

Partial FCC Test Report

Report No.: RFBGSN-WTW-P20080589-14

FCC ID: NKS-MA1BA1TE1

Test Model: Trimble Gateway-MA1, Trimble Gateway-BA1, Trimble Gateway-TE1
(refer to item 3.1 for more details)

Received Date: Aug. 29, 2020

Test Date: Oct. 23, 2020 ~ Nov. 04, 2020

Issued Date: Nov. 13, 2020

Applicant: PeopleNet Communications Corporation

Address: 4400 Baker Road, Minnetonka Minnesota 55343-8684 United States

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

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Test Location: No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City
33383, Taiwan

**FCC Registration /
Designation Number:** 788550 / TW0003



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. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.

Table of Contents

Release Control Record	3
1 Certificate of Conformity	4
2 Summary of Test Results.....	5
2.1 Measurement Uncertainty.....	5
2.2 Modification Record	5
3 General Information	6
3.1 General Description of EUT	6
3.2 Description of Test Modes.....	7
3.2.1 Test Mode Applicability and Tested Channel Detail.....	8
3.3 Description of Support Units	9
3.3.1 Configuration of System under Test	9
3.4 General Description of Applied Standards and References	10
4 Test Types and Results	11
4.1 Radiated Emission and Bandedge Measurement	11
4.1.1 Limits of Radiated Emission and Bandedge Measurement	11
4.1.2 Test Instruments	12
4.1.3 Test Procedures.....	13
4.1.4 Deviation from Test Standard	13
4.1.5 Test Set Up	14
4.1.6 EUT Operating Conditions.....	14
4.1.7 Test Results	15
4.2 Conducted Emission Measurement.....	21
4.2.1 Limits of Conducted Emission Measurement	21
4.2.2 Test Instruments	21
4.2.3 Test Procedures.....	21
4.2.4 Deviation from Test Standard	22
4.2.5 Test Setup.....	22
4.2.6 EUT Operating Conditions.....	22
4.2.7 Test Results	23
5 Pictures of Test Arrangements.....	29
Appendix – Information of the Testing Laboratories	30



Release Control Record

Issue No.	Description	Date Issued
RFBGSN-WTW-P20080589-14	Original Release	Nov. 13, 2020

1 Certificate of Conformity

Product: Trimble Gateway NA

Brand: Trimble

Test Model: Trimble Gateway-MA1, Trimble Gateway-BA1, Trimble Gateway-TE1
(refer to item 3.1 for more details)

Sample Status: Engineering Sample

Applicant: PeopleNet Communications Corporation

Test Date: Oct. 23, 2020 ~ Nov. 04, 2020

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2013

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 RF characteristics under the conditions specified in this report.

Prepared by : Vera Huang , **Date:** Nov. 13, 2020

Vera Huang / Specialist

Approved by : Dylan Chiou , **Date:** Nov. 13, 2020

Dylan Chiou / Senior Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -14.46 dB at 0.47635 MHz.
15.205 & 209	Radiated Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -2.64 dB at 43.58 MHz.
15.247(d)	Band Edge Measurement	N/A	Refer to Note
15.247(d)	Antenna Port Emission	N/A	Refer to Note
15.247(a)(2)	6 dB Bandwidth	N/A	Refer to Note
---	Occupied Bandwidth Measurement	N/A	Refer to Note
15.247(b)	Conducted Power	N/A	Refer to Note
15.247(e)	Power Spectral Density	N/A	Refer to Note
15.203	Antenna Requirement	N/A	Refer to Note

Note:

- Only conducted emission and radiated emission below 1GHz tests are performed for the addendum. Refer to BV CPS report no. RFBGSN-WTW-P20080589-5 for the other test data.
- 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	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.79 dB
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Trimble Gateway NA
Brand	Trimble
Test Model	Trimble Gateway-MA1, Trimble Gateway-BA1, Trimble Gateway-TE1
Model Difference	Refer to note for more details
Status of EUT	Engineering Sample
Power Supply Rating	12 Vdc (adapter)
Modulation Type	GFSK
Transfer Rate	1 Mbps
Operating Frequency	2402 ~ 2480 MHz
Number of Channel	40
Antenna Type	FPC antenna with 0.75 dBi gain
Antenna Connector	N/A
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. The information of module collocated in the EUT is listed as below.

