

**montena**

montena emc sa

Test laboratory accredited by metas, the Swiss Federal Office of Metrology and Accreditation
 Laboratoire d'essai accrédité par metas, l'Office fédéral de métrologie et d'accréditation
 Prüflabor akkreditiert durch metas, das Bundesamt für Metrologie und Akkreditierung

Registration number
 Numéro d'accréditation
 Akkreditierungsnummer

STS 024

Schweizerischer Prüfstellendienst
 Service suisse d'essai
 Swiss testing service



Date of test: Date de l'essai: Prüfdatum:	January 10 and July 1 to 2, 2003	Report no: Rapport no: Bericht Nr:	Draft	Mandate no: Mandat no: Auftrag Nr:	20025229
Report: Rapport: Bericht:	Electromagnetic compatibility				
Product name: Nom du produit: Produktname	Mobile Cordless Headset - Dongle HDC5				
Customer: Client: Kunde:	Logitech	Serial no: No de série: Seriennummer:	Final pre-production sample		

Standards / Normes / Normen	Result Résultat Ergebnis
CFR 47, Part 15, Subpart C, Intentional radiator, Paragraph 15.249	Pass

Test performed by
 Essai effectué par :
 Prüfer

Erich Staub

Test report prepared by
 Rapport d'essai préparé par :
 Berichtersteller

Erich Staub

Test report controlled and approved by
 Rapport d'essai contrôlé et approuvé par :
 Prüfbescheinigung

Bertrand Daout

.....

.....

Rossens, (Issue Date / Date d'édition / Ausstelldatum)

V0309

Main language / Langue principale / Hauptsprache : english / français / deutsch

This report may be reproduced in full. The present document results from tests on a specimen and does not prejudice to the conformity of all the manufactured products. - Ce rapport d'essai peut être reproduit en entier. Le présent document résulte d'essais sur un spécimen. Il ne préjuge pas de la conformité de l'ensemble des produits fabriqués à l'objet essayé. - Dieser Prüfbericht kann als Ganzes vervielfältigt werden. Dieser Bericht beinhaltet die Prüfergebnisse eines Mustergerätes. Es kann daraus nicht auf die Übereinstimmung der Seriegeräte mit dem Mustergerät geschlossen werden.

q:\mandats\mandats_avant_2003\20025229_logitech_headset\messungen fcc\2003-01-10 hdc5 dongle\shockfish hdc5 b.doc

Contents / Table des matières / Inhaltsverzeichnis

Page/Page/Seite

1.	SUMMARY OF TEST RESULTS / RÉSUMÉ DES RÉSULTATS D'ESSAIS / ZUSAMMENFASSUNG DER PRÜFERGEBNISSE	3
2.	APPLIED STANDARDS / NORMES APPLIQUEES / VERWENDETE NORMEN	3
3.	CLIENT / CLIENT / KUNDE	4
4.	EQUIPMENT UNDER TEST / EQUIPEMENT A L'ESSAI / PRÜFLING	4
4.1	Identification / Identification / Identifikation	4
4.2	Connected cables / Câble connectés / Angeschlossene Kabel	4
4.3	Modifications before the tests / Modifications apportées avant les essais / Vor den Prüfungen angebrachte Änderungen	5
4.4	Pictures of the EUT / Photos de l'EST / Fotos des Prüflings	5
4.5	Classification / Classification / Klassierung	6
5.	TEST CONDITIONS / CONDITIONS D'ESSAI / TESTBEDINGUNGEN	6
5.1	Climatic conditions / conditions climatiques / klimatologische Bedingungen	6
5.2	Location and Date / Lieu et date / Ort und Datum	6
5.3	Persons present / Personnes présentes / Anwesende Personen	6
5.4	Test configuration / Configuration d'essai / Prüfkonfiguration	7
5.5	Operating conditions / Conditions de fonctionnement / Betriebszustand	7
5.6	Auxillary equipment / Matériel auxiliaire / Zusatzgeräte	7
6.	EMISSION TEST TRANSMITTER	8
6.1	Carrier measurement	9
6.2	Radiated electromagnetic field 30 - 1000 MHz	19
6.3	Radiated electromagnetic field 1 – 10 GHz	28
7.	EMISSION TEST RECEIVER	45
7.1	Radiated electromagnetic field 30 - 1000 MHz	46
7.2	Radiated electromagnetic field 1 - 5 GHz	51
8.	TEST EQUIPMENT	60

1. Summary of test results / Résumé des résultats d'essais / Zusammenfassung der Prüfergebnisse

✓ Pass / Réussi / Bestanden

✗ Fail / Echoué / Nicht bestanden

Ø Not applicable to this product / Pas applicable à ce produit / Nicht anwendbar für dieses Produkt

— Not tested / Pas testé / Nicht geprüft

■ No requirements / Pas d'exigence / Keine Anforderung

Test Type / Type d'essai / Art der Prüfung	Standard /Norme /Norm	Result / Résultat / Ergebnis
Emission / Emission / Störaussendung		Transmit mode
Mains terminal interference voltage Tension perturbatrice aux bornes d'alimentation Störspannung auf den Energieversorgungsleitungen	CFR 47 § 15.207	Ø ¹
Carrier measurement Mesure de la porteuse Trägerfrequenzmessung	CFR 47 § 15.249(a)	✓
Radiated electromagnetic field Champ perturbateur Störfeldstärke	CFR 47 § 15.249(d) § 15.209	✓
Emission / Emission / Störaussendung		Receive mode
Mains terminal interference voltage Tension perturbatrice aux bornes d'alimentation Störspannung auf den Energieversorgungsleitungen	CFR 47 § 15.107	Ø ¹
Radiated electromagnetic field Champ perturbateur Störfeldstärke	CFR 47 § 15.109	✓

1. Powered with / Alimenté avec / Gespeist mit : Internal battery

2. Applied standards / Normes appliquées / Verwendete Normen

CFR 47 Part 15 Subpart C	Code of Federal Regulations - Telecommunication, FCC Part 15, Subpart C: "Intentional Radiators"
CFR 47 Part 15 Subpart B	Code of Federal Regulations - Telecommunication, FCC Part 15, Subpart B: "Unintentional Radiators"

3. Client / Client / Kunde

Client name and address Nom et adresse du client Name und Adresse des Kunden	<i>Logitech 1499 SE Tech Center Place Vancouver, WA 98683-9575</i>
Contact Person / Responsable / Kontaktperson	<i>Mark C. Ohnstad</i>
e-mail / courrier électronique / e-mail	<i>Mark_ohnstad@logitech.com</i>
Mandate no / Mandat no / Auftrag Nr.	<i>20025229</i>

4. Equipment under test / Equipement à l'essai / Prüfling**4.1 Identification / Identification / Identifikation**

Manufacturer name and address Nom et adresse du fabricant Name und Adresse des Herstellers	<i>Logitech 1499 SE Tech Center Place Vancouver, WA 98683-9575</i>
Production country / Pays de fabrication / Ursprungsland	<i>China</i>
Brand name / nom de marque / Verkaufsmarke	<i>Logitech</i>
Product name / Nom du produit / Produktname	<i>Mobile Cordless Headset - Dongle HDC5</i>
Product description / Description du produit / Produktbeschreibung	<i>Cordless Headset for mobile phones</i>
Model number / Numéro de modèle / Modellnummer	<i>Dongle HDC5</i>
Serial no / No. de série / Seriennummer	<i>Final pre-production sample</i>
Software version / Version du logiciel / Softwareversion	<i>Revision 1.1</i>
Highest frequency / Fréquence la plus élevée / Höchste Frequenz	<i>921.7 MHz</i>
Supply / Alimentation / Speisung	<i>Li-Ion battery 4.2V, 100mAh</i>

4.2 Connected cables / Câble connectés / Angeschlossene Kabel

<i>none</i>

4.3 Modifications before the tests / Modifications apportées avant les essais / Vor den Prüfungen angebrachte Änderungen

none

4.4 Pictures of the EUT / Photos de l'EST / Fotos des PrüflingsEquipment under test / Equipment
sous test / PrüflingEquipment under test / Equipment
sous test / Prüfling

Equipment under test / Equipment
sous test / Prüfling**4.5 Classification / Classification / Klassierung**

- Transmitter part: Intentional radiator
- Receiver part: Unintentional radiator

5. Test conditions / Conditions d'essai / Testbedingungen**5.1 Climatic conditions / conditions climatiques / klimatologische Bedingungen**

Temperature / Température / Temperatur:	20 - 25	°C
Pressure / Pression / Druck:	1001 - 1012	hPa
Relative humidity / Humidité relative / Relative Luftfeuchtigkeit:	36 - 45	%

5.2 Location and Date / Lieu et date / Ort und Datum

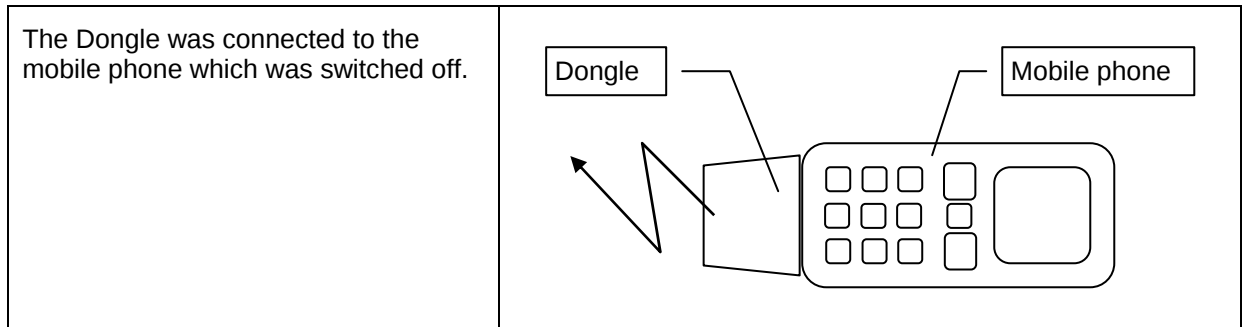
Test period / Date des essais / Datum der Prüfungen:	January 10 and July 1 to 2, 2003
Location / Lieu / Ort:	Rossens

5.3 Persons present / Personnes présentes / Anwesende Personen**Test Engineer(s) / Ingénieur(s) d'essai / Prüfsingenieur(e) :**

Erich Staub

Other(s) / Autre(s) / Andere :

Name / Nom / Name	Company / Société / Firma
Roger Meier	Shockfish SA

5.4 Test configuration / Configuration d'essai / Prüfkonfiguration**5.5 Operating conditions / Conditions de fonctionnement / Betriebszustand**

- | |
|--|
| <ul style="list-style-type: none"> • Normal mode of operation, modulated transmitter at lowest and highest operating frequencies. • Receive mode |
|--|

5.6 Auxillary equipment / Matériel auxiliaire / Zusatzgeräte

The following pieces of equipment are used for the monitoring of the EUT or are necessary for the EUT but they are not tested with the EUT / Les équipements suivants servent à la surveillance de l'EST ou sont indispensable au fonctionnement de celui-ci mais ne font pas partie de l'essai / Folgende Geräte werden für die Überwachung des Prüflings gebraucht oder sind notwendig für die korrekte Funktion. Sie gehören jedoch nicht zum Prüfling.

Product / Produit / Produkt	Brand / Marque / Marke	Model No.	ID	Remark / Remarque / Bemerkung
Mobile phone	Nokia	3330	- - -	Transmit mode
Mobile phone	Nokia	3210	- - -	Receive mode

6. Emission Test Transmitter

6.1 Carrier measurement

Test site: ☒ anechoic chamber (foam) ☐ open test site
☐ anechoic chamber (ferrites) ☐

Distance: ☐ 30 m ☐ 10 m ☒ 3 m ☐

Position of EUT: 0.8 m (height of the equipment under test above floor)

Test precision: ± 6 dB (30 - 300 MHz) / ± 5.4 dB (300 - 1000 MHz)

Test method: The electromagnetic disturbance radiated by the equipment is measured using a spectrum analyser and a wide band antenna. The antenna is moved from 1 to 4 m in height successively with horizontal and vertical polarisations. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value of all the disturbance appearing while the apparatus is under test. The peak values are recorded continuously on the graph. The values exceeding the limits are remeasured manually giving quasi-peak values and average values using a receiver and these measurements are indicated under the graph. The limit must be respected in quasi-peak values (QP).

