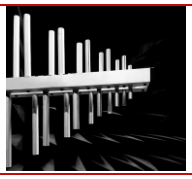
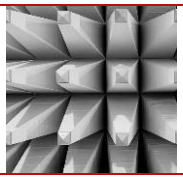




CETECOM™
CETECOM ICT Services
consulting - testing - certification

TEST REPORT

Test report no.: 1-9229/15-01-02

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-00

Testing laboratory

CETECOM ICT Services GmbH
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.cetecom.com
e-mail: ict@cetecom.com

Accredited Testing Laboratory:
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-00

Applicant

BERTHOLD TECHNOLOGIES GmbH & Co KG
Calmbacher Strasse 22
75323 Bad Wildbad / GERMANY
Phone: +49 7081 177-0
Fax: +49 7081 177-402
Contact: Dr. Dirk Mörmann
e-mail: Dirk.Moermann@Berthold.com
Phone: +49 7081 177-0

Manufacturer

BERTHOLD TECHNOLOGIES GmbH & Co KG
Calmbacher Strasse 22
75323 Bad Wildbad / GERMANY

Test standard/s

FCC 47 CFR Part 15	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio Frequency Devices

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item:	**UWB Measurement System**
Model name:	**LB 567-0X (MicroPolar 2)** **LB 568-0X (MicroPolar Moist)**
FCC ID:	**R9ZFCC02X03**
IC:	**-/-**
Frequency:	3.1 GHz – 3.9 GHz
Antenna:	Horn antenna, Spiral antenna and Flow Cell Sensors
Power supply:	100 – 240 V AC 18 – 36 V DC
Temperature range:	-20 °C to +55 °C

This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Test report authorized:

Geraldy Karsten
cn=Karsten Geraldy, o=Cetecom ICT Services GmbH, ou=GER-101125, email=karsten.geraldy@cetecom.com, c=DE
2015.09.30 13:20:53 +02'00'

Karsten Geraldy
Specialist
Radio Communications & EMC

Test performed:

M. Walla
Digital unterschrieben von Meheza WALLA
DN: cn=Meheza WALLA, o=CETECOM ICT GmbH, ou=RCE, email=Meheza.Walla@cetecom.com, c=DE
Datum: 2015.09.30 10:56:06 +02'00'

Meheza Walla
Specialist
Radio Communications & EMC

1 Table of contents

2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.
The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM ICT Services GmbH.
The testing service provided by CETECOM ICT Services GmbH has been rendered under the current "General Terms and Conditions for CETECOM ICT Services GmbH".
CETECOM ICT Services GmbH will not be liable for any loss or damage resulting from false, inaccurate, inappropriate or incomplete product information provided by the customer.
Under no circumstances does the CETECOM ICT Services GmbH test report include any endorsement or warranty regarding the functionality, quality or performance of any other product or service provided.
Under no circumstances does the CETECOM ICT Services GmbH test report include or imply any product or service warranties from CETECOM ICT Services GmbH, including, without limitation, any implied warranties of merchantability, fitness for purpose, or non-infringement, all of which are expressly disclaimed by CETECOM ICT Services GmbH.
All rights and remedies regarding vendor's products and services for which CETECOM ICT Services GmbH has prepared this test report shall be provided by the party offering such products or services and not by CETECOM ICT Services GmbH.
In no case this test report can be considered as a Letter of Approval.

This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

2.2 Application details

Date of receipt of order:	2015-04-21
Date of receipt of test item:	2015-05-27
Start of test:	2015-05-27
End of test:	2015-07-02
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
FCC 47 CFR Part 15	2014-10	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio Frequency Devices

4 Test environment

Temperature:	T_{nom}	+22 °C during room temperature tests
Relative humidity content:		55 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	100 – 240 V AC (LB 568-01) 18 – 36 V DC (LB 568-02)

5 Test item

Kind of test item	**:**	**UWB Measurement System**
Type identification	**:**	**LB 567-0X (MicroPolar 2)** **LB 568-0X (MicroPolar Moist)**
S/N serial number	**:**	**6067 (LB 567)** **6001 (LB 568)**
HW hardware status	**:**	**Id.-Nr: 41990-01**
SW software status	**:**	
Frequency band	**:**	**3.1 GHz – 3.9 GHz**
Type of modulation	**:**	**Stepped CW**
No. of frequency points	**:**	**27 from 3.101 GHz to 3.881 GHz**
Antenna	**:**	**3 antennas (horn antenna, spiral antenna and flow cell sensors)**
Power supply	**:**	**100 – 240 V AC (LB 568-01)** **18 – 36 V DC (LB 568-02)**
Temperature range	**:**	**-20 °C to +55 °C**

5.1 Additional information

Test setup- and EUT-photos are included in test report: 1-9229/15-01-02_AnnexA
1-9229/15-01-02_AnnexB
1-9229/15-01-02_AnnexD

LB 567 MicroPolar 2 and LB 568 MicroPolar Moist

The transmission measurement system is using a heterodyne network analyzer from 3.101 GHz to 3.881 GHz. The MicroPolar 2 / Moist consists of one radio frequency (RF) unit with two RF measurement paths: one path is used for the applicator or sensor (e.g. horn antenna, spiral antenna or flow cell sensor) with the device under test (DUT) and the other path is used as a reference (REF). The RF is based on an unmodulated continuous wave (cw) with discrete frequency points within the above frequency range. The voltage controlled oscillators (VCO) are kept at a constant frequency distance of 100 kHz, which gives the intermediate frequency (IF). This IF signal is band pass filtered, amplified and digitalized by a 16 bit analogue-to-digital converter (ADC) for further signal processing like filtering, data reduction, averaging etc. Finally, the phase and amplitude difference of the DUT and REF path is determined at the main board.

No.	Type	ID no	Power supply	With radiometry board
1	LB 567-01		100 – 240 V AC	No
2	LB 567-02		24 V AC	No
3	LB 568-01		100 – 240 V AC	Yes
3	LB 568-02		24 V DC	Yes

6 Test laboratories sub-contracted

None

7 Description of the test setup

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, RF generating and signaling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

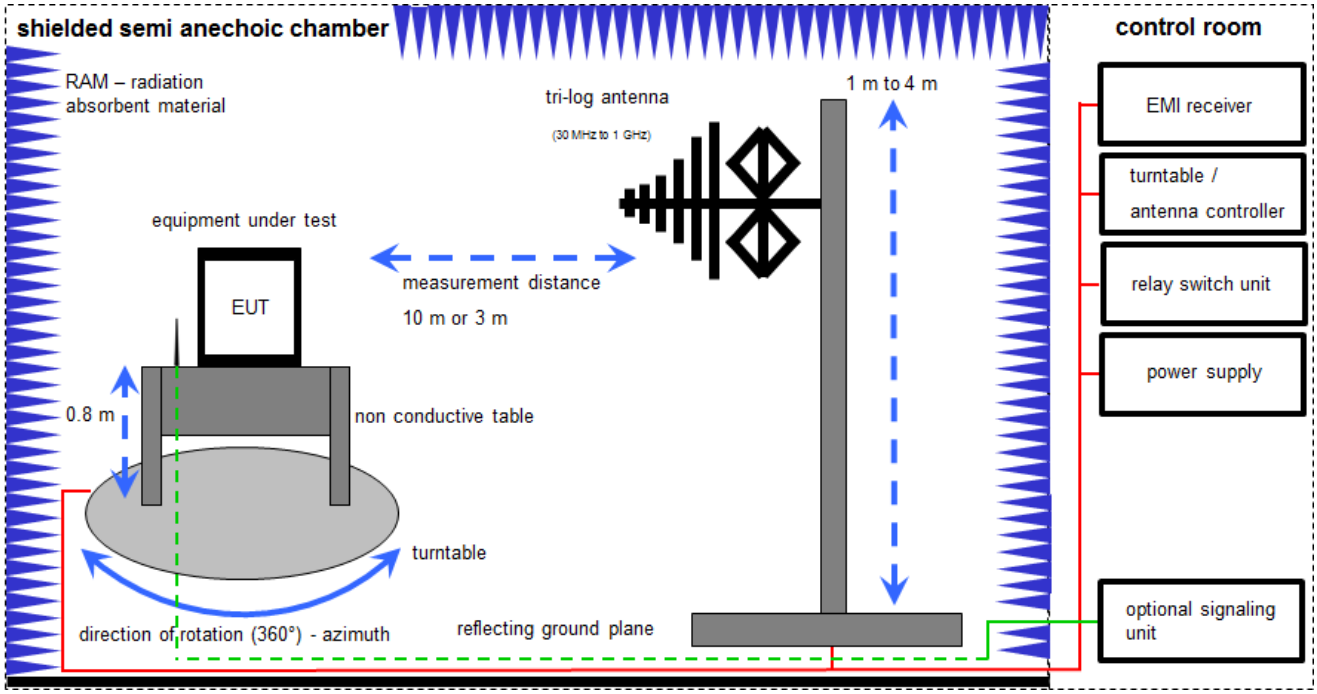
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

Agenda: Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vlkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

7.1 Shielded semi anechoic chamber

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analyzers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.



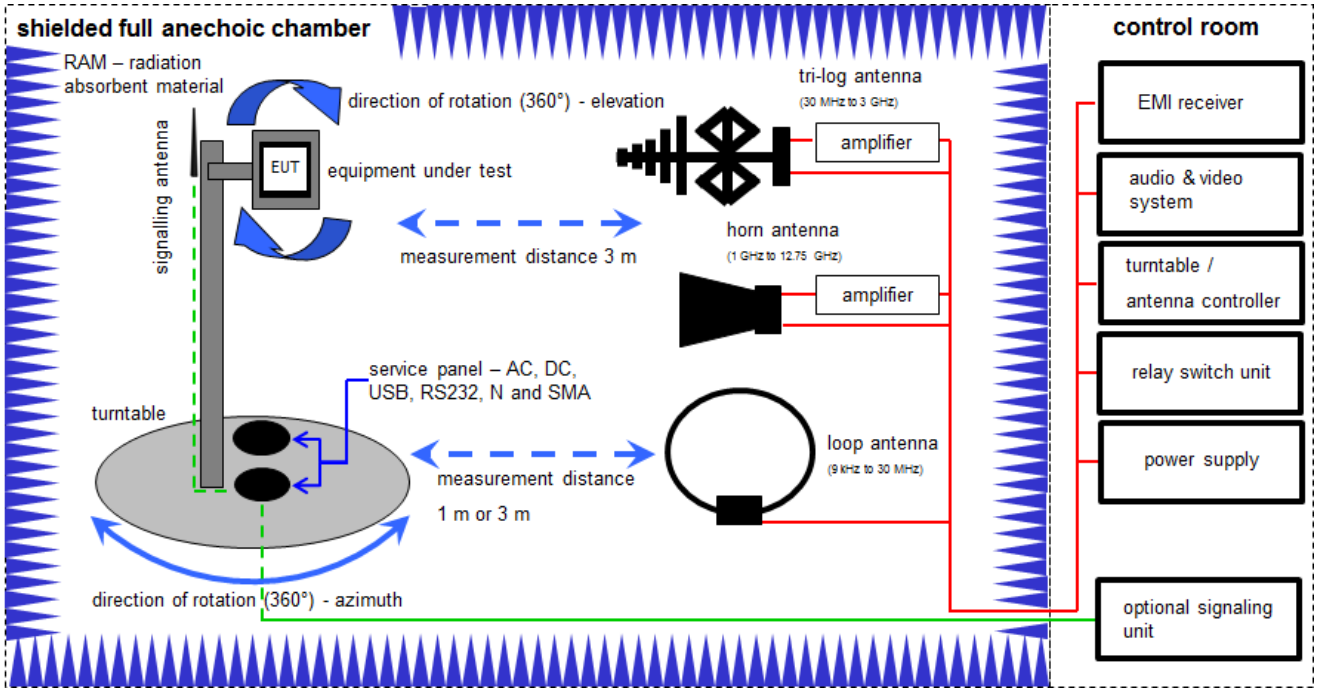
$SS = U_R + CL + AF$
(SS-signal strength; U_R-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

