**CETECOM™****CETECOM ICT Services**
consulting - testing - certification >>>

TEST REPORT

Test report no.: 1-9056/14-01-08-C

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

Poly-Control ApS

Gammel Stillingvej 427 C

8462 Harlev / DENMARK

Phone: -/-

Fax: -/-

Contact: Henning Overgaard

e-mail: ho@poly-control.com

Phone: +45 42 42 81 22

Manufacturer

Poly-Control ApS

Gammel Stillingvej 427 C

8462 Harlev / DENMARK

Test standard/s

47 CFR Part 15	Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices
RSS - 210 Issue 8	Spectrum Management and Telecommunications Radio Standards Specification - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment
RSS - 210 Issue 8 Amendment 1	RSS-210, Amendment 1 — Licence-Exempt, Low-Power Radio Apparatus Operating in the Television Bands (February 2015)

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

Test Item

Kind of test item:	Smartlock family of products
Model name:	DANALOCK
FCC ID:	2ADSH-DANALOCKV2U
IC:	12588A-DANALOCKV2U
Frequency:	ISM band 902 MHz to 928 MHz (lowest channel 908.4 MHz, highest channel 916.0 MHz)
Technology tested:	Z-Wave
Antenna:	Integrated PCB antenna
Power supply:	2.5 V to 3.6 V DC by Li battery
Temperature range:	+5°C to +35°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:



Marco Bertolino
Lab Manager
Radio Communications & EMC

Test performed:



Tobias Wittenmeier
Testing Manager
Radio Communications & EMC

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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.

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This test report replaces the test report with the number 1-9056/14-01-08-A and dated 2016-22-10

2.2 Application details

Date of receipt of order:	2015-11-20
Date of receipt of test item:	2015-10-26
Start of test:	2015-11-30
End of test:	2015-12-04
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	-/-	Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices
RSS - 210 Issue 8	December 2010	Spectrum Management and Telecommunications Radio Standards Specification - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment
RSS - 210 Issue 8 Amendment 1	February 2015	RSS-210, Amendment 1 — Licence-Exempt, Low-Power Radio Apparatus Operating in the Television Bands (February 2015)
RSS - Gen Issue 4	November 2014	Spectrum Management and Telecommunications Radio Standards Specifications - General Requirements and Information for the Certification of Radio Apparatus

3.1 Measurement guidance

Guidance	Version	Description
ANSI C63.4-2014	-/-	American national standard for methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz
ANSI C63.10-2013	-/-	American national standard of procedures for compliance testing of unlicensed wireless devices

4 Test environment

Temperature	:	T _{nom} T _{max} T _{min}	+22 °C during room temperature tests +35 °C during high temperature tests +5 °C during low temperature tests
Relative humidity content	:		55 %
Barometric pressure	:		not relevant for this kind of testing
Power supply	:	V _{nom} V _{max} V _{min}	3.0 V DC by Li battery 3.6 V 2.5 V

5 Test item

5.1 General description

Kind of test item	:	Smartlock family of products
Type identification	:	DANALOCK
HMN	:	-/-
PMN	:	DANALOCK
HVIN	:	DANALOCK V2-BTZU / DANALOCK V2-BTZU-K
FVIN	:	-/-
S/N serial number	:	Rad. 8 Cond. 6
HW hardware status	:	101-014_A1 & 101-022 (with Apple home kit)
SW software status	:	No information available
Frequency band	:	ISM band 902 MHz to 928 MHz (lowest channel 908.4 MHz, highest channel 916.0 MHz)
Type of radio transmission	:	modulated carrier
Use of frequency spectrum	:	
Type of modulation	:	GFSK
Number of channels	:	2
Antenna	:	Integrated PCB antenna
Power supply	:	2.5 V to 3.6 V DC by Li battery
Temperature range	:	+5°C to +35°C

5.2 Additional information

The content of the following annexes is defined in the QA. It may be that not all of the listed annexes are necessary for this report, thus some values in between may be missing.

Test setup- and EUT-photos are included in test report: 1-9056_14-01-01_AnnexA
1-9056_14-01-01_AnnexB
1-9056_14-01-01_AnnexD

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).

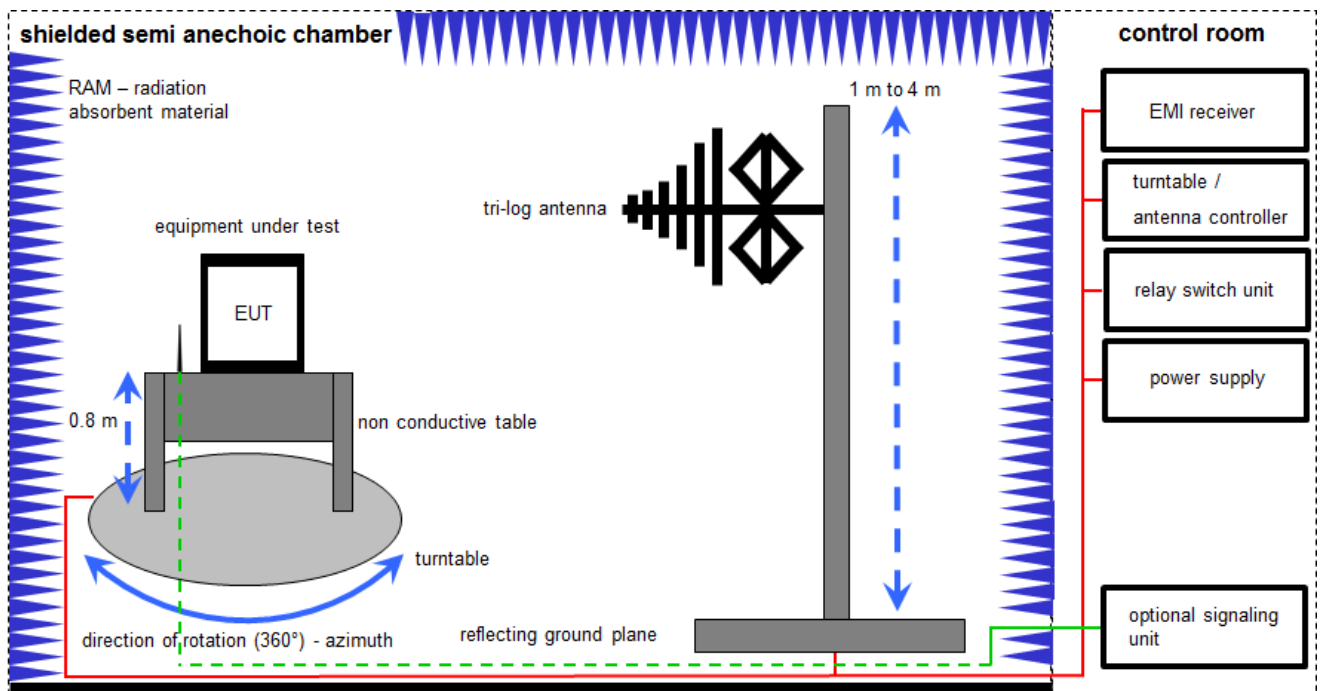
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

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
v/k!	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.



