

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

Test Report No. : E069R-032

AGR No. : A067A-044

Applicant : SAROTECH CO., LTD.
Address : Sarotech Bldg. 320-15, Sungnae-Dong, Gangdong-Gu, Seoul, 134-851, Korea

Manufacturer : SAROTECH CO., LTD.
Address : Hanlim Venture Town #204, 689-6, Gumjeong-Dong, Gunpo-City, Kyungki-Do, Korea

Type of Equipment : Multi Media Player (FM Transmitter)

FCC ID. : PBCDVP-570

Model Name : DVP-570HD

Serial number : N/A

Total page of Report : 19 pages (including this page)

Date of Incoming : June 02, 2006

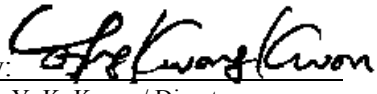
Date of Issuing : September 13, 2006

SUMMARY

The equipment complies with the regulation of *FCC CRF 47 PART 15, SUBPART C, SECTION 15.239*.

This test report contains only the results of a single test of the sample supplied for the examination. It is not a general valid assessment of the features of the respective products of the mass-production.

Prepared by: 
Young-Min, Choi / Project Engineer
EMC Div.
ONETECH Corp.

Reviewed by: 
Y. K. Kwon / Director
EMC Div.
ONETECH Corp.

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1. VERIFICATION OF COMPLIANCE

- APPLICANT : SAROTECH CO., LTD.
- ADDRESS : Sarotech Bldg. 320-15, Sungnae-Dong, Gangdong-Gu, Seoul, 134-851, Korea
- CONTACT PERSON : Mr. Yong-Woo, Lee / Manager
- TELEPHONE NO : +82-2-480-5140
- BRAND NAME : abigs
- FCC ID : PBCDVP-570
- MODEL NAME : DVP-570HD
- SERIAL NUMBER : N/A
- DATE : September 13, 2006

DEVICE TYPE	Low Power Communication Device Transmitter
E.U.T. DESCRIPTION	Multi Media Player (FM Transmitter)
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	Charter 7 and 13 of ANSI C63.4: 2003
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SECTION 15.239
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 METER OPEN AREA TEST SITE

- The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. GENERAL INFORMATION

2.1 Product Description

The SAROTECH CO., LTD., Model DVP-570HD (referred to as the EUT in this report) is a Multi Media Player that has a function for transmitting of FM broadcasting frequency range and PC peripheral. This report covers the FM transmitter from 88.1 MHz to 88.9 MHz with 400Hz step for audio signal of FM radio receiver. Product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Plastic
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	24 MHz, 25 MHz, 27 MHz and 33 MHz on the Main Board
POWER REQUIREMENT	AC 95-240V, 50/60Hz, 0.5A or DC 5V/2.0A, DC 12V/1.0A from a car battery
TX FREQUENCY RANGE	88.1 MHz ~ 88.9 MHz (range into 400 kHz Step)
NUMBER OF LAYERS	2 Layers: Key Board, Host Board, Sub Board, 6 Layers: Main Board
EXTERNAL CONNECTOR	AC In, DC In, Composite Ports, Component Ports, S-Video, DVI, Optical, Coaxial, USB Port, External IR, LAN Port

2.2 Model Differences

- None

2.3 Related Submittal(s) / Grant(s)

- Original submittal only

2.4 Test System Details

The model numbers for all the equipments which were used in the tested system is:

Model	Manufacturer	FCC ID	Description	Connected to
DVP-570HD	SAROTECH CO., LTD.	PBCDVP-570	Multi Media Player(EUT)	Laptop PC & Monitors
PP05LC	Dell Computer	DoC	Laptop PC	-
LT201CB	KTV	N/A	Monitor 1	EUT
N/A	NewQ	N/A	Monitor 2	EUT
SUB-512	Samsung	DoC	Memory Stick	EUT
UP-DP10	Sony Corporation	DoC	Printer	Laptop PC
MO56UOA	Dell Computer	N/A	Mouse	Laptop PC
3453C	U.S. Robotics	CJE-0263	Modem	Laptop PC

2.5 Test Methodology

The radiated testing was performed according to the procedures in chapter 7, 13 of ANSI C63.4: 2003 and performed at a distance of 3 meters from EUT to the antenna.

