EMI TEST REPORT

Test Report No. : 27DE0139-HO-C

Applicant	:	**OMRON Corporation Okayama Factory**
Type of Equipment	:	**FA Wireless LAN Unit**
Model No.	:	**WE70-AP**
Test standard	:	**FCC Part 15 Subpart E Section 15.407: 2006**
FCC ID	:	**RXEWE70AP**
Test Result	:	**Complied**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Apex Co., Ltd.
2. The results in this report apply only to the sample tested.
3. This equipment is in compliance with above regulation.
4. The test results in this report are traceable to the national or international standards.

Date of test: January 19 to March 3, 2007

Tested by:

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NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address, http://ulapex.jp/emc/nvlap.htm

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CONTENTS **PAGE**

SECTION 1: Client information 3
SECTION 2: Equipment under test (E.U.T.) 3
SECTION 3: Test specification, procedures & results 5
SECTION 4: Operation of E.U.T. during testing 8
SECTION 5: Conducted Emission 11
SECTION 6: Spurious Emission , Band Edge Compliance 12
SECTION 7: 26dB Emission Bandwidth 13
SECTION 8: Maximum Peak Output Power 13
SECTION 9: Peak Power Spectral Density 13
SECTION 10: Peak Excursion Ratio 13
APPENDIX 1: Photographs of test setup 14
Conducted Emission 14
Spurious Emission (Radiated) 16
Worst Case Position (Horizontal: EUT-X-axis, Ant-X-axis/ Vertical:EUT-X-axis, Ant-Y-axis) 17
APPENDIX 2: Data of EMI test 21
Conducted Emission 21
26dB Emission Bandwidth 42
Maximum Peak Output Power 45
Maximum Peak Output Power (Transmitter Power Control (Low power)) 50
Radiated Spurious Emission (below 1GHz) 52
Radiated Spurious Emission (above 1GHz:Inside of the restricted band) 67
Radiated Spurious Emission (above 1GHz:Outside of the restricted band) 79
Conducted Spurious Emission(DSSS and other forms of modulation) 97
Radiated emission Band Edge compliance 106
Conducted emission Band Edge compliance 109
Peak Power Spectral Density 110
Peak Excursion Ratio 113
99%Occupied Bandwidth 116
APPENDIX 3:Test instruments 118

SECTION 1: Client information

Company Name	:	OMRON Corporation Okayama Factory
Address	:	2075 Miyoshi Okayama-city, Okayama, 703-8502, Japan
Telephone Number	:	+81-86-276-1797
Facsimile Number	:	+81-86-276-1520
Contact Person	:	Shinji Ueno

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	FA Wireless LAN Unit
Model No.	:	WE70-AP
Serial No.	:	279651000201 (for Radiated Emission and Conducted Emission tests) 279651000202 (for Antenna Terminal Conducted test)
Rating	:	DC 24V (20.4V to 26.4V)
Country of Manufacture	:	JAPAN
Receipt Date of Sample	:	January 19, 2007
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No modification by the test lab.

2.2 Product Description

Model No: WE70-AP is the, FA Wireless LAN Unit (Master).
WE70-AP has a variant model: WE70-CL (Slave). It is identical to WE70-AP in radio specification
The difference between two models is the presence or absence of RSSI button (for receiving status indication) only.
(WE70-AP does not have the button, but WE70-CL does.)

Clock Frequencies are 20MHz(CPU Clock), 25MHz(LAN Clock), 80MHz(Memory Clock) and 40MHz (Wireless LAN).

IEEE802.11b / 11g / 11a WLAN

Equipment Type	Transceiver		
Frequency of Operation	11b/11g	2412MHz - 2462MHz *1)	
	11a	Low	5180MHz - 5240MHz
		Mid	5260MHz - 5320MHz *2)
		Add	5500MHz - 5700MHz *2)
		Upper	5745MHz - 5805MHz
			5825MHz *1)
Type of Modulation	DSSS, DBPSK, DQPSK, CCK (11b) OFDM, BPSK, QPSK, 16QAM, 64QAM, CCK (11g, 11a)		
Bandwidth	20MHz		
Channel spacing	5MHz (11b/11g), 20MHz (11a)		
Power Supply (inner)	DC 3.3V		
Antenna Connector Type	Reverse SMA connector (ANT A and ANT B)		
Antenna Information	Type : Dual Band Diversity Antenna Model name : ANT-S-789 Gain : 2.14dBi (max)		
	Type : Magnetic Pedestal Antenna *3) Model name : WE70-AT001H(OMR04-220100) Gain : 2.4GHz band: 4.5dBi (max) 5GHz band: 7dBi (max)		
	Type : Magnetic Pedestal Antenna with extension cable of 5.0m *4) Model name : WE70-AT001H (OMR04-220100) Gain : 2.4GHz band: 4.5dBi (max) 5GHz band: 7dBi (max)		

