

FCC TEST REPORT

REPORT NO.: RF950615L13

MODEL NO.: 1062

RECEIVED: Jun. 16, 2006

TESTED: Jun. 24 ~ Jun. 26, 2006

ISSUED: Jun. 29, 2006

APPLICANT: Microsoft Corporation

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U.S.A.

ISSUED BY: Advance Data Technology Corporation

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NO. 2177-01



0528

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1. CERTIFICATION

PRODUCT : Microsoft® Wireless Laser Mouse 8000

BRAND NAME : Microsoft®

MODEL NO. : 1062

APPLICANT : Microsoft Corporation

TESTED : Jun. 24 ~ Jun. 26, 2006

TEST SAMPLE : ENGINEERING SAMPLE

STANDARDS: FCC Part 15, Subpart C (Section 15.247),
ANSI C63.4-2003

The above equipment (Model: 1062) have been tested by **Advance Data Technology Corporation**, 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 : Jessie Wang , **DATE:** Jun. 29, 2006
Jessie Wang

TECHNICAL ACCEPTANCE : Long Chen , **DATE:** Jun. 29, 2006
Responsible for RF Long Chen

APPROVED BY : Gary Chang , **DATE:** Jun. 29, 2006
Gary Chang / Supervisor

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	NA
15.247(a)(1)(iii)	Number of Hopping Frequency Used Spec.: At least 15 channels	PASS	Meet the requirement of limit.
15.247(a)(1)(iii)	Dwell Time on Each Channel Spec. : Max. 0.4 second within 31.6 second	PASS	Meet the requirement of limit.
15.247(a)(1)	1. Hopping Channel Separation Spec. : Min. 25 kHz or 20 dB bandwidth, whichever is greater (see Note 1) 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	PASS	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power Spec.: max. 30dBm (see Note 1)	PASS	Meet the requirement of limit.
15.247(d)	Transmitter Radiated Emissions Spec.: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -10.35dB at 2389.00MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.

NOTE: If The Frequency Hopping System operating in 2400-2483.5MHz band and the output power less than 125mW. The hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of hopping channel whichever is greater.

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:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz ~ 30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.71 dB
	200MHz ~ 1000MHz	3.73 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

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

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Microsoft® Wireless Laser Mouse 8000
MODEL NO.	1062
FCC ID	C3K1062
POWER SUPPLY	1.2 Vdc from batteries (mouse) 5 Vdc from adapter (charger)
MODULATION TYPE	GFSK
RADIO TECHNOLOGY	FHSS
TRANSFER RATE	172.8kbps
FREQUENCY RANGE	2402 ~ 2480 MHz
NUMBER OF CHANNEL	79
OUTPUT POWER	1.683mW
ANTENNA TYPE	PCB antenna with -2.05dBi gain
DATA CABLE	NA
I/O PORTS	NA

NOTE:

1. Bluetooth technology is used for the EUT.
2. This EUT has no transmission function during the charger mode.
3. The EUT was powered by the following battery:

Rating:	1.2Vdc
----------------	--------

4. The charger uses the following adapter.

Brand:	LEI
Model:	MU12-2050100-A1
Input:	100-240Vac, 50-60Hz, 0.5A
Output:	5Vdc, 1.0A
Power Line:	1.2 m non-shielded cable

5. Pluto Configuration Information

Configuration #:		Comments: EV3 phase Mouse unit for formal report			
Manufacturer	Component type	Part no.	Revision no.	Description	BOM (if known)
Microsoft	Mouse			Model: 1062	
Infineon	Optical Sensor	11300699200	2.0	SINATRA, 52P, PG-OCCN52	11300699200
Sunpluce	Microcontroller	11300707200		SPMC02A, SOP, 20,MASK	11300707200
ULM	Laser	ULM855-G2-TN-SSMDTL	NA	VCSEL (850nm), SMD	11740049200
Microsoft	firmware			BLVELVET_TR2.0_P08_IFXP O4(PLUTO).SDF	
KYE	PCB Assy	20000870201	02	PCBA,PLUTO, MOUSE, SENSOR, BT	20000870201
Express, Happy	PCB	10230559200	07	SPCB,PLUTO BT LM, SNT, TX, 4L, 55.0X41.0,OM05056U01	10230559200
KYE	PCB Assy	20000871201	04	PCBA, PLUTO,BT MOUSE, SWITCH, HANDSOLDER	20000871201
Ta Chien	PCB	10230560200	06	SPCB, PLUTO SW B, 802, TX, S2L, 93.6X50.0, OM05056U01	10230560200
	Case tooling				



Merrich	Top Cover	25021039203		PLUTO TOP COVER, STERLING-4, METALLIC	25021039203
Merrich	Keytop	15130732202		KEYTOP, COOL GREY, METALLIC	15130732202
Merrich	Top Bezel	15102397202		PLUTO TOP BEZEL, PASADENA	15102397202
Merrich	Surround	15190136202		PLUTO SURROUND, STERLING-8, METALLIC	15190136202
Merrich	Side Key Right	15130733203		PLUTO SIDE KEY, RIGHT, STERLING-8, METALLIC	15130733203
Merrich	Side Key Left	15130734203		PLUTO SIDE KEY, LEFT, STERLING-8, METALLIC	15130734203
Merrich	Side Panel Right Side Panel Left	15190145203 15190146203		PLUTO SIDE PANEL, RIGHT,A-11 PLUTO SIDE PANEL,LEFT,A- 11	15190145203 15190146203
Merrich	Bottom Case Power on/off Button	15120589203 15190148203		BOTTOM, PLUTO, BOTTOM, A-11 OTHERS PLAST, PLUTO, ON/OFF, A-11	15120589203 15190148203
Merrich	Docking Top Case	15102401202		PLUTO DOCKING TOP, SEATTLE, GRAY	15102401202
Merrich	Docking Bottom Case	15120590202		BOTTOM, PLUTO DOCKING, BOTTOM, SEATTLE, GRAY	15120590202

Definition of configuration #: The configuration number (#) is used for traceability to a particular BOM (Bill of Materials). It is an easy way to readily identify and convey the construction of a without having to include all of the details of a BOM on every test data sheet. If two sets of test data have test samples with the same configuration # then the construction details of those test samples can readily be determined (as long as the configuration # correctly corresponds to a BOM) and that these two test samples have been constructed identically.

Detailed information on the configuration of the tested samples is required in order to track performance changes across various revisions of the hardware and to document that the samples tested are representative of the final configuration that will be manufactured in production.

Any prototype or pre-production components must be clearly identified in the configuration table.

6. The above EUT information was declared by manufacturer and 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:

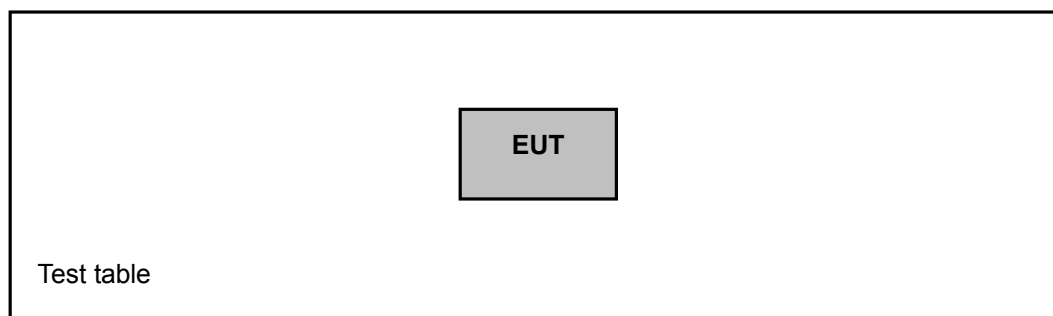
CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	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	2431	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		

There are 4 sets of identical samples tested and presented in the report under Microsoft's request.

No.	Sample Case	Serial Number
1	Plastic	PL-EV3-480-L7-A7
2	Plastic	PL-EV3-483-L8-A2
3	Plastic	PL-EV3-485-L8-A4
4	Metal	PL-EV3-403-L3-A3

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST

(Power from battery)



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	Applicable to				Description
	PLC	RE<1G	RE≥1G	APCM	
A	Note	√	√	-	Series No.: PL-EV3-480-L7-A7
B	Note	√	√	√	Series No.: PL-EV3-483-L8-A2
C	Note	√	√	-	Series No.: PL-EV3-485-L8-A4
D	Note	√	√	-	Series No.: PL-EV3-403-L3-A3

Where **PLC**: Power Line Conducted Emission

RE<1G: Radiated Emission below 1GHz

RE≥1G: Radiated Emission above 1GHz

APCM: Antenna Port Conducted Measurement

NOTE: 1. “-” means no effect.

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

RADIATED EMISSION TEST (BELOW 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, packet types.
- ☒ 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
A	0 to 78	78	FHSS	GFSK	DH1
B	0 to 78	78	FHSS	GFSK	DH1
C	0 to 78	78	FHSS	GFSK	DH1
D	0 to 78	78	FHSS	GFSK	DH1

RADIATED EMISSION TEST (ABOVE 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, packet types.
- ☒ 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
A	0 to 78	0, 39, 78	FHSS	GFSK	DH1
B	0 to 78	0, 39, 78	FHSS	GFSK	DH1
C	0 to 78	0, 39, 78	FHSS	GFSK	DH1
D	0 to 78	0, 39, 78	FHSS	GFSK	DH1

BANDEDGE MEASUREMENT:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.
- ☒ 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
A	0 to 78	0, 78	FHSS	GFSK	DH1
B	0 to 78	0, 78	FHSS	GFSK	DH1
C	0 to 78	0, 78	FHSS	GFSK	DH1
D	0 to 78	0, 78	FHSS	GFSK	DH1

ANTENNA PORT CONDUCTED MEASUREMENT:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.
- ☒ 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
B	0 to 78	0, 39, 78	FHSS	GFSK	DH1

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

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

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.2.4 DESCRIPTION OF SUPPORT UNITS

NA

4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

NA

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 UNTIL
Test Receiver ROHDE & SCHWARZ	ESI7	100033	May. 22, 2007
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100025	Dec. 05, 2006
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	May 31, 2007
HORN Antenna SCHWARZBECK	9120D	9120D-408	Jan. 08, 2007
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170243	Jan. 19, 2007
Preamplifier Agilent	8447D	2944A10633	Nov. 04, 2006
Preamplifier Agilent	8449B	3008A01964	Oct. 30, 2006
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	214377/4	Dec. 13, 2006
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	219272/4	Dec. 13, 2006
Software ADT.	ADT_Radiated_V5.14	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA
Turn Table ADT.	TT100.	TT93021703	NA
Turn Table Controller ADT.	SC100.	SC93021703	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 2.
 3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 4. The VCCI Site Registration No. is R-237.
 5. The IC Site Registration No. is IC4924-3.

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 antenna is a broadband antenna, and its height 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 Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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.

