GUMI COLLEGE
EMC CENTER

407, Bugok-Dong, Gumi-City, Gyeongsangbuk-Do, Korea
TEL : +82 54 440 1195~8 FAX : +82 54 440 1199

FCC EVALUATION REPORT FOR CERTIFICATION

Manufacturer : Kubong Information Technology Co., Ltd.
#1812, Sankyuk-2dong, Buk-gu, Daegu, Korea
Attn : Moo-hee Park, President

Date of Issue : May 31, 2005
Test Report S/N : GETEC-E3-05-039
Test Site : Gumi College EMC Center

FCC ID.	**RGTMT-8001K**
APPLICANT	**Kubong Information Technology Co., Ltd.**

Rule Part(s)	**: FCC Part 15 Subpart C**
Equipment Class	**: Lower Power Communication Device Transmitter (DXX)**
EUT Type	**: FM Transmitter**
Model No.	**: MT-8001K**

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,

Jea-Woon Choi, Chief Engineer
GUMI College EMC center

Reviewed by,

Tae-Sig Park, Technical Manager
GUMI College EMC center

CONTENTS

1. Scope

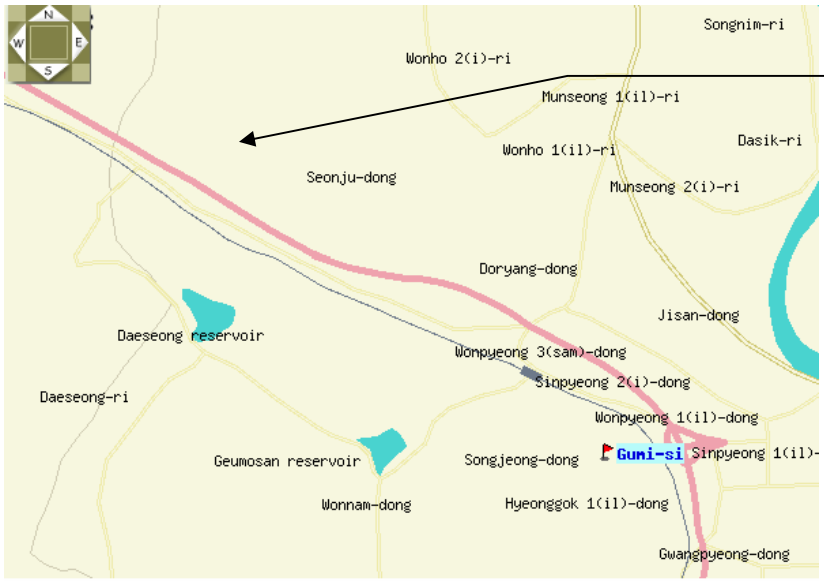
Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and / or unintentional radiators for compliance with technical rules and regulations of the Federal Communications Commission.

- **Equipment Class** Lower Power Communication Device Transmitter (DXX)
- **FCC ID** RGTMT-8001K
- **EUT Type** FM Transmitter
- **Power Source** DC 12V
- **Model No.** MT-8001K
- **Rule Part(s)** FCC Part 15, Subpart C, Section 15.209, 15.239
- **Test Procedure(s)** ANSI C63.4 (2003)
- **Dates of Test** May 7 ~ 9, 2005
- **Place of Test** Gumi College EMC Center
- **Test Report No.** GETEC-E3-05-039

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 **Kubong Information Technology Co., Ltd. FM Transmitter (Model No.: MT-8001K), FCC ID.: RGTMT-8001K**

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



GUMI COLLEGE EMC CENTER
407,Bugok-Dong, Gumi-City,
Gyeongsangbuk-Do 730-711, Korea
Tel: +82-54-440-1195~8
Fax: +82-54-440-1199

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 **Kubong Information Technology Co., Ltd. FM Transmitter (Model No.: MT-8001K)**

Power Supply	DC 12V
Test Mode	Continuous transmitting with a 1000Hz modulated carrier signal
Frequency Range	FM 88.1MHz – 88.5MHz
Frequency Step	200 kHz

3.2 Support Equipment used

	Description	Model	Manufacturer	Serial No.
■ -	TV signal generator	54200	FLUKE	831011
■ -	DC power supply	6544A	Agilent	MY40000116

3.3 Cable(s)

The EUT was tested with following cables

DC Power cable	3.0m	Connected to the EUT and DC power supply
Audio in cable	0.7m	Connected to the EUT

3.4 Test Conditions

The EUT was tested with three frequencies, 88.1MHz, 88.3MHz and 88.5MHz.

