



FCC SDOC TEST REPORT

Equipment : LCD Monitor

Model No. : **273*****(*=0-9,A-Z,a-z,+,-,/,\ or blank)

Applicant : TPV Electronics (Fujian) Co., Ltd.

Address : Ronggiao Economic and Technological
Development Zone, Fuqing City, Fujian Province,
P.R. China

Standard : ANSI C63.4
FCC Part 15 Subpart B
Canada ICES-003

HEREBY CERTIFY THAT :

The sample was received on : Oct. 28, 2019

The testing was carried out on : Nov. 16, 2019

The test result refers exclusively to the test presented test model / sample.

Without written approval of CerpPASS Technology Corp., the test report shall not be reproduced except in full.

Approved by:


Kero Kuo / EMC/RF Manager





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History of this test report

Report No.	Issue Date	Description	Version
TEFD1910221	Nov. 19, 2019	Original	A



Summary of Test Results

1. Applicable Standards

FCC

The measurements shown in this test report were made in accordance with the procedures given in ANSI C63.4 – 2014 and the energy emitted by this equipment was passed Part 2, Part 15, CISPR PUB. 22.

Canada

The measurements shown in this test report were made in accordance with the procedures given in Canada ICES-003 issue 6 section 3.a and 3.b.

The energy emitted by this equipment was passed both Radiated and Conducted Emissions Class **B** limits.

Test Item	Normative References	Test Result
Conducted Emission	ANSI C63.4-2014, FCC Part 15 Subpart B, CISPR PUB. 22 Canada ICES-003 issue 6	PASS
Radiation Emission	ANSI C63.4-2014, FCC Part 15 Subpart B, CISPR PUB. 22 Canada ICES-003 issue 6	PASS

Note*: Pass criterion is defined by the applicant. The test report is to follow the applicant specification.

The lab has lowered the uncertainty risk of test equipment, environment, and staff technicians according to ISO-IEC17025. Therefore we define test result as compliant when it complies with the standard without further evaluation of test result uncertainty.

2. General Description

2.1. Product Details

LCD Monitor	Model No.	**273*****(*=0-9,A-Z,a-z,+,-,/,\ or blank)
Power Cable	Non-Shielding, 1.5m & 1.8m	
Please refer to the user’s manual.		

2.2. Accessories

N/A



3. Test Configuration of Equipment under Test

3.1. Test Software

- a. An executive program, “BurnIn Test” under WIN 7 was used as the test software. The program was executed as follows:
 1. Turn on the power of all equipment.
 2. The PC reads the test program from the hard disk drive and runs it.
 3. The PC sends “H” messages to the monitor, and the monitor displays “H” patterns on the screen.
 4. The PC sends “H” messages to the internal Hard Disk, and the Hard Disk reads and writes the message.
 5. The PC sends “H” messages to the printer, then the printer prints them on the paper.
 6. Repeat the steps from 2 to 4.
- b. An executive program, “BurnIn Test” was executed to play 1kHz signals.

3.2. Test Manner

- a. During testing, the interface cables and equipment positions were varied according to ANSI C63.4.
- b. The test modes of EMI test as follow:

Conducted Emission for AC main power and Radiation Emission	
Test Mode 1	Full system (Display 1 mode 1920*1080@60Hz) Signal from PC for Horizontal
Test Mode 2	Full system (Display 2 mode 1920*1080@60Hz) Signal from PC for Horizontal
Test Mode 3	Full system (HDMI 1 mode 1920*1080@60Hz) Signal from PC for Horizontal
Test Mode 4	Full system (HDMI 2 mode 1920*1080@60Hz) Signal from PC for Horizontal
Test Mode 5	Full system (VGA mode 1920*1080@60Hz) Signal from PC for Horizontal
Test Mode 6	Full system (Display 1 mode 1920*1080@60Hz) Signal from PC for Vertical
Test Mode 7	Full system (Display 1 mode 1280*1024@60Hz) Signal from PC for Horizontal
Test Mode 8	Full system (Display 1 mode 640*480@60Hz) Signal from PC for Horizontal
The “Test Mode 1” generated the worst case, it was reported as the final data.	

- c. The maximum operating frequency is above 108MHz, the test frequency range is from 30MHz to 18GHz.

3.3. Description of Support Systems

No.	Device	Manufacturer	Model No.	Description
For Local				
1	PC*2	DELL	XPS8700	Power Cable, Non-shielded 1.8m
2	Keyboard	DELL	KB216t	USB Cable, Shielded 1.85m
3	Mouse	DELL	MS1161	USB Cable, Shielded 1.85m
4	Printer	HP	P1102w	Power Cable, Non-shielded 1.8m USB Cable, Shielded 1.6m
5	iPod	APPLE	A1320	USB Cable, Shielded 1.0m
6	Earphone	APPLE	EarPods	Audio Cable, Non-shielded 1.35m
Use Cable				
1	HDMI*2	N/A	N/A	Shielding, 1.5m & 1.8m
2	DP*2	N/A	N/A	Shielding, 1.5m & 1.8m
3	VGA	N/A	N/A	Shielded, 1.5m & 1.8m



3.4. General Information of Test

Test Site	Cerpass Technology Corporation Test Laboratory
	Address: No.10, Ln. 2, Lianfu St., Luzhu Dist., Taoyuan City 33848, Taiwan (R.O.C.) Tel:+886-3-3226-888 Fax:+886-3-3226-881
	<input checked="" type="checkbox"/> Conducted emission test (CON01-NK) <input type="checkbox"/> Conducted emission test (CON02-NK) <input checked="" type="checkbox"/> Radiated emission test (10M01-NK) <input type="checkbox"/> Radiated emission test (3M01-NK) <input type="checkbox"/> Radiated emission test (3M02-NK) <input checked="" type="checkbox"/> Radiated disturbance above 1GHz (10M01-NK) <input type="checkbox"/> Radiated disturbance above 1GHz (3M01-NK) <input type="checkbox"/> Radiated disturbance above 1GHz (3M02-NK)
	TW1079, TW1439
Frequency Range Investigated:	Conducted: from 150kHz to 30 MHz Radiation: from 30 MHz to 18000MHz
Test Distance :	The test distance of radiated emission below 1GHz from antenna to EUT is 10 M. The test distance of radiated emission above 1GHz from antenna to EUT is 3 M.



