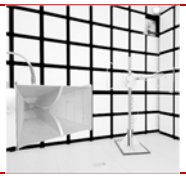
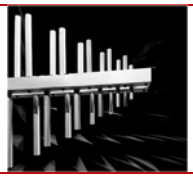
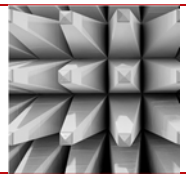

CETECOM™
CETECOM ICT Services
consulting - testing - certification

TEST REPORT

Test report no.: 1-1137/16-02-04-A

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

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-12076-01-01

Applicant

Endress + Hauser Flowtec AG
Kägenstr. 7
4153 Reinach BL1 / SWITZERLAND
Phone: -/-
Fax: -/-
Contact: Lukas Tanner
e-mail: lukas.tanner@flowtec.endress.com
Phone: +41 61 715 6826

Manufacturer

Endress + Hauser Flowtec AG
Kägenstr. 7
4153 Reinach BL1 / SWITZERLAND

Test standard/s

47 CFR Part 15	Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices
RSS - 247 Issue 1	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence - Exempt Local Area Network (LE-LAN) Devices
RSS - Gen Issue 4	Spectrum Management and Telecommunications Radio Standards Specifications - General Requirements and Information for the Certification of Radio Apparatus

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

Test Item

Kind of test item:	**WLAN Access Point IEEE 802.11 b/g**
Model name:	**A309 & A310**
FCC ID:	**2AIMC-A30910AA**
IC:	**2519B-A30910AA**
Frequency:	DTS band 2400 MHz to 2483.5 MHz
Technology tested:	WLAN (DSSS / b mode & OFDM / g mode)
Antenna:	2 provided antennas (1 integrated & 1 external)
Power supply:	+5 V DC by external DC power supply
Temperature range:	-30°C to +50°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=Stefan Boes, o=CETECOM ICT Services GmbH, ou=BOE-111011, email=Stefan.Boes@cetecom.com, c=DE
2016.09.05 16:23:34 +02'00'

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Lab Manager
Radio Communications & EMC

Test performed:

p.o. cn=Marco Bertolino, o=CETECOM ICT Services GmbH, ou=BTL-150828, email=marco.bertolino@cetecom.com, c=DE
2016.09.05 14:58:47 +02'00'

Benedikt Gerber
Testing 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 1-1137/16-02-04 and dated 2016-08-24

2.2 Application details

Date of receipt of order:	2016-06-30
Date of receipt of test item:	2016-07-25
Start of test:	2016-07-25
End of test:	2016-09-02
Person(s) present during the test:	-/-

3 Test standard/s and references

Test standard	Date	Description
47 CFR Part 15	-/-	Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices
RSS - 247 Issue 1	May 2015	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence - Exempt Local Area Network (LE-LAN) Devices
RSS - Gen Issue 4	November 2014	Spectrum Management and Telecommunications Radio Standards Specifications - General Requirements and Information for the Certification of Radio Apparatus

Guidance	Version	Description
DTS: KDB 558074 D01	v03r05	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247
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 No tests under extreme conditions required. No tests under extreme conditions required.
Relative humidity content	:		50 %
Barometric pressure	:		not relevant for this kind of testing
Power supply	:	V_{nom} V_{max} V_{min}	+5 V DC by external DC power supply No tests under extreme conditions required. No tests under extreme conditions required.

5 Test item

5.1 General description

Kind of test item	:	WLAN Access Point IEEE 802.11 b/g
Type identification	:	A309 & A310
HMN	:	-/-
PMN	:	A309 A310
HVIN	:	A309 A310
FVIN	:	-/-
S/N serial number	:	Radiated units: A309: 0112563295 / 0112563288 / 0112563240 A310: 0112564544 / 0112564551 Conducted units: A309: 0112563295 / 0112563288 / 0112563240 A310: 0112564544 / 0112564551 Remeasurement: A309: 0113472640
HW hardware status	:	-/-
SW software status	:	-/-
Frequency band	:	DTS band 2400 MHz to 2483.5 MHz (lowest channel 2412 MHz; highest channel 2462 MHz)
Type of radio transmission Use of frequency spectrum	: :	DSSS, OFDM
Type of modulation	:	(D)BPSK, (D)QPSK, 16 – QAM, 64 – QAM
Number of channels	:	11
Antenna	:	2 provided antennas (1 integrated & 1 external) Integrated: PCB type antenna - ANTXV60P001B24003 (YAGEO) External: OMNI-S broad band dipole antenna - 1399.17.0224 (H&S)
Power supply	:	+5 V DC by external DC power supply
Temperature range	:	-30°C to +50°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: 1-1137/16-02-01_AnnexA
1-1137/16-02-01_AnnexB
1-1137/16-02-01_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).

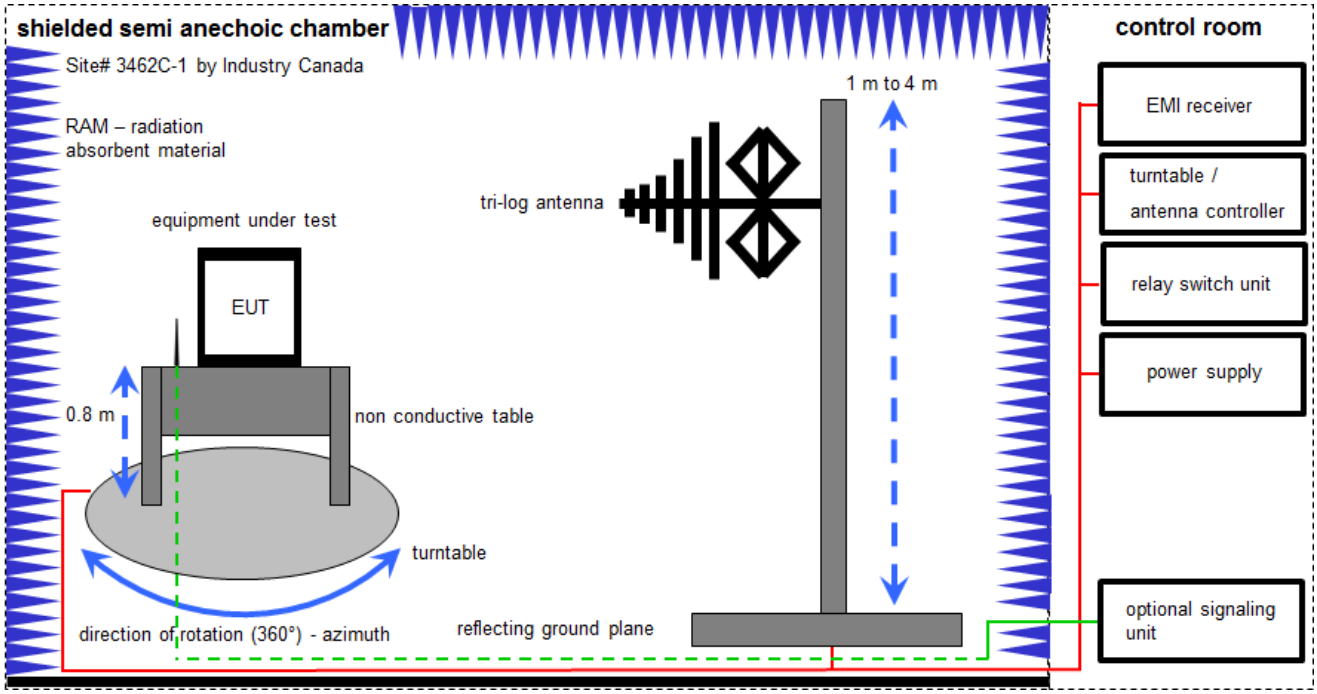
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

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
vlkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

7.1 Shielded semi anechoic chamber

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



Measurement distance: tri-log antenna 10 meter

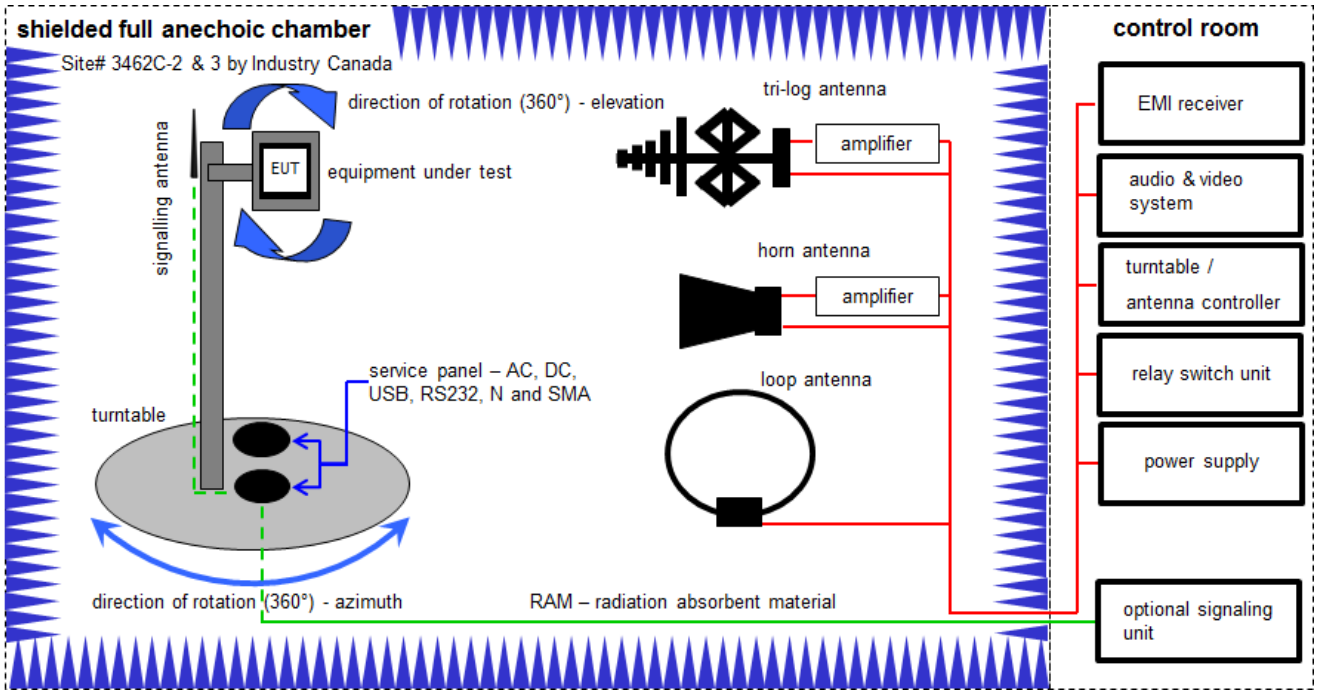
FS = UR + CL + AF
(FS-field strength; UR-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

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 Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A	Switch-Unit	3488A	HP	2719A14505	300000368	ev	-/-	-/-
2	A	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	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

7.2 Shielded fully anechoic chamber



Measurement distance: tri-log antenna and horn antenna 3 meter; loop antenna 3 meter / 1 meter

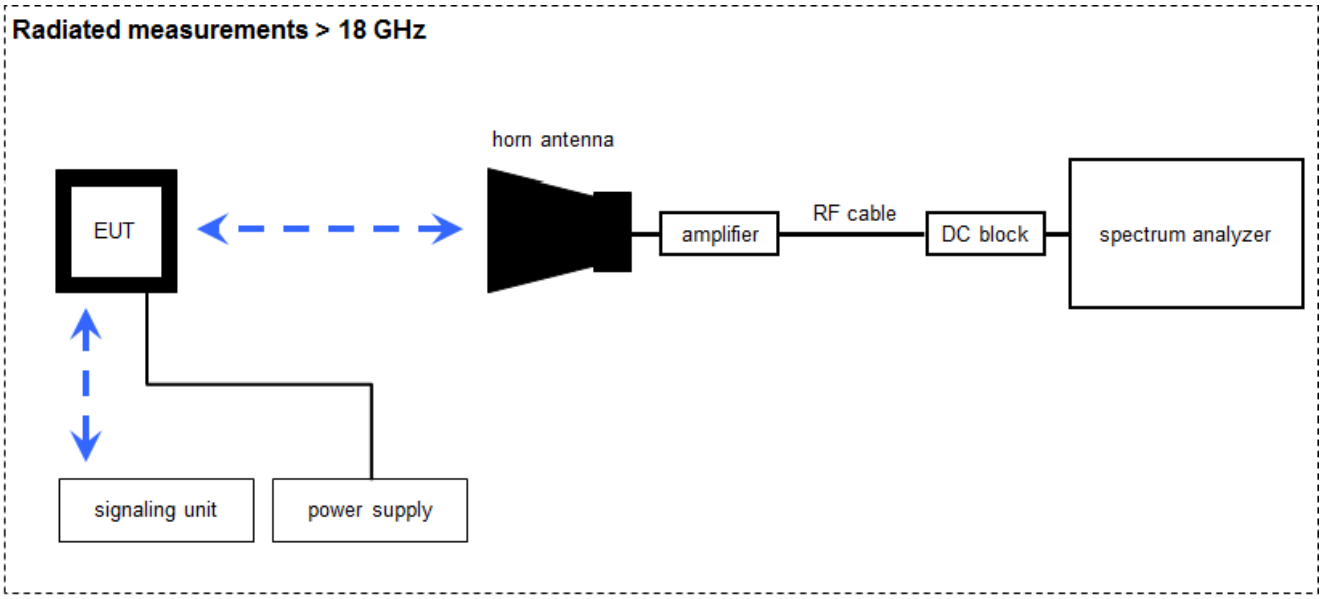
FS = UR + CA + AF
(FS-field strength; UR-voltage at the receiver; CA-loss of the signal path; AF-antenna factor)

Example calculation:
FS [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 Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A, B	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev	-/-	-/-
2	A, B	Switch / Control Unit	3488A	HP	*	300000199	ne	-/-	-/-
3	A	Active Loop Antenna 10 kHz to 30 MHz	6502	EMCO/2	8905-2342	300000256	k	24.06.2015	24.06.2017
4	B	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne	-/-	-/-
5	B	Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev	-/-	-/-
6	B	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne	-/-	-/-
7	B	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vlKI!	29.10.2014	29.10.2017
8	A, B	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000037	300004509	ne	-/-	-/-
9	A, B	EMI Test Receiver 9kHz-26,5GHz	ESR26	R&S	101376	300005063	k	04.09.2015	04.09.2016
10	B	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vlKI!	20.05.2015	20.05.2017

7.3 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)

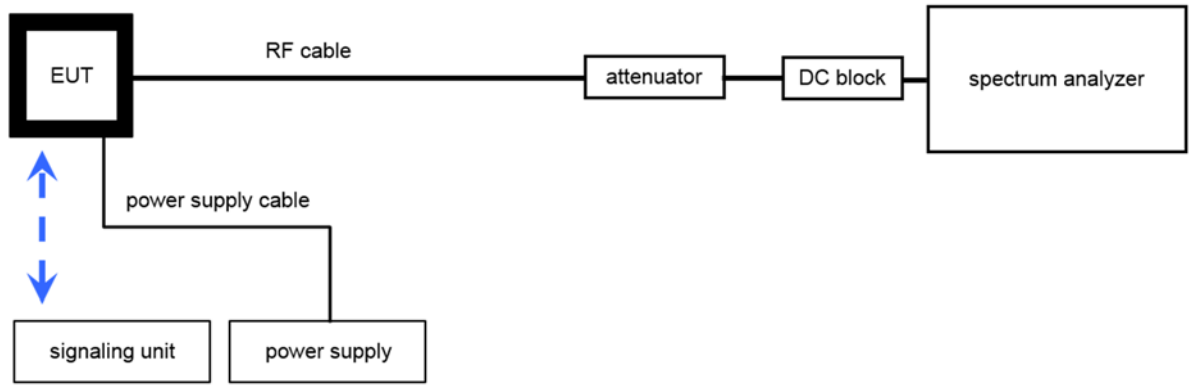
Example calculation:
FS [dBµV/m] = 40.0 [dBµV/m] + (-60.1) [dB] + 36.74 [dB/m] = 16.64 [dBµV/m] (6.79 µV/m)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	-/-	300000486	k	10.09.2015	10.09.2017
2	A	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	21.01.2016	21.01.2017
3	A	Amplifier 2-40 GHz	JS32-02004000-57-5P	MITEQ	1777200	300004541	ev	-/-	-/-
4	A	RF-Cable	ST18/SMAm/SMAm/48	Huber & Suhner	Batch no. 600918	400001182	ev	-/-	-/-
5	A	RF-Cable	ST18/SMAm/SMm/48	Huber & Suhner	Batch no. 127377	400001183	ev	-/-	-/-
6	A	DC-Blocker 0.1-40 GHz	8141A	Inmet	-/-	400001185	ev	-/-	-/-

7.4 Conducted 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 Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A	DC-Blocker 0.1-40 GHz	8141A	Inmet		400001185	ev	-/-	-/-
2	A, B	Switch / Control Unit	3488A	HP	2719A15013	300000151	ne	-/-	-/-
3	A, B	PC-WLAN Tester	Intel Core i3 3220/3,3 GHz, Prozessor	R&S	2V2403033A4523	300004589	ne	-/-	-/-
4	A, B	Teststand	Teststand Custom Sequence Editor	National Instruments GmbH	2V2403033A4523	300004590	ne	-/-	-/-
5	A, B	RF-Cable	ST18/SMAm/SMAm/60	Huber & Suhner	Batch no. 606844	400001181	ev	-/-	-/-
6	A, B	Coax Attenuator 10 dB 2W 0-40 GHz	MCL BW-K10-2W44+	Mini Circuits	Batch no. 606844	400001186	ev	-/-	-/-
7	B	Power Sensor	NRP-Z81	R&S	100010	300003780	k	25.01.2016	25.01.2017
8	A	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	21.01.2016	21.01.2017

8 Sequence of testing

8.1 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.

8.2 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.

8.3 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.

8.4 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.

9 Measurement uncertainty

Measurement uncertainty	
Test case	**Uncertainty**
Antenna gain	± 3 dB
Power spectral density	± 1.5 dB
DTS bandwidth	± 100 kHz (depends on the used RBW)
Occupied bandwidth	± 100 kHz (depends on the used RBW)
Maximum output power	± 1.5 dB
Detailed spurious emissions @ the band edge - conducted	± 1.5 dB
Band edge compliance radiated	± 3 dB
Spurious emissions conducted	± 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 radiated above 12.75 GHz	± 4.5 dB
Spurious emissions conducted below 30 MHz (AC conducted)	± 2.6 dB

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 - 247, Issue 1	See table!	2016-09-05	-/-

Test specification clause	Test case	Guideline	Temperature conditions	Power source voltages	Mode	C	NC	NA	NP	Remark
§15.247(b)(4) RSS - 247 / 5.4 (4)	Antenna gain	-/-	Nominal	Nominal	DSSS	-/-				-/-
RSS – 247 / 6.0	Duty cycle	-/-	Nominal	Nominal	DSSS OFDM	-/-				-/-
§15.247(e) RSS - 247 / 5.2 (2)	Power spectral density	KDB 558074 DTS clause: 10.2	Nominal	Nominal	DSSS OFDM	☒	☐	☐	☐	-/-
§15.247(a)(2) RSS - 247 / 5.2 (1)	DTS bandwidth	KDB 558074 DTS clause: 8.1	Nominal	Nominal	DSSS OFDM	☒	☐	☐	☐	-/-
RSS Gen clause 4.6.1	Occupied bandwidth	-/-	Nominal	Nominal	DSSS OFDM	☒	☐	☐	☐	-/-
§15.247(b)(3) RSS - 247 / 5.4 (4)	Maximum output power	KDB 558074 DTS clause: 9.1.2	Nominal	Nominal	DSSS OFDM	☒	☐	☐	☐	-/-
§15.247(d) RSS - 247 / 5.5	Detailed spurious emissions @ the band edge - conducted	-/-	Nominal	Nominal	DSSS OFDM	☒	☐	☐	☐	-/-
§15.205 RSS - 247 / 5.5 RSS - Gen	Band edge compliance conducted and radiated	KDB 558074 DTS clause: 13.3.2 and clause 12.2.2	Nominal	Nominal	DSSS OFDM	☒	☐	☐	☐	-/-
§15.247(d) RSS - 247 / 5.5	TX spurious emissions conducted	KDB 558074 DTS clause: 11.1 & 11.2 11.3	Nominal	Nominal	DSSS OFDM	☒	☐	☐	☐	-/-
§15.209(a) RSS-Gen	TX spurious emissions radiated below 30 MHz	-/-	Nominal	Nominal	DSSS OFDM	☒	☐	☐	☐	-/-
§15.247(d) RSS - 247 / 5.5 RSS-Gen	TX spurious emissions radiated 30 MHz to 1 GHz	-/-	Nominal	Nominal	DSSS OFDM	☒	☐	☐	☐	-/-
§15.247(d) RSS - 247 / 5.5 RSS-Gen	TX spurious emissions radiated above 1 GHz	-/-	Nominal	Nominal	DSSS OFDM	☒	☐	☐	☐	-/-
§15.109 RSS-Gen	RX spurious emissions radiated 30 MHz to 1 GHz	-/-	Nominal	Nominal	RX / idle	☒	☐	☐	☐	-/-
§15.109 RSS-Gen	RX spurious emissions radiated above 1 GHz	-/-	Nominal	Nominal	RX / idle	☒	☐	☐	☐	-/-
§15.107(a) §15.207	Conducted emissions < 30 MHz	-/-	Nominal	Nominal	DSSS OFDM	☐	☐	☒	☐	External DC!

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

11 Additional comments

Reference documents:

Integrated antenna: An_PCB_2450_ANTXV60P001B24003_0

External antenna: Huber Suhner H_S_1399.17.0224 SENCITY OMNI-S broad band WiFi & LTE Antenna

Special test descriptions: None

Configuration descriptions: 1) The EUT uses only one antenna at the same time.

2) Both units A309 and A310 use the identical PCB layout. The plastic housings are different according to the different mounting backgrounds but without any effect on the RF behavior. (Customer declaration)

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)*

☐ 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.

12 Measurement results

12.1 Antenna gain

Measurement:

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module. For normal WLAN devices, the DSSS mode is used.

Measurement parameters:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	3 MHz
Video bandwidth:	3 MHz
Trace mode:	Max hold
Test setup:	See sub clause 7.4 – A
Measurement uncertainty:	See sub clause 9

Limits:

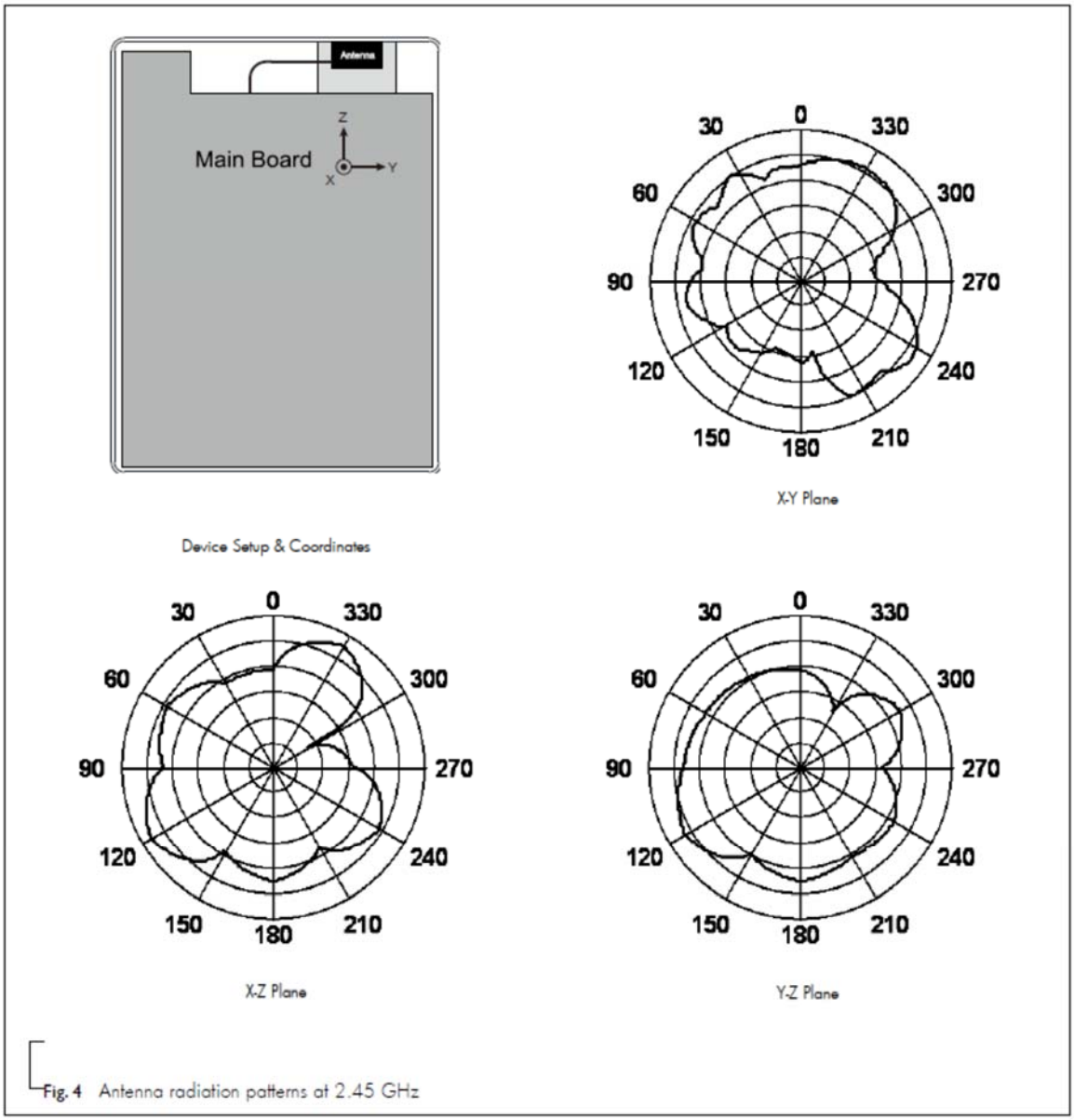
FCC	IC
6 dBi / > 6 dBi output power and power density reduction required	

Results: internal antenna (with antenna cable)

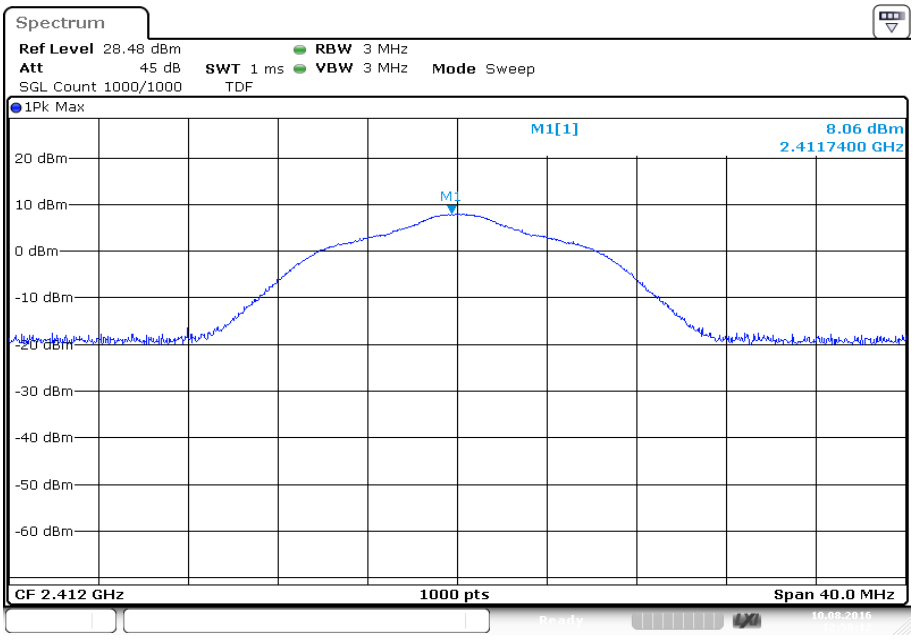
T_{nom}	V_{nom}	Lowest channel	Middle channel	Highest channel
Conducted power [dBm] Measured with DSSS modulation		8.06	9.28	8.33
Radiated power [dBm] Measured with DSSS modulation		4.88	6.50	6.83
Gain [dBi]		-3.18	-2.78	-1.50

Plots:

Plot 1: antenna pattern @ 2.45 GHz (provided from the customer)

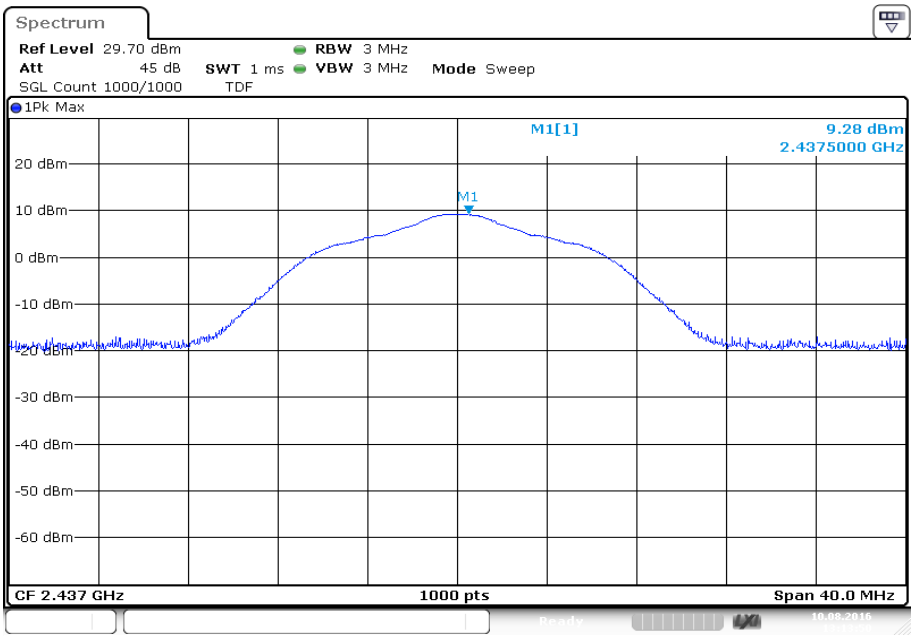


Plot 2: lowest channel, conducted



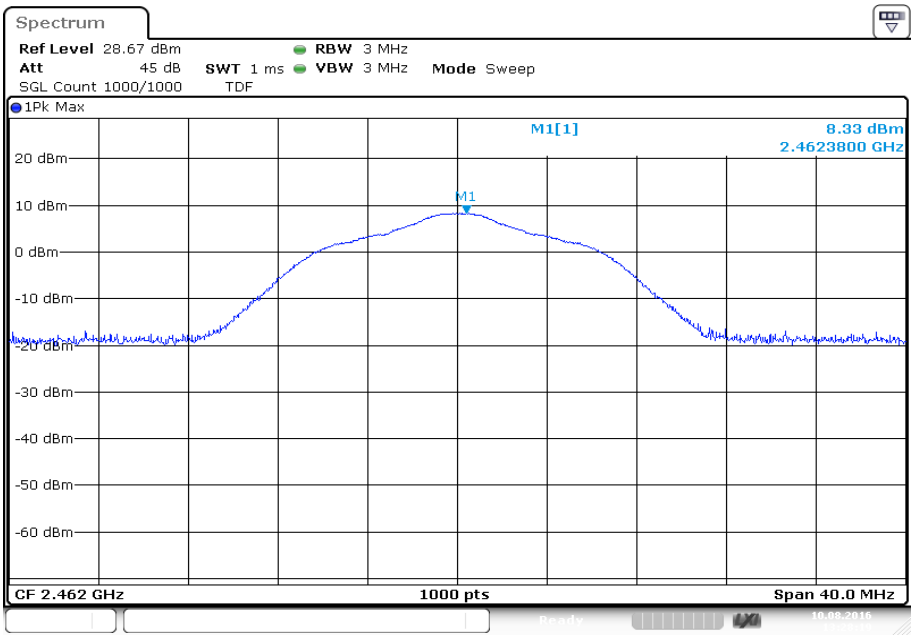
Date: 10.AUG.2016 12:58:12

Plot 3: middle channel, conducted



Date: 10.AUG.2016 13:13:50

Plot 4: highest channel, conducted



Results: external antenna (with antenna cable)

T_{nom}	V_{nom}	DTS band 2400 MHz to 2483.5 MHz
Gain [dBi] Declared		2.0
Antenna cable		2.0
Gain [dBi] Calculated		0.0

Plot 1: antenna information

Description

Broad band omni-directional WiFi & mobile antenna for 1710 up to 6000 MHz
WLAN 2400 - 2500 MHz and 5150 - 6000 MHz WiFi IEEE 802.11 a/b/g/h/p and n
Mobile / cellular 1710 - 2200 MHz
LTE 2300, LTE 2500 and LTE 2700 MHz / WiMax 3400 - 3800 MHz
Small & robust outdoor stick antenna IP66 / IP68 / IP69K
Direct mount on N type connector of wireless access points or clients

Product Configuration

Technical Data

Electrical Data

	Band 1	Band 2	Band 3	Band 4
Frequency (MHz)	1710 - 2000	2000 - 2700	2700 - 3800	4900 - 5150
VSWR	2	2	2	2
Gain (dBi)	1.5	2	1.5	2.5
3dB beamwidth (h) (°)	360	360	360	360

Photo 1: additional antenna cable and connector

12.2 Identify worst case data rate

Measurement:

All modes of the module will be measured with an average power meter or spectrum analyzer to identify the maximum transmission power.

In further tests only the identified worst case modulation scheme or bandwidth will be measured and this mode is used as representative mode for all other modulation schemes.

Additional the band edge compliance test will be performed in the lowest and highest modulation scheme.

Measurement parameters:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	3 MHz
Video bandwidth:	3 MHz
Trace mode:	Max hold
Test setup:	See sub clause 7.4 – A
Measurement uncertainty:	-/-

Results:

Modulation	Modulation scheme / bandwidth
DSSS / b – mode	1 Mbit/s
OFDM / g – mode	6 Mbit/s

12.3 Maximum output power

Description:

Measurement of the maximum output power conducted and radiated. The measurements are performed using the data rate producing the highest conducted output power.

Measurement:

Measurement parameter	
According to DTS clause: 9.1.2	
Peak power meter	
Test setup:	See sub clause 7.4 – B
Measurement uncertainty	See sub clause 9

Limits:

FCC	IC
Conducted: 1.0 W – Antenna gain with max. 6 dBi	

Results: internal antenna port

Frequency	Maximum Output Power [dBm]		
	2412 MHz	2437 MHz	2462 MHz
Output power conducted DSSS / b – mode	12.3	13.7	12.4
Output power conducted OFDM / g – mode	9.3	13.6	10.6

Results: external antenna port

Frequency	Maximum Output Power [dBm]		
	2412 MHz	2437 MHz	2462 MHz
Output power conducted DSSS / b – mode	11.7	13.1	12.2
Output power conducted OFDM / g – mode	9.9	12.3	10.5

12.4 Duty cycle

Measurement parameters:

Measurement parameter	
Detector:	Peak
Sweep time:	Depends on the signal see plot
Resolution bandwidth:	10 MHz
Video bandwidth:	10 MHz
Trace mode:	Max hold
Test setup:	See sub clause 7.5 - A
Measurement uncertainty:	See sub clause 9

Limits:

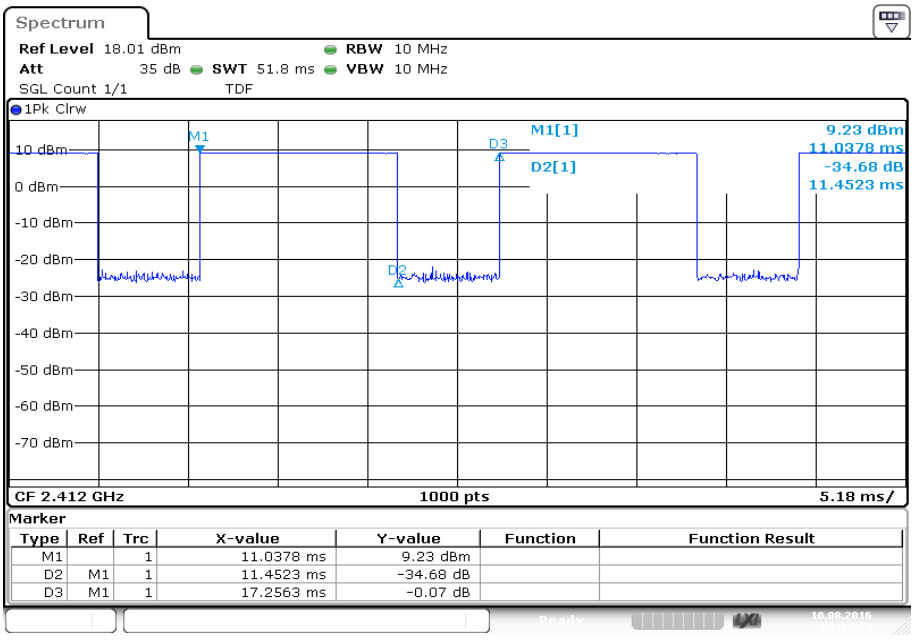
FCC	IC
-/-	

Results: (valid for both antenna ports)

T_{nom}	V_{nom}	lowest channel 2412 MHz	middle channel 2437 MHz	highest channel 2462 MHz
DSSS / b – mode		66.4 % / 1.78 dB	66.4 % / 1.78 dB	66.4 % / 1.78 dB
OFDM / g – mode		11.4 % / 9.43 dB	11.2 % / 9.51 dB	11.9 % / 9.24 dB

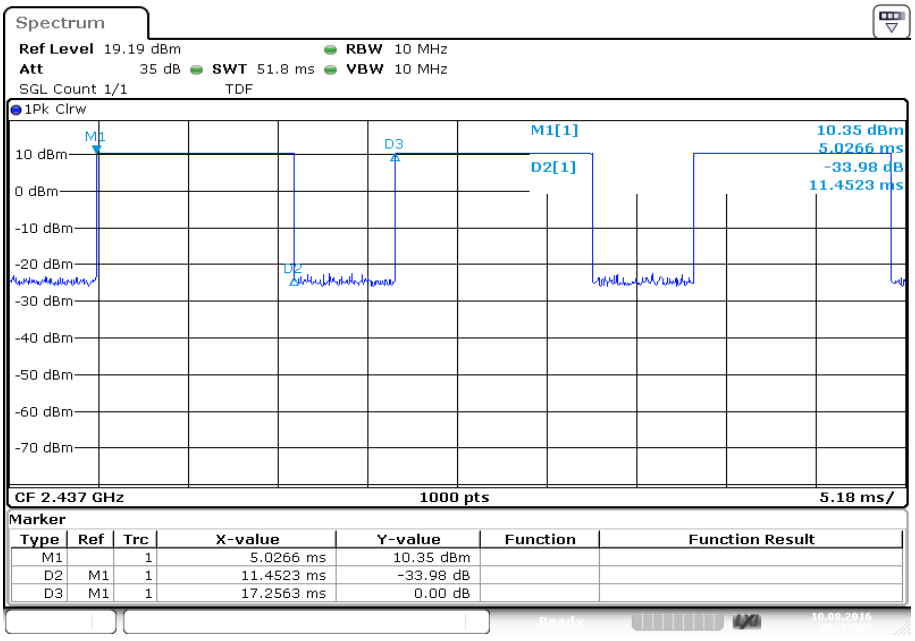
Plots: DSSS / b – mode

Plot 1: Lowest channel



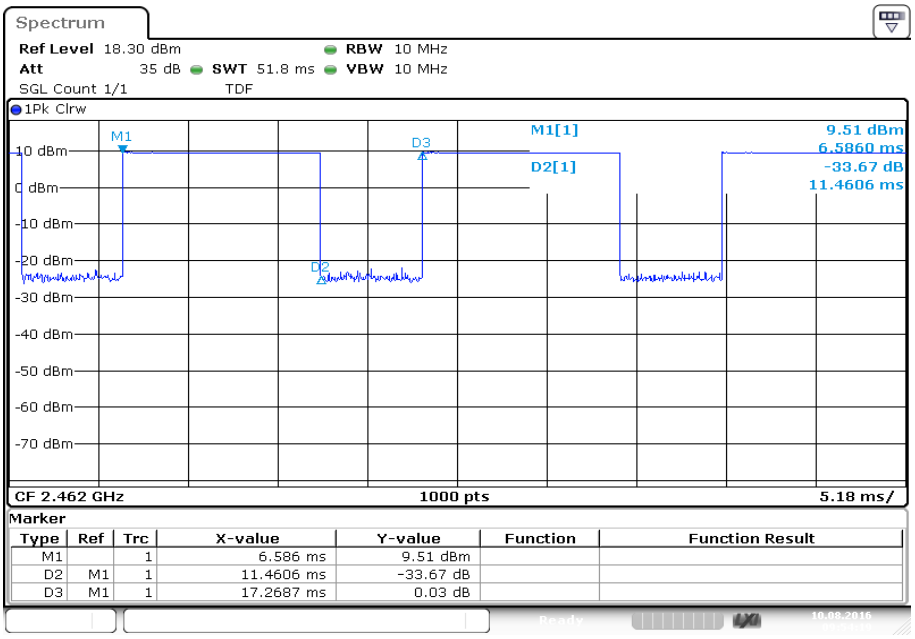
Date: 10.AUG.2016 09:22:24

Plot 2: Middle channel



Date: 10.AUG.2016 09:37:07

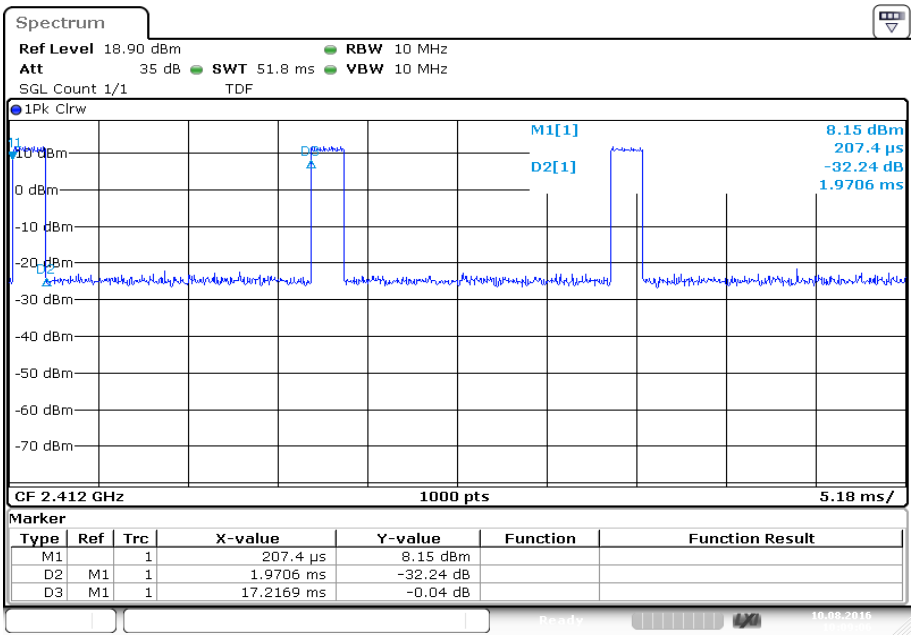
Plot 3: Highest channel



Date: 10.AUG.2016 09:54:19

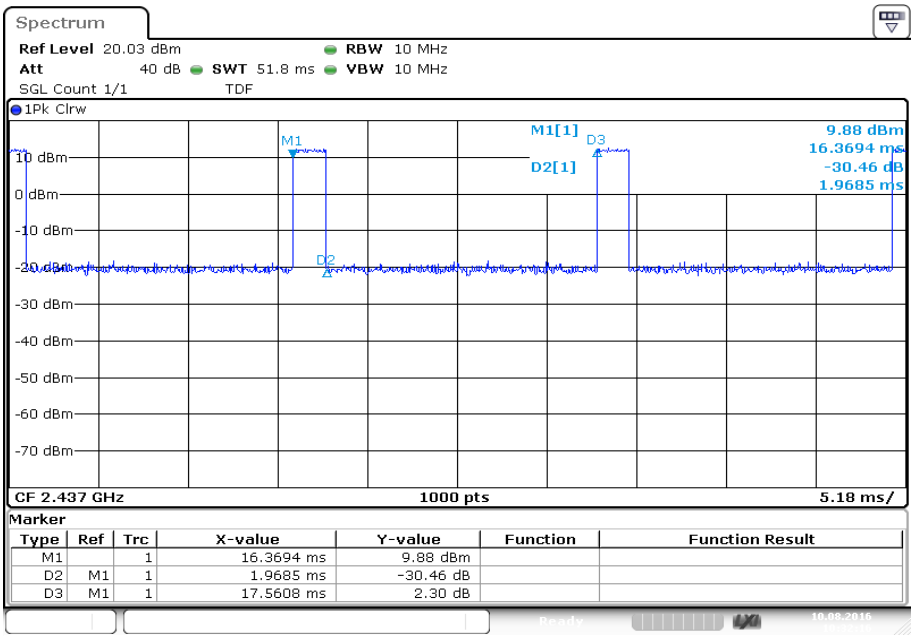
Plots: OFDM / g – mode

Plot 1: Lowest channel



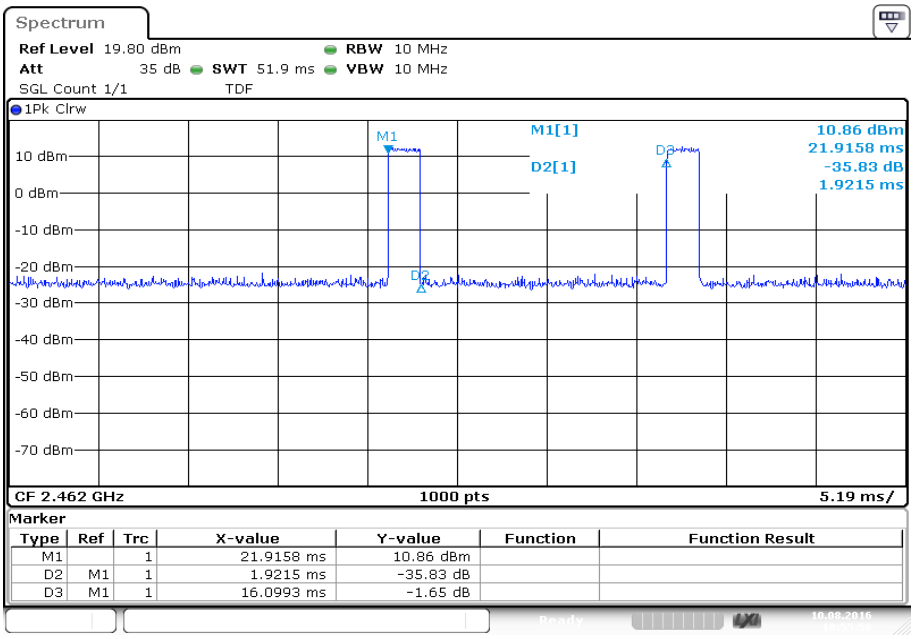
Date: 10.AUG.2016 10:09:06

Plot 2: Middle channel



Date: 10.AUG.2016 10:32:16

Plot 3: Highest channel



12.5 Peak power spectral density

Description:

Measurement of the power spectral density of a digital modulated system. The measurement is repeated for both modulations at the lowest, middle and highest channel.