Example calculation:
SS [dBµV/m] = 12.35 [dBµV/m] + 1.90 [dB] + 16.80 [dBµV/m] = 31.05 [dBµV/m] (35.69 µV/m)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A	Switch-Unit	3488A	HP	2719A14505	300000368	ev	-/-	-/-
2	A	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	26.01.2015	26.01.2016
3	A	Antenna Tower	Model 2175	ETS-Lindgren	64762	300003745	izw	30.01.2014	30.01.2016
4	A	Positioning Controller	Model 2090	ETS-Lindgren	64672	300003746	izw	29.01.2015	29.01.2017
5	A	Turntable Interface-Box	Model 105637	ETS-Lindgren	44583	300003747	izw	26.08.2014	26.08.2016
6	A	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	22.04.2014	22.04.2016

7.2 Shielded fully anechoic chamber



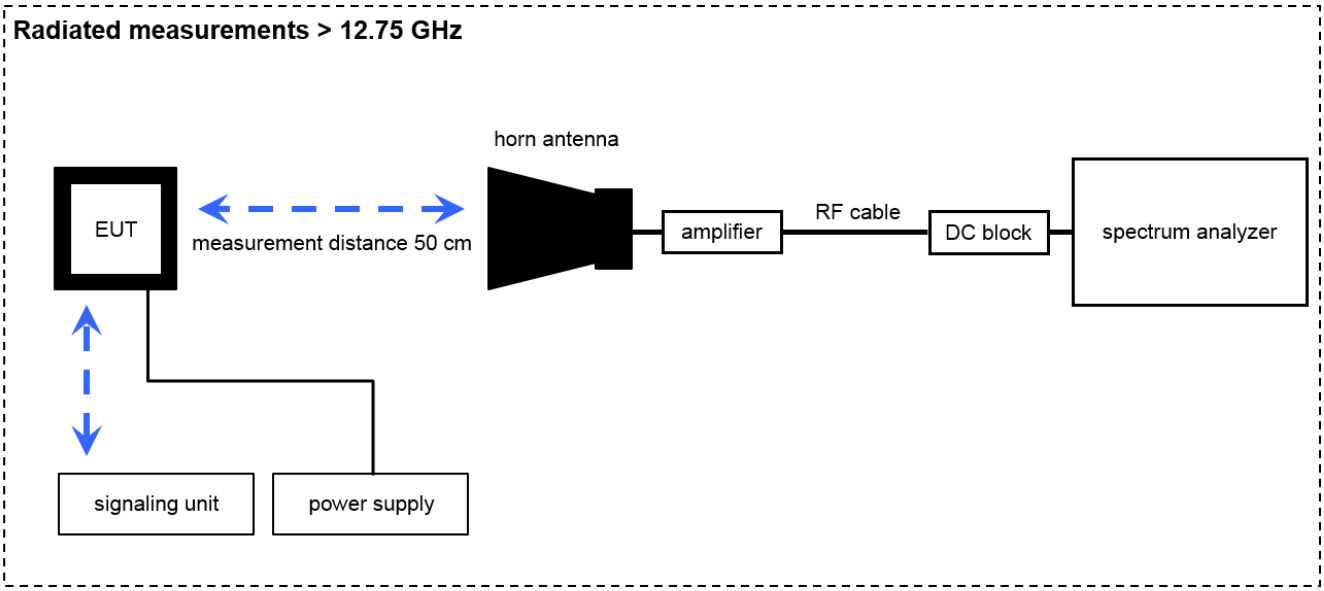
SS = U_R + CA + AF
(SS-signal strength; U_R-voltage at the receiver; CA-loss of the signal path; AF-antenna factor)

Example calculation:
SS [dBµV/m] = 40.0 [dBµV/m] + (-35.8) [dB] + 32.9 [dBµV/m] = 37.1 [dBµV/m] (71.61 µV/m)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A,C	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	9709-5290	300000212	k	23.07.2015	23.07.2017
2	A,B	EMI Test Receiver 20Hz- 26,5GHz	ESU26	R&S	100037	300003555	k	22.01.2015	22.01.2016
3	A,C	Highpass Filter	WHK1.1/15G-10SS	Wainwright	37	400000148	ne	22.04.2014	22.04.2017
4	A	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne	-/-	-/-
5	A	Band Reject Filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	26	300003792	ne	-/-	-/-
6	A	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	318	300003696	k	22.04.2014	22.04.2017
7	A,C	Broadband Amplifier 0.5-18 GHz	CBLU5184540	CERNEX	22050	300004482	ev	-/-	-/-
8	A	Broadband Amplifier	CBLU5135235	CERNEX	22011	300004492	ev	-/-	-/-
9	A,C	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000032	300004510	ne	-/-	-/-
10	A,B,C	Messrechner und Monitor	Intel Core i3 3220/3,3 GHz, Prozessor	Agilent Technologies	2V2403033A5421	300004591	ne	-/-	-/-
11	A,B,C	NEXIO EMV-Software	BAT EMC	EMCO	2V2403033A5421	300004682	ne	-/-	-/-
12	B	Active Loop Antenna 10 kHz to 30 MHz	6502	Kontron Psychotech	8905-2342	300000256	k	24.06.2015	24.06.2017

7.3 Radiated measurements > 12.75 GHz



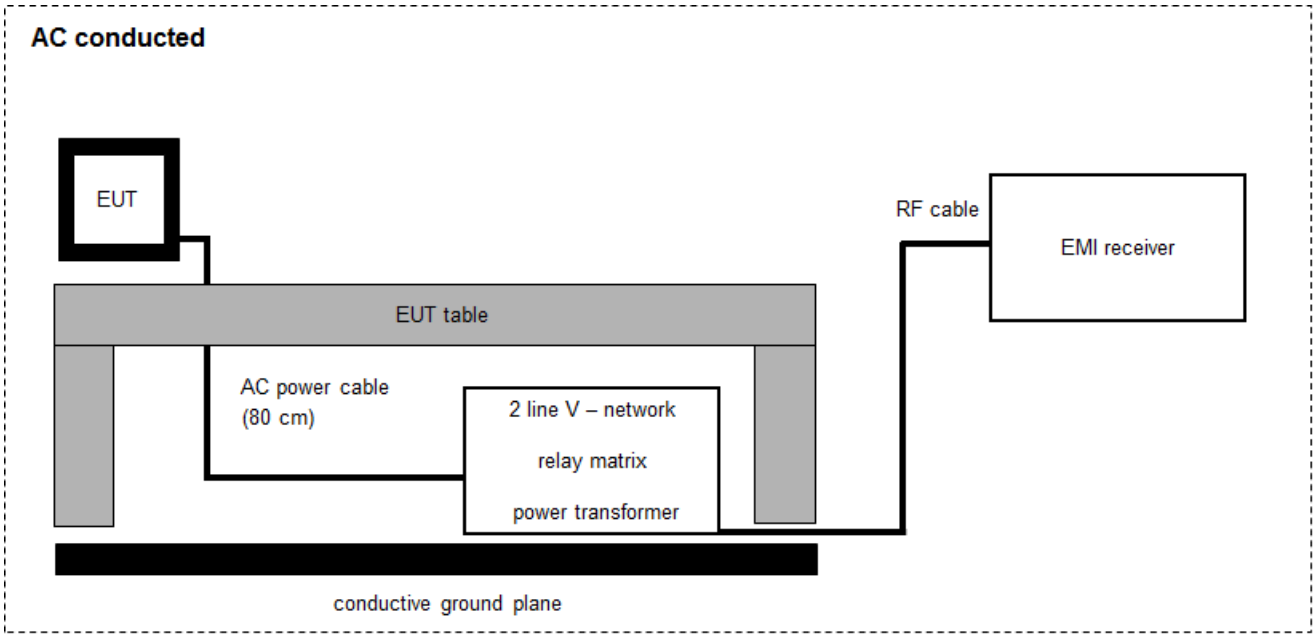
$SS = U_R + CA + AF$
(SS-signal strength; U_R-voltage at the receiver; CA-loss signal path & distance correction; AF-antenna factor)

Example calculation:
SS [dBµV/m] = 40.0 [dBµV/m] + (-60.1) [dB] + 36.74 [dBµV/m] = 16.64 [dBµV/m] (6.79 µV/m)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda	8402	300000787	k	22.07.2013	22.07.2015
2	A	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	8205	300002442	k	19.07.2013	19.07.2015
3	A	Std. Gain Horn Antenna 26.5-40.0 GHz	V637	Narda	7911	300001751	k	19.07.2013	19.07.2015
4	A	Std. Gain Horn Antenna 33.0-50.1 GHz	2324-20	Flann	57	400000683	ne		
5	A	Broadband Low Noise Amplifier 18-50 GHz	CBL18503070-XX	CERNEX	19338	300004273	k	22.01.2015	22.01.2016
6	A	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP	00419	300002268	ev	22.01.2015	22.01.2016
7	A	Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443	Ve	02.10.2014	02.10.2016
8	A	RF-Cable	ST18/SMAm/SMAm/48	Huber & Suhner	Batch no. 600918	400001182	ev	-/-	-/-
9	A	RF-Cable	ST18/SMAm/SMm/48	Huber & Suhner	Batch no. 127377	400001183	ev	-/-	-/-
10	A	DC-Blocker 0.1-40 GHz	8141A	Inmet	Batch no. 127377	400001185	ev	-/-	-/-

7.4 AC conducted



SS = UR + CF + VC
(SS-signal strength; UR-voltage at the receiver; CR-loss of the cable and filter; VC-correction factor of the ISN)

Example calculation:
SS [dBµV/m] = 37.62 [dBµV/m] + 9.90 [dB] + 0.23 [dB] = 47.75 [dBµV/m] (244.06 µV/m)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A,B	Netznachbildung	ESH3-Z5	R&S	892475/017	300002209	k	17.06.2014	17.06.2016
2	A,B	RF-Filter-section	85420E	HP	3427A00162	300002214	k	27.11.2006	-/-
3	A,B	EMI-Receiver	8542E	HP	3617A00170	300000568	k	28.01.2015	28.01.2016
4	B	Laptop (Customer)	X961D A00	Dell	CP8207030117-OLE42-OLH-AT4-C	-/-	-/-	-/-	-/-

8 Measurement uncertainty

Measurement uncertainty	
Test case	**Uncertainty**
Maximum output power	± 1.5 dB
Occupied bandwidth	± span/1000
Spurious emissions radiated below 30 MHz	± 3 dB
Spurious emissions radiated 30 MHz to 1 GHz	± 3 dB
Spurious emissions radiated 1 GHz to 12.75 GHz	± 3.7 dB
Spurious emissions radiated above 12.75 GHz	± 4.5 dB
Spurious emissions conducted below 30 MHz (AC conducted)	± 2.6 dB

9 Sequence of testing

9.1 Sequence of testing 9 kHz to 30 MHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a 2-axis positioner with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna height is 1.5 m.
- At each turntable position the analyzer sweeps with positive-peak detector to find the maximum of all emissions.

Final measurement

- Identified emissions during the premeasurement are maximized by the software by rotating the turntable from 0° to 360°. In case of the 2-axis positioner is used the elevation axis is also rotated from 0° to 360°.
- The final measurement is done in the position (turntable and elevation) causing the highest emissions with quasi-peak (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. A plot with the graph of the premeasurement and the limit is stored.

9.2 Sequence of testing 30 MHz to 1 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 10 m or 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 m to 3 m.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable position ± 45° and antenna height between 1 and 4 m.
- The final measurement is done with quasi-peak detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

9.3 Sequence of testing 1 GHz to 12.75 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a 2-axis positioner with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height is 1.5 m.
- At each turntable position and antenna polarization the analyzer sweeps with positive peak detector to find the maximum of all emissions.

Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximizes the peaks by rotating the turntable from 0° to 360°. This measurement is repeated for different EUT-table positions (0° to 150° in 30°-steps) and for both antenna polarizations.
- The final measurement is done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

9.4 Sequence of testing above 12.75 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet.
- The measurement distance is as appropriate (e.g. 0.5 m).
- The EUT is set into operation.

Premeasurement

- The test antenna is handheld and moved carefully over the EUT to cover the EUT's whole sphere and different polarizations of the antenna.

Final measurement

- The final measurement is performed at the position and antenna orientation causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement and the limit is stored.

