
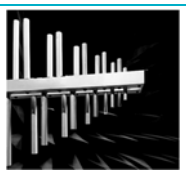
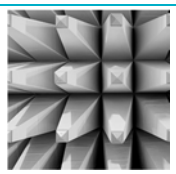

CTC advanced
member of RWTÜV group

Bundesnetzagentur

BNetzA-CAB-02/21-102

TEST REPORT

Test report no.: 1-7166/18-01-02-A

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-03

Testing laboratory

CTC advanced GmbH
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.ctcadvanced.com
e-mail: mail@ctcadvanced.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-12076-01-03

Applicant

Alfred Kärcher SE & Co. KG
Alfred-Kärcher-Str. 28-40
71364 Winnenden / GERMANY
Phone: +49 7195 14-0
Contact: Dieter Plachke
e-mail: dieter.plachke@de.kaercher.com
Phone: +49 7195 14-2374

Manufacturer

CEM S.p.A. – V
Via Ca' Rossa, n. 1
46026 Quistello (MN) / ITALY

Test standard/s

FCC - Title 47 CFR Part 15	FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices
RSS - 210 Issue 9	Spectrum Management and Telecommunications Radio Standards Specification - Licence-Exempt Radio Apparatus: Category I Equipment
RSS - Gen Issue 5	Spectrum Management and Telecommunications Radio Standards Specification - General Requirements for Compliance of Radio Apparatus

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

Test Item

Kind of test item:	**High pressure cleaner remote control**
Model name:	**K5 FULL CONTROL PLUS**
FCC ID:	**ZP913246440999**
IC:	**9752A -13246440999**
Frequency:	ISM band 902 MHz – 928 MHz
Technology tested:	Proprietary
Antenna:	Integrated antenna
Power supply:	110 V AC, 50/60 Hz
Temperature range:	-20°C to +55°C

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.

Test report authorized:

cn=Andreas Luckenbill, o=CTC advanced GmbH, ou=LUC-180217, email=andreas.luckenbill@ctcadvanced.com, c=DE
2019.03.18 19:00:13 +01'00'

Andreas Luckenbill
Lab Manager
Radio Communications & EMC

Test performed:

cn=Tobias Wittenmeier, o=CTC advanced GmbH, ou=WIT-170519, email=tobias.wittenmeier@ctcadvanced.com, c=DE
2019.03.18 14:26:39 +01'00'

Tobias Wittenmeier
Testing Manager
Radio Communications & EMC

1 Table of contents

1 Table of contents 2
2 General information 3
2.1 Notes and disclaimer 3
2.2 Application details 3
2.3 Test laboratories sub-contracted 3
3 Test standard/s and references 4
4 Test environment 5
5 Test item 5
5.1 General description 5
5.2 Additional information 5
6 Description of the test setup 6
6.1 Shielded semi anechoic chamber 7
6.2 Shielded fully anechoic chamber 8
6.3 AC conducted 9
6.4 RF measurements 10
7 Sequence of testing 11
7.1 Sequence of testing radiated spurious 9 kHz to 30 MHz 11
7.2 Sequence of testing radiated spurious 30 MHz to 1 GHz 12
7.3 Sequence of testing radiated spurious 1 GHz to 12.75 GHz 13
8 Measurement uncertainty 14
9 Summary of measurement results 15
10 Additional comments 16
11 Measurement results 17
11.1 Field strength of emissions (wanted signal) 17
11.2 Occupied bandwidth (99% bandwidth) 18
11.3 Spurious emissions radiated below 30 MHz 20
11.4 Spurious emissions radiated 30 MHz to 1 GHz 22
11.5 Spurious emissions radiated above 1 GHz 26
11.6 Spurious emissions conducted below 30 MHz (AC conducted) 29
12 Observations 32
Annex A Glossary 33
Annex B Document history 34
Annex C Accreditation Certificate 34

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. CTC advanced 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 1-7166/18-01-02 and dated 2019-01-07

2.2 Application details

Date of receipt of order:	2018-10-08
Date of receipt of test item:	2018-10-25
Start of test:	2018-10-25
End of test:	2018-10-26
Person(s) present during the test:	-/-

2.3 Test laboratories sub-contracted

None

3 Test standard/s and references

Test standard	Date	Description
FCC - Title 47 CFR Part 15		FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices
RSS - 210 Issue 9	August 2016	Spectrum Management and Telecommunications Radio Standards Specification - Licence-Exempt Radio Apparatus: Category I Equipment
RSS - Gen Issue 5	April 2018	Spectrum Management and Telecommunications Radio Standards Specification - General Requirements for Compliance of Radio Apparatus

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 +55 °C during high temperature tests* -20 °C during low temperature tests*
Relative humidity content	:		55 %
Barometric pressure	:		1021 hpa
Power supply	:	V_{nom} V_{max} V_{min}	110.0 V AC, 50/60 Hz -/- V* -/- V*

*No tests under extreme conditions required.

5 Test item

5.1 General description

Kind of test item	:	High pressure cleaner remote control
Type identification	:	K5 FULL CONTROL PLUS
HMN	:	-/-
PMN	:	K5 Premium Full Control Plus
HVIN	:	13246440
FVIN	:	-/-
S/N serial number	:	Ch 1: 0781861519 Ch.3: 0781861517 Idle: 0781861520
Hardware status	:	2.1
Software status	:	01K5USA
Firmware status	:	-/-
Frequency band	:	ISM band 902 MHz – 928 MHz
Type of radio transmission Use of frequency spectrum	: :	Modulated carrier
Type of modulation	:	FSK
Number of channels	:	3
Antenna	:	Integrated antenna
Power supply	:	110 V AC, 50/60 Hz
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: 1-7166/18-01-02_AnnexA
1-7166/18-01-02_AnnexB
1-7166/18-01-02_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).

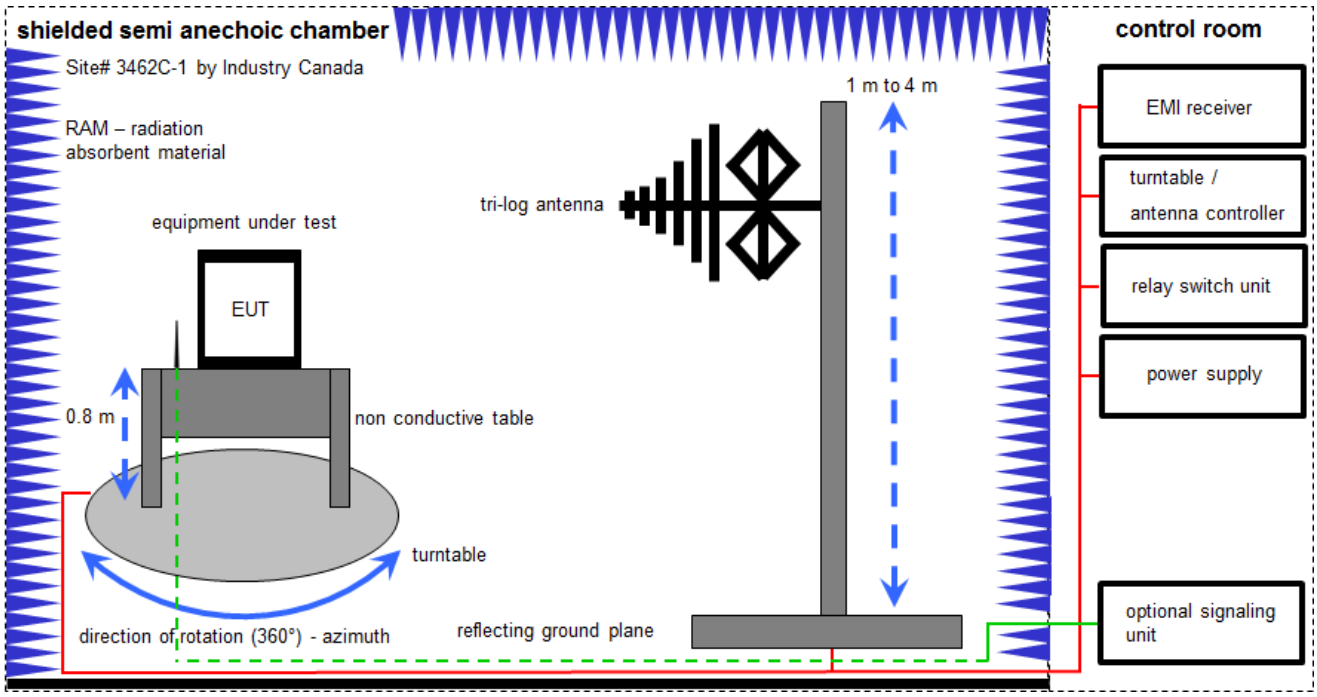
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