A 1000Hz tone was applied to an input for a TV signal generator.

4. Description of tests

4.1 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

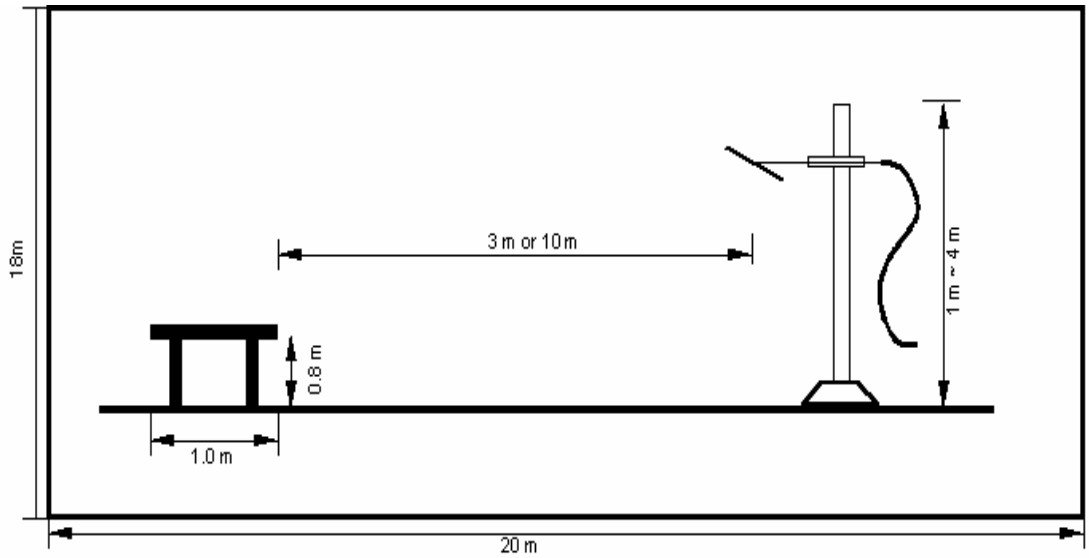


Fig 2. Dimensions of Open Site Test Area

4.2 Conducted Emission

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

5. Radiated emission test

5.1 Operating environment

Temperature : 24℃
Relative humidity : 32 %

5.2 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.

5.3 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)	1.00	1.00	1.00	1.00
Receiver specification	Rectangular	1.00	1.00	1.00	1.00
Antenna directivity	Rectangular	0.50	0.00	3.00	0.50
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	2.83	-2.94	-1.96	-2.96
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	0.07	0.05	0.06	0.10
Cable loss calibration	Normal (k=2)	0.20	0.20	0.20	0.20
Combined standard uncertainty Uc(y)	Normal	1.88 -1.88	1.90 -1.90	2.33 -2.32	1.94 -1.93
Extended uncertainty U	Normal (k=2)	3.77 -3.77	3.80 -3.80	4.65 -4.63	3.87 -3.85

5.4 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	48.0	40.0
88 – 216		43.5
216 – 960		46.0
> 960		54.0

5.5 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Calibrated Date
■ -	ESI	Rohde & Schwarz	EMI test receiver	830482/010	12. 17. 2004
■ -	ESCS30	Rohde & Schwarz	EMI test receiver	839809/003	12. 17. 2004
■ -	HK116	Rohde & Schwarz	Biconical antenna	826861/018	11. 19. 2004
■ -	HL223	Rohde & Schwarz	Log-periodic antenna	829228/011	11. 19. 2004
■ -	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

