

TEST REPORT

Test report no.: 1-7682/14-01-02-B



Deutsche
Akkreditierungsstelle
D-PL-12076-01-01

Testing laboratory

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Accredited Testing Laboratory:

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
 The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01
 Area of Testing: Radio Communications & EMC (RCE)

Applicant

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Manufacturer

Echostar Technologies
 90 Inverness Circle East
 Englewood CO 80112 / USA

Test standard/s

47 CFR Part 15 Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices
 RSS - 210 Issue 8 Spectrum Management and Telecommunications Radio Standards Specification - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment
 For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item: TV streaming media device
Model name: M1
FCC ID: DKN-L37
IC: 1707A-L37
Frequency: DTS band 2400 MHz to 2483.5 MHz
 (lowest channel 01 – 2412 MHz;
 highest channel 11 – 2462 MHz)
Technology tested: WLAN (DSSS / b – mode,
 OFDM / g –; n HT20 & HT40 – mode)
Antenna: Integrated antenna
Power supply: 110 V AC by mains adapter
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 authorised:



Andreas Luckenbill
 Expert

Test performed:



Marco Bertolino
 Testing Manager

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2 General information

2.1 Notes and disclaimer

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

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This test report 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:	2014-03-24
Date of receipt of test item:	2014-04-22
Start of test:	2014-04-22
End of test:	2014-05-07
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	-/-	Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices
RSS - 210 Issue 8	01.12.2010	Spectrum Management and Telecommunications Radio Standards Specification - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

3.1 Measurement guidance

DTS : KDB 558074	2013-04	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247
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4 Test environment

Temperature:	T_{nom}	+22 °C during room temperature tests
	T_{max}	+50 °C during high temperature tests
	T_{min}	-30 °C during low temperature tests
Relative humidity content:		43 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	110 V AC by mains adapter
	V_{max}	121 V
	V_{min}	99 V

5 Test item

Kind of test item	:	TV streaming media device
Type identification	:	M1
S/N serial number	:	No information available!
HW hardware status	:	1.0.1.
SW software status	:	Secured: 0.2.272 (No 364 & 383)
Frequency band [MHz]	:	DTS band 2400 MHz to 2483.5 MHz (lowest channel 01 – 2412 MHz; highest channel 11 – 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	:	110 V AC by mains adapter
Temperature range	:	-30°C to +50 °C

5.1 Additional information

Test setup- and EUT-photos are included in test report: 1-7682/14-01-01_AnnexA
 1-7682/14-01-01_AnnexB
 1-7682/14-01-01_AnnexD

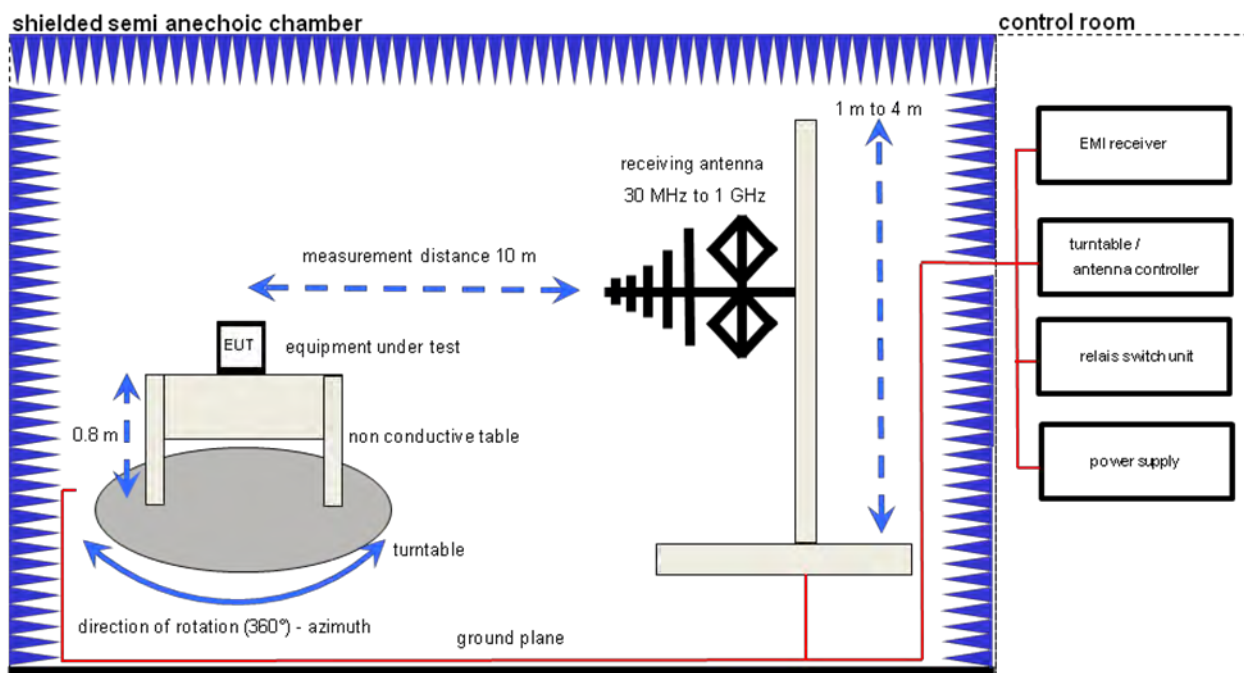
6 Test laboratories sub-contracted

None

7 Description of the test setup

7.1 Radiated measurements chamber F

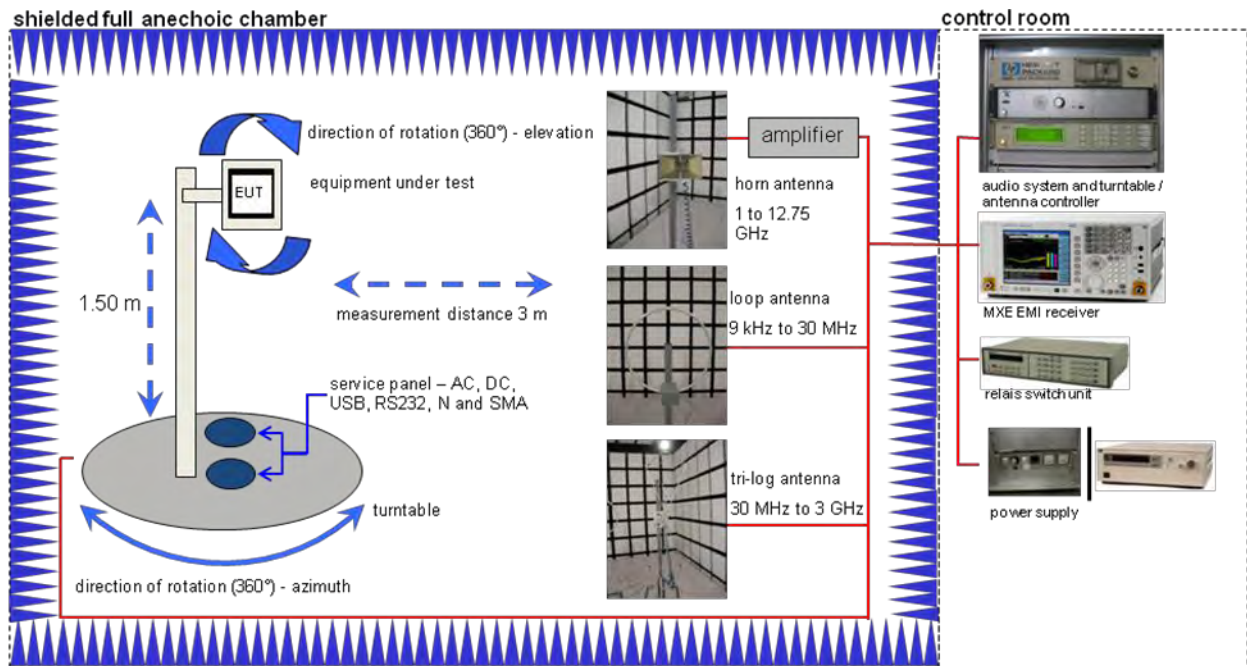
The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas 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.



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368
DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580
EMI Test Receiver	ESCI 3	R&S	100083	300003312
Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379
Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745
Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746
Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747
TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787

7.2 Radiated measurements chamber C



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405
TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854
Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351
Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789
Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032
Active Loop Antenna	6502	EMCO	8905-2342	300000256
Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996
Switch / Control Unit	3488A	HP Meßtechnik	*	300000199
Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156
Isolating Transformer	MPL IEC625 Bus Regeltrenntravo	Erfi	91350	300001155
Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997
Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143

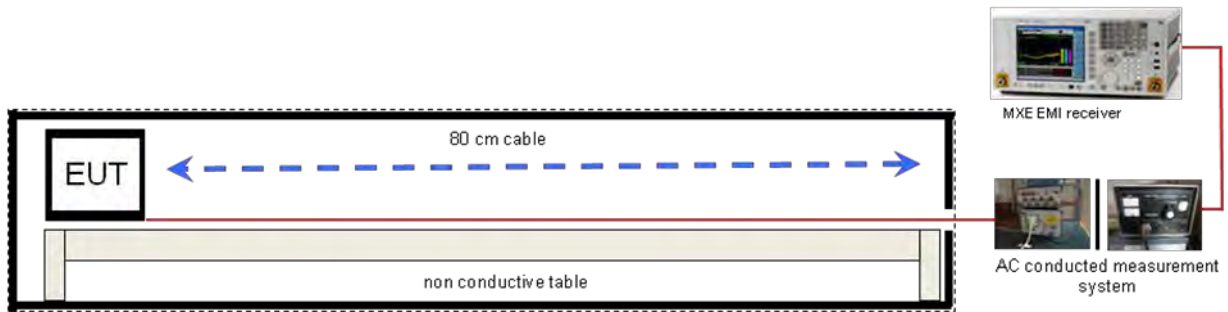
7.3 Radiated measurements 12.75 GHz to 25 GHz



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda	8402	300000787
Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	8205	300002442
Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268
Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517

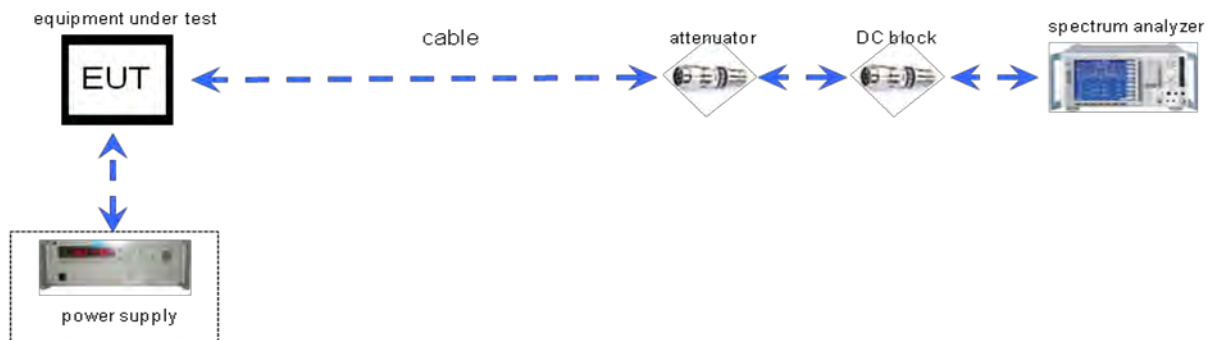
7.4 AC conducted



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405
Isolating Transformer	MPL IEC625 Bus Regeltrenntravo	Erfi	91350	300001155
Switch / Control Unit	3488A	HP Meßtechnik	*	300000199
Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001168
Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210

7.5 Conducted measurements



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517

8 Summary of measurement results



No deviations from the technical specifications were ascertained



There were deviations from the technical specifications ascertained

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15 RSS 210, Issue 8	Passed	2014-05-27	-/-

Test specification clause	Test case	Guideline	Temperature conditions	Power source voltages	Mode	Pass	Fail	NA	NP	Remark
§15.247(b)(4) RSS 210 / A8.4(2)	Antenna gain	-/-	Nominal	Nominal	DSSS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
§15.247(e) RSS 210 / A8.2(b)	Power spectral density	KDB 558074 DTS clause: 10.2	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	complies
§15.247(a)(2) RSS 210 / A8.2(a)	Spectrum bandwidth – 6 dB bandwidth	KDB 558074 DTS clause: 8.2	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	complies
RSS Gen clause 4.6.1	Occupied bandwidth	-/-	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	complies
§15.247(b)(3) RSS-210 / A8.4(4)	Maximum output power	KDB 558074 DTS clause: 9.1.2	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	complies
§15.247(d) RSS-210 / A8.5	Band edge compliance conducted	KDB 558074 DTS clause: 13.2.1	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	complies
§15.205 RSS-210 / A8.5	Band edge compliance radiated	-/-	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions conducted	KDB 558074 DTS clause: 11.1 & 11.2	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions radiated	-/-	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	complies
§15.109 RSS-Gen	RX spurious emissions radiated	-/-	Nominal	Nominal	-/-	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.209(a) RSS-Gen	TX spurious emissions radiated < 30 MHz	-/-	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	complies
§15.107(a) §15.207	Conducted emissions < 30 MHz	-/-	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	complies

Note: NA = Not Applicable; NP = Not Performed

9 Additional comments

Reference documents: Customer power table information

Special test descriptions: See power table information below:

DSSS/b – mode:

Mode	Lowest channel	Middle channel	Highest channel
1L – 5 L	17	17	17
5 S	17	17	17
11 L	17	17	17
11 S	17	17	17

OFDM/g – mode:

Mode	Lowest channel	Middle channel	Highest channel
6- 24	11	17	11
36	11	16	11
48	11	15	11
54	11	14	11

OFDM/n HT20 – mode:

Mode	Lowest channel	Middle channel	Highest channel
MCS0	11	17	11
MCS1	11	17	11
MCS2	11	17	11
MCS3	11	17	11
MCS4	11	16	11
MCS5	11	15	11
MCS6	11	14	11
MCS7	11	13	11

OFDM/n HT40 – mode:

Mode	Lowest channel	Middle channel	Highest channel
MCS0	10	16	10
MCS1	10	16	10
MCS2	10	16	10
MCS3	10	16	10
MCS4	10	15	10
MCS5	10	14	10
MCS6	10	13	10
MCS7	10	12	10

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

10 Measurement results

10.1 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

Limits:

FCC	IC
Antenna Gain	
6 dBi	

Results: ANT0

T _{nom}	V _{nom}	lowest channel 2412 MHz	middle channel 2437 MHz	highest channel 2462 MHz
Conducted power [dBm] Measured with DSSS modulation		14.78	14.83	14.93
Radiated power [dBm] Measured with DSSS modulation		19.10	20.64	19.85
Gain [dBi] Calculated		4.32	5.81	4.92
Measurement uncertainty			± 1.5 dB (cond.) / ± 3 dB (rad.)	

Results: ANT1

T _{nom}	V _{nom}	lowest channel 2412 MHz	middle channel 2437 MHz	highest channel 2462 MHz
Conducted power [dBm] Measured with DSSS modulation		16.00	13.51	15.42
Radiated power [dBm] Measured with DSSS modulation		18.84	18.36	18.40
Gain [dBi] Calculated		2.84	4.85	2.98
Measurement uncertainty			± 1.5 dB (cond.) / ± 3 dB (rad.)	

Result: -/-

Plots: ANT0

Plots: DSSS / b – mode

Plot 1: TX mode, lowest channel



Date: 22.APR.2014 14:42:07

Plot 2: TX mode, middle channel



Date: 22.APR.2014 14:49:28

Plot 3: TX mode, highest channel



Date: 22.APR.2014 14:56:15

Plots: ANT1

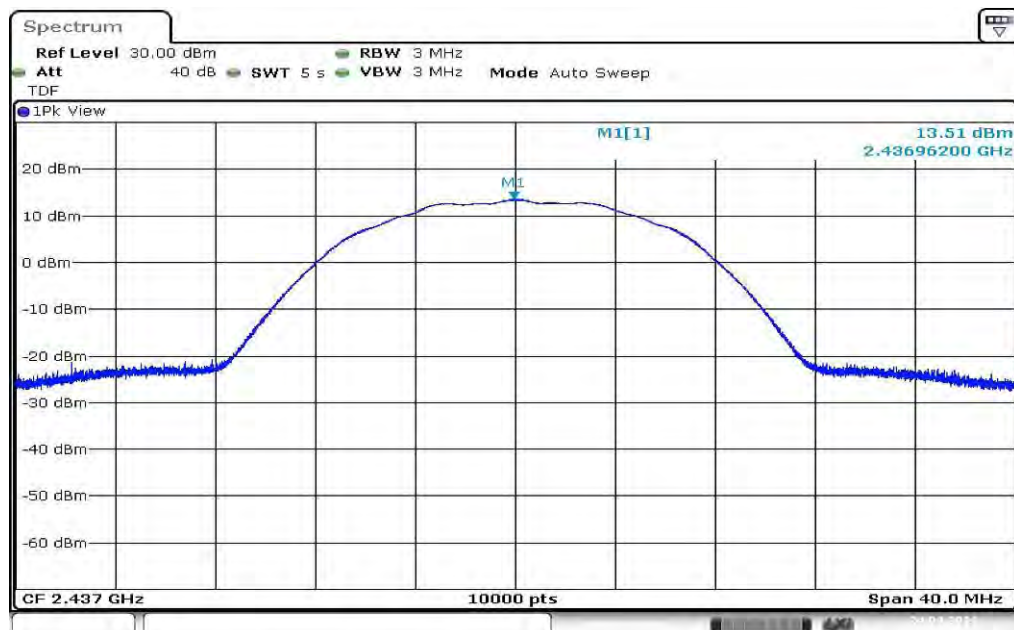
Plots: DSSS / b – mode

Plot 1: TX mode, lowest channel



Date: 24.APR.2014 10:49:03

Plot 2: TX mode, middle channel



Date: 24.APR.2014 10:57:45

Plot 3: TX mode, highest channel



Date: 24.APR.2014 11:06:41

10.2 Identify worst case data rate

Measurement:

All modes of the module will be measured with an average power meter to identify the maximum transmission power on low, mid and high channel. In the case that only one or two channels are available, only these will be measured.

In further tests only the identified worst case modulation scheme or bandwidth will be measured. Additional the band edge compliance test will be performed in the lowest and highest modulation scheme.

Measurement parameters:

Average Power Meter

Results: ANT0

Modulation	Modulation scheme / bandwidth		
	2412 MHz	2437 MHz	2462 MHz
Frequency			
DSSS / b – mode	1 Mbit/s	1 Mbit/s	1 Mbit/s
OFDM / g – mode	6 Mbit/s	6 Mbit/s	6 Mbit/s
OFDM / n HT20 – mode	MCS0	MCS0	MCS0
Frequency	2422 MHz	2437 MHz	2452 MHz
OFDM / n HT40 – mode	MCS0	MCS0	MCS0

Results: ANT1

Modulation	Modulation scheme / bandwidth		
	2412 MHz	2437 MHz	2462 MHz
Frequency			
DSSS / b – mode	11 Mbit/s	11 Mbit/s	11 Mbit/s
OFDM / g – mode	6 Mbit/s	6 Mbit/s	6 Mbit/s
OFDM / n HT20 – mode	MCS0	MCS0	MCS0
Frequency	2422 MHz	2437 MHz	2452 MHz
OFDM / n HT40 – mode	MCS0	MCS0	MCS0

10.3 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	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Span:	40 MHz
Integration bandwidth:	75 % power - bandwidth (DTS BW)
Trace-Mode:	Max hold (allow trace to fully stabilize)
Measurement function:	Channel power with DTS BW

Limits:

FCC	IC
Maximum Output Power	
Conducted: 1.0 W – Antenna Gain max. 6 dBi	

Results: ANT0

DSSS / b – mode Frequency	Maximum Output Power [dBm]		
	2412 MHz	2437 MHz	2462 MHz
Peak output power conducted Worst case data rate	16.93	16.96	17.06
OFDM / g – mode Frequency	Maximum Output Power [dBm]		
	2412 MHz	2437 MHz	2462 MHz
Peak output power conducted Worst case data rate	17.55	19.50	16.21
OFDM / n HT20 – mode Frequency	Maximum Output Power [dBm]		
	2412 MHz	2437 MHz	2462 MHz
Peak output power conducted Worst case data rate	16.34	19.44	16.17
OFDM / n HT40 – mode Frequency	Maximum Output Power [dBm]		
	2422 MHz	2437 MHz	2452 MHz
Peak output power conducted Worst case data rate	14.89	19.68	15.67
Measurement uncertainty	± 1.5 dB (cond.)		

Results: ANT1

DSSS / b – mode Frequency	Maximum Output Power [dBm]		
	2412 MHz	2437 MHz	2462 MHz
Peak output power conducted Worst case data rate	20.29	17.95	19.73
OFDM / g – mode Frequency	Maximum Output Power [dBm]		
	2412 MHz	2437 MHz	2462 MHz
Peak output power conducted Worst case data rate	17.64	19.98	16.33
OFDM / n HT20 – mode Frequency	Maximum Output Power [dBm]		
	2412 MHz	2437 MHz	2462 MHz
Peak output power conducted Worst case data rate	17.63	20.42	16.17
OFDM / n HT40 – mode Frequency	Maximum Output Power [dBm]		
	2422 MHz	2437 MHz	2452 MHz
Peak output power conducted Worst case data rate	14.90	20.23	14.99
Measurement uncertainty	± 1.5 dB (cond.)		

Result: Passed

Results: Worst case calculation

b – mode:

ANT 0 + ANT 1 = 16.93 dBm + 20.29 dBm = 21.94 dBm

g – mode:

ANT 0 + ANT 1 = 19.50 dBm + 19.98 dBm = 22.76 dBm

n HT20 – mode:

ANT 0 + ANT 1 = 19.44 dBm + 20.42 dBm = 22.97 dBm

n HT40 – mode:

ANT 0 + ANT 1 = 19.68 dBm + 20.23 dBm = 22.97 dBm

Result: **Passed**

10.4 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:	Peak
Sweep time:	Auto
Resolution bandwidth:	3 kHz
Video bandwidth:	10 kHz
Span:	40 MHz
Trace-Mode:	Max hold (allow trace to fully stabilize)

Limits:

FCC	IC
Power Spectral Density	
8 dBm (conducted)	

Results: ANT0

Modulation Frequency	Power Spectral density [dBm]		
	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	-7.96	-7.91	-7.83
OFDM / g – mode	-12.85	-10.10	-14.03
OFDM / n HT20 – mode	-14.36	-10.29	-15.27
Frequency	2422 MHz	2437 MHz	2452 MHz
OFDM / n HT40 – mode	-19.86	-14.66	-18.71
Measurement uncertainty	± 1.5 dB (cond.)		

Results: ANT1

Modulation Frequency	Power Spectral density [dBm]		
	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	-9.34	-11.62	-9.83
OFDM / g – mode	-13.14	-9.92	-14.44
OFDM / n HT20 – mode	-13.62	-9.55	-14.47
Frequency	2422 MHz	2437 MHz	2452 MHz
OFDM / n HT40 – mode	-19.14	-13.95	-19.10
Measurement uncertainty	± 1.5 dB (cond.)		

