

TEST REPORT FOR CERTIFICATION
On Behalf of
Halloo Enterprise Co., Ltd.
FM Wireless Transmitter
Model No. : HN-1307
Brand : halloo
FCC ID : T4AHN-1307

Prepared for : Halloo Enterprise Co., Ltd.
Fl. 9, No. 111-33, Sec. 4, San Ho Road,
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Prepared by : AUDIX Technology Corporation
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TEST REPORT CERTIFICATION

Applicant : Halloa Enterprise Co., Ltd.
 EUT Description : FM Wireless Transmitter
 FCC ID : T4AHN-1307
 (A) MODEL NO. : HN-1307
 (B) SERIAL NO. : N/A
 (C) BRAND : halloa
 (D) POWER SUPPLY : DC 9-12V
 (E) TEST VOLTAGE : DC 12V (Via DC Power Supply)

Measurement Procedure Used:

FCC RULES AND REGULATIONS PART 15 SUBPART C, Sep. 2007
 AND ANSI C63.4/2003
 (FCC CFR 47 Part 15C, §15.203, §15.207, §15.209 and §15.239)

The device described above was tested by AUDIX Technology Corporation to determine the maximum emission levels emanating from the device. The maximum emission levels were compared to the FCC Part 15 subpart C limits both radiated and conducted emissions.

The measurement results are contained in this test report and AUDIX Technology Corporation is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the FCC official limits.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of AUDIX Technology Corporation.

Date of Test: Aug. 16 ~ Oct. 20, 2008

Prepared by: Julie Hsu
 (Julie Hsu/Assistant Administrator)

Test Engineer: Ben Cheng
 (Ben Cheng/Manager)

Approved & Authorized Signer: Leon Liu
 (Leon Liu/Deputy General Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Description	:	FM Wireless Transmitter The device to apply to wireless audio systems for example for FM Radio use in a vehicle or radio device carried on a person, and therefore the device only a transmitting function . (Receiver is a general car audio)
Model Number	:	HN-1307
Brand	:	halloa
FCC ID	:	T4AHN-1307
Applicant	:	Halhoa Enterprise Co., Ltd. Fl. 9, No. 111-33, Sec. 4, San Ho Road, San Chung City, Taipei Hsien, 241 Taiwan, R.O.C.
Frequency Range	:	88.1MHz~107.9MHz
Test Frequency	:	88.1MHz, 98.1MHz and 107.9MHz
Date of Receipt of Sample	:	Dec. 05, 2007
Date of Test	:	Aug. 16 ~ Oct. 20, 2008

1.2. Tested Supporting System Details

1.2.1. MP3 PLAYER

Model Number	:	PD-399
Serial Number	:	S/N
FCC ID	:	By DoC
Manufacturer	:	Perception Digital
Audio Cable	:	Non-Shielded, Detachable, 0.5m

1.2.2. DC POWER SUPPLY

Model Number	:	3303A
Serial Number	:	721773
Manufacturer	:	TOP WARD
DC Power Cable*2	:	Non-Shielded, Detachable, 0.3m
Power Cord	:	Non-Shielded, Detachable, 0.3m

1.3. Description of Test Facility

Name of Firm : **AUDIX Technology Corporation**
EMC Department
 No. 53-11, Tin-Fu Tsun, Lin-Kou Hsiang,
 Taipei Hsien, Taiwan

Test Location & Facility : **Semi-Anechoic Chamber**
 (AC) No. 53-11, Tin-Fu Tsun, Lin-Kou Hsiang,
 Taipei Hsien, Taiwan

Renewal on May 16, 2006
 Federal Communication Commission
 Registration Number: 90993

NVLAP Lab. Code : 200077-0
 (NVLAP is a NATA accredited body under Mutual Recognition Agreement)

1.4. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty (dB), (V/m)
Conduction Test	150kHz~30MHz	± 1.73dB
Radiation Test (Distance: 3m)	30MHz~300MHz	± 2.91dB
	300MHz~1000MHz	± 2.74dB

Remark : Uncertainty = $ku_c(y)$

2. POWERLINE CONDUCTED EMISSION MEASUREMENT

【The EUT only employ DC power and battery for operation, no conductive emissions limits are required according to FCC Part 15 Section §15.207】

3. RADIATED EMISSION MEASUREMENT

3.1. Test Equipment

The following test equipment was used during the radiated emission measurement:

3.1.1. At Semi-Anechoic Chamber (For Frequency Range 30MHz-1000MHz)

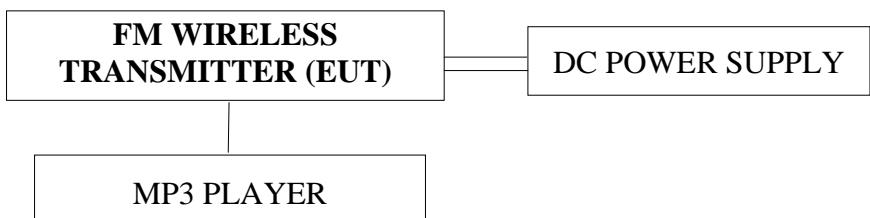
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	HP	8593EM	3826A00272	Jul.03, 08'	Jul.02, 09'
2.	Test Receiver	R&S	ESCS30	100265	Sep.04, 07'	Sep.03, 08'
3.	Pre-Amplifier	HP	8447D	2944A06305	Feb.19, 08'	Feb.18, 09'
4.	Broadband Antenna	CHASE	VBA6106A	1264	Apr.10, 08'	Apr.09, 09'
5.	Log Periodic Antenna	Schwarzbeck	UHALP 9108-A	0810	Apr.10, 08'	Apr.09, 09'

3.1.2. At Semi-Anechoic Chamber (For Frequency Range Above 1GHz)

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	HP	8564EC	3946A00249	Nov.11, 07'	Nov.10, 08'
2.	Amplifier	HP	8449B	3008A00529	Jan.09, 08'	Jan.08, 09'
3.	Horn Antenna	EMCO	3115	9609-4927	Jul.07, 08'	Jul.06'09'
4.	High Pass Filter	HP	84300-80038	005	Jan.08, 08'	Jan.07, 09'

