



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

**Test Report No.** : E057R-058

**Applicant** : OH SUNG ELECTRONICS CO., LTD.

**Address** : #181 Gongdan-dong, Gumi, Gyeong Buk, Korea

**Manufacturer** : OH SUNG ELECTRONICS CO., LTD.

**Address** : #181 Gongdan-dong, Gumi, Gyeong Buk, Korea

**Type of Equipment** : REMOTE CONTROLLER

**FCC ID** : OZ5URCMX-950

**Model / Type No.** : MX-950

**Serial number** : N/A

**Total page of Report** : 16 pages (including this page)


**Date of Incoming** : March 21, 2005


**Date of issuing** : June 19, 2005

## SUMMARY

The equipment complies with the regulation, **FCC PART 15 SUBPART C §15.231**

This test report contains only the result 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.

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## 1. VERIFICATION OF COMPLIANCE

APPLICANT : OH SUNG ELECTRONICS CO., LTD.  
 ADDRESS : #181 Gongdan-dong, Gumi, Gyeong Buk, Korea  
 CONTACT PERSON : Kwang-Jae Ok / Team Leader of Q.C.  
 TELEPHONE NO : +82-54-468-0831  
 FCC ID : OZ5URCMX-950  
 MODEL NO/NAME : MX-950  
 SERIAL NUMBER : N/A  
 DATE : June 19, 2005

EQUIPMENT CLASS	DSC- Security / Remote Control Transmitter
E.U.T. DESCRIPTION	REMOTE CONTROLLER
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	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 SUBPART C §15.231
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	Yes
FINAL TEST WAS CONDUCTED ON	3 METER OPEN AREA TEST SITE

- This device has shown compliance with the conducted emissions limits in 15.107 adopted under FCC 02-107 (ET Docket 98-80). The device may be marketed after July 11, 2005 affected by the 15.37(j) transition provisions.
- 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 OH SUNG ELECTRONICS CO., LTD., Model MX-950 (referred to as the EUT in this report) is a remote controller. The EUT consists of cradle for charging and receiver, Model MFR-250. The EUT sends radio signal to the receiver and then the receiver converts the signal to the infrared signals that control audio and/or video components. Also the EUT can be programmed via a windows PC equipped with a USB port using supplied software, MX-3000 Editor. The associated receiver is manufactured by OH SUNG ELECTRONICS CO., LTD., Model No: MRF-250, FCC ID: OZ5URCMRF250. The product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Plastic
TX FREQUENCY	418.00 MHz
MODULATION	ASK
USED MICROPROCESSOR	206MHz RISC
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	12.0 and 418.0 MHz
ANTENNA TYPE	Built-in on the PCB in the EUT
TRANSMISSION TIME	Not longer than 1 sec
RATED SUPPLY VOLTAGE	DC 5V, 2A from AC/DC Adapter or Lithium Ion Battery
NUMBER OF LAYERS	6 LAYERS
USED AC/DC ADAPTER	Model: 061-052000-UF, MFR: Xiang Fa Electronics Co., Ltd.
EXTERNAL CONNECTOR	DC Input, Charger Signal, and USB Port

\* Remark: This equipment automatically deactivates the transmitter within not more than 1 second of being released.

### Model Differences:

- No other model differences have been mentioned

### 2.2 Related Submittal(s) / Grant(s)

- None



### 2.3 Test System Details

The EUT was tested with the following all equipment used in the tested systems are:

Model	Manufacturer	FCC ID	Description	Connected to
MX-950	OH SUNG ELECTRONICS CO., LTD.	OZ5URCMX950	Transmitter	N/A
MX-950CG	OH SUNG ELECTRONICS CO., LTD.	N/A	Charger	EUT
061-052000-UF	Xiang Fa Electronics(D.G.) Co., Ltd	N/A	AC/DC Adapter	Charger

### 2.4 Test Methodology

Radiated testing was performed according to the procedures in ANSI C63.4/2003. Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

### 2.5 Test Facility

The open area test site and conducted measurement facilities are located on at 426-1 Daessangryung-Ri, Chowol-Myun, Gwangju-Si, Gyeonggi-Do 464-082 Korea. Description details of test facilities were submitted to the Commission on October 02, 2002. (Registration Number: 529838)

## 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	Oh Sung Electronics Co., Ltd	PNCCA0653A	N/A
RF Module	Oh Sung Electronics Co., Ltd	KTM04180OHS-H	N/A
Keypad Board	Oh Sung Electronics Co., Ltd	PFFFA0655B	N/A
LCD Panel	DSD	D-0850CFG	N/A

### 3.2 EUT exercise Software

To get a maximum radiated emission from the EUT, the touch screen o the EUT was pushed to transmit RF signal continuously. To activate continuous transmission, software was changed as above for testing only.