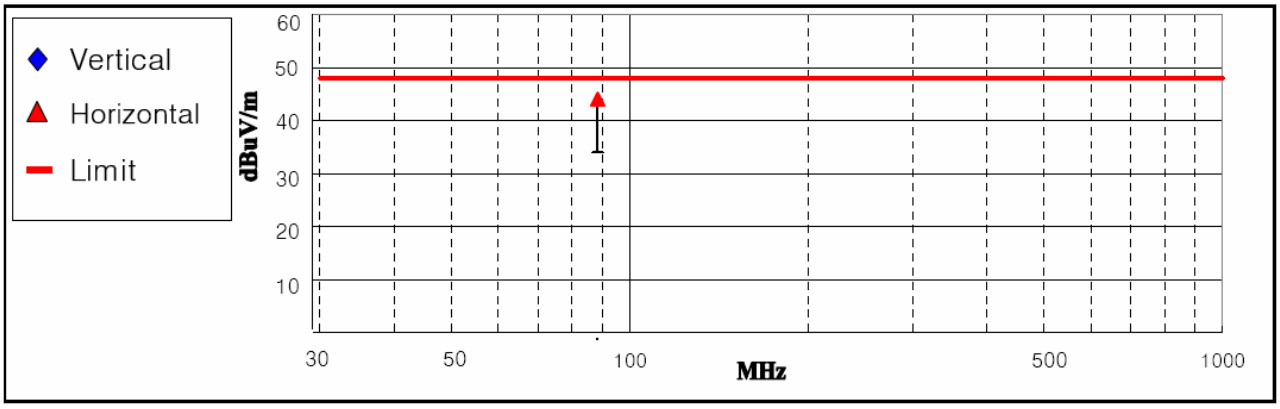
5.6 Radiated emission test data for the fundamental frequency (Within permitted 200kHz band)

-. Test Date : May 9, 2005
-. Reference standard : Part 15 Subpart C, Sec. 15.239(b)
-. Operating condition : Continuous transmitting with a 1000Hz modulated carrier signal
-. 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)
88.1	32.4	H	9.02	2.56	44.0	48.0	4.0
88.3	32.5	H	9.03	2.57	44.1	48.0	3.9
88.5	32.4	H	9.05	2.57	44.0	48.0	4.0

Note: "H": Horizontal, "V": Vertical

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



< Fig 3. Radiated emission result _ Average detector mode >

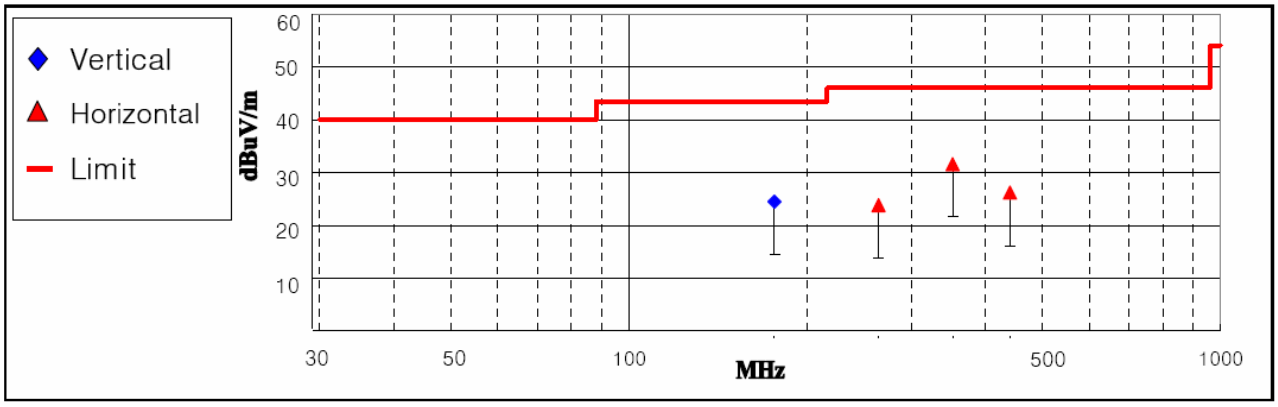
5.7 Radiated emission test data for the spurious frequency
(Outside of the specified 200kHz band)

-. Test Date : August 24, 2004
-. Reference standard : Part 15 Subpart C, Sec. 15.239(c)
-. Operating condition : Continuous transmitting with a 1000Hz modulated carrier signal
-. Detector mode : CISPR Quasi-peak detector mode(6dB Bandwidth: 120kHz)
-. Power Source : DC 12V