Module	Brand	Model	EUT Model		
			Trimble Gateway-MA2	Trimble Gateway-BA2	Trimble Gateway-TE2
BT/WLAN Module	msi	BM25	V	V	V
WWAN Module	Quectel	EC25-A	V	V	V

2. The difference between all models are listed as below.

Ant.	Brand	Model	Ant. Type	Remark	EUT Model		
					EUT 1	EUT 2	EUT 3
					Trimble Gateway-MA2	Trimble Gateway-BA2	Trimble Gateway-TE2
WWAN Antenna 1	TAOGLAS	PCS.06.A	SMD Antenna	Internal, Main Antenna	V		V
WWAN Antenna 2	TAOGLAS	PCS.06.B	SMD Antenna	Internal, Aux. Antenna	V	V	V
WWAN Antenna 3	TAOGLAS	MA240.LBI.001	Adhesive Mount Combination Antenna	External, Main Antenna	V		
WWAN Antenna 4	TAOGLAS	MA240.LBI.001	Adhesive Mount Combination Antenna	External, Aux. Antenna	V		
WWAN Antenna 5	PACCAR	PP407031	Exterior-mount Antenna	External, Main Antenna		V	
WLAN Antenna	TAOGLAS	FXP826.07.0120C	FPC Antenna	--	V	V	V

EUT Model	Connector
Trimble Gateway-MA2	a. 1 44-pin Sinbon connector b. 3 Fakra connectors for external antennas c. 1 M13 connector for ethernet
Trimble Gateway-BA2	a. 1 44-pin Sinbon connector b. 2 Fakra connectors for external antennas c. 1 M13 connector for ethernet
Trimble Gateway-TE2	1 44-pin Sinbon connector

3. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.
4. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or User's Manual.

3.2 Description of Test Modes

40 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To		Description
	RE<1G	PLC	
A	√	√	EUT 1
B	√	√	EUT 2
C	√	√	EUT 3

Where **RE<1G**: Radiated Emission below 1 GHz **PLC**: Power Line Conducted Emission

Note: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

Radiated Emission Test (Below 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
A, B, C	0 to 39	39	GFSK	1

Power Line Conducted Emission Test:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
A, B, C	0 to 39	39	GFSK	1

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Cyril Chen
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Getaz Yang

3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	WWAN & GPS Antenna	TAOGLAS	MA240.LBI.001	NA	NA	For Mode A, Provided by client
		PACCAR	PP407031	NA	NA	For Mode B, Provided by client
B	Adapter	TPT	PMW120300W8	NA	NA	Provided by client AC Input: 100-240V~, 50-60Hz, 1.1A MAX DC Output: 12V, 3.0A

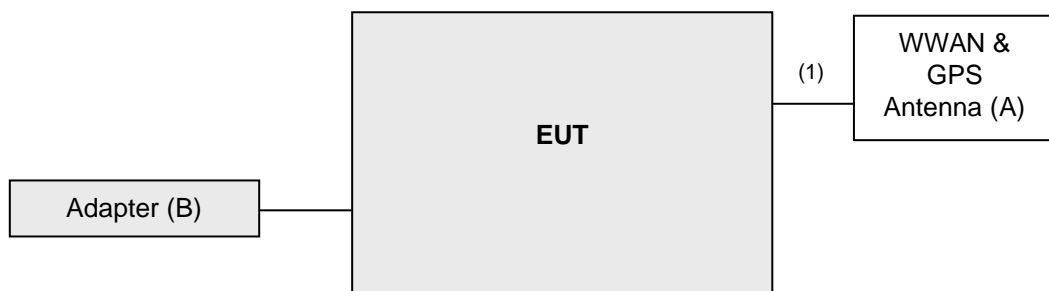
Note:

1. All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RF Cable	3	3	N	0	-

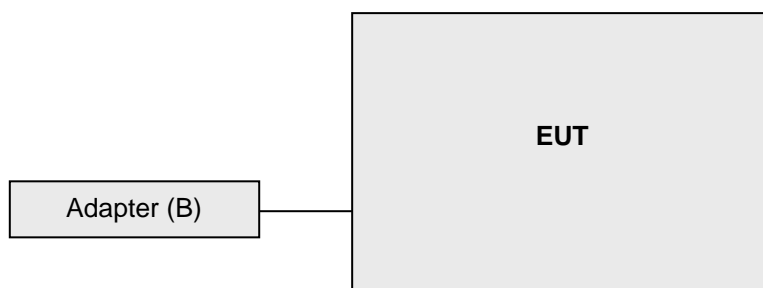
3.3.1 Configuration of System under Test

Mode A, B



Remote site

Mode C



Remote site

3.4 General Description of Applied Standards and References

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards and references:

Test Standard:

FCC Part 15, Subpart C (15.247)

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

References Test Guidance:

