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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:	***3. & 7.10.2003; 11-14.05. & 18.6.2004***	Report no: Rapport no: Bericht Nr:	***13'797***	Mandate no: Mandat no: Auftrag Nr:	***2003-5871***
Report: Rapport: Bericht:	***Electromagnetic compatibility***				
Product name: Nom du produit: Produktname	***BiblioWand***				
Customer: Client: Kunde:	***Bibliotheca RFID Library Systems AG***	Serial no: No de série: Seriennummer:	***Prototyp V1.0***		

Standards / Normes / Normen	Result Résultat Ergebnis
CFR 47, Part 15, Subpart B, Unintentional radiator	***Pass***
CFR 47, Part 15, Subpart C, Intentional radiator	***Pass***

Test performed by
Essai effectué par :
Prüfer

M. Portmann / E. de Raemy

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

M. Portmann / E. de Raemy

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

E. Staub

Rossens, June 30, 2004 (Issue Date / Date d'édition / Ausstelldatum) V20040606

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

The present document results from tests on a specimen and does not prejudge to the conformity of all the manufactured products. - 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 Bericht beinhaltet die Prüfergebnisse eines Mustergerätes. Es kann daraus nicht auf die Übereinstimmung der Seriegeräte mit dem Mustergerät geschlossen werden.

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Contents / Table des matières / Inhaltsverzeichnis

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

✓ Pass / Réussi / Bestanden

✘ Fail / Echoué / Nicht bestanden

∅ 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
6	***Emission / Emission / Störaussendung***		
6.1	Mains terminal interference voltage Tension perturbatrice aux bornes d'alimentation Störspannung auf den Energieversorgungsleitungen	*CFR 47 § 15.107 /15.207*	✓
6.2	Radiated electromagnetic field Champ perturbateur Störfeldstärke	*CFR 47 § 15.209*	✓
6.3	Carrier frequency analysis Analyse de la fréquence porteuse Trägerfrequenzuntersuchung	*CFR 47 § 15.225*	✓
6.4	Radiated electromagnetic field (incl. ancillaries) Champ perturbateur (incl. accessoires) Störfeldstärke (inkl. Zusatzeräte)	*CFR 47 § 15.109*	✓

2. Applied standards / Normes appliquées / Verwendete Normen

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

3. Client / Client / Kunde

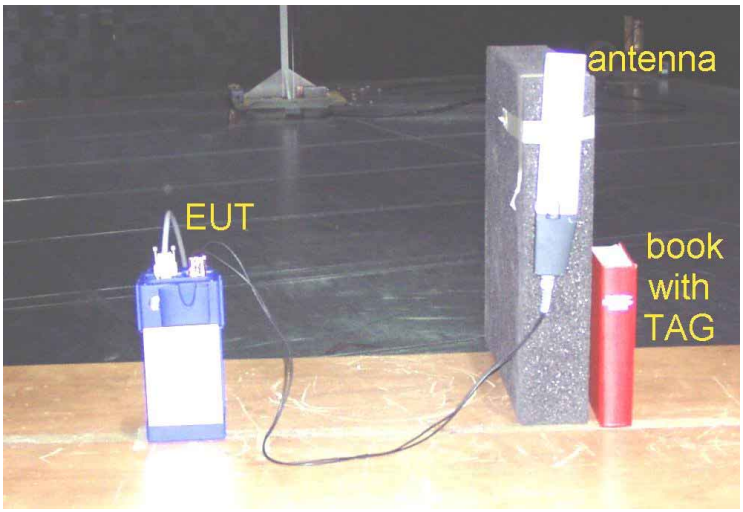
Client name and address Nom et adresse du client Name und Adresse des Kunden	*Bibliotheca RFID Library Systems AG* *Baarerstr. 59* *CH - 6300 Zug ZG*
Contact Person / Responsable / Kontaktperson	*Zühlke Engineering AG* *Jörg Dogwiler* *Wiesenstr. 10A* *CH-8952 Schlieren*
Telephone / Téléphone / Telefon	*++41 1 733 66 11*
Fax / Télécopieur / Telefax	*++41 1 733 69 02*
E-mail / Courrier électronique / E-mail	*www.bibliotheca-rfid.com* *www.zuehlke.com*
Mandate no / no mandat no / Auftragsnr.	*2003-5871*

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	*Bibliotheca RFID Library Systems AG* *Wiesenstrasse 10a* *CH 8952 Schlieren*
Production country / Pays de fabrication / Ursprungsland	*Switzerland*
Brand name / nom de marque / Verkaufsmarke	*Bibliotheca*
Product name / Nom du produit / Produktname	*BiblioWand*
Product description / Description du produit / Produktbeschreibung	*Portable TAG reader system powered by battery and connected to an external handheld antenna. During the battery charging, all other functions are inhibited.*
Model number / Numéro de modèle / Modellnummer	*Q10600*
Serial no / No. de série / Seriennummer	*Prototyp V1.0*
Software version / Version du logiciel / Softwareversion	*---*
Highest frequency / Fréquence la plus élevée / Höchste Frequenz	*81.35 MHz (6 x 13.56 MHz)*
Supply / Alimentation / Speisung	*Uext = 15 V, Iext = 1 A* *Uint = 12 V, Iint = 0.8 A*
Technical documentation Documentation technique Technische Dokumentation	*None. The equipment is completely identified by its serial no. according to ISO 9001.*

4.2 Pictures of the EUT / Photos de l'EST / Fotos des Prüflings

	Equipment under test
	Equipment under test

4.3 Classification / Classification / Klassierung

- *Class A (ancillary equipment);*
  Remark: The ancillary equipment is not furnished by the manufacturer but is necessary for the testing of the EUT.

