TEST REPORT

Ref. Report No.
01-341-016-1

Name and address of the applicant

Belco International Co., Ltd.
1001-11, Doksan 1-dong, Kumcheon-ku, Seoul, Korea 153-011

Standard / Test regulation

FCC Part 15, Subpart C

Test result

Pass

Incoming date : March 16, 2001

Test date : March 28, 2001

Test item(s) ;

Cordless Headset Telephone System (Transmitter Portion of Base)

Model/type ref. ;

IBM-3345

Manufacturer ;

Belco International Co., Ltd.

Additional information ;
-Required Authorization :Certification
-FCC ID. : NYCIBM-3345

Issue date : March 30, 2001

Tested and reported by

Jeong-Min Kim , Senior Engineer

Reviewed by

Won-Seo Cho , EMC Team Leader

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¥ ° GENERAL INFORMATION

1. Grantee Name and Mailing Address : Belco International Co., Ltd.
1001-11, Doksan 1-dong, Kumcheon-ku, Seoul
Korea 153-011

2. Manufacturer's Name and Mailing Address : Belco International Co., Ltd
1001-11, Doksan 1-dong, Kumcheon-ku, Seoul
Korea 153-011

3. Equipment Descriptions

3.1 Operating Frequency : 2402.55 MHz ~ 2404.50 MHz (40 Channel 50 kHz Spacing)
3.2 Type of Emission : Frequency Modulation
3.3 Power Supply : DC 9V (AC Adapter)

4. Rules and Regulations : FCC Part 15, Subpart C

5. Measuring Procedure : ANSI C63.4-1992

6. Place of Measurement : Absorber-lined room(3-Meter) of KTL

7. Date of Measurement

7.1 Conducted Emission : March 27, 2001
7.2 Radiated Emission : March 28, 2001

¥ ± GENERAL REQUIREMENTS OF THE EUT

1. Labelling Requirement (Section 15.19 and Section 15.214)

This device complies with Part 15 of the FCC Rules.
Operation is subject to following two condition : (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Privacy of communication may not be ensured when using this phone.

1.1 Location on Label : Bottom side of EUT
1.2 How Applied : By Ink-printing on Adhesive Label

2. Information to User (Section 15.21)

The following or similar statements were provided in the manual for user instruction.
Please refer page 4 of the attached manual for details.

CAUTION : Any changes or modifications in construction of this device which are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

3. Special Accessories (Section 15.27)

3.1 Were the special Accessories provided? [ ] yes, [x] no

3.2 If yes, details for the special accessories are as follows :

3.3 If yes, were the appropriate instructions provided on the first page of the text concerned with the device?
[ ] yes, [ ] no

3.4 Are these accessories provided of the type which can be readily obtained from multiple retail outlets ?
[ ] yes, [ ] no

And therefore does the manual specify what additional components or accessories are required to used in order to comply with the Rules?
[ ] yes, [ ] no

4. Digital Security Code (Section 15.214)

Was a circuitry for digital security code provided in the cordless telephone system ?
[x] yes, [ ] no

¥ ² CONDUCTED EMISSION MEASUREMENT (Section 15.207)

1. Test Procedure

The base station(EUT) is designed to transmit on one of 40 channels in the band 2402.55 to 2404.50 MHz. Therefore measurements were performed with the equipment operating on three frequencies, which were the top(CH40), middle(CH20), and bottom(CH1) in the band, as per Section 15.31(m).

Conducted emission measurements on the EUT were performed by "AC Power Line Conducted Emissions Testing" procedure as per ANSI C63.4. The EUT was set up on a wooden table 0.8 meters height, 1.0 by 1.5 meters in size, placed in the shielded enclosed with a side of wall of which constituted a vertical conducting surface of 2.2 m X 3.1 m in size to maintain 40 cm from the rear of EUT

2 LISN (Line Impedance Stabilization Network, EMCO, 3825/2, 50 ohm/50 uH) was installed and electrically boned to the conducting ground plane. The EUT was connected to the LISN.

