Electromagnetic Emission

F C C M E A S U R E M E N T R E P O R T

VERIFICATION OF COMPLIANCE

FCC Part 15 Certification Measurement

PRODUCT	:	900MHz Cordless Telephone
MODEL/TYPE NO	:	WHF-7020S
FCC ID	:	O6JWHF-7020S
APPLICANT	:	OPENERS Co.,Ltd. 3rd FL. Sungji Bldg., 499, Wolpyung1-Dong, Seo-Gu, Taejon, 302-281, Korea Attn. : Byung Ho, Yoon
FCC CLASSIFICATION	:	Low Power Communication Device Transceiver(DXT) Intentional Radiator
FCC RULE PART(S)	:	FCC Part 15 Subpart C Part 15.249
FCC PROCEDURE	:	Certification
TRADE NAME	:	OPENERS
TEST REPORT No.	:	E01.0608.FCC.241.N
DATES OF TEST	:	May 26, 2001
DATES OF ISSUE	:	June 08, 2001
TEST LAB.		ETL Inc (FCC Registration Number : 95422) 371-51, Gasan-Dong, Geumcheon-Gu, Seoul, Korea Tel : (031) 885-0072 Fax : (031) 885-0074

This 900MHz Cordless Telephone has been tested in accordance with the measurement procedures specified in ANSI C63.4-1992 at the ETL/EMC Test Laboratory and has been shown to be complied with the applicable technical standards specified in FCC Rule Part15 Subpart C section15.249as indicated in the measurement report.
I attest to the accuracy of data. All measurement 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.
The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Kayoung Kim

Name : Kayoung Kim

Title : Chief Engineer & Lab.Manager

E-RAE Testing Laboratory Inc.
371-51, Gasan-Dong, Geumcheon-Gu,
Seoul, 153-023, Korea

Table of Contents

FCC MEASUREMENT REPORT

Scope – *Measurement and determination of electromagnetic emission(EME) of radio frequency devices including intentional radiators and/or unintentional radiators for compliance with the technical rules and regulations of the U.S Federal Communications Commission(FCC)*

General Information

Applicant Name : OPENERS Co.,Ltd.

Address : 3rd FL. Sungji Bldg., 499, Wolpyung1-Dong, Seo-Gu, Taejon, 302-281, Korea

Attention : Byung Ho, Yoon

- **EUT Type :** Cordless Telephone
- **Model Number :** WHF-7020S
- **FCC Identifier :** O6JWHF-7020S
- **S/N :** Prototype
- **Freq. Range :** 902.30 MHz – 904.75 MHz(Base station)
  925.30 MHz – 927.25 MHz(Handy Unit)
- **FCC Rule Part(s) :** Part 15 Subpart C Section 15.249
- **Test Procedure :** ANSI C63.4-1992
- **FCC Classification :** Low Power Communication Device Transceiver(DXT) : Intentional Radiator
- **Dates of Tests :** May 25, 2001
- **Place of Tests :** ETL Inc
  EMC Testing Lab (FCC Registration Number : 95422)
  584, Sangwhal-Ri, Kanam-Myun, Yoju-Kun,
  Kyounggi-Do, Korea
  Tel : (031) 885-0072 Fax : (031) 885-0074
- **Test Report No. :** E01.0608.FCC.241.N

1. INTRODUCTION

The measurement test for radiated and conducted emission test were conducted at the open area test site of E-RAE Testing Laboratiry Inc. facility located at 584, Sangwhal-ri, Ganam-myun, Youju-kun, Kyoungki-do, Korea. The site is constructed in conformance with the requirements of the ANSI C63.4-1992 and CISPR Publication 16. The ETL has site descriptions on file with the FCC for 3 and 10 meter site configurations. Detailed description of test facility was found to be in compliance with the requirements of Section 2.948 FCC Rules according to the ANSI C63.4-1992 and registered to the Federal Communications Commission(Registration Number : 95422).

The measurement procedure described in American National Standard for Method of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C.63.4-1992) was used in determining radiated and conducted emissions from the Openers Co.,Ltd. Cordless Telephone Model : WHF-7020S.

2. PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test(EUT) is the Openers Co., Ltd. Cordless Telephone Model: WHF-7020S(FCC ID : O6JWHF-7020S). This cordless telephone is powered by rechargable batteries(handy unit) and AC power supply adapter(base station). This cordless telephone has internet phone function through VoIP Gateway and e-mail checking function.

