SGS KES Co., Ltd. EMC Laboratory

705, Dongchun-Ri Sooji-Eub, Yongin-Shi Kyungki-Do, KOREA
TEL.82-31-263-0409 FAX.82-31-263-0454

FCC Part 15 Report

Manufacture :

Metawave, Inc.
78-8 Nonhyun-dong, Kangnam-gu, Seoul,
KOREA

Attn : Sang-Man, Lee

Dates of Tests : March. 12 and 13 . 2002
Test Report No. : 2002KESEMC-II-0073.FCC
Test Site : SGS KES Co., Ltd.,
EMC Site, Korea.

TYPE of EUT **Keynokey**
MODEL No. **Keynokey**

CONTACT PERSON

Metawave, Inc.
78-8 Nonhyun-dong, Kangnam-gu, Seoul,
KOREA
Sang-Mane, Lee
Tel./Fax. : 82-2-866-5536/82-2-866-5537

FCC Rule Part(s) : Part 15 & 2
Classification : FCC Class B Device

The device bearing the trade name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-1992.

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best 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.

Kew – Seung, Lim
EMC Lab. Manager

TABLE OF CONTENTS

MEASUREMENT REPORT

Scope - Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 15.

Responsible Party : Contact Person :	Metawave, Inc. Sang-Man, Lee Tel./Fax. : 82-2-866-5536/82-2-866-5537
Manufacturer :	Metawave, Inc. 78-8 NonHyun-dong, kangnam-gu, Seoul, Korea

- Trade / Model : ***Keynokey***
- Brand Name : -
- EUT Type : Keynokey
- Classification : FCC Class B
- Rule Part(s) : FCC Part 15 & Part 2
- Test Procedure(s): ANSI C63.4 (1992)
- Dates of Test: March. 12 and 13. 2002
- Place of Tests: SGS KES Co., Ltd. EMC Site
- Test Report No.: 2002KESEMC-II-0073.FCC
- Order No. : *SKE-02-0001/E*
- Fundamental Frequency ***433.9MHz***

Applicable Test Item

	Applicable Standard	Applicable	Reason
Conducted Emission	-	No	This device uses one DC voltage battery inside.
Radiated Emission	Part 15.231	Yes	This device uses alarm systems, door openers, remote switch ext.

INTRODUCTION

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-1992) was used in determining radiated emissions emanating from **Metawave Inc.**

Model : **KeynoKey**

These measurement tests were conducted at ***SGS KES Co., Ltd. EMC Laboratory*** .

The site address is 705, Dongchun-Ri, Sooji-Eub, Yongin-Shi, Kyungki-Do, Korea.

The area of SGS KES Co., Ltd. EMC Test Site is located in a mountain area at 45 kilometers (28 miles) southeast from Seoul National Airport (Kimpo Airport), 23 kilometers (14miles) southeast from central Seoul.

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.

