



property name.

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CLASS B CERTIFICATION

Test report file number : E015R-055

Applicant : Maycom Co., Ltd.

Address : Maycom B/D, 280-5, Seoksu2-Dong, Manan-Gu, Anyang-City, Kyungki-Do, 430-042, Korea

Manufacturer : Maycom Co., Ltd.

Address : Maycom B/D, 280-5, Seoksu2-Dong, Manan-Gu, Anyang-City, Kyungki-Do, 430-042, Korea

Type of Equipment : Digital Voice Recorder

FCC ID : N6MMAYCOMVR-2000

Model / Type No. : VR-2000

Serial number : N/A

Total page of Report : 13 pages (including this page)

Date of Incoming : April 28, 2001

Date of issuing : May 24, 2001

SUMMARY

The equipment complies with the regulation; **FCC CFR 47 PART 15 SUBPART B, Class B.**

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

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

Reviewed by:

Y. K. Nam / Asst. Chief Engineer

Approved by:

S. S. Hong / Managing Director

This report shall not be reproduced except in full without our written approval.

FCC-004 (Rev.0)

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-121, Korea
(TEL: 82-31-746-8500 FAX: 82-31-746-8700)

EMC Testing Dept : 426-1 Daesangyong-Ri Chosong-Myun Kwangju-Kun Kyunggi-Do 464-860 Korea (TEL: 82-31-765-8289 FAX: 82-31-766-2904)



property name.

EMC Dept.
ONETECH Corp.

EMC Dept.
ONETECH Corp.



property name.

CONTENTS

	Page
1. VERIFICATION OF COMPLIANCE.....	4
2. GENERAL INFORMATION.....	5
2.1 PRODUCT DESCRIPTION.....	5
2.2 RELATED SUBMITTAL(S) / GRANT(S)	6
2.3 TEST SYSTEM DETAILS.....	6
2.4 TEST METHODOLOGY	6
2.5 TEST FACILITY	6
3. SYSTEM TEST CONFIGURATION.....	7
3.1 JUSTIFICATION.....	7
3.2 EUT EXERCISE SOFTWARE	7
3.3 CABLE DESCRIPTION	7
3.4 NOISE SUPPRESSION PARTS ON CABLE	8
3.5 EQUIPMENT MODIFICATIONS	8
3.6 CONFIGURATION OF TEST SYSTEM.....	8
4. PRELIMINARY TEST.....	9
4.1 CONDUCTED EMISSION TEST	9
4.2 RADIATED EMISSION TEST	9
5. FINAL RESULT OF MEASUREMENT.....	10
5.1 CONDUCTED EMISSION TEST	10
5.2 RADIATED EMISSION TEST	14
6. FIELD STRENGTH CALCULATION	16
7. LIST OF TEST EQUIPMENT	18

property name.**1. VERIFICATION OF COMPLIANCE**

APPLICANT : Maycom Co., Ltd.
 ADDRESS : Maycom B/D, 280-5, Seoksu2-Dong, Manan-Gu, Anyang-City, Kyungki-Do, 430-042, Korea
 CONTACT PERSON : Oi Sung, Yi / Engineer
 TELEPHONE NO : +82-31-470-7757
 FCC ID : N6MMAYCOMVR-2000
 MODEL NO/NAME : VR-2000
 SERIAL NUMBER : N/A
 DATE : May 24, 2001

DEVICE TYPE	Peripheral Device for Class B Computing Device -Unintentional Radiator
E.U.T. DESCRIPTION	Digital Voice Recorder
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 PART 15 SECTION 15.101
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.

property name.

2. GENERAL INFORMATION

2.1 Product Description

The Maycom Co., Ltd., Model VR-2000 (referred to as the EUT in this report) is a Digital Voice Recorder, which can record voice by using external microphone and connect to PC in order to transfer recorded message in EUT. Product specification described herein was obtained from product data sheet or user's manual.

Chassis Type	Plastic
List of Each Oscillator or Crystal Frequency	32.768KHz, 5.00MHz, 36.864MHz on the CPU B/D
Power Requirements	DC 1.5V x 2 (AAA Size Battery)
Battery Life	About 12hours(Record mode), 8hours(Earphone play), 7hours(Speaker play)
Number of Layers	4 Layers (CPU B/D), 4 Layers (AUDIO B/D)
Recording System	Built-in Flash Memory
Max No. of Recording Message	495 Message, 5 Files x 99 messages
Max Output Power	80Mw, @ 8ohm, 10% THD
Frequency Bandwidth	300Hz ~ 3300Hz
Condition for Use	Temperature -10 °C to +50 °C
External Connector	Mic Jack, Earphone Jack, Serial Port

Model Differences:

-. The following list consists of added model name and their difference. The basic and added models are identical except for following difference.

