

# FCC TEST REPORT

**REPORT NO.:** RF940606H08B

**MODEL NO.:** J07H081

**RECEIVED:** Nov. 08, 2006

**TESTED:** Nov. 10 to 16, 2006

**ISSUED:** Nov. 17, 2006

**APPLICANT:** HON HAI PRECISION IND. CO., LTD.  
HSINCHU SCIENCE PARK BRANCH OFFICE

**ADDRESS:** 5F-1,5 Hsin-An Road Hsinchu, Science-Based  
Industrial Park Taiwan, R.O.C.

**ISSUED BY:** Advance Data Technology Corporation

**LAB LOCATION:** No. 81-1, Lu Liao Keng, 9 Ling, Wu Lung Tsuen,  
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Taiwan, R.O.C.

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## 1 CERTIFICATION

**PRODUCT :** Bluetooth Module  
**BRAND NAME :** FOXCONN  
**MODEL NO. :** J07H081  
**APPLICANT :** HON HAI PRECISION IND. CO., LTD. HSINCHU  
SCIENCE PARK BRANCH OFFICE  
**TESTED DATE:** Nov. 10 to 16, 2006  
**TEST ITEM :** R&D SAMPLE  
**STANDARDS :** 47 CFR Part 15, Subpart C (Section 15.247),  
ANSI C63.4-2003

The above equipment (Model: J07H081) has 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 :** Carol Liao , **DATE:** Nov. 17, 2006  
( Carol Liao )

**TECHNICAL**  
**ACCEPTANCE :** Hank Chung , **DATE:** Nov. 17, 2006  
Responsible for RF ( Hank Chung )

**APPROVED BY :** May Chen , **DATE:** Nov. 17, 2006  
( May Chen, Deputy Manager )

## 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR Part 15, Subpart C			
Standard Section	Test Type and Limit	Result	REMARK
15.247(b)	Maximum Peak Output Power Spec.: max. 30dBm	PASS	Meet the requirement of limit
15.247(c)	Transmitter Radiated Emissions Spec.: Table 15.209	PASS	Meet the requirement of limit Minimum passing margin is -3.3dB at 73.73MHz
15.247(c)	Band Edge Measurement	PASS	Meet the requirement of limit

NOTE: This report is prepared for FCC class II permissive change. Only radiated emission, Maximum Peak Output Power and Band Edge Measurement were presented in this test report.

### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Bluetooth Module
<b>MODEL NO.</b>	J07H081
<b>FCC ID</b>	MCLJ07H081
<b>POWER SUPPLY</b>	DC 3.3V from host equipment
<b>MODULATION TYPE</b>	1 Mbps: GFSK 2 Mbps(EDR): $\pi/4$ -DQPSK 3 Mbps(EDR): 8-DPSK
<b>MODULATION TECHNOLOGY</b>	FHSS
<b>FREQUENCY RANGE</b>	2402MHz ~ 2480MHz
<b>NUMBER OF CHANNEL</b>	79
<b>OUTPUT POWER</b>	4.84dBm
<b>ANTENNA TYPE</b>	Chip Antenna with 2dBi antenna gain
<b>DATA CABLE</b>	NA
<b>I/O PORTS</b>	NA
<b>ASSOCIATED DEVICES</b>	NA

#### NOTE:

1. This report is prepared for FCC class II permissive change. The difference compared with the Report No.: RF940606H08 design is as the following:
  - ◆ Parts of circuit and component have been changed.
  - ◆ The product name has been changed.
2. 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

Seventy-nine 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		

### 3.3 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

EUT configure mode	Applicable to				Description
	PLC	RE<1G	RE≥1G	APCM	
A	X	Note 1	v	v	Modulation Type: GFSK for 1Mbps
B	X	Note 1	Note 2	v	Modulation Type: $\pi/4$ -DQPSK for 2Mbps
C	X	Note 1	Note 2	v	Modulation Type: 8-DPSK for 3Mbps

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: Pre-scan different modulation type were no effect for Radiated Emission below 1GHz and only the worst case recorded in this report.

Note 2: Pre-Scan  $\pi/4$ -DQPSK for 2Mbps and 8-DPSK for 3Mbps to determine the worst-case mode.

#### Radiated Emission Test (Below 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, X, Y, Z axis 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	Axis
A	0 to 78	78	FHSS	GFSK	DH5	Z

#### Radiated Emission Test (Above 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, X, Y, Z Axis 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	Axis
A	0 to 78	0,39,78	FHSS	GFSK	DH5	Z
C	0 to 78	0,39,78	FHSS	8-DPSK	DH5	Z



#### **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.

Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type
0 to 78	0, 78	FHSS	GFSK	DH5
0 to 78	0, 78	FHSS	8-DPSK	DH5

#### **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.

Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type
0 to 78	0, 39, 78	FHSS	GFSK	DH5
0 to 78	0, 39, 78	FHSS	$\pi/4$ -DQPSK	DH5
0 to 78	0, 39, 78	FHSS	8-DPSK	DH5

### **3.4 GENERAL DESCRIPTION OF APPLIED STANDARDS**

The EUT is a Bluetooth Module. 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.

### 3.5 DESCRIPTION OF SUPPORT UNITS

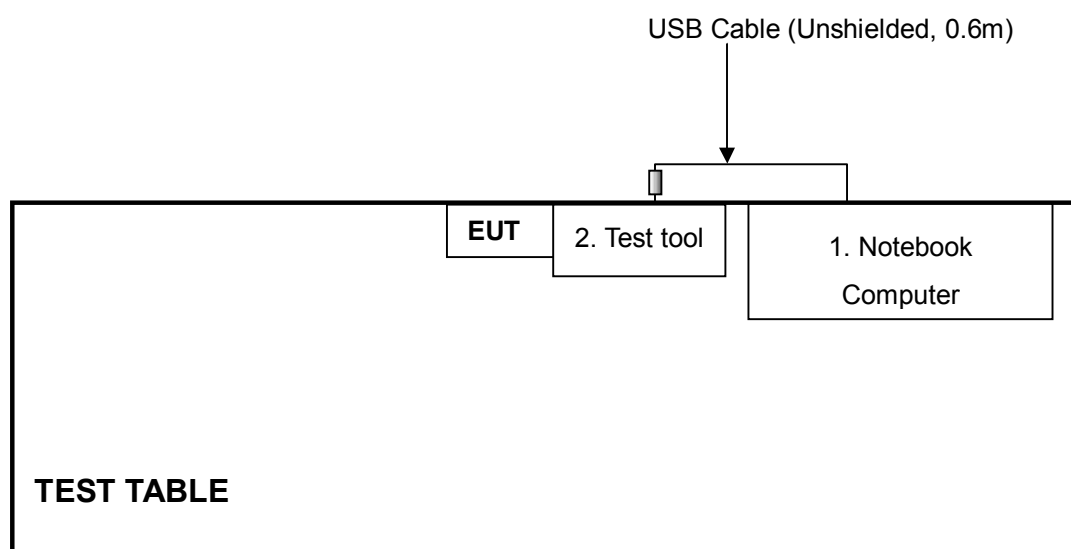
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1	NOTEBOOK COMPUTER	ASUS	A2400H	49NG038481	NA
2	TEST TOOL	FOXCONN	NA	NA	NA

No.	Signal cable description
1	NA
2	NA

Note: 1. All power cords of the above support units are unshielded (1.8m).