4. Test of Conducted Emission

4.1. Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz, according to the methods defined in ANSI C63.4-2014. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

Table 1 Conducted Emission Limits (dBµV):

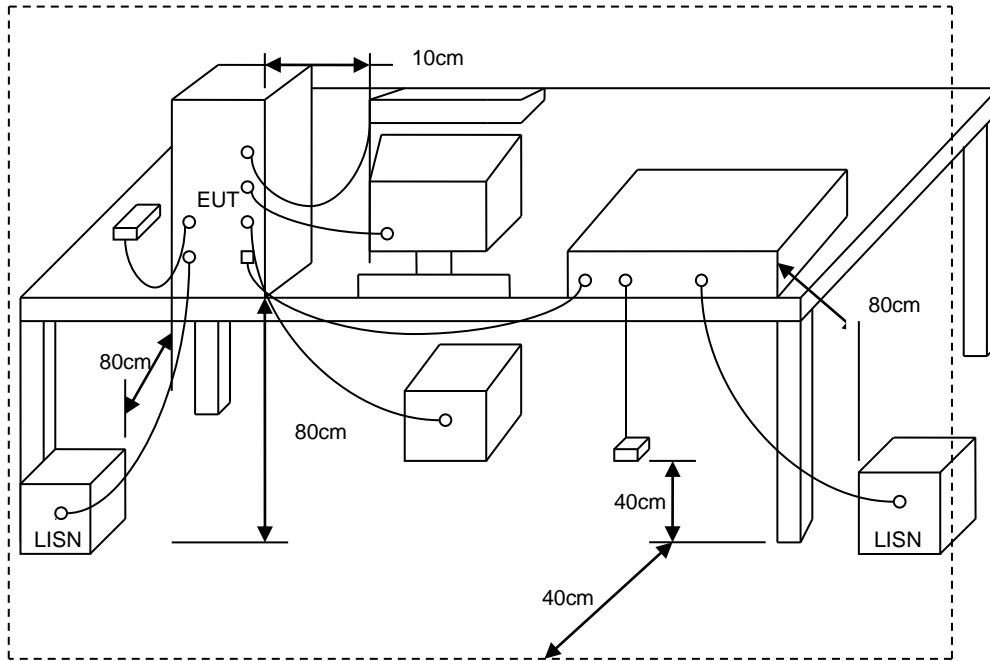
Frequency range (MHz)	Class A Equipment		Class B Equipment	
	Quasi Peak	Average	Quasi Peak	Average
0.15 to 0.50	79	66	66 to 56*	56 to 46*
0.50 to 5	73	60	56	46
5. to 30.	73	60	60	50

*The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5MHz.

4.2. Test Procedures

- a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- c. All the support units are connecting to the other LISN.
- d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- e. The FCC states that a 50 ohm, 50 micro-Henry LISN should be used.
- f. Both sides of AC line were checked for maximum conducted interference.
- g. The frequency range from 150 kHz to 30 MHz was searched.
- h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

4.3. Typical Test Setup

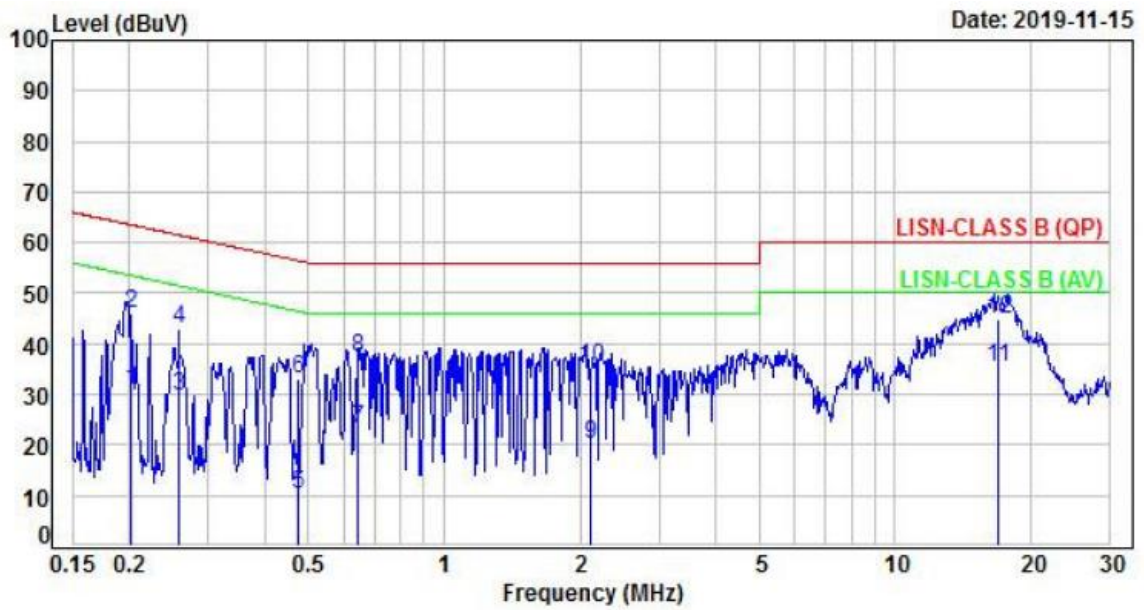




4.4. Test Result and Data of Power Port

Test Mode	Mode 1	Pol/Phase	LINE
Test Frequency	0.15 MHz ~ 30 MHz	Test Voltage	AC 120V
Test Date	Nov. 15, 2019	Test Engineer	Tien
Temperature	23 °C	Relative Humidity	42 %

Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor= (LISN or PLC or Current Probe) Factor + Cable Loss + Attenuator