Test set-up:



Remarks:

- Maximum field strength measured from 1 to 3 m.
- During this measurement the resolution bandwidth was 120 kHz and the video bandwidth 100 kHz. The theoretical error for broad band signals will be smaller than 0.8 dB. For narrow band signals the level does not change.
- EUT measured in position which showed the highest emission on the first HDC9P prototype

Test equipment:

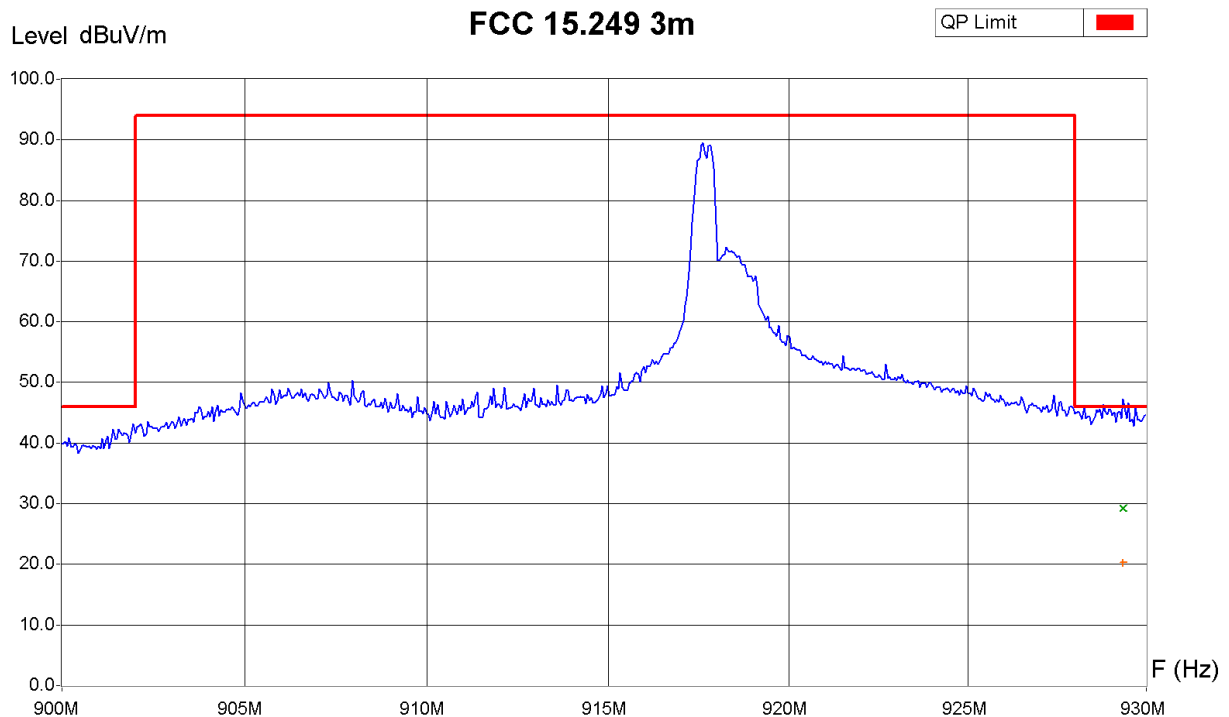
☒ Spectrum analyser	☒ 88-14	☐ 90-26	☐ 94-24		
☒ Receiver	☐ 85-04	☒ 90-43	☐ 94-35		
☒ Preamplifier	☐ 88-05	☐ 90-01	☐ 90-42	☒ 95-86	☐ 92-39
☐ Antenna (biconical)	☐ 82-02	☐ 87-05	☐ 87-16	☐ 91-05	☐ 94-37
☒ Antenna (log-per)	☐ 88-20	☐ 90-30	☐ 91-35	☒ 94-64	
☒ Attenuators					

Result:	☒ pass	☐ fail	☐ not applicable	☐ not tested
----------------	--	-------------------------------	---	-------------------------------------

Measurement Type : Radiated Field
Polarisation : Horizontal
Table Angle : 0 - 360°
Antenna Height : 1 - 4m



Equipment Under Test : Dongle HDC5 US: Lowest channel
Set-Up : without artificial head
Operating Conditions : modulated
Remarks : carrier at 917.7MHz; Dongle attached to Nokia 3330 (switched off)



Zone	900 MHz - 930 MHz
Video Bandwidth	100 KHz
Resol Bandwidth	120 KHz
Sweep Time	0 s

Receiver Measures

Frequency	Peak	QuasiPeak (x)	Average (+)	QP Margin
929.34 MHz	46.4 dBuV/m	29.2 dBuV/m	20.3 dBuV/m	16.8 dB

Operator: Erich Staub
Date/Time: 10.01.03 11:01
Filename:
20025229_LCh_Dongle
HDC5_001h.png/.txt

Table of measured Pk-values with any points within 5 dB of the limit of previous plot

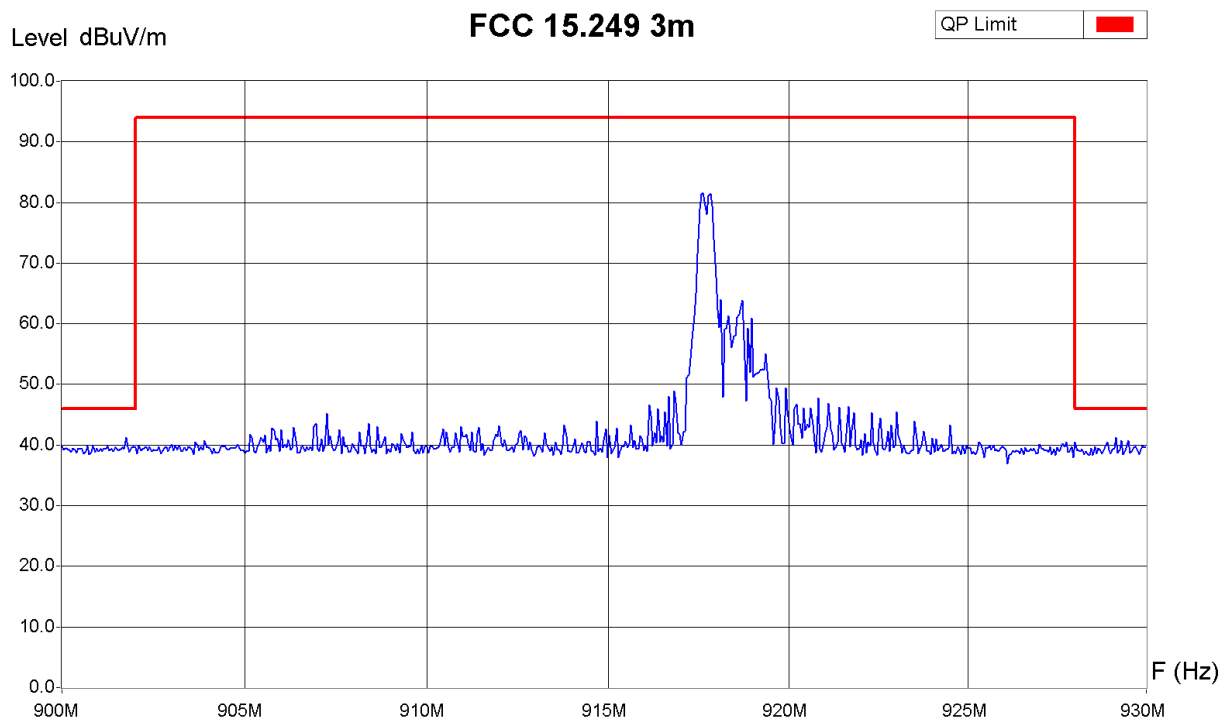
Frequency [MHz]	Pk-value [dBµV/m]	Delta [dB]
901.25	41.1	4.9
901.40	42.3	3.7
901.55	42.3	3.7
901.60	41.6	4.4
901.65	41.3	4.7
901.70	41.6	4.4
901.75	41.5	4.5
901.80	41.3	4.7
901.90	41.9	4.1
901.95	43.1	2.9
902.00	41.6	4.4
917.57	89.2	4.8
917.62	89.5	4.5
928.00	44.8	1.2
928.05	45.1	0.9
928.10	45.3	0.7
928.15	44.6	1.4
928.20	43.9	2.1
928.25	45.9	0.1
928.30	44.1	1.9
928.35	44.3	1.7
928.40	44.3	1.7
928.45	43.1	2.9
928.50	43.6	2.4
928.55	44.3	1.7
928.60	45.4	0.6
928.65	45.1	0.9
928.70	45.6	0.4
928.75	44.1	1.9
928.80	46.4	-0.4
928.85	45.3	0.7
928.90	44.8	1.2
928.95	45.6	0.4
929.00	45.4	0.6
929.05	44.6	1.4
929.10	45.1	0.9
929.15	43.4	2.6
929.20	44.9	1.1
929.25	45.3	0.7
929.30	44.1	1.9
929.35	47.3	-1.3
929.40	45.3	0.7
929.45	44.1	1.9
929.50	46.6	-0.6
929.55	43.6	2.4
929.60	43.9	2.1
929.65	42.8	3.2
929.70	45.9	0.1
929.75	43.8	2.2
929.80	43.8	2.2

929.85	43.6	2.4
929.90	43.7	2.3
929.95	44.6	1.4

Measurement Type : Radiated Field
Polarisation : Vertical
Table Angle : 0 - 360°
Antenna Height : 1 - 4m



Equipment Under Test : Dongle HDC5 US: Lowest channel
Set-Up : without artificial head
Operating Conditions : modulated
Remarks : carrier at 917.7MHz; Dongle attached to Nokia 3330 (switched off)



Zone	900 MHz - 930 MHz
Video Bandwidth	100 KHz
Resol Bandwidth	120 KHz
Sweep Time	0 s

Operator: Erich Staub
Date/Time: 10.01.03 10:57
Filename:
20025229_LCh_Dongle
HDC5_001v.png/.txt

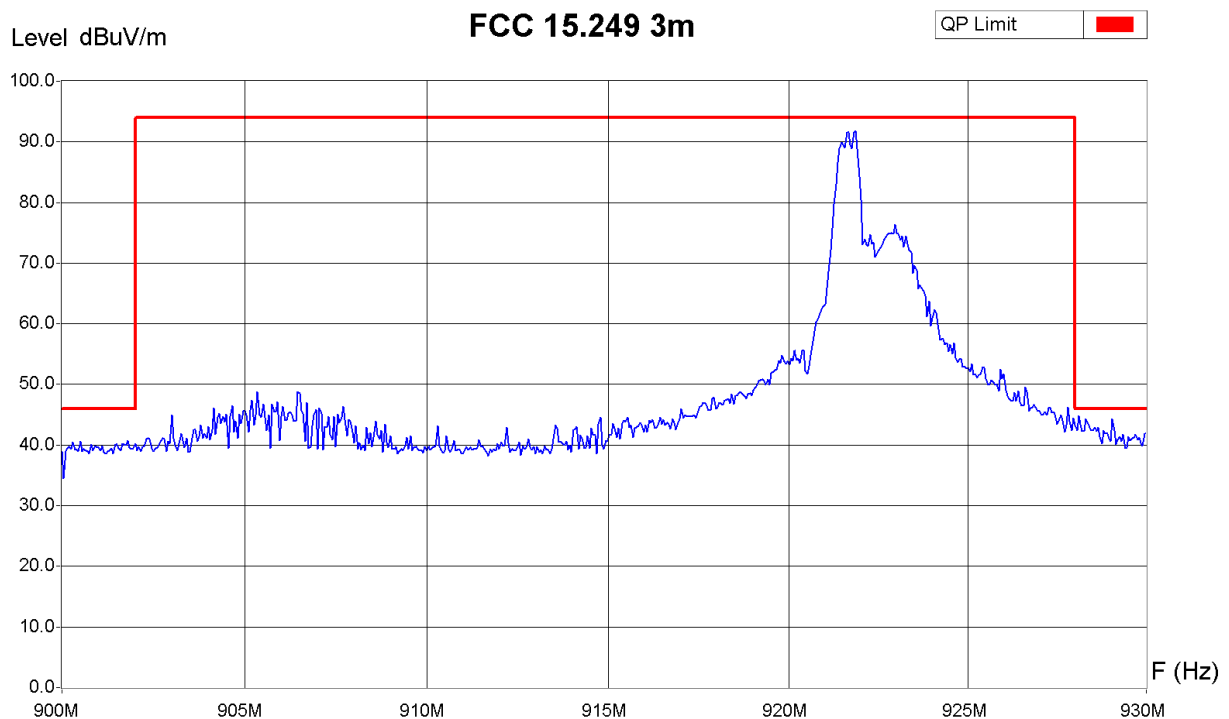
Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [MHz]	Pk-value [dBμV/m]	Delta [dB]
901.75	41.3	4.7
929.15	41.3	4.7

Measurement Type : Radiated Field
Polarisation : Horizontal
Table Angle : 0 - 360°
Antenna Height : 1 - 4m



Equipment Under Test : Dongle HDC5 US: Highest channel
Set-Up : without artificial head
Operating Conditions : modulated
Remarks : carrier at 921.7MHz; Dongle attached to Nokia 3330 (switched off)



Zone	900 MHz - 930 MHz
Video Bandwidth	100 KHz
Resol Bandwidth	120 KHz
Sweep Time	0 s

Operator: Erich Staub
Date/Time: 10.01.03 10:46
Filename:
20025229_HCh_Dongle
HDC5_001h.png/.txt

