

REPORT OF MEASUREMENT

CERTIFICATION

Product : Scanning Receiver (Air/Weather Band Receiver)

Applicant : Maycom Co., Ltd.

Grantee Name : Maycom Co., Ltd.

FCC ID. : N6MMAYCOMAR108

Trade Name : maycom

Model No. : AR-108

Report No. : 341-051

Date : September 11, 1998

KOREA ACADEMY OF INDUSTRIAL TECHNOLOGY(KAITECH)

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ATTACHMENTS

1. Statement for Section 15.37 of the Rules
2. Statement for Section 15.121 of the Rules
3. Proposed FCC ID, Label and Marking
4. Manual for Installation and Operating Instruction
5. Block Diagram & Schematic Diagram
6. Photographs: See the illustration of photographs attached

I. GENERAL INFORMATION

1. Applicant's Name and Mailing Address : Maycom Co., Ltd.
Suite 463, APT Factory 201, Haan-Dong, Kwangmyong-City,
Kyongki-Do, Korea 423-060
2. Manufacturer's Name and Mailing Address : Maycom Co., Ltd.
Suite 463, APT Factory 201, Haan-Dong, Kwangmyong-City,
Kyongki-Do, Korea 423-060
3. Equipment Descriptions
- 3.1 Tuning Frequency : 108.000MHz ~ 136.975MHz (Air-Band : 25kHz Spacing)
161.650MHz ~ 163.275MHz (Weather-Band : 10 Channel)
- 3.2 Antenna Impedance : 50 Ohm
- 3.3 Detect Method : Superheterodyne Detector
- 3.4 Local Oscillator : 1st Local Osc. Frequency = Tuning Frequency + 21.4MHz(1st IF)
2nd Local Osc. Frequency = 20.945MHz (2nd IF : 455kHz)
- 3.5 Used Crystal : 12.8MHz, 20.945MHz, 1MHz
- 3.6 Power Supply : DC 13.5V (Ac-adapter) or DC 3.0V (Battery)
- 3.7 Used AC-Adapter : A31230(Manufacturer : SINO-AMERICAN)
4. Rules and Regulations : FCC Part 15, Subpart B
5. Measuring Procedure : ANSI C63.4-1992
6. Date of Measurement
- 6.1 Line Conducted : August 20, 1998
- 6.2 Radiated Emission : August 18, 1998
7. Statement of Compliance

We, KAITECH, HEREBY STATE THAT the measurements shown in this report were made in accordance with the procedures indicated and the emission emitted by this equipment was found to be within the limits applicable.

Measured by ;

S. J. Kim

Seok-Jin Kim
Senior Engineer

Review by ;

Chang Ho Ko

Chang-Ho Ko
Team Leader
EMC Team

II. GENERAL REQUIREMENTS OF THE EUT

1. Labelling Requirement (Section 15.19)

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.

1.1 Location on Enclosure : Rear side1.2 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 3 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

III. CONDUCTED EMISSION MEASUREMENT (Section 15.107)

1. Test Procedure

The Air/Weather Band Receiver(EUT) is designed to operate in the band 108.000MHz to 136.975MHz and 161.650MHz to 163.275MHz by tuning. Therefore measurements were performed with the equipment tuning on three frequencies, which were the top, middle, and bottom in the band, as per Section 15.31(m) in air band-and weather-band respectively.

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 2.2m X 3.1m in size to maintain 40cm from the rear of EUT

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

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

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

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

The maximum emission level from the EUT occurred at air-band scanning mode in such configuration as shown in the following photograph.