To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

### 3.3 Equipment Modifications

None



### 3.4 Configuration of Test System

**Line Conducted Test:** The battery in the EUT was charged and the power line of the charger 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: 2001 7.2.3 to determine the worse operating conditions.

**Radiated Emission Test:** Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4/2001 8.3.1.1 and 13.1.4.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3meter open area test site.

The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

**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. The plot is taken at 60kHz/division frequency span, 10 kHz resolution bandwidth and 10dB/division logarithmic display from an 8568B spectrum analyzer.

### 3.5 Antenna Requirement

For intentional device, according to §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:**

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

## 4. PRELIMINARY TEST

### 4.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
TX and Charging mode	X

### 4.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
TX mode	X



## 5. FINAL RESULT OF MEASUREMENT

### 5.1 Conducted Emission Test

Humidity Level : 40 %

Temperature: 21 °C

Limits apply to : FCC CFR 47, PART 15 Section 15.207

Result : PASSED BY -14.05dB at 0.165 MHz under peak detector mode.

EUT : REMOTE CONTROLLER

Date: March 24, 2005

Operating Condition : Continuously Transmitting Mode during battery charging.

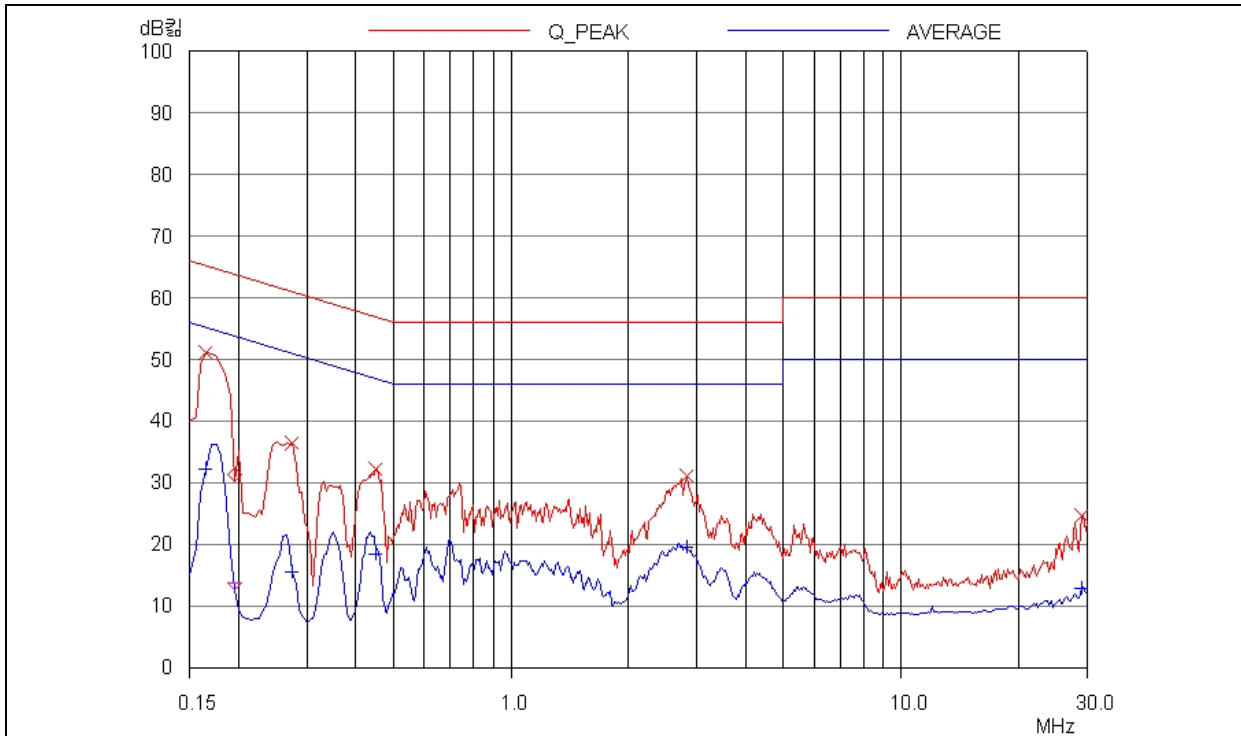
Frequency (MHz)	Line	Quasi-Peak (dBuV)			Margin (dB)	Average (dBuV)		Margin (dB)
		Emission Level	Detector Mode	Limits		Emission level	Limits	
0.165	H	51.16	P	65.21	-14.05	-	-	-
0.18	N	46.77	P	64.49	-17.72	-	-	-
0.355	N	37.03	P	58.84	-21.81	-	-	-
0.45	H	32.28	P	56.88	-24.60	-	-	-
1.07	N	35.72	P	56.00	-20.28	-	-	-
2.51	N	35.35	P	56.00	-20.65	-	-	-

