

Partial FCC Test Report

Report No.: RF180629C33-1

FCC ID: B94-9560D2WZ

Test Model: TPN-Q213

Received Date: Jun. 29, 2018

Test Date: Jul. 23, 2018 ~ Aug. 09, 2018

Issued Date: Aug. 14, 2018

Applicant: HP Inc.

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

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(R.O.C)

Test Location: B2F., No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City, Taiwan

FCC Registration /
Designation Number: 427177 / TW0011



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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	10
3.3.1 Configuration of System under Test	10
3.4 General Description of Applied Standards.....	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.....	15
4.1.7 Test Results	16
5 Pictures of Test Arrangements.....	24
Appendix – Information on the Testing Laboratories	25

Release Control Record

Issue No.	Description	Date Issued
RF180629C33-1	Original Release	Aug. 14, 2018

1 Certificate of Conformity

Product: Notebook PC

Brand: HP

Test Model: TPN-Q213

Sample Status: ENGINEERING SAMPLE

Applicant: HP Inc.

Test Date: Jul. 23, 2018 ~ Aug. 09, 2018

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 :



Date: Aug. 14, 2018

Gina Liu / Specialist

Approved by :



Date: Aug. 14, 2018

Dylan Chiou / 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	N/A	Refer to Note
15.205 & 209	Radiated Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -6.45 dB at 4804 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: This report is a partial report, only test item of Radiated Emissions tests was performed for this report. Other testing data please refer to Intel report no.: 170919-03.TR05 for module (Brand: Intel, Model: 9560D2W).

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	2.44 dB
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.0153 dB
	200 MHz ~ 1000 MHz	2.0224 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.1508 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Notebook PC
Brand	HP
Test Model	TPN-Q213
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	19.5 Vdc (adapter)
Modulation Type	GFSK
Transfer Rate	LE 4.0: 1 Mbps LE 5.0: 2 Mbps
Operating Frequency	2402 ~ 2480 MHz
Number of Channel	40
Antenna Type	Refer to Note as below
Antenna Connector	N/A
Accessory Device	Refer to Note as below
Data Cable Supplied	N/A

Note:

1. The WLAN/BT module (Brand: Intel, Model: 9560D2W) was installed in the EUT.
2. The antenna information is listed as below.

Antenna Type	Manufacturer	Parts Number	Antenna Gain			
			WLAN 2.4 GHz / Bluetooth	WLAN 5.15~5.35 GHz	WLAN 5.47~5.725 GHz	WLAN 5.725~5.875 GHz
PIFA	Tablet Mode					
	INPAQ	Main Antenna: DQ6LB040500 (WA-P-LBLB-04-050) Aux Antenna: DQ6LB040500 (WA-P-LBLB-04-050)	Main: -0.3 Aux: -0.9	Main: 1.0 Aux: 1.1	Main: 2.9 Aux: 0.8	Main: 2.9 Aux: 1.2
	Laptop Mode					
	INPAQ	Main Antenna: DQ6LB040500 (WA-P-LBLB-04-050) Aux Antenna: DQ6LB040500 (WA-P-LBLB-04-050)	Main: -1.0 Aux: -1.1	Main: 2.1 Aux: 0	Main: 0.4 Aux: -0.8	Main: -0.8 Aux: -0.1

3. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter 1	HP	TPN-DA11	I/P: 100-240 Vac, 50/60 Hz, 1.9 A O/P: 19.5 Vdc, 6.9 A 1.78M/0 core
Adapter 2	HP	TPN-CA09	I/P: 100-240 Vac, 50/60 Hz, 1.7 A O/P: 19.5 Vdc, 4.62 A, 90W 1.74M/0 core

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

<LE 4.0>

EUT Configure Mode	Applicable To		Description
	RE≥1G	RE<1G	
-	√	√	-

Where **RE≥1G**: Radiated Emission above 1 GHz **RE<1G**: Radiated Emission below 1 GHz

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

Note: "-" means no effect.

Radiated Emission Test (Above 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)
-	0 to 39	0, 19, 39	GFSK	1

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)
-	0 to 39	19	GFSK	1

<LE 5.0>

EUT Configure Mode	Applicable To		Description
	RE≥1G	RE<1G	
-	√	√	-

Where **RE≥1G**: Radiated Emission above 1 GHz **RE<1G**: Radiated Emission below 1 GHz

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

Note: “-” means no effect.

