FCC TEST REPORT

REPORT NO.: RF950929L12
MODEL NO.: ABG33868
RECEIVED: Sep. 28, 2006
TESTED: Oct. 13 ~ Oct. 20, 2006
ISSUED: Oct. 24, 2006

APPLICANT: AMOD Technology Co., Ltd.

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ISSUED BY: Advance Data Technology Corporation

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TEST LOCATION: No. 19, Hwa Ya 2nd Rd., Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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NO. 2177-01

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1. CERTIFICATION

PRODUCT:	Bluetooth GPS
MODEL NO.:	ABG33868
BRAND NAME:	AMOD
APPLICANT:	AMOD Technology Co., Ltd.
TESTED:	Oct. 13 ~ Oct. 20, 2006
TEST SAMPLE:	ENGINEERING SAMPLE
STANDARDS:	FCC Part 15, Subpart C (Section 15.247), ANSI C63.4-2003

The above equipment (Model: ABG33868) 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	: Peggy Chen Peggy Chen	, **DATE:**	Oct. 24, 2006
TECHNICAL ACCEPTANCE Responsible for RF	: Long Chen Long Chen	, **DATE:**	Oct. 24, 2006
APPROVED BY	: Gary Chang Gary Chang / Supervisor	, **DATE:**	Oct. 24, 2006

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	PASS	Meet the requirement of limit. Minimum passing margin is –2.39dB at 0.349MHz.
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 –7.85dB at 45.55MHz.
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	Bluetooth GPS
MODEL NO.	ABG33868
FCC ID	TLTAGP3330
POWER SUPPLY	3.7Vdc from Rechargeable Li-ion battery 5Vdc from AC adapter or Car charger
MODULATION TYPE	Bluetooth:GFSK GPS: C/A code
RADIO TECHNOLOGY	FHSS
TRANSFER RATE	Bluetooth:721kbps GPS: 50 bps
OPERATING FREQUENCY	Bluetooth: 2402~2480 MHz GPS: 1575.42 MHz
FREQUENCY RANGE	Bluetooth:2400 ~ 2483.5 MHz GPS: 1575.42 MHz
NUMBER OF CHANNEL	Bluetooth: 79 GPS: 1
OUTPUT POWER	1.208mW
ANTENNA TYPE	Bluetooth: Chip antenna with 0dBi gain GPS: Patch antenna with 5dBi gain
DATA CABLE	NA
I/O PORTS	NA

NOTE:

1. Bluetooth technology is used in this EUT.
2. The EUT is powered by the following battery, adapter and car charger.

Battery: 3.7V, 1000mAh

Adapter:

Brand	DVE
Model	DSA-0051-03 FUS
Input Power	100~240Vac, 50/60Hz, 0.2A
Output Power	5Vdc, 1A
Power Line	1.2m non-shielded cable without core

Car Charger:

Brand	SENAO
Model	PI01
Input Power	12/24Vdc
Output Power	5Vdc, 800mA
Power Line	0.45m non-shielded cable without core

3. 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.

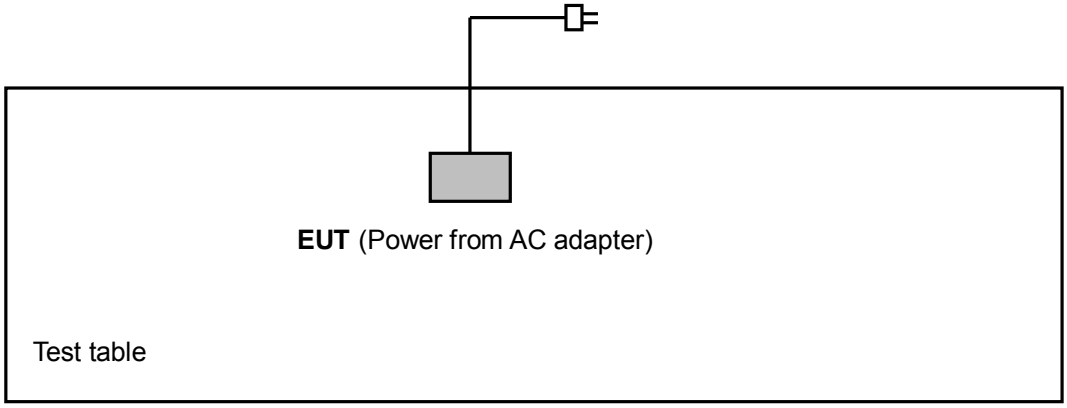
3.2 DESCRIPTION OF TEST MODES

79 channels are provided to this EUT:

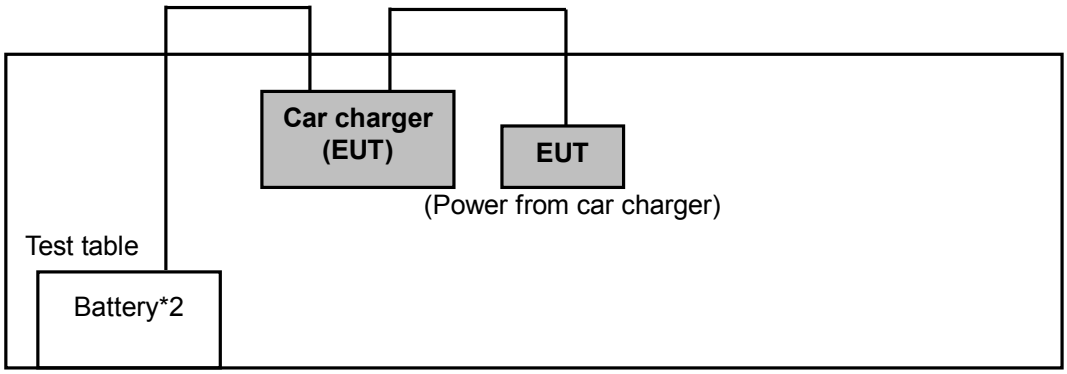
CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409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

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST

TEST MODE A



TEST MODE B



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	Applicable to				Description
	PLC	RE<1G	RE≥1G	APCM	
A	√	√	√	√	Power from adapter
B	-	√	-	-	Power from car charger(24Vdc)

Where **PLC:** Power Line Conducted Emission **RE<1G:** Radiated Emission below 1GHz

RE≥1G: Radiated Emission above 1GHz **APCM:** Antenna Port Conducted Measurement

NOTE: "-" means no effect

POWER LINE CONDUCTED EMISSION TEST:

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

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE	DATE RATE (kbps)
A	0 to 78	0, 39, 78	FHSS	GFSK	DH5	721

RADIATED EMISSION TEST (BELOW 1 GHz):

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

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE	DATE RATE (kbps)	AXIS
A	0 to 78	78	FHSS	GFSK	DH5	721	X
B	0 to 78	78	FHSS	GFSK	DH5	721	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, data rates, packet types and antenna ports (if EUT with antenna diversity architecture), and X, Y, Z axis.

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE	DATE RATE (kbps)	AXIS
A	0 to 78	0, 39, 78	FHSS	GFSK	DH5	721	X

BANDEDGE MEASUREMENT:

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

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE	DATE RATE (kbps)
A	0 to 78	0, 78	FHSS	GFSK	DH5	721

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 of the antenna and antenna ports (if EUT with antenna diversity architecture).

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE	DATE RATE (kbps)
A	0 to 78	0, 39, 78	FHSS	GFSK	DH5	721

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

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	BATTERY	HEXA	NT50-N24LMF	NA	NA
2	BATTERY	HEXA	NT50-N24LMF	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	NA

NOTE: All power cords of the above support units are non shielded (1.8m).

4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

NOTE:
1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS30	100288	Nov. 02, 2006
RF signal cable Woken	5D-FB	Cable-HYCO3-01	Jan. 06, 2007
LISN ROHDE & SCHWARZ	ESH2-Z5	100100	Jan. 09, 2007
LISN ROHDE & SCHWARZ	ESH3-Z5	100311	Jan. 22, 2007
Software ADT	ADT_Cond_V3	NA	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 Shielded Room 2.
3. The VCCI Site Registration No. is C-2047.

4.1.3 TEST PROCEDURES

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

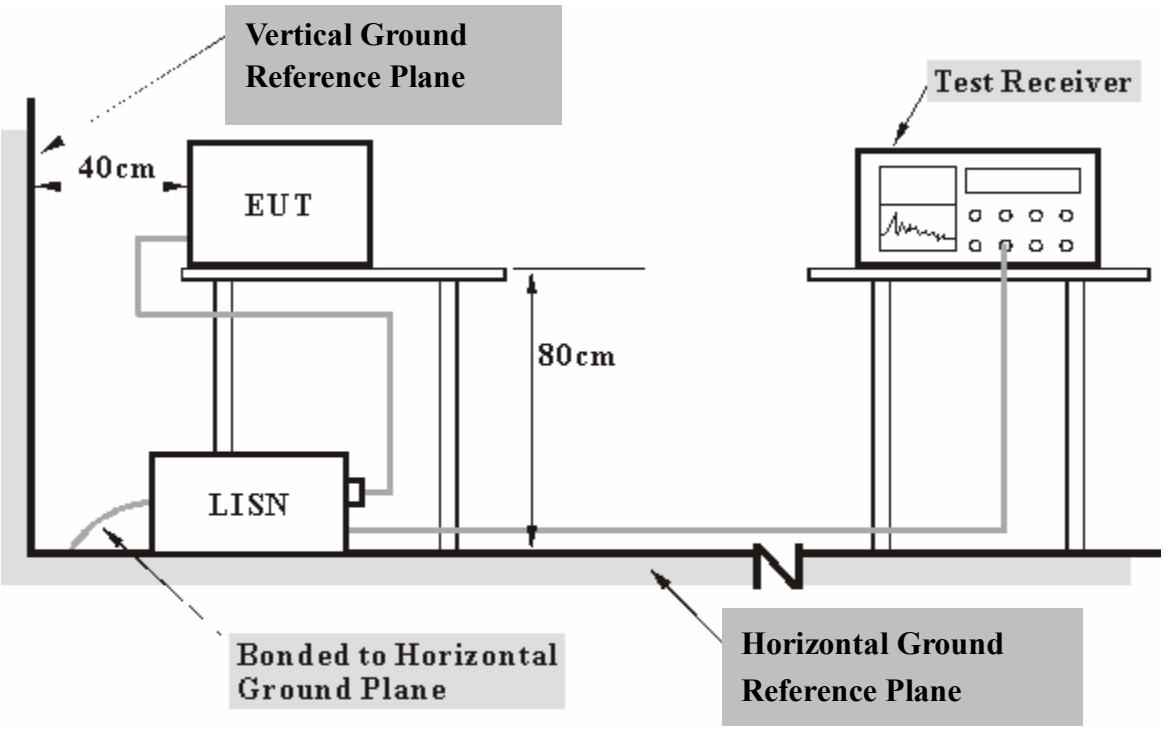
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

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

4.1.6 EUT OPERATING CONDITIONS

a. The EUT was charged by the adapter and placed on the test table.

b. Set the EUT under transmitting condition.

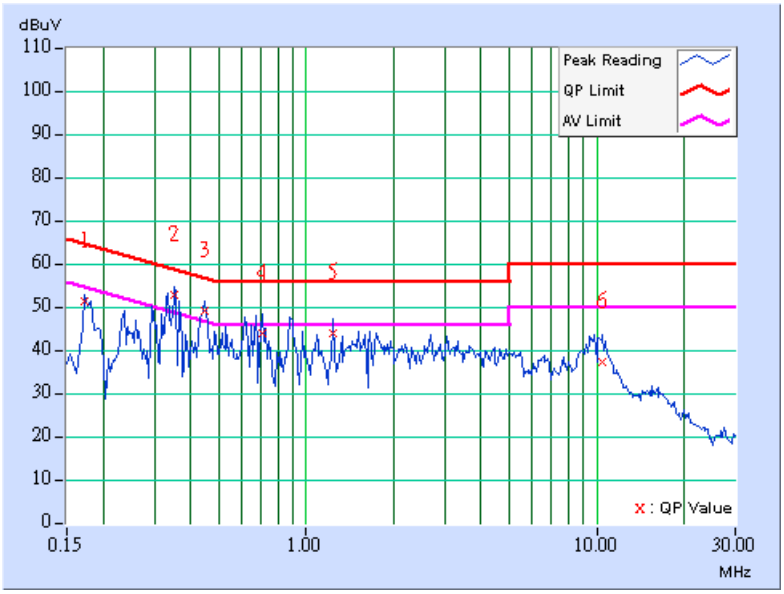
4.1.7 TEST RESULTS

CONDUCTED WORST CASE DATA:

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	**PHASE**	Line 1
MODULATION TYPE	GFSK	**6dB BANDWIDTH**	9 kHz
ENVIRONMENTAL CONDITIONS	20 deg. C, 60%RH, 991hPa	**INPUT POWER (SYSTEM)**	120Vac, 60 Hz
TEST MODE	A	**TESTED BY**	Match Tsui

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.173	0.10	50.98	-	51.08	-	64.79	54.79	-13.71	-
2	0.353	0.10	52.58	46.14	52.68	46.24	58.89	48.89	-6.21	-2.65
3	0.447	0.10	48.72	39.66	48.82	39.76	56.93	46.93	-8.11	-7.17
4	0.709	0.10	43.67	-	43.77	-	56.00	46.00	-12.23	-
5	1.234	0.12	43.65	-	43.77	-	56.00	46.00	-12.23	-
6	10.500	0.39	37.04	-	37.43	-	60.00	50.00	-22.57	-