2.6 Test Facility

The open area test site and conducted measurement facilities are located on at 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-080, Korea. Description details of test facilities were submitted to the Commission on August 30, 2005. (Registration Number: 340658)

3. SYSTEM TEST CONFIGURATION

3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	SAROTECH CO., LTD.	DVP-370W	N/A
Key Board	SAROTECH CO., LTD.	DVP-355W Key VLD	N/A
USB Board	SAROTECH CO., LTD.	DVP-570HD HV1.0	N/A
Sub Board	SAROTECH CO., LTD.	N/A	N/A
Power Board	SEYANG TECH	SY0103RC	N/A
HDD	SAMSUNG	SP1203N/DOM	N/A

3.2 EUT exercise Software

The Model, DVP-570HD is included a FM transmitter designed to operate on function in the 88.1 ~ 88.9 MHz. The EUT does not have an audio input port, so the EUT played MP3 file that was stored in the EUT and then transmitted audio signal with the maximum output volume.

3.3 Cable Description

Ports Name	Shielded	Ferrite Bead	Metal Hood	Length (m)	Connected to
Video Out	N	N	BOTH END	1.5	Monitor 1
Audio Out	N	N	BOTH END	1.5	Monitor 1
S-Video	N	N	BOTH END	1.5	Monitor 2
DVI	Y	Y	BOTH END	1.5	Monitor 2
USB	N	Y	BOTH END	1.5	Laptop PC
LAN	N	N	BOTH END	2.0	Laptop PC
Ext. IR In	N	N	EUT END	1.5	-

3.4 Equipment Modifications

- The digital and analog ground on the main board were shorted.
- The L8 and 43 on the main board were shorted.
- The rating of bead(L3, 6, 7, 11, 12, 13, 14, 15, 30, 31, 32, 33, 35, 40, 41, 50) was changed to 300 ohm on the main board VCC input line.
- The R14(330 ohm) was changed to bead(150 ohm) on the main board 33MHz CLK line.
- The R6, 33, 34, 70, 71(33 ohm) were changed to bead(600 ohm) on the main board 33MHz CLK Logic line.
- The R10(22 ohm) was changed to bead(1000 ohm) on the main board Reset line.
- The R21(33 ohm) was changed to bead(150 ohm) on the main board 27MHz CLK line.
- The R113(22 ohm) was changed to bead(220 ohm) on the main board U5 PCLK line.
- The rating of RP7~RP14 were changed from 22 ohm to 43 ohm on the main board DDR SDRAM.
- The rating of R52~R55 and R57~R60 was changed from 22 ohm to 56 ohm on the main board DDR SDRAM.
- The two beads(2000 ohm) were added to the main board Video/Audio output line.
- The rating of C117~C119, C126~C128(47 pF) was changed to 470 pF on the main board Video/Audio output line.
- The rating of C120~C122, C129~C131(22 pF) was changed to 470 pF on the main board Video/Audio output line.
- The rating of L19, 21 was changed to 2000 ohm on the main board Video output line.
- The CMF 90 ohm was added to the Main Board USB Port CMF(Common Mode Filter) L44 line.
- The R148, 148, 150, 155, 156(0 ohm) were changed to the bead(150 ohm) on the main board SCL/SDA line.
- The rating of L36, 38, 39, 45, 46 was changed to 1000 ohm on the main board DVI port line.
- The bypass capacitors(10 nF) were added to the connector pins 4, 6, 13, 25 on the key board.
- The CMF(Common Mode Filter – 90 ohm) was added to the USB board D+/D- line.
- The ground of key board was connected to the ground of main board by wire.
- The ferrite core(E-Tech, SH2915C) was added to the key connector cable.
- The EMI gasket was added to the inside of metal case in order to connection of HDD.
- The resistor(20 Kohm) and Bead(2000 ohm) were added to the sub board antenna line.