### 3.6 CONFIGURATION OF SYSTEM UNDER TEST



**NOTE:** 1. Please refer to the photos of test configuration in Item 5 also.

## 4 TEST PROCEDURES AND RESULTS

### 4.1 MAXIMUM PEAK OUTPUT POWER

#### 4.1.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

#### 4.1.2 INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 09, 2006
Agilent SIGNAL GENERATOR	E8257C	MY43320668	Dec. 07, 2006
TEKTRONIX OSCILLOSCOPE	TDS380	B016335	Jun. 21, 2007
NARDA DETECTOR	4503A	FSCM99899	NA

**NOTE:**

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

#### 4.1.3 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. Set a reference level on the measuring instrument equal to the highest peak value.
3. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3 MHz RBW and 3 MHz VBW.
4. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
5. Repeat above procedures until all frequencies measured were complete.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.5 TEST SETUP



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

#### 4.1.6 EUT OPERATING CONDITION

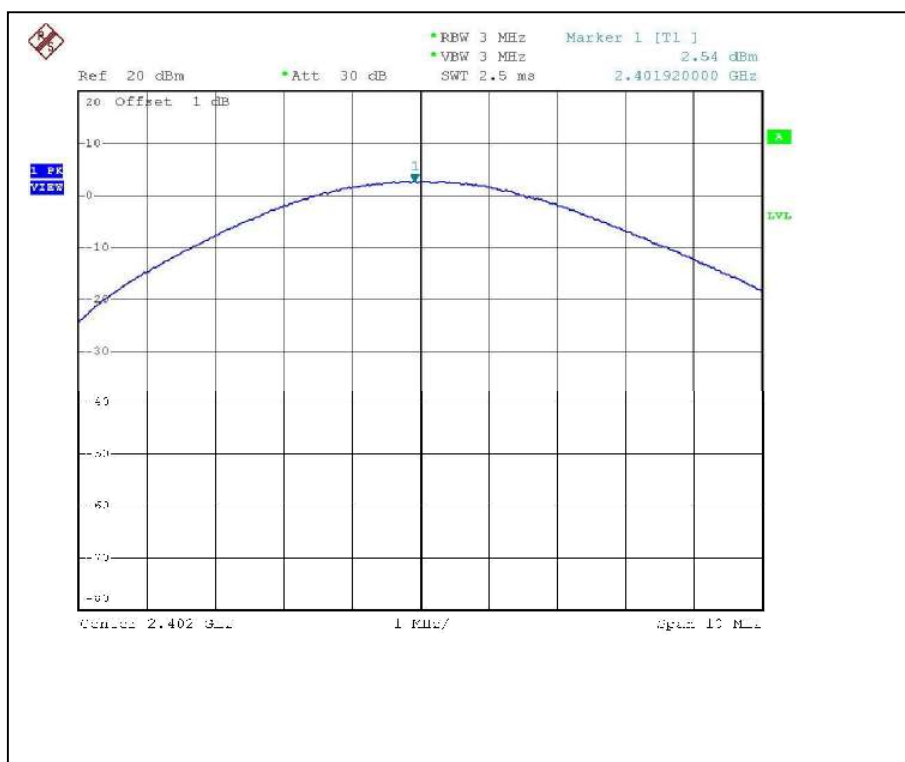
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

#### 4.1.7 TEST RESULTS(MODE A)

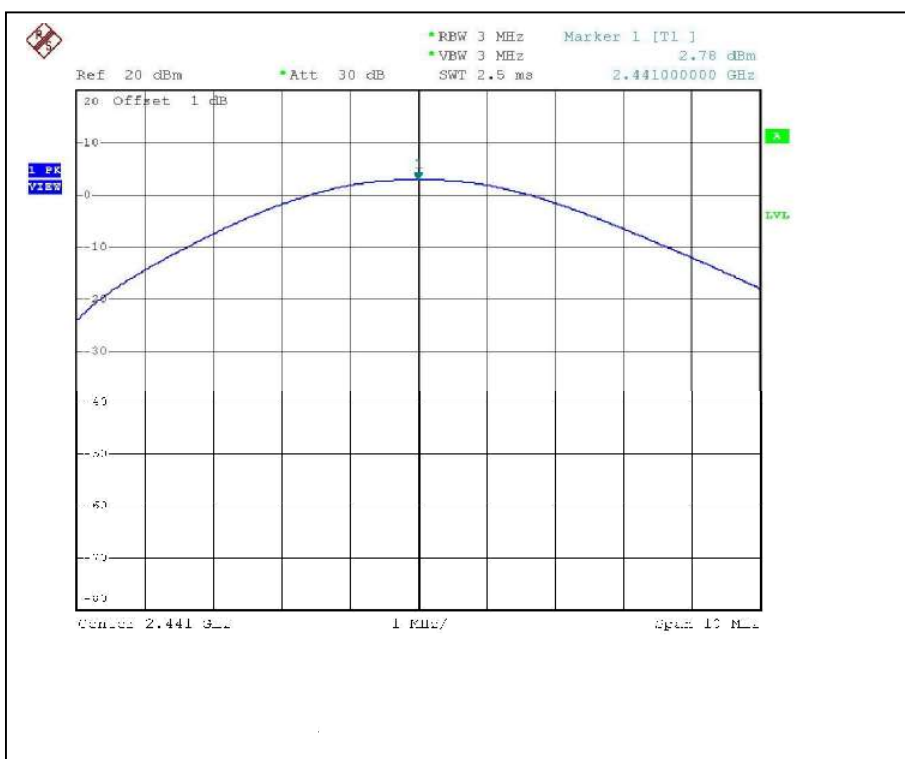
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 62%RH, 965 hPa	<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz
<b>TESTED BY</b>	Phoenix Huang		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
0	2402	2.54	30	PASS
39	2441	2.78	30	PASS
78	2480	2.47	30	PASS