Measurement distance: tri-log antenna 10 meter

$$FS = UR + CL + AF$$

(FS-field strength; UR-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

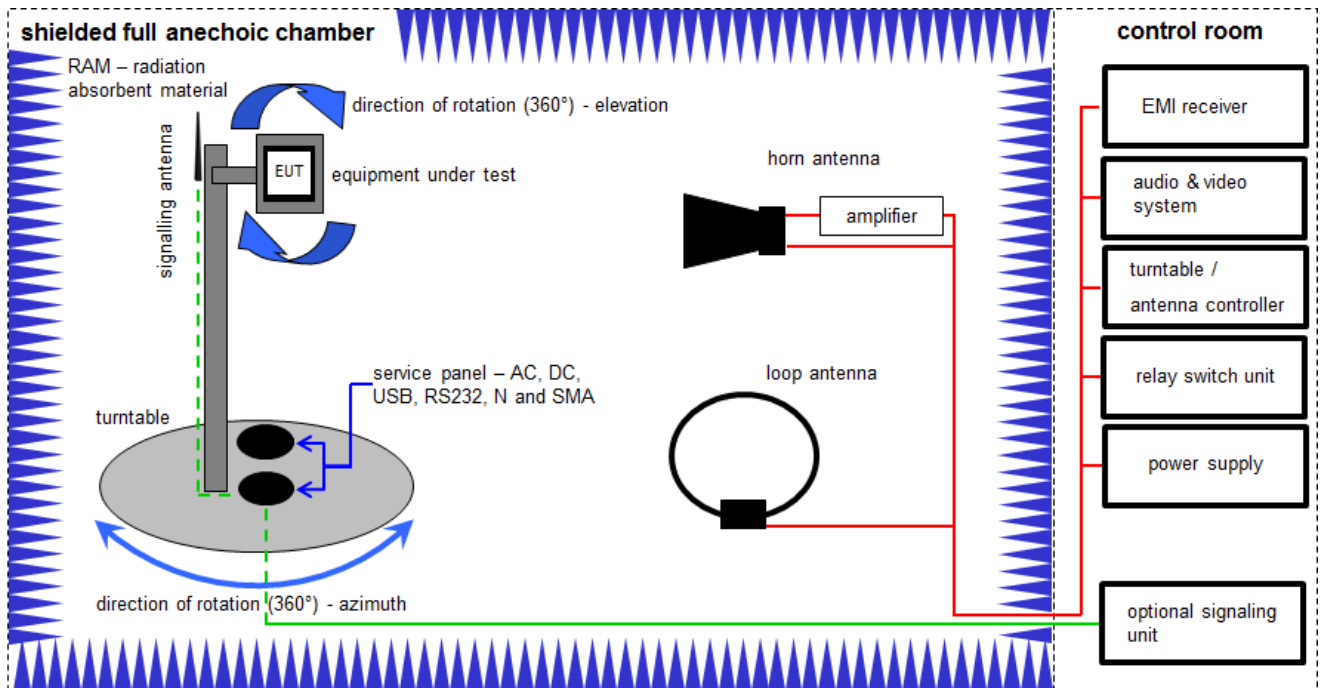
Example calculation:

$$FS [dB\mu V/m] = 12.35 [dB\mu V/m] + 1.90 [dB] + 16.80 [dB/m] = 31.05 [dB\mu V/m] (35.69 \mu V/m)$$

Equipment table:

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A	RF-Filter-section	85420E	HP	3427A00162	300002214	k	27.11.2006	
2	A	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	26.01.2015	26.01.2016
3	A	Analyzer-Reference-System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	Ve	11.02.2014	11.02.2016
4	A	Antenna Tower	Model 2175	ETS-Lindgren	64762	300003745	izw	-/-	-/-
5	A	Positioning Controller	Model 2090	ETS-Lindgren	64672	300003746	izw	-/-	-/-
6	A	Turntable Interface-Box	Model 105637	ETS-Lindgren	44583	300003747	izw	-/-	-/-
7	A	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	22.04.2014	22.04.2016
8	A	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	26.01.2015	26.01.2016

7.2 Shielded fully anechoic chamber



Measurement distance: horn antenna 3 meter; loop antenna 3 meter / 1 meter

$$FS = UR + CA + AF$$

(FS-field strength; UR-voltage at the receiver; CA-loss of the signal path; AF-antenna factor)

Example calculation:

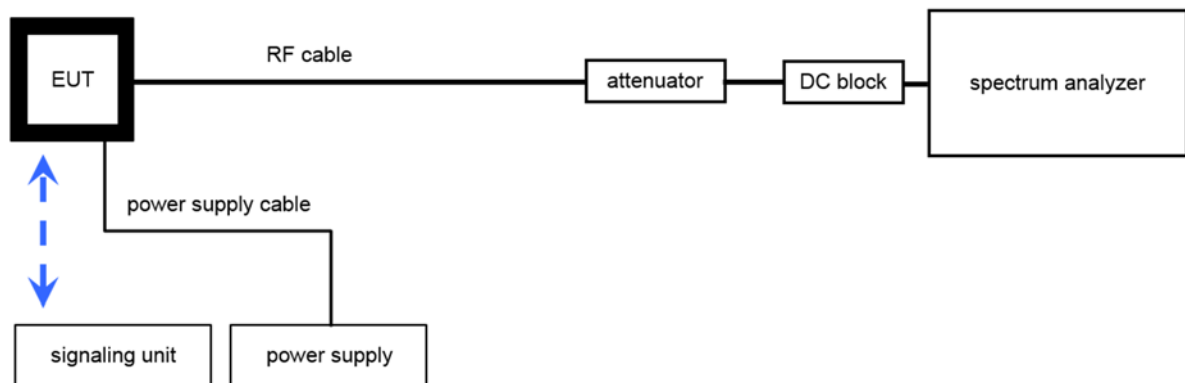
$$FS [dB\mu V/m] = 40.0 [dB\mu V/m] + (-35.8) [dB] + 32.9 [dB/m] = 37.1 [dB\mu V/m] (71.61 \mu V/m)$$

Equipment table:

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	9709-5290	300000212	k	13.08.2015	13.08.2017
2	A	EMI Test Receiver 20Hz- 26,5GHz	ESU26	R&S	100037	300003555	k	22.01.2015	22.01.2016
3	A	Highpass Filter	WHK1.1/15G-10SS	Wainwright	37	400000148	ne	-/-	-/-
4	A	Broadband Amplifier 0.5-18 GHz	CBLU5184540	CERNEX	22050	300004482	ev	-/-	-/-
5	A	Broadband Amplifier 5-13 GHz	CBLU5135235	CERNEX	22011	300004492	ev	-/-	-/-
6	A	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000032	300004510	ne	-/-	-/-
7	A	Messrechner und Monitor	Intel Core i3 3220/3,3 GHz, Prozessor	Agilent Technologies	2V2403033A54 21	300004591	ne	-/-	-/-
8	A	NEXIO EMV-Software	BAT EMC	EMCO	2V2403033A54 21	300004682	ne	-/-	-/-

7.3 Conducted measurements

Conducted measurements normal conditions



$$OP = AV + CA$$

(OP-output power; AV-analyzer value; CA-loss signal path)

Example calculation:

$$OP \text{ [dBm]} = 6.0 \text{ [dBm]} + 11.7 \text{ [dB]} = 17.7 \text{ [dBm]} \text{ (58.88 mW)}$$

Equipment table:

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A	DC Power Supply 0 – 32V	1108-32	Heiden Elektronik	001802	300001383	Ve	29.01.2014	29.01.2017
2	A	Spectrum Analyzer 9kHz to 30GHz - 140...+30dBm	FSP30	R&S	100886	300003575	k	26.08.2014	26.08.2016
3	A	RF-Cable	ST18/SMAM/SMAM/60	Huber & Suhner	Batch no. 606844	400001181	ev	-/-	-/-
4	A	DC-Blocker 0.1-40 GHz	8141A	Inmet	Batch no. 606844	400001185	ev	-/-	-/-

8 Measurement uncertainty

Measurement uncertainty	
Test case	Uncertainty
Field strength of emissions	± 3 dB
Occupied Bandwidth	± 21.5 kHz absolute; ± 15.0 kHz relative
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

9 Sequence of testing

9.1 Sequence of testing 9 kHz to 30 MHz

Setup

- The equipment was setup to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground.
- Auxiliary equipment and cables were 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.
- The measurement distance is 3 meter (see ANSI C 63.4) – see each test details
- The EUT was set into operation.

Premeasurement

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

Final measurement

- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).
- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK (QPK / see ANSI C 63.4) detector
- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit, and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

9.2 Sequence of testing 30 MHz to 1 GHz

Setup

- The equipment was setup to simulate a typical usage like described in the user manual or described by 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 were 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.
- The measurement distance is 10 or 3 meter (see ANSI C 63.4) – see each test details
- The EUT was set into operation.

Premeasurement

- The turntable rotates from 0° to 315° with 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 to 3 meter.
- 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 will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ($\pm 45^\circ$) and antenna movement between 1 and 4 meter.
- The final measurement will be done with QP (Quasi-Peak / see ANSI C 63.4) detector with an EMI receiver
- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit, and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

9.3 Sequence of testing 1 GHz to 12.75 GHz

Setup

- The equipment was setup to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground.
- Auxiliary equipment and cables were 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.
- The measurement distance is 3 meter (see ANSI C 63.4) – see each test details
- The EUT was set into operation.

Premeasurement

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

Final measurement

- The final measurement will be performed with minimum the six highest peaks according the requirements of the ANSI C63.4.
- According to the maximum found antenna polarisation and turntable position of the premeasurement the software maximizes the peaks by rotating the turntable position (0° to 360°). This measurement is repeated for different EUT-table positions (0° to 150° in 30°-steps). This procedure is repeated for both antenna polarisations.
- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and RMS (RMS / see ANSI C 63.4) detector
- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit, and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

10 Summary of measurement results



No deviations from the technical specifications were ascertained



There were deviations from the technical specifications ascertained



This test report is only a partial test report. The content and verdict of the performed test cases are listed below.

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15 RSS 210, Issue 8	See tests	2016-02-29	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	C	NC	NA	NP	Results
§15.249(a) RSS 210	Field strength of emissions (wanted signal)	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
§2.1049 RSS 210	Occupied bandwidth (99% bandwidth)	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
§15.209(a) / §15.249(b)(1)(2)(3) RSS 210	Field strength of emissions (spurious)	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
§15.207(a)	Conducted emissions < 30 MHz	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Only battery operated
§15.109 RSS gen	RX Field strength of emissions (spurious)	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-

Note: C = Compliant; NC = Not compliant; NA = Not Applicable; NP = Not Performed

10.1 Additional comments

Reference documents: None

Special test descriptions: None

Configuration descriptions: None

Test mode: ☐ Normal operation, no special test mode available.

☒ Special software is used.

11 Measurement results**11.1 Transmitter test results****11.1.1 Field strength of emissions (wanted signal)****Description:**

Measurement of the maximum radiated field strength of the wanted signal.

Measurement:

Measurement parameter	
Detector:	Positive peak
Sweep time:	Auto
Video bandwidth:	Auto
Resolution bandwidth:	1 MHz
Trace-Mode:	Max Hold
Test setup:	See sub clause 7.1A
Measurement uncertainty	See sub clause 8

Limits:

FCC		IC
Field strength of emissions		
The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:		
Frequency [MHz]	Field Strength [dBμV/m]	Measurement distance
902 – 928 MHz	94	3

Results:

Ch low

Test condition	Maximum field strength	
	Frequency [MHz]	Field strength [dB μ V/m] @ 3 m
T _{nom} / V _{nom}	908.4	77.0

Ch high

Test condition	Maximum field strength	
	Frequency [MHz]	Field strength [dB μ V/m] @ 3 m
T _{nom} / V _{nom}	916.0	82.8

11.1.2 Occupied bandwidth (99% bandwidth)

Description:

Measurement of the 99% bandwidth of the wanted signal.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	3 kHz
Resolution bandwidth:	1 kHz
Span:	200 kHz
Trace-Mode:	Max Hold
Test setup:	See sub clause 7.3A
Measurement uncertainty	See sub clause 8

Results:

Ch low

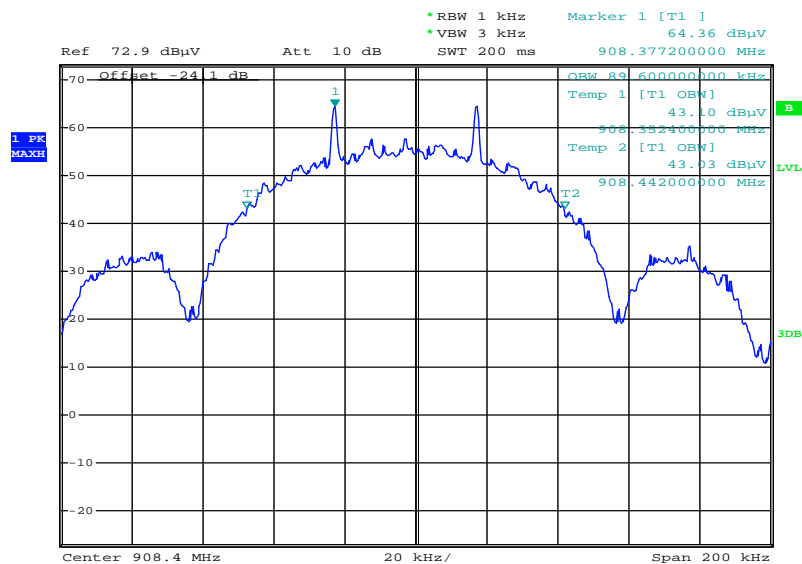
Test condition	Occupied bandwidth	
	Frequency [MHz]	Occupied bandwidth [kHz]
T_{nom} / V_{nom}	908.4	89.6

Ch high

Test condition	Occupied bandwidth	
	Frequency [MHz]	Occupied bandwidth [kHz]
T_{nom} / V_{nom}	916.0	86.0

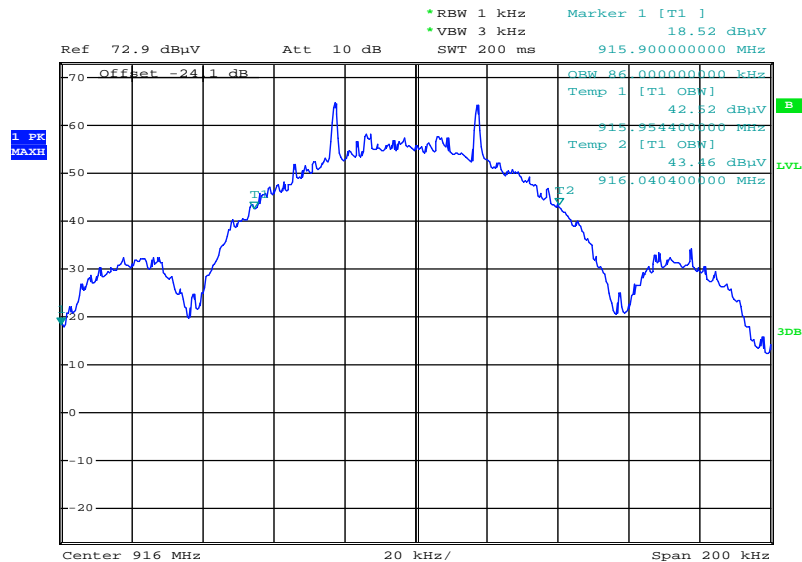
Plots:

Plot 1: OBW99 ch low



Date: 3.DEC.2015 14:57:31

Plot 2: OBW99 ch high



Date: 3.DEC.2015 14:58:59

11.1.3 Field strength of emissions (radiated spurious)

Description:

Measurement of the radiated spurious emissions in transmit mode.

Measurement:

Measurement parameter	
Detector:	F < 1 GHz: Peak / Quasi Peak F > 1 GHz: Peak / RMS
Sweep time:	Auto
Video bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz F > 30 MHz: 100 kHz F > 1 GHz: 1 MHz
Resolution bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz F > 1 GHz: 1 MHz
Frequency range:	9 kHz to 12.75 GHz
Trace-Mode:	Max Hold
Test setup:	See sub clause 7.1A See sub clause 7.2A
Measurement uncertainty	See sub clause 8

Limits:

FCC		IC
Radiated Spurious Emissions		
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
Above 960	54.0	3

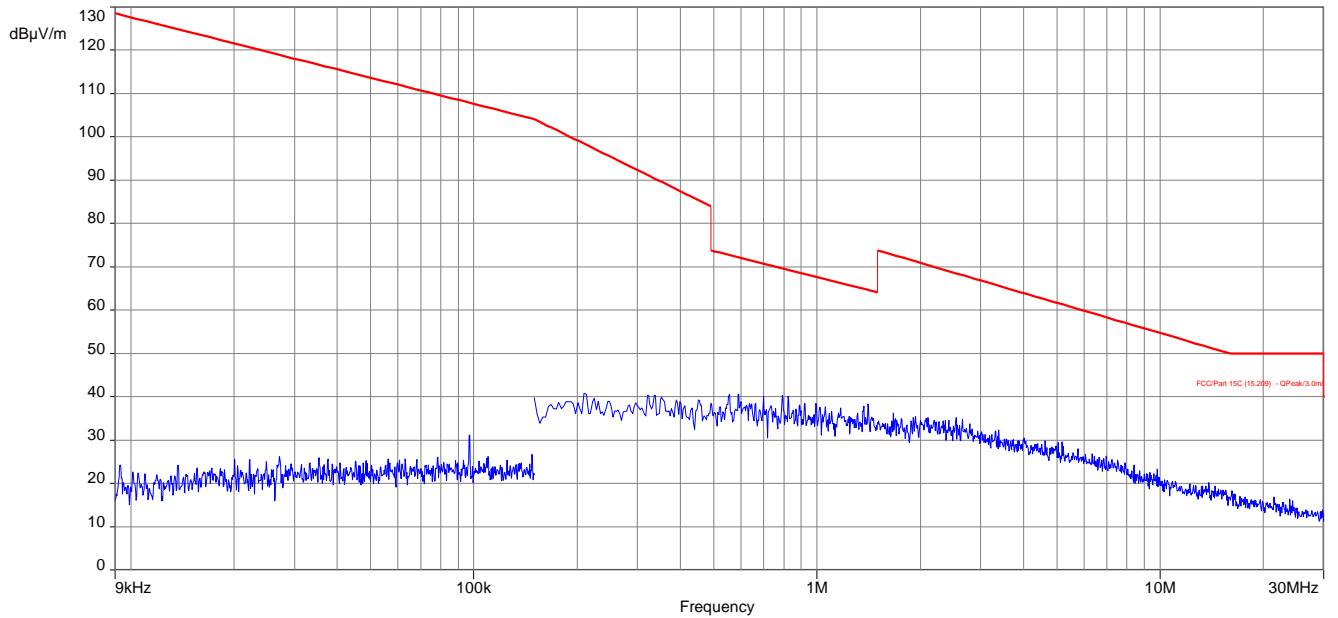
Results:

TX Spurious Emissions Radiated [dB μ V/m]								
Lowest			-/-			Highest		
F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]
2725	Pk/RMS	53.4 / 50.7				2748	Pk/RMS	54.0 / 53.6
4542	Pk/RMS	51.3 / 49.2				3663	Pk/RMS	49.7 / 47.1
7267	Pk/RMS	50.4 / 46.8				4579	Pk/RMS	53.4 / 46.3
8175	Pk/RMS	49.8 / 47.1				7327	Pk/RMS	55.9 / 53.1
11810	Pk/RMS	52.2 / 48.3				8244	Pk/RMS	55.9 / 53.6
For emissions between 30 MHz and 1 GHz see result table below the 30 MHz to 1 GHz plots.								

