



RADIO TEST REPORT

Test Report No. : 28HE0115-HO-02-A

Applicant : NEC Corporation
Type of Equipment : Factory Computer as FC-NOTE Series
Model No. : FC-N22A
FCC ID : BSFFC-N22A
Test regulation : FCC Part 15 Subpart C 2008
Section 15.207, Section 15.247

Test Result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Date of test: April 22 to July 7, 2008

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NVLAP LAB CODE: 200572-0

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SECTION 1: Customer information

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

2.1 Identification of E.U.T.

Type of Equipment : Factory Computer as FC-NOTE Series
Model No. : FC-N22A
Serial No. : PP-004: Used for Conducted emission test
PP-090: Used for Radiated emission test
PP-091: Used for Antenna terminal conducted tests
Rating : AC100-240V / 1.1A-0.5A
Receipt Date of Sample : April 21, 2008
Country of Mass-production : Japan
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

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2.2 Product Description

Model No: FC-N22A (referred to as the EUT in this report) is the Factory Computer as FC-NOTE Series.
Feature of EUT: EUT is the Factory Computer as FC-NOTE Series which has IEEE802.11b, IEEE802.11g, IEEE802.11a functions and approved Bluetooth module (FCC ID: CWTUGPZ6-C3).

	IEEE802.11b	IEEE802.11g	IEEE802.11a	Bluetooth
Frequency band	2412 - 2462MHz		5180-5240MHz (Lower band) 5260-5320MHz (Middle band) 5745-5825MHz (Upper band)	2402-2480MHz
Clock frequencies in the system (radio part)	CPU: 1.05GHz			
Channel spacing	5MHz		20MHz	1MHz
Type of Modulation	DSSS	OFDM		FHSS
Antenna Type	PIFA			
Antenna Connector Type	U.FL-LP-088			
Antenna Gain	Main: L=570mm Gain w/cable loss 2400-2500MHz: 0.36 dBi (peak) ----- Aux: L=385mm Gain w/cable loss 2400-2500MHz: -2.28 dBi (peak)		Main: L=570mm Gain w/cable loss 5150-5350MHz: 0.69 dBi (peak) 5470-5725MHz: 1.27 dBi (peak) 5725-5850MHz: 0.32 dBi (peak) ----- Aux: L=385mm Gain w/cable loss 5150-5350MHz: 4.32 dBi (peak) 5470-5725MHz: 4.42 dBi (peak) 5725-5850MHz: 1.84 dBi (peak)	-3.0dBi
Power Supply (radio part)	DC 3.3V			

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part15 Subpart C: 2008, final revised on May 19, 2008

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928MHz,
2400-2483.5MHz, and 5725-5850MHz

*The revision on May 19, 2008 does not influence the test specification applied to the EUT.

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 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	Conducted emission	FCC: ANSI C63.4:2003 7. AC powerline conducted emission measurements IC: RSS-Gen 7.2.2	FCC: Section 15.207 IC: RSS-Gen 7.2.2	-	N/A	[QP] 22.9dB 0.15051MHz, L [AV] 22.7dB 0.49621MHz, N 0.49636MHz, N	Complied
2	6dB Bandwidth	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" IC: RSS-Gen 4.6.2	FCC: Section 15.247(a)(2) IC: RSS-210 A8.2(a)	Conducted	N/A	See data.	Complied
3	Maximum Peak Output Power	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" IC: RSS-Gen 4.8	FCC: Section 15.247(b)(3) IC: RSS-210 A8.4(4)	Conducted	N/A		Complied
4	Restricted Band Edges	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" IC: -	FCC: Section 15.247 (d) IC: RSS-210 A8.5	Conducted/ Radiated	N/A		Complied
5	Power Density	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" IC: -	FCC: Section 15.247 (e) IC: RSS-210 A8.2(b)	Conducted	N/A		Complied
6	Spurious Emission	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" IC: RSS-Gen 4.9 RSS-Gen 4.10	FCC: Section15.247(d) IC: RSS-210 A8.5 RSS-Gen 7.2.1 and 7.2.3	Conducted/ Radiated	N/A	[Tx] 0.4dB, 11490.0MHz, Horizontal, AV [Rx] 4.2dB, 454.674MHz, Horizontal, QP	Complied*1)

Note: UL Japan, Inc.'s EMI Work Procedures No.QPM05 and QPM15.

