

ONETECH Corp.

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ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

TV INTERFACE DEVICE CERTIFICATION TO FCC PART 15 REQUIREMENT

PRODUCT	VIDEO CASSETTE PLAYER			
FCC ID	BRFVPDD301			
MODEL NO.	MA/2X-2 SERIAL NO. N/A			
APPLICANT & ADDRESS	KOREA ELECTRONICS CO., LTD. 275-7, YANGJAE-DONG, SEOCH-KU, SEOUL, 137-130, KOREA			

REPORT NO.	E98NR-004	ISSUE DATE	November 05, 1998
PREPARED BY: ONETECH CORPORATION			
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	SEOUL 137-070 KOREA (TEL)02-587-9037(FAX)02-587-9039		

LIST OF EXHIBITS

FCC ID : BRFVPDD301

MODEL : MA/2X-2

"VIDEO CASSETTE PLAYER"

EXHIBIT 1. IDENTIFICATION LABEL

- 2. AGENT AUTHORIZATION
- 3. MODIFICATION LIST
- 4. TECHNICAL INFORMATION: ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
- 5. PHOTO REPORT
- 6. USER'S MANUAL & SCHEMATIC (BLOCK DIAGRAM)

PREPARED BY: ONETECH CORPORATION

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EXHIBIT 1. IDENTIFICATION LABEL:

PROPOSED FCC LABEL (Part 15 sec. 15.19)

The following ID Label will be attached on the rear side of a product.

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 operations.

FCC ID: BRFVPDD301

[&]quot;Please find an ID Label for EUT at ID Label/Location Info in Exhibit Type"

EXHIBIT 2. AGENT AUTHORIZATION:

"Please find an Agent Authorization Letter at Attestation Statements in Exhibit Type"

EXHIBIT 3. MODIFICATION LIST:

REPORT NO.: E98NR-004

"There was no modified items during EMI test"

EXHIBIT 4. TECHNICAL INFORMATION:

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

TV INTERFACE DEVICE CERTIFICATION TO FCC PART 15 REQUIREMENT

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1. VERIFICATION OF COMPLIANCE

APPLICANT : KOREA ELECTRONICS CO., LTD.

275-7, YANGJAE-DONG, SEOCH-KU, SEOUL, 137-130, KOREA

CONTACT PERSON : Eui-Yeun, Kim / Associate engineer

TELEPHONE NO : 82-546-467-3553

FCC ID : BRFVPDD301 MODEL NO/NAME : MA/2X-2

SERIAL NUMBER : N/A

DATE : November 05, 1998

DEVICE TYPE	TV Interface Device-Unintentional Radiator
E.U.T. DESCRIPTION	VIDEO CASSETTE PLAYER
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	MP-3, 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)	PART 15
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	NO
FINAL TEST WERE CONDUCTED ON	3 METER OPEN TEST SITE

The above equipment was tested by ONETECH CORPORATION 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.

YONG KWANG, KWON / CHIEF ENGINEER

EMC TESTING DEPARTMENT ONETECH Testing & Eval. Lab.

SEOUL KOREA

2. GENERAL INFORMATION

2.1 Product Description

The KOREA ELECTRONICS CO., LTD., Model MA/2X-2 (referred to as the EUT in this report) is a VIDEO CASSETTE PLAYER. Product specification information described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Metal	
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	3.58 ,8	
POWER REQUIREMENT	12V DC(CAR BATTERY or ADAPTER), 11W	
TELEVISION SYSTEM	EIA Standard 525 Lines/60 Fields, NTSC Color System	
CASSETTE TYPE	1/2" Video-VHS Type	
RF-OUTPUT CHANNEL(s)	CHANNEL 3 AND 4	
RF IN/OUT TERMINAL IMPEDANCE	75 OHM (Unbalanced F-Type coaxial)	
NUMBER OF RF IN/OUT TERMINAL	1 EA AT EACH	
TERMINAL(S) FOR SIGNAL	VIDEO/AUDIO OUT WITH RCA-TYPE JACK	
ACCESSORIES CONNECTED TO THE EUT	75 Ohm Coaxial cable for RF-OUT terminal provided by manufacturer, DC power cord for car	

Model Differences:

No other model differences have been mentioned

2.2 Related Submittal(s) / Grant(s)

Original submittal only

REPORT NO.: E98NR-004 2.3 Test System Details

The Model numbers for all equipment used in the tested system are:

Model	Manufacturer	FCC ID	Description	Connected to
MA/2X-2	KOREA ELECTRONICS	BRFVPDD301	Video Cassette Player (EUT)	N/A
CT-1447	SAMSUNG ELECTRONICS	N/A	TELEVISION	EUT
A41312D	SAMSUNG ELECTRIC	N/A	AC/DC Adapter	EUT

2.4 Test Methodology

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

2.5 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on at 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Kun, Kyunggi-Do 464-080 Korea. Detailed description of test facility was submitted to the Commission on January 24, 1996(31040/SIT, 1200F2).

3.1 Justification

REPORT NO.: E98NR-004

The device was configured for testing in a typical fashion (as a customer would normally use it). During the test, the following components inside the EUT were installed.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
RF MODULATOR	KOREA ELECTRONICS	KCR101N	N/A
MAIN BOARD	KOREA ELECTRONICS	PVDM01-1	N/A

3.2 EUT exercise Software

According to the requirements in Subpart B of Part 15, the measurement is made at each function of the EUT being connected with appropriate cables and loads.

The model MA/2X-2 has a video/audio output terminal in RCA-type plugs, antenna input and RF output terminal. Therefore, every measurement was investigated in the operation modes, Playing VITS 1 Vp-p recorded tape at each CH. 3 or/and 4 for each mode applicable.

3.3 Cable Description

	Power Cord Shielded (Y/N)	I/O cable Shielded (Y/N)	Length (M)
Video Cassette Player(EUT)	N	N	1.5(P),1.2(D)
TELEVISION	N	N	1.2(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
Video Cassette Player(EUT)	N	N/A	Y	BOTH END
TELEVISION	N	N/A	Y	BOTH END

3.5 Equipment Modifications

REPORT NO.: E98NR-004

-. There was no modified item during EMI test

3.6 Configuration of Test System

3.6.1 Line Conducted Test

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

3.6.2 Radiated Emission Test

Preliminary radiated emissions 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 was conducted at 3 meter open area test site.

3.6.3 Output Signal Level Test

The output voltage of video carrier frequency at the RF-output terminal of the EUT was measured at each channel (CH. 3 & 4) connecting directly to a spectrum analyzer with 500hm input impedance via 75-to-500hm matching pad. Indicated voltage on screen of measuring instrument was converted to the voltage of 750hm system. Data conversion method is as follows.

$$V_{75}[uV] = 10^{(Vr + CF)/20}[uV]$$

here, V₇₅: Voltage at the RF-out terminal of 750hm in uV,

Vr : Voltage read at analyzer with 500hm input-impedance in dBuV,

CF : Conversion Factor of the matching pad in dB.

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3.6.4 Output Terminal Conducted Spurious Emission test

Any other spectrum at RF-output terminal appearing on frequencies removed by more than 4.6MHz below or 7.4 MHz above the video carrier frequency of EUT was searched at each channel.

Data conversion method is as follows.

$$V_{75}[uV] = 10^{(Vr + CF + AT)/20}[uV]$$

here, V_{75} : Voltage at the RF-out terminal of 750hm in uV,

V_r: Voltage read at analyzer with 500hm input-impedance in dBuV,

CF : Conversion Factor of the matching pad in dB,

AT : Attenuation of attenuator in dB.

3.6.5 Transfer Switch Isolation Test

As a transfer switch was equipped with EUT as an antenna-in, measurement of isolation were made at RF-input terminal with rated input impedance.

The maximum voltage of video carrier frequency of the EUT at the antenna input (RF-in) terminal of the switch was measured for both channels.

Data conversion method is as follows.

$$V_{75}[uV] = 10^{(Vr + CF - PG + AT)/20}[uV]$$

here, V_{75} : Voltage at the RF-out terminal of 750hm in uV,

V_r: Voltage read at analyzer with 500hm input-impedance in dBuV,

CF : Conversion Factor of the matching pad in dB,

PG : Gain of pre-amplifier in dB,

AT : Attenuation of attenuator in dB.