KDB 558074 D01 15.247 Meas Guidance v05r02

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/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.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Mar. 18, 2020	Mar. 17, 2021
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 12, 2019	Dec. 11, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 16, 2020	Apr. 15, 2021
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 24, 2019	Nov. 23, 2020
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	Nov. 08, 2019	Nov. 07, 2020
Fixed Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	Apr. 14, 2020	Apr. 13, 2021
Loop Antenna	EM-6879	269	Sep. 17, 2020	Sep. 16, 2021
Preamplifier EMCI	EMC001340	980201	Oct. 21, 2020	Oct. 20, 2021
Preamplifier EMCI	EMC 012645	980115	Oct. 07, 2020	Oct. 06, 2021
Preamplifier EMCI	EMC 330H	980112	Oct. 07, 2020	Oct. 06, 2021
Power Meter Anritsu	ML2495A	1012010	Sep. 01, 2020	Aug. 31, 2021
Power Sensor Anritsu	MA2411B	1315050	Sep. 01, 2020	Aug. 31, 2021
RF Coaxial Cable EMCI	EMC104-SM-SM-8000	180409	Jan. 18, 2020	Jan. 17, 2021
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1000(140807)	Oct. 07, 2020	Oct. 06, 2021
RF Coaxial Cable WOKEN	8D-FB	Cable-Ch10-01	Oct. 07, 2020	Oct. 06, 2021
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 10.

4.1.3 Test Procedures

For Radiated Emission below 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.

For Radiated Emission above 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna 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.
- d. 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.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

Note:

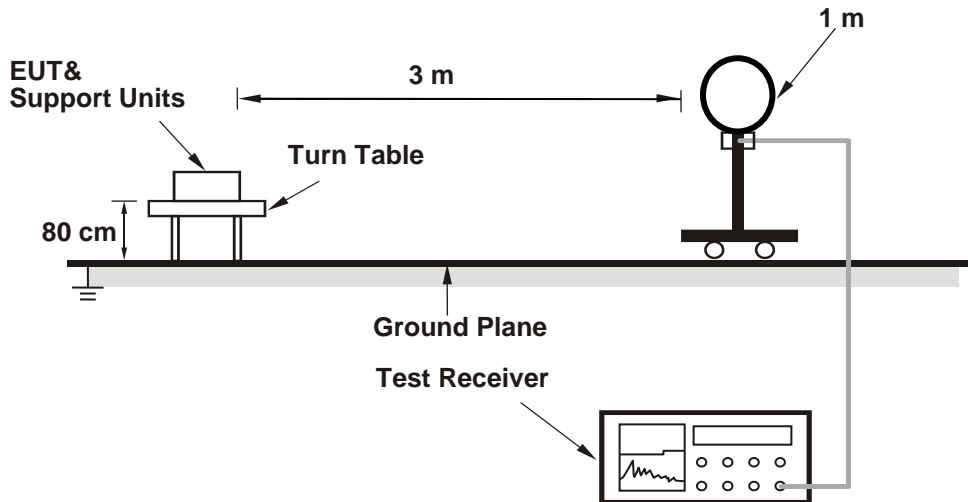
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

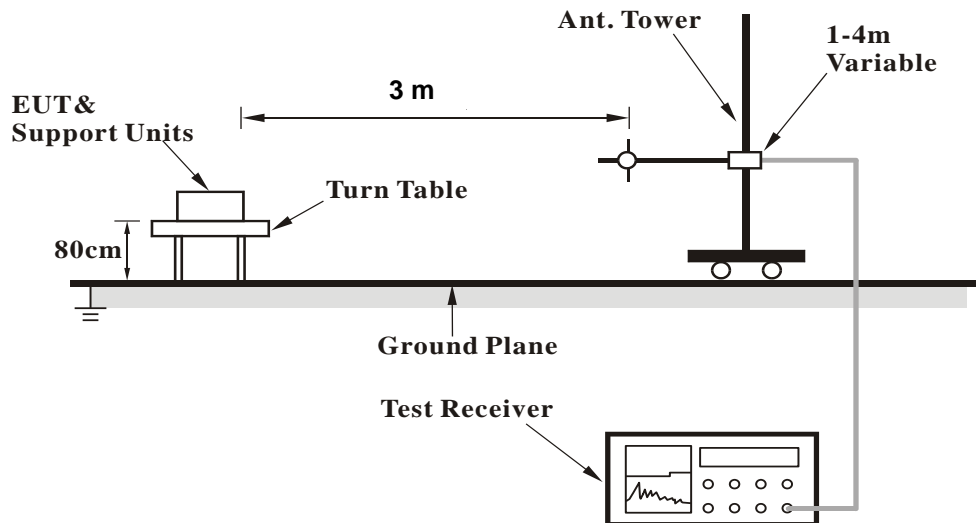
No deviation.

4.1.5 Test Set Up

<Radiated Emission below 30 MHz>



<Radiated Emission 30 MHz to 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

- Placed the EUT on the testing table.
- Set the EUT under transmission condition continuously at specific channel frequency.

