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Test laboratory accredited according to ISO 17025 by the Swiss Accreditation Service SAS
Laboratoire d'essai accrédité selon ISO 17025 par le Service d'accréditation suisse SAS
Prüflabor akkreditiert nach ISO 17025 durch die Schweizerische Akkreditierungsstelle SAS

Registration number
Numéro d'accréditation
Akkreditierungsnummer **STS 024**

Schweizerischer Prüfstellendienst
Service suisse d'essai
Swiss testing service

Report:	***Electromagnetic compatibility and Radio spectrum Matters***	Report no:	***13-MO-0051.12***
Product name:	***D Receivers***	Mandate no:	***13-MO-0051***
Serial no:	*- - -*	Model number:	***MLxD, ML13D***
Customer:	***Phonak Communications AG Länggasse 17 CH-3280 Murten Switzerland***	Date of test:	***January 23-29, 2013 February 7, 2013***

Standards		Result
47 CFR, Part 15	(Subpart C, Intentional radiator: §§ 15.207/209/249)	***Pass***
47 CFR, Part 2	(General rules and regulations : §§ 2.201, 2.202)	***Pass***
Industry Canada	RSS-Gen, General Requirements and Information for the Certification of Radio Apparatus	***Pass***
	RSS-210, Licence-exempt Radio Apparatus: Category I Equipment	***Pass***

Test performed by

Mr B. Itzcovich
EMC test engineer

B. Itzcovich

.....

Report prepared by

Mr B. Itzcovich
EMC test engineer

B. Itzcovich

.....

Report controlled and approved by

Mr J. Ding
EMC test engineer

D. Ding

.....

Rossens, April 18, 2013 (Issue Date) 20121101rev01

Main language : *English*

The present document results from tests on one specimen and does not prejudge to the conformity of all the manufactured products.

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Electrosuisse
Bereich Montena emc
route de Montena 75
1728 Rossens
Switzerland
phone +41 26 411 93 33
fax +41 26 411 93 30
www.montenaemc.ch
office@montenaemc.ch

Electrosuisse
Bereich Montena emc
Technopark Blumenegg
Blumeneggstrasse 50
9403 Goldach
Switzerland
phone +41 71 278 41 92
fax +41 71 278 41 93

Electrosuisse
Bereich Montena emc
Ringstrasse 10
5432 Neuenhof
Switzerland
phone +41 56 290 30 35
fax +41 56 290 38 33

Electrosuisse
Bereich Montena emc
Postfach 1315
3072 Ostermundigen
Switzerland
phone +41 79 256 21 55

Contents

Foreword

According to Phonak Communications AG, the same electronic board is implemented in six types of housings: inside an additional plug-in module (MLxD, to be connected to the battery holder of hearing aids), or directly inside the battery holder of hearing aids (see § 5.2). Therefore, we chose to test 2 representative types of modules, the MLxD (with Ambra SP/AS13 hearing aid), and the ML13D (with Ambra SP hearing aid) that cover all types of existing modules. The occupied bandwith measurements (§ 7.4) have been performed on the electronic board without housing, fitted with temporary antenna connector and power supply connector.

1. Summary of test results (FCC / Canada)

§	Test Type		Result
7	**Emission**		***CFR 47 Part 15 Sub C Industry Canada***
-	Conducted emission	CFR 47 § 15.207 RSS-Gen Table 4	***Not applicable*** [1]
7.1	Radiated emission – Carrier	CFR 47 § 15.249 RSS-210 § A2.9	***Pass***
7.2 7.3	Radiated emission – Transmit mode	CFR 47 § 15.209 RSS-Gen Table 5	***Pass***
7.2 7.3	Radiated emission – Receive mode	CFR 47 § 15.109 RSS-Gen Table2	***Pass***
7	**Emission**		***CFR 47 Part 2 Sub C***
7.4	Designation of emission	FCC 47 §2.201 FCC 47 §2.202	***2M00FXD***

1. Powered with : 1.2VDC battery, no cable

2. Applied standards

47 CFR Part 2	Code of Federal Regulations - Title 47 - Telecommunication, Part 2 – Frequency allocations and radio treaty matters; General rules and regulations
47 CFR Part 15 Subpart C	Code of Federal Regulations - Title 47 - Telecommunication, Part 15, Subpart C: "Intentional Radiators"
RSS-Gen issue 3, December 2010	Spectrum Management and Telecommunications - Radio Standards Specification General Requirements and Information for the Certification of Radio Apparatus
RSS-210 issue 8, December 2010	Spectrum Management and Telecommunications - Radio Standards Specification Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

3. Abbreviations

Electromagnetic compatibility and radio spectrum matters:

AC	Alternating current
AFA	Adaptive Frequency Agility
AM	Amplitude Modulation
AV	Average
BW	Bandwidth
CDN	Coupling Decoupling Network
CW	Continuous Wave
d(t)	Relative voltage change characteristic
DAA	Detect And Avoid spectrum access technique
dB	Decibel
dBi	gain in decibels relative to an isotropic antenna
DC	Direct current
DL	Downlink
dmax	Maximum relative voltage change
DSSS	Direct Sequence Spread Spectrum
e.i.r.p.	equivalent isotropic radiated power
EMC	ElectroMagnetic Compatibility
ERC	European Radiocommunication Committee
ESD	Electro Static Discharge
EUT	Equipment under Test
FHSS	Frequency Hopping Spread Spectrum
GBSAR	Ground Based Synthetic Aperture Radar
GRP	Ground reference plane
GTEM	Gigahertz Transverse ElectroMagnetic cell
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ISM	Industrial Scientific Medical (frequency band)
ITU-R	International Telecommunications Union, Radio Sector
ITU-T	International Telecommunications Union, Telecommunications Sector
L1,L2,L3	Phase
LBT	Listen Before Talk
LISN	Line impedance substitution network
MDS	Absorbing measuring clamp
MU	Master Unit
N	Neutral
NNB	Line impedance substitution network
NRI	National Radio Interfaces
PE	Protective earth
PK	Peak
Plt	Long-term flicker indicator
PM	Pulse Modulation
Pst	Short-term flicker Indicator
R&TTE	Radio and Telecommunications Terminal Equipment
RF	Radio Frequency
RFID	Radio Frequency Identification
RU	Remote Unit
SCU	System Control Unit
SF-CW	Step Frequency Continuous Wave (spread spectrum)
SND/ND	Signal + Noise + Distortion divided by Noise + Distortion
SRD	Short Range Device
TEM	Transverse ElectroMagnetic cell
TETRA	Terrestrial Trunked Radio
Tx	Transmitter
UL	Uplink
UWB	Ultra Wide Band
VSWR	Voltage Standing Wave Ratio

General vocabulary: http://www.electropedia.com

4. Client

Client name and address	*Phonak Communications AG* *Länggasse 17* *CH-3280 Murten* *Switzerland*
Contact Person	*Mr Thomas Meier*
Telephone	*+41 26 672 92 84*
Fax	*+41 26 672 93 80*
E-mail	*Thomas.Meier@phonak.com*
Mandate no	*13-MO-0051*

5. Equipment under test

5.1 Identification

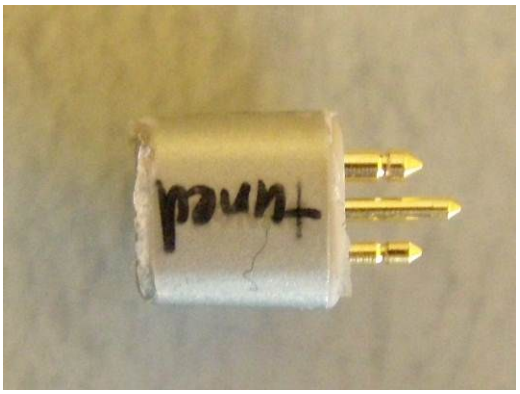
Manufacturer name and address	*Phonak Communications AG* *Länggasse 17* *CH-3280 Murten* *Switzerland*
Production country	*Vietnam*
Brand name	*Phonak*
Product name	*D Receivers*
Product description	*2.4 GHz tranceiver*
Model number	*MLxD, ML13D*
Serial no	*- - -*
Software version	*Test Software AQS V8041*
Highest frequency	*2.48 GHz*
Supply	*Battery: U = 1.2 VDC / I = 3 mA / P = 4 mW*
Dimension	*~ 12 mm x 9 mm x 24 mm (l x w x h)*
Weight	*~ 1 g*
Technical documentation	*None. The equipment is completely identified by the above-mentioned information. Phonak Communications AG assures the traceability of the documentation and is responsible for the product identification.*

5.2 Product family

Tested equipement	**Covered versions**	**Explanation***
ML13D *(electronic board implemented inside battery holder of Ambra SP hearing aid)*	ML10D	*Same electronic implemented inside battery holder of Naida IX UP hearing aid*
	ML11D	*Same electronic implemented inside battery holder of Naida IX SP hearing aid*
	ML15D	*Same electronic implemented inside battery holder of Ambra M H2O hearing aid*
	ML16D	*Same electronic implemented inside battery holder of Bolero hearing aid*

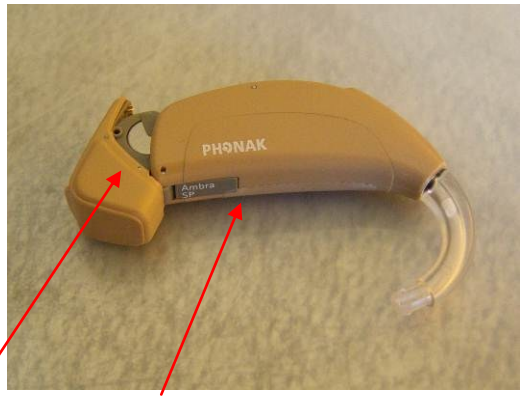
*) According information of Phonak Communications AG and not verified by montena emc sa

5.3 Pictures of the EUT

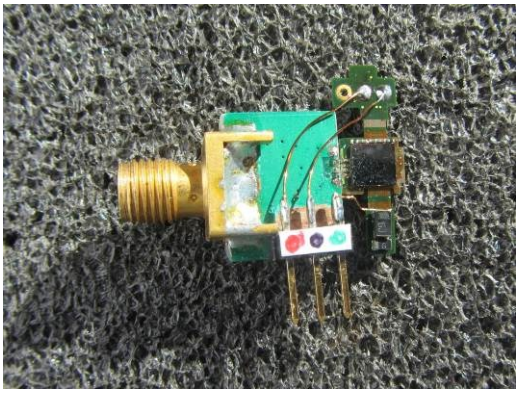


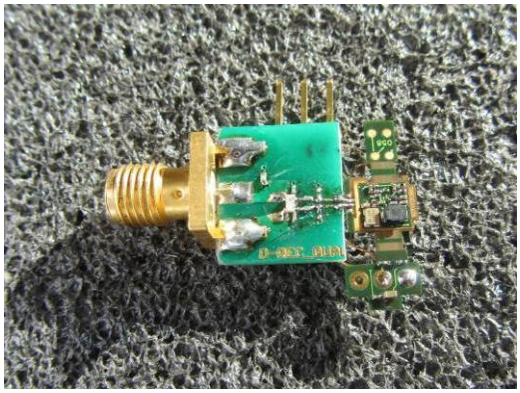
MLxD

MLxD plugged onto battery holder of Ambra SP/AS13 hearing aid



ML13D implemented inside battery holder of Ambra SP heraring aid





Electronic board with termporary antenna & supply connectors (for § 7.4 test)

5.4 Classification

CFR 47 Part 15	☐ Unintentional radiator (Subpart B) ☐ Class A digital device ☐ Class B digital device ☐ The highest frequency of the internal sources of the EUT is less than 108 MHz (measurement shall be made up to 1 GHz). ☐ The highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz (measurement shall be made up to 2 GHz). ☐ The highest frequency of the internal sources of the EUT is between 500 MHz and 1 GHz (measurement shall be made up to 5 GHz). ☐ The highest frequency of the internal sources of the EUT is above 1 GHz (measurement shall be made up to 5 times the highest frequency or 40 GHz, whichever is lower). ☒ Intentional radiator (Subpart C) ☒ The highest fundamental frequency of the EUT is less than 10 GHz (measurement shall be made up to the tenth harmonic or 40 GHz, whichever is lower). ☐ The highest fundamental frequency of the EUT is between 10 GHz and 30 GHz (measurement shall be made up to the fifth harmonic or 100 GHz, whichever is lower). ☐ The highest fundamental frequency of the EUT is above 30 GHz (measurement shall be made up to the fifth harmonic or 200 GHz, whichever is lower).

5.5 Ports

None

6. Test conditions

6.1 Climatic conditions, location and date

Location:	Date:	Temp	Pressure [QFF]:	Rel. humidity:
montena emc sa 1728 Rossens Switzerland	*January 23-29, 2013 February 7, 2013*	*20-23 °C*	*1000 – 1040 hPa*	*35-50 %*

6.2 Test facility and methodology

The alternate test site (ferrite chamber) is accepted by FCC (Reg. No. 90808).
Conducted and radiated measurements are performed according to the ANSI C63.4 (2003) procedure.
The open area test site is accepted by Industry Canada (Site number 3625A-1).

6.3 Attendant persons

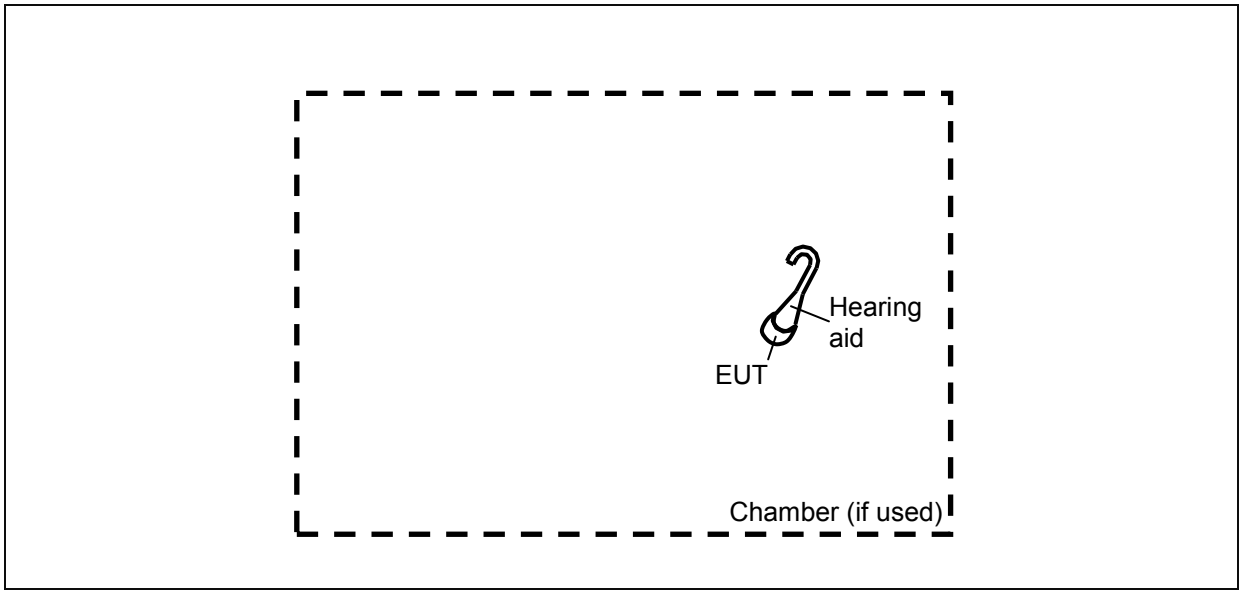
Test Engineer(s):

Mr B. Itzcovich
EMC test engineer

Other(s):

Name	Company
Mr F. Callias (partially)	*Phonak Communications AG*
Mr Y. Oesch (partially)	*Phonak Communications AG*
Mr T. Meier (partially)	*Phonak Communications AG*

6.4 Test configuration



6.5 Operating conditions

If not stated otherwise in § 7 :

- *Power supply: 1.2VDC battery*
- *Transceiver frequency: 2.44 GHz*
- *Emission power: maximum level (modulated)*

6.6 Auxiliary equipment

The following pieces of equipment are used for the monitoring of the EUT or are necessary for the EUT but they are not part of the EUT.

Product	Brand	Model No.	ID	Remark
Ambra SP/AS13	*Phonak*	*- - -*	*- - -*	*Hearing aid with battery holder for MLxD*
Ambra SP	*Phonak*	*- - -*	*- - -*	*Hearing aid with battery holder for ML13D*

Pictures : see §5.3

7. Emission tests

7.1 Carrier - Radiated emission

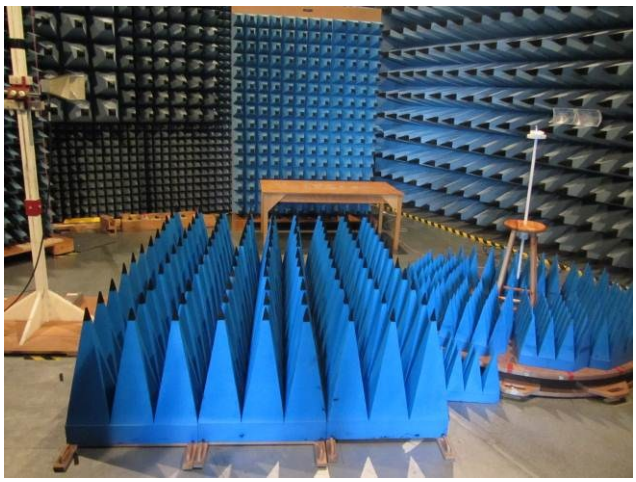
Test site:	☐ anechoic chamber (ferrites)		☐ open test site	
	☒ anechoic chamber (foam)		☐	
Meas. distance:	☐ 1 m	☒ 3 m	☐ 10 m	☐ 30 m

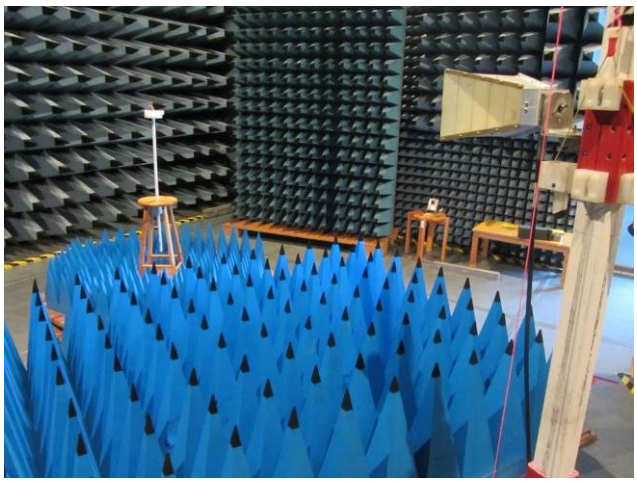
Meas. uncertainty: ± 4.7 dB

Position of EUT: *1.5 m* (height above floor of equipment under test)

Measuring method: The carrier radiated by the equipment is measured using a spectrum analyser and a wide band antenna. The antenna is placed at the same height as the EUT 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 disturbances 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: Limit values expressed in dBµV/m and transformed to a measuring distance of 1m (factor used = 20 dB/decade) if necessary
e.g.: for f = 2.43GHz the limit is 50mV/m at 3m (average detector);

$$20\log\left(\frac{50\frac{mV}{m}}{1\frac{\mu V}{m}}\right)=94\frac{dB\mu V}{m}\ at\ 3m$$

Test equipment:

Spectrum analyser	☐ 88-14	☐ 02-06	☐ 03-45	☐ 05-39	☒ 07-53	☐ 10-70	
Receiver	☐ 94-35	☐ 04-29	☐ 10-70				
Preamplifier	☐ 90-01	☐ 95-86	☐ 05-56	☐ 05-59	☐ 05-62	☐ 05-87	☒ 11-29
Antenna (horn)	☒ 90-24	☐ 98-12	☐ 98-13	☐ 07-31			
Cables	☒ 06-00	☐ 06-01					

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

Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0° - 360° (0° is worst case - front side)
Antenna Height :	1 - 2.5 m (1.5m is worst case)
Equipment Under Test :	D-Receiver MLXD
Set-Up :	See photos
Operating Conditions :	TX 2.402 GHZ (Ton = 0.184ms, T = 5.41ms)
Remarks :	Carrier peak detector sweep, ST = 30 s Cage 06-00