One of two 50ohm output terminals of the LISN was connected to the Spectrum Analyzer(HP, 8566B, 10 kHz to 22 GHz) with the Quasi-Peak Adapter (HP, 85650A, 10 kHz to 1.0 GHz) and the other was terminated in 50 ohms. Measurements were again performed after interchanging such a connection oppositely.

The frequency range from 450 kHz to 30 MHz was examined and the peak values that are within 6 dB of the limit would be compared to quasi-peak values using the Quasi-Peak instrument (ROHDE & SCHWARZ, ESH3, 9 kHz to 30 MHz : Detector Function CISPR Quasi-Peak) or HP Quasi-Peak adapter(85650A, 10 kHz to 1.0 GHz)

The voltage developed across the 50ohms port in LISN was measured by the Spectrum Analyzer and graphed by the Plotter(HP, 7470A). The 6 dB bandwidth of the Spectrum Analyzer and Quasi-Peak Adapter was set to 9 kHz with no post detector video filter.

The position of connecting cables and antenna of the EUT was changed to find the worst case configuration during measurements. The maximum emission level from the EUT occurred in such configuration as shown in the following photograph.

2. Photograph for the worst case configuration

3. Sample Calculation

The emission level measured in decibels above one microvolt (dB§ Å was converted into microvolt (§ Å as shown in following sample calculation.

For example :

	Measured Value at	3.58MHz	19.3 dB§ Å
+	Cable Losses *		0.0 dB
=	Conducted Emission		19.3 dB§ Å
			(= 9.2 § Å)

* In case of RG214/ RF cable 15Ft, the loss is about 0.17dB at the frequency of 30 MHz which is negligible.

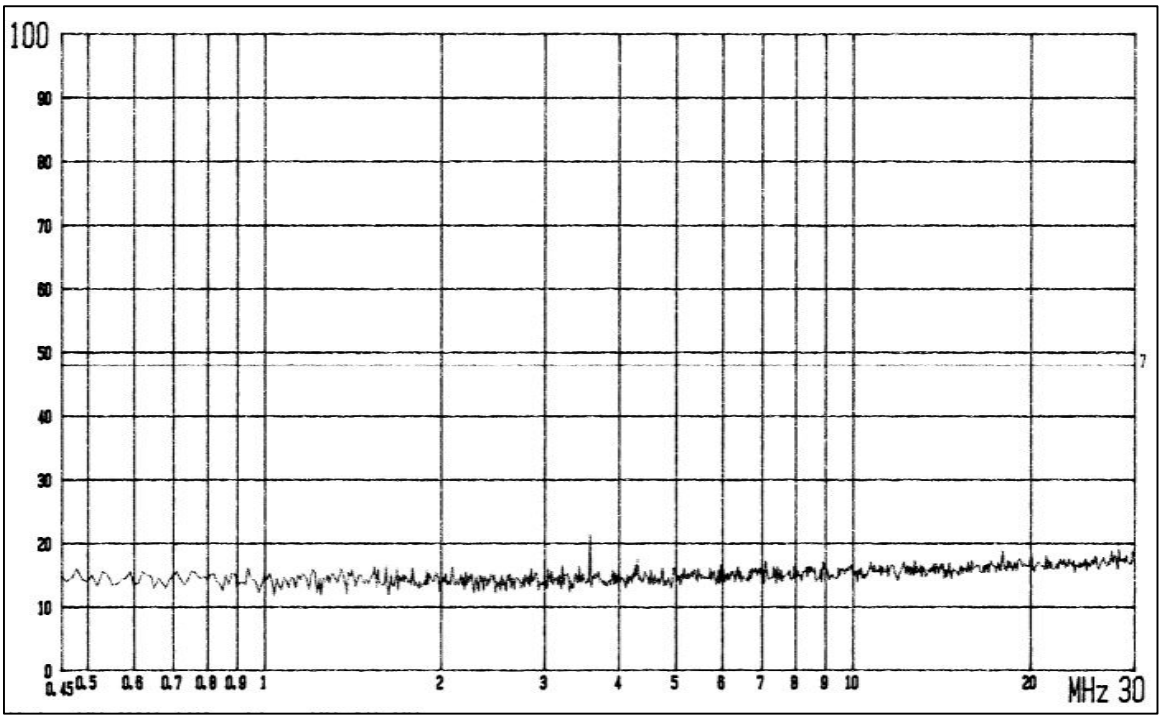
4. Measurement Data

- Resolution Bandwidth : x Peak (6dB Bandwidth : 9kHz)
  x CISPR Quasi-Peak (6dB Bandwidth : 9kHz)
- Measurement channel : CH 40 (2404.50 MHz)