2.2 General Specification

- Chassis Type	Plastic
- List of Each OSC. Or X-Tal. Freq.(>=1MHz)	X1:3.579MHz
- MCU	HT93LC46
- RF Frequency Out	902.8 MHz – 904.75 MHz(Base station) 925.3 MHz – 927.75 MHz(Handy Unit)
- Channel Number	40 ch
- Communication	Full duplex
- Modulation Type	Analog FM
- Antenna Type	Omni-directional antenna permanently attached to the unit
- Max. Transmission Output	10 dBm
- Supurious transmission	-55dBm
- I/O Cable(s)	Two Unshielded RJ-11C (Line/Phone), Interface cable to PC
- Power Requirement	Handset unit : NI-MH 3.6V 400mAh Base unit : AC Adapter 120VAC 0.07A
- Dimension(HxWxD)	70 x 59.3 x 28 mm (for handy unit)

3. DESCRIPTION OF TESTS

3.1 Conducted Emission Measurement

Conducted emissions measurements were made in accordance with section 11, "Measurement of Information Technology Equipment" of ANSI C63.4-1992. The measurement were performed over the frequency range of 0.15MHz to 30MHz using a 50Ω/50uH LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within an bandwidth of 10KHz or for "quasi-peak" within a bandwidth of 9KHz.

The line-conducted emission test is conducted inside a shielded anechoic chamber room with 1m x 1.5m x 0.8m wooden table which is placed 40cm away from the vertical wall and 1.5m away from the side wall of the chamber room. Two EMCO 3825/2 LISN are bonded to the shielded room. The EUT is powered from the EMCO LISN and the support equipment is powered from the another EMCO LISN. Power to the LISNs is filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner ϕ 1.2cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and these supply lines will be connected to the EMCO LISN. All interconnecting cables more than 1m were shortened by non-inductive bundling(serprntine fashion) to a 1m length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the R3261A Spectrum Analyzer to determine the frequency producing the max. emission from the EUT. The frequency producing the max. level was reexamined using the detector function set to the CISPR Quasi-Peak mode by manual, after scanned by automatic Peak mode from 0.45 to 30MHz. The bandwidth of the Spectrum Analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was maximized by switching power lines, varying the mode of operation or resolution, clock or data exchange speed, if applicable, whichever determined the worst-case emission. Each emission reported was calibrated using self-calibrating mode.
Photographs of the worst-case emission can be seen in photographs of conducted emission test setup.

3. DESCRIPTION OF TESTS

3.2 Radiated Emission Measurement

Preliminary measurements were made at indoors 3 meter semi EMC Anechoic Chamber using broadband antennas, broadband amplifier, and spectrum analyzer to determine the emission frequencies producing the maximum EME.
Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 to 1000MHz using biconilog antenna and above 1000MHz, linearly polarized double ridge horn antennas were used. The measurements were performed with three frequencies which were selected as bottom, middle and top frequency in the operating frequency band. Emission level from the EUT with various configurations were examined on the spectrum analyzer connected with the RF amplifier and plotted graphically.

Final measurements were made outdoors open site at 3-meter test range using biconilog antenna. The output from the antenna was connected, via a preselector or a preamplifier, to the input of the EMI Measuring Receiver and Spectrum analyzer(for above 1GHz). The detector function was set to the quasi-peak or peak mode as appropriate. The measurement bandwidth on the Field strength receiver was set to at least 120kHz (1MHz for measurement above 1GHz), with all post-detector filtering no less than 10 times the measurement bandwidth. 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 preliminary measurement was examined and investigated as the same set up and configuration which produced the maximum emission The EUT , support equipment and interconnecting cables were 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 1m x 1.5 meter table. The turntable containing the system was rotated and the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission.

Each emission was maximized by varying the mode of operating frequencies of the EUT. The system was tested in all the three orthogonal planes and changing the polarity of the antenna. The worst case emissions are recorded in the data tables. If necessary, the radiated emission measurement could be performed at a closer distance to ensure higher accuracy and the results were extrapolated to the specified distance using an inverse linear distance extrapolation factor(20dB/decade) as per section 15.31(f).

Photographs of the worst-case emission test setup can be seen in Appendix B.

4. TEST CONDITION

4.1 Test Configuration

The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the EUT and the supported equipments were installed to meet FCC requirement and operated in a manner which tends to maximize its emission level in a typical application.