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 30 MHz 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
EMC32 software version: 10.30.0

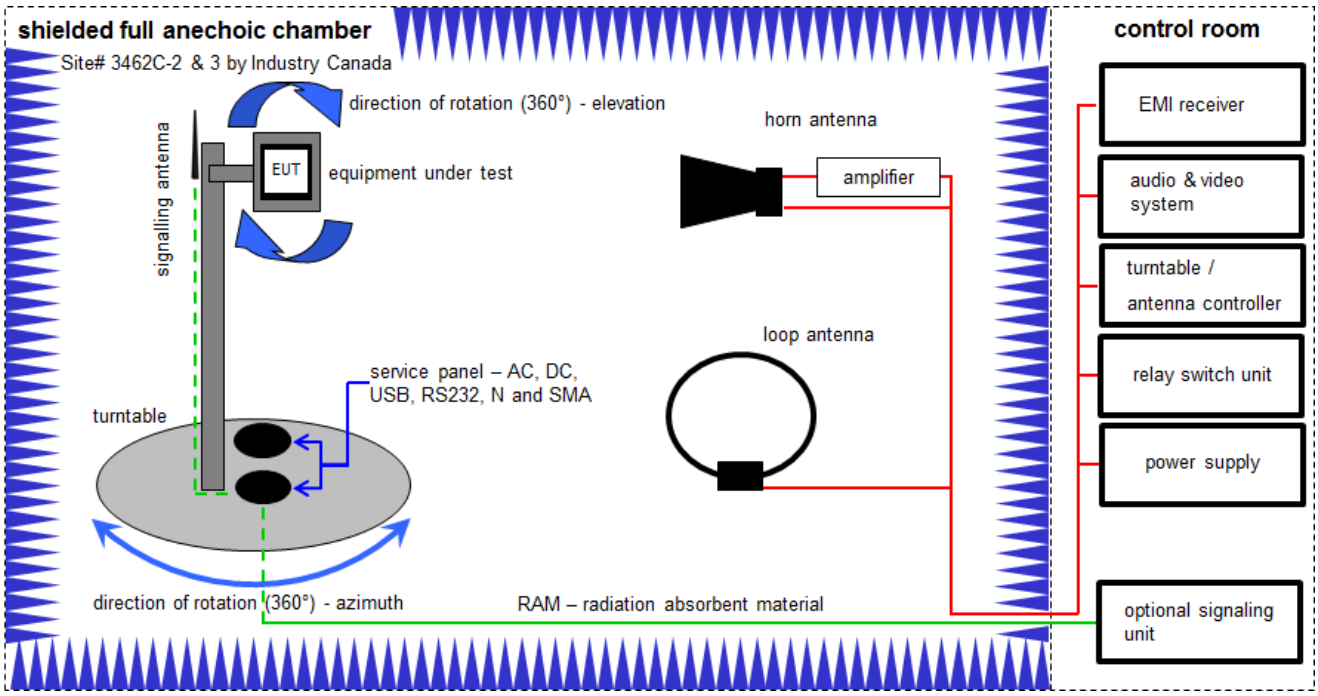
FS = UR + CL + AF
(FS-field strength; UR-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

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	Meßkabine 1	HF-Absorberhalle	MWB AG 300023		300000551	ne	-/-	-/-
3	A	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	15.12.2017	14.12.2018
4	A	Analyzer-Reference-System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	vlKl!	15.01.2018	14.01.2020
5	A	Antenna Tower	Model 2175	ETS-Lindgren	64762	300003745	izw	-/-	-/-
6	A	Positioning Controller	Model 2090	ETS-Lindgren	64672	300003746	izw	-/-	-/-
7	A	Turntable Interface-Box	Model 105637	ETS-Lindgren	44583	300003747	izw	-/-	-/-
8	A	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck Mess - Elektronik	371	300003854	vlKl!	24.11.2017	23.11.2020

6.2 Shielded fully anechoic chamber



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

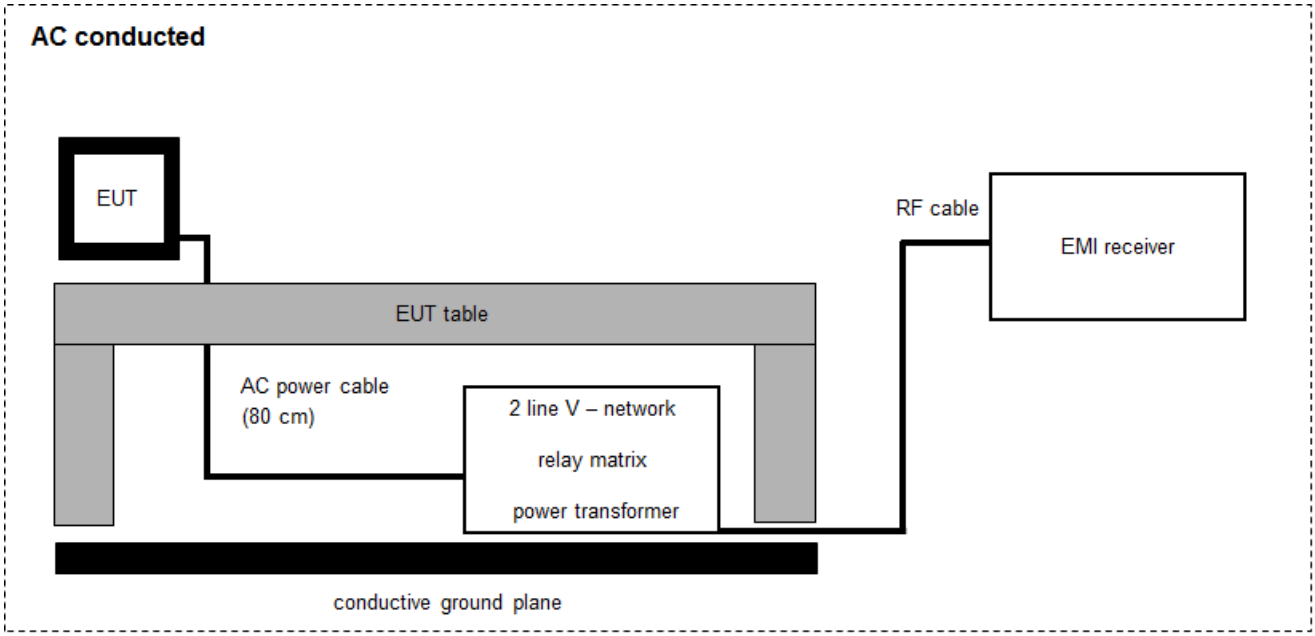
FS = UR + CA + AF
(FS-field strength; UR-voltage at the receiver; CA-loss of the signal path; AF-antenna factor)

