
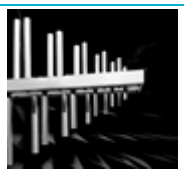


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TEST REPORT

Test report no.: 1-2842/16-01-09-A

DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-01

Testing laboratory

CTC advanced GmbH
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
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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-12076-01-01

Applicant

Philips Medizin Systeme Böblingen GmbH
Hewlett-Packard-Strasse 2
71034 Böblingen / GERMANY
Phone: -/-
Fax: +49 7031 463-2499
Contact: Hansjörg Gewitz
e-mail: hansjoerg.gewitz@philips.com
Phone: +49 7031 463-1879

Manufacturer

Philips Medizin Systeme Böblingen GmbH
Hewlett-Packard-Strasse 2
71034 Böblingen / GERMANY

Test standard/s

47 CFR Part 95 Personal radio services – medical device Radiocommunication service (MedRadio)

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

Test Item

Kind of test item:	**2.4 GHz transceiver**
Model name:	**IntelliVue CL NBP Pod 865216**
FCC ID:	**PQC-CLNBPBV2**
IC:	**-/-**
Frequency:	MBAN bands: 2360 MHz to 2390 MHz & 2390 MHz to 2400 MHz
Technology tested:	MBAN
Antenna:	Integrated chip antenna
Power supply:	3.7 V DC by Li-ion battery
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:

p.o. cn=Andreas Luckenbill, o=CTC advanced GmbH, ou=LUC-170203, email=Andreas.Luckenbill@ctcadvanced.com, c=DE
2017.09.27 14:10:36 +02'00'

Stefan Bös
Lab Manager
Radio Communications & EMC

Test performed:

p.o. cn=Mihail Dorongovskij, o=CTC advanced GmbH, ou=DOR-281116, email=Mihail.Dorongovskij@ctcadvanced.com, c=DE
2017.09.27 09:20:48 +02'00'

Marco Bertolino
Lab Manager
Radio Communications & EMC

1 Table of contents

2 General information

2.1 Notes and disclaimer

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This test report replaces the test report with the number 1-2842/16-01-09 and dated 2017-02-23.

2.2 Application details

Date of receipt of order:	2016-11-17
Date of receipt of test item:	2017-01-30
Start of test:	2017-01-30
End of test:	2017-02-10
Person(s) present during the test:	-/-

3 Test standard/s and references

Test standard	Date	Description
47 CFR Part 95	May-14-2009	Personal radio services – medical device Radiocommunication service (MedRadio)

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
KDB 550599 D01 v01	June-17-2016	Medical body area network (MBAN) measurement procedures

4 Test environment

Temperature	:	T_{nom} T_{max} T_{min}	+23 °C during room temperature tests No test under extreme conditions performed. No test under extreme conditions performed.
Relative humidity content	:		55 %
Barometric pressure	:		1021 hpa
Power supply	:	V_{nom} V_{max} V_{min}	3.7 V DC by Li-ion battery No test under extreme conditions performed. No test under extreme conditions performed.

5 Test item

5.1 General description

Kind of test item	:	2.4 GHz transceiver
Type identification	:	IntelliVue CL NBP Pod 865216
HMN	:	-/-
PMN	:	-/-
HVIN	:	-/-
FVIN	:	-/-
S/N serial number	:	Radiated unit: DE03801770
HW hardware status	:	1
SW software status	:	D.00.70
Frequency band	:	MBAN bands: 2360 MHz to 2390 MHz & 2390 MHz to 2400 MHz (lowest channel 2363 MHz, highest channel 2397 MHz)
Type of radio transmission Use of frequency spectrum	: :	modulated carrier, DSSS
Type of modulation	:	OQPSK
Number of channels	:	15
Antenna	:	Integrated chip antenna
Power supply	:	3.7 V DC by Li-ion battery
Temperature range	:	-20°C to +55°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: 1-2842/16-01-07_AnnexA
1-2842/16-01-07_AnnexB
1-2842/16-01-07_AnnexD

6 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).

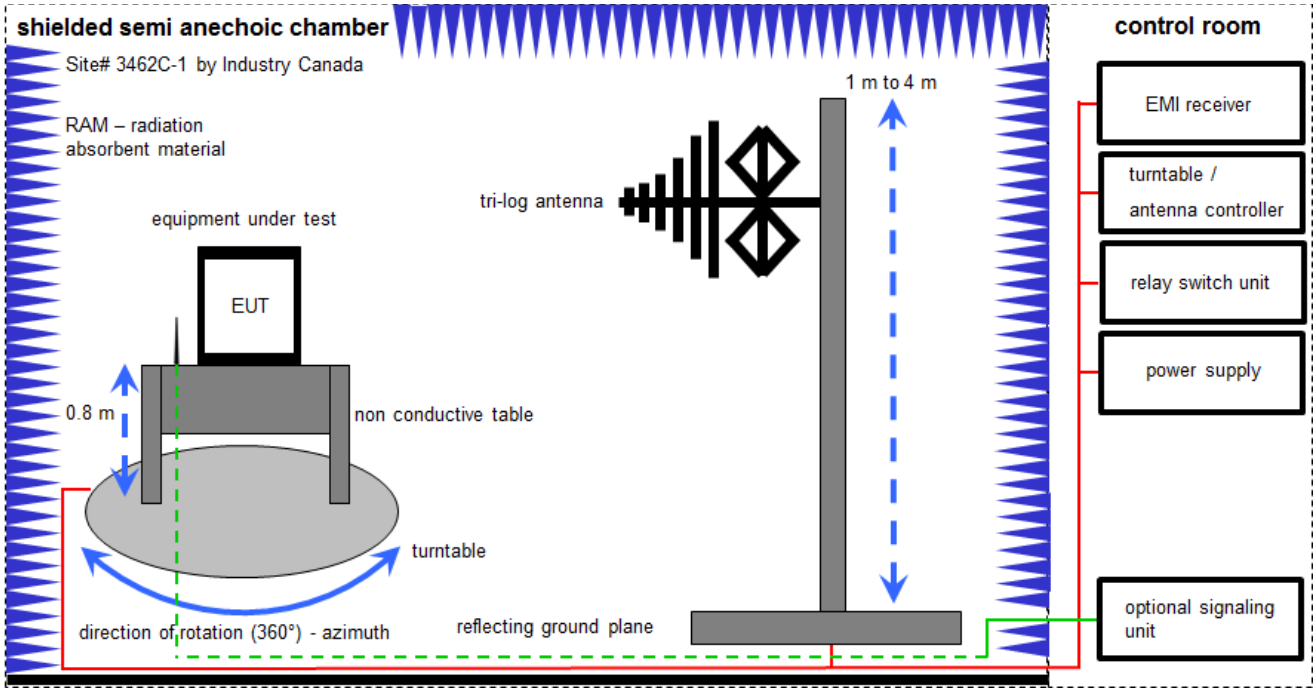
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

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

6.1 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 conform to 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

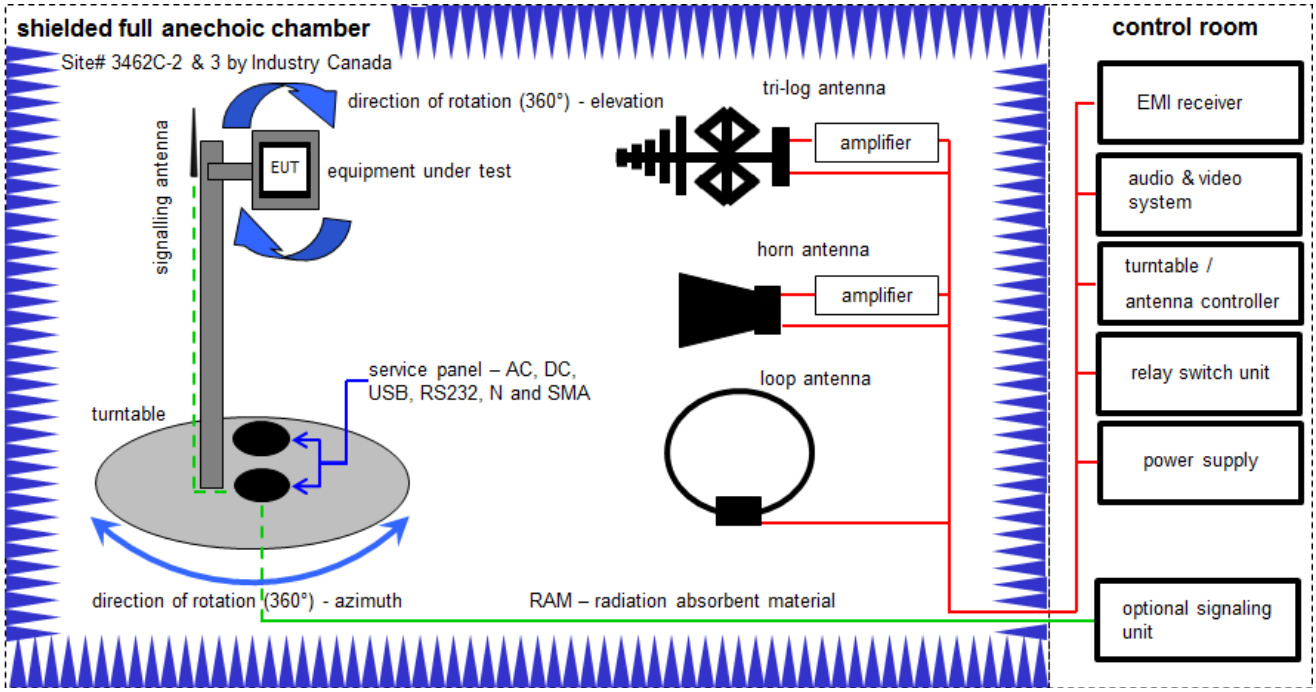
FS = UR + CL + AF
(FS-field strength; UR-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

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

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	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	08.03.2016	08.03.2017
3	A	Antenna Tower	Model 2175	ETS-Lindgren	64762	300003745	izw	-/-	-/-
4	A	Positioning Controller	Model 2090	ETS-Lindgren	64672	300003746	izw	-/-	-/-
5	A	Turntable Interface-Box	Model 105637	ETS-Lindgren	44583	300003747	izw	-/-	-/-
6	A	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	25.04.2016	25.04.2018

6.2 Shielded fully anechoic chamber



Measurement distance: tri-log antenna and horn antenna 3 meter; loop antenna 3 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 [dBµV/m] = 40.0 [dBµV/m] + (-35.8) [dB] + 32.9 [dB/m] = 37.1 [dBµV/m] (71.61 µV/m)

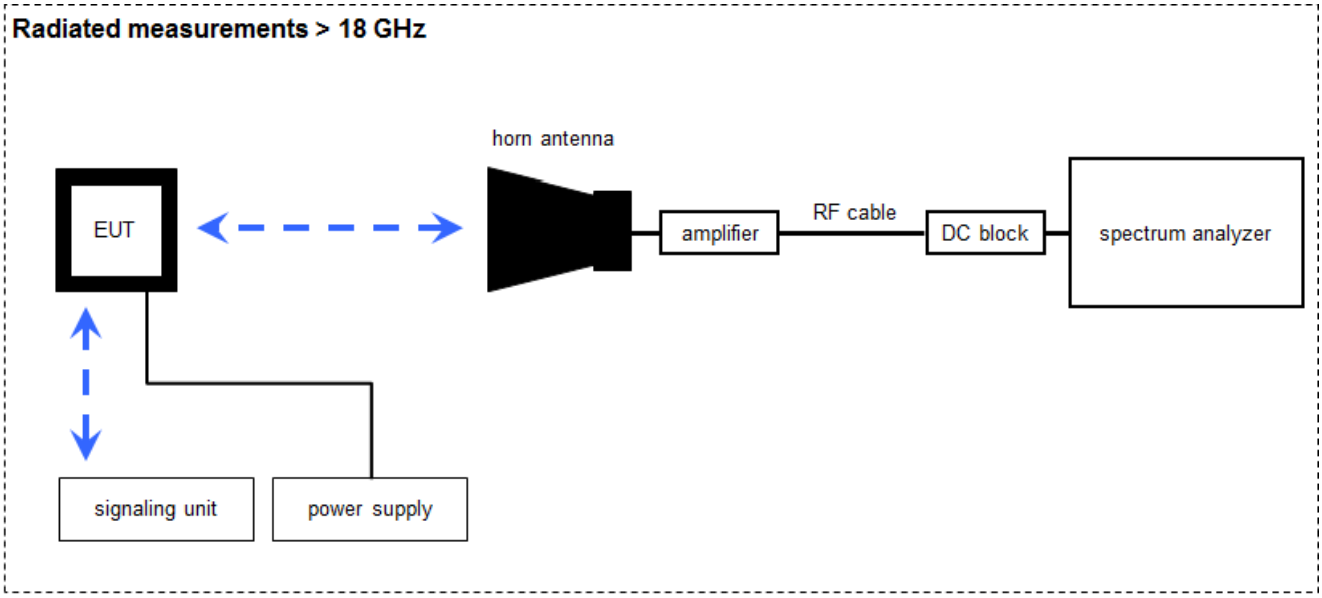
OP = AV + D - G + CA
(OP-radiated output power; AV-analyzer value; D-free field attenuation of measurement distance; G-antenna gain+amplifier gain; CA-loss signal path)

Example calculation:
OP [dBm] = -65.0 [dBm] + 50 [dB] - 20 [dBi] + 5 [dB] = -30 [dBm] (1 µW)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A, B	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	20.05.2015	20.05.2017
2	A, B, C	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev	-/-	-/-
3	A, B, C	Switch / Control Unit	3488A	HP	*	300000199	ne	-/-	-/-
4	C	Active Loop Antenna 10 kHz to 30 MHz	6502	EMCO/2	8905-2342	300000256	k	24.06.2015	24.06.2017
5	A, B, C	EMI Test Receiver 20Hz- 26,5GHz	ESU26	R&S	100037	300003555	k	31.01.2017	30.01.2018
6	A, B	Broadband Amplifier 0.5-18 GHz	CBLU5184540	CERNEX	22049	300004481	ev	-/-	-/-
7	A, B, C	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000037	300004509	ne	-/-	-/-

6.3 Radiated measurements > 18 GHz



Measurement distance: horn antenna 50 cm

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

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

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	27.01.2017	26.01.2018
2	A	Amplifier 2-40 GHz	JS32-02004000-57-5P	MITEQ	1777200	300004541	ev	-/-	-/-
3	A	RF-Cable	ST18/SMAm/SMAm/48	Huber & Suhner	Batch no. 600918	400001182	ev	-/-	-/-
4	A	RF-Cable	ST18/SMAm/SMm/48	Huber & Suhner	Batch no. 127377	400001183	ev	-/-	-/-
5	A	DC-Blocker 0.1-40 GHz	8141A	Inmet	Batch no. 127377	400001185	ev	-/-	-/-
6	A	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	-/-	300000486	k	10.09.2015	10.09.2017

7 Sequence of testing

7.1 Sequence of testing radiated spurious 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.

7.2 Sequence of testing radiated spurious 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.

7.3 Sequence of testing radiated spurious 1 GHz to 18 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.

7.4 Sequence of testing radiated spurious above 18 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.

8 Measurement uncertainty

Measurement uncertainty	
Test case	**Uncertainty**
Frequency stability	± 100 Hz
Emission bandwidth	± 21.5 kHz absolute; ± 15.0 kHz relative
Maximum output power	± 1 dB
Band edge	± 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 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	47 CFR Part 2 47 CFR Part 95 H	See table	2017-09-27	Tests according customer demand!