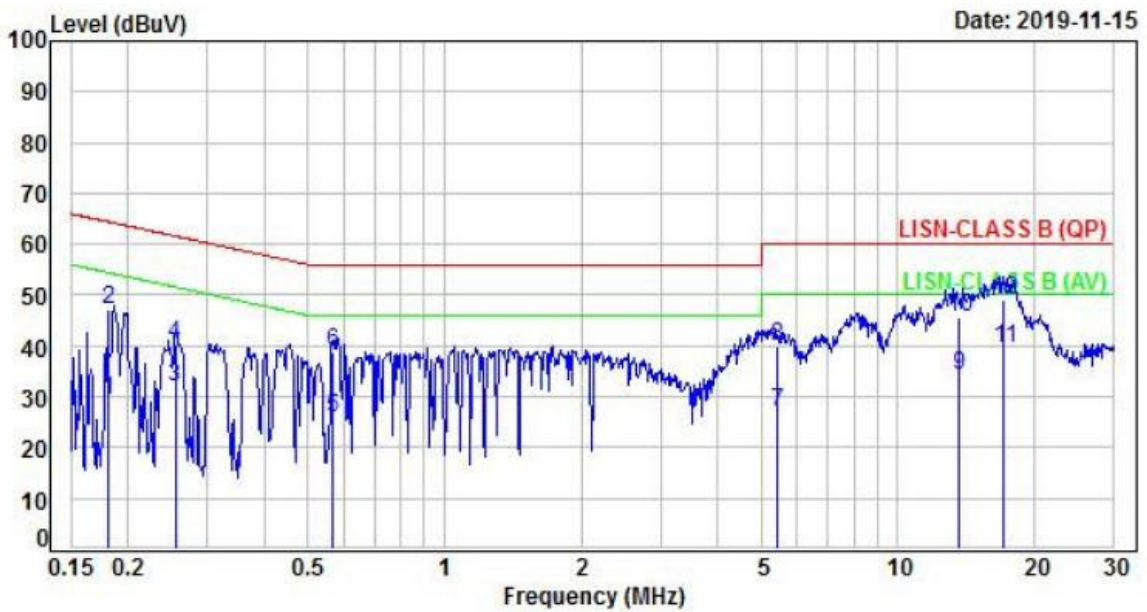


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.20	9.92	20.99	30.91	53.56	-22.65	Average	P
2	0.20	9.92	35.93	45.85	63.56	-17.71	QP	P
3	0.26	9.92	19.82	29.74	51.52	-21.78	Average	P
4	0.26	9.92	32.91	42.83	61.52	-18.69	QP	P
5	0.48	9.94	0.34	10.28	46.42	-36.14	Average	P
6	0.48	9.94	23.19	33.13	56.42	-23.29	QP	P
7	0.65	9.96	13.21	23.17	46.00	-22.83	Average	P
8	0.65	9.96	27.24	37.20	56.00	-18.80	QP	P
9	2.11	10.05	9.94	19.99	46.00	-26.01	Average	P
10	2.11	10.05	25.15	35.20	56.00	-20.80	QP	P
11	16.93	10.55	24.88	35.43	50.00	-14.57	Average	P
12	16.93	10.55	34.50	45.05	60.00	-14.95	QP	P



Test Mode	Mode 1	Pol/Phase	NEUTRAL
Test Frequency	0.15 MHz ~ 30 MHz	Test Voltage	AC 120V
Test Date	Nov. 15, 2019	Test Engineer	Tien
Temperature	23 °C	Relative Humidity	42 %

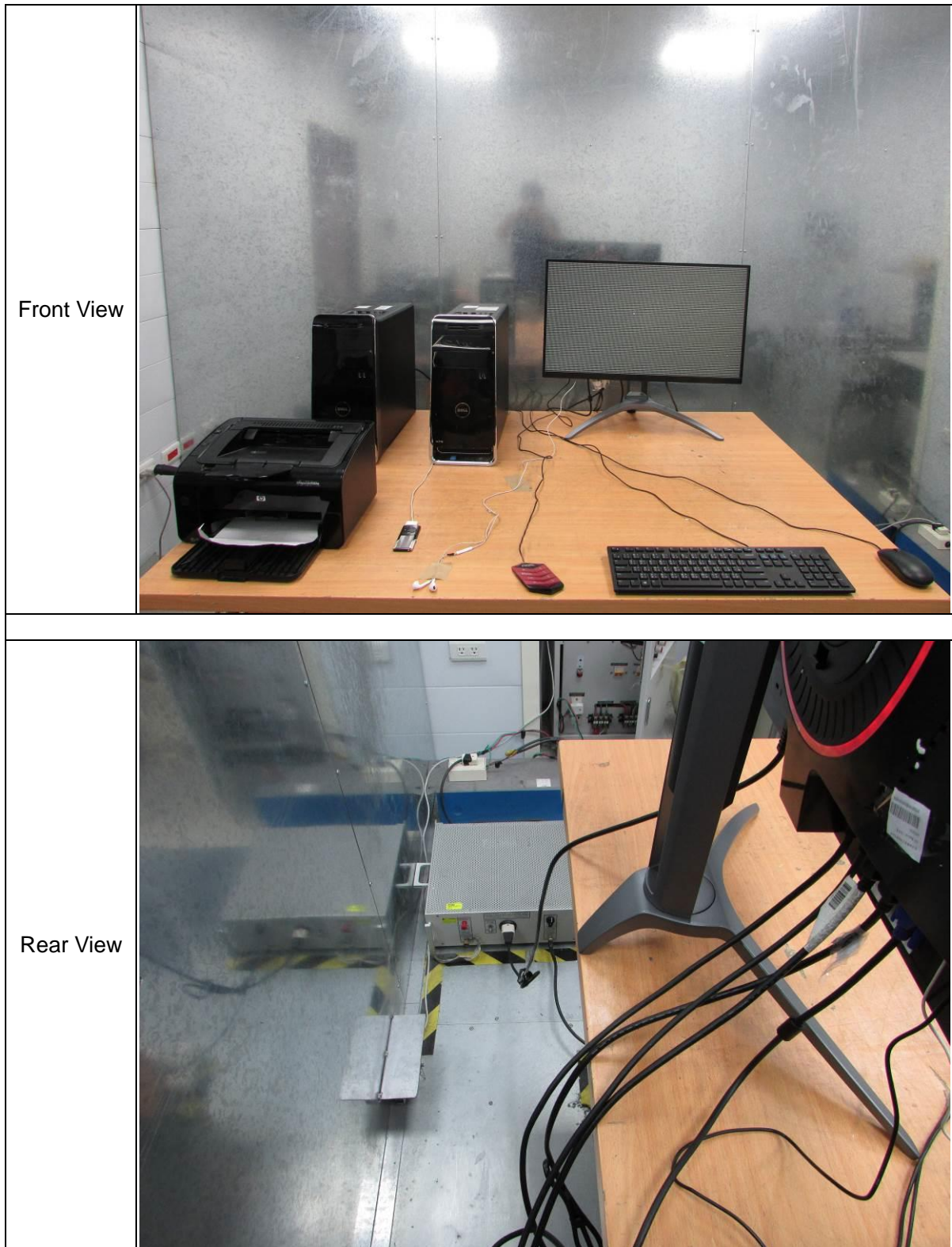
Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor= (LISN or PLC or Current Probe) Factor + Cable Loss + Attenuator



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.18	9.95	19.28	29.23	54.40	-25.17	Average	P
2	0.18	9.95	37.29	47.24	64.40	-17.16	QP	P
3	0.25	9.95	21.84	31.79	51.61	-19.82	Average	P
4	0.25	9.95	30.39	40.34	61.61	-21.27	QP	P
5	0.57	9.97	15.88	25.85	46.00	-20.15	Average	P
6	0.57	9.97	28.82	38.79	56.00	-17.21	QP	P
7	5.40	10.20	16.79	26.99	50.00	-23.01	Average	P
8	5.40	10.20	29.60	39.80	60.00	-20.20	QP	P
9	13.66	10.48	23.88	34.36	50.00	-15.64	Average	P
10	13.66	10.48	35.10	45.58	60.00	-14.42	QP	P
11	17.15	10.59	28.76	39.35	50.00	-10.65	Average	P
12	17.15	10.59	38.48	49.07	60.00	-10.93	QP	P



4.5. Test Photographs of Power Port





5. Test of Radiated Emission

5.1. Test Limit

Radiated emissions from 30 MHz to 18,000 MHz were measured with a bandwidth of 120 kHz according to the methods defines in ANSI C63.4-2014. The EUT was placed on a nonmetallic stand in the open-field site, 0.8 meter above the ground plane. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Table 1 – Frequency below 1GHz

Frequency (MHz)	Distance Meters	Class A(dB μ V/m)	Class B(dB μ V/m)t
30-230	10	40	30
230-1000	10	47	37

Note: The limit for radiated test was performed according to CISPR 22, which was specified in FCC PART 15B 15.109(g). Also the limits of ICES-003 and CISPR 22 are the same.

