EMISSION TEST REPORT

Test Report No. : **21KE0066-YW-1**

Applicant: **Matsushita Electric Industrial Co.,Ltd.**
AVC Company Personal Computer Division

Type of Equipment: **Wireless LAN Module**

Model No.: **WLM-1**

FCC ID: **ACJ9TGWLM-1**

Test standard: **Fcc Part15 Subpart C, Section 15.247**

Test Result: **Complied**

The results in this report apply only to the sample tested.

Date of test: August 8, 9, 11,12 and 13, 2001 **Issued date:** August 29, 2001

Tested by: Naoki Sakamoto

Approved by: Kazutoyo Nakanishi
Section Manager of EMC section

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1 GENERAL INFORMATION

APPLICANT	: Matsushita Electric Industrial Co.,Ltd. AVC Company Personal Computer Division.
ADDRESS	: 1-10-12 Yaqumohigashi-machi, Moriguchi City Osaka Japan Tel: +81-6-6907-4050 Fax: +81-6-6907-4041
REGULATION(S)	: FCC Part15 Subpart C, Section 15.247
MODEL NUMBER	: WLM-1
SERIAL NUMBER	: 00003, 00004, and 00005
KIND OF EQUIPMENT	: Wireless LAN Module
TESTED DATE	: August 8,9,11,12 and 13, 2001
RECEIPT DATE OF SAMPLE	: August 8, 2001
REPORT FILE NUMBER	: 21KE0066-YW-1
TEST SITE	: A-PEX Yokowa No.3 Open Test Sites

1.1 Tested Methodology

The measurement was performed according to the procedures in FCC/ANSI C63.4(1992).

1.2 Test Facility

The open area site measurement facilities used to collect the radiated data are located at 108, Yokowa-cho, Ise-shi, Mie-ken, 516-1106 Japan.
These sites have been fully described in reports submitted to the FCC office.
No.3 test site has filed to the FCC on September 12, 2000 as number: 90412 and is accepted by Industry Canada on February 19, 1998 as number IC2973-3.

2 PRODUCT DESCRIPTION

Matsushita Electric Induatrial Co.,Ltd. Model WLM-1 (referred to as the EUT in this report) is a Wireless LAN Module. The specification is as following :

Direct sequence spread spectrum.(IEEE 802.11)
2412MHz through 2462MHz(11 channels / each 5MHz wide)
Wireless LAN Module, Model:WLM-1 is designed only for Panasonic Mobile Data Wireless Display PC (Display:CF-VDW07 / Main Unit:CF-07) exclusive use.It is sold as integrated in Mobile Data Wireless Display PC.Each Wireless LAN Module, Model:WLM-1 integrated in Display:CF-VDW07 and Main Unit:CF-07 is identical except antenna part.

Display:CF-VDW07
Antenna Part No: DFUP7099ZA
Antenna Gain: 4.0dBi(Maximum)
Main Unit:CF-07
Antenna Part No: DFUP7100ZA
Antenna Gain: 1.5dBi(Maximum)

Interface : PCMCIA-bus
Operating Voltage : DC3.3V
*FccPart15.203 Antenna requirement
Wireless LAN Module and its antenna comply with Modile Data Wireless Display PC since they are built in Modile Data Wireless Display PC when they are put up for sale and they are used with a particular antenna connector.

2.1 Test System Details

Model	FCC ID	Description
(1) Matsushita Electric Industrial Co.,Ltd. M/N: CF-VDW07	DOC	Wireless LAN built in Display
*Built in Wireless LAN Module M/N: WLM-1(EUT) S/N: 00003(Anenna terminal test) S/N: 00004(Radiated test)	ACJ9TGWLAN-1	
(2) Matsushita Electric Industrial Co.,Ltd. M/N: CF-07	DOC	Wireless LAN built in Main unit
*Built in Wireless LAN Module M/N: WLM-1(EUT) S/N: 00005(Radiated test)	ACJ9TGWLAN-1	
(3) Matsushita Electric Industrial Co.,Ltd. M/N: CF-AA1639AM1	DOC	AC Adaptor