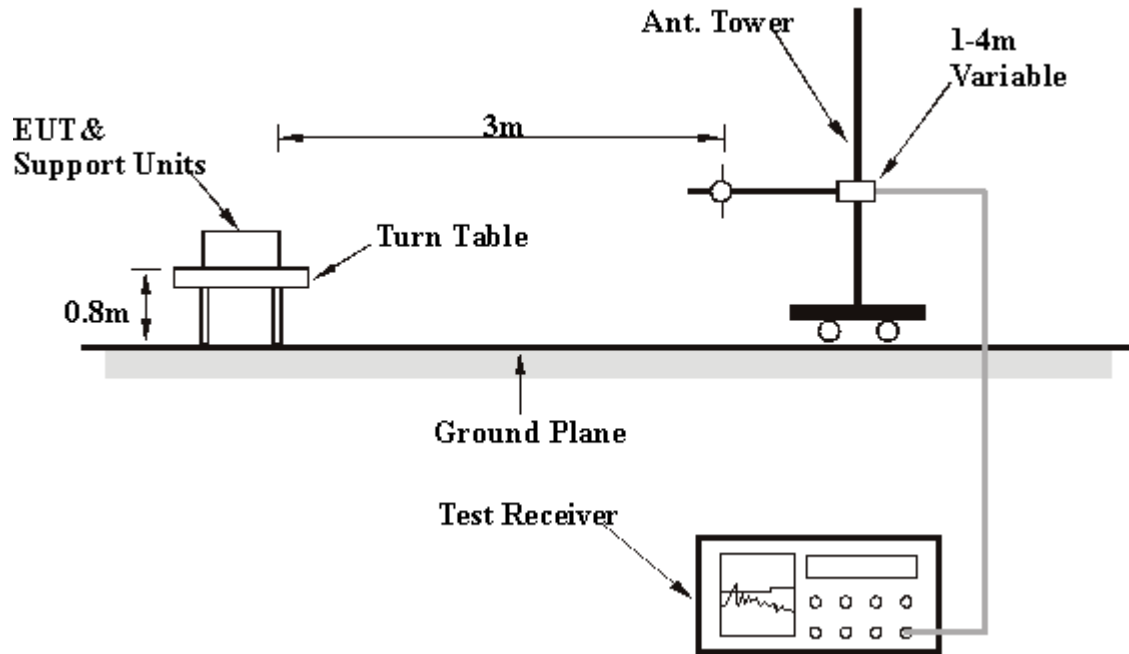
NOTE:

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

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

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

4.2.7 TEST RESULTS

RADIATED WORST CASE DATA: BELOW 1GHz

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	Below 1000MHz
MODULATION TYPE	GFSK	DETECTOR FUNCTION	Quasi-Peak
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
TEST MODE	A	TESTED BY	Morgan Chen

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	41.66	13.68 QP	40.00	-26.32	1.00 H	241	-0.83	14.51
2	807.56	26.87 QP	46.00	-19.13	1.00 H	301	1.02	25.85
3	832.83	29.61 QP	46.00	-16.39	1.00 H	313	3.27	26.34
4	858.10	28.28 QP	46.00	-17.72	1.00 H	241	1.50	26.78
5	898.92	27.50 QP	46.00	-18.50	1.00 H	148	0.25	27.26
6	910.58	28.77 QP	46.00	-17.23	1.00 H	313	1.36	27.41
7	963.07	30.15 QP	54.00	-23.85	1.00 H	268	2.17	27.98

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	41.66	14.90 QP	40.00	-25.10	1.00 V	169	0.38	14.51
2	103.87	15.49 QP	43.50	-28.01	1.00 V	46	4.82	10.66
3	129.14	14.72 QP	43.50	-28.78	1.00 V	82	1.57	13.15
4	842.55	26.40 QP	46.00	-19.60	1.25 V	25	-0.13	26.53
5	852.26	26.39 QP	46.00	-19.61	1.00 V	295	-0.31	26.71
6	900.86	27.07 QP	46.00	-18.93	1.25 V	34	-0.21	27.28
7	935.85	27.34 QP	46.00	-18.66	1.25 V	25	-0.39	27.73
8	955.29	27.73 QP	46.00	-18.27	1.00 V	85	-0.21	27.94

- 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.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	Below 1000MHz
MODULATION TYPE	GFSK	DETECTOR FUNCTION	Quasi-Peak
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
TEST MODE	B	TESTED BY	Morgan Chen

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	727.86	26.62 QP	46.00	-19.38	1.00 H	316	1.79	24.83
2	807.56	27.60 QP	46.00	-18.40	1.00 H	148	1.75	25.85
3	832.83	32.57 QP	46.00	-13.43	1.00 H	46	6.23	26.34
4	858.10	28.02 QP	46.00	-17.98	1.00 H	67	1.25	26.78
5	898.92	27.30 QP	46.00	-18.70	1.00 H	205	0.04	27.26
6	937.80	29.31 QP	46.00	-16.69	1.00 H	265	1.55	27.75

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	51.38	15.17 QP	40.00	-24.83	1.25 V	115	0.39	14.78
2	99.98	15.04 QP	43.50	-28.46	1.00 V	61	4.85	10.19
3	129.14	15.23 QP	43.50	-28.27	1.00 V	250	2.09	13.15
4	547.07	21.44 QP	46.00	-24.56	1.00 V	319	0.41	21.03
5	683.15	23.76 QP	46.00	-22.24	1.25 V	28	-0.06	23.82
6	832.83	27.37 QP	46.00	-18.63	1.25 V	127	1.03	26.34

- 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.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	Below 1000MHz
MODULATION TYPE	GFSK	DETECTOR FUNCTION	Quasi-Peak
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
TEST MODE	C	TESTED BY	Morgan Chen

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	160.24	13.97 QP	43.50	-29.53	1.25 H	25	-0.52	14.49
2	311.86	14.96 QP	46.00	-31.04	1.00 H	91	-0.50	15.46
3	471.26	20.29 QP	46.00	-25.71	1.25 H	52	0.57	19.72
4	727.86	25.86 QP	46.00	-20.14	1.00 H	115	1.04	24.83
5	807.56	27.21 QP	46.00	-18.79	1.00 H	64	1.36	25.85
6	832.83	31.98 QP	46.00	-14.02	1.00 H	223	5.64	26.34

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	51.38	16.22 QP	40.00	-23.78	1.25 V	16	1.44	14.78
2	99.98	16.12 QP	43.50	-27.38	1.00 V	289	5.94	10.19
3	129.14	16.21 QP	43.50	-27.29	1.00 V	55	3.06	13.15
4	751.18	25.19 QP	46.00	-20.81	1.00 V	163	-0.27	25.46
5	823.11	26.46 QP	46.00	-19.54	1.00 V	121	0.31	26.15
6	877.54	26.69 QP	46.00	-19.31	1.00 V	52	-0.32	27.00
7	996.11	28.66 QP	54.00	-25.34	1.00 V	310	0.49	28.17

- 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.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	Below 1000MHz
MODULATION TYPE	GFSK	DETECTOR FUNCTION	Quasi-Peak
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
TEST MODE	D	TESTED BY	Morgan Chen

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	51.38	13.38 QP	40.00	-26.62	1.00 H	10	-1.40	14.78
2	103.87	13.88 QP	43.50	-29.62	1.25 H	190	3.22	10.66
3	206.89	12.35 QP	43.50	-31.15	1.25 H	19	0.78	11.57
4	681.20	24.47 QP	46.00	-21.53	1.00 H	190	0.68	23.80
5	737.58	25.75 QP	46.00	-20.25	1.00 H	37	0.65	25.10
6	807.56	28.27 QP	46.00	-17.73	1.00 H	235	2.42	25.85
7	832.83	29.41 QP	46.00	-16.59	1.00 H	82	3.06	26.34

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	51.38	15.38 QP	40.00	-24.62	1.00 V	28	0.60	14.78
2	103.87	18.92 QP	43.50	-24.58	1.00 V	43	8.25	10.66
3	148.58	13.61 QP	43.50	-29.89	1.00 V	28	-0.47	14.08
4	183.57	12.36 QP	43.50	-31.14	1.00 V	10	-0.33	12.69
5	716.19	23.98 QP	46.00	-22.02	1.25 V	13	-0.51	24.50
6	778.40	22.94 QP	46.00	-23.06	1.00 V	28	-2.65	25.59
7	858.10	26.96 QP	46.00	-19.04	1.00 V	214	0.18	26.78

- 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.

RADIATED WORST CASE DATA: ABOVE 1GHz

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	GFSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
TEST MODE	A	TESTED BY	Morgan Chen

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	2127.00	56.09 PK	79.50	-23.41	1.28 H	13	25.60	30.49
1	2127.00	18.03 AV	41.44	-23.35	1.28 H	13	-12.46	30.49
2	2389.00	51.50 PK	74.00	-22.50	1.08 H	161	20.11	31.39
2	2389.00	13.44 AV	54.00	-40.56	1.08 H	161	-17.95	31.39
3	*2402.00	99.50 PK			1.08 H	161	68.06	31.44
3	*2402.00	61.44 AV			1.08 H	161	30.00	31.44
4	2676.00	59.70 PK	79.50	-19.80	1.00 H	19	27.48	32.22
4	2676.00	21.64 AV	41.44	-19.80	1.00 H	19	-10.58	32.22
5	4804.00	49.75 PK	74.00	-24.25	1.00 H	341	12.57	37.18
5	4804.00	11.69 AV	54.00	-42.31	1.00 H	341	-25.49	37.18

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	2127.00	50.12 PK	73.47	-23.35	1.13 V	321	19.63	30.49
1	2127.00	12.06 AV	35.41	-23.35	1.13 V	321	-18.43	30.49
2	2389.00	45.35 PK	74.00	-28.65	1.38 V	127	13.96	31.39
2	2389.00	7.29 AV	54.00	-46.71	1.38 V	127	-24.10	31.39
3	*2402.00	93.47 PK			1.38 V	127	62.03	31.44
3	*2402.00	55.41 AV			1.38 V	127	23.97	31.44
4	2676.00	56.32 PK	73.47	-17.15	1.08 V	352	24.10	32.22
4	2676.00	18.26 AV	35.41	-17.15	1.08 V	352	-13.96	32.22
5	4804.00	48.15 PK	74.00	-25.85	1.00 V	3	10.97	37.18
5	4804.00	10.09 AV	54.00	-43.91	1.00 V	3	-27.09	37.18

- 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. The DH1 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 2$ per 1.25ms per channel. Therefore, the duty cycle be equal to: $20\log(1.25/100) = -38.06$ dB.
 6. Average value = peak reading $-20\log(\text{duty cycle})$.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	GFSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
TEST MODE	A	TESTED BY	Morgan Chen

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	2166.00	55.22 PK	78.91	-23.69	1.02 H	31	24.59	30.63
1	2166.00	17.16 AV	40.85	-23.69	1.02 H	31	-13.47	30.63
2	*2441.00	98.91 PK			1.06 H	174	67.33	31.58
2	*2441.00	60.85 AV			1.06 H	174	29.27	31.58
3	2715.00	59.61 PK	74.00	-14.39	1.00 H	18	27.30	32.31
3	2715.00	21.55 AV	54.00	-32.45	1.00 H	18	-10.76	32.31
4	4882.00	49.12 PK	74.00	-24.88	1.02 H	352	11.75	37.37
4	4882.00	11.06 AV	54.00	-42.94	1.02 H	352	-26.31	37.37

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	2166.00	50.08 PK	72.55	-22.47	1.09 V	315	19.45	30.63
1	2166.00	12.02 AV	34.49	-22.47	1.09 V	315	-18.61	30.63
2	*2441.00	92.55 PK			1.35 V	133	60.97	31.58
2	*2441.00	54.49 AV			1.35 V	133	22.91	31.58
3	2715.00	56.11 PK	74.00	-17.89	1.09 V	322	23.80	32.31
3	2715.00	18.05 AV	54.00	-35.95	1.09 V	322	-14.26	32.31
4	4882.00	48.56 PK	74.00	-25.44	1.03 V	1	11.19	37.37
4	4882.00	10.50 AV	54.00	-43.50	1.03 V	1	-26.87	37.37

- 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. The DH1 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625×2 per 1.25ms per channel. Therefore, the duty cycle be equal to: $20\log(1.25/100) = -38.06$ dB.
 6. Average value = peak reading $-20\log(\text{duty cycle})$.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	GFSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
TEST MODE	A	TESTED BY	Morgan Chen

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	2206.00	55.11 PK	74.00	-18.89	1.03 H	25	24.33	30.78
1	2206.00	17.05 AV	54.00	-36.95	1.03 H	25	-13.73	30.78
2	*2480.00	98.22 PK			1.00 H	172	66.50	31.72
2	*2480.00	60.16 AV			1.00 H	172	28.44	31.72
3	2493.00	48.22 PK	74.00	-25.78	1.02 H	185	16.46	31.76
3	2493.00	10.16 AV	54.00	-43.84	1.02 H	185	-21.60	31.76
4	2754.00	59.42 PK	74.00	-14.58	1.00 H	12	27.02	32.40
4	2754.00	21.36 AV	54.00	-32.64	1.00 H	12	-11.04	32.40
5	4960.00	49.75 PK	74.00	-24.25	1.03 H	345	12.22	37.53
5	4960.00	11.69 AV	54.00	-42.31	1.03 H	345	-25.84	37.53

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	2206.00	49.22 PK	74.00	-24.78	1.15 V	328	18.44	30.78
1	2206.00	11.16 AV	54.00	-42.84	1.15 V	328	-19.62	30.78
2	*2480.00	92.68 PK			1.22 V	133	60.96	31.72
2	*2480.00	54.62 AV			1.22 V	133	22.90	31.72
3	2493.00	44.28 PK	74.00	-29.72	1.22 V	133	12.52	31.76
3	2493.00	6.22 AV	54.00	-47.78	1.22 V	133	-25.54	31.76
4	2754.00	55.85 PK	74.00	-18.15	1.03 V	345	23.45	32.40
4	2754.00	17.79 AV	54.00	-36.21	1.03 V	345	-14.61	32.40
5	4960.00	48.11 PK	74.00	-25.89	1.00 V	32	10.58	37.53
5	4960.00	10.05 AV	54.00	-43.95	1.00 V	32	-27.48	37.53

- 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. The DH1 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 2$ per 1.25ms per channel. Therefore, the duty cycle be equal to: $20\log(1.25/100) = -38.06$ dB.
 6. Average value = peak reading $-20\log(\text{duty cycle})$.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	GFSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
TEST MODE	B	TESTED BY	Morgan Chen