The following test mode for EUT operating were investigated
-. Internet Phone function : worst case condition
-. Normal cordless phone function

4.2 Support Equipment Used

Following peripheral devices and interface cables were connected during the measurement:

EUT- 900MHz Cordless Telephone

FCC ID	: O6JWHF-7020S
Model Name	: WHF-7020S
Serial No.	: Prototype
Manufacturer	: Openers Cp.,Ltd.
Power Supply Type	: AC 120V Adapter (Model : AP120902)
Interface Cable	: Non shielded type Manufacturer supplied cable
Tel Line Cord	: Non-shielded type 2m

Support Unit 1 – Personal Computer

FCC ID	: N/A
Model Name	: PRESARIO 2230
Serial No.	: 8742BP9M2143
Manufacturer	: COMPAQ/영국
Power Supply Type	: Internal SMPS AC 120V
Power Cord	: Non shielded type 1.2m
Interface cable	: Non shielded , non detachable interface cable

Support Unit 2- Monitor

FCC ID	: CKLHL-7682B
Model Name	: HL-7682B
Serial No.	: N/A
Manufacturer	: Hyundai Electronics Industry Co., Ltd.
Power Supply Type	: SMPS AC120V
Power Cord	: Non-shielded, Detachable: 1.2m
Data Cable	: Shielded 15pin D-sub, 1.5m

Support Unit 3- Printer

FCC ID	: B94C2164X
Model Name	: C4562B
Serial No.	: TH9411434G
Manufacturer	: H.P
Power Supply Type	: DC 24V From Adaptor
Power Cord	: Non-Shield, 1.5m
Data Cable	: Shielded, 1.5m

4. TEST CONDITION

Support Unit 4-Keyboard

FCC ID	: N/A(DoC)
Model Name	: RT2156TWGR
Serial No.	: BOAB80B39FB16H
Manufacturer	: COMPAQ/Taiwan
Power Supply Type	: N/A
Power Cord	: N/A
Data Cable	: Shielded, 1.5m

Support Unit 5-Mouse

FCC ID	:
Model Name	: GNEZE4
Serial No.	: 970122726
Manufacturer	: COMPAQ/Taiwan
Power Supply Type	: N/A
Power Cord	: N/A
Data Cable	: Shielded, 1.2m

Support Unit 6- Joystick

FCC ID	:
Model Name	: DHA-2000
Serial No.	: N/A
Manufacturer	: Dahoo Electronics Co., Ltd.
Power Supply Type	:
Power Cord	: Non-shielded, Detachable: 1.2m
Data Cable	: Shielded 15pin D-sub, 1.5m

5. TEST RESULTS

5.1 Summary of Test Results

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum emission of the EUT are reported.

FCC Rule Parts	Measurement Required	Result
15.249(a)	Radiated Emissions of RF Carrier and Harmonics	Passed by – 2.18 dB
15.249(c)/15.209	Out-of-band Radiated Emissions(Spurious)	Passed by – 17.72 dB
15.209(a)	AC Line Conducted Emission Measurement	Passed by – 23.05 dB

The data collected shows that the **OPENERS Co.,Ltd. 900 MHz Cordless Telephone WHF-7020S** complies with technical requirements of the Part 15.247 of the FCC Rules.

The equipment is not modified anything, mechanical or circuits to improve EMI status during a measurement. No EMI suppression device(s) was added and/or modified during testing.

5. TEST RESULTS

5.2 Radiated Emissions of RF Carrier and Harmonics

EUT	Cordless Telephone WHF-7020S (SN:Prototype)
Limit apply to	FCC Part15 Subpart C Section 15.249(a)
Test Date	May 25, 2001
Operating Condition	Carrier channel : 902.8 MHz (Base station Low)
Environment Condition	Humidity Level : 37 %RH, Temperature : 22℃
Result	Passed

The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.
Detector mode : Peak mode
Measurement Distance : 3 meters

Frequency [MHz]	Reading [dBμV]	Polarization (*H/**V)	AFCL [dB]	AMP. [dB]	Emission Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]
902.8	87.7	V	31.34	28.5	90.54	94.0	-3.46
1805.6	38.5	V	31.50	31.0	36.48	54.0	-17.52
2708.4	27.8	V	34.10	31.0	30.90	54.0	-23.10
3611.2	28.6	V	37.90	31.0	35.50	54.0	-18.50
4514.0	24.1	V	38.52	31.0	31.62	54.0	-22.38
5416.8	20.6	V	40.10	31.0	29.70	54.0	-24.30

NOTES :

1. **** H : Horizontal polarization , ** V : Vertical polarization***
2. ***Emission Level = Reading + AFCL(ntenna factor + Cable loss) – AMP.Gain***
3. ***Margin value = Emission Level - Limit***
4. ***Measurement were performed at two frequencies as bottom and top of the operating frequency range.***
5. ***The EUT was tested in all the three orthogonal planes and the worst case emissions was vertical axes.***
6. ***The EUT(handset unit) was tested in all the three orthogonal planes and the worst case emissions was vertical axes. The EUT(base station) antenna was placed vertical and horizontal position for the measurement.***