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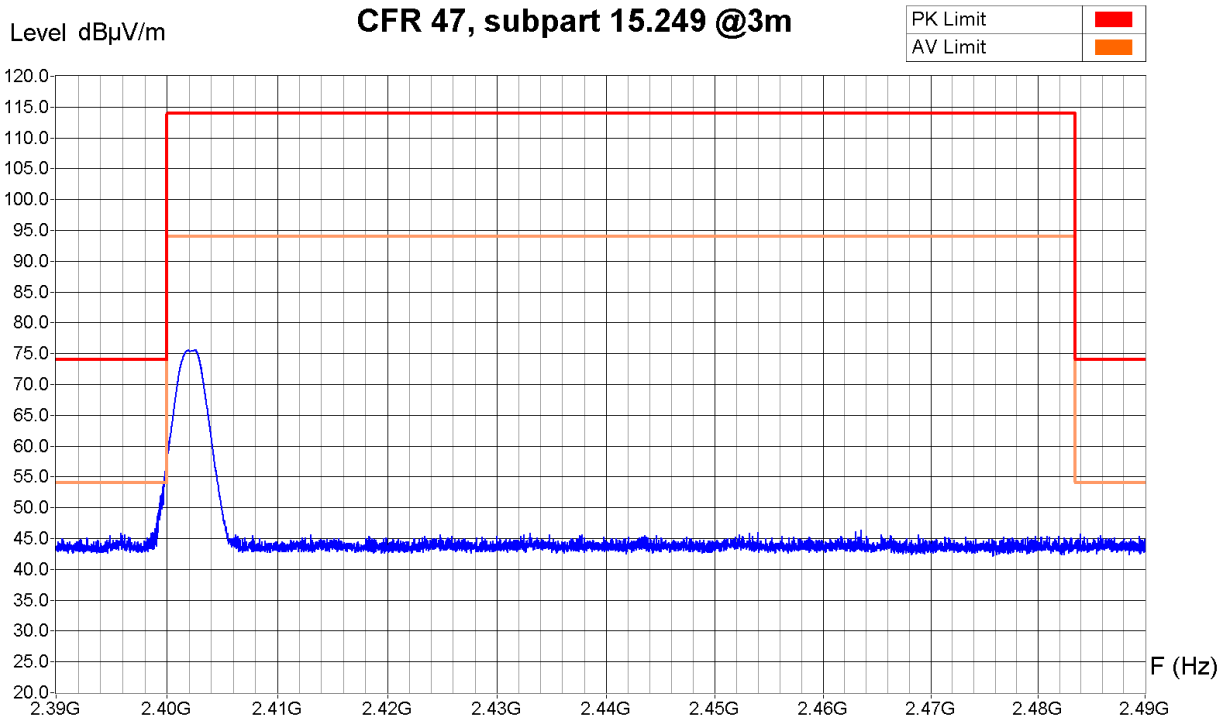

Zone	2.39 GHz - 2.49
Video Bandwidth	1 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 07.02.2013 15:50
Filename: 51_MLXD_TX2402_H_carrier_1MHz.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0° - 360° (0° is worst case - front side)
Antenna Height :	1 - 2.5 m (1.5m is worst case)

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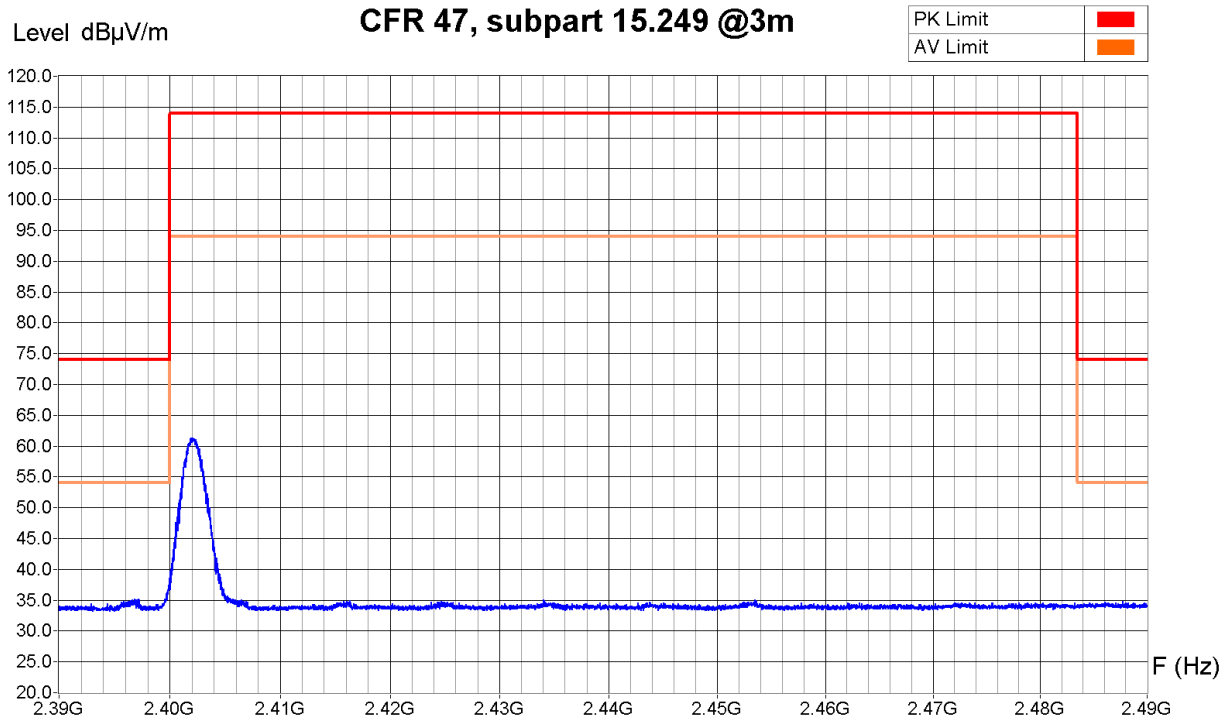
Equipment Under Test :	D-Receiver MLXD
Set-Up :	See photos
Operating Conditions :	TX 2.402 GHZ (Ton = 0.184ms, T = 5.41ms)
Remarks :	Carrier average RMS power detector sweep, ST = 30 s (7001 points) Cage 06-00



Zone	2.39 GHz - 2.49
Video Bandwidth	3 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 07.02.2013 15:53
Filename: 51b_MLXD_TX2402_H_carrier_AVG.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0° - 360° (90° is worst case - right side)
Antenna Height :	1 - 2 m (1.5m is worst case)
Equipment Under Test :	D-Receiver MLXD
Set-Up :	See photos
Operating Conditions :	TX 2.402 GHZ (Ton = 0.184ms, T = 5.41ms)
Remarks :	Carrier peak detector sweep, ST = 30 s Cage 06-00

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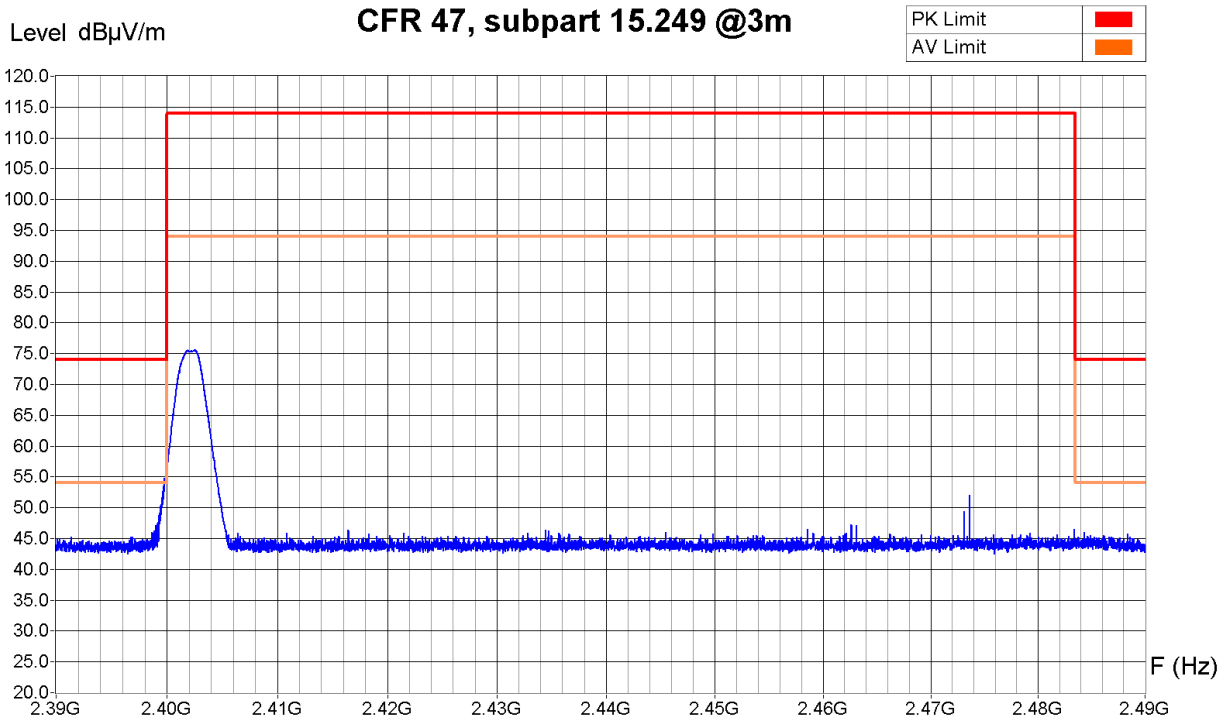

Zone	2.39 GHz - 2.49
Video Bandwidth	1 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 07.02.2013 11:55
Filename: 52_MLXD_TX2402_V_carrier-1MHz.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0° - 360° (270° is worst case - left side)
Antenna Height :	1 - 2 m (1.5m is worst case)

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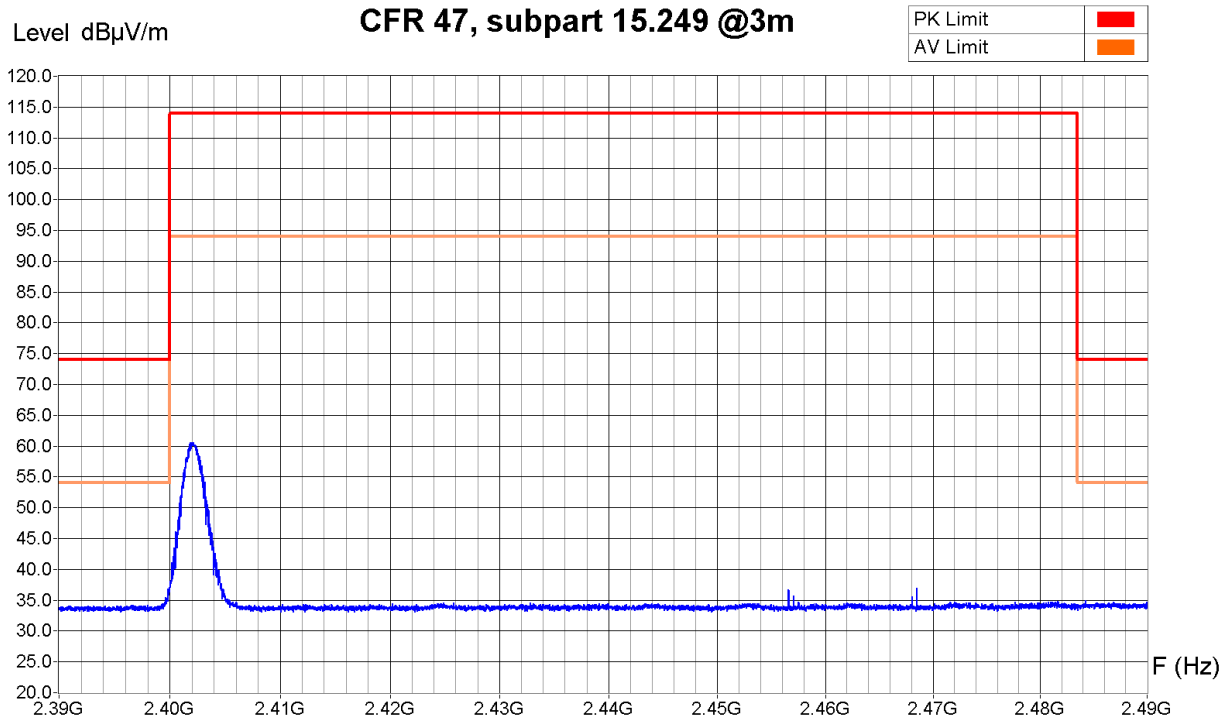
Equipment Under Test :	D-Receiver MLXD
Set-Up :	See photos
Operating Conditions :	TX 2.402 GHZ (Ton = 0.184ms, T = 5.41ms)
Remarks :	Carrier average RMS power detector sweep, ST = 30 s (7001 points) Cage 06-00



Zone	2.39 GHz - 2.49
Video Bandwidth	3 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 07.02.2013 13:53
Filename: 52b_MLXD_TX2402_V_carrier_AVG.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0° - 360° (0° is worst case - front side)
Antenna Height :	1 - 2.5 m (1.5m is worst case)
Equipment Under Test :	D-Receiver MLXD
Set-Up :	See photos
Operating Conditions :	TX 2.440 GHZ (Ton = 0.184ms, T = 5.41ms)
Remarks :	Carrier peak detector sweep, ST = 30 s Cage 06-00

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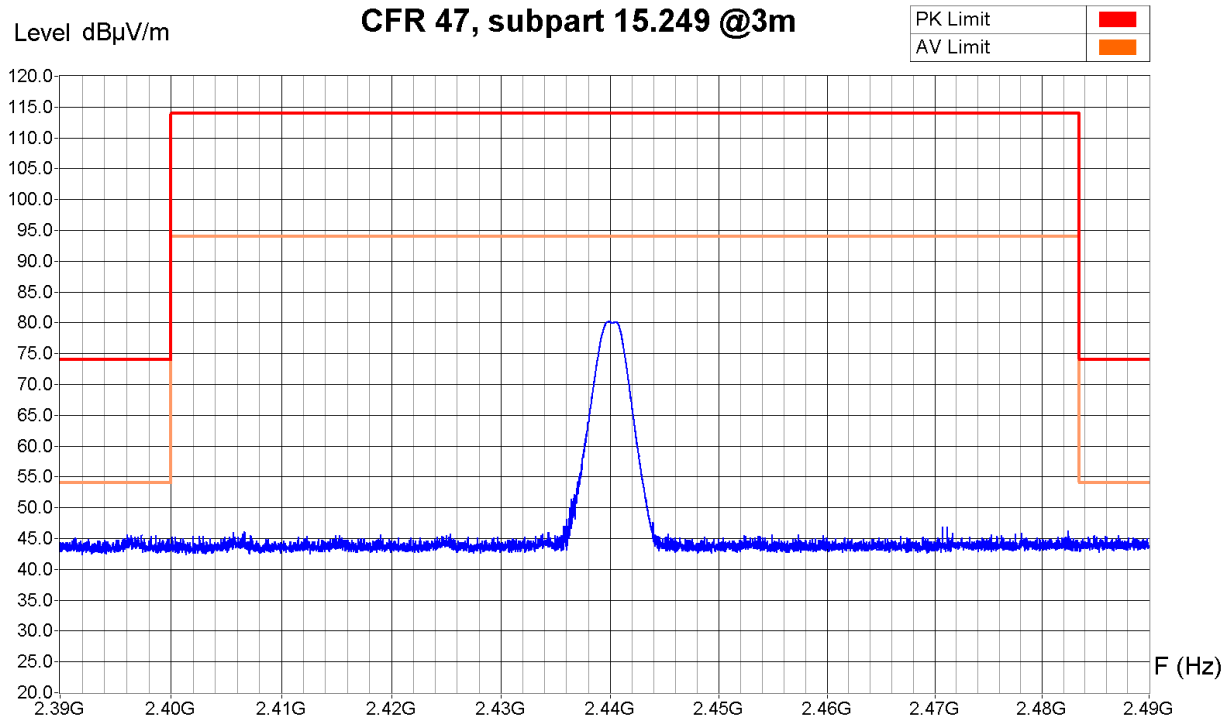
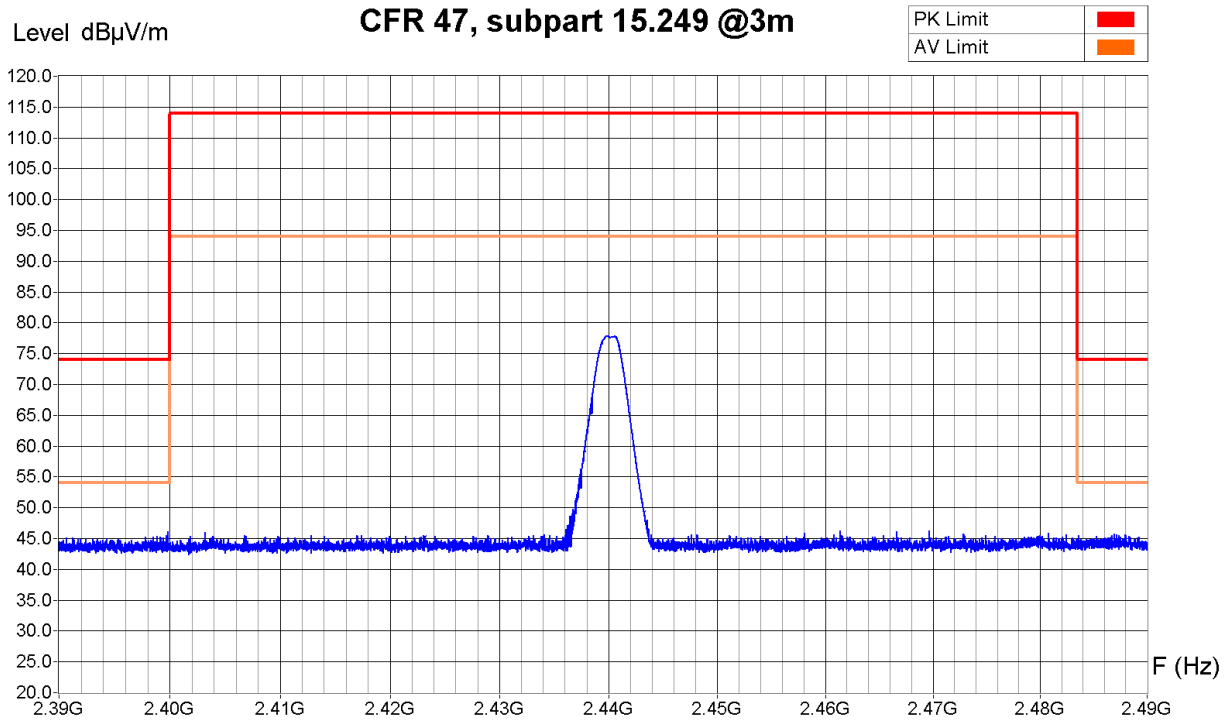


Zone	2.39 GHz - 2.49
Video Bandwidth	1 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 07.02.2013 15:57
Filename: 51c_MLXD_TX2440_H_carrier_1MHz.png/.txt