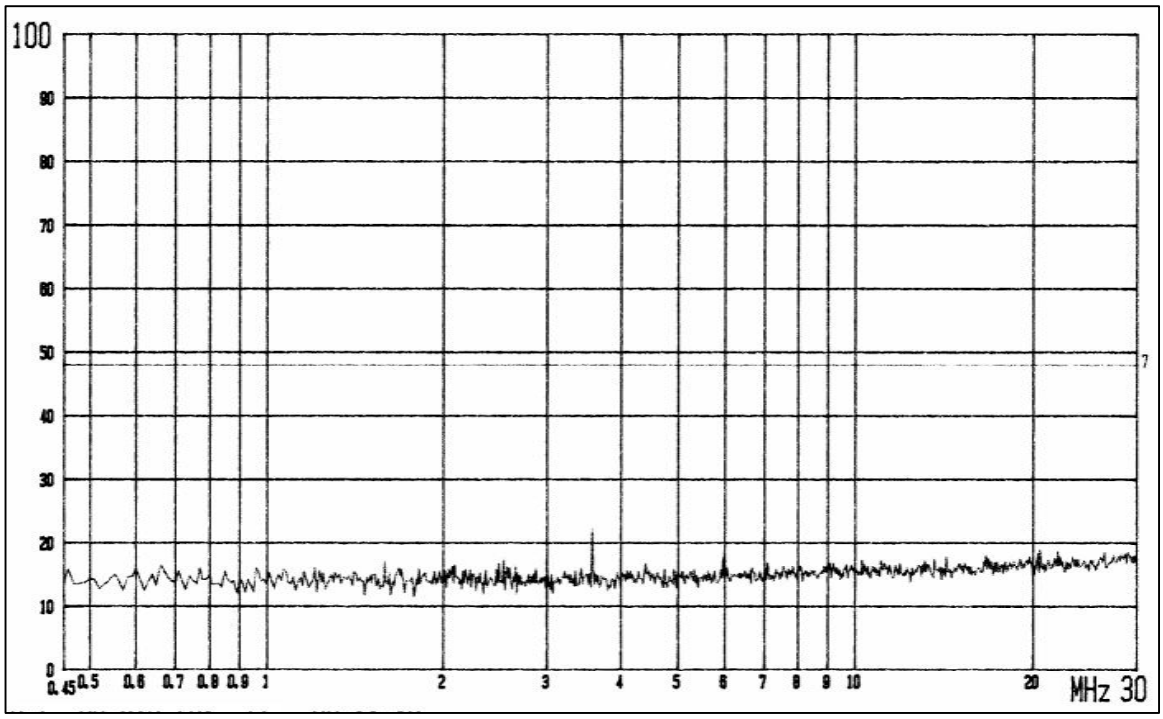
Power Lead Tested	Frequency (MHz)	Measured Value		Emission Level		Limit	(*) Margin (dB)
		Peak (dB§ Å	Q-Peak (dB§ Å	(dB§ Å	(§ Å	(§ Å	
Live to Ground	3.58	21.5	18.7	18.7	8.6	250	-29.3
	-	-	-	-	-	-	-
Neutral to Ground	3.58	22.2	19.3	19.3	9.2	250	-28.7
	-	-	-	-	-	-	-

Note : The noise floor level of the spectrum analyzer was observed in 20 dB§ Å
The highest emission level was reported .
And refer to measured graphs on next page.

* Margin(dB) : Emission Level (dB) - Limit (dB)



(Test side : Live-Ground side)



(Test side : Neutral-Ground side)

¥ ³RADIATED EMISSION MEASUREMENT (Section 15.249)

1. Test Procedure

1.1 Preliminary Testing for Reference

The base station(EUT) is designed to transmit on one of 40 channels in the band 2402.55 to 2404.50 MHz. Therefore measurements were performed with the equipment operating on three frequencies, which were the top(CH40), middle(CH20), and bottom(CH1) in the band, as per Section 15.31(m).

