

Partial FCC Test Report

Report No.: RF180629C33

FCC ID: B94-9560D2WZ

Test Model: TPN-Q213

Received Date: Jun. 29, 2018

Test Date: Jul. 23, 2018 ~ Jul. 25, 2018

Issued Date: Aug. 14, 2018

Applicant: HP Inc.

Address: 3390 East Harmony Road, Fort Collins, Colorado 80528, United States

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

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

Issue No.	Description	Date Issued
RF180629C33	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 ~ Jul. 25, 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 : Gina Liu, **Date:** Aug. 14, 2018
Gina Liu / Specialist

Approved by : Dylan Chiou, **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
15.247(a)(1)(iii)	Number of Hopping Frequency Used	N/A	Refer to Note
15.247(a)(1)(iii)	Dwell Time on Each Channel	N/A	Refer to Note
15.247(a)(1)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	N/A	Refer to Note
15.247(b)	Maximum Peak Output Power	N/A	Refer to Note
---	Occupied Bandwidth Measurement	N/A	Refer to Note
15.205 & 209	Radiated Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -9.88 dB at 2483.72 MHz.
15.247(d)	Band Edge Measurement	N/A	Refer to Note
15.247(d)	Antenna Port Emission	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.TR04 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, $\pi/4$ -DQPSK, 8DPSK
Transfer Rate	1/2/3 Mbps
Operating Frequency	2402 ~ 2480 MHz
Number of Channel	79
Antenna Type	Refer to Note as below
Antenna Connector	N/A
Accessory Device	Refer to Note as below
Data Cable Supplied	Refer to Note as below

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)	Main: -0.3	Main: 1.0	Main: 2.9	Main: 2.9
		Aux Antenna: DQ6LB040500 (WA-P-LBLB-04-050)	Aux: -0.9	Aux: 1.1	Aux: 0.8	Aux: 1.2
	Laptop Mode					
INPAQ	Main Antenna: DQ6LB040500 (WA-P-LBLB-04-050)	Main: -1.0	Main: 2.1	Main: 0.4	Main: -0.8	
	Aux Antenna: DO6LB040500 (WA-P-LBLB-04-050)	Aux: -1.1	Aux: 0	Aux: -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

79 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To		Description
	RE $\geq$ 1G	RE<1G	
-	√	√	-

Where **RE $\geq$ 1G**: Radiated Emission above 1 GHz **RE<1G**: Radiated Emission below 1 GHz

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.
2. "-" 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 Technology	Modulation Type	Packet Type
-	0 to 78	0, 39, 78	FHSS	GFSK	DH5
	0 to 78	0, 39, 78	FHSS	8DPSK	3DH5

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 Technology	Modulation Type	Packet Type
-	0 to 78	78	FHSS	8DPSK	3DH5

