FCC TEST REPORT (15.247)

REPORT NO.:	080831FIA01
MODEL NO.:	EM1102
RECEIVED:	Aug. 25, 2008
TESTED:	Aug. 25 ~ Aug. 28, 2008
ISSUED:	Aug. 29, 2008

APPLICANT:	3DIJOY DIGITAL TECHNOLOGY CO., LTD.
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ISSUED BY:	ADT (Shanghai) Corporation
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1. CERTIFICATION

PRODUCT:	Bluetooth remote control
MODEL:	EM1102 (refer to note 3.1 for more detail)
BRAND:	FlingPC
APPLICANT:	3DIJOY DIGITAL TECHNOLOGY CO., LTD.
TESTED:	Aug. 25 ~ Aug. 28, 2008
TEST SAMPLE:	ENGINEERING SAMPLE
STANDARDS:	FCC Part 15, Subpart C (Section 15.247) ANSI C63.4-2003

The above equipment (Model: EM1102) has been tested by **ADT(Shanghai) 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 : Lucy Tian , **DATE:** Aug. 29, 2008
Lucy Tian
Certification Engineer

TECHNICAL ACCEPTANCE : Joy Zhu , **DATE:** Aug. 29, 2008
Joy Zhu
Lab Manager

APPROVED BY : , **DATE:** Aug. 29, 2008
Wallace Pan
Director of Operations

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C (Section 15.247)			
Standard Section	**Test Type and Limit**	**Result**	**Remark**
15.207	AC Power Conducted Emission	N/A	Power supply is 3.0Vdc from batteries
15.247(a)(1)	Hopping Channel Separation Spec. : Min. 25 kHz or 20 dB bandwidth, whichever is greater	PASS	Meet the requirement of limit
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)	Maximum Peak Output Power Limit: max. 21dBm	PASS	Meet the requirement of limit
15.247(d)	Transmitter Radiated Emissions FCC Limit: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is –7.03dB at 2483.50MHz
15.247(d)	Band Edge Measurement Limit: 20 dB less than the peak value of fundamental frequency	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 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz ~ 30MHz	2.55 dB
Radiated emissions	30MHz ~ 200MHz	2.98 dB
	200MHz ~ 1000MHz	2.96 dB
	1GHz ~18GHz	2.26 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	FlingPC Remote Controller
MODEL NO.	EM1102
IC ID	WNZEM-1102RC
POWER SUPPLY	3.0Vdc from batteries
MODULATION TYPE	Bluetooth: GFSK,
MODULATION TECHNOLOGY	FHSS
TRANSFER RATE	Bluetooth: 1/2/3Mbps
FREQUENCY RANGE	Bluetooth: 2402~2480 MHz
NUMBER OF CHANNEL	Bluetooth: 79
CHANNEL SPACING	1MHz
OUTPUT POWER	1.072mW
ANTENNA TYPE	Printed Antenna with 0dBi gain
DATA CABLE	N/A
I/O PORTS	N/A
ACCESSORY DEVICES	Batteries

NOTE:

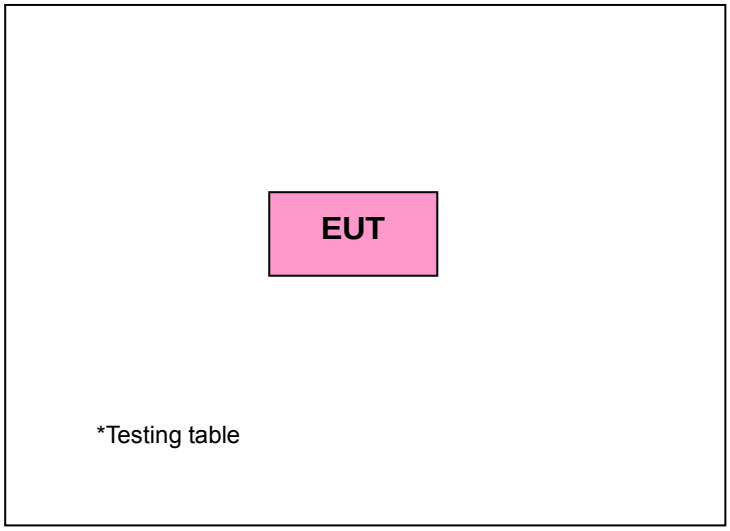
1. Bluetooth technology is used in this EUT.
2. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

79 channels are provided to this EUT:

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

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

FOR BLUETOOTH FUNCTION:

EUT CONFIGURE MODE	Applicable to							Description
	DT	CB	HCS	MPOP	BM	CE	RE	
-	√	√	√	√	√	--	√	Powered by batteries

Where **DT:** Dwell Time on Each Channel **CB:** Channel Bandwidth
HCS: Hopping Channel Separation **MPOP:** Maximum Peak Output Power
BM: Band edge Measurement **RE:** Radiated Emission

RADIATED EMISSION TEST (ABOVE 1 GHz):

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

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE	AXIS
0 to 78	0, 39, 78	FHSS	GFSK	DH1	X

RADIATED EMISSION TEST (BELOW 1 GHz):

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

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE	AXIS
0 to 78	0	FHSS	GFSK	DH1	X

BANDEDGE MEASUREMENT:

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

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
0 to 78	0, 78	FHSS	GFSK	DH1

ANTENNA PORT CONDUCTED MEASUREMENT:

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

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
0 to 78	0, 39, 78	FHSS	GFSK	DH1

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 (Section 15.247)
ANSI C63.4-2003

All test items have been performed and recorded as per the above standards.

NOTE: Public Notice DA 00-705 Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit.

4. TEST TYPES AND RESULTS

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 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.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Spectrum Agilent	E4403B	E1S1001	Jul. 31, 2009
Receiver R&S	ESCS30	E1R1001	Oct. 31, 2008
Trilog Broadband Antenna Schwarzbeck	VULB 9168	E1A1001	Aug. 31, 2009
Horn Antenna Schwarzbeck	BBHA 9120D	E1A1002	Jul. 31, 2009
Spectrum R&S	FSP30	E1S1002	Jul. 31, 2009
Preamplifier Agilent	HP 8447D	E1A2001	Aug. 1, 2009
Preamplifier Agilent	HP 8449B	E1A2002	Aug. 1, 2009
Software ADT	ADT_Radiated_V7.5	N/A	N/A

4.1.3 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.

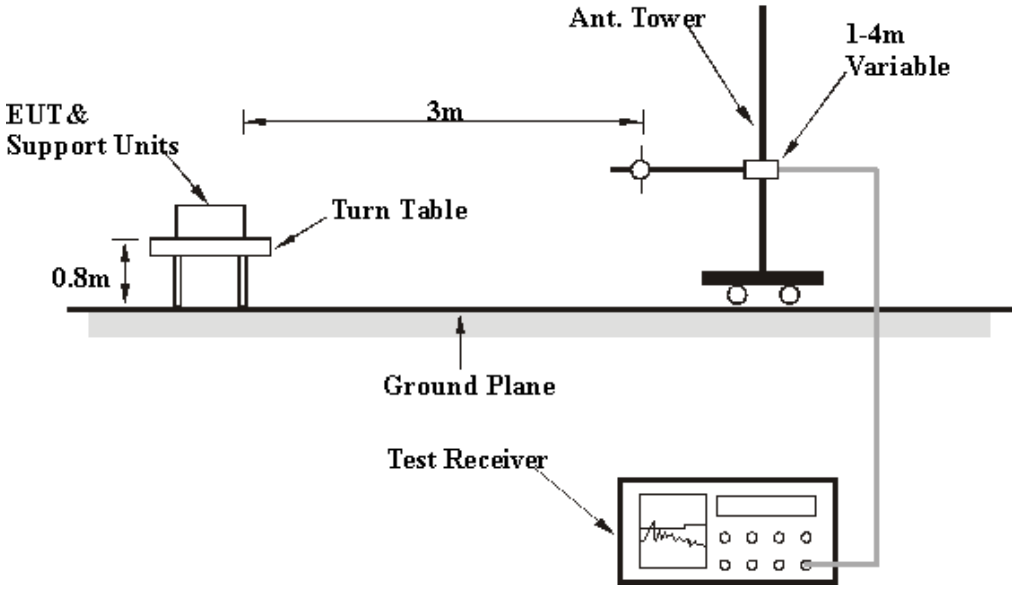
NOTE:

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.
3. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



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

4.1.6 EUT OPERATING CONDITIONS

a. Make sure EUT the fixed test mode.
b. Put EUT on the center of the turn table.
c. Do the test.