Result: Passed

Plots ANT0

Plots: DSSS / b - mode

Plot 1: TX mode, lowest channel



Date: 22.APR.2014 14:44:09

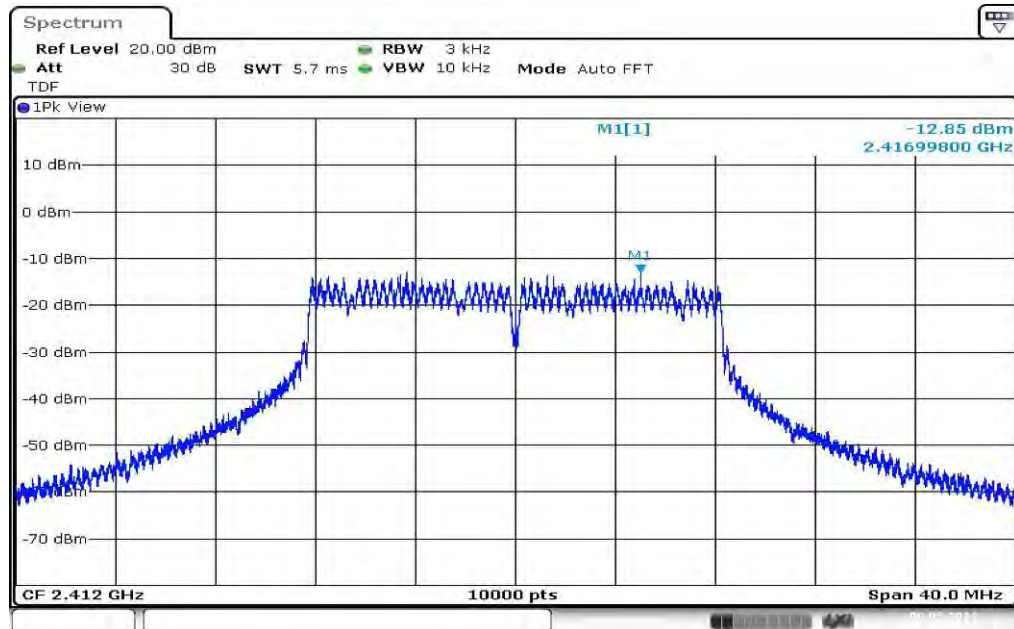
Plot 2: TX mode, middle channel



Date: 22.APR.2014 14:51:31

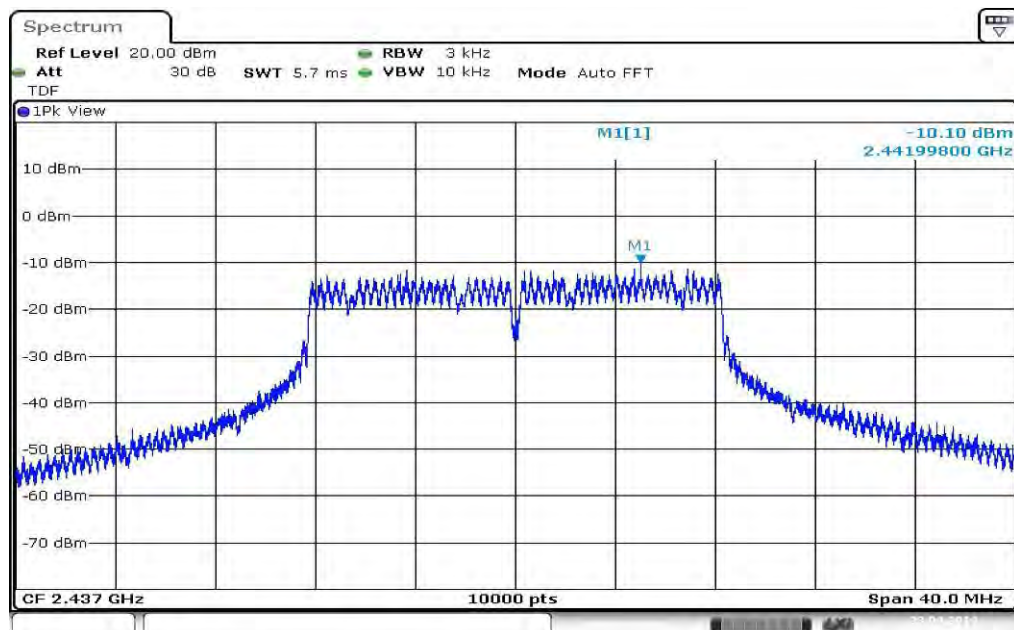
Plots: OFDM / g – mode

Plot 1: TX mode, lowest channel



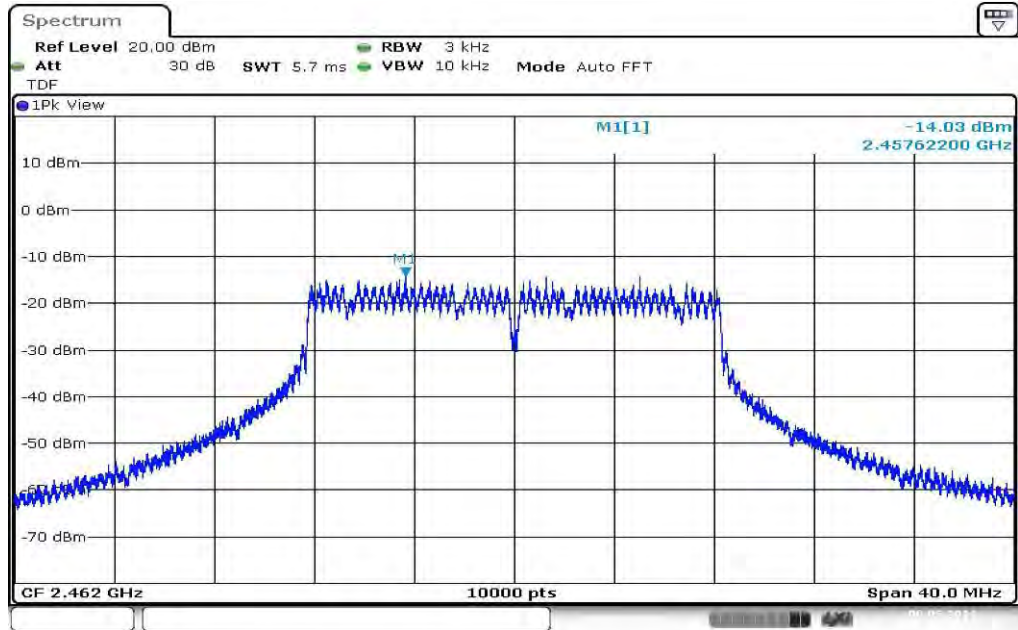
Date: 6.MAY.2014 15:30:07

Plot 2: TX mode, middle channel



Date: 23.APR.2014 11:24:32

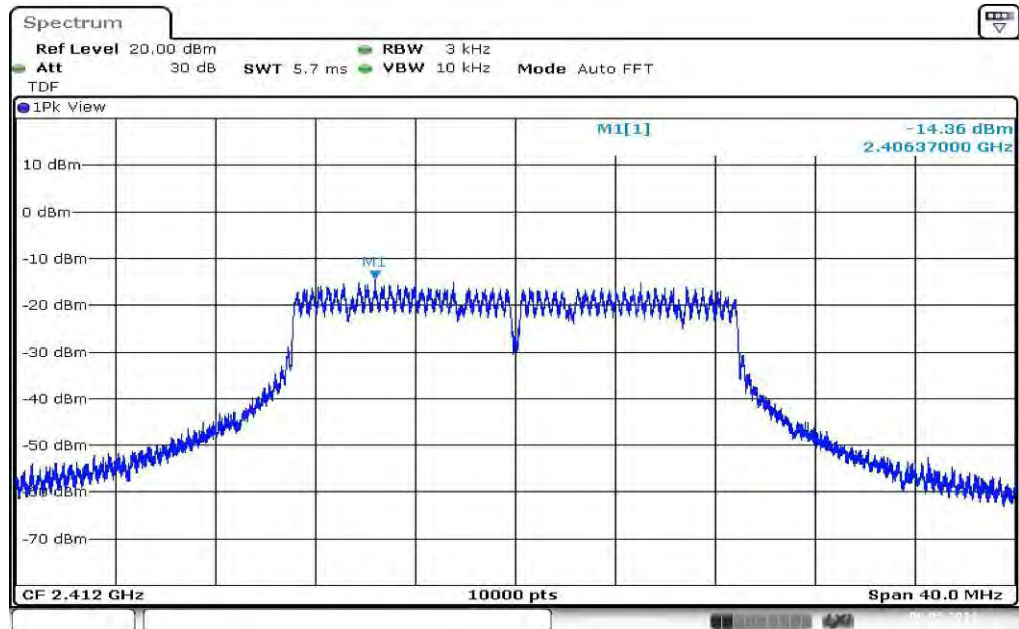
Plot 3: TX mode, highest channel



Date: 6.MAY.2014 15:02:54

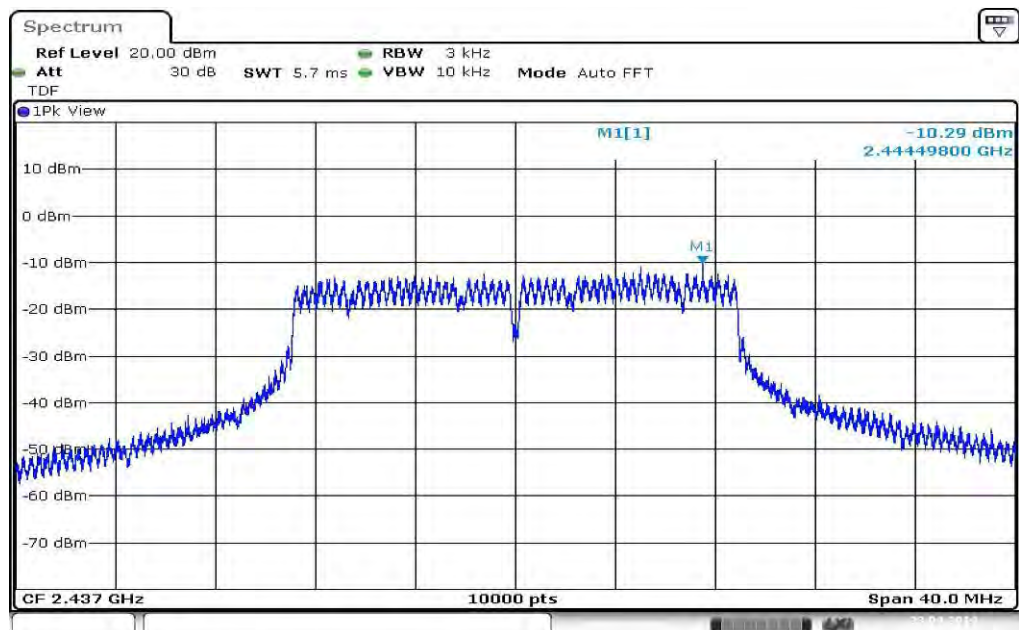
Plots: OFDM / n HT20 – mode

Plot 1: TX mode, lowest channel



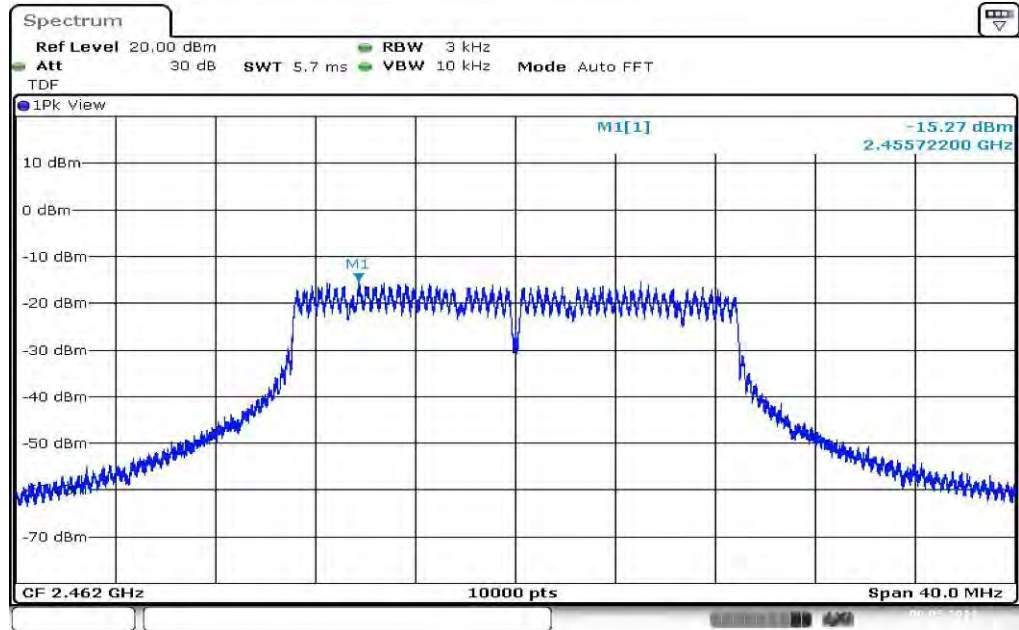
Date: 6.MAY.2014 15:14:28

Plot 2: TX mode, middle channel



Date: 23.APR.2014 11:51:31

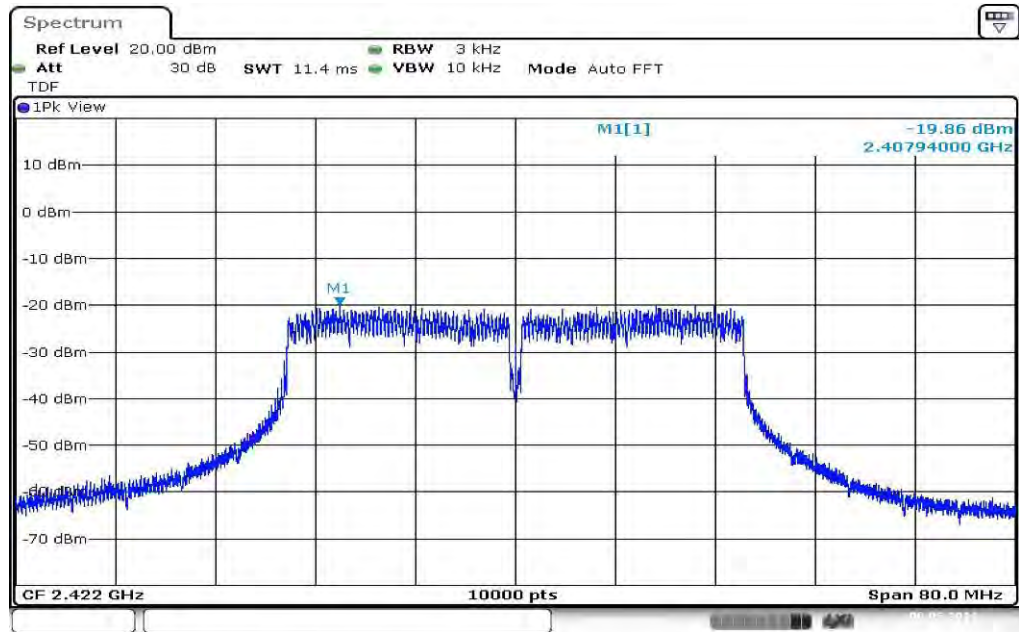
Plot 3: TX mode, highest channel



Date: 6.MAY.2014 15:21:34

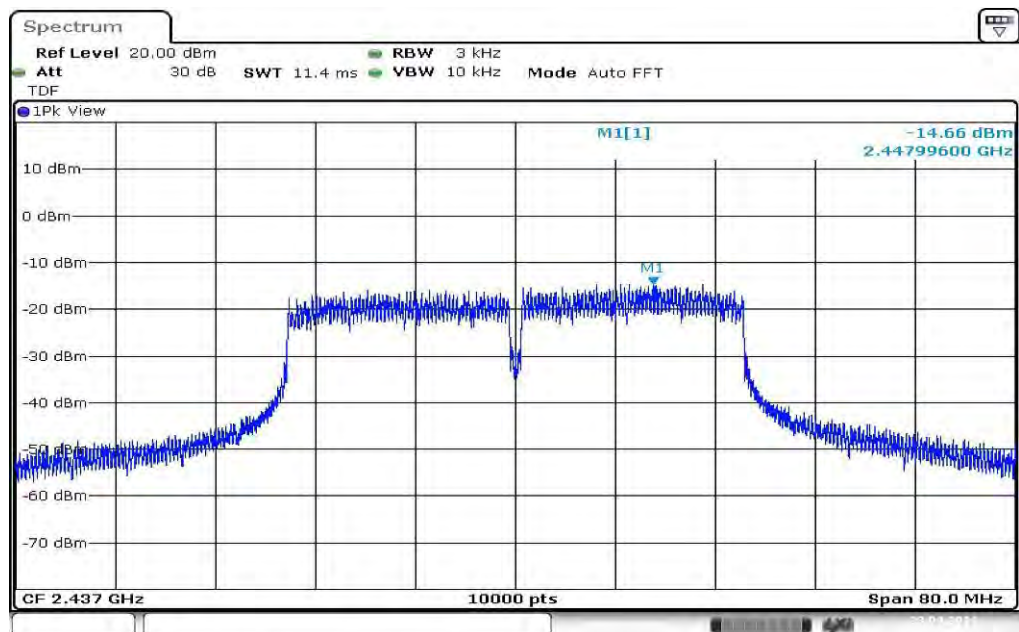
Plots: OFDM / n HT40 – mode

Plot 1: TX mode, lowest channel



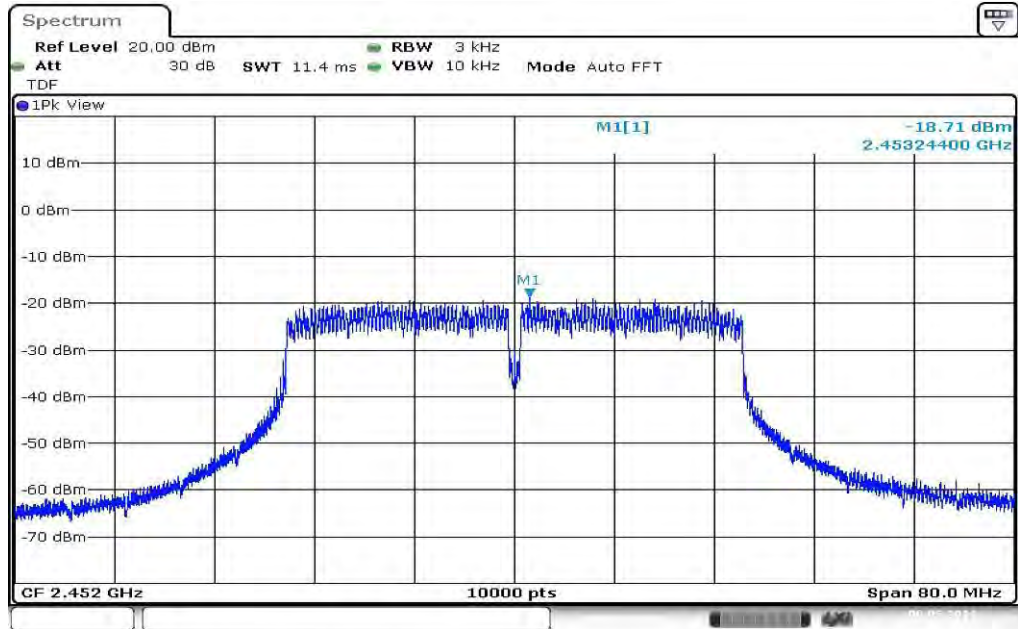
Date: 6.MAY.2014 13:51:47

Plot 2: TX mode, middle channel



Date: 23.APR.2014 12:18:24

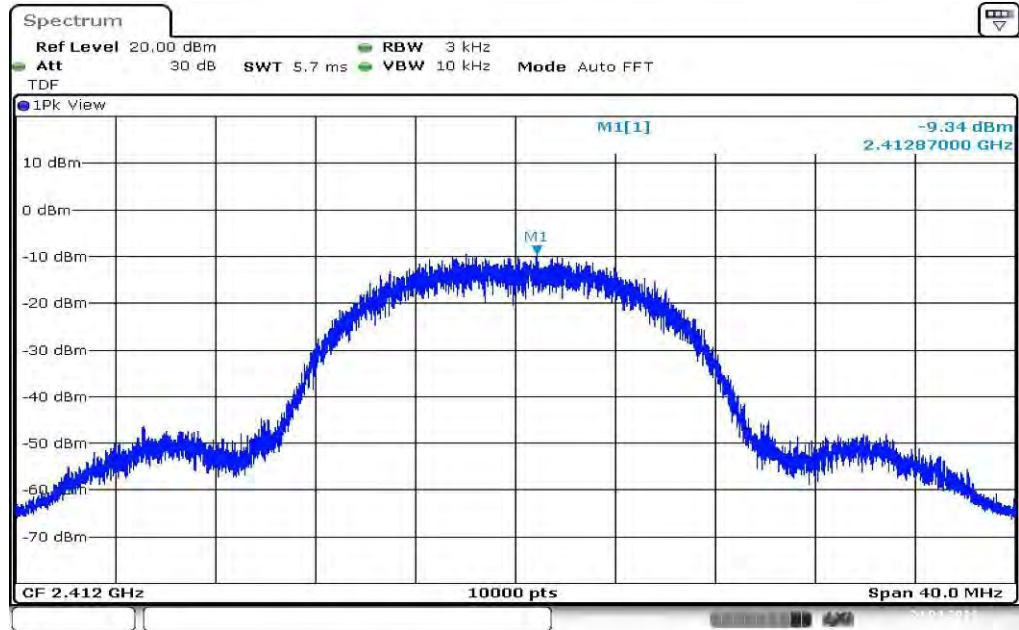
Plot 3: TX mode, highest channel



Plots ANT1

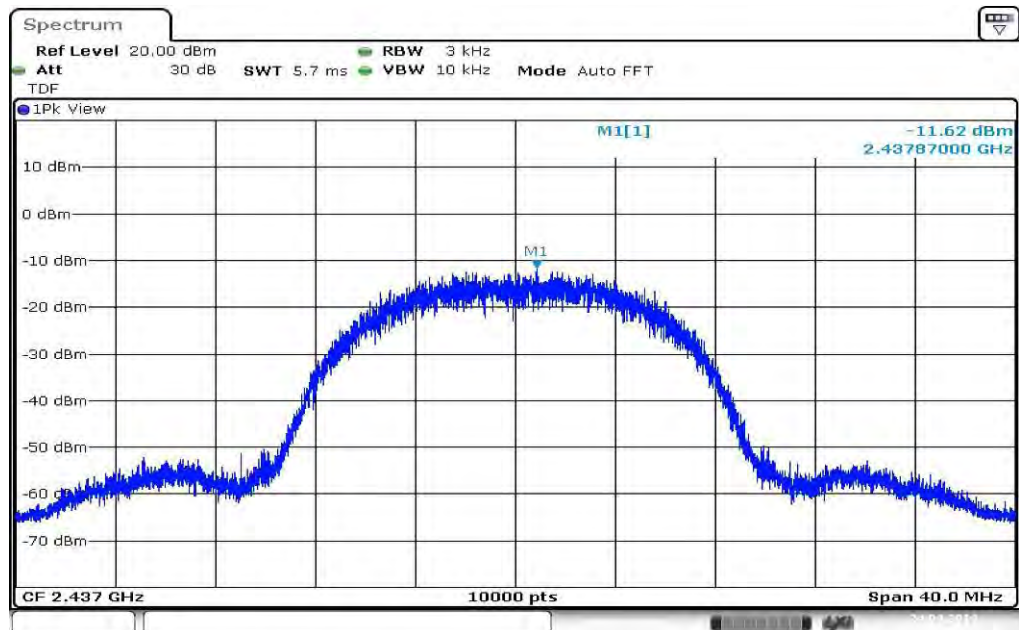
Plots: DSSS / b – mode

Plot 1: TX mode, lowest channel



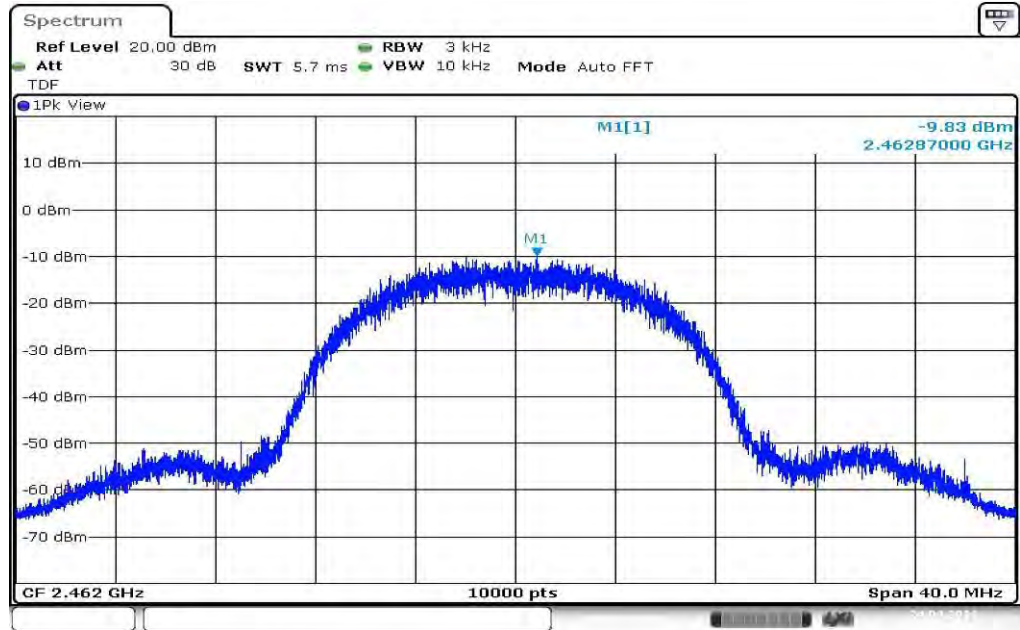
Date: 24.APR.2014 10:51:06

Plot 2: TX mode, middle channel



Date: 24.APR.2014 10:59:47

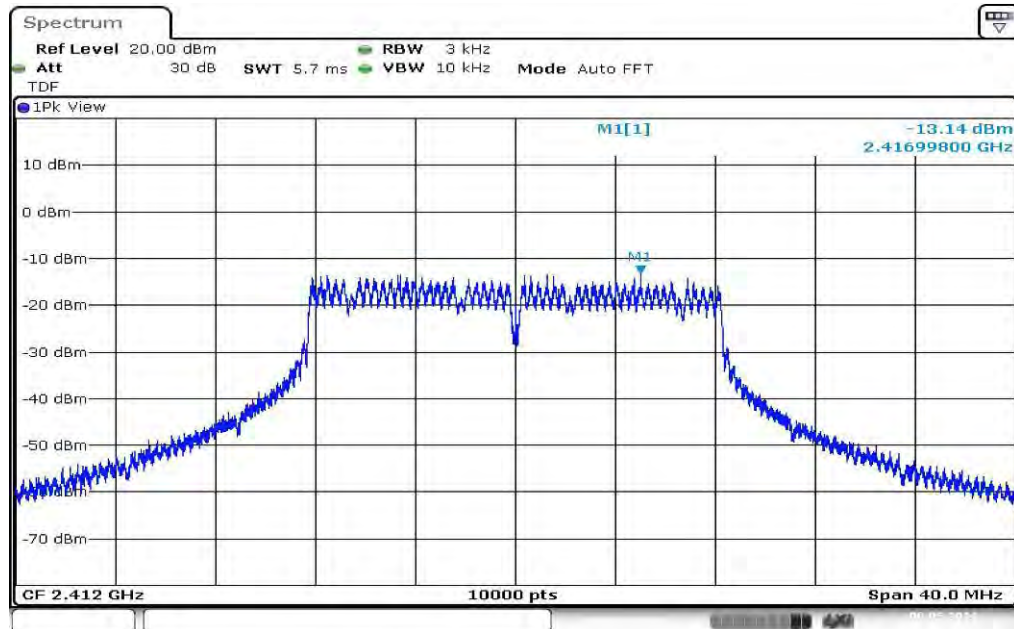
Plot 3: TX mode, highest channel



Date: 24.APR.2014 11:08:43

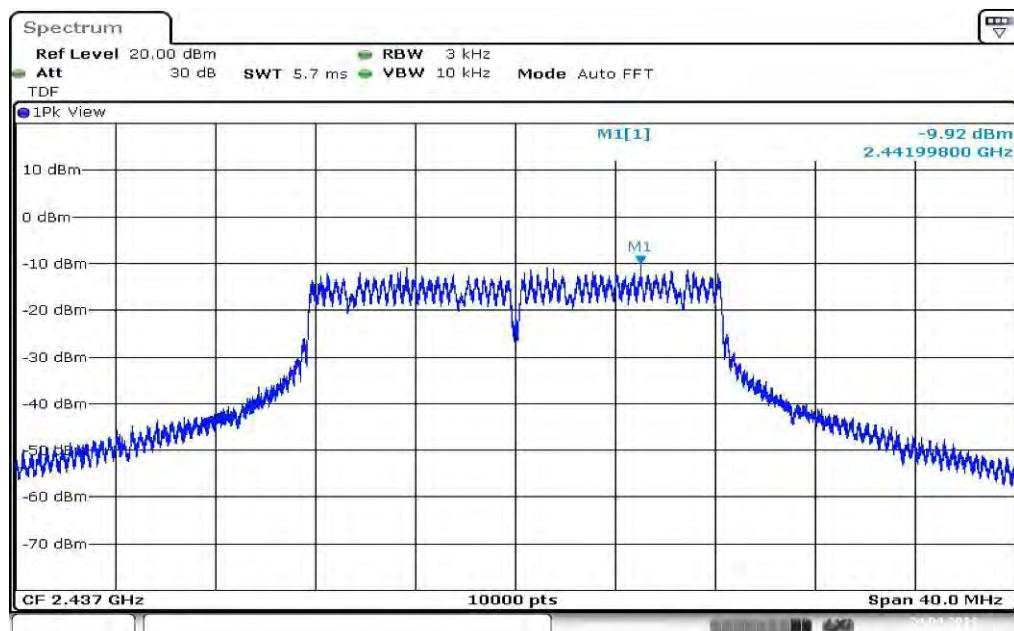
Plots: OFDM / g – mode

Plot 1: TX mode, lowest channel



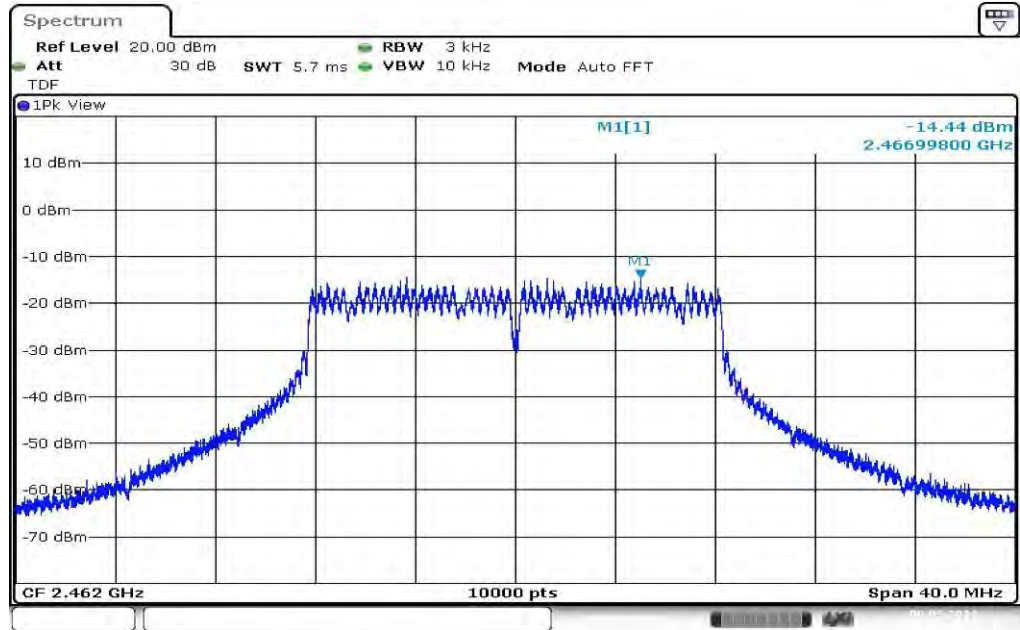
Date: 6.MAY.2014 15:39:15

Plot 2: TX mode, middle channel



Date: 24.APR.2014 11:37:54

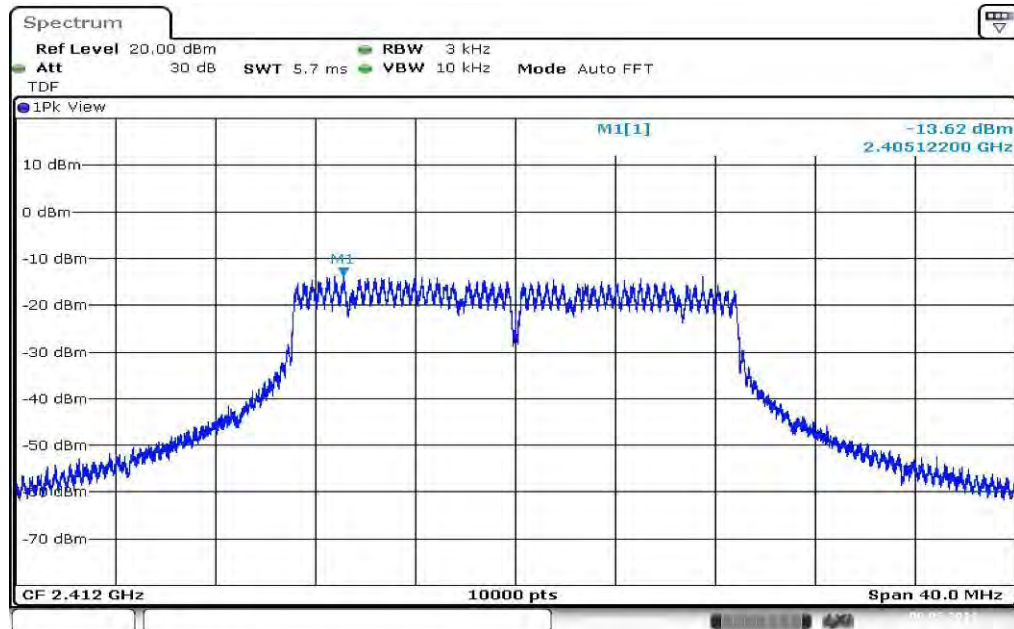
Plot 3: TX mode, highest channel



Date: 6.MAY.2014 15:48:19

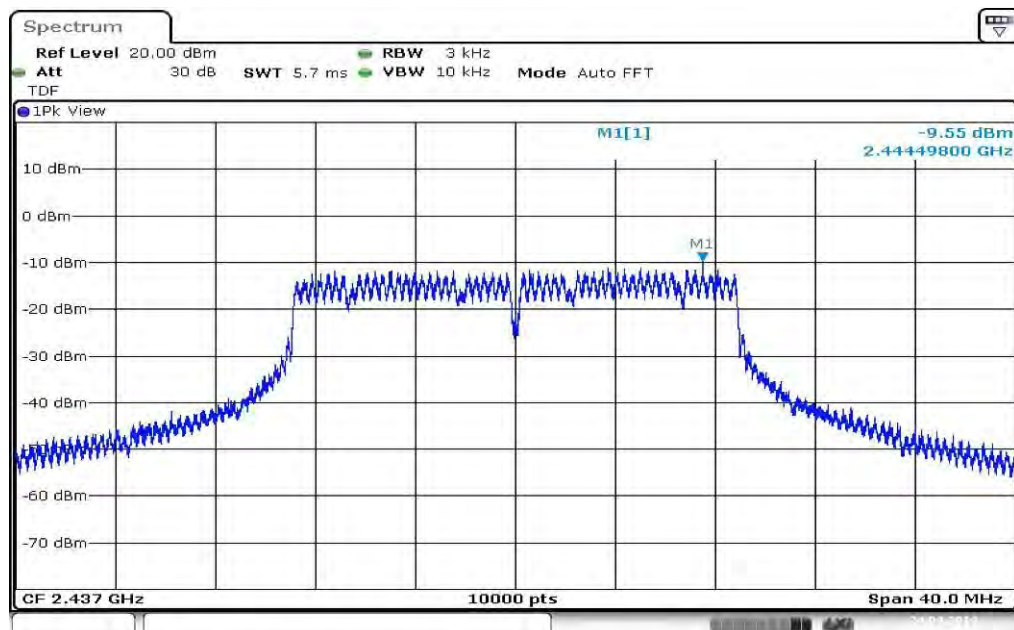
Plots: OFDM / n HT20 – mode

Plot 1: TX mode, lowest channel



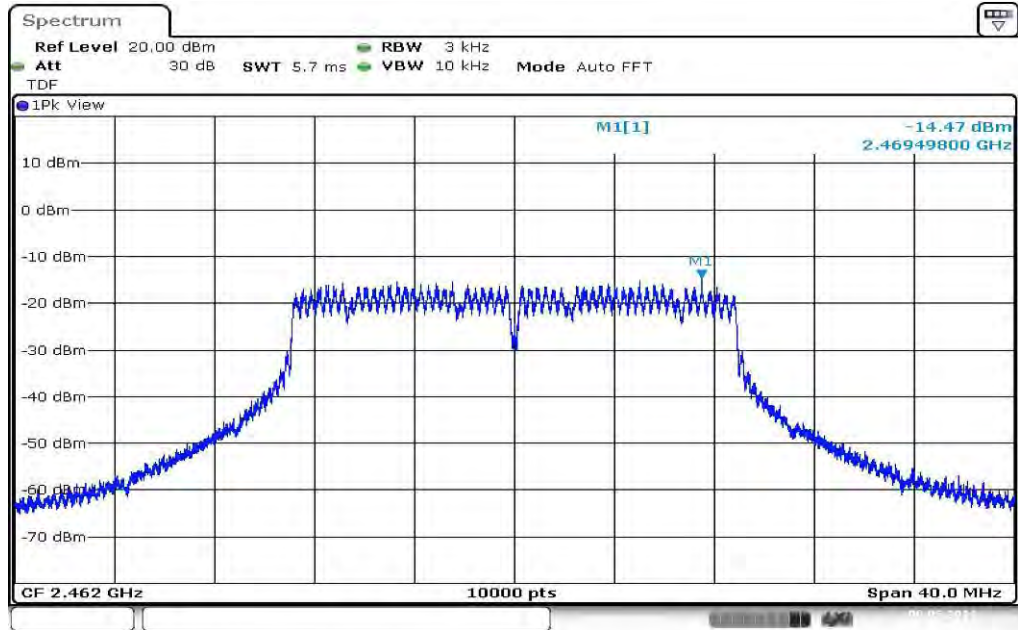
Date: 6.MAY.2014 15:56:54

Plot 2: TX mode, middle channel



Date: 24.APR.2014 12:58:57

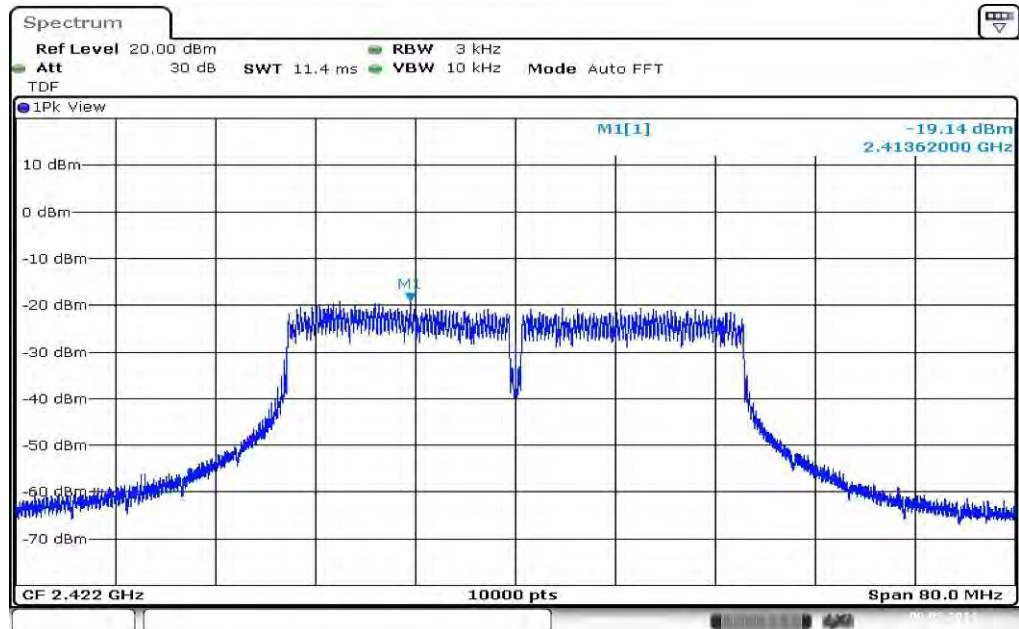
Plot 3: TX mode, highest channel



Date: 6.MAY.2014 16:09:10

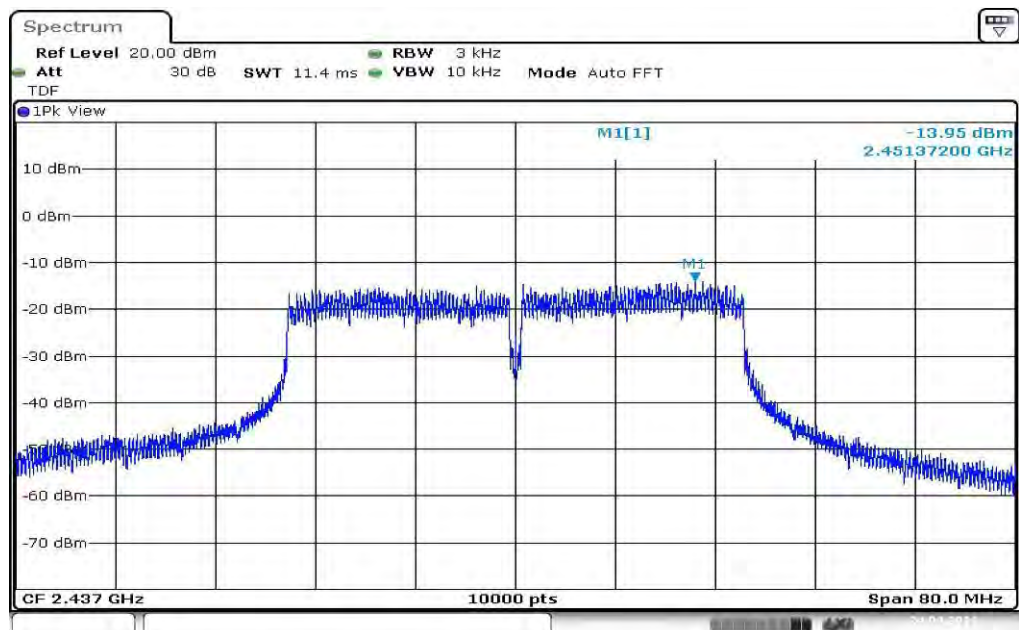
Plots: OFDM / n HT40 – mode

Plot 1: TX mode, lowest channel



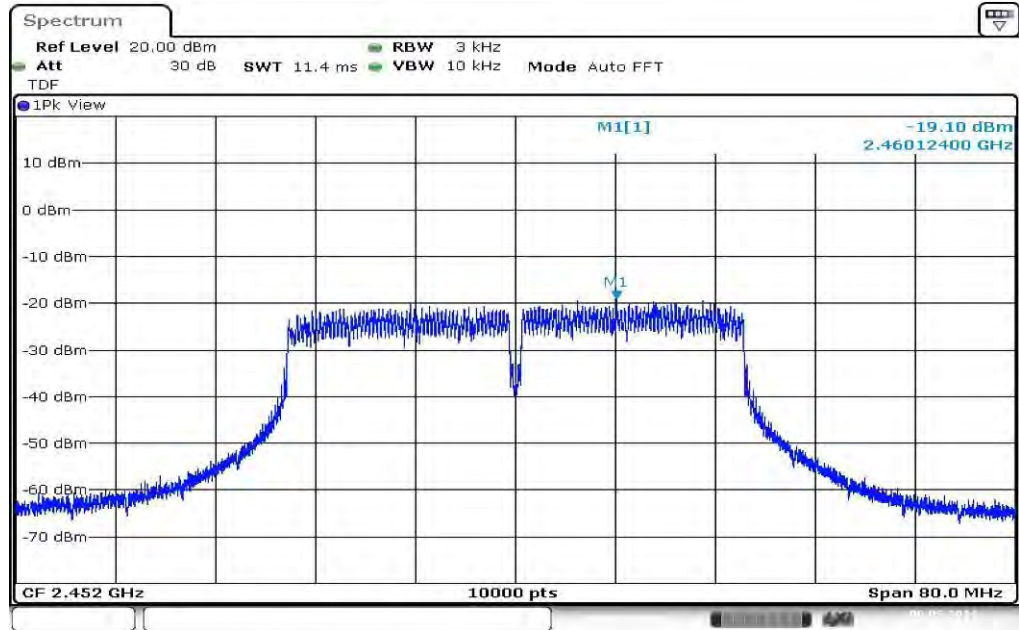
Date: 6.MAY.2014 16:18:17

Plot 2: TX mode, middle channel



Date: 24.APR.2014 14:50:37

Plot 3: TX mode, highest channel



Date: 6.MAY.2014 16:29:46

10.5 Spectrum bandwidth – 6 dB

Description:

Measurement of the 6 dB bandwidth of the modulated signal.

Measurement:

Measurement parameter	
According to DTS clause: 8.2	
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)

Limits:

FCC	IC
Spectrum Bandwidth – 6 dB	
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: ANT0

Frequency	6 dB bandwidth [MHz]		
	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	7.27	7.25	7.26
OFDM / g – mode	12.00	12.05	12.03
OFDM / n HT20 – mode	12.88	12.81	12.83
Frequency	2422 MHz	2437 MHz	2452 MHz
OFDM / n HT40 – mode	27.88	26.68	26.55
Measurement uncertainty	± RBW		

Results: ANT1

Frequency	6 dB bandwidth [MHz]		
	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	7.31	7.35	7.24
OFDM / g – mode	12.01	12.15	12.02
OFDM / n HT20 – mode	12.77	12.85	12.65
Frequency	2422 MHz	2437 MHz	2452 MHz
OFDM / n HT40 – mode	27.49	27.56	26.74
Measurement uncertainty	± RBW		

Result: Passed

10.6 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:	500 kHz
Video bandwidth:	3 MHz
Span:	2 x nominal Bandwidth
Measurement procedure:	Measurement of the 99% bandwidth using the integration function of the analyzer
Trace-Mode:	Max hold (allow trace to stabilize)

Usage:

-/-	IC
Occupied Bandwidth – 99% emission bandwidth	
OBW is necessary for Emission Designator	

Results: ANT0

Modulation	99 % bandwidth [MHz]		
	2412 MHz	2437 MHz	2462 MHz
Frequency	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	14.23	14.05	14.22
OFDM / g – mode	17.74	18.00	18.11
OFDM / n HT20 – mode	18.73	19.01	18.80
Frequency	2422 MHz	2437 MHz	2452 MHz
OFDM / n HT40 – mode	38.04	37.88	37.36
Measurement uncertainty	± RBW		

Results: ANT1

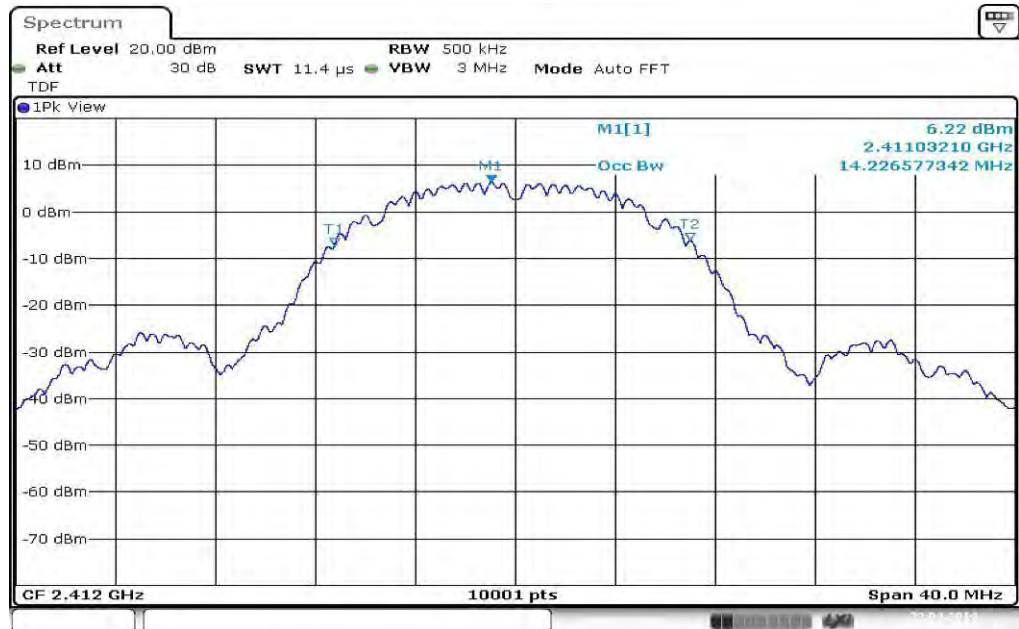
Modulation	99 % bandwidth [MHz]		
	2412 MHz	2437 MHz	2462 MHz
Frequency	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	13.84	13.79	13.73
OFDM / g – mode	17.90	18.43	17.86
OFDM / n HT20 – mode	19.16	18.89	18.73
Frequency	2422 MHz	2437 MHz	2452 MHz
OFDM / n HT40 – mode	37.75	37.85	37.20
Measurement uncertainty	± RBW		