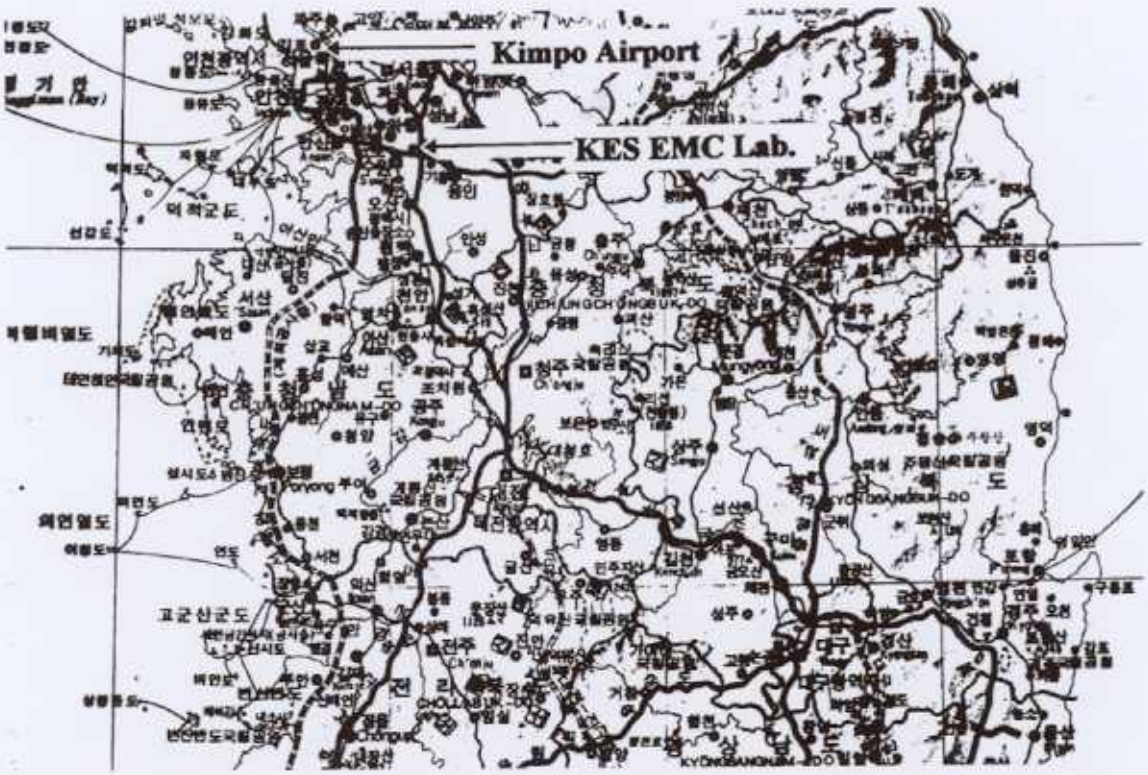


Fig. 1. The map above shows the Seoul in Korea vicinity area.
The map also shows SGS KES Co., Ltd. EMC Lab and Kimpo Airport.

PRODUCT INFORMATION

The Equipment Under Test (EUT) is
Company : **Metawave Inc.**
Model : **Keynokey**

RF Carrier :	FSK one-way
Antenna Impedance :	50 ohm
Output Power:	0.01mW
Power Supply :	Base Unit – Vehicle Battery Remote Unit – (1) 3Vdc Lithium(CR3032) Battery
Fundamental Frequency:	433.920MHz
Sensitivity:	-120dBm
Operating Temperature:	-30°C to +80°C
I/O Port Type	Connected to
1. Battery	3ft Wire to12vdc Power Supply
2. Key-in Signal	3ft Wire to IG1(12vdc) Power Supply
3. Door Locks(all)	3ft Wire to Door Lock/Unlock Actuator
4. Starter/Kill	3ft Wire to Starter Wire
5. Door Pin	3ft Wire to Door Pin Sensor
6. Brake	3ft Wire to Brake Sensor
7. Siren/Horn	3ft Wire to Horn
8. Communication Module	3ft Wire to Model

DESCRIPTION OF TESTS

Radiated Emissions

Preliminary measurements were made indoors at 1 meter using broadband antennas, broadband amplifier, and spectrum analyzer 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 system configuration, clock speed, mode of operation and turntable azimuth with respect to the antenna were note for each frequency found. The spectrum was scanned from 30 to 300 MHz using biconical antenna and 300 to 1000 MHz using log-periodic antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used.

Final measurements were made outdoors at 3 meter test range using EMCO Dipole antennas or horn antenna . The test equipment was placed on a wooden and plastic bench situated on a 1.5 x 2 meter area adjacent to measurement area. 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 reexamined and investigated using EMI/Field Intensity Meter and Quasi-Peak Adapter. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 100 kHz or 1 MHz depending on the frequency or type of signal.

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT was re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1x1.5 meter table.

The EUT was supplied by DC Power Source. The EUT was re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meter and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: rotating the turntable containing the EUT and changing the polarity of the antenna, whichever determined the worst-case emission. Each EME reported was calibrated using the R/S SMG signal generator.