4. PRELIMINARY TEST

4.1 AC Powerline Conducted Emissions Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
CH. 3	X
CH. 4	

4.2 Radiated Emissions Test

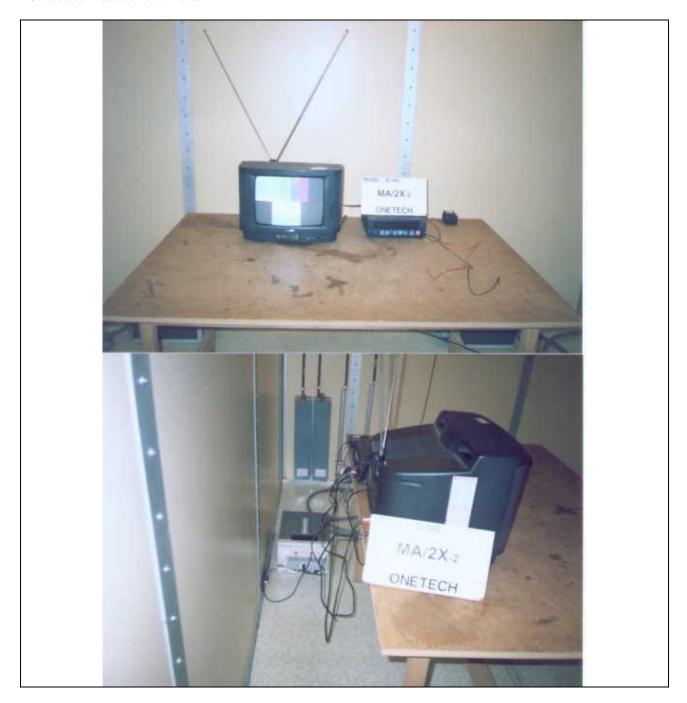
During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
CH. 3	X
CH. 4	

Tested by: Gea Won, Lee Date: October 23, 1998

5. CONDUCTED AND RADIATED MEASUREMENT PHOTOS

<Conducted Measurement Photos>



< Radiated Measurement Photos>



6. FINAL TEST DATA SUMMARY

Per preliminary test, the following normal mode of operations were selected which shown the maximum emissions level.

6.1 Conducted Emissions Test

Humidity Level : <u>53%</u> Temperature : <u>19</u>

Limits apply to : FCC CFR 47, PART 15, SUBPART B (Section 15.107)

Type of Test : TV INTERFACE DEVICE

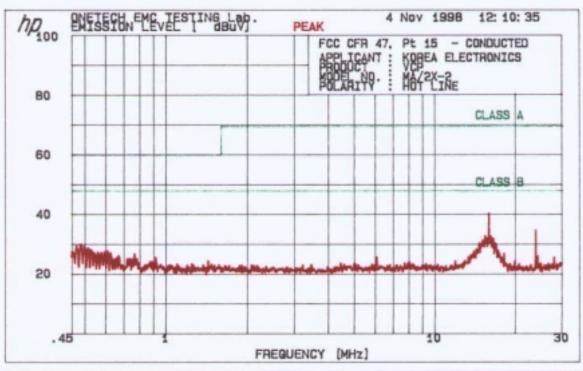
Result : PASSED BY -13.30 dB

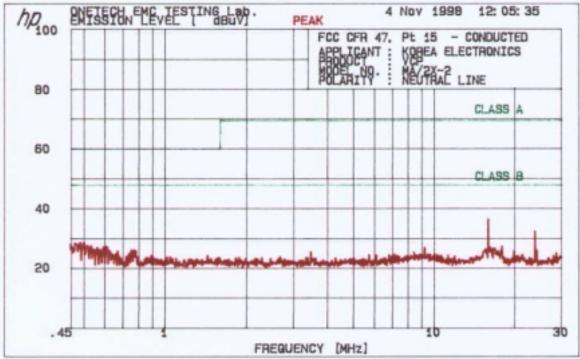
EUT : VIDEO CASSETTE PLAYER Date: November 04, 1998.