Result: **Passed**

Plots: ANT0

Plots: DSSS / b – mode

Plot 1: TX mode, lowest channel



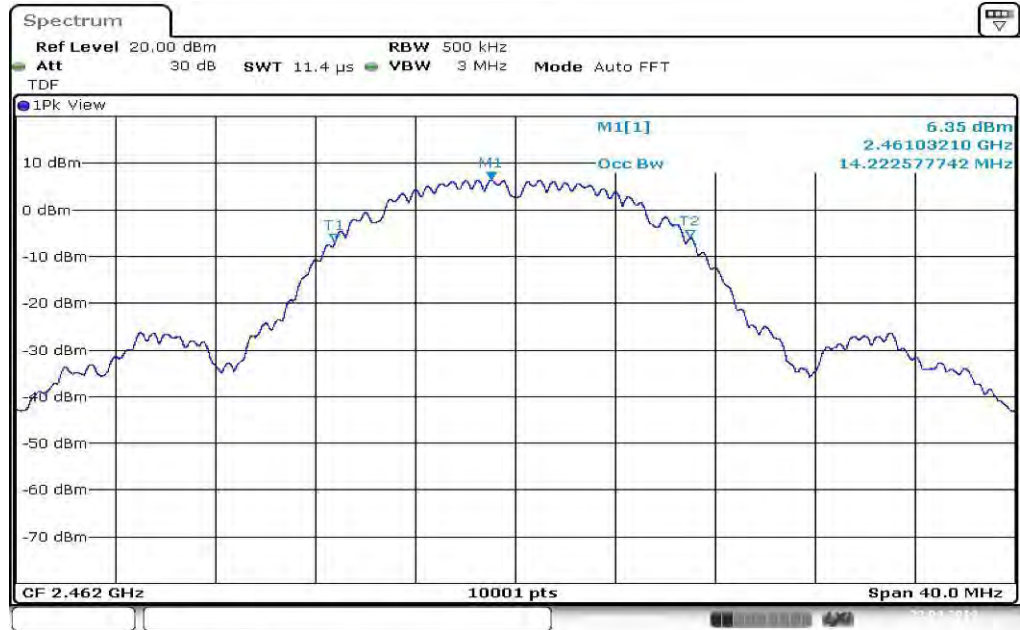
Date: 22.APR.2014 14:43:21

Plot 2: TX mode, middle channel



Date: 22.APR.2014 14:50:42

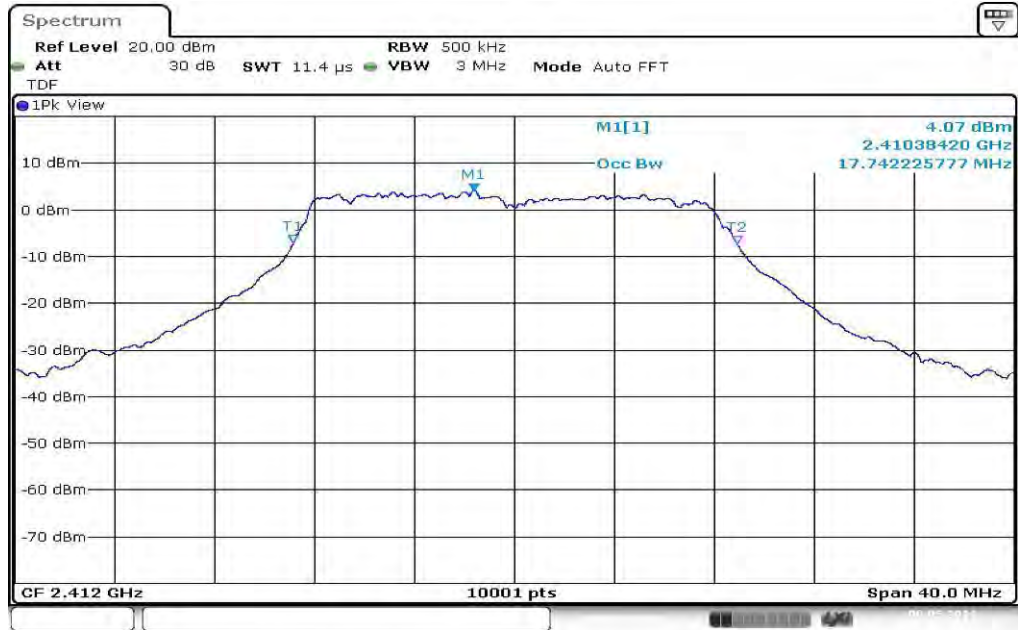
Plot 3: TX mode, highest channel



Date: 22.APR.2014 14:57:29

Plots: OFDM / g – mode

Plot 1: TX mode, lowest channel



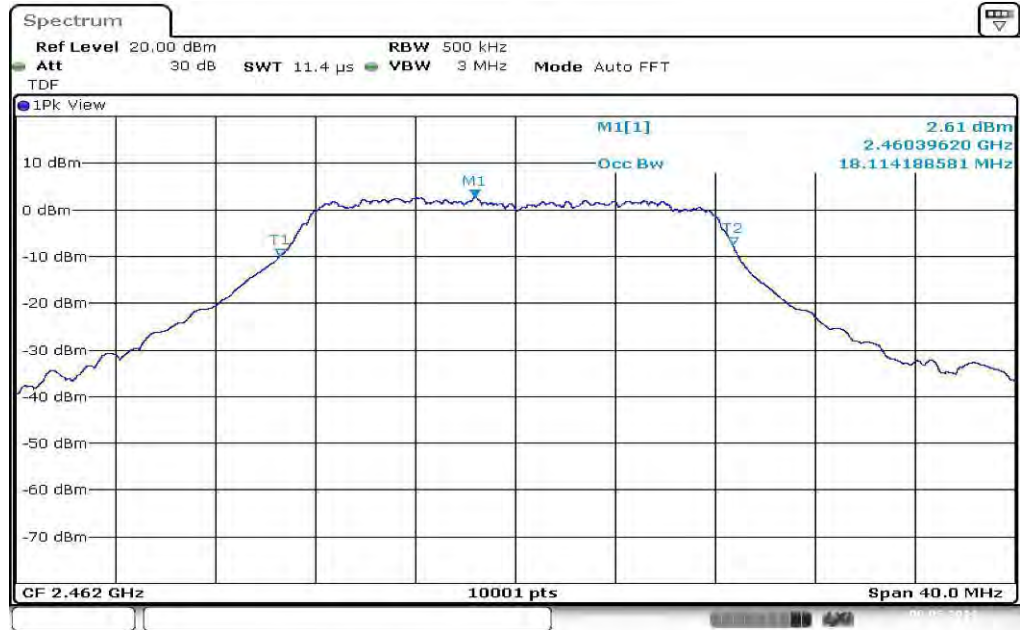
Date: 6.MAY.2014 15:29:19

Plot 2: TX mode, middle channel



Date: 23.APR.2014 11:23:44

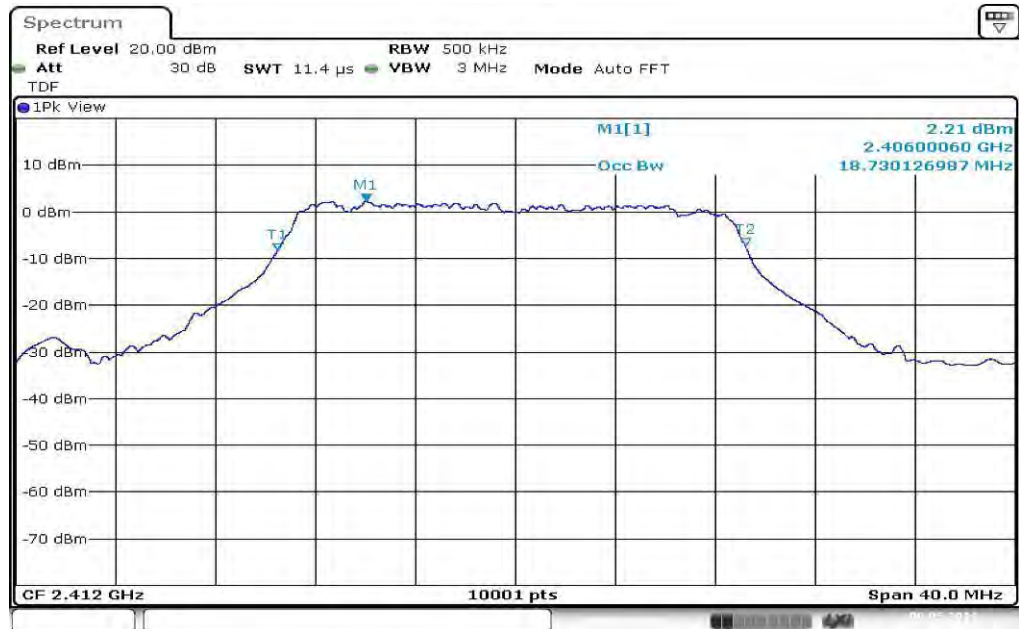
Plot 3: TX mode, highest channel



Date: 6.MAY.2014 15:02:05

Plots: OFDM / n HT20 – mode

Plot 1: TX mode, lowest channel



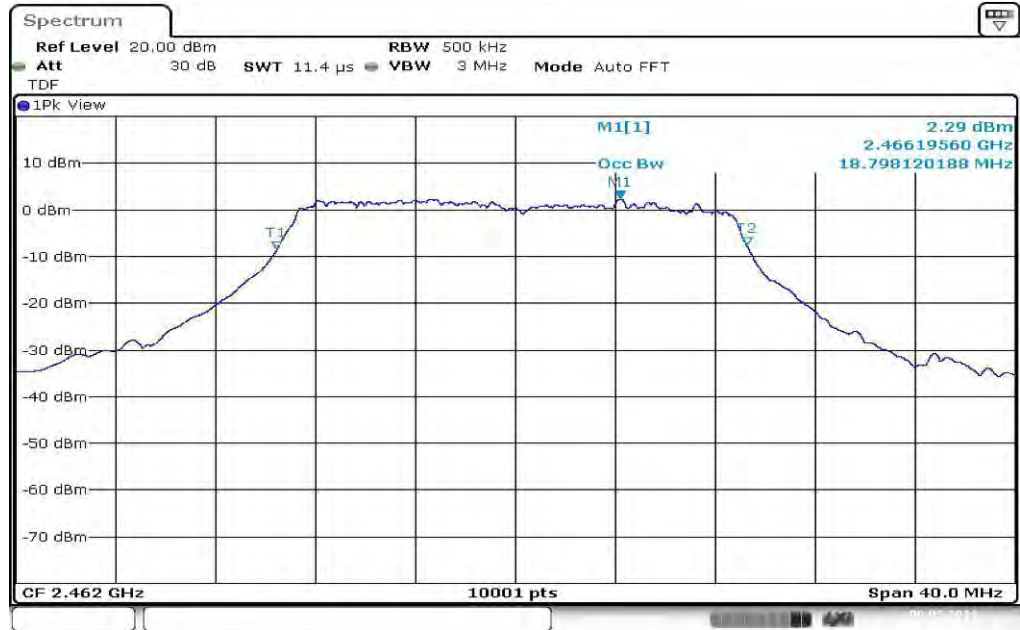
Date: 6.MAY.2014 15:13:40

Plot 2: TX mode, middle channel



Date: 23.APR.2014 11:50:43

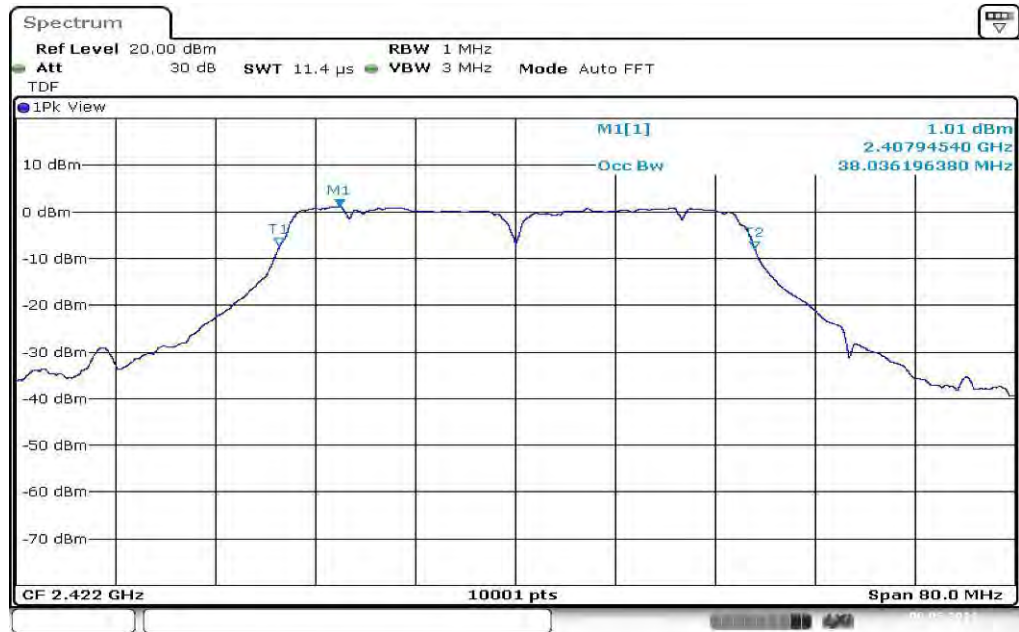
Plot 3: TX mode, highest channel



Date: 6.MAY.2014 15:20:46

Plots: OFDM / n HT40 – mode

Plot 1: TX mode, lowest channel



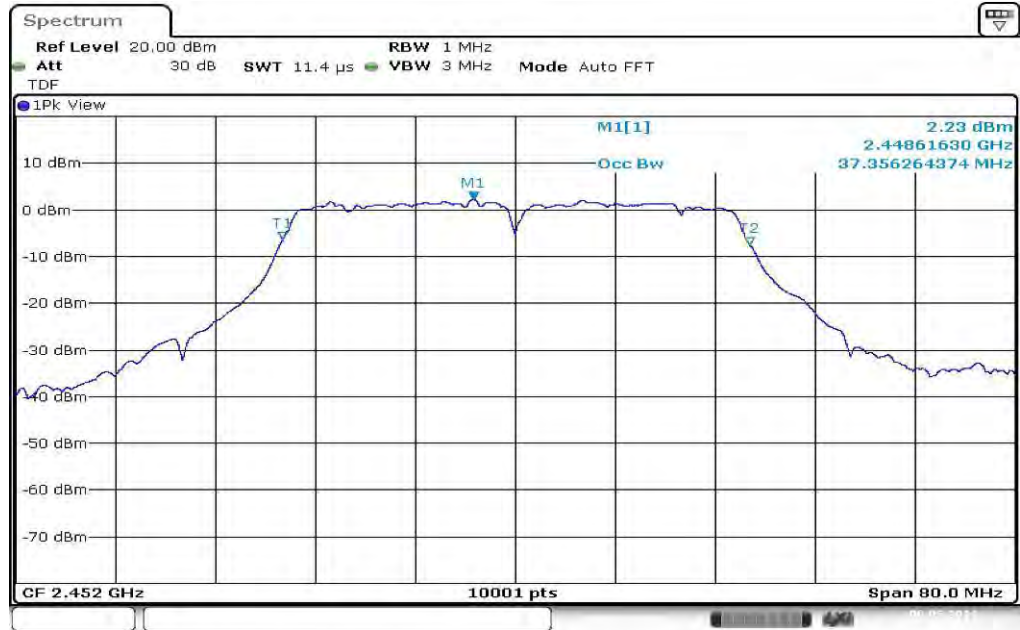
Date: 6.MAY.2014 13:50:59

Plot 2: TX mode, middle channel



Date: 23.APR.2014 12:17:35

Plot 3: TX mode, highest channel

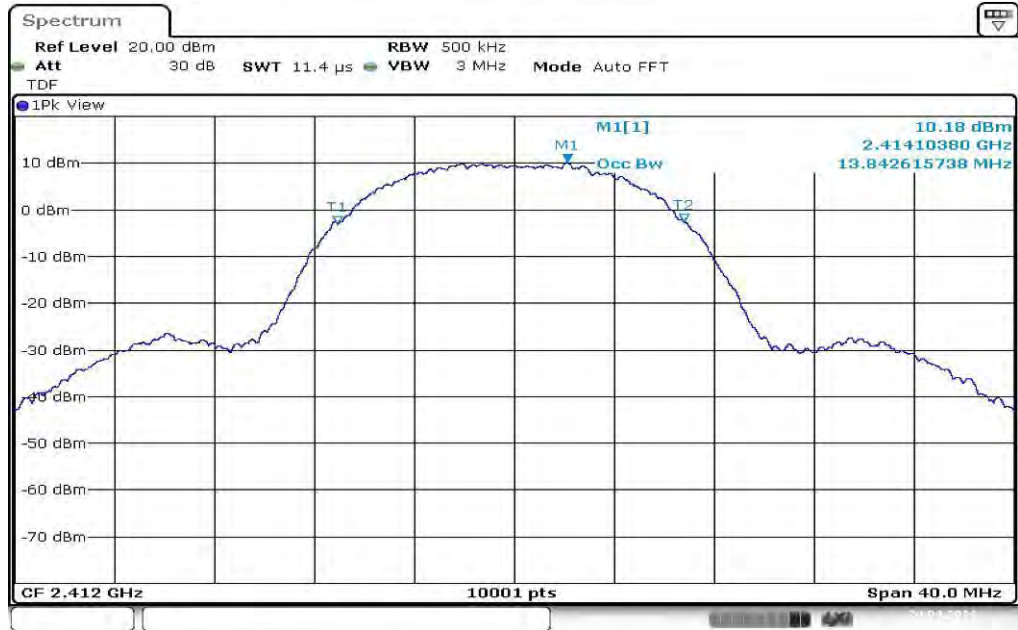


Date: 6.MAY.2014 13:58:30

Plots: ANT1

Plots: DSSS / b - mode

Plot 1: TX mode, lowest channel



Date: 24.APR.2014 10:50:17

Plot 2: TX mode, middle channel



Date: 24.APR.2014 10:58:59

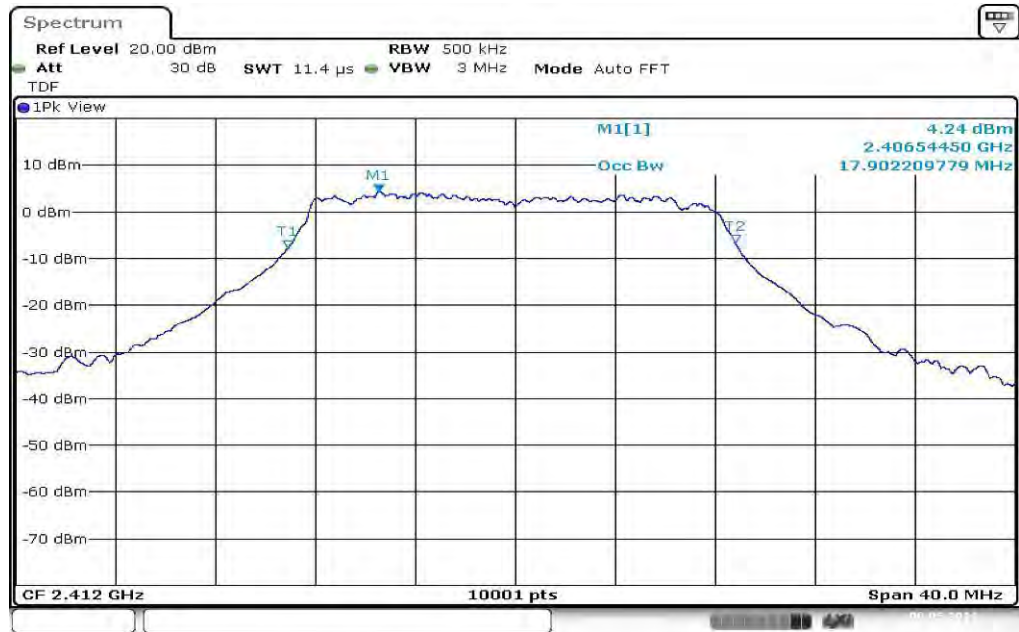
Plot 3: TX mode, highest channel



Date: 24.APR.2014 11:07:55

Plots: OFDM / g – mode

Plot 1: TX mode, lowest channel



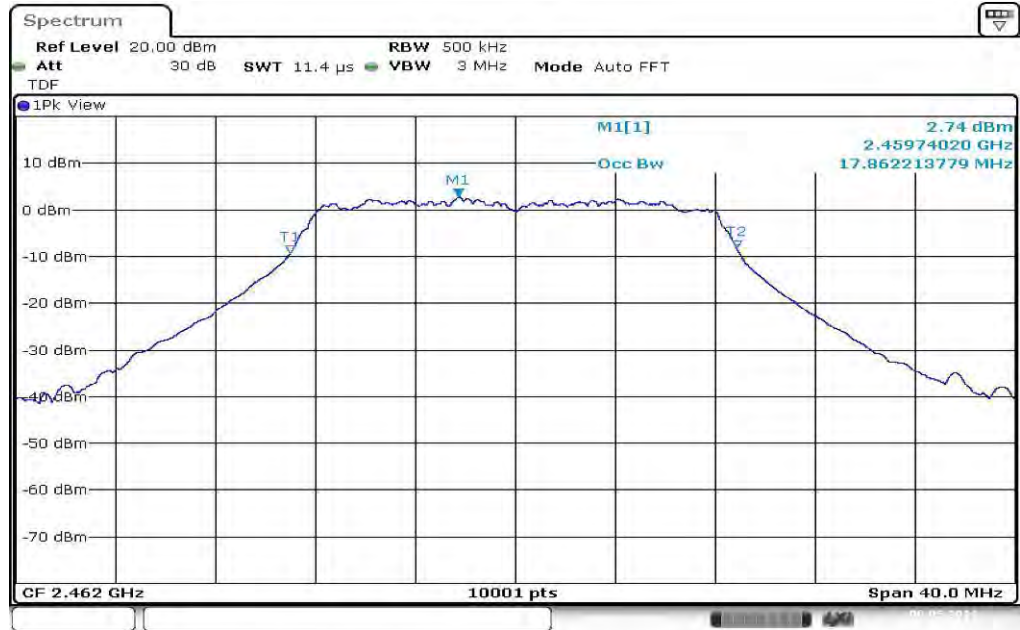
Date: 6.MAY.2014 15:38:27

Plot 2: TX mode, middle channel



Date: 24.APR.2014 11:37:06

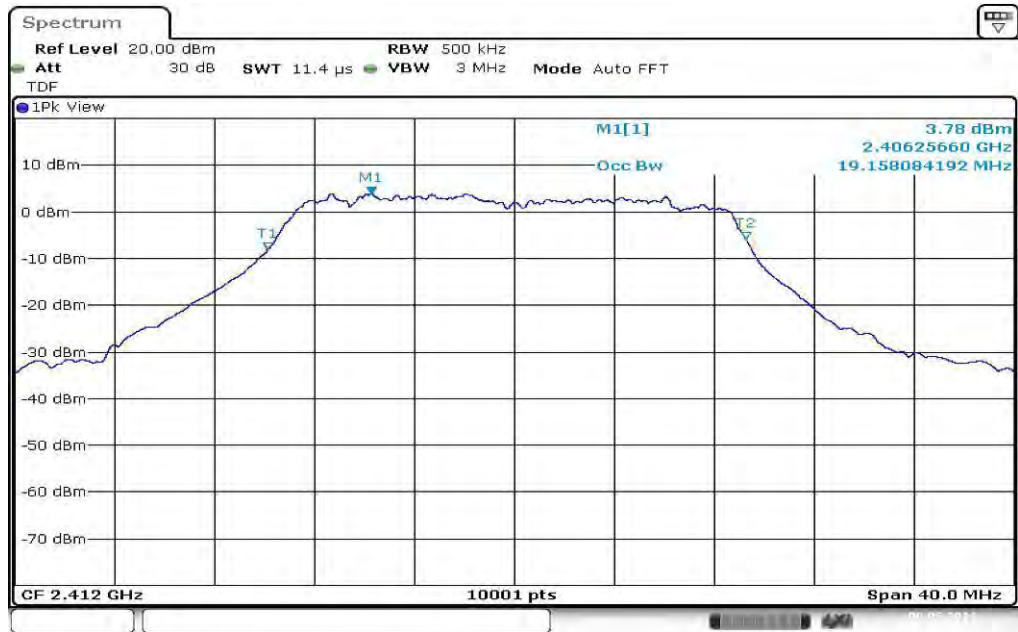
Plot 3: TX mode, highest channel



Date: 6.MAY.2014 15:47:30

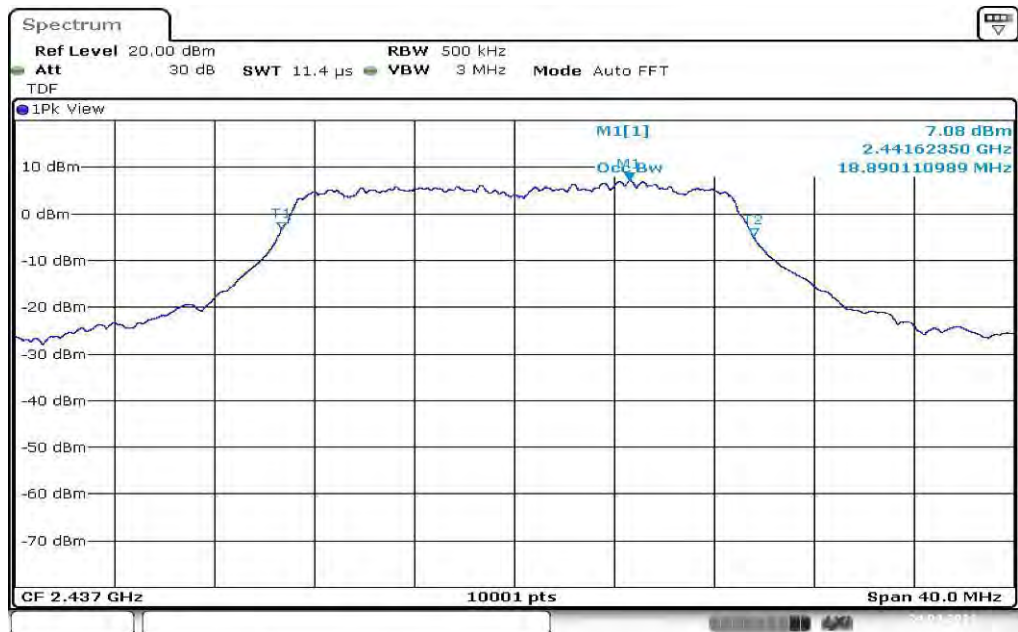
Plots: OFDM / n HT20 – mode

Plot 1: TX mode, lowest channel



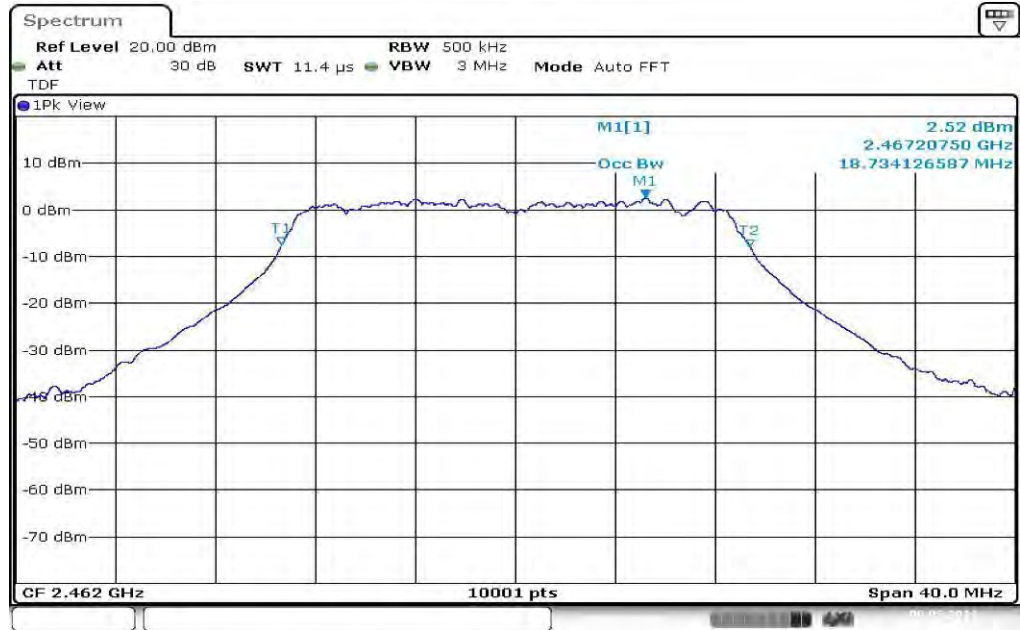
Date: 6.MAY.2014 15:56:06

Plot 2: TX mode, middle channel



Date: 24.APR.2014 12:58:08

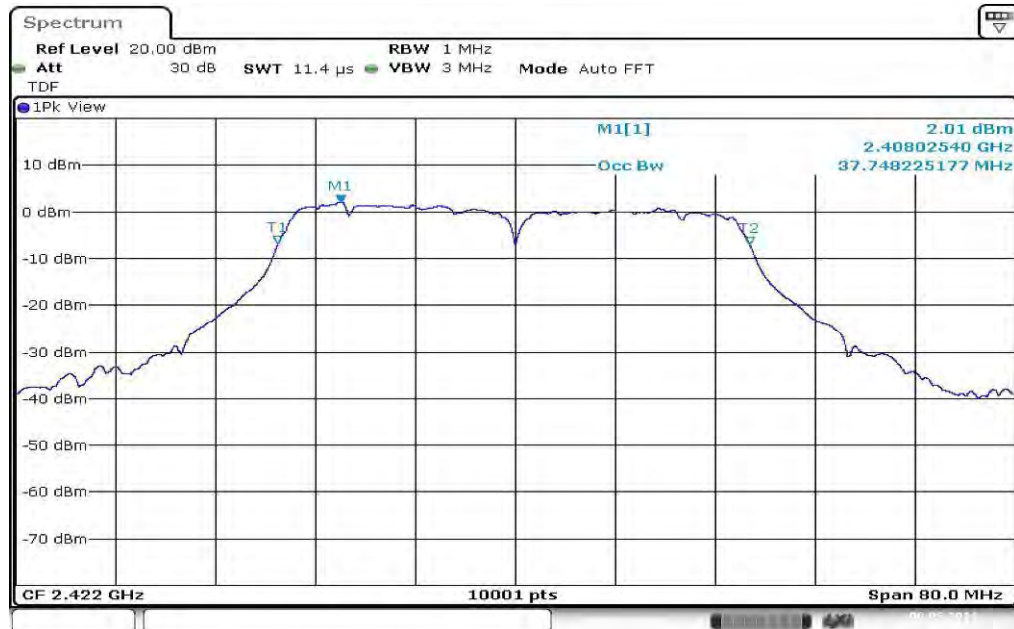
Plot 3: TX mode, highest channel



Date: 6.MAY.2014 16:08:22

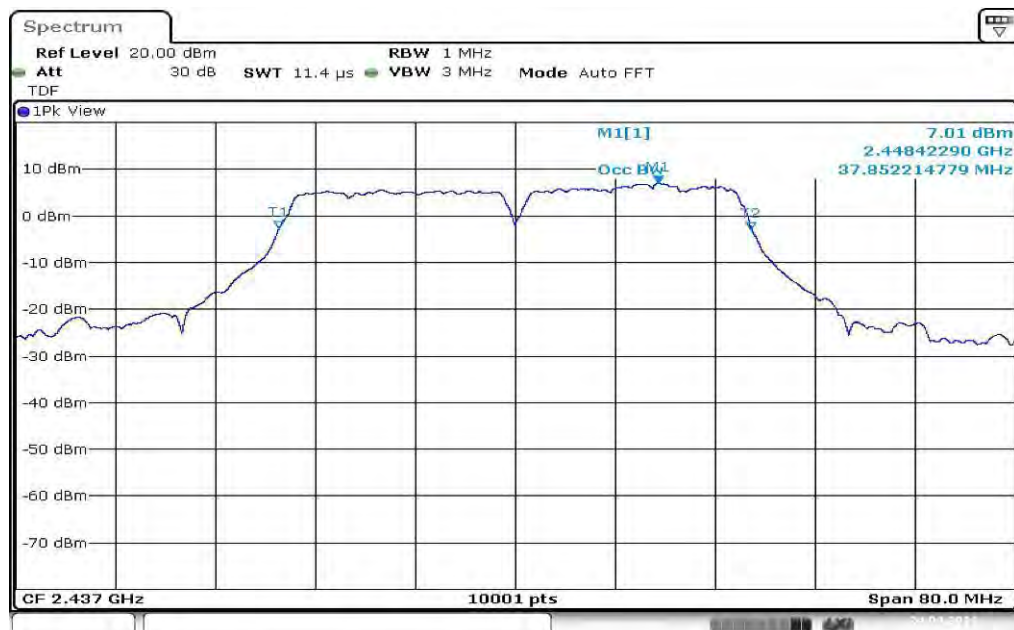
Plots: OFDM / n HT40 – mode

Plot 1: TX mode, lowest channel



Date: 6.MAY.2014 16:17:28

Plot 2: TX mode, middle channel



Date: 24.APR.2014 14:49:49

Plot 3: TX mode, highest channel



Date: 6.MAY.2014 16:29:58

10.7 Band edge compliance conducted

Description:

Measurement of the conducted band edge compliance. EUT is measured at the lower and upper band edge in both modes.

Measurement:

Measurement parameter	
According to DTS clause: 13.2.1	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	500 kHz
Span:	Lower Band Edge: 2300 – 2425 MHz Upper Band Edge: 2450 – 2550 MHz
Trace-Mode:	Max hold

Limits:

FCC	IC
Band Edge Compliance Conducted	
<p>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.</p>	

Results: ANT0

Scenario Modulation	Band Edge Compliance conducted [dB]			
	DSSS / b – mode	OFDM / g – mode	OFDM / n HT20 – mode	OFDM / n HT40 – mode
Lower band edge	> 20 dB	> 20 dB	> 20 dB	> 20 dB
Upper band edge	> 20 dB	> 20 dB	> 20 dB	> 20 dB
Measurement uncertainty	± 1.5 dB			

Results: ANT1

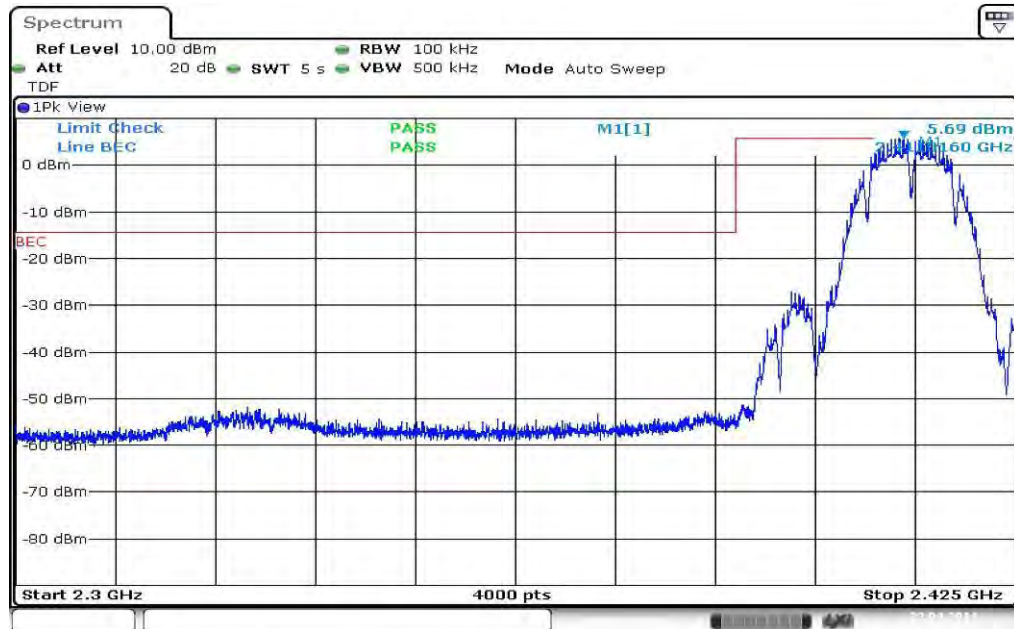
Scenario Modulation	Band Edge Compliance conducted [dB]			
	DSSS / b – mode	OFDM / g – mode	OFDM / n HT20 – mode	OFDM / n HT40 – mode
Lower band edge	> 20 dB	> 20 dB	> 20 dB	> 20 dB
Upper band edge	> 20 dB	> 20 dB	> 20 dB	> 20 dB
Measurement uncertainty	± 1.5 dB			

Result: **Passed**

Plots: ANTO

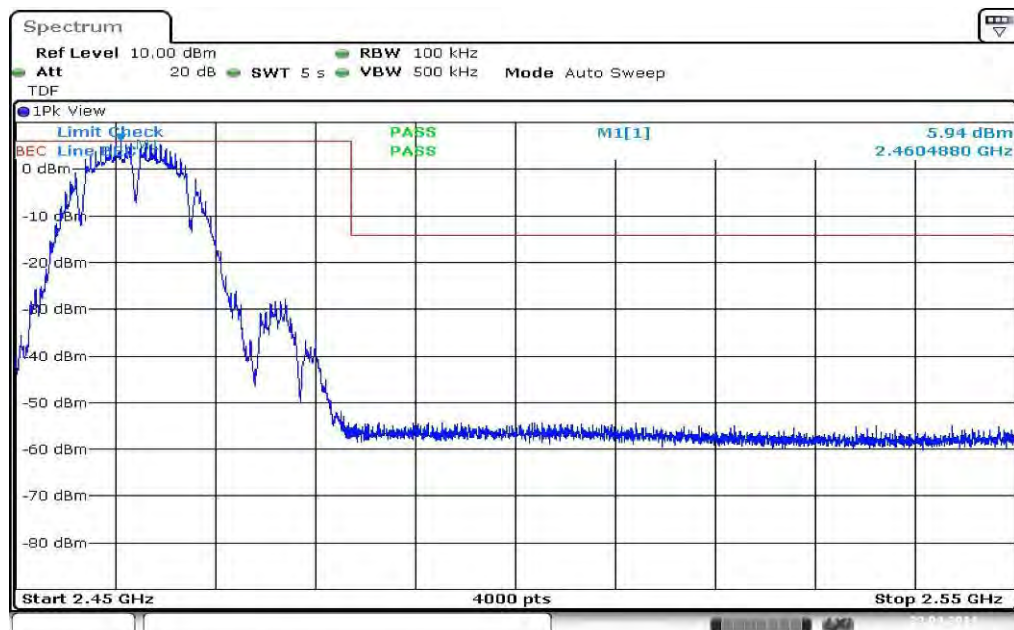
Plots: DSSS / b – mode

Plot 1: TX mode, lower band edge



Date: 22.APR.2014 14:44:24

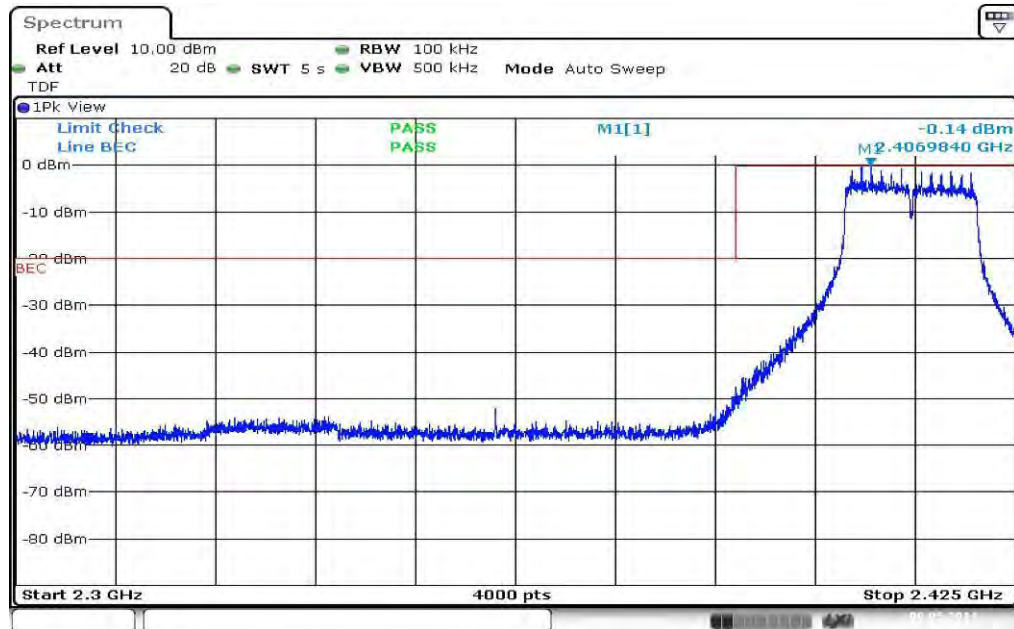
Plot 2: TX mode, upper band edge



Date: 22.APR.2014 14:58:31

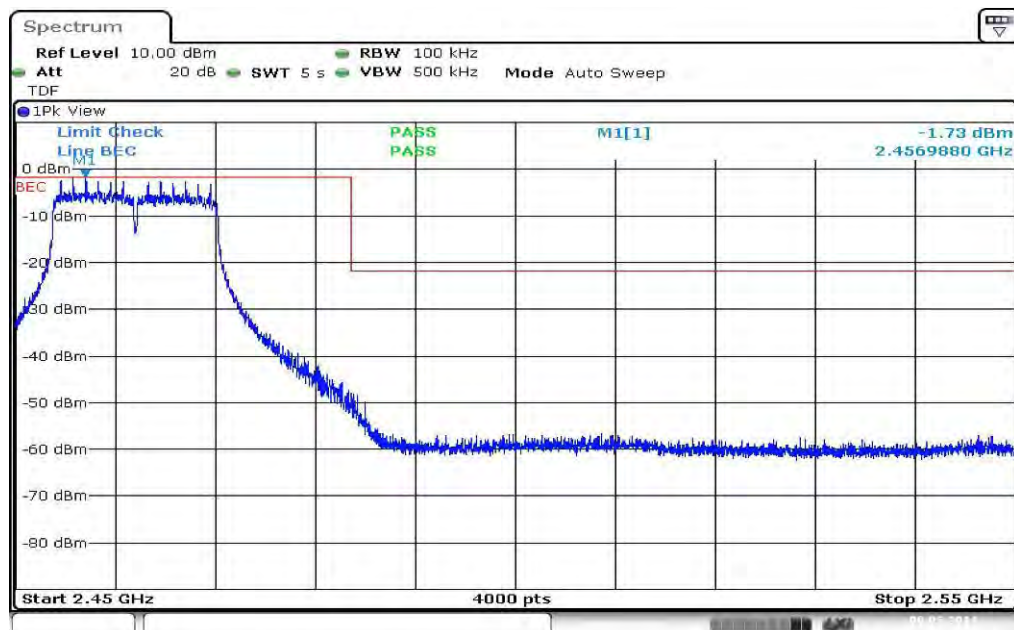
Plots: OFDM / g – mode

Plot 1: TX mode, lower band edge



Date: 6.MAY.2014 15:30:21

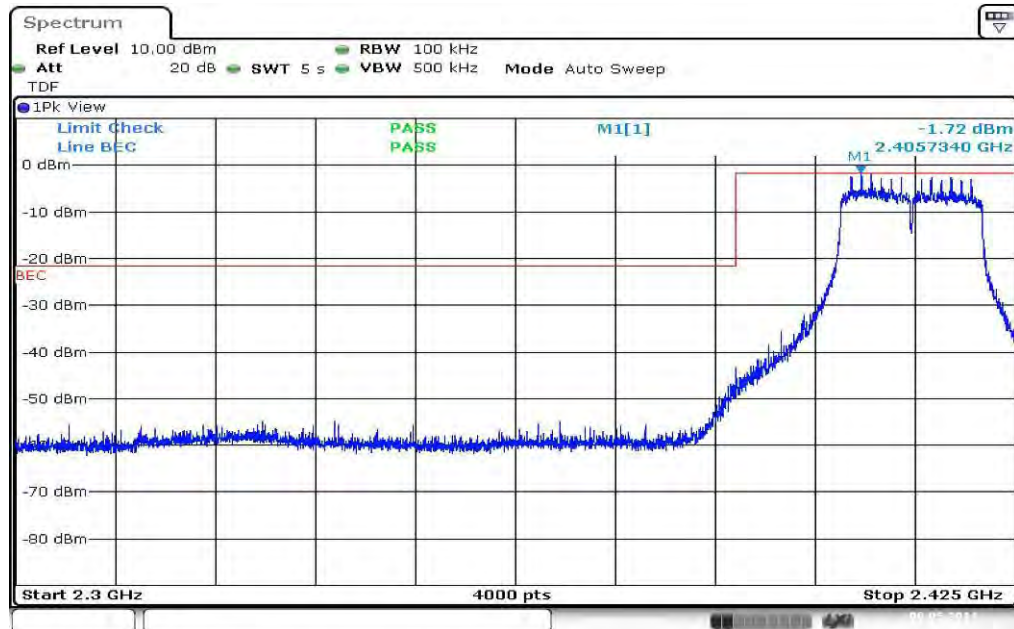
Plot 2: TX mode, upper band edge



Date: 6.MAY.2014 15:03:07

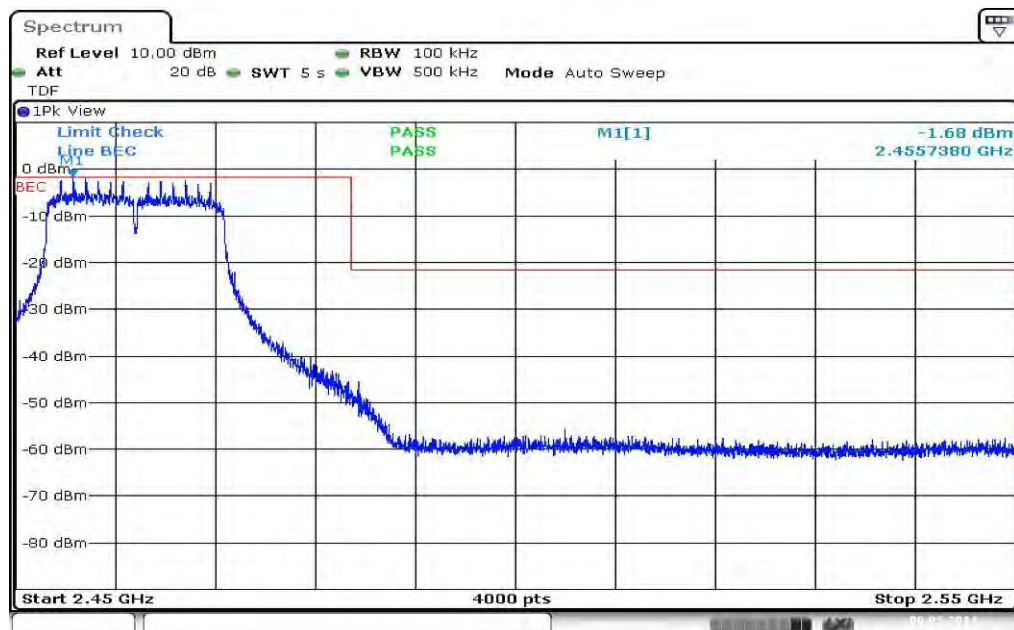
Plots: OFDM / n HT20 – mode

Plot 1: TX mode, lower band edge



Date: 6.MAY.2014 15:14:42

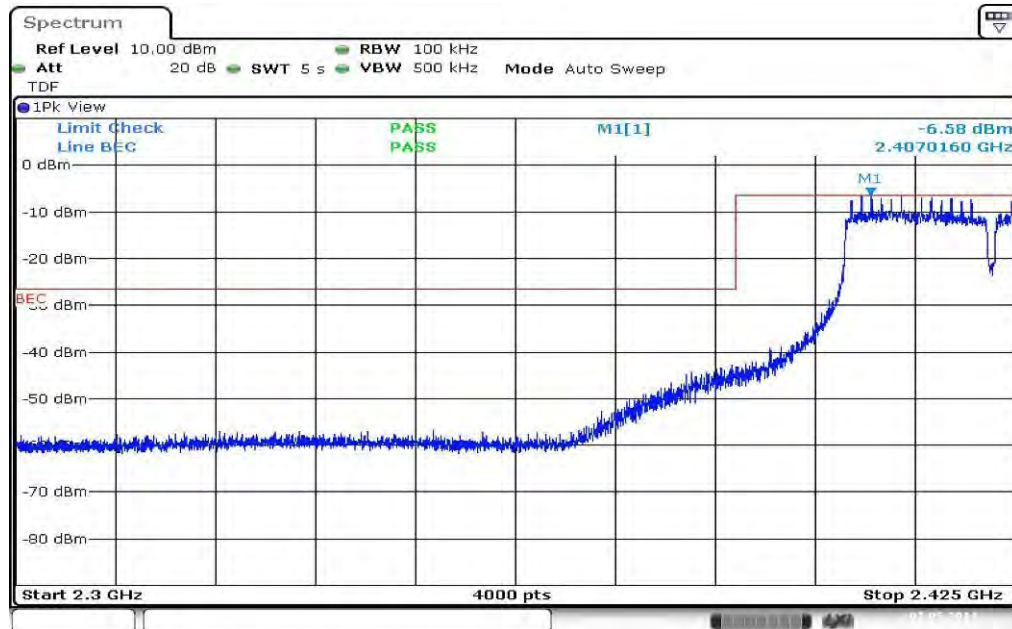
Plot 2: TX mode, upper band edge



Date: 6.MAY.2014 15:21:48

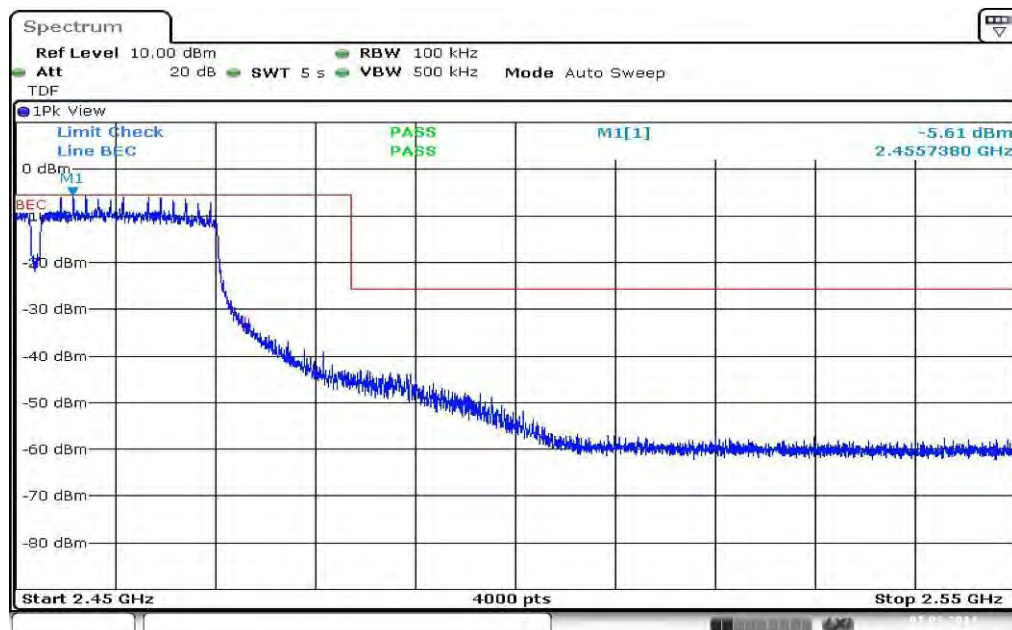
Plots: OFDM / n HT40 – mode

Plot 1: TX mode, lower band edge



Date: 7.MAY.2014 07:12:26

Plot 2: TX mode, upper band edge

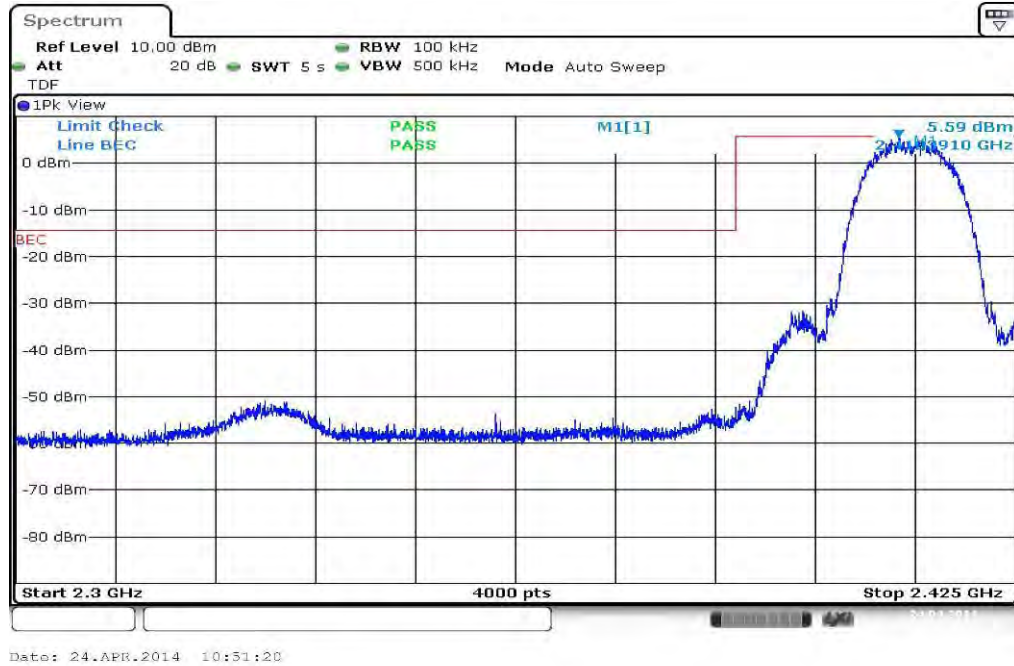


Date: 7.MAY.2014 07:26:28

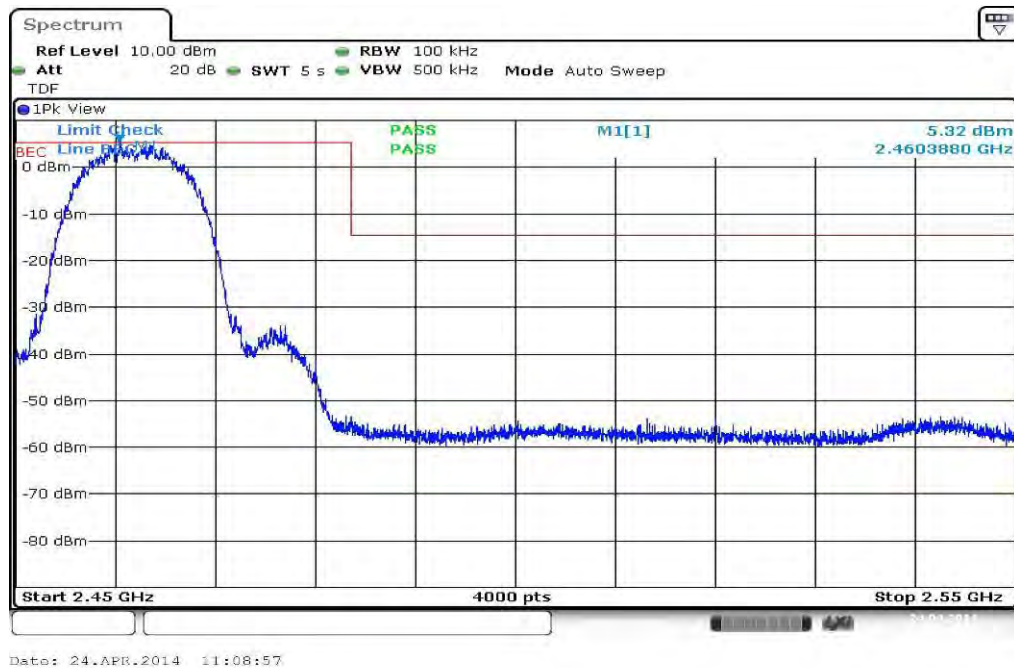
Plots: ANT1

Plots: DSSS / b - mode

Plot 1: TX mode, lower band edge

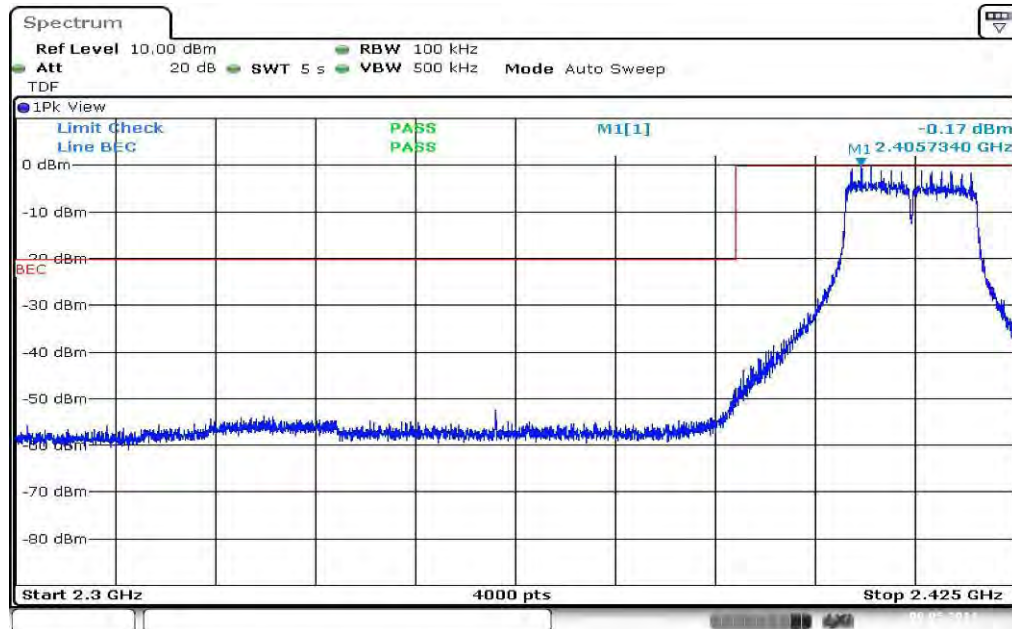


Plot 2: TX mode, upper band edge



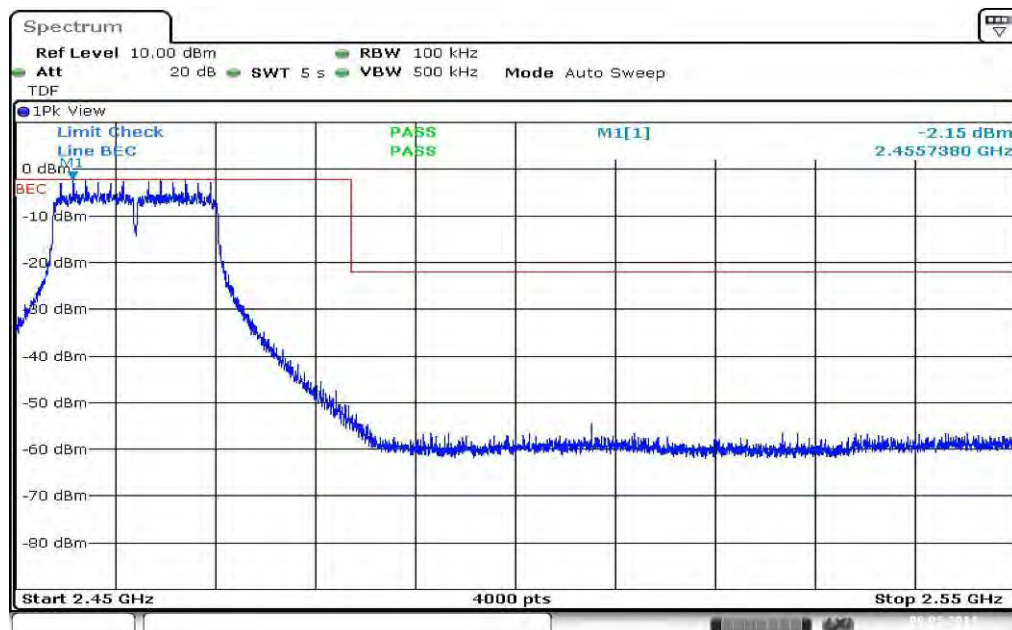
Plots: OFDM / g – mode

Plot 1: TX mode, lower band edge



Date: 6.MAY.2014 15:39:29

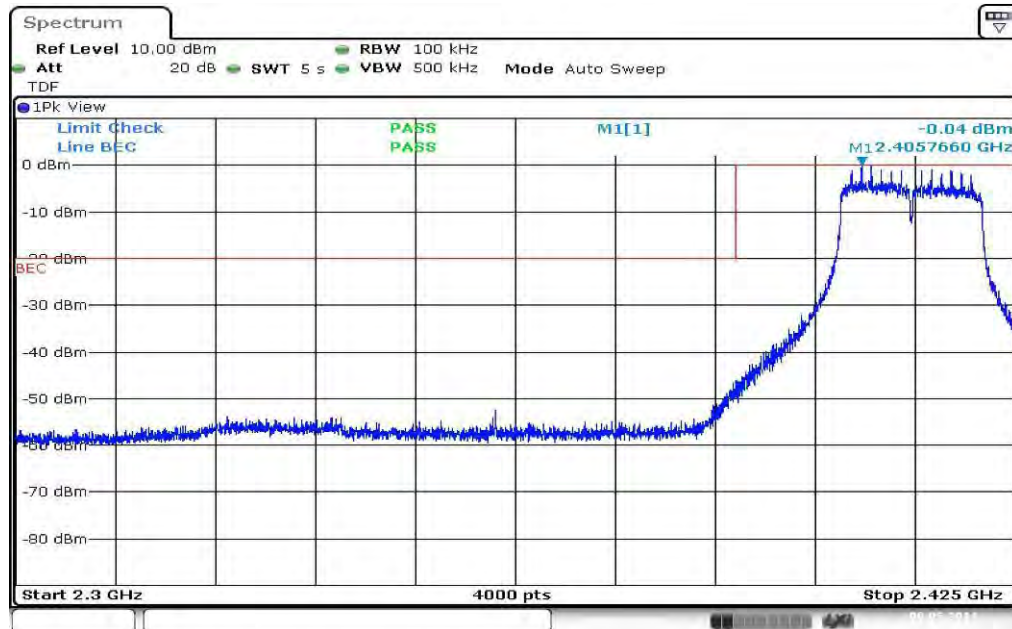
Plot 2: TX mode, upper band edge



Date: 6.MAY.2014 15:48:33

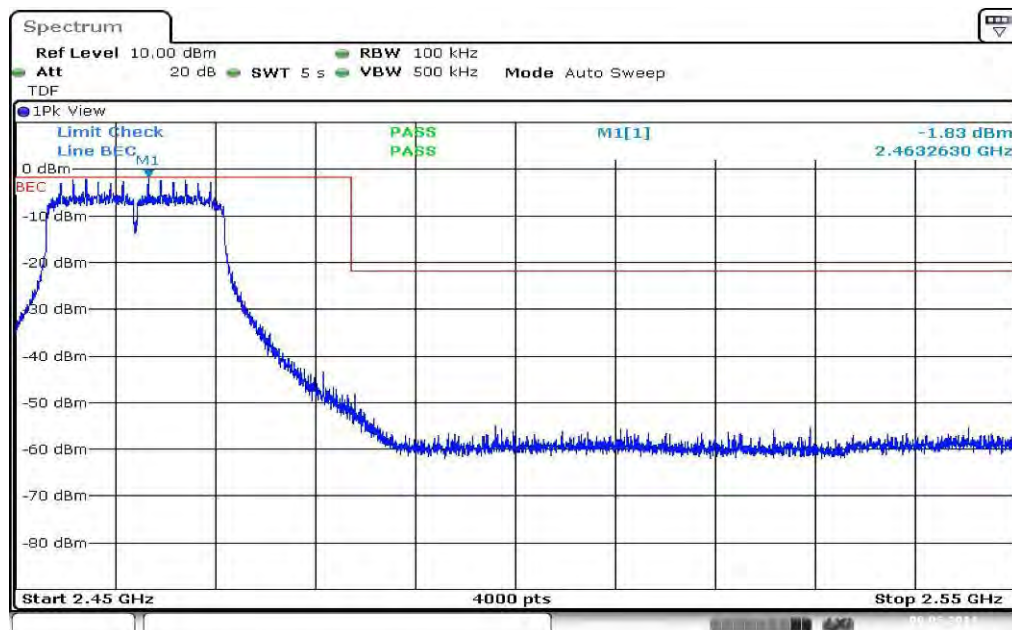
Plots: OFDM / n HT20 – mode

Plot 1: TX mode, lower band edge



Date: 6.MAY.2014 15:57:08

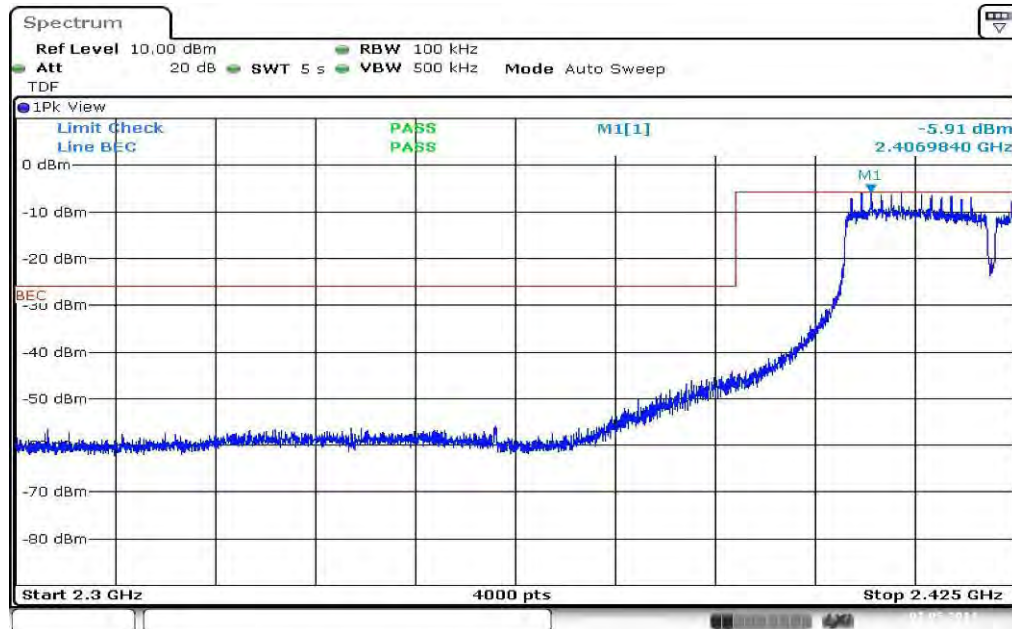
Plot 2: TX mode, upper band edge



Date: 6.MAY.2014 16:09:24

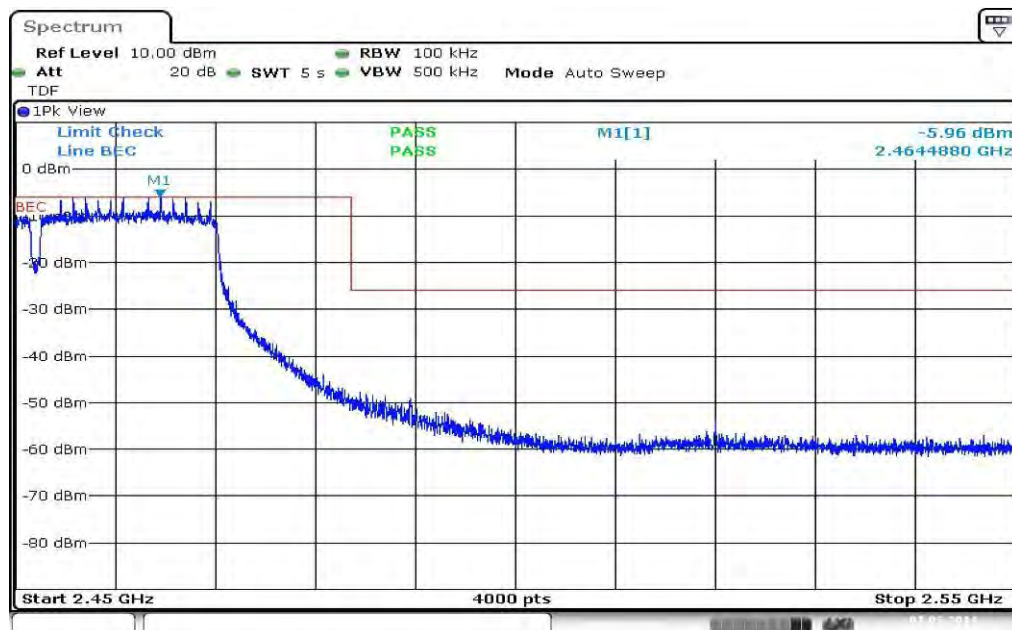
Plots: OFDM / n HT40 – mode

Plot 1: TX mode, lower band edge



Date: 7.MAY.2014 07:33:36

Plot 2: TX mode, upper band edge



Date: 7.MAY.2014 07:47:48

10.8 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 3m.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 MHz / 1 MHz
Video bandwidth:	1 MHz / 10 Hz
Span:	See plot!
Trace-Mode:	Max Hold

Limits:

FCC	IC
Band Edge Compliance Radiated	
<p>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)).</p>	
74 dB μ V/m Peak 54 dB μ V/m AVG	

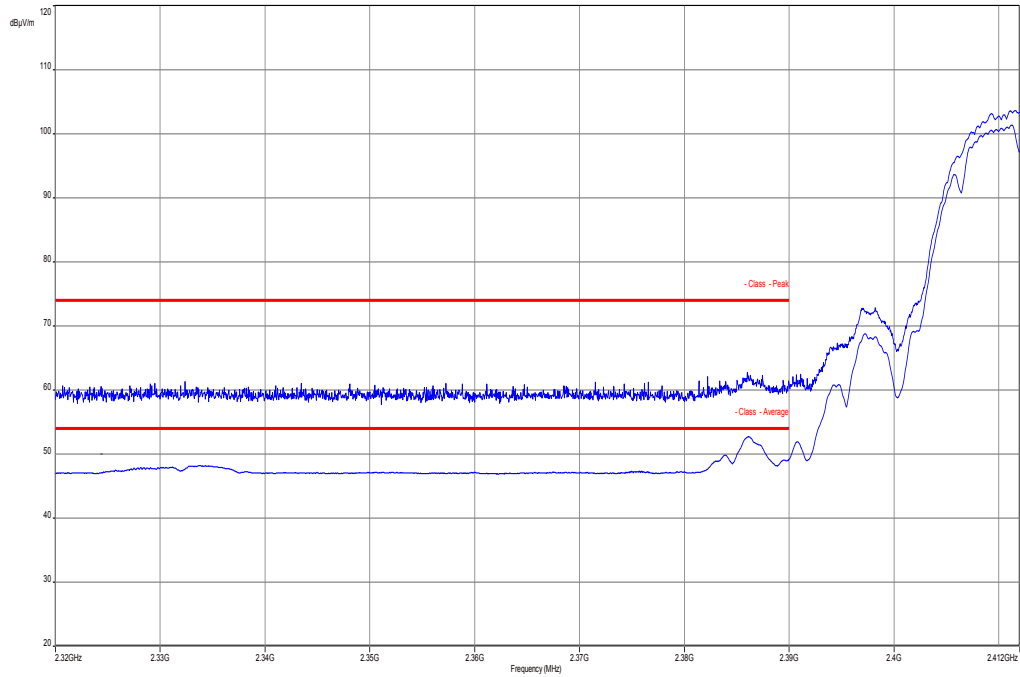
Results: both antennas active

Scenario Modulation	Band Edge Compliance radiated			
	DSSS / b – mode	OFDM / g – mode	OFDM / n HT20 – mode	OFDM / n HT40 – mode
Lower band edge	62.8 dB μ V/m @ 3m (Peak)	67.1 dB μ V/m @ 3m (Peak)	73.5 dB μ V/m @ 3m (Peak)	69.5 dB μ V/m @ 3m (Peak)
	52.7 dB μ V/m @ 3m (AVG)	50.5 dB μ V/m @ 3m (AVG)	52.5 dB μ V/m @ 3m (AVG)	51.9 dB μ V/m @ 3m (AVG)
Upper band edge	62.1 dB μ V/m @ 3m (Peak)	69.3 dB μ V/m @ 3m (Peak)	73.0 dB μ V/m @ 3m (Peak)	71.4 dB μ V/m @ 3m (Peak)
	50.3 dB μ V/m @ 3m (AVG)	51.7 dB μ V/m @ 3m (AVG)	53.2 dB μ V/m @ 3m (AVG)	53.8 dB μ V/m @ 3m (AVG)
Measurement uncertainty	± 1.5 dB			

