FCC TEST REPORT

Product Name:	SET TOP BOX
Trade Mark:	N/A
Model No.:	KM2 PLUS
Add. Model No.:	KM2 PRO, KM3 PRO, KM3 PLUS, KM5 PRO, KM5 PLUS, KM6 PRO, KM6 PLUS, KM7 RPO, KM7 PLUS, HP44H, HP4414
Report Number:	220608033EMC-1
Test Standards:	FCC 47 CFR Part 15 Subpart B
FCC ID:	2AGKB-KM2PLUS
Test Result:	PASS
Date of Issue:	August 5, 2022

Prepared for:

Videostrong Technology Co., Ltd
604, Lushi industrial Building, 28 District Bao'an District, Shenzhen, China

Prepared by:

Shenzhen UnionTrust Quality and Technology Co., Ltd.
Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China
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Prepared by:	Kieron Luo Project Engineer	Reviewed by:	Henry Lu Team Leader
Approved by:	Kevin Liang Assistant Manager	Date:	August 5, 2022

Version

Version No.	Date	Description
V1.0	August 5, 2022	Original

CONTENTS

1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Videostrong Technology Co., Ltd
Address of Applicant:	604, Lushi industrial Building, 28 District Bao'an District, Shenzhen, China
Manufacturer:	Videostrong Technology Co., Ltd
Address of Manufacturer:	604, Lushi industrial Building, 28 District Bao'an District, Shenzhen, China

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	SET TOP BOX
Model No.:	KM2 PLUS
Add. Model No.:	KM2 PRO, KM3 PRO, KM3 PLUS, KM5 PRO, KM5 PLUS, KM6 PRO, KM6 PLUS, KM7 RPO, KM7 PLUS, HP44H, HP4414
Trade Mark:	N/A
DUT Stage:	Identical Prototype
Rated Voltage:	☐ Powered by USB port (5Vdc)
	☒ Adapter: Input: 100-240 V~50/60 Hz 0.35 A Max Output: 12.0 V ⎓ 1.0 A
Classification of digital devices:	Class B
Highest Internal Frequency:	5.825 GHz
Software Version:	C2.1.4 (Provided by the customer)
Hardware Version:	5800-2AHP44H-1102 (Provided by the customer)
Sample Received Date:	June 6, 2022
Sample Tested Date:	June 18, 2022 to July 16, 2022
Note: The additional model KM2 PRO, KM3 PRO, KM3 PLUS, KM5 PRO, KM5 PLUS, KM6 PRO, KM6 PLUS, KM7 RPO, KM7 PLUS, HP44H, HP4414 is identical with the test model KM2 PLUS except the model number for marketing purpose.	

1.2.2 Description of Accessories

Adapter	
Model No.:	TEKA012-1201000UK
Input:	100-240 V~50/60 Hz 0.35 A Max
Output:	12.0 V ⎓ 1.0 A
AC Cable:	N/A
DC Cable:	1.2 Meter, Unshielded without ferrite

Cable	
Description:	HDMI Cable
Connector:	HDMI-A
Cable Type:	Shielded with two ferrite
Length:	1.5 Meter

1.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
USB flash disk	Kingston	DTSE9	N/A	UnionTrust
TF Card	Kingston	8G	N/A	UnionTrust
Notebook	DELL	E450	N/A	UnionTrust
Monitor	DELL	P2719H	N/A	UnionTrust
Mouse	DELL	MS111	N/A	UnionTrust
Remote Control	N/A	N/A	N/A	Applicant
DVD	GIEC	BDP-G4305	N/A	UnionTrust

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
Ethernet Cable	1	Unshielded without ferrite	1.5	UnionTrust
SPDIF Cable	1	Unshielded without ferrite	1.5	UnionTrust
AV Cable	1	Unshielded without ferrite	1.5	UnionTrust

1.4 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China, China 518109
Telephone: +86 (0) 755 2823 0888
Fax: +86 (0) 755 2823 0886

1.5 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069
The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01
Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories
CAB identifier: CN0032

FCC Accredited Lab.

1.6 DEVIATION FROM STANDARDS

None.

1.7 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.9 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9kHz-150kHz	±3.2 dB
2	Conducted emission 150kHz-30MHz	±2.7 dB
3	Radiated emission 9kHz-30MHz	±4.7 dB
4	Radiated emission 30MHz-1GHz	±4.6 dB
5	Radiated emission 1GHz-18GHz	±4.4 dB
6	Radiated emission 18GHz-40GHz	±4.6 dB

2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart B Test Cases			
Test Item	**Test Requirement**	**Test Method**	**Result**
Conducted Emission	FCC 47 CFR Part 15.107	ANSI C63.4-2014	PASS
Radiated Emission	FCC 47 CFR Part 15.109	ANSI C63.4-2014	PASS