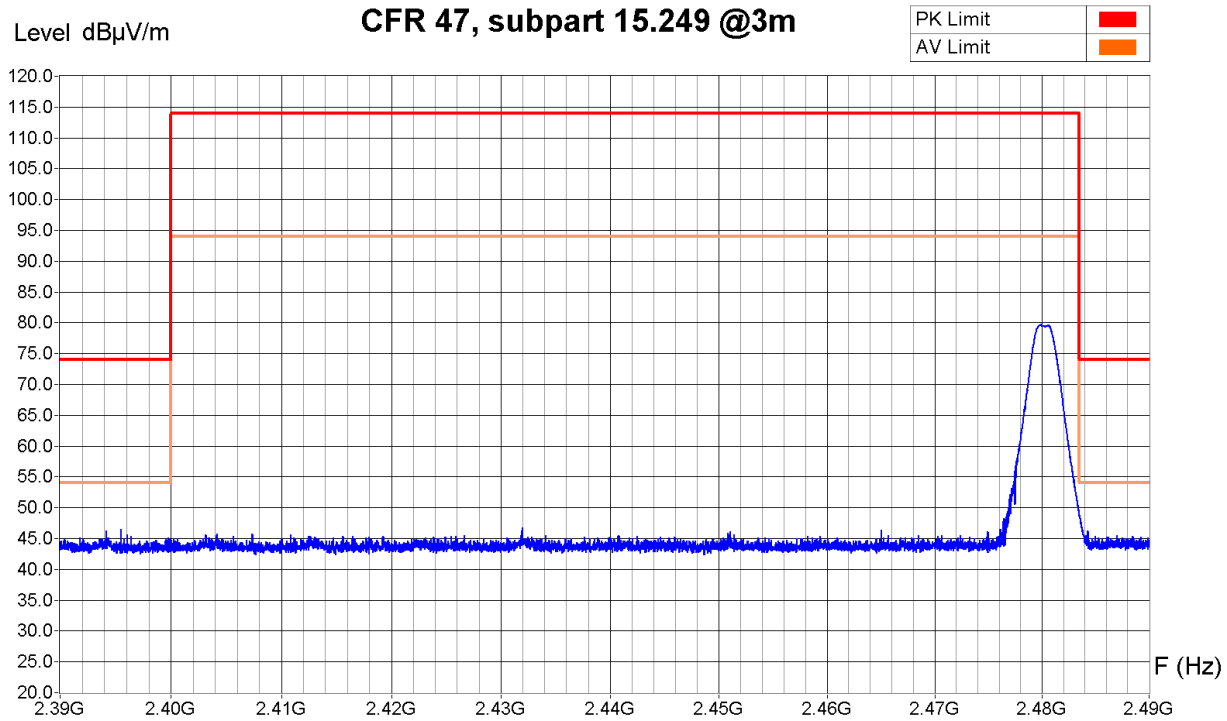
Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0° - 360° (270° is worst case - left side)
Antenna Height :	1 - 2 m (1.5m is worst case)
Equipment Under Test :	D-Receiver MLXD
Set-Up :	See photos
Operating Conditions :	TX 2.440 GHZ (Ton = 0.184ms, T = 5.41ms)
Remarks :	Carrier
	Peak detector sweep, ST = 30 s
	Cage 06-00



Zone	2.39 GHz - 2.49
Video Bandwidth	1 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 07.02.2013 14:02
Filename: 52c_MLXD_TX2440_V_carrier-1MHz.png/.txt

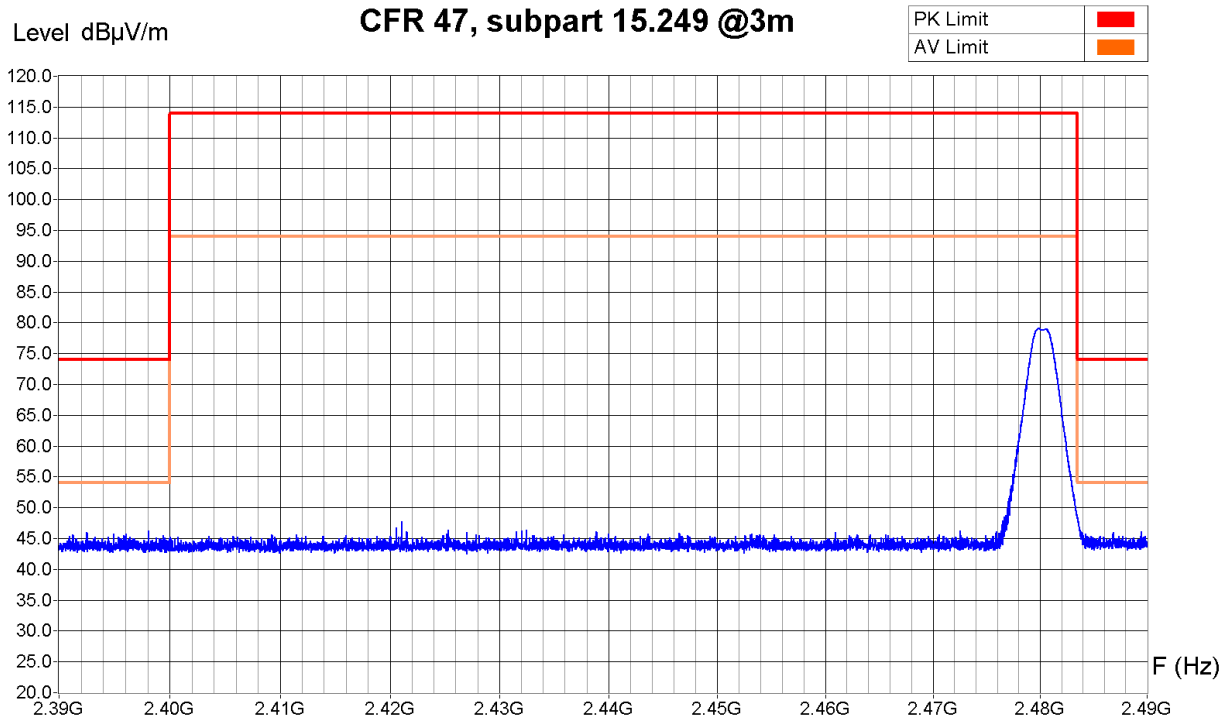
Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0° - 360° (0° is worst case - front side)
Antenna Height :	1 - 2.5 m (1.5m is worst case)
Equipment Under Test :	D-Receiver MLXD
Set-Up :	See photos
Operating Conditions :	TX 2.480 GHZ (Ton = 0.184ms, T = 5.41ms)
Remarks :	Carrier peak detector sweep, ST = 30 s Cage 06-00



Zone	2.39 GHz - 2.49
Video Bandwidth	1 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 07.02.2013 16:00
Filename: 54_MLXD_TX2480_H_carrier_1MHz.png/.txt

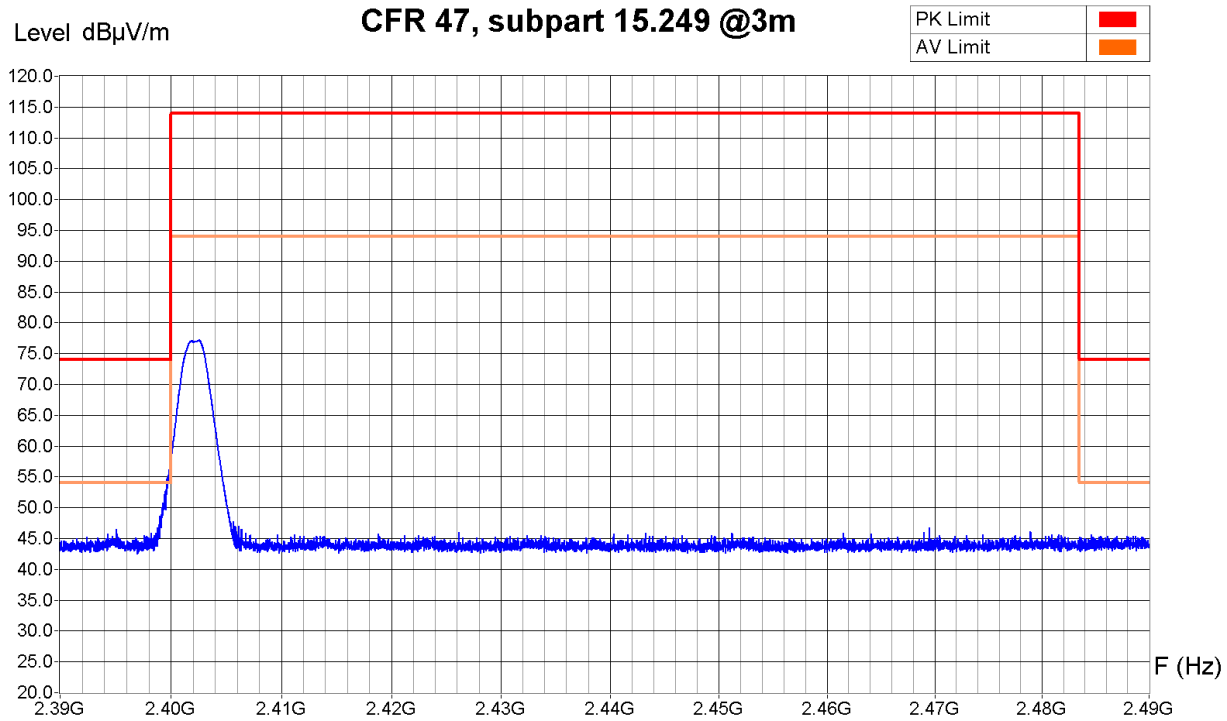
Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0° - 360° (270° is worst case - left side)
Antenna Height :	1 - 2 m (1.5m is worst case)
Equipment Under Test :	D-Receiver MLXD
Set-Up :	See photos
Operating Conditions :	TX 2.480 GHZ (Ton = 0.184ms, T = 5.41ms)
Remarks :	Carrier peak detector sweep, ST = 30 s Cage 06-00



Zone	2.39 GHz - 2.49
Video Bandwidth	1 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 07.02.2013 12:13
Filename: 53_MLXD_TX2480_V_carrier-1MHz.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0° - 360° (0° is worst case - front side)
Antenna Height :	1 - 2.5 m (1.5m is worst case)
Equipment Under Test :	D-Receiver ML13D
Set-Up :	See photos
Operating Conditions :	TX 2.402 GHZ (Ton = 0.184ms, T = 5.41ms)
Remarks :	Carrier peak detector sweep, ST = 30 s Cage 06-00



Zone	2.39 GHz - 2.49
Video Bandwidth	1 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 07.02.2013 15:37
Filename: 56_ML13D_TX2402_H_carrier-1MHz.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0° - 360° (0° is worst case - front side)
Antenna Height :	1 - 2.5 m (1.5m is worst case)

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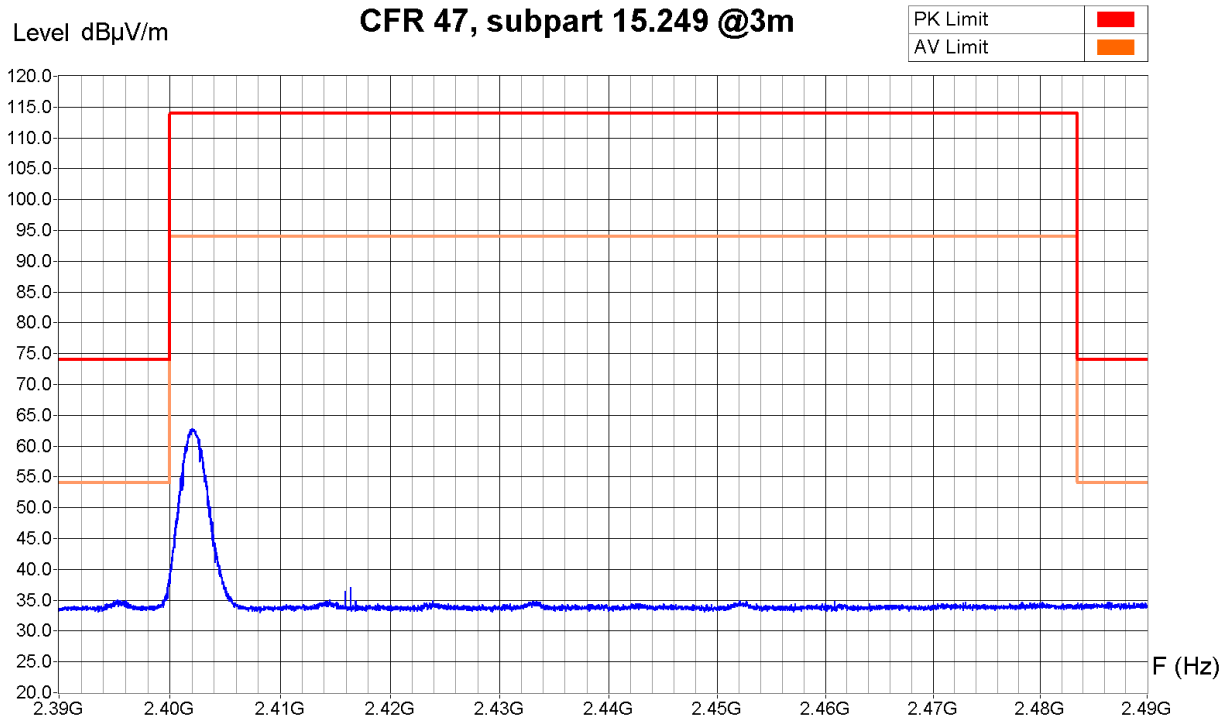
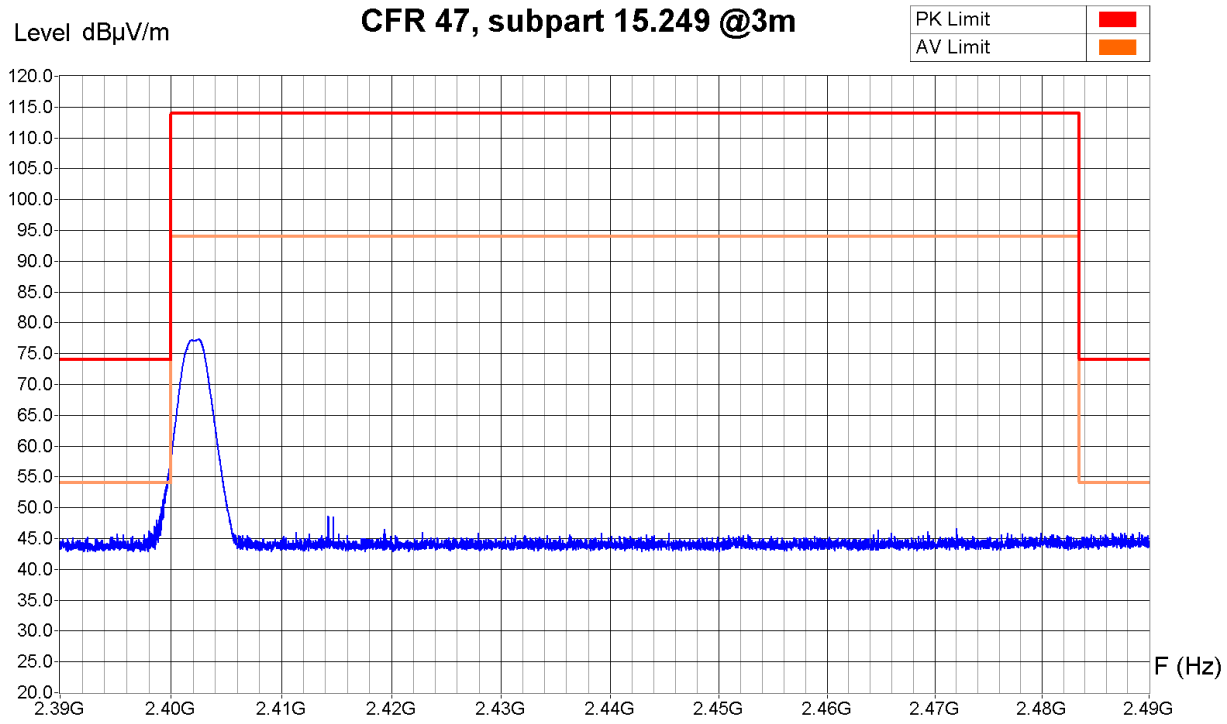
Equipment Under Test :	D-Receiver ML13D
Set-Up :	See photos
Operating Conditions :	TX 2.402 GHZ (Ton = 0.184ms, T = 5.41ms)
Remarks :	Carrier average RMS power detector sweep, ST = 30 s (7001 points) Cage 06-00



Zone	2.39 GHz - 2.49
Video Bandwidth	3 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 07.02.2013 15:41
Filename: 56b_ML13D_TX2402_H_carrier-AVG.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0° - 360° (90° is worst case - right side)
Antenna Height :	1 - 2 m (1.5m is worst case)
Equipment Under Test :	D-Receiver ML13D
Set-Up :	See photos
Operating Conditions :	TX 2.402 GHZ (Ton = 0.184ms, T = 5.41ms)
Remarks :	Carrier peak detector sweep, ST = 30 s Cage 06-00



Zone	2.39 GHz - 2.49
Video Bandwidth	1 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 07.02.2013 14:12
Filename: 55_ML13D_TX2402_V_carrier-1MHz.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0° - 360° (90° is worst case - right side)
Antenna Height :	1 - 2 m (1.5m is worst case)

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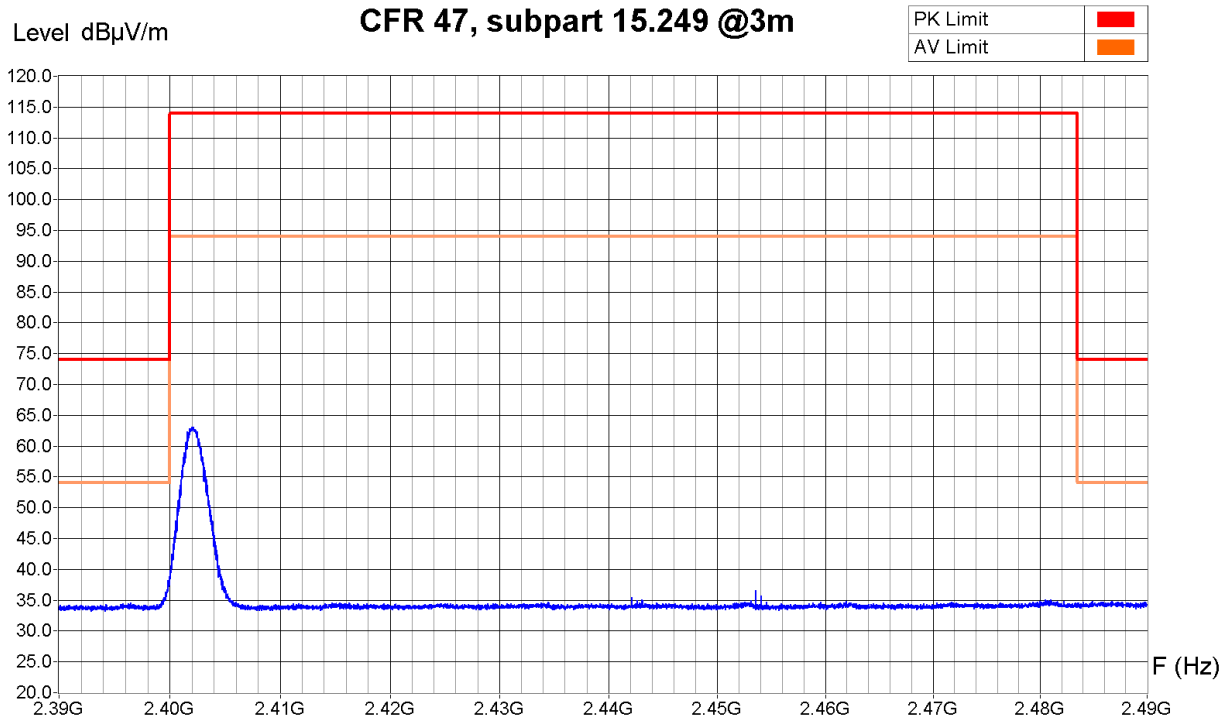
Equipment Under Test :	D-Receiver ML13D
Set-Up :	See photos
Operating Conditions :	TX 2.402 GHZ (Ton = 0.184ms, T = 5.41ms)
Remarks :	Carrier average RMS power detector sweep, ST = 30 s (7001 points) Cage 06-00



Zone	2.39 GHz - 2.49
Video Bandwidth	3 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 07.02.2013 14:22
Filename: 55b_ML13D_TX2402_V_carrier-AVG.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0° - 360° (0° is worst case - front side)
Antenna Height :	1 - 2.5 m (1.5m is worst case)
Equipment Under Test :	D-Receiver ML13D
Set-Up :	See photos
Operating Conditions :	TX 2.440 GHZ (Ton = 0.184ms, T = 5.41ms)
Remarks :	Carrier peak detector sweep, ST = 30 s Cage 06-00

