

TEST REPORT

Ref. Report No.

04-PIS03334-15-1

Name and address of the applicant

I-tel Corporation
5th Fl., Sungwoo Bldg, 37-4 Haan-Dong, Kwangmyung-Si,
Kyunggi-Do, Korea

Standard / Test regulation

FCC Part 15, Subpart C

Test result

Pass

Incoming date : May 24, 2004

Test date : May 24, 2004 – June 04, 2004

Test item(s) ;

Low Power Transceiver, Rx Verified
(900MHz/5.8GHz 40 Channel Analog
Cordless Phone, Base Station)

Model/type ref. ;

GH5816

Manufacturer ;

Bonso Electronics (Shenzhen) Co., Ltd.

Additional information ;

-Required Authorization : Certification
-FCC ID. : QVF0401

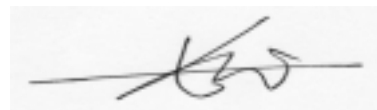
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Tested and reported by



Jeong-Min Kim, Senior Engineer

Reviewed by



Hee-Soo Kim, Telecommunication Team
Manager

KOREA TESTING LABORATORY

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I. GENERAL INFORMATION

1. Grantee's Name and : I-tel Corporation
Mailing Address : 5th Fl., Sungwoo Bldg, 37-4 Haan-Dong, Kwangmyung-Si,,
Kyunggi-Do, Korea

2. Manufacturer's Name and : Bonso Electronics (Shenzhen) Co., Ltd.
Mailing Address : Da Yang Road, Da Yang Synthetical District, Fu Yong,
Shenzhen, China 518103

3. Equipment Descriptions

3.1 Operating Frequency : 902.150 MHz ~ 905.075 MHz
3.2 Channel Space : 75 kHz
3.3 Power Supply : AC/DC Adapter (9.0V DC, 300mA)
3.4 Model Name : GH5816

* Multi-model name: The following model name is used in according to the color of cabinet and other marketing strategy but these items are identical in electrical, mechanical and physical design.

GH5800XX, GH5815XX, GH5830XX, GH5801XX, GH5831XX, GH5802XX, GH5817XX,
GH5832XX, GH5803XX, GH5818XX, GH5833XX, XG5104XX, XG5204XX, XG5404XX,
XG5105XX, XG5205XX, XG5405XX, XG5106XX, XG5206XX, XG5406XX, XG5107XX,
XG5207XX, XG5407XX, CTA-300, CTA-600, CTA-600M, CTA-700

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

5. Measuring Procedure : ANSI C63.4-2001

6. Place of Measurement : Absorber-lined Room (KTL)

7. Date of Measurement

7.1 Conducted Emission : May 27, 2004
7.2 Radiated Emission : May 27, 2004

II. 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 : User's Manual

1.2 How Applied : Printed

2. Information to User (Section 15.21)

The following or similar statements were provided in the manual for user instruction.

Please refer page 33 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, [☒] 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 ?

[☒] yes, [] no

III. 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 902.150 to 905.075 MHz. Therefore measurements were performed with the equipment operating on two frequencies, which were the top(CH40) and bottom(CH1) in the band, as per Section 15.31(m). Test mode was charging mode and transmitting mode.

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

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 EMI Test Receiver(R&S, ESI, 20 Hz to 7 GHz) and the other was terminated in 50 ohms. Measurements were again performed after interchanging such a connection oppositely.

The frequency range from 150 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 mode.

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 test configuration



3. Sample Calculation

The emission level measured in decibels was shown in following sample calculation.