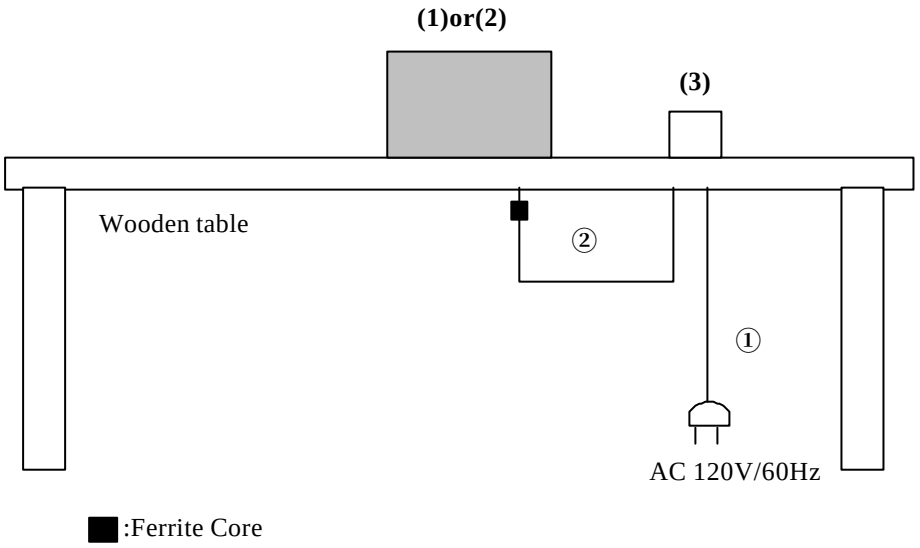
3 SYSTEM TEST CONFIGURATION

3.1 Justification

The system was configured in typical fashion (as a customer would normally use it) for testing.

Test mode : Data Transmitting mode(bit rate : 11Mbps)
Performed the test about channels 1(Low), 6(Mid), and 11(High) among 11 channels of all Carrier frequencies.
Receiving mode

3.2 Configuration of Tested System



* Cabling was taken into consideration and test data was taken under worst case conditions.

List of cables used

No.	Name	Length (m)	Shield	Remark
①	AC Power Cable	1.7	N	P.V.C
②	DC Power Cable	2.0	N	P.V.C

4 Measurement Uncertainty

Conducted Emission Test

The measurement uncertainty (with a 95% confidence level) for this test was ±2.0dB.

☐ The data listed in this test report may exceed the test limit because it does not have enough margin (more than 2.0dB).

■ The data listed in this test report has enough margin, more than 2.0dB.

Radiated Emission Test

The measurement uncertainty (with a 95% confidence level) for this test was ±3.3dB.

☐ The data listed in this test report may exceed the test limit because it does not have enough margin (more than 3.3dB).

■ The data listed in this test report has enough margin, more than 3.3dB.

5 TEST EQUIPMENT USED

Name	Manufacturer	Model	Control No.	Calibrated Until
Pre Amplifier	Hewlett Packard	8447D	AF-01	March 30, 2002
Pre Amplifier	Hewlett Packard	8449B	AF-04	November 4, 2001
Biconical Antenna	Schwarzbeck	BBA9106	BA-03	April 30, 2002
Logperiodic Antenna	Schwarzbeck	UHALP9108-A	LA-06	April 30, 2002
LISN	Rohde & Schwarz	ESH3-Z5	LS-04	October 30, 2001
Horn Antenna	AH System, Inc	SAS-200/571	HA-01	May 19 , 2002
Horn Antenna	Schwarzbeck	BBHA9170	HA-03	November 22, 2001
Spectrum Analyzer	Hewlett packard	8567A	SA-04	March 30, 2002
Spectrum Analyzer	Advantest	R3271	SA-05	January 31, 2002
Test Receiver	Rohde & Schwarz	ESHS-10	TR-05	August 17, 2001
Test Receiver	Rohde & Schwarz	ESVS-10	TR-06	August 9, 2001
Power Sensor	Hewlett packard	ECP-E18A	PS-01	May 28, 2002
Power Metor	Hewlett packard	EPM-442A	PM-01	May 28, 2002

All measurement equipment is traceable to national standards.

6 SUMMARY OF TESTS

6.1 §15.207 Conducted Emissions

Test Procedure
EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane.
The rear of tabletop was located 40cm to the vertical conducting plane.The rear of EUT, including peripherals aligned and flush with rear of tabletop.All other surfaces of tabletop was at least 80cm from any other grounded conducting surface. I/O cables and AC cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. Each EUT current-carrying power lead, except the ground (safety) lead, were individually connected through a LISN to the input power source.All unused 50Ω connectors of the LISN were resistively terminated in 50Ω when not connected to the measuring equipment.
The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT on a shielded room.
The EUT was connected to a Line Impedance Stabilization Network (LISN).
An overview sweep with peak detection has been performed.
The measurements have been performed with a CISPR quasi-peak detector(IF BW 10kHz) .
(Measurement range : 450kHz to 30MHz)

Test data : APPENDIX A1 to A10
Photographs of test setup : Page 13(1) 14(2)
Test result : Pass
Test instruments : LS-04, SA-04, TR-06

6.2 § 15.247(a)(2) 6dB Bandwidth

Test Procedure
The minimum 6dB bandwidth was measured with a spectrum analyzer connected to the antenna port.

