



FCC TEST REPORT (Bluetooth)

REPORT NO.: RF960312A13

MODEL NO.: 650-M

RECEIVED: March 12, 2007

TESTED: April 26 ~ May 31, 2007

ISSUED: June 1, 2007

APPLICANT : Socket Communications, Inc.

ADDRESS : 39700 Eureka Drive Newark, CA 94560-4808 USA

ISSUED BY : Advance Data Technology Corporation

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

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1 CERTIFICATION

PRODUCT: SoMo 650-M PMC
BRAND NAME: Socketmobile
MODELNO.: 650-M
APPLICANT: Socket Communications, Inc.
TESTED: April 26 ~ May 31, 2007
TEST SAMPLE: ENGINEERING SAMPLE
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 : Annie Chang , **DATE:** June 1, 2007
(Annie Chang / Specialist)

TECHNICAL ACCEPTANCE : Jamison Chan , **DATE:** June 1, 2007
Responsible for RF (Jamison Chan / Senior Engineer)

APPROVED BY : Ken Liu , **DATE:** June 1, 2007
(Ken Liu / Deputy Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -9.53dB at 0.173MHz.
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. 21dBm (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 -5.32dB at 1654.000MHz.
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	Uncertainty
Conducted emissions	2.44 dB
Radiated emissions	3.75 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	SoMo 650-M PMC
MODEL NO.	650-M
FCC ID	LUB650M-1
POWER SUPPLY	5Vdc from adapter or cradle 3.7Vdc from battery
MODULATION TYPE	Wireless LAN: CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM Bluetooth: GFSK, $\pi/4$ -DQPSK, 8DPSK for FHSS
MODULATION TECHNOLOGY	DSSS, OFDM, FHSS
TRANSFER RATE	Wireless LAN: 802.11b: 11/5.5/2/1Mbps 802.11g: 54/48/36/24/18/12/9/6Mbps Bluetooth: 1/2/3Mbps
FREQUENCY RANGE	Wireless LAN: 2412MHz ~ 2462MHz Bluetooth: 2402MHz ~ 2480MHz
NUMBER OF CHANNEL	Wireless LAN: 11 Bluetooth: 79
MAXIMUM OUTPUT POWER	Wireless LAN: 66.222mW for 802.11b 112.980mW for 802.11g Bluetooth: 0.585mW
ANTENNA TYPE	Wireless LAN: PIFA antenna with 0.202dBi gain Bluetooth: PIFA antenna with 1.55dBi gain
DATA CABLE	Refer to user's manual
I/O PORTS	1.2m USB cable with one core
ACCESSORY DEVICE	NA

NOTE:

1. The EUT is a PDA with 802.11b/g and Bluetooth function. The 802.11b/g and Bluetooth could transmit at the same time.
2. The EUT, operates in the 2.4GHz frequency range, lets you connect IEEE 802.11g or IEEE 802.11b devices to the network. With its high-speed data transmissions of up to 54Mbps.

3. The EUT consumes power from switching power, battery or cradle as follows:

Item	Brand Name	Model No.	Power Rating
Adapter	PI	P015WA0508	AC I/P: 100-240V, 50/60Hz, 560mA DC O/P: 5V, 3A(1.5m + 1 core)
Battery 1	Socket	SoMo-650-2600	3.7Vdc, 2600mAh
Battery 2	Socket	SoMo-650-1200	3.7Vdc, 1200mAh
Cradle	Socket	650-M	5.0Vdc, 3.0A

The **Battery 1** was selected for the final test and its data was recorded in this report.

4. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

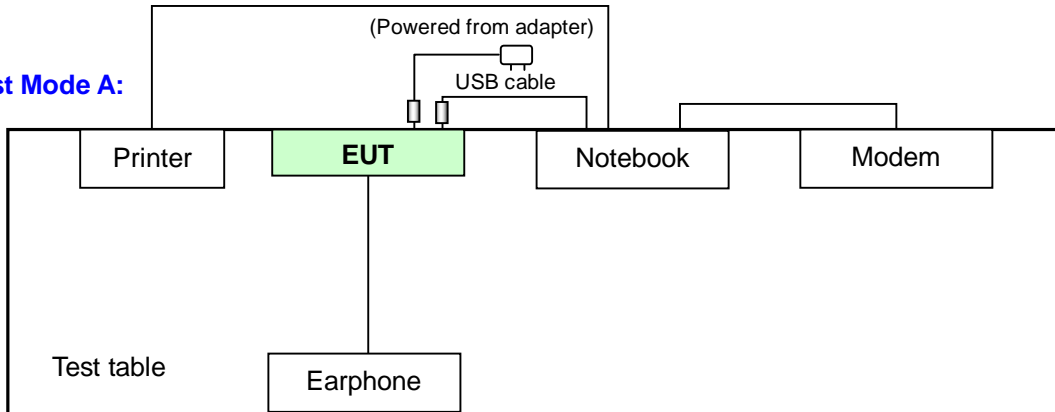
3.2 DESCRIPTION OF TEST MODES

Seventy-nine channels are provided to this EUT:

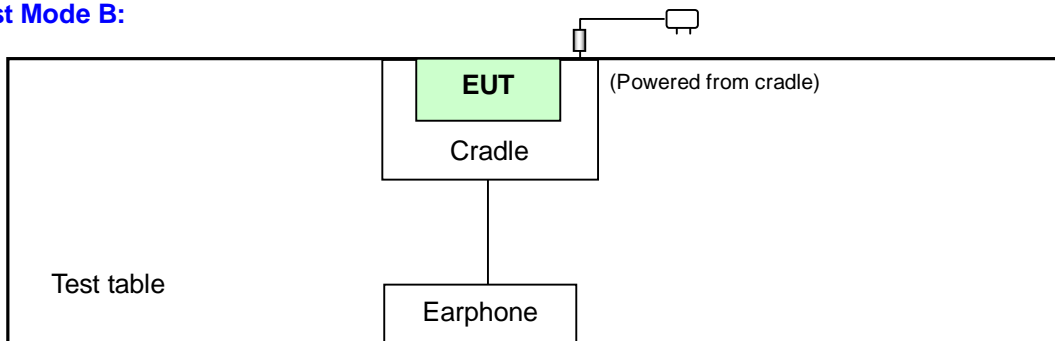
CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409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

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST

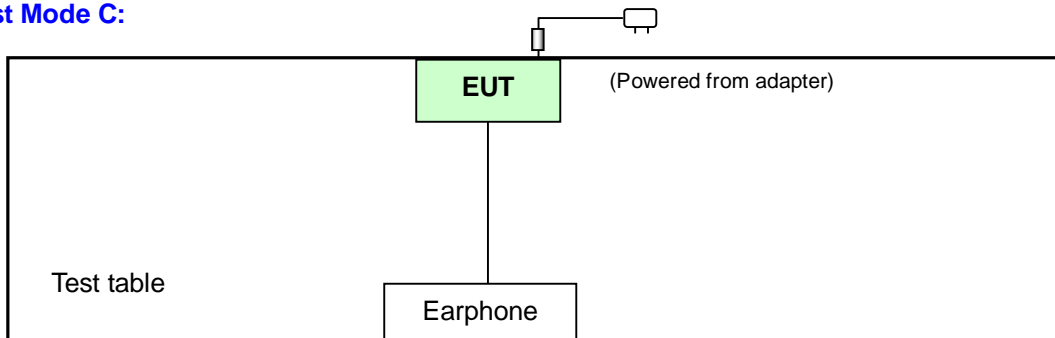
Test Mode A:



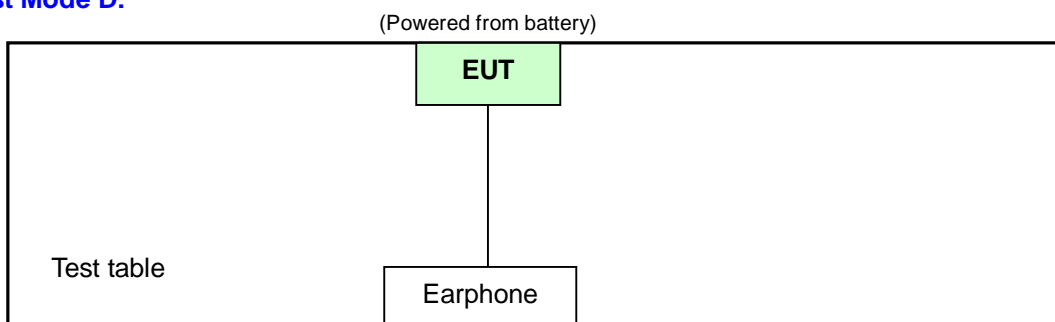
Test Mode B:



Test Mode C:



Test Mode D:



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT Configure Mode	Applicable to				Description
	PLC	RE<1G	RE [≥] 1G	APCM	
A	-	√	√	√	Link to Notebook (Powered from adapter)
B	√	√	-	-	EUT with cradle (Powered from cradle)
C	-	√	-	-	EUT with adapter (Powered from adapter)
D		√			EUT only (Powered from battery)

Where PLC: Power Line Conducted Emission RE<1G RE: Radiated Emission below 1GHz
 RE≥1G: Radiated Emission above 1GHz APCM: Antenna Port Conducted Measurement

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 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	Data Rate (Mbps)
B	0 to 78	0, 39, 78	FHSS	GFSK	DH5	1

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, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	PACKET TYPE	Data Rate (Mbps)	AXIS
A	0 to 78	0	FHSS	GFSK	DH5	1	X
A	0 to 78	0	FHSS	8DPSK	DH5	3	X
B	0 to 78	0	FHSS	GFSK	DH5	1	X
B	0 to 78	0	FHSS	8DPSK	DH5	3	X
C	0 to 78	0	FHSS	GFSK	DH5	1	X
C	0 to 78	0	FHSS	8DPSK	DH5	3	X
D	0 to 78	0	FHSS	GFSK	DH5	1	X
D	0 to 78	0	FHSS	8DPSK	DH5	3	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, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	PACKET TYPE	Data Rate (Mbps)	AXIS
A	0 to 78	0, 39, 78	FHSS	GFSK	DH5	1	X
A	0 to 78	0, 39, 78	FHSS	8DPSK	DH5	3	X

BANDEDGE MEASUREMENT:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	PACKET TYPE	Data Rate (Mbps)	AXIS
A	0 to 78	0, 78	FHSS	GFSK	DH5	1	X
A	0 to 78	0, 78	FHSS	8DPSK	DH5	3	X

ANTENNA PORT CONDUCTED MEASUREMENT:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	PACKET TYPE	Data Rate (Mbps)	AXIS
A	0 to 78	0, 39, 78	FHSS	GFSK	DH5	1	X
A	0 to 78	0, 39, 78	FHSS	8DPSK	DH5	3	X



3.3 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.

3.4 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	NOTEBOOK COMPUTER	DELL	PP05L	20375526736	FCC DoC Approved
2	PRINTER	EPSON	LQ-300+	DCGY017054	FCC DoC Approved
3	MODEM	ACEEX	1414	980020520	IFAXDM1414
4	EARPHONE	PHS	N/A	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	1.8m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core
3	1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.
4	1.2m data cable

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 (dB μ V)	
	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
ROHDE & SCHWARZ Test Receiver	ESCS 30	838251/021	Nov. 23, 2007
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	100218	Nov. 21, 2007
LISN With Adapter (for EUT)	AD10	C10Ada-001	Nov. 21, 2007
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100219	Nov. 07, 2007
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100220	Oct. 26, 2007
Software	ADT_Cond_V7.3.2	NA	NA
Software	ADT_ISN_V7.3.2	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C10.01	Mar. 01, 2008
SUHNTER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010773	Feb. 11, 2008

- 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 ADT Shielded Room No. 10.
 3. The VCCI Site Registration No. C-1852.

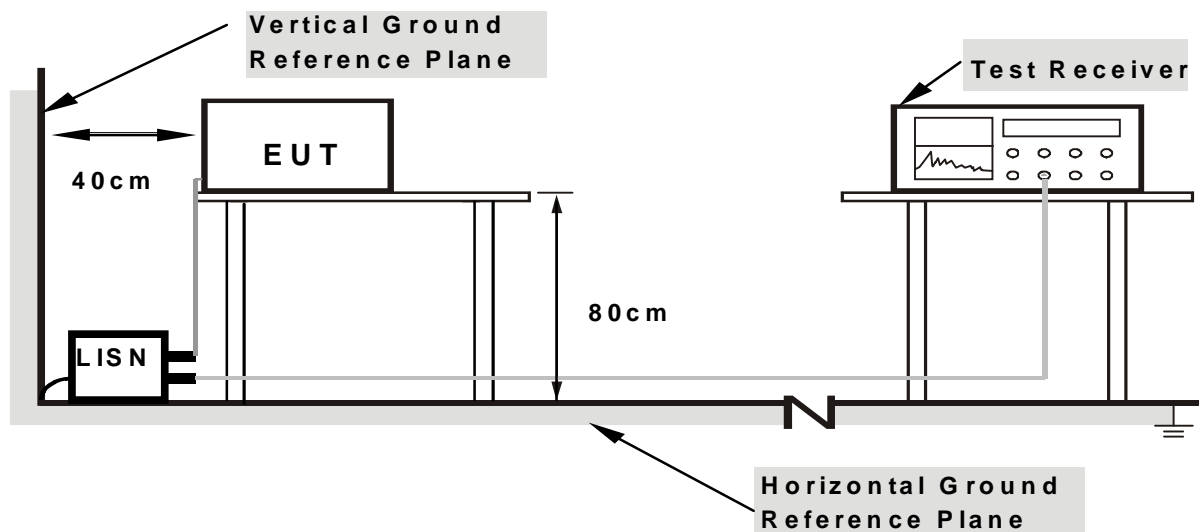
4.1.3 TEST PROCEDURES

- 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) are 80 cm from EUT and at 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

For Mode B:

- Connected the EUT with an AC adapter via cradle placed on testing table.
- EUT sent audio messages to earphone continuously.

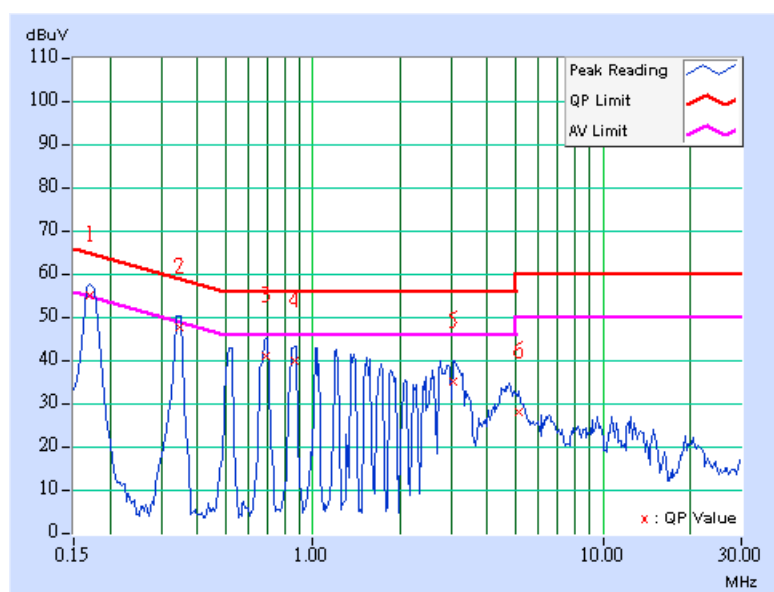
4.1.7 TEST RESULTS

CONDUCTED WORST-CASE DATA

TEST MIDE	B		
MODULATION TYPE	GFSK	CHANNEL	0
INPUT POWER	120Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	24 deg. C, 70%RH, 1004hPa	PHASE	Line 1
TESTED BY	Jun Wu		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.170	0.20	54.47	-	54.67	-	64.98	54.98	-10.31	-
2	0.345	0.20	47.24	-	47.44	-	59.07	49.07	-11.63	-
3	0.685	0.30	40.55	-	40.85	-	56.00	46.00	-15.15	-
4	0.869	0.36	39.43	-	39.79	-	56.00	46.00	-16.21	-
5	3.055	0.45	34.73	-	35.18	-	56.00	46.00	-20.82	-
6	5.098	0.54	27.67	-	28.21	-	60.00	50.00	-31.79	-

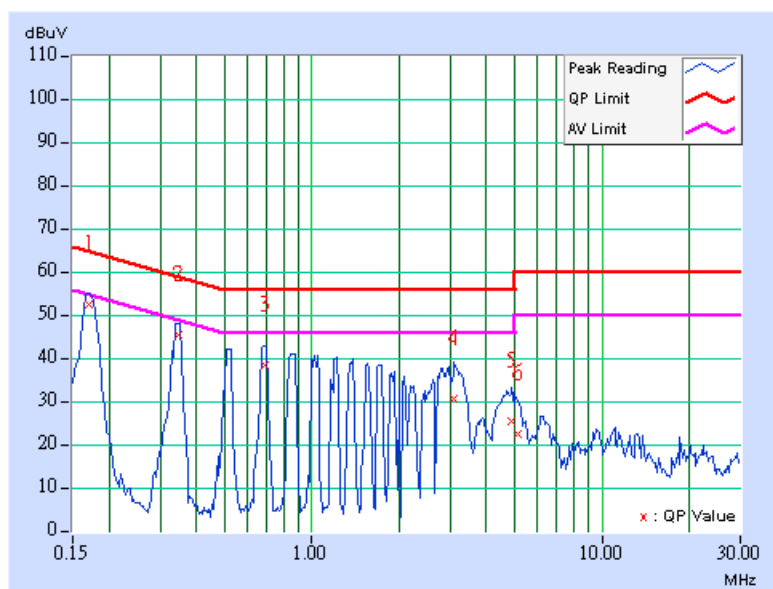
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



TEST MIDE	B		
MODULATION TYPE	GFSK	CHANNEL	0
INPUT POWER	120Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	24 deg. C, 70%RH, 1004hPa	PHASE	Line 2
TESTED BY	Jun Wu		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.170	0.20	52.09	-	52.29	-	64.98	54.98	-12.69	-
2	0.345	0.20	45.13	-	45.33	-	59.07	49.07	-13.74	-
3	0.685	0.25	37.94	-	38.19	-	56.00	46.00	-17.81	-
4	3.105	0.36	30.45	-	30.81	-	56.00	46.00	-25.19	-
5	4.906	0.42	25.19	-	25.61	-	56.00	46.00	-30.39	-
6	5.102	0.42	22.24	-	22.66	-	60.00	50.00	-37.34	-

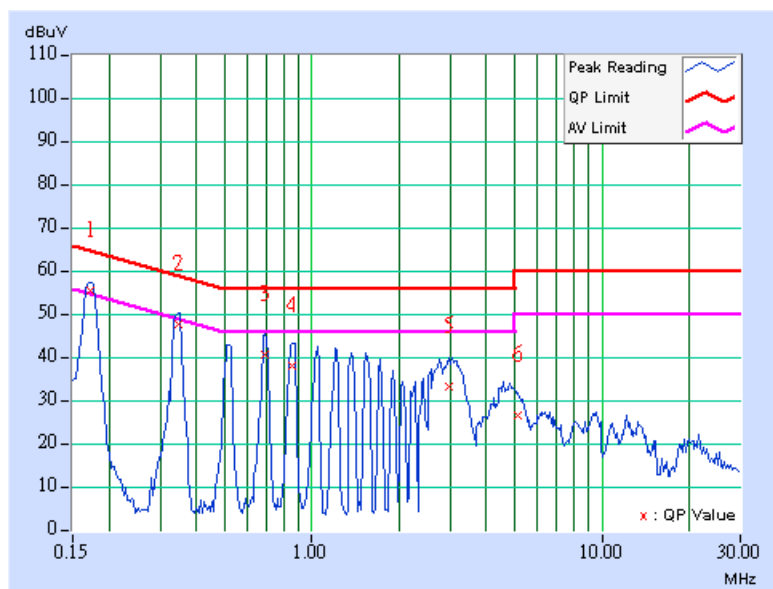
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



TEST MIDE	B		
MODULATION TYPE	GFSK	CHANNEL	39
INPUT POWER	120Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	24 deg. C, 70%RH, 1004hPa	PHASE	Line 1
TESTED BY	Jun Wu		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.173	0.20	55.06	44.60	55.26	44.80	64.79	54.79	-9.53	-9.99
2	0.345	0.20	47.22	-	47.42	-	59.07	49.07	-11.65	-
3	0.689	0.30	40.13	-	40.43	-	56.00	46.00	-15.57	-
4	0.857	0.35	37.53	-	37.88	-	56.00	46.00	-18.12	-
5	2.965	0.45	32.93	-	33.38	-	56.00	46.00	-22.62	-
6	5.160	0.54	26.16	-	26.70	-	60.00	50.00	-33.30	-

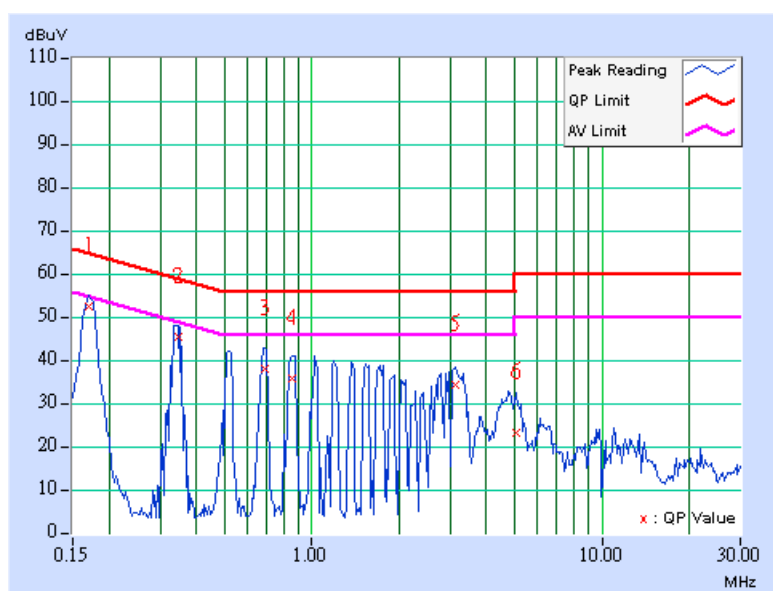
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



TEST MIDE	B		
MODULATION TYPE	GFSK	CHANNEL	39
INPUT POWER	120Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	24 deg. C, 70%RH, 1004hPa	PHASE	Line 2
TESTED BY	Jun Wu		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.170	0.20	52.03	-	52.23	-	64.98	54.98	-12.75	-
2	0.345	0.20	45.13	-	45.33	-	59.07	49.07	-13.74	-
3	0.689	0.25	37.68	-	37.93	-	56.00	46.00	-18.07	-
4	0.853	0.28	35.38	-	35.66	-	56.00	46.00	-20.34	-
5	3.145	0.36	34.01	-	34.37	-	56.00	46.00	-21.63	-
6	5.047	0.42	22.90	-	23.32	-	60.00	50.00	-36.68	-

