

FCC TEST REPORT

REPORT NO.: RF950926L04
MODEL NO.: Falcon P40
RECEIVED: Nov. 03, 2006
TESTED: Dec. 26 ~ Dec. 28, 2006
ISSUED: Jan. 02, 2007

APPLICANT: Datalogic Scanning, Inc.

ADDRESS: 959 Terry Street, Eugene, Oregon 97402,
U.S.A

ISSUED BY: Advance Data Technology Corporation

LAB ADDRESS: No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou
Hsiang 244, Taipei Hsien, Taiwan, R.O.C.

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

This test report consists of 146 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by CNLA, A2LA or any government agencies. The test results in the report only apply to the tested sample.



Table of Contents

1.	CERTIFICATION	5
2.	SUMMARY OF TEST RESULTS	6
2.1	MEASUREMENT UNCERTAINTY	7
3.	GENERAL INFORMATION	8
3.1	GENERAL DESCRIPTION OF EUT	8
3.2	DESCRIPTION OF TEST MODES	9
3.2.1	CONFIGURATION OF SYSTEM UNDER TEST	10
3.2.2	TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL	11
3.3	GENERAL DESCRIPTION OF APPLIED STANDARDS	15
3.4	DESCRIPTION OF SUPPORT UNITS	15
4.	TEST TYPES AND RESULTS (FOR WIRELESS LAN FUNCTION)	16
4.1	CONDUCTED EMISSION MEASUREMENT	16
4.1.1	LIMITS OF CONDUCTED EMISSION MEASUREMENT	16
4.1.2	TEST INSTRUMENTS	16
4.1.3	TEST PROCEDURES	17
4.1.4	DEVIATION FROM TEST STANDARD	17
4.1.5	TEST SETUP	18
4.1.6	EUT OPERATING CONDITIONS	18
4.1.7	TEST RESULTS	19
4.2	RADIATED EMISSION MEASUREMENT	31
4.2.1	LIMITS OF RADIATED EMISSION MEASUREMENT	31
4.2.2	TEST INSTRUMENTS	32
4.2.3	TEST PROCEDURES	33
4.2.4	DEVIATION FROM TEST STANDARD	33
4.2.5	TEST SETUP	34
4.2.6	EUT OPERATING CONDITIONS	34
4.2.7	TEST RESULTS	35
4.3	6dB BANDWIDTH MEASUREMENT	47
4.3.1	LIMITS OF 6dB BANDWIDTH MEASUREMENT	47
4.3.2	TEST INSTRUMENTS	47
4.3.3	TEST PROCEDURE	48
4.3.4	DEVIATION FROM TEST STANDARD	48
4.3.5	TEST SETUP	48
4.3.6	EUT OPERATING CONDITIONS	48
4.3.7	TEST RESULTS	49
4.4	MAXIMUM PEAK OUTPUT POWER	55
4.4.1	LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT	55
4.4.2	INSTRUMENTS	55
4.4.1	TEST PROCEDURES	56
4.4.2	DEVIATION FROM TEST STANDARD	56
4.4.3	TEST SETUP	56
4.4.4	EUT OPERATING CONDITIONS	56
4.4.3	TEST RESULTS	57
4.5	POWER SPECTRAL DENSITY MEASUREMENT	58
4.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT	58
4.5.2	TEST INSTRUMENTS	58

4.5.3	TEST PROCEDURE	59
4.5.4	DEVIATION FROM TEST STANDARD	59
4.5.5	TEST SETUP	59
4.5.6	EUT OPERATING CONDITION	59
4.5.7	TEST RESULTS	60
4.6	BAND EDGES MEASUREMENT	66
4.6.1	LIMITS OF BAND EDGES MEASUREMENT	66
4.6.2	TEST INSTRUMENTS	66
4.6.3	TEST PROCEDURE	66
4.6.4	DEVIATION FROM TEST STANDARD	66
4.6.5	EUT OPERATING CONDITION	66
4.6.6	TEST RESULTS	67
4.7	ANTENNA REQUIREMENT	75
4.7.1	STANDARD APPLICABLE	75
4.7.2	ANTENNA CONNECTED CONSTRUCTION	75
5.	TEST TYPES AND RESULTS (FOR BLUETOOTH FUNCTION).....	76
5.1	CONDUCTED EMISSION MEASUREMENT	76
5.1.1	LIMITS OF CONDUCTED EMISSION MEASUREMENT.....	76
5.1.2	TEST INSTRUMENTS	76
5.1.3	TEST PROCEDURES	77
5.1.4	DEVIATION FROM TEST STANDARD	77
5.1.5	TEST SETUP	78
5.1.6	EUT OPERATING CONDITIONS	78
5.1.7	TEST RESULTS	79
5.2	RADIATED EMISSION MEASUREMENT	91
5.2.1	LIMITS OF RADIATED EMISSION MEASUREMENT.....	91
5.2.2	TEST INSTRUMENTS	92
5.2.3	TEST PROCEDURES	93
5.2.4	DEVIATION FROM TEST STANDARD	93
5.2.5	TEST SETUP	94
5.2.6	EUT OPERATING CONDITIONS	94
5.2.7	TEST RESULTS	95
5.3	NUMBER OF HOPPING FREQUENCY USED	103
5.3.1	LIMIT OF HOPPING FREQUENCY USED	103
5.3.2	TEST INSTRUMENTS	103
5.3.3	TEST PROCEDURES	103
5.3.4	DEVIATION FROM TEST STANDARD	104
5.3.5	TEST SETUP	104
5.3.6	TEST RESULTS	104
5.4	DWELL TIME ON EACH CHANNEL	107
5.4.1	LIMIT OF DWELL TIME USED.....	107
5.4.2	TEST INSTRUMENTS	107
5.4.3	TEST PROCEDURES	107
5.4.4	DEVIATION FROM TEST STANDARD	107
5.4.5	TEST SETUP	108
5.4.6	EST RESULTS	108
5.5	CHANNEL BANDWIDTH.....	116
5.5.1	LIMITS OF CHANNEL BANDWIDTH	116
5.5.2	TEST INSTRUMENTS	116
5.5.3	TEST PROCEDURE	116

5.5.4	DEVIATION FROM TEST STANDARD	116
5.5.5	TEST SETUP	117
5.5.6	EUT OPERATING CONDITION	117
5.5.7	TEST RESULTS	117
5.6	HOPPING CHANNEL SEPARATION	123
5.6.1	LIMIT OF HOPPING CHANNEL SEPARATION	123
5.6.2	TEST INSTRUMENTS	123
5.6.3	TEST PROCEDURES	123
5.6.4	DEVIATION FROM TEST STANDARD	124
5.6.5	TEST SETUP	124
5.6.6	TEST RESULTS	124
5.7	MAXIMUM PEAK OUTPUT POWER	130
5.7.1	LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT	130
5.7.2	TEST INSTRUMENTS	130
5.7.3	TEST PROCEDURES	130
5.7.4	DEVIATION FROM TEST STANDARD	130
5.7.5	TEST SETUP	131
5.7.6	EUT OPERATING CONDITION	131
5.7.7	TEST RESULTS	131
5.8	BAND EDGES MEASUREMENT	137
5.8.1	LIMITS OF BAND EDGES MEASUREMENT	137
5.8.2	TEST INSTRUMENTS	137
5.8.3	TEST PROCEDURE	137
5.8.4	DEVIATION FROM TEST STANDARD	137
5.8.5	EUT OPERATING CONDITION	137
5.8.6	TEST RESULTS	138
5.9	ANTENNA REQUIREMENT	144
5.9.1	STANDARD APPLICABLE	144
5.9.2	ANTENNA CONNECTED CONSTRUCTION	144
6.	INFORMATION ON THE TESTING LABORATORIES	145
APPENDIX-A		A-1

1. CERTIFICATION

PRODUCT: Portable Data Terminal

MODEL: Falcon P40

BRAND: Falcon

APPLICANT: Datalogic Scanning, Inc.

TEST SAMPLE: ENGINEERING SAMPLE

TESTED: Dec. 26 ~ Dec. 28, 2006

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

The above equipment (Model: Falcon P40) has been tested by **Advance Data Technology Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Andrea Hsia , **DATE:** Jan. 02, 2007
Andrea Hsia

TECHNICAL
ACCEPTANCE : Long Chen , **DATE:** Jan. 02, 2007
Responsible for RF Long Chen

APPROVED BY : Gary Chang , **DATE:** Jan. 02, 2007
Gary Chang / Supervisor

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

FOR WIRELESS LAN FUNCTION:

APPLIED STANDARD: FCC Part 15, Subpart C (Section 15.247)			
Standard Section	Test Type and Limit	Result	Remark
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -12.15dB at 2.938MHz
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Limit: min. 500kHz	PASS	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power Limit: max. 30dBm	PASS	Meet the requirement of limit.
15.247(d)	Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -3.18dB at 2483.5MHz
15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit.
15.247(d)	Band Edge Measurement Limit: 20dB less than the peak value of fundamental frequency	PASS	Meet the requirement of limit.

FOR BLUETOOTH FUNCTION:

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 -11.46dB at 2.938MHz.
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) 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)	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 -6.14dB at 4960.00MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.

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

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4:

Measurement	Frequency	Uncertainty
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.71 dB
	200MHz ~1000MHz	3.73 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

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

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	Portable Data Terminal
MODEL NO.	Falcon P40
FCC ID	O9NPC
POWER SUPPLY	3.7Vdc from rechargeable lithium battery 5.0Vdc from power adapter
MODULATION TYPE	Wireless LAN: CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM Bluetooth: GFSK, $\pi/4$ -DQPSK, 8DPSK
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: 2.412 ~ 2.462GHz Bluetooth: 2.402 ~ 2.480GHz
NUMBER OF CHANNEL	Wireless LAN: 11 Bluetooth: 79
CHANNEL SPACING	Wireless LAN: 5MHz Bluetooth: 1MHz
OUTPUT POWER	Wireless LAN: 51.050mW Bluetooth: 1.312mW
ANTENNA TYPE	Wireless LAN: PCB antenna with 1.96dBi gain PIFA antenna with 2.69dBi gain Bluetooth: SMD antenna with 4.1dBi gain
DATA CABLE	1.5m USB cable with charger port without core
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	1 x USB cable (1.5m), Adapter, 2 x lithium battery

NOTE:

1. The EUT is a Portable Data Terminal with wireless LAN and bluetooth functions.
2. For the antennas of WLAN, after pre-tested both antenna, highest one was chosen for the final test and recorded in the test report.
3. The EUT have two lithium batteries listed as below:

BATTERY 1:		BATTERY 2:	
BRAND:	ETI	BRAND:	ETI
MODEL:	4006-0337	MODEL:	4006-0338
RATING:	3.7Vdc, 3300mAh	RATING:	3.7Vdc, 2200mAh

NOTE: After pre-tested both batteries, found battery 1 was the worse, therefore all the test results came out from this.

4. The EUT was operated with following power adapter:

BRAND:	PHIHONG
MODEL:	PSA15R-050P
INPUT:	100-240Vac, 50-60Hz, 0.5A
OUTPUT:	5.0Vdc, 3.0A
POWER LINE:	AC 1.8m non-shielded cable with one core

5. The EUT operates in the 2.4GHz frequency spectrum and complies with 802.11b & 802.11g techniques.
6. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

Operated in 2400 ~ 2483.5MHz band:

11 channels are provided to the EUT for wireless LAN function:

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412 MHz	7	2442 MHz
2	2417 MHz	8	2447 MHz
3	2422 MHz	9	2452 MHz
4	2427 MHz	10	2457 MHz
5	2432 MHz	11	2462 MHz
6	2437 MHz		

79 channels are provided to this EUT for bluetooth function:

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		

3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

FOR WIRELESS LAN FUNCTION:

EUT configure mode	Applicable to				Description
	PLC	RE<1G	RE≥1G	APCM	
A	√	√	√	√	Charger mode
B	√	√	-	-	Cradle mode

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
B	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6

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, antenna ports (if EUT with antenna diversity architecture), and X, Y and Z Axis.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)	AXIS
A	802.11g	1 to 11	11	OFDM	BPSK	6	Y
B	802.11g	1 to 11	11	OFDM	BPSK	6	-

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, antenna ports (if EUT with antenna diversity architecture), and X, Y and Z Axis.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	ANTENNA TYPE	DATA RATE (Mbps)	AXIS
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	PIFA	1	Y
A	802.11b	1 to 11	1, 11	DSSS	DBPSK	PCB	1	Y
A	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	PIFA	6	Y
A	802.11g	1 to 11	1, 11	OFDM	BPSK	PCB	6	Y

Bandedge Measurement:

- ☒ 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 11	OFDM	BPSK	6

Antenna Port Conducted Measurement:

- ☒ 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6

FOR BLUETOOTH FUNCTION:

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	PLC	RE<1G	RE≥1G	APCM	
A	√	√	√	√	Charger mode
B	√	√	-	-	Cradle mode

Where **PLC:** Power Line Conducted Emission
RE≥1G: Radiated Emission above 1GHz

RE<1G RE: Radiated Emission below 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, antenna ports (if EUT with antenna diversity architecture), and packet types.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
A	0 to 78	0, 39, 78	FHSS	GFSK	DH5
B	0 to 78	0, 39, 78	FHSS	GFSK	DH5

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, antenna ports (if EUT with antenna diversity architecture), X, Y, Z Axis, and packet type.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE	AXIS
A	0 to 78	0	FHSS	8DPSK	DH5	Y
B	0 to 78	0	FHSS	8DPSK	DH5	-

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, antenna ports (if EUT with antenna diversity architecture), X, Y, Z Axis, and packet type.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE	AXIS
A	0 to 78	0, 39, 78	FHSS	GFSK	DH5	Y
A	0 to 78	0, 39, 78	FHSS	8DPSK	DH5	Y

BANDEDGE MEASUREMENT:

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
0 to 78	0, 78	FHSS	GFSK	DH5
0 to 78	0, 78	FHSS	8DPSK	DH5

ANTENNA PORT CONDUCTED MEASUREMENT:

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
0 to 78	0, 39, 78	FHSS	GFSK	DH5
0 to 78	0, 39, 78	FHSS	8DPSK	DH5

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.

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.

3.4 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	12130898320	E2K24CLNS
2	PRINTER	EPSON	LQ-300+	DCGY047265	FCC DoC Approved
3	MODEM	ACEEX	1414V/3	0401008248	IFAXDM1414
4	EARPHONE	FGE	FGE-202-3	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	1.2 m shielded cable without core
3	1.2 m shielded cable without core
4	1.2m non-shielded cable without core

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

4. TEST TYPES AND RESULTS(FOR WIRELESS LAN FUNCTION)

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	Sep. 25, 2007
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.

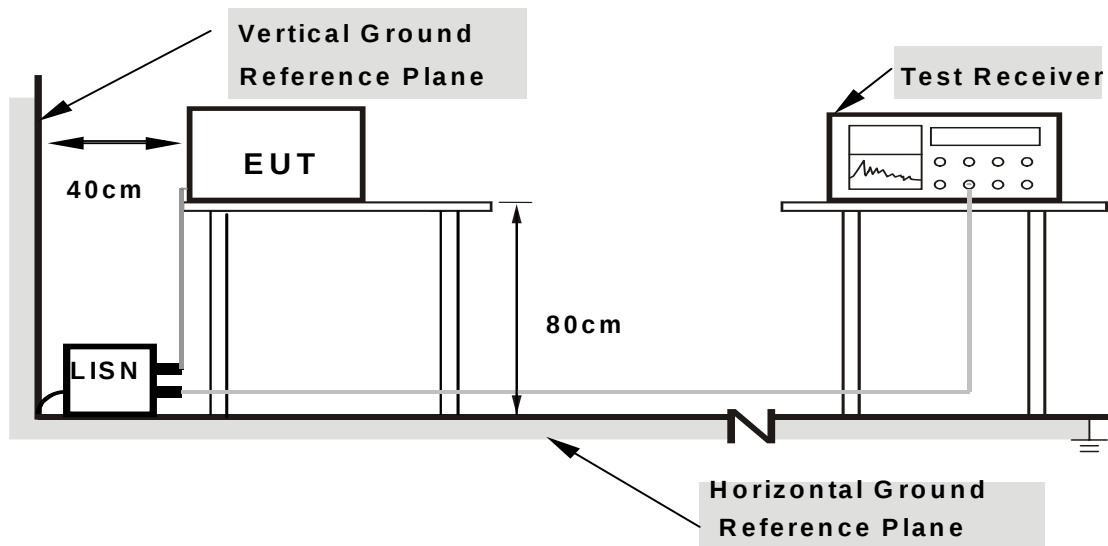
4.1.3 TEST PROCEDURES

- 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) are 80 cm from EUT and at least 80 cm from other units and other metal planes

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT OPERATING CONDITIONS

- a. Connected EUT with notebook system via USB cable and placed on a testing table.
- b. The notebook system ran a test program (provided by manufacturer) to enable EUT under transmitting condition continuously at specific channel frequency.
- c. The necessary accessories enable the system in full functions.

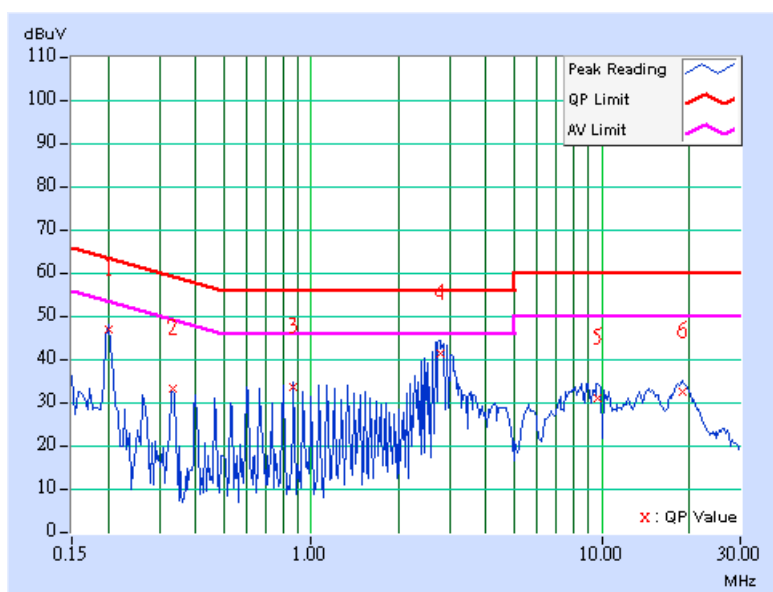
4.1.7 TEST RESULTS

Conducted Worst-Case Data

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	PHASE	Line 1
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	20deg. 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	0.201	0.10	46.33	-	46.43	-	63.58	53.58	-17.15	-
2	0.332	0.10	32.80	-	32.90	-	59.40	49.40	-26.50	-
3	0.869	0.10	33.23	-	33.33	-	56.00	46.00	-22.67	-
4	2.801	0.27	40.95	-	41.22	-	56.00	46.00	-14.78	-
5	9.738	0.36	30.53	-	30.89	-	60.00	50.00	-29.11	-
6	18.945	0.57	32.11	-	32.68	-	60.00	50.00	-27.32	-

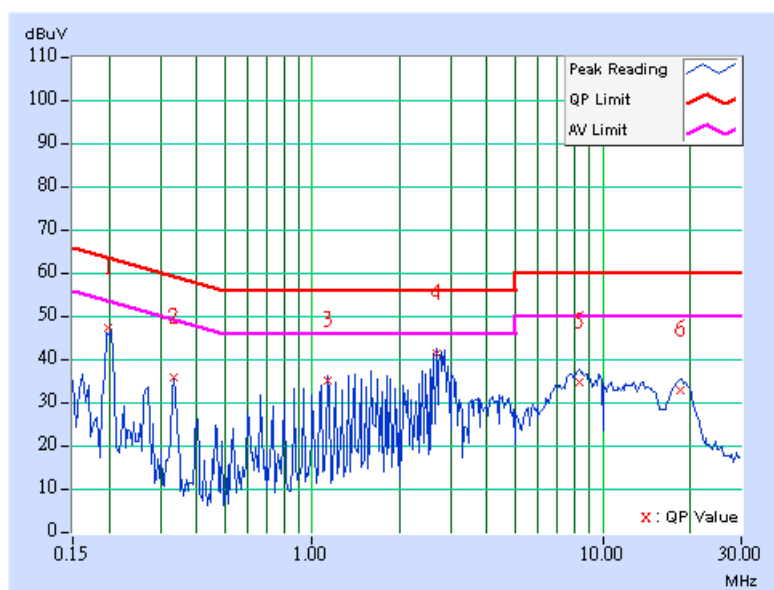
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = 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 1	PHASE	Line 2
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TEST MODE	A
TESTED BY	Match Tsui		

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.200	0.10	47.00	-	47.10	-	63.63	53.63	-16.53	-
2	0.334	0.10	35.39	-	35.49	-	59.36	49.36	-23.87	-
3	1.133	0.20	34.56	-	34.76	-	56.00	46.00	-21.24	-
4	2.668	0.26	40.90	-	41.16	-	56.00	46.00	-14.84	-
5	8.273	0.43	34.19	-	34.62	-	60.00	50.00	-25.38	-
6	18.414	0.58	32.38	-	32.96	-	60.00	50.00	-27.04	-

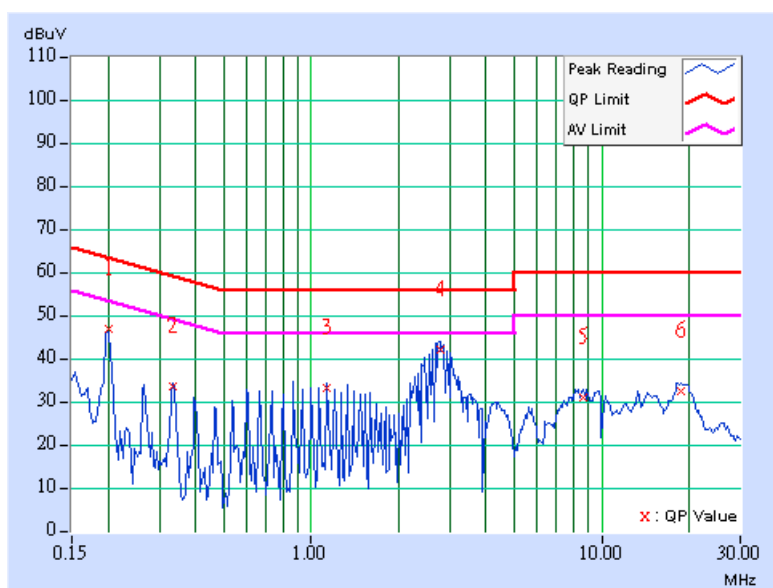
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = 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 6	PHASE	Line 1
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TEST MODE	A
TESTED BY	Match Tsui		

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.10	46.31	-	46.41	-	63.58	53.58	-17.17	-
2	0.334	0.10	33.07	-	33.17	-	59.36	49.36	-26.19	-
3	1.133	0.11	32.61	-	32.72	-	56.00	46.00	-23.28	-
4	2.801	0.27	41.70	-	41.97	-	56.00	46.00	-14.03	-
5	8.672	0.36	30.39	-	30.75	-	60.00	50.00	-29.25	-
6	18.813	0.58	32.04	-	32.62	-	60.00	50.00	-27.38	-

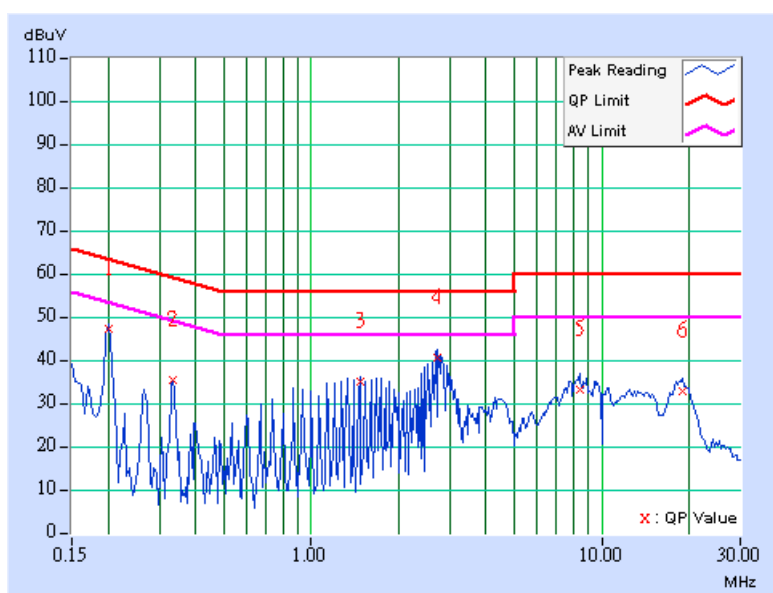
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = 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 6	PHASE	Line 2
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TEST MODE	A
TESTED BY	Match Tsui		

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.10	46.92	-	47.02	-	63.58	53.58	-16.56	-
2	0.334	0.10	35.05	-	35.15	-	59.36	49.36	-24.21	-
3	1.469	0.20	34.50	-	34.70	-	56.00	46.00	-21.30	-
4	2.734	0.26	40.21	-	40.47	-	56.00	46.00	-15.53	-
5	8.406	0.44	32.62	-	33.06	-	60.00	50.00	-26.94	-
6	19.078	0.57	32.40	-	32.97	-	60.00	50.00	-27.03	-

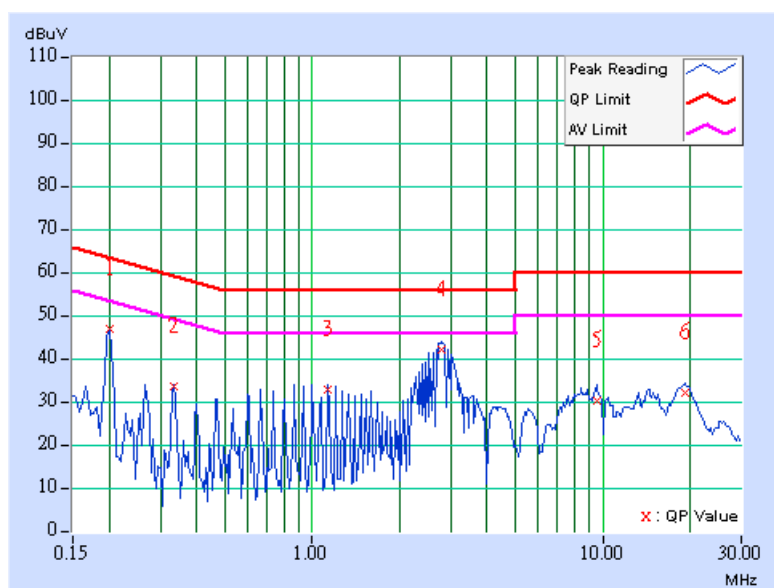
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = 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 11	PHASE	Line 1
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TEST MODE	A
TESTED BY	Match Tsui		

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.10	46.31	-	46.41	-	63.58	53.58	-17.17	-
2	0.334	0.10	33.05	-	33.15	-	59.36	49.36	-26.21	-
3	1.133	0.11	32.22	-	32.33	-	56.00	46.00	-23.67	-
4	2.803	0.27	41.54	-	41.81	-	56.00	46.00	-14.19	-
5	9.539	0.36	29.76	-	30.12	-	60.00	50.00	-29.88	-
6	19.281	0.57	31.74	-	32.31	-	60.00	50.00	-27.69	-

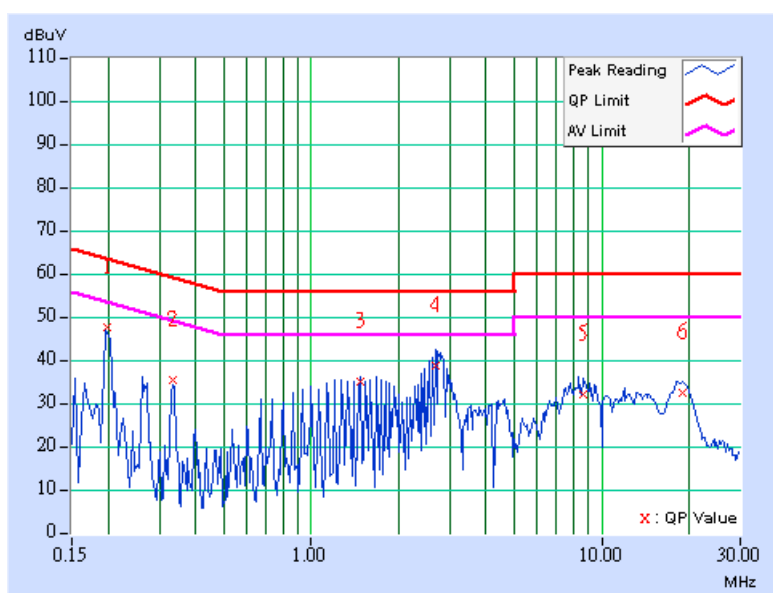
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = 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 11	PHASE	Line 2
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TEST MODE	A
TESTED BY	Match Tsui		

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.199	0.10	47.02	-	47.12	-	63.63	53.63	-16.51	-
2	0.334	0.10	34.80	-	34.90	-	59.36	49.36	-24.46	-
3	1.469	0.20	34.50	-	34.70	-	56.00	46.00	-21.30	-
4	2.668	0.26	38.45	-	38.71	-	56.00	46.00	-17.29	-
5	8.672	0.44	31.81	-	32.25	-	60.00	50.00	-27.75	-
6	19.016	0.57	32.00	-	32.57	-	60.00	50.00	-27.43	-

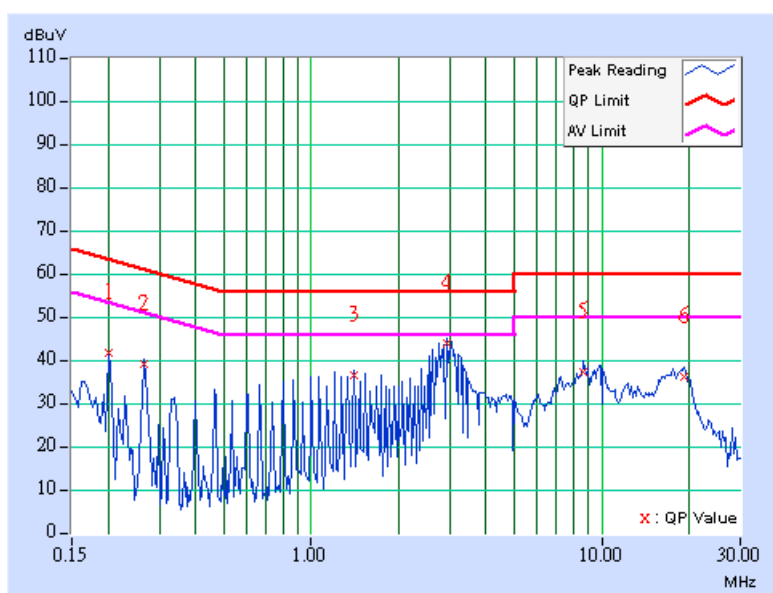
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = 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 1	PHASE	Line 1
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TEST MODE	B
TESTED BY	Match Tsui		

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.10	41.40	-	41.50	-	63.58	53.58	-22.08	-
2	0.267	0.10	38.51	-	38.61	-	61.20	51.20	-22.59	-
3	1.402	0.14	35.94	-	36.08	-	56.00	46.00	-19.92	-
4	2.938	0.28	43.57	-	43.85	-	56.00	46.00	-12.15	-
5	8.676	0.36	36.96	-	37.32	-	60.00	50.00	-22.68	-
6	19.281	0.57	35.91	-	36.48	-	60.00	50.00	-23.52	-

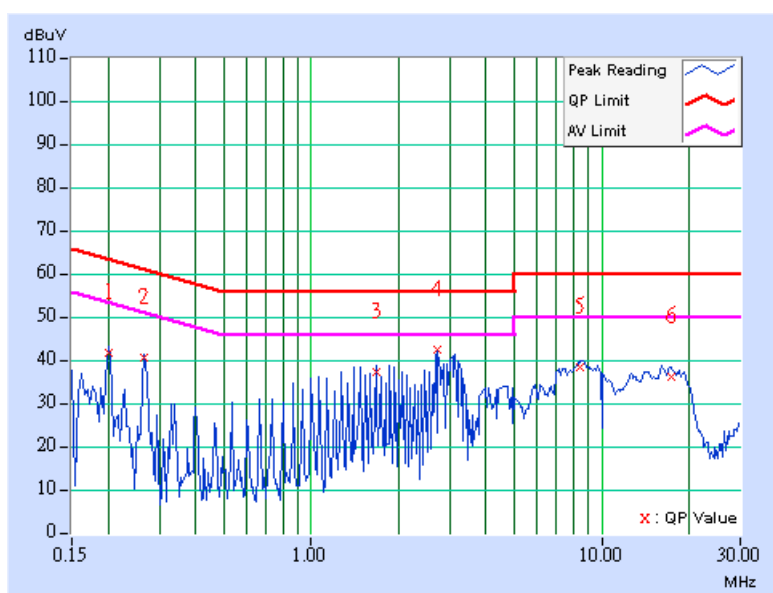
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = 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 1	PHASE	Line 2
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TEST MODE	B
TESTED BY	Match Tsui		

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.10	41.27	-	41.37	-	63.58	53.58	-22.21	-
2	0.267	0.10	39.97	-	40.07	-	61.20	51.20	-21.13	-
3	1.668	0.20	36.74	-	36.94	-	56.00	46.00	-19.06	-
4	2.734	0.26	42.06	-	42.32	-	56.00	46.00	-13.68	-
5	8.406	0.44	37.74	-	38.18	-	60.00	50.00	-21.82	-
6	17.410	0.60	35.57	-	36.17	-	60.00	50.00	-23.83	-

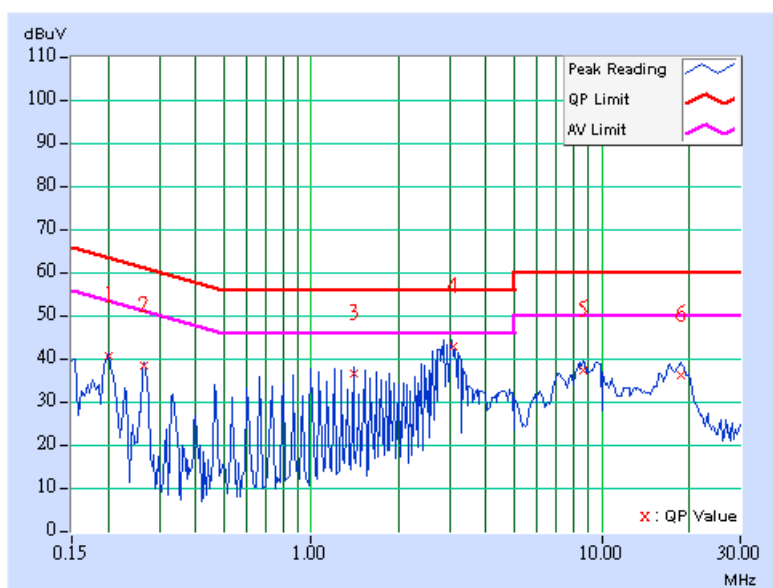
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = 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 6	PHASE	Line 1
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TEST MODE	B
TESTED BY	Match Tsui		

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.10	40.12	-	40.22	-	63.58	53.58	-23.36	-
2	0.267	0.10	38.10	-	38.20	-	61.20	51.20	-23.00	-
3	1.402	0.14	35.98	-	36.12	-	56.00	46.00	-19.88	-
4	3.066	0.29	42.50	-	42.79	-	56.00	46.00	-13.21	-
5	8.605	0.36	36.87	-	37.23	-	60.00	50.00	-22.77	-
6	18.809	0.58	35.84	-	36.42	-	60.00	50.00	-23.58	-

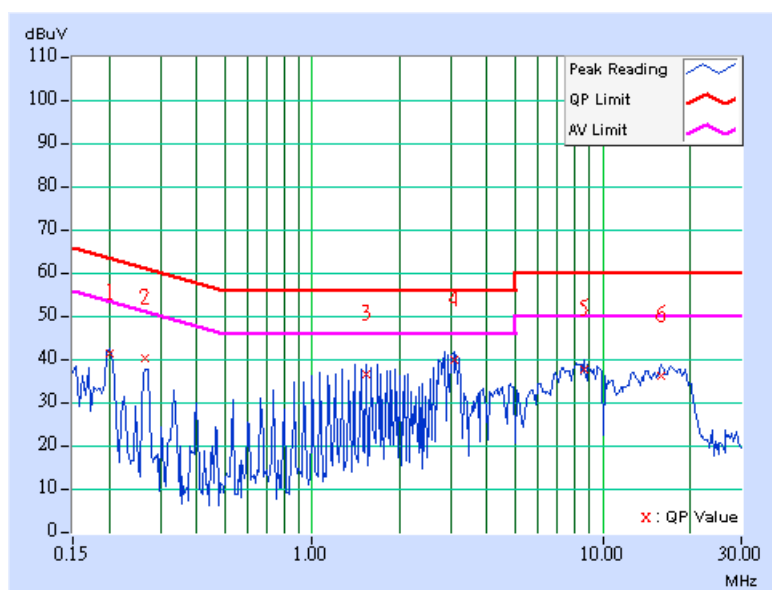
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = 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 6	PHASE	Line 2
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TEST MODE	B
TESTED BY	Match Tsui		

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.10	40.87	-	40.97	-	63.58	53.58	-22.61	-
2	0.267	0.10	39.89	-	39.99	-	61.20	51.20	-21.21	-
3	1.535	0.20	36.22	-	36.42	-	56.00	46.00	-19.58	-
4	3.070	0.29	39.52	-	39.81	-	56.00	46.00	-16.19	-
5	8.605	0.44	37.15	-	37.59	-	60.00	50.00	-22.41	-
6	15.875	0.62	35.59	-	36.21	-	60.00	50.00	-23.79	-

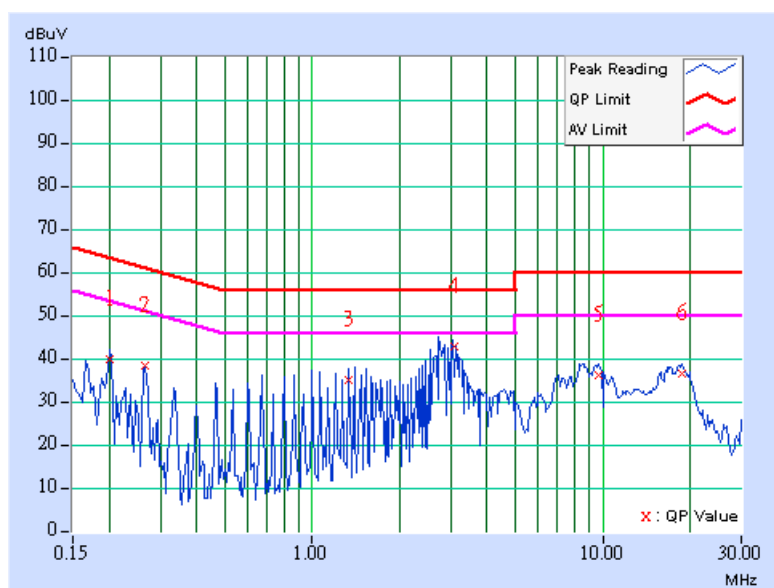
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	PHASE	Line 1
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TEST MODE	B
TESTED BY	Match Tsui		

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.10	39.60	-	39.70	-	63.58	53.58	-23.88	-
2	0.267	0.10	37.88	-	37.98	-	61.20	51.20	-23.22	-
3	1.332	0.13	34.55	-	34.68	-	56.00	46.00	-21.32	-
4	3.066	0.29	42.28	-	42.57	-	56.00	46.00	-13.43	-
5	9.672	0.36	35.86	-	36.22	-	60.00	50.00	-23.78	-
6	18.672	0.58	36.07	-	36.65	-	60.00	50.00	-23.35	-

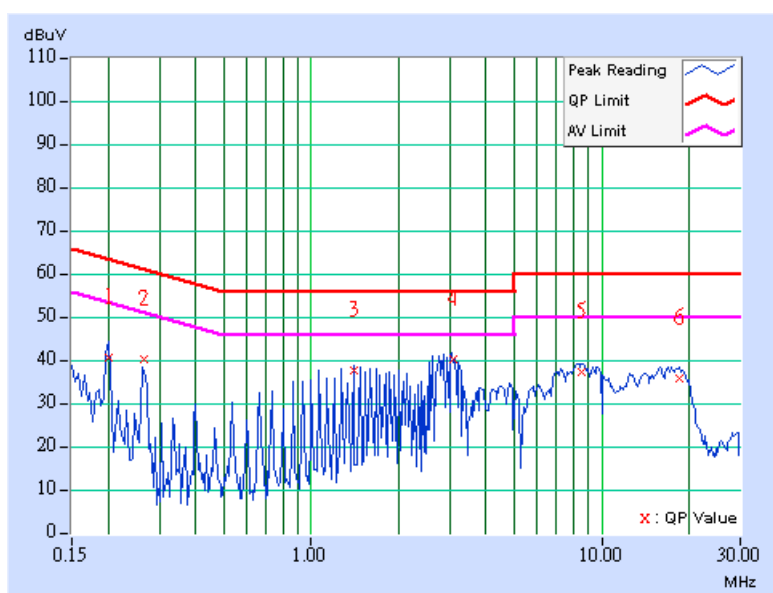
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = 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 11	PHASE	Line 2
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TEST MODE	B
TESTED BY	Match Tsui		

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.10	40.24	-	40.34	-	63.58	53.58	-23.24	-
2	0.267	0.10	39.67	-	39.77	-	61.21	51.21	-21.44	-
3	1.398	0.20	37.32	-	37.52	-	56.00	46.00	-18.48	-
4	3.066	0.29	39.89	-	40.18	-	56.00	46.00	-15.82	-
5	8.535	0.44	36.98	-	37.42	-	60.00	50.00	-22.58	-
6	18.406	0.58	35.49	-	36.07	-	60.00	50.00	-23.93	-

- 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.



