

	Report No: R1401	FCC ID: POB-A040	
	Test No: T0359	Test Report	Page: 1 of 15



dB Technology
|----- (Cambridge Ltd.) -----|

EMC
Testing

EMC
Consultancy

EMC
Training

23, Headington Drive,
Cambridge.
CB1 4HE
Tel : 01954 251974 (test site)
or : 01223 241140 (accounts)
Fax : 01954 251907
web : www.dbtechnology.mcmail.com
email: dbtech@mcmail.com

REPORT ON ELECTROMAGNETIC COMPATIBILITY TESTS

Performed at:
TWENTY PENCE TEST SITE

Twenty Pence Road,
Cottenham,
Cambridge
U.K.
CB4 4PS

on

Nokia UK Ltd

Nokia A040 WLAN Ethernet Adapter

dated

6 March 2001

	Report No: R1401	FCC ID: POB-A040	
	Test No: T0359	Test Report	Page: 2 of 15

Equipment Under Test (EUT): Nokia A040 WLAN Ethernet Adapter

Test Commissioned by: Nokia UK Ltd
Unit 3
Cambridge Business Park
Cowley Road
Cambridge
CB4 4WS

Representative: Simon Black

Test Started: 13 February 2001

Test Completed: 28 February 2001

Test Engineer: Dave Smith

Date of Report: 6 March 2001

Report:

Written by: _ _ _ _ Dave Smith _ _ _ _ . Checked by: _ _ _ _ Derek Barlow _ _ _ _ .

Signature: _ _ _ _ _ . Signature: _ _ _ _ _ .

Date: _ _ _ 16 March 2001 _ _ _ . Date: _ _ _ 16 March 2001 _ _ _ .

Test Standards Applied

CFR 47 : 1999
Class B

Code of Federal Regulations: Pt 15 Subpart B- Radio Frequency Devices - **PASS**
Unintentional Radiators

	Report No: R1401	FCC ID: POB-A040	
	Test No: T0359	Test Report	Page: 3 of 15

Emissions Test Results Summary

CFR 47 : 1999

PASS

Test	Port	Method	Limit	PASS/FAIL	Notes
Conducted Emissions	ac power	ANSI C63.4:1992	CISPR22(B)	PASS	
Radiated Emissions		ANSI C63.4:1992	CISPR22(B)	PASS	

	Report No: R1401	FCC ID: POB-A040	
	Test No: T0359	Test Report	Page: 4 of 15

Contents

1 EUT Details	5
1.1 General	5
1.2 Modifications to EUT and Peripherals	6
1.3 EUT Operating Modes	6
<i>Figure 1 General Arrangement of EUT and Peripherals for Emissions</i>	7
2 Test Equipment	8
3 Test Methods	9
3.1 Conducted Emissions - ac power	9
3.2 Radiated Emissions	9
4 Test Results	9
4.1 Conducted Emission Results	10
4.2 Radiated Emissions Results	11
PLOT 1 Conducted Emissions - Neutral	12
PLOT 2 Conducted Emissions - Live	13
PLOT 3 Radiated Emissions - 25MHz to 275MHz	14
PLOT 4 Radiated Emissions - 250MHz to 1GHz	15

	Report No: R1401	FCC ID: POB-A040	
	Test No: T0359	Test Report	Page: 5 of 15

1 EUT Details

1.1 General

The EUT was a Nokia A040 Wireless LAN Ethernet adapter.

Details of the EUT and associated peripherals used during the tests are listed below. Figure 1 shows the interconnections between the EUT and peripherals.

Item	Manufacturer	Model	Description	Serial No:	FCC ID
1	Nokia UK <i>Nokia</i>	A040 <i>including C110</i>	EUT <i>11Mbps WLAN card</i>	000612	POB-A040 <i>ORE-C110-C111</i>
2	FRIWO	FW7238/12 15.1210.500 EDV 1812710	AC-DC power adapter		N/A
3	Compaq	Deskpro EN ENS/P733/10E/9/64 UK	PC	8029FHGZA124	DoC
4	Compaq	SK-2860	Keyboard	B21A50FN1J0030	GYUR86SK
5	Logitech	M-S48a	Mouse	F22420CBJ42XL2	JNZ201213
6	Dell	M570	Monitor	GB-08204T-47604 0C1-AESZ	DoC
7	HP	Deskjet 850C	Printer	SG563160BJ	B94C2145X
8	Nokia UK	A032	WLAN Access Point	001256	verified digital device
9	Nokia UK	A030	WLAN Access Point	000003	

	Report No: R1401	FCC ID: POB-A040	
	Test No: T0359	Test Report	Page: 6 of 15

1.2 Modifications to EUT and Peripherals

Details of any modifications that were required to achieve compliance are listed below. The modification numbers are referred to in the results sections as appropriate.

