FCC TEST REPORT

REPORT NO. : RF940126L09B
MODEL NO. : NTE4002
RECEIVED : Jan. 26, 2005
TESTED : Jan. 26 ~ Jan. 27, 2005
ISSUED : Aug. 31, 2006

APPLICANT : Nasaco Electronics (HK) Ltd.
ADDRESS : 11/F., Unit 6, Eastern Centre, 1065 King's Road, Quarry Bay, Hong Kong

ISSUED BY : Advance Data Technology Corporation
LAB ADDRESS : No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang 244, Taipei Hsien, Taiwan, R.O.C.
TEST LOCATION : No. 19, Hwa Ya 2nd Rd., Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

ACCREDITED
No. 2177-01

TABLE OF CONTENTS

1. CERTIFICATION

PRODUCT:	Bluetooth stereo headset
MODEL NO:	NTE4002
TEST SAMPLE:	ENGINEERING SAMPLE
TESTED:	Jan. 26 ~ Jan. 27, 2005
APPLICANT:	Nasaco Electronics (HK) Ltd.
STANDARDS:	FCC Part 15, Subpart C (Section 15.247) ANSI C63.4-2003

The above equipment 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 : Andrea Hsia , **DATE:** Aug. 31, 2006
Andrea Hsia

TECHNICAL ACCEPTANCE : Long Chen , **DATE:** Aug. 31, 2006
Responsible for RF Long Chen

APPROVED BY : Gary Chang , **DATE:** Aug. 31, 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	N/A	Power supply is 3Vdc from batteries.
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 –14.29dB at 31.71MHz.
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	3.63 dB
	200MHz ~1000MHz	3.65 dB
	1GHz ~ 18GHz	2.20 dB
	18GHz ~ 40GHz	1.88 dB

3. GENERAL INFORMATION

3.1. GENERAL DESCRIPTION OF EUT

PRODUCT	Bluetooth stereo headset
MODEL NO.	NTE4002
FCC ID	LLP-NTE4002
POWER SUPPLY	3Vdc from batteries
MODULATION TYPE	GFSK
MODULATION TECHNOLOGY	FHSS
TRANSFER RATE	723Kbps
FREQUENCY RANGE	2402MHz ~ 2480MHz
NUMBER OF CHANNEL	79
OUTPUT POWER	2.355mW
ANTENNA TYPE	Chip antenna with 3dBi gain
DATA CABLE	NA
I/O PORTS	NA

NOTE:

1. This is a duplicate report of RF940126L09, the differences are changing the model name, product name, FCC ID and applicant.
2. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

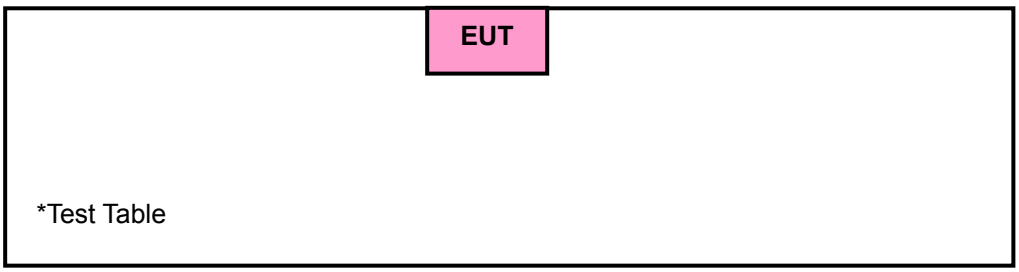
3.2. DESCRIPTION OF TEST MODES

Operated in 2402 ~ 2480MHz Band:

79 channels are provided to this EUT.

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

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



3.2.2 TEST MODE APPLICABILITY:

EUT configure mode	Applicable to				Description
	PLC	RE<1G	RE≥1G	APCM	
-	Note 1	√	√	√	-

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: EUT powered from the 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, XYZ axis and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	AXIS
0 to 78	0	FHSS	GFSK	X

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, XYZ axis and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE	AXIS
0 to 78	0, 39, 78	FHSS	GFSK	DH5	X

Bandedge Measurement:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, packet types and antenna ports (if EUT with antenna diversity architecture).

☒ 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

Antenna Port Conducted Measurement:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, packet types and antenna ports (if EUT with antenna diversity architecture).

☒ 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

3.3. DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product, according to the specifications of the manufacturers, it must comply with the requirements of the following standards:

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

All tests 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. The test report has been issued separately.

3.4. 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 the 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
Test Receiver ROHDE & SCHWARZ	ESI7	838496/016	Feb. 09, 2005
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Nov. 29, 2005
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Feb. 03, 2005
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-404	Feb. 03, 2005
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA 9170242	Feb. 23, 2005
Preamplifier Agilent	8447D	2944A10631	Nov. 17, 2005
Preamplifier Agilent	8449B	3008A01960	Nov. 14, 2005
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	219272/4	Mar. 04, 2005
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	219275/4	Mar. 04, 2005
Software ADT.	ADT_Radiated_V5.14	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA
Turn Table ADT.	TT100.	TT93021704	NA
Turn Table Controller ADT.	SC100.	SC93021704	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 3.

3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

4. The IC Site Registration No. is IC4924-4.

4.2.3. TEST PROCEDURE

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters 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.

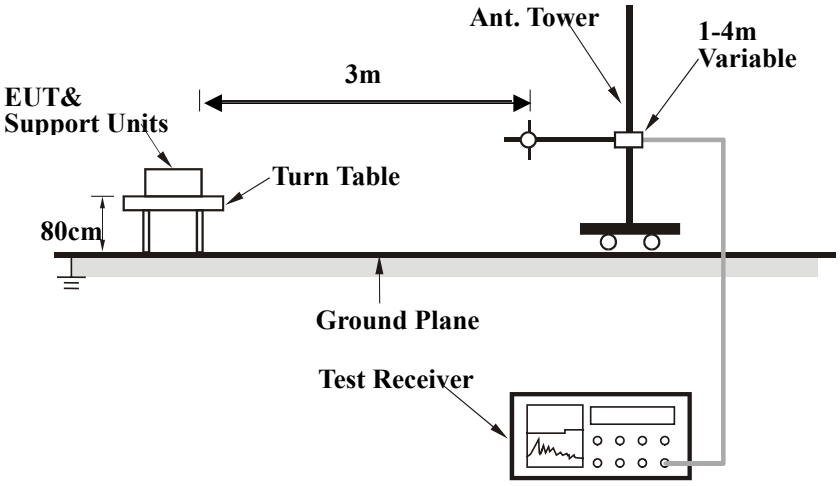
NOTE:

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 and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection 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. Placed the EUT on a testing table.

b. Ran a test program (provided by manufacturer) to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.2.7. TEST RESULTS

RADIATED WORST CASE DATA: BELOW 1GHz

CHANNEL	0	**FREQUENCY RANGE**	Below 1 GHz
MODULATION TYPE	GFSK	**DETECTOR FUNCTION**	Quasi-Peak
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	24 deg. C, 63% RH, 991 hPa
TESTED BY	Long 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	70.82	17.54 QP	40.00	-22.46	1.00 H	310	5.28	12.27
2	154.41	27.58 QP	43.50	-15.92	1.75 H	163	12.78	14.80
3	183.57	29.15 QP	43.50	-14.35	1.50 H	187	16.54	12.61
4	393.51	19.49 QP	46.00	-26.51	2.00 H	85	2.92	16.57
5	436.27	24.27 QP	46.00	-21.73	1.75 H	274	6.62	17.65
6	861.98	24.21 QP	46.00	-21.79	1.50 H	172	0.08	24.13
7	**955.29**	**31.71 QP**	**46.00**	**-14.29**	**1.50 H**	**271**	**6.36**	**25.35**

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	70.82	21.74 QP	40.00	-18.26	1.00 V	346	9.48	12.27
2	84.43	19.99 QP	40.00	-20.01	1.00 V	100	10.02	9.97
3	127.19	20.39 QP	43.50	-23.11	1.25 V	346	6.96	13.43
4	156.35	24.15 QP	43.50	-19.35	1.00 V	79	9.30	14.85
5	181.62	22.42 QP	43.50	-21.08	2.00 V	109	9.65	12.77
6	821.16	23.32 QP	46.00	-22.68	1.50 V	250	-0.33	23.65
7	883.37	24.73 QP	46.00	-21.27	2.50 V	100	0.22	24.51
8	955.29	30.28 QP	46.00	-15.72	1.75 V	244	4.94	25.35

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

CHANNEL	0	**FREQUENCY RANGE**	1 ~ 25 GHz
MODULATION TYPE	GFSK	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	24 deg. C, 63% RH, 991 hPa
TESTED BY	Long 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	*2402.00	104.34 PK			1.37 H	115	71.23	33.11
1	*2402.00	74.34 AV			1.37 H	115	41.23	33.11
2	7206.00	54.28 PK	74.00	-19.72	1.60 H	346	9.68	44.60
2	7206.00	24.28 AV	54.00	-29.72	1.60 H	346	-20.32	44.60

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	*2402.00	102.33 PK			1.23 V	345	69.22	33.11
1	*2402.00	72.33 AV			1.23 V	345	39.22	33.11
2	7206.00	53.09 PK	74.00	-20.91	1.34 V	23	8.49	44.60
2	7206.00	23.09 AV	54.00	-30.91	1.34 V	23	-21.51	44.60

REMARKS:
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 247 ms per channel. Therefore, the duty cycle be equal to: 20log(3.125/100)= -30dB
7. Average value = peak reading –20log(duty cycle).

CHANNEL	39	**FREQUENCY RANGE**	1 ~ 25 GHz
MODULATION TYPE	GFSK	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	24 deg. C, 63% RH, 991 hPa
TESTED BY	Long 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	*2441.19	101.25 PK			1.30 H	224	69.43	31.82
1	*2441.19	71.25 AV			1.30 H	224	39.43	31.82
2	7323.00	53.85 PK	74.00	-20.15	1.38 H	335	11.28	42.57
2	7323.00	23.85 AV	54.00	-30.15	1.38 H	335	-18.72	42.57

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	99.43 PK			1.20 V	321	67.62	31.81
1	*2441.00	69.43 AV			1.20 V	321	37.62	31.81
2	7323.00	52.81 PK	74.00	-21.19	1.46 V	307	10.24	42.57
2	7323.00	22.81 AV	54.00	-31.19	1.46 V	307	-19.76	42.57

REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 247 ms per channel. Therefore, the duty cycle be equal to: 20log(3.125/100)= -30dB
7. Average value = peak reading –20log(duty cycle).