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

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	B	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vlKl!	07.07.2017	06.07.2019
2	A	Active Loop Antenna 9 kHz to 30 MHz	6502	EMCO	2210	300001015	vlKl!	07.07.2017	06.07.2019
3	B	Highpass Filter	WHK1.1/15G-10SS	Wainwright	37	400000148	ne	-/-	-/-
4	B	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne	-/-	-/-
5	B	Broadband Amplifier 0.5-18 GHz	CBLU5184540	CERNEX	22051	300004483	ev	-/-	-/-
6	A,B	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000032	300004510	ne	-/-	-/-
7	A,B	Computer	Intel Core i3 3220/3,3 GHz, Prozessor		2V2403033A54 21	300004591	ne	-/-	-/-
8	A,B	NEXIO EMV-Software	BAT EMC V3.16.0.49	EMCO		300004682	ne	-/-	-/-
9	A,B	Anechoic chamber		TDK		300003726	ne	-/-	-/-
10	A,B	EMI Test Receiver 9kHz-26,5GHz	ESR26	R&S	101376	300005063	k	14.12.2017	13.12.2018

6.3 AC conducted



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

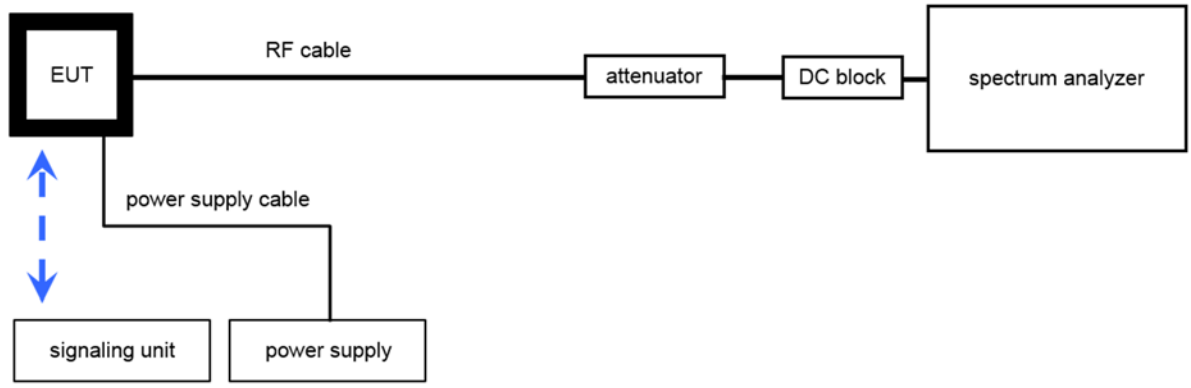
Example calculation:
FS [dBµV/m] = 37.62 [dBµV/m] + 9.90 [dB] + 0.23 [dB] = 47.75 [dBµV/m] (244.06 µV/m)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Two-line V-Network (LISN) 9 kHz to 30 MHz	ESH3-Z5	R&S	892475/017	300002209	vIKI!	13.12.2017	12.12.2019
2	A	RF-Filter-section	85420E	HP	3427A00162	300002214	NK!	-/-	-/-
3	A	Hochpass 150 kHz	EZ-25	R&S	100010	300003798	ev	-/-	-/-
4	A	MXE EMI Receiver 20 Hz to 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	18.12.2017	17.12.2018

6.4 RF measurements

Conducted measurements normal conditions



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

Example calculation:
OP [dBm] = 6.0 [dBm] + 11.7 [dB] = 17.7 [dBm] (58.88 mW)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Isolating Transformer	RT5A	Grundig	8041	300001626	g	-/-	-/-
2	A	EMI Test Receiver 9 kHz - 3 GHz incl. Preselector	ESPI3	R&S	101713	300004059	k	13.12.2017	12.12.2018
3	A	Shielding Box	JRE2218	JRE Test LLC	0001109	400001293	ne	-/-	-/-
4	A	RF-Cable SRD021 No. 1	Enviroflex 316 D	Huber & Suhner		400001311	ev	-/-	-/-

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, it is placed on a table with 0.8 m height.
- 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 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 pre-measurement are maximized by the software by rotating the turntable from 0° to 360°.
- Loop antenna is rotated about its vertical axis for maximum response at each azimuth about the EUT. (For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT)
- 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.

*)Note: The sequence will be repeated three times with different EUT orientations.

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 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.

8 Measurement uncertainty

Measurement uncertainty	
Test case	**Uncertainty**
Occupied bandwidth	± 100 kHz (depends on the used RBW)
Field strength of the emissions	± 3 dB
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 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 15 RSS 210 Issue 9 RSS Gen Issue 5	See table!	2019-03-18	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	C	NC	NA	NP	Remark
§15.249(a) RSS 210 B.10	Field strength of emissions (wanted signal)	Nominal	Nominal	☒	☐	☐	☐	-/-
RSS Gen	Occupied bandwidth (99% bandwidth)	Nominal	Nominal	☒	☐	☐	☐	-/-
§15.209(a) / §15.249(b)(1)(2)(3) RSS Gen	Field strength of emissions (spurious)	Nominal	Nominal	☒	☐	☐	☐	-/-
§15.109 RSS Gen	Field strength of emissions (spurious)	Nominal	Nominal	☒	☐	☐	☐	-/-
§15.207(a)	Conducted emissions < 30 MHz	Nominal	Nominal	☒	☐	☐	☐	-/-

Note: C = Compliant; NC = Not compliant; NA = Not applicable; NP = Not performed

10 Additional comments

Reference documents: None

Special test descriptions: The EUT uses 3 channels (Channel 1: 922.6 MHz; Channel 2: 923.0 MHz; Channel 3: 923.4 MHz). We tested the lowest and highest channel.

Configuration descriptions: None

Test mode:

☐ No test mode available.
Iperf was used to ping another device with the largest support packet size

☒ 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)*

11 Measurement results

11.1 Field strength of emissions (wanted signal)

Description:

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

Measurement:

Measurement parameter	
Detector:	Peak / Quasi peak
Resolution bandwidth:	1 MHz (> OBW)
Video bandwidth:	3x RBW
Span:	Depends on the signal
Trace mode:	Max. hold
Used equipment:	See chapter 6.1 - A
Measurement uncertainty:	See chapter 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

Result:

Test condition	Maximum field strength Quasi peak	
	Frequency / MHz	Field strength / dBµV/m @ 3 m
T_{nom} / V_{nom}	922.6	93.11
T_{nom} / V_{nom}	923.4	93.57

11.2 Occupied bandwidth (99% bandwidth)

Description:

Measurement of the 99% bandwidth of the wanted signal.

Measurement:

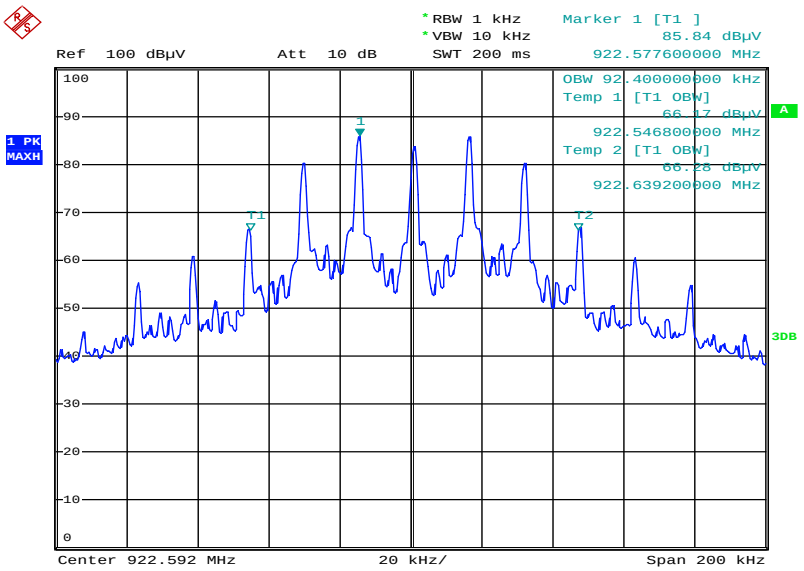
Measurement parameter	
Detector:	Peak
Resolution bandwidth:	1 % – 5 % of the occupied bandwidth
Video bandwidth:	≥ 3x RBW
Trace mode:	Max hold
Analyzer function:	99 % power function
Used equipment:	See chapter 6.4 - A
Measurement uncertainty:	See chapter 8

