ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

Test report file number	**: E00OR-032**
Applicant	**: Woori Technology, Inc**
Address	**: WooriTG. Bldg., 1595, Bongchun 7-Dong, Kwanak-Gu, 151-835 Korea**
Manufacturer	**: Woori Technology, Inc**
Address	**: WooriTG. Bldg., 1595, Bongchun 7-Dong, Kwanak-Gu, 151-835 Korea**
Type of Equipment	**: Scanning Receiver - Bugging Device Detection System**
FCC ID.	**: PA2WS-100**
Model / Type No.	**: WS-100**
Serial number	**: N/A**
Total page of Report	**: 17 pages (including this page)**
Date of Incoming	**: September 22, 2000**
Date of issue	**: October 19, 2000**

SUMMARY

The equipment complies with the regulation; FCC CFR 47 PART 15 SUBPART B §15.101 and §15.121.

This test report contains only the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production

Prepared by:
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Unknown document property name.

1. VERIFICATION OF COMPLIANCE

APPLICANT	: Woori Technology, Inc
ADDRESS	: WooriTG. Bldg., 1595, Bongchun 7-Dong, Kwanak-Gu, 151-835 Korea
CONTACT PERSON	: Keun-Sang Lee / Manager
TELEPHONE NO	: 82-2-886-0351(ext.532)
FCC ID	: PA2WS-100
MODEL NO/NAME	: WS-100
SERIAL NUMBER	: N/A
DATE	: October 19, 2000

DEVICE TYPE	SCANNING RECEIVER- UNINTENTIONAL RADIATOR
E.U.T. DESCRIPTION	Bugging Device Detection System
SCANNING FREQUENCY	1.7 ~ 781.1MHz, 895 ~ 2400 MHz
BLOCKING FREQUENCY	781.2 ~ 894 MHz
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	ANSI C63.4/1992
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC CFR 47 PART 15 §15.101 and §15.121
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 METER OPEN AREA TEST SITE

The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

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2. GENERAL INFORMATION

2.1 Product Description

The Woori Technology, Inc, Model WS-100 (referred to as the EUT in this report) is a Bugging Device Detection System which scan a wide range of frequencies (1.7~781.1 and 895 ~ 2400 MHz) and analyzes the spectrum patterns with its advanced analytical algorithm. It alerts user the possible presence of wireless bugging device, including hidden video camera. Its detection range is up to 1000 sq. ft. Product specification described herein was obtained from product data sheet or user's manual.

Cellular Telephone Band (824~849MHz and 869~894MHz) and it's image frequency(781.2~806.2 and 826.2~851.2MHz) was blocked by ROM BIOS on the main board. The user can not tune and access the cellular telephone band using this EUT.

CHASSIS TYPE		Metal
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)		4 MHz, 20.0 MHz, 20.945 MHz
POWER REQUIREMENT		100 ~ 220 Vac/50, 60Hz
NUMBER OF LAYERS		MAIN Board: 4 Layers, EARPHONE Board: 2 Layers
RF MODULATOR Type NO.		MLM-24
Specification for RF Module	Antennas	1.7 MHz ~ 1.2GHz (Low Band), 1.2GHz ~ 2.4GHz (High Band)
	Receiver Sensibility	-110 dBm ~ -60dBm
	Scanning Step	50 kHz
	Scanning Bandwidth	50 kHz
BLOCKING FREQUENCY		781.2 ~ 894 MHz
LCD	Viewing Area	127(W) X 70(H) mm
	Number of Dots	256(W) X 128(H) dots
EXTERNAL TERMINALS		RS-232C, Ethernet(10 Base T), RS-485 2 Ports, Headphone Jack, and Discrete Input / Output port

Model Differences:

-. None

2.2 Related Submittal(s) / Grant(s)

Original submittal only

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2.3 Test System Details

The model numbers for all the equipments which were used in the tested system is:

Model	Manufacturer	FCC ID	Description	Connected to
WS-100	Woori Technology	PA2WS-100	Bugging Device Detection System (EUT)	PC
GA-6BXE	GIGABITE	DOC	PC	EUT
AV-5T	KDS	EVOKD-1510T	MONITOR	PC
5530	BTC	DOC	KEYBOARD	PC
SMB-601	SEJIN Elec.	GJJB509A0	MOUSE	PC
N/A	N/A	N/A	EARPHONE	EUT
2225C	HP	DSI6XU2225	PRINTER	PC

2.4 Test Methodology

The measurement for Radiated Emission, Line Conducted Emission, Output signal levels and Output Terminal Conducted Spurious Emission were performed in accordance with the procedures described in MP-3 and ANSI C63.4/1992. Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

2.5 Test Facility

The open area test site and conducted measurement facilities are located on at 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Kun, Kyunggi-Do 464-080 Korea. Description details of test facilities were submitted to the Commission on January 12, 1999. (Registration Number: 92819)

3. SYSTEM TEST CONFIGURATION

3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	Woori Technology	XN001A	N/A
EARPHONE BOARD	Woori Technology	XN001A-EARPN	N/A
LCD MODULE	HYUNDAI	HG2250ING-EW-01H	N/A
Power Board	Fine Suntronix	PB-WRT15-ABEI	N/A

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3.2 EUT exercise Software

The EUT transmitted spectrum signal which was scaned from its RF Module to the personal computer using RS232C port and to another bugging device detection system which was installed in the test room using RS485 port simultaneously.

3.3 Cable Description

	Power Cord Shielded (Y/N)	I/O cable Shielded (Y/N)	Length (M)
Bugging Device Detection System (EUT)	N	N	1.5(P), 10.0(D)
PC	N	Y	1.5(P), 0.3(D)
MONITOR	N	Y	1.5(P), 1.8(D)
KEYBOARD	N/A	Y	1.8(D)
MOUSE	N/A	Y	1.8(D)
EARPHONE	N	Y	1.5(D)
PRINTER	N	Y	1.5(P), 1.2 (D)

* The marked “(D)” means the Data Cable and “(P)” means the Power Cable.

3.4 Noise Suppression Parts on Cable

	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
Bugging Device Detection System (EUT)	N	N/A	Y	BOTH END
PC	-	-	-	-
MONITOR	Y	PC END	Y	PC END
KEYBOARD	N	N/A	Y	PC END
MOUSE	N	N/A	Y	PC END
EARPHONE	N	N/A	N	N/A
PRINTER	N	N/A	Y	BOTH END

3.5 Equipment Modifications

To achieve compliance to FCC part 15 rules, the following change(s) was made by ONETECH Corp. during compliance testing:

“There was no Modified items during EMI test”

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4. 4. REFERENCED RULES SECTIONS AND TEST PROCEDURE

4.1 Section 15.121(a):

Receivers can not altered or tunning by the user for the ablity to receive transmissions in the cellular telephone bands(824~849 MHz and 869~894 MHz), because the above frequency band are blocked from ROM Bios during manufacture. The above band can not displayed on the LCD Panel of the EUT in spite that user enter the band using the keypad on the EUT. According to the above method, the EUT can not access and analyze the cellular telephone band and cannot be re-enabled by any user-accessible procedure, including diode, resistor or jumper changes, nor by connection of any external device such as a personal computer, nor by installation of any special enabling semiconductor device.

Also, the receiver cannot capable of converting digital cellular transmissions to analog voice audio.

4.2 Section 15.121(b): Cellular Image and Spurious Rejection in Scanning Receiver

The 12 dB SINAD measurement method in the cellular telephone band used for frequencies that the receiver tunes and the signal rejection ratio gained by the measurement.

4.3 Line Conducted Test:

EUT was connected to LISN, all supporting equipment were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4/1992 7.2.3 to determine the worse operating conditions.

