FCC Test Report

Report No.:	RFBHSE-WTW-P20110975-2
FCC ID:	2AKMG-HSA-N001ER
Test Model:	HSA-N001E
Received Date:	Dec. 01, 2020
Test Date:	Jan. 19, 2021
Issued Date:	Feb. 18, 2021
Applicant:	Nuheara Limited
Address:	190 Aberdeen St, Northbridge, Western Australia 6003
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

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 6
3.2.1 Test Mode Applicability and Tested Channel Detail 7
3.3 Description of Support Units 8
3.3.1 Configuration of System under Test 8
3.4 General Description of Applied Standards 9

4 Test Types and Results 10

4.1 Radiated Emission Measurement 10
4.1.1 Limits of Radiated Emission Measurement 10
4.1.2 Test Instruments 11
4.1.3 Test Procedures 12
4.1.4 Deviation from Test Standard 13
4.1.5 Test Set Up 13
4.1.6 EUT Operating Conditions 13
4.1.7 Test Results 14
4.2 Conducted Emission Measurement 22
4.2.1 Limits of Conducted Emission Measurement 22
4.2.2 Test Instruments 22
4.2.3 Test Procedures 23
4.2.4 Deviation from Test Standard 23
4.2.5 Test Setup 23
4.2.6 EUT Operating Conditions 23
4.2.7 Test Results 24

5 Pictures of Test Arrangements 28

Appendix – Information of the Testing Laboratories 29

Release Control Record

Issue No.	Description	Date Issued
RFBHSE-WTW-P20110975-2	Original release	Feb. 18, 2021

1 Certificate of Conformity

Product:	HP Elite Wireless Earbuds
Brand:	HP
Test Model:	HSA-N001E
Sample Status:	DVT Production Unit
Applicant:	Nuheara Limited
Test Date:	Jan. 19, 2021
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.209) 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 : _____ , **Date:** Feb. 18, 2021
Polly Chien / Specialist

Approved by : _____ , **Date:** Feb. 18, 2021
Bruce Chen / Senior Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.209)			
FCC Clause	Test Item	Result	Remarks
15.207	Conducted emission test	Pass	Meet the requirement of limit. Minimum passing margin is -8.50dB at 0.44624MHz.
15.209	Radiated emission test	Pass	Meet the requirement of limit. Minimum passing margin is -5.4dB at 935.10MHz.

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

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.79 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	3.63 dB
	200MHz ~1000MHz	3.64 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	HP Elite Wireless Earbuds
Brand	HP
Test Model	HSA-N001E
Sample Status	DVT Production Unit
Power Supply Rating	3.7Vdc (Battery) 5.0Vdc (from adapter or host equipment)
Operating Frequency	10.6MHz
Field Strength (Maximum)	10.0 dBuV/m (30m)
Antenna Type	Inductor antenna
Antenna Connector	Soldered
Accessory Device	Charging case
Cable Supplied	0.8m shielding USB cable without core

Note:

1. The EUT contains following accessory devices.

Battery 1 (Earbuds)	
Brand	VDL
Model	ZJ1654A Rev A/3
Rating	3.7Vdc, 120mAh, 0.444Wh

Battery 2 (Charging case)	
Brand	Shenzhen Mastang Technology
Model	CFX802050 Rev A0
Rating	3.7Vdc, 800mAh, 2.96Wh

2. 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.

3.2 Description of Test Modes

1 channel is provided to this EUT

Channel	Freq. (MHz)
1	10.6

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to		Description
	RE<1G	PLC	
A	√	-	Right Bud
B	√	√	Left and Right Buds + Charge Case (Charging by Adapter)
C	-	√	Left and Right Buds + Charge Case (Charging by Notebook)

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

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.
2. "-"means no effect.

Radiated 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.

Below 30MHz

EUT Configure Mode	Available Channel	Tested Channel
A	1	1

Below 1GHz

EUT Configure Mode	
B	Left and Right Buds + Charge Case (Charging by Adapter)

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	
B	Left and Right Buds + Charge Case (Charging by Adapter)
C	Left and Right Buds + Charge Case (Charging by Notebook)

Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
RE	25 deg. C, 70% RH	3.7Vdc 120Vac, 60Hz	Hans Wu
PLC	25 deg. C, 70% RH	120Vac, 60Hz	Tank Wu

3.3 Description of Support Units

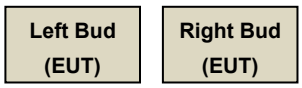
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Adapter	Liteon	PA-1050-39	NA	NA	Input: 100-240Vac, 50/60Hz, 0.25A Output: 5.2Vdc, 1A
B.	Notebook	Lenovo	20AYA00MTW	MP042ERE	FCC DoC Approved	-

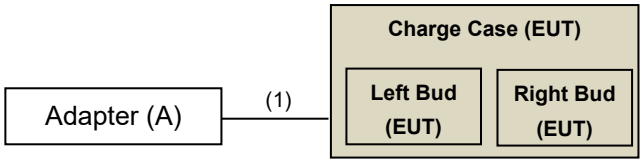
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	0.8	Y	0	Provided by client