Line Conducted Emission Tabulated Data

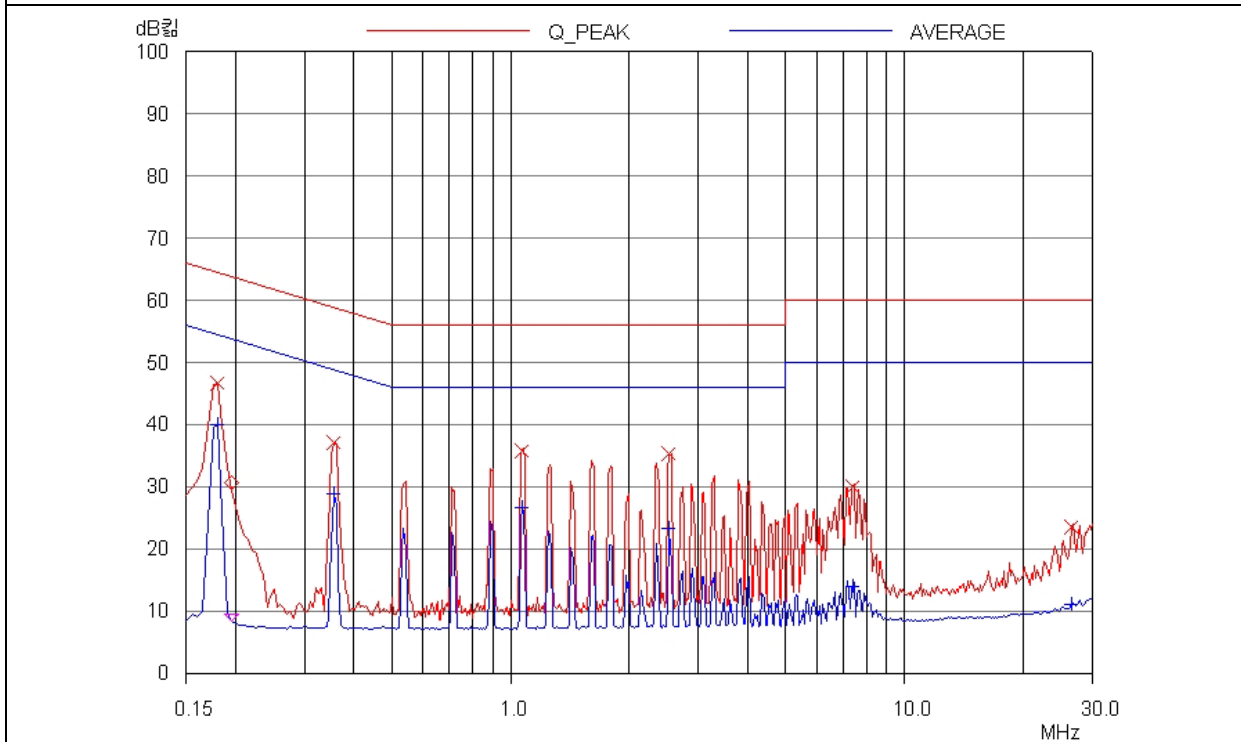
Remark : "H": Hot Line, "N": Neutral Line. "P": Peak Detector mode, "Q.P": Quasi-Peak Detector mode