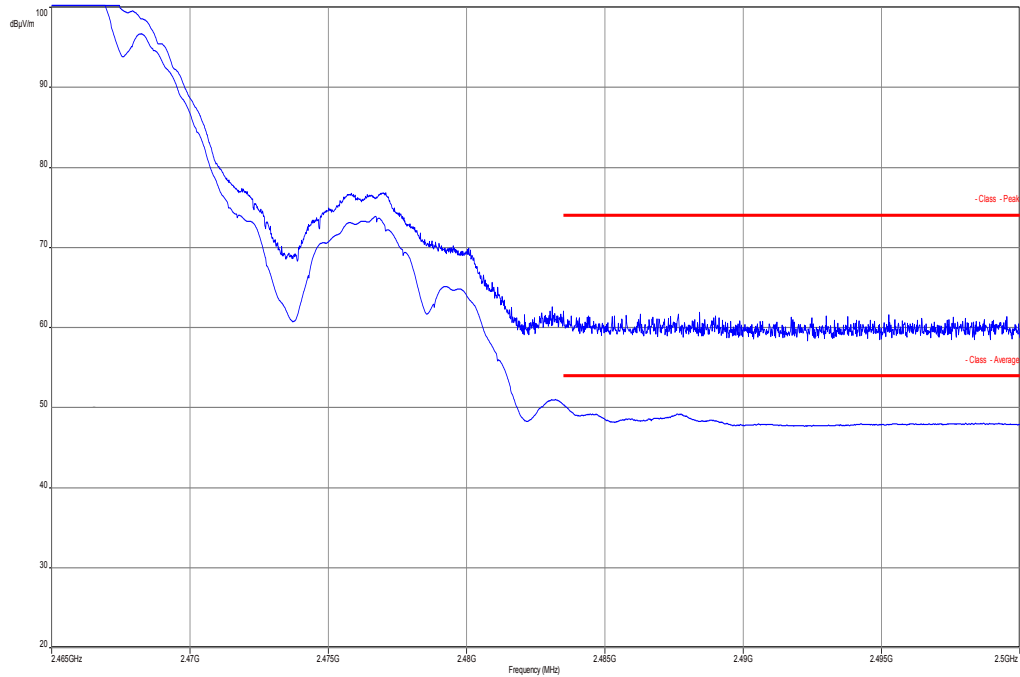
Result: **Passed**

Plots: DSSS/ b – mode peak / average

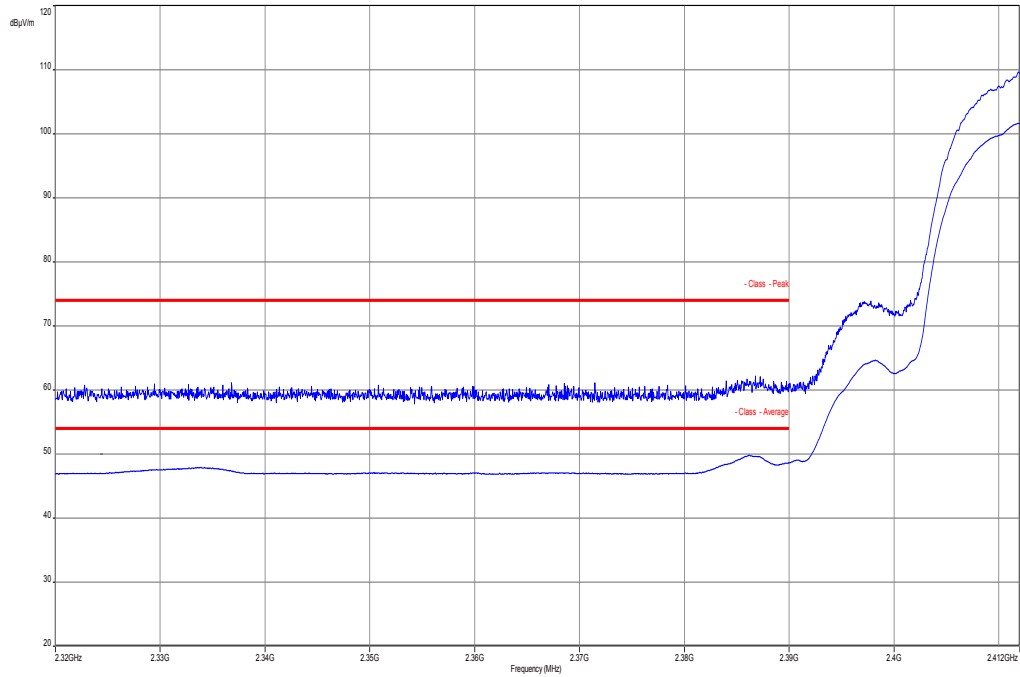
Plot 1: TX mode, lower band edge, vertical & horizontal polarization, low data rate



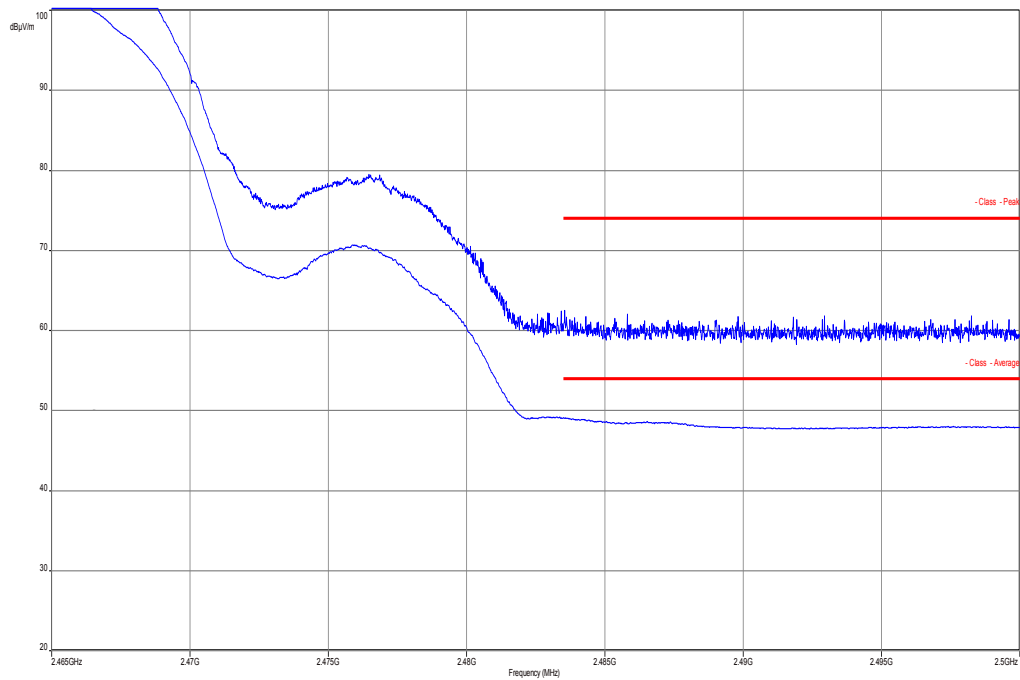
Plot 2: TX mode, upper band edge, vertical & horizontal polarization, low data rate



Plot 3: TX mode, lower band edge, vertical & horizontal polarization, high data rate

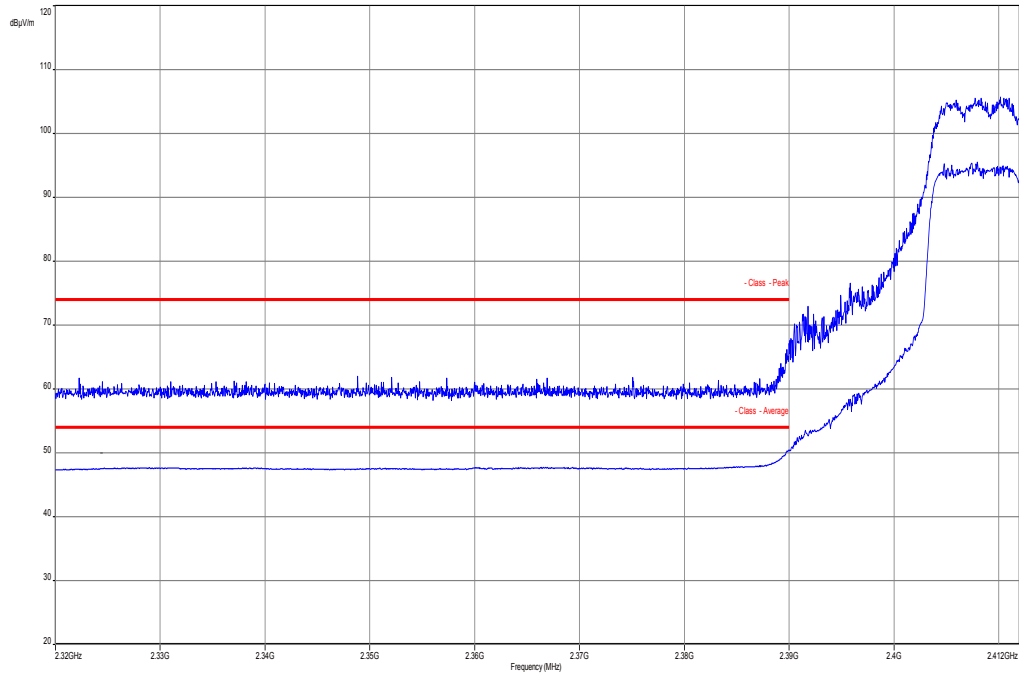


Plot 4: TX mode, upper band edge, vertical & horizontal polarization, high data rate

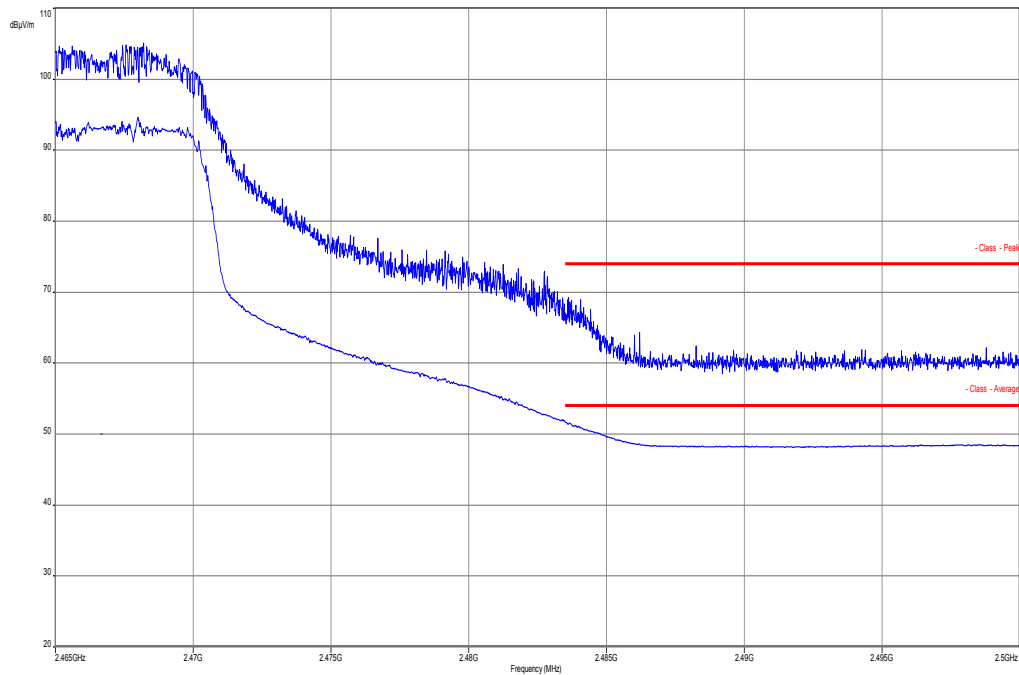


Plots: OFDM / g – mode peak / average

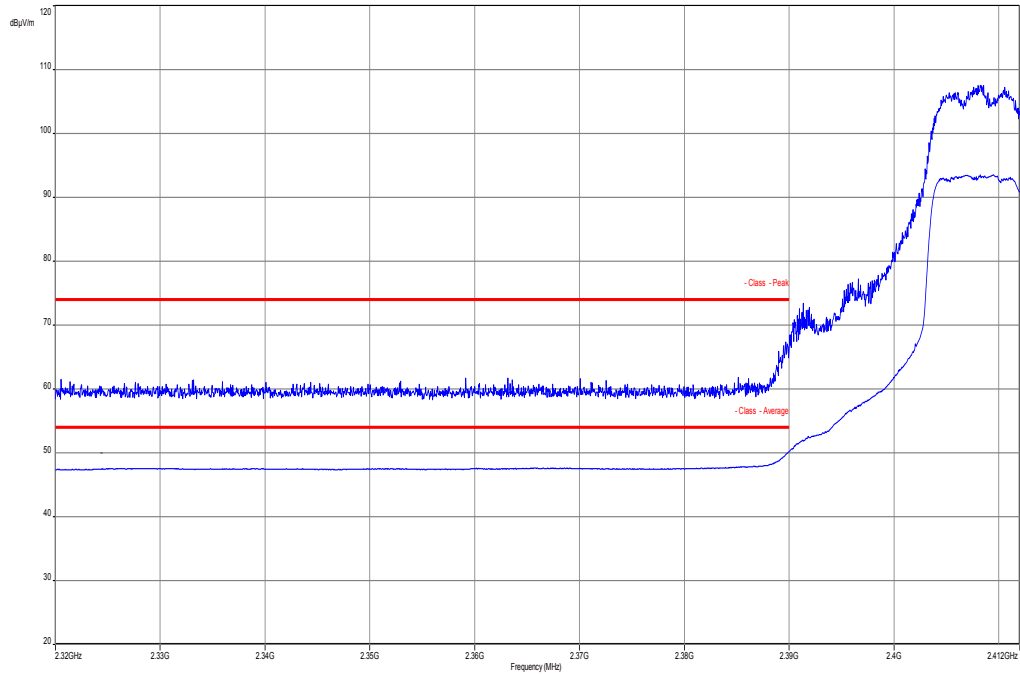
Plot 1: TX mode, lower band edge, vertical & horizontal polarization



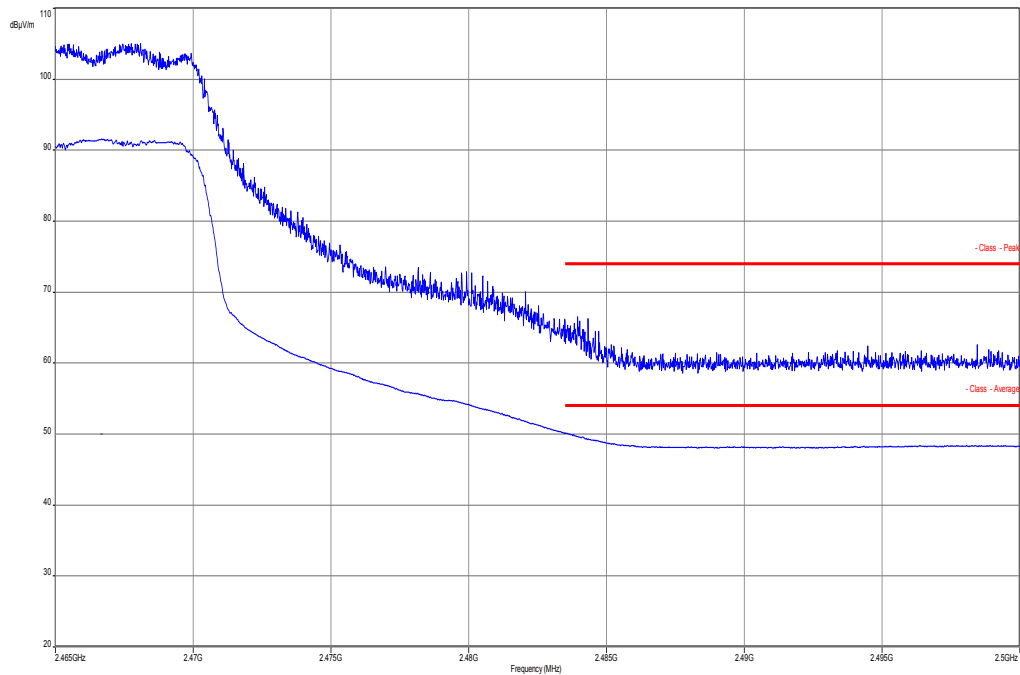
Plot 2: TX mode, upper band edge, vertical & horizontal polarization



Plot 3: TX mode, lower band edge, vertical & horizontal polarization, high data rate

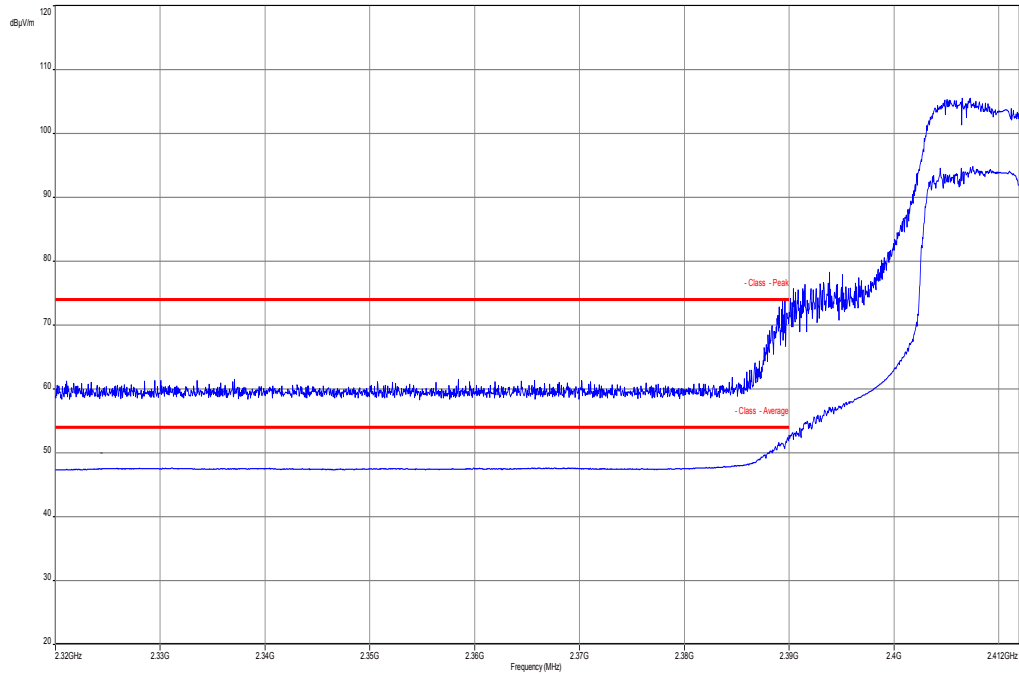


Plot 4: TX mode, upper band edge, vertical & horizontal polarization, high data rate

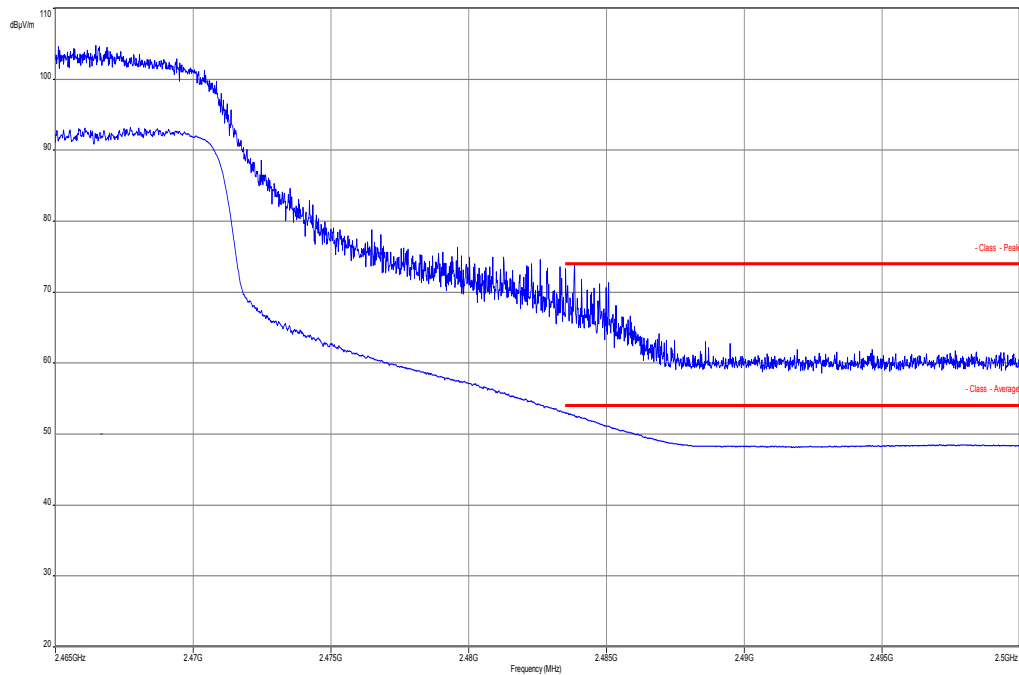


Plots: OFDM / n HT20 – mode peak / average

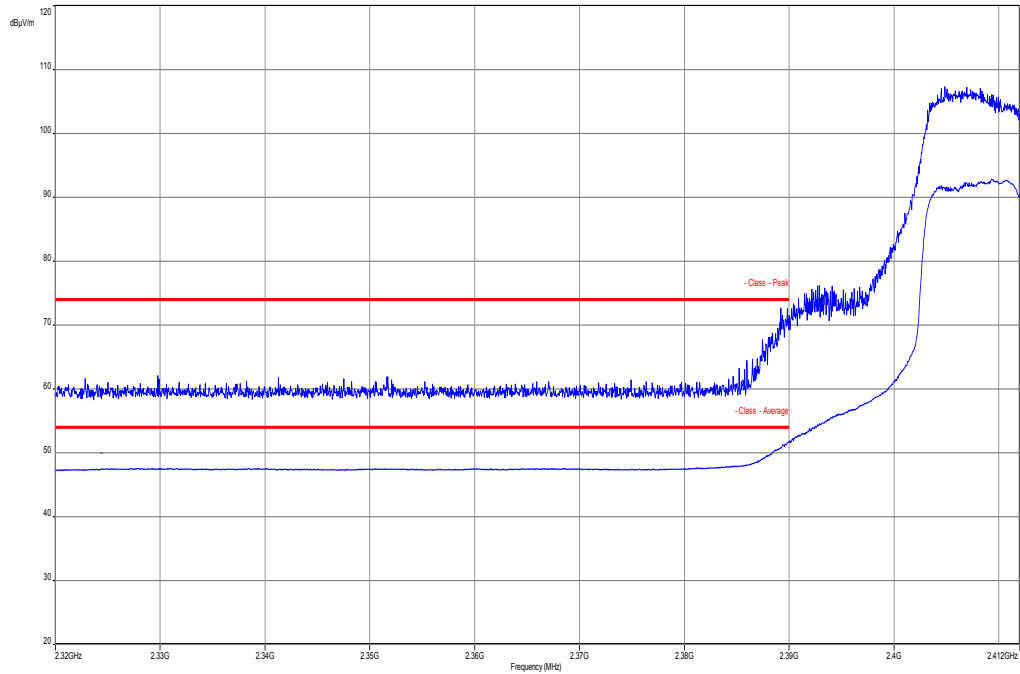
Plot 1: TX mode, lower band edge, vertical & horizontal polarization



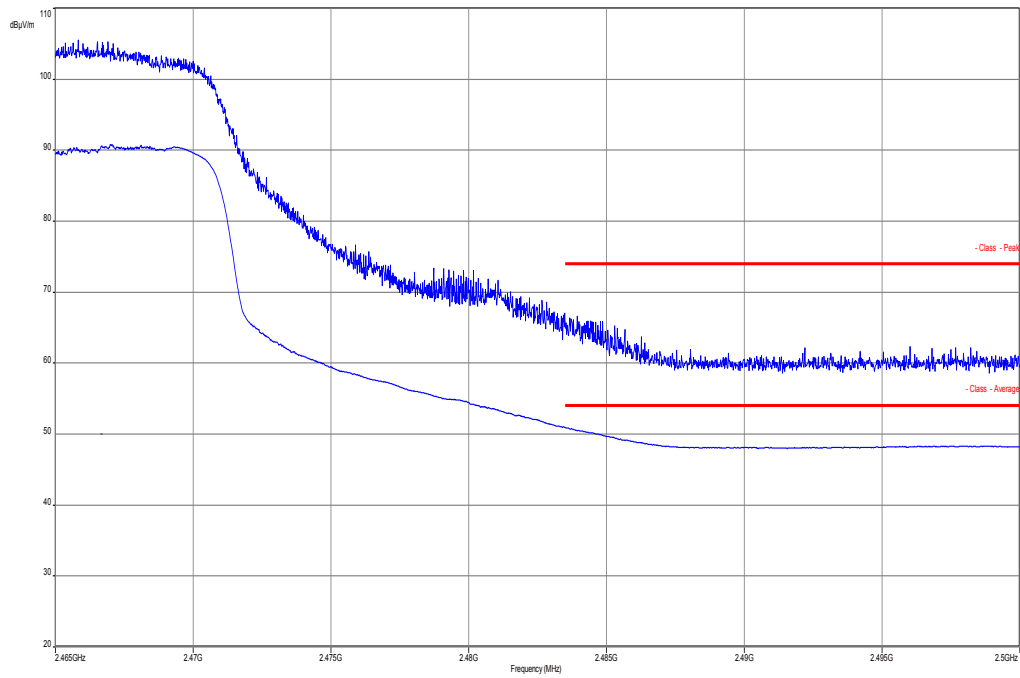
Plot 2: TX mode, upper band edge, vertical & horizontal polarization



Plot 3: TX mode, lower band edge, vertical & horizontal polarization, high data rate

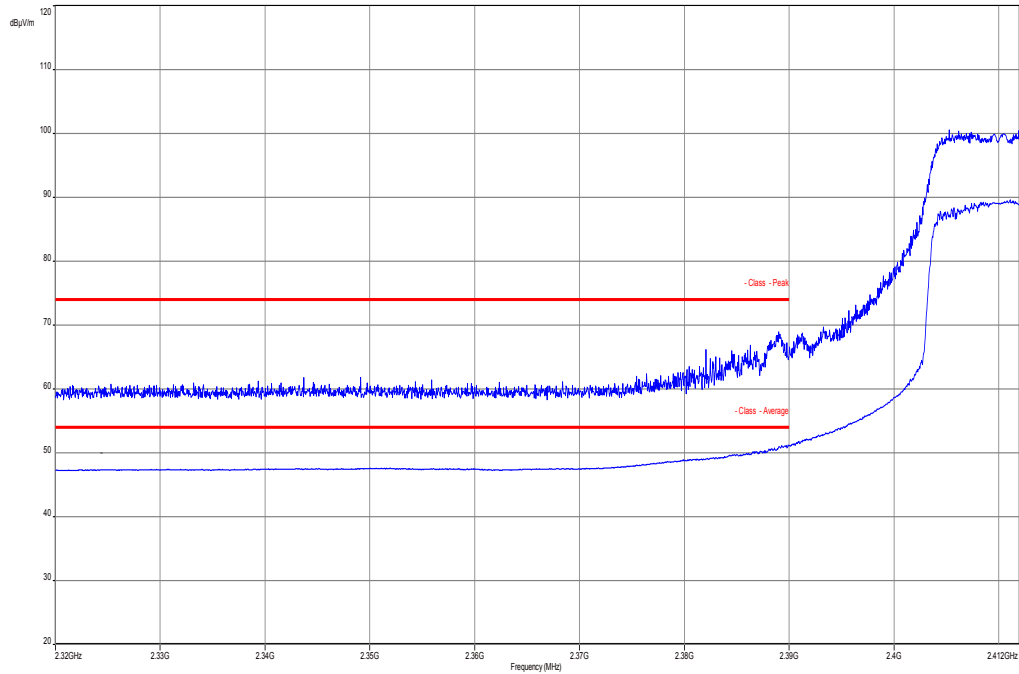


Plot 4: TX mode, upper band edge, vertical & horizontal polarization, high data rate

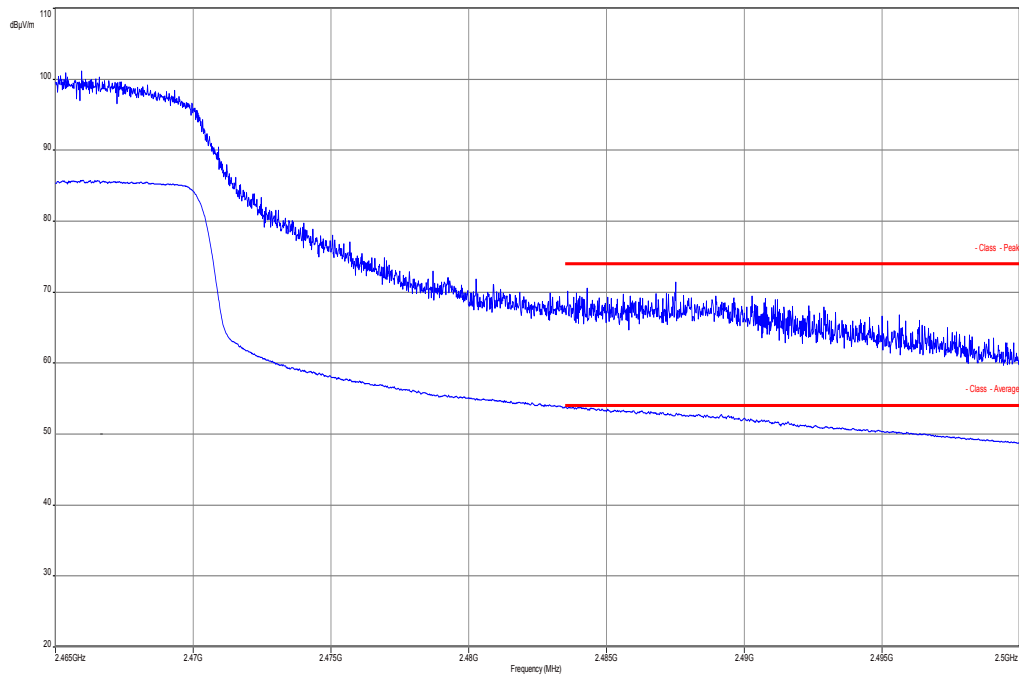


Plots: OFDM / n HT40 – mode peak / average

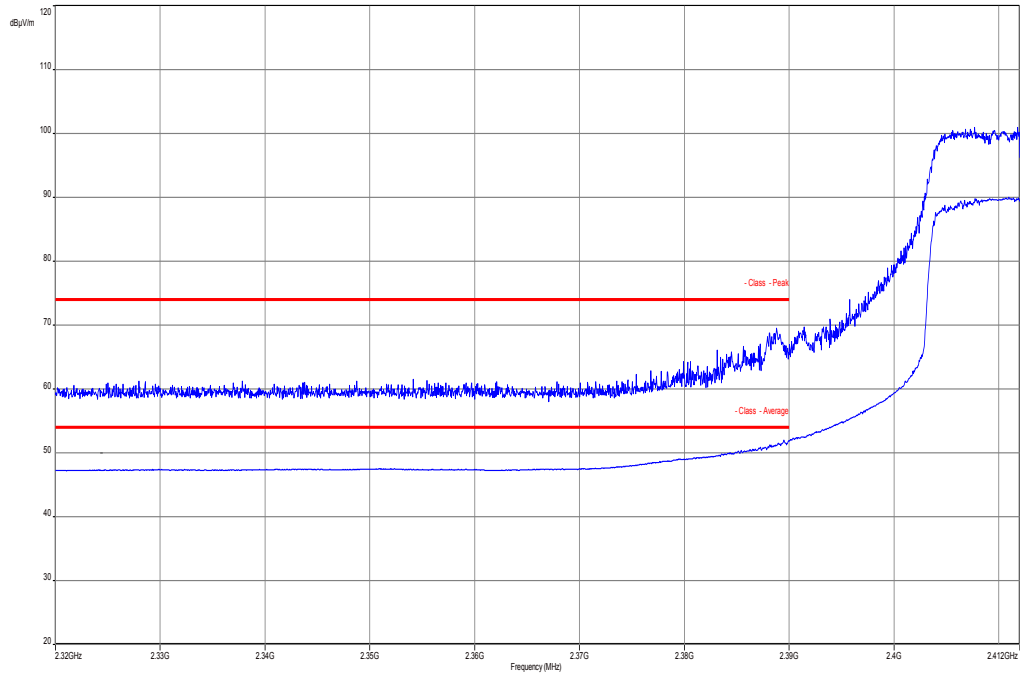
Plot 1: TX mode, lower band edge, vertical & horizontal polarization



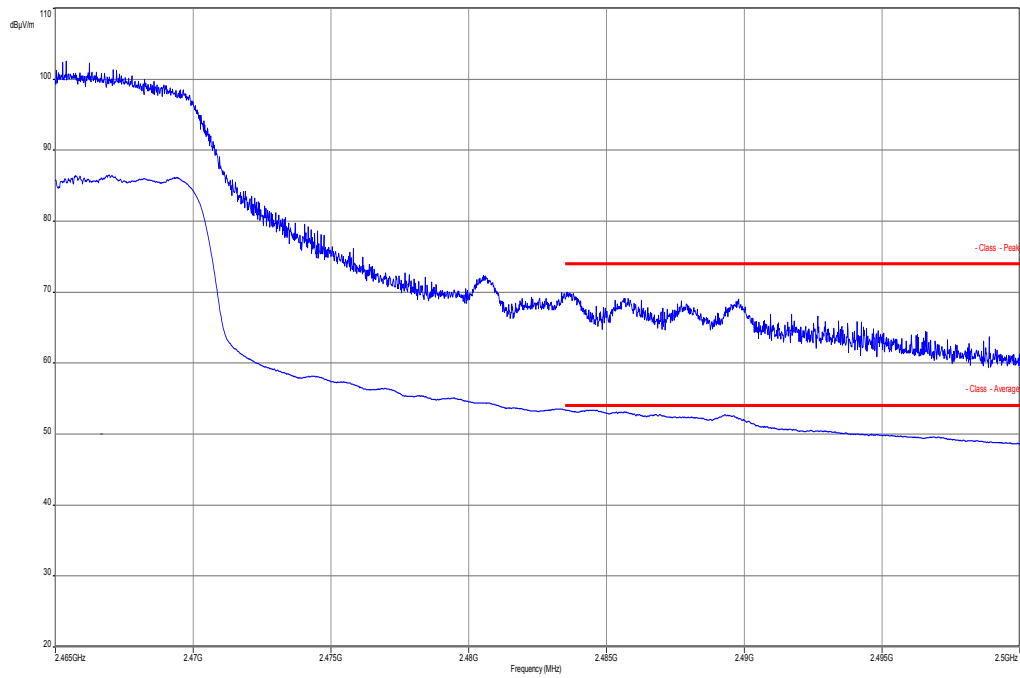
Plot 2: TX mode, upper band edge, vertical & horizontal polarization



Plot 3: TX mode, lower band edge, vertical & horizontal polarization, high data rate



Plot 4: TX mode, upper band edge, vertical & horizontal polarization, high data rate



10.9 TX 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

Limits:

FCC	IC
TX Spurious Emissions Conducted	
<p>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</p>	

Plots: ANTO

Results: DSSS / b – mode

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		5.82	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2437		5.70	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2462		5.53	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: **Passed**

Results: OFDM / g – mode

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		-0.09	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2437		-0.90	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2462		-2.13	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: **Passed**

Results: OFDM / n HT20 – mode

TX Spurious Emissions Conducted					
OFDM / n HT20 – mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		-3.11	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2437		1.78	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2462		-1.76	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: Passed

Results: OFDM / n HT40 – mode

TX Spurious Emissions Conducted					
OFDM / n HT40 – mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2422		-6.74	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2437		-1.19	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2452		-5.83	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: Passed

Plots: ANT1

Results: DSSS / b – mode

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		5.62	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2437		3.24	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2462		5.42	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: Passed

Results: OFDM / g – mode

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		0.09	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2437		2.04	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2462		-2.17	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: Passed

Results: OFDM / n HT20 – mode

TX Spurious Emissions Conducted					
OFDM / n HT20 – mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		-0.13	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2437		1.91	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2462		-2.17	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: Passed

Results: OFDM / n HT40 – mode

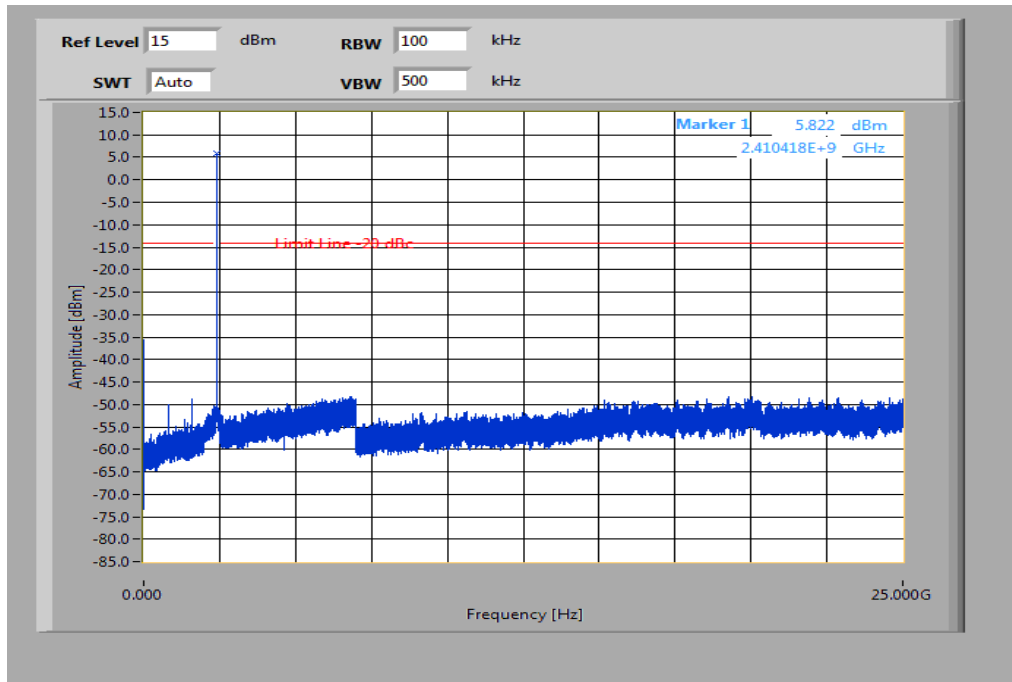
TX Spurious Emissions Conducted					
OFDM / n HT40 – mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2422		-6.18	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2437		-0.75	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2452		-6.23	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: Passed

Plots: ANTO

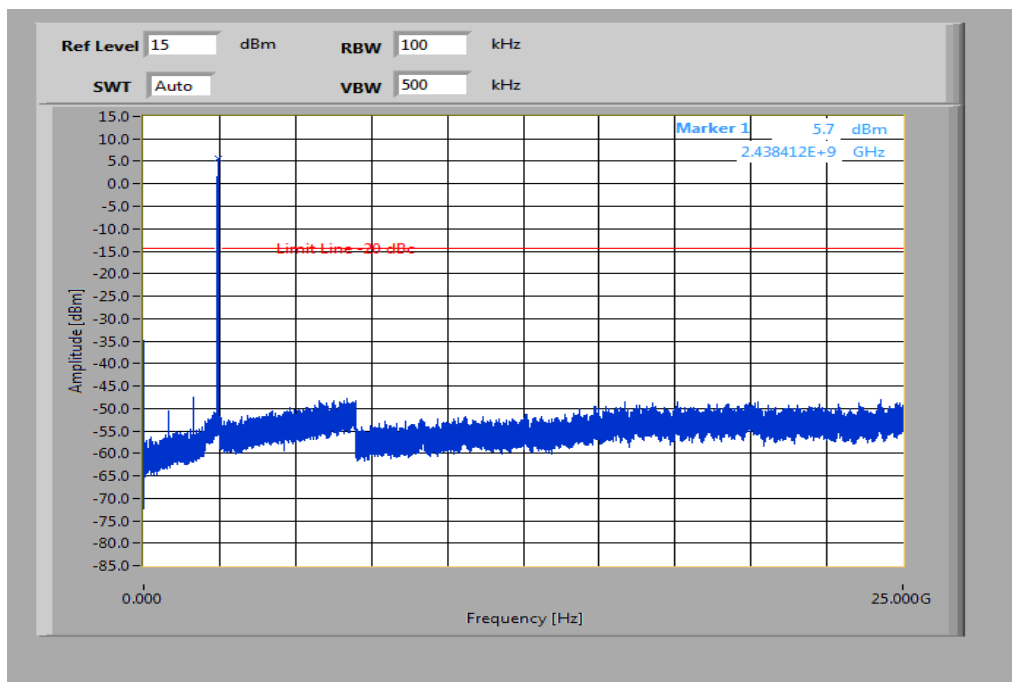
Plots: DSSS / b – mode

Plot 1: TX mode, lowest channel, up to 25 GHz



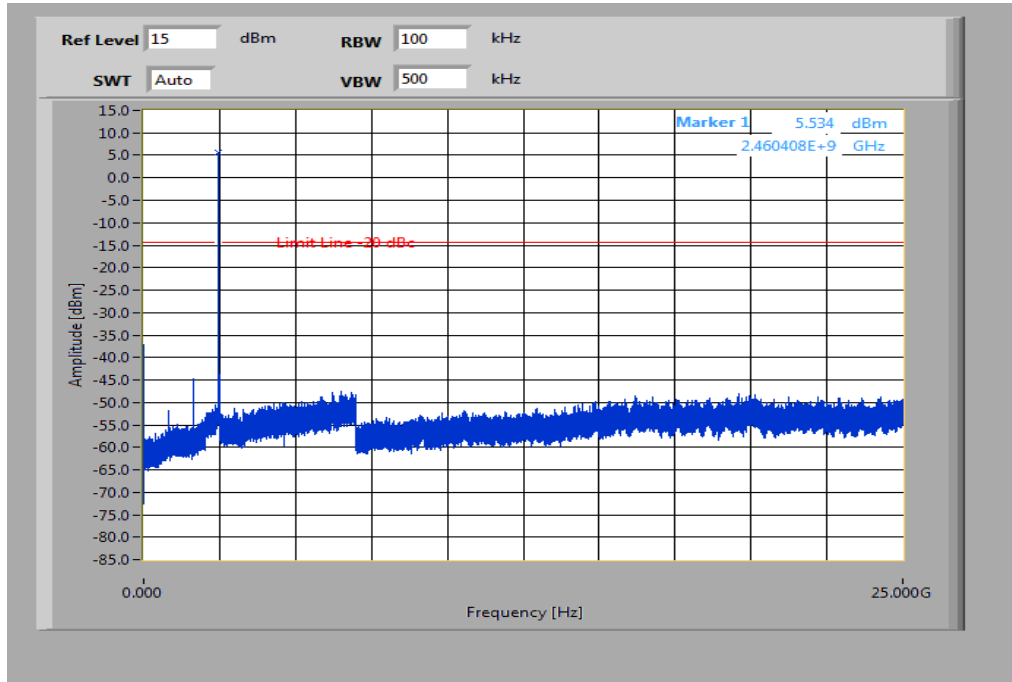
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, middle channel, up to 25 GHz



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

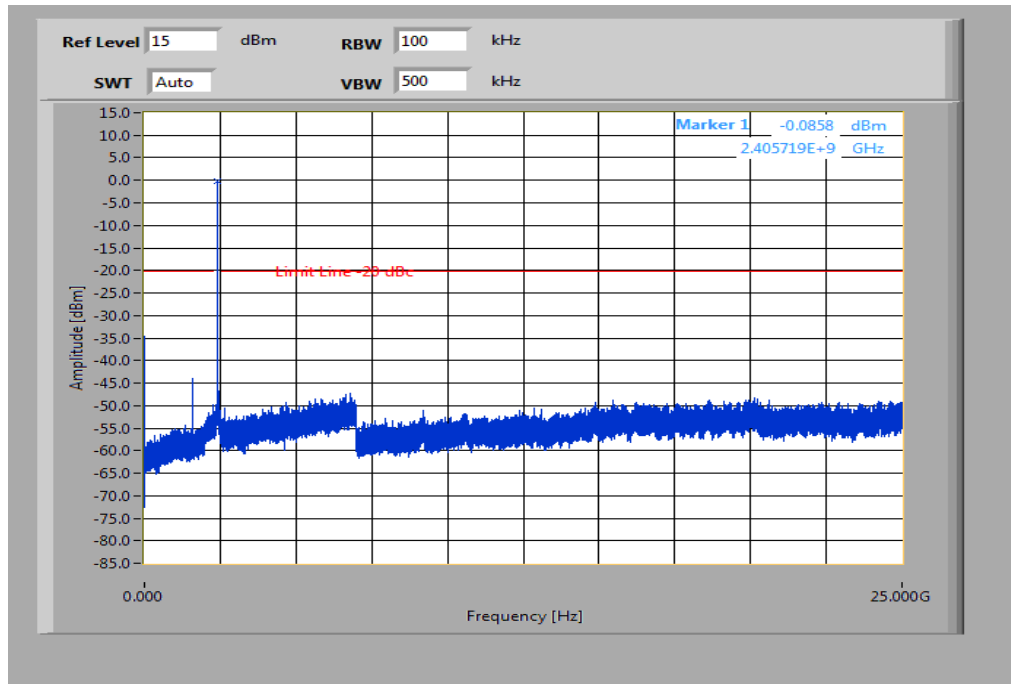
Plot 3: TX mode, highest channel, up to 25 GHz



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

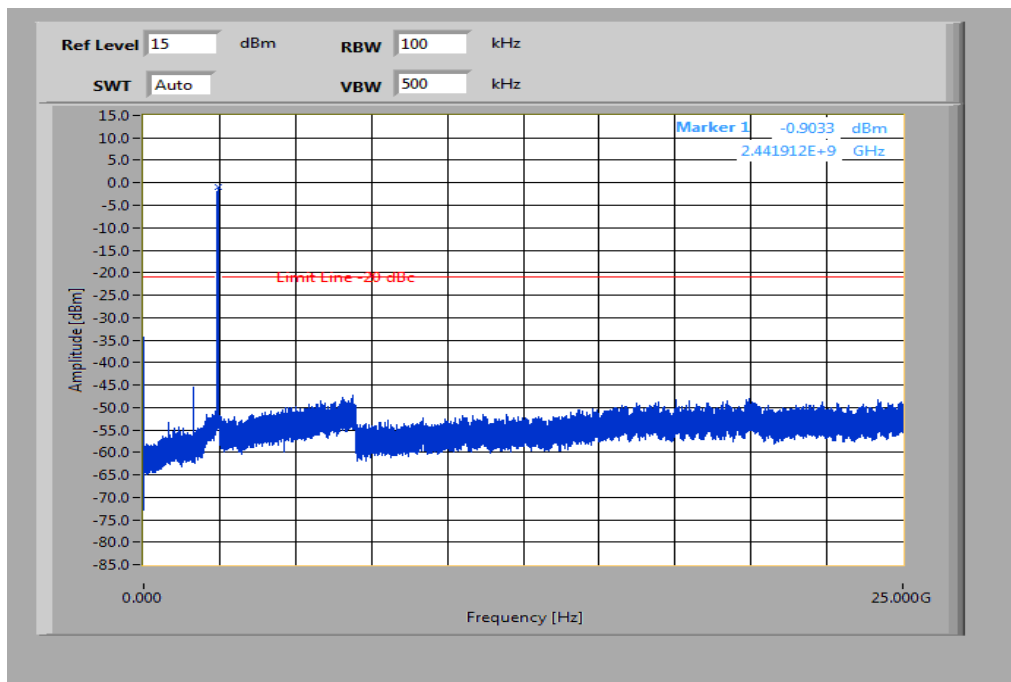
Plots: OFDM / g – mode

Plot 1: TX mode, lowest channel, up to 25 GHz



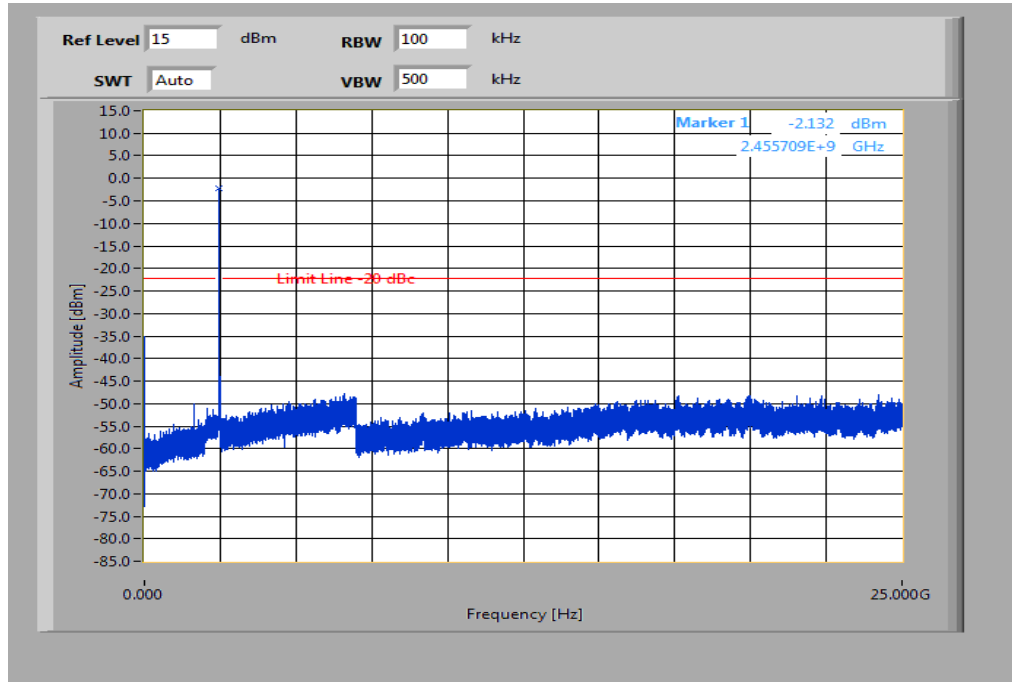
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, middle channel, up to 25 GHz



