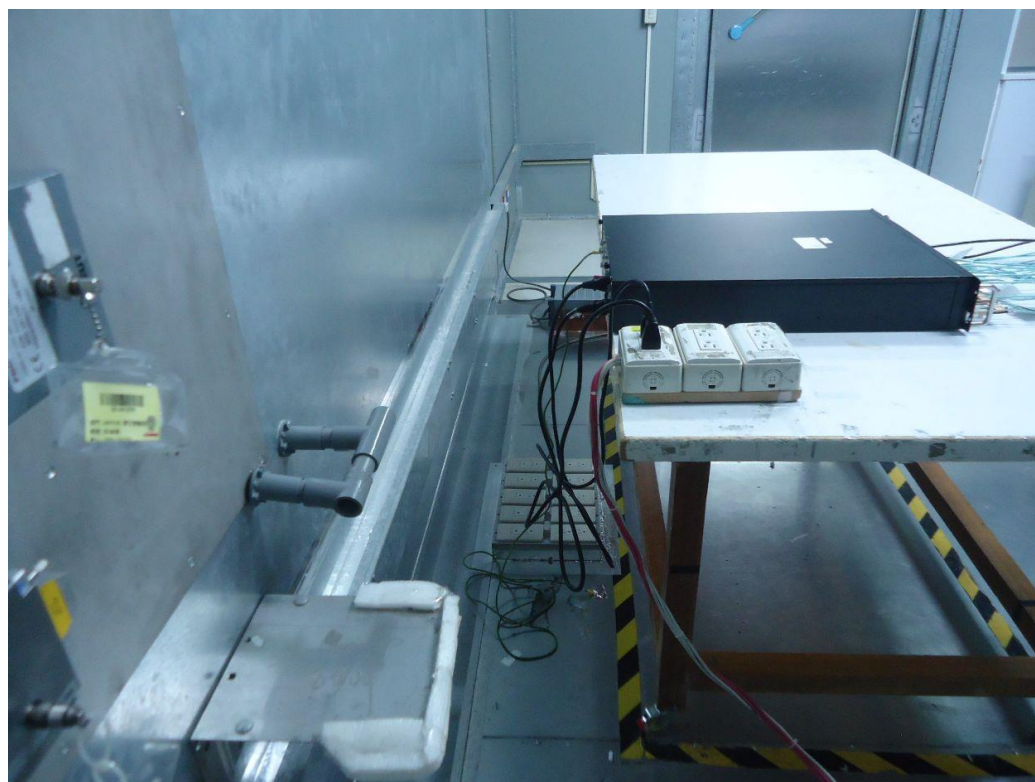
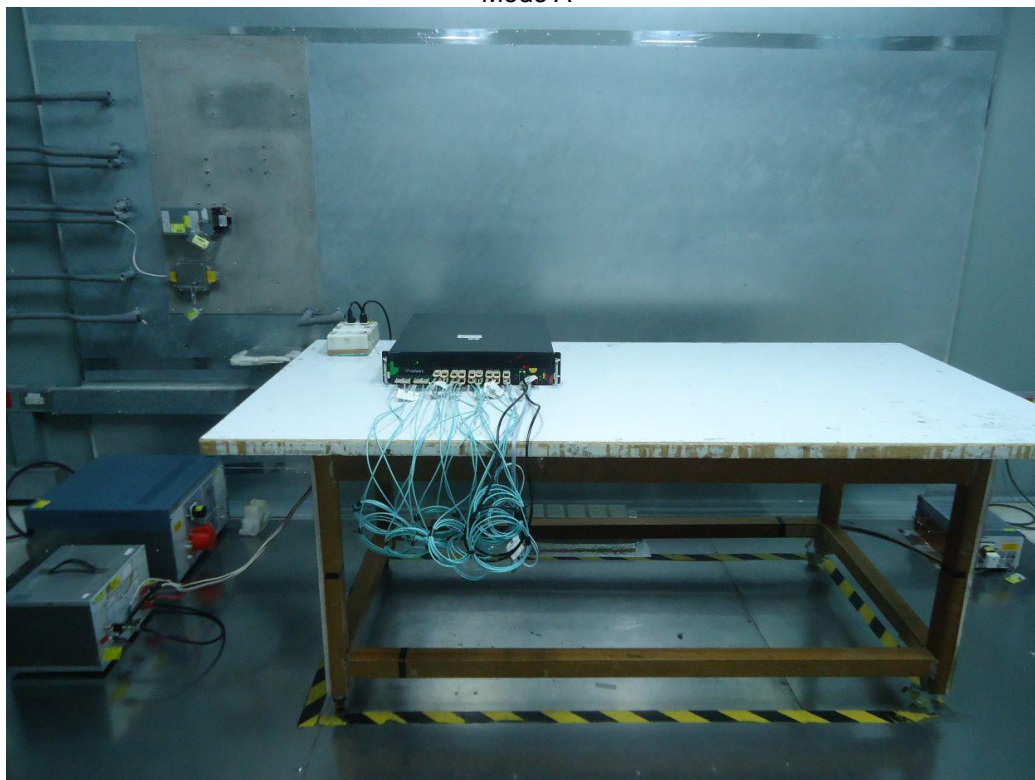
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)  
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