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date**	**Cal. Due date**
☒	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	Euroshiedpn-CT001270-1317	22-Jan-2021	21-Jan-2024
☒	Receiver	R&S	ESIB26	100114	5-Nov-2021	4-Nov-2022
☐	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	15-Apr-2022	14-Apr-2023
☐	Loop Antenna	ETS-LINDGREN	6502	00202525	11-Nov-2021	10-Nov-2023
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	11-Nov-2021	10-Nov-2023
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	11-Nov-2021	10-Nov-2023
☒	Preamplifier	HP	8447F	2805A02960	5-Nov-2021	4-Nov-2022
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	17-Apr-2022	16-Apr-2024
☒	Pre-amplifier	ETS-LINDGREN	00118385	00201874	6-Nov-2021	5-Nov-2022
☐	Horn Antenna	ETS-LINDGREN	3116C	00200180	17-Apr-2022	16-Apr-2024
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	14-Nov-2020	13-Nov-2022
☒	Pre-amplifier	ETS-LINDGREN	00118384	00202652	17-Nov-2020	16-Nov-2022
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	Test Software	Audix	e3	Software Version: 9.160323		

Conducted Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date**	**Cal. Due date**
☒	Receiver	R&S	ESR7	101181	5-Nov-2021	4-Nov-2022
☒	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	5-Nov-2021	4-Nov-2022
☒	LISN	R&S	ESH2-Z5	860014/024	5-Nov-2021	4-Nov-2022
☒	LISN	ETS-Lindgren	3816/2SH	00201088	5-Nov-2021	4-Nov-2022
☒	Test Software	Audix	e3	Software Version: 9 20151119i		

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Environment Parameter	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
NT/NV	+15 to +35	120V~60Hz or 240V~50Hz	20 to 75
Remark: 1) NV: Normal Voltage; NT: Normal Temperature			

4.1.2 Record of Normal Environment and Test Sample

Test Item	Temp. (°C)	Relative Humidity (%)	Pressure (kPa)	Sample No.	Tested by
Radiated Emission	24.5	47	101.1	220606012-A06/7	David Zhang
Conducted Emission	22.1	53	100.2	220606012-A06/7	Asia Yan

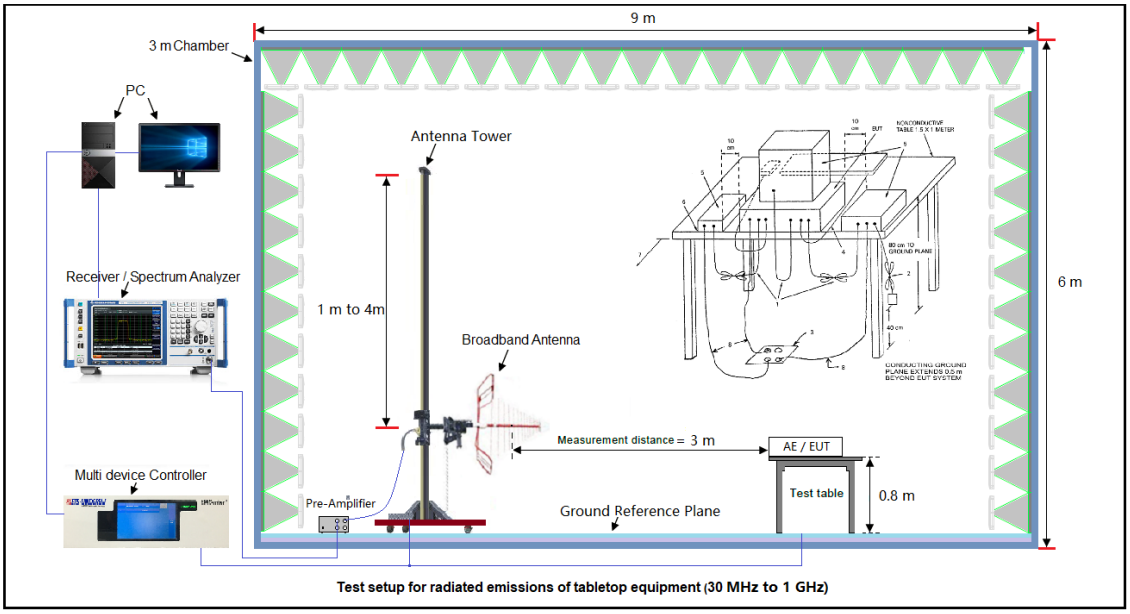
4.2 TEST MODES

Test Item	EMI Test Modes
Radiated Emission	Test Mode 1: AC120V/50Hz (Adaptor1) + USB 2.0 Play + HDMI output Test Mode 2: AC120V/50Hz (Adaptor1) + USB 3.0 Play + HDMI output Test Mode 3: AC120V/50Hz (Adaptor1) + LAN Play + HDMI output Test Mode 4: AC120V/50Hz (Adaptor1) + Optical Play + HDMI output Test Mode 5: AC120V/50Hz (Adaptor1) + TF Play + HDMI output Test Mode 6: AC120V/50Hz (Adaptor1) + worst test mode 1~5 + AV output Test Mode 7: AC240V/60Hz (Adaptor1) + worst test mode 1~6
Conducted Emission	Test Mode 1: AC120V/50Hz (Adaptor1) + USB 2.0 Play + HDMI output Test Mode 2: AC120V/50Hz (Adaptor1) + USB 3.0 Play + HDMI output Test Mode 3: AC120V/50Hz (Adaptor1) + LAN Play + HDMI output Test Mode 4: AC120V/50Hz (Adaptor1) + Optical Play + HDMI output Test Mode 5: AC120V/50Hz (Adaptor1) + TF Play + HDMI output Test Mode 6: AC120V/50Hz (Adaptor1) + worst test mode 1~5 + AV output Test Mode 7: AC240V/60Hz (Adaptor1) + worst test mode 1~6