Measurement:

Measurement parameter	
According to DTS clause: 10.2	
Detector:	Positive Peak
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Span:	30 MHz
Trace mode:	Max hold (allow trace to fully stabilize)
Test setup:	See sub clause 7.4 – A
Measurement uncertainty	See sub clause 9

Limits:

FCC	IC
8 dBm / 3kHz (conducted)	

Results: internal antenna port

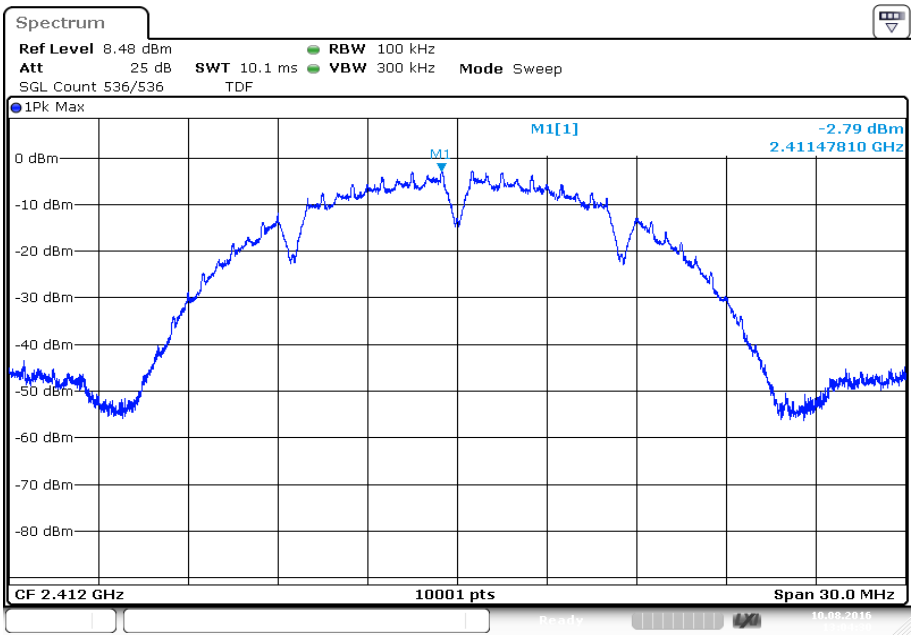
Modulation	Peak power spectral density [dBm/100kHz]		
Frequency	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	-2.8	-1.3	-2.4
OFDM / g – mode	-3.7	-2.1	-4.5

Results: external antenna port

Modulation	Peak power spectral density [dBm/100kHz]		
Frequency	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	-3.0	-1.9	-2.5
OFDM / g – mode	-4.2	-2.8	-3.3

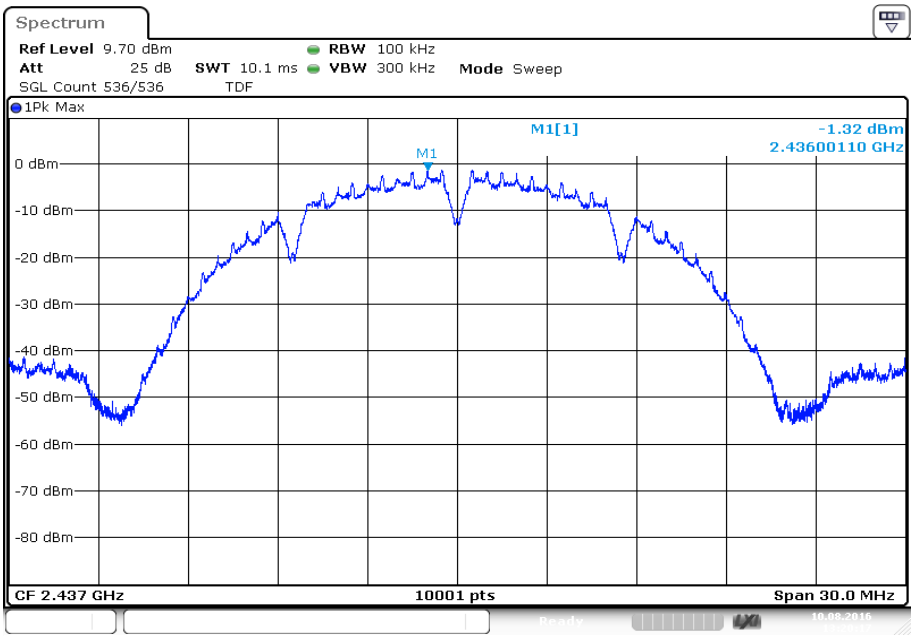
Plots: DSSS / b – mode, internal antenna port

Plot 1: Lowest channel



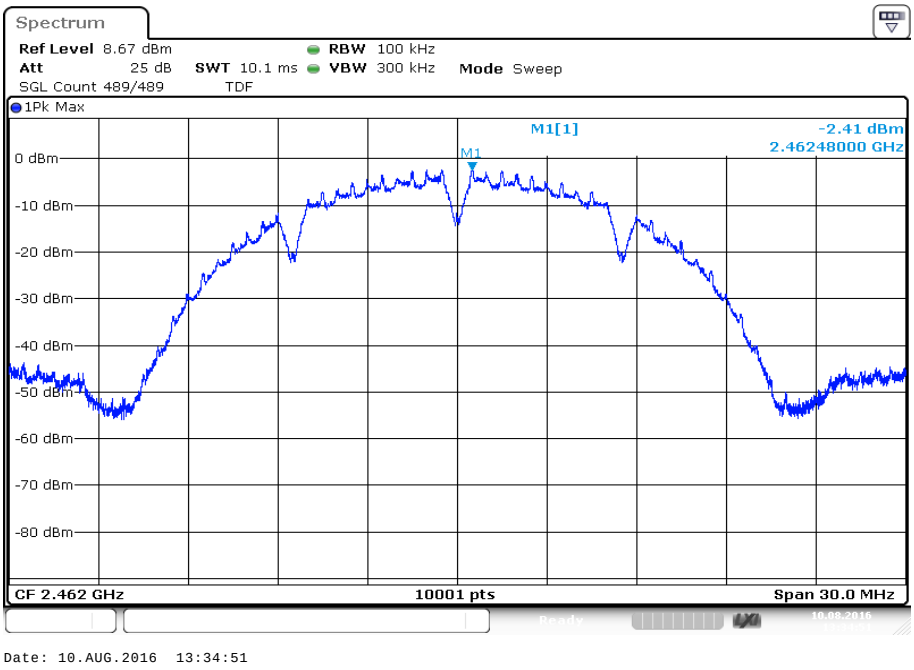
Date: 10.AUG.2016 13:04:30

Plot 2: Middle channel



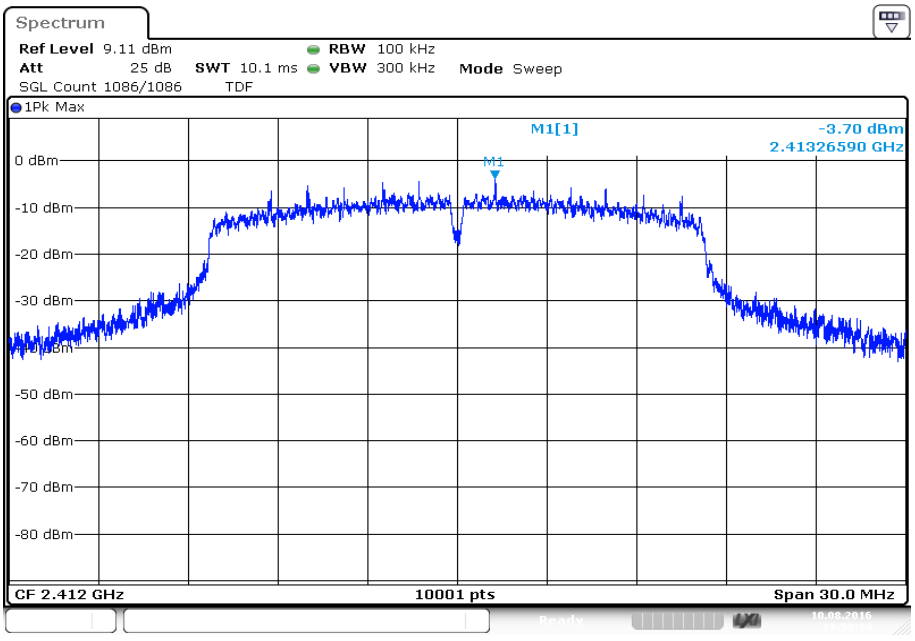
Date: 10.AUG.2016 13:20:17

Plot 3: Highest channel



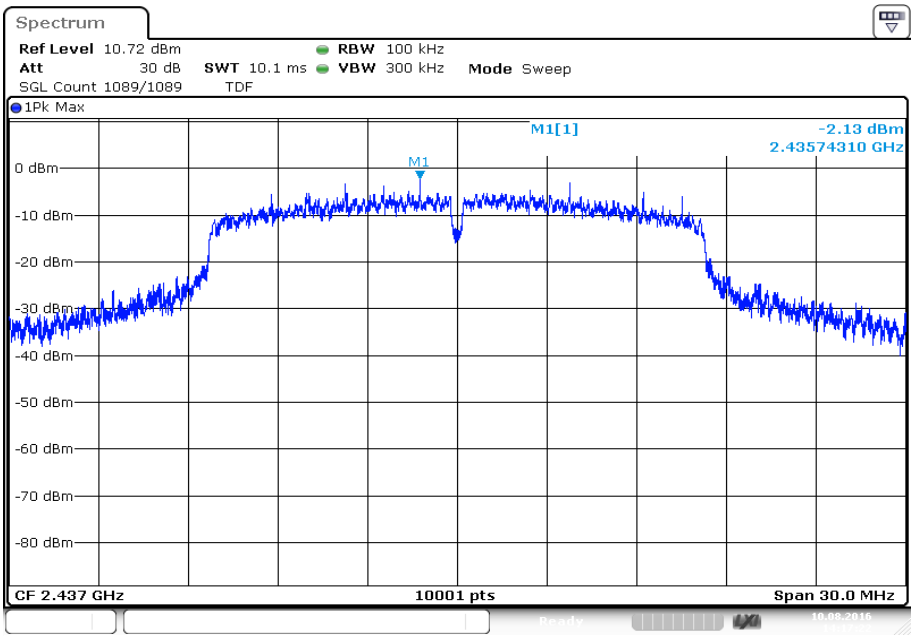
Plots: OFDM / g – mode, internal antenna port

Plot 1: Lowest channel



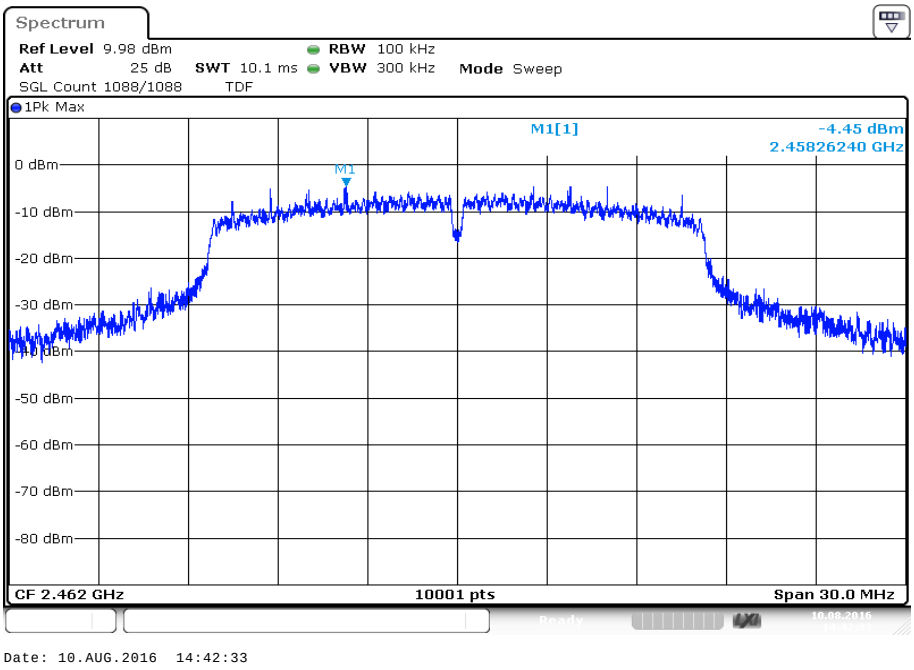
Date: 10.AUG.2016 13:53:14

Plot 2: Middle channel



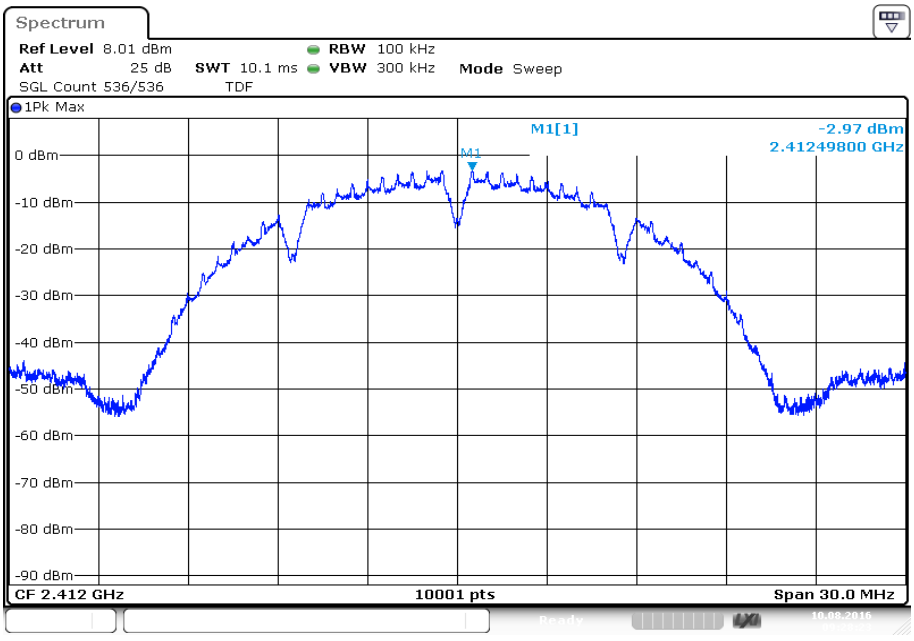
Date: 10.AUG.2016 14:17:22

Plot 3: Highest channel



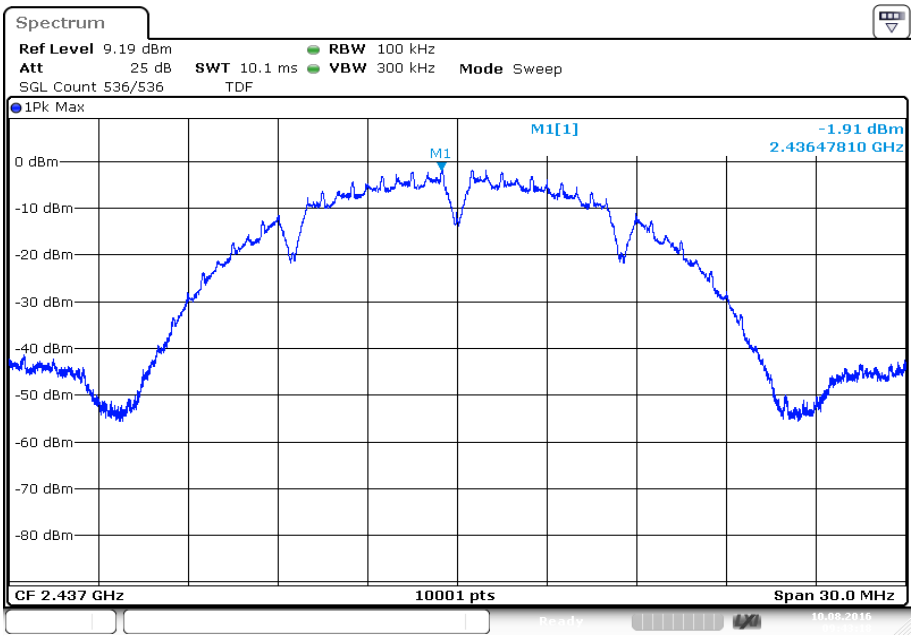
Plots: DSSS / b – mode, external antenna port

Plot 1: Lowest channel



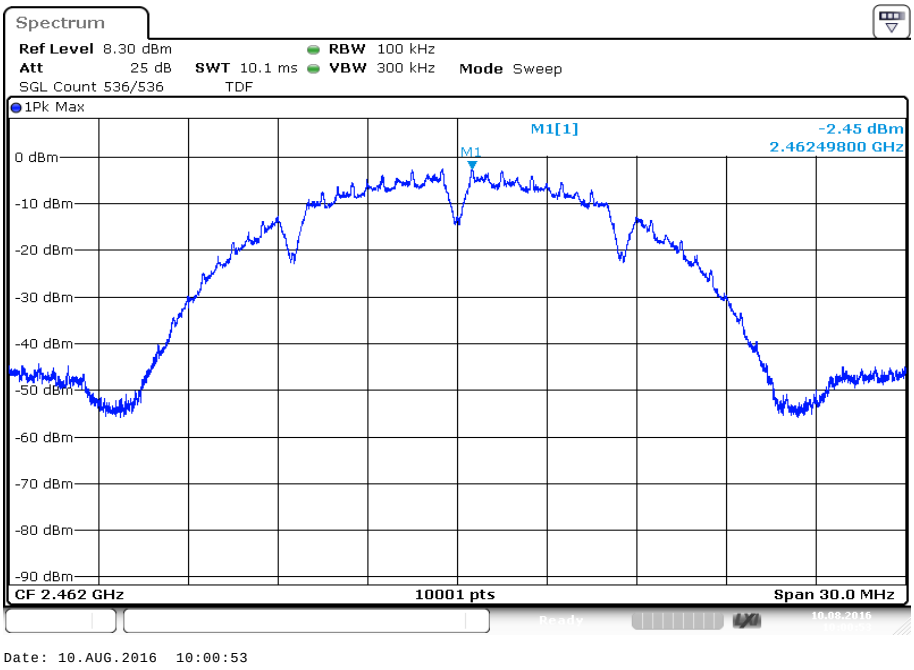
Date: 10.AUG.2016 09:28:23

Plot 2: Middle channel



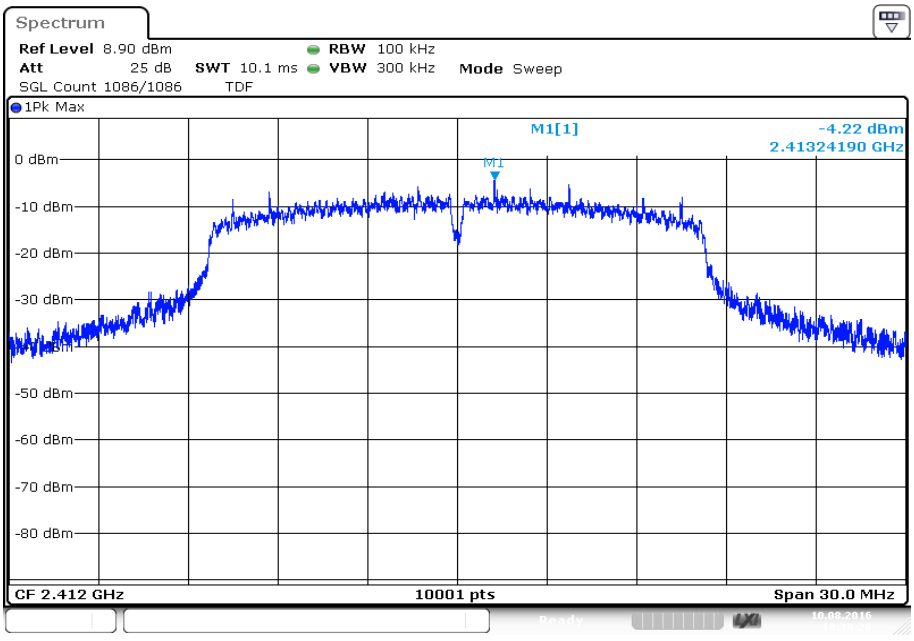
Date: 10.AUG.2016 09:43:19

Plot 3: Highest channel



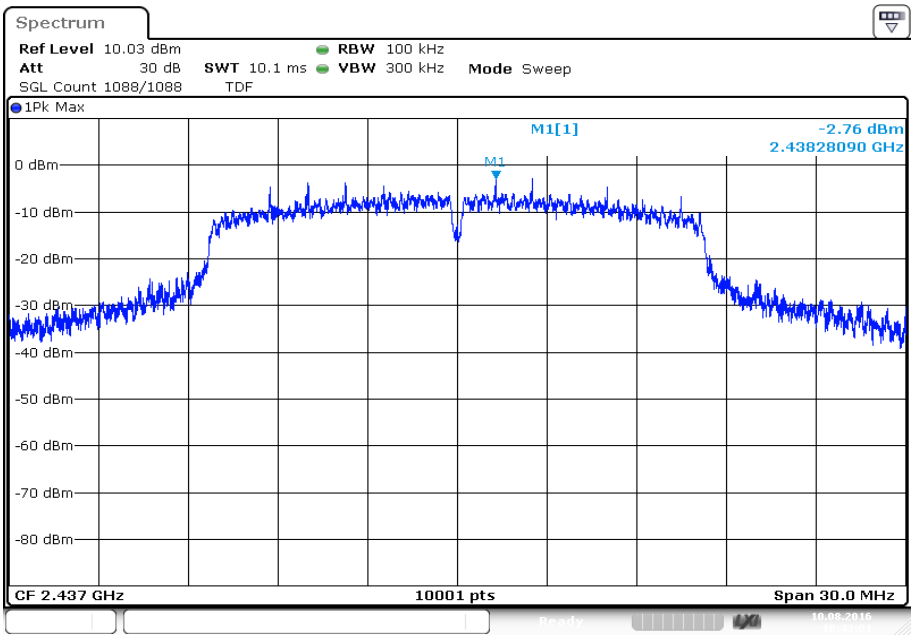
Plots: OFDM / g – mode, external antenna port

Plot 1: Lowest channel



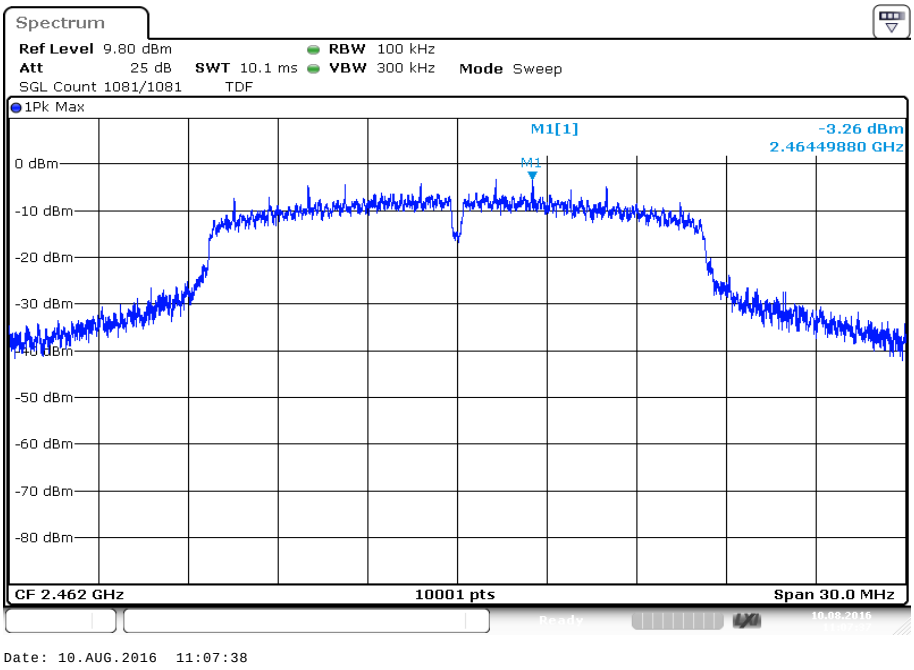
Date: 10.AUG.2016 10:19:20

Plot 2: Middle channel



Date: 10.AUG.2016 10:43:01

Plot 3: Highest channel



12.6 6 dB DTS bandwidth

Description:

Measurement of the 6 dB bandwidth of the modulated signal.

Measurement:

Measurement parameter	
According to DTS clause: 8.1	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	500 kHz
Span:	30 MHz / 50 MHz
Measurement procedure:	Measurement of the 75% bandwidth using the integration function of the analyzer
Trace mode:	Single count with 200 counts
Test setup:	See sub clause 7.4 – A
Measurement uncertainty	See sub clause 9

Limits:

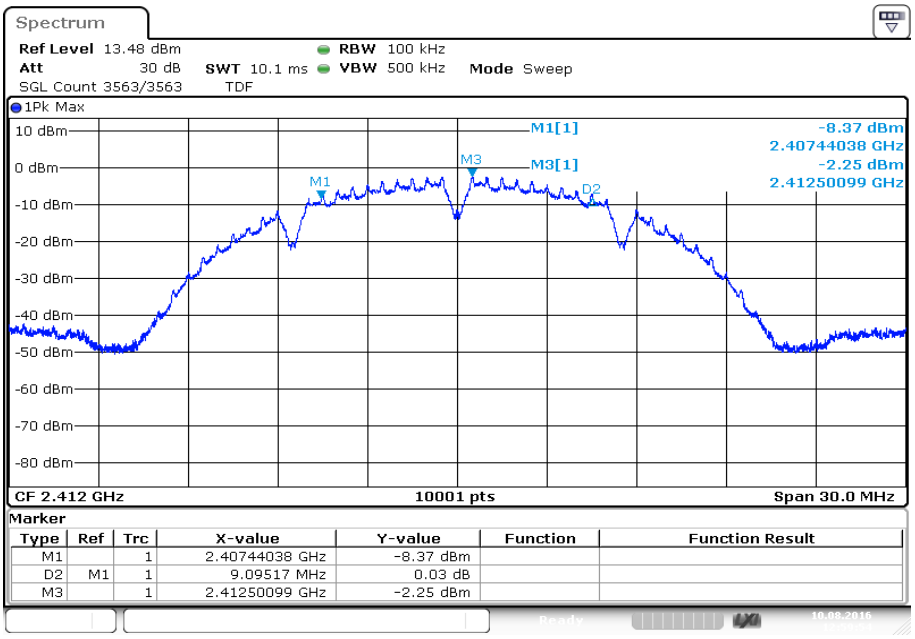
FCC	IC
Systems using digital modulation techniques may operate in the 2400–2483.5 MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz.	

Results: (valid for both antenna ports)

Frequency	6 dB DTS bandwidth [kHz]		
	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	9095	9095	9548
OFDM / g – mode	15091	15056	15097

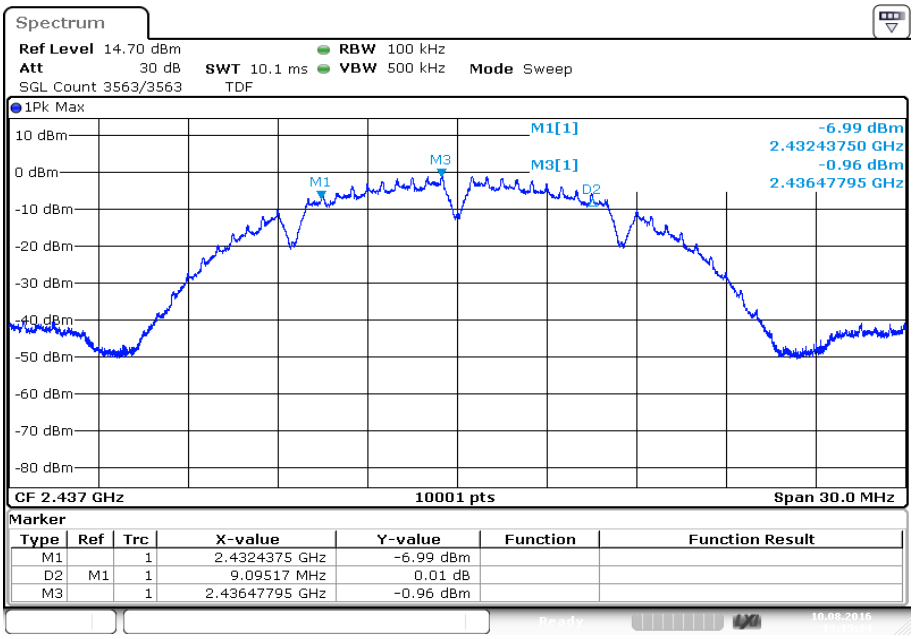
Plots: DSSS / b – mode

Plot 1: Lowest channel



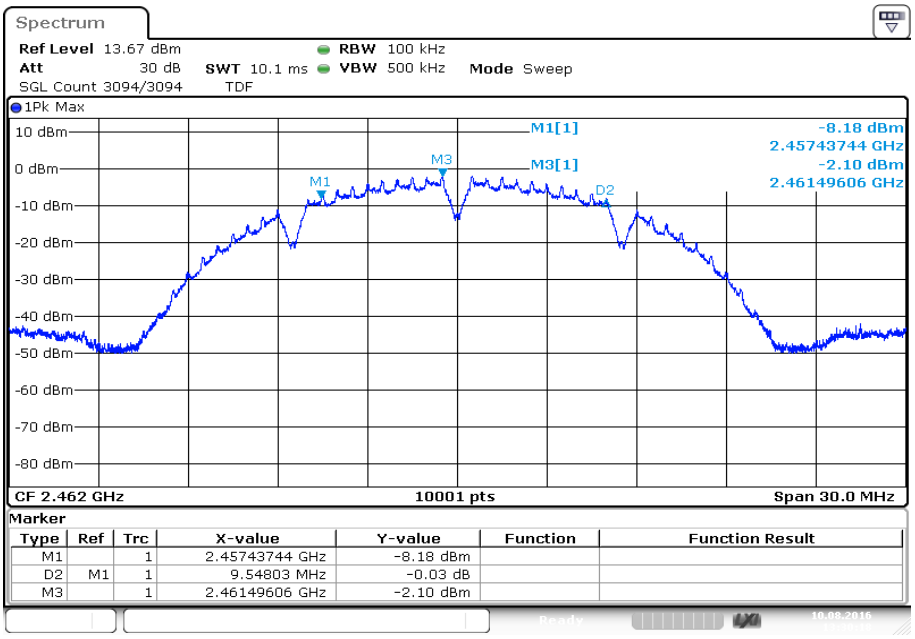
Date: 10.AUG.2016 12:59:54

Plot 2: Middle channel



Date: 10.AUG.2016 13:15:34

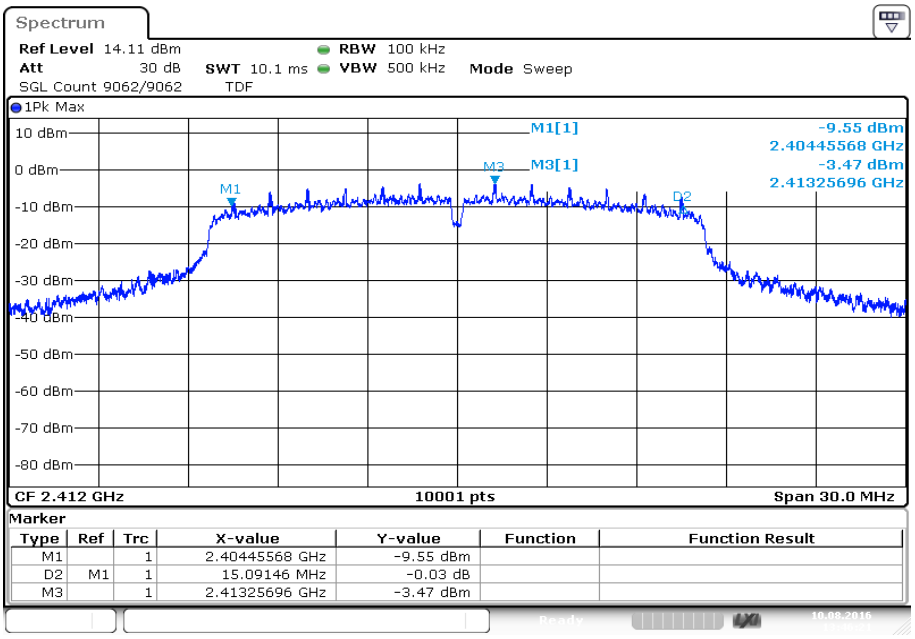
Plot 3: Highest channel



Date: 10.AUG.2016 13:30:18

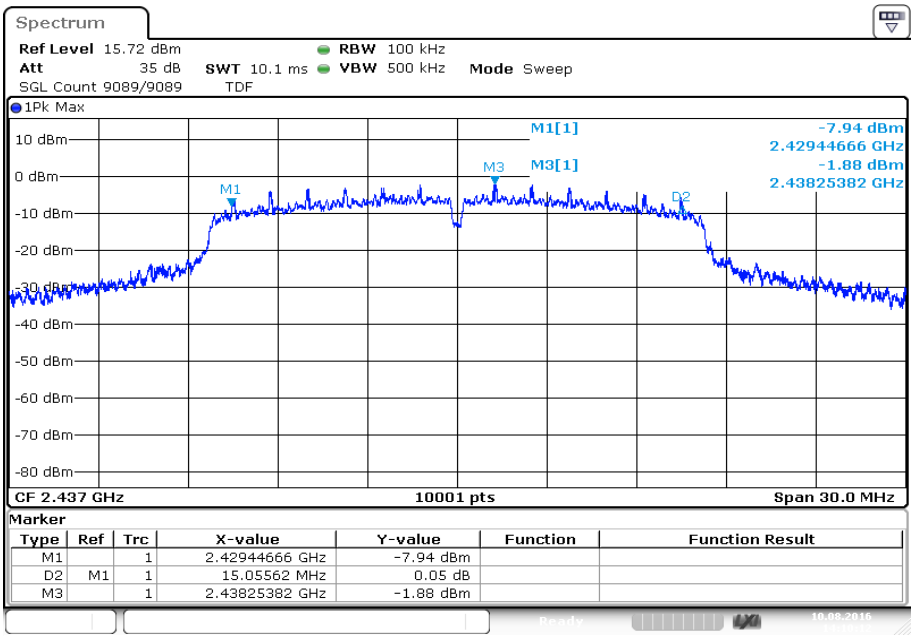
Plots: OFDM / g – mode

Plot 1: Lowest channel



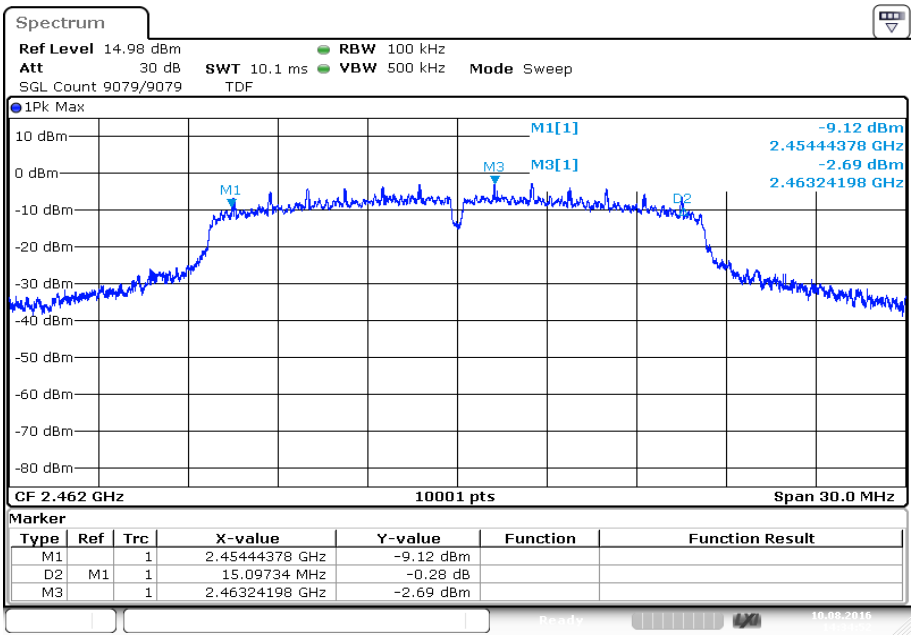
Date: 10.AUG.2016 13:46:21

Plot 2: Middle channel



Date: 10.AUG.2016 14:10:12

Plot 3: Highest channel



Date: 10.AUG.2016 14:34:52

12.7 Occupied bandwidth – 99% emission bandwidth

Description:

Measurement of the 99% bandwidth of the modulated signal acc. RSS-GEN.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	300 kHz
Video bandwidth:	1 MHz
Span:	30 MHz / 50 MHz
Measurement procedure:	Measurement of the 99% bandwidth using the integration function of the analyzer
Trace mode:	Single count with 200 counts
Test setup:	See sub clause 7.4 – A
Measurement uncertainty	See sub clause 9

Usage:

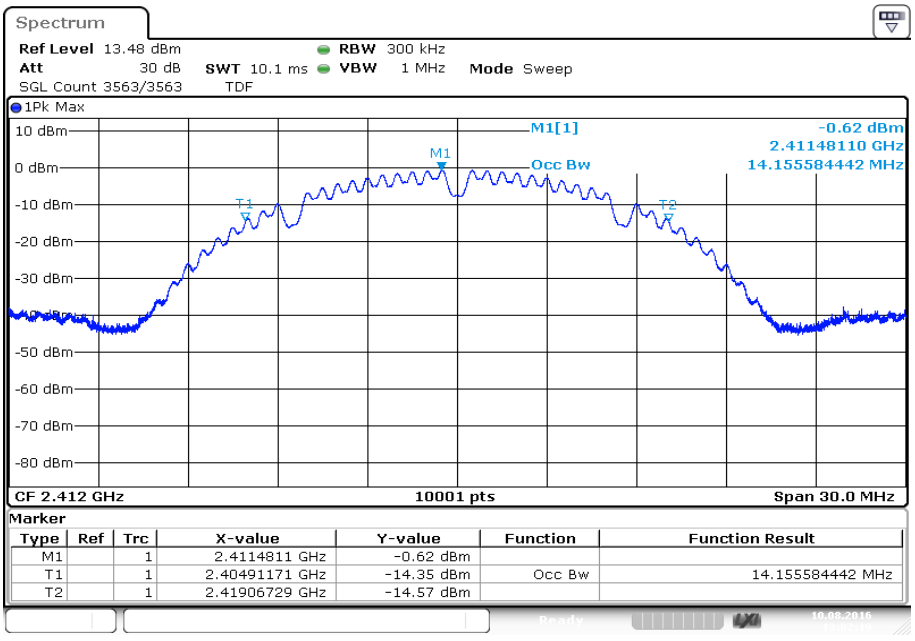
-/-	IC
OBW is necessary for Emission Designator	

Results: (valid for both antenna ports)

Modulation	99% bandwidth [kHz]		
Frequency	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	14156	14162	14153
OFDM / g – mode	16684	16933	16753

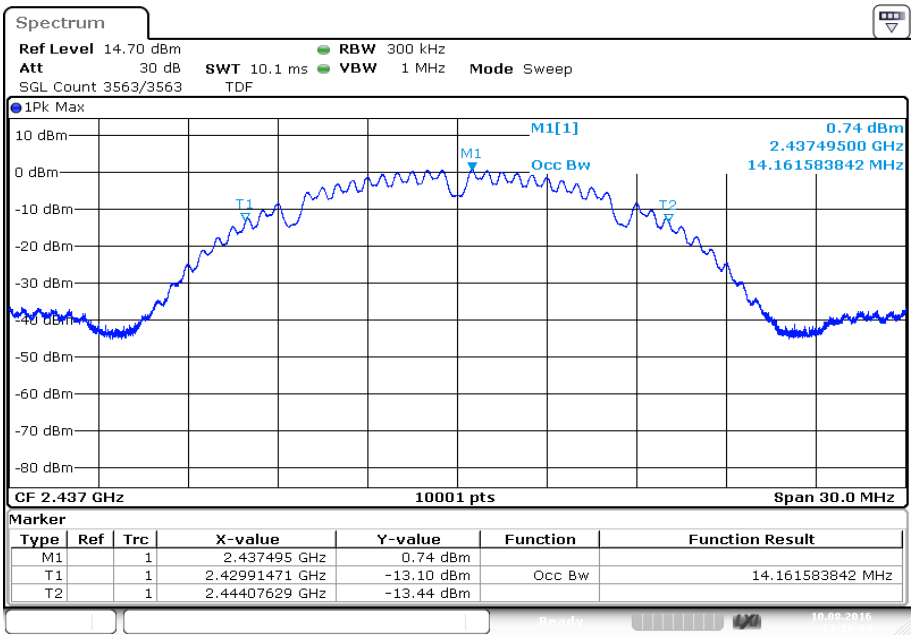
Plots: DSSS / b – mode

Plot 1: Lowest channel



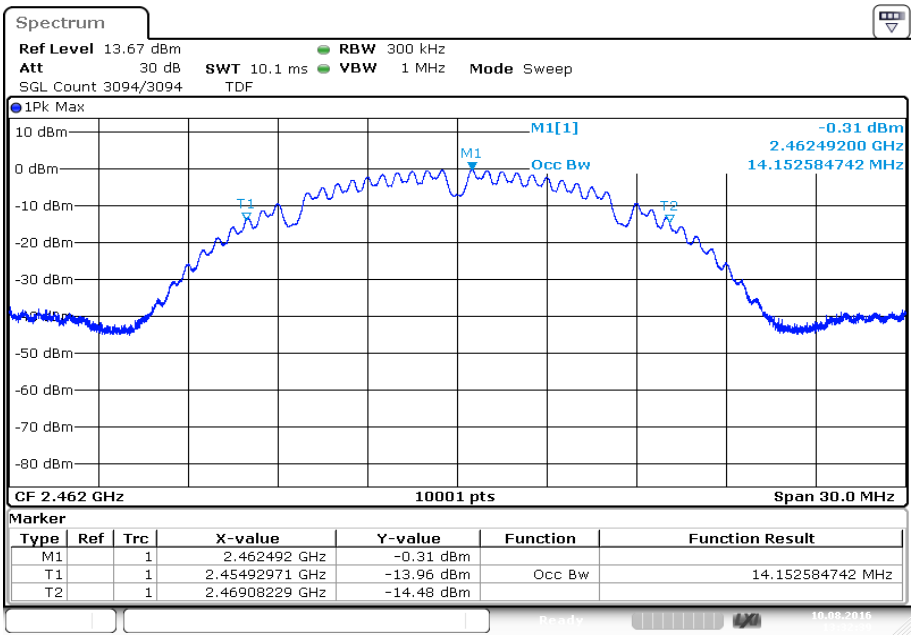
Date: 10.AUG.2016 13:02:19

Plot 2: Middle channel



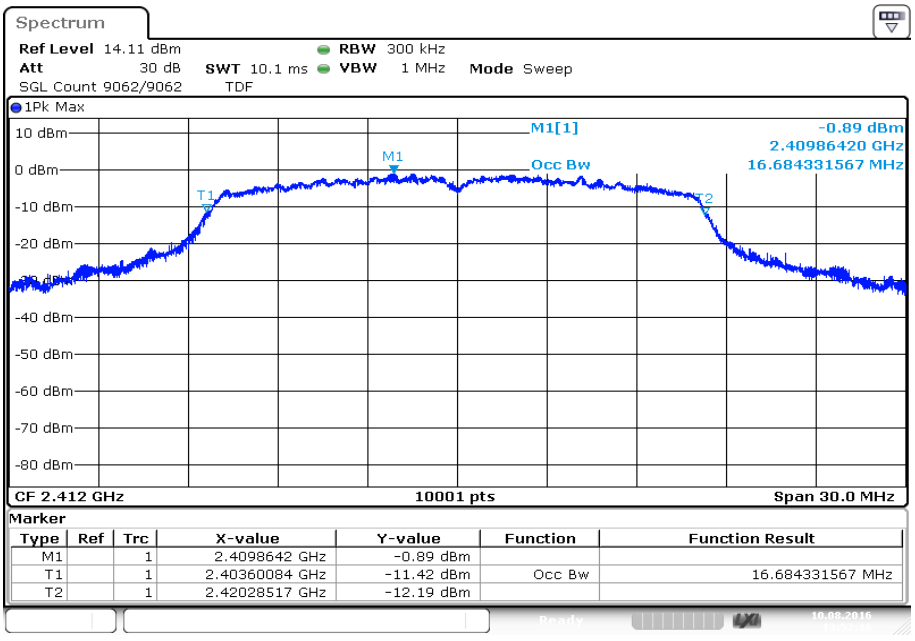
Date: 10.AUG.2016 13:18:04

Plot 3: Highest channel



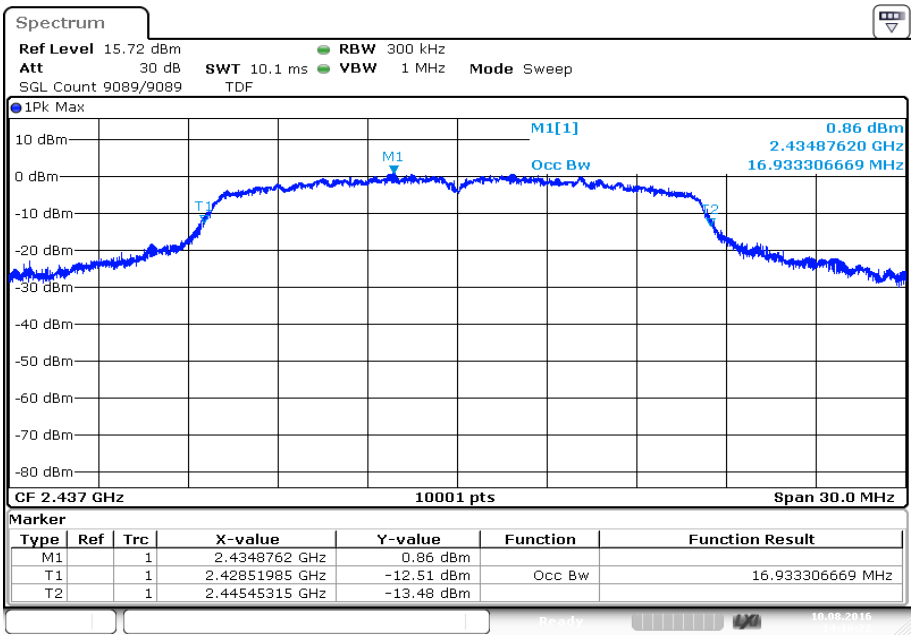
Plots: OFDM / g – mode

Plot 1: Lowest channel



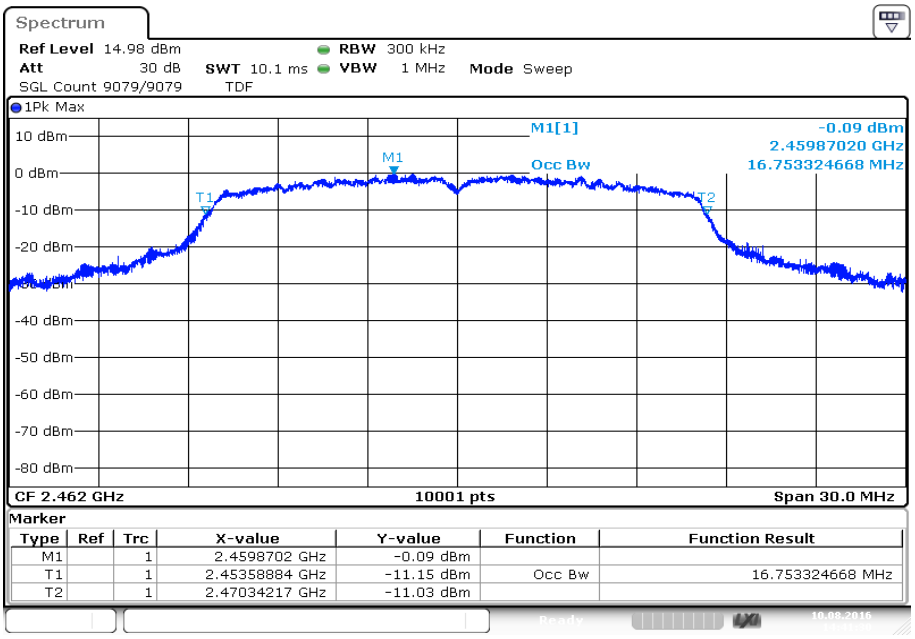
Date: 10.AUG.2016 13:52:16

Plot 2: Middle channel



Date: 10.AUG.2016 14:16:23

Plot 3: Highest channel



12.8 Occupied bandwidth – 20 dB bandwidth

Description:

Measurement of the 20 dB bandwidth of the modulated carrier.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	500 kHz
Span:	30 MHz / 50 MHz
Trace mode:	Single count with min. 200 counts
Test setup:	See sub clause 7.4 – A
Measurement uncertainty	See sub clause 9

Usage:

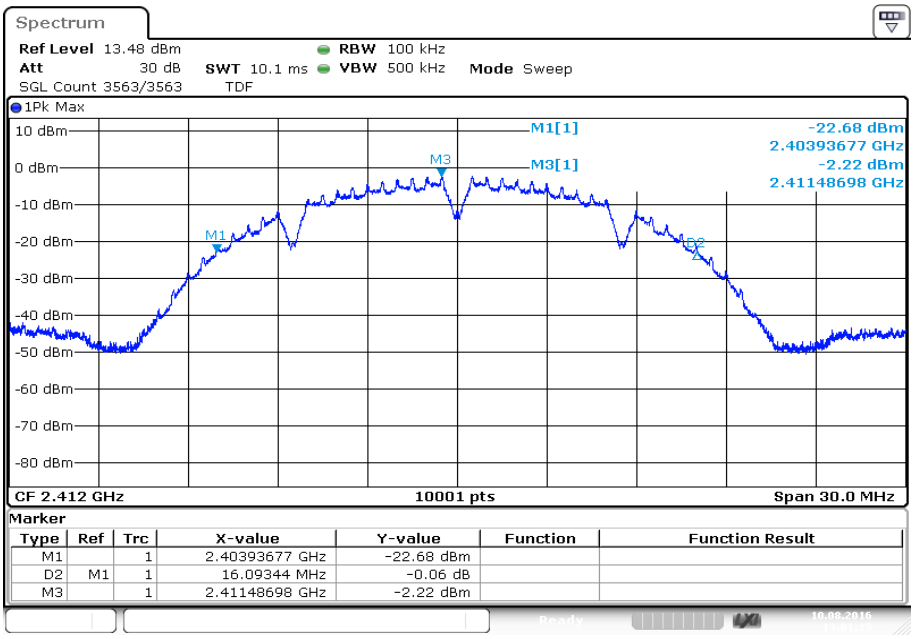
-/-	IC
Within the used band!	