3.5 Configuration of Test System

Line Conducted Test: The EUT was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4: 2003 7.2.3 to determine the worse operating conditions.

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4: 2003 8.3.1.1 and 13.1.4.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 meter open area test site.

Occupied Bandwidth Measurement:

This measurement is performed with the antenna located close enough to give a full-scale deflection of the modulated carrier on the spectrum analyzer.

Tuning Range Measurement:

This measurement is performed with the search coil located close to the EUT enough to get a full-scale of the modulated carrier on the spectrum analyzer.

3.6 Antenna Requirement

For intentional device, according to 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.

Antenna Construction:

FM transmitter antenna of the EUT is fixed inside the EUT, no consideration of replacement by the user.

4. PRELIMINARY TEST

4.1 AC Power line Conducted Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Transmit the RF Signal continuously	X

4.2 Radiated Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Transmit the RF Signal continuously	X

5. FINAL RESULT OF MEASUREMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level

5.1 Conducted Emission Test

Humidity Level : 45 %

Temperature: 21 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.207 (a)

Type of Test : Low Power Communication Device Transmitter

Result : PASSED BY -6.66 dB at 22.38 MHz under peak detector mode

EUT : Multi Media Player

Date: September 04, 2006

Operating Condition : Transmit the RF signal.

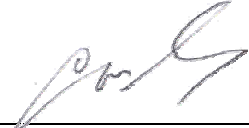
Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

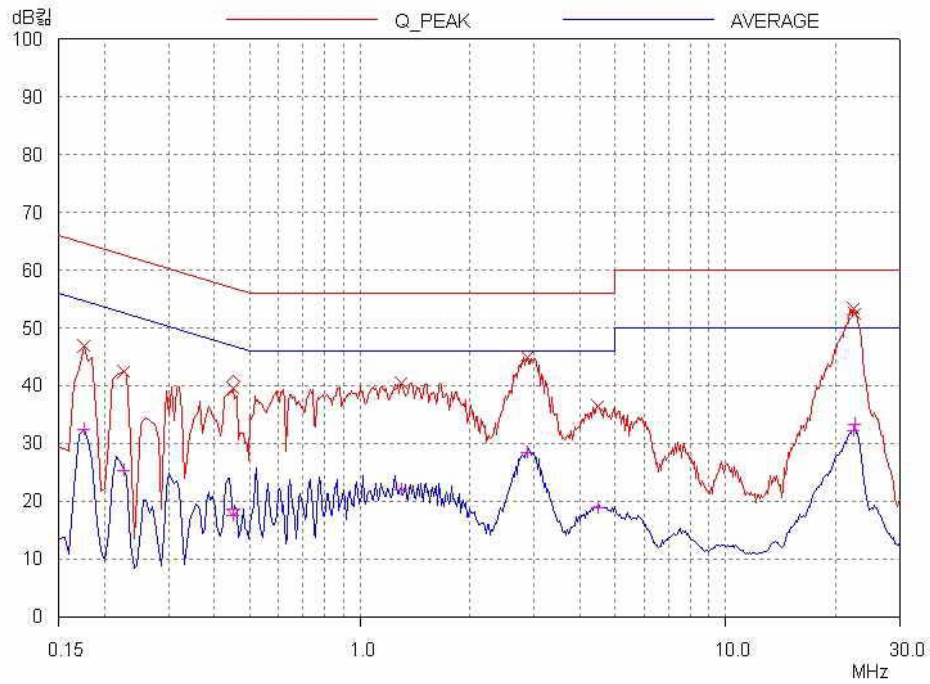
Frequency (MHz)	Line	Peak (dBuV)		Margin (dB)
		Emission level	Q.P Limits	
2.84	H	44.93	56.00	-11.07
2.87	N	45.37	56.00	-10.63
21.93	N	52.37	60.00	7.63
22.38	H	53.34	60.00	-6.66
22.50	H	52.35	60.00	-7.65
22.68	N	52.69	60.00	-7.31
Frequency (MHz)	Line	Average (dBuV)		Margin (dB)
		Emission level	Limits	
2.84	H	28.51	46.00	-17.49
2.87	N	29.23	46.00	-16.77
21.93	N	31.19	50.00	-18.81
22.38	H	31.16	50.00	-17.84
22.50	H	33.23	50.00	-16.77
22.68	N	32.15	50.00	-17.85