Operating Condition : CH. 3, Playing VITS 1 V_{p-p} recorded tape Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

Power L	ine Conducted Emission	FCC CLASS B		
Frequency	Amplitude	Conductor	Limit	Margin
(MHz)	(dBuV)		(dBuV)	(dB)
0.49	30.00	Н	48.0	-18.00
0.61	27.80	Н	48.0	-20.20
0.77	26.80	Н	48.0.	-21.20
0.92	25.60	Н	48.0	-22.40
1.44	24.50	Н	48.0	-23.50
3.49	25.40	N	48.0	-22.60
6.09	25.70	Н	48.0.	-22.30
9.27	26.80	N	48.0	-21.20
18.21	26.90	Н	48.0	-21.10
23.92	34.70	Н	48.0	-13.30

Line Conducted Emissions Tabulated Data





The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.

Humidity Level : 53 % Temperature : 18

Limits apply to : FCC CFR 47, PART 15, SUBPART B (Section 15.109)

Type of Test : TV INTERFACE DEVICE

Result : PASSED BY -11.86 dB

EUT : VIDEO CASSETTE PLAYER Date: October 29. 1998

Operating Condition $\,:$ CH. 3, Playing VITS 1 V_{p-p} recorded tape

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

Distance : 3 Meter

Radiated 1	Emissions	Ant	Correction	n Factors	Total	FCC CL	ASS B
Freq.	Amp.		Ant.	Cable	Amp.	Limit	Margin
(MHz)	(dBuV)	Pol.	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
49.85	14.30	V	10.23	2.80	27.33	40.00	-12.67
64.05	15.90	V	9.24	3.00	28.14	40.00	-11.86
111.85	12.20	V	13.88	3.46	29.54	43.50	-13.96
119.90	12.30	V	13.81	3.60	29.71	43.50	-13.79
125.65	12.30	V	13.51	3.63	29.44	43.50	-14.06
133.70	13.70	V	13.09	3.87	30.66	43.50	-12.84
136.40	12.40	V	12.95	3.90	29.25	43.50	-14.25

Line Radiated Emissions Tabulated Data

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6.3 Output Signal Level Test

The following table shows that the all modes of operation and worst-case emissions were investigated

Humidity Level : 50 % Temperature : 20

Limits apply to : FCC CFR 47, PART 15, SUBPART B (Section 15.115)

EUT : VIDEO CASSETTE PLAYER Date: October 28. 1998

Operating Condition: CH. 3 & CH. 4, Playing VITS 1 V_{p-p} recorded tape

Detector : Span : 10 MHz SWP : 20 msec

Output Impedance of RF-Output Terminal: 750hm

СН	Freq.()	Reading(dBuV)	M/P Loss(dB)	Signal Level(uV)	Limit(uV)	Margin(dB)
3	61.25	58.3	6.0	1640.6	3000	-5.2
(Visual)						
3	65.75	40.8	6.0	218.8	671	-9.7
(Aural)						
4	67.25	54.7	6.0	1083.9	3000	-8.8
(Visual)						
4	71.75	41.4	6.0	234.4	671	-9.1
(Aural)						

MP = Impedance Matching Pad

^{*}Sample Calculation at $61.25 = 10^{[(58.3+6.0)/20]} = 1640.6 \text{ uV}$

^{*}Margin[dB] = $20 \log (R/L)$ where, R: Corrected Results, [uV] or [uV/m], L: Corresponding Limit, [uV] or [uV/m].

6.4 Output Terminal Conducted Spurious Emissions Test

The following table shows that frequency range of 30MHz to 1000MHz removed by more than 4.6MHz below or 7.4MHz above the video carrier frequency of EUT was investigated at each channel.

Humidity Level : 53 % Temperature : 19

Limits apply to : FCC CFR 47, PART 15, SUBPART B (Section 15.115)

EUT : VIDEO CASSETTE PLAYER Date: October 29, 1998

Operating Condition : CH. 3 & CH. 4, Playing VITS 1 V_{p-p} recorded tape

Detector : Span : 10 MHz SWP : 20 msec

Output Impedance of RF-Output Terminal: 750hm

СН.	Freq.	Reading (dBuV)	M/P Loss (dB)	Attn.	Output Level(uV)	Limit (uV)	Margin (dB)
	41.88	12.5			11.9		-18.0
	47.92	13.4			13.2		-17.1
3	54.15	9.3	6.0	3.0	8.2	95	-21.3
	74.84	14.0			14.1		-16.6
	122.60	13.8			13.8		-16.8
	183.86	13.3			13.0		-17.3
	54.02	12.4			11.7		-18.2
	60.14	8.6			7.6		-21.9
4	80.80	11.9	6.0	3.0	11.1	95	-18.7
	134.54	19.6			26.9		-11.0
	201.8	14.4			14.8		-16.2

