

**DIGITAL EMC CO., LTD.**

683-3, Yubang-Dong, Yongin-Si, Kyunggi-Do, Korea. 449-080

Tel: +82-31-321-2664 Fax: +82-31-321-1664

<http://www.digitalemcc.com>**CERTIFICATION OF COMPLIANCE**

Raymedia co., Ltd.
665, Youngchun-ri, Dongtan-myun, Hwasung-si
Kyunggi-do, 445-813, Korea.

Dates of Tests: June 13~16, 2005
Test Report S/N: DR50110506D
Test Site : DIGITAL EMC CO., LTD.

FCC ID

TEOROV-1000

APPLICANT

Raymedia Co., Ltd.

FCC Classification : **Low Power Communication Device Transmitter**
Device name : **Car DVD Player**
Manufacturer : **Raymedia Co., Ltd.**
Model / Brand name : **ROV-1000 / RMC**
Add Model : **ROV-1001 / DVD-10.2F / PF-10DVD / LSMD-102**
Test Device Serial number : **Identical prototype**
FCC Rule Part(s) : **FCC Part 15 Subpart C**
Frequency Range : **88.1 ~ 90.1 MHz**
Data of issue : **June 17, 2005**

I attest to the accuracy of data. All measurements reported 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.



NVLAP LAB CODE 200559-0

TABLE OF CONTENTS

1. GENERAL INFORMATION	-----	3
2. INFORMATION ABOUT TEST ITEM	-----	4
3. TEST REPORT	-----	6
3.1 SUMMARY OF TESTS	-----	6
3.2 TEST REQUIREMENTS	-----	7
3.2.1 FIELD STRENGTH OF FUNDAMENTAL AND EMISSIONS WITHIN PERMITTED BAND. --		7
3.2.2 RADIATED EMISSIONS	-----	8
3.2.3 AC CONDUCTED EMISSION	-----	11
3.2.4 OCCUPIED CHANNEL BANDWIDTH	-----	12
3.2.5 ANTENNA REQUIREMENT	-----	14
APPENDIX I MEASUREMETN UNCERTAINTY	-----	15
APPENDIX II TEST EQUIPMENT USED FOR TESTS	-----	17

1. General Information

This report contains the result of tests performed by:

DIGITAL EMC CO., LTD.

Address : 683-3, Yubang-Dong, Yongin-Si, Kyunggi-Do, Korea. 449-080

<http://www.digitalemc.com> E-mail : demc@unitel.co.kr

Tel: +82-31-321-2664 Fax: +82-31-321-1664

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competent of calibration and testing laboratory".
This laboratory is accredited by NVLAP and NVLAP Lab. Code is 200559-0.

Test By : Engineer

June 17, 2005

Won -Jung LEE

Data

Name

Signature

Report Reviewed By: Manager

June 17, 2005

Harvey Sung

Data

Name

Signature

Ordering party:

Company name : Raymedia Co., Ltd.
Address : 665, Youngchun-ri, Dongtan-myun, Hwasung-si
Zip code : 445-813
City/town : Kyunggi-do
Country : KOREA
Date of order : June 9, 2005
Attention : June-Su Yeo

2. Information about test item

TEOROV-1000

2.1 Equipment information

Equipment model name	ROV-1000
Type of equipment	CAR DVDPLAYER
Frequency band	88.1 ~ 90.1 MHz
Type of antenna	Line Antenna
Power	DC 12 V

2.2 Cabling Configuration

EUT	Shield	Length (m)	Connection
AUX-IN Video	None	1.2	Termination
AUX -IN Audio(R)	None	1.2	Termination
AUX -IN Audio(L)	None	1.2	Termination
AUX -OUT Video	None	1.2	Termination
AUX - OUT Audio(R)	None	1.2	Termination
AUX - OUT Audio(L)	None	1.2	Termination
DC POWER	None	1.5	DC power supply
SPDIF OUT	None	0.5	open
REMOTE	None	0.5	open
LIGHT 1	None	0.5	open
LIGHT 2	None	0.5	open

2.3 Tested environment

Temperature	: 15 ~ 35 (°C)
Relative humidity content	: 20 ~ 75 %
Air pressure	: 86 ~ 103 kPa
Details of power supply	: DC 12.0 V (powered by power supply)

TEOROV-1000

2.4 Tested frequency

Frequency	TX	RX
Low frequency	88.1 MHz	-
High frequency	90.1MHz	-

Note: Measurements were performed top and bottom location in the frequency range of operation according to the section 15.31(m)

2.5 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing

- ➔ 1. Shielded internal interface cables and grounded to metal frame.
For more details, refer to attached internal photos.
- ➔ 2. Added a copper tape on the DVD loader chassis.
- ➔ 3. Shielded internal loader cable.