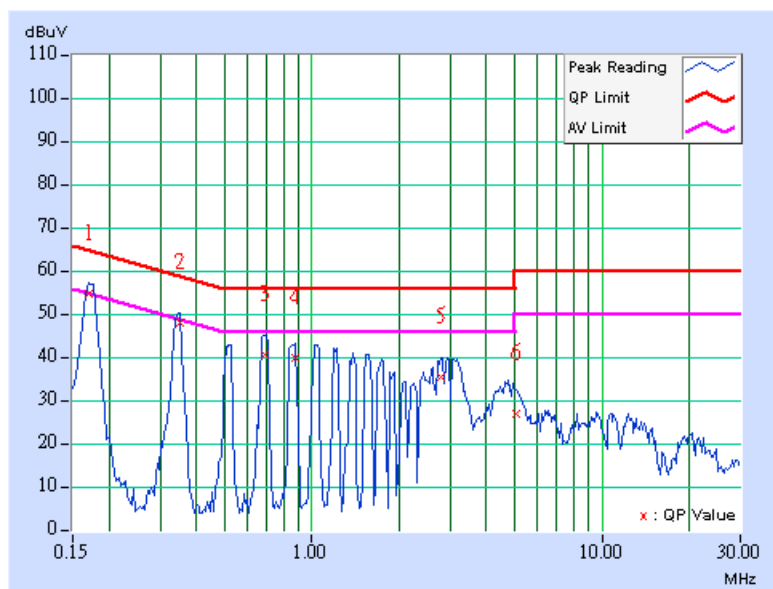
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



TEST MIDE	B		
MODULATION TYPE	GFSK	CHANNEL	78
INPUT POWER	120Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	24 deg. C, 70%RH, 1004hPa	PHASE	Line 1
TESTED BY	Jun Wu		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.170	0.20	54.19	-	54.39	-	64.98	54.98	-10.59	-
2	0.349	0.20	47.78	-	47.98	-	58.98	48.98	-11.00	-
3	0.685	0.30	40.25	-	40.55	-	56.00	46.00	-15.45	-
4	0.873	0.36	39.39	-	39.75	-	56.00	46.00	-16.25	-
5	2.801	0.44	34.84	-	35.28	-	56.00	46.00	-20.72	-
6	5.094	0.54	26.44	-	26.98	-	60.00	50.00	-33.02	-

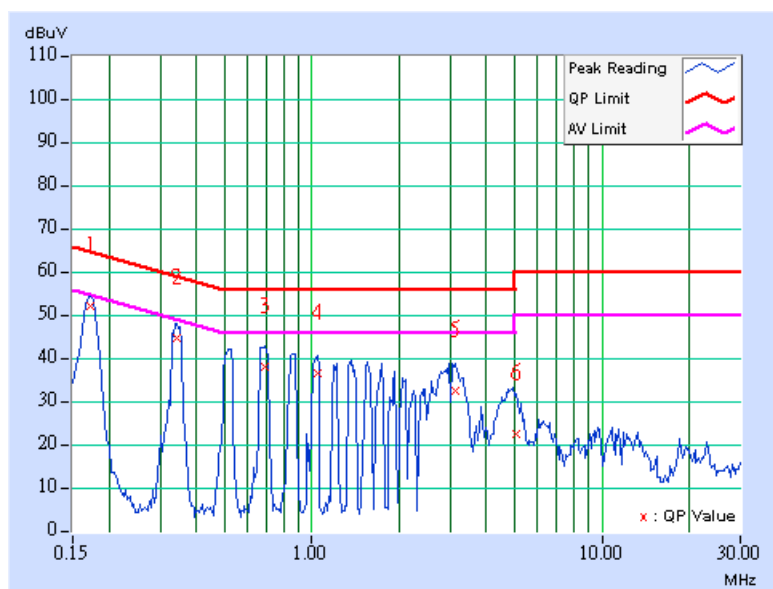
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



TEST MIDE	B		
MODULATION TYPE	GFSK	CHANNEL	78
INPUT POWER	120Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	24 deg. C, 70%RH, 1004hPa	PHASE	Line 2
TESTED BY	Jun Wu		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.173	0.20	51.95	-	52.15	-	64.79	54.79	-12.64	-
2	0.341	0.20	44.37	-	44.57	-	59.17	49.17	-14.60	-
3	0.689	0.25	37.64	-	37.89	-	56.00	46.00	-18.11	-
4	1.047	0.30	36.19	-	36.49	-	56.00	46.00	-19.51	-
5	3.141	0.36	32.18	-	32.54	-	56.00	46.00	-23.46	-
6	5.043	0.42	22.33	-	22.75	-	60.00	50.00	-37.25	-

- 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
HP Preamplifier	8447D	2432A03504	May 09, 2008
HP Preamplifier	8449B	3008A01924	Sep. 05, 2007
HP Preamplifier	8449B	3008A01638	Sep. 17, 2007
ROHDE & SCHWARZ TEST RECEIVER	ESI7	836697/012	Oct. 24, 2007
Schwarzbeck Antenna	VULB 9168	137	Oct. 01, 2007
Schwarzbeck Antenna	VHBA 9123	480	Apr. 18, 2008
EMCO Horn Antenna	3115	6714	Oct. 24, 2007
EMCO Horn Antenna	3115	9312-4192	Apr. 19, 2008
ADT. Turn Table	TT100	0306	NA
ADT. Tower	AT100	0306	NA
Software	ADT_Radiated_V7.6.15	NA	NA
SUHNER RF cable	SF104-26.5	CABLE-CH6-17m-01	Dec. 11, 2007
ROHDE & SCHWARZ Spectrum Analyzer	FSP 40	100036	Mar. 13, 2008

- 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 horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 3. The test was performed in ADT Chamber No. 6.
 4. The Industry Canada Reference No. IC 3789-6.

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.

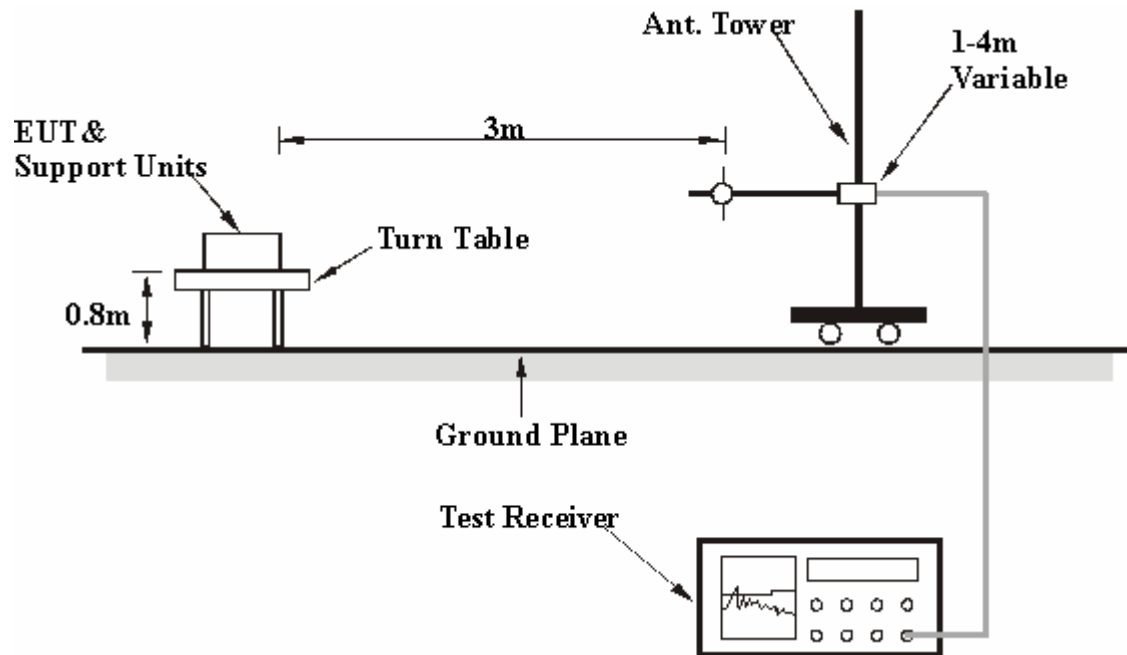
NOTE:

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

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



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

4.2.6 EUT OPERATING CONDITIONS

For Mode A:

- Connected EUT into notebook system and placed on the testing table.
- The notebook system run a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- EUT ran a test program to enable to transmit/receive condition continuously at specific channel frequency.
- The notebook system sent messages to modem.
- The notebook system sent messages to printer, and the printer printed them out.
- The notebook system sent “1kHz” audio messages to earphone via EUT.
- Steps c-g were repeated.

For Mode B ~ D:

- Set the EUT under transmission/receiving condition continuously at specific channel frequency.
- EUT sent audio messages to earphone continuously.

4.2.7 TEST RESULTS

RADIATED WORST CASE DATA: FOR GFSK (BELOW 1GHz)

TEST MODE	A		
MODULATION TYPE	GFSK	CHANNEL	0
INPUT POWER	120Vac, 60 Hz	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	22 deg. C, 72%RH, 1005Pa	DETECTOR FUNCTION	Quasi-Peak
TESTED BY	Jun Wu		

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	127.194	34.79 QP	43.50	-8.71	1.43 H	292	22.87	11.92
2	162.184	31.12 QP	43.50	-12.38	1.38 H	253	17.54	13.58
3	208.838	30.07 QP	43.50	-13.43	1.52 H	280	18.53	11.54
4	304.088	32.42 QP	46.00	-13.58	1.47 H	265	15.98	16.44
5	346.854	34.49 QP	46.00	-11.51	1.56 H	235	17.35	17.14
6	521.804	35.65 QP	46.00	-10.35	1.38 H	331	13.32	22.33
7	799.780	32.04 QP	46.00	-13.96	1.28 H	304	4.00	28.04

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	41.663	32.82 QP	40.00	-7.18	1.00 V	10	17.92	14.90
2	64.990	31.77 QP	40.00	-8.23	1.00 V	355	18.56	13.21
3	107.756	35.44 QP	43.50	-8.06	1.00 V	331	25.44	10.00
4	134.970	33.96 QP	43.50	-9.54	1.00 V	349	21.01	12.96
5	166.072	27.85 QP	43.50	-15.65	1.00 V	136	14.51	13.34
6	521.804	30.50 QP	46.00	-15.50	1.28 V	262	8.17	22.33
7	834.770	30.61 QP	46.00	-15.39	1.28 V	49	2.28	28.33

- 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.

TEST MODE	B		
MODULATION TYPE	GFSK	CHANNEL	0
INPUT POWER	120Vac, 60 Hz	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	24 deg. C, 64%RH, 998Pa	DETECTOR FUNCTION	Quasi-Peak
TESTED BY	Jun Wu		

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	37.776	29.66 QP	40.00	-10.34	1.00 H	115	15.63	14.03
2	72.766	23.28 QP	40.00	-16.72	1.00 H	325	10.87	12.41
3	871.703	30.65 QP	46.00	-15.35	1.25 H	316	1.54	29.11
4	879.479	31.41 QP	46.00	-14.59	1.32 H	142	2.18	29.23
5	922.244	32.41 QP	46.00	-13.59	1.19 H	10	2.63	29.78
6	959.178	31.74 QP	46.00	-14.26	1.36 H	265	1.61	30.13

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	30.000	27.02 QP	40.00	-12.98	1.00 V	10	14.32	12.70
2	844.489	31.25 QP	46.00	-14.75	1.24 V	211	2.54	28.71
3	856.152	32.74 QP	46.00	-13.26	1.24 V	76	3.87	28.87
4	902.806	30.85 QP	46.00	-15.15	1.36 V	196	1.28	29.57
5	926.132	31.11 QP	46.00	-14.89	1.45 V	118	1.28	29.83
6	957.234	32.23 QP	46.00	-13.77	1.46 V	16	2.11	30.12

- 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.

TEST MODE	C		
MODULATION TYPE	GFSK	CHANNEL	0
INPUT POWER	120Vac, 60 Hz	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	24 deg. C, 64%RH, 998Pa	DETECTOR FUNCTION	Quasi-Peak
TESTED BY	Jun Wu		

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	45.551	27.29 QP	40.00	-12.71	1.47 H	10	11.72	15.57
2	68.878	20.48 QP	40.00	-19.52	1.45 H	343	7.49	12.99
3	764.790	28.71 QP	46.00	-17.29	1.36 H	10	0.66	28.06
4	832.826	28.62 QP	46.00	-17.38	1.30 H	301	0.05	28.57
5	881.423	29.87 QP	46.00	-16.13	1.15 H	64	0.61	29.26
6	922.244	30.25 QP	46.00	-15.75	1.14 H	112	0.47	29.78
7	955.291	30.26 QP	46.00	-15.74	1.10 H	340	0.15	30.11

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	45.551	28.81 QP	40.00	-11.19	1.00 V	52	13.24	15.57
2	72.766	21.85 QP	40.00	-18.15	1.00 V	112	9.44	12.41
3	751.182	28.52 QP	46.00	-17.48	1.17 V	211	0.51	28.01
4	863.928	29.97 QP	46.00	-16.03	1.25 V	73	0.98	28.99
5	885.311	30.26 QP	46.00	-15.74	1.40 V	103	0.94	29.32
6	912.525	30.47 QP	46.00	-15.53	1.42 V	88	0.79	29.68
7	959.178	31.26 QP	46.00	-14.74	1.35 V	169	1.13	30.13

- 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.

TEST MODE	D		
MODULATION TYPE	GFSK	CHANNEL	0
INPUT POWER	3.7Vdc	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	22 deg. C, 72%RH, 1005Pa	DETECTOR FUNCTION	Quasi-Peak
TESTED BY	Jun Wu		

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	31.944	25.13 QP	40.00	-14.87	1.62 H	202	12.32	12.81
2	751.182	25.32 QP	46.00	-20.68	1.42 H	289	-2.49	27.81
3	778.397	26.02 QP	46.00	-19.98	1.38 H	307	-1.92	27.94
4	801.723	25.44 QP	46.00	-20.56	1.24 H	115	-2.61	28.05
5	834.770	26.49 QP	46.00	-19.51	1.21 H	19	-1.84	28.33
6	867.816	26.67 QP	46.00	-19.33	1.16 H	160	-2.17	28.84
7	885.311	26.55 QP	46.00	-19.45	1.14 H	298	-2.67	29.22
8	931.964	27.52 QP	46.00	-18.48	1.09 H	79	-2.75	30.27
9	951.403	28.49 QP	46.00	-17.51	1.03 H	10	-2.18	30.67

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	30.000	26.22 QP	40.00	-13.78	1.00 V	25	13.71	12.51
2	737.575	25.35 QP	46.00	-20.65	1.20 V	298	-1.92	27.27
3	776.453	25.49 QP	46.00	-20.51	1.24 V	94	-2.44	27.93
4	790.060	26.89 QP	46.00	-19.11	1.32 V	70	-1.10	27.99
5	825.050	25.84 QP	46.00	-20.16	1.42 V	121	-2.41	28.25
6	873.647	26.21 QP	46.00	-19.79	1.39 V	40	-2.76	28.97
7	883.367	26.74 QP	46.00	-19.26	1.47 V	250	-2.44	29.18
8	933.908	28.13 QP	46.00	-17.87	1.52 V	295	-2.18	30.31

- 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: FOR GFSK (ABOVE 1GHz)

TEST MODE	A		
MODULATION TYPE	GFSK	CHANNEL	0
INPUT POWER	120Vac, 60 Hz	FREQUENCY RANGE	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	22 deg. C, 72%RH, 1005Pa	DETECTOR FUNCTION	Peak (PK) Average (AV)
TESTED BY	Jun Wu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1602.000	44.75 PK	74.00	-29.25	1.08 H	272	12.46	32.29
2	1602.000	39.46 AV	54.00	-14.54	1.08 H	272	7.17	32.29
3	2390.000	58.86 PK	74.00	-15.14	1.29 H	45	24.16	34.70
4	2390.000	28.86 AV	54.00	-25.14	1.29 H	45	-5.84	34.70
5	*2402.000	97.27 PK			1.29 H	45	62.55	34.72
6	*2402.000	67.27 AV			1.29 H	45	32.55	34.72
7	4804.000	60.14 PK	74.00	-13.86	1.10 H	136	18.44	41.69
8	4804.000	30.14 AV	54.00	-23.86	1.10 H	136	-11.56	41.69

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1602.000	46.78 PK	74.00	-27.22	1.00 V	4	14.49	32.29
2	1602.000	43.27 AV	54.00	-10.73	1.00 V	4	10.98	32.29
3	2390.000	57.67 PK	74.00	-16.33	1.11 V	138	22.97	34.70
4	2390.000	27.67 AV	54.00	-26.33	1.11 V	138	-7.03	34.70
5	*2402.000	93.07 PK			1.11 V	138	58.35	34.72
6	*2402.000	63.07 AV			1.11 V	138	28.35	34.72
7	4804.000	59.39 PK	74.00	-14.61	1.02 V	22	17.69	41.69
8	4804.000	29.39 AV	54.00	-24.61	1.02 V	22	-12.31	41.69

- 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: $20\log(3.125/100) = -30$ dB.
 6. Average value = peak reading $-20\log(\text{duty cycle})$.

TEST MODE	A		
MODULATION TYPE	GFSK	CHANNEL	39
INPUT POWER	120Vac, 60 Hz	FREQUENCY RANGE	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	22 deg. C, 72%RH, 1005Pa	DETECTOR FUNCTION	Peak (PK) Average (AV)
TESTED BY	Jun Wu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1628.000	46.39 PK	74.00	-27.61	1.09 H	264	14.01	32.39
2	1628.000	41.64 AV	54.00	-12.36	1.09 H	264	9.26	32.39
3	*2441.000	92.98 PK			1.06 H	31	58.17	34.81
4	*2441.000	62.98 AV			1.06 H	31	28.17	34.81
5	4882.000	59.05 PK	74.00	-14.95	1.00 H	146	17.15	41.90
6	4882.000	29.05 AV	54.00	-24.95	1.00 H	146	-12.85	41.90

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1628.000	47.52 PK	74.00	-26.48	1.00 V	5	15.14	32.39
2	1628.000	43.81 AV	54.00	-10.19	1.00 V	5	11.43	32.39
3	*2441.000	93.72 PK			1.07 V	15	58.91	34.81
4	*2441.000	63.72 AV			1.07 V	15	28.91	34.81
5	4882.000	60.86 PK	74.00	-13.14	1.00 V	22	18.96	41.90
6	4882.000	30.86 AV	54.00	-23.14	1.00 V	22	-11.04	41.90

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 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: $20\log(3.125/100) = -30$ dB.
 6. Average value = peak reading $-20\log(\text{duty cycle})$.

TEST MODE	A		
MODULATION TYPE	GFSK	CHANNEL	78
INPUT POWER	120Vac, 60 Hz	FREQUENCY RANGE	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	22 deg. C, 72%RH, 1005Pa	DETECTOR FUNCTION	Peak (PK) Average (AV)
TESTED BY	Jun Wu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1654.000	47.98 PK	74.00	-26.02	1.10 H	249	15.49	32.49
2	1654.000	44.52 AV	54.00	-9.48	1.10 H	249	12.03	32.49
3	*2480.000	92.87 PK			1.01 H	42	57.97	34.90
4	*2480.000	62.87 AV			1.01 H	42	27.97	34.90
5	2483.500	60.16 PK	74.00	-13.84	1.01 H	42	25.26	34.90
6	2483.500	30.16 AV	54.00	-23.84	1.01 H	42	-4.74	34.90
7	4960.000	57.72 PK	74.00	-16.28	1.09 H	146	15.62	42.10
8	4960.000	27.72 AV	54.00	-26.28	1.09 H	146	-14.38	42.10

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1654.000	48.32 PK	74.00	-25.68	1.00 V	349	15.83	32.49
2	1654.000	45.22 AV	54.00	-8.78	1.00 V	349	12.73	32.49
3	*2480.000	92.18 PK			1.02 V	120	57.28	34.90
4	*2480.000	62.18 AV			1.02 V	120	27.28	34.90
5	2483.500	60.51 PK	74.00	-13.49	1.02 V	120	25.61	34.90
6	2483.500	30.51 AV	54.00	-23.49	1.02 V	120	-4.39	34.90
7	4960.000	59.72 PK	74.00	-14.28	1.00 V	22	17.62	42.10
8	4960.000	29.72 AV	54.00	-24.28	1.00 V	22	-12.38	42.10

- 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: $20\log(3.125/100) = -30$ dB.
 6. Average value = peak reading $-20\log(\text{duty cycle})$.

RADIATED WORST CASE DATA: FOR 8DPSK (BELOW 1GHz)

TEST MODE	A		
MODULATION TYPE	8DPSK	CHANNEL	0
INPUT POWER	120Vac, 60 Hz	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	22 deg. C, 72%RH, 1005Pa	DETECTOR FUNCTION	Quasi-Peak
TESTED BY	Jun Wu		

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	31.944	25.43 QP	40.00	-14.57	1.65 H	322	12.62	12.81
2	121.363	34.41 QP	43.50	-9.09	1.58 H	265	23.27	11.14
3	134.970	32.93 QP	43.50	-10.57	1.54 H	244	19.97	12.96
4	208.838	30.14 QP	43.50	-13.36	1.47 H	280	18.60	11.54
5	304.088	31.73 QP	46.00	-14.27	1.43 H	253	15.29	16.44
6	346.854	34.52 QP	46.00	-11.48	1.28 H	235	17.38	17.14
7	521.804	35.72 QP	46.00	-10.28	1.26 H	337	13.39	22.33
8	867.816	31.13 QP	46.00	-14.87	1.14 H	274	2.29	28.84

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	41.663	31.99 QP	40.00	-8.01	1.00 V	55	17.09	14.90
2	64.990	31.53 QP	40.00	-8.47	1.00 V	349	18.32	13.21
3	127.194	34.89 QP	43.50	-8.61	1.00 V	334	22.97	11.92
4	134.970	36.03 QP	43.50	-7.47	1.00 V	337	23.07	12.96
5	164.128	28.11 QP	43.50	-15.39	1.00 V	238	14.64	13.46
6	521.804	30.50 QP	46.00	-15.50	1.17 V	241	8.17	22.33
7	908.637	32.33 QP	46.00	-13.67	1.35 V	205	2.59	29.74

- 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.

TEST MODE	B		
MODULATION TYPE	8DPSK	CHANNEL	0
INPUT POWER	120Vac, 60 Hz	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	24 deg. C, 64%RH, 998Pa	DETECTOR FUNCTION	Quasi-Peak
TESTED BY	Jun Wu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	39.719	30.41 QP	40.00	-9.59	1.45 H	196	15.95	14.46
2	68.878	22.98 QP	40.00	-17.02	1.44 H	316	9.99	12.99
3	131.082	23.88 QP	43.50	-19.62	1.39 H	190	11.04	12.84
4	825.050	31.77 QP	46.00	-14.23	1.25 H	10	3.29	28.48
5	858.096	30.26 QP	46.00	-15.74	1.18 H	340	1.36	28.90
6	885.311	31.26 QP	46.00	-14.74	1.08 H	175	1.94	29.32
7	935.852	31.65 QP	46.00	-14.35	1.02 H	10	1.72	29.93

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	31.944	27.03 QP	40.00	-12.97	1.00 V	10	14.05	12.98
2	64.990	20.52 QP	40.00	-19.48	1.00 V	154	7.06	13.46
3	860.040	30.65 QP	46.00	-15.35	1.15 V	25	1.72	28.93
4	896.974	31.86 QP	46.00	-14.14	1.24 V	67	2.37	29.49
5	926.132	32.49 QP	46.00	-13.51	1.33 V	10	2.66	29.83
6	955.291	30.24 QP	46.00	-15.76	1.41 V	175	0.13	30.11

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
 2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.