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

Tested by: Ki-Hong, Nam / Test Engineer



### HOT LINE



### NEUTRAL LINE





## 5.2 Field Strength of the Carrier Test

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

Humidity Level : 42 % Temperature: 16°C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.231(b)  
 Type of Test : Intentional Radiator  
 Result : PASSED BY -3.27 dB with Peak detector

EUT : REMOTE CONTROLLER Date: March 28, 2005  
 Operating Condition : TX mode  
 Distance : 3 Meter

Radiated Emissions			Ant	Correction Factors			Total	FCC	
Carrier Freq. (MHz)	Amplitude (dBuV)	Detector Mode	Pol.	Antenna (dB/m)	Cable (dB)	Average Level Factor	Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
417.97	69.10	Peak	H	15.93	4.44	17.76	71.71	80.28	-8.54
418.01	52.20	Peak	V	15.93	4.44	17.76	54.81	80.28	-25.47

\*Remark: To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

“Q.P.” : Quasi-Peak, “AVE”: Average, “H”: Horizontal Polarization, “V”: Vertical Polarization

## 5.3 Maximum Modulation Percentage (MMP)

In order to determine possible Maximum Modulation Percentage from the EUT, we measured the duty cycle according to the clause I4.(10) in ANSI C63.4/1992.

The pulse train from the EUT was consisting of long and short pulse. The measured values are as follows.

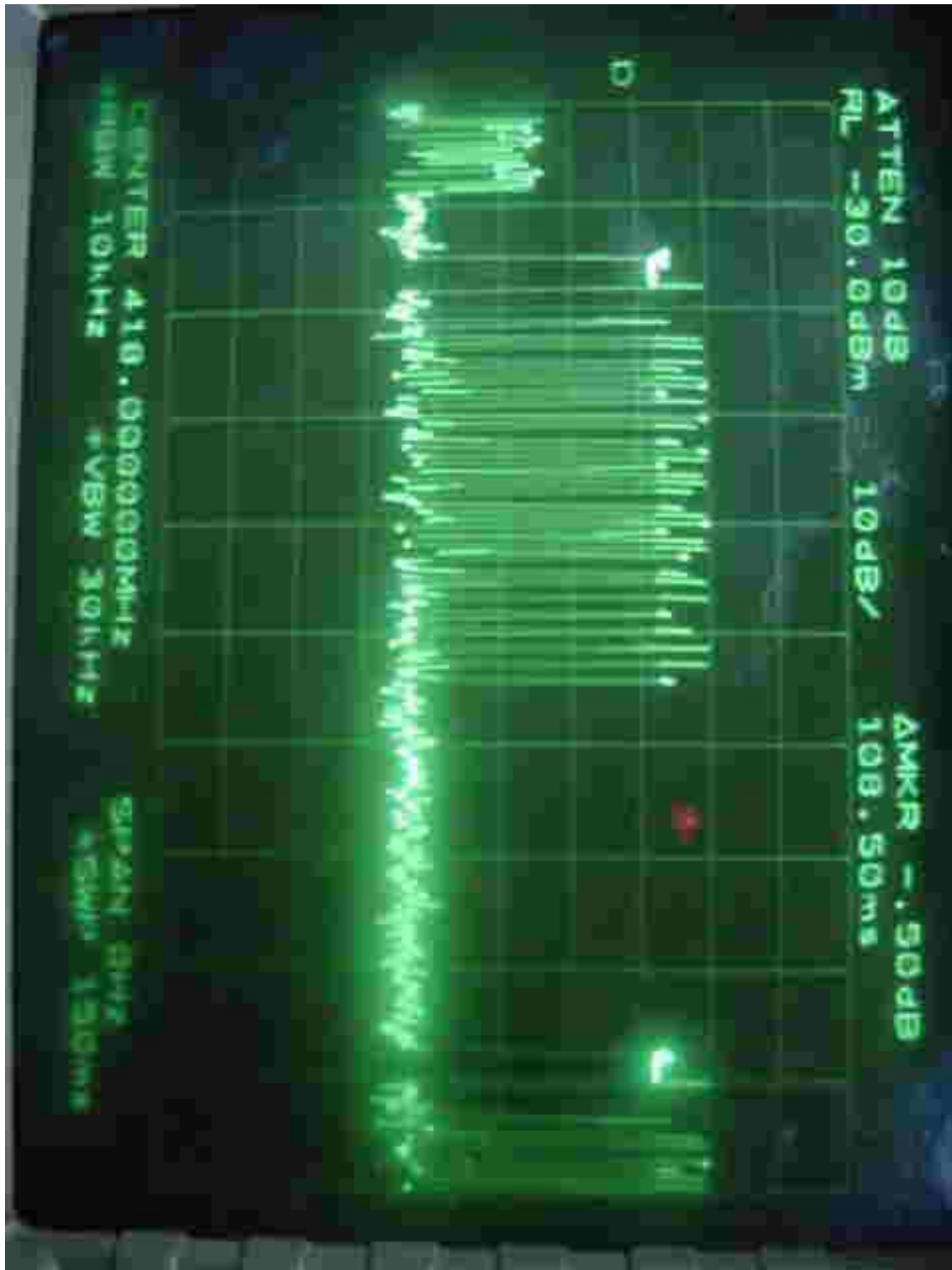
Long Pulse (LP)	Short Pulse (SP)	Total sum of LP	Total sum of SP	Pulse Width
4.133ms	0.267ms	1	33	108.5
Duty Cycle		$(4.133 \times 1 + 0.267 \times 33) / 100 = 0.12944$		
Maximum Modulation Percentage(MMP)		Duty Cycle X 100 % = 12.944%		
Average Level Factor		-17.76 dB		