*1) Refer to 27DE0139-HO-A, FCC Part 15C (FCC 15.247) report.
*2) Refer to 27DE0139-HO-E, FCC Part 15E (FCC 15.407 DFS) report.
*3) Magnetic Pedestal Antenna is connected direclty with the cable of 2.0m.
*4) Magnetic Pedestal Antenna can be used with extension cable of 5.0 m (Total length of cable: 7.0m).

[Remarks]
The circuits for 2.4GHz and 5GHz bands are included in one chip of FA Wireless LAN Unit.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part15 Subpart E : 2006
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart E Unlicensed National Information Infrastructure Devices Section 15.407 General technical requirements

FCC 15.31 (e)
This EUT provides stable voltage (DC3.3V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.407(d) Antenna requirement
This EUT complies with the requirement of 15.203, because a unique coupling (antenna connector, Type: Reverse SMA) is used for this EUT.

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	26dB Emission Bandwidth	**FCC:** ANSI C63.4:2003	**FCC :**15.407(a)(1)(2)	Conducted	N/A	See data	N/A
		IC: -	**IC:** RSS-210 A9.2 (1) (2)				
2	Maximum Peak Output Power	**FCC:** ANSI C63.4:2003	**FCC :** 15.407(a)(1)(2)	Conducted	N/A		Complied
		IC: -	**IC:** RSS-210 A.9.2 (1) (2)				
3	Peak Power Spectral Density	**FCC:** ANSI C63.4:2003	**FCC :**15.407(a)(1)(2)	Conducted	N/A		Complied
		IC: -	**IC:** RSS-210 A.9.2 (1) (2)				
4	Peak Excursion Ratio	**FCC:** ANSI C63.4:2003	**FCC :**15.407(a)(1)(2)(3)	Conducted	N/A		Complied
		IC: -	**IC:** RSS-210 A.9.2 (1) (2)				
5	Spurious Emission	**FCC:** ANSI C63.4:2003	**FCC :** 15.407(b)(1)(2)(4) (5)(7), 15.205and15.209	Conducted Radiated	N/A	**[Tx]** 2.5dB 62.501MHz Ver, QP (Tx 5180MHz) **[Rx]** 4.6dB 719.981MHz Hori, QP	Complied
		IC: -	**IC:** RSS-210 A.9.3 (1) (2)				
6	Conducted Emission	**FCC:** ANSI C63.4:2003	**FCC:** 15.407(b)(6)/15.207	-	N/A	15.3dB 4.99554MHz AV, N (Tx 5700MHz)	Complied
		IC: RSS-Gen 7.2.2	**IC:** RSS-Gen 7.2.2				
7	Band Edge Compliance	**FCC:** ANSI C63.4:2003	**FCC :** 15.407(b)(1)(2)(7)/15.205	Conducted / Radiated	N/A	See data	Complied
		IC: -	**IC:** RSS-210 A.9.3 (1)(2)				
8	Dynamic Frequency Selection	FCC 06-96 APPENDIX	**FCC :** 15.407(h)(2)	Conducted	N/A	N/A	N/A *1)
		IC: -	**IC:** RSS-210 A9.4				

Note: UL Apex's EMI Work Procedures No.QPM05 and QPM15.
*1) Refer to 27DE0139-HO-E, FCC part 15E (FCC 15.407) DFS report.

*These tests were also referred to FCC Public Notice DA 02-2138 "Measurement Procedure Updated for Peak Transmit Power in the Unlicensed National Information Infrastructure (U-NII) Bands ".
*These tests were performed without any deviations from test procedure except for additions or exclusions.

3.3 Addition to standards

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	RSS-Gen 4.4.1	RSS-Gen 4.4.1	Conducted	N/A	N/A	N/A

3.4 Uncertainty

Conducted Emission

The measurement uncertainty (with a 95% confidence level) for this test is ±2.66dB.
The data listed in this test report has enough margin, more than the site margin.

Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ±4.59dB(3m)/ ±4.58dB(10m).
The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ±4.62dB(3m)/ ±4.60dB(10m).
The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is ±5.27dB.
The data listed in this report meets the limits unless the uncertainty is taken into consideration.

Other test except Conducted Emission and Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test is ±3.0dB.

3.5 Test Location

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	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	IC4247A	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	655103	IC4247A-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	IC4247A-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	IC4247A-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	-
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	N/A	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	2.0 x 2.0 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 5.4 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3 and No.4 semi-anechoic chambers and No.7 shielded room.

3.6 Test set up, Test instruments and Data of EMI

Refer to APPENDIX 1 to 3.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

The mode is used :
The EUT was operating in a manner similar to typical use during the tests.
IEEE 802.11a : OFDM(54Mbps(Worst), Packet Type: Maximum, Payload: PN9) * See Remarks.

-Transmitting mode

Channel 36:	:	5180MHz
Channel 52:	:	5260MHz
Channel 64:	:	5320MHz
Channel 100:	:	5500MHz
Channel 120:	:	5600MHz
Channel 140:	:	5700MHz
Channel 149:	:	5745MHz
Channel 153:	:	5765MHz
Channel 161:	:	5805MHz

-Receiving mode

Channel 52:	:	5260MHz
Channel 120:	:	5600MHz
Channel 153:	:	5765MHz

Remarks
Conditions : 1) Data Rate:IEEE802.11a : 6, 9, 12, 18, 24, 36, 48, 54 Mbps
2) Antenna connecter: ANT A and ANTB (same type)
3) Antenna Type: Dual Band Diversity Antenna
Magnetic Pedestal Antenna
Magnetic Pedestal Antenna with extension cable 5m
4) High / Mid / Low power

As a result of the preliminary test, the final test was performed under the worst conditions of the above. See the below table for the details of the worst conditions.

Worst Conditions:

Test Item	IEEE802.11a
All tests	1) Rate: 54Mbps
	2) Antenna Port: ANT A
	3) Dual Band Diversity Antenna
	4) High power

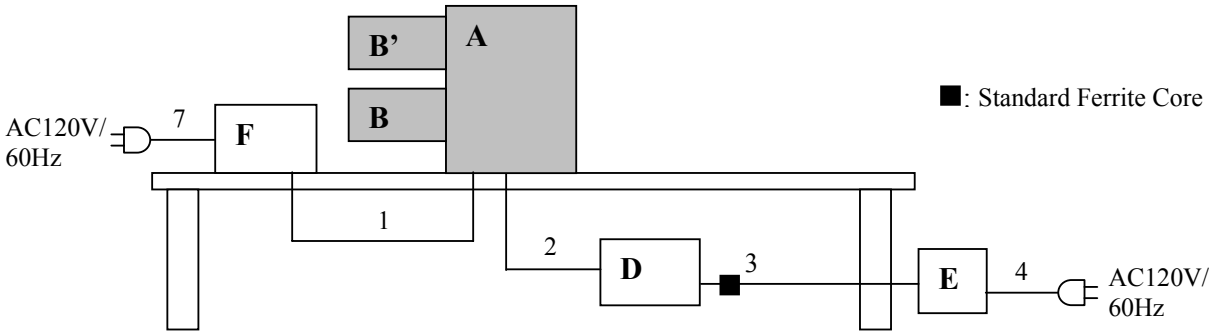
However, some test items were performed with other antennas in addition to the worst one (Dual Band Diversity Antenna). See the below table for the details.

Test Item	Tested Antenna Type
Spurious emissions (Tx 5260MHz, 5600MHz, and 5765MHz) BandEdge emissions (Tx 5180MHz, 5320MHz, 5500MHz, 5700MHz, 5745MHz, and 5805MHz)	Dual Band Diversity Antenna Magnetic Pedestal Antenna
BandEdge emissions (Tx 5180MHz, 5320MHz, 5500MHz, 5700MHz, 5745MHz, and 5805MHz)	Dual Band Diversity Antenna Magnetic Pedestal Antenna Magnetic Pedestal Antenna with extension cable 5m