4.1.7 TEST RESULTS

RADIATED ABOVE 1GHz DATA: GFSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	3Vdc from batteries	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 67%RH 999hPa	TESTED BY	Ray Xue

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	2390.00	32.59	21.81	54.40 PK	74.00	-19.60	100.00	0.00
2	4804.00	37.71	9.84	47.55 PK	74.00	-26.45	199.00	0.00
3	7206.00	43.98	10.48	54.46 PK	74.00	-19.54	199.00	0.00
4	9608.00	46.40	11.58	57.98 PK	74.00	-16.02	199.00	0.00
5	2390.00	32.59	12.16	44.74 AV	54.00	-9.26	100.00	327.00
6	4804.00	37.74	-1.54	13.05 AV	54.00	-40.95	100.00	0.00
7	7206.00	44.58	-1.20	19.96 AV	54.00	-34.04	100.00	0.00
8	9608.00	47.12	-1.11	23.48 AV	54.00	-30.52	100.00	0.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	2390.00	32.59	24.03	56.62 PK	74.00	-17.38	100.00	18.00
2	4804.00	37.71	9.41	47.11 PK	74.00	-26.89	100.00	0.00
3	7206.00	43.98	9.70	53.68 PK	74.00	-20.32	100.00	0.00
4	9608.00	46.40	10.21	56.60 PK	74.00	-17.40	100.00	0.00
5	2390.00	32.59	12.17	44.75 AV	54.00	-9.25	100.00	107.00
6	4804.00	37.71	-28.70	9.01 AV	54.00	-44.99	100.00	18.00
7	7206.00	43.98	-28.40	15.58 AV	54.00	-38.42	100.00	18.00
8	9608.00	46.40	-27.90	18.50AV	54.00	-35.50	100.00	18.00

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 product is holded on DH1 packet, based upon bluetooth theory the transmitter is on 0.625 * 1 per 98.75ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log((0.625+0.625) / 100)= -38.1 dB.
6. Average value = peak reading + 20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	3Vdc from batteries	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 67%RH 999hPa	TESTED BY	Ray Xue

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	4882.00	38.03	9.03	47.06 PK	74.00	-26.94	100.00	18.00
2	7323.00	44.65	9.94	54.59 PK	74.00	-19.41	100.00	18.00
3	9764.00	47.52	10.40	57.92 PK	74.00	-16.08	100.00	18.00
4	4882.00	38.03	-1.78	12.56 AV	54.00	-41.44	100.00	0.00
5	7323.00	44.65	-1.44	20.09 AV	54.00	-33.91	100.00	0.00
6	9764.00	47.52	-0.47	23.42 AV	54.00	-30.58	100.00	0.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	4882.00	38.03	9.65	47.68 PK	74.00	-26.32	100.00	0.00
2	7323.00	44.65	9.65	54.30 PK	74.00	-19.70	100.00	0.00
3	9764.00	47.52	10.45	57.98 PK	74.00	-16.02	100.00	0.00
4	4882.00	38.03	-28.45	9.58 AV	54.00	-44.42	100.00	18.00
5	7323.00	44.65	-28.45	16.2 AV	54.00	-37.80	100.00	18.00
6	9764.00	47.52	-27.64	19.88 AV	54.00	-34.12	100.00	18.00

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 product is holded on DH1 packet, based upon bluetooth theory the transmitter is on 0.625 * 1 per 98.75ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log((0.625+0.625) / 100)= -38.1 dB.

6. Average value = peak reading + 20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	3Vdc from batteries	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 67%RH 999hPa	TESTED BY	Ray Xue

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	2483.50	32.76	23.30	56.06 PK	74.00	-17.94	100.00	0.00
2	4960.00	38.32	9.74	48.05 PK	74.00	-25.95	100.00	18.00
3	7440.00	44.58	9.45	54.02 PK	74.00	-19.98	100.00	18.00
4	9920.00	47.73	10.24	57.97 PK	74.00	-16.03	100.00	18.00
5	2483.50	32.76	13.56	46.31 AV	54.00	-7.69	100.00	18.00
6	4960.00	38.32	-1.71	13.55 AV	54.00	-40.45	100.00	1.00
7	7440.00	44.58	-0.97	19.52 AV	54.00	-34.48	100.00	0.00
8	9920.00	47.73	-0.40	23.47 AV	54.00	-30.53	100.00	0.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	2483.50	32.76	23.30	56.05 PK	74.00	-17.95	100.00	18.00
2	4960.00	38.32	9.47	47.78 PK	74.00	-26.22	100.00	0.00
3	7440.00	44.58	9.97	54.55 PK	74.00	-19.45	100.00	0.00
4	9920.00	47.73	10.64	58.37 PK	74.00	-15.63	100.00	0.00
5	2483.50	32.76	14.21	46.97 AV	54.00	-7.03	100.00	312.00
6	4960.00	38.32	-28.64	9.68AV	54.00	-44.32	100.00	18.00
7	7440.00	44.58	-28.13	16.45 AV	54.00	-37.55	100.00	18.00
8	9920.00	47.73	-27.46	20.27 AV	54.00	-33.73	100.00	18.00

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 product is holded on DH1 packet, based upon bluetooth theory the transmitter is on 0.625 * 1 per 98.75ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log((0.625+0.625) / 100)= -38.1 dB.

6. Average value = peak reading + 20log(duty cycle).

BELOW 1GHz WORST-CASE DATA：GFSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	3Vdc from batteries	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 999hPa	TESTED BY	Ray Xue

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	51.83	15.34	-7.56	7.78	40.00	-32.22	100.00	0.00
2	156.10	17.03	-7.54	9.49	43.50	-34.01	100.00	218.00
3	530.23	21.54	-5.52	16.02	46.00	-29.98	100.00	163.00
4	744.00	25.27	-0.17	25.10	46.00	-20.90	100.00	284.00
5	768.00	25.54	-1.50	24.04	46.00	-21.96	100.00	95.00
6	917.55	27.55	-7.36	20.19	46.00	-25.81	100.00	15.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	49.40	15.47	-7.26	8.21	40.00	-31.79	100.00	93.00
2	146.40	16.70	-7.26	9.44	43.50	-34.06	100.00	307.00
3	311.30	16.91	-7.40	9.51	46.00	-36.49	100.00	113.00
4	473.77	20.49	-7.13	13.36	46.00	-32.64	100.00	259.00
5	720.00	24.99	-3.68	21.31	46.00	-24.69	100.00	301.00
6	881.17	26.72	-7.20	19.51	46.00	-26.49	100.00	187.00

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

4.2 NUMBER OF HOPPING FREQUENCY USED

4.2.1 LIMIT OF HOPPING FREQUENCY USED

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

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Spectrum R&S	FSP30	E1S1002	Jul. 31, 2009

4.2.3 TEST PROCEDURES

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

b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.

c. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.

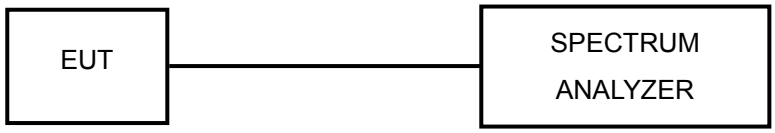
d. Set the SA on View mode and then plot the result on SA screen.