## Channel 0

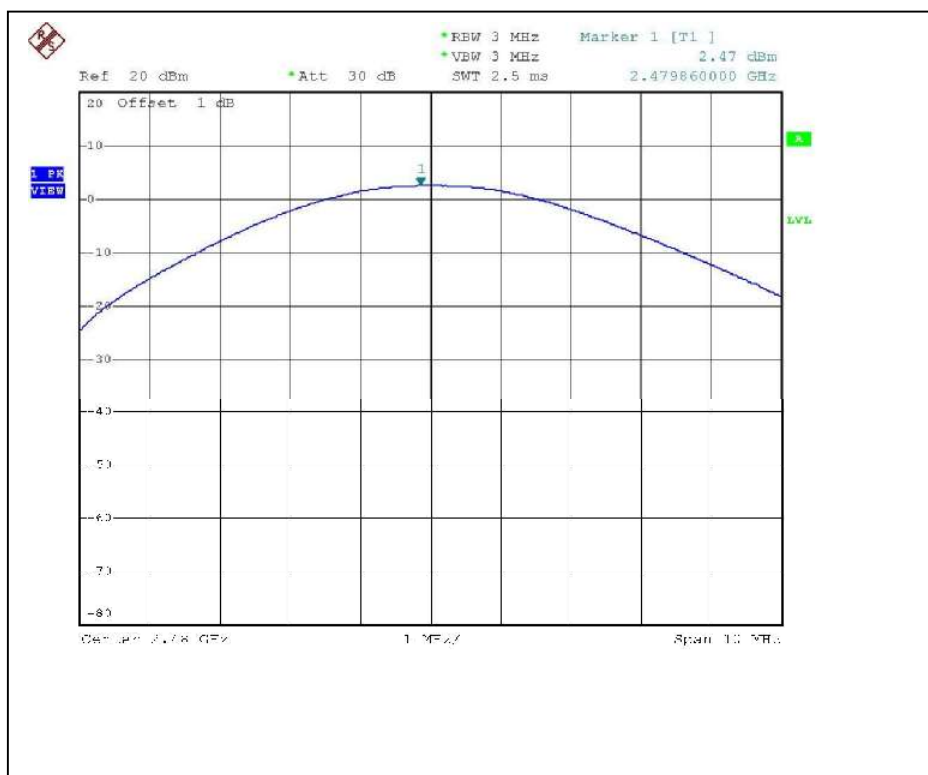


## Channel 39





## Channel 78

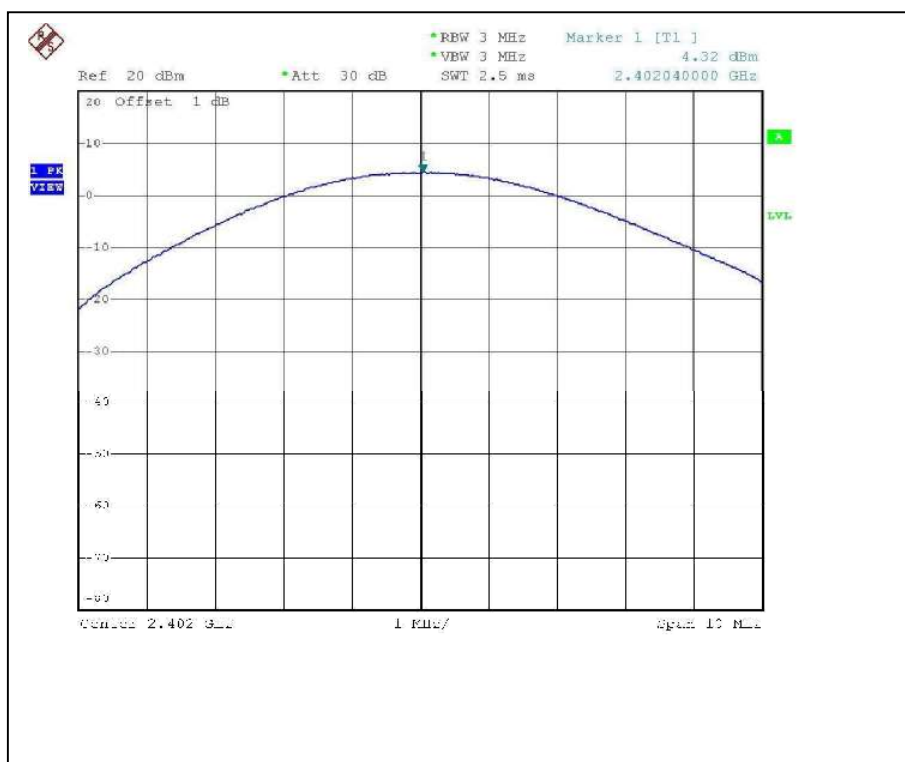


#### 4.1.8 TEST RESULTS(MODE B)

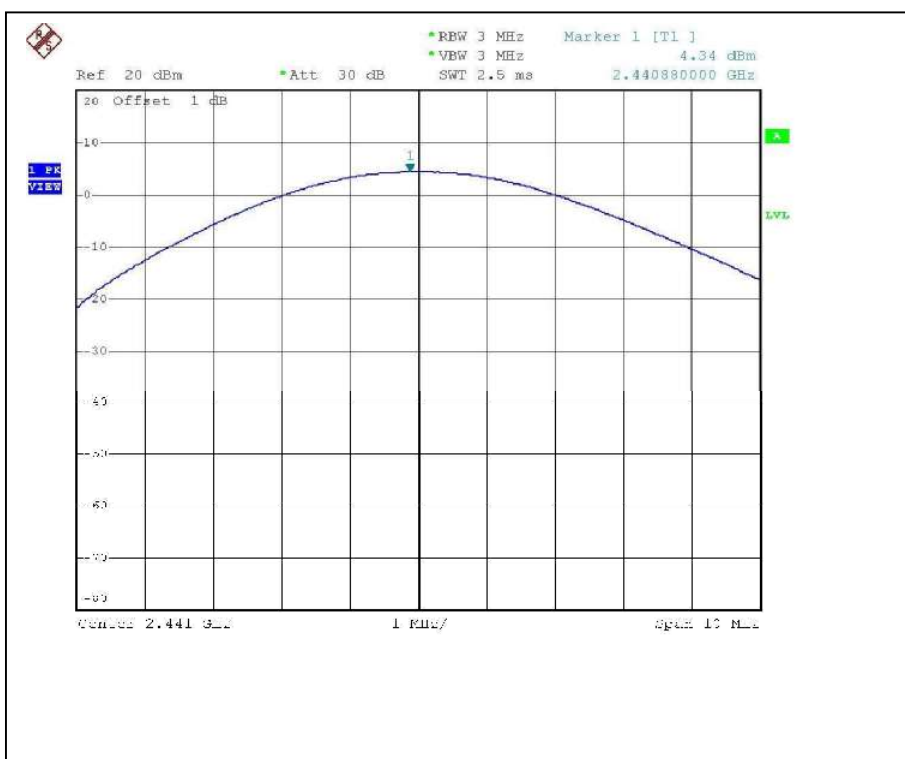
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 62%RH, 965 hPa	<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz
<b>TESTED BY</b>	Phoenix Huang		

<b>CHANNEL</b>	<b>CHANNEL FREQUENCY (MHz)</b>	<b>PEAK POWER OUTPUT (dBm)</b>	<b>PEAK POWER LIMIT (dBm)</b>	<b>PASS/FAIL</b>
0	2402	4.32	30	PASS
39	2441	4.34	30	PASS
78	2480	4.44	30	PASS