4.4 Connected cables / Câble connectés / Angeschlossene Kabel

Access / Accès / Anschluss	**Length / Longueur / Länge**	**Type / Type / Typ**	**Screened / Blindé / Geschirmt**	**Terminated with / Terminé avec / Abgeschlossen mit**	**Remark / Remarque / Bemerkung**
DC Supply	*1.5m (≤ 10m)*	*2-wires*	*none*	*Power module 230 VAC / 15 VDC*	*only used for battery charging*
Digital I/O and antenna	*1.0m (≤ 3m)*	*3-wires + coax*	*Cu-mesh*	*Antenna*	
RS 232	*1.0m (≤ 3m)*		*Yes*	*Palm Compaq*	*original cable from Compaq*

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

None

5. Test conditions / Conditions d'essai / Testbedingungen

5.1 Climatic conditions / conditions climatiques / klimatische Bedingungen

Temperature / Température / Temperatur:	*19 – 27*	*°C*
Pressure / Pression / Druck:	*1004 – 1018*	*hPa*
Relative humidity / Humidité relative / Relative Luftfeuchtigkeit:	*31 – 49*	*%*

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

Test period / Date des essais / Datum der Prüfungen:	*3. & 7.10.2003;* *11-14.05. & 18.6.2004*
Location / Lieu / Ort:	*Rossens*

5.3 Persons present / Personnes présentes / Anwesende Personen

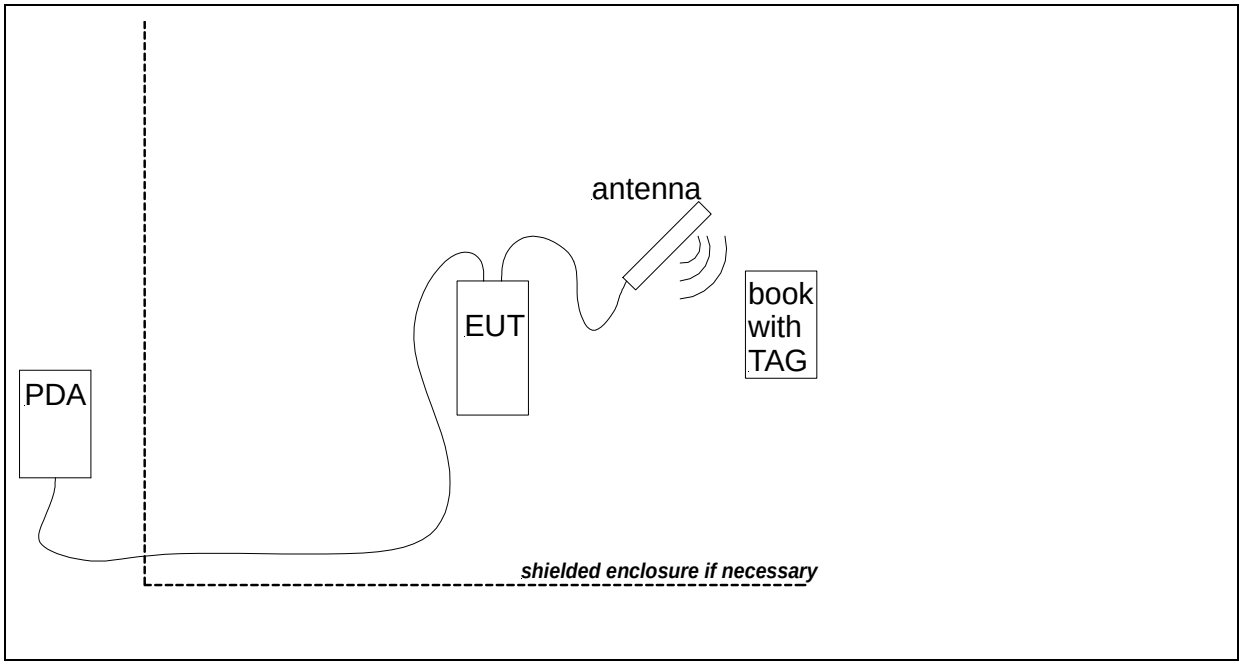
Test Engineer(s) / Ingénieur(s) d'essai / Prüfingenieur(e) :

M. Portmann / E. de Raemy

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

Name / Nom / Name	Company / Société / Firma
Mr Dogwiler (partly)	*Bibliotheca RFID Library Systems AG*

5.4 Test configuration / Configuration d'essai / Prüfkonfiguration



5.5 Operating conditions / Conditions de fonctionnement / Betriebszustand

Normal operating conditions with continuous reading of a TAG.

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 indispensables 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**
Power Module 230Vac / 15Vdc	*Mainy Egston*	*N2XFSW3*	*---*	*24 W, 15V*
Pocket PC	*Compaq*			

6. Emission Test

6.1 Interference voltage

Test site:	☐ anechoic chamber (foam)	☐ shielded room
	☒ anechoic chamber (ferrites)	☐ laboratory
	☐ open test site	☐ .....

Test precision: +/- 1.6 dB

Measuring method: The conducted disturbance is measured using a spectrum analyser and a line impedance substitution network (LISN). The measurement of the voltage against the earth is carried out succesively. The peak values are recorded continuously on the graph. The values that exceed the limit are remeasured with a measuring receiver.

Test set-up:

Remarks:	*During the battery charging, all other functions are inhibited.*

Test equipment:

Spectrum analyser	☐ 88-14	☐ 90-26	☐ 94-24	☐ 02-06	☒ 03-45	☐ 03-57
Receiver	☐ 85-12	☐ 90-11	☒ 94-34			
LISN	☐ 85-13	☐ 90-08	☐ 94-36	☒ 94-40	☐ 95-12	☐ 00-43
LISN	☐ 04-04	☐ 04-05	☐			
Protection 10 dB	Internal in 94-40					
.....	.....					

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

Measurement Type : Voltage Interference
Wire : Line 2

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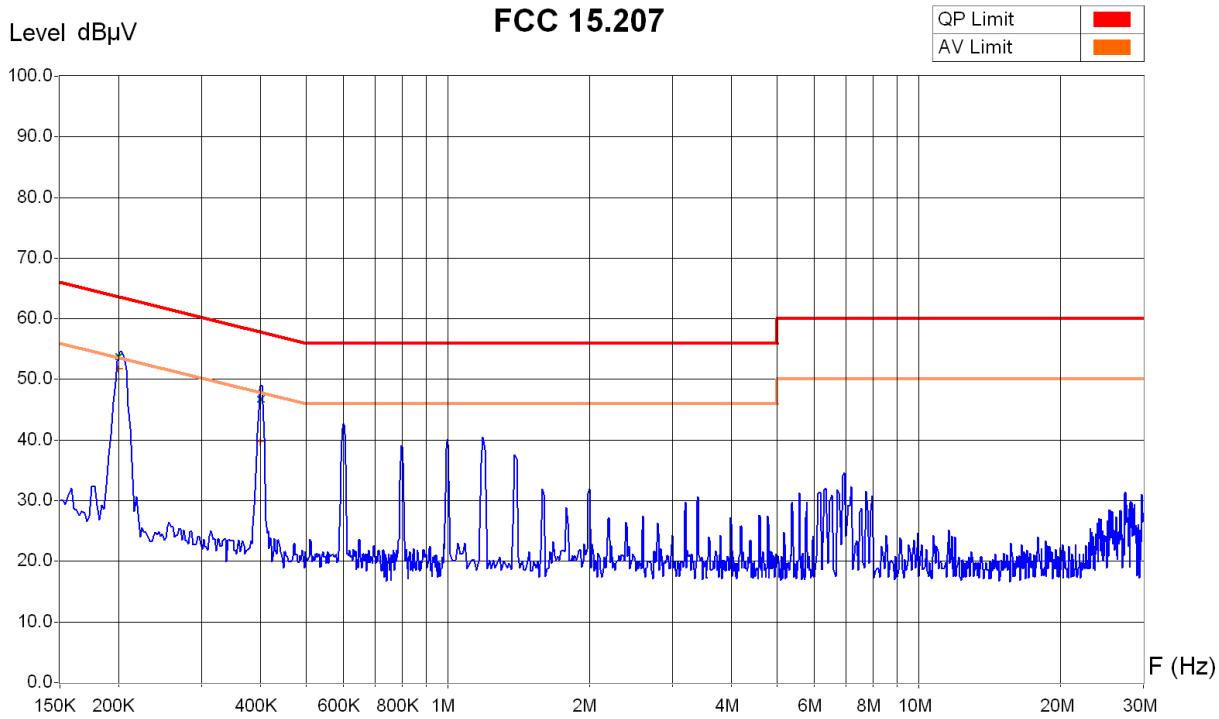
Equipment Under Test : BiblioWand
Set-Up : table top
Operating Conditions : battery charging
Remarks :



