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EMC CENTER

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FCC EVALUATION REPORT FOR CERTIFICATION

Manufacturer : DONGYANG Electronics Co., Ltd.

760, Daemang-Re, Goa-Eub, Gumi-City

Gyeongsangbuk-Do, Korea

Attn : Mr. Ho-Seok Gwak, QA Manager

Date of Issue : January 11, 2006

Test Report S/N : GETEC-E3-06-002

Test Site : Gumi College EMC Center

FCC ID.	**RCDXM9560CBR**
APPLICANT	**DONGYANG Electronics Co., Ltd.**

Rule Part(s)	**: FCC Part 15 Subpart C**
Equipment Class	**: Lower Power Communication Device Transmitter (DXX)**
EUT Type	**: FM Transmitter (built-in 9.5" Motorized overhead Monitor / DVD combo)**
Model No.	**: XM-9560CBR**

This equipment has been shown to be in compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the vest of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested by,

Jae-Hoon Jeong, Associate Engineer
GUMI College EMC center

Reviewed by,

Tae-Sig Park, Technical Manager
GUMI College EMC center

CONTENTS

1. Scope

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and / or unintentional radiators for compliance with technical rules and regulations of the Federal Communications Commission.

Responsible Party : DONGYANG Electronics Co., Ltd.

Contact Person : Mr. Ho-Seok Gwak, Q.A Manager

Manufacturer : DONGYANG Electronics Co., Ltd.

760, Daemang-re, Goa-eub, Gumi-city, Gyeongsangbuk-do, Korea

- **FCC ID** RCDXM9560CBR
- **Equipment Class** Lower Power Communication Device Transmitter (DXX)
- **EUT Type** FM Transmitter (built-in 9.5” Motorized overhead Monitor/DVD combo)
- **Power Source** DC 12V
- **Model No.** XM-9560CBR
- **Rule Part(s)** FCC Part 15, Subpart C, Section 15.239
- **Test Procedure(s)** ANSI C63.4 (2003)
- **Dates of Test** January 3, 2006
- **Place of Test** Gumi College EMC Center
- **Test Report No.** GETEC-E3-06-002

2. Introduction

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Nose Emissions From Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ASNI C63.4-2003) was used in determining radiated and conducted emissions emanating from **DONGYANG Electronics Co., Ltd. FM Transmitter (built-in 9.5" Motorized overhead Monitor / DVD combo), FCC ID.: RCDXM9560CBR**

These measurement tests were conducted at **Gumi College EMC Center**.
The site address is 407, Bugok-Dong, Gumi-City, Gyeongsangbuk-Do, Korea
This test site is one of the highest point of Gumi 1 college at about 200 kilometers away from Seoul city and 40 kilometers away from Daege city. It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures. The detailed description of the measurement facility was found to be in compliance with the requirements of §2.948 according to ANSI C63.4 on October 19, 1992

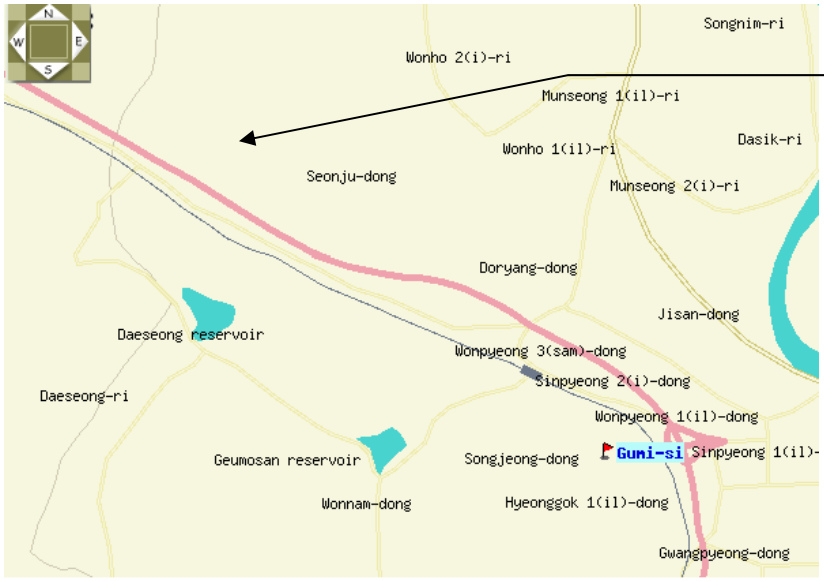

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Fig 1. The map above shows the Gumi College in vicinity area.