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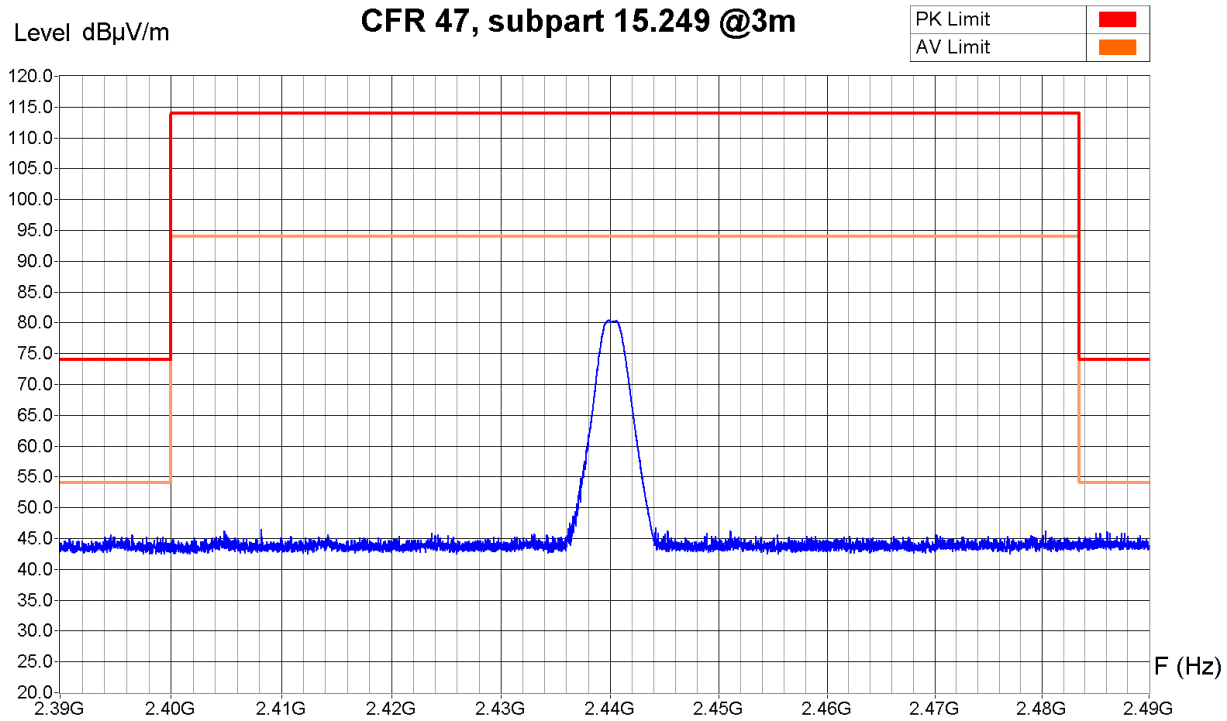
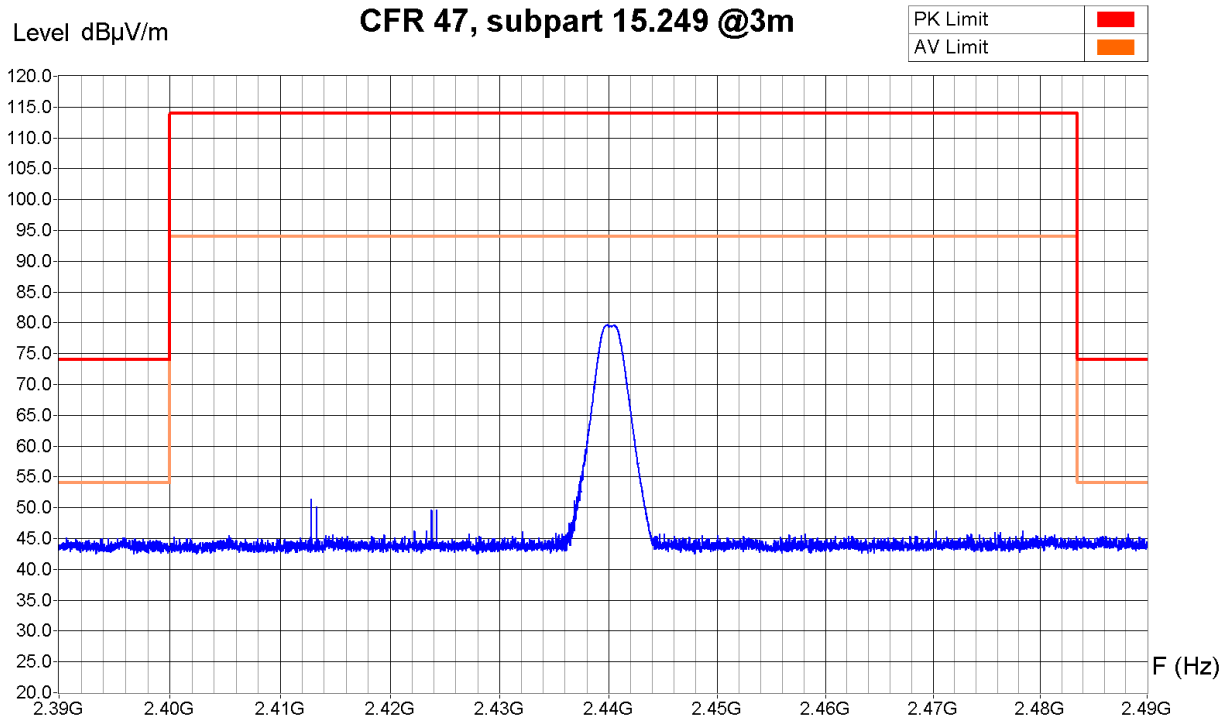


Zone	2.39 GHz - 2.49
Video Bandwidth	1 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 07.02.2013 15:32
Filename: 56c_ML13D_TX2440_H_carrier-1MHz.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0° - 360° (90° is worst case - right side)
Antenna Height :	1 - 2 m (1.5m is worst case)
Equipment Under Test :	D-Receiver ML13D
Set-Up :	See photos
Operating Conditions :	TX 2.440 GHZ (Ton = 0.184ms, T = 5.41ms)
Remarks :	Carrier peak detector sweep, ST = 30 s Cage 06-00



Zone	2.39 GHz - 2.49
Video Bandwidth	1 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 07.02.2013 14:31
Filename: 55c_ML13D_TX2440_V_carrier-1MHz.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0° - 360° (0° is worst case - front side)
Antenna Height :	1 - 2.5 m (1.5m is worst case)
Equipment Under Test :	D-Receiver ML13D
Set-Up :	See photos
Operating Conditions :	TX 2.480 GHZ (Ton = 0.184ms, T = 5.41ms)
Remarks :	Carrier peak detector sweep, ST = 30 s Cage 06-00

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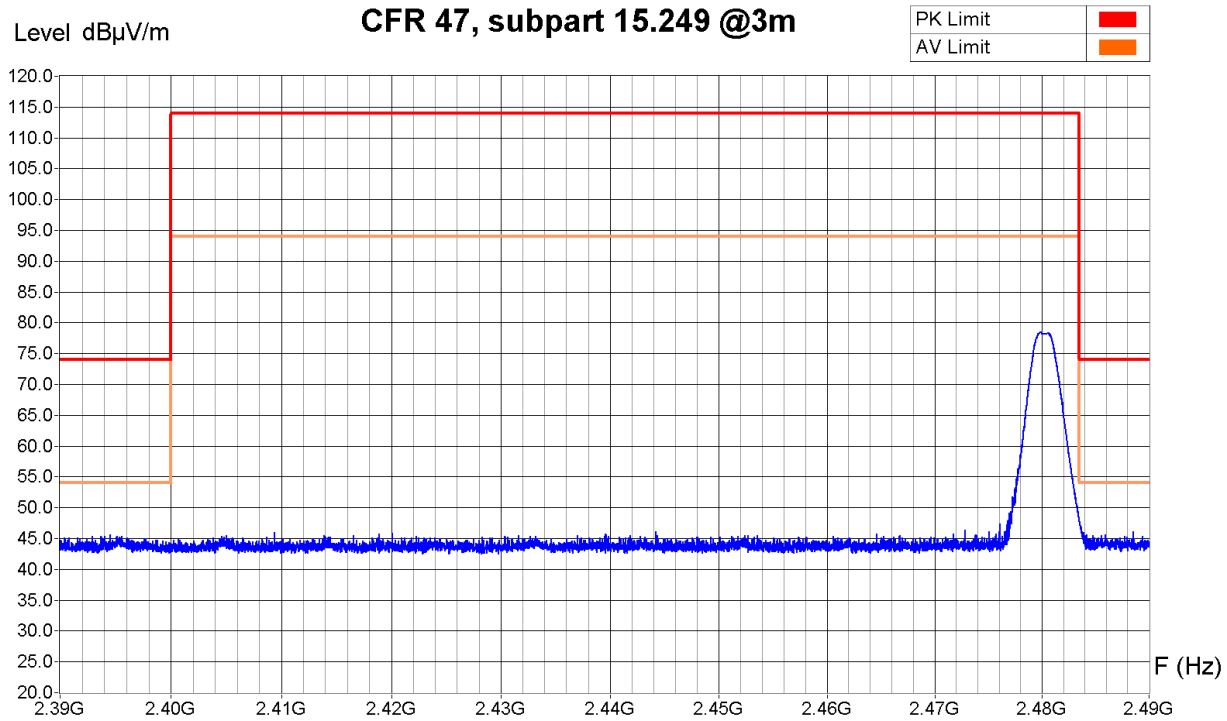
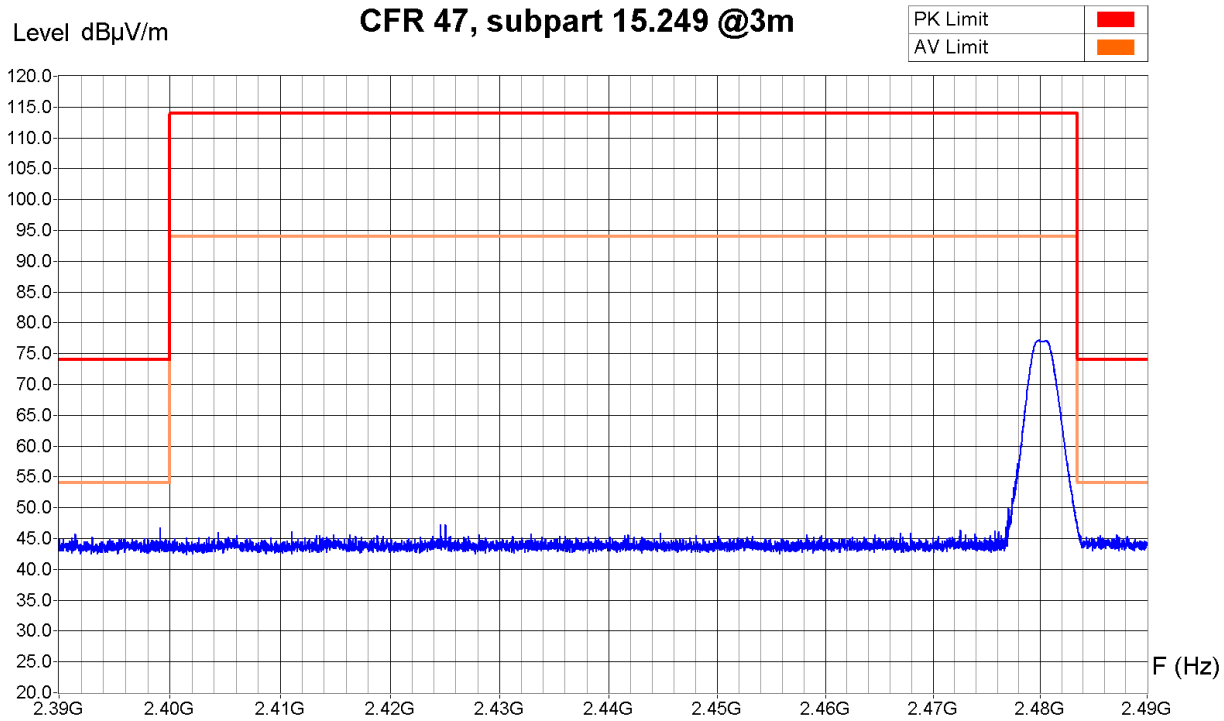


Zone	2.39 GHz - 2.49
Video Bandwidth	1 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 07.02.2013 15:18
Filename: 58_ML13D_TX2480_H_carrier-1MHz.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0° - 360° (270° is worst case - left side)
Antenna Height :	1 - 2 m (1.5m is worst case)
Equipment Under Test :	D-Receiver ML13D
Set-Up :	See photos
Operating Conditions :	TX 2.480 GHZ (Ton = 0.184ms, T = 5.41ms)
Remarks :	Carrier peak detector sweep, ST = 30 s Cage 06-00



Zone	2.39 GHz - 2.49
Video Bandwidth	1 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 07.02.2013 14:37
Filename: 57_ML13D_TX2480_V_carrier_1MHz.png/.txt

7.2 Radiated electromagnetic field (30 MHz to 1 GHz)

Test site: ☒ anechoic chamber (ferrites) ☐ anechoic chamber (foam)
☐ semi-anechoic chamber (hybrid) ☐ laboratory

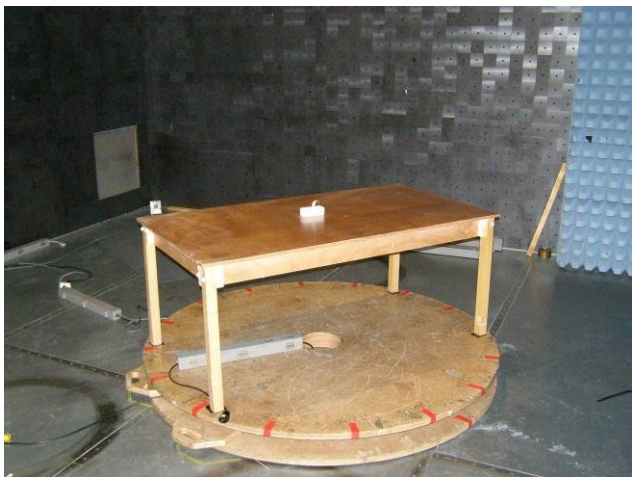
Distance: ☒ 3 m ☐ 10 m ☐ 30m

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

Meas. uncertainty: ± 4.6 dB

Measuring 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 disturbances 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:
- *Max. power*
- *Special communication test mode*
- *modulated*

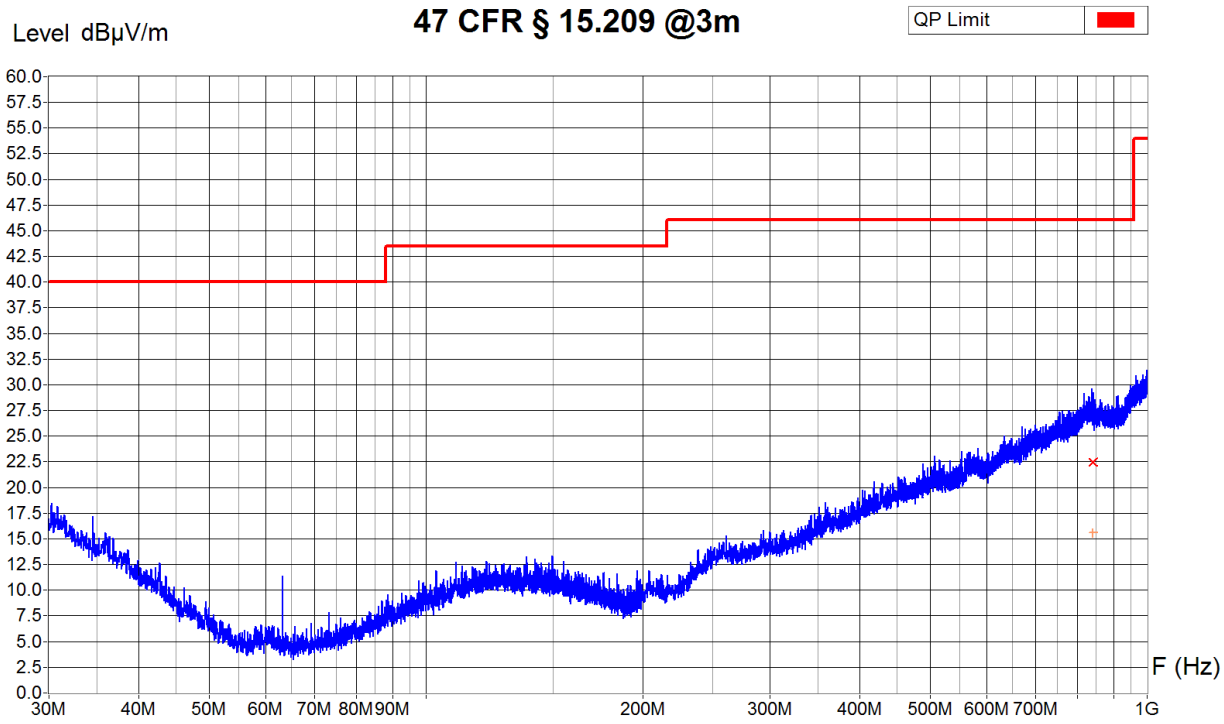
Test equipment:

Spectrum analyser	☐ 88-14	☐ 94-24	☐ 02-06	☐ 03-45	☐ 05-39	☐ 07-53	☒ 10-70
Receiver	☐ 94-35	☐ 04-29	☒ 10-70				
Preamplifier	☐ 90-01	☐ 95-86	☐ 05-56	☒ 05-59	☐ 05-62	☐ 05-87	
Antenna (bilog)	☒ 94-03	☐ 05-38					
Substitution antenna	☐ 89-01						
Cables	☐ 06-00	☒ 06-01					

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

7.2.1 Transmit mode

Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0 - 360 °
Antenna Height :	1 - 4m
Equipment Under Test :	D-Receiver MLxD
Set-Up :	See photos
Operating Conditions :	TX 2.402 GHZ
Remarks :	Max. power, modulated
	Cage 06-01



Zone	25 MHz - 199 MHz	199 MHz - 1 GHz
Video Bandwidth	300 KHz	300 KHz
Resol Bandwidth	100 KHz	100 KHz

Receiver Measures

Frequency	Peak	QuasiPeak (x)	Average (+)	QP Margin
841.50 MHz	28.3 dBµV/m	22.5 dBµV/m	15.6 dBµV/m	18.5 dB

Operator: B. Itzcovich
Date/Time: 23.01.2013 09:50
Filename: 01_MLXD_TX2402_V_FCC.png/.txt

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

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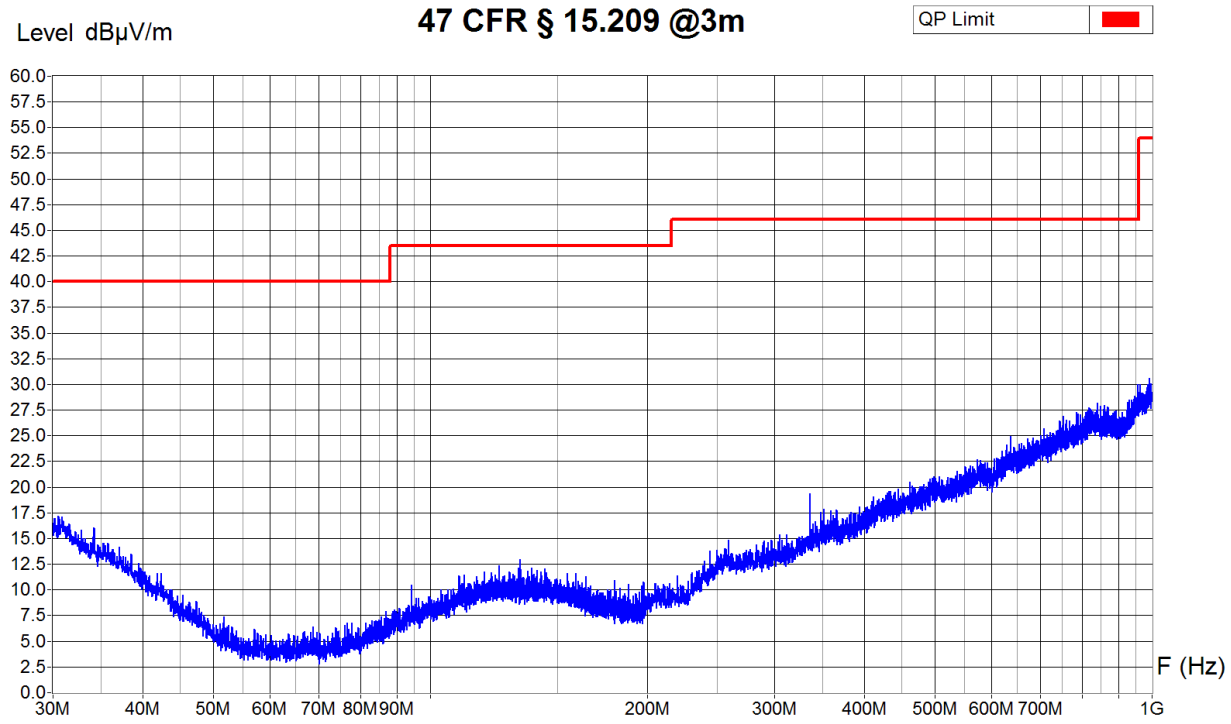
Equipment Under Test :	D-Receiver MLxD
Set-Up :	See photos
Operating Conditions :	TX 2.402 GHZ
Remarks :	Max. power, modulated
	Cage 06-01