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

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

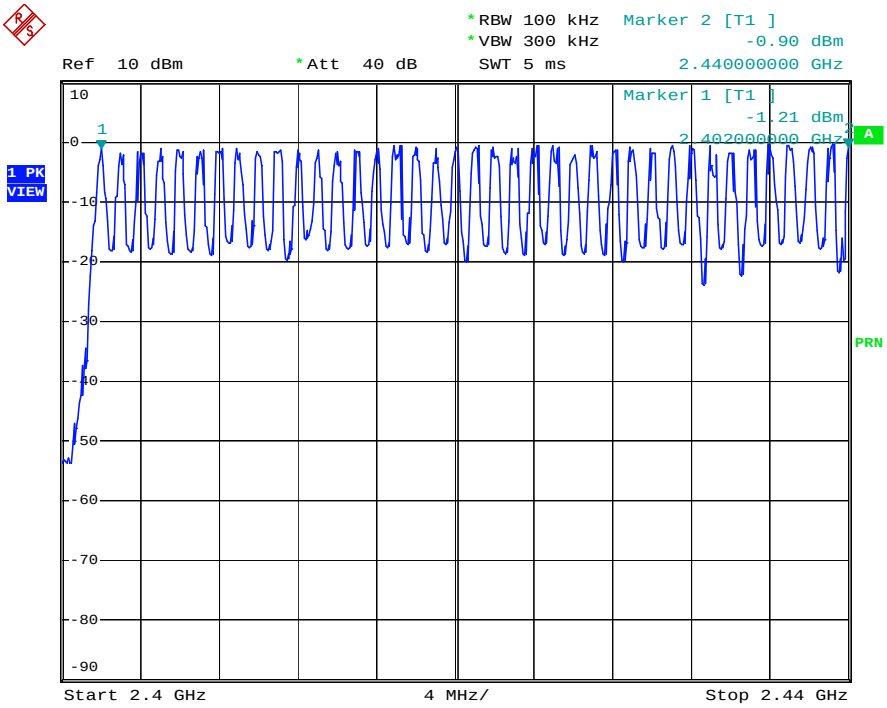
4.2.5 TEST SETUP



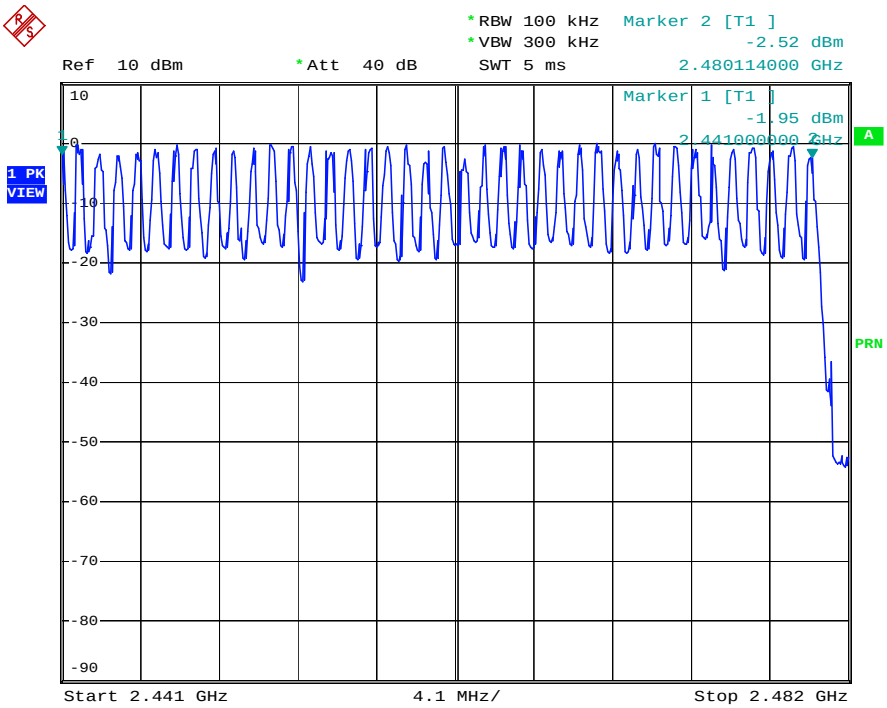
4.2.6 TEST RESULTS

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.

GFSK MODULATION



Date: 25.AUG.2008 17:38:14



Date: 25.AUG.2008 17:44:06

4.3 DWELL TIME ON EACH CHANNEL

4.3.1 LIMIT OF DWELL TIME USED

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Spectrum R&S	FSP30	E1S1002	Jul. 31, 2009

4.3.3 TEST PROCEDURES

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

b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.

c. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.

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

e. Repeat above procedures until all different time-slot modes have been completed.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

4.3.5 TEST SETUP

Same as 4.3.5.

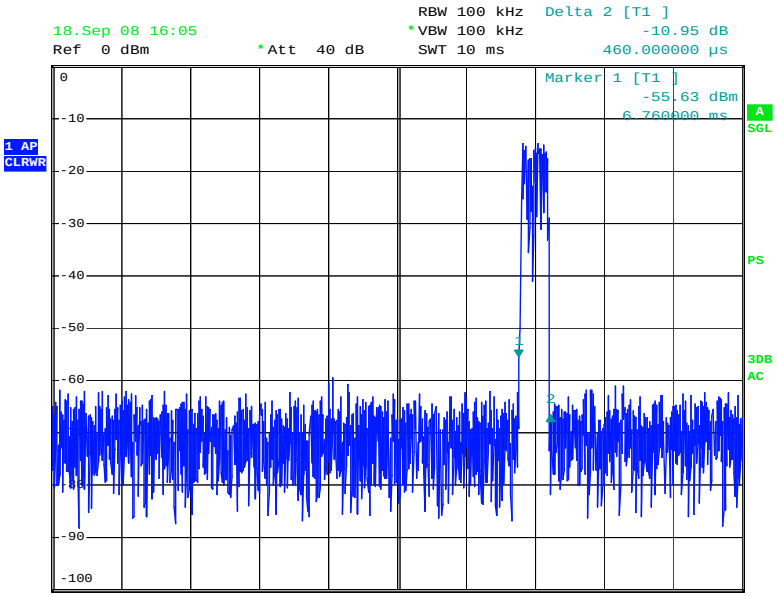
4.3.6 TEST RESULTS

GFSK MODULATION

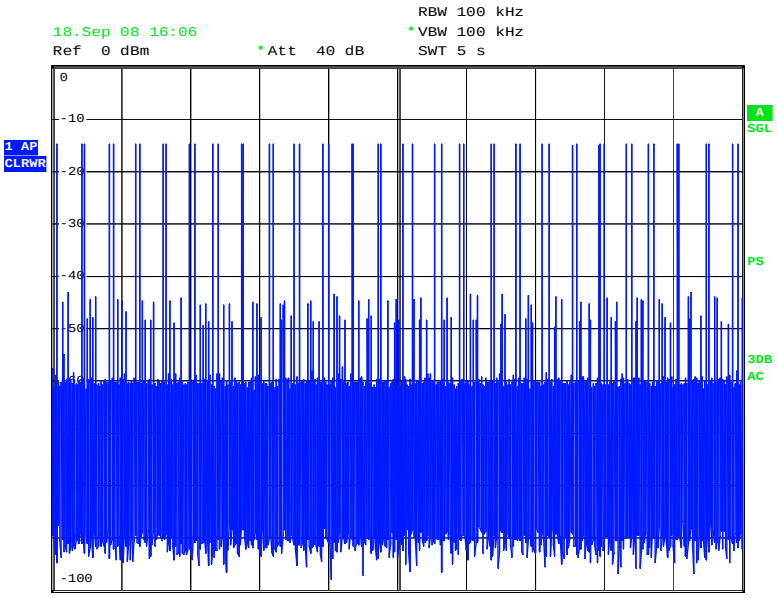
Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH17	52*(31.6/5) times	0.46	151.17	400

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

DH1



Date: 18.SEP.2008 16:05:40



Date: 18.SEP.2008 16:06:23

4.4 CHANNEL BANDWIDTH

4.4.1 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 20dBbandwidth of hopping channel shell be a minimum limit for the hopping channel separation.

4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Spectrum R&S	FSP30	E1S1002	Jul. 31, 2009

4.4.3 TEST PROCEDURE

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

b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.

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

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

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP

Same as 4.3.5.