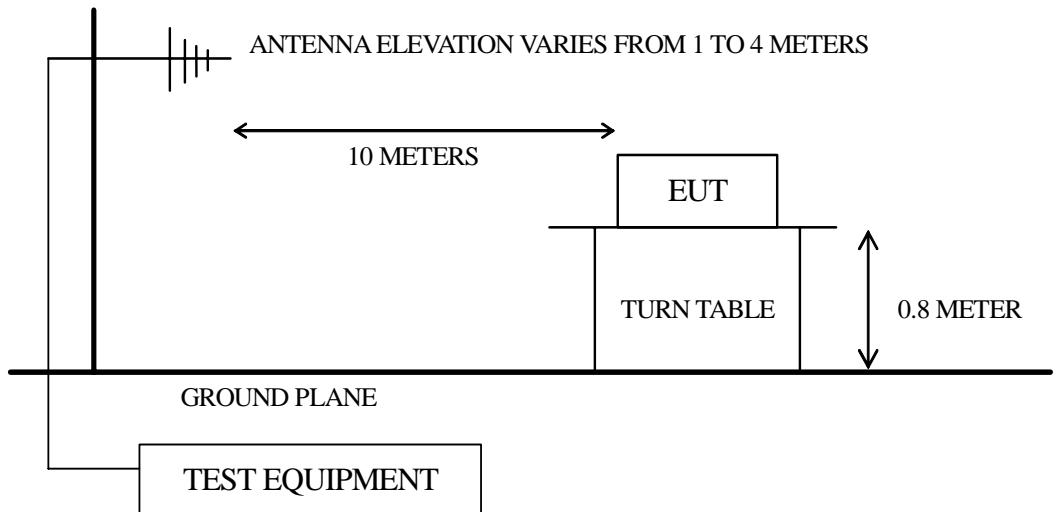
3.2. Test Setup

3.2.1. Block Diagram of connection between EUT and simulators



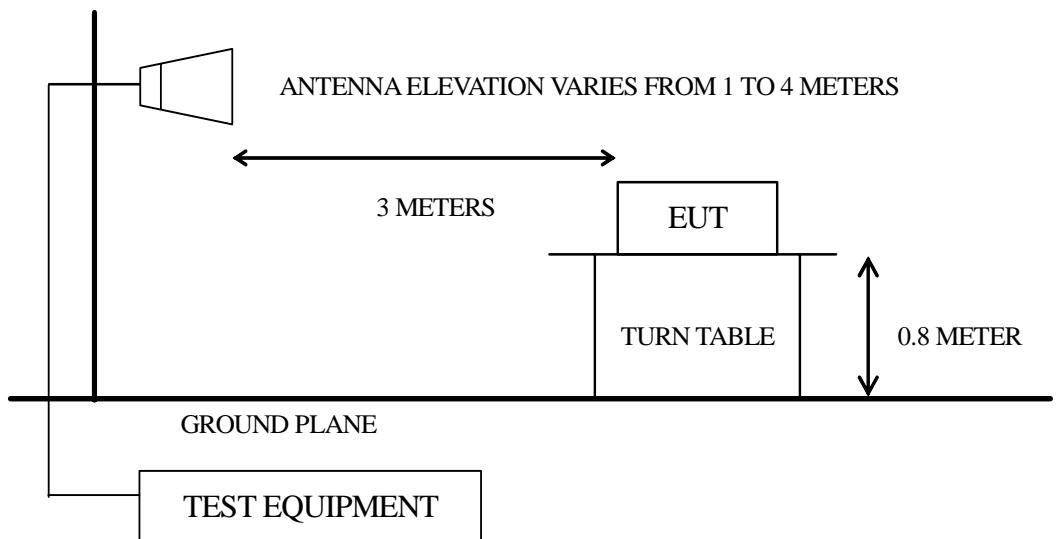
3.2.2. Semi-Anechoic Chamber (10m) Setup Diagram for 30-1000MHz

ANTENNA TOWER



3.2.3. Semi-Anechoic Chamber (3m) Setup Diagram for Above 1GHz

ANTENNA TOWER



3.3. Radiation Limit (Comply with §15.239 & §15.209)

3.3.1. §15.239 Radiated Emission Limits (Fundamental Frequency)

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMITS	
		µV/m	dBµV/m
Fundamental Freq.	3	250	48.0 (Average)
		---	68.0 (Peak) ⁽²⁾

Remark : (1) Emission level (dBµV/m) = 20 log Emission level (µV/m)
 (2) The provision in section 15.35 for limiting peak emission apply.

3.3.2. §15.209 Radiated Emission Limits (Spurious Frequency)

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMITS	
		µV/m	dBµV/m
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	---	74.0 (Peak)
Above 1000	3	---	54.0 (Average)

Remark : (1) Emission level (dBµV/m) = 20 log Emission level (µV/m)
 (2) The tighter limit applies at the edge between two frequency bands.
 (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
 (4) The over 1GHz limit, FCC limit is used based on CFR 47 Part 15.35 (b) and 15.205(b) & Part 15.209(e).

3.4. EUT's Configuration during Compliance Measurement

The following equipment were installed on radiated measurement to meet the commission requirement and operating in a manner which tended to maximize its emission characteristics in a normal application.

3.4.1. FM Wireless Transmitter (EUT)

Model Number	:	HN-1307
Serial Number	:	N/A
FCC ID	:	T4AHN-1307
Frequency Range	:	88.1MHz~107.9MHz (FM)
Test Frequency	:	88.1MHz, 98.1MHz and 107.9MHz

3.4.2. Supporting System : As in Section 1.2.

3.5. Operating Condition of EUT

- 3.5.1. Setup the EUT and simulator as shown on 3.2.
- 3.5.2. Turned on the power of all equipment.
- 3.5.3. The MP3 player to provide a pop music and the sound volume adjust to maximum for test. (Set EUT transmitting frequency tune into 88.1MHz, 98.1MHz and 107.9MHz)
- 3.5.4. The other peripheral devices were driven and operated in turn during all testing.

3.6. Test Procedure

The EUT and its simulators were placed on a turn table which was 0.8 meter above the ground. The turn table rotated 360 degrees to determine the position of the maximum emission level. EUT was set 3 meters away from the receiving antenna which was mounted on a antenna tower. The antenna moved up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna such as calibrated biconical and log- periodical antenna or horn antenna were used as a receiving antenna. Both horizontal and vertical polarization of the antenna were set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to FCC ANSI C63.4-2003 regulation.

