

Partial FCC Test Report

Report No.: RFBGSN-WTW-P20080589-15

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

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



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Release Control Record

Issue No.	Description	Date Issued
RFBGSN-WTW-P20080589-15	Original Release	Nov. 13, 2020

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 -12.37 dB at 1.17150 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -4.22 dB at 45.52 MHz.
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:

1. Only conducted emission and radiated emission below 1GHz tests are performed for the addendum. Refer to BV CPS report no. RFBGSN-WTW-P20080589-6 for the other test data.
2. 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) (\pm)
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	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: 11.0 / 5.5 / 2.0 / 1.0 Mbps 802.11g: 54.0 / 48.0 / 36.0 / 24.0 / 18.0 / 12.0 / 9.0 / 6.0 Mbps 802.11n: up to MCS7
Operating Frequency	2412 ~ 2462 MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20)
Antenna Type	FPC antenna with 0.75 dBi gain
Antenna Connector	N/A
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

- The EUT provides one completed transmitter and one receiver.

Modulation Mode	Tx Function
802.11b	1TX
802.11g	1TX
802.11n (HT20)	1TX

- 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

- 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

4. 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.
5. 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

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

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	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
A, B, C	802.11g	1 to 11	1	OFDM	BPSK	6.0

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	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
A, B, C	802.11g	1 to 11	1	OFDM	BPSK	6.0

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

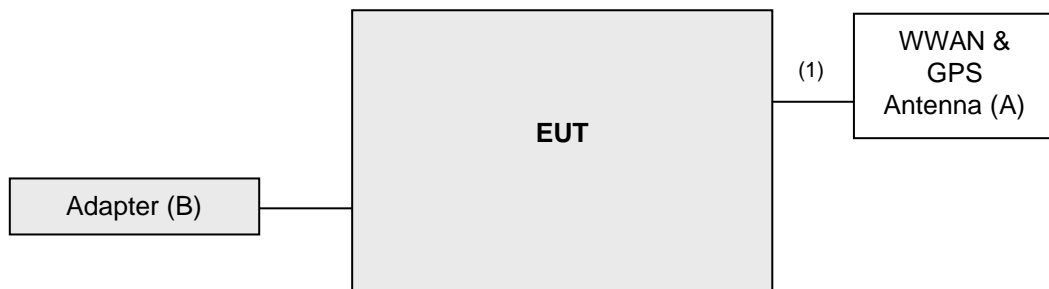
Note:

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	-

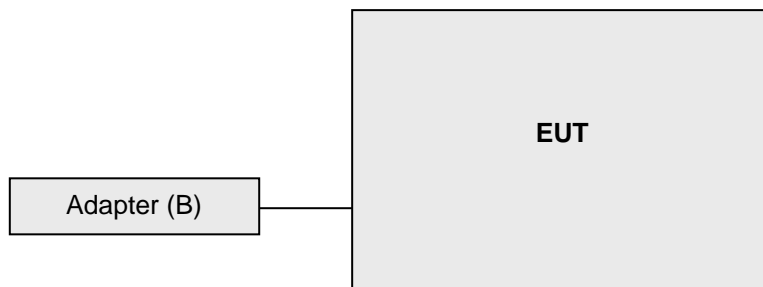
3.3.1 Configuration of System under Test

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 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:

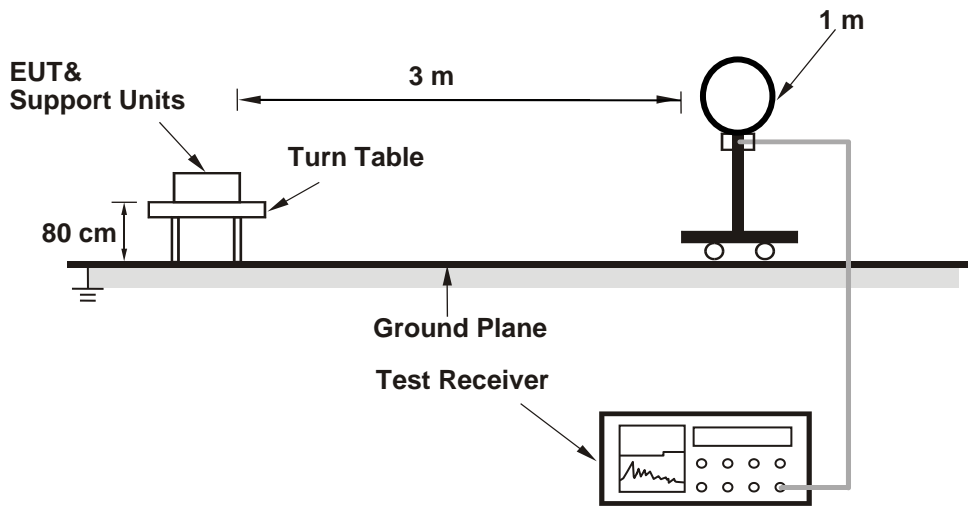
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