3.3.1 Configuration of System under Test

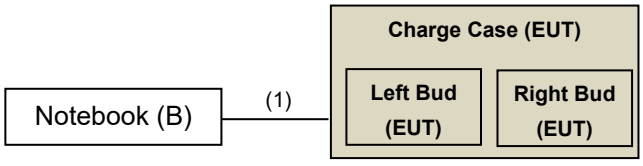
Mode A



Mode B



Mode C



3.4 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.209)

ANSI C63.10-2013

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

4 Test Types and Results

4.1 Radiated Emission Measurement

4.1.1 Limits of Radiated Emission Measurement

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.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Dec. 31, 2020	Dec. 30, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Sep. 16, 2020	Sep. 15, 2021
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Nov. 03, 2020	Nov. 02, 2021
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-1170	Nov. 22, 2020	Nov. 21, 2021
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 22, 2020	Nov. 21, 2021
Loop Antenna TESEQ	HLA 6121	45745	Jul. 06, 2020	Jul. 05, 2021
Preamplifier Agilent (Below 1GHz)	8447D	2944A10631	Jun. 08, 2020	Jun. 07, 2021
Preamplifier KEYSIGHT (Above 1GHz)	83017A	MY53270295	Jun. 08, 2020	Jun. 07, 2021
RF Coaxial Cable WOKEN With 5dB PAD	8D-FB	Cable-CH4-01	Aug. 16, 2020	Aug. 15, 2021
RF Coaxial Cable EMCI	EMC102-KM-KM-3000	150929	Aug. 16, 2020	Aug. 15, 2021
RF Coaxial Cable EMCI	EMC102-KM-KM-600	150928	Aug. 16, 2020	Aug. 15, 2021
RF signal cable HUBER+SUHNER	SUCOFLEX 104	MY 13380+295012/04	Jun. 08, 2020	Jun. 07, 2021
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-03 (250724)	Jun. 08, 2020	Jun. 07, 2021
Software BV ADT	ADT_Radiated_V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021703	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	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 4.

4.1.3 Test Procedures

For Radiated emission below 30MHz

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 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) 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.

f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

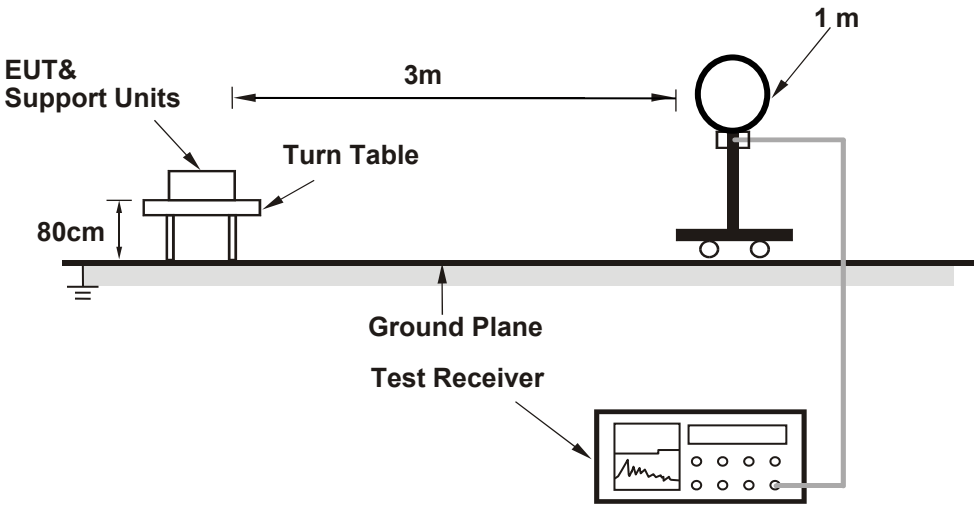
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

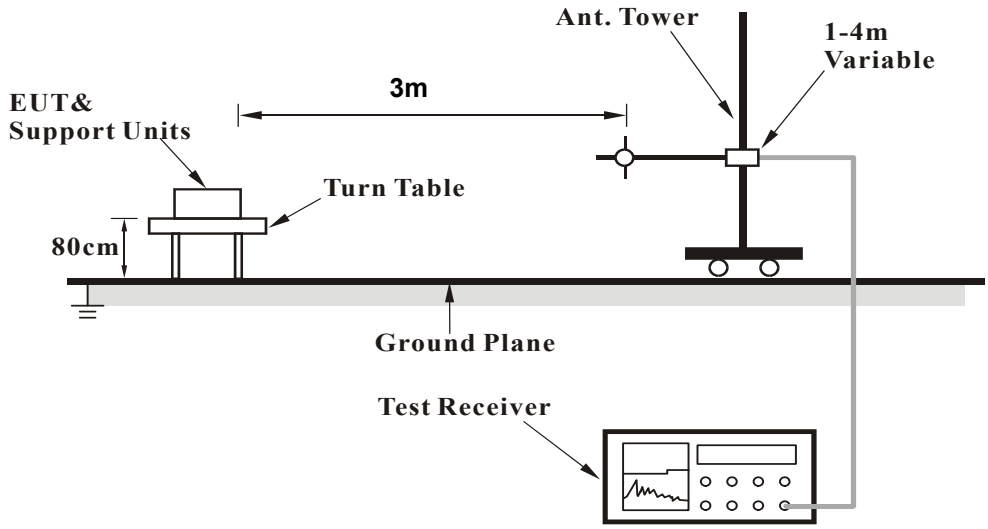
No deviation.