Results: (valid for both antenna ports)

Modulation	20 dB bandwidth [MHz]		
Frequency	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	16.09	16.08	16.09
OFDM / g – mode	17.09	17.28	17.60

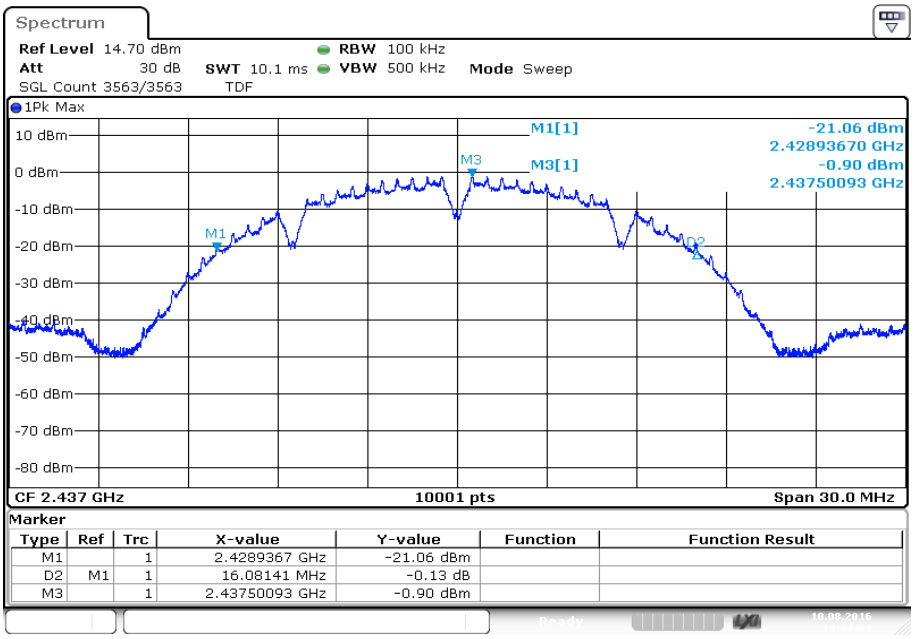
Plots: DSSS / b – mode

Plot 1: Lowest channel



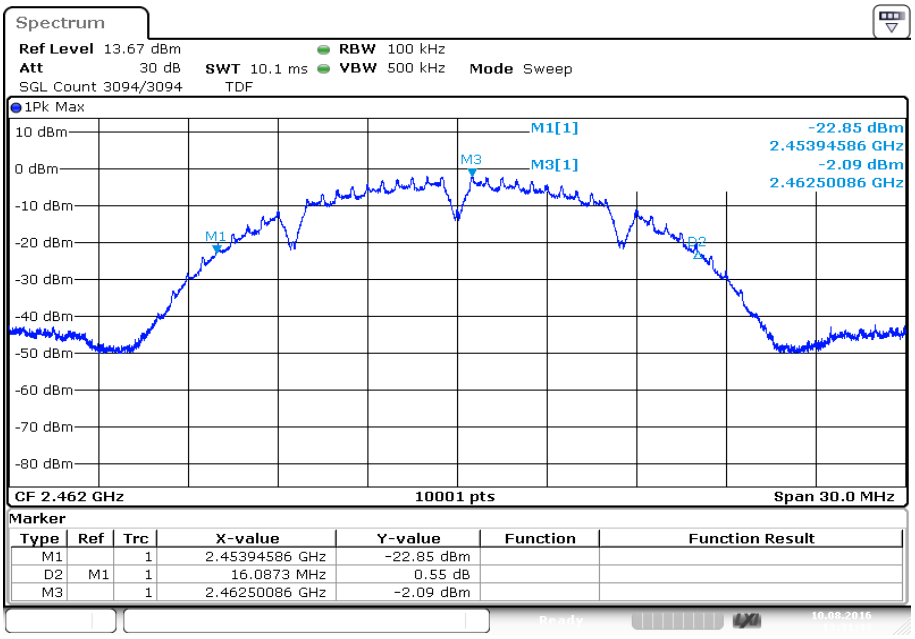
Date: 10.AUG.2016 13:01:15

Plot 2: Middle channel



Date: 10.AUG.2016 13:17:01

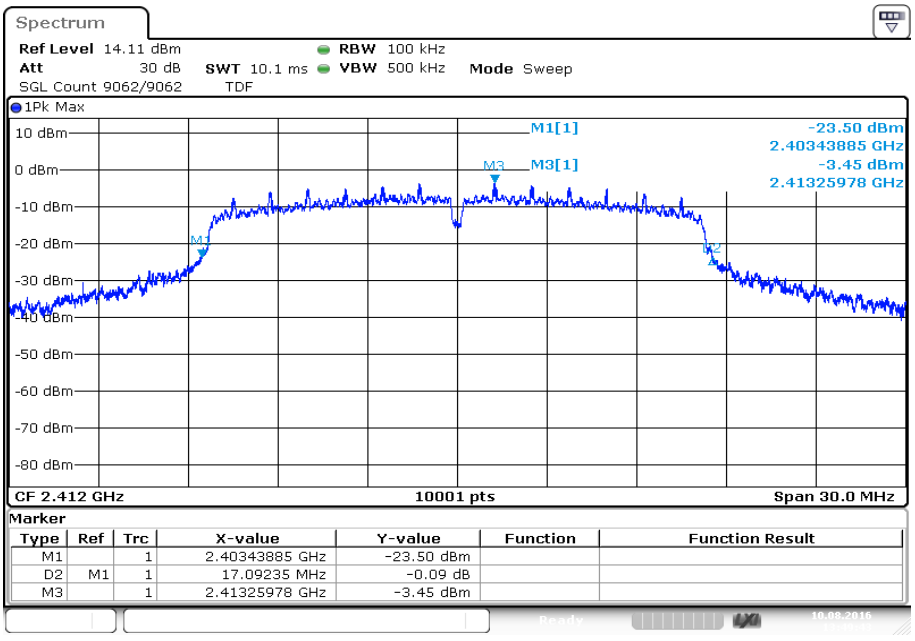
Plot 3: Highest channel



Date: 10.AUG.2016 13:31:43

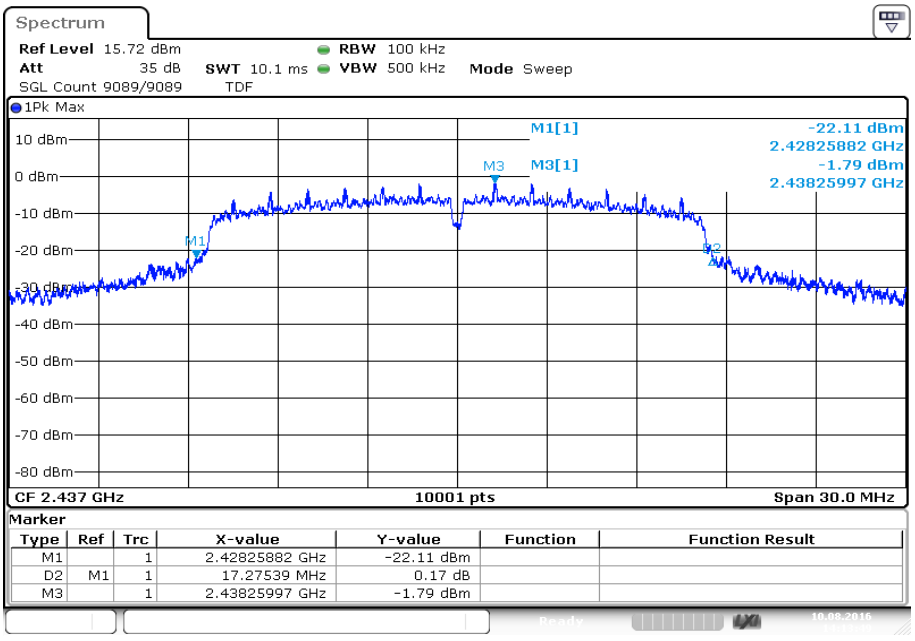
Plots: OFDM / g – mode

Plot 1: Lowest channel



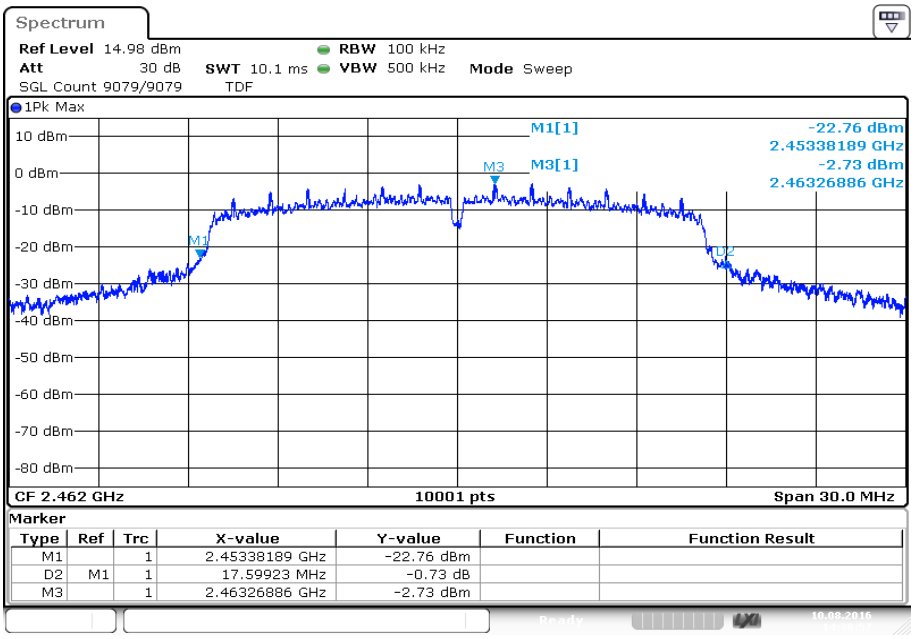
Date: 10.AUG.2016 13:49:43

Plot 2: Middle channel



Date: 10.AUG.2016 14:13:49

Plot 3: Highest channel



12.9 Band edge compliance conducted

Description:

Measurement of the radiated band edge compliance with a conducted test setup.

Measurement:

Measurement parameter for measurements	
According to DTS clause: 13.3.2 and clause 12.2.2	
Detector:	RMS
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Span:	Lower band edge: 2388 MHz to 2390 MHz (2 MHz) Upper band edge: 2483.5 MHz to 2485.5 MHz (2 MHz)
Trace mode:	Trace average with 200 counts
Test setup:	See sub clause 7.4 – A
Measurement uncertainty	See sub clause 9

Limits:

FCC	IC
-41.26 dBm	

Results: internal antenna port

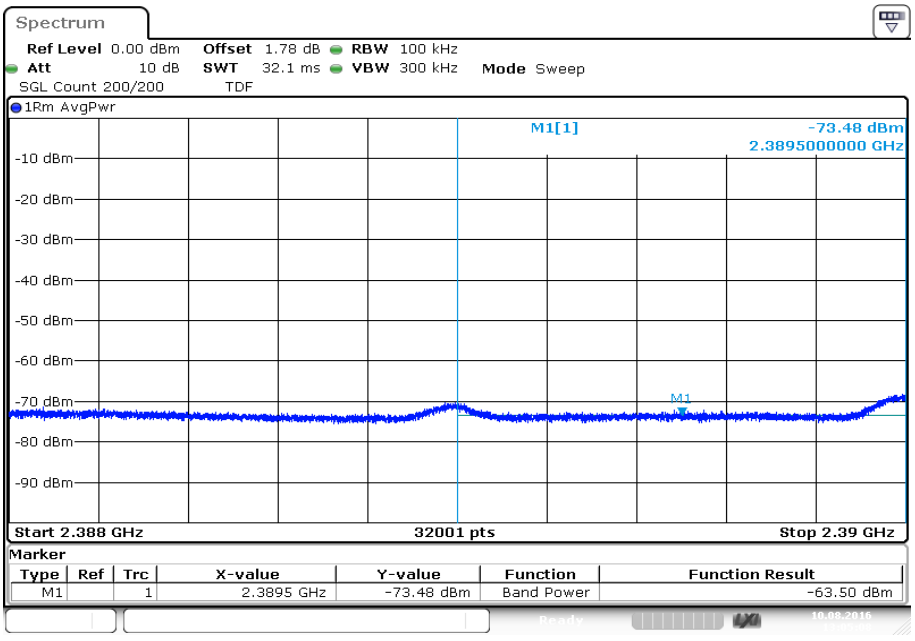
Scenario Modulation	Band edge compliance [dBm] (gain calculation)			
	DSSS / b – mode	OFDM / g – mode	OFDM / n HT20 – mode	OFDM / n HT40 – mode
Max. lower band edge power conducted	-63.5	-55.5	-/-	-/-
Antenna gain	-3.2			
Max. lower band edge power radiated	-66.7	-58.7	-/-	-/-
Max. upper band edge power conducted	-63.3	-53.0	-/-	-/-
Antenna gain	-1.5			
Max. upper band edge power radiated	-64.8	-54.5	-/-	-/-

Results: external antenna port

Scenario Modulation	Band edge compliance [dBm] (gain calculation)			
	DSSS / b – mode	OFDM / g – mode	OFDM / n HT20 – mode	OFDM / n HT40 – mode
Max. lower band edge power conducted	-63.8	-55.7	-/-	-/-
Antenna gain	0.0			
Max. lower band edge power radiated	-63.8	-55.7	-/-	-/-
Max. upper band edge power conducted	-63.5	-53.2	-/-	-/-
Antenna gain	0.0			
Max. upper band edge power radiated	-63.5	-53.2	-/-	-/-

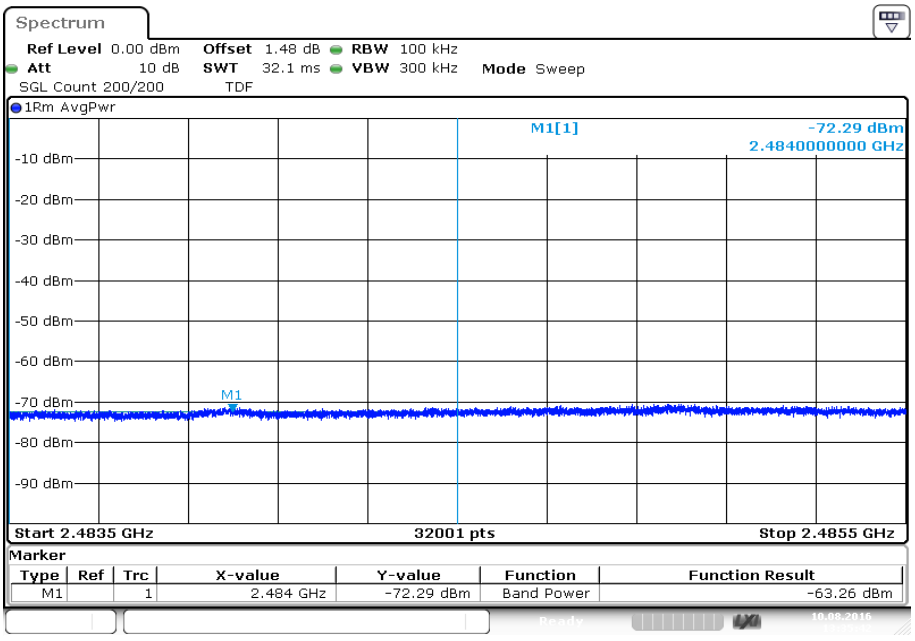
Plots: DSSS / b – mode, internal antenna port

Plot 1: Lower band edge



Date: 10.AUG.2016 13:05:08

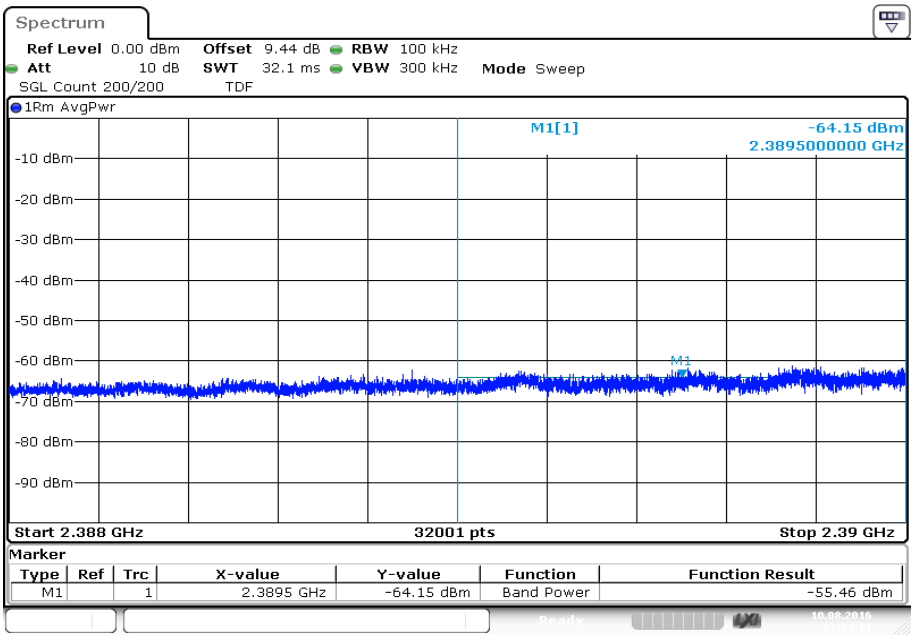
Plot 2: Upper band edge



Date: 10.AUG.2016 13:35:42

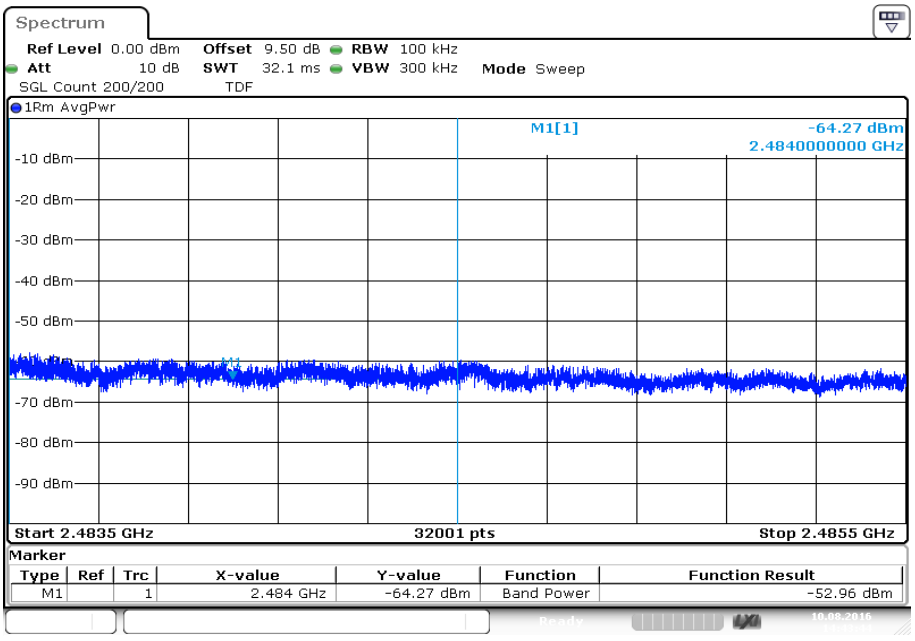
Plots: OFDM / g – mode, internal antenna port

Plot 1: Lower band edge



Date: 10.AUG.2016 13:54:11

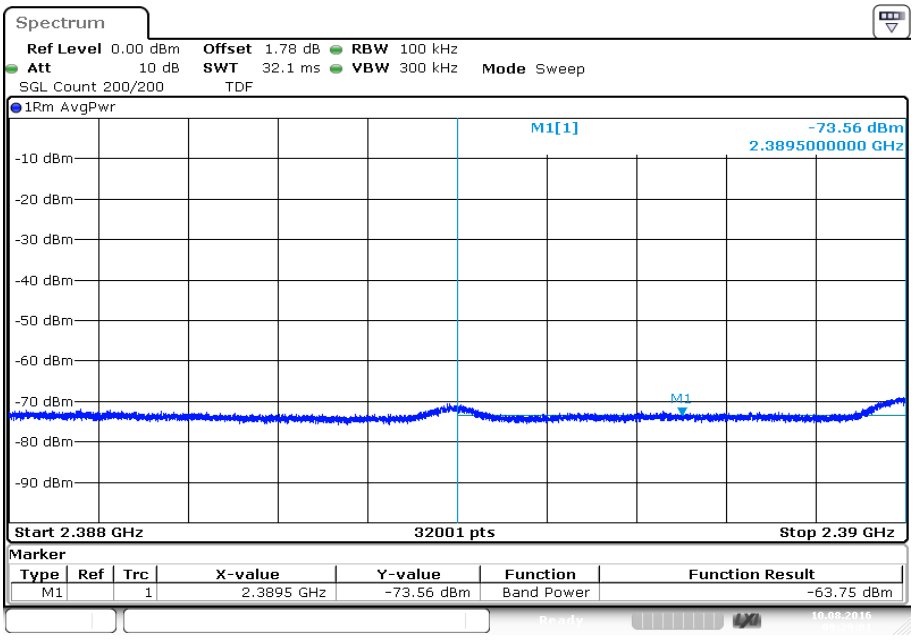
Plot 2: Upper band edge



Date: 10.AUG.2016 14:43:44

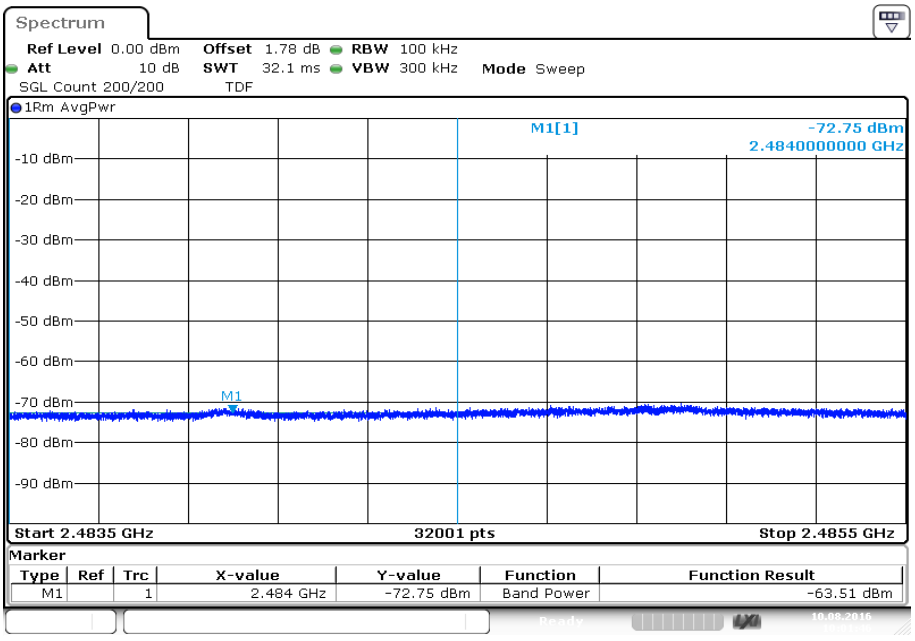
Plots: DSSS / b – mode, external antenna port

Plot 1: Lower band edge



Date: 10.AUG.2016 09:29:01

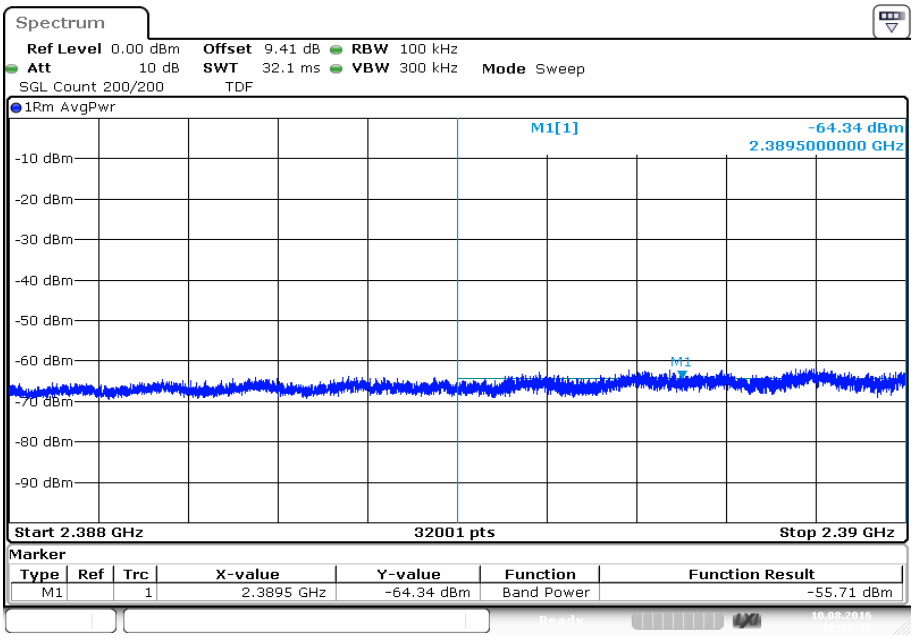
Plot 2: Upper band edge



Date: 10.AUG.2016 10:01:46

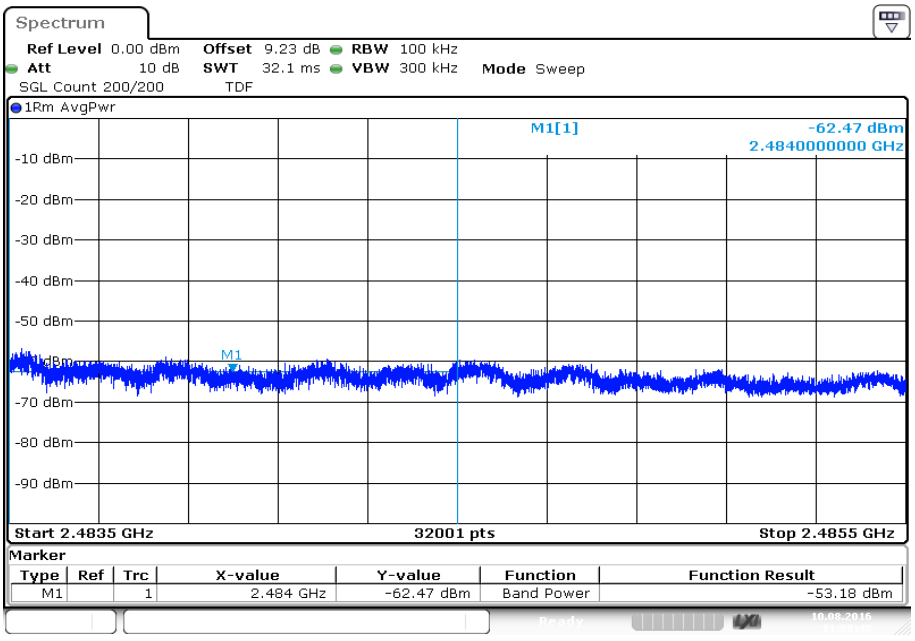
Plots: OFDM / g – mode, external antenna port

Plot 1: Lower band edge



Date: 10.AUG.2016 10:20:17

Plot 2: Upper band edge



Date: 10.AUG.2016 11:08:48

12.10 Spurious emissions conducted

Description:

Measurement of the conducted spurious emissions in transmit mode. The measurement is performed at channel 1, 6 and 11. The measurement is repeated for all modulations.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	500 kHz
Span:	9 kHz to 25 GHz
Trace mode:	Max Hold
Test setup:	See sub clause 7.4 – A
Measurement uncertainty	See sub clause 9

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 30 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	

Results: DSSS / b – mode, internal antenna port

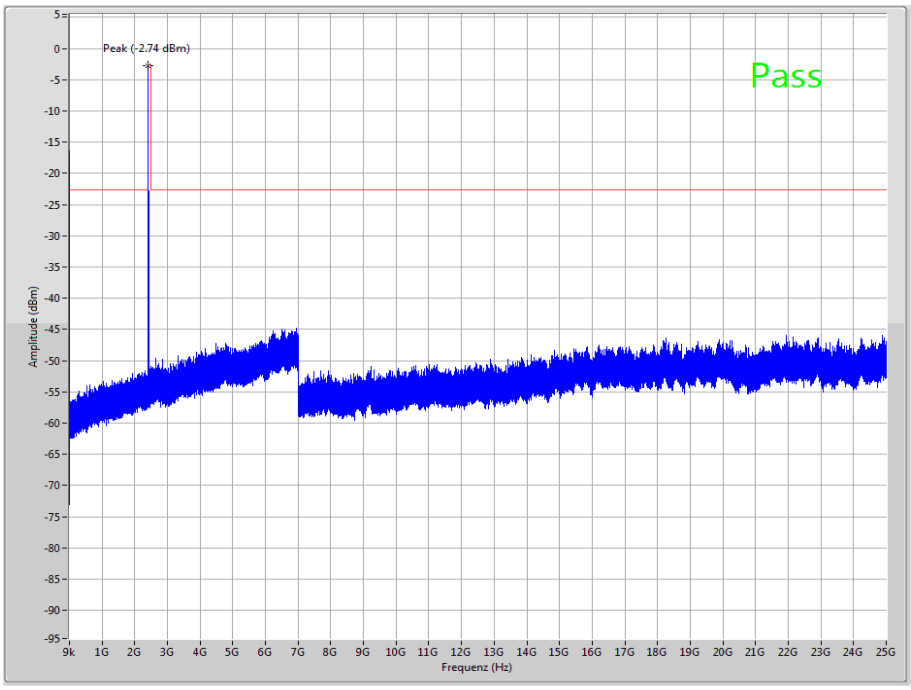
TX Spurious Emissions Conducted					
DSSS / b – mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		-2.7	30 dBm		Operating frequency
All detected emissions are more than 20 dB below the limit.			-20 dBc (peak) -30 dBc (average)		compliant
2437		-1.6	30 dBm		Operating frequency
All detected emissions are more than 20 dB below the limit.			-20 dBc (peak) -30 dBc (average)		compliant
2462		-2.5	30 dBm		Operating frequency
All detected emissions are more than 20 dB below the limit.			-20 dBc (peak) -30 dBc (average)		compliant

Results: OFDM / g – mode, internal antenna port

TX Spurious Emissions Conducted					
OFDM / g – mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		-7.1	30 dBm		Operating frequency
All detected emissions are more than 20 dB below the limit.			-20 dBc (peak) -30 dBc (average)		compliant
2437		-5.7	30 dBm		Operating frequency
All detected emissions are more than 20 dB below the limit.			-20 dBc (peak) -30 dBc (average)		compliant
2462		-6.6	30 dBm		Operating frequency
All detected emissions are more than 20 dB below the limit.			-20 dBc (peak) -30 dBc (average)		compliant

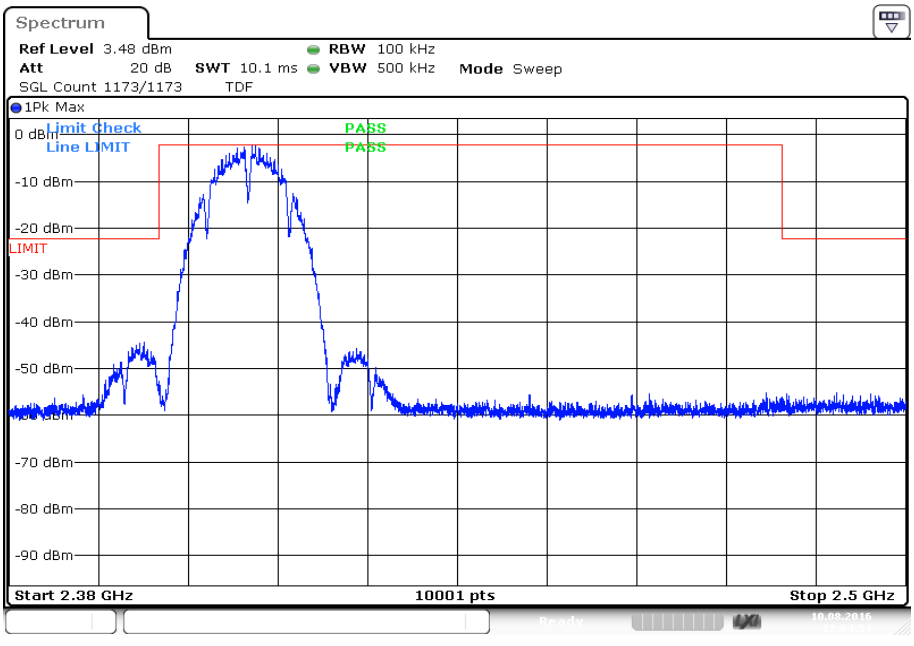
Plots: DSSS / b – mode, internal antenna port

Plot 1: Lowest channel, up to 25 GHz



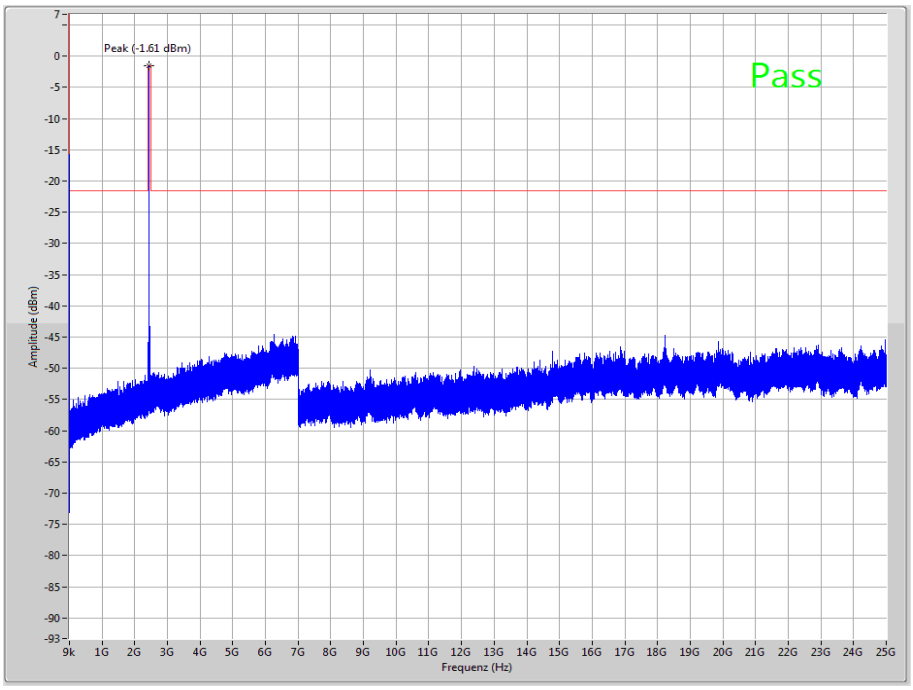
The peak at the beginning of the plot is the LO from the SA.

Plot 2: Lowest channel, zoomed carrier



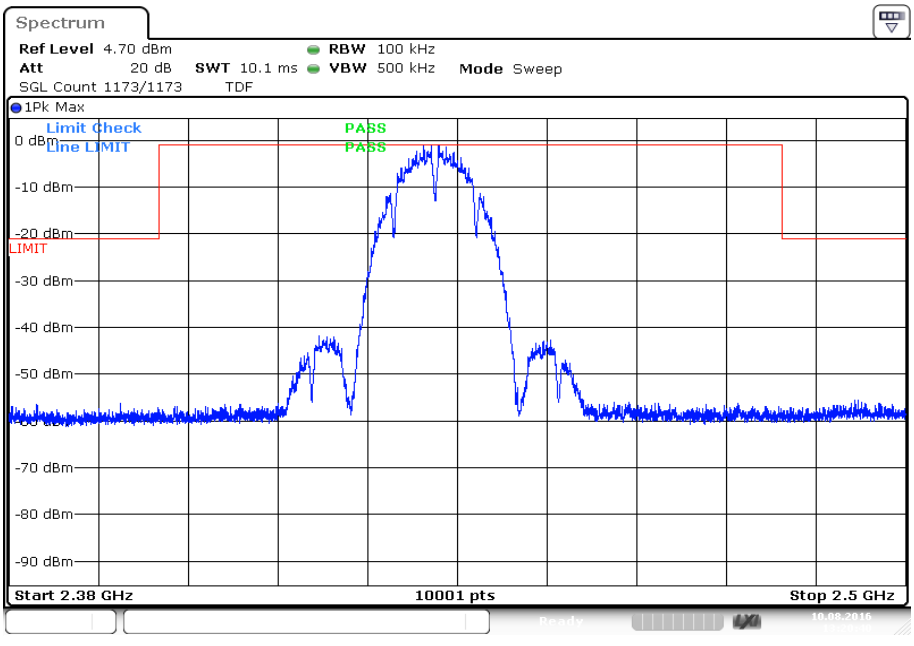
Date: 10.AUG.2016 13:04:53

Plot 3: Middle channel, up to 25 GHz



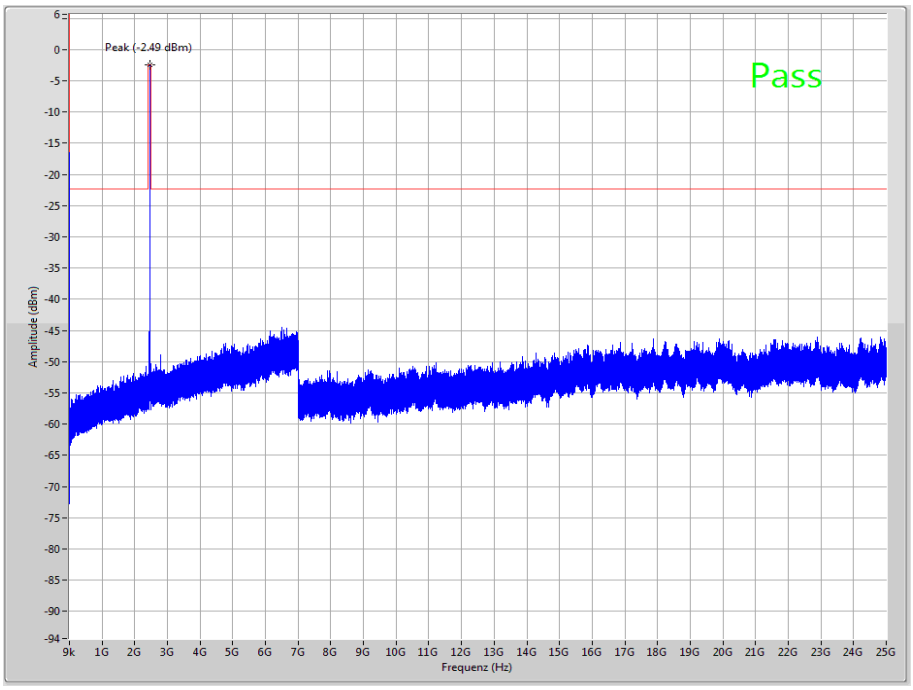
The peak at the beginning of the plot is the LO from the SA.

Plot 4: Middle channel, zoomed carrier



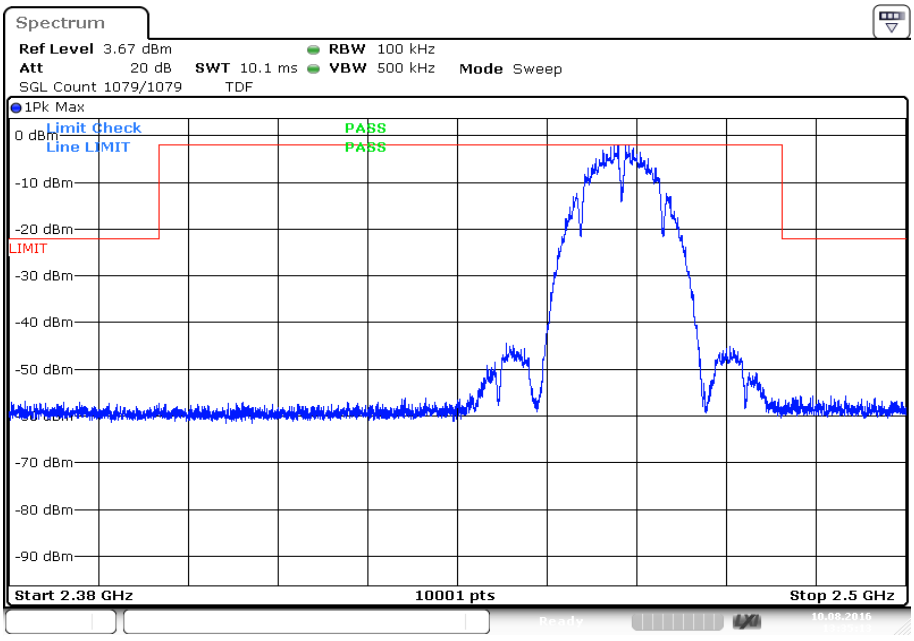
Date: 10.AUG.2016 13:20:40

Plot 5: Highest channel, up to 25 GHz



The peak at the beginning of the plot is the LO from the SA.

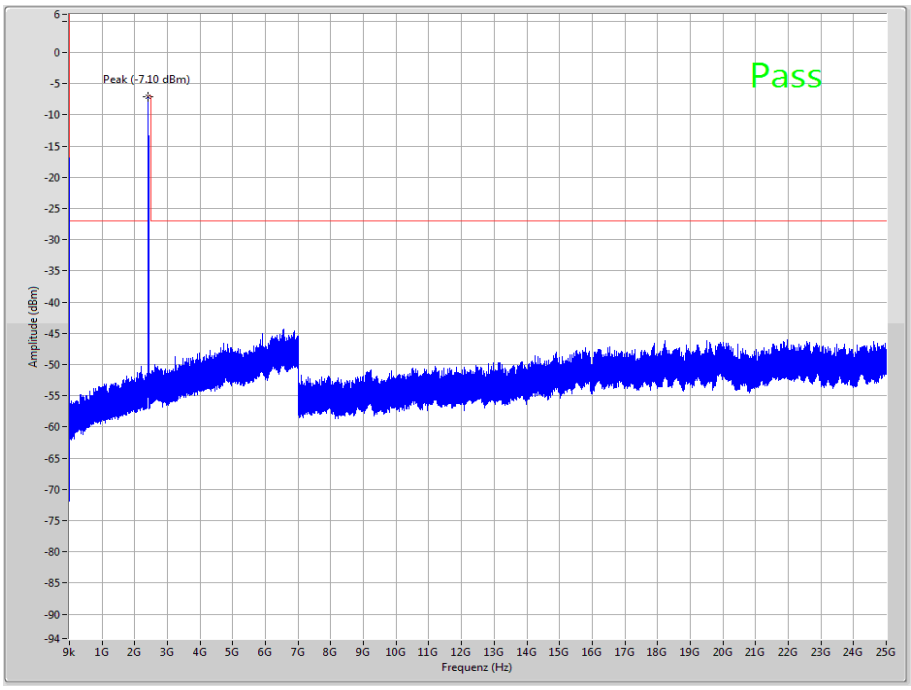
Plot 6: Highest channel, zoomed carrier



Date: 10.AUG.2016 13:35:13

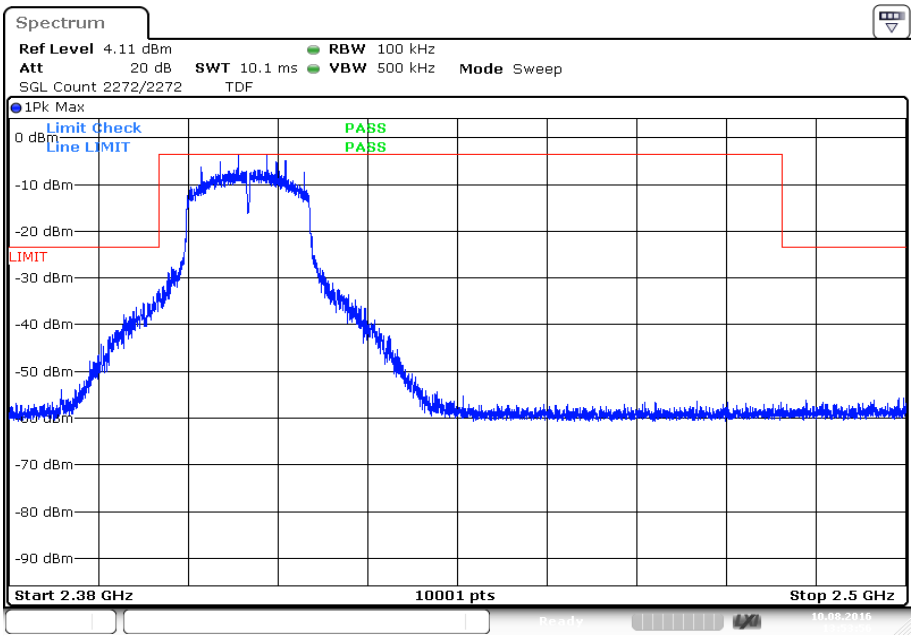
Plots: OFDM / g – mode, internal antenna port

Plot 1: Lowest channel, up to 25 GHz



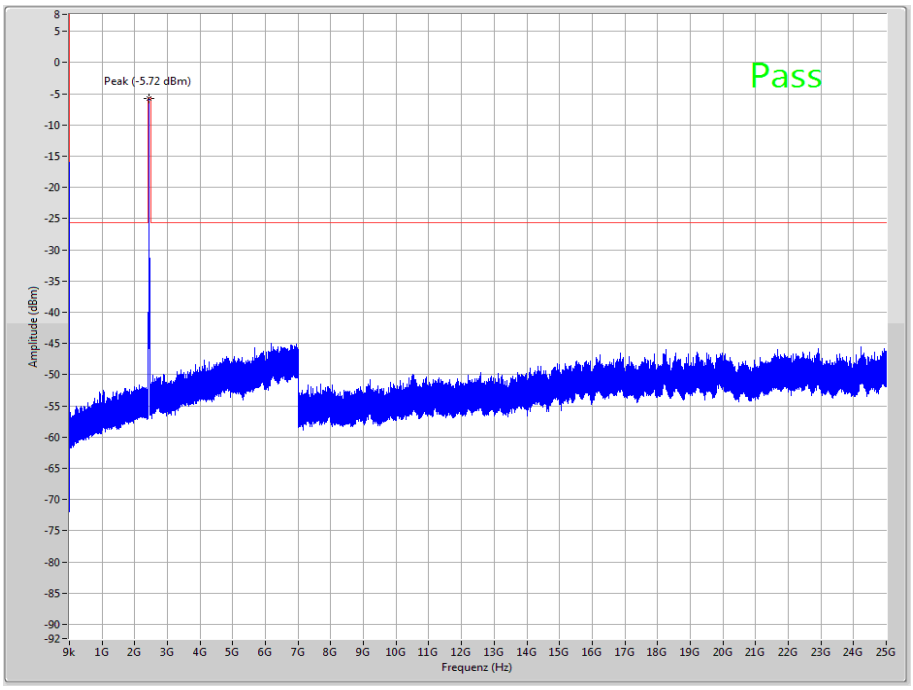
The peak at the beginning of the plot is the LO from the SA.