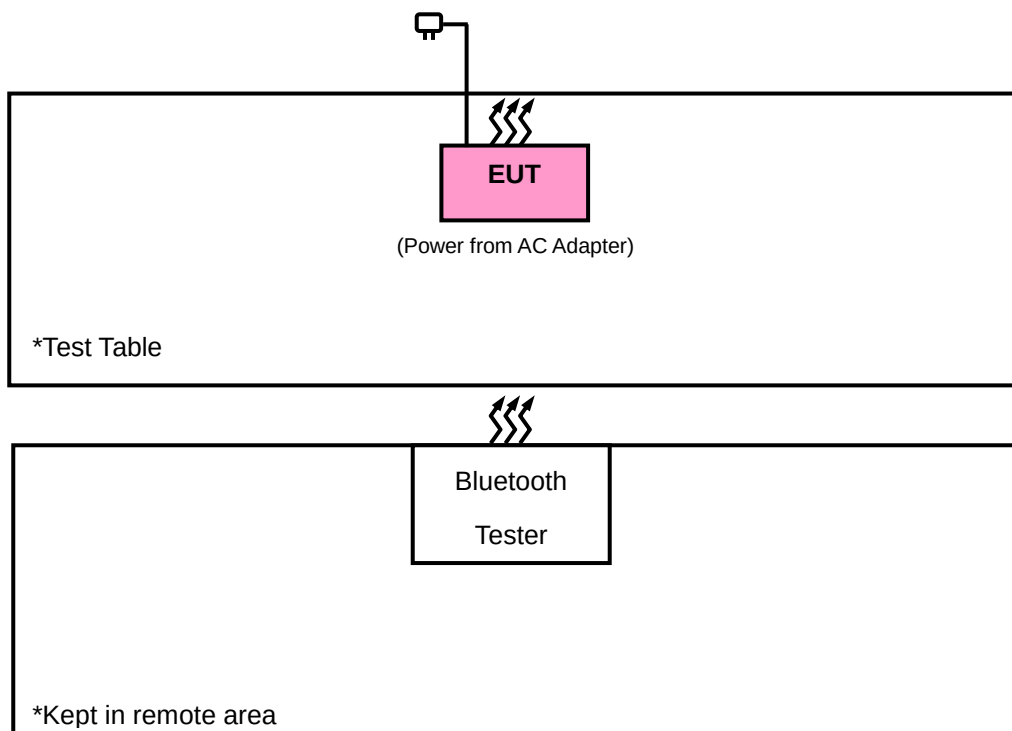
Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE $\geq$ 1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Harry Hsueh
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)

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:

- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = 20 log Emission level (uV/m).
- 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
Bluetooth Tester	CBT	100980	Jun. 28, 2017	Jun. 27, 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-12 0+RFC-SMS-100-S MS-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 12/24 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. Both 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:

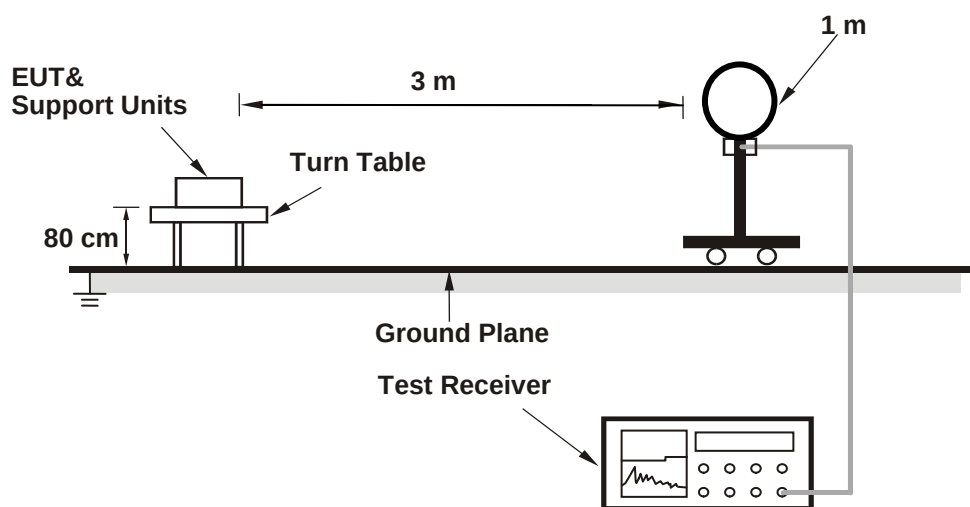
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
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 $\geq 98\%$) 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