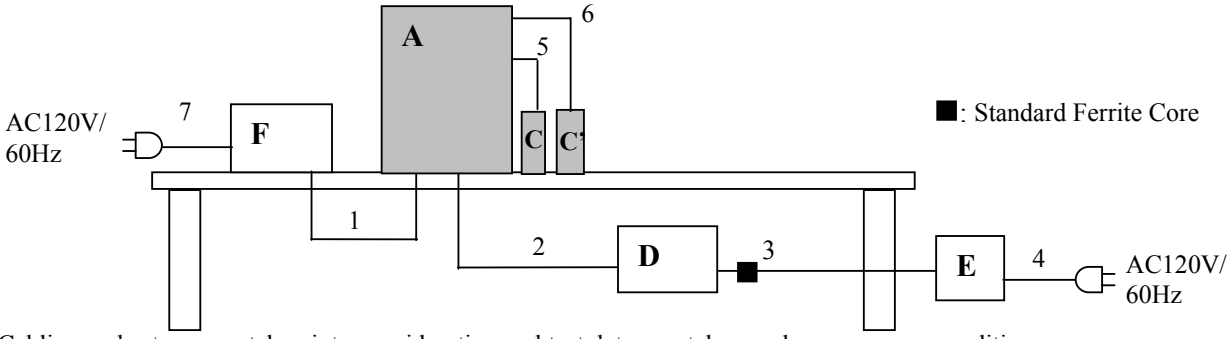
4.2 Configuration and peripherals

4.2.1 Conducted emissions /Antenna Terminal Conducted test

(1) Dual Band Diversity Antenna



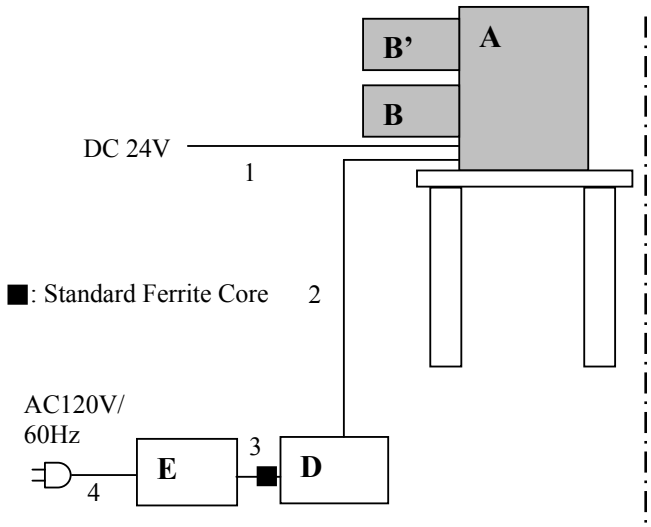
(2) Magnetic Pedestal Antenna



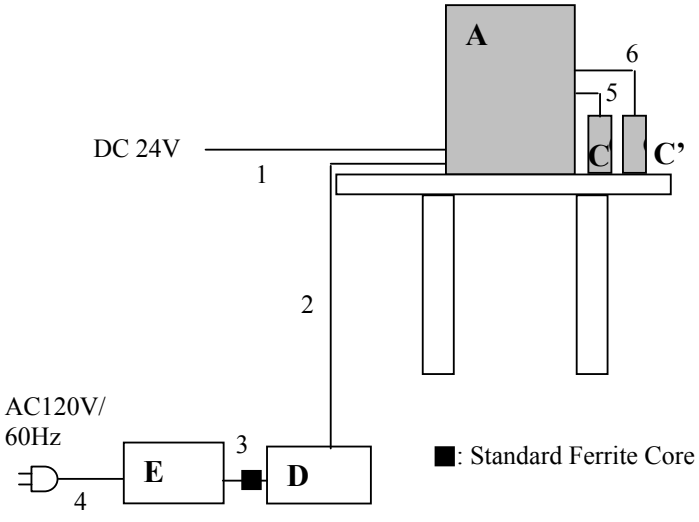
* Cabling and setup were taken into consideration and test data was taken under worse case conditions.

