

EMI TEST REPORT

Test Report No. : 22GE0028-YW

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

Type of Equipment: Wireless LAN built in Personal Computer
with Whip and External Antenna

Model No.: CF-28

FCC ID: ACJ9TGCF-281

Test standard: Fcc Part15 Subpart C, Section 15.207
Fcc Part15 Subpart C, Section 15.247(c)

Test Result: Complied

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

Date of test: February 18 and 27, 2002 **Issued date:** March 4, 2002

Tested by:



Naoki Sakamoto

Group Leader of EMC section

Approved by:



Kazutoyo Nakanishi

Site Operation Manager of EMC section

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1 GENERAL INFORMATION

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

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REGULATION(S) : FCC Part15 Subpart C, Section 15.207
: FCC Part15 Subpart C, Section 15.247(c)

MODEL NUMBER : CF-28

SERIAL NUMBER : 06

KIND OF EQUIPMENT : Wireless LAN built in personal computer
With Whip and External Antenna

TESTED DATE : February 18 and 27, 2002

RECEIPT DATE OF SAMPLE : February 18, 2002

REPORT FILE NUMBER : 22GE0028-YW

TEST SITE : A-PEX Yokowa No.3 Open Test Sites

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1.1 Tested Methodology

The measurement was performed according to the procedures in 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 May 1,2001 as number IC2973-3.

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2 PRODUCT DESCRIPTION

Matsushita Electric Industrial Co.,Ltd, Model CF-28 (referred to as the EUT in this report) is a Wireless LAN built in Personal Computer with Whip and External Antenna.
The specification is as following :

Wireless LAN : Direct sequence spread spectrum.(IEEE 802.11b)
2412 through 2462MHz (11channels / each 5MHz wide)

Measurement for Wireless LAN Personal Computer, model: CF-28 which has been already granted by the FCC as FCC ID: ACJ9TGCF-281 according to FCC § 2.1043 Changes in certified equipment (b)(2) Class2 .

Changes:

Add 2 type of antennas.

1. Whip antenna

They are added on the left as its face.

Antennas are installed permanently so as to user can not remove them then they comply with FCC 15.203 antenna requirements.

2. External antenna

External antenna is added via port replicator.

External antenna is mounted on a vehicle body by magnet.

However TNC is used as connector between external antenna and port replicator, its use is not prohibited by FCC Public Notice DA-00-2225 anymore since it complies with FCC 15.203 antenna requirements.

Except above mentioned changes, changed equipment is completely same with the one which has already been granted by the FCC as FCC ID: ACJ9TGCF-281.

Radiated emission test and conducted emission test were performed since performance degradation may happen for these test items.

It is verified and confirmed that the equipment still comply with the FCC requirement after changes.

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2.1 Test System Details

Whip Antenna

Model	FCC ID	Description
(1) Matsushita Electric Industrial Co.,Ltd. M/N: CF-28 S/N: 06 *FccPart15 Subpart B Class B Digital Device	ACJ9TGCF-281 DOC	Wireless LAN built in PC
(2)Matsushita Electric Industrial Co.,Ltd. M/N: CF-AA1639A S/N: 001203365A	DOC	AC Adapter

External Antenna

Model	FCC ID	Description
(1) Matsushita Electric Industrial Co.,Ltd. M/N: CF-28 S/N: 06 *FccPart15 Subpart B Class B Digital Device	ACJ9TGCF-281 DOC	Wireless LAN built in PC
(2)Matsushita Electric Industrial Co.,Ltd. M/N: CF-AA1639A S/N: 001203365A	DOC	AC Adapter
(3) Matsushita Electric Industrial Co.,Ltd. M/N: CF-WEB273 S/N: 1IKSB58338	DOC	Port Replicater

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3 SYSTEM TEST CONFIGURATION

3.1 Justification

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

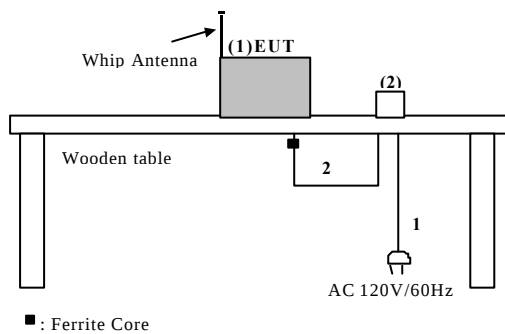
Test mode : Data Transmitting mode(bit rate : 11Mbps)

Performed the test about channels 1(low), 6(mid) and 11(high) among 11 channels of all Carrier frequencies.