Test Specification Clause	Test Case	Temperature Conditions	Power Source Voltages	C	NC	NA	NP	Remark
FCC 47 CFR § 95.628(f)(2)	Frequency stability	Nominal and extreme	Nominal	☐	☐	☐	☒	-/-
FCC 47 CFR § 95.633(e)	Emission bandwidth	Nominal	Nominal	☐	☐	☐	☒	-/-
FCC 47 CFR § 95.639(f)	Maximum transmit power	Nominal	Nominal	☒	☐	☐	☐	-/-
FCC 47 CFR § 95.635(d)(7)	Band edge measurements	Nominal	Nominal	☐	☐	☐	☒	-/-
FCC 47 CFR § 95.635(d)(1)(v) § 95.635(d)(3)	Transmitter unwanted radiation	Nominal	Nominal	☒	☐	☐	☐	-/-
FCC 47 CFR § 95.635(d)(1)(v) § 95.635(d)(3)	Receiver spurious emissions (radiated)	Nominal	Nominal	☒	☐	☐	☐	-/-
FCC 47 CFR § 15.107(a) § 15.207	Conducted emissions below 30 MHz (AC conducted)	Nominal	Nominal	☐	☐	☒	☐	Battery operated only!
550599 D01 Medical Body Area Network v01 § 95.628 (c)	Connection interrupt test	Nominal	Nominal	☐	☐	☐	☒	-/-

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

10 Additional comments

Reference documents: CTC advanced report: 1-9941/15-01-06

Questionnaire_IntelliVue CL NBP Pod

Special test descriptions: All channels within the band 2360 MHz to 2390 MHz use power setting -1 and all channels within the band 2390 MHz to 2400 MHz use power setting 0.

Configuration descriptions: None

Test mode:

☒ Special software is used.
EUT is transmitting pseudo random data by itself

Antennas and transmit operating modes:

☒ Operating mode 1 (single antenna)

- *Equipment with 1 antenna,*
- *Equipment with 2 diversity antennas operating in switched diversity mode by which at any moment in time only 1 antenna is used,*
- *Smart antenna system with 2 or more transmit/receive chains, but operating in a mode where only 1 transmit/receive chain is used)*

☐ Operating mode 2 (multiple antennas, no beamforming)

- *Equipment operating in this mode contains a smart antenna system using two or more transmit/receive chains simultaneously but without beamforming.*

☐ Operating mode 3 (multiple antennas, with beamforming)

- *Equipment operating in this mode contains a smart antenna system using two or more transmit/receive chains simultaneously with beamforming.*
  In addition to the antenna assembly gain (G), the beamforming gain (Y) may have to be taken into account when performing the measurements.

11 Measurement results

11.1 Maximum transmit power

Measurement:

Measurements were made in accordance with the procedures detailed in FCC 95.628 (f)(3) , ANSI C63.10, Section 9.10 – Measurement of the fundamental emission using a spectrum analyzer, and FCC OET 971168 – Measurement Guidance for Certification of Licensed Digital Transmitters, Section 5.1.

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	3 MHz
Video bandwidth:	10 MHz
Span:	20 MHz
Trace-Mode:	Max. hold
Test setup	See sub clause 7.2 – B & 7.4 – A
Measurement uncertainty	See sub clause 8

Limits:

FCC	IC
47 CFR § 95.639 (f)(3)(4)(5)	-/-
95.639(f)(3): The antenna associated with any MedRadio transmitter must be supplied with the transmitter and shall be considered part of the transmitter subject to equipment authorization. 95.639(f)(5): MBAN transmissions in the 2360 – 2390 MHz frequency band are limited to a maximum equivalent isotropic radiated power (EIRP) that shall not exceed the lesser of 1 mW (0 dBm) or 10log (EBW) dBm, where EBW is expressed in MHz. 95.639(f)(4): MBAN transmissions in the 2390 – 2400 MHz frequency band are limited to a maximum equivalent isotropic radiated power (EIRP) that shall not exceed the lesser of 20 mW (13 dBm) or 16 + 10log (EBW) dBm, where EBW is expressed in MHz.	

Result: main report 1-9941_15-01-06

Frequency [MHz]	Output power conducted [dBm]	Gain [dBi]	EIRP [dBm]	Limit [dBm]
2363	2.1	-2.3	-0.2	0.0
2382	1.1	-1.2	-0.1	0.0
2387	0.9	-1.9	-1.0	0.0
2392	4.6	-2.5	2.1	13.0
2397	4.5	-2.3	2.2	13.0

Result:

Frequency [MHz]	Output power conducted [dBm]	Gain [dBi]	EIRP [dBm]	Limit [dBm]
2363	-/-	-/-	0.0	0.0
2382	-/-	-/-	-0.1	0.0
2387	-/-	-/-	-0.1	0.0
2392	-/-	-/-	1.1	13.0
2397	-/-	-/-	1.2	13.0

11.2 Transmitter unwanted radiation (radiated)

Measurement:

Measurement parameter	
Detector:	Prescan: Peak Final: QPK below 960 MHz RMS above 960 MHz
Video bandwidth:	9 kHz – 150 kHz: 1 kHz 150 kHz – 30 MHz: 30 kHz 30 MHz – 1 GHz: 300 kHz 1 GHz – 26 GHz: 3 MHz
Resolution bandwidth:	9 kHz – 150 kHz: 200 Hz 150 kHz – 30 MHz: 9 kHz 30 MHz – 1 GHz: 100 kHz 1 GHz – 26 GHz: 1 MHz
Span:	See plots
Trace mode:	Max Hold
Test setup	See sub clause 7.1 – A & 7.2 – A & 7.3 – A
Measurement uncertainty	See sub clause 8

Limits:

FCC	IC	
47 CFR § 15.109 47 CFR § 95.635(d)(1)(v), 95.635(d)(3)	-/-	
Transmitter unwanted radiation (radiated)		
Frequency (MHz)	**Field strength (µV/m)** [1]	**Measurement distance (m)**
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 - 88	100 (40 dBµV/m)	3
30 - 88	31.6 (30 dBµV/m)	10
88 - 216	150 (43.5 dBµV/m)	3
88 - 216	47.3 (33.5 dBµV/m)	10
216 - 960	200 (46 dBµV/m)	3
216 - 960	63.1 (36 dBµV/m)	10
above 960	500 (54 dBµV/m)	3

[1] Measurements in the 9 to 90 kHz, 110 to 490 kHz and above 1000 MHz ranges employ an average detector. Otherwise a quasi-peak detector is used.

Results: Transmitter mode

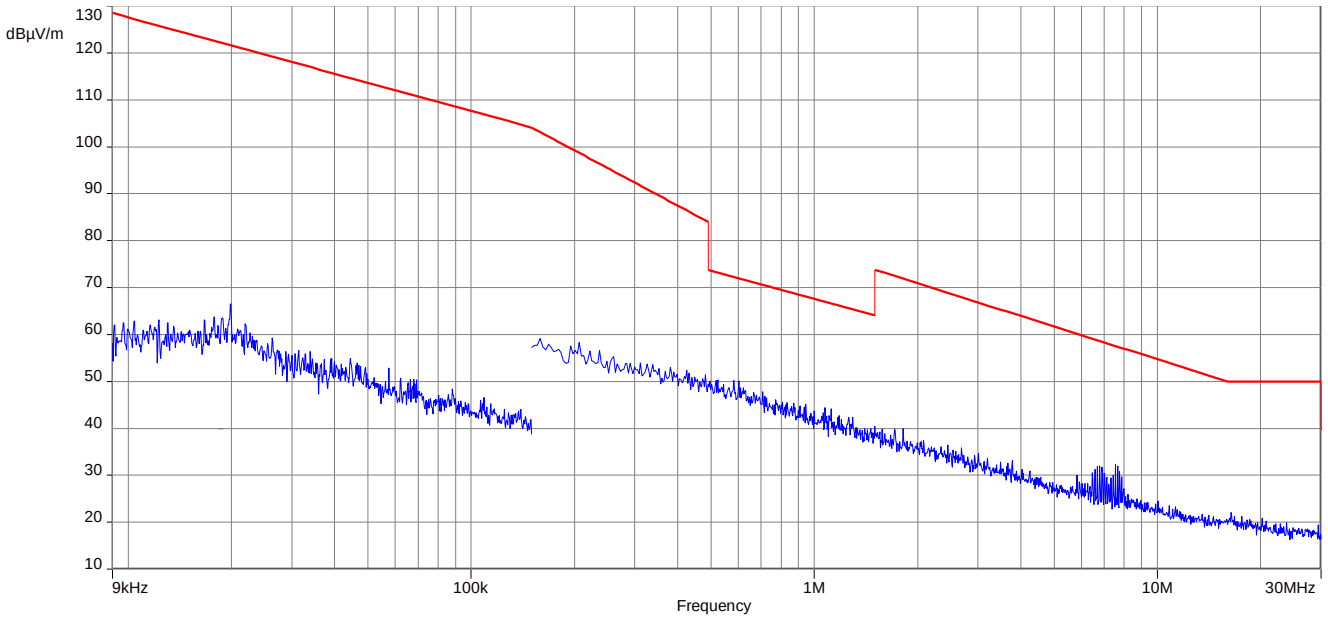
Transmitter unwanted radiation [dBµV/m]								
2363 MHz			2382 MHz			2387 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please look at the table below the 1 GHz plot.								
2507	Peak	48.2	4746	Peak	45.6	4774	Peak	45.9
	QPK	-/-		QPK	-/-		QPK	-/-
4726	Peak	45.3	-/-	Peak	-/-	-/-	Peak	-/-
	QPK	-/-		QPK	-/-		QPK	-/-
Additional peaks according to KDB 550599.								
1046	Peak	28.1	1379	Peak	29.4	1093	Peak	28.5
	AVG	-/-		AVG	-/-		AVG	-/-
1663	Peak	30.1	1842	Peak	32.4	1471	Peak	29.4
	AVG	-/-		AVG	-/-		AVG	-/-
2219	Peak	33.8	2600	Peak	37.2	1973	Peak	32.8
	AVG	-/-		AVG	-/-		AVG	-/-
2507	Peak	39.7	3220	Peak	42.1	2769	Peak	38.1
	AVG	-/-		AVG	-/-		AVG	-/-
3484	Peak	35.7	3311	Peak	35.5	3344	Peak	43.3
	AVG	-/-		AVG	-/-		AVG	-/-
6490	Peak	34.4	5949	Peak	33.3	3595	Peak	35.1
	AVG	-/-		AVG	-/-		AVG	-/-
11517	Peak	42.0	12925	Peak	42.1	11727	Peak	42.3
	AVG	-/-		AVG	-/-		AVG	-/-
15700	Peak	41.7	14439	Peak	43.0	14309	Peak	43.2
	AVG	-/-		AVG	-/-		AVG	-/-
For emissions above 18 GHz, please look at the plots.								
-/-	Peak	-/-	-/-	Peak	-/-	-/-	Peak	-/-
	AVG	-/-		AVG	-/-		AVG	-/-
-/-	Peak	-/-	-/-	Peak	-/-	-/-	Peak	-/-
	AVG	-/-		AVG	-/-		AVG	-/-
-/-	Peak	-/-	-/-	Peak	-/-	-/-	Peak	-/-
	AVG	-/-		AVG	-/-		AVG	-/-

Results: Transmitter mode

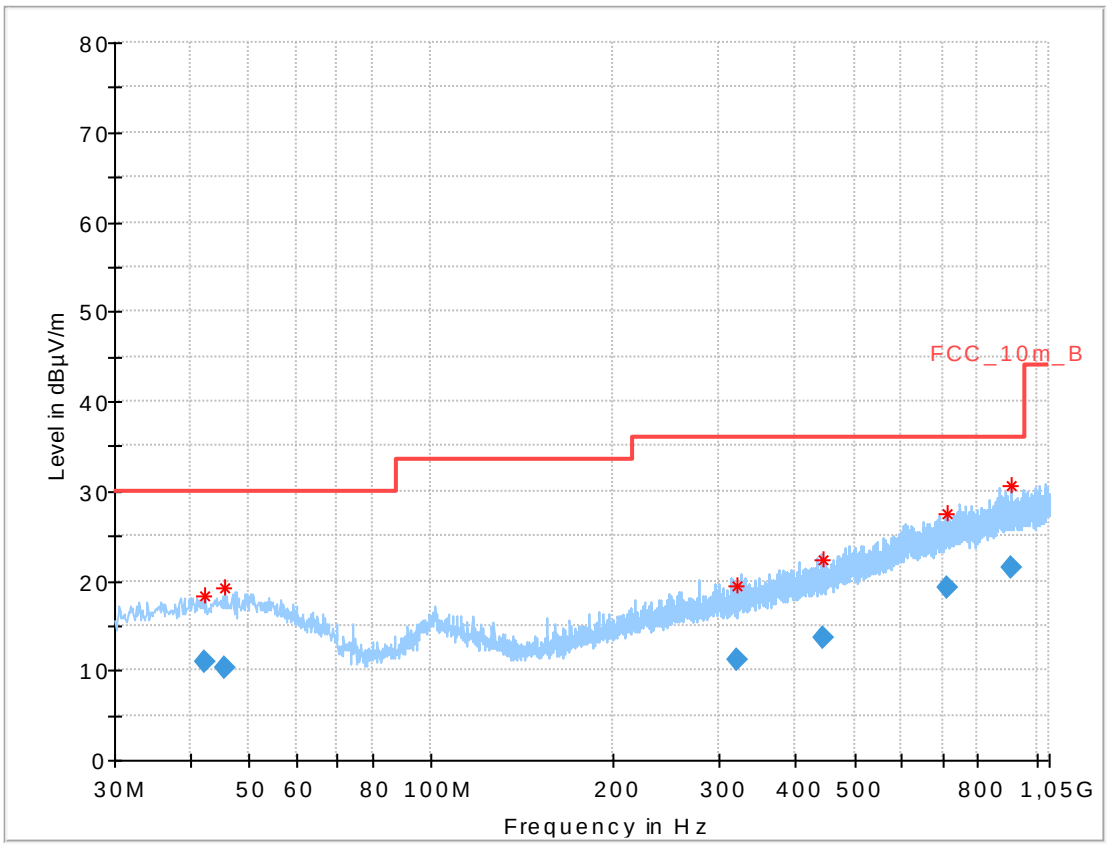
Transmitter unwanted radiation [dBµV/m]								
2392 MHz			-/-			2397 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please look at the table below the 1 GHz plot.								
4784	Peak	45.9	-/-	Peak	-/-	2541	Peak	46.0
	QPK	-/-		QPK	-/-		QPK	-/-
-/-	Peak	-/-	-/-	Peak	-/-	4794	Peak	43.6
	QPK	-/-		QPK	-/-		QPK	-/-
Additional peaks according to KDB 550599.								
1628	Peak	29.5	-/-	Peak	-/-	2253	Peak	34.7
	AVG	-/-		AVG	-/-		AVG	-/-
1931	Peak	32.7	-/-	Peak	-/-	2541	Peak	37.6
	AVG	-/-		AVG	-/-		AVG	-/-
2336	Peak	34.4	-/-	Peak	-/-	3283	Peak	42.9
	AVG	-/-		AVG	-/-		AVG	-/-
3364	Peak	43.5	-/-	Peak	-/-	3107	Peak	34.3
	AVG	-/-		AVG	-/-		AVG	-/-
6254	Peak	33.1	-/-	Peak	-/-	3374	Peak	35.1
	AVG	-/-		AVG	-/-		AVG	-/-
9844	Peak	39.5	-/-	Peak	-/-	9849	Peak	39.6
	AVG	-/-		AVG	-/-		AVG	-/-
11726	Peak	42.3	-/-	Peak	-/-	11814	Peak	42.3
	AVG	-/-		AVG	-/-		AVG	-/-
14433	Peak	44.2	-/-	Peak	-/-	15728	Peak	41.4
	AVG	-/-		AVG	-/-		AVG	-/-
For emissions above 18 GHz, please look at the plots.								
-/-	Peak	-/-	-/-	Peak	-/-	-/-	Peak	-/-
	AVG	-/-		AVG	-/-		AVG	-/-
-/-	Peak	-/-	-/-	Peak	-/-	-/-	Peak	-/-
	AVG	-/-		AVG	-/-		AVG	-/-
-/-	Peak	-/-	-/-	Peak	-/-	-/-	Peak	-/-
	AVG	-/-		AVG	-/-		AVG	-/-

Plots:

Plot 1: 9 kHz – 30 MHz, channel low, lower band



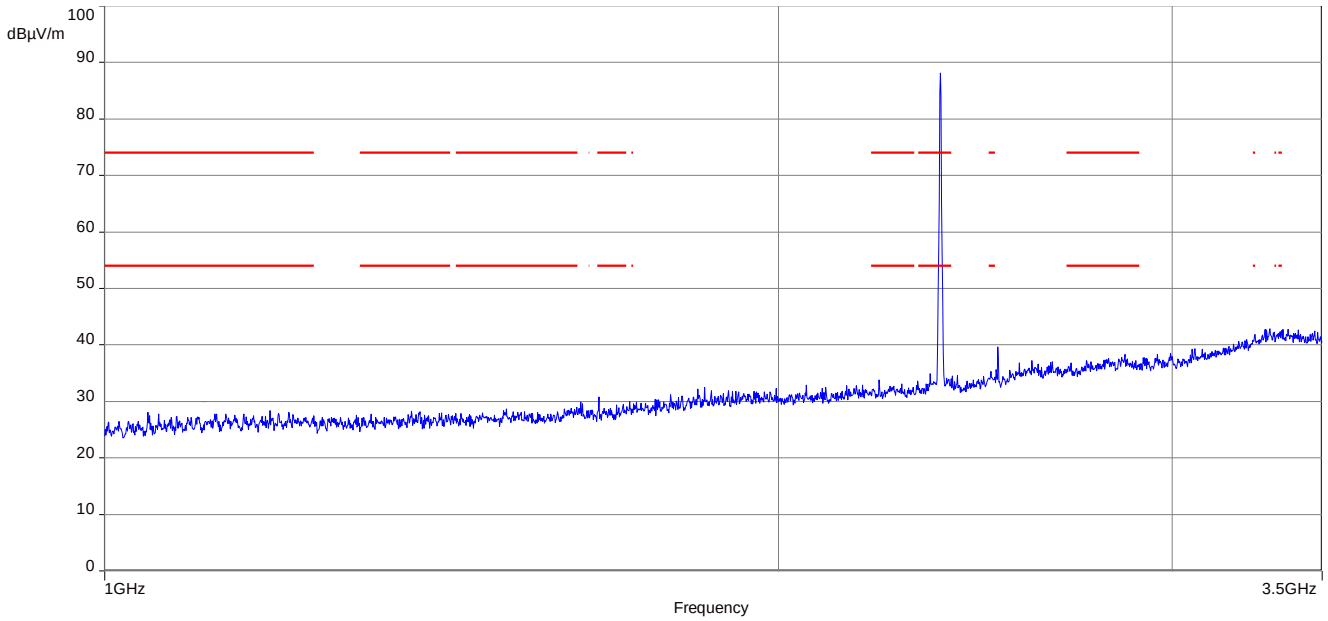
Plot 2: 30 MHz – 1 GHz, channel low, lower band



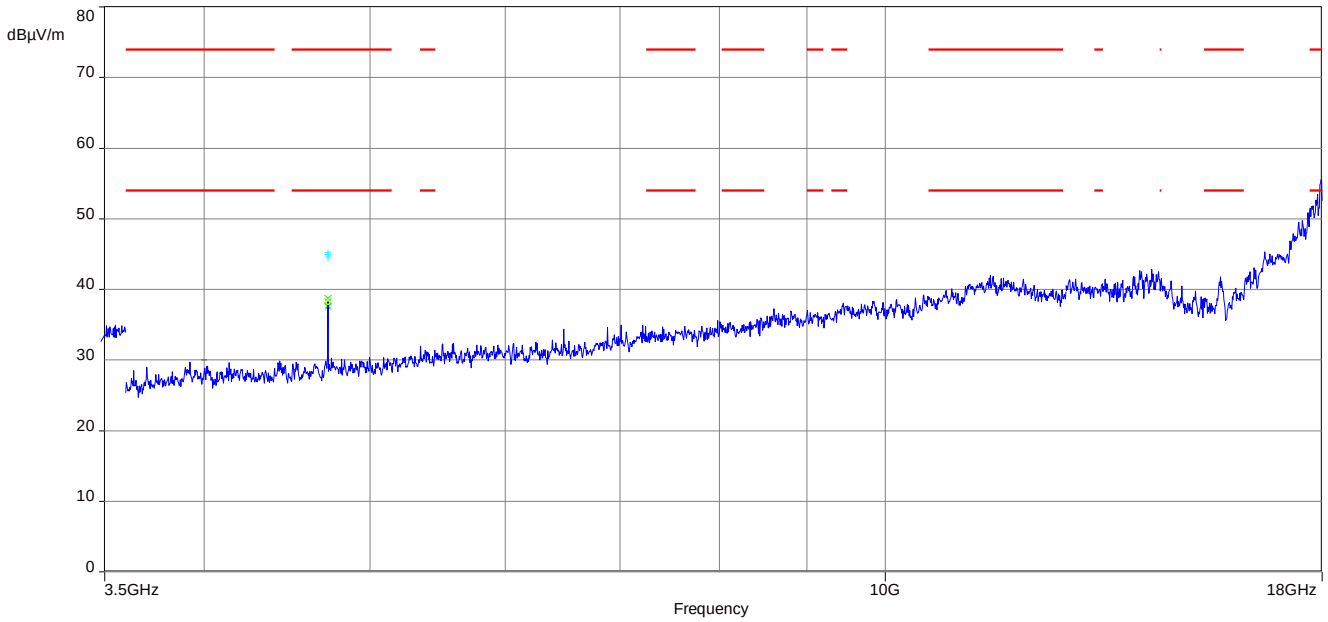
Final_Result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
42.361800	10.87	30.00	19.13	1000.0	120.000	101.0	V	250.0	13.4
45.471750	10.36	30.00	19.64	1000.0	120.000	98.0	H	153.0	13.6
321.168600	11.21	36.00	24.79	1000.0	120.000	185.0	H	126.0	15.1
442.703700	13.61	36.00	22.39	1000.0	120.000	185.0	V	212.0	17.5
713.372700	19.19	36.00	16.81	1000.0	120.000	98.0	H	297.0	21.9
907.493700	21.36	36.00	14.64	1000.0	120.000	178.0	H	101.0	24.2

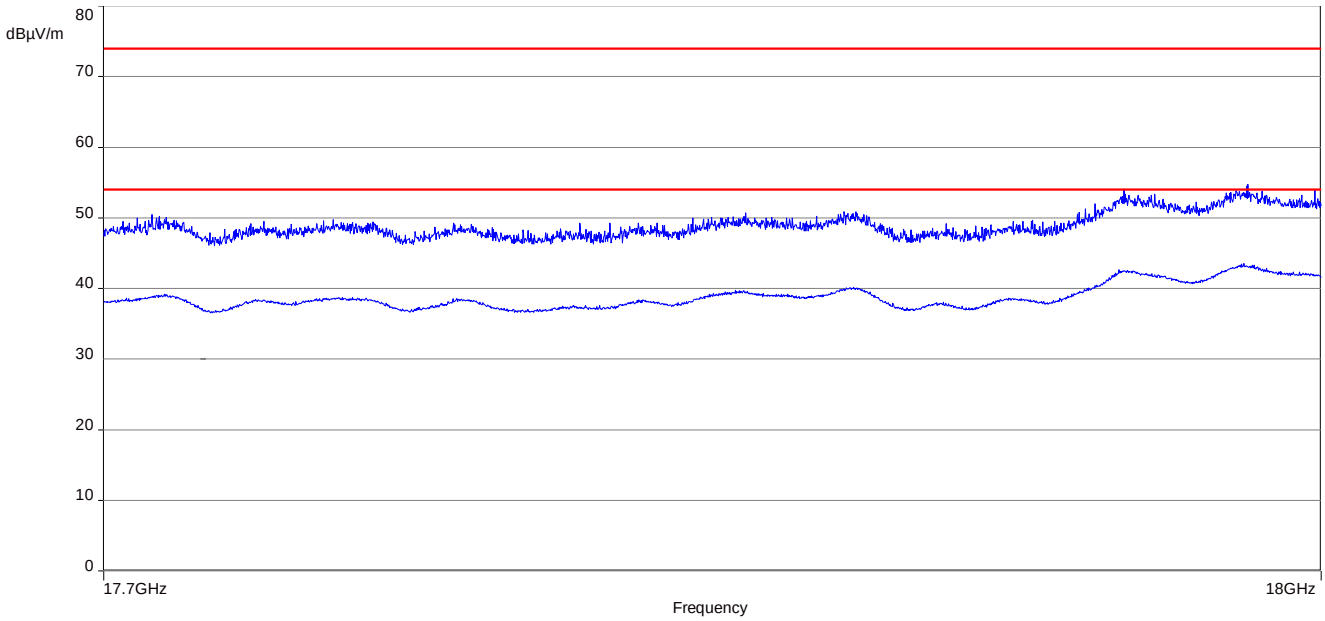
Plot 3: 1 GHz – 3.5 GHz, antenna horizontal/vertical, channel low, lower band



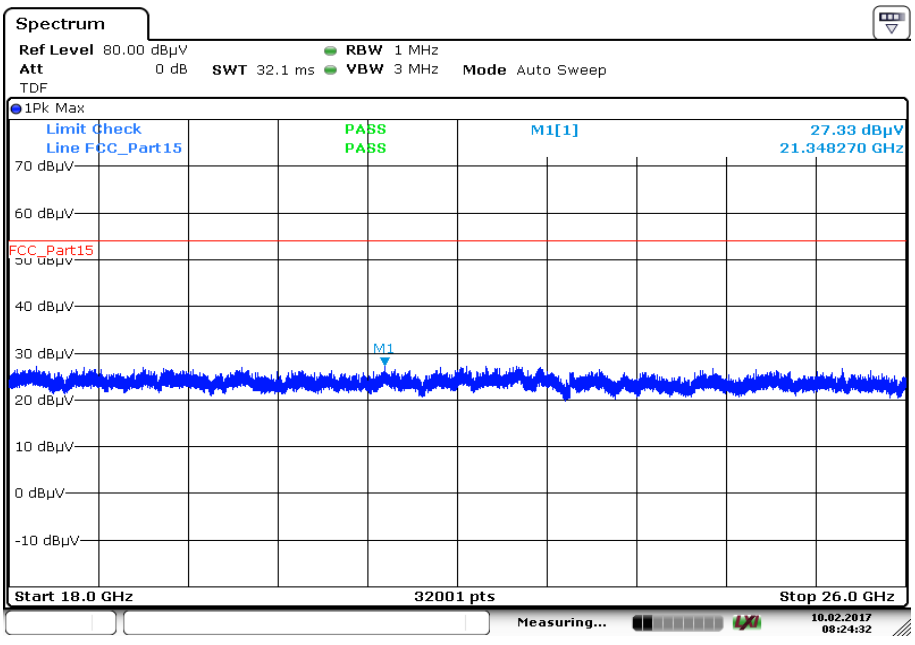
Plot 4: 3.5 GHz – 18 GHz, antenna horizontal/vertical, channel low, lower band



Plot 5: 17.7 GHz – 18 GHz, antenna horizontal/vertical, channel low, lower band



Plot 6: 18 GHz – 26 GHz, antenna horizontal/vertical, channel low, lower band



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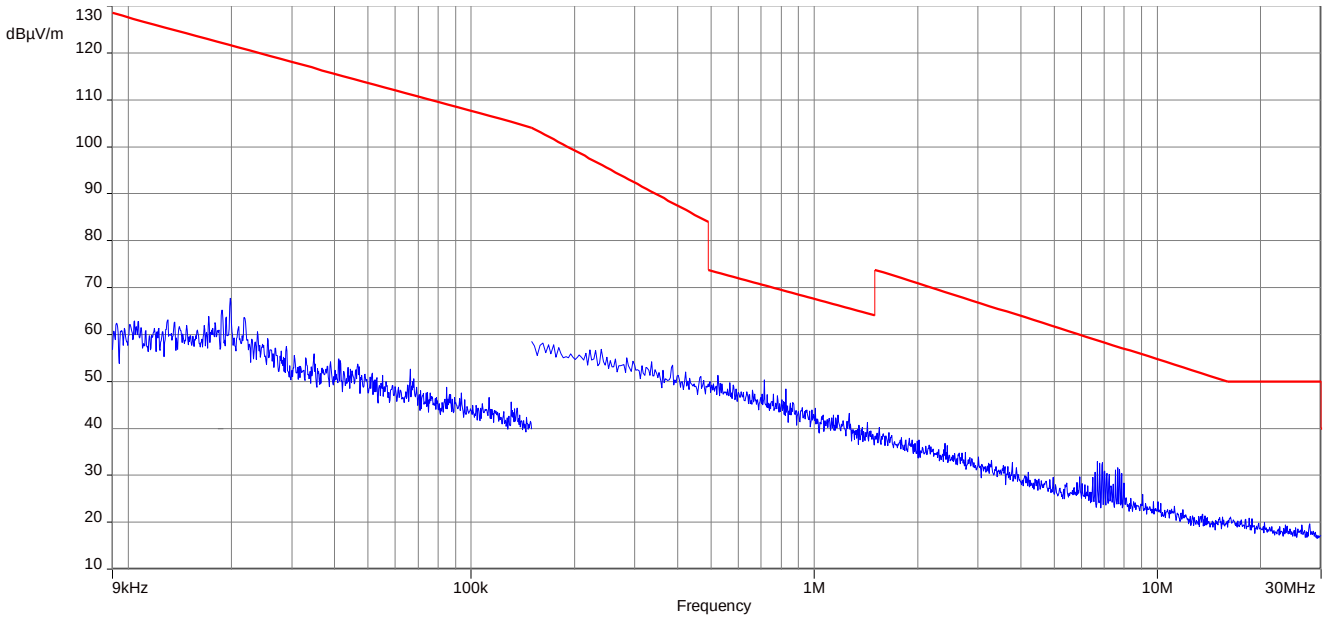
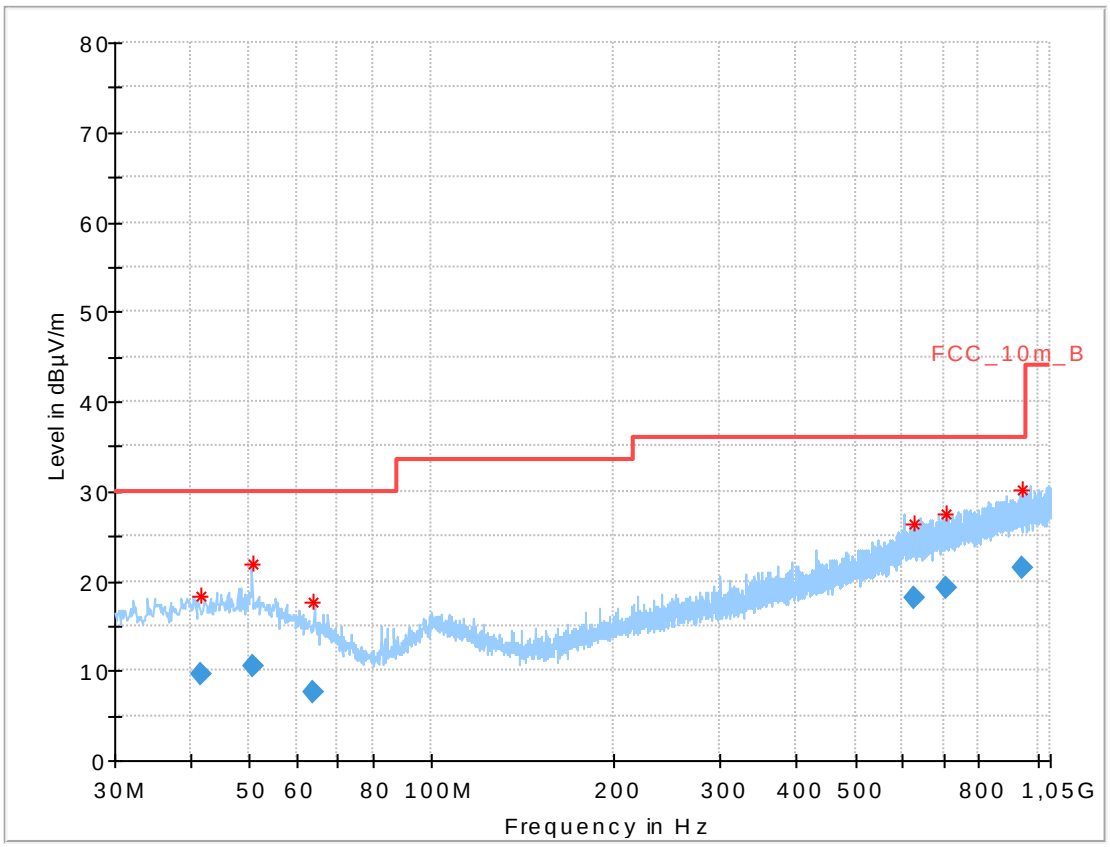
Plot 7: 9 kHz – 30 MHz, channel mid, lower band