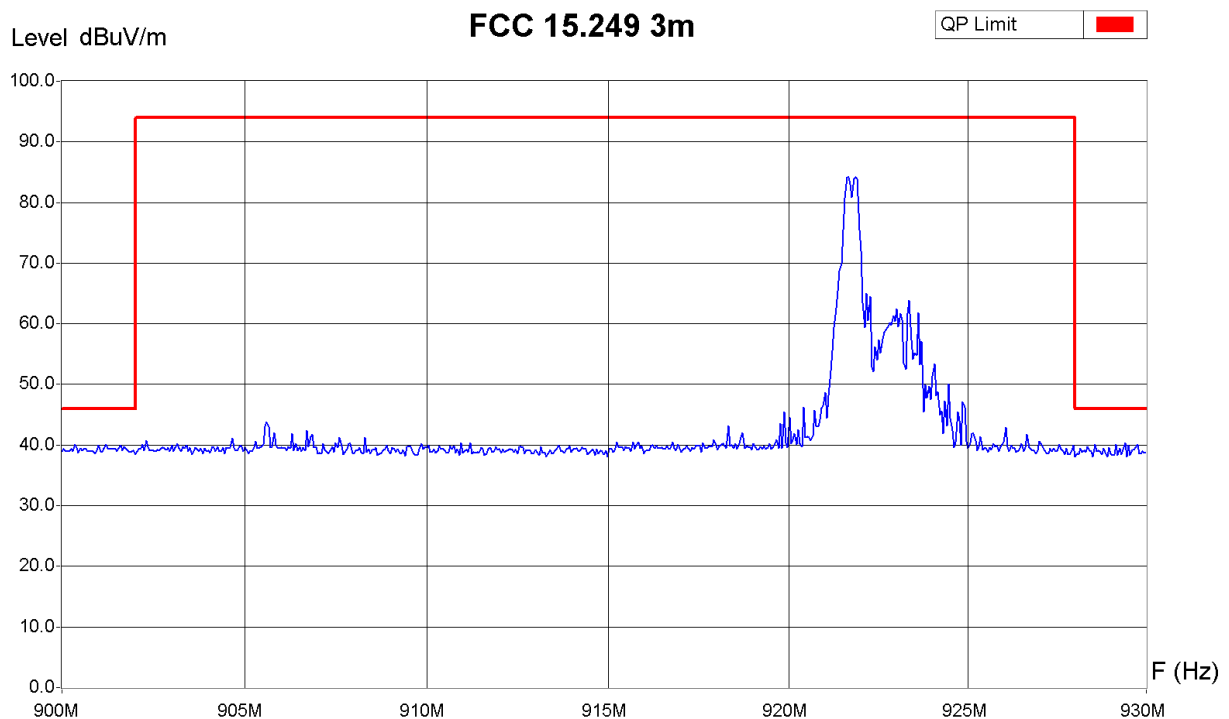
Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [MHz]	Pk-value [dBμV/m]	Delta [dB]
921.46	89.9	4.1
921.51	89.5	4.5
921.56	89.0	5.0
921.61	91.5	2.5
921.66	91.5	2.5
921.71	89.5	4.5
921.81	91.5	2.5
921.86	91.8	2.2
928.00	43.3	2.7
928.05	42.4	3.6
928.10	44.8	1.2
928.15	43.4	2.6
928.20	42.3	3.7
928.25	42.3	3.7
928.30	44.3	1.7
928.35	43.8	2.2
928.40	42.9	3.1
928.45	42.4	3.6
928.50	42.4	3.6
928.55	42.9	3.1
928.60	42.3	3.7
928.65	42.9	3.1
928.70	41.4	4.6
928.80	42.4	3.6
928.85	41.9	4.1
928.90	41.9	4.1
928.95	41.1	4.9
929.05	44.3	1.7
929.10	42.4	3.6
929.25	41.4	4.6
929.35	41.8	4.2
929.50	41.4	4.6
929.60	41.1	4.9
929.65	41.1	4.9
929.70	41.8	4.2
929.80	41.3	4.7
929.95	41.9	4.1

Measurement Type : Radiated Field
Polarisation : Vertical
Table Angle : 0 - 360°
Antenna Height : 1 - 4m



Equipment Under Test : Dongle HDC5 US: Highest channel
Set-Up : without artificial head
Operating Conditions : modulated
Remarks : carrier at 921.7MHz; Dongle attached to Nokia 3330 (switched off)



Zone	900 MHz - 930 MHz
Video Bandwidth	100 KHz
Resol Bandwidth	120 KHz
Sweep Time	0 s

Operator: Erich Staub
Date/Time: 10.01.03 10:53
Filename:
20025229_HCh_Dongle
HDC5_001v.png/.txt

Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [MHz]	Pk-value [dB μ V/m]	Delta [dB]

6.2 Radiated electromagnetic field 30 - 1000 MHz

Test site: ☒ anechoic chamber (foam) ☐ open test site
☐ anechoic chamber (ferrites) ☐

Distance: ☐ 30 m ☐ 10 m ☒ 3 m ☐

Position of EUT: 0.8 m (height of the equipment under test above floor)

Test precision: ± 6 dB (30 - 300 MHz) / ± 5.4 dB (300 - 1000 MHz)

Test method: The electromagnetic disturbance radiated by the equipment is measured from 30 to 1000 MHz using a spectrum analyser and a wide band antenna. The antenna is moved from 1 to 4 m in height successively with horizontal and vertical polarisations. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value of all the disturbance appearing while the apparatus is under test. The peak values are recorded continuously on the graph. The values exceeding the limits are remeasured manually giving quasi-peak values and average values using a receiver and these measurements are indicated under the graph. The limit must be respected in quasi-peak values (QP).

Test set-up:



Remarks:

- Maximum field strength measured from 1 to 3 m.
- EUT measured in position which showed the highest emission on the first HDC9P prototype
- With notch filter at transmitting frequency, for values around carrier see §6.1

Test equipment:

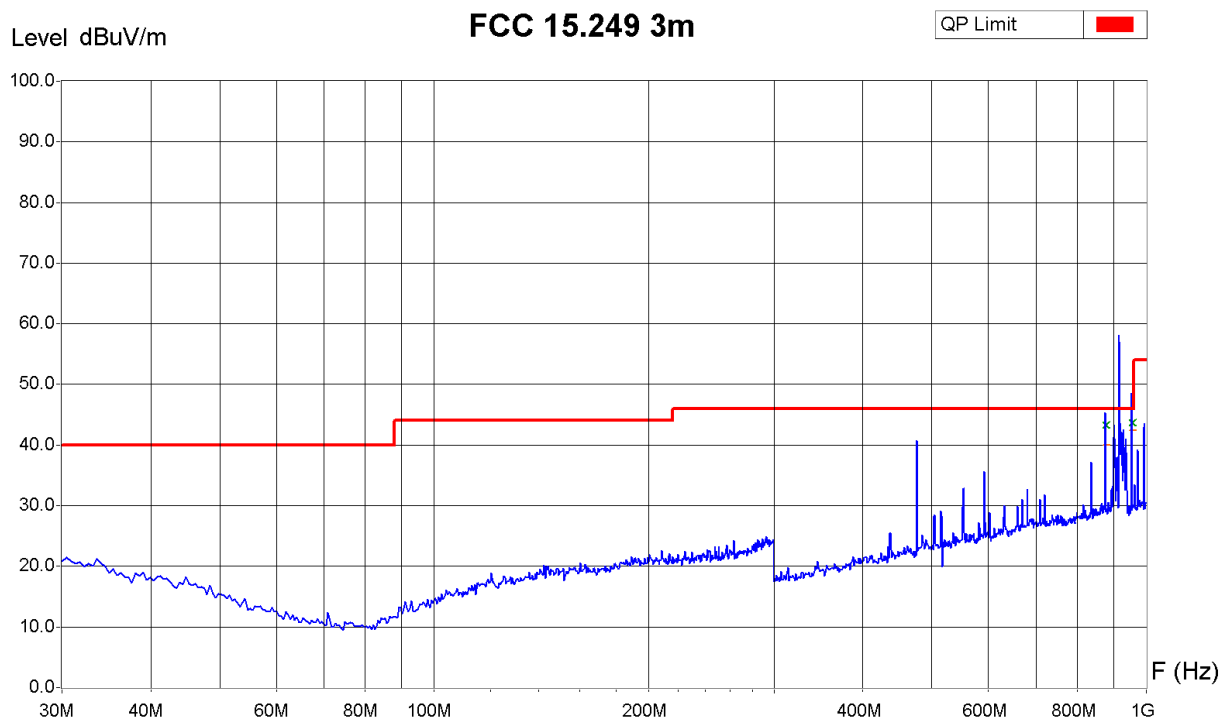
☒ Spectrum analyser	☒ 88-14	☐ 90-26	☐ 94-24		
☒ Receiver	☐ 85-04	☒ 90-43	☐ 94-35		
☒ Preamplifier	☐ 88-05	☐ 90-01	☐ 90-42	☒ 95-86	☐ 92-39
☒ Antenna (biconical)	☐ 82-02	☐ 87-05	☐ 87-16	☐ 91-05	☒ 94-37
☒ Antenna (log-per)	☐ 88-20	☐ 90-30	☐ 91-35	☒ 94-64	
☐ Antenna (horn)	☐ 90-24	☐ 90-29	☐ 98-12	☐ 98-13	☐
☒ Notch filter					

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Measurement Type : Radiated Field
Polarisation : Horizontal
Table Angle : 0 - 360°
Antenna Height : 1 - 3m



Equipment Under Test : Dongle HDC5 US: Lowest channel
Set-Up : without artificial head
Operating Conditions : modulated
Remarks : carrier at 917.7 MHz; Dongle attached to Nokia 3330 (switched off)



Zone	30 MHz - 300 MHz	300 MHz - 1 GHz
Video Bandwidth	100 KHz	100 KHz
Resol Bandwidth	120 KHz	120 KHz
Sweep Time	0 s	0 s

Receiver Measures

Frequency	Peak	QuasiPeak (x)	Average (+)	QP Margin
878.65 MHz	46.5 dBuV/m	43.3 dBuV/m	40.0 dBuV/m	2.7 dB
956.65 MHz	47.6 dBuV/m	43.7 dBuV/m	42.4 dBuV/m	2.3 dB

Operator: Erich Staub
Date/Time: 10.01.03 09:39
Filename:
20025229_LCh_Dongle
HDC5_000h.png/.txt

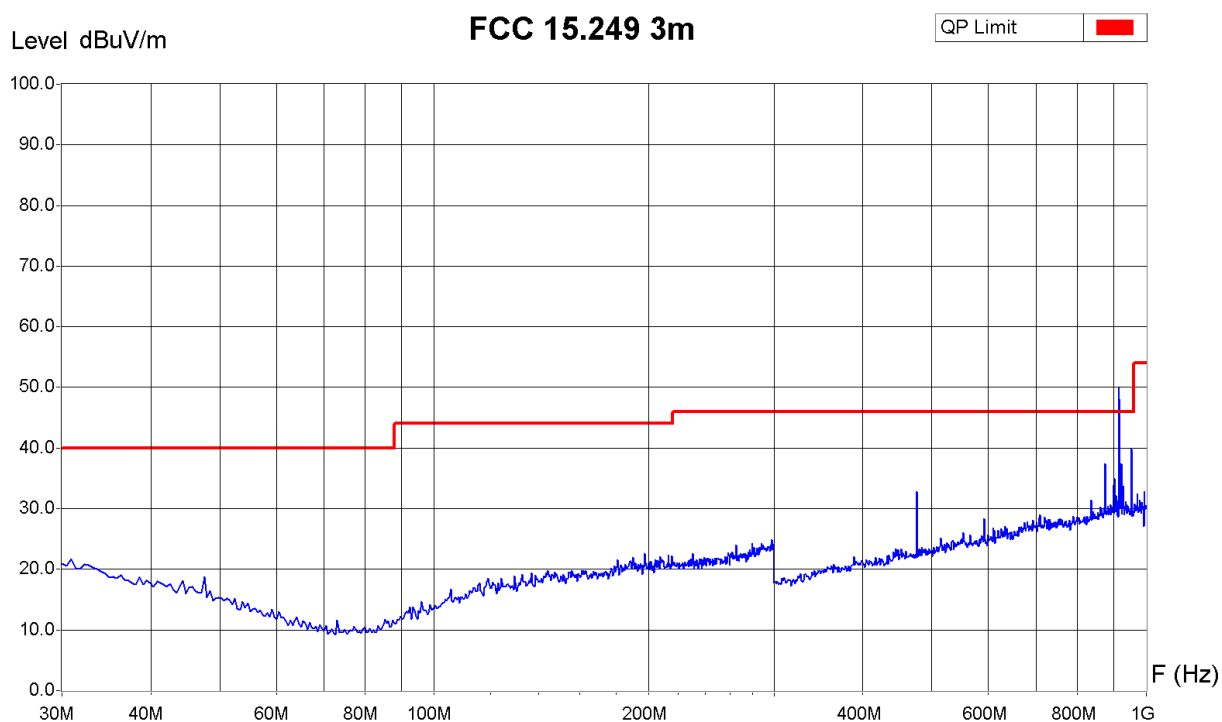
Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [MHz]	Pk-value [dBµV/m]	Delta [dB]
875.37	45.3	0.7
876.54	45.3	0.7
901.00	41.3	4.7
902.16	43.3	2.7
903.33	41.1	4.9
914.98	58.1	-12.1
916.14	57.1	-11.1
917.30	52.1	-6.1
918.47	42.4	3.6
919.63	43.6	2.4
923.13	42.1	3.9
925.46	41.6	4.4
928.95	42.6	3.4
935.94	41.0	5.0
953.41	48.3	-2.3
954.58	48.5	-2.5