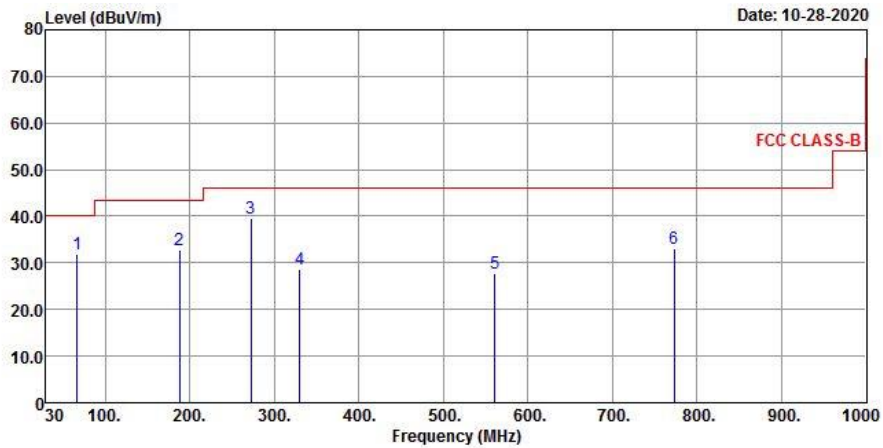
4.1.7 Test Results

30 MHz ~ 1 GHz Data:

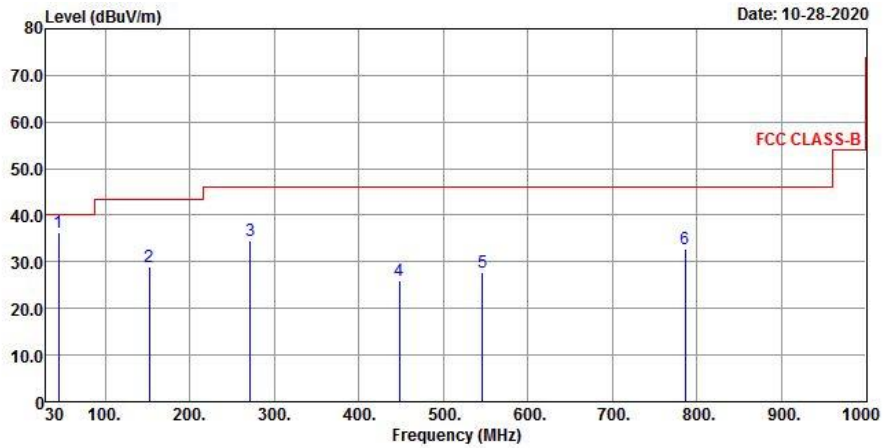
Mode A

EUT Test Condition		Measurement Detail	
Channel	Channel 39	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Cyril Chen

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
66.86	31.81	45	-13.19	40	-8.19	166	144	QP
188.11	32.72	47.13	-14.41	43.5	-10.78	133	289	QP
272.5	39.57	51.57	-12	46	-6.43	167	84	QP
329.73	28.6	38.61	-10.01	46	-17.4	122	300	QP
560.59	27.74	31.87	-4.13	46	-18.26	157	237	QP
773.02	33.1	31.75	1.35	46	-12.9	188	263	QP

Antenna Polarity & Test Distance: Vertical at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
44.55	36.29	48.16	-11.87	40	-3.71	169	197	QP
152.22	28.79	40.5	-11.71	43.5	-14.71	133	77	QP
271.53	34.65	46.7	-12.05	46	-11.35	198	157	QP
448.07	25.83	32.31	-6.48	46	-20.17	166	213	QP
546.04	27.69	32.26	-4.57	46	-18.31	147	150	QP
785.63	32.65	31.1	1.55	46	-13.35	152	183	QP

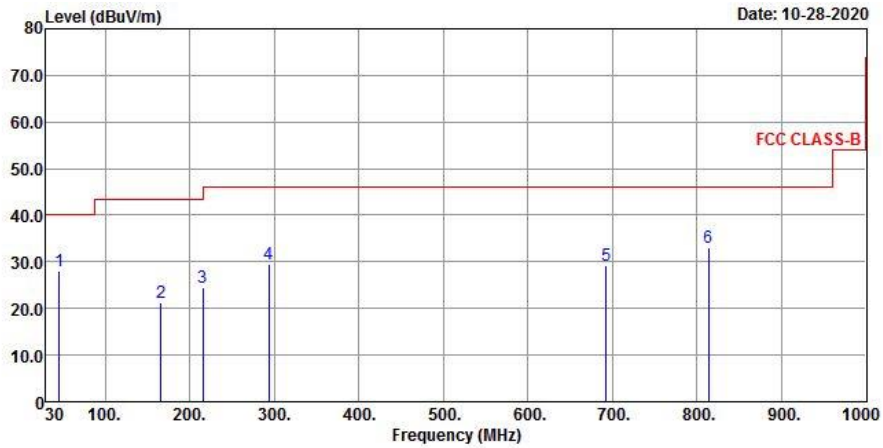
Remarks:

1. Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
2. The emission levels of other frequencies were very low against the limit.