4.1.5 Test Set Up

For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



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

4.1.6 EUT Operating Conditions

a. The EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Below 30MHz Data:

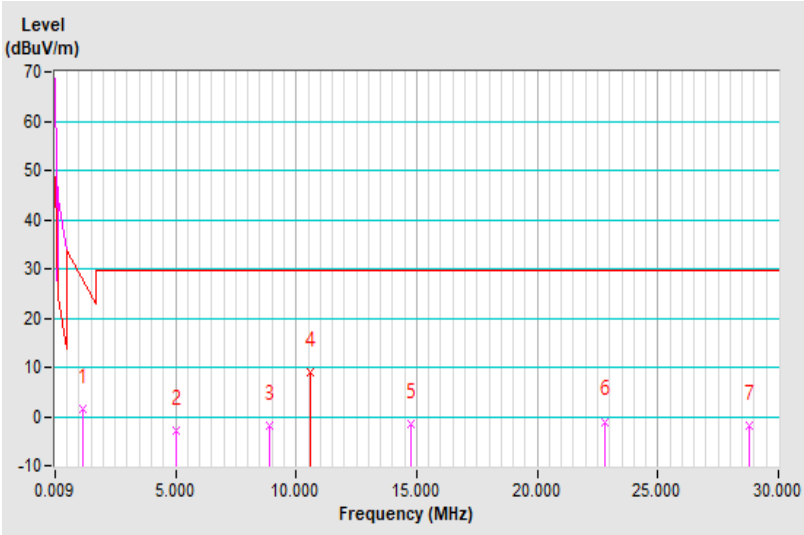
Operating Mode

Channel	TX Channel 1	Detector Function	Quasi-Peak (QP)
Frequency Range	9 kHz ~ 30 MHz		
Test Mode	A		

Antenna Polarity & Test Distance: Loop antenna Parallel at 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1.18	1.5 QP	26.1	-24.6	1.00	88	21.7	-20.2
2	5.01	-3.0 QP	29.5	-32.5	1.00	354	16.9	-19.9
3	8.92	-1.9 QP	29.5	-31.4	1.00	129	17.1	-19.0
4	*10.60	9.0 QP	29.5	-20.5	1.00	186	27.8	-18.8
5	14.79	-1.4 QP	29.5	-30.9	1.00	357	17.2	-18.6
6	22.78	-1.0 QP	29.5	-30.5	1.00	238	17.3	-18.3
7	28.78	-1.8 QP	29.5	-31.3	1.00	66	16.4	-18.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance conversion factor
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. Loop antenna was used for all radiated emission below 30MHz.
7. For 0.009 ~ 0.49MHz, the measured field strength was extrapolated to distance 300 meters Distance factor@3m = 40*log(3/300) = -80dB
8. For 0.49 ~ 30MHz, the measured field strength was extrapolated to distance 30 meters Distance factor@3m = 40*log(3/30) = -40dB

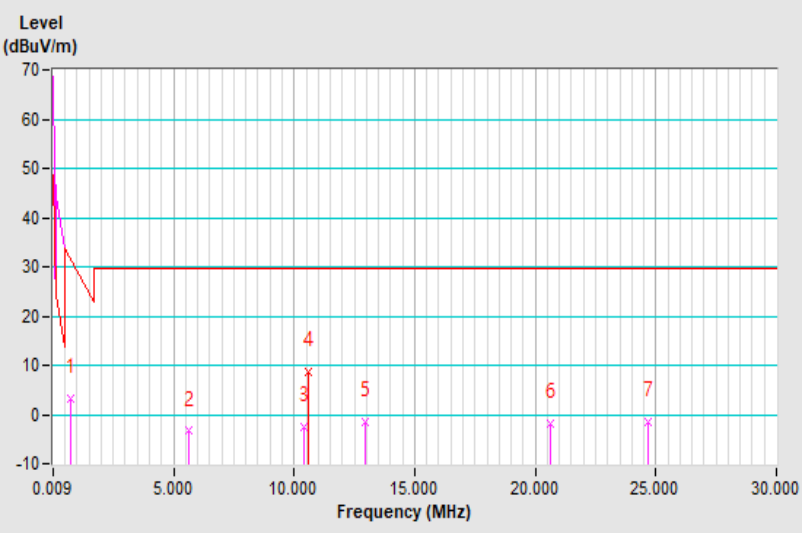


Channel	TX Channel 1	Detector Function	Quasi-Peak (QP)
Frequency Range	9 kHz ~ 30 MHz		
Test Mode	A		