Yo han, Park

Tested by : Y. H, Park / Test Engineer

5. TEST RESULTS

5.2 Radiated Emissions of RF Carrier and Harmonics

EUT	Cordless Telephone WHF-7020S (SN:Prototype)
Limit apply to	FCC Part15 Subpart C Section 15.249(a)
Test Date	May 25, 2001
Operating Condition	Carrier channel : 904.75 MHz (Base station High)
Environment Condition	Humidity Level : 37 %RH, Temperature : 22℃
Result	Passed

The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.
Detector mode : Peak mode
Measurement Distance : 3 meters

Frequency [MHz]	Reading [dBμV]	Polarization (*H/**V)	AFCL [dB]	AMP. [dB]	Emission Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]
904.75	86.8	V	31.34	28.5	89.64	94.0	-4.36
1809.5	37.5	V	31.50	31.0	38.00	54.0	-16.00
2714.3	28.4	V	34.10	31.0	31.50	54.0	-22.50
3619.0	25.7	V	37.90	31.0	32.60	54.0	-21.40
4523.8	24.1	V	38.52	31.0	31.62	54.0	-22.38
5428.5	20.6	V	40.10	31.0	29.60	54.0	-24.40

NOTES :

1. **** H : Horizontal polarization , ** V : Vertical polarization***
2. ***Emission Level = Reading + AAFCL(ntenna factor + Cable loss) – AMP.Gain***
3. ***Margin value = Emission Level - Limit***
4. ***Measurement were performed at two frequencies as bottom and top of the operating frequency range.***
5. ***The EUT was tested in all the three orthogonal planes and the worst case emissions was vertical axes.***
6. ***The EUT(handset unit) was tested in all the three orthogonal planes and the worst case emissions was vertical axes. The EUT(base station) antenna was placed vertical and horizontal position for the measurement.***

Yo han, Park

Tested by : Y. H, Park / Test Engineer

5. TEST RESULTS

5.2 Radiated Emissions of RF Carrier and Harmonics

EUT	Cordless Telephone WHF-7020S (SN:Prototype)
Limit apply to	FCC Part15 Subpart C Section 15.249(a)
Test Date	May 25, 2001
Operating Condition	Carrier channel : 925.3 MHz (Handy Unit Low)
Environment Condition	Humidity Level : 37 %RH, Temperature : 22℃
Result	Passed

The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.
Detector mode : Peak mode
Measurement Distance : 3 meters

Frequency [MHz]	Reading [dBμV]	Polarization (*H/**V)	AFCL [dB]	AMP. [dB]	Emission Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]
925.3	88.5	V	31.82	28.5	91.82	94.0	-2.18
1805.6	39.0	V	31.50	31.0	39.50	54.0	-14.50
2775.9	32.3	V	34.10	31.0	35.40	54.0	-18.60
3701.2	24.7	V	37.90	31.0	31.60	54.0	-22.40
4626.5	21.2	V	38.52	31.0	28.72	54.0	-25.28
5551.8	19.9	V	40.10	31.0	29.00	54.0	-25.00

NOTES :

1. **** H : Horizontal polarization , ** V : Vertical polarization***
2. ***Emission Level = Reading + AAFCL(ntenna factor + Cable loss) – AMP.Gain***
3. ***Margin value = Emission Level – Limit***
4. ***Measurement were performed at two frequencies as bottom and top of the operating frequency range.***
5. ***The EUT was tested in all the three orthogonal planes and the worst case emissions was vertical axes.***
6. ***The EUT(handset unit) was tested in all the three orthogonal planes and the worst case emissions was vertical axes. The EUT(base station) antenna was placed vertical and horizontal position for the measurement.***

Yo han, Park

Tested by : Y. H, Park / Test Engineer

5. TEST RESULTS

5.2 Radiated Emissions of RF Carrier and Harmonics

EUT	Cordless Telephone WHF-7020S (SN:Prototype)
Limit apply to	FCC Part15 Subpart C Section 15.249(a)
Test Date	May 25, 2001
Operating Condition	Carrier channel : 927.25 MHz (Handy Unit High)
Environment Condition	Humidity Level : 37 %RH, Temperature : 22℃
Result	Passed

The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.
Detector mode : Peak mode
Measurement Distance : 3 meters

Frequency [MHz]	Reading [dBμV]	Polarization (*H/**V)	AFCL [dB]	AMP. [dB]	Emission Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]
927.3	88.3	V	31.82	28.5	91.62	94.0	-2.38
1854.5	38.6	V	31.50	31.0	39.10	54.0	-14.90
2781.8	30.2	V	34.10	31.0	33.30	54.0	-20.70
3709.0	22.4	V	37.90	31.0	29.30	54.0	-24.70
4636.3	20.8	V	38.52	31.0	28.32	54.0	-25.68
5563.5	19.8	V	40.10	31.0	28.90	54.0	-25.10