Preliminary testing was performed in a KTL absorber-lined room to determine the emission characteristics of the EUT. The EUT was placed on the wooden table which has dimensions of 0.8 meters in height, 1 meter in length and 1.5 meters in width. Receiving antenna(Biconical antenna : 30 to 300 MHz, Log-periodic antenna : 200 to 1000 MHz or Horn Antenna : 1 to 18 GHz) was placed at the distance of 1 meter from the EUT.

An attempt was made to maximize the emission level with the various configurations of the EUT. The position of connecting cables and antenna of the EUT was changed to find the worst case configuration that produces maximum emission level from the EUT while rotating the table and varying antenna height.

Emissions level from the EUT with various configurations were examined on a Spectrum Analyzer connected with a RF amplifier and graphed by a plotter.

1.2 Final Radiated Emission Test at an Absorber-Lined Room

The final measurement of radiated field strength was carried out in a KTL Absorber-Lined Room that was listed up at FCC according to the "Radiated Emissions Testing" procedure specified by ANSI C63.4.

Based on the test results in preliminary test, measurement was made in same test set up and configuration which produced maximum emission level. Receiving antenna was installed at 3-meter distance from the EUT, and was connected to an EMI receiver or spectrum analyzer(for above 1GHz) with a RF amplifier.

Turntable was rotated through 360 degrees and receiving antenna height was varied from 1 to 4 meters above the ground plane to read maximum emission level.

If necessary, the radiated emission measurements could be performed at a closer distance than specified distance to ensure higher accuracy and their results were extrapolated to the specified distance using an inverse linear distance extrapolation factor(20 dB/decade) as per Section 15.31(f).

The maximum emission level from the EUT occurred in such configuration as shown in the following photograph.

2. Photograph for the worst case configuration

3. Sample Calculation

The emission level measured in decibels above one microvolt (dB § Å was converted into microvolt per meter (§ Åm) as shown in following sample calculation.

For example :

	Measured Value at 2404.5 MHz	91.8 dB § Å
+	Antenna Factor	28.5 dB/m
+	Cable Loss	2.5 dB
-	Preamplifier	35.0 dB
-	Distance Correction Factor *	0.0 dB
=	Radiated Emission	87.8 dB § Åm
		(=24547.1 § Åm)

* Extrapolated from the measured distance(1 m) to the specified distance(3 m) by an inverse linear distance extrapolation.

4. Measurement Data

4.1 Operating Frequency (Bottom : 2402.5 MHz , CH.1)

- Resolution Bandwidth : x CISPR Quasi-Peak (6dB Bandwidth : 120kHz for below 1GHz)
  x Peak (3dB Bandwidth : 1MHz for above 1GHz)
- Measurement Distance : 3 Meter

Frequency (MHz)	* D.M.	* A.P.	Measured Value (dB§ Å)	* A.F. + C.L (dB)	* A.G. (dB)	* D.C.F. (dB)	Emission Level (dB§ Åm)	Emission Level (§ Åm)	Limit (§ Åm)	** Margin (dB)
800.85	Q	V	17.8	26.5	-30.0	-	14.3	5.2	***** 77.6	-23.5
2402.50	P	H	91.8	31.0	-35.0	-	87.8	24547.1	50000	-6.2
*** 4805.00	P	H	47.5	37.5	-35.0	-9.5	40.5	105.9	500	-13.5
*** 7207.50	P	H/V	**** <35.0	40.8	-35.0	-9.5	<31.3	<36.7	500	<-22.7
*** 9610.00	P	H/V	**** <35.0	44.0	-35.0	-9.5	<34.5	<53.1	500	<-19.5
*** 12012.50	P	H/V	**** <35.0	47.5	-35.0	-9.5	<38.0	<79.4	500	<-16.0
-	-	-	-	-	-	-	-	-	-	-

Note

* D.M. : Detect Mode (P : Peak, Q : Quasi-Peak, A : Average)
A.P. : Antenna Polarization (H : Horizontal, V : Vertical)
A.F. : Antenna Factor
C.L. : Cable Loss
A.G. : Amplifier Gain
D.C.F. : Distance Correction Factor

** Margin (dB) = Emission Level (dB) - Limit (dB)

*** In the case of these frequencies, the EUT was measured at 1.0m distance for sufficient sensitivity of measurement system.