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, 2007
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	Oct. 26, 2007
Preamplifier Agilent	8449B	3008A01964	Oct. 26, 2007
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	238137/4	Feb. 14, 2007
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	233233/4	Nov. 14, 2007
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 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 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.

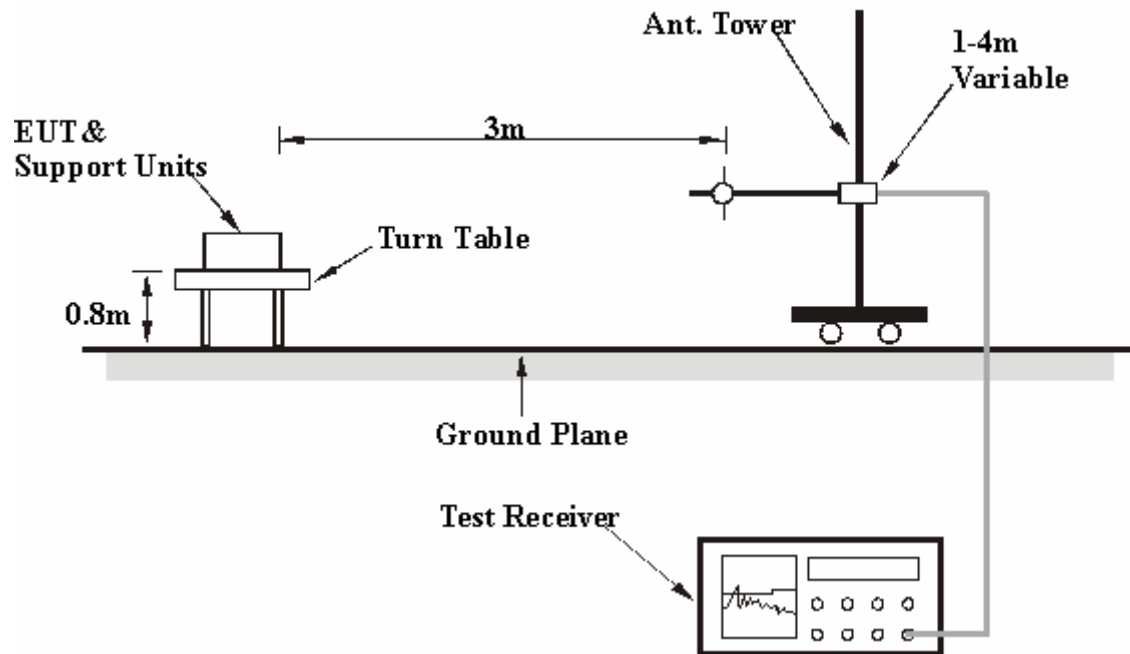
NOTE:

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.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10Hz(for 802.11b); 1kHz(for 802.11g) 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

Same as 4.1.6

4.2.7 TEST RESULTS

Below 1GHz Worst-Case Data

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	Below 1000MHz
MODULATION TYPE	BPSK	DETECTOR FUNCTION	Quasi-Peak
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TEST MODE	A
TESTED BY	Long Chen		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	101.92	31.60 QP	43.50	-11.90	1.00 H	160	22.44	9.17
2	224.39	31.02 QP	46.00	-14.98	1.50 H	31	19.39	11.63
3	294.37	40.68 QP	46.00	-5.32	1.75 H	85	25.34	15.34
4	490.70	32.60 QP	46.00	-13.40	1.00 H	58	12.74	19.86
5	527.64	32.13 QP	46.00	-13.87	1.50 H	133	11.46	20.67
6	617.05	33.97 QP	46.00	-12.03	1.75 H	10	11.30	22.67
7	768.68	31.34 QP	46.00	-14.66	1.75 H	10	5.48	25.86
8	792.00	31.85 QP	46.00	-14.15	1.75 H	124	5.89	25.96

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	31.94	32.50 QP	40.00	-7.50	1.00 V	262	19.97	12.54
2	70.82	29.85 QP	40.00	-10.15	1.00 V	175	18.14	11.71
3	113.59	35.71 QP	43.50	-7.79	1.00 V	316	25.49	10.23
4	129.14	32.48 QP	43.50	-11.02	1.00 V	262	20.47	12.01
5	414.89	32.74 QP	46.00	-13.26	1.00 V	76	14.50	18.24
6	527.64	33.34 QP	46.00	-12.66	1.00 V	262	12.67	20.67
7	768.68	31.53 QP	46.00	-14.47	1.00 V	64	5.67	25.86

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 11	FREQUENCY RANGE	Below 1000MHz
MODULATION TYPE	BPSK	DETECTOR FUNCTION	Quasi-Peak
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TEST MODE	B
TESTED BY	Long Chen		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	113.59	29.60 QP	43.50	-13.90	1.00 H	58	19.38	10.23
2	158.30	27.83 QP	43.50	-15.67	1.25 H	226	14.42	13.41
3	245.77	30.78 QP	46.00	-15.22	1.00 H	58	18.45	12.33
4	269.10	30.63 QP	46.00	-15.37	1.25 H	169	16.62	14.01
5	304.09	30.51 QP	46.00	-15.49	1.00 H	160	14.84	15.67
6	799.78	29.10 QP	46.00	-16.90	1.25 H	133	3.10	26.00

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	35.83	33.49 QP	40.00	-6.51	1.00 V	34	20.25	13.24
2	88.32	33.48 QP	43.50	-10.02	1.00 V	235	24.09	9.39
3	119.42	36.16 QP	43.50	-7.34	1.00 V	190	25.41	10.76
4	133.03	31.13 QP	43.50	-12.37	1.00 V	10	18.60	12.53
5	294.37	32.26 QP	46.00	-13.74	1.00 V	133	16.91	15.34
6	519.86	31.20 QP	46.00	-14.80	1.00 V	190	10.70	20.50
7	832.83	31.56 QP	46.00	-14.44	1.25 V	76	5.12	26.44

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.

802.11b DSSS modulation (For PIFA Antenna)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1608.00	51.02 PK	74.00	-22.98	1.65 H	20	21.76	29.26
1	1608.00	46.79 AV	54.00	-7.21	1.65 H	20	17.53	29.26
2	2390.00	55.38 PK	74.00	-18.62	1.05 H	8	23.89	31.49
2	2390.00	44.78 AV	54.00	-9.22	1.05 H	8	13.29	31.49
3	*2412.00	105.02 PK			1.05 H	6	73.43	31.59
3	*2412.00	101.11 AV			1.05 H	6	69.52	31.59
4	4824.00	48.04 PK	74.00	-25.96	1.03 H	178	10.51	37.53
4	4824.00	36.26 AV	54.00	-17.74	1.03 H	178	-1.27	37.53

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1608.00	50.45 PK	74.00	-23.55	1.13 V	64	21.19	29.26
1	1608.00	46.05 AV	54.00	-7.95	1.13 V	64	16.79	29.26
2	2390.00	55.52 PK	74.00	-18.48	1.03 V	59	24.03	31.49
2	2390.00	44.81 AV	54.00	-9.19	1.03 V	59	13.32	31.49
3	*2412.00	103.08 PK			1.16 V	75	71.49	31.59
3	*2412.00	99.93 AV			1.16 V	75	68.34	31.59
4	4824.00	51.02 PK	74.00	-22.98	1.08 V	285	13.49	37.53
4	4824.00	39.34 AV	54.00	-14.66	1.08 V	285	1.81	37.53

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	DBPSK	DETECTOR FUNCTION	Peak(PK) Average (AV)
TRANSFER RATE	1Mbps	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Morgan Chen

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1624.00	50.56 PK	74.00	-23.44	1.06 H	316	21.28	29.28
1	1624.00	46.23 AV	54.00	-7.77	1.06 H	316	16.95	29.28
2	*2437.00	105.75 PK			1.04 H	5	74.05	31.70
2	*2437.00	101.20 AV			1.04 H	5	69.50	31.70
3	4874.00	50.10 PK	74.00	-23.90	1.08 H	169	12.45	37.65
3	4874.00	38.77 AV	54.00	-15.23	1.08 H	169	1.12	37.65

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	1624.00	50.12 PK	74.00	-23.88	1.19 V	325	20.84	29.28
1	1624.00	45.89 AV	54.00	-8.11	1.19 V	325	16.61	29.28
2	*2437.00	103.34 PK			1.15 V	74	71.64	31.70
2	*2437.00	99.98 AV			1.15 V	74	68.28	31.70
3	4874.00	51.32 PK	74.00	-22.68	1.03 V	249	13.67	37.65
3	4874.00	40.02 AV	54.00	-13.98	1.03 V	249	2.37	37.65

- 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.
 5. “ * ” : Fundamental frequency.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	DBPSK	DETECTOR FUNCTION	Peak(PK) Average (AV)
TRANSFER RATE	1Mbps	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Morgan Chen

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1642.00	50.41 PK	74.00	-23.59	1.56 H	16	21.11	29.30
1	1642.00	45.98 AV	54.00	-8.02	1.56 H	16	16.68	29.30
2	*2462.00	105.89 PK			1.08 H	5	74.07	31.82
2	*2462.00	101.35 AV			1.08 H	5	69.53	31.82
3	2483.50	56.58 PK	74.00	-17.42	1.09 H	3	24.67	31.91
3	2483.50	45.89 AV	54.00	-8.11	1.09 H	3	13.98	31.91
4	4924.00	47.12 PK	74.00	-26.88	1.08 H	168	9.36	37.76
4	4924.00	35.35 AV	54.00	-18.65	1.08 H	168	-2.41	37.76

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	1642.00	50.01 PK	74.00	-23.99	1.02 V	71	20.71	29.30
1	1642.00	45.76 AV	54.00	-8.24	1.02 V	71	16.46	29.30
2	*2462.00	103.76 PK			1.15 V	76	71.94	31.82
2	*2462.00	100.46 AV			1.15 V	76	68.64	31.82
3	2483.50	54.68 PK	74.00	-19.32	1.02 V	67	22.77	31.91
3	2483.50	43.79 AV	54.00	-10.21	1.02 V	67	11.88	31.91
4	4924.00	50.85 PK	74.00	-23.15	1.06 V	320	13.09	37.76
4	4924.00	39.05 AV	54.00	-14.95	1.06 V	320	1.29	37.76

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

(For PCB Antenna)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1608.00	50.69 PK	74.00	-23.31	1.08 H	35	20.21	30.48
1	1608.00	46.35 AV	54.00	-7.65	1.08 H	35	15.87	30.48
2	2390.00	50.33 PK	74.00	-23.67	1.08 H	305	17.89	32.44
2	2390.00	40.65 AV	54.00	-13.35	1.08 H	305	8.21	32.44
3	*2412.00	98.36 PK			1.03 H	315	65.82	32.53
3	*2412.00	94.29 AV			1.03 H	315	61.76	32.53
4	4824.00	50.22 PK	74.00	-23.78	1.03 H	155	10.94	39.28
4	4824.00	38.22 AV	54.00	-15.78	1.03 H	155	-1.06	39.28

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	1608.00	51.98 PK	74.00	-22.02	1.43 V	65	21.50	30.48
1	1608.00	47.36 AV	54.00	-6.64	1.43 V	65	16.88	30.48
2	2390.00	54.98 PK	74.00	-19.02	1.08 V	36	22.54	32.44
2	2390.00	44.36 AV	54.00	-9.64	1.08 V	36	11.92	32.44
3	*2412.00	104.49 PK			1.17 V	77	71.96	32.53
3	*2412.00	100.53 AV			1.17 V	77	68.00	32.53
4	4824.00	47.55 PK	74.00	-26.45	1.05 V	133	8.27	39.28
4	4824.00	36.01 AV	54.00	-17.99	1.05 V	133	-3.27	39.28

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	DBPSK	DETECTOR FUNCTION	Peak(PK) Average (AV)
TRANSFER RATE	1Mbps	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Morgan Chen

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1642.00	50.55 PK	74.00	-23.45	1.05 H	33	20.06	30.49
1	1642.00	46.35 AV	54.00	-7.65	1.05 H	33	15.86	30.49
2	*2462.00	98.55 PK			1.08 H	305	65.79	32.76
2	*2462.00	94.38 AV			1.08 H	305	61.62	32.76
3	2483.50	50.88 PK	74.00	-23.12	1.06 H	305	18.02	32.86
3	2483.50	40.75 AV	54.00	-13.25	1.06 H	305	7.89	32.86
4	4924.00	50.55 PK	74.00	-23.45	1.08 H	163	11.13	39.42
4	4924.00	38.16 AV	54.00	-15.84	1.08 H	163	-1.26	39.42

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	1641.00	51.76 PK	74.00	-22.24	1.36 V	91	21.27	30.49
1	1641.00	47.13 AV	54.00	-6.87	1.36 V	91	16.64	30.49
2	*2462.00	104.56 PK			1.09 V	13	71.80	32.76
2	*2462.00	100.62 AV			1.09 V	13	67.86	32.76
3	2483.50	55.11 PK	74.00	-18.89	1.03 V	31	22.25	32.86
3	2483.50	44.52 AV	54.00	-9.48	1.03 V	31	11.66	32.86
4	4924.00	47.68 PK	74.00	-26.32	1.08 V	126	8.26	39.42
4	4924.00	36.25 AV	54.00	-17.75	1.08 V	126	-3.17	39.42

REMARKS:

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

802.11g OFDM modulation (For PIFA Antenna)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	BPSK	DETECTOR FUNCTION	Peak(PK) Average (AV)
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Morgan Chen

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1608.00	57.15 PK	74.00	-16.85	1.03 H	136	27.89	29.26
1	1608.00	47.48 AV	54.00	-6.52	1.03 H	136	18.22	29.26
2	2390.00	63.27 PK	74.00	-10.73	1.06 H	351	31.78	31.49
2	2390.00	50.65 AV	54.00	-3.35	1.06 H	351	19.16	31.49
3	*2412.00	105.63 PK			1.01 H	15	74.04	31.59
3	*2412.00	95.41 AV			1.01 H	15	63.82	31.59
4	4824.00	52.32 PK	74.00	-21.68	1.08 H	305	14.79	37.53
4	4824.00	38.22 AV	54.00	-15.78	1.08 H	305	0.69	37.53

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1608.00	56.89 PK	74.00	-17.11	1.00 V	128	27.63	29.26
1	1608.00	46.98 AV	54.00	-7.02	1.00 V	128	17.72	29.26
2	2390.00	61.11 PK	74.00	-12.89	1.13 V	105	29.62	31.49
2	2390.00	48.43 AV	54.00	-5.57	1.13 V	105	16.94	31.49
3	*2412.00	103.56 PK			1.15 V	112	71.97	31.59
3	*2412.00	93.35 AV			1.15 V	112	61.76	31.59
4	4824.00	53.81 PK	74.00	-20.19	1.05 V	321	16.28	37.53
4	4824.00	39.04 AV	54.00	-14.96	1.05 V	321	1.51	37.53

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	BPSK	DETECTOR FUNCTION	Peak(PK) Average (AV)
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Morgan Chen

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1624.00	56.99 PK	74.00	-17.01	1.01 H	148	27.71	29.28
1	1624.00	47.39 AV	54.00	-6.61	1.01 H	148	18.11	29.28
2	*2437.00	105.88 PK			1.04 H	358	74.18	31.70
2	*2437.00	95.89 AV			1.04 H	358	64.19	31.70
3	4874.00	54.00 PK	74.00	-20.00	1.07 H	308	16.35	37.65
3	4874.00	39.97 AV	54.00	-14.03	1.07 H	308	2.32	37.65

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	1624.00	56.79 PK	74.00	-17.21	1.00 V	120	27.51	29.28
1	1624.00	46.96 AV	54.00	-7.04	1.00 V	120	17.68	29.28
2	*2437.00	103.74 PK			1.16 V	108	72.04	31.70
2	*2437.00	93.46 AV			1.16 V	108	61.76	31.70
3	4874.00	54.77 PK	74.00	-19.23	1.08 V	301	17.12	37.65
3	4874.00	39.75 AV	54.00	-14.25	1.08 V	301	2.10	37.65

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.
5. “ * ” : Fundamental frequency.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	BPSK	DETECTOR FUNCTION	Peak(PK) Average (AV)
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Morgan Chen

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1641.00	56.38 PK	74.00	-17.62	1.22 H	19	27.08	29.30
1	1641.00	48.44 AV	54.00	-5.56	1.22 H	19	19.14	29.30
2	*2462.00	106.12 PK			1.05 H	5	74.30	31.82
2	*2462.00	96.23 AV			1.05 H	5	64.41	31.82
3	2483.50	63.94 PK	74.00	-10.06	1.05 H	5	32.03	31.91
3	2483.50	50.82 AV	54.00	-3.18	1.05 H	5	18.91	31.91
4	4924.00	54.19 PK	74.00	-19.81	1.05 H	301	16.43	37.76
4	4924.00	40.26 AV	54.00	-13.74	1.05 H	301	2.50	37.76

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	1641.00	55.85 PK	74.00	-18.15	1.01 V	115	26.55	29.30
1	1641.00	47.45 AV	54.00	-6.55	1.01 V	115	18.15	29.30
2	*2462.00	103.93 PK			1.12 V	95	72.11	31.82
2	*2462.00	93.67 AV			1.12 V	95	61.85	31.82
3	2483.50	62.01 PK	74.00	-11.99	1.09 V	89	30.10	31.91
3	2483.50	48.67 AV	54.00	-5.33	1.09 V	89	16.76	31.91
4	4924.00	53.86 PK	74.00	-20.14	1.08 V	305	16.10	37.76
4	4924.00	39.86 AV	54.00	-14.14	1.08 V	305	2.10	37.76

REMARKS:

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

(For PCB Antenna)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	BPSK	DETECTOR FUNCTION	Peak(PK) Average (AV)
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Morgan Chen

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1608.00	50.55 PK	74.00	-23.45	1.05 H	315	20.07	30.48
1	1608.00	46.15 AV	54.00	-7.85	1.05 H	315	15.67	30.48
2	2390.00	53.55 PK	74.00	-20.45	1.03 H	345	21.11	32.44
2	2390.00	43.81 AV	54.00	-10.19	1.03 H	345	11.37	32.44
3	*2412.00	99.55 PK			1.05 H	135	67.02	32.53
3	*2412.00	89.65 AV			1.05 H	135	57.12	32.53
4	4824.00	49.55 PK	74.00	-24.45	1.03 H	165	10.27	39.28
4	4824.00	36.52 AV	54.00	-17.48	1.03 H	165	-2.76	39.28

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	1608.00	52.33 PK	74.00	-21.67	1.36 V	32	21.85	30.48
1	1608.00	47.55 AV	54.00	-6.45	1.36 V	32	17.07	30.48
2	2390.00	60.22 PK	74.00	-13.78	1.08 V	345	27.78	32.44
2	2390.00	50.11 AV	54.00	-3.89	1.08 V	345	17.67	32.44
3	*2412.00	105.11 PK			1.05 V	33	72.58	32.53
3	*2412.00	94.91 AV			1.05 V	33	62.38	32.53
4	4824.00	47.11 PK	74.00	-26.89	1.06 V	315	7.83	39.28
4	4824.00	35.55 AV	54.00	-18.45	1.06 V	315	-3.73	39.28

REMARKS:

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	BPSK	DETECTOR FUNCTION	Peak(PK) Average (AV)
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Morgan Chen

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1641.00	50.68 PK	74.00	-23.32	1.08 H	305	20.19	30.49
1	1641.00	46.35 AV	54.00	-7.65	1.08 H	305	15.86	30.49
2	*2462.00	99.85 PK			1.11 H	145	67.09	32.76
2	*2462.00	89.76 AV			1.11 H	145	57.00	32.76
3	2483.50	53.68 PK	74.00	-20.32	1.05 H	343	20.82	32.86
3	2483.50	43.98 AV	54.00	-10.02	1.05 H	343	11.12	32.86
4	4924.00	49.68 PK	74.00	-24.32	1.22 H	176	10.26	39.42
4	4924.00	36.85 AV	54.00	-17.15	1.22 H	176	-2.57	39.42

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	1641.00	52.55 PK	74.00	-21.45	1.45 V	25	22.06	30.49
1	1641.00	47.65 AV	54.00	-6.35	1.45 V	25	17.16	30.49
2	*2462.00	105.23 PK			1.03 V	31	72.47	32.76
2	*2462.00	95.01 AV			1.03 V	31	62.25	32.76
3	2483.50	60.35 PK	74.00	-13.65	1.06 V	305	27.49	32.86
3	2483.50	50.44 AV	54.00	-3.56	1.06 V	305	17.58	32.86
4	4924.00	47.35 PK	74.00	-26.65	1.03 V	306	7.93	39.42
4	4924.00	35.65 AV	54.00	-18.35	1.03 V	306	-3.77	39.42

REMARKS:

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

4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

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.

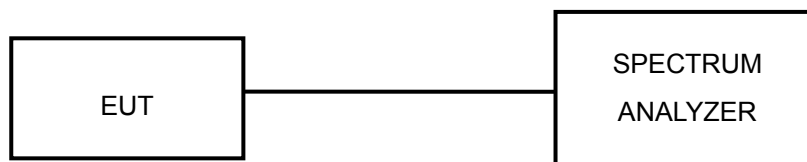
4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 100kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

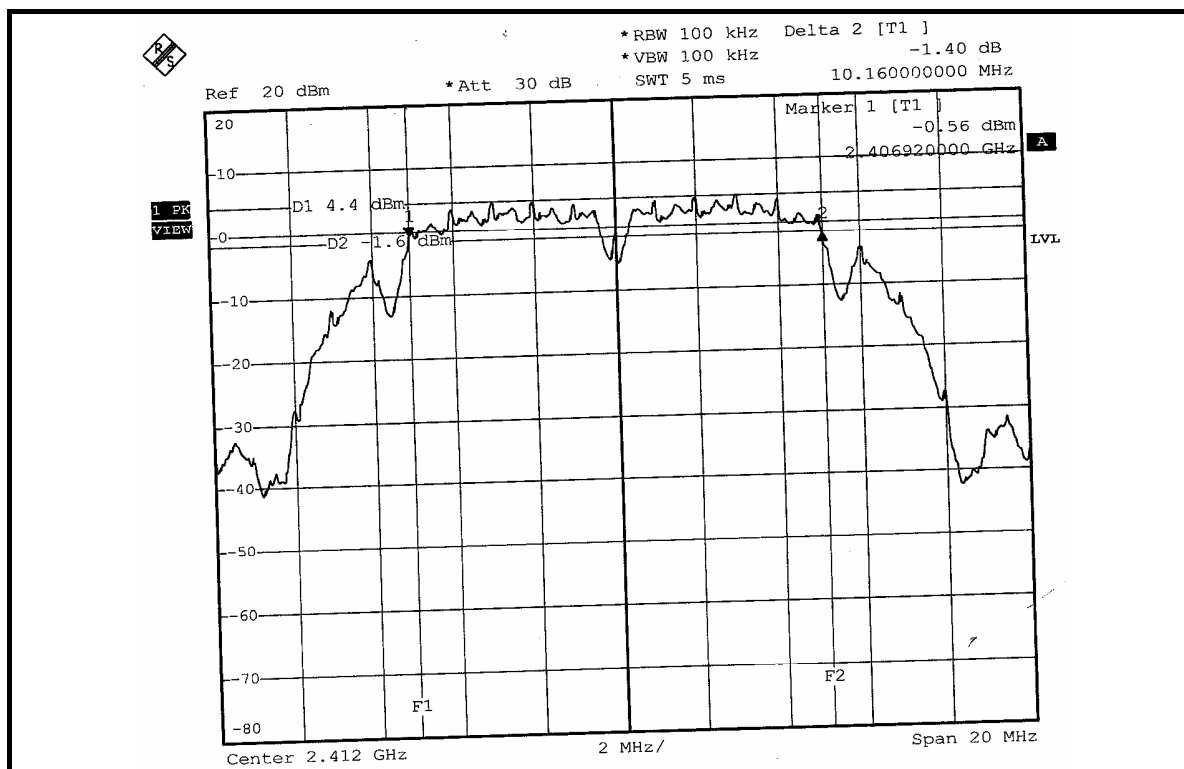
4.3.7 TEST RESULTS

802.11b DSSS modulation

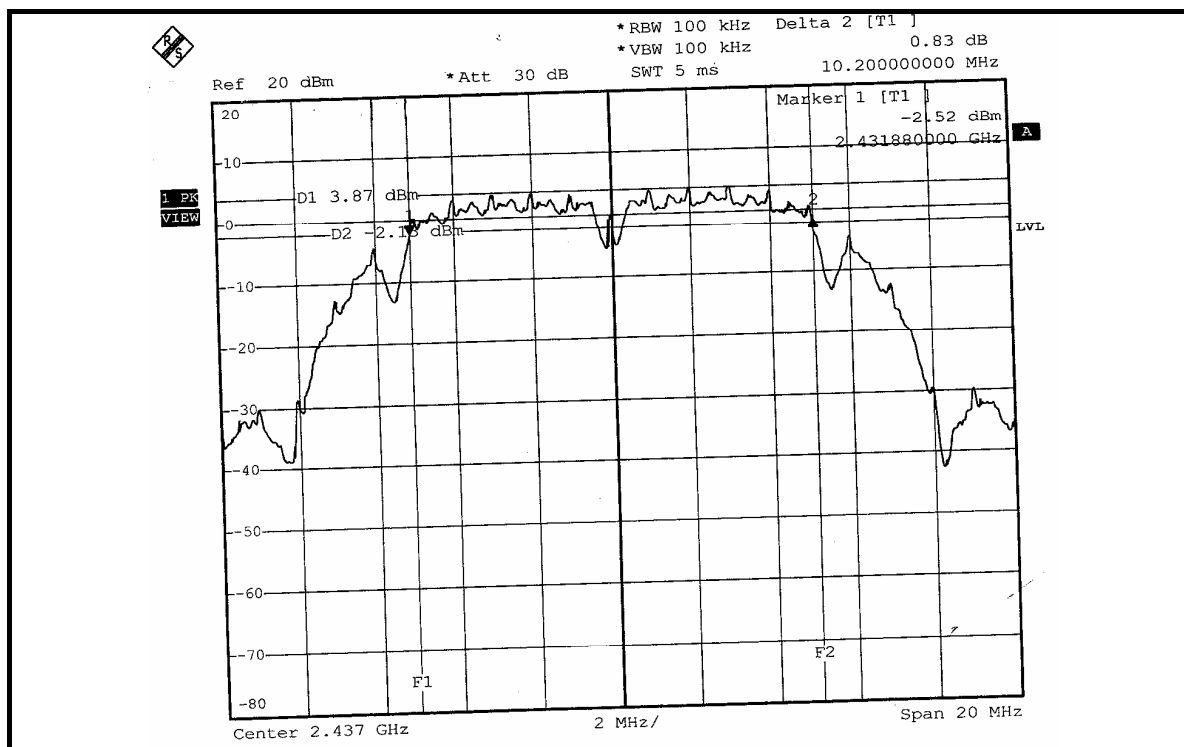
MODULATION TYPE	DBPSK	TRANSFER RATE	1Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 66%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	10.16	0.5	PASS
6	2437	10.20	0.5	PASS
11	2462	10.20	0.5	PASS

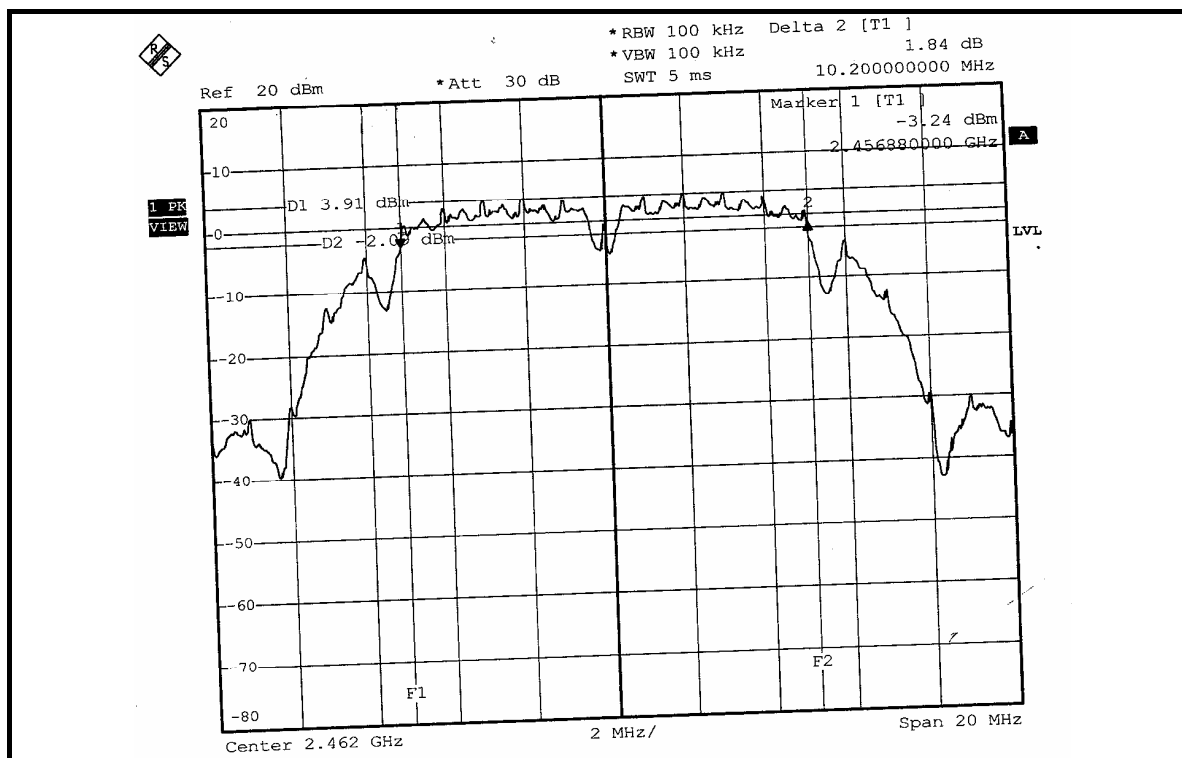
CH 1



CH 6



CH 11

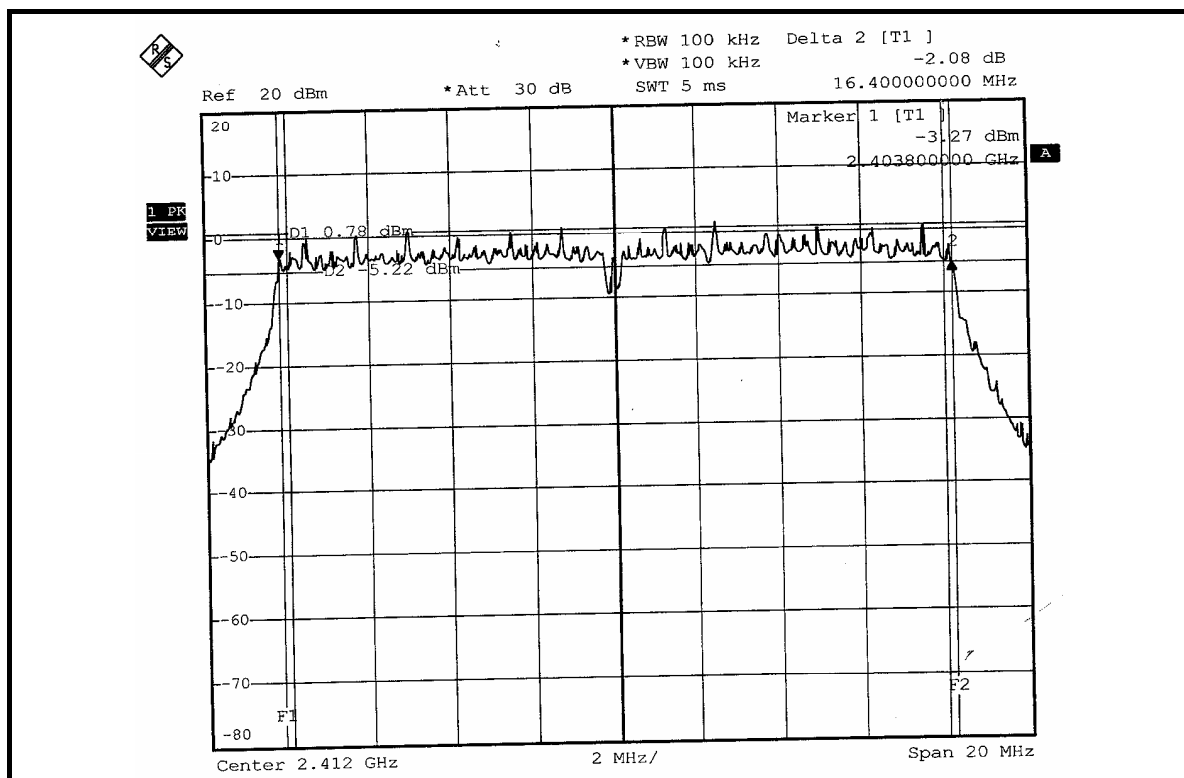


802.11g OFDM modulation

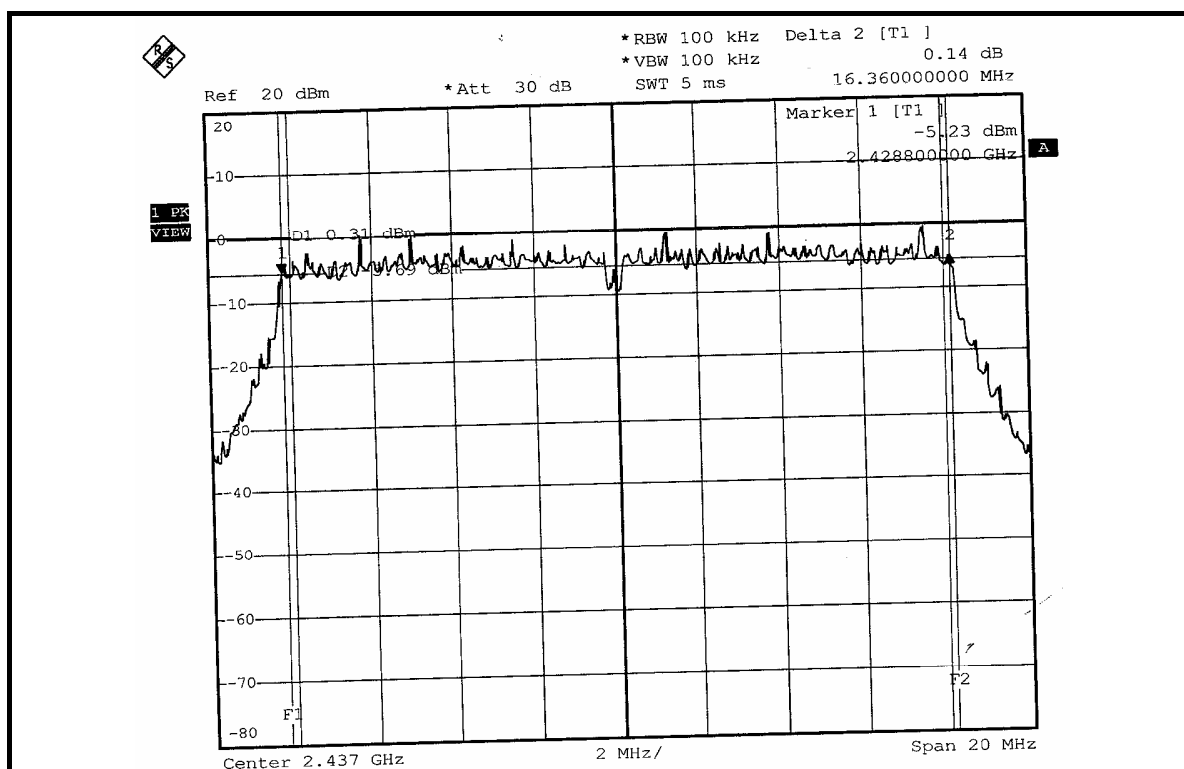
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 66%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	16.40	0.5	PASS
6	2437	16.36	0.5	PASS
11	2462	16.40	0.5	PASS

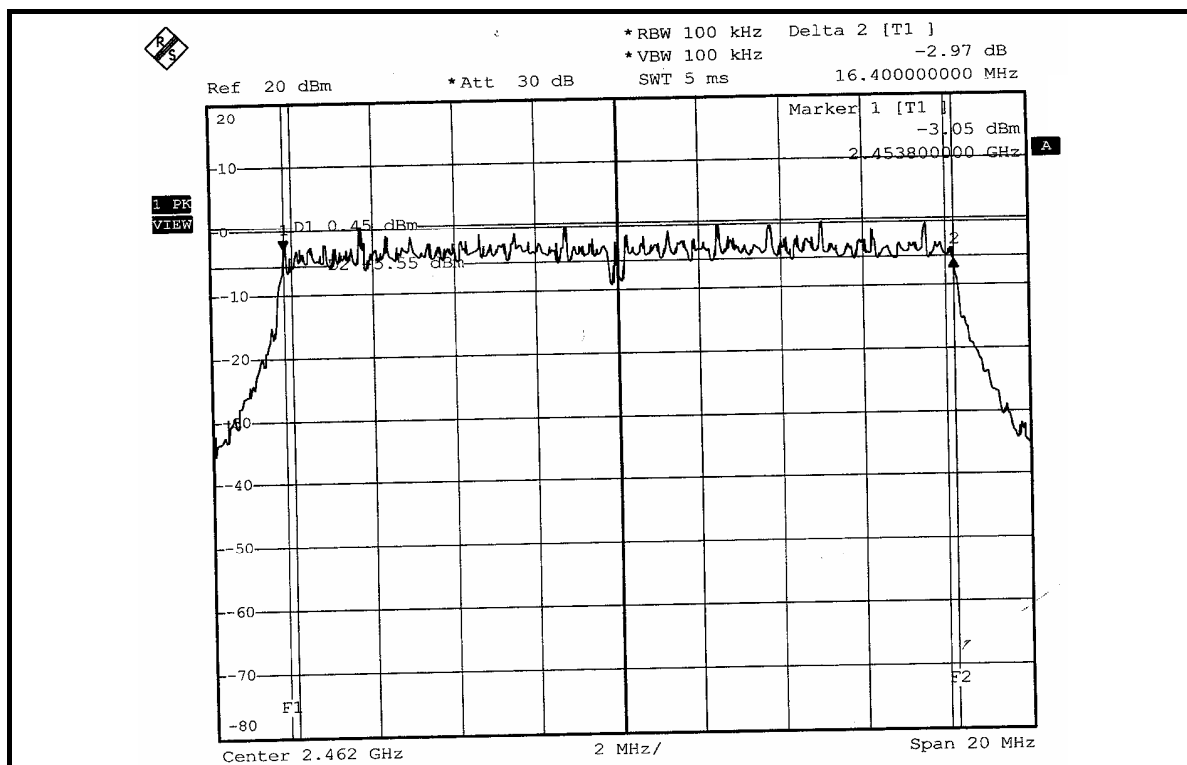
CH 1



CH 6



CH 11



4.4 MAXIMUM PEAK OUTPUT POWER

4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

4.4.2 INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100040	Jun. 07, 2007
Anritsu Synthesized Signal Generator	68247B	984703	May 08, 2007
TEKTRONIX OSCILLOSCOPE	TDS 1012	C019167	Jan. 16, 2007
NARDA DETECTOR	4503A	FSCM99899	NA

NOTE:

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

4.4.1 TEST PROCEDURES

1. A detector was used on the output port of the EUT. An oscilloscope was used to read the response of the detector.
2. Replaced the EUT by the signal generator. The center frequency of the S.G was adjusted to the center frequency of the measured channel.
3. Adjusted the power to have the same reading on oscilloscope. Record the power level.