For 30-1000MHz :

The bandwidth of R&S test receiver ESCS 30 was set at 120kHz.

The device duty cycle is almost 100%, and therefore the frequency range from 30MHz to 1000MHz was reading Quasi-Peak value.

For Above 1GHz :

The resolution bandwidth of HP Spectrum Analyzer 8564EC was set at 1MHz.

The frequency range from above 1GHz was checked with Peak and Average detector.

EUT with the worst operating conduction were measured within Semi-Anechoic Chamber and all the test results are listed in section 3.7. The details of test modes are as follows:

Mode	Operating Condition of EUT	Power Supply
1.	Transmitting FM Radio Frequency 88.1MHz	DC Battery 12V
2.	Transmitting FM Radio Frequency 98.1MHz	
3.	Transmitting FM Radio Frequency 107.9MHz	

3.7. Radiated Emission Noise Measurement Results

PASSED. Please refer to the following pages.

All the emissions not reported below are too low against the FCC Part 15 Subpart C official limits.

3.7.1. Radiated Emission Noise Measurement Results at Semi Anechoic Chamber (30 ~ 1000MHz)

Date of Test : Oct. 20, 2008 Temperature : 25°C

EUT : FM Wireless Transmitter Humidity : 65%

Test Mode : Transmitting FM Radio Frequency 88.1MHz

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Reading Horizontal dB μ V	Emission Level Horizontal dB μ V/m	Limits dB μ V/m	Margin dB
<hr/>						
Fundamental Freq. (Quasi-Pack Value)						
88.100	15.37	0.61	26.10	42.08	48.00	5.92
<hr/>						
Spurious Freq. (Quasi-Peak Value)						
72.390	12.38	0.56	11.56	24.50	40.00	15.50
96.690	16.72	0.64	16.81	34.17	43.50	9.33
147.990	20.56	0.81	11.80	33.17	43.50	10.33
152.580	20.68	0.82	13.77	35.27	43.50	8.23
176.200	21.20	0.88	16.22	38.30	43.50	5.20
201.990	22.04	0.97	13.11	36.13	43.50	7.37
261.390	24.57	1.11	12.58	38.26	46.00	7.74
264.300	24.61	1.11	13.01	38.74	46.00	7.26
352.400	15.27	1.28	15.92	32.47	46.00	13.53
528.600	18.04	1.67	8.40	28.11	46.00	17.89
792.900	21.25	2.04	2.74	26.03	46.00	19.97
866.300	22.12	2.15	3.24	27.51	46.00	18.49
881.000	22.34	2.21	6.65	31.19	46.00	14.81
969.100	22.80	2.32	6.72	31.84	54.00	22.16

Remark : 1. Emission Level = Antenna Factor + Cable Loss + Reading.
 2. Measurement was up to 10th harmonics (from fundamental frequency), but the emissions level were too low against the official limit and not reported.

Date of Test : Oct. 20, 2008 Temperature : 25°C

EUT : FM Wireless Transmitter Humidity : 65%

Test Mode : Transmitting FM Radio Frequency 88.1MHz

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Reading Vertical dB μ V	Emission Level Vertical dB μ V/m	Limits dB μ V/m	Margin dB
Fundamental Freq. (Quasi-Pack Value)						
88.100	15.37	0.61	25.87	41.85	48.00	6.15
Spurious Freq. (Quasi-Peak Value)						
55.380	14.11	0.47	11.89	26.47	40.00	13.53
72.390	12.38	0.56	17.42	30.36	40.00	9.64
176.200	21.20	0.88	8.09	30.17	43.50	13.33
200.640	22.07	0.97	7.22	30.27	43.50	13.23
205.230	21.93	0.98	8.14	31.05	43.50	12.45
264.300	24.61	1.11	6.01	31.74	46.00	14.26
352.400	15.27	1.28	9.13	25.68	46.00	20.32
440.500	16.99	1.57	6.83	25.38	46.00	20.62
528.600	18.04	1.67	5.86	25.57	46.00	20.43
979.100	22.96	2.32	4.25	29.52	54.00	24.48

Remark : 1. Emission Level = Antenna Factor + Cable Loss + Reading.
 2. Measurement was up to 10th harmonics (from fundamental frequency), but the emissions level were too low against the official limit and not reported.

Date of Test : Oct. 20, 2008 Temperature : 25°C

EUT : FM Wireless Transmitter Humidity : 65%

Test Mode : Transmitting FM Radio Frequency 98.1MHz

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Reading Horizontal dB μ V	Emission Level Horizontal dB μ V/m	Limits dB μ V/m	Margin dB
Fundamental Freq. (Quasi-Pack Value)						
98.100	16.87	0.64	26.17	43.68	48.00	4.32
Spurious Freq. (Quasi-Peak Value)						
72.390	12.38	0.56	12.63	25.57	40.00	14.43
152.580	20.68	0.82	14.76	36.26	43.50	7.24
196.200	21.90	0.96	15.25	38.11	43.50	5.39
200.640	22.07	0.97	15.40	38.45	43.50	5.05
245.730	23.51	1.05	12.98	37.54	46.00	8.46
253.830	24.11	1.09	12.42	37.62	46.00	8.38
257.880	24.44	1.10	12.82	38.35	46.00	7.65
262.740	24.58	1.11	11.58	37.27	46.00	8.73
294.300	26.39	1.17	8.71	36.27	46.00	9.73
346.900	15.08	1.28	19.39	35.75	46.00	10.25
392.400	16.94	1.38	11.35	29.67	46.00	16.33
490.500	17.66	1.58	9.39	28.63	46.00	17.37
577.900	18.64	1.69	8.94	29.27	46.00	16.73
649.300	19.89	1.84	5.01	26.74	46.00	19.26
784.800	21.07	2.06	6.71	29.83	46.00	16.17
882.900	22.33	2.21	10.63	35.17	46.00	10.83
981.000	23.00	2.31	6.77	32.08	54.00	21.92

Remark : 1. Emission Level = Antenna Factor + Cable Loss + Reading.
 2. Measurement was up to 10th harmonics (from fundamental frequency), but the emissions level were too low against the official limit and not reported.