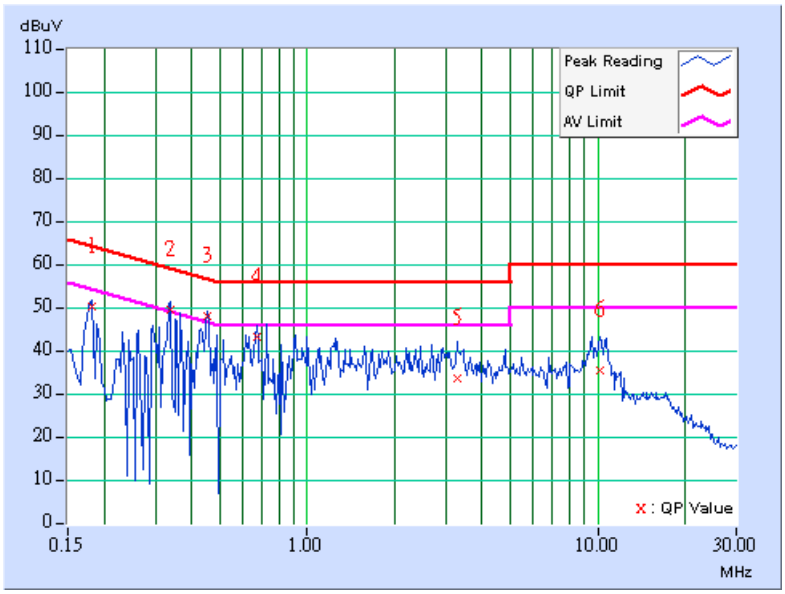
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	PHASE	Line 2
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	20 deg. C, 60%RH, 991hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	A	TESTED BY	Match Tsui

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.181	0.10	50.06	-	50.16	-	64.43	54.43	-14.27	-
2	0.338	0.10	49.06	-	49.16	-	59.26	49.26	-10.10	-
3	0.455	0.11	47.67	33.79	47.78	33.90	56.79	46.79	-9.01	-12.89
4	0.670	0.14	42.69	-	42.83	-	56.00	46.00	-13.17	-
5	3.273	0.31	33.12	-	33.43	-	56.00	46.00	-22.57	-
6	10.227	0.47	34.95	-	35.42	-	60.00	50.00	-24.58	-

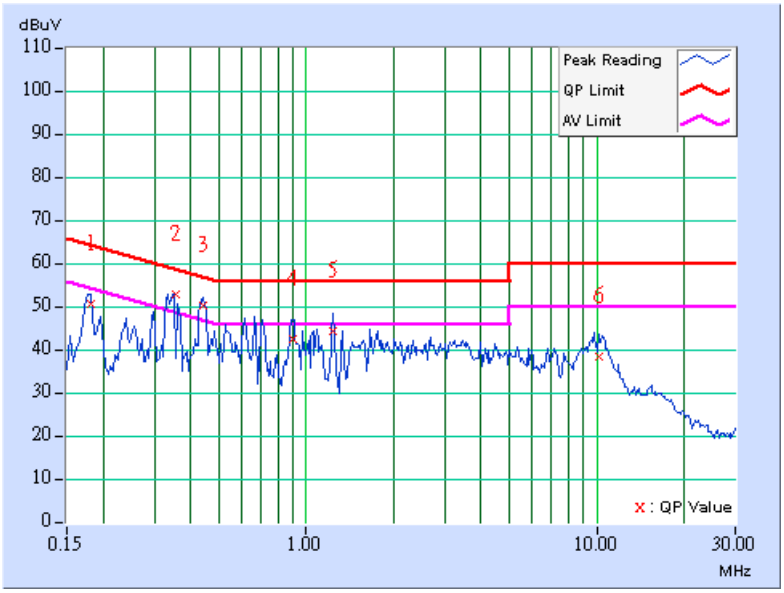
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	PHASE	Line 1
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	20 deg. C, 60%RH, 991hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	A	TESTED BY	Match Tsui

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.181	0.10	50.26	-	50.36	-	64.43	54.43	-14.07	-
2	0.354	0.10	52.64	46.10	52.74	46.20	58.86	48.86	-6.12	-2.66
3	0.443	0.10	49.92	41.74	50.02	41.84	57.01	47.01	-6.99	-5.17
4	0.896	0.10	42.27	-	42.37	-	56.00	46.00	-13.63	-
5	1.234	0.12	44.04	-	44.16	-	56.00	46.00	-11.84	-
6	10.184	0.37	38.33	-	38.70	-	60.00	50.00	-21.30	-

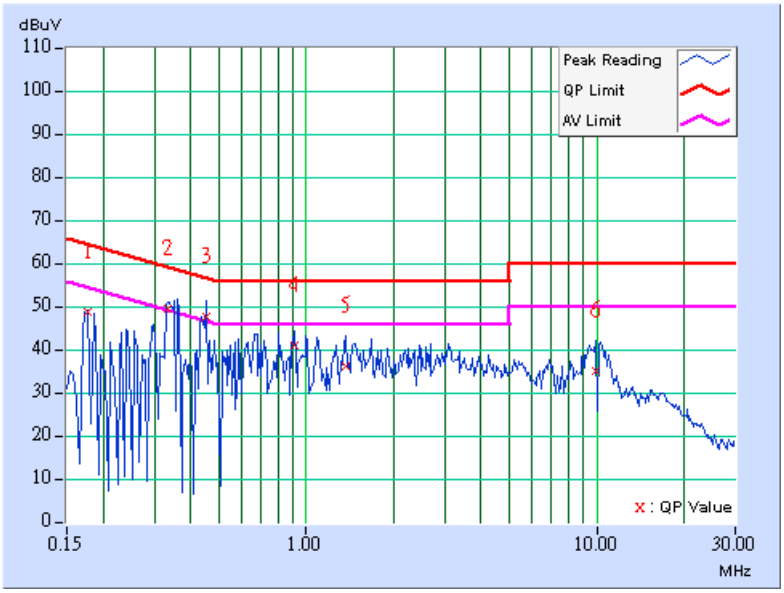
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	PHASE	Line 2
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	20 deg. C, 60%RH, 991hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	A	TESTED BY	Match Tsui

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.177	0.10	48.58	-	48.68	-	64.61	54.61	-15.93	-
2	0.334	0.10	49.21	-	49.31	-	59.36	49.36	-10.05	-
3	0.451	0.11	47.33	34.57	47.44	34.68	56.86	46.86	-9.42	-12.18
4	0.916	0.19	40.64	-	40.83	-	56.00	46.00	-15.17	-
5	1.363	0.20	36.02	-	36.22	-	56.00	46.00	-19.78	-
6	9.918	0.46	34.61	-	35.07	-	60.00	50.00	-24.93	-

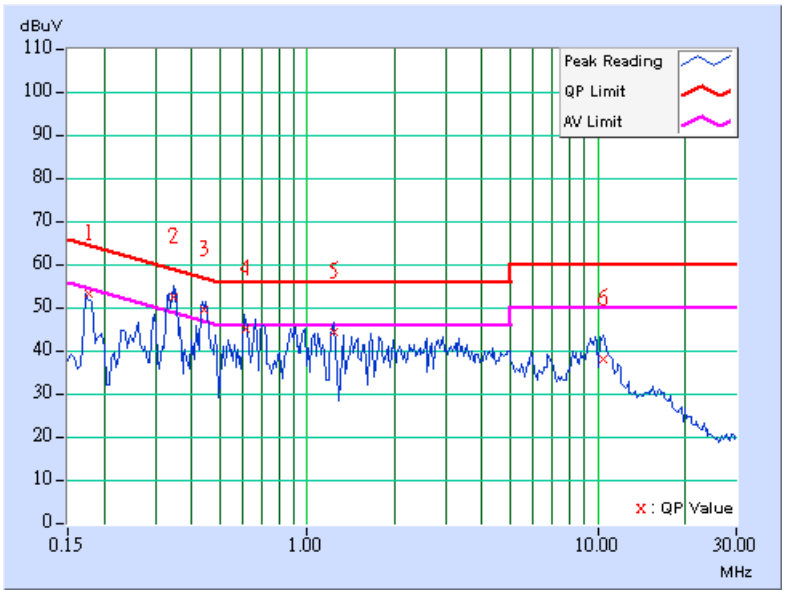
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	PHASE	Line 1
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	20 deg. C, 60%RH, 991hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	A	TESTED BY	Match Tsui

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.176	0.10	52.81	-	52.91	-	64.67	54.67	-11.76	-
2	**0.349**	**0.10**	**52.20**	**46.49**	**52.30**	**46.59**	**58.98**	**48.98**	**-6.68**	**-2.39**
3	0.439	0.10	49.41	42.00	49.51	42.10	57.08	47.08	-7.57	-4.98
4	0.611	0.10	44.97	-	45.07	-	56.00	46.00	-10.93	-
5	1.238	0.12	44.04	-	44.16	-	56.00	46.00	-11.84	-
6	10.465	0.39	37.73	-	38.12	-	60.00	50.00	-21.88	-

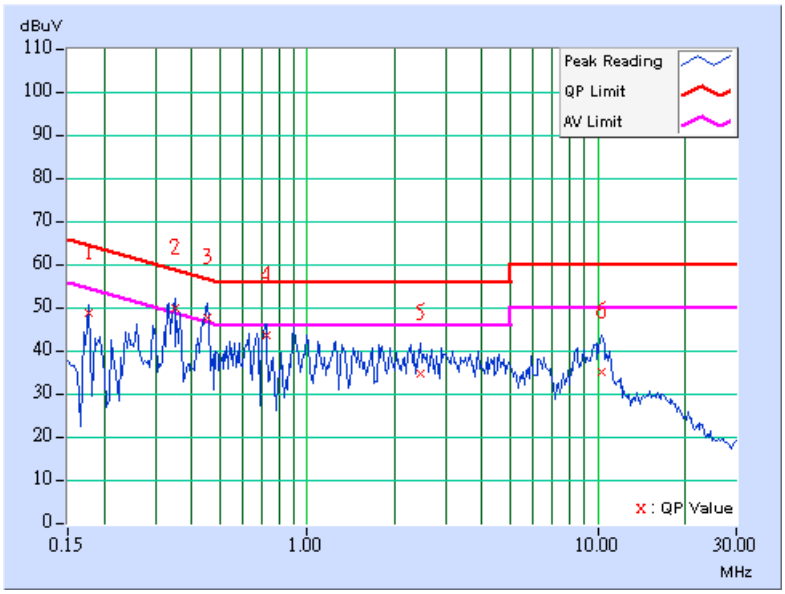
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	PHASE	Line 2
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	20 deg. C, 60%RH, 991hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	A	TESTED BY	Match Tsui

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.177	0.10	48.60	-	48.70	-	64.61	54.61	-15.91	-
2	0.349	0.10	49.67	32.86	49.77	32.96	58.98	48.98	-9.21	-16.02
3	0.455	0.11	47.41	33.11	47.52	33.22	56.79	46.79	-9.27	-13.57
4	0.724	0.15	43.41	-	43.56	-	56.00	46.00	-12.44	-
5	2.449	0.24	34.31	-	34.55	-	56.00	46.00	-21.45	-
6	10.273	0.47	34.74	-	35.21	-	60.00	50.00	-24.79	-

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



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 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 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.

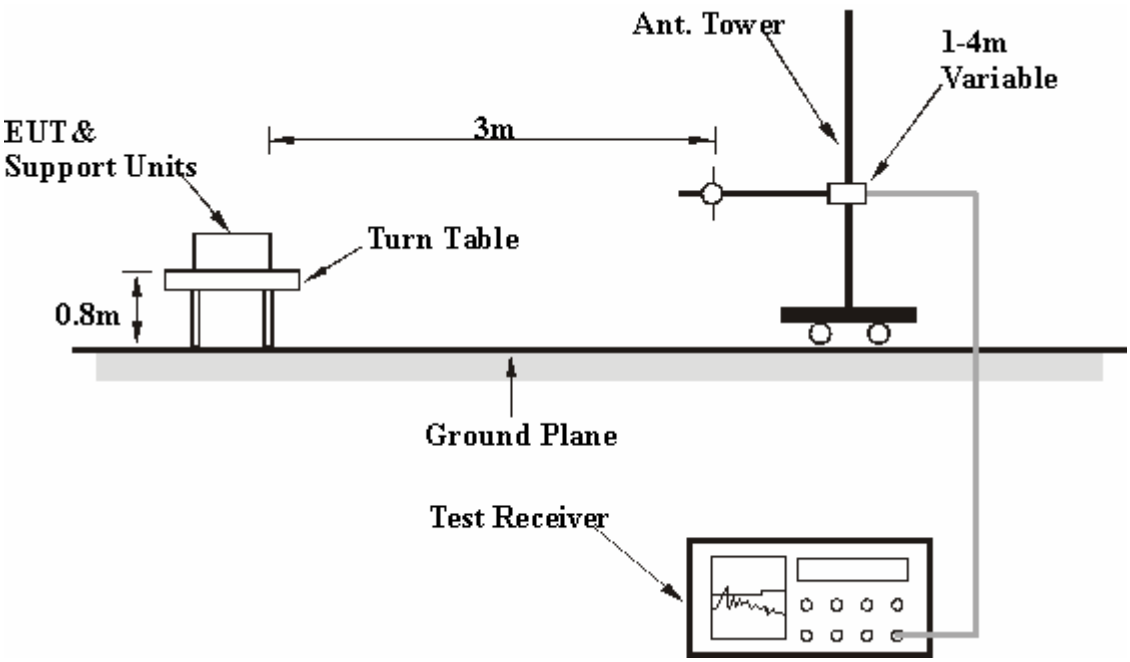
NOTE:

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 of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz 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

Test Mode A

a. The EUT was charged by the adapter and placed on the test table.

b. Set the EUT under transmitting condition.

Test Mode B

a. The EUT connected with battery via car charger at charging mode and placed on the test table.

b. Set the EUT under transmitting condition.