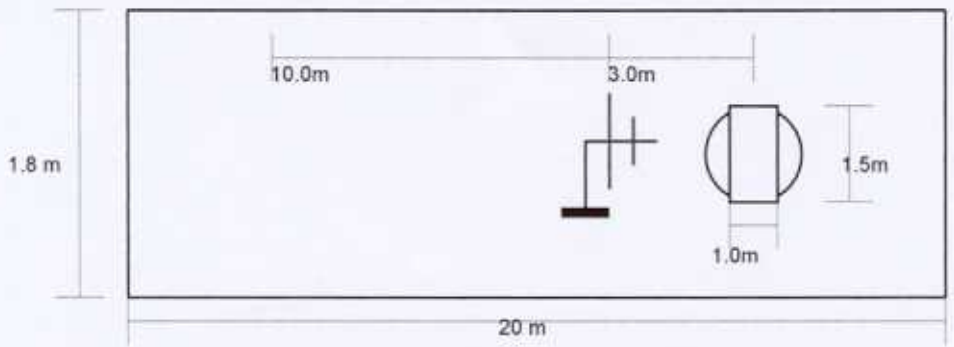


Fig. 2. Dimensions of Outdoor Test Site

TEST RESULTS

Radiated Emissions(Part 15.231)

Company : Metawave Inc.
Model No. : KeynoKey (FCC ID : P8IKEYNOKEY-C)
Date of Test : March. 13. 2002
Measure Bandwidth : 120kHz

Freq. (MHz)	Level (dBμV)	AF* (dB)	CL** (dB)	POL (H/V)	Limit (dB)	F/S (μV/m)	Margin*** (dB)
41.26	3.10	12.64	1.30	V	47.0	7.11	29.96
45.81	2.80	10.44	1.50	V	47.0	5.46	32.26
75.02	3.10	6.47	2.20	V	41.9	3.87	30.14
76.35	3.00	6.61	2.20	V	41.9	3.90	30.09
141.61	14.23	11.47	2.70	H	60.8	26.31	32.40
433.92	19.71	16.36	5.66	H	80.8	122.10	39.07

Table 1. Radiated Measurements at 3meters.

* *AF = Antenna Factor.*
** *CL = Cable Loss.*
*** *Margin=80.8dBuV(or 60.8.dBuB) - (Level+AF+CL)*

Remark : This is measured by QP detector.

Note : All Frequency from 30MHz to 5GHz was scanned and every emission from this unit is very low as reported above because this unit has very low power. This Unit was found to be within the limits.

Tested by **E. J. Choi**

TEST RESULTS

Radiated Emissions(Part 15.109)

Company : Metawave Inc.
Model No. : KeynoKey (FCC ID : P8IKEYNOKEY)
Date of Test : March 13. 2002
Measure Bandwidth : 120kHz

Freq. (MHz)	Level (dBμV)	AF* (dB)	CL** (dB)	POL (H/V)	Limit (dB)	F/S (μV/m)	Margin*** (dB)
45.83	19.30	10.44	1.50	V	40.0	36.48	8.76
69.51	3.40	5.67	2.14	V	40.0	3.63	28.80
135.70	2.90	11.62	2.60	H	43.5	7.18	26.38
183.34	15.10	8.52	3.30	H	43.5	22.17	16.58
255.90	3.00	12.98	4.05	H	46.0	10.03	25.97
271.56	3.20	12.92	4.21	H	46.0	10.38	25.67

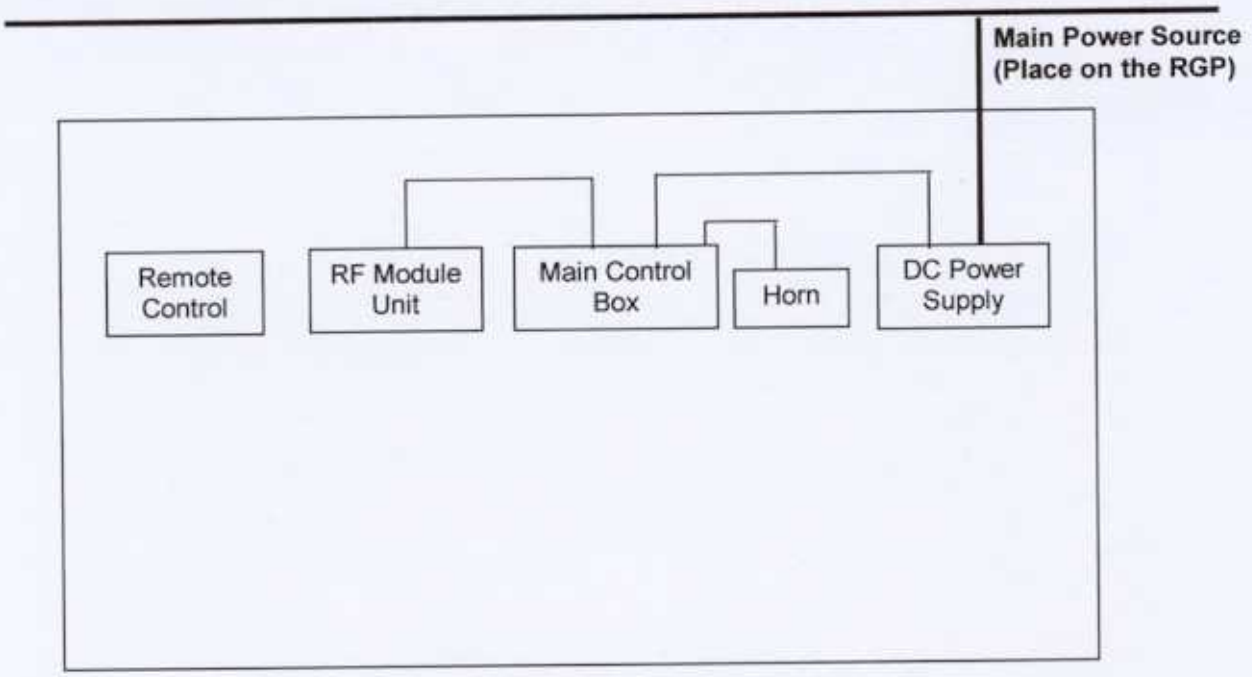
Table 2. Radiated Measurements at 3meters.