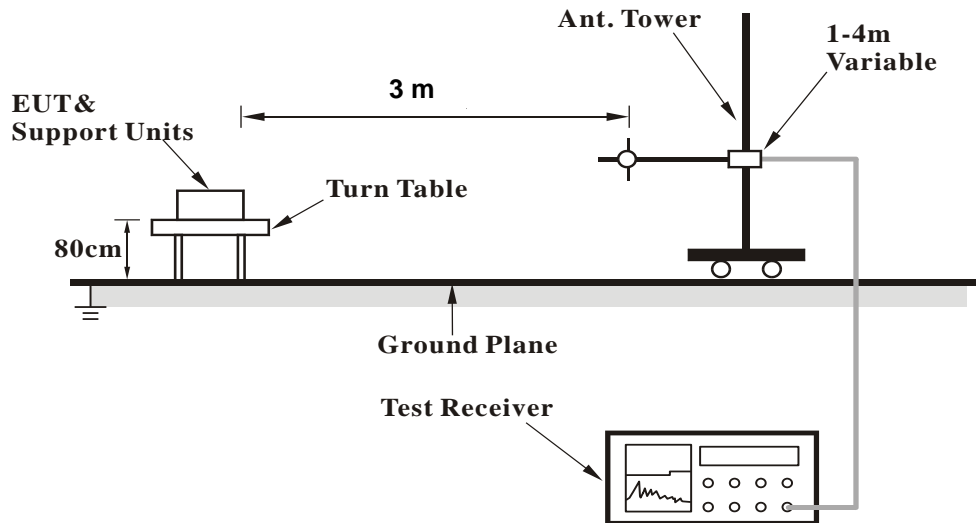
No deviation.

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 a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.