10 Summary of measurement results

☒	**No deviations from the technical specifications were ascertained**
☐	There were deviations from the technical specifications ascertained

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	FCC 47 CFR Part 15	Passed	2015-09-30	-/-

Test specification clause	Test case	Temperature conditions	Power supply	Pass	Fail	NA	NP	Results (max.)
§15.511(e)	E.I.R.P	Nominal	Nominal	☒	☐	☐	☐	-31.4 dBm
§2.1049 §15.503(a)	Occupied bandwidth (10dB bandwidth)	Nominal	Nominal	☒	☐	☐	☐	780 MHz
§15.511(c) (d) §15.209(a)	Radiated Spurious emissions	Nominal	Nominal	☒	☐	☐	☐	complies
§15.207(a) ICES-003	AC Conducted emissions < 30 MHz	Nominal	Nominal	☒	☐	☐	☐	complies

Note: NA = Not Applicable; NP = Not Performed

11 Measurement results

11.1 E.I.R.P.

Description and Limit: **CFR Part 15.511(e)**

(e) There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, f_M. That limit is 0 dBm EIRP. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in §15.521.

Measurement:

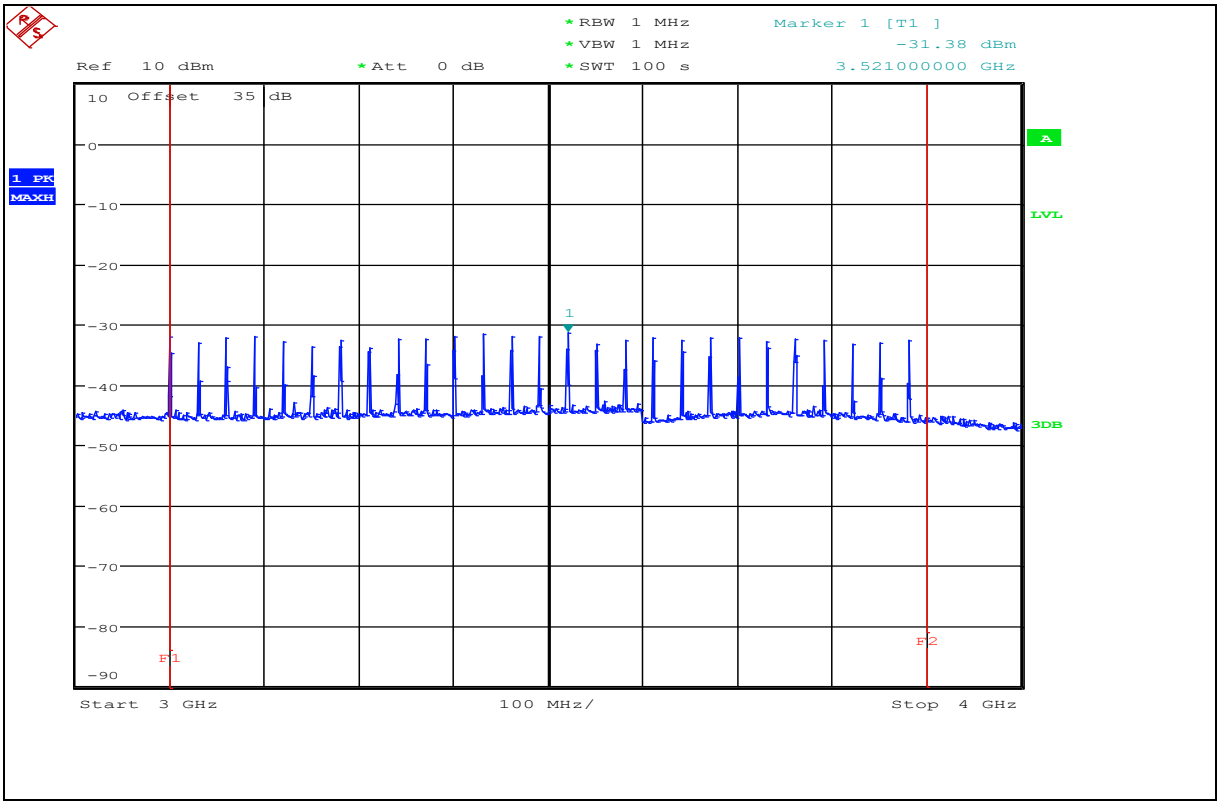
Measurement parameter	
Detector:	Pos-Peak
Sweep time:	Auto
Resolution bandwidth:	1 MHz
Video bandwidth:	≥ RBW
Span:	1 GHz
Trace-Mode:	Max Hold

Measurement results:

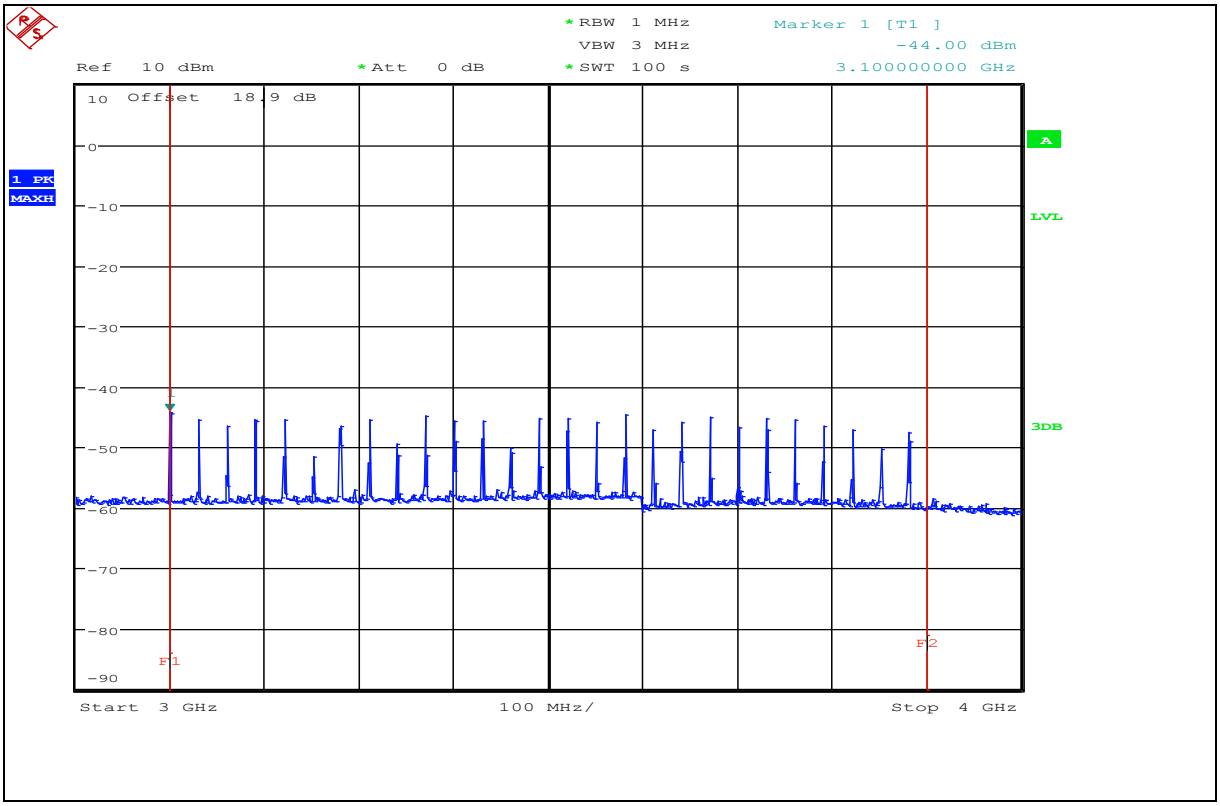
Test conditions T_{nom} / V_{nom}	E.I.R.P. [MHz]
MicroPolar Moist (LB 568-01) @ Horn antenna	-31.4
MicroPolar Moist (LB 568-01) @ Spiral antenna	-44.0
MicroPolar Moist (LB 568-01) @ Flow cell sensors	Noise floor

Result: **The measurement is passed.**

Plot 1: MicroPolar Moist (LB 568-01), EIRP @ Horn antenna



Plot 2: MicroPolar Moist (LB 568-01), EIRP @ Spiral antenna



11.2 Occupied Bandwidth

Description:

(a) UWB bandwidth. For the purpose of this subpart, the UWB bandwidth is the frequency band bounded by the points that are 10 dB below the highest radiated emission, as based on the complete transmission system including the antenna. The upper boundary is designated f_H and the lower boundary is designated f_L. The frequency at which the highest radiated emission occurs is designated f_M.

Measurement:

Measurement parameter	
Detector:	Pos-Peak
Sweep time:	Auto
Resolution bandwidth:	1 MHz
Video bandwidth:	≥ RBW
Span:	1 GHz
Trace-Mode:	Max Hold

Result:

Test condition	10 dB Occupied Bandwidth [MHz]
T_{nom} / V_{nom}	780
Measurement uncertainty	±span/1000

DUT uses stepped CW consisting of 27 frequency steps from 3.101 GHz to 3.881 GHz.

Result: The measurement is passed.

11.3 Radiated spurious emissions

Description and Limit: **CFR Part 15.511(c) (d)**

c) The radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in §15.209. The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

Measurement:

Measurement parameter	
Detector:	F < 960 MHz: Quasi Peak F > 960 MHz: Average
Sweep time:	100s
Video bandwidth:	Auto
Resolution bandwidth:	F < 960 MHz: 100 kHz F > 960 MHz: 1 MHz
Frequency range:	30 MHz to 100 GHz
Trace-Mode:	Max Hold

Limits:

CFR Part 15.209(a)		
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.		
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 88	30.0	10
88 – 216	33.5	10
216 – 960	36.0	10

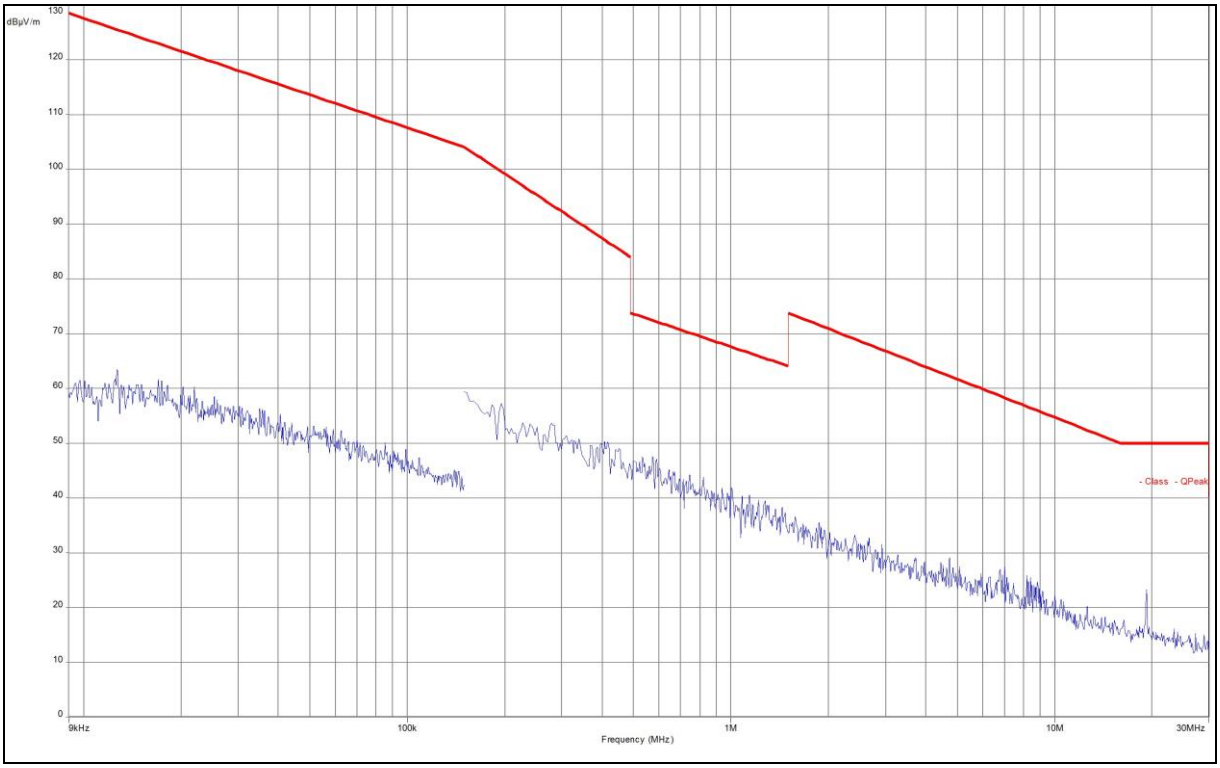
Frequency (MHz)	E.I.R.P in dBm
960 – 1610	-53.3
1610 – 1990	-51.3
1990 – 10600	-41.3
Above 10600	-51.3