NOTES :

1. **** H : Horizontal polarization , ** V : Vertical polarization***
2. ***Emission Level = Reading + AAFCL(ntenna factor + Cable loss) – AMP.Gain***
3. ***Margin value = Emission Level - Limit***
4. ***Measurement were performed at two frequencies as bottom and top of the operating frequency range.***
5. ***The EUT was tested in all the three orthogonal planes and the worst case emissions was vertical axes.***
6. ***The EUT(handset unit) was tested in all the three orthogonal planes and the worst case emissions was vertical axes. The EUT(base station) antenna was placed vertical and horizontal position for the measurement.***

Yo han, Park

Tested by : Y. H, Park / Test Engineer

5. TEST RESULTS

5.3 Out-of-band Radiated Emissions(Spurious)

EUT	Cordless Telephone WHF-7020S (SN:Prototype)
Limit apply to	FCC Part15 Subpart C Section 15.209 & 15.249(c)
Test Date	May 25, 2001
Operating Frequencies	902 – 927 MHz
Environment Condition	Humidity Level : 37 %RH, Temperature : 22℃
Result	Passed by – 17.72dB

Radiated Emission Test Data

The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.
Detector mode : CISPR Quasi-Peak mode (6dB Bandwidth : 120 kHz)
Measurement Distance : 3 meters

Frequency [MHz]	Reading [dBμV]	Polarization (*H/**V)	Ant. Factor [dB]	Cable Loss [dB]	Emission Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]
35.40	7.90	V	13.32	1.06	22.28	40.0	-17.72
72.20	5.60	V	9.83	1.57	17.00	40.0	-23.00
112.90	5.20	V	10.37	1.96	17.53	40.0	-22.47
135.34	7.92	H	12.12	2.18	22.22	43.5	-21.30
163.80	6.00	V	12.80	2.39	21.19	43.5	-22.31
208.57	11.90	H	9.51	2.68	24.09	43.5	-19.41
241.83	5.92	H	10.69	2.96	19.57	43.5	-23.97
247.77	11.65	H	10.69	2.96	25.30	43.5	-18.20
255.86	9.20	H	11.38	3.08	23.66	43.5	-19.84
316.29	10.35	H	12.77	3.38	26.50	46.0	-19.50
391.00	8.82	H	14.32	3.82	26.96	46.0	-19.04
446.57	10.17	H	15.48	4.05	29.70	46.0	-16.30

NOTES :

1. **** H : Horizontal polarization , ** V : Vertical polarization***
2. ***Emission Level = Reading + Antenna factor + Cable loss***
3. ***Margin value = Emission Level - Limit***
4. ***All operating modes and channels were investigated and the worst-case emissions were reported.***
5. ***All other emissions not reported were more than 25dB below the permitted limit.***
6. ***The EUT(handset unit) was tested in all the three orthogonal planes and the worst case emissions was vertical axes. The EUT(base station) antenna was placed vertical and horizontal position for the measurement.***

Yo han, Park

Tested by : Y. H. Park / Test Engineer

5. TEST RESULTS

5.4 AC Line Conducted Emission Measurement

EUT	Cordless Telephone WHF-7020S (SN:Prototype)
Limit apply to	FCC Part15 Subpart C Section 15.207(a)
Test Date	May 25, 2001
Operating Condition	Internet Phone Function
Environment Condition	Humidity Level : 37 %RH, Temperature : 22℃
Result	Passed by – 23.05dB

Conducted Emission Test Data

The following table shows the highest levels of conducted emissions on both polarization of live and neutral line.

Detector mode : CISPR Quasi-Peak mode (6dB Bandwidth : 9 KHz)

Frequency [MHz]	Reading [dBμV]		Phase (*H/**N)	Limit [dBμV]		Margin [dB]	
	Quasi-peak	Average		Quasi-peak	Average	Q.Peak	Average
0.152	44.32	-	H	65.8	55.8	21.48	
0.311	37.82	-	H	59.9	49.9	22.08	-
0.470	35.15	-	N	56.00	46.00	20.85	-
0.592	33.12	-	H			22.80	-
0.633	32.32	-	N			23.68	-
2.300	26.15	-	H			29.85	-
3.490	35.80	-	N			20.20	-
7.130	25.92	-	N	60.00	50.00	34.00	-
10.74	32.10	-	N			27.90	-
14.30	34.97	-	H			25.03	-
21.96	23.05	-	H			36.95	-

NOTES :