4.4.2 DEVIATION FROM TEST STANDARD

No deviation

4.4.3 TEST SETUP



4.4.4 EUT OPERATING CONDITIONS

Same as Item 4.3.6

4.4.3 TEST RESULTS

802.11b DSSS modulation

MODULATION TYPE	DBPSK	TRANSFER RATE	1Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 66%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	50.699	17.05	30	PASS
6	2437	50.816	17.06	30	PASS
11	2462	51.050	17.08	30	PASS

802.11g OFDM modulation

MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 66%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	50.466	17.03	30	PASS
6	2437	51.050	17.08	30	PASS
11	2462	50.350	17.02	30	PASS

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S 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

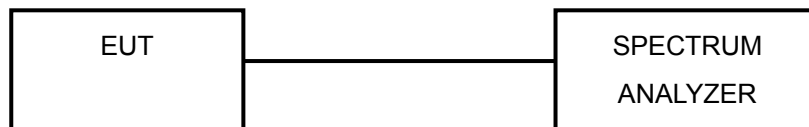
The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span/3kHz for a full response of the mixer in the spectrum analyzer.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

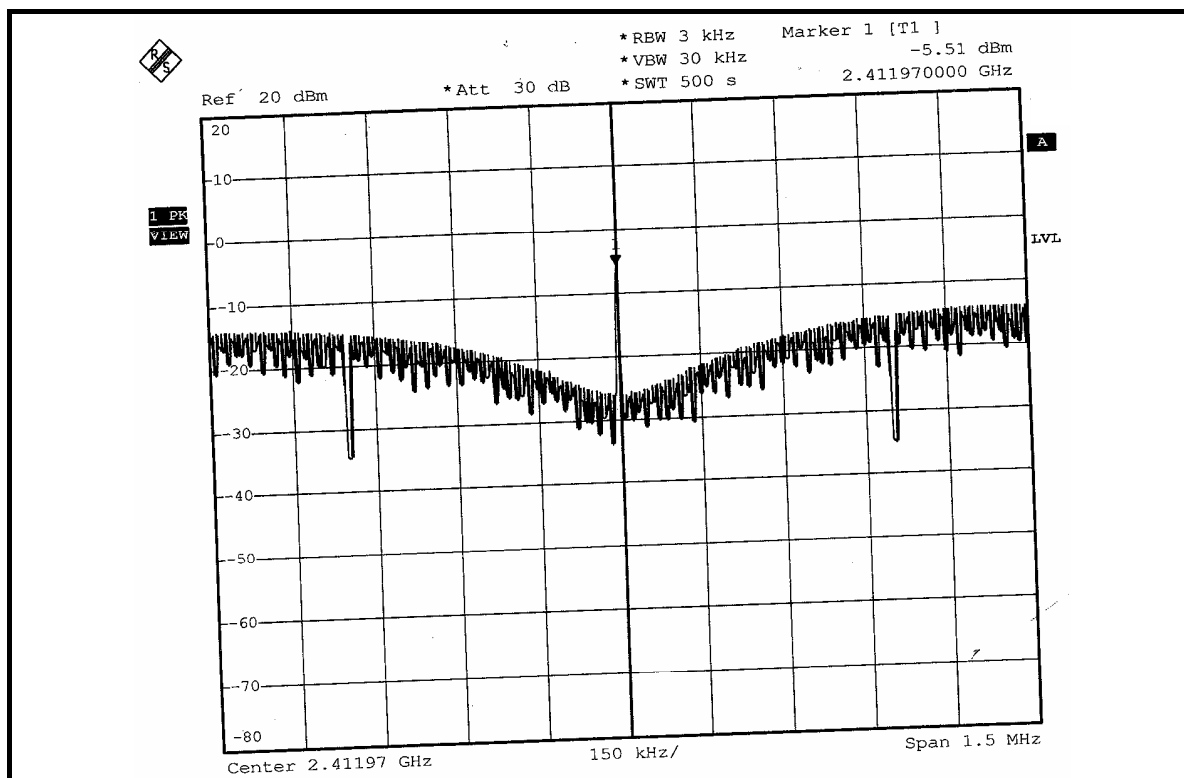
4.5.7 TEST RESULTS

802.11b DSSS modulation

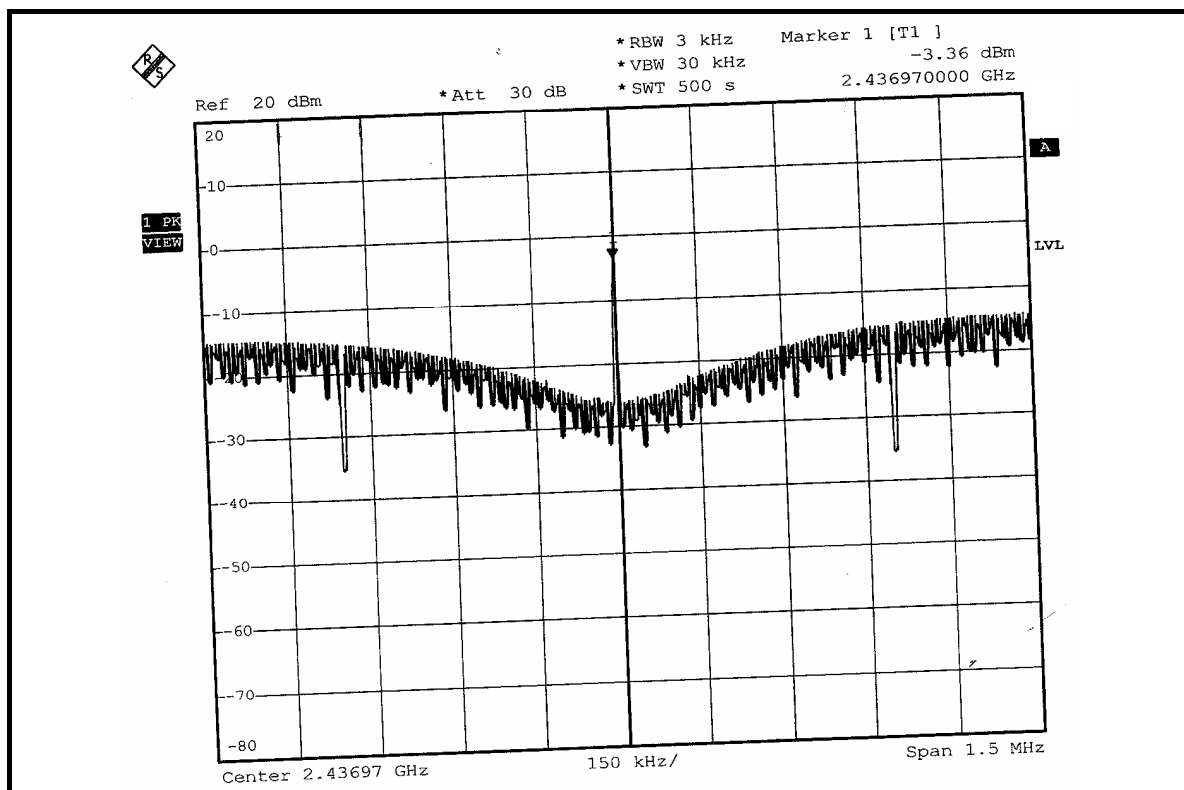
MODULATION TYPE	DBPSK	TRANSFER RATE	1Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 66%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-5.51	8	PASS
6	2437	-3.36	8	PASS
11	2462	-3.83	8	PASS

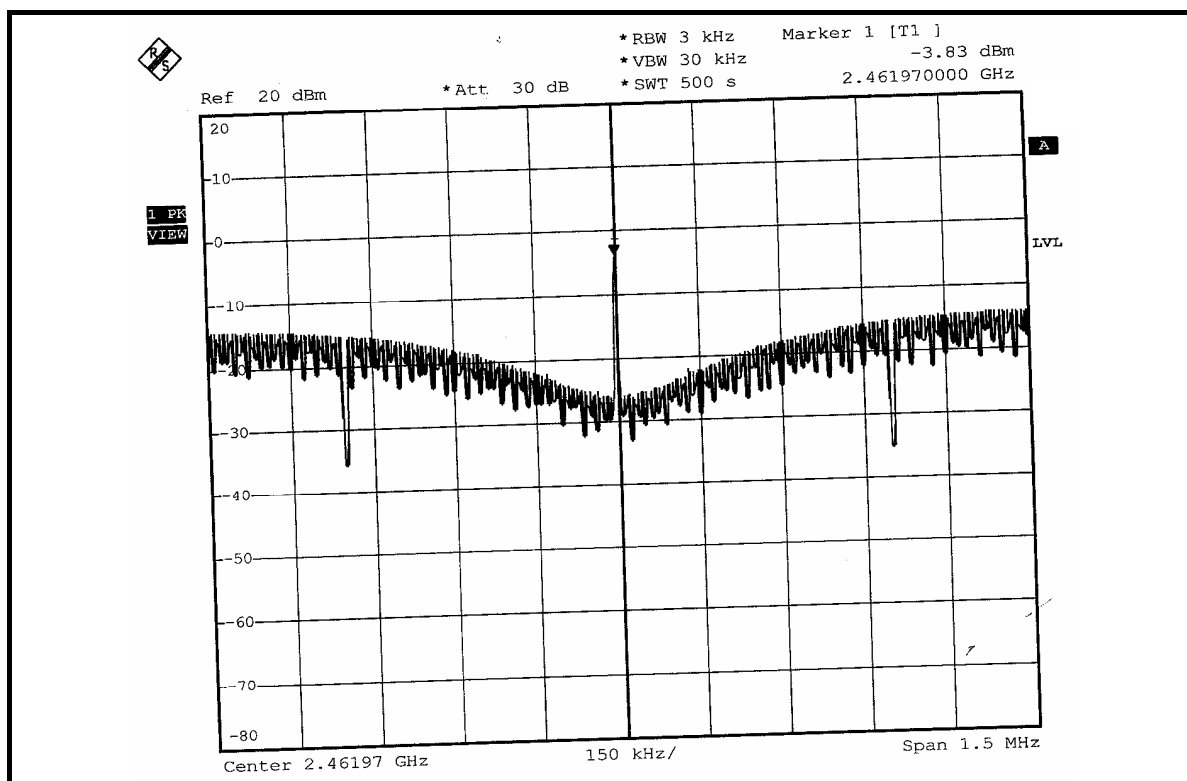
CH 1



CH 6



CH 11

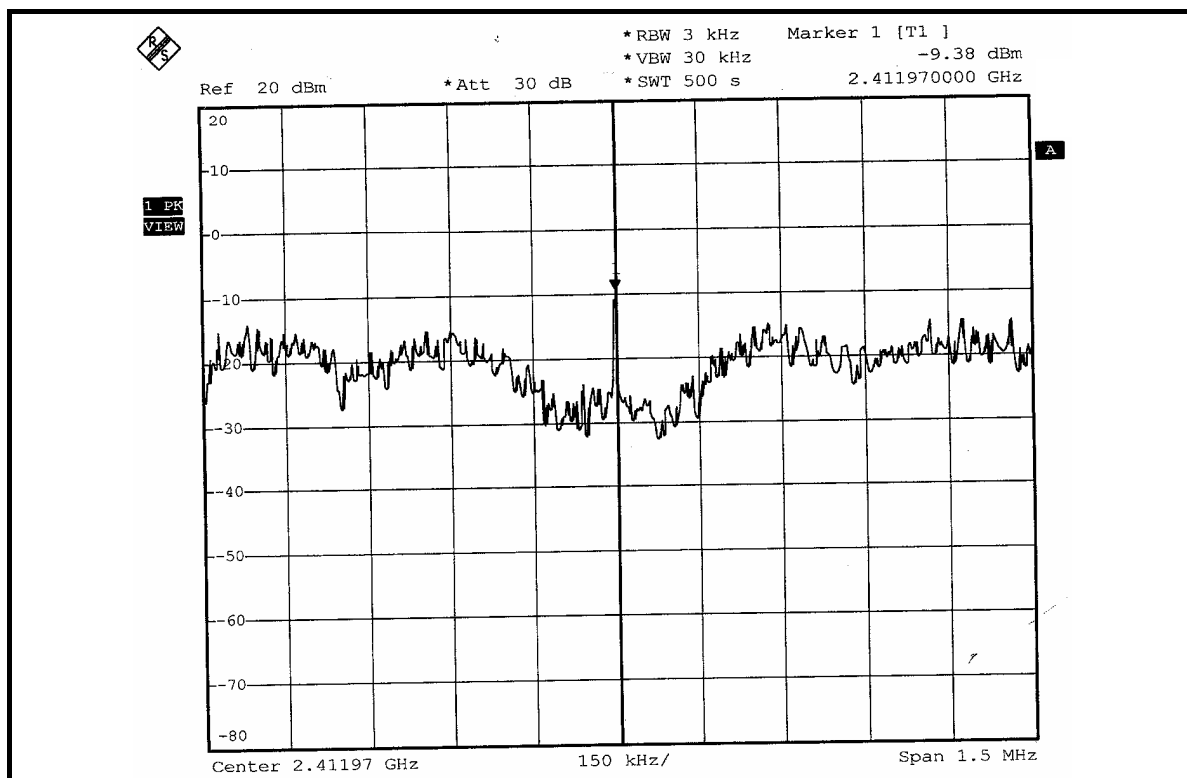


802.11g OFDM modulation

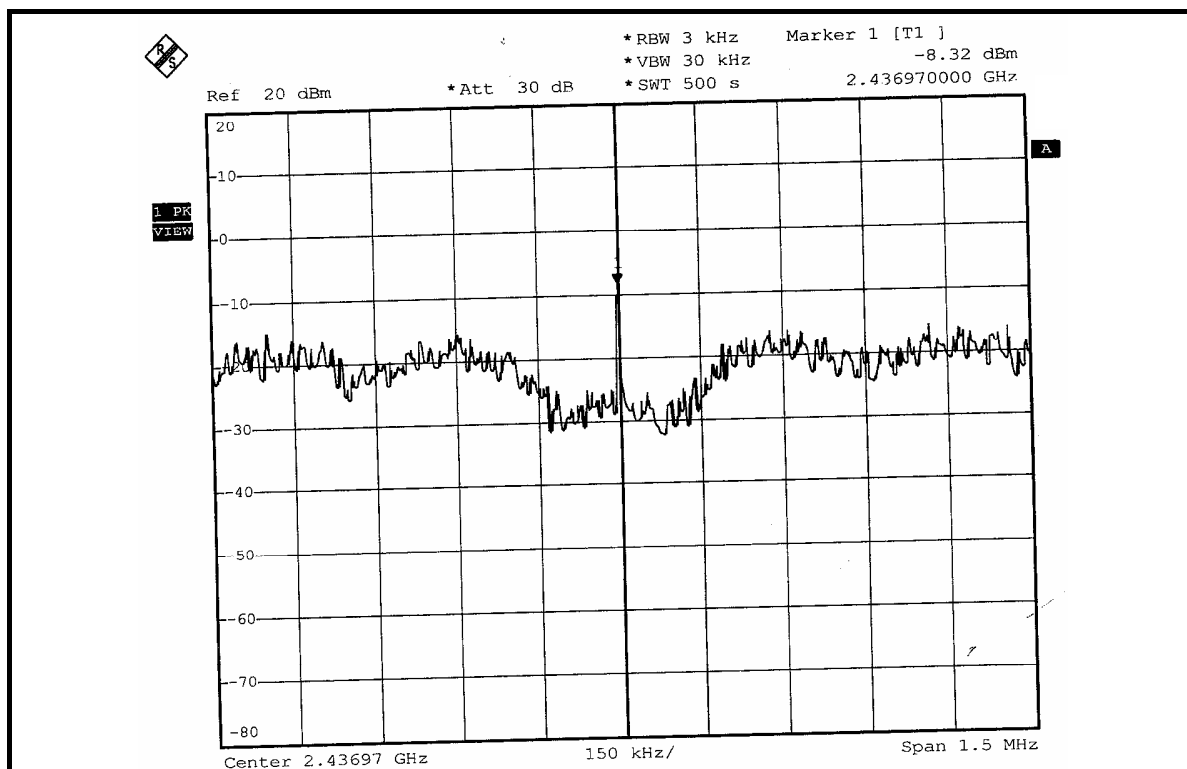
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 66%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-9.38	8	PASS
6	2437	-8.32	8	PASS
11	2462	-7.27	8	PASS

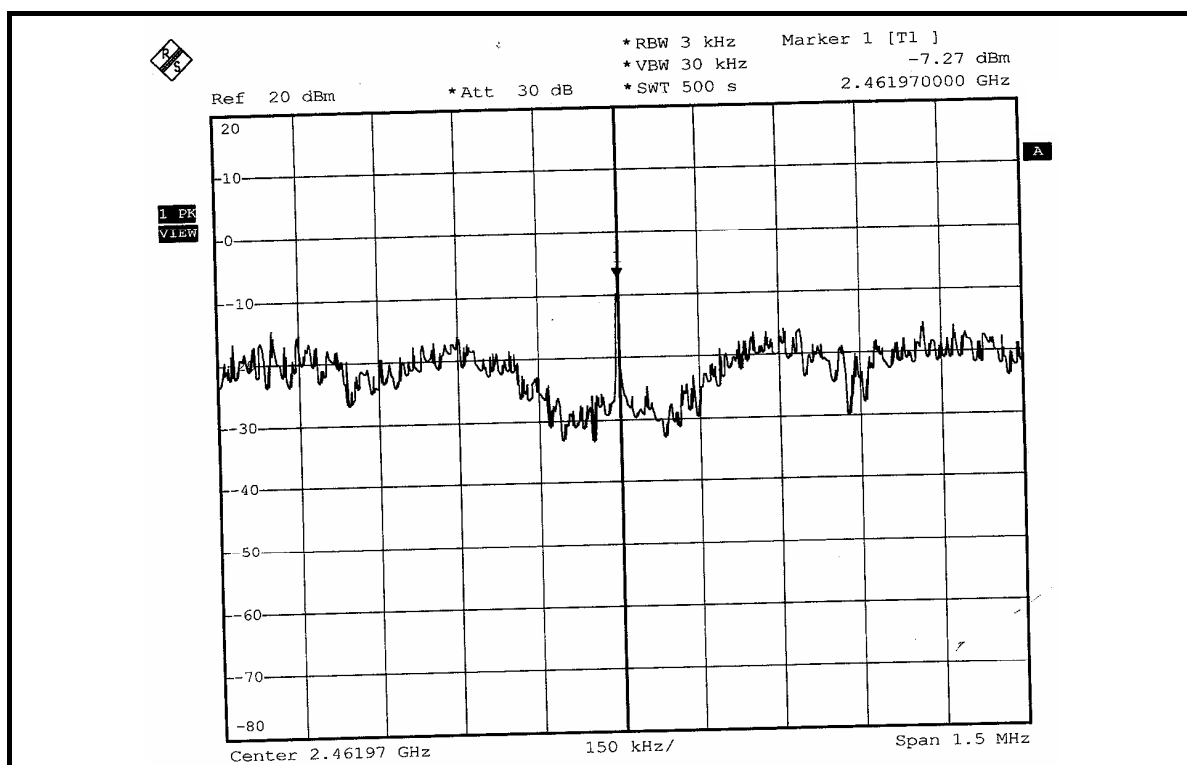
CH 1



CH 6



CH 11



4.6 BAND EDGES MEASUREMENT

4.6.1 LIMITS OF BAND EDGES MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.6.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S 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.

4.6.3 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 100kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

The spectrum plots (Peak RBW=VBW=100kHz; Average RBW=1MHz, VBW= 10Hz (for 802.11b); Average RBW=1MHz, VBW= 1kHz (for 802.11g) are attached on the following pages.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 EUT OPERATING CONDITION

Same as Item 4.3.6

4.6.6 TEST RESULTS

The spectrum plots are attached on the following 12 images. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

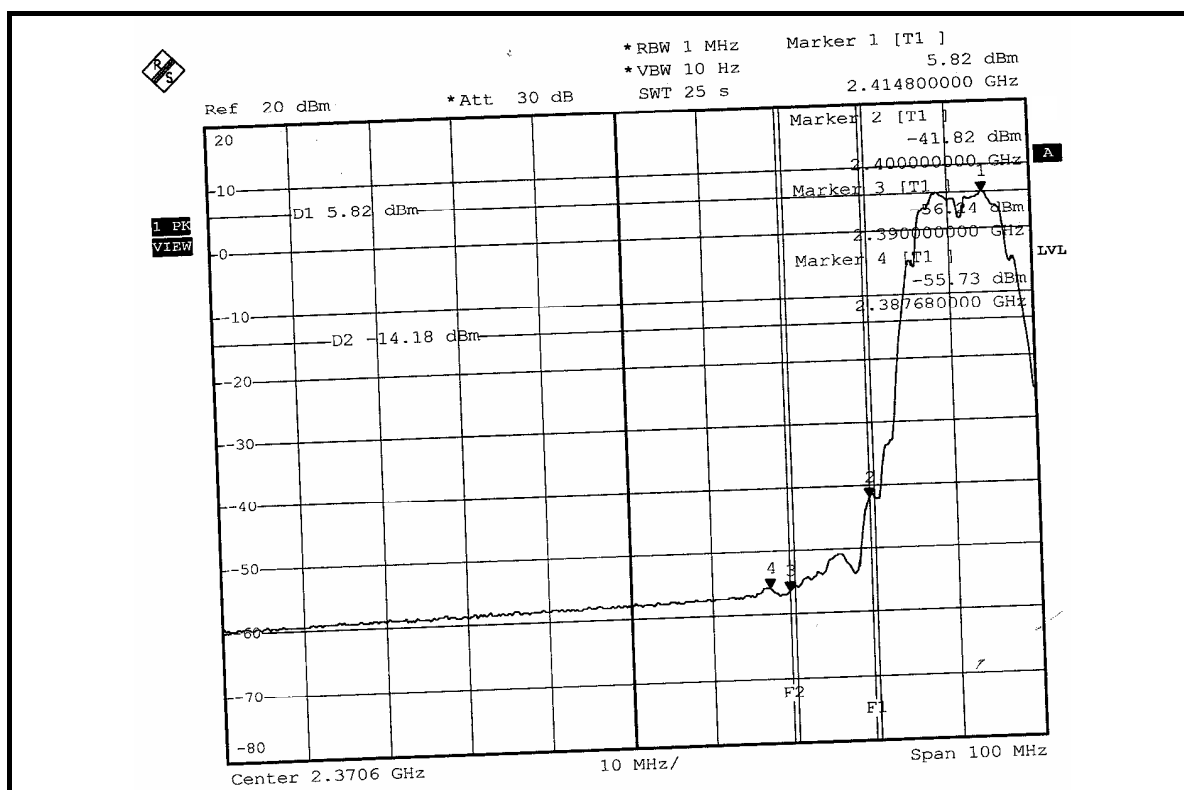
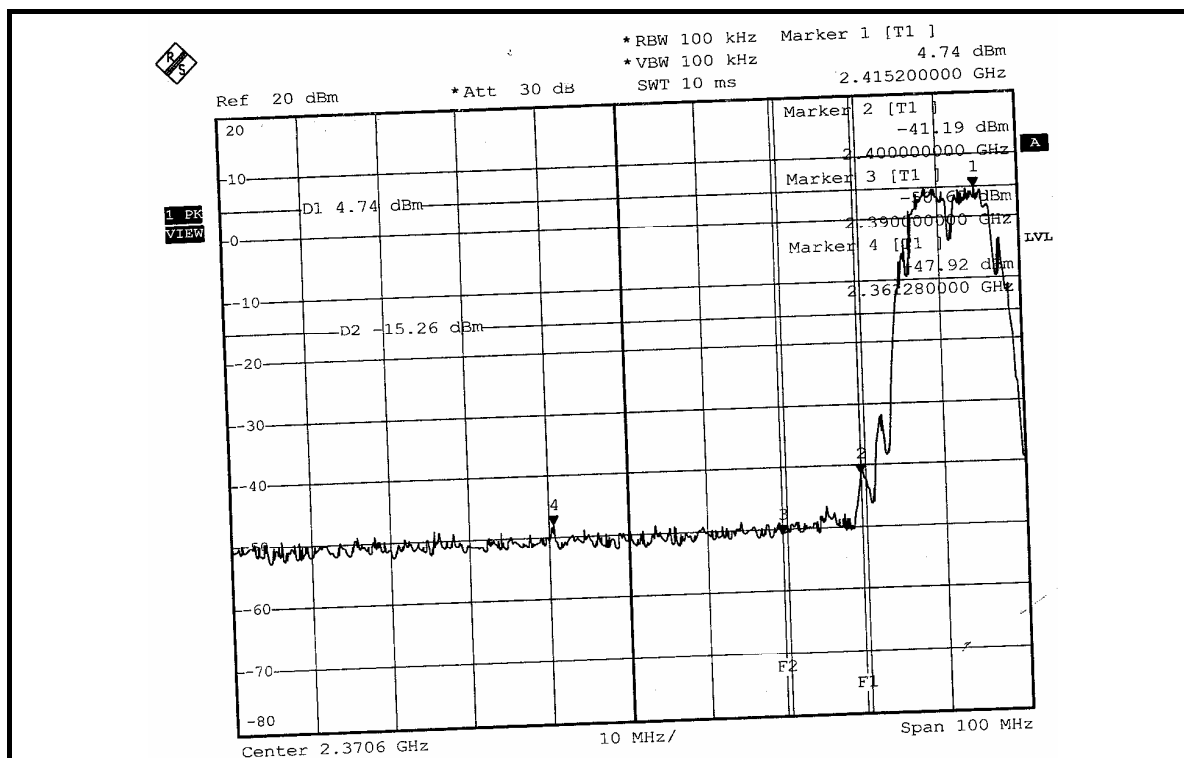
802.11b DSSS modulation

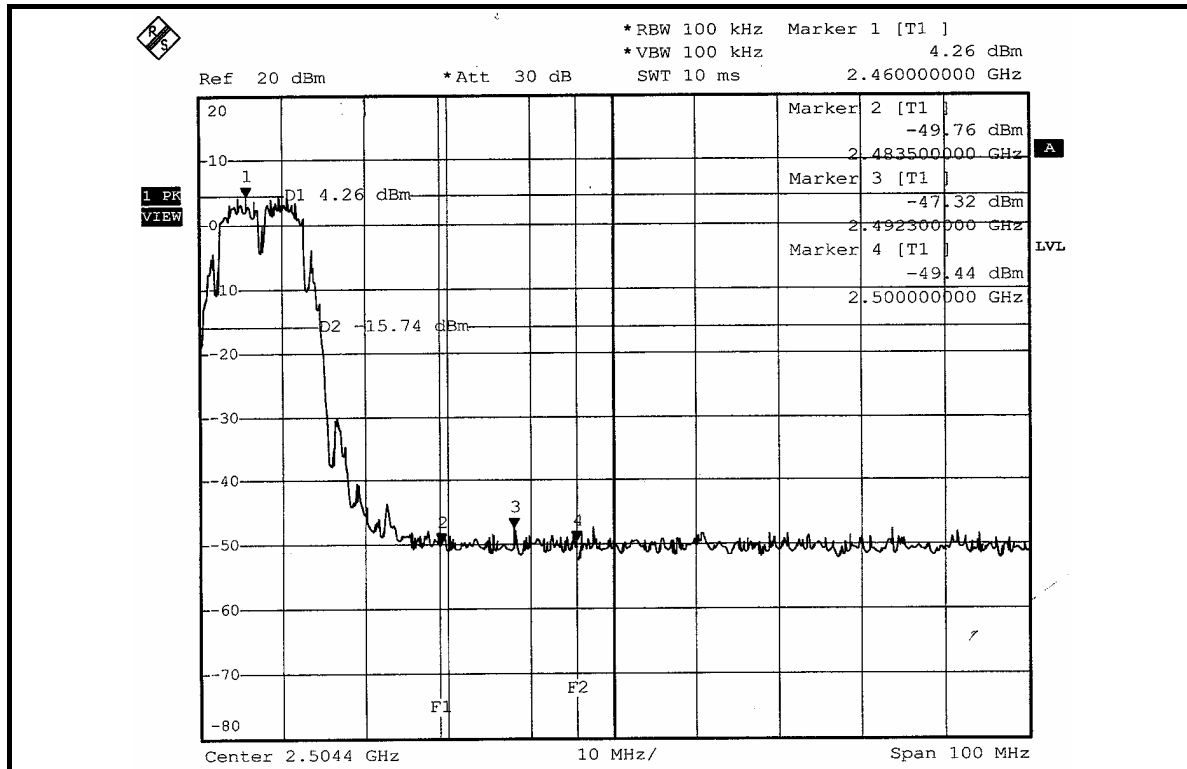
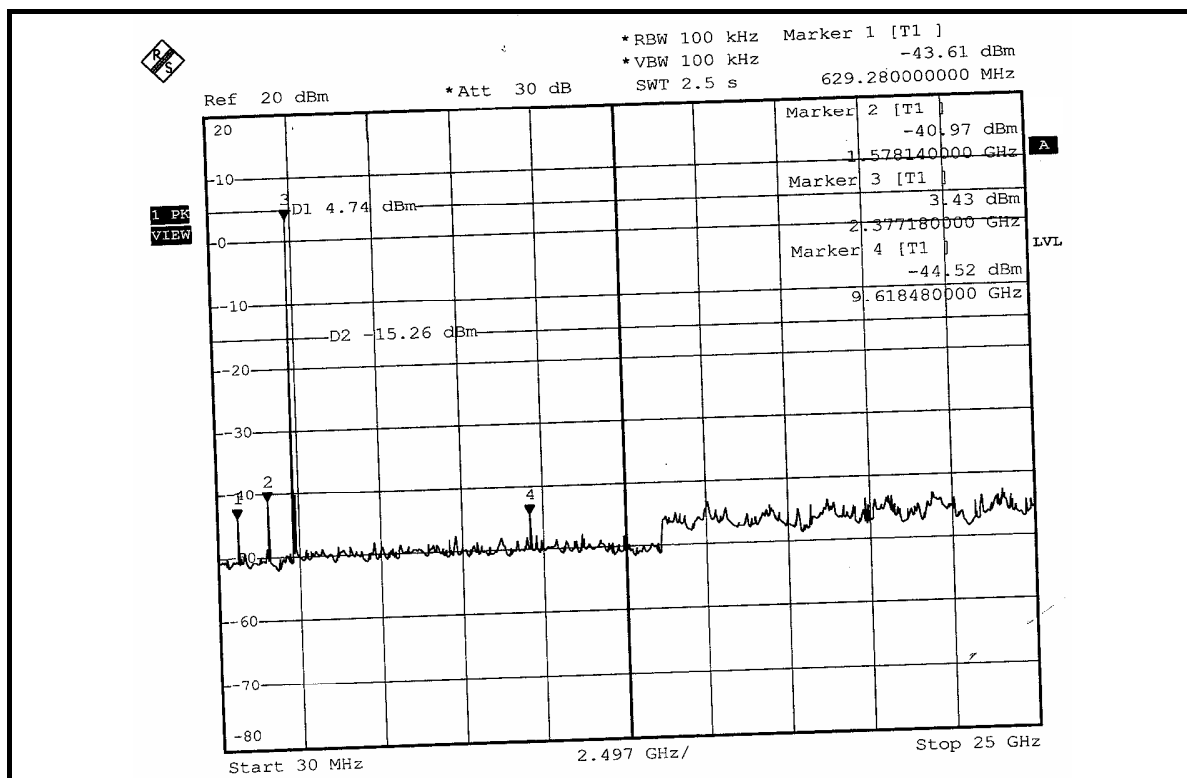
NOTE 1: The band edge emission plot on the next page shows 52.66dBc between carrier maximum power and local maximum emission in restrict band (2.36128GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 105.02dBuV/m (Peak), so the maximum field strength in restrict band is $105.02 - 52.66 = 52.36$ dBuV/m which is under 74dBuV/m limit.

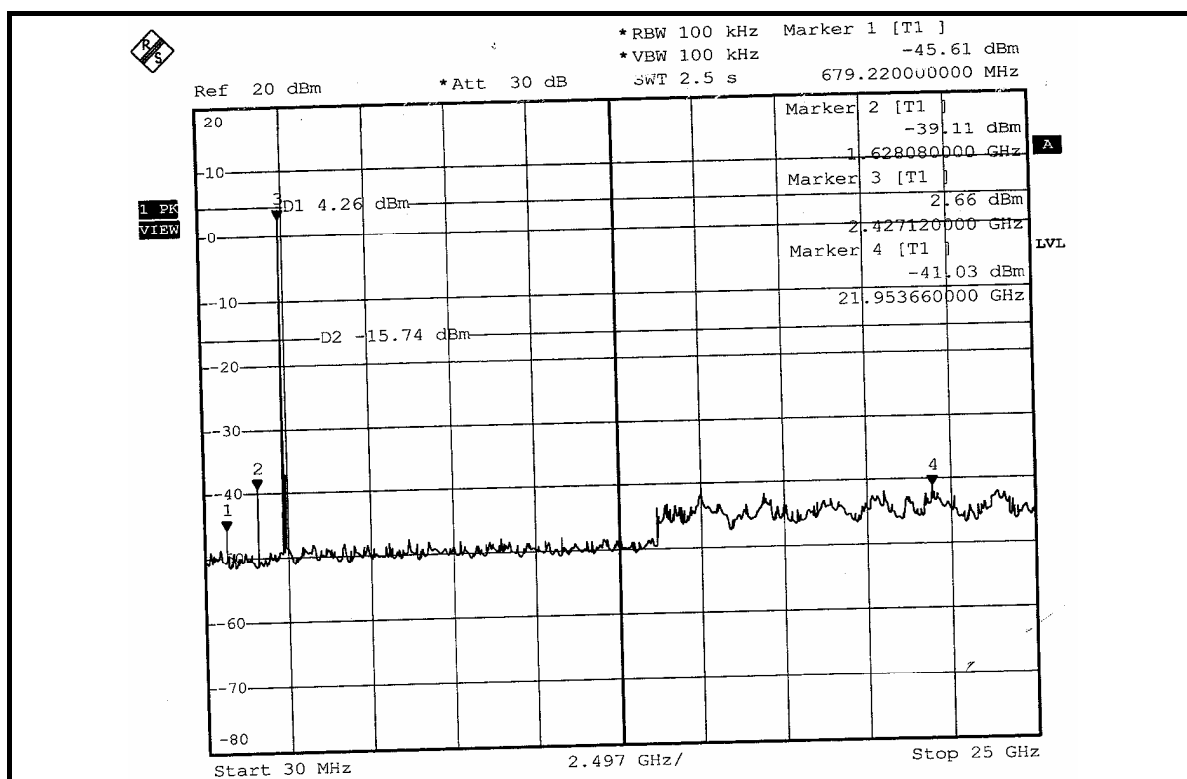
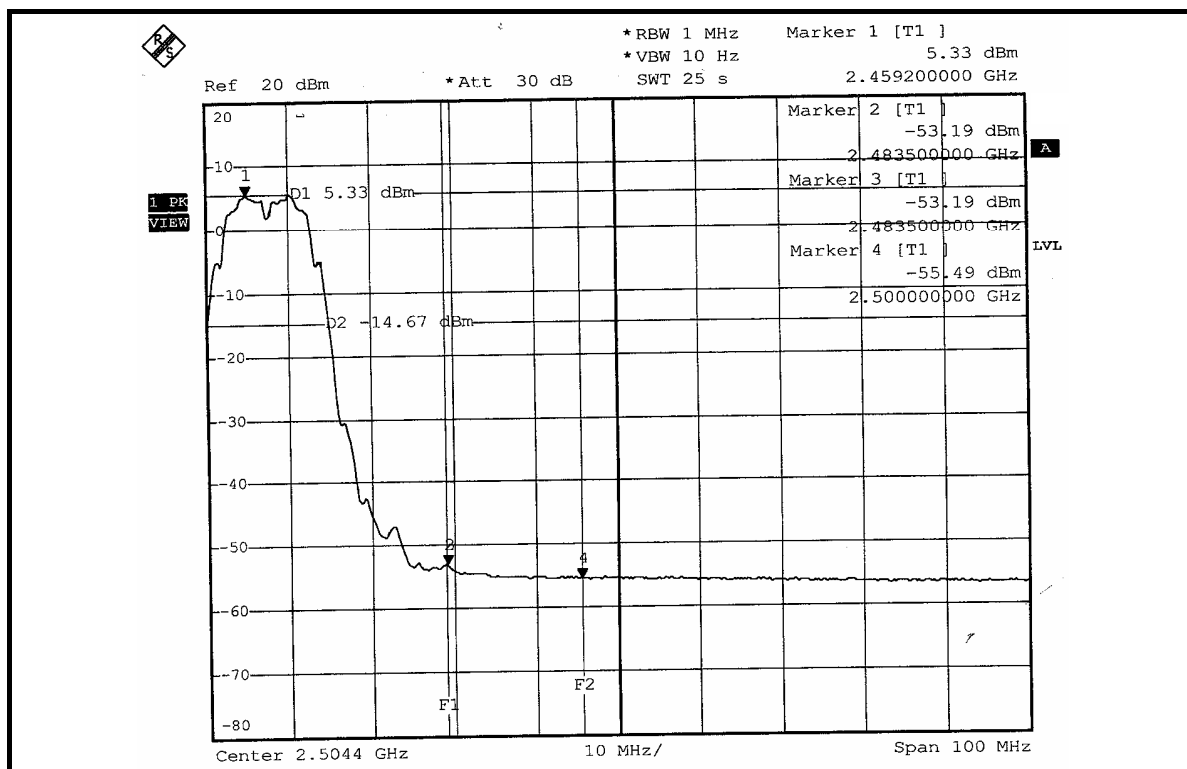
The band edge emission plot of on the next page shows 61.55dBc between carrier maximum power and local maximum emission in restrict band (2.38768GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 101.11dBuV/m (Average), so the maximum field strength in restrict band is $101.11 - 61.55 = 39.56$ dBuV/m which is under 54dBuV/m limit.