4.4 Radiated Emission Test:

Preliminary radiated emission test were conducted using the procedure in ANSI C63.4/1992 8.3.1.1 to determine the worse operating conditions. Final radiated emission test were conducted at 3meter open area test site.

4.5 Antenna-Conducted Power Measurement:

Antenna-Conducted Power Measurement was performed by using the procedure in ANSI C63.4/1992 12.1.5 to determine the voltage present at these terminals.

4.6 Coherent Test:

During Radiated Emission Tests, H.P. signal generator model no: 8648C was used to radiate an unmodulated CW signal to EUT at 1.7, 600.85 and 960 MHz in order to cohere the individual components of the characteristic broadband emissions from EUT.

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5. PRELIMINARY TEST

5.1 AC Power line Conducted Emission Test

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Continuously spectrum signal transmitting to the PC using RS-232C and another EUT using RS-485	X

5.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated.

Operation Mode	The Worse operating condition (Please check one only)
Continuously spectrum signal transmitting to the PC and another EUT with antenna connected antenna at the input terminals of EUT	X

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6. FINAL RESULT OF MEASURMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level.

6.1 Conducted Emission Test

Humidity Level : 57 % Temperature : 23•

Limits apply to : FCC CFR 47, PART 15, SUBPART B

Type of Test : SCANNING RECEIVER

Result : PASSED BY -3.83 dB at 0.72 MHz

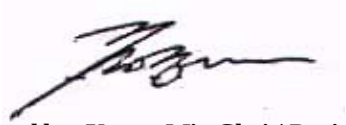
EUT : Bugging Device Detection System Date: October 02, 2000

Operating Condition : Continuously transmitting received spectrum signal

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

Power Line Conducted Emission			FCC CLASS B	
Frequency (MHz)	**Amplitude (dBuV)**	**Conductor**	**Limit (dBuV)**	**Margin (dB)**
0.72	44.17	NEUTRAL	48.00	-3.83
2.26	40.41	NEUTRAL	48.00	-7.59
9.0	39.29	HOT	48.00	-8.71
9.72	40.06	HOT	48.00	-7.94
14.14	37.90	HOT	48.00	-10.10
21.94	36.13	NEUTRAL	48.00	-11.87
25.00	43.43	HOT	48.00	-4.57