TEST MODE	C		
MODULATION TYPE	8DPSK	CHANNEL	0
INPUT POWER	120Vac, 60 Hz	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	24 deg. C, 64%RH, 998Pa	DETECTOR FUNCTION	Quasi-Peak
TESTED BY	Jun Wu		

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	70.822	20.77 QP	40.00	-19.23	1.35 H	10	8.05	12.72
2	747.295	29.96 QP	46.00	-16.04	1.28 H	118	2.07	27.89
3	758.958	30.14 QP	46.00	-15.86	1.21 H	157	2.10	28.04
4	805.611	31.52 QP	46.00	-14.48	1.17 H	10	3.28	28.24
5	838.657	31.26 QP	46.00	-14.74	1.18 H	298	2.62	28.64
6	877.535	31.47 QP	46.00	-14.53	1.05 H	253	2.27	29.20
7	928.076	32.52 QP	46.00	-13.48	1.01 H	10	2.67	29.85

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	31.944	26.58 QP	40.00	-13.42	1.00 V	4	13.60	12.98
2	68.878	21.86 QP	40.00	-18.14	1.00 V	136	8.87	12.99
3	836.713	28.96 QP	46.00	-17.04	1.15 V	292	0.34	28.62
4	875.591	30.26 QP	46.00	-15.74	1.19 V	259	1.09	29.17
5	902.806	31.26 QP	46.00	-14.74	1.35 V	277	1.69	29.57
6	916.413	32.01 QP	46.00	-13.99	1.42 V	232	2.29	29.72
7	953.347	30.26 QP	46.00	-15.74	1.35 V	58	0.16	30.10

- 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.

TEST MODE	D		
MODULATION TYPE	8DPSK	CHANNEL	0
INPUT POWER	3.7Vdc	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	22 deg. C, 72%RH, 1005Pa	DETECTOR FUNCTION	Quasi-Peak
TESTED BY	Jun Wu		

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	30.000	24.69 QP	40.00	-15.31	1.65 H	184	12.18	12.51
2	747.295	25.10 QP	46.00	-20.90	1.42 H	49	-2.58	27.68
3	764.790	25.50 QP	46.00	-20.50	1.32 H	163	-2.37	27.87
4	809.499	25.77 QP	46.00	-20.23	1.18 H	337	-2.35	28.12
5	821.162	26.28 QP	46.00	-19.72	1.26 H	202	-1.94	28.22
6	906.693	26.93 QP	46.00	-19.07	1.09 H	232	-2.76	29.69
7	959.178	30.40 QP	46.00	-15.60	1.07 H	154	-0.21	30.61

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	30.000	26.12 QP	40.00	-13.88	1.00 V	13	13.61	12.51
2	747.295	25.01 QP	46.00	-20.99	1.24 V	154	-2.67	27.68
3	782.285	25.79 QP	46.00	-20.21	1.26 V	52	-2.16	27.95
4	811.443	25.75 QP	46.00	-20.25	1.36 V	220	-2.39	28.14
5	830.882	26.10 QP	46.00	-19.90	1.37 V	10	-2.20	28.30
6	871.703	26.27 QP	46.00	-19.73	1.45 V	334	-2.66	28.93
7	902.806	27.41 QP	46.00	-18.59	1.56 V	322	-2.19	29.60
8	953.347	28.33 QP	46.00	-17.67	1.63 V	193	-2.32	30.65

- 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: FOR 8DPSK (ABOVE 1GHz)

TEST MODE	A		
MODULATION TYPE	8DPSK	CHANNEL	0
INPUT POWER	120Vac, 60 Hz	FREQUENCY RANGE	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	22 deg. C, 72%RH, 1005Pa	DETECTOR FUNCTION	Peak (PK) Average (AV)
TESTED BY	Jun Wu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1602.000	45.02 PK	74.00	-28.98	1.01 H	245	12.73	32.29
2	1602.000	40.39 AV	54.00	-13.61	1.01 H	245	8.10	32.29
3	2390.000	58.99 PK	74.00	-15.01	1.35 H	43	24.29	34.70
4	2390.000	28.99 AV	54.00	-25.01	1.35 H	43	-5.71	34.70
5	*2402.000	96.28 PK			1.35 H	43	61.56	34.72
6	*2402.000	66.28 AV			1.35 H	43	31.56	34.72
7	4804.000	54.14 PK	74.00	-19.86	1.02 H	162	12.44	41.69
8	4804.000	24.14 AV	54.00	-29.86	1.02 H	162	-17.56	41.69

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1602.000	47.50 PK	74.00	-26.50	1.00 V	220	15.21	32.29
2	1602.000	44.30 AV	54.00	-9.70	1.00 V	220	12.01	32.29
3	2390.000	58.56 PK	74.00	-15.44	1.04 V	120	23.86	34.70
4	2390.000	28.56 AV	54.00	-25.44	1.04 V	120	-6.14	34.70
5	*2402.000	91.94 PK			1.04 V	120	57.22	34.72
6	*2402.000	61.94 AV			1.04 V	120	27.22	34.72
7	4804.000	53.09 PK	74.00	-20.91	1.00 V	163	11.39	41.69
8	4804.000	23.09 AV	54.00	-30.91	1.00 V	163	-18.61	41.69

- 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: $20\log(3.125/100) = -30$ dB.
 6. Average value = peak reading $-20\log(\text{duty cycle})$.



TEST MODE	A		
MODULATION TYPE	8DPSK	CHANNEL	39
INPUT POWER	120Vac, 60 Hz	FREQUENCY RANGE	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	22 deg. C, 72%RH, 1005Pa	DETECTOR FUNCTION	Peak (PK) Average (AV)
TESTED BY	Jun Wu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1628.000	49.51 PK	74.00	-24.49	1.14 H	247	17.13	32.39
2	1628.000	47.01 AV	54.00	-6.99	1.14 H	247	14.63	32.39
3	*2441.000	95.30 PK			1.31 H	43	60.49	34.81
4	*2441.000	65.30 AV			1.31 H	43	30.49	34.81
5	4882.000	54.00 PK	74.00	-20.00	1.00 H	159	12.10	41.90
6	4882.000	24.00 AV	54.00	-30.00	1.00 H	159	-17.90	41.90

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1628.000	49.54 PK	74.00	-24.46	1.27 V	213	17.16	32.39
2	1628.000	46.89 AV	54.00	-7.11	1.27 V	213	14.51	32.39
3	*2441.000	92.48 PK			1.02 V	136	57.67	34.81
4	*2441.000	62.48 AV			1.02 V	136	27.67	34.81
5	4882.000	52.24 PK	74.00	-21.76	1.00 V	196	10.34	41.90
6	4882.000	22.24 AV	54.00	-31.76	1.00 V	196	-19.66	41.90

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 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: $20\log(3.125/100) = -30$ dB.
 6. Average value = peak reading $-20\log(\text{duty cycle})$.

TEST MODE	A		
MODULATION TYPE	8DPSK	CHANNEL	78
INPUT POWER	120Vac, 60 Hz	FREQUENCY RANGE	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	22 deg. C, 72%RH, 1005Pa	DETECTOR FUNCTION	Peak (PK) Average (AV)
TESTED BY	Jun Wu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1654.000	47.12 PK	74.00	-26.88	1.00 H	294	14.63	32.49
2	1654.000	42.97 AV	54.00	-11.03	1.00 H	294	10.48	32.49
3	*2480.000	94.80 PK			1.32 H	42	59.90	34.90
4	*2480.000	64.80 AV			1.32 H	42	29.90	34.90
5	2483.500	63.99 PK	74.00	-10.01	1.32 H	42	29.09	34.90
6	2483.500	33.99 AV	54.00	-20.01	1.32 H	42	-0.91	34.90
7	4960.000	52.20 PK	74.00	-21.80	1.01 H	169	10.10	42.10
8	4960.000	22.20 AV	54.00	-31.80	1.01 H	169	-19.90	42.10

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1654.000	51.29 PK	74.00	-22.71	1.00 V	92	18.80	32.49
2	1654.000	48.68 AV	54.00	-5.32	1.00 V	92	16.19	32.49
3	*2480.000	92.35 PK			1.04 V	150	57.45	34.90
4	*2480.000	62.35 AV			1.04 V	150	27.45	34.90
5	2483.500	62.57 PK	74.00	-11.43	1.04 V	150	27.67	34.90
6	2483.500	32.57 AV	54.00	-21.43	1.04 V	150	-2.33	34.90
7	4960.000	53.26 PK	74.00	-20.74	1.00 V	20	11.16	42.10
8	4960.000	23.26 AV	54.00	-30.74	1.00 V	20	-18.84	42.10

- 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: $20\log(3.125/100) = -30$ dB.
 6. Average value = peak reading $-20\log(\text{duty cycle})$.

4.3 NUMBER OF HOPPING FREQUENCY USED

4.3.1 LIMIT OF HOPPING FREQUENCY USED

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

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100036	Mar. 13, 2008

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

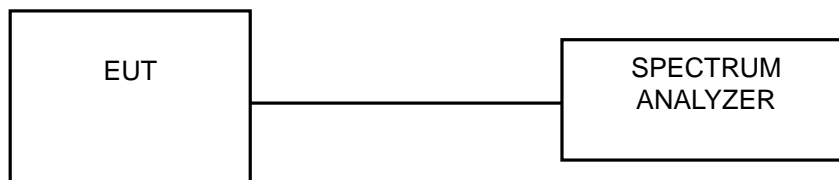
4.3.3 TEST PROCEDURES

- 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.

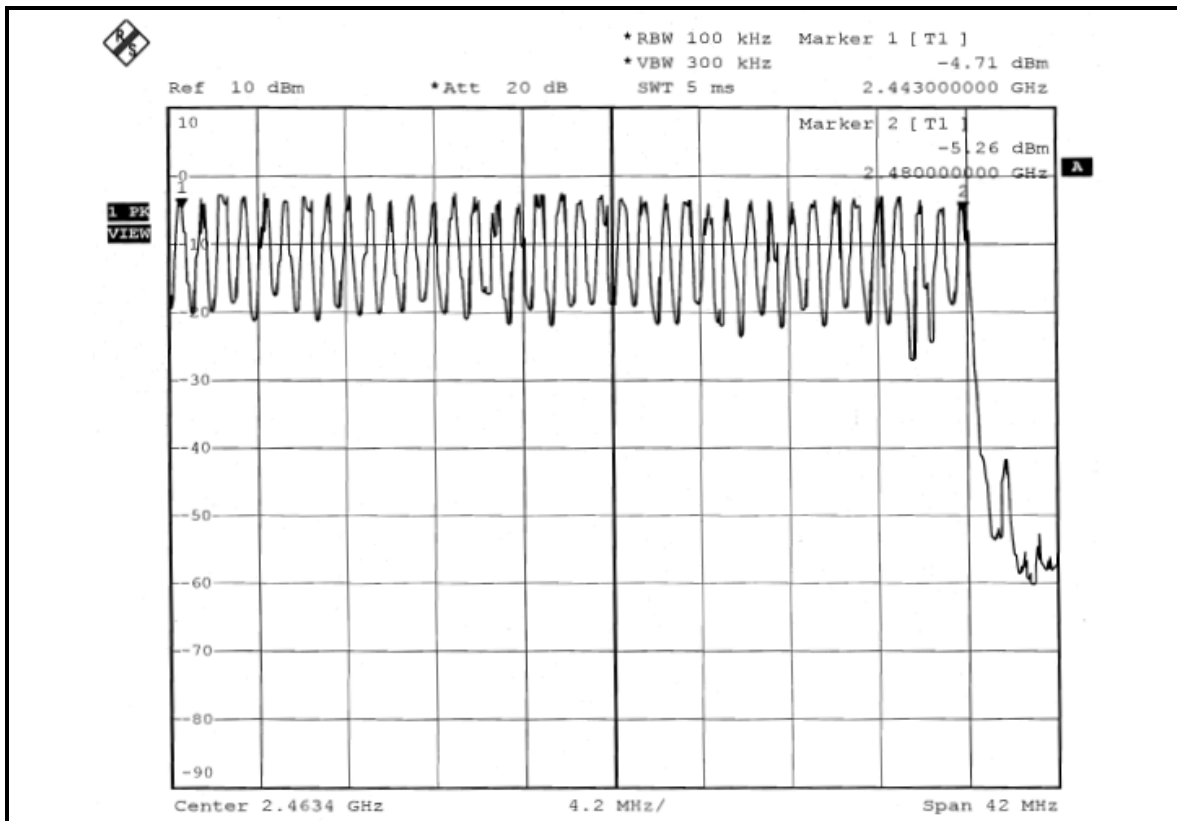
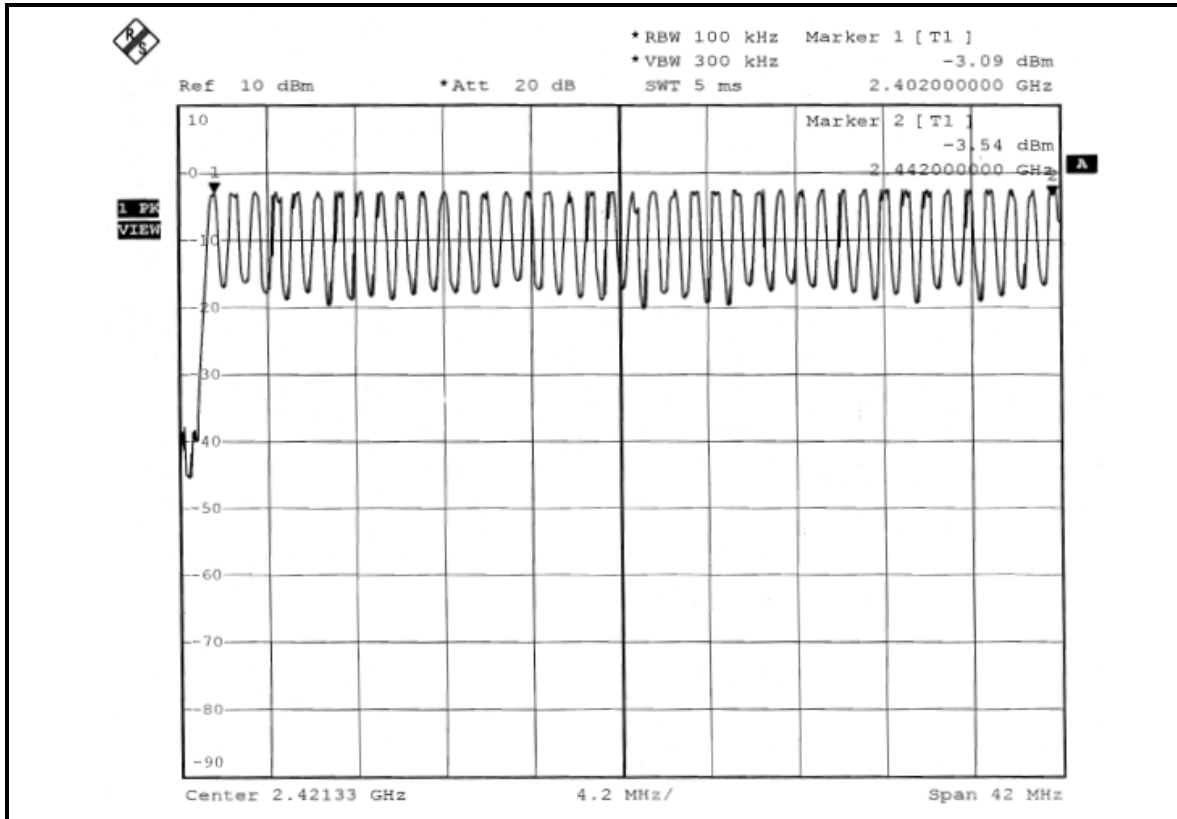
4.3.5 TEST SETUP



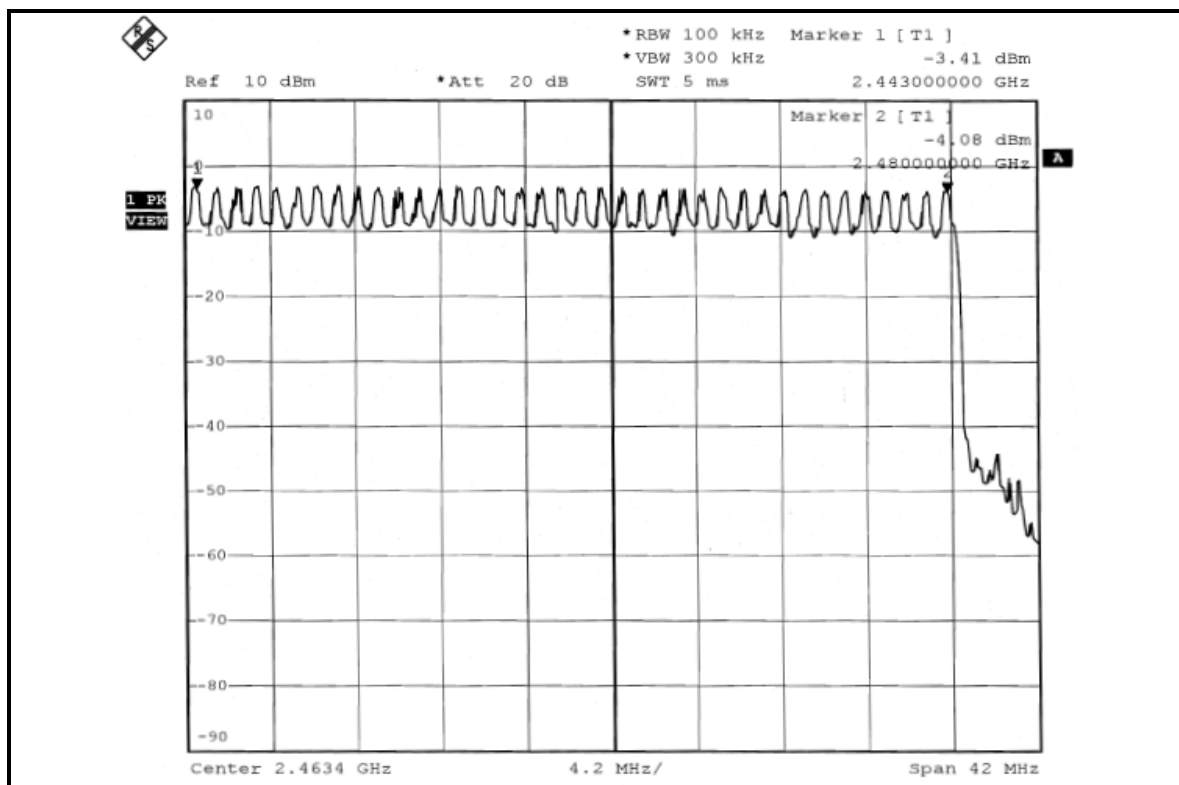
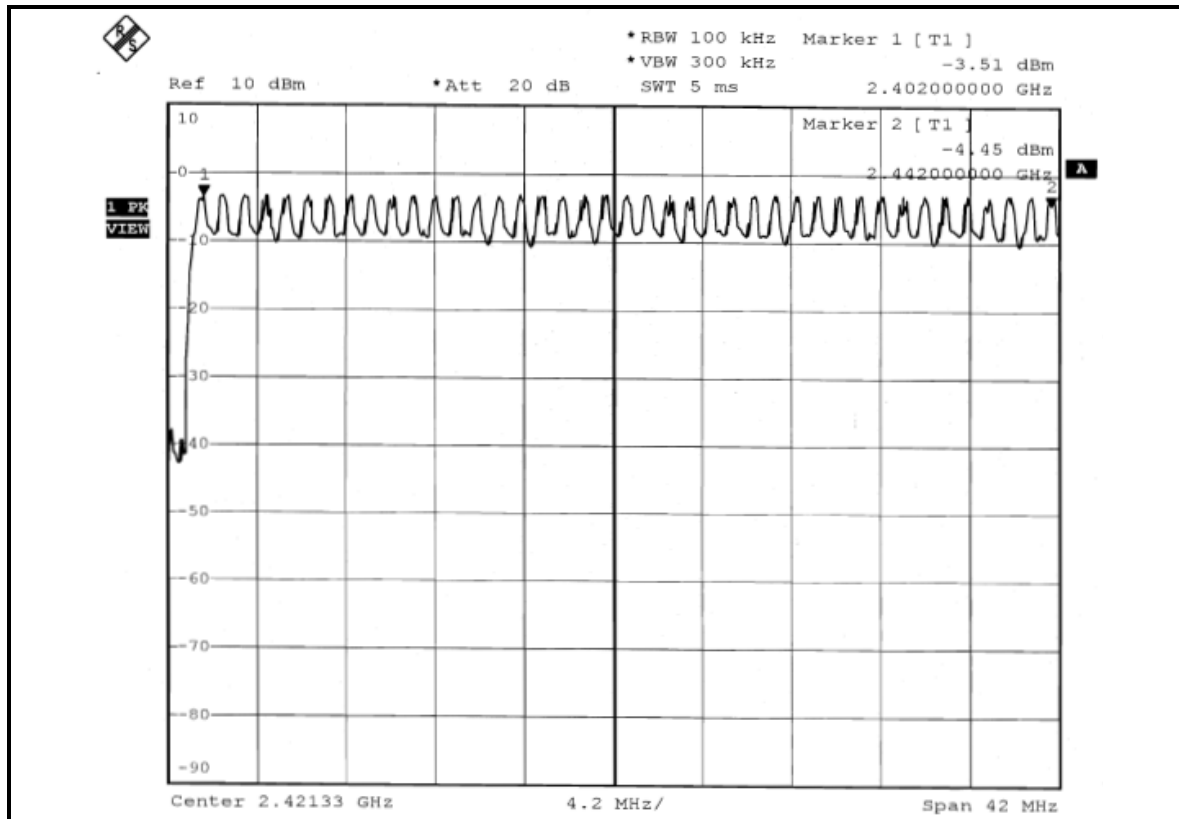
4.3.6 TEST RESULTS

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.