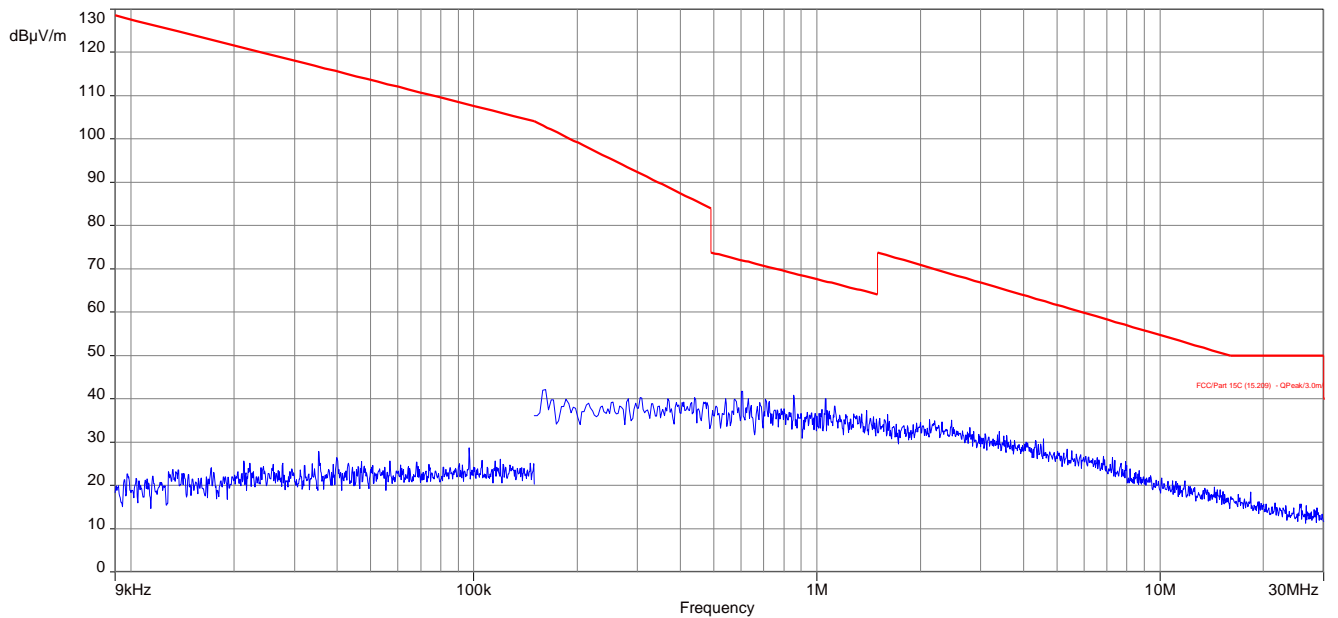
Note: The limit was recalculated with 20 dB / decade (Part 15.31) for all radiated spurious emissions 30 MHz to 1 GHz from 3 meter limit to a 10 meter distance. (40dB/decade for emissions < 30MHz)

Plots:

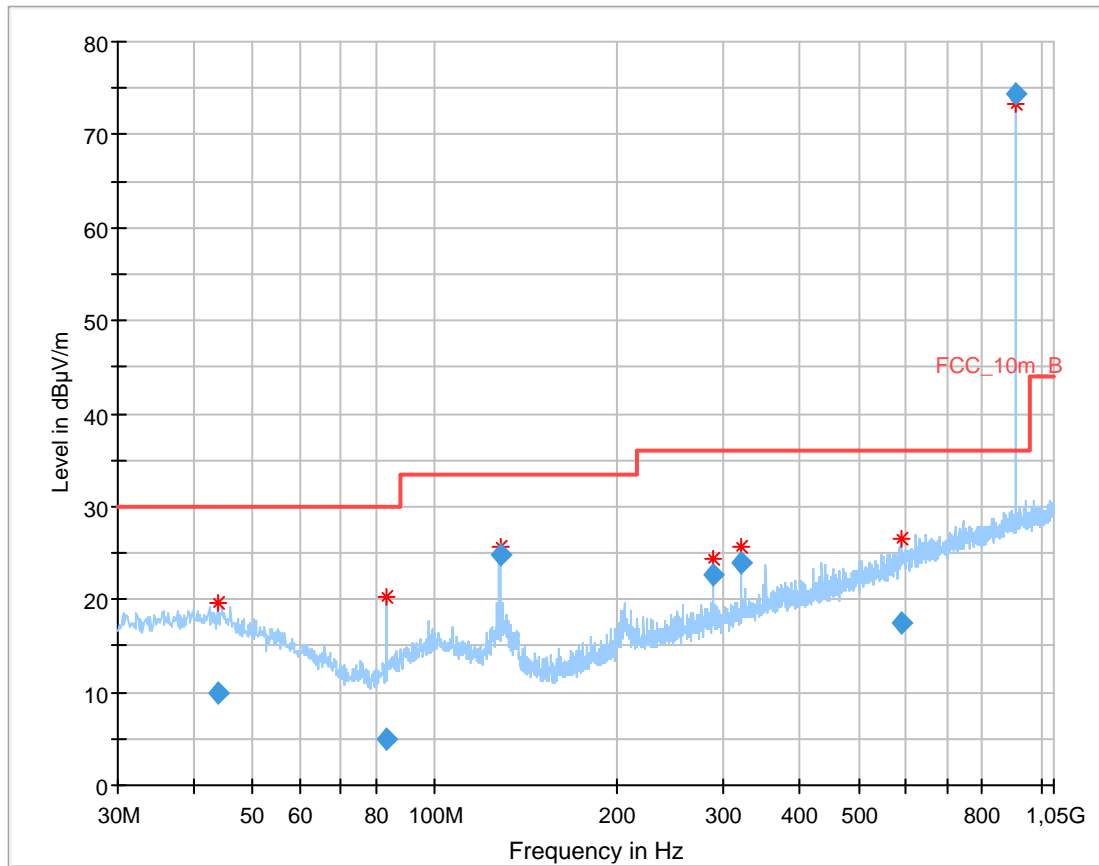
Plot 1: 9 kHz to 30 MHz, ch low



Plot 2: 9 kHz to 30 MHz, ch high



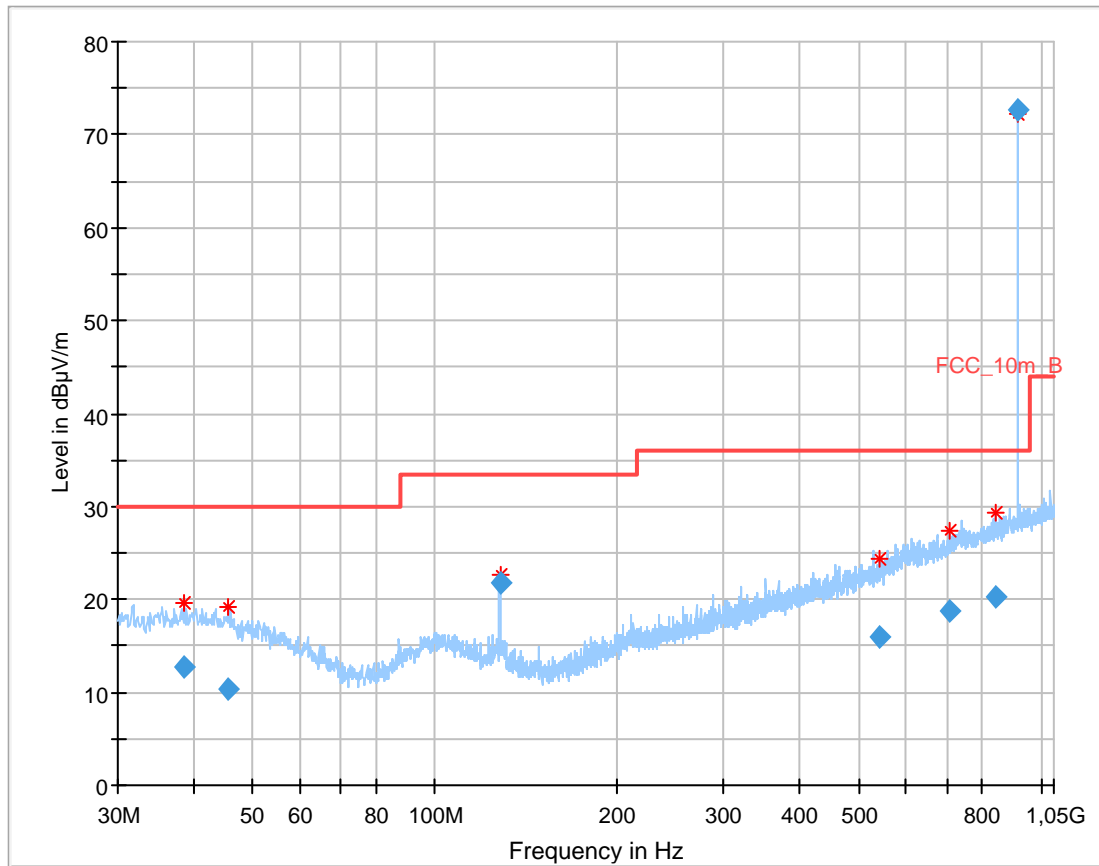
Plot 3: 30 MHz to 1 GHz, horizontal / vertical polarization ch low



Final_Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
43.897800	10.01	30.00	19.99	1000.0	120.000	101.0	V	285	13.9
83.432850	5.04	30.00	24.96	1000.0	120.000	101.0	V	300	8.9
128.013450	24.71	33.50	8.79	1000.0	120.000	98.0	V	30	9.5
287.994000	22.60	36.00	13.40	1000.0	120.000	98.0	V	352	14.2
319.999650	23.83	36.00	12.17	1000.0	120.000	98.0	V	330	15.1
586.555200	17.41	36.00	18.59	1000.0	120.000	101.0	V	30	20.3
908.379300	74.49	36.00	-38.49	1000.0	120.000	98.0	H	41	24.1

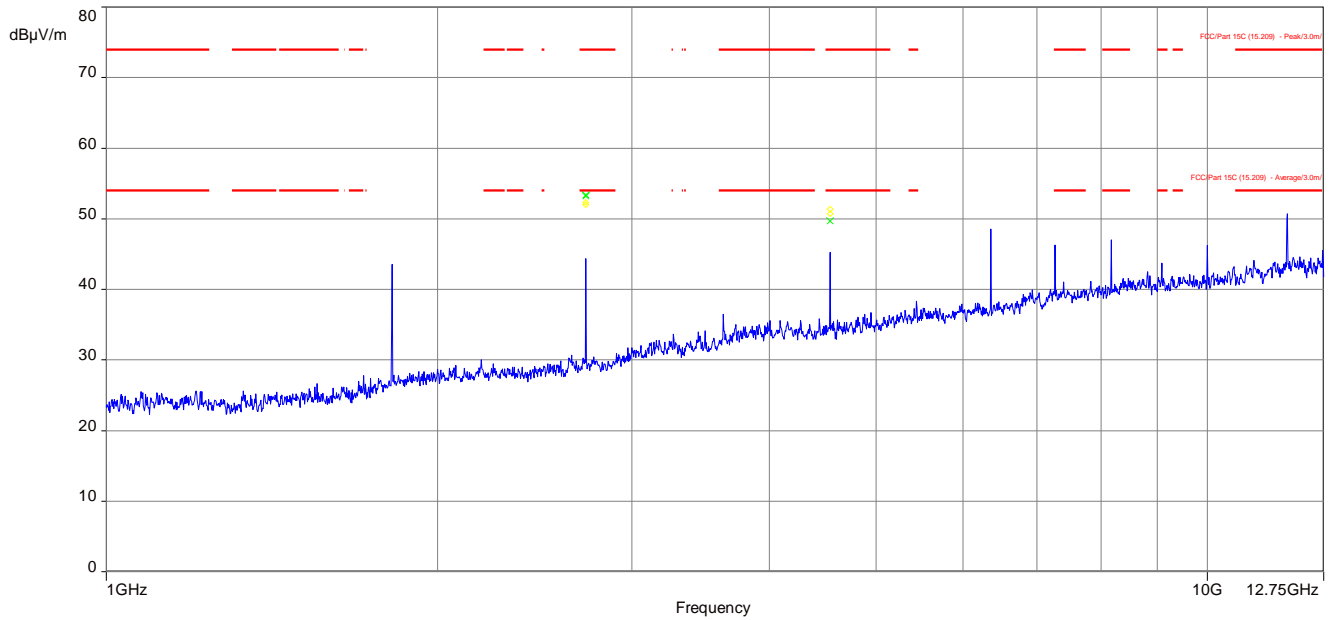
Plot 4: 30 MHz to 1 GHz, horizontal / vertical polarization ch high