Line Conducted Emission Tabulated Data

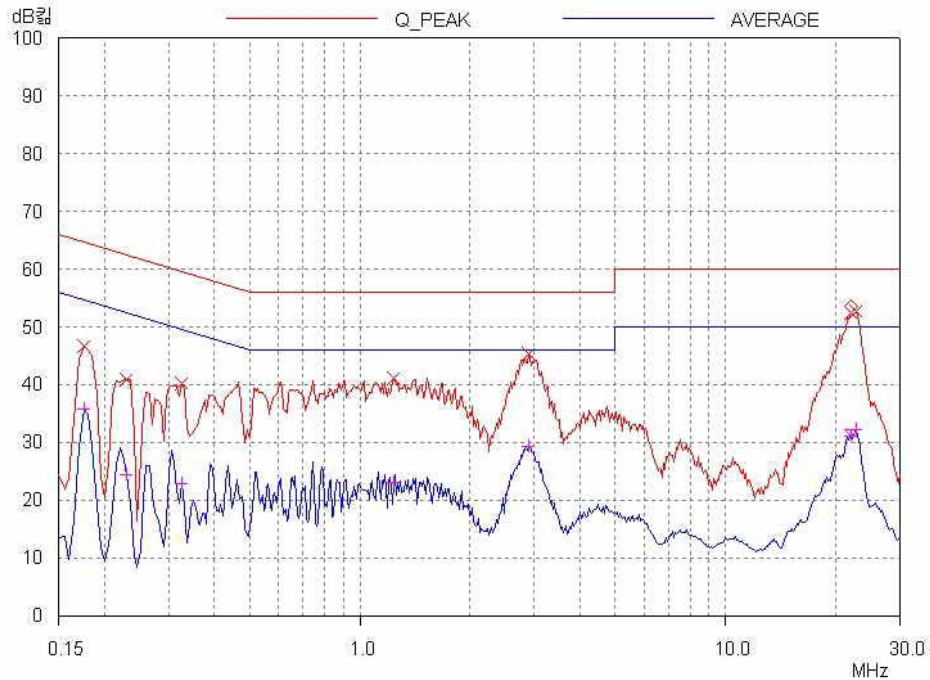
Remark : "H": Hot Line, "N": Neutral line

See next page for an overview sweep performed with peak and average detector.


Tested by: In-Sub, Youn / Test Engineer



HOT LINE



NEUTRAL LINE

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EMC-002 (Rev.0)

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea
(TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

5.2 Radiated Emission Test (Within the permitted 200 kHz band)

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 41% Temperature: 25°C
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.239 (b)
Type of Test : Low Power Communication Device Transmitter
Result : PASSED BY -2.64 dB at 88.90 MHz

EUT : Multi Media Player

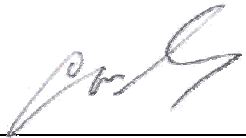
Date: August 07, 2006

Distance : 3 Meter

Radiated Emission			Ant	Correction Factors		Total	Limit (dBuV/m)	Margin (dB)
Freq. (MHz)	Amp. (dBuV)	Detect Mode	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)		
88.10	33.80	Peak	H	7.89	1.74	43.43	48.00	-4.57
88.50	34.50	Peak	H	7.97	1.73	44.20	48.00	-3.80
88.90	35.60	Peak	H	8.04	1.72	45.36	48.00	-2.64

Radiated Emission Tabulated Data

Remark: The peak values at each frequency were investigated under average limit, so the average mode was not performed.