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	2127.00	55.98 PK	79.25	-23.27	1.22 H	3	25.49	30.49
1	2127.00	17.92 AV	41.19	-23.27	1.22 H	3	-12.57	30.49
2	2389.00	51.32 PK	74.00	-22.68	1.07 H	159	19.93	31.39
2	2389.00	13.26 AV	54.00	-40.74	1.07 H	159	-18.13	31.39
3	*2402.00	99.25 PK			1.06 H	162	67.81	31.44
3	*2402.00	61.19 AV			1.06 H	162	29.75	31.44
4	2676.00	59.58 PK	79.25	-19.67	1.00 H	17	27.36	32.22
4	2676.00	21.52 AV	41.19	-19.67	1.00 H	17	-10.70	32.22
5	4804.00	49.65 PK	74.00	-24.35	1.00 H	329	12.47	37.18
5	4804.00	11.59 AV	54.00	-42.41	1.00 H	329	-25.59	37.18

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	2127.00	50.03 PK	73.12	-23.09	1.12 V	352	19.54	30.49
1	2127.00	11.97 AV	35.06	-23.09	1.12 V	352	-18.52	30.49
2	2389.00	45.19 PK	74.00	-28.81	1.28 V	133	13.80	31.39
2	2389.00	7.13 AV	54.00	-46.87	1.28 V	133	-24.26	31.39
3	*2402.00	93.12 PK			1.33 V	133	61.68	31.44
3	*2402.00	55.06 AV			1.33 V	133	23.62	31.44
4	2676.00	56.18 PK	73.12	-16.94	1.09 V	342	23.96	32.22
4	2676.00	18.12 AV	35.06	-16.94	1.09 V	342	-14.10	32.22
5	4804.00	48.68 PK	74.00	-25.32	1.00 V	31	11.50	37.18
5	4804.00	10.62 AV	54.00	-43.38	1.00 V	31	-26.56	37.18

- 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. The DH1 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625×2 per 1.25ms per channel. Therefore, the duty cycle be equal to: $20\log(1.25/100) = -38.06$ dB.
 6. Average value = peak reading $-20\log(\text{duty cycle})$.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	GFSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
TEST MODE	B	TESTED BY	Morgan Chen

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	2166.00	55.13 PK	78.93	-23.80	1.03 H	29	24.50	30.63
1	2166.00	17.07 AV	40.87	-23.80	1.03 H	29	-13.56	30.63
2	*2441.00	98.93 PK			1.05 H	181	67.35	31.58
2	*2441.00	60.87 AV			1.05 H	181	29.29	31.58
3	2715.00	59.73 PK	74.00	-14.27	1.00 H	11	27.42	32.31
3	2715.00	21.67 AV	54.00	-32.33	1.00 H	11	-10.64	32.31
4	4882.00	49.22 PK	74.00	-24.78	1.03 H	345	11.85	37.37
4	4882.00	11.16 AV	54.00	-42.84	1.03 H	345	-26.21	37.37

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	2166.00	49.89 PK	72.63	-22.74	1.05 V	305	19.26	30.63
1	2166.00	11.83 AV	34.57	-22.74	1.05 V	305	-18.80	30.63
2	*2441.00	92.63 PK			1.19 V	138	61.05	31.58
2	*2441.00	54.57 AV			1.19 V	138	22.99	31.58
3	2715.00	56.01 PK	74.00	-17.99	1.05 V	318	23.70	32.31
3	2715.00	17.95 AV	54.00	-36.05	1.05 V	318	-14.36	32.31
4	4882.00	48.49 PK	74.00	-25.51	1.01 V	3	11.12	37.37
4	4882.00	10.43 AV	54.00	-43.57	1.01 V	3	-26.94	37.37

- 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. The DH1 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625×2 per 1.25ms per channel. Therefore, the duty cycle be equal to: $20\log(1.25/100) = -38.06$ dB.
 6. Average value = peak reading $-20\log(\text{duty cycle})$.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	GFSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
TEST MODE	B	TESTED BY	Morgan Chen

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	2206.00	54.89 PK	74.00	-19.11	1.08 H	355	24.11	30.78
1	2206.00	16.83 AV	54.00	-37.17	1.08 H	355	-13.95	30.78
2	*2480.00	98.45 PK			1.05 H	162	66.73	31.72
2	*2480.00	60.39 AV			1.05 H	162	28.67	31.72
3	2493.00	48.65 PK	74.00	-25.35	1.05 H	168	16.89	31.76
3	2493.00	10.59 AV	54.00	-43.41	1.05 H	168	21.17	31.76
4	2754.00	59.38 PK	74.00	-14.62	1.00 H	8	26.98	32.40
4	2754.00	21.32 AV	54.00	-32.68	1.00 H	8	-11.08	32.40
5	4960.00	49.11 PK	74.00	-24.89	1.01 H	325	11.58	37.53
5	4960.00	11.05 AV	54.00	-42.95	1.01 H	325	-26.48	37.53

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	2206.00	49.11 PK	74.00	-24.89	1.18 V	312	18.33	30.78
1	2206.00	11.05 AV	54.00	-42.95	1.18 V	312	-19.73	30.78
2	*2480.00	92.55 PK			1.19 V	128	60.83	31.72
2	*2480.00	54.49 AV			1.19 V	128	22.77	31.72
3	2493.00	44.11 PK	74.00	-29.89	1.08 V	315	12.35	31.76
3	2493.00	6.05 AV	54.00	-47.95	1.08 V	315	-25.71	31.76
4	2754.00	55.63 PK	74.00	-18.37	1.08 V	325	23.23	32.40
4	2754.00	17.57 AV	54.00	-36.43	1.08 V	325	-14.83	32.40
5	4960.00	48.02 PK	74.00	-25.98	1.08 V	18	10.49	37.53
5	4960.00	9.96 AV	54.00	-44.04	1.08 V	18	-27.57	37.53

- 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. The DH1 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 2$ per 1.25ms per channel. Therefore, the duty cycle be equal to: $20\log(1.25/100) = -38.06$ dB.
 6. Average value = peak reading $-20\log(\text{duty cycle})$.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	GFSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
TEST MODE	C	TESTED BY	Morgan Chen

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	2115.00	55.33 PK	79.85	-24.52	1.19 H	8	24.88	30.45
1	2115.00	17.27 AV	41.79	-24.52	1.19 H	8	-13.18	30.45
2	2389.00	51.89 PK	74.00	-22.11	1.23 H	8	20.50	31.39
2	2389.00	13.83 AV	54.00	-40.17	1.23 H	8	-17.56	31.39
3	*2402.00	99.85 PK			1.08 H	0	68.41	31.44
3	*2402.00	61.79 AV			1.08 H	0	30.35	31.44
4	2688.00	60.55 PK	79.85	-19.30	1.00 H	165	28.30	32.25
4	2688.00	22.49 AV	41.79	-19.30	1.00 H	165	-9.76	32.25
5	4804.00	50.12 PK	74.00	-23.88	1.00 H	325	12.94	37.18
5	4804.00	12.06 AV	54.00	-41.94	1.00 H	325	-25.12	37.18

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	2115.00	50.02 PK	73.85	-23.83	1.18 V	325	19.57	30.45
1	2115.00	11.96 AV	35.79	-23.83	1.18 V	325	-18.49	30.45
2	2389.00	45.68 PK	74.00	-28.32	1.28 V	133	14.29	31.39
2	2389.00	7.62 AV	54.00	-46.38	1.28 V	133	-23.77	31.39
3	*2402.00	93.85 PK			1.26 V	132	62.41	31.44
3	*2402.00	55.79 AV			1.26 V	132	24.35	31.44
4	2688.00	56.11 PK	73.85	-17.74	1.06 V	341	23.86	32.25
4	2688.00	18.05 AV	35.79	-17.74	1.06 V	341	-14.20	32.25
5	4804.00	48.02 PK	74.00	-25.98	1.00 V	8	10.84	37.18
5	4804.00	9.96 AV	54.00	-44.04	1.00 V	8	-27.22	37.18

- 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. The DH1 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 2$ per 1.25ms per channel. Therefore, the duty cycle be equal to: $20\log(1.25/100) = -38.06$ dB.
 6. Average value = peak reading $-20\log(\text{duty cycle})$.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	GFSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
TEST MODE	C	TESTED BY	Morgan Chen

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	2154.00	55.18 PK	78.85	-23.67	1.05 H	28	24.59	30.59
1	2154.00	17.12 AV	40.79	-23.67	1.05 H	28	-13.47	30.59
2	*2441.00	98.85 PK			1.05 H	168	67.27	31.58
2	*2441.00	60.79 AV			1.05 H	168	29.21	31.58
3	2703.00	59.52 PK	74.00	-14.48	1.00 H	12	27.23	32.29
3	2703.00	21.46 AV	54.00	-32.54	1.00 H	12	-10.83	32.29
4	4882.00	49.35 PK	74.00	-24.65	1.08 H	344	11.98	37.37
4	4882.00	11.29 AV	54.00	-42.71	1.08 H	344	-26.08	37.37

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	2154.00	50.12 PK	72.48	-22.36	1.05 V	302	19.53	30.59
1	2154.00	12.06 AV	34.42	-22.36	1.05 V	302	-18.53	30.59
2	*2441.00	92.48 PK			1.33 V	125	60.90	31.58
2	*2441.00	54.42 AV			1.33 V	125	22.84	31.58
3	2703.00	55.98 PK	74.00	-18.02	1.05 V	318	23.69	32.29
3	2703.00	17.92 AV	54.00	-36.08	1.05 V	318	-14.37	32.29
4	4882.00	48.75 PK	74.00	-25.25	1.08 V	3	11.38	37.37
4	4882.00	10.69 AV	54.00	-43.31	1.08 V	3	-26.68	37.37

- 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. The DH1 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625×2 per 1.25ms per channel. Therefore, the duty cycle be equal to: $20\log(1.25/100) = -38.06$ dB.
 6. Average value = peak reading $-20\log(\text{duty cycle})$.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	GFSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
TEST MODE	C	TESTED BY	Morgan Chen

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	2194.00	55.65 PK	78.65	-23.00	1.08 H	11	24.91	30.74
1	2194.00	17.59 AV	40.59	-23.36	1.08 H	11	-13.15	30.74
2	*2480.00	98.65 PK			1.00 H	169	66.93	31.72
2	*2480.00	60.59 AV			1.00 H	169	28.87	31.72
3	2493.00	48.65 PK	74.00	-25.35	1.06 H	199	16.89	31.76
3	2493.00	10.59 AV	54.00	-43.41	1.06 H	199	-21.17	31.76
4	2742.00	59.88 PK	74.00	-14.12	1.00 H	352	27.51	32.37
4	2742.00	21.82 AV	54.00	-32.18	1.00 H	352	-10.55	32.37
5	4960.00	49.81 PK	74.00	-24.19	1.08 H	311	12.28	37.53
5	4960.00	11.75 AV	54.00	-42.25	1.08 H	311	-25.78	37.53

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	2194.00	49.11 PK	72.89	-23.78	1.13 V	312	18.37	30.74
1	2194.00	11.05 AV	34.83	-23.78	1.13 V	312	-19.69	30.74
2	*2480.00	92.89 PK			1.19 V	139	61.17	31.72
2	*2480.00	54.83 AV			1.19 V	139	23.11	31.72
3	2493.00	44.55 PK	74.00	-29.45	1.09 V	145	12.79	31.76
3	2493.00	6.49 AV	54.00	-47.51	1.09 V	145	-25.27	31.76
4	2742.00	56.02 PK	74.00	-17.98	1.18 V	142	23.65	32.37
4	2742.00	17.96 AV	54.00	-36.04	1.18 V	142	-14.41	32.37
5	4960.00	48.05 PK	74.00	-25.95	1.00 V	28	10.52	37.53
5	4960.00	9.99 AV	54.00	-43.95	1.00 V	28	-27.54	37.53

- 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. The DH1 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 2$ per 1.25ms per channel. Therefore, the duty cycle be equal to: $20\log(1.25/100) = -38.06$ dB.
 6. Average value = peak reading $-20\log(\text{duty cycle})$.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	GFSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
TEST MODE	D	TESTED BY	Morgan Chen