Zone	25 MHz - 199 MHz	199 MHz - 1 GHz
Video Bandwidth	300 KHz	300 KHz
Resol Bandwidth	100 KHz	100 KHz

Operator: B. Itzcovich
Date/Time: 23.01.2013 10:03
Filename: 02_MLXD_TX2402_H_FCC.png/.txt

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

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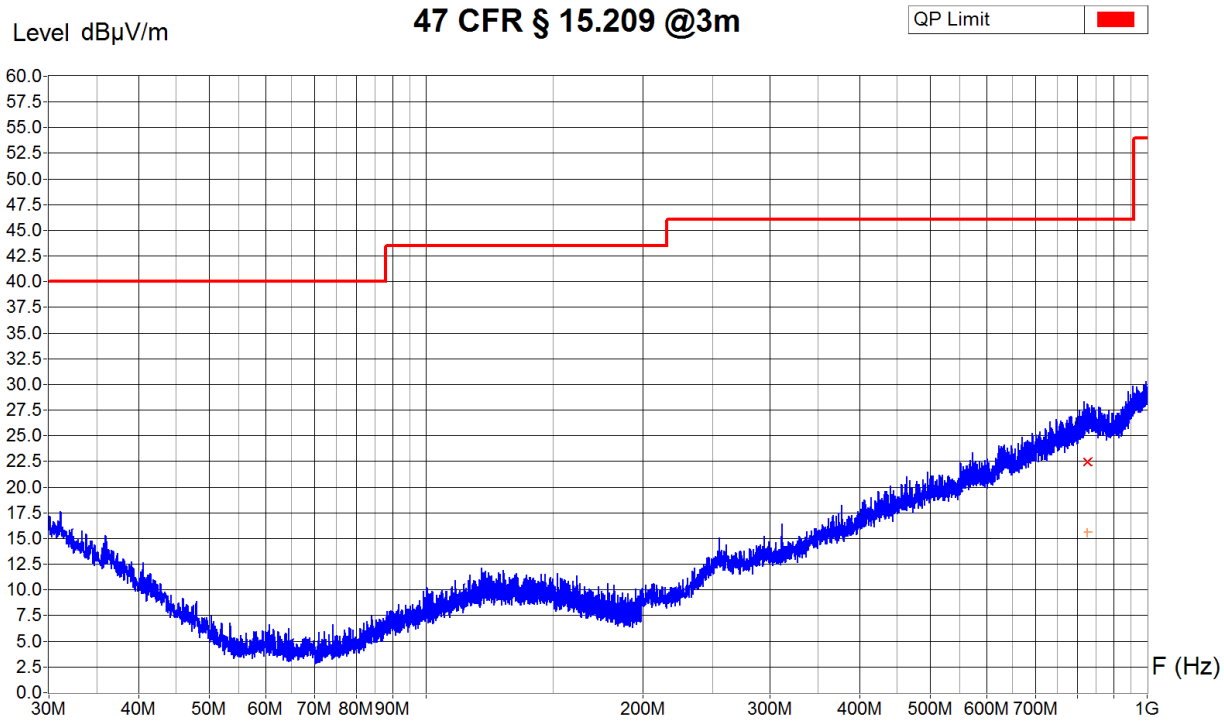
Equipment Under Test :	D-Receiver ML13D
Set-Up :	See photos
Operating Conditions :	TX 2.402 GHZ
Remarks :	Max. power, modulated
	Cage 06-01



Zone	25 MHz - 199 MHz	199 MHz - 1 GHz
Video Bandwidth	300 KHz	300 KHz
Resol Bandwidth	100 KHz	100 KHz

Receiver Measures

Frequency	Peak	QuasiPeak (x)	Average (+)	QP Margin
827.10 MHz	29.8 dBµV/m	22.5 dBµV/m	15.6 dBµV/m	18.5 dB

Operator: B. Itzcovich
Date/Time: 23.01.2013 10:39
Filename: 03_ML13D_TX2402_V_FCC.png/.txt

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

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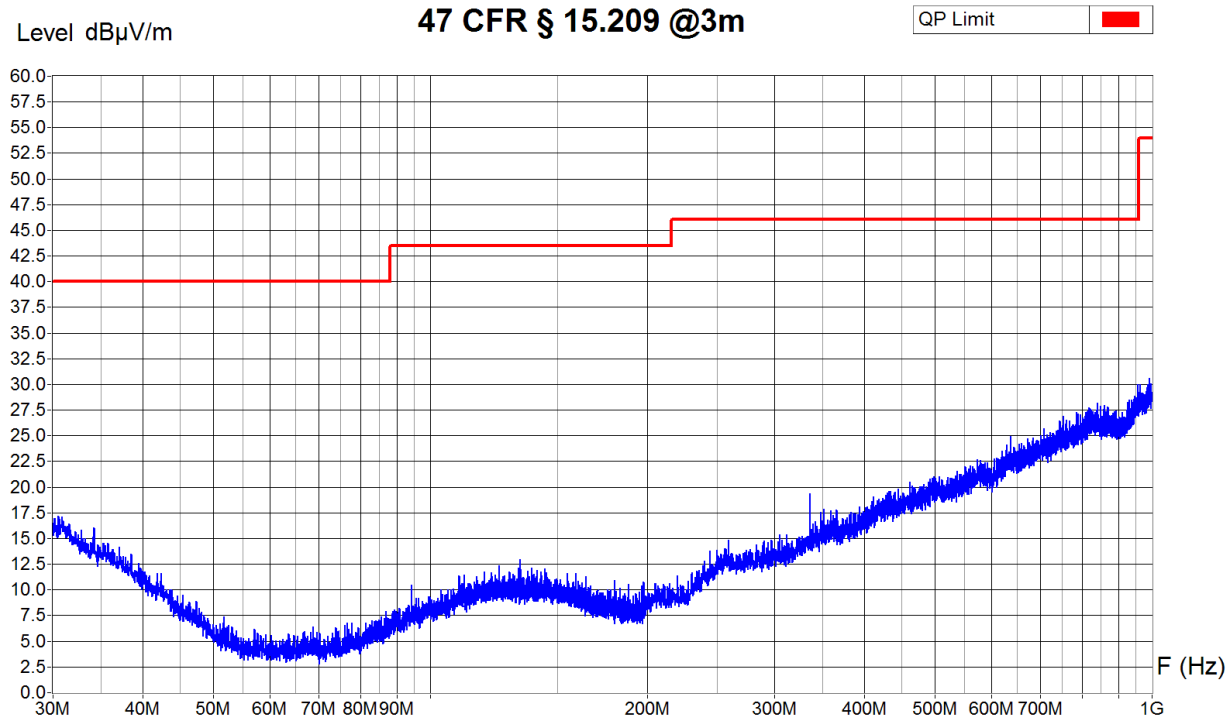
Equipment Under Test :	D-Receiver ML13D
Set-Up :	See photos
Operating Conditions :	TX 2.402 GHZ
Remarks :	Max. power, modulated
	Cage 06-01

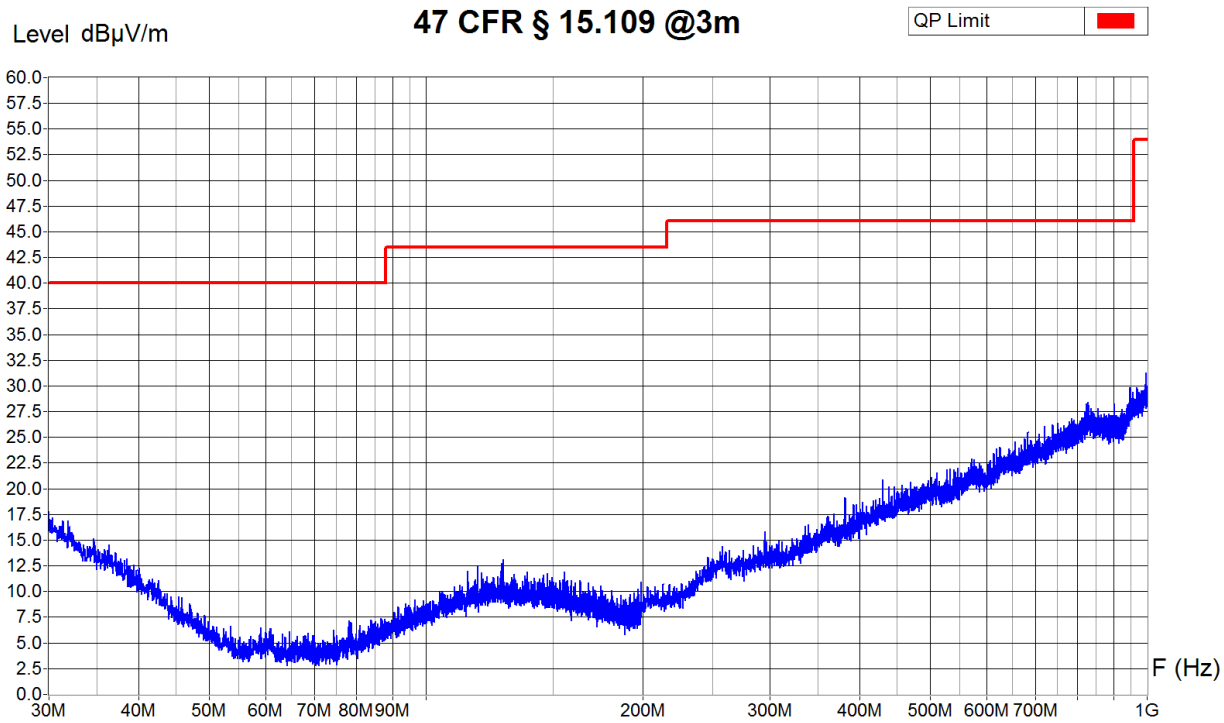


Zone	199 MHz - 1 GHz
Video Bandwidth	300 KHz
Resol Bandwidth	100 KHz

Operator: B. Itzcovich
Date/Time: 23.01.2013 10:03
Filename: 04_ML13D_TX2402_H_FCC.png/.txt

7.2.2 Receive mode

Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0 - 360 °
Antenna Height :	1 - 4m
Equipment Under Test :	D-Receiver MLxD
Set-Up :	See photos
Operating Conditions :	RX 2.402 GHZ
Remarks :	
	Cage 06-01



Zone	25 MHz - 199 MHz	199 MHz - 1 GHz
Video Bandwidth	300 KHz	300 KHz
Resol Bandwidth	100 KHz	100 KHz

Operator: B. Itzcovich
Date/Time: 23.01.2013 10:54
Filename: 09_MLXD_RX2402_V_FCC.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0 - 360 °
Antenna Height :	1 - 4m
Equipment Under Test :	D-Receiver MLxD
Set-Up :	See photos
Operating Conditions :	RX 2.402 GHZ
Remarks :	
	Cage 06-01

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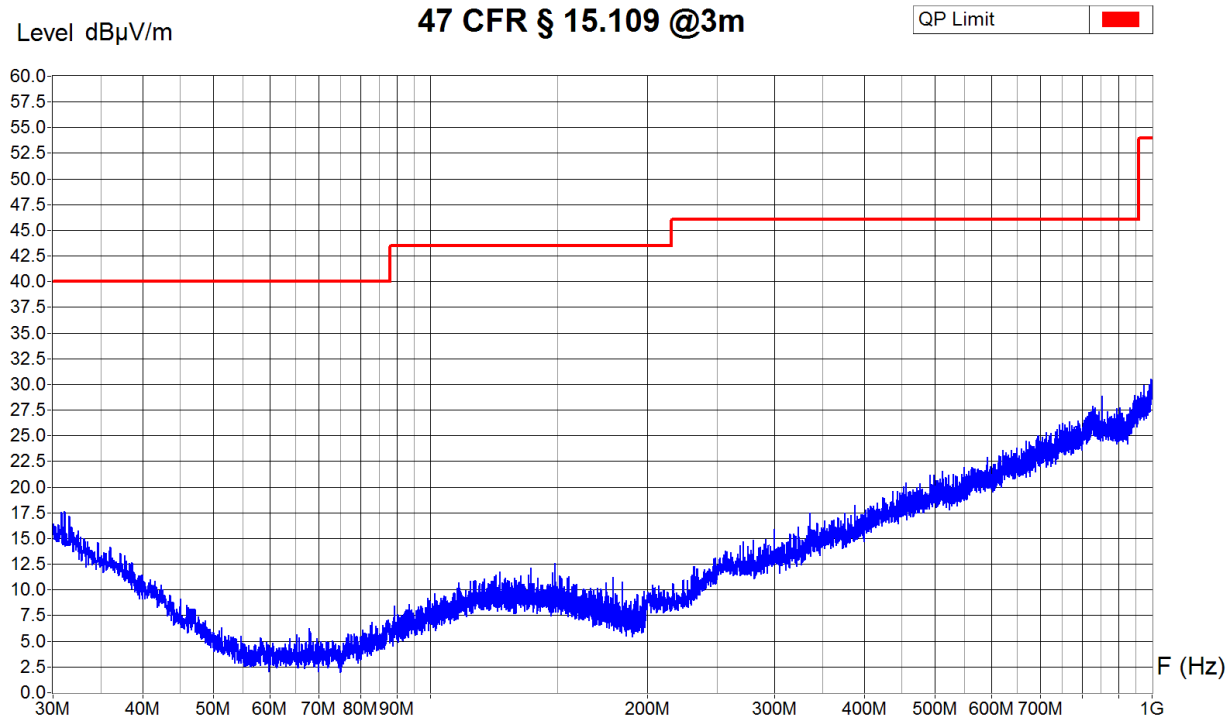

Zone	25 MHz - 199 MHz	199 MHz - 1 GHz
Video Bandwidth	300 KHz	300 KHz
Resol Bandwidth	100 KHz	100 KHz

Operator: B. Itzcovich
Date/Time: 23.01.2013 11:03
Filename: 10_MLXD_RX2402_H_FCC.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0 - 360 °
Antenna Height :	1 - 4m
Equipment Under Test :	D-Receiver ML13D
Set-Up :	See photos
Operating Conditions :	RX 2.402 GHZ
Remarks :	
	Cage 06-01

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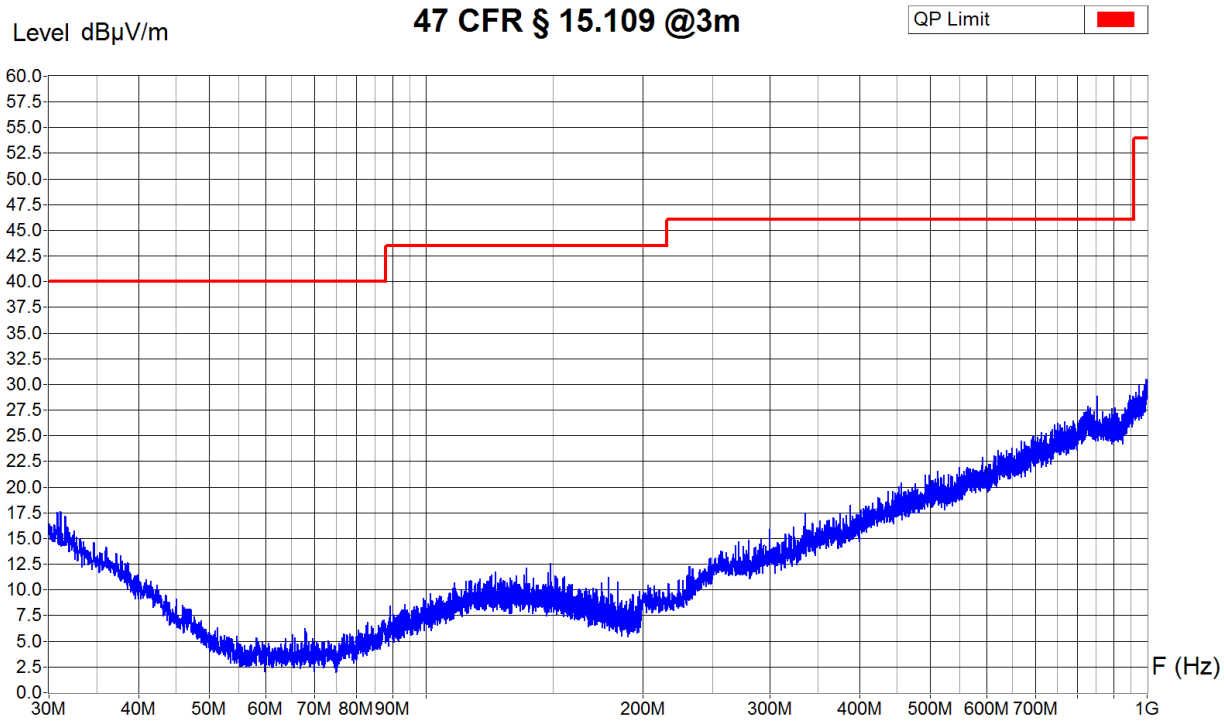

Zone	25 MHz - 199 MHz	199 MHz - 1 GHz
Video Bandwidth	300 KHz	300 KHz
Resol Bandwidth	100 KHz	100 KHz

Operator: B. Itzcovich
Date/Time: 23.01.2013 11:03
Filename: 11_ML13D_RX2402_H_FCC.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0 - 360 °
Antenna Height :	1 - 4m
Equipment Under Test :	D-Receiver ML13D
Set-Up :	See photos
Operating Conditions :	RX 2.402 GHZ
Remarks :	
	Cage 06-01

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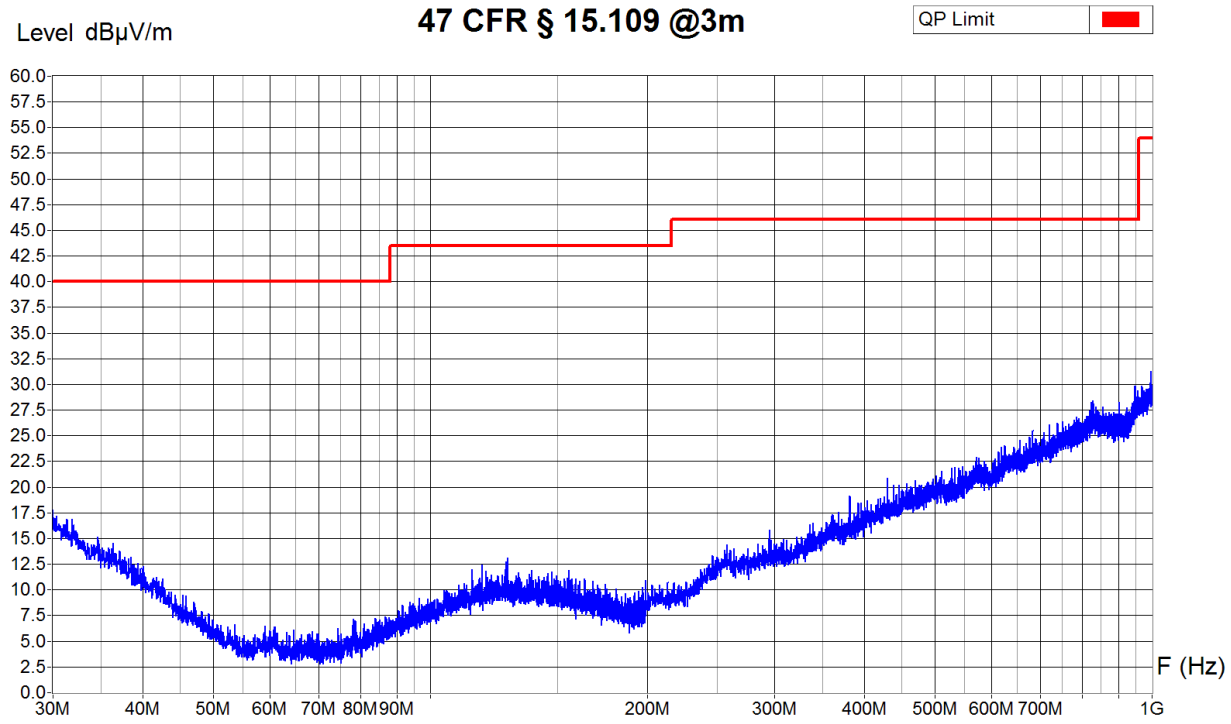


Zone	25 MHz - 199 MHz	199 MHz - 1 GHz
Video Bandwidth	300 KHz	300 KHz
Resol Bandwidth	100 KHz	100 KHz

Operator: B. Itzcovich
Date/Time: 23.01.2013 10:54
Filename: 12_ML13D_RX2402_V_FCC.png/.txt