4.4.6 EUT OPERATING CONDITION

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

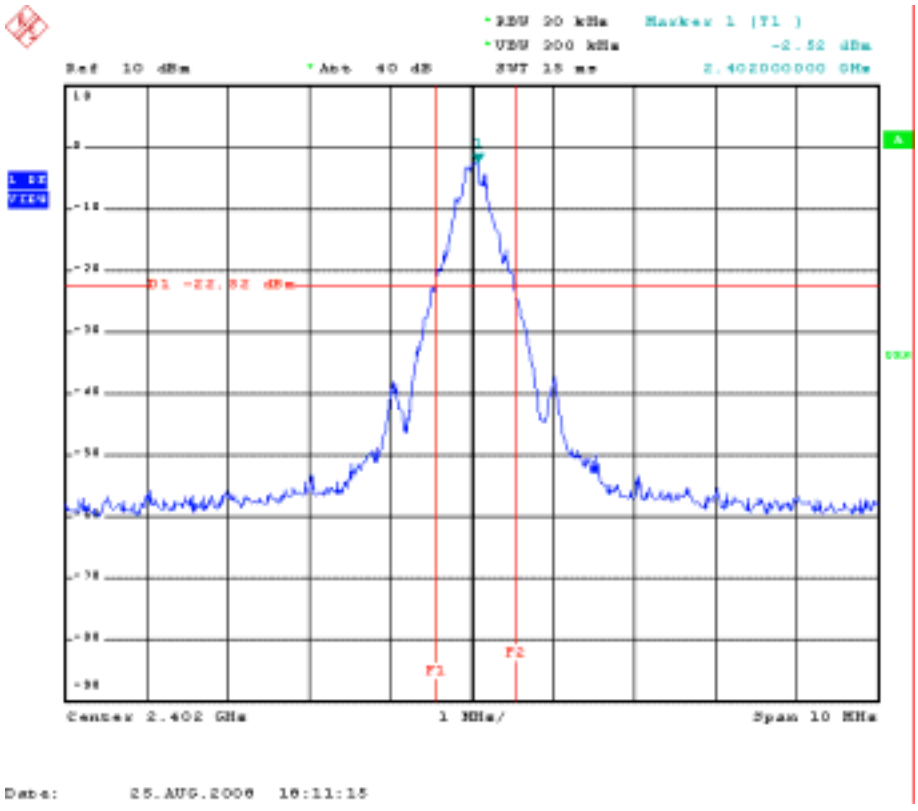
4.4.7 TEST RESULTS

GFSK MODULATION

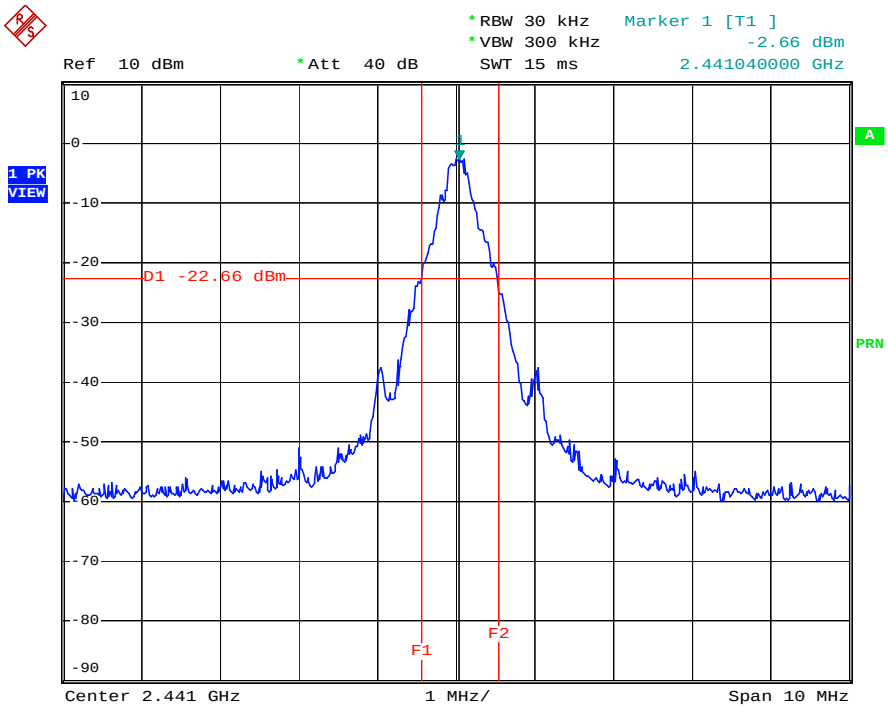
MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH, 991hPa
INPUT POWER	3Vdc from batteries	TESTED BY	Ray Xue

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	1.00
39	2441	0.98
78	2480	0.98

CH 0

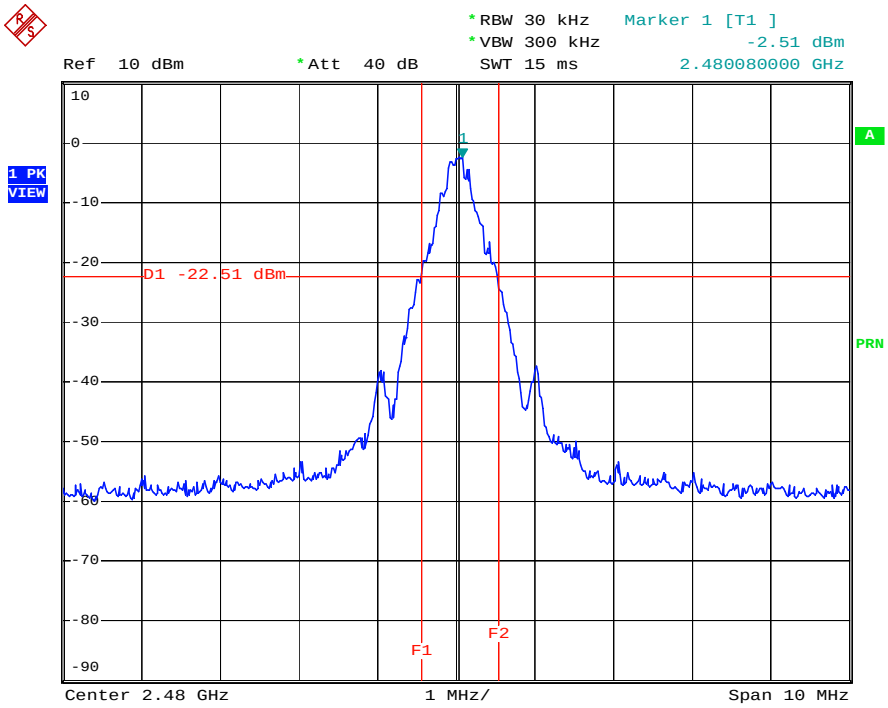


CH 39



Date: 25.AUG.2008 18:09:57

CH 78



Date: 25.AUG.2008 18:11:15

4.5 HOPPING CHANNEL SEPARATION

4.5.1 LIMIT OF HOPPING CHANNEL SEPARATION

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

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Spectrum R&S	FSP30	E1S1002	Jul. 31, 2009

NOTES: 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 PROCEDURES

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

b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.

c. By using the MaxHold function record the separation of two adjacent channels.

d. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.

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

4.5.4 DEVIATION FROM TEST STANDARD

No deviation.