Line Conducted Emission Tabulated Data



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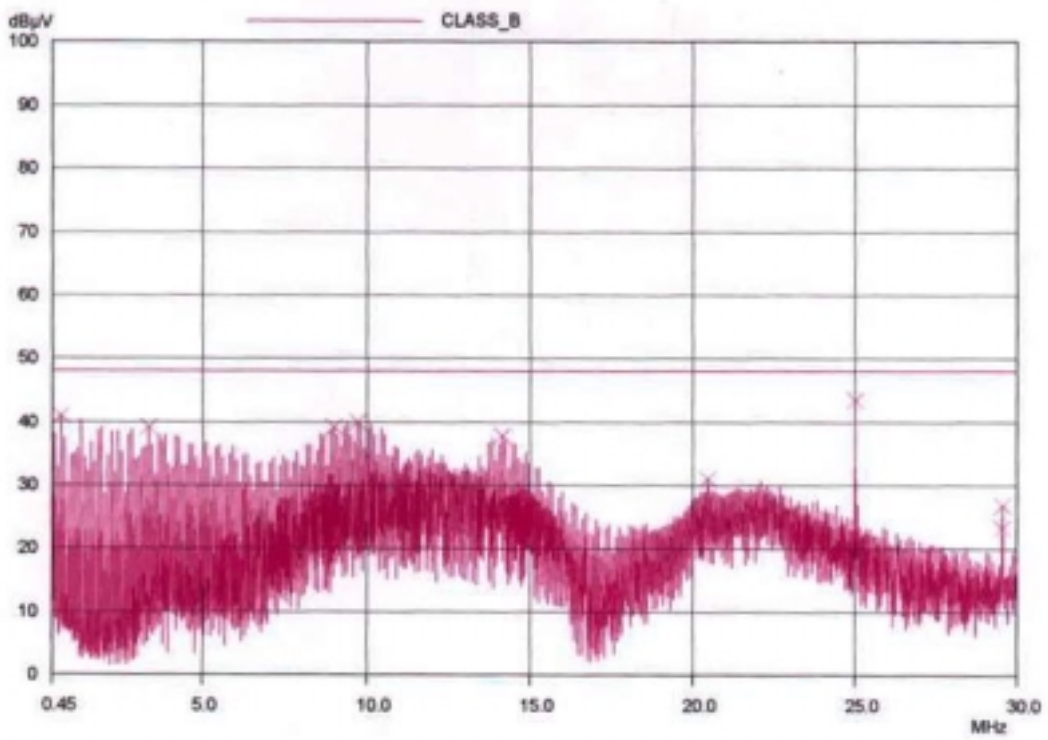
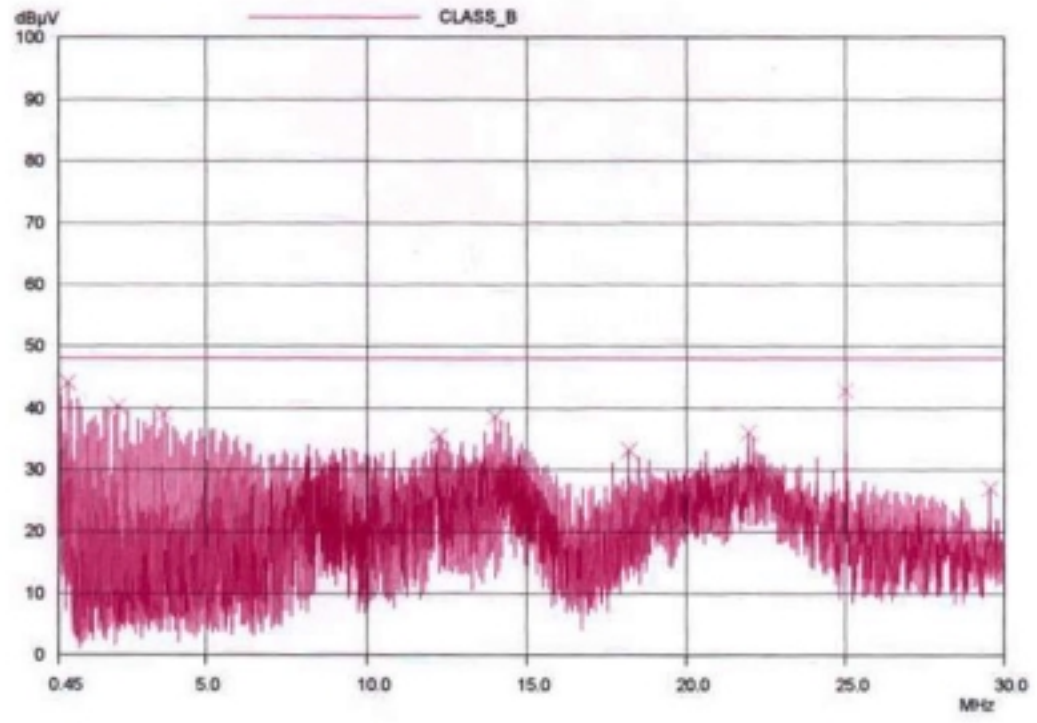


HOT LINE



NEUTRAL LINE

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6.2 Radiated Emission Test

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 51 % Temperature : 23•
Limits apply to : FCC CFR 47, PART 15, SUBPART B
Type of Test : SCANNING RECEIVER
Result : PASSED BY –5.42 dB at 275.00 MHz

EUT : Bugging Device Detection System Date: October 09, 2000
Operating Condition : Continuously transmitting received spectrum signal
Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)
Distance : 3 Meter