Antenna Polarity & Test Distance: Loop antenna Perpendicular at 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.75	3.3 QP	30.1	-26.8	1.00	4	23.5	-20.2
2	5.66	-3.4 QP	29.5	-32.9	1.00	11	16.4	-19.8
3	10.40	-2.4 QP	29.5	-31.9	1.00	4	16.4	-18.8
4	*10.60	8.6 QP	29.5	-20.9	1.00	74	27.4	-18.8
5	12.96	-1.5 QP	29.5	-31.0	1.00	35	17.2	-18.7
6	20.61	-1.9 QP	29.5	-31.4	1.00	90	16.5	-18.4
7	24.70	-1.4 QP	29.5	-30.9	1.00	103	16.9	-18.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance conversion factor
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. Loop antenna was used for all radiated emission below 30MHz.
7. For 0.009 ~ 0.49MHz, the measured field strength was extrapolated to distance 300 meters Distance factor@3m = 40*log(3/300) = -80dB
8. For 0.49 ~ 30MHz, the measured field strength was extrapolated to distance 30 meters Distance factor@3m = 40*log(3/30) = -40dB

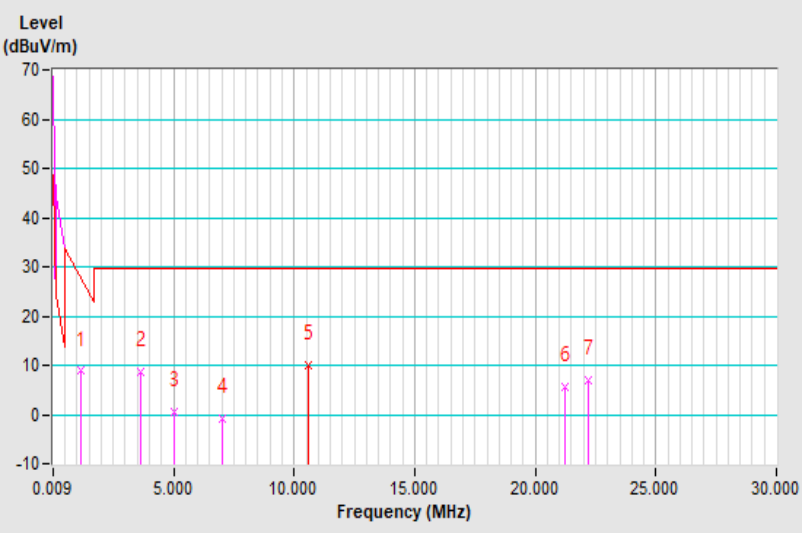


Channel	TX Channel 1	Detector Function	Quasi-Peak (QP)
Frequency Range	9 kHz ~ 30 MHz		
Test Mode	A		

Antenna Polarity & Test Distance: Loop antenna Ground-Parallel at 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1.14	8.8 QP	26.5	-17.7	1.00	359	29.0	-20.2
2	3.62	8.5 QP	29.5	-21.0	1.00	66	29.0	-20.5
3	5.05	0.4 QP	29.5	-29.1	1.00	108	20.3	-19.9
4	7.05	-0.8 QP	29.5	-30.3	1.00	189	18.6	-19.4
5	*10.60	10.0 QP	29.5	-19.5	1.00	266	28.8	-18.8
6	21.22	5.5 QP	29.5	-24.0	1.00	43	23.9	-18.4
7	22.18	6.9 QP	29.5	-22.6	1.00	89	25.3	-18.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance conversion factor
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. Loop antenna was used for all radiated emission below 30MHz.
7. For 0.009 ~ 0.49MHz, the measured field strength was extrapolated to distance 300 meters Distance factor@3m = 40*log(3/300) = -80dB
8. For 0.49 ~ 30MHz, the measured field strength was extrapolated to distance 30 meters Distance factor@3m = 40*log(3/30) = -40dB