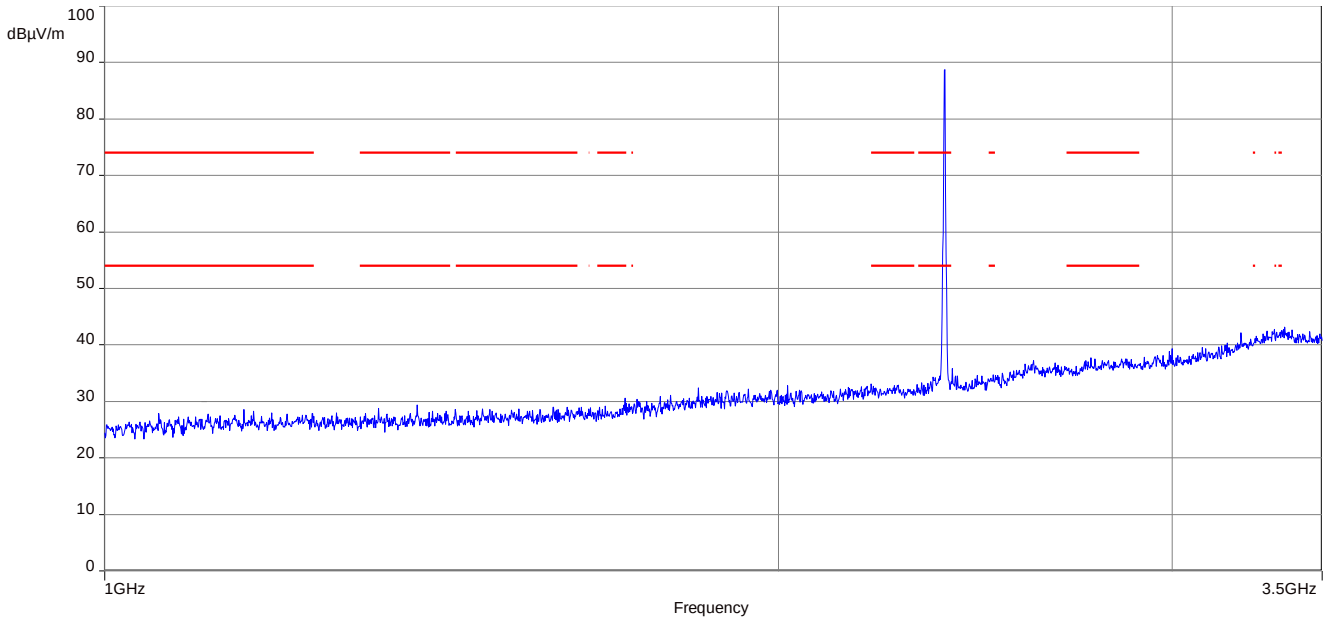
Plot 8: 30 MHz – 1 GHz, channel mid, lower band



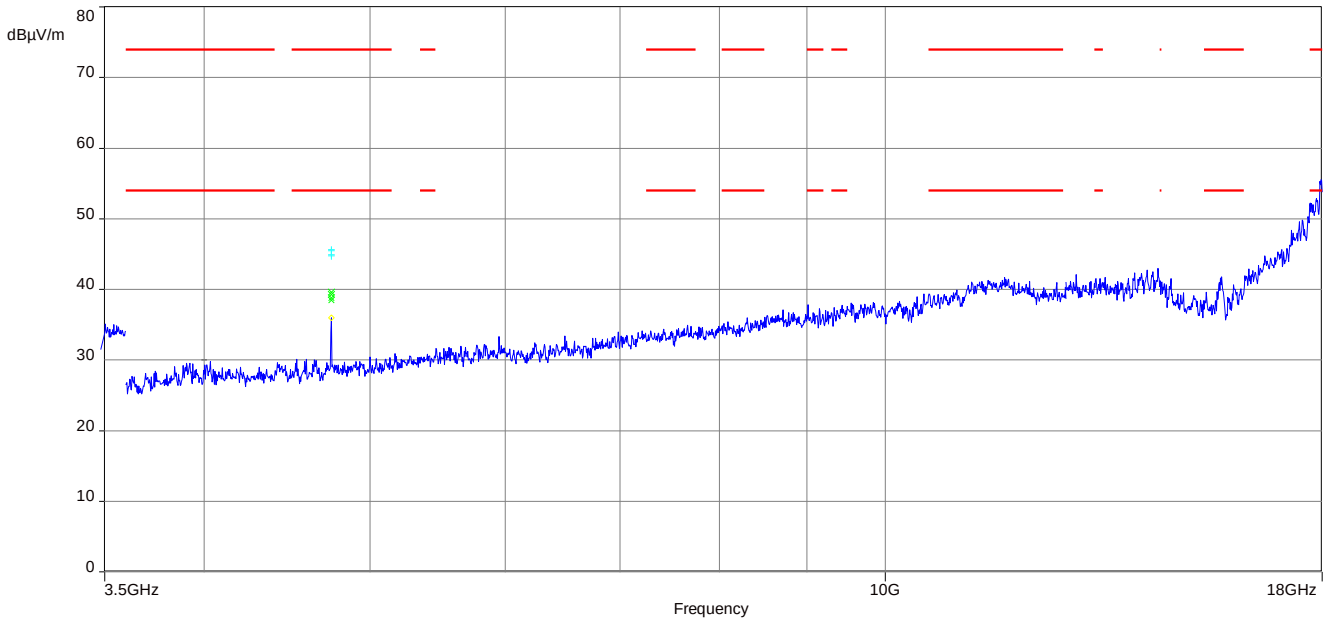
Final_Result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
41.667450	9.63	30.00	20.37	1000.0	120.000	100.0	H	182.0	13.4
50.781000	10.50	30.00	19.50	1000.0	120.000	185.0	V	267.0	13.6
63.529050	7.67	30.00	22.33	1000.0	120.000	185.0	V	290.0	11.1
623.781300	18.12	36.00	17.88	1000.0	120.000	185.0	V	48.0	20.9
708.280950	19.12	36.00	16.88	1000.0	120.000	185.0	H	267.0	21.7
943.027500	21.43	36.00	14.57	1000.0	120.000	98.0	V	97.0	24.3

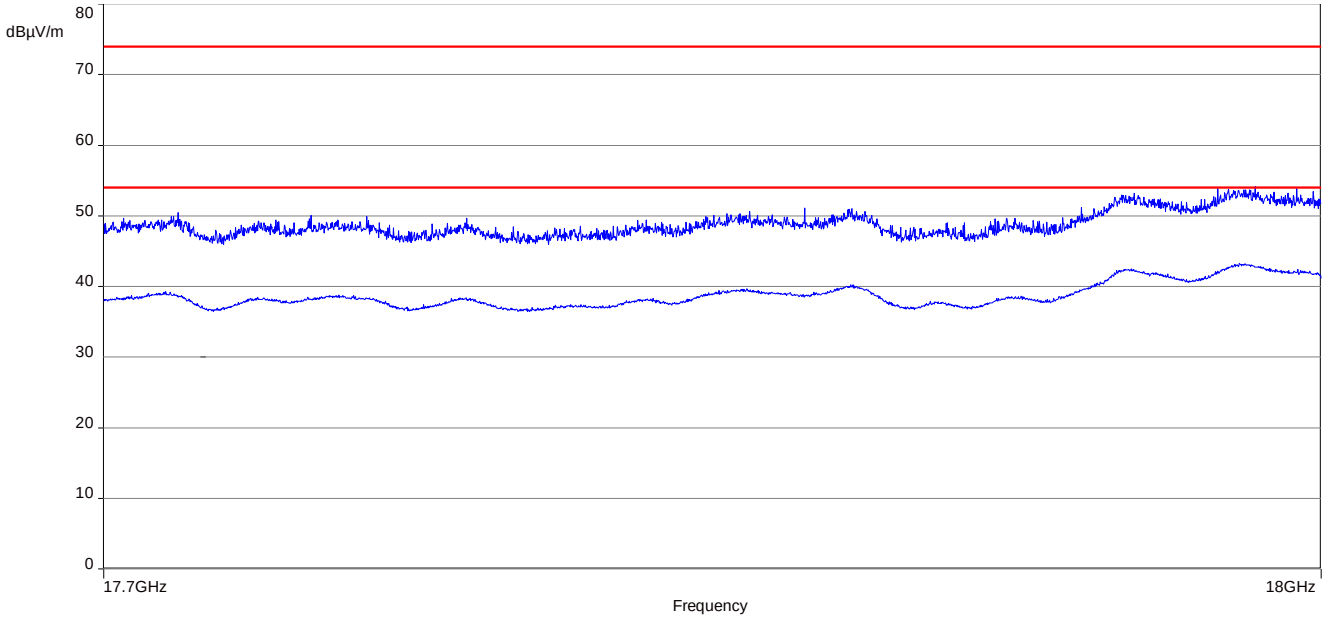
Plot 9: 1 GHz – 3.5 GHz, antenna horizontal/vertical, channel mid, lower band



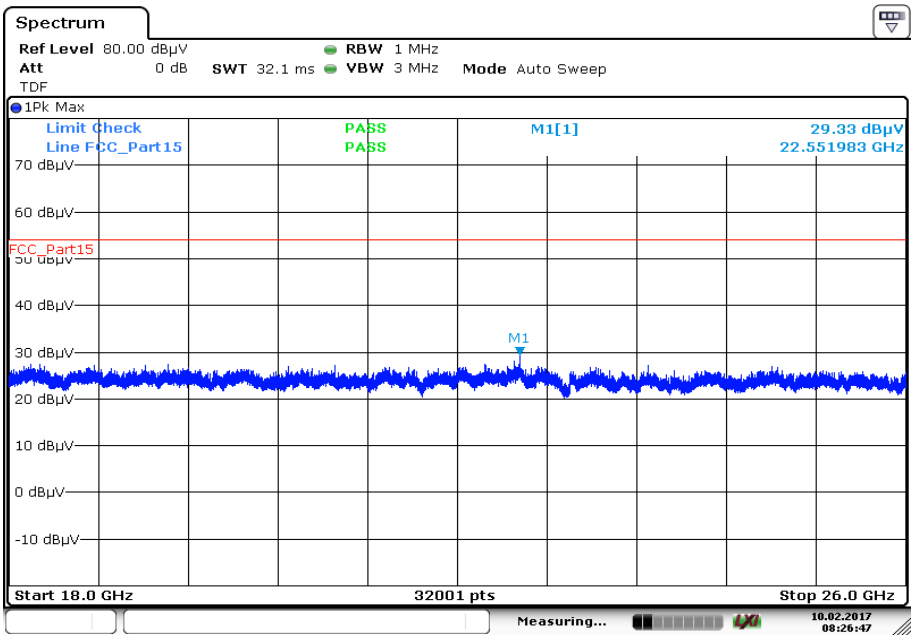
Plot 10: 3.5 GHz – 18 GHz, antenna horizontal/vertical, channel mid, lower band



Plot 11: 17.7 GHz – 18 GHz, antenna horizontal/vertical, channel mid, lower band



Plot 12: 18 GHz – 26 GHz, antenna horizontal/vertical, channel mid, lower band



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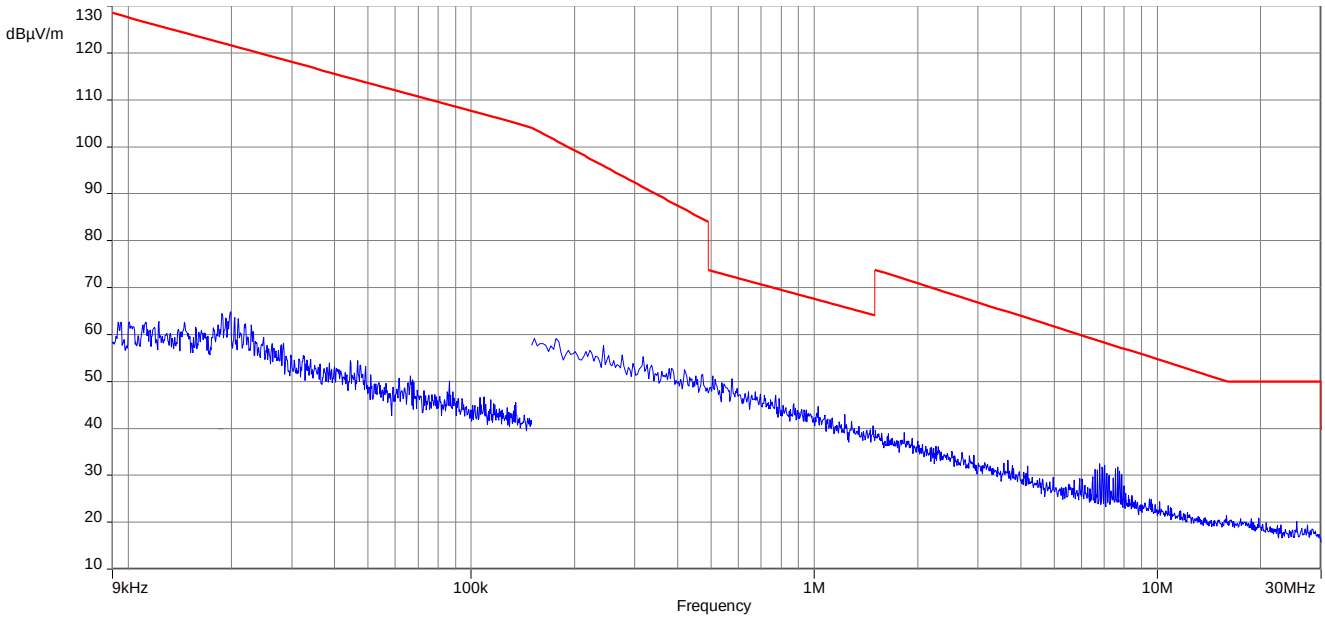
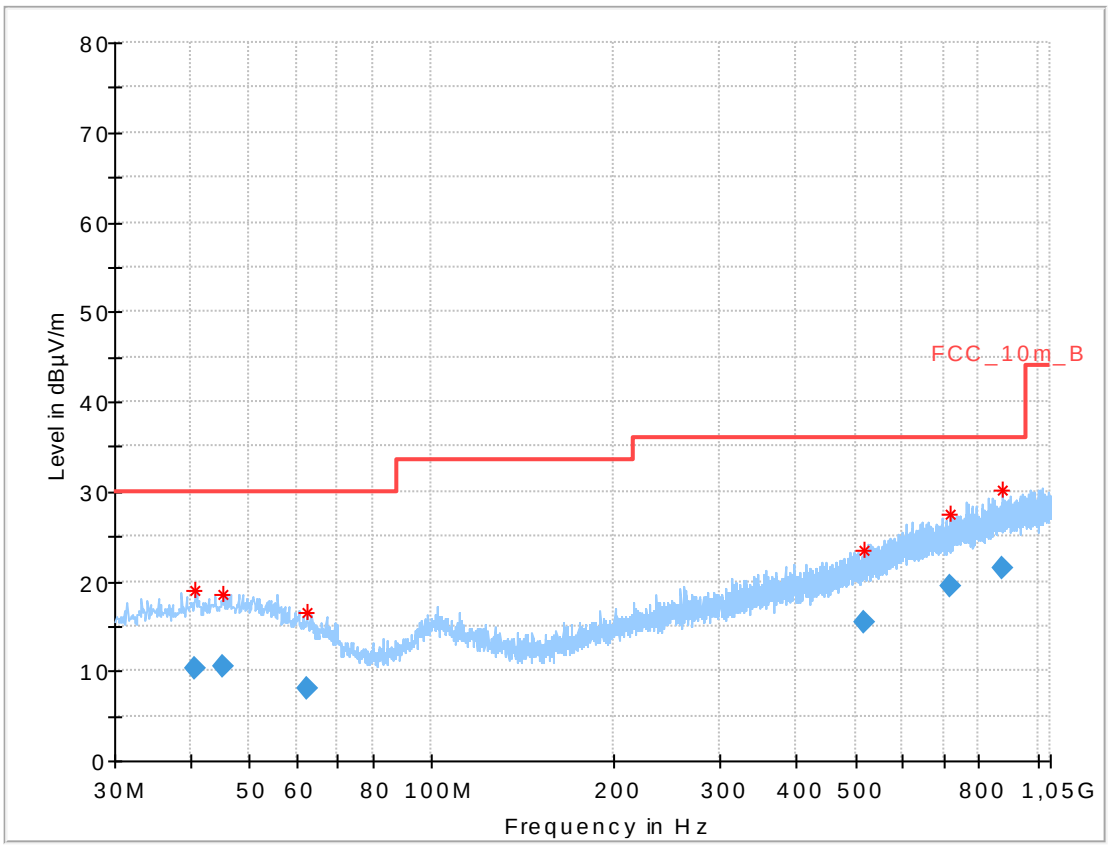
Plot 13: 9 kHz – 30 MHz, channel high, lower band