For example :

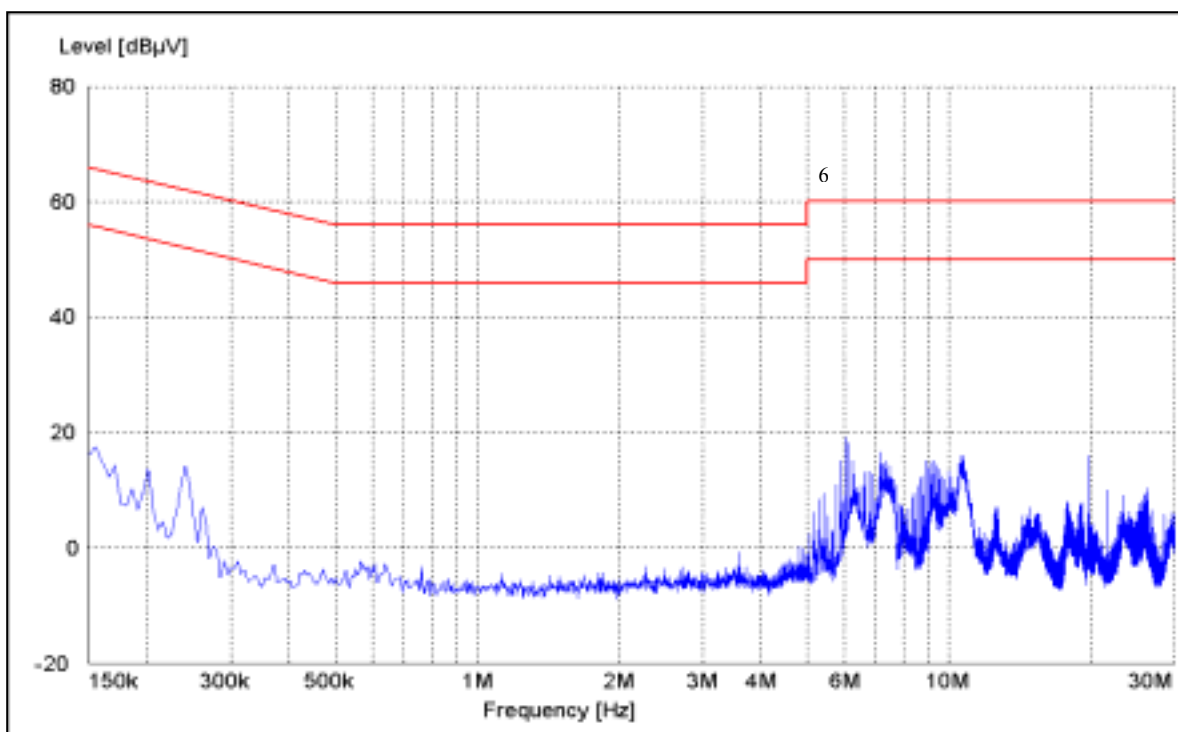
Measured Value at	<u>7.165 MHz</u>	32.3 dB μV	@ Average mode
+	Cable Loss *	0.0 dB	
=	Conducted Emission	32.3 dB μV	