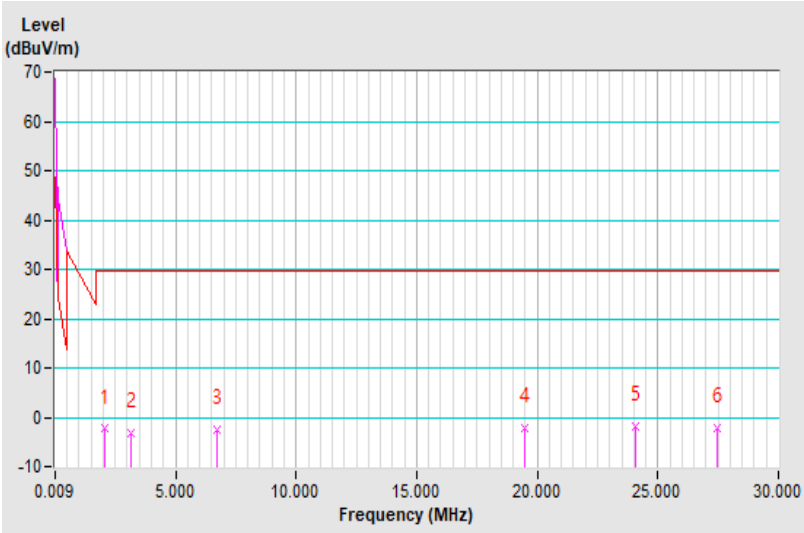
Standby Mode

Channel	TX Channel 1	Detector Function	Quasi-Peak (QP)
Frequency Range	9 kHz ~ 30 MHz		
Test Mode	A		

Antenna Polarity & Test Distance: Loop antenna Parallel at 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2.05	-2.4 QP	29.5	-31.9	1.00	207	18.1	-20.5
2	3.18	-3.1 QP	29.5	-32.6	1.00	339	17.5	-20.6
3	6.70	-2.4 QP	29.5	-31.9	1.00	5	17.1	-19.5
4	19.48	-2.1 QP	29.5	-31.6	1.00	310	16.3	-18.4
5	24.09	-1.8 QP	29.5	-31.3	1.00	12	16.5	-18.3
6	27.44	-2.1 QP	29.5	-31.6	1.00	120	16.2	-18.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance conversion factor
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. Loop antenna was used for all radiated emission below 30MHz.
7. For 0.009 ~ 0.49MHz, the measured field strength was extrapolated to distance 300 meters Distance factor@3m = 40*log(3/300) = -80dB
8. For 0.49 ~ 30MHz, the measured field strength was extrapolated to distance 30 meters Distance factor@3m = 40*log(3/30) = -40dB

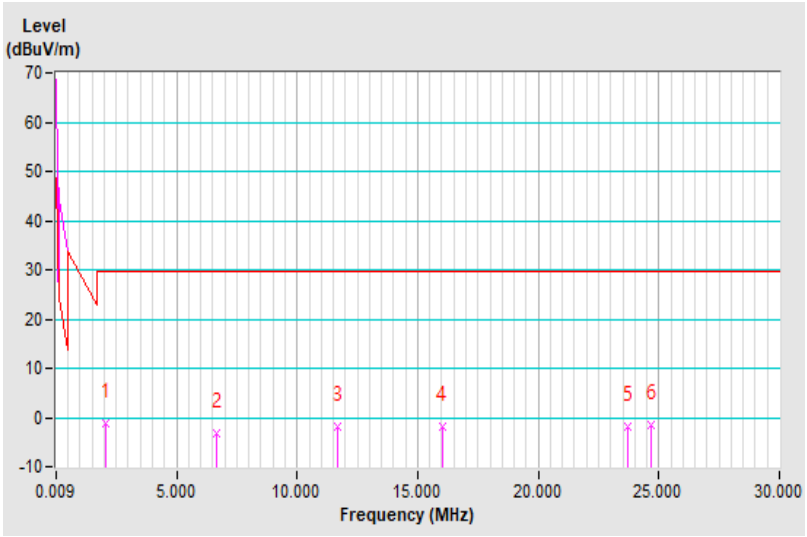


Channel	TX Channel 1	Detector Function	Quasi-Peak (QP)
Frequency Range	9 kHz ~ 30 MHz		
Test Mode	A		

Antenna Polarity & Test Distance: Loop antenna Perpendicular at 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2.05	-1.3 QP	29.5	-30.8	1.00	104	19.2	-20.5
2	6.66	-3.1 QP	29.5	-32.6	1.00	315	16.4	-19.5
3	11.70	-1.9 QP	29.5	-31.4	1.00	4	16.8	-18.7
4	16.00	-1.9 QP	29.5	-31.4	1.00	299	16.7	-18.6
5	23.70	-1.7 QP	29.5	-31.2	1.00	312	16.6	-18.3
6	24.70	-1.4 QP	29.5	-30.9	1.00	103	16.9	-18.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance conversion factor
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. Loop antenna was used for all radiated emission below 30MHz.
7. For 0.009 ~ 0.49MHz, the measured field strength was extrapolated to distance 300 meters Distance factor@3m = 40*log(3/300) = -80dB
8. For 0.49 ~ 30MHz, the measured field strength was extrapolated to distance 30 meters Distance factor@3m = 40*log(3/30) = -40dB