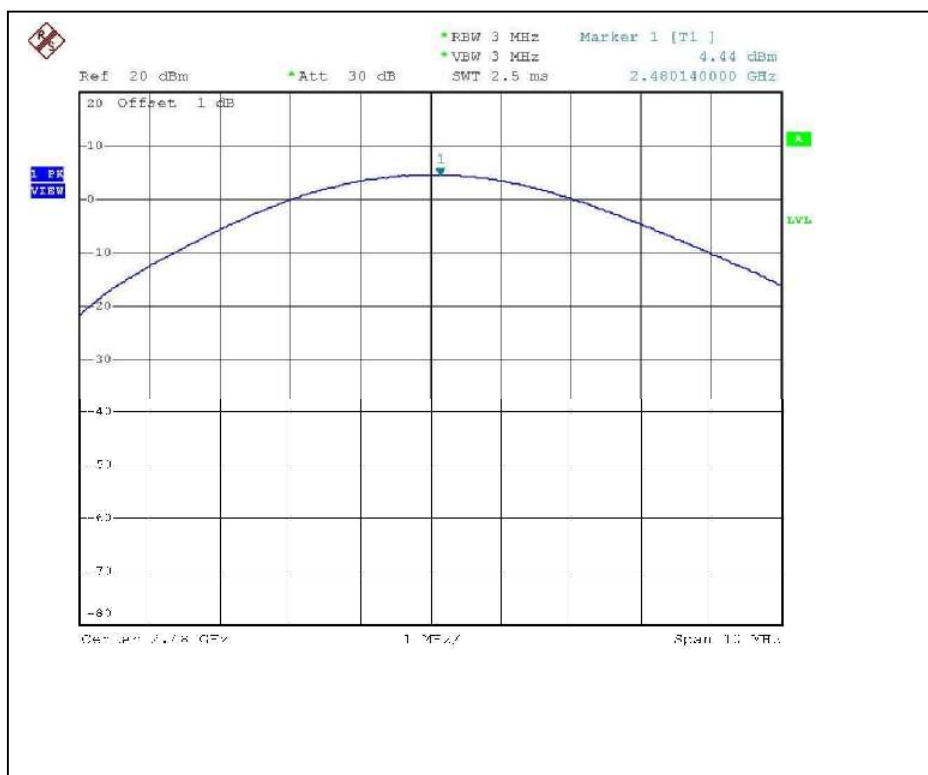
## Channel 0



## Channel 39



## Channel 78

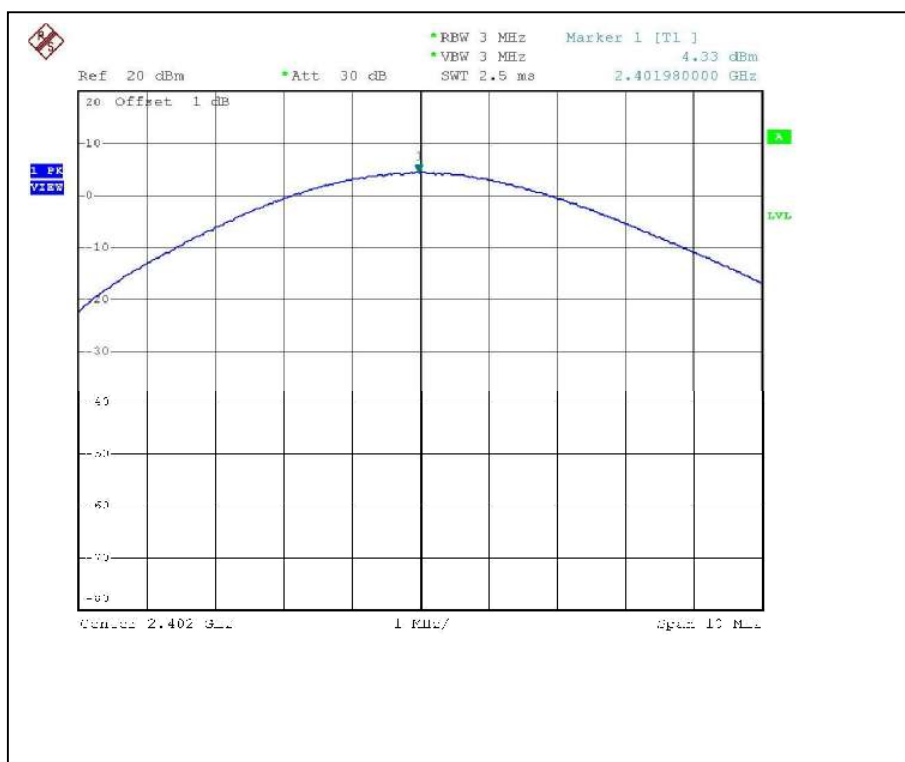


#### 4.1.9 TEST RESULTS(MODE C)

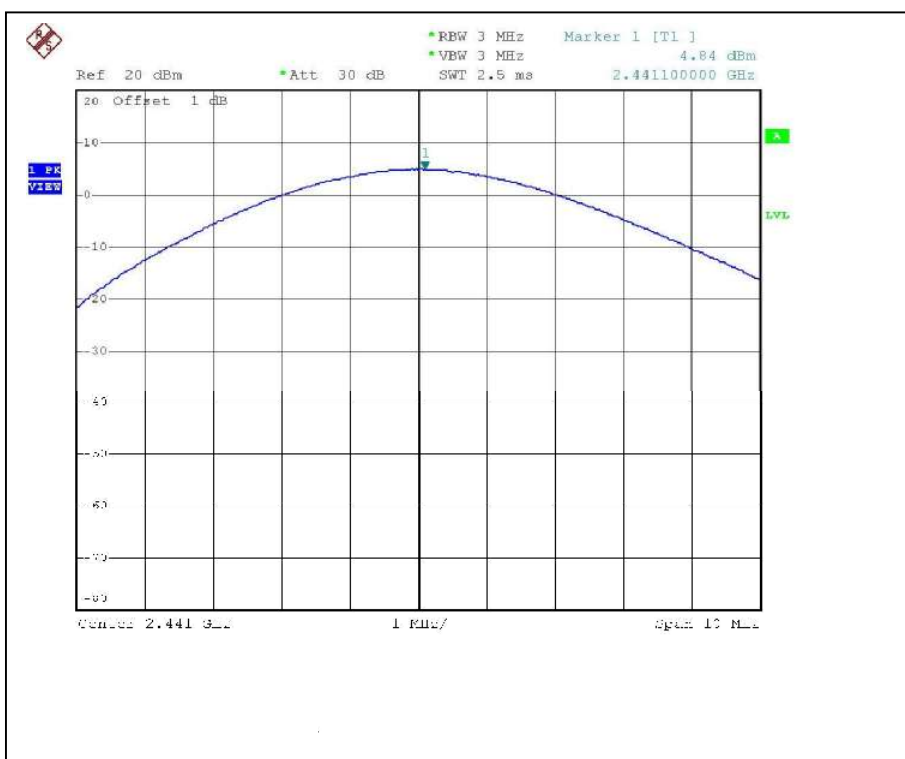
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 62%RH, 965 hPa	<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz
<b>TESTED BY</b>	Phoenix Huang		

<b>CHANNEL</b>	<b>CHANNEL FREQUENCY (MHz)</b>	<b>PEAK POWER OUTPUT (dBm)</b>	<b>PEAK POWER LIMIT (dBm)</b>	<b>PASS/FAIL</b>
0	2402	4.33	30	PASS
39	2441	4.84	30	PASS
78	2480	4.75	30	PASS

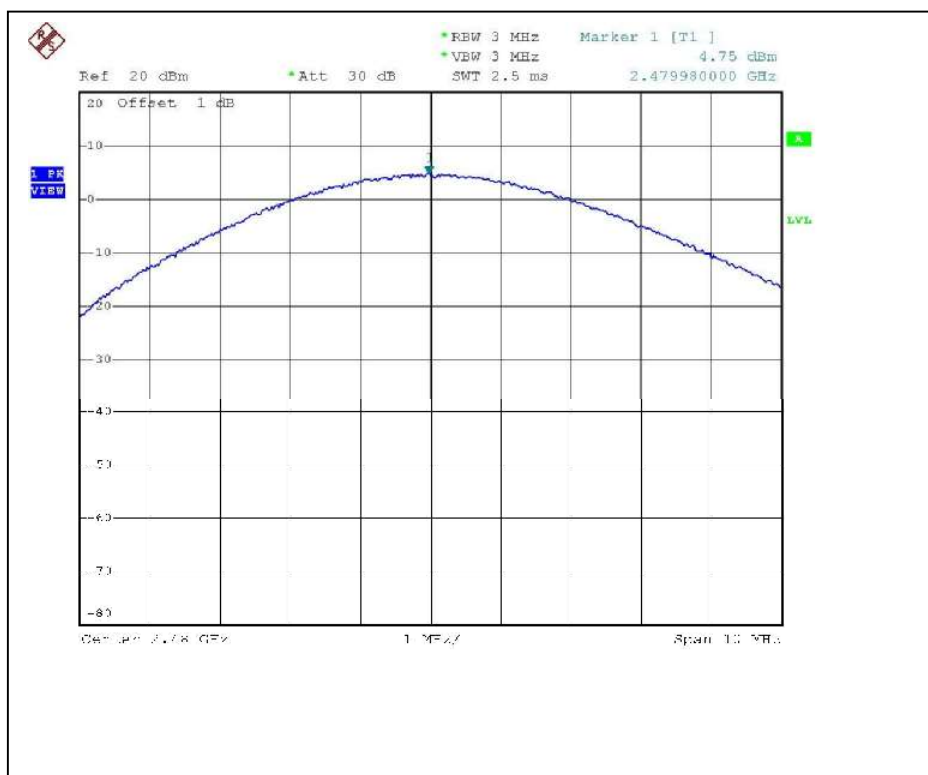
## Channel 0



## Channel 39



## Channel 78



## 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

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
ADVANTEST Spectrum Analyzer	R3271A	85060311	July 03, 2007
HP Pre_Amplifier	8449B	3008A01922	Sep. 18, 2007
ROHDE & SCHWARZ Test Receiver	ESCS30	100375	Sep. 20, 2007
CHASE Broadband Antenna	VULB9168	138	Dec. 11, 2006
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 27, 2006
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 05, 2007
SCHWARZBECK Biconical Antenna	VHBA9123	459	Jun. 08, 2009
SCHWARZBECK Periodic Antenna	UPA6108	1148	Jun. 08, 2009
R&S Loop Antenna	HFH2-Z2	881058/15	Nov. 29, 2007
RF Switches (ARNITSU)	CS-201	1565157	NA
RF CABLE (Chaintek)	SF102	22054-2	Nov. 16, 2006
RF Cable(RICHTEC)	9913-30M N-N Cable	STCCAB-30M-1 GHz	Jul. 15, 2007
Software	ADT_Radiated_V 5.14	NA	NA
CHANCE MOST Antenna Tower	AT-100	0203	NA
CHANCE MOST Turn Table	TT-100	0203	NA

- Note: 1. The calibration interval of the above test instruments is 12 months (36 months for Biconical and Periodic Antenna) and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: R3271A) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in ADT Open Site No. C.
4. The FCC Site Registration No. is 656396.
5. The VCCI Site Registration No. is R-1626.
6. The CANADA Site Registration No. is IC 4824A-3.
7. The following table is for the measurement uncertainty, which is calculated as per the document CISPR 16-4. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Value
Radiated emissions (30MHz-1GHz)	2.98 dB
Radiated emissions (1GHz ~18GHz)	2.21 dB
Radiated emissions (18GHz ~40GHz)	1.88 dB

8. Loop antenna was used for all emissions below 30 MHz. (FOR Loop antenna only)

### 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 10 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 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

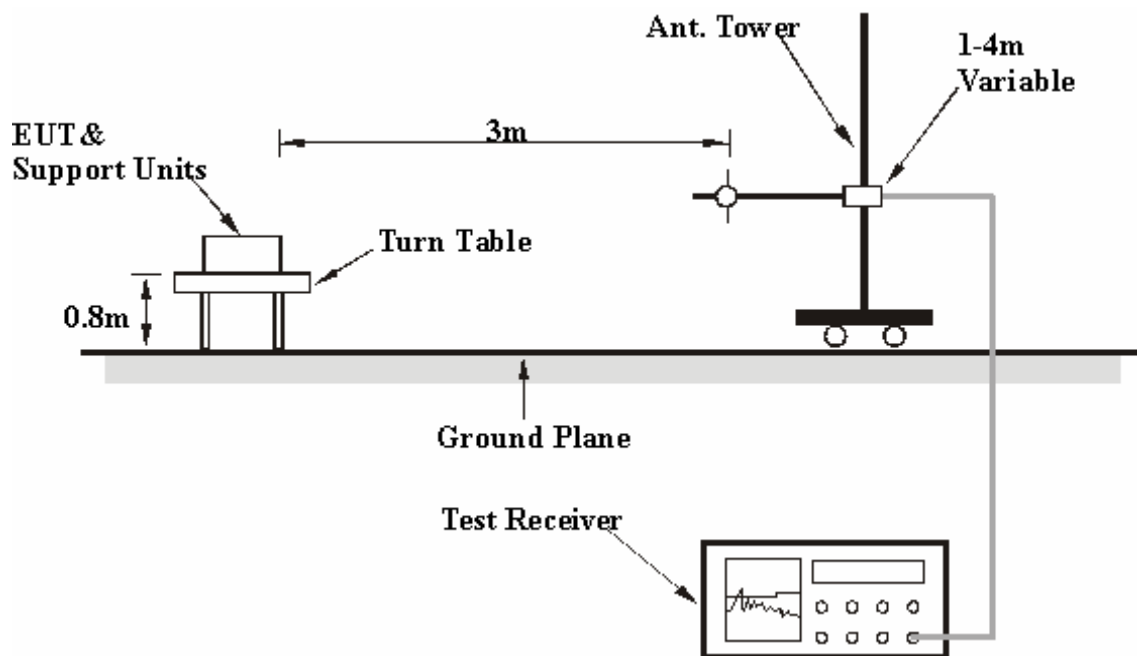
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) 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

- a. Connected the EUT to test tool and placed on the testing table.
- b. The support unit 1 (Notebook computer) ran a test program “CSR.exe” to enable EUT under transmission condition continuously at specific channel frequency.