Mod No:	Details
0	Original unit as received on 14 February 2001.

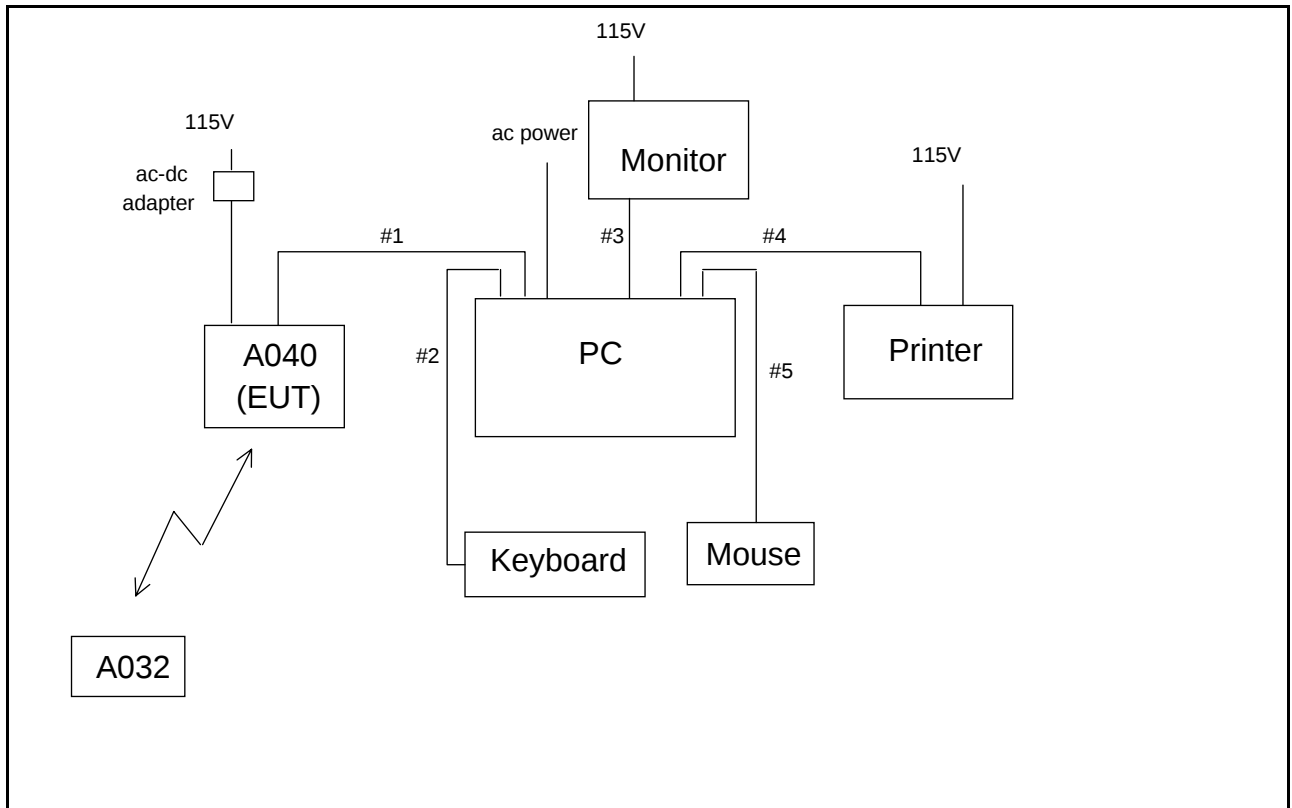
1.3 EUT Operating Modes

The EUT was tested in the following operating mode or modes. Generally, operating modes are chosen that will exercise the functions of the EUT as fully as possible and in a manner likely to produce maximum emission levels or susceptibility. Individual

Operating Mode	Details
1	Packets continually sent between A032 and EUT over radio link. Data continually sent between EUT and PC over ethernet link. (Set up as figure 1).