7.3 Radiated electromagnetic field (1 GHz to 26.5 GHz)

Test site: ☐ anechoic chamber (ferrites) ☒ anechoic chamber (foam)
☐ semi-anechoic chamber (hybrid) ☐ laboratory

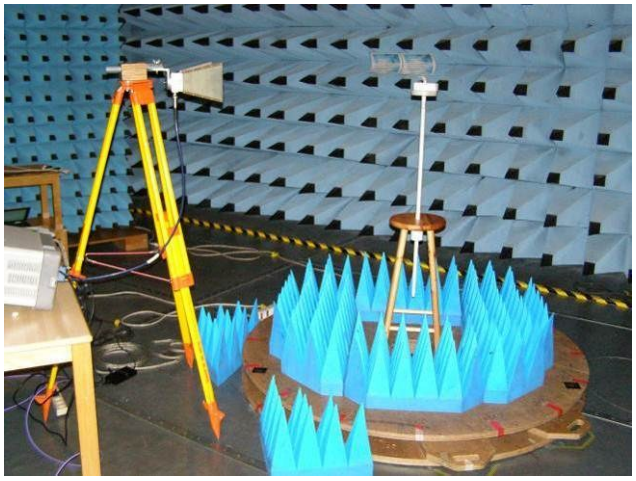
Distance: ☒ 1 m ☐ 3 m ☐ 10 m ☐ 30m

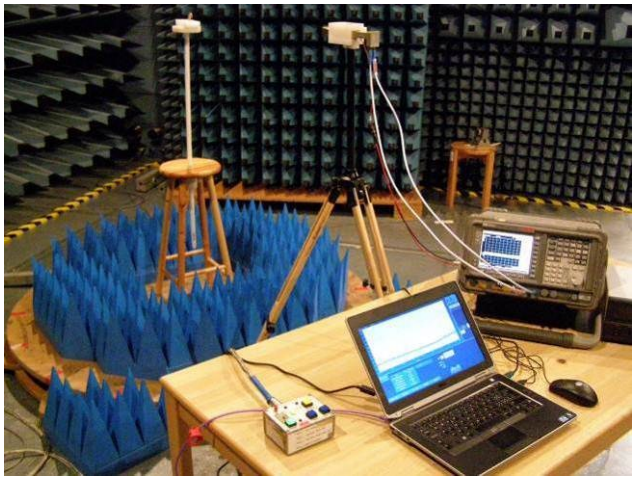
Position of EUT: *1.5 m* (height of the equipment under test above floor)

Meas. uncertainty: ± 4.7 dB

Measuring 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 disturbances 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:

- *Max. power*
- *Special communication test mode*
- *Modulated*

Harmonics #2, #3 and #4 have been measured with a longer sweep time (4 - 8s) and are below the limits

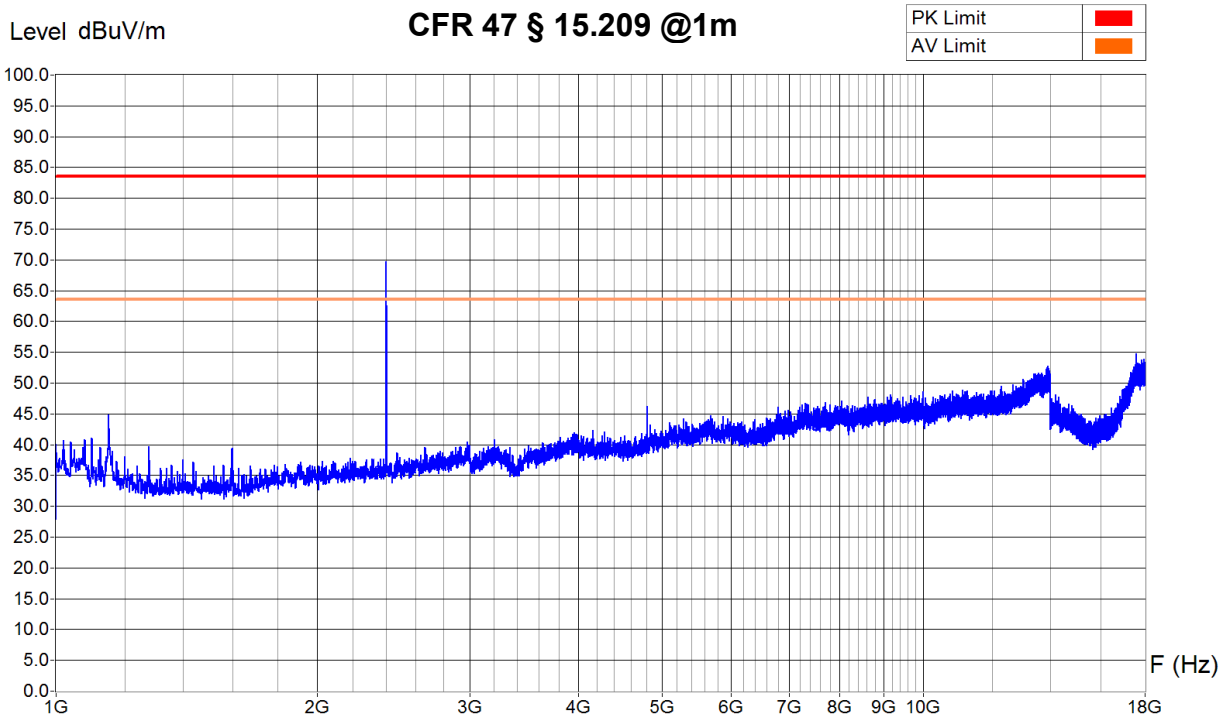
Test equipment:

Spectrum analyser	☐ 88-14	☐ 94-24	☒ 02-06	☐ 03-45	☐ 05-39	☐ 07-53	☐ 10-70
Receiver	☐ 94-35	☐ 04-29	☐ 10-70				
Preamplifier	☐ 90-01	☐ 95-86	☐ 05-56	☐ 05-59	☐ 05-62	☐ 05-87	☒ 11-29
Antenna (horn)	☒ 90-24	☐ 98-12	☐ 98-13	☐ 07-31			
Antenna with mixer	☒ 98-12	☐ 98-13					
Cables	☒ 11-60A	☒ Sucoflex 1m (8416/4)		☒ 10-81	☒ 11-62		
Power supply	☐ 99-04	☐ 99-07	☒ 06-62				

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

7.3.1 Transmit mode

Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0 - 360 °
Antenna Height :	1.5 m
Equipment Under Test :	D-Receiver MLXD
Set-Up :	See photos
Operating Conditions :	TX 2.402 GHZ
Remarks :	
	Cage 06-00 @1m



Zone	1 GHz - 6 GHz	6 GHz - 10 GHz	10 GHz - 14 GHz	14 GHz - 18 GHz
Video Bandwidth	3 MHz	3 MHz	3 MHz	3 MHz
Resol Bandwidth	1 MHz	1 MHz	1 MHz	300 KHz

Operator: B. Itzcovich
Date/Time: 24.01.2013 10:10
Filename: 21_MLXD_TX2402_V.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0 - 360 °
Antenna Height :	1.5 m
Equipment Under Test :	D-Receiver MLXD
Set-Up :	See photos
Operating Conditions :	TX 2.402 GHZ
Remarks :	
	Cage 06-00 @1m

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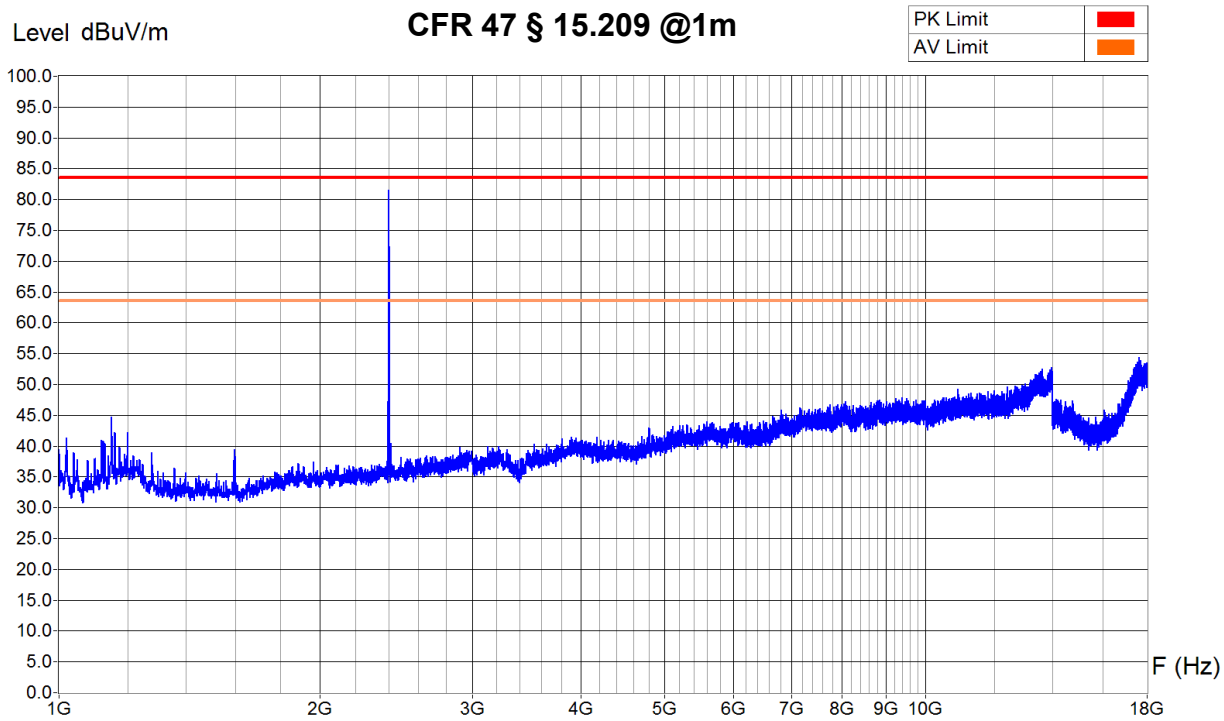

Zone	1 GHz - 6 GHz	6 GHz - 10 GHz	10 GHz - 14 GHz	14 GHz - 18 GHz
Video Bandwidth	3 MHz	3 MHz	3 MHz	3 MHz
Resol Bandwidth	1 MHz	1 MHz	1 MHz	300 KHz

Operator: B. Itzcovich
Date/Time: 24.01.2013 10:16
Filename: 22_MLXD_TX2402_H.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0° - 360°
Antenna Height :	1.5 m
Equipment Under Test :	D-Receiver MLXD
Set-Up :	See photos
Operating Conditions :	TX 2.402 GHZ
Remarks :	
	Cage 06-00 @1m

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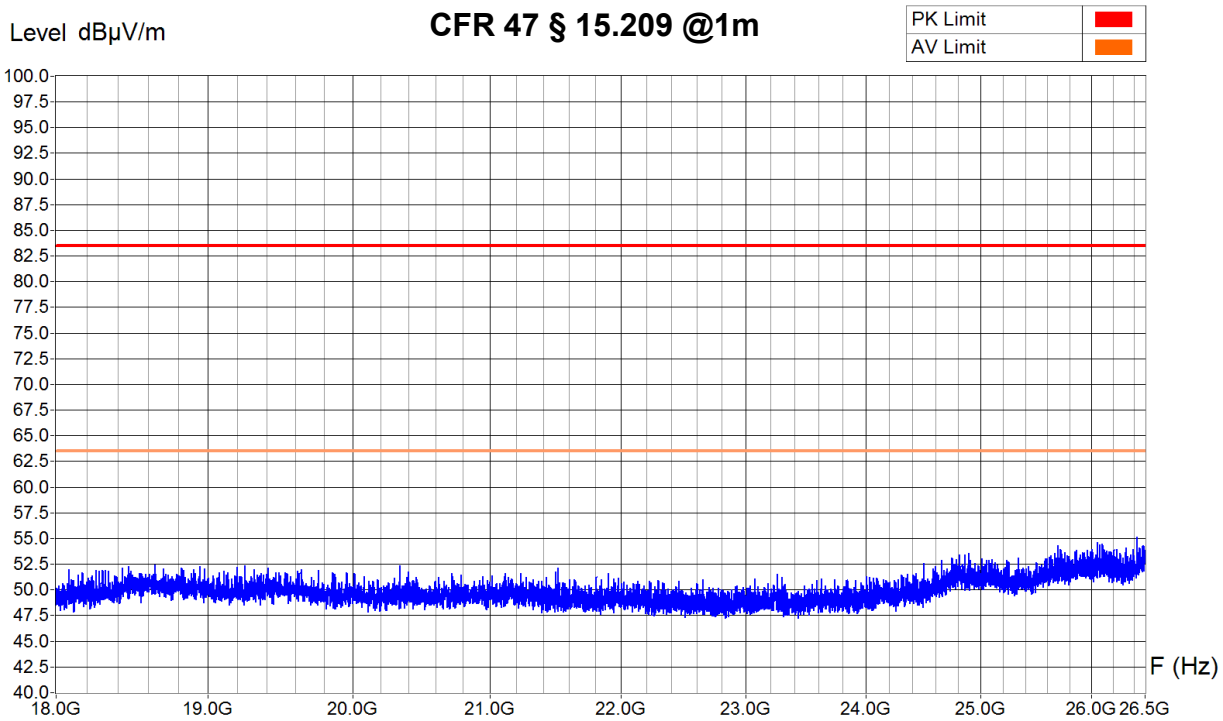
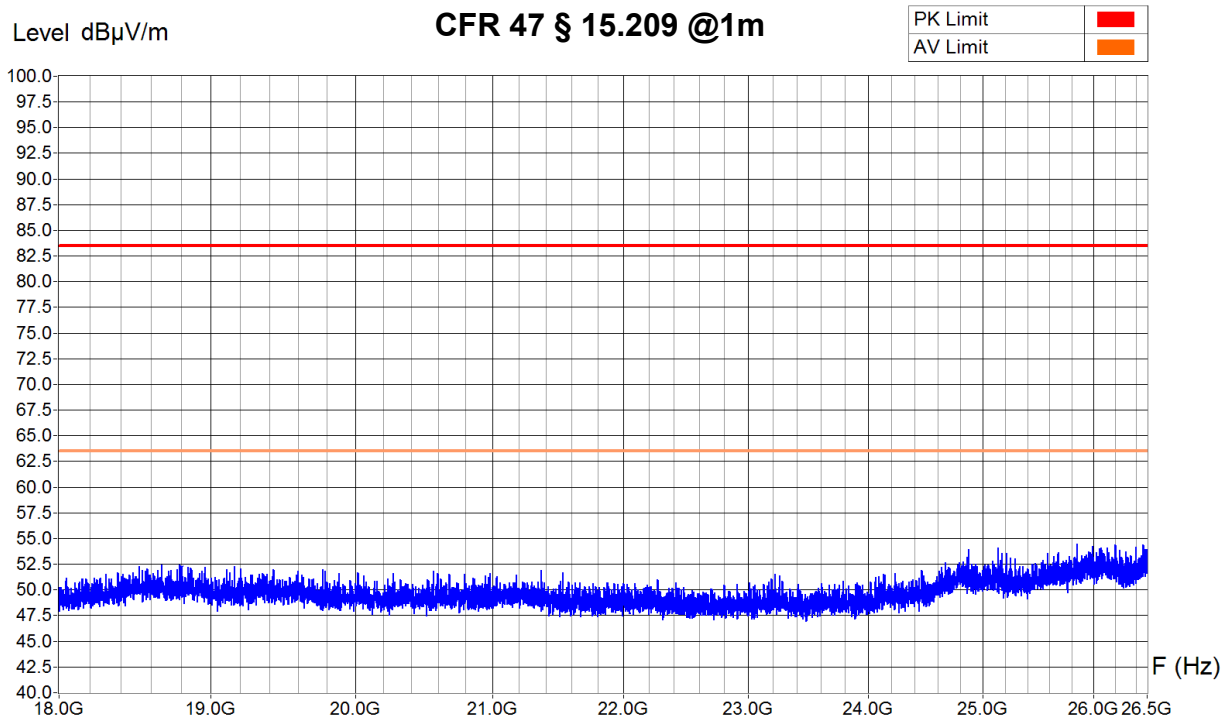


Zone	18 GHz - 26.50 GHz
Video Bandwidth	1 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 25.01.2013 12:43
Filename: 61_MLXD_TX2402_V_18-26G5.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0° - 360°
Antenna Height :	1.5 m
Equipment Under Test :	D-Receiver MLXD
Set-Up :	See photos
Operating Conditions :	TX 2.402 GHZ
Remarks :	
	Cage 06-00 @1m



Zone	18 GHz - 26.50 GHz
Video Bandwidth	1 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 25.01.2013 14:55
Filename: 62_MLXD_TX2402_H_18-26G5.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0 - 360 °
Antenna Height :	1.5 m
Equipment Under Test :	D-Receiver ML13D
Set-Up :	See photos
Operating Conditions :	TX 2.402 GHZ
Remarks :	
	Cage 06-00 @1m

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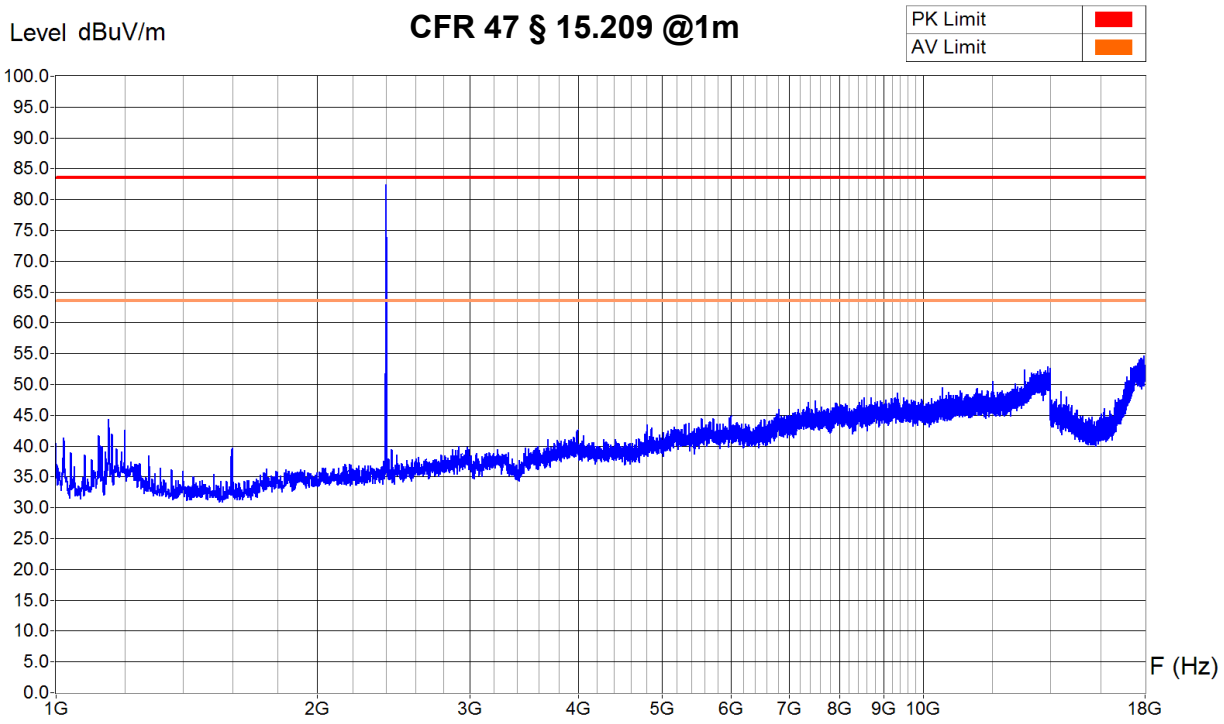

Zone	1 GHz - 6 GHz	6 GHz - 10 GHz	10 GHz - 14 GHz	14 GHz - 18 GHz
Video Bandwidth	3 MHz	3 MHz	3 MHz	3 MHz
Resol Bandwidth	1 MHz	1 MHz	1 MHz	300 KHz

Operator: B. Itzcovich
Date/Time: 24.01.2013 10:25
Filename:
23_ML13D_TX2402_H.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0 - 360 °
Antenna Height :	1.5 m
Equipment Under Test :	D-Receiver ML13D
Set-Up :	See photos
Operating Conditions :	TX 2.402 GHZ
Remarks :	
	Cage 06-00 @1m

