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FCC TEST REPORT

REPORT NO.: RF980505A01G R1

MODEL NO.: BH-105

FCC ID: QTLBH-106

VERSION: Proto: B5.1B, HW: 1.0B, SW: 1.2, MV:0.6

RECEIVED: Oct. 19, 2010

TESTED: Oct. 19 ~ 29, 2010

ISSUED: Mar. 4, 2011

APPLICANT: Nokia(China) Investment Co., LTD.

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ISSUED BY: Bureau Veritas Consumer Products Services (H.K.)
Ltd., Taoyuan Branch

LAB LOCATION: No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang,
Taipei Hsien, 244 Taiwan

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
Original release	N/A	Nov. 1, 2010
RF980505A01G R1	1. Modify the description of change detail in section 3.1 2. Addition of Radiated Emission data (Above 1GHz) in section 4.2.7	Mar. 4, 2011



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1. CERTIFICATION

PRODUCT: Bluetooth Headset
BRAND NAME: NOKIA
MODEL NO.: BH-105
APPLICANT: Nokia(China) Investment Co., LTD.
TESTED: Oct. 19 ~ 29, 2010
TEST SAMPLE: ENGINEERING SAMPLE
STANDARDS: FCC Part 15, Subpart C (Section 15.247),
ANSI C63.4-2003
ANSI C63.10-2009

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 EMC characteristics under the conditions specified in this report.

PREPARED BY : Annie Chang , **DATE:** Mar. 4, 2011
(Annie Chang / Senior Specialist)

APPROVED BY : Ken Liu , **DATE:** Mar. 4, 2011
(Ken Liu / Manager)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
15.207	AC Power Conducted Emission	NA	Refer to NOTE below
15.247(a)(1)(iii)	Number of Hopping Frequency Used Spec.: At least 15 channels	NA	Refer to NOTE below
15.247(a)(1)(iii)	Dwell Time on Each Channel Spec. : Max. 0.4 second within 31.6 second	NA	Refer to NOTE below
15.247(a)(1)	1. Hopping Channel Separation Spec. : Min. 25 kHz or 20 dB bandwidth, whichever is greater (see Note) 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	NA	Refer to NOTE below
15.247(b)	Maximum Peak Output Power Spec.: max. 21dBm (see Note)	NA	Refer to NOTE below
15.247(d)	Transmitter Radiated Emissions Spec.: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -6.6dB at 2390.00MHz
15.247(d)	Band Edge Measurement	NA	Refer to NOTE below
15.203	Antenna Requirement	PASS	No antenna connector is used.

Note: Radiated Emission Test was performed for this addendum. Other testing data refer to original report.

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:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

MEASUREMENT	FREQUENCY	UNCERTAINTY
Radiated emissions	30MHz~1GHz	3.67 dB
	Above 1GHz	2.89 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Bluetooth Headset
MODEL NO.	BH-105
FCC ID	QTLBH-106
POWER SUPPLY	5Vdc from adapter, 3.7Vdc from battery
MODULATION TYPE	GFSK, π /4-DQPSK, 8DPSK
RADIO TECHNOLOGY	FHSS
TRANSFER RATE	1/2/3Mbps
OPERATING FREQUENCY	2402 ~ 2480MHz
NUMBER OF CHANNEL	79
ANTENNA TYPE	IFA antenna with 2.82dBi gain
ANTENNA CONNECTOR	N/A
I/O PORTS	N/A
DATA CABLE	N/A
ASSOCIATED DEVICES	Refer to note 3 below

NOTE:

- This report is a supplementary report or original one (BV CPS report no.: RF980505A01A) issued on June 5, 2009 to verify test result for some electronic and mechanical changes. The main changes are as follows:
 - Remove C1 / C4 / C6 / C7 / C30 / R1/ RV6 / RV7
 The resistor C1 / C4 / C6 / C7 / C30 / R1 are for power filter,
 The original design is to put this component to reduce power filter.
 After testing, we found remove this component not influence test result.
 For components RV6, RV7 are for ESD protection component, no EMI concern.
 - C5 change from 4.7uf to 2.2uf
 The resistor C5 is for power filter,
 The original design is use 4.7uF now change to 2.2uF. After testing, we found this change not influence test result.
 - B2 / B3 / B5 change from 121 bead to 0R
 The bead B2, B3 are for Speaker filter, no EMI concern.
 The bead B5 is for Microphone filter, no EMI concern.