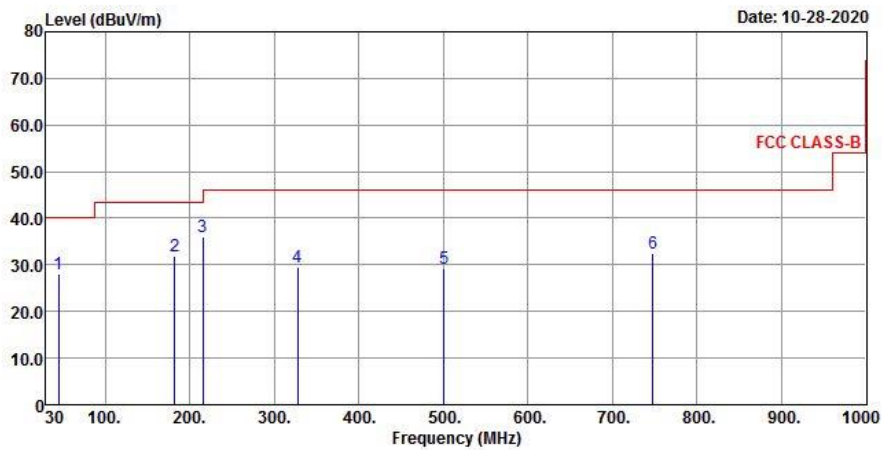
4.1.7 Test Results

30 MHz ~ 1 GHz Data: 802.11g

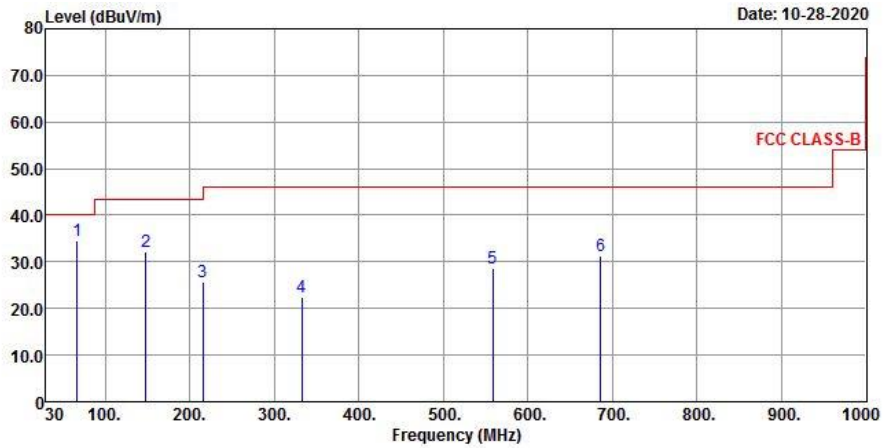
Mode A

EUT Test Condition		Measurement Detail	
Channel	Channel 1	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
44.55	28.12	39.99	-11.87	40	-11.88	105	264	QP
182.29	31.93	45.64	-13.71	43.5	-11.57	191	311	QP
215.27	36.15	51.1	-14.95	43.5	-7.35	169	217	QP
327.79	29.6	39.69	-10.09	46	-16.4	108	43	QP
500.45	29.18	34.62	-5.44	46	-16.82	177	169	QP
747.8	32.55	31.59	0.96	46	-13.45	183	247	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
66.86	34.44	47.63	-13.19	40	-5.56	102	98	QP
148.34	32.24	44.03	-11.79	43.5	-11.26	164	237	QP
215.27	25.68	40.63	-14.95	43.5	-17.82	190	218	QP
332.64	22.37	32.35	-9.98	46	-23.63	111	106	QP
558.65	28.65	32.85	-4.2	46	-17.35	132	248	QP
685.72	31.22	32.15	-0.93	46	-14.78	147	250	QP

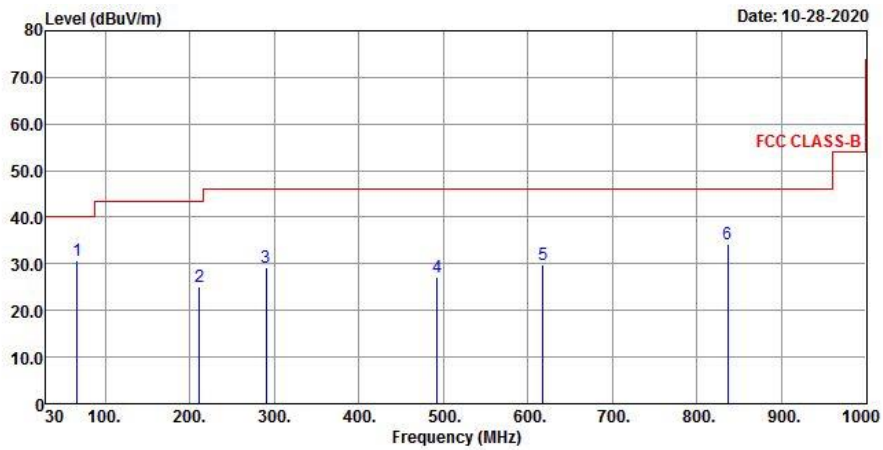
Remarks:

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.