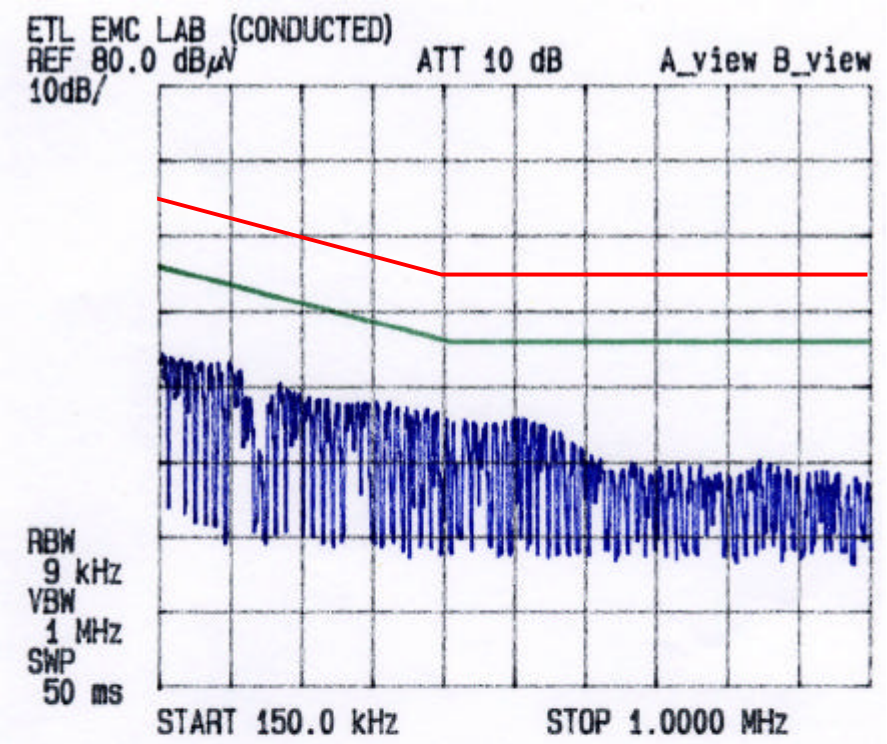
1. ***Please see the measured plot in next page.***
2. **** H : HOT Line , **N : Neutral Line***
3. ***Margin value = Limit – Reading***
4. ***The EUT wassupplied with the norminal AC voltage through the AC power supply adapter.***
5. ***All operating modes and channels were investigated and the worst-case emissions were reported.***
6. ***The measurement was performed for the frequency range 150KHz ~ 30MHz according to the CISPR 22 Class B***