CHANNEL	78	**FREQUENCY RANGE**	1 ~ 25 GHz
MODULATION TYPE	GFSK	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	24 deg. C, 63% RH, 991 hPa
TESTED BY	Long 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	*2480.00	100.58 PK			1.18 H	229	68.52	32.06
1	*2480.00	70.58 AV			1.18 H	229	38.52	32.06
2	7440.00	56.86 PK	74.00	-17.14	1.35 H	344	13.80	43.06
2	7440.00	26.86 AV	54.00	-27.14	1.35 H	344	-16.20	43.06

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	98.41 PK			1.05 V	38	66.35	32.06
1	*2480.00	68.41 AV			1.05 V	38	36.35	32.06
2	7440.00	53.84 PK	74.00	-20.16	1.62 V	217	10.78	43.06
2	7440.00	23.84 AV	54.00	-30.16	1.62 V	217	-19.22	43.06

REMARKS:
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 247 ms per channel. Therefore, the duty cycle be equal to: 20log(3.125/100)= -30dB
7. Average value = peak reading –20log(duty cycle).

4.3. NUMBER OF HOPPING FREQUENCY USED

4.3.1. LIMITS OF HOPPING FREQUENCY USED

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

4.3.2. TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100035	Apr. 19, 2005

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

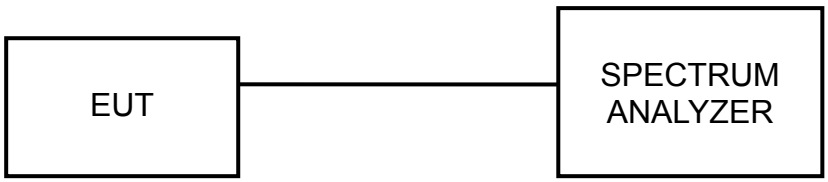
4.3.3. TEST PROCEDURE

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. 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.
3. 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.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

4.3.4. DEVIATION FROM TEST STANDARD

No deviation.

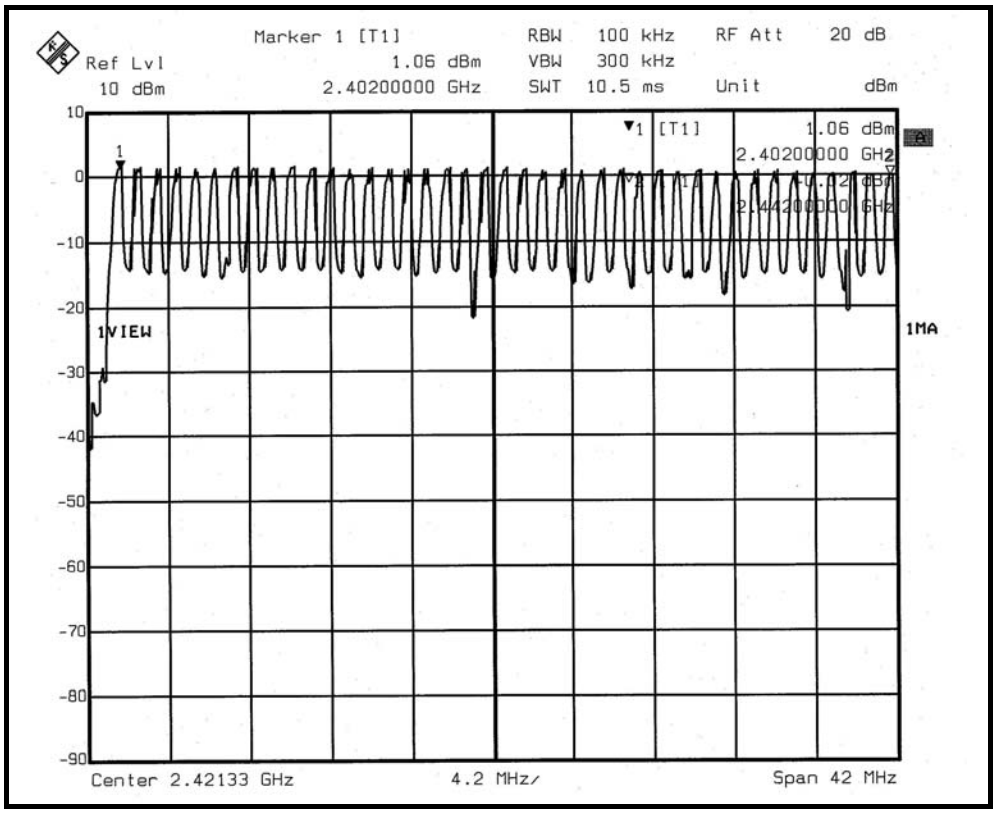
4.3.5. TEST SETUP

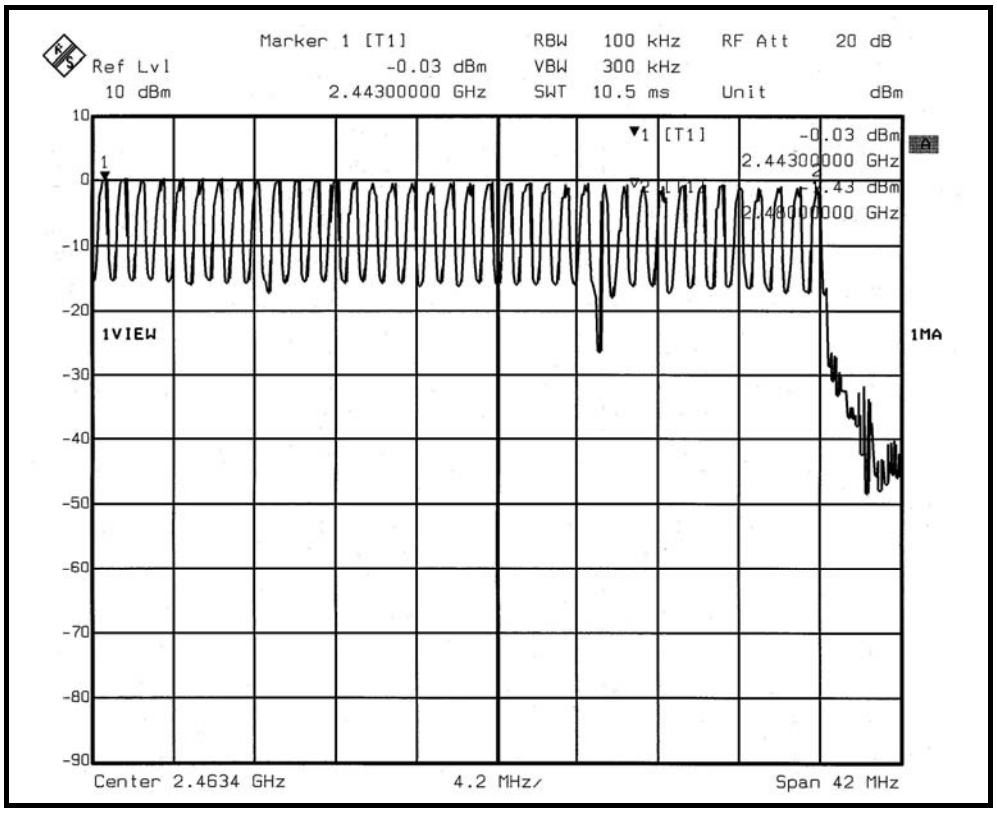


For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

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 hopping frequencies are equally spaced.


Marker 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
1.06 dBm
VBW 300 kHz
10 dBm
2.40200000 GHz
SWT 10.5 ms
Unit dBm
1 [T1]
1.06 dBm
2.40200000 GHz
1VIEW
1MA
Center 2.42133 GHz
4.2 MHz/
Span 42 MHz


Marker 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
-0.03 dBm
VBW 300 kHz
10 dBm
2.44300000 GHz
SWT 10.5 ms
Unit dBm
1 [T1]
-0.03 dBm
2.44300000 GHz
1VIEW
1MA
Center 2.4634 GHz
4.2 MHz/
Span 42 MHz

4.4. DWELL TIME ON EACH CHANNEL

4.4.1. LIMITS OF DWELL TIME USED

For FHSS, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 31.6 second period. For hybrid systems, the average time of occupancy on any frequency should not exceed 0.4 seconds within a time period in seconds equal to the number of hopping frequencies employed multiplied by 0.4

4.4.2. TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100035	Apr. 19, 2005

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

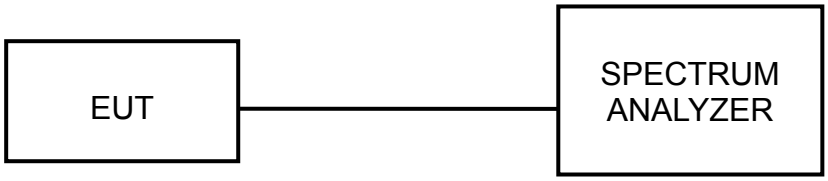
4.4.3. TEST PROCEDURE

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. 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.
3. 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.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

4.4.4. DEVIATION FROM TEST STANDARD

No deviation.