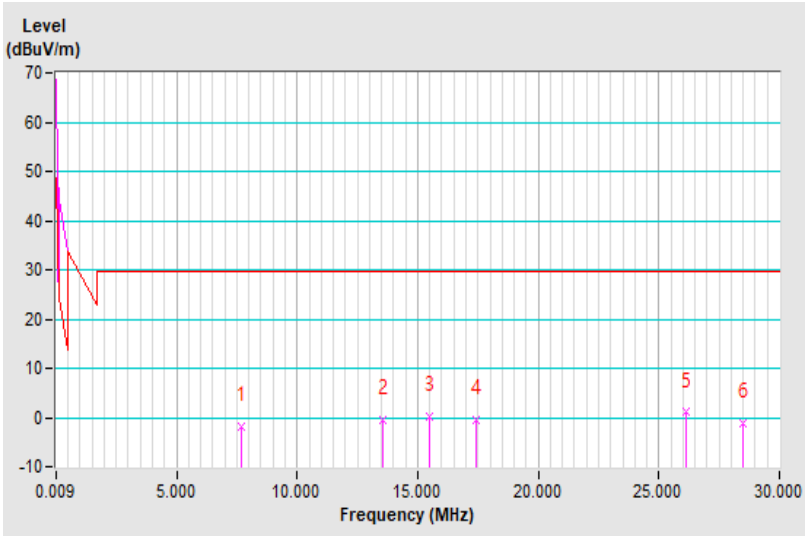


Channel	TX Channel 1	Detector Function	Quasi-Peak (QP)
Frequency Range	9 kHz ~ 30 MHz		
Test Mode	A		

Antenna Polarity & Test Distance: Loop antenna Ground-Parallel at 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	7.70	-1.8 QP	29.5	-31.3	1.00	89	17.5	-19.3
2	13.57	-0.5 QP	29.5	-30.0	1.00	4	18.2	-18.7
3	15.48	0.1 QP	29.5	-29.4	1.00	193	18.7	-18.6
4	17.44	-0.6 QP	29.5	-30.1	1.00	135	17.9	-18.5
5	26.13	1.0 QP	29.5	-28.5	1.00	30	19.3	-18.3
6	28.48	-1.3 QP	29.5	-30.8	1.00	24	16.9	-18.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance conversion factor
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. Loop antenna was used for all radiated emission below 30MHz.
7. For 0.009 ~ 0.49MHz, the measured field strength was extrapolated to distance 300 meters Distance factor@3m = 40*log(3/300) = -80dB
8. For 0.49 ~ 30MHz, the measured field strength was extrapolated to distance 30 meters Distance factor@3m = 40*log(3/30) = -40dB



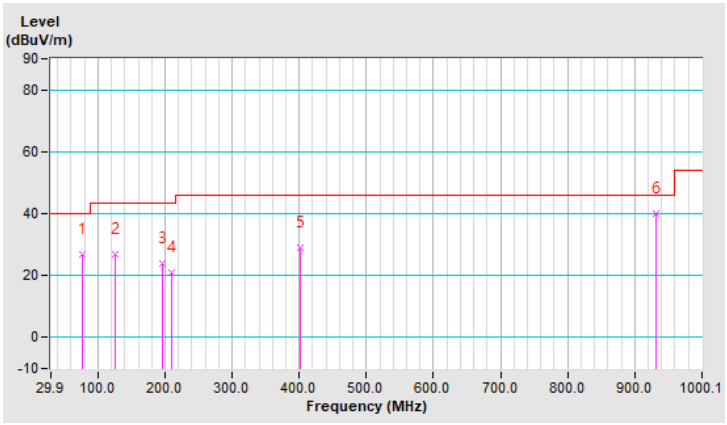
Below 1GHz Data:

Channel	Channel 1	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz		
Test Mode	B		

Antenna Polarity & Test Distance: Horizontal At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	77.44	26.9 QP	40.0	-13.1	1.50 H	33	39.4	-12.5
2	124.98	26.9 QP	43.5	-16.6	1.50 H	33	37.6	-10.7
3	195.80	24.1 QP	43.5	-19.4	1.00 H	35	35.9	-11.8
4	209.39	21.1 QP	43.5	-22.4	2.00 H	30	32.8	-11.7
5	401.49	29.1 QP	46.0	-16.9	2.00 H	37	34.9	-5.8
6	932.19	39.8 QP	46.0	-6.2	1.50 H	4	32.9	6.9

Remarks:

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

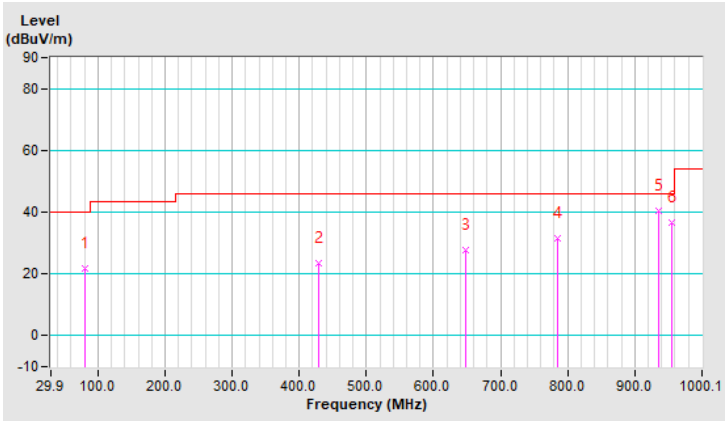


Channel	Channel 1	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz		
Test Mode	B		