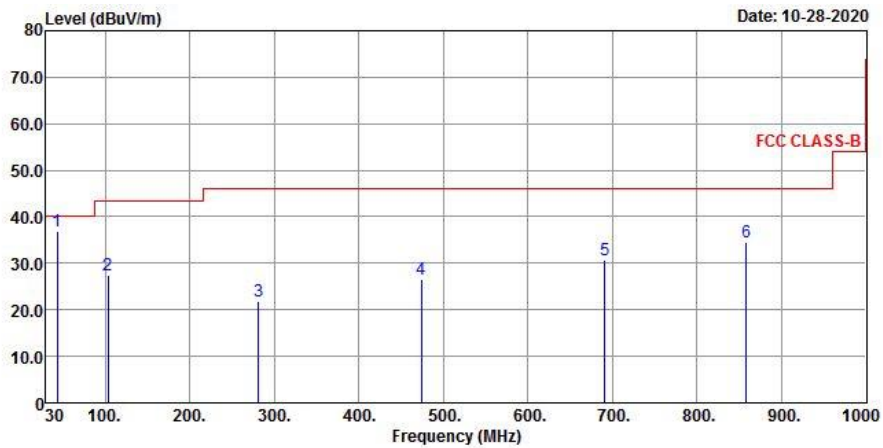
Mode B

EUT Test Condition		Measurement Detail	
Channel	Channel 39	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Cyril Chen

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
45.52	28	39.78	-11.78	40	-12	179	215	QP
165.8	21.18	33.18	-12	43.5	-22.32	122	154	QP
215.27	24.59	39.54	-14.95	43.5	-18.91	163	87	QP
293.84	29.66	41.02	-11.36	46	-16.34	195	149	QP
692.51	29.27	30.08	-0.81	46	-16.73	168	211	QP
813.76	33.03	31.02	2.01	46	-12.97	158	214	QP

Antenna Polarity & Test Distance: Vertical at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
43.58	36.86	48.78	-11.92	40	-3.14	144	210	QP
103.72	27.42	42.84	-15.42	43.5	-16.08	133	217	QP
281.23	21.89	33.58	-11.69	46	-24.11	177	66	QP
474.26	26.51	32.43	-5.92	46	-19.49	164	289	QP
690.57	30.66	31.55	-0.89	46	-15.34	144	237	QP
858.38	34.6	32.04	2.56	46	-11.4	188	256	QP

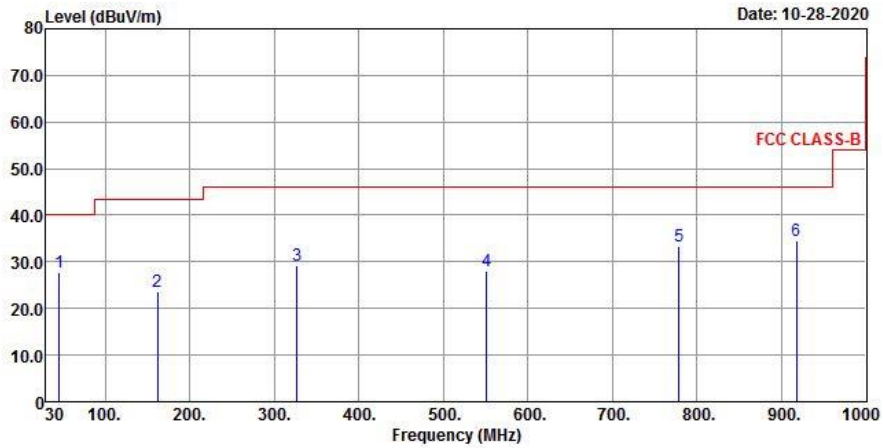
Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- The emission levels of other frequencies were very low against the limit.

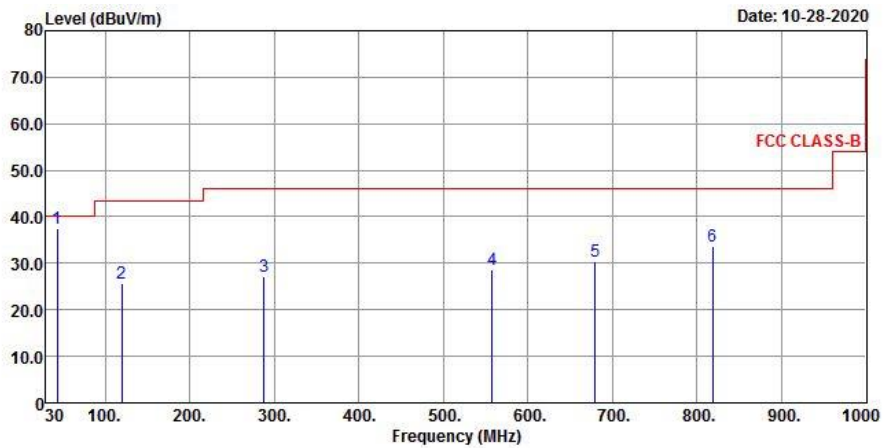
Mode C

EUT Test Condition		Measurement Detail	
Channel	Channel 39	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Cyril Chen