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

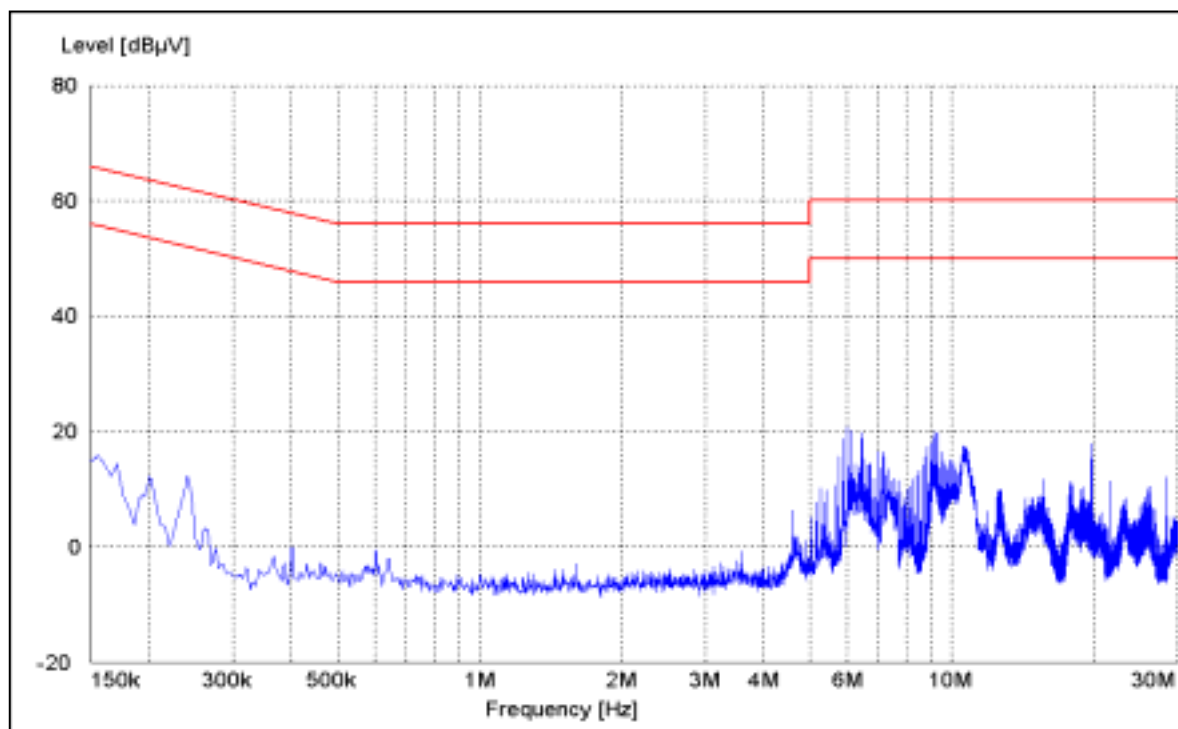
4. Measurement Data

- Measurement channel : CH. 40 (905.075 MHz)
- Resolution Bandwidth : x CISPR Quasi-Peak (6dB Bandwidth : 9 kHz)
- x Average (6dB Bandwidth : 9 kHz)

Power Lead Tested	Frequency (MHz)	Emission Level		Limit		(*) Margin	
		Q-Peak (dB μ V)	Average (dB μ V)	Q-Peak (dB μ V)	Average (dB μ V)	Q-Peak (dB μ V)	Average (dB μ V)
Live to Ground	0.150	27.4	18.1	66.0	56.0	-38.6	-37.9
	0.175	20.9	7.6	64.5	54.5	-43.6	-46.9
	0.240	14.5	3.1	62.1	52.1	-47.6	-49.0
	5.990	19.4	18.9	60.0	50.0	-40.6	-31.1
	7.165	32.1	30.4	60.0	50.0	-27.9	-19.6
	--	--	--	--	--	--	--
Neutral to Ground	0.200	14.3	7.00	63.6	53.6	-49.3	-46.6
	0.240	10.6	10.3	62.1	52.1	-51.5	-41.8
	5.995	21.2	20.4	60.0	50.0	-38.8	-29.6
	7.165	33.8	32.2	60.0	50.0	-26.2	-17.8
	10.600	11.6	9.5	60.0	50.0	-48.4	-40.5
	--	--	--	--	--	--	--
Note : Refer to measured graphs on next page. * Margin(dB) : Emission Level (dB) - Limit (dB)							



(Test side : Live-Ground side)



(Test side : Neutral-Ground side)

IV. RADIATED 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 902.150 to 905.075 MHz. Therefore measurements were performed with the equipment operating on two frequencies, which were the top(CH40) 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(Biconi-Log antenna : 26 to 2000 MHz, or Horn Antenna : 1 to 18 GHz, 18 GHz to 40 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.

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 of the test configuration



3. Sample Calculation

The emission level measured in decibels above one microvolt ($\text{dB } \mu\text{V}$) was converted into microvolt per meter ($\mu\text{V/m}$) as shown in following sample calculation.