- d) CHIP change from BC63C159A03 (BlueVox2) to BC6130A04-IQQB-R.
 The new chip component is pin to pin compatible, has same function, the mini change is ROM (software) change.
- e) Add second source MIC (Brand: LYS Model: LYS-M4015-BOL577)
 Hardware change
- f) Add second source Speaker (Brand: LYS Model: LYS-R0010-032-011R-L1)
 Hardware change

2. This report is prepared for FCC class II permissive change.

3. The EUT was power supplied from the following power adapter or battery:

Item	Brand	Model	Spec.
Adapter	NOKIA	AC-3U	AC I/P: 100-240V, 50-60Hz, 65mA DC O/P: 5.0V, 350mA Non-shielded DC (1.8m), AC 2-pin
Battery	-	-	3.7Vdc

4. For more detailed features description, please refer to the manufacturer's specifications or User's Manual.

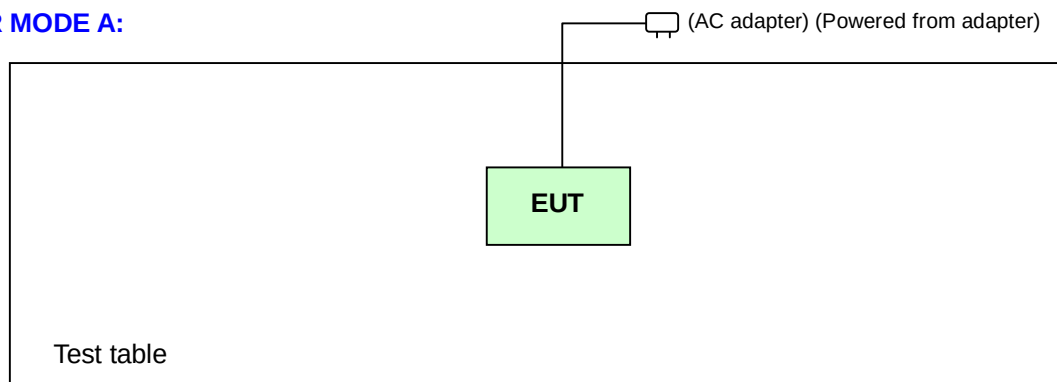
3.2 DESCRIPTION OF TEST MODES

79 channels are provided to this EUT:

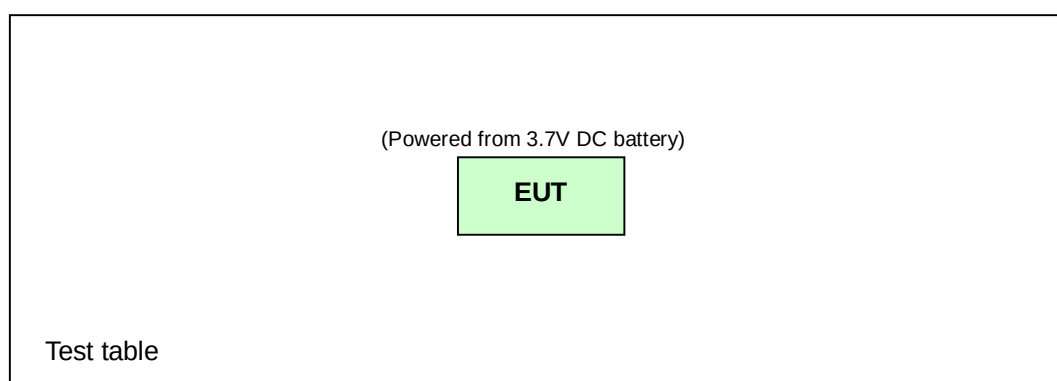
CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	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 CONFIGURATION OF SYSTEM UNDER TEST