4.5.5 TEST SETUP

Same as 4.3.5

4.5.6 TEST RESULTS

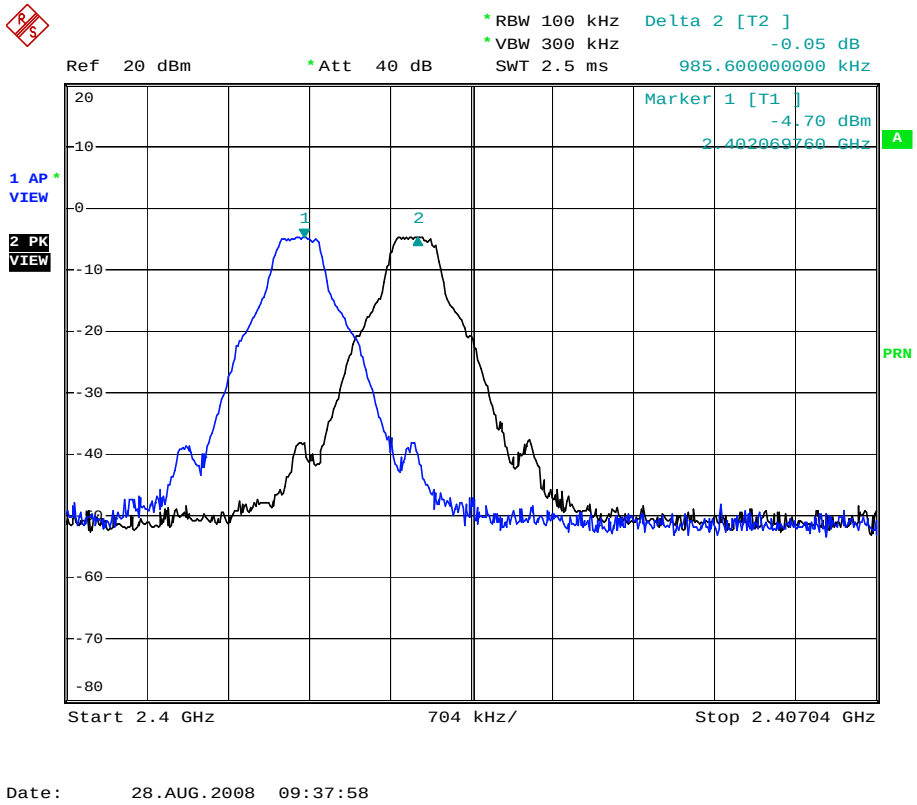
GFSK MODULATION

MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	23deg. C, 61%RH, 991hPa
INPUT POWER	3Vdc from batteries	TESTED BY	Ray Xue

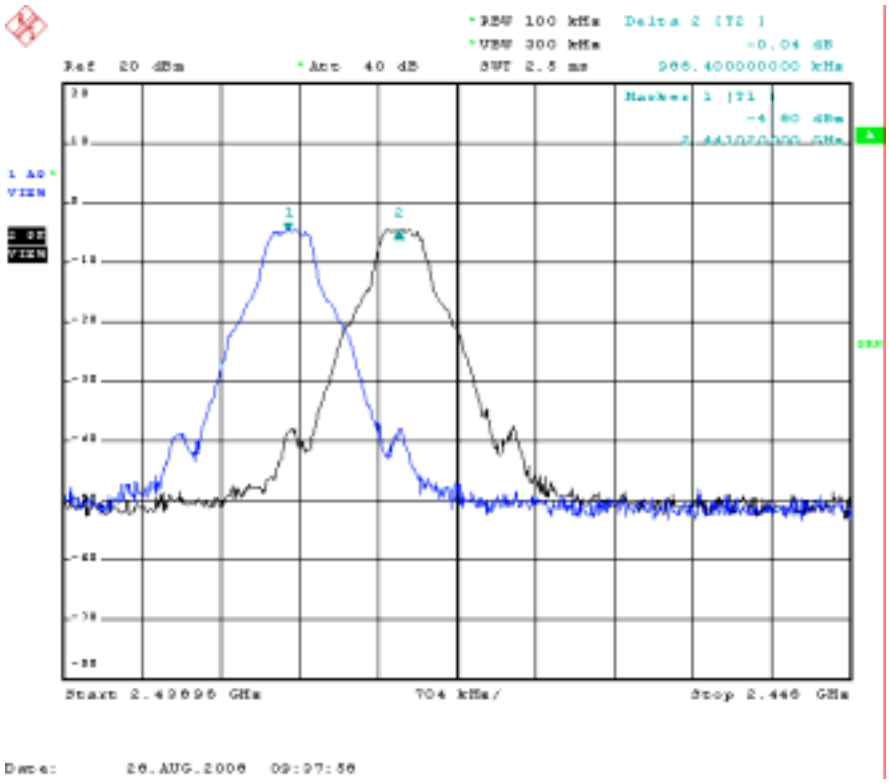
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	0.9856	1.00	0.667	pass
39	2441	0.9864	0.98	0.653	pass
78	2480	0.9886	0.98	0.653	pass

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

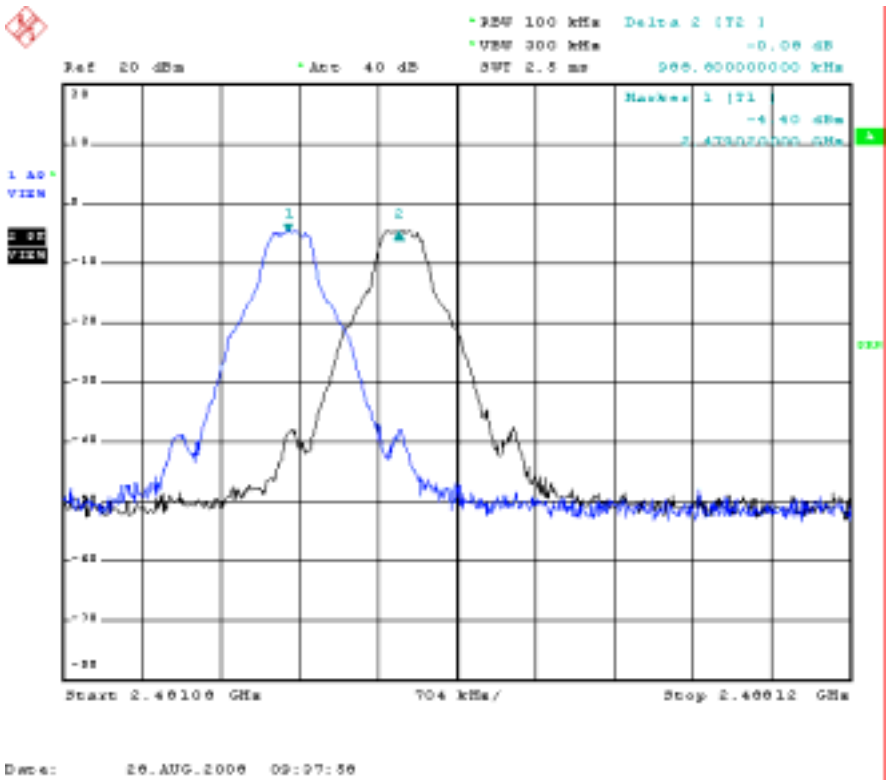
CH 0



CH 39


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
Delta 2 [T2]
-0.04 dB
966.400000000 kHz
Ref 20 dBm
Att 40 dB
Marker 1 [T1]
-4.40 dBm
2.441070000 GHz
1 AP
VIEW
1
2
Start 2.40696 GHz
704 kHz/
Stop 2.446 GHz
Date: 26.AUG.2006 09:27:56

CH 78


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
Delta 2 [T2]
-0.08 dB
966.600000000 kHz
Ref 20 dBm
Att 40 dB
Marker 1 [T1]
-4.40 dBm
2.473070000 GHz
1 AP
VIEW
1
2
Start 2.46106 GHz
704 kHz/
Stop 2.46612 GHz
Date: 26.AUG.2006 09:27:56

4.6 MAXIMUM PEAK OUTPUT POWER

4.6.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 125mW.

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Spectrum R&S	FSP30	E1S1002	Jul. 31, 2009

4.6.3 TEST PROCEDURES

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

b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.

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

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

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

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP

Same as 4.3.5.