4.3 TEST SETUP

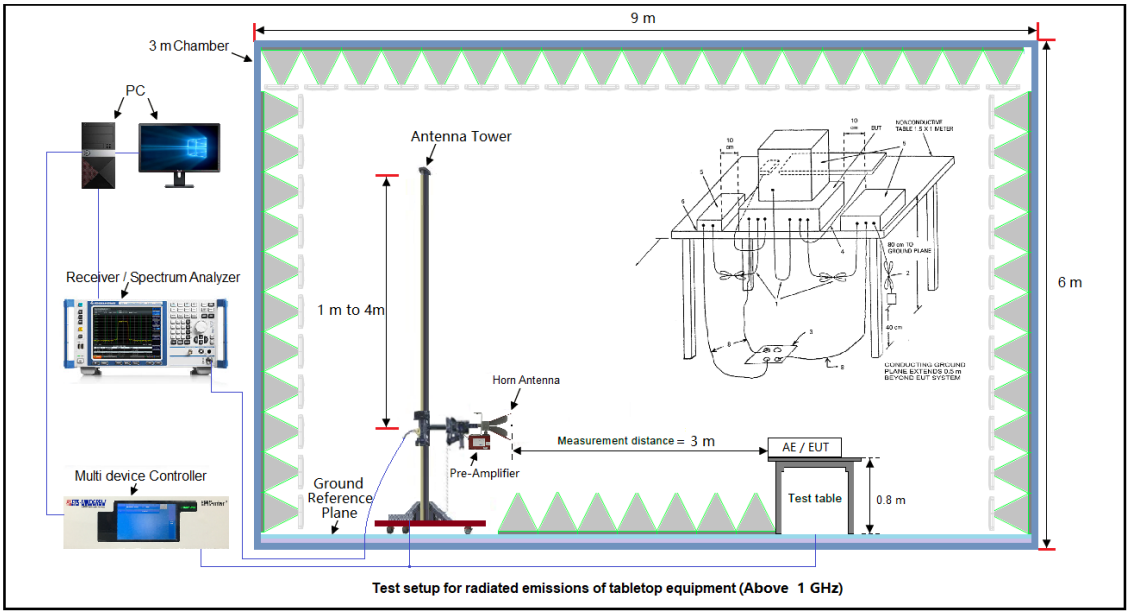
4.3.1 For Radiated Emissions test setup

Figure 1. 30MHz to 1GHz



Test setup for radiated emissions of tabletop equipment (30 MHz to 1 GHz)

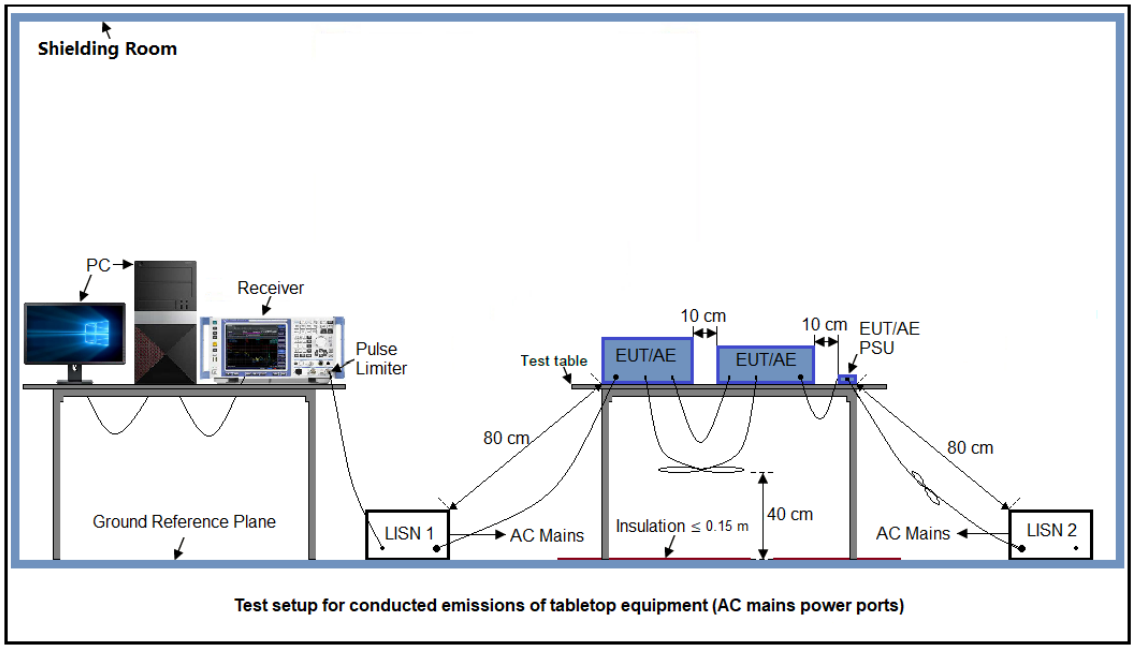
Figure 2. Above 1GHz



Test setup for radiated emissions of tabletop equipment (Above 1 GHz)