①2412MHz(Ch 1) : 8.3714MHz > 500kHz
②2437MHz(Ch 6) : 8.0000MHz > 500kHz
③2462MHz(Ch11) : 8.6857MHz > 500kHz

Test data : APPENDIX A11 to A13
Test result : Pass
Test instruments :SA-05

6.3 § 15.247(b) Maximum Peak Out Put Power

Radiated : Test Procedure

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane.
I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged 40cm height to the ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.
The Radiated Electric Field Strength intensity has been measured on an open test site with a ground plane and at a distance of 3m.
The measuring antenna height was varied between 1 to 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
The measurements were performed for both vertical and horizontal antenna polarization.

Test data : APPENDIX A14 to A27
Photographs of test setup : Page15(3),16(4)
Test result : Pass
Test instruments : SA-05, HA-01, AF-04

Conducted:Test Procedure

The Maximum Peak Output power was measured with a power meter connected to the antenna port.
* Antenna Gain dose not exceed 6dBi.

Test data : APPENDIX A28
Test result : Pass
Test instruments : PS-01, PM-01, SA-05

6.4 § 15.247(c) Out of Band Emissions

Test Procedure
EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane.
I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged 40cm height to the ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.
The Radiated Electric Field Strength intensity has been measured on an open test site with a ground plane and at a distance of 3m.
The measuring antenna height was varied between 1 to 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
The measurements were performed for both vertical and horizontal antenna polarization.

Radiated Spurious emissions
In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement. The result was also satisfied the general limits specified in Sec.15.209(a).
Measurement range : 30MHz to 1000MHz CISPR QP Detector, IF BW 120kHz
: 1GHz to 26GHz PK and AV Detector

Test data : APPENDIX A29 to A36(30 –1000MHz)
: APPENDIX A37 to A44(1 – 26GHz)
Photographs of test setup : Page15(3),16(4)
Test result : Pass
Test instruments : AF-01, AF-04, BA-03, LA-06, HA-01, HA-03, SA-04, SA-05, TR-06

Restricted Band Edges
Test Procedure
The Restricted band Edges was measured with a spectrum analyzer connected to the antenna port.

Restricted Band	2390.0MHz (RBW 100kHz, VBW 100kHz, SWP5s)	47.00dBμV
Ch1	2413.1MHz(RBW 1MHz, VBW 10Hz, SWP5s)	105.75dBμV

Diff = 105.75 – 47.0 = 58.75 dB > 54.0dB

Restricted Band	2483.5MHz (RBW 100kHz, VBW 100kHz, SWP5s)	46.75dBμV
Ch11	2462.9MHz(RBW 1MHz, VBW 10Hz, SWP5s)	105.13dBμV

Diff = 105.13 – 46.75 = 58.38 dB > 54.0dB

Test data : APPENDIX A45 to A48
Test result : Pass
Test instruments : SA-05

6.5 § 15.247(d) Power Density(Conducted)

Test Procedure
The Power Density was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX A49 to A52
Test result : Pass
Test instruments : SA-05

6.6 § 15.247(e) Processing Gain

See Appendix A53 – A73

Test result : Pass

1. Test has been done at 341 frequency points(repeating uniform step in frequency increments of 50kHz across the receiver pass band in each channel) in each channels (Channel 1, 6, 11).