Date of Test : Oct. 20, 2008 Temperature : 25°C
 EUT : FM Wireless Transmitter Humidity : 65%
 Test Mode : Transmitting FM Radio Frequency 98.1MHz

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Reading Vertical dB μ V	Emission Level Vertical dB μ V/m	Limits dB μ V/m	Margin dB
Fundamental Freq. (Quasi-Pack Value)						
98.100	16.87	0.64	24.14	41.65	48.00	6.35
Spurious Freq. (Quasi-Peak Value)						
44.580	18.77	0.42	6.28	25.47	40.00	14.53
55.380	14.11	0.47	9.88	24.46	40.00	15.54
72.390	12.38	0.56	15.71	28.65	40.00	11.35
152.580	20.68	0.82	6.02	27.52	43.50	15.98
196.200	21.90	0.96	11.80	34.66	43.50	8.84
257.880	24.44	1.10	6.84	32.37	46.00	13.63
294.300	26.39	1.17	3.97	31.53	46.00	14.47
325.900	14.38	1.23	12.66	28.27	46.00	17.73
490.500	17.66	1.58	8.43	27.67	46.00	18.33
577.900	18.64	1.69	7.14	27.47	46.00	18.53
784.800	21.07	2.06	4.59	27.71	46.00	18.29
882.900	22.33	2.21	6.32	30.86	46.00	15.14
981.000	23.00	2.31	6.34	31.65	54.00	22.35

Remark : 1. Emission Level = Antenna Factor + Cable Loss + Reading.
 2. Measurement was up to 10th harmonics (from fundamental frequency), but the emissions level were too low against the official limit and not reported.

Date of Test : Oct. 20, 2008 Temperature : 25°C

EUT : FM Wireless Transmitter Humidity : 65%

Test Mode : Transmitting FM Radio Frequency 107.9MHz

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Reading Horizontal dB μ V	Emission Level Horizontal dB μ V/m	Limits dB μ V/m	Margin dB
Fundamental Freq. (Quasi-Pack Value)						
107.900	17.95	0.67	24.04	42.65	48.00	5.35
Spurious Freq. (Quasi-Peak Value)						
72.390	12.38	0.56	11.73	24.67	40.00	15.33
147.990	20.56	0.81	12.91	34.28	43.50	9.22
156.630	20.70	0.83	16.02	37.55	43.50	5.95
200.640	22.07	0.97	14.57	37.62	43.50	5.88
215.800	21.84	0.98	14.34	37.17	43.50	6.33
253.830	24.11	1.09	12.44	37.64	46.00	8.36
257.880	24.44	1.10	12.93	38.46	46.00	7.54
262.740	24.58	1.11	11.14	36.83	46.00	9.17
323.700	14.36	1.22	17.74	33.31	46.00	12.69
343.400	14.91	1.29	18.58	34.78	46.00	11.22
431.600	16.63	1.52	12.43	30.57	46.00	15.43
539.500	18.46	1.68	11.43	31.57	46.00	14.43
577.900	18.64	1.69	10.35	30.68	46.00	15.32
647.400	19.84	1.84	7.96	29.64	46.00	16.36
755.300	20.76	2.01	5.08	27.85	46.00	18.15
863.200	22.00	2.15	9.02	33.17	46.00	12.83
971.100	22.82	2.32	7.94	33.08	54.00	20.92

Remark : 1. Emission Level = Antenna Factor + Cable Loss + Reading.
 2. Measurement was up to 10th harmonics (from fundamental frequency), but the emissions level were too low against the official limit and not reported.

Date of Test : Oct. 20, 2008 Temperature : 25°C

EUT : FM Wireless Transmitter Humidity : 65%

Test Mode : Transmitting FM Radio Frequency 107.9MHz

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Reading Vertical dB μ V	Emission Level Vertical dB μ V/m	Limits dB μ V/m	Margin dB
Fundamental Freq. (Quasi-Pack Value)						
107.900	17.95	0.67	22.83	41.44	48.00	6.56
Spurious Freq. (Quasi-Peak Value)						
44.580	18.77	0.42	6.37	25.56	40.00	14.44
55.380	14.11	0.47	10.89	25.47	40.00	14.53
72.390	12.38	0.56	16.64	29.58	40.00	10.42
197.940	22.02	0.96	7.48	30.47	43.50	13.03
215.800	21.84	0.98	6.73	29.56	43.50	13.94
265.440	24.66	1.12	5.34	31.11	46.00	14.89
292.980	26.24	1.17	4.55	31.96	46.00	14.04
297.030	26.62	1.18	4.67	32.47	46.00	13.53
323.000	14.34	1.21	12.07	27.62	46.00	18.38
329.400	14.46	1.25	11.46	27.17	46.00	18.83
431.600	16.63	1.52	7.60	25.74	46.00	20.26
539.500	18.46	1.68	7.53	27.67	46.00	18.33
577.900	18.64	1.69	7.23	27.56	46.00	18.44
647.400	19.84	1.84	4.50	26.18	46.00	19.82
755.300	20.76	2.01	4.04	26.81	46.00	19.19
863.200	22.00	2.15	6.13	30.28	46.00	15.72
971.100	22.82	2.32	7.71	32.85	54.00	21.15