Radiated Emission Test (Above 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)
-	0 to 39	0, 19, 39	GFSK	2

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)
-	0 to 39	39	GFSK	2

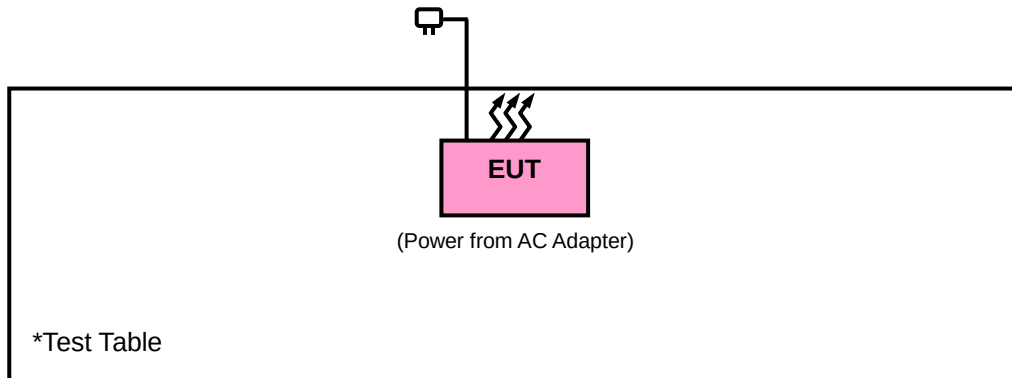
Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE≥1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee

3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

3.3.1 Configuration of System under Test



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 (15.247)

KDB 558074 D01 DTS Meas Guidance v04

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 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 Technologies	N9038A	MY51210203	Mar. 16, 2018	Mar. 15, 2019
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Jan. 11, 2018	Jan. 10, 2019
BILOG Antenna SCHWARZBECK	VULB9168	9168-616	Dec. 14, 2017	Dec. 13, 2018
HORN Antenna ETS-Lindgren	3117	00143293	Dec. 13, 2017	Dec. 12, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Dec. 01, 2017	Nov. 30, 2018
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 16, 2018	Apr. 15, 2019
Loop Antenna	EM-6879	269	Aug. 11, 2017	Aug. 10, 2018
Preamplifier Agilent	310N	187226	Jun. 19, 2018	Jun. 18, 2019
Preamplifier Agilent	83017A	MY39501357	Jun. 19, 2018	Jun. 18, 2019
Power Meter Anritsu	ML2495A	1012010	Aug. 15, 2017	Aug. 14, 2018
Power Sensor Anritsu	MA2411B	1315050	Aug. 15, 2017	Aug. 14, 2018
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-400)	Jun. 19, 2018	Jun. 18, 2019
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(RFC-SMS-100-SMS-24)	Jun. 19, 2018	Jun. 18, 2019
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	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 HsinTien Chamber 1.
3. The horn antenna and preamplifier (model: 83017A) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The IC Site Registration No. is IC7450I-1.

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) / 1.5 meters (for above 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.
- f. The test-receiver system was set to peak and average detected 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:

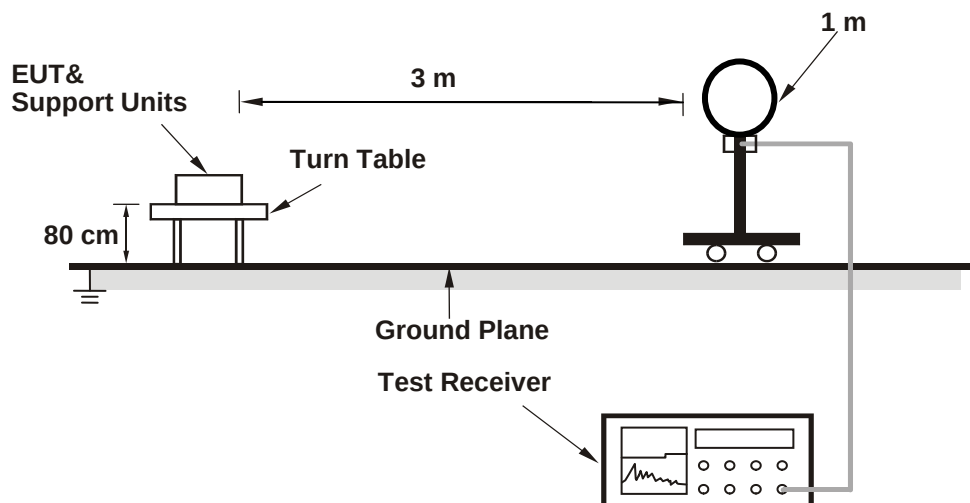
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.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