4.4.5. TEST SETUP



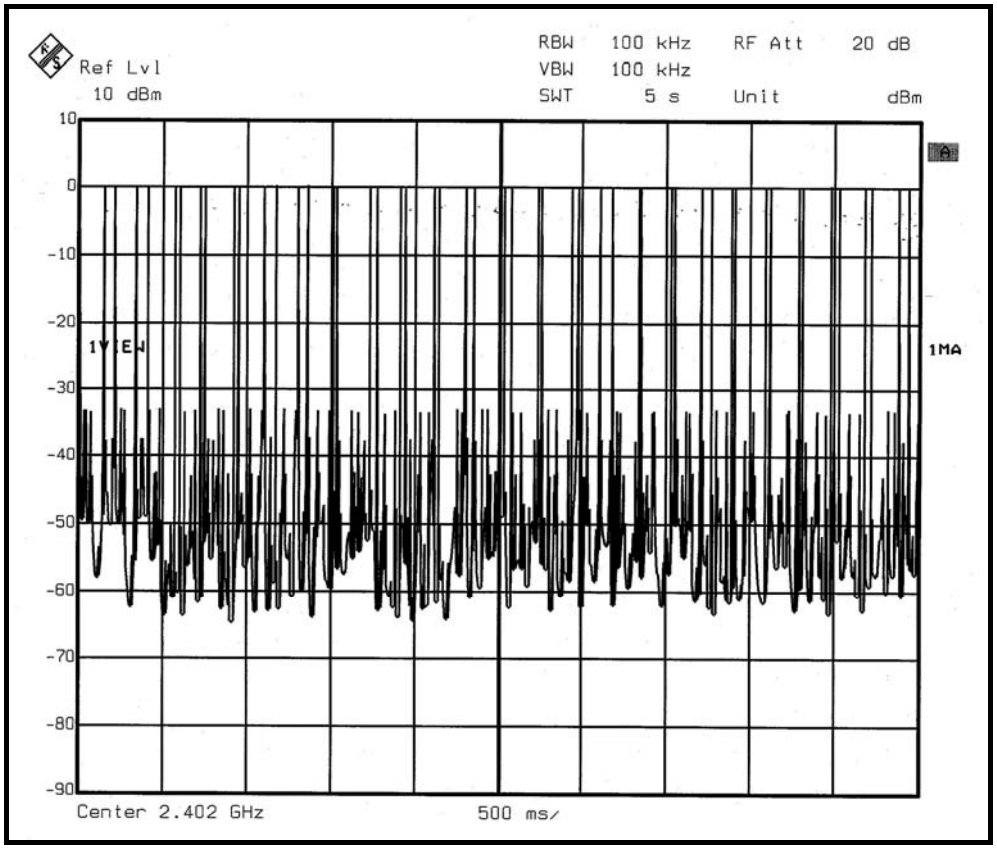
For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

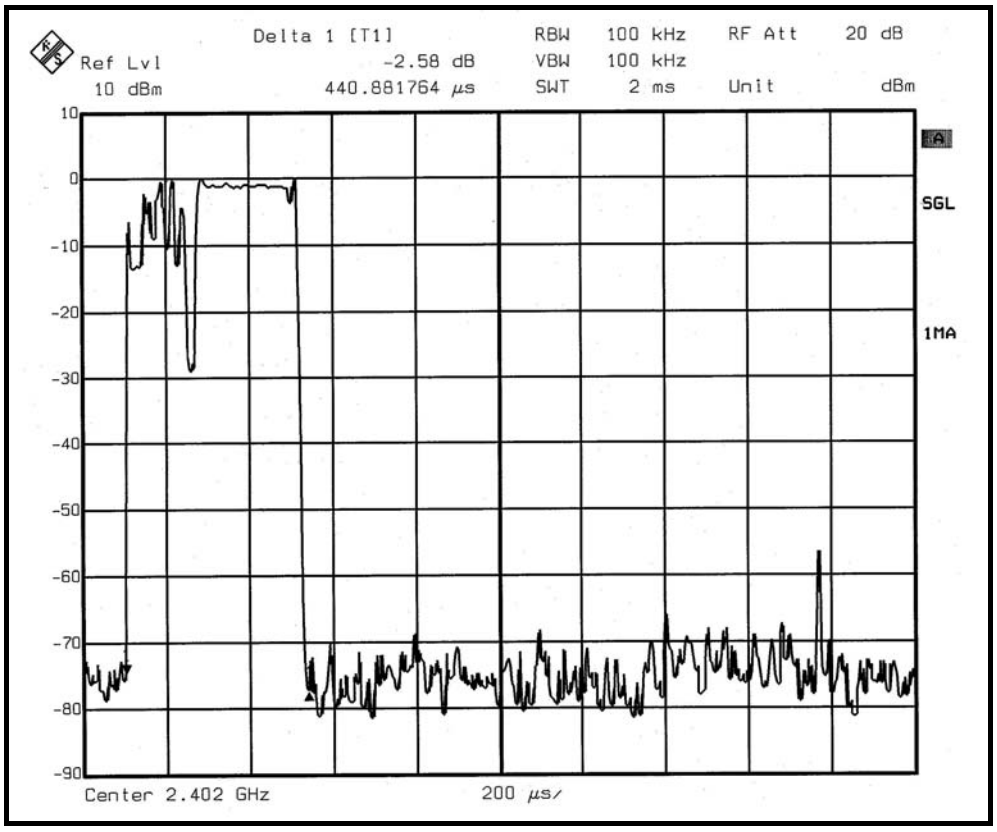
4.4.6. TEST RESULTS

MODE	NUMBER OF TRANSMISSION IN A 31.6 (79HOPPING * 0.4)	LENGTH OF TRANSMISSION TIME (msec)	RESULT (msec)	LIMIT (msec)
DH1	48 (times / 5 sec) * 6.32 = 303.36 times	0.440	133.48	400
DH3	24 (times / 5 sec) * 6.32= 151.68 times	1.740	263.92	400
DH5	20 (times / 5 sec) * 6.32= 126.40 times	3.006	379.96	400

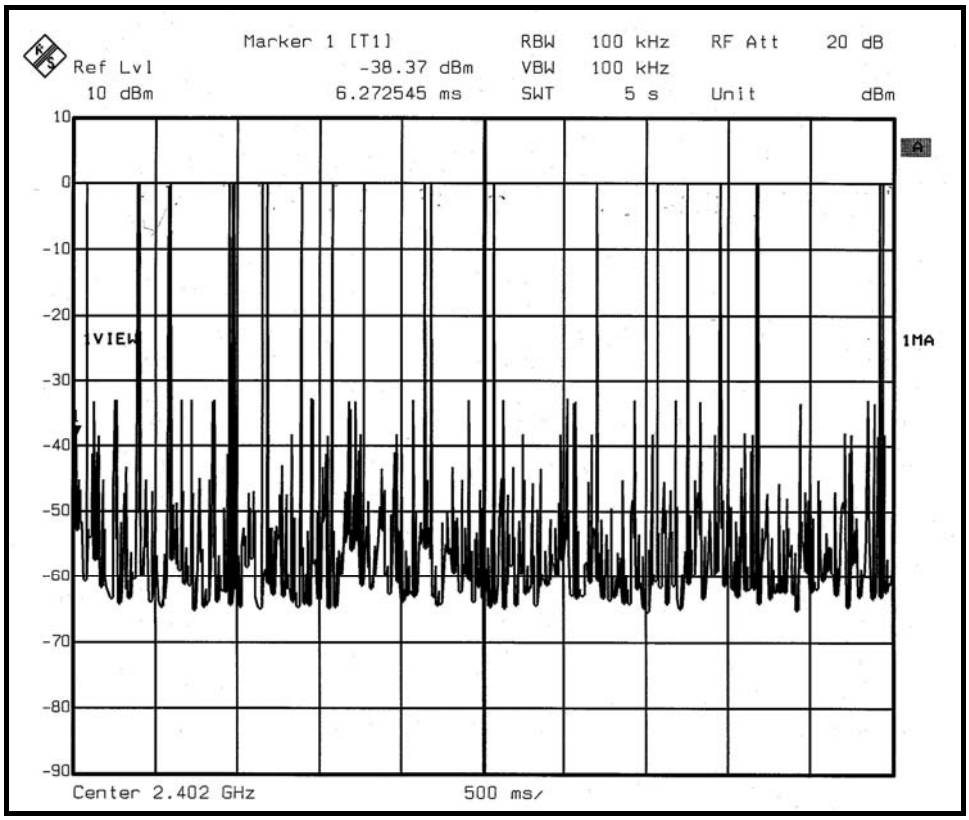
NOTE: Test plots of the transmitting time slot are shown on next six pages.

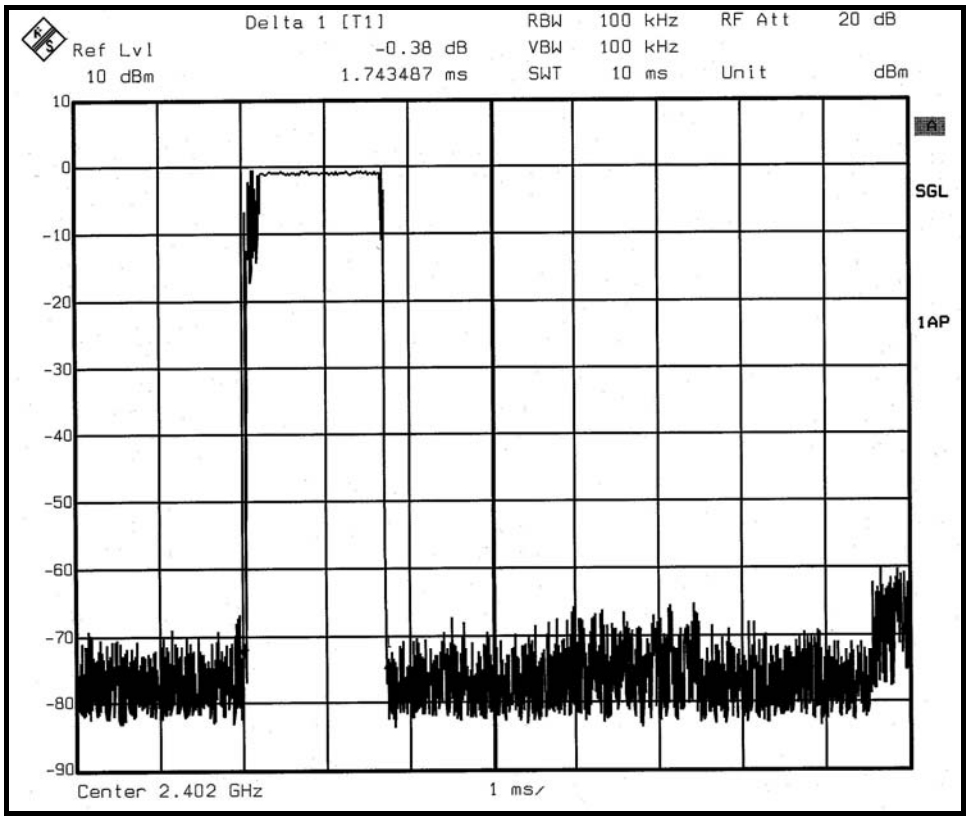
DH1


RBW 100 kHz
RF Att 20 dB
VBW 100 kHz
SWT 5 s
Unit dBm
Ref Lvl
10 dBm
1VIEW
1MA
Center 2.402 GHz
500 ms/