	Report No: R1401	FCC ID: POB-A040	
	Test No: T0359	Test Report	Page: 7 of 15

Figure 1 General Arrangement of EUT and Peripherals for Emissions



- #1 1m screened twisted pair ethernet cable
- #2 1.5m screened keyboard cable
- #3 1.5m screened monitor cable
- #4 2m screened printer cable
- #5 1.5m screened mouse cable

	Report No: R1401	FCC ID: POB-A040	
	Test No: T0359	Test Report	Page: 8 of 15

2 Test Equipment

The test equipment used during the tests was one or more of the items listed below. Individual test result sheets indicate which items were used.

Ref No:	Manufacturer	Model	Description	Serial Number	Cal Date
R1	Chase	LHR7000	RF Receiver (10kHz -30MHz)	1056	12 Dec 2001
R4	Rohde and Schwarz	ESVS10	RF Receiver (20MHz - 1GHz)	843744/00	4 Dec 2001
R5	Hewlett Packard	HP 8595E	Spectrum Analyser	3412A00701	17 Aug 2001
R5A	Hewlett Packard	HP11947A	Transient Limiter	3107A01209	
R5B	Hewlett Packard	HP87405A	Pre-amp	3207A00322	
L1	EMCO	3825/2	LISN	1358	18 Mar 2000
L2	Rohde and Schwarz	ESH3-Z5	LISN	843862/009	18 Mar 2000
A4	Chase	CBL6112	Bilog Antenna (30MHz - 2GHz)	2027	30 May 2000
A5	Chase	CBL111A	Bilog Antenna (30MHz - 1GHz)	1760	30 May 2000

	Report No: R1401	FCC ID: POB-A040	
	Test No: T0359	Test Report	Page: 9 of 15

3 Test Methods

3.1 Conducted Emissions - ac power

This section describes the general method of performing this test. The specific method used and any deviations from this general method are listed in the appropriate results section.

Bench top EUTs and peripheral equipment are normally placed on a 0.8m high non-conducting bench, positioned 0.4m from one of the metallic walls of a screened room. Floor standing EUTs are normally placed 0.1m above the metallic floor of the screened room. Mains leads are bundled so as not to exceed 1m.

The EUT is powered using a 50ohm/50uH Line Impedance Stabilisation Network (LISN). Peripherals are powered using a second a 50ohm/50uH LISN.

With the correct supply voltage applied to the EUT scans are performed on both the live and neutral line outputs of the LISN using quasi-peak detection over the specified frequency range. The results of these scans are shown in the plots section at the end of the report.

Significant emissions identified by the scans are measured and the results tabulated. The table of results is shown in the conducted emissions results section.

3.2 Radiated Emissions

This section describes the general method of performing this test. The specific method used and any deviations from this general method are listed in the appropriate results section.

Initial scans are performed in a semi-anechoic screened room at a distance of 3m. Scans are performed over the frequency range specified in the test standard with the antenna both horizontally and vertically polarised. During these scans the EUT and peripherals are rotated through 360°. Bench top EUTs are placed on a non-conducting bench at a height of 0.8m above the ground plane. Floor standing EUTs are placed 0.1m above the ground plane. The results of the scans are shown in the plots included at the end of the report.

Significant emissions identified by the scans are measured on an open area test site at the appropriate test distance using a CISPR16 quasi-peak receiver. Maximised readings are obtained by rotating the EUT through 360° and adjusting the height of the antenna from 1m to 4m. Measurements are made with the antenna both horizontally and vertically polarised and the results tabulated.

4 Test Results

The following sections contain tabulated test results. Plots of various scans are included at the back of this section.

	Report No: R1401	FCC ID: POB-A040	
	Test No: T0359	Test Report	Page: 10 of 15

4.1 Conducted Emission Results

Test Equipment:	Factor Set 1:	EMLISN	RG214	10 m cable
-----------------	---------------	--------	-------	------------

Conducted Emissions

Company:	Nokia UK Ltd	Product:	A040 WLAN Ethernet Adapter
Date:	15 February 2001	Test Eng:	Dave Smith
Ports:	ac power		
Test:	ANSI C63.4:1992 using limits of CISPR22(B)		
Ports:			
Test:			