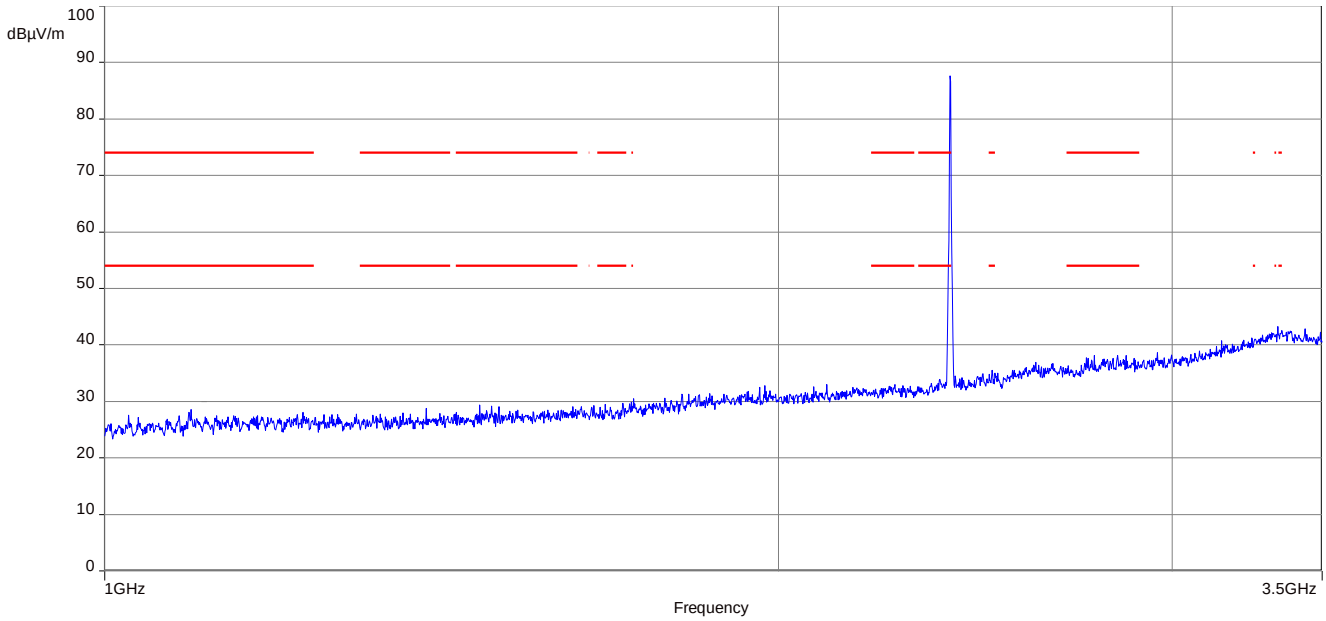
Plot 14: 30 MHz – 1 GHz, channel high, lower band



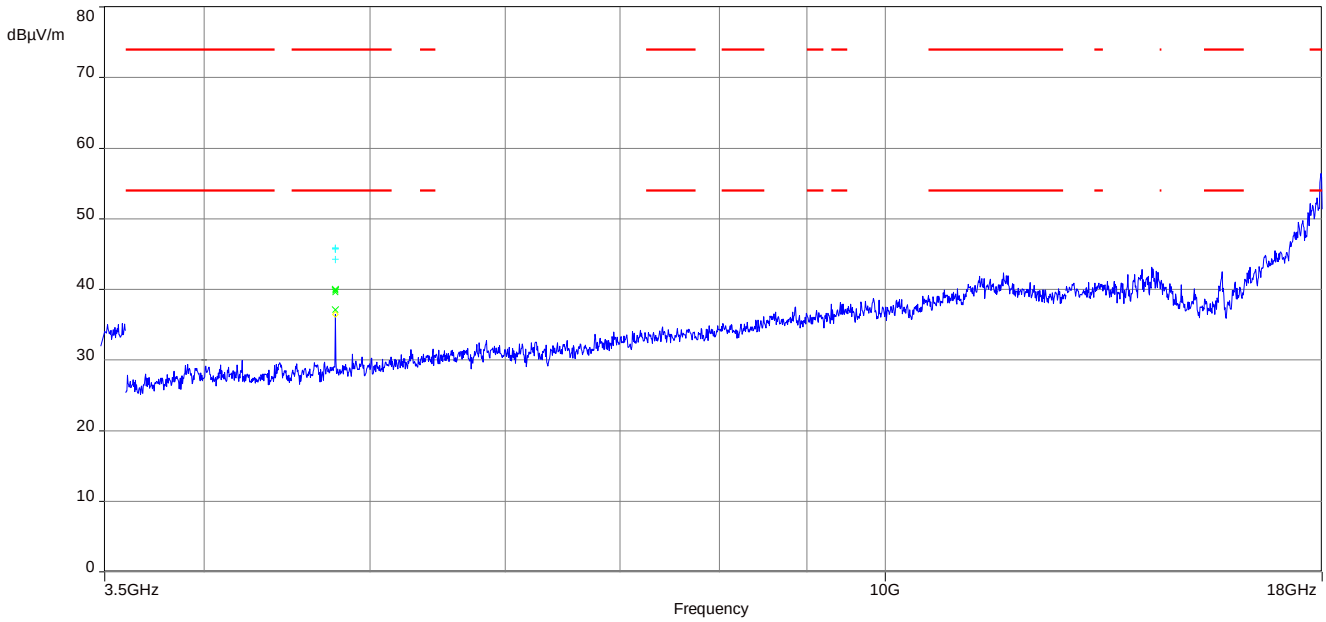
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
40.626600	10.24	30.00	19.76	1000.0	120.000	101.0	V	150.0	13.3
45.328200	10.41	30.00	19.59	1000.0	120.000	101.0	V	53.0	13.6
62.495700	8.04	30.00	21.96	1000.0	120.000	101.0	V	67.0	11.3
515.327100	15.44	36.00	20.56	1000.0	120.000	100.0	V	341.0	18.9
719.588400	19.35	36.00	16.65	1000.0	120.000	185.0	H	18.0	22.0
874.794300	21.37	36.00	14.63	1000.0	120.000	98.0	H	269.0	23.9

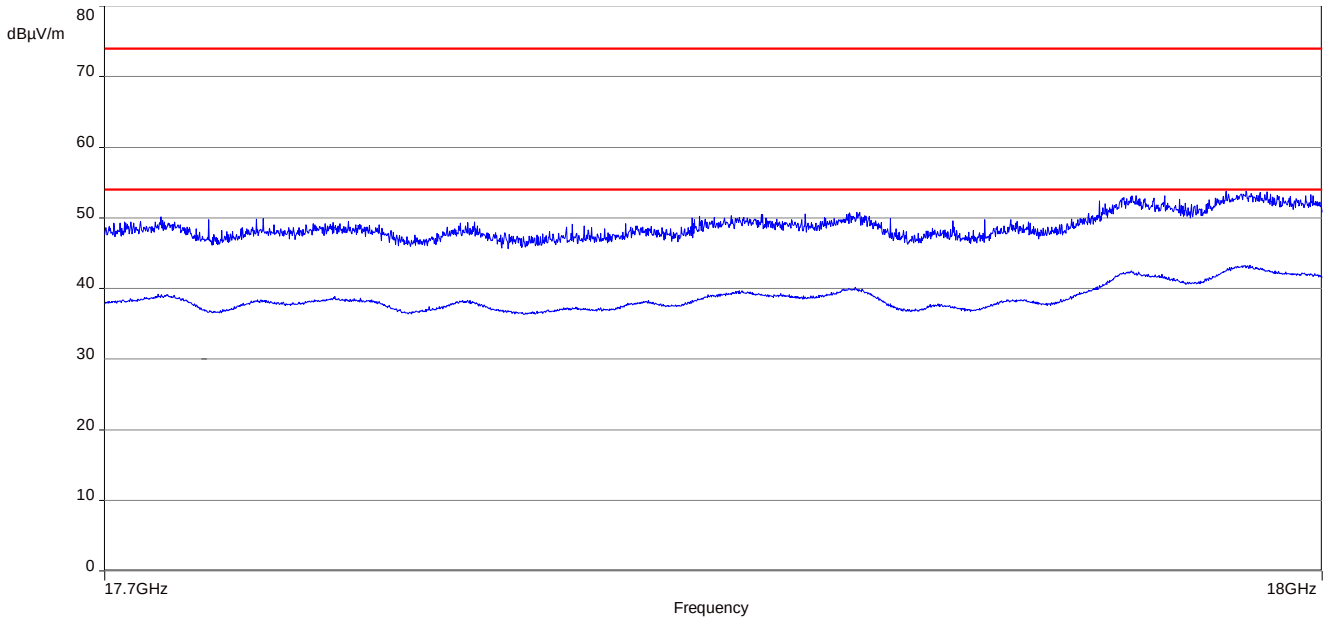
Plot 15: 1 GHz – 3.5 GHz, antenna horizontal/vertical, channel high, lower band



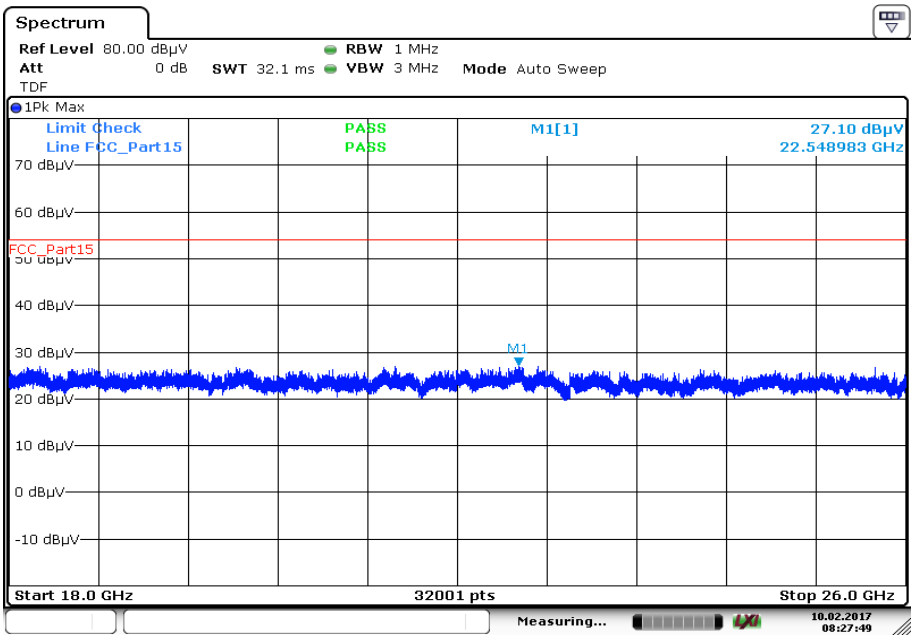
Plot 16: 3.5 GHz – 18 GHz, antenna horizontal/vertical, channel high, lower band



Plot 17: 17.7 GHz – 18 GHz, antenna horizontal/vertical, channel high, lower band



Plot 18: 18 GHz – 26 GHz, antenna horizontal/vertical, channel high, lower band



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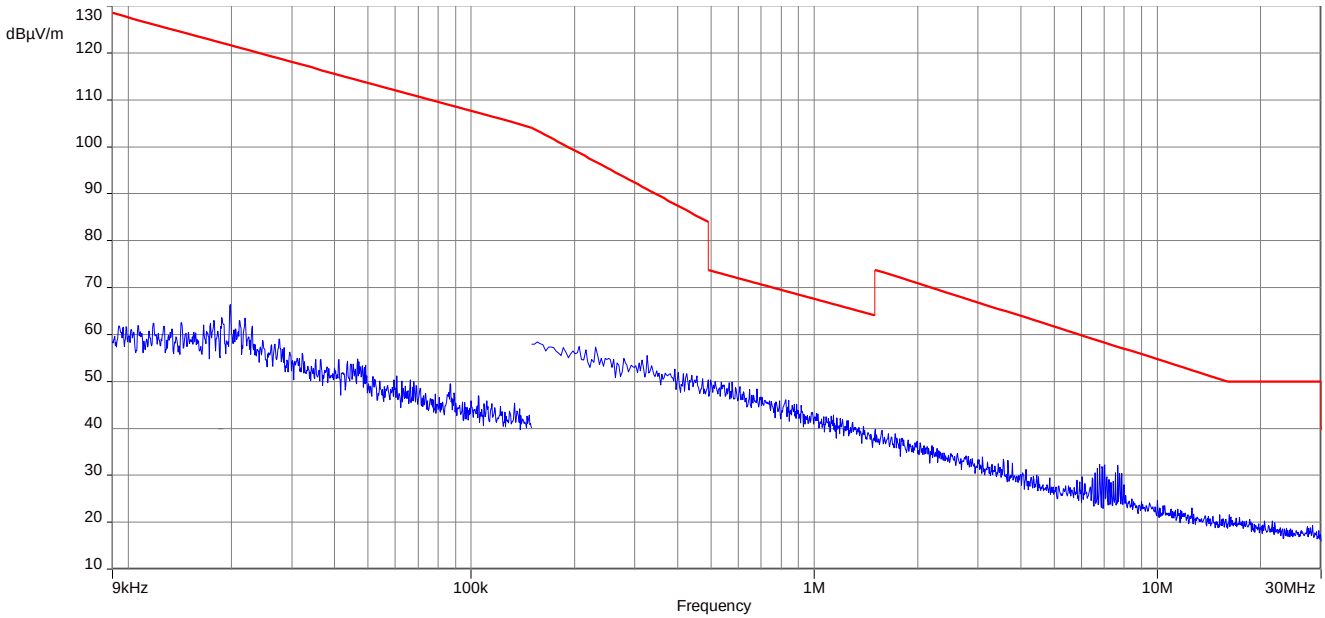
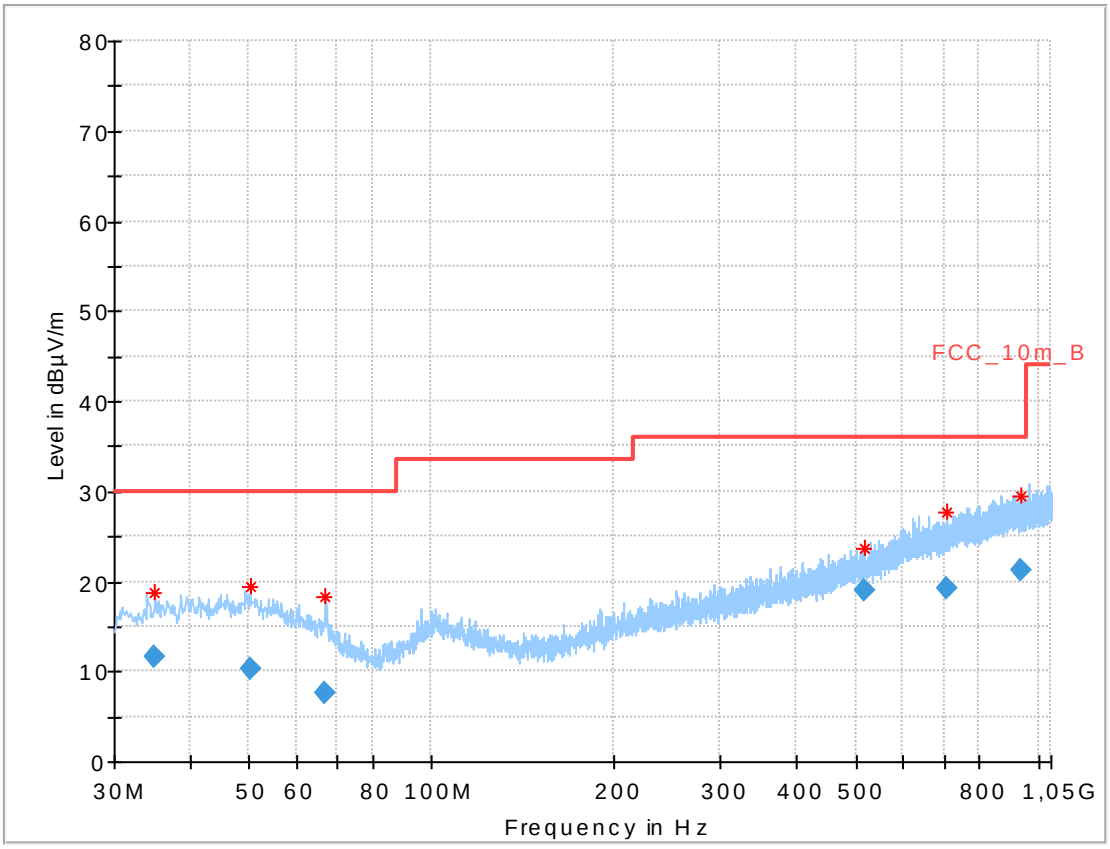
Plot 19: 9 kHz – 30 MHz, channel low, upper band