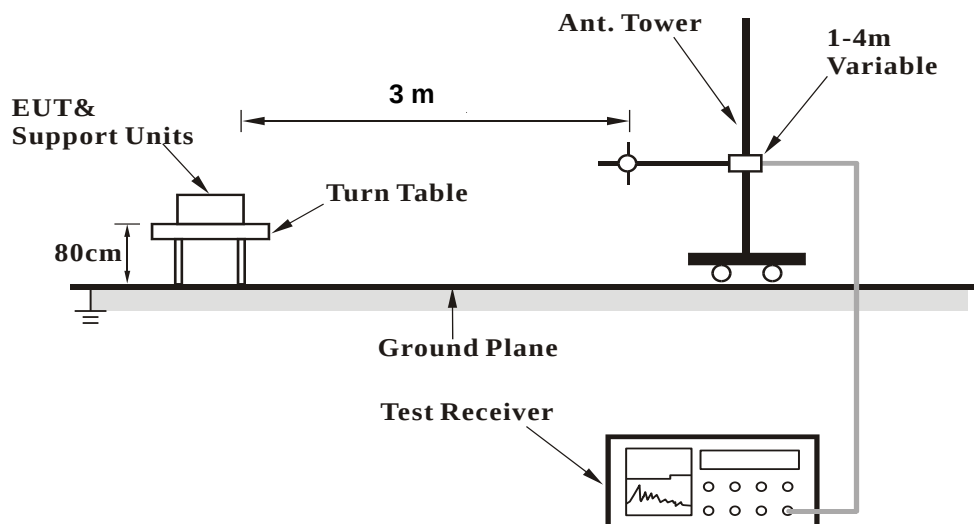
No deviation.

4.1.5 Test Set Up

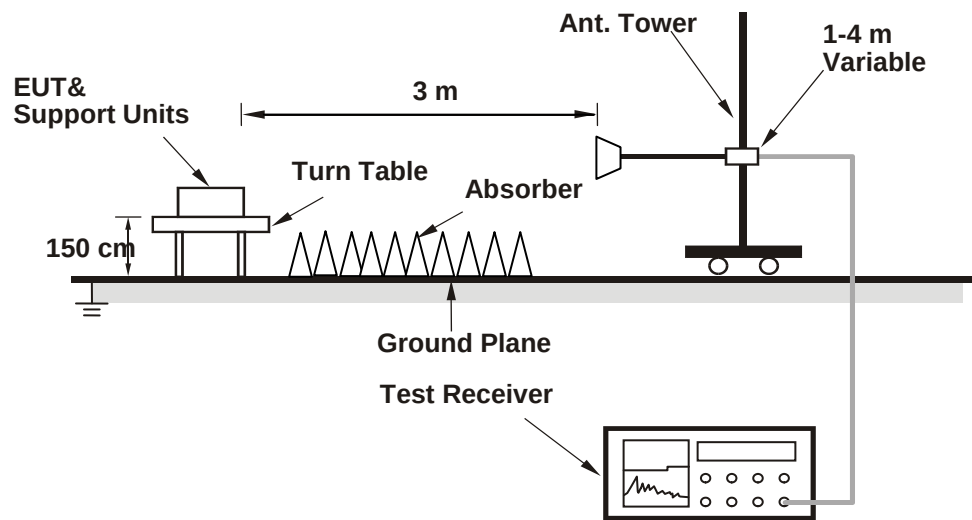
<Radiated Emission below 30 MHz>



<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

Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1 GHz Data: GFSK

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	Harry Hsueh

Antenna 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
2384.43	40.59	38.9	54	-13.41	31.78	5.4	35.49	155	360	Average
2384.43	51.43	49.74	74	-22.57	31.78	5.4	35.49	155	360	Peak
2402	90.43	88.7			31.8	5.4	35.47	155	360	Average
2402	92.63	90.9			31.8	5.4	35.47	155	360	Peak
4804	36.71	28.62	54	-17.29	33.96	8.25	34.12	163	259	Average
4804	45.86	37.77	74	-28.14	33.96	8.25	34.12	163	259	Peak
Antenna 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
2325.21	41.25	39.74	54	-12.75	31.73	5.3	35.52	167	14	Average
2325.21	52.12	50.61	74	-21.88	31.73	5.3	35.52	167	14	Peak
2402	101.32	99.59			31.8	5.4	35.47	167	14	Average
2402	103.41	101.68			31.8	5.4	35.47	167	14	Peak
4804	36.95	28.86	54	-17.05	33.96	8.25	34.12	126	340	Average
4804	46.65	38.56	74	-27.35	33.96	8.25	34.12	126	340	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 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	Harry Hsueh