4.3.2 For Conducted Emissions test setup

Figure 3. Conducted Emissions setup



4.4 SYSTEM TEST CONFIGURATION

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000MHz. The resolution is 1 MHz or greater for frequencies above 1000MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic (according to KDB 896810 D02 SDoC FAQ v01r01) of the highest fundamental frequency or to 40 GHz, whichever is lower.

5. REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part15 Subpart B	Unintentional Radiators
2	ANSI C63.4-2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
3	KDB 174176 D01 Line Conducted FAQ v01r01	AC power-line conducted emission frequency asked questions
4	KDB 896810 D02 SDoC FAQ v01r02	Supplier's Declaration of Conformity frequency asked questions

6. EMC REQUIREMENTS SPECIFICATION

6.1 RADIATED EMISSION

Test Requirement: FCC 47 CFR Part 15.109

Test Method: ANSI C63.4-2014

Receiver Setup:

Frequency: (f) (MHz)	Detector type	Measurement receiver bandwidth	
		RBW	VBW
30 ≤ f ≤ 1 000	Quasi Peak	120 kHz	300 kHz
f ≥1000	Peak	1 MHz	3 MHz
	Average	1 MHz	3 MHz

Measured frequency range

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

Limits:

Limits for Class B devices

Frequency (MHz)	limits at 3m (dBμV/m)		
	QP Detector	PK Detector	AV Detector
30-88	40.0	--	--
88-216	43.5	--	--
216-960	46.0	--	--
960 to 1000	54.0	--	--
Above 1000	--	74.0	54.0

Remark:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBμV/m) = 20 log Emission level (μV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

Test Setup: Refer to section 4.3.1 for details.

Test Procedures:

1. From 30 MHz to 1GHz test procedure as below:

1) The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
3) For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

2. Above 1GHz test procedure as below:

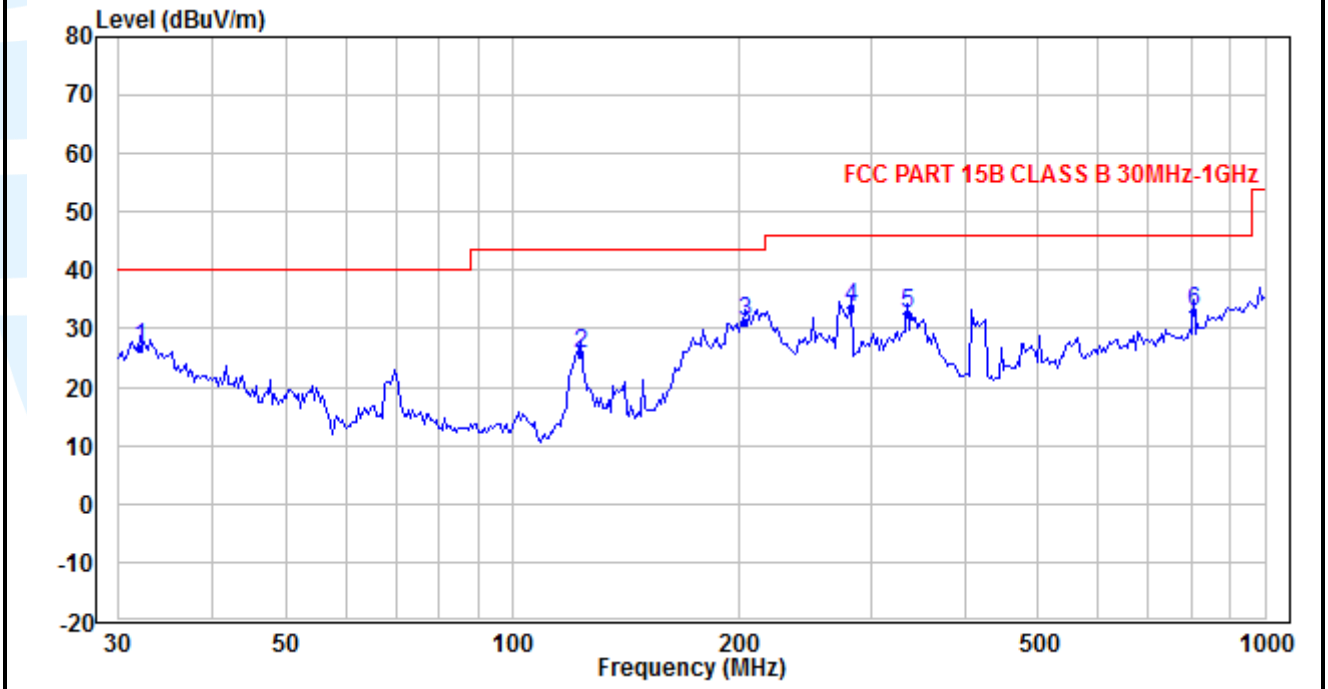
1) The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
3) For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

Equipment Used: Refer to section 3 for details.