Measurement Type : Radiated Field
Polarisation : Vertical
Table Angle : 0 - 360°
Antenna Height : 1 - 3m



Equipment Under Test : Dongle HDC5 US: Lowest channel
Set-Up : without artificial head
Operating Conditions : modulated
Remarks : carrier at 917.7 MHz; Dongle attached to Nokia 3330 (switched off)



Zone	30 MHz - 300 MHz	300 MHz - 1 GHz
Video Bandwidth	100 KHz	100 KHz
Resol Bandwidth	120 KHz	120 KHz
Sweep Time	0 s	0 s

Operator: Erich Staub
Date/Time: 10.01.03 10:04
Filename:
20025229_LCh_Dongle
HDC5_000v.png/.txt

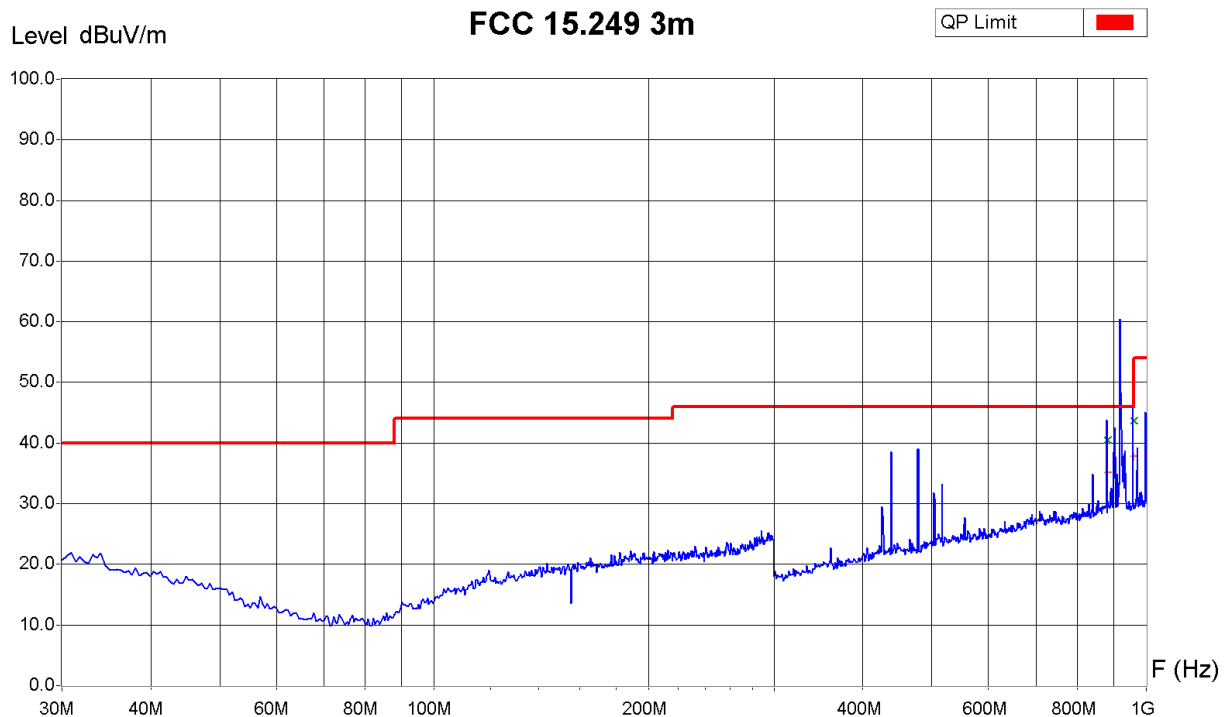
Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [MHz]	Pk-value [dBμV/m]	Delta [dB]
914.98	49.9	-3.9
916.14	48.1	-2.1

Measurement Type : Radiated Field
Polarisation : Horizontal
Table Angle : 0 - 360°
Antenna Height : 1 - 3m



Equipment Under Test : Dongle HDC5 US: Highest channel
Set-Up : without artificial head
Operating Conditions : modulated
Remarks : carrier at 921.7 MHz; Dongle attached to Nokia 3330 (switched off)



Zone	30 MHz - 300 MHz	300 MHz - 1 GHz
Video Bandwidth	100 KHz	100 KHz
Resol Bandwidth	120 KHz	120 KHz
Sweep Time	0 s	0 s

Receiver Measures

Frequency	Peak	QuasiPeak (x)	Average (+)	QP Margin
882.72 MHz	44.0 dBuV/m	40.5 dBuV/m	35.1 dBuV/m	5.5 dB
960.70 MHz	47.2 dBuV/m	43.7 dBuV/m	37.8 dBuV/m	10.3 dB

Operator: Erich Staub
Date/Time: 10.01.03 10:32
Filename:
20025229_HCh_Dongle
HDC5_000h.png/.txt

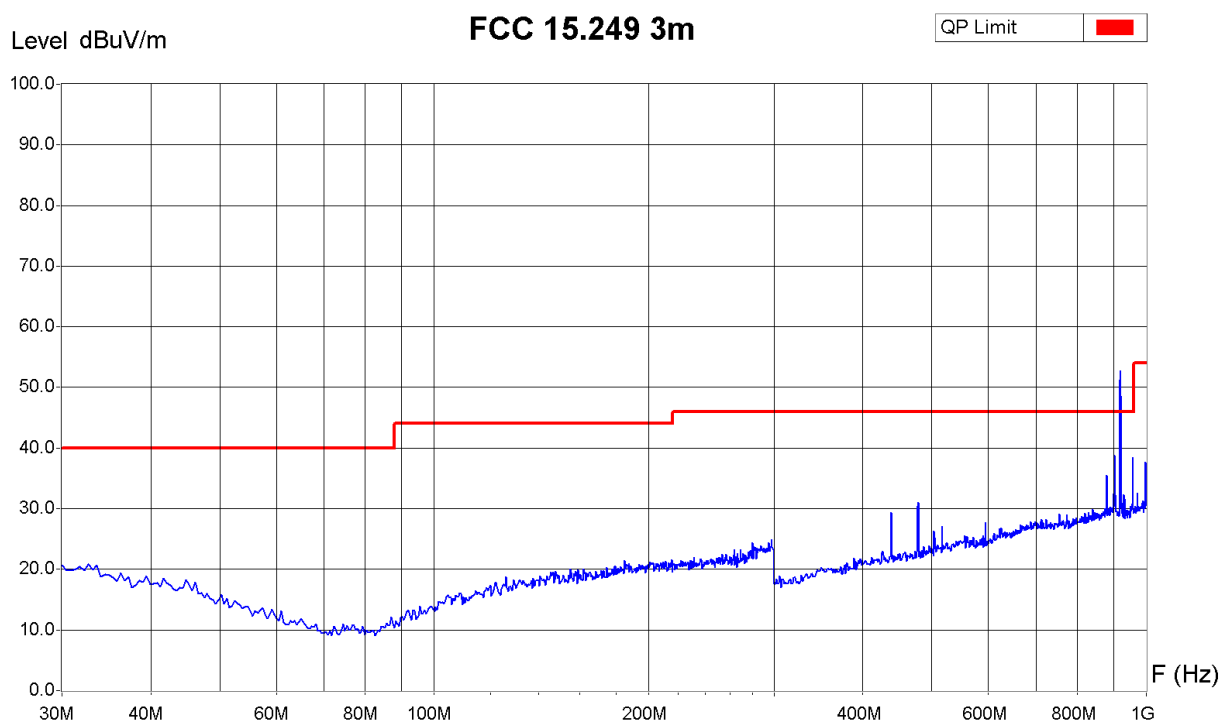
Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [MHz]	Pk-value [dBμV/m]	Delta [dB]
880.03	43.8	2.2
904.49	42.6	3.4
918.47	60.4	-14.4
919.63	60.2	-14.2
920.80	48.4	-2.4
921.96	46.7	-0.7
923.13	42.3	3.7
958.07	48.1	-2.1

Measurement Type : Radiated Field
Polarisation : Vertical
Table Angle : 0 - 360°
Antenna Height : 1 - 3m



Equipment Under Test : Dongle HDC5 US: Highest channel
Set-Up : without artificial head
Operating Conditions : modulated
Remarks : carrier at 921.7 MHz; Dongle attached to Nokia 3330 (switched off)



Zone	30 MHz - 300 MHz	300 MHz - 1 GHz
Video Bandwidth	100 KHz	100 KHz
Resol Bandwidth	120 KHz	120 KHz
Sweep Time	0 s	0 s

Operator: Erich Staub
Date/Time: 10.01.03 10:11
Filename:
20025229_HCh_Dongle
HDC5_000v.png/.txt

Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [MHz]	Pk-value [dBμV/m]	Delta [dB]
918.47	51.2	-5.2
919.63	52.7	-6.7
920.80	48.7	-2.7

6.3 Radiated electromagnetic field 1 – 10 GHz

Test site: ☒ anechoic chamber (foam) ☐ open test site
☐ anechoic chamber (ferrites) ☐

Distance: ☐ 30 m ☐ 10 m ☐ 3 m ☒ 1 m

Position of EUT: 0.8 m (height of the equipment under test above floor)

Test precision: ± 6 dB (30 - 300 MHz) / ± 5.4 dB (300 - 1000 MHz)

Test method: The electromagnetic disturbance radiated by the equipment is measured using a spectrum analyser and a wide band antenna. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value of all the disturbance appearing while the apparatus is under test. The peak values are recorded continuously on the graph.

Test set-up:



- Remarks:
- As the noise level of the measuring system was close the the limit, the RBW has been reduced for some frequency ranges. Any emission exceeding the limit would be measured with a receiver with 1 MHz bandwidth
 - EUT measured in position which showed the highest emission on the first HDC9P prototype

Test equipment:

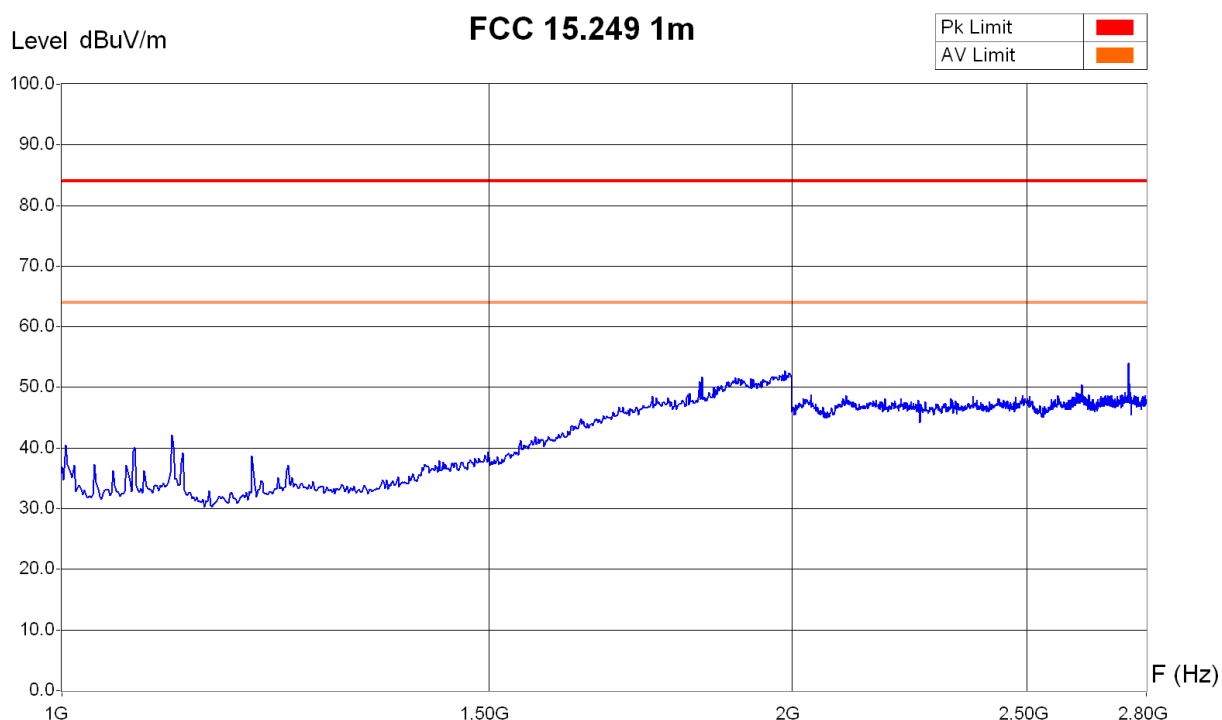
☒ Spectrum analyser	☒ 88-14	☐ 90-26	☐ 94-24		
☒ Receiver	☐ 85-04	☒ 90-43	☐ 94-35		
☒ Preamplifier	☐ 88-05	☐ 90-01	☐ 90-42	☒ 95-86	☒ 92-39
☐ Antenna (biconical)	☐ 82-02	☐ 87-05	☐ 87-16	☐ 91-05	☐ 94-37
☐ Antenna (log-per)	☐ 88-20	☐ 90-30	☐ 91-35	☐ 94-64	
☒ Antenna (horn)	☒ 90-24	☐ 90-29	☐ 98-12	☐ 98-13	☐
☒ Notch and high-pass filter					