* *AF = Antenna Factor.*
** *CL = Cable Loss.*
*** *Margin=80.0dBuV(or 54.0dBuB) - (Level+AF+CL)*

Note : All Frequency from 30MHz to 1GHz was scanned and every emission from this unit is very low as reported above because this unit has very low power. This Unit was found to be within the limits.

Tested by **E. J. Choi**

TEST SET UP



1. Note : Main Control Box is supplied power from DC Power Supply and this unit distributes power to RF Module unit and horn.

2. Operating Mode :

-Remote Control : Continuously transmits signal.

-RF Module Unit and Main Control Box : Receives signal from Remote Control and the sensor detects any movement.

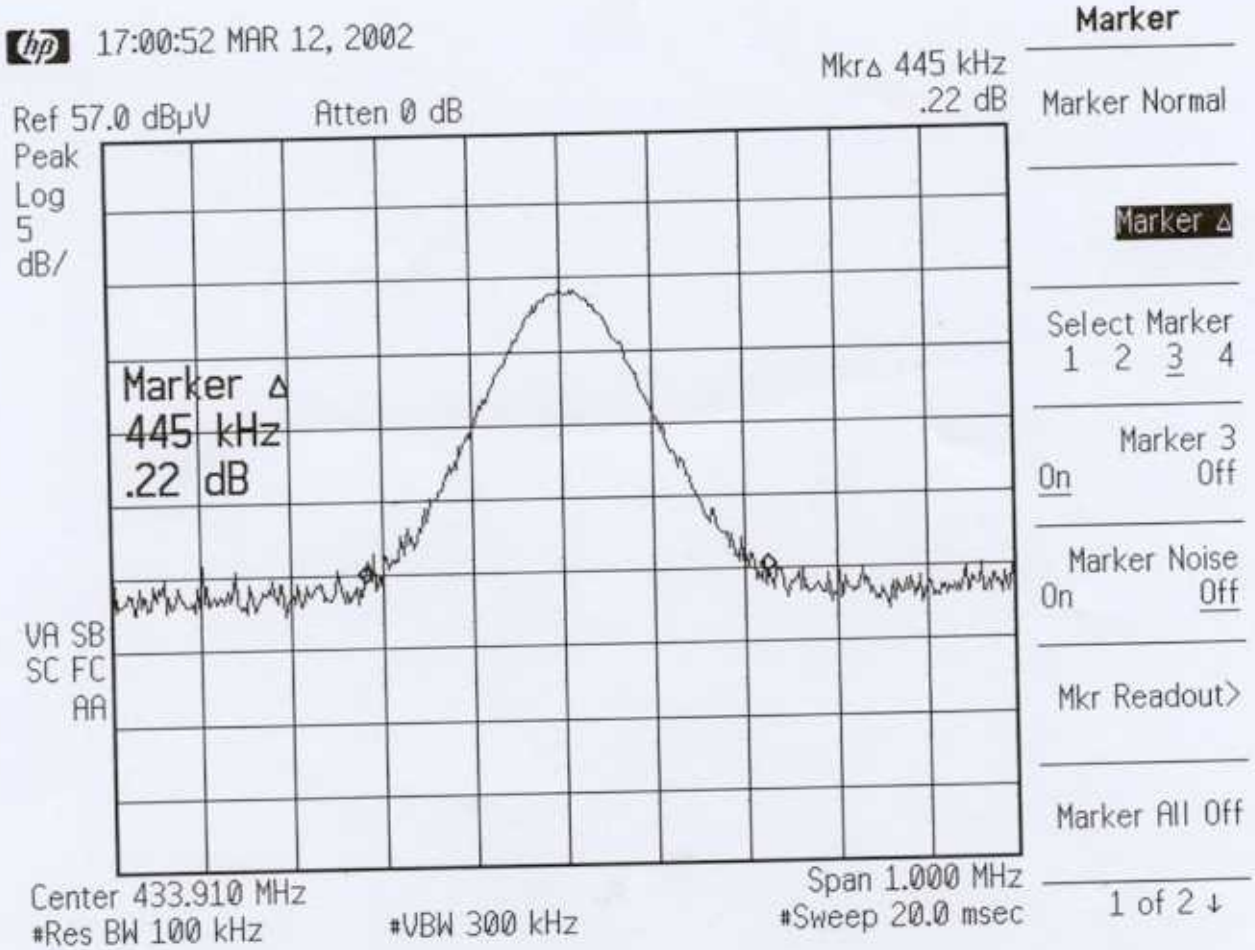