For example :

Measured Value at	<u>902.150 MHz</u>	49.4 dB μV
+	Antenna Factor	22.9 dB/m
+	Cable Loss	5.4 dB
-	Preamplifier	0.0 dB
-	Distance Correction Factor *	0.0 dB
=	Radiated Emission	77.7 dB $\mu\text{V/m}$ (7673.6 $\mu\text{V/m}$)

* Extrapolated from the measured distance to the specified distance by an inverse linear distance extrapolation.

4. Measurement Data

4.1 Operating Frequency (Bottom : 902.150 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 μ V)	* A.F. + C.L. (dB)	* A.G. (dB)	* D.C.F. (dB)	Emission Level		Limit (μ V/m)	** Margin (dB)
							(dB μ V/m)	(μ V/m)		
902.15	Q	H	49.4	28.3	-	-	77.7	7673.6	50000	-16.3
1804.30	P	H/V	*** < 5.0	30.0	-	-	< 35.0	56.2	500	< -19.0
2706.45	P	H/V	*** < 5.0	33.6	-	-	< 38.6	85.1	500	< -15.4
-	-	-	-	-	-	-	-	-	-	-

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)

*** < means less than. The observed spectrum analyzer noise floor level was 5.0 dBuV

4.2 Operating Frequency (Top : 905.075 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 μ N)	* A.F. + C.L. (dB)	* A.G. (dB)	* D.C.F. (dB)	Emission Level		Limit (μ N/m)	** Margin (dB)
							(dB μ N/m)	(μ N/m)		
905.075	Q	H	51.1	28.4	-	-	79.5	9440.6	50000	-14.5
1810.15	P	H/V	*** < 5.0	30.0	-	-	< 35.0	56.2	500	< -19.0
2715.23	P	H/V	*** < 5.0	33.6	-	-	< 38.6	85.1	500	< -15.4
-	-	-	-	-	-	-	-	-	-	-

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)