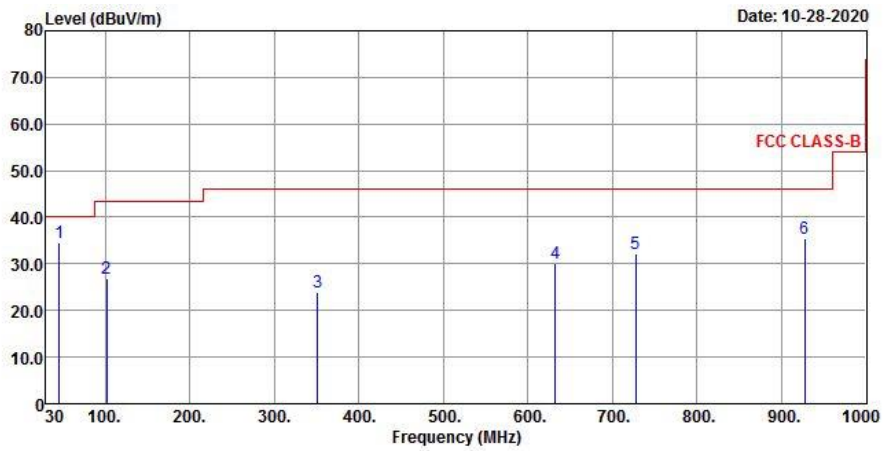
Mode B

EUT Test Condition		Measurement Detail	
Channel	Channel 1	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	30.75	43.94	-13.19	40	-9.25	132	166	QP
211.39	25.14	40.18	-15.04	43.5	-18.36	147	189	QP
289.96	29.2	40.64	-11.44	46	-16.8	121	153	QP
492.69	27.02	32.65	-5.63	46	-18.98	169	177	QP
617.82	29.85	31.97	-2.12	46	-16.15	155	234	QP
836.07	34.33	32.02	2.31	46	-11.67	174	283	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
45.52	34.51	46.29	-11.78	40	-5.49	124	150	QP
101.78	26.98	42.74	-15.76	43.5	-16.52	107	299	QP
351.07	23.9	33.65	-9.75	46	-22.1	138	256	QP
632.37	30.2	31.97	-1.77	46	-15.8	122	157	QP
727.43	32.31	32.13	0.18	46	-13.69	164	132	QP
927.25	35.32	31.93	3.39	46	-10.68	167	185	QP

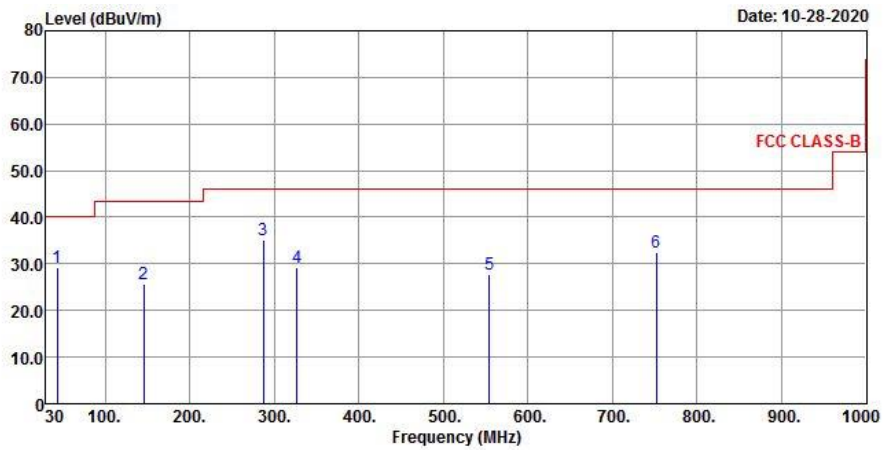
Remarks:

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.

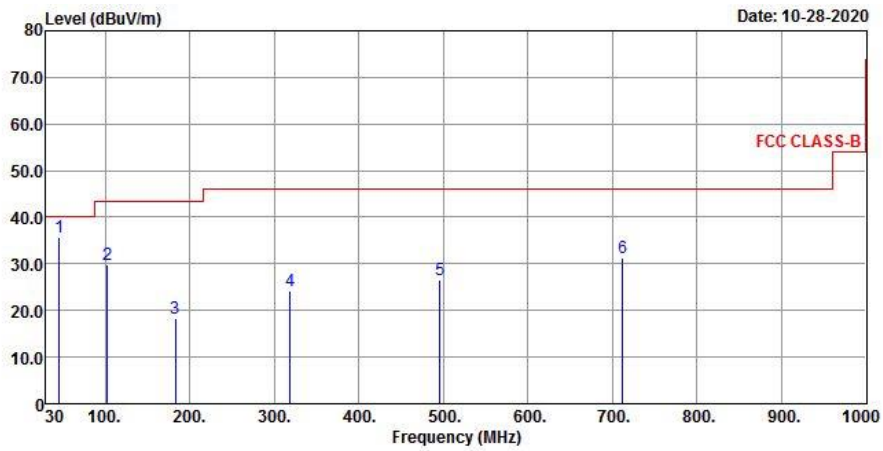
Mode C

EUT Test Condition		Measurement Detail	
Channel	Channel 1	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
43.58	29.09	41.01	-11.92	40	-10.91	155	89	QP
145.43	25.58	37.38	-11.8	43.5	-17.92	162	197	QP
287.05	35.12	46.63	-11.51	46	-10.88	133	141	QP
326.82	29.14	39.27	-10.13	46	-16.86	144	167	QP
554.77	27.68	32	-4.32	46	-18.32	193	271	QP
751.68	32.48	31.5	0.98	46	-13.52	161	215	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
45.52	35.78	47.56	-11.78	40	-4.22	200	310	QP
102.75	29.86	45.47	-15.61	43.5	-13.64	144	166	QP
183.26	18.23	32	-13.77	43.5	-25.27	101	258	QP
319.06	24.2	34.7	-10.5	46	-21.8	163	222	QP
495.6	26.6	32.14	-5.54	46	-19.4	157	112	QP
711.91	31.17	31.6	-0.43	46	-14.83	133	189	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

