



CTK Co., Ltd.
The Power Leader of Global Regulatory Compliance

CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea
Tel: +82-31-339-9970 Fax: +82-31-339-9855
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TEST REPORT For FCC

Test Report No. : 2007040036

Date of Issue : May 4, 2007

FCC ID : CCEWLO24TX

Model/Type No. : WLO24TX

Kind of Product : Wireless Observation System

Applicant : COMMAX Co.,Ltd.

Applicant Address : 513-11, Sangdaewon-Dong, Jungwon-Gu, Sunghnam-Si, Kyunggi-Do, KOREA

Manufacturer : COMMAX Co.,Ltd.

Manufacturer Address : 513-11, Sangdaewon-Dong, Jungwon-Gu, Sunghnam-Si, Kyunggi-Do, KOREA

Contact Person : Ji-Soo, KIM / Assitant Manager

Telephone : +82-31-739-3682

Received Date : April 16, 2007

Test period : Start : April 17, 2007 End : May 3, 2007

Test Results : In Compliance Not in Compliance

The test results presented in this report relate only to the object tested.

CTK Co., Ltd. is accredited by Korea Laboratory Accreditation Scheme (KOLAS) which signed the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA) for the above test item(s) and test method(s).

Tested by

Eun-Won, Lee
Test Engineer
Date: May 4, 2007

Reviewed by

Young-Joon, Park
Technical Manager
Date: May 4, 2007



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REPORT REVISION HISTORY

Date	Revision	Page No
May 4, 2007	Issued (2007040036)	All

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1.0 General Product Description

Discription : Wireless Observation System
 Equipment model name : WLO24TX
 Serial number : Prototype
 EUT condition : Pre-production, not damaged
 Frequency Range : 2414 ~ 2468 MHz
 Number of channels : 4channel(2414,2432,2450,2468MHz)
 Type of Modulation : Frequency Modulation
 Power Source : 11~28VDC

1.1 Tested Frequency

	LOW	MID	HIGH
Frequency (MHz)	2414	2450	2468



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1.2 Model Differences

Not applicable

1.3 Device Modifications

The following modifications were necessary for compliance:

Not applicable

1.4 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.	FCC ID or DoC
Camera	C O M M A X C o . , L t d .	CR-ICN	CT030900031	-

* note : This camera is setted outside of the test site during testing



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1.5 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.6 Test Facility

The measurement facility is located at 386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea.

1.7 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	 93250
JAPAN	VCCI	10 meter Open Area Test Site and one conducted site.	 R-948, C-986
KOREA	MIC	EMI (10 meter Open Area Test Site and two conducted sites) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 No. 51, KR0025
International	KOLAS	EMC	
Europe	GLAS	EMC EN 55011, EN 55022, EN 61000-6-3, EN 61000-6-4, EN 61000-3-2, EN 61000-3-3, EN 61000-6-1, EN 61000-6-2, EN 50130-4, EN 55024, EN 61204-3, EN 60601-1-2, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11	 No.13000796-02



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2.0 Summary of test Results

FCC Part Section(s)	Description Of Tests	Status (note 1)
15.203	Antenna Requirement	C
15.205 15.209(a) 15.249(a)	Radiated Emission	C
15.207(a)	Conducted Emission	NA
15.249(d)	Band Edge Testing	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

The sample was tested according to the following specification:
- FCC Part 15.247, ANSI C63.4-2003



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2.1 Technical Characteristic Test

2.1.1 Antenna Requirement

Standard Applicable

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 Connected Construction

The EUT has a built in antenna which is a short wire solder on the PCB, this is permanently attached antenna and meets the requirements of this section.

Test Results : Complies

2.1.2 Radiated Emission Test

Test Location

Testing was performed at a test distance of 3 meter Open Area Test Site

Test Procedures

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity. The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 30 MHz ~ 10th harmonic

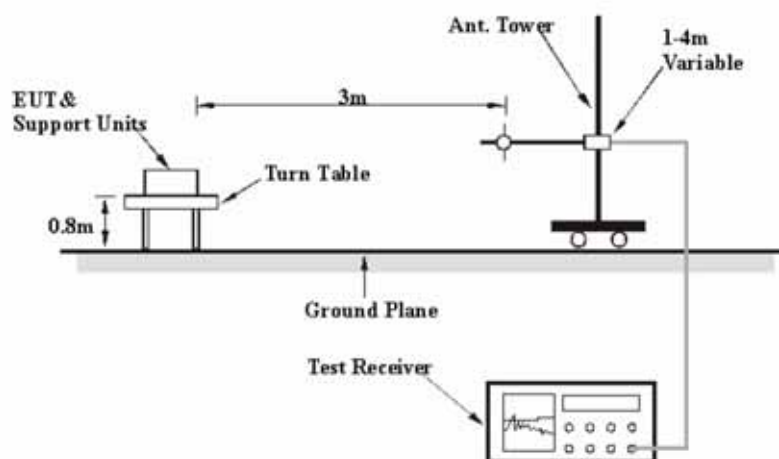
RBW = 120 kHz (30 MHz ~ 1 GHz) VBW RBW

 = 1 MHz (1 GHz ~ 10th harmonic)

Span = 100 MHz

Detector function = Quasi-peak

Trace = max hold



Limit

- 15.209(a)