## 8 Pictures of Test Arrangements

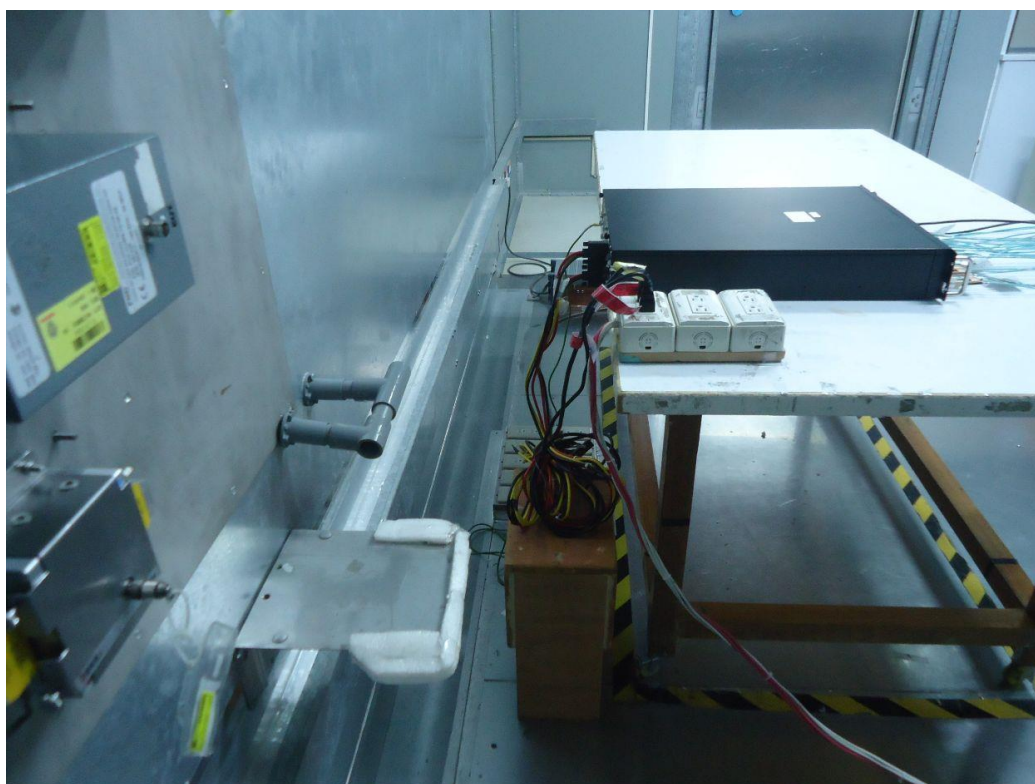
### 8.1 Conducted Emissions from Power Ports