Test Result: Pass

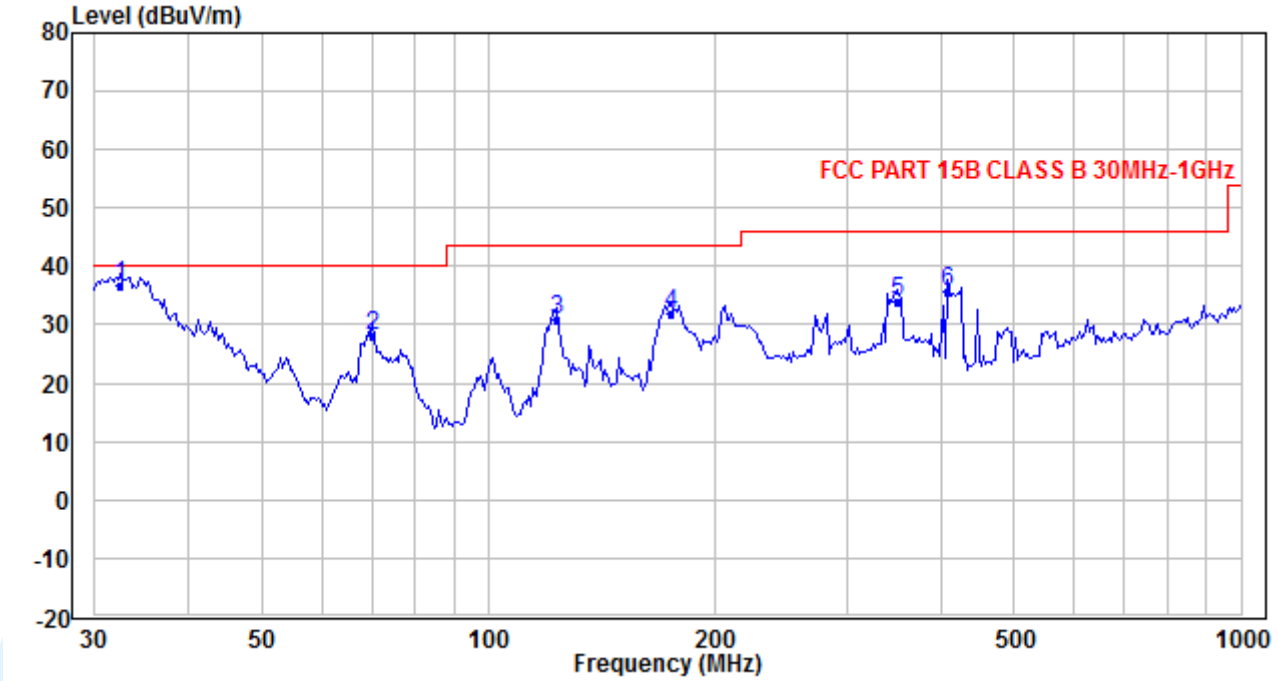
The measurement data as follows:

Below 1GHz(Quasi Peak):
Test Mode 2
Horizontal



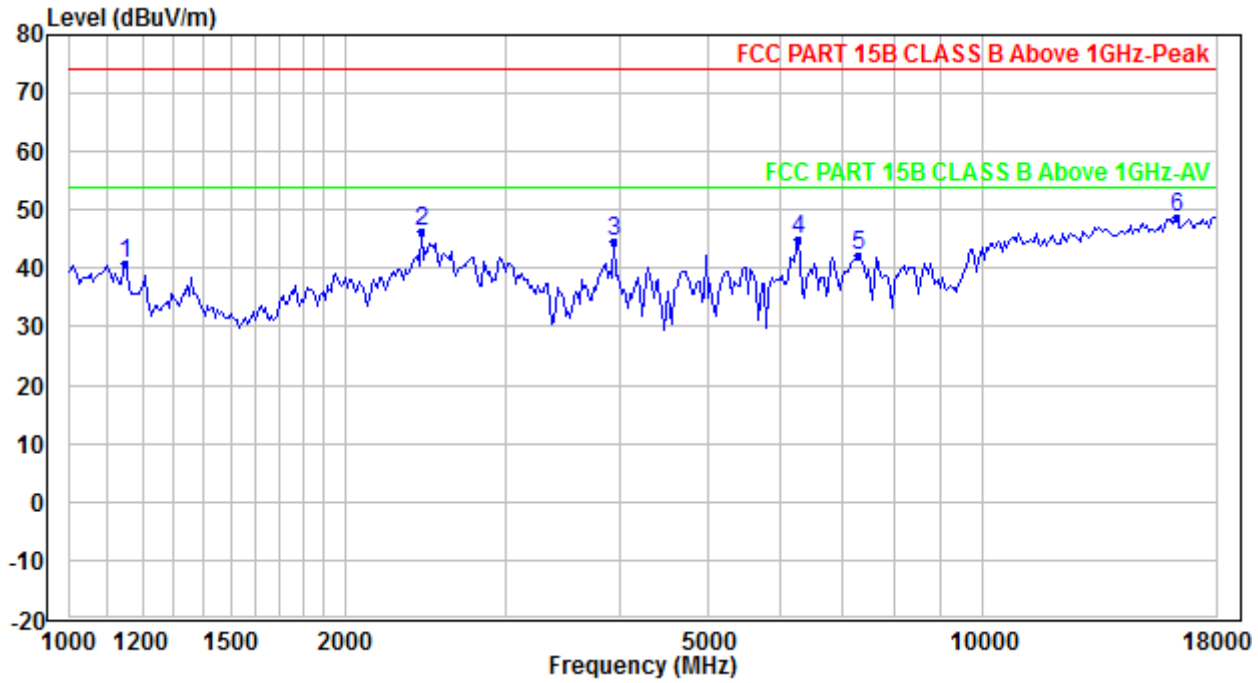
No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	31.959	31.40	-4.73	26.67	40.00	-13.33	QP
2	123.181	41.57	-15.84	25.73	43.50	-17.77	QP
3	204.305	42.13	-10.76	31.37	43.50	-12.13	QP
4	282.270	40.71	-7.26	33.45	46.00	-12.55	QP
5	334.126	38.11	-5.69	32.42	46.00	-13.58	QP
6	804.252	30.30	2.60	32.90	46.00	-13.10	QP

Vertical



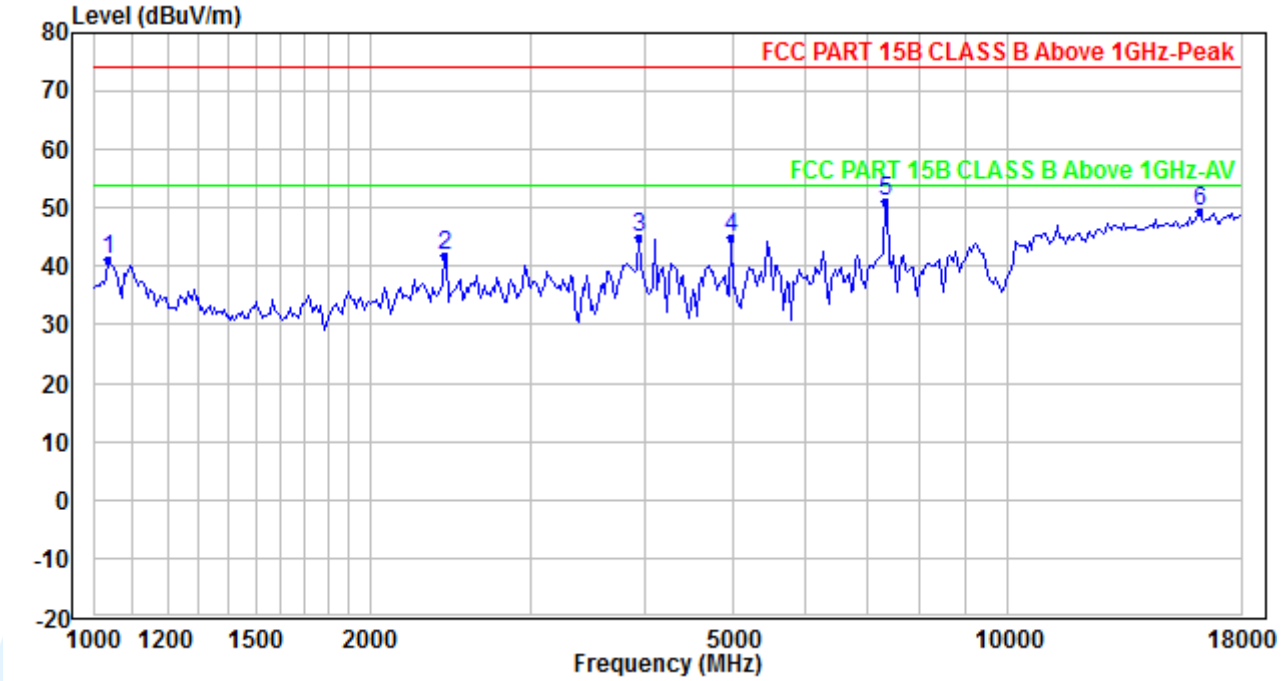
No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	32.411	41.42	-4.77	36.65	40.00	-3.35	QP
2	70.210	45.35	-17.31	28.04	40.00	-11.96	QP
3	123.181	46.60	-15.84	30.76	43.50	-12.74	QP
4	175.040	42.40	-10.68	31.72	43.50	-11.78	QP
5	348.514	39.04	-5.19	33.85	46.00	-12.15	QP
6	406.782	40.04	-4.37	35.67	46.00	-10.33	QP