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
45.52	27.73	39.51	-11.78	40	-12.27	191	283	QP
161.92	23.67	35.45	-11.78	43.5	-19.83	137	251	QP
326.82	29.2	39.33	-10.13	46	-16.8	144	182	QP
550.89	27.91	32.35	-4.44	46	-18.09	153	160	QP
778.84	33.25	31.77	1.48	46	-12.75	199	217	QP
917.55	34.59	31.33	3.26	46	-11.41	120	168	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
43.58	37.36	49.28	-11.92	40	-2.64	102	211	QP
119.24	25.62	39.54	-13.92	43.5	-17.88	127	199	QP
288.02	27.29	38.78	-11.49	46	-18.71	187	293	QP
557.68	28.59	32.82	-4.23	46	-17.41	154	137	QP
679.9	30.51	31.55	-1.04	46	-15.49	180	162	QP
818.61	33.67	31.53	2.14	46	-12.33	134	128	QP

Remarks:

1. Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
2. The emission levels of other frequencies were very low against the limit.

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

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

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESR3	102412	Feb. 17, 2020	Feb. 16, 2021
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Sep. 04, 2020	Sep. 03, 2021
LISN/AMN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Jan. 20, 2020	Jan. 19, 2021
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Aug. 18, 2020	Aug. 17, 2021
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Shielded Room 2. (Conduction 2)
 3. The VCCI Site Registration No. is C-12047.

4.2.3 Test Procedures

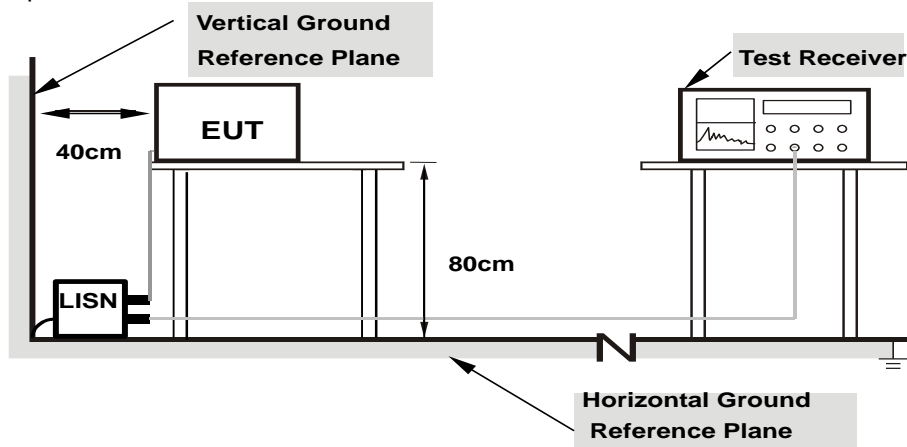
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

4.2.6 EUT Operating Conditions

- a. Placed the EUT on the testing table.
- b. Set the EUT under transmission condition continuously at specific channel frequency.

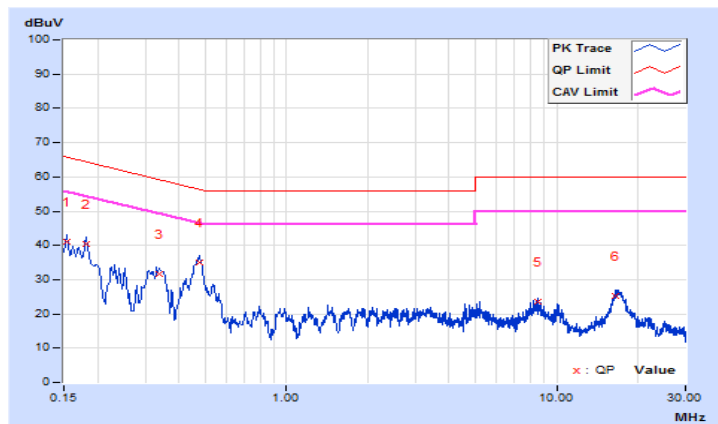
4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	21°C, 65%RH
Tested by	Getaz Yang	Test Date	2020/11/4
Test Mode	Mode A		

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	0.15391	9.65	31.28	25.28	40.93	34.93	65.79	55.79	-24.86	-20.86
2	0.18122	9.66	30.84	22.38	40.50	32.04	64.43	54.43	-23.93	-22.39
3	0.33750	9.66	21.88	15.36	31.54	25.02	59.26	49.26	-27.72	-24.24
4	0.47789	9.66	25.19	19.75	34.85	29.41	56.38	46.38	-21.53	-16.97
5	8.57996	9.78	13.89	6.40	23.67	16.18	60.00	50.00	-36.33	-33.82
6	16.47034	9.85	15.26	8.35	25.11	18.20	60.00	50.00	-34.89	-31.80