Result:	☒ pass	☐ fail	☐ not applicable	☐ not tested
----------------	--	-------------------------------	---	-------------------------------------

Measurement Type : Radiated Field
Polarisation : Horizontal
Table Angle : 0 - 360°
Antenna Height : 1m



Equipment Under Test : Dongle HDC5 US: Lowest channel
Set-Up : without artificial head
Operating Conditions : modulated
Remarks : carrier at 917.7MHz; Dongle attached to Nokia 3330 (switched off)



Zone	1 GHz - 2 GHz	2 GHz - 2.60 GHz	2.60 GHz - 2.80
Video Bandwidth	1 MHz	1 MHz	1 MHz
Resol Bandwidth	1 MHz	1 MHz	1 MHz
Sweep Time	0 s	0 s	0 s

Operator: E. Staub
Date/Time: 10.01.2003 11:41
Filename:
20025229_LCh_Dongle
HDC5_002h.png/.txt

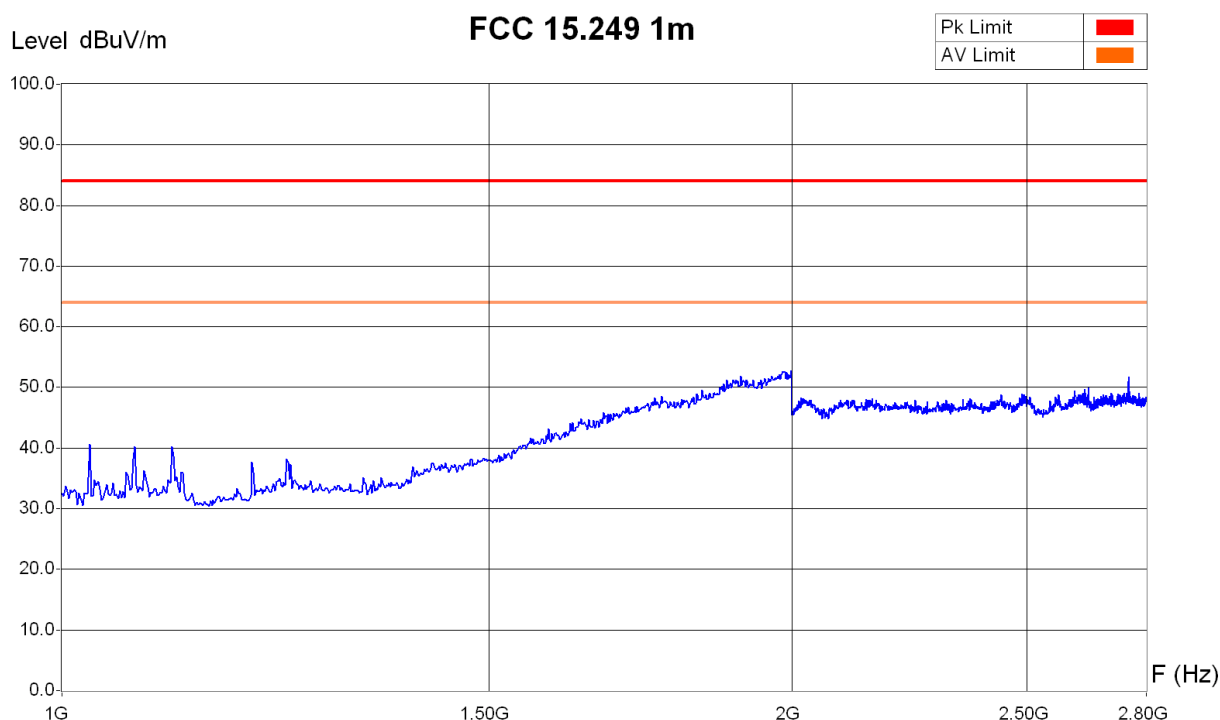
Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [GHz]	Pk-value [dB μ V/m]	Delta [dB]

Measurement Type : Radiated Field
Polarisation : Vertical
Table Angle : 0 - 360°
Antenna Height : 1m



Equipment Under Test : Dongle HDC5 US: Lowest channel
Set-Up : without artificial head
Operating Conditions : modulated
Remarks : carrier at 917.7MHz; Dongle attached to Nokia 3330 (switched off)



Zone	1 GHz - 2 GHz	2 GHz - 2.60 GHz	2.60 GHz - 2.80
Video Bandwidth	1 MHz	1 MHz	1 MHz
Resol Bandwidth	1 MHz	1 MHz	1 MHz
Sweep Time	0 s	0 s	0 s

Operator: E. Staub
Date/Time: 10.01.2003 11:43
Filename:
20025229_LCh_Dongle
HDC5_002v.png/.txt

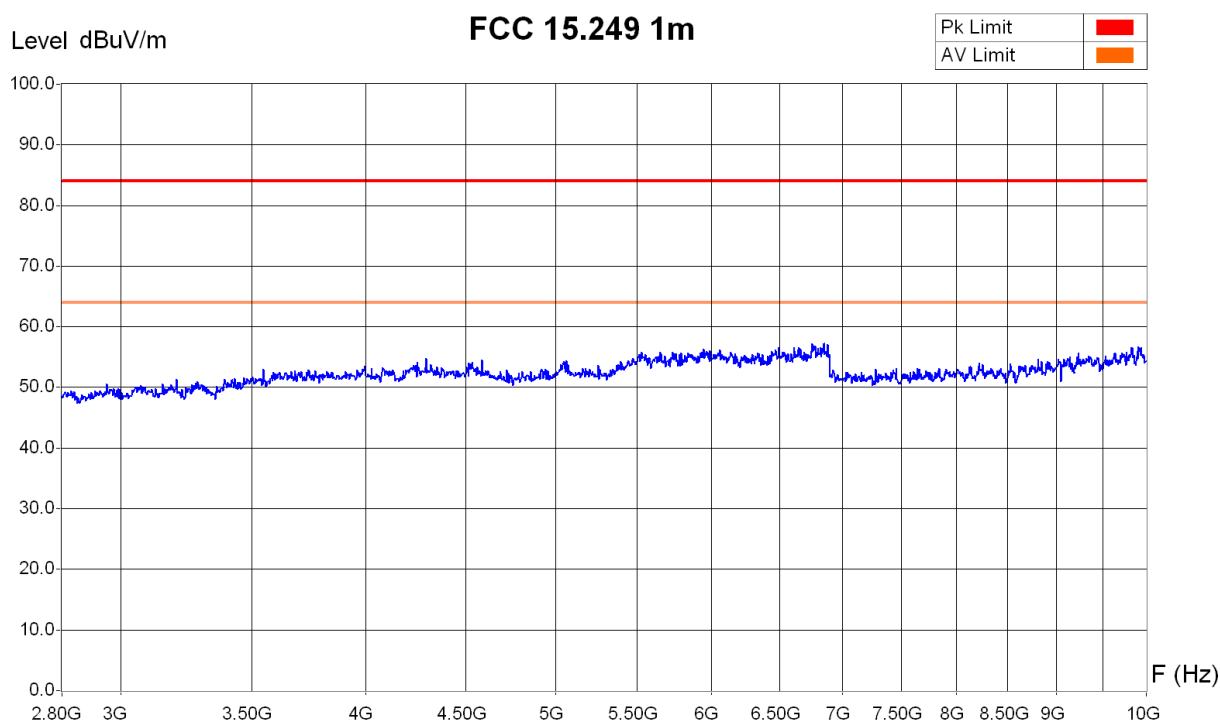
Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [GHz]	Pk-value [dB μ V/m]	Delta [dB]

Measurement Type : Radiated Field
Polarisation : Horizontal
Table Angle : 0 - 360°
Antenna Height : 1m



Equipment Under Test : Dongle HDC5 US: Lowest channel
Set-Up : without artificial head
Operating Conditions : modulated
Remarks : carrier at 917.7MHz; Dongle attached to Nokia 3330 (switched off)



Zone	2.80 GHz - 4.60	4.60 GHz - 6.90	6.90 GHz - 10 GHz
Video Bandwidth	1 MHz	1 MHz	300 KHz
Resol Bandwidth	1 MHz	1 MHz	300 KHz
Sweep Time	0 s	0 s	0 s

Operator: E. Staub
Date/Time: 10.01.2003 11:56
Filename:
20025229_LCh_Dongle
HDC5_003hb.png/.txt

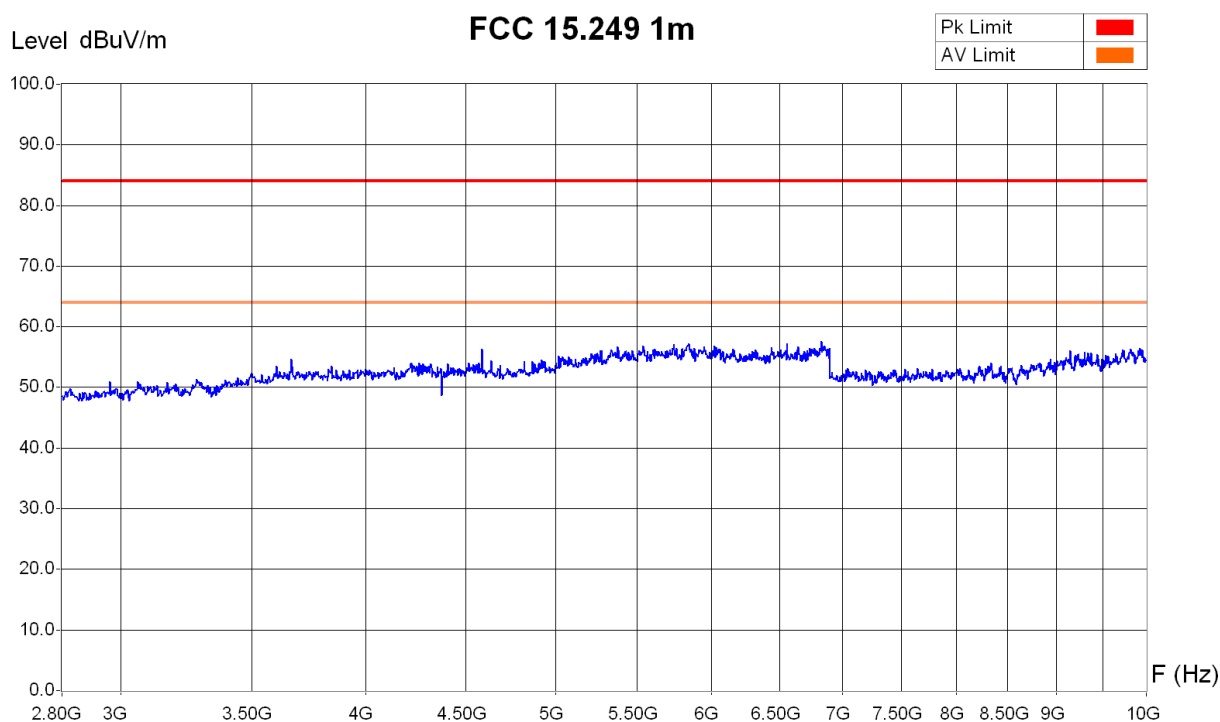
Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [GHz]	Pk-value [dB μ V/m]	Delta [dB]

Measurement Type : Radiated Field
Polarisation : Vertical
Table Angle : 0 - 360°
Antenna Height : 1m



Equipment Under Test : Dongle HDC5 US: Lowest channel
Set-Up : without artificial head
Operating Conditions : modulated
Remarks : carrier at 917.7MHz; Dongle attached to Nokia 3330 (switched off)



Zone	2.80 GHz - 4.60	4.60 GHz - 6.90	6.90 GHz - 10 GHz
Video Bandwidth	1 MHz	1 MHz	300 KHz
Resol Bandwidth	1 MHz	1 MHz	300 KHz
Sweep Time	0 s	0 s	0 s

Operator: E. Staub
Date/Time: 10.01.2003 11:50
Filename:
20025229_LCh_Dongle
HDC5_003v.png/.txt