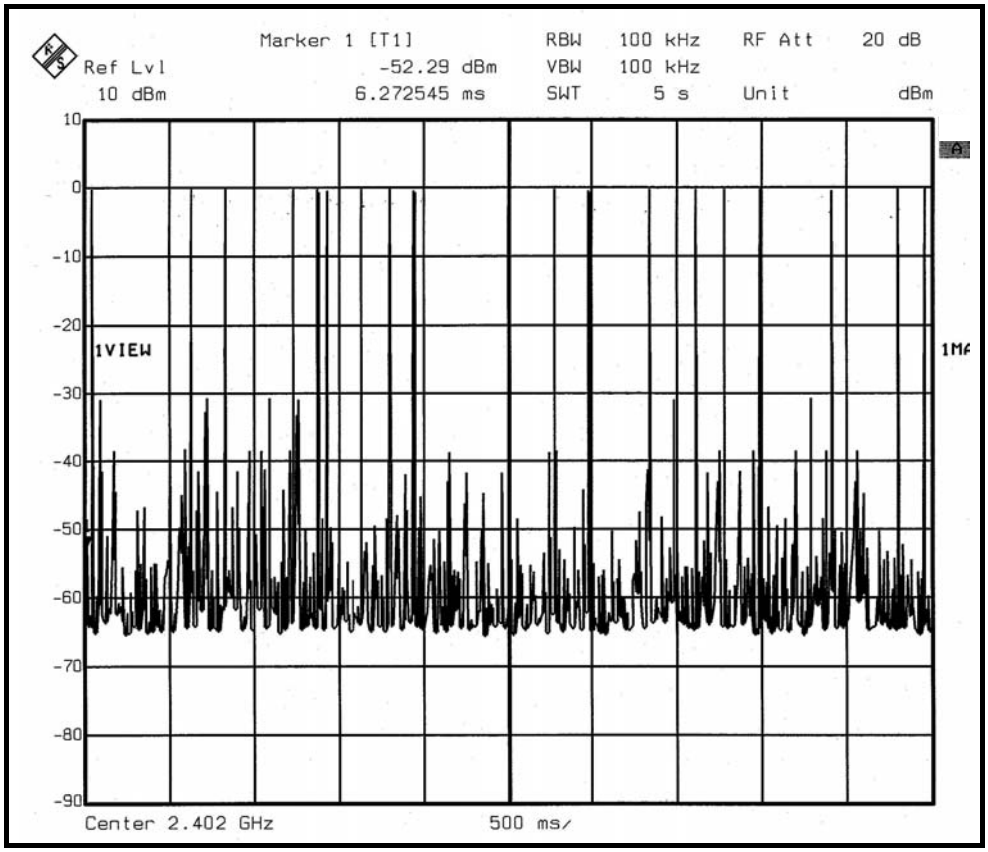

Delta 1 [T1]
-2.58 dB
440.881764 µs
RBW 100 kHz
RF Att 20 dB
VBW 100 kHz
SWT 2 ms
Unit dBm
Ref Lvl
10 dBm
SGL
1MA
Center 2.402 GHz
200 µs/

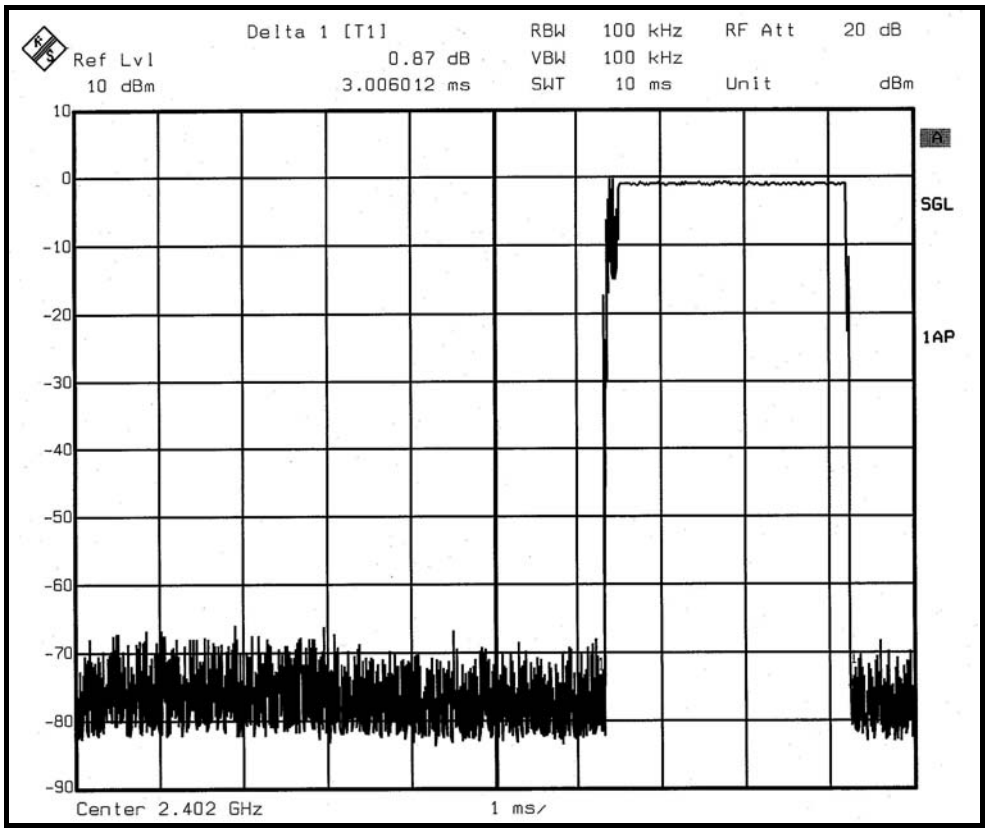
DH3


Marker 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
-38.37 dBm
VBW 100 kHz
10 dBm
6.272545 ms
SWT 5 s
Unit dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
1VIEW
1MA
Center 2.402 GHz
500 ms/


Delta 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
-0.38 dB
VBW 100 kHz
10 dBm
1.743487 ms
SWT 10 ms
Unit dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
SGL
1AP
Center 2.402 GHz
1 ms/

DH5


Marker 1 [T1]
-52.29 dBm
6.272545 ms
RBW 100 kHz
VBW 100 kHz
SWT 5 s
RF Att 20 dB
Unit dBm
Ref Lvl
10 dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
1VIEW
Center 2.402 GHz
500 ms/


Delta 1 [T1]
0.87 dB
3.006012 ms
RBW 100 kHz
VBW 100 kHz
SWT 10 ms
RF Att 20 dB
Unit dBm
Ref Lvl
10 dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
SGL
1AP
Center 2.402 GHz
1 ms/

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 20dBbandwidth of hopping channel shell be a minimum limit for the hopping channel separation.

4.5.2. TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100035	Apr. 19, 2005

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

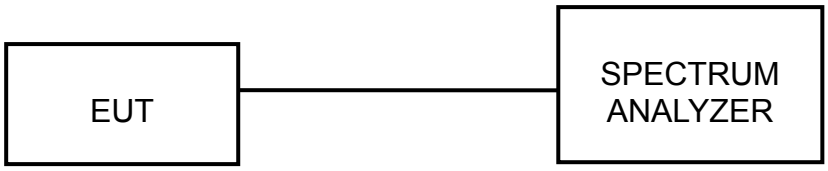
4.5.3. TEST PROCEDURE

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. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
4. 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

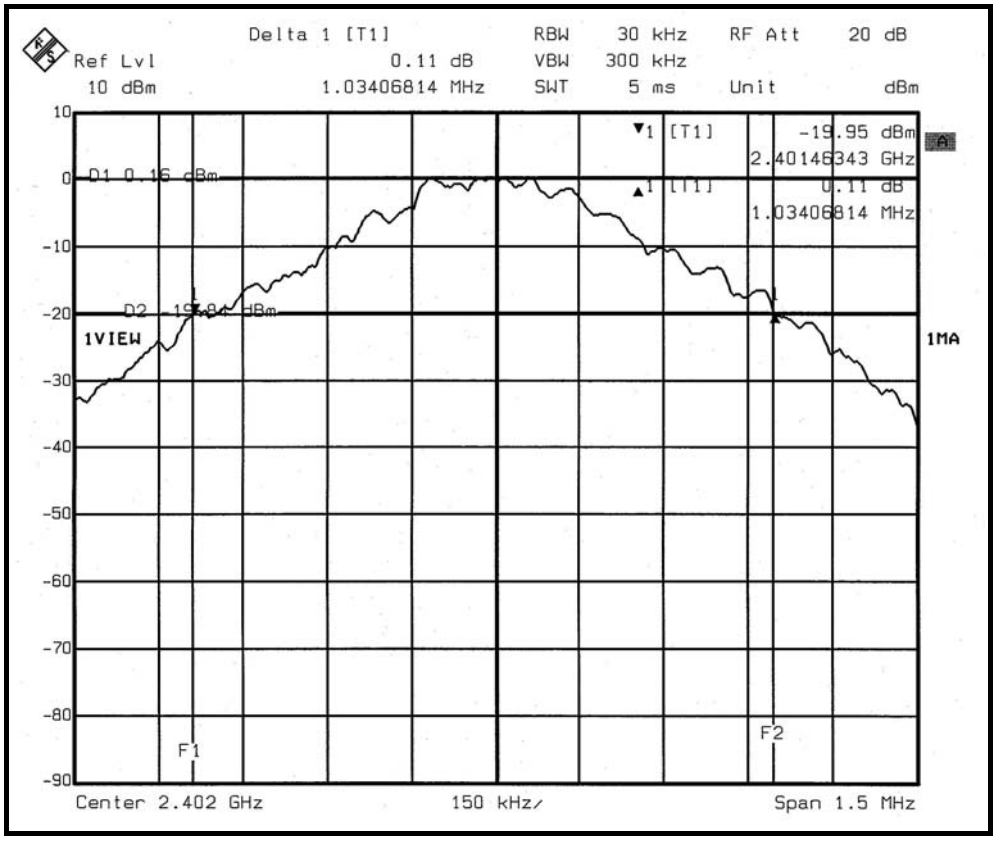
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.5.7. TEST RESULTS