TEST RESULTS

15.231(a)(2)

1. The Remote Control is automatically deactivated within not more than 5 seconds.
   (See the attached graph)

15.231(c)

1. The bandwidth of Remote Control is within no wider than 0.25% of the center frequency at the 20dB down points. (See the attached graph)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Ref 57.0 dBµV
Atten 0 dB
Peak
Log
5
dB/
Marker △
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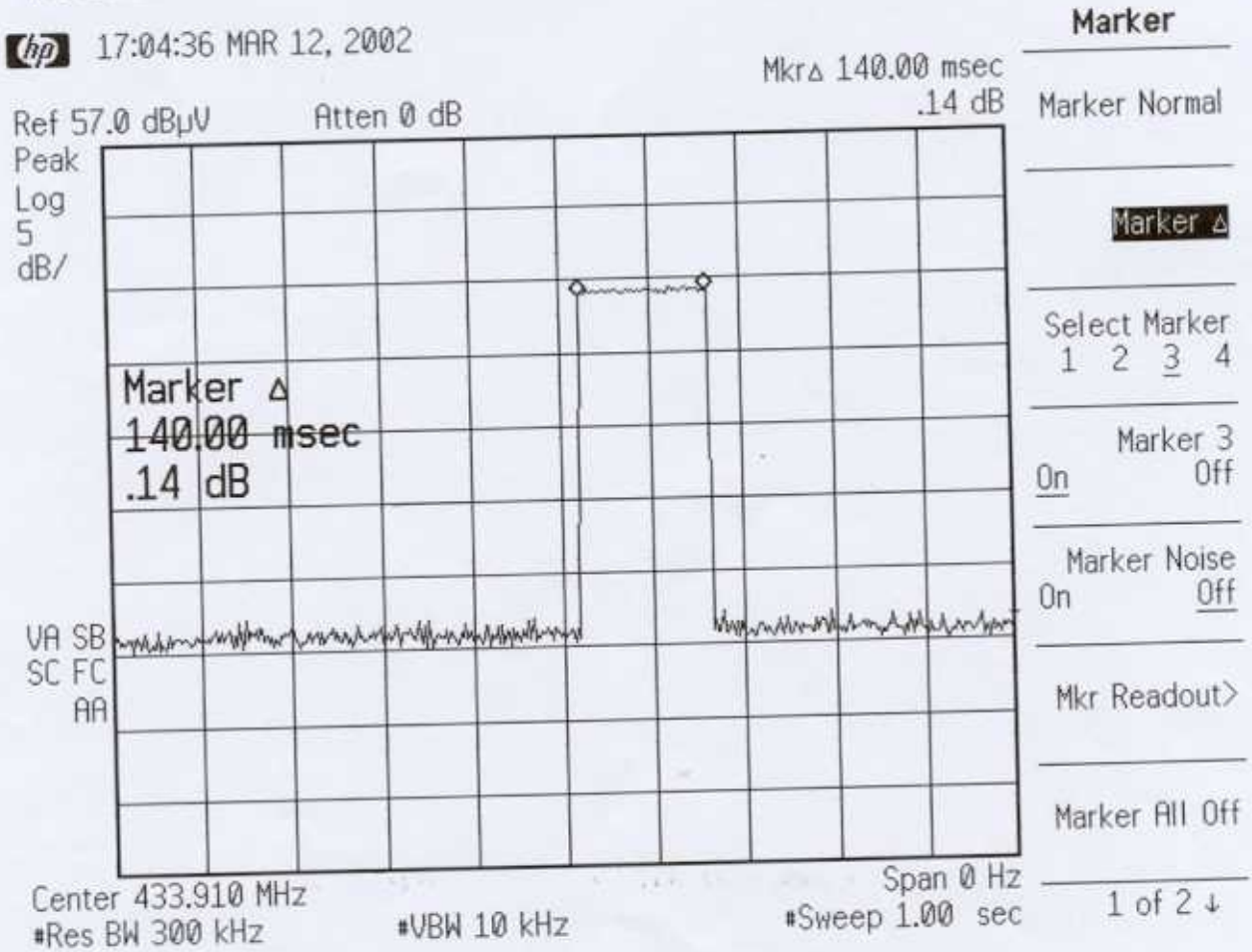
SC FC
AA
Center 433.910 MHz
#Res BW 100 kHz
#VBW 300 kHz
Span 1.000 MHz
#Sweep 20.0 msec
Marker
Marker Normal
Marker △
Select Marker
1 2 3 4
Marker 3
On Off
Marker Noise
On Off
Mkr Readout>
Marker All Off
1 of 2 ↓