Test	Op Mode	Mod State	Line (L/N)	Fact Set	Freq. MHz	Det qp/av	Rec. Level dBuV	Corr'n Factor dB	Total Level dBuV	Limit CISPR22(B) dBuV	Margin CISPR22(B) dB	Limit	Margin	Notes	
	1	0	N	1	0.267	qp	38.3	0.1	38.4	61.2	22.8				
	1	0	N	1	0.267	av	29.0	0.1	29.1	51.2	22.1				
	1	0	N	1	0.468	qp	34.6	0.1	34.7	56.5	21.9				
	1	0	N	1	0.468	av	27.9	0.1	28.0	46.5	18.6				
	1	0	N	1	4.345	qp	40.3	0.1	40.4	56.0	15.6				
	1	0	N	1	4.345	av	32.2	0.1	32.3	46.0	13.7				
	1	0	N	1	4.415	qp	39.4	0.1	39.5	56.0	16.5				
	1	0	N	1	4.415	av	31.5	0.1	31.6	46.0	14.4				
	1	0	N	1	4.547	qp	40.0	0.2	40.2	56.0	15.8				
	1	0	N	1	4.547	av	32.5	0.2	32.7	46.0	13.3				
	1	0	N	1	21.005	qp	29.8	0.3	30.1	60.0	29.9				
	1	0	N	1	21.005	av	22.1	0.3	22.4	50.0	27.6				
	1	0	L	1	0.271	qp	37.6	0.1	37.7	61.1	23.4				
	1	0	L	1	0.271	av	31.6	0.1	31.7	51.1	19.4				
	1	0	L	1	0.670	qp	33.8	0.1	33.9	56.0	22.1				
	1	0	L	1	0.670	av	28.9	0.1	29.0	46.0	17.0				
	1	0	L	1	4.149	qp	37.6	0.1	37.7	56.0	18.3				
	1	0	L	1	4.149	av	32.0	0.1	32.1	46.0	13.9				
	1	0	L	1	4.346	qp	39.4	0.1	39.5	56.0	16.5				
	1	0	L	1	4.346	av	33.9	0.1	34.0	46.0	12.0				
	1	0	L	1	4.621	qp	41.1	0.2	41.3	56.0	14.7				
	1	0	L	1	4.621	av	25.6	0.2	25.8	46.0	20.2				
	1	0	L	1	24.345	qp	30.1	0.3	30.4	60.0	29.6				
	1	0	L	1	24.345	av	23.6	0.3	23.9	50.0	26.1				
Results										Minimum Margin PASS/FAIL		12.0 dB PASS			
Notes		Comments and Observations													
		Results of scans shown in plot 1 to 2.													

	Report No: R1401	FCC ID: POB-A040	
	Test No: T0359	Test Report	Page: 11 of 15

4.2 Radiated Emissions Results

Test Equipment:	Factor Set 1:	HFBIOLOG	RG214	25 m cable
-----------------	---------------	----------	-------	------------

Radiated Emissions

Company: Nokia UK Ltd	Product: A040 WLAN Ethernet Adapter
Date: 14 February 2001	Test Eng: Dave Smith
Ports:	
Test: ANSI C63.4:1992 using limits of CISPR22(B)	
Ports:	
Test:	