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
ENVIRONMENTAL CONDITIONS	24 deg. C, 69%RH, 991hPa	**INPUT POWER (SYSTEM)**	120Vac, 60 Hz
TEST MODE	A	**TESTED BY**	Morgan Chen

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m								
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	455.71	28.62 QP	46.00	-17.38	1.25 H	127	9.14	19.49
2	465.43	37.30 QP	46.00	-8.70	1.00 H	118	17.67	19.63
3	601.50	31.10 QP	46.00	-14.90	1.25 H	349	8.74	22.36
4	733.69	35.46 QP	46.00	-10.54	1.25 H	121	10.47	24.99
5	755.07	28.44 QP	46.00	-17.56	1.25 H	223	2.96	25.48
6	807.56	28.91 QP	46.00	-17.09	1.00 H	211	3.06	25.85
7	865.87	36.49 QP	46.00	-9.51	1.25 H	127	9.62	26.87

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m								
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	**45.55**	**32.15 QP**	**40.00**	**-7.85**	**1.25 V**	**25**	**17.90**	**14.24**
2	66.93	28.64 QP	40.00	-11.36	1.25 V	349	15.56	13.09
3	113.59	29.74 QP	43.50	-13.76	1.00 V	73	17.89	11.85
4	160.24	28.66 QP	43.50	-14.84	1.50 V	19	14.17	14.49
5	168.02	30.05 QP	43.50	-13.45	1.00 V	181	16.15	13.90
6	232.16	32.84 QP	46.00	-13.16	1.25 V	349	20.15	12.69
7	463.49	33.98 QP	46.00	-12.02	1.25 V	349	14.38	19.61
8	733.69	33.51 QP	46.00	-12.49	1.00 V	127	8.52	24.99
9	863.93	37.71 QP	46.00	-8.29	1.00 V	73	10.87	26.84

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
ENVIRONMENTAL CONDITIONS	24 deg. C, 69%RH, 991hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	B	TESTED BY	Morgan Chen

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m								
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	463.49	30.25 QP	46.00	-15.75	1.25 H	250	10.64	19.61
2	572.34	29.36 QP	46.00	-16.64	1.50 H	64	7.72	21.64
3	597.62	33.10 QP	46.00	-12.90	1.50 H	256	10.83	22.27
4	731.74	33.38 QP	46.00	-12.62	1.50 H	292	8.45	24.94
5	799.78	28.21 QP	46.00	-17.79	1.00 H	346	2.51	25.70
6	861.98	36.80 QP	46.00	-9.20	1.00 H	346	9.98	26.82
7	928.08	32.18 QP	46.00	-13.82	1.50 H	52	4.55	27.63

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m								
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	53.33	31.59 QP	40.00	-8.41	1.00 V	25	16.99	14.60
2	66.93	27.27 QP	40.00	-12.73	1.00 V	352	14.18	13.09
3	113.59	30.78 QP	43.50	-12.72	1.25 V	211	18.93	11.85
4	199.12	31.54 QP	43.50	-11.96	1.00 V	352	20.20	11.34
5	232.16	32.98 QP	46.00	-13.02	1.00 V	352	20.28	12.69
6	465.43	33.59 QP	46.00	-12.41	1.25 V	232	13.95	19.63
7	603.45	35.41 QP	46.00	-10.59	1.00 V	43	13.01	22.40
8	733.69	34.45 QP	46.00	-11.55	1.00 V	43	9.46	24.99
9	865.87	37.28 QP	46.00	-8.72	1.00 V	112	10.41	26.87

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	24 deg. C, 69%RH, 991hPa
TEST MODE	A	TESTED BY	Match Tsui

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m								
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	34.83 PK	74.00	-39.17	1.08 H	316	3.34	31.49
1	2390.00	25.67 AV	54.00	-28.33	1.08 H	316	-5.82	31.49
2	*2402.00	90.47 PK			1.08 H	316	58.93	31.54
2	*2402.00	60.47 AV			1.08 H	316	28.93	31.54
3	4804.00	46.08 PK	74.00	-27.92	1.48 H	71	8.60	37.48
3	4804.00	16.08 AV	54.00	-37.92	1.48 H	71	-21.40	37.48

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m								
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	32.08 PK	74.00	-41.92	1.13 V	5	0.59	31.49
1	2390.00	23.54 AV	54.00	-30.46	1.13 V	5	-7.95	31.49
2	*2402.00	87.72 PK			1.13 V	5	56.18	31.54
2	*2402.00	57.72 AV			1.13 V	5	26.18	31.54
3	4804.00	46.08 PK	74.00	-27.92	1.10 V	334	8.60	37.48
3	4804.00	16.08 AV	54.00	-37.92	1.10 V	334	-21.40	37.48

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 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.
6. Average value = peak reading –20log(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**	24 deg. C, 69%RH, 991hPa
TEST MODE	A	**TESTED BY**	Match Tsui

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m								
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	90.87 PK			1.10 H	344	59.15	31.72
1	*2441.00	60.87 AV			1.10 H	344	29.15	31.72
2	4882.00	47.54 PK	74.00	-26.46	1.39 H	101	9.87	37.67
2	4882.00	17.54 AV	54.00	-36.46	1.39 H	101	-20.13	37.67

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m								
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	88.11 PK			1.10 V	356	56.39	31.72
1	*2441.00	58.11 AV			1.10 V	356	26.39	31.72
2	4882.00	48.21 PK	74.00	-25.79	1.11 V	360	10.54	37.67
2	4882.00	18.21 AV	54.00	-35.79	1.11 V	360	-19.46	37.67

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 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.
6. Average value = peak reading –20log(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**	24 deg. C, 69%RH, 991hPa
TEST MODE	A	**TESTED BY**	Match Tsui

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m								
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	90.98 PK			1.07 H	15	59.08	31.90
1	*2480.00	60.98 AV			1.07 H	15	29.08	31.90
2	2483.50	45.44 PK	74.00	-28.56	1.07 H	15	13.53	31.91
2	2483.50	36.57 AV	54.00	-17.43	1.07 H	15	4.66	31.91
3	4960.00	47.23 PK	74.00	-26.77	1.25 H	147	9.40	37.83
3	4960.00	17.23 AV	54.00	-36.77	1.25 H	147	-20.60	37.83

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m								
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	87.59 PK			1.18 V	355	55.69	31.90
1	*2480.00	57.59 AV			1.18 V	355	25.69	31.90
2	2483.50	42.05 PK	74.00	-31.95	1.18 V	355	10.14	31.91
2	2483.50	33.54 AV	54.00	-20.46	1.18 V	355	1.63	31.91
3	4960.00	46.54 PK	74.00	-27.46	1.08 V	35	8.71	37.83
3	4960.00	16.56 AV	54.00	-37.44	1.08 V	35	-21.27	37.83

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 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.
6. Average value = peak reading –20log(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	FSP40	100040	Jun. 07, 2007

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

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

b. 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.

c. 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.

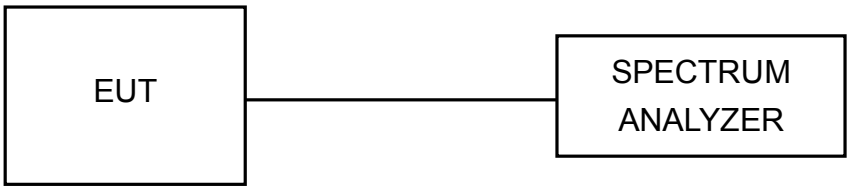
d. Set the SA on View mode and then plot the result on SA screen.

e. Repeat above procedures until all frequencies measured were complete.

4.3.4 DEVIATION FROM TEST STANDARD

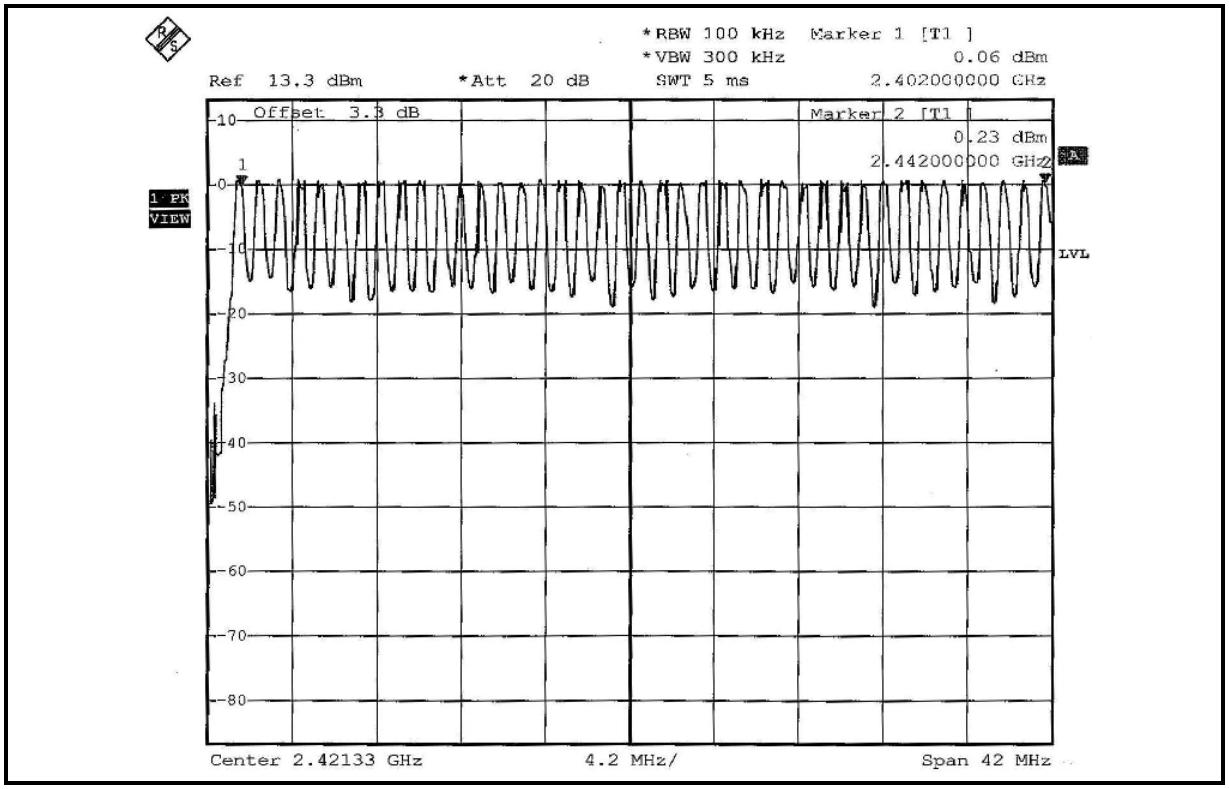
No deviation.

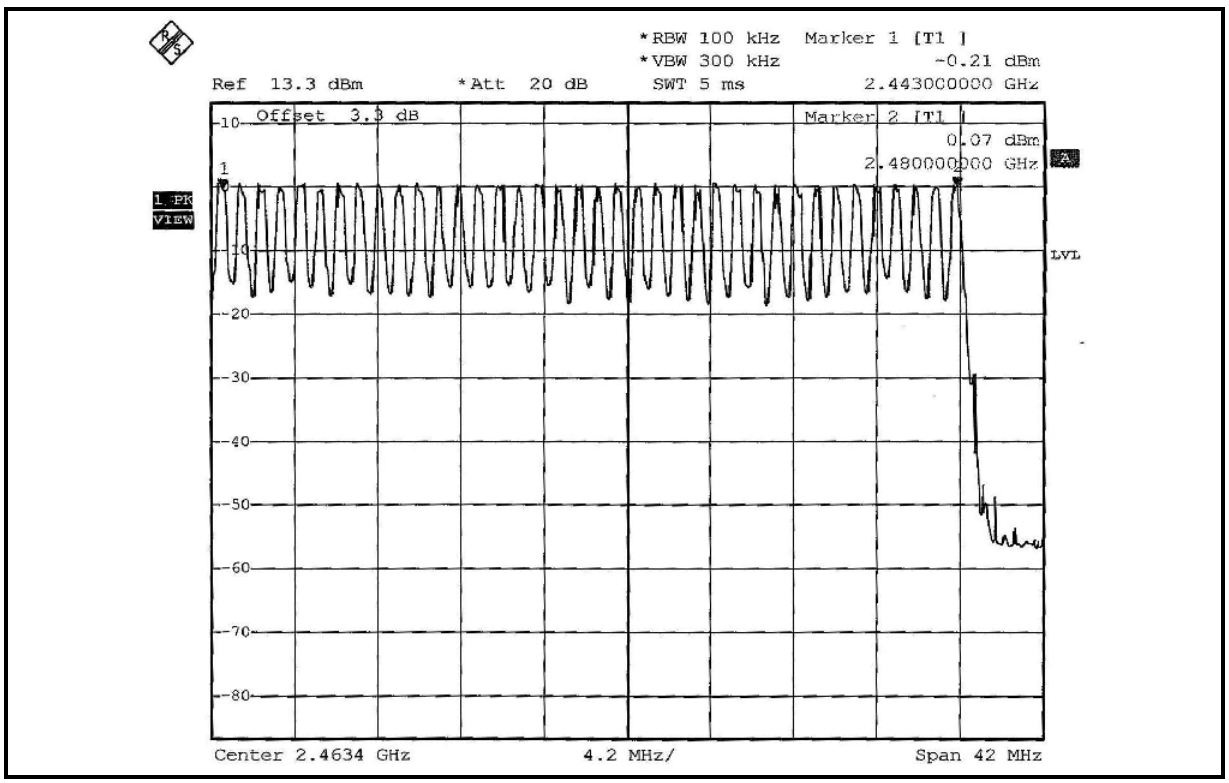
4.3.5 TEST SETUP



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.


*RBW 100 kHz
*VBW 300 kHz
SWT 5 ms
Marker 1 [T1]
0.06 dBm
2.402000000 GHz
Ref 13.3 dBm
*Att 20 dB
Offset 3.3 dB
Marker 2 [T1]
0.23 dBm
2.442000000 GHz
1 PK
VIEW
LVL
Center 2.42133 GHz
4.2 MHz/
Span 42 MHz


*RBW 100 kHz
*VBW 300 kHz
SWT 5 ms
Marker 1 [T1]
-0.21 dBm
2.443000000 GHz
Ref 13.3 dBm
*Att 20 dB
Offset 3.3 dB
Marker 2 [T1]
0.07 dBm
2.480000000 GHz
1 PK
VIEW
LVL
Center 2.4634 GHz
4.2 MHz/
Span 42 MHz

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	FSP40	100040	Jun. 07, 2007

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

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

b. 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.

c. 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.