Table 2 –Frequency above 1GHz

Frequency (MHz)	Distance Meters	Class A(dB μ V/m)		Class B(dB μ V/m)t	
		Peak	Average	Peak	Average
Above 1GHz	3	80.0	60.0	74.0	54.0

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

(2) Emission level (dB μ V/m)= 20 log Emission level(μ V/m)

(3) All emission from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

Table 3 –Frequency range of radiated measurement (for unintentional radiators)

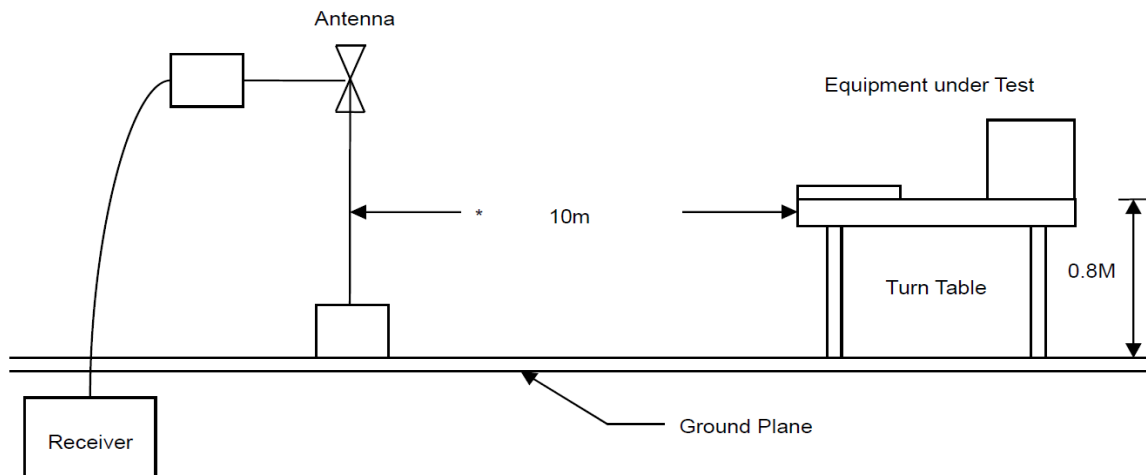
Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes(MHz)	Range(MHz)
Below 1.705	30
1.705-108	1000
108-500	2000
500-1000	5000
Above 1000	5th harmonic of the highest frequency or 40GHz, which is lower

5.2. Test Procedures

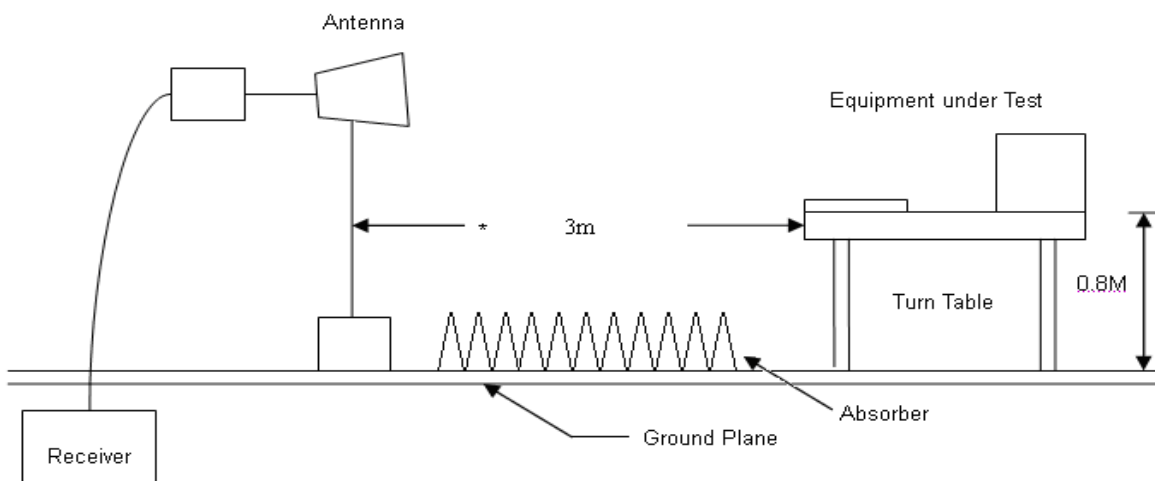
- a. The EUT was placed on a Rota table top 0.8 meter above ground.
- b. The EUT was set 3/10 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- f. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 6 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 6 dB margin will be repeated one by one using the quasi-peak method and reported.

5.3. Typical Test Setup

Below 1GHz Test Setup



Above 1GHz Test Setup

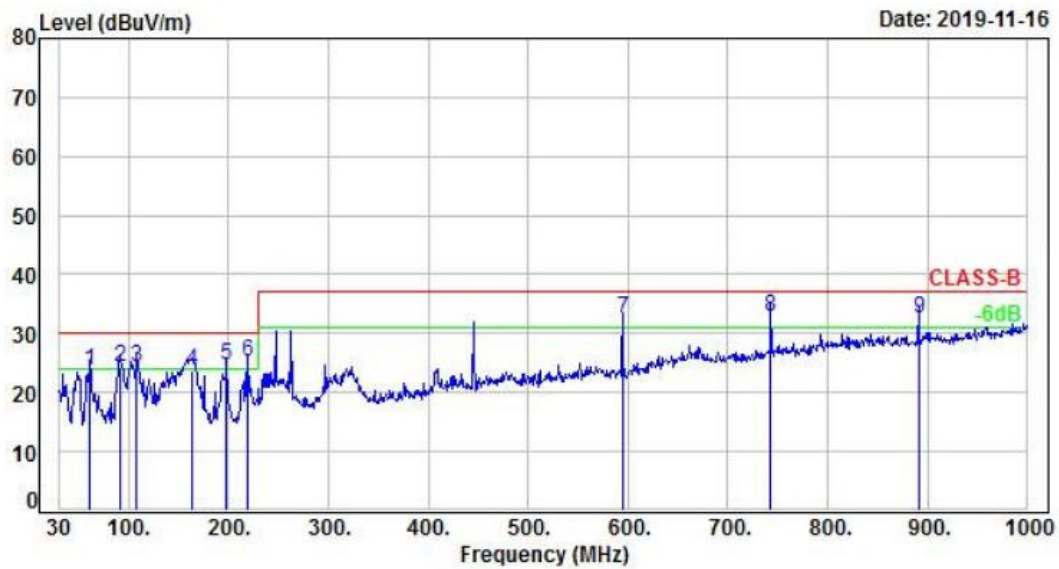




5.4. Test Result and Data (30MHz ~ 1GHz)

Test Mode	Mode 1	PoI/Phase	VERTICAL
Test Frequency	30MHz ~ 1GHz	Test Voltage	AC 120V
Test Date	Nov. 16, 2019	Test Engineer	Tien
Temperature	22 °C	Relative Humidity	48 %