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Condition	Status (note 1)
15.239	Field Strength of Fundamental and Emissions within permitted band.	< 250 uV @ 3m	Radiated	C
15.209	Radiated Emission	< FCC 15.209 limits	Radiated	C
15.207	AC Conducted Emissions	< FCC 15.207 limits	Line Conducted	NA
15.239	Occupied channel bandwidth	< 200kHz	Radiated	C
15.203	Antenna Requirement	-	-	C
Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable Note 2: Conducted emission test is not applied, because the power of the EUT is supplied from a Car battery. Note 3: The sample was tested according to the following specification: FCC Parts 15.239; ANSI C 63.4-2003				

3.2 TEST requirements

3.2.1 Field Strength of Fundamental and Emissions within permitted band.

Procedure:

The field strength of emissions from intentional radiators operated within the bands 88 ~108MHz was measured in accordance with FCC Part § 15.239. The test set-up was made according to ANSI C 63.4:2003.

The EUT was placed on a 0.8m high wooden table inside a shielded semi-anechoic chamber. An antenna was placed at 3m distance from EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed at 3m OATS.

Type of Test : Low Power Communication Device Transmitter
 FCC ID : **TEOROV-1000**
 Operating Condition : Transmit the 1 kHz audio signal from the test CD.

Measurement Data:

Frequency (MHz)	Pol	Read Level (dBuV/m)	Probe Factor (dB)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
88.1	V	57.82	7.77	1.50	28.39	38.7	48	9.3
90.1	V	56.97	8.12	1.50	28.39	38.2	48	9.8

Note 1: Field Strength Calculation

Level = Read Level + Probe Factor + Cable Loss - Preamplifier Factor

Margin = Limit - Level

Minimum Standard:

The maximum Field Strength authorized within 200kHz is 250 uV/m@3m

TEST EQUIPMENT USED: 02, 22, 30, 31, 33, 34, 39, 40, 41, 47, 49

3.2.2 Radiated Emission

Procedure:

The field strength of emissions from intentional radiators operated within the bands 88 ~108MHz was measured in accordance with FCC Part § 15.239. The test set-up was made according to ANSI C 63.4:2003.

The EUT was placed on a 0.8m high wooden table inside a shielded semi-anechoic chamber. An antenna was placed at 3m distance form the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed at 3m OATS.

The spectrum analyzer is set to:

Frequency Range = 30 MHz ~ 10th harmonic.

RBW = 120 kHz (30MHz ~ 1 GHz)

VBW ≥ RBW

= 1 MHz (1 GHz ~ 10th harmonic)

Trace = max hold

Detector function = Peak

Sweep = auto

Receiver Detector = Quasi-Peak

Operating Condition: Transmit the 1 kHz audio signal from the test CD.

Measurement Data: Complies

- Refer to the next page.

Minimum Standard: FCC Part 15.209(a)

Frequency (MHz)	Limit (uV/m) @ 3m
30 ~ 88	100 **
88 ~ 216	150 **
216 ~ 960	200 **
Above 960	500

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

TEST EQUIPMENT USED: 02, 30, 31, 33, 34, 39, 40, 41, 47, 49

Measurement Data 1 : Harmonics of the 88.1 MHz

Frequency (MHz)	Pol	Read Level (dBuV/m)	Probe Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
No emissions were detected at a level greater than 10dB below limit.								

Measurement Data 2: Harmonics of the 90.1 MHz

Frequency (MHz)	Pol	Read Level (dBuV/m)	Probe Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
No emissions were detected at a level greater than 10dB below limit.								

Note 1: Field Strength Calculation

Level = Read Level + Probe Factor + Cable Loss - Preamp Factor

Margin = Limit - Level

Note 2.: Up to the 10th harmonics were investigated according to 15.239 and the worst-case emissions are reported.