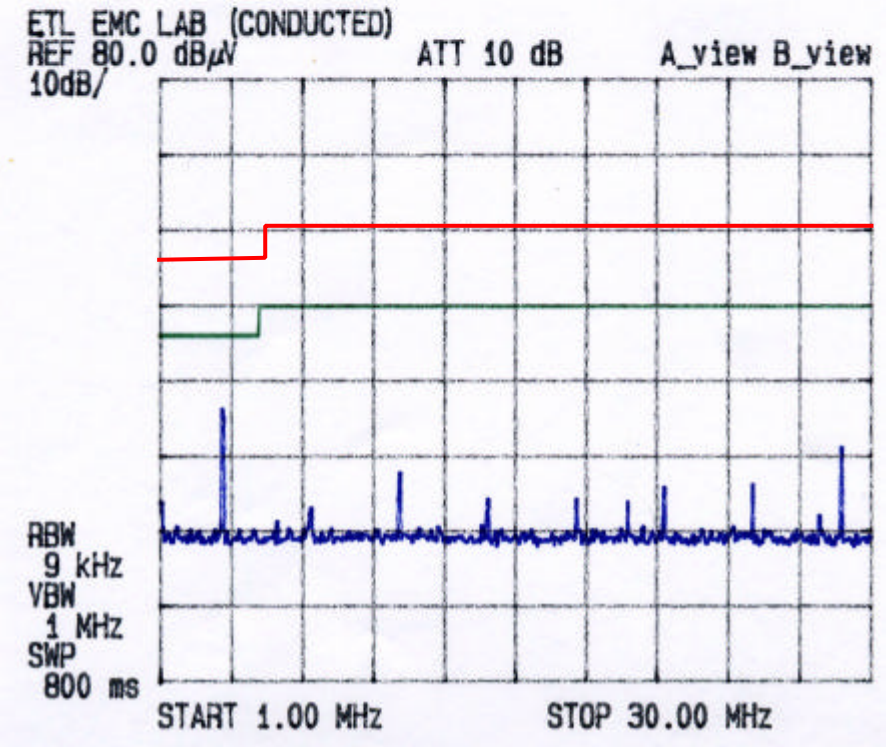
Yo han, Park

Tested by : Y. H. Park / Test Engineer

5. TEST RESULTS

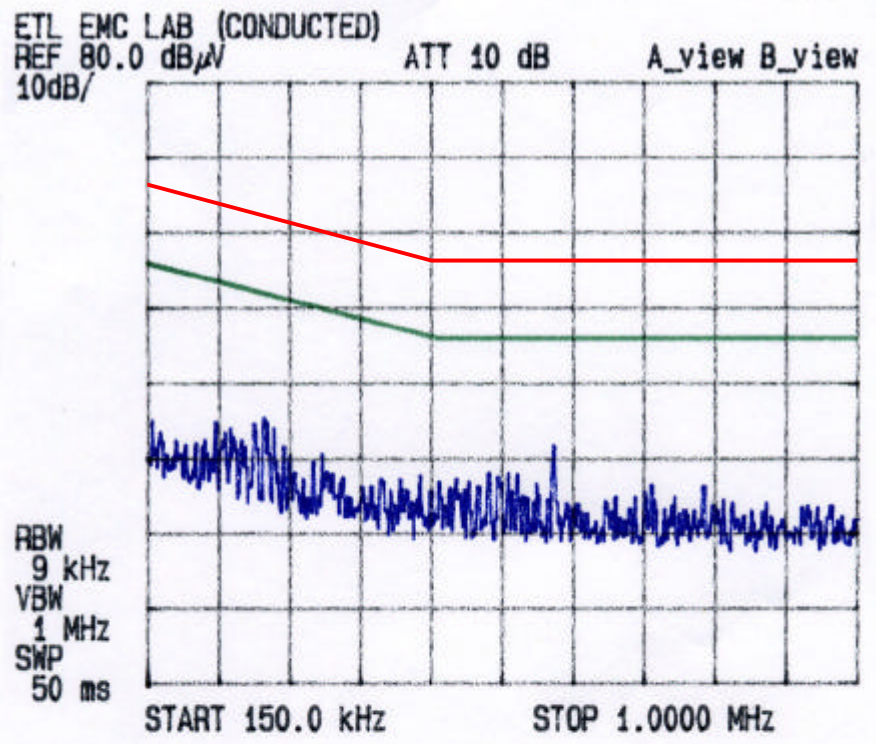
Line Polarity : Hot

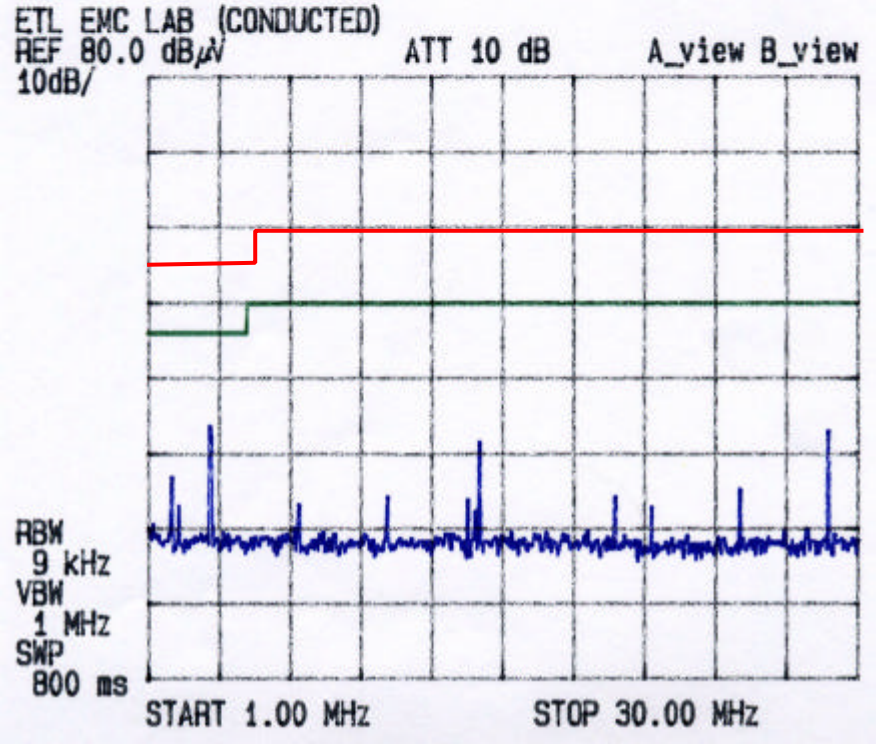




5. TEST RESULTS

Line Polarity : Neutral





6. ANTENNA REQUIREMENT

6.1 Antenna Requirement

According to the 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to be complied.