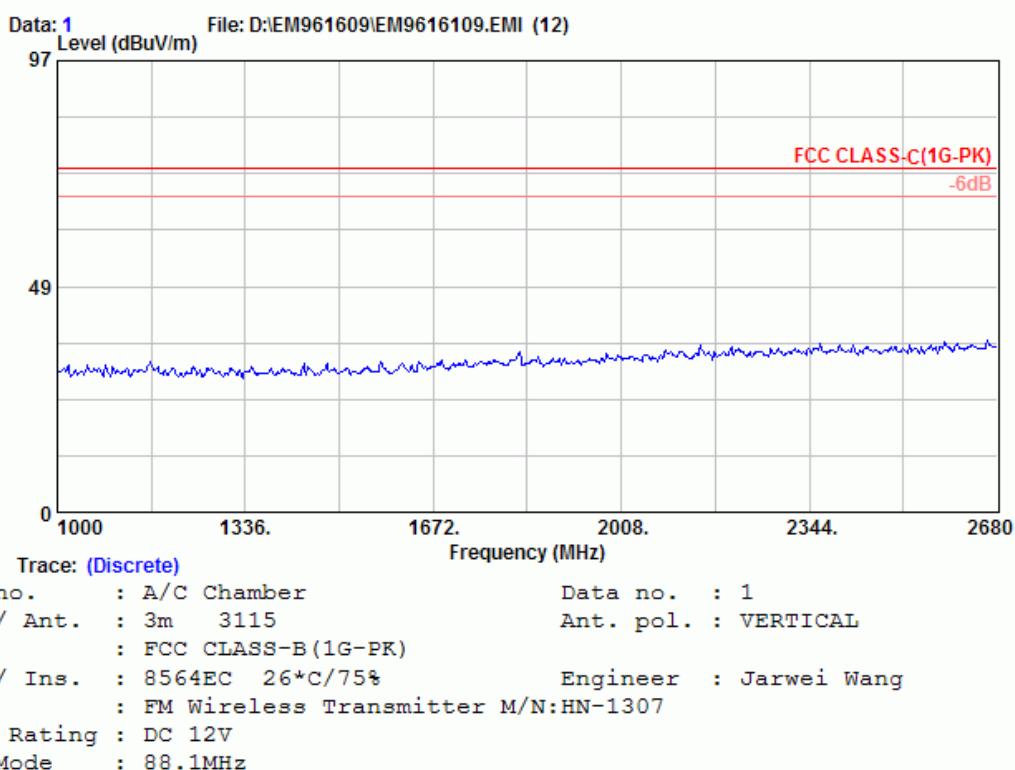
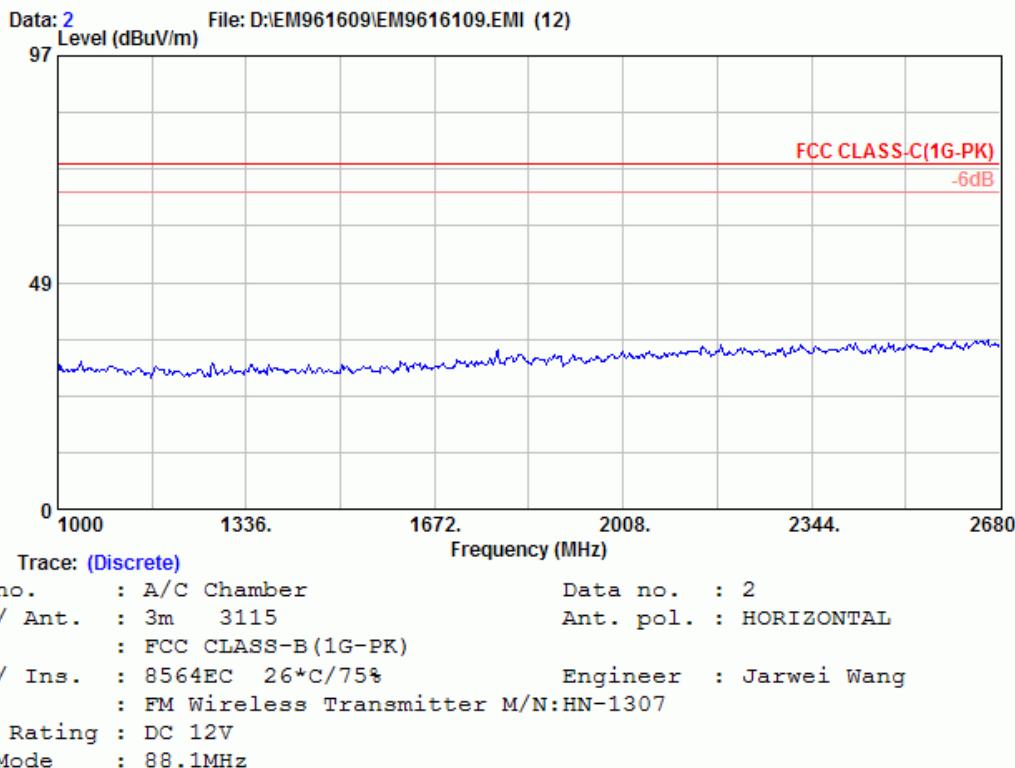
Remark : 1. Emission Level = Antenna Factor + Cable Loss + Reading.
 2. Measurement was up to 10th harmonics (from fundamental frequency), but the emissions level were too low against the official limit and not reported.

3.7.2. Radiated Emission Noise Measurement Results at Semi Anechoic Chamber (Above 1GHz)

The EUT was measure the spectrum analyzer from above 1GHz, and found the noise from EUT was under the permissible limit more than 20dB, therefore there is no result needing to be reported.