Note : Level = Reading + Factor
Margin = Level – Limit
Factor = Antenna Factor + Cable Loss – Amplifier Factor

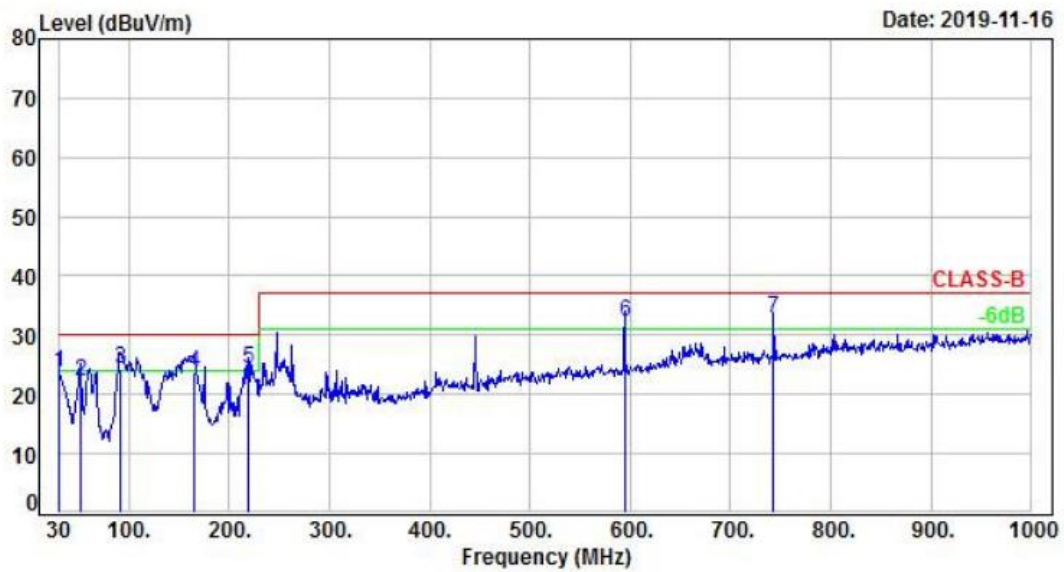


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	61.04	-16.29	39.88	23.59	30.00	-6.41	QP	200	138	P
2	91.11	-16.10	40.57	24.47	30.00	-5.53	QP	100	236	P
3	108.57	-11.34	35.69	24.35	30.00	-5.65	QP	200	263	P
4	162.89	-11.45	35.20	23.75	30.00	-6.25	QP	100	339	P
5	197.81	-10.55	35.23	24.68	30.00	-5.32	QP	100	212	P
6	219.15	-12.16	37.36	25.20	30.00	-4.80	QP	100	201	P
7	594.54	-1.99	34.48	32.49	37.00	-4.51	QP	300	24	P
8	742.95	1.49	31.37	32.86	37.00	-4.14	QP	300	212	P
9	891.36	3.98	28.54	32.52	37.00	-4.48	QP	200	61	P



Test Mode	Mode 1	Pol/Phase	HORIZONTAL
Test Frequency	30MHz ~ 1GHz	Test Voltage	AC 120V
Test Date	Nov. 16, 2019	Test Engineer	Tien
Temperature	22 °C	Relative Humidity	48 %

Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor = Antenna Factor + Cable Loss – Amplifier Factor



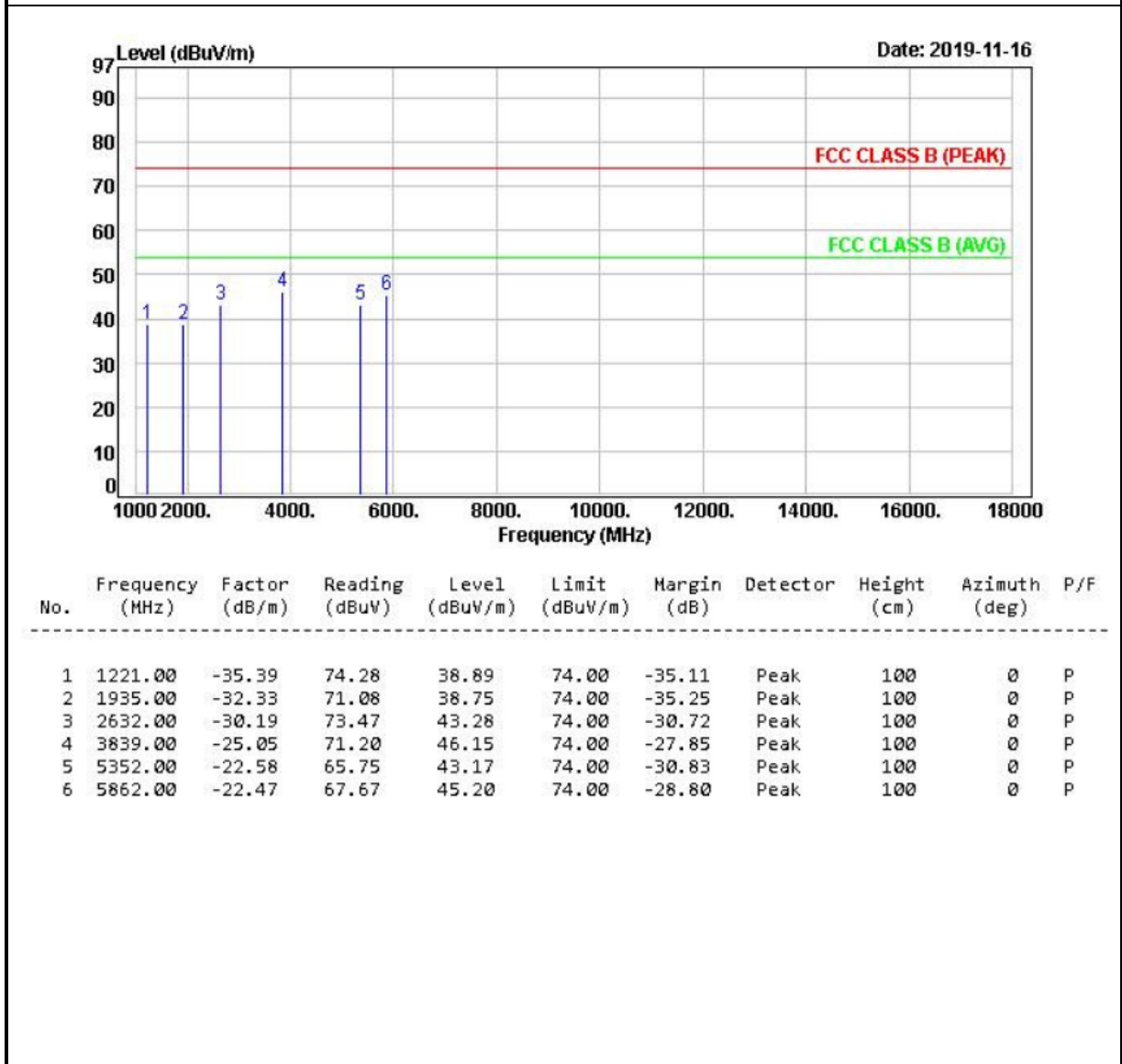
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBUV)	Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	30.00	-2.44	26.23	23.79	30.00	-6.21	QP	200	11	P
2	51.34	-15.88	38.10	22.22	30.00	-7.78	QP	400	217	P
3	91.11	-15.39	39.57	24.18	30.00	-5.82	QP	300	296	P
4	164.83	-10.80	34.47	23.67	30.00	-6.33	QP	400	100	P
5	219.15	-11.59	35.88	24.29	30.00	-5.71	QP	400	203	P
6	594.54	-1.21	33.43	32.22	37.00	-4.78	QP	100	164	P
7	742.95	1.74	30.98	32.72	37.00	-4.28	QP	300	12	P