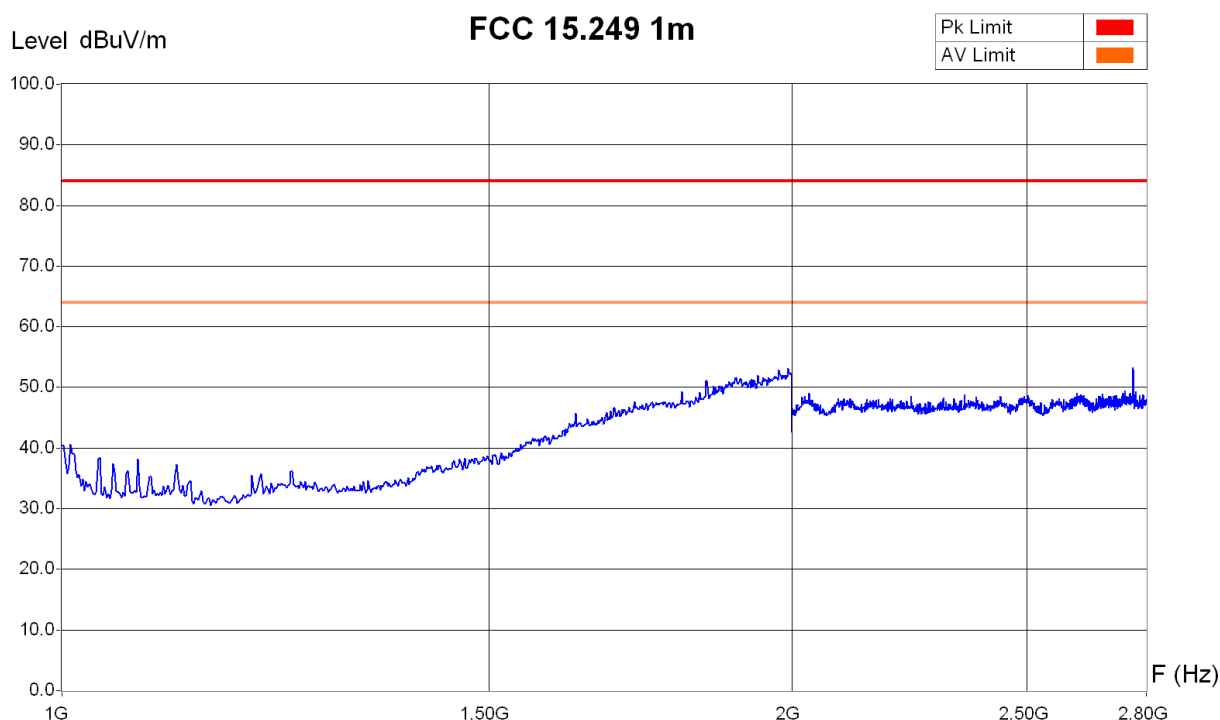
Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [GHz]	Pk-value [dB μ V/m]	Delta [dB]

Measurement Type : Radiated Field
Polarisation : Horizontal
Table Angle : 0 - 360°
Antenna Height : 1m



Equipment Under Test : Dongle HDC5 US: Highest channel
Set-Up : without artificial head
Operating Conditions : modulated
Remarks : carrier at 921.7MHz; Dongle attached to Nokia 3330 (switched off)



Zone	1 GHz - 2 GHz	2 GHz - 2.60 GHz	2.60 GHz - 2.80
Video Bandwidth	1 MHz	1 MHz	1 MHz
Resol Bandwidth	1 MHz	1 MHz	1 MHz
Sweep Time	0 s	0 s	0 s

Operator: Erich Staub
Date/Time: 10.01.2003 12:22
Filename:
20025229_HCh_Dongle
HDC5_002h.png/.txt

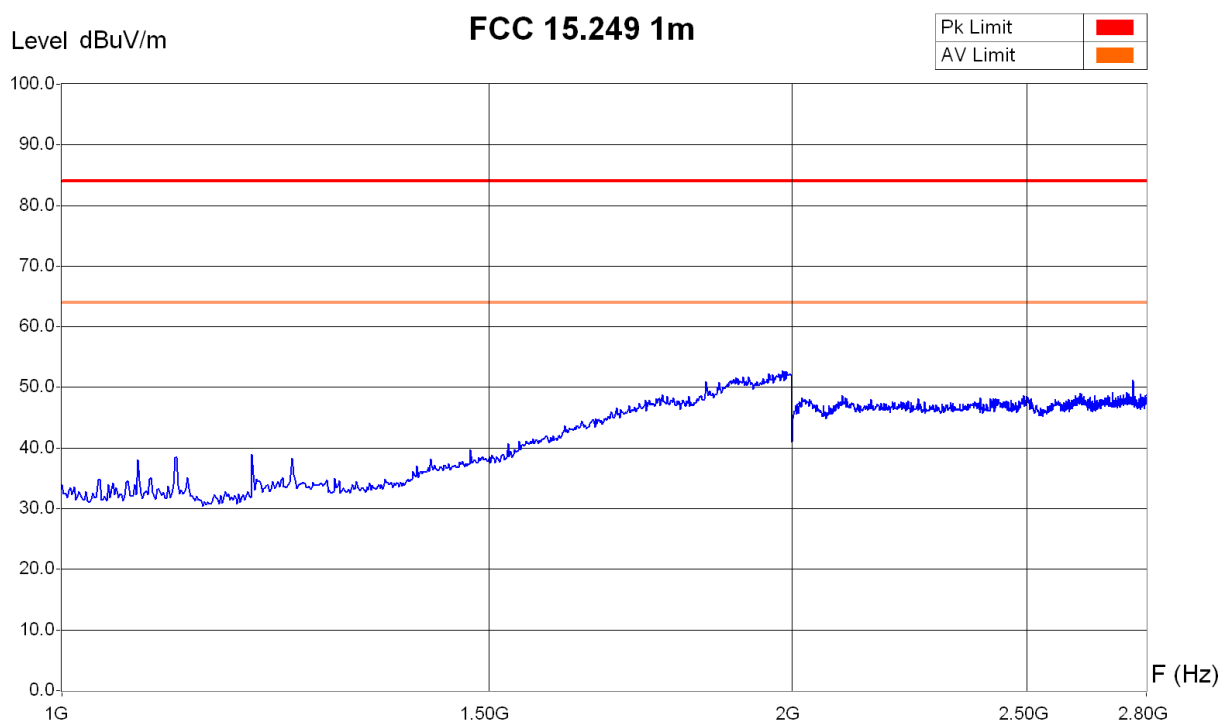
Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [GHz]	Pk-value [dB μ V/m]	Delta [dB]

Measurement Type : Radiated Field
Polarisation : Vertical
Table Angle : 0 - 360°
Antenna Height : 1m



Equipment Under Test : Dongle HDC5 US: Highest channel
Set-Up : without artificial head
Operating Conditions : modulated
Remarks : carrier at 921.7MHz; Dongle attached to Nokia 3330 (switched off)



Zone	1 GHz - 2 GHz	2 GHz - 2.60 GHz	2.60 GHz - 2.80
Video Bandwidth	1 MHz	1 MHz	1 MHz
Resol Bandwidth	1 MHz	1 MHz	1 MHz
Sweep Time	0 s	0 s	0 s

Operator: Erich Staub
Date/Time: 10.01.2003 12:25
Filename:
20025229_HCh_Dongle
HDC5_002v.png/.txt

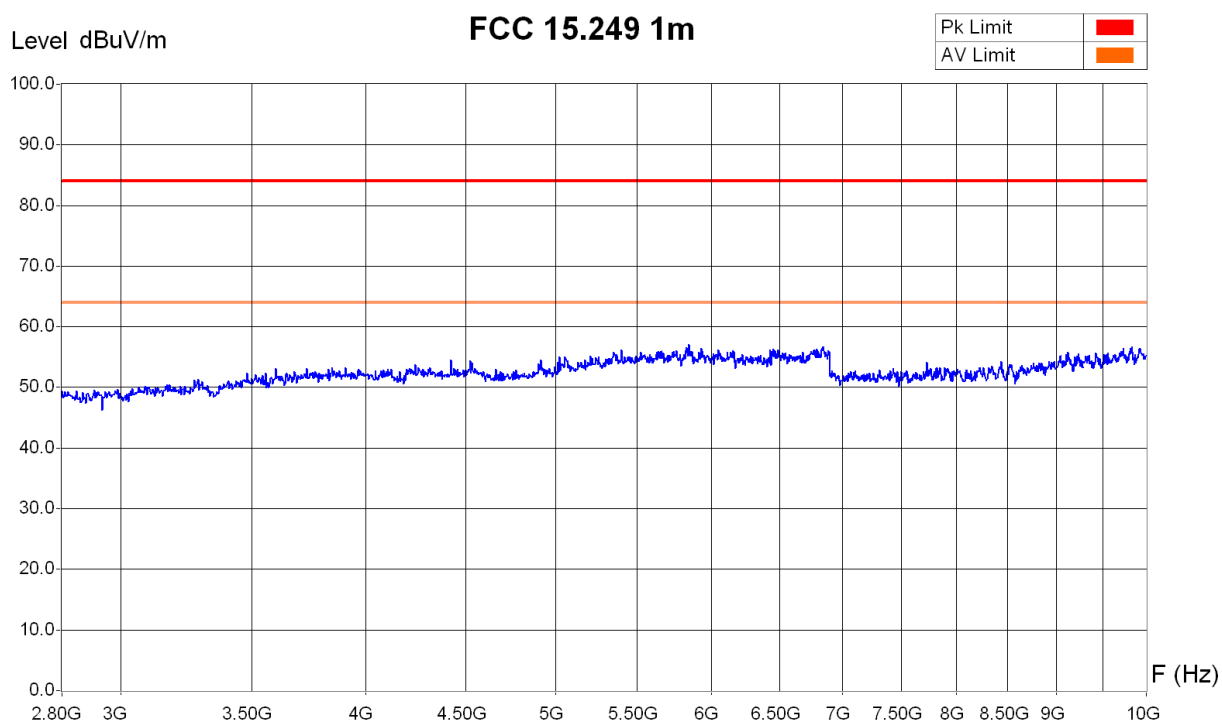
Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [GHz]	Pk-value [dB μ V/m]	Delta [dB]

Measurement Type : Radiated Field
Polarisation : Horizontal
Table Angle : 0 - 360°
Antenna Height : 1m



Equipment Under Test : Dongle HDC5 US: Highest channel
Set-Up : without artificial head
Operating Conditions : modulated
Remarks : carrier at 921.7MHz; Dongle attached to Nokia 3330 (switched off)



Zone	2.80 GHz - 4.60	4.60 GHz - 6.90	6.90 GHz - 10 GHz
Video Bandwidth	1 MHz	1 MHz	300 KHz
Resol Bandwidth	1 MHz	1 MHz	300 KHz
Sweep Time	0 s	0 s	0 s

Operator: E. Staub
Date/Time: 10.01.2003 12:03
Filename:
20025229_HCh_Dongle
HDC5_003h.png/.txt

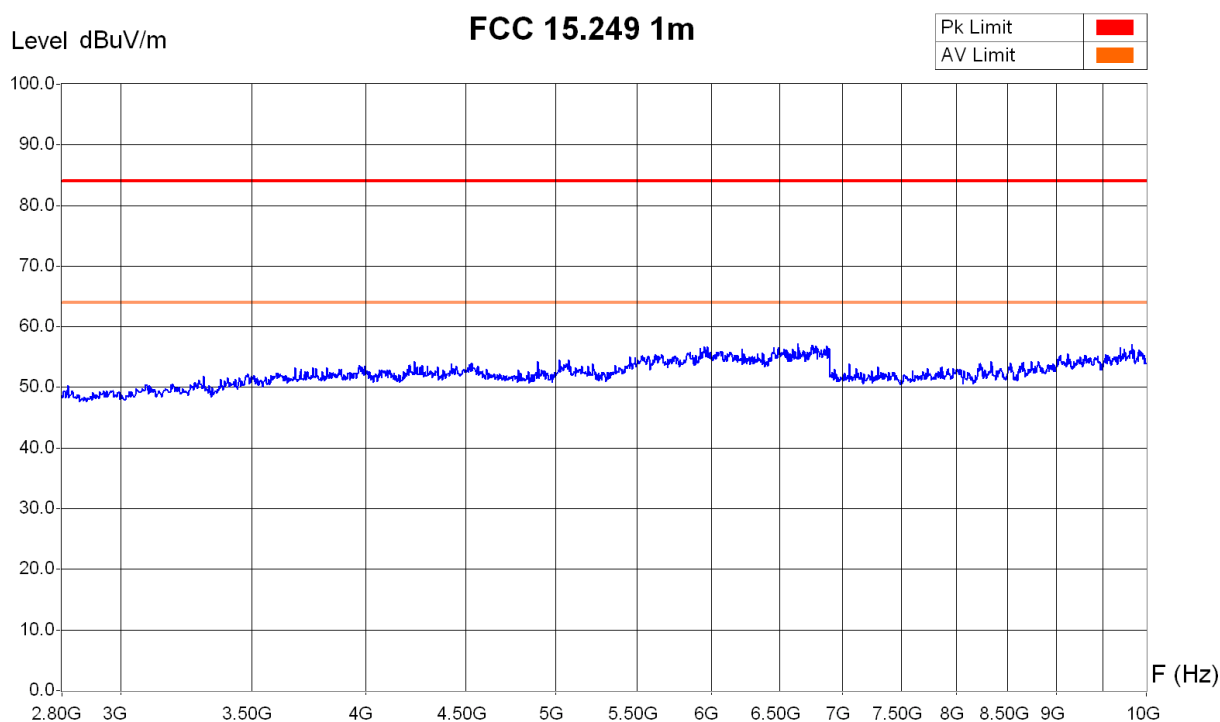
Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [GHz]	Pk-value [dB μ V/m]	Delta [dB]

Measurement Type : Radiated Field
Polarisation : Vertical
Table Angle : 0 - 360°
Antenna Height : 1m



Equipment Under Test : Dongle HDC5 US: Highest channel
Set-Up : without artificial head
Operating Conditions : modulated
Remarks : carrier at 921.7MHz; Dongle attached to Nokia 3330 (switched off)



Zone	2.80 GHz - 4.60	4.60 GHz - 6.90	6.90 GHz - 10 GHz
Video Bandwidth	1 MHz	1 MHz	300 KHz
Resol Bandwidth	1 MHz	1 MHz	300 KHz
Sweep Time	0 s	0 s	0 s

Operator: E. Staub
Date/Time: 10.01.2003 12:08
Filename: 20025229_HCh_Dongle HDC5_003v.png/.txt

Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [GHz]	Pk-value [dB μ V/m]	Delta [dB]

7. Emission Test Receiver

7.1 Radiated electromagnetic field 30 - 1000 MHz

Test site: ☐ anechoic chamber (foam) ☐ open test site
☒ anechoic chamber (ferrites) ☐

Distance: ☐ 30 m ☐ 10 m ☒ 3 m ☐

Position of EUT: 0.8 m (height of the equipment under test above floor)

Test precision: ± 6 dB (30 - 300 MHz) / ± 5.4 dB (300 - 1000 MHz)

Test method: The electromagnetic disturbance radiated by the equipment is measured from 30 to 1000 MHz using a spectrum analyser and a wide band antenna. The antenna is moved from 1 to 4 m in height successively with horizontal and vertical polarisations. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value of all the disturbance appearing while the apparatus is under test. The peak values are recorded continuously on the graph. The values exceeding the limits are remeasured manually giving quasi-peak values and average values using a receiver and these measurements are indicated under the graph. The limit must be respected in quasi-peak values (QP).