(d) In addition to the radiated emission limits specified in the table in paragraph (c) of this section, UWB transmitters operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of no less than 1 kHz:

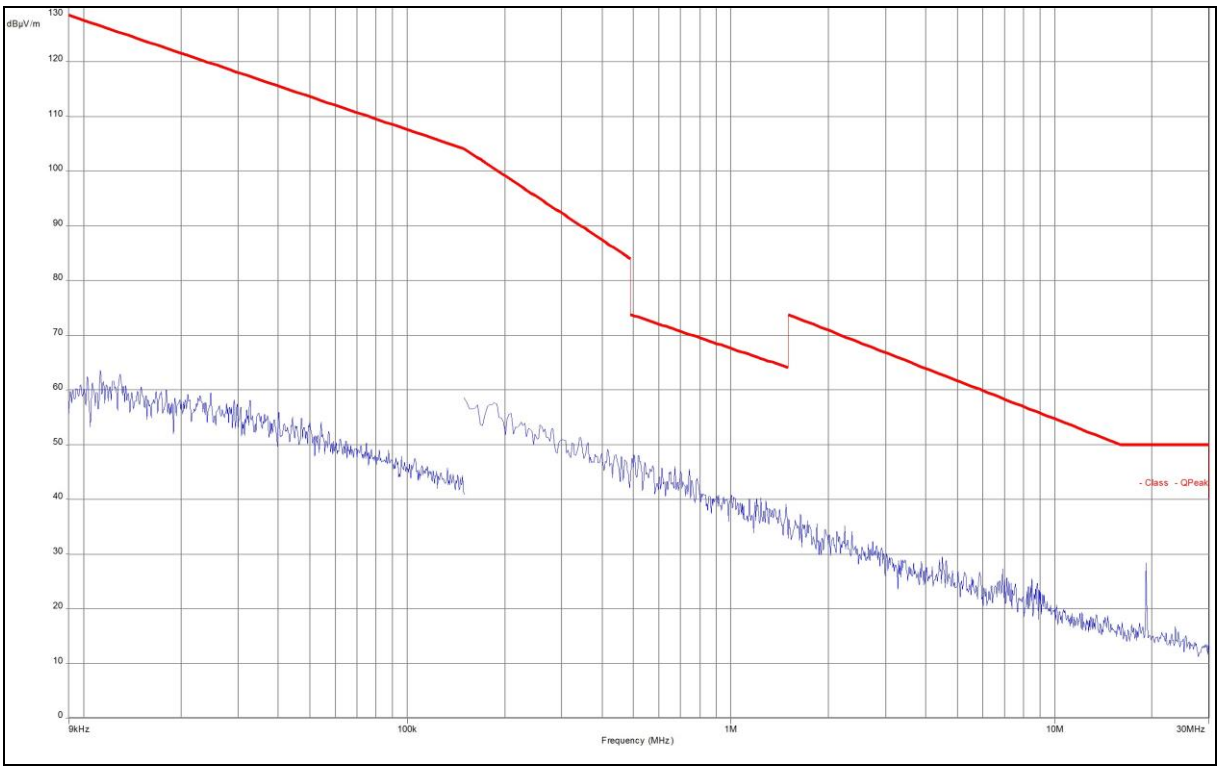
Frequency (MHz)	E.I.R.P in dBm
1164 – 1240	-63.3
1559 – 1610	-63.3

Result: The measurement is passed.

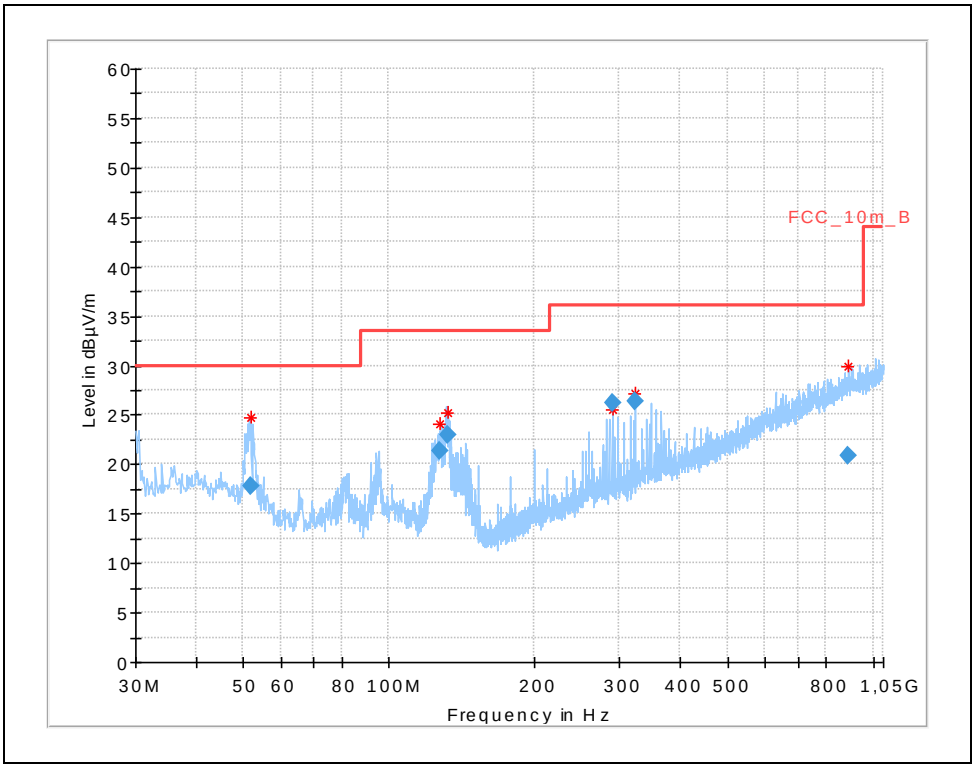
Plot 3: MicroPolar Moist AC-powered (LB 568-01) with all antennas, Magnetic



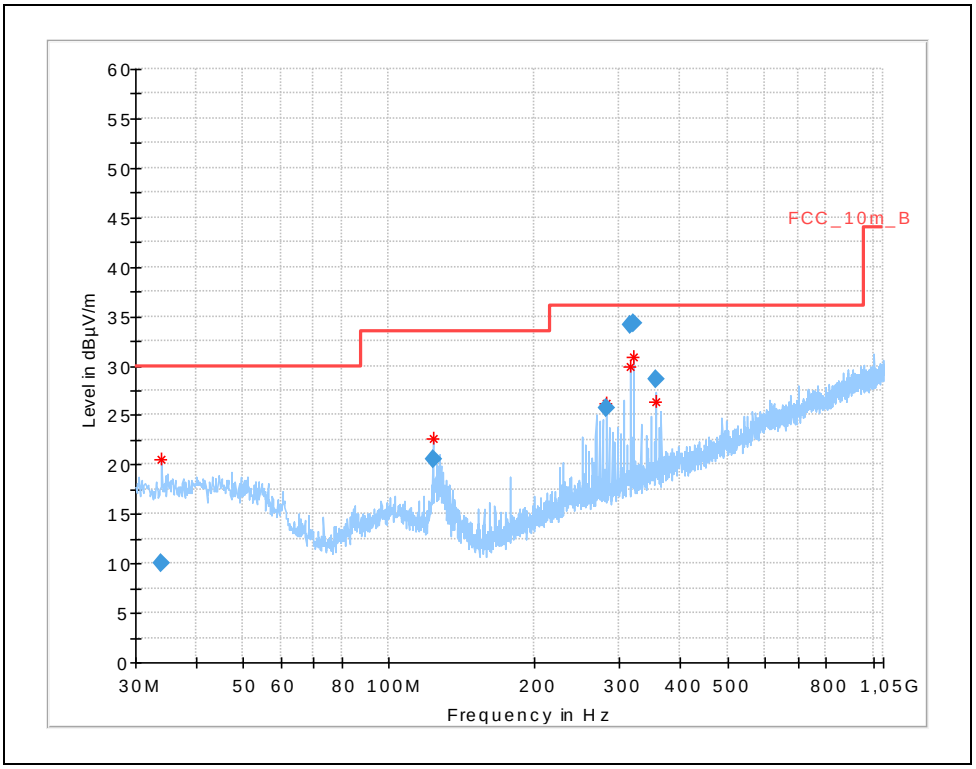
Plot 4: MicroPolar Moist DC-powered (LB 568-02) with all antennas, Magnetic



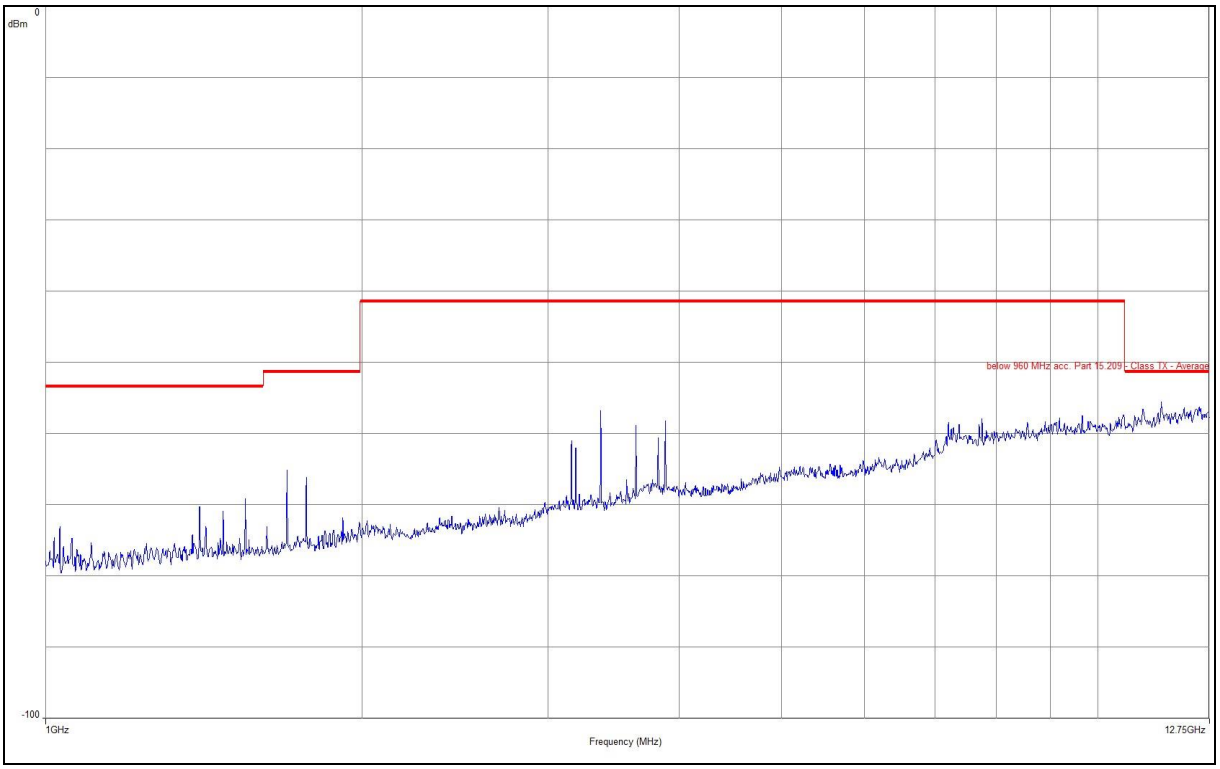
Plot 5: MicroPolar Moist AC-powered (LB 568-01) with all antennas, 30 MHz to 1 GHz, horizontal/vertical polarization