5.5. Test Result and Data (1GHz ~ 18GHz)

Test Mode	Mode 1	Pol/Phase	VERTICAL
Test Frequency	1GHz ~ 18GHz	Test Voltage	AC 120V
Test Date	Nov. 16, 2019	Test Engineer	Tien
Temperature	22 °C	Relative Humidity	49 %

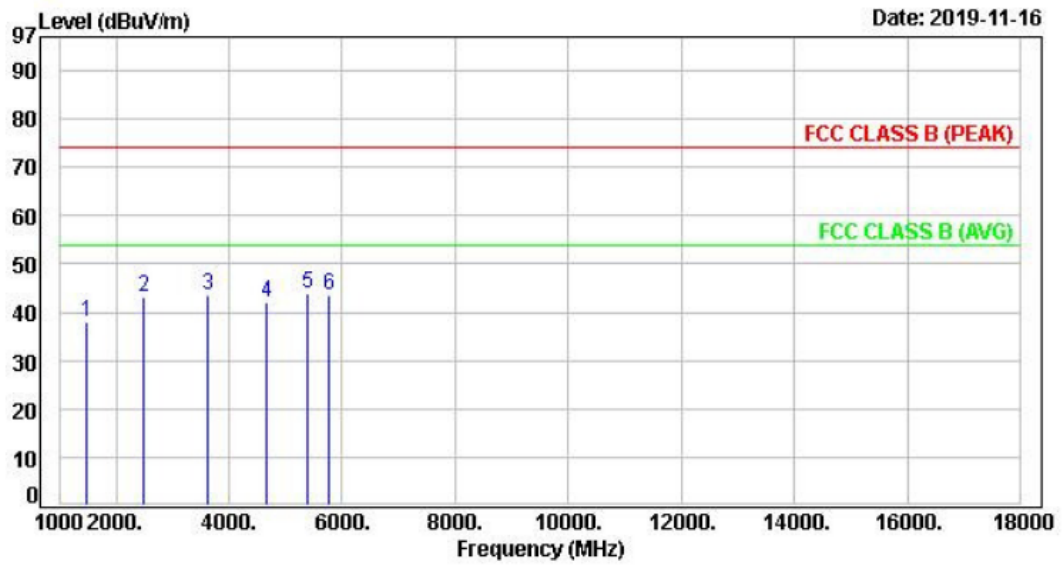
Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor = Antenna Factor + Cable Loss – Amplifier Factor





Test Mode	Mode 1	Pol/Phase	HORIZONTAL
Test Frequency	1GHz ~ 18GHz	Test Voltage	AC 120V
Test Date	Nov. 16, 2019	Test Engineer	Tien
Temperature	22 °C	Relative Humidity	49 %