3. Test Conditions & EUT Information

3.1 Description of EUT

The Equipment Under Test (EUT) is the **DONGYANG Electronics Co., Ltd.**
FM Transmitter (built-in 9.5" Motorized overhead Monitor / DVD combo), Model No.: XM-9560CBR
It can transmit audio signal of AV equipments (DVD or TV) to FM Radio receiver in a car.
This EUT include AV equipments is utilized in a car exclusively.

TX Frequency Range	FM 88.3MHz – 90.1 MHz
TX Frequency Step	100 kHz
Power Supply	DC 12V
Display Type	**LQ092Y3DG01**(SHARP)
DVD Loader	**DSS-826** (DVS KOREA)

3.2 Support Equipment used

DC power supply	Agilent 6544A S/N: MY40000116 FCC ID: DoC
TV Signal Generator	FLUKE 54200 S/N: 831011 FCC ID: DoC
DVD Player	Pioneer DV-525 S/N: UEYDoR390LL FCC ID: DoC
Monitor	LG Electronics RZ-13LA60 S/N: N/A FCC ID: DoC

3.3 Cable(s)

The EUT was tested with following cables

Power cable	1.8m	Connected to the DC power supply
AV input cable	3.0	Connected to the EUT and DVD player
AV output cable	3.0m	Connected to the EUT and Monitor
Coaxial ANT cable	10.0m	Connected to the EUT and TV signal generator

4. Antenna Requirement-§15.203

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the applicant can be used with the device. The use of permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with this requirement.

4.1 Description of Antenna

The **DONGYANG Electronics Co., Ltd. FM Transmitter (built-in 9.5" Motorized overhead Monitor / DVD combo)** comply with the requirement of §15.203 with a built-in looped antenna permanently attached to the transmitter.

5. Description of tests

5.1 Radiated Emission

Preliminary measurements were conducted 3m semi anechoic chamber using broadband antennas to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The technology configuration, mode of operation and turntable azimuth with respect to antenna was note for each frequency found.

The spectrum was scanned from 30 to 1000MHz using biconical log antenna (Schwarzbeck, VULB9160).

Final measurements were made outdoors at 3 m-test range using biconical antenna (R&S, HK116) and log-periodic antenna (R&S, HL223).

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

Each frequency found during pre-scan measurements was re-examined and investigated using EMI test receiver. (ESCS30)

The detector function was set to Average mode and CISPR quasi-peak mode, the bandwidth of the receiver was set to 120KHz.

The EUT, support equipment and interconnecting cables were reconfigured to the setup producing the maximum emission for the frequency and were placed on top of a 0.8m high non-metallic 1.0×1.5 meter table.

The turntable containing the test sample was rotated; the antenna height was varied 1 to 4 meter and stopped at the azimuth or height producing the maximum emission. Each EME reported was calibrated using the R/S signal generator

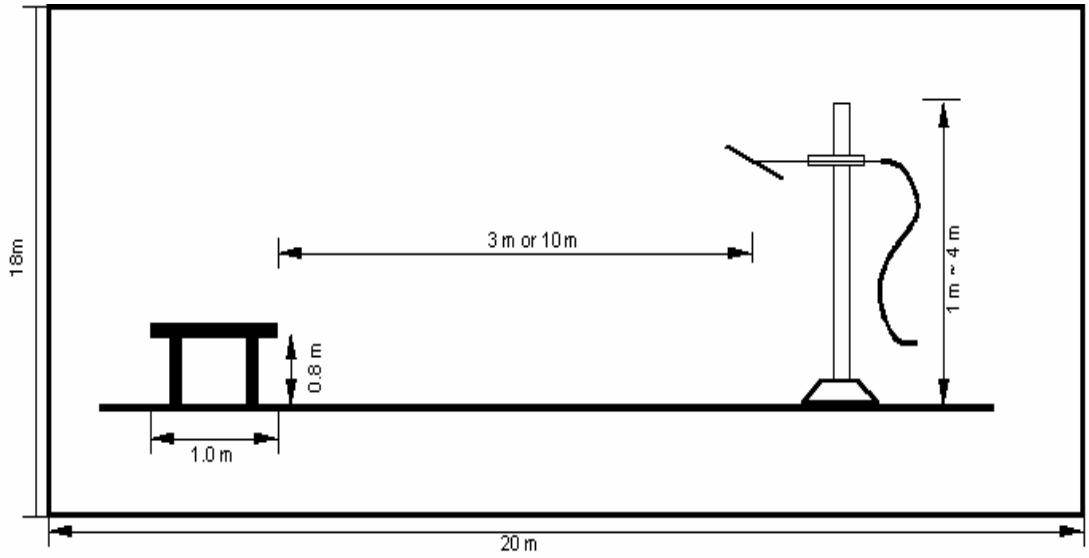

Fig 2. Dimensions of Open Site Test Area

5.2 Conducted Emission

This equipment is supplied DC power from the car battery. Therefore, no conducted limits apply for this equipment.