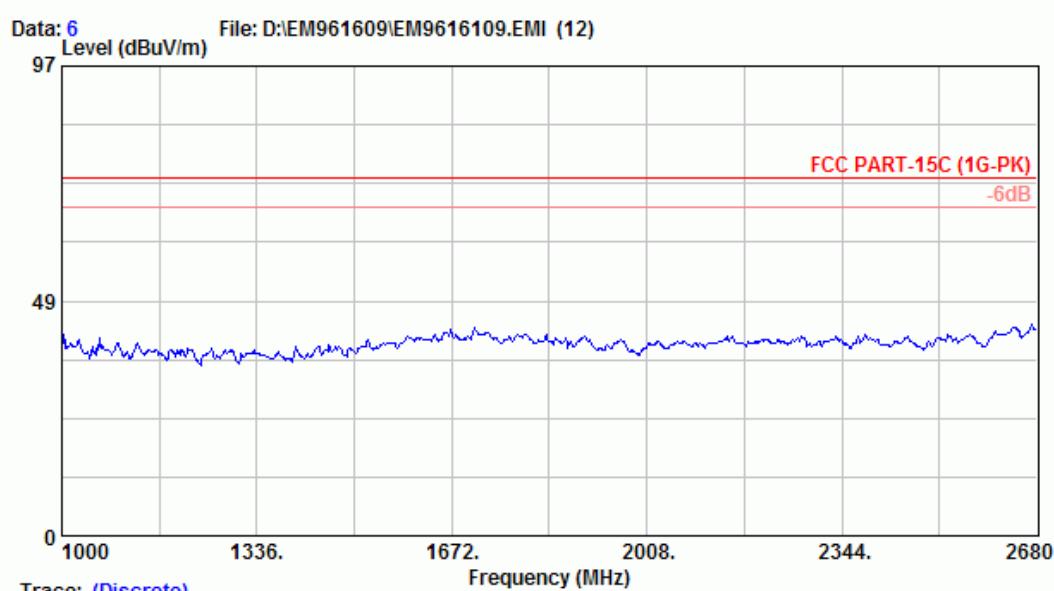


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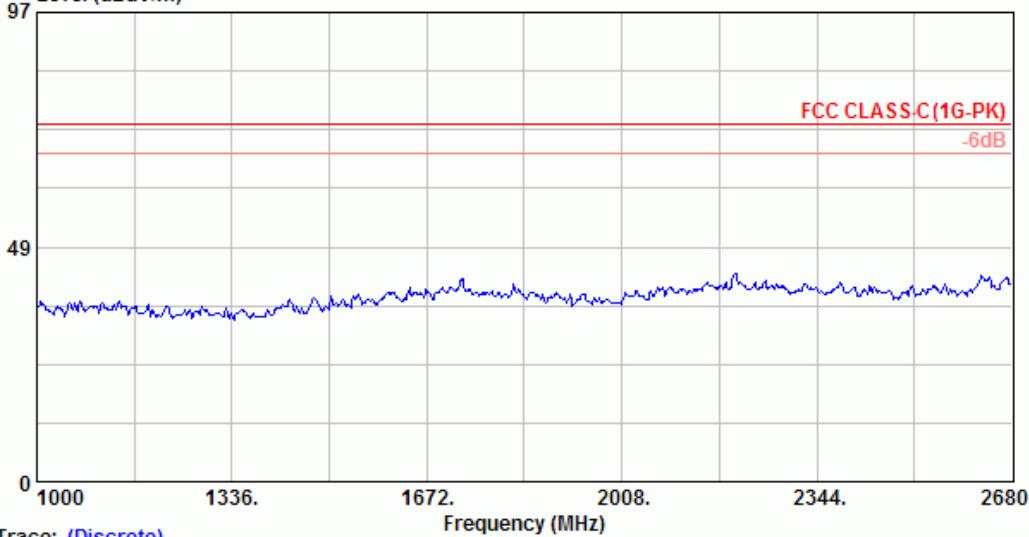
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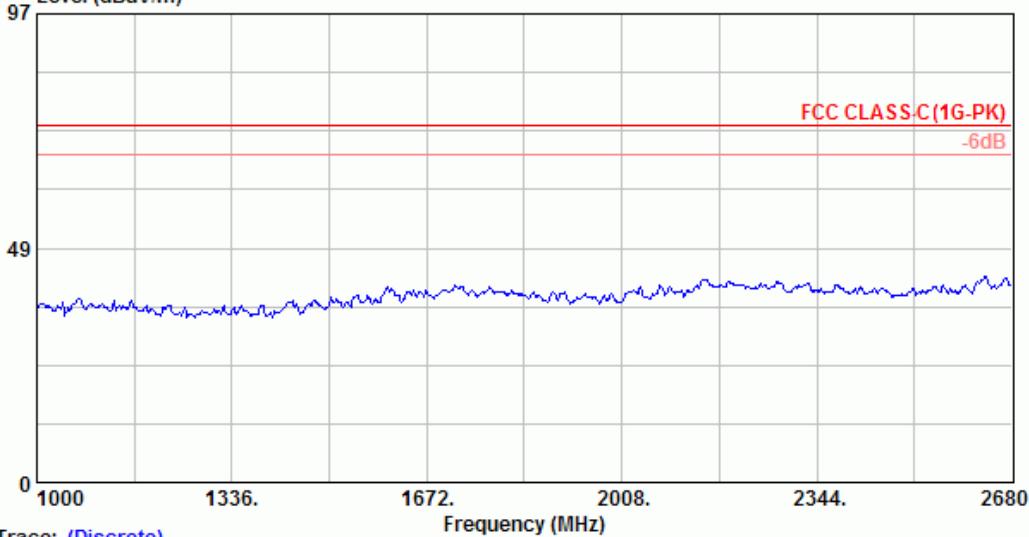
Data: 5 File: D:\EM961609\EM9616109.EMI (12)
 Level (dBuV/m)



Trace: (Discrete)

Site no. : A/C Chamber Data no. : 5
 Dis. / Ant. : 3m 3115 Ant. pol. : HORIZONTAL
 Limit : FCC CLASS-B(1G-PK)
 Env. / Ins. : 8564EC 26*C/75% Engineer : Jarwei Wang
 EUT : FM Wireless Transmitter M/N:HN-1307
 Power Rating : DC 12V
 Test Mode : 107.9MHz

Data: 6 File: D:\EM961609\EM9616109.EMI (12)
 Level (dBuV/m)



Trace: (Discrete)

Site no. : A/C Chamber Data no. : 6
 Dis. / Ant. : 3m 3115 Ant. pol. : VERTICAL
 Limit : FCC CLASS-B(1G-PK)
 Env. / Ins. : 8564EC 26*C/75% Engineer : Jarwei Wang
 EUT : FM Wireless Transmitter M/N:HN-1307
 Power Rating : DC 12V
 Test Mode : 107.9MHz

4. 26dB BANDWIDTH MEASUREMENT

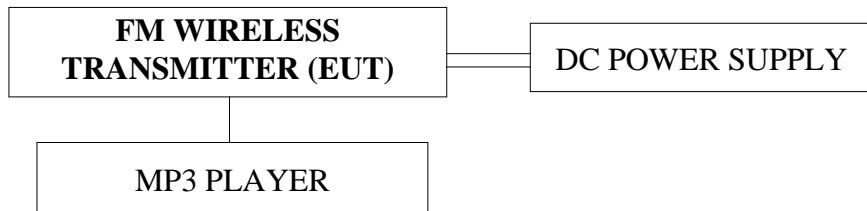
4.1. Test Equipment

The following test equipment were used during the Emission Bandwidth Measurement: (Semi-Anechoic Chamber)