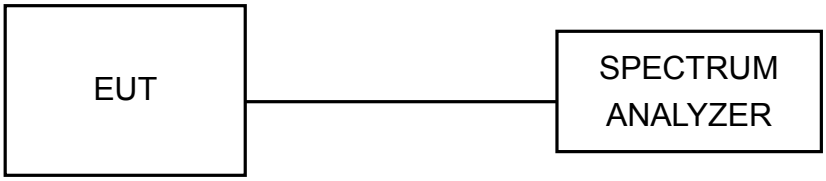
d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.

e. 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

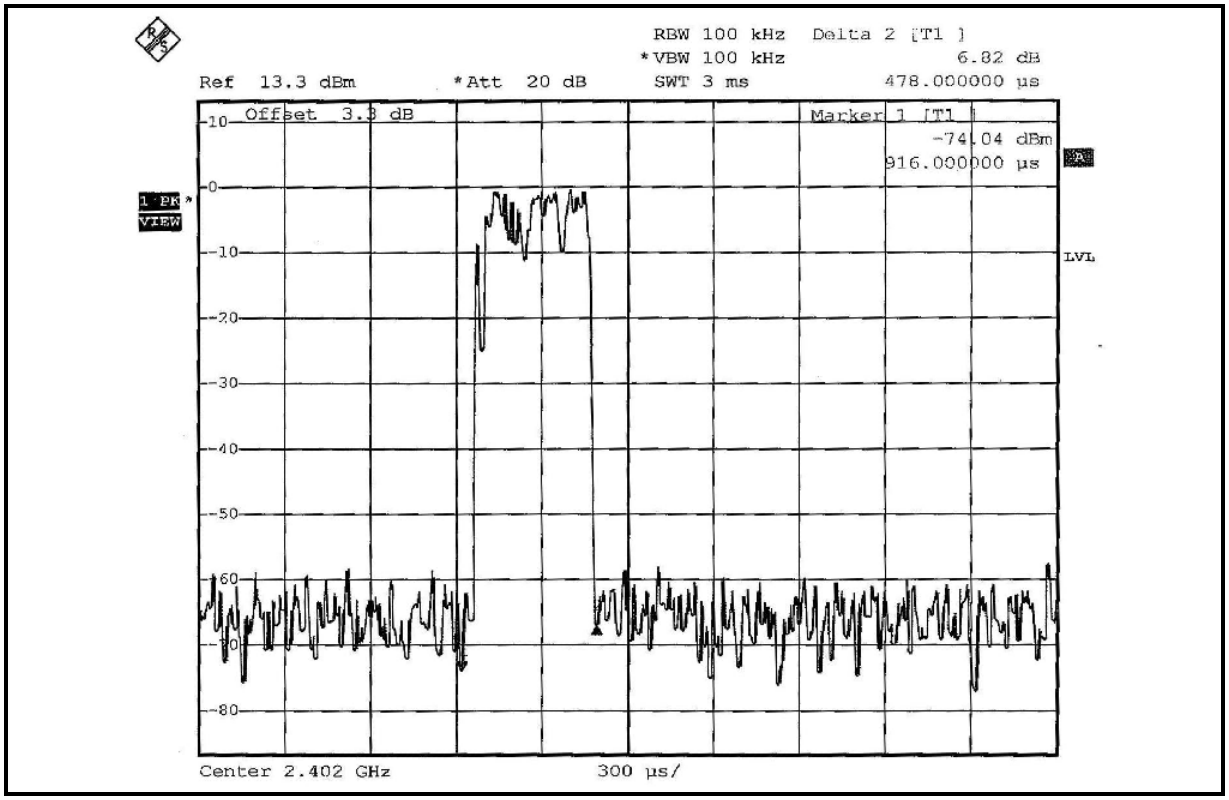


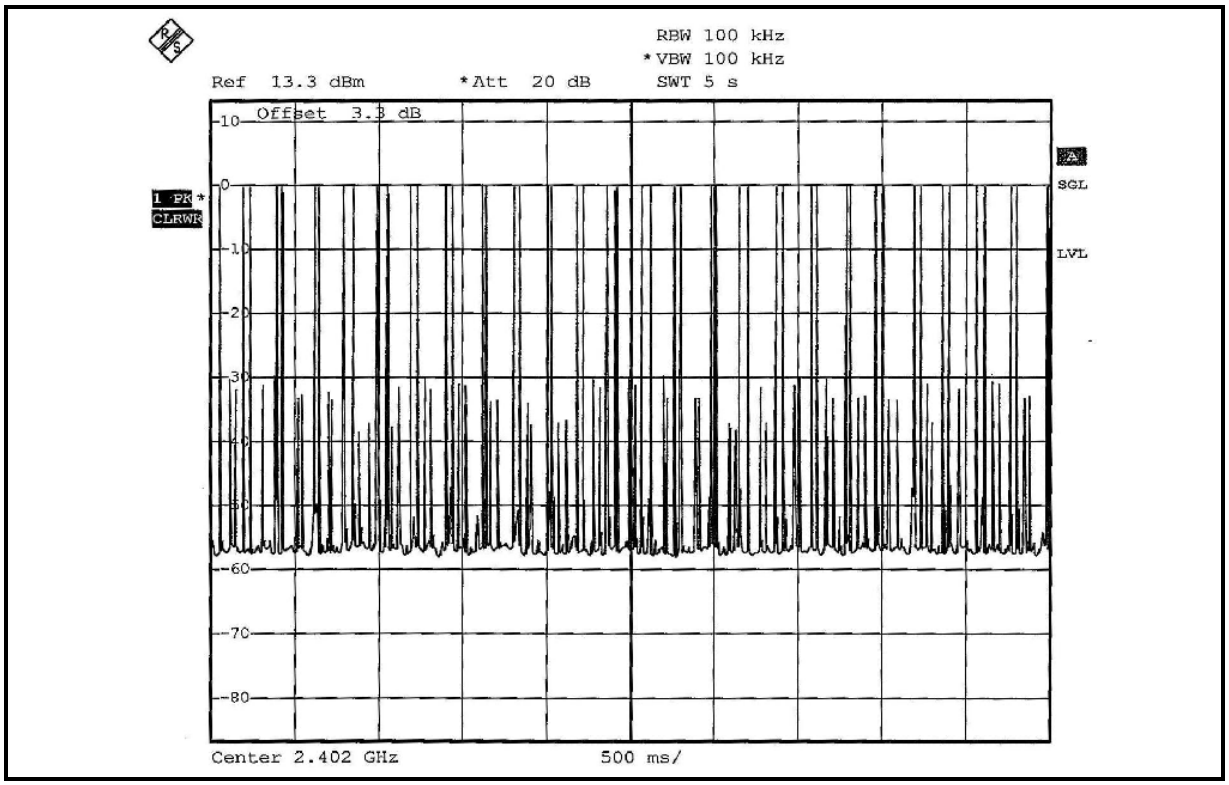
4.4.6 TEST RESULTS

Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	50 (times / 5 sec) *6.32=316.00 times	0.478	151.048	400
DH3	26 (times / 5 sec) *6.32=164.32 times	1.768	290.518	400
DH5	16 (times / 5 sec) *6.32=101.12 times	3.010	304.371	400

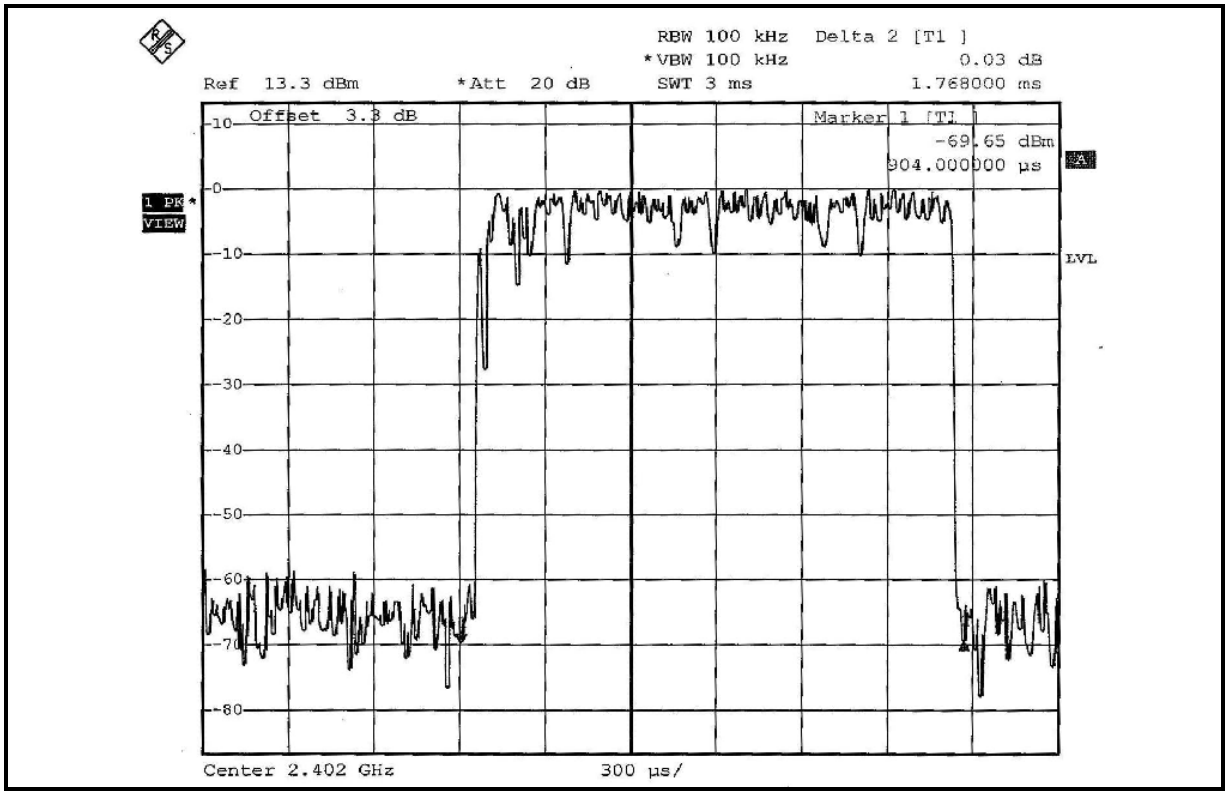
NOTE: Test plots of the transmitting time slot are shown on next 3 pages.

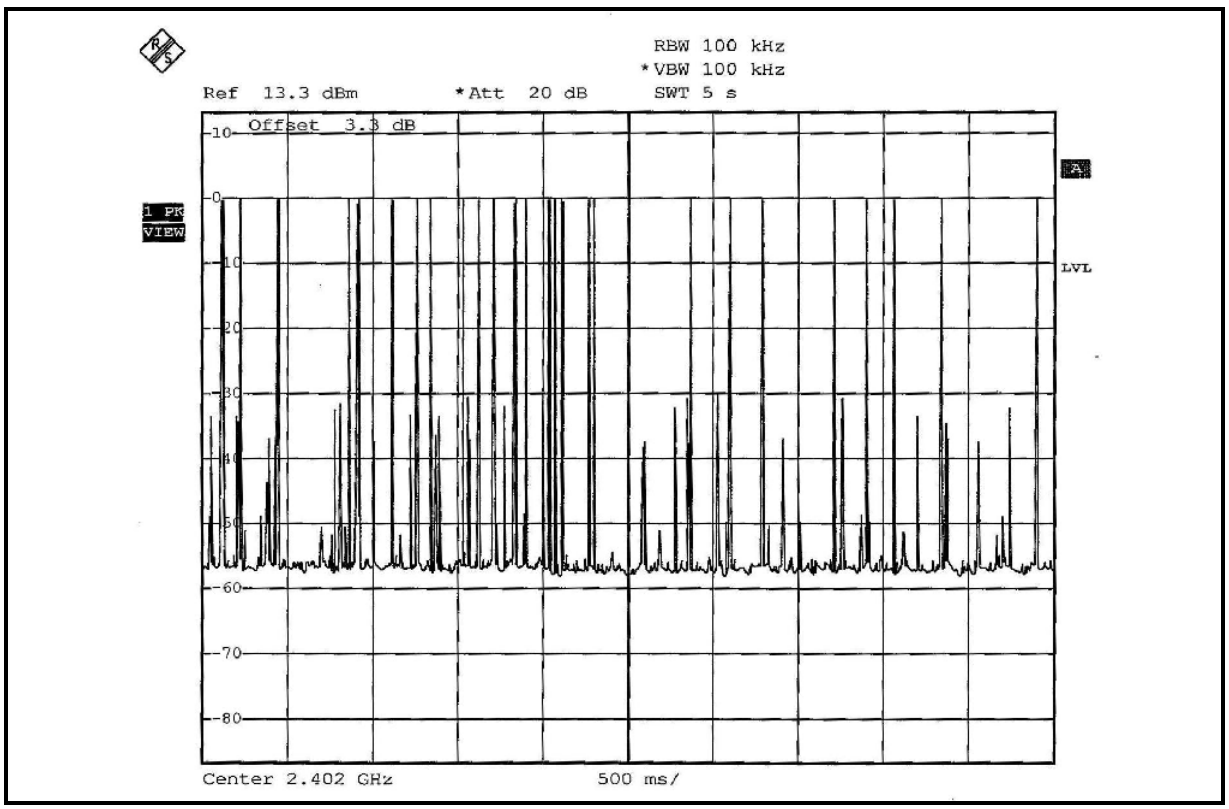
DH1


RBW 100 kHz
*VBW 100 kHz
SWT 3 ms
Delta 2 [T1]
6.82 dB
478.000000 µs
Ref 13.3 dBm
*Att 20 dB
Offset 3.3 dB
Marker 1 [T1]
-74.04 dBm
916.000000 µs
1 PK
VIEW
A
LVL
Center 2.402 GHz
300 µs/