Zone	150 KHz - 1 MHz	1 MHz - 6 MHz	6 MHz - 30 MHz
Video Bandwidth	10 KHz	10 KHz	10 KHz
Resol Bandwidth	9 KHz	9 KHz	9 KHz
Sweep Time	0 s	0 s	0 s

Receiver Measures

Frequency	Peak	QuasiPeak (x)	Average (+)	QP Margin
200 KHz	54.4 dBµV	53.8 dBµV	51.8 dBµV	9.8 dB
400 KHz	47.8 dBµV	46.7 dBµV	39.7 dBµV	11.1 dB

Operator: PoM
Date/Time: 18.06.04 09:58
Filename:
cond 1.png/.txt

Measurement Type : Voltage Interference
Wire : Line 2

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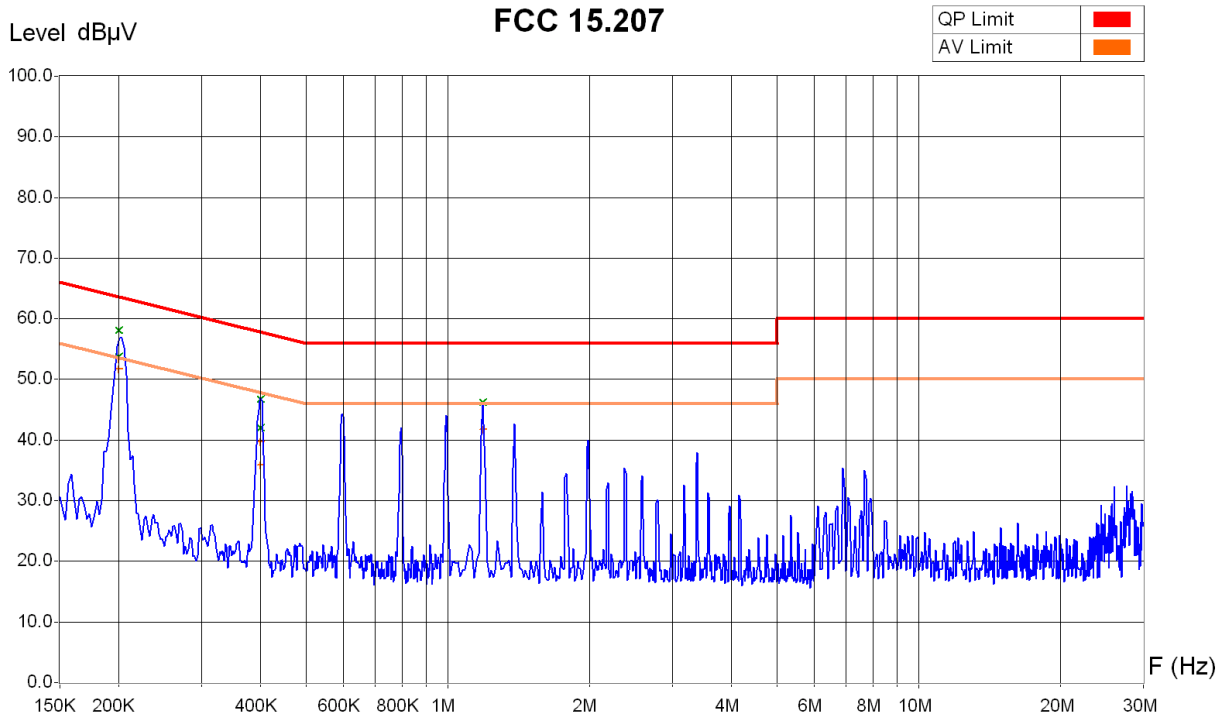
Equipment Under Test : BiblioWand
Set-Up : table top
Operating Conditions : battery charging
Remarks :



Zone	150 KHz - 1 MHz	1 MHz - 6 MHz	6 MHz - 30 MHz
Video Bandwidth	10 KHz	10 KHz	10 KHz
Resol Bandwidth	9 KHz	9 KHz	9 KHz
Sweep Time	0 s	0 s	0 s

Receiver Measures

Frequency	Peak	QuasiPeak (x)	Average (+)	QP Margin
200 KHz	54.4 dBµV	53.8 dBµV	51.8 dBµV	9.8 dB
200 KHz	58.8 dBµV	58.0 dBµV	53.3 dBµV	5.6 dB
400 KHz	47.8 dBµV	46.7 dBµV	39.7 dBµV	11.1 dB
400 KHz	43.9 dBµV	42.1 dBµV	35.9 dBµV	15.8 dB
1.19 MHz	46.7 dBµV	46.3 dBµV	41.7 dBµV	9.7 dB

Operator: PoM
Date/Time: 18.06.04 10:02
Filename:
cond 2.png/.txt

6.2 Radiated electromagnetic field (unwanted emissions of an intentional radiator)

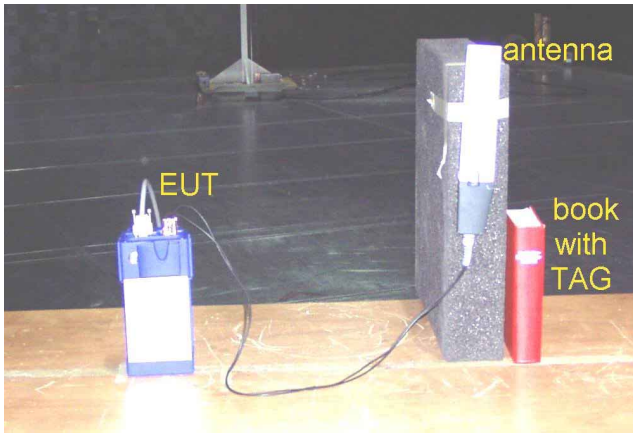
Radiated electromagnetic field Test site:	☐ anechoic chamber (foam)		☐ open test site	
	☒ anechoic chamber (ferrites)		☐	
Distance:	☐ 30 m	☒ 10 m	☐ 3 m	☐ .....

