

**CETECOM™**

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

## TEST REPORT

Test report no.: 1-9730/15-01-07



Deutsche  
Akkreditierungsstelle  
D-PL-12076-01-00

### Testing laboratory

**CETECOM ICT Services GmbH**

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**Accredited Testing Laboratory:**

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)

The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-00

### Applicant

**FLIR Systems AB**

Antennvägen 6

18715 Täby / SWEDEN

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### Manufacturer

**FLIR Systems AB**

Antennvägen 6

18715 Täby / SWEDEN

### 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

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

### Test Item

**Kind of test item:** Infrared camera

**Model name:** FLIR-T7250

**FCC ID:** ZLV-FLIRT7250

**IC:** 5306A-FLIRT7250

**Frequency:** DTS band 2400 MHz to 2483.5 MHz

**Technology tested:** WLAN (DSSS/b-mode; OFDM/g- & n HT20-mode)

**Antenna:** Integrated antenna

**Power supply:** 3.7 V DC by Li - Ion battery

**Temperature range:** -10°C to +55°C



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

### Test report authorised:

Andreas Luckenbill  
Lab Manager  
Radio Communications & EMC

### Test performed:

Marco Bertolino  
Lab Manager  
Radio Communications & EMC

**1 Table of contents**

1 Table of contents .....2

2 General information .....3

    2.1 Notes and disclaimer .....3

    2.2 Application details.....3

3 Test standard/s .....3

    3.1 Measurement guidance.....3

4 Test environment.....4

5 Test item .....4

    5.1 Additional information .....4

6 Test laboratories sub-contracted .....4

7 Description of the test setup .....5

    7.1 Shielded semi anechoic chamber.....6

    7.2 Shielded fully anechoic chamber .....7

    7.3 Radiated measurements > 12.75 GHz.....8

    7.4 AC conducted .....9

    7.5 Conducted measurements .....10

8 Measurement uncertainty .....11

9 Sequence of testing .....12

    9.1 Sequence of testing 9 kHz to 30 MHz .....12

    9.2 Sequence of testing 30 MHz to 1 GHz .....13

    9.3 Sequence of testing 1 GHz to 12.75 GHz .....14

    9.4 Sequence of testing above 12.75 GHz.....15

10 Summary of measurement results.....16

11 Additional comments .....17

12 Measurement results .....18

    12.1 Antenna gain .....18

    12.2 Identify worst case data rate.....19

    12.3 Maximum output power.....20

    12.4 DTS bandwidth.....27

    12.5 Occupied bandwidth.....34

    12.6 Band edge compliance radiated.....41

    12.7 Spurious emissions radiated below 30 MHz.....46

    12.8 Spurious emissions radiated 30 MHz to 1 GHz.....51

    12.9 Spurious emissions radiated above 1 GHz .....59

    12.10 Spurious emissions conducted below 30 MHz (AC conducted).....73

13 Observations .....80

Annex A Document history .....80

Annex B Further information.....80

Annex C Accreditation Certificate .....81

## 2 General information

### 2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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

### 2.2 Application details

Date of receipt of order:	2015-07-08
Date of receipt of test item:	2015-07-14
Start of test:	2015-07-14
End of test:	2015-07-17
Person(s) present during the test:	Mr. Göran Skedung

## 3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	-/-	Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices
RSS - 247 Issue 1	May 2015	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSS) and Licence - Exempt Local Area Network (LE-LAN) Devices

### 3.1 Measurement guidance

Guidance	Version	Description
DTS: KDB 558074 D01	v03r03	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:	$T_{nom}$	+22 °C during room temperature tests
	$T_{max}$	No tests under extreme conditions required.
	$T_{min}$	No tests under extreme conditions required.
Relative humidity content:		53 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	$V_{nom}$	3.7 V DC by Li - Ion battery
	$V_{max}$	No tests under extreme conditions required.
	$V_{min}$	No tests under extreme conditions required.

#### 5 Test item

Kind of test item	:	Infrared camera
Type identification	:	FLIR-T7250 (FLIR T1030SC)
PMN	:	FLIR-T7250
HVIN	:	FLIR-T7250
FVIN	:	-/-
HMN	:	-/-
S/N serial number	:	Radiated units: 72500037; 72400046
	:	Conducted unit: No information available!
HW hardware status	:	T198767-01
SW software status	:	RF test mode
Frequency band	:	DTS band 2400 MHz to 2483.5 MHz (lowest channel 2412 MHz; highest channel 2462 MHz)
Type of radio transmission	:	DSSS, OFDM
Use of frequency spectrum	:	
Type of modulation	:	BPSK, QPSK, 16 – QAM, 64 – QAM
Number of channels	:	11
Antenna	:	Integrated antenna
Power supply	:	3.7 V DC by Li - Ion battery
Temperature range	:	-10°C to +55°C

#### 5.1 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:

- 1-9730/15-01-01\_AnnexA
- 1-9730/15-01-01\_AnnexB
- 1-9730/15-01-01\_AnnexD

#### 6 Test laboratories sub-contracted

None

## 7 Description of the test setup

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

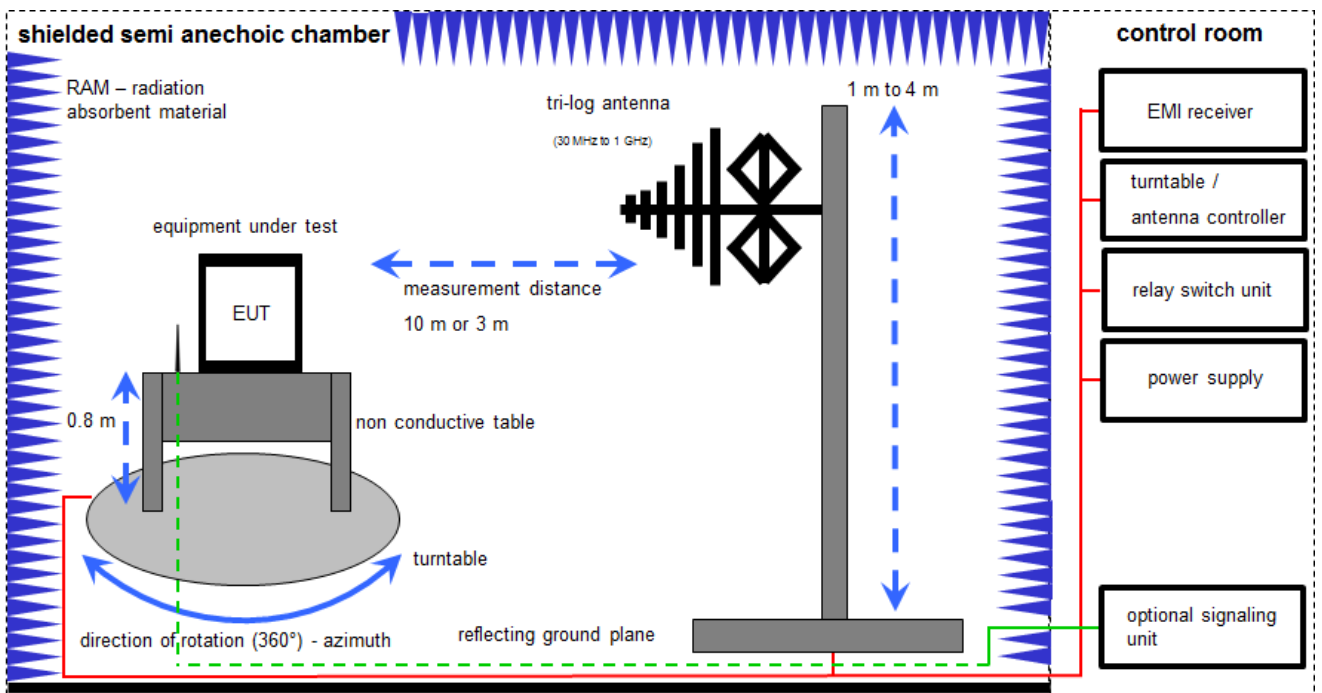
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

### **Agenda:** Kind of Calibration

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

### 7.1 Shielded semi anechoic chamber

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



$$SS = U_R + CL + AF$$

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

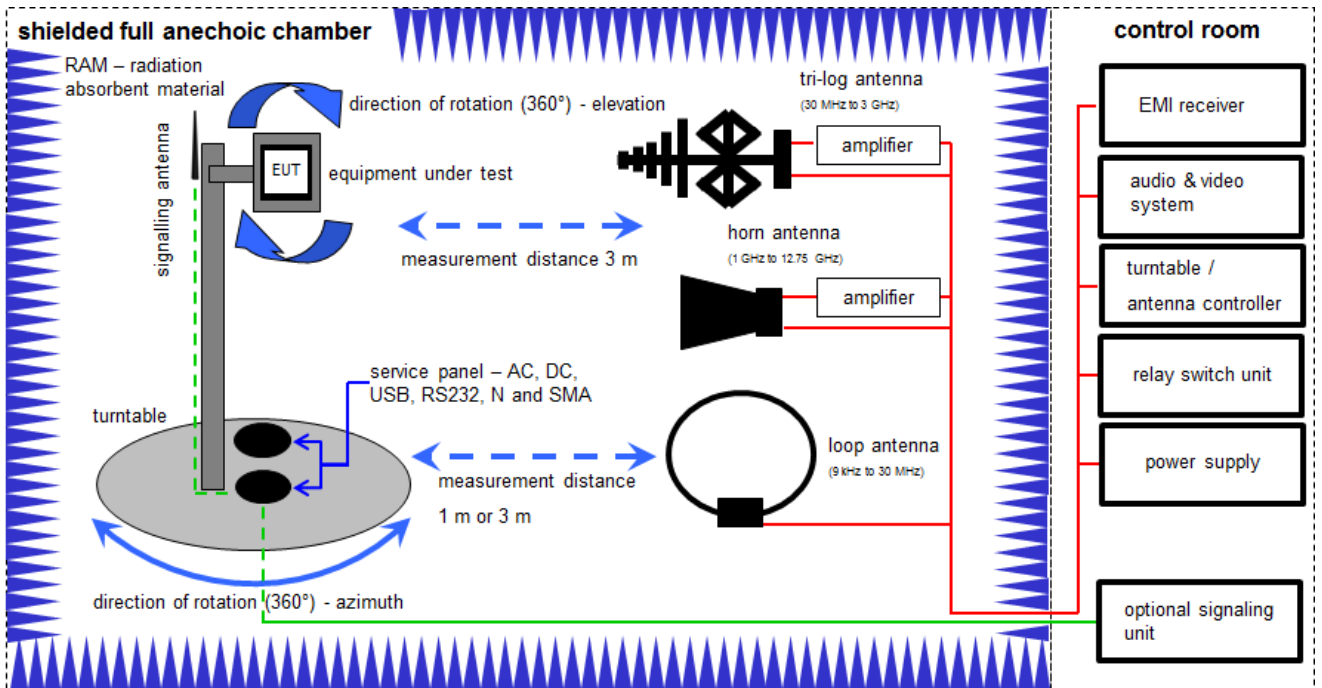
Example calculation:

$$SS \text{ [dB}\mu\text{V/m]} = 12.35 \text{ [dB}\mu\text{V/m]} + 1.90 \text{ [dB]} + 16.80 \text{ [dB}\mu\text{V/m]} = 31.05 \text{ [dB}\mu\text{V/m]} \text{ (35.69 } \mu\text{V/m)}$$

**Equipment table:**

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

## 7.2 Shielded fully anechoic chamber



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

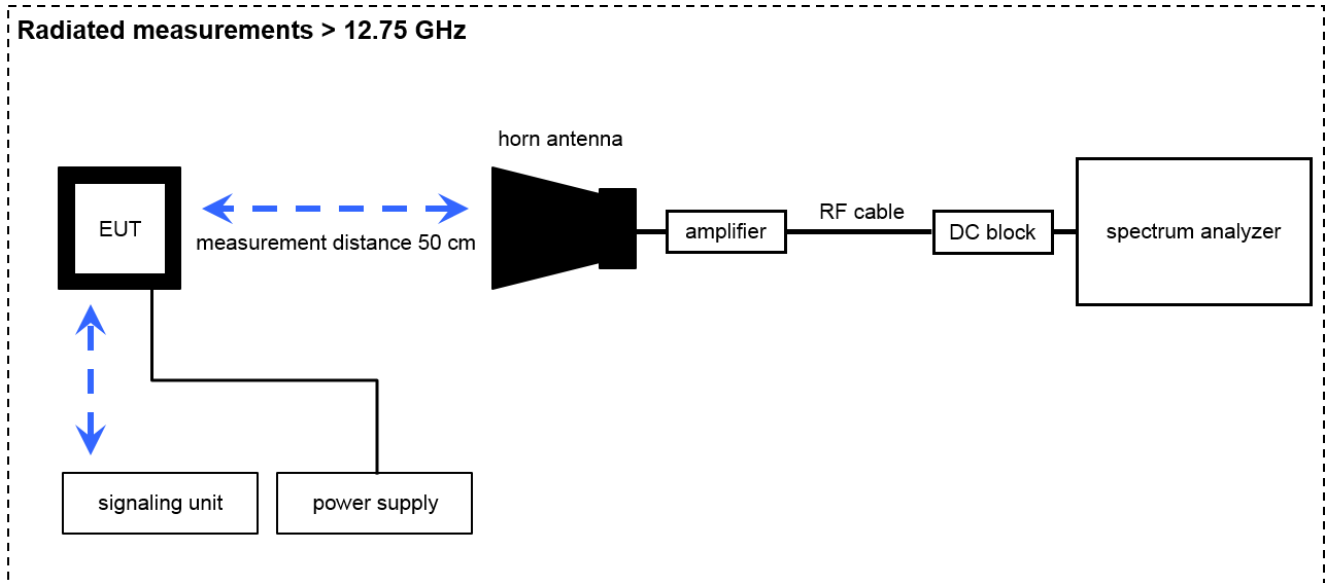
Example calculation:

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

**Equipment table:**

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A,C	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	9709-5290	300000212	k	23.07.2013	23.07.2015
2	A,B	EMI Test Receiver 20Hz- 26,5GHz	ESU26	R&S	100037	300003555	k	22.01.2015	22.01.2016
3	A,C	Highpass Filter	WHK1.1/15G-10SS	Wainwright	37	400000148	ne	22.04.2014	22.04.2017
4	A	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne	-/-	-/-
5	A	Band Reject Filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	26	300003792	ne	-/-	-/-
6	A	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	318	300003696	k	22.04.2014	22.04.2017
7	A,C	Broadband Amplifier 0.5-18 GHz	CBLU5184540	CERNEX	22050	300004482	ev	-/-	-/-
8	A	Broadband Amplifier	CBLU5135235	CERNEX	22011	300004492	ev	-/-	-/-
9	A,C	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000032	300004510	ne	-/-	-/-
10	A,B,C	Messrechner und Monitor	Intel Core i3 3220/3,3 GHz, Prozessor	Agilent Technologies	2V2403033A54 21	300004591	ne	-/-	-/-
11	A,B,C	NEXIO EMV-Software	BAT EMC	EMCO	2V2403033A54 21	300004682	ne	-/-	-/-
12	B	Active Loop Antenna 10 kHz to 30 MHz	6502	Kontron Psychotech	8905-2342	300000256	k	24.06.2015	24.06.2017

### 7.3 Radiated measurements > 12.75 GHz



$$SS = U_R + CA + AF$$

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

Example calculation:

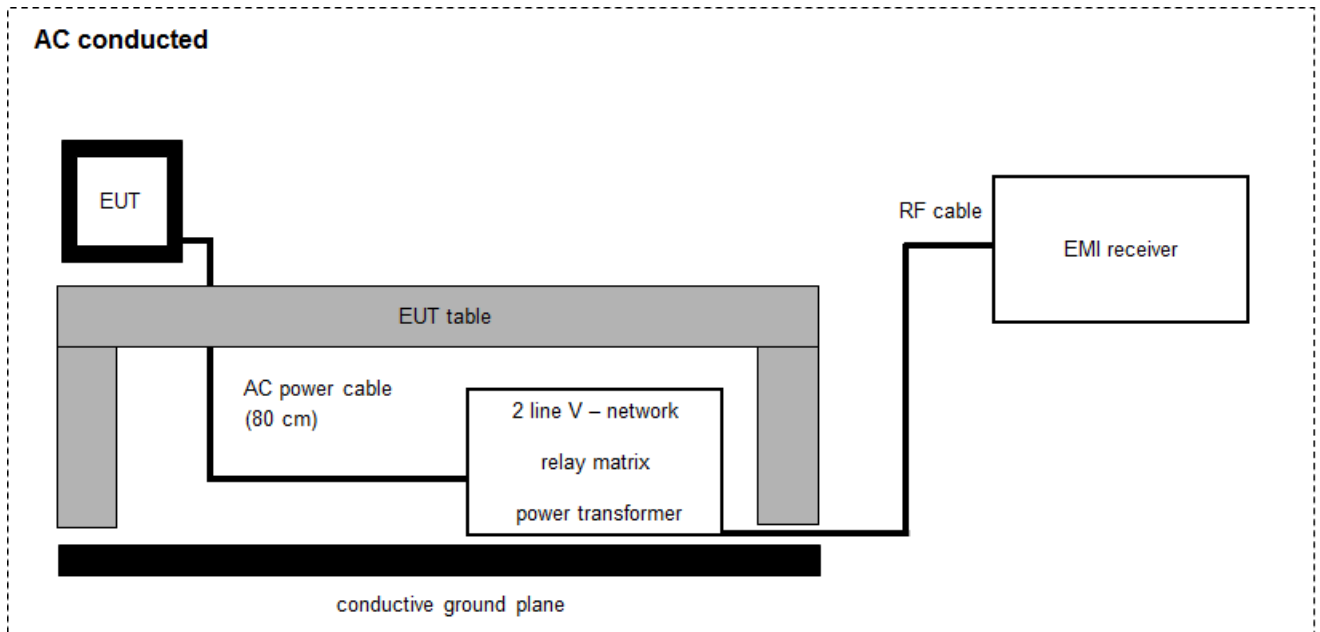
$$SS \text{ [dB}\mu\text{V/m]} = 40.0 \text{ [dB}\mu\text{V/m]} + (-60.1) \text{ [dB]} + 36.74 \text{ [dB}\mu\text{V/m]} = 16.64 \text{ [dB}\mu\text{V/m]} \text{ (6.79 } \mu\text{V/m)}$$

Equipment table:

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda	8402	300000787	k	22.07.2013	22.07.2015
2	A	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	8205	300002442	k	19.07.2013	19.07.2015
3	A	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	22.01.2015	22.01.2016
4	A	Amplifier 2-40 GHz	JS32-02004000-57-5P	MITEQ	1777200	300004541	ev	-/-	-/-
5	A	RF-Cable	ST18/SMAm/SMAm/48	Huber & Suhner	Batch no. 600918	400001182	ev	-/-	-/-
6	A	RF-Cable	ST18/SMAm/SMm/48	Huber & Suhner	Batch no. 127377	400001183	ev	-/-	-/-
7	A	DC-Blocker 0.1-40 GHz	8141A	Inmet	Batch no. 127377	400001185	ev	-/-	-/-



## 7.4 AC conducted



$$SS = UR + CF + VC$$

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

Example calculation:

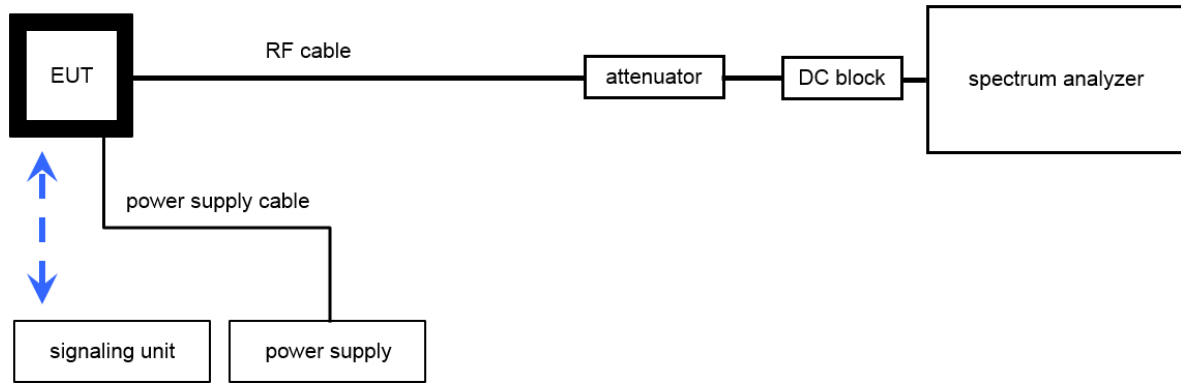
$$SS [dB\mu V/m] = 37.62 [dB\mu V/m] + 9.90 [dB] + 0.23 [dB] = 47.75 [dB\mu V/m] (244.06 \mu V/m)$$

### Equipment table:

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

## 7.5 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	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	22.01.2015	22.01.2016
2	A	Amplifier 2-40 GHz	JS32-02004000-57-5P	MITEQ	1777200	300004541	ev	-/-	-/-
3	A	Power Supply 0-20V, 0-5A	6632B	Agilent Technologies	GB42110541	400000562	vIKII	10.01.2013	10.01.2016
4	A	PC-WLAN Tester	Intel Core i3 3220/3,3 GHz, Prozessor	Agilent Technologies	2V2403033A4523	300004589	ne	-/-	-/-
5	A	Teststand	Teststand Custom Sequence Editor	National Instruments GmbH	2V2403033A4523	300004590	ne	-/-	-/-
6	A	RF-Cable	ST18/SMAm/SMAm/60	Huber & Suhner	Batch no. 606844	400001181	ev	-/-	-/-
7	A	DC-Blocker 0.1-40 GHz	8141A	Inmet	Batch no. 127377	400001185	ev	-/-	-/-
8	A	Coax Attenuator 10 dB 2W 0-40 GHz	MCL BW-K10-2W44+	Mini Circuits	Batch no. 127377	400001186	ev	-/-	-/-

**8 Measurement uncertainty**

<b>Measurement uncertainty</b>	
<b>Test case</b>	<b>Uncertainty</b>
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
TX spurious emissions conducted	± 3 dB
TX spurious emissions radiated below 30 MHz	± 3 dB
TX spurious emissions radiated 30 MHz to 1 GHz	± 3 dB
Spurious emissions radiated 1 GHz to 12.75 GHz	± 3.7 dB
Spurious emissions radiated above 12.75 GHz	± 4.5 dB
Spurious emissions conducted below 30 MHz (AC conducted)	± 2.6 dB

## 9 Sequence of testing

### 9.1 Sequence of testing 9 kHz to 30 MHz

#### Setup

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

#### Premeasurement

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

#### Final measurement

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

## 9.2 Sequence of testing 30 MHz to 1 GHz

### Setup

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

### Premeasurement

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

### Final measurement

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

### 9.3 Sequence of testing 1 GHz to 12.75 GHz

#### Setup

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

#### Premeasurement

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

#### Final measurement

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

## 9.4 Sequence of testing above 12.75 GHz

### Setup

- The equipment was setup to simulate a typical usage like described in the user manual or described by manufacturer.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 0.5 meter
- The EUT was set into operation.

### Premeasurement

- The antenna is moved spherical over the EUT in different polarisations of the antenna.

### Final measurement

- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and RMS (RMS / see ANSI C 63.4) detector
- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit, and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

## 10 Summary of measurement results

<input type="checkbox"/>	No deviations from the technical specifications were ascertained
<input type="checkbox"/>	There were deviations from the technical specifications ascertained
<input checked="" type="checkbox"/>	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!	2015-07-24	Delta tests according customer demand!

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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Declared
§15.247(e) RSS - 247 / 5.2 (2)	Power spectral density	KDB 558074 DTS clause: 10.6	Nominal	Nominal	DSSS OFDM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
§15.247(a)(2) RSS - 247 / 5.2 (1)	DTS bandwidth	KDB 558074 DTS clause: 8.1	Nominal	Nominal	DSSS OFDM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
RSS Gen clause 4.6.1	Occupied bandwidth	-/-	Nominal	Nominal	DSSS OFDM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
§15.247(b)(3) RSS - 247 / 5.4 (4)	Maximum output power	KDB 558074 DTS clause: 9.2.2.5	Nominal	Nominal	DSSS OFDM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
§15.247(d) RSS - 247 / 5.5	Detailed spurious emissions @ the band edge - conducted	-/-	Nominal	Nominal	DSSS OFDM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
§15.205 RSS - 247 / 5.5 RSS - Gen	Band edge compliance radiated	KDB 558074 DTS clause: 13.3.2	Nominal	Nominal	DSSS OFDM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
§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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
§15.209(a) RSS-Gen	TX spurious emissions radiated below 30 MHz	-/-	Nominal	Nominal	DSSS OFDM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
§15.247(d) RSS - 247 / 5.5 RSS-Gen	TX spurious emissions radiated 30 MHz to 1 GHz	-/-	Nominal	Nominal	DSSS OFDM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
§15.247(d) RSS - 247 / 5.5 RSS-Gen	TX spurious emissions radiated above 1 GHz	-/-	Nominal	Nominal	DSSS OFDM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
§15.109 RSS-Gen	RX spurious emissions radiated 30 MHz to 1 GHz	-/-	Nominal	Nominal	RX / idle	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
§15.109 RSS-Gen	RX spurious emissions radiated above 1 GHz	-/-	Nominal	Nominal	RX / idle	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
§15.107(a) §15.207	Conducted emissions < 30 MHz	-/-	Nominal	Nominal	DSSS OFDM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-

**Note:** C = Complies; NC = Not complies; NA = Not applicable; NP = Not performed



**11 Additional comments**

- Reference documents:           Module report: (fcc) ETHE0009 part 3 of 3.pdf  
  Antenna gain: 3-3-TECH-587 900-01 Flir T1020 - Antenna measurements\_A
- Special test descriptions:       None
- Configuration descriptions:     None
- Test mode:                        No test mode available.  
  Iperf was used to ping another device with the largest support packet size
- Special software is used.  
  EUT is transmitting pseudo random data by itself
- Antennas and transmit  
operating modes:                Operating mode 1 (single antenna)
- *Equipment with 1 antenna,*
  - *Equipment with 2 diversity antennas operating in switched diversity mode by which at any moment in time only 1 antenna is used,*
  - *Smart antenna system with 2 or more transmit/receive chains, but operating in a mode where only 1 transmit/receive chain is used)*
- 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

**Limits:**

FCC	IC
6 dBi	

**Results:**

T <sub>nom</sub>	V <sub>nom</sub>	ISM band 2400 MHz to 2483.5 MHz
Gain [dBi] Declared		+ 0.9 dBi*

\*Note: For detailed information, please take a look at the external document 3-3-TECH-587 900-01 Flir T1020 - Antenna measurements\_A.