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

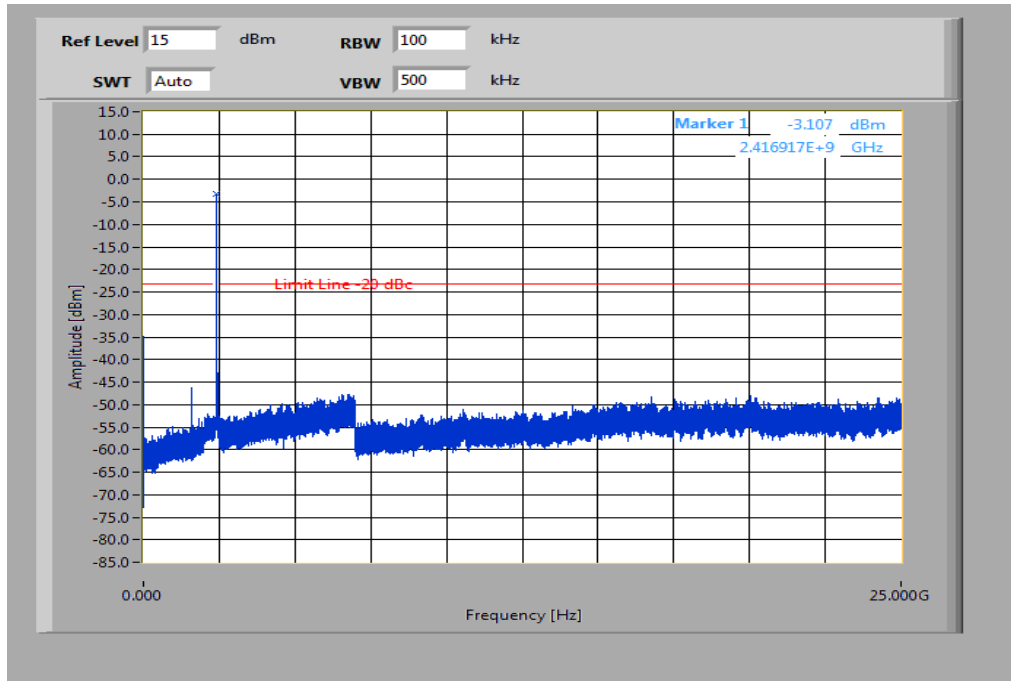
Plot 3: TX mode, highest channel, up to 25 GHz



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

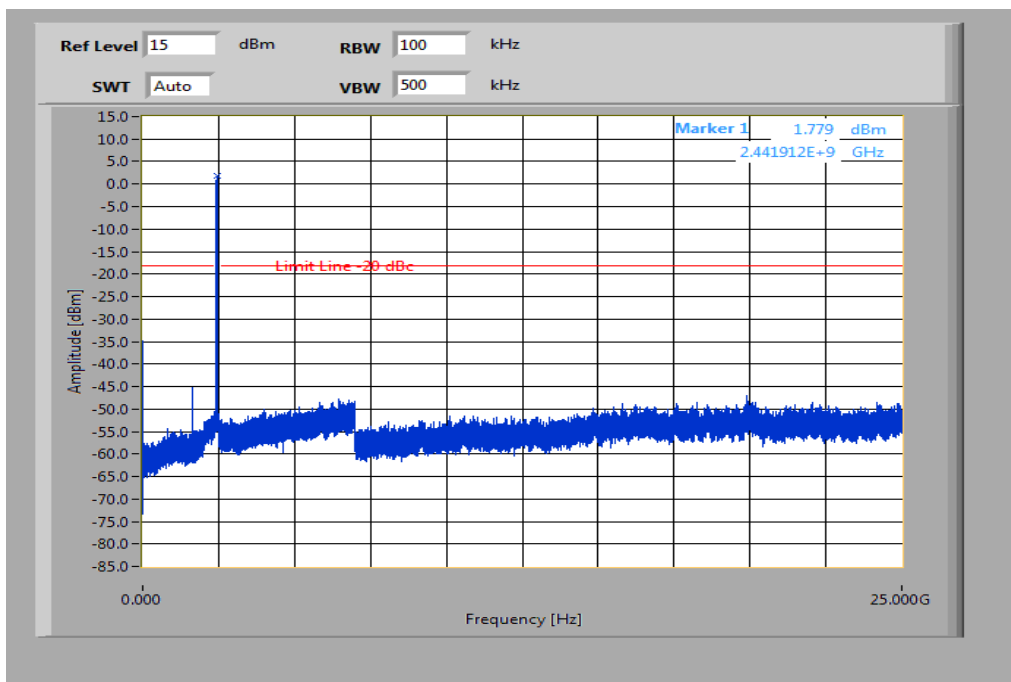
Plots: OFDM / n HT20 – mode

Plot 1: TX mode, lowest channel, up to 25 GHz



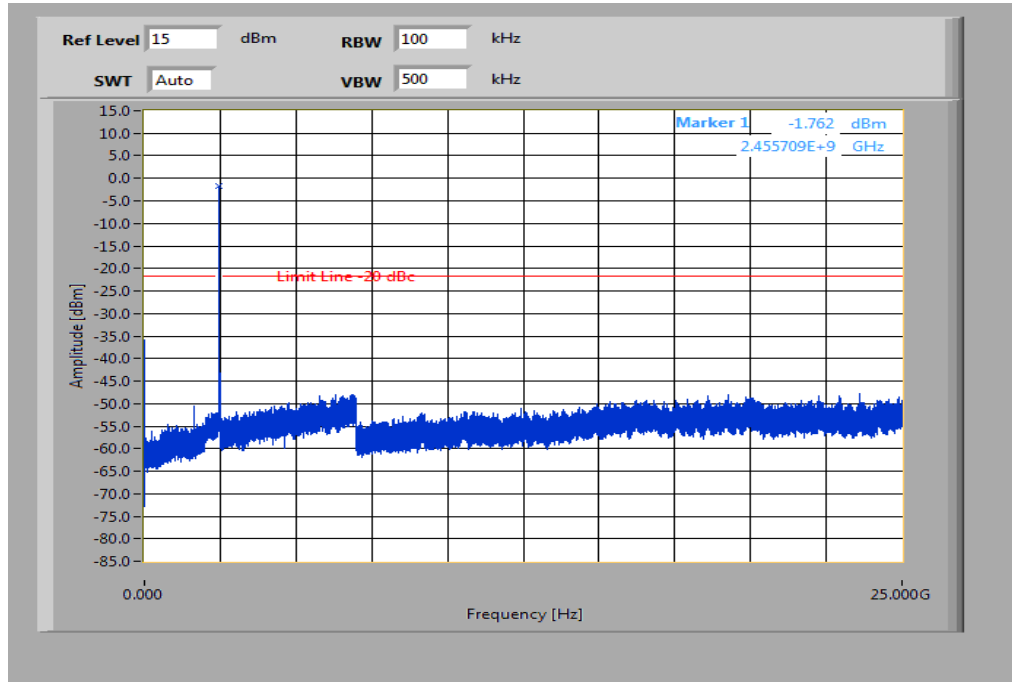
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, middle channel, up to 25 GHz



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

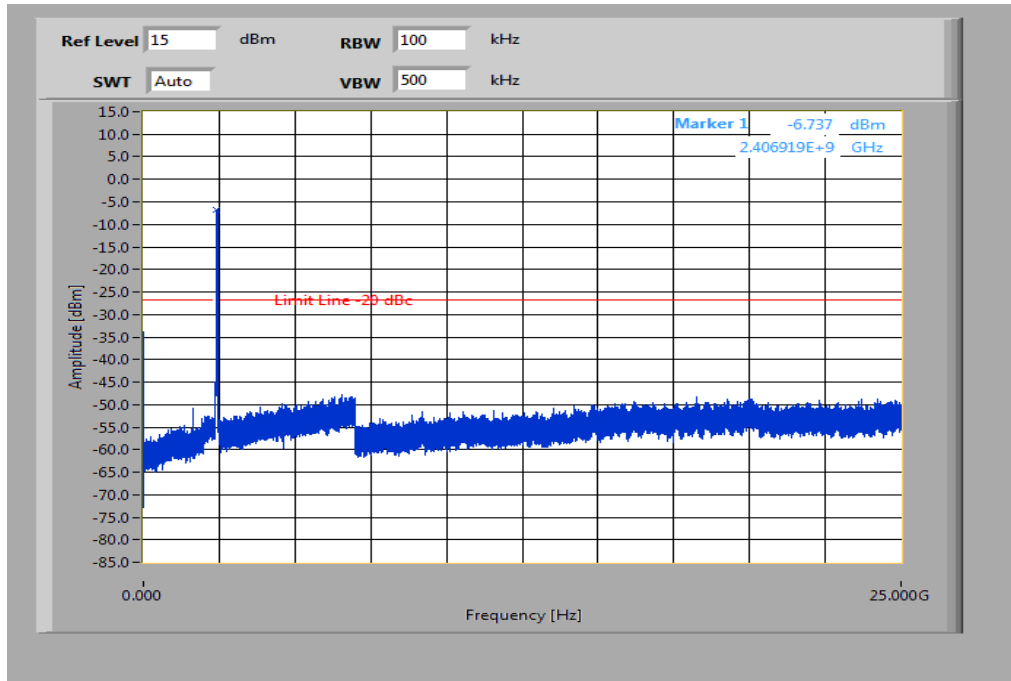
Plot 3: TX mode, highest channel, up to 25 GHz



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

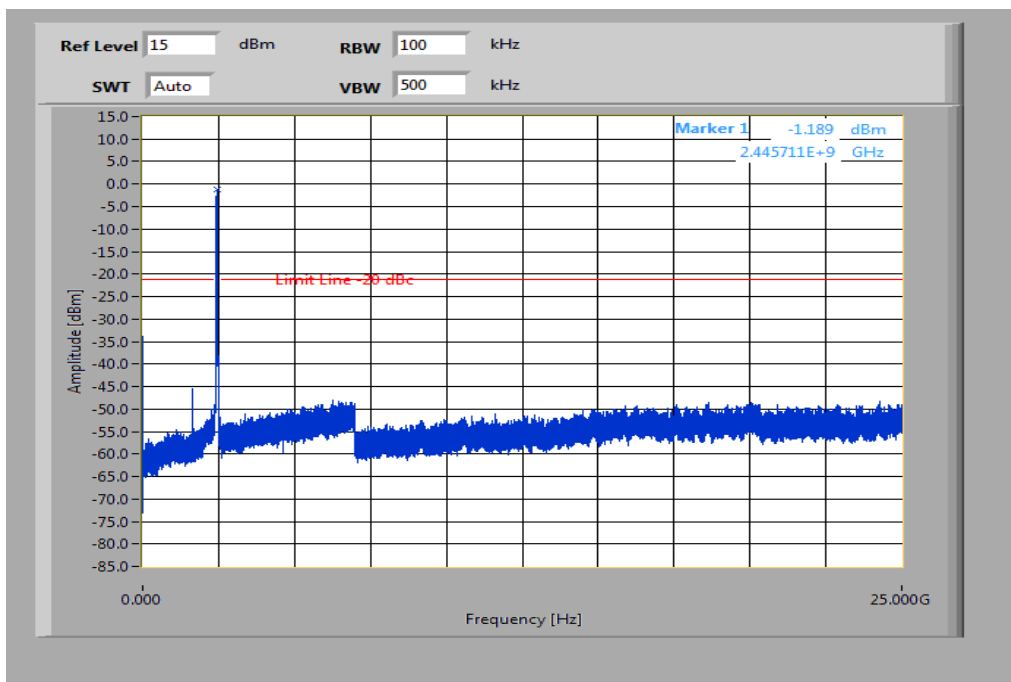
Plots: OFDM / n HT40 – mode

Plot 1: TX mode, lowest channel, up to 25 GHz



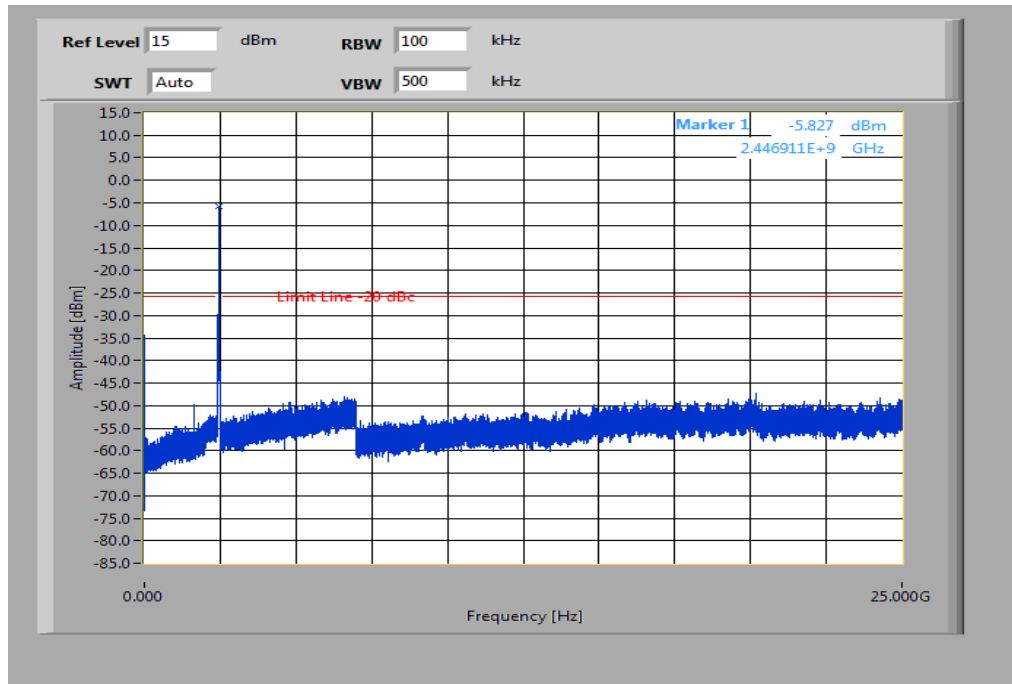
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, middle channel, up to 25 GHz



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

Plot 3: TX mode, highest channel, up to 25 GHz

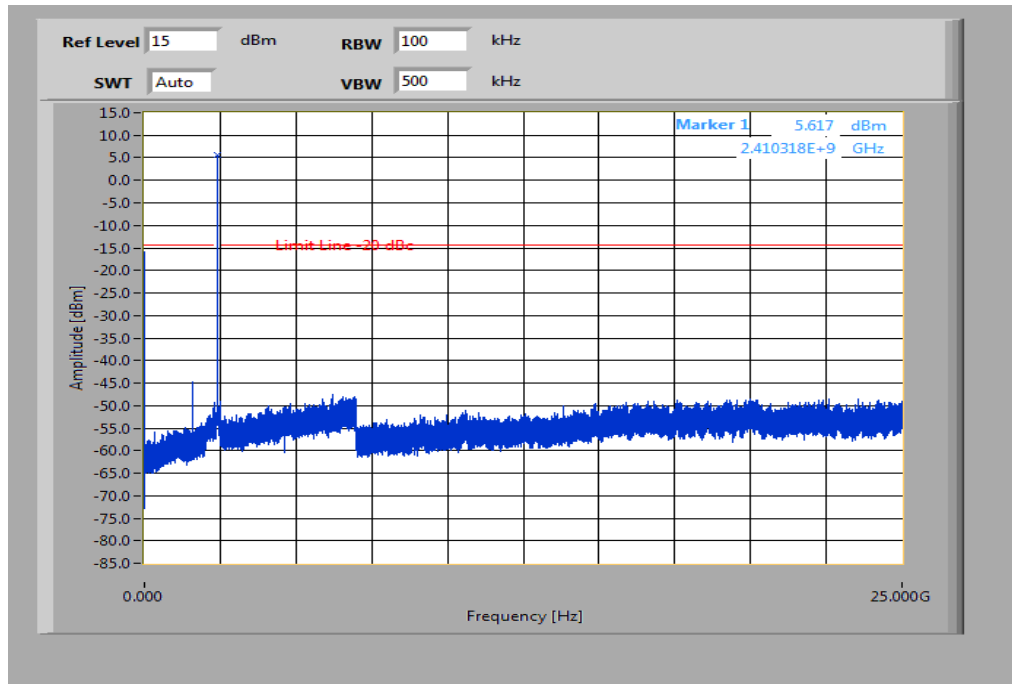


The peak at the beginning of the plot is the LO from the SA.

Plots: ANT1

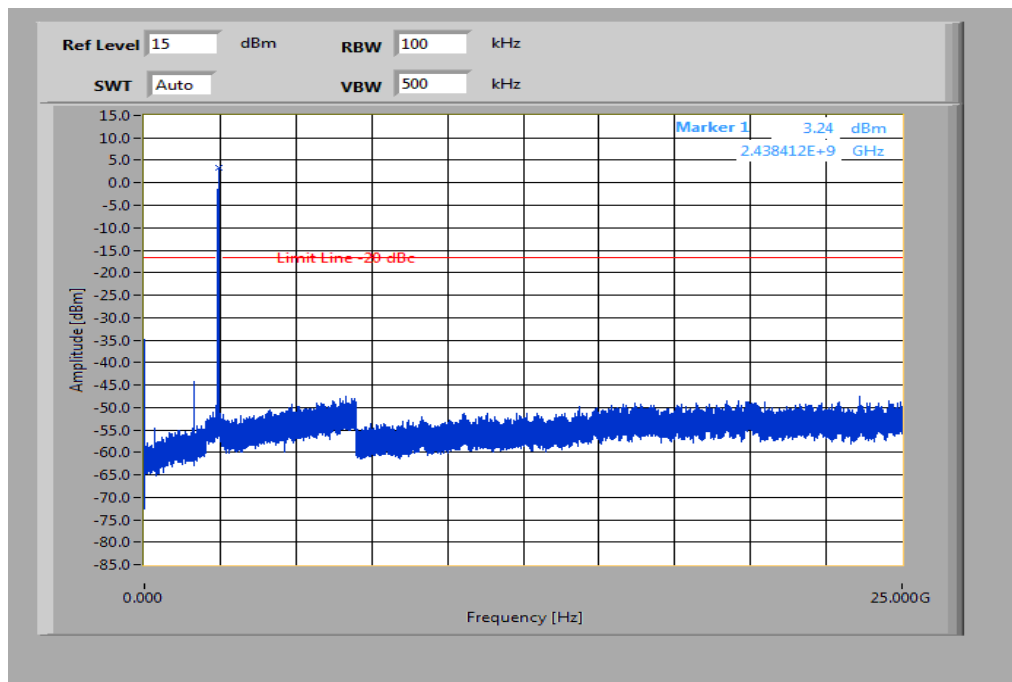
Plots: DSSS / b – mode

Plot 1: TX mode, lowest channel, up to 25 GHz



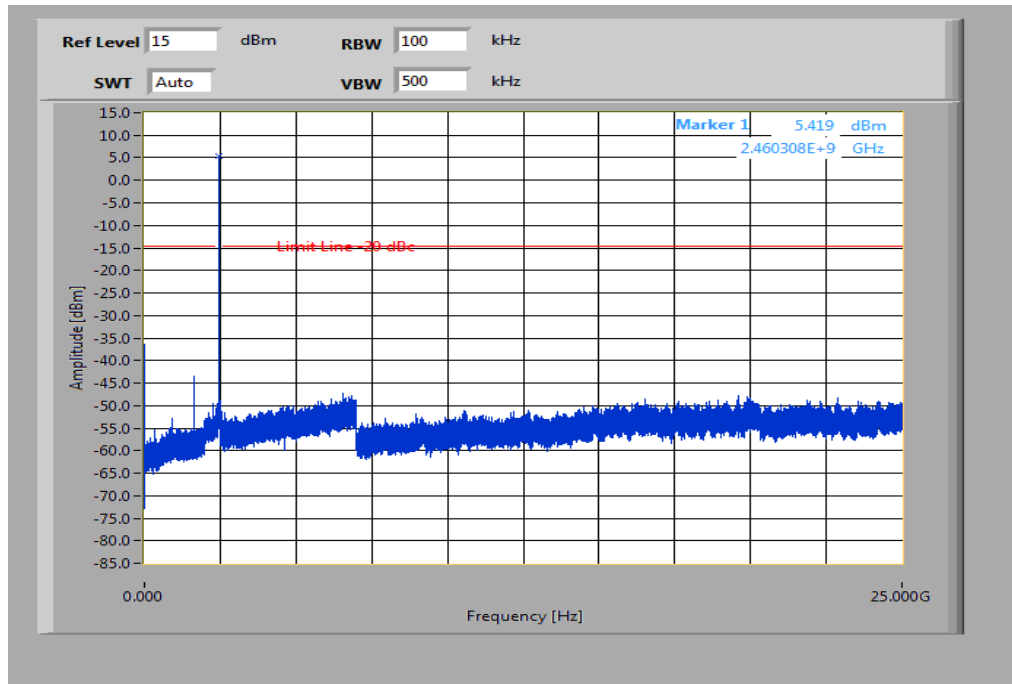
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, middle channel, up to 25 GHz



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

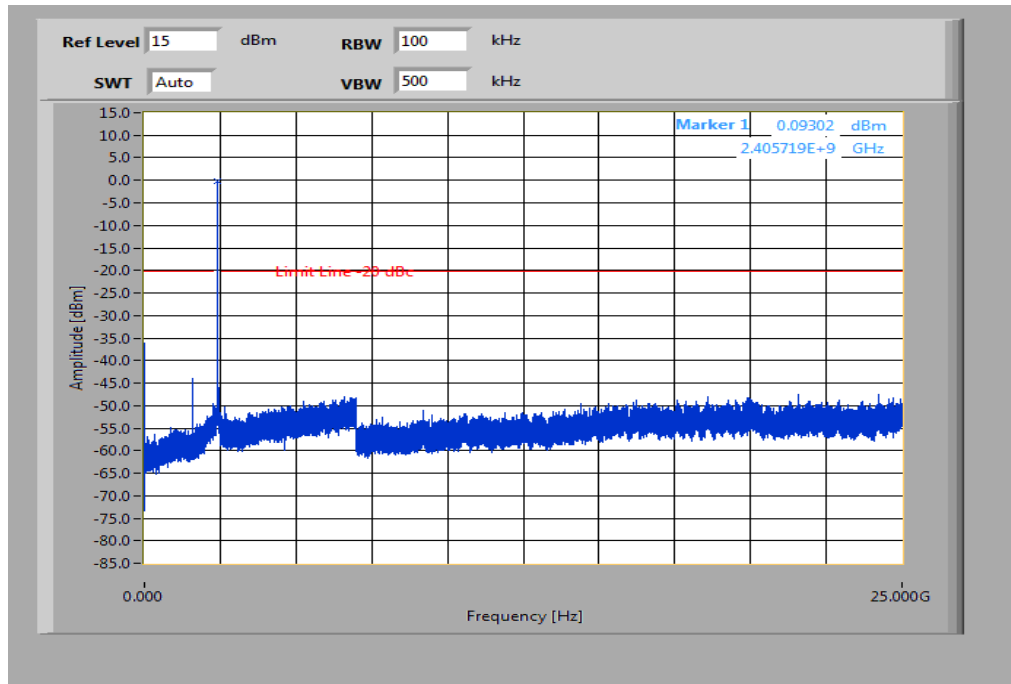
Plot 3: TX mode, highest channel, up to 25 GHz



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

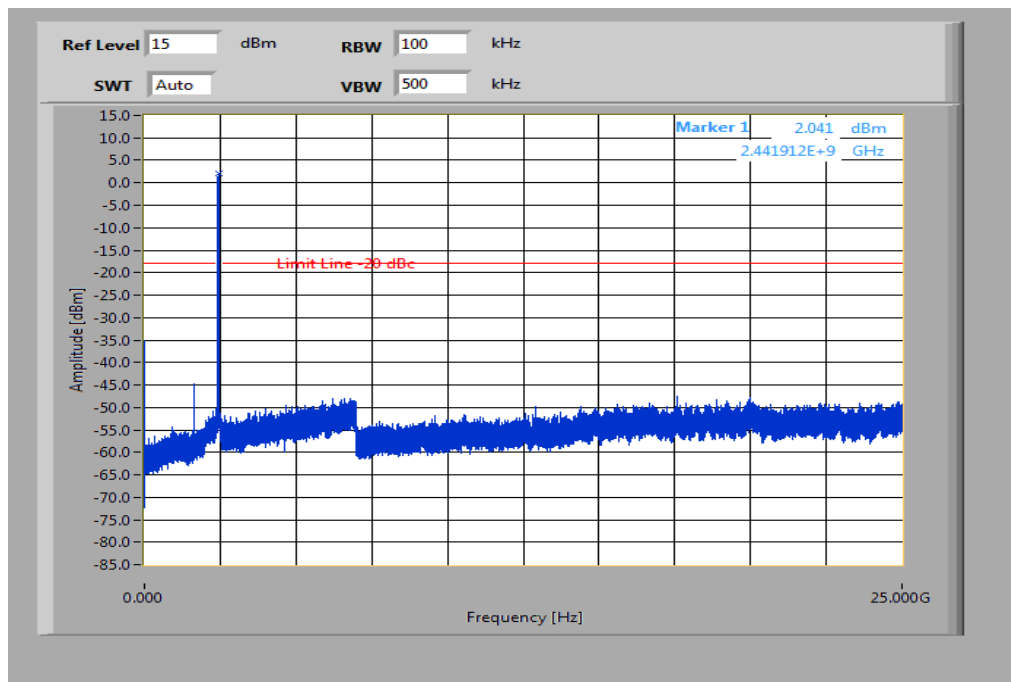
Plots: OFDM / g – mode

Plot 1: TX mode, lowest channel, up to 25 GHz



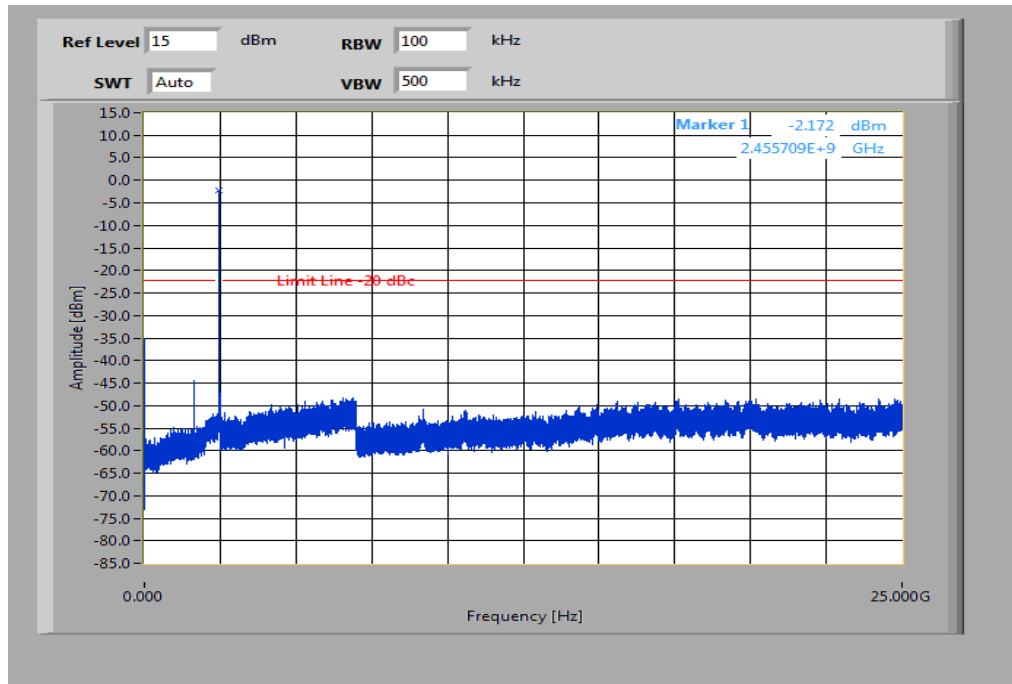
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, middle channel, up to 25 GHz



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

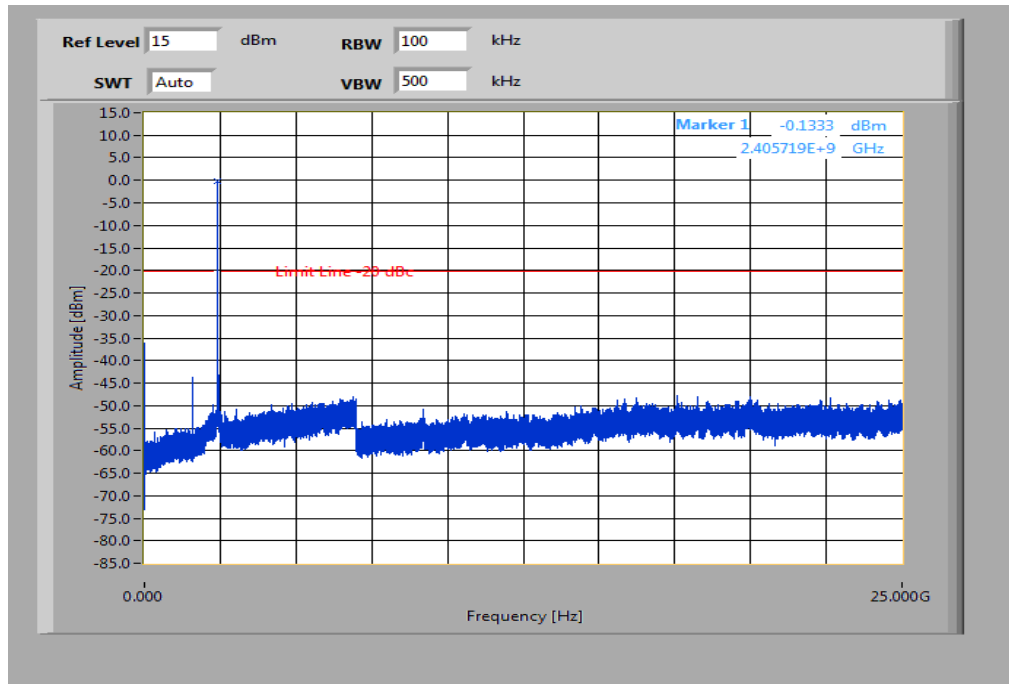
Plot 3: TX mode, highest channel, up to 25 GHz



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

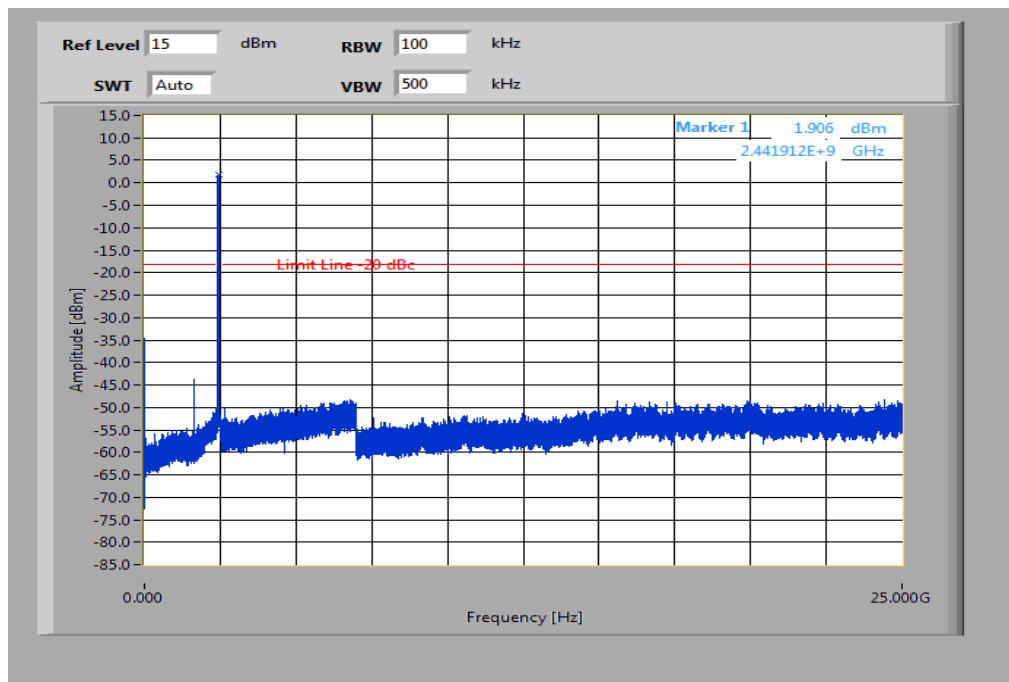
Plots: OFDM / n HT 20 – mode

Plot 1: TX mode, lowest channel, up to 25 GHz



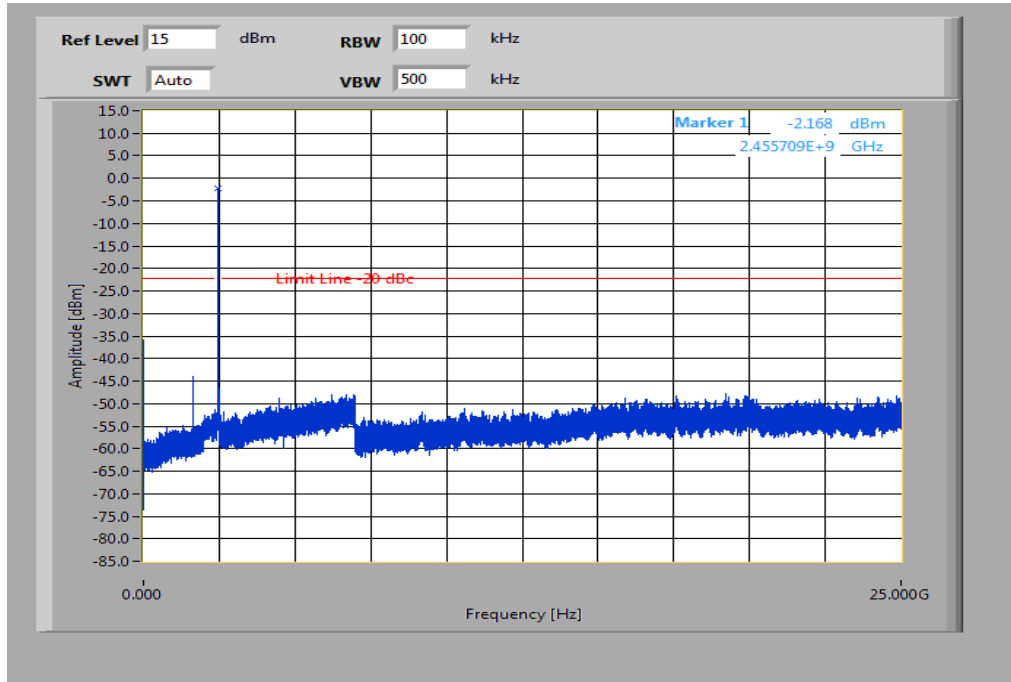
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, middle channel, up to 25 GHz



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

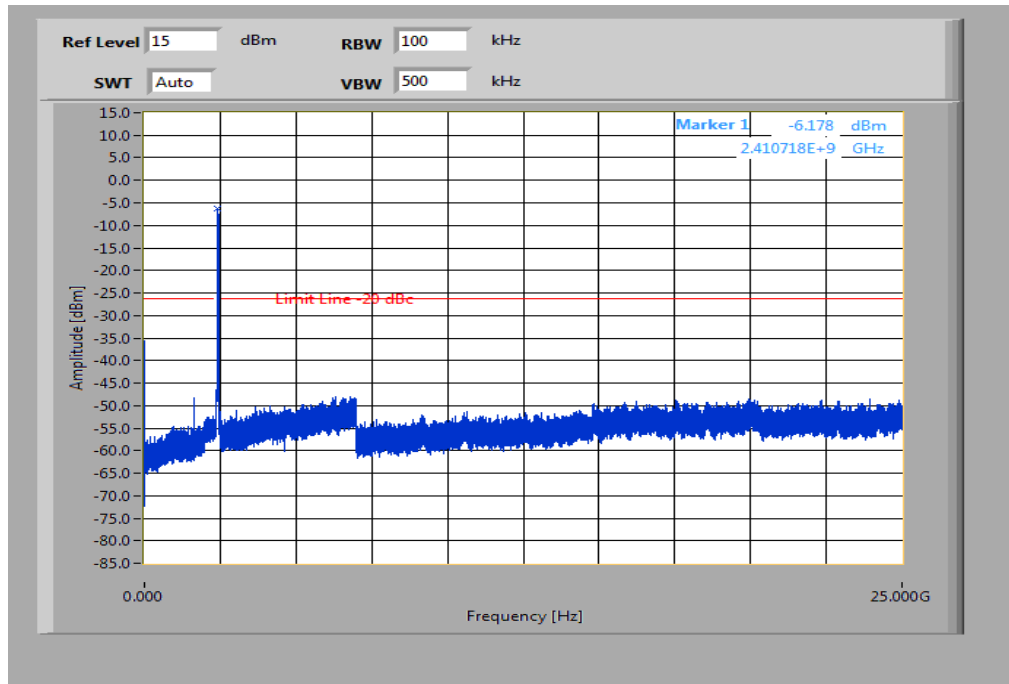
Plot 3: TX mode, highest channel, up to 25 GHz



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

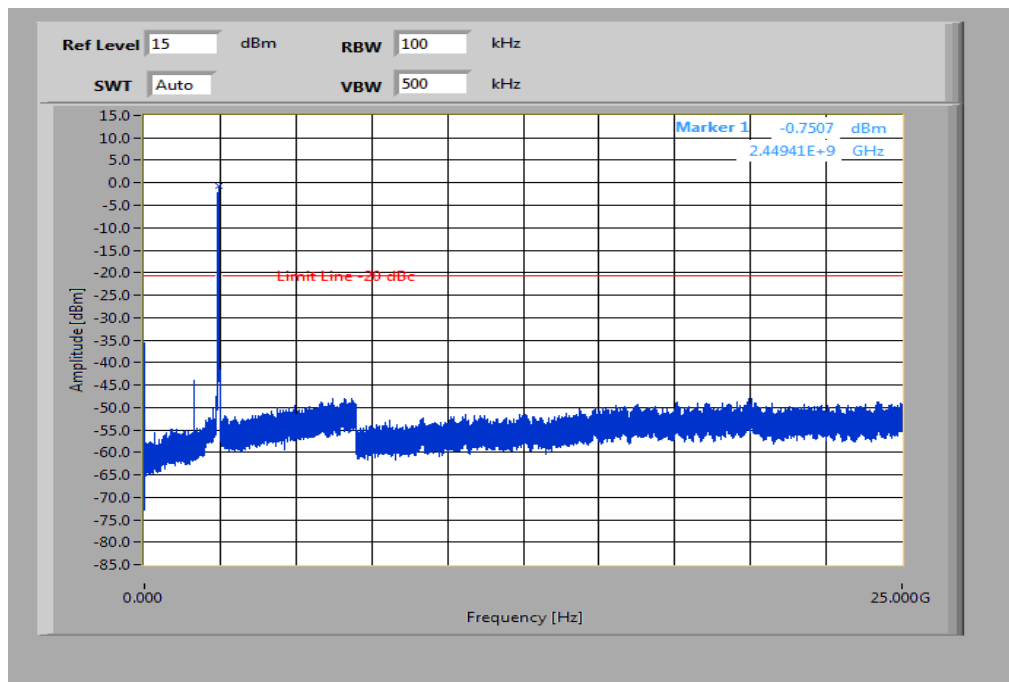
Plots: OFDM / n HT 40 – mode

Plot 1: TX mode, lowest channel, up to 25 GHz



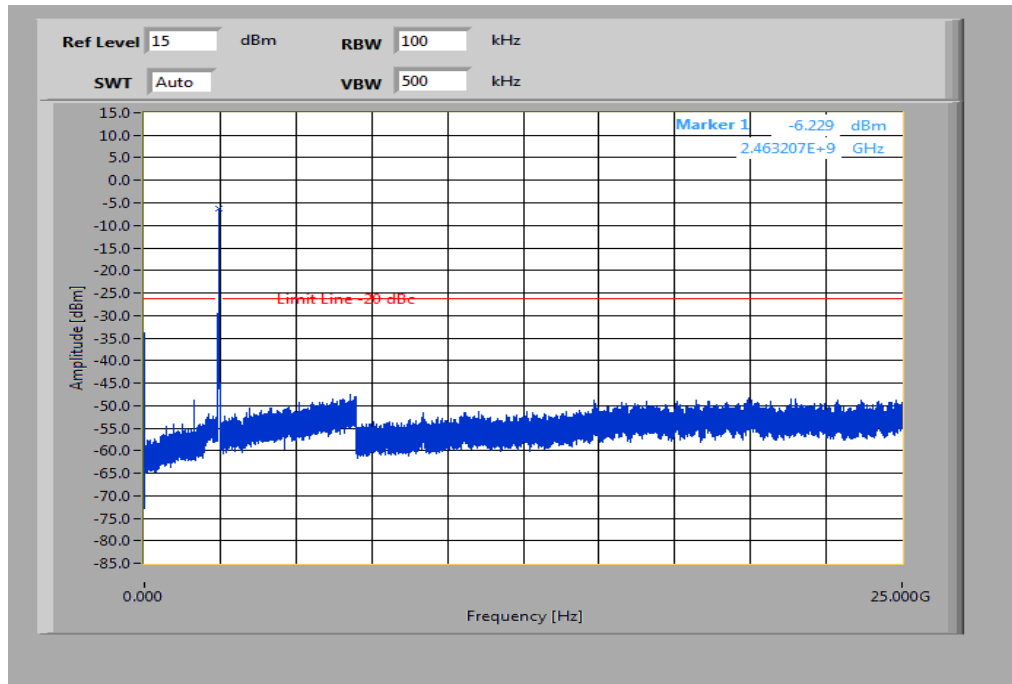
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, middle channel, up to 25 GHz



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

Plot 3: TX mode, highest channel, up to 25 GHz



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

10.10 TX spurious emissions radiated

Description:

Measurement of the radiated 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 / Quasi Peak / RMS
Sweep time:	Auto
Resolution bandwidth:	F > 1 GHz: 1 MHz F < 1 GHz: 100 kHz
Video bandwidth:	3 x RBW Remeasurement: 10 Hz / 3 MHz
Span:	30 MHz to 26 GHz
Trace-Mode:	Max Hold
Measured Modulation	<input checked="" type="checkbox"/> DSSS b – mode <input checked="" type="checkbox"/> OFDM g – mode <input checked="" type="checkbox"/> OFDM n – mode

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	
TX Spurious Emissions Radiated		
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
Above 960	54.0	3

Results: DSSS / b – mode

TX Spurious Emissions Radiated [dBµV/m]								
DSSS / b – mode								
2412 MHz			2437 MHz			2462 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
4824	Peak	56.63	4874	Peak	51.15	4924	Peak	45.46
	AVG	53.58						
Measurement uncertainty			± 3 dB					

Result: Passed

Results: OFDM / g – mode

TX Spurious Emissions Radiated [dBµV/m]								
OFDM / g – mode								
2412 MHz			2437 MHz			2462 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
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!		
Measurement uncertainty			± 3 dB					

Result: Passed

Results: OFDM / n HT20 – mode

TX Spurious Emissions Radiated [dBµV/m]								
OFDM / n – mode								
2412 MHz			2437 MHz			2462 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
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!		
Measurement uncertainty			± 3 dB					

Result: Passed

Results: OFDM / n HT40 – mode

TX Spurious Emissions Radiated [dBµV/m]								
OFDM / n – mode								
2422 MHz			2437 MHz			2452 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
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!		
Measurement uncertainty			± 3 dB					

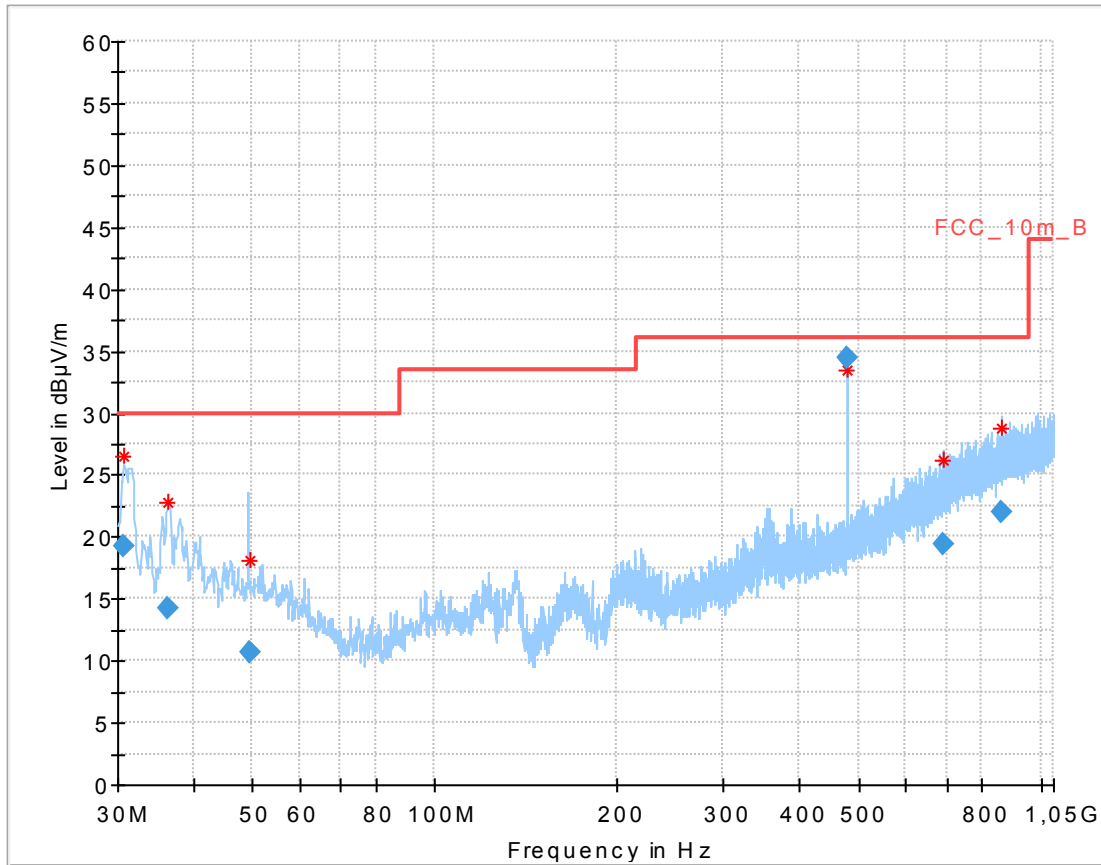
Result: Passed

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

Both antennas ANT0 and ANT1 are active!