4.1.4 Deviation from Test Standard

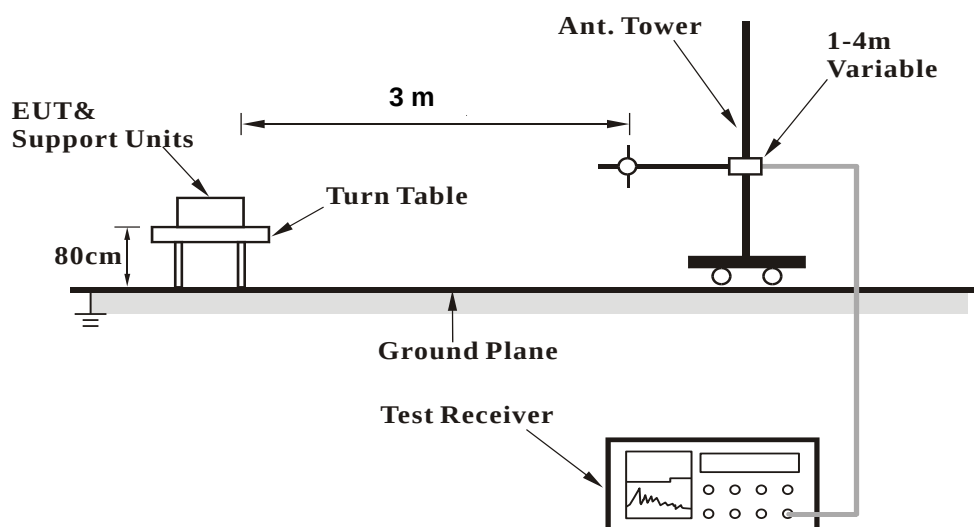
No deviation.

4.1.5 Test Set Up

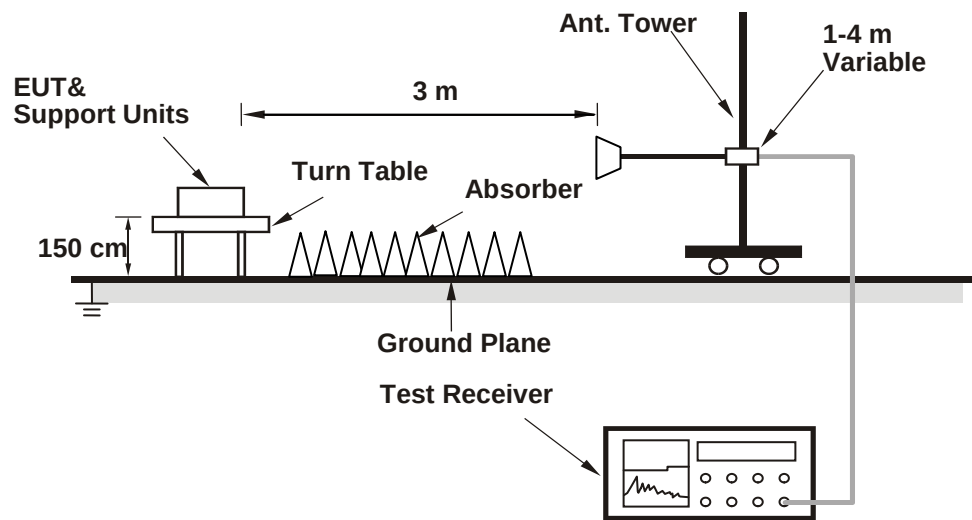
<Radiated Emission below 30 MHz>



<Radiated Emission 30 MHz to 1 GHz>



<Radiated Emission above 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

Above 1 GHz Data:

<LE 4.0>

EUT Test Condition		Measurement Detail	
Channel	Channel 0	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2387.49	41.3	39.59	54	-12.7	31.8	5.4	35.49	244	16	Average
2387.49	51.9	50.19	74	-22.1	31.8	5.4	35.49	244	16	Peak
2402	92.28	90.55			31.8	5.4	35.47	244	16	Average
2402	93.37	91.64			31.8	5.4	35.47	244	16	Peak
4804	47.55	39.46	54	-6.45	33.96	8.25	34.12	193	306	Average
4804	47.12	39.03	74	-26.88	33.96	8.25	34.12	193	306	Peak

Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2384.25	40.8	39.11	54	-13.2	31.78	5.4	35.49	239	0	Average
2384.25	51.97	50.28	74	-22.03	31.78	5.4	35.49	239	0	Peak
2402	102.32	100.59			31.8	5.4	35.47	239	0	Average
2402	103.28	101.55			31.8	5.4	35.47	239	0	Peak
4804	37.25	29.16	54	-16.75	33.96	8.25	34.12	113	149	Average
4804	46.74	38.65	74	-27.26	33.96	8.25	34.12	113	149	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2402 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 19	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2385.78	41.28	39.57	54	-12.72	31.8	5.4	35.49	244	16	Average
2385.78	51.56	49.85	74	-22.44	31.8	5.4	35.49	244	16	Peak
2440	92.24	90.39			31.85	5.46	35.46	244	16	Average
2440	93.26	91.41			31.85	5.46	35.46	244	16	Peak
2490.08	41.99	39.98	54	-12.01	31.9	5.53	35.42	244	16	Average
2490.08	52.78	50.77	74	-21.22	31.9	5.53	35.42	244	16	Peak
4880	47.78	39.59	54	-6.22	33.98	8.27	34.06	130	331	Average
4880	47.35	39.16	74	-26.65	33.98	8.27	34.06	130	331	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2363.1	42.35	40.72	54	-11.65	31.76	5.37	35.5	239	0	Average
2363.1	51.66	50.03	74	-22.34	31.76	5.37	35.5	239	0	Peak
2440	102.82	100.97			31.85	5.46	35.46	239	0	Average
2440	103.78	101.93			31.85	5.46	35.46	239	0	Peak
2491.96	42.08	40.06	54	-11.92	31.9	5.53	35.41	239	0	Average
2491.96	52.36	50.34	74	-21.64	31.9	5.53	35.41	239	0	Peak
4880	47.31	39.12	54	-6.69	33.98	8.27	34.06	126	178	Average
4880	46.98	38.79	74	-27.02	33.98	8.27	34.06	126	178	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2440 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 39	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2480	92.38	90.42			31.88	5.5	35.42	244	16	Average
2480	93.43	91.47			31.88	5.5	35.42	244	16	Peak
2483.84	41.94	39.98	54	-12.06	31.88	5.5	35.42	244	16	Average
2483.84	52.31	50.35	74	-21.69	31.88	5.5	35.42	244	16	Peak
4960	37.16	28.89	54	-16.84	33.99	8.29	34.01	132	196	Average
4960	46.84	38.57	74	-27.16	33.99	8.29	34.01	132	196	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2480	102.84	100.88			31.88	5.5	35.42	239	0	Average
2480	103.78	101.82			31.88	5.5	35.42	239	0	Peak
2489.52	45.34	43.33	54	-8.66	31.9	5.53	35.42	239	0	Average
2489.52	56.66	54.65	74	-17.34	31.9	5.53	35.42	239	0	Peak
4960	36.74	28.47	54	-17.26	33.99	8.29	34.01	161	49	Average
4960	46.43	38.16	74	-27.57	33.99	8.29	34.01	161	49	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2480 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.