**Verdict:** [complies](#)

## 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 7.5 - A
Measurement uncertainty	-/-

### Results:

Modulation	Modulation scheme / bandwidth
DSSS / b – mode	1 Mbit/s
OFDM / g – mode	6 Mbit/s
OFDM / n HT20 – mode	MCS0

### 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: 9.2.2.5	
Detector:	RMS
Sweep time:	Auto
Resolution bandwidth:	1 – 5 % of the OBW
Video bandwidth:	≥ 3x RBW
Span:	Depends on the signal
Integration bandwidth:	99 % power - bandwidth (OBW)
Trace mode:	Max hold (allow trace to fully stabilize)
Measurement function:	Channel power with OBW
Test setup:	See sub clause 7.5 - A
Measurement uncertainty	See sub clause 8

**Limits:**

FCC	IC
Conducted: 1.0 W (30 dBm) – Antenna gain max. 6 dBi	

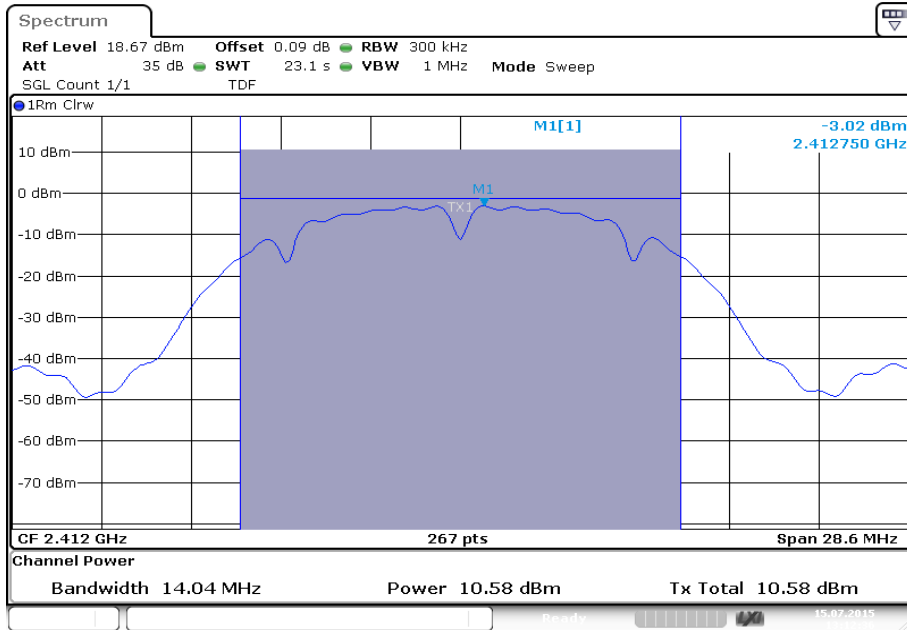
**Results:**

Frequency	Maximum Output Power [dBm]		
	2412 MHz	2437 MHz	2462 MHz
Output power conducted DSSS / b – mode	10.58	10.24	9.44
Output power conducted DSSS / g – mode	10.89	9.89	9.69
Output power conducted DSSS / n HT20 – mode	10.32	9.85	9.65

**Verdict:** **complies**

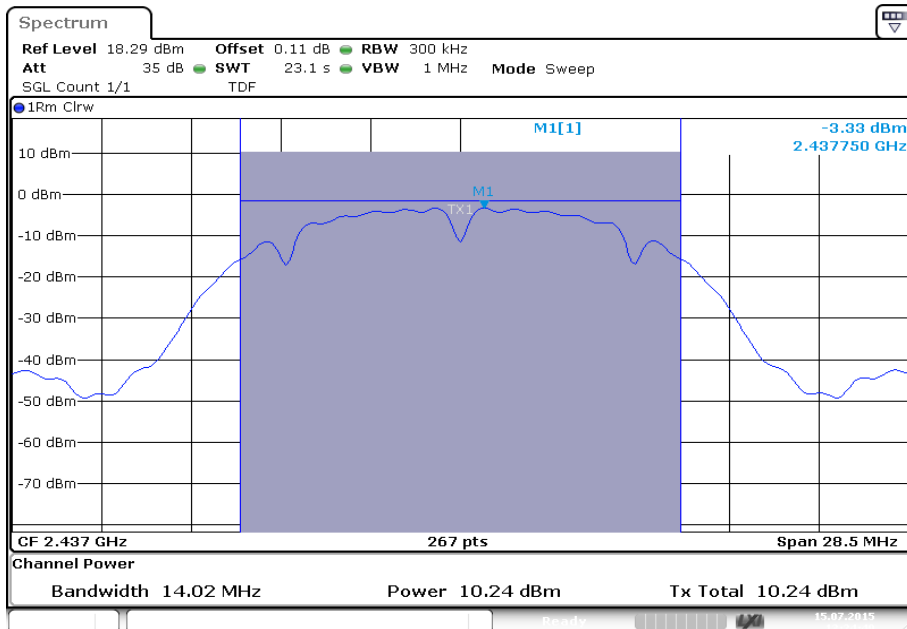
Plots: DSSS / b – mode

Plot 1: low channel



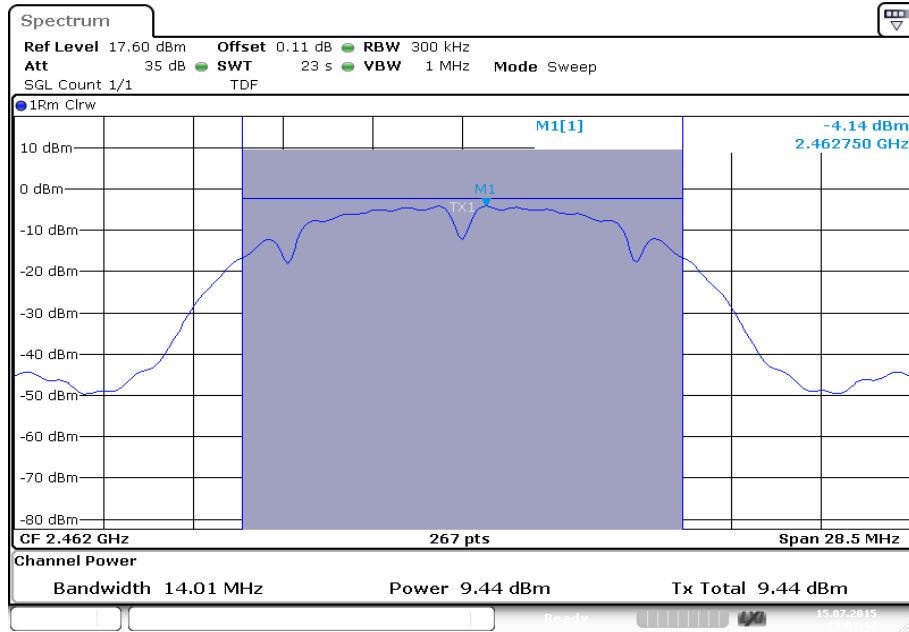
Date: 15.JUL.2015 13:12:36

Plot 2: mid channel



Date: 15.JUL.2015 13:24:49

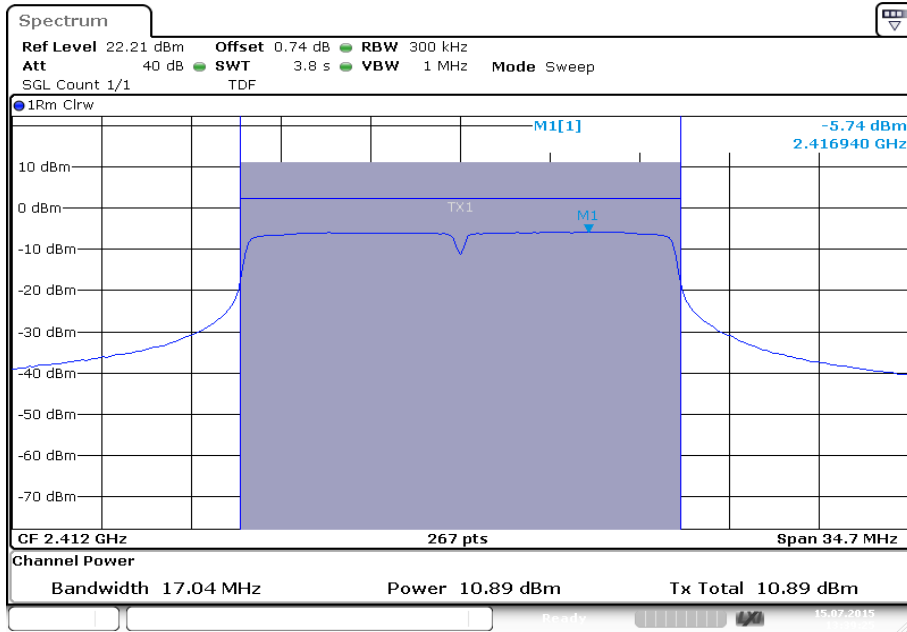
Plot 3: high channel



Date: 15.JUL.2015 13:03:42

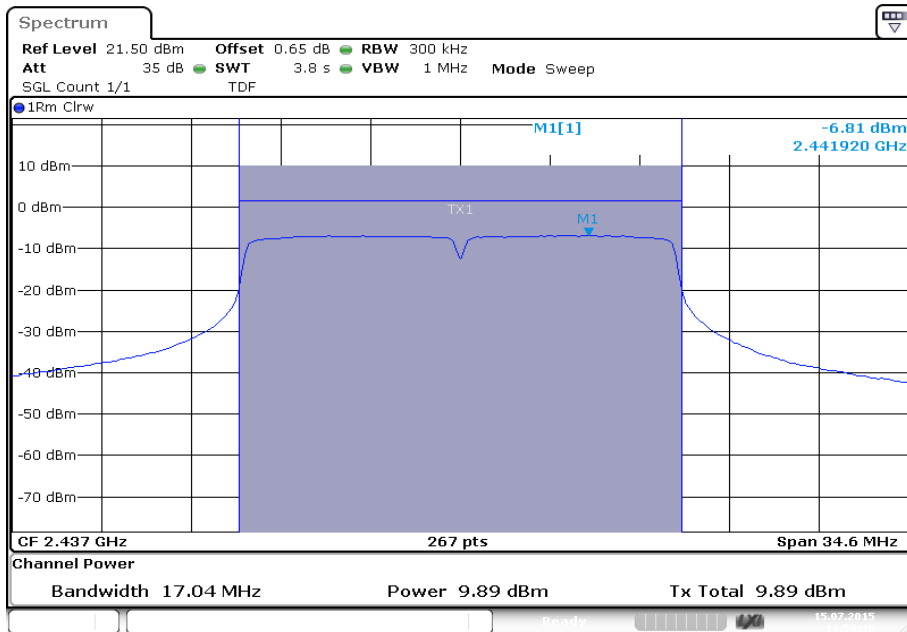
Plots: OFDM / g – mode

Plot 1: low channel



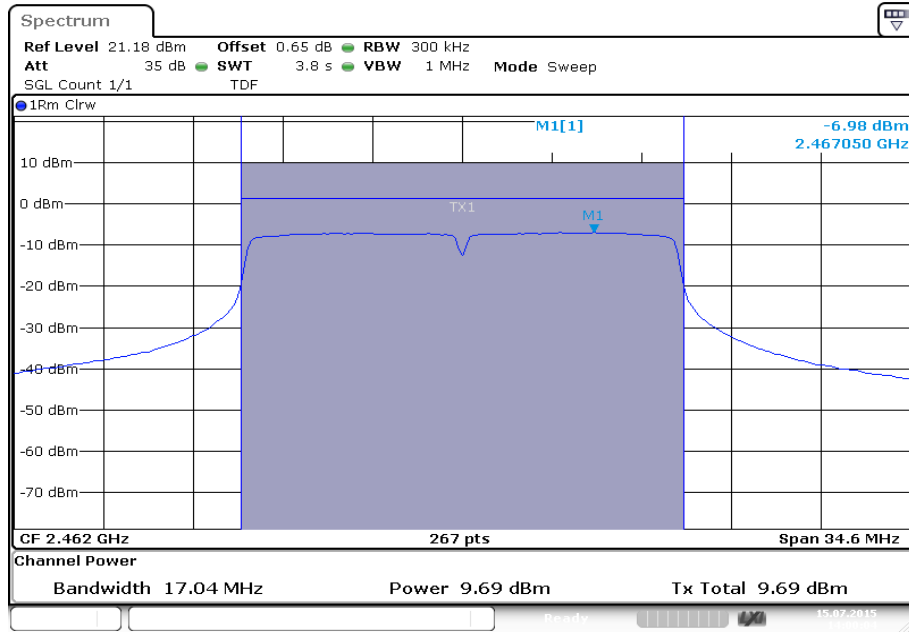
Date: 15.JUL.2015 13:39:24

Plot 2: mid channel



Date: 15.JUL.2015 13:50:16

Plot 3: high channel

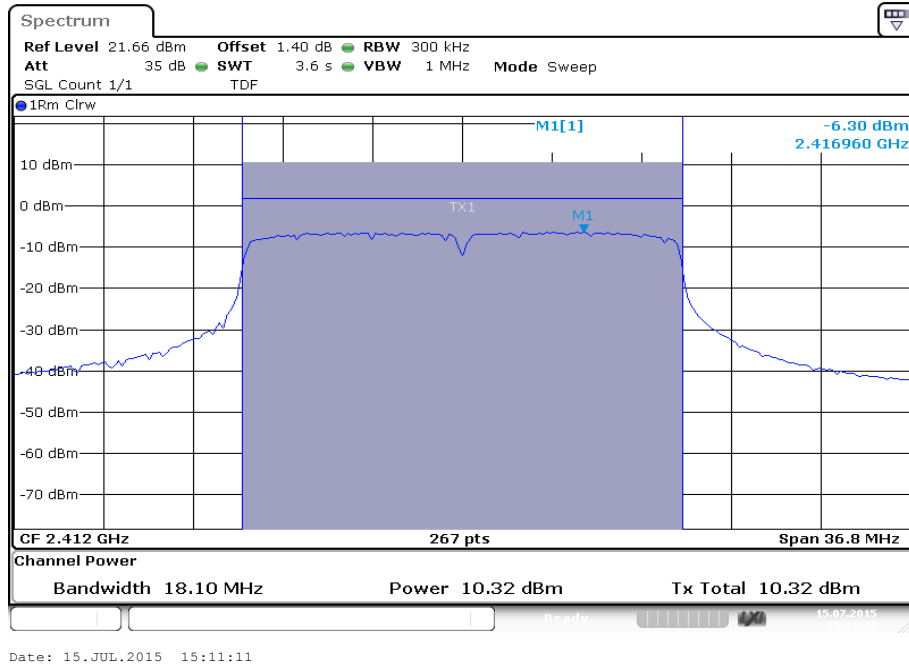


Date: 15.JUL.2015 14:00:04

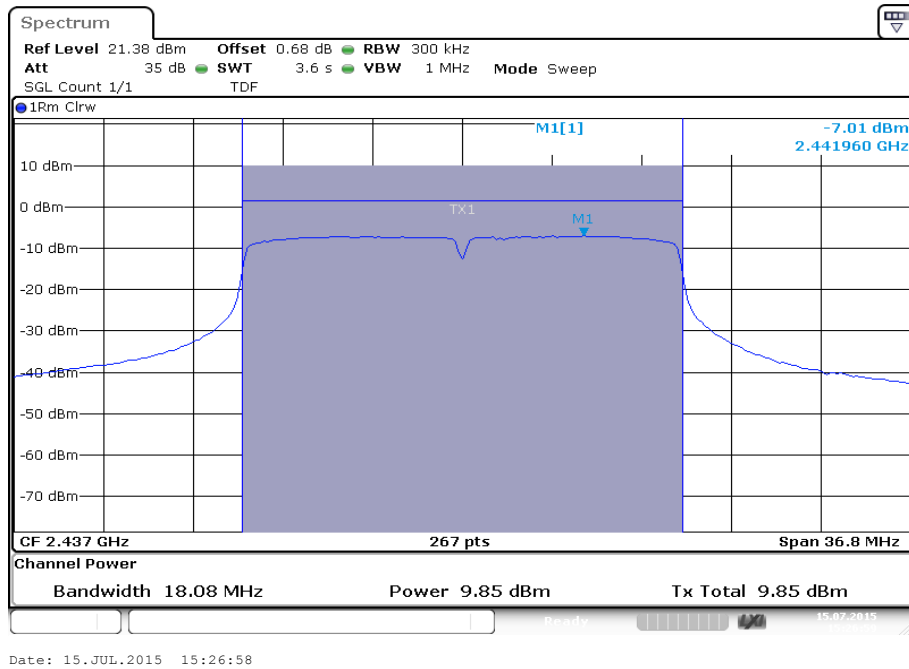


Plots: OFDM / n HT20 – mode

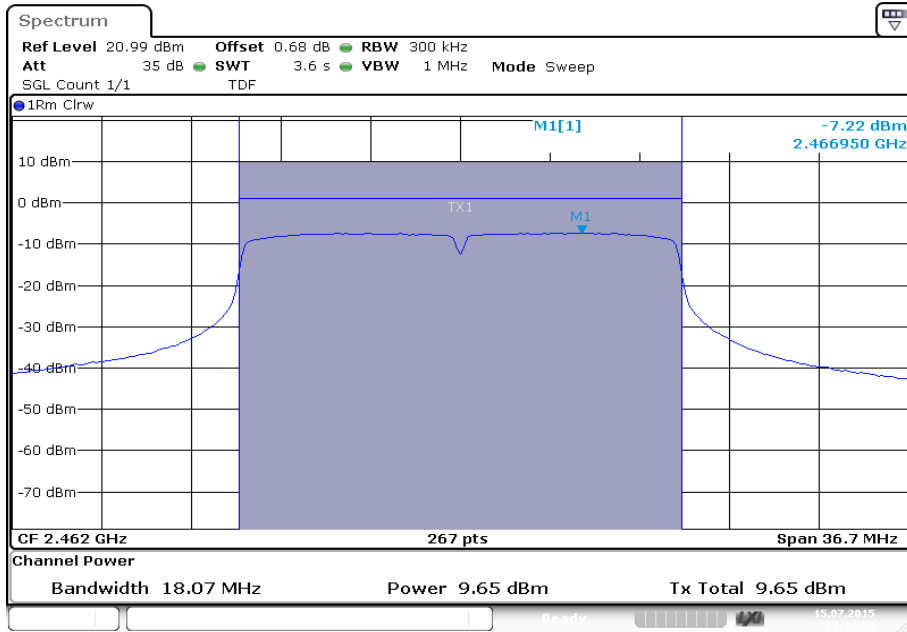
Plot 1: low channel



Plot 2: mid channel



Plot 3: high channel



Date: 15.JUL.2015 15:32:50

## 12.4 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:	300 kHz
Span:	40 MHz
Measurement procedure:	Measurement of the 75% bandwidth using the integration function of the analyzer
Trace mode:	Max hold (allow trace to stabilize)
Test setup:	See sub clause 7.5 - A
Measurement uncertainty	See sub clause 8

**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.	

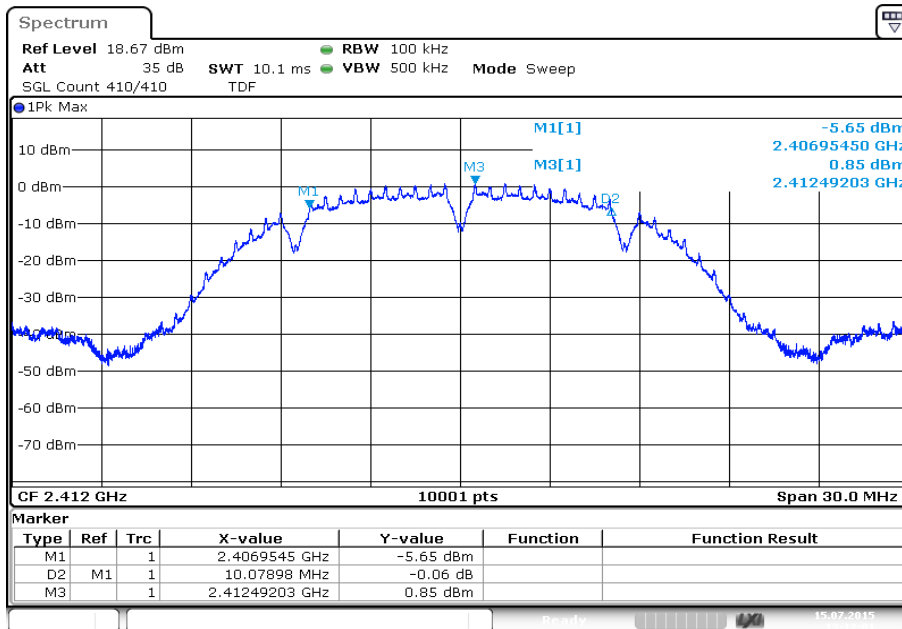
**Results:**

Frequency	6 dB bandwidth [kHz]		
	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	10.08	10.06	10.07
OFDM / g – mode	16.32	16.32	16.31
OFDM / n HT20 – mode	17.30	17.53	17.52