Antenna 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
2386.24	40.57	38.86	54	-13.43	31.8	5.4	35.49	155	360	Average
2386.24	52	50.29	74	-22	31.8	5.4	35.49	155	360	Peak
2441	90.64	88.77			31.85	5.46	35.44	155	360	Average
2441	92.03	90.16			31.85	5.46	35.44	155	360	Peak
2494.08	41.2	39.18	54	-12.8	31.9	5.53	35.41	155	360	Average
2494.08	51.9	49.88	74	-22.1	31.9	5.53	35.41	155	360	Peak
4882	42.33	39.14	54	-11.67	33.98	8.27	34.06	103	121	Average
4882	47.09	38.9	74	-26.91	33.98	8.27	34.06	103	121	Peak
Antenna 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
2364.18	42.36	40.73	54	-11.64	31.76	5.37	35.5	167	14	Average
2364.18	52.63	51	74	-21.37	31.76	5.37	35.5	167	14	Peak
2441	101.84	99.97			31.85	5.46	35.44	167	14	Average
2441	103.26	101.39			31.85	5.46	35.44	167	14	Peak
2490.24	41.18	39.17	54	-12.82	31.9	5.53	35.42	167	14	Average
2490.24	52.38	50.37	74	-21.62	31.9	5.53	35.42	167	14	Peak
4882	36.62	28.43	54	-17.38	33.98	8.27	34.06	153	286	Average
4882	46.38	38.19	74	-27.62	33.98	8.27	34.06	153	286	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2441 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 78	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	Harry Hsueh

Antenna 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	91.59	89.63			31.88	5.5	35.42	155	360	Average
2480	93.75	91.79			31.88	5.5	35.42	155	360	Peak
2491.64	41.13	39.12	54	-12.87	31.9	5.53	35.42	155	360	Average
2491.64	52.34	50.33	74	-21.66	31.9	5.53	35.42	155	360	Peak
4960	37.56	29.29	54	-16.44	33.99	8.29	34.01	142	119	Average
4960	47.39	39.12	74	-26.61	33.99	8.29	34.01	142	119	Peak
Antenna 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	101.95	99.99			31.88	5.5	35.42	167	14	Average
2480	103.35	101.39			31.88	5.5	35.42	167	14	Peak
2483.6	42.75	40.79	54	-11.25	31.88	5.5	35.42	167	14	Average
2483.6	55.23	53.27	74	-18.77	31.88	5.5	35.42	167	14	Peak
4960	37.23	28.96	54	-16.77	33.99	8.29	34.01	108	224	Average
4960	46.88	38.61	74	-27.12	33.99	8.29	34.01	108	224	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
2. 2480 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

8DPSK

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	Harry Hsueh

Antenna 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
2387.58	40.72	39.01	54	-13.28	31.8	5.4	35.49	155	360	Average
2387.58	52.06	50.35	74	-21.94	31.8	5.4	35.49	155	360	Peak
2402	88.32	86.59			31.8	5.4	35.47	155	360	Average
2402	92.44	90.71			31.8	5.4	35.47	155	360	Peak
4804	43.63	39.54	54	-10.37	33.96	8.25	34.12	166	213	Average
4804	47.25	39.16	74	-26.75	33.96	8.25	34.12	166	213	Peak
Antenna 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
2389.56	41.49	39.78	54	-12.51	31.8	5.4	35.49	167	14	Average
2389.56	52.01	50.3	74	-21.99	31.8	5.4	35.49	167	14	Peak
2402	100.45	98.72			31.8	5.4	35.47	167	14	Average
2402	104.33	102.6			31.8	5.4	35.47	167	14	Peak
4804	36.72	28.63	54	-17.28	33.96	8.25	34.12	112	240	Average
4804	46.42	38.33	74	-27.58	33.96	8.25	34.12	112	240	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 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	Harry Hsueh