4.6.6 EUT OPERATING CONDITION

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

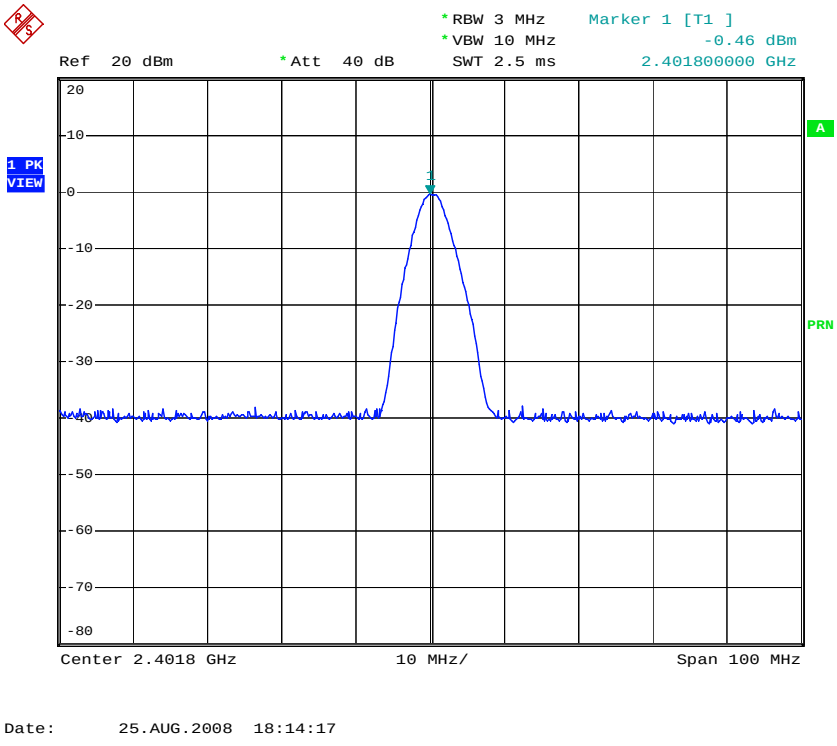
4.6.7 TEST RESULTS

GFSK MODULATION

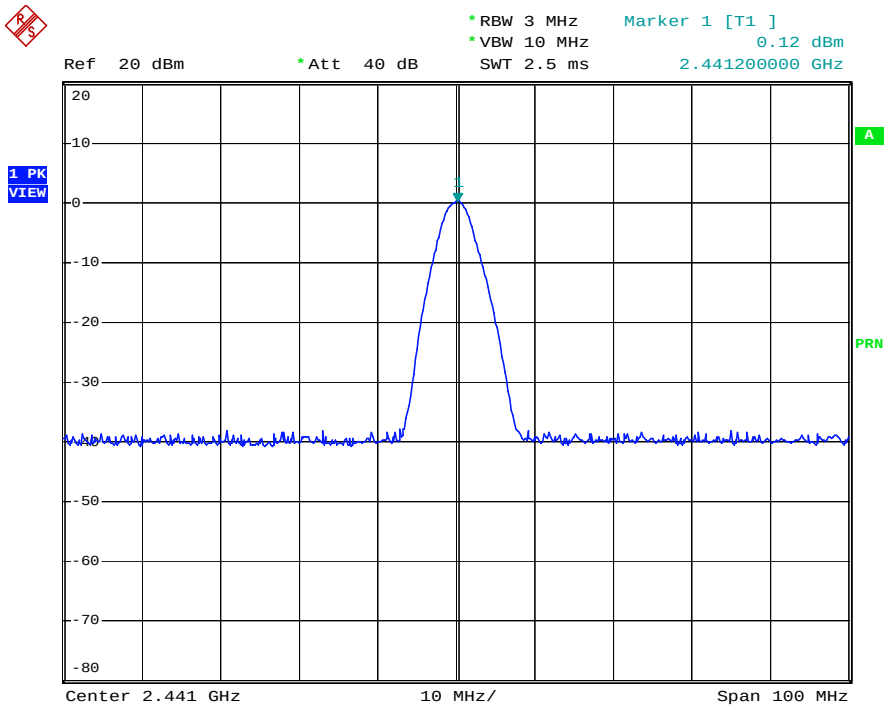
MODULATION TYPE	GFSK	**ENVIRONMENTAL CONDITIONS**	23deg. C, 61%RH, 991hPa
INPUT POWER	3Vdc from batteries	**TESTED BY**	Ray Xue

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	0.899	-0.460	125	PASS
39	2441	1.028	0.120	125	PASS
78	2480	1.072	0.300	125	PASS

CH 0

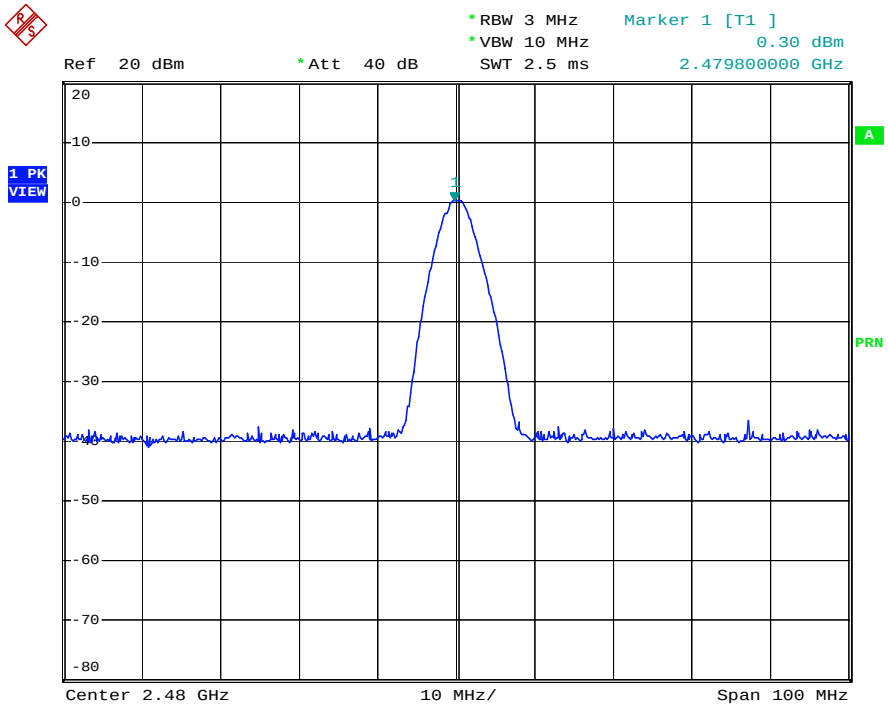


CH 39



Date: 25.AUG.2008 18:13:40

CH 78



Date: 25.AUG.2008 18:12:50

4.7 BAND EDGES MEASUREMENT

4.7.1 LIMITS OF BAND EDGES MEASUREMENT

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

4.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Spectrum R&S	FSP30	E1S1002	Jul. 31, 2009

4.7.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

4.7.4 DEVIATION FROM TEST STANDARD

No deviation.

4.7.5 EUT OPERATING CONDITION

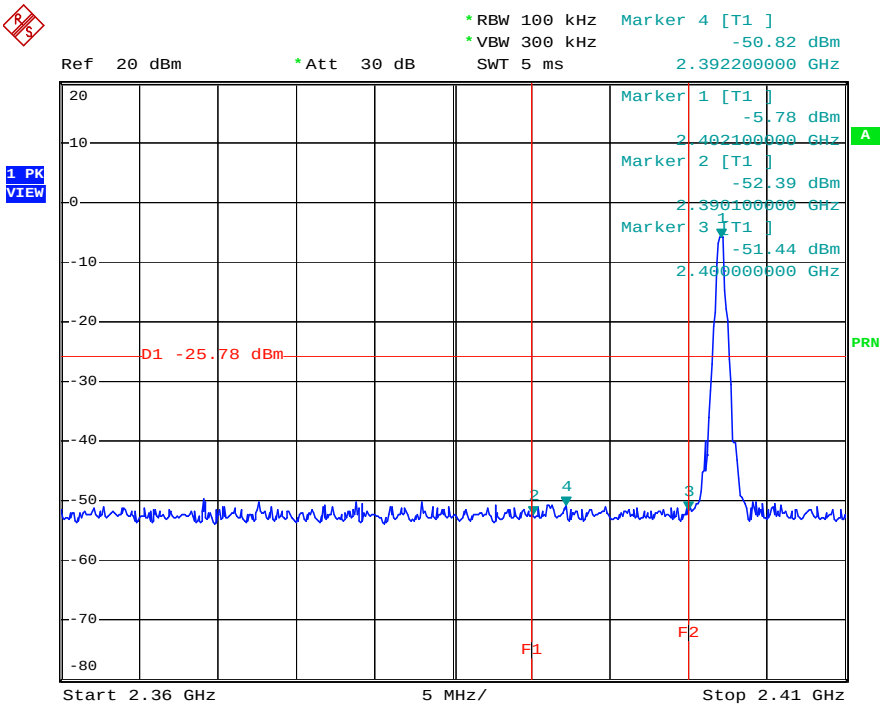
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.7.6 TEST RESULTS