#### 4.2.7 TEST RESULTS

<b>CHANNEL</b>	78	<b>FREQUENCY RANGE</b>	Below 1GHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Quasi-Peak
<b>ENVIRONMENTAL CONDITIONS</b>	20 deg. C, 65%RH, 965 hPa	<b>TESTED BY</b>	Phoenix Huang

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	73.73	36.70 QP	40.00	-3.30	1.56 H	341	25.00	11.70
2	125.02	34.40 QP	43.50	-9.10	1.48 H	199	22.20	12.20
3	172.03	37.20 QP	43.50	-6.30	1.53 H	1	23.80	13.40
4	184.32	38.60 QP	43.50	-4.90	1.31 H	340	25.90	12.70
5	208.89	37.30 QP	43.50	-6.20	1.57 H	18	25.40	12.00
6	275.00	37.70 QP	46.00	-8.30	1.33 H	118	22.10	15.60
7	344.06	40.00 QP	46.00	-6.00	1.00 H	130	22.70	17.30
8	456.02	38.10 QP	46.00	-7.90	1.29 H	85	17.40	20.60
9	623.90	35.20 QP	46.00	-10.80	1.15 H	21	10.40	24.70
10	900.10	38.20 QP	46.00	-7.80	1.00 H	116	9.30	28.90

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	75.00	35.40 QP	40.00	-4.60	1.00 V	206	24.00	11.40
2	132.94	31.00 QP	43.50	-12.50	1.00 V	85	18.10	12.90
3	144.28	32.00 QP	43.50	-11.50	1.00 V	135	18.40	13.60
4	323.90	32.20 QP	46.00	-13.80	1.00 V	63	15.10	17.10
5	456.02	41.50 QP	46.00	-4.50	1.00 V	184	20.80	20.60
6	480.10	33.00 QP	46.00	-13.00	1.00 V	7	11.70	21.30
7	586.32	33.90 QP	46.00	-12.10	1.00 V	65	9.80	24.10
8	624.09	32.80 QP	46.00	-13.20	1.00 V	301	8.10	24.70
9	899.98	33.60 QP	46.00	-12.40	1.22 V	49	4.80	28.80
10	960.00	35.20 QP	46.00	-10.80	1.22 V	54	5.30	29.90

- 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.

#### 4.2.8 TEST RESULTS (MODE A)

<b>CHANNEL</b>	Channel 0	<b>FREQUENCY RANGE</b>	1 ~25GHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	27 deg. C, 59%RH, 965 hPa	<b>TESTED BY</b>	Phoenix Huang

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	2390.00	53.01 PK	74.00	-20.99	1.42 H	75	21.08	31.93
1	2390.00	13.65 AV	54.00	-40.35	1.42 H	75	-18.28	31.93
2	*2402.00	105.20 PK			1.42 H	75	73.22	31.98
2	*2402.00	75.20 AV			1.42 H	75	43.22	31.98
3	4804.00	54.74 PK	74.00	-19.26	1.42 H	69	18.82	35.92
3	4804.00	24.74 AV	54.00	-29.26	1.42 H	69	-11.18	35.92
4	7206.00	63.67 PK	74.00	-10.33	1.74 H	278	21.54	42.13
4	7206.00	33.67 AV	54.00	-20.33	1.74 H	278	-8.46	42.13

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	2390.00	44.01 PK	74.00	-29.99	1.47 V	14	12.08	31.93
1	2390.00	5.45 AV	54.00	-48.55	1.47 V	14	-26.48	31.93
2	*2402.00	97.00 PK			1.47 V	14	65.02	31.98
2	*2402.00	67.00 AV			1.47 V	14	35.02	31.98
3	4804.00	56.24 PK	74.00	-17.76	1.37 V	137	20.32	35.92
3	4804.00	26.24 AV	54.00	-27.76	1.37 V	137	-9.68	35.92
4	7206.00	61.97 PK	74.00	-12.03	1.04 V	294	19.84	42.13
4	7206.00	31.97 AV	54.00	-22.03	1.04 V	294	-10.16	42.13

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
  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 be equal to:  $20\log(3.125/100) = -30\text{dB}$
  7. Average value = peak reading + 20log(duty cycle)

<b>CHANNEL</b>	Channel 39	<b>FREQUENCY RANGE</b>	1 ~25GHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	27 deg. C, 59%RH, 965 hPa	<b>TESTED BY</b>	Phoenix Huang

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>								
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	*2441.00	108.60 PK			1.38 H	246	76.47	32.13
1	*2441.00	78.60 AV			1.38 H	246	46.47	32.13
2	4882.00	56.73 PK	74.00	-17.27	1.59 H	41	20.63	36.10
2	4882.00	26.73 AV	54.00	-27.27	1.59 H	41	-9.37	36.10
3	7323.00	64.45 PK	74.00	-9.55	1.00 H	105	21.89	42.56
3	7323.00	34.45 AV	54.00	-19.55	1.00 H	105	-8.11	42.56

<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>								
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	*2441.00	98.87 PK			1.41 V	206	66.74	32.13
1	*2441.00	68.87 AV			1.41 V	206	36.74	32.13
2	4882.00	56.89 PK	74.00	-17.11	1.11 V	1	20.79	36.10
2	4882.00	26.89 AV	54.00	-27.11	1.11 V	1	-9.21	36.10
3	7323.00	58.73 PK	74.00	-15.27	1.76 V	330	16.17	42.56
3	7323.00	28.73 AV	54.00	-25.27	1.76 V	330	-13.83	42.56

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
  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 be equal to:  $20\log(3.125/100) = -30\text{dB}$
  7. Average value = peak reading + 20log(duty cycle)

<b>CHANNEL</b>	Channel 78	<b>FREQUENCY RANGE</b>	1 ~25GHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	27 deg. C, 59%RH, 965 hPa	<b>TESTED BY</b>	Phoenix Huang

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	2483.50	60.50 PK	74.00	-13.50	1.41 H	247	28.21	32.29
1	2483.50	35.92 AV	54.00	-18.08	1.41 H	247	3.63	32.29
2	*2480.00	108.10 PK			1.41 H	247	75.79	32.31
2	*2480.00	78.10 AV			1.41 H	247	45.79	32.31
3	4960.00	60.15 PK	74.00	-13.85	1.09 H	89	23.87	36.27
3	4960.00	30.15 AV	54.00	-23.85	1.09 H	89	-6.13	36.27
4	7440.00	66.42 PK	74.00	-7.58	1.67 H	97	23.42	43.00
4	7440.00	36.42 AV	54.00	-17.58	1.67 H	97	-6.58	43.00

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	*2480.00	99.58 PK			1.66 V	170	67.31	32.27
1	*2480.00	69.58 AV			1.66 V	170	37.31	32.27
2	2483.50	51.98 PK	74.00	-22.02	1.66 V	170	19.69	32.29
2	2483.50	27.40 AV	54.00	-26.60	1.66 V	170	-4.89	32.29
3	4960.00	56.98 PK	74.00	-17.02	1.59 V	349	20.70	36.27
3	4960.00	26.98 AV	54.00	-27.02	1.59 V	349	-9.30	36.27
4	7440.00	61.07 PK	74.00	-12.93	1.95 V	2	18.07	43.00
4	7440.00	31.07 AV	54.00	-22.93	1.95 V	2	-11.93	43.00

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
  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 be equal to:  $20\log(3.125/100) = -30\text{dB}$
  7. Average value = peak reading +  $20\log(\text{duty cycle})$

#### 4.2.9 TEST RESULTS (MODE C)

<b>CHANNEL</b>	Channel 0	<b>FREQUENCY RANGE</b>	1 ~25GHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	27 deg. C, 59%RH, 965 hPa	<b>TESTED BY</b>	Phoenix Huang