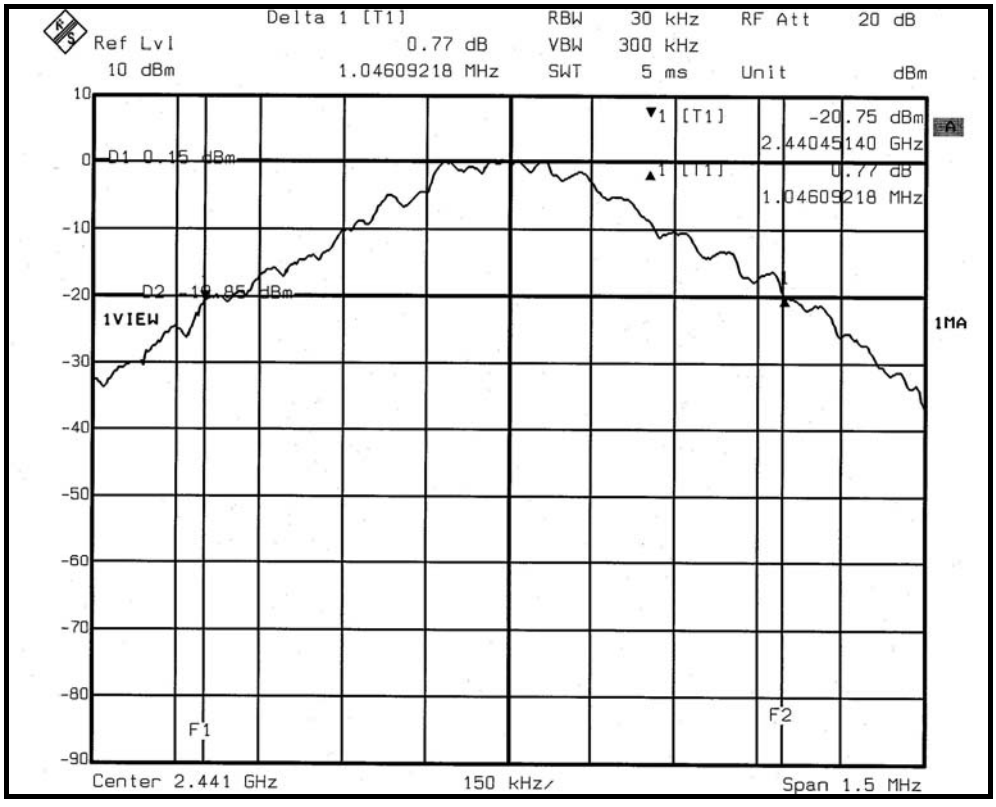
MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	23 deg. C, 60% RH, 991 hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Leo Hung

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (kHz)	MORE THAN 25kHz
0	2402	689	Yes
39	2441	697	Yes
78	2480	693	Yes

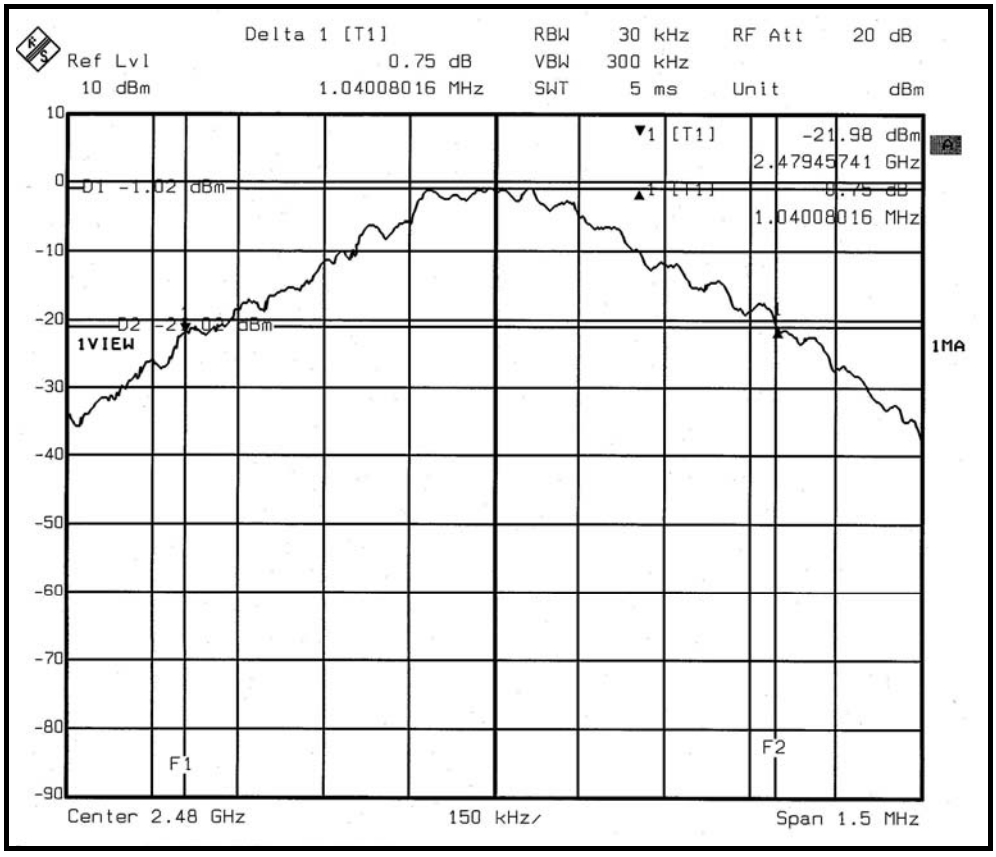
CH0


Delta 1 [T1]
RBW 30 kHz
RF Att 20 dB
Ref Lvl
0.11 dB
VBW 300 kHz
10 dBm
1.03406814 MHz
SWT 5 ms
Unit dBm
1 [T1] -19.95 dBm
2.40146343 GHz
1 [T1] 0.11 dB
1.03406814 MHz
D1 0.16 dBm
D2 -19.84 dBm
1VIEW
1MA
F1
F2
Center 2.402 GHz
150 kHz/
Span 1.5 MHz

CH39


Delta 1 [T1]
RBW 30 kHz
RF Att 20 dB
Ref Lvl
0.77 dB
VBW 300 kHz
10 dBm
1.04609218 MHz
SWT 5 ms
Unit dBm
1 [T1] -20.75 dBm
2.44045140 GHz
1 [T1] 0.77 dB
1.04609218 MHz
D1 0.15 dBm
D2 -19.85 dBm
1VIEW
1MA
F1
F2
Center 2.441 GHz
150 kHz/
Span 1.5 MHz

CH78


Delta 1 [T1]
RBW 30 kHz
RF Att 20 dB
Ref Lvl
0.75 dB
VBW 300 kHz
10 dBm
1.04008016 MHz
SWT 5 ms
Unit dBm
▼1 [T1]
-21.98 dBm
2.47945741 GHz
D1 -1.02 dBm
▲1 [T1]
0.75 dB
1.04008016 MHz
D2 -21.02 dBm
1VIEW
1MA
F1
F2
Center 2.48 GHz
150 kHz/
Span 1.5 MHz

4.6. HOPPING CHANNEL SEPARATION

4.6.1. LIMITS OF HOPPING CHANNEL SEPARATION

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

4.6.2. TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100035	Apr. 19, 2005

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

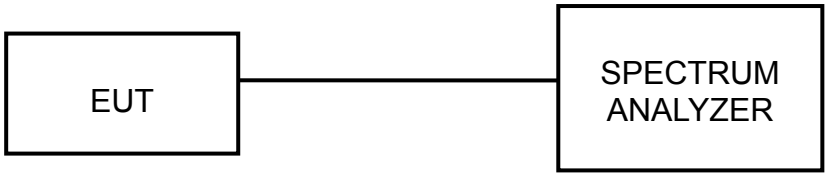
4.6.3. TEST PROCEDURE

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



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

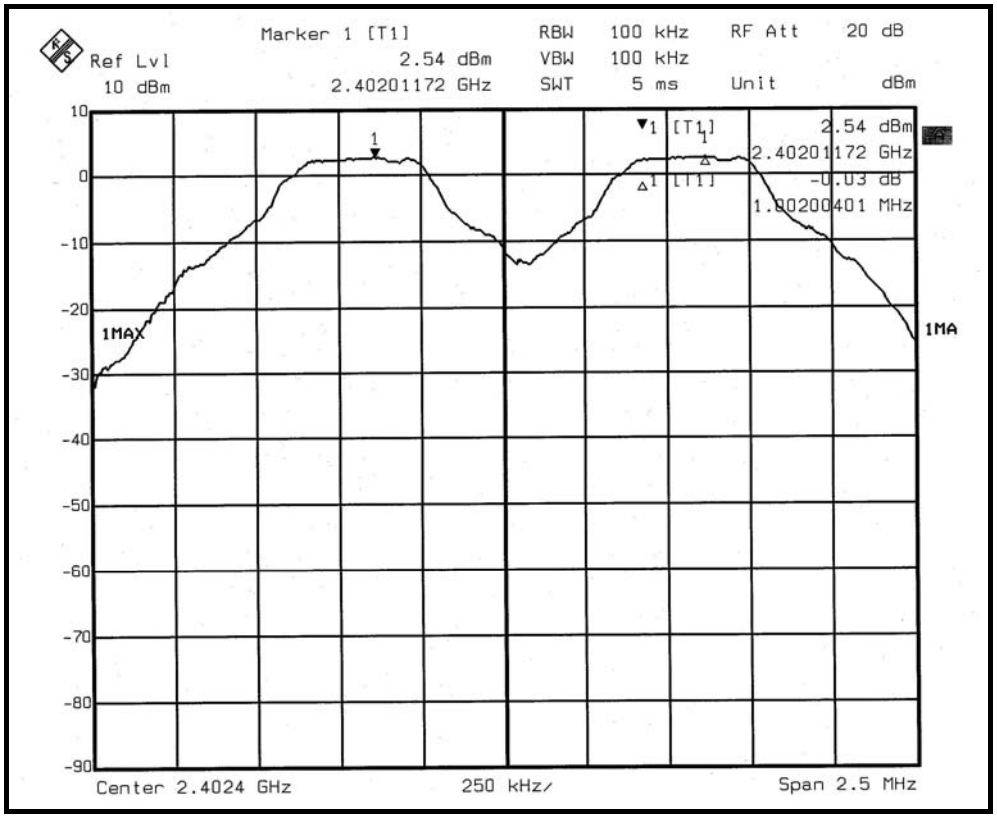
4.6.6. TEST RESULTS

MODULATION TYPE	GFSK	**ENVIRONMENTAL CONDITIONS**	25 deg. C, 62% RH, 991 hPa
INPUT POWER (SYSTEM)	23 deg. C, 69%RH, 991 hPa	**TESTED BY**	Leo Hung