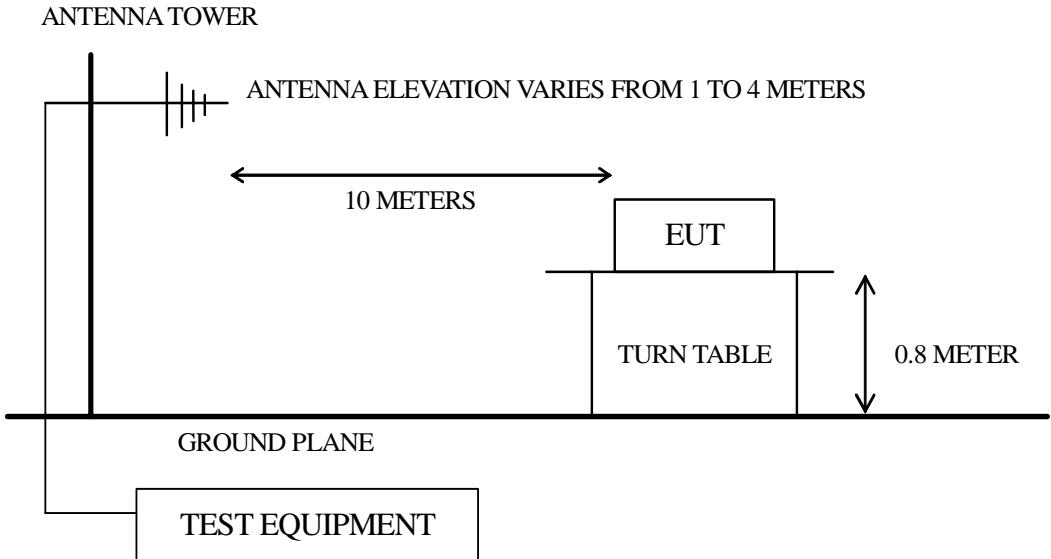
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	E4446A	US44300366	Aug.07, 08'	Aug.06, 09'
2.	Test Receiver	R&S	ESCS30	100265	Sep. 04, 07'	Sep. 03, 08'
3.	Pre-Amplifier	HP	8447D	2944A06305	Feb.19, 08'	Feb.18, 09'
4.	Broadband Antenna	CHASE	VBA6106A	1264	Apr.10, 08'	Apr.09, 09'

4.2. Block Diagram of Test Setup

4.2.1. Block Diagram of connection between EUT and simulators



4.2.2. Semi-Anechoic Chamber (10m) Setup Diagram



4.3. Specification Limits (§15.239)

The 26dB bandwidth of fundamental emission from the intentional radiator shall be confined within a band 200kHz wide centered on the operating frequency. The 200kHz band shall lie wholly within the frequency range of 88.1-88.8MHz.

4.4. EUT's Configuration during Compliance Measurement

The configuration of EUT were same as section 3.4.

4.5. Operating Condition of EUT

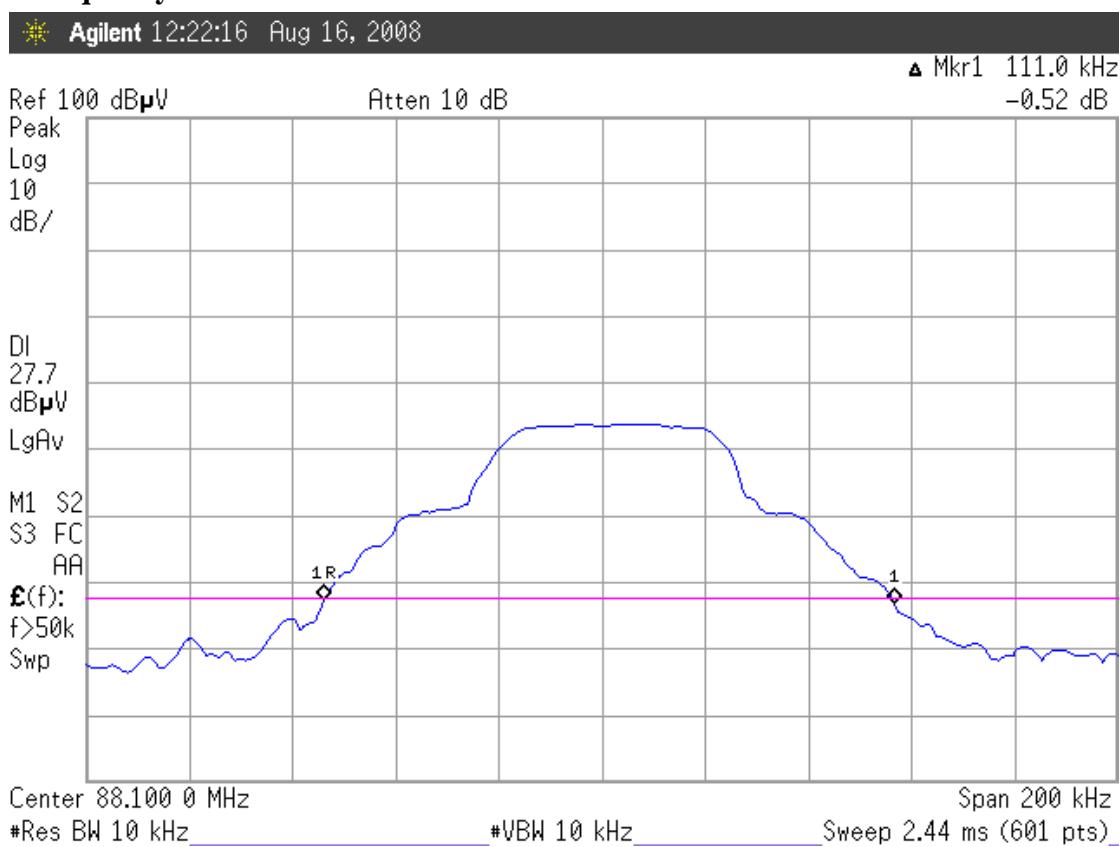
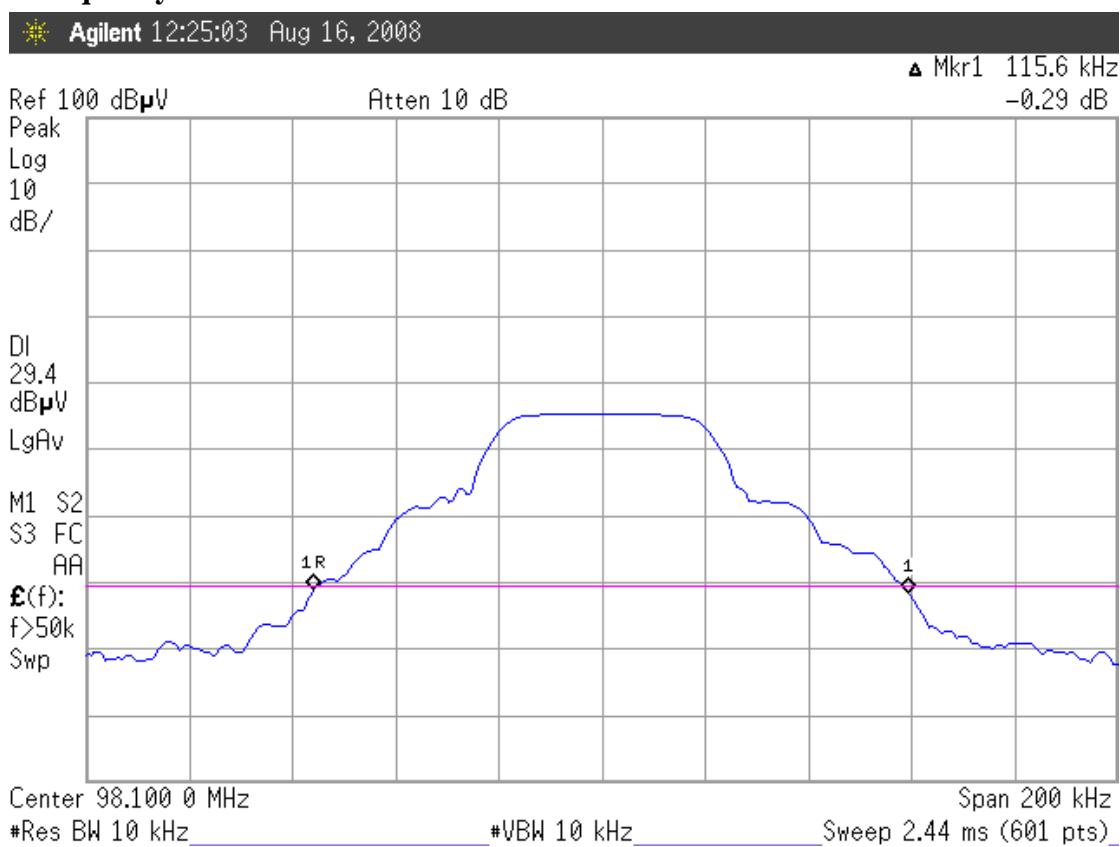
- 4.5.1. Setup the EUT and simulator as shown on 3.2.
- 4.5.2. Turned on the power of all equipment.
- 4.5.3. The MP3 player to provide a pop music and the sound volume adjust to maximum for test. (Set EUT transmitting frequency tune into 88.1MHz, 98.1MHz and 107.9MHz)
- 4.5.4. The other peripheral devices were driven and operated in turn during all testing.