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 a limit are remeasured manually using a receiver.

Test set-up:



Remarks: - - -

Test equipment:

Spectrum analyser		☐ 88-14	☐ 90-26	☐ 94-24	☐ 02-06	☒ 03-45	☐ 03-57
Receiver		☐ 85-04	☐ 90-43	☒ 94-35			
Preamplifier		☐ 88-05	☐ 90-01	☒ 90-42	☐ 95-86		
Antenna	(biconical)	☐ 82-02	☐ 87-05	☐ 87-16	☐ 91-05	☐ 94-37	
Antenna	(log-per)	☐ 88-20	☐ 90-30	☐ 91-35	☐ 94-64		
Antenna	(bilog)	☒ 94-03	☐				
Antenna	(loop)	☒ 90-28					
.....		.....					

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

Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0 - 360°
Antenna Height :	on the ground

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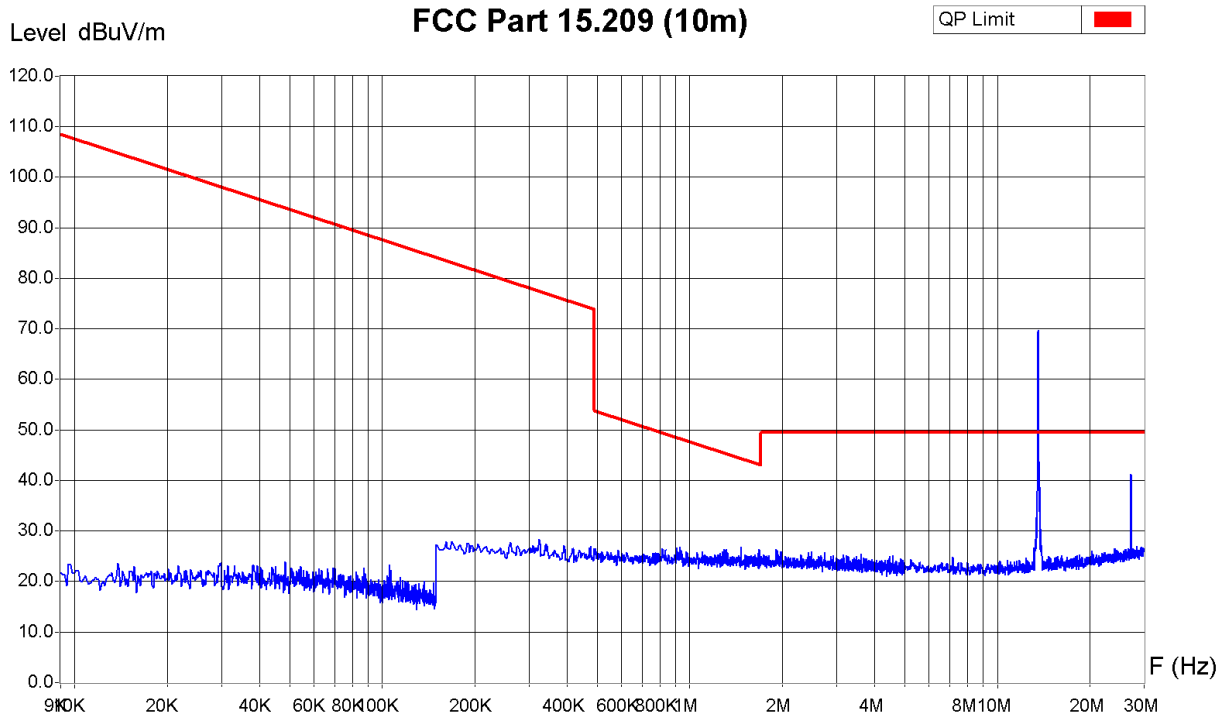
Equipment Under Test :	BiblioWand (Model Q10600)
Set-Up :	Original
Operating Conditions :	Tag scanning (TX on)
Remarks :	limit at 13.56 MHz at 10 m is 120 dBuV/m



Zone	9 KHz - 150 KHz	150 KHz - 2 MHz	2 MHz - 5 MHz	5 MHz - 30 MHz
Video Bandwidth	300 Hz	10 KHz	10 KHz	10 KHz
Resol Bandwidth	200 Hz	10 KHz	10 KHz	10 KHz

