

# **EMISSION TEST REPORT**

**Test Report No. :** **21KE0022YW-1**

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

**Type of Equipment:** **Wireless LAN built in Personal Computer**

**Model No.:** **CF-28**

**FCC ID:** **ACJ9TGCF-28WLAN1**

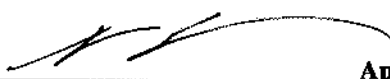
**Test standard:** **Fcc Part15 Subpart C, Section 15.247**


**Test Result:** **Complied**

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

**Date of test:** June 20, 21, 22, 23 and 24, 2001 **Issued date:** July 1, 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.

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

MODEL NUMBER : CF-28

SERIAL NUMBER : N/A(Prototype)

KIND OF EQUIPMENT : Wireless LAN built in personal computer

TESTED DATE : June 20,21,22,23 and 24, 2001

RECEIPT DATE OF SAMPLE : June 20, 2001

REPORT FILE NUMBER : 21KE0022- YW-1

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

**Test report**

**FCC ID** : ACJ9TGCF-28WLAN1

**Our reference** : 21KE0022-YW-1

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**Issued date** : 2001-7-01

## **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.

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### 3 SYSTEM TEST CONFIGURATION

#### 3.1 Justification

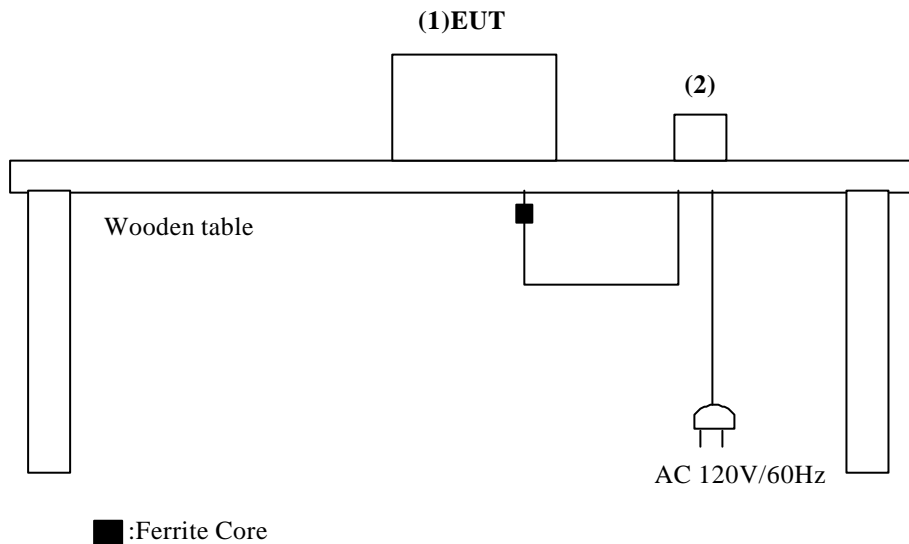
The system was configured in typical fashion (as a customer would normally use it) for testing.

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



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

#### List of cables used

| No. | Name           | Length (m) | Shield | Remark |
|-----|----------------|------------|--------|--------|
|     | AC Power Cable | 1.8        | N      | P.V.C  |
|     | DC Power Cable | 1.9        | N      | P.V.C  |

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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 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  $\pm 3.3\text{dB}$ .

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.

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## 5 TEST EQUIPMENT USED

| <u>Name</u>         | <u>Manufacturer</u> | <u>Model</u> | <u>Control No.</u> | <u>Calibrated Until</u> |
|---------------------|---------------------|--------------|--------------------|-------------------------|
| 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                | Schwarzbeck         | NSLK8126     | LS-07              | November 2, 2001        |
| Horn Antenna        | AH System, Inc      | SAS-200/571  | HA-01              | May 19, 2002            |
| Horn Antenna        | Schwarzbeck         | BBHA9170     | HA-03              | November 22, 2003       |
| 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.

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## 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 50 connectors of the LISN were resistively terminated in 50 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 A8  
Photographs of test setup : Page 13(1)  
Test result : Pass  
Test instruments : LS-07, 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.