**Verdict:** [complies](#)

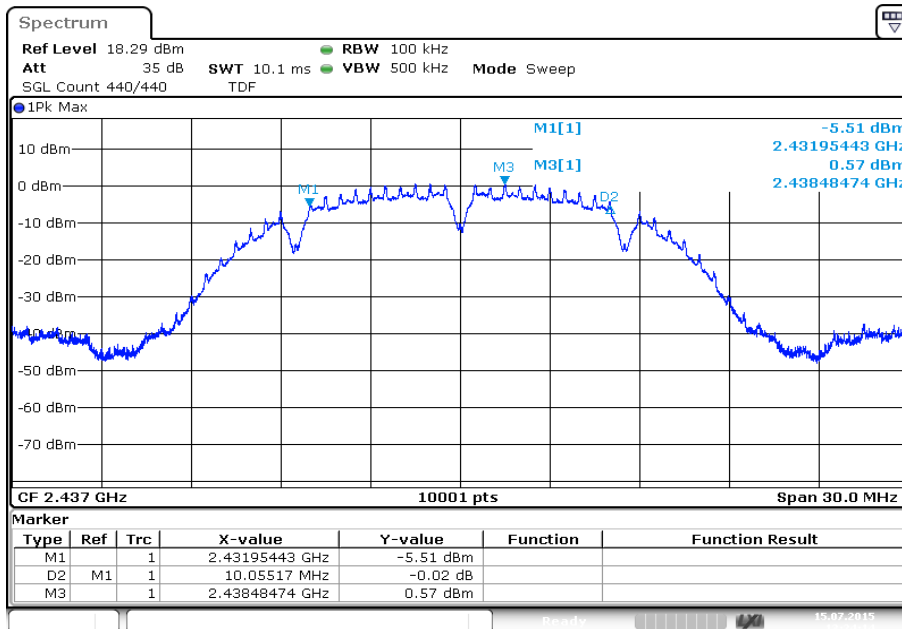
Plots: DSSS / b – mode

Plot 1: low channel



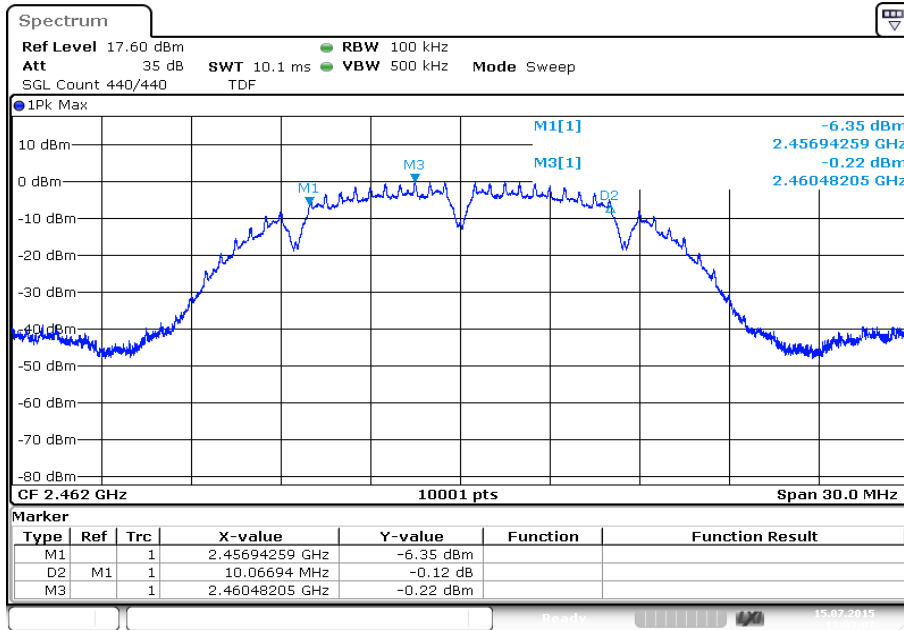
Date: 15.JUL.2015 13:12:01

Plot 2: mid channel



Date: 15.JUL.2015 13:24:14

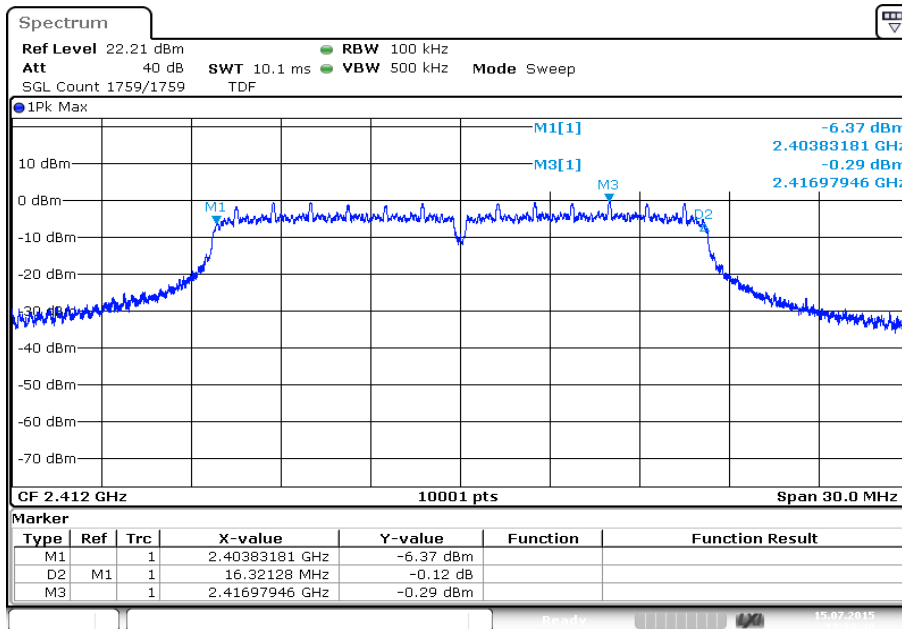
Plot 3: high channel



Date: 15.JUL.2015 13:03:07

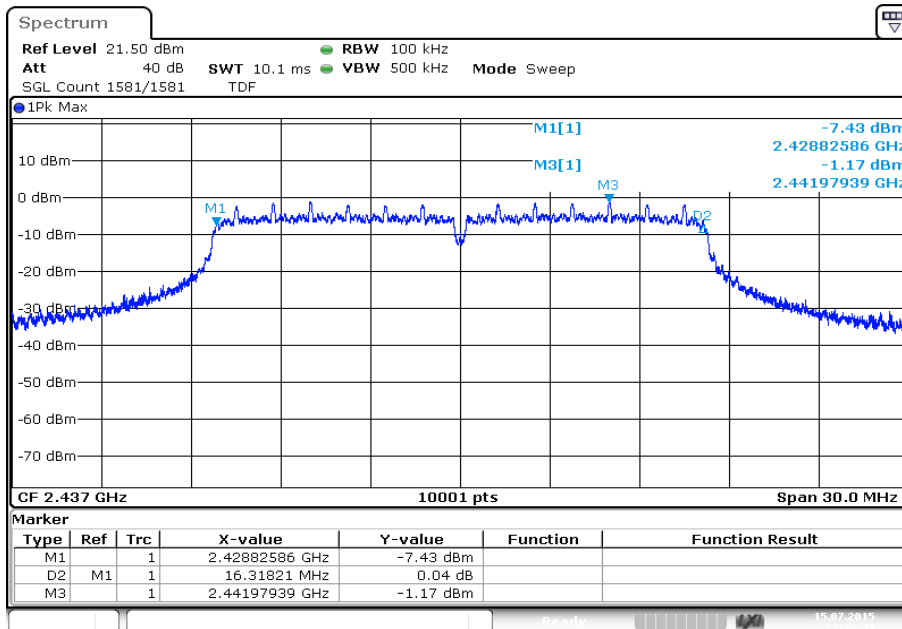
Plots: OFDM / g – mode

Plot 1: low channel



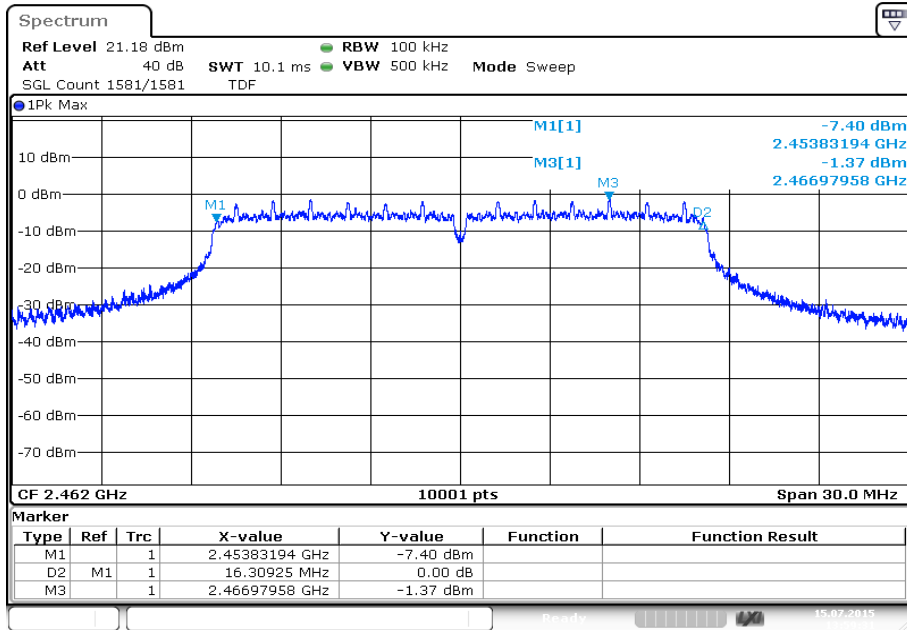
Date: 15.JUL.2015 13:38:48

Plot 2: mid channel



Date: 15.JUL.2015 13:49:43

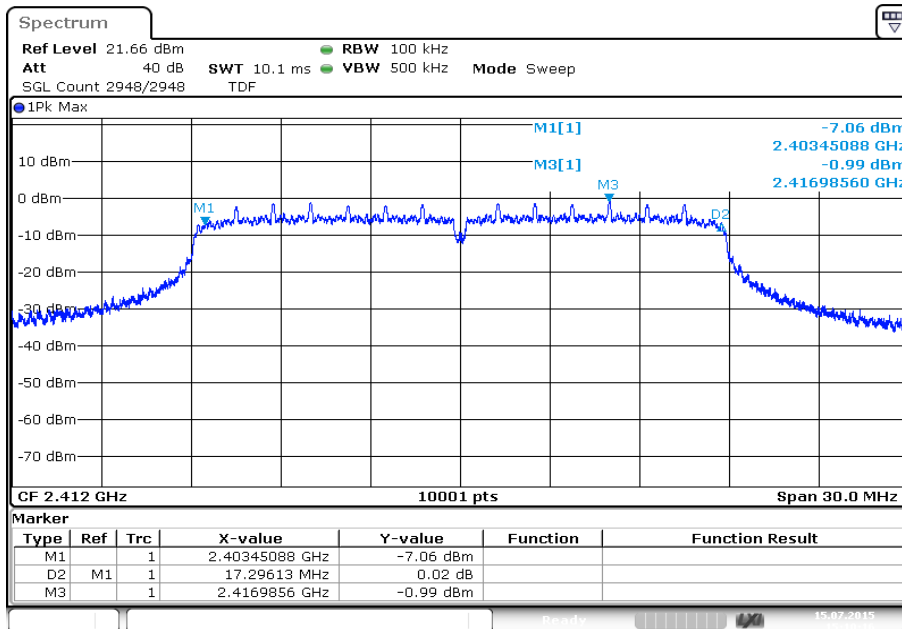
Plot 3: high channel



Date: 15.JUL.2015 13:59:30

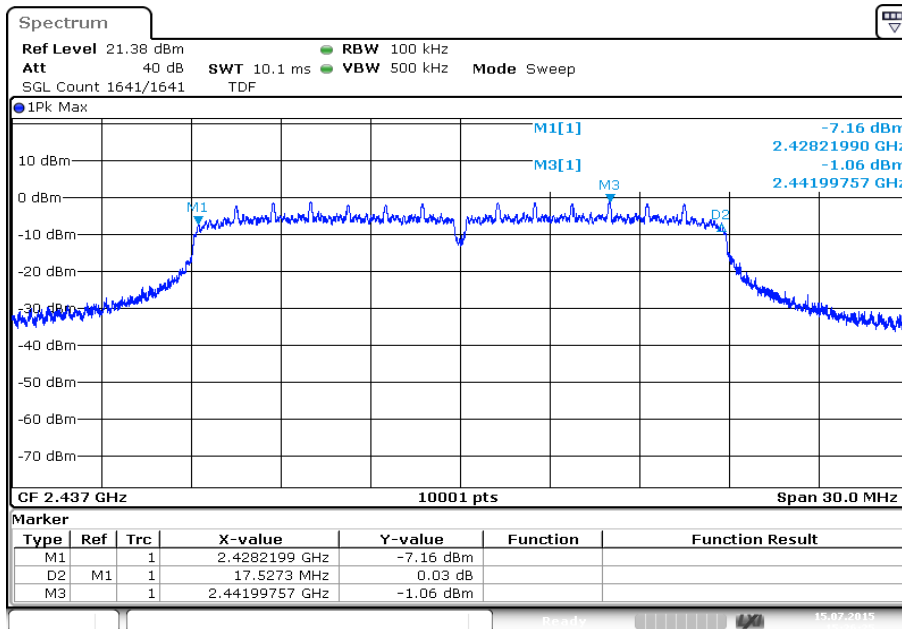
Plots: OFDM / n HT20 – mode

Plot 1: low channel



Date: 15.JUL.2015 15:10:16

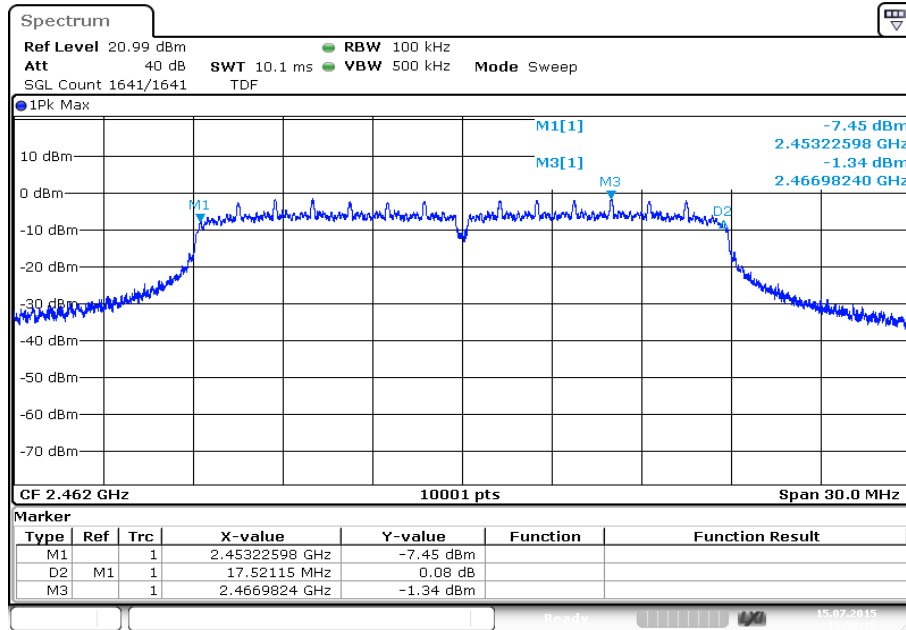
Plot 2: mid channel



Date: 15.JUL.2015 15:26:24



Plot 3: high channel



Date: 15.JUL.2015 15:32:16

## 12.5 Occupied bandwidth

**Description:**

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

**Measurement:**

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Span:	30 MHz
Measurement procedure:	Measurement of the 99% bandwidth using the integration function of the analyzer
Trace mode:	Max hold (allow trace to stabilize)
Test setup:	See sub clause 7.5 - A
Measurement uncertainty	See sub clause 8

**Usage:**

-/-	IC
OBW is necessary for Emission Designator	

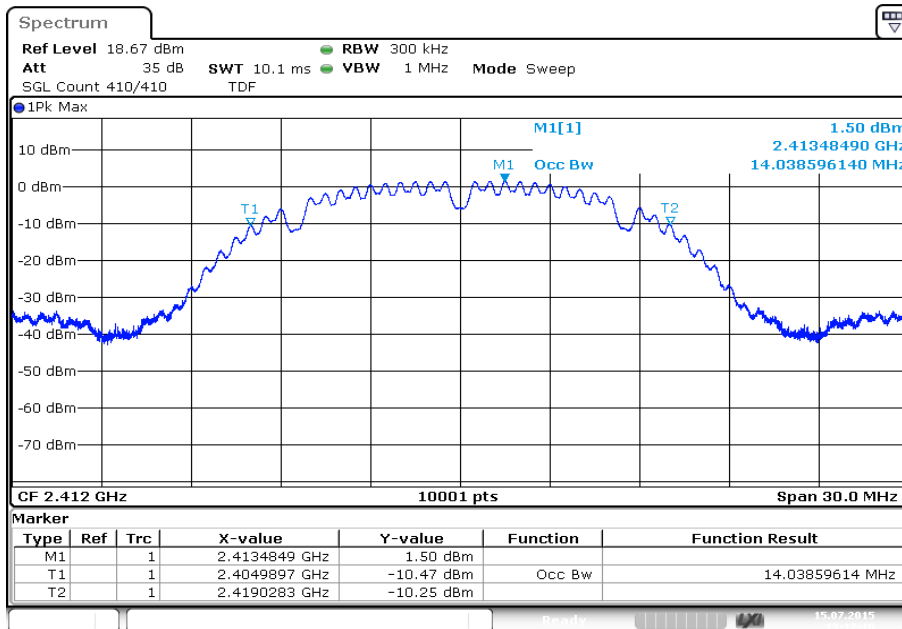
**Results:**

Modulation Frequency	99% bandwidth [kHz]		
	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	14.04	14.02	14.01
OFDM / g – mode	17.04	17.04	17.04
OFDM / n HT20 – mode	18.10	18.08	18.07

**Verdict:** complies

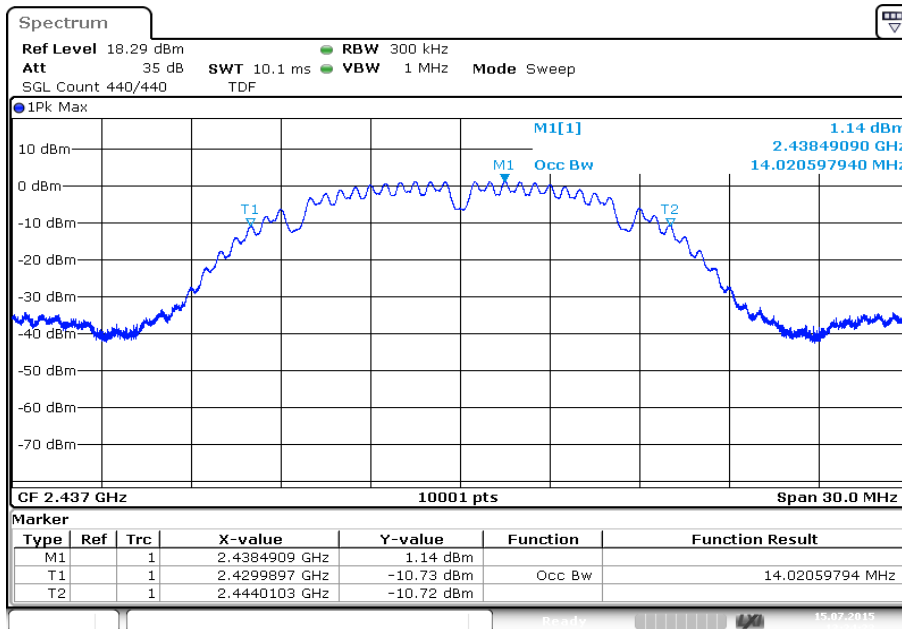
**Plots:** DSSS / b – mode

**Plot 1:** lowest channel



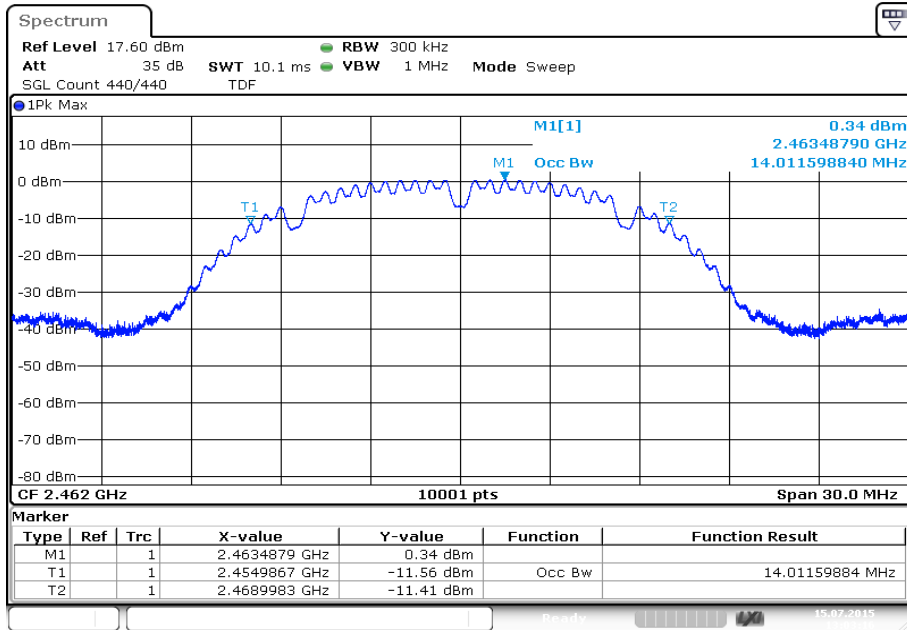
Date: 15.JUL.2015 13:12:10

**Plot 2:** middle channel



Date: 15.JUL.2015 13:24:23

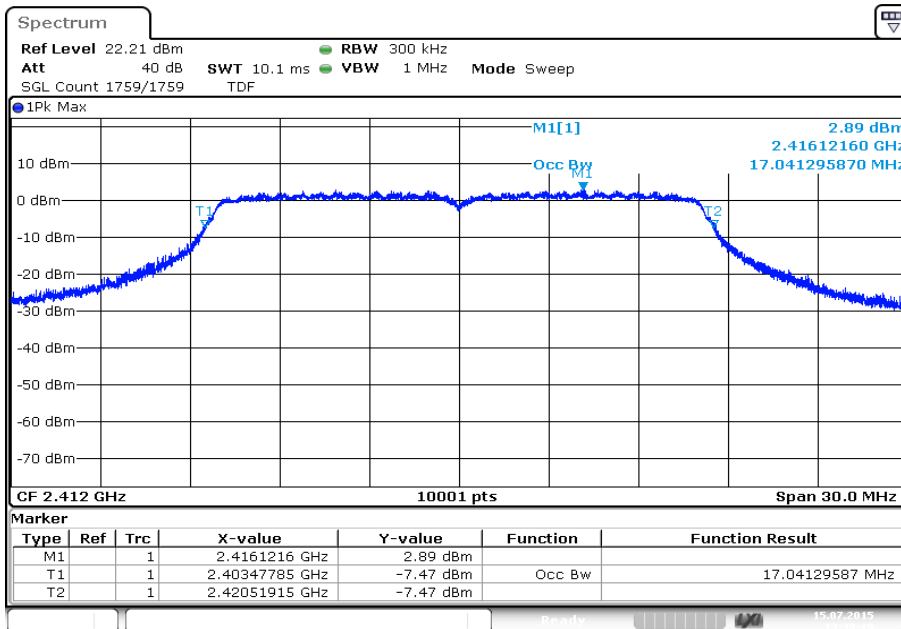
Plot 3: highest channel



Date: 15.JUL.2015 13:03:16

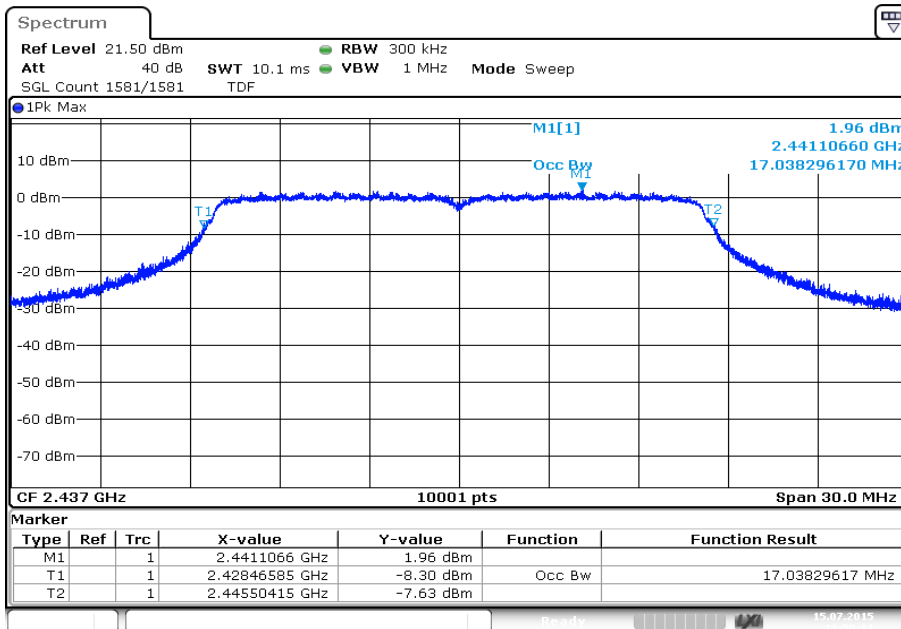
**Plots:** OFDM / g – mode

**Plot 1:** lowest channel



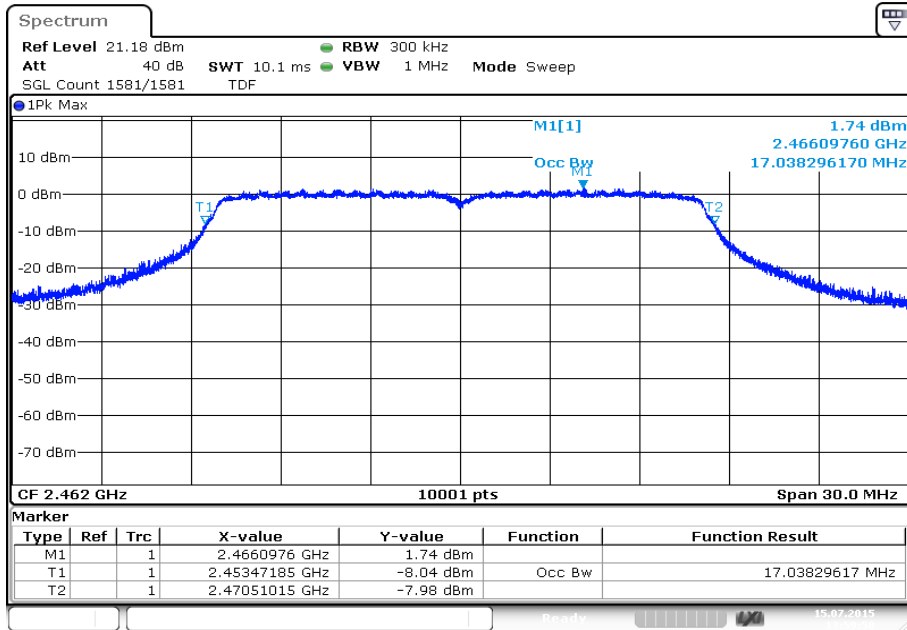
Date: 15.JUL.2015 13:39:19

**Plot 2:** middle channel



Date: 15.JUL.2015 13:50:10

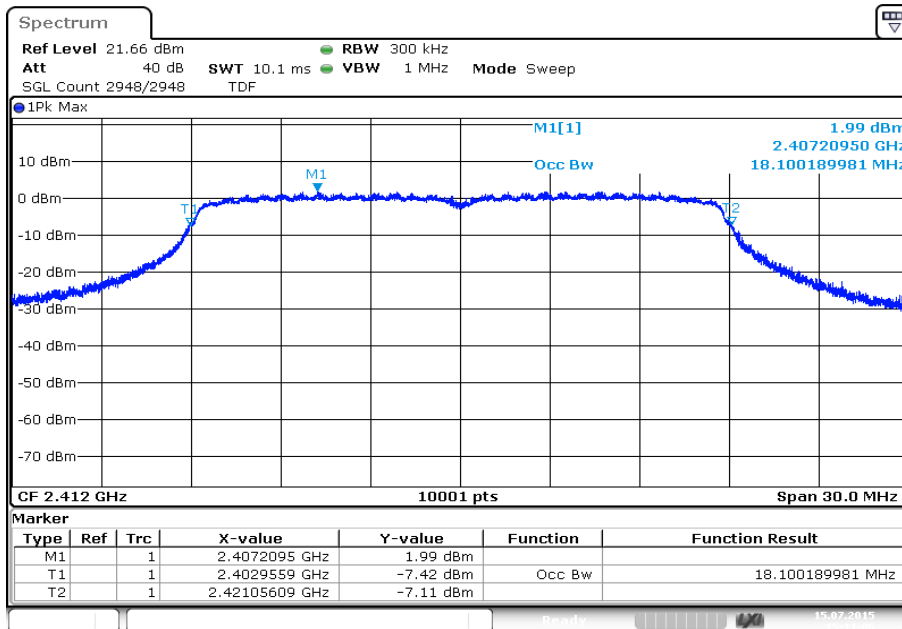
Plot 3: highest channel



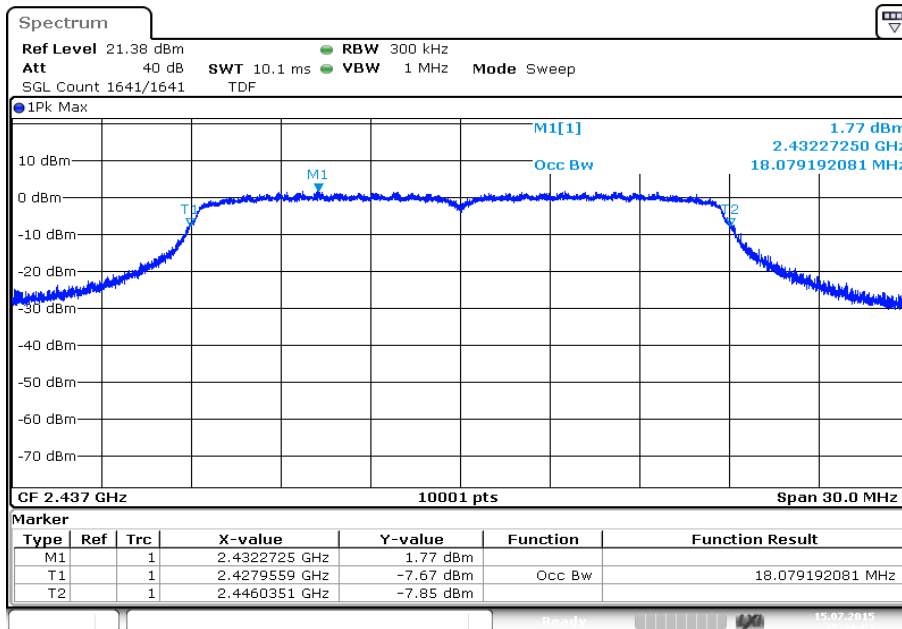
Date: 15.JUL.2015 13:59:58

**Plots:** OFDM / n HT20 – mode

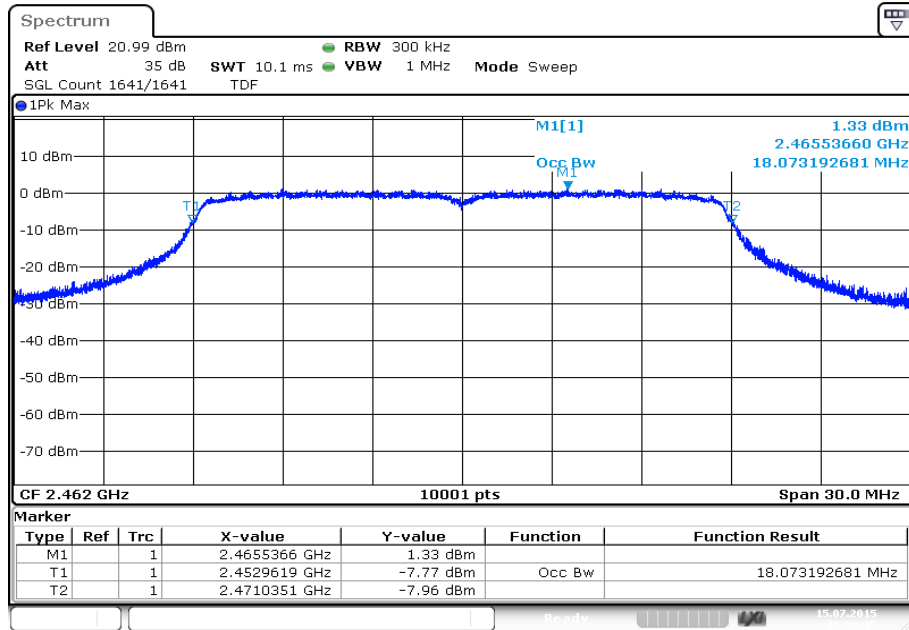
**Plot 1:** lowest channel



**Plot 2:** middle channel



Plot 3: highest channel



Date: 15.JUL.2015 15:32:44



## 12.6 Band edge compliance radiated

### Description:

Measurement of the radiated band edge compliance. The EUT is turned in the position that results in the maximum level at the band edge. Then a sweep over the corresponding restricted band is performed. The EUT is set to channel 1 for the lower restricted band and to channel 11 for the upper restricted band. The measurement is repeated for all modulations. Measurement distance is 3 m.