Operator: E. de Raemy
Date/Time: 11.05.04 15:57
Filename:
FCC9k_30M.png/.txt

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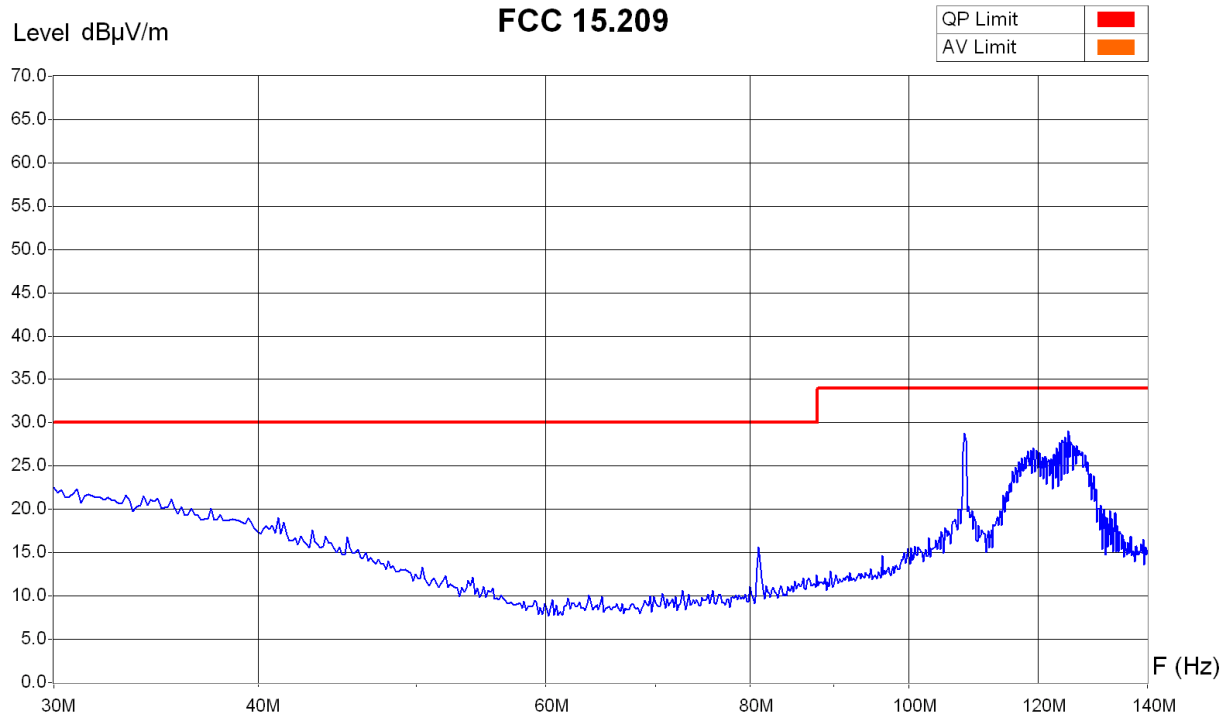
Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0 - 360°
Antenna Height :	1 - 4 m
Equipment Under Test :	Bibliowand Q10600
Set-Up :	table top, without ancillary equipment
Operating Conditions :	TX ON
Remarks :	



Zone
Video Bandwidth
Resol Bandwidth
Sweep Time

Operator: PoM
Date/Time: 11.05.04 12:22
Filename:
fcc c hor on.png/.txt

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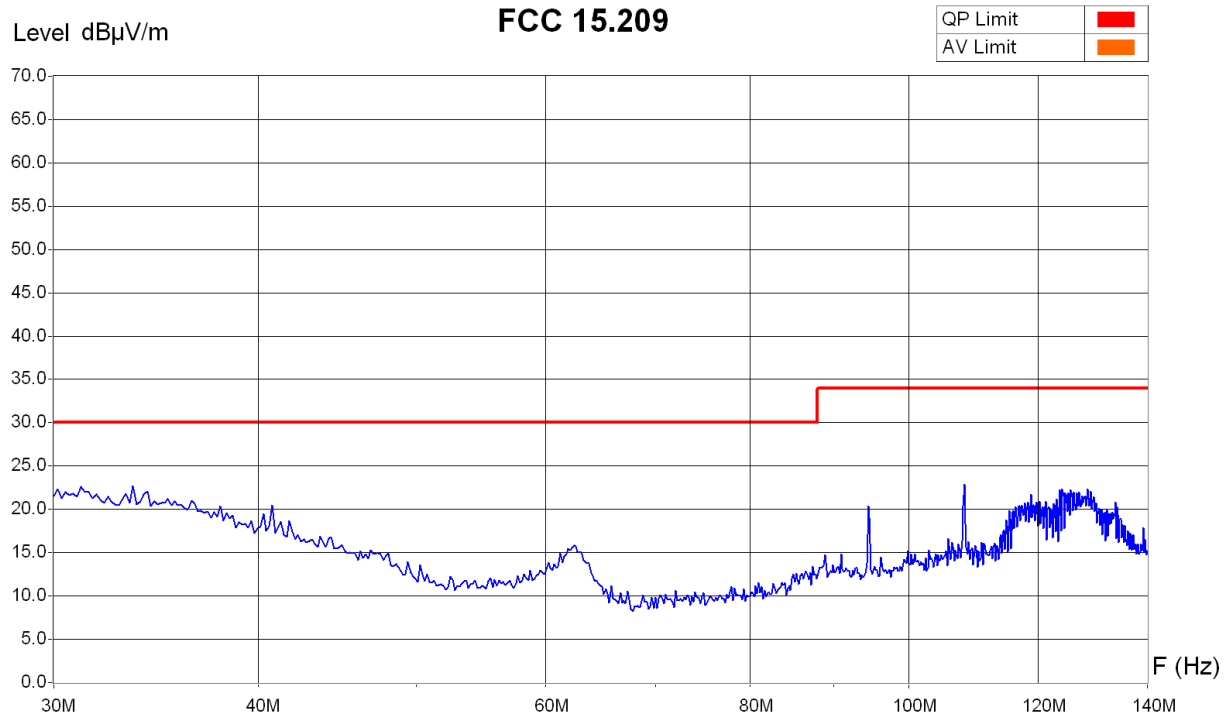
Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0 - 360°
Antenna Height :	1 m
Equipment Under Test :	Bibliownd Q10600
Set-Up :	table top without ancillary equipment
Operating Conditions :	TX ON
Remarks :	



Zone
Video Bandwidth
Resol Bandwidth
Sweep Time

Operator: PoM
Date/Time: 11.05.04 12:10
Filename:
fcc c ver on.png/.txt

6.3 Radiated electromagnetic field (carrier analysis)

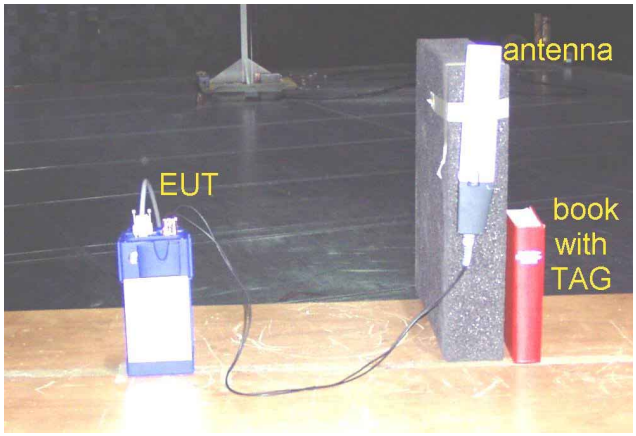
Test site:	☐ anechoic chamber (foam)		☐ open test site	
	☒ anechoic chamber (ferrites)		☐	
Distance:	☐ 30 m	☒ 10 m	☐ 3 m	☐ .....

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 a limit are remeasured manually using a receiver.