Radiated Emission		Ant	Correction Factors		Total	FCC CLASS B	
Freq. (MHz)	Amp. (dBuV)	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
144.84	11.50	H	12.96	1.22	25.68	43.50	-17.82
141.68	13.90	H	12.78	1.32	28.00	43.50	-15.50
169.58	12.10	H	15.08	1.43	28.61	43.50	-14.89
194.60	10.10	H	16.51	1.54	28.15	43.50	-15.35
194.60	23.90	H	11.94	1.70	37.54	46.00	-8.46
224.60	20.30	H	12.37	1.83	34.50	46.00	-11.50
249.80	23.30	H	14.13	1.89	39.32	46.00	-6.68
275.00	23.10	H	15.20	2.28	40.58	46.00	-5.42
350.40	21.20	H	15.51	2.39	39.10	46.00	-6.90
375.40	19.50	H	16.19	2.46	38.15	46.00	-7.85
416.42	20.10	H	16.50	2.50	39.10	46.00	-6.90
430.55	19.30	H	16.83	2.54	38.67	46.00	-7.33
475.12	15.30	V	17.61	2.60	35.51	46.00	-10.49

Radiated Emission Tabulated Data

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Tested by: Young-Min, Choi / Project Engineer

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6.3 Coherent Test

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

This is the additional radiated emission test due to the local oscillator in the RF Module of the EUT.

The fundamental and 2nd harmonic frequencies of the local oscillator in the RF Module part was tested on a near top, middle and bottom tuning frequencies of the EUT according to section 15.31(m), 15.33(b)(3) and 15.101(b).

Operating Condition : Tuning the selected frequency

Detector : Span : 10 MHz SWP : 2 sec
RBW : 100 kHz below 1 GHz, 1MHz above 1 GHz
VBW : 300 kHz

Distance : 3 Meter

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Freq. to which tuned (MHz)	OSC. Freq (MHz)	Ampl. (dBuV)	Pol.	Ant. (dBuV)	Cable (dB)	Ampl (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1.7	1221.1	-	H	-	-	-	54.00	-
600.85	1821.25	-	H	-	-	-	54.00	-
960	2180.4	-	H	-	-	-	54.00	-

*Harmonics RF Radiation

Radiated Emissions				Ant	Correction Factors		Total	FCC Limit	
Freq. to which tuned (MHz)	Ham.	Freq. (MHz)	Ampl. (dBuV)	Pol.	Ant. (dBuV)	Cable (dB)	Ampl (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1.7	2	2442.2	-	H	-	-	-	54.00	-
600.85	2	3642.5	-	H	-	-	-	54.00	-
960	2	4360.8	-	H	-	-	-	54.00	-

Remark: There was no found any emission during the above test.

In the RF Module. the Fixed VCO is 1199MHz and IF frequency is 21.4MHz, so oscillator frequency is generated by adding VCO and IF frequency.

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6.4. Antenna-Conducted Power Measurement

This test is the antenna power conduction test at the antenna terminal due to local oscillator of the RF Modulator in the EUT.

The fundamental and 2nd harmonic frequencies of the local oscillator were tested on a near top, middle and bottom tuned frequencies of the EUT according to section 15.31(m) and 15.33(b)(3), 15.101(b) and 15.111(a).

The EUT antenna terminal connected to a resistive termination equal to the impedance specified or employed for the antenna, the power at the antenna terminal at any frequency within the range of measurements specified in section 15.33 shall not exceed 2.0 nanowatts. (2.0 nW = 50.1dBuV)

Operating Condition : Tuning the selected frequency

Detector : Span : 10 MHz SWP : 2 sec
RBW : 100 kHz below 1 GHz, 1MHz above 1 GHz
VBW : 300 kHz

Freq. to which tuned (MHz)	OSC. Freq (MHz)	Measured Value (dBuV)	Imp. Mat. +Ca. Loss (dB)	Total (dBuV)	Limit (dBuV)	Margin (dBuV)
1.7	1221.1	-	6.0	-	50.10	-
600.85	1821.25	-	6.0	-	50.10	-
960	2419.9	-	6.0	-	50.10	-

*Harmonics RF Radiation

Freq. to which tuned (MHz)	Har.	OSC. Freq (MHz)	Measured Value (dBuV)	Imp. Mat. +Ca. Loss (dB)	Total (dBuV)	Limit (dBuV)	Margin (dBuV)
1.7	2	2442.2	-	6.0	-	50.10	-
600.85	2	3642.5	-	6.0	-	50.10	-
960	2	4839.8	-	6.0	-	50.10	-

Remark: There was no found any emission during the above test.