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	2135.00	54.22 PK	78.31	-24.09	1.22 H	33	23.70	30.52
1	2135.00	16.16 AV	40.25	-24.09	1.22 H	33	-14.36	30.52
2	2389.00	51.88 PK	74.00	-22.12	1.06 H	155	20.49	31.39
2	2389.00	13.82 AV	54.00	-40.18	1.06 H	155	-17.57	31.39
3	*2402.00	98.31 PK			1.35 H	131	66.87	31.44
3	*2402.00	60.25 AV			1.35 H	131	28.81	31.44
4	2670.00	57.33 PK	78.31	-20.98	1.00 H	158	25.12	32.20
4	2670.00	19.27 AV	40.25	-20.98	1.00 H	158	-12.93	32.20
5	4804.00	47.33 PK	74.00	-26.67	1.00 H	352	10.15	37.18
5	4804.00	9.27 AV	54.00	-44.73	1.00 H	352	-27.91	37.18

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	2135.00	49.88 PK	72.55	-22.67	1.09 V	305	19.36	30.52
1	2135.00	11.82 AV	34.49	-22.67	1.09 V	305	-18.70	30.52
2	2389.00	45.58 PK	74.00	-28.42	1.27 V	313	14.19	31.39
2	2389.00	7.52 AV	54.00	-46.48	1.27 V	313	-23.87	31.39
3	*2402.00	92.55 PK			1.06 V	341	61.11	31.44
3	*2402.00	54.49 AV			1.06 V	341	23.05	31.44
4	2676.00	56.11 PK	72.55	-16.44	1.06 V	341	23.89	32.22
4	2676.00	18.05 AV	34.49	-16.44	1.06 V	341	-14.17	32.22
5	4804.00	48.04 PK	74.00	-25.96	1.03 V	3	10.86	37.18
5	4804.00	9.98 AV	54.00	-44.02	1.03 V	3	-27.20	37.18

- 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. The DH1 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 2$ per 1.25ms per channel. Therefore, the duty cycle be equal to: $20\log(1.25/100) = -38.06$ dB.
 6. Average value = peak reading $-20\log(\text{duty cycle})$.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	GFSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
TEST MODE	D	TESTED BY	Morgan Chen

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	2173.00	55.02 PK	75.79	-20.77	1.05 H	6	24.36	30.66
1	2173.00	16.96 AV	37.73	-20.77	1.05 H	6	-13.70	30.66
2	*2441.00	95.79 PK			1.03 H	355	64.21	31.58
2	*2441.00	57.73 AV			1.03 H	355	26.15	31.58
3	2709.00	59.55 PK	74.00	-14.45	1.00 H	2	27.25	32.30
3	2709.00	21.49 AV	54.00	-32.51	1.00 H	2	-10.81	32.30
4	4882.00	49.01 PK	74.00	-24.99	1.08 H	345	11.64	37.37
4	4882.00	10.95 AV	54.00	-43.05	1.08 H	345	-26.42	37.37

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	2173.00	49.85 PK	70.13	-20.28	1.05 V	302	19.19	30.66
1	2173.00	11.79 AV	32.07	-20.28	1.05 V	302	-18.87	30.66
2	*2441.00	90.13 PK			1.22 V	136	58.55	31.58
2	*2441.00	52.07 AV			1.22 V	136	20.49	31.58
3	2709.00	55.33 PK	74.00	-18.67	1.03 V	312	23.03	32.30
3	2709.00	17.27 AV	54.00	-36.73	1.03 V	312	-15.03	32.30
4	4882.00	48.11 PK	74.00	-25.89	1.08 V	6	10.74	37.37
4	4882.00	10.05 AV	54.00	-43.95	1.08 V	6	-27.32	37.37

- 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. The DH1 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625×2 per 1.25ms per channel. Therefore, the duty cycle be equal to: $20\log(1.25/100) = -38.06$ dB.
 6. Average value = peak reading $-20\log(\text{duty cycle})$.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	GFSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
TEST MODE	D	TESTED BY	Morgan Chen

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	2212.00	54.98 PK	74.00	-19.02	1.08 H	11	24.18	30.80
1	2212.00	16.92 AV	54.00	-37.08	1.08 H	11	-13.88	30.80
2	*2480.00	95.52 PK			1.05 H	163	63.80	31.72
2	*2480.00	57.46 AV			1.05 H	163	25.74	31.72
3	2493.00	48.89 PK	74.00	-25.11	1.01 H	178	17.13	31.76
3	2493.00	10.83 AV	54.00	-43.17	1.01 H	178	-20.93	31.76
4	2748.00	58.65 PK	74.00	-15.35	1.00 H	8	26.26	32.39
4	2748.00	20.59 AV	54.00	-33.41	1.00 H	8	-11.80	32.39
5	4960.00	49.16 PK	74.00	-24.84	1.08 H	312	11.63	37.53
5	4960.00	11.10 AV	54.00	-42.90	1.08 H	312	-26.43	37.53

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	2212.00	48.65 PK	74.00	-25.35	1.09 V	325	17.85	30.80
1	2212.00	10.59 AV	54.00	-43.41	1.09 V	325	-20.21	30.80
2	*2480.00	90.05 PK			1.19 V	135	58.33	31.72
2	*2480.00	51.99 AV			1.19 V	135	20.27	31.72
3	2493.00	44.19 PK	74.00	-29.81	1.32 V	338	12.43	31.76
3	2493.00	6.13 AV	54.00	-47.87	1.32 V	338	-25.63	31.76
4	2748.00	55.98 PK	74.00	-18.02	1.08 V	329	23.59	32.39
4	2748.00	17.92 AV	54.00	-36.08	1.08 V	329	-14.47	32.39
5	4960.00	48.02 PK	74.00	-25.98	1.00 V	45	10.49	37.53
5	4960.00	9.96 AV	54.00	-44.04	1.00 V	45	-27.57	37.53

- 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. The DH1 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 2$ per 1.25ms per channel. Therefore, the duty cycle be equal to: $20\log(1.25/100) = -38.06$ dB.
 6. Average value = peak reading $-20\log(\text{duty cycle})$.

4.3 NUMBER OF HOPPING FREQUENCY USED

4.3.1 LIMIT OF HOPPING FREQUENCY USED

At least 15 channels frequencies, and should be equally spaced.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSEK30	100049	Aug. 14, 2006

NOTE: The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

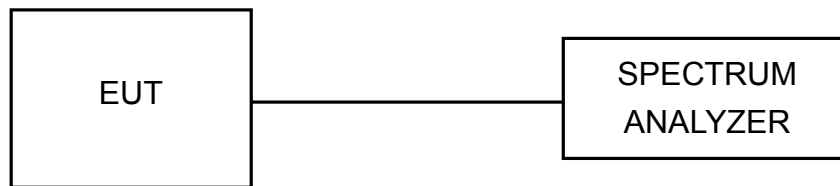
4.3.3 TEST PROCEDURES

- Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
- Set the SA on View mode and then plot the result on SA screen.
- Repeat above procedures until all frequencies measured were complete.

4.3.4 DEVIATION FROM TEST STANDARD

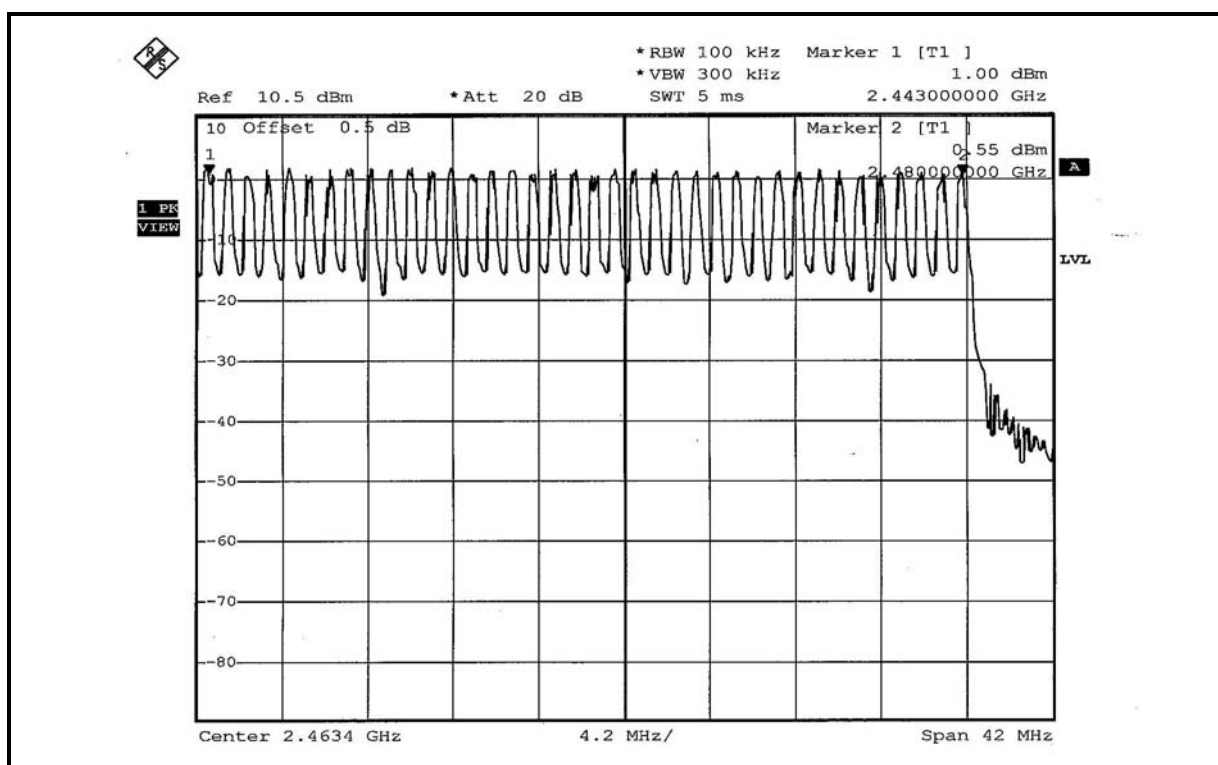
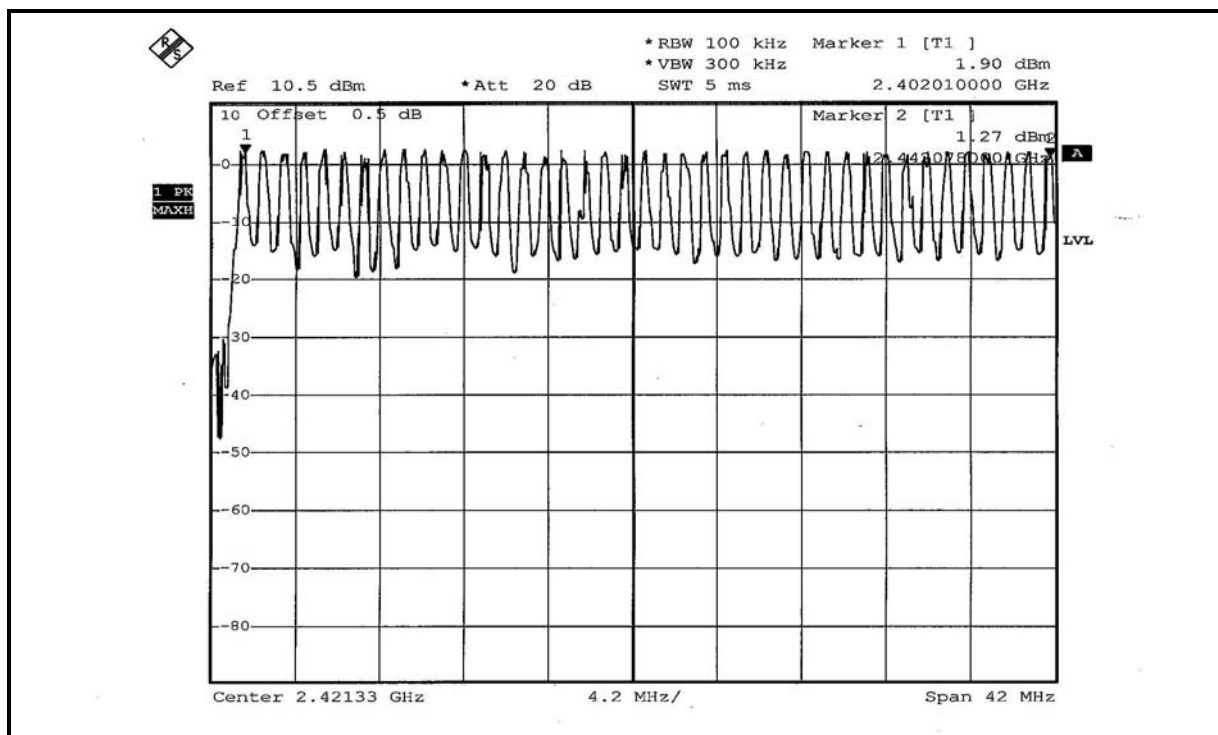
No deviation.

4.3.5 TEST SETUP



4.3.6 TEST RESULTS

There are 79 hopping frequencies in the hopping mode. Please refer to next two pages for the test result. On the plots, it shows that the hopping frequencies are equally spaced.