*** < means less than. The observed spectrum analyzer noise floor level was 5.0 dBuV

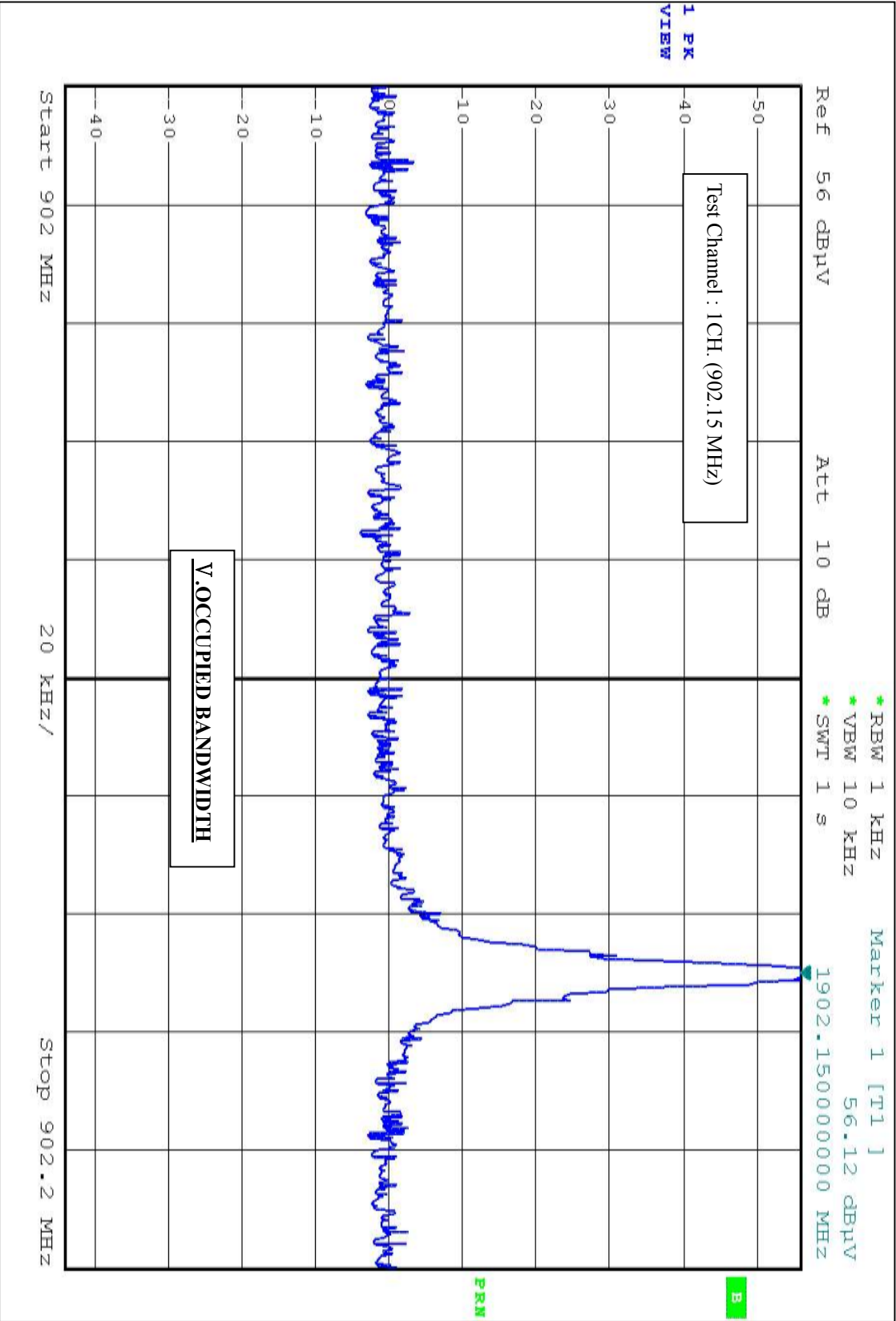
Note ;

- (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 1000MHz, compliance with the limits section 15.209 was demonstrated using measurement employing a CISPR quasi-peak detector. Above 1000MHz, 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 54-72MHz, 76-88MHz, 174-216MHz, 470-860MHz.
- (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 30MHz to 3GHz. And all other emissions not reported on data were more than 20 dB below the permitted level.



VI. TEST EQUIPMENT USED FOR MEASUREMENTS

<u>Equipment</u>	<u>Specification</u>	<u>Model No.</u>	<u>Manufacturer</u>	<u>Serial No.</u>
EMI Receiver	(20 MHz-1 GHz)	ESVS30	R & S	830516/002
EMI Receiver	(20 Hz-7 GHz)	ESI	R & S	835571/004
Spectrum Analyzer	(9 kHz-26.5 GHz)	8563A	H. P.	3222A02069
Spectrum Analyzer	(3 Hz-50 GHz)	E4448A	Agilent	MY43360322
Synthesized Sweeper	10 MHz-20 GHz	83620A	H. P.	3250A01653
Pre-Amplifier	0.1-3000 MHz, 30 dB	8347A	H. P.	2834A00543
Pre-Amplifier	1-26.5 GHz, 35 dB	8449B	H. P.	3008A00302
LISN(50 Ω , 50 μ H)	10 kHz-100 MHz	3825/2	EMCO	9010-1710
Biconical Ant.	30 MHz-300 MHz	BBA 9106	Schwarzbeck	--
Biconi-Log Ant.	26 MHz-2000 MHz	3142B	EMCO	00023784
Log Periodic Ant.	200 MHz-1 GHz	3146	EMCO	--
Horn Ant.	1 GHz-18 GHz	3115	EMCO	--
Horn Ant.	18GHz-40 GHz	3116	EMCO	--
Active Loop Ant.	9 kHz-30 MHz	6502	EMCO	2532