Results:

Test condition	Occupied bandwidth	
	Frequency / MHz	Occupied bandwidth / kHz
T_{nom} / V_{nom}	922.6	92.4
T_{nom} / V_{nom}	923.4	93.6

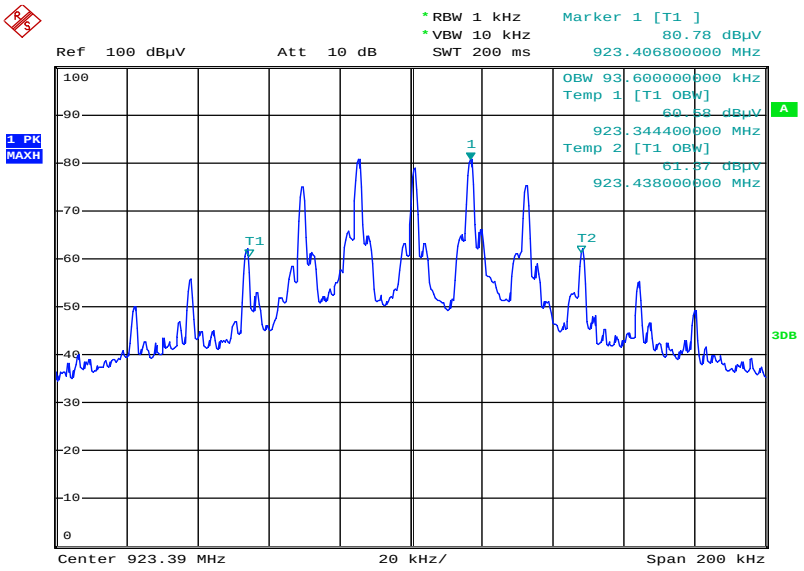
Plots:

Plot 1: 922.6 MHz



Date: 26.OCT.2018 12:07:28

Plot 2: 923.4 MHz



Date: 26.OCT.2018 12:03:06

11.3 Spurious emissions radiated below 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The limits are recalculated to a measurement distance of 3 m with 40 dB/decade according CFR Part 2.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak
Sweep time:	Auto
Resolution bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Video bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace mode:	Max Hold
Test setup:	See sub clause 6.2 - A
Measurement uncertainty	See sub clause 8

Limits:

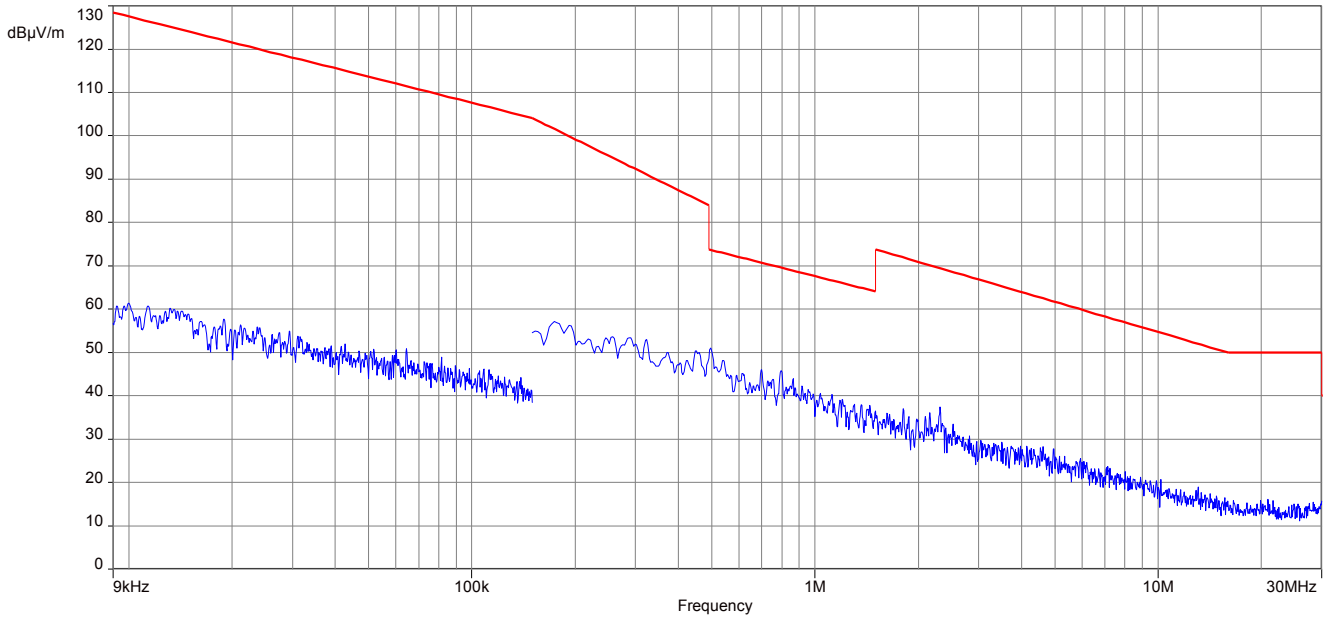
FCC		IC
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

Results: (Valid for all channels)

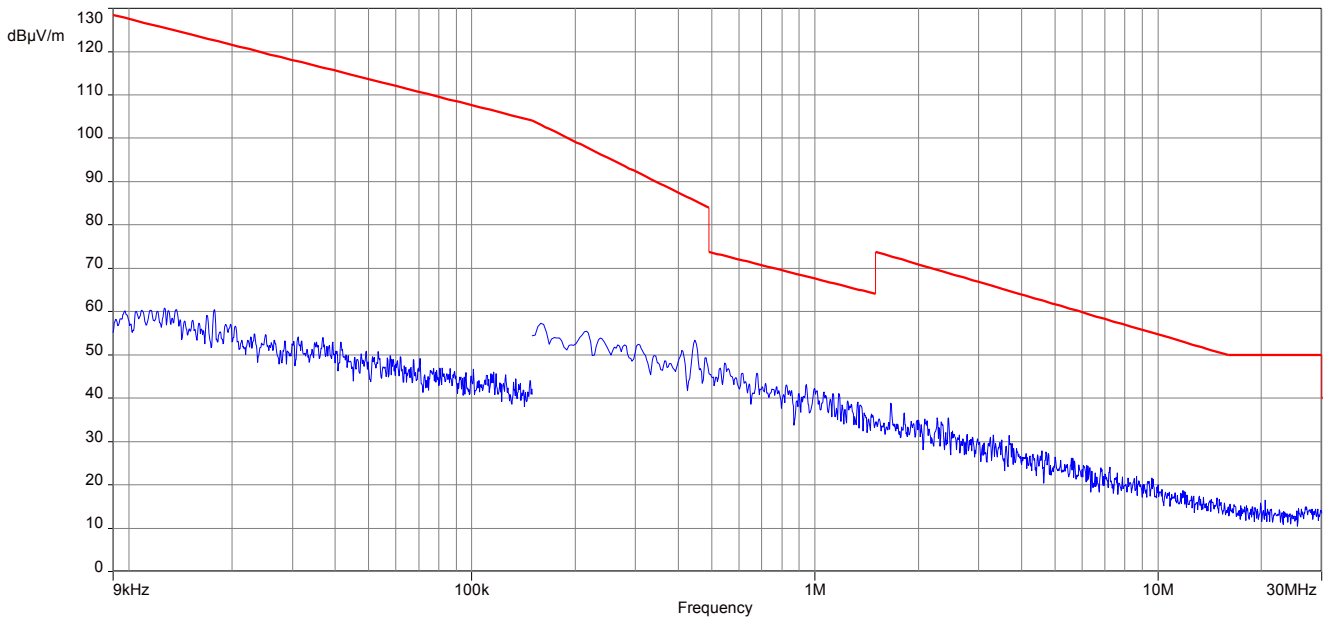
TX Spurious Emissions Radiated < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
All detected peaks are more than 20 dB below the limit.		