4.4 DWELL TIME ON EACH CHANNEL

4.4.1 LIMIT OF DWELL TIME USED

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSEK30	100049	Aug. 14, 2006

NOTES: The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

4.4.3 TEST PROCEDURES

- Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- Repeat above procedures until all different time-slot modes have been completed.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP

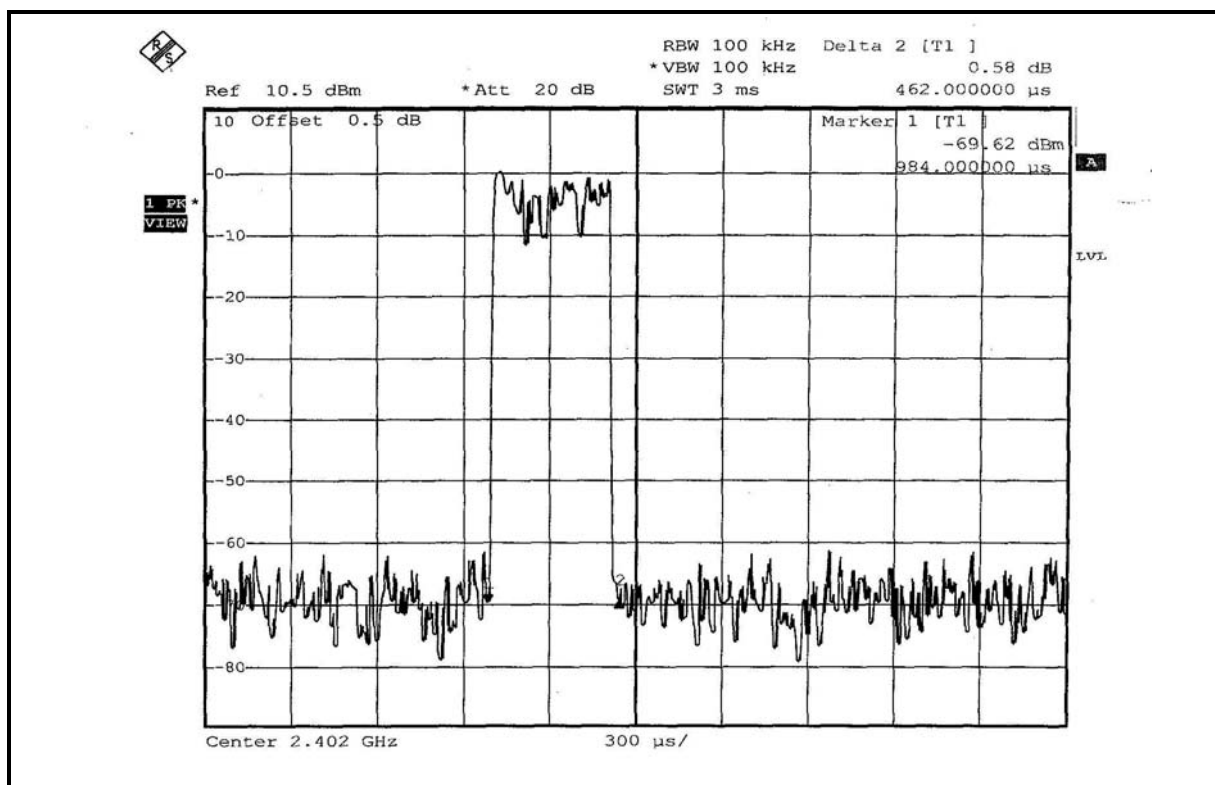
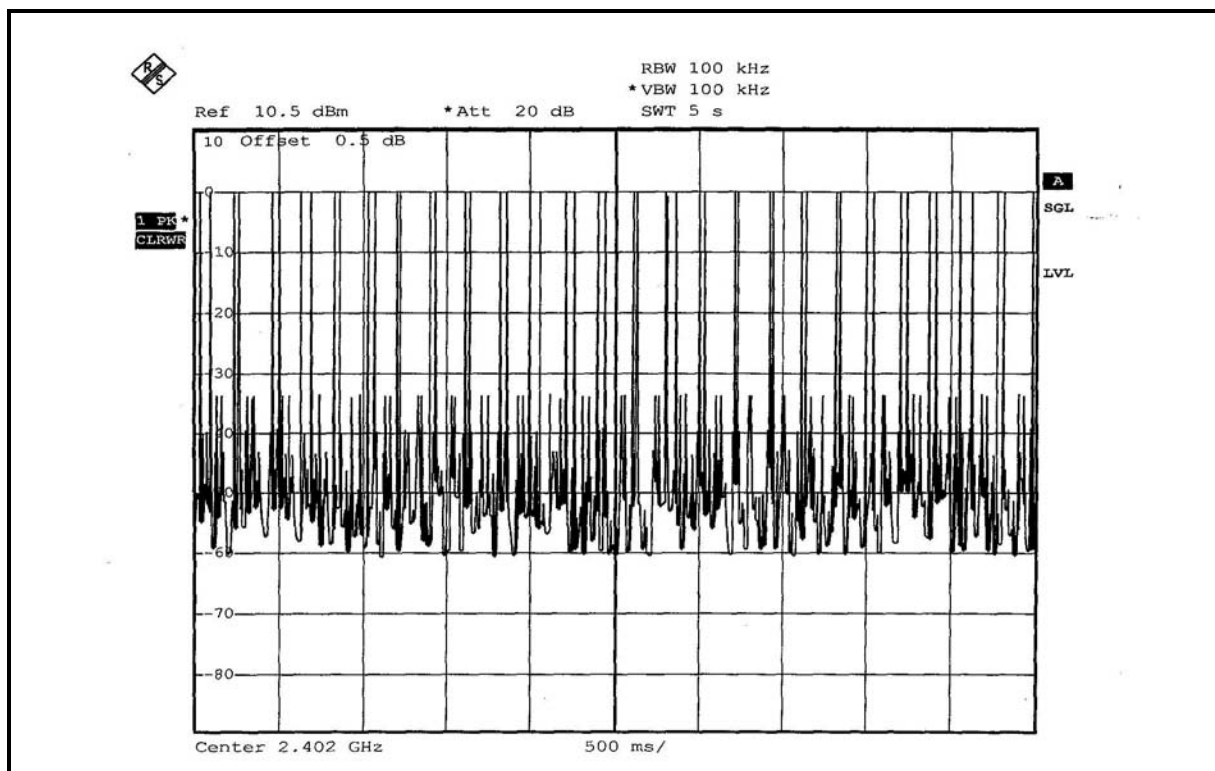


4.4.6 TEST RESULTS

Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	51 (times / 5 sec) *6.32=322.32 times	0.462	148.912	400

NOTE: Test plots of the transmitting time slot are shown on next 3 pages.

DH1



4.5 CHANNEL BANDWIDTH

4.5.1 LIMITS OF CHANNEL BANDWIDTH

For frequency hopping system operating in the 2400-2483.5MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, the 20dB bandwidth of hopping channel shall be a minimum limit for the hopping channel separation.

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSEK30	100049	Aug. 14, 2006

NOTE: The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

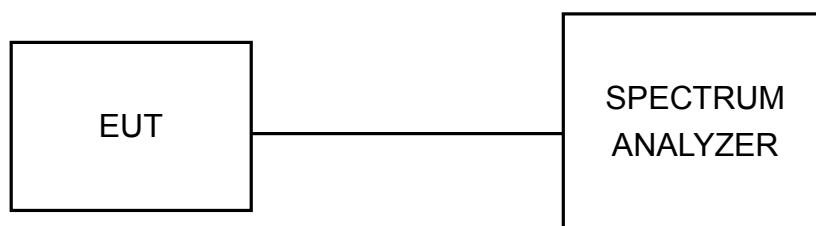
4.5.3 TEST PROCEDURE

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- Repeat above procedures until all frequencies measured were complete.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation.

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITION

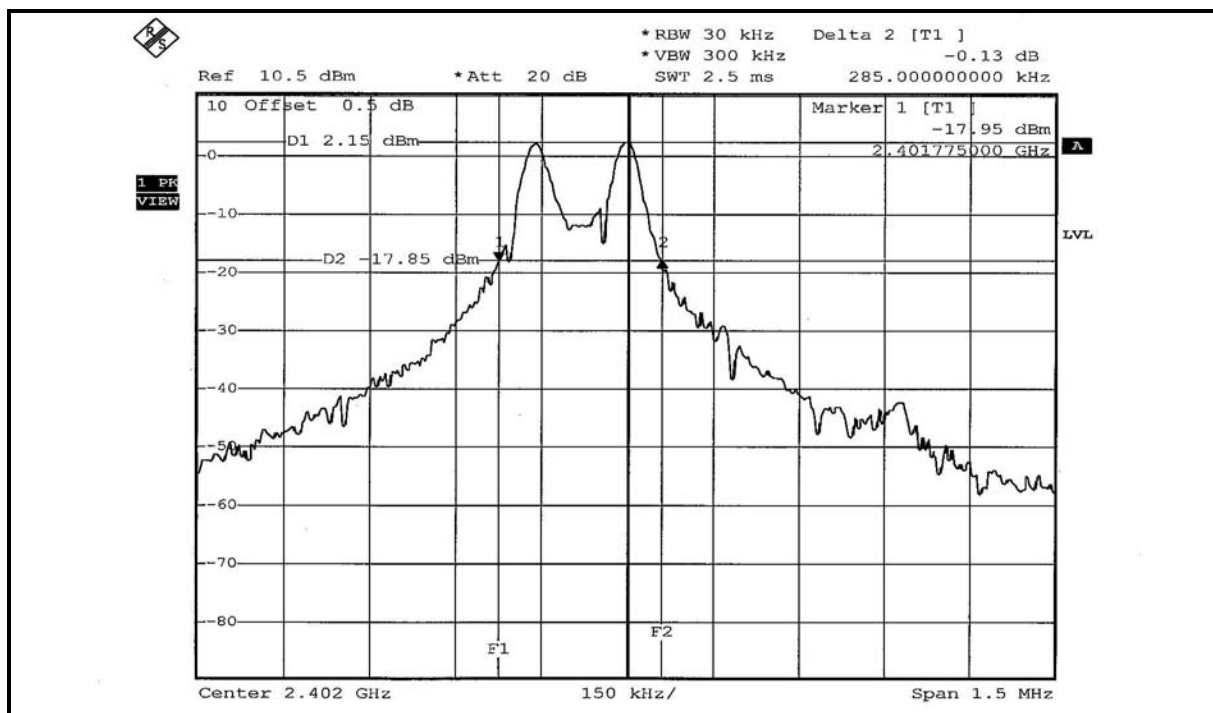
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.5.7 TEST RESULTS

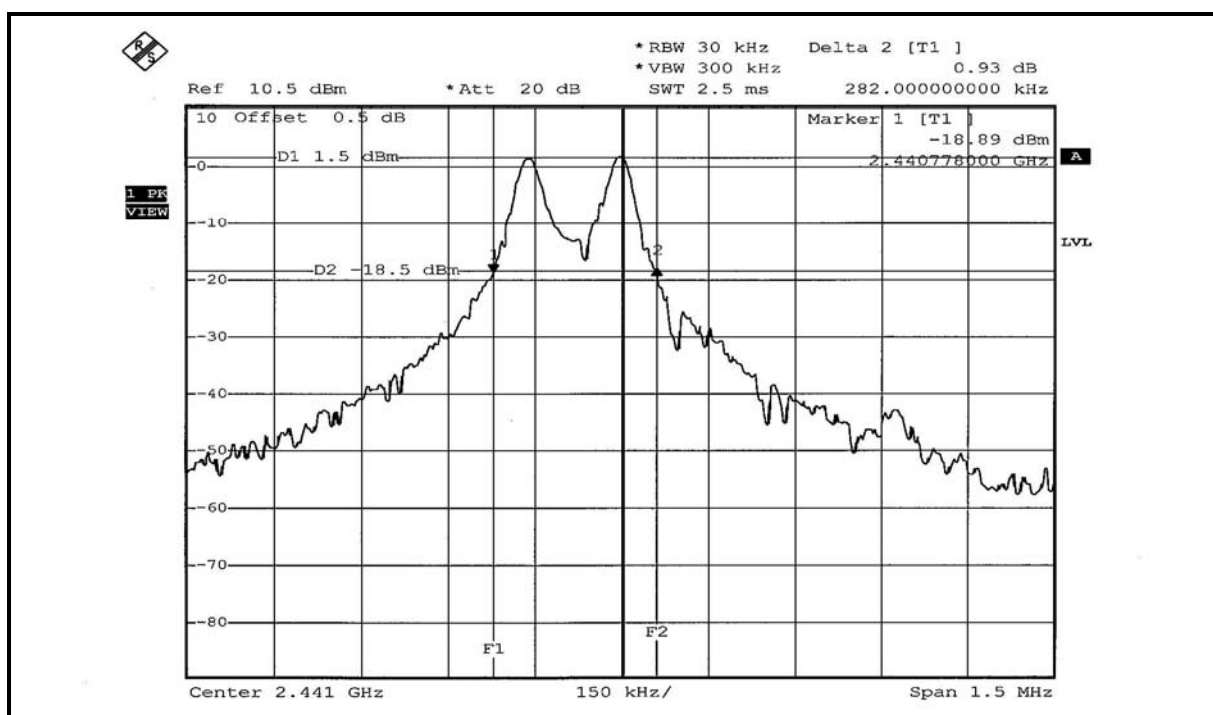
MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Match Tsui