Mode A



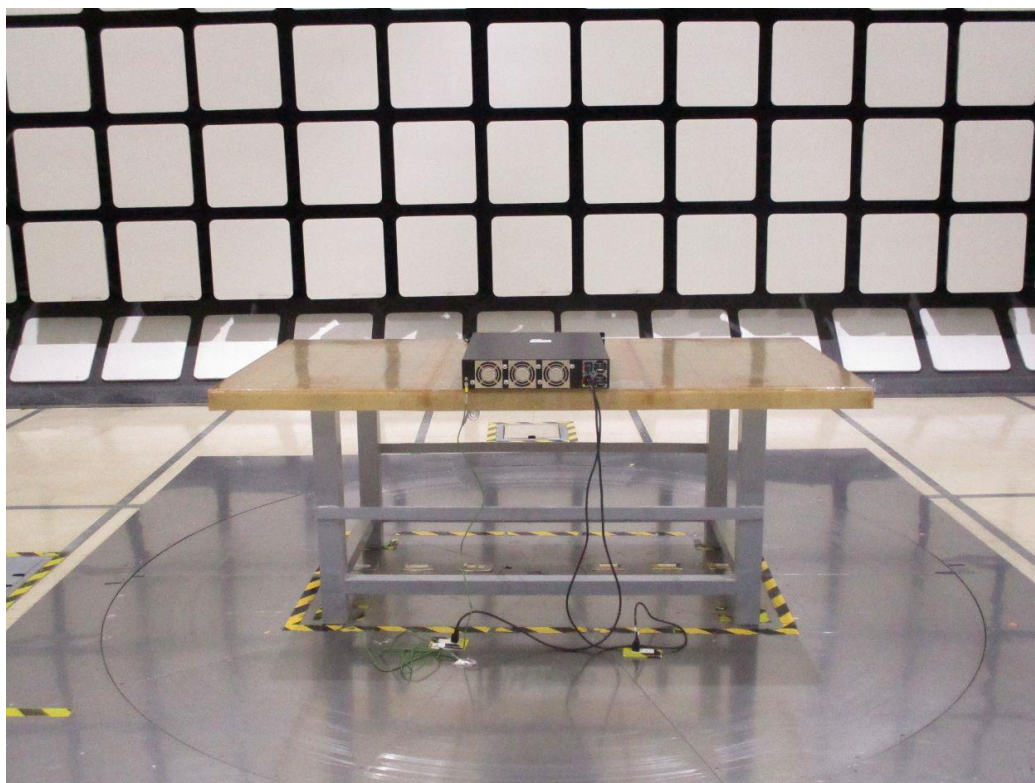
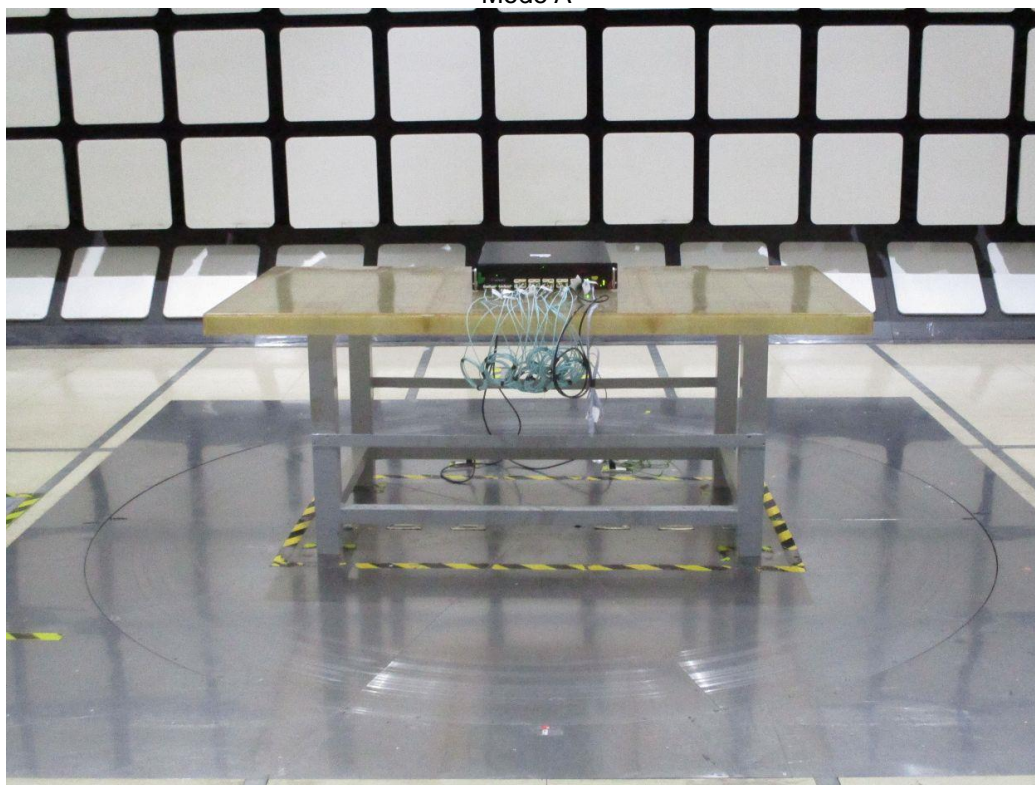