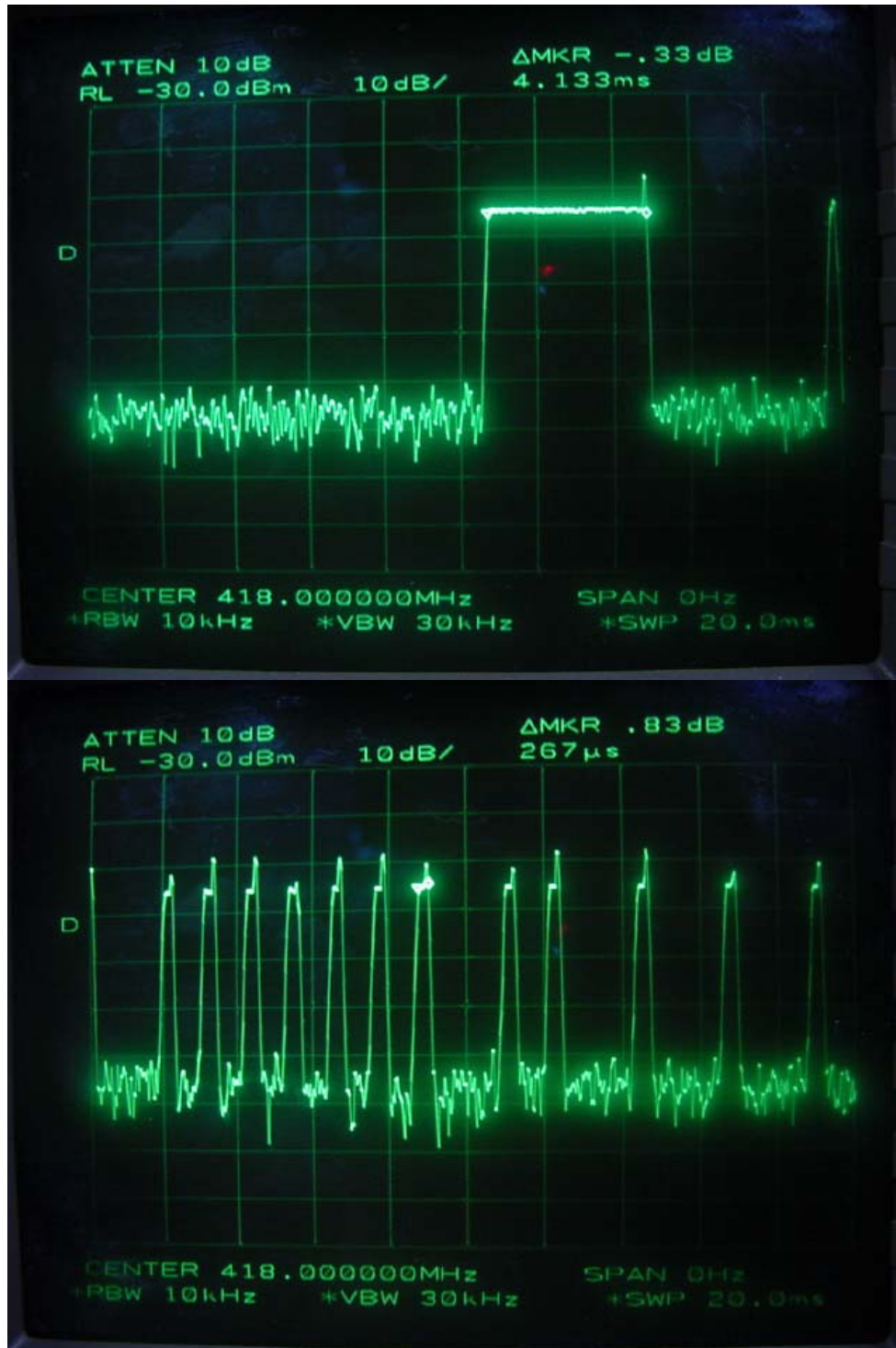
Remark: Please refer to Photo Data for MMP.