Above 1GHz(Peak & Average)
Test Mode 7
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1149.142	54.08	-13.23	40.85	74.00	-33.15	Peak
2	2425.957	54.51	-8.32	46.19	74.00	-27.81	Peak
3	3946.313	47.79	-3.29	44.50	74.00	-29.50	Peak
4	6272.456	44.74	0.14	44.88	74.00	-29.12	Peak
5	7291.932	40.76	1.56	42.32	74.00	-31.68	Peak
6	16312.020	36.53	12.15	48.68	74.00	-25.32	Peak

Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1035.365	54.68	-13.44	41.24	74.00	-32.76	Peak
2	2411.946	50.21	-8.37	41.84	74.00	-32.16	Peak
3	3946.313	48.40	-3.29	45.11	74.00	-28.89	Peak
4	4975.247	47.27	-2.25	45.02	74.00	-28.98	Peak
5	7334.292	49.56	1.63	51.19	74.00	-22.81	Peak
6	16217.810	37.40	12.06	49.46	74.00	-24.54	Peak

Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result – Limit
4. All possible modes of operation were investigated, and testing at two nominal voltages of 240V/50Hz and 120V/60Hz, only the worst case emissions reported.
5. For Radiated Emission above 18GHz, there was not any unwanted emission detected.
6. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.
7. N/A, since there are not any ancillary equipments connected to the radio equipment. The Radiated Emission test is only applicable to ancillary equipment not incorporated in the radio equipment and intended to be measured on a stand-alone basis, as declared by the manufacturer.

6.2 CONDUCTED EMISSION

Test Requirement: FCC 47 CFR Part 15.107

Test Method: ANSI C63.4-2014

Limits:

Limits for Class B devices

Frequency range (MHz)	Limits (dB(μV))	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

Remark:

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

Test Setup: Refer to section 4.3.2 for details.

Test Procedures:

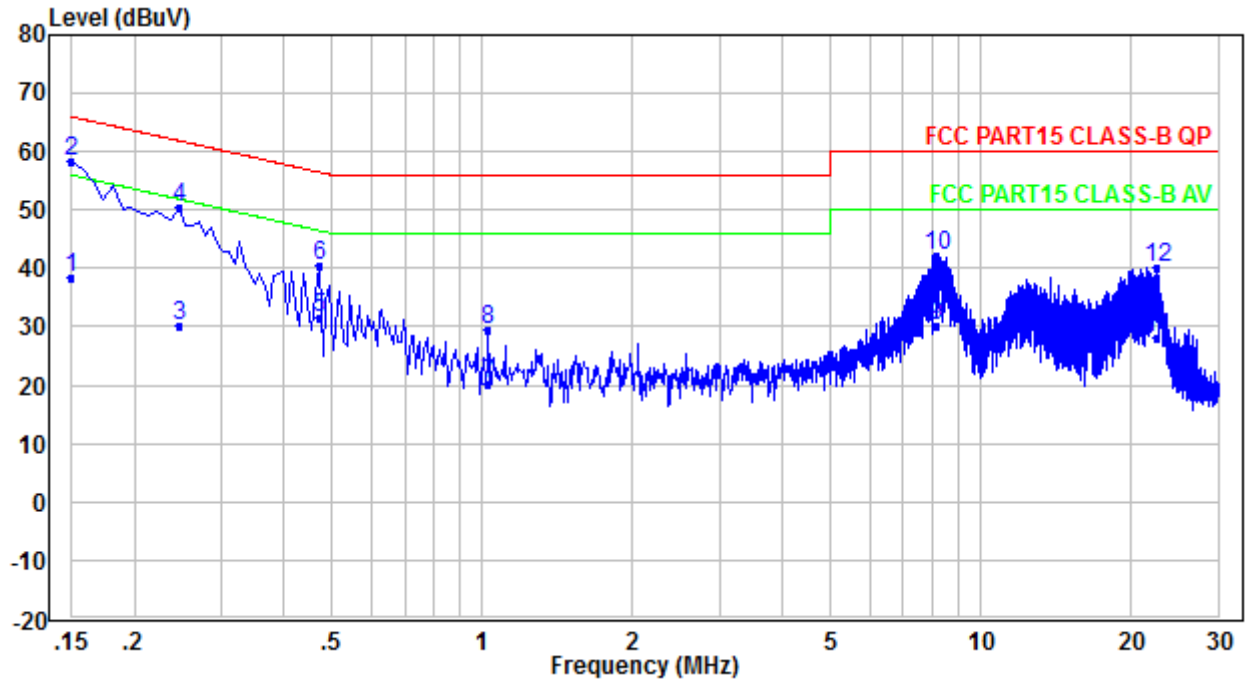
1) The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
2) The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.
3) For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

Equipment Used: Refer to section 3 for details.