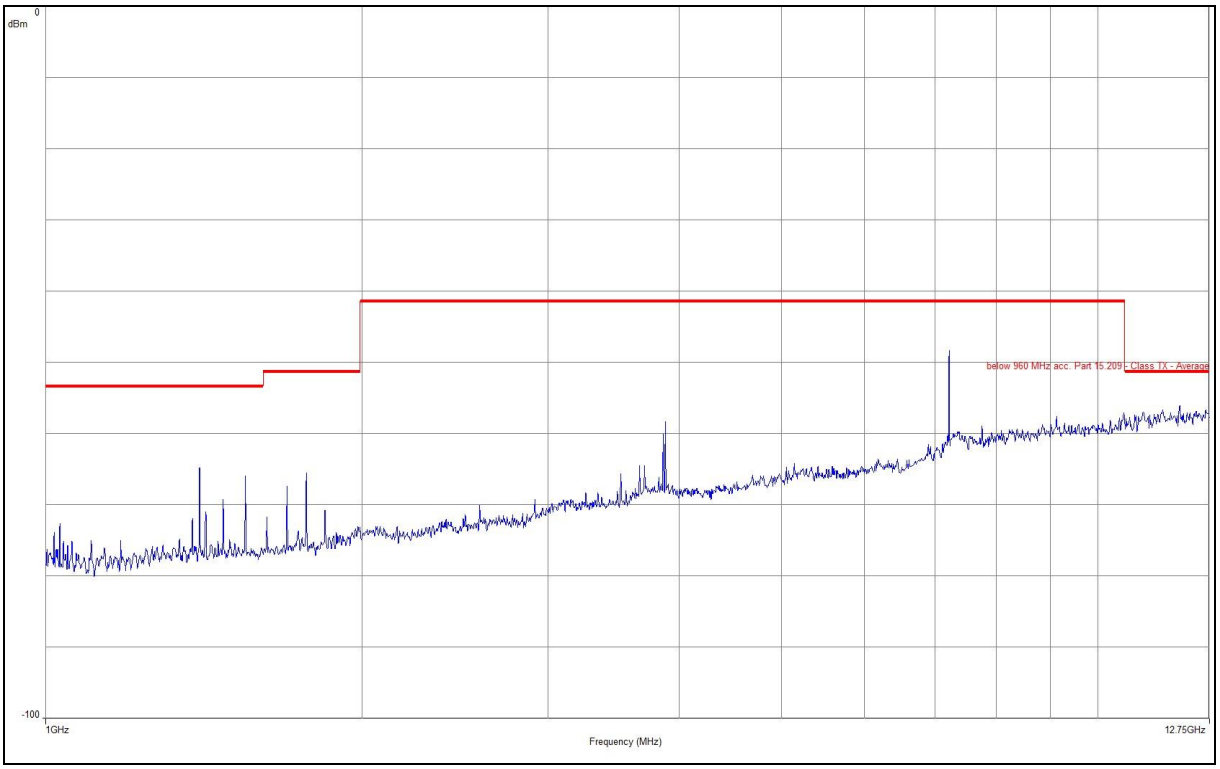
Plot 6: MicroPolar Moist DC-powered (LB 568-02) with all antennas, 30 MHz to 1 GHz, horizontal/vertical polarization



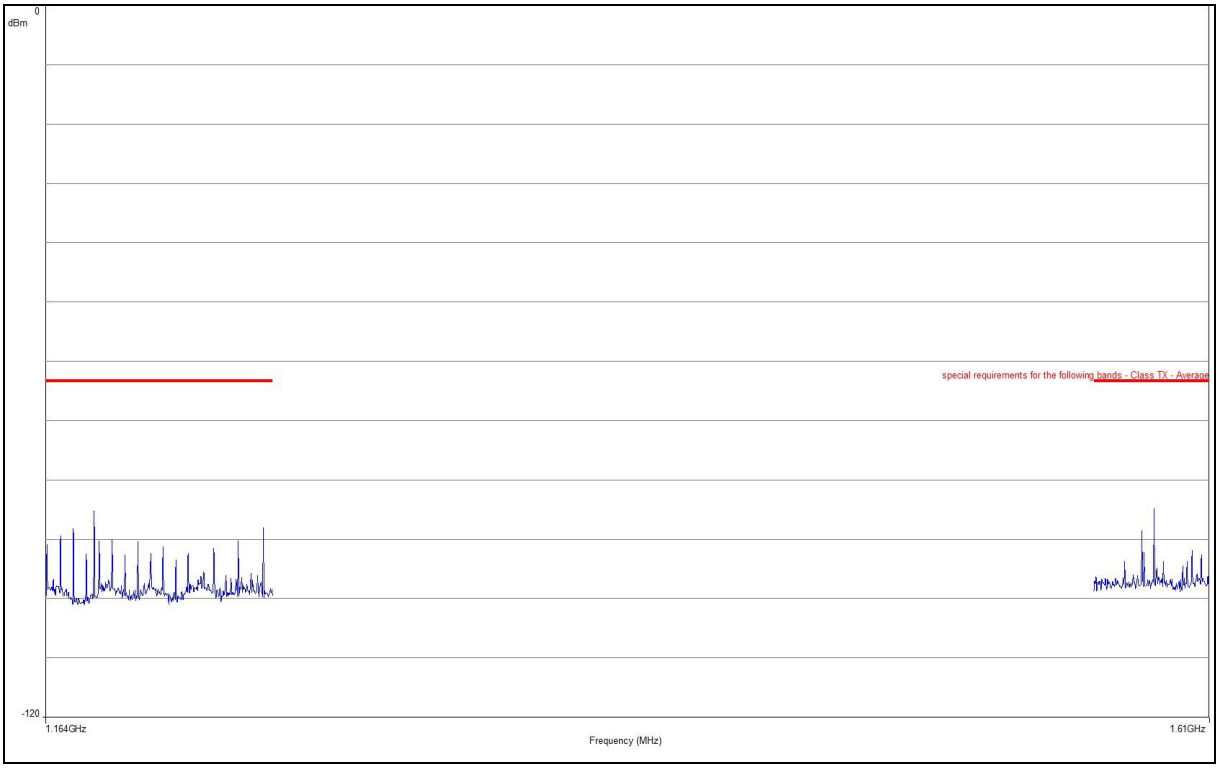
Plot 7: MicroPolar Moist AC-powered (LB 568-01) with all antennas, 1 GHz to 12 GHz, horizontal/vertical polarization



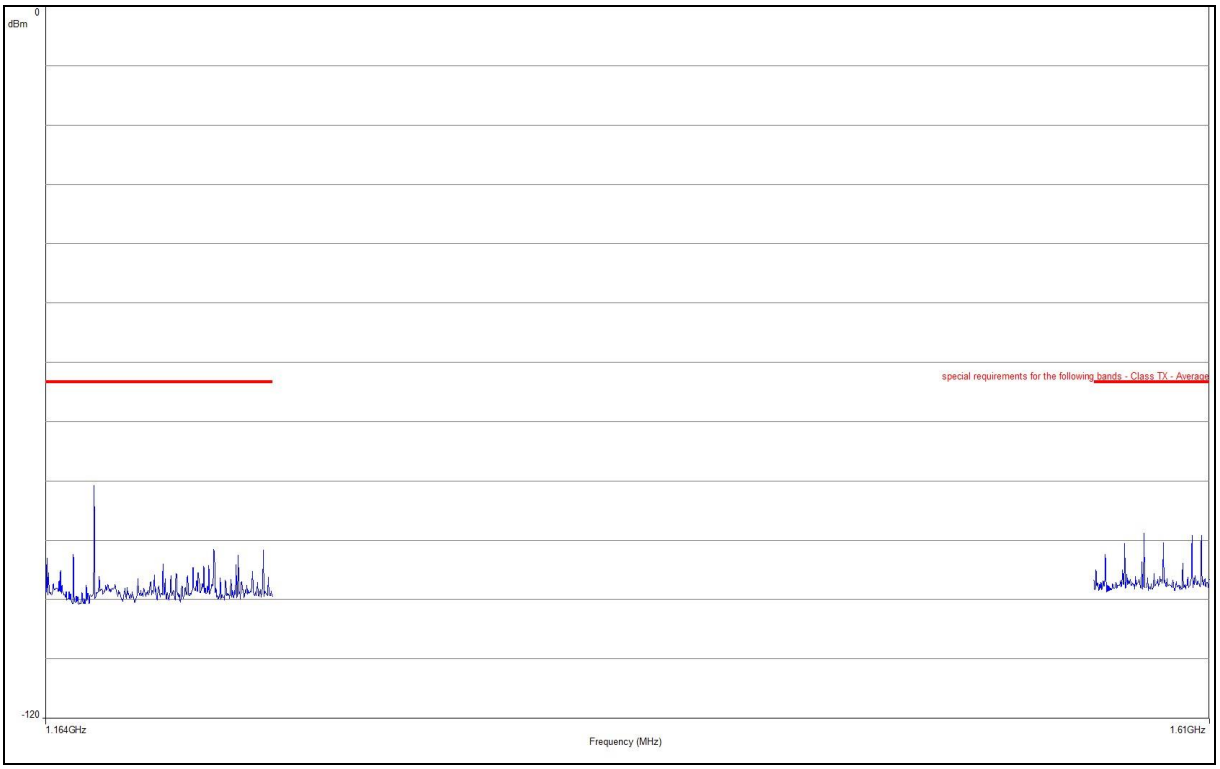
Plot 8: MicroPolar Moist DC-powered (LB 568-02) with all antennas, 1 GHz to 12 GHz, horizontal/vertical polarization



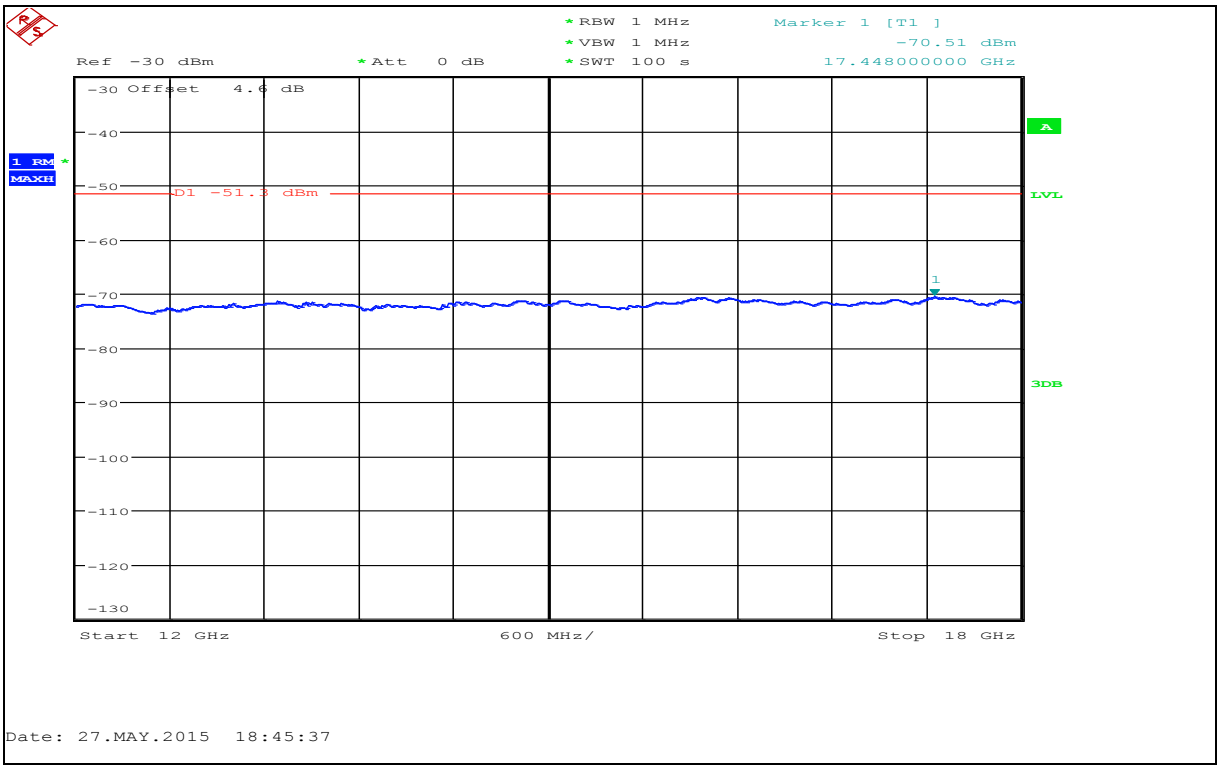
Plot 9: MicroPolar Moist AC-powered (LB 568-01) with all antennas, 1164-1240 MHz and 1559-1610 MHz, horizontal/vertical polarization