Plots:

Plot 1: 9 kHz to 30 MHz, 922.6 MHz



Plot 2: 9 kHz to 30 MHz, 923.4 MHz



11.4 Spurious emissions radiated 30 MHz to 1 GHz

Description:

Measurement of the radiated spurious emissions and cabinet radiations below 1 GHz.

Measurement:

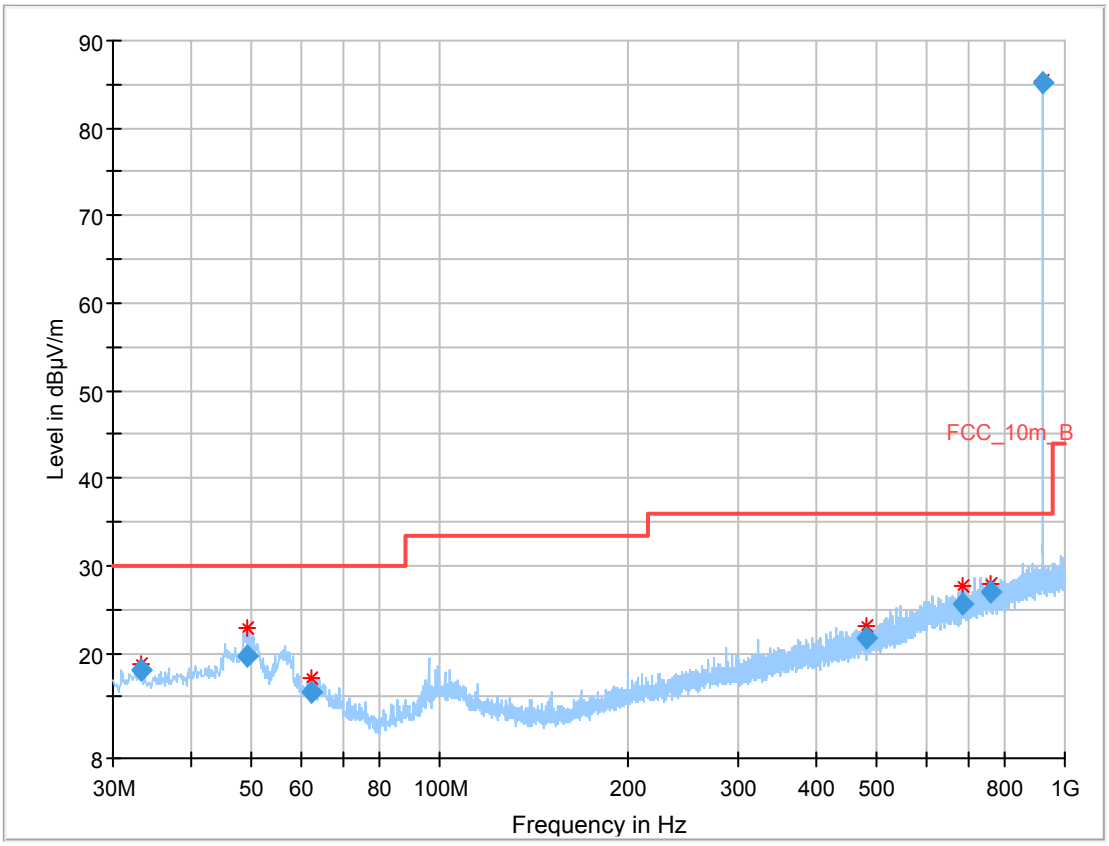
Measurement parameter	
Detector:	Peak / Quasi Peak
Sweep time:	Auto
Resolution bandwidth:	120 kHz
Video bandwidth:	3 x RBW
Span:	30 MHz to 1 GHz
Trace mode:	Max Hold
Test setup:	See sub clause 6.1 - A
Measurement uncertainty	See sub clause 8

Limits:

FCC	IC	
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).		
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance
30 - 88	30.0	10
88 – 216	33.5	10
216 – 960	36.0	10

Plot:

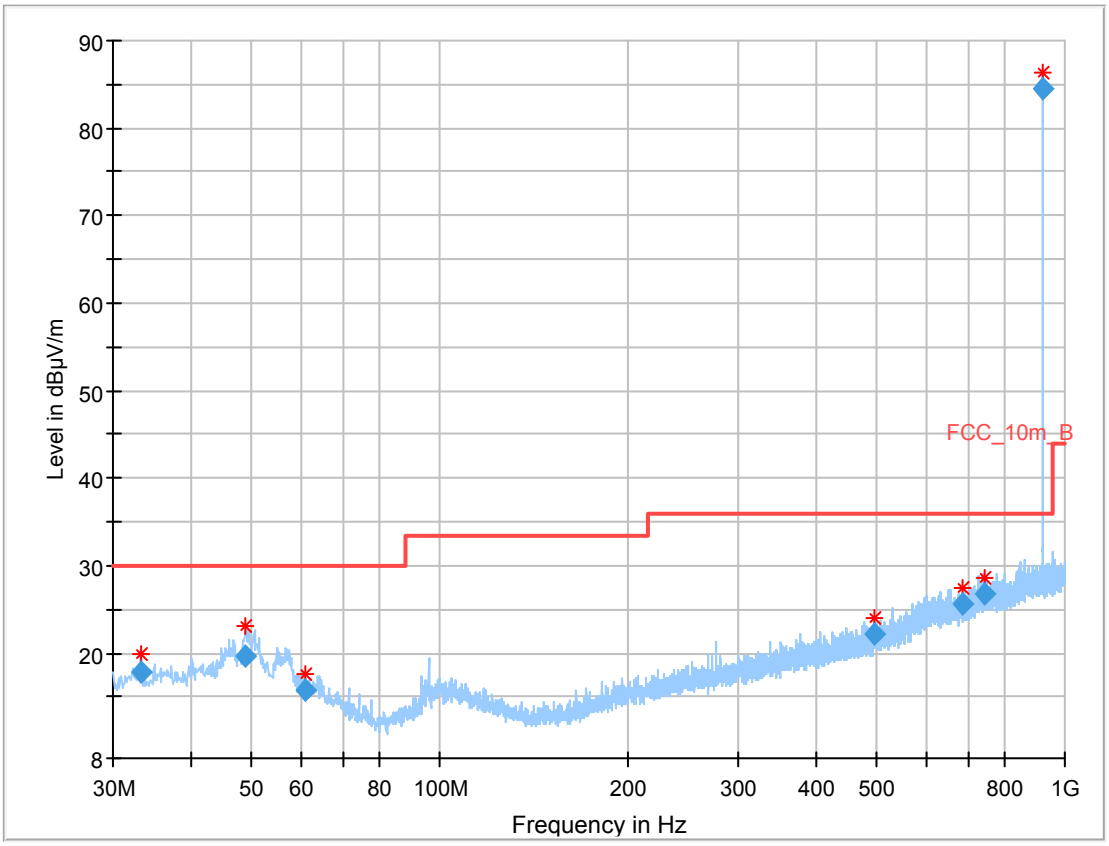
Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization, 922.6 MHz