Test set-up:



Remarks: - - -

Test equipment:

Spectrum analyser		☐ 88-14	☐ 90-26	☐ 94-24	☐ 02-06	☒ 03-45	☐ 03-57
Receiver		☐ 85-04	☐ 90-43	☒ 94-35			
Preamplifier		☐ 88-05	☐ 90-01	☒ 90-42	☐ 95-86		
Antenna	(biconical)	☐ 82-02	☐ 87-05	☐ 87-16	☐ 91-05	☐ 94-37	
Antenna	(log-per)	☐ 88-20	☐ 90-30	☐ 91-35	☐ 94-64		
Antenna	(bilog)	☐ 94-03	☐				
Antenna	(loop)	☒ 90-28					
.....		.....					

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

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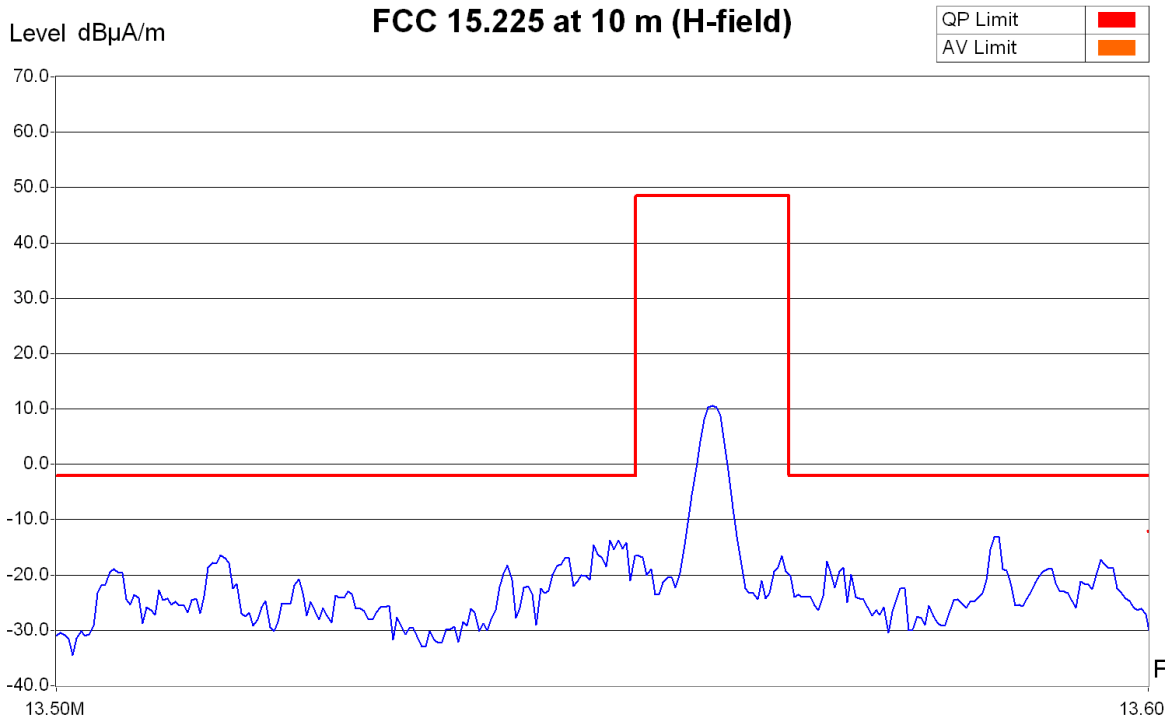
Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0-360 deg.
Antenna Height :	1-4 m
Equipment Under Test :	Bibliowand Q10600
Set-Up :	table top
Operating Conditions :	TX ON
Remarks :	limit correction factor regarding the distance is 40 dB/decade limit correction factor from E-field to H-field is 51.5 dB



Zone	
Video Bandwidth	
Resol Bandwidth	
Sweep Time	

Operator: PoM
Date/Time: 03.10.03 13:49
Filename:
carrier.png/.txt

Frequency measurement under “extreme conditions”

Test conditions		Frequency
T_{nom} (22 °C)	V_{nom} (9.6 Vdc)	13.5613 MHz
T_{min} (0 °C)	V_{min} (8.7 Vdc)	13.5615 MHz
	V_{max} (9.6 Vdc)	13.5615 MHz
T_{max} (55 °C)	V_{min} (8.7 Vdc)	13.5613 MHz
	V_{max} (9.6 Vdc)	13.5615 MHz

The supply values of 8.7 Vdc and 9.6 Vdc are the extreme values accepted by the EUT.
Due to fact that the EUT ist restricted for indoor use, the temperatures of 0 – 55 °C are the extreme values.

Frequency variation over all: **0.002 %**

The EUT fulfils the requirements.

6.4 Radiated electromagnetic field (unwanted emissions of an unintentional radiator)

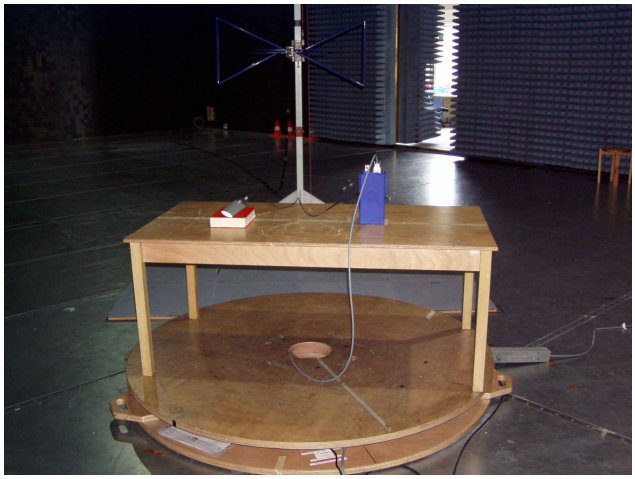
Test site:	☐ anechoic chamber (foam)		☐ open test site	
	☒ anechoic chamber (ferrites)		☐	
Distance:	☐ 30 m	☒ 10 m	☐ 3 m	☐ .....

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 a limit are remeasured manually using a receiver.

Test set-up:



Remarks: - - -

Test equipment:

Spectrum analyser		☐ 88-14	☐ 90-26	☐ 94-24	☐ 02-06	☒ 03-45	☐ 03-57
Receiver		☐ 85-04	☐ 90-43	☒ 94-35			
Preamplifier		☐ 88-05	☐ 90-01	☒ 90-42	☐ 95-86		
Antenna	(biconical)	☐ 82-02	☐ 87-05	☐ 87-16	☐ 91-05	☐ 94-37	
Antenna	(log-per)	☐ 88-20	☐ 90-30	☐ 91-35	☐ 94-64		
Antenna	(bilog)	☒ 94-03	☐				
Antenna	(horn)	☐ 90-24	☐ 90-29	☐ 98-12	☐ 98-13	☐	
.....		.....					