^{*} Sample Calculation at 47.88 = $10^{[(12.5 + 6.0 + 3.0)/20]} = 11.9 \text{ uV}$

^{*}Margin[dB] = 20 log (R/L) where, R: Corrected Results, [uV] or [uV/m], L: Corresponding Limit, [uV] or [uV/m].

6.5 Transfer Switch Isolation Test

DATE: November 05, 1998

The following table shows that the maximum voltage of video carrier frequency of the EUT at the antenna input (RF-in) terminal of the switch was measured for both channels.

Humidity Level Temperature: 19 : 53 %

Limits apply to : FCC CFR 47, PART 15, SUBPART B (Section 15.115)

EUT : VIDEO CASSETTE PLAYER Date: October 29, 1998

Operating Condition : CH. 3 & CH. 4, Playing VITS 1 V_{p-p} recorded tape,

: Span : 1 MHz **SWP** Detector : 30 msec

> RBW: 10 kHz VBW : 30 kHz

Output Impedance of RF-Output Terminal: 750hm

СН.	Freq.	Meter Reading	M/P Loss	PreAmp	Attn.	Signal Level	Limit	Margin
	(MHz)	(dBuV)	(dB)	Gain(dB)	(dB)	(uV)	(uV)	(dB)
3	61.25	16.9	6.0	25.0	3.0	1.1	3.0	-8.7
4	67.25	19.6	6.0	25.0	3.0	1.5	3.0	-6.0

^{*} Sample Calculation at 61.25 MHz = $10^{[(16.9 + 6.0 - 25 + 3.0)/20]} = 1.1 \text{ uV}$

Note: To clarify the emissions emanated from RF output terminal the EUT, RF pre-amplifier was utilized.

The gain of pre-amplifier at each frequency measured from the EUT was obtained after sufficient warm-up for stabilization of gain.

^{*}Margin[dB] = $20 \log (R/L)$ where, R: Corrected Results, [uV] or [uV/m], L: Corresponding Limit, [uV] or [uV/m].

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)

8. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESVS 30	826638/008	AUG/98	12MONTH	
2.	Spectrum analyzer	HP	8568B	3026A0226	AUG/98	12MONTH	
3.	RF preselector	HP	85685A	3107A01264	AUG/98	12MONTH	
4.	Quasi-Peak Adapter	НР	85650A	3107A01542	AUG/98	12MONTH	
5.	Matching Pad	TME	ZT-130	9F 954	N/A	N/A	
6.	Loop Antenna	EMCO	6502	9108-2668	FEB/98	12MONTH	
7.	Dipole Antenna	EMCO	3121C	9107-745	FEB/98	12MONTH	
8.	Biconical antenna	EMCO	3104C	9109-4441	FEB/98	12MONTH	•
				9109-4443			
				9109-4444			
9.	Log Periodic antenna	EMCO	3146	9109-3213	FEB/98	12MONTH	•
				9109-3214			
				9109-3217			
10.	LISN	EMCO	3825/2	9109-1867	FEB/98	12MONTH	•
				9109-1869			
11.	RF Amplifier	НР	8447F	3113A04554	AUG/98	N/A	
12.	3dB Attenuator	R/S	DNF	N/A	N/A	N/A	
13.	Spectrum Analyzer	НР	8591A	3131A02312	APR/98	12MONTH	
14.	Computer System	НР	98581C	98543A	N/A	N/A	•
	Hard disk drive		9153C	CMC762Z9153	N/A	N/A	
15.	Plotter	НР	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.	Turn Table	ROBOTECH			N/A	N/A	
19.	Antenna Master	EMCO	1070-1	9109-1624	N/A	N/A	
20.	Antenna Master	COMPLIANCE	CD M-100		N/A	N/A	
		DESIGN INC					

EXHIBIT 5. PHOTO REPORT

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