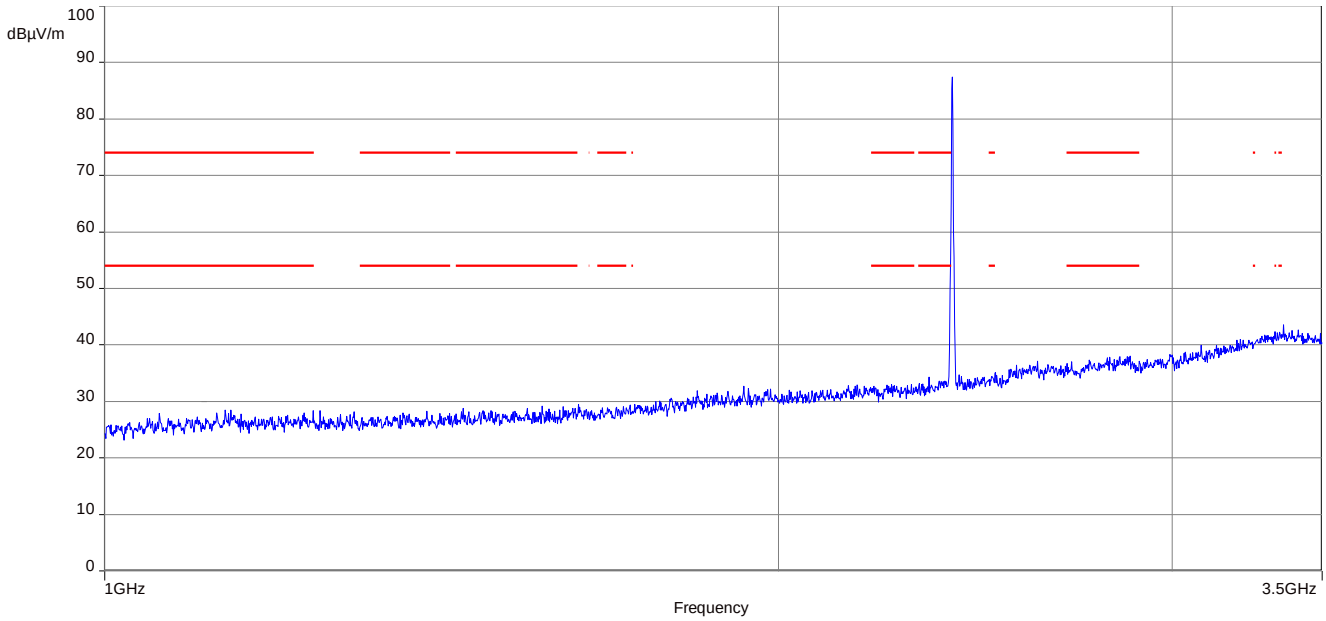
Plot 20: 30 MHz – 1 GHz, channel low, upper band



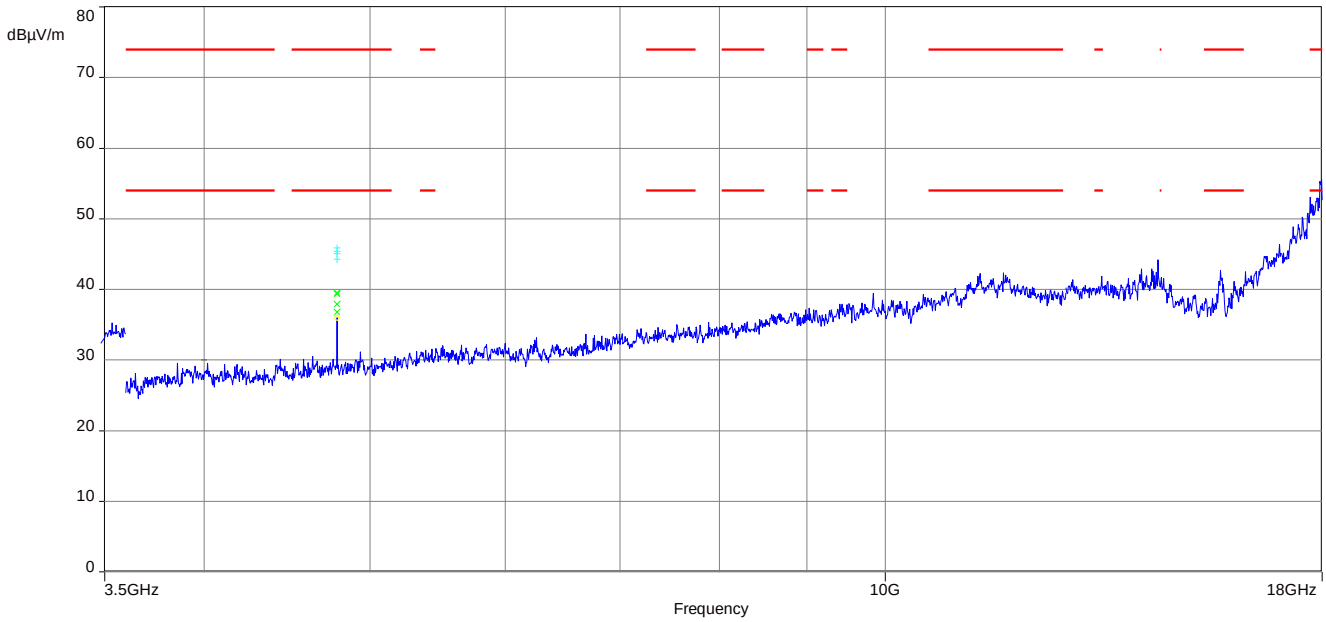
Final_Result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
34.993800	11.67	30.00	18.33	1000.0	120.000	178.0	V	144.0	12.7
50.161050	10.33	30.00	19.67	1000.0	120.000	101.0	H	132.0	13.7
66.853500	7.59	30.00	22.41	1000.0	120.000	98.0	H	0.0	10.4
515.380050	19.00	36.00	17.00	1000.0	120.000	101.0	H	266.0	18.9
708.258900	19.13	36.00	16.87	1000.0	120.000	98.0	V	291.0	21.7
934.447200	21.26	36.00	14.74	1000.0	120.000	98.0	H	120.0	24.3

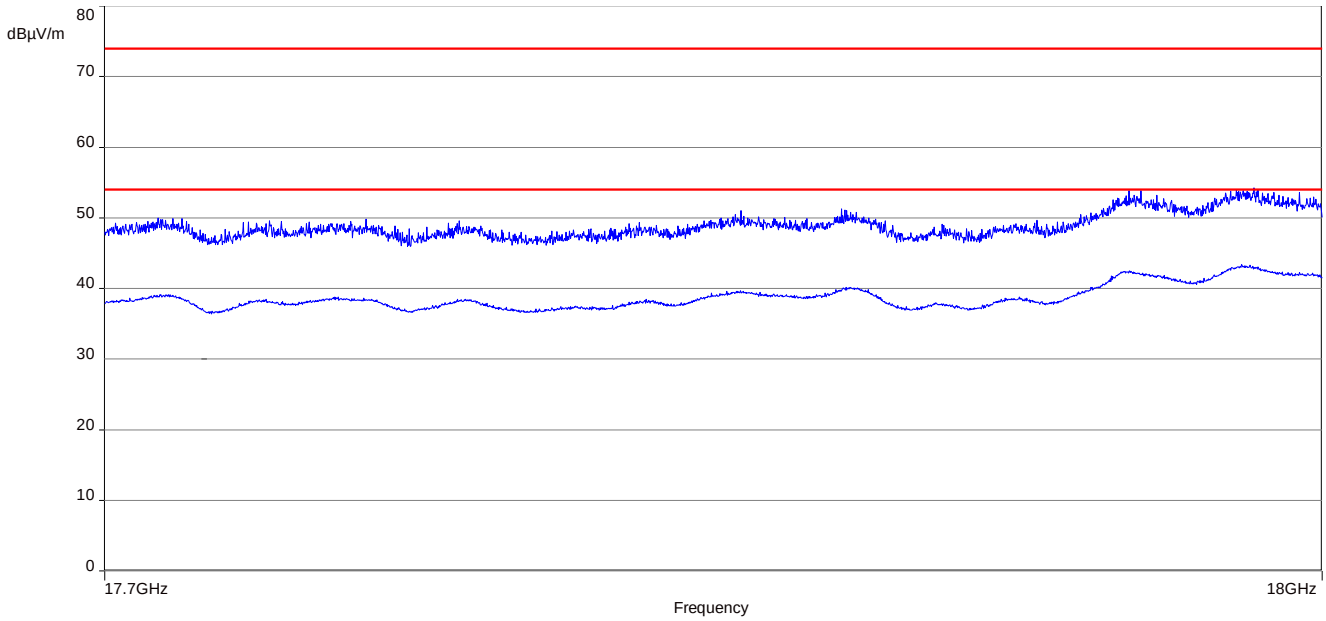
Plot 21: 1 GHz – 3.5 GHz, antenna horizontal/vertical, channel low, upper band



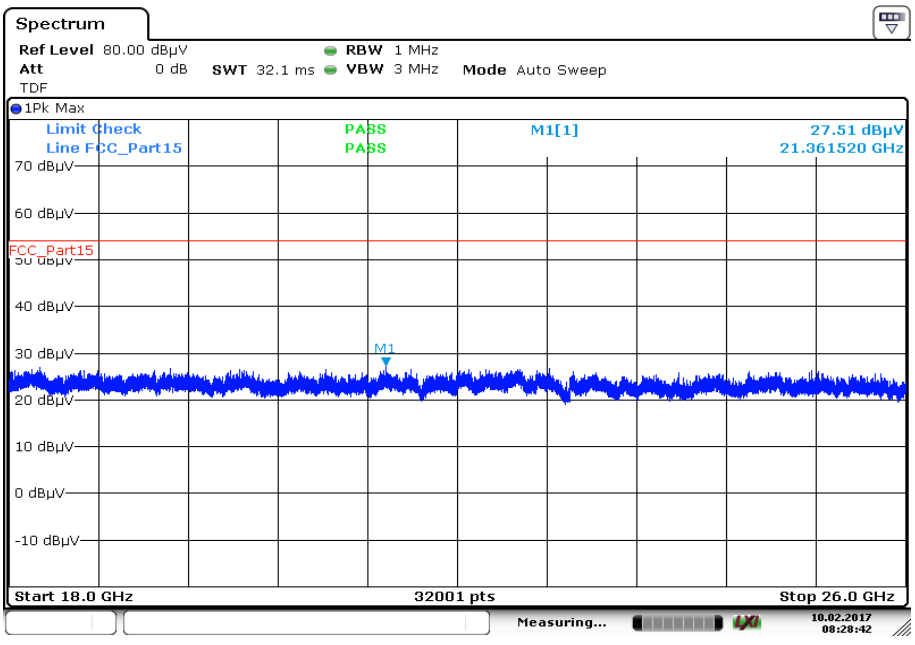
Plot 22: 3.5 GHz – 18 GHz, antenna horizontal/vertical, channel low, upper band



Plot 23: 17.7 GHz – 18 GHz, antenna horizontal/vertical, channel low, upper band



Plot 24: 18 GHz – 26 GHz, antenna horizontal/vertical, channel low, upper band



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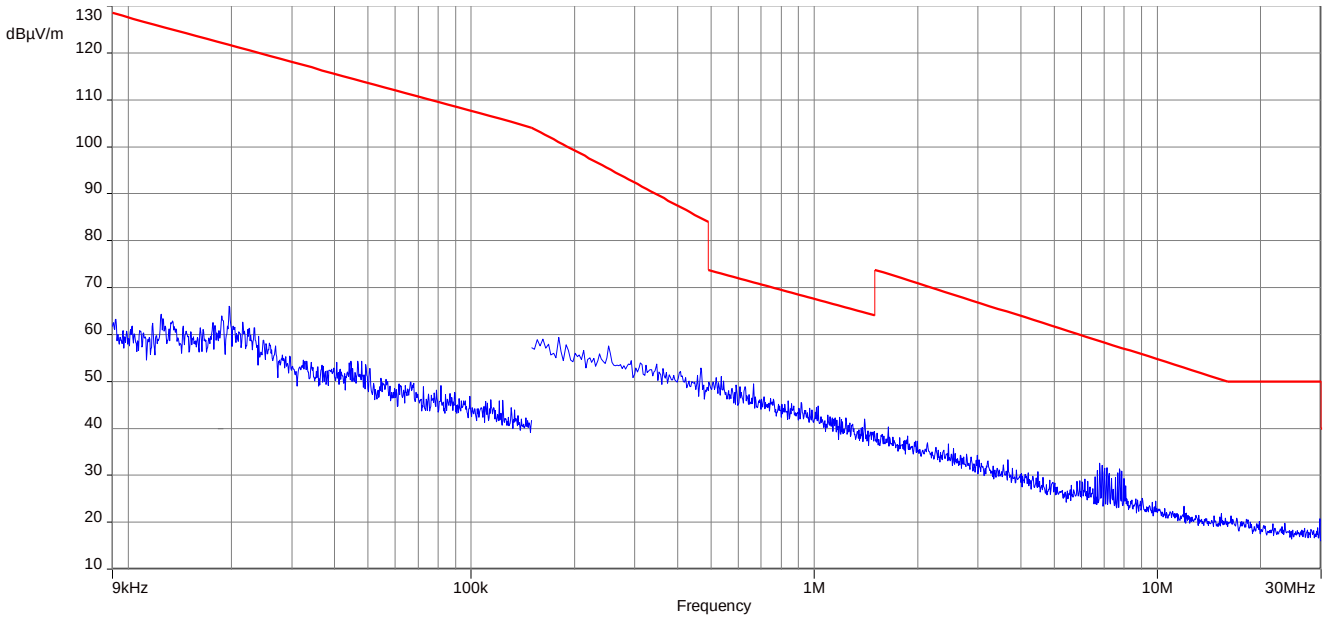
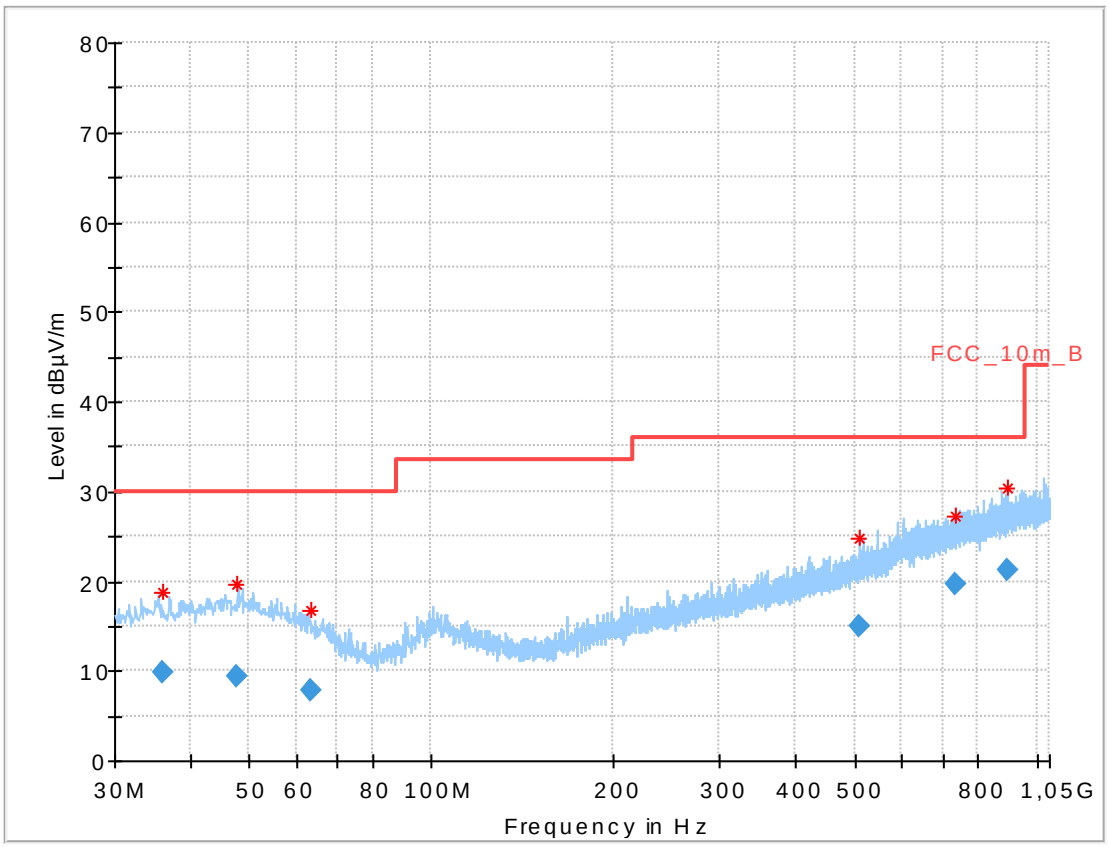
Plot 25: 9 kHz – 30 MHz, channel high, upper band