MODE A: FOR GFSK



MODE A: FOR 8DPSK





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	FSP 40	100036	Mar. 13, 2008

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

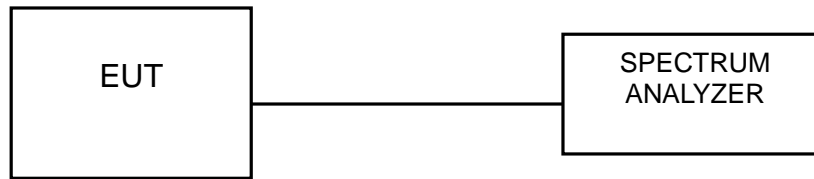
4.4.3 TEST PROCEDURES

- 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



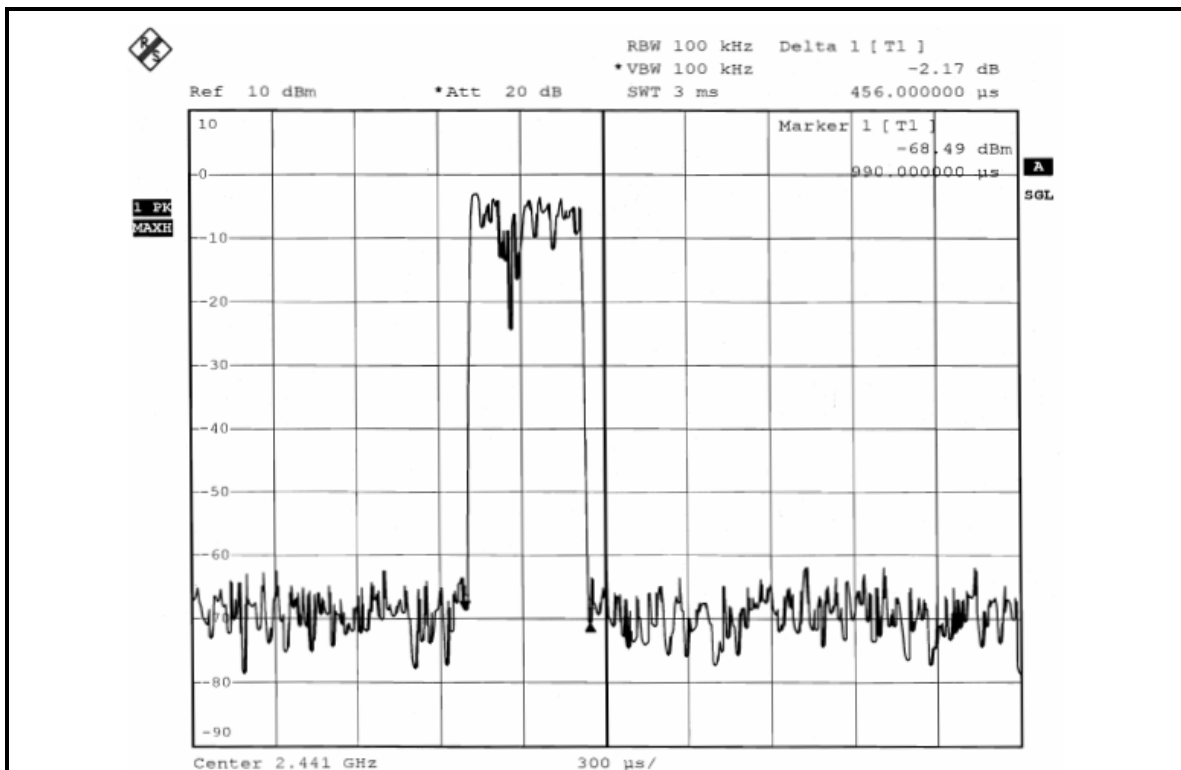
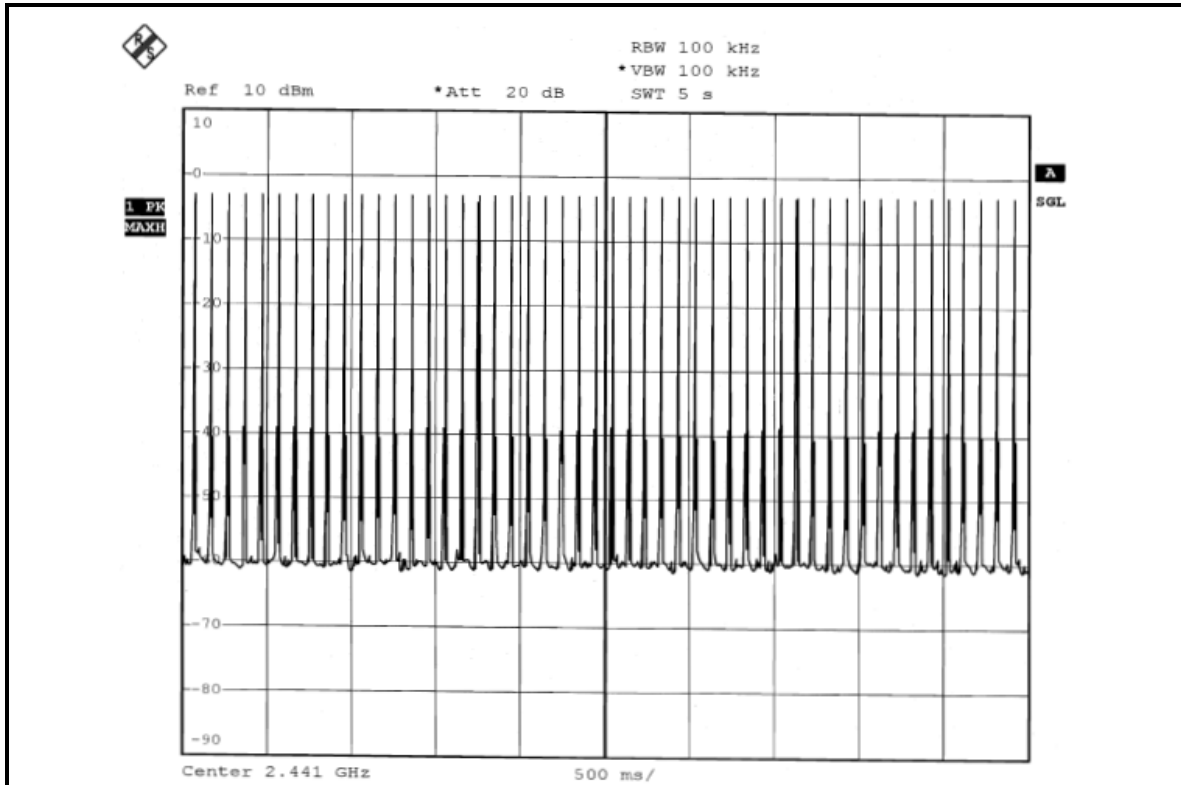
4.4.6 TEST RESULTS

MODE A: FOR GFSK

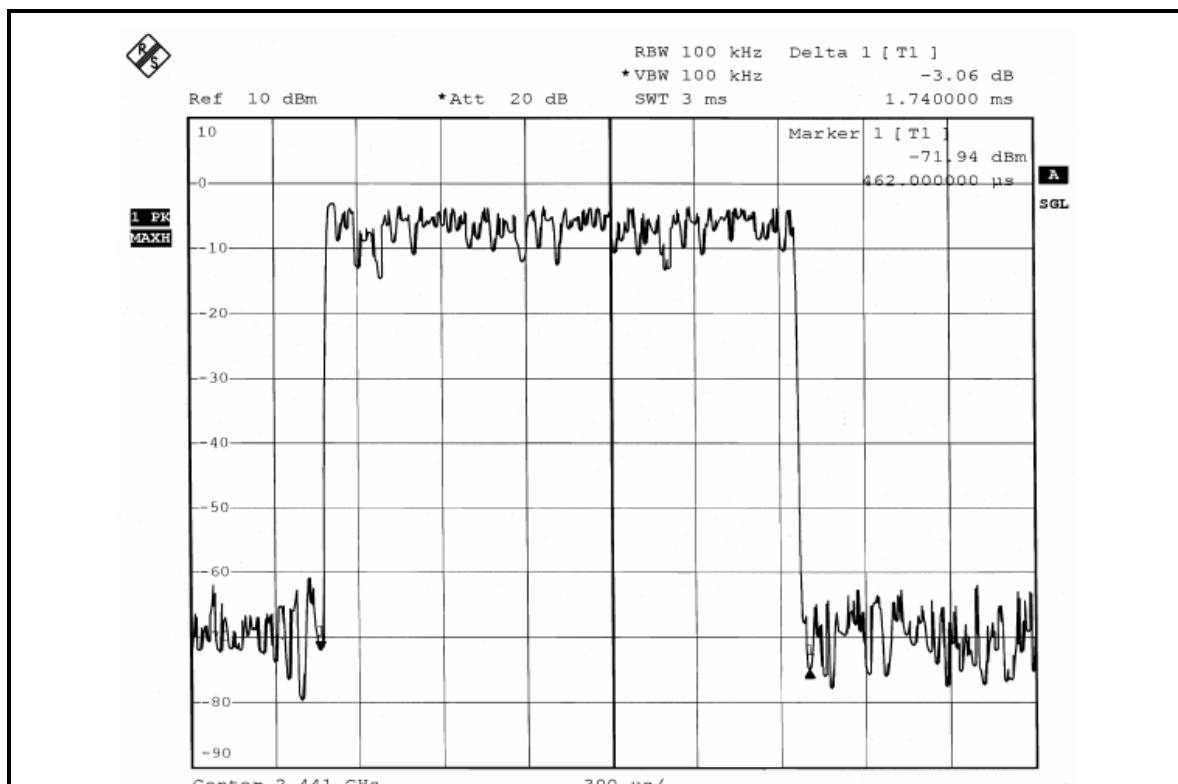
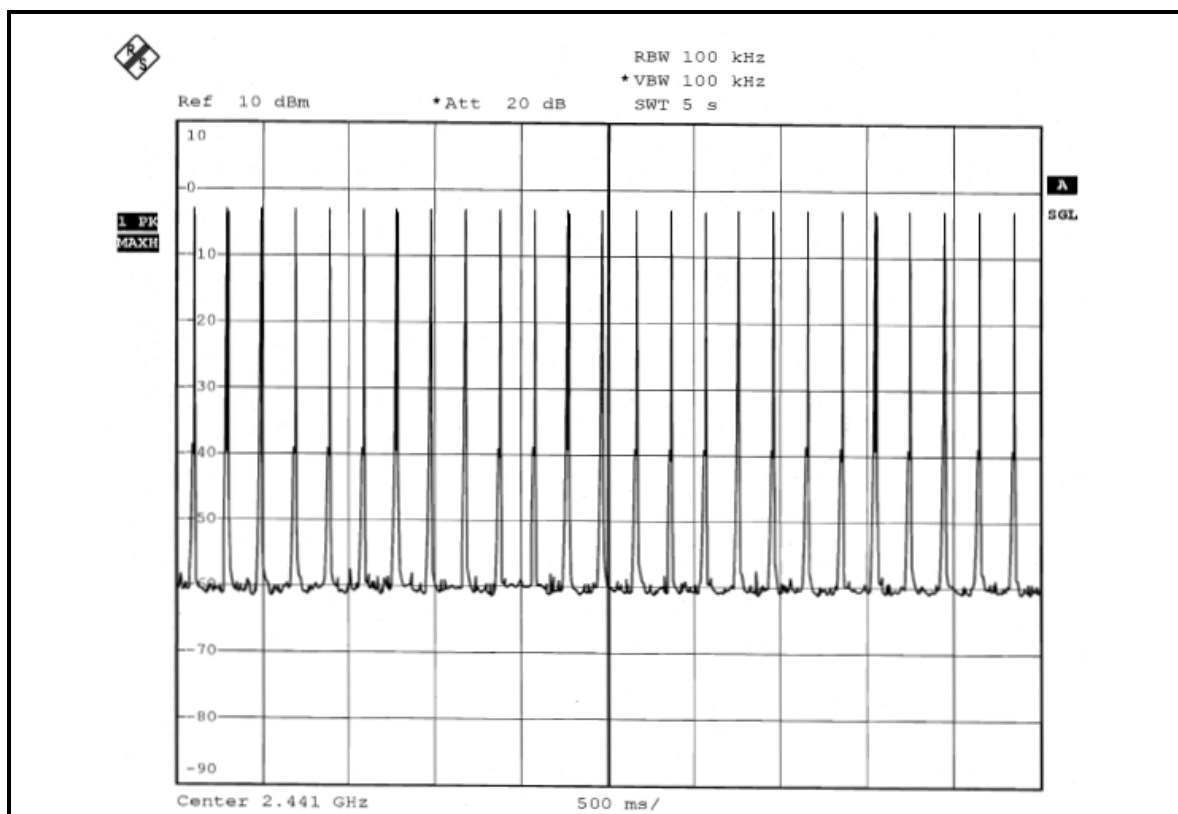
Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	50 (times / 5 sec) *6.32=316.00 times	0.456	144.0960	400
DH3	25 (times / 5 sec) *6.32=158.00 times	1.740	274.9200	400
DH5	17 (times / 5 sec) *6.32=107.44 times	3.070	329.8408	400

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

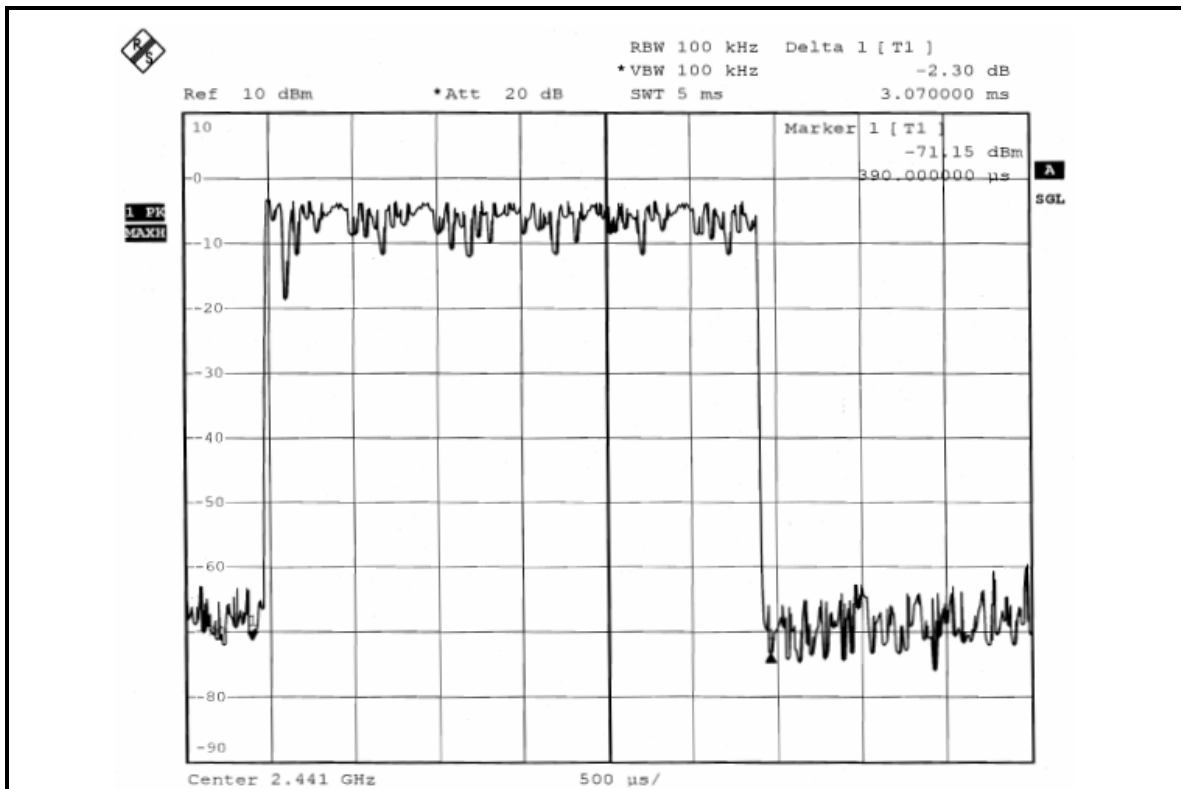
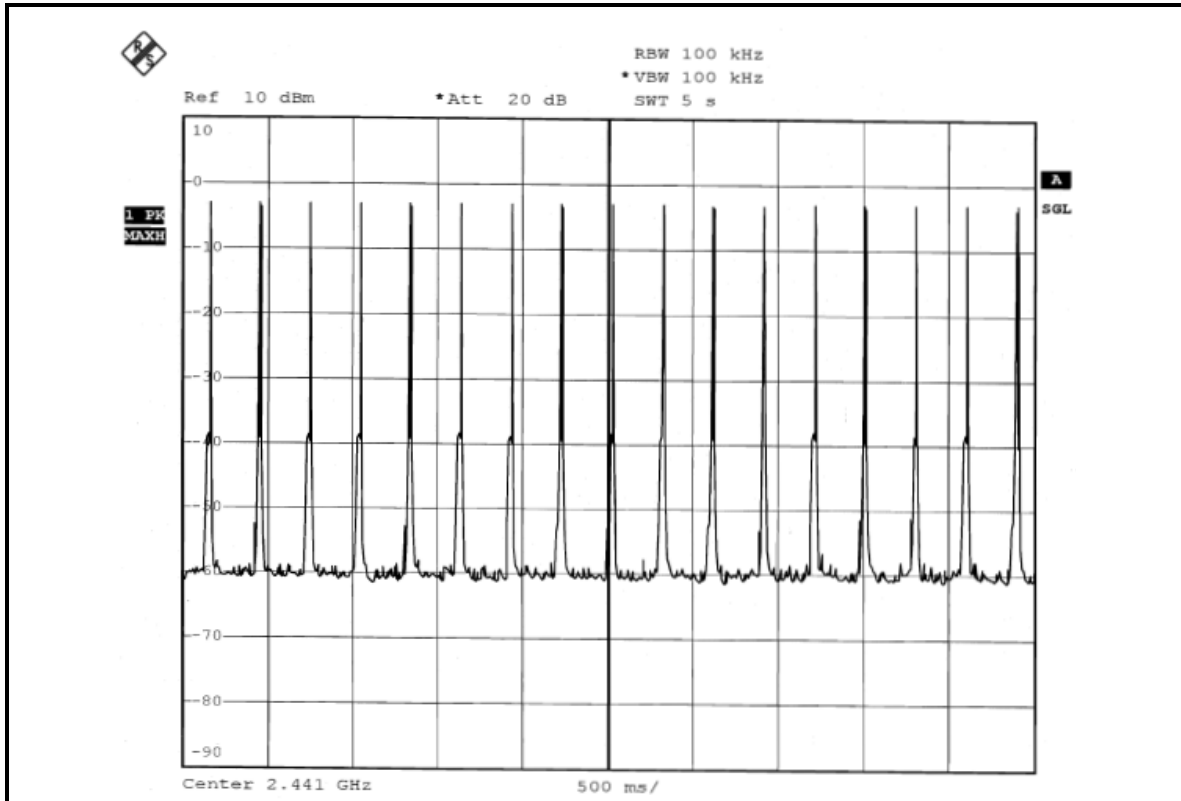
DH1



DH3



DH5

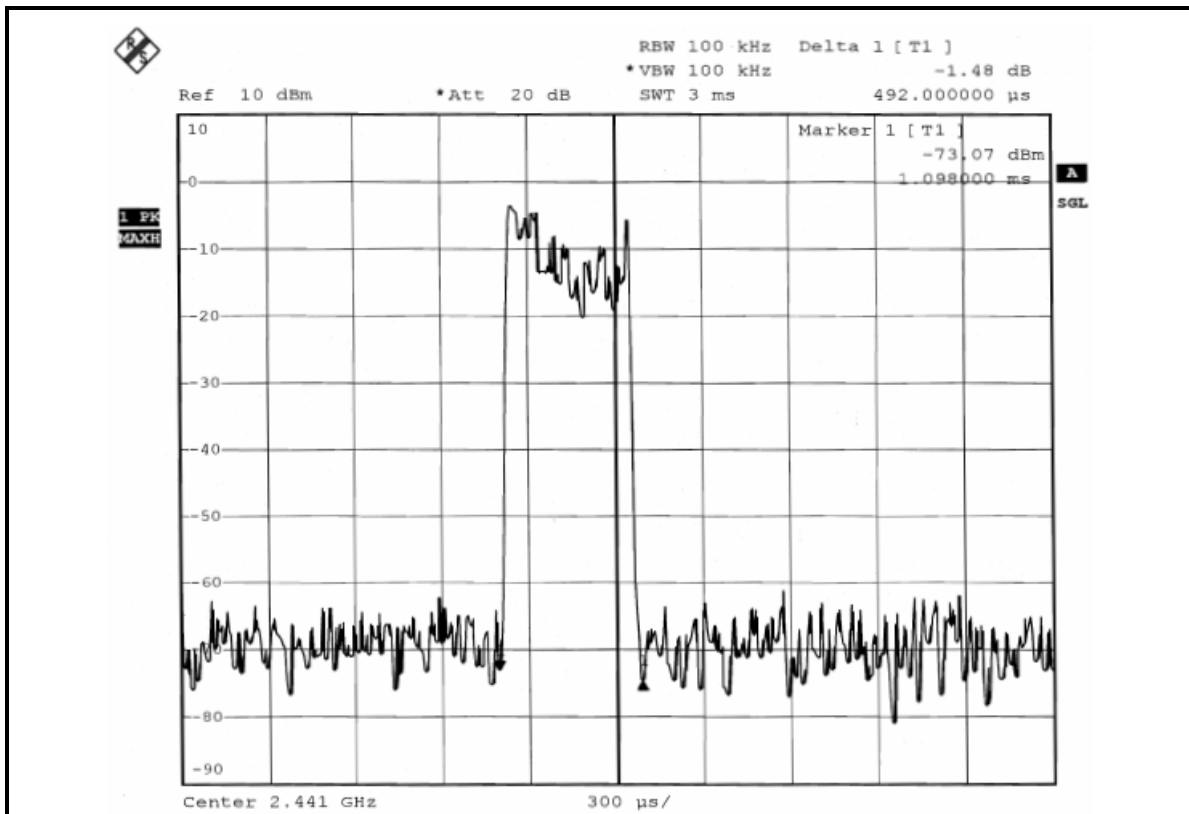
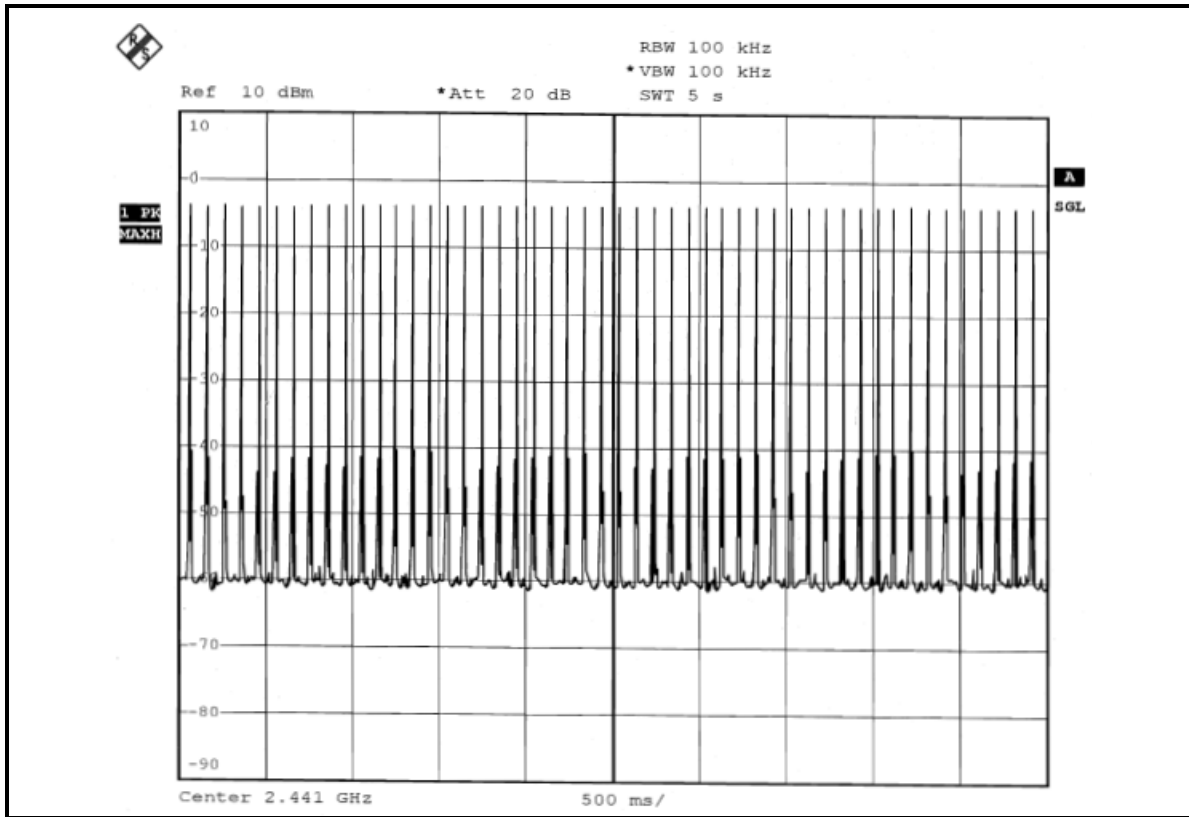