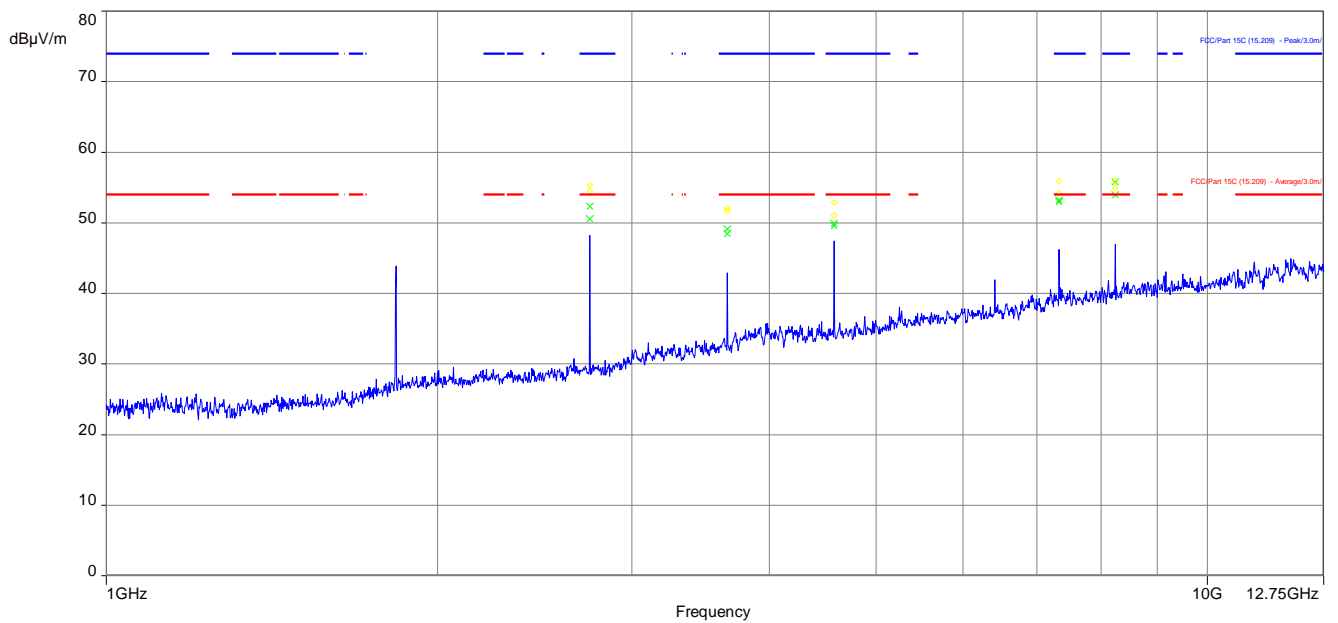
Final_Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
38.668500	12.82	30.00	17.18	1000.0	120.000	98.0	V	181	14.0
45.513150	10.45	30.00	19.55	1000.0	120.000	170.0	H	145	13.7
128.001900	21.70	33.50	11.80	1000.0	120.000	100.0	V	343	9.5
540.114750	15.88	36.00	20.12	1000.0	120.000	170.0	H	227	19.2
708.358650	18.67	36.00	17.33	1000.0	120.000	170.0	V	304	21.7
842.582700	20.31	36.00	15.69	1000.0	120.000	170.0	V	255	23.3
916.018950	72.70	36.00	-36.70	1000.0	120.000	101.0	H	92	24.2

Plot 5: 1 GHz to 12.75 GHz, horizontal / vertical polarization ch low



Plot 6: 1 GHz to 12.75 GHz, horizontal / vertical polarization ch high



11.2 Receiver test results

11.2.1 Spurious emissions radiated – receiver mode

Description:

The measurement was performed in worst case.

Measurement:

Measurement parameters	
Detector:	F < 1 GHz: Peak / Quasi Peak F > 1 GHz: Peak / RMS
Sweep time:	2 sec
Video bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz F > 30 MHz: 100 kHz F > 1 GHz: 1 MHz
Resolution bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz F > 1 GHz: 1 MHz
Span:	100 MHz Steps
Trace-Mode:	Max Hold
Test setup:	See sub clause 7.1A See sub clause 7.2A
Measurement uncertainty	See sub clause 8

Limits:

FCC		IC
Spurious Emissions Radiated – Receiver Mode		
Frequency (MHz)	Field Strength (dB μ V/m)	Measurement distance (m)
30 – 88	30.0	10
88 - 216	33.5	10
216 – 960	36.0	10
Above 960	54.0	3

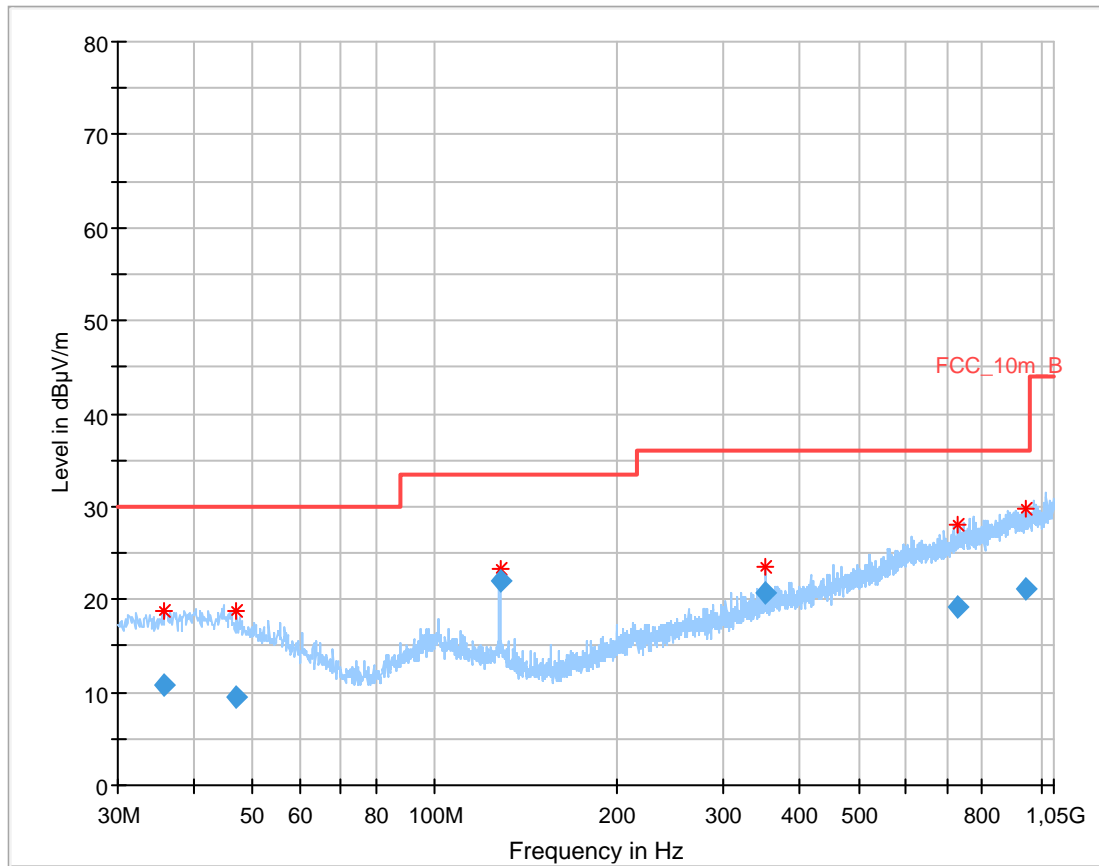
Results:

Spurious Emission Level (dB μ V/m)		
Frequency (MHz)	Detector	Level (dB μ V/m)
No emissions found		

Note: The limit was recalculated with 20 dB / decade (Part 15.31) for all radiated spurious emissions 30 MHz to 1 GHz from 3 meter limit to a 10 meter distance. (40dB/decade for emissions < 30MHz)

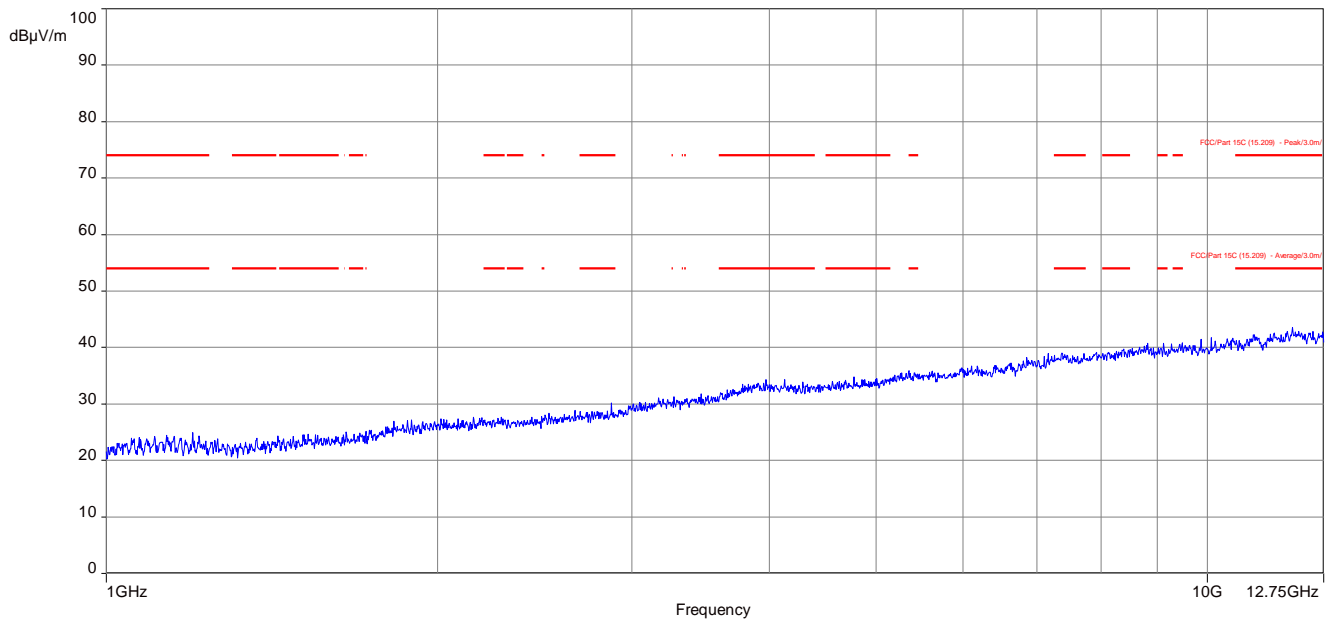
Plots:

Plot 1: 30 MHz to 1 GHz, horizontal / vertical polarization, RX

**Final_Result**

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
35.856000	10.71	30.00	19.29	1000.0	120.000	101.0	H	164	13.8
47.165400	9.39	30.00	20.61	1000.0	120.000	170.0	V	114	13.3
128.014350	22.03	33.50	11.47	1000.0	120.000	101.0	V	229	9.5
352.002150	20.76	36.00	15.24	1000.0	120.000	101.0	V	237	16.1
729.484500	19.13	36.00	16.87	1000.0	120.000	170.0	H	195	22.2
943.738500	21.11	36.00	14.89	1000.0	120.000	98.0	V	195	24.2

Plot 2: 1 GHz to 12.75 GHz, horizontal / vertical polarization, RX



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
	Initial release	2015-12-08
-A	Correction of HVIN	2016-02-10
-B	Correction of FCC/IC numbers	2016-02-18
-C	Correction of HVIN	2016-02-29

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
PMN		Product marketing name
HMN		Host marketing name
HVIN		Hardware version identification number
FVIN		Firmware version identification number

Annex C Accreditation Certificate

Front side of certificate

Back side of certificate



Deutsche Akkreditierungsstelle GmbH

Bellehene 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

Datei: doc/07.03.2014

in Auftrag gegeben von: CETECOM
Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

Standort Berlin
Spittelmarkt 10
10117 Berlin

Standort Frankfurt am Main
Gartenstraße 6
60591 Frankfurt am Main

Standort Braunschweig
Bundesallee 100
38115 Braunschweig

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Die Akkreditierung erfolgte gemäß des Gesetzes über die Akkreditierungsstellen (AkkStelleG) vom
31. Juli 2009 (BGBl. I S. 2075) 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 (Abt. L 218 vom 9. Juli 2008, S. 30).
Die DAKkS ist Unterzeichnerin der Multilateralen Abkommen zur gegenseitigen Anerkennung der
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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.eu

Note:

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

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