Mode B



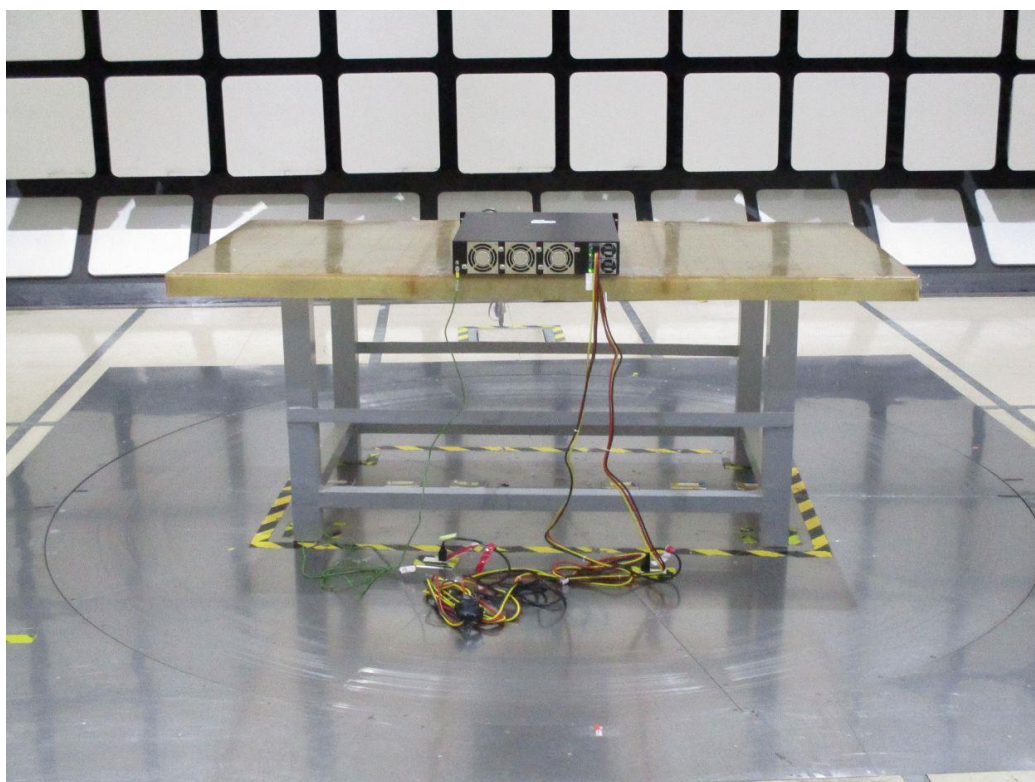
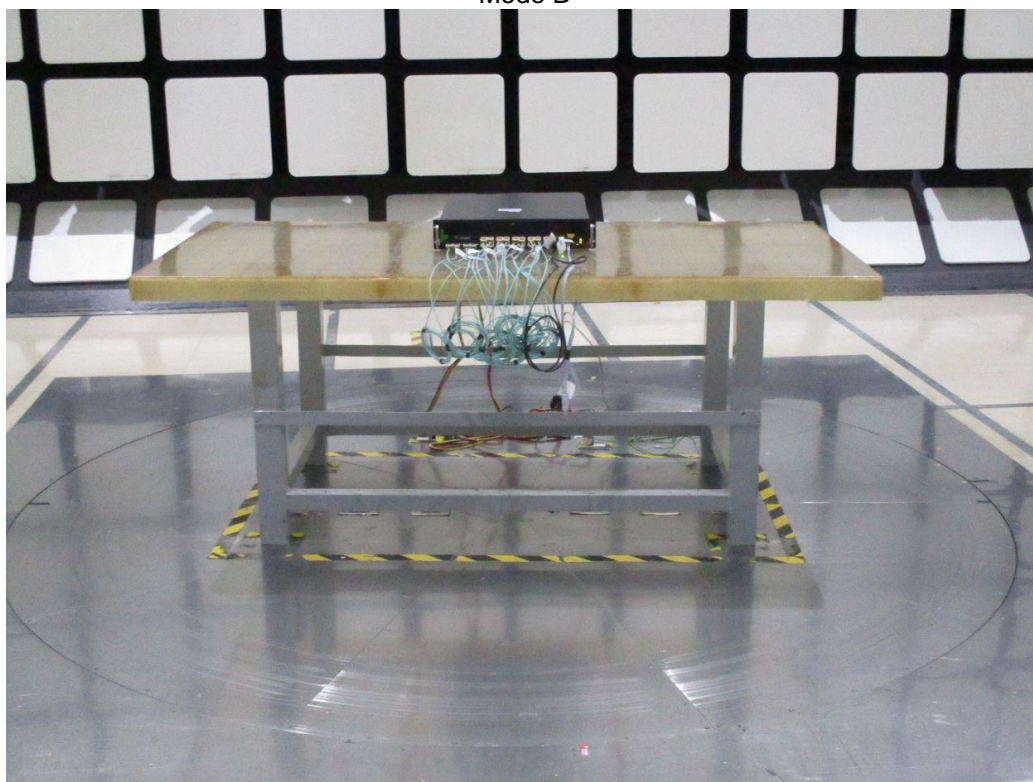
## 8.2 Radiated Emissions up to 1 GHz