MODE A: FOR 8DPSK

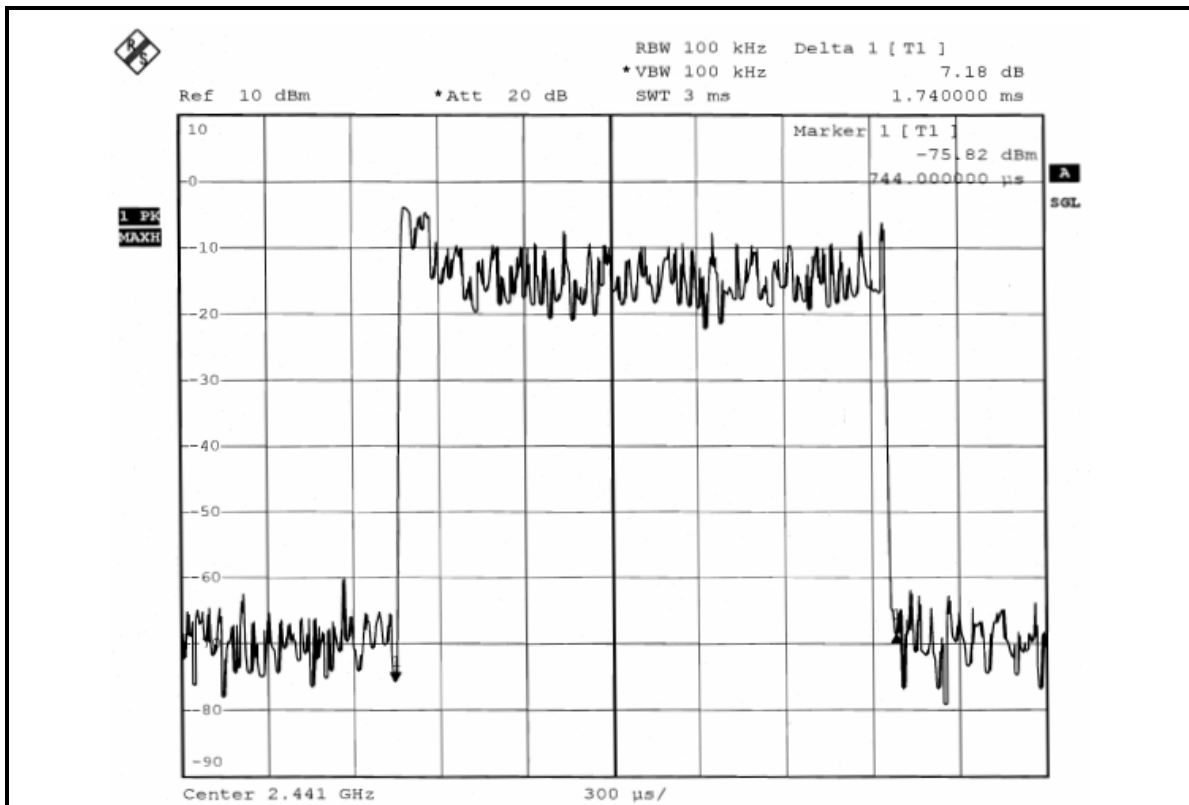
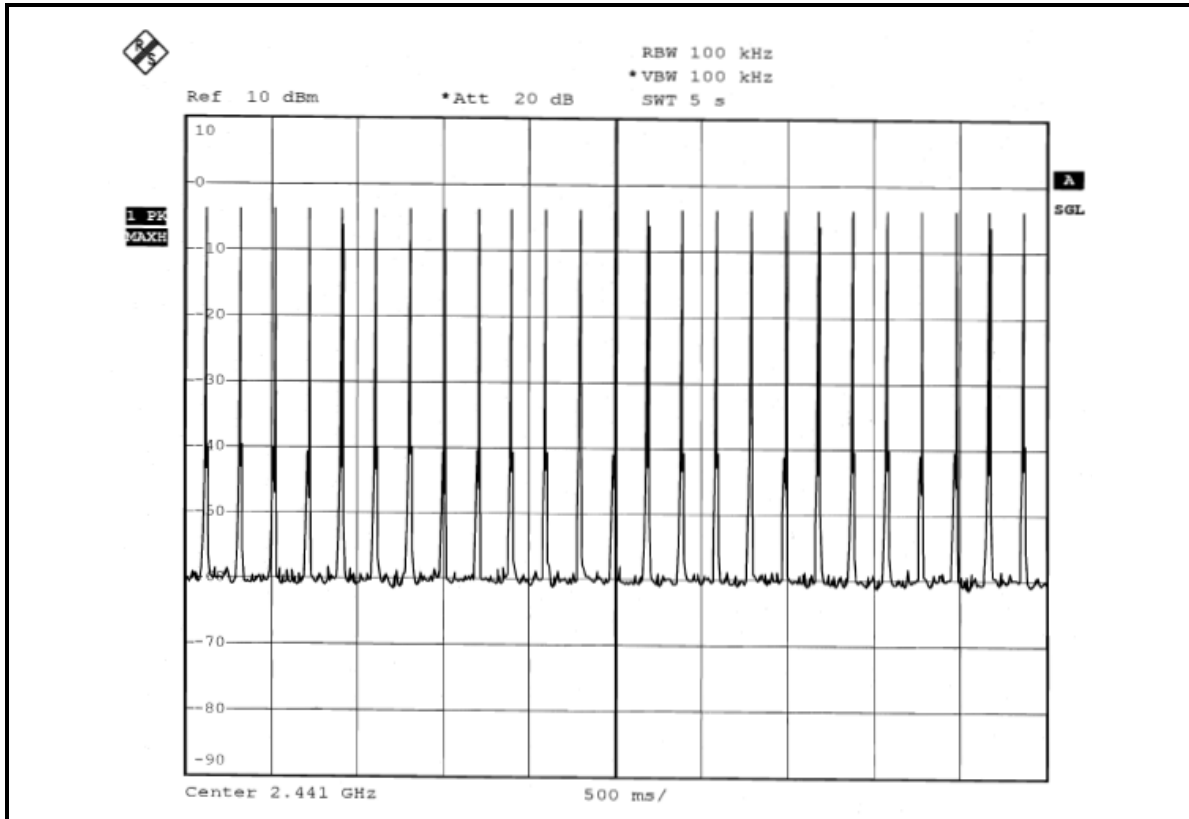
Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	51 (times / 5 sec) *6.32=322.32 times	0.492	155.472	400
DH3	25 (times / 5 sec) *6.32=158.00 times	1.740	274.920	400
DH5	17 (times / 5 sec) *6.32=107.44 times	3.050	327.692	400

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

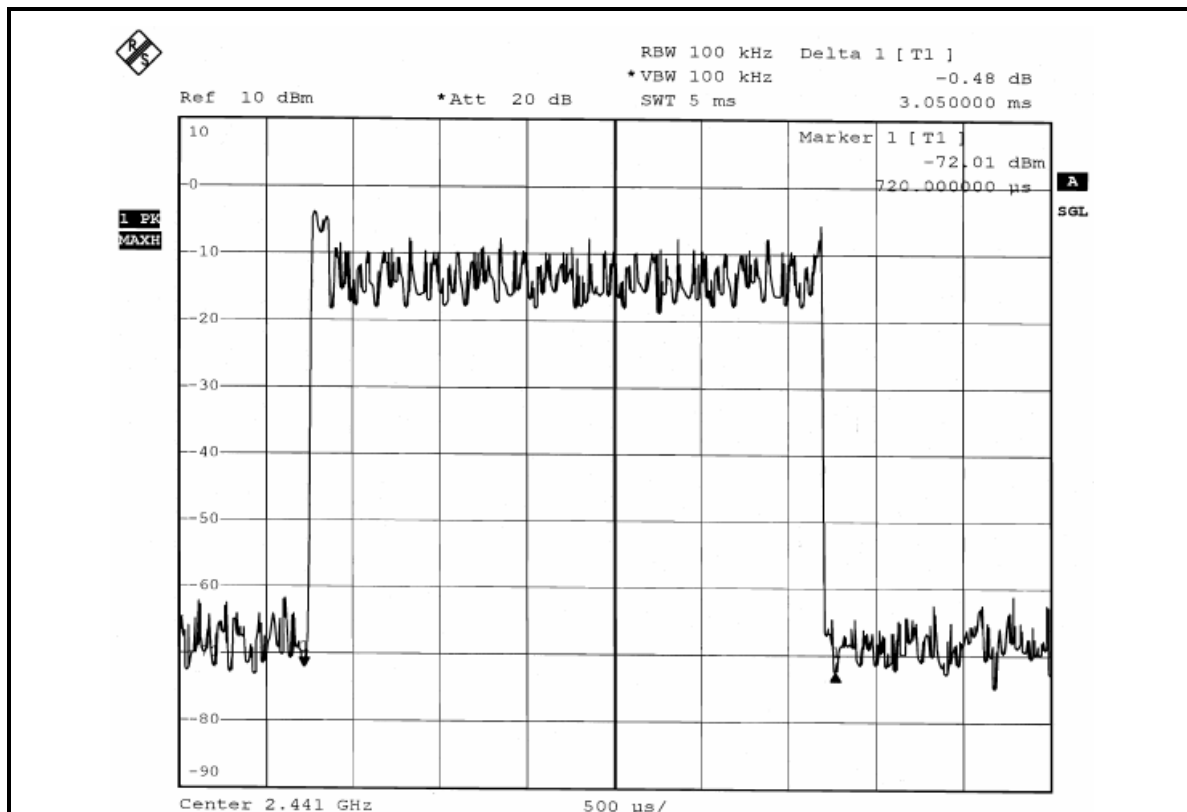
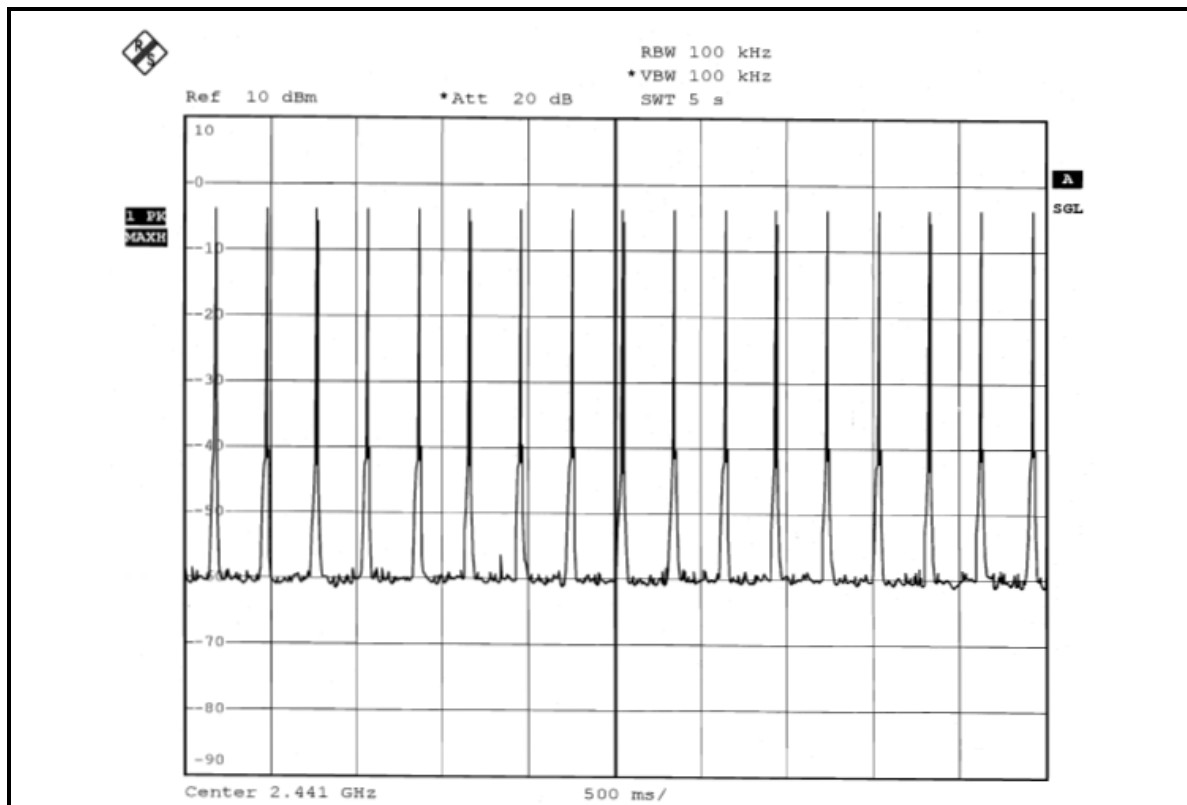
DH1



DH3



DH5





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, two-thirds 20dB bandwidth of hopping channel shall be a minimum limit for the hopping channel separation.

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100036	Mar. 13, 2008

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.

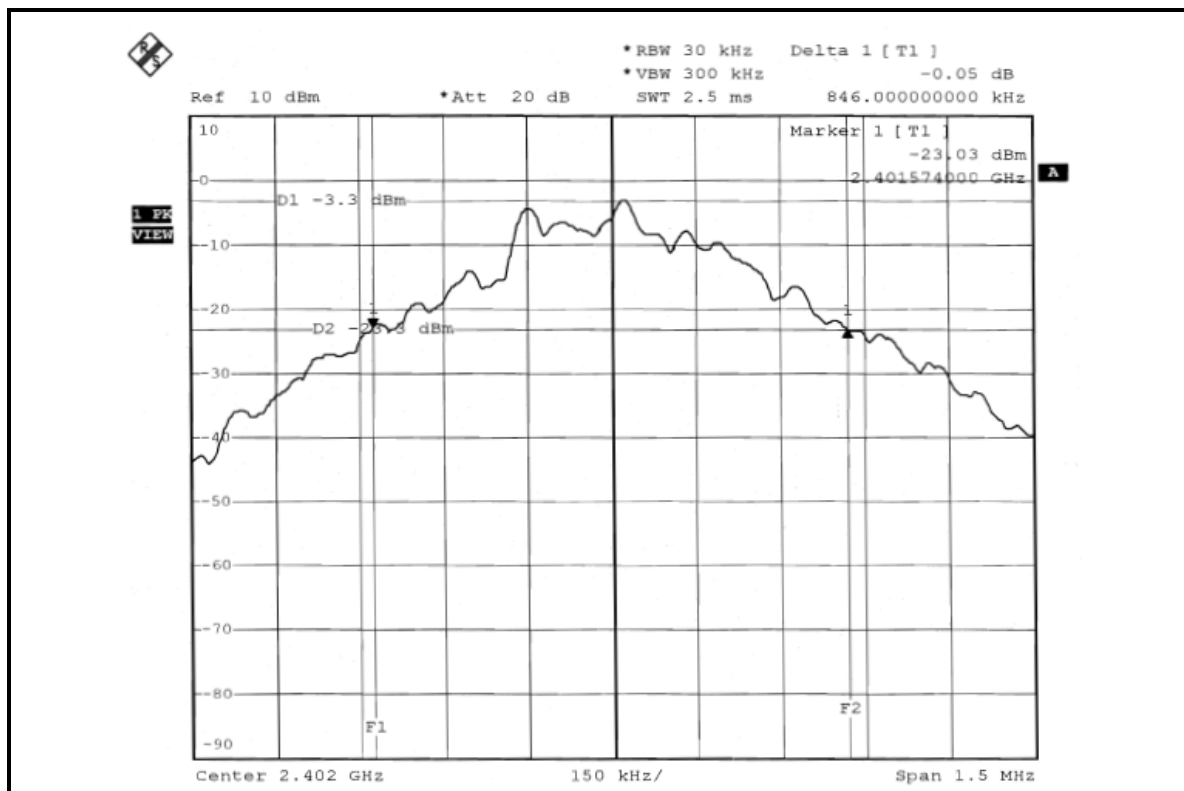
4.5.7 TEST RESULTS

FOR GFSK

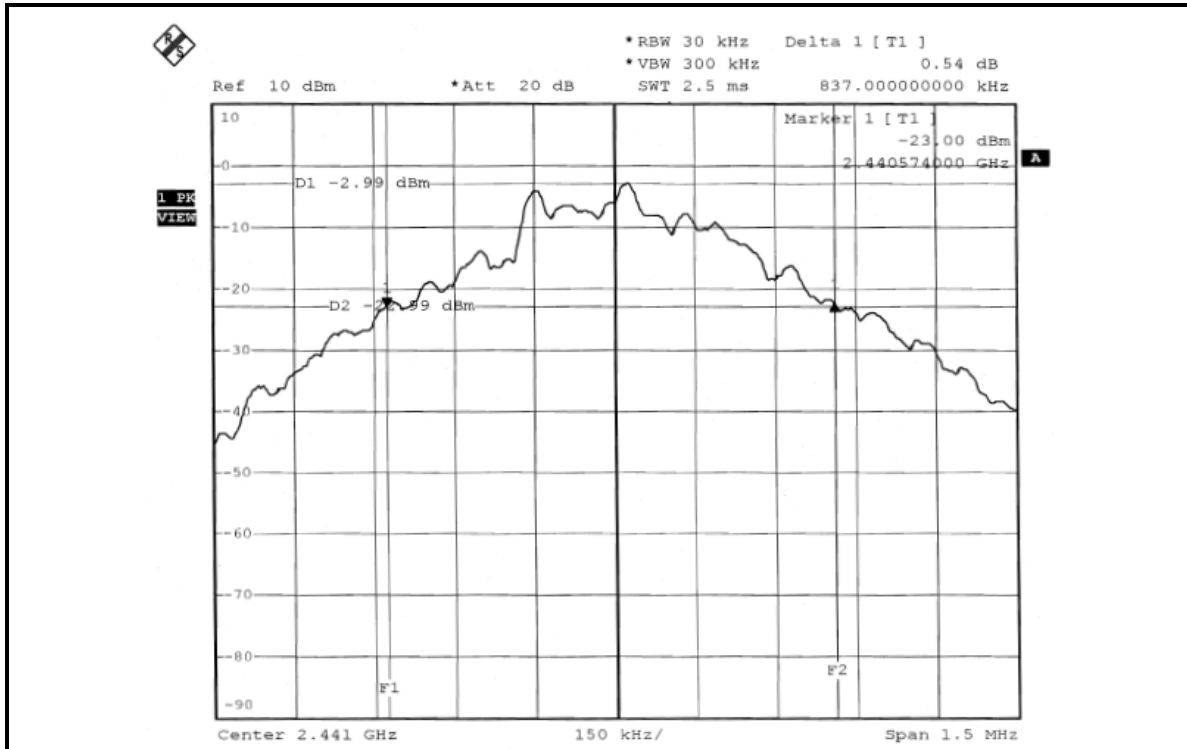
TEST MODE	A		
MODULATION TYPE	GFSK	CHANNEL	0, 39, 78
INPUT POWER	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	22 deg. C, 72%RH, 1003hPa
TESTED BY	Jamison Chan		

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	0.846
39	2441	0.837
78	2480	0.846