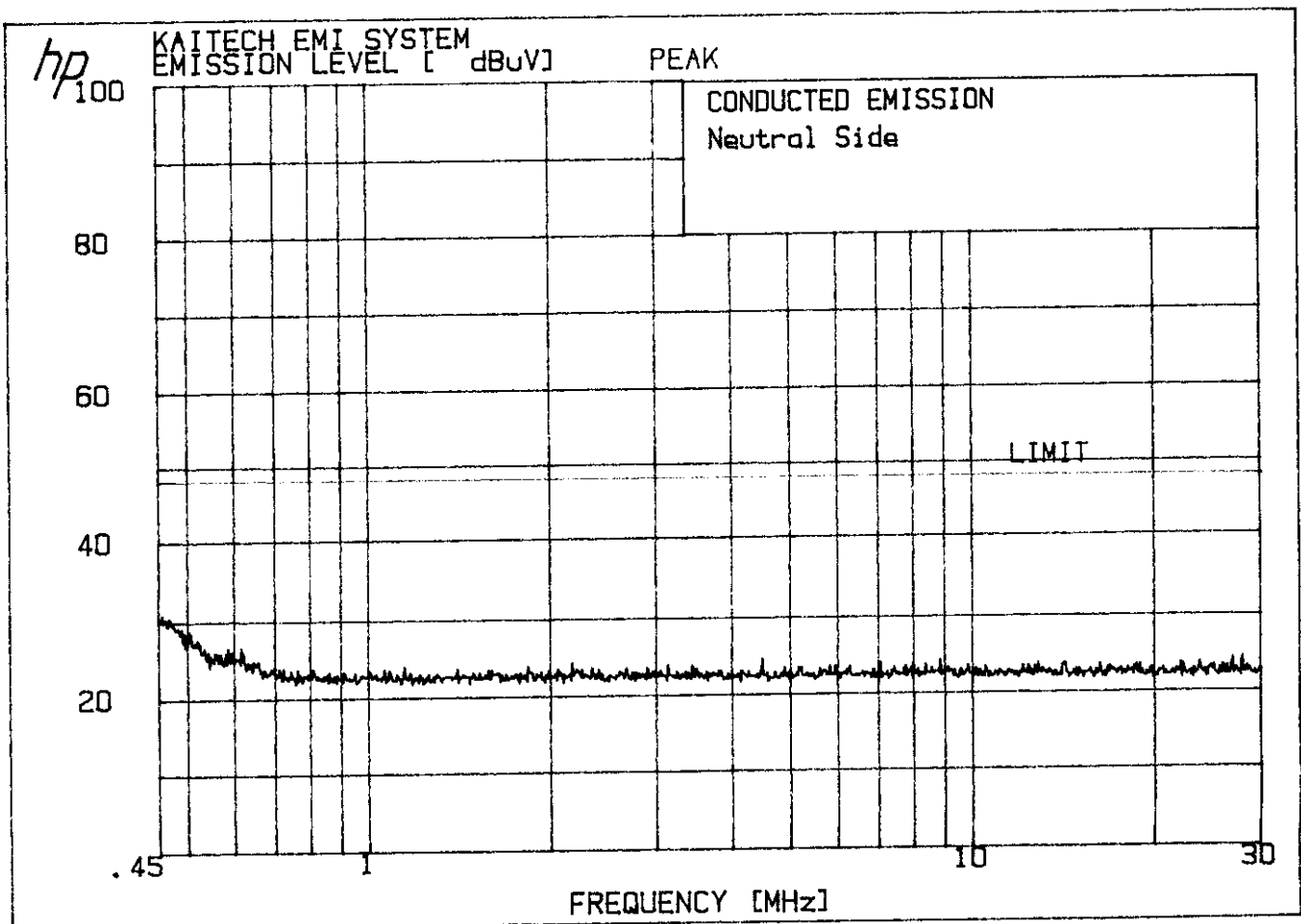
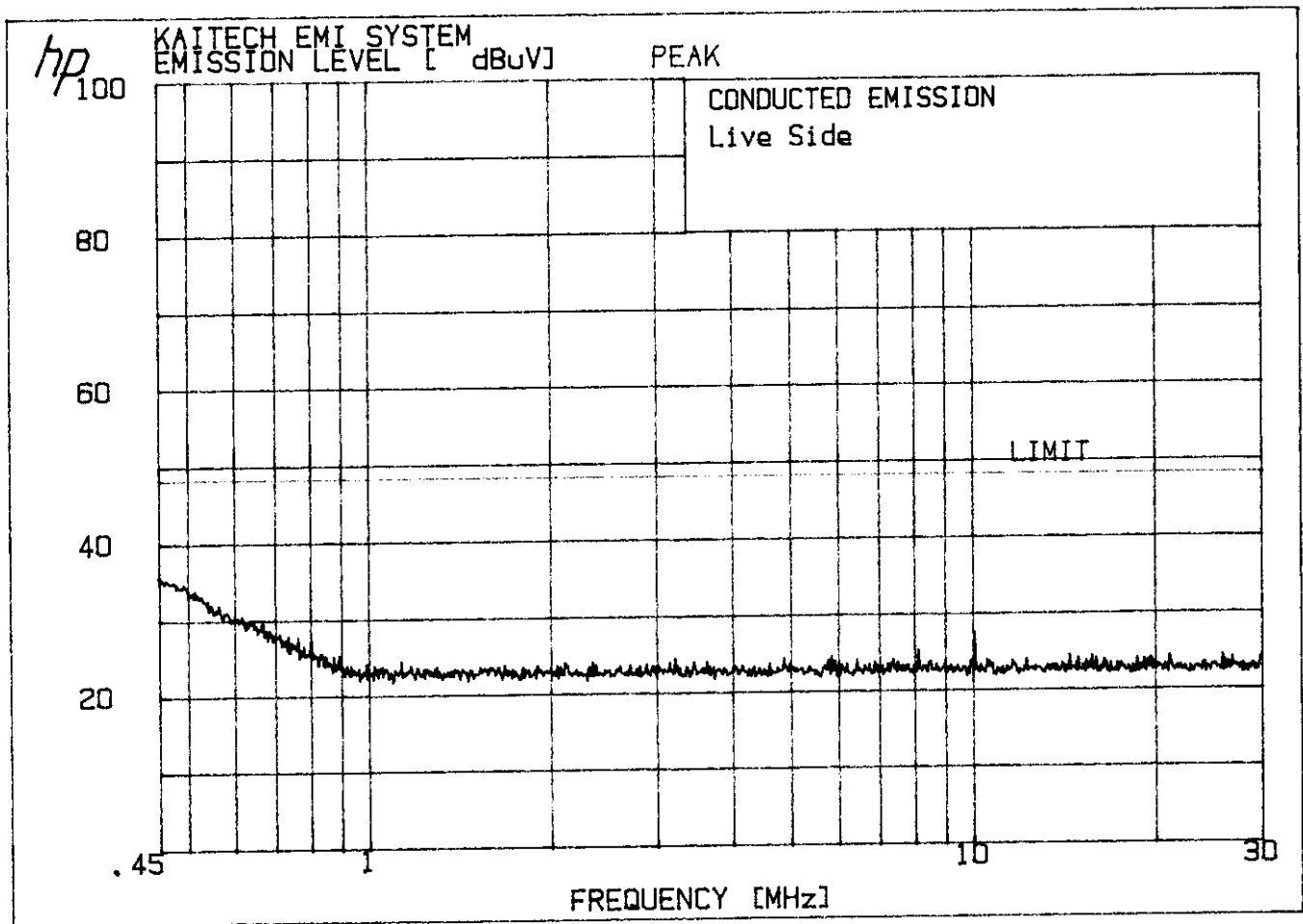
4. Measurement Data