FOR MODE A:



FOR MODE B:



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	Applicable to				Description
	PLC	RE<1G	RE ³ 1G	APCM	
A	Note 1	√	√	Note 1	Operating Mode (EUT+adapter)
B	Note 2	√	-	-	Operating Mode (EUT only)

Where **PLC**: Power Line Conducted Emission

RE<1G: Radiated Emission below 1GHz

RE³1G: Radiated Emission above 1GHz

APCM: Antenna Port Conducted Measurement

NOTE: 1. No need to re-tested the test item due to the change should not influence test result.

2. No need to concern of Conducted Emission due to the EUT is powered by battery.

RADIATED EMISSION TEST (ABOVE 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ Axis 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	DATE RATE	AXIS
A	0 to 78	0, 39, 78	FHSS	GFSK	DH5	1	X
A	0 to 78	0, 39, 78	FHSS	8DPSK	DH5	3	X

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, packet types data rate, XYZ axis 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	DATE RATE	AXIS
A	0 to 78	0	FHSS	GFSK	DH5	1	X
B	0 to 78	0	FHSS	GFSK	DH5	1	X

TEST CONDITION:

APPLICABLE TO	EUT CONFIGURE MODE	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE ³ 1G	A	23deg. C, 85% RH, 1011hPa	120Vac, 60Hz	Nick Chen
RE<1G	A	21deg. C, 66% RH, 1021hPa	120Vac, 60Hz	Nick Chen
	B	21deg. C, 66% RH, 1021hPa	3.7Vdc	Nick Chen

3.2.3 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 C63.4- 2003

ANSI C63.10-2009

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

3.2.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together without any necessary accessory or support unit.

4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

N/A

4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

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. As shown in 15.35(b), for frequencies above 1000MHz, 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 20dB under any condition of modulation.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	May 06, 2010	May 05, 2011
HP Preamplifier	8449B	3008A01924	Jul. 14, 2010	Jul. 13, 2011
HP Preamplifier	8449B	3008A01292	Jul. 14, 2010	Jul. 13, 2011
ROHDE & SCHWARZ TEST RECEIVER	ESU26	100005	Jun. 10, 2010	Jun. 09, 2011
Schwarzbeck Antenna	VULB 9168	137	Apr. 29, 2010	Apr. 28, 2011
Schwarzbeck Antenna	VHBA 9123	480	Apr. 29, 2010	Apr. 28, 2011
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	ADT_Radiated_V 7.6.15.9.2	NA	NA	NA
SUHNER RF cable	SF102	CABLE-CH6	Aug. 20, 2010	Aug. 19, 2011
EMCO Horn Antenna	3115	6714	Oct. 26, 2010	Oct. 25, 2011
EMCO Horn Antenna	3115	9312-4192	Apr. 23, 2010	Apr. 22, 2011
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	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 horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Chamber No. 6.
4. The Industry Canada Reference No. IC 7450E-6.
5. The FCC Site Registration No. is 447212.

4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. 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. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