6.2 Antenna Construction

The antenna used for the EUT is so designed that antenna other than that furnished by the manufacturer shall not be used with this device. The antenna supplied is a unique coupling to this 900MHz Cordless Telephone.

7. SAMPLE CALCULATION

Sample Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor.
The basic equation with a sample calculation is as follows:

FS = RA + AF + CF

where FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor

$dB(\mu V/m) = 20 \log_{10} (\mu V /m)$: Equation 1
$dB\mu V = dBm + 107$: Equation 2

Example 1 : @ 0.218 MHz

Class B Limit = 441.063 uV = 52.89 dBuV
Reading = 48.45dBuV
Convert to uV = 264.55uV
Margin = 48.45 – 52.89 = -4.44
= -4.44dB below Limit

Example 2 : @664.64 MHz

Class B Limit = 70.79 uV = 37.0 dBuV/m
Reading = 7.38dBuV
Antenna Factor + Cable Loss = 25.14 dB
Total = 32.52 dBuV/m
Margin = 32.52 – 37.0 = -4.48
= -4.48dB below Limit

8. TEST EQUIPMENT LIST

List of Test Equipments Used for Measurements

Test Equipment	Model	Mfg.	Serial No.	Cal. Due Date
Spectrum Analyzer	R3261A	Advantest	21720033	01-10-08
Spectrum Analyzer	R3265A	Advantest	45060321	02-02-28
Spectrum Analyzer	L1500A	H.P	US37360920	01-10-20
Receiver	ESVS 10	R & S	835165/001	02-04-06
Signal Generator	SMT-03	Rohde & Schwarz	831676/029	01-09-26
Signal Generator	SMT-03	Rohde & Schwarz	831676/030	01-09-27
Signal Generator	2025	IFR	202301/933	01-11-01
Power Meter	4232A	Boonton	42001	02-04-11
Power Meter	NRVS	Rohde & Schwarz	834053/060	02-04-17
Power Meter	URV35	Rohde & Schwarz	831688/004	02-04-25
Power Sensor	51011	Boonton	31619/32620	02-04-11
Audio Analyzer	8903B	HP	3120A07501	01-10-25
Audio Analyzer	UPL	Rohde & Schwarz	836421/028	01-09-07
Modulation Analyzer	8901B	HP	2525A03952	01-10-25
Power Sensor	11722A	HP	2501A02085	01-10-25
Synthesized Function Generator	33120A	Agilent	US36042014	02-01-07
Broadband Power Amplifier	AR75A250	Amplifier Research	27568	02-02-23
Broadband Power Amplifier	GRF5066	Ophir	1011	02-01-25
Preamplifier	HP8447D	HP	2944A07626	02-03-05
Preamplifier	HP 8347A	HP	2834A00544	01-05-23
TriLog Antenna	VULB9160	Schwarz Beck	3082	02-05-08
LogBicon	VULB9165	Schwarz Beck	2023	02-05-08
Dipole Antenna	VHAP	Schwarz Beck	964	02-05-03
Dipole Antenna	VHAP	Schwarz Beck	965	02-05-03
Dipole Antenna	UHAP	Schwarz Beck	949	02-05-03
Dipole Antenna	UHAP	Schwarz Beck	950	02-05-03
Dipole Antenna	3121C	EMCO	9807-2104	01-09-20
Double Ridged Horn	3115	EMCO	9809-2334	01-09-20
Double Ridged Horn	3115	EMCO	9809-2335	01-09-20
Attenuator	33-20-34	Weinschel	BH3583/2997	01-08-26
Attenuator	33-30-34	Weinschel	BG9477/9487	01-09-15
Dual directional coupler	C5571	Werlatone	7860	02-01-26
Dual directional coupler	C3653	Werlatone	7825	02-01-26
LISN	3825/2	EMCO	9208-1995 9006-1669	01-12-27
RF Detector	8471D	HP	3012A	01-10-12
Digital Oscilloscope	TDS540B	Tektronix	B020115	02-04-20
Digital Oscilloscope	2430A	Tektronix	B015319	02-03-15
Turn-Table	DETT-03	Daeil EMC	-	
Antenna Master	DEAM-03	Daeil EMC	-	
Plotter	7440A	H.P	2725A 75722	
EMC Anechoic Chamber	DTEC01	DAETONG	-	
Temp/Humidity Chamber	DSTH 702	DAESUNG	-	02-01-03
Impedance Matching Pad	6001.01.A	SUNNER	3252	01-09-22
Thermo Hygrograph	3-3122	ISUZU	3312201	01-12-20
BaroMeter	Regulus	Aneroid	-	02-03-08