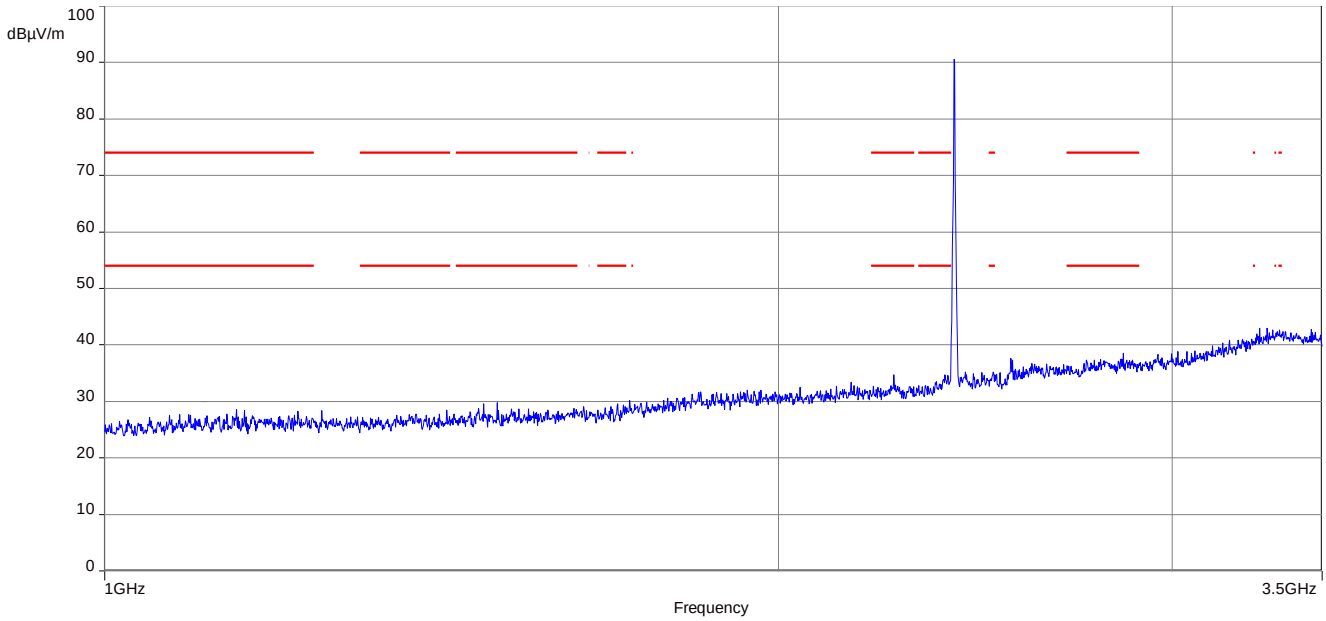
Plot 26: 30 MHz – 1 GHz, channel high, upper band



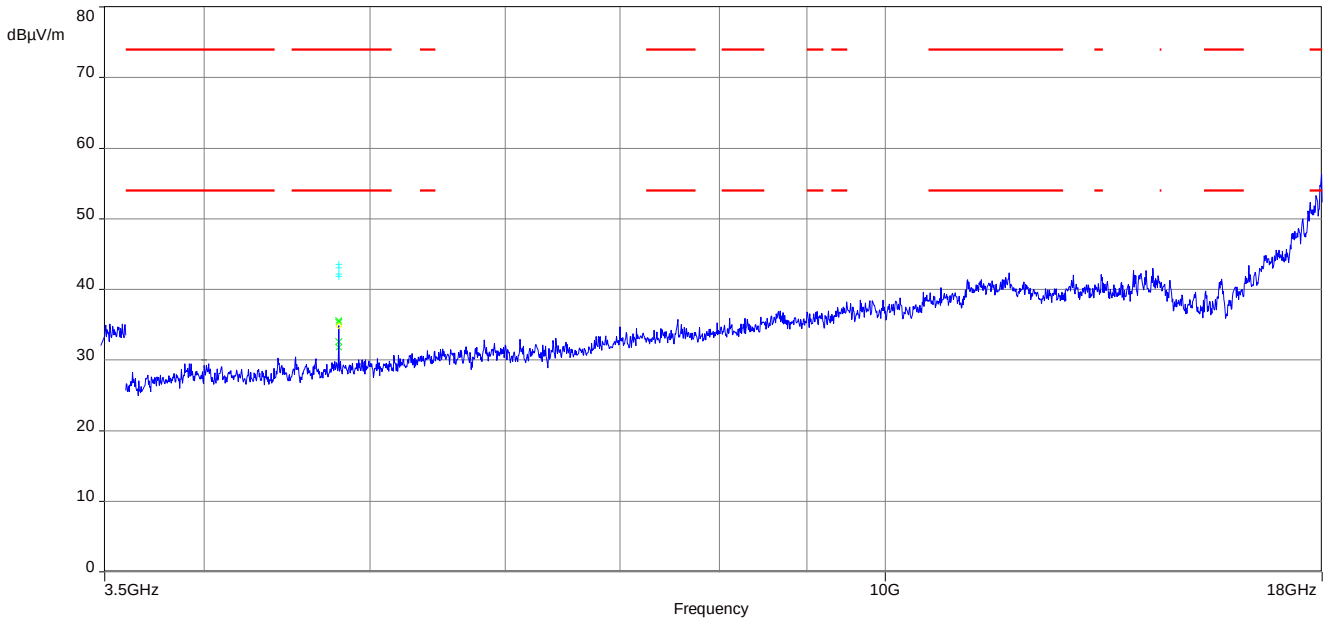
Final_Result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
35.941950	9.76	30.00	20.24	1000.0	120.000	101.0	H	72.0	12.8
47.711250	9.45	30.00	20.55	1000.0	120.000	98.0	H	161.0	13.7
63.190650	7.80	30.00	22.20	1000.0	120.000	101.0	V	21.0	11.1
510.998250	15.02	36.00	20.98	1000.0	120.000	101.0	H	0.0	18.8
734.578500	19.62	36.00	16.38	1000.0	120.000	185.0	H	72.0	22.4
894.677850	21.31	36.00	14.69	1000.0	120.000	98.0	H	21.0	24.1

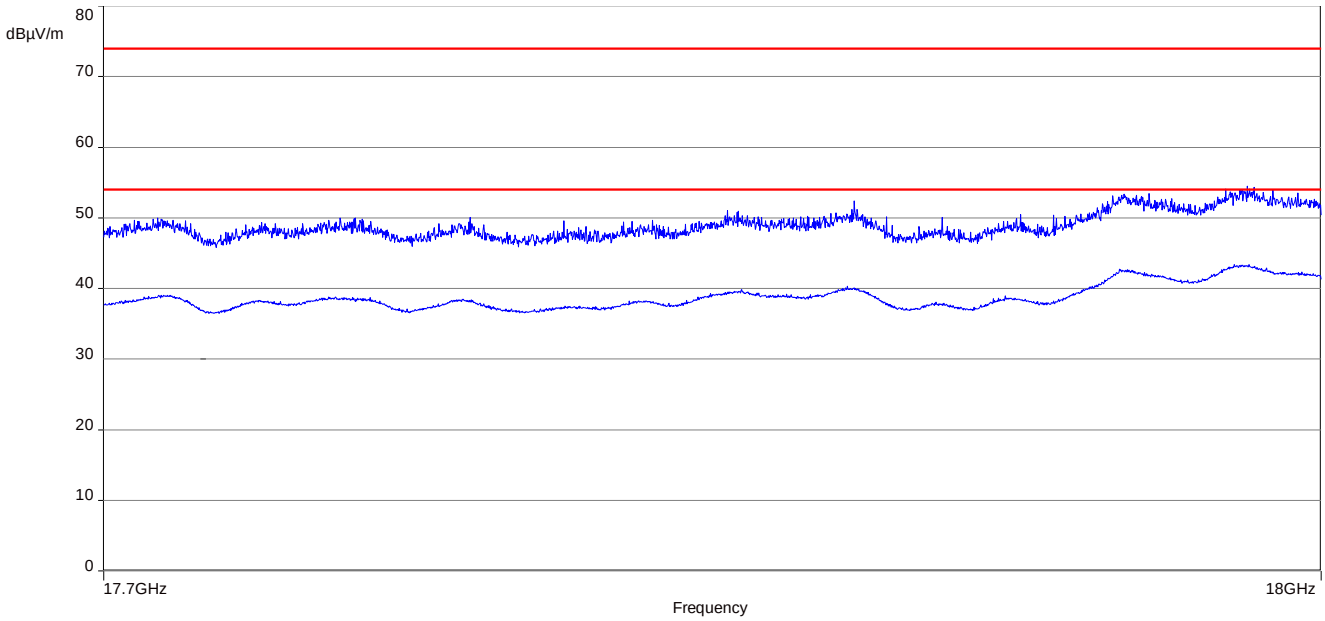
Plot 27: 1 GHz – 3.5 GHz, antenna horizontal/vertical, channel high, upper band



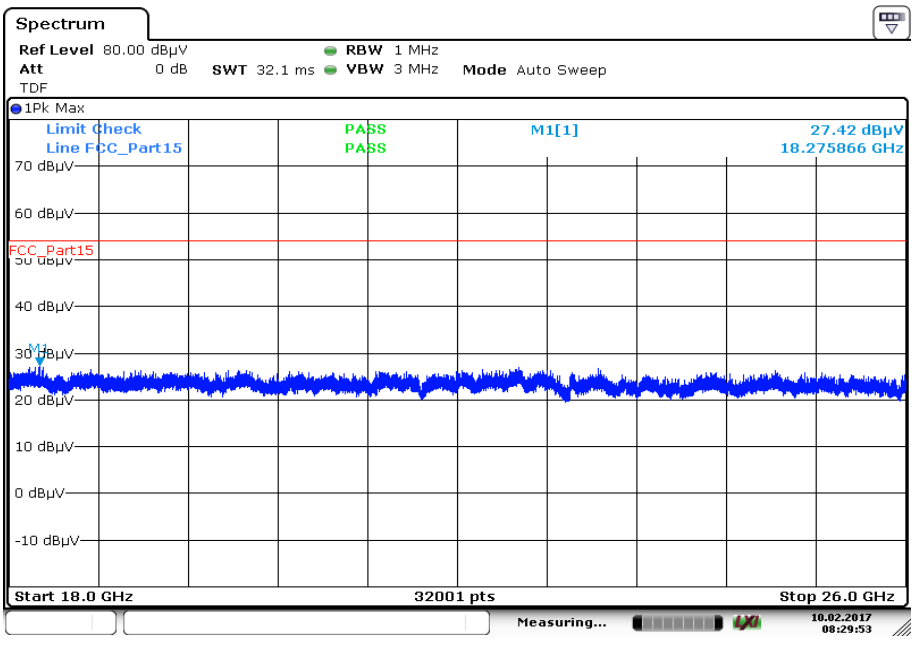
Plot 28: 3.5 GHz – 18 GHz, antenna horizontal/vertical, channel high, upper band



Plot 29: 17.7 GHz – 18 GHz, antenna horizontal/vertical, channel high, upper band



Plot 30: 18 GHz – 26 GHz, antenna horizontal/vertical, channel high, upper band



11.3 Receiver unwanted radiation (radiated)

Measurement:

Measurement parameter		
Detector:	Prescan: Final:	Peak QPK below 960 MHz RMS above 960 MHz
Resolution bandwidth:	9 kHz – 150 kHz: 150 kHz – 30 MHz: 30 MHz – 1 GHz: 1 GHz – 26 GHz:	200 Hz 9 kHz 100 kHz 1 MHz
Video bandwidth:	9 kHz – 150 kHz: 150 kHz – 30 MHz: 30 MHz – 1 GHz: 1 GHz – 26 GHz:	1 kHz 30 kHz 300 kHz 3 MHz
Span:	See plots	
Trace mode:	Max Hold	
Test setup	See sub clause 7.1 – A & 7.2 – A & 7.3 – A	
Measurement uncertainty	See sub clause 8	

Limits:

FCC	IC	
47 CFR § 15.109	-/-	
Receiver unwanted radiation (radiated)		
Frequency (MHz)	**Field strength (µV/m)** [1]	**Measurement distance (m)**
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 - 88	100 (40 dBµV/m)	3
30 - 88	31.6 (30 dBµV/m)	10
88 - 216	150 (43.5 dBµV/m)	3
88 - 216	47.3 (33.5 dBµV/m)	10
216 - 960	200 (46 dBµV/m)	3
216 - 960	63.1 (36 dBµV/m)	10
above 960	500 (54 dBµV/m)	3

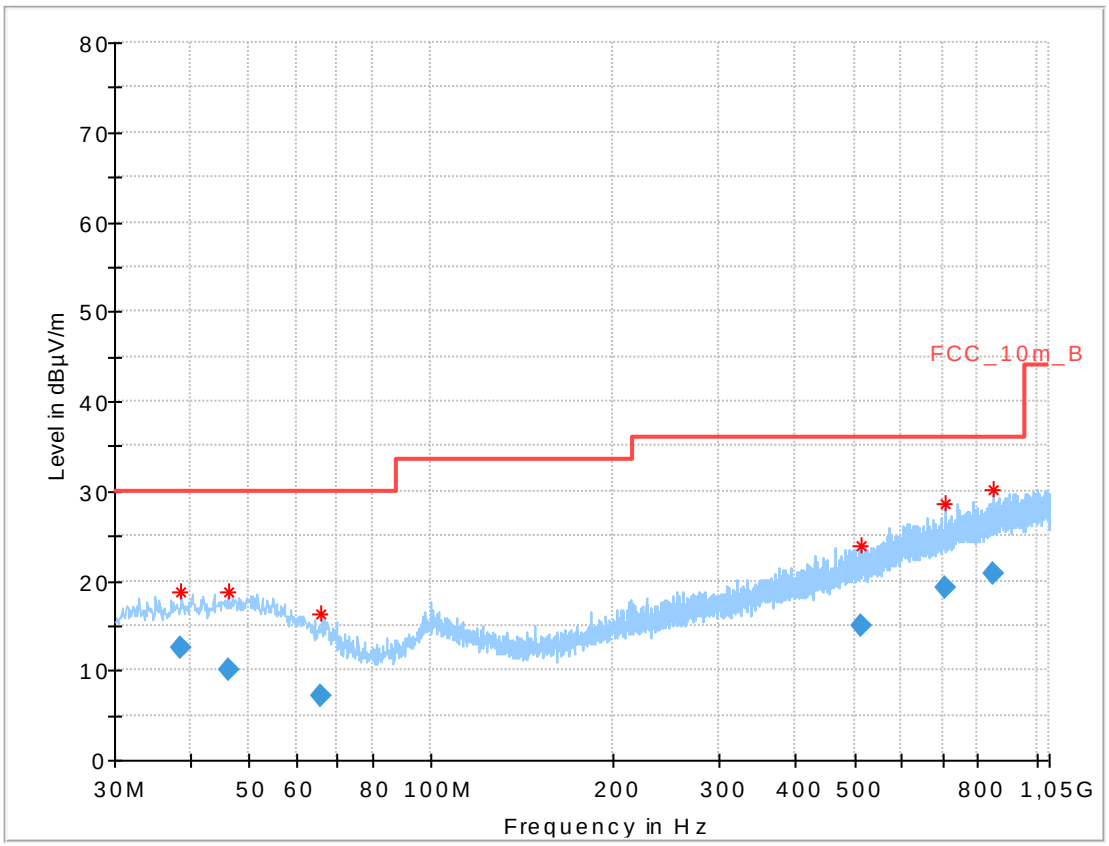
[1] Measurements in the 9 to 90 kHz, 110 to 490 kHz and above 1000 MHz ranges employ an average detector. Otherwise a quasi-peak detector is used.