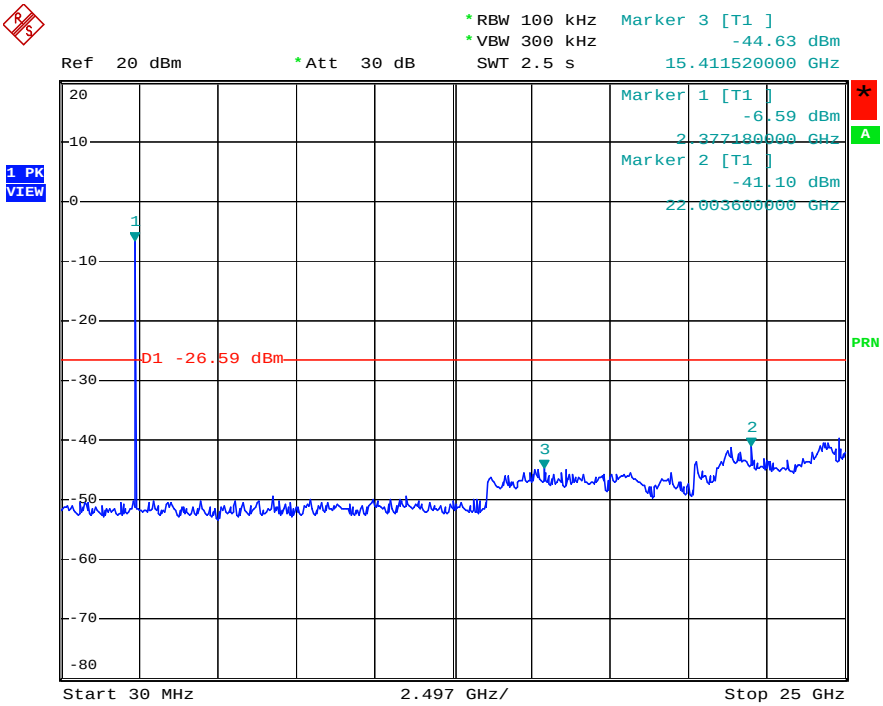
The spectrum plots are attached on the following 4 images. D1 line indicates the highest level, D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

GFSK MODULATION

CH 0

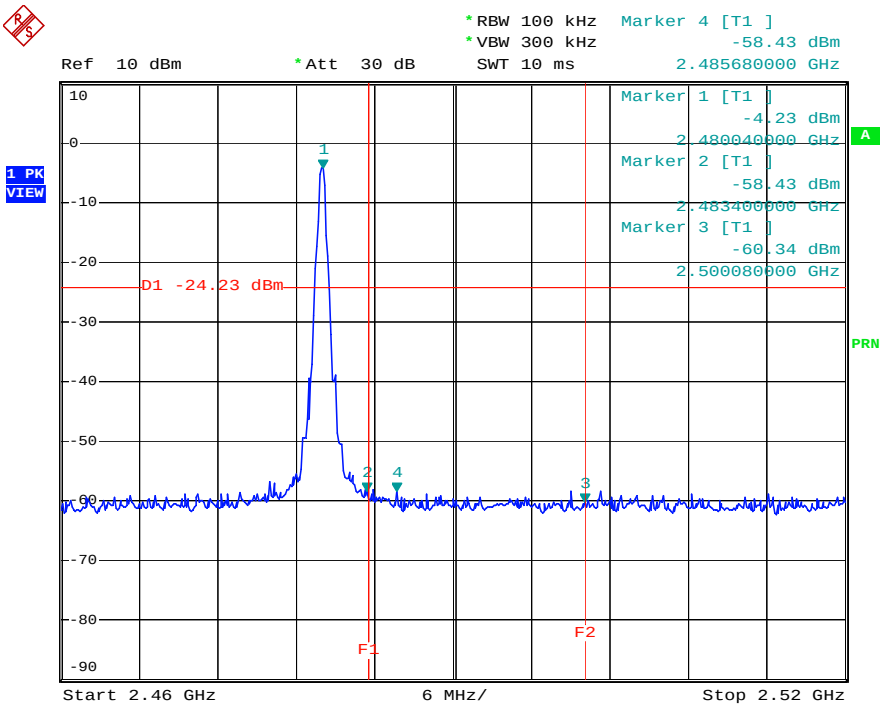


Date: 17.SEP.2008 16:06:56

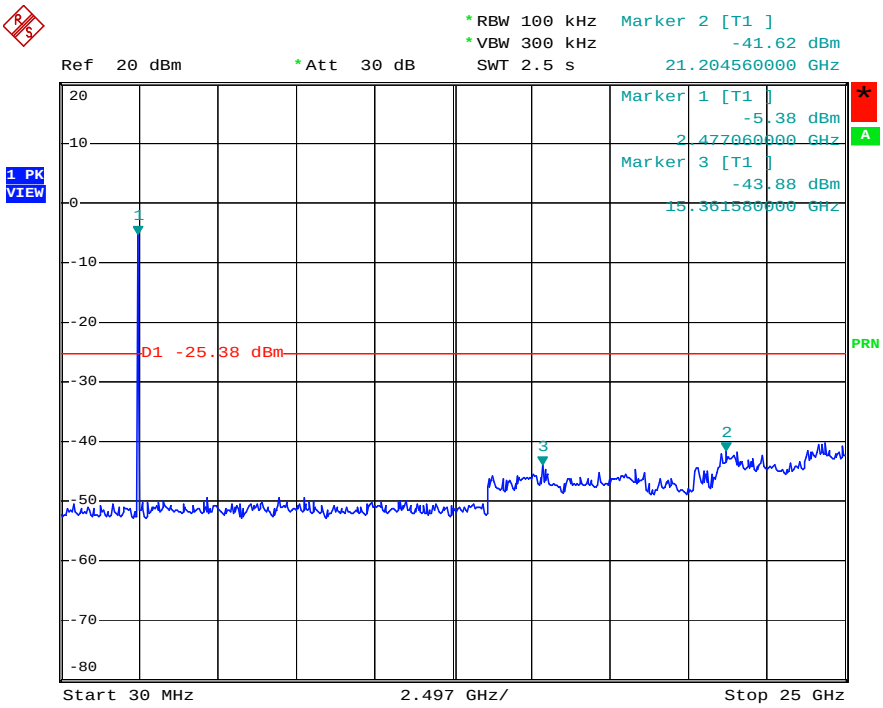


Date: 17.SEP.2008 16:08:06

CH 78



Date: 17.SEP.2008 16:43:17



Date: 17.SEP.2008 16:09:14

4.8 ANTENNA REQUIREMENT

4.8.1 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.