Plot 2: Lowest channel, zoomed carrier



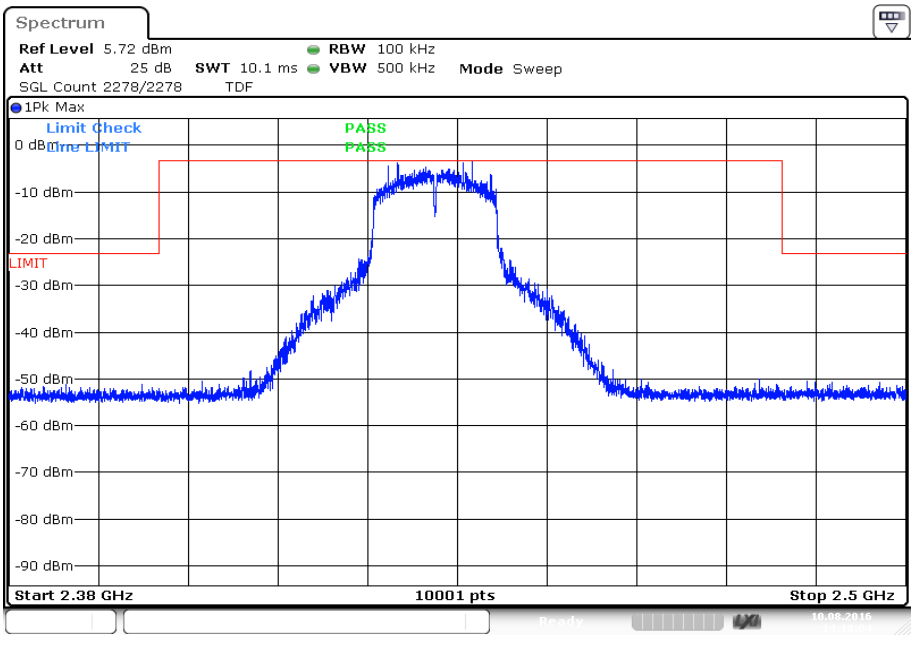
Date: 10.AUG.2016 13:53:56

Plot 3: Middle channel, up to 25 GHz



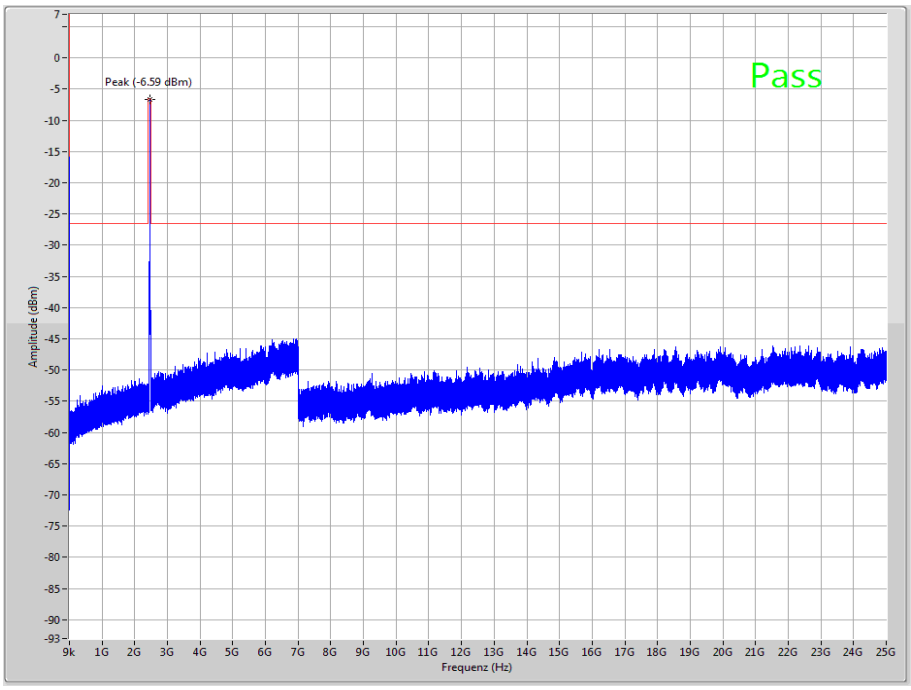
The peak at the beginning of the plot is the LO from the SA.

Plot 4: Middle channel, zoomed carrier



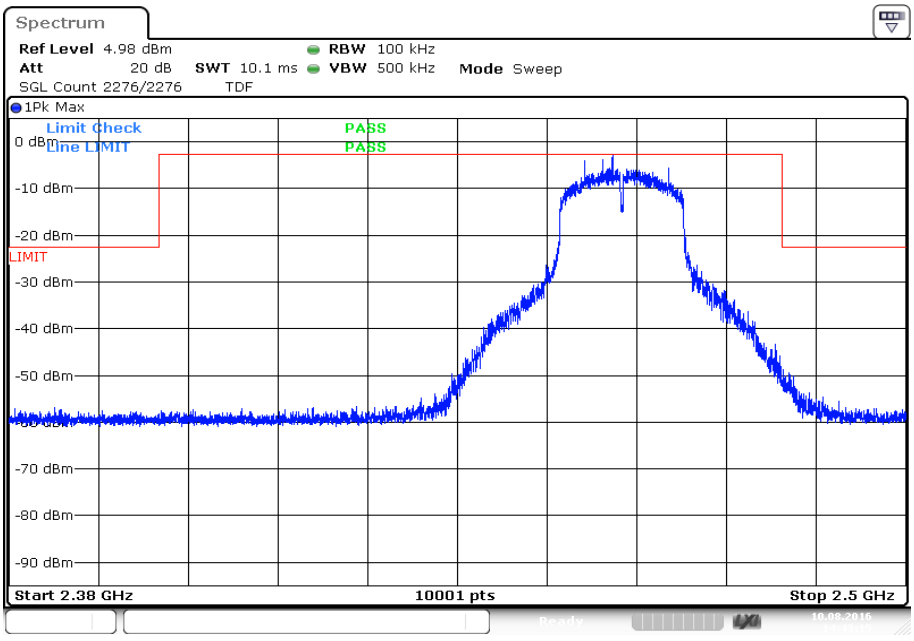
Date: 10.AUG.2016 14:18:04

Plot 5: Highest channel, up to 25 GHz



The peak at the beginning of the plot is the LO from the SA.

Plot 6: Highest channel, zoomed carrier



Date: 10.AUG.2016 14:43:15

Results: DSSS / b – mode, external antenna port

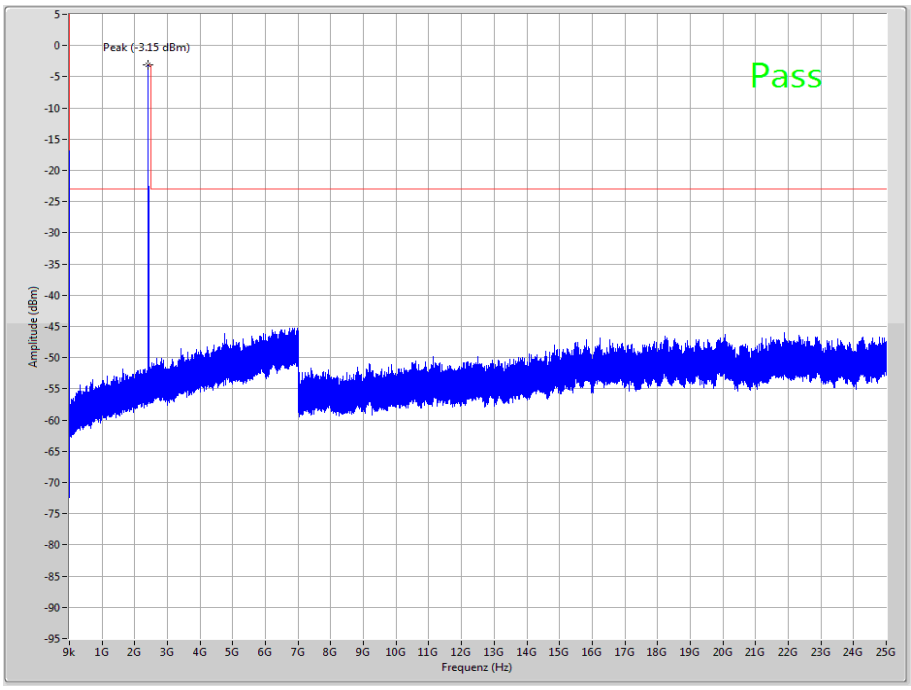
TX Spurious Emissions Conducted					
DSSS / b – mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		-3.2	30 dBm		Operating frequency
All detected emissions are more than 20 dB below the limit.			-20 dBc (peak) -30 dBc (average)		compliant
2437		-2.3	30 dBm		Operating frequency
All detected emissions are more than 20 dB below the limit.			-20 dBc (peak) -30 dBc (average)		compliant
2462		-2.6	30 dBm		Operating frequency
All detected emissions are more than 20 dB below the limit.			-20 dBc (peak) -30 dBc (average)		compliant

Results: OFDM / g – mode, external antenna port

TX Spurious Emissions Conducted					
OFDM / g – mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		-10.3	30 dBm		Operating frequency
All detected emissions are more than 20 dB below the limit.			-20 dBc (peak) -30 dBc (average)		compliant
2437		-6.5	30 dBm		Operating frequency
All detected emissions are more than 20 dB below the limit.			-20 dBc (peak) -30 dBc (average)		compliant
2462		-7.0	30 dBm		Operating frequency
All detected emissions are more than 20 dB below the limit.			-20 dBc (peak) -30 dBc (average)		compliant

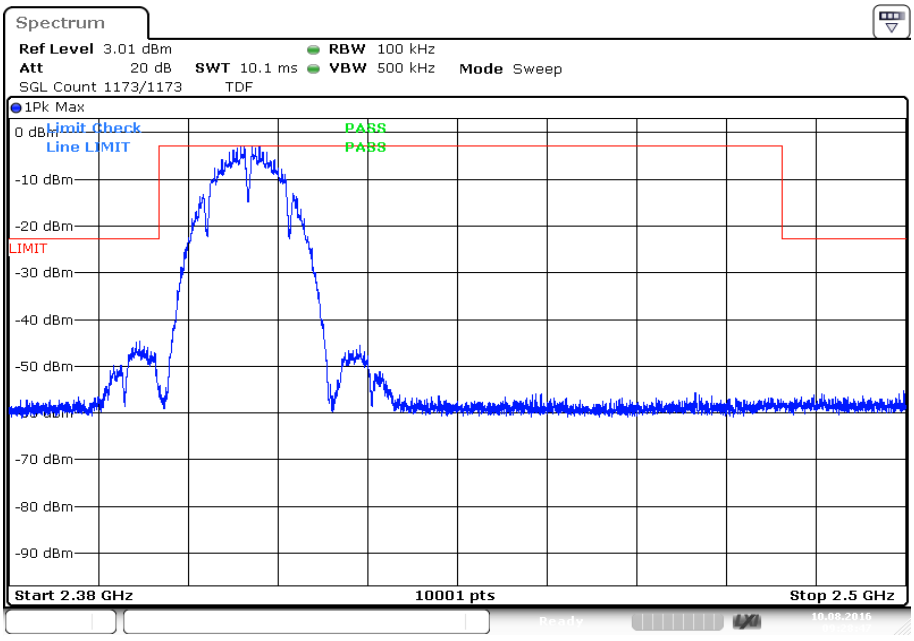
Plots: DSSS / b – mode, external antenna port

Plot 1: Lowest channel, up to 25 GHz



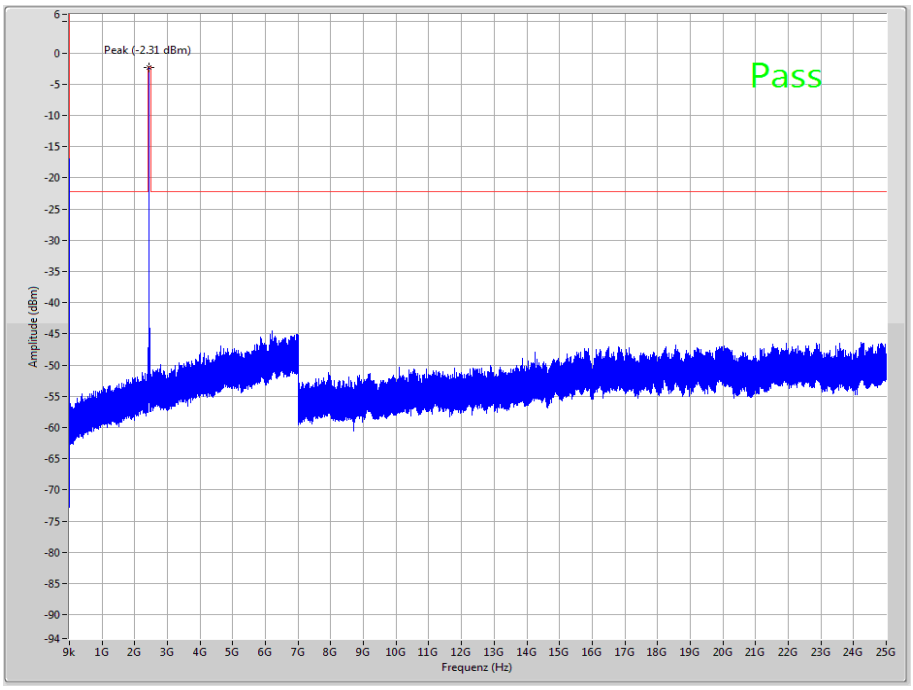
The peak at the beginning of the plot is the LO from the SA.

Plot 2: Lowest channel, zoomed carrier



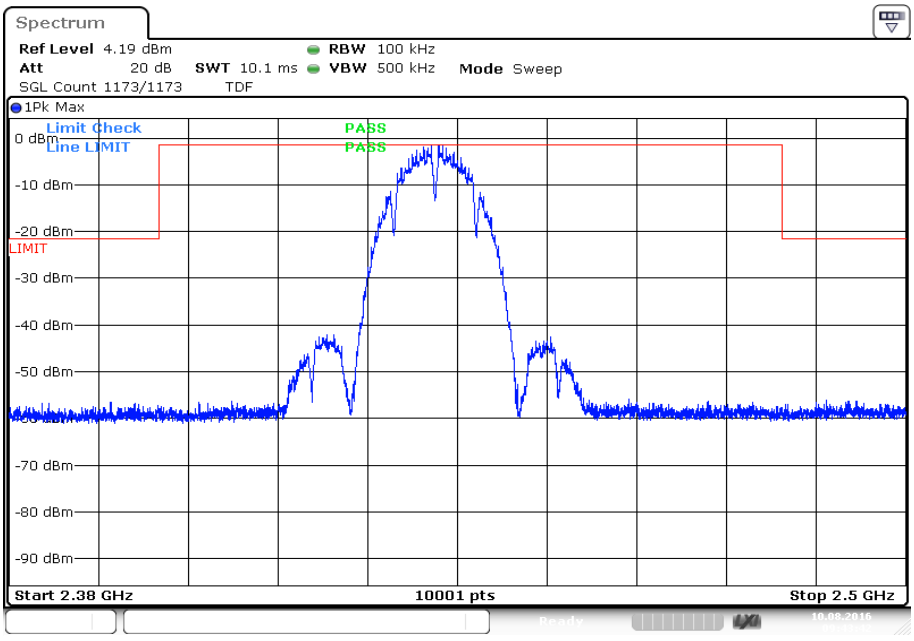
Date: 10.AUG.2016 09:28:47

Plot 3: Middle channel, up to 25 GHz



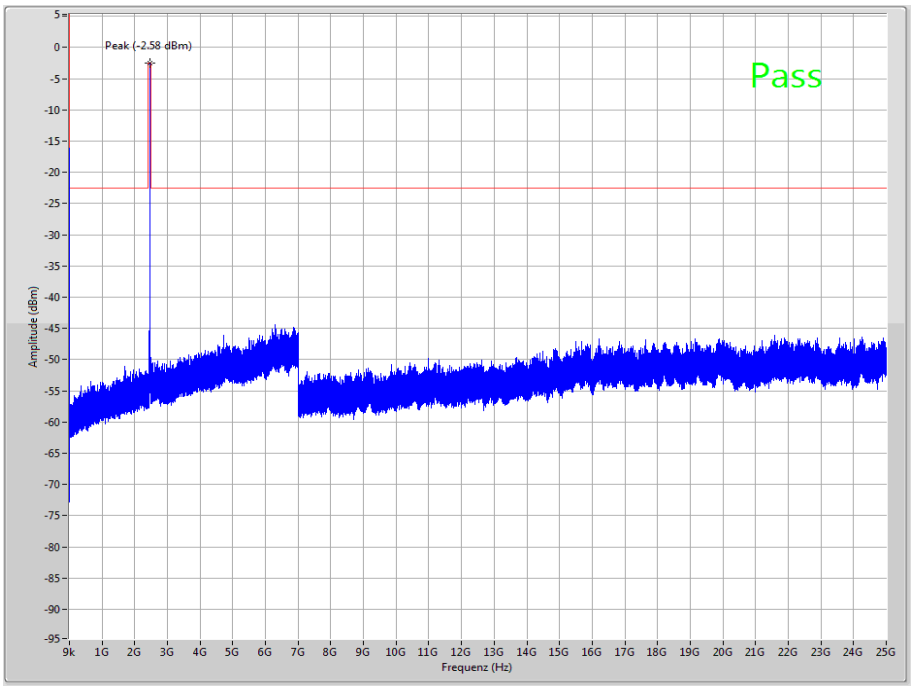
The peak at the beginning of the plot is the LO from the SA.

Plot 4: Middle channel, zoomed carrier



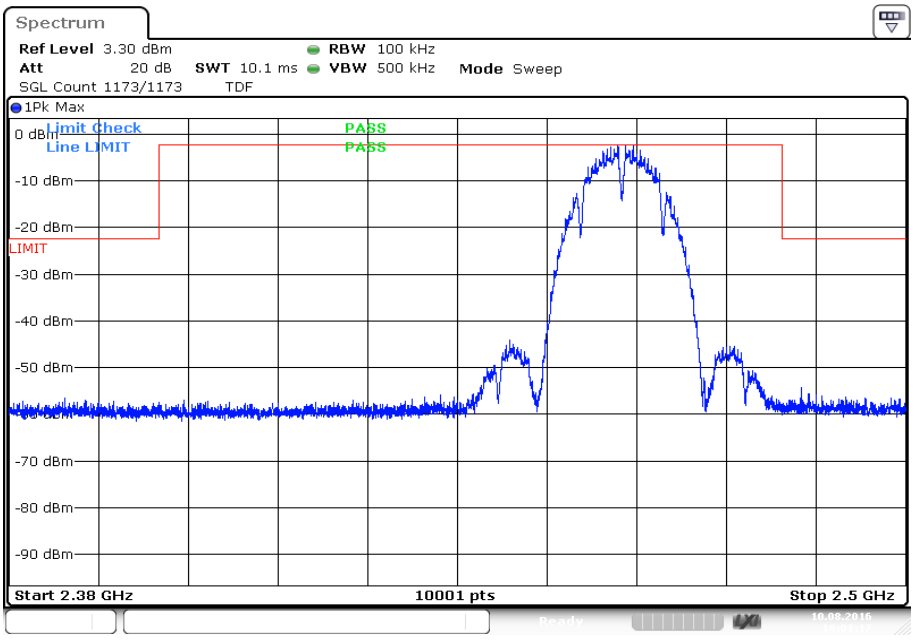
Date: 10.AUG.2016 09:43:42

Plot 5: Highest channel, up to 25 GHz



The peak at the beginning of the plot is the LO from the SA.

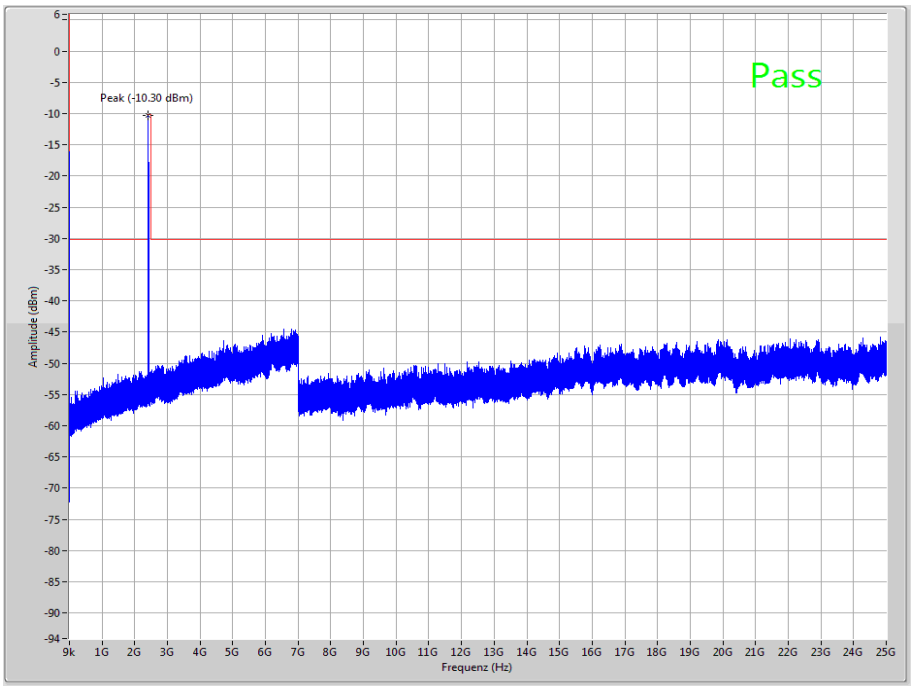
Plot 6: Highest channel, zoomed carrier



Date: 10.AUG.2016 10:01:17

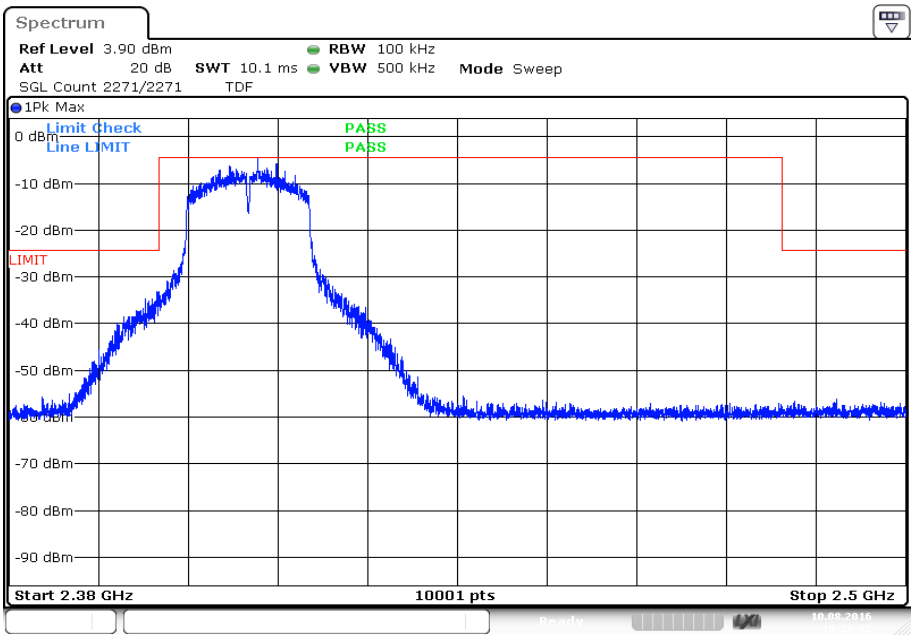
Plots: OFDM / g – mode, external antenna port

Plot 1: Lowest channel, up to 25 GHz



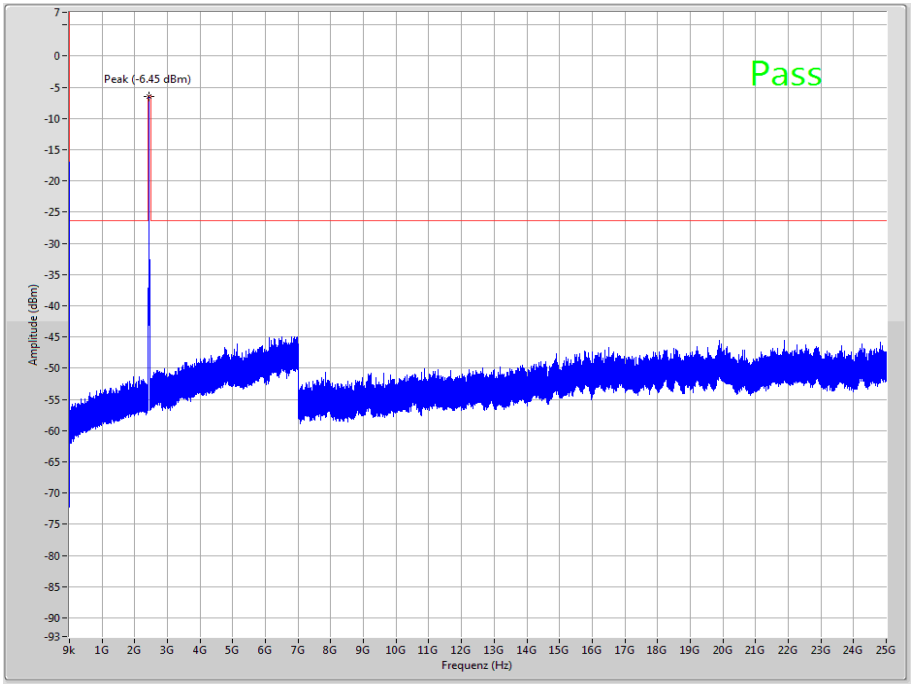
The peak at the beginning of the plot is the LO from the SA.

Plot 2: Lowest channel, zoomed carrier



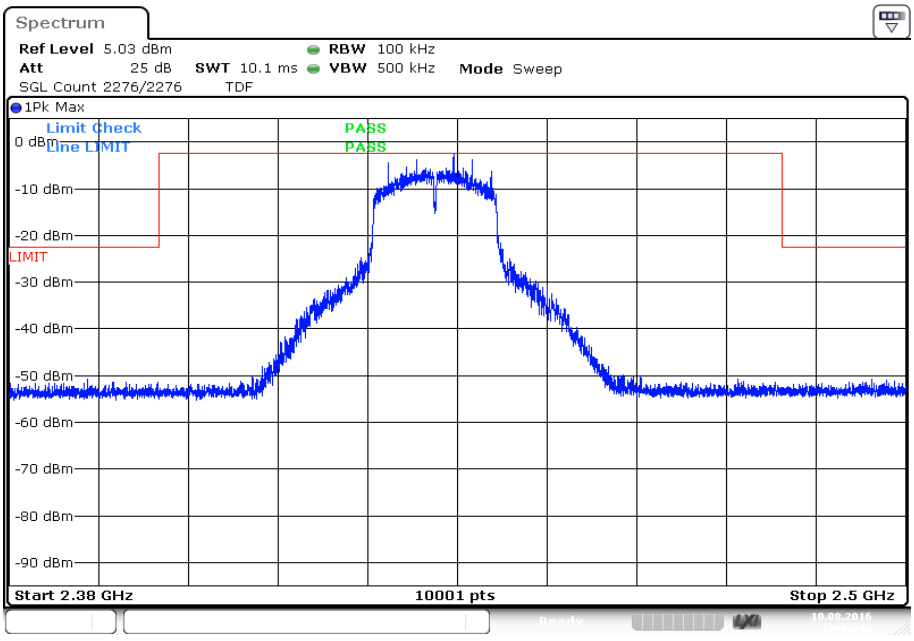
Date: 10.AUG.2016 10:20:02

Plot 3: Middle channel, up to 25 GHz



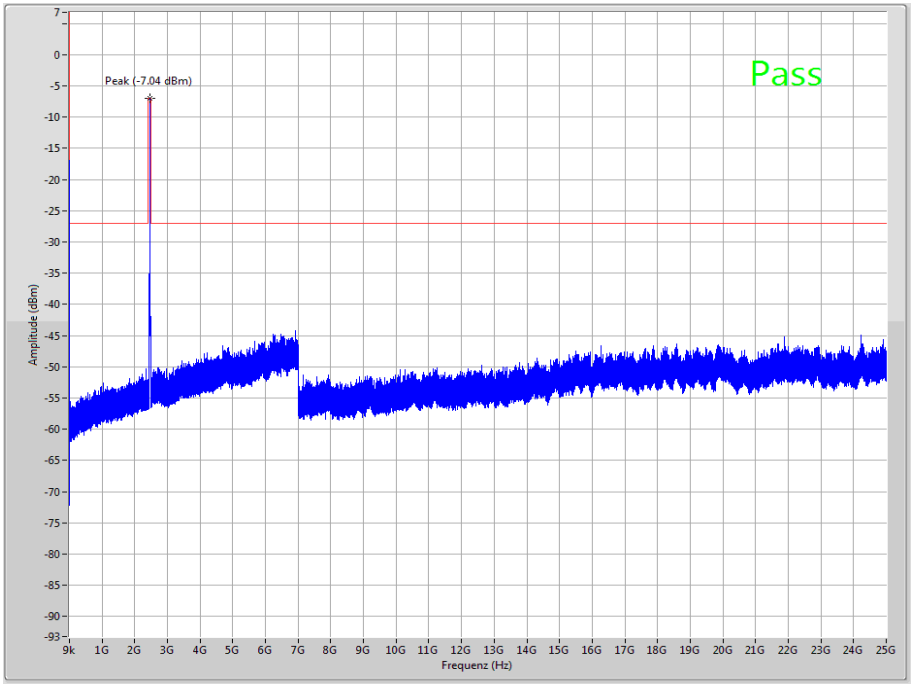
The peak at the beginning of the plot is the LO from the SA.

Plot 4: Middle channel, zoomed carrier



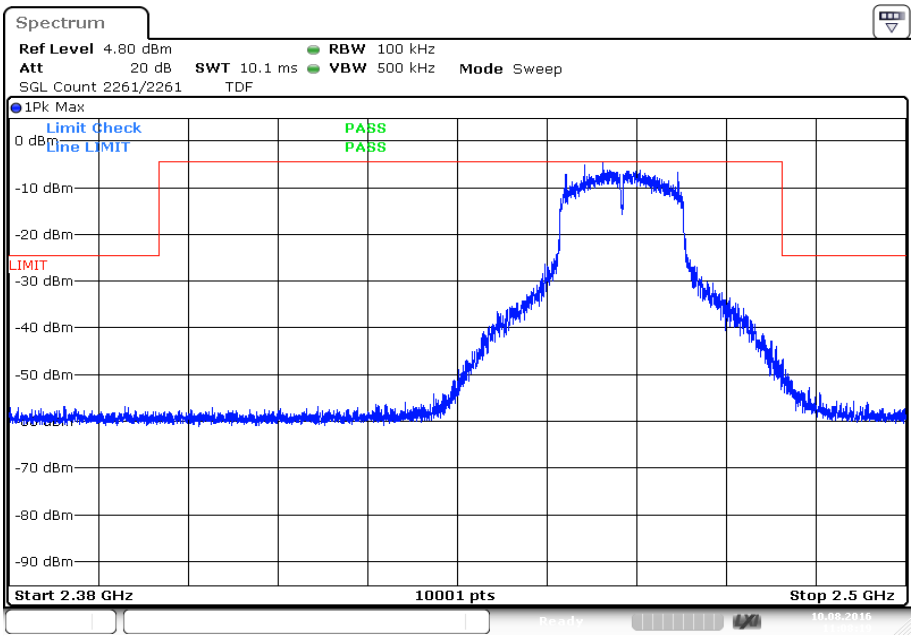
Date: 10.AUG.2016 10:43:43

Plot 5: Highest channel, up to 25 GHz



The peak at the beginning of the plot is the LO from the SA.

Plot 6: Highest channel, zoomed carrier



Date: 10.AUG.2016 11:08:19

12.11 Spurious emissions radiated below 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The EUT is set to channel 6. This measurement is representative for all channels and modes. 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. 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
Measured modulation	☒ DSSS b – mode ☒ OFDM g – mode ☐ OFDM n HT20 – mode ☐ OFDM n HT40 – mode
Test setup:	See sub clause 7.2 - A
Measurement uncertainty	See sub clause 9

Limits:

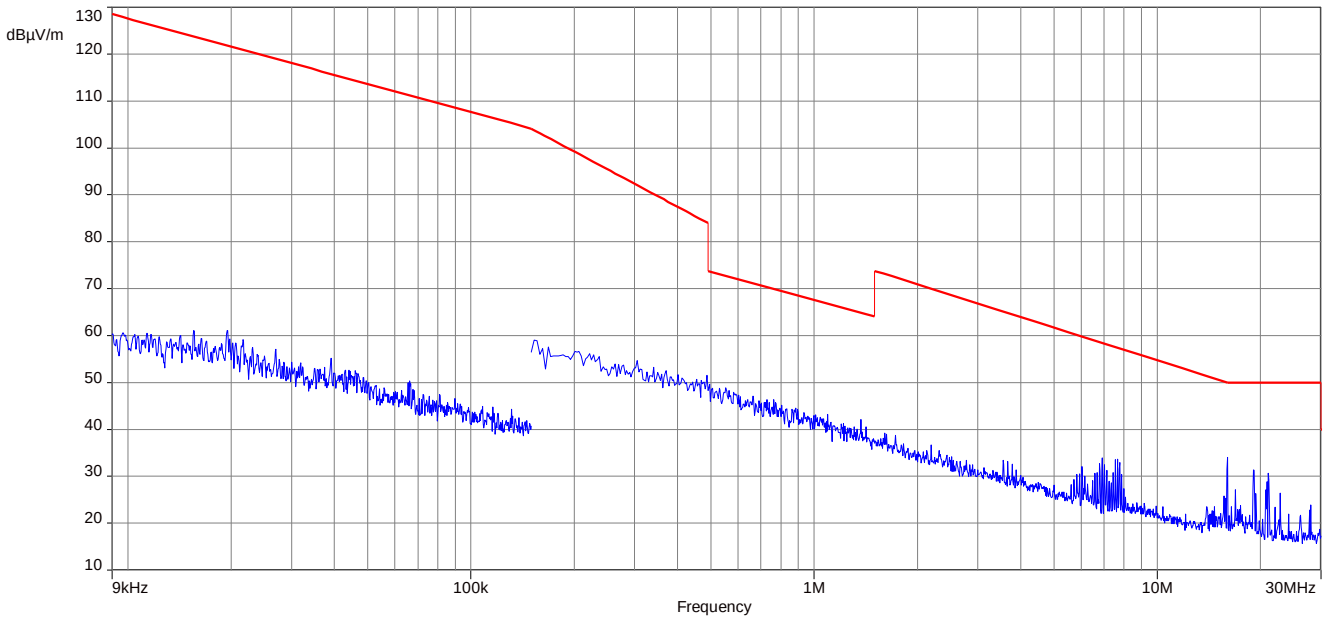
FCC		IC
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

Results: internal antenna port & external antenna port

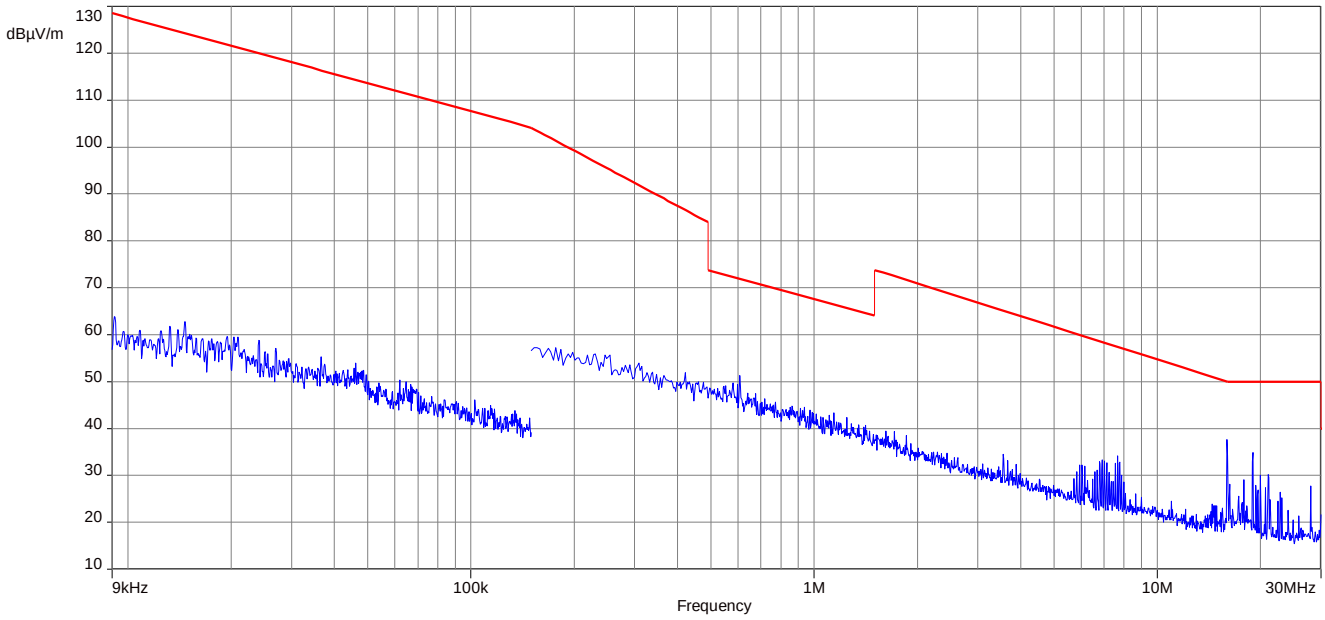
TX Spurious Emissions Radiated < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
7.7	Peak	34.1
16.0	Peak	42.3
19.0	Peak	34.9
20.0	Peak	41.0
21.0	Peak	34.2