5.7.1. Test frequency for 88.1MHz Harmonics

Frequency (MHz)	Reading (dBuV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBuV/m)	Limits (dBuV/m)	Margin (dB)
176.2	7.77	V	13.15	3.58	24.50	43.5	19.0
264.3	3.06	H	16.07	4.67	23.80	46.0	22.2
352.4	11.54	H	14.44	5.62	31.60	46.0	14.4
440.5	3.48	H	16.42	6.30	26.20	46.0	19.8

Note: “H”: Horizontal, “V”: Vertical

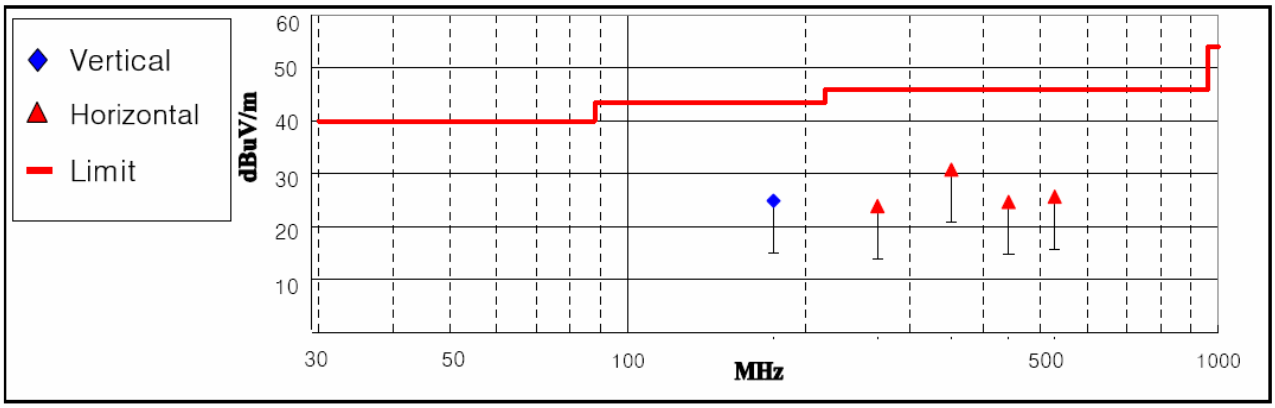


< Fig 4. Radiated emission result _ 88.1MHz >

5.7.2. 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)
176.6	8.16	V	13.16	3.58	24.90	43.5	18.6
264.9	3.12	H	16.10	4.68	23.90	46.0	22.1
353.2	10.71	H	14.46	5.63	30.80	46.0	15.2
441.5	1.95	H	16.44	6.31	24.70	46.0	21.3
528.6	1.49	H	17.39	6.83	25.70	46.0	20.3

Note: “H”: Horizontal, “V”: Vertical

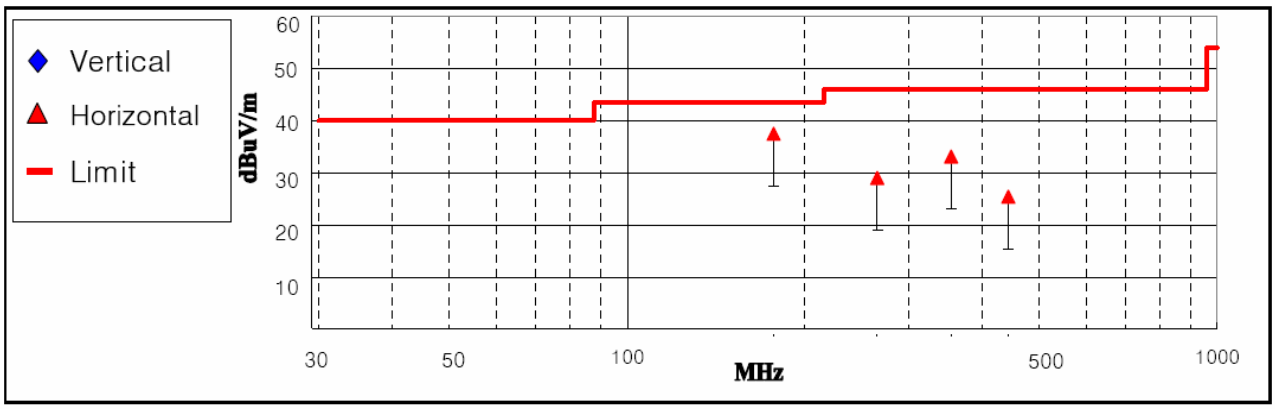


< Fig 5. Radiated emission result _ 88.3MHz >

5.7.3. Test frequency for 88.5 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)
177.0	20.75	H	13.16	3.59	37.5	43.5	6.0
265.5	8.18	H	16.13	4.69	29.0	46.0	17.0
354.0	12.98	H	14.48	5.64	33.1	46.0	12.9
442.5	2.63	H	16.46	6.31	25.4	46.0	20.6