Tested by: In-Sub, Youn / Test Engineer

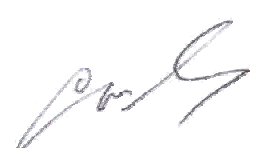
5.3 Radiated Emission Test (Outside of the specified 200 kHz band)

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 45 % Temperature: 25 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209 (a)
 Type of Test : Low Power Communication Device Transmitter
 Result : PASSED BY -4.61 dB at 297.40MHz

EUT : Multi Media Player Date: July 01, 2006
 Frequency range : 30MHz – 1000MHz
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)
 Distance : 3 Meter
 Remark : Other emissions

Radiated Emission		Ant	Correction Factors		Total	FCC	
Freq. (MHz)	Amp. (dBuV)	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
151.60	17.60	V	14.68	2.32	34.60	43.52	-8.92
166.10	17.90	V	15.16	2.40	35.46	43.52	-8.06
212.20	14.30	H	16.52	2.90	33.72	43.52	-9.80
233.20	17.60	H	16.96	3.13	37.69	46.02	-8.33
240.17	18.20	H	17.03	3.24	38.47	46.02	-7.55
297.40	17.60	H	20.04	3.77	41.41	46.02	-4.61
324.50	13.60	V	15.38	4.00	32.98	46.02	-13.04
364.00	18.80	H	16.23	4.26	39.29	46.02	-6.73
465.30	15.60	H	18.52	4.81	38.93	46.02	-7.09
480.00	16.60	H	18.79	5.10	40.49	46.02	-5.53

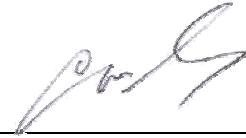

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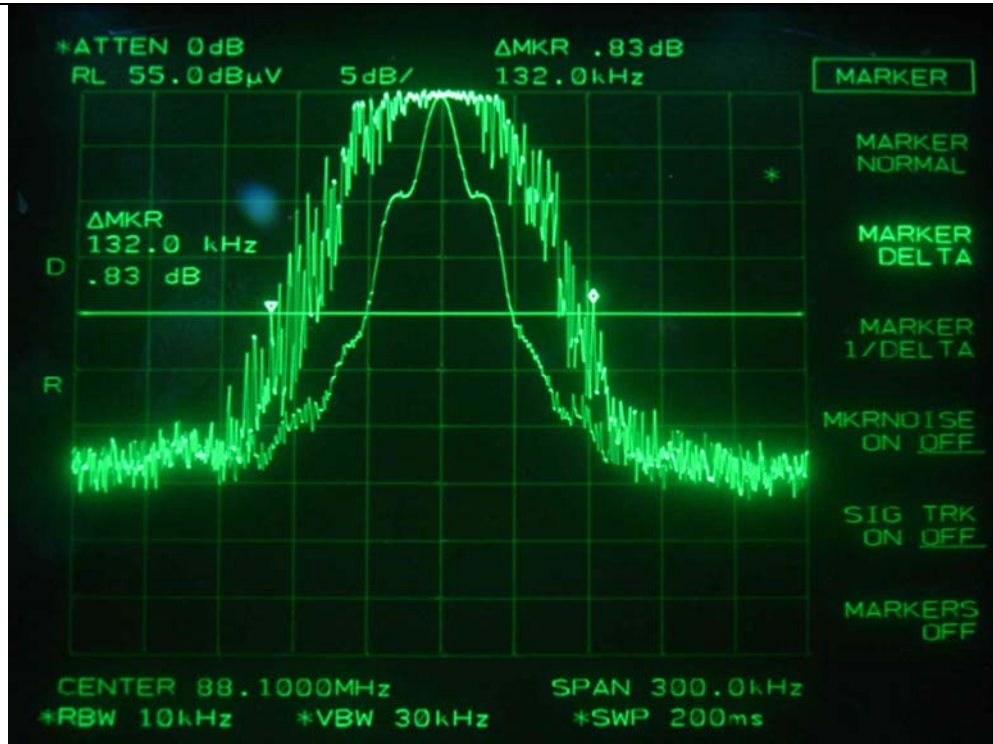
5.4 Bandwidth of the operating frequency

Humidity Level : 41 % Temperature: 25 °C
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.239 (a)
Result : PASSED