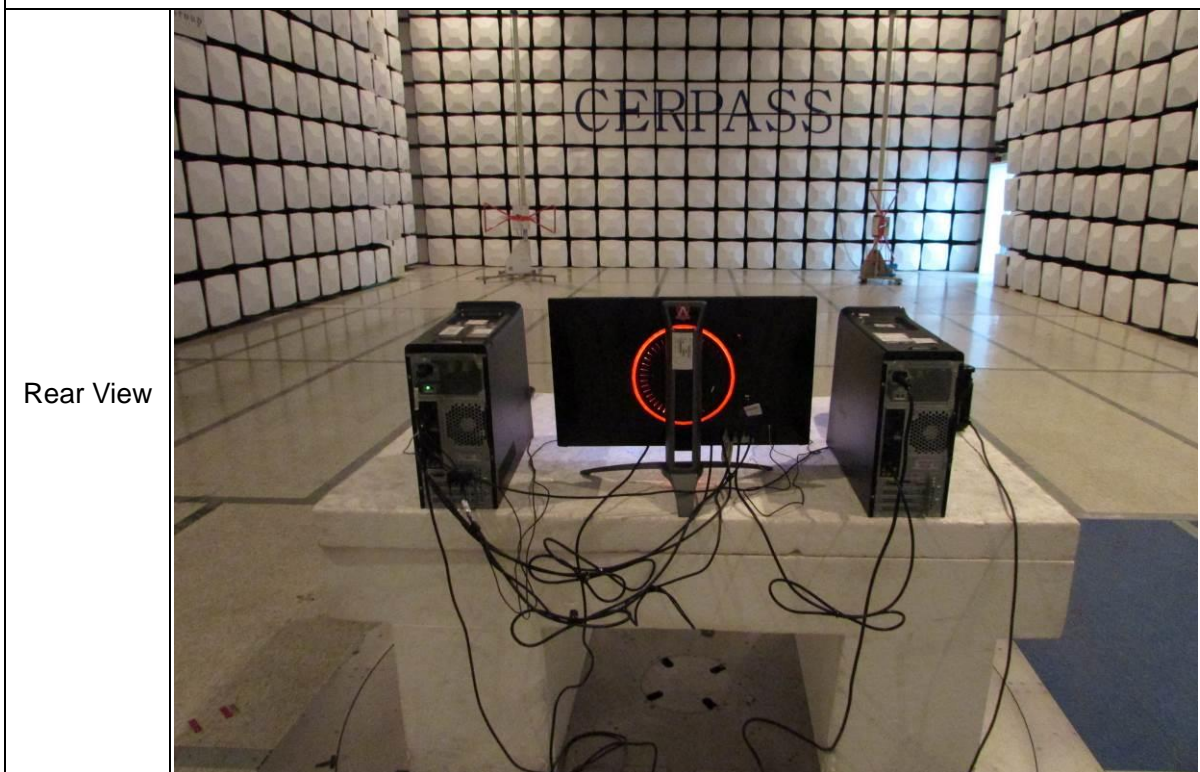
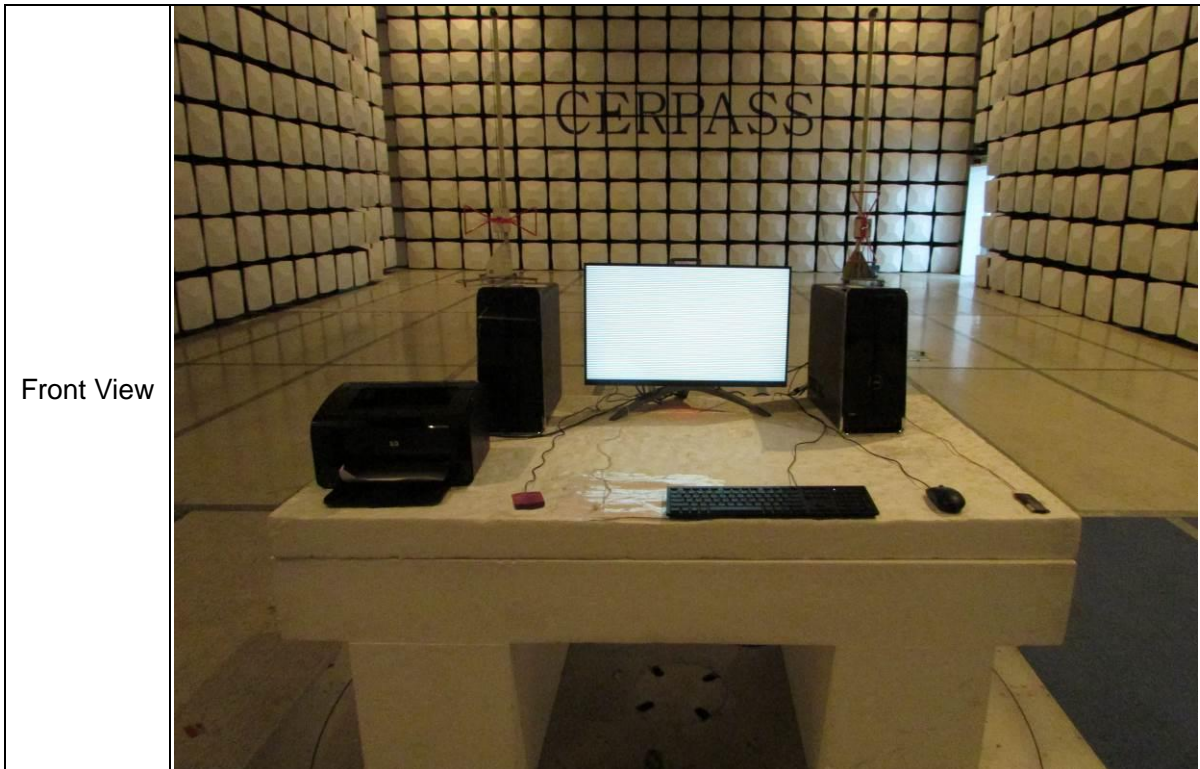
Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor = Antenna Factor + Cable Loss – Amplifier Factor



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBUV)	Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	1493.00	-34.86	72.97	38.11	74.00	-35.89	Peak	400	0	P
2	2496.00	-30.69	73.73	43.04	74.00	-30.96	Peak	400	0	P
3	3618.00	-26.43	69.92	43.49	74.00	-30.51	Peak	400	0	P
4	4672.00	-24.32	66.36	42.04	74.00	-31.96	Peak	400	0	P
5	5403.00	-22.34	66.22	43.88	74.00	-30.12	Peak	400	0	P
6	5777.00	-22.58	66.19	43.61	74.00	-30.39	Peak	400	0	P