Measurement Data 3 : other emissions

Frequency (MHz)	Pol	Read Level (dBuV/m)	Probe Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
803.24	V	34.5	20.31	4.42	29.07	30.16	46	-15.84
803.27	H	37.0	20.31	4.42	29.07	32.66	46	-13.34
918.01	H	31.0	20.39	5.00	28.29	27.32	46	-15.9
918.02	V	36.0	20.39	5.00	28.29	32.32	46	-10.9
-	-	-	-	-	-	-	-	-

Note 1: Field Strength Calculation

Level = Read Level + Probe Factor + Cable Loss - Preamp Factor

Margin = Limit - Level

Note 2.: Up to the 10th harmonics were investigated according to 15.239 and the worst-case emissions are reported.

3.2.3 AC Conducted Emissions

Procedure:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its normal operating function. Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

Measurement Data: Not Applicable

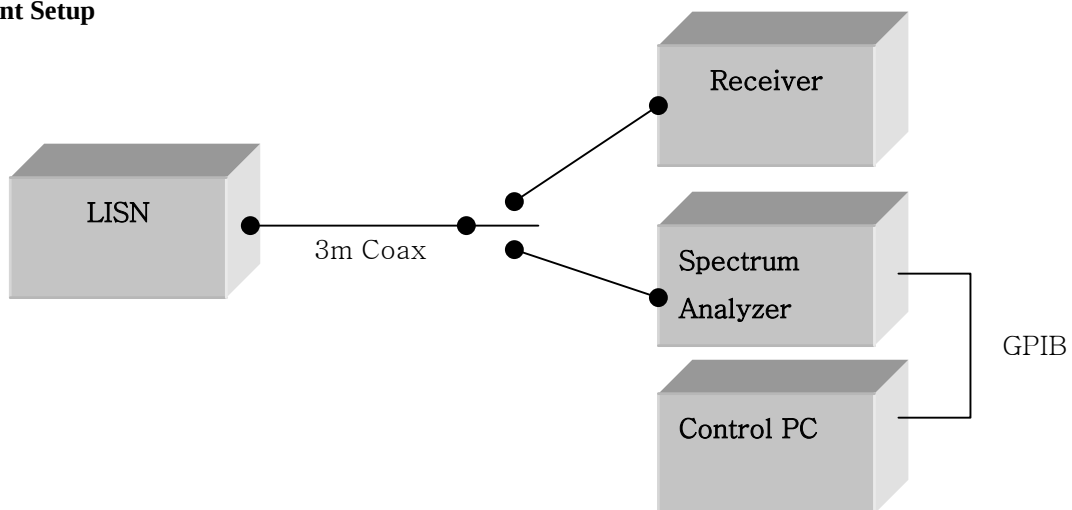
Conducted emission test is not applied because the power of the EUT is supplied from a Car battery.
So it is not need to test this requirement,

Minimum Standard: FCC Part 15.207(a)/EN 55022

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

Measurement Setup



Measurement setup for AC Conducted Emission

TEST EQUIPMENT USED: 42, 43, 44, 45, 46, 48

3.2.4 Occupied Channel Bandwidth

Procedure:

The occupied channel Bandwidth is defined as the minimum declared bandwidth within which the transmitter's necessary bandwidth can be contained. The transmitter was adjusted to work at the selected channels. The occupied channel BW was measured at an amplitude level reduced from the reference level by the 26dB.

The plot is taken at 30kHz/division frequency span, 10kHz resolution bandwidth and 5dB/division amplitude logarithmic display from a spectrum analyzer.

The spectrum analyzer is set to:

Frequency Range =

RBW = 10 kHz

Trace = max hold

Sweep = auto

VBW $\geq$ RBW

Detector function = Peak

Span = 300 kHz

Operating Condition: Transmit 1kHz audio signal from the test CD

Measurement Data: Complies

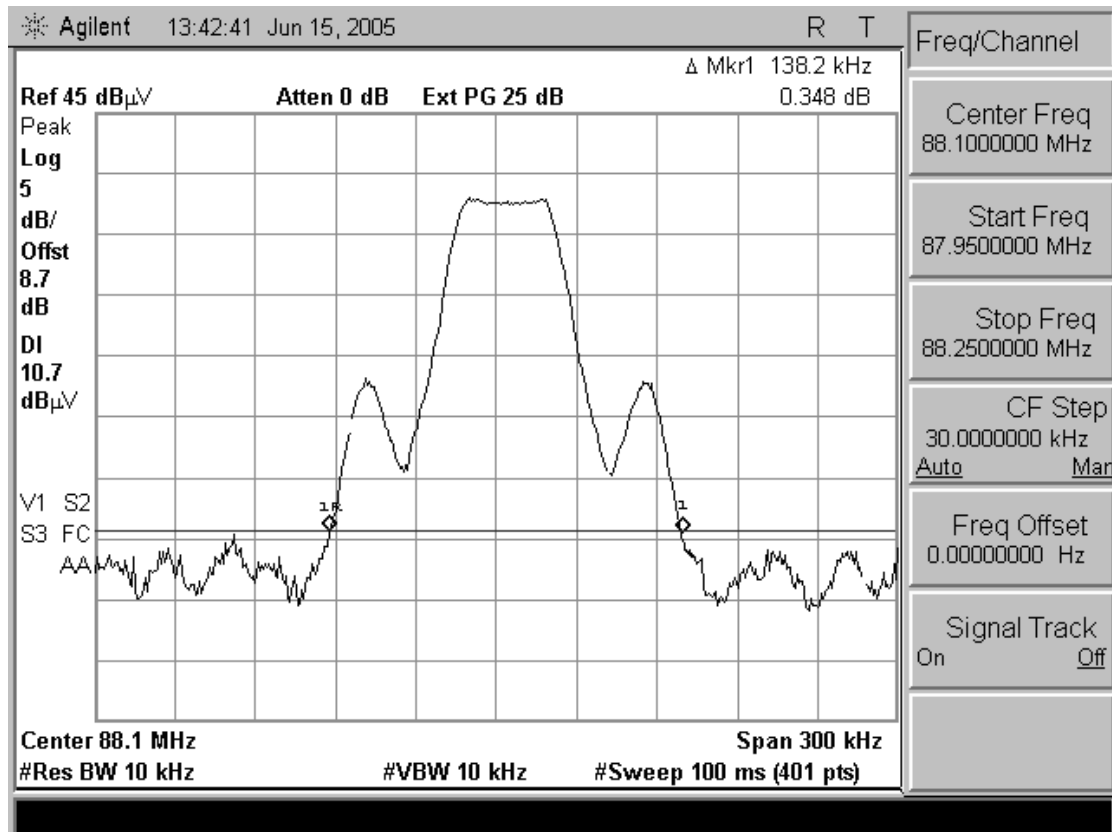
Refer to the next page.

Minimum Standard:

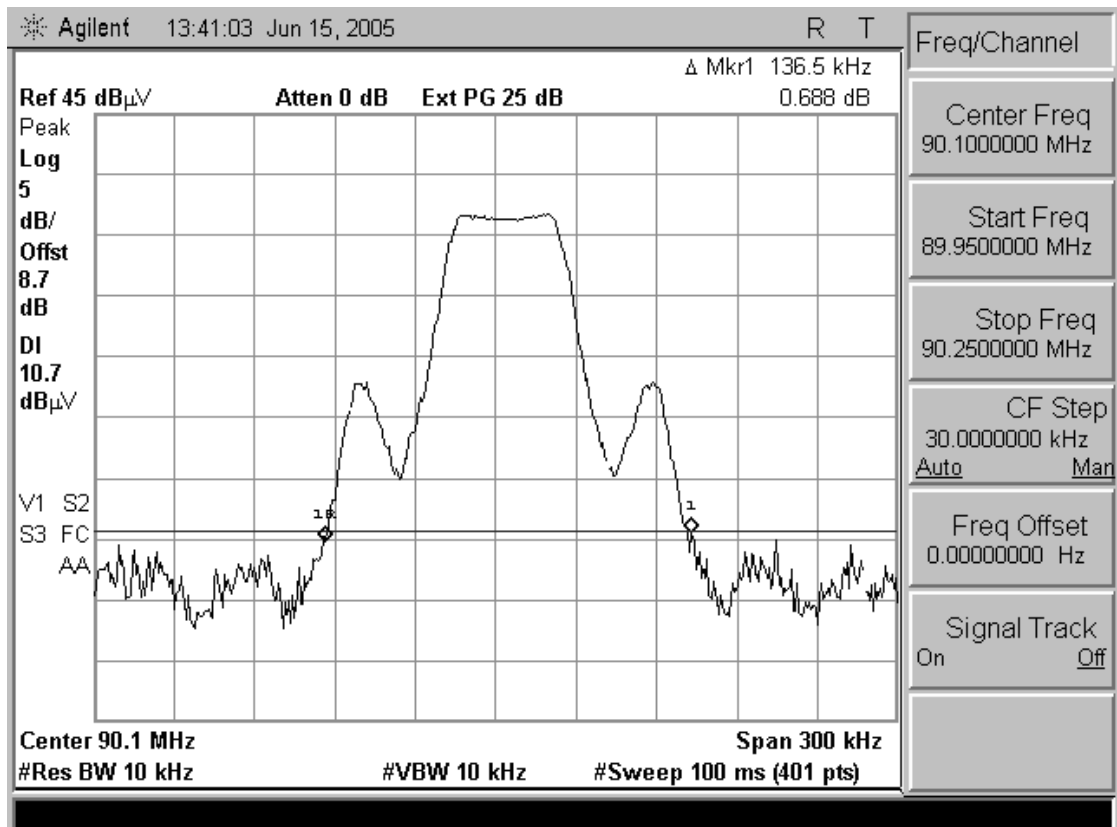
Occupied Channel Bandwidth < 200kHz.