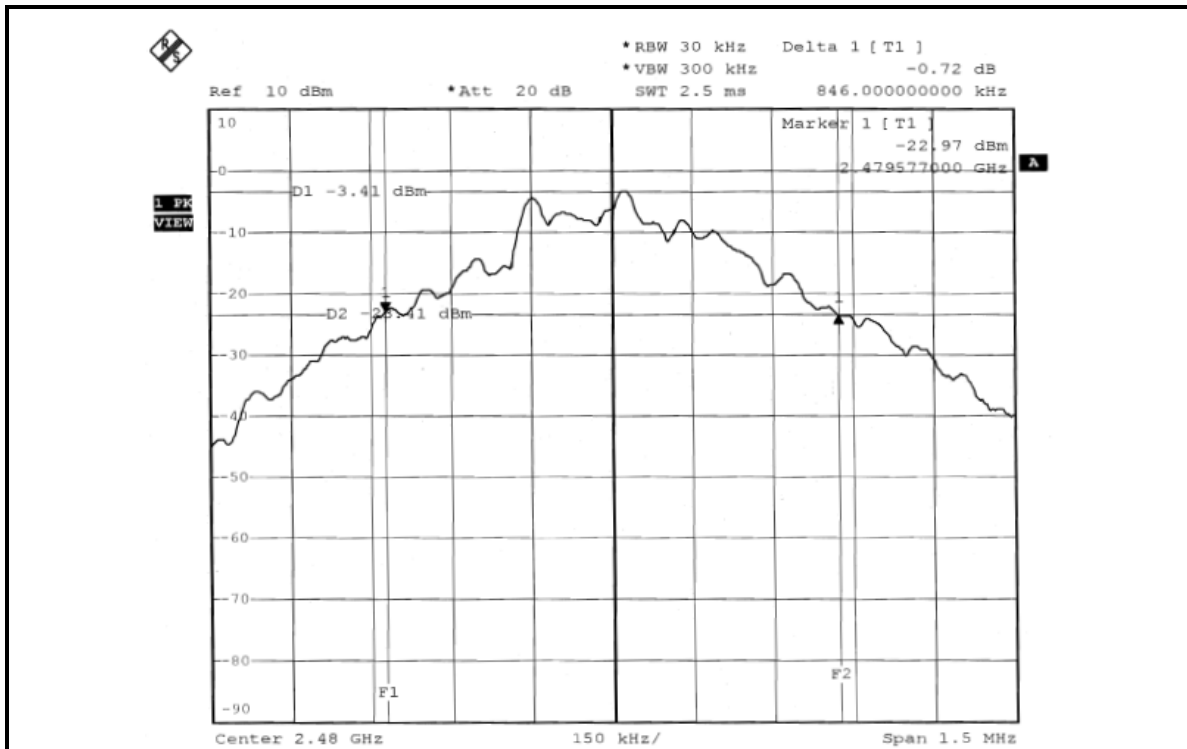
CH 0



CH 39



CH 78

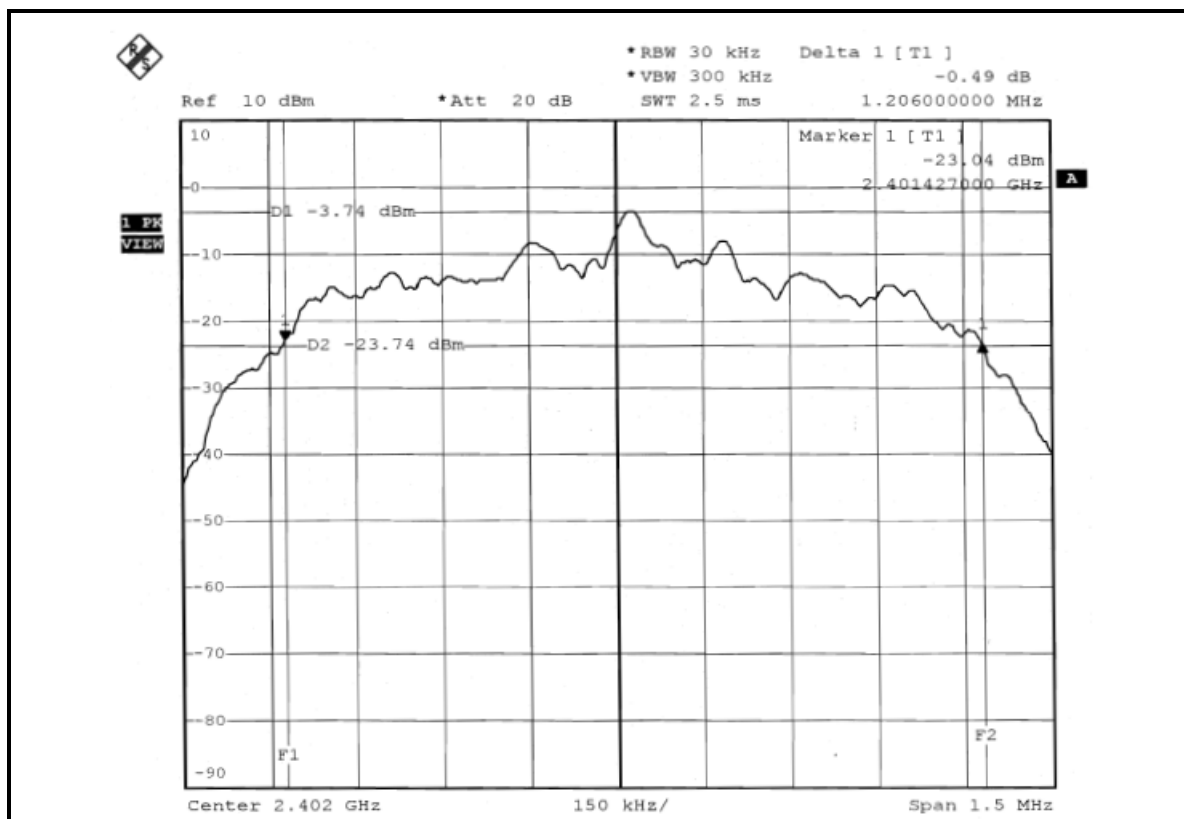


FOR 8DPSK

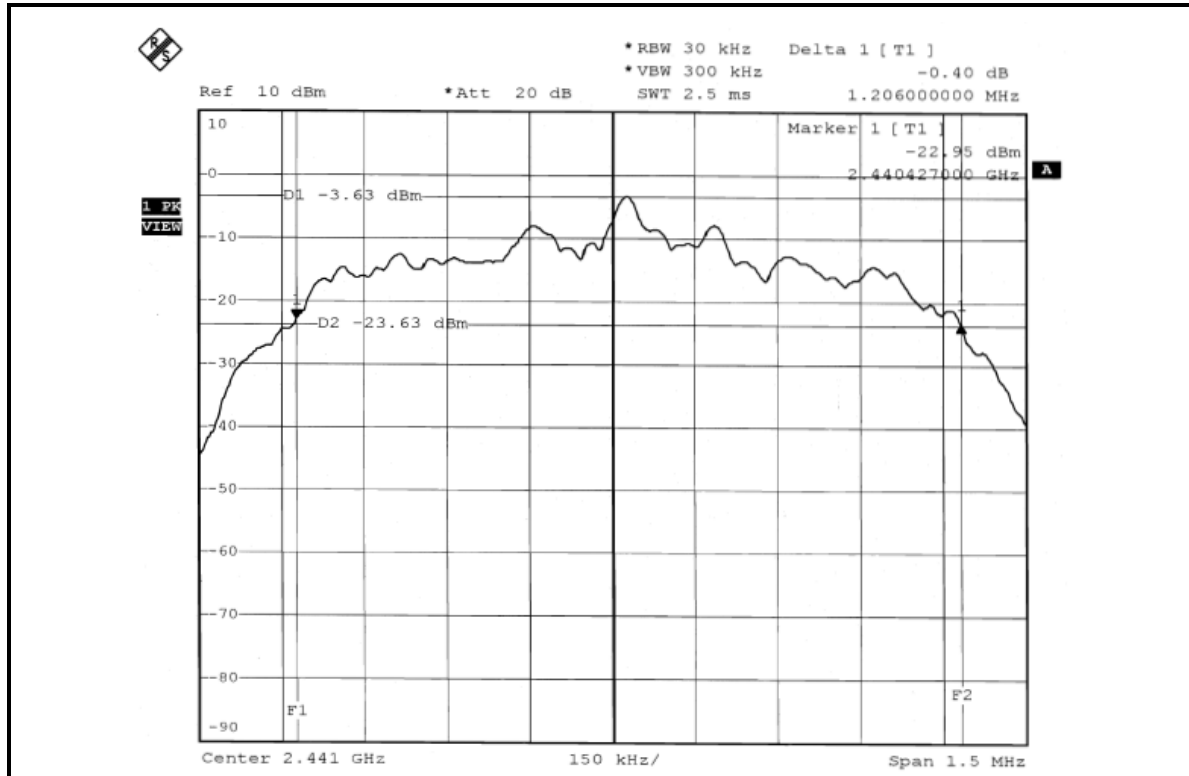
TEST MODE	A		
MODULATION TYPE	8DPSK	CHANNEL	0, 39, 78
INPUT POWER	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	22 deg. C, 72%RH, 1003hPa
TESTED BY	Jamison Chan		

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	1.206
39	2441	1.206
78	2480	1.212

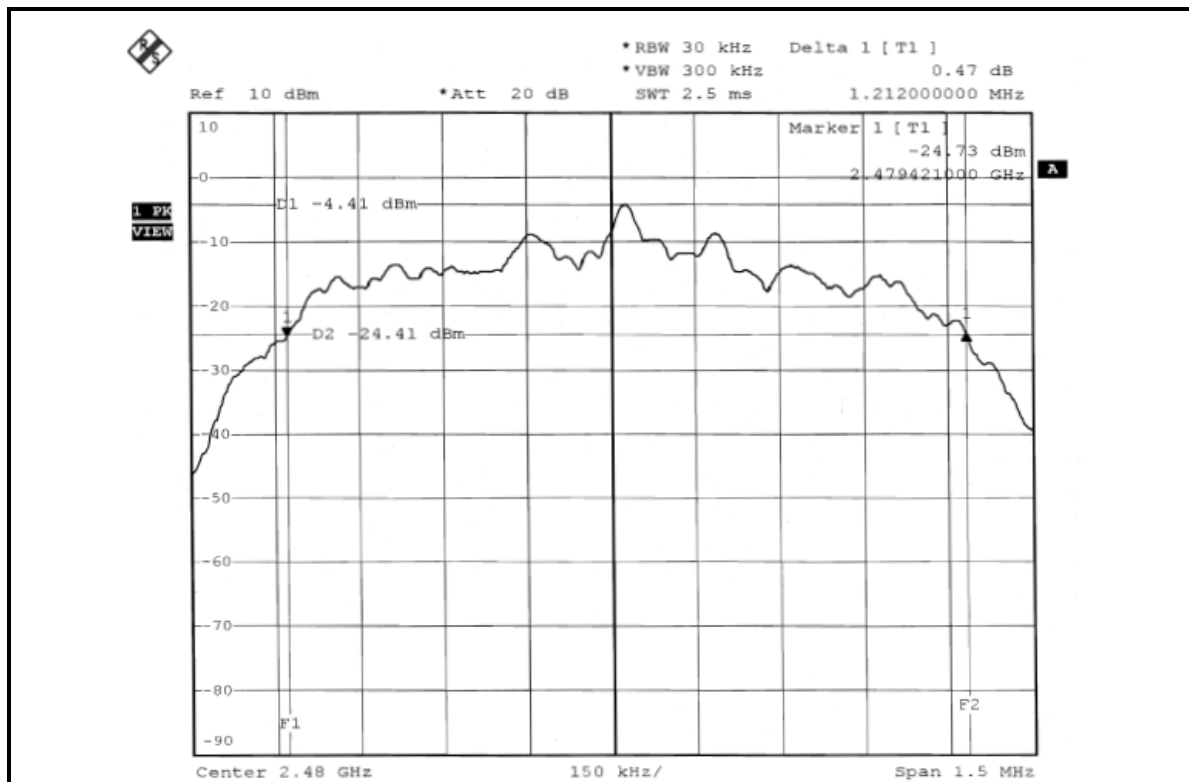
CH 0



CH 39



CH 78





4.6 HOPPING CHANNEL SEPARATION

4.6.1 LIMIT OF HOPPING CHANNEL SEPARATION

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

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100036	Mar. 13, 2008

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

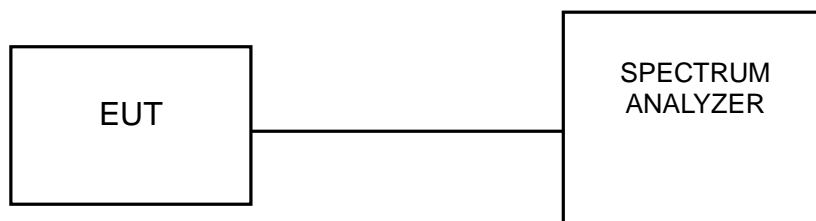
4.6.3 TEST PROCEDURES

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

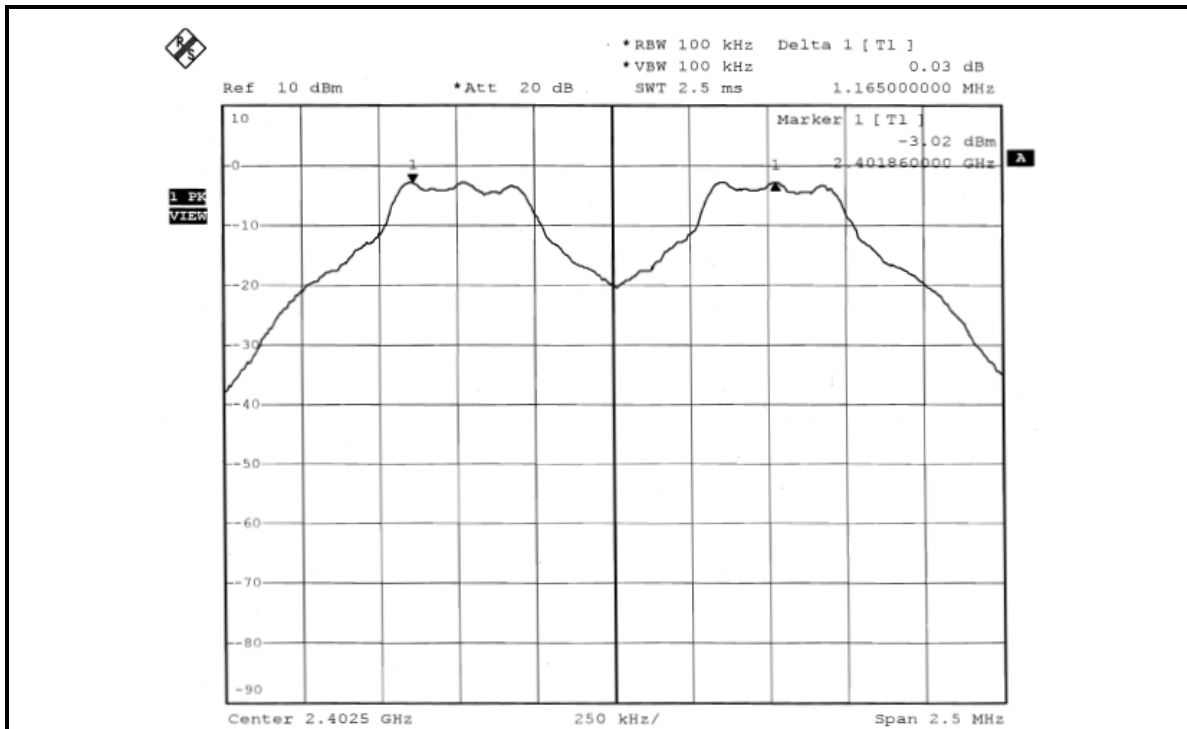
FOR GFSK

TEST MODE	A		
MODULATION TYPE	GFSK	CHANNEL	0, 39, 78
INPUT POWER	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	22 deg. C, 72%RH, 1003hPa
TESTED BY	Jamison Chan		

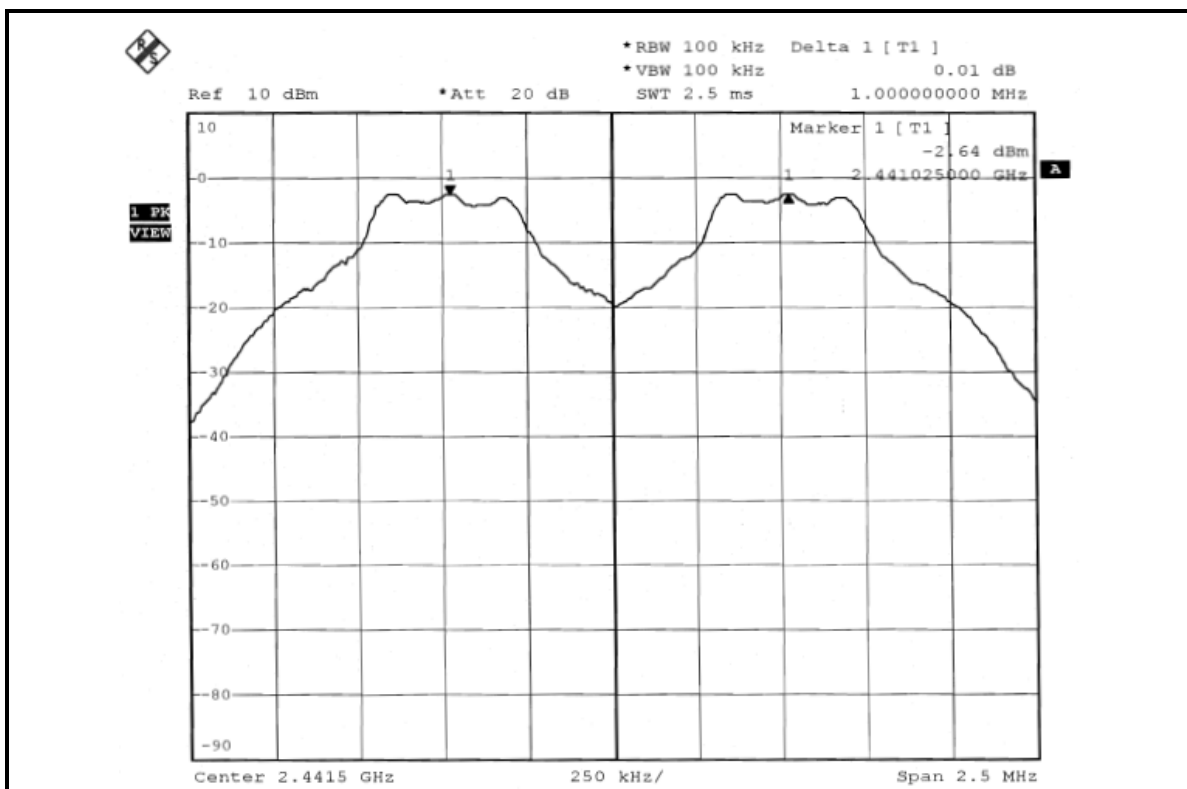
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	1.165	0.846	0.564	PASS
39	2441	1.000	0.837	0.558	PASS
78	2480	1.000	0.846	0.564	PASS

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

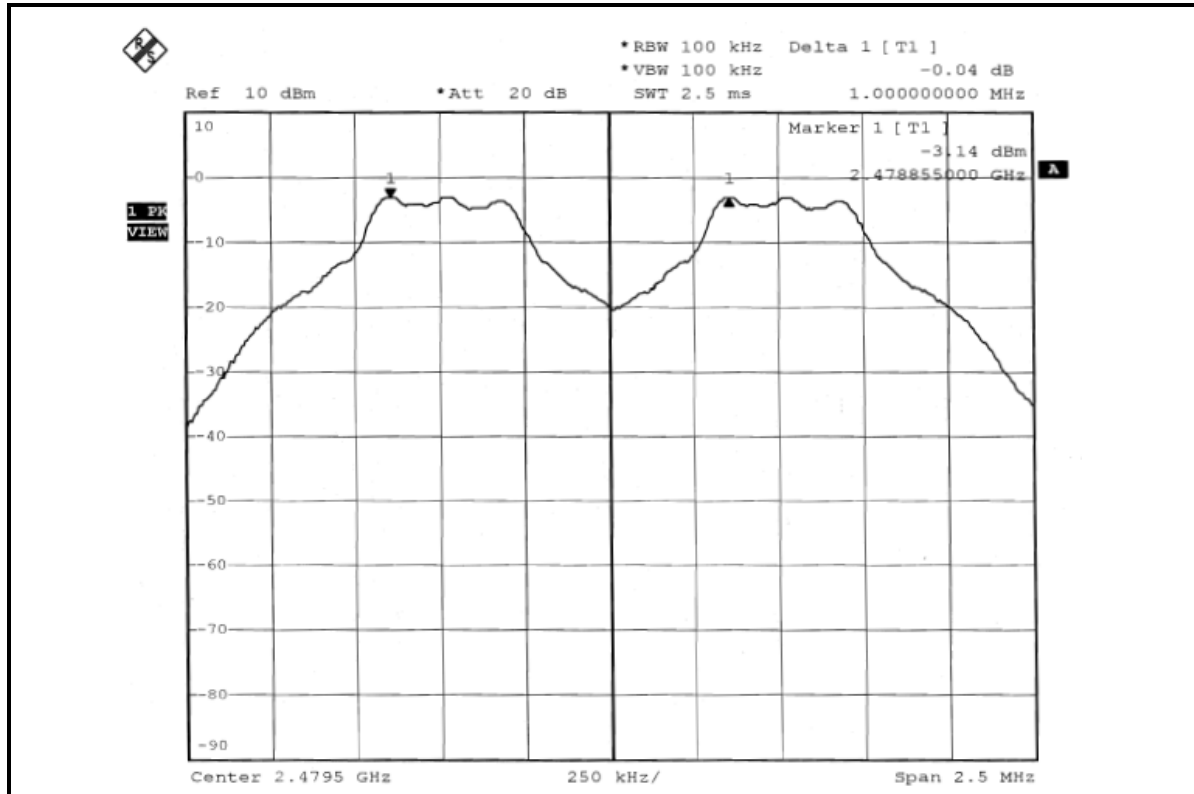
CH 0



CH 39



CH 78



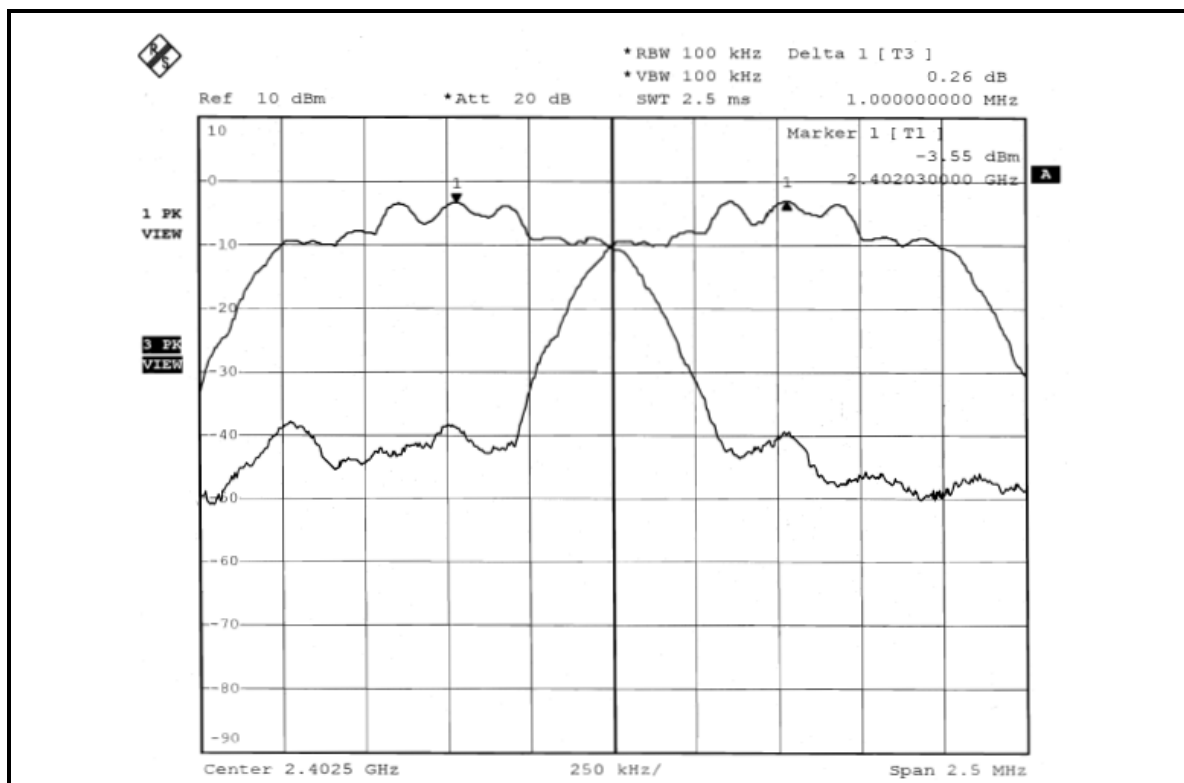
FOR 8DPSK

TEST MODE	A		
MODULATION TYPE	8DPSK	CHANNEL	0, 39, 78
INPUT POWER	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	22 deg. C, 72%RH, 1003hPa
TESTED BY	Jamison Chan		

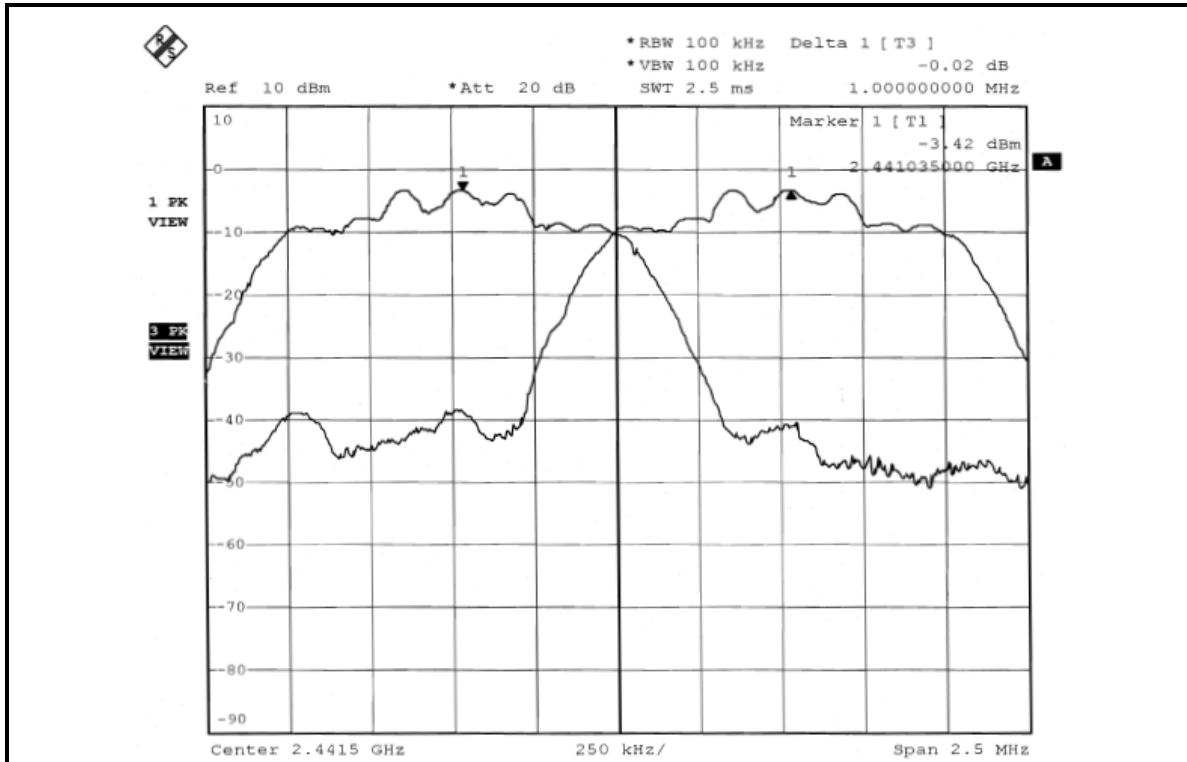
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	1.000	1.206	0.804	PASS
39	2441	1.000	1.206	0.804	PASS
78	2480	1.005	1.212	0.808	PASS

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

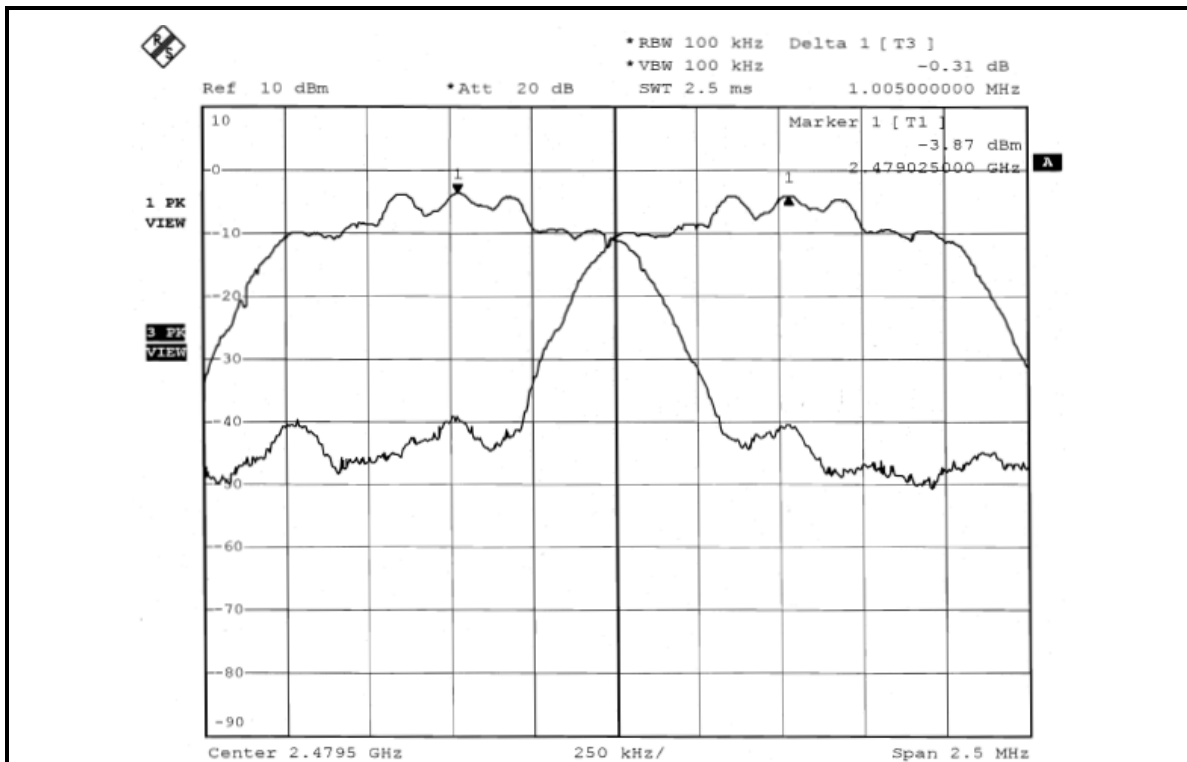
CH 0



CH 39



CH 78





4.7 MAXIMUM PEAK OUTPUT POWER

4.7.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 125mW.