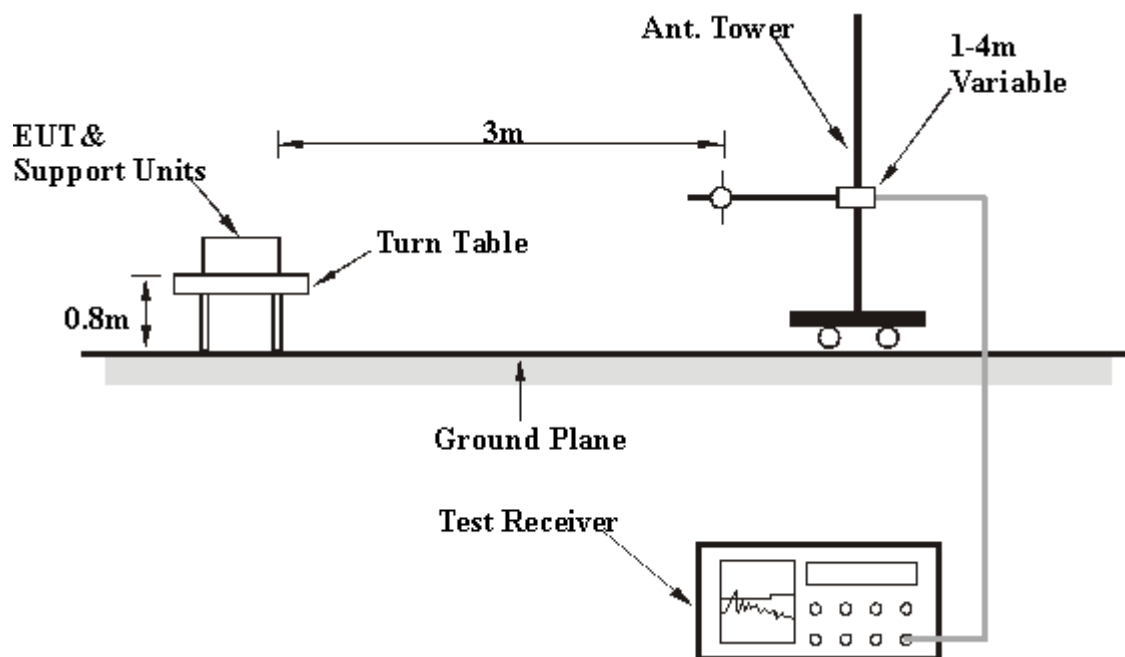
NOTE:

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

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.2.6 EUT OPERATING CONDITIONS

For Mode A:

- a. Connected the EUT with AC adapter placed on testing table.
- b. Set the EUT under transmission/receiving condition continuously at specific channel frequency.

For Mode B:

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



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4.2.7 TEST RESULTS

ABOVE 1GHz DATA: GFSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 85% RH 1011hPa	TESTED BY	Nick Chen
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
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	1602.00	45.8 PK	74.0	-28.2	1.00 H	91	15.74	30.06
2	1602.00	40.1 AV	54.0	-13.9	1.00 H	91	10.06	30.06
3	2390.00	60.0 PK	74.0	-14.1	1.00 H	90	27.48	32.47
4	2390.00	47.4 AV	54.0	-6.6	1.00 H	90	14.96	32.47
5	#2400.00	67.2 PK	89.9	-22.7	1.00 H	90	34.64	32.51
6	#2400.00	37.1 AV	59.8	-22.7	1.00 H	90	4.54	32.51
7	*2402.00	109.9 PK			1.00 H	90	77.33	32.52
8	*2402.00	79.8 AV			1.00 H	90	47.23	32.52
9	4804.00	61.6 PK	74.0	-12.4	1.04 H	90	21.76	39.85
10	4804.00	31.5 AV	54.0	-22.5	1.04 H	90	-8.34	39.85

- 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).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * ”: Fundamental frequency.
 6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB.
 7. Average value = peak reading + $20\log(\text{duty cycle})$.
 8. "#": The radiated frequency is out the restricted band.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 85% RH 1011hPa	TESTED BY	Nick Chen
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
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	1602.00	41.7 PK	74.0	-32.3	1.00 V	16	11.67	30.06
2	1602.00	30.4 AV	54.0	-23.6	1.00 V	16	0.34	30.06
3	2390.00	60.2 PK	74.0	-13.8	1.00 V	84	27.69	32.47
4	2390.00	47.0 AV	54.0	-7.0	1.00 V	84	14.52	32.47
5	#2400.00	59.0 PK	81.7	-22.7	1.00 V	84	26.44	32.51
6	#2400.00	28.9 AV	51.6	-22.7	1.00 V	84	-3.66	32.51
7	*2402.00	101.7 PK			1.00 V	84	69.13	32.52
8	*2402.00	71.6 AV			1.00 V	84	39.03	32.52
9	4804.00	59.2 PK	74.0	-14.8	1.00 V	213	19.32	39.85
10	4804.00	29.1 AV	54.0	-24.9	1.00 V	213	-10.78	39.85