	Model Name	Model Difference	
Basic Model Name	VR-2000	Built-in flash memory 32MB and PC interface cable is include in basic accessories	
Added Model Name	VR-2032	Flash memory 32MB	PC interface cable is include in basic accessories
	VR-2016	Flash memory 16MB	
	VR-2008	Flash memory 8MB	
	VR-1032	Flash memory 32MB	PC interface cable is not include in basic accessories
	VR-1016	Flash memory 16MB	
	VR-1008	Flash memory 8MB	



property name.

2.2 Related Submittal(s) / Grant(s)

Original submittal only.

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
VR-2000	Maycom Co., Ltd.	N6MMAYCOMVR-2000	Digital Voice Recorder (EUT)	PC
DCM	Dell Computer Corp	DoC	PC	-
AV-5T	KDS	EVOKD-1510T	MONITOR	PC
SKR-1032	SEJIN Elec	GJJKR-1032B	KEYBOARD	PC
SMB-601	SEJIN Elec	GJJB509A0	MOUSE	PC
2225C	HP	DSI6XU2225	PRINTER	PC

2.4 Test Methodology

Both conducted and radiated testing was performed according to the procedures in 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)



property name.

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
CPU Board	Maycom Co., Ltd.	N/A	N/A
AUDIO Board	Maycom Co., Ltd.	N/A	N/A

3.2 EUT exercise Software

After connecting the earphone, microphone and PC using interface cable on the EUT, the EUT was tested at each following mode during the testing.

- 1) Standby mode 2) Recording mode 3) Playing the recorded message and
- 4) PC Communication Mode between PC and the EUT

3.3 Cable Description

	Power Cord Shielded (Y/N)	I/O cable Shielded (Y/N)	Length (M)
Digital Voice Recorder (EUT)	N/A	Y	1.2 (D)
PC	N	Y	1.5(P), 1.2(D)
MONITOR	N	Y	1.5(P), 1.8(D)
KEYBOARD	N/A	Y	1.5 (D)
MOUSE	N/A	Y	1.5(D)
PRINTER	N	Y	1.5(P), 1.2 (D)
EARPHONE	N/A	N	1.2(D)
MIC	N/A	N	1.2 (D)

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

property name.

3.4 Noise Suppression Parts on Cable

	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
Digital Voice Recorder (EUT)	N	N/A	Y	BOTH END
PC	-	-	-	-
MONITOR	Y	BOTH END	Y	PC END
KEYBOARD	N	N/A	Y	PC END
MOUSE	N	N/A	Y	PC END
PRINTER	N	N/A	Y	BOTH END
EARPHONE	N	N/A	Y	EUT END
MIC	N	N/A	Y	EUT END

3.5 Equipment Modifications

To achieve compliance to CLASS B levels, the following change(s) was made by Maycom Co., Ltd during compliance testing:

1. Added a ferrite bead at each signal line of Mic. Jack and Earphone Jack.
2. Added ferrite bead between Jack's ground and PCB ground through the ferrite bead after cut out ground pattern.

3.6 Configuration of Test System

Line Conducted Test: EUT was connected to the PC by using interface cable and PC was connected to LISN, all supporting equipment was 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.

Radiated Emission Test: Preliminary radiated emission test was conducted using the procedure in ANSI C63.4/1992 8.3.1.1 to determine the worse operating conditions. Final radiated emission test was conducted at 3 meters open area test site.



property name.

4. PRELIMINARY TEST

4.1 Conducted Emission Test

During Preliminary Test, the following operating mode was investigated.

Operation Mode	The Worse operating condition (Please check one only)
Played the recording of voice and playback mode	X
Downloaded messages from the EUT	

4.2 Radiated Emission Test

During Preliminary Test, the following operating mode was investigated.

Operation Mode	The Worse operating condition (Please check one only)
Played the recording of voice and playback mode	X
Downloaded messages from the EUT	



property name.