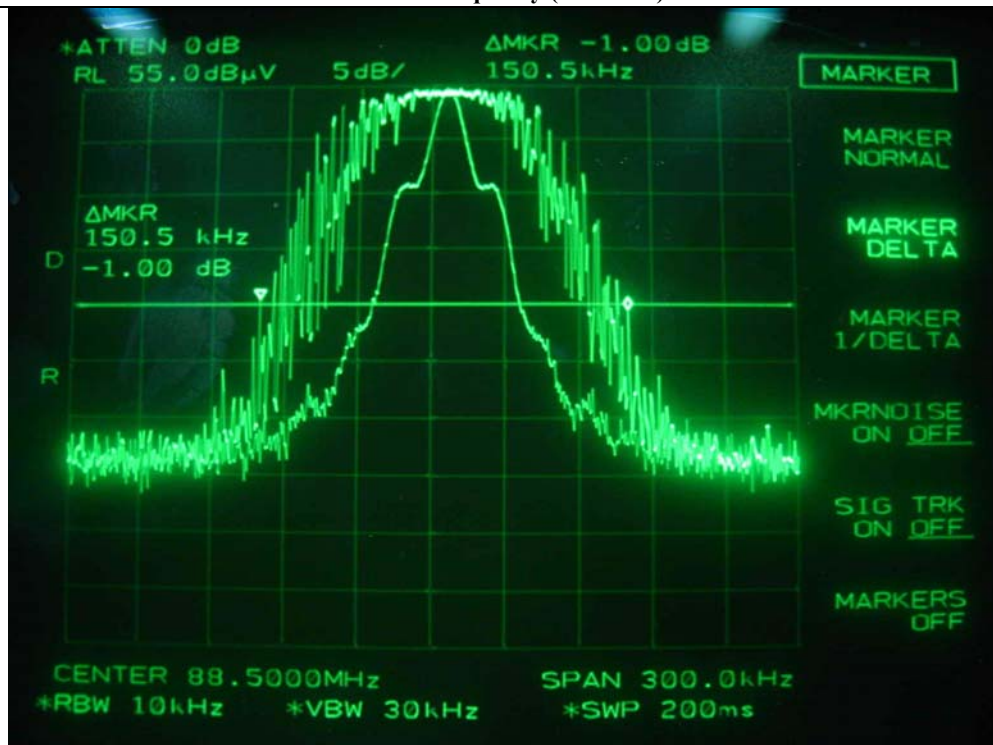
EUT : Multi Media Player Date: August 07, 2006
Operating Condition : Transmit the RF signal.
Minimum Resolution
Bandwidth : 10 kHz
Remark : Refer to test data in next page.

Frequency (MHz)	Measured Value (kHz)	Limit (kHz)	Margin (kHz)
88.1	132.0	200	-68.0
88.5	150.5		-49.5
88.9	173.0		-27.0