TEST EQUIPMENT USED: 01, 34, 39, 40, 41,...

Occupied Channel Bandwidth plot (88.1 MHz)



Occupied Channel Bandwidth plot (90.1 MHz)



3.2.5 Antenna Requirement

Define:

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the applicant can be used with the device. The use of permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with this requirement.

--- **The antenna Type** : Line Antenna with soldering to the PCB.

APPENDIX I

MEASUREMETN UNCERTAINTY

Measurement Uncertainty(CE/RE)

Input Quantity	Probability Distribution	Probability Distribution (dB)	Standard
		9kHz~30MHz	
Cable loss(RG214)	Standard Deviation(SD)	± 0.08	10 th measurement
Receiver corrections; -Voltage accuracy -Attenuation accuracy -Absolute pulse response	Rectangular ($\sqrt{3}$) Rectangular ($\sqrt{3}$) Rectangular ($\sqrt{3}$)	± 0.27 ± 0.1 ± 1.5	Cal. Report Cal. Report Cal. Report (CISPR16-3)
LISN corrections (KNW-242) ; -Voltage division factor	Normal (k=2)	± 0.8	Cal. Report
Mismatch; - Receiver VRC* : $\Gamma_i = 0.2$ -LISN VRC : $\Gamma_g = 0.2(150\text{kHz})$ = 0.04(30MHz) - Uncertainty : $20\log(1 \pm \Gamma_i \Gamma_g)$	U-type ($\sqrt{2}$)	+0.34 -0.35	Cal. Report Cal. Report
System Repeatability	Standard Deviation(SD)	± 0.46	10 th measurement
Combined measurement uncertainty Uc(y)	Normal	+ 1.1 - 1.1	
Expended measurement uncertainty (95%,Confidence level,k=2)dB	Normal(k=2)	+ 2.20 - 2.21	

Input Quantity	Probability Distribution	Measurement Uncertainty(dB)		Standard
		3m	10m	
		Bi-Log	Bi-Log	
Antenna Factor(CBL6112B)	Normal(K=2)	30M~1G: ± 1.5 1G~2G: ± 1.2	30M~1G: ± 1.5 1G~2G: ± 1.2	ANT Cal. uncertainty
Cable loss(RG214/U,HFC12D)	Standard Deviation(SD)	± 0.14	± 0.14	5 th measurement
Receiver corrections; -Voltage accuracy -Attenuation accuracy -Absolute pulse response	$\sqrt{3}$	± 0.19 ± 0.15 ± 0.19	± 0.19 ± 0.15 ± 0.19	Cal. Report
Antenna Directivity	Rectangular ($\sqrt{3}$)	+1.0/-0	+1.0/-0	CISPR16-4
AF height deviations	Rectangular ($\sqrt{3}$)	± 0	± 0	CISPR16-4
Phase center location	Rectangular ($\sqrt{3}$)	± 0	± 0	CISPR16-4
Separation distance	Rectangular ($\sqrt{3}$)	± 0.3	± 0.1	CISPR16-4
Uncertainty of Site	Rectangular ($\sqrt{3}$)	+2.3/-3.17	+2.0/-3.1	NSA
Mismatch -Receiver VRC*: $\Gamma_i=0.2$ -ANT.VRC : $\Gamma_g=0.33$ - Uncertainty $20\log(1 \pm \Gamma_i \Gamma_g=0.33)$	U-type $\sqrt{2}$	+0.56 -0.59	+0.56 -0.59	Manual
Pre-amp.	K=2	± 0.18	± 0.18	Cal. Report
System Repeatability	Standard Deviation(SD)	± 0.11	± 0.71	5 th repeated measurement
Combined measurement uncertainty Uc(y)	Normal(k=1)	+ 1.7342 - 2.0682	+ 1.7328 - 2.1346	
Expended measurement uncertainty (95%,Confidence level,k=2)dB	K=2	30M~1GHz +3.47 -4.14	30M~1GHz +3.47 -4.27	

APPENDIX II

TEST EQUIPMENT USED FOR TESTS

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment.