2412MHz(Low) : 7.9714MHz > 500kHz  
2437MHz(Mid) : 7.8000MHz > 500kHz  
2462MHz(High) : 8.8286MHz > 500kHz

Test data : APPENDIX A9 to A11  
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 A12 to A18  
**Photographs of test setup** : Page14(2)  
**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 A19  
**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 A20 to A23(30–1000MHz)  
: APPENDIX A24 to A27(1– 26GHz)  
**Photographs of test setup** : Page14(2)  
**Test result** : Pass  
**Test instruments** : AF-01, AF-04, BA-03, LA-06, HA-01, HA-03, SA-04, SA-05, TR-06

### **Radiated Band Edges(Horizontal)**

|  |                 |
|--|-----------------|
| Restricted Band 2390.0MHz (RBW 100kHz, VBW 100kHz, SWP10s) | 38.63dB $\mu$ V |
| Ch01(Low) 2412.0MHz(RBW 1MHz, VBW 10Hz, SWP5s)             | 97.0dB $\mu$ V  |
| Diff = 97.00 – 38.63 = 58.37dB > 54.0dB                    |                 |
| Restricted Band 2483.5MHz (RBW 100kHz, VBW 100kHz, SWP10s) | 36.88dB $\mu$ V |
| Ch11(High) 2462.0MHz(RBW 1MHz, VBW 10Hz, SWP5s)            | 98.13dB $\mu$ V |
| Diff = 98.13 – 36.88 = 61.25dB > 54.0dB                    |                 |

**Test data** : APPENDIX A28 to A31  
**Photographs of test setup** : Page14(2)  
**Test result** : Pass  
**Test instruments** : AF-04, HA-01, SA-05

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**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 A32 to A35

**Test result** : Pass

**Test instruments** : SA-05

**6.6 § 15.247(e) Processing Gain**

See Appendix A36 – A59

**Test result** : Pass

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Test report

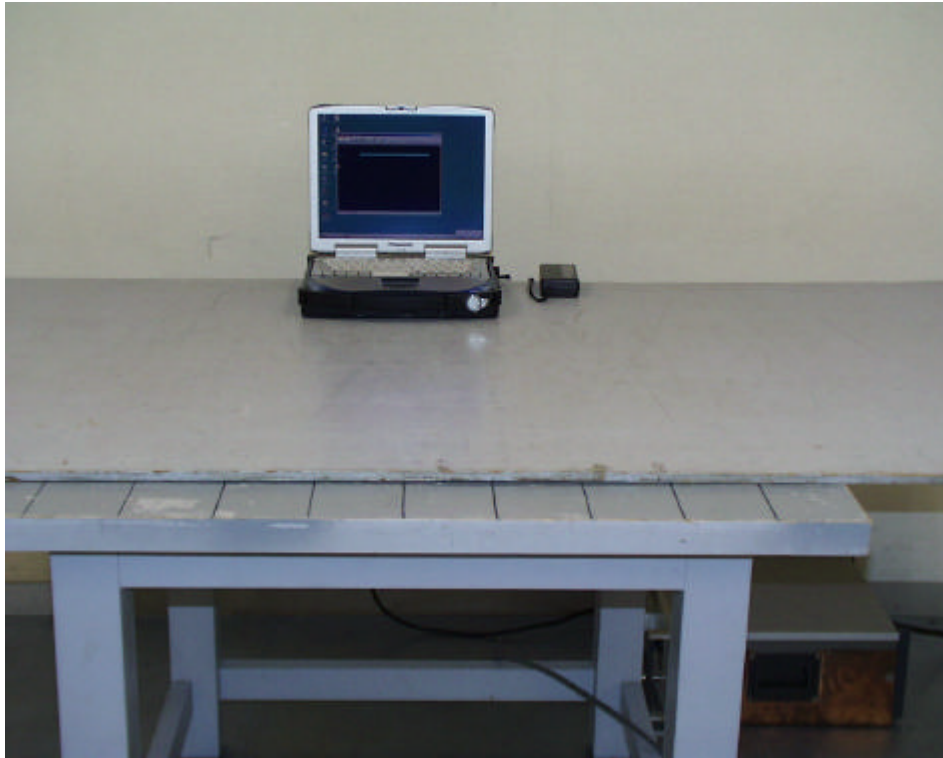
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**Photographs of test setup(1)**