### Measurement:

Measurement parameter for peak measurements	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 MHz
Video bandwidth:	1 MHz
Span:	See plot!
Trace mode:	Max Hold
Test setup:	See sub clause 7.2 - C
Measurement uncertainty	See sub clause 8

Measurement parameter for average measurements	
According to DTS clause: 13.3.2	
Detector:	RMS
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Span:	2 MHz
Trace mode:	RMS Average over 101 sweeps
Test setup:	See sub clause 7.2 - C
Measurement uncertainty	See sub clause 8

### Limits:

FCC	IC
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).	
74 dBµV/m Peak 54 dBµV/m AVG	

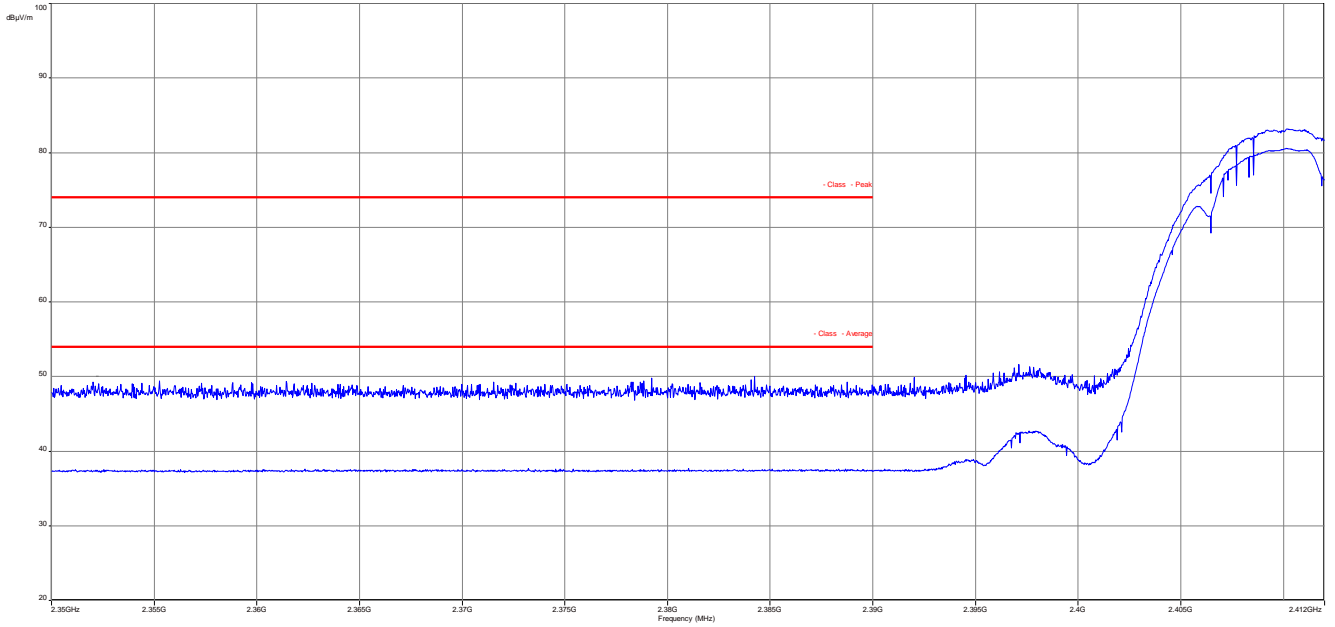
**Results:**

Scenario Modulation	Band edge compliance radiated [dB]			
	DSSS / b – mode	OFDM / g – mode	OFDM / n HT20 – mode	OFDM / n HT40 – mode
Lower band edge	> 20 dB (Peak) > 10 dB (AVG)	> 20 dB (Peak) > 10 dB (AVG)	> 10 dB (Peak) > 10 dB (AVG)	-/-
Upper band edge	> 20 dB (Peak) > 10 dB (AVG)	> 20 dB (Peak) > 10 dB (AVG)	> 10 dB (Peak) > 10 dB (AVG)	-/-

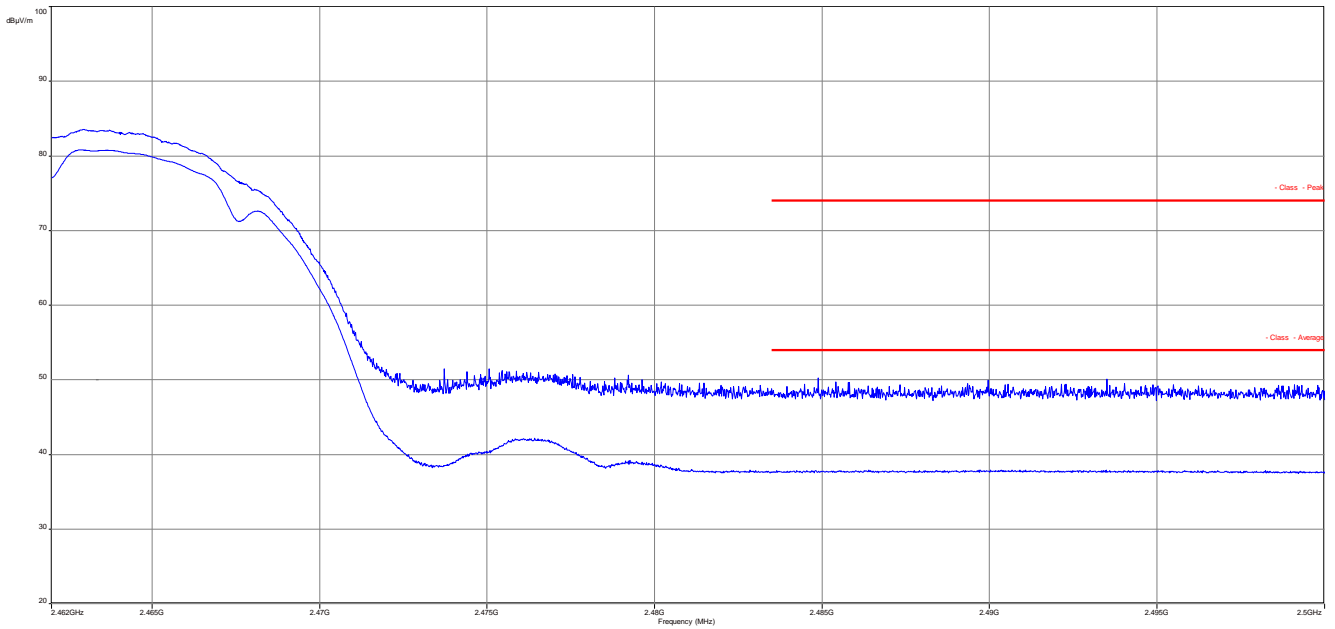
**Verdict:** [complies](#)

**Plots:** DSSS/ b – mode peak / average

**Plot 1:** lower band edge, vertical & horizontal polarization

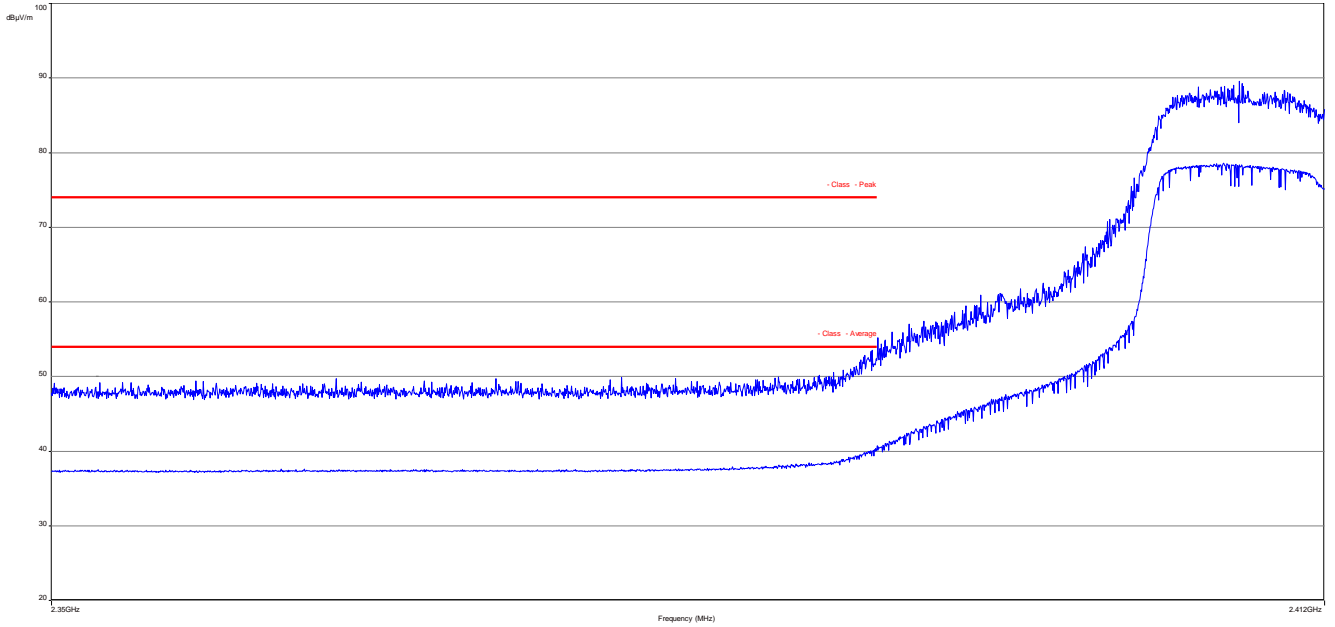


**Plot 2:** upper band edge, vertical & horizontal polarization

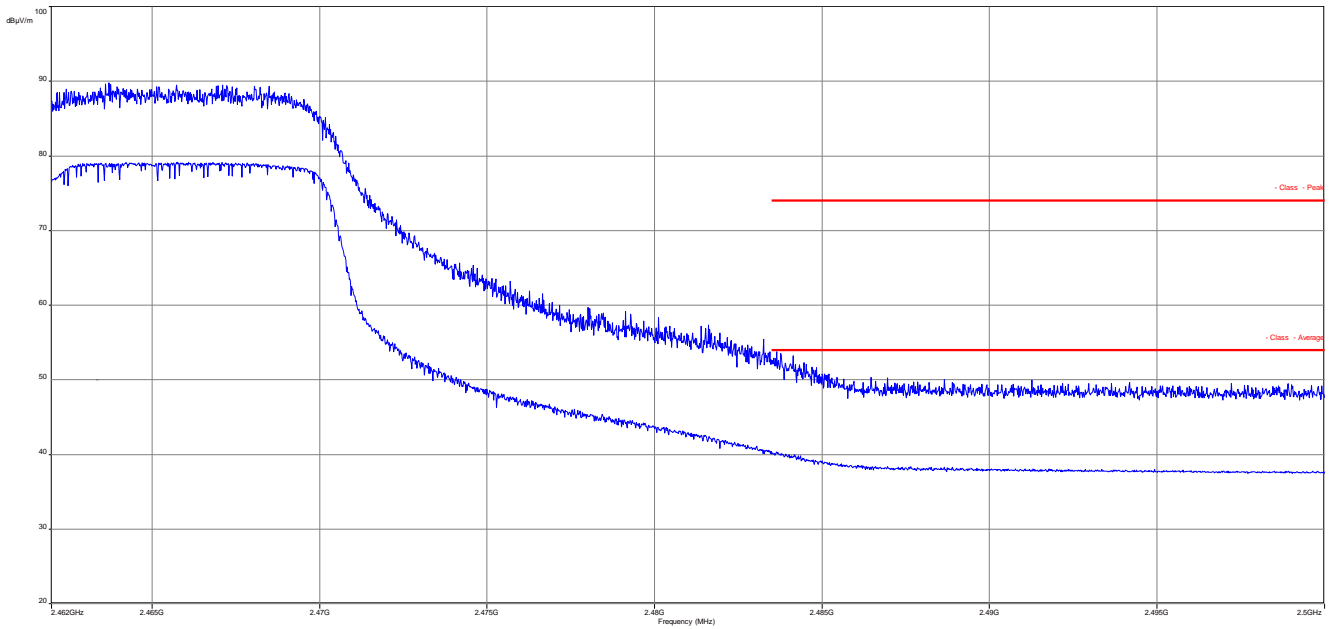


**Plots:** OFDM / g – mode peak / average

**Plot 1:** lower band edge, vertical & horizontal polarization

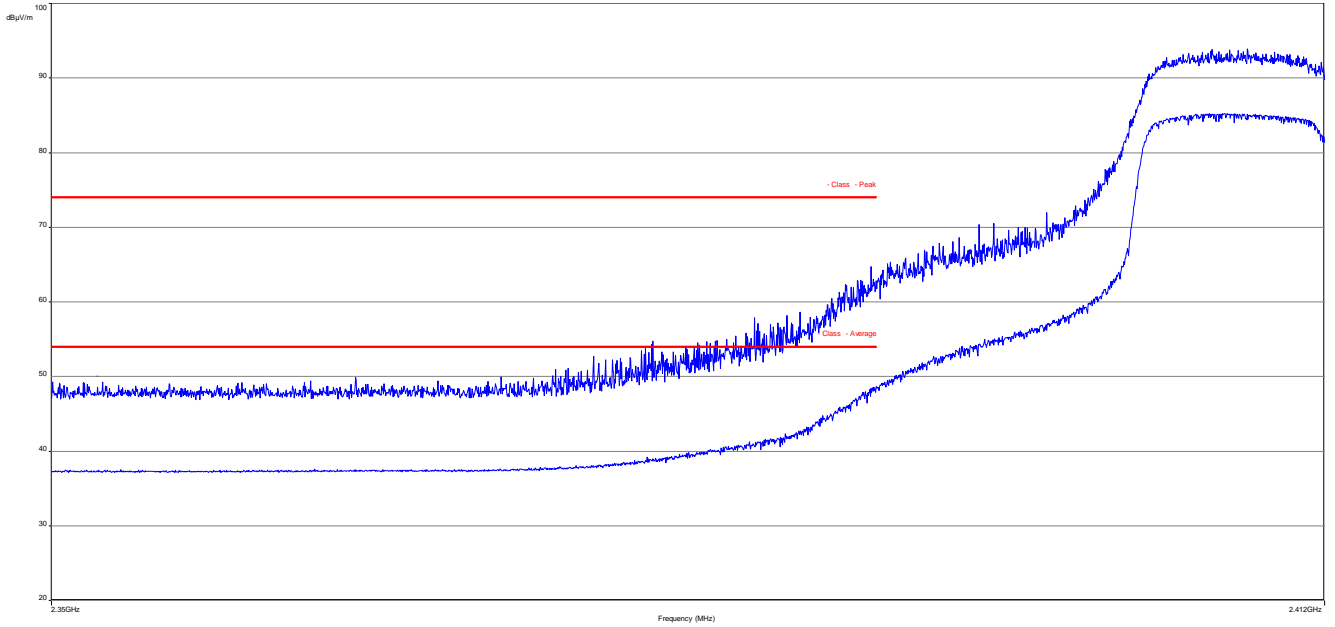


**Plot 2:** upper band edge, vertical & horizontal polarization

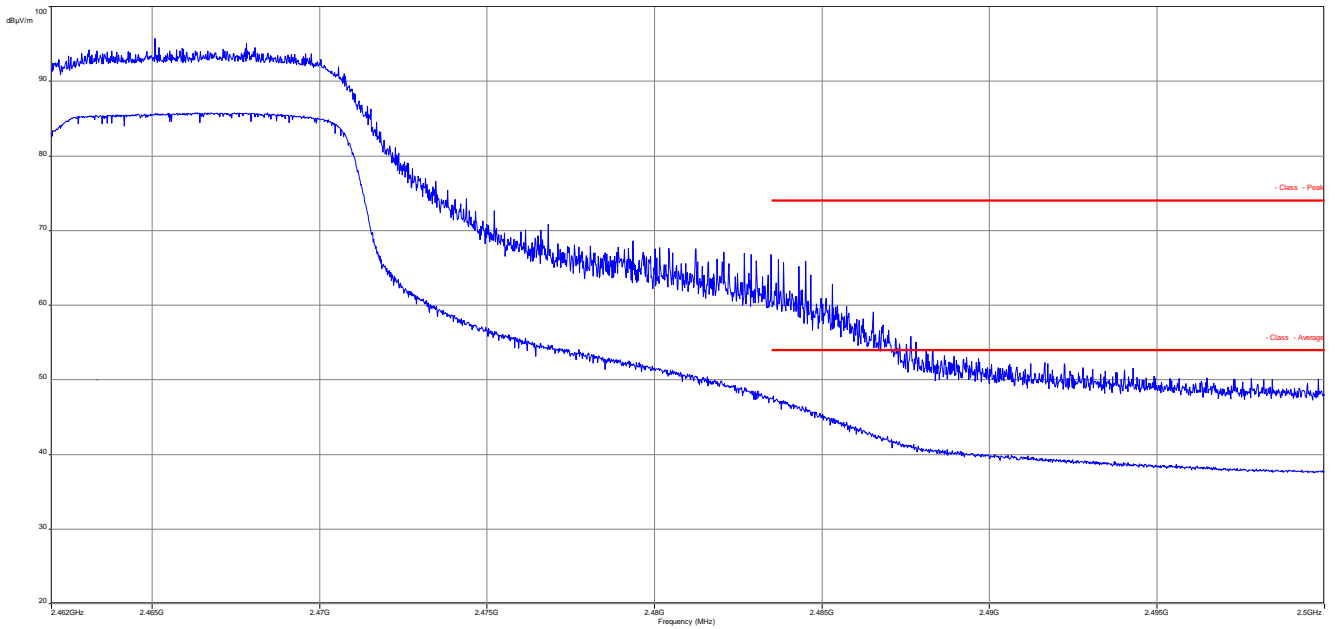


**Plots:** OFDM / n HT20 – mode peak / average

**Plot 1:** lower band edge, vertical & horizontal polarization



**Plot 2:** upper band edge, vertical & horizontal polarization



## 12.7 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	<input checked="" type="checkbox"/> DSSS b – mode <input type="checkbox"/> OFDM g – mode <input checked="" type="checkbox"/> OFDM n HT20 – mode <input type="checkbox"/> OFDM n HT40 – mode
Test setup:	See sub clause 7.2 - B
Measurement uncertainty	See sub clause 8

### Limits:

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

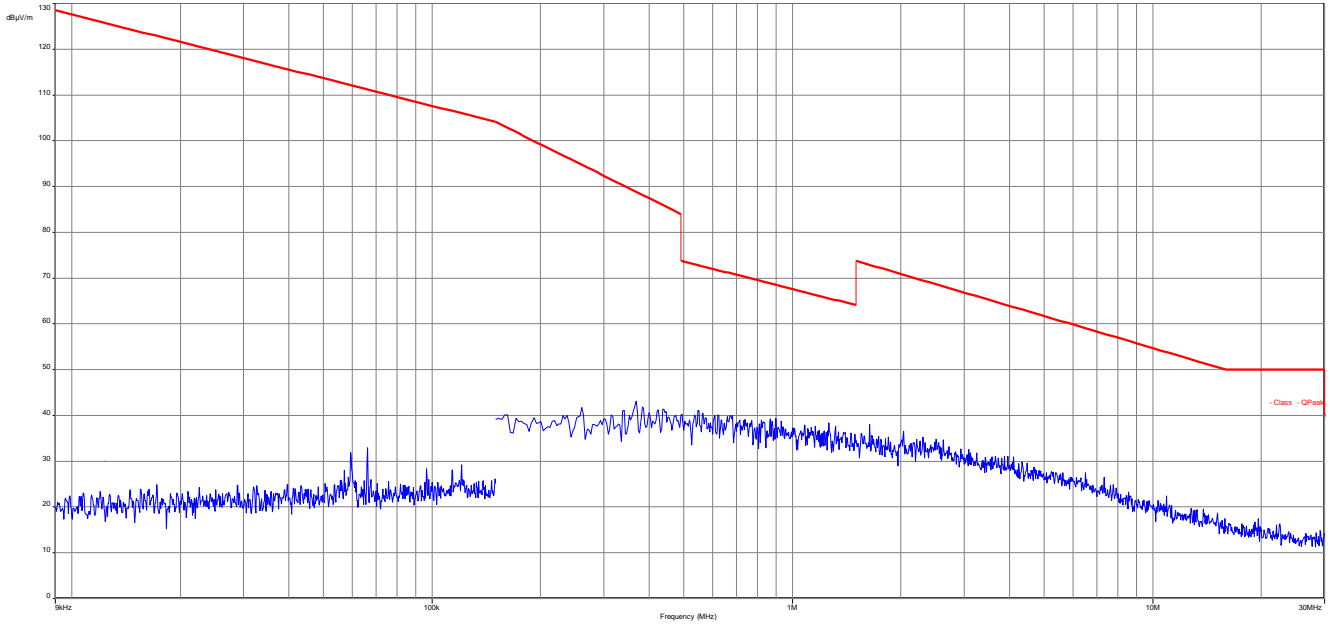
### Results:

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

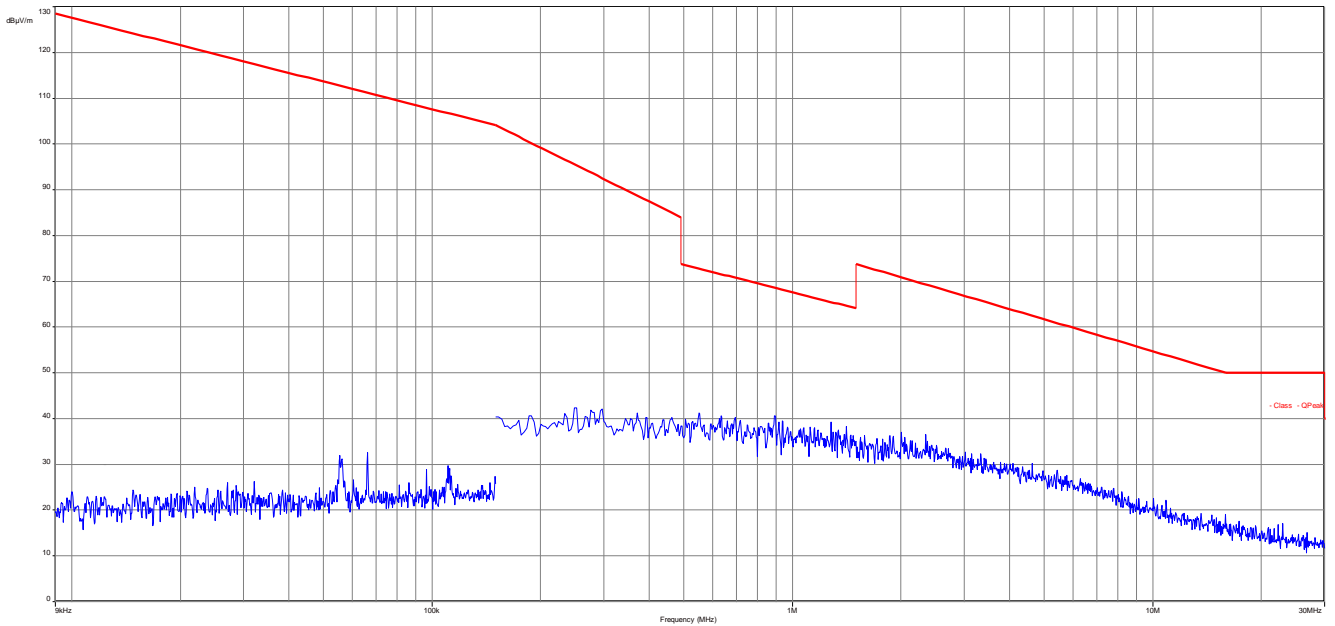
**Verdict:** **complies**

**Plots:** DSSS

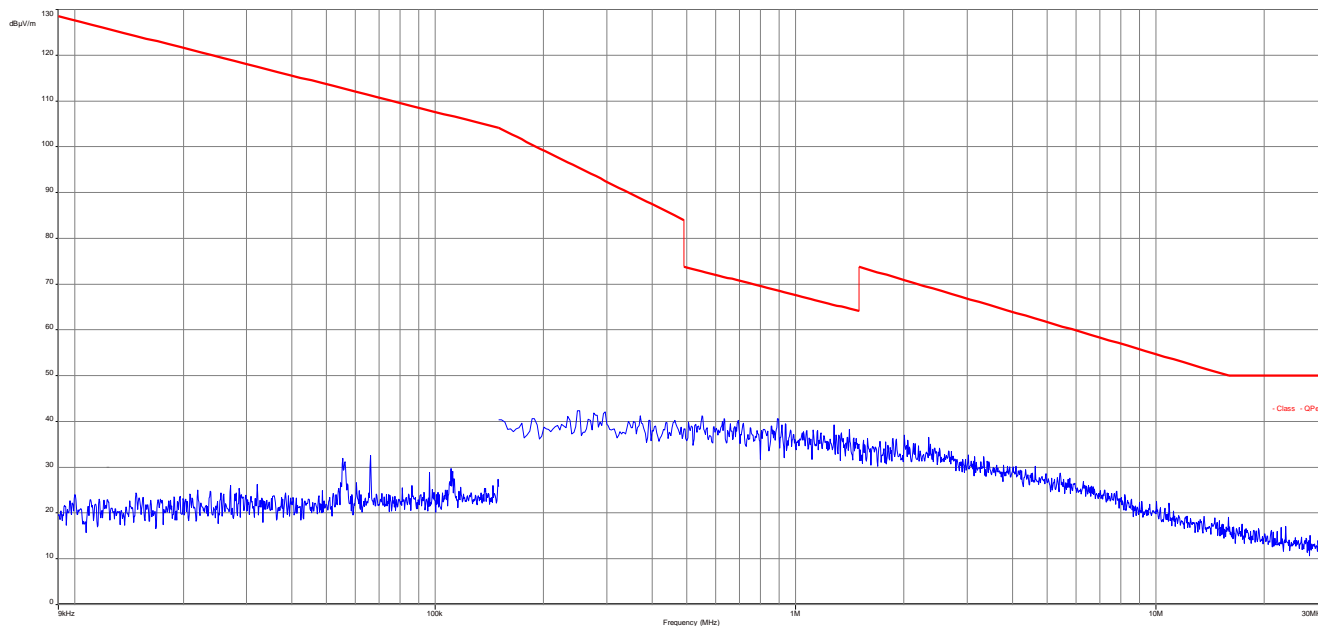
**Plot 1:** 9 kHz to 30 MHz, low channel