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
33.253	18.00	30.0	12.00	1000	120	170.0	H	286.0	12.7
49.114	19.61	30.0	10.39	1000	120	100.0	V	339.0	14.0
62.089	15.67	30.0	14.33	1000	120	101.0	V	192.0	11.7
481.465	21.84	36.0	14.16	1000	120	98.0	V	340.0	18.3
688.457	25.66	36.0	10.34	1000	120	170.0	V	137.0	21.7
761.084	27.02	36.0	8.98	1000	120	105.0	V	173.0	23.0

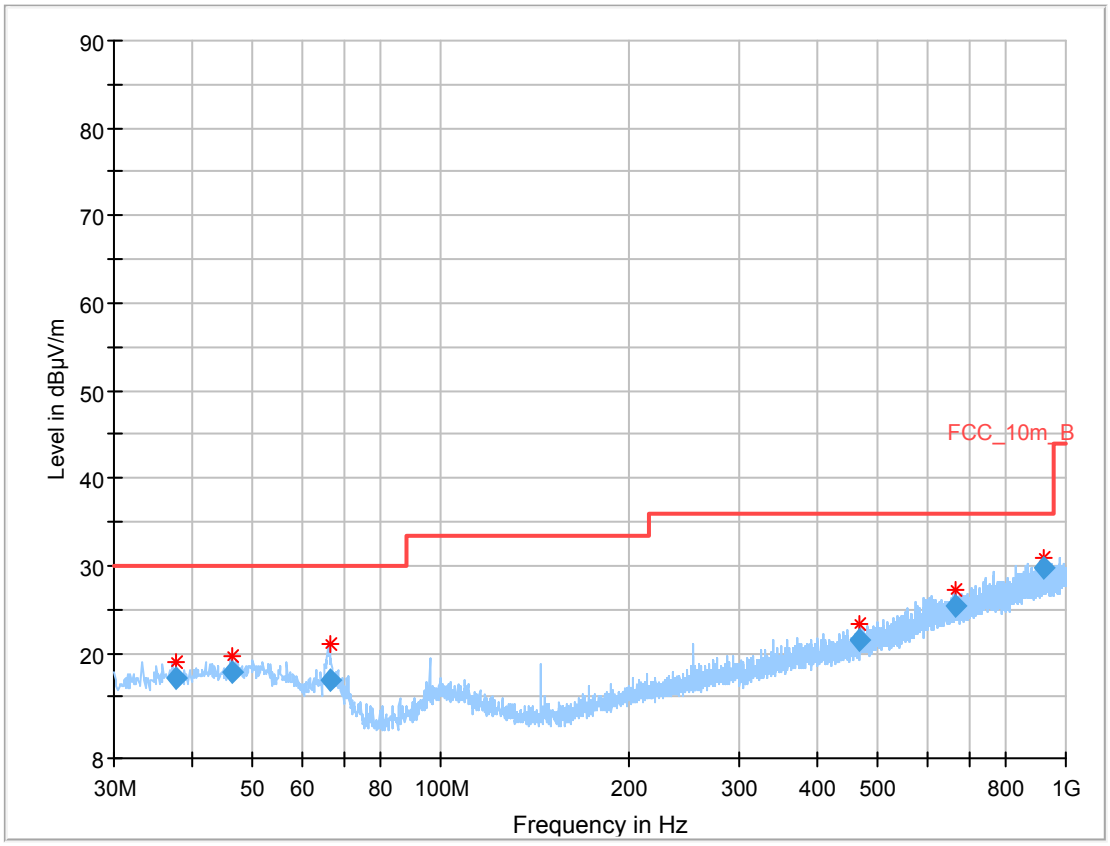
Plot 2: 30 MHz to 1 GHz, vertical & horizontal polarization, 923.4 MHz



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
33.231	17.79	30.0	12.21	1000	120	98.0	H	122.0	12.7
48.991	19.62	30.0	10.38	1000	120	98.0	V	178.0	14.0
61.127	15.74	30.0	14.26	1000	120	101.0	V	313.0	11.9
495.945	22.22	36.0	13.78	1000	120	170.0	V	180.0	18.6
688.577	25.72	36.0	10.28	1000	120	101.0	H	298.0	21.7
745.861	26.84	36.0	9.16	1000	120	170.0	H	228.0	22.9

Plot 3: 30 MHz to 1 GHz, vertical & horizontal polarization, idle



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
37.617	17.08	30.0	12.92	1000	120	101.0	V	316.0	13.3
46.455	17.76	30.0	12.24	1000	120	101.0	V	29.0	14.0
66.345	16.87	30.0	13.13	1000	120	170.0	V	152.0	10.8
468.865	21.54	36.0	14.46	1000	120	170.0	V	121.0	18.1
667.239	25.39	36.0	10.61	1000	120	170.0	H	59.0	21.5
921.607	29.71	36.0	6.29	1000	120	170.0	V	132.0	24.7

11.5 Spurious emissions radiated above 1 GHz

Description:

Measurement of the radiated spurious emissions above 1 GHz in transmit mode and receiver / idle mode.

Measurement:

Measurement parameter	
Detector:	Peak / RMS
Sweep time:	Auto
Resolution bandwidth:	1 MHz
Video bandwidth:	3 x RBW
Span:	1 GHz to 12.75 GHz
Trace mode:	Max Hold
Test setup:	See sub clause 6.2 - B
Measurement uncertainty	See sub clause 8

Limits:

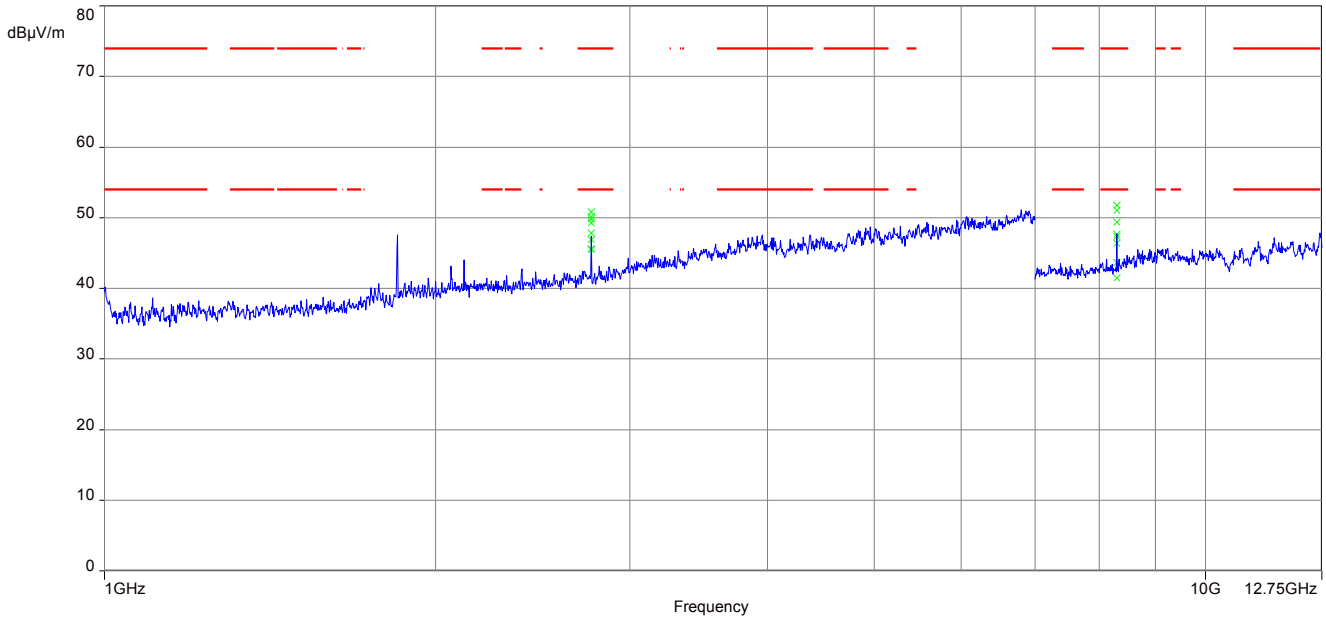
FCC		IC
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance
Above 960	54.0	3