**** < means less than. The observed spectrum analyzer noise floor level with RF preamplifier was 35.0 dBuV

***** This limit is 50dB below the level of the fundamental emission (sec. 15.249 (c))

4.2 Operating Frequency (Middle : 2403.55 MHz , CH.20)

- Resolution Bandwidth : x CISPR Quasi-Peak (6dB Bandwidth : 120kHz for below 1GHz)
  x Peak (3dB Bandwidth : 1MHz for above 1GHz)
- Measurement Distance : 3 Meter

Frequency (MHz)	* D.M.	* A.P.	Measured Value (dB§ Å	* A.F. + C.L (dB)	* A.G. (dB)	* D.C.F. (dB)	Emission Level (dB§ Åm)	Emission Level (§ Åm)	Limit (§ Åm)	** Margin (dB)
801.17	Q	V	17.8	26.5	-30.0	-	14.3	5.2	***** 73.3	-23.0
2403.55	P	H	91.3	31.0	-35.0	-	87.3	23173.9	50000	-6.7
*** 4807.00	P	H/V	**** <35.0	37.5	-35.0	-9.5	<28.0	<25.1	500	<-26.0
*** 7210.50	P	H/V	**** <35.0	40.8	-35.0	-9.5	<31.3	<36.7	500	<-22.7
*** 9614.00	P	H/V	**** <35.0	44.0	-35.0	-9.5	<34.5	<53.1	500	<-19.5
*** 12017.50	P	H/V	**** <35.0	47.5	-35.0	-9.5	<38.0	<79.4	500	<-16.0
-	-	-	-	-	-	-	-	-	-	-

Note

* D.M. : Detect Mode (P : Peak, Q : Quasi-Peak, A : Average)
A.P. : Antenna Polarization (H : Horizontal, V : Vertical)
A.F. : Antenna Factor
C.L. : Cable Loss
A.G. : Amplifier Gain
D.C.F. : Distance Correction Factor

** Margin (dB) = Emission Level (dB) - Limit (dB)

*** In the case of these frequencies, the EUT was measured at 1.0m distance for sufficient sensitivity of measurement system.

**** < means less than. The observed spectrum analyzer noise floor level with RF preamplifier was 35.0 dBuV

***** This limit is 50dB below the level of the fundamental emission (sec. 15.249 (c))

4.3 Operating Frequency (Top : 2404.50 MHz , CH.40)

- Resolution Bandwidth : x CISPR Quasi-Peak (6dB Bandwidth : 120kHz for below 1GHz)
  x Peak (3dB Bandwidth : 1MHz for above 1GHz)
- Measurement Distance : 3 Meter

Frequency (MHz)	* D.M.	* A.P.	Measured Value (dB§ Å)	* A.F. + C.L (dB)	* A.G. (dB)	* D.C.F. (dB)	Emission Level (dB§ Åm)	Emission Level (§ Åm)	Limit (§ Åm)	** Margin (dB)
801.50	Q	V	17.9	26.5	-30.0	-	14.4	5.2	***** 77.6	-23.4
2404.50	P	H	91.8	31.0	-35.0	-	87.8	24547.1	50000	-6.2
*** 4809.00	P	H/V	**** <35.0	37.5	-35.0	-9.5	<28.0	<25.1	500	<-26.0
*** 7213.50	P	H/V	**** <35.0	40.8	-35.0	-9.5	<31.3	<36.7	500	<-22.7
*** 9618.00	P	H/V	**** <35.0	44.0	-35.0	-9.5	<34.5	<53.1	500	<-19.5
*** 12022.50	P	H/V	**** <35.0	47.5	-35.0	-9.5	<38.0	<79.4	500	<-16.0
-	-	-	-	-	-	-	-	-	-	-

Note

* D.M. : Detect Mode (P : Peak, Q : Quasi-Peak, A : Average)
A.P. : Antenna Polarization (H : Horizontal, V : Vertical)
A.F. : Antenna Factor
C.L. : Cable Loss
A.G. : Amplifier Gain
D.C.F. : Distance Correction Factor

** Margin (dB) = Emission Level (dB) - Limit (dB)

*** In the case of these frequencies, the EUT was measured at 1.0m distance for sufficient sensitivity of measurement system.