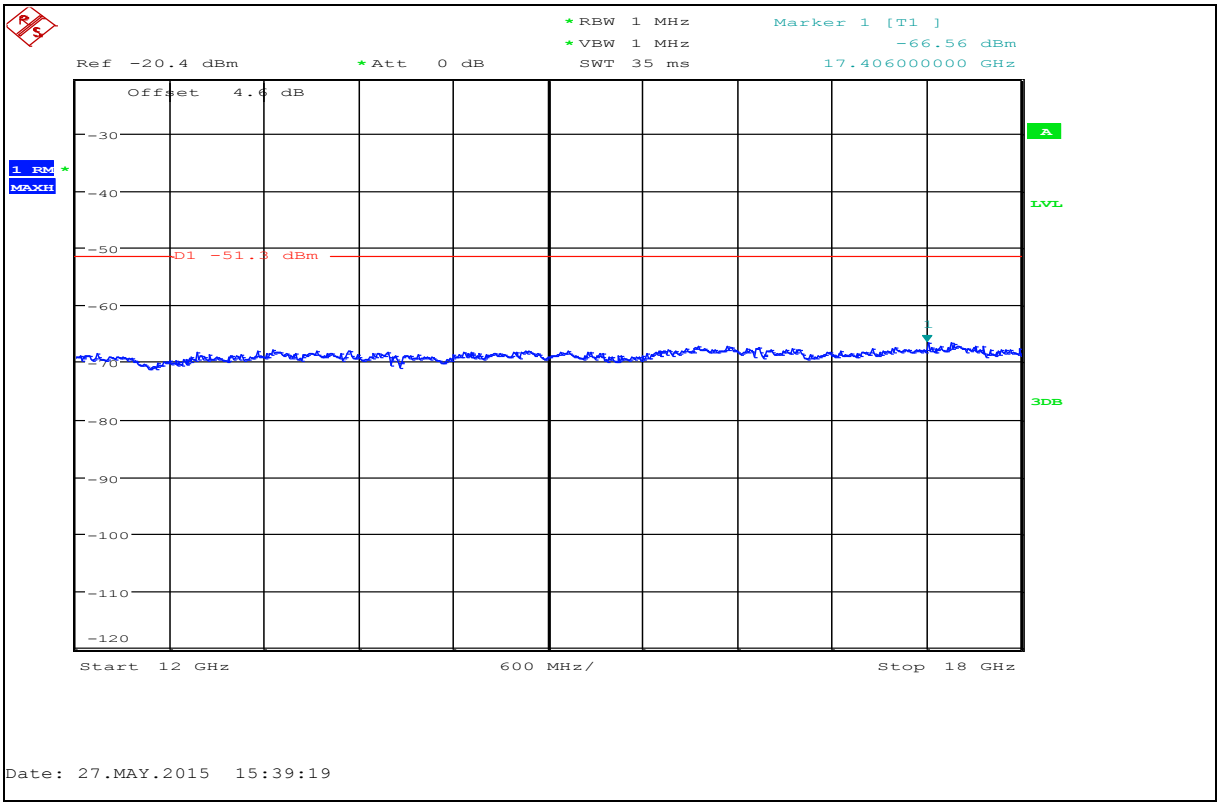
Plot 10: MicroPolar Moist DC-powered (LB 568-02) with all antennas, 1164-1240 MHz and 1559-1610 MHz, horizontal/vertical polarization



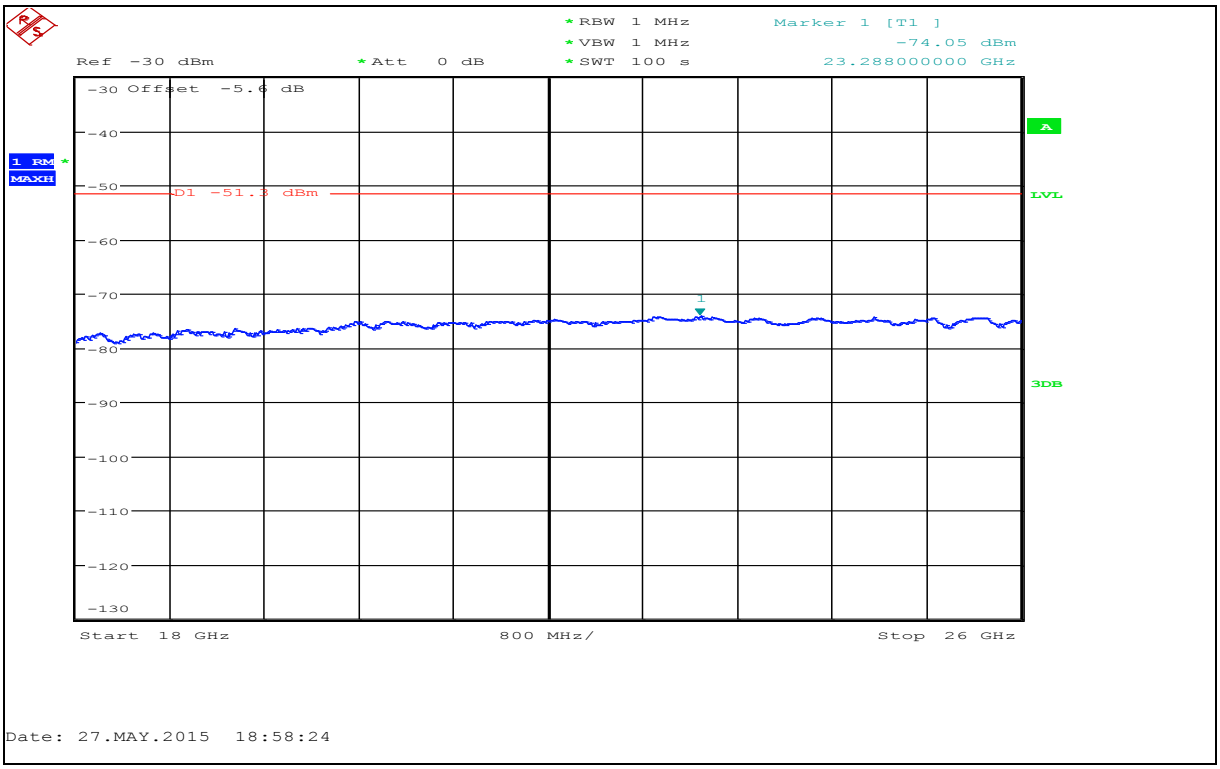
Plot 11: MicroPolar Moist AC-powered (LB 568-01) with all antennas, 12 GHz – 18 GHz, horizontal/vertical polarization



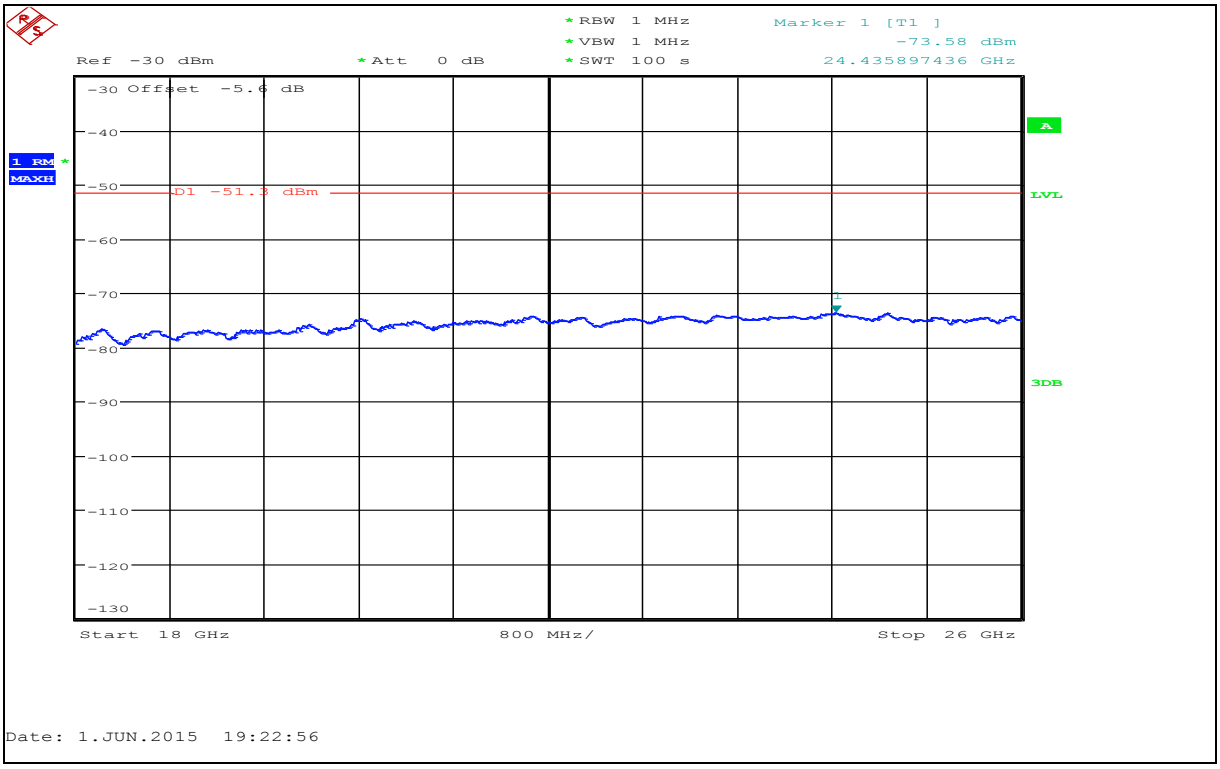
Plot 12: MicroPolar Moist DC-powered (LB 568-02) with all antennas, 12 GHz – 18 GHz, horizontal/vertical polarization



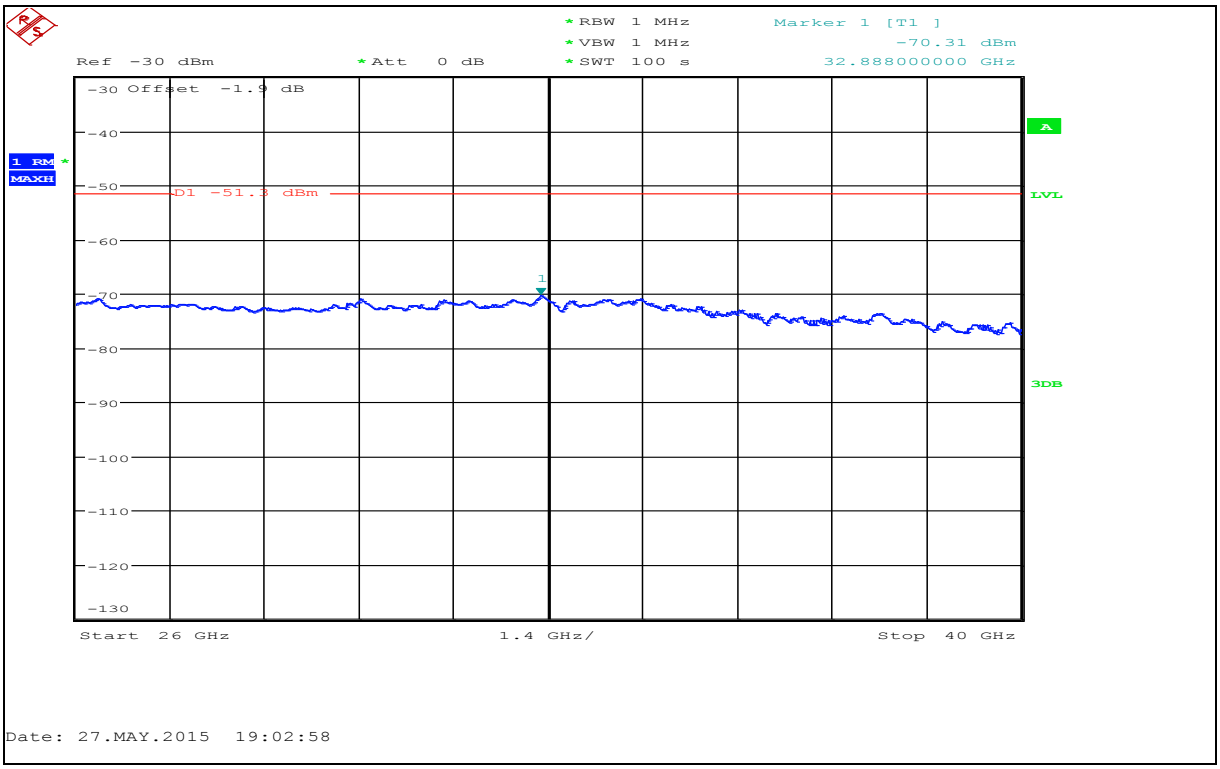
Plot 13: MicroPolar Moist AC-powered (LB 568-01) with all antennas, 18 GHz – 26 GHz, horizontal/vertical polarization