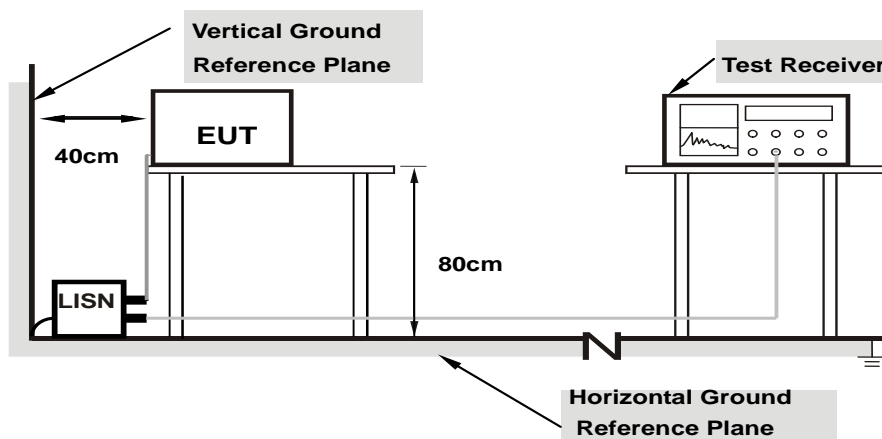
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling impedance 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.

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

4.2.6 EUT Operating Conditions

- Placed the EUT on a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.

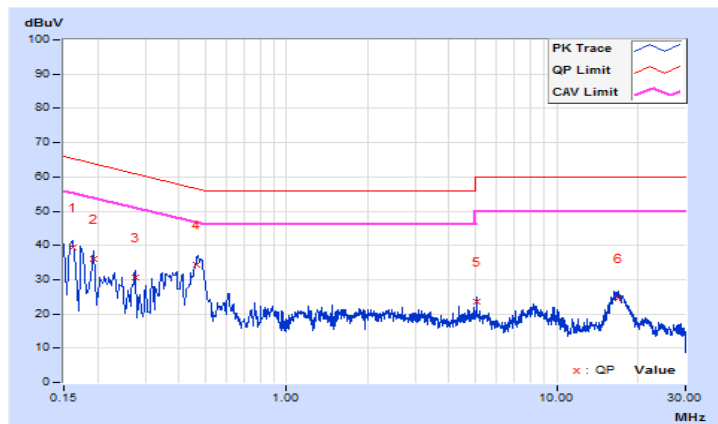
4.2.7 Test Results

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	0.16096	9.65	29.68	23.84	39.33	33.49	65.41	55.41	-26.08	-21.92
2	0.19255	9.66	26.33	20.56	35.99	30.22	63.93	53.93	-27.94	-23.71
3	0.27512	9.66	20.84	13.48	30.50	23.14	60.96	50.96	-30.46	-27.82
4	0.46423	9.66	24.83	18.07	34.49	27.73	56.62	46.62	-22.13	-18.89
5	5.06878	9.75	13.89	6.34	23.64	16.09	60.00	50.00	-36.36	-33.91
6	16.95127	9.85	14.59	7.62	24.44	17.47	60.00	50.00	-35.56	-32.53