- 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).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.
 6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB.
 7. Average value = peak reading + $20\log(\text{duty cycle})$.
 8. "#": The radiated frequency is out the restricted band.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 85% RH 1011hPa	TESTED BY	Nick Chen
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
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	#1628.00	42.7 PK	89.8	-47.1	1.00 H	90	12.55	30.13
2	#1628.00	34.0 AV	59.7	-25.7	1.00 H	90	3.83	30.13
3	*2441.00	109.8 PK			1.00 H	81	77.10	32.66
4	*2441.00	79.7 AV			1.00 H	81	47.00	32.66
5	4882.00	65.1 PK	74.0	-8.9	1.06 H	101	24.98	40.11
6	4882.00	35.0 AV	54.0	-19.0	1.06 H	101	-5.12	40.11
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
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	#1628.00	41.2 PK	80.7	-39.5	1.00 V	298	11.06	30.13
2	#1628.00	30.2 AV	50.6	-20.3	1.00 V	298	0.09	30.13
3	*2441.00	100.7 PK			1.00 V	86	67.99	32.66
4	*2441.00	70.6 AV			1.00 V	86	37.89	32.66
5	4882.00	60.6 PK	74.0	-13.4	1.00 V	217	20.49	40.11
6	4882.00	30.5 AV	54.0	-23.5	1.00 V	217	-9.61	40.11

- 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).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.
 6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1 \text{ dB}$.
 7. Average value = peak reading + $20\log(\text{duty cycle})$.
 8. "#":The radiated frequency is out the restricted band.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 85% RH 1011hPa	TESTED BY	Nick Chen
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
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	#1654.00	43.6 PK	89.3	-45.8	1.00 H	88	13.35	30.21
2	#1654.00	35.5 AV	59.2	-23.8	1.00 H	88	5.26	30.21
3	*2480.00	109.3 PK			1.00 H	81	76.54	32.80
4	*2480.00	79.2 AV			1.00 H	81	46.44	32.80
5	2483.50	56.5 PK	74.0	-17.5	1.00 H	81	23.73	32.81
6	2483.50	26.4 AV	54.0	-27.6	1.00 H	81	-6.37	32.81
7	4960.00	67.2 PK	74.0	-6.8	1.04 H	101	26.82	40.34
8	4960.00	37.1 AV	54.0	-16.9	1.04 H	101	-3.28	40.34
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
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	#1654.00	42.0 PK	80.5	-38.5	1.01 V	267	11.82	30.21
2	#1654.00	31.8 AV	50.4	-18.7	1.01 V	267	1.55	30.21
3	*2480.00	100.5 PK			1.00 V	83	67.72	32.80
4	*2480.00	70.4 AV			1.00 V	83	37.62	32.80
5	2483.50	47.7 PK	74.0	-26.3	1.00 V	83	14.91	32.81
6	2483.50	17.6 AV	54.0	-36.4	1.00 V	83	-15.19	32.81
7	4960.00	65.7 PK	74.0	-8.3	1.01 V	83	25.35	40.34
8	4960.00	35.6 AV	54.0	-18.4	1.01 V	83	-4.75	40.34

- 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).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.
 6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 5$ per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB.
 7. Average value = peak reading + $20\log(\text{duty cycle})$.
 8. "#": The radiated frequency is out the restricted band.