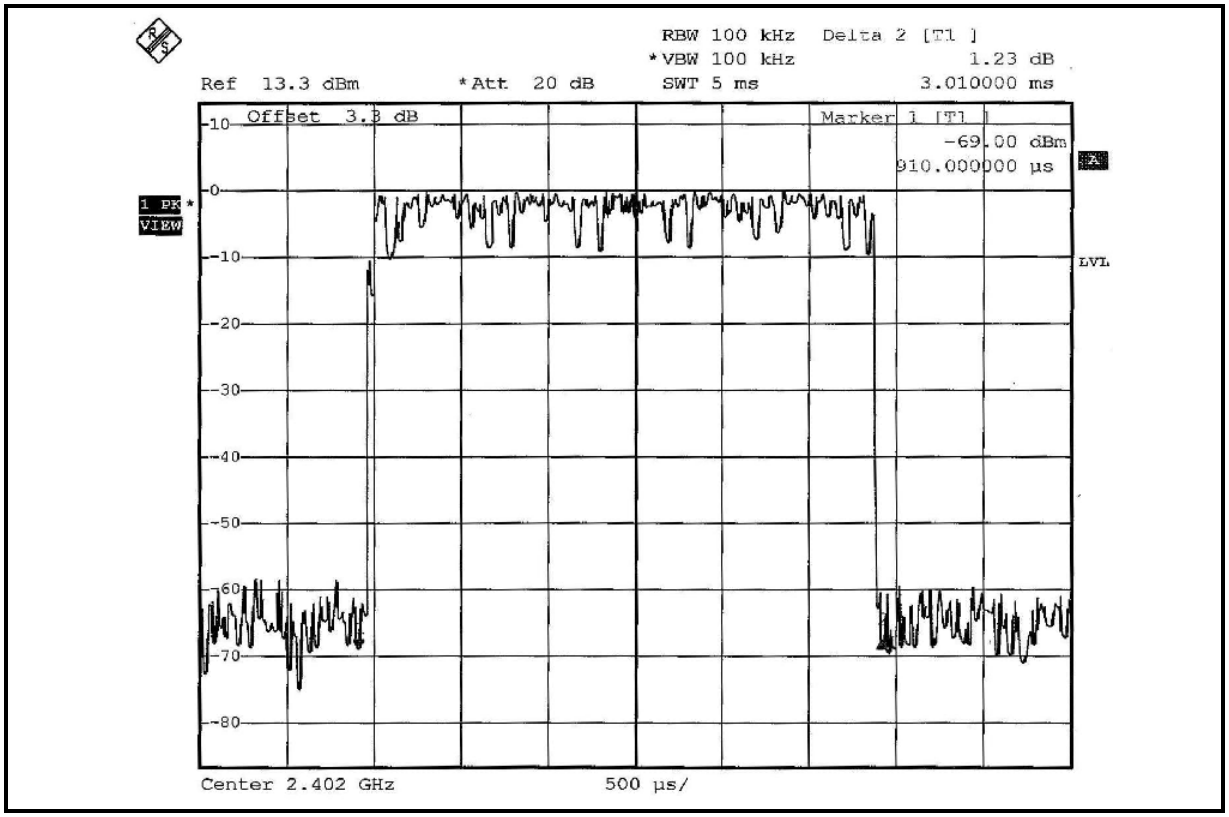

RBW 100 kHz
*VBW 100 kHz
SWT 5 s
Ref 13.3 dBm
*Att 20 dB
Offset 3.3 dB
1 PK
CLRWR
A
SGL
LVL
Center 2.402 GHz
500 ms/

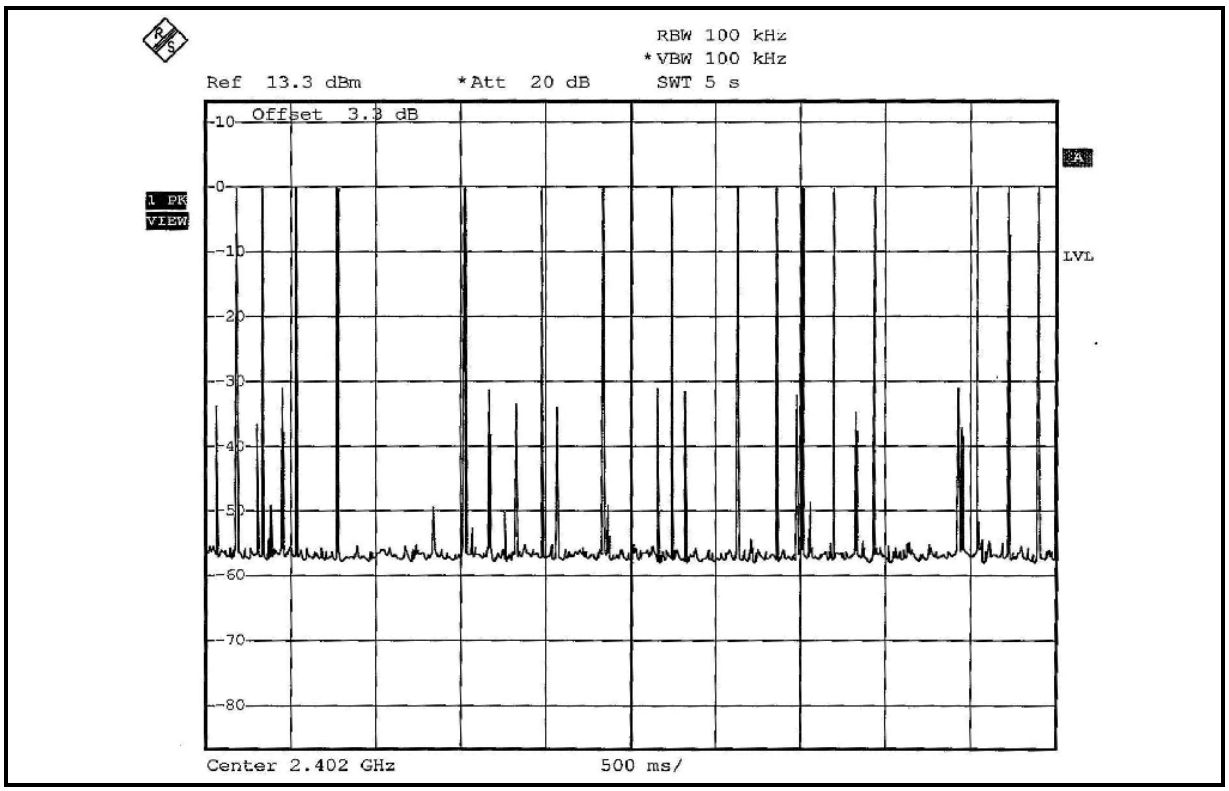
DH3


RBW 100 kHz
Delta 2 [T1]
*VBW 100 kHz
0.03 dB
Ref 13.3 dBm
*Att 20 dB
SWT 3 ms
1.768000 ms
Offset 3.3 dB
Marker 1 [T1]
-69.65 dBm
904.000000 µs
1 PK VIEW
A
LVL
Center 2.402 GHz
300 µs/


RBW 100 kHz
*VBW 100 kHz
Ref 13.3 dBm
*Att 20 dB
SWT 5 s
Offset 3.3 dB
1 PK VIEW
A
LVL
Center 2.402 GHz
500 ms/

DH5


RBW 100 kHz
Delta 2 [T1]
*VBW 100 kHz
1.23 dB
Ref 13.3 dBm
*Att 20 dB
SWT 5 ms
3.010000 ms
Offset 3.3 dB
Marker 1 [T1]
-69.00 dBm
910.000000 µs
1 PK VIEW
LVL
Center 2.402 GHz
500 µs/


RBW 100 kHz
*VBW 100 kHz
Ref 13.3 dBm
*Att 20 dB
SWT 5 s
Offset 3.3 dB
1 PK VIEW
LVL
Center 2.402 GHz
500 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, 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	FSP40	100040	Jun. 07, 2007

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

a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

b. 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.

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

d. 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

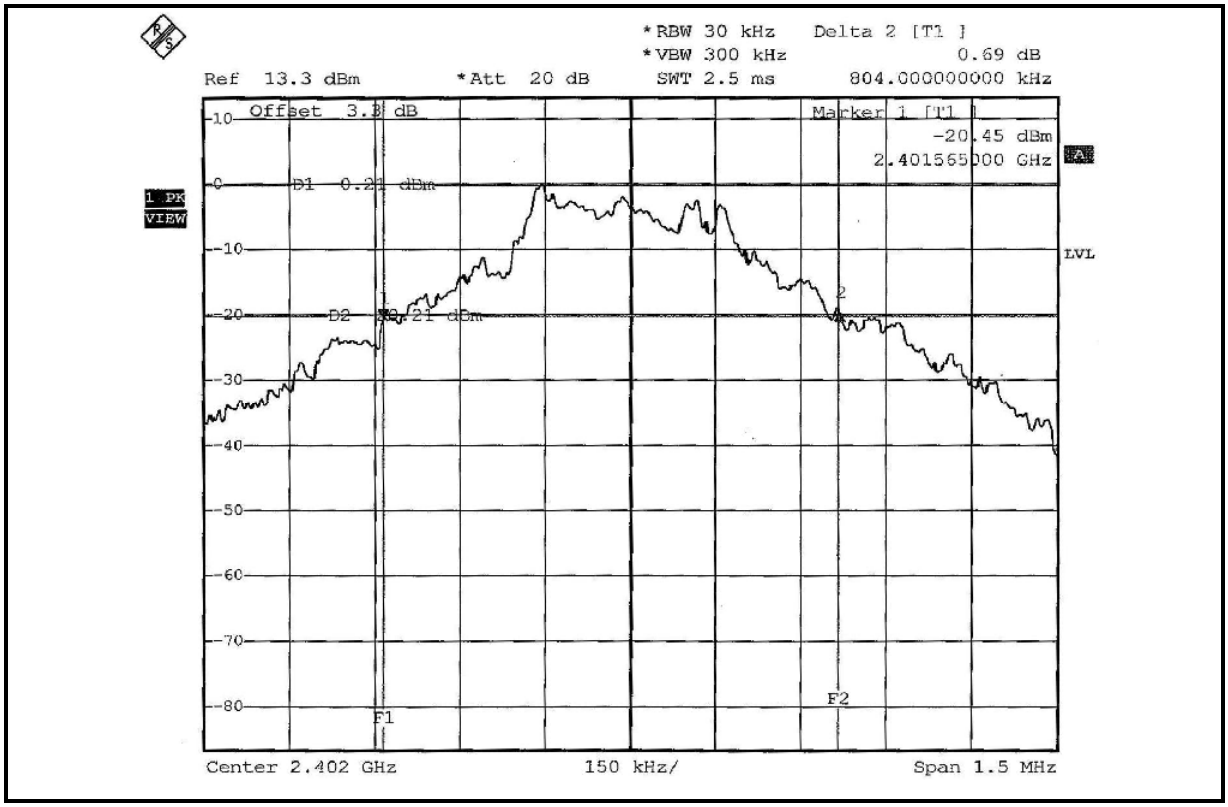
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.5.7 TEST RESULTS

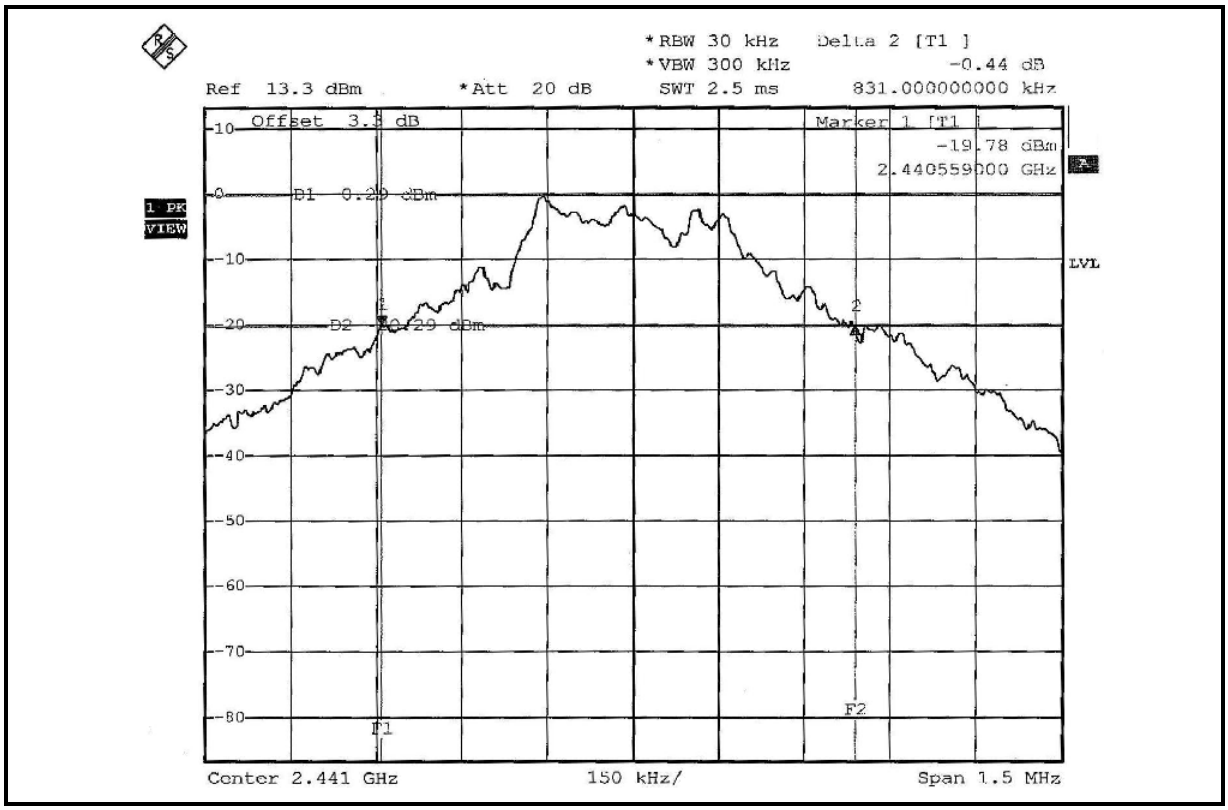
MODULATION TYPE	GFSK	**ENVIRONMENTAL CONDITIONS**	25 deg. C, 56%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**TESTED BY**	Long Chen