Tested by: Ki-Hong, Nam / Test Engineer



### Photo Data for MMP







### 5.4 Spurious Emission Test

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

Humidity Level : 42 % Temperature: 16°C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.231(b)  
 Type of Test : Intentional Radiator  
 Result : PASSED BY -12.86dB at 836.02 MHz

EUT : REMOTE CONTROLLER Date: March 28, 2005  
 Operating Condition : TX mode  
 Distance : 3 Meter

Radiated Emissions			Ant	Correction Factors			Total	FCC	
Carrier Freq. (MHz)	Amplitude (dBuV)	Detector Mode	Pol.	Antenna (dB/m)	Cable (dB)	Average Level Factor	Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
304.23	16.30	P	H	13.80	3.83		33.93	60.28	-26.35
405.64	31.62	Peak	H	15.61	4.41		31.62	60.28	-28.66
711.12	14.00	Peak	H	20.70	6.51		41.21	60.28	-19.07
836.02	28.80	Peak	V	21.95	7.13	17.76	40.12	60.28	-20.16
836.02	36.10	Peak	H	21.95	7.13	17.76	47.42	60.28	-12.86
Other spurious frequencies were not found up to 4200 MHz.									

\*Remark: To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

“Q.P.” : Quasi-Peak, “AVE”: Average, “H”: Horizontal Polarization, “V”: Vertical Polarization

**Tested by: Ki-Hong, Nam / Test Engineer**



### 5.4 Bandwidth of the operating frequency

Humidity Level : 39 % Temperature: 22°C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.231 (c)  
 Type of Test : Intentional Radiator  
 Result : PASSED

EUT : REMOTE CONTROLLER Date: March 28, 2005  
 Operating Condition : TX mode  
 Minimum Resolution  
 Bandwidth : 10 kHz