Plots: DSSS, internal antenna port

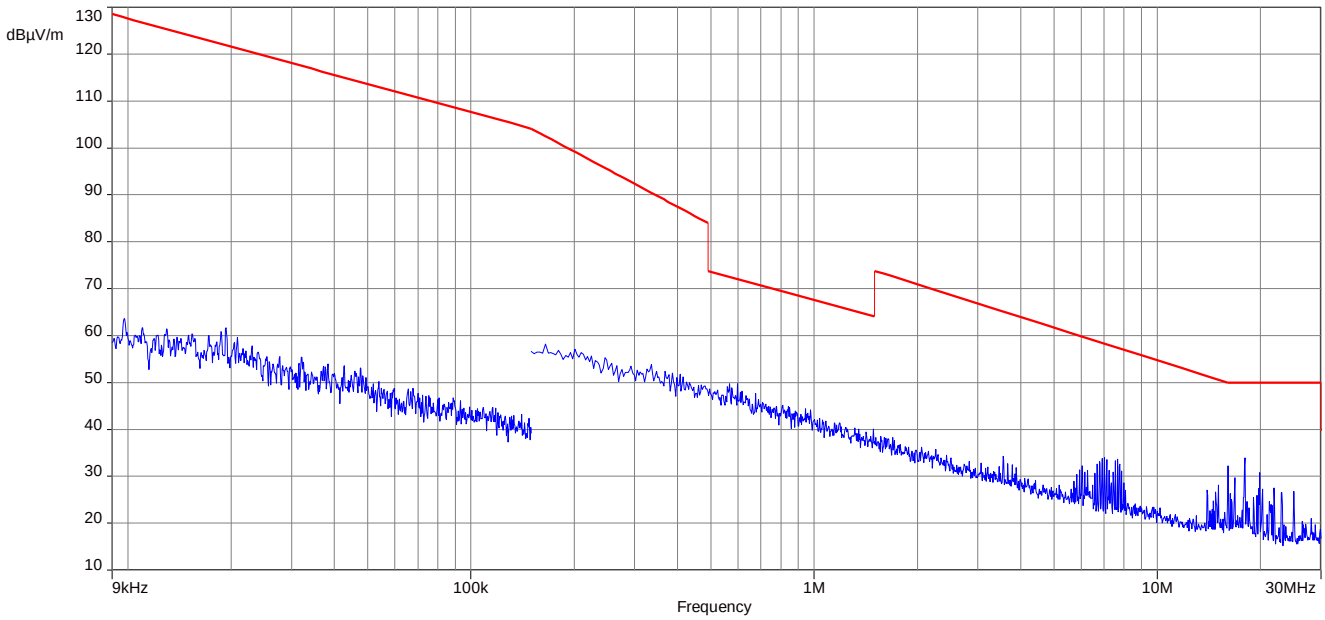
Plot 1: 9 kHz to 30 MHz, low channel



Plot 2: 9 kHz to 30 MHz, mid channel

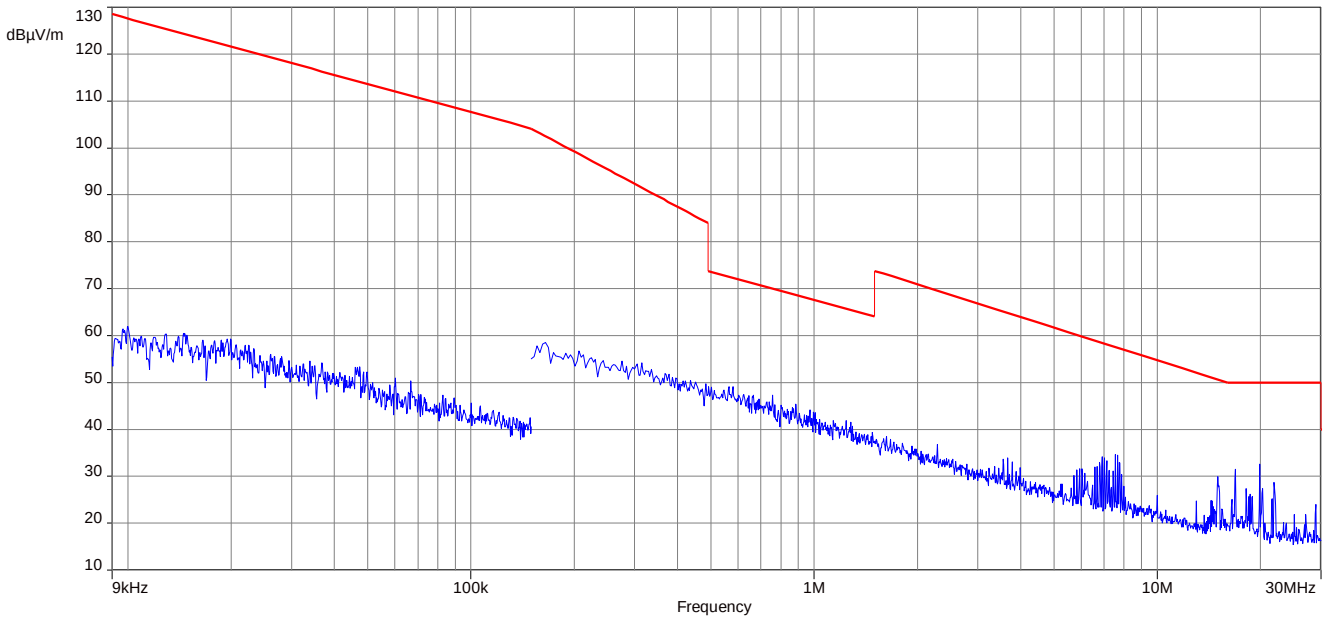


Plot 3: 9 kHz to 30 MHz, high channel

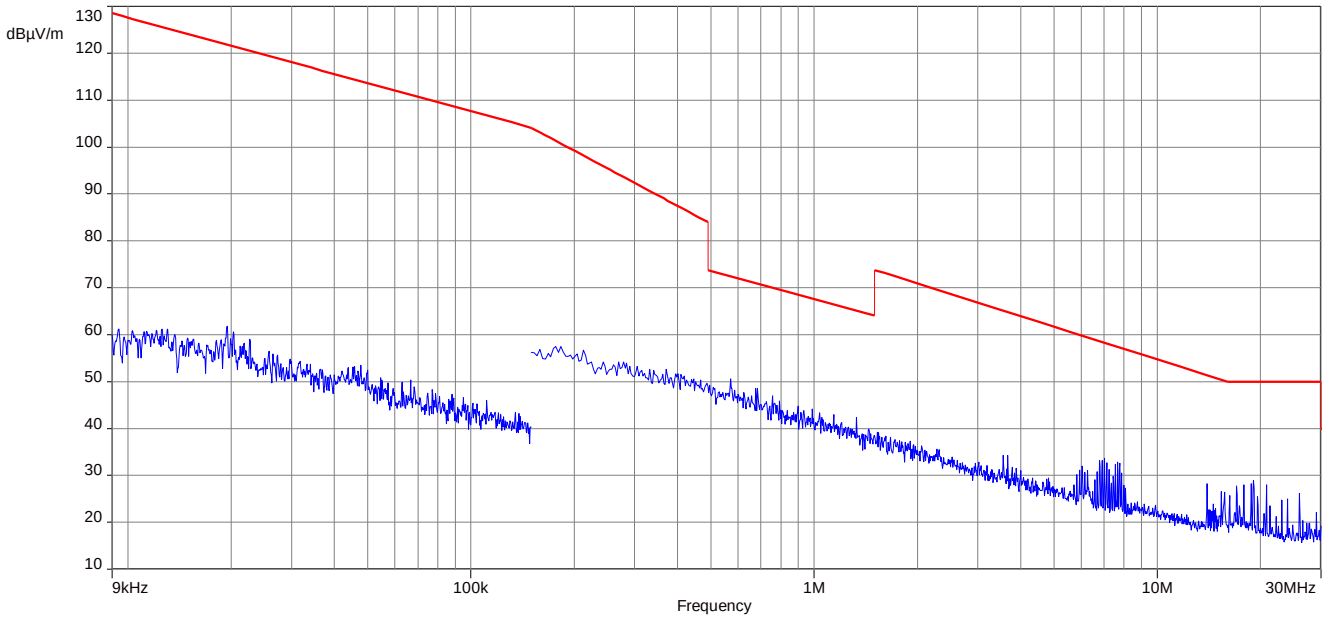


Plots: OFDM (20 MHz bandwidth), internal antenna port

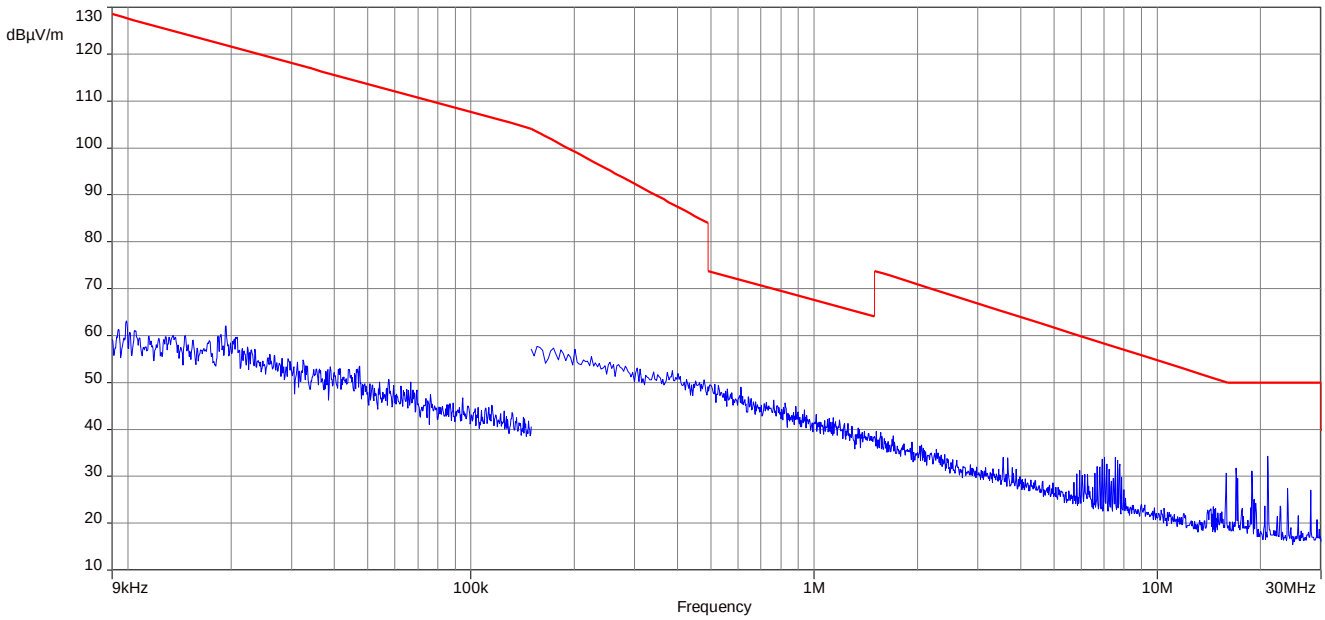
Plot 1: 9 kHz to 30 MHz, low channel



Plot 2: 9 kHz to 30 MHz, mid channel

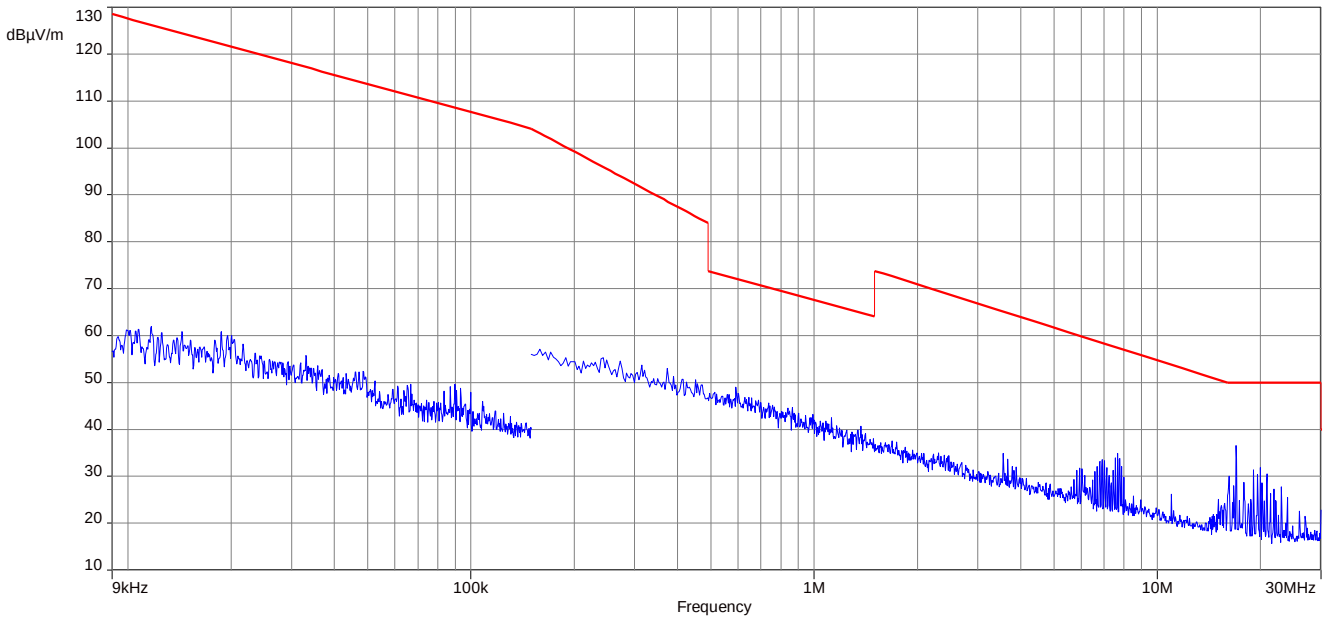


Plot 3: 9 kHz to 30 MHz, high channel

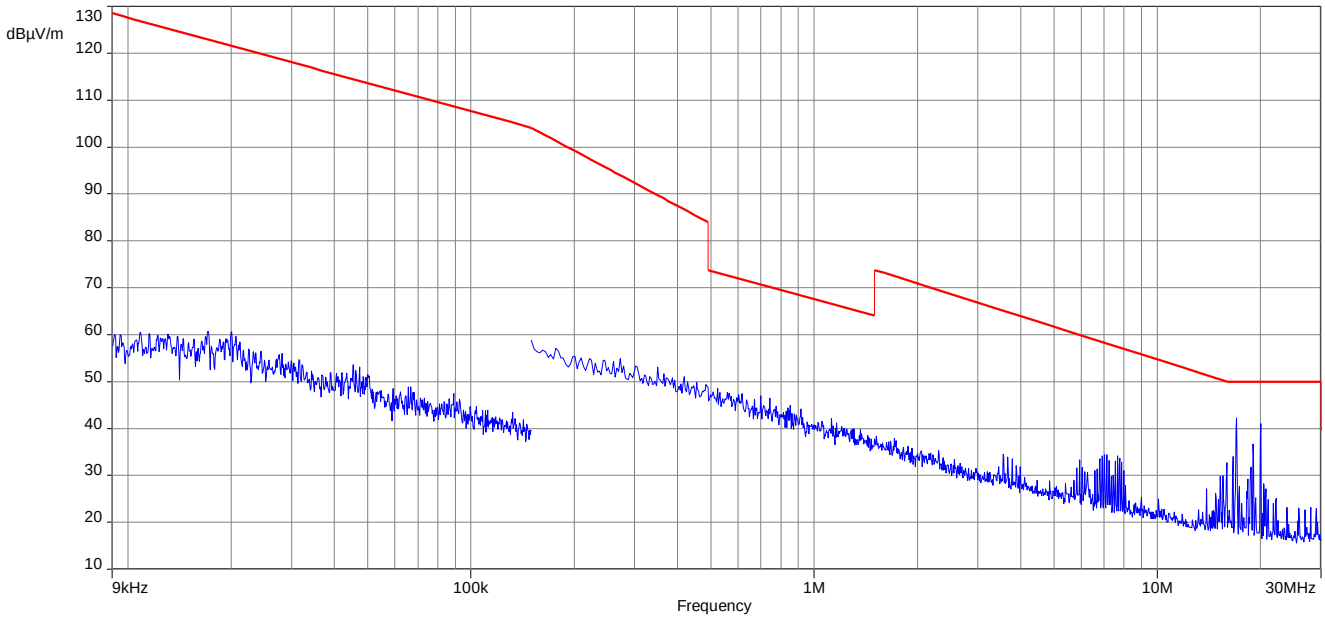


Plots: DSSS, external antenna port

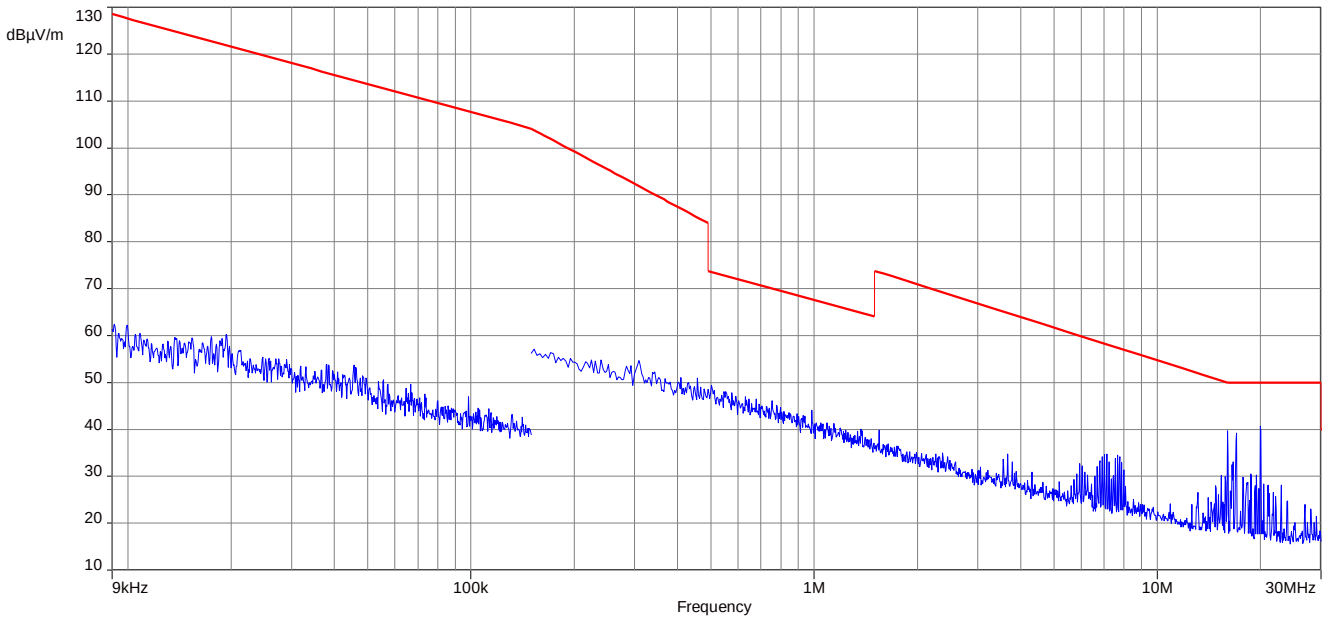
Plot 1: 9 kHz to 30 MHz, low channel



Plot 2: 9 kHz to 30 MHz, mid channel

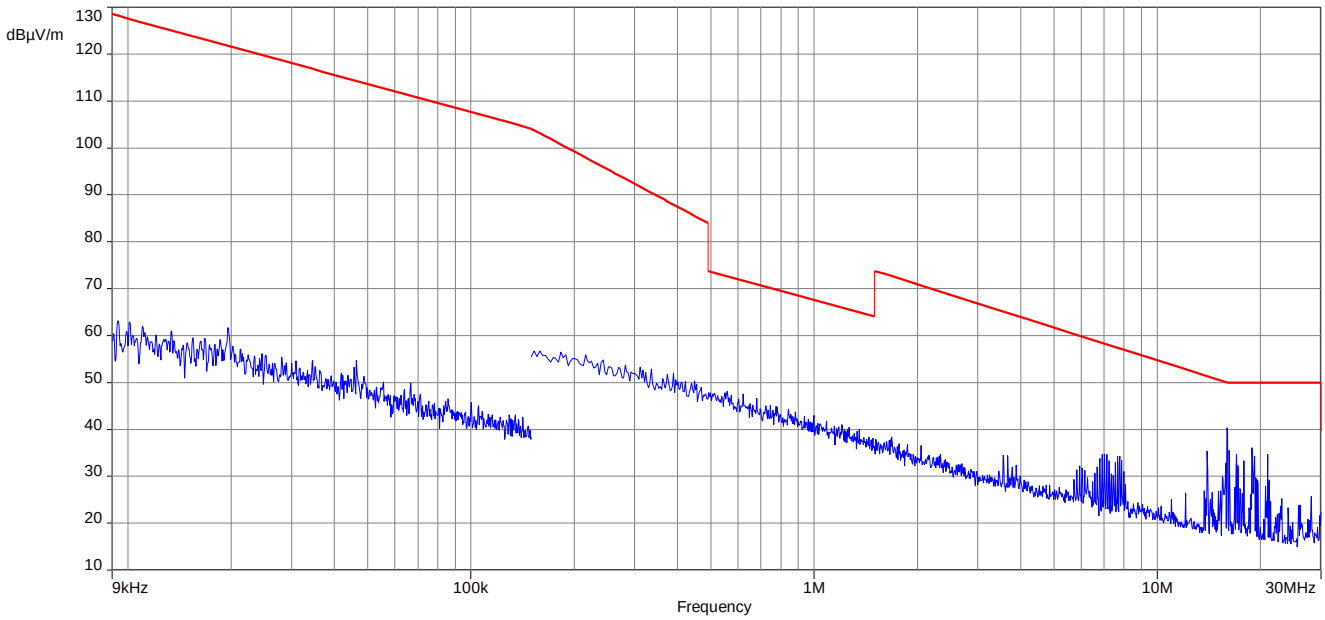


Plot 3: 9 kHz to 30 MHz, high channel

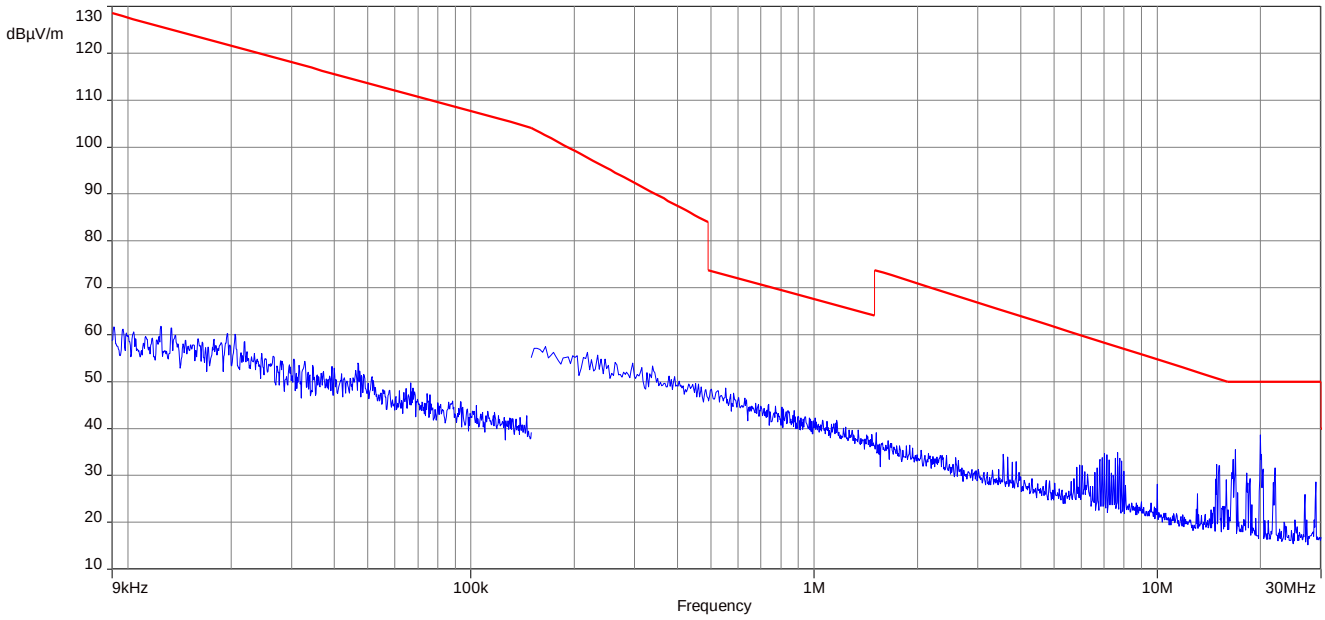


Plots: OFDM (20 MHz bandwidth), external antenna port

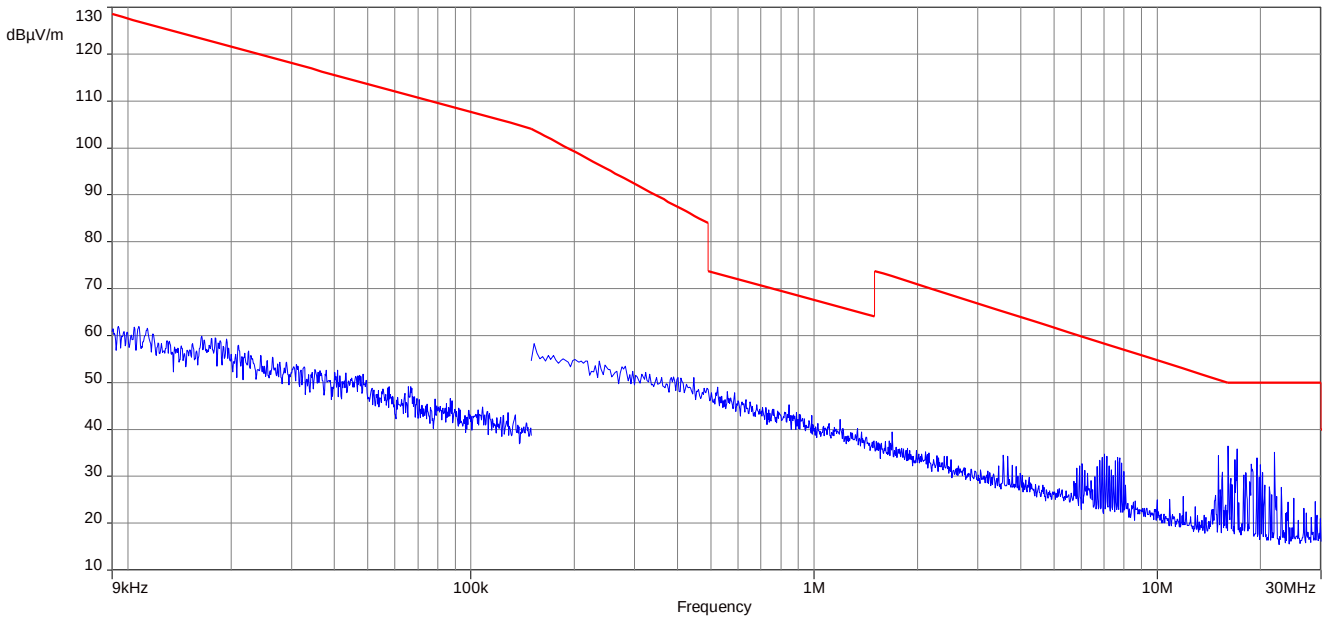
Plot 1: 9 kHz to 30 MHz, low channel



Plot 2: 9 kHz to 30 MHz, mid channel



Plot 3: 9 kHz to 30 MHz, high channel



12.12 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
Measured modulation	☒ DSSS b – mode ☒ OFDM g – mode ☐ OFDM n HT20 – mode ☐ OFDM n HT40 – mode ☒ RX / Idle – mode
Test setup:	See sub clause 7.1 – A
Measurement uncertainty	See sub clause 9

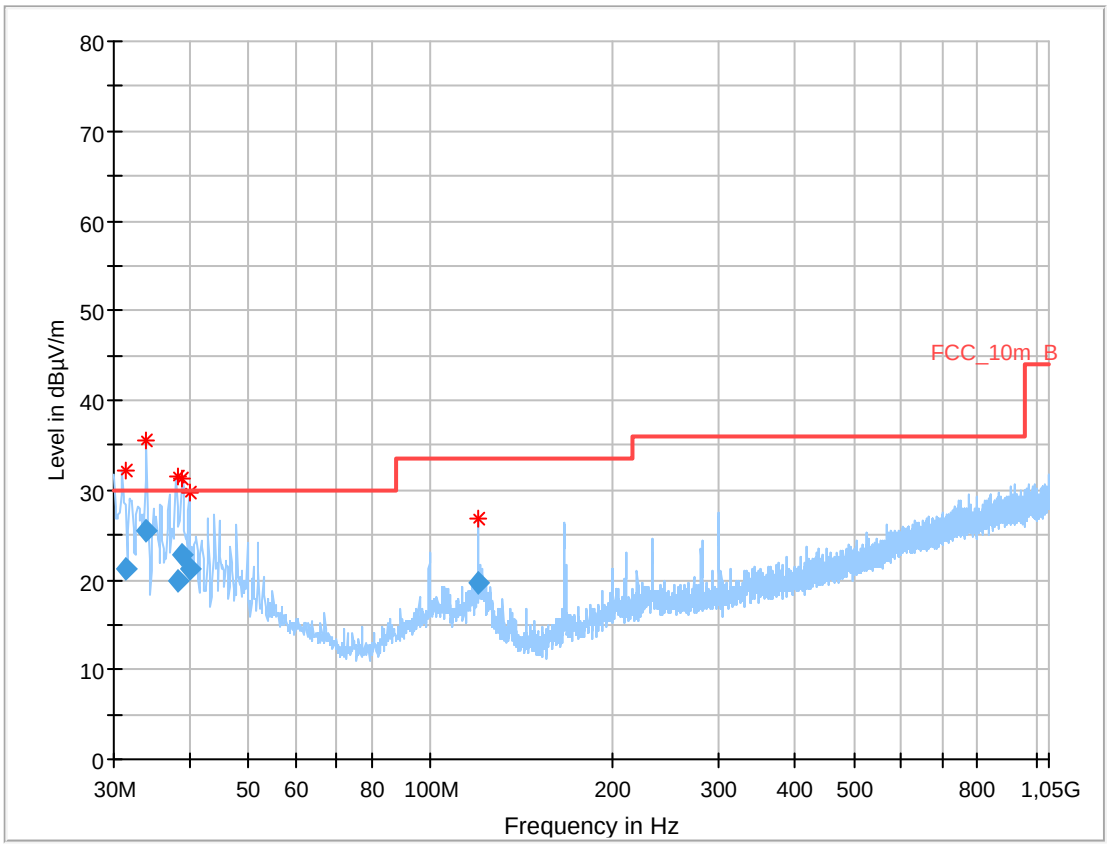
The modulation with the highest output power was used to perform the transmitter spurious emissions. If spurious were detected a re-measurement was performed on the detected frequency with each modulation.

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: DSSS (valid for both antennas)

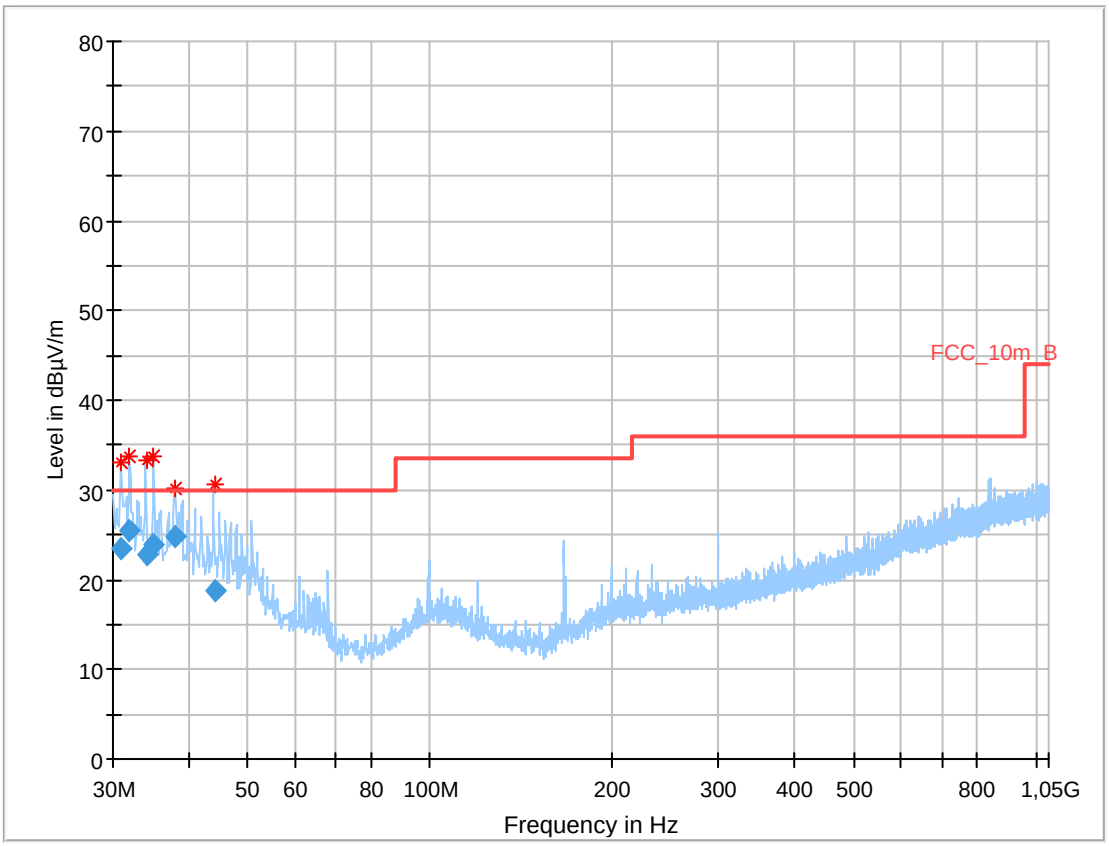
Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization, low channel



Final_Result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.435200	21.14	30.00	8.86	1000.0	120.000	101.0	V	257.0	13.5
33.936900	25.46	30.00	4.54	1000.0	120.000	98.0	V	272.0	13.7
38.315250	19.83	30.00	10.17	1000.0	120.000	101.0	V	245.0	14.0
38.956650	22.72	30.00	7.28	1000.0	120.000	98.0	V	178.0	14.0
39.977100	21.24	30.00	8.76	1000.0	120.000	101.0	V	178.0	14.0
120.012900	19.64	33.50	13.86	1000.0	120.000	101.0	V	89.0	10.2

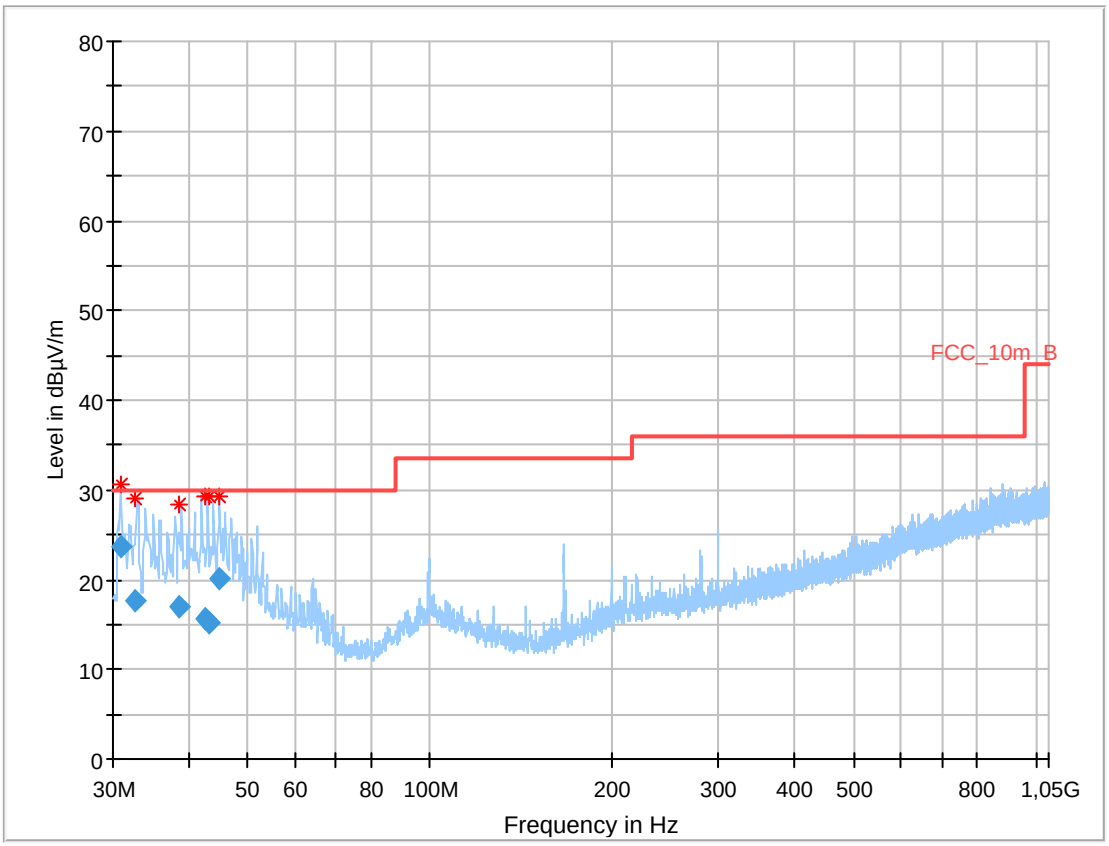
Plot 2: 30 MHz to 1 GHz, vertical & horizontal polarization, mid channel



Final_Result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.876900	23.41	30.00	6.59	1000.0	120.000	101.0	V	302.0	13.4
31.932900	25.51	30.00	4.49	1000.0	120.000	98.0	V	131.0	13.5
34.067550	22.76	30.00	7.24	1000.0	120.000	98.0	V	249.0	13.7
35.020350	23.91	30.00	6.09	1000.0	120.000	100.0	V	290.0	13.8
37.974750	24.85	30.00	5.15	1000.0	120.000	101.0	V	37.0	13.9
44.086800	18.85	30.00	11.15	1000.0	120.000	185.0	V	103.0	13.9

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

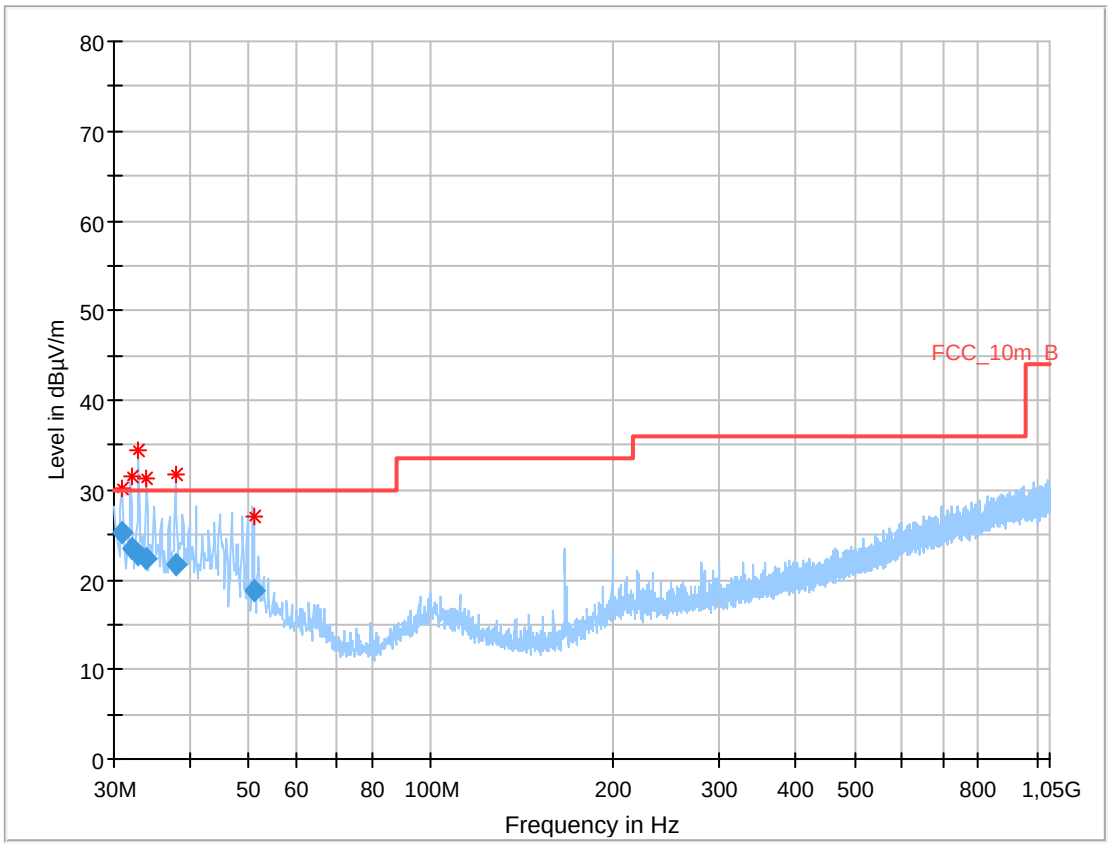


Final_Result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.900300	23.60	30.00	6.40	1000.0	120.000	101.0	V	90.0	13.4
32.512350	17.63	30.00	12.37	1000.0	120.000	185.0	V	90.0	13.6
38.565150	16.95	30.00	13.05	1000.0	120.000	101.0	V	102.0	14.0
42.507000	15.62	30.00	14.38	1000.0	120.000	101.0	V	102.0	13.9
43.251150	15.29	30.00	14.71	1000.0	120.000	101.0	V	102.0	13.9
45.065550	20.22	30.00	9.78	1000.0	120.000	101.0	V	48.0	13.8

Plot: OFDM (20 MHz bandwidth) (valid for both antennas)

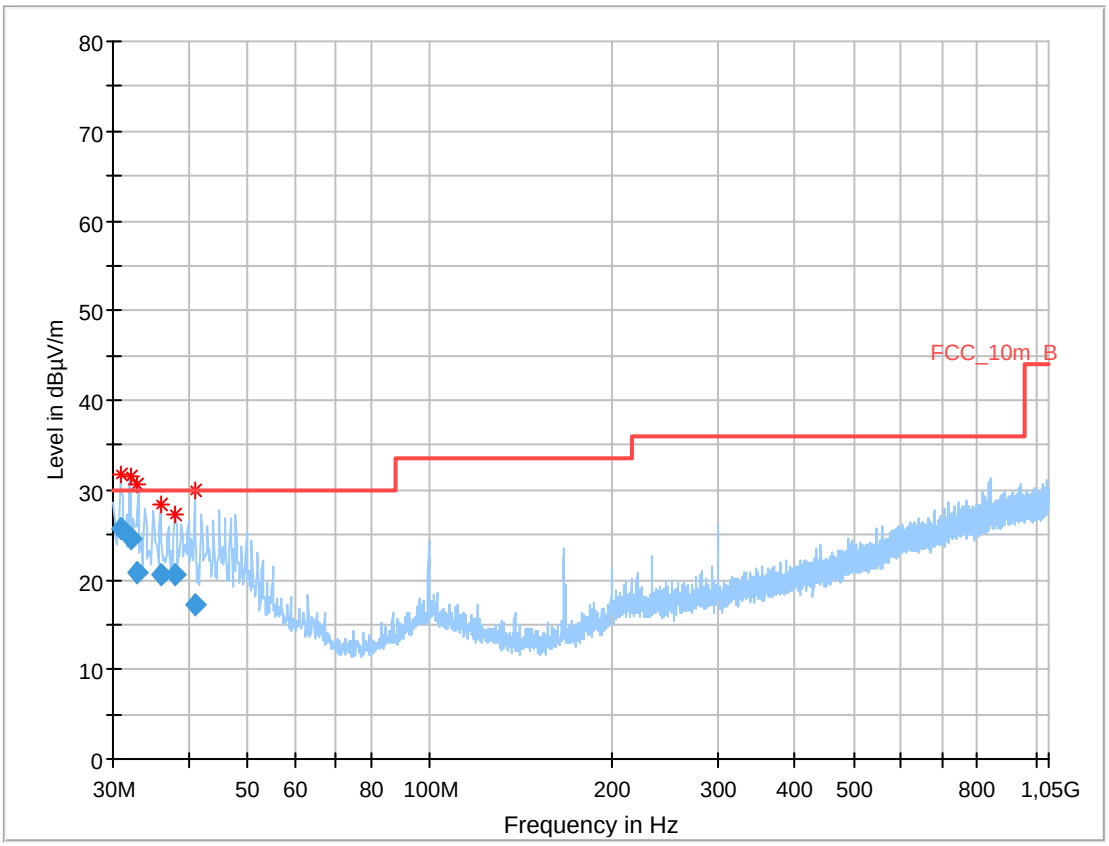
Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization, low channel



Final_Result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.982800	25.18	30.00	4.82	1000.0	120.000	185.0	V	188.0	13.4
32.053650	23.53	30.00	6.47	1000.0	120.000	101.0	V	218.0	13.5
32.953200	22.69	30.00	7.31	1000.0	120.000	185.0	V	108.0	13.6
33.955050	22.24	30.00	7.76	1000.0	120.000	178.0	V	31.0	13.7
38.045850	21.77	30.00	8.23	1000.0	120.000	101.0	V	346.0	13.9
51.022350	18.77	30.00	11.23	1000.0	120.000	101.0	V	65.0	12.5

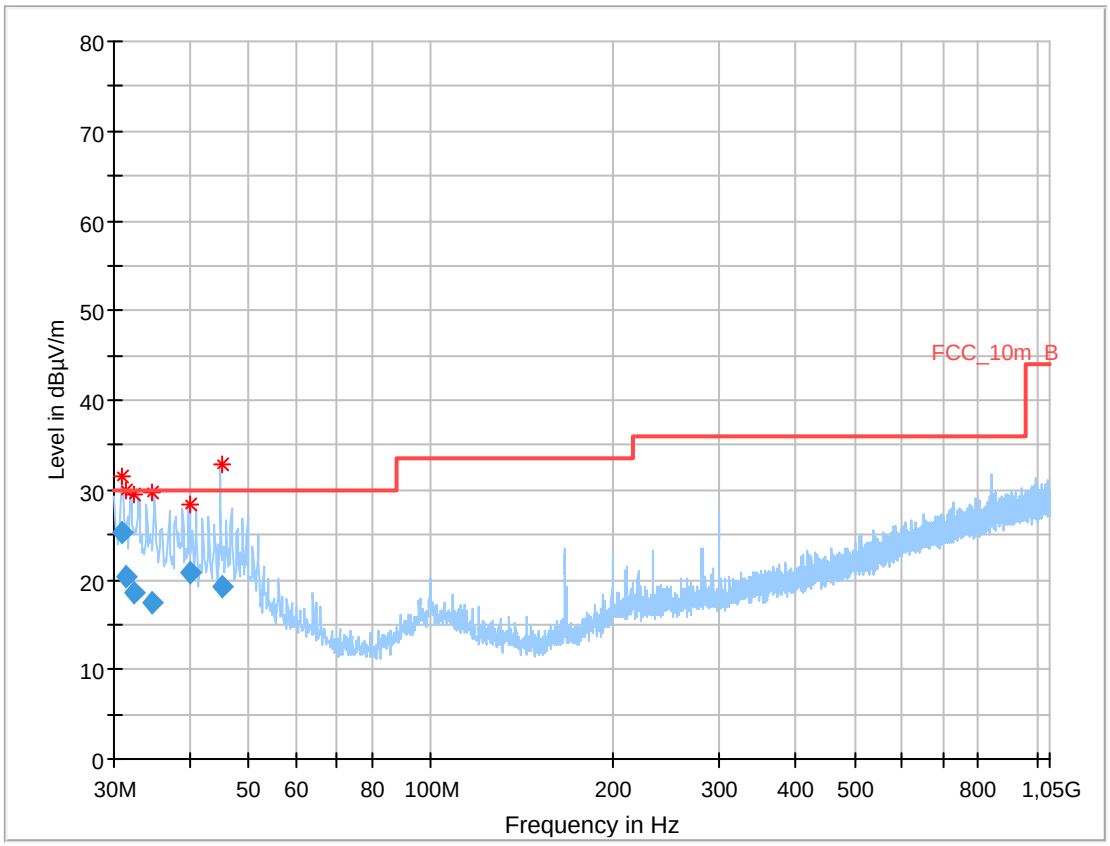
Plot 2: 30 MHz to 1 GHz, vertical & horizontal polarization, mid channel



Final_Result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.038750	25.63	30.00	4.37	1000.0	120.000	98.0	V	143.0	13.4
32.023950	24.59	30.00	5.41	1000.0	120.000	185.0	V	224.0	13.5
32.880450	20.71	30.00	9.29	1000.0	120.000	101.0	V	353.0	13.6
35.940450	20.62	30.00	9.38	1000.0	120.000	98.0	V	112.0	13.8
37.915200	20.56	30.00	9.44	1000.0	120.000	101.0	V	224.0	13.9
40.848150	17.29	30.00	12.71	1000.0	120.000	101.0	V	224.0	14.0

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

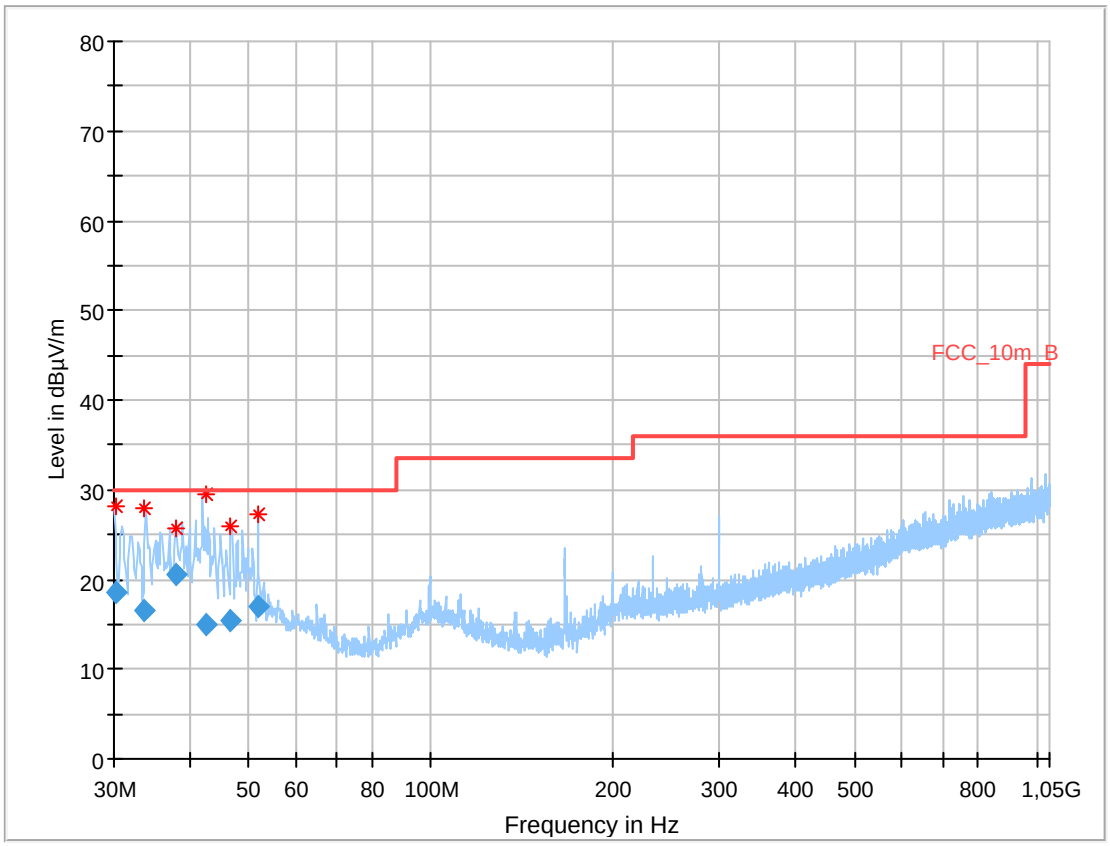


Final_Result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.038000	25.28	30.00	4.72	1000.0	120.000	98.0	V	63.0	13.4
31.349100	20.34	30.00	9.66	1000.0	120.000	101.0	V	134.0	13.5
32.432250	18.61	30.00	11.39	1000.0	120.000	98.0	V	246.0	13.6
34.797000	17.44	30.00	12.56	1000.0	120.000	101.0	V	246.0	13.8
39.933000	20.79	30.00	9.21	1000.0	120.000	101.0	V	285.0	14.0
45.099600	19.29	30.00	10.71	1000.0	120.000	98.0	V	20.0	13.8

Plot: RX / Idle mode (valid for both antennas)

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



Final_Result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.122025	18.51	30.00	11.49	1000.0	120.000	185.0	V	6.0	13.3
33.658650	16.44	30.00	13.56	1000.0	120.000	101.0	V	229.0	13.7
37.944600	20.51	30.00	9.49	1000.0	120.000	98.0	V	83.0	13.9
42.514800	15.08	30.00	14.92	1000.0	120.000	101.0	V	40.0	13.9
46.801050	15.40	30.00	14.60	1000.0	120.000	100.0	V	186.0	13.4
51.966150	17.08	30.00	12.92	1000.0	120.000	100.0	V	312.0	12.3

12.13 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 26 GHz
Trace mode:	Max Hold
Measured modulation	☒ DSSS b – mode ☒ OFDM g – mode ☐ OFDM n HT20 – mode ☐ OFDM n HT40 – mode ☒ RX / Idle – mode
Test setup:	See sub clause 7.2 – C See sub clause 7.3 – A
Measurement uncertainty	See sub clause 9

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 30 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
Above 960	54.0	3

Results: DSSS, internal antenna port

TX Spurious Emissions Radiated [dBµV/m]								
2412 MHz			2437 MHz			2462 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
4019	Peak	58.0	3921	Peak	51.1	4100	Peak	57.5
	AVG	52.1		AVG	39.4		AVG	51.4
4824	Peak	53.9	4064	Peak	58.5	4924	Peak	54.2
	AVG	46.5		AVG	53.1		AVG	45.4

Results: OFDM (20 MHz bandwidth), internal antenna port

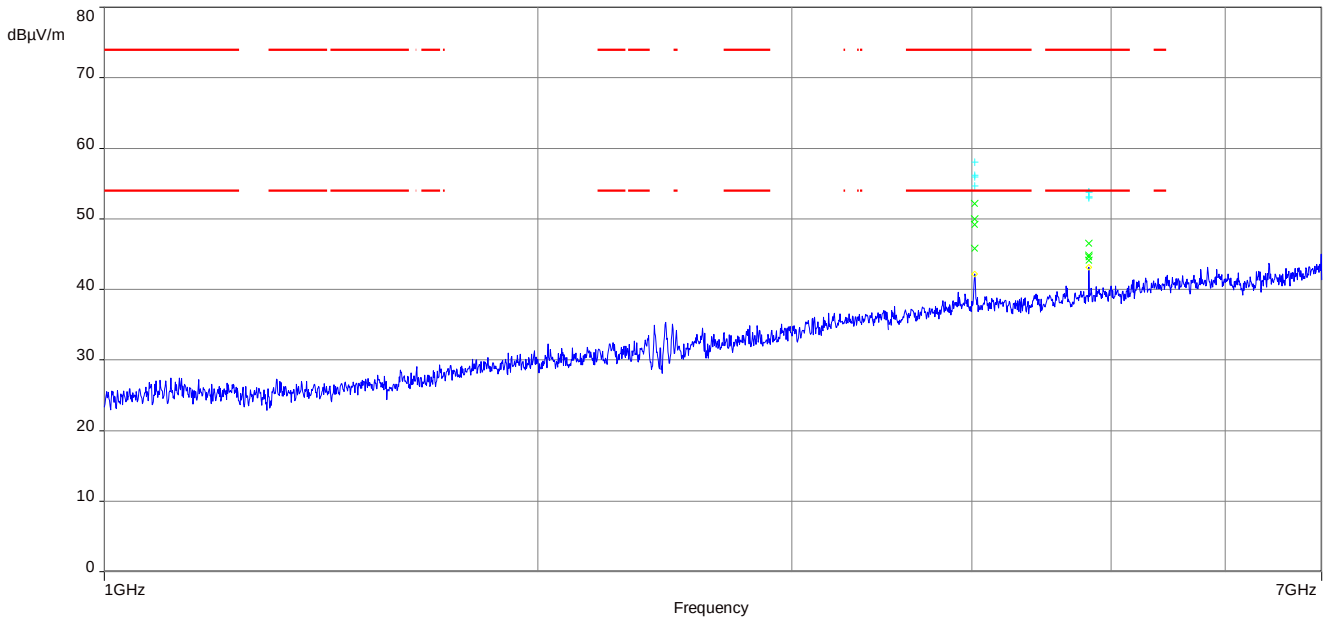
TX Spurious Emissions Radiated [dBµV/m]								
2412 MHz			2437 MHz			2462 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
4184	Peak	51.1	3891	Peak	50.2	4181	Peak	51.3
	AVG	39.3		AVG	38.7		AVG	39.7
4428	Peak	No restricted band!	4090	Peak	51.1	4657	Peak	51.7
	AVG			AVG	39.5		AVG	40.6
5753	Peak	No restricted band!		Peak			Peak	
	AVG			AVG			AVG	

Results: RX / idle – mode, internal antenna port

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

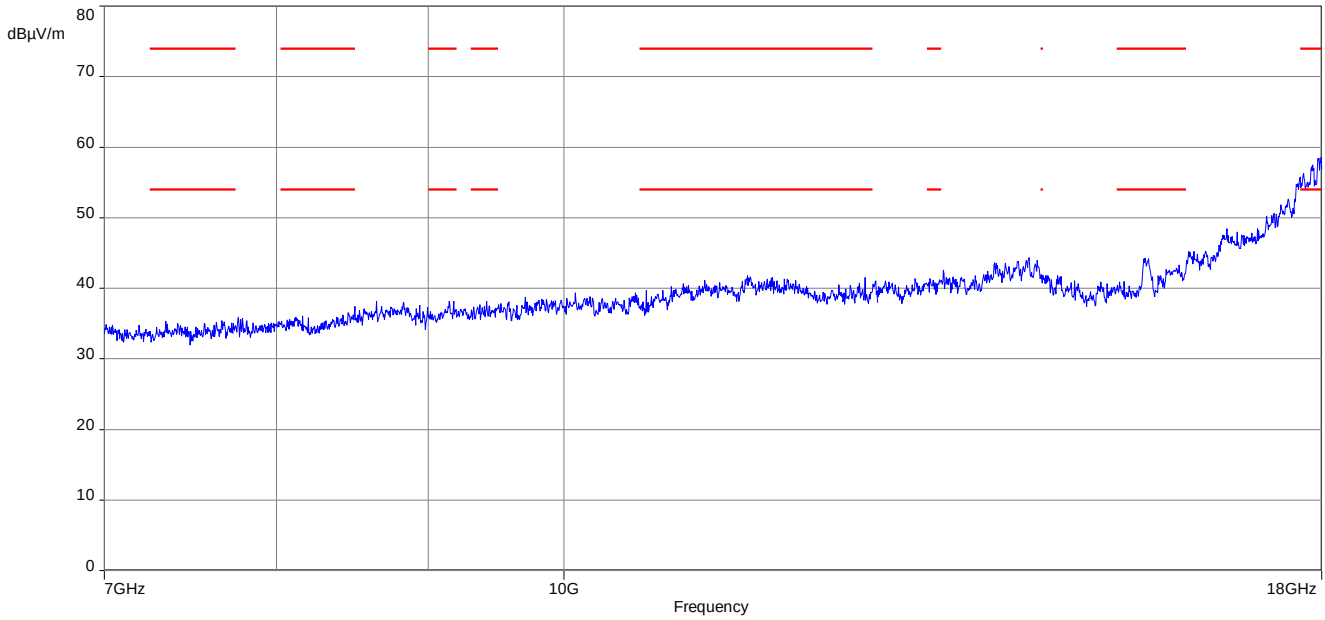
Plots: DSSS, internal antenna port

Plot 1: Lowest channel, 1 GHz to 7 GHz, vertical & horizontal polarization

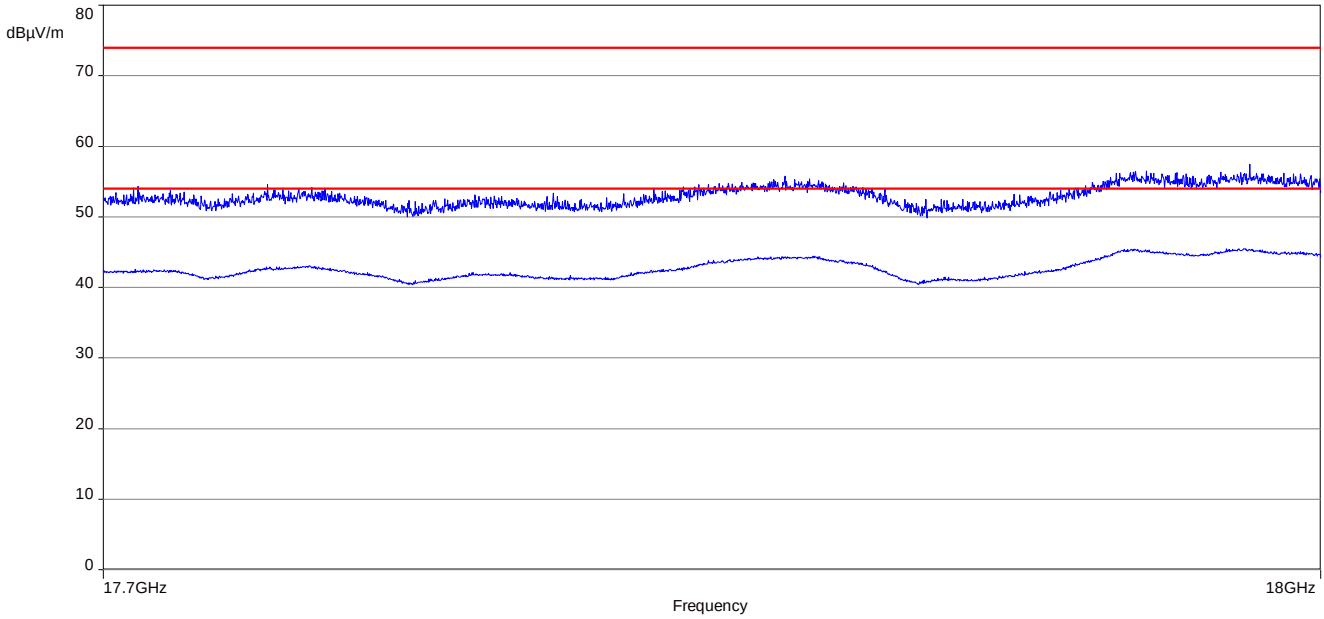


The carrier signal is notched with a 2.4 GHz band rejection filter.