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	0.285
39	2441	0.282
78	2480	0.282

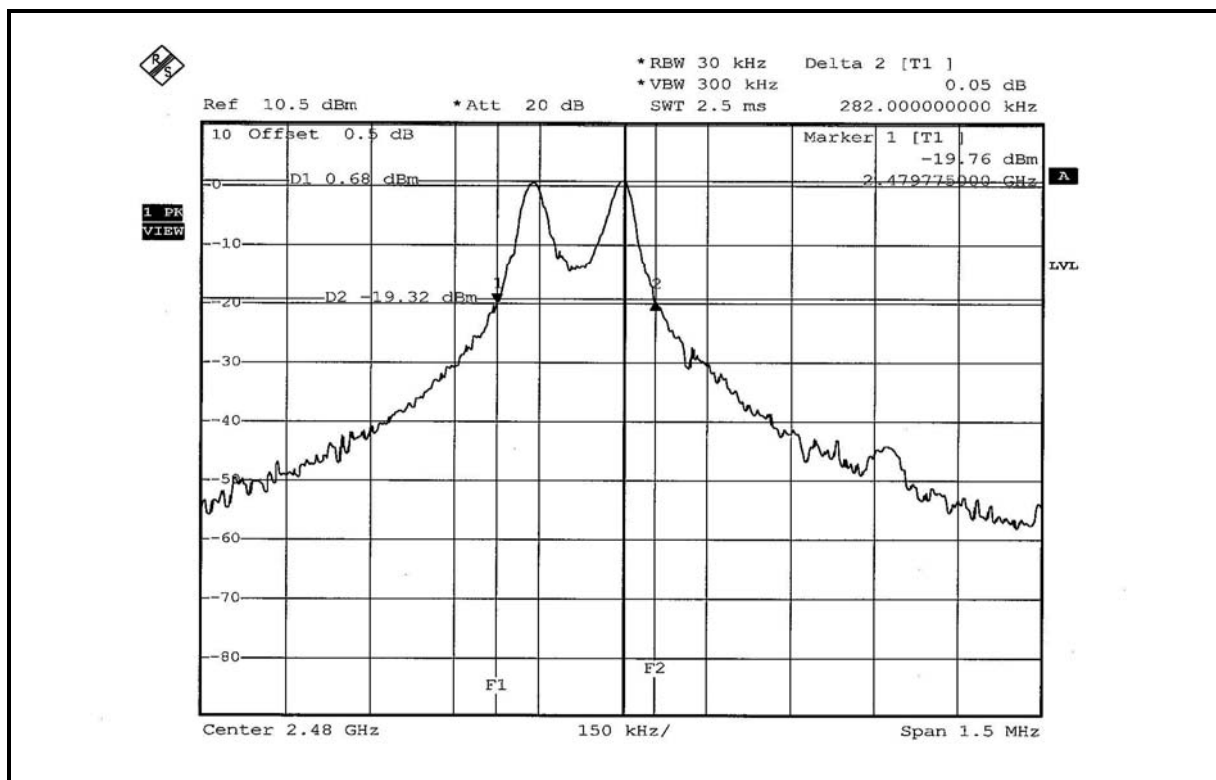
CH 0



CH 39



CH 78



4.6 HOPPING CHANNEL SEPARATION

4.6.1 LIMIT OF HOPPING CHANNEL SEPARATION

At least 25kHz or 20dB hopping channel bandwidth (whichever is greater).

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSEK30	100049	Aug. 14, 2006

NOTES: The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

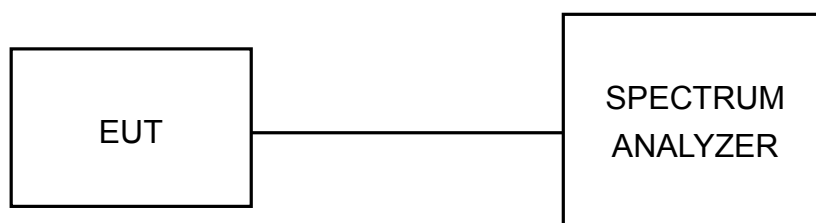
4.6.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the MaxHold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation.

4.6.5 TEST SETUP



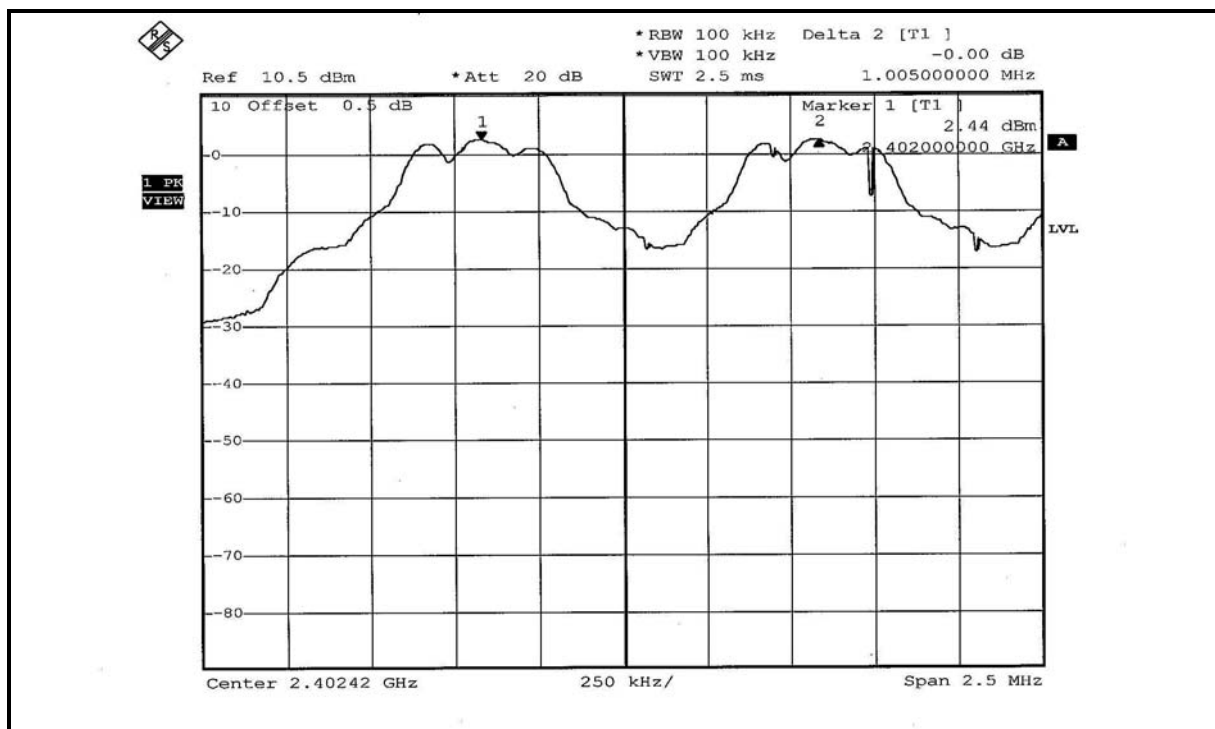
4.6.6 TEST RESULTS

MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Match Tsui

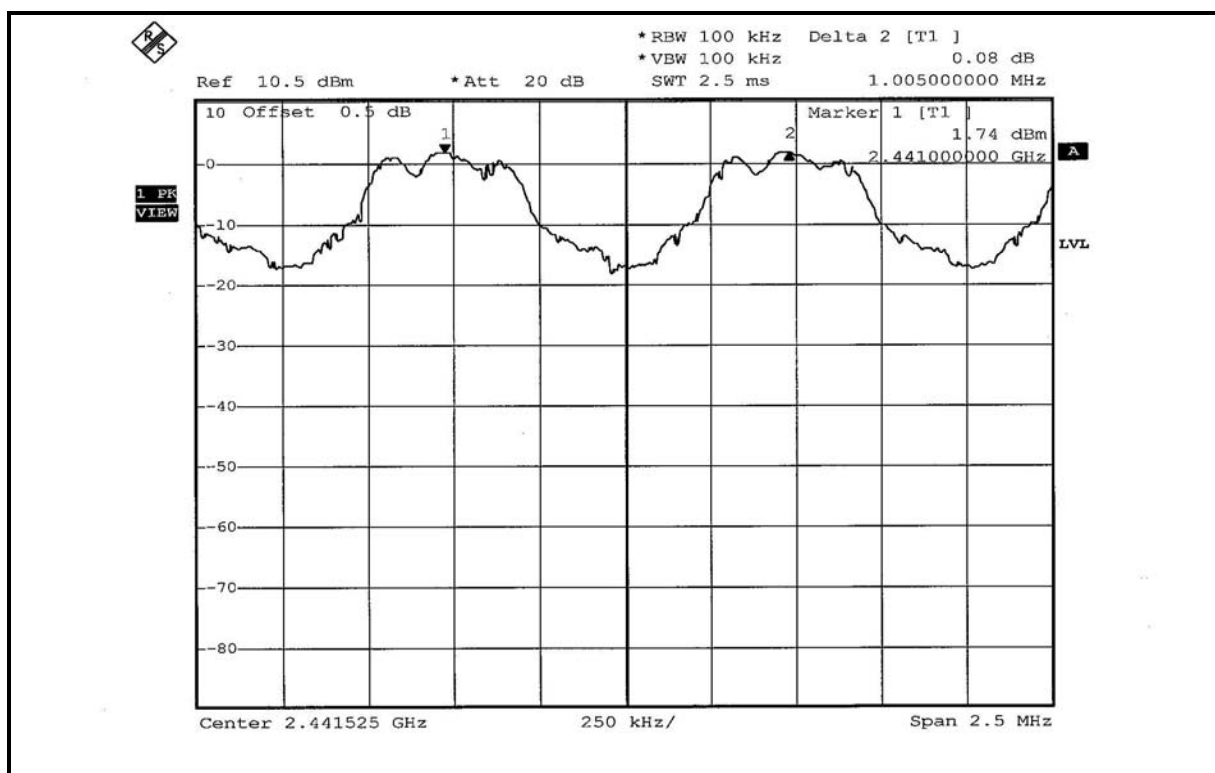
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHZ)	MINIMUM LIMIT (MHZ)	PASS / FAIL
0	2402	1.005	0.285	PASS
39	2441	1.005	0.282	PASS
78	2480	1.005	0.282	PASS

NOTE: The minimum limit is 20dB bandwidth. Test results please refer to next two pages.