Note: “H”: Horizontal, “V”: Vertical

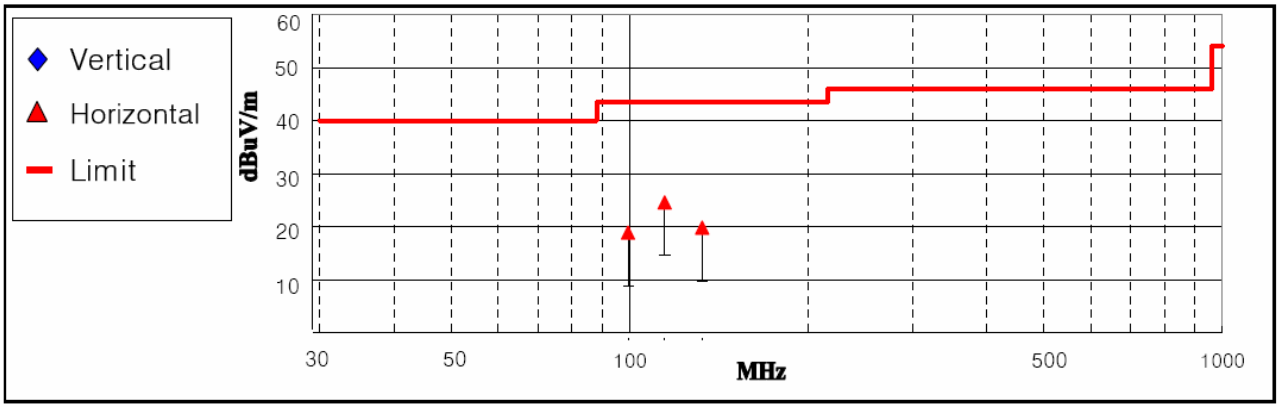


< Fig 6. Radiated emission result _ 88.5MHz >

5.7.4. Test of the other frequencies

Frequency (MHz)	Reading (dBuV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBuV/m)	Limits (dBuV/m)	Margin (dB)
99.42	6.59	H	9.61	2.69	18.9	43.5	24.6
114.54	11.06	H	10.69	2.85	24.6	43.5	18.9
132.60	5.00	H	11.68	3.12	19.8	43.5	23.7

Note: “H”: Horizontal, “V”: Vertical



< Fig 7. Radiated emission result _ other frequency >

6. Occupied Bandwidth Measurement

6.1 Operating environment

Temperature : 24℃
Relative humidity : 32 %

6.2 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 25kHz/division frequency span, 30kHz resolution bandwidth and 5dB/division logarithmic display from an ESI EMI Test Receiver.

6.3 Limit

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

6.4 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Calibrated Date
■ -	ESI	Rohde & Schwarz	EMI Test Receiver	830482/010	12. 17. 2004
■ -	HK116	Rohde & Schwarz	Biconical antenna	826861/018	11. 19. 2004

6.5 Test result of occupied bandwidth

-. Test Date : May 11, 2005
-. Reference standard : Part 15 Subpart C, Sec. 15.239(a)
-. Operating condition : Continuous transmitting with a 1000Hz modulated carrier signal
-. Spectrum resolution bandwidth(6dB) : 30 kHz
-. Power Source : DC 12V

■ RESULT : Passed
Refer to APPENDIX B: Test Plots of occupied bandwidth

Remark : Measurements were performed 1 near top, 1near middle and 1 near bottom location in the frequency range operation according to ANSI C63.4/2003. Sec. 13.1.1
Occupied bandwidth were measured at -26dB with respect to the reference level according to ANSI C63.4/2003. Sec. 13.1.7

7. Recommendation & conclusion

The data collected shows that the Gumi College EMC Center.

Kubong Information Technology Co., Ltd. FM Transmitter (Model No.: MT-8001K) was complies with § 15.209, 15.239 of the FCC Rules.

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