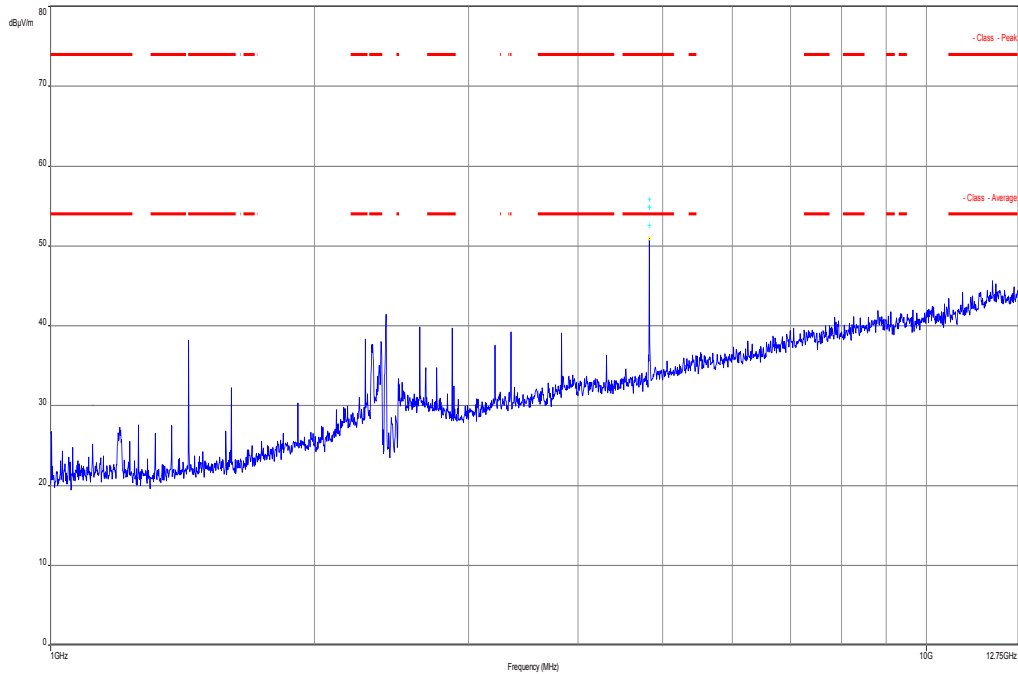
Plots: DSSS / b – mode

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



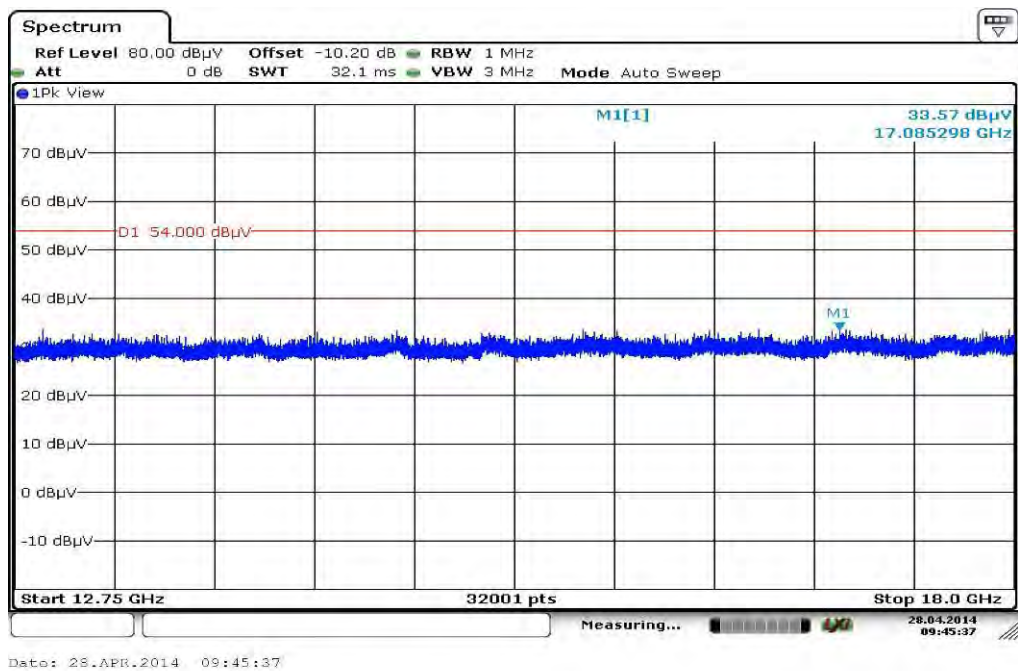
Frequency (MHz)	Quasi Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.660150	19.21	30.00	10.79	1000.0	120.000	170.0	V	-8.0	12.6
36.313950	14.21	30.00	15.79	1000.0	120.000	170.0	V	180.0	13.1
49.635600	10.62	30.00	19.38	1000.0	120.000	170.0	V	10.0	13.4
478.998450	34.45	36.00	1.55	1000.0	120.000	170.0	H	10.0	18.3
690.523350	19.40	36.00	16.60	1000.0	120.000	164.0	H	100.0	22.2
863.705400	21.97	36.00	14.03	1000.0	120.000	170.0	H	171.0	24.7

Plot 2: Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

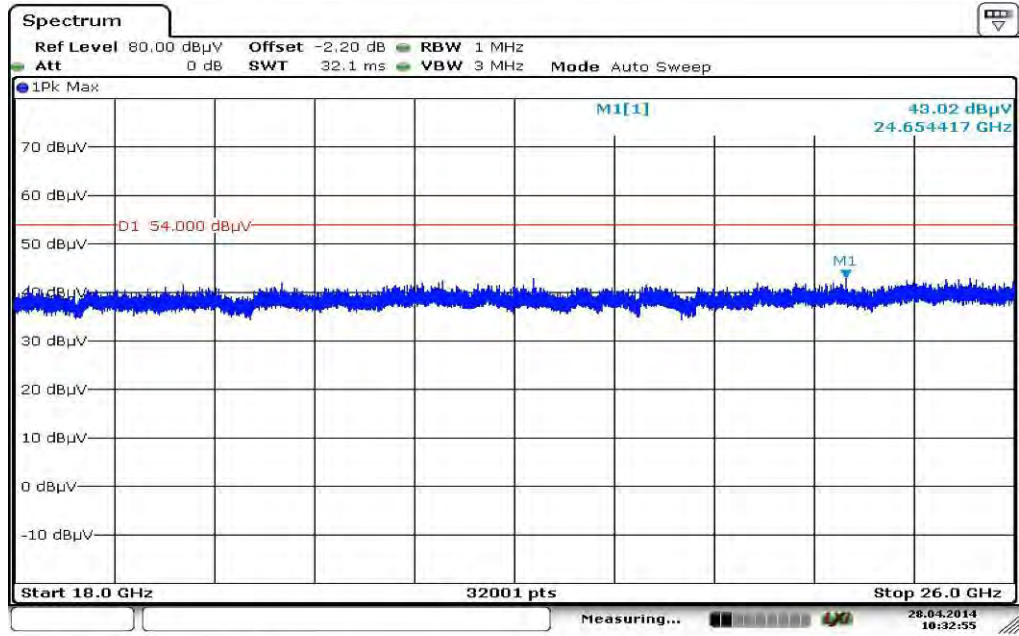


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 3: Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

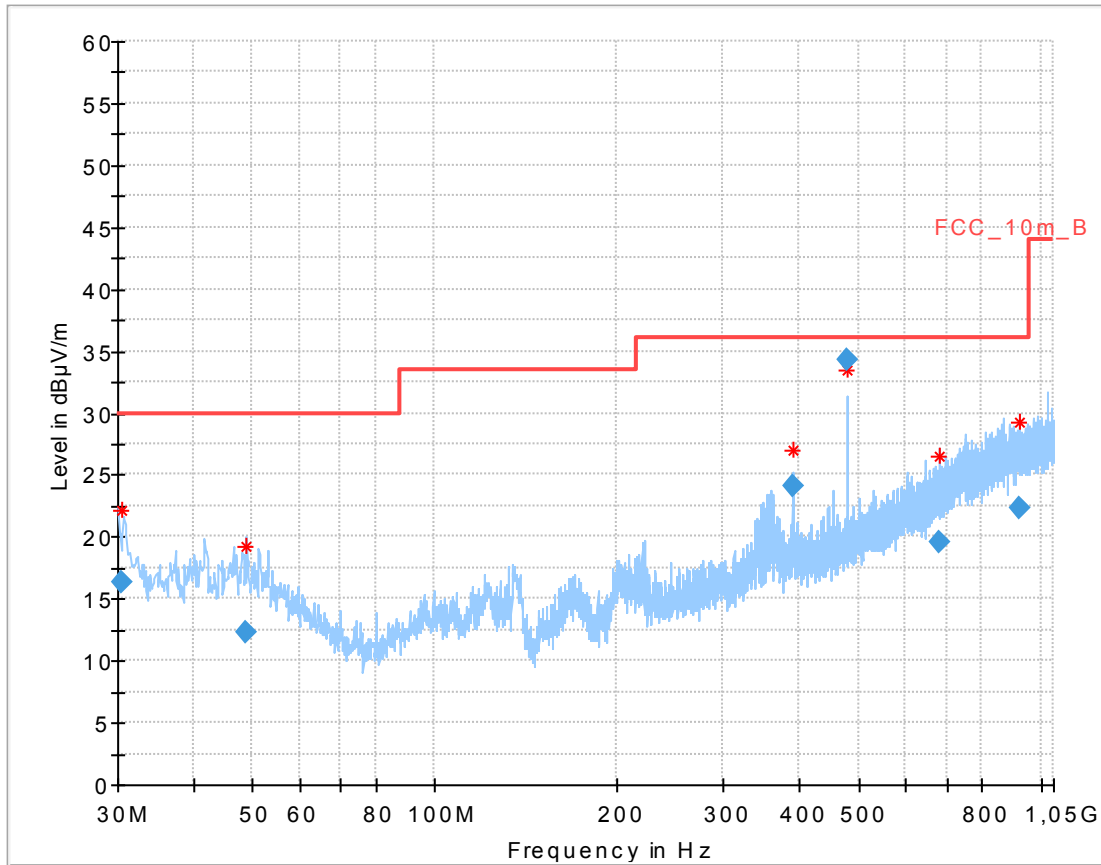


Plot 4: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



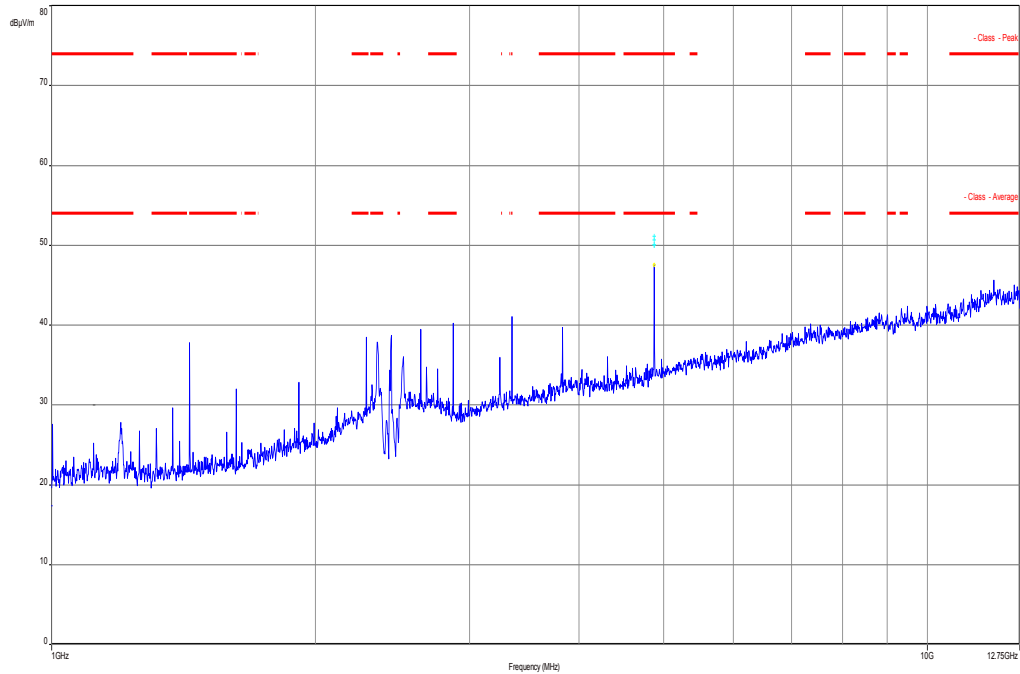
Date: 28.APR.2014 10:32:55

Plot 5: Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization



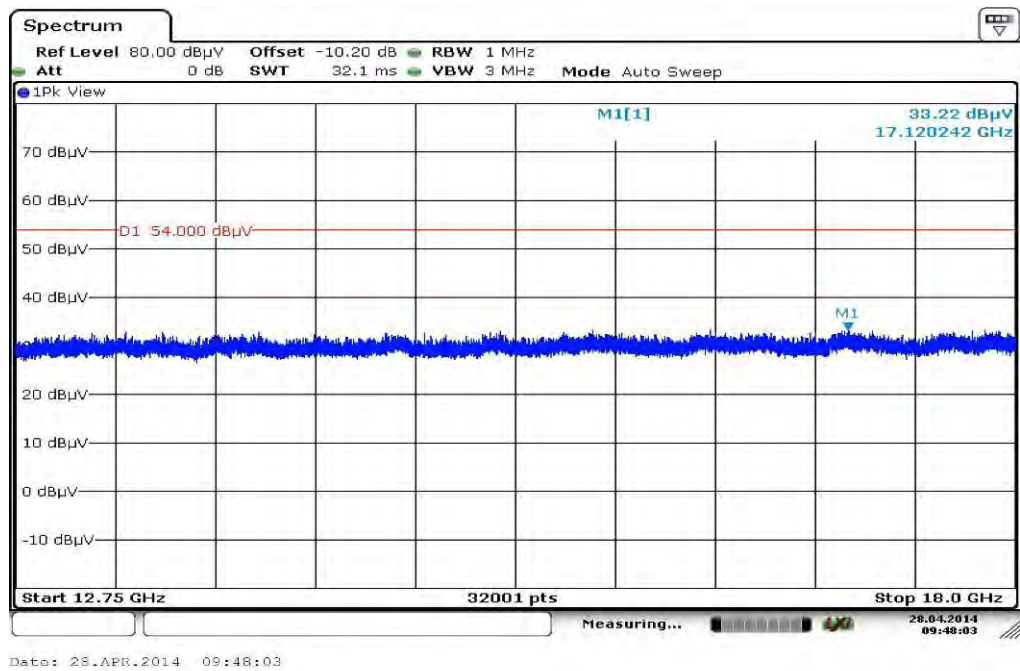
Frequency (MHz)	Quasi Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.518925	16.28	30.00	13.72	1000.0	120.000	113.0	V	170.0	12.6
49.014900	12.37	30.00	17.63	1000.0	120.000	170.0	V	190.0	13.4
389.526450	24.05	36.00	11.95	1000.0	120.000	105.0	V	173.0	16.7
478.990050	34.26	36.00	1.74	1000.0	120.000	163.0	H	178.0	18.3
681.604950	19.56	36.00	16.44	1000.0	120.000	170.0	H	-8.0	22.0
922.375050	22.26	36.00	13.74	1000.0	120.000	170.0	H	183.0	25.3

Plot 6: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

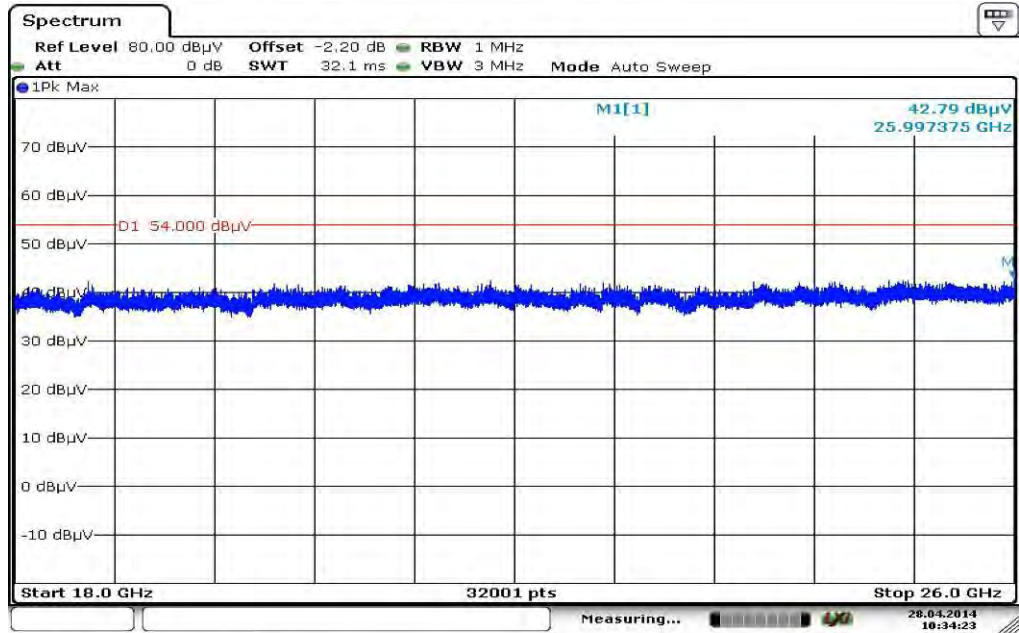


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 7: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

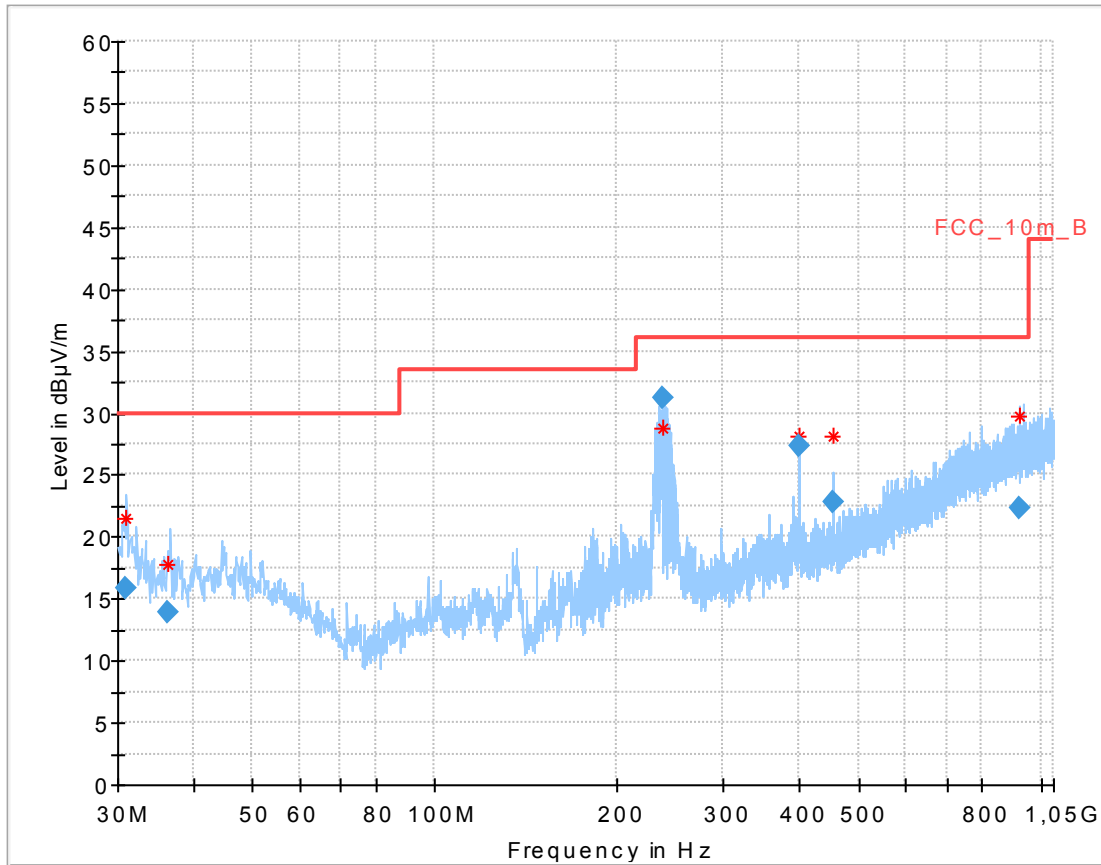


Plot 8: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



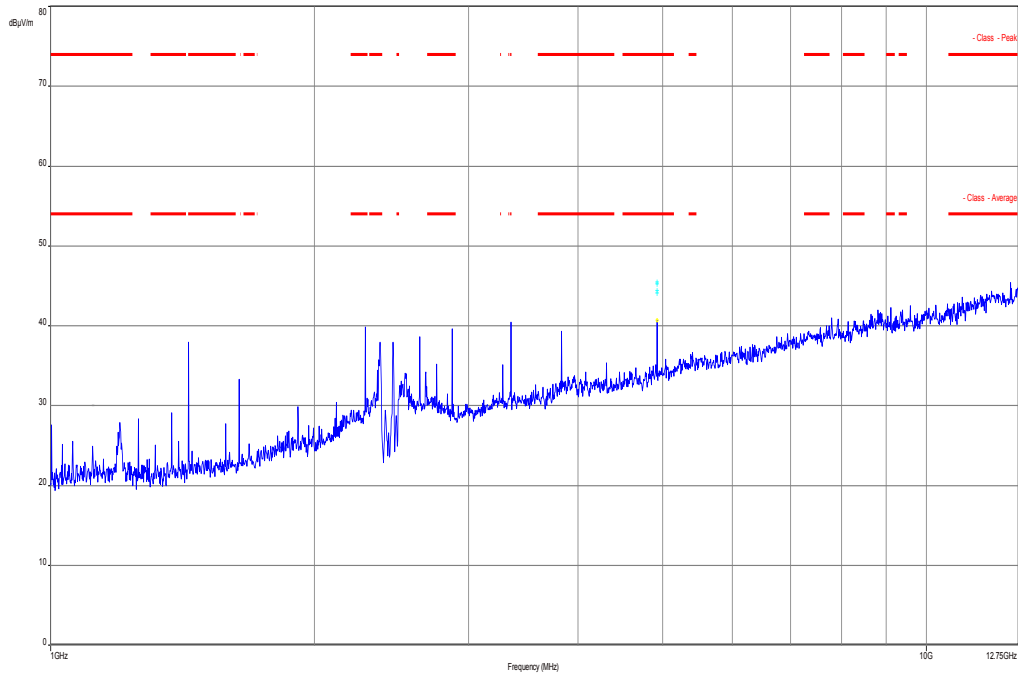
Date: 28.APR.2014 10:34:23

Plot 9: Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization



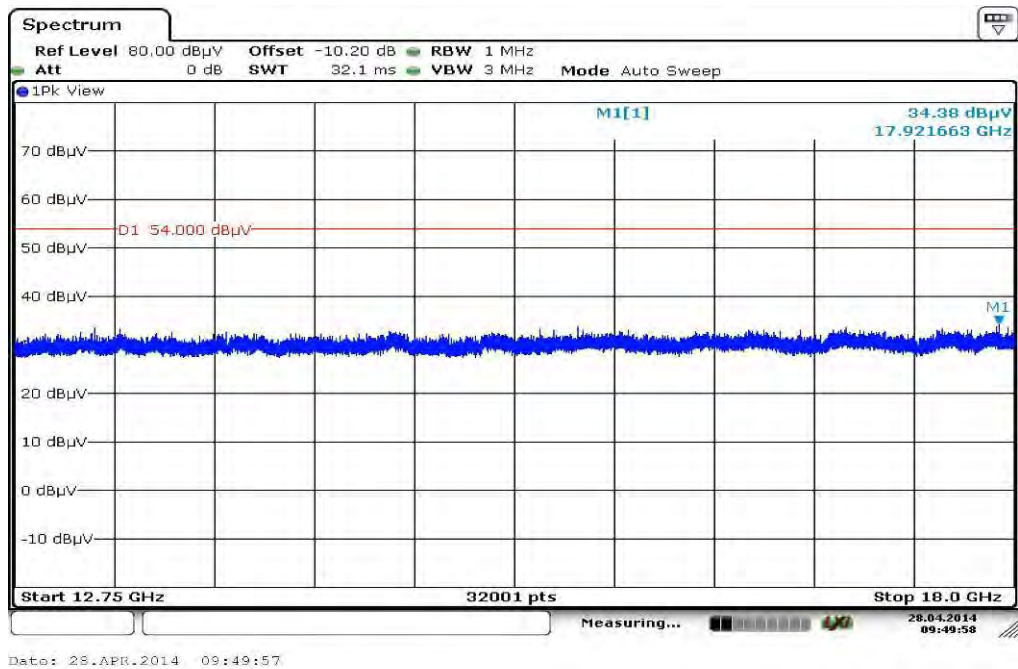
Frequency (MHz)	Quasi Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.001850	15.81	30.00	14.19	1000.0	120.000	140.0	V	280.0	12.6
36.260400	13.97	30.00	16.03	1000.0	120.000	117.0	V	10.0	13.1
237.407250	31.17	36.00	4.83	1000.0	120.000	98.0	V	100.0	12.9
400.017750	27.35	36.00	8.65	1000.0	120.000	98.0	V	83.0	16.9
453.633600	22.75	36.00	13.25	1000.0	120.000	105.0	V	265.0	17.7
920.580450	22.31	36.00	13.69	1000.0	120.000	170.0	H	-9.0	25.3

Plot 10: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

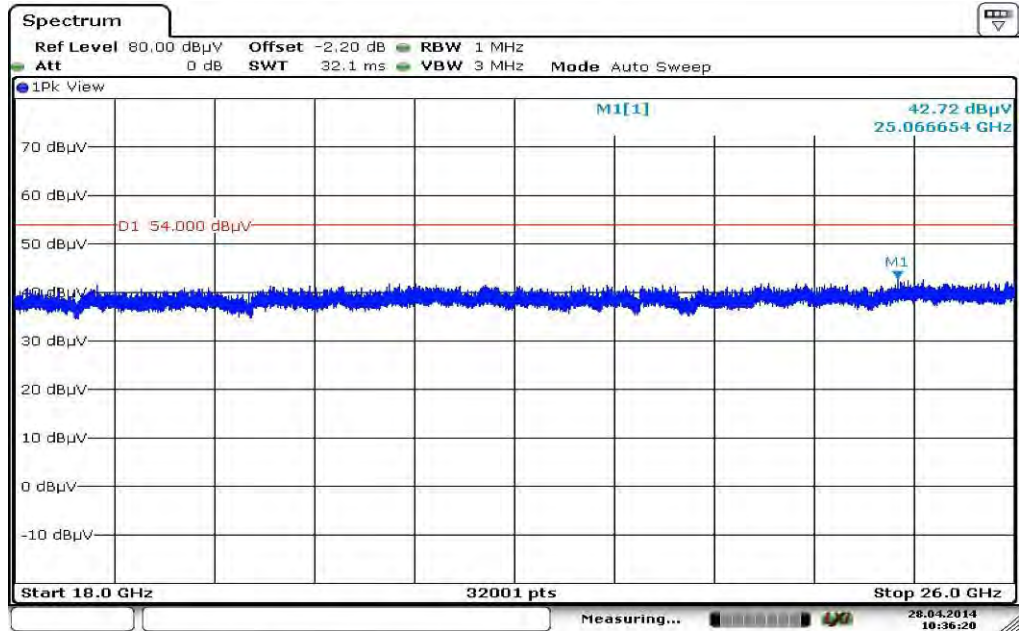


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 11: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



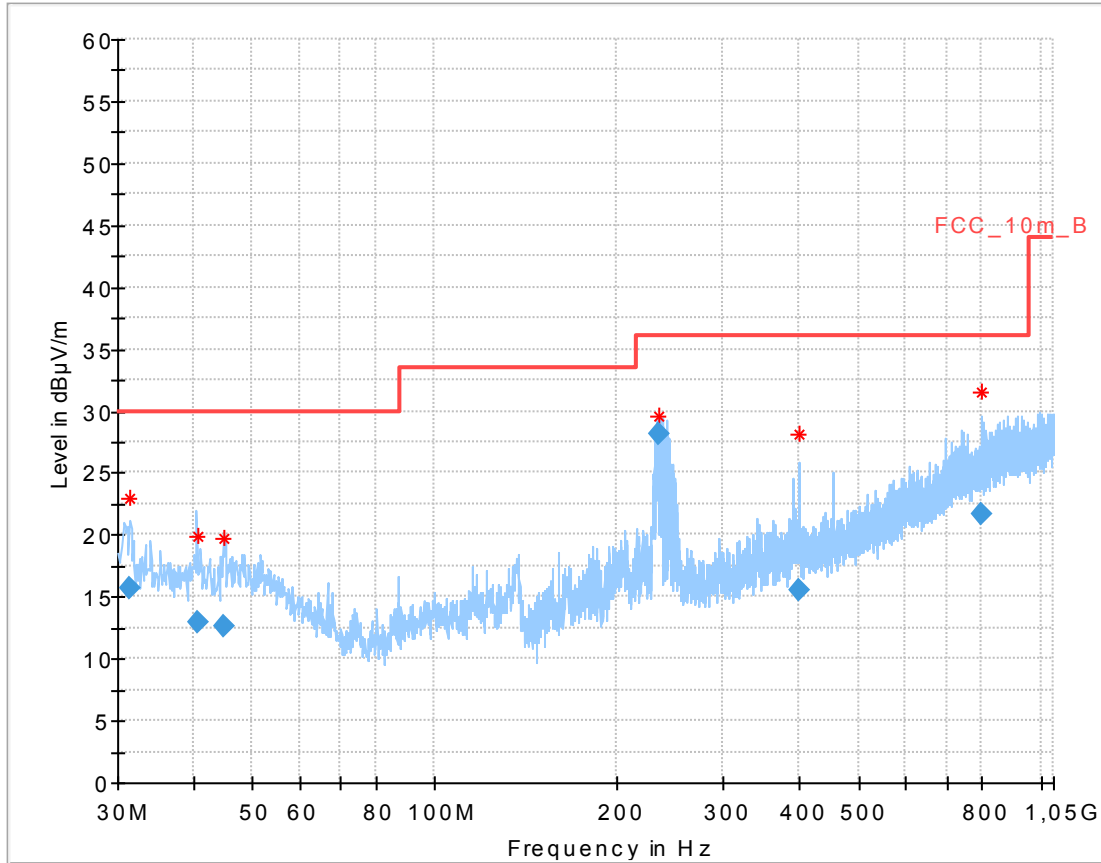
Plot 12: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 28.APR.2014 10:36:20

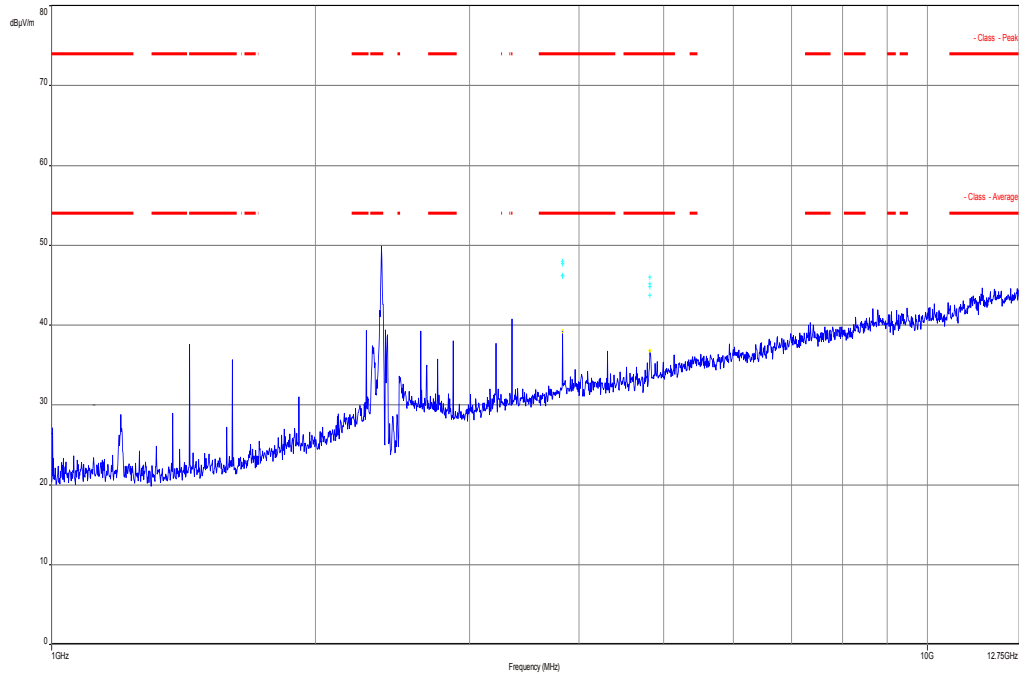
Plots: OFDM / g – mode

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



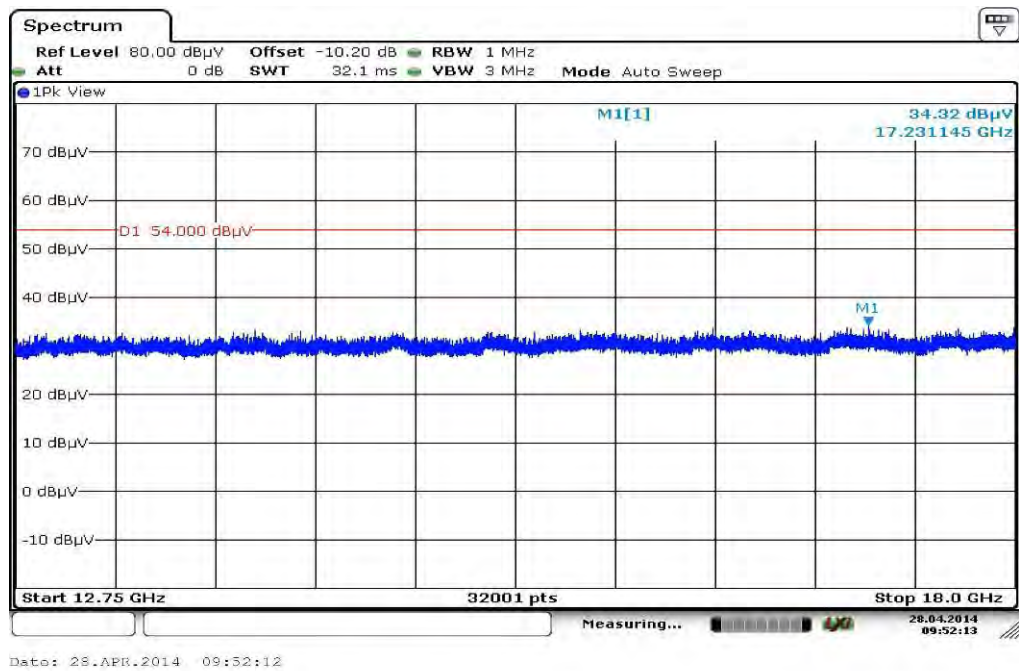
Frequency (MHz)	Quasi Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.434900	15.75	30.00	14.25	1000.0	120.000	143.0	V	10.0	12.7
40.808700	12.94	30.00	17.06	1000.0	120.000	98.0	V	190.0	13.4
44.923800	12.57	30.00	17.43	1000.0	120.000	170.0	V	82.0	13.3
234.444450	28.20	36.00	7.80	1000.0	120.000	111.0	V	-8.0	12.8
399.989700	15.57	36.00	20.43	1000.0	120.000	98.0	V	80.0	16.9
797.599200	21.73	36.00	14.27	1000.0	120.000	157.0	H	267.0	23.8

Plot 2: Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

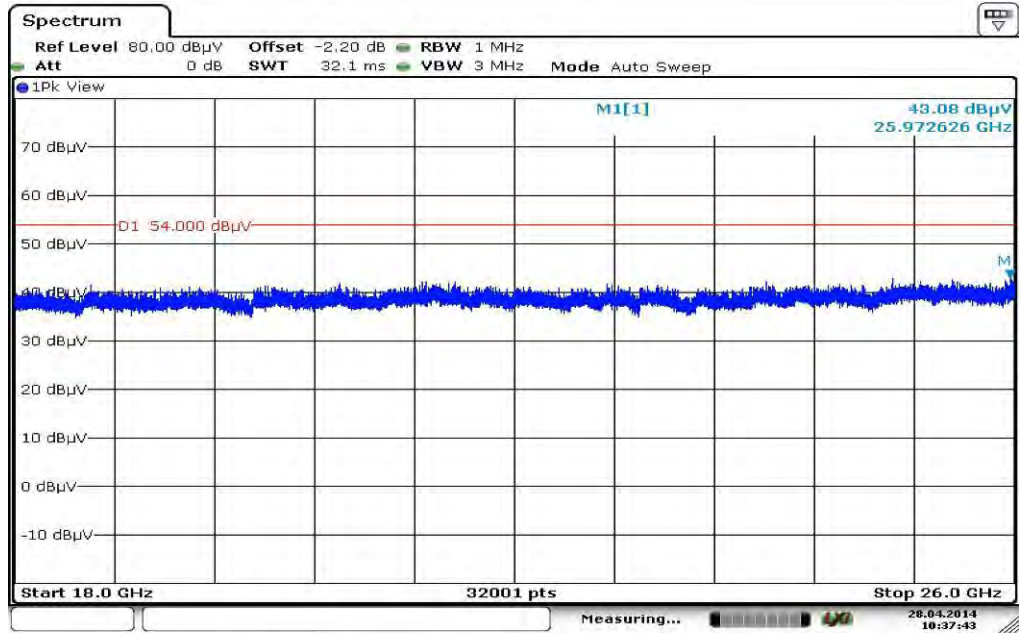


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 3: Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

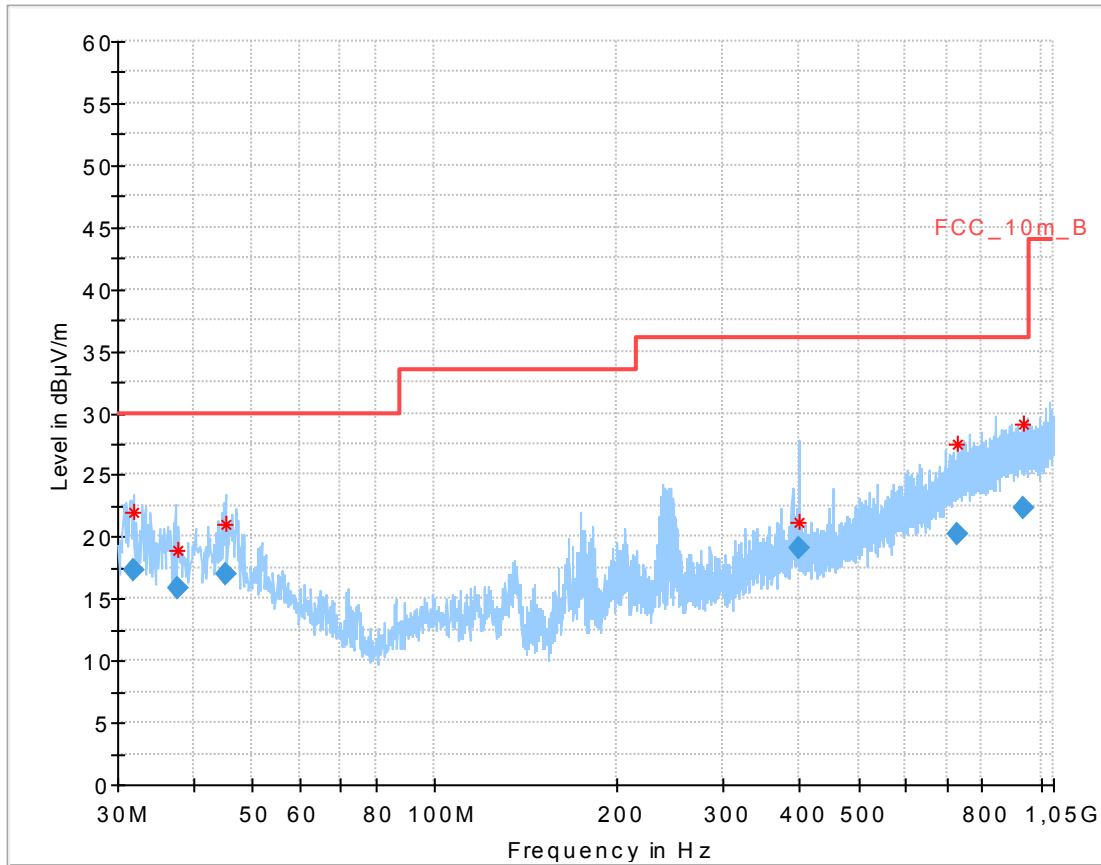


Plot 4: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



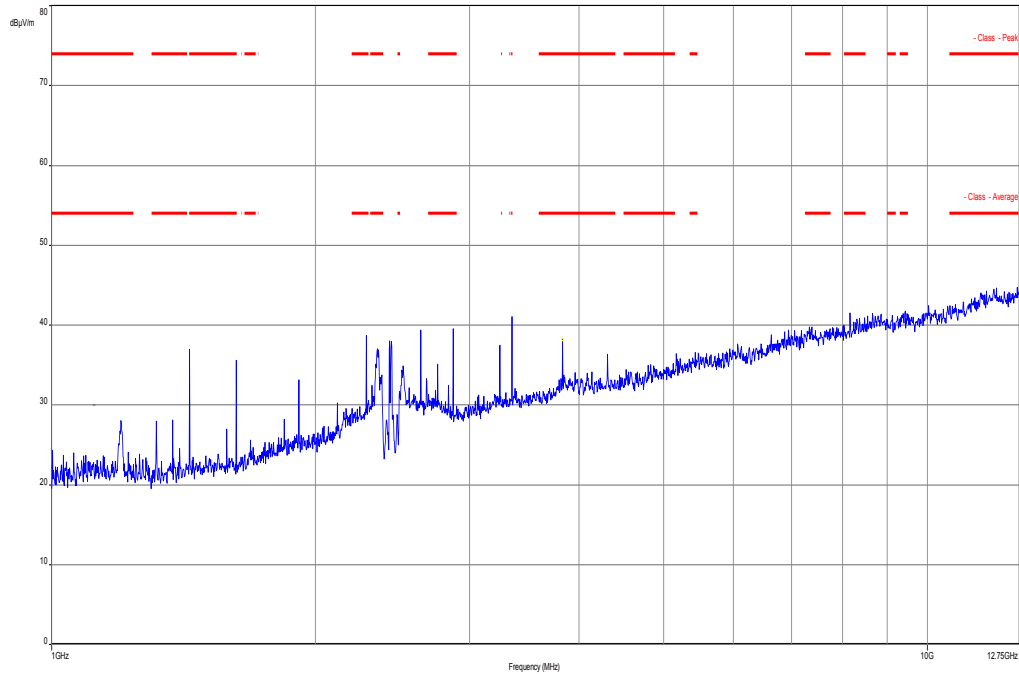
Date: 28.APR.2014 10:37:43

Plot 5: Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization



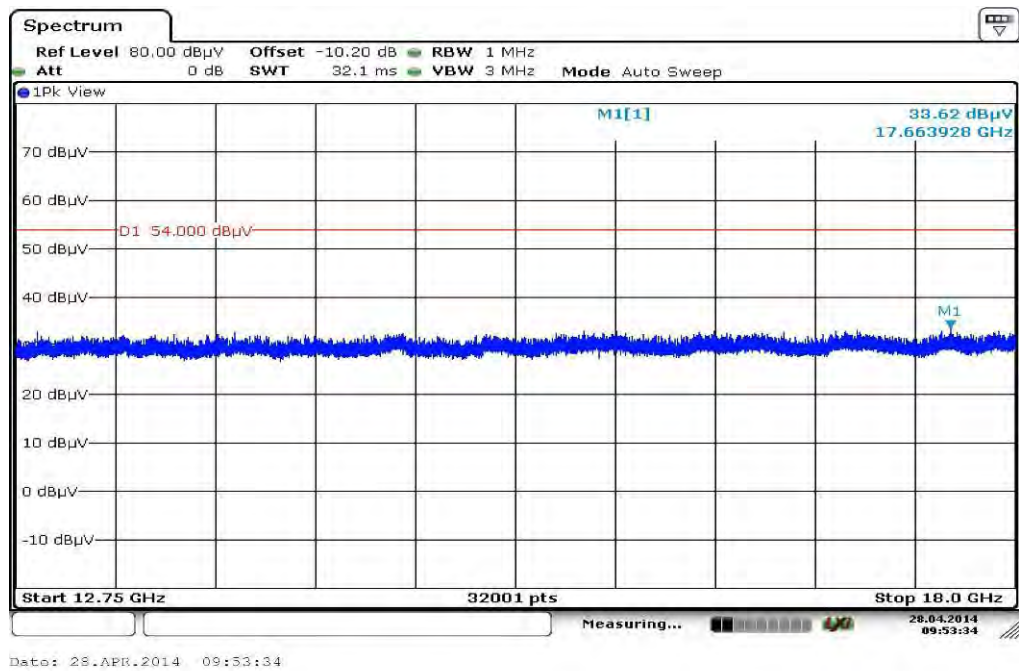
Frequency (MHz)	Quasi Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.796850	17.23	30.00	12.77	1000.0	120.000	157.0	V	90.0	12.7
37.812600	15.88	30.00	14.12	1000.0	120.000	170.0	V	100.0	13.3
45.171300	16.92	30.00	13.08	1000.0	120.000	98.0	V	90.0	13.3
399.925950	19.09	36.00	16.91	1000.0	120.000	100.0	V	90.0	16.9
726.558750	20.22	36.00	15.78	1000.0	120.000	170.0	V	-9.0	23.1
935.484300	22.38	36.00	13.62	1000.0	120.000	170.0	V	178.0	25.3

Plot 6: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

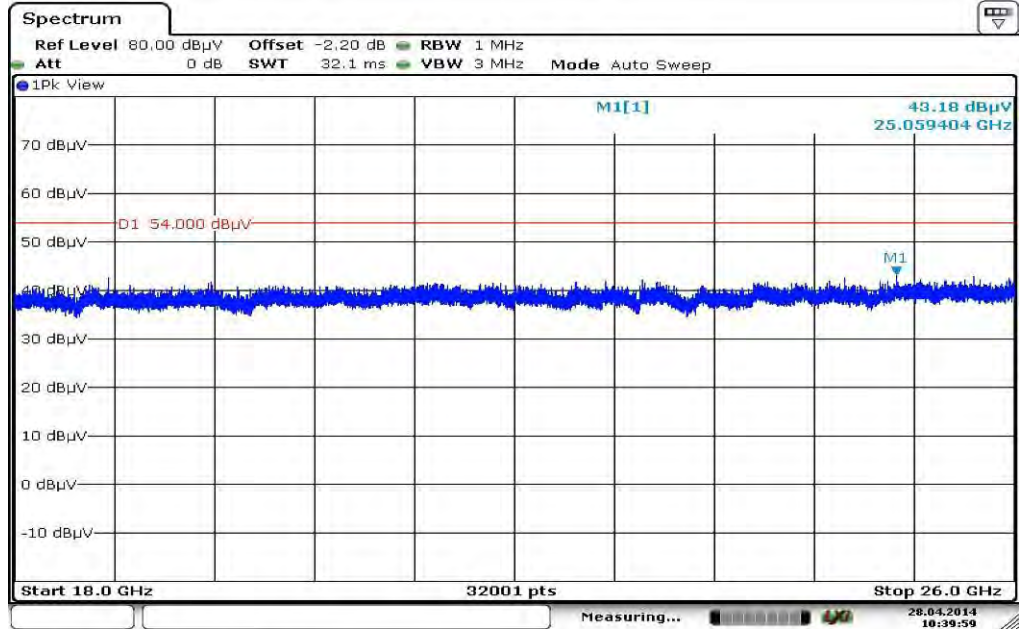


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 7: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