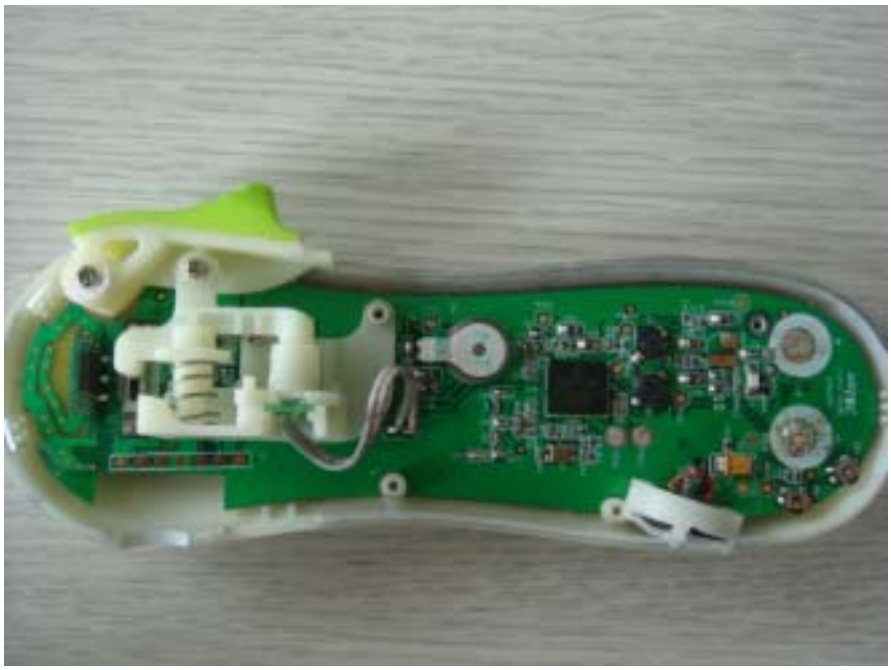
4.8.2 ANTENNA CONNECTED CONSTRUCTION

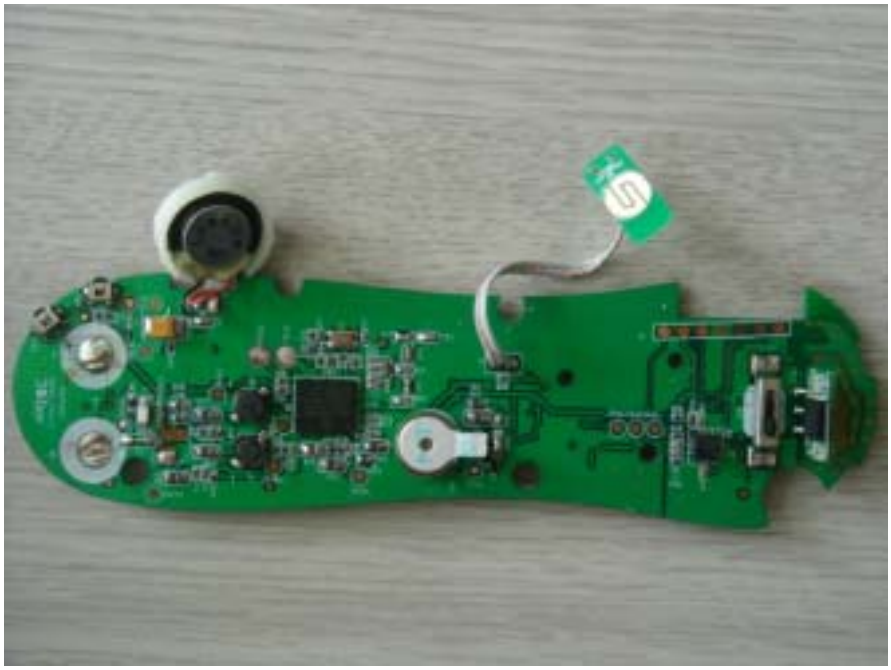
The antennas used in this product is Printed antenna that without antenna connector. The maximum gain of this antenna is 0dBi.

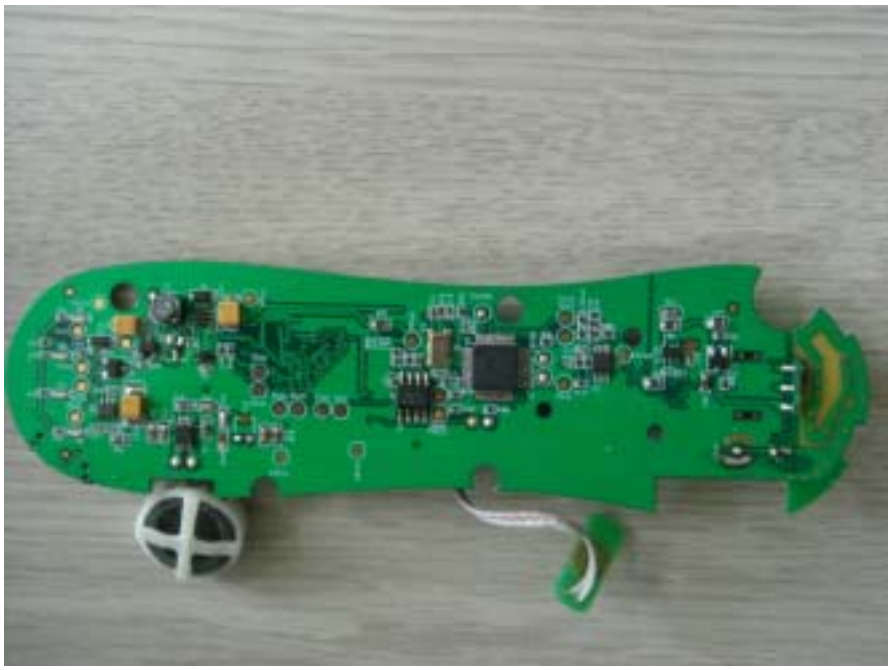
5. PHOTOGRAPHS OF THE TEST CONFIGURATION

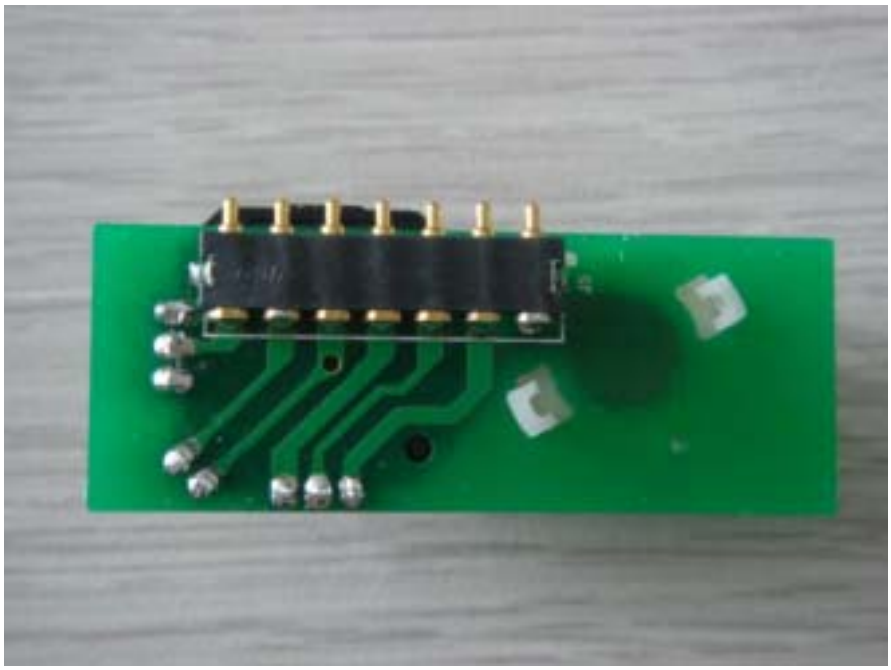
RADIATED EMISSION TEST

6. PHOTOGRAPHS OF THE EUT









7. APPENDIX A - INFORMATION ON THE TESTING LABORATORY

We, ADT (Shanghai) Corp., was founded in 2003 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratory is accredited and approved by the following approval agencies according to ISO / IEC 17025 (2005).

The client should not use it to claim product endorsement by CNAS, A2LA, or any government agency.

Japan	VCCI
USA	FCC, A2LA
Norway	DNV
China	CNAS

Copies of accreditation certificates of our laboratory obtained from approval agencies can be downloaded from our web site: www.cnadt.com
If you have any comments, please feel free to contact us at the following:

ADT (Shanghai) Corporation
TEL :86-21-6465-9091
Fax : 86-21-6465-9092
Email: service@adt-sh.com
Web Site: www.cnadt.com

8. APPENDIX B - UNCERTAINTY IN EMC MEASUREMENT

As specified in CISPR 16-4-2, measurement instrumentation uncertainty shall be taken into account when determining compliance or non-compliance with a disturbance limit. A disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cispr} in table 1, then:

※ Compliance is deemed to occur if no measured disturbance exceeds the disturbance limit;

※ Non-compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.

If U_{lab} is greater than or equal to U_{cispr} in table 1, then:

※ Compliance is deemed to occur if no measured disturbance, increased by (U_{lab} -U_{cispr}), exceeds the disturbance limit;

※ Non-compliance is deemed to occur if any measured disturbance, increased by (U_{lab} -U_{cispr}), exceeds the disturbance limit.

Table 1 – Values of U_{cispr}

Measurement		U_{cispr}
Conducted disturbance (mains port)	(9kHz – 150kHz) (150kHz – 30MHz)	4,0 dB 3,6 dB
Disturbance power	(30MHz – 300MHz)	4,5 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(30MHz – 1000MHz)	5,2 dB
Other		Under consideration

ADT Shanghai hereby declare the U lab value are as the following:

Conducted test performed at SR1 shielded room with U_{lab} values: +/- 2.55 dB

Radiated test performed at SAC Chamber with U_{lab} values: +/- 2.98 dB

Based on the above specification, the U_{lab} values of our sites are less than U_{cispr} in table 1 and compliance is deemed to occur if no measured disturbance exceeds the disturbance limit.