Test set-up:



Remarks:

- Maximum field strength measured from 1 to 3 m.
- Radiated emissions measurements were maximized through orientation of EUT in three orthogonal axes

Test equipment:

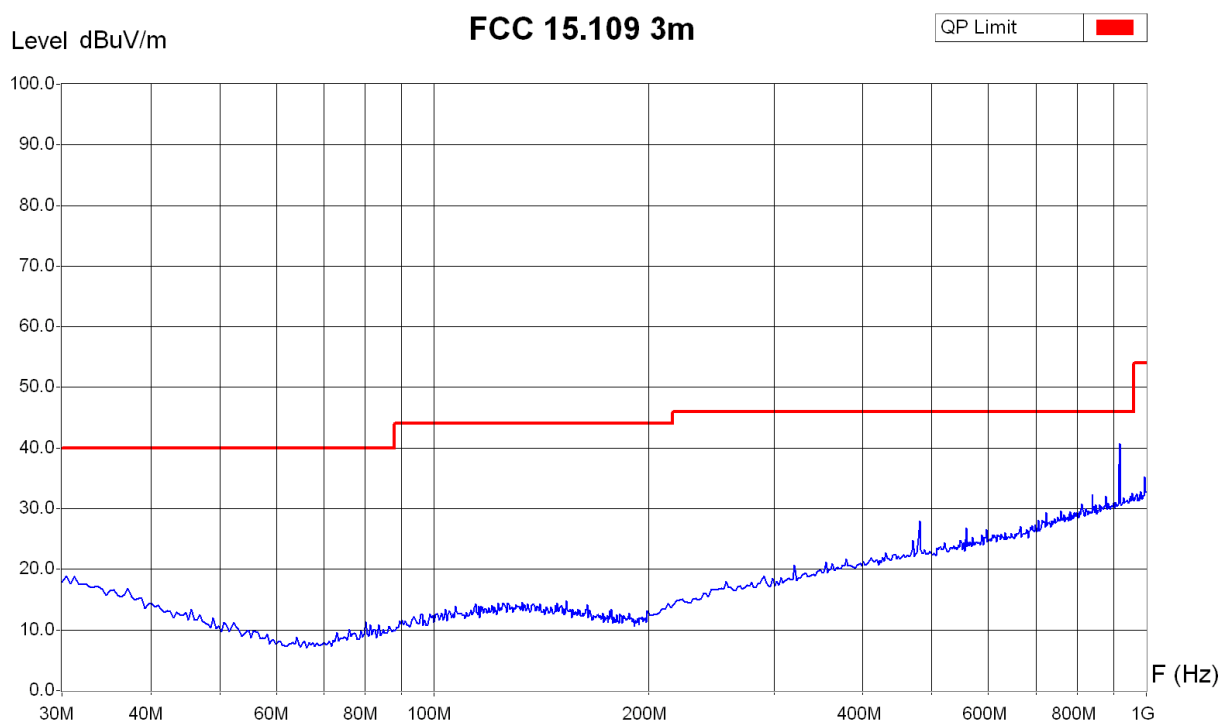
☒ Spectrum analyser	☐ 88-14	☐ 90-26	☒ 94-24		
☒ Receiver	☐ 85-04	☐ 90-43	☒ 94-35		
☒ Preamplifier	☐ 88-05	☐ 90-01	☒ 90-42	☐ 95-86	☐ 92-39
☐ Antenna (horn)	☐ 90-24	☐ 90-29	☐ 98-12	☐ 98-13	☐
☒ Antenna	☒ 94-03				
☐ Notch filter					

Result:	☒ pass	☐ fail	☐ not applicable	☐ not tested
----------------	--	-------------------------------	---	-------------------------------------

Measurement Type : Radiated Field
Polarisation : Horizontal
Table Angle : 0 - 360°
Antenna Height : 1 - 3m



Equipment Under Test : Dongle HDC5 US: Lowest channel
Set-Up : without artificial head
Operating Conditions : receive mode
Remarks : 917.7 MHz; Dongle attached to Nokia 3210 (switched off)
P3 = EUT side



Zone	30 MHz - 199 MHz	199 MHz - 1 GHz
Video Bandwidth	300 KHz	300 KHz
Resol Bandwidth	120 KHz	120 KHz
Sweep Time	0 s	0 s

Operator: E. Staub
Date/Time: 03.07.03 09:45
Filename:
20025229_RX_DongleHDC5_000
hP3.png/.txt

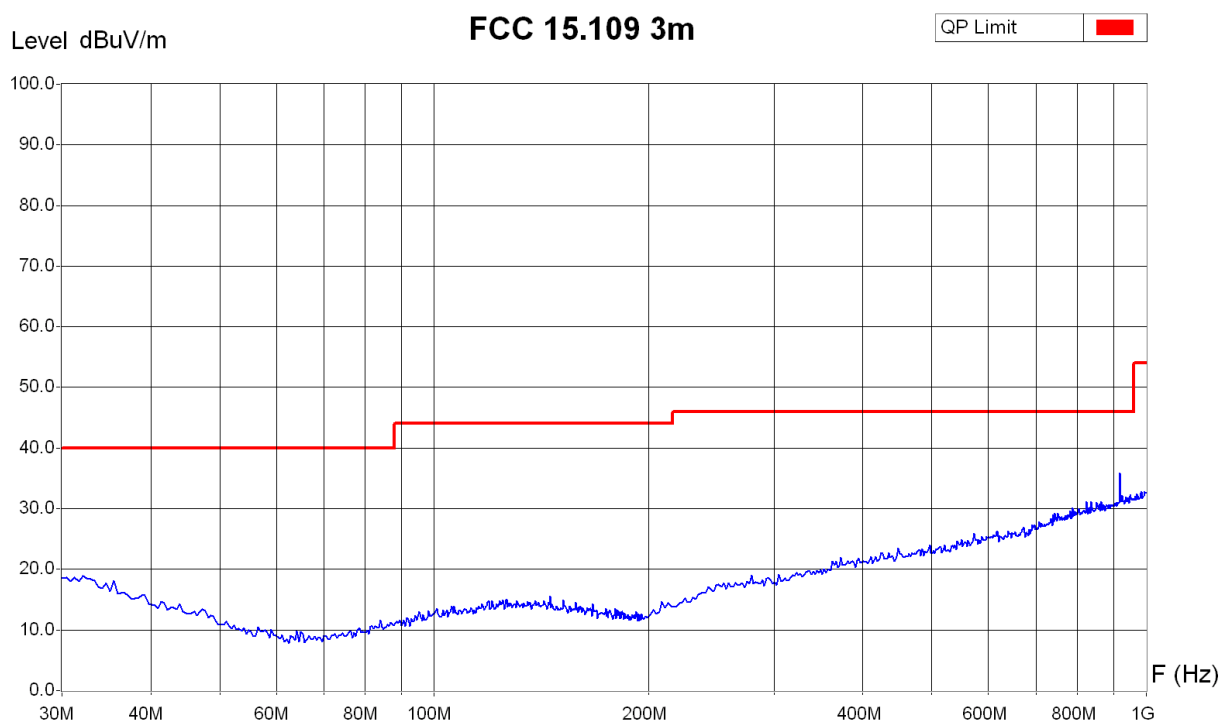
Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [MHz]	Pk-value [dB μ V/m]	Delta [dB]

Measurement Type : Radiated Field
Polarisation : Vertical
Table Angle : 0 - 360°
Antenna Height : 1 - 3m



Equipment Under Test : Dongle HDC5 US: Lowest channel
Set-Up : without artificial head
Operating Conditions : receive mode
Remarks : 917.7 MHz; Dongle attached to Nokia 3210 (switched off)
P3 = EUT side



Zone	30 MHz - 199 MHz	199 MHz - 1 GHz
Video Bandwidth	300 KHz	300 KHz
Resol Bandwidth	120 KHz	120 KHz
Sweep Time	0 s	0 s

Operator: E. Staub
Date/Time: 03.07.03 09:49
Filename:
20025229_RX_DongleHDC5_000v
P3.png/.txt

Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [MHz]	Pk-value [dB μ V/m]	Delta [dB]

7.2 Radiated electromagnetic field 1 - 5 GHz

Test site: ☐ anechoic chamber (foam) ☐ open test site
☒ anechoic chamber (ferrites) ☐

Distance: ☐ 30 m ☐ 10 m ☐ 3 m ☒ 1 m

Position of EUT: 0.8 m (height of the equipment under test above floor)

Test precision: ± 6 dB (30 - 300 MHz) / ± 5.4 dB (300 - 1000 MHz)

Test method: The electromagnetic disturbance radiated by the equipment is measured using a spectrum analyser and a wide band antenna. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value of all the disturbance appearing while the apparatus is under test. The peak values are recorded continuously on the graph.

Test set-up:



Remarks: • Radiated emissions measurements were maximized through orientation of EUT in three orthogonal axes

Test equipment:

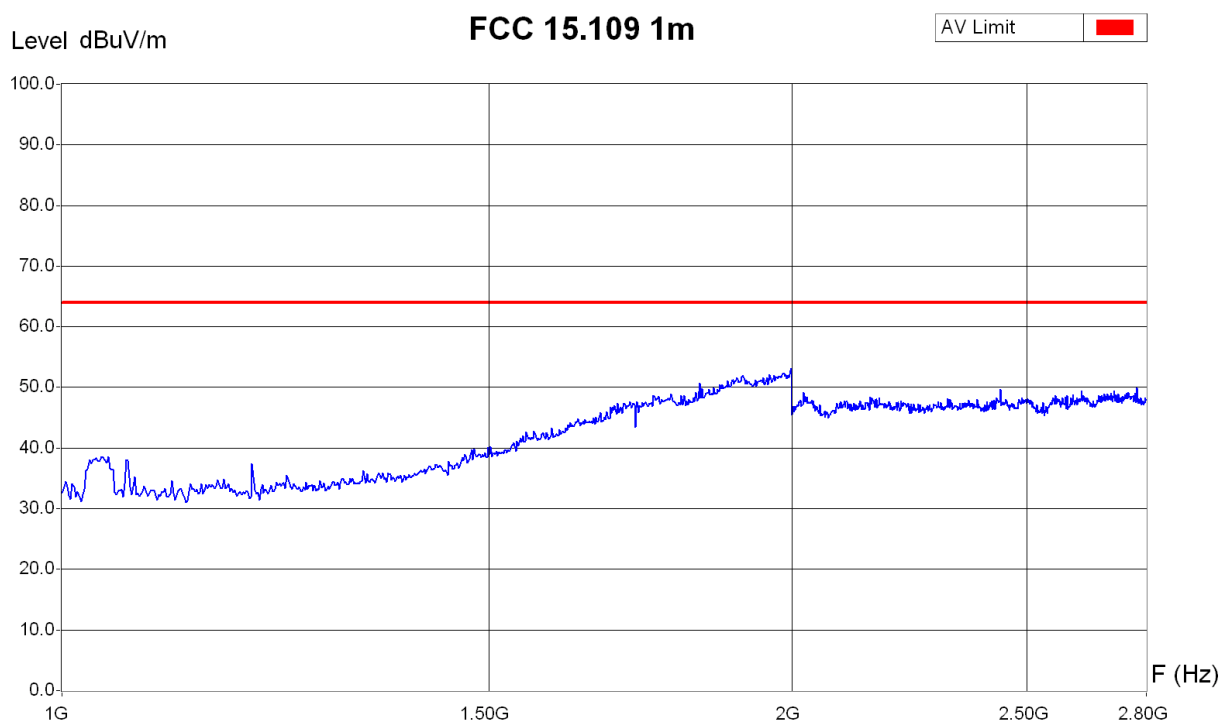
☒ Spectrum analyser	☒ 88-14	☐ 90-26	☐ 94-24		
☐ Receiver	☐ 85-04	☐ 90-43	☐ 94-35		
☒ Preamplifier	☐ 88-05	☐ 90-01	☐ 90-42	☒ 95-86	☒ 92-39
☐ Antenna (biconical)	☐ 82-02	☐ 87-05	☐ 87-16	☐ 91-05	☐ 94-37
☐ Antenna (log-per)	☐ 88-20	☐ 90-30	☐ 91-35	☐ 94-64	
☒ Antenna (horn)	☐ 90-24	☒ 90-29	☐ 98-12	☐ 98-13	☐
☐ Notch and high-pass filter					