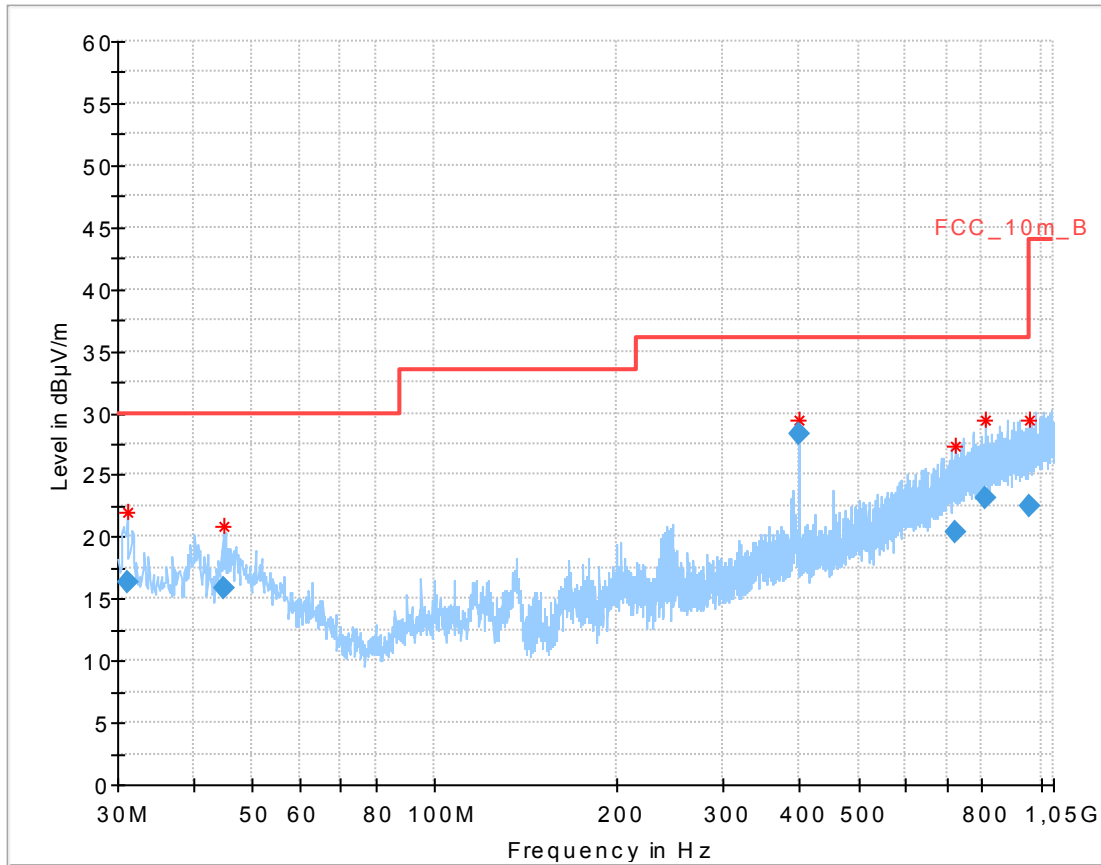


Plot 8: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



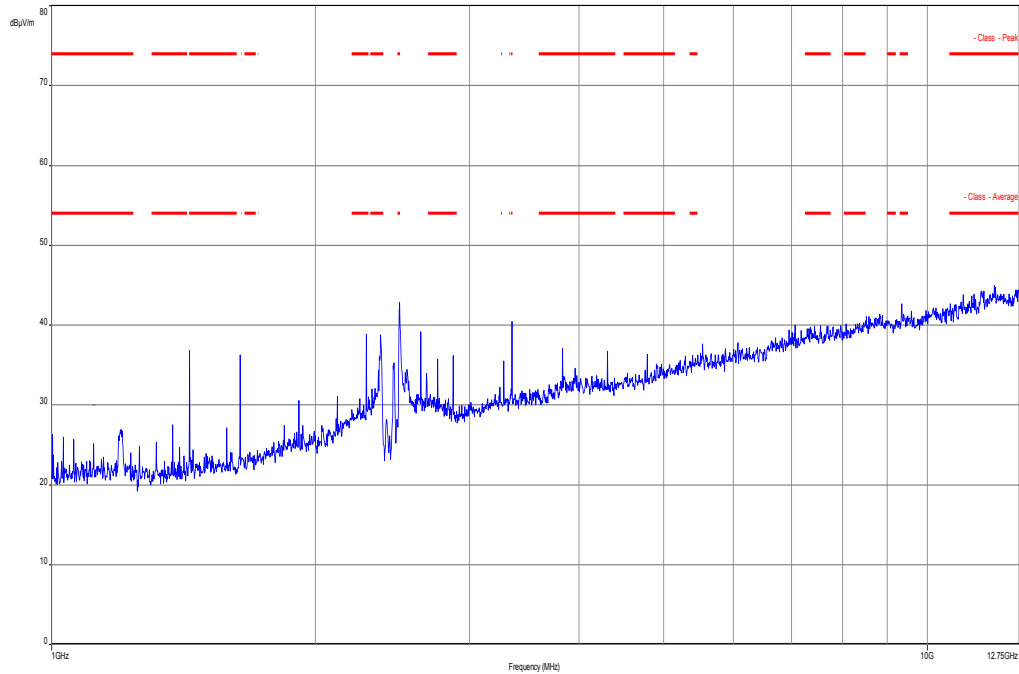
Date: 28.APR.2014 10:39:59

Plot 9: Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization



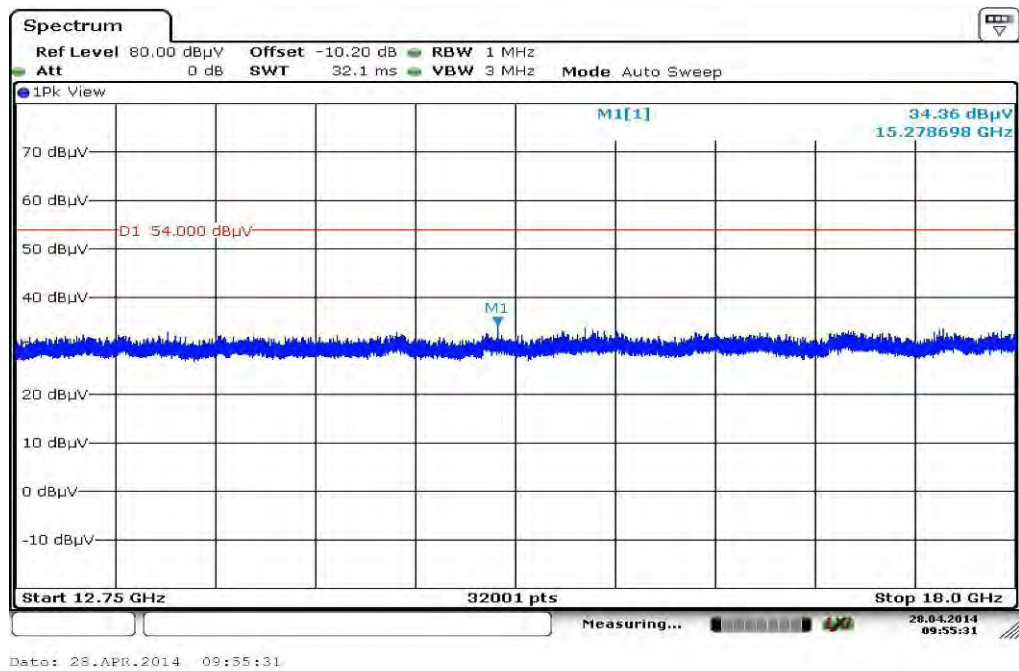
Frequency (MHz)	Quasi Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.132650	16.32	30.00	13.68	1000.0	120.000	164.0	V	180.0	12.6
44.775000	15.80	30.00	14.20	1000.0	120.000	106.0	V	190.0	13.3
399.992550	28.31	36.00	7.69	1000.0	120.000	101.0	V	80.0	16.9
724.959750	20.41	36.00	15.59	1000.0	120.000	158.0	H	172.0	23.1
811.358400	23.06	36.00	12.94	1000.0	120.000	112.0	H	93.0	24.0
960.552150	22.49	44.00	21.51	1000.0	120.000	112.0	H	273.0	25.4

Plot 10: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

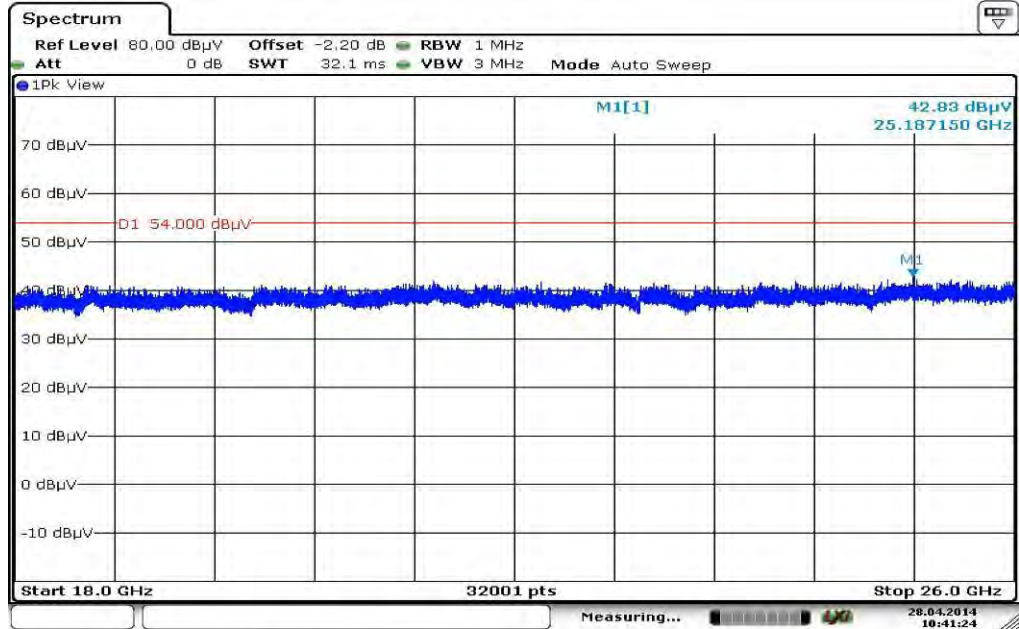


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 11: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



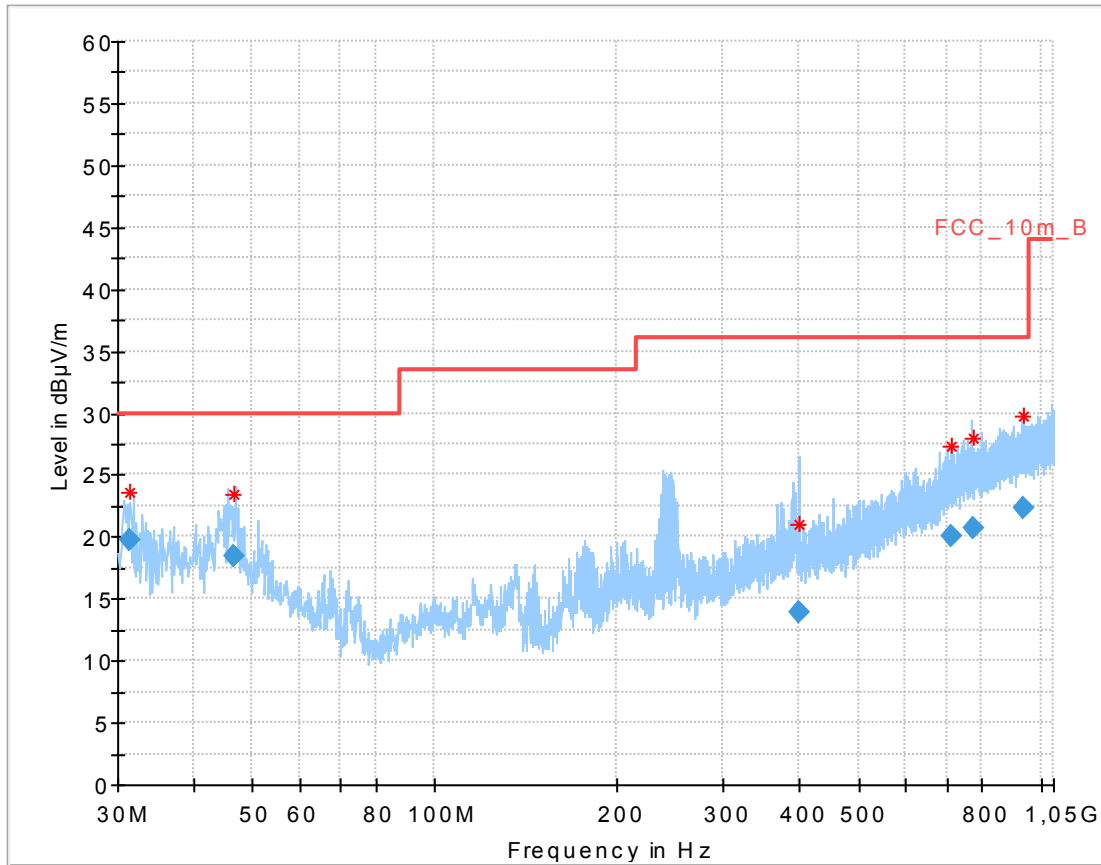
Plot 12: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 28.APR.2014 10:41:24

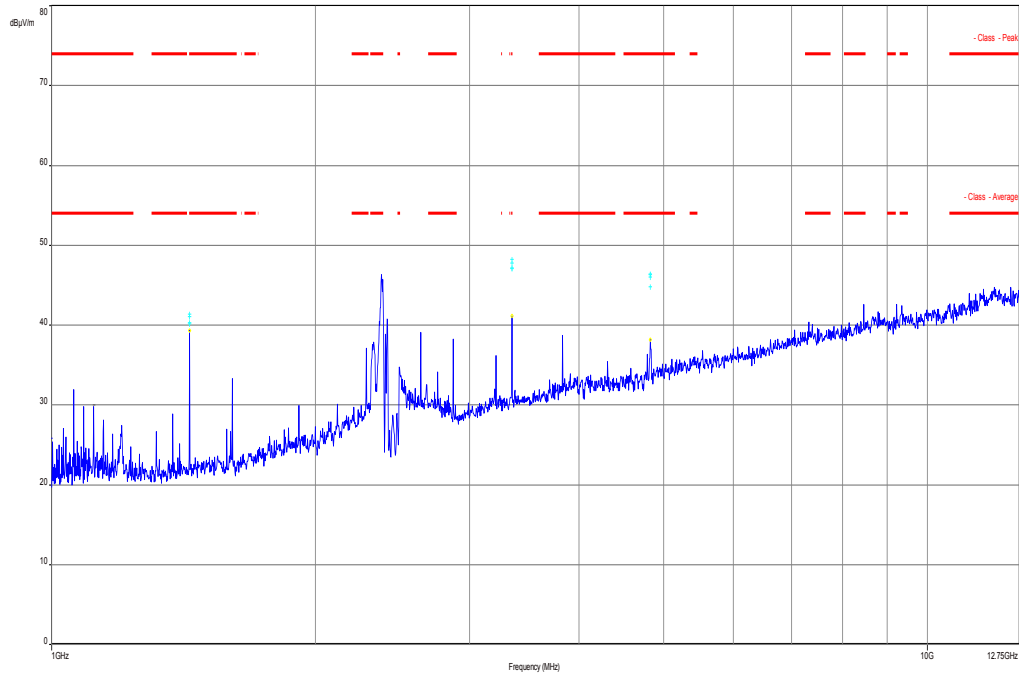
Plots: OFDM / n – HT 20 mode

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



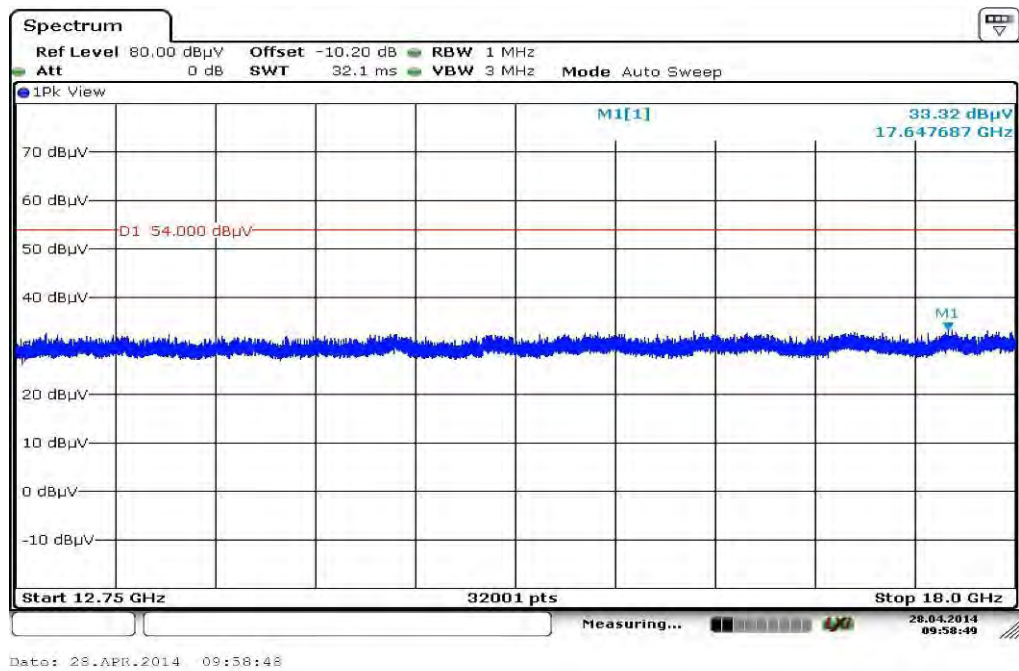
Frequency (MHz)	Quasi Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.477500	19.71	30.00	10.29	1000.0	120.000	105.0	V	88.0	12.7
46.816200	18.38	30.00	11.62	1000.0	120.000	98.0	V	280.0	13.3
400.390050	13.97	36.00	22.03	1000.0	120.000	101.0	V	100.0	16.9
711.153450	20.02	36.00	15.98	1000.0	120.000	170.0	V	10.0	22.8
771.444450	20.69	36.00	15.31	1000.0	120.000	170.0	V	177.0	23.7
938.412750	22.35	36.00	13.65	1000.0	120.000	135.0	H	83.0	25.3

Plot 2: Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

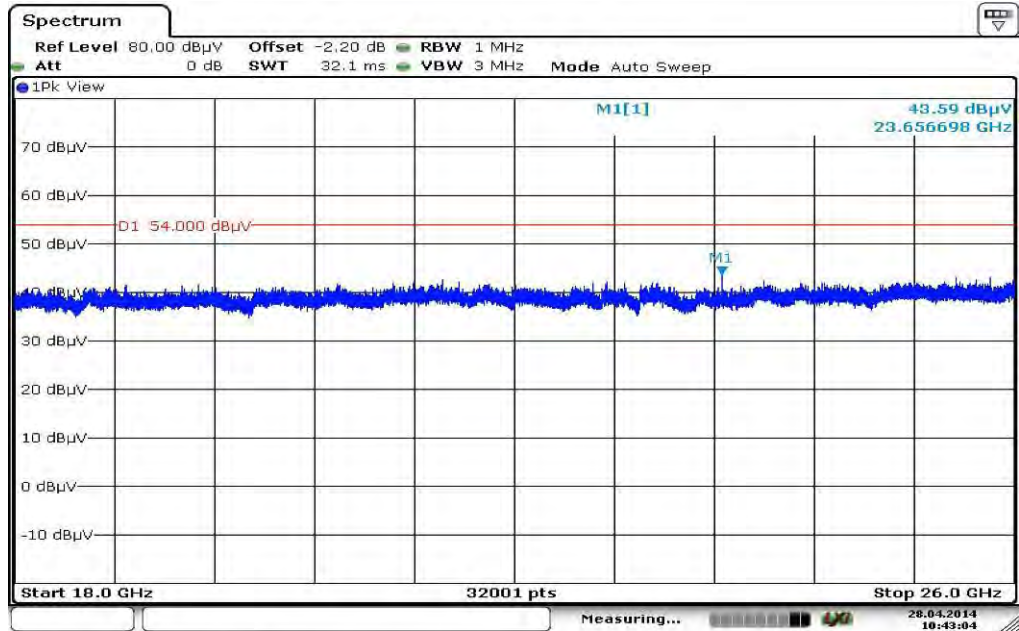


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 3: Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

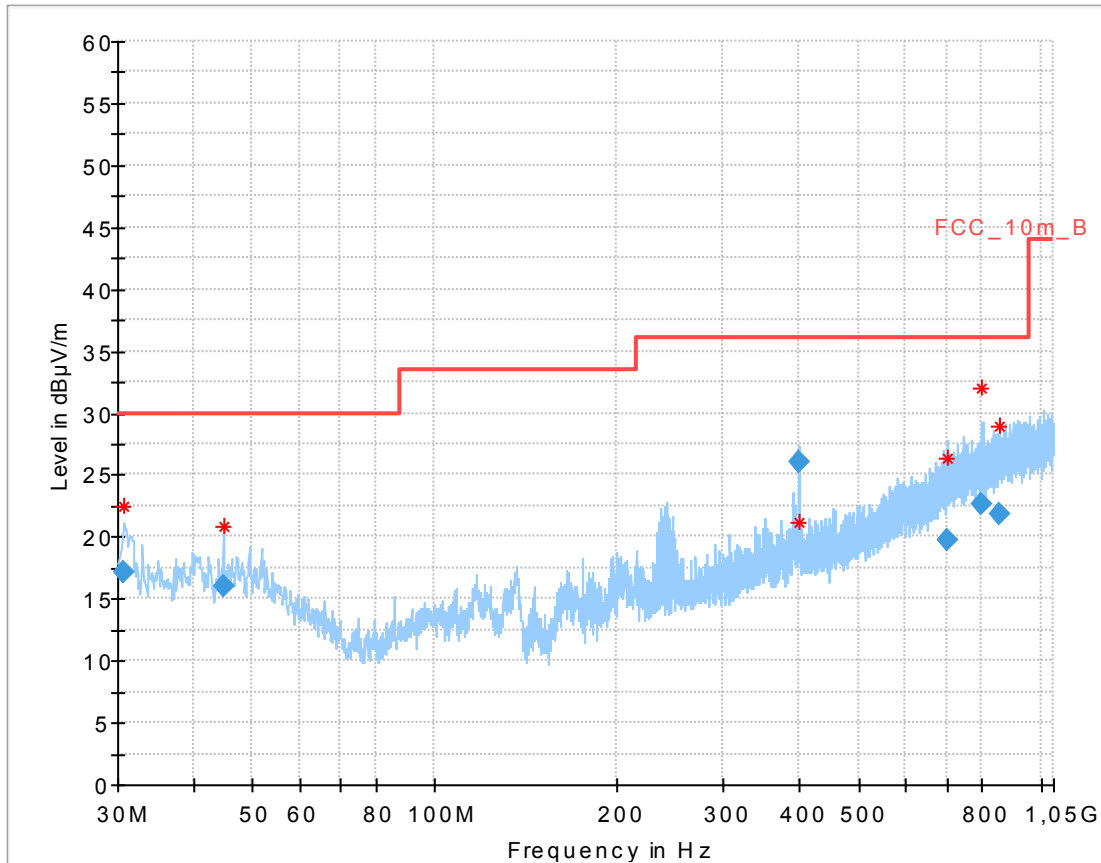


Plot 4: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



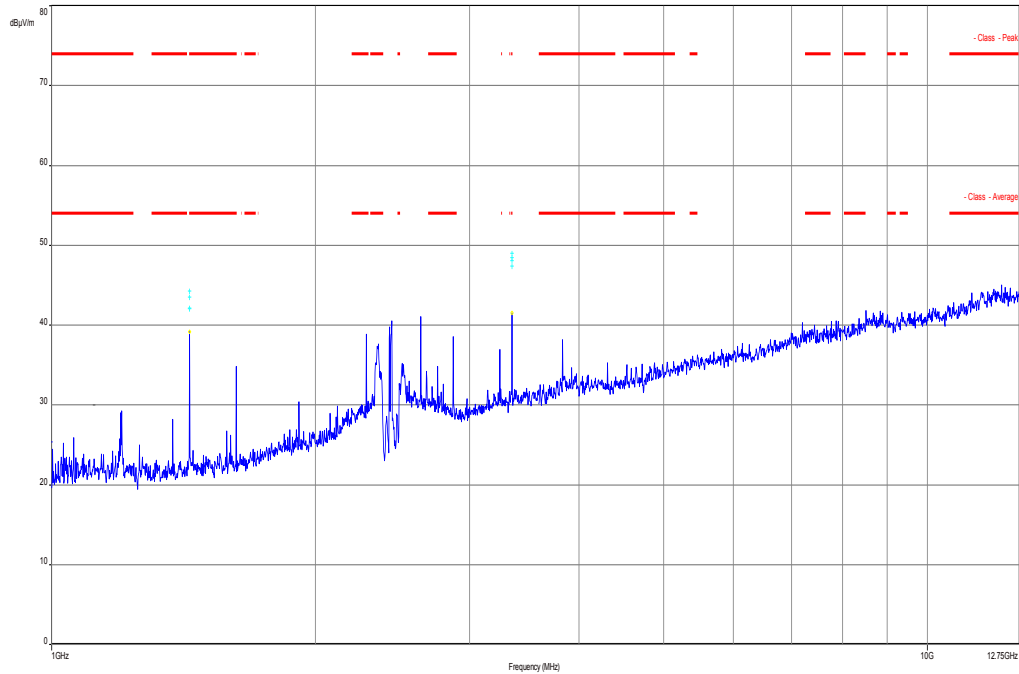
Date: 28.APR.2014 10:43:03

Plot 5: Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization



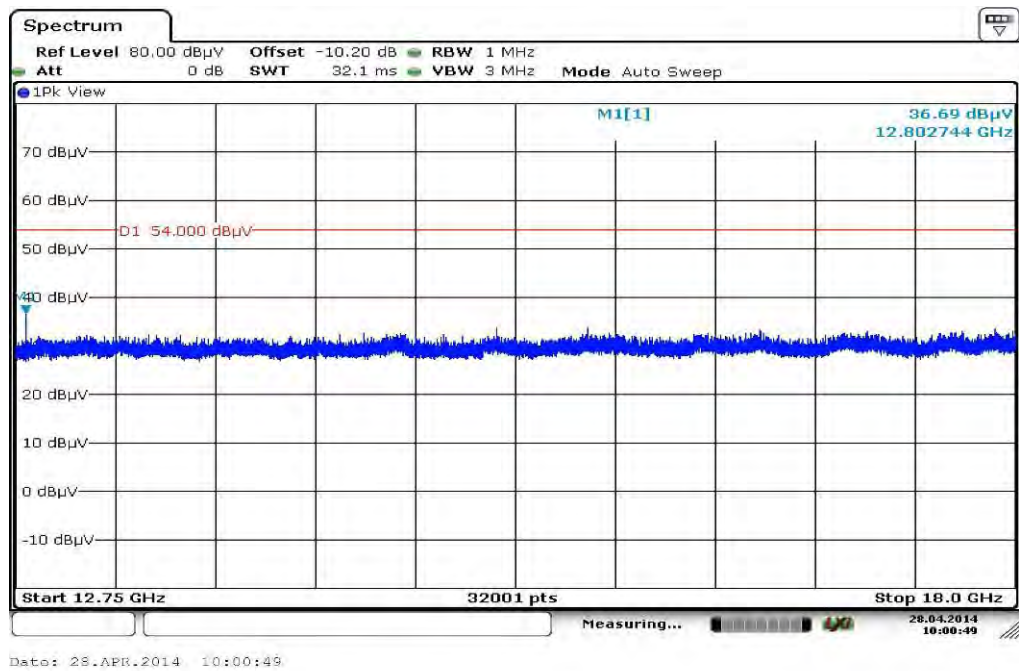
Frequency (MHz)	Quasi Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.791100	17.07	30.00	12.93	1000.0	120.000	162.0	V	89.0	12.6
44.798700	15.95	30.00	14.05	1000.0	120.000	128.0	V	190.0	13.3
399.966300	26.05	36.00	9.95	1000.0	120.000	101.0	V	81.0	16.9
699.448500	19.74	36.00	16.26	1000.0	120.000	170.0	V	83.0	22.5
799.389000	22.62	36.00	13.38	1000.0	120.000	115.0	H	280.0	23.8
855.154050	21.81	36.00	14.19	1000.0	120.000	170.0	H	180.0	24.6

Plot 6: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

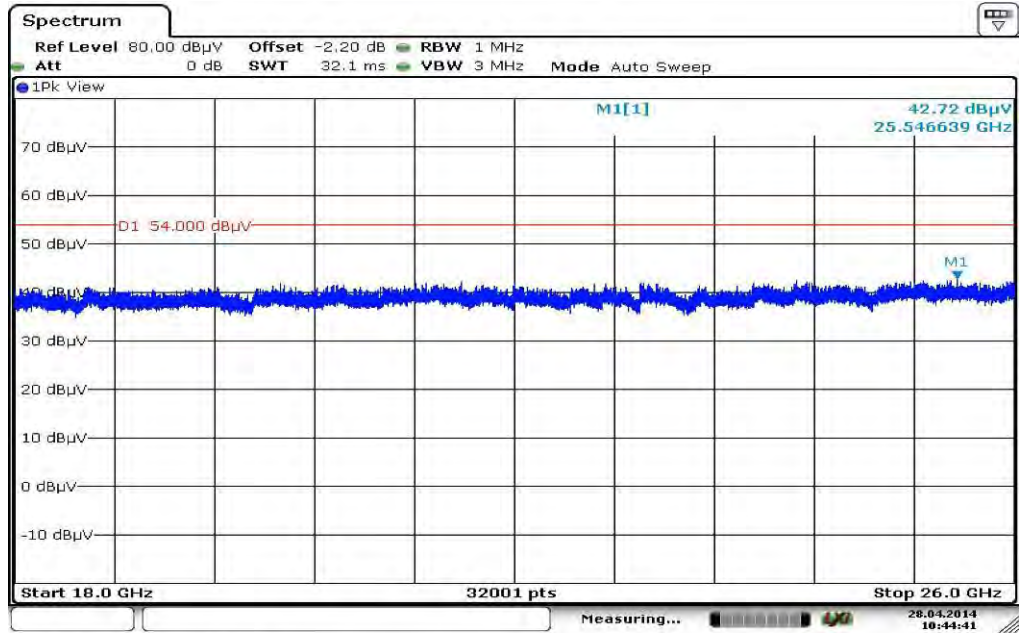


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 7: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

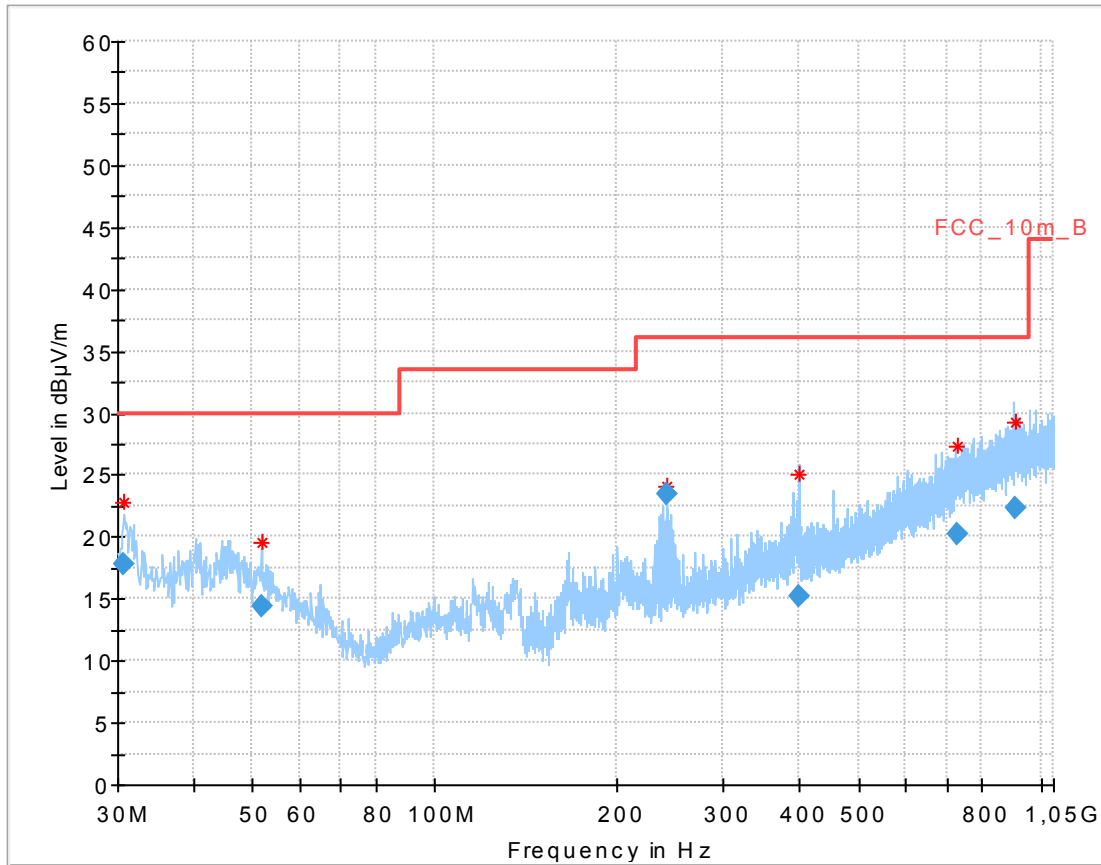


Plot 8: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



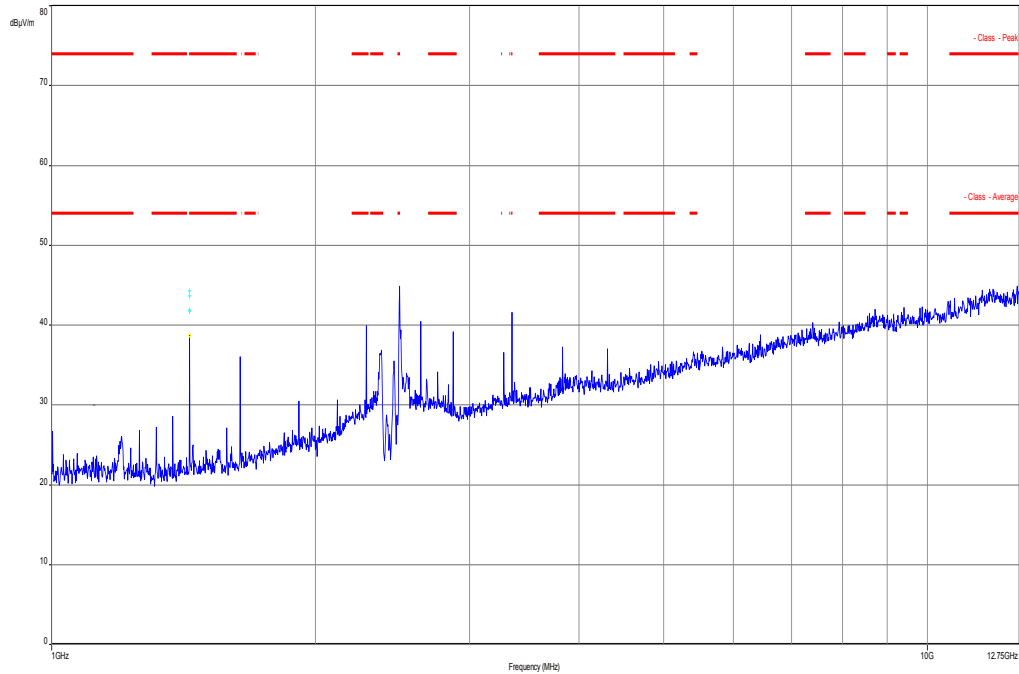
Date: 28.APR.2014 10:44:40

Plot 9: Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization



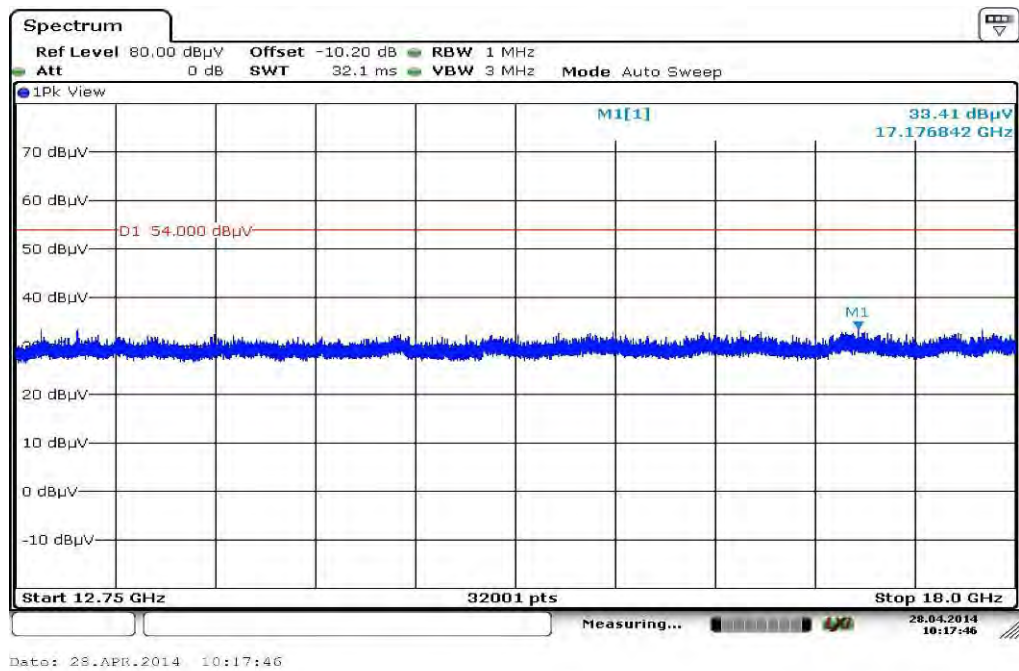
Frequency (MHz)	Quasi Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.788850	17.87	30.00	12.13	1000.0	120.000	98.0	V	80.0	12.6
51.812700	14.40	30.00	15.60	1000.0	120.000	101.0	V	80.0	13.2
241.861050	23.52	36.00	12.48	1000.0	120.000	170.0	H	280.0	13.1
399.997500	15.16	36.00	20.84	1000.0	120.000	98.0	V	85.0	16.9
726.108000	20.19	36.00	15.81	1000.0	120.000	170.0	V	10.0	23.1
905.239350	22.34	36.00	13.66	1000.0	120.000	170.0	V	280.0	25.2

Plot 10: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

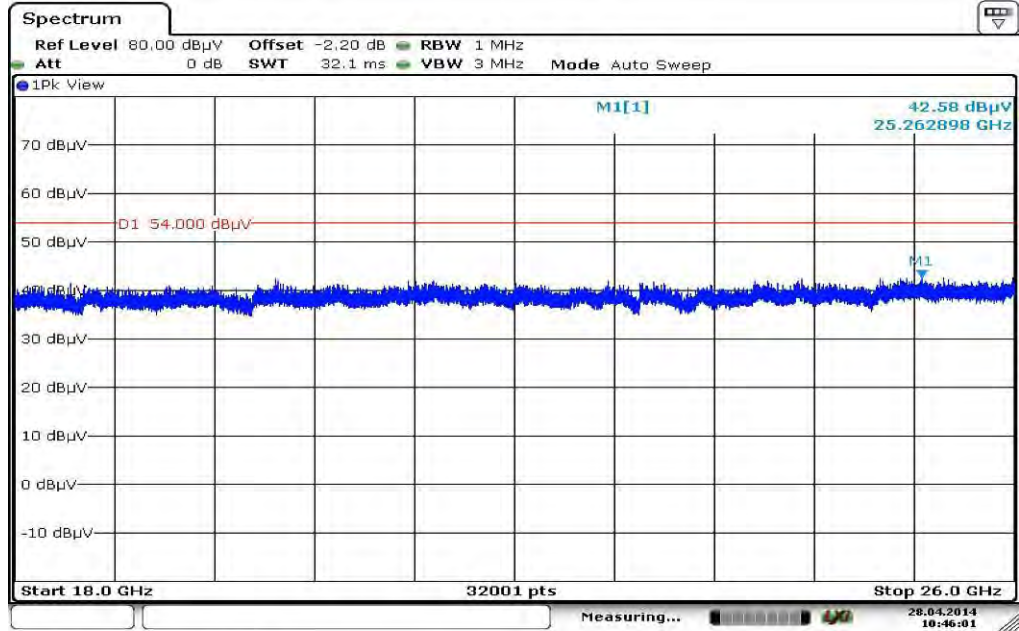


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 11: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



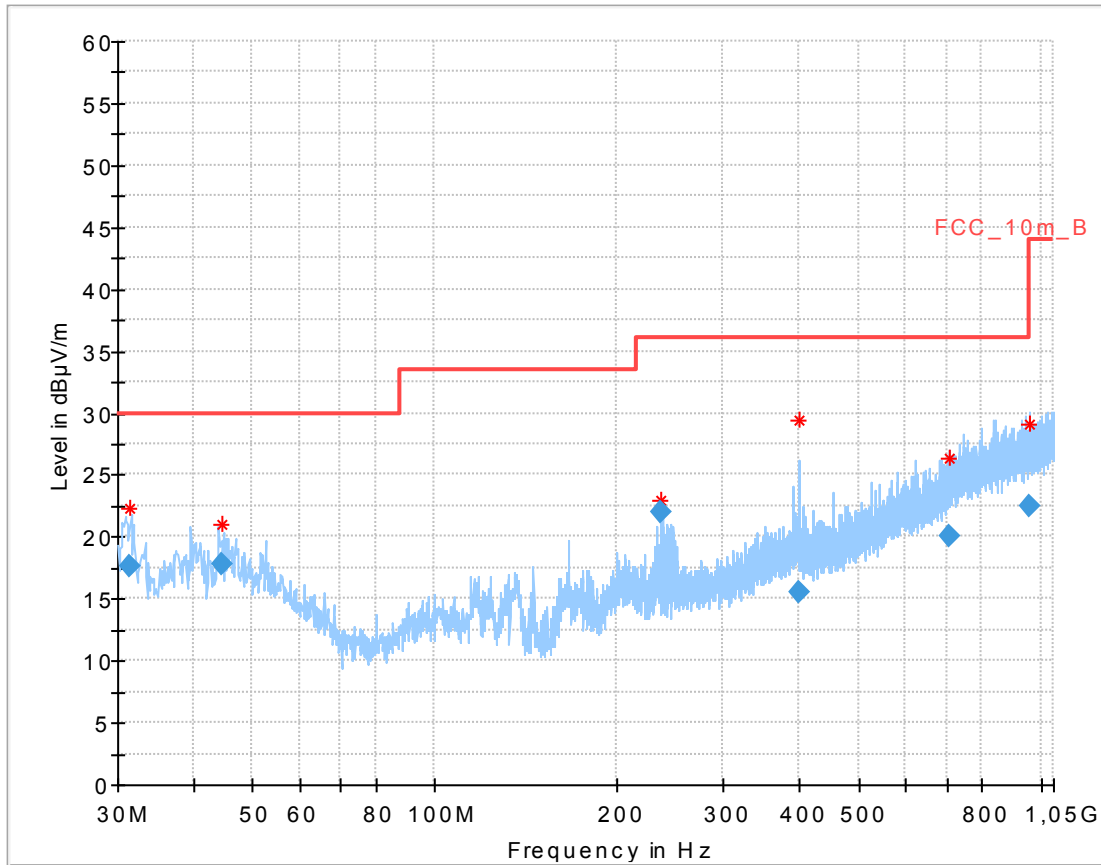
Plot 12: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 28.APR.2014 10:46:01

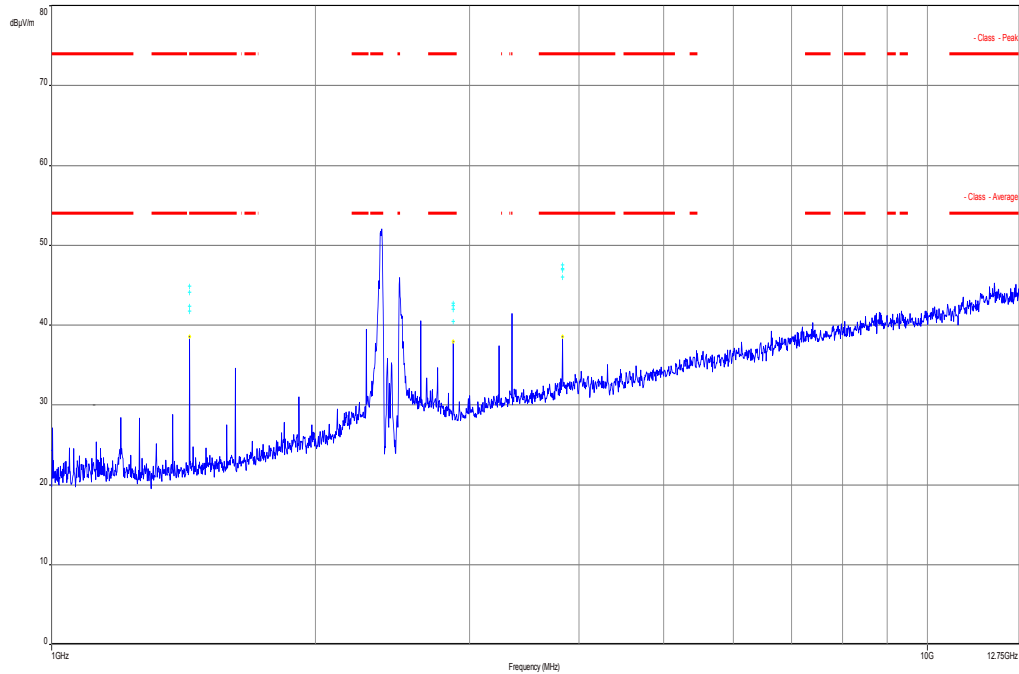
Plots: OFDM / n – HT 40 mode

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



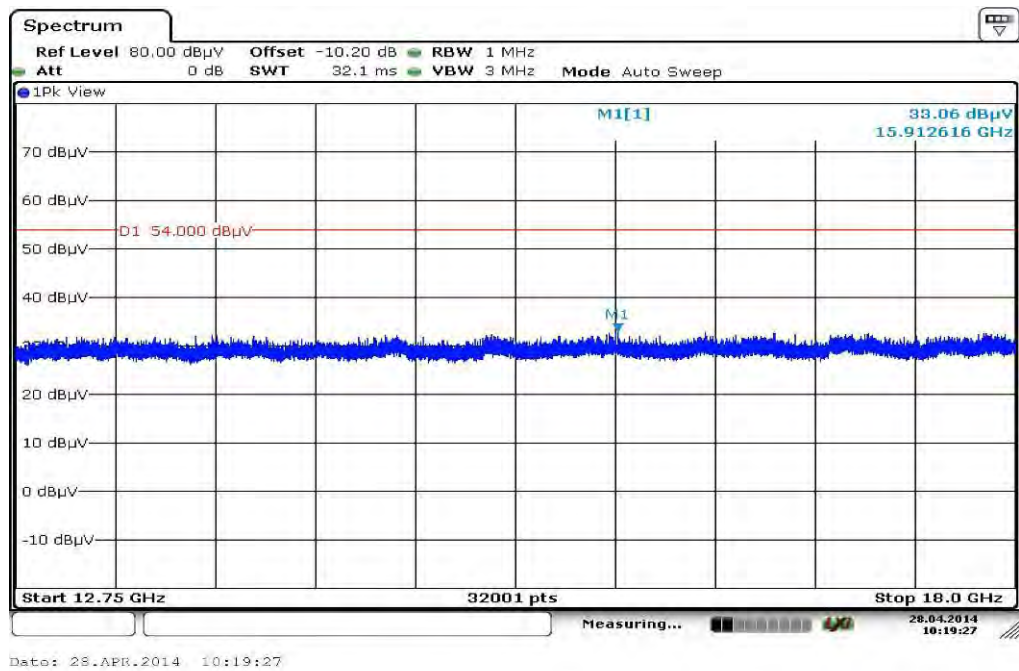
Frequency (MHz)	Quasi Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.488450	17.60	30.00	12.40	1000.0	120.000	145.0	V	263.0	12.7
44.442450	17.87	30.00	12.13	1000.0	120.000	101.0	V	173.0	13.3
235.548450	21.92	36.00	14.08	1000.0	120.000	170.0	H	261.0	12.9
399.998550	15.48	36.00	20.52	1000.0	120.000	98.0	V	92.0	16.9
704.855400	19.99	36.00	16.01	1000.0	120.000	130.0	H	280.0	22.6
958.308150	22.53	36.00	13.47	1000.0	120.000	170.0	V	100.0	25.4

Plot 2: Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

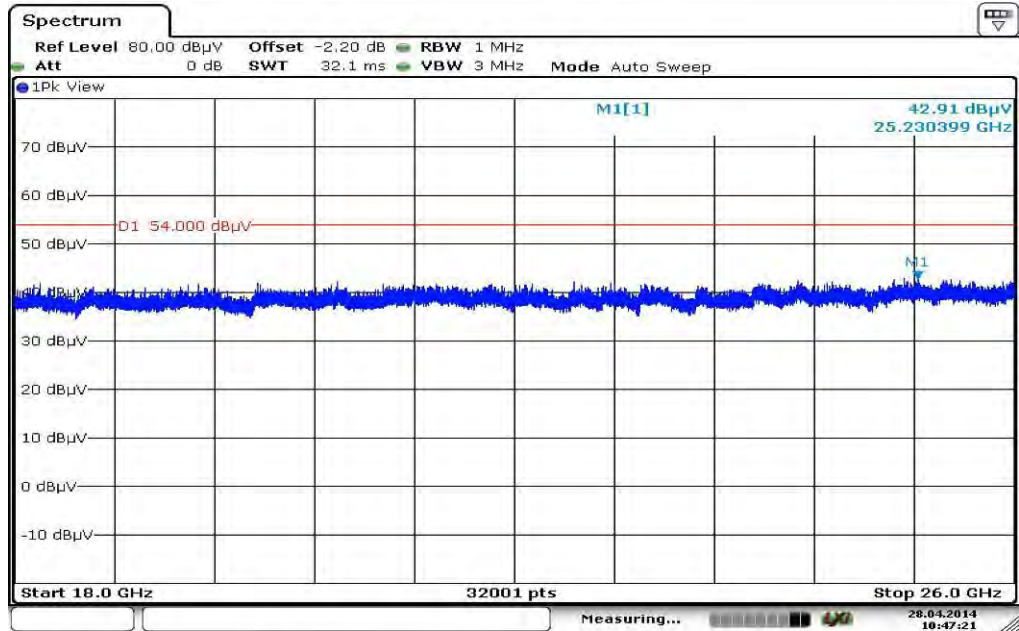


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 3: Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