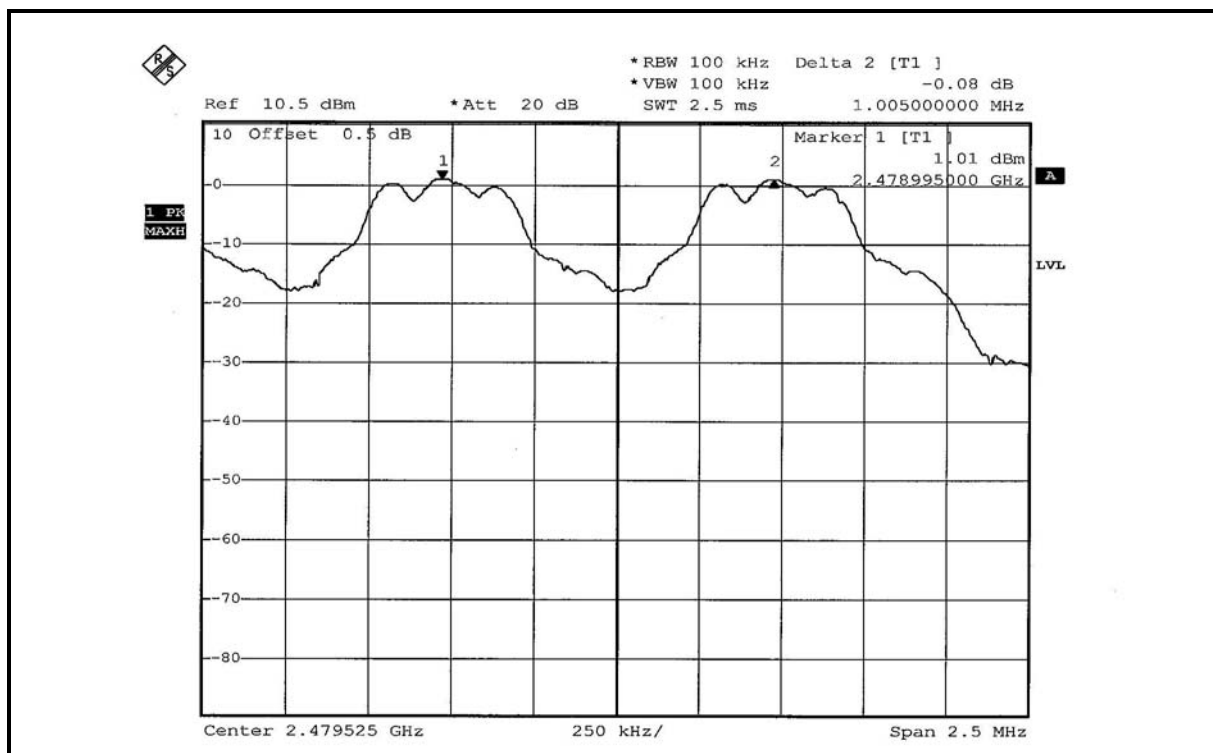
CH 0



CH 39



CH 78



4.7 MAXIMUM PEAK OUTPUT POWER

4.7.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

4.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSEK30	100049	Aug. 14, 2006

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

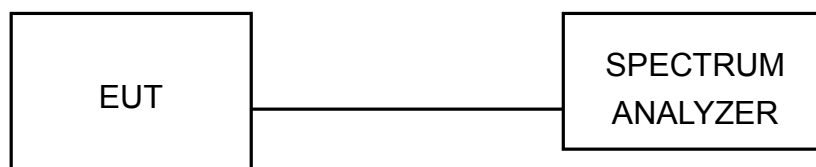
4.7.3 TEST PROCEDURES

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3MHz RBW and 10 MHz VBW.
- Measure the captured power within the band and recording the plot.
- Repeat above procedures until all frequencies required were complete.

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP



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

4.7.6 EUT OPERATING CONDITION

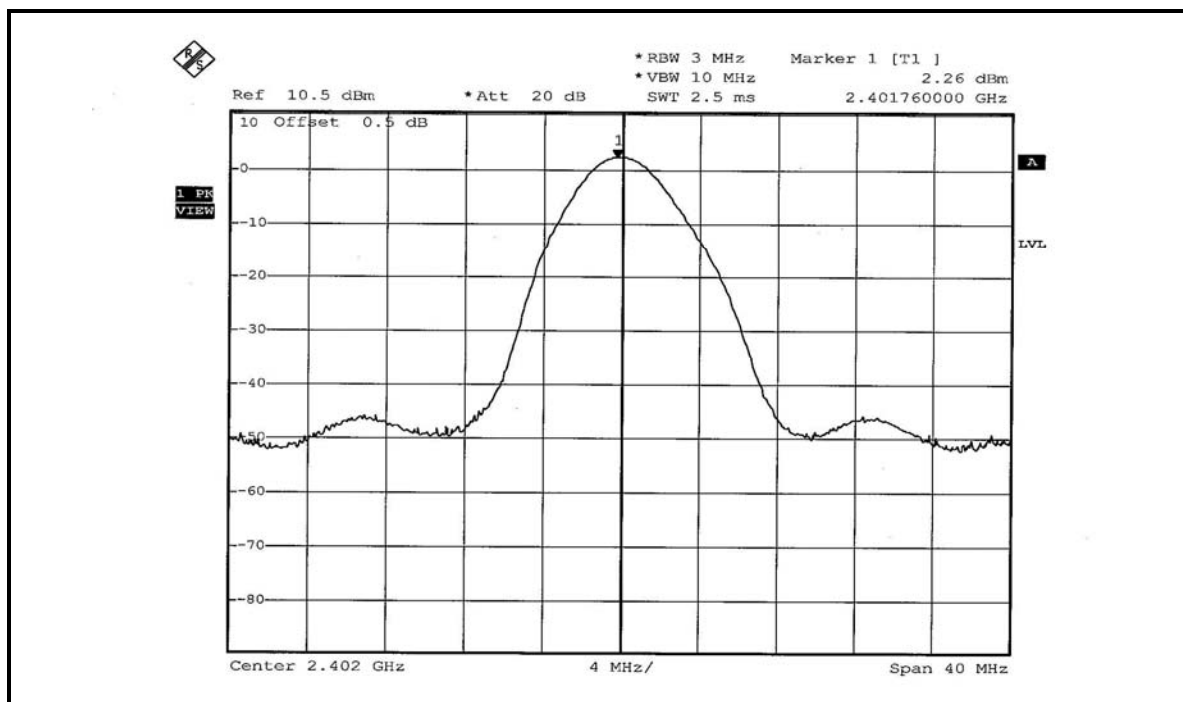
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.7.7 TEST RESULTS

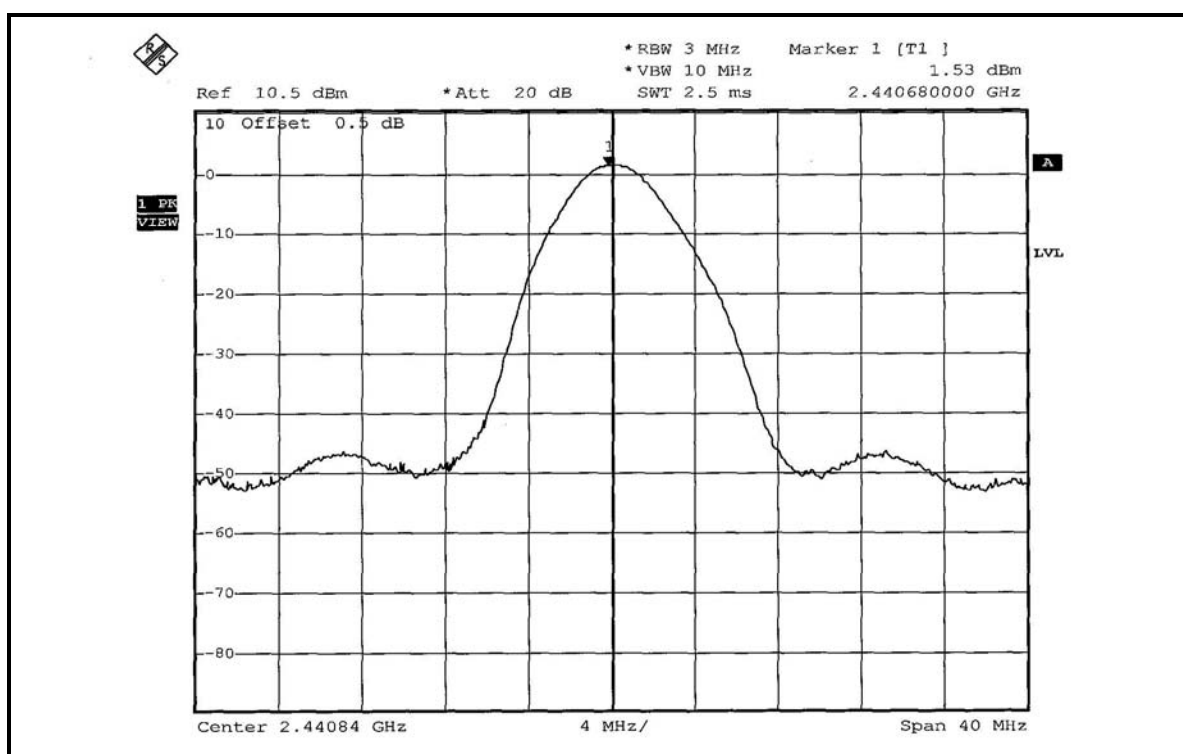
MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Match Tsui

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
0	2402	1.683	2.260	30	PASS
39	2441	1.422	1.530	30	PASS
78	2480	1.175	0.700	30	PASS

CH 0



CH 39



4.8 BAND EDGES MEASUREMENT

4.8.1 LIMITS OF BAND EDGES MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100KHz RBW).

4.8.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSEK30	100049	Aug. 14, 2006

NOTES: The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

4.8.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

4.8.4 DEVIATION FROM TEST STANDARD

No deviation.

4.8.5 EUT OPERATING CONDITION

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.8.6 TEST RESULTS

The spectrum plots are attached on the following 4 images. D1 line indicates the highest level, D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

Test Mode A

NOTE 1:

The band edge emission plot on the next page shows 49.91dBc between carrier maximum power and local maximum emission in restrict band (2.38908GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 99.50dBuV/m (Peak), so the maximum field strength in restrict band is $99.50 - 49.91 = 49.59$ dBuV/m, which is under 74 dBuV/m limit.

Average value = $49.59 - 38.06 = 11.53$ dBuV/m, which is under 54dBuV/m limit.

*The DH1 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 2$ per 1.25ms per channel. Therefore, the duty cycle be equal to: $20\log(1.25/100) = -38.06$ dB.

Average value = peak reading -38.06

NOTE 2:

The band edge emission plot on the next second page shows 50.16dBc between carrier maximum power and local maximum emission in restrict band (2.49280GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.2.7 is 98.22dBuV/m (Peak), so the maximum field strength in restrict band is $98.22 - 50.16 = 48.06$ dBuV/m, which is under 74 dBuV/m limit.

Average value = $48.06 - 38.06 = 10.00$ dBuV/m, which is under 54dBuV/m limit.

*The DH1 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 2$ per 1.25ms per channel. Therefore, the duty cycle be equal to: $20\log(1.25/100) = -38.06$ dB.

Average value = peak reading -38.06

Test Mode B

NOTE 1:

The band edge emission plot on the next page shows 49.91dBc between carrier maximum power and local maximum emission in restrict band (2.38908GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 99.25dBuV/m (Peak), so the maximum field strength in restrict band is $99.25 - 49.91 = 49.34$ dBuV/m, which is under 74 dBuV/m limit.

Average value = $49.34 - 38.06 = 11.28$ dBuV/m, which is under 54dBuV/m limit.

*The DH1 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 2$ per 1.25ms per channel. Therefore, the duty cycle be equal to: $20\log(1.25/100) = -38.06$ dB.

Average value = peak reading -38.06

NOTE 2:

The band edge emission plot on the next second page shows 50.16dBc between carrier maximum power and local maximum emission in restrict band (2.49280GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.2.7 is 98.45dBuV/m (Peak), so the maximum field strength in restrict band is $98.45 - 50.16 = 48.29$ dBuV/m, which is under 74 dBuV/m limit.

Average value = $48.29 - 38.06 = 10.23$ dBuV/m, which is under 54dBuV/m limit.

*The DH1 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 2$ per 1.25ms per channel. Therefore, the duty cycle be equal to: $20\log(1.25/100) = -38.06$ dB.

Average value = peak reading -38.06

Test Mode C

NOTE 1:

The band edge emission plot on the next page shows 49.91dBc between carrier maximum power and local maximum emission in restrict band (2.38908GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 99.85dBuV/m (Peak), so the maximum field strength in restrict band is $99.85 - 49.91 = 49.94$ dBuV/m, which is under 74 dBuV/m limit.

Average value = $49.94 - 38.06 = 11.88$ dBuV/m, which is under 54dBuV/m limit.

*The DH1 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 2$ per 1.25ms per channel. Therefore, the duty cycle be equal to: $20\log(1.25/100) = -38.06$ dB.

Average value = peak reading -38.06

NOTE 2:

The band edge emission plot on the next second page shows 50.16dBc between carrier maximum power and local maximum emission in restrict band (2.49280GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.2.7 is 98.65dBuV/m (Peak), so the maximum field strength in restrict band is $98.65 - 50.16 = 48.49$ dBuV/m, which is under 74 dBuV/m limit.

Average value = $48.49 - 38.06 = 10.43$ dBuV/m, which is under 54dBuV/m limit.

*The DH1 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 2$ per 1.25ms per channel. Therefore, the duty cycle be equal to: $20\log(1.25/100) = -38.06$ dB.

Average value = peak reading -38.06

Test Mode D

NOTE 1:

The band edge emission plot on the next page shows 49.91dBc between carrier maximum power and local maximum emission in restrict band (2.38908GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 98.31dBuV/m (Peak), so the maximum field strength in restrict band is $98.31 - 49.91 = 48.40$ dBuV/m, which is under 74 dBuV/m limit.