NOTE 2: The band edge emission plot on the next second page shows 51.58dBc between carrier maximum power and local maximum emission in restrict band (2.49230GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 105.89dBuV/m (Peak), so the maximum field strength in restrict band is $105.89 - 51.58 = 54.31$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot on the next third page shows 58.52dBc between carrier maximum power and local maximum emission in restrict band (2.48350GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 101.35dBuV/m (Average), so the maximum field strength in restrict band is $101.35 - 58.52 = 42.83$ dBuV/m which is under 54dBuV/m limit.







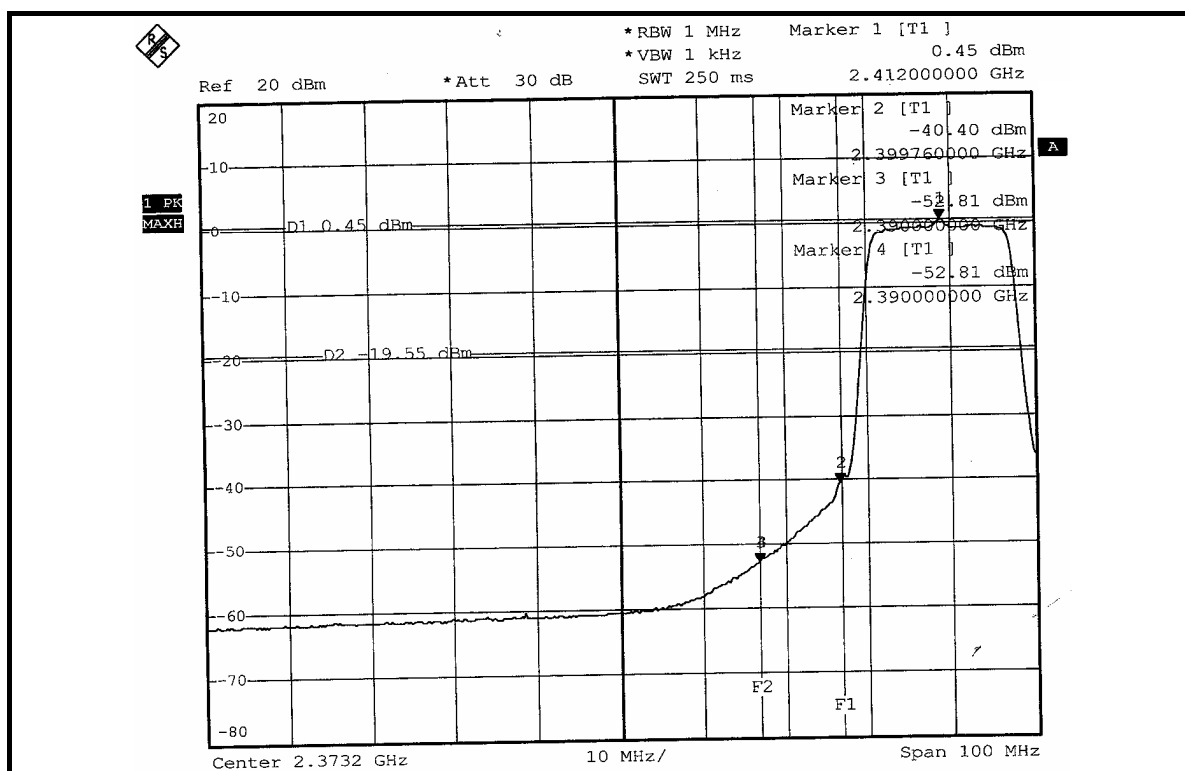
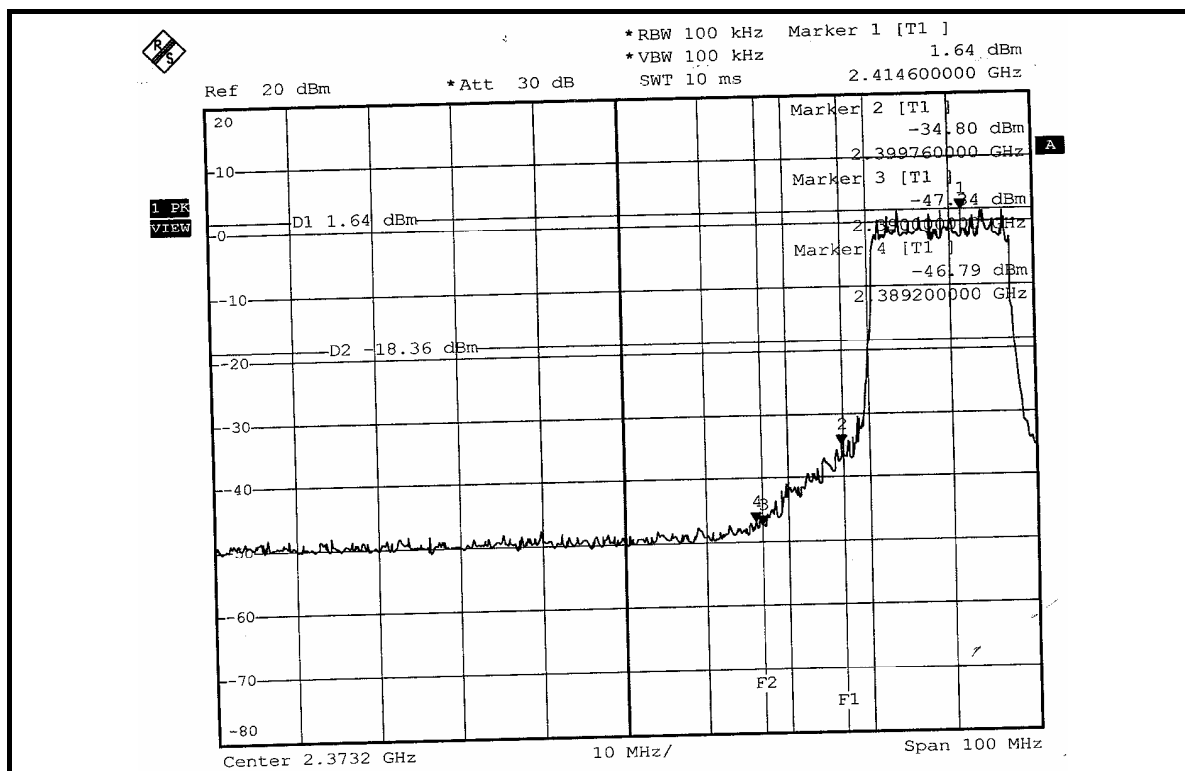
802.11g OFDM modulation

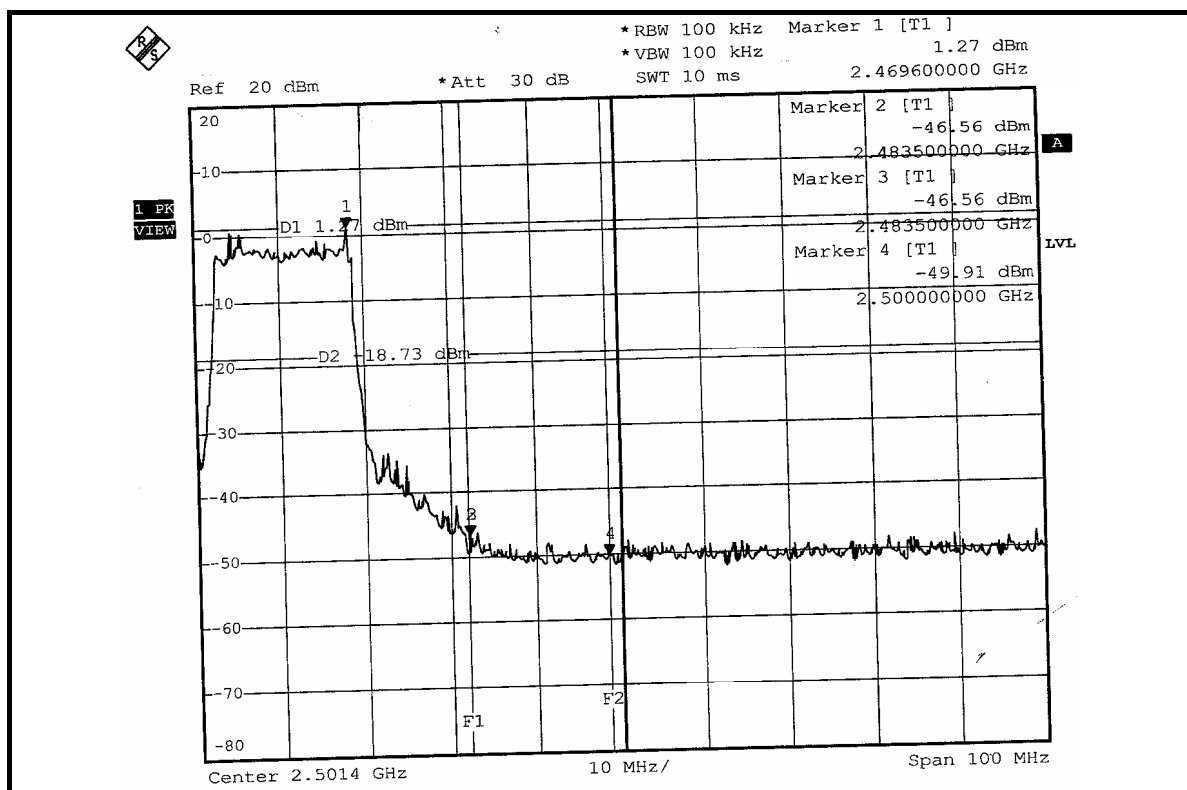
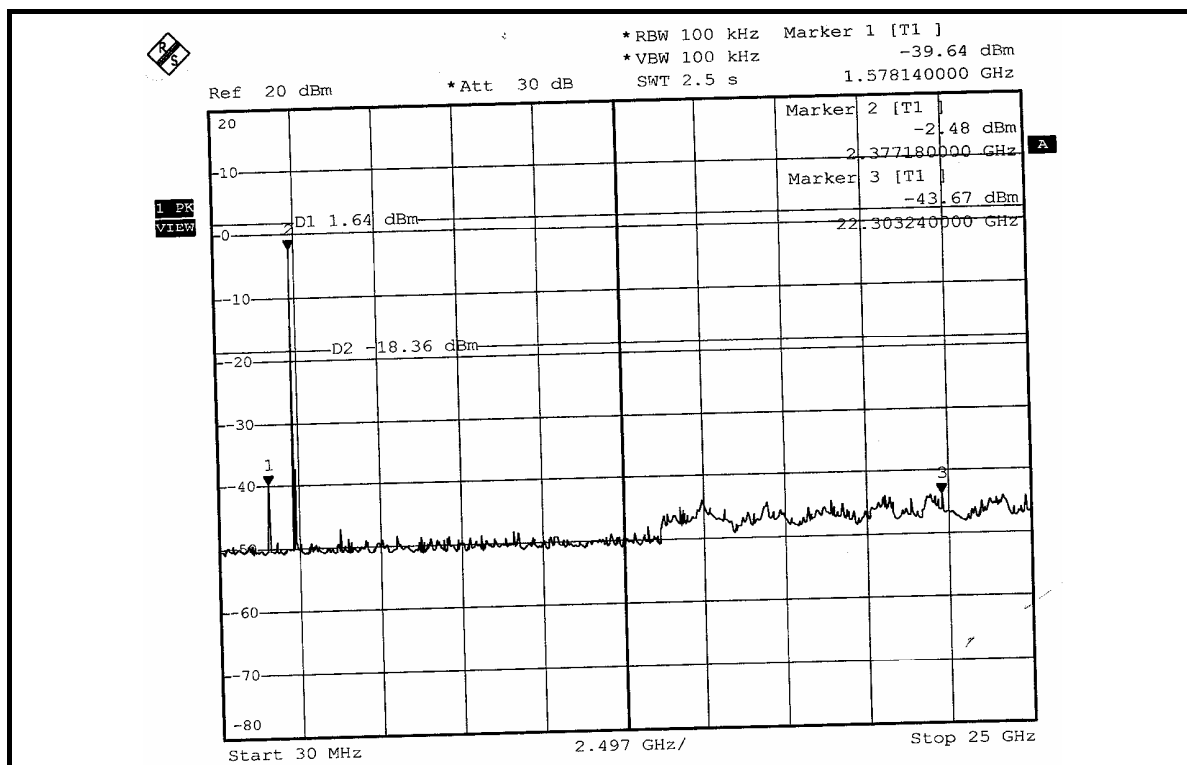
NOTE 1: The band edge emission plot on the next page shows 48.43dBc between carrier maximum power and local maximum emission in restrict band (2.38920GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 105.63dBuV/m (Peak), so the maximum field strength in restrict band is $105.63 - 48.43 = 57.20$ dBuV/m which is under 74dBuV/m limit.

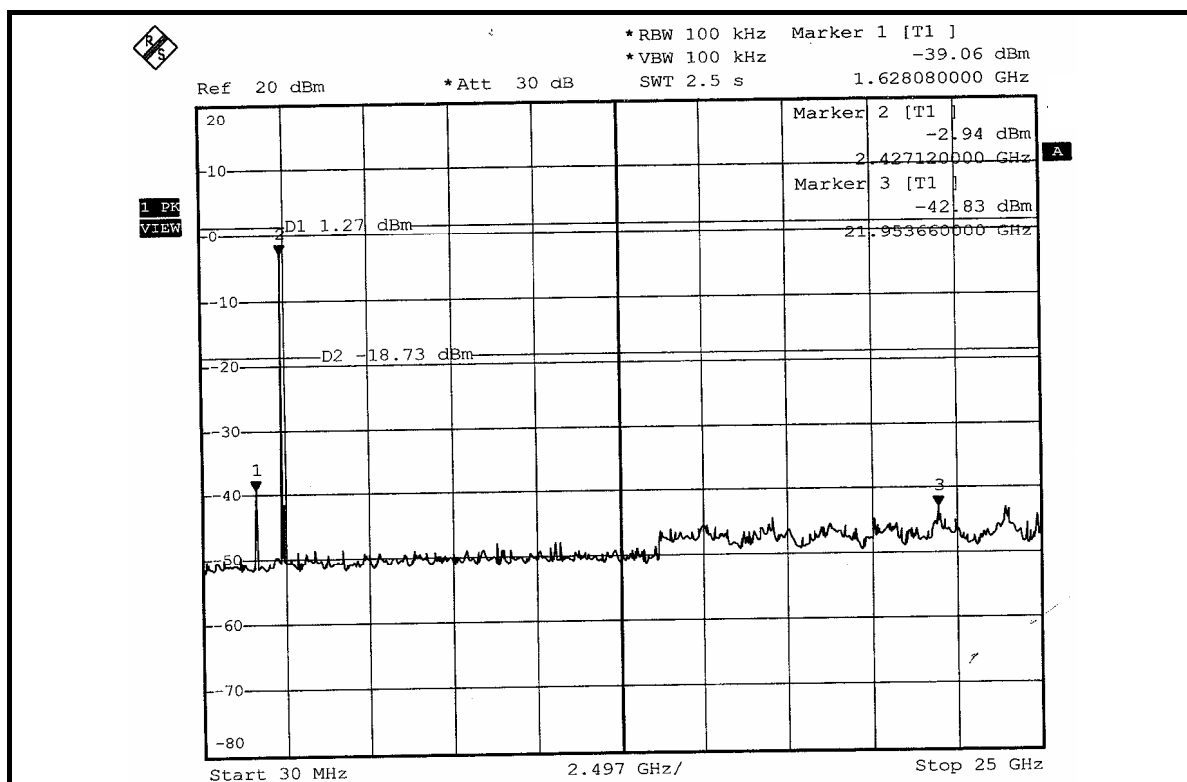
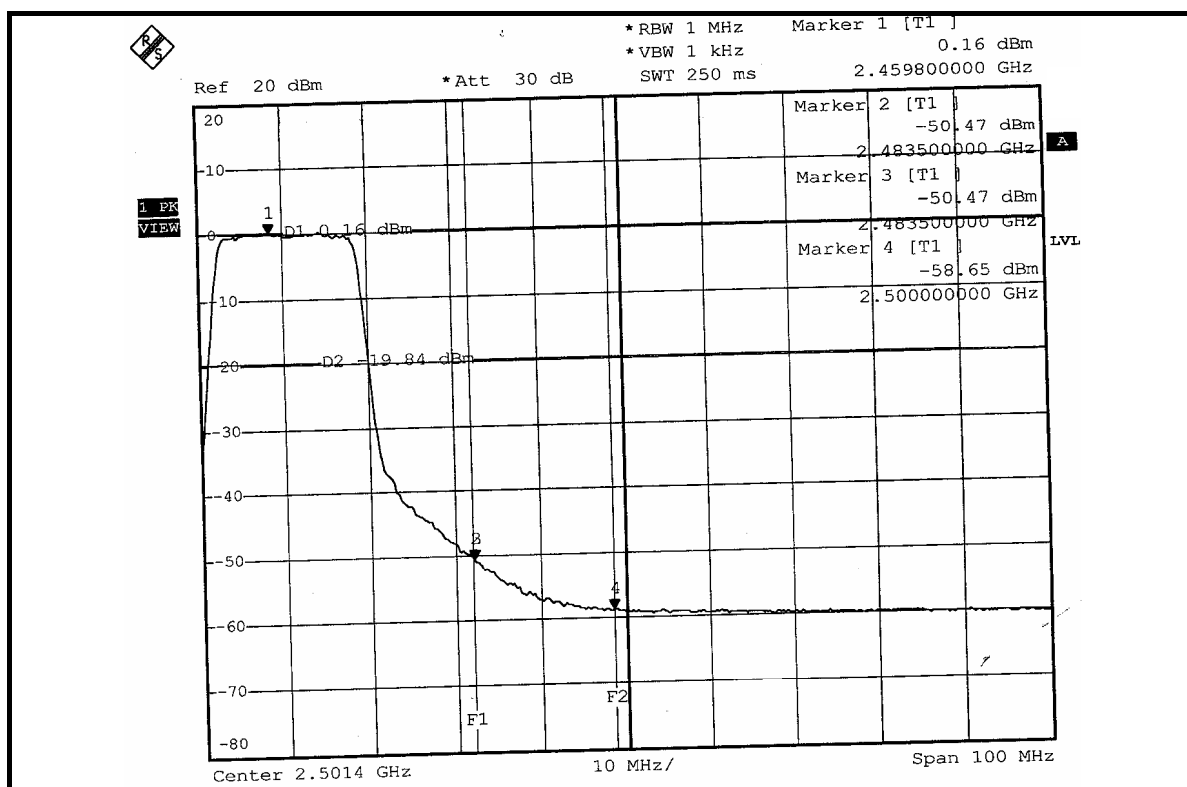
The band edge emission plot of on the next page shows 53.26dBc between carrier maximum power and local maximum emission in restrict band (2.39000GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 95.41dBuV/m (Average), so the maximum field strength in restrict band is $95.41 - 53.26 = 42.15$ dBuV/m which is under 54dBuV/m limit.

NOTE 2: The band edge emission plot on the next second page shows 47.83dBc between carrier maximum power and local maximum emission in restrict band (2.48350GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 106.12dBuV/m (Peak), so the maximum field strength in restrict band is $106.12 - 47.83 = 58.29$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot on the next third page shows 50.63dBc between carrier maximum power and local maximum emission in restrict band (2.48350GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 96.23dBuV/m (Average), so the maximum field strength in restrict band is $96.23 - 50.63 = 45.60$ dBuV/m which is under 54dBuV/m limit.







4.7 ANTENNA REQUIREMENT

4.7.1 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.

4.7.2 ANTENNA CONNECTED CONSTRUCTION

The antennas used in this product are PIFA antenna with UFL connector and PCB antenna with UFL connector. The maximum Gain of the antenna is 2.69dBi.

5. TEST TYPES AND RESULTS (FOR BLUETOOTH FUNCTION)

5.1 CONDUCTED EMISSION MEASUREMENT

5.1.1 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.

5.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS30	100288	Sep. 25, 2007
RF signal cable Woken	5D-FB	Cable-HYCO3-01	Jan. 06, 2008
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.

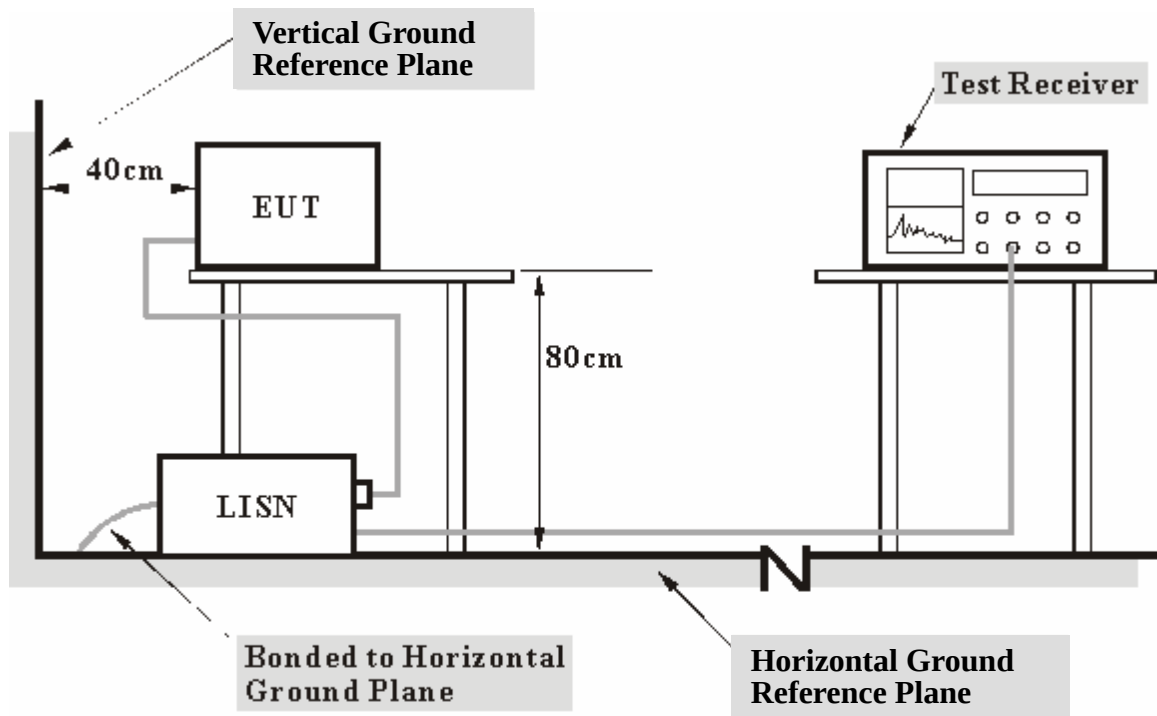
5.1.3 TEST PROCEDURES

- 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.

5.1.4 DEVIATION FROM TEST STANDARD

No deviation

5.1.5 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 attached file (Test Setup Photo).

5.1.6 EUT OPERATING CONDITIONS

- a. Connected EUT with notebook system via USB cable and placed on a testing table.
- b. The notebook system ran a test program (provided by manufacturer) to enable EUT under transmitting condition continuously at specific channel frequency.
- c. The necessary accessories enable the system in full functions.

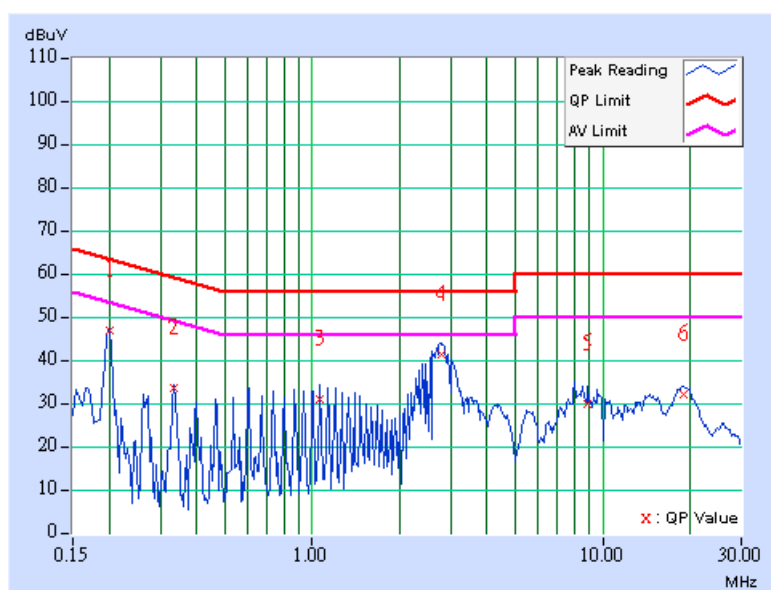
5.1.7 TEST RESULTS

CONDUCTED WORST CASE DATA: (FOR GFSK)

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

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.10	46.31	-	46.41	-	63.58	53.58	-17.17	-
2	0.334	0.10	32.99	-	33.09	-	59.36	49.36	-26.27	-
3	1.066	0.11	30.58	-	30.69	-	56.00	46.00	-25.31	-
4	2.801	0.27	41.05	-	41.32	-	56.00	46.00	-14.68	-
5	8.871	0.36	29.42	-	29.78	-	60.00	50.00	-30.22	-
6	18.879	0.58	31.70	-	32.28	-	60.00	50.00	-27.72	-

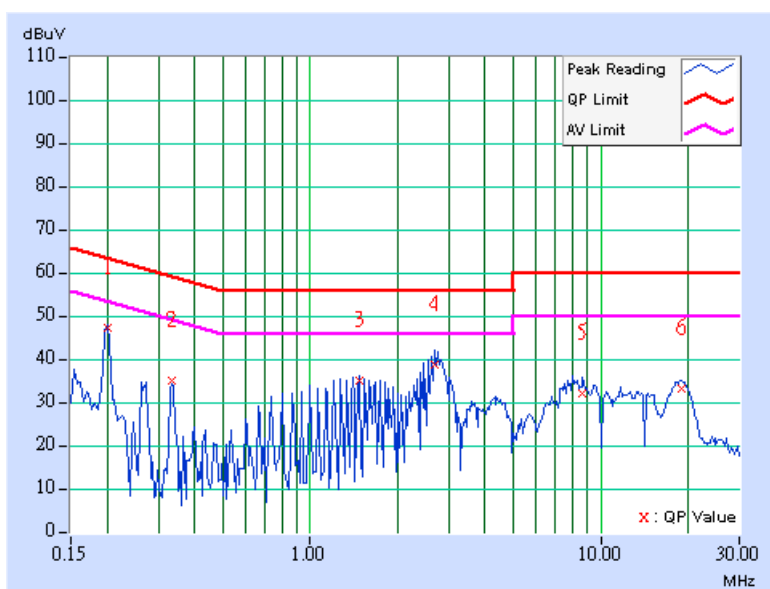
- REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = 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	20deg. C, 60%RH, 991hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	A	TESTED BY	Match Tsui

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.10	46.86	-	46.96	-	63.58	53.58	-16.62	-
2	0.334	0.10	34.64	-	34.74	-	59.36	49.36	-24.62	-
3	1.469	0.20	34.44	-	34.64	-	56.00	46.00	-21.36	-
4	2.672	0.26	38.13	-	38.39	-	56.00	46.00	-17.61	-
5	8.672	0.44	31.75	-	32.19	-	60.00	50.00	-27.81	-
6	18.945	0.57	32.62	-	33.19	-	60.00	50.00	-26.81	-

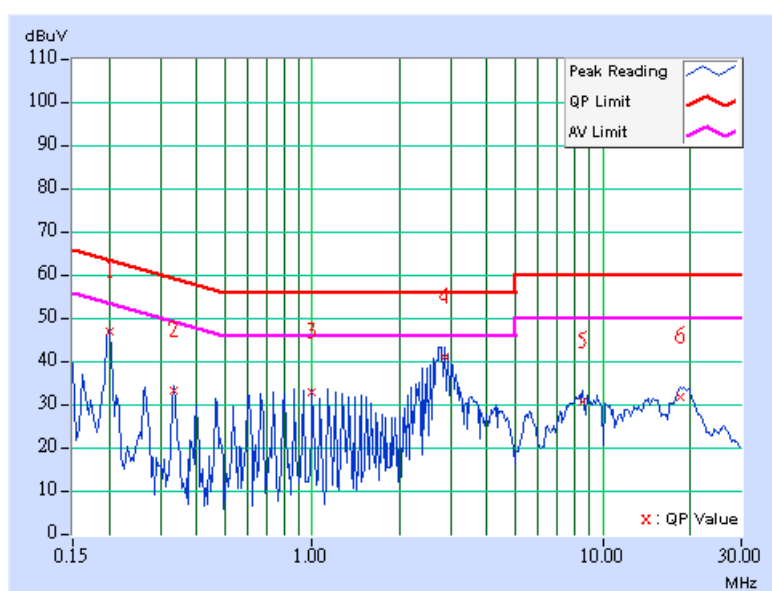
- REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = 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	20deg. C, 60%RH, 991hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	A	TESTED BY	Match Tsui

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.10	46.33	-	46.43	-	63.58	53.58	-17.15	-
2	0.334	0.10	32.93	-	33.03	-	59.36	49.36	-26.33	-
3	1.000	0.10	32.49	-	32.59	-	56.00	46.00	-23.41	-
4	2.867	0.27	40.43	-	40.70	-	56.00	46.00	-15.30	-
5	8.539	0.36	30.29	-	30.65	-	60.00	50.00	-29.35	-
6	18.613	0.58	31.30	-	31.88	-	60.00	50.00	-28.12	-

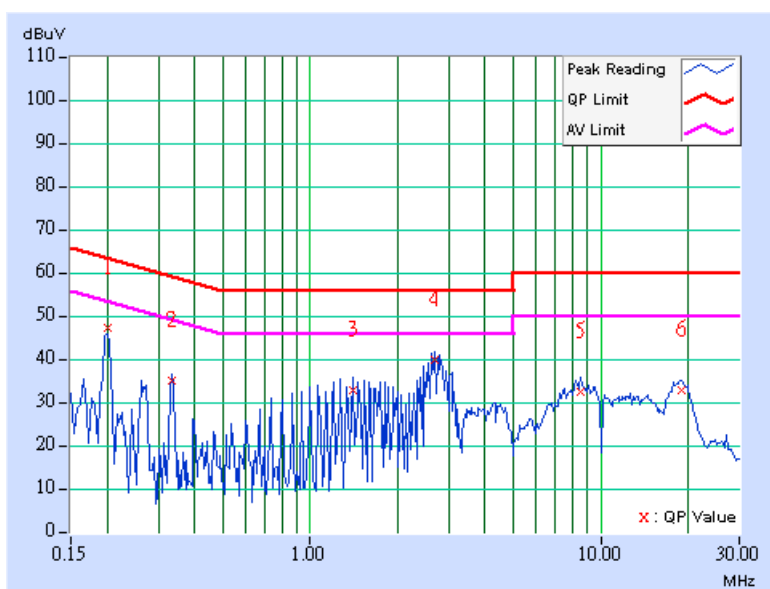
- REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = 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	20deg. C, 60%RH, 991hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	A	TESTED BY	Match Tsui

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.10	46.84	-	46.94	-	63.58	53.58	-16.64	-
2	0.334	0.10	34.48	-	34.58	-	59.36	49.36	-24.78	-
3	1.398	0.20	32.28	-	32.48	-	56.00	46.00	-23.52	-
4	2.669	0.26	39.51	-	39.77	-	56.00	46.00	-16.23	-
5	8.539	0.44	31.92	-	32.36	-	60.00	50.00	-27.64	-
6	18.879	0.58	32.52	-	33.10	-	60.00	50.00	-26.90	-

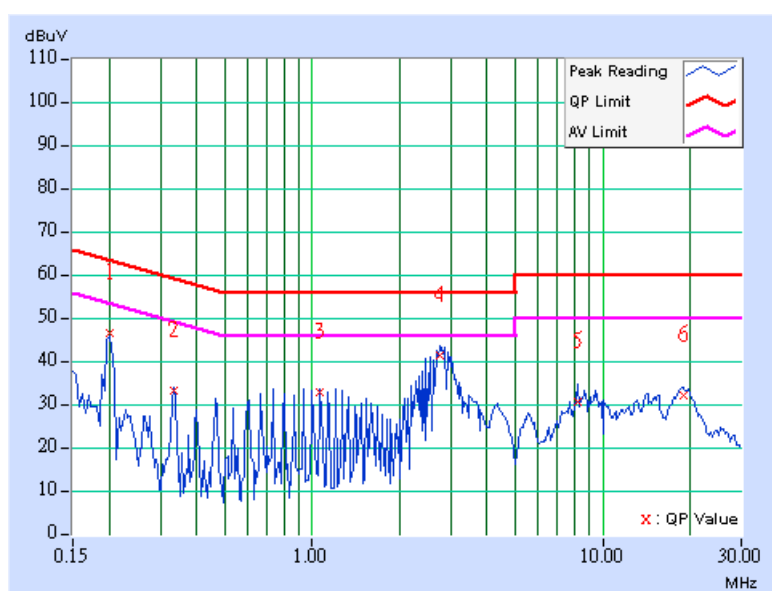
- REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = 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	20deg. 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	0.201	0.10	46.23	-	46.33	-	63.58	53.58	-17.25	-
2	0.334	0.10	32.77	-	32.87	-	59.36	49.36	-26.49	-
3	1.066	0.11	32.32	-	32.43	-	56.00	46.00	-23.57	-
4	2.738	0.26	40.80	-	41.06	-	56.00	46.00	-14.94	-
5	8.203	0.36	30.33	-	30.69	-	60.00	50.00	-29.31	-
6	18.879	0.58	31.76	-	32.34	-	60.00	50.00	-27.66	-

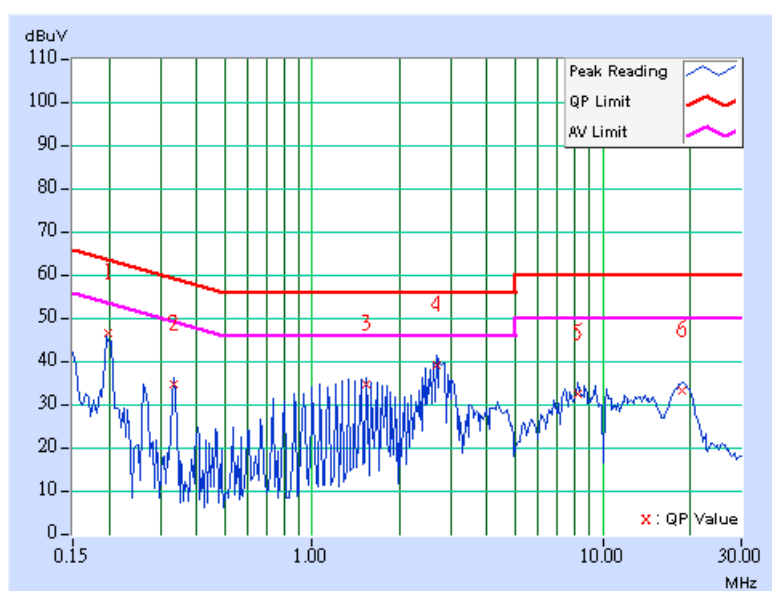
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = 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	20deg. C, 60%RH, 991hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	A	TESTED BY	Match Tsui

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.198	0.10	46.21	-	46.31	-	63.69	53.69	-17.38	-
2	0.334	0.10	34.15	-	34.25	-	59.36	49.36	-25.11	-
3	1.535	0.20	34.24	-	34.44	-	56.00	46.00	-21.56	-
4	2.672	0.26	38.55	-	38.81	-	56.00	46.00	-17.19	-
5	8.203	0.43	31.92	-	32.35	-	60.00	50.00	-27.65	-
6	18.746	0.58	32.73	-	33.31	-	60.00	50.00	-26.69	-