*1) Co-location & Co-operation are included in this test.

*These tests were performed without any deviations from test procedure except for additions or exclusions.

*In case any questions arise about test procedure, ANSI C63.4: 2003 is also referred.

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3.3 Addition to standards

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	IC: RSS-Gen 4.6.1	IC: RSS-Gen 4.6.1	Conducted	N/A	N/A	N/A

3.4 Uncertainty

EMI

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Test room	Conducted emission	Radiated emission (10m*)			Radiated emission (3m*)			Radiated emission (3m*)	
	150kHz-30MHz	9kHz-30MHz	30MHz-300MHz	300MHz-1GHz	9kHz-30MHz	30MHz-300MHz	300MHz-1GHz	1GHz-18GHz	18GHz-40GHz
No.1 semi-anechoic Chamber (±)	3.7dB	3.1dB	4.4dB	4.2dB	3.2dB	3.8dB	3.9dB	5.9dB	6.1dB
No.2 semi-anechoic chamber (±)	3.7dB	-	-	-	3.2dB	4.4dB	4.0dB	5.9dB	6.1dB
No.3 semi-anechoic chamber (±)	3.7dB	-	-	-	3.2dB	4.6dB	4.0dB	5.9dB	6.1dB
No.4 semi-anechoic chamber (±)	3.7dB	-	-	-	3.2dB	3.9dB	3.9dB	5.9dB	6.1dB

*10m/3m = Measurement distance

Conducted emission test

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

Radiated emission test(3m)

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 for this test is 3.0dB.

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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	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
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	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 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	-
No.9 measurement room	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

* 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.3 and No.4 shielded rooms.

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 Mode(s)

Test Item	Operating Mode	Tested frequency	Used Antenna
Conducted emission	-IEEE802.11b Transmitting (Tx), 11Mbps, Payload: PN9	2412MHz(L) 2437MHz(M) 2462MHz(H)	MAIN
	-IEEE802.11g Transmitting (Tx), 6Mbps, Payload: PN9		
	-IEEE802.11a Transmitting (Tx), 6Mbps, Payload: PN9	5745MHz(L) 5785MHz(M) 5825MHz(H)	AUX
	-IEEE802.11b/g Receiving (Rx)	2437MHz(M)	MAIN
	-IEEE802.11a Receiving (Rx)	5785MHz(M)	AUX
6dB Bandwidth Maximum Peak Output Power Power Density 99% Occupied Bandwidth	-IEEE802.11b Transmitting (Tx), 11Mbps, Payload: PN9	2412MHz(L) 2437MHz(M) 2462MHz(H)	MAIN
	-IEEE802.11g Transmitting (Tx), 6Mbps, Payload: PN9		
	-IEEE802.11a Transmitting (Tx), 6Mbps, Payload: PN9	5745MHz(L) 5785MHz(M) 5825MHz(H)	AUX
Spurious Emission	-IEEE802.11b Transmitting (Tx), 11Mbps, Payload: PN9	2412MHz(L) 2437MHz(M) 2462MHz(H)	MAIN
	-IEEE802.11g Transmitting (Tx), 6Mbps, Payload: PN9		
	-IEEE802.11a Transmitting (Tx), 6Mbps, Payload: PN9	5745MHz(L) 5785MHz(M) 5825MHz(H)	AUX
	-IEEE802.11g Transmitting (Tx), 6Mbps, Bluetooth (EDR) Hopping mode, PRBS9	2437MHz(M)	MAIN
	-IEEE802.11b/g Receiving (Rx)	2437MHz(M)	MAIN
	-IEEE802.11a Receiving (Rx)	5785MHz(M)	AUX
Restricted Band Edge	-IEEE802.11b Transmitting (Tx), 11Mbps, Payload: PN9	2412MHz(L) 2462MHz(H)	MAIN
	-IEEE802.11g Transmitting (Tx), 6Mbps, Payload: PN9		
	-IEEE802.11b Transmitting (Tx), 11Mbps, Bluetooth (EDR) Hopping mode, PRBS9		
	-IEEE802.11g Transmitting (Tx), 6Mbps, Bluetooth (EDR) Hopping mode, PRBS9		
	-IEEE802.11a Transmitting (Tx), 6Mbps, Payload: PN9	5745MHz(L) 5825MHz(H)	AUX