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

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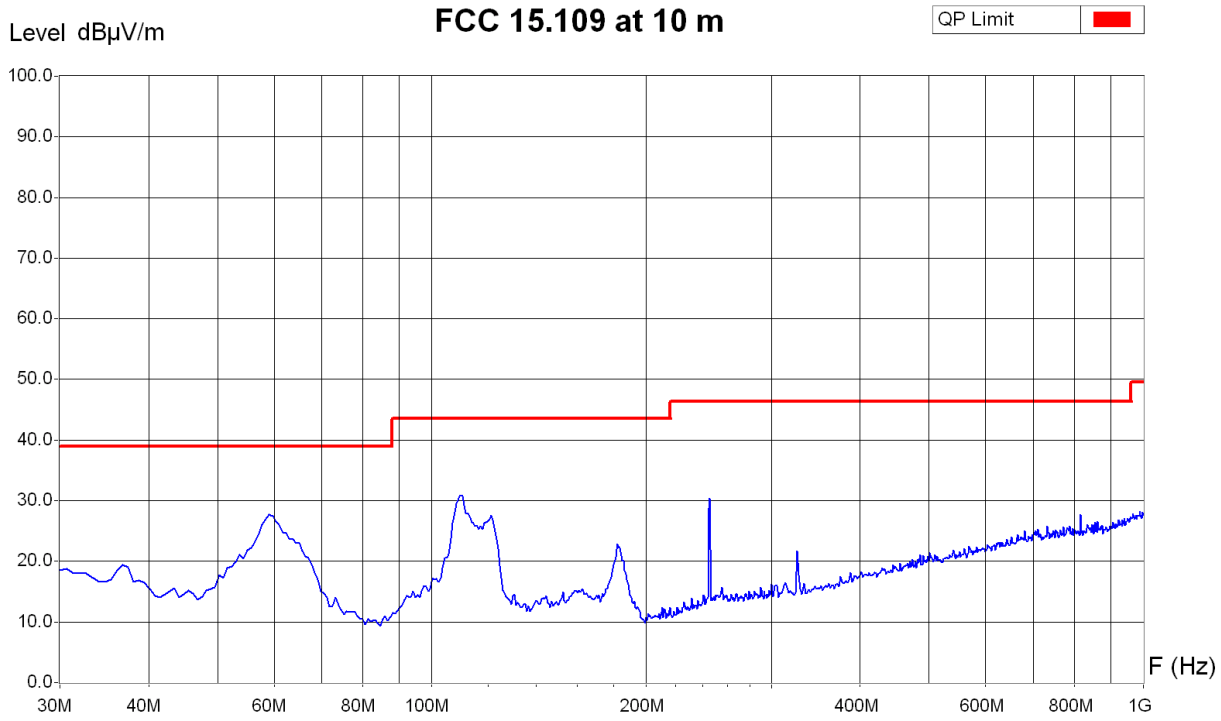
Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0-360 deg.
Antenna Height :	1-4 m
Equipment Under Test :	BiblioWand Q10600
Set-Up :	table top
Operating Conditions :	TX OFF
Remarks :	



Zone
Video Bandwidth
Resol Bandwidth
Sweep Time

Operator: PoM
Date/Time: 18.06.04 08:21
Filename:
rad sp ver off.png/.txt

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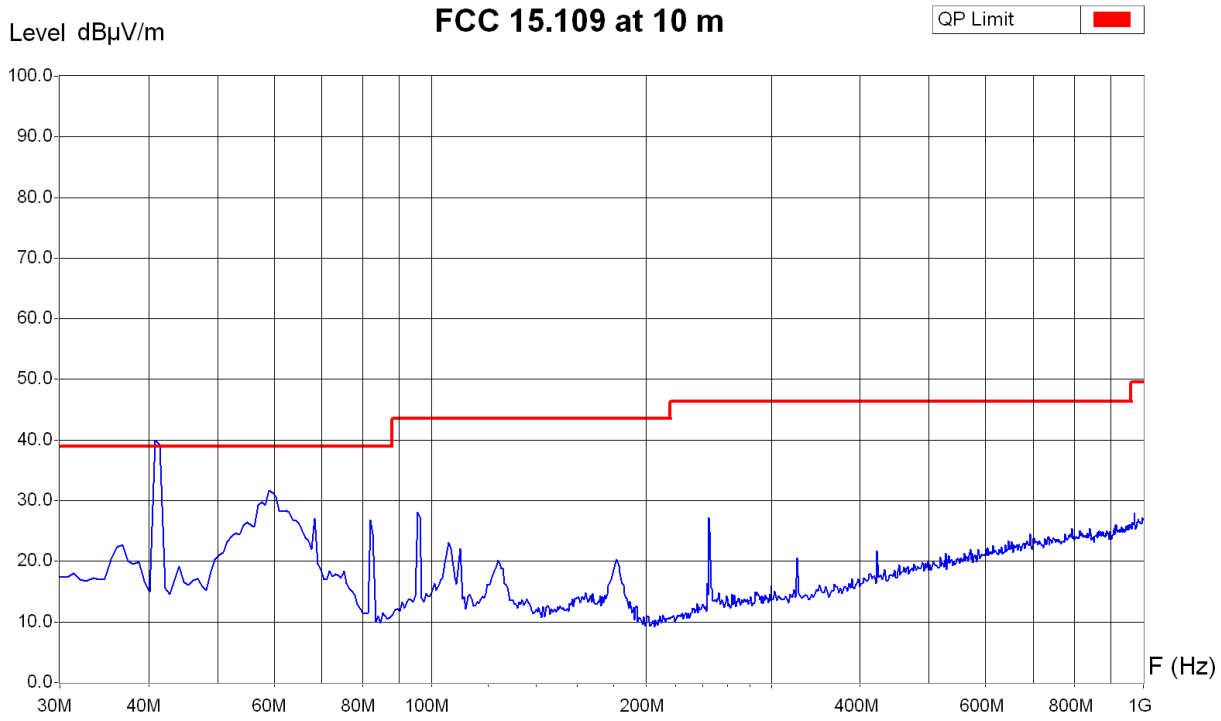
Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0 - 360 deg.
Antenna Height :	1 - 4 m
Equipment Under Test :	Bibliowand Q10600
Set-Up :	table top
Operating Conditions :	TX ON
Remarks :	quasi peak value at 40.5 MHz: 38 dBuV/m