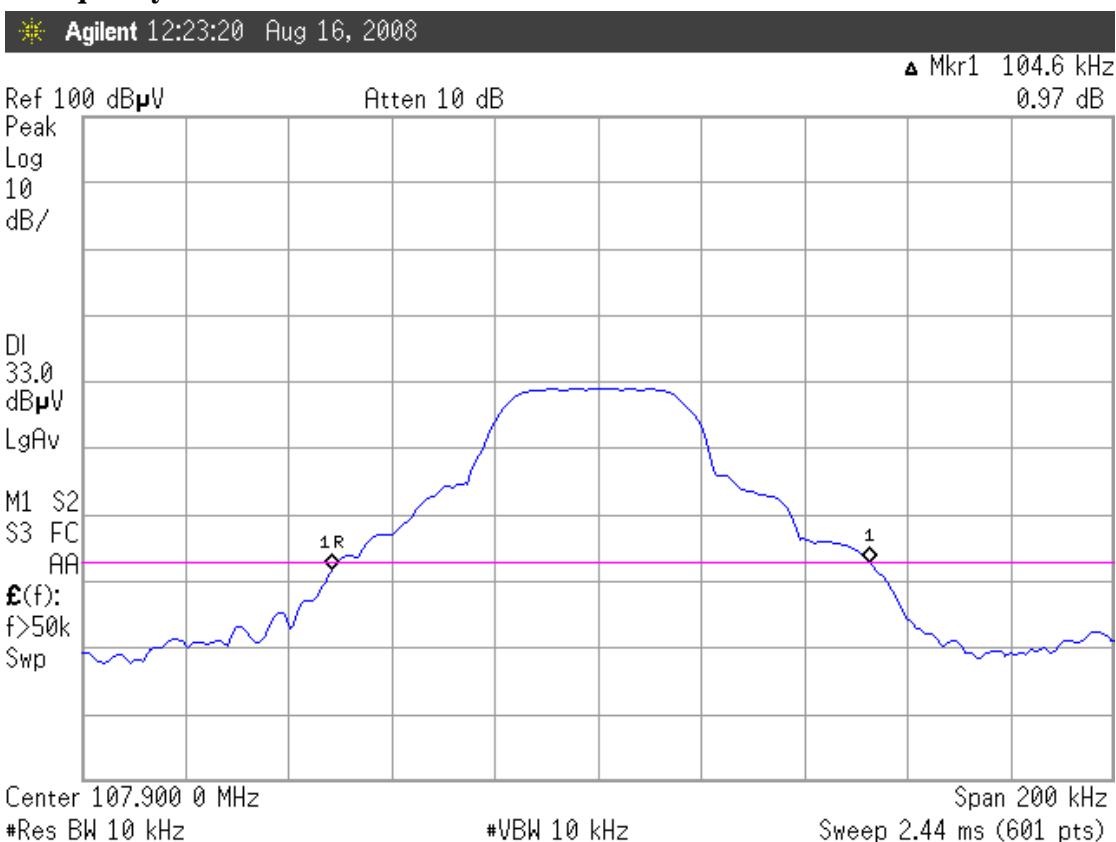
4.6. 26dB Bandwidth Measurement Results

PASSED. The graph of bandwidth measured is attached in next pages.
(Remark: -26dB below the peak level to measure)

Date of Test: Aug. 16, 2008 Temperature : 26°C Humidity : 75%

Mode	Center Frequency	26dB Bandwidth	Limits
1.	88.1MHz	111.0kHz	200kHz
2.	98.1MHz	115.6kHz	200kHz
3.	107.9MHz	104.6kHz	200kHz

Frequency: 88.1MHz**Frequency: 98.1MHz**

Frequency: 107.9MHz

5. DEVIATION TO TEST SPECIFICATIONS

【NONE】