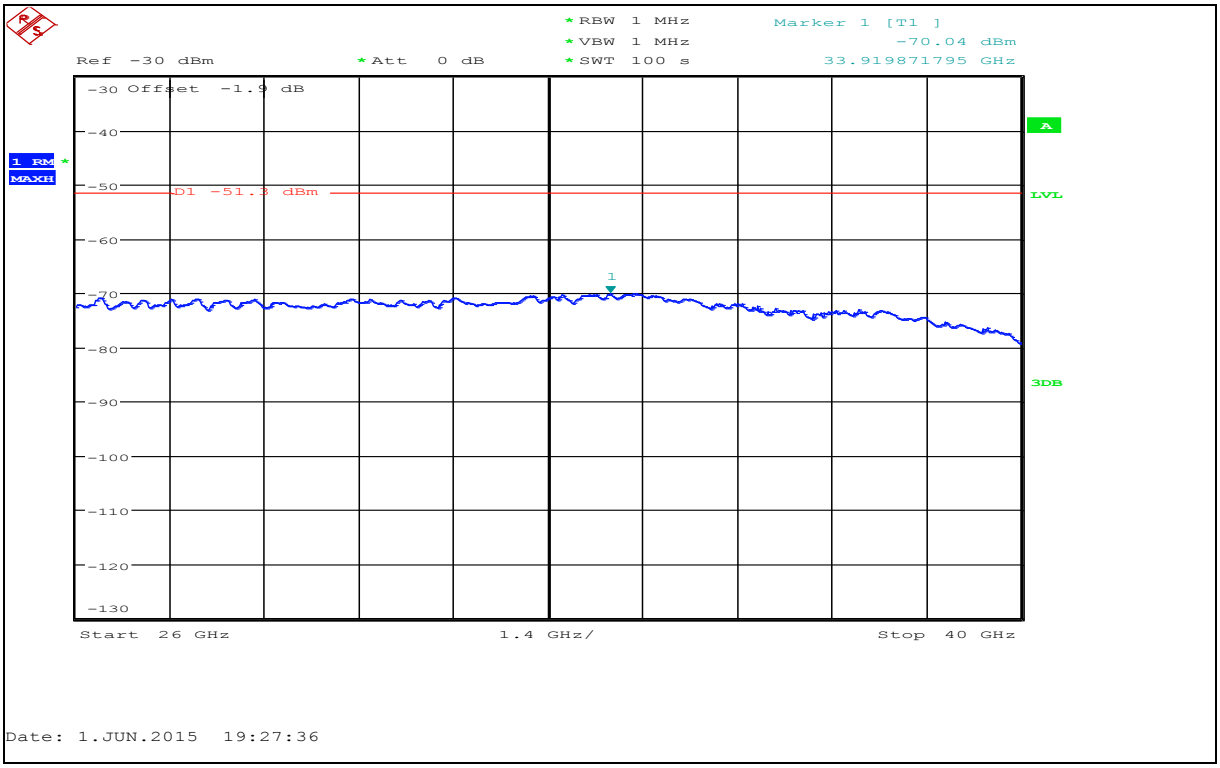
Plot 14: MicroPolar Moist DC-powered (LB 568-02) with all antennas, 18 GHz – 26 GHz, horizontal/vertical polarization



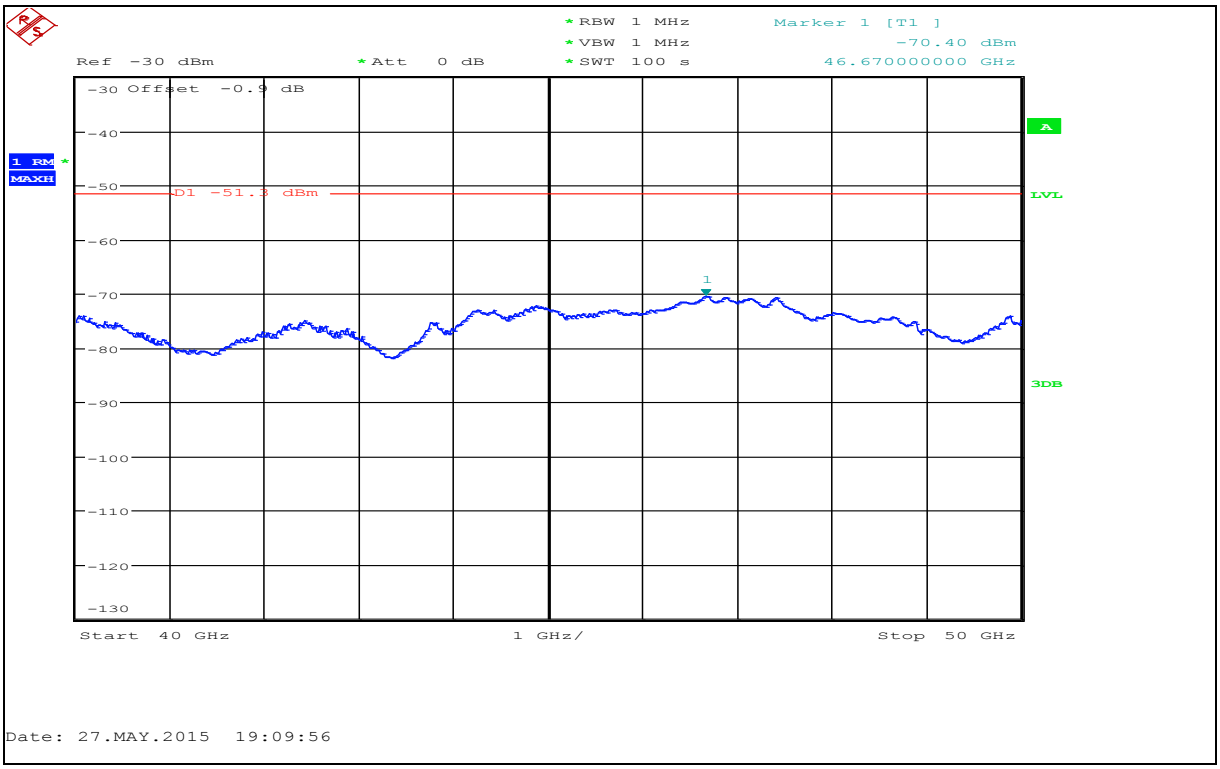
Plot 15: MicroPolar Moist AC-powered (LB 568-01) with all antennas, 26 GHz – 40 GHz, horizontal/vertical polarization



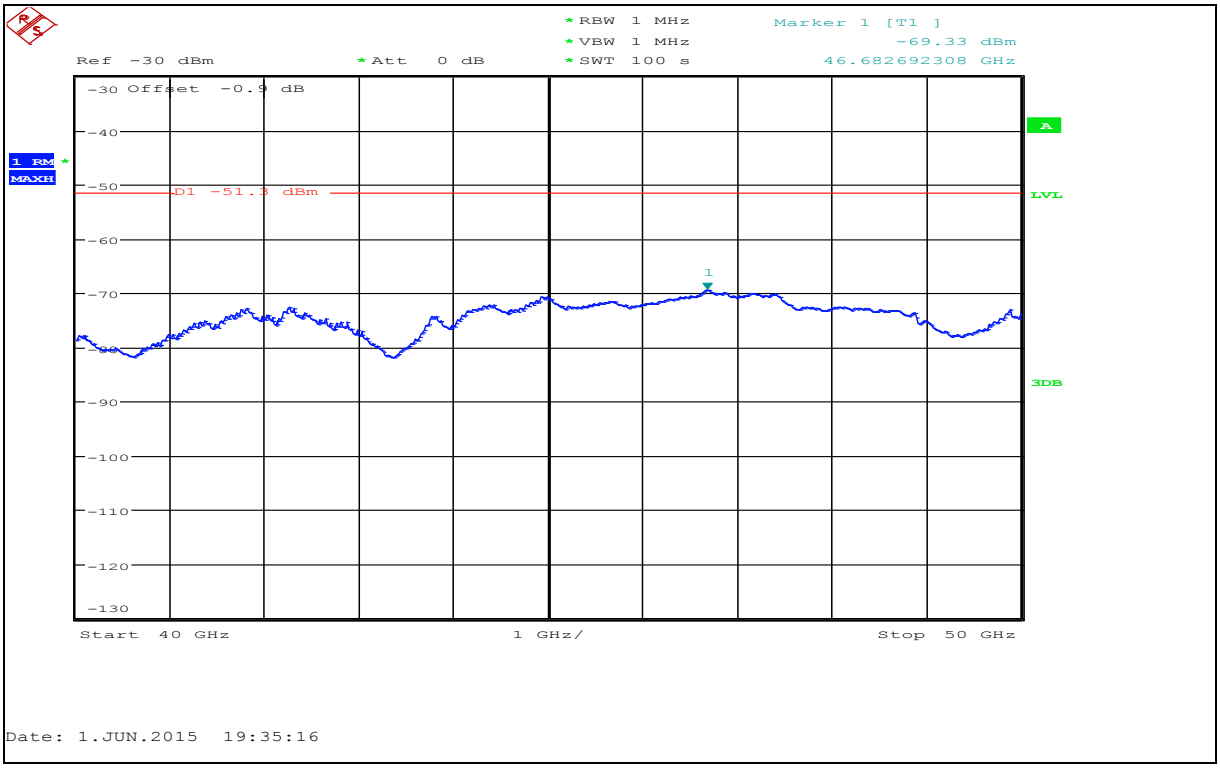
Plot 16: MicroPolar Moist DC-powered (LB 568-02) with all antennas, 26 GHz – 40 GHz, horizontal/vertical polarization



Plot 17: MicroPolar Moist AC-powered (LB 568-01) with all antennas, 40 GHz – 50 GHz, horizontal/vertical polarization



Plot 18: MicroPolar Moist DC-powered (LB 568-02) with all antennas, 40 GHz – 50 GHz, horizontal/vertical polarization



11.4 AC Conducted spurious emissions < 30 MHz

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. Both power lines, phase and neutral line, are measured. Found peaks are re-measured with average and quasi peak detection to show compliance to the limits.