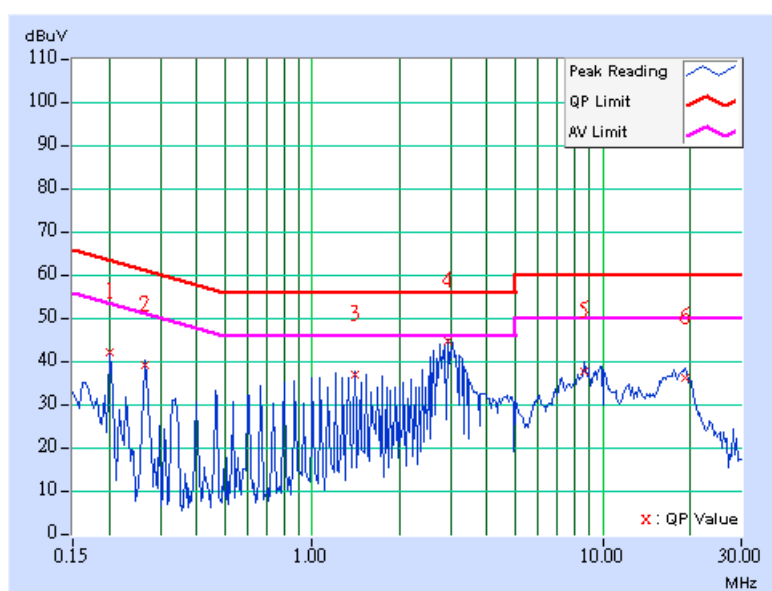
- REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = 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 1
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	B	TESTED BY	Match Tsui

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.202	0.10	41.74	-	41.84	-	63.54	53.54	-21.70	-
2	0.267	0.10	38.77	-	38.87	-	61.20	51.20	-22.33	-
3	1.402	0.14	36.54	-	36.68	-	56.00	46.00	-19.32	-
4	2.938	0.28	44.26	-	44.54	-	56.00	46.00	-11.46	-
5	8.676	0.36	37.25	-	37.61	-	60.00	50.00	-22.39	-
6	19.282	0.57	35.91	-	36.48	-	60.00	50.00	-23.52	-

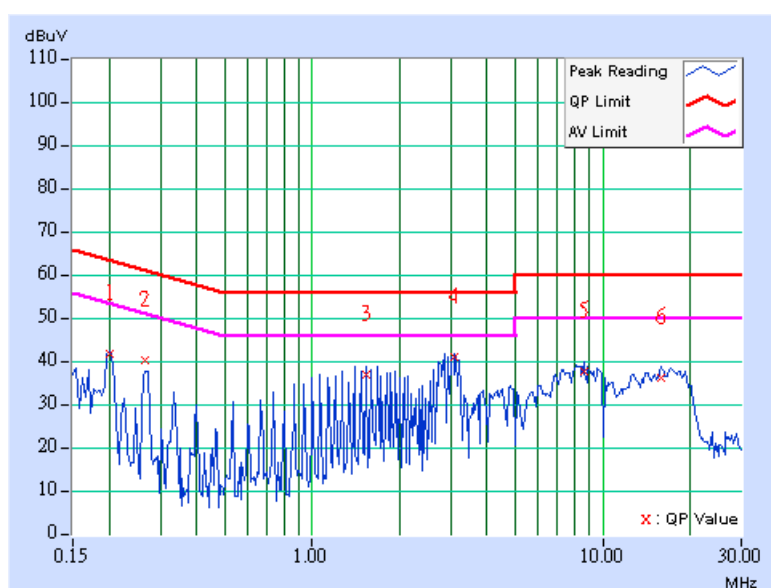
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = 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	20deg. C, 60%RH, 991hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	B	TESTED BY	Match Tsui

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.10	41.26	-	41.36	-	63.55	53.55	-22.19	-
2	0.267	0.10	39.89	-	39.99	-	61.20	51.20	-21.21	-
3	1.537	0.20	36.58	-	36.78	-	56.00	46.00	-19.22	-
4	3.070	0.29	40.36	-	40.65	-	56.00	46.00	-15.35	-
5	8.607	0.44	37.28	-	37.72	-	60.00	50.00	-22.28	-
6	15.875	0.62	35.77	-	36.39	-	60.00	50.00	-23.61	-

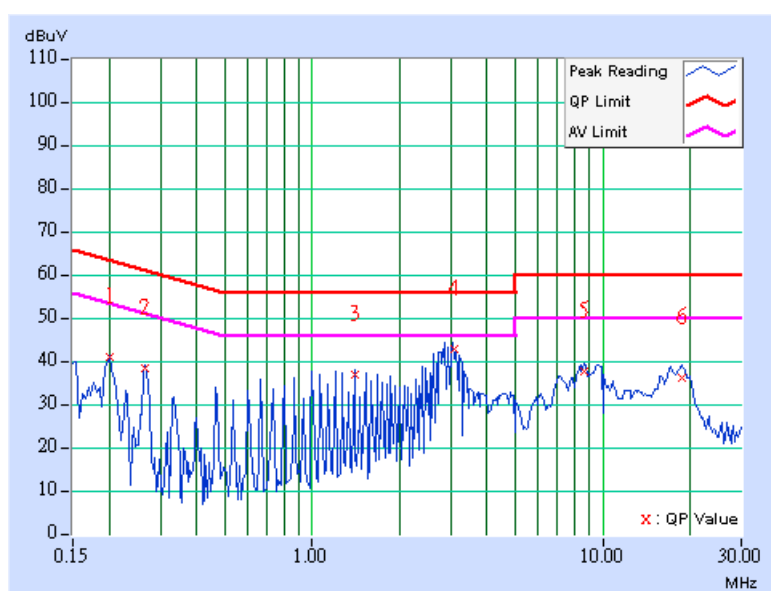
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = 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	20deg. C, 60%RH, 991hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	B	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	0.201	0.10	40.63	-	40.73	-	63.58	53.58	-22.85	-
2	0.267	0.10	38.10	-	38.20	-	61.20	51.20	-23.00	-
3	1.403	0.14	36.30	-	36.44	-	56.00	46.00	-19.56	-
4	3.067	0.29	42.50	-	42.79	-	56.00	46.00	-13.21	-
5	8.606	0.36	37.15	-	37.51	-	60.00	50.00	-22.49	-
6	18.810	0.58	35.84	-	36.42	-	60.00	50.00	-23.58	-

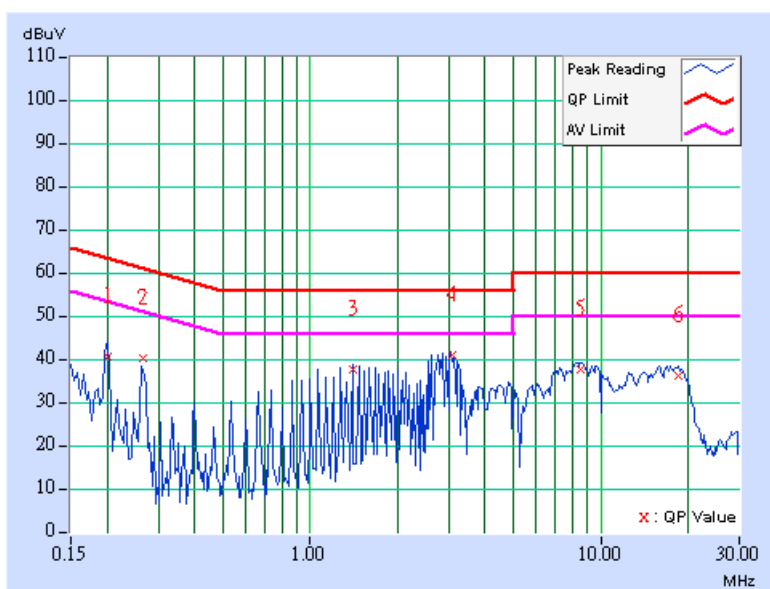
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = 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 2
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	B	TESTED BY	Match Tsui

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.10	40.06	-	40.16	-	63.55	53.55	-23.39	-
2	0.267	0.10	39.96	-	40.06	-	61.21	51.21	-21.15	-
3	1.400	0.20	37.32	-	37.52	-	56.00	46.00	-18.48	-
4	3.067	0.29	40.36	-	40.65	-	56.00	46.00	-15.35	-
5	8.535	0.44	37.06	-	37.50	-	60.00	50.00	-22.50	-
6	18.407	0.58	35.77	-	36.35	-	60.00	50.00	-23.65	-

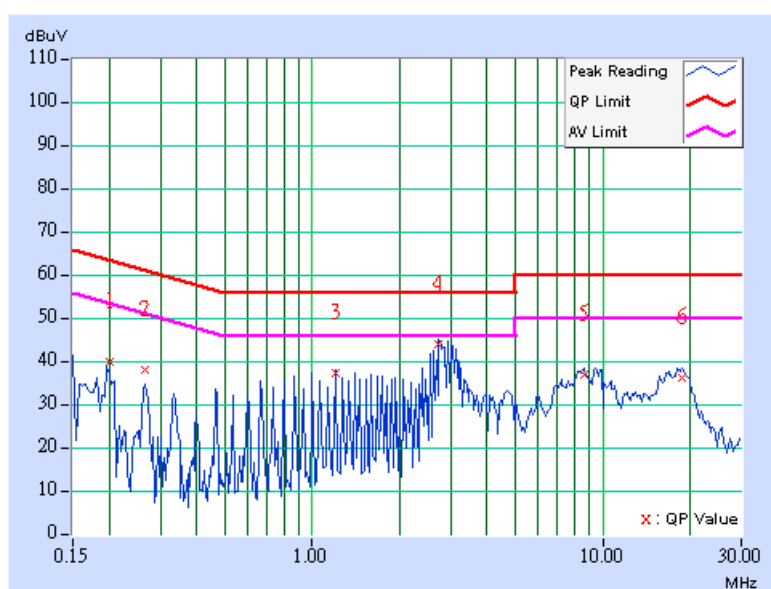
- REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = 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	20deg. C, 60%RH, 991hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	B	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	0.201	0.10	39.44	-	39.54	-	63.58	53.58	-24.04	-
2	0.267	0.10	37.62	-	37.72	-	61.20	51.20	-23.48	-
3	1.199	0.12	36.66	-	36.78	-	56.00	46.00	-19.22	-
4	2.734	0.26	43.67	-	43.93	-	56.00	46.00	-12.07	-
5	8.602	0.36	36.32	-	36.68	-	60.00	50.00	-23.32	-
6	18.805	0.58	35.78	-	36.36	-	60.00	50.00	-23.64	-

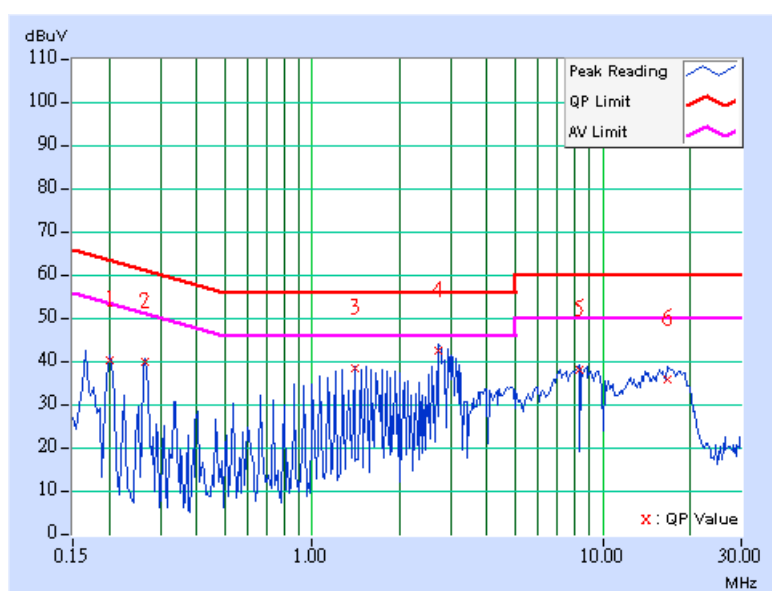
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = 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	20deg. C, 60%RH, 991hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	B	TESTED BY	Match Tsui

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.10	39.82	-	39.92	-	63.58	53.58	-23.66	-
2	0.267	0.10	39.51	-	39.61	-	61.20	51.20	-21.59	-
3	1.400	0.20	37.87	-	38.07	-	56.00	46.00	-17.93	-
4	2.734	0.26	41.95	-	42.21	-	56.00	46.00	-13.79	-
5	8.270	0.43	37.42	-	37.85	-	60.00	50.00	-22.15	-
6	16.805	0.60	35.24	-	35.84	-	60.00	50.00	-24.16	-

- 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.



5.2 RADIATED EMISSION MEASUREMENT

5.2.1 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.

5.2.2 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	Oct. 05, 2007
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	May 31, 2007
HORN Antenna SCHWARZBECK	9120D	9120D-209	Jan. 27, 2007
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170243	Dec. 28, 2007
Preamplifier Agilent	8447D	2944A10633	Oct. 26, 2007
Preamplifier Agilent	8449B	3008A01964	Oct. 26, 2007
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	238137/4	Feb. 14, 2007
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	233233/4	Nov. 14, 2007
Software ADT.	ADT_Radiated_V7.6	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.

5.2.3 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.

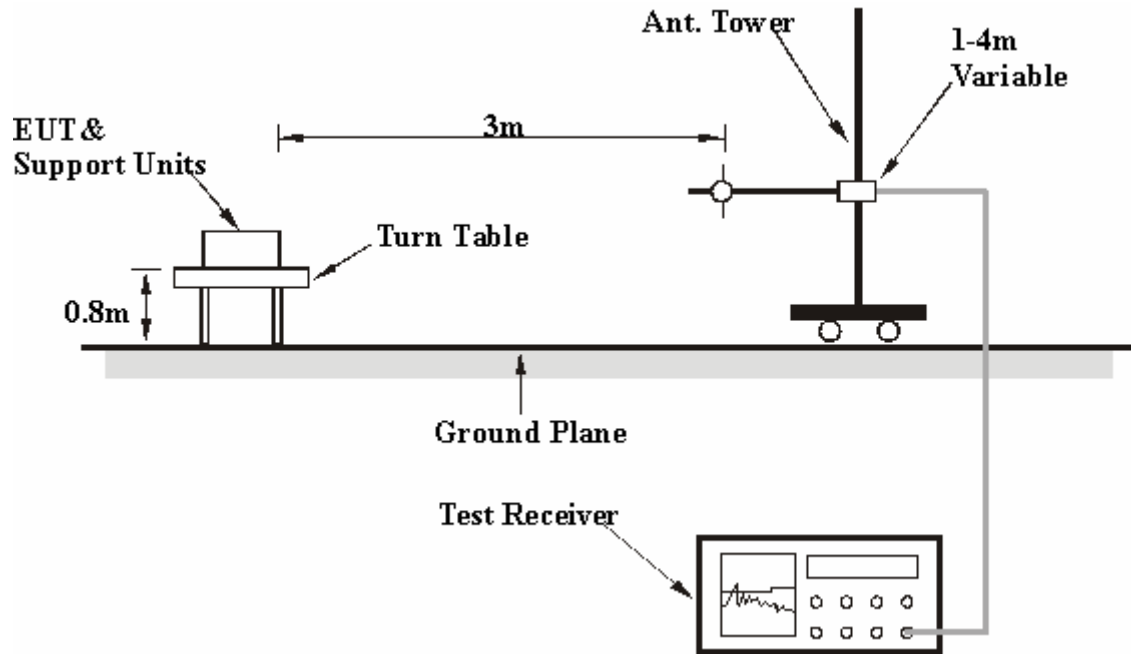
NOTE:

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.

5.2.4 DEVIATION FROM TEST STANDARD

No deviation

5.2.5 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

5.2.6 EUT OPERATING CONDITIONS

Same as 5.1.6

5.2.7 TEST RESULTS

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	Below 1000MHz
MODULATION TYPE	8DPSK	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	A	TESTED BY	Long Chen

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	47.51	28.55 QP	40.00	-11.45	1.00 H	315	10.15	18.40
2	95.11	29.85 QP	43.50	-13.65	1.25 H	355	16.71	13.14
3	133.55	30.25 QP	43.50	-13.25	1.25 H	35	13.48	16.77
4	295.11	29.55 QP	46.00	-16.45	1.50 H	315	11.76	17.79
5	415.20	27.11 QP	46.00	-18.89	1.00 H	352	6.61	20.50
6	527.55	29.55 QP	46.00	-16.45	1.03 H	55	6.84	22.71
7	727.55	25.85 QP	46.00	-20.15	1.25 H	102	-0.35	26.20

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	49.44	31.69 QP	40.00	-8.31	1.00 V	316	17.24	14.44
2	72.77	30.24 QP	40.00	-9.76	1.25 V	223	18.78	11.46
3	125.25	36.63 QP	43.50	-6.87	1.00 V	64	25.13	11.50
4	166.07	29.39 QP	43.50	-14.11	1.25 V	238	16.36	13.03
5	414.89	30.66 QP	46.00	-15.34	1.00 V	55	12.42	18.24
6	440.16	31.90 QP	46.00	-14.10	1.25 V	205	13.15	18.75
7	527.64	30.19 QP	46.00	-15.81	1.00 V	217	9.51	20.67
8	792.00	30.18 QP	46.00	-15.82	1.00 V	85	4.21	25.96

- 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 0	FREQUENCY RANGE	Below 1000MHz
MODULATION TYPE	8DPSK	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	B	TESTED BY	Long Chen

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	55.27	23.20 QP	40.00	-16.80	1.75 H	193	9.27	13.93
2	88.32	28.73 QP	43.50	-14.77	1.75 H	193	19.34	9.39
3	107.76	29.60 QP	43.50	-13.90	1.50 H	127	19.90	9.70
4	206.89	29.80 QP	43.50	-13.70	1.50 H	127	18.74	11.06
5	239.94	29.89 QP	46.00	-16.11	1.50 H	127	17.76	12.14
6	311.86	29.16 QP	46.00	-16.84	1.25 H	73	13.38	15.77
7	792.00	31.36 QP	46.00	-14.64	1.25 H	145	5.40	25.96

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	35.83	33.64 QP	40.00	-6.36	1.00 V	175	20.40	13.24
2	88.32	34.50 QP	43.50	-9.00	1.00 V	199	25.11	9.39
3	117.47	35.99 QP	43.50	-7.51	1.00 V	40	25.41	10.58
4	138.86	31.18 QP	43.50	-12.32	1.00 V	133	17.88	13.30
5	222.44	31.23 QP	46.00	-14.77	1.00 V	178	19.66	11.57
6	294.37	34.28 QP	46.00	-11.72	1.25 V	169	18.94	15.34
7	527.64	31.22 QP	46.00	-14.78	1.00 V	118	10.55	20.67
8	832.83	31.78 QP	46.00	-14.22	1.50 V	28	5.34	26.44

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 (FOR GFSK)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1602.00	37.85 PK	74.00	-36.15	1.21 H	199	8.60	29.25
1	1602.00	29.86 AV	54.00	-24.14	1.21 H	199	0.61	29.25
2	2390.00	44.45 PK	74.00	-29.55	1.05 H	15	12.96	31.49
2	2390.00	36.75 AV	54.00	-17.25	1.05 H	15	5.26	31.49
3	*2402.00	94.59 PK			1.05 H	28	63.05	31.54
3	*2402.00	64.59 AV			1.05 H	28	33.05	31.54
4	4804.00	62.01 PK	74.00	-11.99	1.04 H	11	24.53	37.48
4	4804.00	32.01 AV	54.00	-21.99	1.04 H	11	-5.47	37.48

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	1602.00	36.52 PK	74.00	-37.48	1.00 V	258	7.27	29.25
1	1602.00	28.62 AV	54.00	-25.38	1.00 V	258	-0.63	29.25
2	2390.00	46.39 PK	74.00	-27.61	1.07 V	128	14.90	31.49
2	2390.00	38.81 AV	54.00	-15.19	1.07 V	128	7.32	31.49
3	*2402.00	96.20 PK			1.07 V	126	64.66	31.54
3	*2402.00	66.20 AV			1.07 V	126	34.66	31.54
4	4804.00	64.87 PK	74.00	-9.13	1.37 V	113	27.39	37.48
4	4804.00	34.87 AV	54.00	-19.13	1.37 V	113	-2.61	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 correlation factor be equal to: $20\log(3.125 / 100) = -30$ dB.
 6. Average value = peak reading + $20\log(\text{duty cycle})$.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1628.00	37.98 PK	74.00	-36.02	1.31 H	18	8.70	29.28
1	1628.00	30.12 AV	54.00	-23.88	1.31 H	18	0.84	29.28
2	*2441.00	93.42 PK			1.08 H	26	61.70	31.72
2	*2441.00	63.42 AV			1.08 H	26	31.70	31.72
3	4882.00	60.12 PK	74.00	-13.88	1.08 H	5	22.45	37.67
3	4882.00	30.12 AV	54.00	-23.88	1.08 H	5	-7.55	37.67

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	1628.00	36.74 PK	74.00	-37.26	1.11 V	160	7.46	29.28
1	1628.00	28.76 AV	54.00	-25.24	1.11 V	160	-0.52	29.28
2	*2441.00	95.56 PK			1.15 V	135	63.84	31.72
2	*2441.00	65.56 AV			1.15 V	135	33.84	31.72
3	4882.00	62.35 PK	74.00	-11.65	1.25 V	108	24.68	37.67
3	4882.00	32.35 AV	54.00	-21.65	1.25 V	108	-5.32	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 correlation factor be equal to: $20\log(3.125 / 100) = -30$ dB.
 6. Average value = peak reading + $20\log(\text{duty cycle})$.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1654.00	37.92 PK	74.00	-36.08	1.08 H	315	8.61	29.31
1	1654.00	29.97 AV	54.00	-24.03	1.08 H	315	0.66	29.31
2	*2480.00	93.91 PK			1.08 H	35	62.01	31.90
2	*2480.00	63.91 AV			1.08 H	35	32.01	31.90
3	2483.50	45.11 PK	74.00	-28.89	1.08 H	18	13.20	31.91
3	2483.50	38.01 AV	54.00	-15.99	1.08 H	18	6.10	31.91
4	4960.00	63.55 PK	74.00	-10.45	1.08 H	32	25.72	37.83
4	4960.00	33.55 AV	54.00	-20.45	1.08 H	32	-4.28	37.83

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	1654.00	36.89 PK	74.00	-37.11	1.03 V	265	7.58	29.31
1	1654.00	28.76 AV	54.00	-25.24	1.03 V	265	-0.55	29.31
2	*2480.00	95.18 PK			1.08 V	118	63.28	31.90
2	*2480.00	65.18 AV			1.08 V	118	33.28	31.90
3	2483.50	47.01 PK	74.00	-26.99	1.08 V	352	15.10	31.91
3	2483.50	39.76 AV	54.00	-14.24	1.08 V	352	7.85	31.91
4	4960.00	67.86 PK	74.00	-6.14	1.03 V	108	30.03	37.83
4	4960.00	37.86 AV	54.00	-16.14	1.03 V	108	0.03	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 correlation factor be equal to: $20\log(3.125 / 100) = -30$ dB.
 6. Average value = peak reading + $20\log(\text{duty cycle})$.

FOR 8DPSK

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	8DPSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
TESTED BY	Long Chen		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1602.00	37.22 PK	74.00	-36.78	1.15 H	121	7.97	29.25
1	1602.00	29.69 AV	54.00	-24.31	1.15 H	121	0.44	29.25
2	2390.00	44.11 PK	74.00	-29.89	1.08 H	12	12.62	31.49
2	2390.00	36.65 AV	54.00	-17.35	1.08 H	12	5.16	31.49
3	*2402.00	93.55 PK			1.02 H	39	62.01	31.54
3	*2402.00	63.55 AV			1.02 H	39	32.01	31.54
4	4804.00	61.32 PK	74.00	-12.68	1.08 H	26	23.84	37.48
4	4804.00	31.32 AV	54.00	-22.68	1.08 H	26	-6.16	37.48

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	1602.00	36.85 PK	74.00	-37.15	1.00 V	263	7.60	29.25
1	1602.00	28.98 AV	54.00	-25.02	1.00 V	263	-0.27	29.25
2	2390.00	45.85 PK	74.00	-28.15	1.03 V	118	14.36	31.49
2	2390.00	38.94 AV	54.00	-15.06	1.03 V	118	7.45	31.49
3	*2402.00	95.12 PK			1.05 V	113	63.58	31.54
3	*2402.00	65.12 AV			1.05 V	113	33.58	31.54
4	4804.00	63.55 PK	74.00	-10.45	1.28 V	103	26.07	37.48
4	4804.00	33.55 AV	54.00	-20.45	1.28 V	103	-3.93	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 correlation factor be equal to: $20\log(3.125 / 100) = -30 \text{ dB}$.
 6. Average value = peak reading + $20\log(\text{duty cycle})$.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	8DPSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
TESTED BY	Long Chen		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1628.00	37.85 PK	74.00	-36.15	1.22 H	36	8.57	29.28
1	1628.00	30.02 AV	54.00	-23.98	1.22 H	36	0.74	29.28
2	*2441.00	93.15 PK			1.02 H	19	61.43	31.72
2	*2441.00	63.15 AV			1.02 H	19	31.43	31.72
3	4882.00	59.98 PK	74.00	-14.02	1.05 H	1	22.32	37.67
3	4882.00	29.98 AV	54.00	-24.02	1.05 H	1	-7.69	37.67

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	1628.00	36.29 PK	74.00	-37.71	1.11 V	125	7.01	29.28
1	1628.00	28.37 AV	54.00	-25.63	1.11 V	125	-0.91	29.28
2	*2441.00	95.32 PK			1.05 V	102	63.60	31.72
2	*2441.00	65.32 AV			1.05 V	102	33.60	31.72
3	4882.00	63.55 PK	74.00	-10.45	1.02 V	101	25.88	37.67
3	4882.00	33.55 AV	54.00	-20.45	1.02 V	101	-4.12	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 correlation factor be equal to: $20\log(3.125 / 100) = -30$ dB.
 6. Average value = peak reading + $20\log(\text{duty cycle})$.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	8DPSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH, 991hPa
TESTED BY	Long Chen		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1654.00	36.71 PK	74.00	-37.29	1.03 H	302	7.40	29.31
1	1654.00	29.68 AV	54.00	-24.32	1.03 H	302	0.37	29.31
2	*2480.00	92.12 PK			1.03 H	32	60.22	31.90
2	*2480.00	62.12 AV			1.03 H	32	30.22	31.90
3	2483.50	45.55 PK	74.00	-28.45	1.06 H	32	13.64	31.91
3	2483.50	38.23 AV	54.00	-15.77	1.06 H	32	6.32	31.91
4	4960.00	62.75 PK	74.00	-11.25	1.06 H	39	24.92	37.83
4	4960.00	32.75 AV	54.00	-21.25	1.06 H	39	-5.08	37.83

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	1654.00	36.55 PK	74.00	-37.45	1.05 V	241	7.24	29.31
1	1654.00	28.43 AV	54.00	-25.57	1.05 V	241	-0.88	29.31
2	*2480.00	94.55 PK			1.07 V	105	62.65	31.90
2	*2480.00	64.55 AV			1.07 V	105	32.65	31.90
3	2483.50	46.85 PK	74.00	-27.15	1.06 V	315	14.94	31.91
3	2483.50	39.44 AV	54.00	-14.56	1.06 V	315	7.53	31.91
4	4960.00	67.11 PK	74.00	-6.89	1.01 V	122	29.28	37.83
4	4960.00	37.11 AV	54.00	-16.89	1.01 V	122	-0.72	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 correlation factor be equal to: $20\log(3.125 / 100) = -30$ dB.
 6. Average value = peak reading + $20\log(\text{duty cycle})$.

5.3 NUMBER OF HOPPING FREQUENCY USED

5.3.1 LIMIT OF HOPPING FREQUENCY USED

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

5.3.2 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.

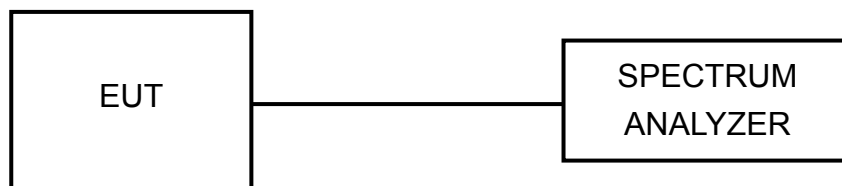
5.3.3 TEST PROCEDURES

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

5.3.4 DEVIATION FROM TEST STANDARD

No deviation.

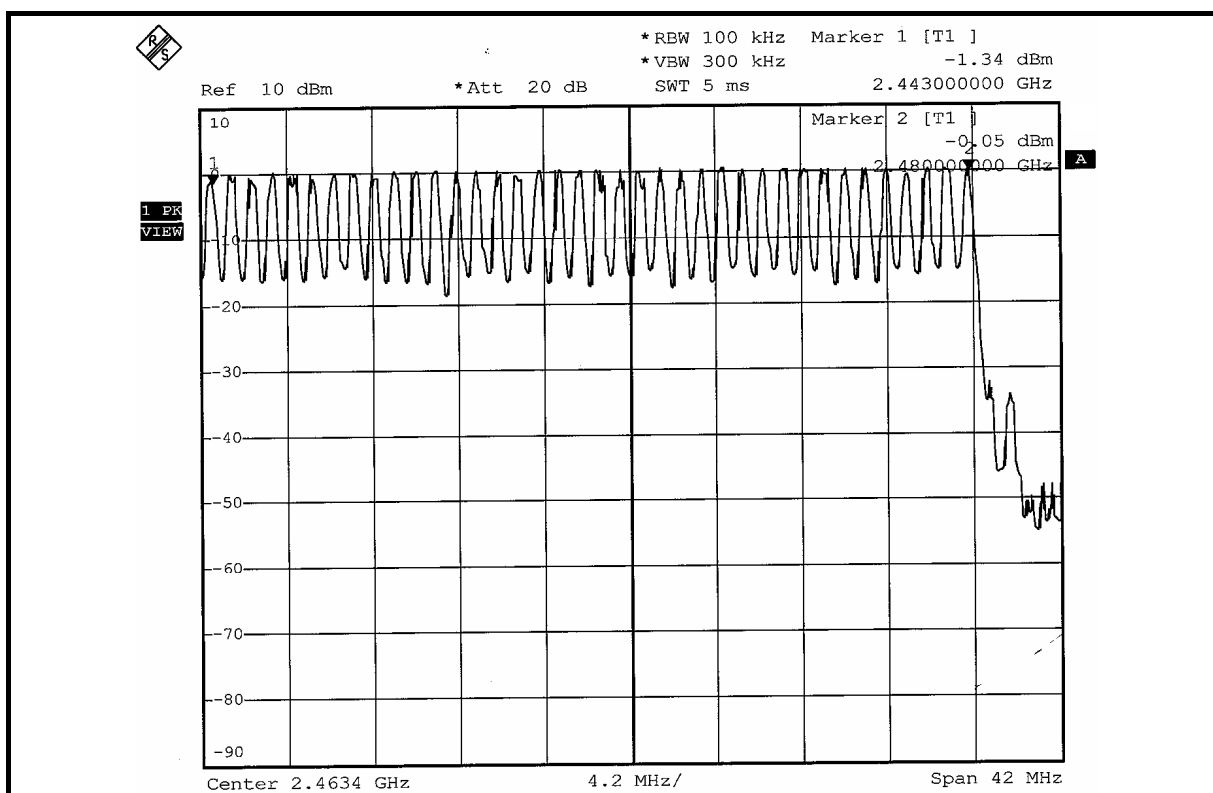
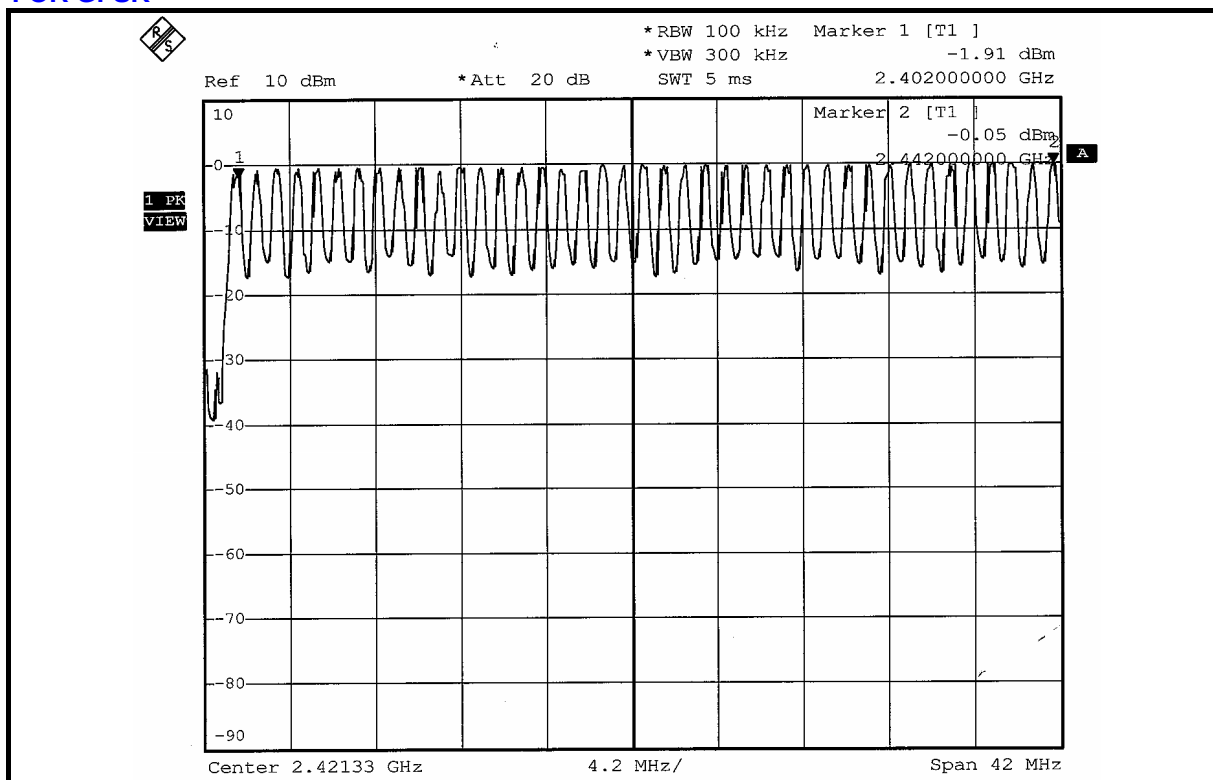
5.3.5 TEST SETUP



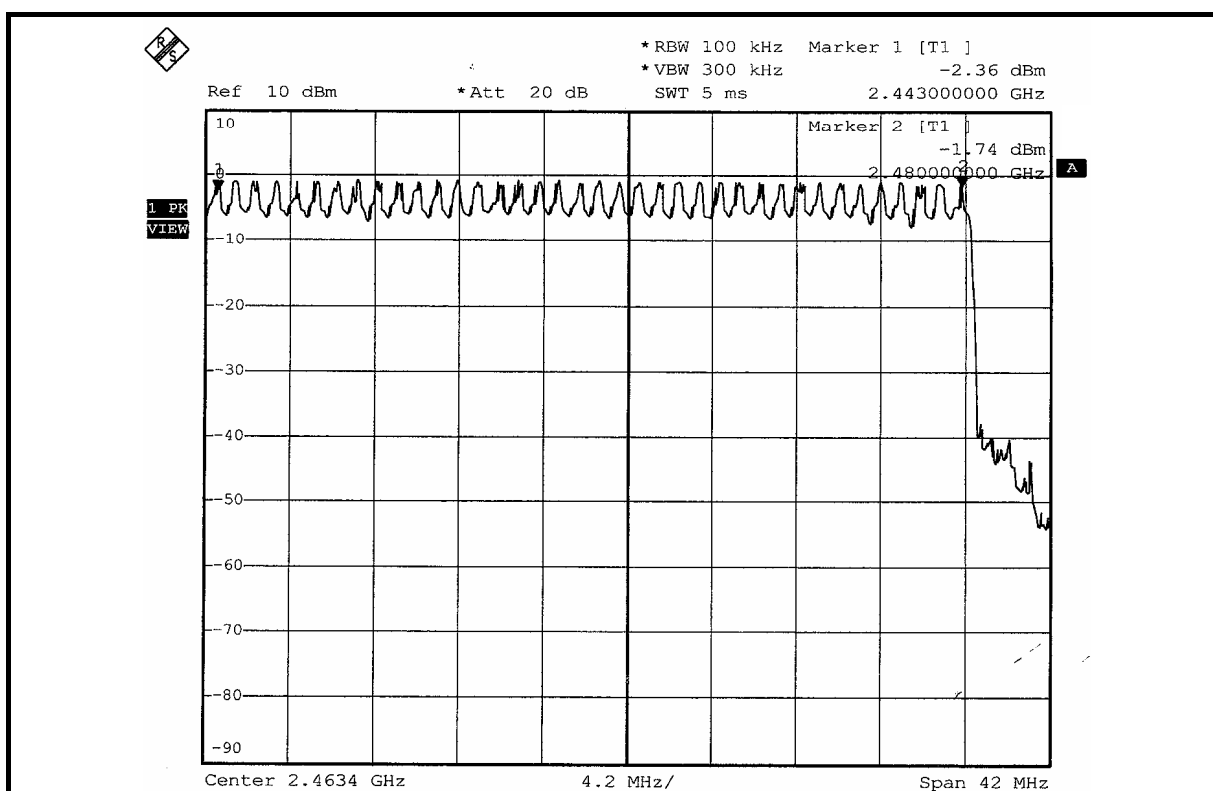
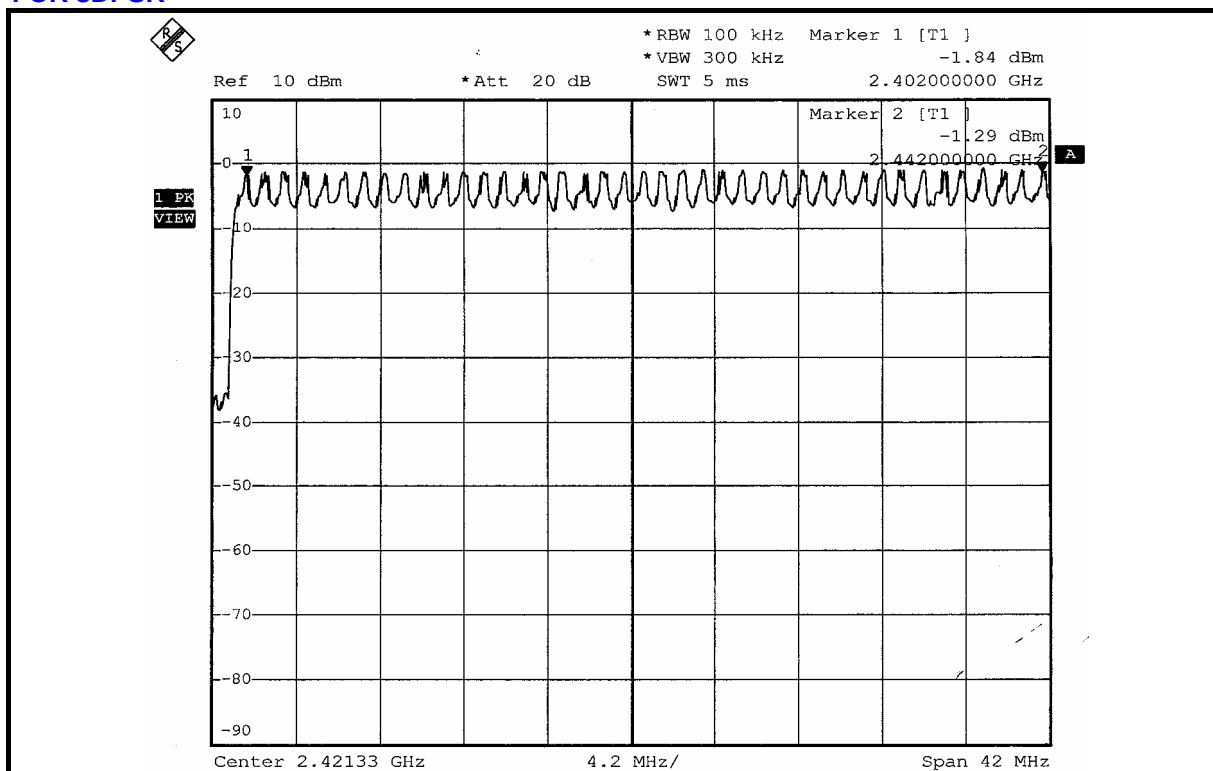
5.3.6 TEST RESULTS

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.