**Plot 2:** 9 kHz to 30 MHz, mid channel



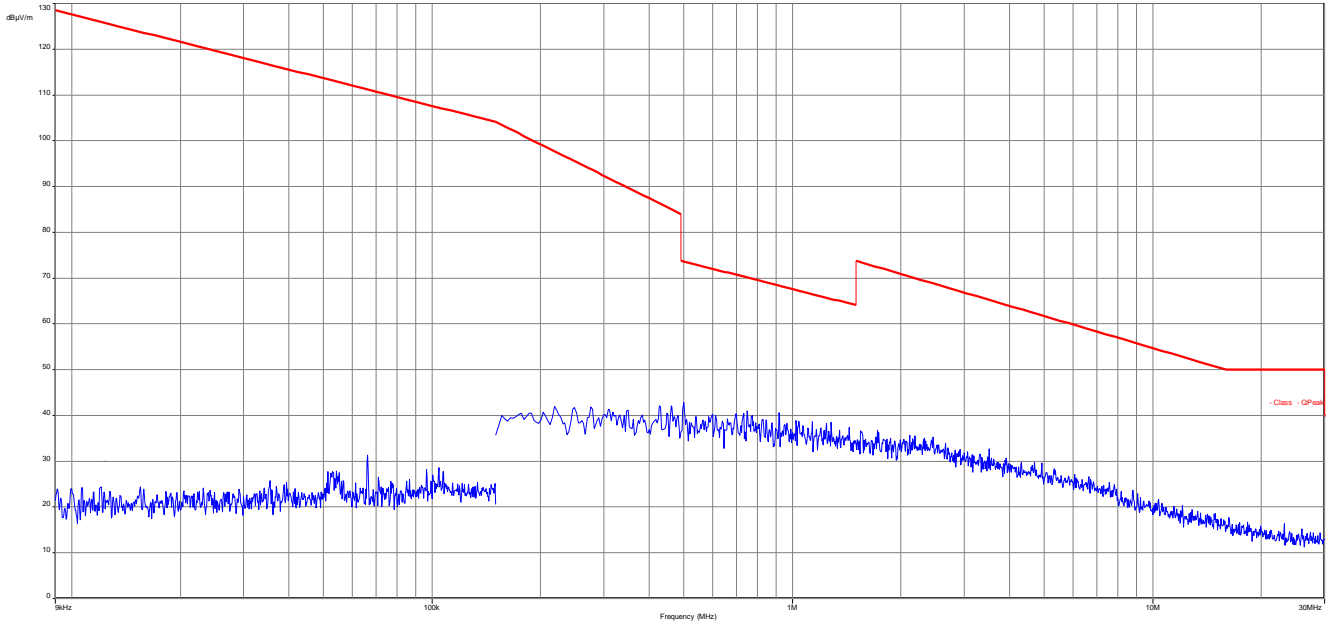
Plot 3: 9 kHz to 30 MHz, high channel



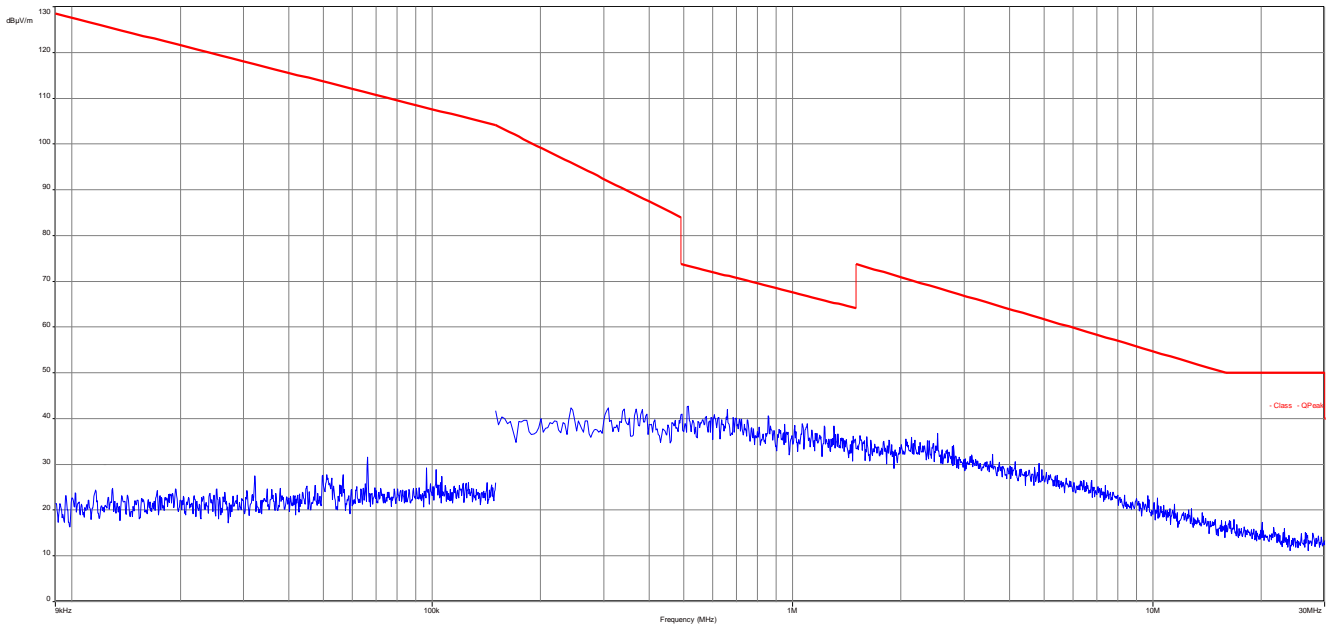


**Plots:** OFDM

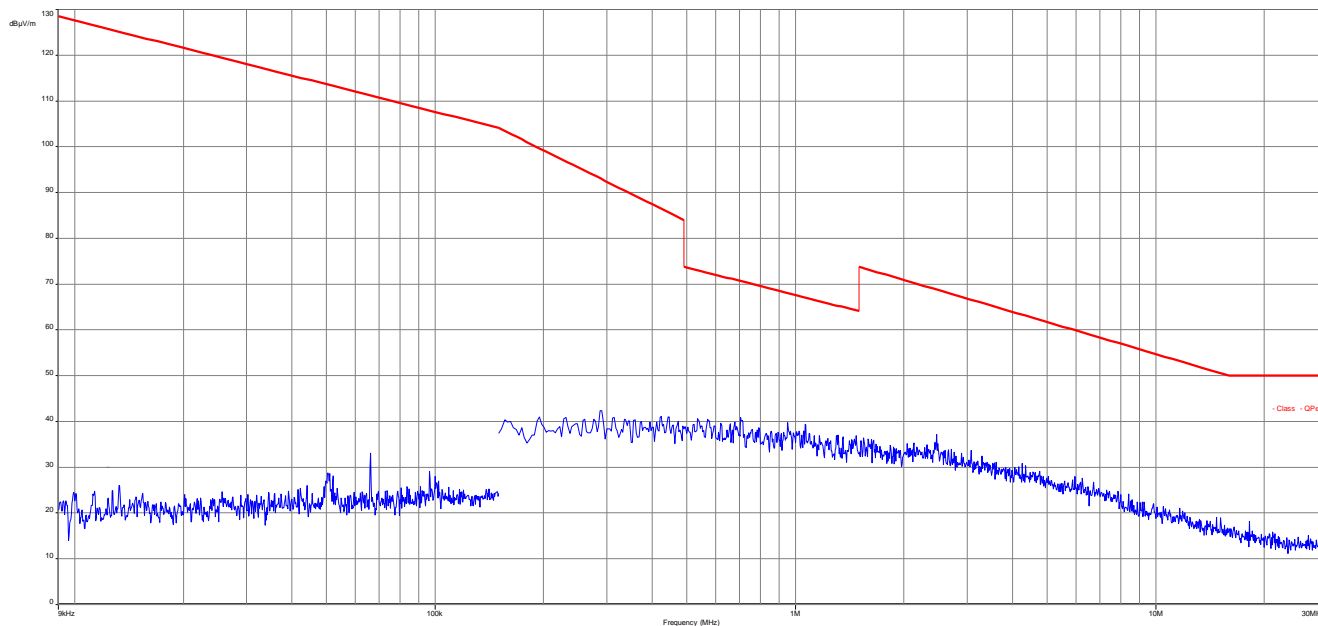
**Plot 1:** 9 kHz to 30 MHz, low channel



**Plot 2:** 9 kHz to 30 MHz, mid channel



Plot 3: 9 kHz to 30 MHz, high channel



**12.8 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:	F < 1 GHz: 120 kHz
Video bandwidth:	3 x RBW
Span:	30 MHz to 1 GHz
Trace mode:	Max Hold
Measured modulation	<input checked="" type="checkbox"/> DSSS b – mode <input type="checkbox"/> OFDM g – mode <input checked="" type="checkbox"/> OFDM n HT20 – mode <input type="checkbox"/> OFDM n HT40 – mode <input checked="" type="checkbox"/> RX / Idle – mode
Test setup:	See sub clause 7.1 - A
Measurement uncertainty	See sub clause 8

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.

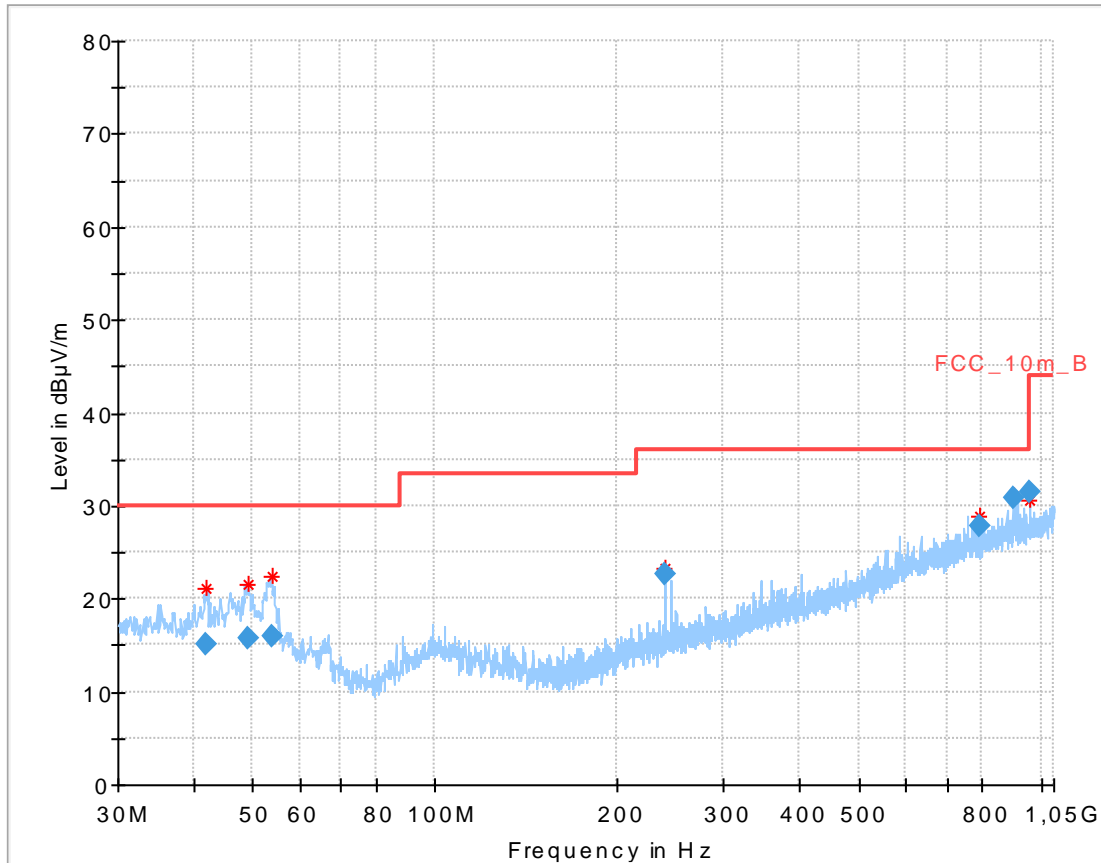
**Limits:**

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

**Verdict:** [complies](#)

**Plot:** DSSS

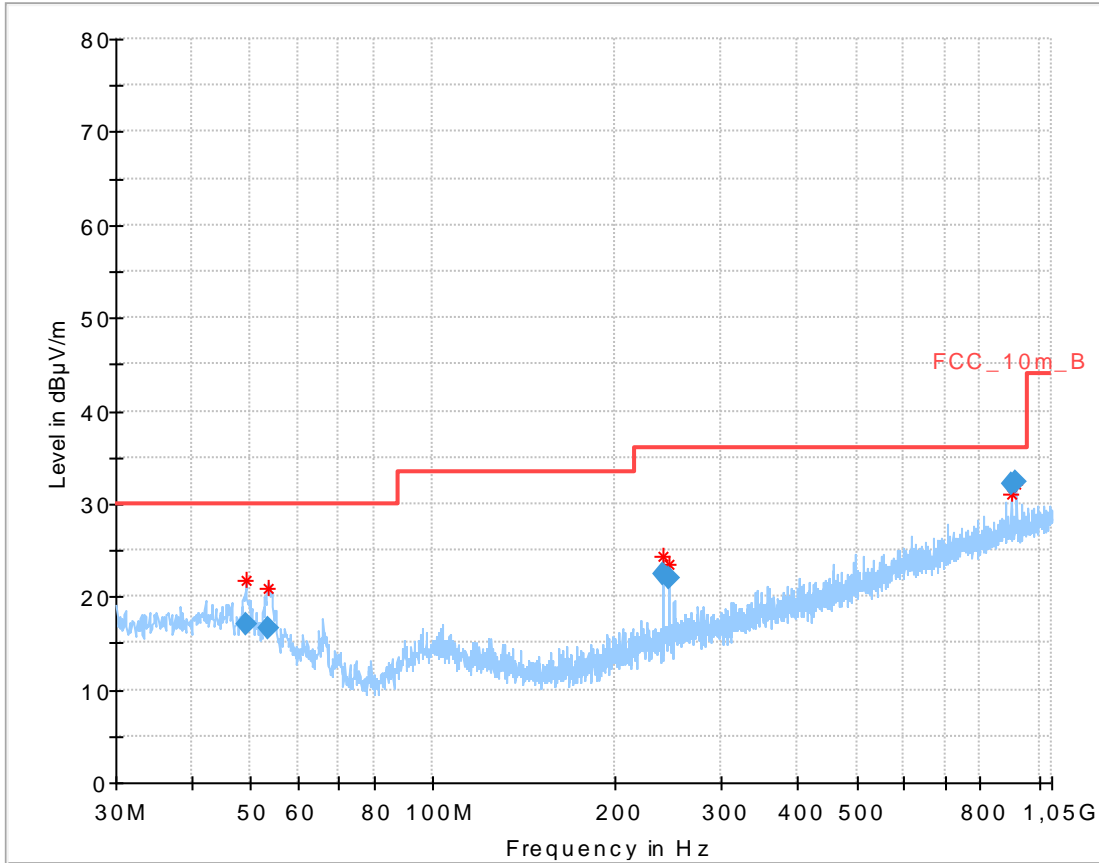
**Plot 1:** 30 MHz to 1 GHz, vertical & horizontal polarization, low channel



**Final\_Result:**

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
41.803050	15.19	30.00	14.81	1000.0	120.000	101.0	V	260	14.0
49.048500	15.68	30.00	14.32	1000.0	120.000	101.0	V	-9	12.9
53.726850	15.99	30.00	14.01	1000.0	120.000	170.0	V	190	12.0
239.594100	22.72	36.00	13.28	1000.0	120.000	98.0	V	171	13.0
791.651850	27.73	36.00	8.27	1000.0	120.000	101.0	H	260	22.7
898.493850	30.90	36.00	5.10	1000.0	120.000	98.0	H	260	24.1
958.342950	31.51	36.00	4.49	1000.0	120.000	98.0	H	260	24.3

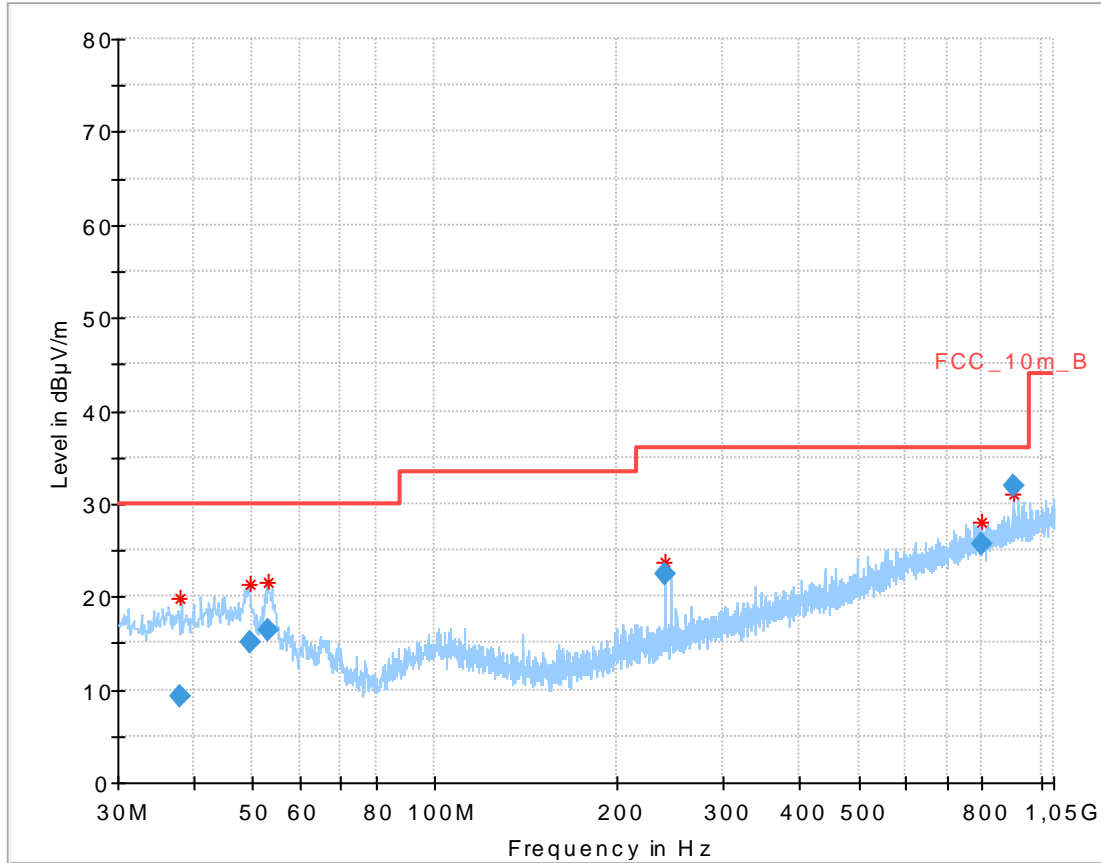
Plot 2: 30 MHz to 1 GHz, vertical & horizontal polarization, mid channel



Final\_Result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
49.165950	16.97	30.00	13.03	1000.0	120.000	101.0	V	190	12.8
53.657700	16.70	30.00	13.30	1000.0	120.000	98.0	V	-9	12.1
239.604600	22.42	36.00	13.58	1000.0	120.000	98.0	V	171	13.0
245.005050	22.04	36.00	13.96	1000.0	120.000	98.0	V	190	13.2
898.460850	32.05	36.00	3.95	1000.0	120.000	98.0	H	260	24.1
918.422550	32.40	36.00	3.60	1000.0	120.000	98.0	H	260	24.2

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

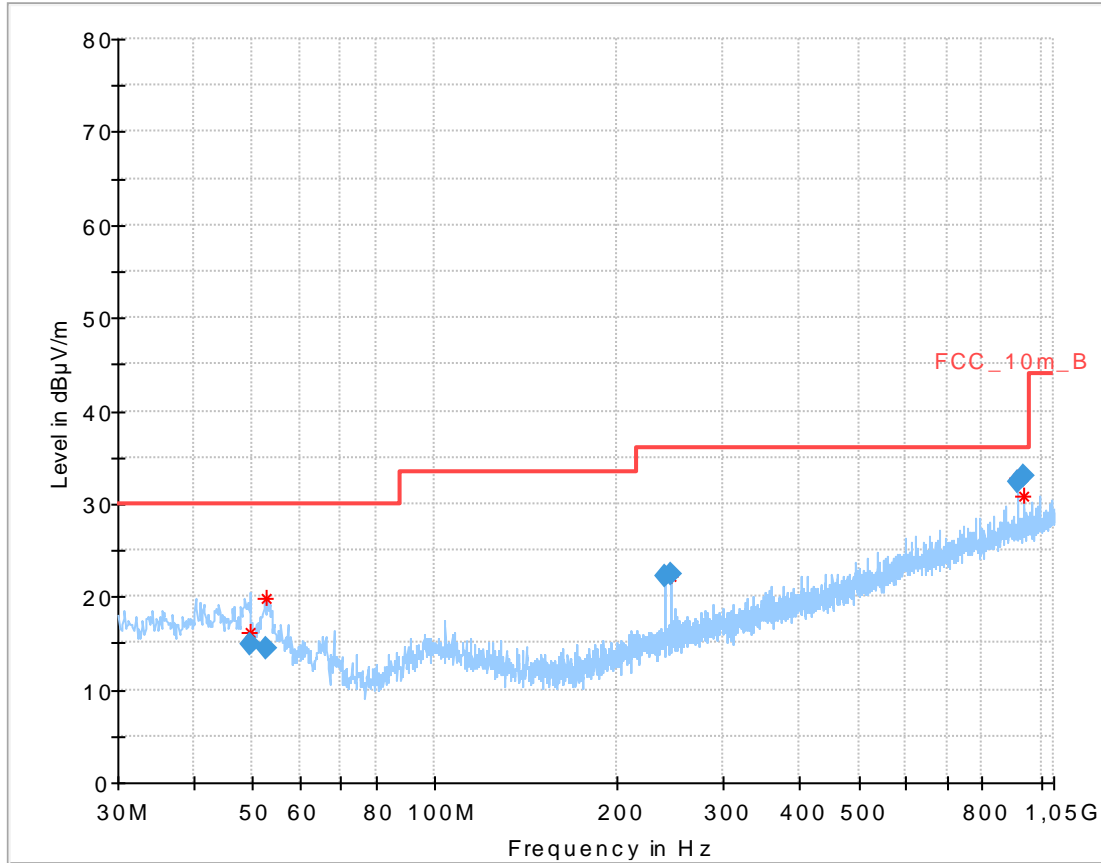


Final\_Result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
37.989000	9.34	30.00	20.66	1000.0	120.000	101.0	H	280	13.9
49.483500	15.17	30.00	14.83	1000.0	120.000	101.0	V	80	12.8
52.908150	16.47	30.00	13.53	1000.0	120.000	98.0	V	-10	12.2
239.604300	22.40	36.00	13.60	1000.0	120.000	101.0	V	170	13.0
798.619050	25.64	36.00	10.36	1000.0	120.000	98.0	H	261	22.7
898.453050	31.91	36.00	4.09	1000.0	120.000	98.0	H	260	24.1

**Plot:** OFDM

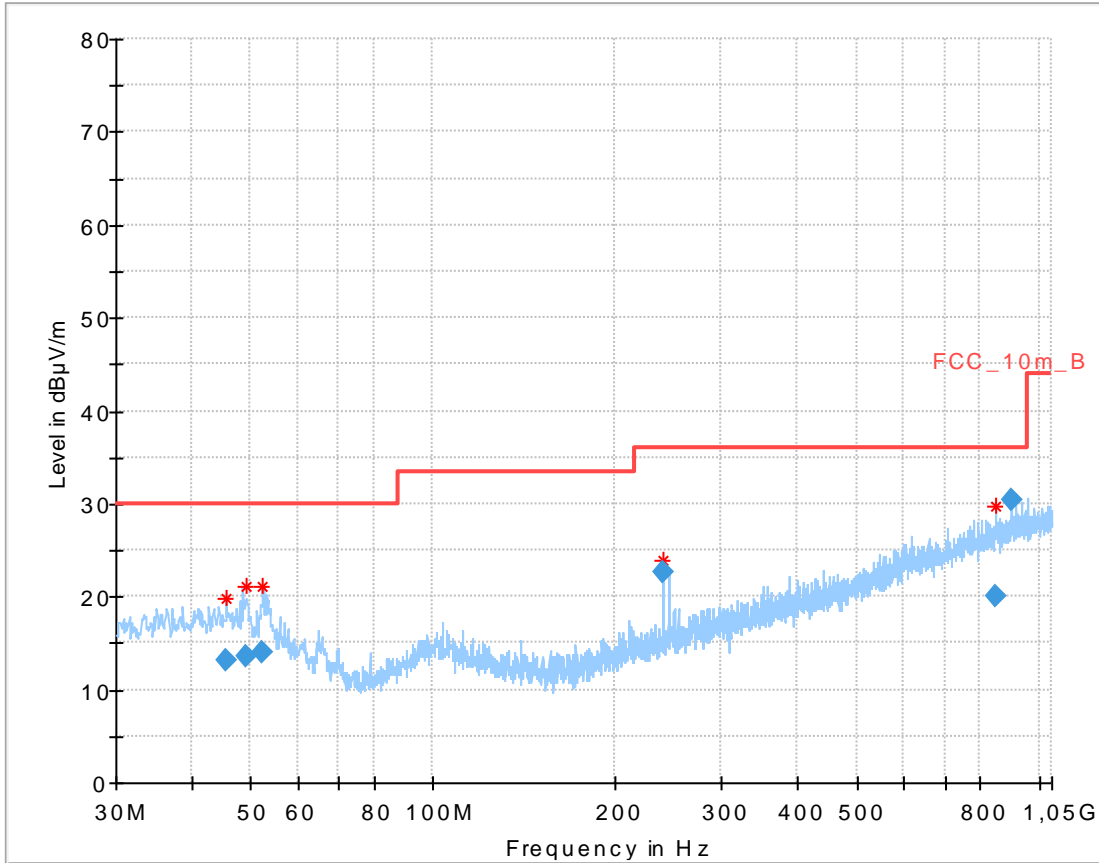
**Plot 1:** 30 MHz to 1 GHz, vertical & horizontal polarization, low channel



**Final\_Result:**

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
49.437900	14.78	30.00	15.22	1000.0	120.000	101.0	V	260	12.8
52.800000	14.54	30.00	15.46	1000.0	120.000	98.0	V	10	12.2
239.607300	22.16	36.00	13.84	1000.0	120.000	98.0	V	171	13.0
244.992000	22.46	36.00	13.54	1000.0	120.000	98.0	V	260	13.2
918.423300	32.35	36.00	3.65	1000.0	120.000	98.0	H	260	24.2
938.400600	33.08	36.00	2.92	1000.0	120.000	98.0	H	260	24.2