Measurement:

Measurement parameter	
Detector:	Peak - Quasi Peak / Average
Sweep time:	Auto
Video bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Resolution bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace-Mode:	Max Hold

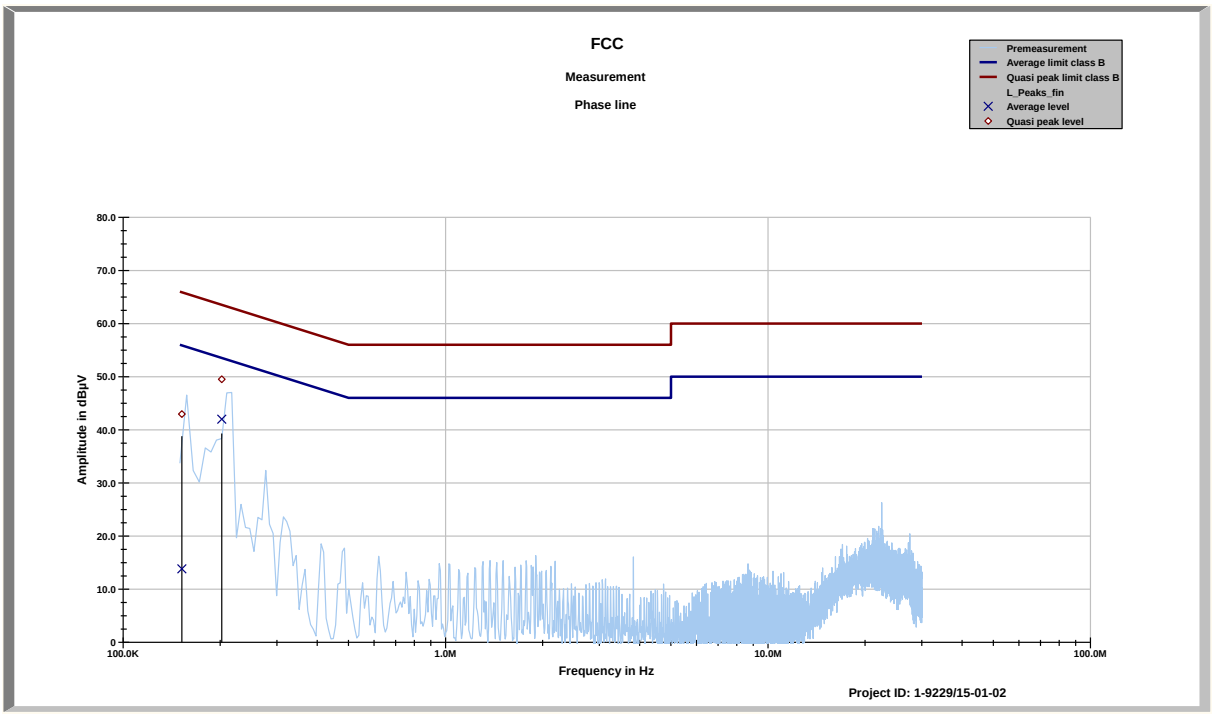
Limits:

FCC		
CFR Part 15.207(a)		
Conducted Spurious Emissions < 30 MHz		
Frequency (MHz)	Quasi-Peak (dBµV/m)	Average (dBµV/m)
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30.0	60	50

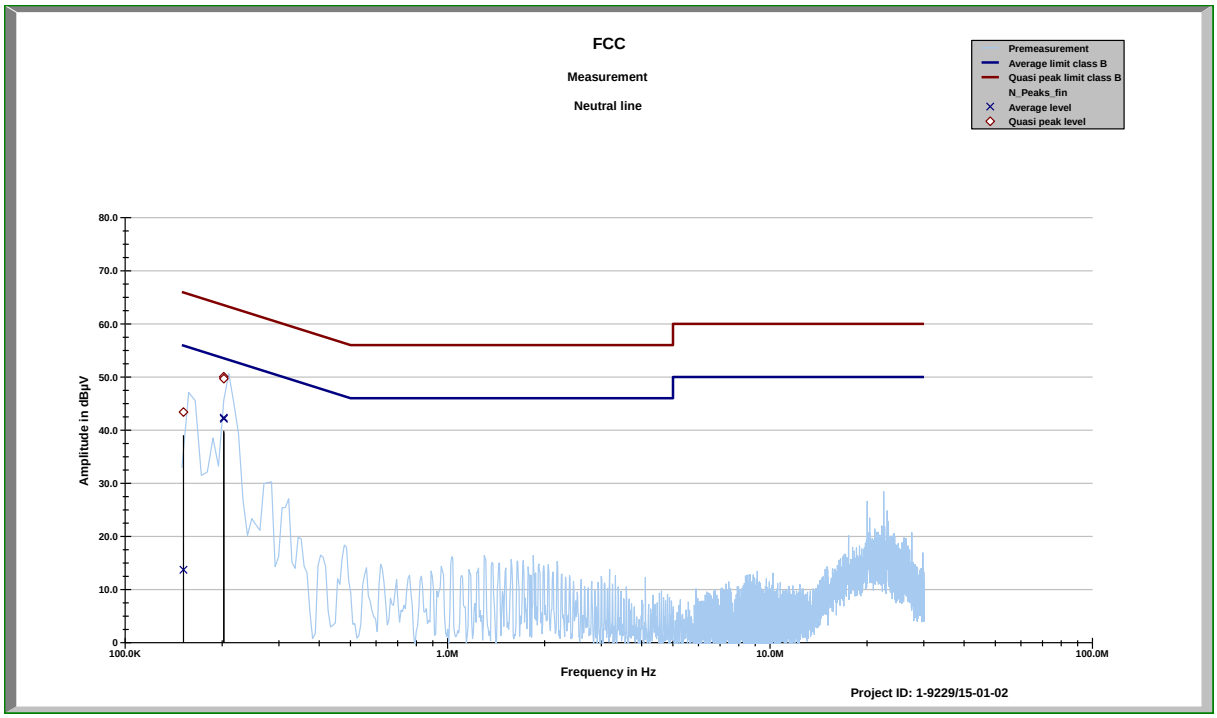
*Decreases with the logarithm of the frequency

Result: **The measurement is passed.**

Plot 19: Phase line (LB 568-01)



Plot 20: Neutral line (LB 568-01)



12 Observations

No observations except those reported with the single test cases have been made.

Annex A Document history

Version	Applied changes	Date of release
1.0	Initial release	2015-09-30

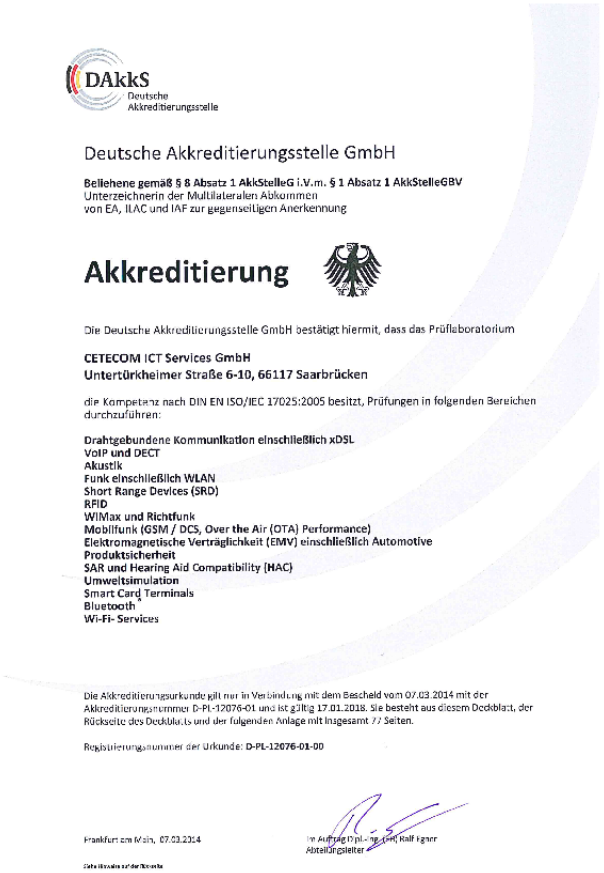
Annex B Further information

Glossary

AVG - Average
DUT - Device under test
EMC - Electromagnetic Compatibility
EN - European Standard
EUT - Equipment under test
ETSI - European Telecommunications Standard Institute
FCC - Federal Communication Commission
FCC ID - Company Identifier at FCC
HW - Hardware
IC - Industry Canada
Inv. No. - Inventory number
N/A - Not applicable
PP - Positive peak
QP - Quasi peak
S/N - Serial number
SW - Software

Annex C Accreditation Certificate

Front side of certificate



DAkkS
Deutsche Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

Beliehene gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV
Unterzeichnerin der Multilateralen Abkommen
von EA, ILAC und IAF zur gegenseitigen Anerkennung

Akkreditierung

Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

CETECOM ICT Services GmbH
Untertürkheimer Straße 6-10, 66117 Saarbrücken

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen:

Drahtgebundene Kommunikation einschließlich xDSL
VoIP und DECT
Akustik
Funk einschließlich WLAN
Short Range Devices (SRD)
RFID
WiMax und Richtfunk
Mobilfunk (GSM / DCS, Over the Air (OTA) Performance)
Elektromagnetische Verträglichkeit (EMV) einschließlich Automotive
Produktsicherheit
SAR und Hearing Aid Compatibility (HAC)
Umweltsimulation
Smart Card Terminals
Bluetooth
Wi-Fi- Services

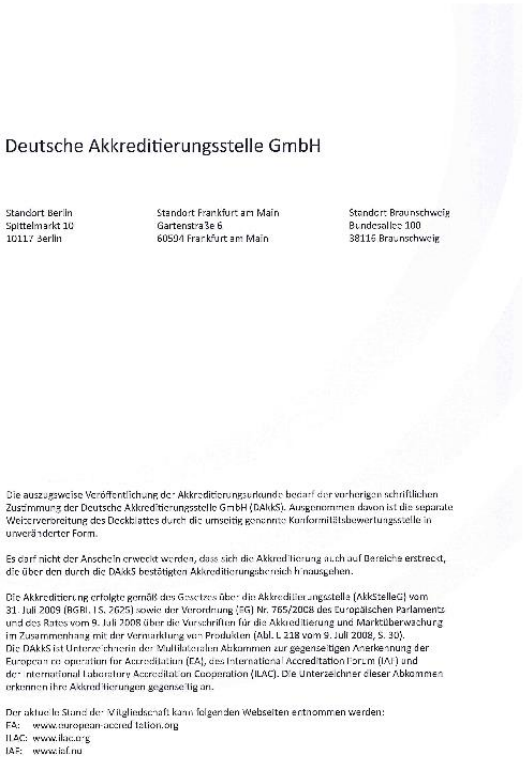
Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Bescheid vom 07.03.2014 mit der Akkreditierungsnummer D-PL-12076-01 und ist gültig 17.01.2018. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 77 Seiten.

Registrierungsnummer der Urkunde: **D-PL-12076-01-00**

Frankfurt am Main, 07.03.2014

Im Auftrag Dipl.-Ing. (FH) Rolf Egner
Abteilungsleiter

Back side of certificate



Deutsche Akkreditierungsstelle GmbH

Standort Berlin
Spittelmarkt 10
10117 Berlin

Standort Frankfurt am Main
Gartenstraße 6
60594 Frankfurt am Main

Standort Braunschweig
Bundesallee 100
38116 Braunschweig

Die auszugsweise Veröffentlichung der Akkreditierungsurkunde bedarf der vorherigen schriftlichen Zustimmung der Deutsche Akkreditierungsstelle GmbH (DAkkS). Ausgenommen davon ist die separate Weiterverbreitung des Deckblattes durch die umseitig genannte Konformitätsbewertungsstelle in unveränderter Form.

Es darf nicht der Anschein erweckt werden, dass sich die Akkreditierung auch auf Bereiche erstreckt, die über den durch die DAkkS bestätigten Akkreditierungsbereich hinausgehen.

Die Akkreditierung erfolgte gemäß des Gesetzes über die Akkreditierungsstelle (AkkStelleG) vom 31. Juli 2009 (BGBl. I S. 2625) sowie der Verordnung (EG) Nr. 765/2008 des Europäischen Parlaments und des Rates vom 9. Juli 2008 über die Vorschriften für die Akkreditierung und Marktüberwachung im Zusammenhang mit der Vermarktung von Produkten (Abl. L 218 vom 9. Juli 2008, S. 30).
Die DAkkS ist Unterzeichnerin der Multilateralen Abkommen zur gegenseitigen Anerkennung der European co-operation for Accreditation (EA), des International Accreditation Forum (IAF) und der International Laboratory Accreditation Cooperation (ILAC). Die Unterzeichner dieser Abkommen erkennen ihre Akkreditierungen gegenseitig an.

Der aktuelle Stand der Mitgliedschaft kann folgenden Webseiten entnommen werden:
EA: www.european-accreditation.org
ILAC: www.ilac.org
IAF: www.iaf.nu

Note:

The current certificate including annex is published on our website (see link below) or may be received from CETECOM ICT Services on request.

http://www.cetecom.com/eu/de/cetecom-group/europa/deutschland-saarbruecken/akkreditierungen.html