Test	Op Mode	Mod State	Dist m	Fact Set	Freq. MHz	Ant Pol	Rec. Level dBuV	Corr'n Factor dB/m	Total Level dBuV/m	Limit CISPR22(B) dBuV/m	Margin CISPR22(B) dB	Limit	Margin	Notes
	1	0	10	1	32.000	V	3.9	18.5	22.4	30.0	7.6			#1
	1	0	10	1	36.908	V	5.1	15.6	20.7	30.0	9.3			
	1	0	10	1	42.950	V	8.9	12.4	21.3	30.0	8.7			
	1	0	10	1	63.927	V	12.8	7.6	20.4	30.0	9.6			
	1	0	10	1	66.350	V	16.3	7.6	23.9	30.0	6.1			
	1	0	10	1	42.950	V	8.9	12.4	21.3	30.0	8.7			
	1	0	10	1	67.349	V	10.3	7.6	17.9	30.0	12.1			
	1	0	10	1	128.899	V	13.1	13.9	27.0	30.0	3.0			
	1	0	10	1	132.675	V	12.1	13.6	25.7	30.0	4.3			
	1	0	10	1	157.488	V	12.8	12.4	25.2	30.0	4.8			
	1	0	10	1	171.860	V	11.3	12.2	23.5	30.0	6.5			
	1	0	10	1	186.125	V	14.3	11.8	26.1	30.0	3.9			
	1	0	10	1	199.202	V	15.7	12.1	27.8	30.0	2.2			
	1	0	10	1	232.687	H	14.7	13.2	27.9	37.0	9.1			
	1	0	10	1	265.716	V	8.8	16.0	24.8	37.0	12.2			
	1	0	10	1	298.987	V	9.0	16.8	25.8	37.0	11.2			
	1	0	10	1	396.023	H	10.0	19.7	29.7	37.0	7.3			
	1	0	10	1	400.052	H	6.0	19.8	25.8	37.0	11.2			
	1	0	10	1	465.106	V	7.0	21.2	28.2	37.0	8.8			
	1	0	10	1	498.283	H	10.2	21.7	31.9	37.0	5.1			
	1	0	10	1	564.832	H	10.3	23.7	34.0	37.0	3.0			
	1	0	3	1	664.750	H	22.0	24.4	46.4	47.5	1.0			
	1	0	10	1	730.718	H	1.9	24.8	26.7	37.0	10.3			
	1	0	10	1	797.500	V	3.0	25.7	28.7	37.0	8.3			
	1	0	10	1	930.494	V	6.0	27.0	33.0	37.0	4.0			
Results					Minimum Margin PASS/FAIL					1.0 dB PASS				
Notes		Comments and Observations												
#1		Results of screened room scans shown in plot 5 and plot 6. The source of this emission was identified as the PC rather than the EUT. The measurement was made at a distance of 3m because of a high ambient signal.												

	Report No: R1401	FCC ID: POB-A040	
	Test No: T0359	Test Report	Page: 12 of 15

Chase EMS 6.21

Notes

Analyse 010214 C1N Nokia A040 - 115V

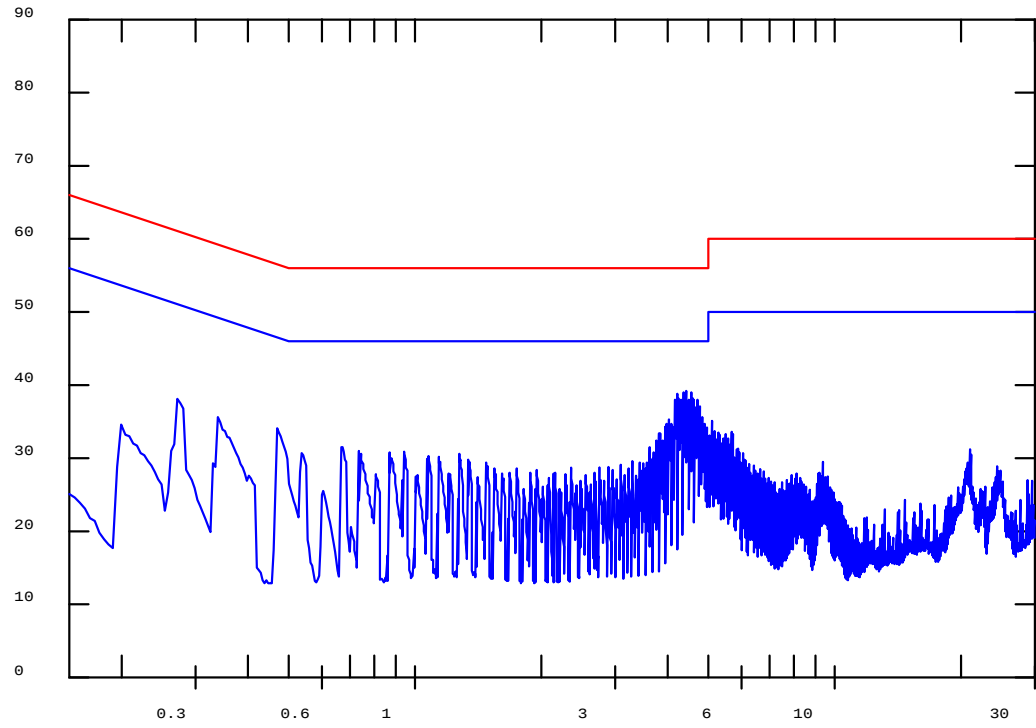
Test: EN55022(B) & Vfg243/1991 Mains Cond (QP Det)