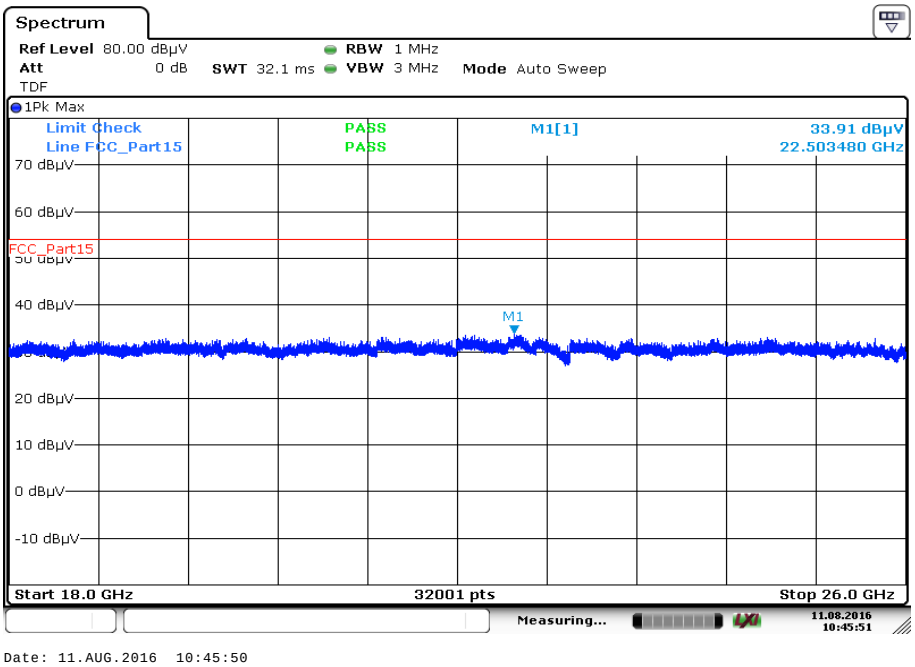
Plot 2: Lowest channel, 7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



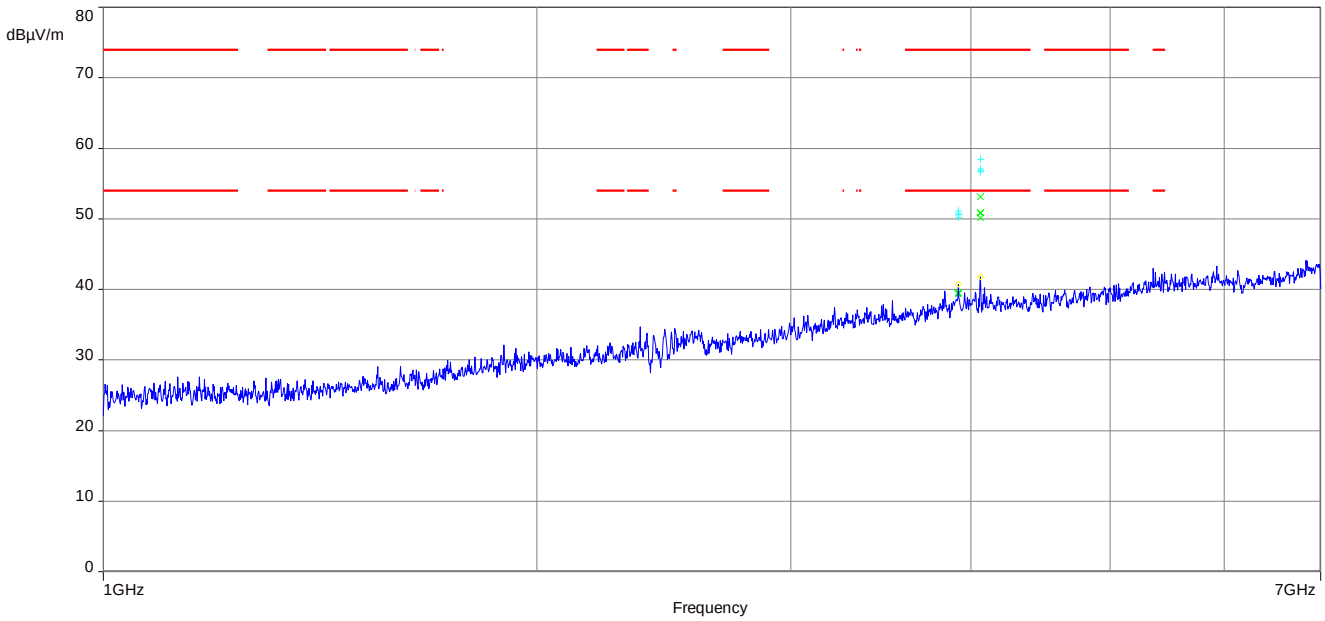
Plot 3: Lowest channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



Plot 4: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

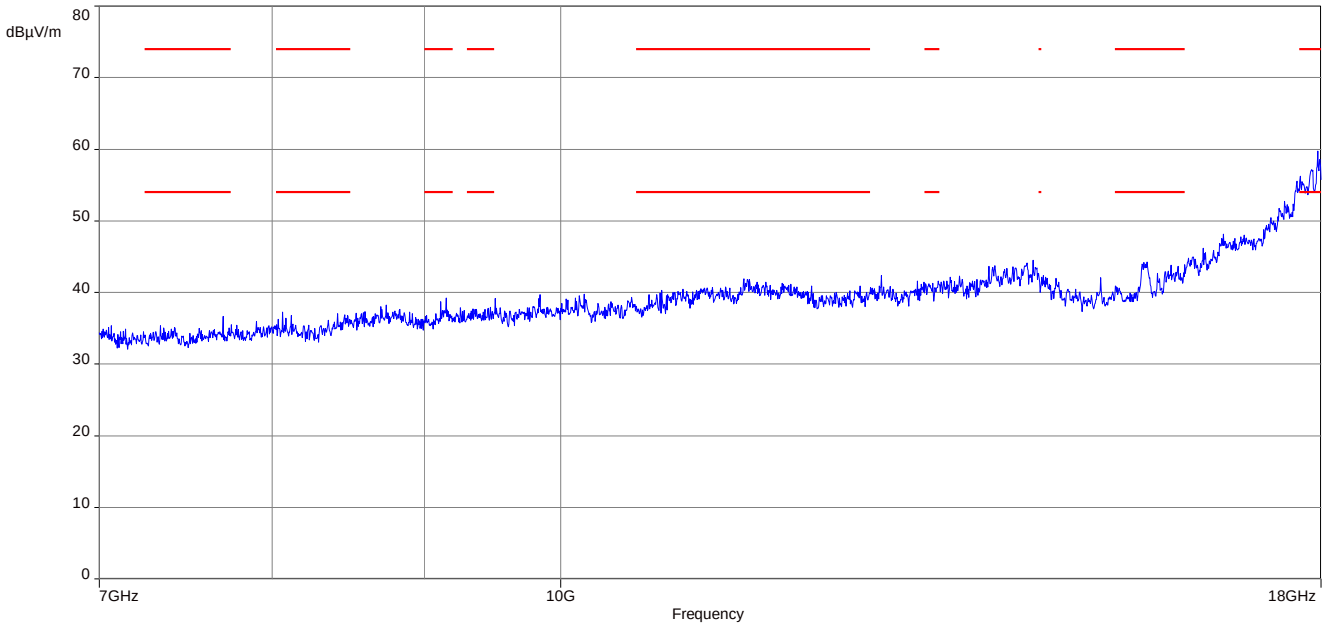


Plot 5: Mid channel, 1 GHz to 7 GHz, vertical & horizontal polarization

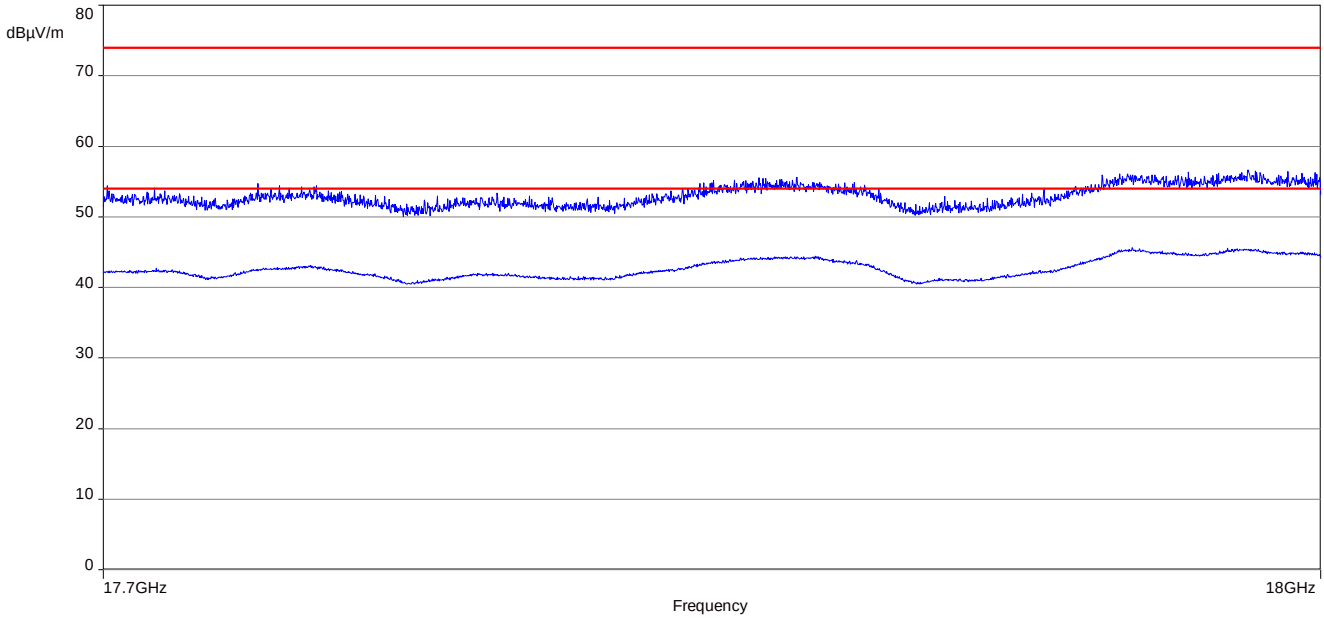


The carrier signal is notched with a 2.4 GHz band rejection filter.

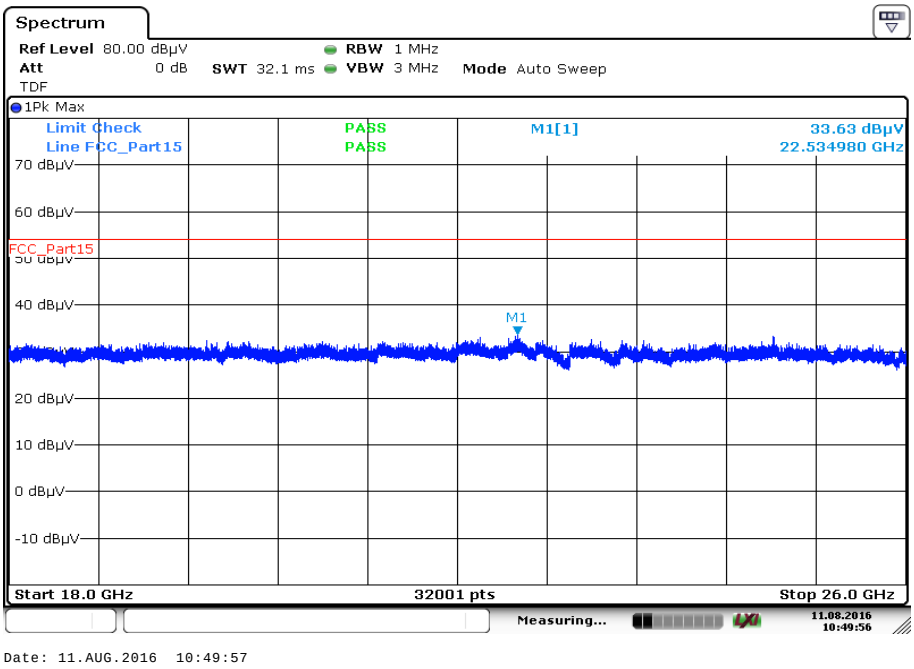
Plot 6: Mid channel, 7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



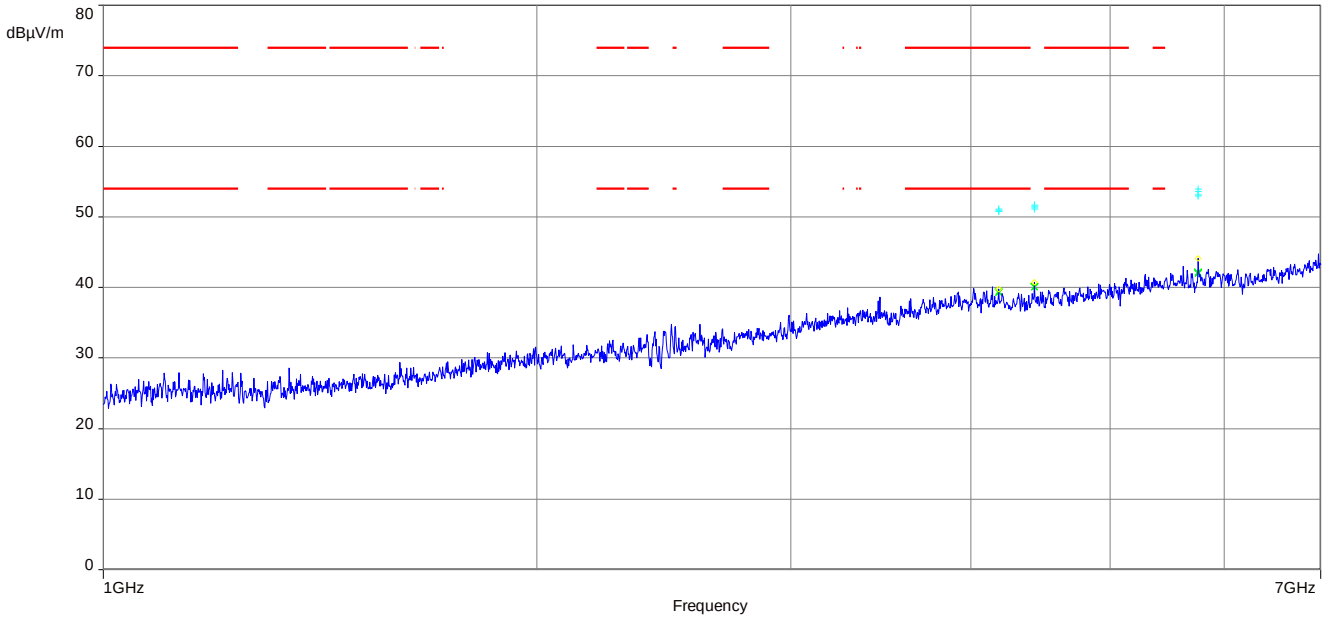
Plot 7: Mid channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



Plot 8: Mid channel, 18 GHz to 26 GHz, vertical & horizontal polarization

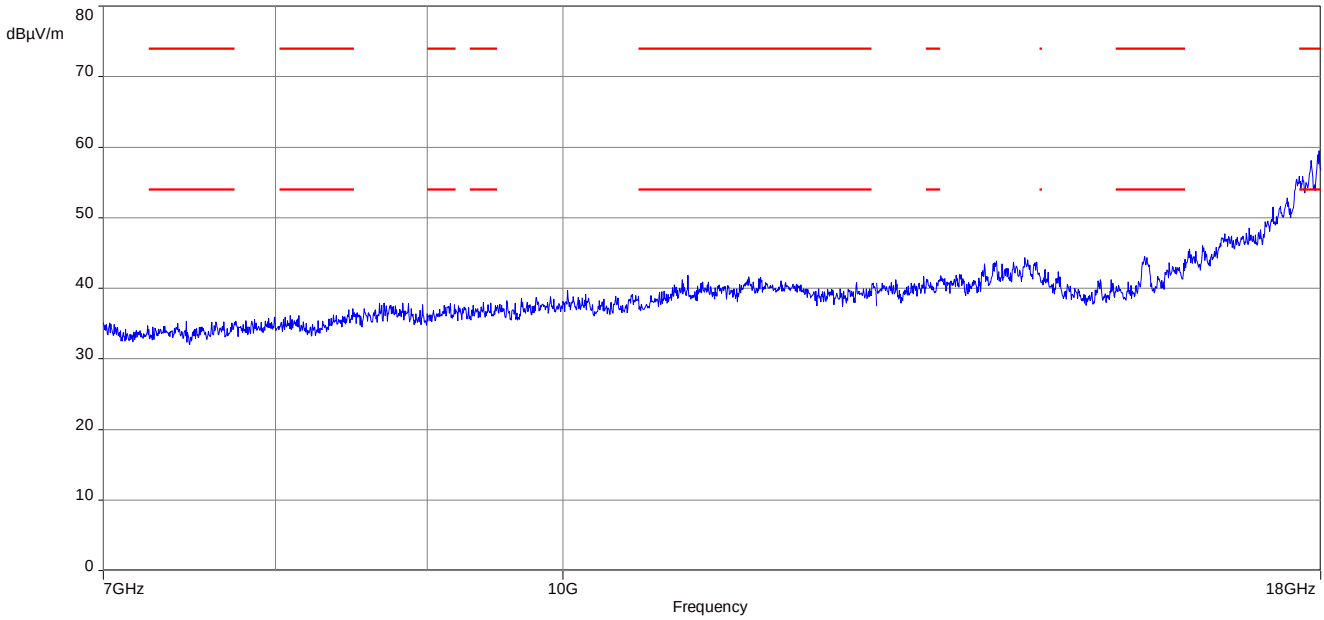


Plot 9: High channel, 1 GHz to 7 GHz, vertical & horizontal polarization

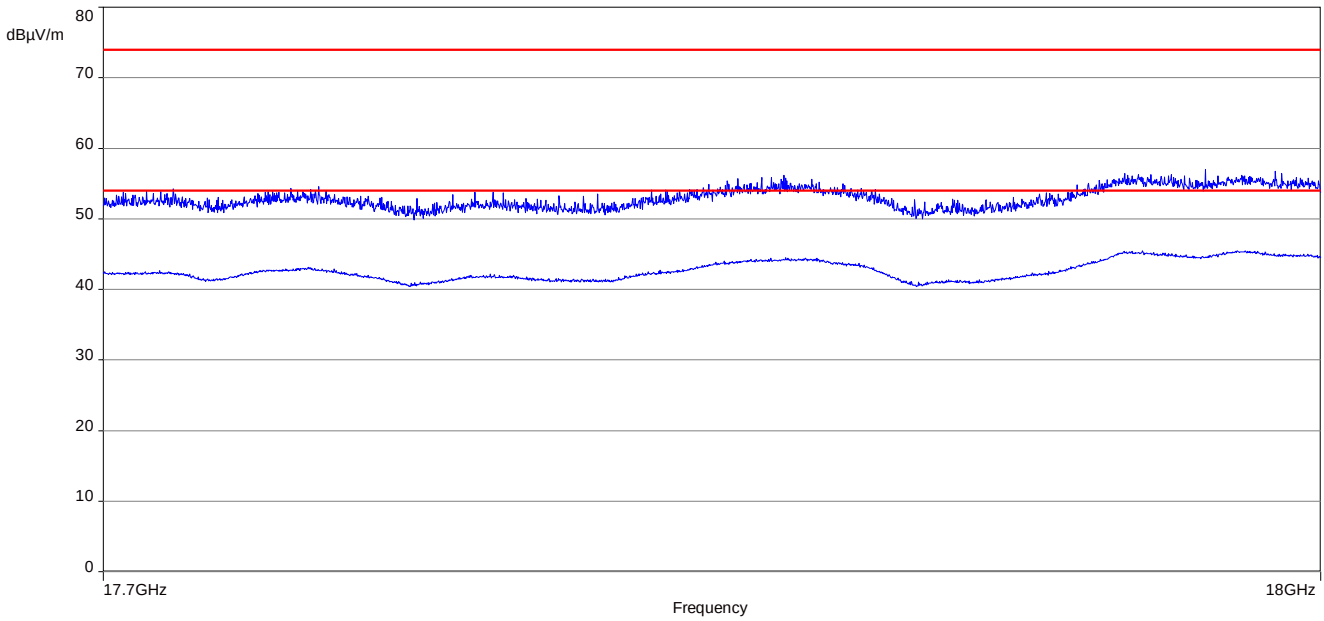


The carrier signal is notched with a 2.4 GHz band rejection filter.

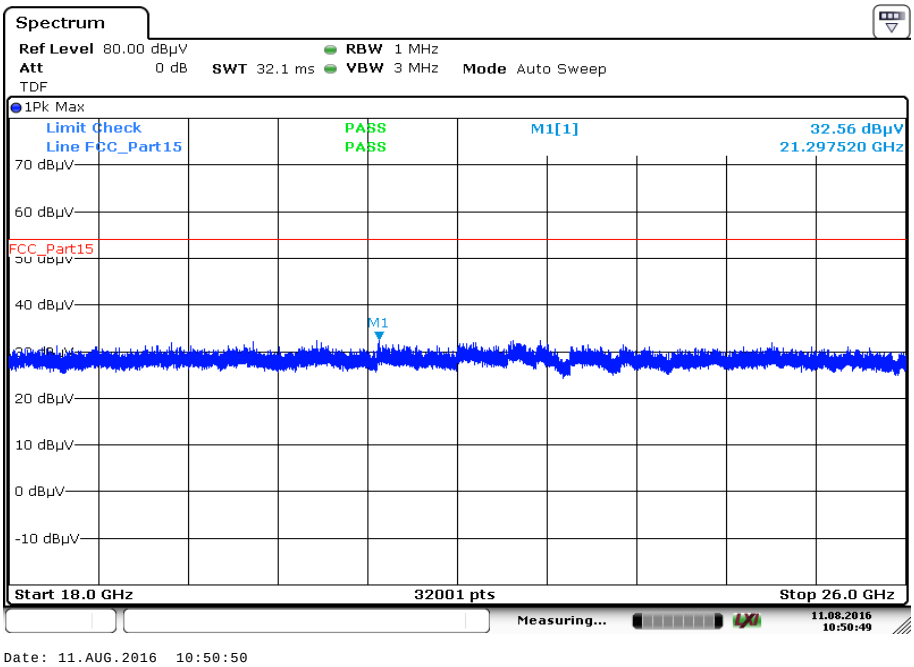
Plot 10: High channel, 7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



Plot 11: High channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization, peak & average

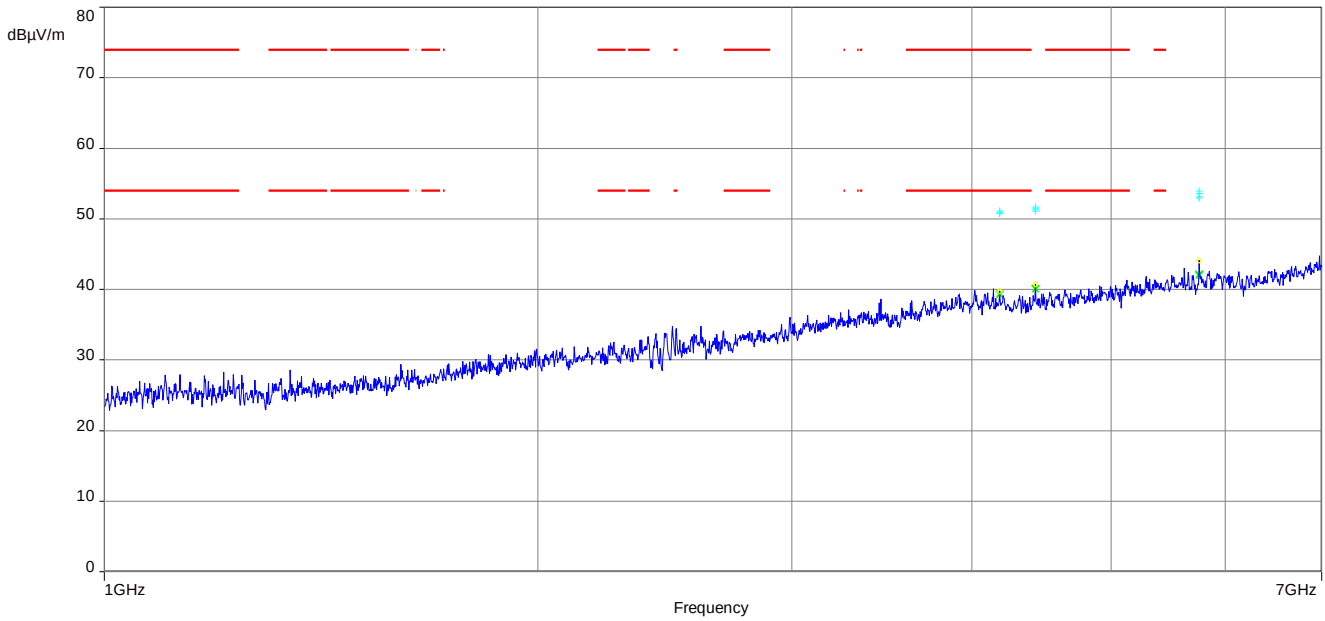


Plot 12: High channel, 18 GHz to 26 GHz, vertical & horizontal polarization



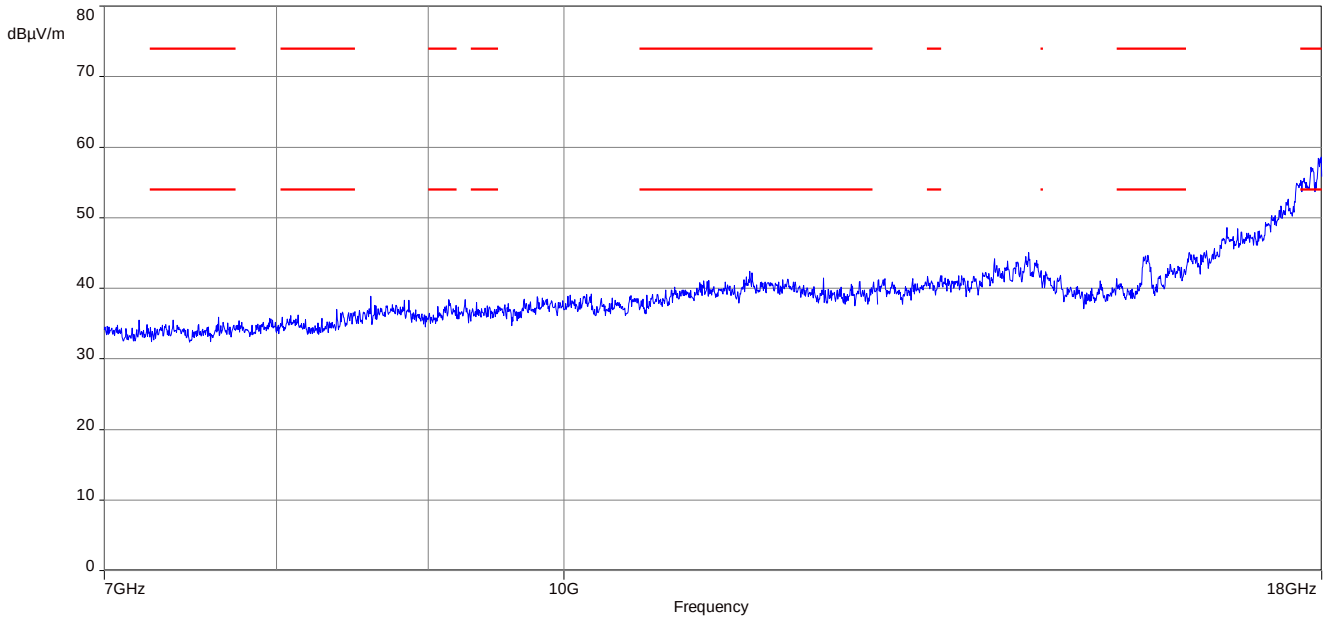
Plots: OFDM, internal antenna port

Plot 1: Lowest channel, 1 GHz to 7 GHz, vertical & horizontal polarization

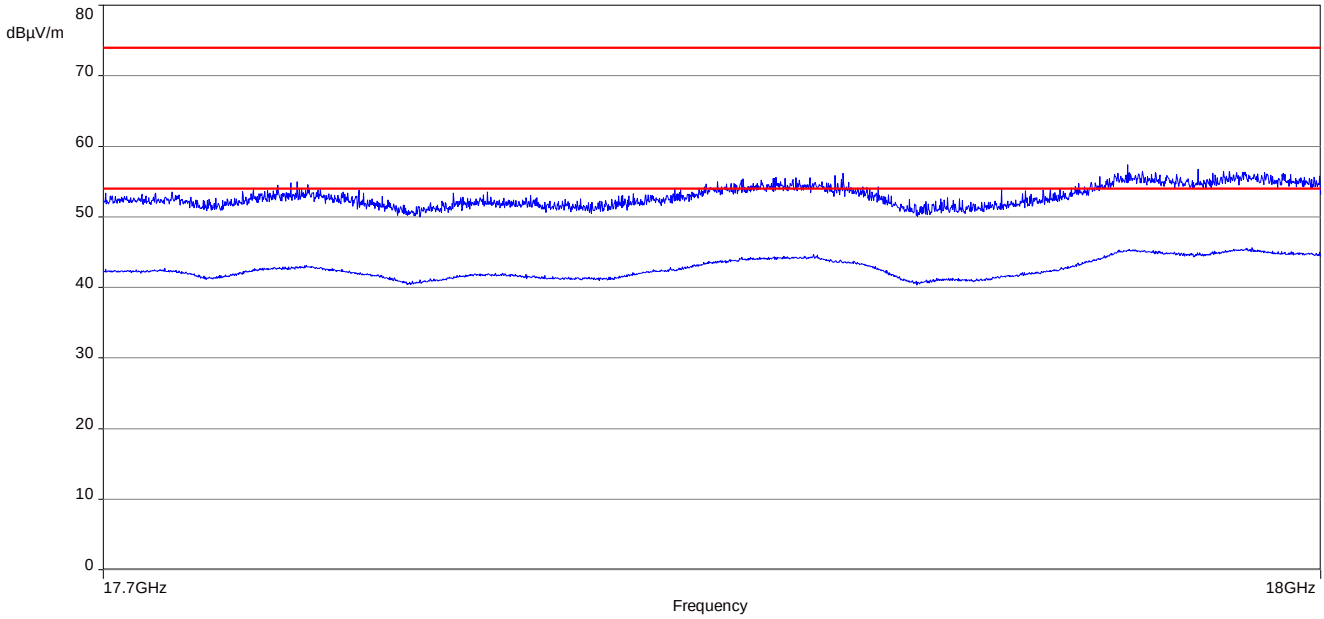


The carrier signal is notched with a 2.4 GHz band rejection filter.

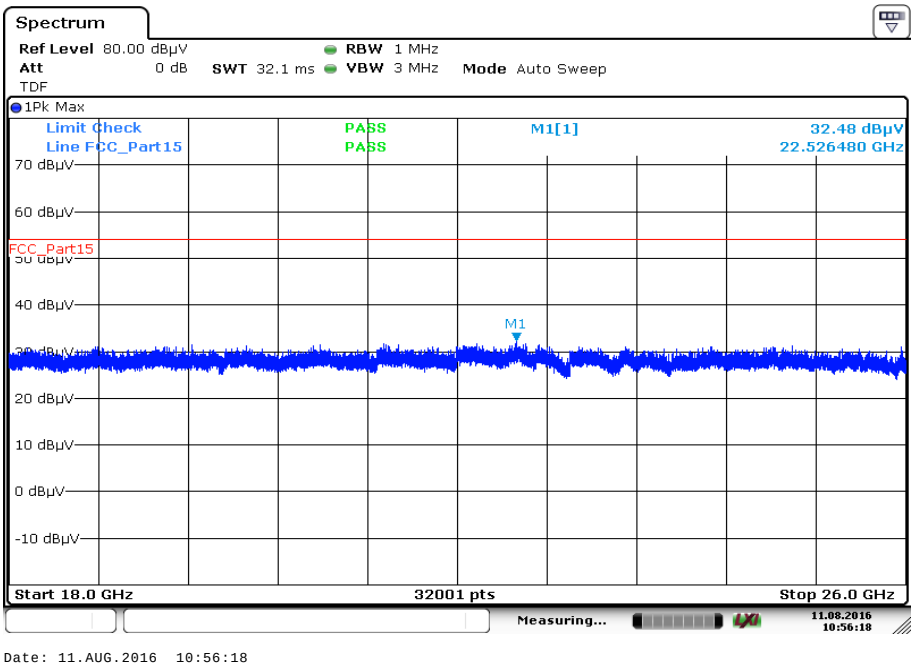
Plot 2: Lowest channel, 7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



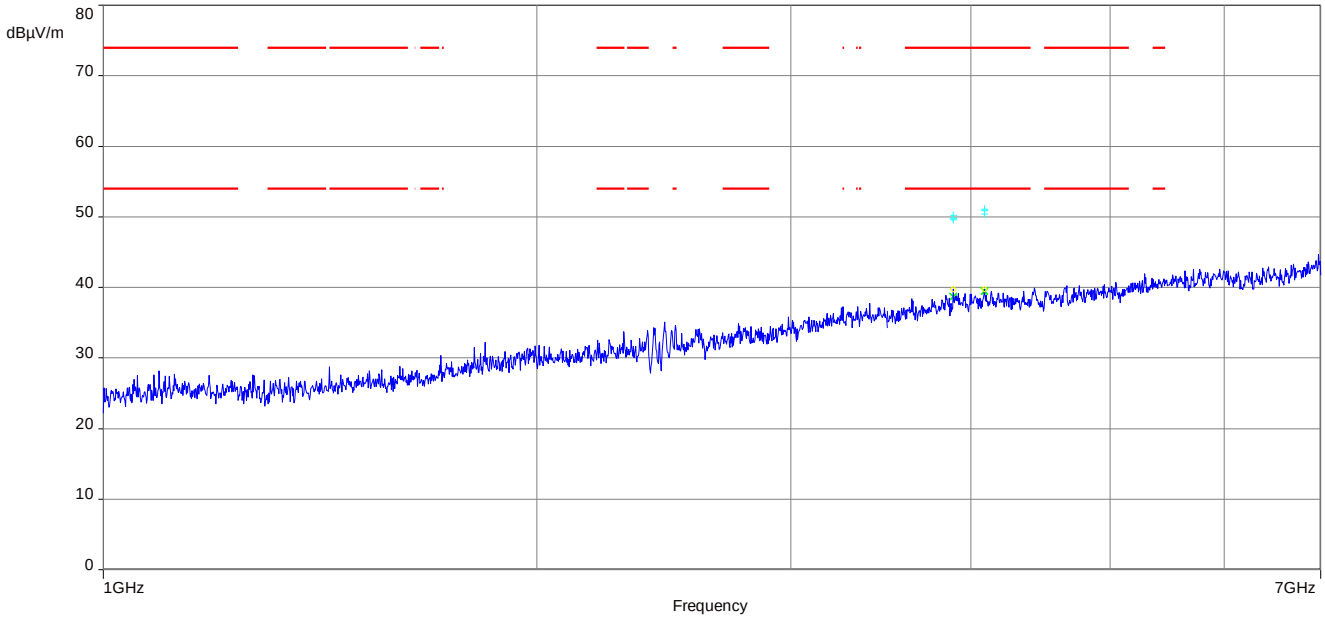
Plot 3: Lowest channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



Plot 4: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

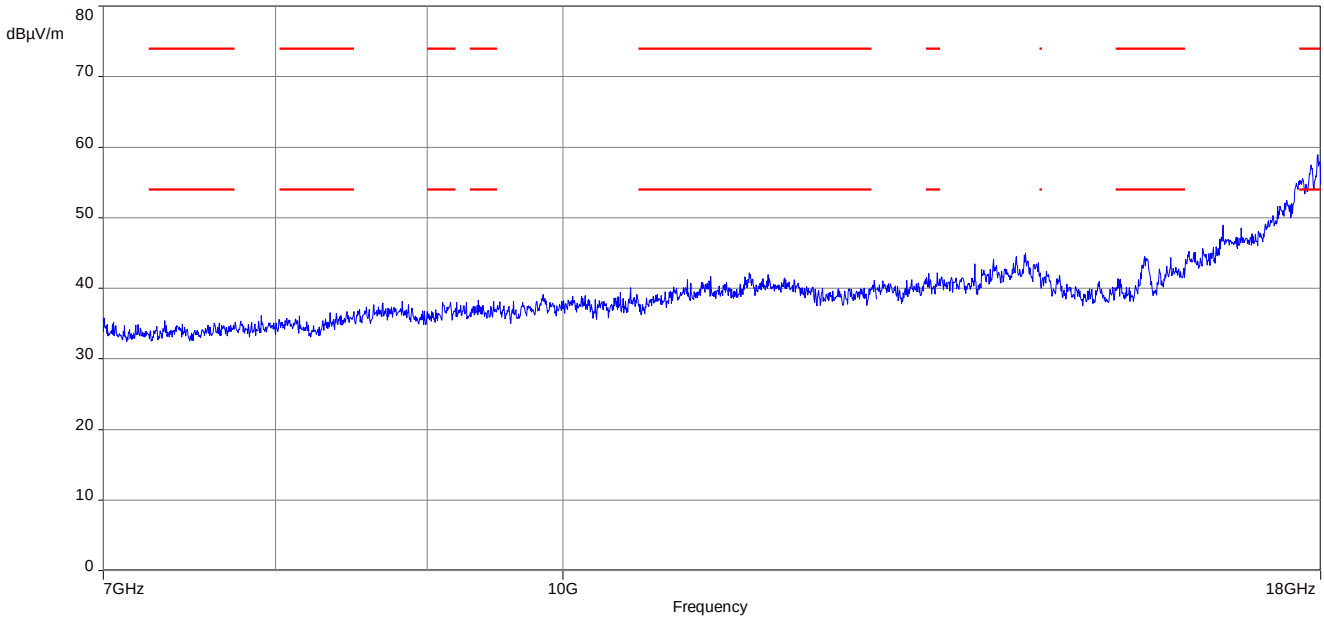


Plot 5: Mid channel, 1 GHz to 7 GHz, vertical & horizontal polarization

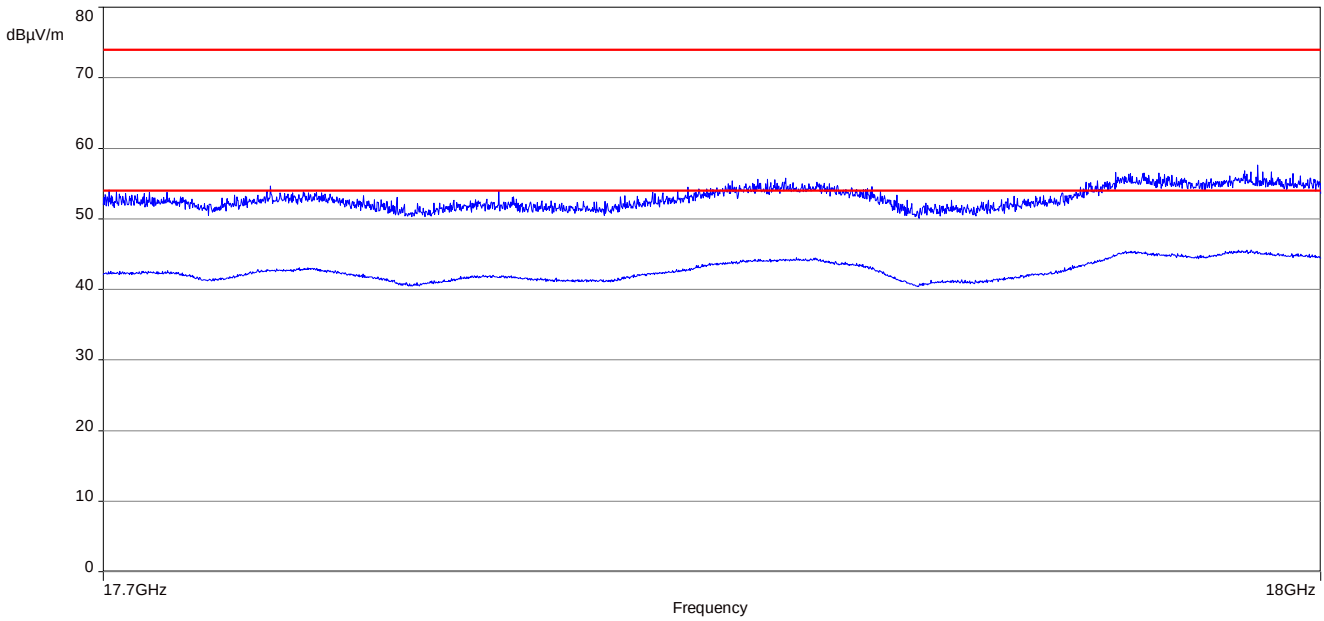


The carrier signal is notched with a 2.4 GHz band rejection filter.