- Resolution Bandwidth : x Peak (6dB Bandwidth : 9kHz)
 CISPR Quasi-Peak (6dB Bandwidth : 9kHz)

Operating Mode	Power Lead Tested	Frequency (MHz)	Measured Value		Emission Level		Limit (μV)	* Margin (dB)	
			Peak (dB μV)	Q-Peak (dB μV)	(dB μV)	(μV)			
Air-Band Scanning Mode	Hot to Ground	0.45	35.0	-	35.0	56.2	250	-13.0	
		-	-	-	-	-	-	-	
	Neutral to Ground	0.45	31.0	-	31.0	35.5	250	-17.0	
		-	-	-	-	-	-	-	-

Note : The noise floor level of the spectrum analyzer was observed in 22dB μV .
 The highest emission level was reported. And refer to measured graphs on next page.

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



IV. RADIATED EMISSION MEASUREMENT (Section 15.109)

1. Test Procedure

1.1 Preliminary Testing for Reference

The Air/Weather Band Receiver(EUT) is designed to operate in the band 108.000MHz to 136.975MHz and 161.650MHz to 163.275MHz by tuning. Therefore measurements were performed with the equipment tuning on three frequencies, which were the top, middle, and bottom in the band, as per Section 15.31(m) in air-band and weather-band respectively.

Preliminary testing was performed in a KAITECH 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 300MHz, Log-periodic antenna : 200 to 1000MHz or Horn Antenna : 1 to 18GHz) 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 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 a Absorber-Lined Room

The final measurement of radiated field strength was carried out in a KAITECH 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(20dB/decade) as per Section 15.31(f).

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

4. Measurement Data

4.1 Operating Frequency (Air-Band Bottom : 108.000MHz)

- Resolution Bandwidth : x CISPR Quasi-Peak (6dB Bandwidth : 120kHz)
 Peak (3dB Bandwidth : 1MHz)
- 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)		
129.4	Q	H	19.5	13.1	-	-	32.6	42.7	150	-10.9
258.8	Q	H	12.8	20.0	-	-	32.8	43.7	200	-13.2
-	-	-	-	-	-	-	-	-	-	-

Note : The noise floor level of the EMI Receiver(ESVS30) was 5.0dB μ V. And all other emissions not reported on data were more than 15dB below the permitted level.