RF level

dBuV

010214 C1N N

Quasi-peak



Log Freq. (0.15 - 30)MHz

Limit EN 55022 B Conducted Quas

PLOT 1 Conducted Emissions - Neutral

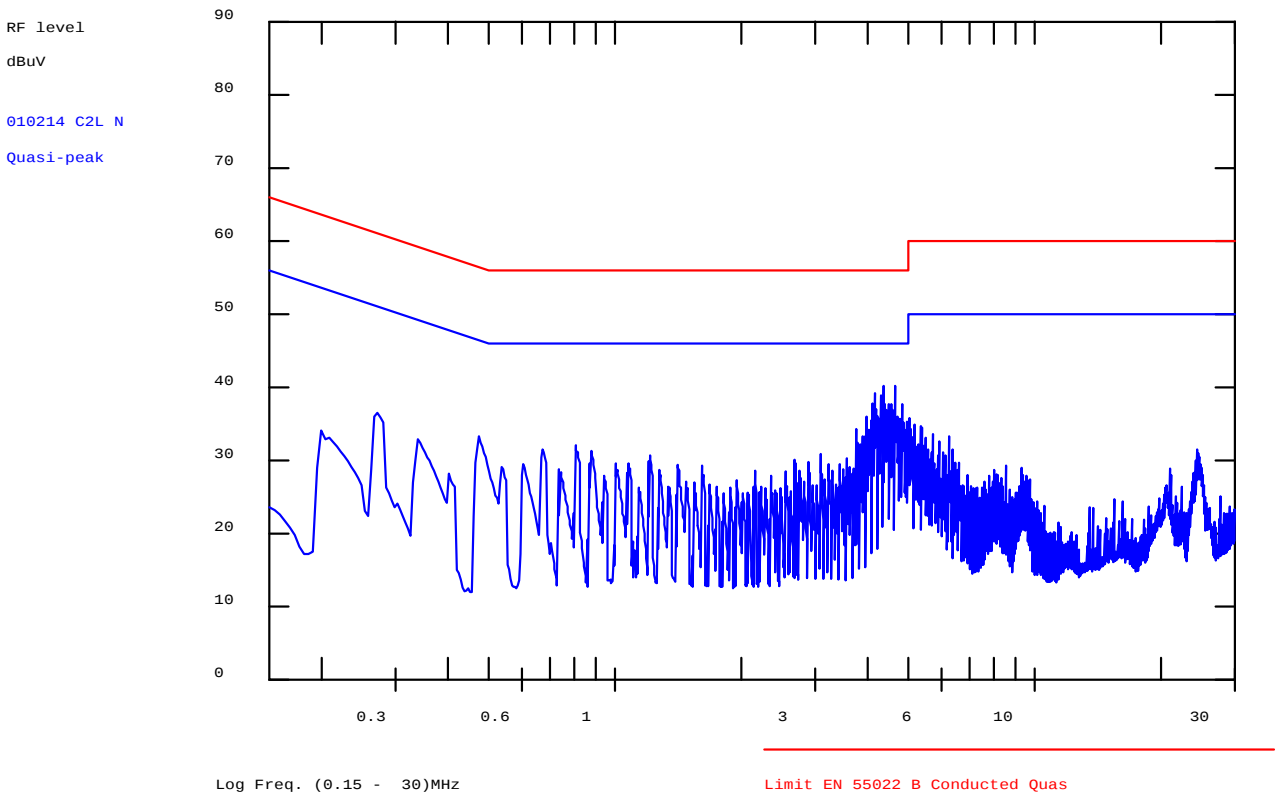
Company:	Nokia	Product:	A040
Date:	14 Feb 01	Test Engineer:	DS
Test:	EN55022	Limit:	EN (B) QP + AV
Notes:			
115V			
Line:	Neutral	Attenuator:	10dB PAD
Detector:	QuasiPeak	Operating Mode:	1
LISN:	EMCO	Mod. State:	1
Filename:	C1214764.plt		

Frequency List (MHz)

	Report No: R1401	FCC ID: POB-A040	
	Test No: T0359	Test Report	Page: 13 of 15

Chase EMS 6.21	Notes
----------------	-------

Analyse 010214 C2L Nokia A040 - 115V
 Test: EN55022(B) & Vfg243/1991 Mains Cond (QP Det)