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

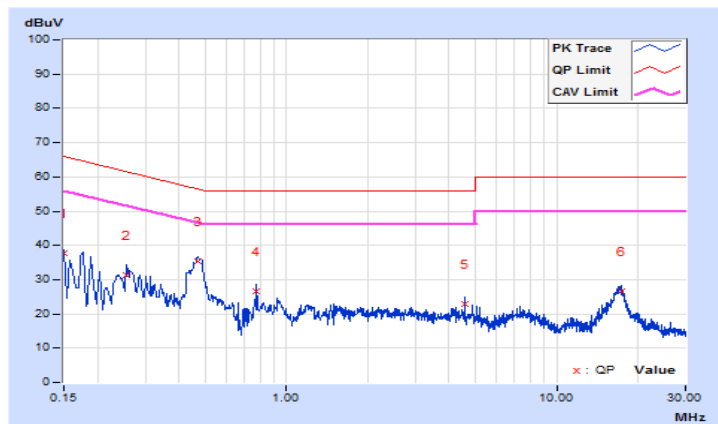


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	21°C, 65%RH
Tested by	Getaz Yang	Test Date	2020/11/4
Test Mode	Mode A		

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	0.15000	9.68	28.08	22.12	37.76	31.80	66.00	56.00	-28.24	-24.20
2	0.25557	9.68	21.64	12.18	31.32	21.86	61.57	51.57	-30.25	-29.71
3	0.46915	9.68	25.61	17.74	35.29	27.42	56.53	46.53	-21.24	-19.11
4	0.77560	9.69	17.07	9.23	26.76	18.92	56.00	46.00	-29.24	-27.08
5	4.57221	9.78	13.21	7.26	22.99	17.04	56.00	46.00	-33.01	-28.96
6	17.40874	9.95	16.50	10.64	26.45	20.59	60.00	50.00	-33.55	-29.41

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

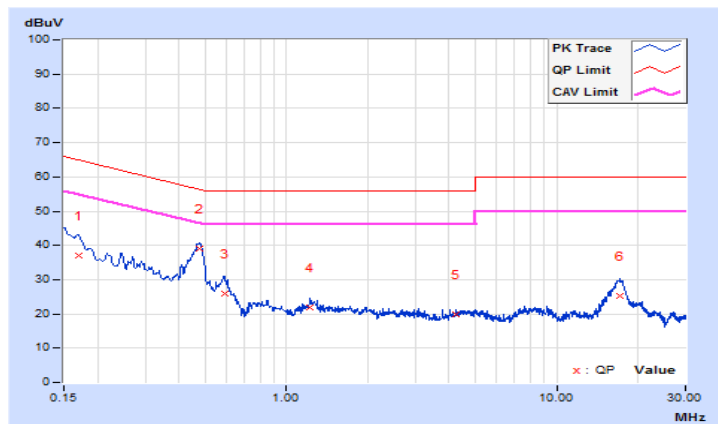


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 75%RH
Tested by	Getaz Yang	Test Date	2020/10/23
Test Mode	Mode B		

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	0.17025	10.09	26.99	21.72	37.08	31.81	64.95	54.95	-27.87	-23.14
2	0.47384	10.11	29.08	21.61	39.19	31.72	56.45	46.45	-17.26	-14.73
3	0.58838	10.12	15.81	9.39	25.93	19.51	56.00	46.00	-30.07	-26.49
4	1.22325	10.15	11.89	2.16	22.04	12.31	56.00	46.00	-33.96	-33.69
5	4.25400	10.23	9.79	2.01	20.02	12.24	56.00	46.00	-35.98	-33.76
6	17.15775	10.38	14.81	10.05	25.19	20.43	60.00	50.00	-34.81	-29.57

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

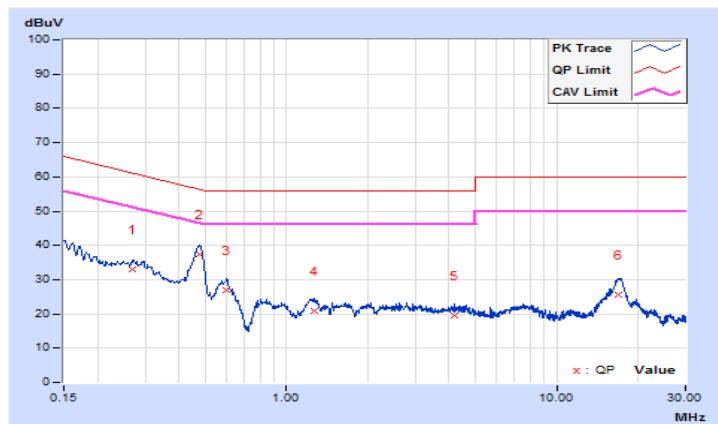


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 75%RH
Tested by	Getaz Yang	Test Date	2020/10/23
Test Mode	Mode B		