Results: Receiver mode

Receiver unwanted radiation [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please look at the table below the 1 GHz plot.		
No emissions detected above 1 GHz.		
-/-	Peak	-/-
	AVG	-/-
-/-	Peak	-/-
	AVG	-/-
-/-	Peak	-/-
	AVG	-/-

Plot:

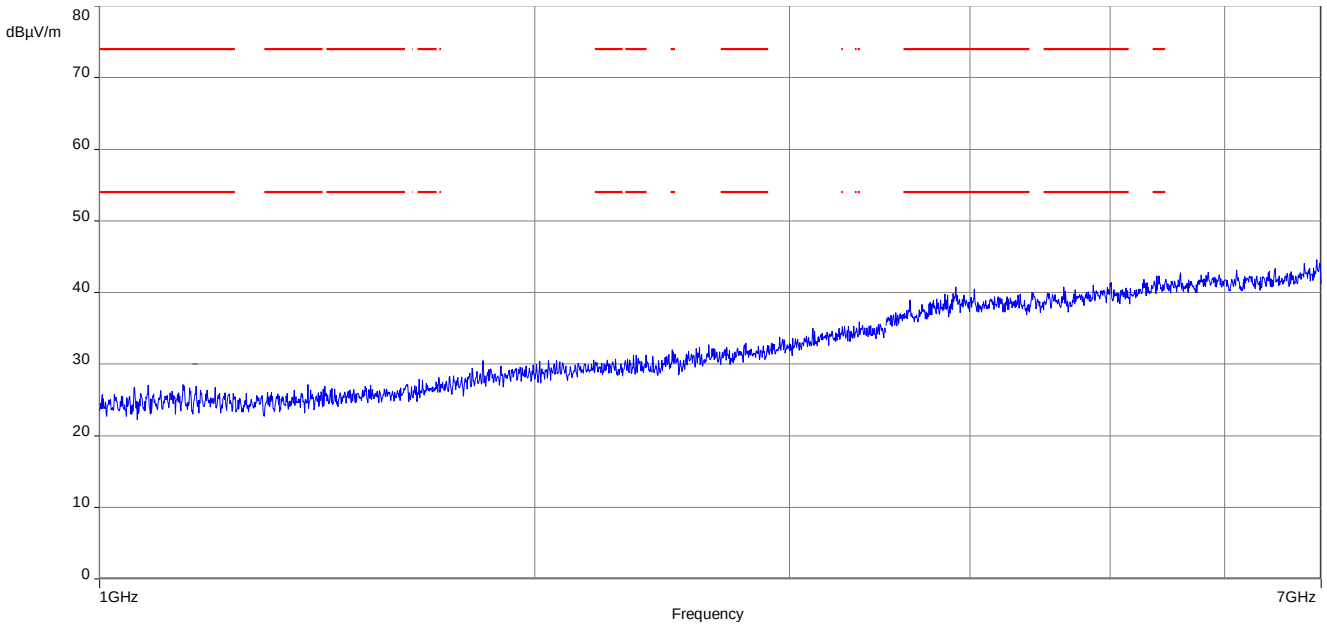
Plot 1: 30 MHz – 1 GHz



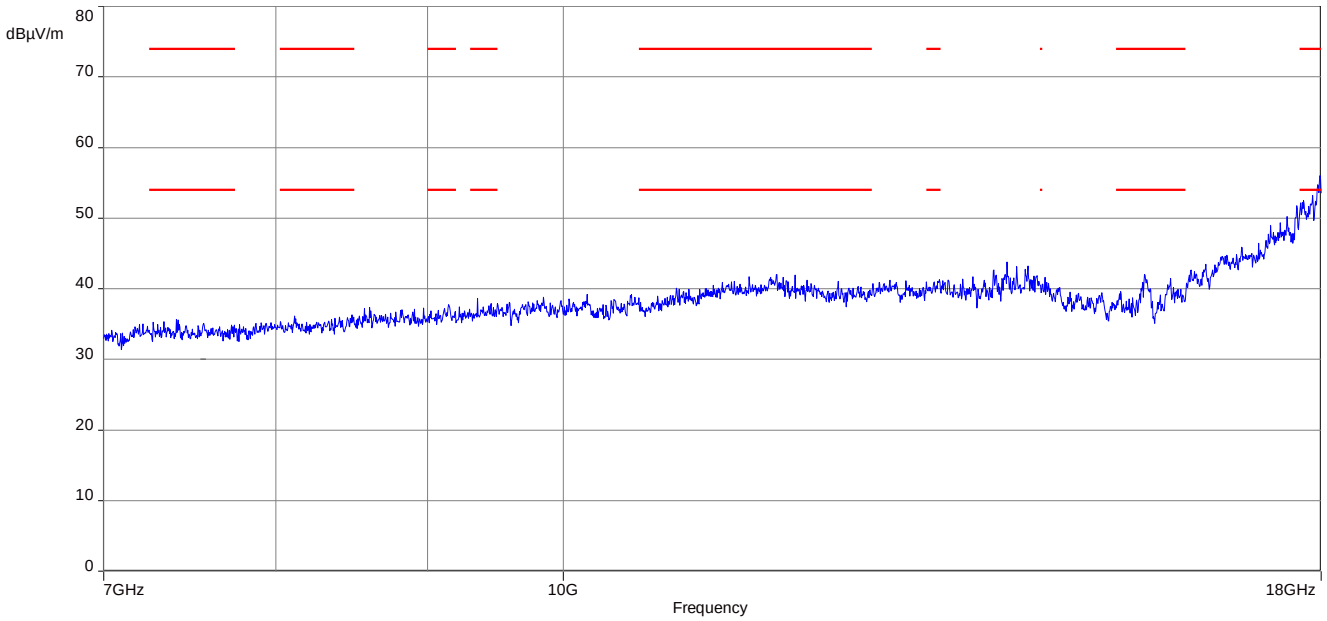
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
38.665350	12.42	30.00	17.58	1000.0	120.000	98.0	V	96.0	13.1
46.367550	10.01	30.00	19.99	1000.0	120.000	98.0	H	54.0	13.7
65.761200	7.24	30.00	22.76	1000.0	120.000	179.0	H	353.0	10.6
514.070400	15.04	36.00	20.96	1000.0	120.000	98.0	H	205.0	18.9
707.322300	19.13	36.00	16.87	1000.0	120.000	178.0	V	205.0	21.7
847.663500	20.79	36.00	15.21	1000.0	120.000	179.0	V	353.0	23.5

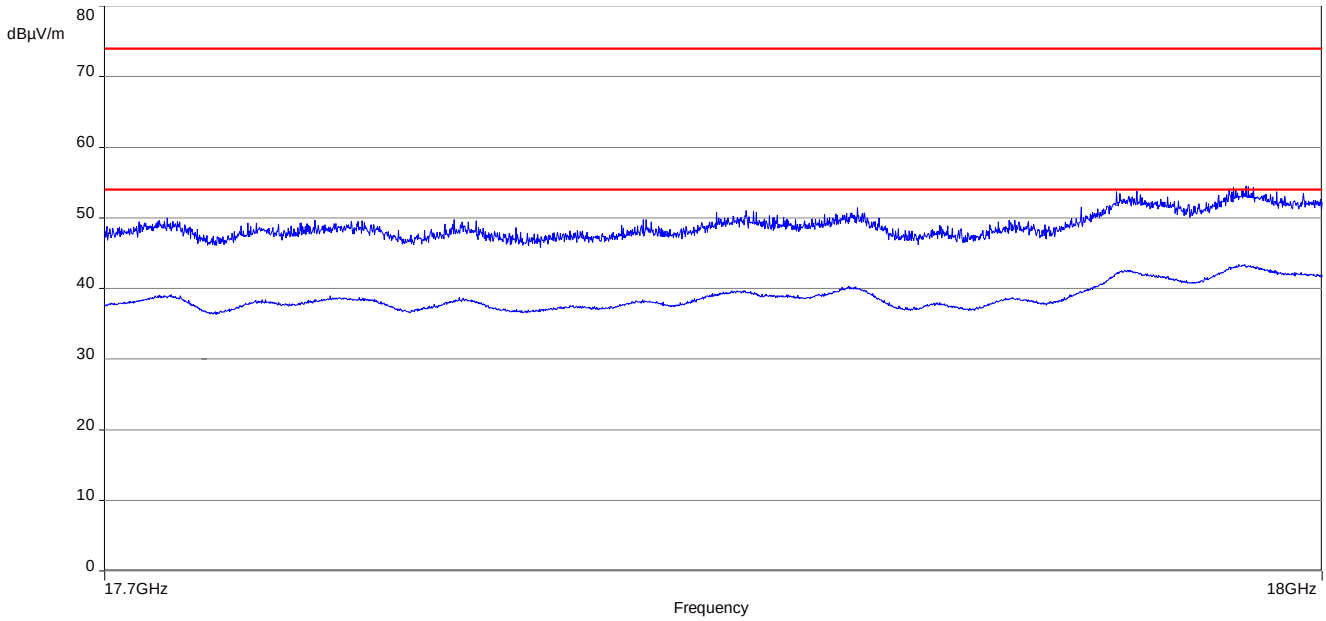
Plot 2: 1 GHz – 7 GHz, antenna horizontal/vertical



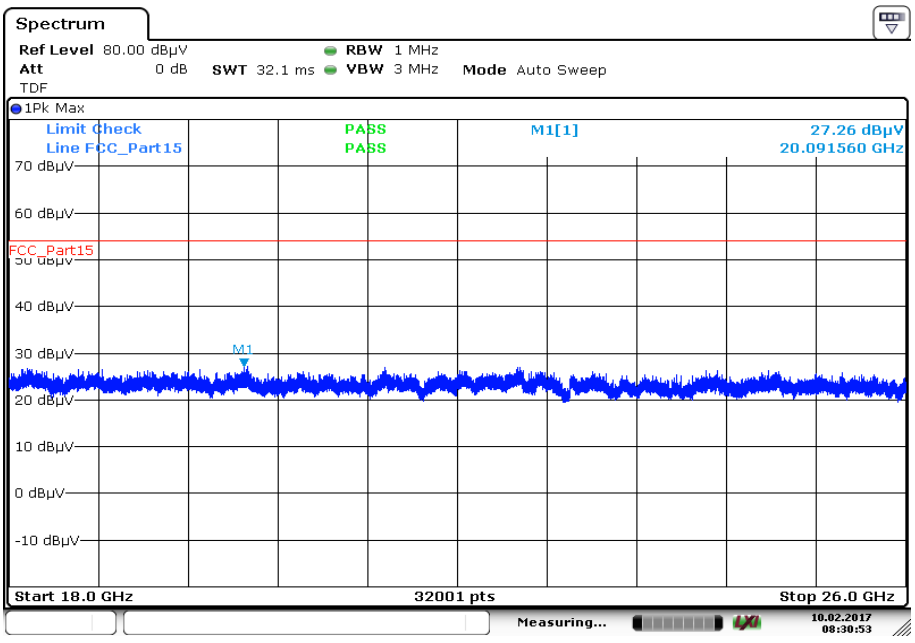
Plot 3: 7 GHz – 18 GHz, antenna horizontal/vertical



Plot 4: 17.7 GHz – 18 GHz, antenna horizontal/vertical



Plot 5: 18 GHz – 26 GHz, antenna horizontal/vertical



Date: 10.FEB.2017 08:30:52

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	2017-02-23
A	Editorial changes in chapter 10	2017-09-27

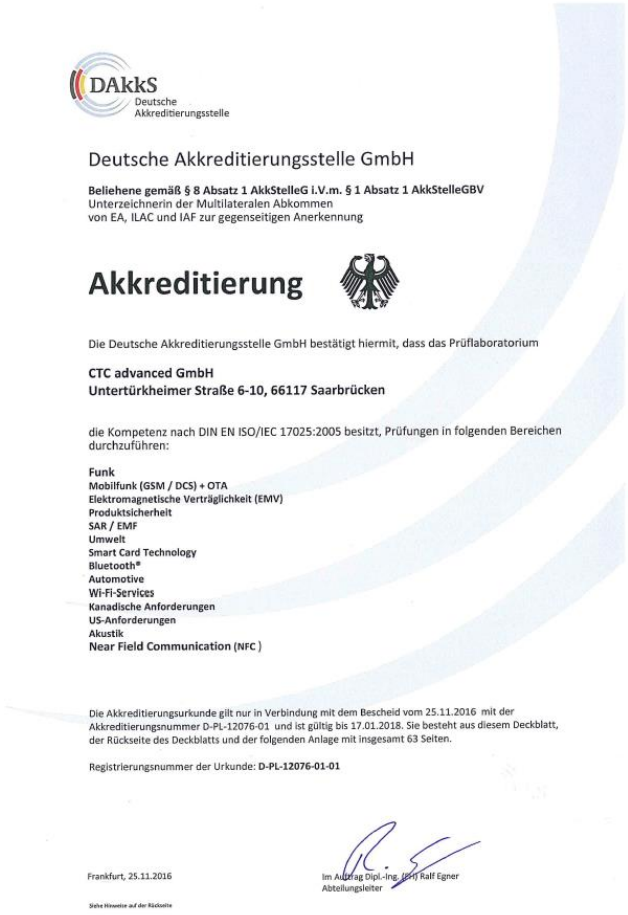
Annex B Further information

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
OBW Occupied Bandwidth
OC Operating Channel
OCW Operating Channel Bandwidth
OOB Out Of Band

Annex C Accreditation Certificate

first page



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Automotive
Wi-Fi-Services
Kanadische Anforderungen
US-Anforderungen
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Im Auftrag Dipl.-Ing. (FH) Ralf Egner
Abteilungsleiter

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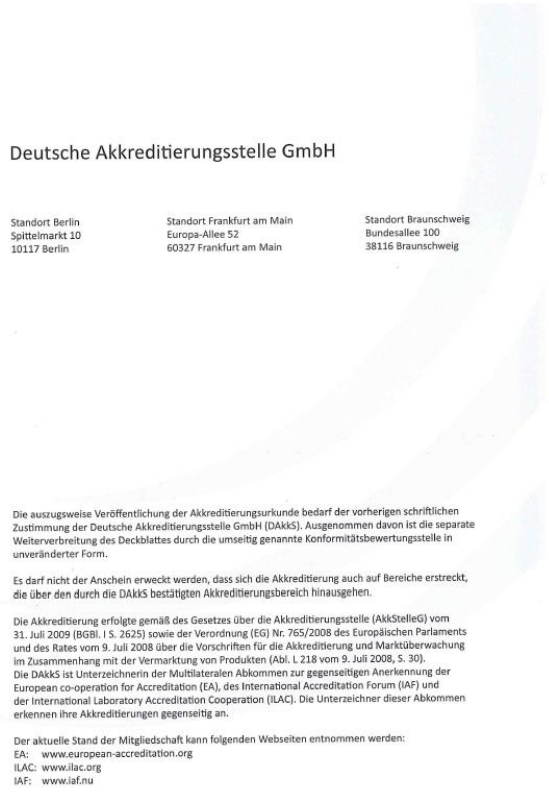
last page



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