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

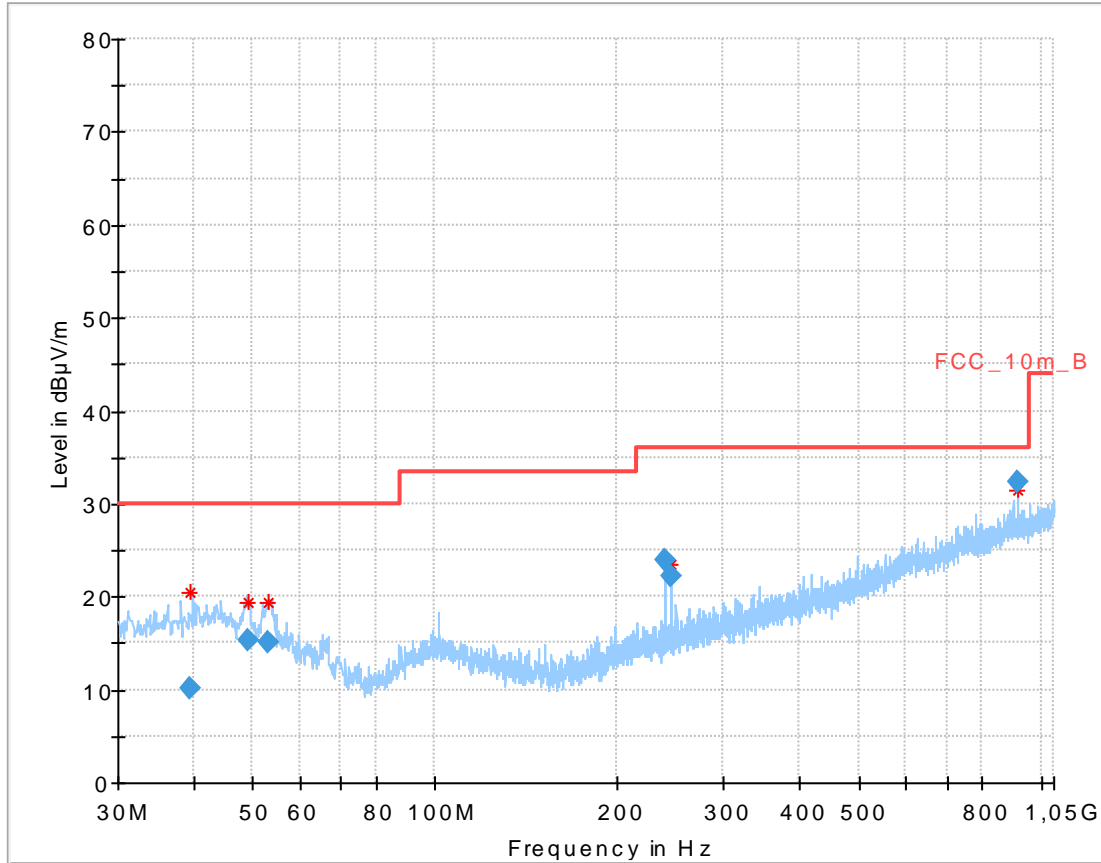


Final\_Result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
45.640650	13.06	30.00	16.94	1000.0	120.000	101.0	V	280	13.7
49.126200	13.62	30.00	16.38	1000.0	120.000	170.0	V	100	12.8
52.488300	13.92	30.00	16.08	1000.0	120.000	170.0	V	260	12.2
239.598900	22.61	36.00	13.39	1000.0	120.000	98.0	V	170	13.0
845.875200	20.10	36.00	15.90	1000.0	120.000	170.0	H	-10	23.4
898.426950	30.34	36.00	5.66	1000.0	120.000	98.0	H	260	24.1



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

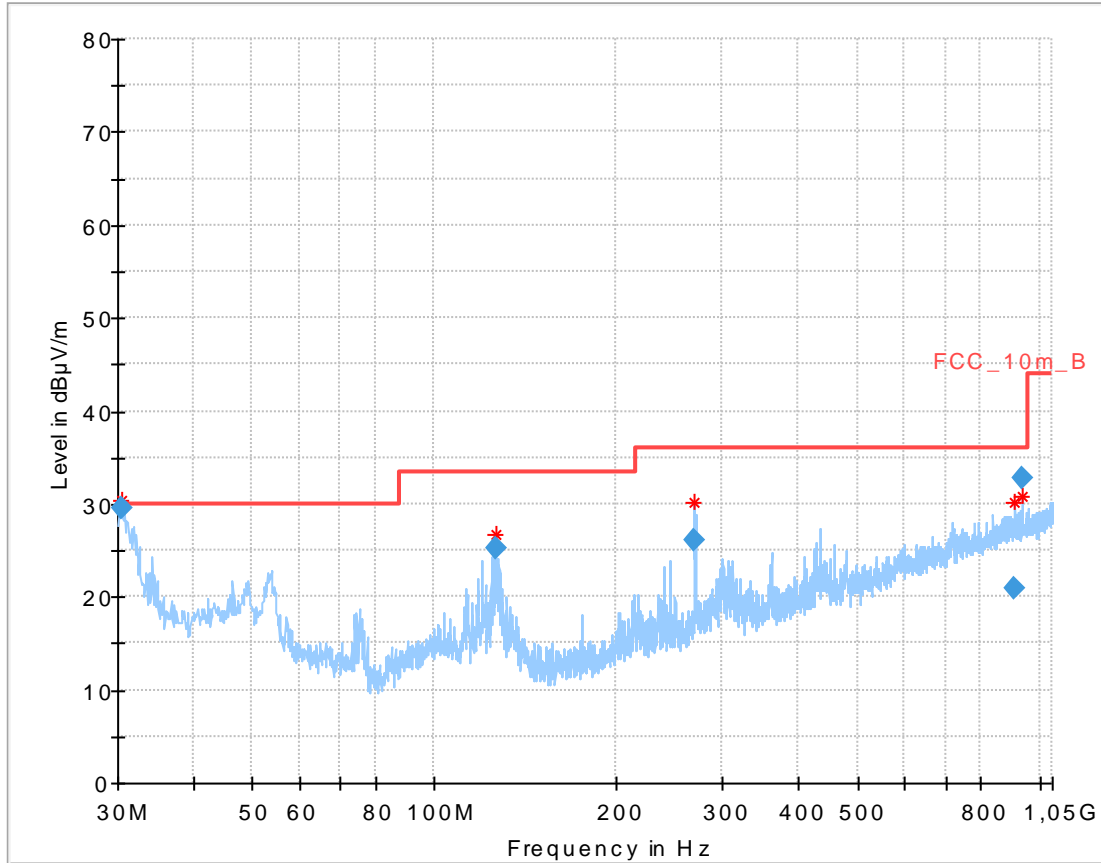


Final\_Result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
39.444600	10.13	30.00	19.87	1000.0	120.000	170.0	H	10	14.0
49.048350	15.23	30.00	14.77	1000.0	120.000	98.0	V	260	12.9
52.939650	15.13	30.00	14.87	1000.0	120.000	98.0	V	190	12.2
239.591850	23.94	36.00	12.06	1000.0	120.000	170.0	H	10	13.0
244.995900	22.17	36.00	13.83	1000.0	120.000	98.0	V	280	13.2
918.424200	32.42	36.00	3.58	1000.0	120.000	98.0	H	260	24.2

**Plot:** RX / Idle mode

**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)
30.391649	29.49	30.00	0.51	1000.0	120.000	101.0	V	-10	13.4
126.080850	25.23	33.50	8.27	1000.0	120.000	101.0	V	280	9.7
268.698150	26.00	36.00	10.00	1000.0	120.000	98.0	V	81	13.8
911.765700	20.92	36.00	15.08	1000.0	120.000	170.0	H	190	24.1
938.394300	32.84	36.00	3.16	1000.0	120.000	98.0	H	260	24.2

**12.9 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:	F > 1 GHz: 1 MHz
Video bandwidth:	3 x RBW
Span:	1 GHz to 26 GHz
Trace mode:	Max Hold
Measured modulation	<input checked="" type="checkbox"/> DSSS b – mode <input type="checkbox"/> OFDM g – mode <input checked="" type="checkbox"/> OFDM n HT20 – mode <input type="checkbox"/> OFDM n HT40 – mode <input checked="" type="checkbox"/> RX / Idle – mode
Test setup:	See sub clause 7.2 – A See sub clause 7.3 – A
Measurement uncertainty	See sub clause 8

**Limits:**

FCC		IC
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 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

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 emissions are more than 20 dB below the limit.			All detected emissions are more than 20 dB below the limit.			All detected emissions are more than 20 dB below the limit.		
-/-	Peak	-/-	-/-	Peak	-/-	-/-	Peak	-/-
	AVG	-/-		AVG	-/-		AVG	-/-
-/-	Peak	-/-	-/-	Peak	-/-	-/-	Peak	-/-
	AVG	-/-		AVG	-/-		AVG	-/-

**Verdict:** [complies](#)

**Results:** OFDM

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 emissions are more than 20 dB below the limit.			All detected emissions are more than 20 dB below the limit.			All detected emissions are more than 20 dB below the limit.		
-/-	Peak	-/-	-/-	Peak	-/-	-/-	Peak	-/-
	AVG	-/-		AVG	-/-		AVG	-/-
-/-	Peak	-/-	-/-	Peak	-/-	-/-	Peak	-/-
	AVG	-/-		AVG	-/-		AVG	-/-

**Verdict:** [complies](#)

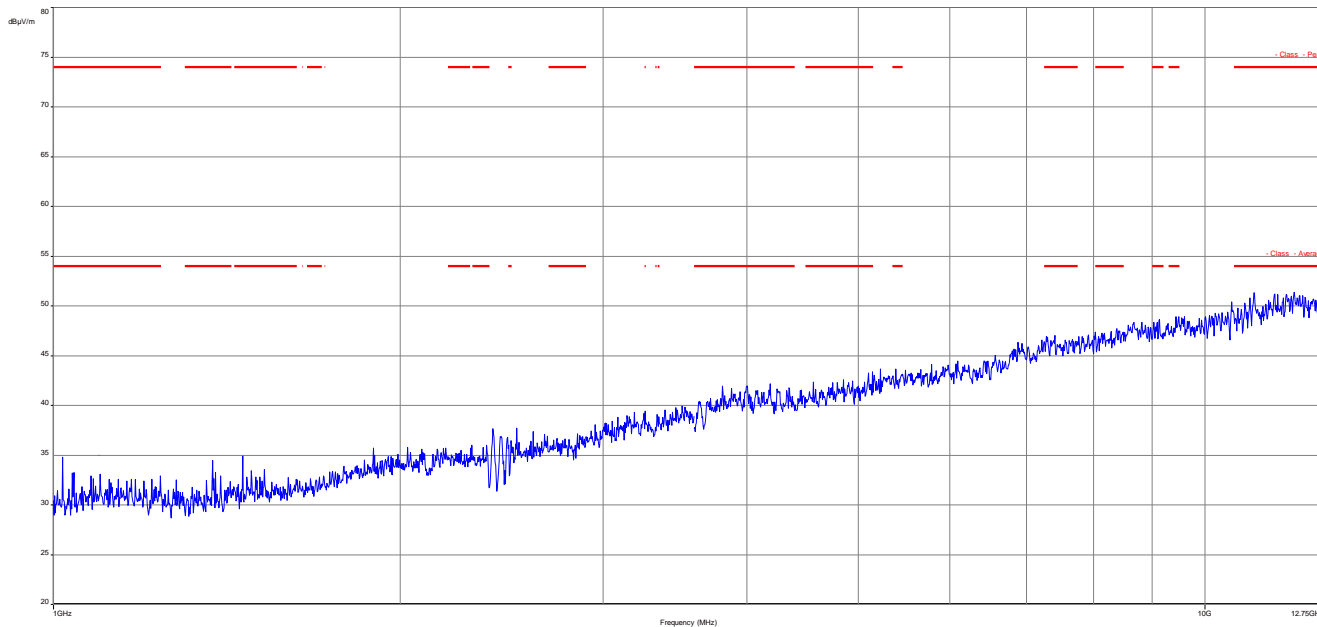
**Results:** RX / idle – mode

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	-/-

**Verdict:** [complies](#)

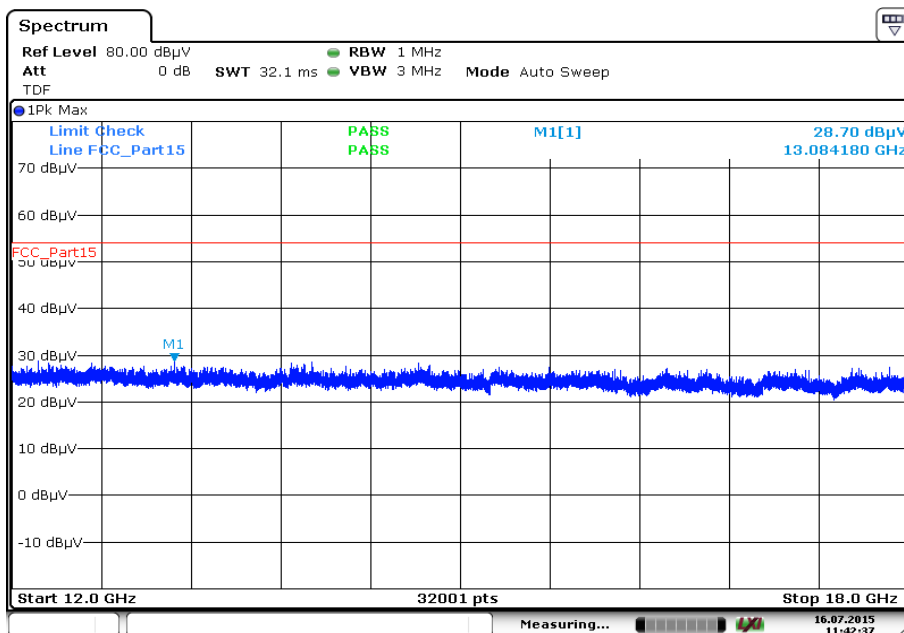
**Plots:** DSSS

**Plot 1:** Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



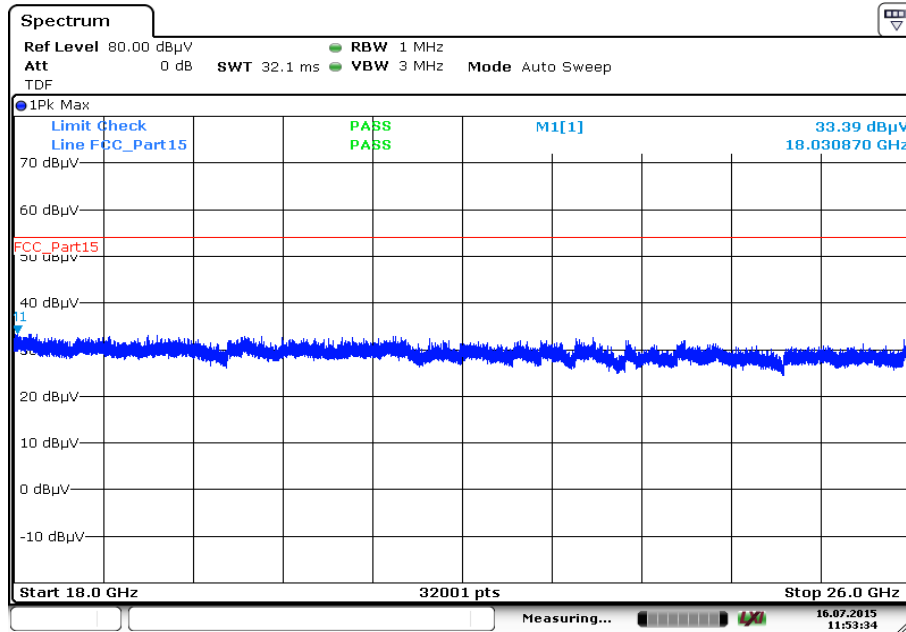
The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 2:** Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

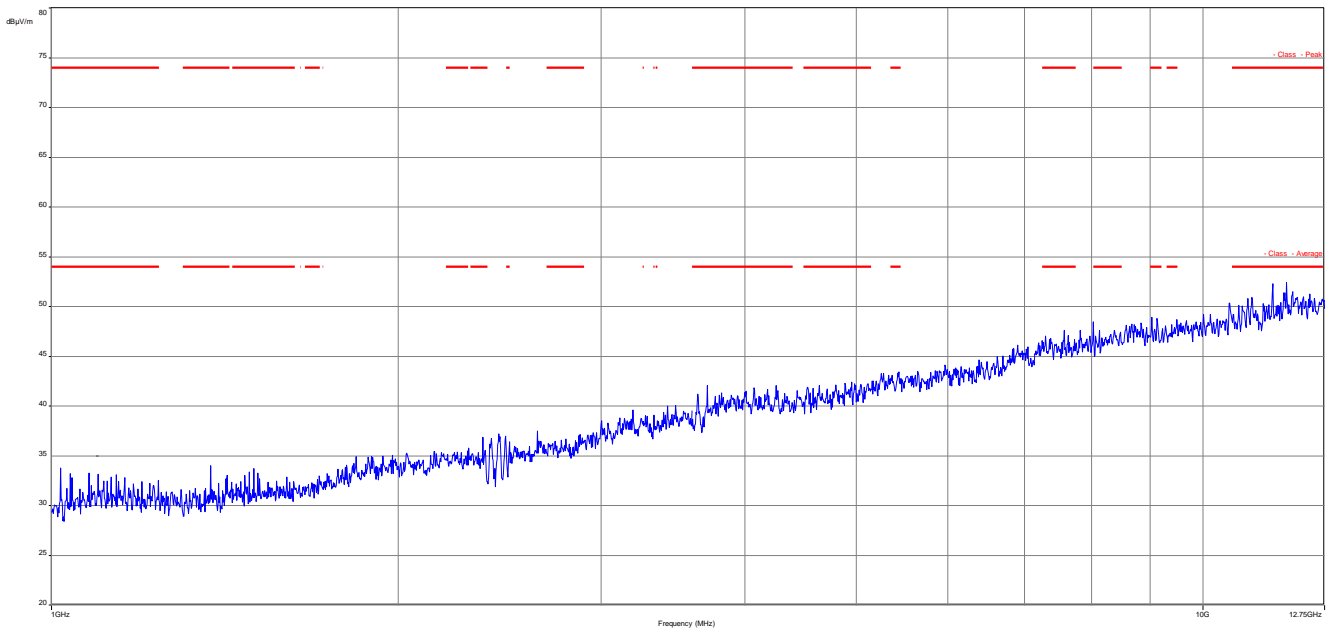


Date: 16.JUL.2015 11:42:37

Plot 3: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

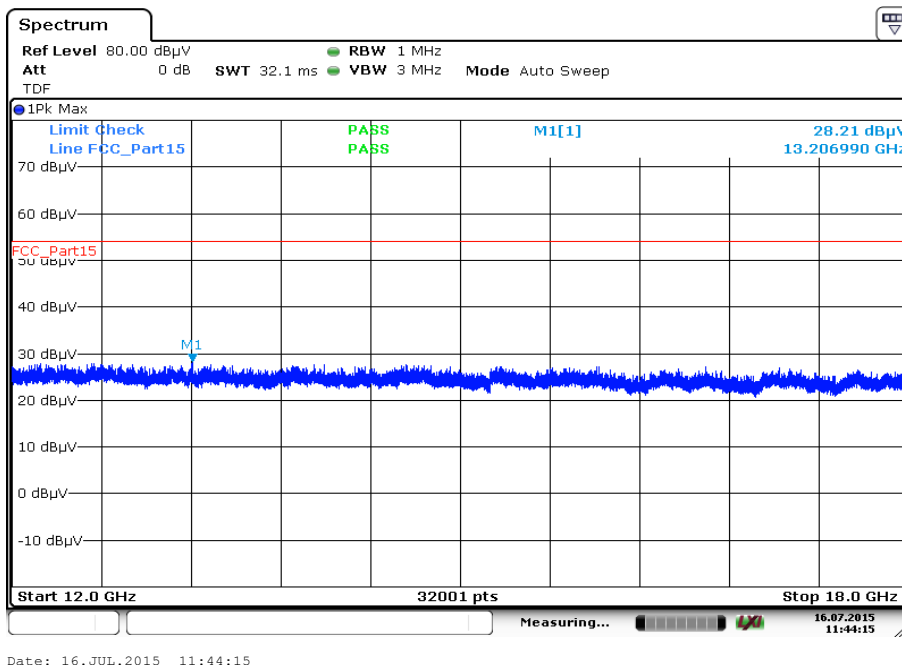


Plot 4: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

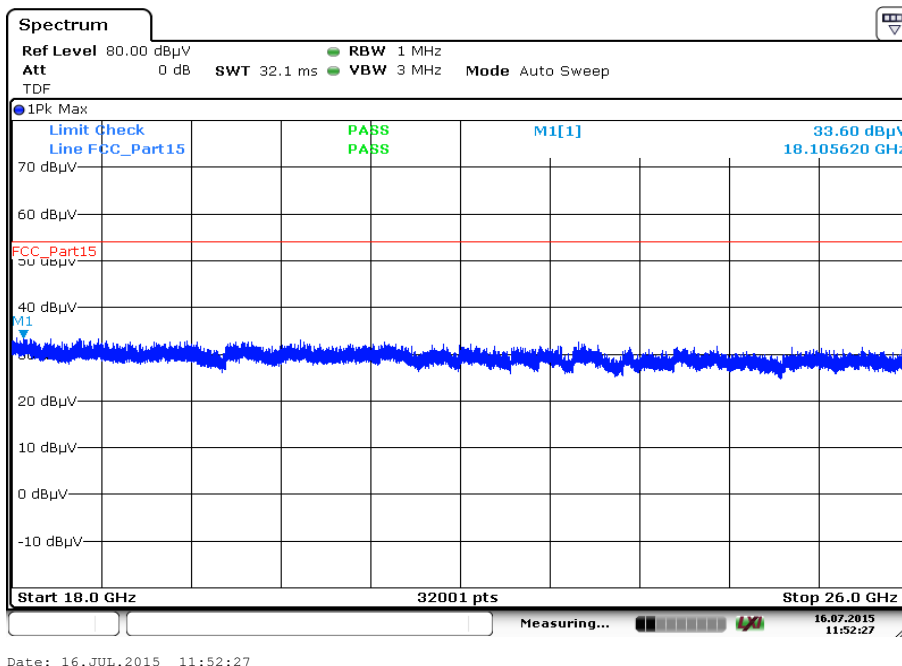


The carrier signal is notched with a 2.4 GHz band rejection filter.

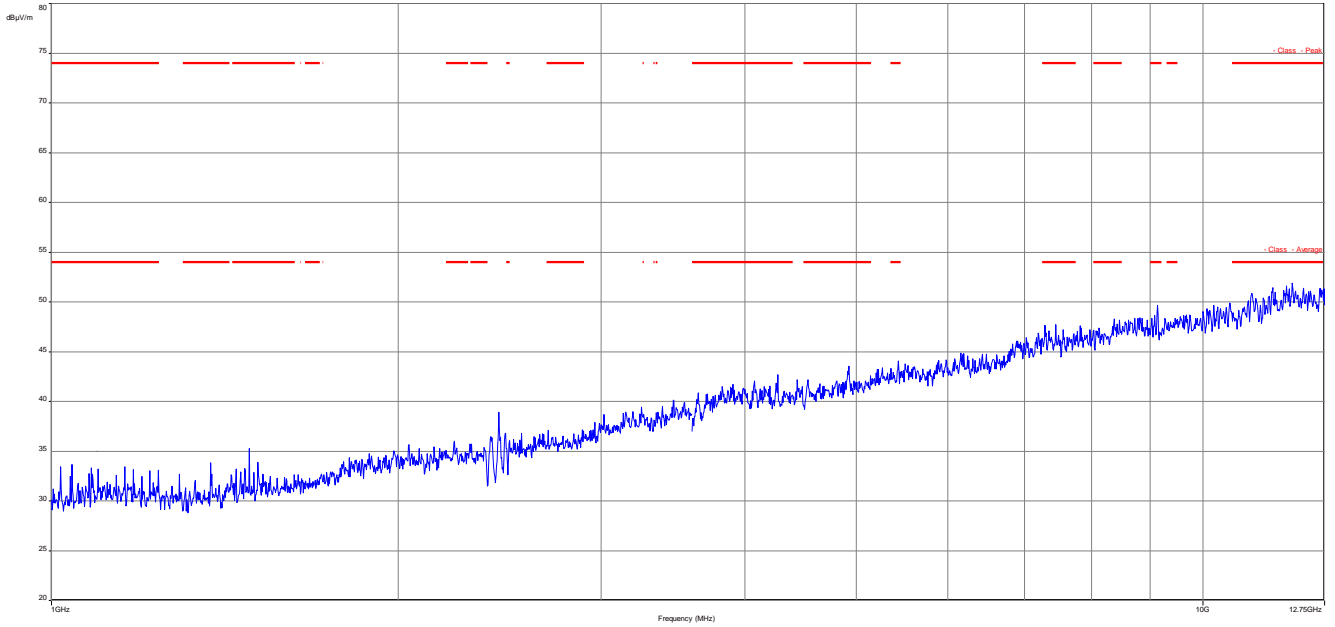
Plot 5: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Plot 6: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization

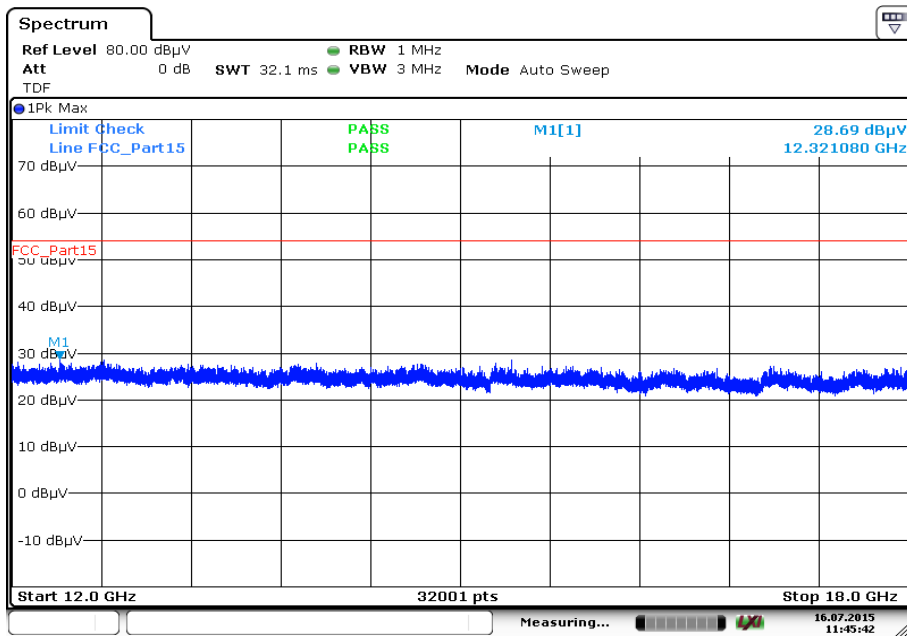


**Plot 7:** Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



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

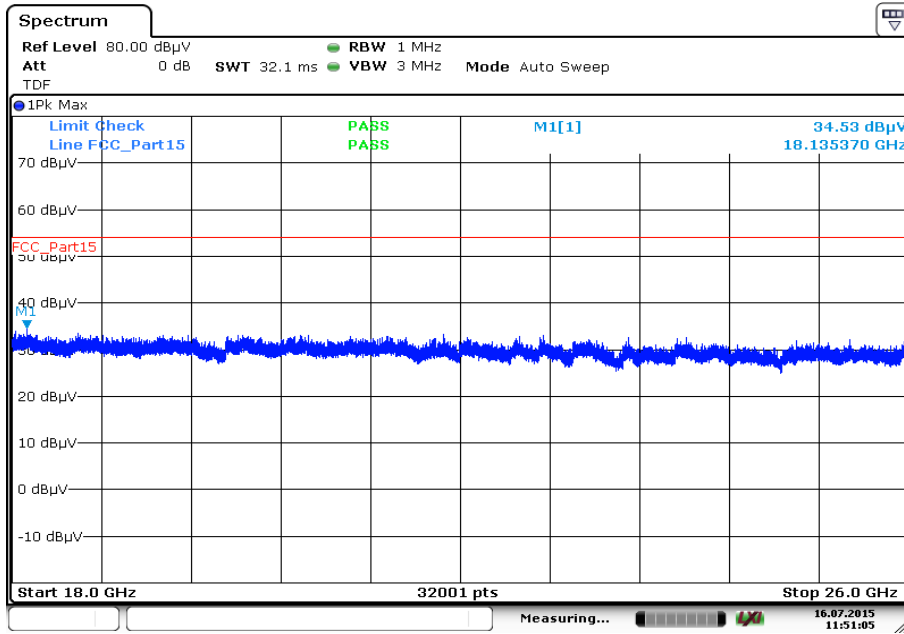
**Plot 8:** Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 16.JUL.2015 11:45:42



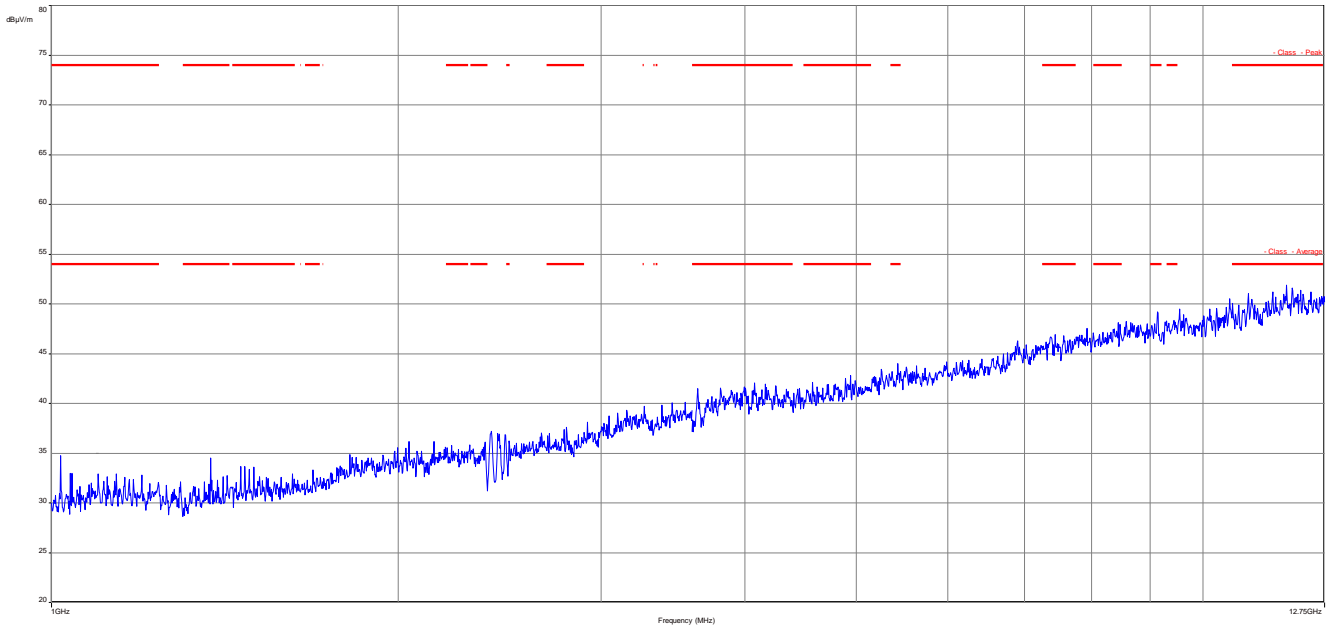
Plot 9: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 16.JUL.2015 11:51:05

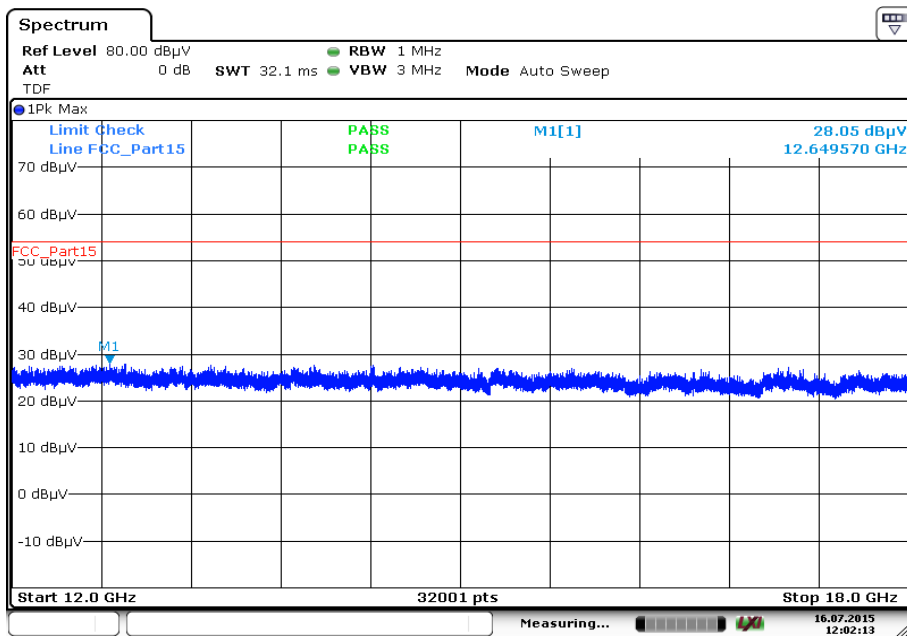
**Plots:** OFDM

**Plot 1:** Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



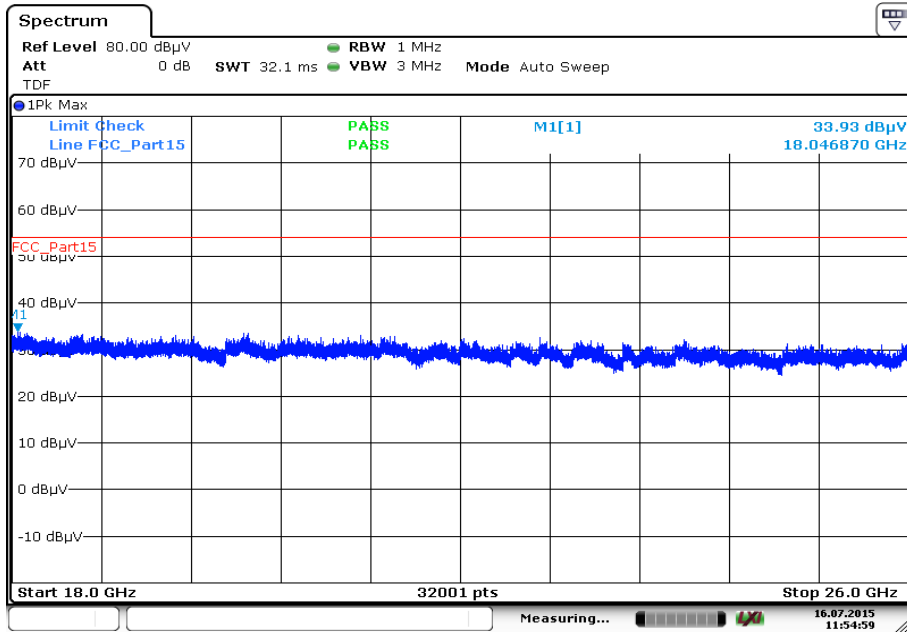
The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 2:** Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



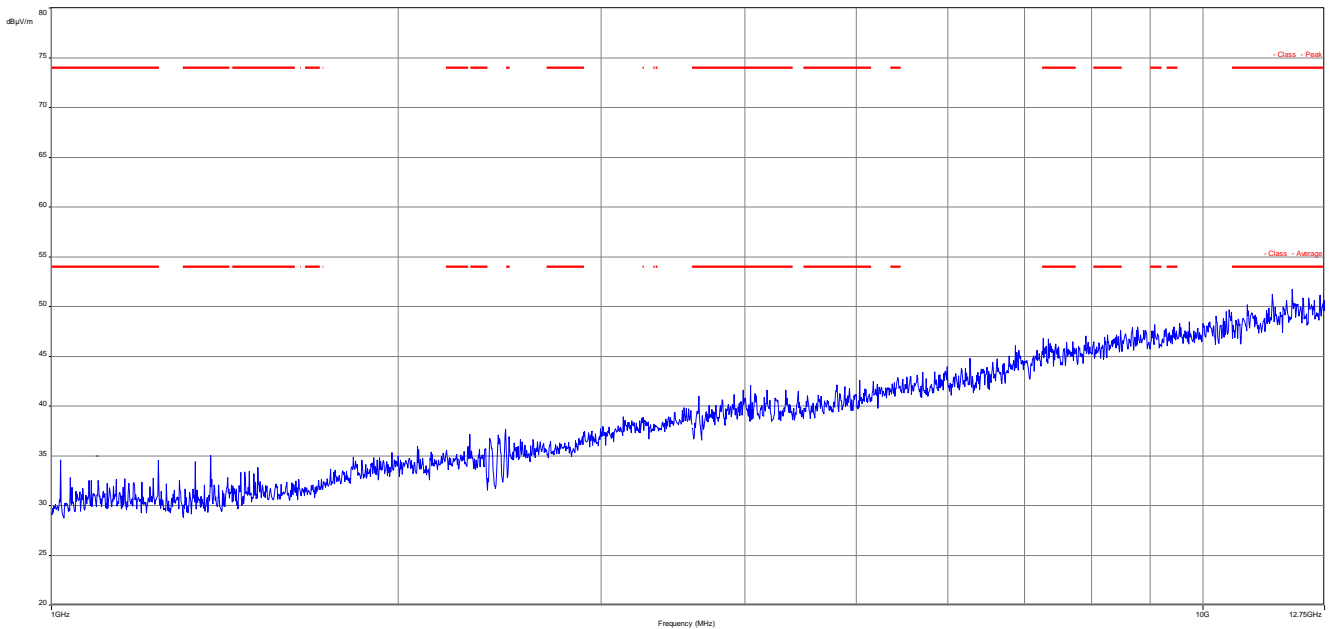
Date: 16.JUL.2015 12:02:13

Plot 3: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



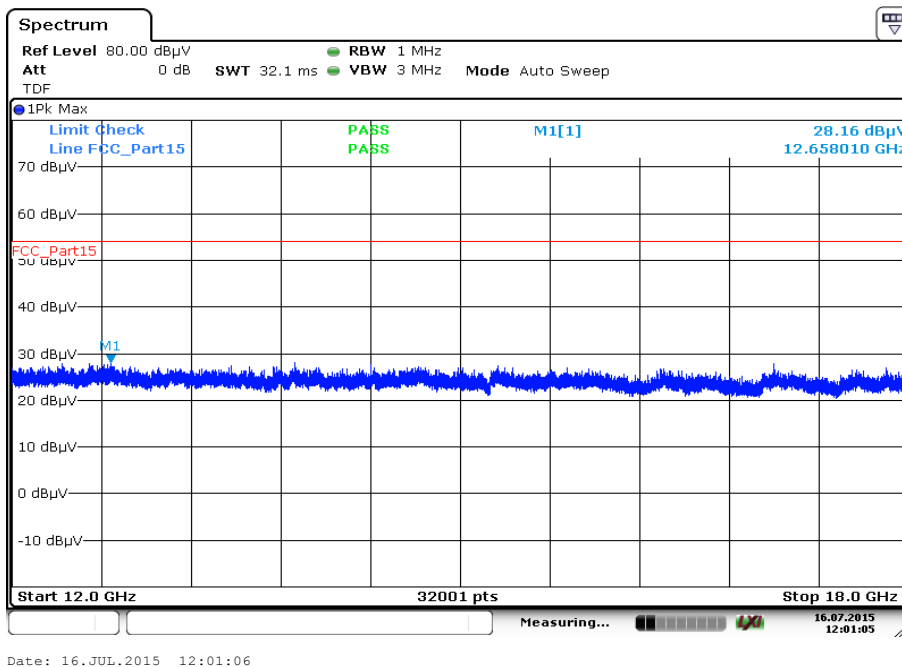
Date: 16.JUL.2015 11:54:59

Plot 4: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

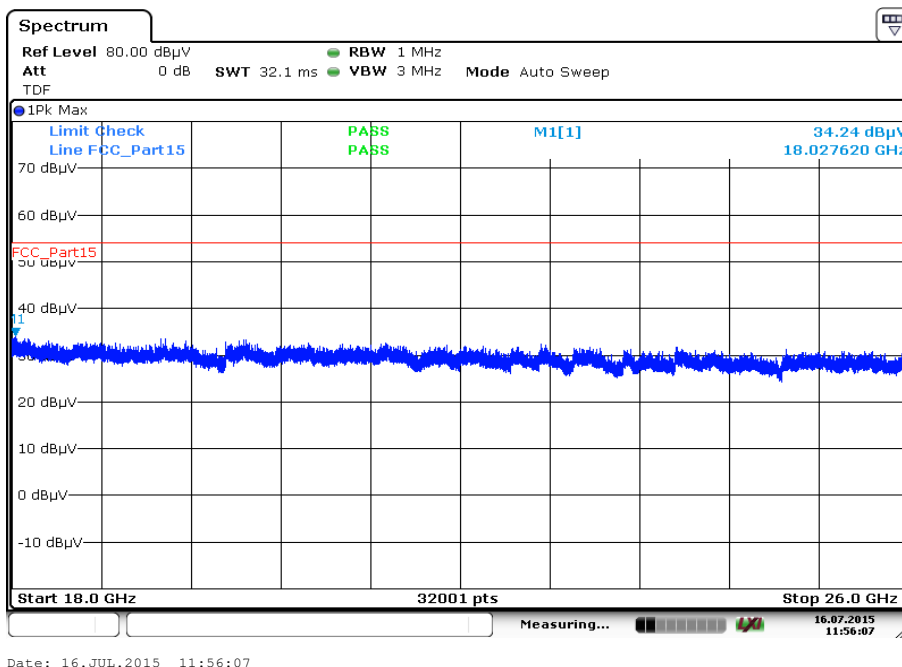


The carrier signal is notched with a 2.4 GHz band rejection filter.

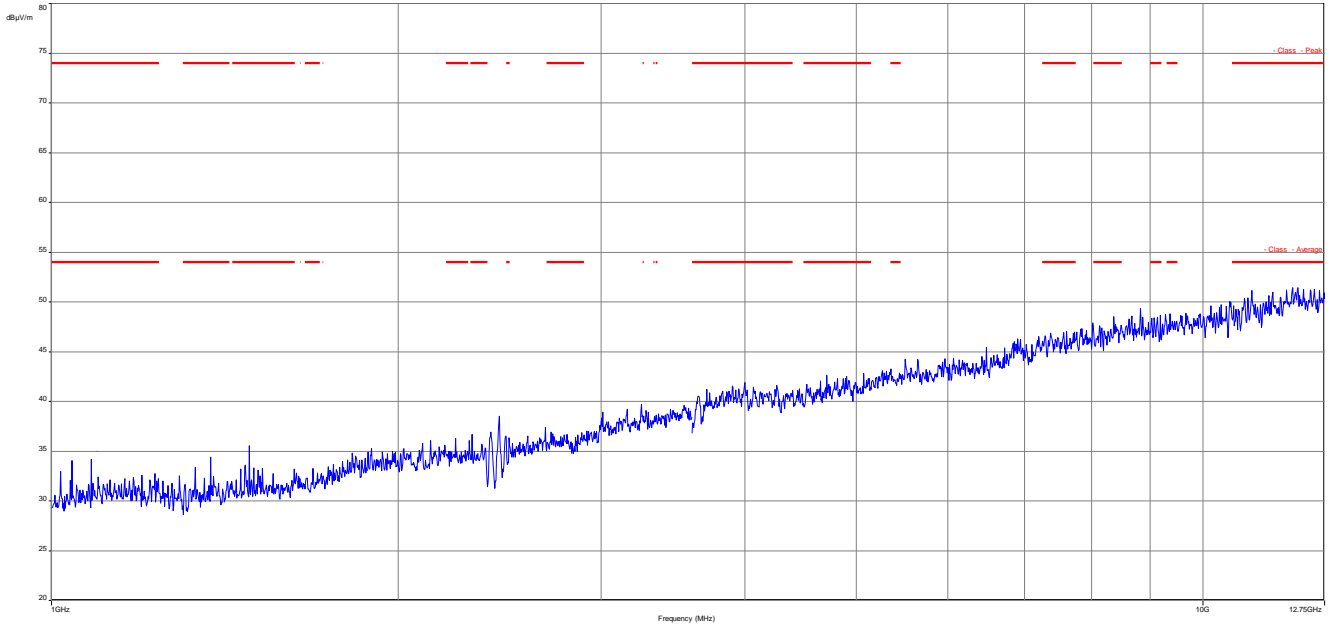
Plot 5: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Plot 6: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization

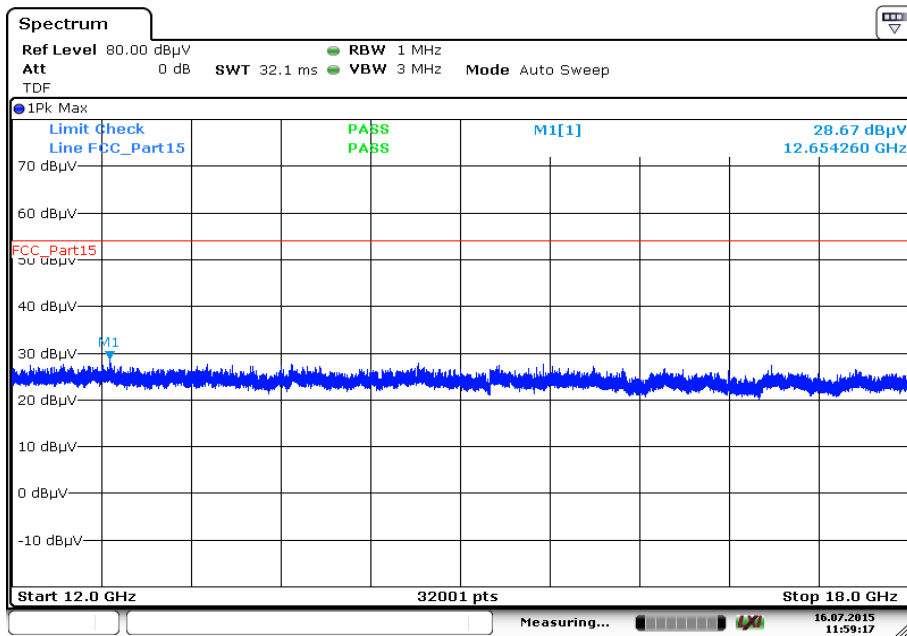


**Plot 7:** Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



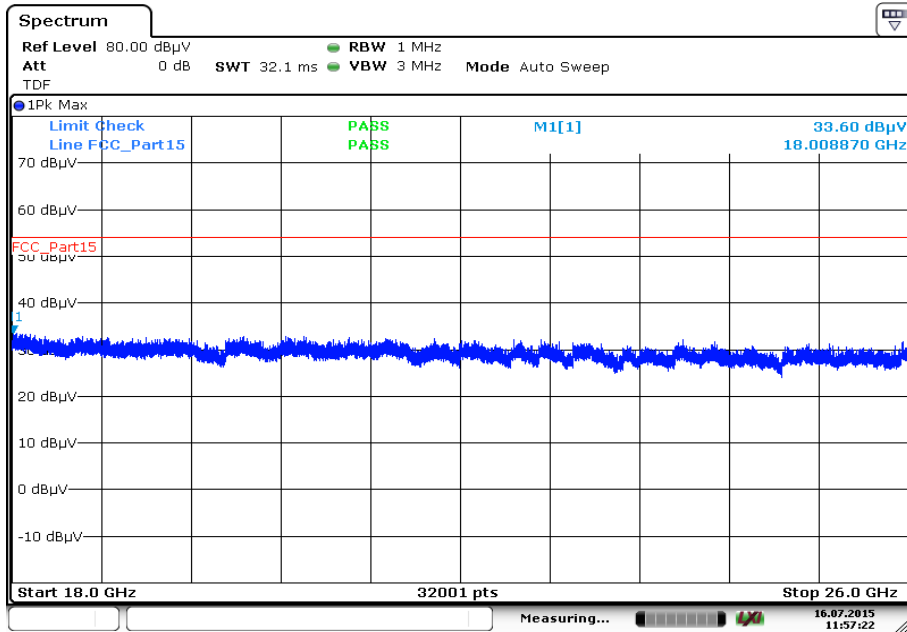
The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 8:** Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 16.JUL.2015 11:59:17

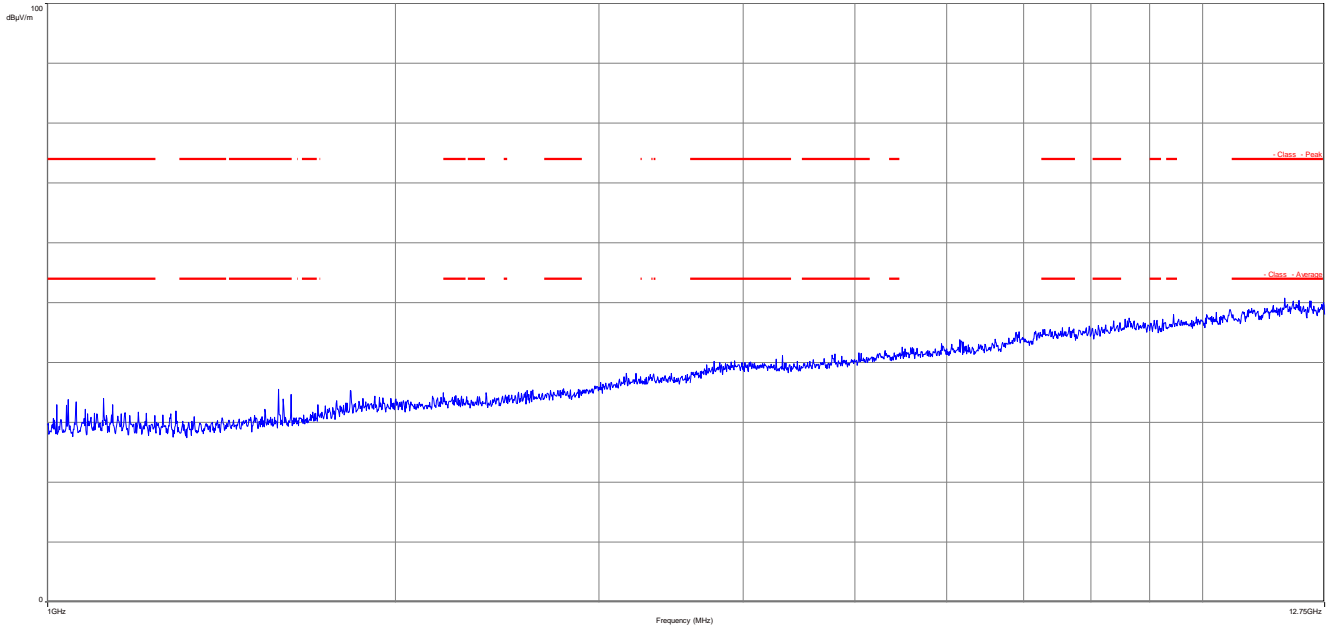
Plot 9: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



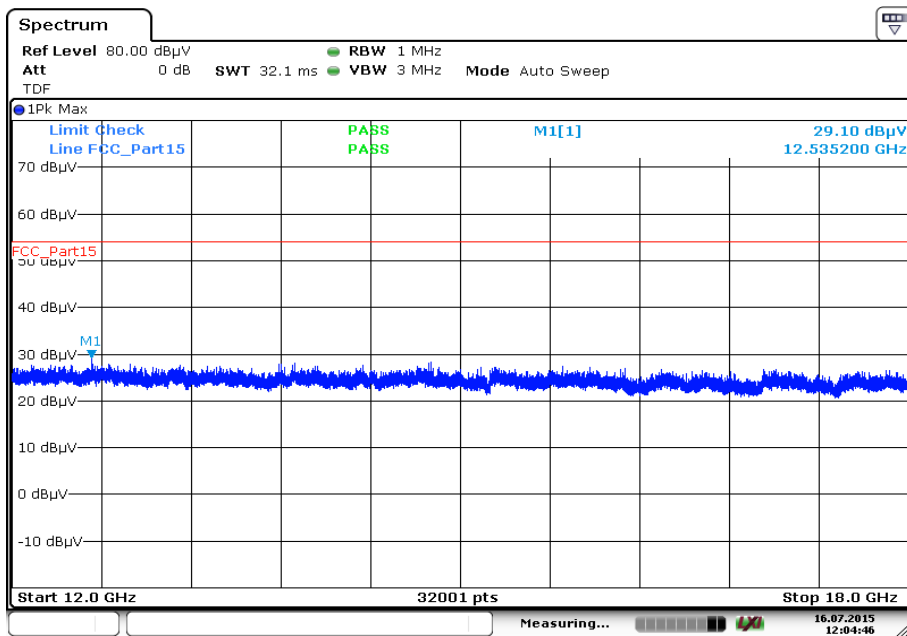
Date: 16.JUL.2015 11:57:22

**Plots:** RX / idle mode

**Plot 1:** 1 GHz to 12.75 GHz, vertical & horizontal polarization

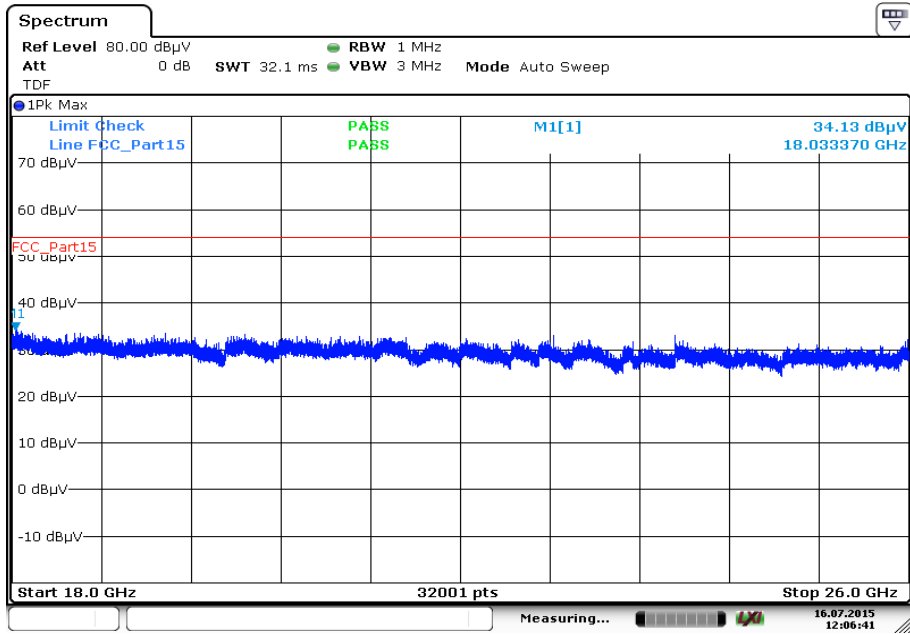


**Plot 2:** 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 16.JUL.2015 12:04:46

Plot 3: 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 16.JUL.2015 12:06:42



**12.10 Spurious emissions conducted below 30 MHz (AC conducted)**

**Description:**

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to channel 6. This measurement is repeated for DSSS and OFDM modulation. If peaks are found channel 1 and channel 11 will be measured too. The measurement is performed with the data rate producing the highest output power. Both power lines, phase and neutral line, are measured. Found peaks are remeasured with average and quasi peak detection to show compliance to the limits.