*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum power.
As for the Radiated Spurious Emission test, the antenna which transmits the largest power as a pre-test was verified.
The antenna which transmits the largest power was selected as an antenna for formal test. Please refer to P.35 and P.36.

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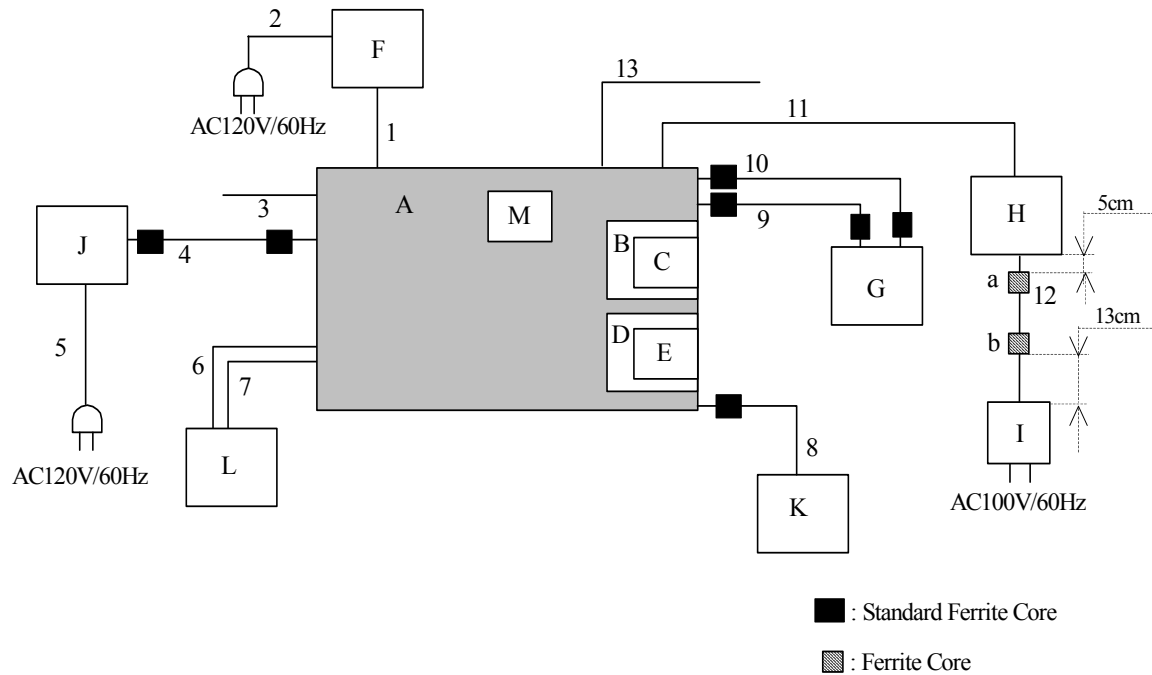
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4.2 Configuration and peripherals



- * Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.
- * The EUT noise was not influenced by these Ferrite Cores.
- * The Full port test was confirmed by the test of FCC Part 15 Subpart B.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Factory Computer as FC-NOTE Series	FC-N22A	PP-004 *1) PP-090 *2) PP-091 *3)	NEC	EUT
B	PC Card Adapter	BN-SDDBP3	P3021981R	Matsushita	-
C	SD Card	GH-SDC2G6X	-	Green House	-
D	Express Card	GH-EX25AD	R000/5340	Green House	-
E	SD Card	SD-M08O	-	TOSHIBA	-
F	AC Adapter	FC-AA01N	0803 PP 0000231G *1) 0000177 *2)	NEC	-
G	CD/DVD-Drive	FC-CW002U	S6Z0984M	NEC	-
H	Modem	MRV56R2	70107585	Micro Reserch	-
I	AC Adapter	-	-	-	-
J	Monitor	F15 T6A	2400026G1	NEC	-
K	Mouse	-	X05-87477	Microsoft	-
L	Earphone/Mic	-	-	Creative	-
M	SD Card	-	-	IO Data	-