A D T

8DPSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 85% RH 1011hPa	TESTED BY	Nick Chen
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
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	1602.00	45.9 PK	74.0	-28.1	1.00 H	115	15.83	30.06
2	1602.00	39.5 AV	54.0	-14.5	1.00 H	115	9.48	30.06
3	2390.00	59.4 PK	74.0	-14.6	1.02 H	112	26.94	32.47
4	2390.00	47.4 AV	54.0	-6.6	1.02 H	112	14.93	32.47
5	#2400.00	64.1 PK	90.4	-26.3	1.02 H	112	31.60	32.51
6	#2400.00	34.0 AV	60.3	-26.3	1.02 H	112	1.50	32.51
7	*2402.00	110.4 PK			1.02 H	112	77.89	32.52
8	*2402.00	80.3 AV			1.02 H	112	47.79	32.52
9	4804.00	55.5 PK	74.0	-18.5	1.03 H	97	15.67	39.85
10	4804.00	25.4 AV	54.0	-28.6	1.03 H	97	-14.43	39.85

- 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).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.
 6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 5$ per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB.
 7. Average value = peak reading + $20\log(\text{duty cycle})$.
 8. "#": The radiated frequency is out the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 85% RH 1011hPa	TESTED BY	Nick Chen
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
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	1602.00	43.7 PK	74.0	-30.3	1.00 V	115	13.61	30.06
2	1602.00	35.7 AV	54.0	-18.3	1.00 V	115	5.68	30.06
3	2390.00	59.3 PK	74.0	-14.7	1.00 V	129	26.86	32.47
4	2390.00	47.1 AV	54.0	-6.9	1.00 V	129	14.63	32.47
5	#2400.00	56.8 PK	83.1	-26.3	1.00 V	129	24.27	32.51
6	#2400.00	26.7 AV	53.0	-26.3	1.00 V	129	-5.83	32.51
7	*2402.00	103.1 PK			1.00 V	129	70.56	32.52
8	*2402.00	73.0 AV			1.00 V	129	40.46	32.52
9	4804.00	56.3 PK	74.0	-17.7	1.02 V	104	16.48	39.85
10	4804.00	26.2 AV	54.0	-27.8	1.02 V	104	-13.62	39.85

- 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).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * ”: Fundamental frequency.
 6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 5$ per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB.
 7. Average value = peak reading + $20\log(\text{duty cycle})$.
 8. "#": The radiated frequency is out the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 85% RH 1011hPa	TESTED BY	Nick Chen
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
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	#1628.00	44.4 PK	90.8	-46.4	1.00 H	68	14.25	30.13
2	#1628.00	38.3 AV	60.7	-22.4	1.00 H	68	8.14	30.13
3	*2441.00	110.8 PK			1.00 H	111	78.14	32.66
4	*2441.00	80.7 AV			1.00 H	111	48.04	32.66
5	4882.00	59.9 PK	74.0	-14.1	1.05 H	100	19.78	40.11
6	4882.00	29.8 AV	54.0	-24.2	1.05 H	100	-10.32	40.11
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
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	#1628.00	42.8 PK	79.6	-36.8	1.00 V	121	12.65	30.13
2	#1628.00	33.1 AV	49.5	-16.5	1.00 V	121	2.93	30.13
3	*2441.00	99.6 PK			1.00 V	83	66.96	32.66
4	*2441.00	69.5 AV			1.00 V	83	36.86	32.66
5	4882.00	56.1 PK	74.0	-17.9	1.00 V	88	16.00	40.11
6	4882.00	26.0 AV	54.0	-28.0	1.00 V	88	-14.10	40.11

- 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).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.
 6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 5$ per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB.
 7. Average value = peak reading + $20\log(\text{duty cycle})$.
 8. “#”: The radiated frequency is out the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 85% RH 1011hPa	TESTED BY	Nick Chen
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
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	#1654.00	45.1 PK	89.0	-43.9	1.00 H	88	14.89	30.21
2	#1654.00	38.8 AV	58.9	-20.1	1.00 H	88	8.59	30.21
3	*2480.00	109.0 PK			1.00 H	100	76.22	32.80
4	*2480.00	78.9 AV			1.00 H	100	46.12	32.80
5	2483.50	63.1 PK	74.0	-10.9	1.00 H	100	30.31	32.81
6	2483.50	33.0 AV	54.0	-21.0	1.00 H	100	0.21	32.81
7	4960.00	61.9 PK	74.0	-12.1	1.03 H	83	21.54	40.34
8	4960.00	31.8 AV	54.0	-22.2	1.03 H	83	-8.56	40.34
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
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	#1654.00	42.9 PK	81.3	-38.4	1.00 V	122	12.67	30.21
2	#1654.00	34.7 AV	51.2	-16.5	1.00 V	122	4.44	30.21
3	*2480.00	101.3 PK			1.00 V	82	68.48	32.80
4	*2480.00	71.2 AV			1.00 V	82	38.38	32.80
5	2483.50	55.4 PK	74.0	-18.6	1.00 V	82	22.57	32.81
6	2483.50	25.3 AV	54.0	-28.7	1.00 V	82	-7.53	32.81
7	4960.00	62.0 PK	74.0	-12.0	1.00 V	260	21.67	40.34
8	4960.00	31.9 AV	54.0	-22.1	1.00 V	260	-8.43	40.34