FOR GFSK



FOR 8DPSK



5.4 DWELL TIME ON EACH CHANNEL

5.4.1 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.

5.4.2 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.

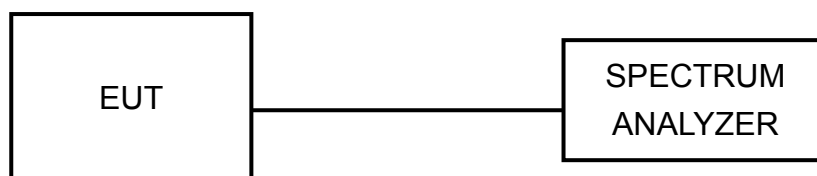
5.4.3 TEST PROCEDURES

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

5.4.4 DEVIATION FROM TEST STANDARD

No deviation.

5.4.5 TEST SETUP



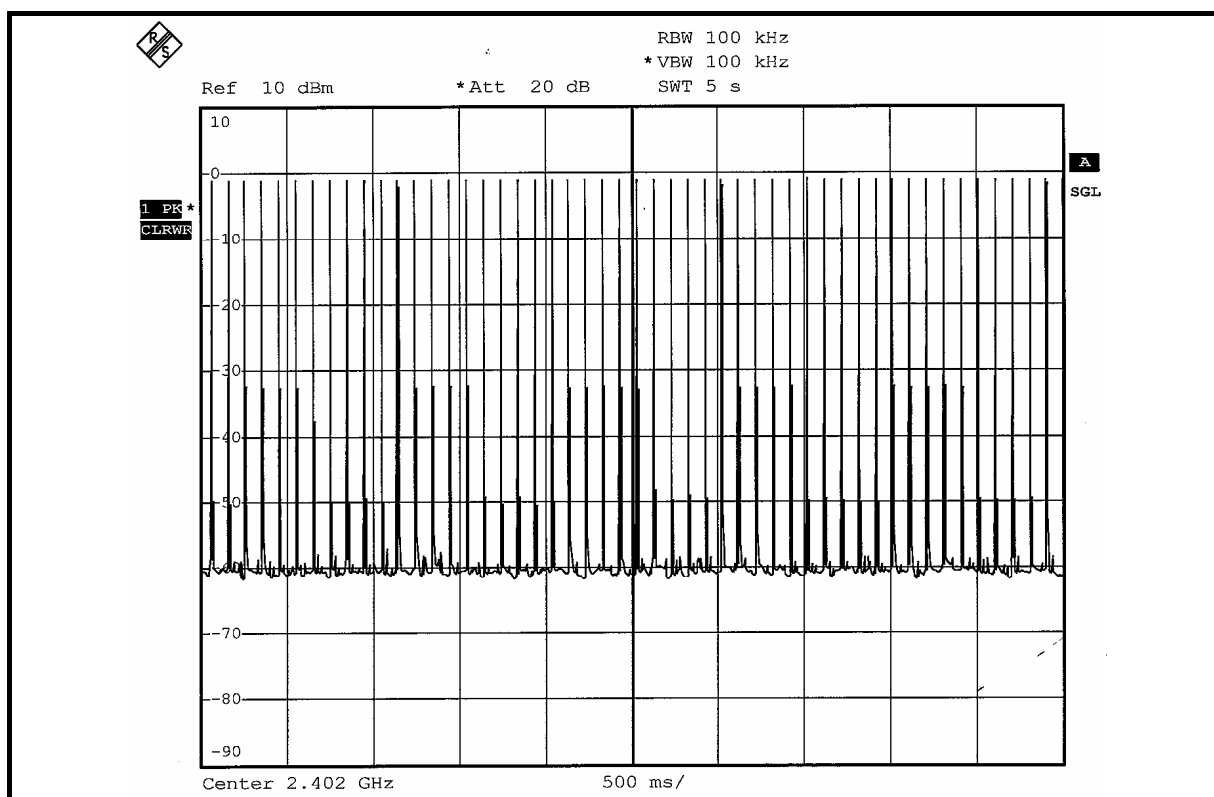
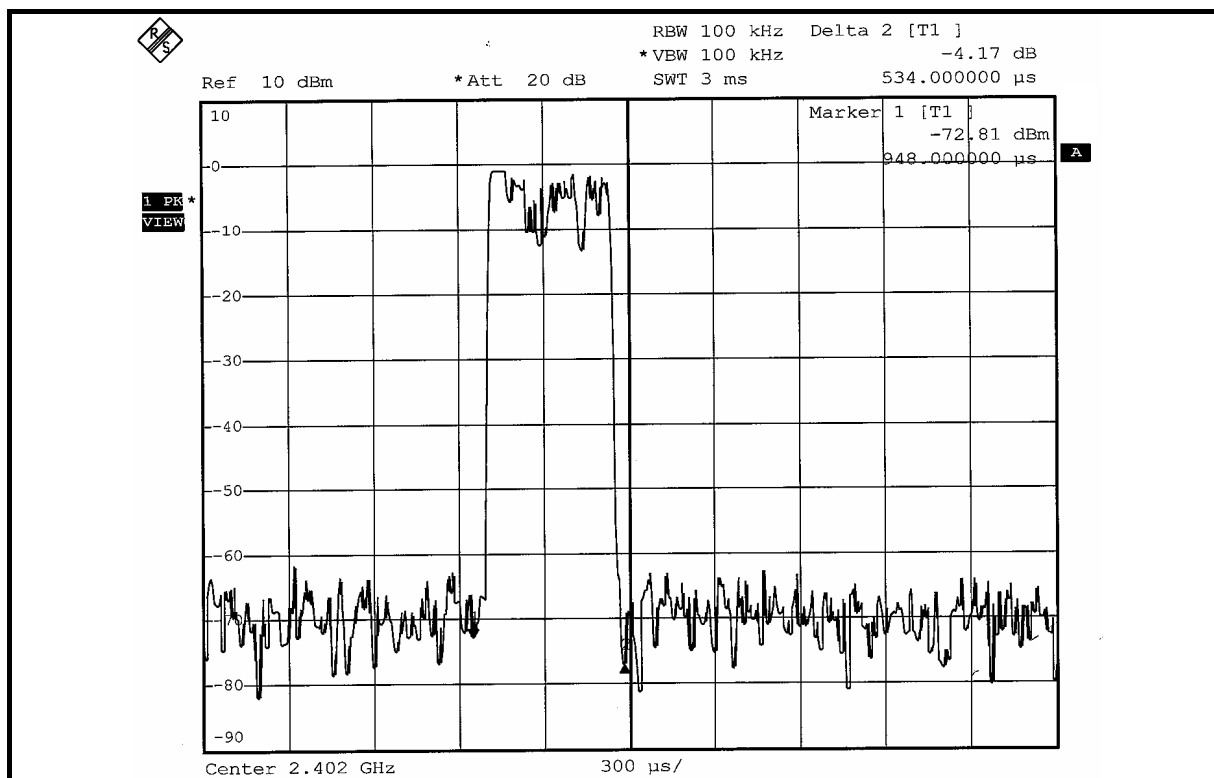
5.4.6 EST RESULTS

FOR GFSK

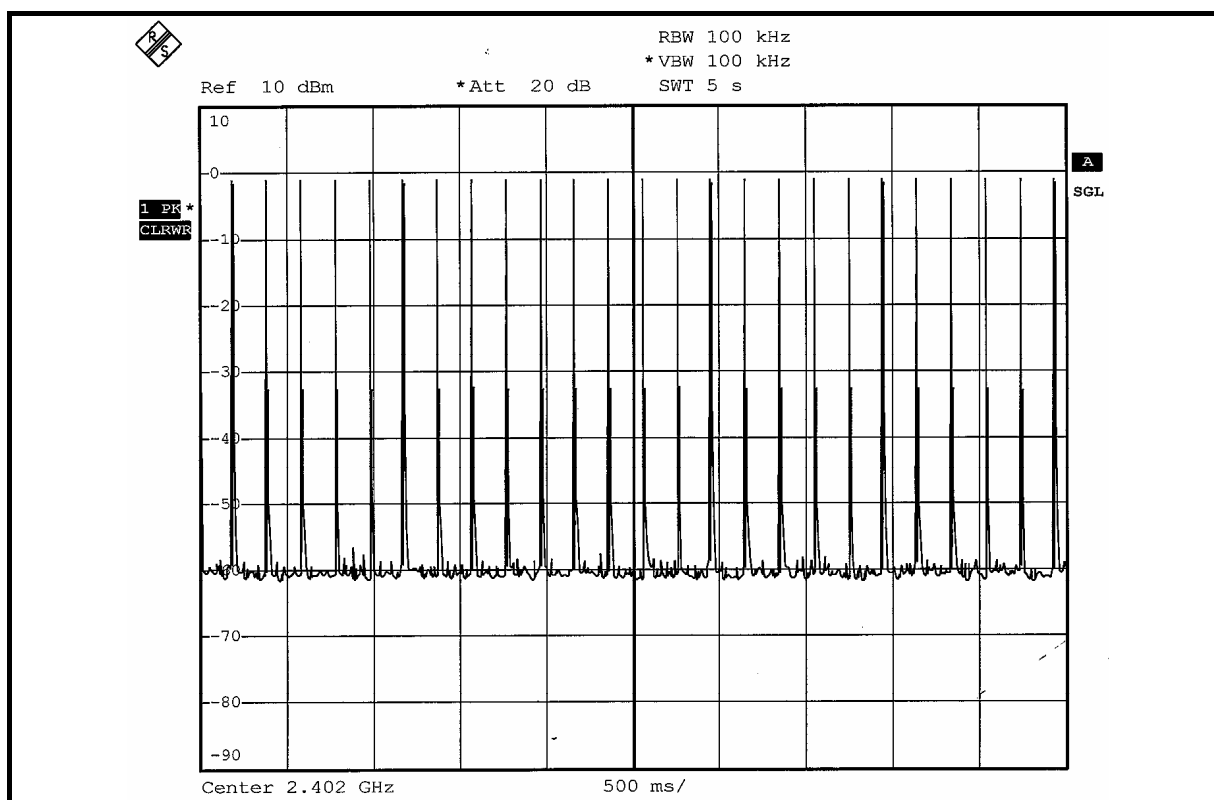
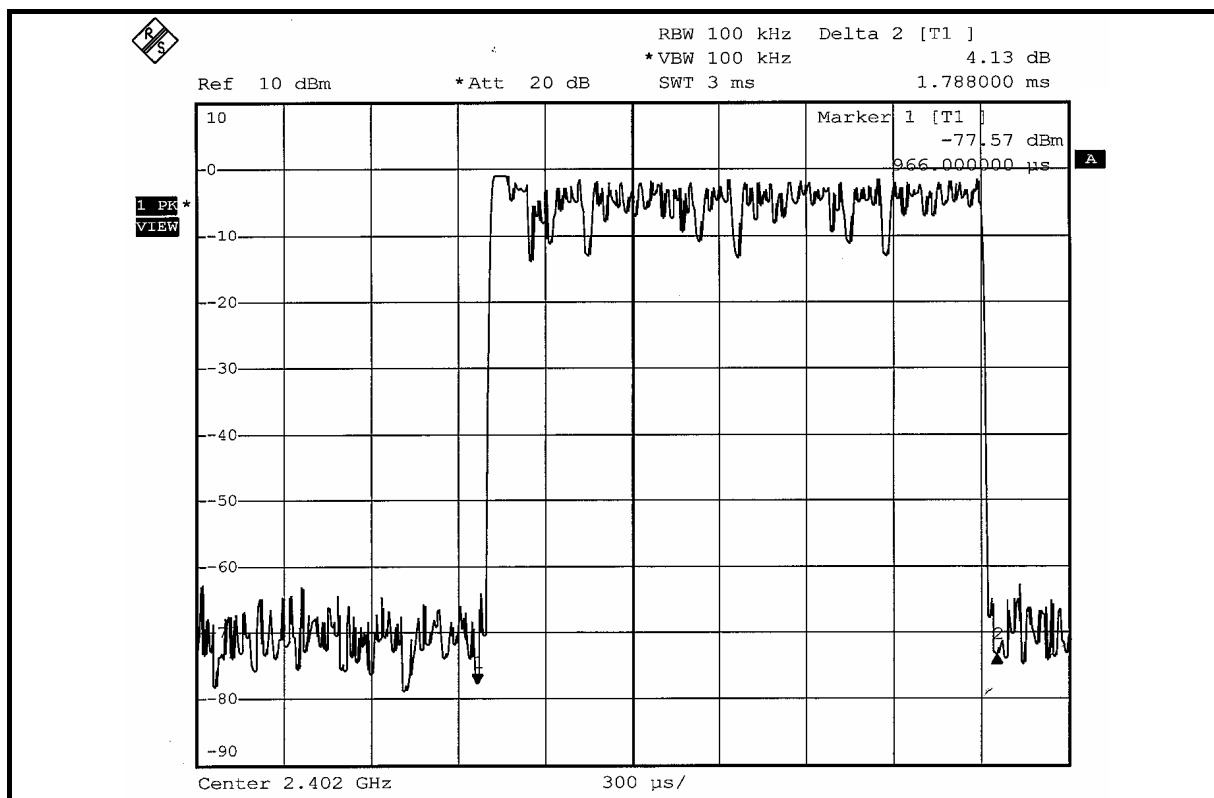
Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	51 (times / 5 sec) * 6.32 = 322.32 times	0.534	172.119	400
DH3	25 (times / 5 sec) * 6.32 = 158.00times	1.788	282.504	400
DH5	17 (times / 5 sec) * 6.32 = 107.44 times	3.024	324.899	400

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

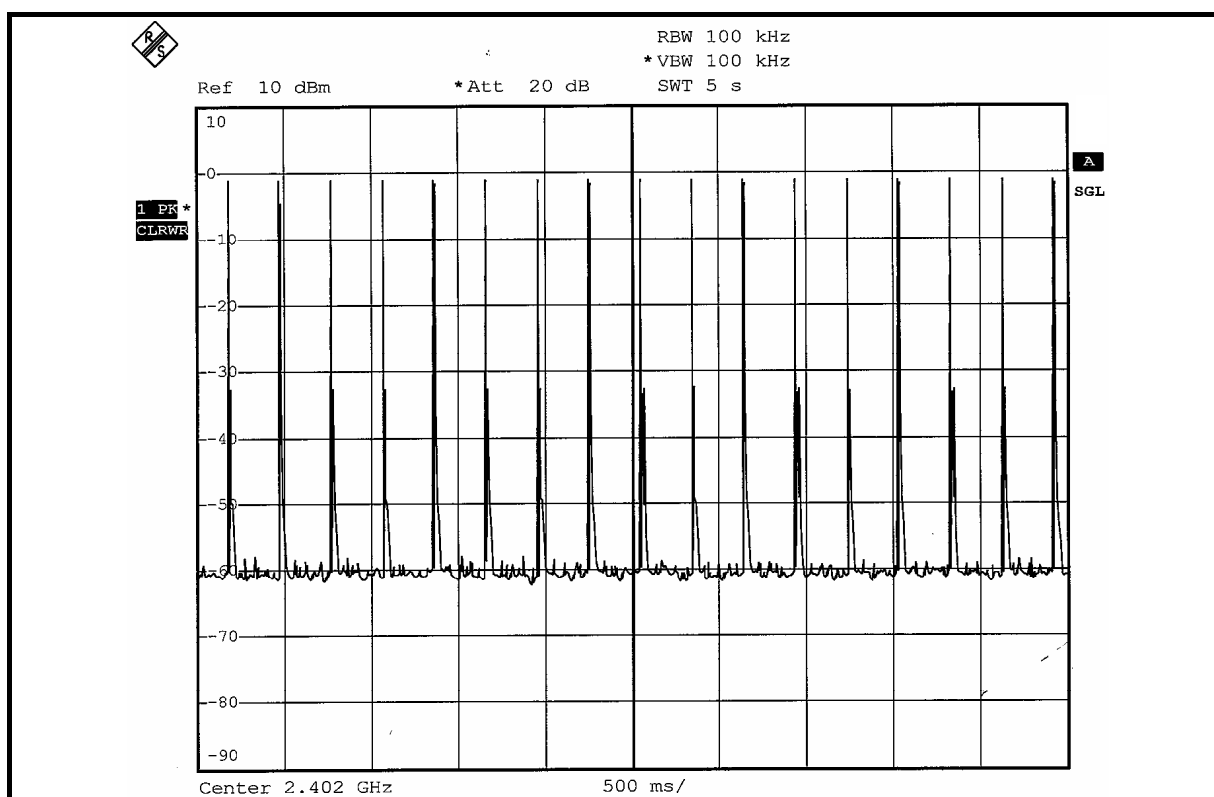
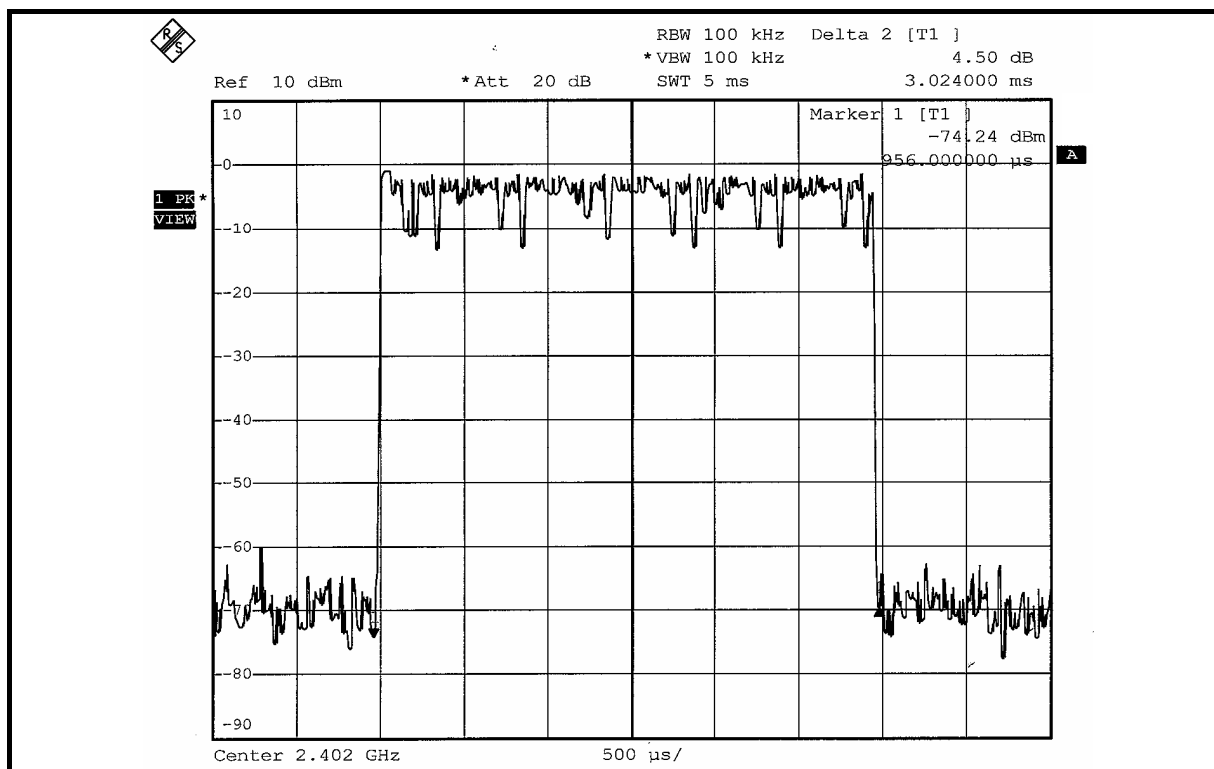
DH1



DH3



DH5

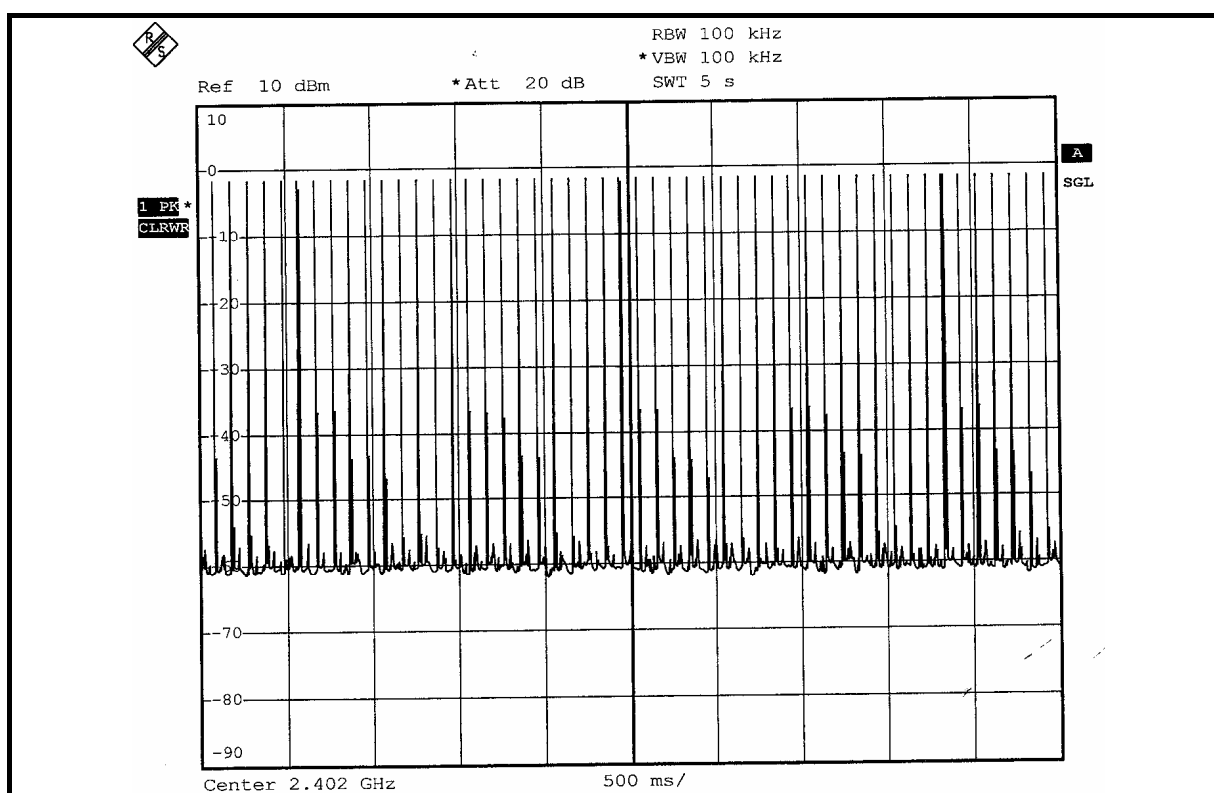
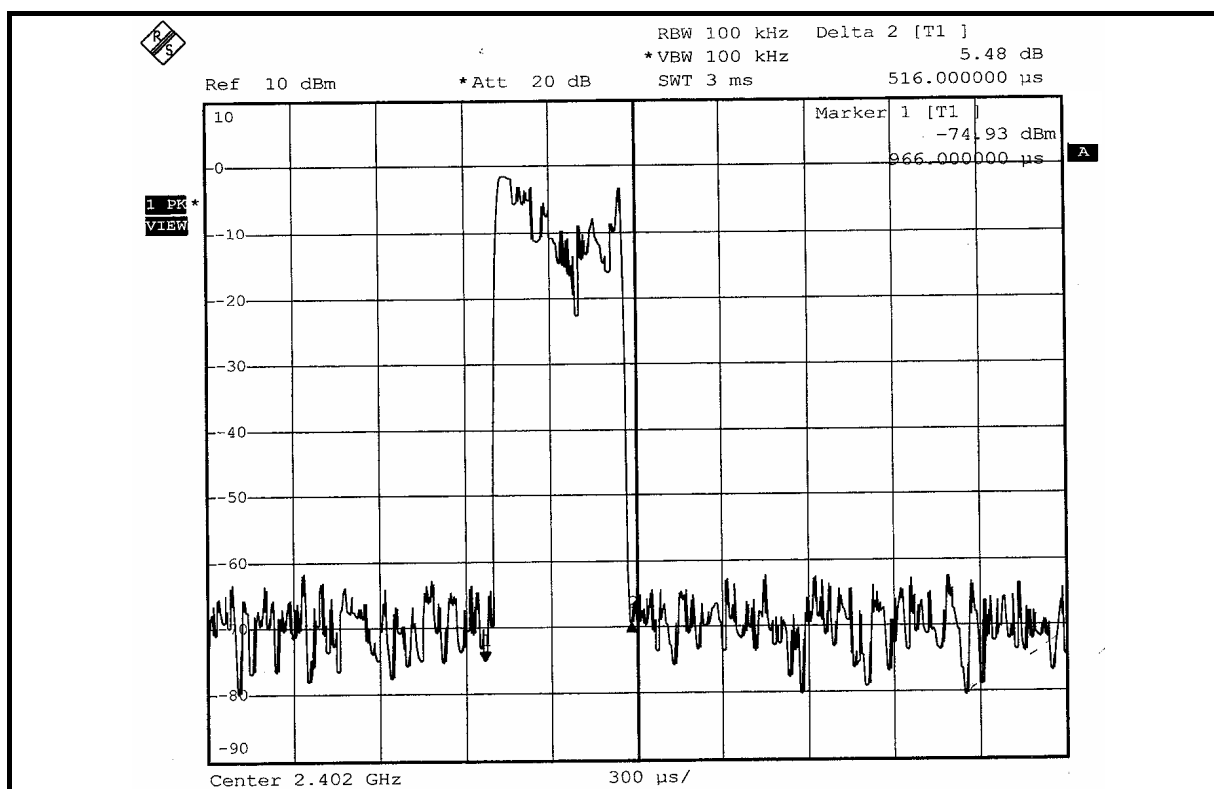


FOR 8DPSK

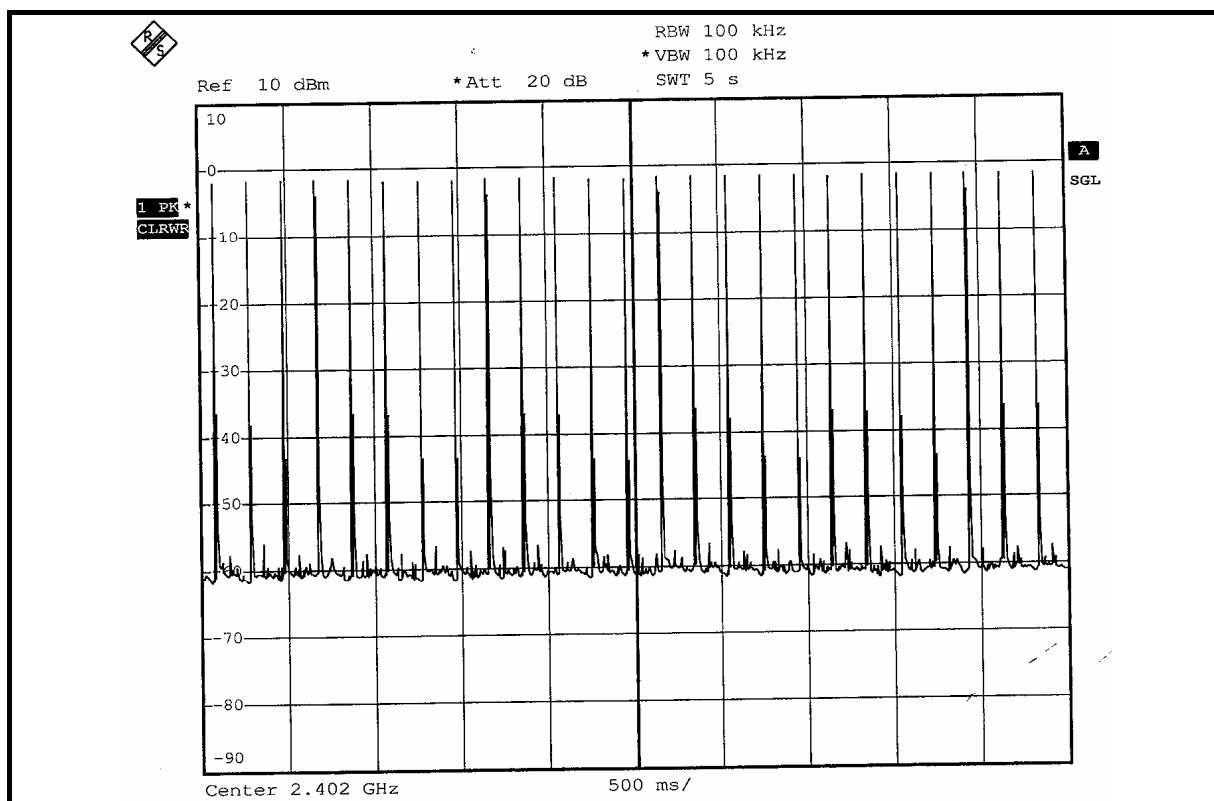
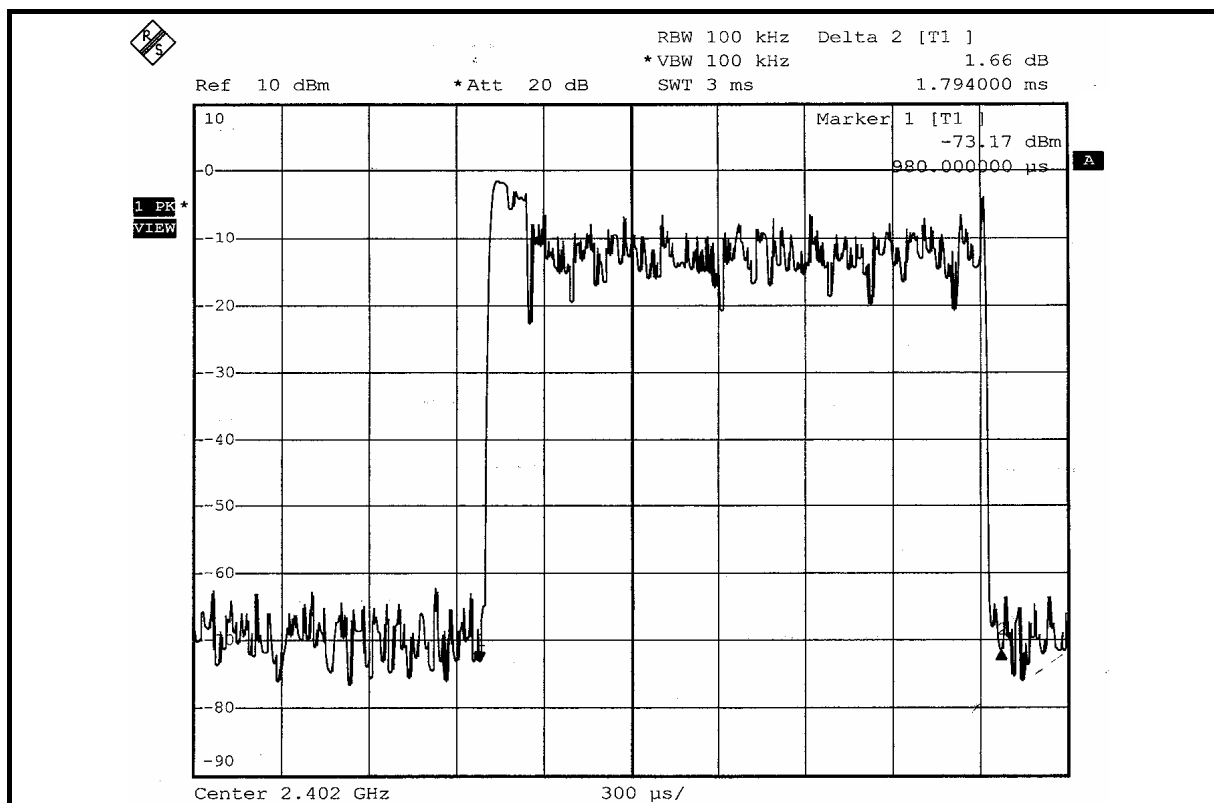
Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	50 (times / 5 sec) * 6.32 = 316.00 times	0.516	163.056	400
DH3	25 (times / 5 sec) * 6.32 = 158.00 times	1.794	283.452	400
DH5	17 (times / 5 sec) * 6.32 = 107.44 times	3.070	329.841	400

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

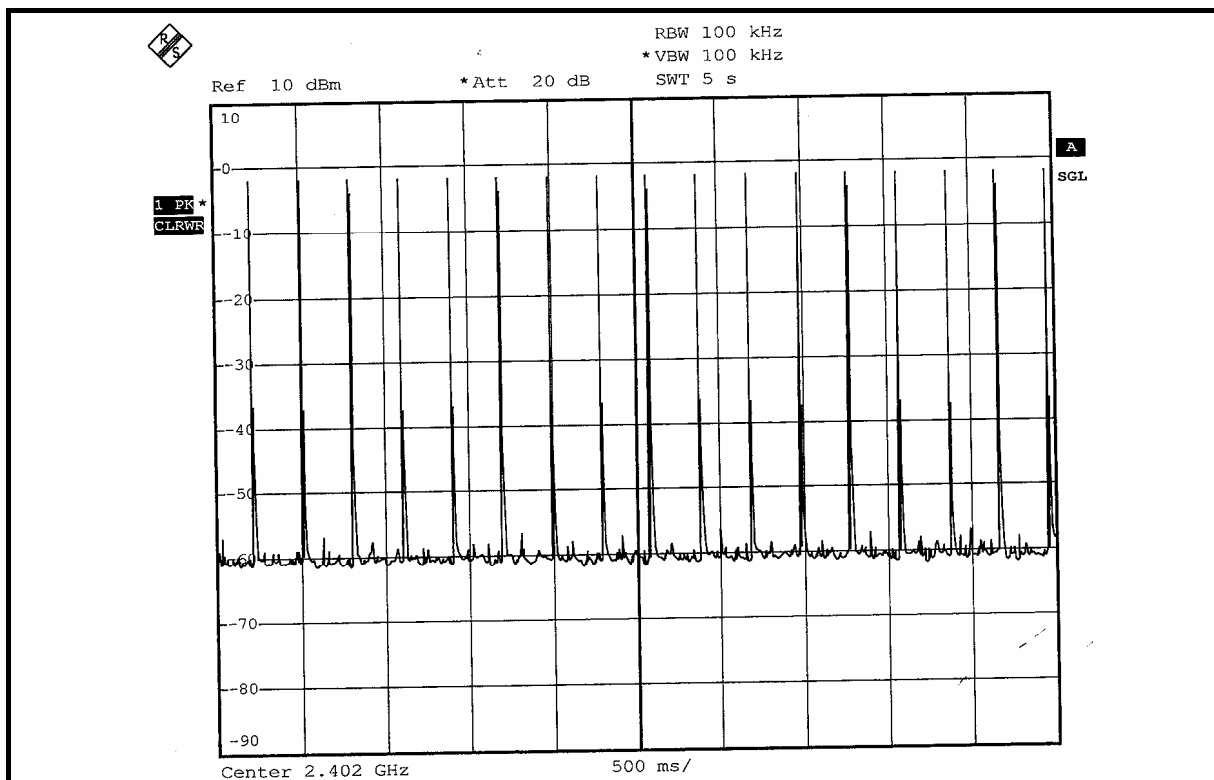
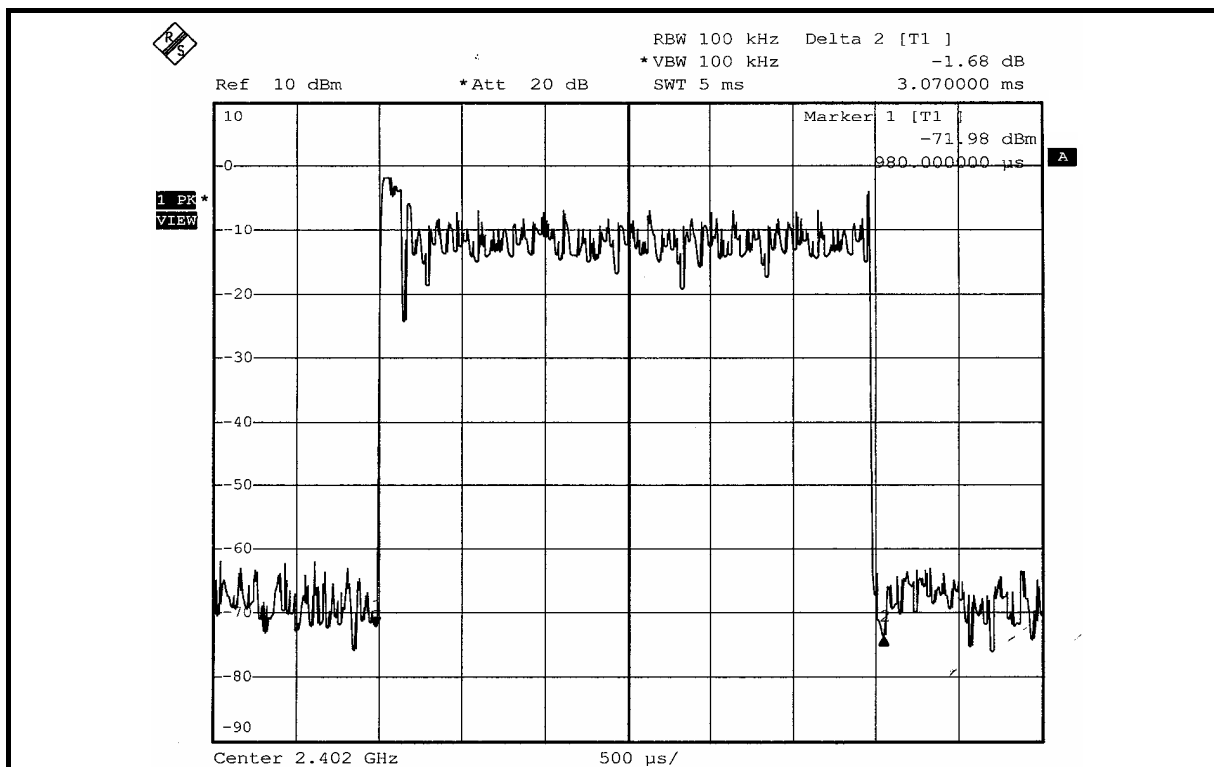
DH1



DH3



DH5



5.5 CHANNEL BANDWIDTH

5.5.1 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.