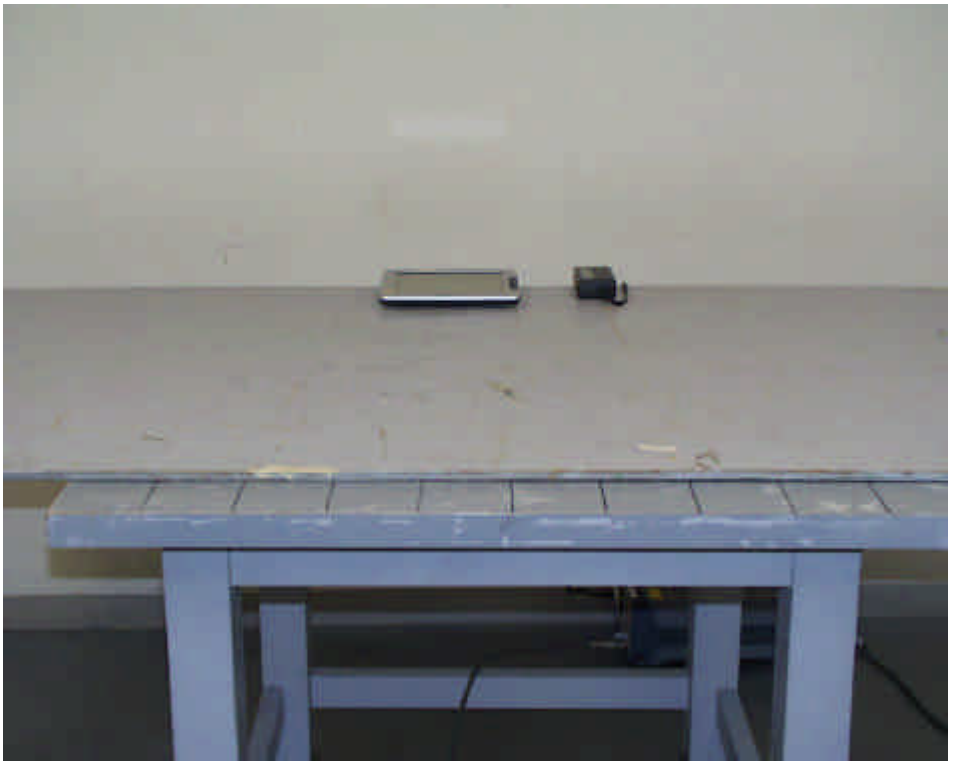
2. Mj = J/S : -8.4dB at all the tests frequency points of 1023 in total.
   [341(points) x 3 (Channels) = 1023(points)]
   Mj = (J/S) -8.4dB then the EUT passes.

3. PER Fails (heigher than 8%) point and persentage.

Channel 1	: 0 point	0/341	0%
Channel 6	: 0 point	0/341	0%
Channel 11	: 0 point	0/341	0%
(Fails/Achieve)	8.8% < 20%		EUT Passes

4. From the result of 2. and 3 above, the EUT passes requirments.

Photographs of test setup(1)



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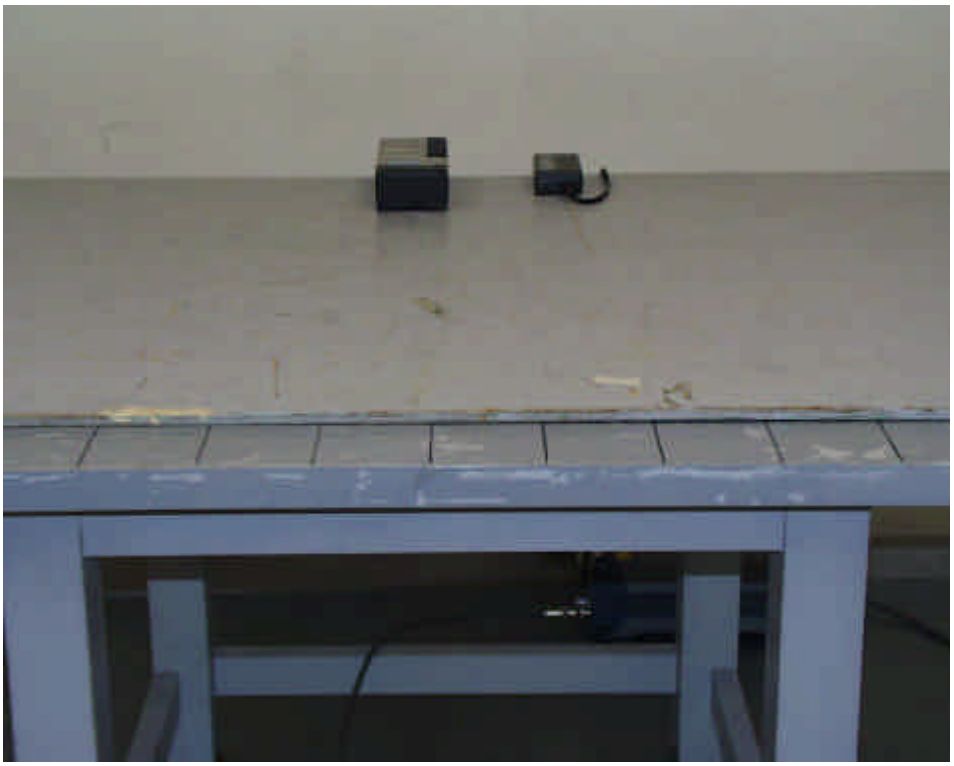
Photographs of test setup(2)



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Photographs o f test setup(3)

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Photographs of test setup(4)

APPENDIX

Test Data

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