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Test report

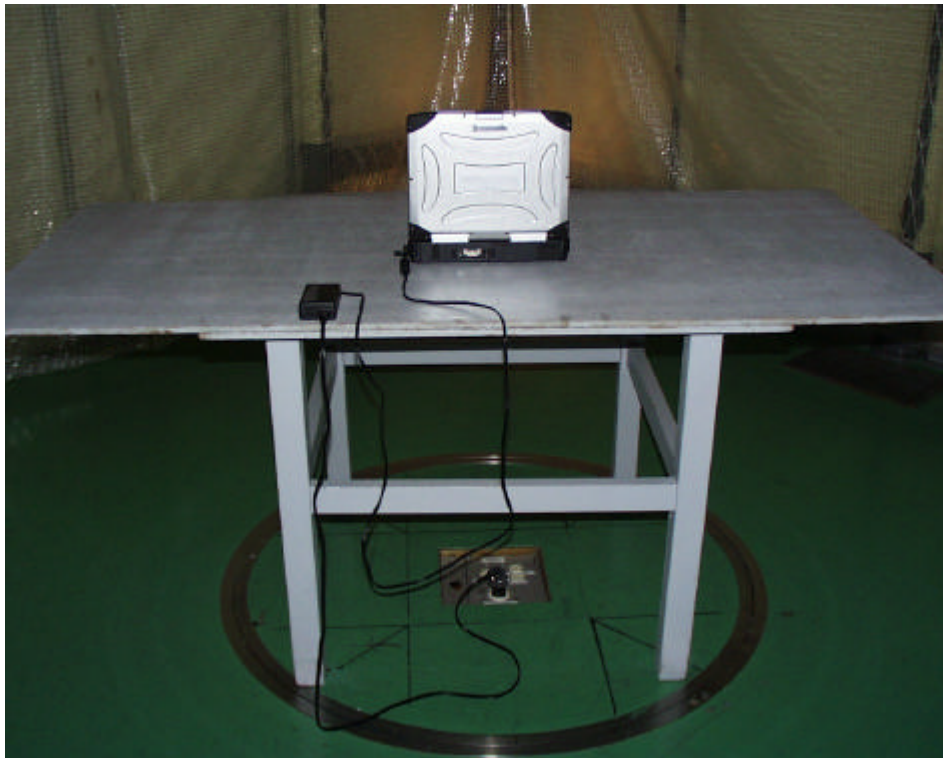
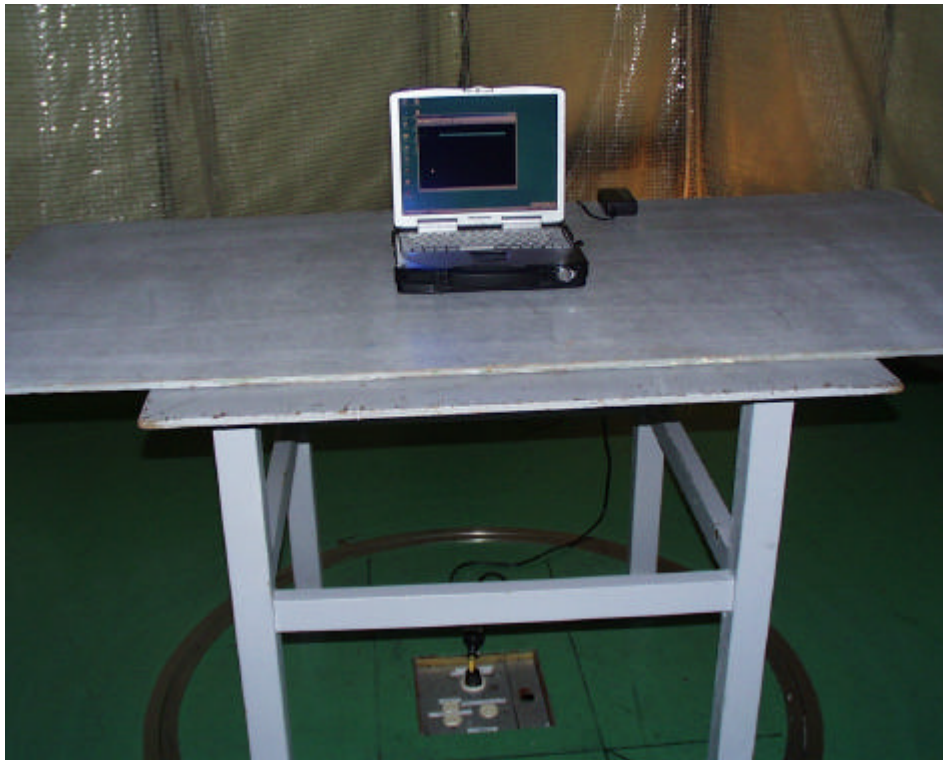
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**Photographs of test setup(2)**



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## APPENDIX

### Test Data

|                                 |                   |
|---------------------------------|-------------------|
| Conducted Emission (6.1)        | <u>A1 to A8</u>   |
| 6dB Bandwidth (6.2)             | <u>A9 to A11</u>  |
| Maximum peak output power (6.3) | <u>A12 to A19</u> |
| Out of band emissions (6.4)     | <u>A20 to A31</u> |
| Power density (6.5)             | <u>A32 to A35</u> |
| Processing Gain (6.6)           | <u>A36 to A59</u> |