**** < means less than. The observed spectrum analyzer noise floor level with RF preamplifier was 35.0 dBuV

***** This limit is 50dB below the level of the fundamental emission (sec. 15.249 (c))

Note ;

(1) Fundamental emissions from the intentional radiators were not located within any of frequency bands described in section 15.205(a) listed below ;

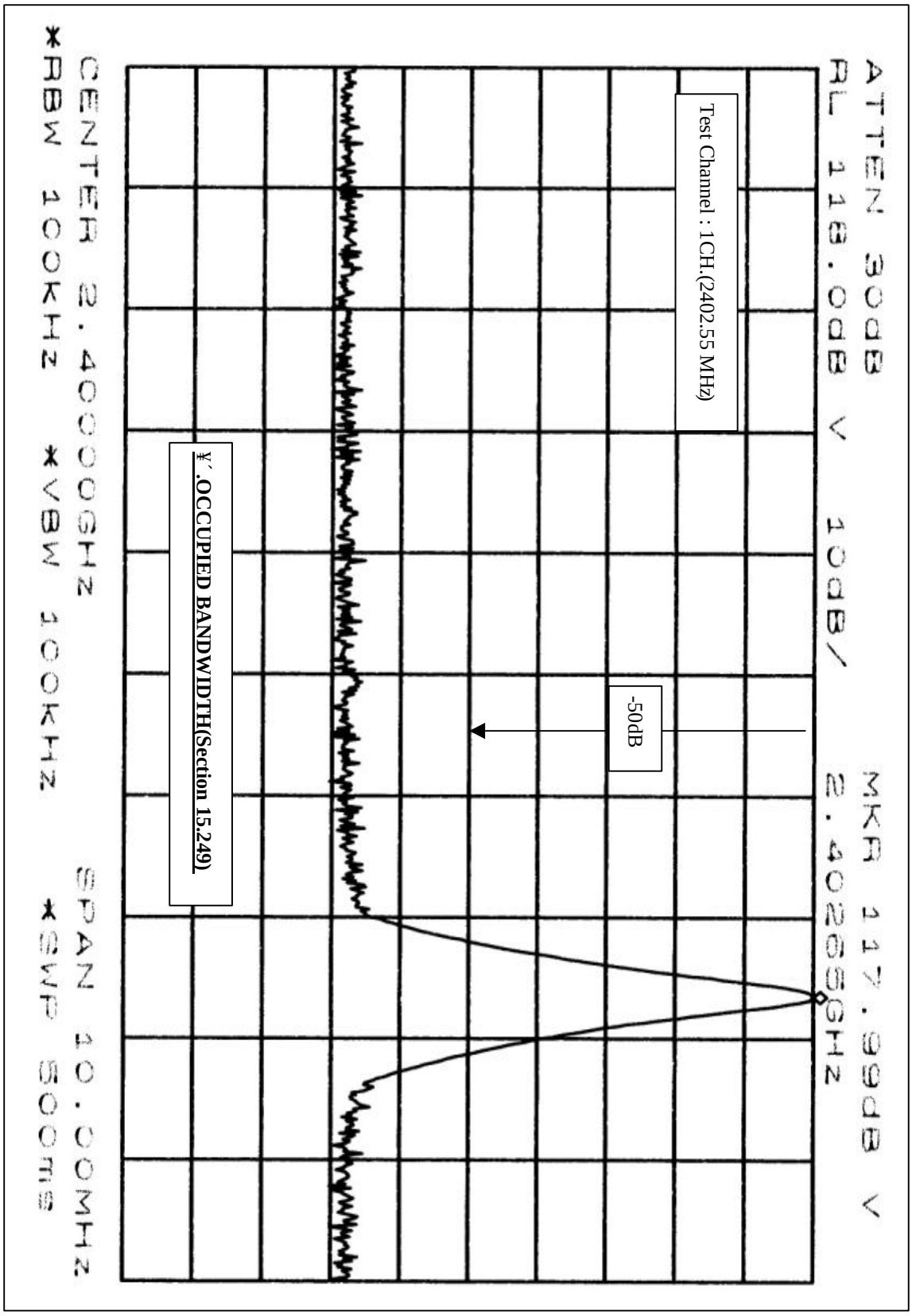
MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.25
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.1775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	
13.36-13.41			