6. Radiated emission test

6.1 Operating environment

Temperature : -8℃
Relative humidity : 35 %

6.2 Test set-up

A preliminary scan with peak mode was performed in the semi anechoic chamber using the procedure in ANSI C63.4/1992 13.1.4.1 and found frequency for open area test site.
The formal radiated emission was measured at 3m-distance open area test site.
The EUT was placed on a non-conductive turntable approximately 0.8 meters above the ground plane.
The turntable with EUT was rotated 360°, and the antenna was varied in height between 1.0 and 4.0 meters in order to determine the maximum emission levels.
This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

6.3 Measurement uncertainty

The measurement uncertainty was calculated in accordance with ISO “Guide to the expression of uncertainty in measurement”.
The measurement uncertainty was given with a confidence of 95%.

Contribution	Probability Distribution	Uncertainty (dB)			
		Biconical Ant.		Log-periodic Ant.	
		3m	10m	3m	10m
Ambient signal					
Antenna factor calibration	Normal (k=2)	0.50	0.50	0.50	0.50
Receiver specification	Rectangular	0.50	0.50	0.50	0.50
Antenna directivity	Rectangular	0.25	0.00	1.50	0.25
Antenna phase center variation	Rectangular	0.00	0.00	1.00	0.20
Antenna factor frequency interpolation	Rectangular	0.25	0.25	0.25	0.25
Measure distance variation	Rectangular	0.60	0.40	0.60	0.40
Site imperfections	Rectangular	1.46	-2.32	2.26	2.94
Mismatch Receiver VRC : Γl= 0.09 Antenna VRC : Γg= 0.43 (Bi) 0.23 (Lp) Uncertainty limits 20log(1± Γl Γg)	U-shaped	0.33 -0.35	0.33 -0.35	0.33 -0.18	0.33 -0.18
System repeatability	Std Deviation	0.18	0.18	0.17	0.17
Cable loss calibration	Normal (k=2)	0.05	0.05	0.05	0.05
Combined standard uncertainty Uc(y)	Normal	1.05 -1.05	1.45 -1.45	1.78 -1.77	1.80 -1.78
Extended uncertainty U	Normal (k=2)	2.11 -2.11	2.90 -2.90	3.55 -3.53	3.59 -3.57

6.4 Limit

Measurement Items / Frequency (MHz)	Fundamental Frequency (Within the permitted 200kHz band) Average detector mode / dBuV/m (3m)	Spurious Frequency(Outside of the specified 200kHz) & Others Quasi-peak detector mode / dBuV/m(3m)
30 – 88	48	40
88 – 216		43.5
216 – 960		46
> 960		54

6.5 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Calibrated Date
■ -	ESI	Rohde & Schwarz	EMI test receiver	830482/010	12. 2. 2005
■ -	ESCS30	Rohde & Schwarz	EMI test receiver	839809/003	12. 14. 2005
■ -	HK116	Rohde & Schwarz	Biconical antenna	826861/018	12. 2. 2005
■ -	HL223	Rohde & Schwarz	Log-periodic antenna	829228/011	12. 2. 2005
■ -	HD100	HD GmbH	Position Controller	100/692/01	NCR
■ -	DS415S	HD GmbH	Turntable	415/657/01	NCR
■ -	MA240	HD GmbH	Antenna Mast	240/565/01	NCR

6.6 Radiated emission test data for the fundamental frequency
(Within permitted 200kHz band)

-. Test Date : January 3, 2006
-. Reference standard : Part 15 Subpart C, Sec. 15.239(b)
-. Operating condition : Transmit audio signal of DVD play mode
-. Detector mode : Average detector mode
-. Power Source : DC 12V

Frequency (MHz)	Reading (dBuV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBuV/m)	Limits (dBuV/m)	Margin (dB)
88.30	33.2	V	8.57	2.57	44.3	48.0	3.7
89.20	32.9	V	8.62	2.58	44.1	48.0	3.9
90.10	32.4	V	8.68	2.60	43.7	48.0	4.3

Note: “H”: Horizontal, “V”: Vertical

Remark: Measurements were performed 1 near top and 1 near bottom location in the frequency range operation according to ANSI C63.4/2003. Sec. 13.1.1