5. FINAL RESULT OF MEASUREMENT

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

5.1 Conducted Emission Test

Humidity Level : 42 % Temperature : 24 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART B
 Type of Test : CLASS B
 Result : PASSED BY -7.38 dB at 1.12 MHz

EUT : Digital Voice Recorder Date: May 25, 2001
 Operating Condition : Continuously played the recording of voice and played the messages recorded in EUT
 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)
0.56	39.07	NEUTRAL	48.00	-8.93
0.70	39.15	NEUTRAL	48.00	-8.85
1.12	40.62	HOT	48.00	-7.38
1.65	40.04	NEUTRAL	48.00	-7.96
9.74	39.67	NEUTRAL	48.00	-8.33
13.53	36.07	HOT	48.00	-11.93
14.28	38.03	NEUTRAL	48.00	-9.97
18.21	35.49	HOT	48.00	-12.51

Line Conducted Emission Tabulated Data

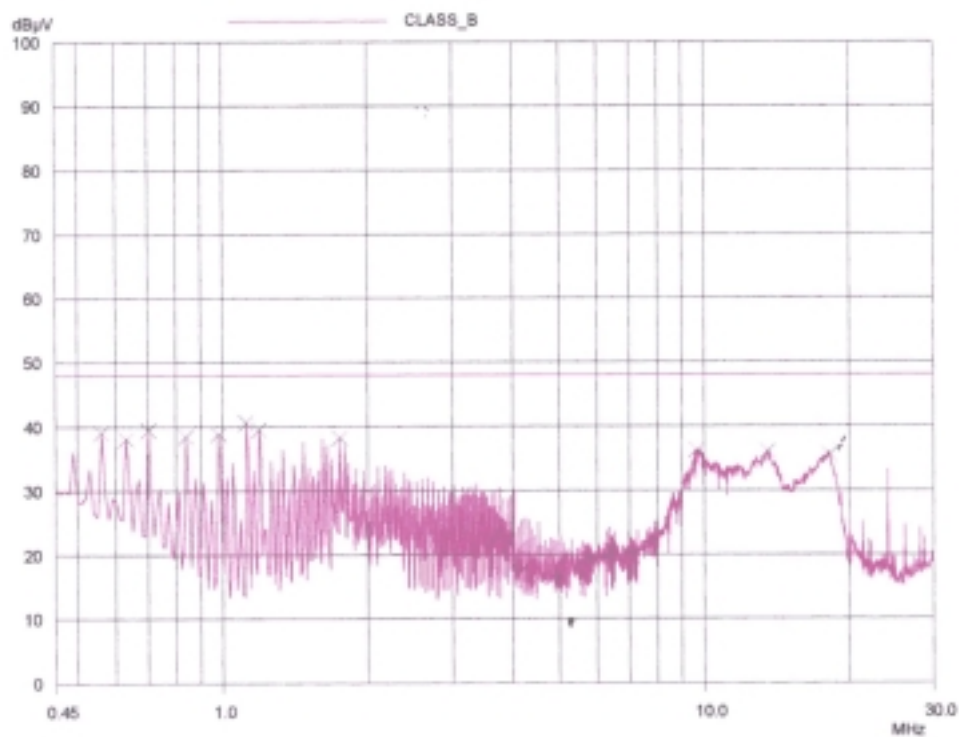


property name.

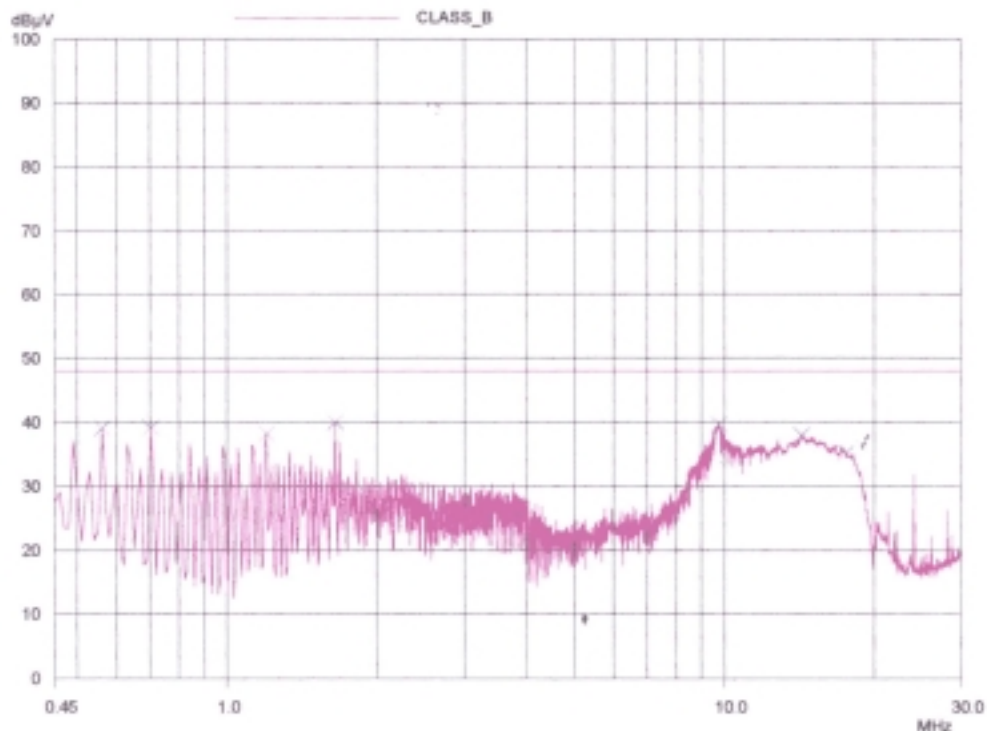
Tested by: Seung-Hyun, Nam / Test Engineer