4.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100036	Mar. 13, 2008

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

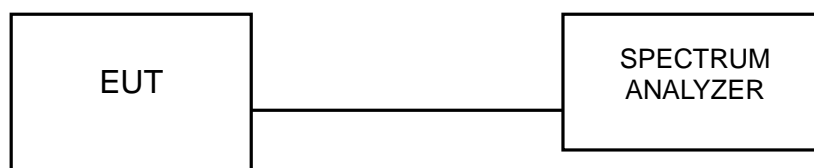
4.7.3 TEST PROCEDURES

- 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.

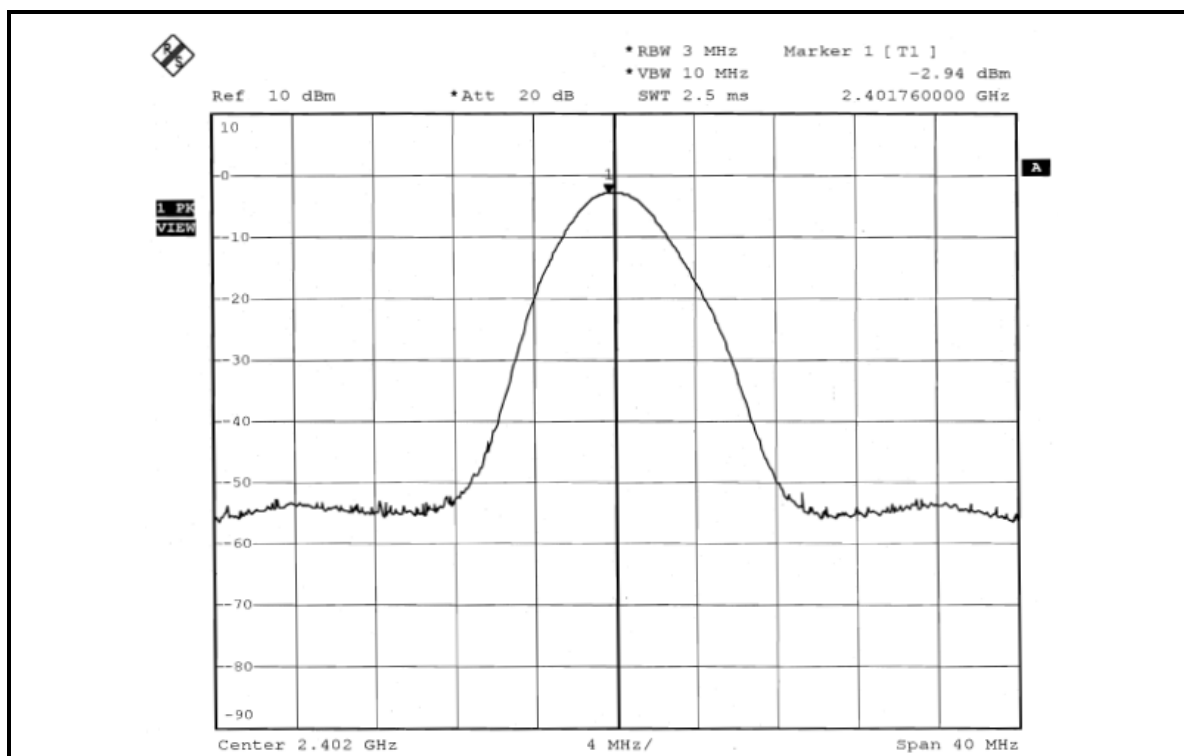
4.7.7 TEST RESULTS

FOR GFSK

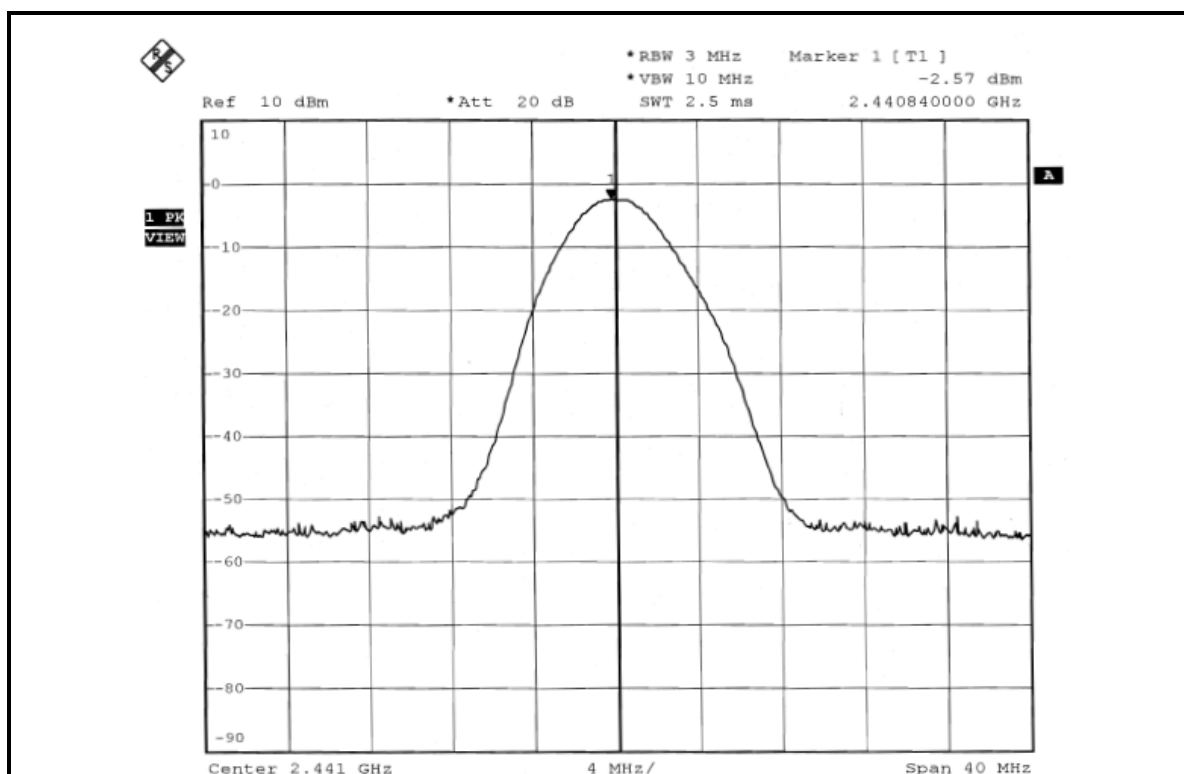
TEST MODE	A		
MODULATION TYPE	GFSK	CHANNEL	0, 39, 78
INPUT POWER	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	22 deg. C, 72%RH, 1003hPa
TESTED BY	Jamison Chan		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	0.508	-2.94	125	PASS
39	2441	0.553	-2.57	125	PASS
78	2480	0.501	-3.00	125	PASS

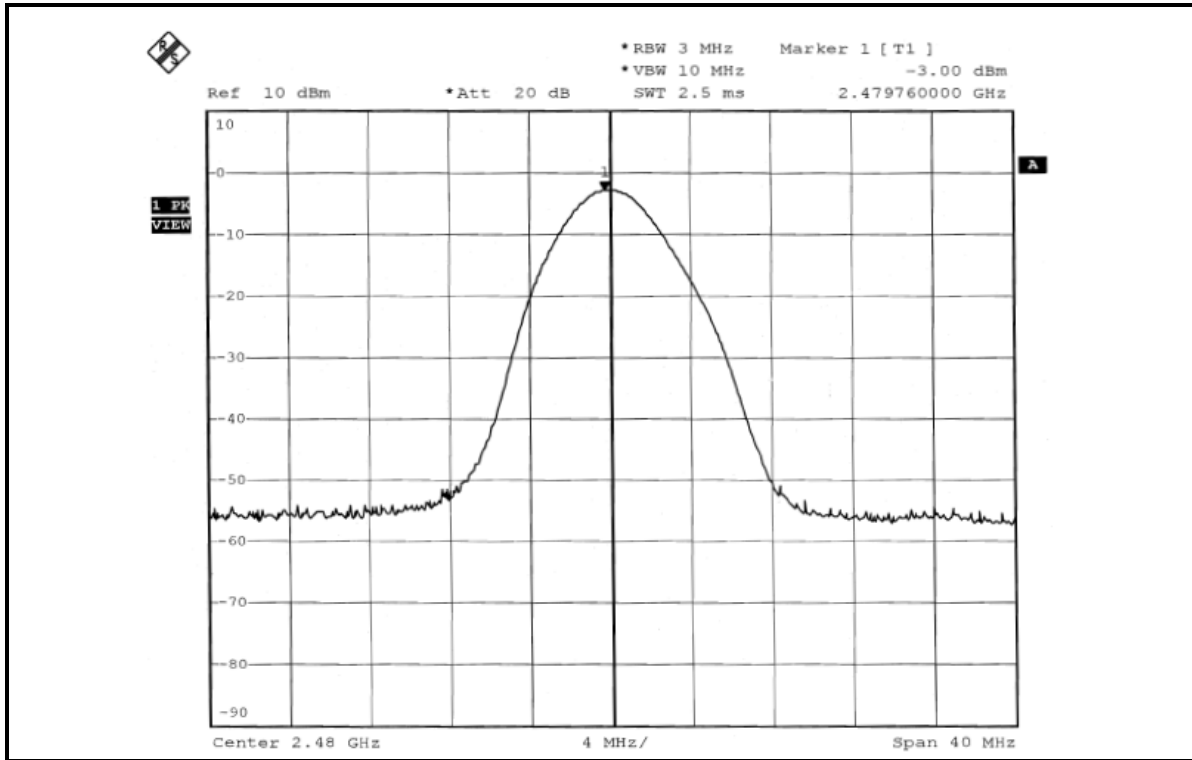
CH 0



CH 39



CH 78

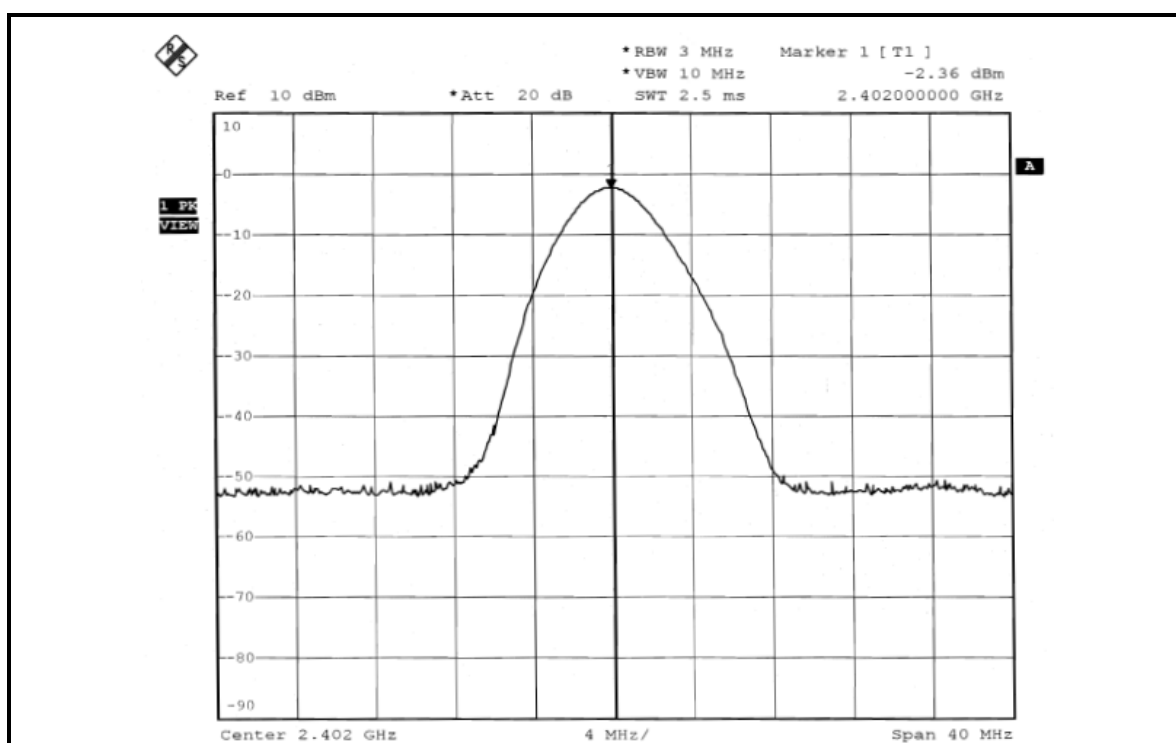


FOR 8DPSK

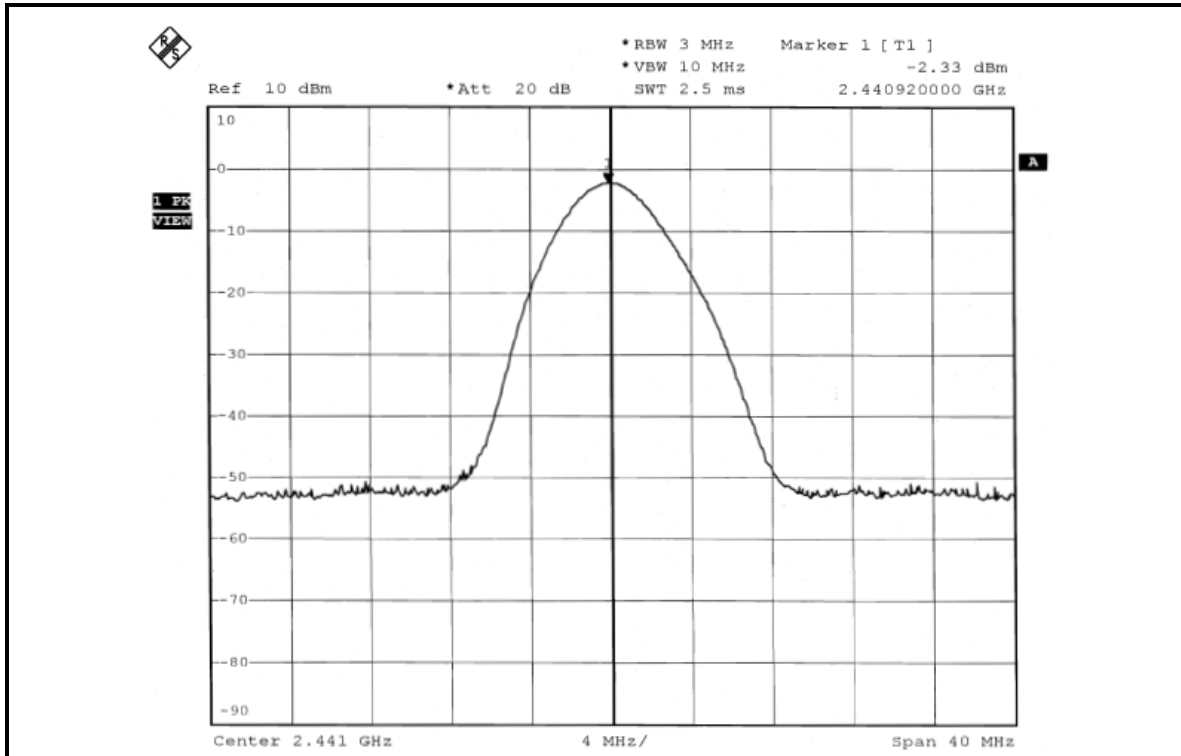
TEST MODE	A		
MODULATION TYPE	8DPSK	CHANNEL	0, 39, 78
INPUT POWER	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	22 deg. C, 72%RH, 1003hPa
TESTED BY	Jamison Chan		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	0.581	-2.36	125	PASS
39	2441	0.585	-2.33	125	PASS
78	2480	0.505	-2.97	125	PASS

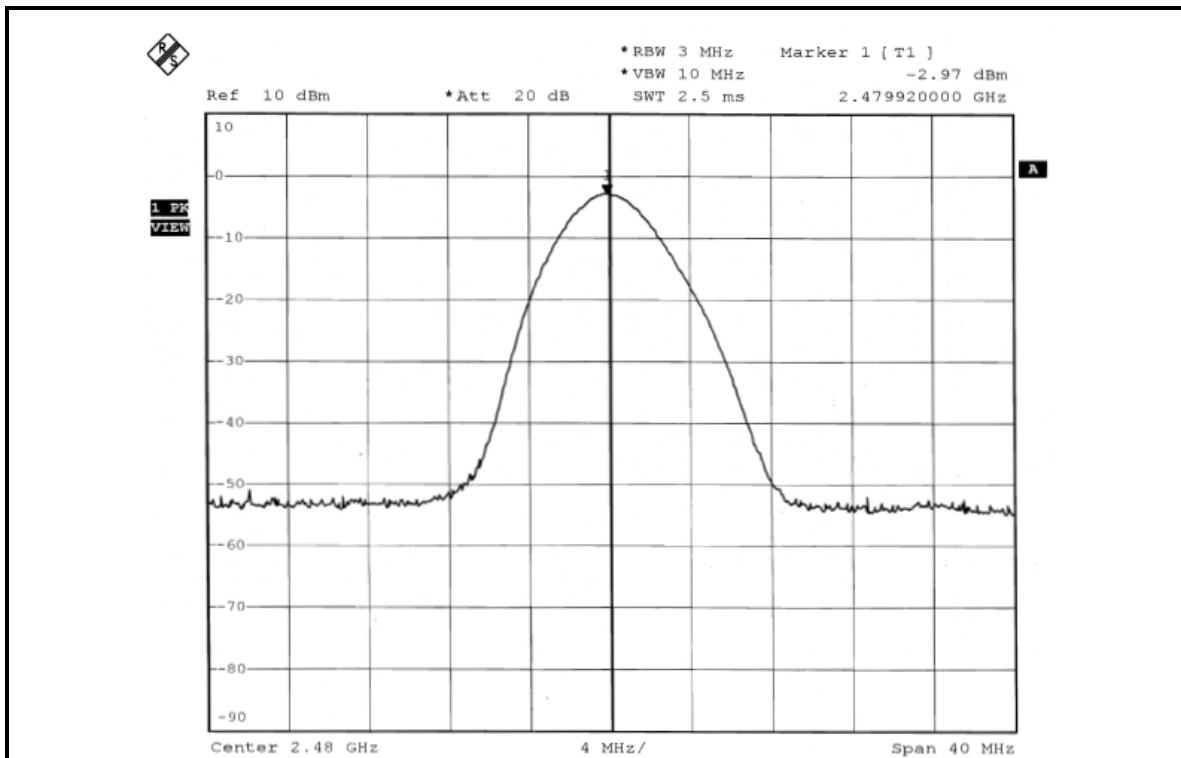
CH 0



CH 39



CH 78





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	FSP 40	100036	Mar. 13, 2008

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 loss 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 8 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).

MODE A: FOR GFSK

NOTE 1:

The band edge emission plot on the next page shows 56.17dBc between carrier maximum power and local maximum emission in restrict band (2.3868GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 97.27dBuV/m (Peak), so the maximum field strength in restrict band is $97.27 - 56.17 = 41.10$ dBuV/m, which is under 74 dBuV/m limit.

Average value = $41.10 - 30.00 = 11.10$ dBuV/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: $20\log(3.125/100) = -30$ dB.

Average value = peak reading -30.00 .