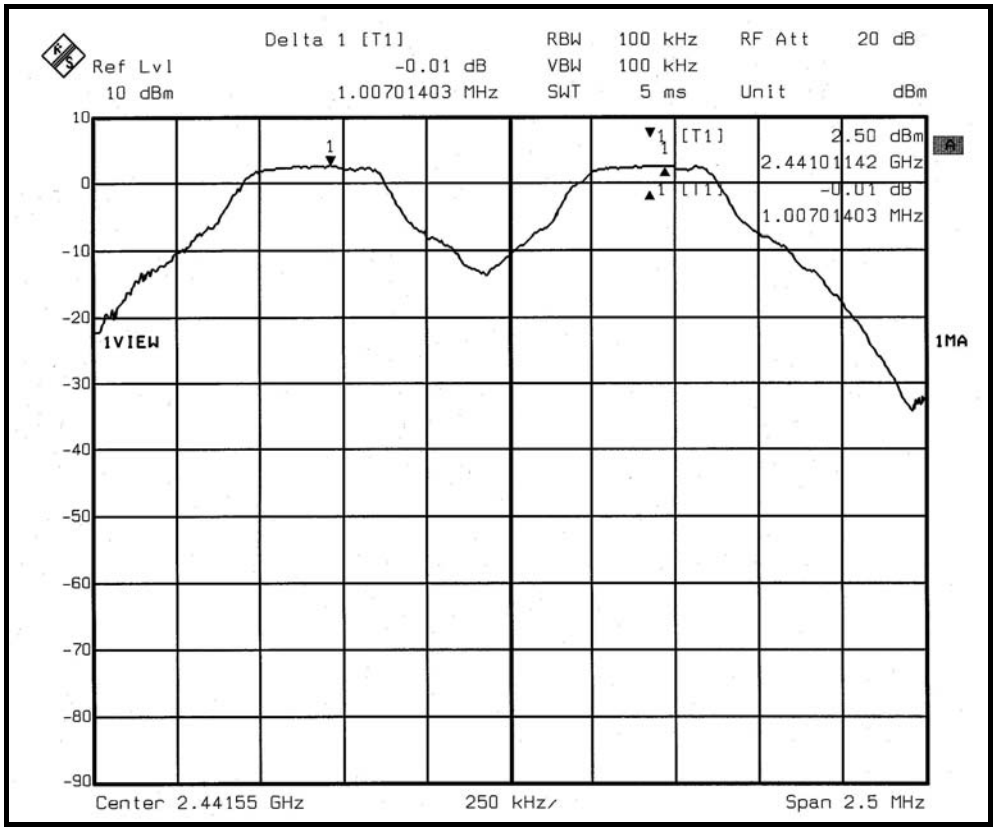
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION	MINIMUM LIMIT (kHz)	PASS/FAIL
0	2402	1.002MHz	675	PASS
39	2441	1.007MHz	684	PASS
78	2480	1.002MHz	681	PASS

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

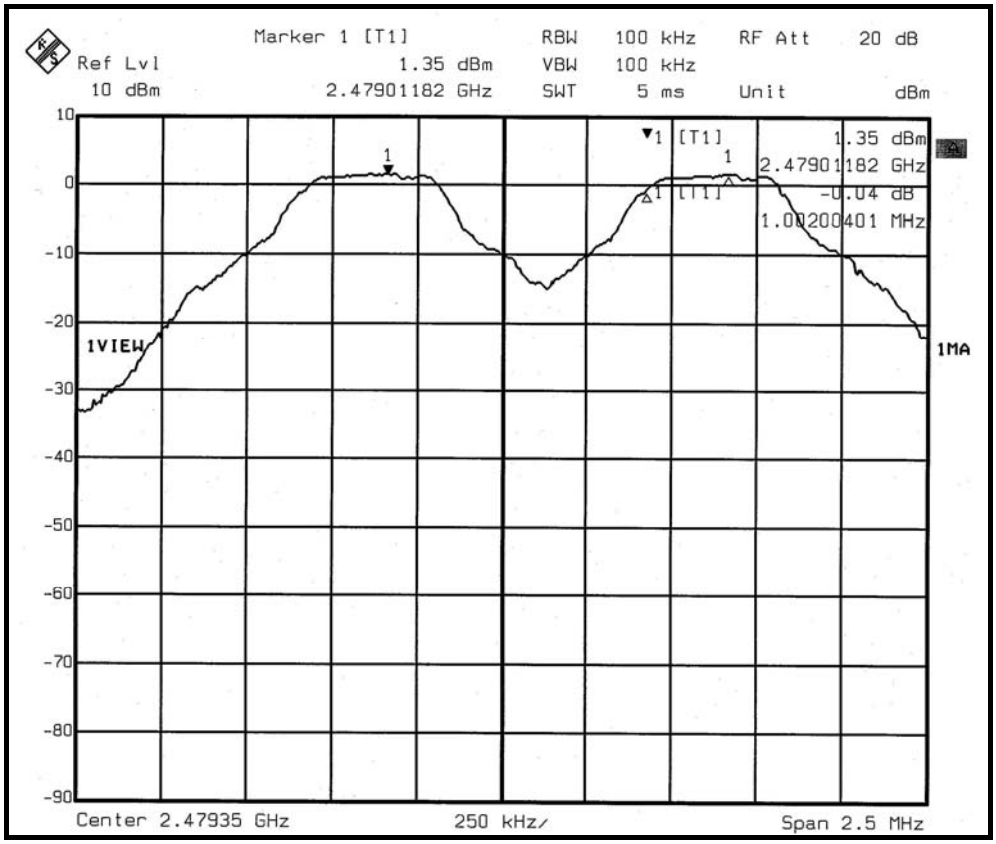
CH0


Marker 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
2.54 dBm
VBW 100 kHz
10 dBm
2.40201172 GHz
SWT 5 ms
Unit dBm
[T1]
2.54 dBm
2.40201172 GHz
[T1]
-0.03 dB
1.00200401 MHz
1MAX
1MA
Center 2.4024 GHz
250 kHz/
Span 2.5 MHz

CH39


Delta 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
-0.01 dB
VBW 100 kHz
10 dBm
1.00701403 MHz
SWT 5 ms
Unit dBm
[T1]
2.50 dBm
2.44101142 GHz
[T1]
-0.01 dB
1.00701403 MHz
1VIEW
1MA
Center 2.44155 GHz
250 kHz/
Span 2.5 MHz

CH78


Marker 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
1.35 dBm
VBW 100 kHz
10 dBm
2.47901182 GHz
SWT 5 ms
Unit dBm
[T1]
1.35 dBm
2.47901182 GHz
[T1]
-0.04 dB
1.00200401 MHz
1VIEW
1MA
Center 2.47935 GHz
250 kHz/
Span 2.5 MHz

4.7. MAXIMUM PEAK OUTPUT POWER

4.7.1. LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The limit of Maximum Peak Output Power Measurement is 30dBm.

4.7.2. TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100035	Apr. 19, 2005

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

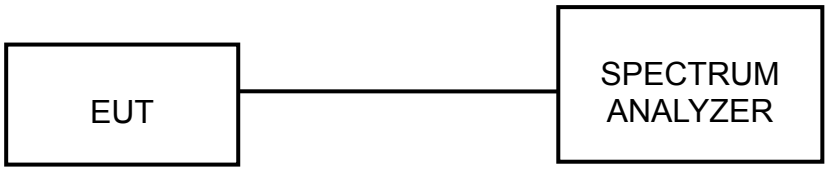
4.7.3. TEST PROCEDURE

1. Check the calibration of the measuring instrument (SA) 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 1 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.

4.7.4. DEVIATION FROM TEST STANDARD

No deviation.

4.7.5. TEST SETUP



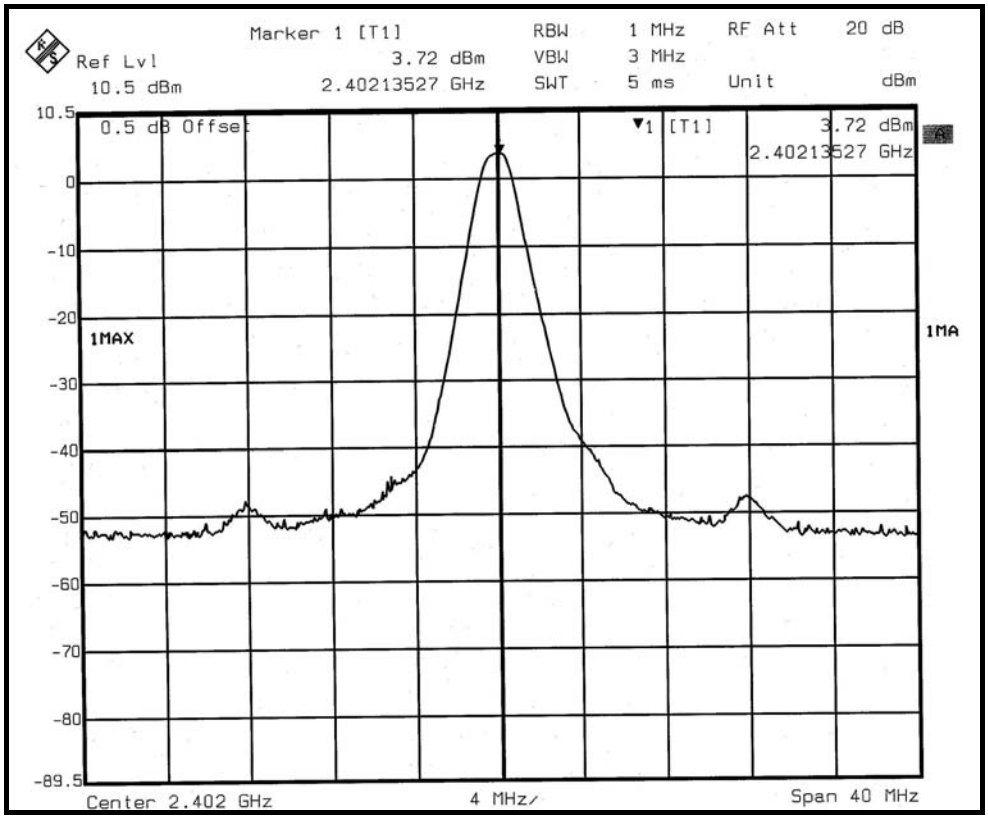
For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