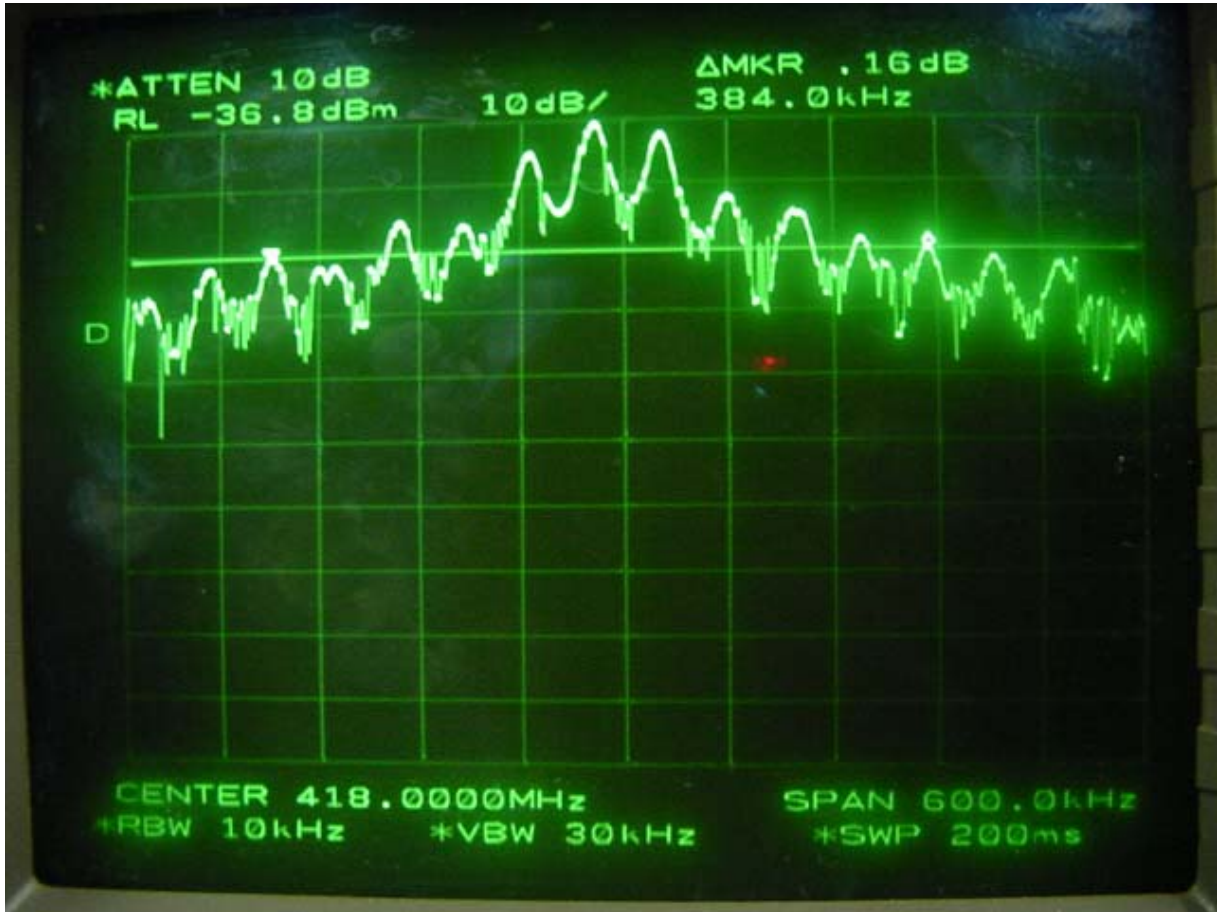
Carrier Freq. (MHz)	Bandwidth of the emission. (kHz)	Limit (kHz)	Remark
418.00	384.0	1045.0	<u>The point 20dB down from the modulated carrier</u>

Remark: Please refer to Photo Data for bandwidth for test data.

Tested by: Ki-Hong, Nam / Test Engineer



## Photo Data for bandwidth





## 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	ESVS 10	827864/005	DEC/04	12MONTH	■
2.	Test receiver	R/S	ESHS10	834467/007	MAY/05	12MONTH	■
3.	Spectrum analyzer	HP	85680B	3001A04955	APR/05	12MONTH	■
4.	RF preselector	HP	85685A	3107A01264	MAR/05	12MONTH	■
5.	Quasi-Peak Adapter	HP	85650A	3107A01542	MAR/05	12MONTH	■
6.	Biconical antenna	EMCO	3104C	9109-4441	JUL/04	12MONTH	
		Schwarzbeck	VHA9103	91031852	JAN/05		■
7.	Log Periodic antenna	EMCO	3146	9001-2614	FEB/05	12MONTH	
				9109-3217	MAY/05		
		Schwarzbeck	9108-A(494)	62281001	FEB/05		■
8.	Horn Antenna	SCHWARZBECK	BBHA9120D	BBHA9120D294	JUN/05	12MONTH	■
9.	LISN	EMCO	3825/2	9109-1867	JUL/05	12MONTH	
				9109-1869	JUL/05		
		Schwarzbeck	NSLK8128	8126-216	JUN/05		■
10.	RF Amplifier	HP	8347F	3307A01354	JUN/04	N/A	
11.	Spectrum Analyzer	HP	8564E	3650A00756	JUL/05	12MONTH	■
12.	Plotter	HP	7475A	30052 22986	N/A	N/A	■
13.	Position Controller	HD	HD100	100/788	N/A	N/A	■
14.	Turn Table	HD	DS420S	N/A	N/A	N/A	■
15.	Antenna Master	HD	HD240	N/A	N/A	N/A	■
16.	Isolation Transformer	Digitek Power	DPT	DPF-22027	N/A	N/A	■
17.	Isolation Transformer	Digitek Power	DPT	DPF-22028	N/A	N/A	■
18.	Frequency Converter	Digitek Power	VFS/DEFC	N/A	N/A	N/A	■