Test Result: Pass

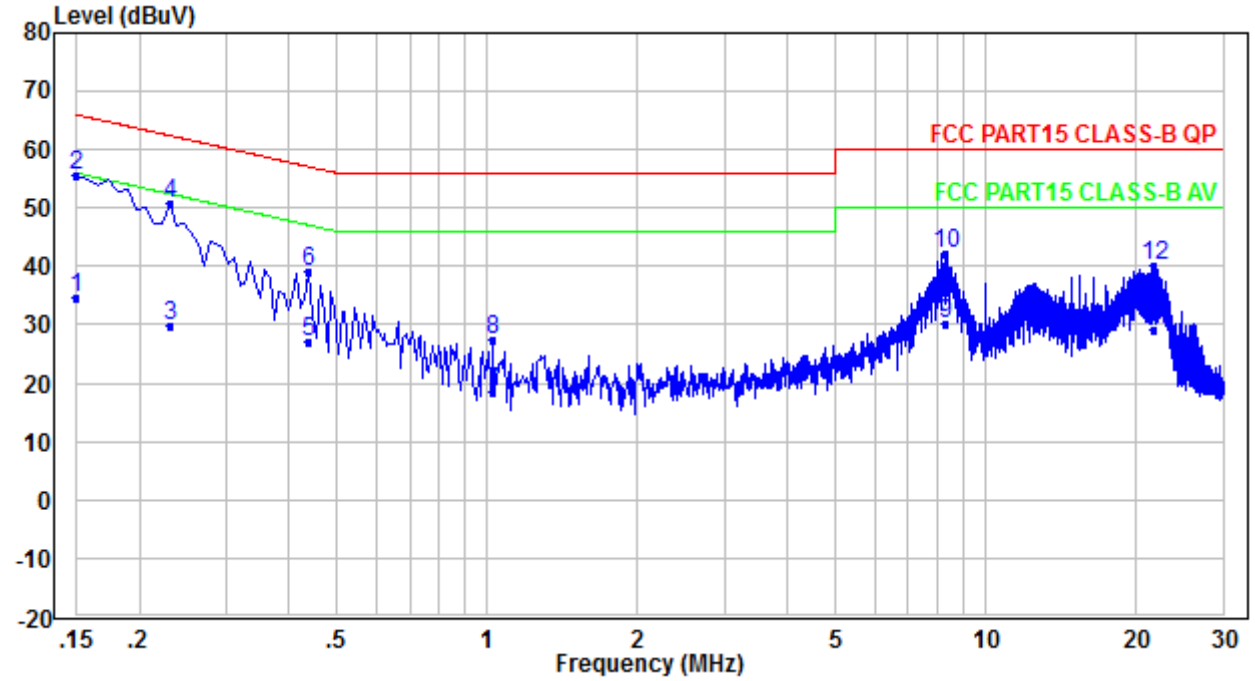
The measurement data as follows:
Quasi Peak and Average:
Test Mode 1

Live Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.150	28.40	10.12	38.52	56.00	-17.48	Average
2	0.150	48.40	10.12	58.52	66.00	-7.48	QP
3	0.246	20.18	10.13	30.31	51.89	-21.58	Average
4	0.246	40.18	10.13	50.31	61.89	-11.58	QP
5	0.470	21.43	10.15	31.58	46.52	-14.94	Average
6	0.470	30.43	10.15	40.58	56.52	-15.94	QP
7	1.030	10.12	10.22	20.34	46.00	-25.66	Average
8	1.030	19.12	10.22	29.34	56.00	-26.66	QP
9	8.172	19.80	10.51	30.31	50.00	-19.69	Average
10	8.172	31.80	10.51	42.31	60.00	-17.69	QP
11	22.617	17.18	10.95	28.13	50.00	-21.87	Average
12	22.617	29.18	10.95	40.13	60.00	-19.87	QP

Neutral Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.150	24.56	10.11	34.67	56.00	-21.33	Average
2	0.150	45.56	10.11	55.67	66.00	-10.33	QP
3	0.230	19.66	10.11	29.77	52.45	-22.68	Average
4	0.230	40.66	10.11	50.77	62.45	-11.68	QP
5	0.438	17.07	10.12	27.19	47.10	-19.91	Average
6	0.438	29.07	10.12	39.19	57.10	-17.91	QP
7	1.030	8.26	10.15	18.41	46.00	-27.59	Average
8	1.030	17.26	10.15	27.41	56.00	-28.59	QP
9	8.292	19.49	10.54	30.03	50.00	-19.97	Average
10	8.292	31.49	10.54	42.03	60.00	-17.97	QP
11	21.866	18.24	10.95	29.19	50.00	-20.81	Average
12	21.866	29.24	10.95	40.19	60.00	-19.81	QP

Remark:

1. Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Factor, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result - Limit
4. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.
5. All possible modes of operation were investigated, and testing at two nominal voltages of 240V/50Hz and 120V/60Hz, only the worst case emissions reported.

APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

********** End of Report **********