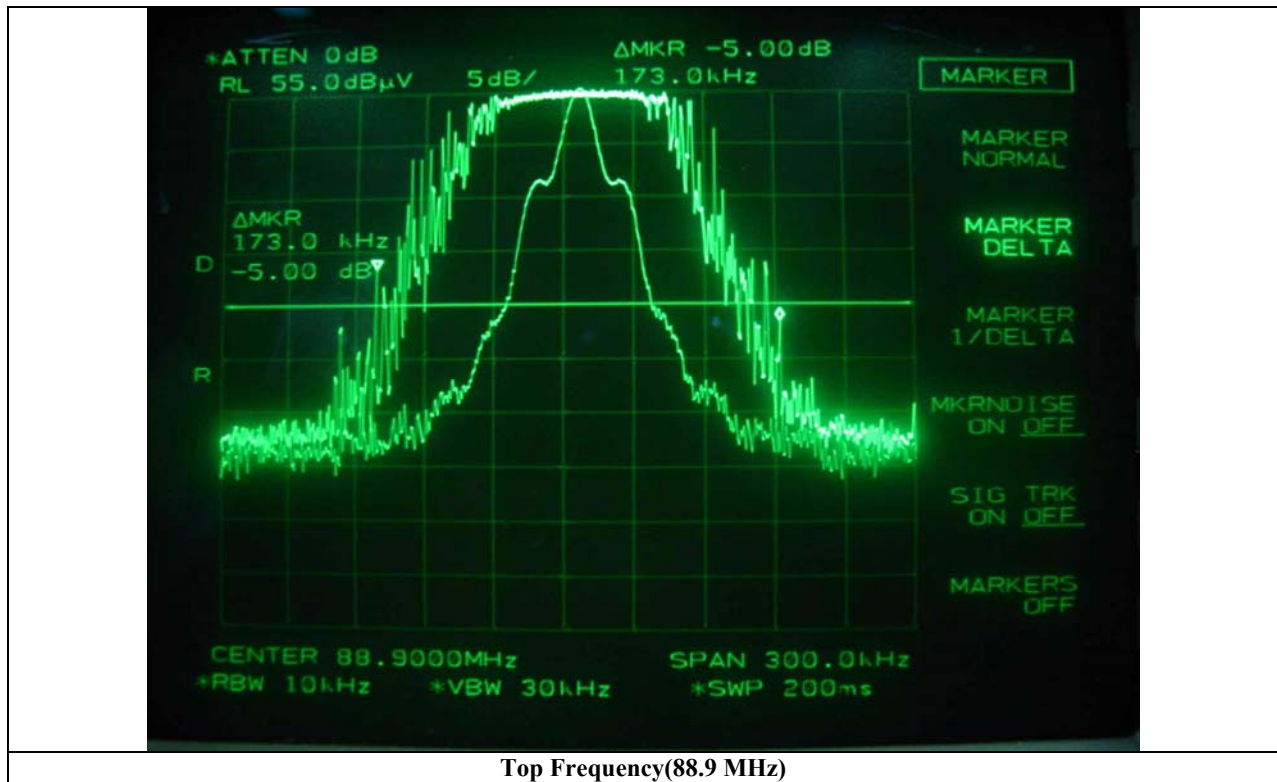

Tested by: In-Sub, Youn / Test Engineer



Bottom Frequency (88.1MHz)



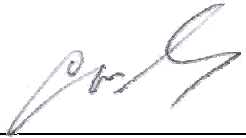
Middle Frequency (88.5MHz)