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	0.804
39	2441	0.831
78	2480	0.879

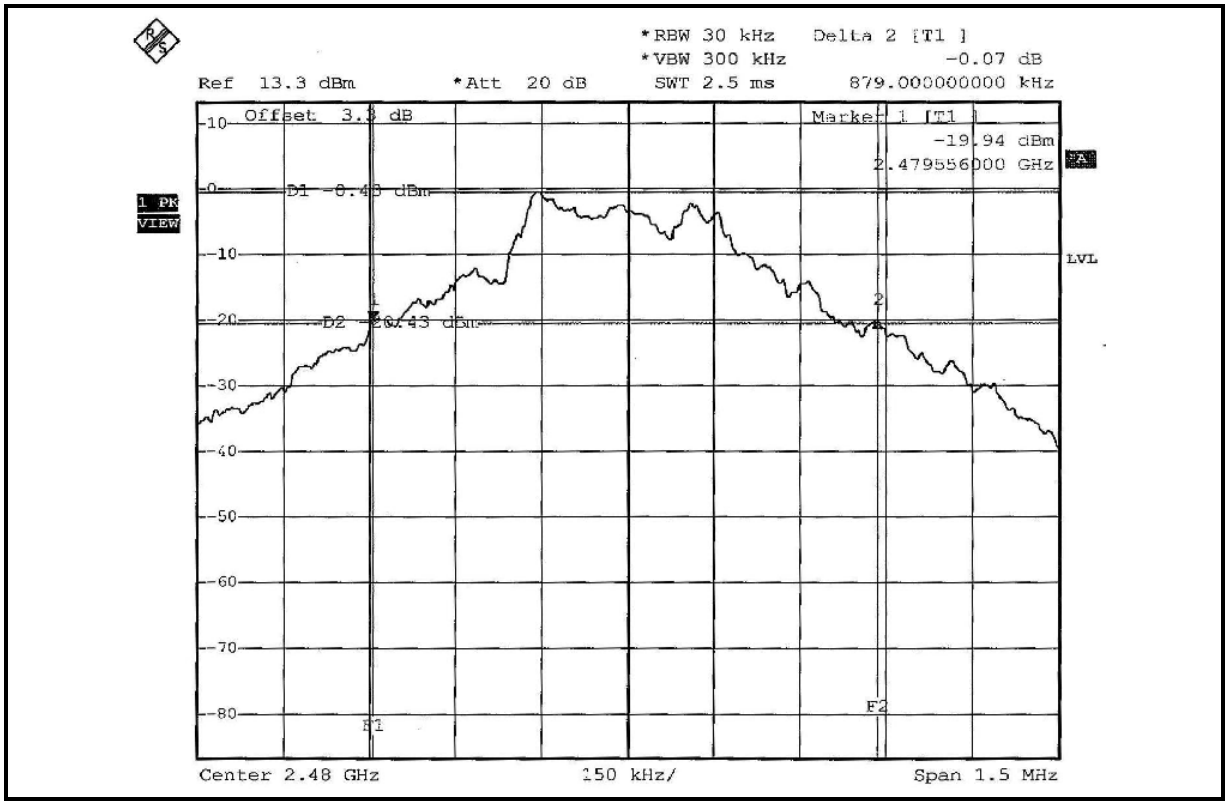
CH 0


*RBW 30 kHz
*VBW 300 kHz
Ref 13.3 dBm
*Att 20 dB
SWT 2.5 ms
Delta 2 [T1]
0.69 dB
804.000000000 kHz
Offset 3.3 dB
Marker 1 [T1]
-20.45 dBm
2.401565000 GHz
1 PK
VIEW
LVL
F1
F2
Center 2.402 GHz
150 kHz/
Span 1.5 MHz

CH 39


*RBW 30 kHz
*VBW 300 kHz
Ref 13.3 dBm
*Att 20 dB
SWT 2.5 ms
Delta 2 [T1]
-0.44 dB
831.000000000 kHz
Offset 3.3 dB
Marker 1 [T1]
-19.78 dBm
2.440559000 GHz
1 PK
VIEW
LVL
F1
F2
Center 2.441 GHz
150 kHz/
Span 1.5 MHz

CH 78


*RBW 30 kHz
*VBW 300 kHz
SWT 2.5 ms
Delta 2 [T1]
-0.07 dB
879.000000000 kHz
Ref 13.3 dBm
*Att 20 dB
Offset 3.3 dB
Marker 1 [T1]
-19.94 dBm
2.479556000 GHz
1 PK
VIEW
LVL
D1 -0.43 dBm
D2 -20.43 dBm
F1
F2
Center 2.48 GHz
150 kHz/
Span 1.5 MHz

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	FSP40	100040	Jun. 07, 2007

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

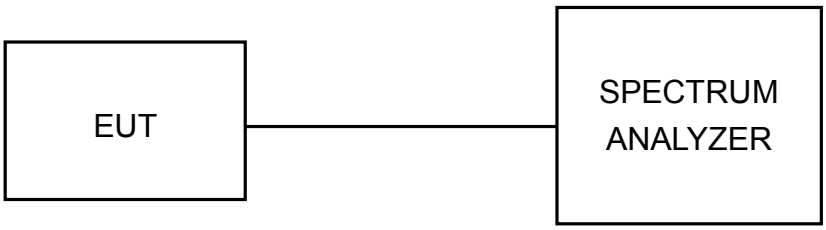
4.6.3 TEST PROCEDURES

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



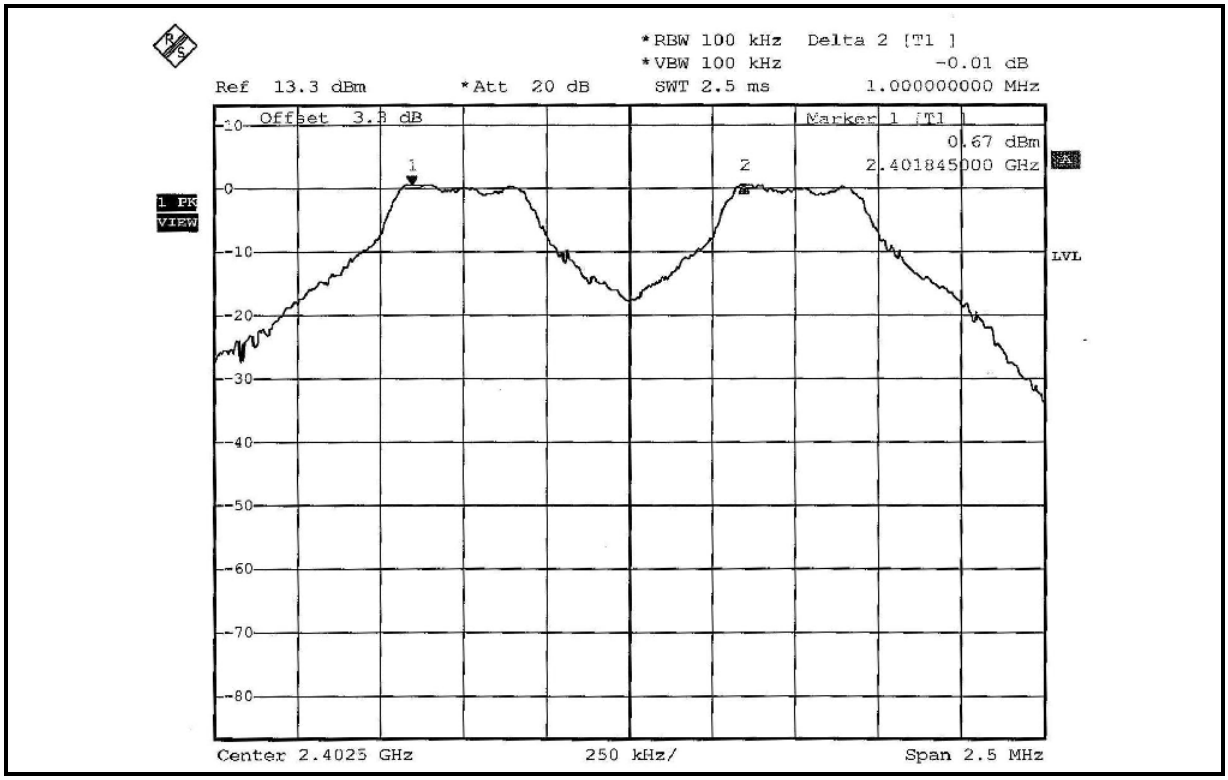
4.6.6 TEST RESULTS

MODULATION TYPE	GFSK	**ENVIRONMENTAL CONDITIONS**	25 deg. C, 56%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**TESTED BY**	Long Chen

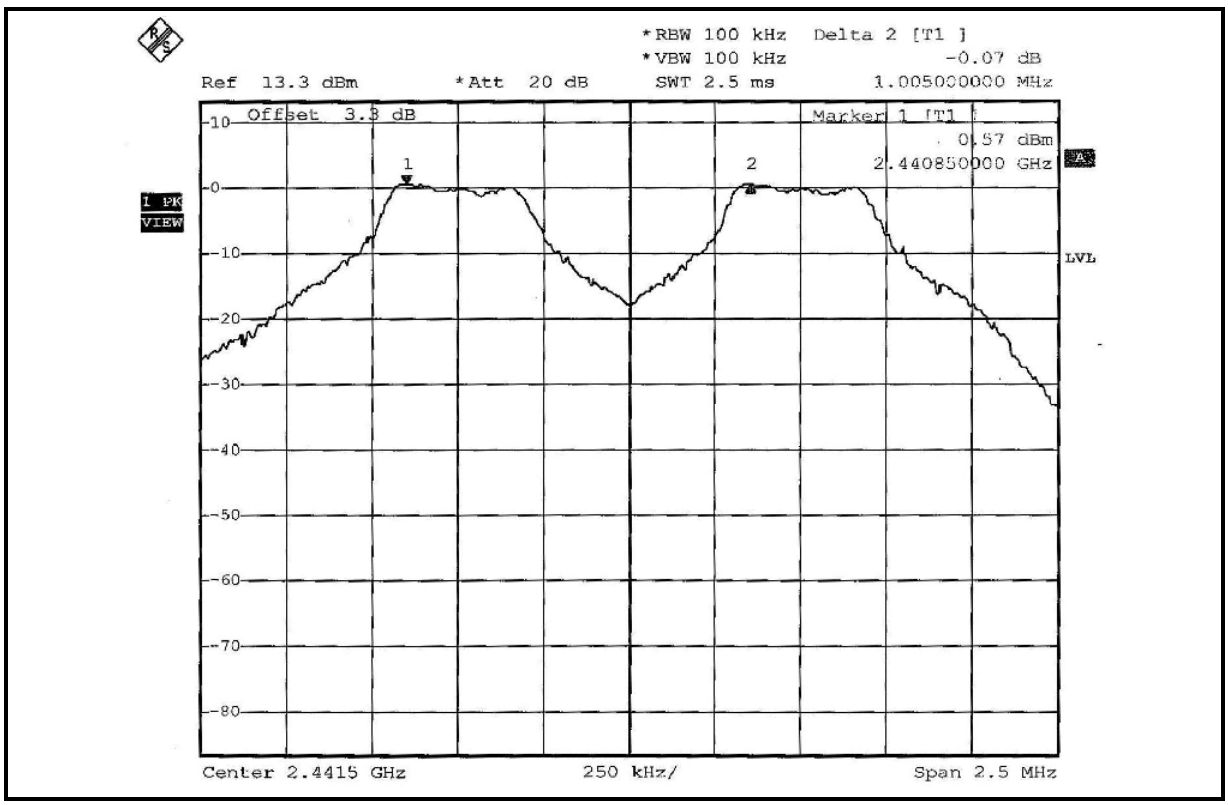
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	PASS / FAIL
0	2402	1.000	0.804	PASS
39	2441	1.005	0.831	PASS
78	2480	1.005	0.879	PASS