Average value = $48.40 - 38.06 = 10.34$ dBuV/m, which is under 54dBuV/m limit.

*The DH1 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 2$ per 1.25ms per channel. Therefore, the duty cycle be equal to: $20\log(1.25/100) = -38.06$ dB.

Average value = peak reading -38.06

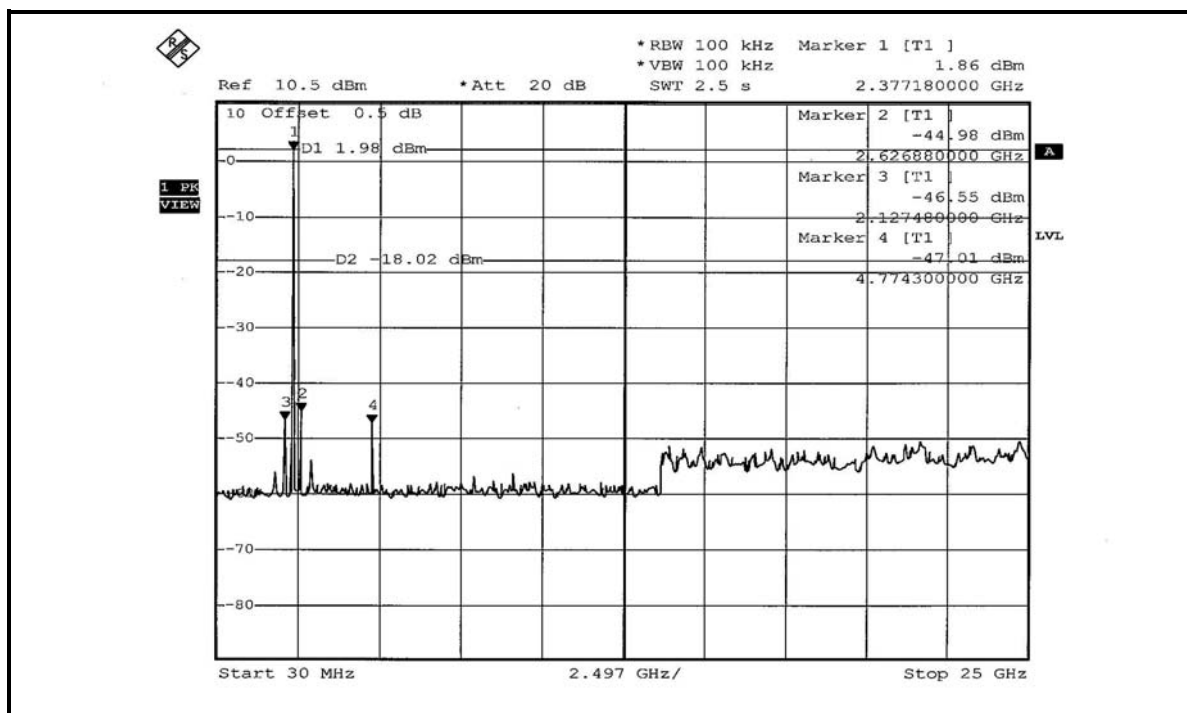
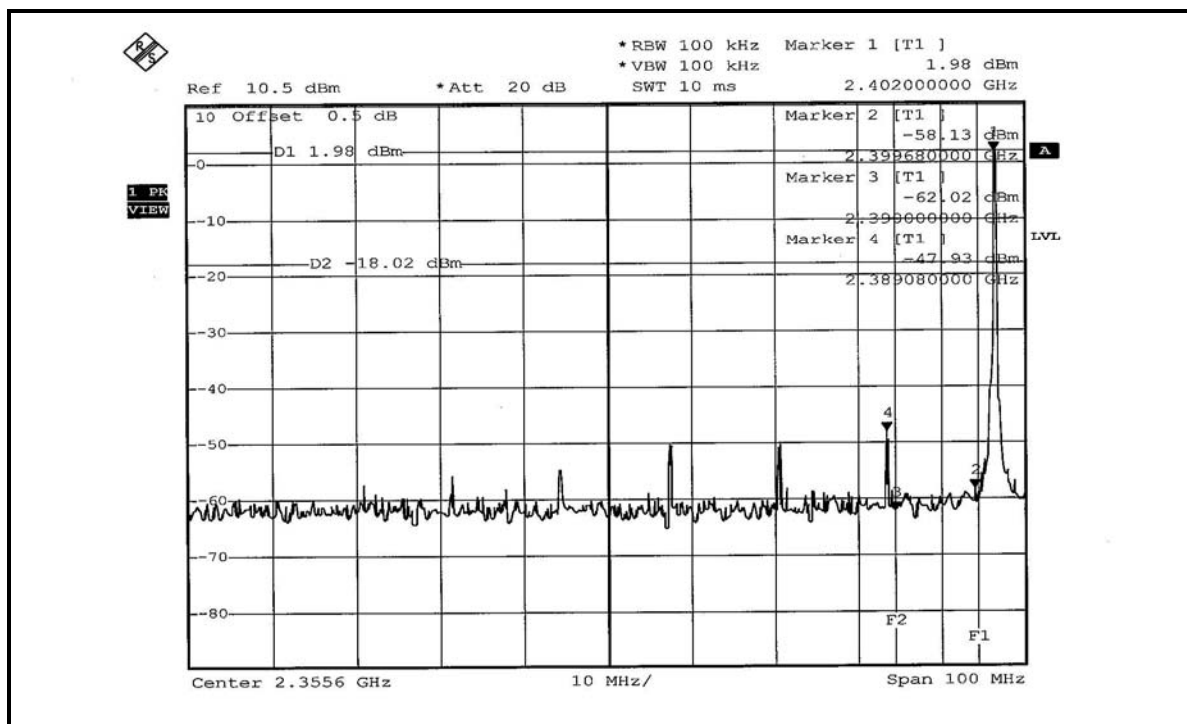
NOTE 2:

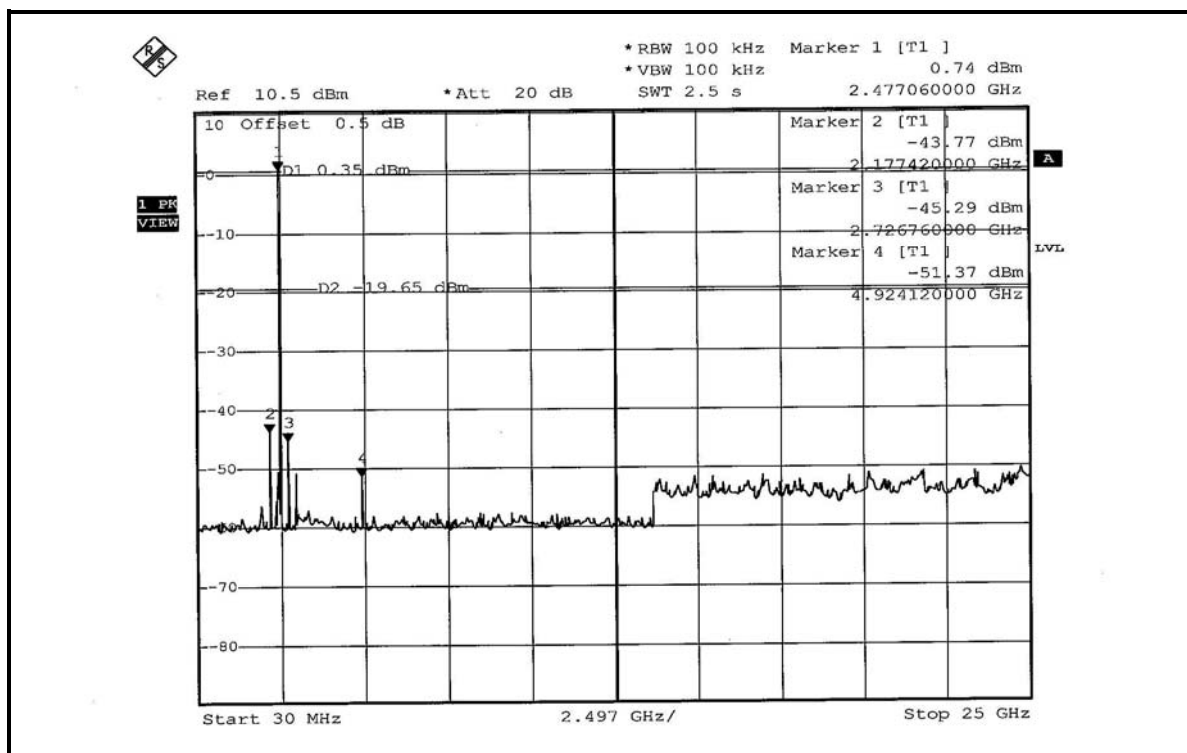
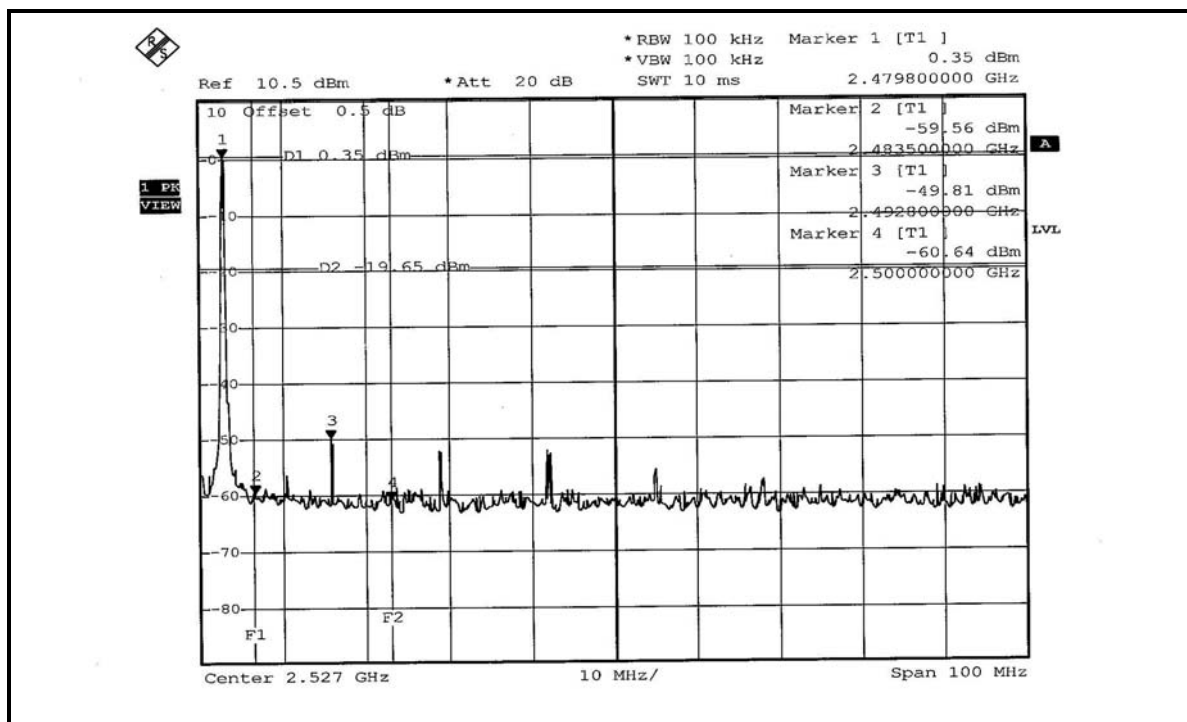
The band edge emission plot on the next second page shows 50.16dBc between carrier maximum power and local maximum emission in restrict band (2.49280GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.2.7 is 95.52dBuV/m (Peak), so the maximum field strength in restrict band is $95.52 - 50.16 = 45.36$ dBuV/m, which is under 74 dBuV/m limit.

Average value = $45.36 - 38.06 = 7.30$ dBuV/m, which is under 54dBuV/m limit.

*The DH1 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 2$ per 1.25ms per channel. Therefore, the duty cycle be equal to: $20\log(1.25/100) = -38.06$ dB.

Average value = peak reading -38.06





4.9 ANTENNA REQUIREMENT

4.9.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.9.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is PCB antenna without antenna connector. The maximum Gain of the antenna is -2.05dBi .

5. INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	FCC, UL, A2LA
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA , CSA
R.O.C.	CNLA, BSMI, DGT
Netherlands	Telefication
Singapore	PSB , GOST-ASIA(MOU)
Russia	CERTIS(MOU)

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:

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Telecom Lab:

Tel: 886-3-3183232

Fax: 886-3-3185050

Linko RF Lab.

Tel: 886-3-3270910

Fax: 886-3-3270892

Web Site: www.adt.com.tw

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

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.