* 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)

4.2 Operating Frequency (Air-Band Middle : 122.500MHz)

- Resolution Bandwidth : x CISPR Quasi-Peak (6dB Bandwidth : 120kHz)
 Peak (3dB Bandwidth : 1MHz)
- 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)		
143.9	Q	H	19.4	14.1	-	-	33.5	47.3	150	-10.0
287.8	Q	H	10.2	21.1	-	-	31.3	36.7	200	-14.7
-	-	-	-	-	-	-	-	-	-	-

Note : The noise floor level of the EMI Receiver(ESVS30) was 5.0dB μ V. And all other emissions not reported on data were more than 15dB below the permitted level.

* 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)

4.3 Operating Frequency (Air-Band Top : 136.975MHz)

- Resolution Bandwidth : x CISPR Quasi-Peak (6dB Bandwidth : 120kHz)
 Peak (3dB Bandwidth : 1MHz)
- 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 N/m)	** Margin (dB)
							(dB μ V/m)	(μ N/m)		
158.4	Q	H	16.5	15.0	-	-	31.5	37.6	150	-12.0
316.8	Q	H	8.5	21.7	-	-	30.2	32.4	200	-15.8
-	-	-	-	-	-	-	-	-	-	-
<p>Note : The noise floor level of the EMI Receiver(ESVS30) was 5.0dBμV. And all other emissions not reported on data were more than 15dB below the permitted level.</p> <p>* 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</p> <p>** Margin (dB) = Emission Level (dB) - Limit (dB)</p>										

4.4 Operating Frequency (Weather-Band Bottom : 161.650MHz)

- Resolution Bandwidth : x CISPR Quasi-Peak (6dB Bandwidth : 120kHz)
 Peak (3dB Bandwidth : 1MHz)
- 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)		
183.1	Q	H	18.0	16.5	-	-	34.5	53.1	150	-9.0
366.1	Q	H	13.2	23.5	-	-	36.7	68.4	200	-9.3
-	-	-	-	-	-	-	-	-	-	-

Note : The noise floor level of the EMI Receiver(ESVS30) was 5.0dB μ V. And all other emissions not reported on data were more than 15dB below the permitted level.

* 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)

4.5 Operating Frequency (Weather-Band Middle : 162.475MHz)

- Resolution Bandwidth : x CISPR Quasi-Peak (6dB Bandwidth : 120kHz)
- Peak (3dB Bandwidth : 1MHz)
- 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)		
183.9	Q	H	17.6	16.5	-	-	34.1	50.7	150	-9.4
367.8	Q	H	13.2	23.5	-	-	36.7	68.4	200	-9.3
-	-	-	-	-	-	-	-	-	-	-

Note : The noise floor level of the EMI Receiver(ESVS30) was 5.0dB μ V. And all other emissions not reported on data were more than 15dB below the permitted level.

- * 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)

V. ANTENNA POWER CONDUCTION MEASUREMENTS (Section 15.111)

1. Test Procedure

The Air/Weather Band Receiver(EUT) is designed to operate in the band 108.000MHz to 136.975MHz and 161.650MHz to 163.275MHz by tuning. Therefore measurements were performed with the equipment tuning on three frequencies, which were the top, middle, and bottom in the band, as per Section 15.31(m) in air-band and weather-band respectively.

Antenna Power Conduction Measurements were made in shielded room.

The antenna terminal of the EUT was connected the Spectrum Analyzer through the RF Amplifier(30dB). The RF levels for fundamental and harmonic frequency were scanned in frequency range from 30MHz to 1000MHz.