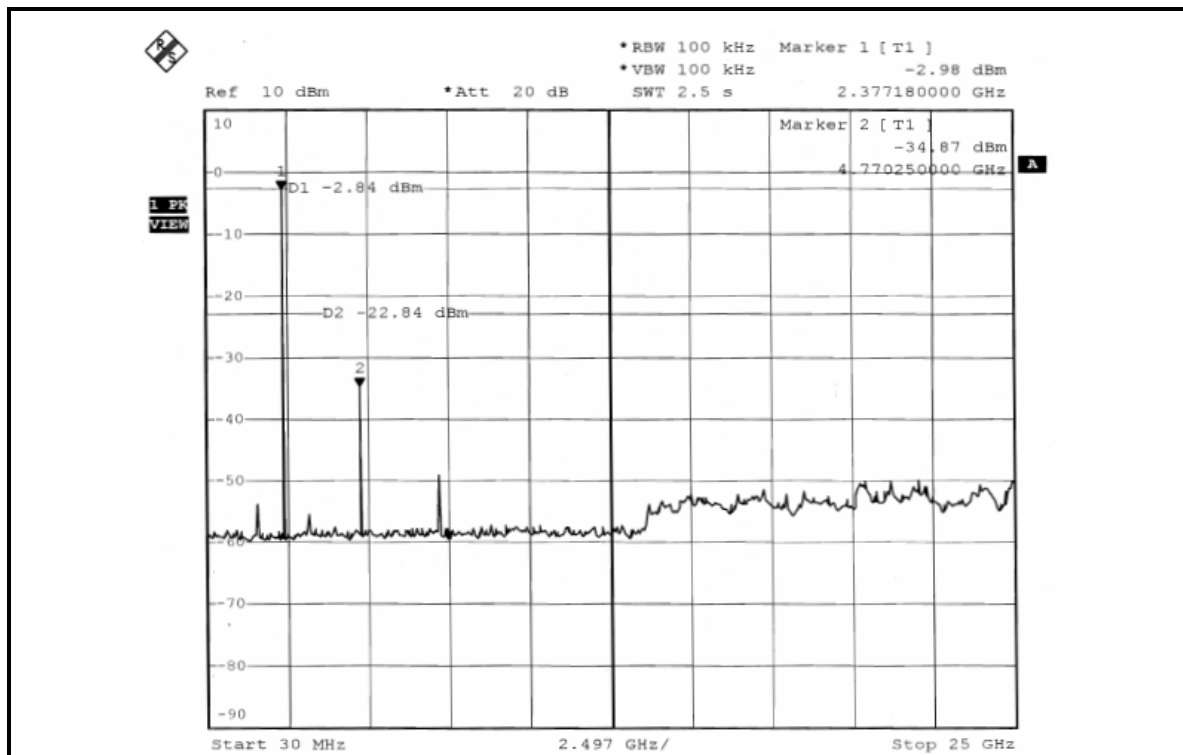
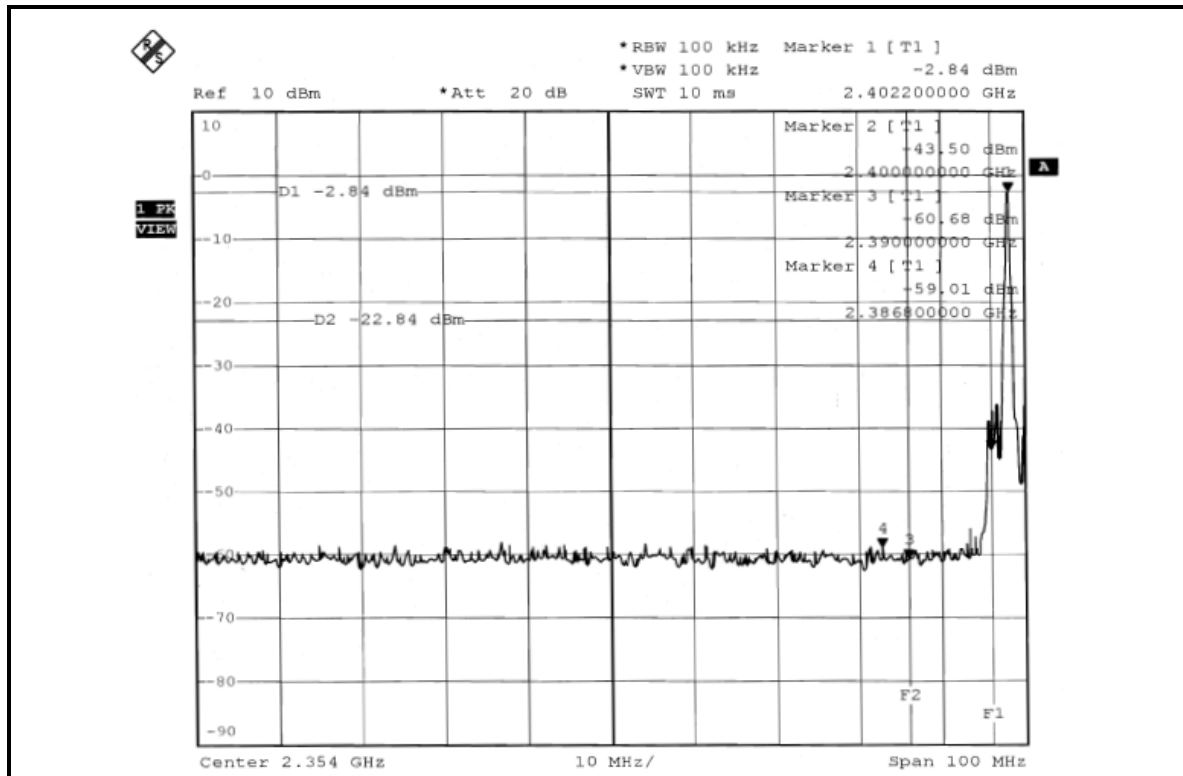
NOTE 2:

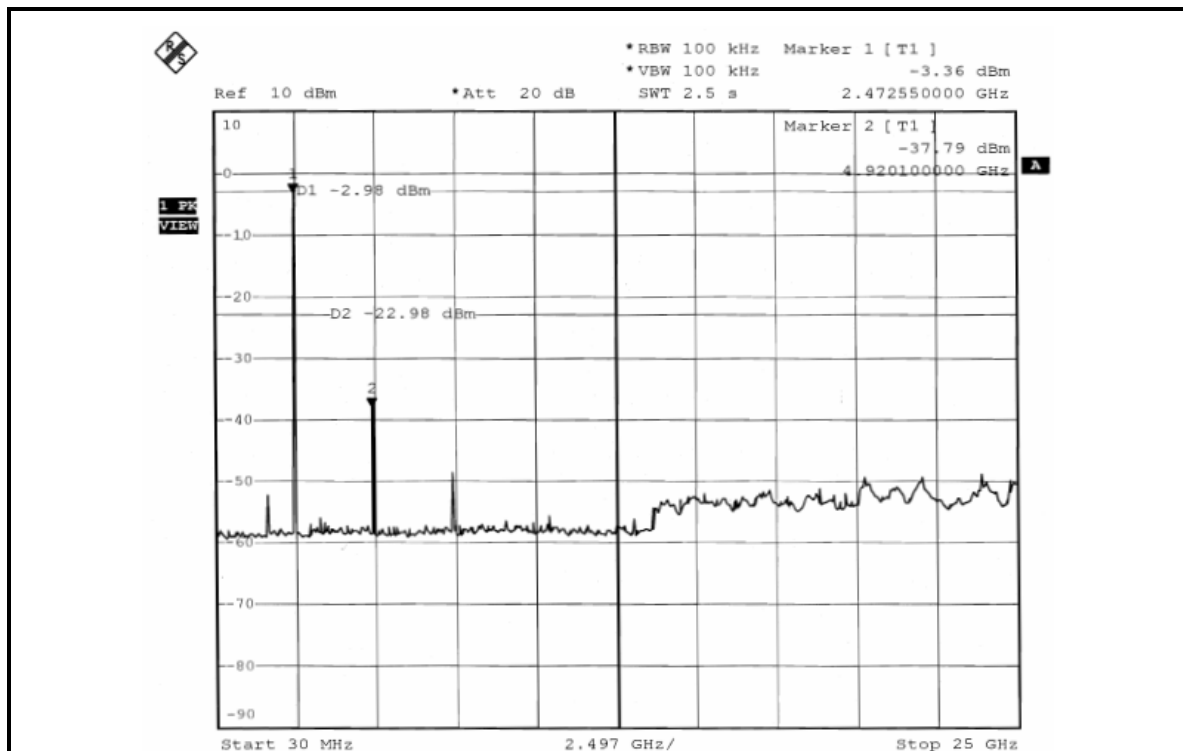
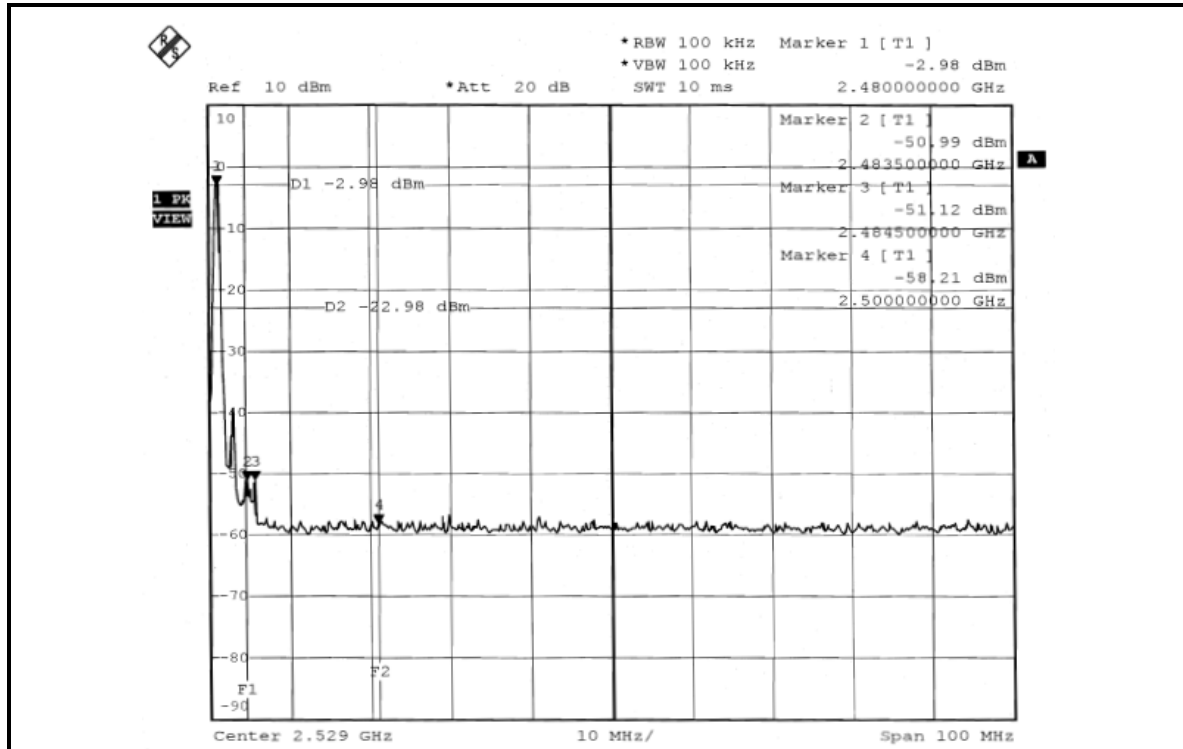
The band edge emission plot on the next second page shows 48.01dBc between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.2.7 is 92.87dBuV/m (Peak), so the maximum field strength in restrict band is $92.87 - 48.01 = 44.86$ dBuV/m, which is under 74 dBuV/m limit.

Average value = $44.86 - 30.00 = 14.86$ dBuV/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: $20\log(3.125/100) = -30$ dB.

Average value = peak reading -30.00 .





MODE A: FOR 8DPSK

NOTE 1:

The band edge emission plot on the next page shows 53.64dBc between carrier maximum power and local maximum emission in restrict band (2.3448GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 96.28dBuV/m (Peak), so the maximum field strength in restrict band is $96.28 - 53.64 = 42.64$ dBuV/m, which is under 74 dBuV/m limit.

Average value = $42.64 - 30.00 = 12.64$ dBuV/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: $20\log(3.125/100) = -30$ dB.

Average value = peak reading -30.00 .

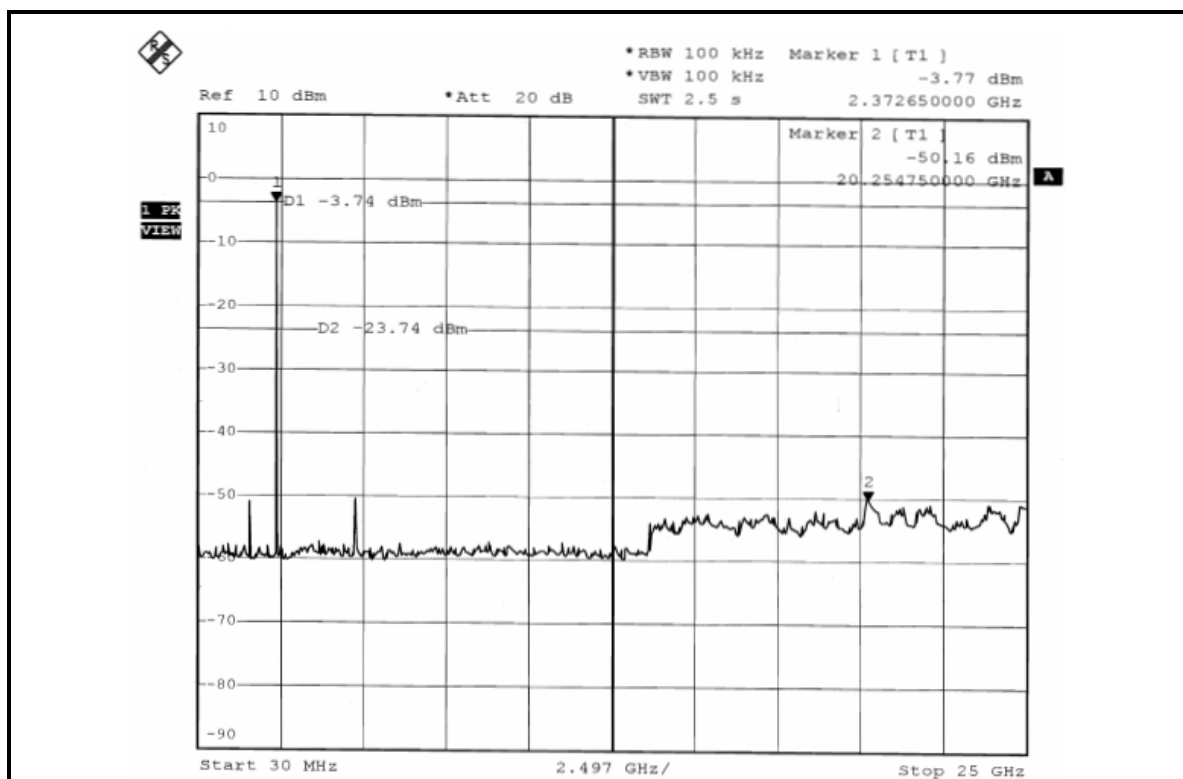
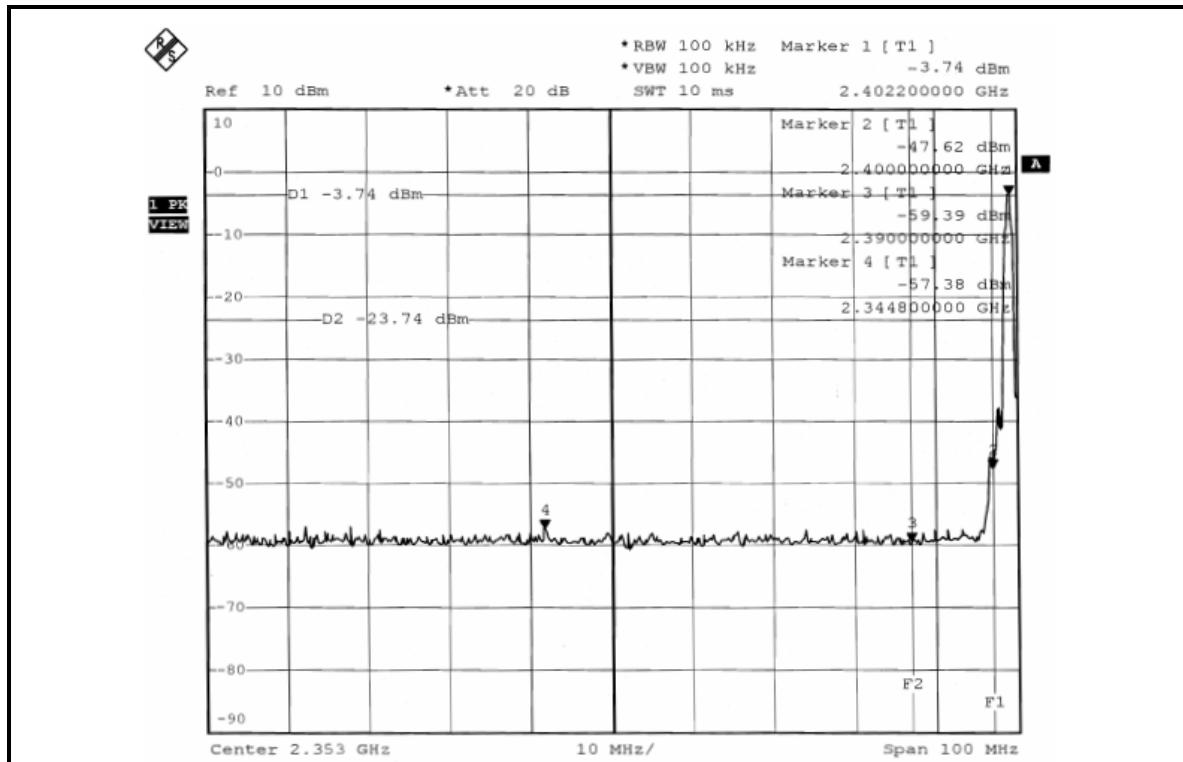
NOTE 2:

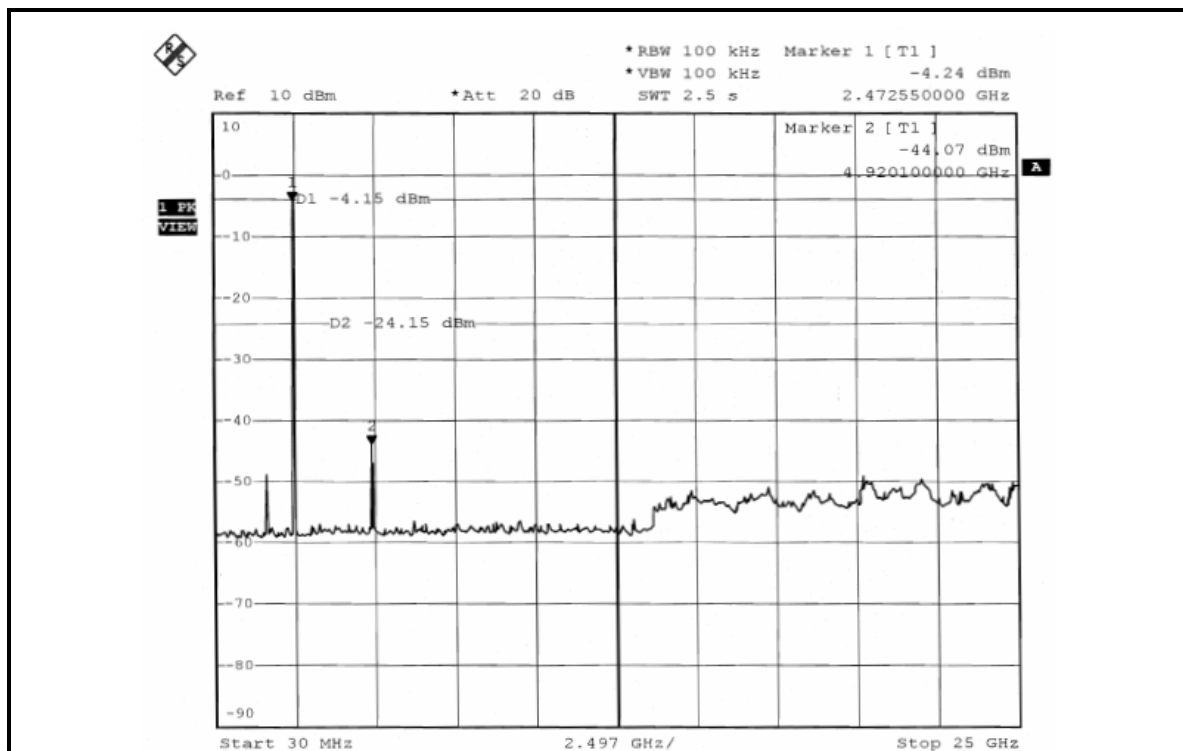
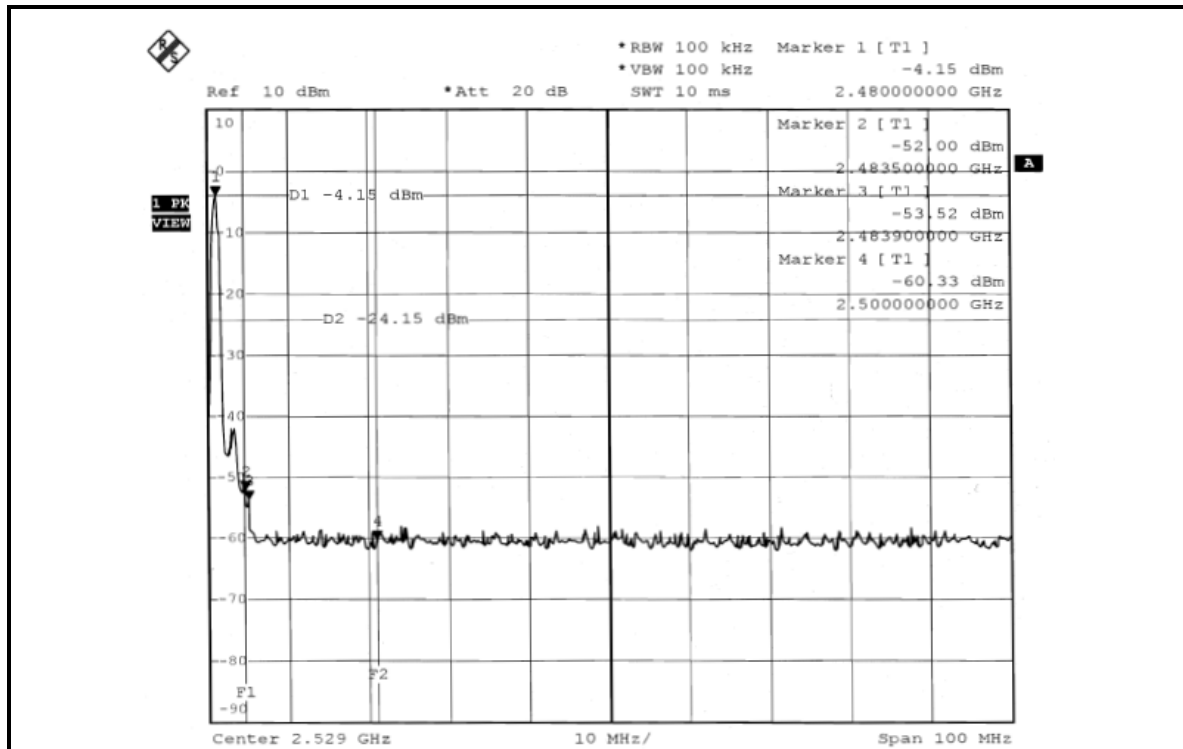
The band edge emission plot on the next second page shows 47.85dBc between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.2.7 is 94.80dBuV/m (Peak), so the maximum field strength in restrict band is $94.80 - 47.85 = 46.95$ dBuV/m, which is under 74 dBuV/m limit.

Average value = $46.95 - 30.00 = 16.95$ dBuV/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: $20\log(3.125/100) = -30$ dB.

Average value = peak reading -30.00 .





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 PIFA antenna without antenna connector. The maximum Gain of the antenna is 1.55dBi gain.



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

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Hwa Ya EMC/RF/Safety/Telecom Lab

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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.