Antenna Polarity & Test Distance: Vertical At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	80.35	21.7 QP	40.0	-18.3	1.00 V	74	35.1	-13.4
2	428.65	23.5 QP	46.0	-22.5	1.50 V	50	28.7	-5.2
3	647.92	27.8 QP	46.0	-18.2	1.50 V	243	28.0	-0.2
4	785.69	31.7 QP	46.0	-14.3	2.00 V	37	28.1	3.6
5	**935.10**	**40.6 QP**	**46.0**	**-5.4**	**1.00 V**	**215**	**33.7**	**6.9**
6	954.50	36.4 QP	46.0	-9.6	1.50 V	174	29.3	7.1

Remarks:

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



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 0.50MHz.

4.2.2 Test Instruments

Tested date: Jan. 19, 2021

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Dec. 04, 2020	Dec. 03, 2021
RF signal cable Woken	5D-FB	Cable-cond1-01	Jan. 16, 2021	Jan. 15, 2022
LISN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 20, 2020	Feb. 19, 2021
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 28, 2020	Aug. 27, 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 1 (Conduction 1).
3. The VCCI Site Registration No. is C-12040.

4.2.3 Test Procedures

a. 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/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

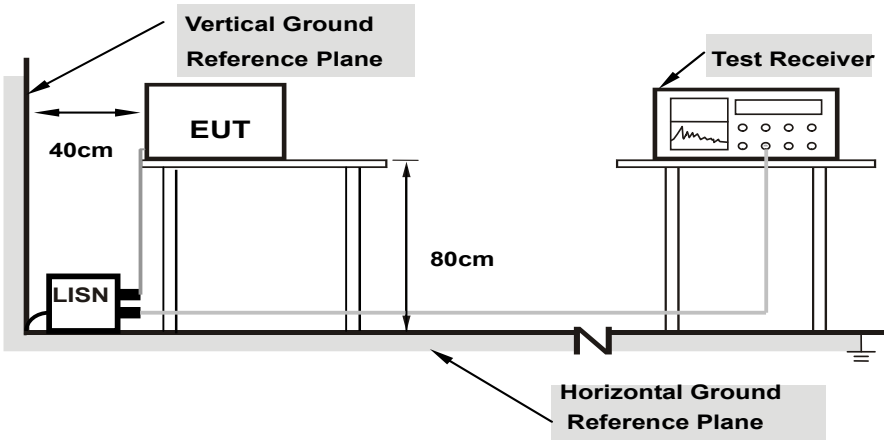
c. The frequency range from 150kHz to 30mHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

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

Same as 4.1.6.

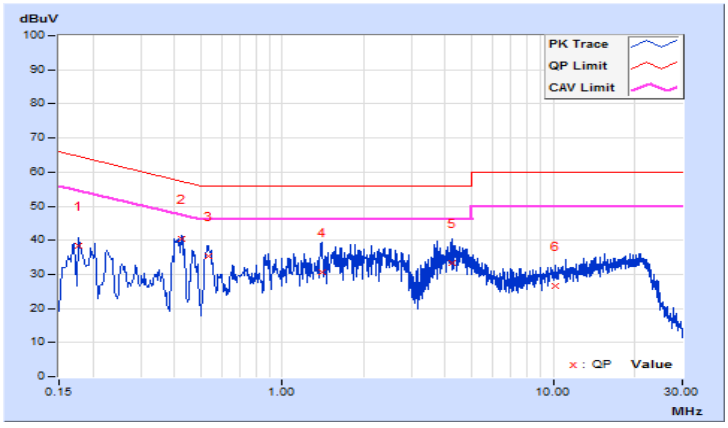
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17737	9.65	28.62	16.26	38.27	25.91	64.61	54.61	-26.34	-28.70
2	0.42370	9.68	30.71	22.93	40.39	32.61	57.38	47.38	-16.99	-14.77
3	0.53318	9.69	25.57	16.75	35.26	26.44	56.00	46.00	-20.74	-19.56
4	1.39729	9.71	21.06	8.81	30.77	18.52	56.00	46.00	-25.23	-27.48
5	4.25941	9.74	23.75	11.96	33.49	21.70	56.00	46.00	-22.51	-24.30
6	10.24562	9.80	16.72	7.25	26.52	17.05	60.00	50.00	-33.48	-32.95

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.