Antenna 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
2372.46	40.59	38.93	54	-13.41	31.78	5.37	35.49	107	336	Average
2372.46	51.52	49.86	74	-22.48	31.78	5.37	35.49	107	336	Peak
2441	88.67	86.8			31.85	5.46	35.44	107	336	Average
2441	92.61	90.74			31.85	5.46	35.44	107	336	Peak
2487.88	41.25	39.24	54	-12.75	31.9	5.53	35.42	107	336	Average
2487.88	52.25	50.24	74	-21.75	31.9	5.53	35.42	107	336	Peak
4882	36.88	28.69	54	-17.12	33.98	8.27	34.06	190	16	Average
4882	46.37	38.18	74	-27.63	33.98	8.27	34.06	190	16	Peak
Antenna 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
2364.45	43.37	41.73	54	-10.63	31.76	5.37	35.49	167	14	Average
2364.45	52.03	50.39	74	-21.97	31.76	5.37	35.49	167	14	Peak
2441	100.53	98.66			31.85	5.46	35.44	167	14	Average
2441	104.66	102.79			31.85	5.46	35.44	167	14	Peak
2492.24	41.35	39.33	54	-12.65	31.9	5.53	35.41	167	14	Average
2492.24	52.55	50.53	74	-21.45	31.9	5.53	35.41	167	14	Peak
4882	36.92	28.73	54	-17.08	33.98	8.27	34.06	133	85	Average
4882	46.62	38.43	74	-27.38	33.98	8.27	34.06	133	85	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2441 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 78	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	Harry Hsueh

Antenna 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	88.59	86.63			31.88	5.5	35.42	155	278	Average
2480	92.44	90.48			31.88	5.5	35.42	155	278	Peak
2483.64	41.23	39.27	54	-12.77	31.88	5.5	35.42	155	278	Average
2483.64	52.5	50.54	74	-21.5	31.88	5.5	35.42	155	278	Peak
4960	37.53	29.26	54	-16.47	33.99	8.29	34.01	196	172	Average
4960	47.34	39.07	74	-26.66	33.99	8.29	34.01	196	172	Peak
Antenna 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	99.62	97.66			31.88	5.5	35.42	167	352	Average
2480	103.58	101.62			31.88	5.5	35.42	167	352	Peak
2483.72	44.12	42.16	54	-9.88	31.88	5.5	35.42	167	352	Average
2483.72	56.62	54.66	74	-17.38	31.88	5.5	35.42	167	352	Peak
4960	37.22	28.95	54	-16.78	33.99	8.29	34.01	154	116	Average
4960	46.62	38.35	74	-27.38	33.99	8.29	34.01	154	116	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:

EUT Test Condition		Measurement Detail	
Channel	Channel 78	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

Antenna 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
47.82	27.45	44.26	40	-12.55	14.51	0.9	32.22	141	112	Peak
99.39	20.01	38.71	43.5	-23.49	12.28	1.28	32.26	152	207	Peak
202.8	23.99	43.53	43.5	-19.51	11.1	1.65	32.29	146	263	Peak
433.7	20.39	34.71	46	-25.61	15.36	2.49	32.17	137	118	Peak
645.1	18.9	29.69	46	-27.1	18.37	2.99	32.15	165	285	Peak
827.1	23.79	31.58	46	-22.21	20.74	3.38	31.91	172	203	Peak
Antenna 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
50.52	16.36	33.14	40	-23.64	14.54	0.9	32.22	175	109	Peak
106.68	9.34	28.05	43.5	-34.16	12.26	1.28	32.25	182	261	Peak
240.87	10.55	28.73	46	-35.45	12.1	1.85	32.13	161	145	Peak
431.6	15.63	30.05	46	-30.37	15.34	2.41	32.17	138	276	Peak
673.1	18.95	29.2	46	-27.05	18.82	3.05	32.12	122	151	Peak
870.5	21.91	28.9	46	-24.09	21.24	3.44	31.67	160	86	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:

Linko 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

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.

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