Frequency(MHz)	Field Strength uV/m@3m	Field Strength dBuV/m@3m
30-88	100**	40
88-216	150**	43.5
216-960	200**	46
Above 960	500	54

** Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.



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Test Results

EUT	Wireless Observation System	Measurement Detail	
Model	WLO24TX	Frequency Range	Below 1000MHz
Channel	-	Detector function	Quasi-Peak

The requirements are:

Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
56.70	36.5	3.5	Quasi-Peak

Test Data

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor			Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Amp. Gain	Cable			
56.70	29.2	V	1.0	6.3		1.0	40.0	36.5	3.5
76.10	27.6	V	1.0	7.3		1.2	40.0	36.1	3.9
182.80	27.1	V	1.1	6.9		2.0	43.5	36.0	7.5
345.30	21.5	V	1.0	12.2		2.9	46.0	36.6	9.4
401.00	21.5	V	1.5	13.4		3.1	46.0	38.0	8.0
468.90	18.2	V	1.2	14.8		3.4	46.0	36.4	9.6



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Test Results

EUT	Wireless Observation System	Measurement Detail	
Model	WLO24TX	Frequency Range	1-25GHz
Channel	Channel Low	Detector function	Peak

The requirements are:

Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
2414.00	91.4	2.6	Peak

Test Data

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor			Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Amp. Gain	Cable			
2414.00	91.1	V	1.3	28.2	35.3	7.4	94.0	91.4	2.6
4825.00	39.2	V	1.3	32.7	34.9	11.4	54.0	48.4	5.6
7225.00	23.8	V	1.3	37.7	34.8	14.3	54.0	41.0	13.0

* No emissions were detected at a level greater than 20dB below limit



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Test Results

EUT	Wireless Observation System	Measurement Detail	
Model	WLO24TX	Frequency Range	1-25GHz
Channel	Channel 3	Detector function	Peak

The requirements are:

Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
2450	91.9	2.1	Peak

Test Data

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor			Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Amp. Gain	Cable			
2450.00	91.6	V	1.3	28.2	35.3	7.4	94.0	91.9	2.1
4898.00	38.1	V	1.3	32.7	34.9	11.4	54.0	47.3	6.7
7349.00	24.1	V	1.3	37.7	34.8	14.3	54.0	41.3	12.7

* No emissions were detected at a level greater than 20dB below limit



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Test Results

EUT	Wireless Observation System	Measurement Detail	
Model	WLO24TX	Frequency Range	1-25GHz
Channel	Channel 4	Detector function	Peak

The requirements are:

Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
2462	92.1	1.9	Peak

Test Data

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor			Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Amp. Gain	Cable			
2462.00	91.8	V	1.3	28.2	35.3	7.4	94.0	92.1	1.9
4932.50	39.6	V	1.3	32.7	34.9	11.4	54.0	48.8	5.2
7379.00	24.6	V	1.3	37.7	34.8	14.3	54.0	41.8	12.2

* No emissions were detected at a level greater than 20dB below limit



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2.1.3 Conducted Emission Test

Not Applicable, as it's power was supplied from DC Power Supply



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2.1.4 Band-Edge Testing

Test Standard

FCC Part 15 15.249 :2005

Band Edge FCC 15.249(d) Limit

Emission radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation

Test Procedures

With the EUT's antenna attached, the EUT's radiated emission power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.

Test Results

Band-Edge Testing	Result
	Complies

See next pages for actual measured spectrum plots.



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[Channel 1]



[Channel 4]





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APPENDIX A – Test Equipment Used For Tests

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Spectrum Analyzer	Agilent	8564E	3551A0041	2007-11-03
2	EMI Test Receiver	Rohde & Schwarz	ESVS30	829637/015	2008-01-12
3	ULTRA Broadband Antenna	Rohde & Schwarz	HL562	361324/014	2007-06-12
4	Field Strength Meter	Rohde & Schwarz	ESHS30	828144/002	2008-02-15
5	LISN	EMCO	3825/2	9607-2575	2007-09-01
6	LISN	EMCO	3825/2	9409-2246	2007-09-01
7	Field Strength Meter	Rohde & Schwarz	ESHS30	862024/001	2008-03-07
8	System Power Supply	HP	6032A	3440A-10521	2007-07-06
9	EPM Series Power Meter	HP	E4418A	GB38272734	2007-11-03
10	Power Sensor	HP	8481A	331BA92056	2007-11-01
11	Power Sensor	HP	8482B	331BA05406	2007-10-27
12	Audio Analyzer	HP	8903B	2747A03432	2007-11-03
13	ESG-D Series Signal Generator	Agilent	E4432B	US40054094	2007-11-03
14	Modulation Analyzer	HP	8901B	3438A05228	2007-11-06
15	Attenuator	HP	8494A	3308A33351	2007-10-27
16	Attenuator	HP	8496A	3308A15142	2007-10-27
17	Temp&Humi Chamber	Kunpoong	KP-1000	2002KP050041	2008-01-15
18	EMC Analyzer	Agilent	E7403A	MY42000054	2007-10-18
19	Horn Antenna	ETS-Lindgren	3115	00078894	2008-11-29
20	Horn Antenna	ETS-Lindgren	3116	00062504	2008-11-27
21	OPT H64 AMPLIFIER	HP	8447F	3113A06814	2008-03-03
22	PREAMPLIFIER	Agilent	8449B	3008A02307	2007-11-20