Mode A



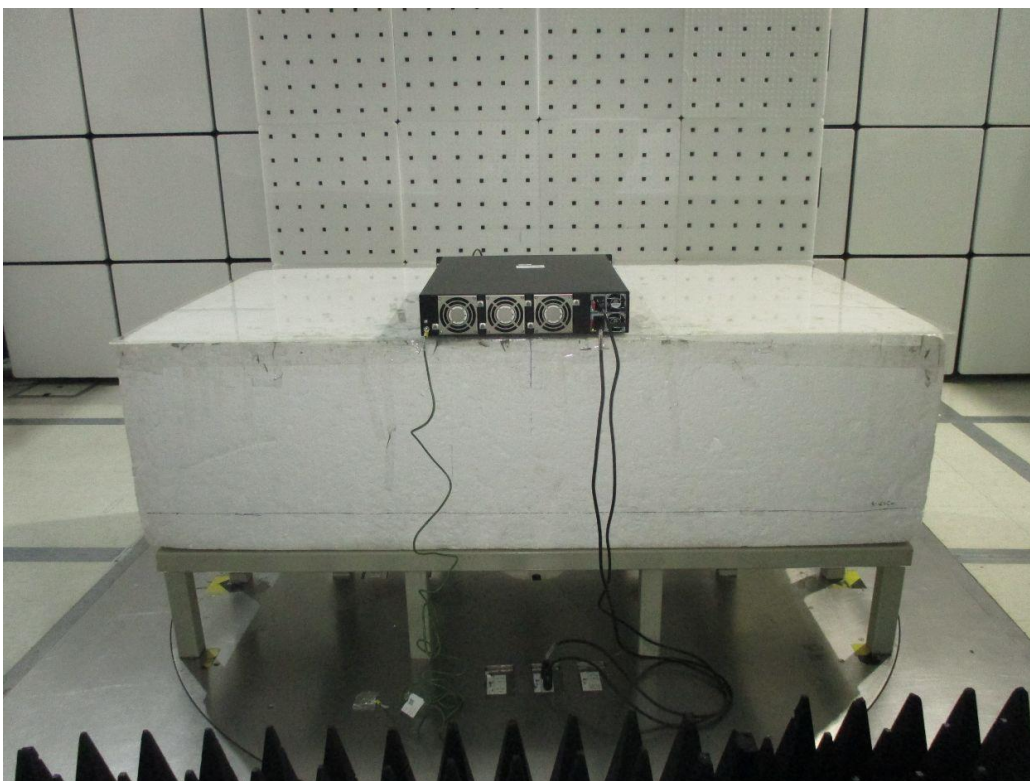
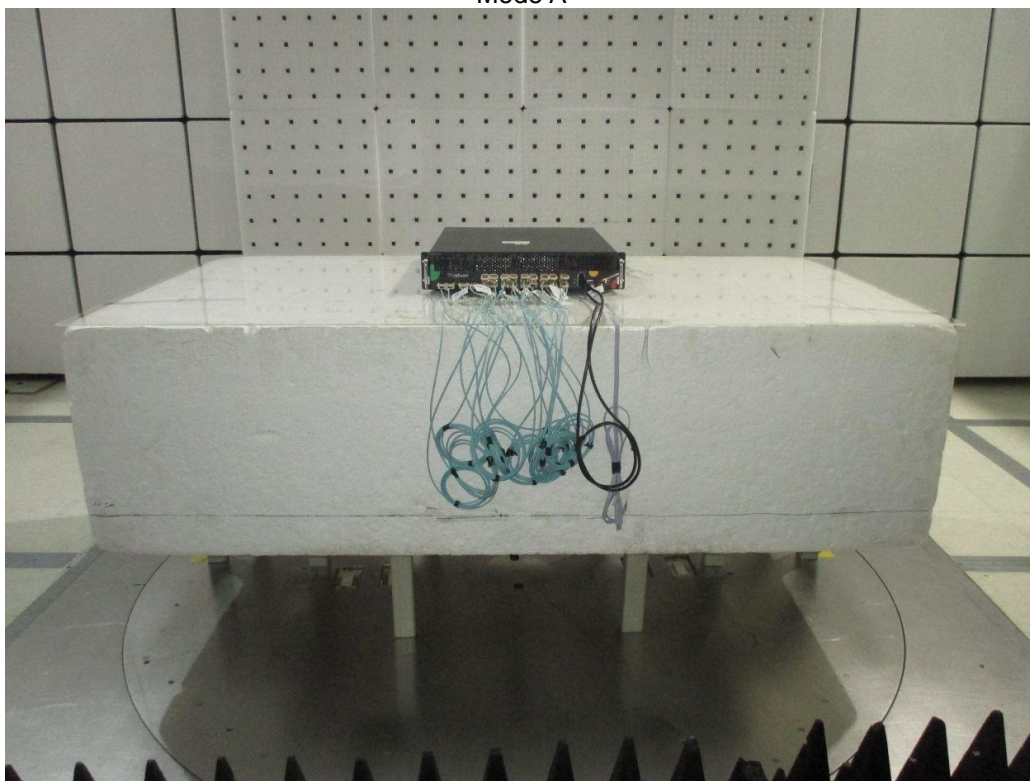