Results:

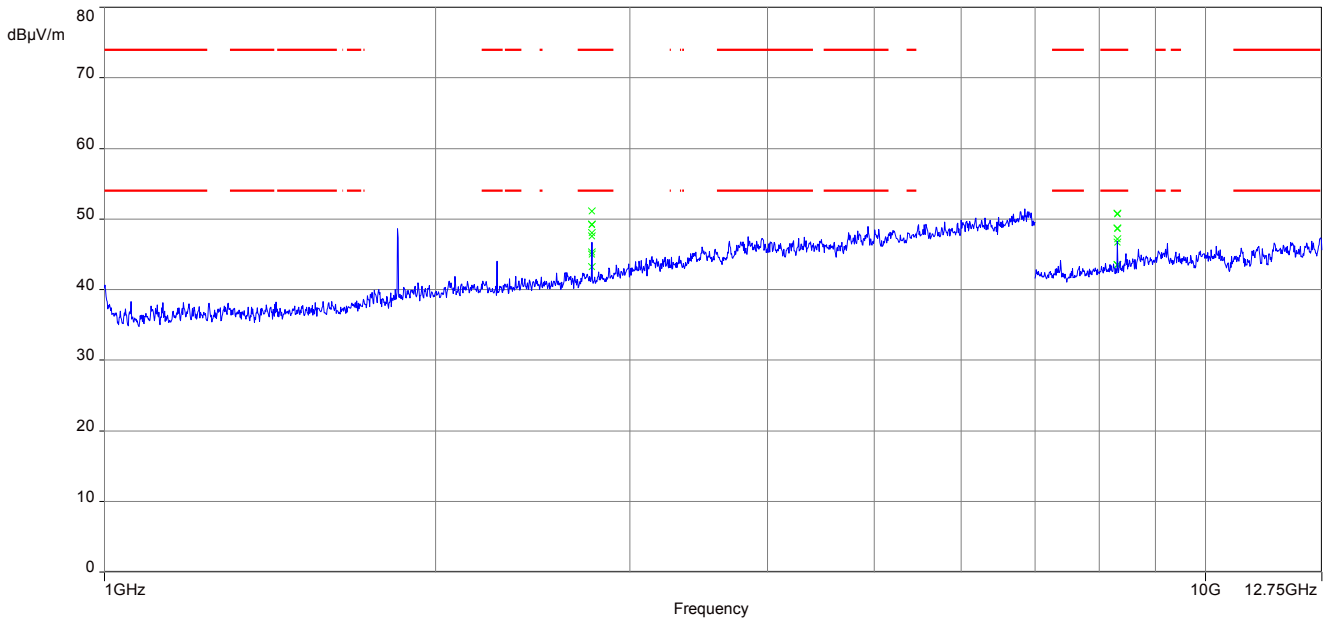
TX Spurious Emissions Radiated [dBµV/m]								
922.6 MHz TX			923.4 MHz TX			Idle		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
2768	Peak	50.8	2770	Peak	51.3	No emissions detected.		
	AVG	47.8		AVG	47.6			
8303	Peak	51.8	8310	Peak	50.8			
	AVG	47.3		AVG	47.2			

Plots:

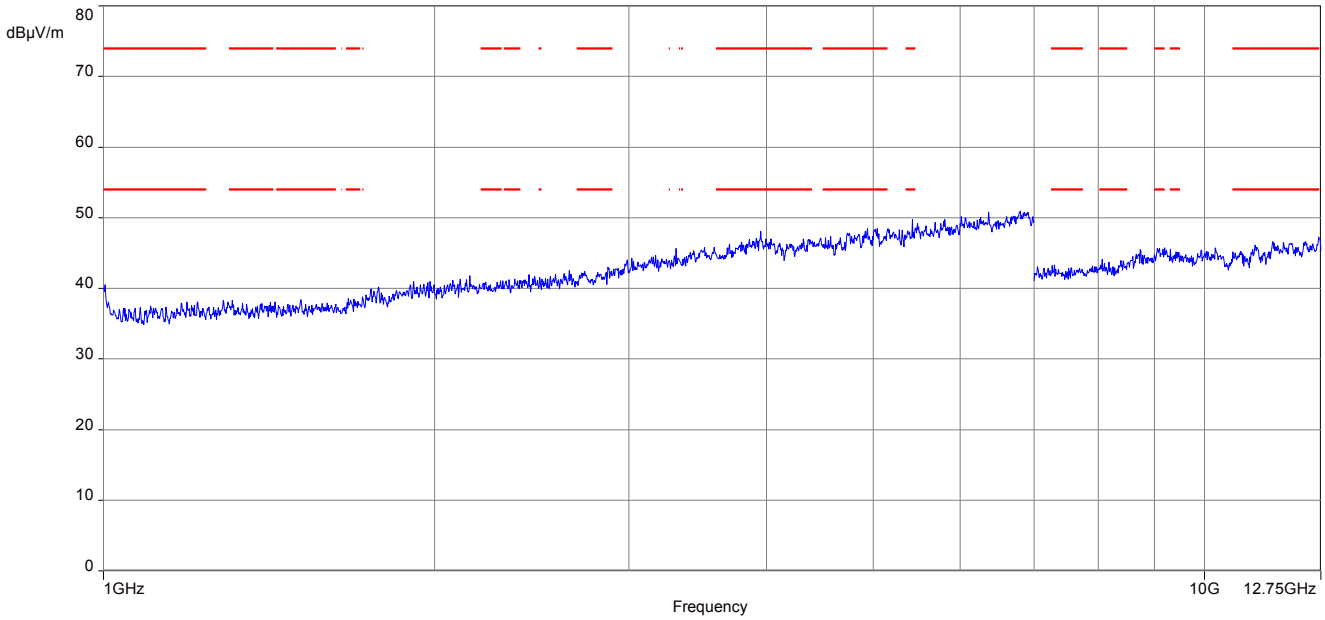
Plot 1: 1 GHz to 12.75 GHz, vertical & horizontal polarization, 922.6 MHz



Plot 2: 1 GHz to 12.75 GHz, vertical & horizontal polarization, 923.4 MHz



Plot 3: 1 GHz to 18 GHz, vertical & horizontal polarization, idle



11.6 Spurious emissions conducted below 30 MHz (AC conducted)

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to channel 6. This measurement is repeated for DSSS and OFDM modulation. If peaks are found channel 1 and channel 11 will be measured too. The measurement is performed with the data rate producing the highest output power. 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
Resolution bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Video bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace mode:	Max Hold
Test setup:	See sub clause 6.3 - A
Measurement uncertainty:	See sub clause 8

Limits:

FCC		IC
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

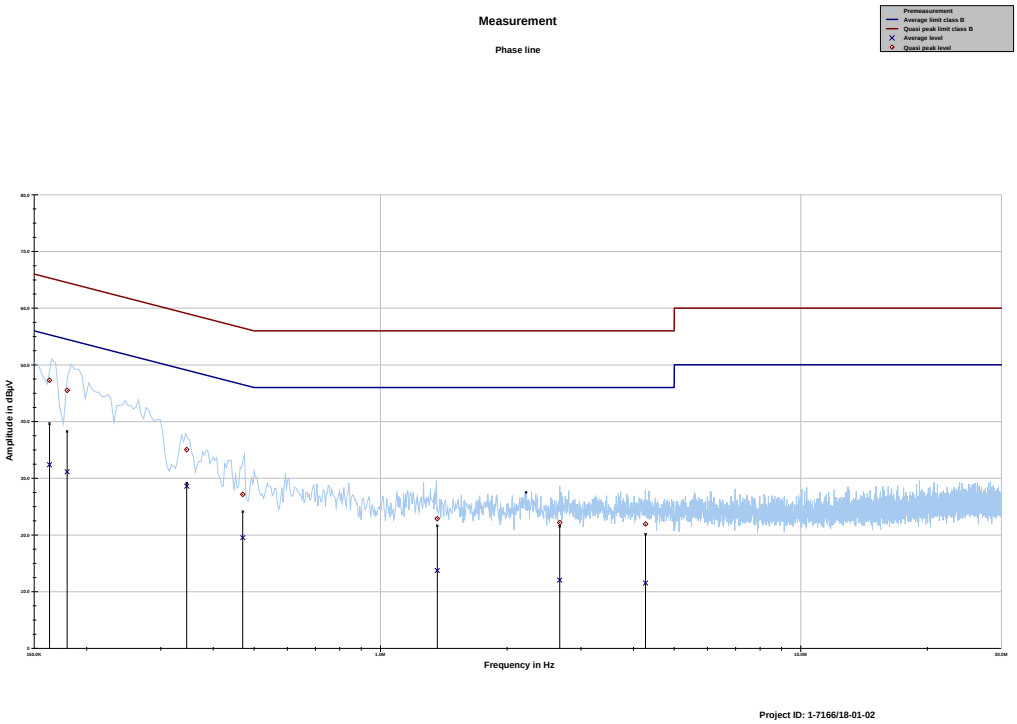
*Decreases with the logarithm of the frequency

Results:

TX Spurious Emissions Conducted < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
All detected peaks are more than 20 dB below the limit.		

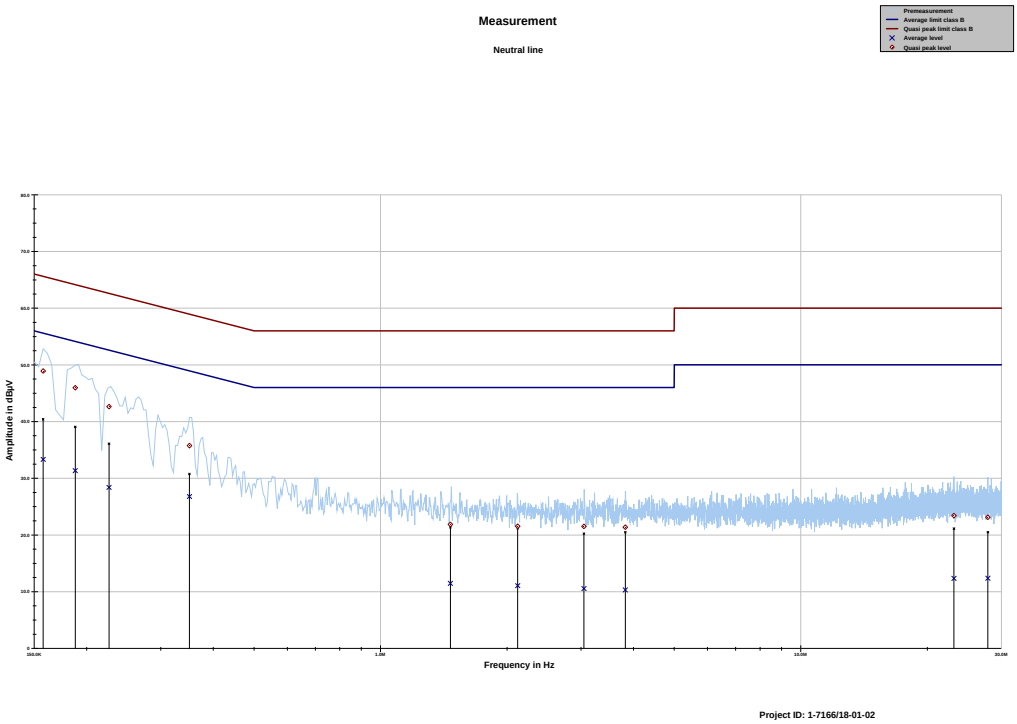
Plots:

Plot 1: 150 kHz to 30 MHz, phase line, 622.6 MHz



Frequency	Quasi peak level	Margin quasi peak	Limit QP	Average level	Margin average	Limit AV
MHz	dBµV	dB	dBµV	dBµV	dB	dBµV
0.163074	47.27	18.04	65.306	32.38	23.24	55.626
0.179677	45.52	18.98	64.501	31.14	24.01	55.152
0.345978	35.04	24.01	59.058	28.59	21.81	50.401
0.470175	27.16	29.35	56.511	19.52	27.33	46.852
1.364879	22.86	33.14	56.000	13.71	32.29	46.000
2.668791	22.18	33.82	56.000	12.04	33.96	46.000
4.272882	21.94	34.06	56.000	11.52	34.48	46.000

Plot 2: 150 kHz to 30 MHz, neutral line, 623.4 MHz



Frequency	Quasi peak level	Margin quasi peak	Limit QP	Average level	Margin average	Limit AV
MHz	dBµV	dB	dBµV	dBµV	dB	dBµV
0.157524	48.90	16.69	65.594	33.33	22.46	55.785
0.187820	45.95	18.18	64.132	31.33	23.59	54.919
0.225987	42.63	19.96	62.596	28.38	25.45	53.829
0.351087	35.75	23.19	58.937	26.77	23.49	50.255
1.466786	21.85	34.15	56.000	11.46	34.54	46.000
2.120460	21.54	34.46	56.000	11.05	34.95	46.000
3.048002	21.50	34.50	56.000	10.54	35.46	46.000
3.822796	21.36	34.64	56.000	10.31	35.69	46.000
23.140057	23.41	36.59	60.000	12.34	37.66	50.000
27.868517	23.12	36.88	60.000	12.36	37.64	50.000

12 Observations

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

Annex A Glossary

EUT	Equipment under test
DUT	Device under test
UUT	Unit under test
GUE	GNSS User Equipment
ETSI	European Telecommunications Standards Institute
EN	European Standard
FCC	Federal Communications Commission
FCC ID	Company Identifier at FCC
IC	Industry Canada
PMN	Product marketing name
HMN	Host marketing name
HVIN	Hardware version identification number
FVIN	Firmware version identification number
EMC	Electromagnetic Compatibility
HW	Hardware
SW	Software
Inv. No.	Inventory number
S/N or SN	Serial number
C	Compliant
NC	Not compliant
NA	Not applicable
NP	Not performed
PP	Positive peak
QP	Quasi peak
AVG	Average
OC	Operating channel
OCW	Operating channel bandwidth
OBW	Occupied bandwidth
OOB	Out of band
DFS	Dynamic frequency selection
CAC	Channel availability check
OP	Occupancy period
NOP	Non occupancy period
DC	Duty cycle
PER	Packet error rate
CW	Clean wave
MC	Modulated carrier
WLAN	Wireless local area network
RLAN	Radio local area network
DSSS	Dynamic sequence spread spectrum
OFDM	Orthogonal frequency division multiplexing
FHSS	Frequency hopping spread spectrum
GNSS	Global Navigation Satellite System
C/N_0	Carrier to noise-density ratio, expressed in dB-Hz

Annex B Document history

Version	Applied changes	Date of release
-/-	Initial release	2019-01-07
-A	Editorial corrections	2019-03-18

Annex C Accreditation Certificate

first page	last page
	

Note: The current certificate annex is published on the website (link see below) of the Accreditation Body DAkkS or may be received by CTC advanced GmbH on request

https://www.dakks.de/as/ast/d/D-PL-12076-01-03e.pdf

########## END OF TEST REPORT ##########