**Measurement:**

Measurement parameter	
Detector:	Peak - Quasi Peak / Average
Sweep time:	Auto
Resolution bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Video bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace mode:	Max Hold
Test setup:	See sub clause 7.4 – A (TX/RX) – B (JBP)
Measurement uncertainty	See sub clause 8

**Limits:**

FCC		IC	
Frequency (MHz)	Quasi-Peak (dBµV/m)	Average (dBµV/m)	
0.15 – 0.5	66 to 56*	56 to 46*	
0.5 – 5	56	46	
5 – 30.0	60	50	

\*Decreases with the logarithm of the frequency

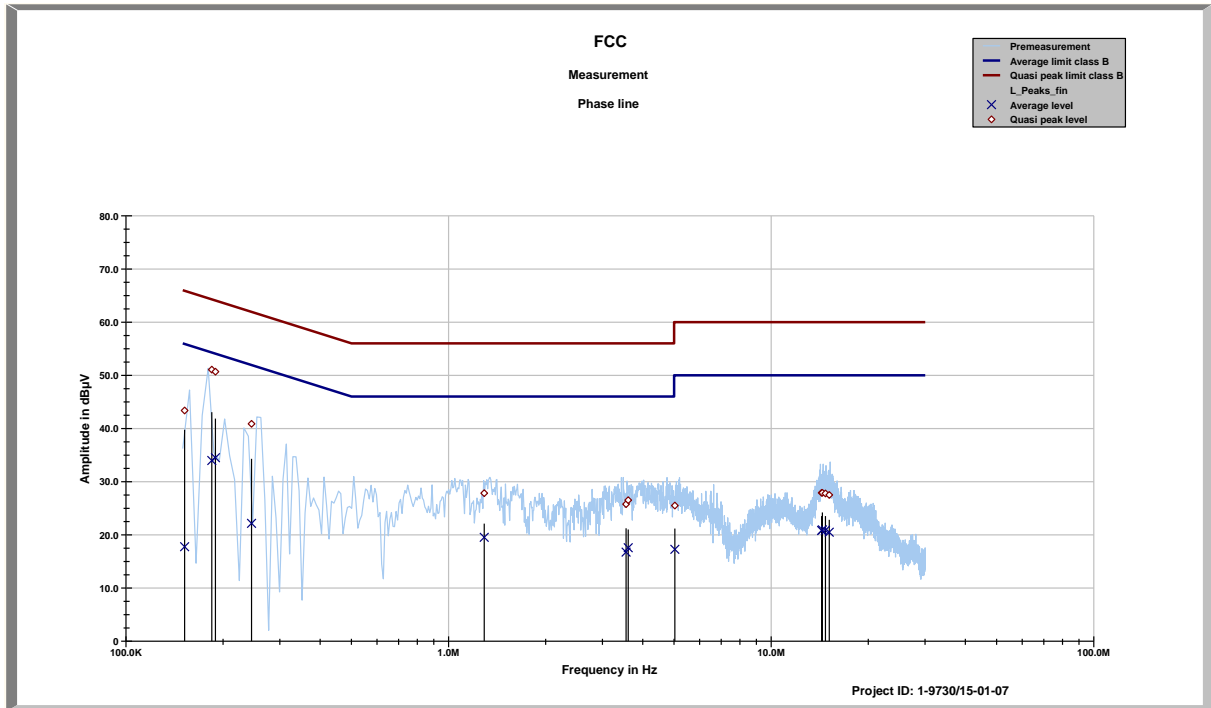
**Results:**

TX Spurious Emissions Conducted < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
All detected peaks are more than 16 dB below the limit.		

**Verdict:** [complies](#)

**Plots & result tables:**

**Plot 1:** 150 kHz to 30 MHz, phase line , TX mode



FCC  
Phase line tbl

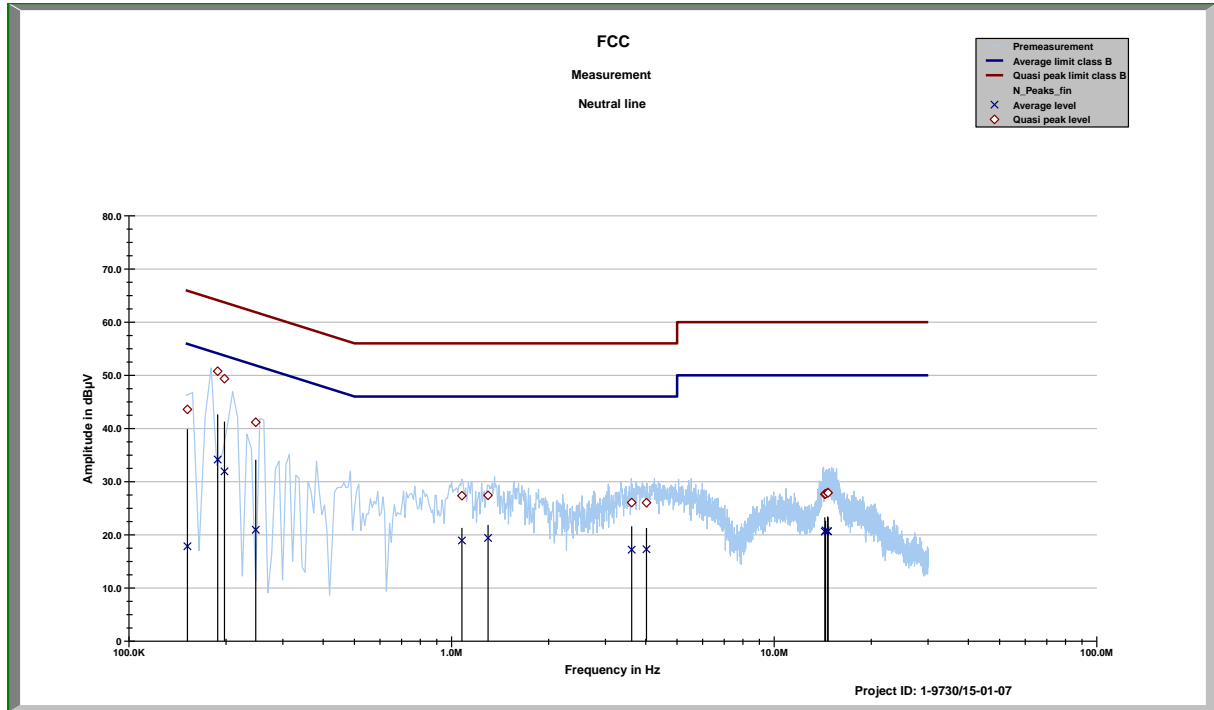
Project ID: 1-9730/15-01-07

02:39:38 PM, Wednesday, July 15, 2015

Frequency MHz	Quasi peak level dBµV	Margin quasi peak dBµV	Average level dBµV	Margin average dBµV
0.152	43.37	22.52	17.75	38.19
0.18459	51.06	13.22	33.98	21.03
0.18941	50.67	13.39	34.51	20.36
0.2451	40.88	21.05	22.16	31.13
1.2892	27.84	28.16	19.52	26.48
3.549	25.76	30.24	16.75	29.25
3.603	26.51	29.49	17.57	28.43
5.0251	25.50	34.50	17.28	32.72
14.321	27.90	32.10	20.81	29.19
14.404	27.90	32.10	20.93	29.07
14.717	27.78	32.22	20.86	29.14
15.131	27.49	32.51	20.50	29.50

Project ID - 1-9730/15-01-07  
 EUT - FLIR-T7250  
 Serial Number - 72400046  
 Operating mode - WLAN TX (n HT20-mode Ch. 11)

Plot 2: 150 kHz to 30 MHz, neutral line, TX mode



FCC  
Neutral line tbl

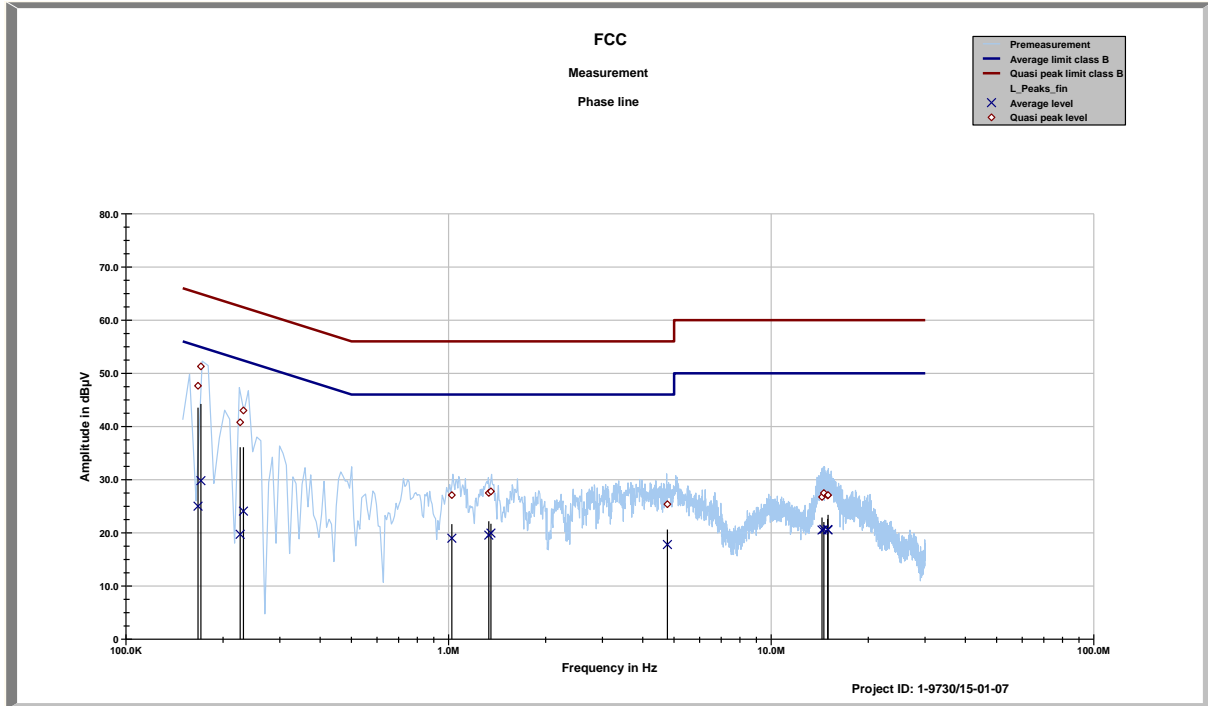
Project ID: 1-9730/15-01-07

02:39:38 PM, Wednesday, July 15, 2015

Frequency MHz	Quasi peak level dBµV	Margin quasi peak dBµV	Average level dBµV	Margin average dBµV
0.15185	43.59	22.31	17.86	38.09
0.18834	50.77	13.34	34.15	20.76
0.19776	49.38	14.33	31.93	22.70
0.24724	41.18	20.67	20.95	32.27
1.0762	27.35	28.65	18.94	27.06
1.2976	27.43	28.57	19.40	26.60
3.6145	26.07	29.93	17.21	28.79
4.0177	26.05	29.95	17.28	28.72
14.344	27.65	32.35	20.59	29.41
14.417	27.69	32.31	20.83	29.17
14.639	27.96	32.04	20.68	29.32
14.677	27.89	32.11	20.69	29.31

Project ID - 1-9730/15-01-07  
 EUT - FLIR-T7250  
 Serial Number - 72400046  
 Operating mode - WLAN TX (n HT20-mode Ch. 11)

Plot 3: 150 kHz to 30 MHz, phase line, RX mode



FCC  
Phase line tbl

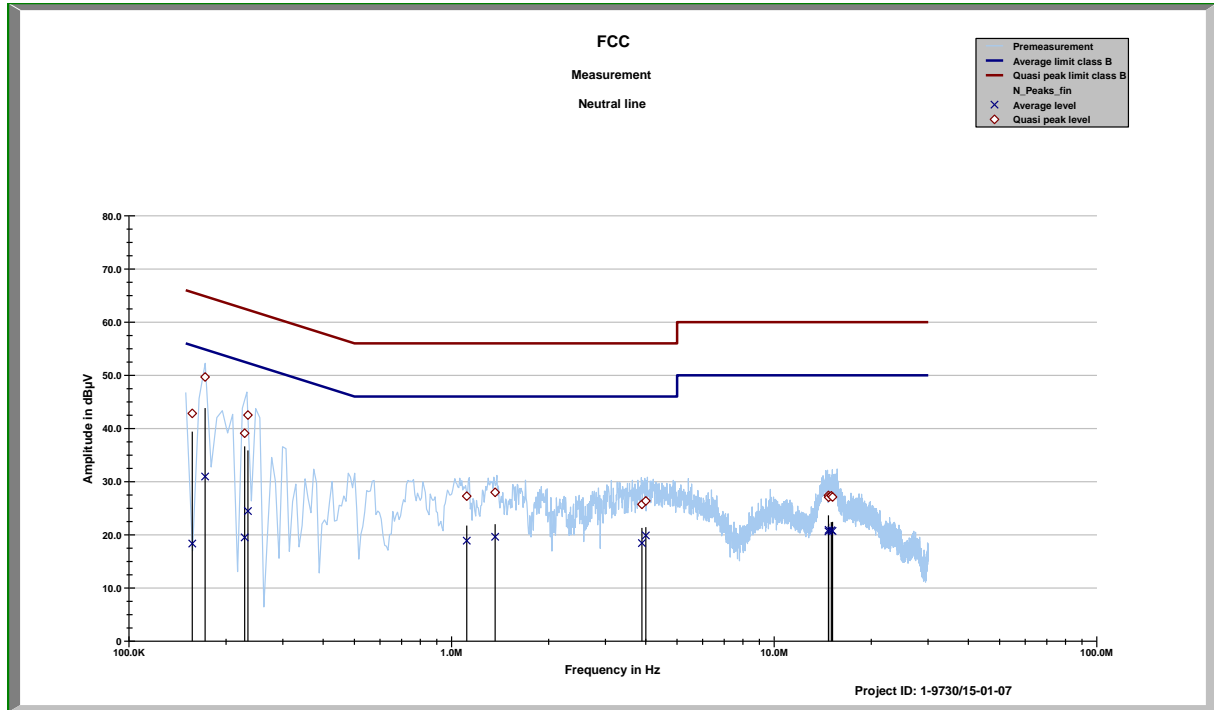
Project ID: 1-9730/15-01-08

03:18:15 PM, Wednesday, July 15, 2015

Frequency MHz	Quasi peak level dBµV	Margin quasi peak dBµV	Average level dBµV	Margin average dBµV
0.16724	47.65	17.45	25.02	30.49
0.17074	51.30	13.63	29.82	25.59
0.22601	40.79	21.81	19.73	34.10
0.23127	43.00	19.40	24.08	29.60
1.02358	27.10	28.90	19.00	27.00
1.3321	27.50	28.50	19.57	26.43
1.3526	27.80	28.20	19.96	26.04
4.7655	25.37	30.63	17.80	28.20
14.361	26.75	33.25	20.52	29.48
14.553	27.48	32.52	20.67	29.33
14.955	27.03	32.97	20.62	29.38
14.993	27.09	32.91	20.55	29.45

Project ID - 1-9730/15-01-08  
 EUT - FLIR-T7250  
 Serial Number - 72400046  
 Operating mode - RX

Plot 4: 150 kHz to 30 MHz, neutral line, RX mode



FCC  
Neutral line tbl

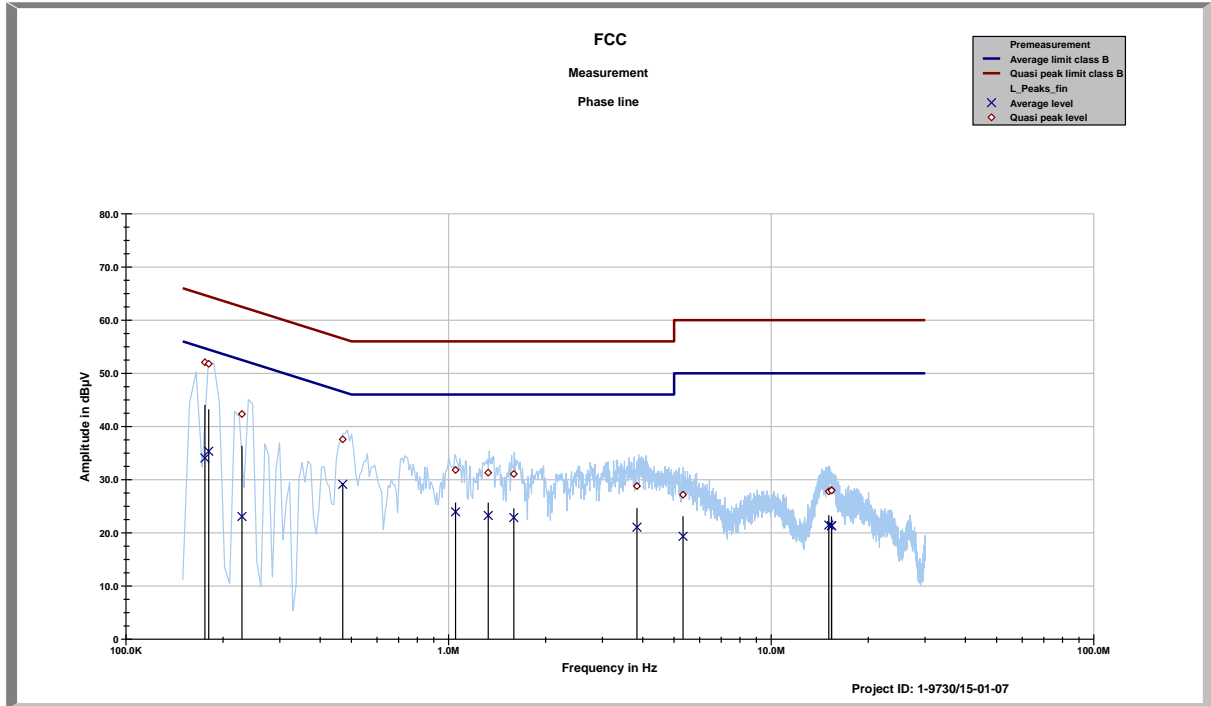
Project ID: 1-9730/15-01-08

03:18:15 PM, Wednesday, July 15, 2015

Frequency MHz	Quasi peak level dBµV	Margin quasi peak dBµV	Average level dBµV	Margin average dBµV
0.15716	42.83	22.78	18.35	37.44
0.1722	49.68	15.17	30.97	24.40
0.22838	39.11	23.40	19.52	34.25
0.23373	42.53	19.79	24.47	29.14
1.11403	27.27	28.73	18.91	27.09
1.3641	28.00	28.00	19.64	26.36
3.8887	25.73	30.27	18.44	27.56
3.9979	26.37	29.63	19.88	26.12
14.721	27.42	32.58	20.66	29.34
14.737	27.06	32.94	20.93	29.07
15.027	27.33	32.67	20.84	29.16
15.155	27.11	32.89	20.73	29.27

Project ID - 1-9730/15-01-08  
 EUT - FLIR-T7250  
 Serial Number - 72400046  
 Operating mode - RX

Plot 5: 150 kHz to 30 MHz, phase line, JBP



FCC  
Phase line tbl

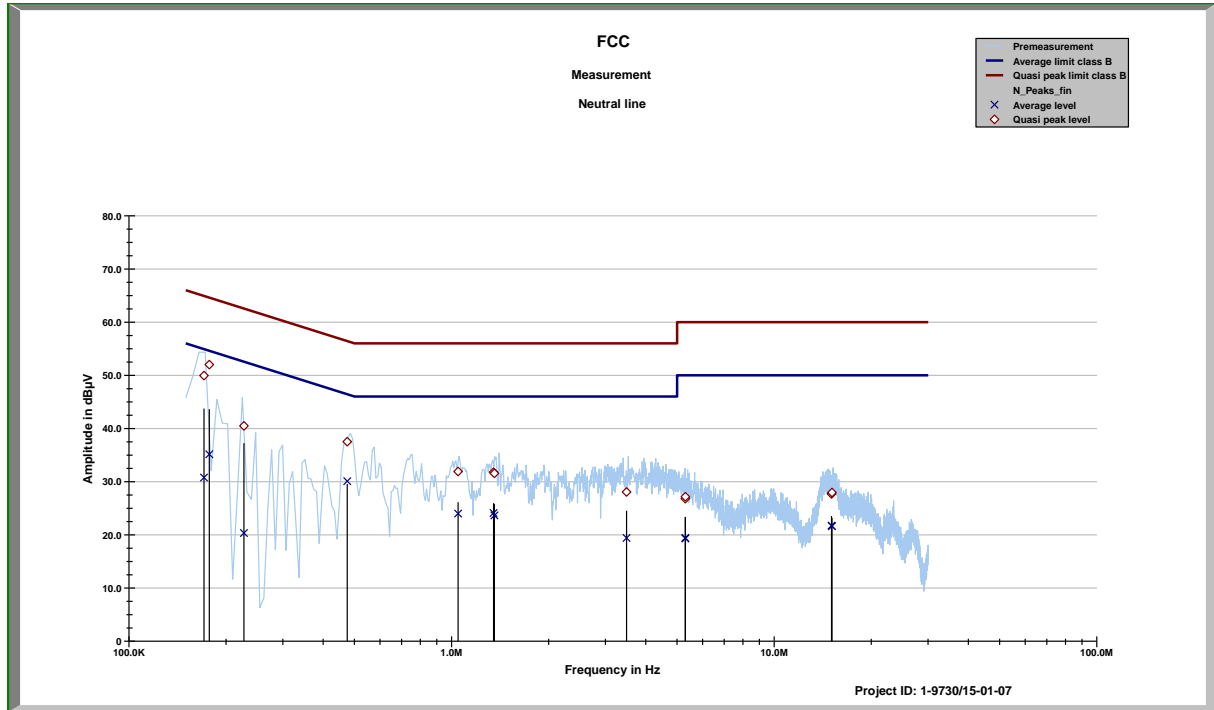
Project ID: 1-9730/15-01-08

03:36:42 PM, Wednesday, July 15, 2015

Frequency MHz	Quasi peak level dBµV	Margin quasi peak dBµV	Average level dBµV	Margin average dBµV
0.17564	52.08	12.61	34.06	21.20
0.18056	51.78	12.68	35.34	19.79
0.22889	42.34	20.15	23.07	30.67
0.46991	37.58	18.94	29.13	17.73
1.05073	31.82	24.18	23.95	22.05
1.3269	31.32	24.68	23.25	22.75
1.5927	31.07	24.93	22.88	23.12
3.8357	28.79	27.21	21.05	24.95
5.3284	27.17	32.83	19.35	30.65
15.074	27.79	32.21	21.46	28.54
15.375	28.05	31.95	21.33	28.67
15.377	27.97	32.03	21.36	28.64

Project ID - 1-9730/15-01-08  
 EUT - FLIR-T7250  
 Serial Number - 72400046  
 Operating mode - RX + traffic on USB

Plot 6: 150 kHz to 30 MHz, neutral line, JBP



FCC  
Neutral line tbl

Project ID: 1-9730/15-01-08

03:36:42 PM, Wednesday, July 15, 2015

Frequency MHz	Quasi peak level dBµV	Margin quasi peak dBµV	Average level dBµV	Margin average dBµV
0.17082	49.94	14.98	30.77	24.64
0.17746	52.01	12.59	35.15	20.06
0.22714	40.50	22.06	20.34	33.45
0.47488	37.51	18.92	30.09	16.63
1.04771	31.90	24.10	24.00	22.00
1.3493	31.79	24.21	24.10	21.90
1.3573	31.57	24.43	23.65	22.35
3.4854	28.05	27.95	19.41	26.59
5.3001	26.79	33.21	19.43	30.57
5.3046	27.17	32.83	19.31	30.69
15.044	27.69	32.31	21.73	28.27
15.099	27.96	32.04	21.62	28.38

Project ID - 1-9730/15-01-08  
 EUT - FLIR-T7250  
 Serial Number - 72400046  
 Operating mode - RX + traffic on USB

### 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	2015-07-24

### Annex B Further information

#### Glossary

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



## Annex C Accreditation Certificate

Front side of certificate

Back side of certificate



Deutsche Akkreditierungsstelle GmbH

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

**Akkreditierung**



Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

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

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

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

Die Akkreditierungskunde gilt nur in Verbindung mit dem Bescheid vom 07.03.2014 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 77 Seiten.

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

Frankfurt am Main, 07.03.2014

Stelle des Leiters der Deutsche Akkreditierungsstelle

In Auftrag 07-PL-12076-01-00, Kalligauer  
 stellvertretender Leiter

Deutsche Akkreditierungsstelle GmbH

Standort Berlin  
 Spittelmarkt 10  
 10117 Berlin

Standort Frankfurt am Main  
 Gartenstraße 6  
 60594 Frankfurt am Main

Standort Braunschweig  
 Bundesallee 100  
 38115 Braunschweig

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Der aktuelle Stand der Mitgliedschaft kann folgenden Webseiten entnommen werden:  
 EA: [www.european-accreditation.org](http://www.european-accreditation.org)  
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**Note:**

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

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