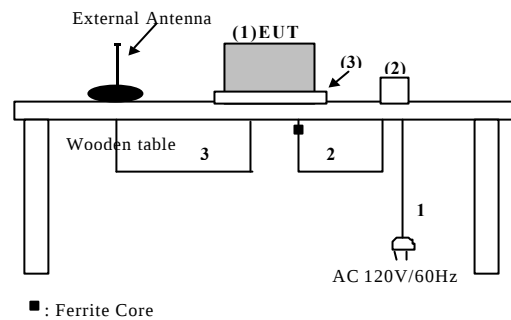
Receiving mode

3.2 Configuration of Tested System

Whip Antenna



External Antenna



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

List of cables used

Whip Antenna

No.	Name	Length (m)	Shield	Remark
1	AC Power Cable	1.8	N	Polyvinyl chloride
2	DC Power Cable	1.9	N	Polyvinyl chloride

External Antenna

No.	Name	Length (m)	Shield	Remark
1	AC Power Cable	1.8	N	Polyvinyl chloride
2	DC Power Cable	1.9	N	Polyvinyl chloride
3	Antenna Cable	1.7	Y	Polyvinyl chloride

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4 Measurement Uncertainty

Conducted Emission Test

The measurement uncertainty (with a 95% confidence level) for this test was $\pm 2.0\text{dB}$.

The data listed in this test report has enough margin, more than site margin.

Radiated Emission Test

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is $\pm 4.4\text{dB}$.

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is $\pm 3.2\text{dB}$.

The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is $\pm 5.8\text{dB}$.

The data listed in this test report has enough margin, more than site margin.

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5 SUMMARY OF TESTS

5.1 §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 flushes with rear of tabletop. All other surfaces of tabletop were 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, was individually connected through a LISN to the input power source. All unused 50ohm connectors of the LISN were resistively terminated in 50ohm 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	: Whip Antenna	APPENDIX A1 to A 5
	: External Antenna	APPENDIX A6 to A10
Photographs of test setup	: Whip Antenna	Page 12
	: External Antenna	Page 13
Test result	: Pass	
Test instruments	: LS-02, SA-04, TR-05, CC-3BC, YOATS-03	

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5.2 § 15.247(c) Out of Band Emissions(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.

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	: Whip Antenna	APPENDIX A11 to A14 (30 - 1000MHz)
	: External Antenna	APPENDIX A15 to A18 (30 - 1000MHz)
	: Whip Antenna	APPENDIX A19 to A22 (1 - 26GHz)
	: External Antenna	APPENDIX A23 to A26 (1 - 26GHz)
	: Restricted Band Edges	APPENDIX A27 to A34(2390MHz/2483.5MHz)
Photographs of test setup : Page14		
Page15		
Test result	: Pass	
Test instruments	: AF-01, AF-06, AT-06, BA-03, LA-06, HA-02, EST-10, HF-04, SA-04, SA-06, TR-06, CC-3ORC, CC-C10, CC-C11, YOATS-03	