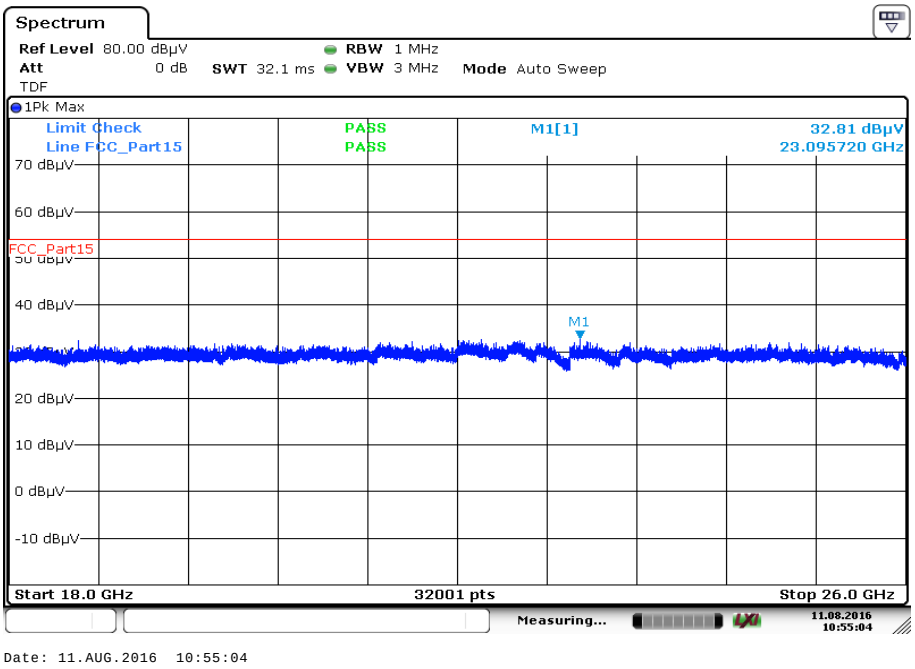
Plot 6: Mid channel, 7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



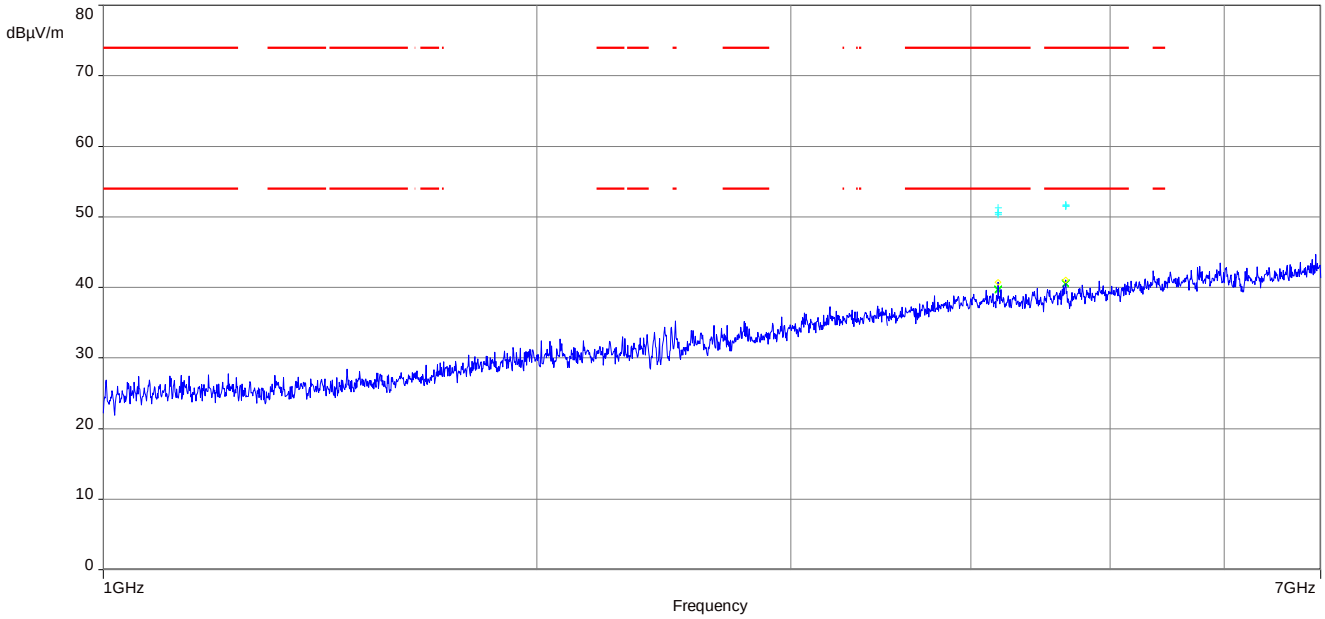
Plot 7: Mid channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



Plot 8: Mid channel, 18 GHz to 26 GHz, vertical & horizontal polarization

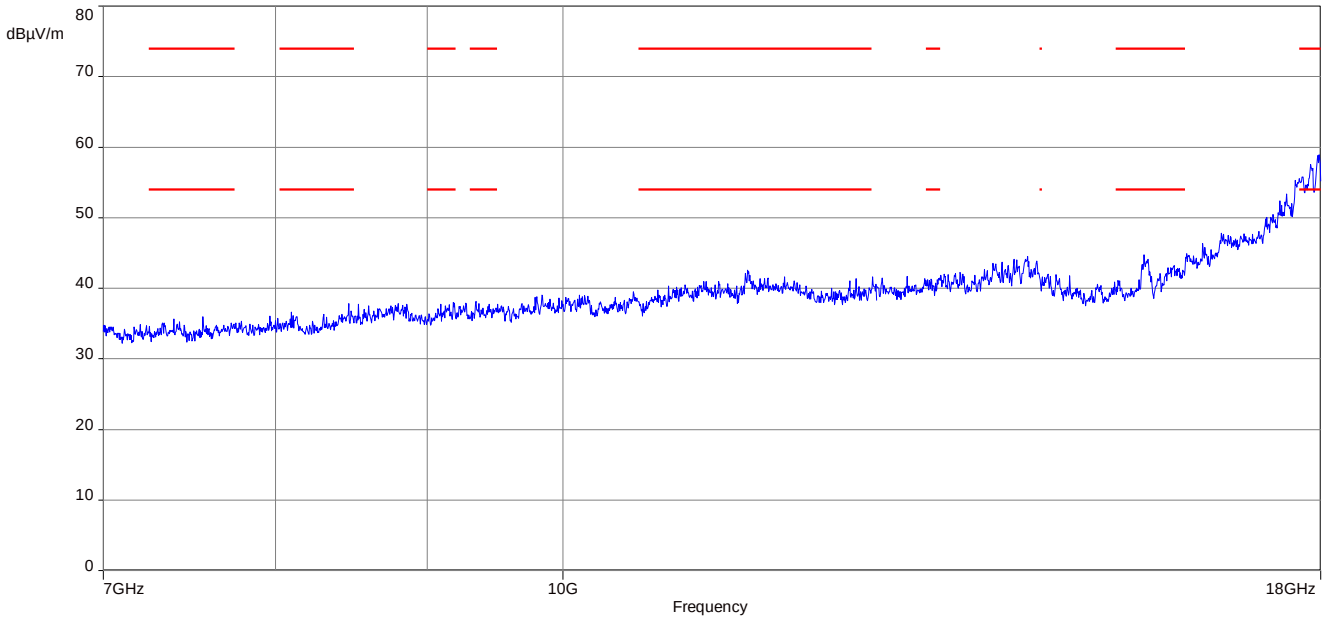


Plot 9: High channel, 1 GHz to 7 GHz, vertical & horizontal polarization

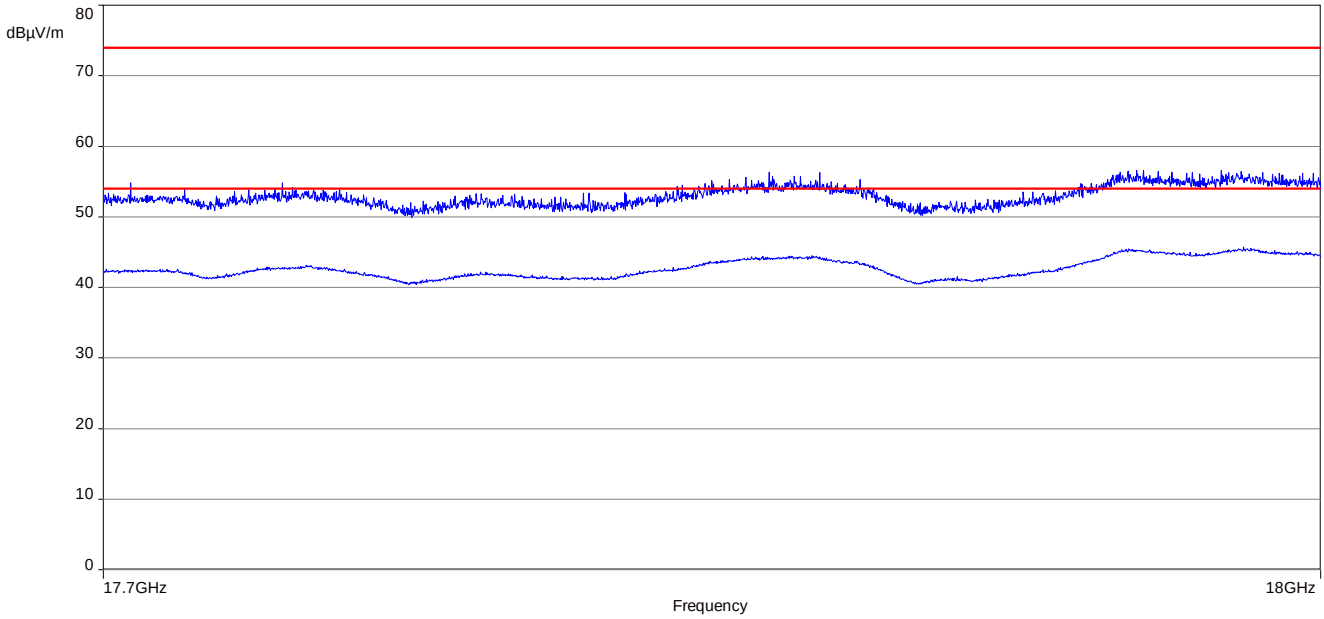


The carrier signal is notched with a 2.4 GHz band rejection filter.

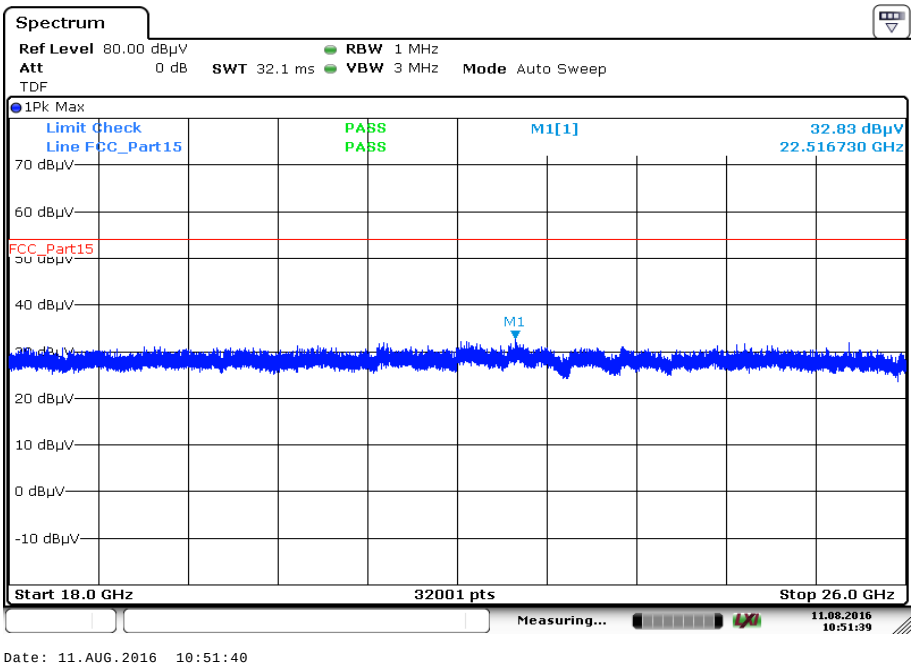
Plot 10: High channel, 7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



Plot 11: High channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization, peak & average

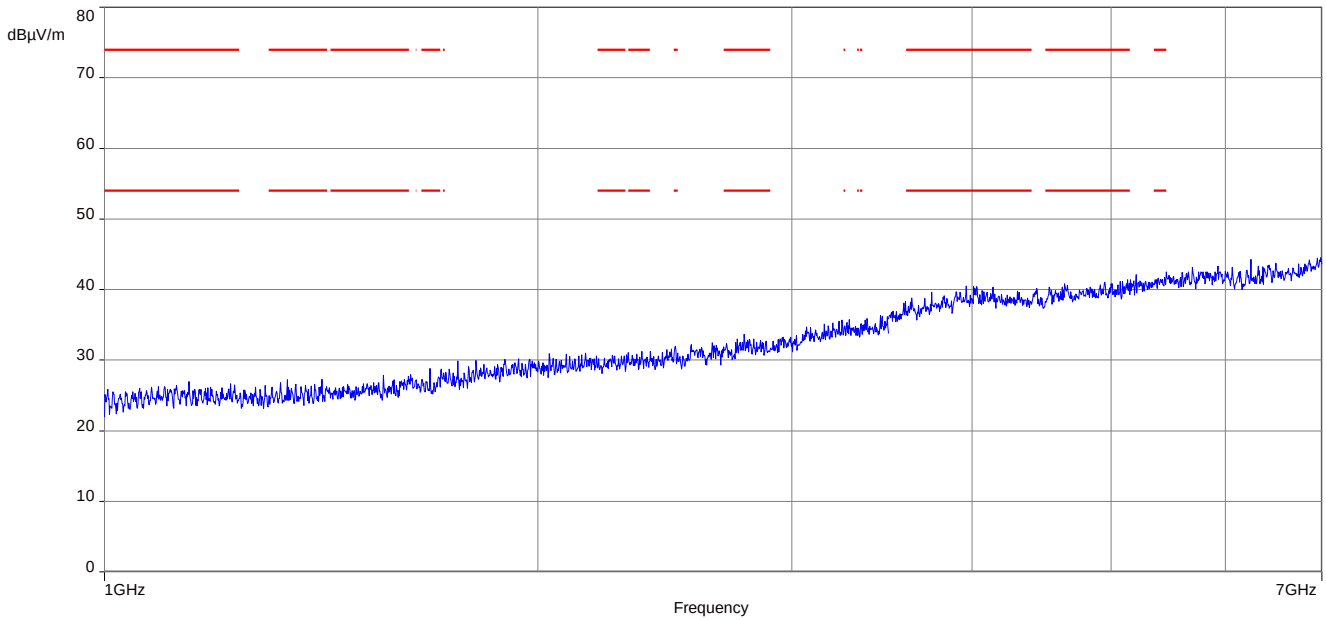


Plot 12: High channel, 18 GHz to 26 GHz, vertical & horizontal polarization



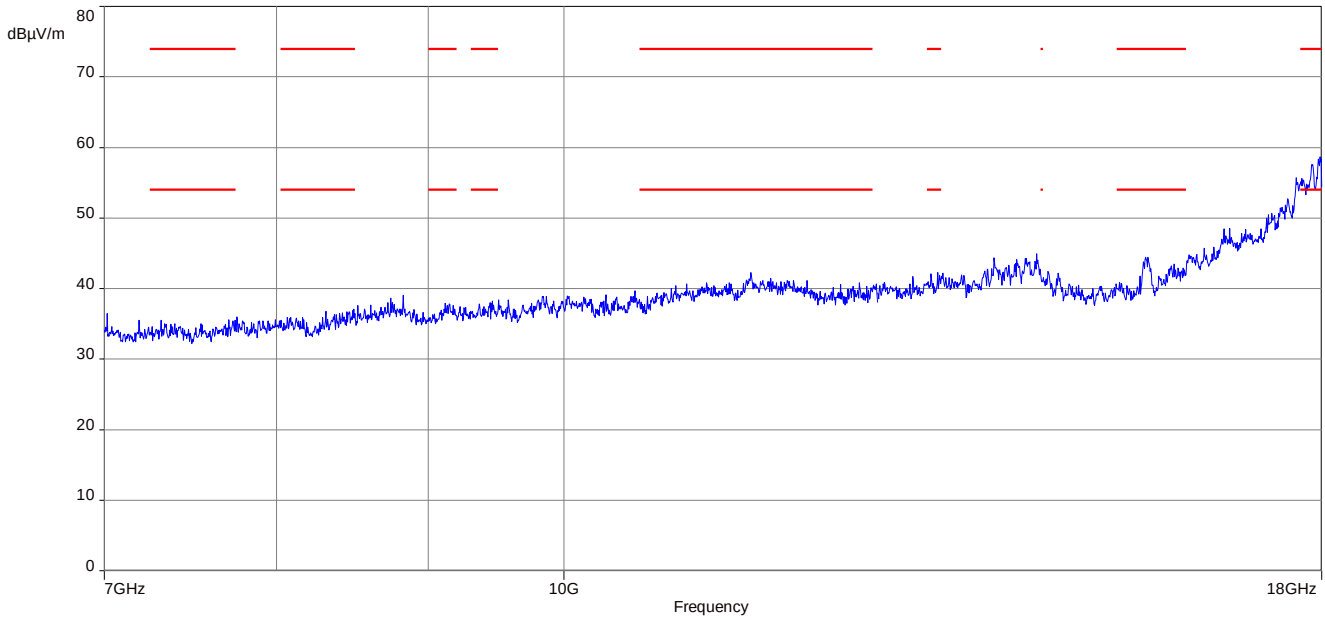
Plots: RX / idle mode, internal antenna port

Plot 1: 1 GHz to 7 GHz, vertical & horizontal polarization

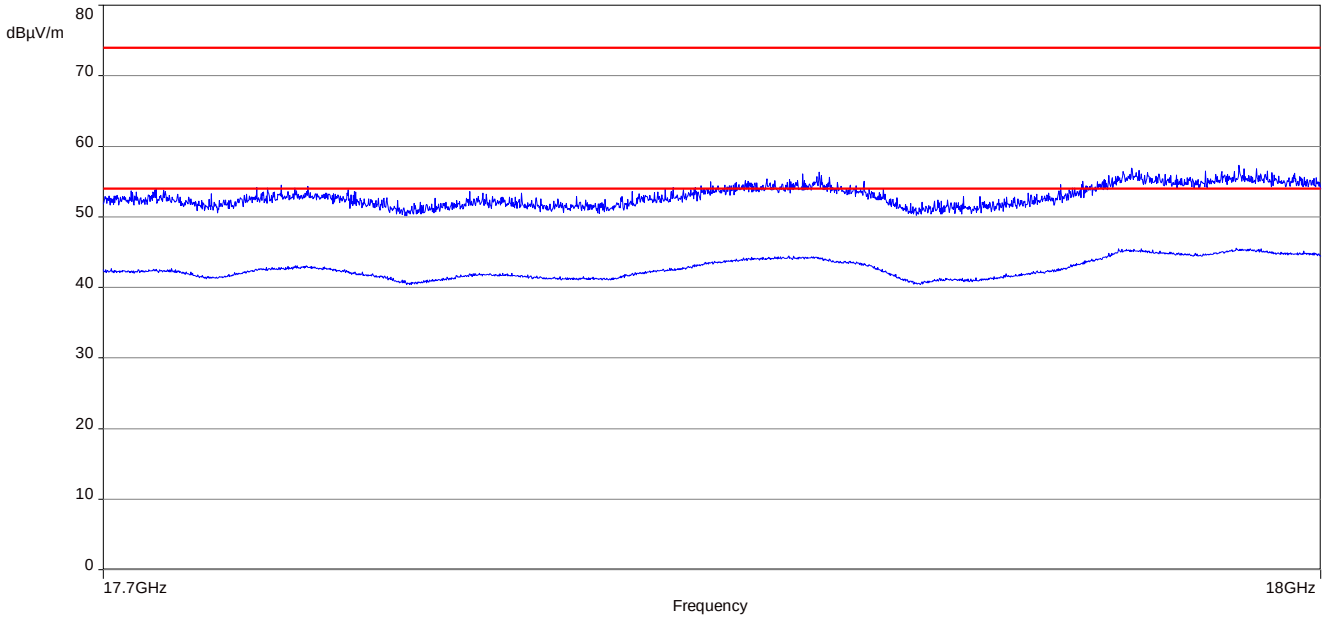


The carrier signal is notched with a 2.4 GHz band rejection filter.

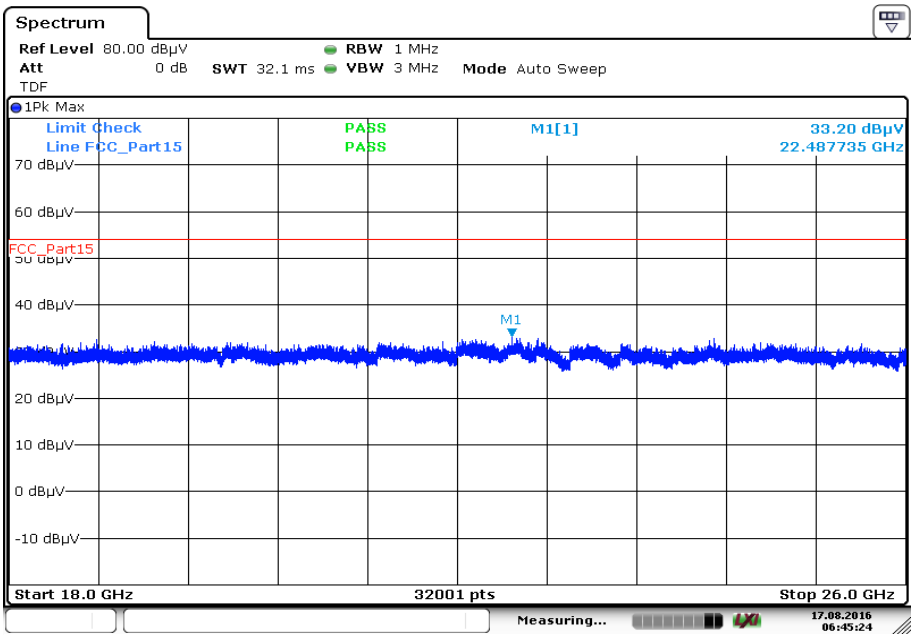
Plot 2: 7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



Plot 3: 17.7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



Plot 4: 18 GHz to 26 GHz, vertical & horizontal polarization



Results: DSSS, external antenna port

TX Spurious Emissions Radiated [dBµV/m]								
2412 MHz			2437 MHz			2462 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
1349	Peak	38.1	4063	Peak	60.0	4102	Peak	58.6
	AVG	26.1		AVG	53.4		AVG	51.0
4021	Peak	59.7	-/-	Peak	-/-	-/-	Peak	-/-
	AVG	52.3		AVG	-/-		AVG	-/-

Results: OFDM (20 MHz bandwidth), external antenna port

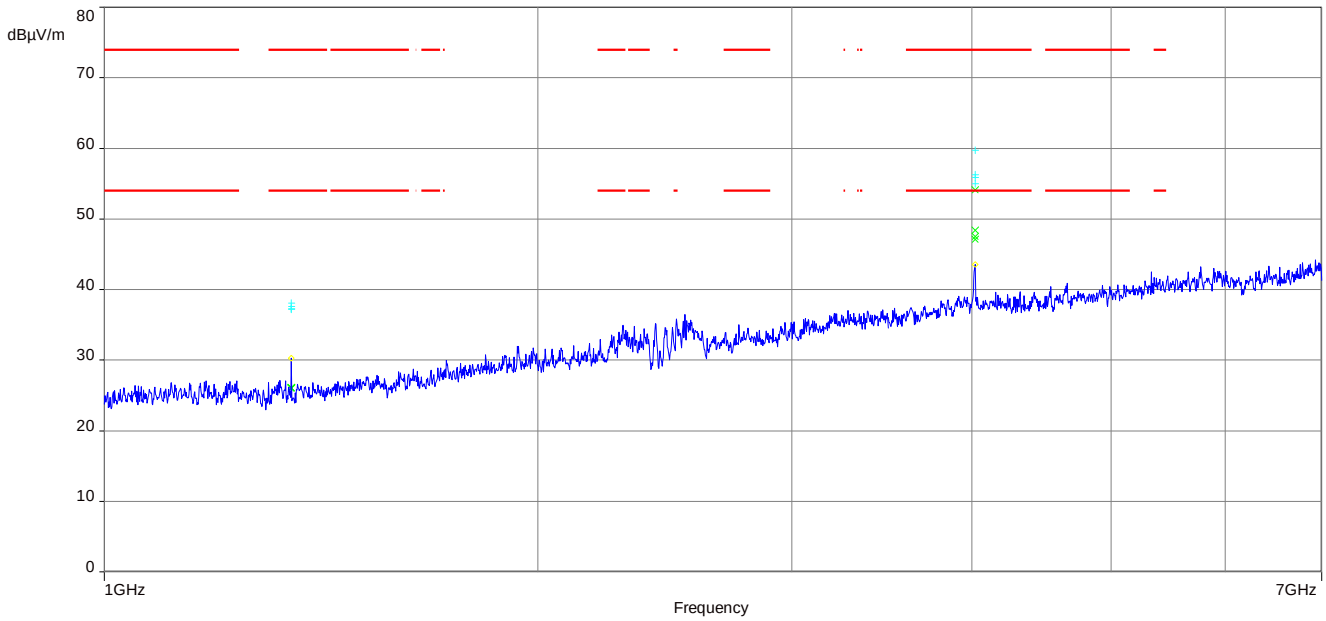
TX Spurious Emissions Radiated [dBµV/m]								
2412 MHz			2437 MHz			2462 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
All detected peak emissions are below the average limit.			All detected peak emissions are below the average limit.			All detected peak emissions are below the average limit.		
-/-	Peak	-/-	-/-	Peak	-/-	-/-	Peak	-/-
	AVG	-/-		AVG	-/-		AVG	-/-
-/-	Peak	-/-	-/-	Peak	-/-	-/-	Peak	-/-
	AVG	-/-		AVG	-/-		AVG	-/-

Results: RX / idle – mode, external antenna port

TX Spurious Emissions Radiated [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
All detected emissions are more than 20 dB below the limit.		
-/-	Peak	-/-
	AVG	-/-
-/-	Peak	-/-
	AVG	-/-

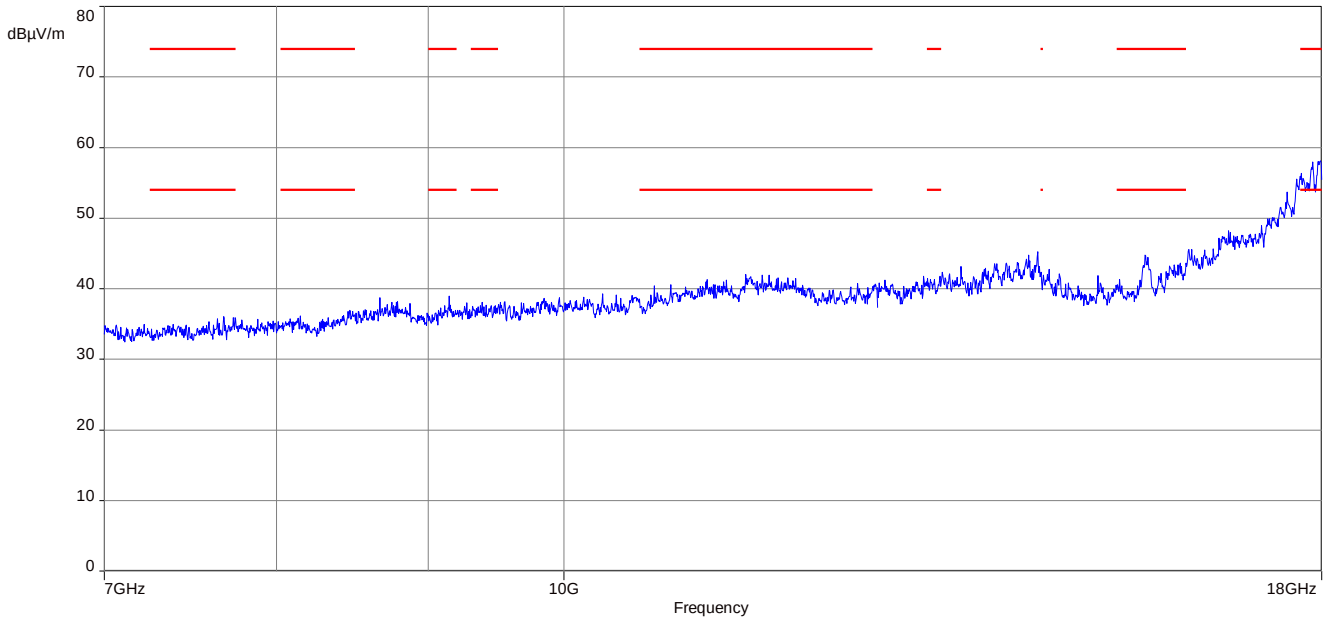
Plots: DSSS, external antenna port

Plot 1: Lowest channel, 1 GHz to 7 GHz, vertical & horizontal polarization

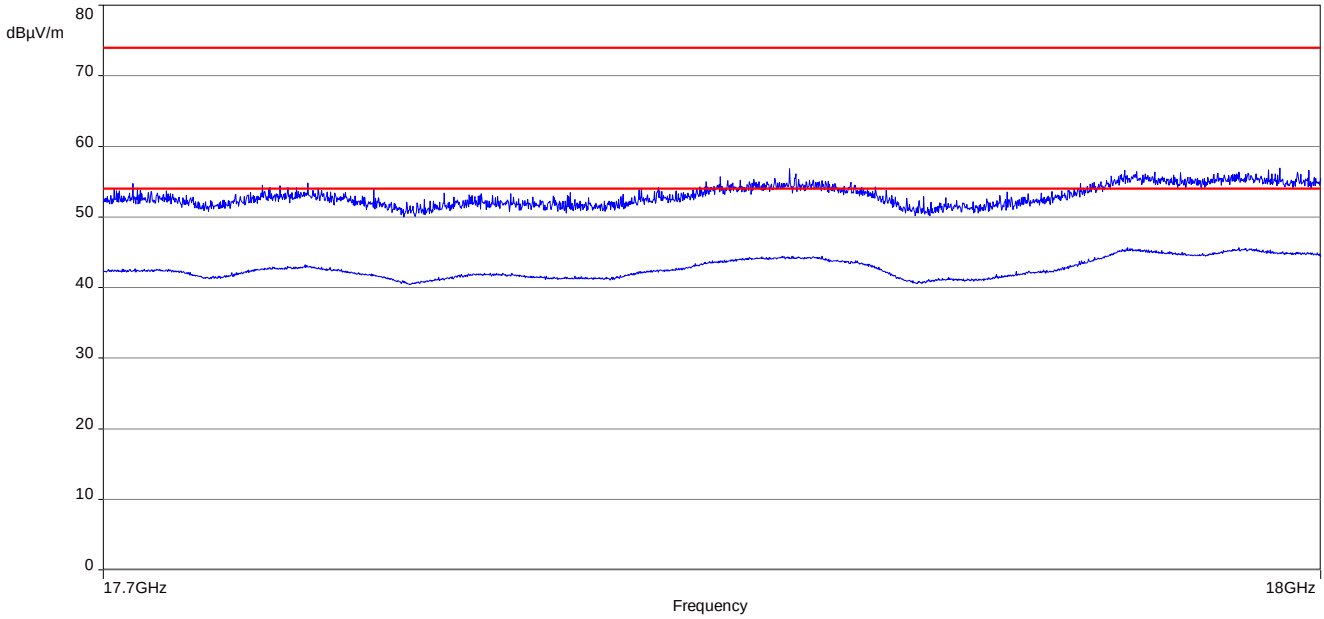


The carrier signal is notched with a 2.4 GHz band rejection filter.

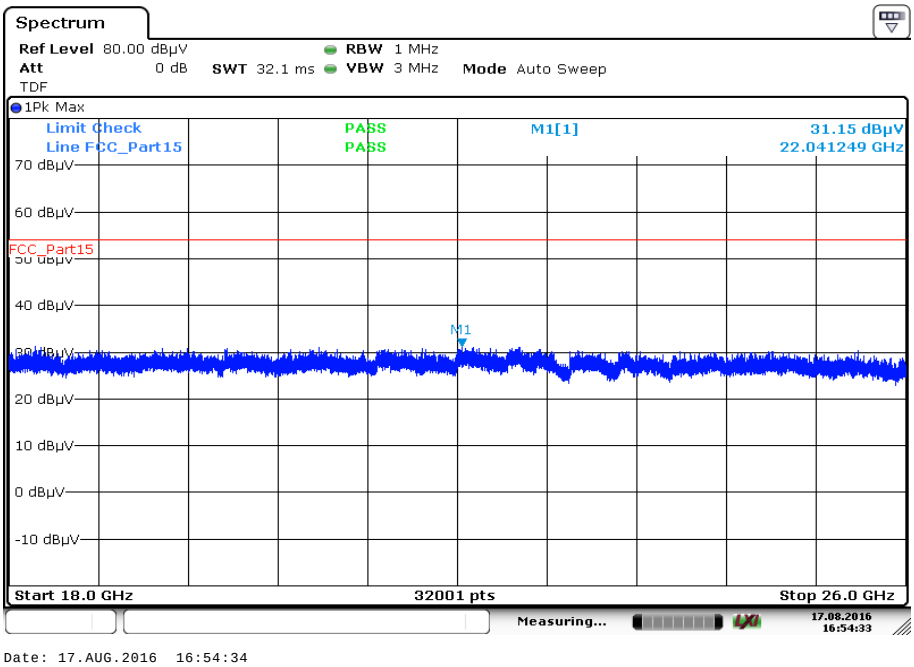
Plot 2: Lowest channel, 7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



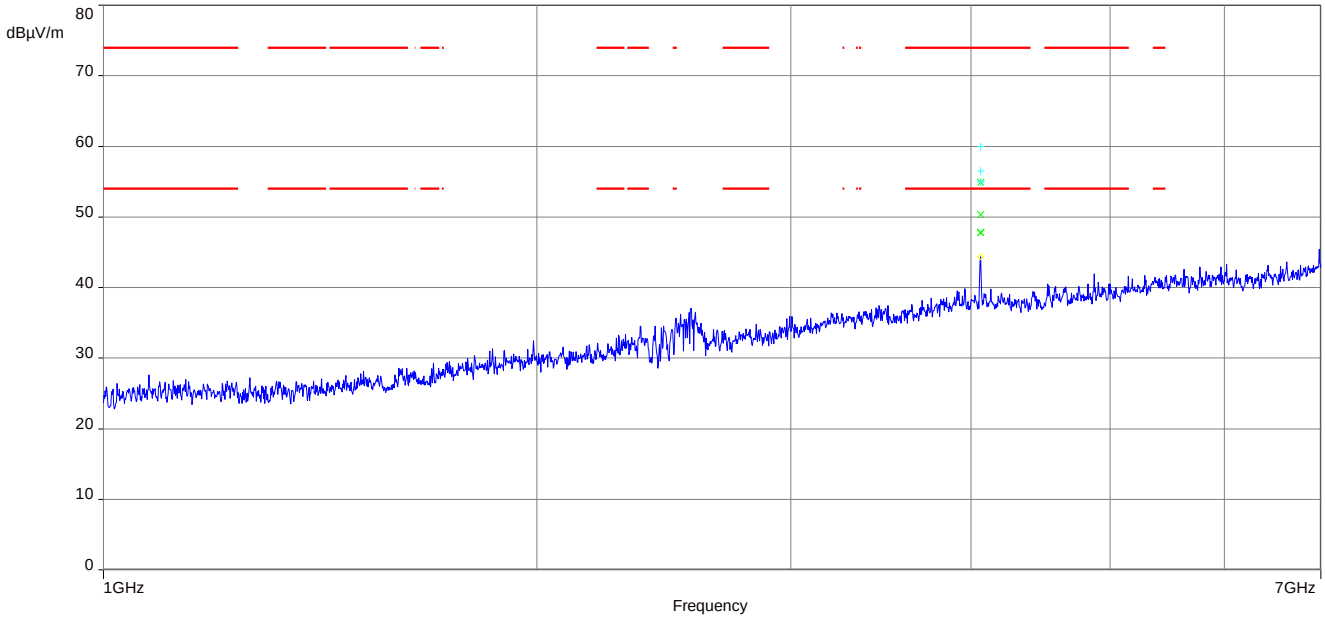
Plot 3: Lowest channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



Plot 4: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

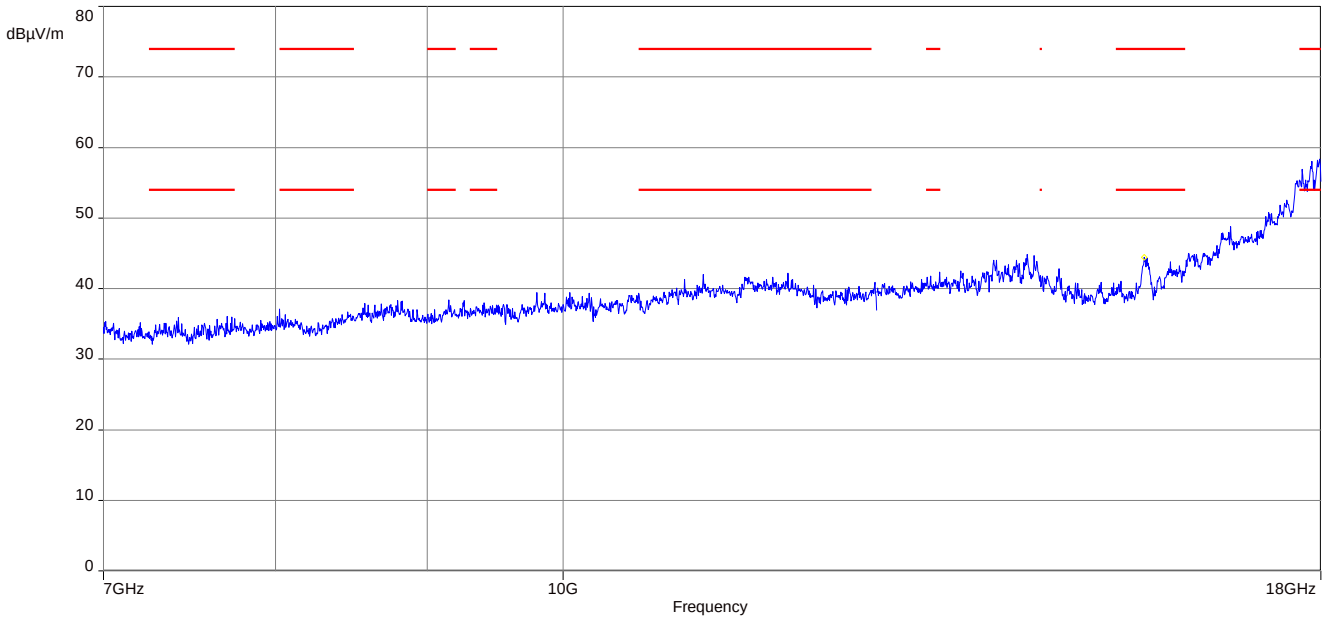


Plot 5: Mid channel, 1 GHz to 7 GHz, vertical & horizontal polarization

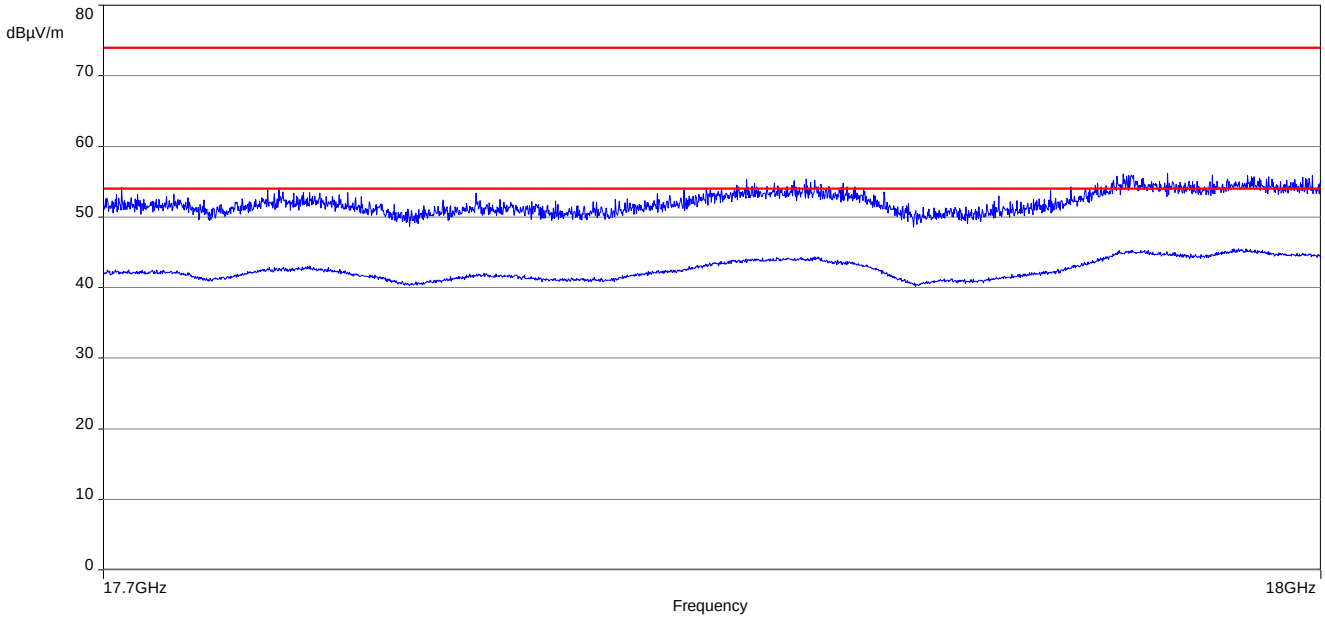


The carrier signal is notched with a 2.4 GHz band rejection filter.

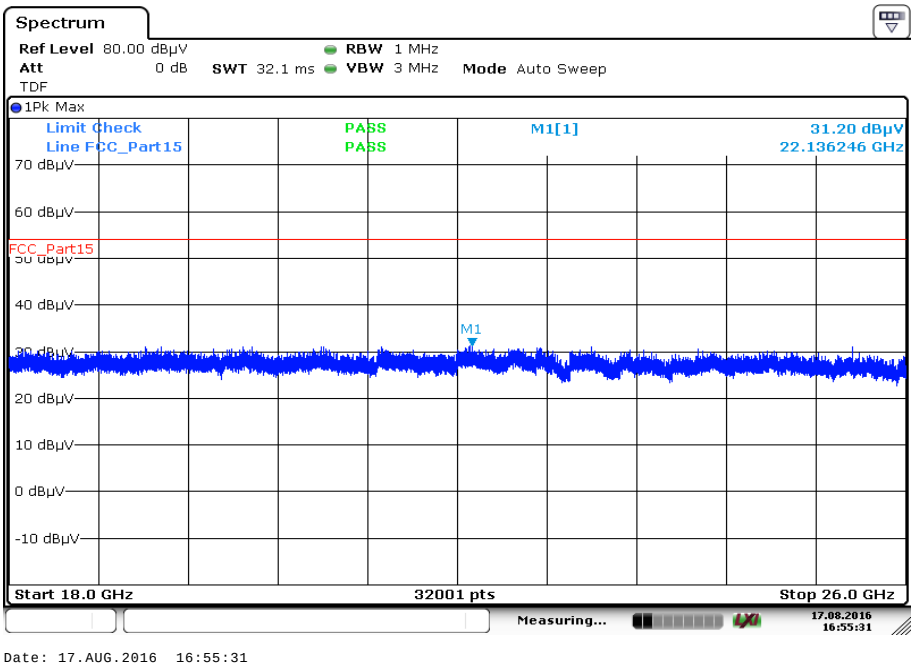
Plot 6: Mid channel, 7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



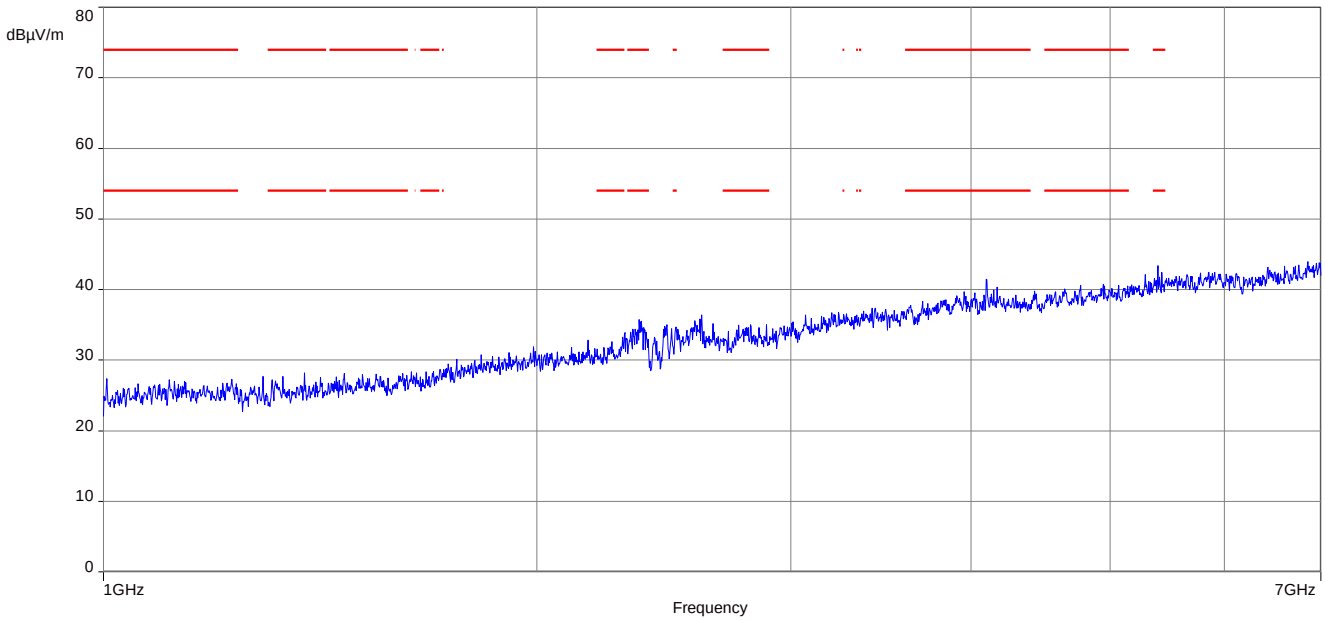
Plot 7: Mid channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



Plot 8: Mid channel, 18 GHz to 26 GHz, vertical & horizontal polarization

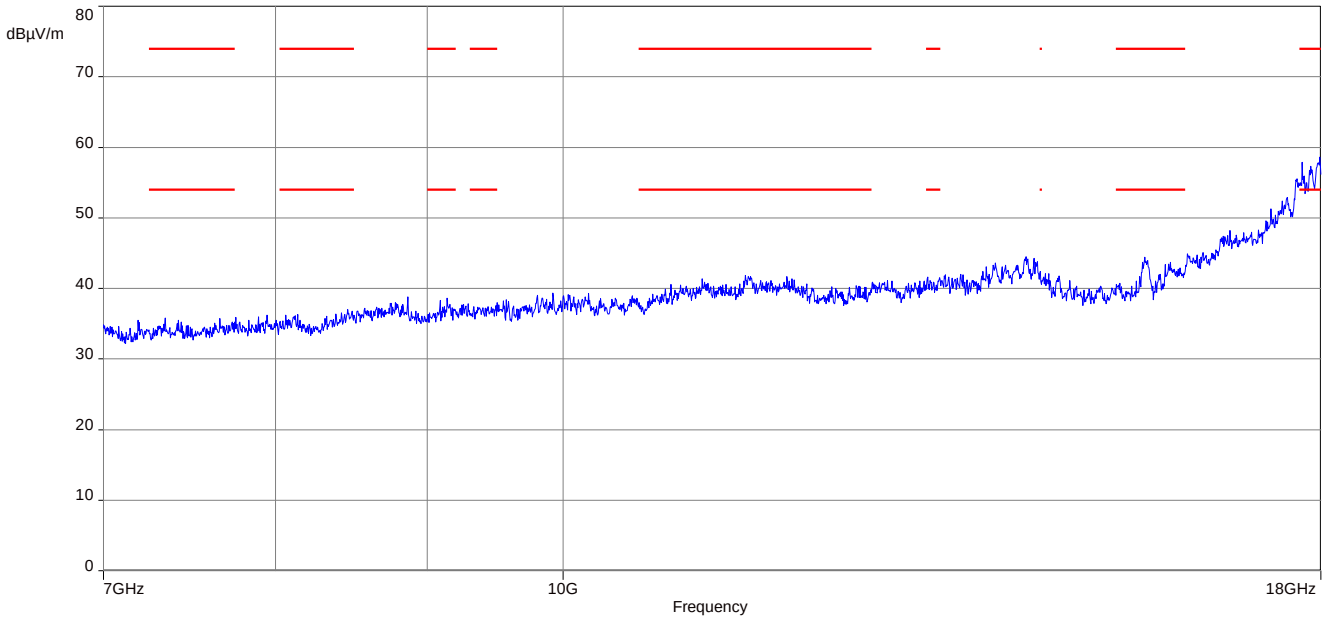


Plot 9: High channel, 1 GHz to 7 GHz, vertical & horizontal polarization

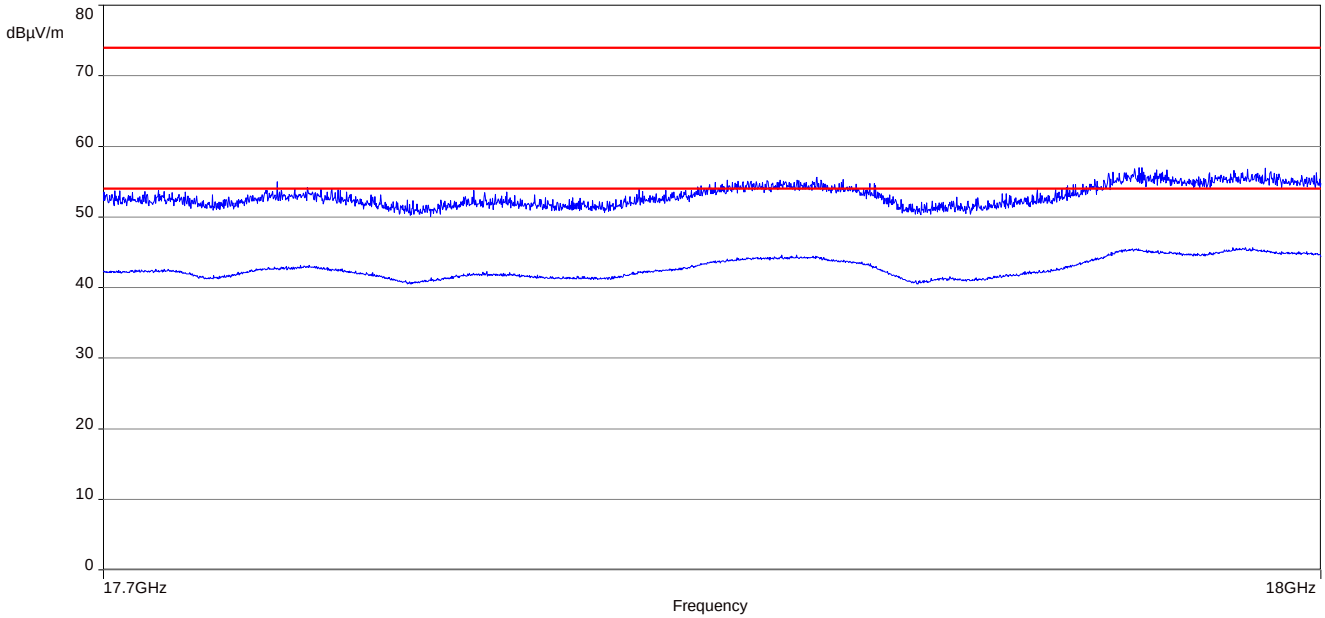


The carrier signal is notched with a 2.4 GHz band rejection filter.