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

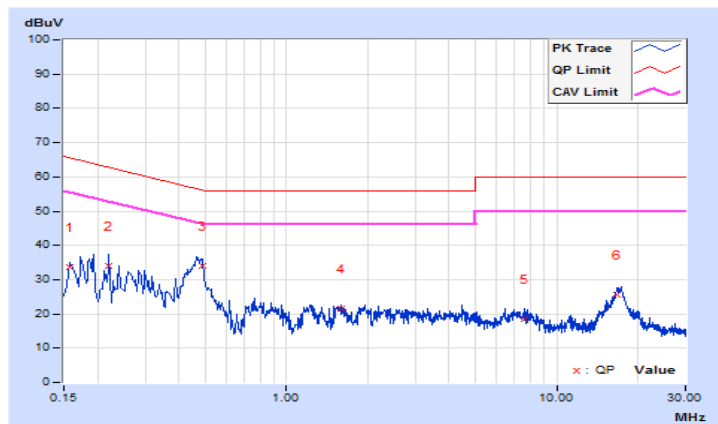


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	21°C, 65%RH
Tested by	Getaz Yang	Test Date	2020/11/4
Test Mode	Mode A		

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	0.15782	9.68	23.86	15.77	33.54	25.45	65.58	55.58	-32.04	-30.13
2	0.22038	9.68	24.29	18.07	33.97	27.75	62.80	52.80	-28.83	-25.05
3	0.48626	9.68	24.26	17.16	33.94	26.84	56.23	46.23	-22.29	-19.39
4	1.60061	9.71	11.88	6.88	21.59	16.59	56.00	46.00	-34.41	-29.41
5	7.59855	9.81	8.77	2.83	18.58	12.64	60.00	50.00	-41.42	-37.36
6	16.77532	9.95	15.57	9.58	25.52	19.53	60.00	50.00	-34.48	-30.47

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

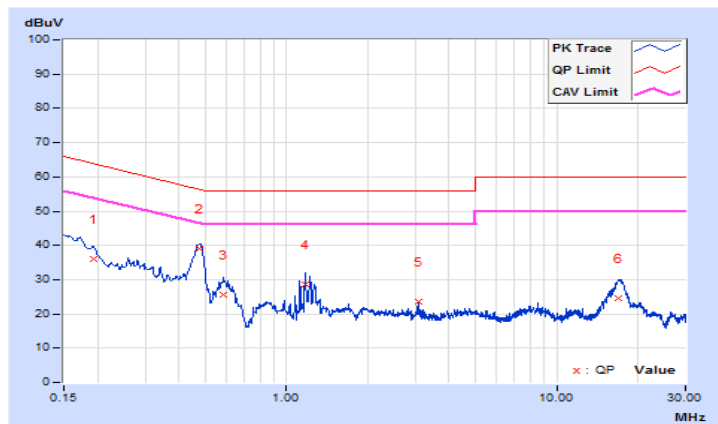


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 75%RH
Tested by	Getaz Yang	Test Date	2020/10/23
Test Mode	Mode B		

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	0.19258	10.10	25.79	18.42	35.89	28.52	63.92	53.92	-28.03	-25.40
2	0.47635	10.11	28.99	21.83	39.10	31.94	56.40	46.40	-17.30	-14.46
3	0.58220	10.12	15.38	9.46	25.50	19.58	56.00	46.00	-30.50	-26.42
4	1.17150	10.15	18.54	11.04	28.69	21.19	56.00	46.00	-27.31	-24.81
5	3.08625	10.20	13.46	10.10	23.66	20.30	56.00	46.00	-32.34	-25.70
6	16.88100	10.38	14.25	9.51	24.63	19.89	60.00	50.00	-35.37	-30.11

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

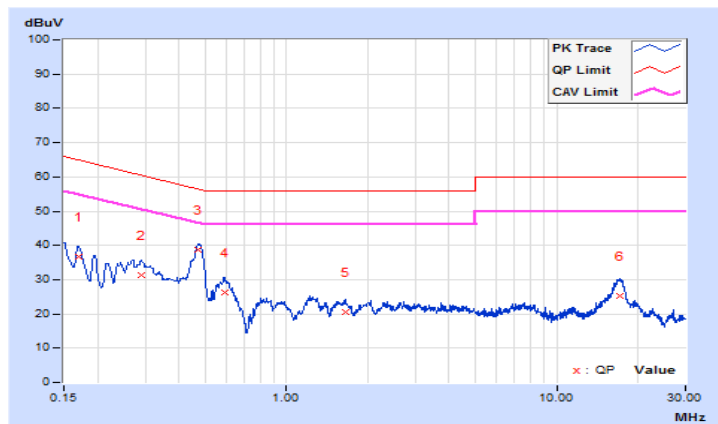


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 75%RH
Tested by	Getaz Yang	Test Date	2020/10/23
Test Mode	Mode B		