17:04:36 MAR 12, 2002
Mkr△ 140.00 msec
.14 dB
Ref 57.0 dBµV
Atten 0 dB
Peak
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5
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Marker △
140.00 msec
.14 dB
VA SB
SC FC
AA
Center 433.910 MHz
#Res BW 300 kHz
#VBW 10 kHz
Span 0 Hz
#Sweep 1.00 sec
Marker
Marker Normal
Marker △
Select Marker
1 2 3 4
Marker 3
On Off
Marker Noise
On Off
Mkr Readout>
Marker All Off
1 of 2 ↓

TEST EQUIPMENT

Name of Equipment	Manufactory	Model	Cal. Date
Test Receiver	R/S	ESPC	Nov. 2001
RF Amplifier	Hewlett Packard	8447F/OPT H64	May. 2001
BILOG Antenna	Schaffner	CBL-6111C	Apr. 2001
Horn Antenna	Schwarzbeck	BBHA 9120D	Sep.2001
Antenna Master	Electro-Mechanics	EMCO-1050	Nov. 2001
Turn Table	Dail EMC	DIE-1500	Aug. 2001
Spectrum Analyzer	H.P.	HP8561B	May. 2001
PreAmplifier	H.P.	HP8449B	May. 2001

CONCLUSION

The test results collected show that the EUT

COMPANY : Metawave Inc.
Model : KeynoKey

complies with § 15.231 & 15.109 of the FCC Rules. The Radiated emissions from this system unit (FCC ID : P8IKEYNOKEY-C and P8IKEYNOKEY)are observed within the limits. Remote Control unit is automatically deactivated within not more than 5 seconds. And the Bandwidth of the unit is no wider than 0.25% of the center frequency at the 20dB down points. So this device finally complies with FCC Rules.

APPENDIX A – SAMPLE LABEL

Labelling Requirements

The sample label shown shall be *permanently affixed* at a conspicuous location on the unit and be readily visible to the user at the time of purchase.

Model : KeynoKey **Metawave Inc.**
THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1)THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE AND (2)THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

APPENDIX B – TEST PHOTOGRAPHS

- Radiated Test Picture (FCC ID: P8IKEYNOKEY)

- Radiated Test Picture (FCC ID: P8IKEYNOKEY-C)

APPENDIX C – EUT PHOTOGRAPHS