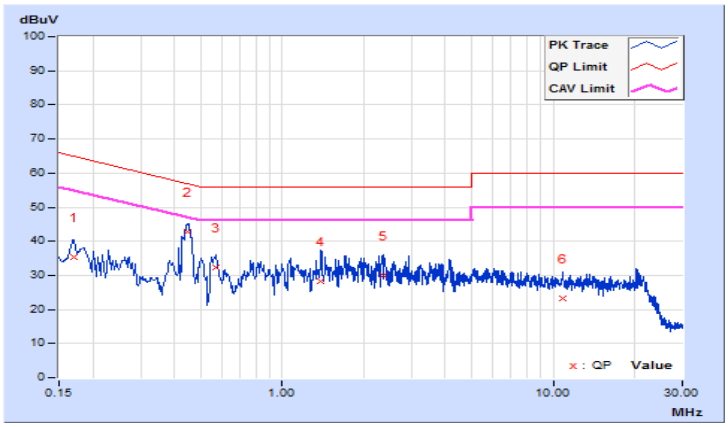


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16955	9.68	25.78	16.56	35.46	26.24	64.98	54.98	-29.52	-28.74
2	**0.44624**	**9.70**	**33.17**	**28.74**	**42.87**	**38.44**	**56.94**	**46.94**	**-14.07**	**-8.50**
3	0.56837	9.71	22.59	18.68	32.30	28.39	56.00	46.00	-23.70	-17.61
4	1.38947	9.74	18.46	9.03	28.20	18.77	56.00	46.00	-27.80	-27.23
5	2.37479	9.75	20.28	9.85	30.03	19.60	56.00	46.00	-25.97	-26.40
6	10.87513	9.84	13.41	6.82	23.25	16.66	60.00	50.00	-36.75	-33.34

Remarks:

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

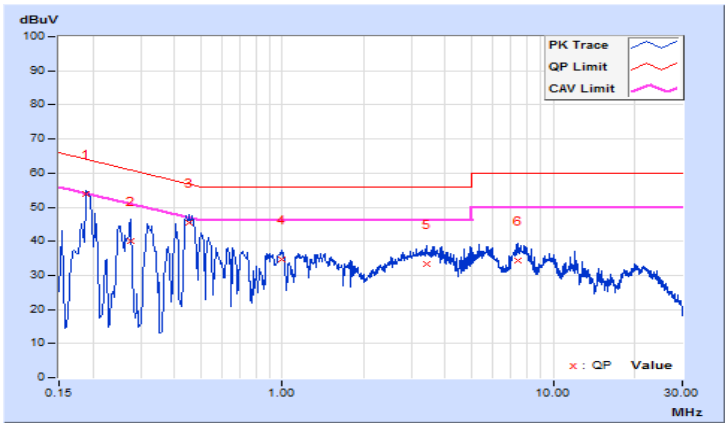


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	C		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18910	9.65	44.21	29.29	53.86	38.94	64.08	54.08	-10.22	-15.14
2	0.27512	9.66	30.42	11.70	40.08	21.36	60.96	50.96	-20.88	-29.60
3	0.45498	9.68	35.91	23.57	45.59	33.25	56.78	46.78	-11.19	-13.53
4	0.99456	9.71	25.01	10.52	34.72	20.23	56.00	46.00	-21.28	-25.77
5	3.40284	9.73	23.47	13.12	33.20	22.85	56.00	46.00	-22.80	-23.15
6	7.44606	9.77	24.60	17.81	34.37	27.58	60.00	50.00	-25.63	-22.42

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.

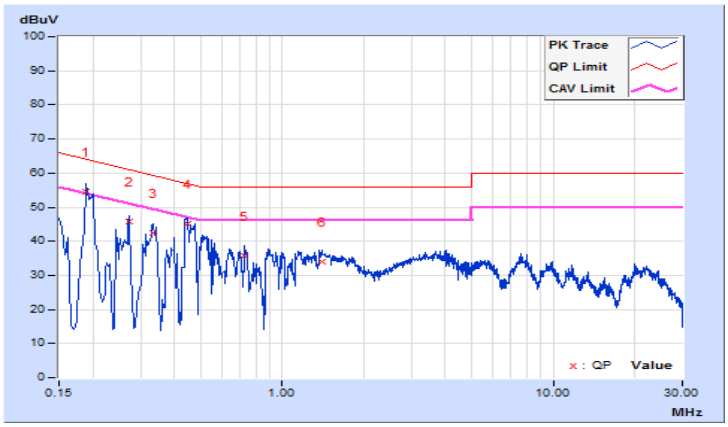


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	C		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18910	9.67	44.94	29.96	54.61	39.63	64.08	54.08	-9.47	-14.45
2	0.27120	9.68	36.06	19.80	45.74	29.48	61.08	51.08	-15.34	-21.60
3	0.33221	9.69	32.70	20.43	42.39	30.12	59.40	49.40	-17.01	-19.28
4	0.44716	9.70	35.47	22.88	45.17	32.58	56.93	46.93	-11.76	-14.35
5	0.72868	9.72	25.94	11.18	35.66	20.90	56.00	46.00	-20.34	-25.10
6	1.39729	9.74	24.42	8.77	34.16	18.51	56.00	46.00	-21.84	-27.49

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 and approved 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 ---