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

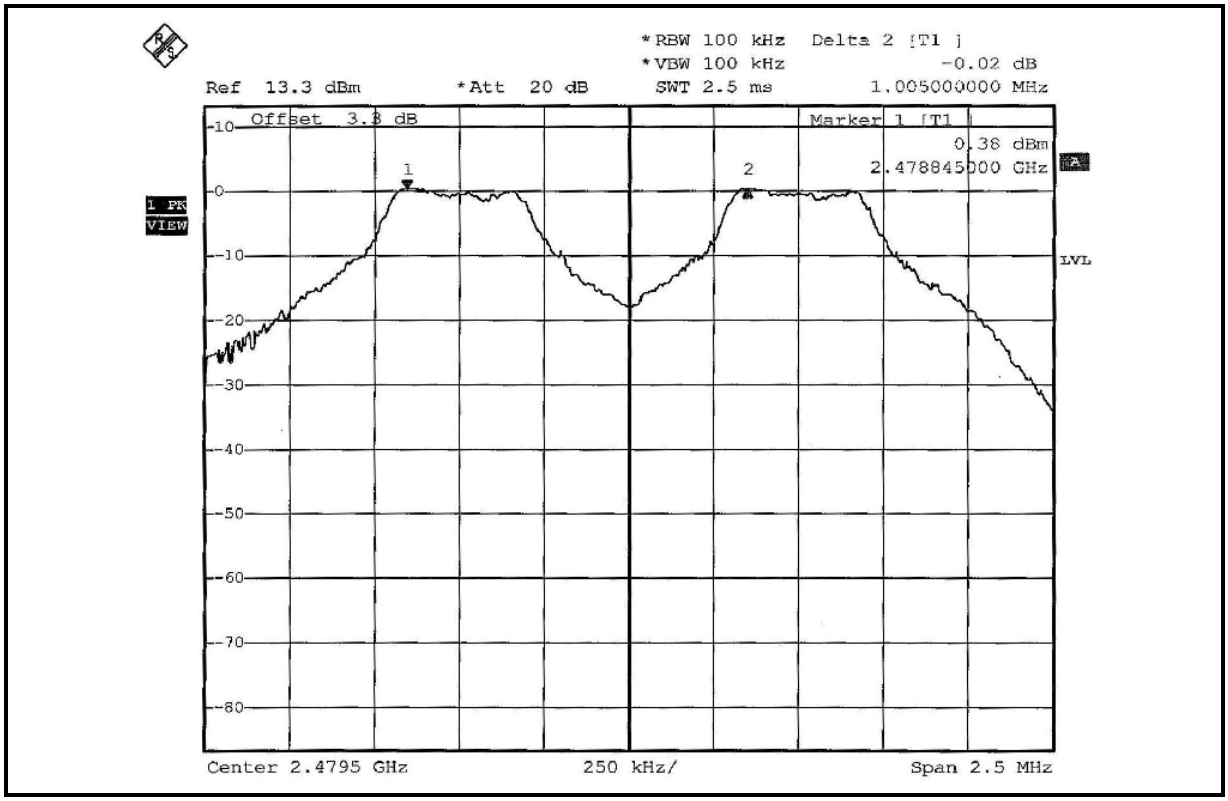
CH 0


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 ms
Delta 2 [T1]
-0.01 dB
1.000000000 MHz
Ref 13.3 dBm
*Att 20 dB
Offset 3.3 dB
Marker 1 [T1]
0.67 dBm
2.401845000 GHz
1 PK
VIEW
LVL
Center 2.4025 GHz
250 kHz/
Span 2.5 MHz

CH 39


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 ms
Delta 2 [T1]
-0.07 dB
1.005000000 MHz
Ref 13.3 dBm
*Att 20 dB
Offset 3.3 dB
Marker 1 [T1]
0.57 dBm
2.440850000 GHz
1 PK
VIEW
LVL
Center 2.4415 GHz
250 kHz/
Span 2.5 MHz

CH 78


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 ms
Delta 2 [T1]
-0.02 dB
1.005000000 MHz
Ref 13.3 dBm
*Att 20 dB
Offset 3.8 dB
Marker 1 [T1]
0.38 dBm
2.478845000 GHz
1 PK
VIEW
LVL
Center 2.4795 GHz
250 kHz/
Span 2.5 MHz

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	FSP40	100040	Jun. 07, 2007

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

a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

b. 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.

c. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3MHz RBW and 10 MHz VBW.

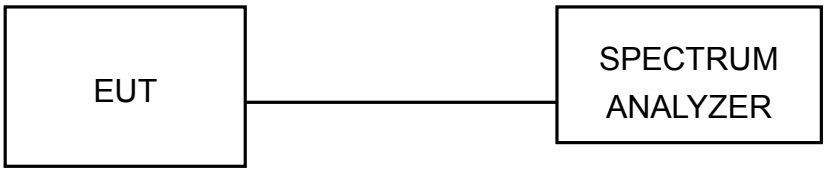
d. Measure the captured power within the band and recording the plot.

e. 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

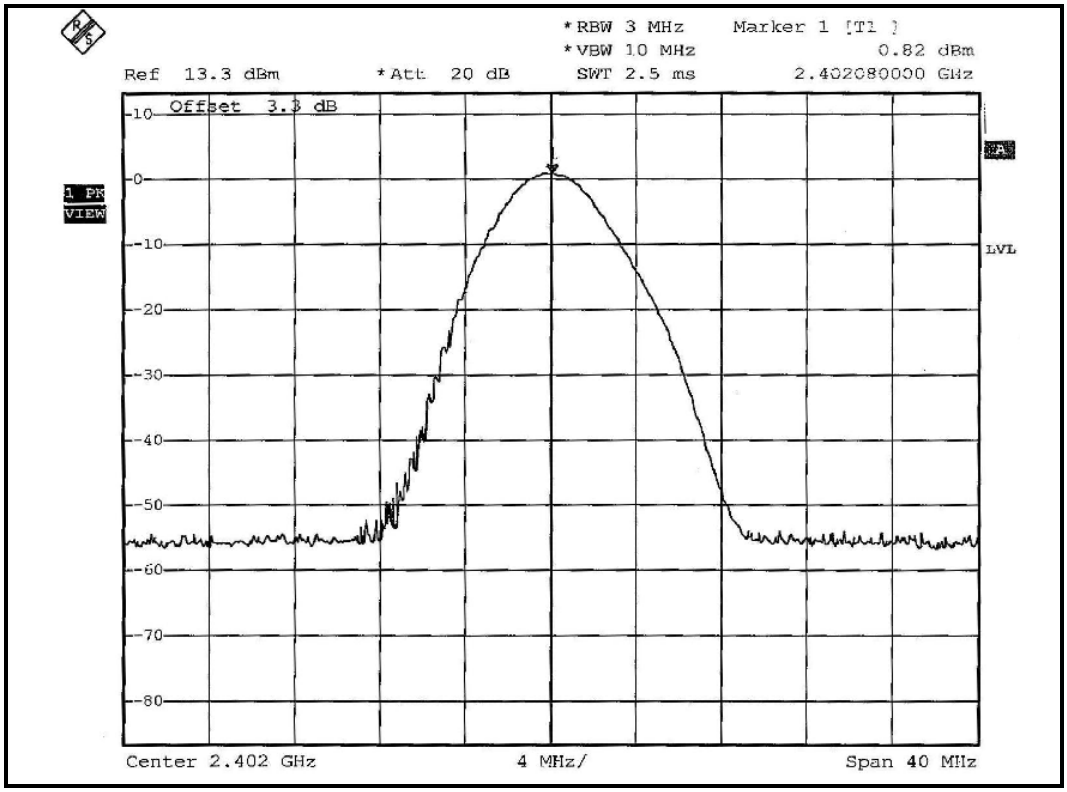
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.7.7 TEST RESULTS

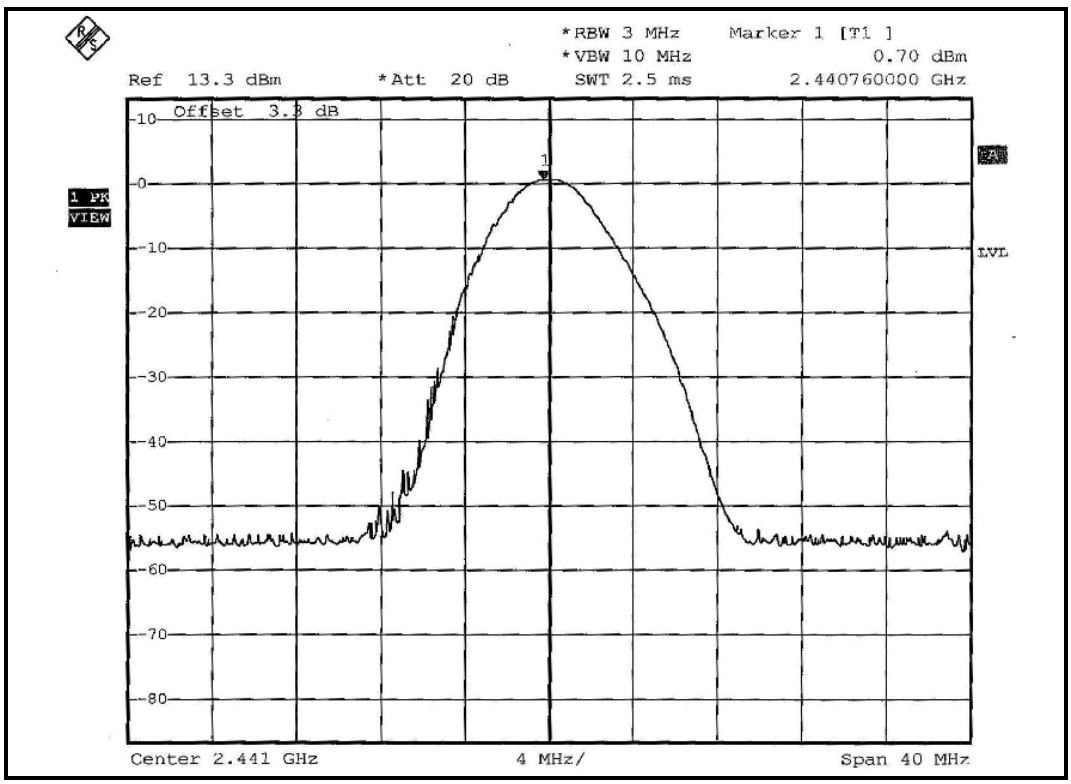
MODULATION TYPE	GFSK	**ENVIRONMENTAL CONDITIONS**	25 deg. C, 56%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**TESTED BY**	Long Chen

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dB)	PASS/FAIL
0	2402	1.208	0.82	30	PASS
39	2441	1.175	0.70	30	PASS
78	2480	1.117	0.48	30	PASS

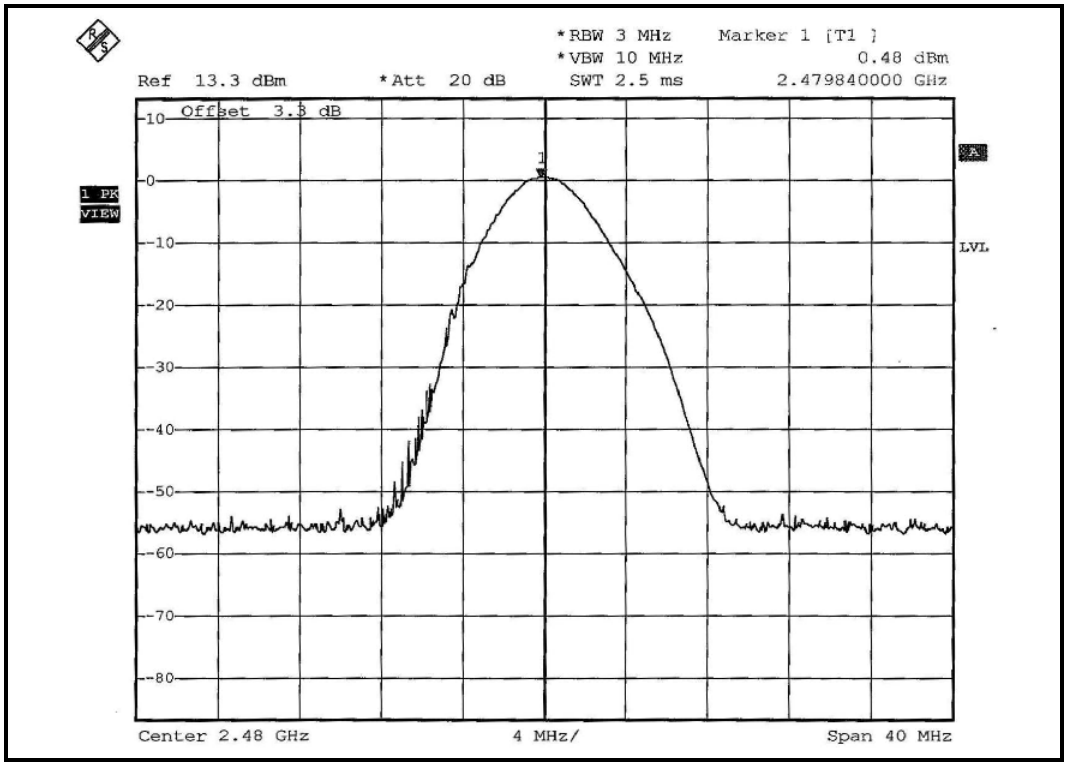
CH 0


*RBW 3 MHz
*VBW 10 MHz
SWT 2.5 ms
Marker 1 [T1]
0.82 dBm
2.402080000 GHz
Ref 13.3 dBm
*Att 20 dB
Offset 3.3 dB
1 PK
VIEW
LVL
Center 2.402 GHz
4 MHz/
Span 40 MHz

CH 39


*RBW 3 MHz
*VBW 10 MHz
SWT 2.5 ms
Marker 1 [T1]
0.70 dBm
2.440760000 GHz
Ref 13.3 dBm
*Att 20 dB
Offset 3.3 dB
1 PK
VIEW
LVL
Center 2.441 GHz
4 MHz/
Span 40 MHz

CH 78


*RBW 3 MHz
*VBW 10 MHz
SWT 2.5 ms
Marker 1 [T1]
0.48 dBm
2.479840000 GHz
Ref 13.3 dBm
*Att 20 dB
Offset 3.3 dB
1 PK
VIEW
A
LVL
10
0
-10
-20
-30
-40
-50
-60
-70
-80
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 RBW).

4.8.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP40	100040	Jun. 07, 2007

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).

FOR GFSK

NOTE 1:
The band edge emission plot on the next page shows 55.79dBc between carrier maximum power and local maximum emission in restrict band (2.36856GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 90.47dBuV/m (Peak), so the maximum field strength in restrict band is 90.47 – 55.79 = 34.68dBuV/m, which is under 74 dBuV/m limit.

Average value = 34.68 - 30.00= 4.68dBuV/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.