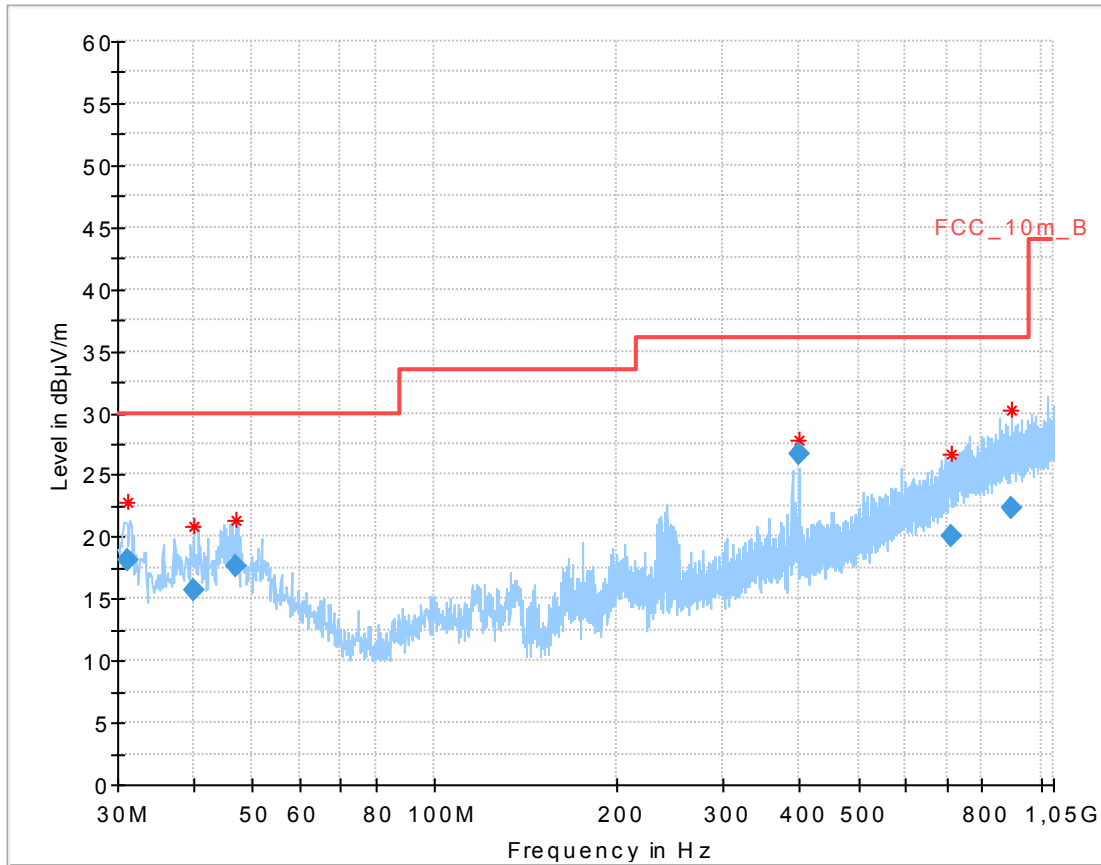


Plot 4: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



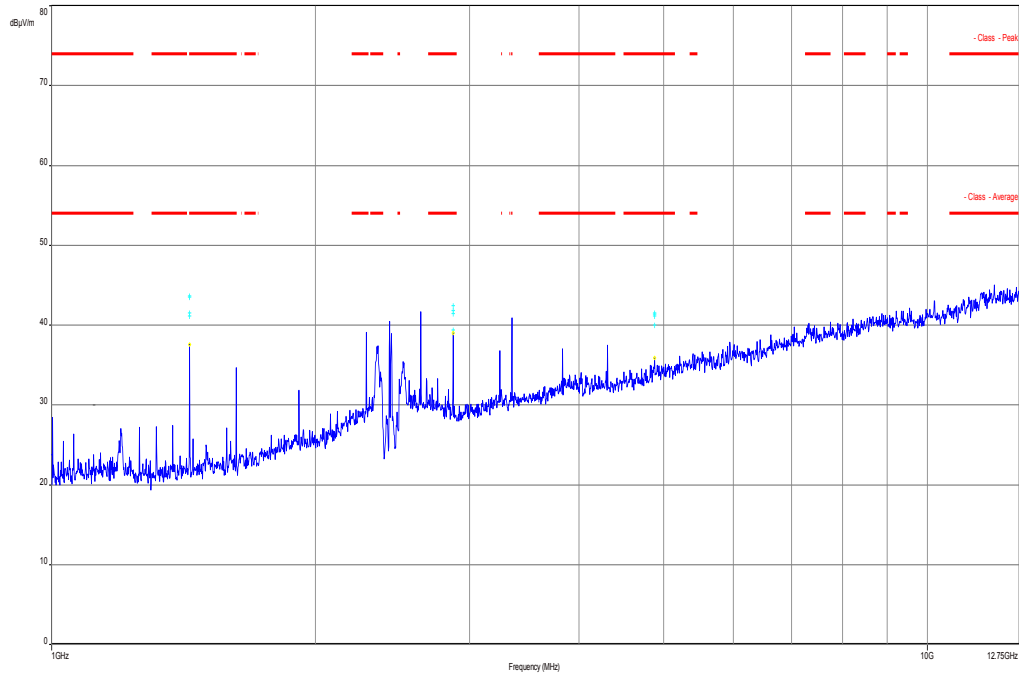
Date: 28.APR.2014 10:47:21

Plot 5: Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization



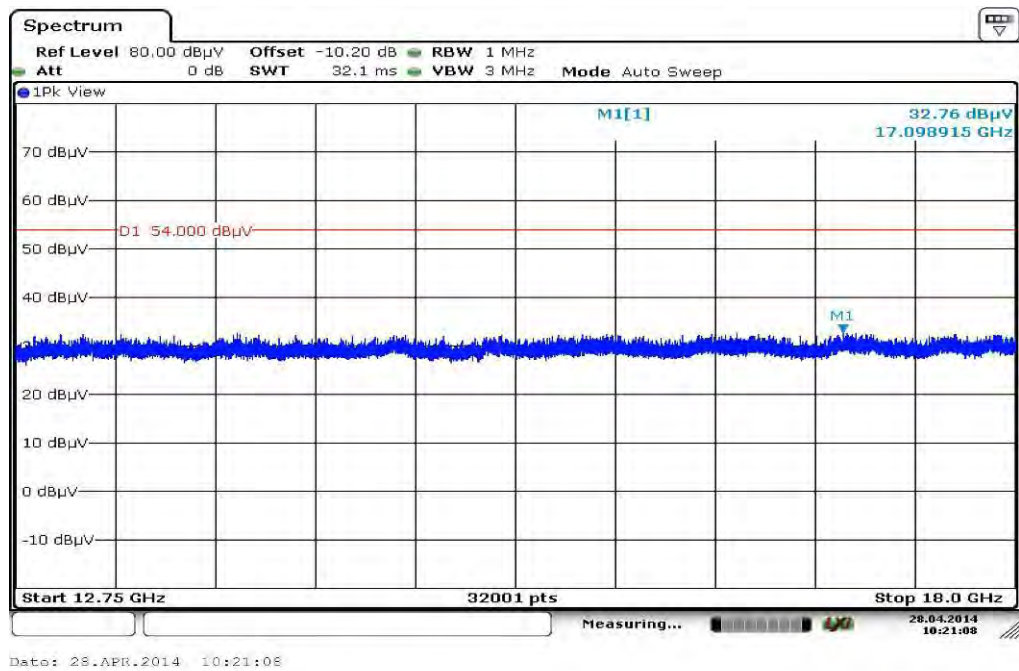
Frequency (MHz)	Quasi Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.108500	18.05	30.00	11.95	1000.0	120.000	170.0	V	280.0	12.6
40.205250	15.61	30.00	14.39	1000.0	120.000	98.0	V	280.0	13.4
47.007450	17.67	30.00	12.33	1000.0	120.000	98.0	V	-5.0	13.3
400.000650	26.62	36.00	9.38	1000.0	120.000	98.0	V	280.0	16.9
714.701100	20.08	36.00	15.92	1000.0	120.000	170.0	H	180.0	22.8
892.299600	22.26	36.00	13.74	1000.0	120.000	170.0	H	175.0	25.1

Plot 6: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

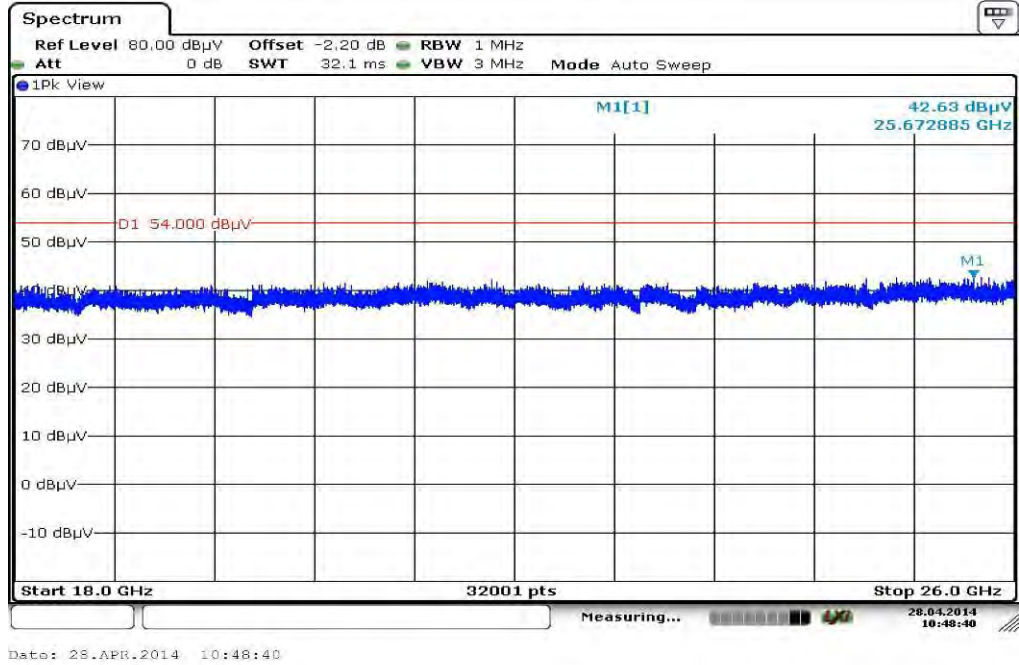


The carrier signal is notched with a 2.4 GHz band rejection filter.

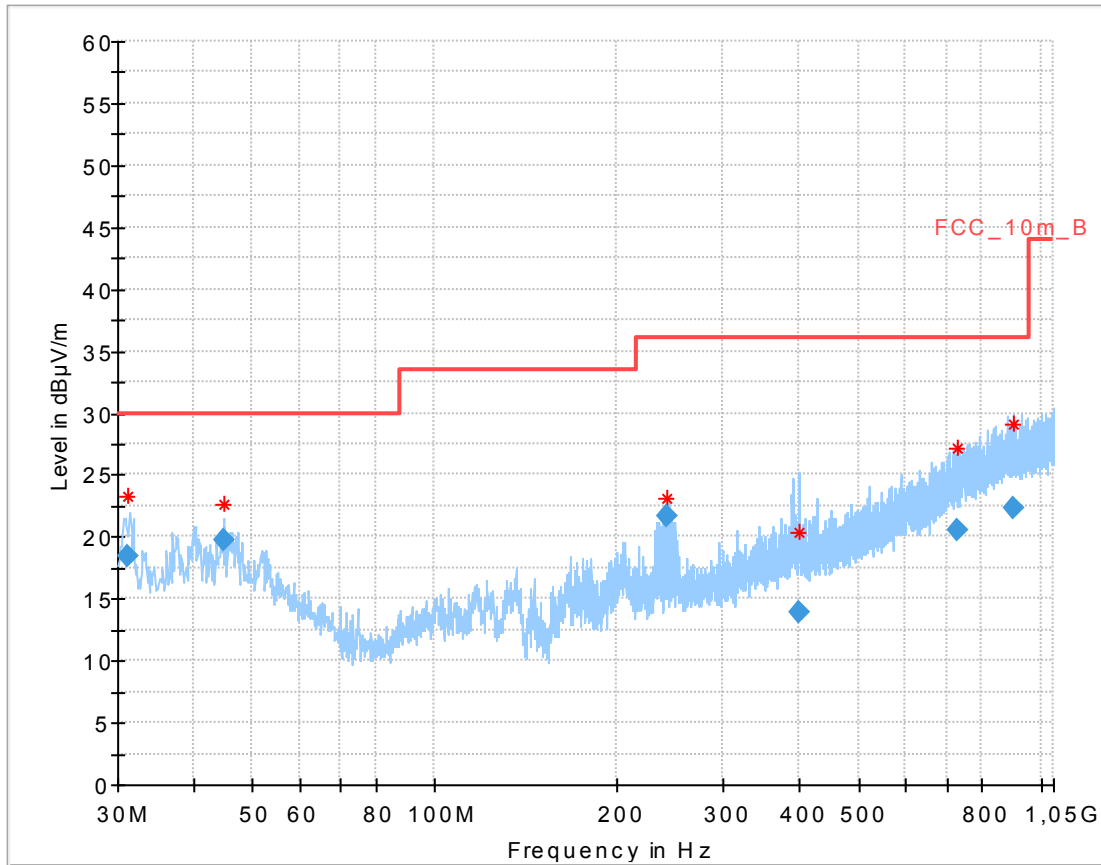
Plot 7: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



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

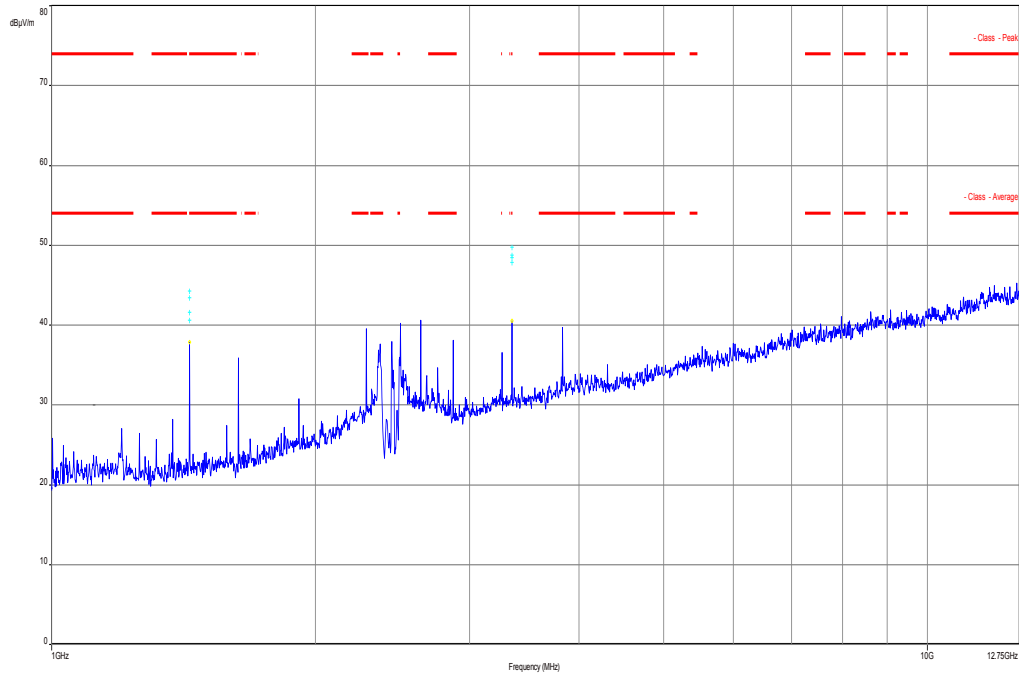


Plot 9: Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization



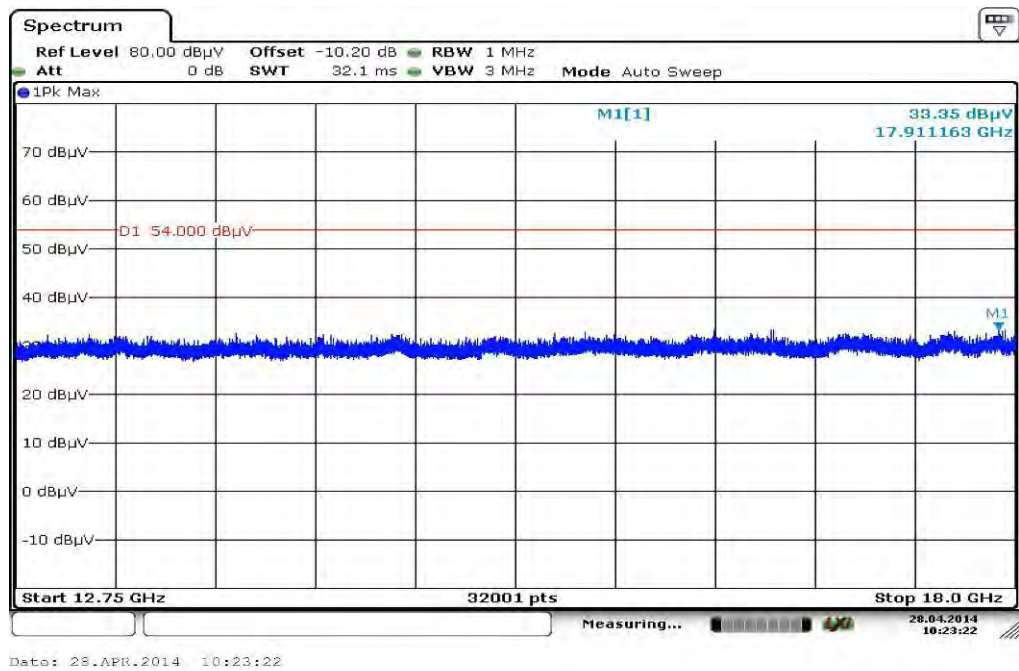
Frequency (MHz)	Quasi Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.102050	18.44	30.00	11.56	1000.0	120.000	170.0	V	2.0	12.6
44.807250	19.73	30.00	10.27	1000.0	120.000	101.0	V	280.0	13.3
242.214600	21.72	36.00	14.28	1000.0	120.000	98.0	V	171.0	13.1
400.129650	13.86	36.00	22.14	1000.0	120.000	101.0	V	85.0	16.9
728.035200	20.58	36.00	15.42	1000.0	120.000	164.0	H	100.0	23.2
902.795250	22.35	36.00	13.65	1000.0	120.000	170.0	H	272.0	25.2

Plot 10: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

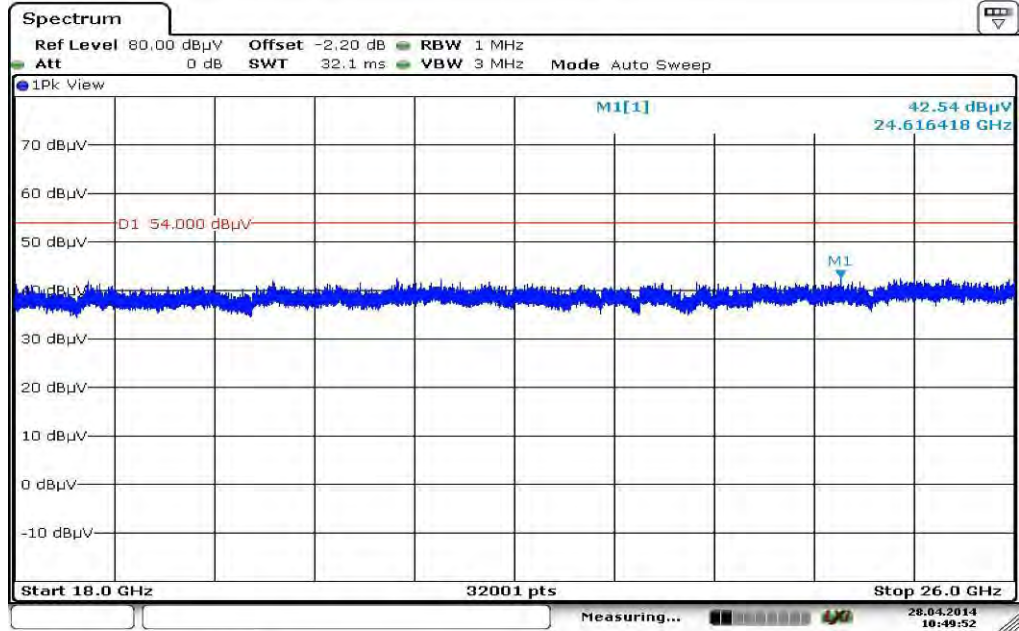


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 11: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



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



Date: 28.APR.2014 10:49:51

10.11 RX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in idle/receive mode. The results are valid for both modes.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak / RMS
Sweep time:	Auto
Resolution bandwidth:	F > 1 GHz: 1 MHz F < 1 GHz: 100 kHz
Video bandwidth:	3 x RBW Remeasurement: 10 Hz / 3 MHz
Span:	30 MHz to 26 GHz
Trace-Mode:	Max Hold

Limits:

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

Results:

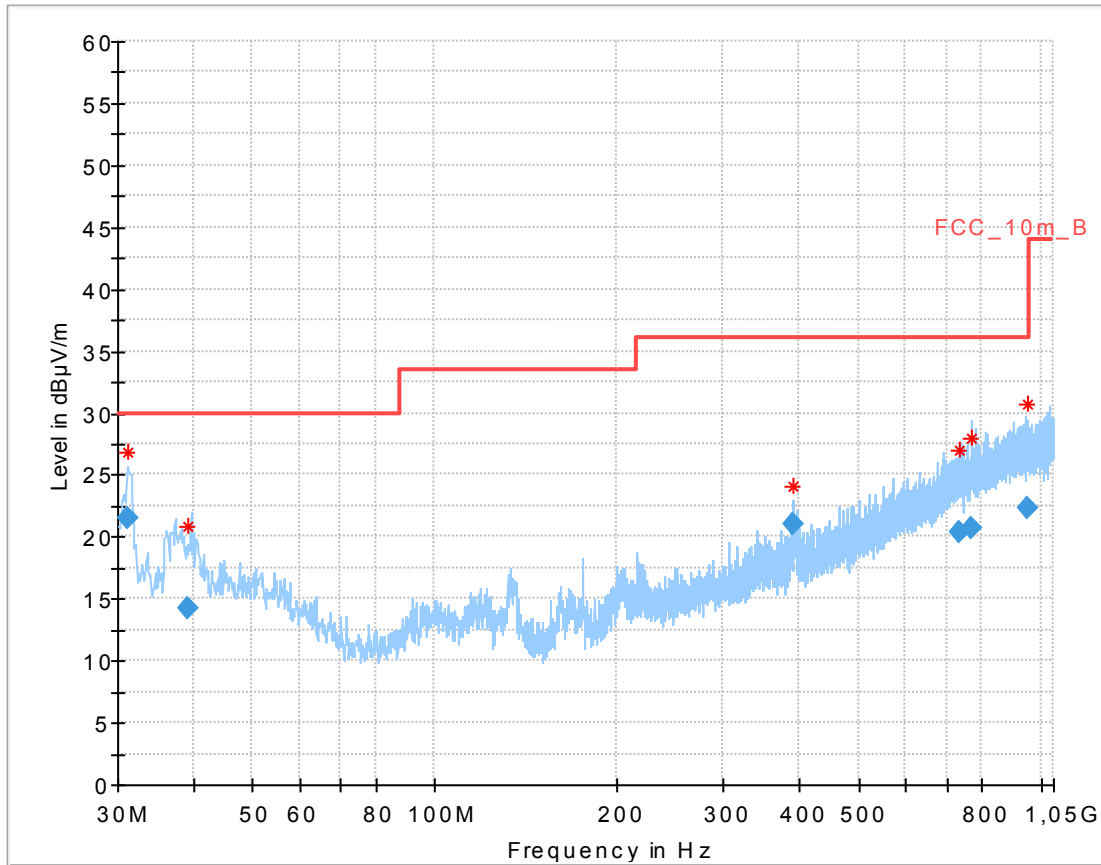
RX Spurious Emissions Radiated [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
All detected peak emissions are below the average limit!		
Measurement uncertainty	± 3 dB	

Result: Passed.

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

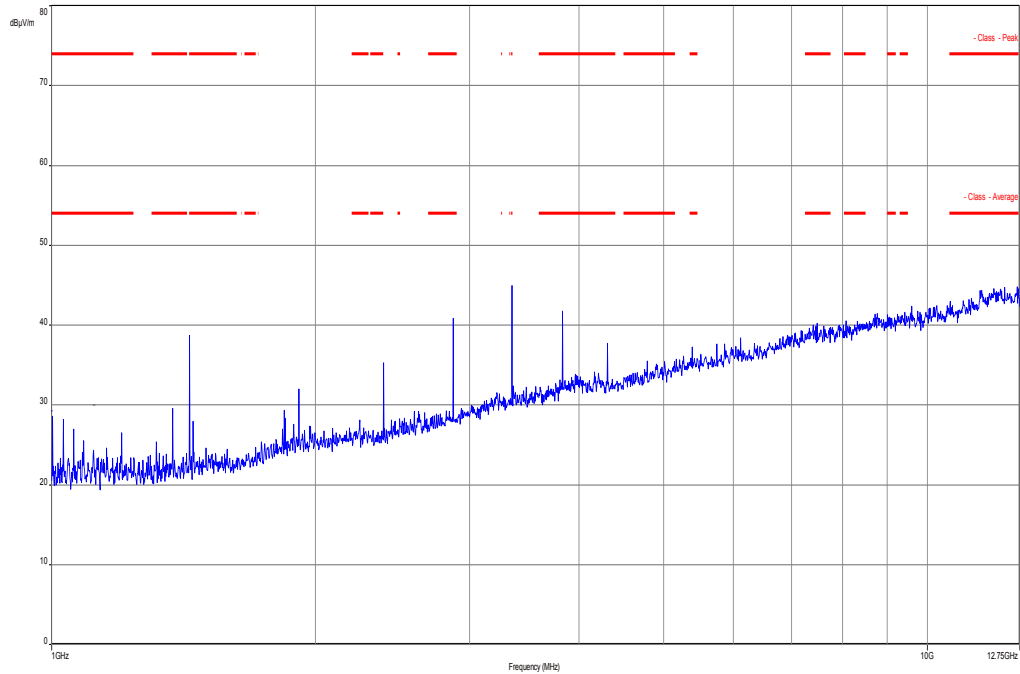
Plots: RX / Idle – mode

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

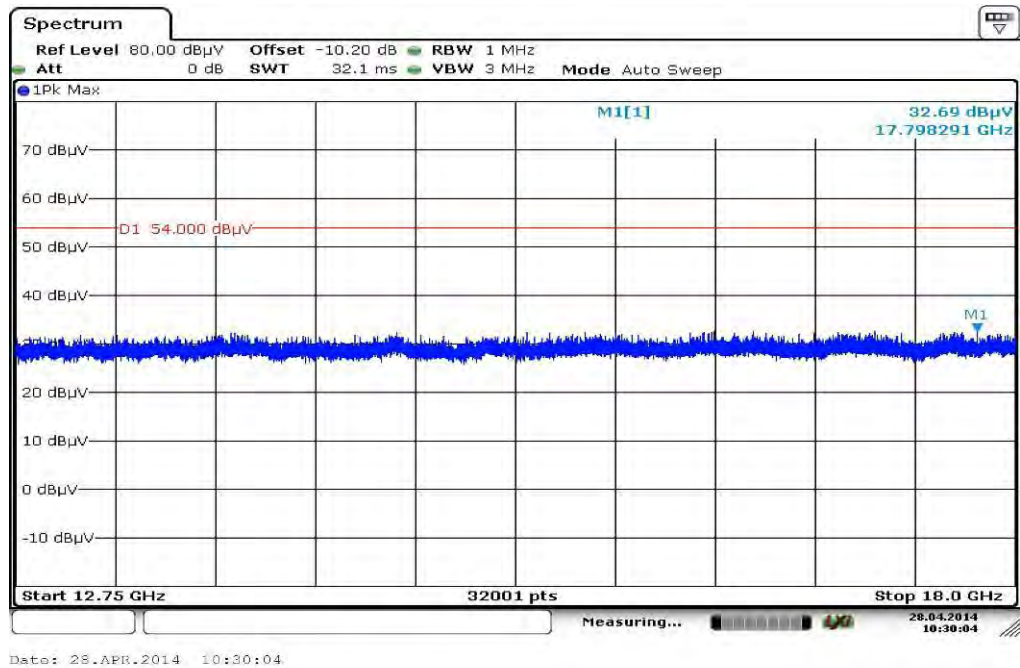


Frequency (MHz)	Quasi Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.179450	21.48	30.00	8.52	1000.0	120.000	101.0	V	10.0	12.6
39.225900	14.25	30.00	15.75	1000.0	120.000	98.0	V	10.0	13.4
391.199700	20.98	36.00	15.02	1000.0	120.000	170.0	H	180.0	16.8
732.138750	20.33	36.00	15.67	1000.0	120.000	170.0	V	-10.0	23.2
769.060350	20.65	36.00	15.35	1000.0	120.000	114.0	H	80.0	23.7
947.718600	22.33	36.00	13.67	1000.0	120.000	170.0	V	-5.0	25.3

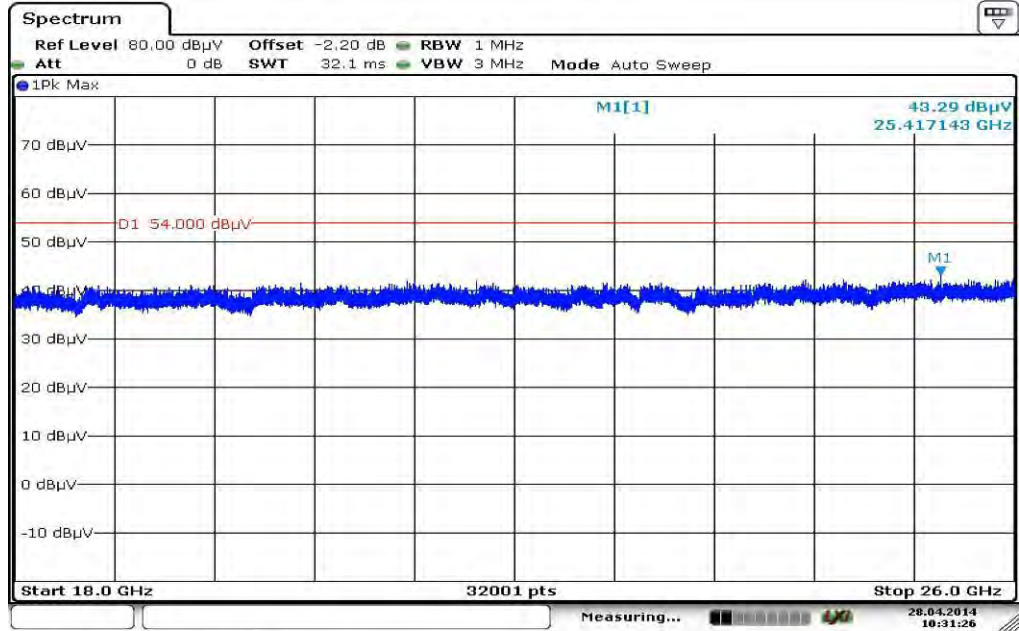
Plot 2: 1 GHz to 12.75 GHz, vertical & horizontal polarization



Plot 3: 12.75 GHz to 18 GHz, vertical & horizontal polarization



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



10.12 Spurious emissions radiated < 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
Video bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Resolution bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace-Mode:	Max Hold

Limits:

FCC	IC	
TX Spurious Emissions Radiated < 30 MHz		
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

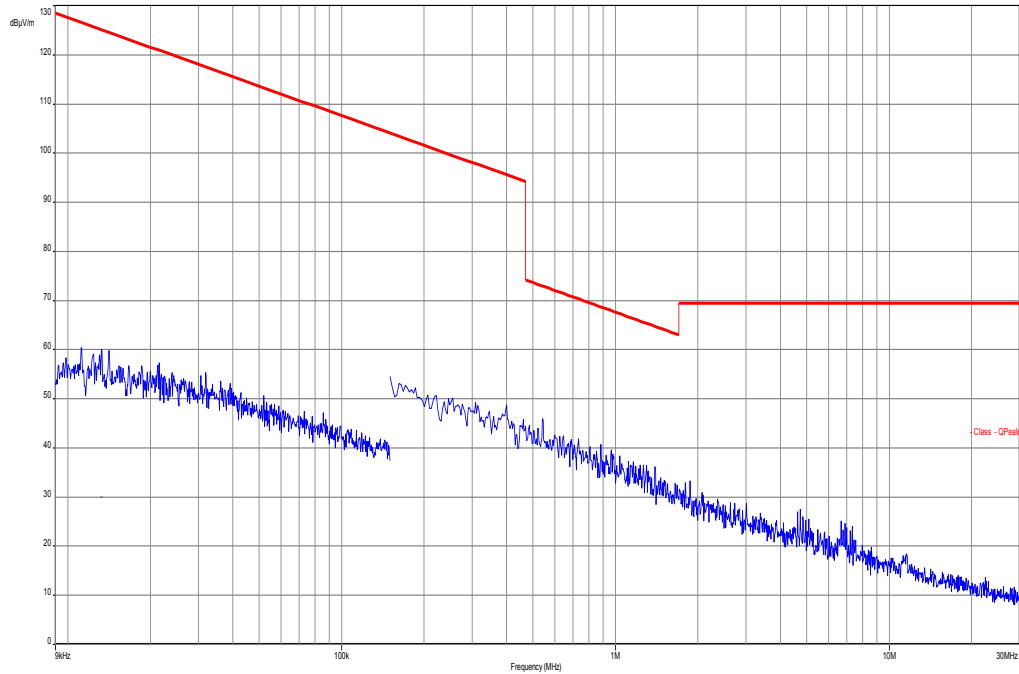
Results:

TX Spurious Emissions Radiated < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
No peaks detected.		
Measurement uncertainty	± 3 dB	

Result: Passed

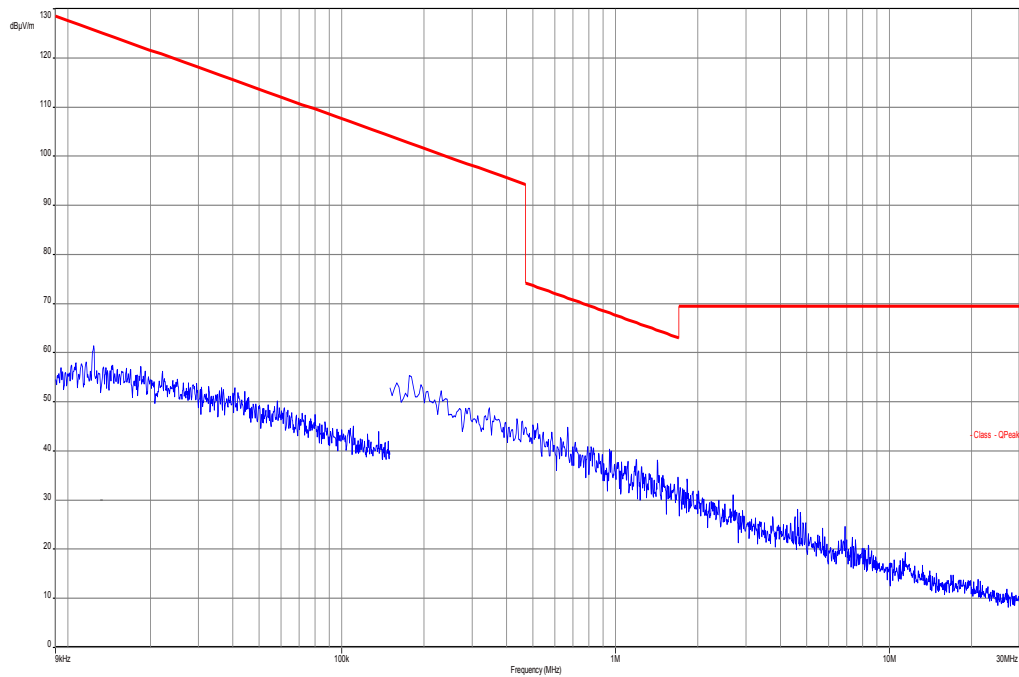
Plots: TX mode

Plot 1: 9 kHz to 30 MHz



Plots: RX / Idle – mode

Plot 1: 9 kHz to 30 MHz



10.13 Spurious emissions conducted < 30 MHz

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
Video bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Resolution bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace-Mode:	Max Hold

Limits:

FCC		IC	
TX Spurious Emissions Conducted < 30 MHz			
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

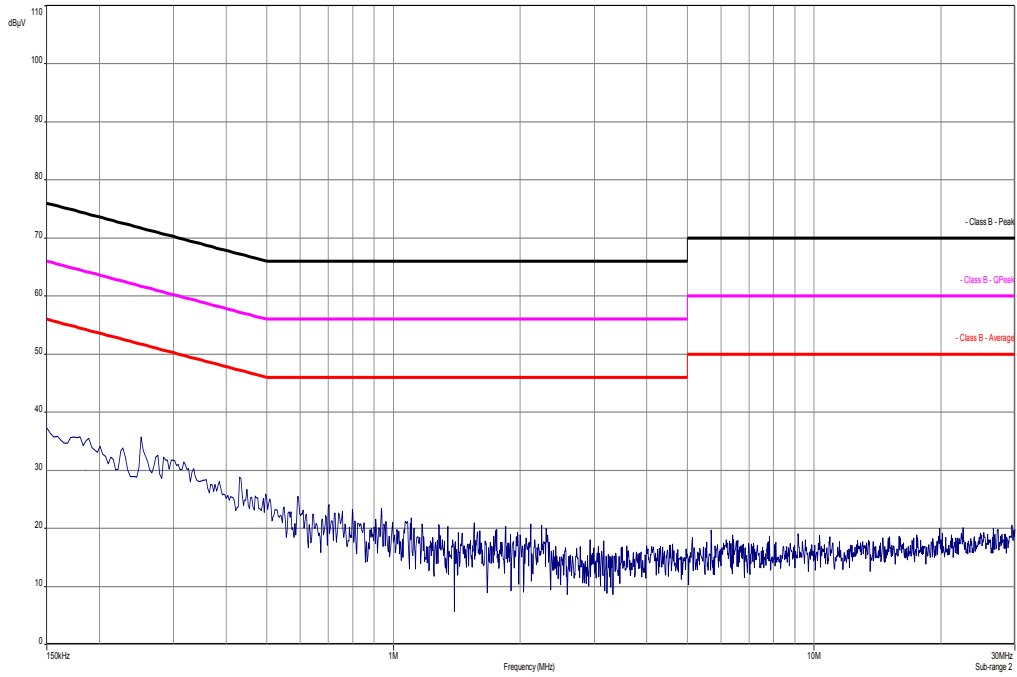
Results:

TX Spurious Emissions Conducted < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
No peaks detected.		
Measurement uncertainty	± 3 dB	

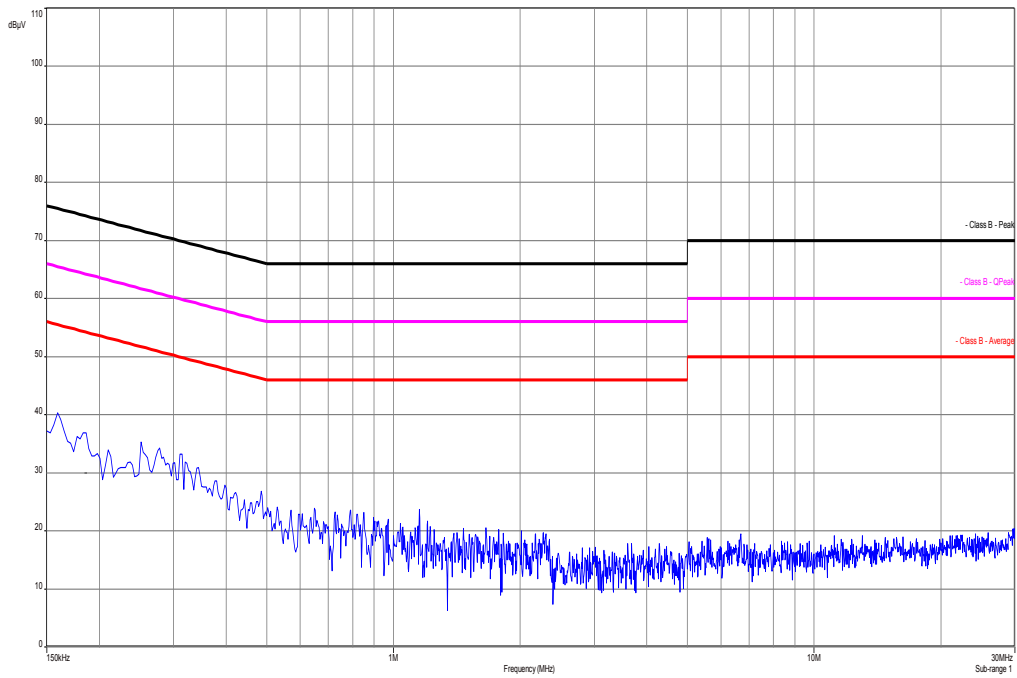
Result: Passed

Plots:

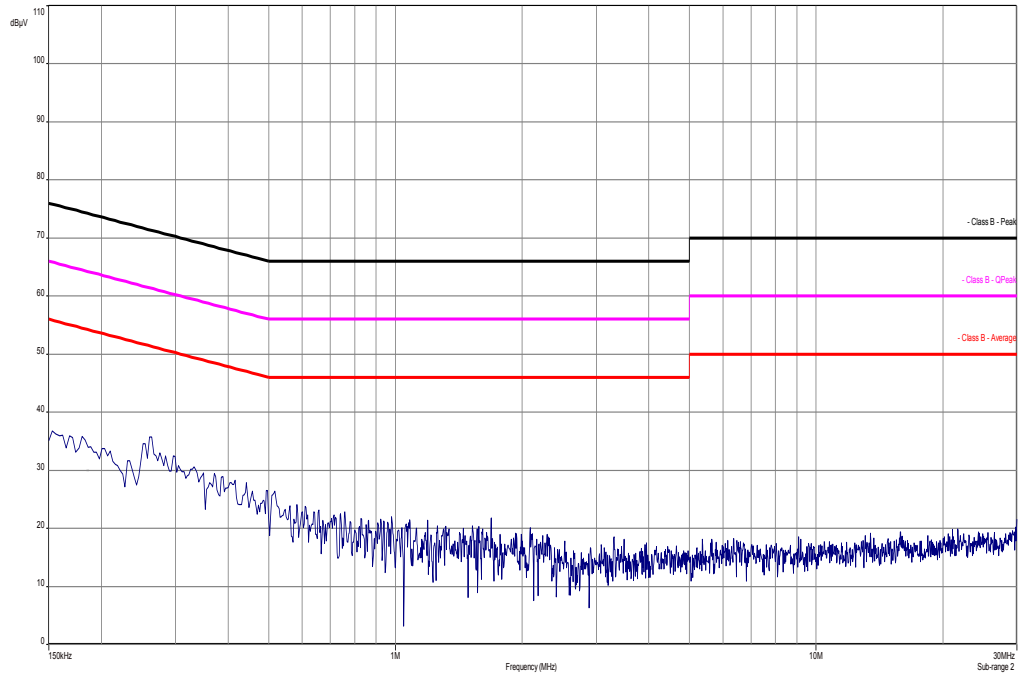
Plot 1: TX mode, 150 kHz to 30 MHz, phase line



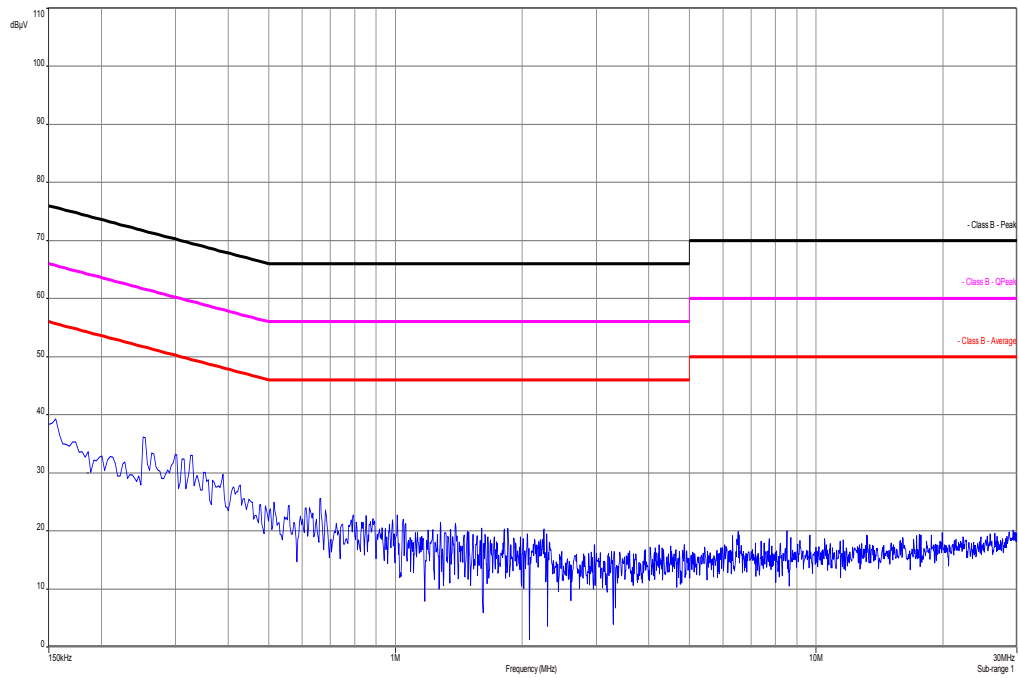
Plot 2: TX mode, 150 kHz to 30 MHz, neutral line



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



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



11 Test equipment and ancillaries used for tests

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 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).

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
2	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	ne		
3	n. a.	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	27.01.2014	27.01.2015
4	n. a.	Funkstörmesse mpfänger 20Hz-26,5GHz	ESU26	R&S	100037	300003555	k	28.02.2014	28.02.2015
5	n. a.	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		
6	n. a.	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
7	n. a.	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
8	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	22.04.2014	22.04.2016
9	n. a.	Double-Ridged Waveguide Horn Antenna 1-18,0GHz	3115	EMCO	8812-3088	300001032	vKI!	08.05.2013	08.05.2015
10	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
11	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	*	300000199	ne		
12	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156	ne		
13	9	Isolating Transformer	MPL IEC625 Bus Regeltrennravo	Erfi	91350	300001155	ne		
14	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
15	90	Active Loop Antenna 10 kHz to 30 MHz	6502	Kontron Psychotech	8905-2342	300000256	k	13.06.2013	13.06.2015
16	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
17	n. a.	Band Reject filter	WRCG240/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
18	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vKI!	14.10.2011	14.10.2014
19	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	13.03.2014	13.03.2015
20	11b	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268	ev		
21	A026	Std. Gain Horn Antenna 12.4 to 18,0 GHz	639	Narda	8402	300000787	k	22.07.2013	22.07.2015
22	A031	Std. Gain Horn	637	Narda		300000510	k	19.07.2013	19.07.2015

		Antenna 26.5 to 40.0 GHz							
23	n. a.	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	21.01.2014	21.01.2015

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

12 Observations

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

Annex A Document history

Version	Applied changes	Date of release
	Initial release	2014-05-08
A	New applicant information added (page 1)	2014-05-14
B	New model name; software & hardware version	2014-05-27

Annex B Further information**Glossary**

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

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 / UTRAN / LTE) Performance
- Elektromagnetische Verträglichkeit (EMV) einschließlich Automotive
- Produktsicherheit
- SAR und Hearing Aid Compatibility (HAC)
- Umweltsimulation
- Smart Card Terminals
- Bluetooth
- Wi-Fi Services

Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Bescheid vom 07.03.2014 mit der Akkreditierungsnummer D-PL-12076-01 und ist gültig 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

Signature of the certificate

Dr. Ingrid Pl.-M. Hoffmeyer
 Akkreditierungsstellenleiter

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 38116 Braunschweig

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Die Akkreditierung erfolgte gemäß des Gesetzes über die Akkreditierungsstellen (AkkStelleG) vom 21. Juli 2009 (BGBl. I S. 2025) sowie der Verordnung (EG) Nr. 765/2008 des Europäischen Parlaments und des Rates vom 9. Juli 2008 über die Vorschriften für die Akkreditierung und Marktüberwachung im Zusammenhang mit der Vermarktung von Produkten (Abt. L 228 vom 9. Juli 2008; S. 30). Die DAkkS ist Teilnehmerin der Multilateralen Abkommen zur gegenseitigen Anerkennung der Ergebnisse spezifiziert für Accreditation (EA), des International Accreditation Forum (IAF) und des International Laboratory Accreditation Cooperation (ILAC). Die Unterzeichner dieser Abkommen erkennen ihre Akkreditierungen gegenseitig an.

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

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>