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	0.16966	10.06	26.54	19.08	36.60	29.14	64.98	54.98	-28.38	-25.84
2	0.28920	10.07	21.27	13.42	31.34	23.49	60.55	50.55	-29.21	-27.06
3	0.46950	10.09	28.48	21.01	38.57	31.10	56.52	46.52	-17.95	-15.42
4	0.58838	10.10	16.17	10.23	26.27	20.33	56.00	46.00	-29.73	-25.67
5	1.64625	10.14	10.27	2.54	20.41	12.68	56.00	46.00	-35.59	-33.32
6	17.07900	10.55	14.61	10.00	25.16	20.55	60.00	50.00	-34.84	-29.45

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

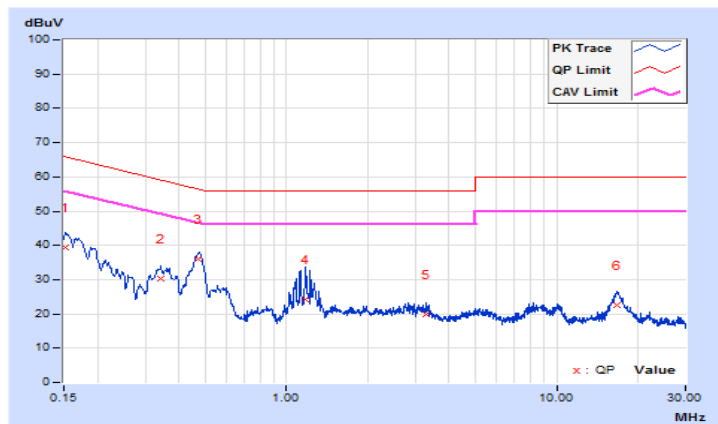


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 75%RH
Tested by	Getaz Yang	Test Date	2020/10/24
Test Mode	Mode C		

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	0.15225	10.09	29.15	21.58	39.24	31.67	65.88	55.88	-26.64	-24.21
2	0.34335	10.10	20.35	12.70	30.45	22.80	59.12	49.12	-28.67	-26.32
3	0.47259	10.11	25.78	19.36	35.89	29.47	56.47	46.47	-20.58	-17.00
4	1.17600	10.15	14.10	8.17	24.25	18.32	56.00	46.00	-31.75	-27.68
5	3.27975	10.21	9.54	1.40	19.75	11.61	56.00	46.00	-36.25	-34.39
6	16.77300	10.38	12.18	5.86	22.56	16.24	60.00	50.00	-37.44	-33.76

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

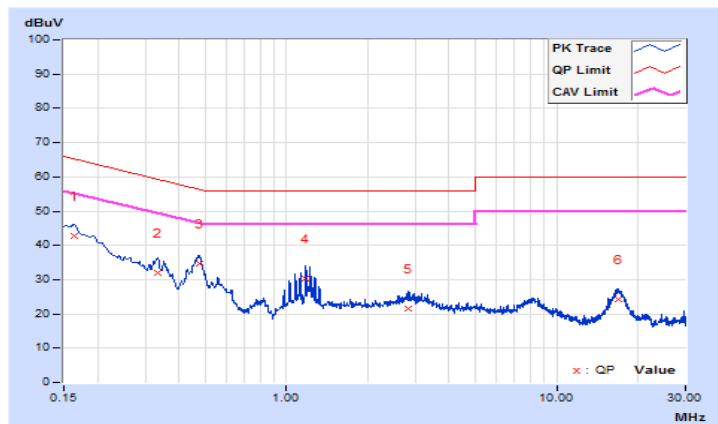


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 75%RH
Tested by	Getaz Yang	Test Date	2020/10/24
Test Mode	Mode C		

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	0.16307	10.06	32.83	24.68	42.89	34.74	65.31	55.31	-22.42	-20.57
2	0.33440	10.07	21.90	12.87	31.97	22.94	59.34	49.34	-27.37	-26.40
3	0.47384	10.09	24.50	18.16	34.59	28.25	56.45	46.45	-21.86	-18.20
4	1.17600	10.13	20.32	14.34	30.45	24.47	56.00	46.00	-25.55	-21.53
5	2.81850	10.18	11.39	4.89	21.57	15.07	56.00	46.00	-34.43	-30.93
6	16.98900	10.55	13.62	6.08	24.17	16.63	60.00	50.00	-35.83	-33.37

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



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – 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:

Lin Kou EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

--- END ---