The field strength of emissions appearing within above frequency bands did not exceed the limits shown in section 15.209. At frequency equal to or less than 1000 MHz, compliance with the limits section 15.209 was demonstrated using measurement employing a CISPR quasi-peak detector. Above 1000 MHz, demonstrated based on the average value of the measured emissions.

(2) If the intentional radiator was operated under the radiated emission limits of the general requirements of section 15.209, it's fundamental emissions were not located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz, 470-860 MHz.

(3) The level of any unwanted emissions from an intentional radiator did not exceed the level of the fundamental emission.

(4) Radiated and spurious emissions were checked from 30 MHz to 18 GHz. And all other emissions not reported on data were more than 20 dB below the permitted level.


ATTEN 30dB
RL 116.00dB V 10dB/
MKR 147.99dB V
2.402665GHz
Test Channel : 1CH.(2402.55 MHz)
-50dB
¥'.OCCUPIED BANDWIDTH(Section 15.249)
CENTER 2.400000GHz
SPAN 40.00MHz
*RBW 100KHz
*VBW 100KHz
*SWP 500ms

¥ µTEST EQUIPMENT USED FOR MEASUREMENTS

Equipment	Model No.	Manufacturer	Serial No.	Effective Cal. Duration
[x] EMI Receiver (20 MHz-1 GHz)	ESVS30	R & S	830516/002	06/13/00-06/12/01
[x] Spectrum Analyzer (9 kHz-26.5 GHz)	8563A	H. P.	3222A02069	02/18/01-02/17/02
[x] Spectrum Analyzer (100 Hz-22 GHz)	8566B	H. P.	3014A07057	05/24/00-05/23/01
[x] Quasi-Peak Adapter (10 kHz-1 GHz)	85650A	H. P.	3107A01511	05/24/00-05/23/01
[x] RF-Preselector (20 Hz-2 GHz)	85685A	H. P.	3010A01181	05/24/00-05/23/01
[x] Test Receiver (9 kHz-30 MHz)	ESH3	R & S	860905/001	06/13/00-06/12/01
[x] Pre-Amplifier (0.1-3000 MHz, 30 dB)	8347A	H. P.	2834A00543	05/24/00-05/23/01
[x] Pre-Amplifier (1-26.5 GHz, 35 dB)	8449B	H. P.	3008A00302	06/13/00-06/12/01
[x] LISN(50 Ù, 50ìH) (10 kHz-100 MHz)	3825/2	EMCO	9010-1710	-
[x] LISN(50 Ù, 50 ìH) (10 kHz-100 MHz)	3825/2	EMCO	9011-1720	-
[x] Plotter	7470A	H. P.	3104A21292	-
[x] Tuned Dipole Ant. (30 MHz-300 MHz)	VHA 9103	Schwarzbeck	-	*
[x] Tuned Dipole Ant. (300 MHz-1 GHz)	UHA 9105	Schwarzbeck	-	*
[x] Biconical Ant. (30 MHz-300 MHz)	BBA 9106	Schwarzbeck	-	*
[x] Log Periodic Ant. (200 MHz-1 GHz)	3146	EMCO	-	*
[x] Horn Ant. (1 GHz-18 GHz)	3115	EMCO	-	*
[ ] DC Power Supply	6260B	H.P.	1145A04822	-
[x] Shielded Room (5.0 m x 4.5 m)	-	SIN-MYUNG	-	-

* Each set of antennas has been calibrated to ensure correlation with ANSI C63.5 standard. The calibration of antennas is traceable to Korea Standard Research Institute(KSRI).