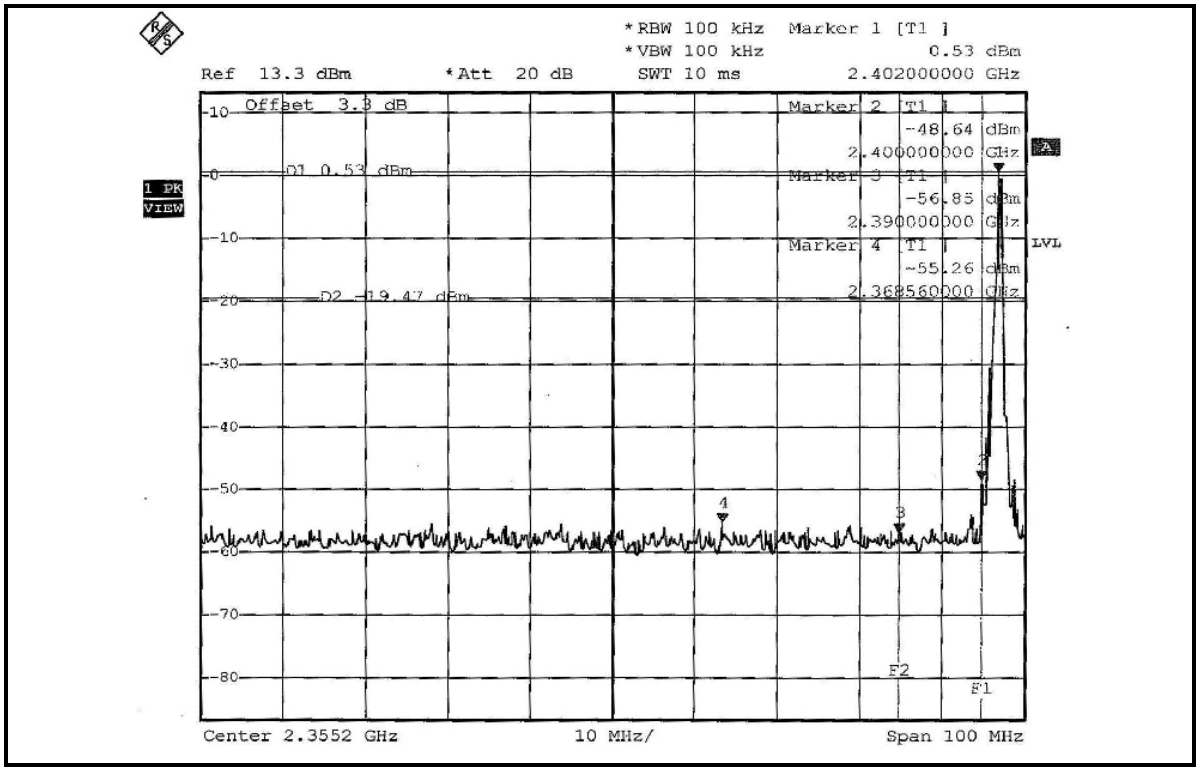
Average value = peak reading –30.00.

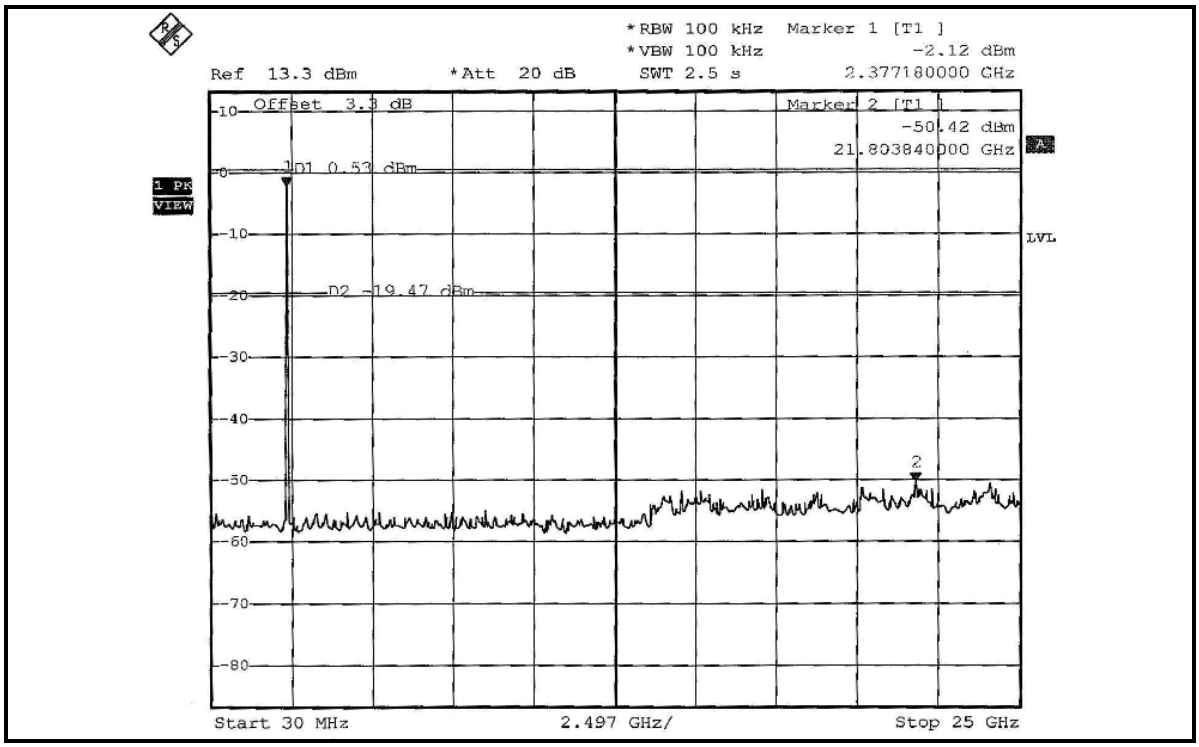
NOTE 2:
The band edge emission plot on the next second page shows 55.90dBc between carrier maximum power and local maximum emission in restrict band (2.48690GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.2.7 is 90.98dBuV/m (Peak), so the maximum field strength in restrict band is 90.98 – 55.90 = 35.08dBuV/m, which is under 74 dBuV/m limit.

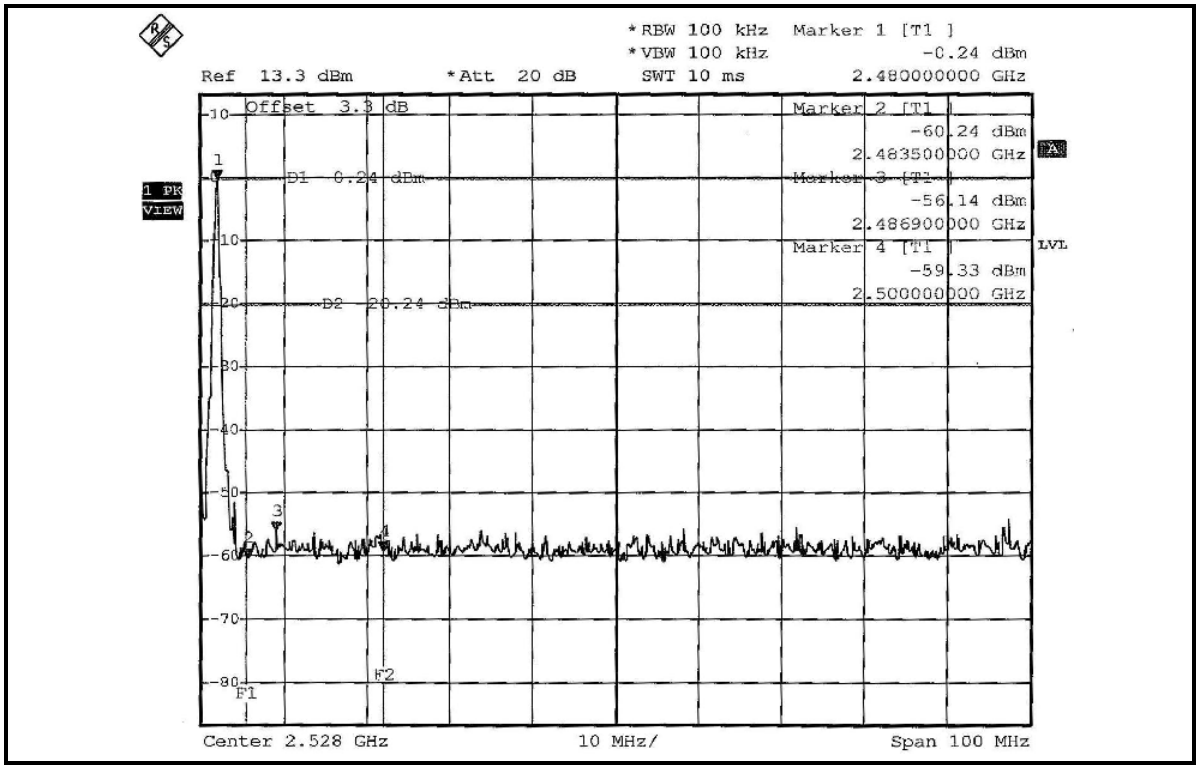
Average value = 35.08 - 30.00= 5.08dBuV/m, which is under 54dBuV/m limit.

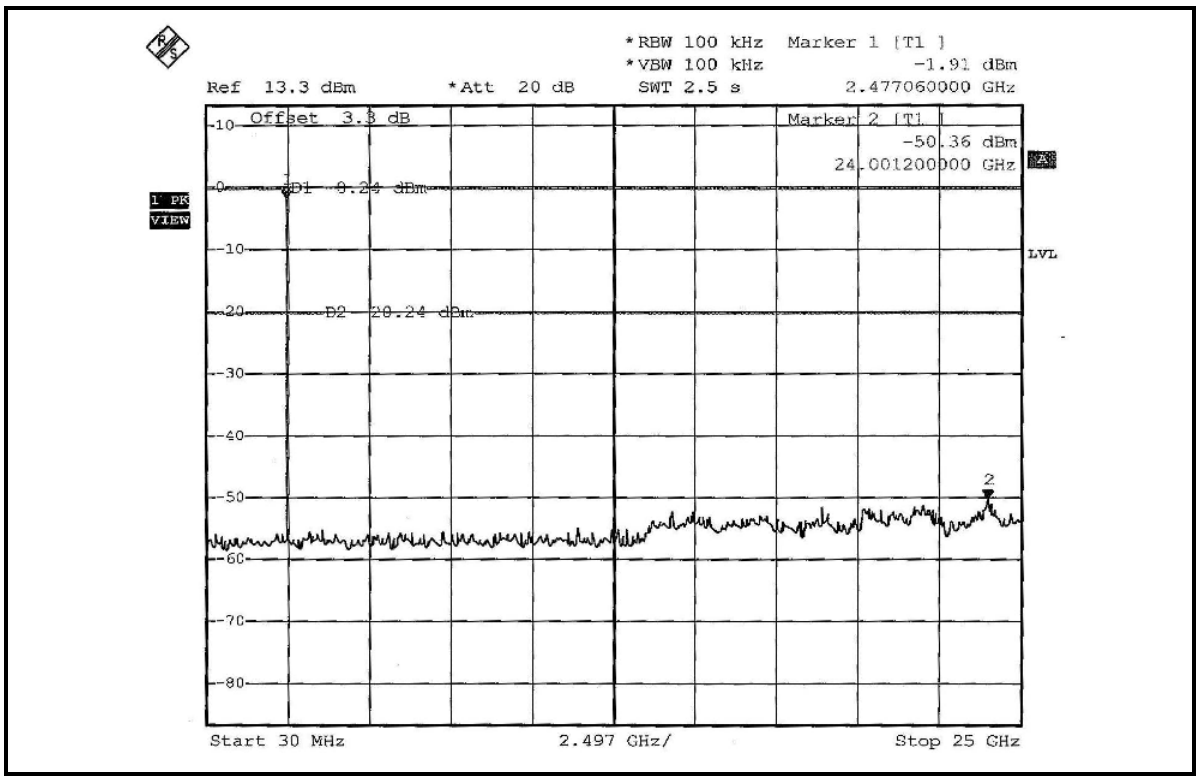
*The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle be equal to: 20log(3.125/100)= -30 dB.

Average value = peak reading –30.00.


*RBW 100 kHz
*VBW 100 kHz
SWT 10 ms
Marker 1 [T1]
0.53 dBm
2.402000000 GHz
Ref 13.3 dBm
*Att 20 dB
Offset 3.3 dB
Marker 2 [T1]
-48.64 dBm
2.400000000 GHz
D1 0.53 dBm
Marker 3 [T1]
-56.85 dBm
2.390000000 GHz
Marker 4 [T1]
-55.26 dBm
2.368560000 GHz
D2 -19.47 dBm
1 PK
VIEW
LVL
F2
F1
Center 2.3552 GHz
10 MHz/
Span 100 MHz


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 s
Marker 1 [T1]
-2.12 dBm
2.377180000 GHz
Ref 13.3 dBm
*Att 20 dB
Offset 3.3 dB
Marker 2 [T1]
-50.42 dBm
21.803840000 GHz
D1 0.53 dBm
D2 -19.47 dBm
1 PK
VIEW
LVL
Start 30 MHz
2.497 GHz/
Stop 25 GHz


*RBW 100 kHz
*VBW 100 kHz
SWT 10 ms
Marker 1 [T1]
-0.24 dBm
2.480000000 GHz
Ref 13.3 dBm
*Att 20 dB
Offset 3.3 dB
Marker 2 [T1]
-60.24 dBm
2.483500000 GHz
Marker 3 [T1]
-56.14 dBm
2.486900000 GHz
Marker 4 [T1]
-59.33 dBm
2.500000000 GHz
D1 0.24 dBm
D2 20.24 dBm
1 PK
VIEW
LVL
F1
F2
Center 2.528 GHz
10 MHz/
Span 100 MHz


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 s
Marker 1 [T1]
-1.91 dBm
2.477060000 GHz
Ref 13.3 dBm
*Att 20 dB
Offset 3.3 dB
Marker 2 [T1]
-50.36 dBm
24.001200000 GHz
D1 0.24 dBm
D2 20.24 dBm
1 PK
VIEW
LVL
Start 30 MHz
2.497 GHz/
Stop 25 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 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 chip antenna without antenna connector. The maximum gain of this antenna is 0dBi.

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, NCC
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

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.