property name.



HOT LINE



This report shall not be reproduced except in full without our written approval.

FCC-004 (Rev.0)

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-121, Korea
(TEL: 82-31-746-8500 FAX: 82-31-746-8700)

EMC Testing Dept : 426-1 Dae-sangyong-Ri Chowol-Myun, Kwangju-Kun, Kyunggi-Do 464-860 Korea (TEL: 82-31-765-8289 FAX: 82-31-766-2904)



property name.

NEUTRAL LINE



property name.

5.2 Radiated Emission Test

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

Humidity Level : 42 % Temperature : 24 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART B
 Type of Test : CLASS B
 Result : PASSED BY -6.87 dB at 201.09 MHz

EUT : Digital Voice Recorder Date: May 22, 2001
 Operating Condition : Continuously played the recording of voice and played the messages recorded in EUT
 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)
110.63	14.40	H	12.65	1.20	28.25	43.50	-15.25
201.09	23.50	H	11.55	1.58	36.63	43.50	-6.87
204.81	22.70	H	11.61	1.60	35.91	43.50	-7.59
208.54	21.20	H	11.67	1.61	34.48	43.50	-9.02
212.26	20.60	H	11.74	1.63	33.97	43.50	-9.53
215.98	19.40	H	11.80	1.65	32.85	43.50	-10.65
219.71	18.10	H	11.86	1.67	31.63	46.00	-14.37
223.43	17.80	H	11.92	1.69	31.41	46.00	-14.59
227.15	16.90	H	11.99	1.71	30.60	46.00	-15.40
230.82	16.00	H	12.05	1.73	29.78	46.00	-16.22
234.55	15.00	H	12.11	1.75	28.86	46.00	-17.14
238.27	15.00	H	12.17	1.77	28.94	46.00	-17.06
241.99	12.50	H	12.24	1.79	26.53	46.00	-19.47

Radiated Emission Tabulated Data

This report shall not be reproduced except in full without our written approval.

FCC-004 (Rev.0)

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-121, Korea
 (TEL: 82-31-746-8500 FAX: 82-31-746-8700)

EMC Testing Dept : 426-1 Daesangyong-Ri, Chongwŏn-Myun, Kwangju-Kun, Kyunggi-Do 464-860 Korea (TEL: 82-31-765-8289 FAX: 82-31-766-2904)



property name.

Tested by : Seung-Hyun, Nam / Test Engineer



property name.

6. 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)



property name.



property name.

7. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESVS 10	827864/005	OCT/00	12MONTH	■
2.	Test receiver	R/S	ESHS10	834467/007	APR/01	12MONTH	■
3.	Spectrum analyzer	HP	8568B	3026A0226	SEP/00	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/01	12MONTH	■
8.	Log Periodic antenna	EMCO	3146	9109-3213 9109-3214 9109-3217	JUN/00	12MONTH	■
9.	LISN	EMCO	3825/2	9109-1867 9109-1869	JUN/00	12MONTH	■
10.	RF Amplifier	HP	8447F	3113A04554	JUN/00	N/A	
11.	Spectrum Analyzer	HP	8591A	3131A02312	APR/01	12MONTH	
12.	Computer System	HP	98581C	98543A	N/A	N/A	■
	Hard disk drive		9153C	CMC762Z9153	N/A	N/A	■
13.	Plotter	HP	7475A	30052 22986	N/A	N/A	■
14.	Position Controller	EMCO	1090	9107-1038	N/A	N/A	■
15.	Turn Table	EMCO	1080-1.21	9109-1576	N/A	N/A	■
16.	Antenna Master	EMCO	1070-1	9109-1624	N/A	N/A	■