5.5.2 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.

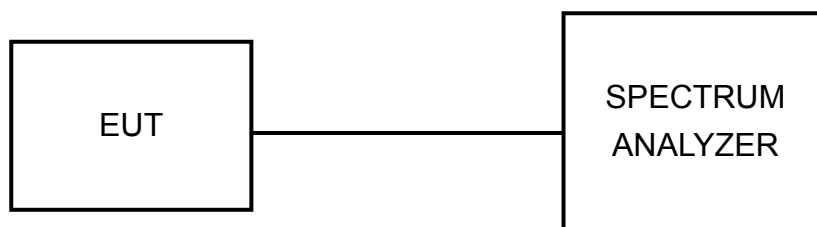
5.5.3 TEST PROCEDURE

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

5.5.4 DEVIATION FROM TEST STANDARD

No deviation.

5.5.5 TEST SETUP



5.5.6 EUT OPERATING CONDITION

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

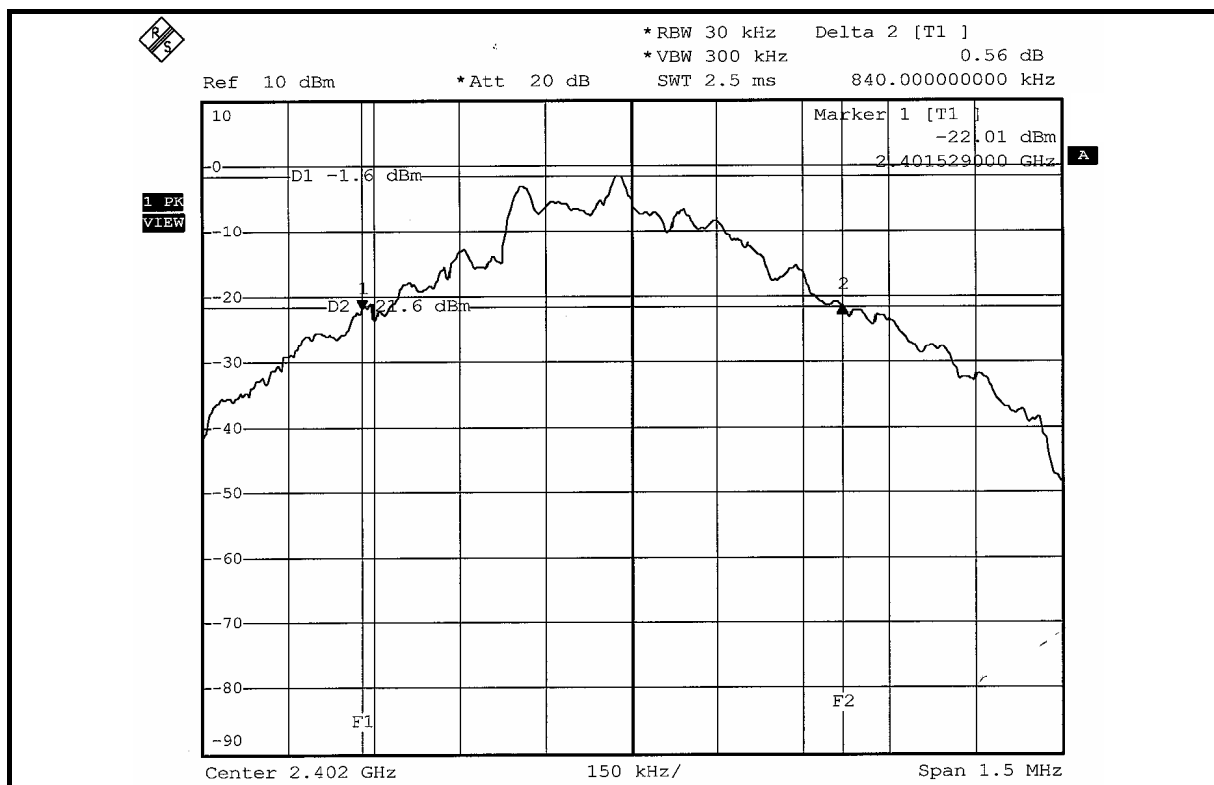
5.5.7 TEST RESULTS

FOR GFSK

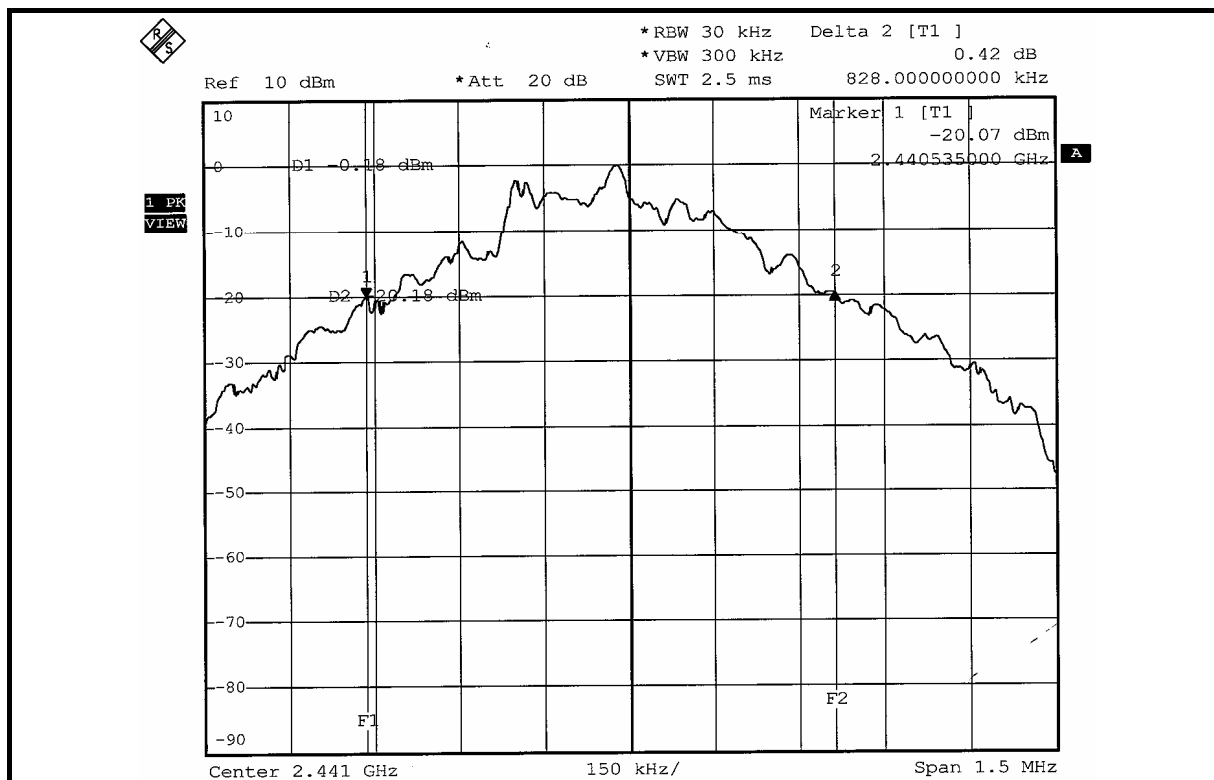
MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Long Chen

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	0.840
39	2441	0.828
78	2480	0.831

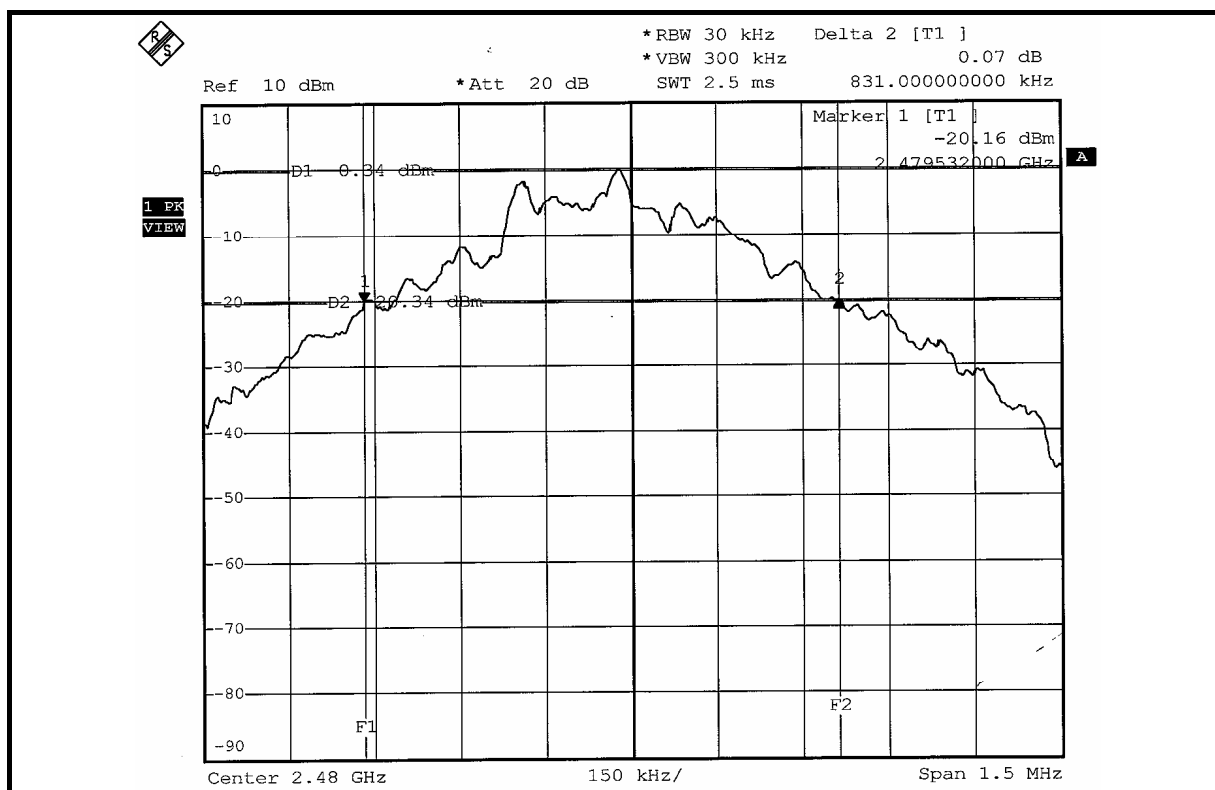
CH 0



CH 39



CH 78

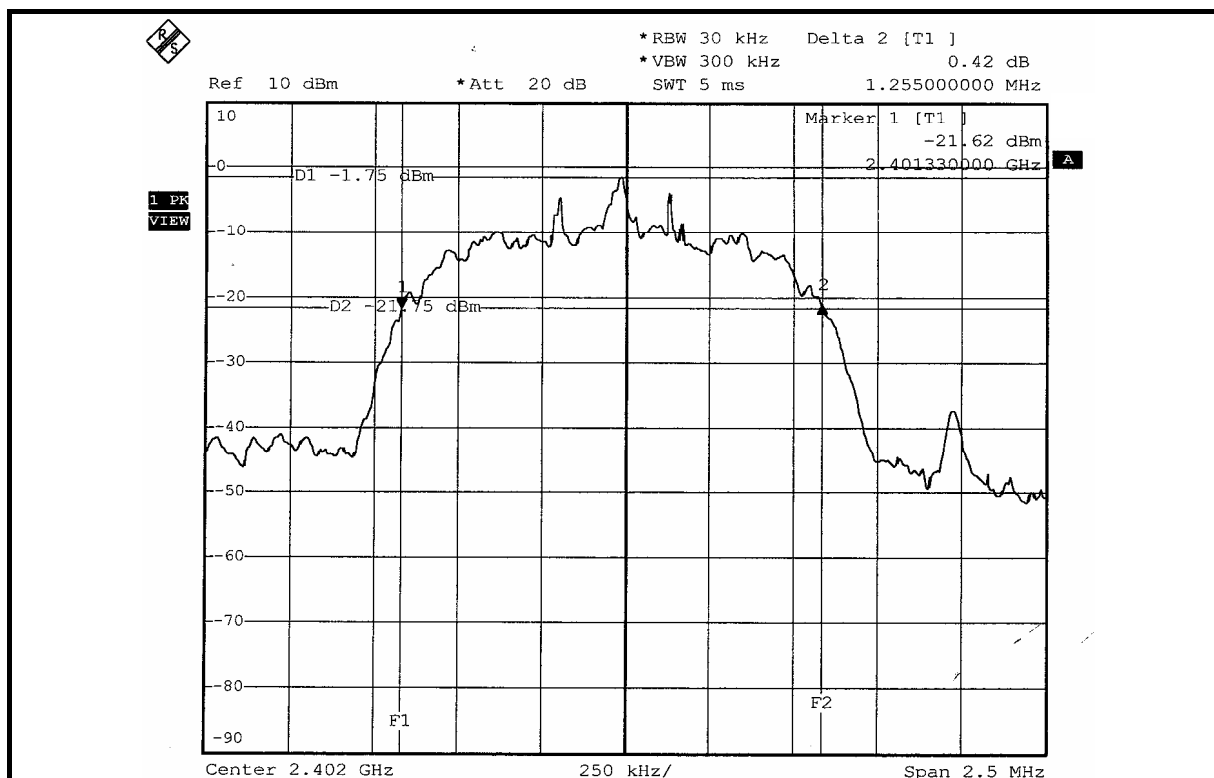


FOR 8DPSK

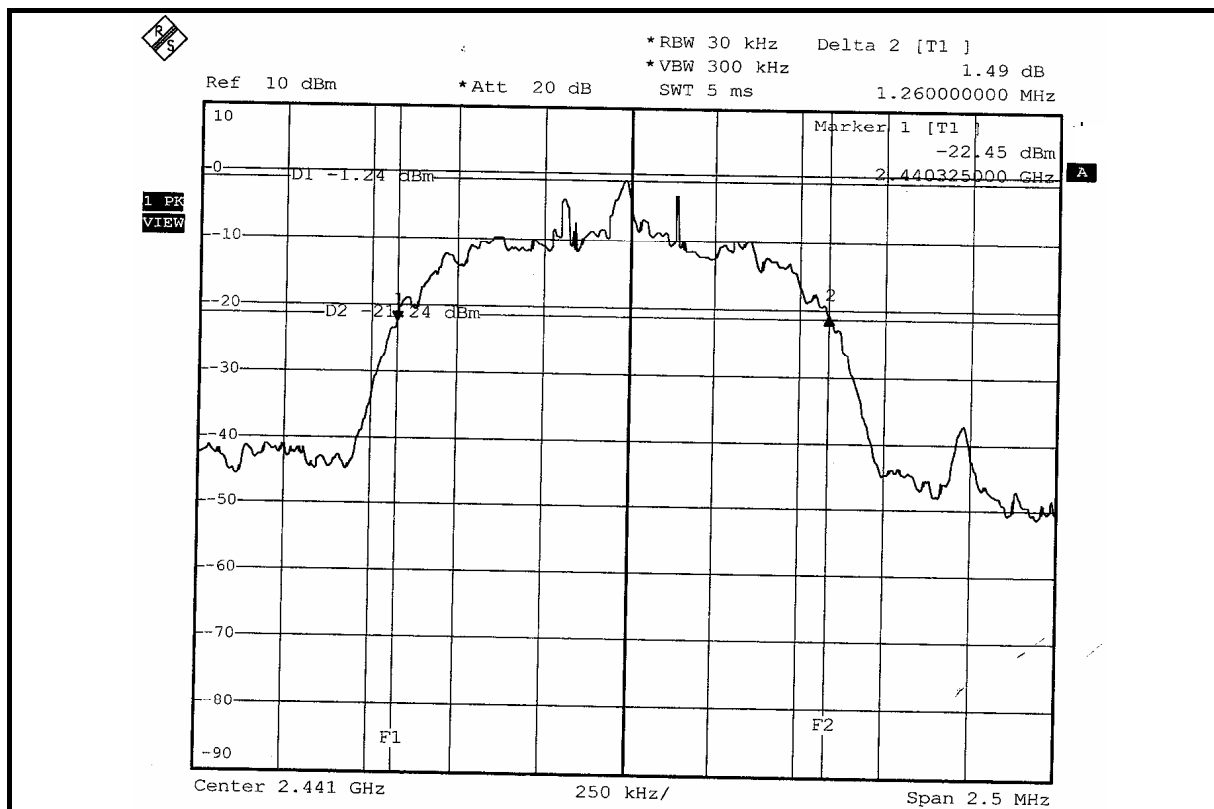
MODULATION TYPE	8DPSK	ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Long Chen

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	1.255
39	2441	1.260
78	2480	1.260

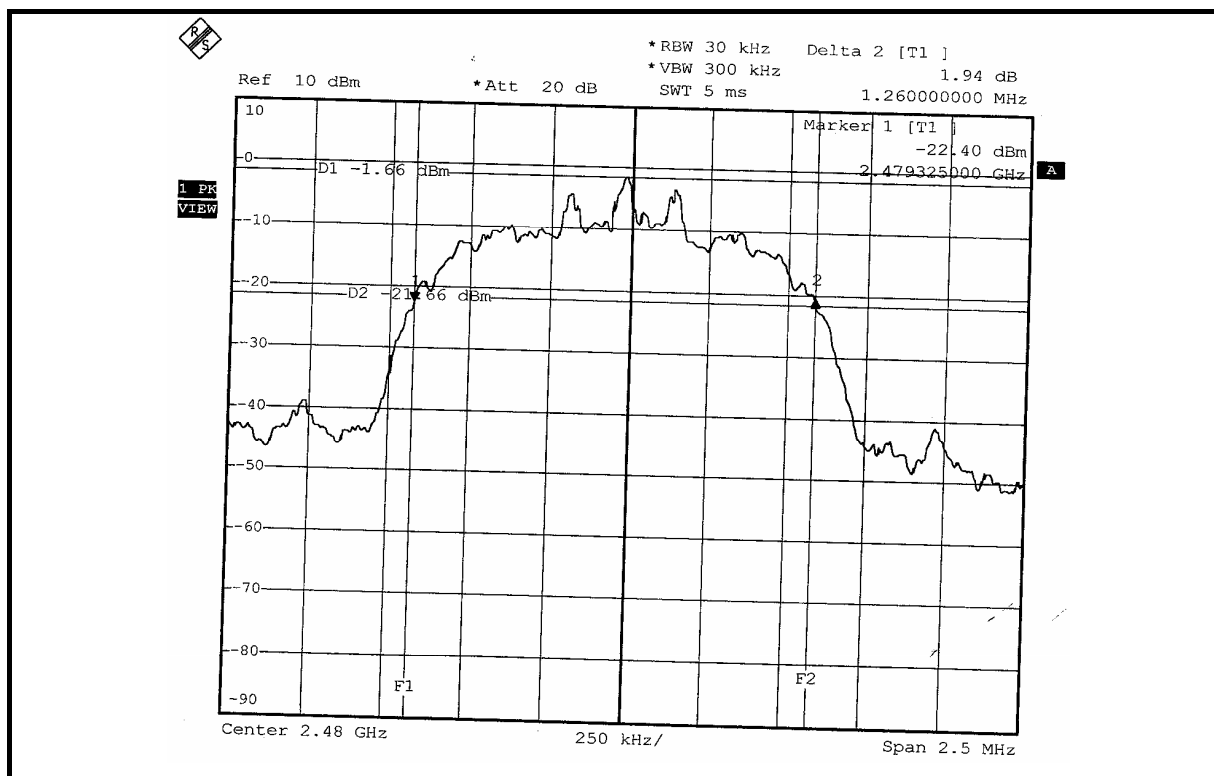
CH 0



CH 39



CH 78



5.6 HOPPING CHANNEL SEPARATION

5.6.1 LIMIT OF HOPPING CHANNEL SEPARATION

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

5.6.2 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.

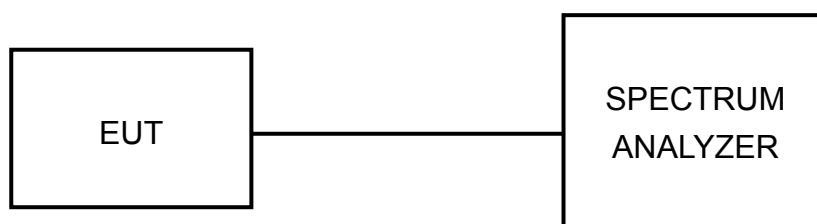
5.6.3 TEST PROCEDURES

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.

5.6.4 DEVIATION FROM TEST STANDARD

No deviation.

5.6.5 TEST SETUP



5.6.6 TEST RESULTS

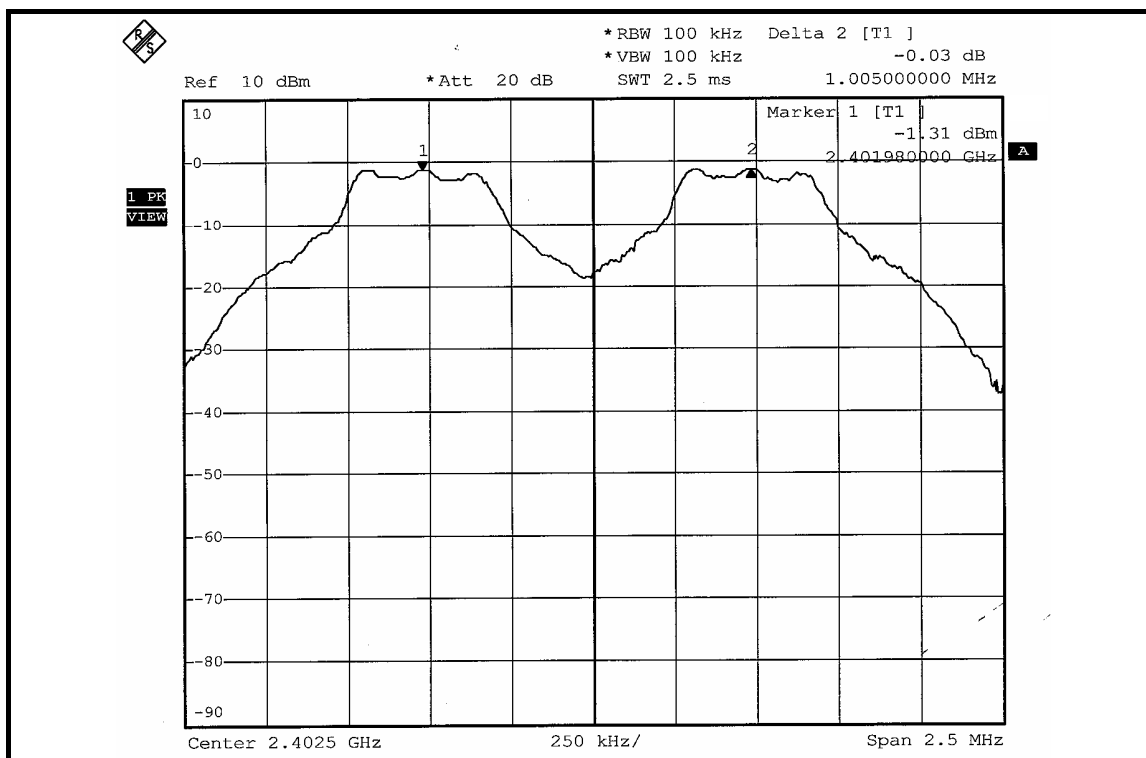
FOR GFSK

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

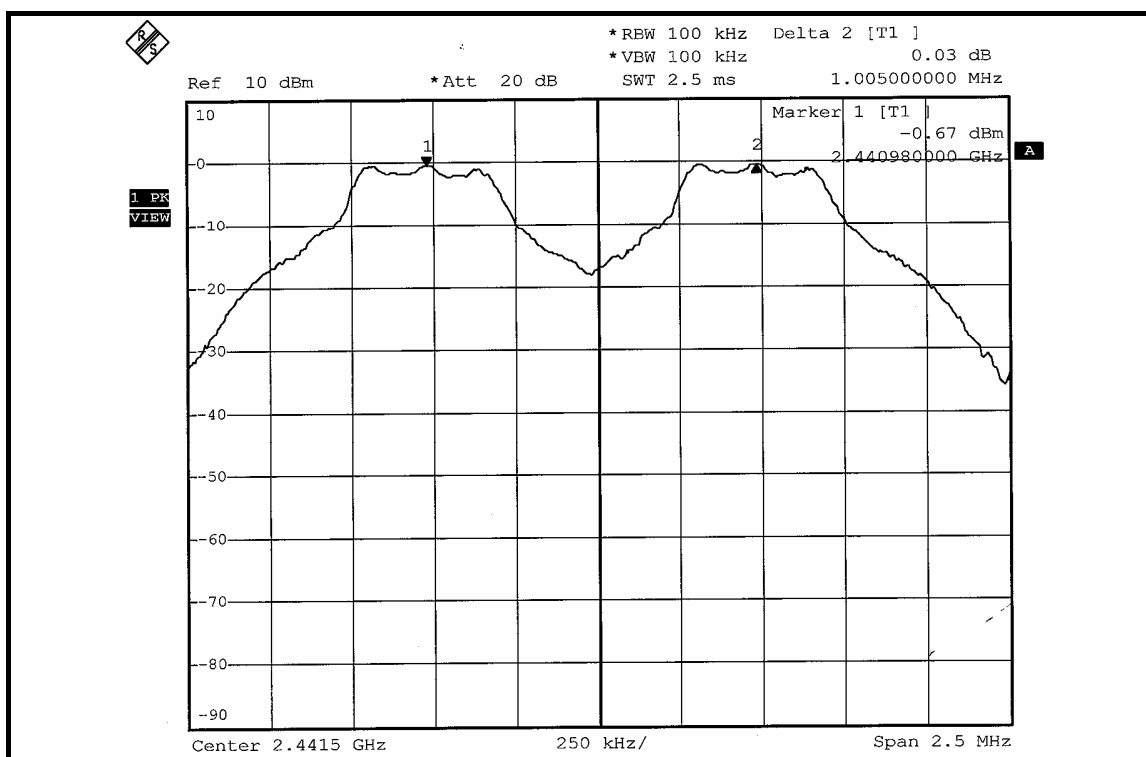
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	1.005	0.840	0.560	PASS
39	2441	1.005	0.828	0.552	PASS
78	2480	1.005	0.831	0.554	PASS

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

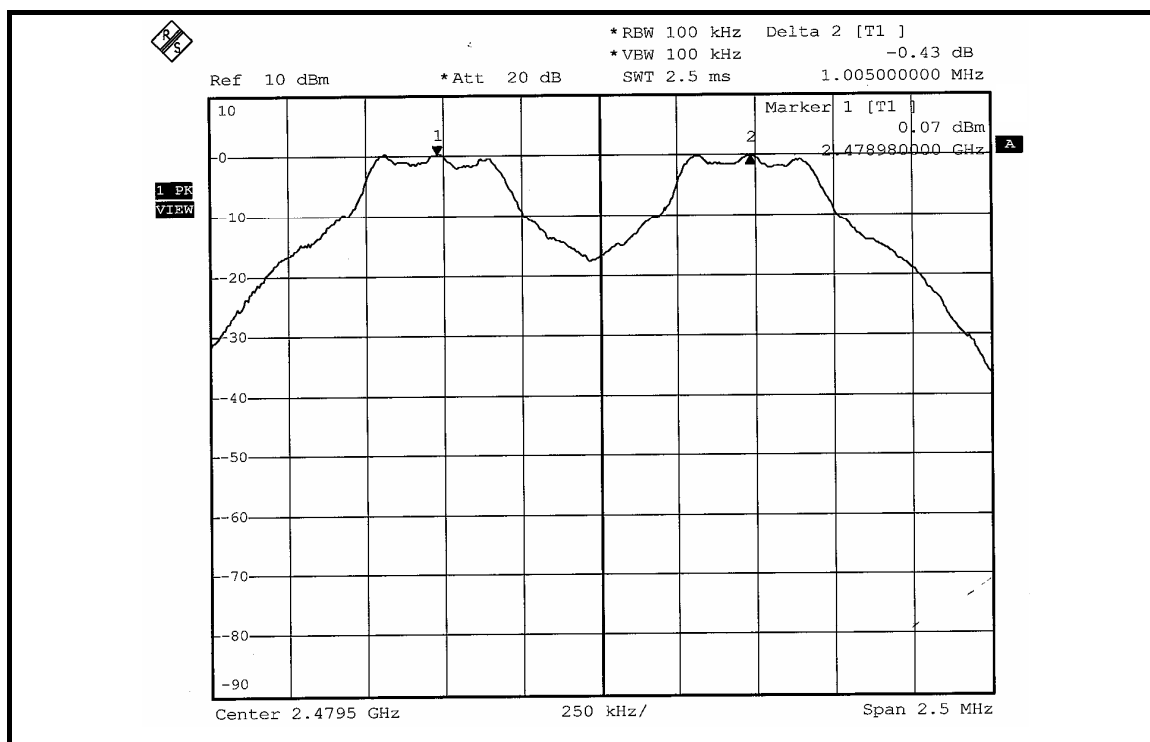
CH 0



CH 39



CH 78



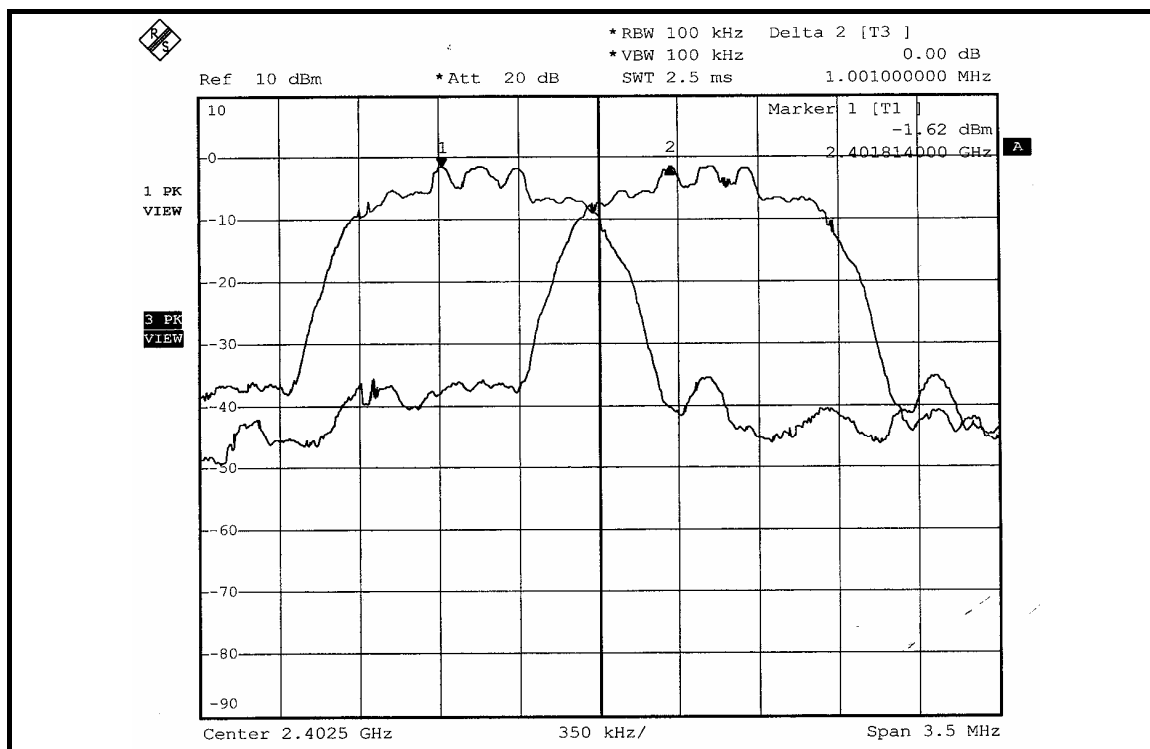
FOR 8DPSK

MODULATION TYPE	8DPSK	ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Long Chen

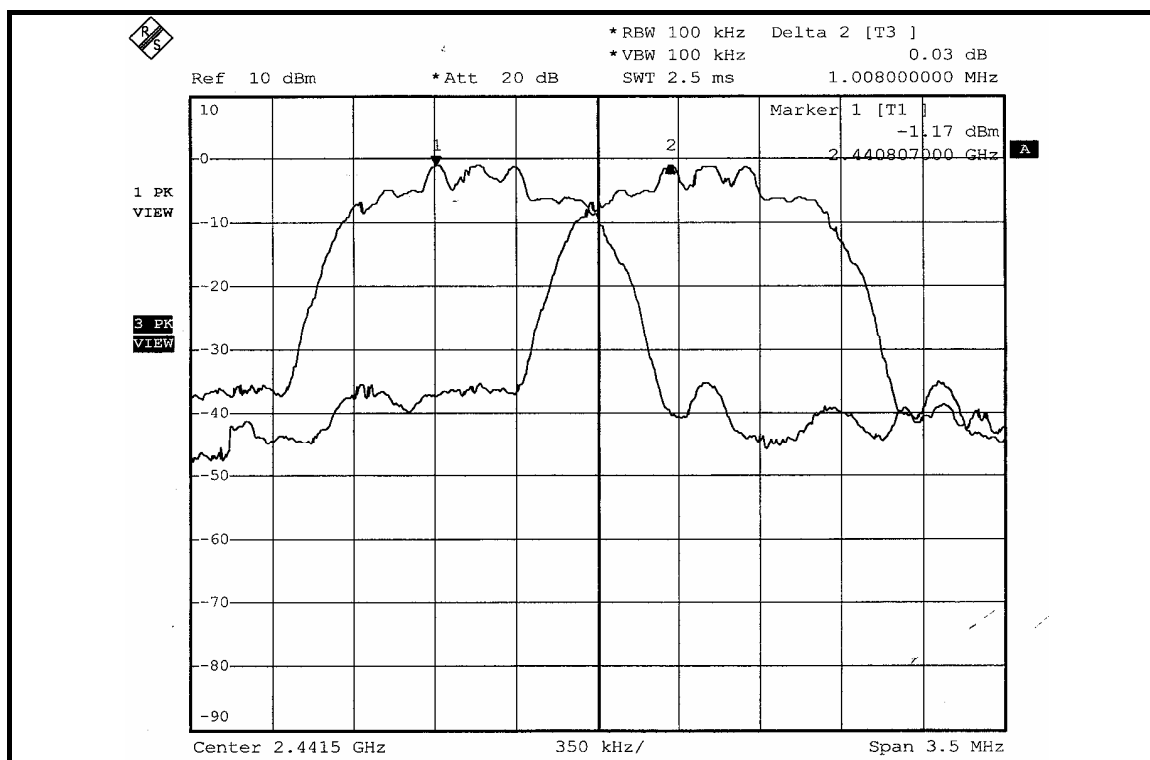
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	1.001	1.255	0.837	PASS
39	2441	1.008	1.260	0.840	PASS
78	2480	1.001	1.260	0.840	PASS

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

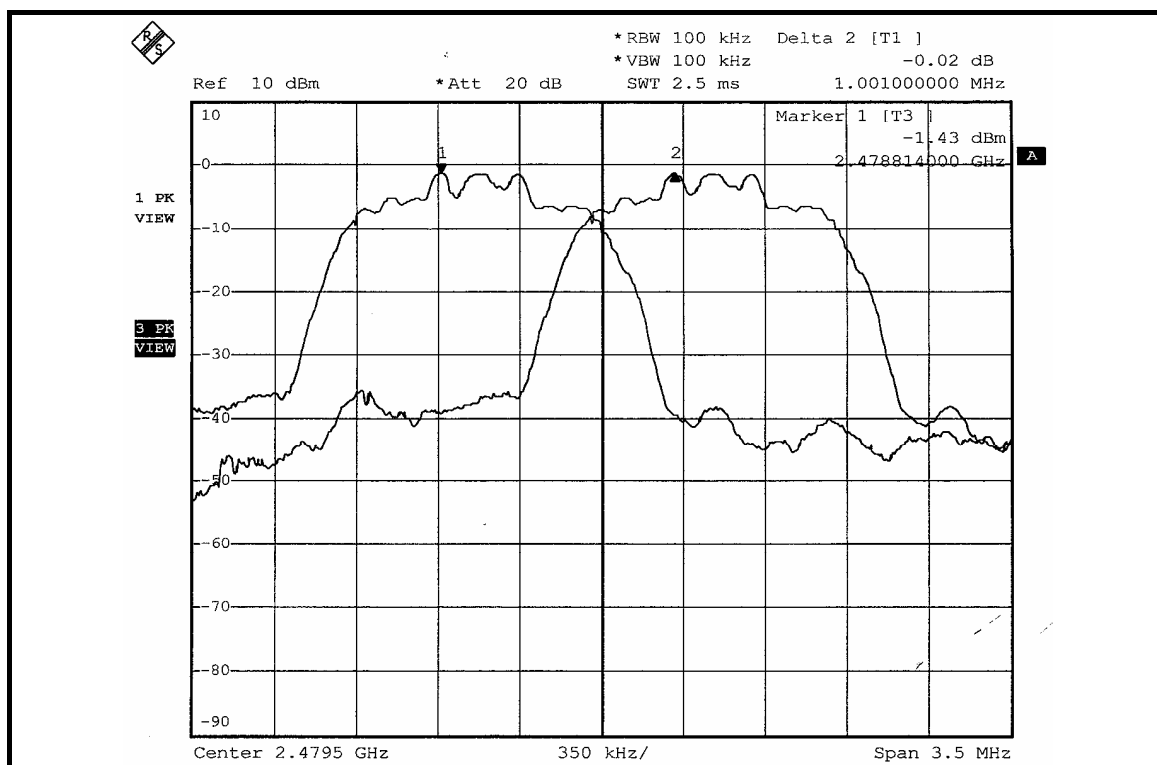
CH 0



CH 39



CH 78



5.7 MAXIMUM PEAK OUTPUT POWER

5.7.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 125mW.

5.7.2 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.