Mode B



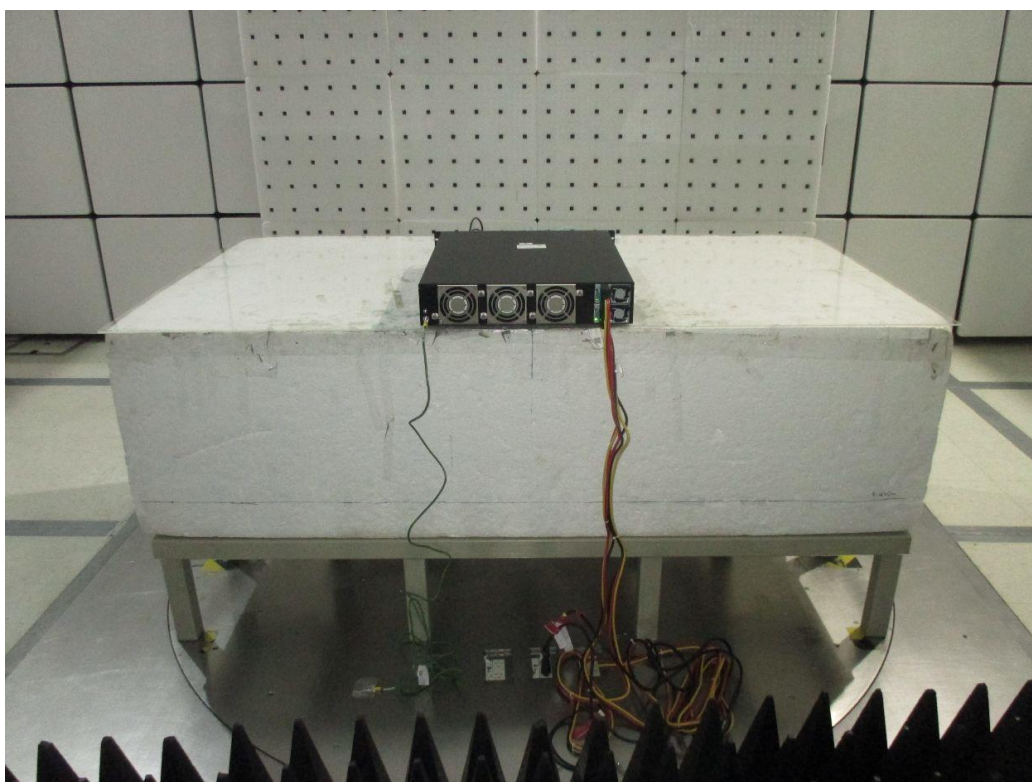
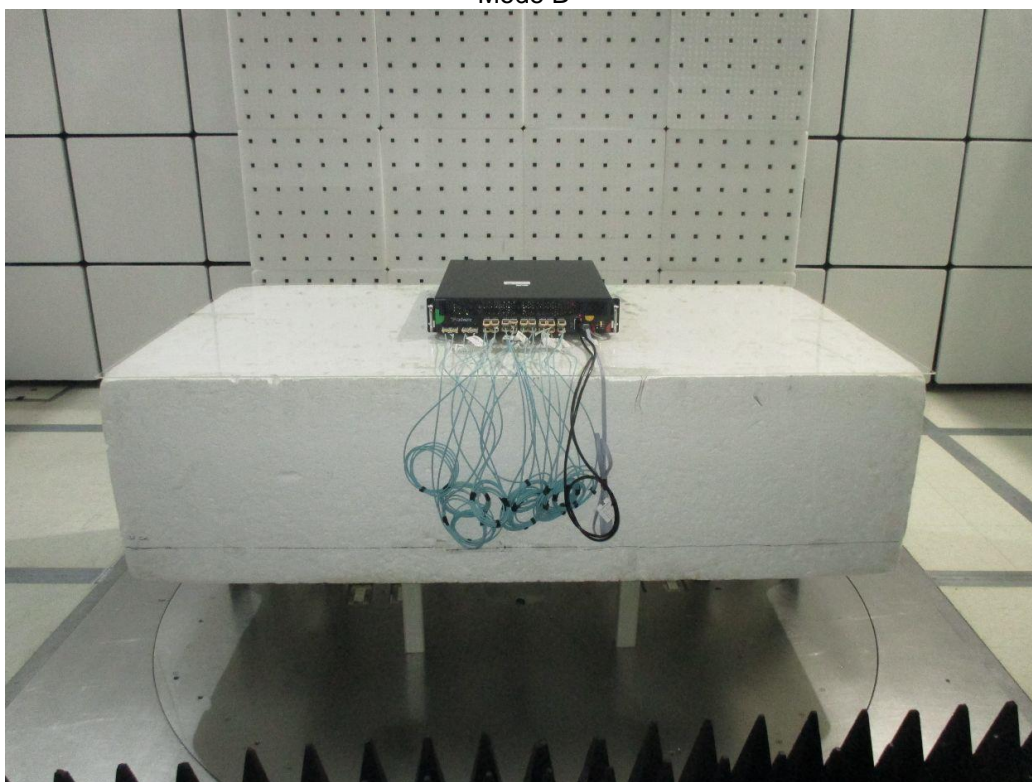
### 8.3 Radiated Emissions above 1 GHz

Mode A





Mode B



## 9 Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

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