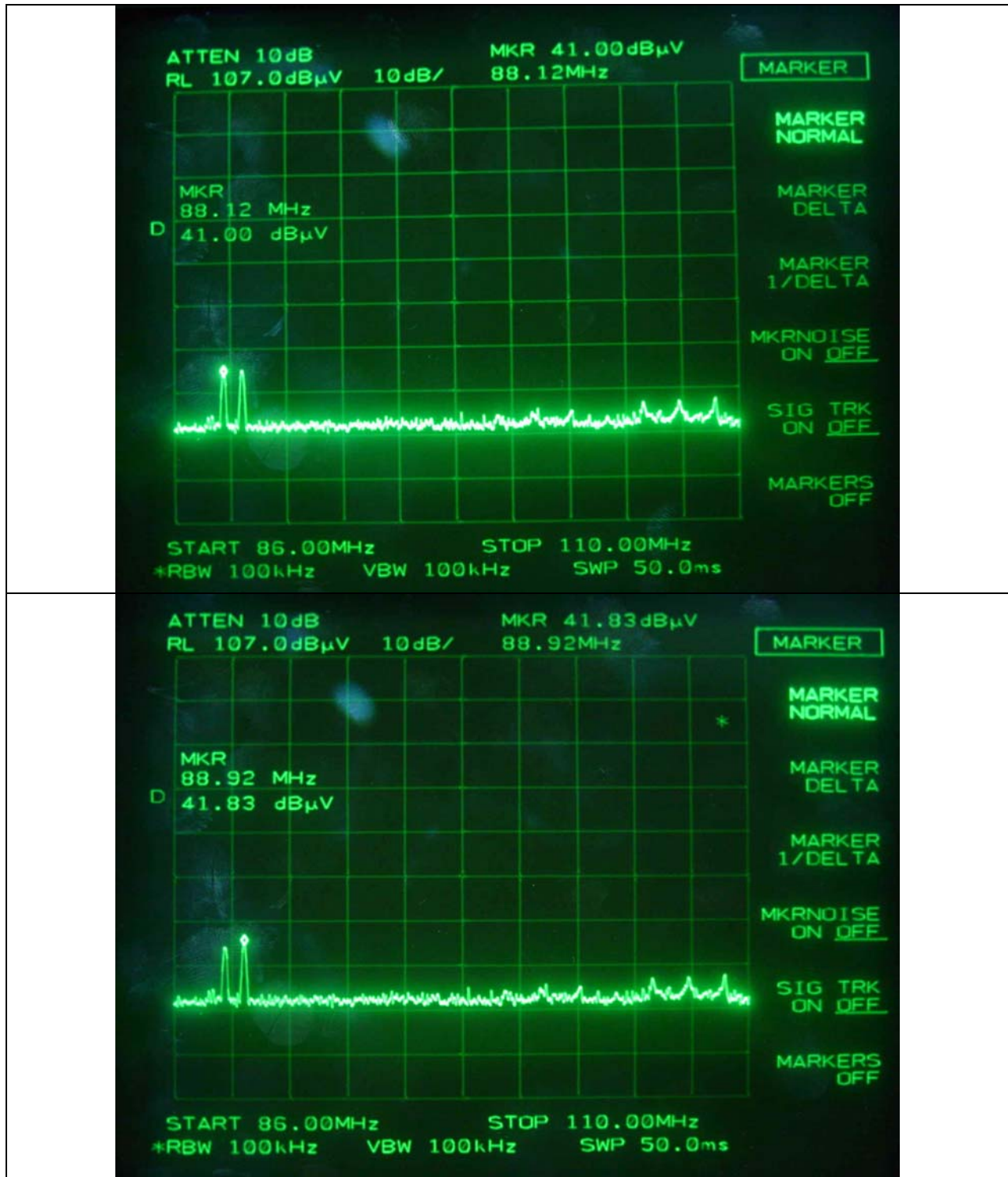
5.5 Tuning Range of the operating frequency

Humidity Level : 41 % Temperature: 25 °C
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.239 (a)
Result : PASSED

EUT : Multi Media Player Date: August 07, 2006
Operating Condition : Transmit the RF signal at the lowest and highest frequency.
Test Result : Met the requirement. Refer to test data in next page.



Tested by: In-Sub, Youn / Test Engineer



6. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+ Meter reading (dBuV)

+ Cable Loss (dB)

+ Antenna Factor (Loss) (dB/meter)

= Corrected Reading (dBuV/meter)

- Specification Limit (dBuV/meter)

= dB Relative to Spec (+/- dB)

7. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESVS10	827864/005	DEC/05	12MONTH	■
2.	Test receiver	R/S	ESHS 10	834467/007	MAY/06	12MONTH	■
3.	Spectrum analyzer	HP	8566B	3407A08547	JUN/06	12MONTH	■
4.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	VULB9163 166	MAY/06	12MONTH	
5.	Biconical antenna	EMCO	3110	9003-1121	FEB/06	12MONTH	
		Schwarzbeck	VHA9103	91031852	FEB/06		■
6.	Log Periodic antenna	EMCO	3146	9001-2614	FEB/06	12MONTH	
		Schwarzbeck	9108-A(494)	62281001	FEB/06		■
7.	LISN	EMCO	3825/2	9109-1867	JUN/06	12MONTH	■
				9109-1869	JUN/06		
		Schwarzbeck	NSLK 8126	8126-404	JUL/06		■
8.	Position Controller	HD GmbH	HD100	N/A	N/A	N/A	■
9.	Turn Table	HD GmbH	DS420S	N/A	N/A	N/A	■
10.	Antenna Master	HD GmbH	MA240	N/A	N/A	N/A	■