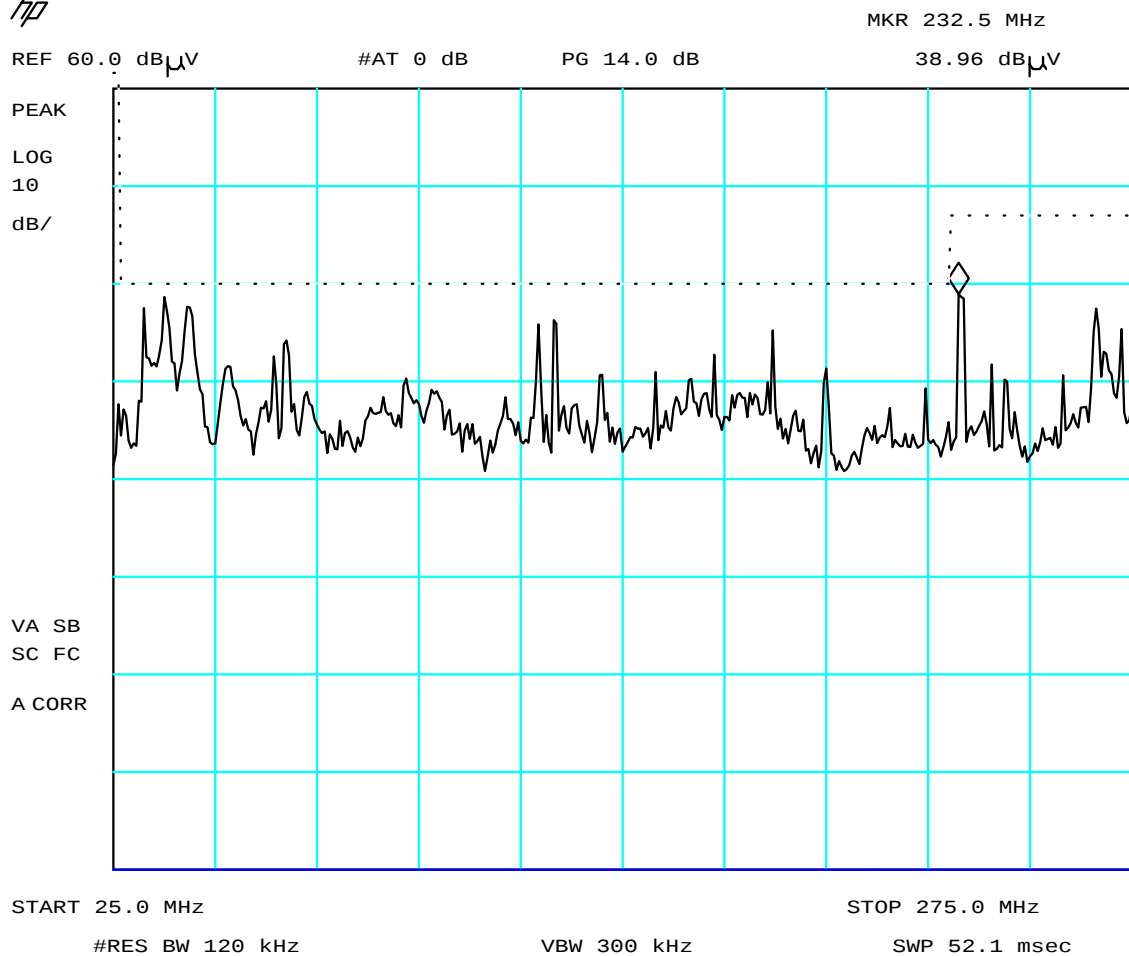
PLOT 2 Conducted Emissions - Live

Company:	Nokia	Product:	A040
Date:	14 Feb 01	Test Engineer:	DS
Test:	EN55022	Limit:	EN (B) QP + AV
Notes:			
115V			
Line:	Live	Attenuator:	10dB PAD
Detector:	QuasiPeak	Operating Mode:	1
LISN:	EMCO	Mod. State:	1
Filename:	C121476E.plt		

Frequency List (MHz)