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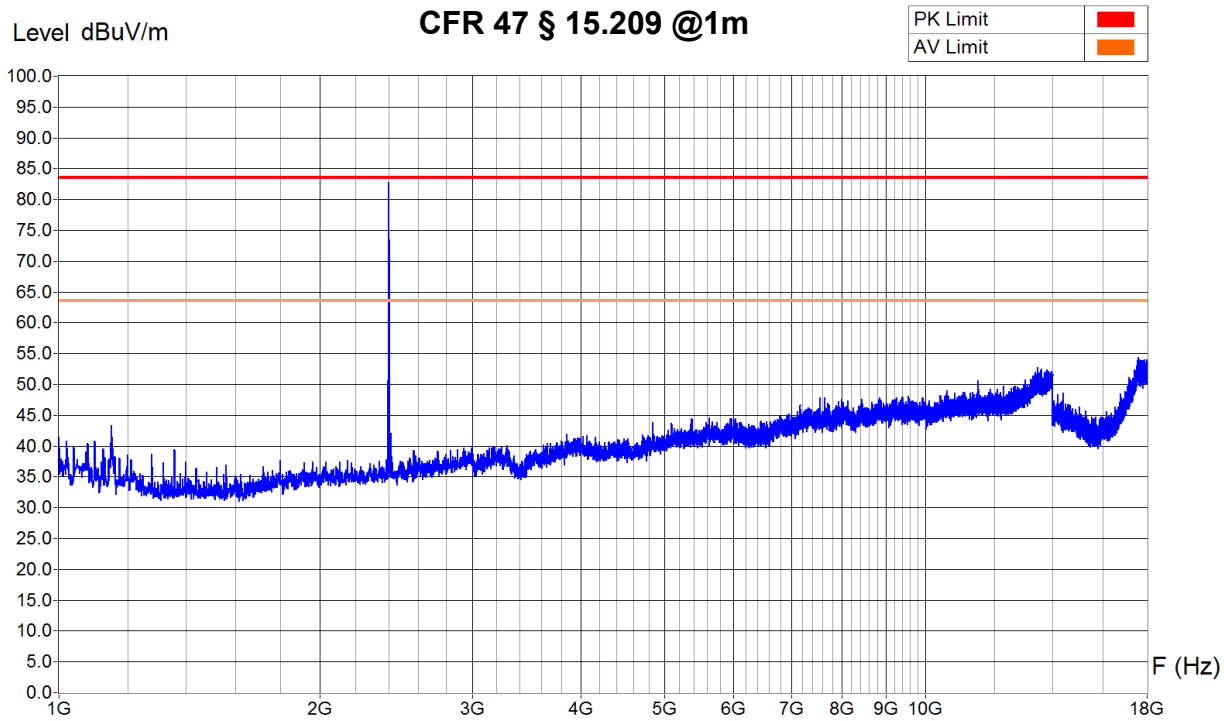

Zone	1 GHz - 6 GHz	6 GHz - 10 GHz	10 GHz - 14 GHz	14 GHz - 18 GHz
Video Bandwidth	3 MHz	3 MHz	3 MHz	3 MHz
Resol Bandwidth	1 MHz	1 MHz	1 MHz	300 KHz

Operator: B. Itzcovich
Date/Time: 24.01.2013 10:29
Filename: 24_ML13D_TX2402_V.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0° - 360°
Antenna Height :	1.5 m
Equipment Under Test :	D-Receiver ML13D
Set-Up :	See photos
Operating Conditions :	TX 2.402 GHZ
Remarks :	
	Cage 06-00 @1m

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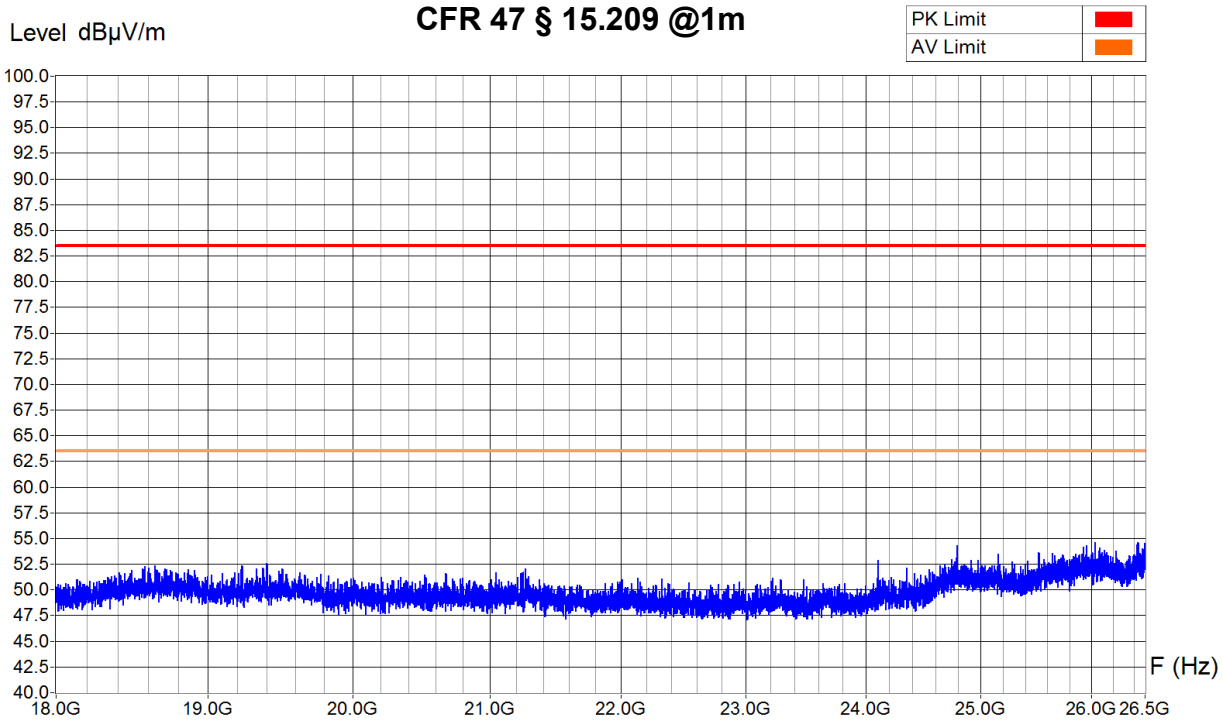

Zone	18 GHz - 26.50 GHz
Video Bandwidth	1 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 25.01.2013 15:09
Filename: 69_ML13D_TX2402_V_18-26G5.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0° - 360°
Antenna Height :	1.5 m
Equipment Under Test :	D-Receiver ML13D
Set-Up :	See photos
Operating Conditions :	TX 2.402 GHZ
Remarks :	
	Cage 06-00 @1m

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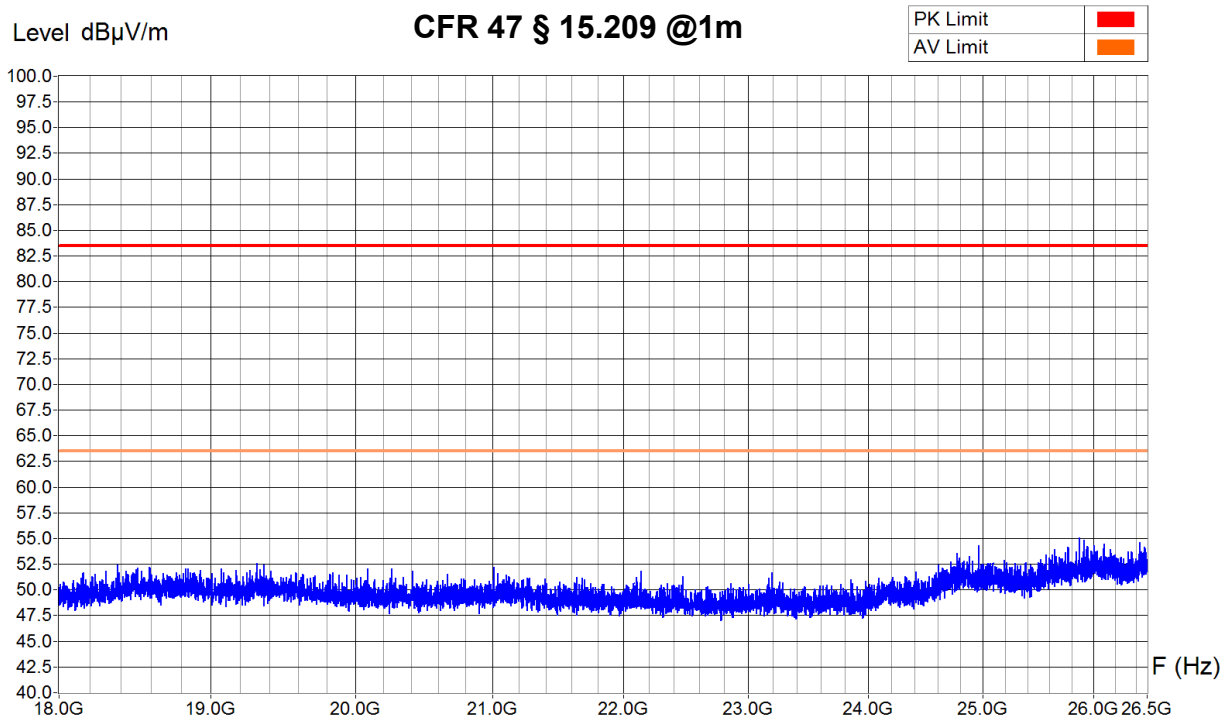
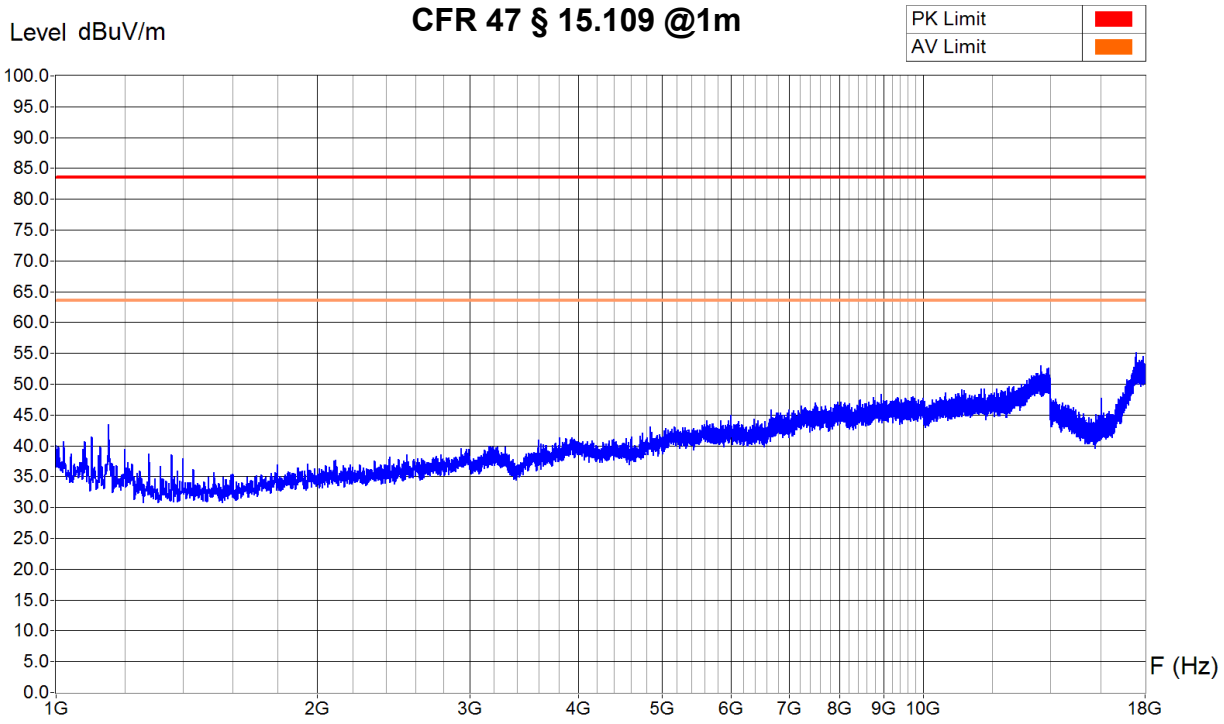


Zone	18 GHz - 26.50 GHz
Video Bandwidth	1 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 25.01.2013 15:05
Filename: 70_ML13D_TX2402_H_18-26G5.png/.txt

7.3.2 Receive mode

Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0 - 360 °
Antenna Height :	1.5 m
Equipment Under Test :	D-Receiver MLXD
Set-Up :	See photos
Operating Conditions :	RX 2.402 GHZ
Remarks :	
	Cage 06-00 @1m



Zone	1 GHz - 6 GHz	6 GHz - 10 GHz	10 GHz - 14 GHz	14 GHz - 18 GHz
Video Bandwidth	3 MHz	3 MHz	3 MHz	3 MHz
Resol Bandwidth	1 MHz	1 MHz	1 MHz	300 KHz

Operator: B. Itzcovich
Date/Time: 24.01.2013 10:37
Filename: 25_MLXD_RX2402_V.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0 - 360 °
Antenna Height :	1.5 m
Equipment Under Test :	D-Receiver MLXD
Set-Up :	See photos
Operating Conditions :	RX 2.402 GHZ
Remarks :	
	Cage 06-00 @1m

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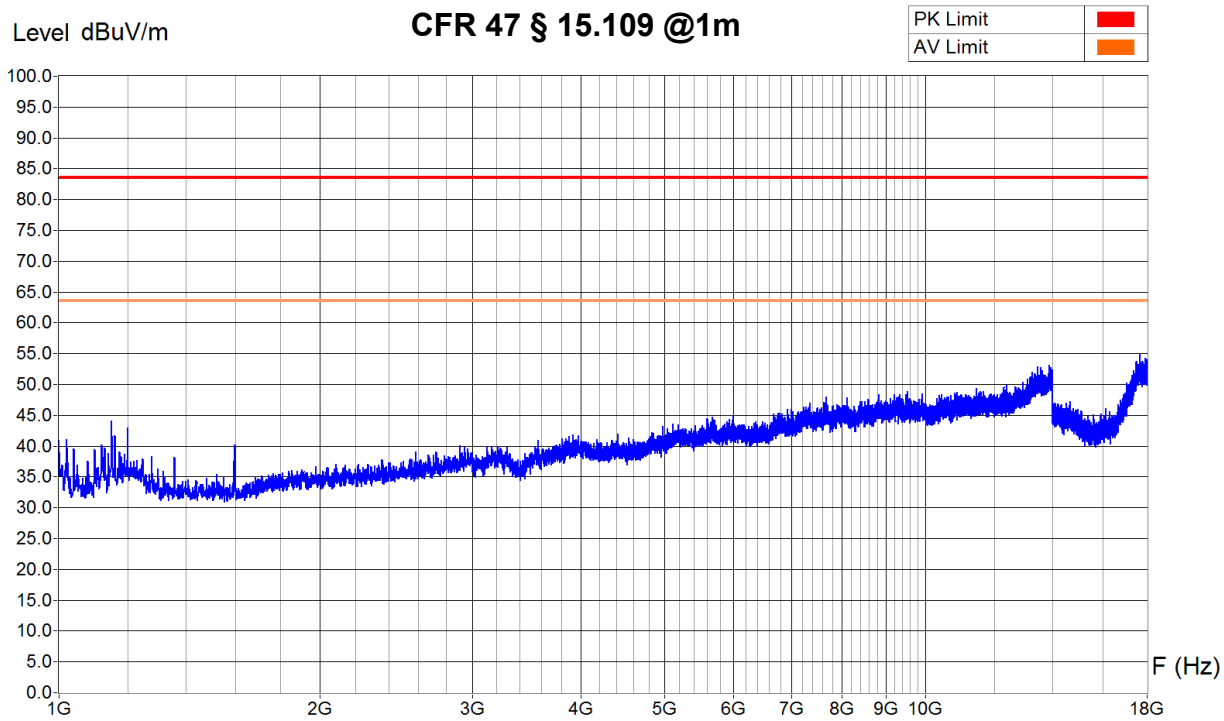
montena emc sa



Zone	1 GHz - 6 GHz	6 GHz - 10 GHz	10 GHz - 14 GHz	14 GHz - 18 GHz
Video Bandwidth	3 MHz	3 MHz	3 MHz	3 MHz
Resol Bandwidth	1 MHz	1 MHz	1 MHz	300 KHz

Operator: B. Itzcovich
Date/Time: 24.01.2013 10:40
Filename: 26_MLXD_RX2402_H.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0° - 360°
Antenna Height :	1.5 m
Equipment Under Test :	D-Receiver MLXD
Set-Up :	See photos
Operating Conditions :	RX 2.402 GHZ
Remarks :	
	Cage 06-00 @1m

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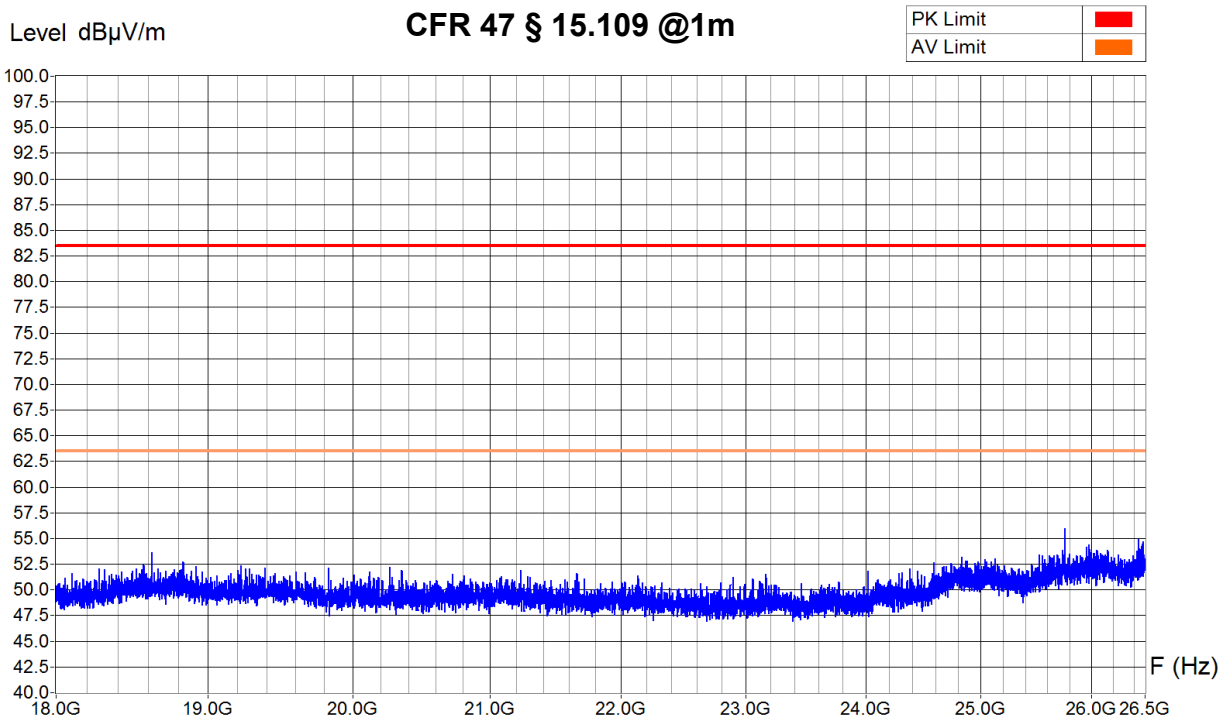
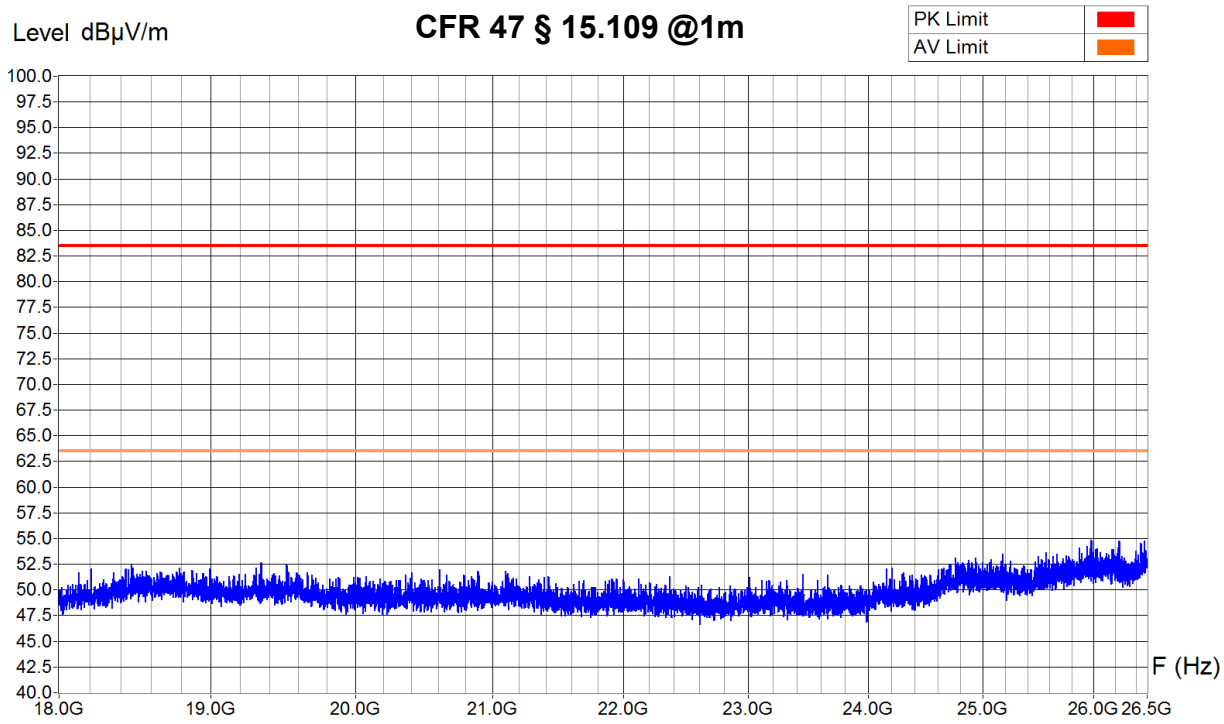
montena emc sa