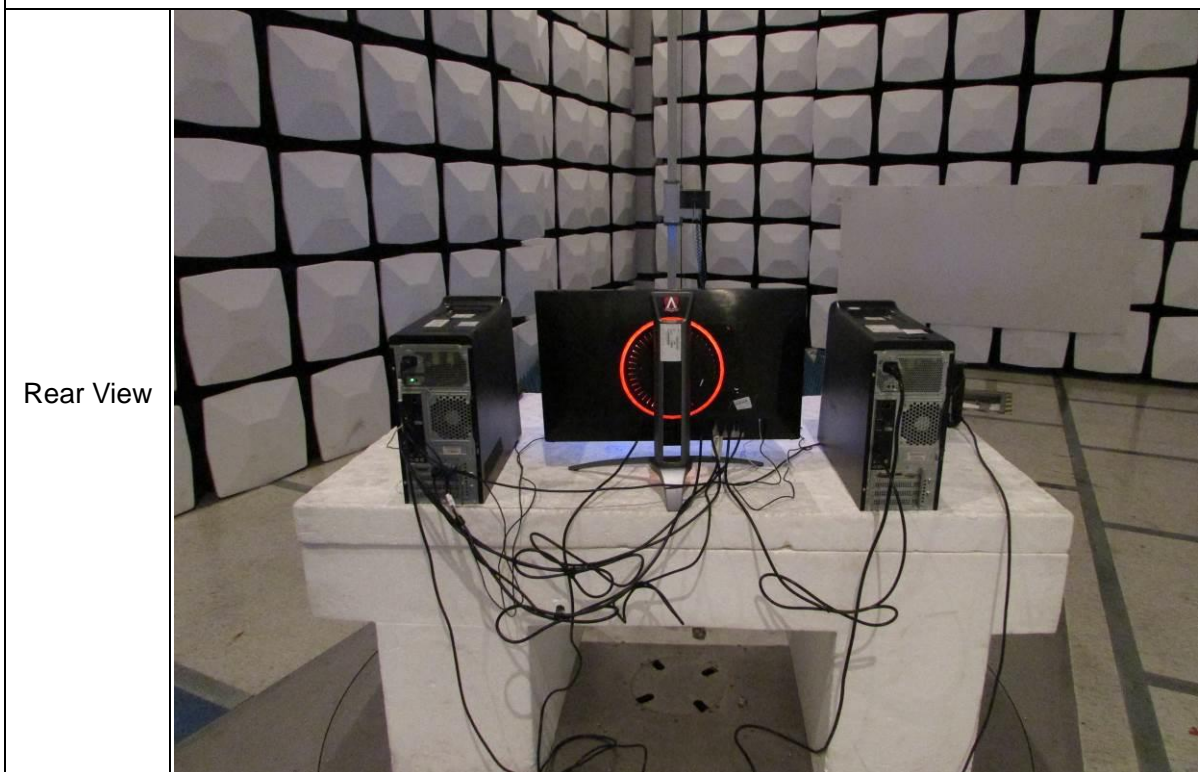
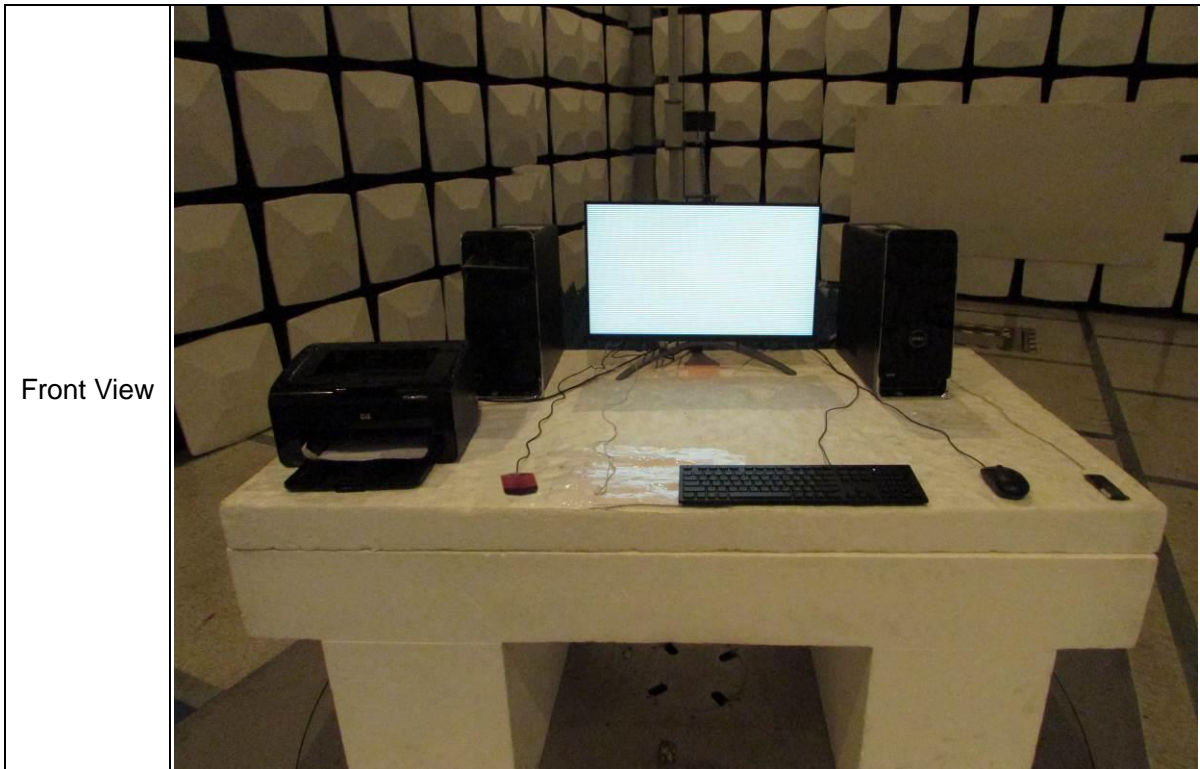


5.6. Test Photographs (30MHz ~ 1GHz)





5.7. Test Photographs (1GHz ~ 18GHz)





6. Measurement Uncertainty

Measurement Item	Measurement Frequency	Polarization	Uncertainty
Conducted Emission	9 kHz ~ 30 MHz	LINE / NEUTRAL	±3.25 dB
Radiated Emission	30 MHz ~ 1,000 MHz	Vertical / Horizontal	±3.93 dB
	1,000 MHz ~ 6,000 MHz	Vertical / Horizontal	±3.82 dB
	6,000 MHz ~ 18,000 MHz	Vertical / Horizontal	±4.62 dB

The measurement uncertainty will be considered, when test result margin to the limit.

7. List of Measuring Equipment

Conducted Emission (Test date: 2019/10/15)					
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
EMI Receiver	R&S	ESCI	100443	2019/03/29	2020/03/28
LISN	Schwarzbeck	NSLK 8127	8127-740	2019/05/22	2020/05/21
LISN	Schwarzbeck	NSLK 8127	8127-568	2019/03/15	2020/03/14
Pulse Limiter	R&S	ESH3-Z2	101934	2019/03/12	2020/03/11
Cable-6m (9kHz~300MHz)	NA	EMC5D-BM- BM-6	130606	2019/03/14	2020/03/13
Software	AUDIX	E3	Version: 8.14.806b	N/A	N/A

Radiated Emission below 1GHz (Test date: 2019/11/16)					
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
Bilog Antenna(H)	Sunol	JB1	A020514-1	2019/03/26	2020/03/25
Bilog Antenna(V)	Sunol	JB1	A020514-2	2019/04/23	2020/04/22
EMI Receiver(V)	R&S	ESCI	101402	2019/03/14	2020/03/13
EMI Receiver(H)	R&S	ESCI 7	100963	2019/03/29	2020/03/28
Preamplifier(V)	EM Electronics corp.	EM330	60610	2019/03/11	2020/03/10
Preamplifier(H)	EM Electronics corp.	EM330	60611	2019/03/11	2020/03/10
Cable-16m (30MHz-1GHz)(H)	HUBER SUHNER	RG-214	01110M	2019/06/20	2020/06/19
Cable-4m (30MHz-1GHz)(H)	HUBER SUHNER	RG-214	02951M	2019/06/21	2020/06/20
Cable-1m 30MHz-1GHz)(H)	HUBER SUHNER	RG-214	01098M	2019/06/21	2020/06/20
Cable-10m (30MHz-1GHz)(V)	HUBER SUHNER	RG-214	01126M	2019/06/21	2020/06/20
Cable-4m (30MHz-1GHz)(V)	HUBER SUHNER	RG-214	02953M	2019/06/21	2020/06/20
Cable-1m (30MHz-1GHz)(V)	HUBER SUHNER	RG-214	01099M	2019/06/21	2020/06/20
Software	AUDIX	E3	Version: 8.2014-6-4	N/A	N/A



Radiated Emission above 1GHz (Test date: 2019/11/16)					
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
Horn Antenna	EMCO	3115	31589	2019/04/01	2020/03/31
Spectrum Analyzer	R&S	FSP 40	100047	2019/03/28	2020/03/27
Preamplifier	Agilent	8449B	3008A01954	2019/03/11	2020/03/10
Cable-0.5m (30MHz-40GHz)	HUBER SUHNER	SUCOFLEX 102	36270/2	2019/03/14	2020/03/13
Cable-3m (1GHz-26.5GHz)	HUBER SUHNER	SUCOFLEX 102	28417/2	2019/03/13	2020/03/12
Software	AUDIX	E3	Version: 8.2014-6-4	N/A	N/A