Zone
Video Bandwidth
Resol Bandwidth
Sweep Time

Operator: PoM
Date/Time:
Filename:
rad sp ver on.png/.txt

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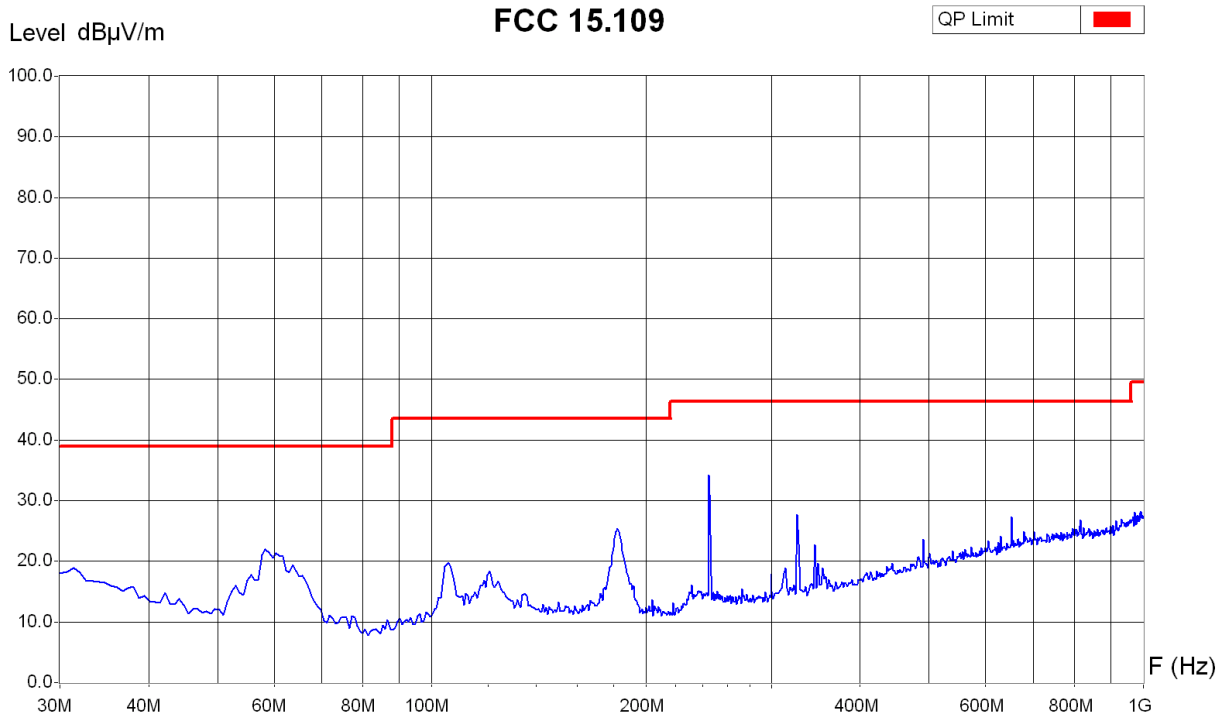
montena emc sa

Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0-360 deg.
Antenna Height :	1-4 m
Equipment Under Test :	BiblioWand Q10600
Set-Up :	table top
Operating Conditions :	TX OFF
Remarks :	

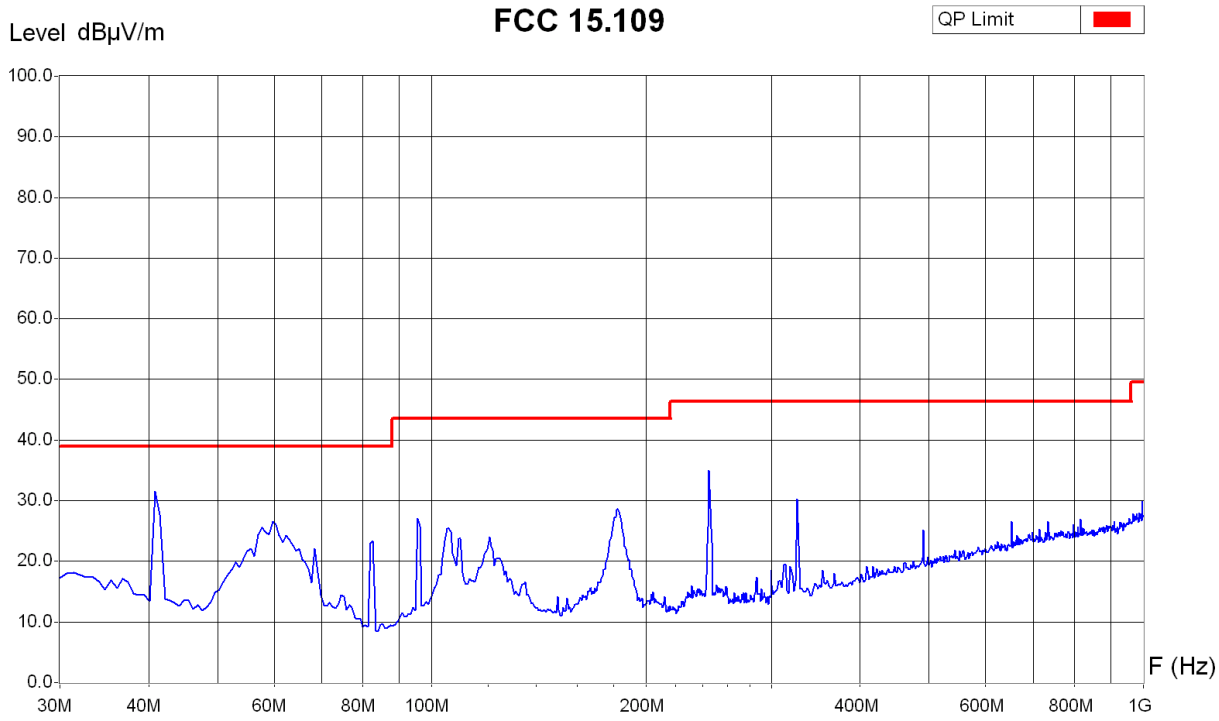


Zone
Video Bandwidth
Resol Bandwidth
Sweep Time

Operator: PoM
Date/Time: 18.06.04 09:03
Filename:
rad sp hor off.png/.txt

montena
montena emc sa

Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0-360 deg.
Antenna Height :	1-4 m
Equipment Under Test :	BiblioWand Q10600
Set-Up :	table top
Operating Conditions :	TX ON
Remarks :	



Zone
Video Bandwidth
Resol Bandwidth
Sweep Time

Operator: PoM
Date/Time: 18.06.04 09:09
Filename:
rad sp hor on.png/.txt