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Measurement Type : Radiated Field
Polarisation : Horizontal
Table Angle : 0 - 360°
Antenna Height : 1m



Equipment Under Test : Dongle HDC5 US: Lowest channel
Set-Up : without artificial head
Operating Conditions : receive mode
Remarks : 917.7 MHz; Dongle attached to Nokia 3210 (switched off)
P3 = EUT lying



Zone	1 GHz - 2 GHz	2 GHz - 2.80 GHz
Video Bandwidth	1 MHz	1 MHz
Resol Bandwidth	1 MHz	1 MHz
Sweep Time	0 s	0 s

Operator: E. Staub
Date/Time: 03.07.2003 13:55
Filename:
20025229_RX_DongleHDC5_001
hP3.png/.txt

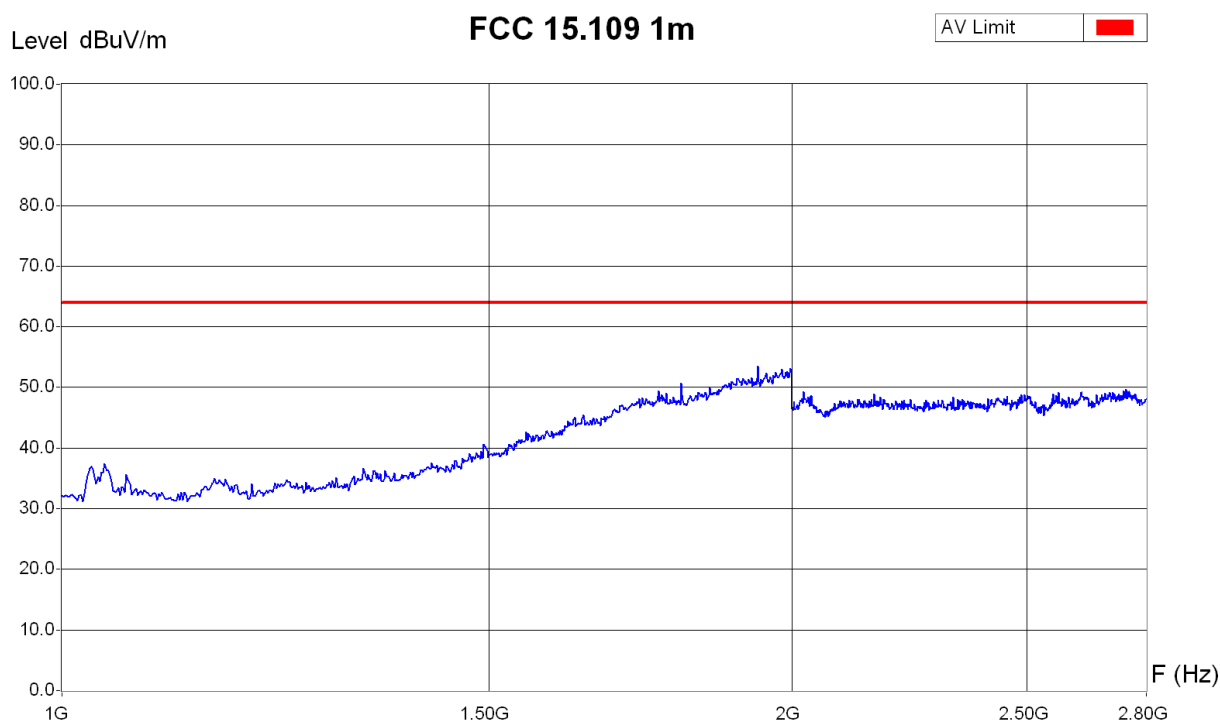
Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [GHz]	Pk-value [dB μ V/m]	Delta [dB]

Measurement Type : Radiated Field
Polarisation : Vertical
Table Angle : 0 - 360°
Antenna Height : 1m



Equipment Under Test : Dongle HDC5 US: Lowest channel
Set-Up : without artificial head
Operating Conditions : receive mode
Remarks : 917.7 MHz; Dongle attached to Nokia 3210 (switched off)
P3 = EUT lying



Zone	1 GHz - 2 GHz	2 GHz - 2.80 GHz
Video Bandwidth	1 MHz	1 MHz
Resol Bandwidth	1 MHz	1 MHz
Sweep Time	0 s	0 s

Operator: E. Staub
Date/Time 03.07.2003 13:53
Filename:
20025229_RX_DongleHDC5_001v
P3.png/.txt

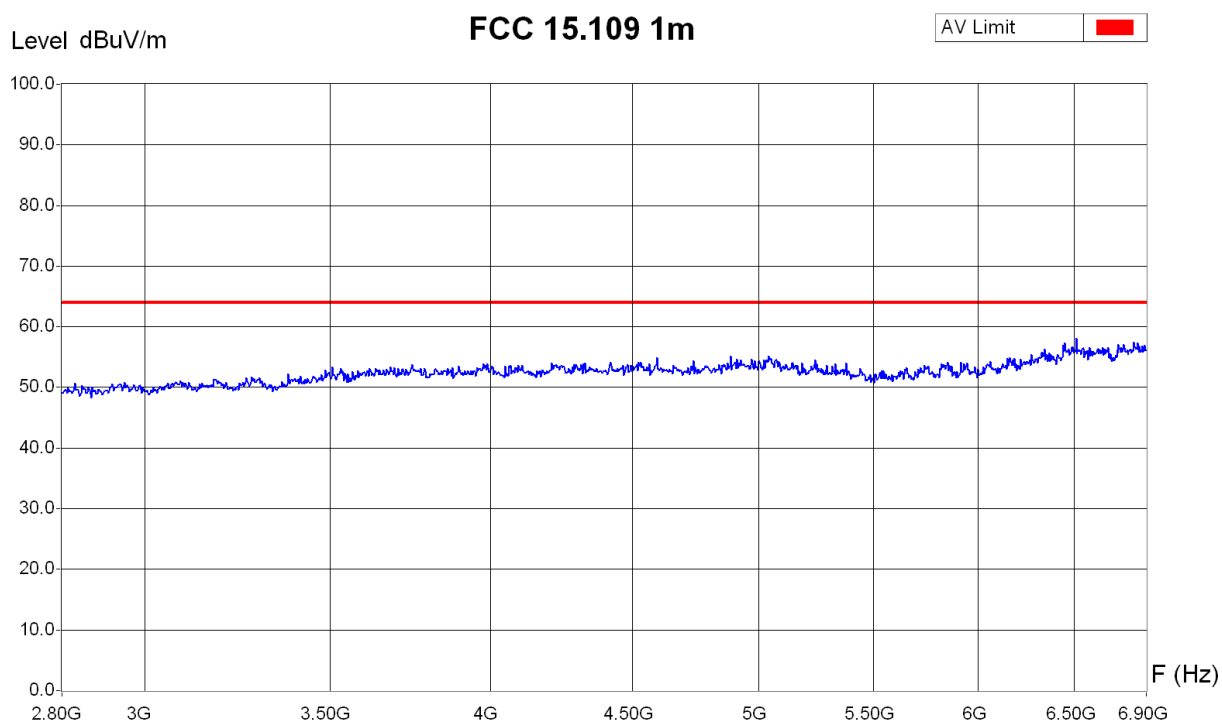
Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [GHz]	Pk-value [dB μ V/m]	Delta [dB]

Measurement Type : Radiated Field
Polarisation : Horizontal
Table Angle : 0 - 360°
Antenna Height : 1m



Equipment Under Test : Dongle HDC5 US: Lowest channel
Set-Up : without artificial head
Operating Conditions : receive mode
Remarks : 917.7 MHz; Dongle attached to Nokia 3210 (switched off)
P3 = EUT side



Zone	2.80 GHz - 4.60	4.60 GHz - 6.90
Video Bandwidth	1 MHz	1 MHz
Resol Bandwidth	1 MHz	1 MHz
Sweep Time	0 s	0 s

Operator: E. Staub
Date/Time 03.07.2003 14:12
Filename:
20025229_RX_DongleHDC5_002
hP3.png/.txt

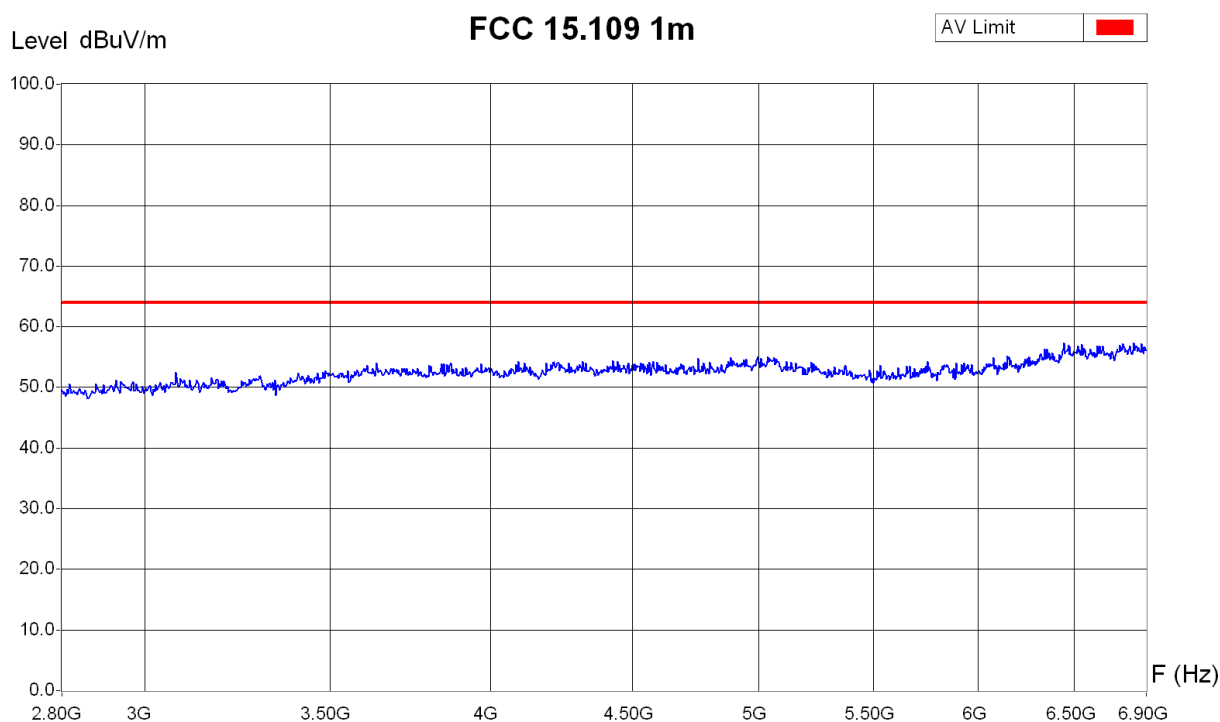
Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [GHz]	Pk-value [dB μ V/m]	Delta [dB]

Measurement Type : Radiated Field
Polarisation : Vertical
Table Angle : 0 - 360°
Antenna Height : 1m



Equipment Under Test : Dongle HDC5 US: Lowest channel
Set-Up : without artificial head
Operating Conditions : receive mode
Remarks : 917.7 MHz; Dongle attached to Nokia 3210 (switched off)
P3 = EUT side



Zone	2.80 GHz - 4.60	4.60 GHz - 6.90
Video Bandwidth	1 MHz	1 MHz
Resol Bandwidth	1 MHz	1 MHz
Sweep Time	0 s	0 s

Operator: E. Staub
Date/Time: 03.07.2003 14:14
Filename:
20025229_RX_DongleHDC5_002v
P3.png/.txt

Table of measured Pk-values with any points within 5 dB of the limit of previous plot

Frequency [GHz]	Pk-value [dB μ V/m]	Delta [dB]

8. Test equipment

Inv.	Manufacturer	Model	Last cal.	Cal interval
88-14	Hewlett Packard	8562A	Feb 2003	1 year
94-24	Hewlett Packard	8591E	Feb 2003	1 year
94-24	Hewlett Packard	E 4407 B	March 2002	2 years
90-43	Rohde & Schwarz	ESVP	Feb 2003	1 year
94-35	Rohde & Schwarz	ESVS10	Feb 2003	1 year
90-42	Montena emc		Feb 2003	1 year
95-86	Montena emc		Feb 2003	1 year
92-39	Hewlett Packard	8349	Feb 2003	1 year