4.2.2 Radiated emissions

(1) Dual Band Diversity Antenna



(2) Magnetic Pedestal Antenna



* Cabling and setup were taken into consideration and test data was taken under worse case conditions.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	FA Wireless LAN Unit	WE70-AP	279651000201 *1) 279651000202 *2)	OMRON	EUT
B,B'	Dual Band Diversity Antenna	-	-	OMRON	EUT
C,C'	Magnetic Pedestal Antenna	-	-	OMRON	EUT
D	Personal Computer	TYPE2366-LJ7	97-99D4L	IBM	-
E	AC Adapter	02K6750	11S02K6750Z1Z2UP29ADTJ	IBM	-
F	DC power supply	6654A	MY40000510	Agilent	-

*1) for Conducted Emission and Radiated Emission tests.
*2) for Antenna Terminal Conducted test

List of cables used

No.	Name	Length (m)	Shield	
			Cable	Connector
1	DC cable	2.5	Unshielded	Unshielded
2	LAN cable	3.0	Shielded	Shielded
3	DC cable	1.8	Unshielded	Unshielded
4	AC cable	1.0	Unshielded	Unshielded
5	Antenna cable	2.0, 7.0 *3)	Shielded	Shielded
6	Antenna cable	2.0, 7.0 *3)	Shielded	Shielded
7	AC cable	2.2	Unshielded	Unshielded

*3) Without extension cable of 5.0m = 2.0m, With extension cable of 5.0m = 7.0m (2.0m + 5.0m.)

SECTION 5: Conducted Emission

Test Procedure

EUT was placed on a urethane platform of nominal size, 1.0m 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 flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center .

For the tests on EUT with other peripherals (as a whole system)
I/O cable 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.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber or a Measurement Room.
The EUT was connected to a LISN (AMN).
An overview sweep with peak detection has been performed.
The measurements have been performed with a CISPR quasi-peak detector (IF BW 9 kHz).
Measurement range: 0.15-30MHz

Test data : APPENDIX 2
Test result : Pass

SECTION 6: Spurious Emission , Band Edge Compliance

[Conducted]

Test Procedure
The Out of Band Emission was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2
Test result : Pass

[Radiated]

Test Procedure
EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 80cm above the conducting ground plane.
The Radiated Electric Field Strength intensity has been measured in a Semi Anechoic Chamber with a ground plane and at a distance of 3m(Below 10GHz) , 1m(10-26.5GHz, Distance Factor : 20log(3[m]/1[m])) and 0.5m(Upper 26.5GHz, Distance Factor : 20log(3[m]/0.5[m]).
The height of the measuring varied between 1 and 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 with the Test Receiver or the Spectrum Analyzer.

Below 1GHz

The result also satisfied with the general limits specified in section 15.209(a).

Above 1GHz

Inside of the restricted bands (Section 15.205) : Apply to limit in the Section 15.209(a)
Outside of the restricted bands (Section 15.407) : Limit –27dBm EIRP
–17dBm EIRP (5.725-5.825GHz Band Edge)

Frequency	Below 1GHz	Above 1GHz (Inside of the restricted bands)	Above 1GHz (Outside of the restricted bands)
Instrument use	Test Receiver	Spectrum Analyzer	Spectrum Analyzer
Detector IF Bandwidth	QP: BW 120kHz	PK: RBW:1MHz/VBW: 1MHz AV: RBW:1MHz/VBW:10Hz	RBW:1MHz/VBW: 1MHz

*The noise from the EUT was not seen above 18GHz. The measurement was made in the residual noise levels.

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT and EUT's antenna to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Test data : APPENDIX 2
Test result : Pass

SECTION 7: 26dB Emission Bandwidth

Test Procedure
The 26dB Emission Bandwidth was measured with a spectrum analyzer connected to the antenna port.

Test data : **APPENDIX 2**
Test result : **Pass**

SECTION 8: Maximum Peak Output Power

Test Procedure
The Peak Transmit Power was measured with a spectrum analyzer connected to the antenna port.
The test was made with the spectrum analyzer that has a function of channel-power measurement.
We followed the method 1 specified in DA-02-2138A1.

Test data : **APPENDIX 2**
Test result : **Pass**

SECTION 9: Peak Power Spectral Density

Test Procedure
The Peak Power Spectral Density was measured with a spectrum analyzer connected to the antenna port.
We followed the method 2 specified in DA-02-2138A1.

Test data : **APPENDIX 2**
Test result : **Pass**

SECTION 10: Peak Excursion Ratio

Test Procedure
The Peak Excursion Ratio was measured with a spectrum analyzer connected to the antenna port.
The second Sweep was measured based on Method 1 specified in DA-02-2138A1.

Test data : **APPENDIX 2**
Test result : **Pass**