2. Sample Calculation

For example :

	Measured Value at <u>129.4MHz</u>	-49.3 dBm
+	Preamplifier Gain	- 30.0 dB
=	Radiated Emission	-79.3 dBm (= 0.012 nW)

3. Measurement Data

3.1 Measurement Data for Fundamental and Harmonic frequencies on Air-Band

- Resolution Bandwidth : _____ CISPR Quasi-Peak (6dB Bandwidth : 120kHz)
- x _____ Peak (3B Bandwidth : 100kHz)

Tuned Frequency (MHz)	Measured Frequency (MHz)	Measured Value (dBm)	Amplifier Gain (dB)	Emission Level		Limit (nW)	* Margin (dB)
				(dBm)	(nW)		
108.000	129.4	-49.3	-30.0	-79.3	0.012	2.0	-22.3
	517.6	-50.0	-30.0	-80.0	0.010	2.0	-23.0
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
122.500	143.9	-57.2	-30.0	-87.2	0.002	2.0	-30.2
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
136.975	158.4	-44.3	-30.0	-74.3	0.037	2.0	-17.3
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-

Note : The noise floor level of the Spectrum Analyzer with RF amplifier(30dB) was 32.0dB μ V. And all other emissions not reported on data were more than 30dB below the permitted level.

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

3.2 Measurement Data for Fundamental and Harmonic frequencies on Weather-Band

- Resolution Bandwidth : _____ CISPR Quasi-Peak (6dB Bandwidth : 120kHz)
- x _____ Peak (3B Bandwidth : 100kHz)

Tuned Frequency (MHz)	Measured Frequency (MHz)	Measured Value (dBm)	Amplifier Gain (dB)	Emission Level		Limit (nW)	* Margin (dB)
				(dBm)	(nW)		
161.650	183.1	-40.1	-30.0	-70.1	0.098	2.0	-13.1
	732.2	-53.6	-30.0	-83.6	0.004	2.0	-26.6
	915.3	-55.3	-30.0	-85.3	0.003	2.0	-28.3
	-	-	-	-	-	-	-
162.475	183.9	-40.0	-30.0	-70.0	0.100	2.0	-13.0
	735.5	-53.6	-30.0	-83.6	0.004	2.0	-26.6
	919.4	-55.0	-30.0	-85.0	0.003	2.0	-28.0
	-	-	-	-	-	-	-
163.275	184.7	-39.8	-30.0	-69.8	0.105	2.0	-12.8
	738.7	-53.5	-30.0	-83.5	0.004	2.0	-26.5
	923.4	-54.5	-30.0	-84.5	0.004	2.0	-27.5
	-	-	-	-	-	-	-

Note : The noise floor level of the Spectrum Analyzer with RF amplifier(30dB) was 32.0dB μ V. And all other emissions not reported on data were more than 30dB below the permitted level.

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

VI. TEST EQUIPMENT USED FOR FCC COMPLIANCE TESTING

<u>Equipment</u>	<u>Model No.</u>	<u>Manufacturer</u>	<u>Serial No.</u>	<u>Effective Cal. Duration</u>
[x] EMI Receiver (20MHz-1GHz)	ESVS30	R & S	830516/002	06/29/98-06/29/99
[x] Spectrum Analyzer (9kHz-26.5GHz)	8563A	H. P.	3222A02069	01/30/98-01/30/99
[x] Spectrum Analyzer (100Hz-22GHz)	8566B	H. P.	3014A07057	05/29/98-05/29/99
[x] Quasi-Peak Adapter (10kHz-1GHz)	85650A	H. P.	3107A01511	05/29/98-05/29/99
[x] RF-Preselector (20Hz-2GHz)	85685A	H. P.	3010A01181	05/29/98-05/29/99
[] Test Receiver (9kHz-30MHz)	ESH3	R & S	860905/001	06/29/98-06/29/99
[x] Pre-Amplifier (0.1-3000MHz, 30dB)	8347A	H. P.	2834A00543	05/29/98-05/29/99
[] Pre-Amplifier (1-26.5GHz, 35dB)	8449B	H. P.	3008A00302	06/29/98-06/29/99
[x] LISN(50 Ω , 50 μ H) (10kHz-100MHz)	3825/2	EMCO	9010-1710	-
[] LISN(50 Ω , 50 μ H) (10kHz-100MHz)	3825/2	EMCO	9011-1720	-
[x] Plotter	7470A	H. P.	3104A21292	-
[x] Tuned Dipole Ant. (30MHz-300MHz)	VHA 9103	Schwarzbeck	-	*
[x] Tuned Dipole Ant. (300MHz-1GHz)	UHA 9105	Schwarzbeck	-	*
[] Biconical Ant. (20MHz-200MHz)	BBA9106	Schwarzbeck	-	*
[] Log Periodic Ant. (200MHz-1GHz)	3146	EMCO	-	*
[] Horn Ant. (1GHz-18GHz)	3115	EMCO	-	*
[] DC Power Supply	6260B	H.P.	1145A04822	-
[x] Shielded Room (5.0m x 4.5m)	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).