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	2390.00	56.84 PK	74.00	-17.16	1.47 H	71	24.91	31.93
1	2390.00	16.87 AV	54.00	-37.13	1.47 H	71	-15.06	31.93
2	*2402.00	106.80 PK			1.47 H	71	74.82	31.98
2	*2402.00	76.80 AV			1.47 H	71	44.82	31.98
3	4804.00	57.04 PK	74.00	-16.96	1.42 H	67	21.12	35.92
3	4804.00	27.04 AV	54.00	-26.96	1.42 H	67	-8.88	35.92
4	7206.00	68.27 PK	74.00	-5.73	1.74 H	280	26.14	42.13
4	7206.00	38.27 AV	54.00	-15.73	1.74 H	280	-3.86	42.13

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	2390.00	46.54 PK	74.00	-27.46	2.02 V	20	14.61	31.93
1	2390.00	6.57 AV	54.00	-47.43	2.02 V	20	-25.36	31.93
2	*2402.00	96.50 PK			2.02 V	20	64.52	31.98
2	*2402.00	66.50 AV			2.02 V	20	34.52	31.98
3	4804.00	57.24 PK	74.00	-16.76	1.37 V	136	21.32	35.92
3	4804.00	27.24 AV	54.00	-26.76	1.37 V	136	-8.68	35.92
4	7206.00	67.17 PK	74.00	-6.83	1.04 V	294	25.04	42.13
4	7206.00	37.17 AV	54.00	-16.83	1.04 V	294	-4.96	42.13

#### REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
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 be equal to:  $20\log(3.125/100) = -30\text{dB}$
7. Average value = peak reading +  $20\log(\text{duty cycle})$



<b>CHANNEL</b>	Channel 39	<b>FREQUENCY RANGE</b>	1 ~25GHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	27 deg. C, 59%RH, 965 hPa	<b>TESTED BY</b>	Phoenix Huang

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	*2441.00	106.70 PK			1.38 H	247	74.57	32.13
1	*2441.00	76.70 AV			1.38 H	247	44.57	32.13
2	4882.00	59.07 PK	74.00	-14.93	1.59 H	39	22.97	36.10
2	4882.00	29.07 AV	54.00	-24.93	1.59 H	39	-7.03	36.10
3	7323.00	70.01 PK	74.00	-3.99	1.00 H	105	27.45	42.56
3	7323.00	40.01 AV	54.00	-13.99	1.00 H	105	-2.55	42.56

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	*2441.00	98.52 PK			1.78 V	180	66.39	32.13
1	*2441.00	68.52 AV			1.78 V	180	36.39	32.13
2	4882.00	59.54 PK	74.00	-14.46	1.11 V	0	23.44	36.10
2	4882.00	29.54 AV	54.00	-24.46	1.11 V	0	-6.56	36.10
3	7323.00	62.85 PK	74.00	-11.15	1.79 V	26	20.29	42.56
3	7323.00	32.85 AV	54.00	-21.15	1.79 V	26	-9.71	42.56

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
  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 be equal to:  $20\log(3.125/100) = -30\text{dB}$
  7. Average value = peak reading +  $20\log(\text{duty cycle})$

<b>CHANNEL</b>	Channel 78	<b>FREQUENCY RANGE</b>	1 ~25GHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	27 deg. C, 59%RH, 965 hPa	<b>TESTED BY</b>	Phoenix Huang

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	*2480.00	107.80 PK			1.41 H	247	75.53	32.27
1	*2480.00	77.80 AV			1.41 H	247	45.53	32.27
2	2483.50	58.77 PK	74.00	-15.23	1.41 H	247	26.48	32.29
2	2483.50	37.52 AV	54.00	-16.48	1.41 H	247	5.23	32.29
3	4960.00	63.05 PK	74.00	-10.95	1.10 H	89	26.77	36.27
3	4960.00	33.05 AV	54.00	-20.95	1.10 H	89	-3.23	36.27
4	7440.00	70.53 PK	74.00	-3.47	1.04 H	96	27.53	43.00
4	7440.00	40.53 AV	54.00	-13.47	1.04 H	96	-2.47	43.00

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	*2480.00	99.80 PK			1.69 V	185	67.53	32.27
1	*2480.00	69.80 AV			1.69 V	185	37.53	32.27
2	2483.50	50.77 PK	74.00	-23.23	1.69 V	185	18.48	32.29
2	2483.50	29.52 AV	54.00	-24.48	1.69 V	185	-2.77	32.29
3	4960.00	59.66 PK	74.00	-14.34	1.59 V	6	23.38	36.27
3	4960.00	29.66 AV	54.00	-24.34	1.59 V	6	-6.62	36.27
4	7440.00	63.97 PK	74.00	-10.03	1.95 V	0	20.97	43.00
4	7440.00	33.97 AV	54.00	-20.03	1.95 V	0	-9.03	43.00

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
  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 be equal to:  $20\log(3.125/100) = -30\text{dB}$
  7. Average value = peak reading +  $20\log(\text{duty cycle})$

### 4.3 BAND EDGES MEASUREMENT

#### 4.3.1 LIMITS OF BAND EDGES MEASUREMENT

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

#### 4.3.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100036	Nov. 23, 2006

**NOTE:**

- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
- 2.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 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.

#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.3.5 EUT OPERATING CONDITION

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

#### 4.3.6 TEST RESULTS (MODE A)

The spectrum plots are attached on the following 2 pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(C).

Note - The delta method is only used up to 2 MHz away from the restricted bandage, The radiated emissions which located in other restricted frequency band, the result, please refer to 4.2.

##### **NOTE (Peak):**

The band edge emission plot on the following first page show 52.19dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2 is 105.20dBuV/m, so the maximum field strength in restrict band is  $105.20 - 52.19 = 53.01$  dBuV/m which is under 74 dBuV/m limit.

The band edge emission plot on the following first page shows 52.58dB delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.2 is 108.1dBuV/m, so the maximum field strength in restrict band is  $108.10 - 52.58 = 55.52$  dBuV/m which is under 74 dBuV/m limit.

##### **NOTE (Average):**

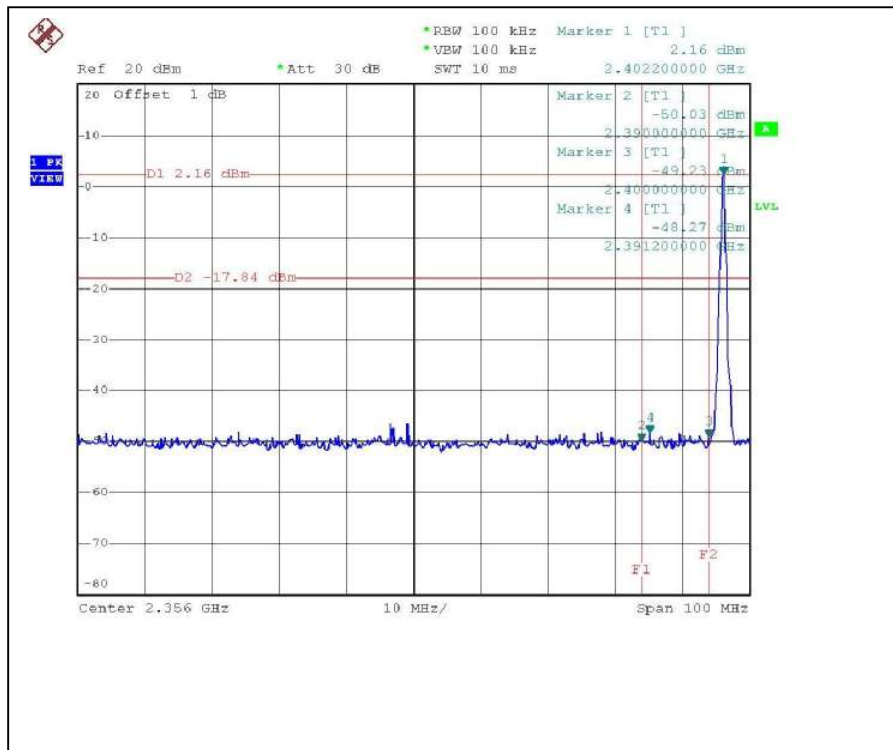
Average value =  $53.01 - 30.00 = 23.01$  dBuV/m, which is under 54 dBuV/m limit.

\*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 be equal to:  $20\log(3.125/100) = -30$  dB. Average value = peak reading - 30.00.