6.7 Radiated emission test data for the spurious frequency
(Outside of the specified 200kHz band)

-. Test Date : January 3, 2006
-. Reference standard : Part 15 Subpart C, Sec. 15.239(c)
-. Operating condition : Transmit audio signal
-. Detector mode : CISPR Quasi-peak detector mode (6dB Bandwidth: 120kHz)
-. Power Source : DC 12V

6.7.1. Test frequency for 88.3MHz Harmonics

Frequency (MHz)	Reading (dBuV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBuV/m)	Limits (dBuV/m)	Margin (dB)
176.60	20.6	V	13.05	3.58	37.2	43.5	6.3
264.90	18.6	H	16.48	4.68	39.8	46.0	6.2
353.20	17.1	H	14.38	5.63	37.1	46.0	8.9
441.50	16.2	V	16.55	6.31	39.1	46.0	6.9

Note: “H”: Horizontal, “V”: Vertical

6.7.2. Test frequency for 89.2 MHz Harmonics

Frequency (MHz)	Reading (dBuV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBuV/m)	Limits (dBuV/m)	Margin (dB)
178.40	21.2	V	13.10	3.59	37.9	43.5	5.6
267.60	20.1	H	16.63	4.71	41.4	46.0	4.6
356.80	15.3	H	14.48	5.67	35.5	46.0	10.5
446.00	14.1	V	16.64	6.33	37.1	46.0	8.9

Note: “H”: Horizontal, “V”: Vertical

6.7.3. Test frequency for 90.1 MHz Harmonics

Frequency (MHz)	Reading (dBuV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBuV/m)	Limits (dBuV/m)	Margin (dB)
180.20	21.6	V	13.16	3.60	38.4	43.5	5.1
270.30	15.7	V	16.77	4.74	37.2	46.0	8.8
360.40	17.4	V	14.59	5.70	37.7	46.0	8.3
450.50	15.3	V	16.73	6.35	38.4	46.0	7.6

Note: “H”: Horizontal, “V”: Vertical

6.7.4. Test of the other frequency

Frequency (MHz)	Reading (dBuV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBuV/m)	Limits (dBuV/m)	Margin (dB)
202.75	16.3	H	13.96	3.93	34.2	43.5	9.3
313.33	17.4	H	12.86	5.23	35.5	46.0	10.5
350.19	15.3	H	14.30	5.60	35.2	46.0	10.8
387.02	15.3	H	15.35	5.97	36.6	46.0	9.4
423.98	7.6	V	16.20	6.22	30.0	46.0	16.0
792.56	8.6	H	21.16	8.46	38.2	46.0	7.8
903.12	9.4	H	22.24	9.12	40.8	46.0	5.2

Note: “H”: Horizontal, “V”: Vertical

7. Occupied Bandwidth Measurement

7.1 Operating environment

Temperature : -8℃
Relative humidity : 35 %

7.2 Test set-up

This measurement is performed with the antenna located close enough to give a full-scale deflection of the modulated carrier on the spectrum analyzer. The plot is taken at 20kHz division frequency span, 30kHz resolution bandwidth and 5dB/division logarithmic display from an E7401A spectrum analyzer.

7.3 Limit

■ - Within 200kHz wide centered on the operating frequency
■ - The 200kHz band shall lie wholly within the frequency range of 88-108MHz

7.4 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Calibrated Date
■ -	E7401A	Agilient	Spectrum Analyzer	USA11101461	12. 16. 2005
■ -	HK116	Rohde & Schwarz	Biconical antenna	826861/018	12. 02. 2005

7.5 Test result of occupied bandwidth

-. Test Date : January 3, 2006
-. Reference standard : Part 15 Subpart C, Sec. 15.239(a)
-. Operating condition : Transmit audio signal
-. Spectrum resolution bandwidth(6dB) : 30 kHz
-. Power Source : DC 12V

Frequency (MHz)	Occupied Bandwidth (kHz)	Limit (kHz)	Result
88.3	147.2	200	Pass
89.2	133.2	200	Pass
90.1	151.6	200	Pass

Reference Level: The level of the highest amplitude signal observed from the transmitter at the fundamental frequency

Occupied Bandwidth: The bandwidth at -26dB with respect to the reference level.

8. Recommendation & conclusion

The data collected shows that the Gumi College EMC Center.
DONGYANG Electronics Co., Ltd. FM Transmitter (built-in 9.5" Motorized overhead Monitor / DVD combo)
Model No.: XM-9560CBR was complies with §15.239 of the FCC Rules.