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Photographs of test setup

Whip Antenna



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Photographs of test setup

External Antenna



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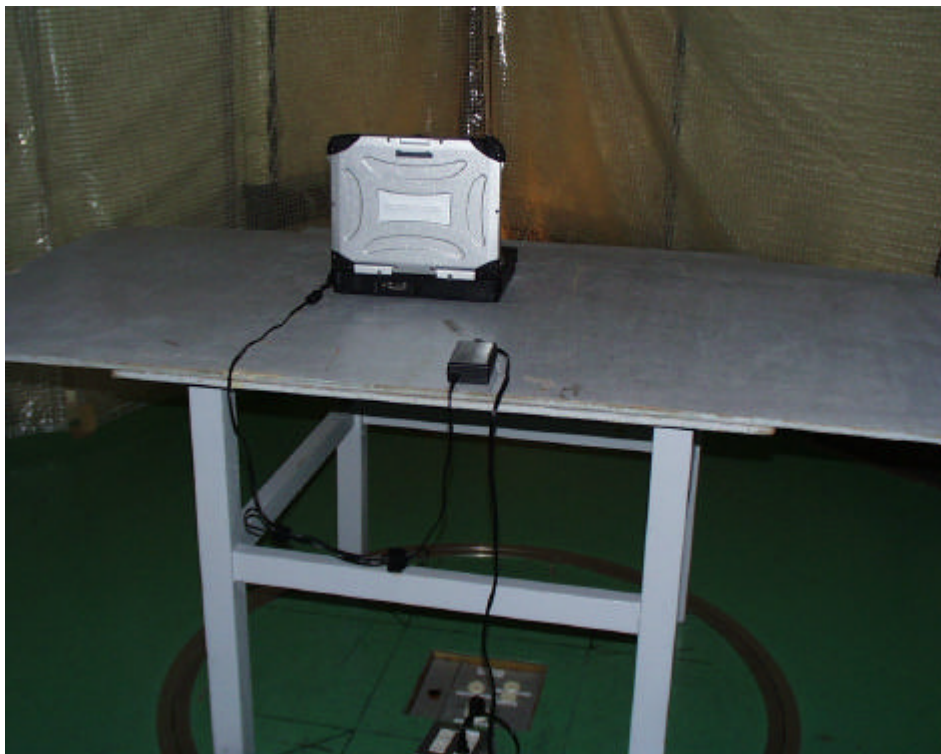
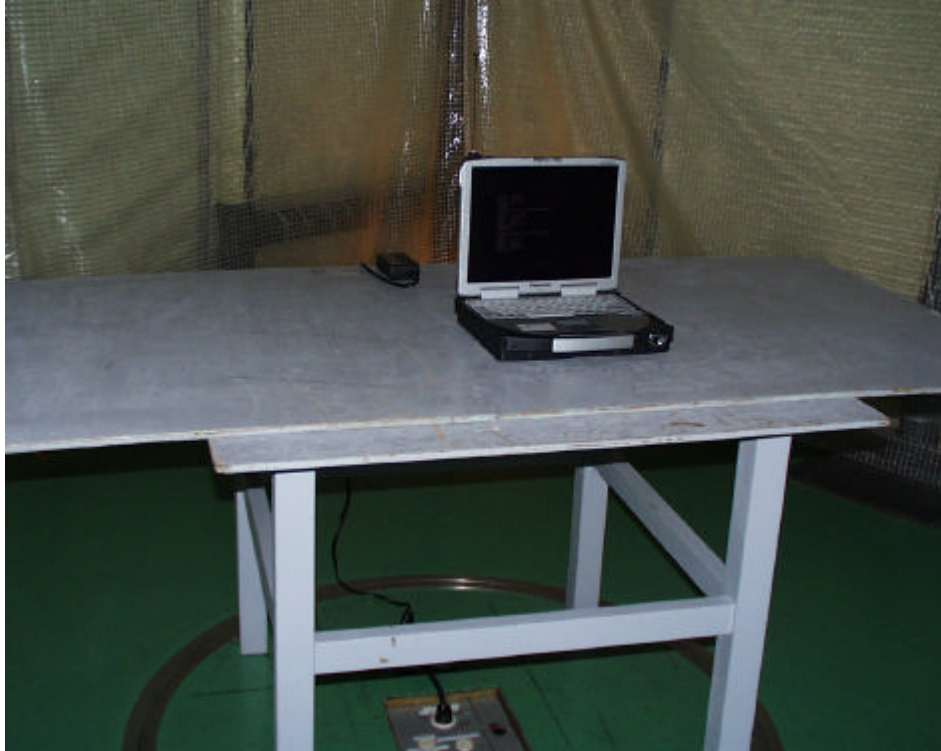
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Photographs of test setup