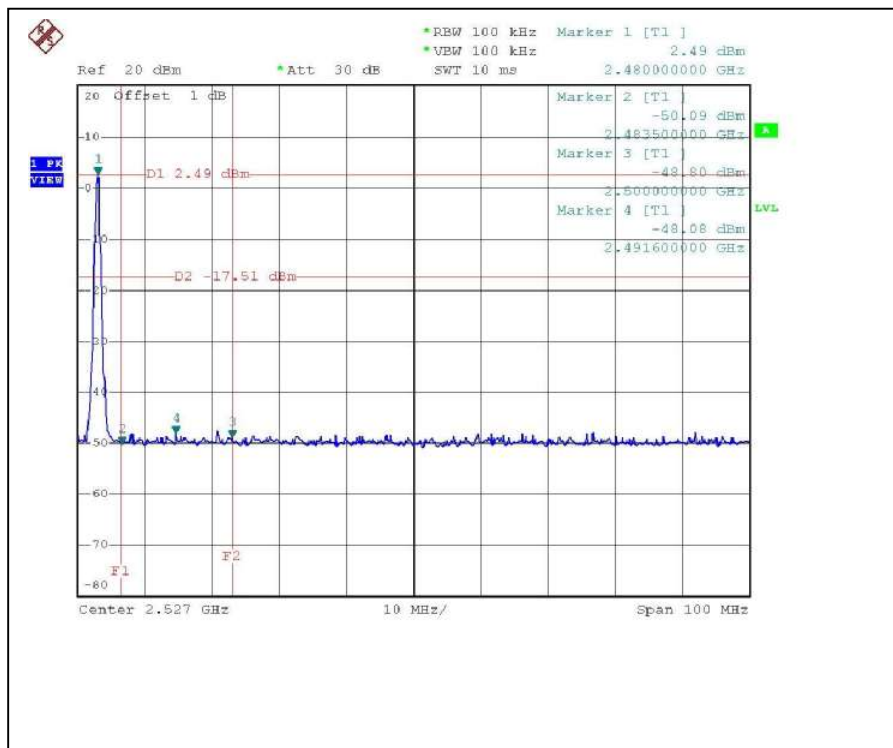
Average value =  $55.52 - 30.00 = 25.52$  dBuV/m, which is under 54 dBuV/m limit.

\*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 be equal to:  $20\log(3.125/100) = -30$  dB. Average value = peak reading - 30.00.

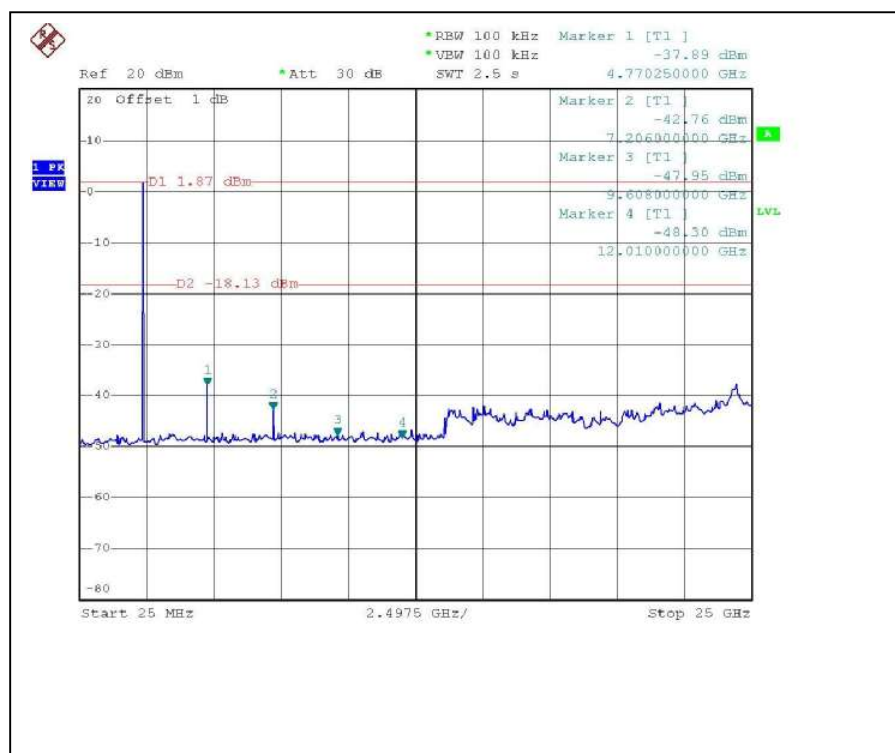
CH0



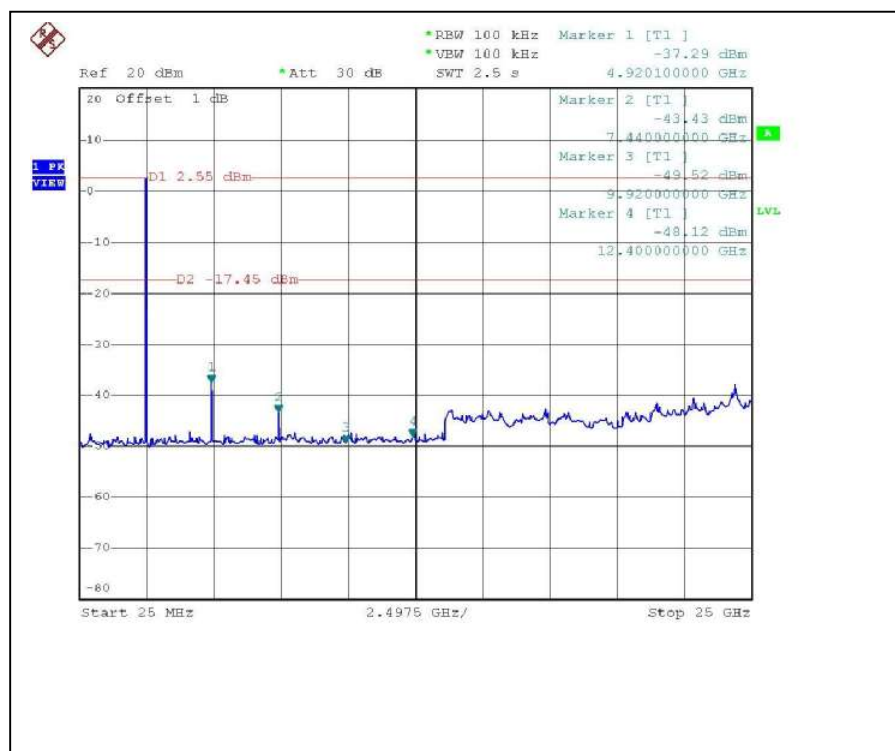
CH78



CH0



CH78



#### 4.3.7 TEST RESULTS (MODE C)

The spectrum plots are attached on the following 2 pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(C).

Note - The delta method is only used up to 2 MHz away from the restricted bandage, The radiated emissions which located in other restricted frequency band, the result, please refer to 4.2.

##### **NOTE (Peak):**

The band edge emission plot on the following first page show 49.96dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2 is 106.80dBuV/m, so the maximum field strength in restrict band is  $106.80 - 49.96 = 56.84$  dBuV/m which is under 74 dBuV/m limit.

The band edge emission plot on the following first page shows 49.03dB delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.2 is 107.80dBuV/m, so the maximum field strength in restrict band is  $107.80 - 49.03 = 58.77$  dBuV/m which is under 74 dBuV/m limit.

##### **NOTE (Average):**

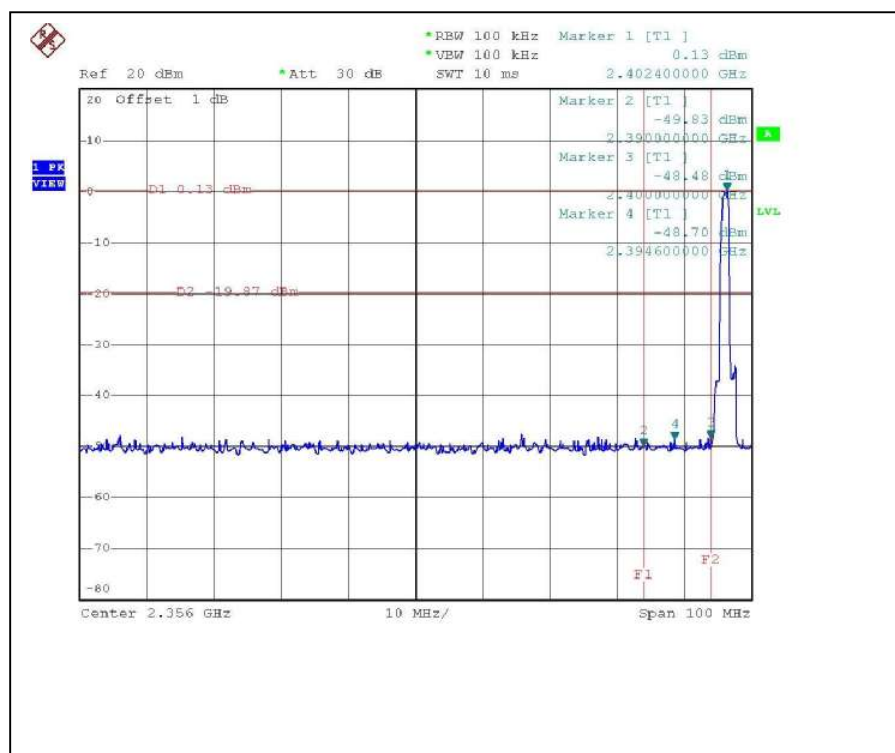
Average value =  $56.84 - 30.00 = 26.84$  dBuV/m, which is under 54 dBuV/m limit.