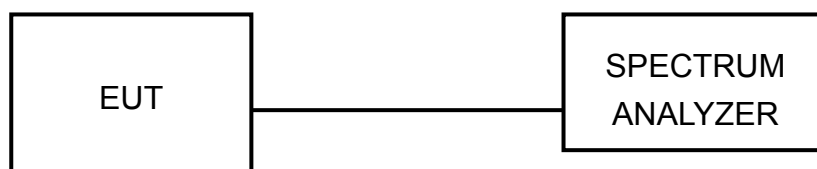
5.7.3 TEST PROCEDURES

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

5.7.4 DEVIATION FROM TEST STANDARD

No deviation

5.7.5 TEST SETUP



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

5.7.6 EUT OPERATING CONDITION

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

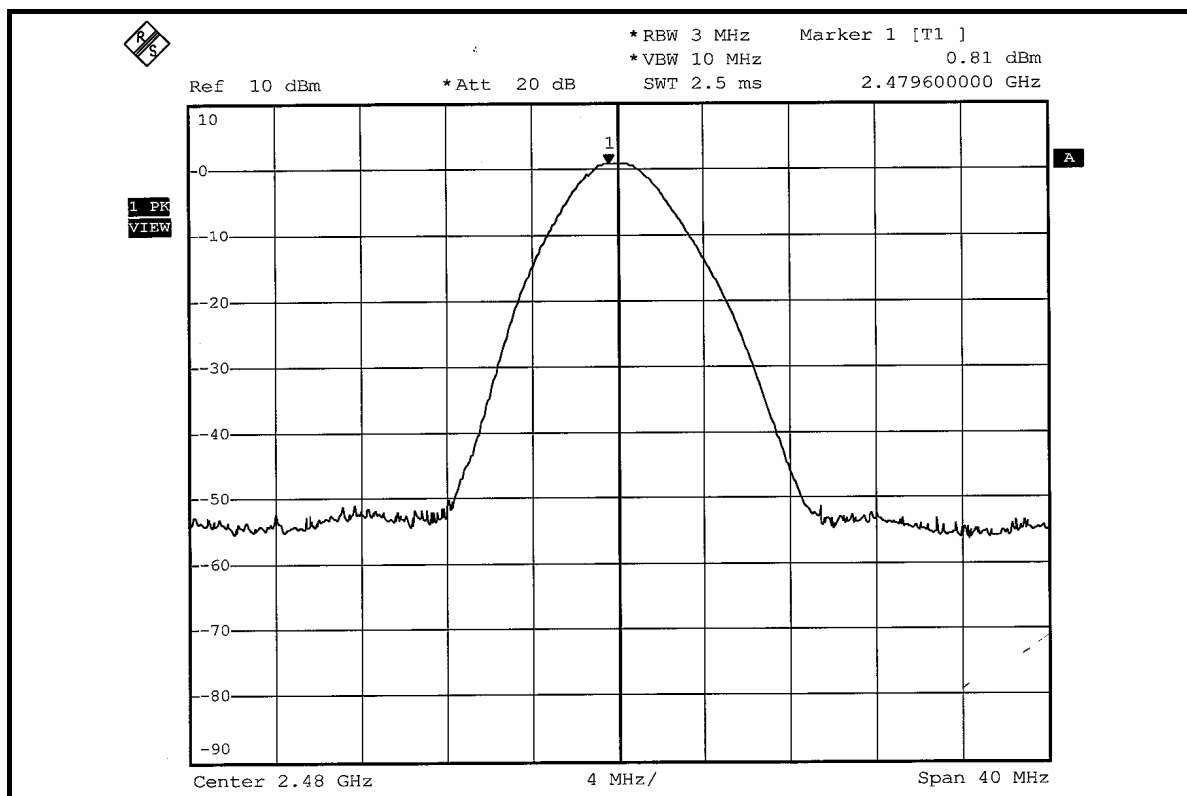
5.7.7 TEST RESULTS

FOR GFSK

MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	25deg. C, 65%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 (mW)	PASS/FAIL
0	2402	1.109	0.45	125	PASS
39	2441	1.312	1.81	125	PASS
78	2480	1.205	0.81	125	PASS

CH 78

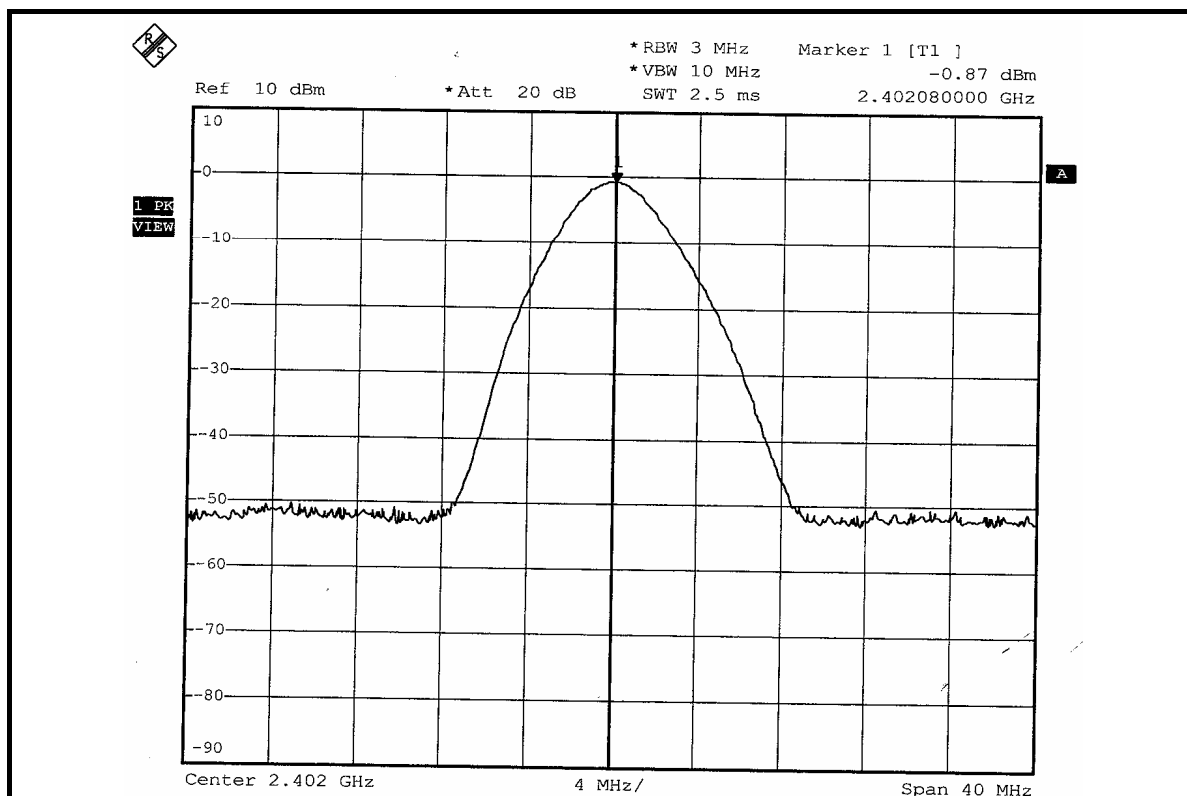


FOR 8DPSK

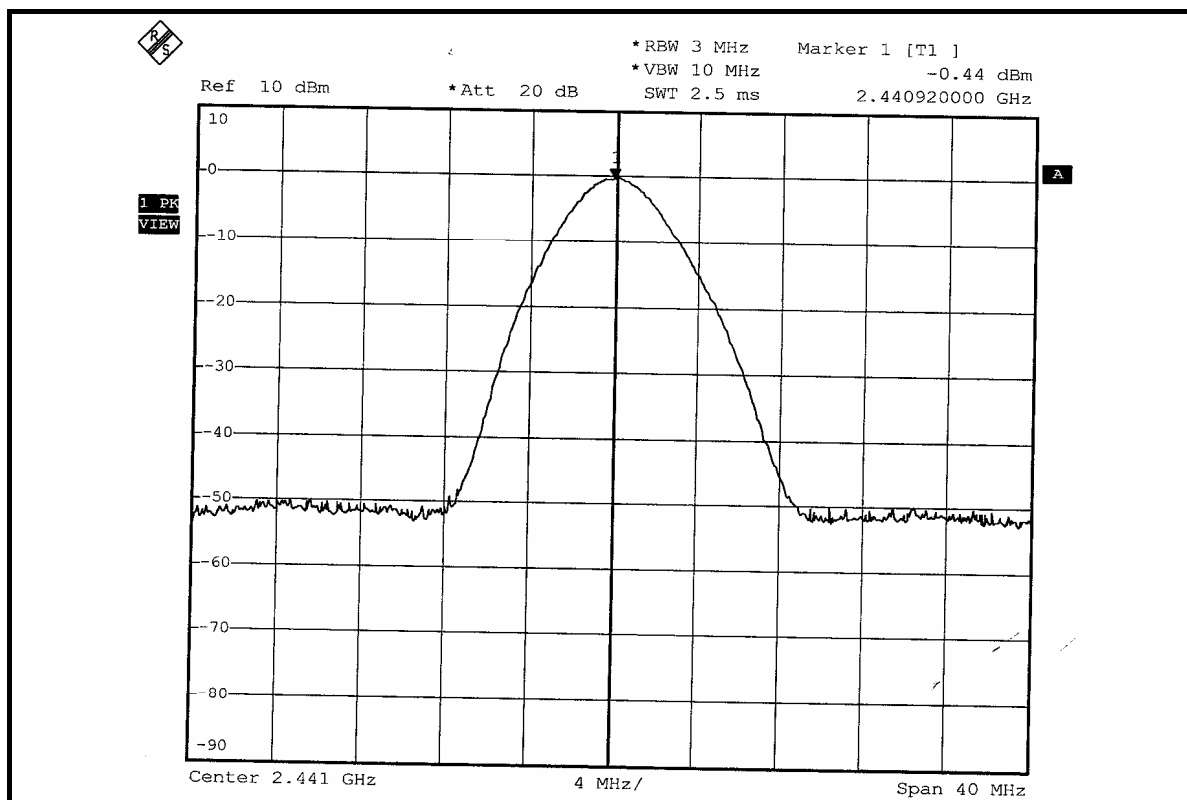
MODULATION TYPE	8DPSK	ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Long Chen

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	0.818	-0.87	125	PASS
39	2441	0.904	-0.44	125	PASS
78	2480	0.838	-0.77	125	PASS

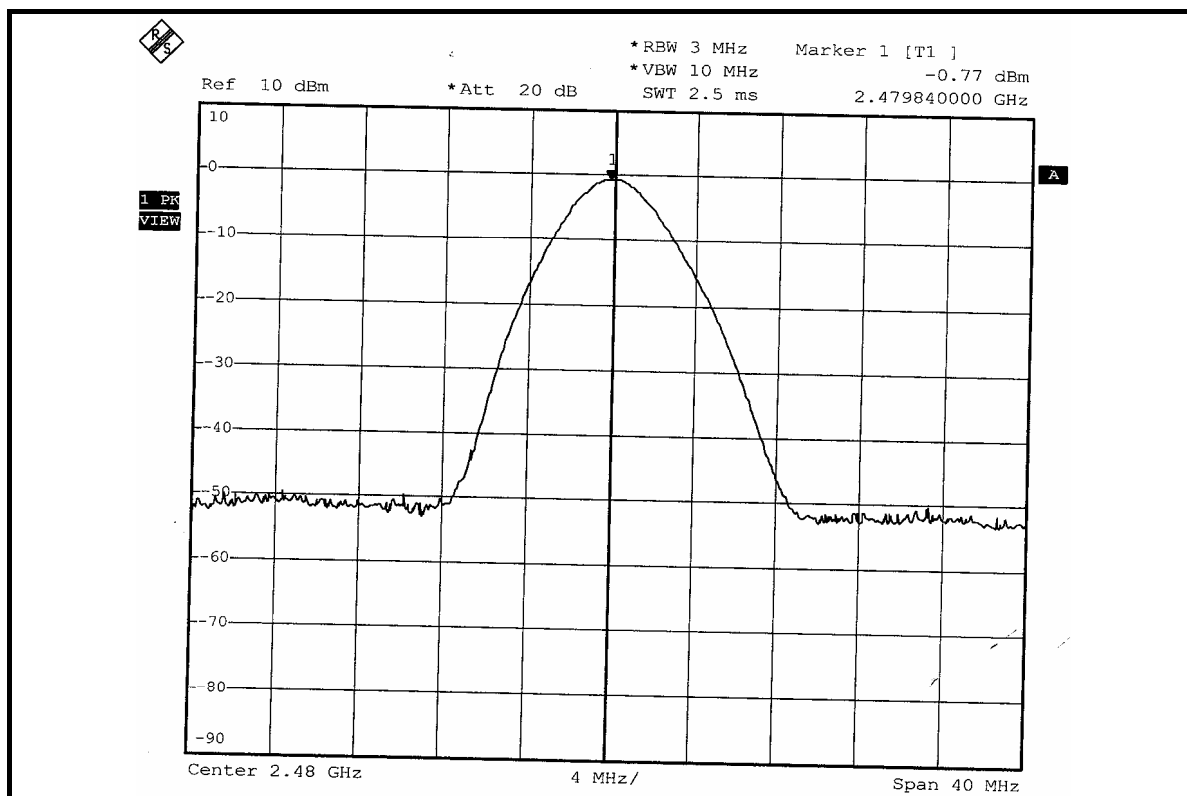
CH 0



CH 39



CH 78



5.8 BAND EDGES MEASUREMENT

5.8.1 LIMITS OF BAND EDGES MEASUREMENT

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

5.8.2 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.

5.8.3 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.

5.8.4 DEVIATION FROM TEST STANDARD

No deviation.

5.8.5 EUT OPERATING CONDITION

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

5.8.6 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).

FOR GFSK

NOTE 1:

The band edge emission plot on the next page shows 57.62dBc between carrier maximum power and local maximum emission in restrict band (2.36732GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 99.78dBuV/m (Peak), so the maximum field strength in restrict band is $99.78 - 57.62 = 42.16$ dBuV/m, which is under 74 dBuV/m limit.

Average value = $42.16 - 30.00 = 12.16$ 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 correction factor be equal to: $20\log(3.125/100) = -30$ dB.

Average value = peak reading -30

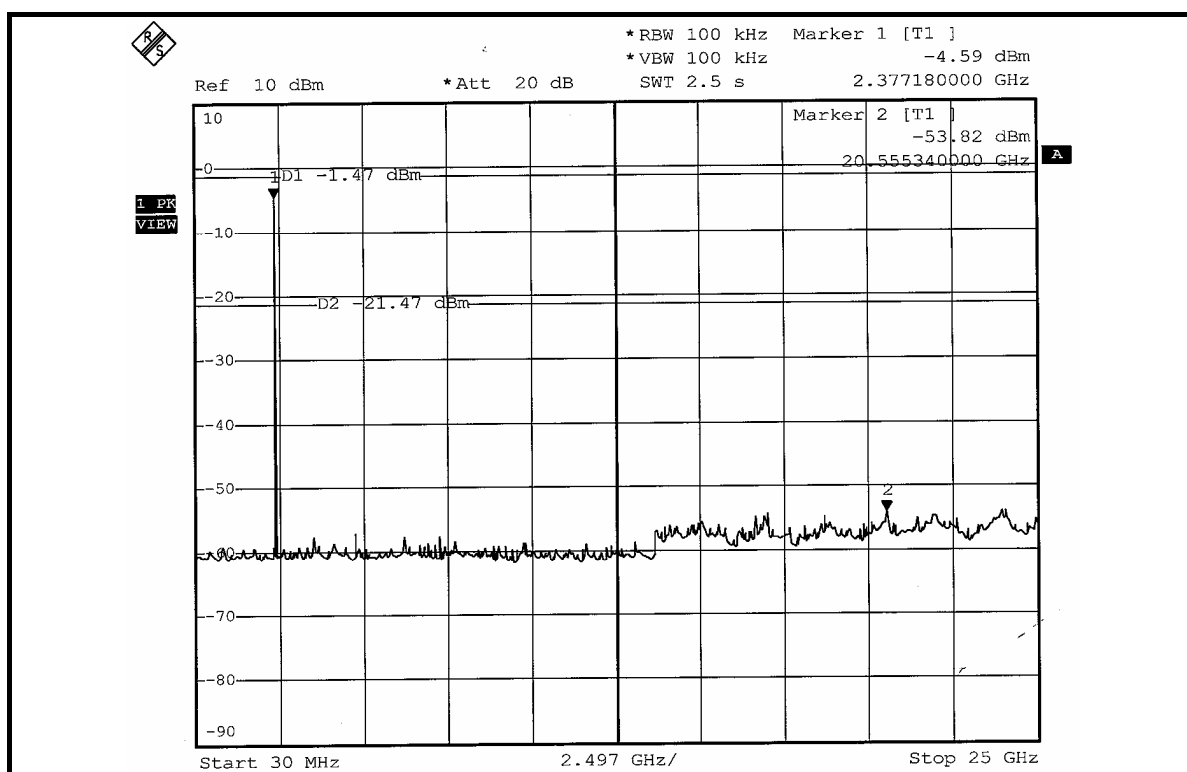
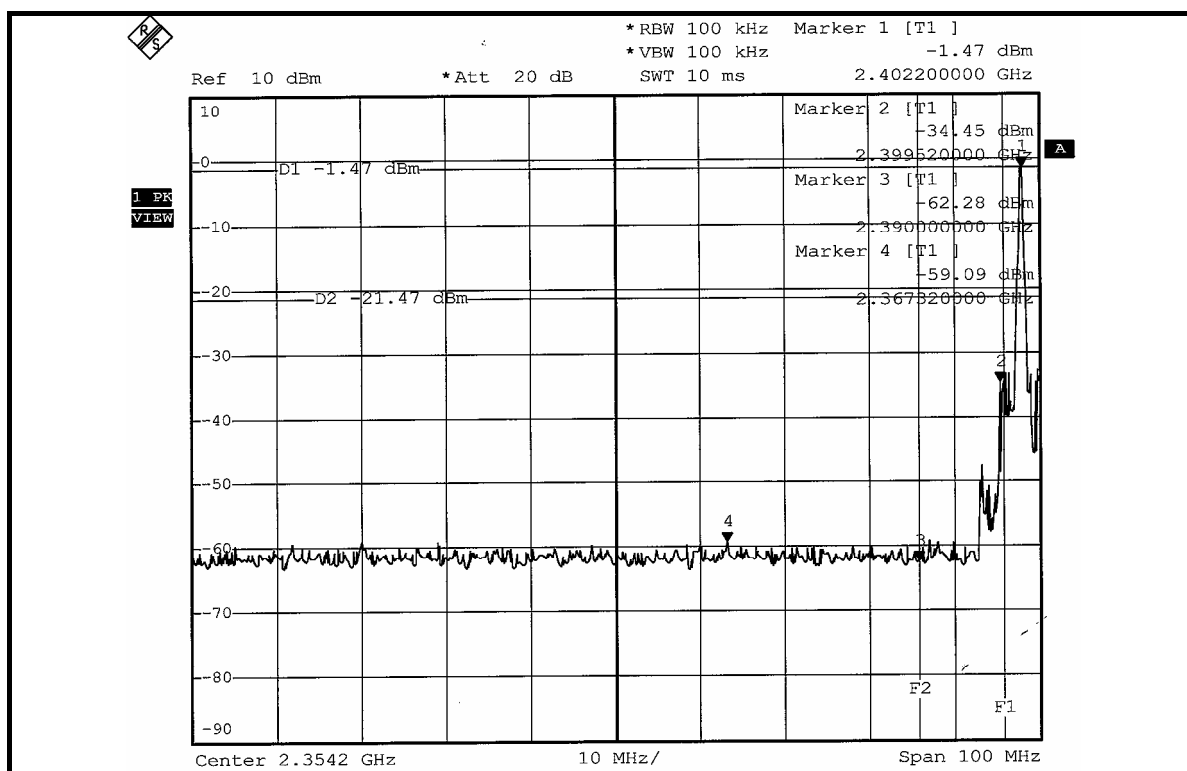
NOTE 2:

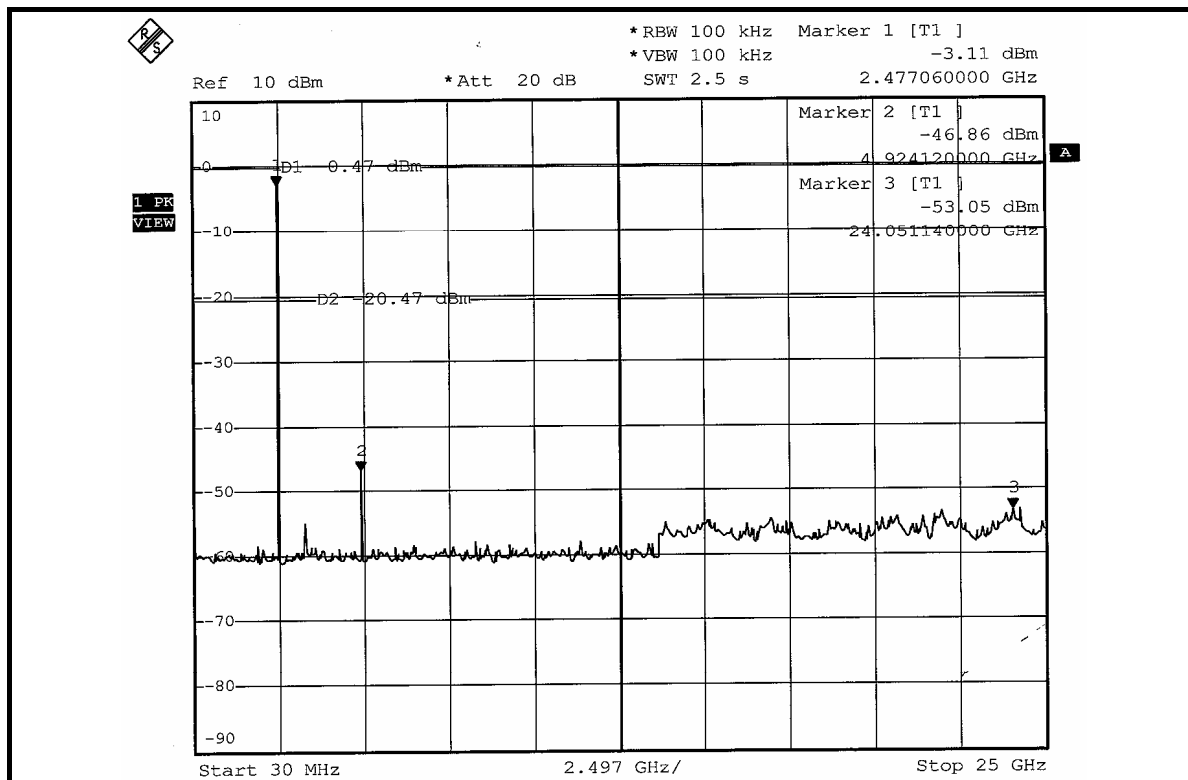
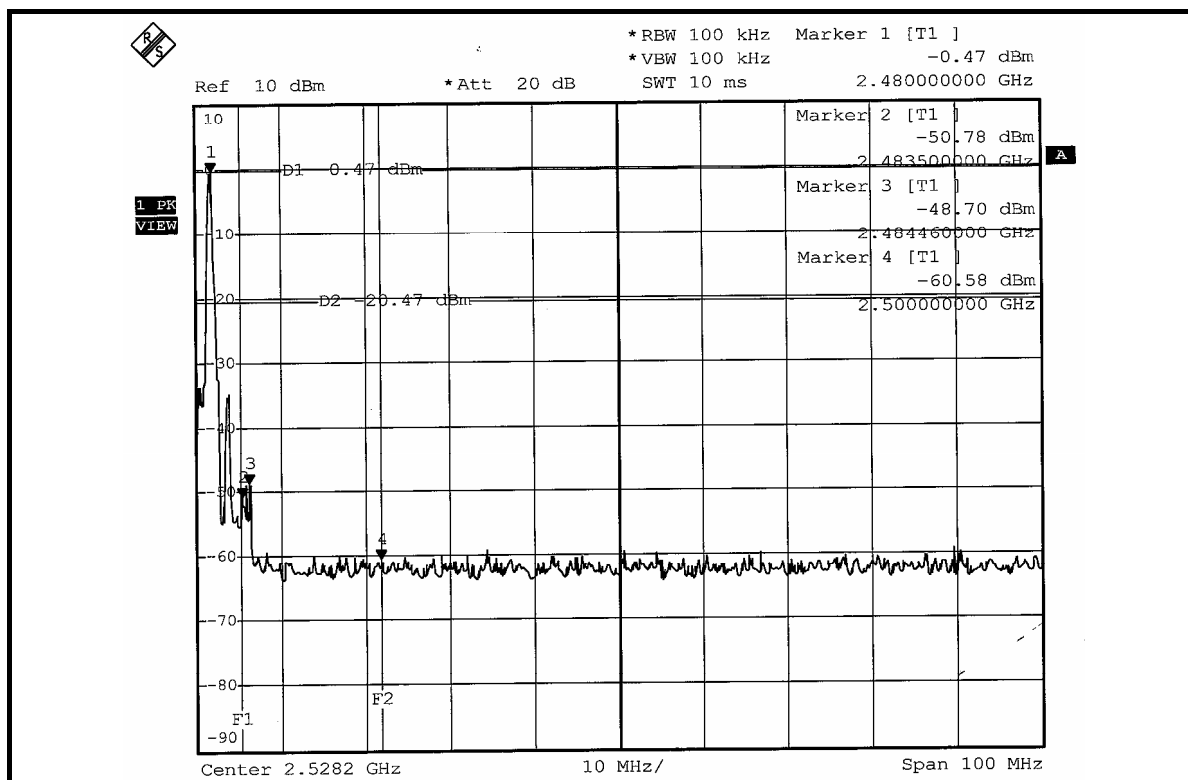
The band edge emission plot on the next second page shows 48.23dBc between carrier maximum power and local maximum emission in restrict band (2.48446GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.2.7 is 95.18dBuV/m (Peak), so the maximum field strength in restrict band is $95.18 - 48.23 = 46.95$ 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 correction factor be equal to: $20\log(3.125/100) = -30$ dB.

Average value = peak reading -30





FOR 8DPSK

NOTE 1:

The band edge emission plot on the next page shows 56.98dBc between carrier maximum power and local maximum emission in restrict band (2.38048GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 95.12dBuV/m (Peak), so the maximum field strength in restrict band is $95.12 - 56.98 = 38.14$ dBuV/m, which is under 74 dBuV/m limit.

Average value = $38.14 - 30.00 = 8.14$ 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

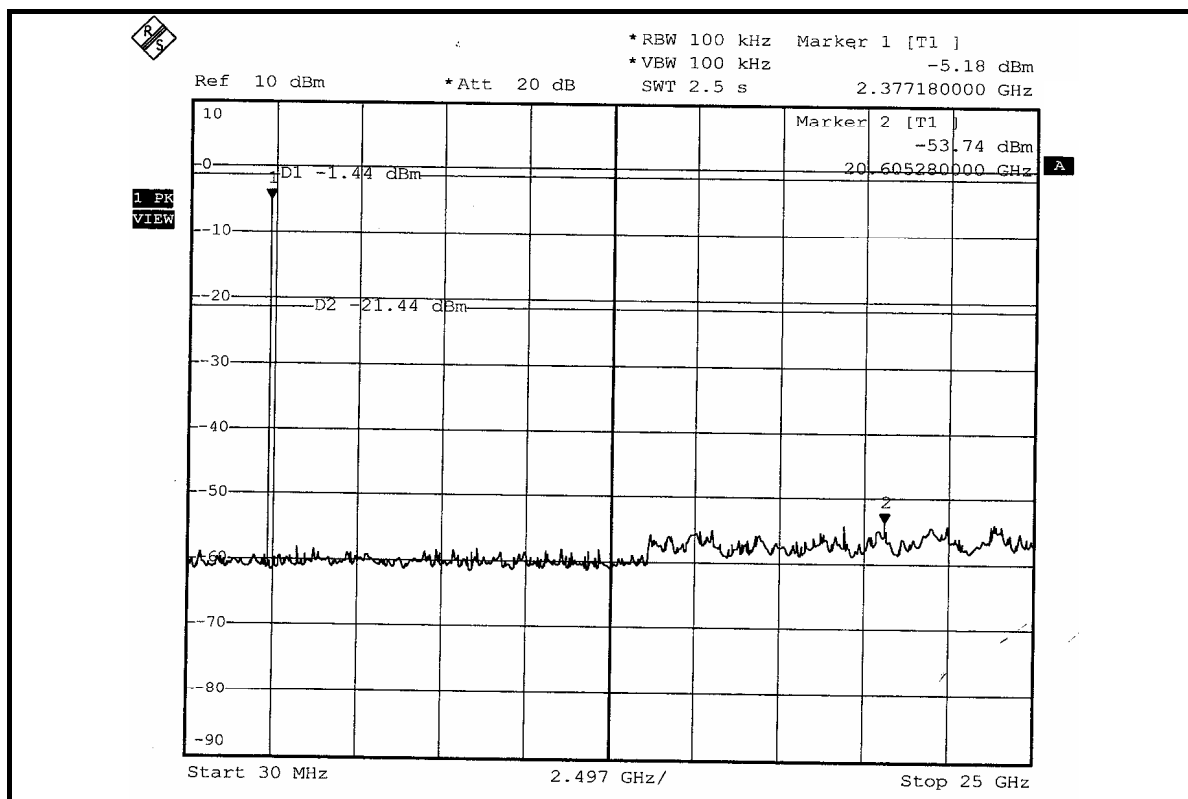
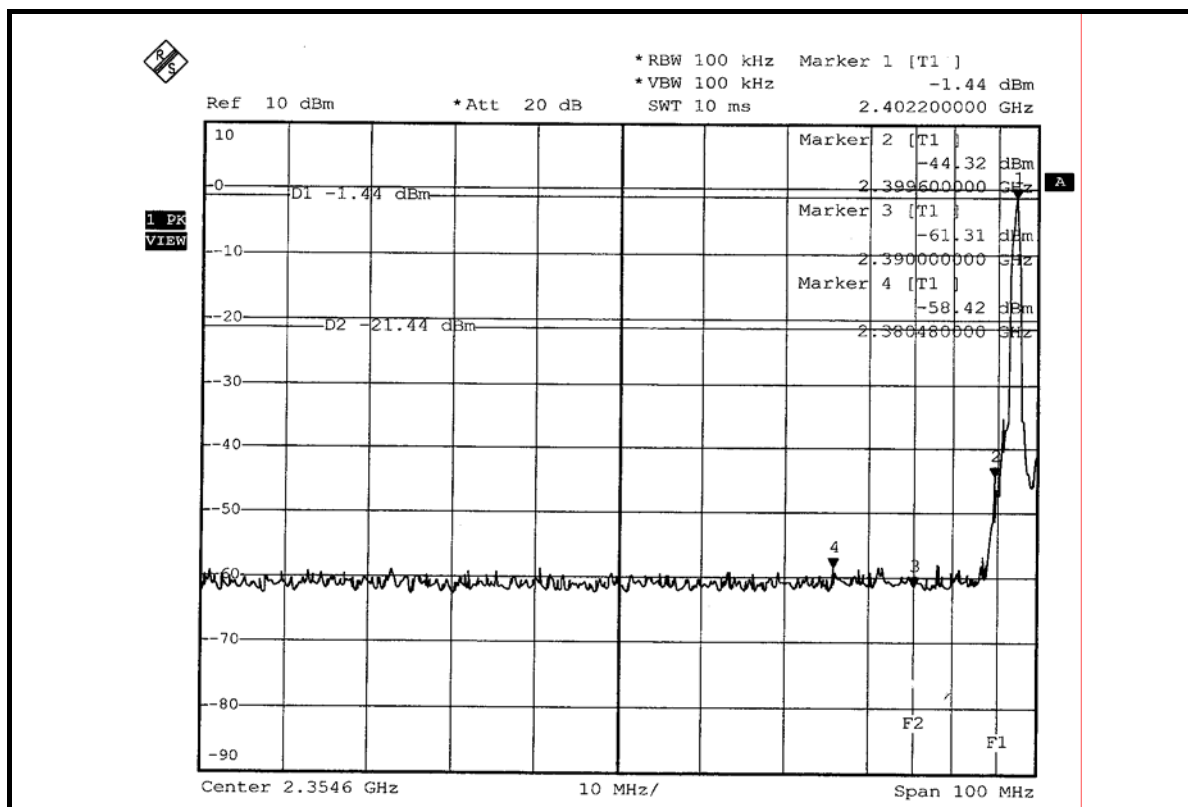
NOTE 2:

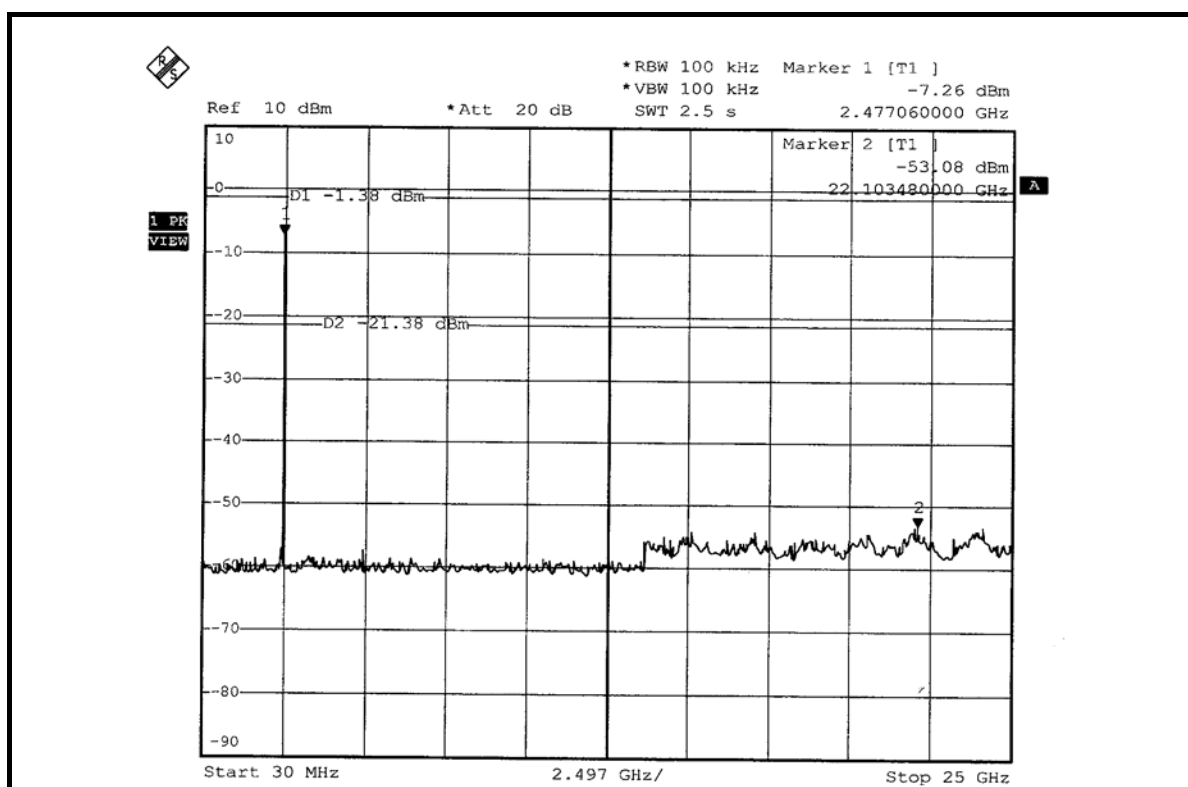
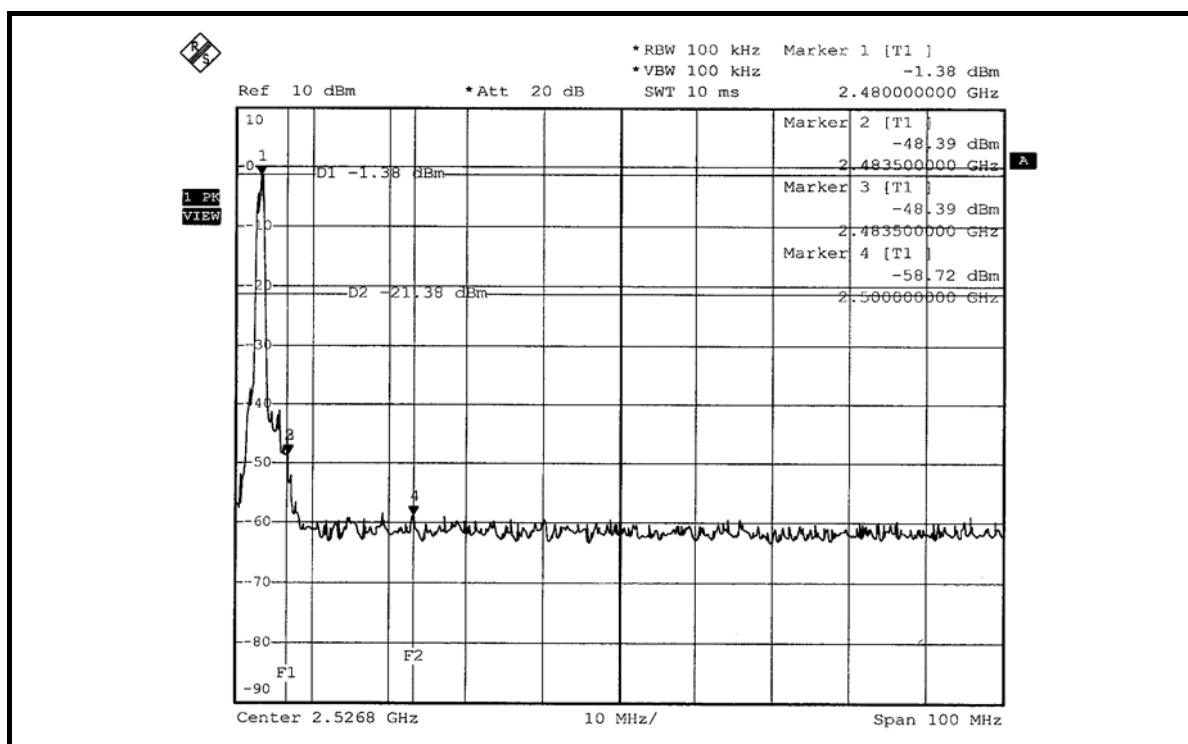
The band edge emission plot on the next second page shows 47.01dBc between carrier maximum power and local maximum emission in restrict band (2.48350GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.2.7 is 94.55dBuV/m (Peak), so the maximum field strength in restrict band is $94.55 - 47.01 = 47.54$ dBuV/m, which is under 74 dBuV/m limit.

Average value = $47.54 - 30.00 = 17.54$ 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





5.9 ANTENNA REQUIREMENT

5.9.1 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.

5.9.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is SMD antenna without antenna connector. The maximum gain of this antenna is 4.1dBi.

6. INFORMATION ON THE TESTING LABORATORIES

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

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: 886-2-26052943

Hsin Chu EMC/RF Lab:
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Telecom Lab:
Tel: 886-3-3183232
Fax: 886-3-3185050

Web Site: www.adt.com.tw

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

APPENDIX-A

MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.