Zone	18 GHz - 26.50 GHz
Video Bandwidth	1 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 25.01.2013 14:34
Filename: 65_MLXD_RX2402_V_18-26G5.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0° - 360°
Antenna Height :	1.5 m
Equipment Under Test :	D-Receiver MLXD
Set-Up :	See photos
Operating Conditions :	RX 2.402 GHZ
Remarks :	
	Cage 06-00 @1m



Zone	18 GHz - 26.50 GHz
Video Bandwidth	1 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 25.01.2013 14:59
Filename: 66_MLXD_RX2402_H_18-26G5.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0 - 360 °
Antenna Height :	1.5 m
Equipment Under Test :	D-Receiver M13D
Set-Up :	See photos
Operating Conditions :	RX 2.402 GHZ
Remarks :	
	Cage 06-00 @1m

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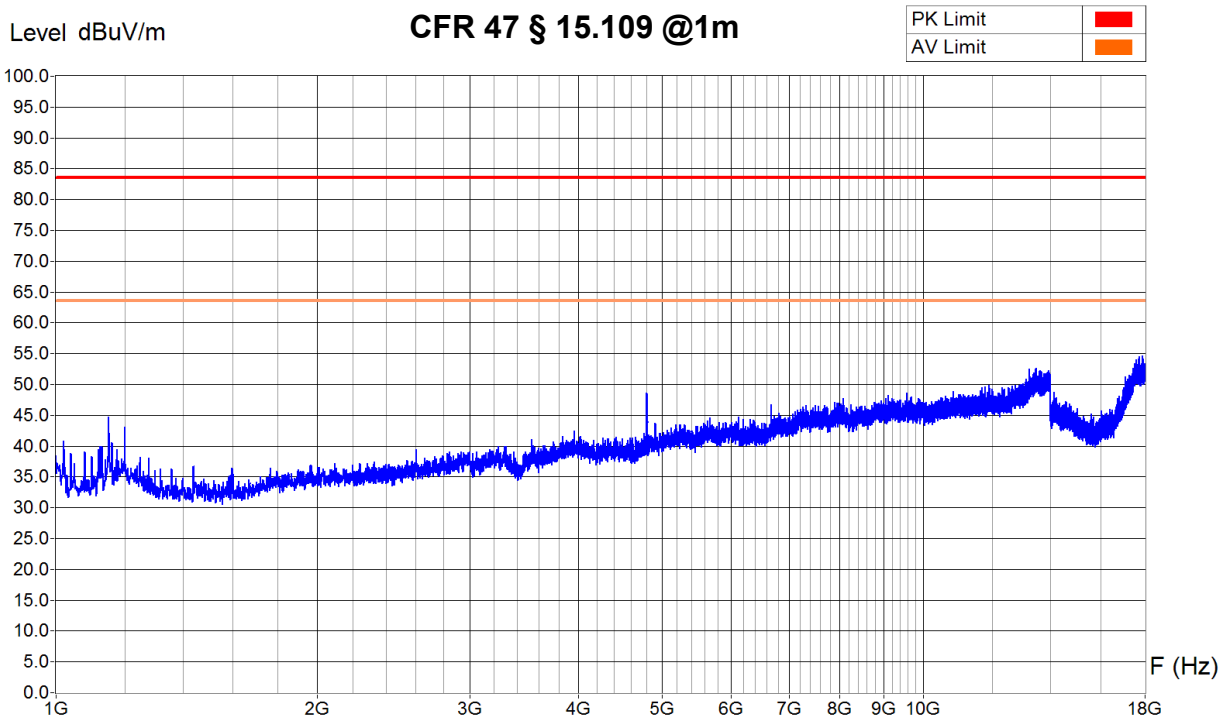

Zone	1 GHz - 6 GHz	6 GHz - 10 GHz	10 GHz - 14 GHz	14 GHz - 18 GHz
Video Bandwidth	3 MHz	3 MHz	3 MHz	3 MHz
Resol Bandwidth	1 MHz	1 MHz	1 MHz	300 KHz

Operator: B. Itzcovich
Date/Time: 24.01.2013 10:48
Filename: 27_ML13D_RX2402_H.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0 - 360 °
Antenna Height :	1.5 m
Equipment Under Test :	D-Receiver M13D
Set-Up :	See photos
Operating Conditions :	RX 2.402 GHZ
Remarks :	
	Cage 06-00 @1m

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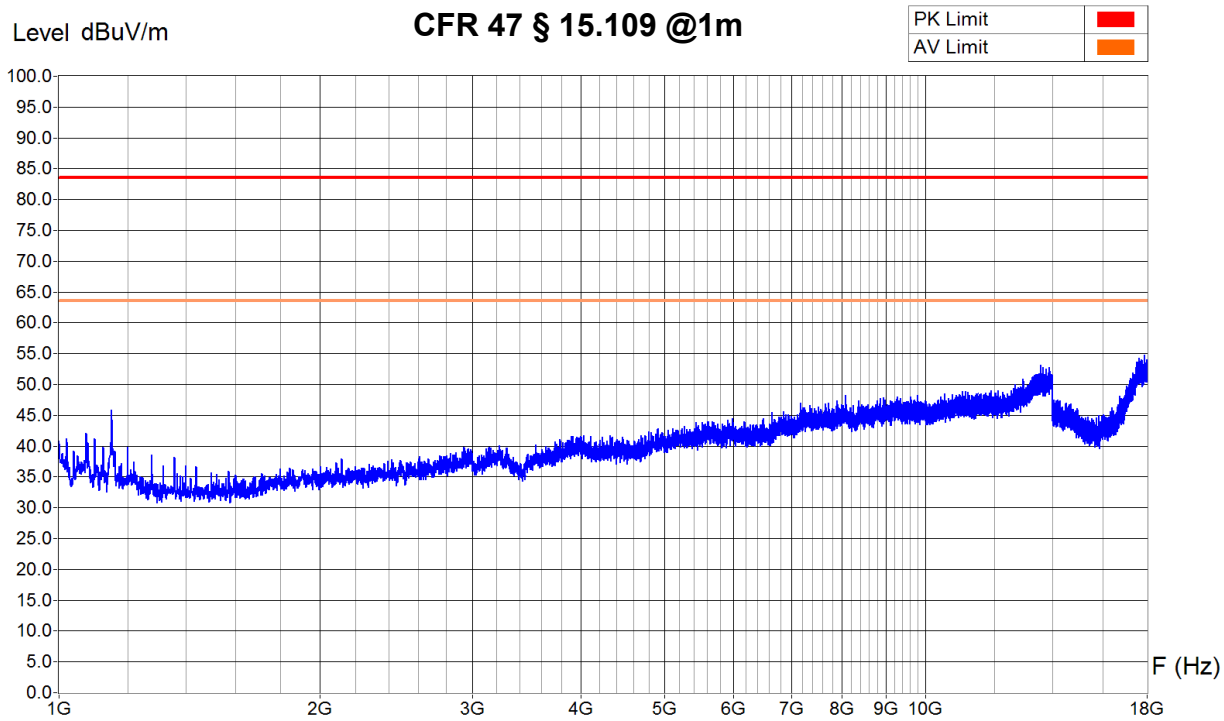

Zone	1 GHz - 6 GHz	6 GHz - 10 GHz	10 GHz - 14 GHz	14 GHz - 18 GHz
Video Bandwidth	3 MHz	3 MHz	3 MHz	3 MHz
Resol Bandwidth	1 MHz	1 MHz	1 MHz	300 KHz

Operator: B. Itzcovich
Date/Time: 24.01.2013 10:51
Filename: 28_ML13D_RX2402_V.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Vertical
Table Angle :	0° - 360°
Antenna Height :	1.5 m
Equipment Under Test :	D-Receiver ML13D
Set-Up :	See photos
Operating Conditions :	RX 2.402 GHZ
Remarks :	
	Cage 06-00 @1m

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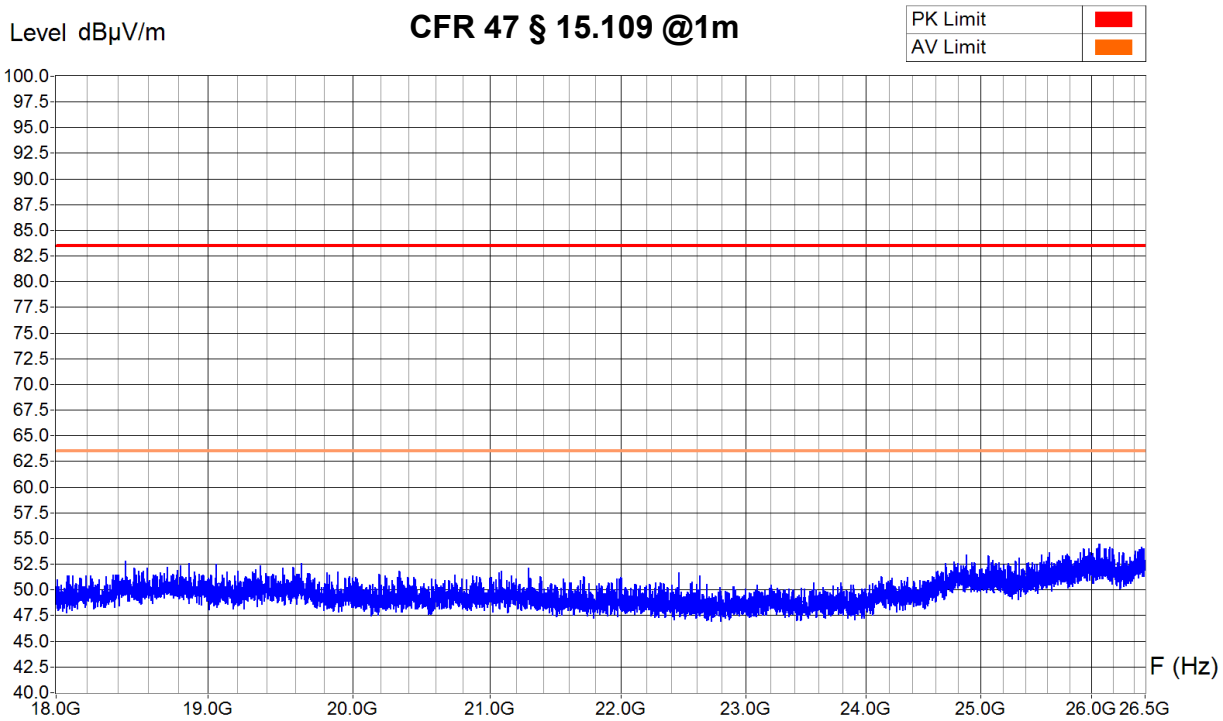
montena emc sa

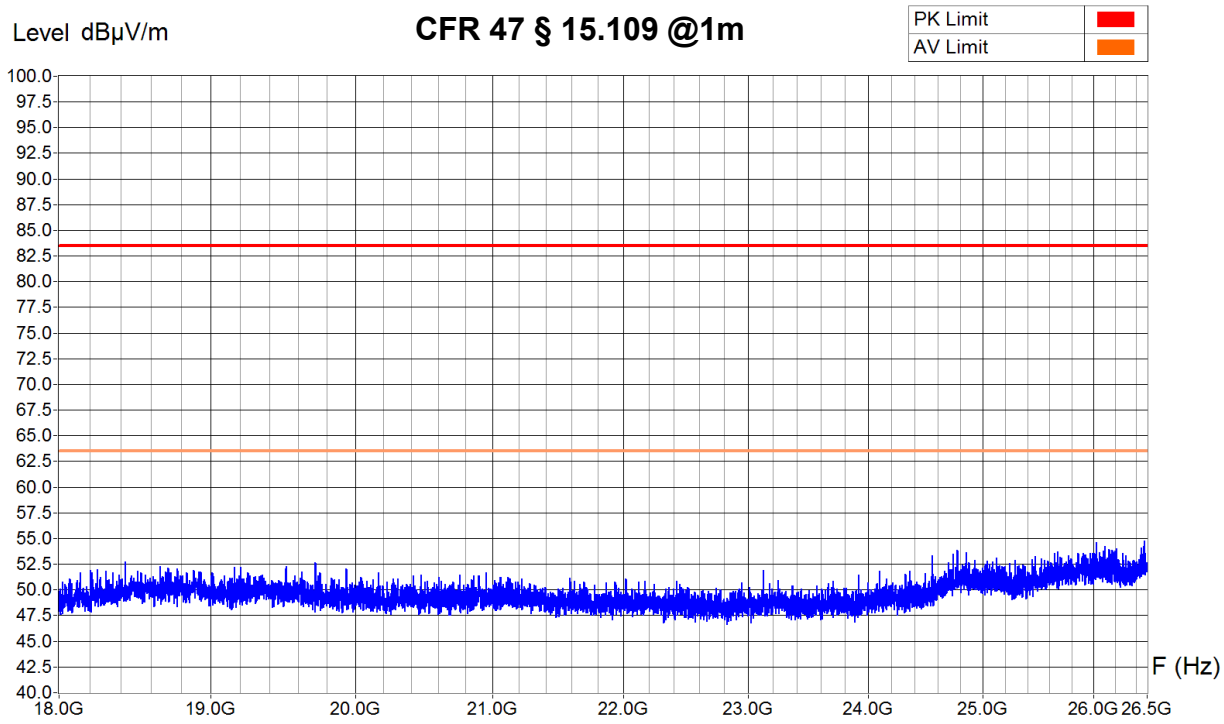


Zone	18 GHz - 26.50 GHz
Video Bandwidth	1 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 25.01.2013 14:39
Filename: 73_ML13D_RX2402_V_18-26G5.png/.txt

Measurement Type :	Radiated Field
Polarisation :	Horizontal
Table Angle :	0° - 360°
Antenna Height :	1.5 m
Equipment Under Test :	D-Receiver ML13D
Set-Up :	See photos
Operating Conditions :	RX 2.402 GHZ
Remarks :	
	Cage 06-00 @1m

montena
montena emc sa

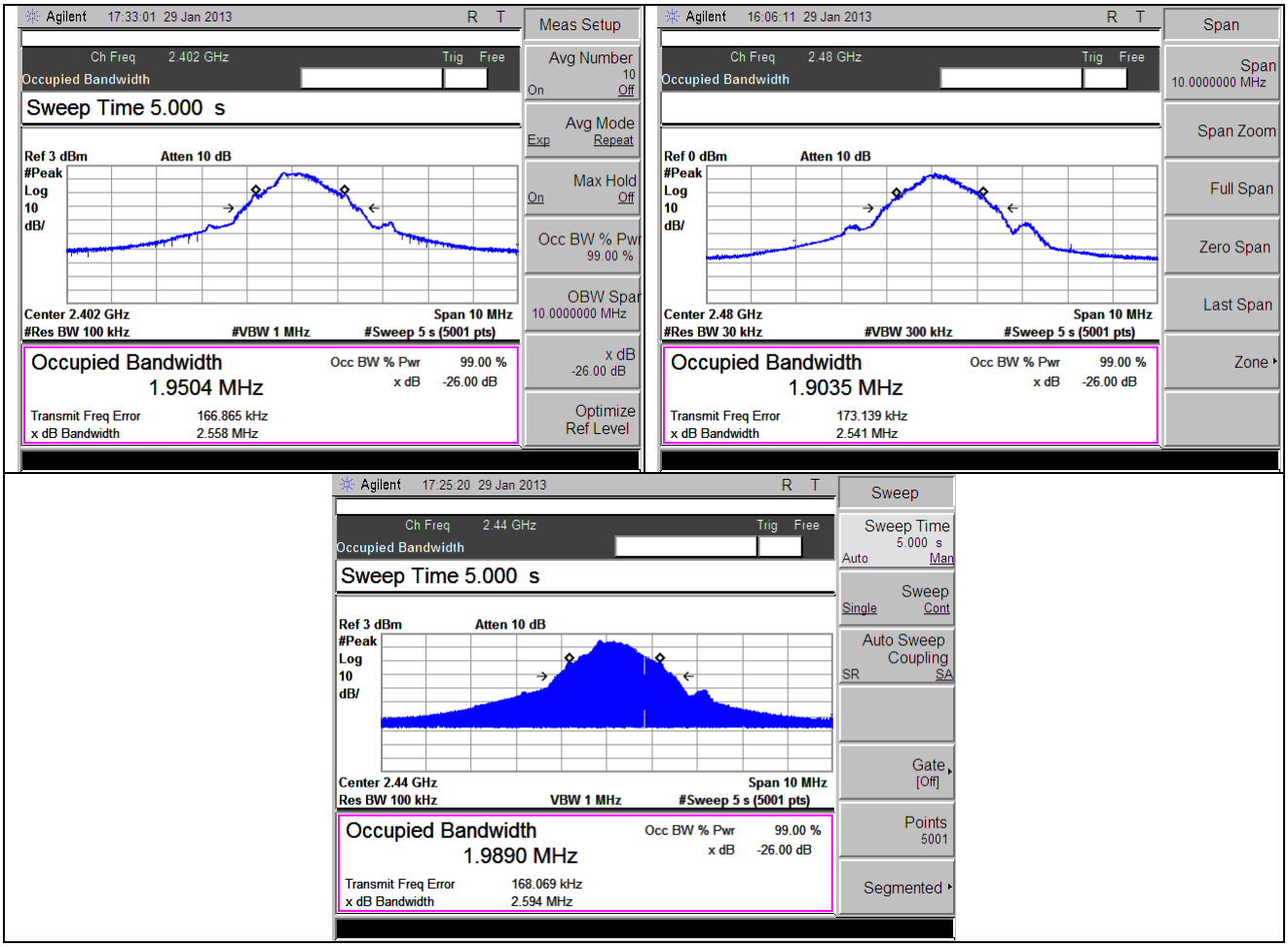


Zone	18 GHz - 26.50 GHz
Video Bandwidth	1 MHz
Resol Bandwidth	1 MHz

Operator: B. Itzcovich
Date/Time: 25.01.2013 14:47
Filename: 74_ML13D_RX2402_H_18-26G5.png/.txt

7.4 Designation of emission

Standard:	United States: 47 CFR "Code of Federal Regulations" – Telecommunication ☒ FCC Part 2, Subpart C: Emission: §2.201 and §2.202
Introduction:	A system of designating emission, modulation and transmission characteristics shall be employed. (a) Emissions are designated according to their classification and their necessary bandwidth. (b) A minimum of three symbols are used to describe the basic characteristics of radio waves. (c) Four symbols are used to describe the necessary bandwidth.
Necessary bandwidth:	For a given class of emission, the minimum value of the occupied bandwidth sufficient to ensure the transmission of information at the rate and with the quality required for the system employed, under specified conditions. B_n = 1.99 MHz (occupied bandwith)
Basic characteristics:	FXD F : frequency modulation X : Cases not otherwise covered D : data transmission
Designation of emission:	2M00FXD



Place and date of test: *Rossens, January 29, 2013*
Operator: *B. Itzcovich*