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	0.27073	10.07	22.84	18.43	32.91	28.50	61.10	51.10	-28.19	-22.60
2	0.47509	10.09	27.35	19.75	37.44	29.84	56.42	46.42	-18.98	-16.58
3	0.60225	10.10	16.91	9.32	27.01	19.42	56.00	46.00	-28.99	-26.58
4	1.27500	10.14	10.62	4.00	20.76	14.14	56.00	46.00	-35.24	-31.86
5	4.20675	10.24	9.16	1.19	19.40	11.43	56.00	46.00	-36.60	-34.57
6	16.95075	10.55	14.91	10.14	25.46	20.69	60.00	50.00	-34.54	-29.31

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

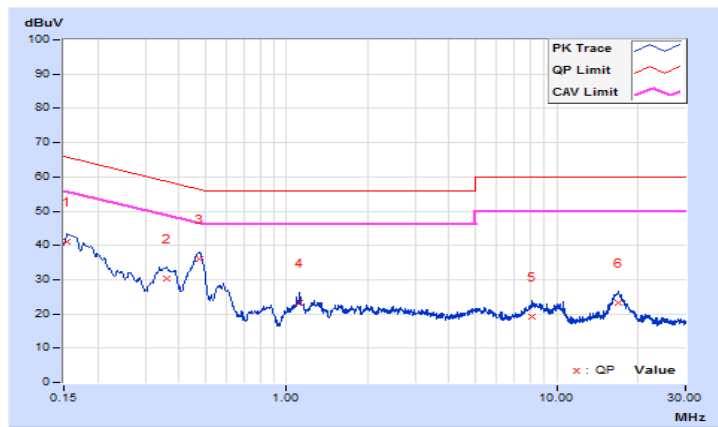


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 75%RH
Tested by	Getaz Yang	Test Date	2020/10/24
Test Mode	Mode C		

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	0.15450	10.09	30.91	24.22	41.00	34.31	65.75	55.75	-24.75	-21.44
2	0.36101	10.10	20.35	12.91	30.45	23.01	58.71	48.71	-28.26	-25.70
3	0.47625	10.11	26.05	18.85	36.16	28.96	56.40	46.40	-20.24	-17.44
4	1.12200	10.15	13.08	7.06	23.23	17.21	56.00	46.00	-32.77	-28.79
5	8.14875	10.28	9.03	1.09	19.31	11.37	60.00	50.00	-40.69	-38.63
6	16.89225	10.38	12.71	6.34	23.09	16.72	60.00	50.00	-36.91	-33.28

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

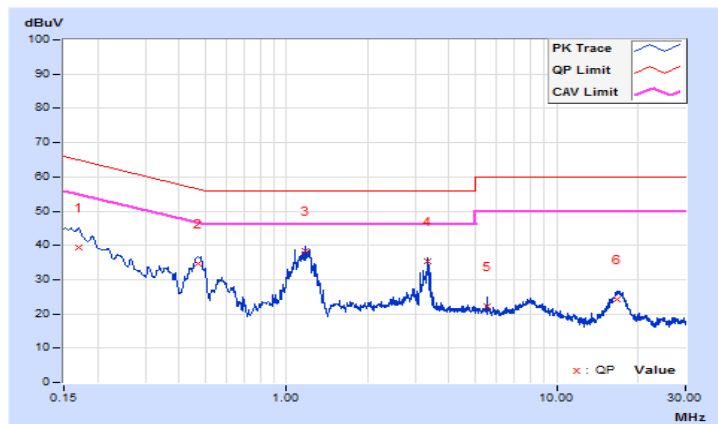


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 75%RH
Tested by	Getaz Yang	Test Date	2020/10/24
Test Mode	Mode C		

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	0.17011	10.06	29.43	24.37	39.49	34.43	64.96	54.96	-25.47	-20.53
2	0.46886	10.09	24.56	18.49	34.65	28.58	56.53	46.53	-21.88	-17.95
3	1.17150	10.13	28.14	23.50	38.27	33.63	56.00	46.00	-17.73	-12.37
4	3.34275	10.20	25.09	18.36	35.29	28.56	56.00	46.00	-20.71	-17.44
5	5.55450	10.27	11.82	2.14	22.09	12.41	60.00	50.00	-37.91	-37.59
6	16.71000	10.54	13.79	5.45	24.33	15.99	60.00	50.00	-35.67	-34.01

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.

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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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