4.7.6. TEST RESULTS

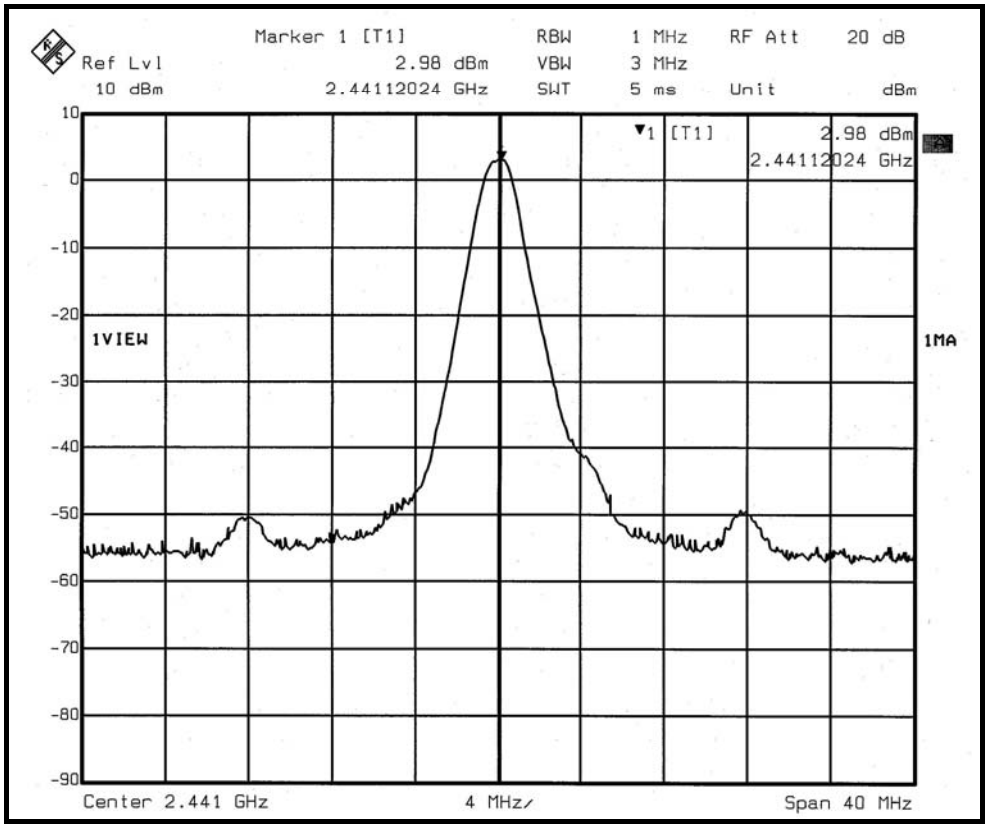
MODULATION TYPE	GFSK	**ENVIRONMENTAL CONDITIONS**	25 deg. C, 62% RH, 991 hPa
INPUT POWER (SYSTEM)	23 deg. C, 60% RH, 991 hPa	**TESTED BY**	Leo Hung

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
0	2402	2.355	3.72	30	PASS
39	2441	1.986	2.98	30	PASS
78	2480	1.766	2.47	30	PASS

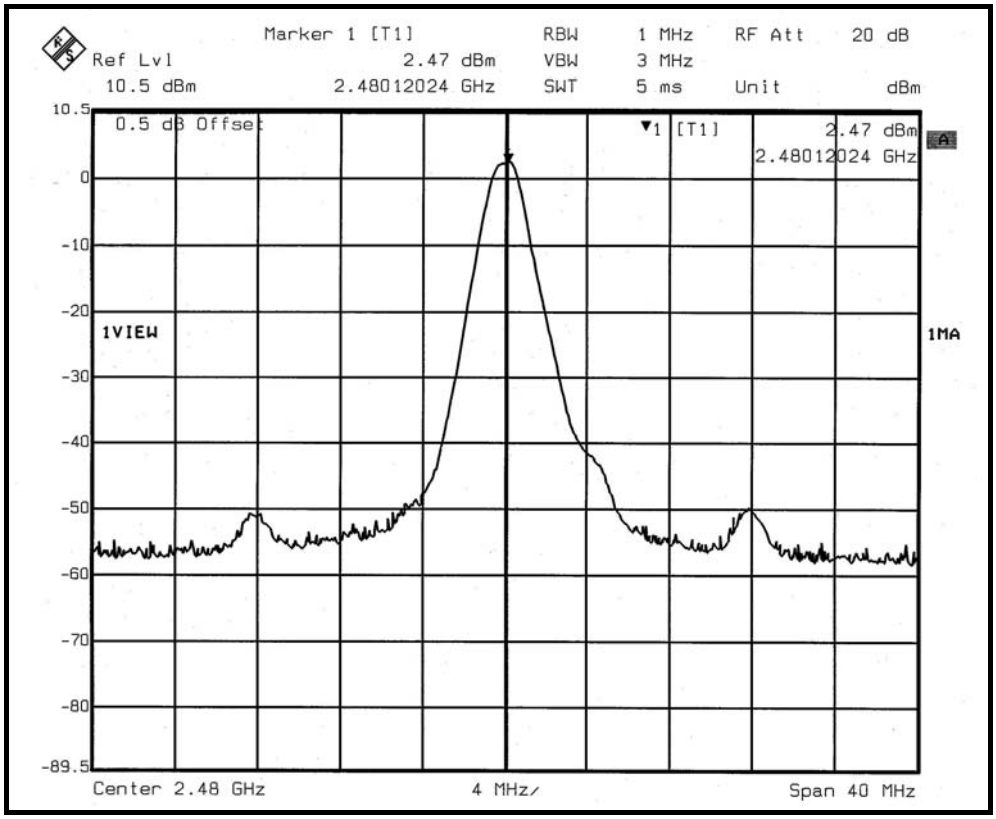
CH0


Marker 1 [T1]
RBW 1 MHz
RF Att 20 dB
Ref Lvl
3.72 dBm
VBW 3 MHz
10.5 dBm
2.40213527 GHz
SWT 5 ms
Unit dBm
0.5 dB Offset
▼1 [T1]
3.72 dBm
2.40213527 GHz
1MAX
1MA
10.5
0
-10
-20
-30
-40
-50
-60
-70
-80
-89.5
Center 2.402 GHz
4 MHz/
Span 40 MHz

CH39


Marker 1 [T1]
RBW 1 MHz
RF Att 20 dB
Ref Lvl
2.98 dBm
VBW 3 MHz
10 dBm
2.44112024 GHz
SWT 5 ms
Unit dBm
▼1 [T1]
2.98 dBm
2.44112024 GHz
1VIEW
1MA
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.441 GHz
4 MHz/
Span 40 MHz

CH78


Marker 1 [T1]
RBW 1 MHz
RF Att 20 dB
Ref Lvl
2.47 dBm
VBW 3 MHz
10.5 dBm
2.48012024 GHz
SWT 5 ms
Unit dBm
0.5 dB Offset
▼1 [T1]
2.47 dBm
2.48012024 GHz
1VIEW
1MA
10.5
0
-10
-20
-30
-40
-50
-60
-70
-80
-89.5
Center 2.48 GHz
4 MHz/
Span 40 MHz

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 Resolution Bandwidth).

4.8.2. TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100035	Apr. 19, 2005

NOTE: 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 100kHz with suitable frequency span including 100MHz 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 6 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(d).

NOTE 1:

The band edge emission plot on the next page shows 57.75dBc 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 4.2.7 is 104.34dBuV/m (Peak), so the maximum field strength in restrict band is 104.34 –57.75 = 46.59dBuV/m, which is under 74 dBuV/m limit.

Average value = 46.59-30.00=16.59dBuV/m, which is under 54dBuV/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: 20log(3.125/100)= -30 dB.

Average value = peak reading –30

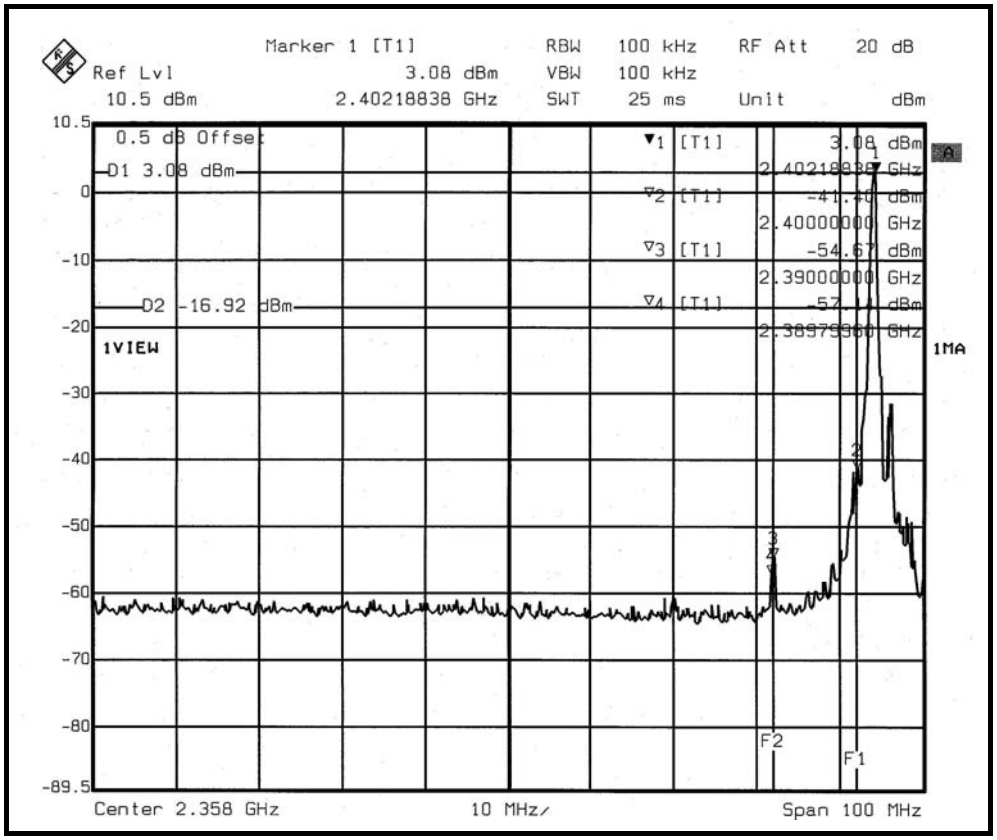
NOTE 2:

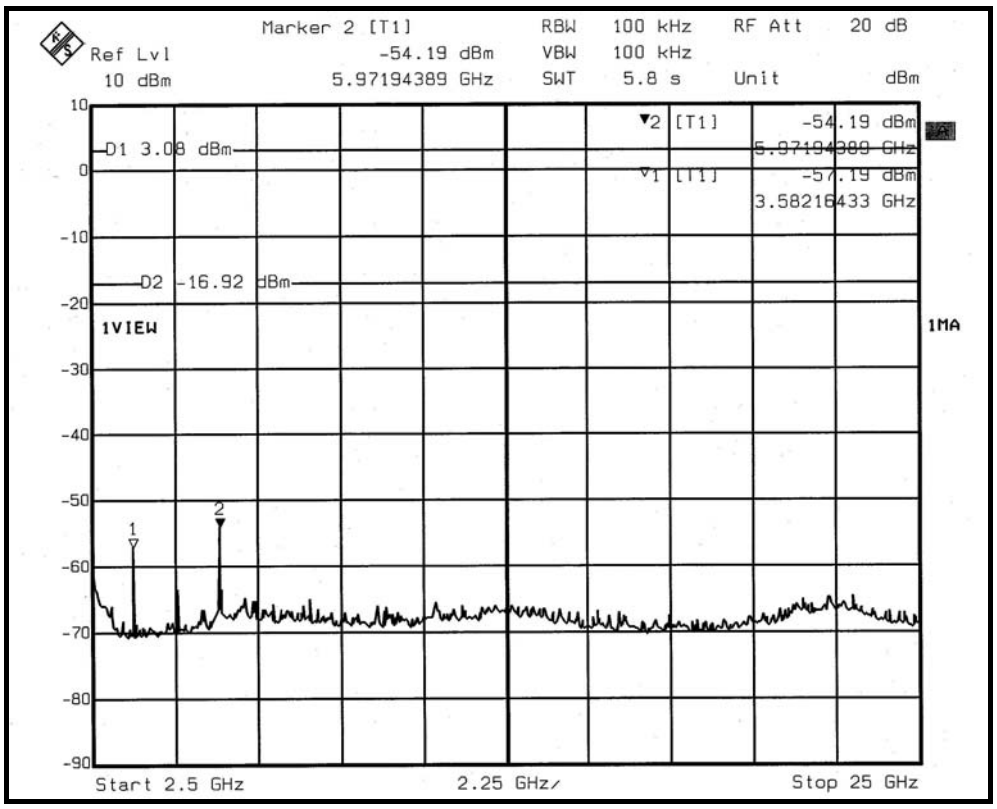
The band edge emission plot on the next second page shows 49.81dBc between carrier maximum power and local maximum emission in restrict band (2.4839GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.2.7 is 100.58dBuV/m (Peak), so the maximum field strength in restrict band is 100.58 –49.81 = 50.77dBuV/m, which is under 74 dBuV/m limit.

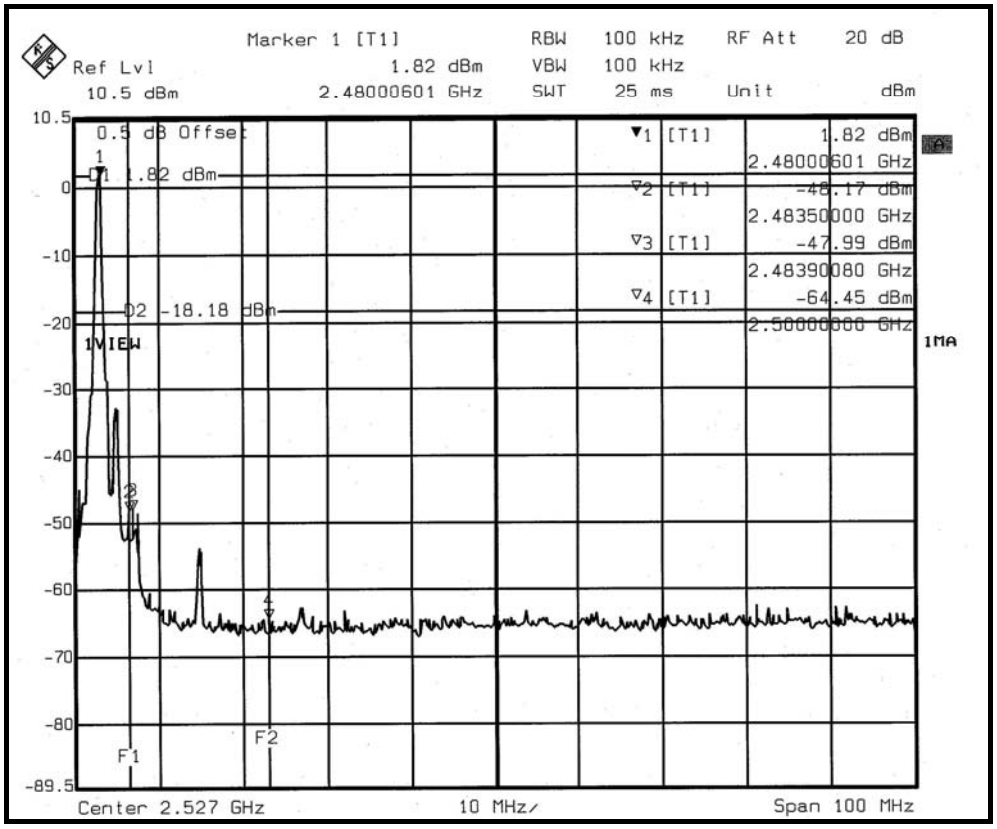
Average value = 50.77-30.00=20.77dBuV/m, which is under 54dBuV/m limit.

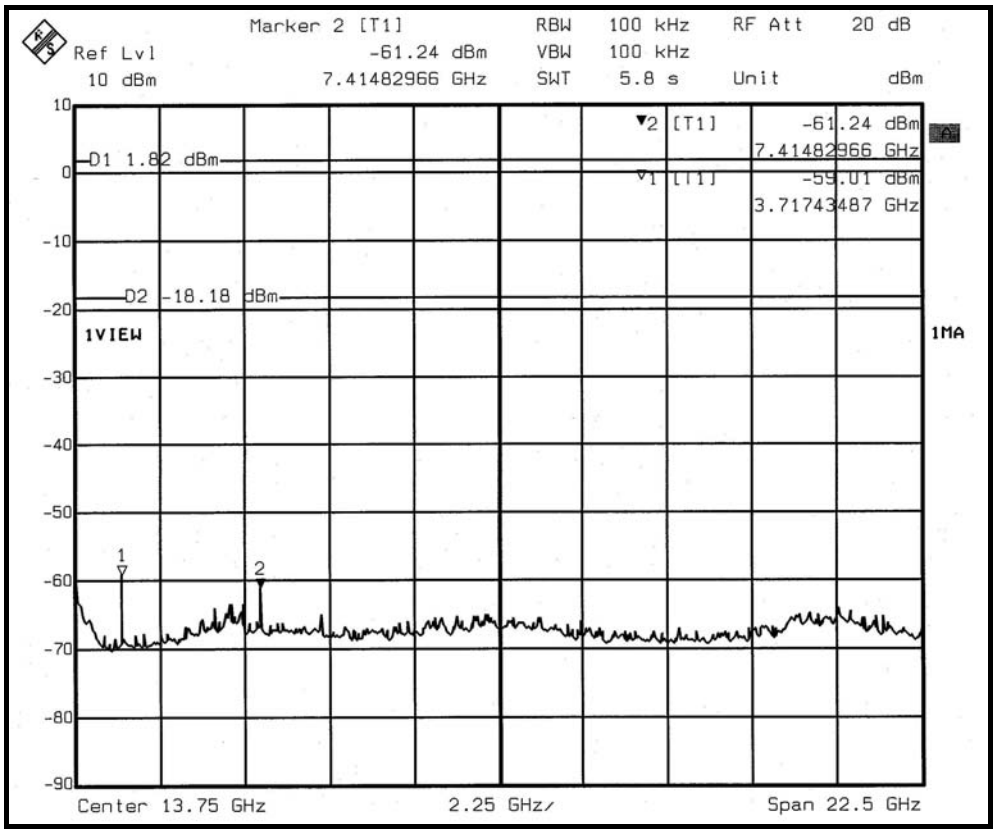
*The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle be equal to: 20log(3.125/100)= -30 dB.

Average value = peak reading –30


Marker 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
3.08 dBm
VBW 100 kHz
10.5 dBm
2.40218838 GHz
SWT 25 ms
Unit dBm
0.5 dB Offset
D1 3.08 dBm
D2 -16.92 dBm
1VIEW
1MA
Center 2.358 GHz
10 MHz/
Span 100 MHz


Marker 2 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
-54.19 dBm
VBW 100 kHz
10 dBm
5.97194389 GHz
SWT 5.8 s
Unit dBm
D1 3.08 dBm
D2 -16.92 dBm
1VIEW
1MA
Start 2.5 GHz
2.25 GHz/
Stop 25 GHz


Marker 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
1.82 dBm
VBW 100 kHz
10.5 dBm
2.48000601 GHz
SWT 25 ms
Unit dBm
0.5 dB Offset
▼1 [T1] 1.82 dBm
2.48000601 GHz
D1 1.82 dBm
▽2 [T1] -48.17 dBm
2.48350000 GHz
▽3 [T1] -47.99 dBm
2.48390080 GHz
▽4 [T1] -64.45 dBm
2.50000000 GHz
D2 -18.18 dBm
1VIEW
1MA
F1
F2
Center 2.527 GHz
10 MHz/
Span 100 MHz


Marker 2 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
-61.24 dBm
VBW 100 kHz
10 dBm
7.41482966 GHz
SWT 5.8 s
Unit dBm
▼2 [T1] -61.24 dBm
7.41482966 GHz
D1 1.82 dBm
▽1 [T1] -59.01 dBm
3.71743487 GHz
D2 -18.18 dBm
1VIEW
1MA
Center 13.75 GHz
2.25 GHz/
Span 22.5 GHz

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 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.9.2. ANTENNA CONNECTED CONSTRUCTION

The antenna type used in this product is Chip antenna without antenna connector. The maximum gain of this antenna is 3dBi.

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: 886-2-26052943

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

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.