- 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).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.
 6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 5$ per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB.
 7. Average value = peak reading + $20\log(\text{duty cycle})$.
 8. "#": The radiated frequency is out the restricted band.



A D T

BELOW 1GHz WORST-CASE DATA: GFSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	21deg. C, 66% RH 1021hPa	TESTED BY	Nick Chen
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
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	33.11	22.7 QP	40.0	-17.3	1.08 H	49	10.22	12.52
2	755.95	26.1 QP	46.0	-19.9	1.13 H	10	0.48	25.61
3	813.46	26.5 QP	46.0	-19.5	1.07 H	235	0.01	26.48
4	863.21	26.2 QP	46.0	-19.8	1.29 H	16	-1.11	27.35
5	916.06	26.1 QP	46.0	-19.9	1.31 H	256	-2.01	28.13
6	953.37	27.3 QP	46.0	-18.7	1.00 H	10	-1.31	28.62
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
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	36.22	22.8 QP	40.0	-17.2	1.07 V	79	9.75	13.03
2	75.08	20.2 QP	40.0	-19.8	1.12 V	43	9.29	10.89
3	836.78	25.9 QP	46.0	-20.1	1.36 V	37	-1.00	26.90
4	870.98	25.9 QP	46.0	-20.1	1.15 V	10	-1.60	27.47
5	900.51	26.8 QP	46.0	-19.2	1.02 V	49	-1.15	27.92
6	920.72	27.1 QP	46.0	-18.9	1.36 V	10	-1.08	28.19

- 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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	3.7Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	21deg. C, 66% RH 1021hPa	TESTED BY	Nick Chen
TEST MODE	B		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
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	39.33	27.5 QP	40.0	-12.5	1.12 H	10	14.06	13.42
2	801.03	25.4 QP	46.0	-20.7	1.38 H	175	-0.90	26.25
3	830.56	25.3 QP	46.0	-20.7	1.07 H	223	-1.51	26.79
4	852.32	26.4 QP	46.0	-19.6	1.35 H	145	-0.80	27.18
5	889.63	26.6 QP	46.0	-19.4	1.09 H	10	-1.12	27.75
6	934.71	27.1 QP	46.0	-18.9	1.07 H	232	-1.25	28.38
7	940.93	27.4 QP	46.0	-18.6	1.00 H	10	-1.07	28.46
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
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	39.33	22.8 QP	40.0	-17.2	1.15 V	76	9.41	13.42
2	782.37	25.2 QP	46.0	-20.8	1.03 V	262	-0.74	25.98
3	838.33	25.4 QP	46.0	-20.6	1.07 V	10	-1.51	26.93
4	847.66	27.5 QP	46.0	-18.5	1.28 V	331	0.39	27.10
5	888.08	26.3 QP	46.0	-19.7	1.33 V	241	-1.43	27.73
6	936.27	27.2 QP	46.0	-18.8	1.00 V	319	-1.24	28.40

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

6. 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 accredited and approved according to ISO/IEC 17025.

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5.phtml.
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 Lab:

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Hwa Ya EMC/RF/Safety Telecom Lab:

Tel: 886-3-3183232

Fax: 886-3-3185050

Web Site: www.adt.com.tw

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

7. APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

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