	Type	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	S/N
01	Spectrum Analyzer	Agilent	E4404B	19/11/05	30601-01-6025569
02	Spectrum Analyzer	H.P	8563E	25/09/05	3551A04634
03	Power Meter	H.P	EPM-442A	15/07/05	GB37170413
04	Power Sensor	H.P	8481A	15/07/05	3318A96332
05	Frequency Counter	H.P	5342A	07/10/05	2119A04450
06	Multifunction Synthesizer	H.P	8904A	07/10/05	3633A08404
07	Signal Generator	H.P	8673D	26/09/05	2844A00753
08	Signal Generator	H.P	E4421A	15/07/05	US37230529
09	Signal Generator	H.P	8657A	26/05/05	3430U02049
10	Audio Analyzer	H.P	8903B	21/07/05	3011A0944B
11	Modulation Analyzer	H.P	8901B	15/07/05	3028A03029
12	Sensor Module	H.P	11722A	15/07/05	3111A04665
13	Oscilloscope	LeCroy	9314A	10/10/05	93144390
14	CDMA Mobile Station Test Set	H.P	8924C	07/10/05	US35360688
15	Power Splitter	WEINSCHEL	1593	07/10/05	332
16	BAND Reject Filter	Wainwright	WRCG824	07/10/05	SN1
17	BAND Reject Filter	Wainwright	WRCG1750	07/10/05	SN2
18	AC Power supply	DAEKWANG	5KVA	18/04/06	N/A
19	DC Power Supply	H.P	6622A	18/04/06	465487
20	Attenuator (30dB)	H.P	8498A	07/10/05	50101
21	Attenuator (10dB)	WEINSCHEL	23-10-34	07/10/05	BP4387
22	HORN ANT	EMCO	3115	06/03/07	6419
23	HORN ANT	EMCO	3115	04/25/07	21097
24	HORN ANT	A.H.Systems	SAS-574	09/11/06	154
25	HORN ANT	A.H.Systems	SAS-574	09/11/06	155
26	Dipole Antenna	Schwarzbeck	VHA9103	29/10/05	2116

	Type	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	S/N
27	Dipole Antenna	Schwarzbeck	VHA9103	29/10/05	2117
28	Dipole Antenna	Schwarzbeck	UHA9105	29/10/05	2261
29	Dipole Antenna	Schwarzbeck	UHA9105	29/10/05	2262
30	RFI/FIELD Intensity Meter	Kyorits	KNM-504D	25/07/05	SN-161-4
31	Frequency Converter	Kyorits	KCV-604C	25/07/05	4-230-3
32	TEMP & HUMIDITY Chamber	JISCO	J-RHC2	14/09/05	021031
33	Log Periodic Antenna	Schwarzbeck	UHALP9108A1	29/10/05	1098
34	Biconical Antenna	Schwarzbeck	VHA9103	29/10/05	VHA91031946
35	Digital Multimeter	H.P	34401A	18/04/06	3146A13475
36	Attenuator (10dB)	WEINSCHEL	23-10-34	07/10/05	BP4386
37	High-Pass Filter	ANRITSU	MP526	12/05/06	M27756
38	Attenuator (3dB)	Agilent	8491B	15/09/05	58177
39	Amplifier (25dB)	Agilent	8447D	18/04/06	2944A10144
40	Position Controller	TOKIN	5901T	N/A	14173
41	Driver	TOKIN	5902T2	N/A	14174
42	Spectrum Analyzer	H.P	8591E	18/04/06	3649A05889
43	RFI/FIELD Intensity Meter	Kyorits	KNW-2402	07/07/05	4N-170-3
44	LISN	Kyorits	KNW-407	29/08/05	8-317-8
45	LISN	Kyorits	KNW-242	16/08/05	8-654-15
46	CVCF	NF Electronic	4400	N/A	344536 4420064
47	Software	ToYo EMI	EP5/RE	N/A	Ver 2.0.800
48	Software	ToYo EMI	EP5/CE	N/A	Ver 2.0.801
49	Software	AUDIX	e3	N/A	Ver 3.0
50	Software	Agilent	Benchlink	N/A	A.01.09 021211