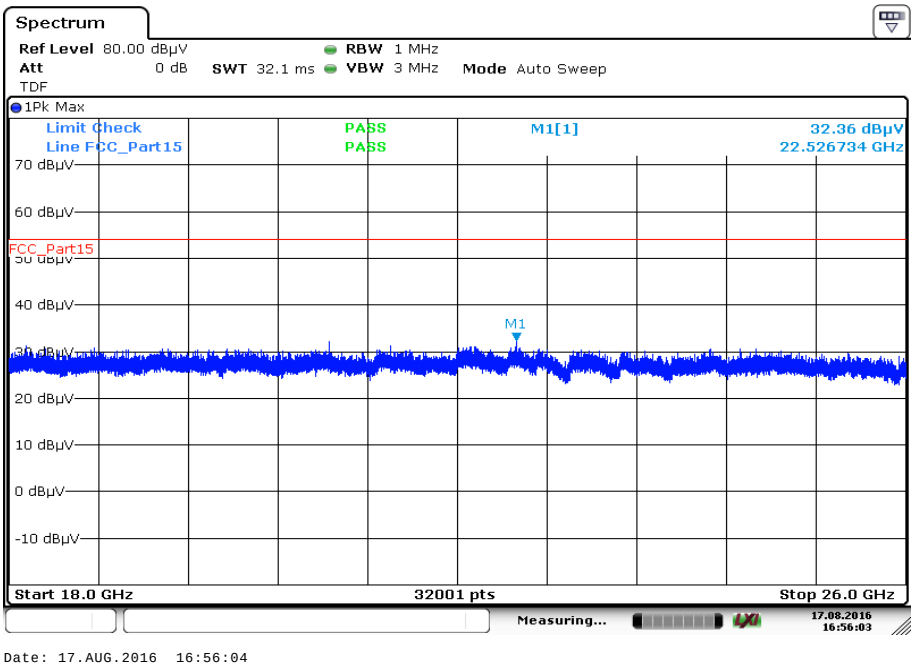
Plot 10: High channel, 7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



Plot 11: High channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization, peak & average

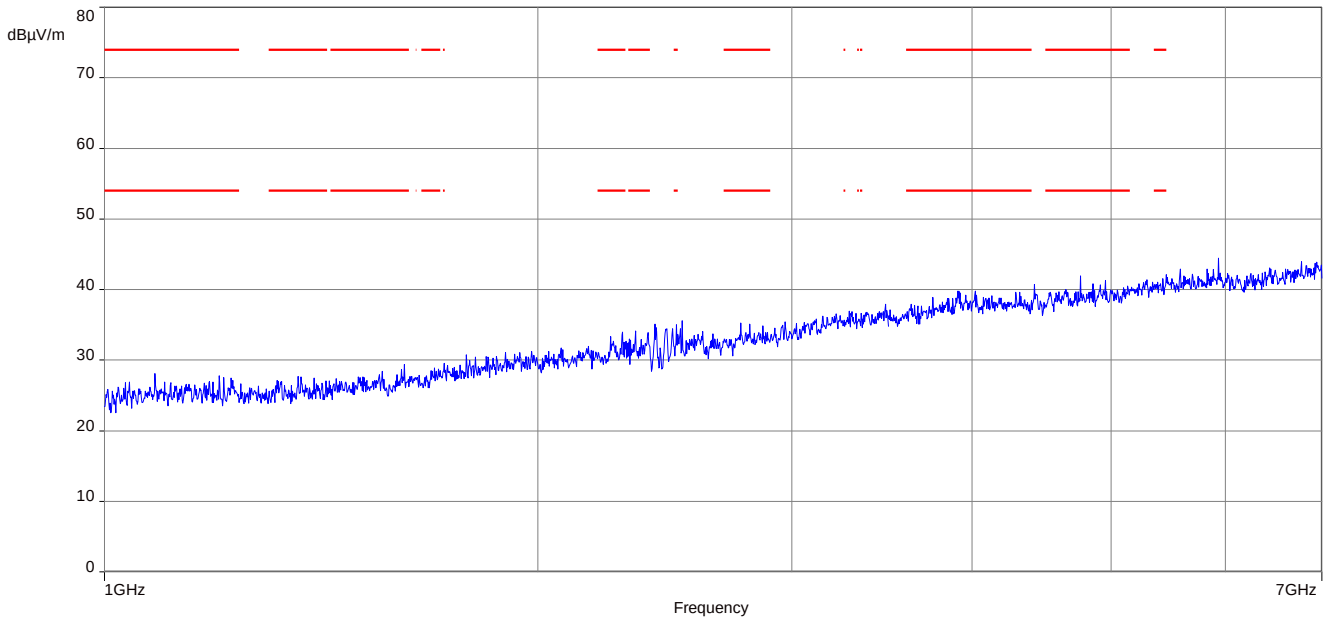


Plot 12: High channel, 18 GHz to 26 GHz, vertical & horizontal polarization



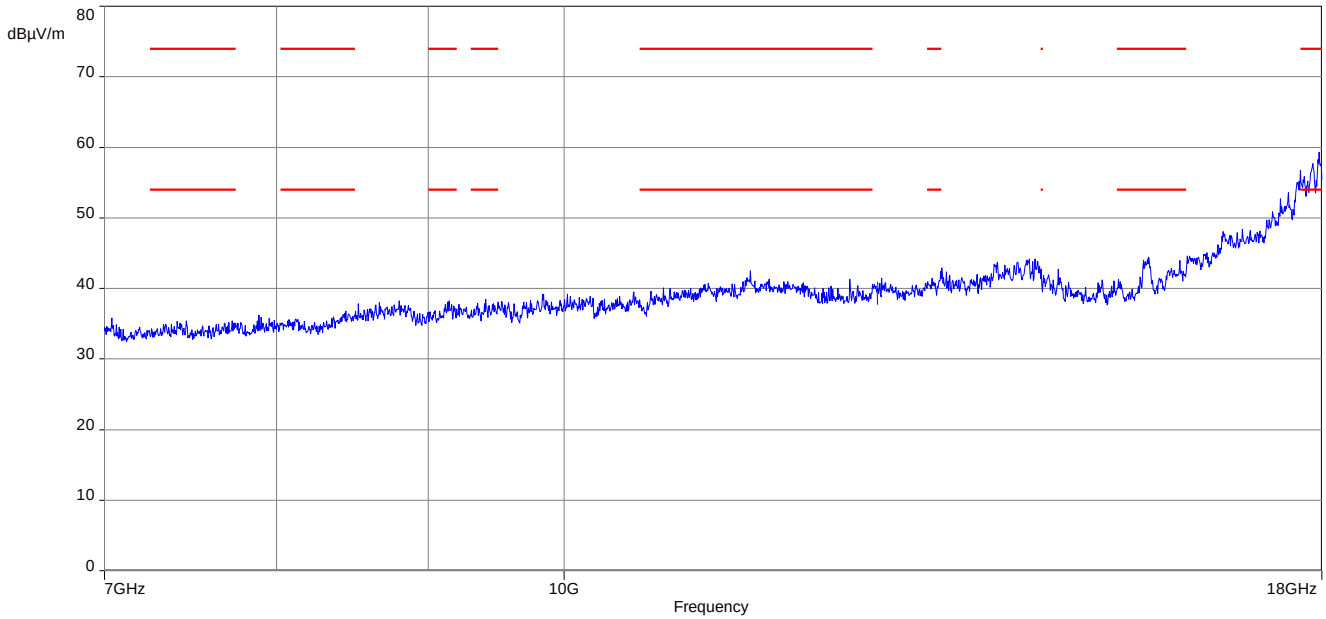
Plots: OFDM, external antenna port

Plot 1: Lowest channel, 1 GHz to 7 GHz, vertical & horizontal polarization

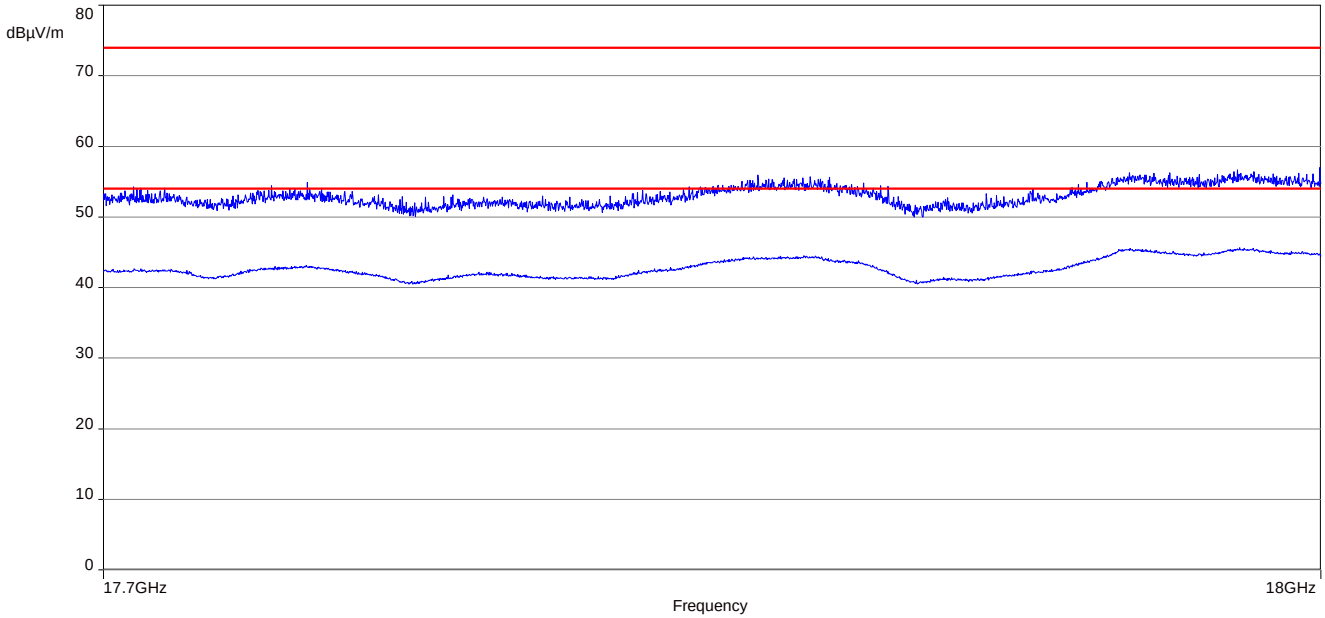


The carrier signal is notched with a 2.4 GHz band rejection filter.

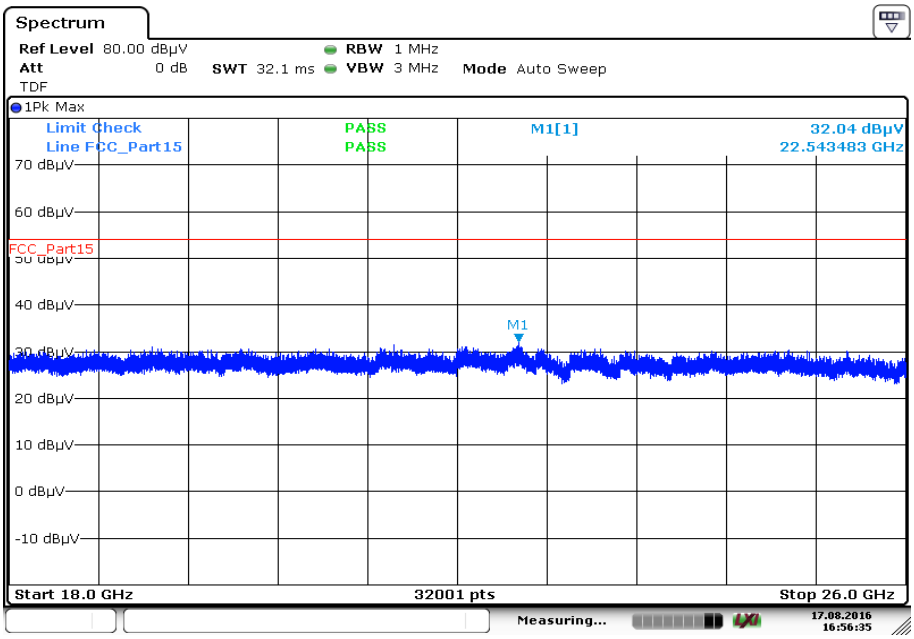
Plot 2: Lowest channel, 7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



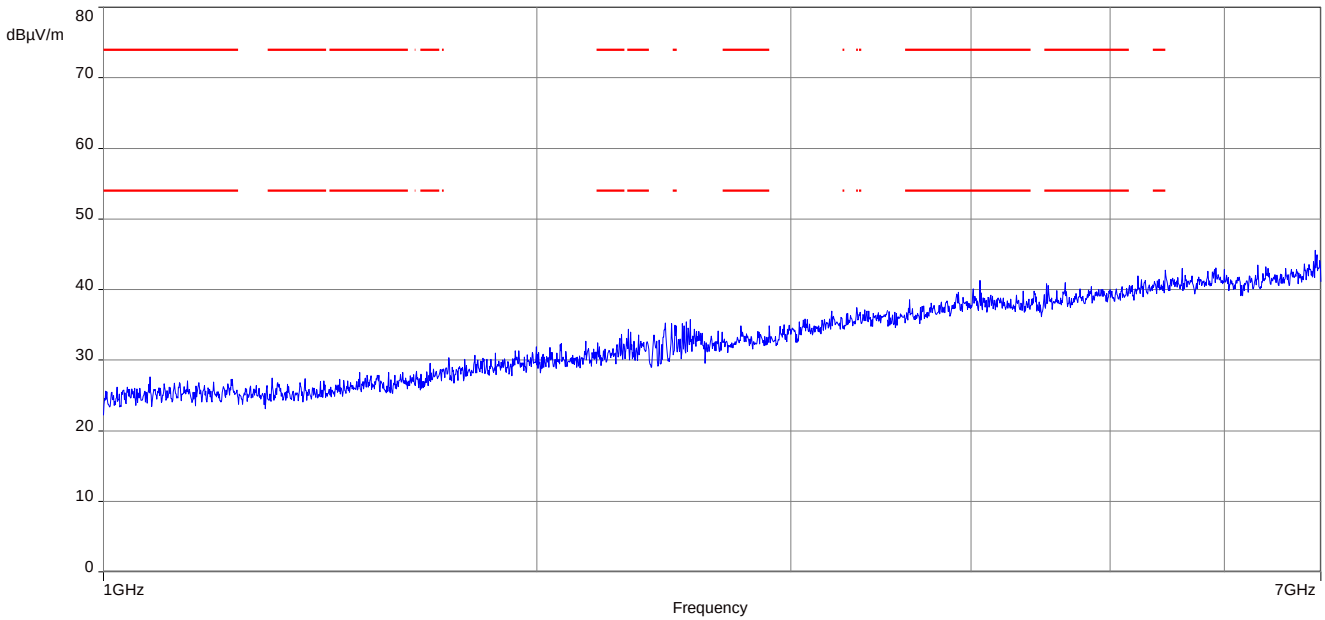
Plot 3: Lowest channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



Plot 4: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

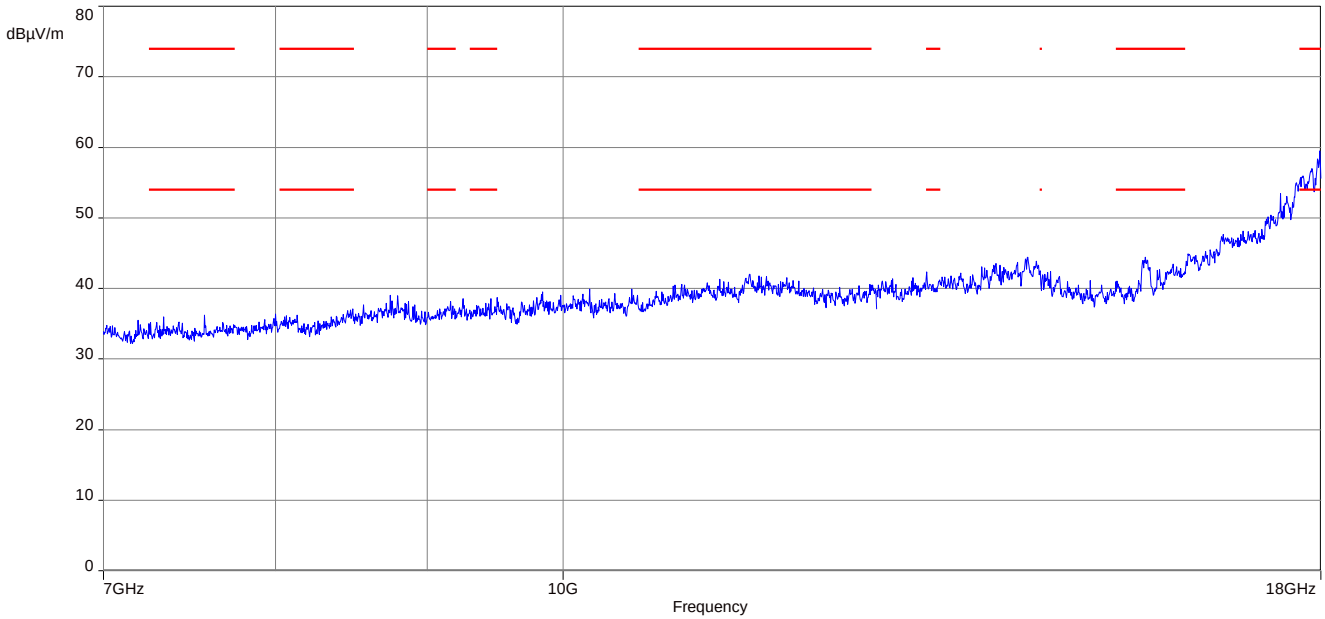


Plot 5: Mid channel, 1 GHz to 7 GHz, vertical & horizontal polarization

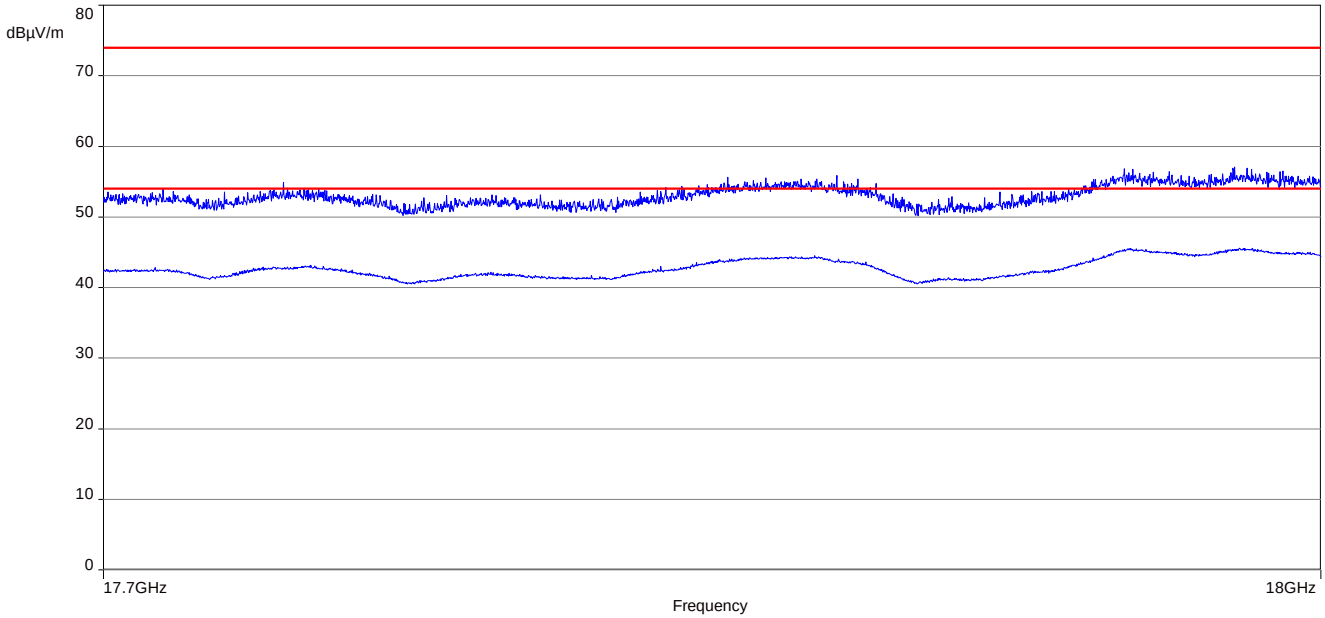


The carrier signal is notched with a 2.4 GHz band rejection filter.

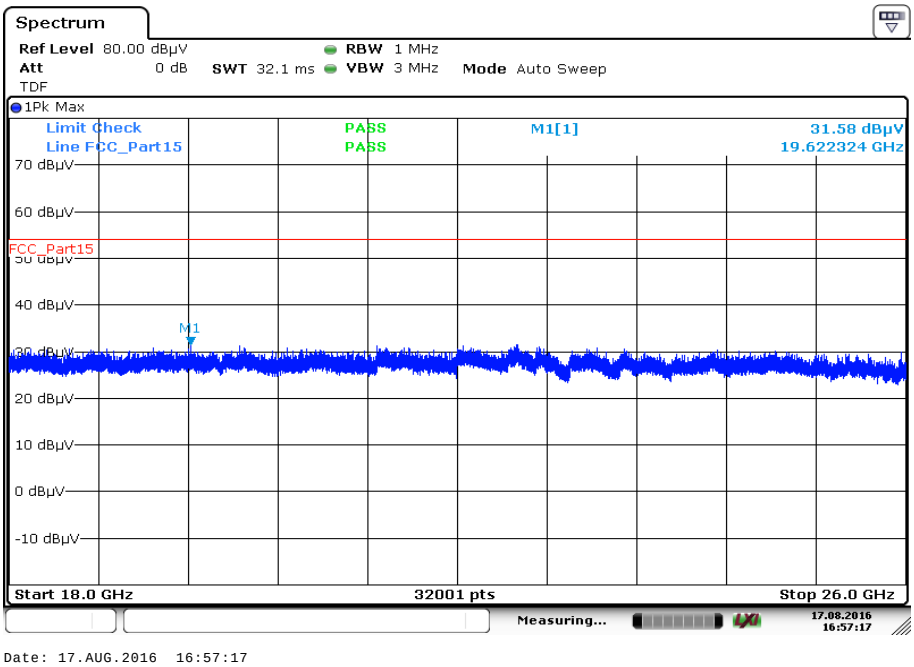
Plot 6: Mid channel, 7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



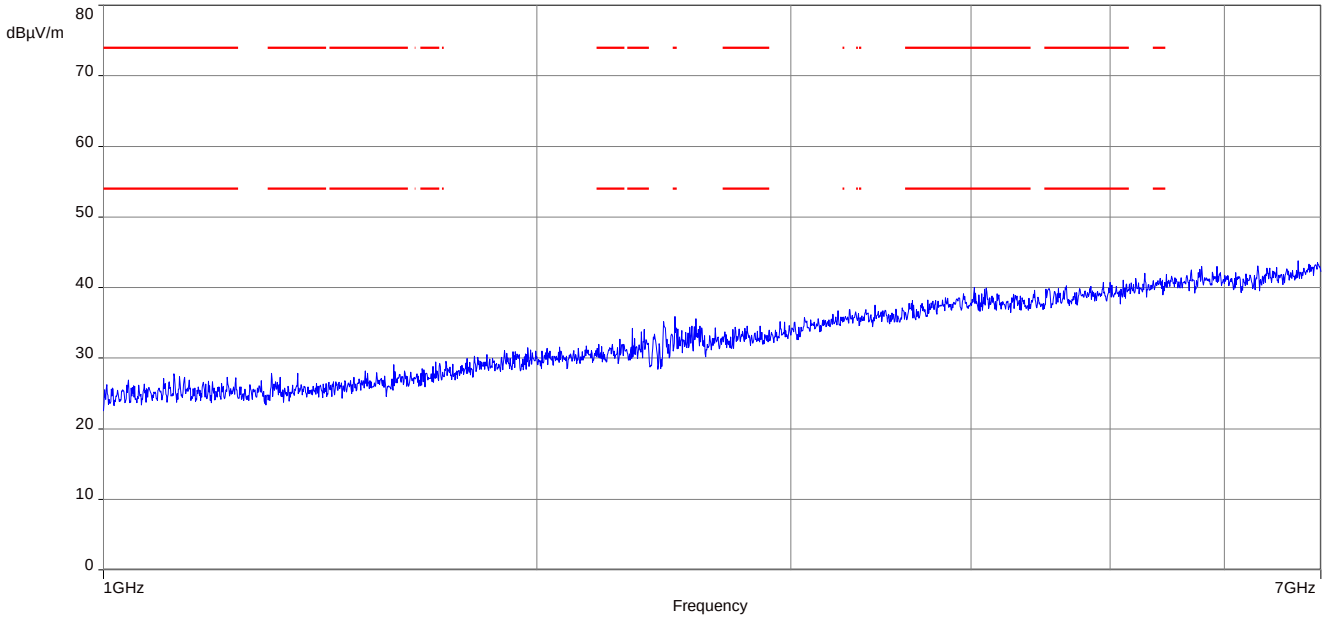
Plot 7: Mid channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



Plot 8: Mid channel, 18 GHz to 26 GHz, vertical & horizontal polarization

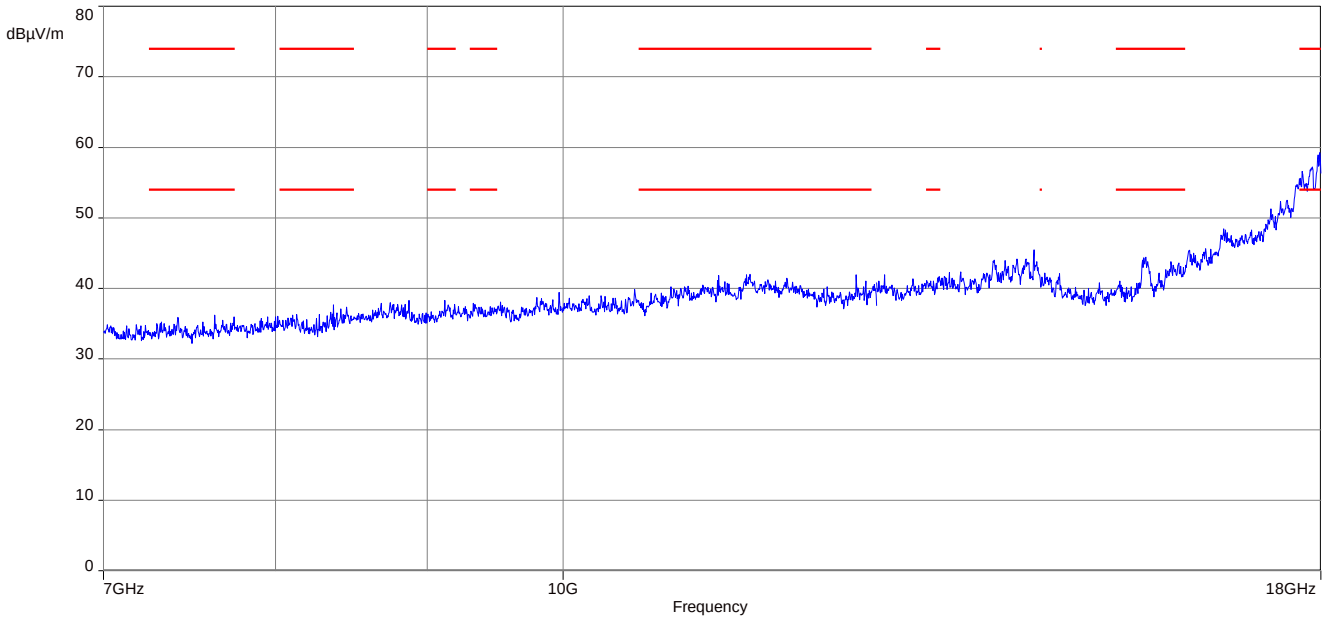


Plot 9: High channel, 1 GHz to 7 GHz, vertical & horizontal polarization

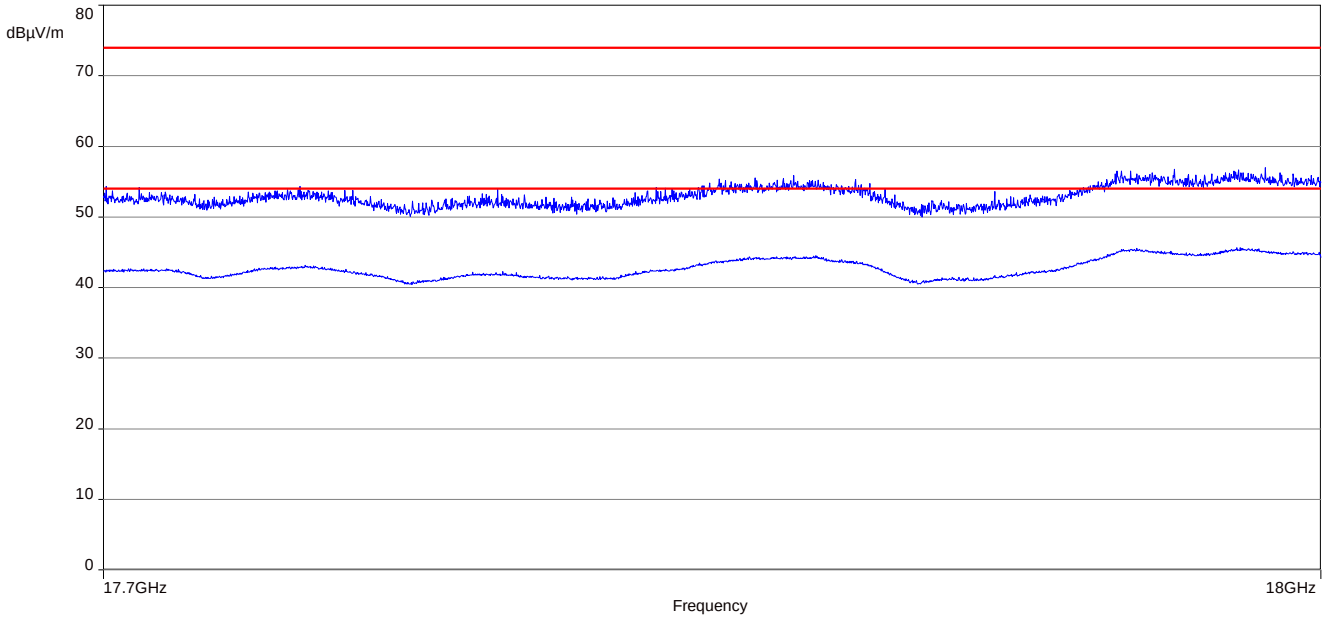


The carrier signal is notched with a 2.4 GHz band rejection filter.

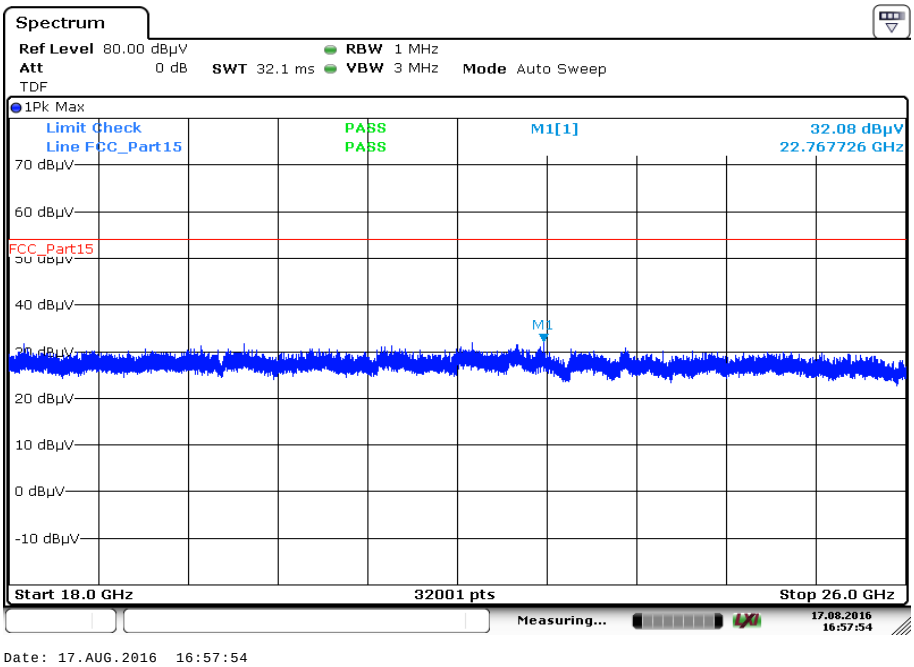
Plot 10: High channel, 7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



Plot 11: High channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization, peak & average

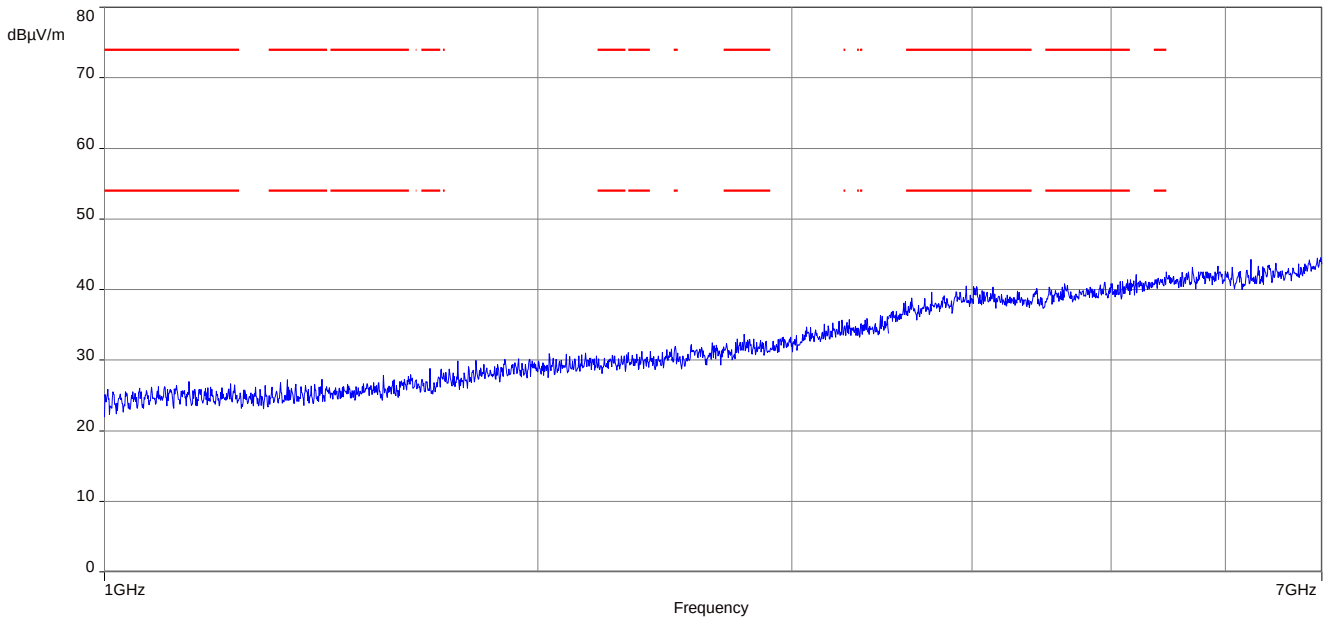


Plot 12: High channel, 18 GHz to 26 GHz, vertical & horizontal polarization



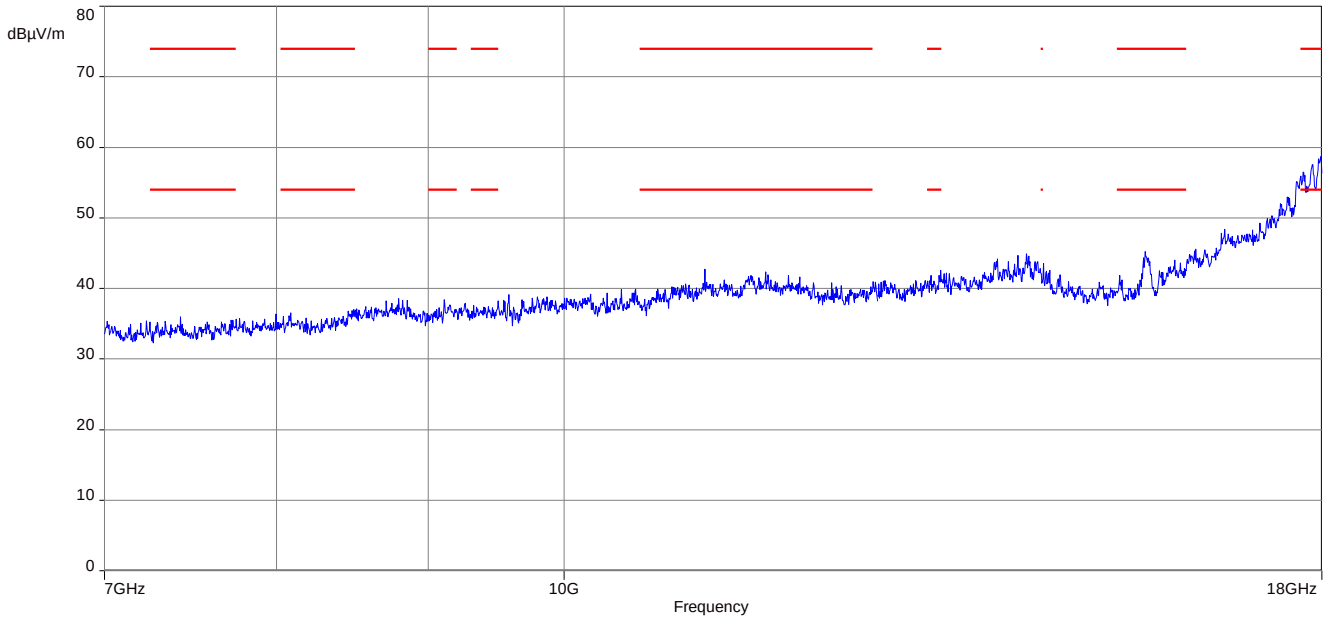
Plots: RX / idle mode, external antenna port

Plot 1: 1 GHz to 7 GHz, vertical & horizontal polarization

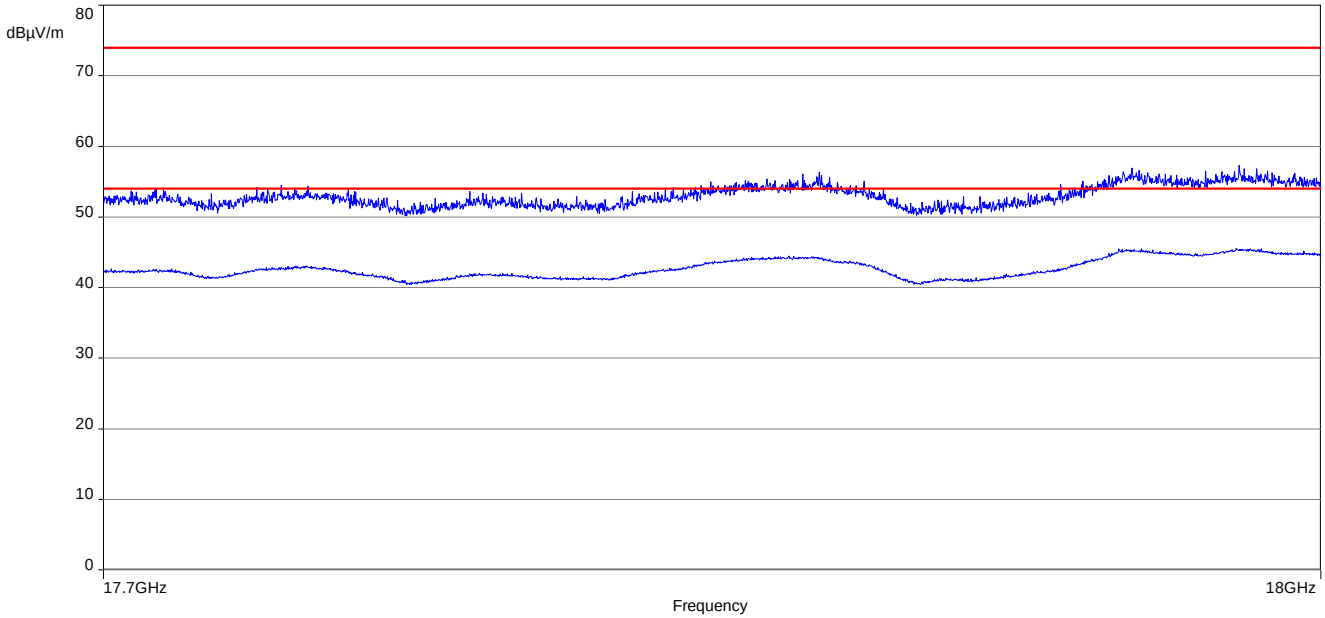


The carrier signal is notched with a 2.4 GHz band rejection filter.

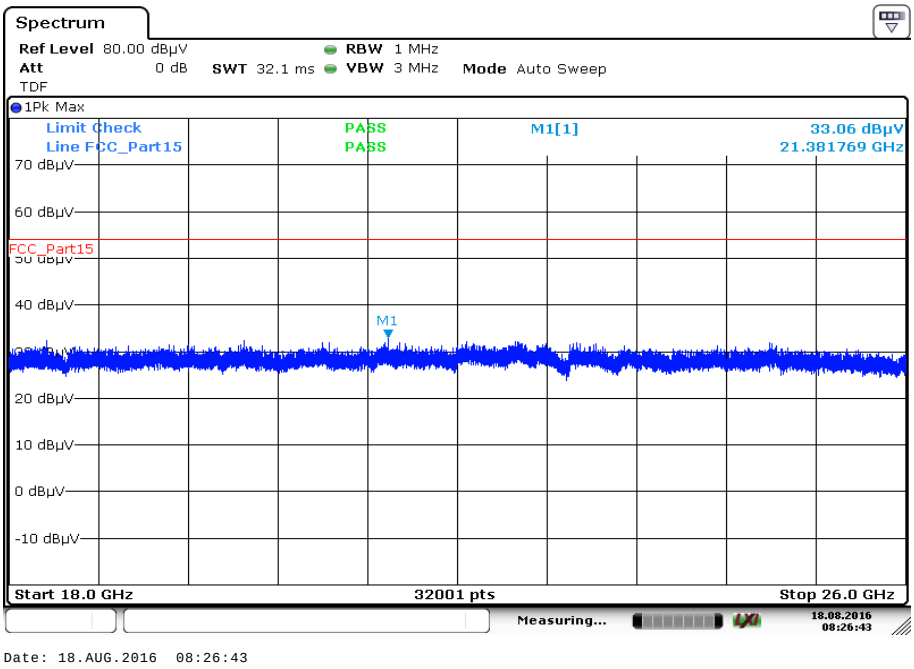
Plot 2: 7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



Plot 3: 17.7 GHz to 18 GHz, vertical & horizontal polarization, peak & average



Plot 4: 18 GHz to 26 GHz, vertical & horizontal polarization



13 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	2016-08-24
A	re-measurement of the maximum output power	2016-09-05

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

DAkkS
Deutsche Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

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

Akkreditierung

Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

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

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

Funk
Mobilfunk (GSM / DCS) + OTA
Elektromagnetische Verträglichkeit (EMV)
Produktsicherheit
SAR / EMF
Umwelt
Smart Card Technology
Bluetooth®
Automotive
Wi-Fi-Services
Kanadische Anforderungen
US-Anforderungen
Akustik
Near Field Communication (NFC)

Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Bescheid vom 04.05.2016 mit der Akkreditierungsnummer D-PL-12076-01 und ist gültig bis 17.01.2018. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 63 Seiten.

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

Frankfurt, 04.05.2016

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

Siehe Hinweise auf der Rückseite

Back side of certificate

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

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

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

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

Note:
The current certificate including annex can be received from CETECOM ICT Services GmbH on request.