	Report No: R1401	FCC ID: POB-A040	
	Test No: T0359	Test Report	Page: 14 of 15

hp

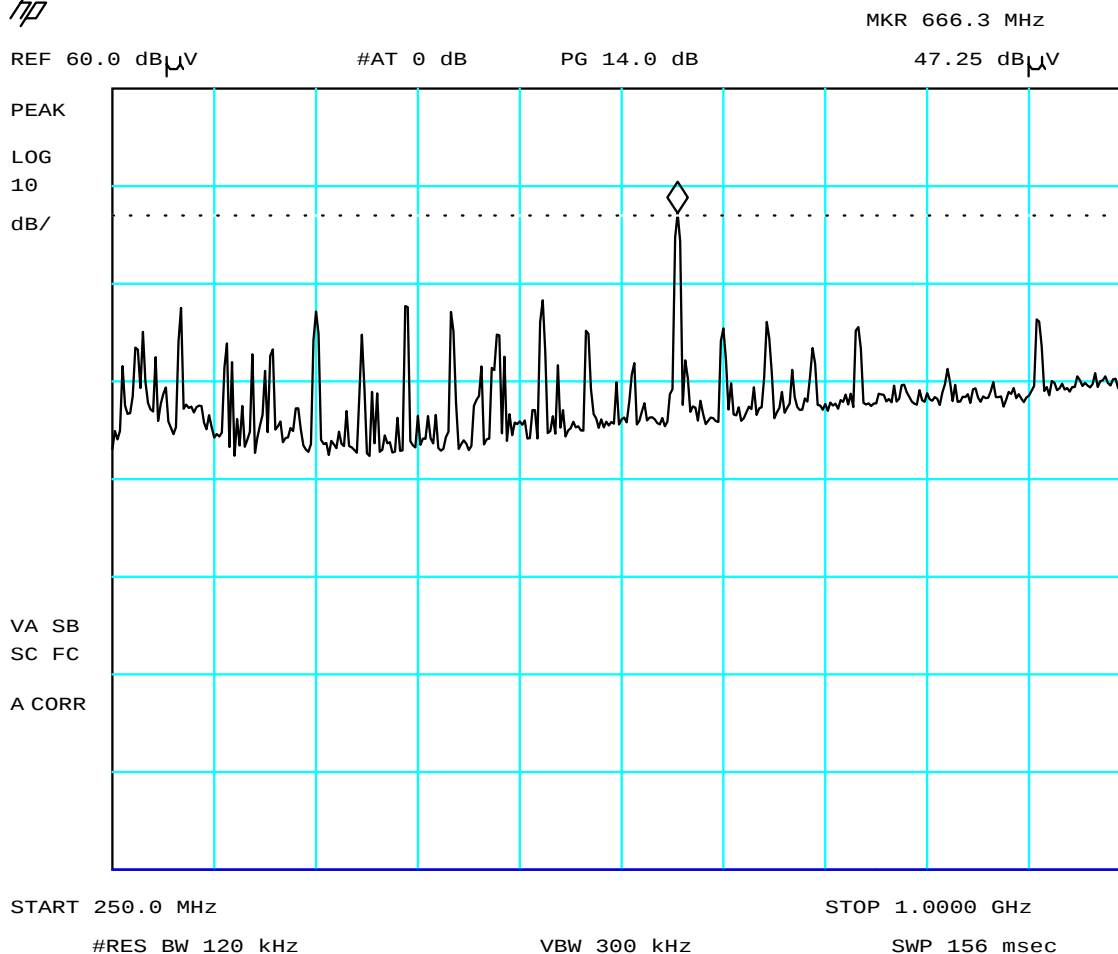


PLOT 3 Radiated Emissions - 25MHz to 275MHz

Company:	Nokia	Product:	A040.
Date:	13 Feb 01	Test Engineer:	DS
Test:	EN55022	Limit:	EN (B)
Notes:			
Configuration B with printer.			
115V operation.			
Polarisation:	V + H	Orientation:	0 - 360°
Distance:	3m	Antenna:	Bilog
Height:	1m	Filename:	H12136DC.plt
Operating Mode:		1	
Mod. State:		1	

Frequency List (MHz)

	Report No: R1401	FCC ID: POB-A040	
	Test No: T0359	Test Report	Page: 15 of 15



PLOT 4 Radiated Emissions - 250MHz to 1GHz

Company:	Nokia	Product:	A040.
Date:	13 Feb 01	Test Engineer:	DS
Test:	EN55022	Limit:	EN (B)
Notes:			
Configuration B with printer.			
115V operation.			
Polarisation:	V + H	Orientation:	0 - 360°
Distance:	3m	Antenna:	Bilog
Height:	1m	Filename:	H121375A.plt
Operating Mode:	1	Mod. State:	1

Frequency List (MHz)