<LE 5.0>

EUT Test Condition		Measurement Detail	
Channel	Channel 0	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2382.47	41.16	39.47	54	-12.84	31.78	5.4	35.49	244	16	Average
2382.47	51.68	49.99	74	-22.32	31.78	5.4	35.49	244	16	Peak
2402	97.73	96			31.8	5.4	35.47	244	16	Average
2402	92.81	91.08			31.8	5.4	35.47	244	16	Peak
4804	37.63	29.54	54	-16.37	33.96	8.25	34.12	175	183	Average
4804	47.29	39.2	74	-26.71	33.96	8.25	34.12	175	183	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2363.29	40.91	39.28	54	-13.09	31.76	5.37	35.5	239	0	Average
2363.29	51.86	50.23	74	-22.14	31.76	5.37	35.5	239	0	Peak
2402	101.75	100.02			31.8	5.4	35.47	239	0	Average
2402	102.69	100.96			31.8	5.4	35.47	239	0	Peak
4804	37.34	29.25	54	-16.66	33.96	8.25	34.12	108	129	Average
4804	46.61	38.52	74	-27.39	33.96	8.25	34.12	108	129	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2402 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 19	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2377.16	41.26	39.6	54	-12.74	31.78	5.37	35.49	244	16	Average
2377.16	51.43	49.77	74	-22.57	31.78	5.37	35.49	244	16	Peak
2440	91.68	89.83			31.85	5.46	35.46	244	16	Average
2440	92.75	90.9			31.85	5.46	35.46	244	16	Peak
2487.44	42.03	40.04	54	-11.97	31.88	5.53	35.42	244	16	Average
2487.44	52.63	50.64	74	-21.37	31.88	5.53	35.42	244	16	Peak
4880	37.56	29.37	54	-16.44	33.98	8.27	34.06	185	205	Average
4880	47.15	38.96	74	-26.85	33.98	8.27	34.06	130	331	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2386.14	42.27	40.56	54	-11.73	31.8	5.4	35.49	239	0	Average
2386.14	51.54	49.83	74	-22.46	31.8	5.4	35.49	239	0	Peak
2440	102.32	100.47			31.85	5.46	35.46	239	0	Average
2440	103.26	101.41			31.85	5.46	35.46	239	0	Peak
2493.07	42.23	40.21	54	-11.77	31.9	5.53	35.41	239	0	Average
2493.07	52.29	50.27	74	-21.71	31.9	5.53	35.41	239	0	Peak
4880	37.57	29.38	54	-16.43	33.98	8.27	34.06	127	83	Average
4880	47.05	38.86	74	-26.95	33.98	8.27	34.06	127	83	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2440 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 39	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2480	91.75	89.79			31.88	5.5	35.42	244	16	Average
2480	92.89	90.93			31.88	5.5	35.42	244	16	Peak
2485.76	41.88	39.89	54	-12.12	31.88	5.53	35.42	244	16	Average
2485.76	52.23	50.24	74	-21.77	31.88	5.53	35.42	244	16	Peak
4960	37.26	28.99	54	-16.74	33.99	8.29	34.01	162	121	Average
4960	46.68	38.41	74	-27.32	33.99	8.29	34.01	162	121	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2480	102.35	100.39			31.88	5.5	35.42	239	0	Average
2480	103.31	101.35			31.88	5.5	35.42	239	0	Peak
2487.43	44.27	42.28	54	-9.73	31.88	5.53	35.42	239	0	Average
2487.43	55.46	53.47	74	-18.54	31.88	5.53	35.42	239	0	Peak
4960	36.81	28.54	54	-17.19	33.99	8.29	34.01	156	263	Average
4960	46.52	38.25	74	-27.48	33.99	8.29	34.01	156	263	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2480 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.

9 kHz ~ 30 MHz Data:

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Worst-Case Data:

<LE 4.0>

EUT Test Condition		Measurement Detail	
Channel	Channel 19	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
45.66	25.23	42.14	40	-14.77	14.41	0.9	32.22	162	227	Peak
96.42	19.79	38.8	43.5	-23.71	11.75	1.28	32.04	138	249	Peak
149.34	17.58	39.93	43.5	-25.92	8.4	1.52	32.27	120	134	Peak
425.3	18.58	33.07	46	-27.42	15.28	2.41	32.18	185	146	Peak
669.6	19.25	29.57	46	-26.75	18.76	3.05	32.13	160	321	Peak
915.3	22.63	28.93	46	-23.37	21.54	3.53	31.37	178	149	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
49.17	16.87	33.64	40	-23.13	14.55	0.9	32.22	123	185	Peak
100.74	8.75	27.42	43.5	-34.75	12.31	1.28	32.26	172	216	Peak
223.59	10.64	29.68	46	-35.36	11.51	1.65	32.2	166	304	Peak
475	16.31	29.89	46	-29.69	15.98	2.56	32.12	164	231	Peak
609.4	16.46	27.76	46	-29.54	18.02	2.87	32.19	100	108	Peak
788.6	20.78	29.37	46	-25.22	20.22	3.27	32.08	176	87	Peak

Remarks:

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

<LE 5.0>

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

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
50.25	21.08	37.86	40	-18.92	14.54	0.9	32.22	134	168	Peak
106.14	15.82	34.46	43.5	-27.68	12.34	1.28	32.26	178	145	Peak
184.44	16.33	36.85	43.5	-27.17	10.11	1.61	32.24	190	263	Peak
419.7	15.18	29.73	46	-30.82	15.23	2.41	32.19	186	254	Peak
651.4	18.67	29.35	46	-27.33	18.48	2.99	32.15	111	140	Peak
839	21.58	29.17	46	-24.42	20.88	3.38	31.85	169	326	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
50.79	15.46	32.24	40	-24.54	14.54	0.9	32.22	148	121	Peak
113.43	9.28	28.71	43.5	-34.22	11.54	1.28	32.25	163	85	Peak
251.67	10.08	27.89	46	-35.92	12.35	1.94	32.1	127	114	Peak
418.3	13.57	28.15	46	-32.43	15.21	2.41	32.2	150	316	Peak
708.1	18.81	28.45	46	-27.19	19.35	3.11	32.1	145	131	Peak
801.9	19.27	27.64	46	-26.73	20.36	3.32	32.05	184	105	Peak

Remarks:

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

5 Pictures of Test Arrangements

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

Appendix – Information on 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:

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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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