In the RF Module for antenna connector 1, the Fixed VCO is 1999MHz and IF frequency is 21.4MHz, so oscillator frequency is generated by adding VCO and IF frequency.

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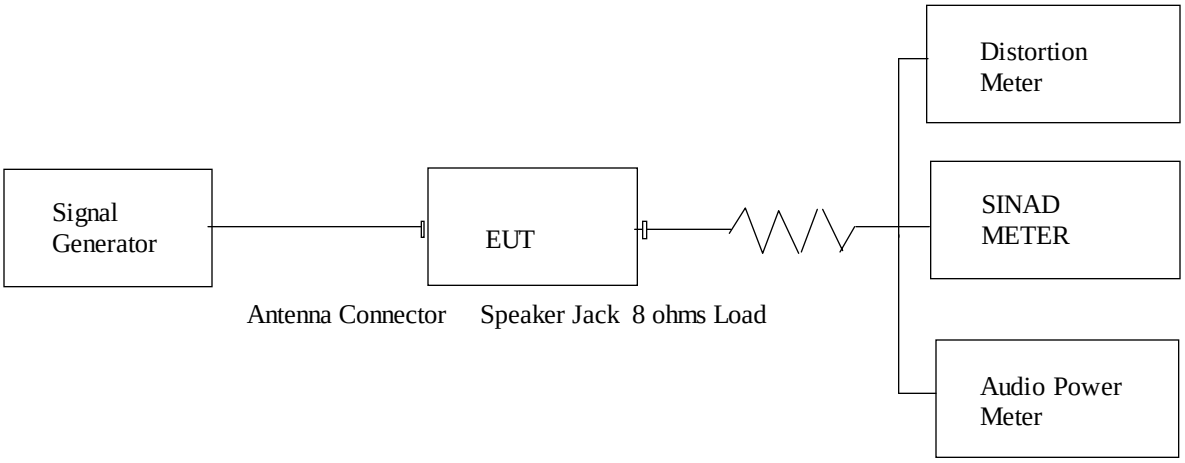
6.5. Cellular Image and Spurious Rejection in Scanning Receiver

The 12 dB SINAD measurement method in the cellular telephone band used for frequencies that the receiver tunes and the signal rejection ratio gained by the measurement according to the below setup diagram.



Tune the receiver to the received frequency and output the receiving frequency from siganl generator to obtain its 12 dB SINAD. Then output the interference frequency to obtain its 12 dB SINAD. The signal rejection ratio is the ratio between these two output levels of the signal generator.

The tested cellular telephone frequency is as follows.

	Bottom	Middle	Top
Mobile Frequency	824.5	836.5	848.5
Base Frequency	869.5	881.5	893.5

Result: We scanned entire tunning range of receiver at each of cellular test frequencies above and signals which were noted as response were checked with the signal generator off and if they still existed as a response were determined as ambient signals and removed from the response list. According to the above procedure, only ambient signals unsquelched the receiver. Since no “received” frequency to cellular bands appeared, the EUT is compliance with 38dB rejection requirement.

Used Equipment:

Equipment Name	Model No	Manufacturer	Serial No	Last Cal
Radio Communication Annalyzer	CMTA 54	Rohde & Schwarz	834.0000.54	Sep. 2001

Remark: Above equipment has a function for Signal Generator, SINAD Meter, Audio Power Mmeter and Distortion Meter.