*1) Used for Conducted emission test

*2) Used for Radiated emission test

*3) Used for Antenna terminal conducted tests

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	1.8	Unshielded	Unshielded	-
2	AC Cable	2.0	Unshielded	Unshielded	-
3	LAN Cable	0.1	Unshielded	Unshielded	-
4	Monitor Cable	2.0	Unshielded	Unshielded	-
5	AC Cable	2.0	Unshielded	Unshielded	-
6	Audio Cable	2.4	Unshielded	Unshileded	-
7	Audio Cable	2.4	Unshielded	Unshielded	-
8	USB Cable	1.5	Shielded	Shielded	-
9	USB Cable	0.55	Shielded	Shielded	-
10	USB Cable	0.55	Shielded	Shielded	-
11	RS-232C Cable	6.6	Shielded	Shielded	-
12	DC Cable	1.8	Unshielded	Unshielded	a: Ferrite Core (model: TFC16816, manufacturer: KG, Two turns) b: Ferrite Core (model: RFC-8, manufacturer: KG, Two turns)
13	IEEE 1394 Cable	1.5	Shielded	Shielded	-

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SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane 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 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. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm when not connected to the measuring equipment.

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.

Detector	: quasi-peak and average detector (IF BW 9 kHz)
Measurement range	: 0.15-30MHz
Test data	: APPENDIX 2
Test result	: Pass

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SECTION 6: Spurious Emission

[Conducted]

Test Procedure

The Out of Band Emission was measured with a spectrum analyzer connected to the antenna port. It was measured based on "1. RF antenna conducted test" of "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247".

The following spectrum analyzer setting was used:

- RBW: 100kHz
- VBW: 300kHz
- Sweep: Auto
- Detector: Peak
- Trace: Max Hold

Test data : APPENDIX 2

Test result : Pass

[Radiated]

Test Procedure

It was measured based on "2. Radiated emission test" of "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247".

EUT was placed on a urethane platform of nominal size, 1m by 1.5m, 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) and 0.5m(Upper 26.5GHz).

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 (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

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.

20dBc was applied to the frequency over the limit of FCC 15.209 / Table 2 of RSS-210 2.7 (IC) and outside the restricted band of FCC15.205 / Table 1 of RSS-210 2.7 (IC).

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver / Spectrum Analyzer	Spectrum Analyzer *1)
Detector	QP: BW 120kHz(T/R)	PK: RBW:1MHz/VBW: 1MHz
IF Bandwidth	20dBc : RBW: 100kHz VBW: 300kHz (S/A)	AV: RBW:1MHz/VBW:10Hz 20dBc : RBW:100kHz/VBW:300kHz

*1) The Spectrum Analyzer was used in 3dB resolution bandwidth.

The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT 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

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SECTION 7: Bandwidth

Test Procedure

The bandwidth was measured with a spectrum analyzer connected to the antenna port.
It was measured based on "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247".
The following spectrum analyzer setting was used:

- Span: 20MHz
- RBW: 100kHz
- VBW: 300kHz
- Sweep: Auto
- Detector: Peak
- Trace: Max Hold

Test data	: APPENDIX 2
Test result	: Pass

SECTION 8: Maximum Peak Output Power

Test Procedure

The Maximum Peak Output Power was measured with a power meter (tested bandwidth: 50MHz) connected to the antenna port.
It was measured based on "Power Output Option 1" of "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247".

Test data	: APPENDIX 2
Test result	: Pass

SECTION 9: Peak Power Density

[Conducted]

Test Procedure

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

It was measured based on "PSD Option 1" of "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247".

- Span: 3MHz
- RBW: 3kHz
- VBW: 100kHz
- Sweep: 500sec.
- Detector: Peak
- Trace: Max Hold

Test data : APPENDIX 2

Test result : Pass

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