Whip Antenna



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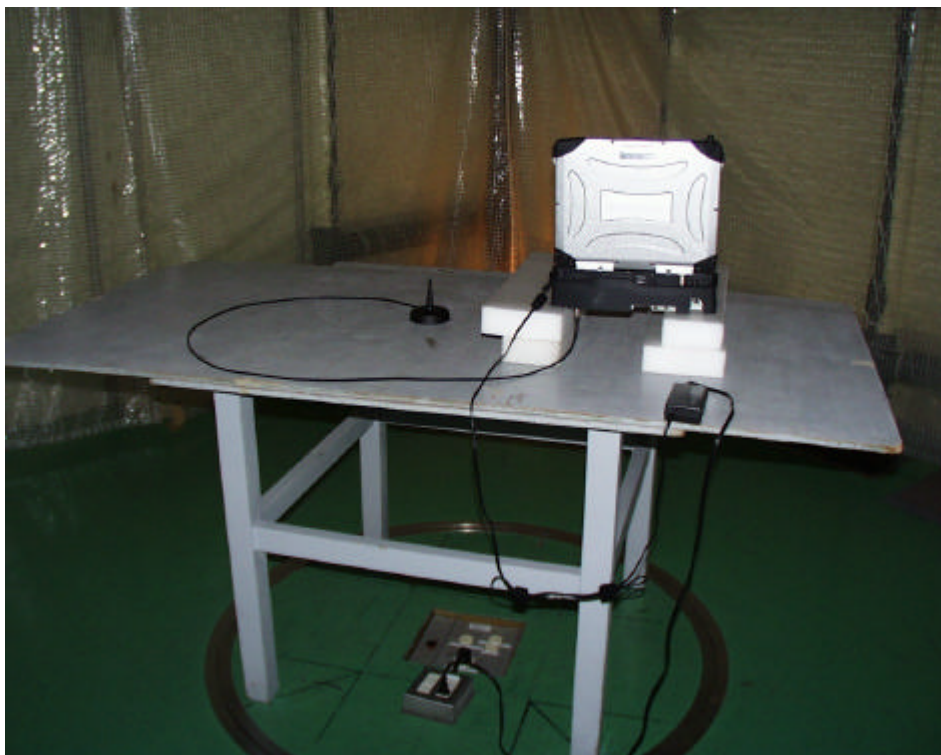
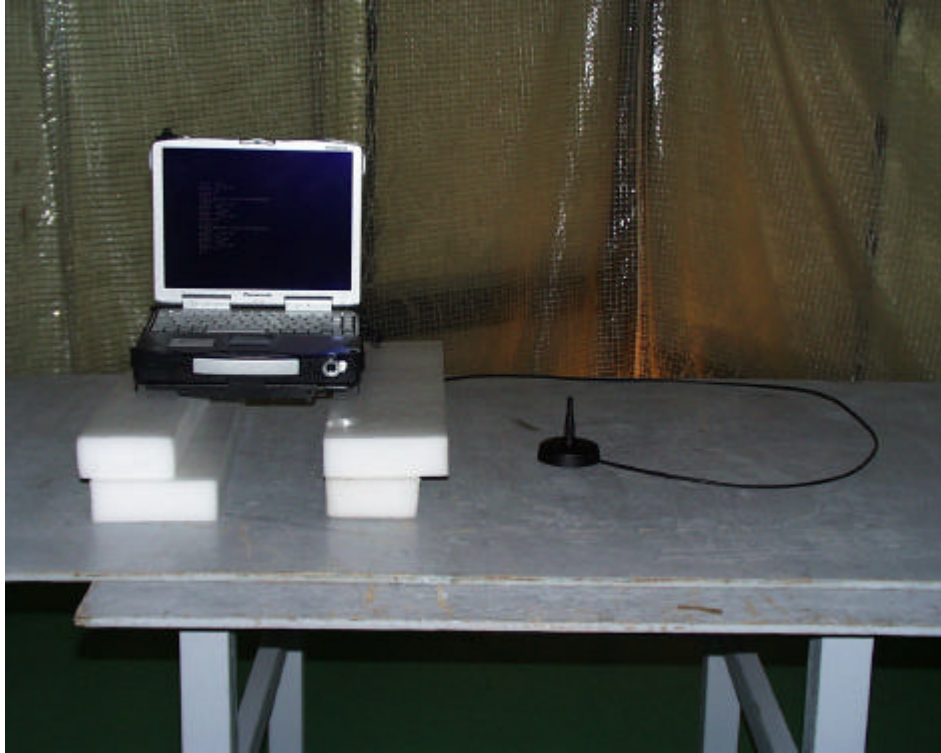
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Photographs of test setup

External Antenna



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APPENDIX

Test Data

1 : 5.1 Conducted emissions

Whip Antenna	<u>A 1 to A 5</u>
External Antenna	<u>A 6 to A10</u>

2 : 5.2 Out of band emissions(Radiated)

Whip Antenna(30-1000MHz)	<u>A11 to A14</u>
External Antenna(30-1000MHz)	<u>A15 to A18</u>
Whip Antenna(1-26GHz)	<u>A19 to A22</u>
External Antenna(1-26GHz)	<u>A23 to A26</u>
Restricted Band Edges(2390/2483.5MHz)	<u>A27 to A34</u>

Test Instruments

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