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Test result at 824.5 MHz in Cellular Telephone Band

Antenna Connector	Scanned Frequency	Received Frequency in Cellular Telephone Band
ANT 1	1.7 MHz ~ 1.2 GHz	None
ANT 2	1.2 GHz ~ 2.4 GHz	None

Test result at 836.5 MHz in Cellular Telephone Band

Antenna Connector	Scanned Frequency	Received Frequency in Cellular Telephone Band
ANT 1	1.7 MHz ~ 1.2 GHz	None
ANT 2	1.2 GHz ~ 2.4 GHz	None

Test result at 848.5 MHz in Cellular Telephone Band

Antenna Connector	Scanned Frequency	Received Frequency in Cellular Telephone Band
ANT 1	1.7 MHz ~ 1.2 GHz	None
ANT 2	1.2 GHz ~ 2.4 GHz	None

Test result at 869.5 MHz in Cellular Telephone Band

Antenna Connector	Scanned Frequency	Received Frequency in Cellular Telephone Band
ANT 1	1.7 MHz ~ 1.2 GHz	None
ANT 2	1.2 GHz ~ 2.4 GHz	None

Test result at 881.5 MHz in Cellular Telephone Band

Antenna Connector	Scanned Frequency	Received Frequency in Cellular Telephone Band
ANT 1	1.7 MHz ~ 1.2 GHz	None
ANT 2	1.2 GHz ~ 2.4 GHz	None

Test result at 893.5 MHz in Cellular Telephone Band

Antenna Connector	Scanned Frequency	Received Frequency in Cellular Telephone Band
ANT 1	1.7 MHz ~ 1.2 GHz	None
ANT 2	1.2 GHz ~ 2.4 GHz	None

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Unknown document property name.

Tested by: Gae-Won Lee / Asst. Chief Engineer

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7. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+ Meter reading (dBuV)

+ Cable Loss (dB)

+ Antenna Factor (Loss) (dB/meter)

= Corrected Reading (dBuV/meter)

- Specification Limit (dBuV/meter)

= dB Relative to Spec (+/- dB)

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8. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test Receiver	R/S	ESVS 10	827864/005	SEP/00	12MONTH	■
2.	Test Receiver	R/S	ESHS 10	834467/007	APR/00	12MONTH	■
3.	Spectrum analyzer	HP	8568B	3026A0226	SEP/99	12MONTH	■
4.	RF preselector	HP	85685A	3107A01264	SEP/00	12MONTH	■
5.	Quasi-Peak Adapter	HP	85650A	3107A01542	SEP/00	12MONTH	■
6.	Dipole Antenna	EMCO	3121C	9107-745	JUN/00	12MONTH	
7.	Biconical antenna	EMCO	3104C	9109-4441 9109-4443 9109-4444	MAR/00	12MONTH	■
8.	Log Periodic antenna	EMCO	3146	9109-3213 9109-3214 9109-3217	MAR/00	12MONTH	■
9.	Conical Log spiral Antenna	EATON	93491-2	340	FEB/00	12MONTH	■
10.	LISN	EMCO	3825/2	9109-1867 9109-1869	JUN/00	12MONTH	■
11.	RF Amplifier	HP	8447F	3113A04554	SEP/00	12MONTH	■
12.	Spectrum Analyzer	HP	8561E	3350A00546	FEB/00	12MONTH	■
13	Signal Generator	HP	8648C	3847U02731	APR./00	12MONTH	■
14.	Computer System Hard disk drive	HP	98581C 9153C	98543A CMC762Z9153	N/A N/A	N/A N/A	■ ■
15.	Plotter	HP	7475A	30052 22986	N/A	N/A	■
16.	Position Controller	EMCO	1090	9107-1038	N/A	N/A	■
17.	Turn Table	EMCO	1080-1.21	9109-1576	N/A	N/A	■
18.	Antenna Master	EMCO	1070-1	9109-1624	N/A	N/A	■

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