\*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 be equal to:  $20\log(3.125/100) = -30$  dB. Average value = peak reading - 30.00.

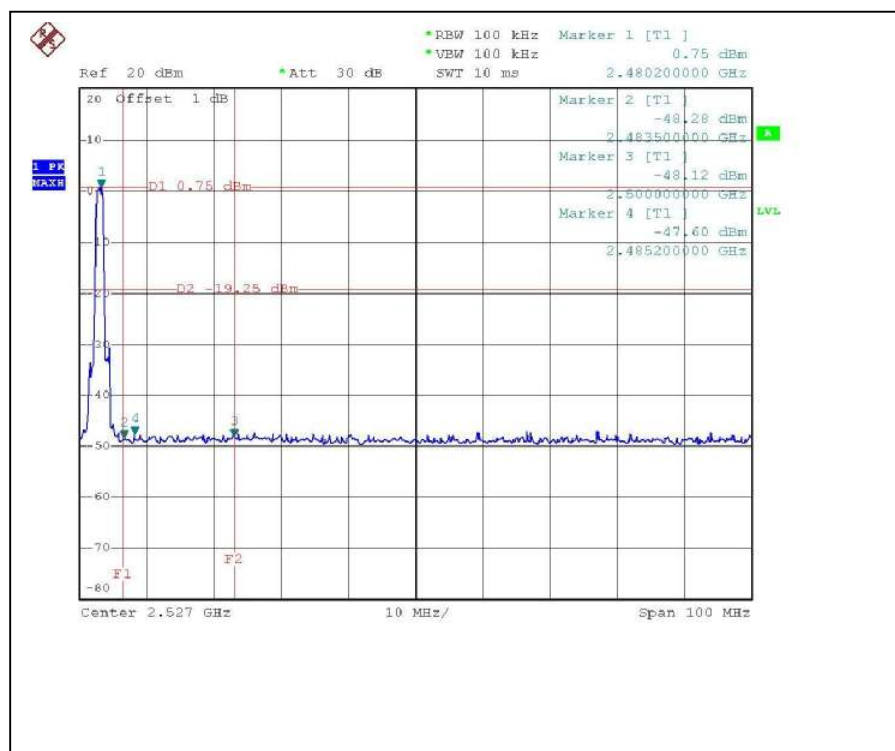
Average value =  $58.77 - 30.00 = 28.77$  dBuV/m, which is under 54 dBuV/m limit.

\*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 be equal to:  $20\log(3.125/100) = -30$  dB. Average value = peak reading - 30.00.

## CH0

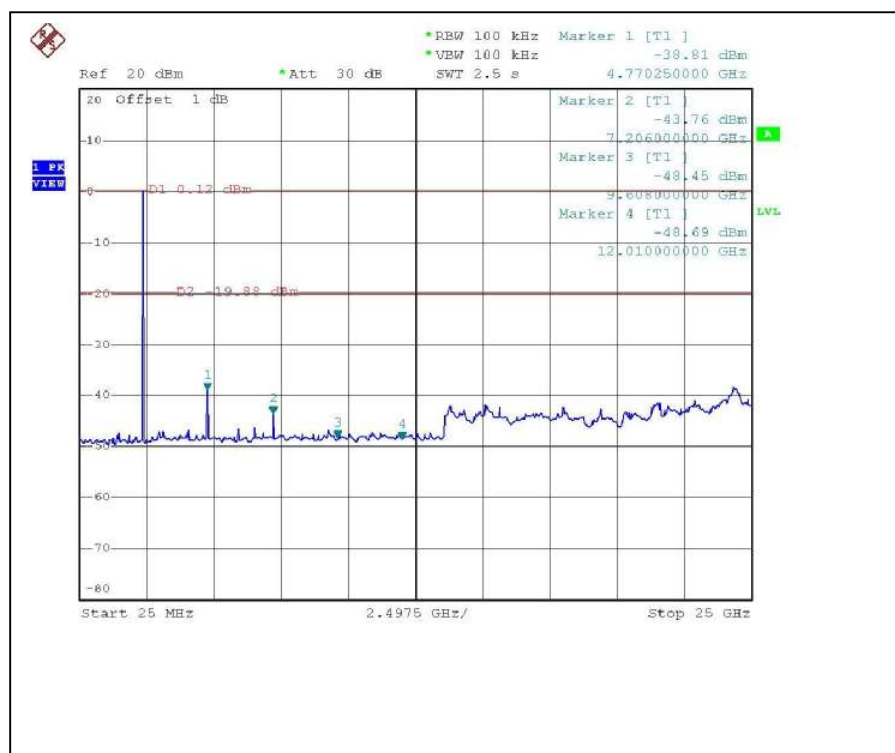


## CH78

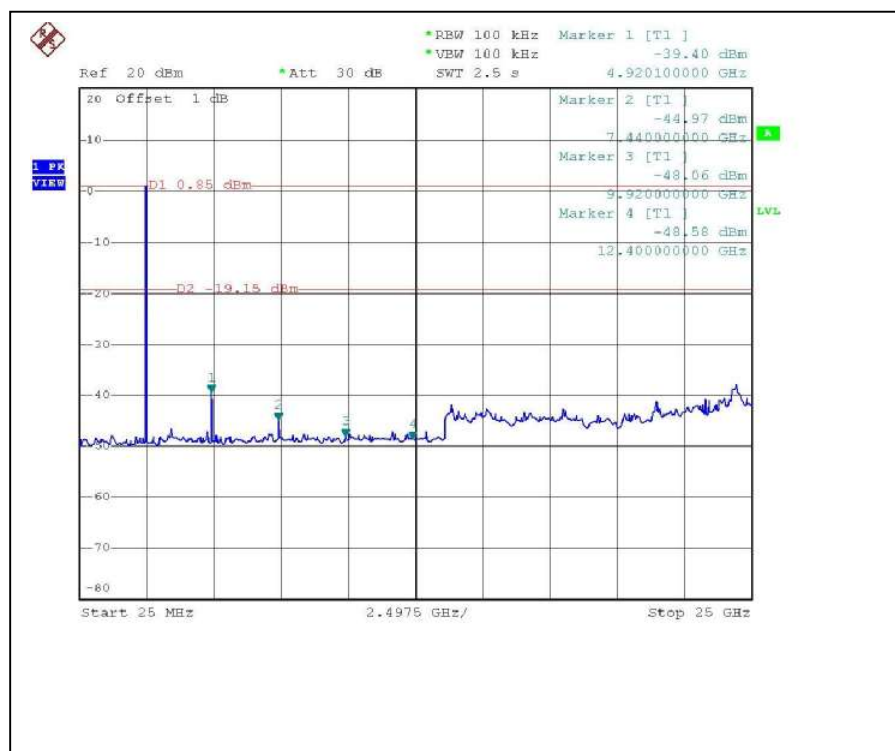




CH0



CH78



## **4.4 ANTENNA REQUIREMENT**

### **4.4.1 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.

### **4.4.2 ANTENNA CONNECTED CONSTRUCTION**

The antenna used in this product is Chip antenna without connector. The maximum Gain of the antenna is 2 dBi.

## 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

### RADIATED EMISSION TEST





## 6 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:

<b>USA</b>	FCC, UL, A2LA
<b>Germany</b>	TUV Rheinland
<b>Japan</b>	VCCI
<b>Norway</b>	NEMKO
<b>Canada</b>	INDUSTRY CANADA, CSA
<b>R.O.C.</b>	CNLA, BSMI, NCC
<b>Netherlands</b>	Telefication
<b>Singapore</b>	PSB, GOST-ASIA (MOU)
<b>Russia</b>	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](http://www.adt.com.tw/index.5/phtml).

If you have any comments, please feel free to contact us at the following:

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**Email:** [service@adt.com.tw](mailto:service@adt.com.tw)

**Web Site:** [www.adt.com.tw](http://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.