12.6 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:	300 kHz
Video bandwidth:	1 MHz
Span:	30 MHz / 50 MHz
Measurement procedure:	Measurement of the 99% bandwidth using the integration function of the analyzer
Trace mode:	Single count with 200 counts
Test setup:	See sub clause 7.4 – B
Measurement uncertainty	See sub clause 9

Usage:

-/-	IC
OBW is necessary for Emission Designator	

Results: antenna port 1

Frequency	99% bandwidth [MHz]				
	2412 MHz	2422 MHz	2437 MHz	2452 MHz	2462 MHz
DSSS / b – mode	13.9	13.9	13.9	13.9	13.9
OFDM / g – mode	17.1	17.1	17.1	17.1	17.1
Frequency	2417 MHz	2422 MHz	2437 MHz	2447 MHz	2457 MHz
OFDM / n HT20 – mode	18.2	18.2	18.1	18.1	18.2

Results: antenna port 2

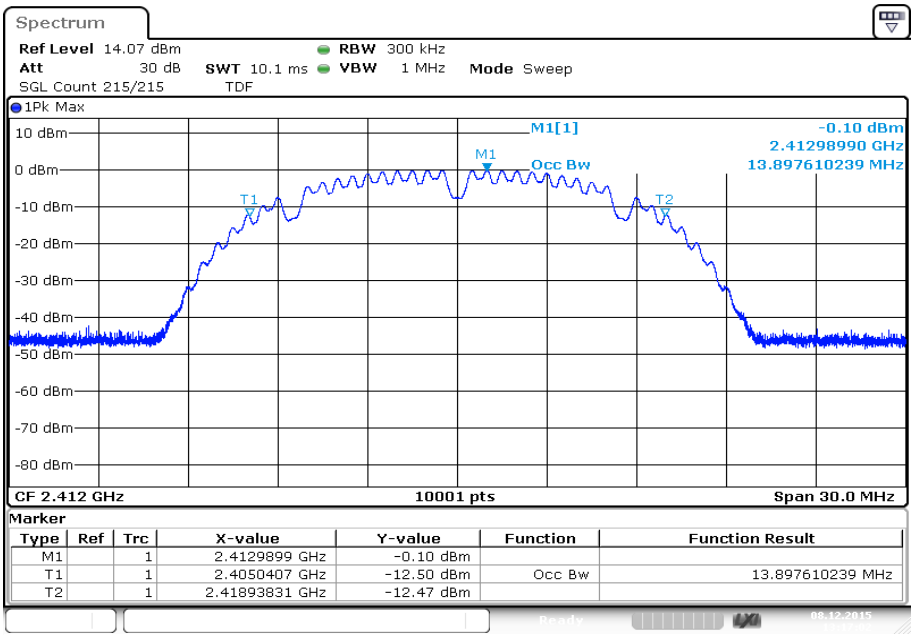
Frequency	99% bandwidth [MHz]				
	2412 MHz	2422 MHz	2437 MHz	2452 MHz	2462 MHz
DSSS / b – mode	13.9	13.9	13.9	13.9	13.9
OFDM / g – mode	17.1	17.1	17.1	17.1	17.1
Frequency	2417 MHz	2422 MHz	2437 MHz	2447 MHz	2457 MHz
OFDM / n HT20 – mode	18.1	18.1	18.1	18.1	18.1

Results: antenna port 3

Frequency	99% bandwidth [MHz]				
	2412 MHz	2422 MHz	2437 MHz	2452 MHz	2462 MHz
DSSS / b – mode	13.9	13.9	13.9	13.9	13.9
OFDM / g – mode	17.1	17.1	17.1	17.1	17.1
Frequency	2417 MHz	2422 MHz	2437 MHz	2447 MHz	2457 MHz
OFDM / n HT20 – mode	18.1	18.1	18.1	18.2	18.2

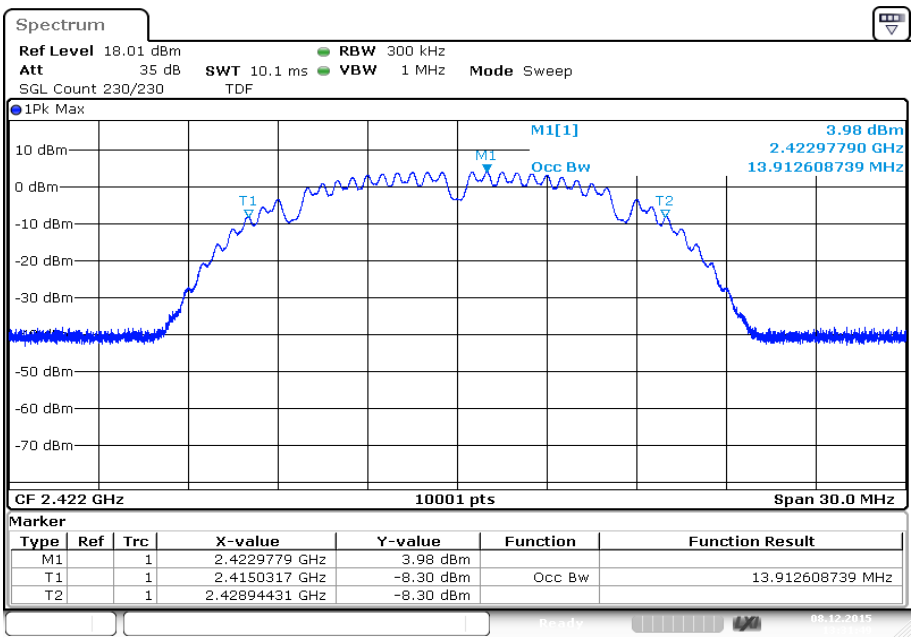
Plots: DSSS / b – mode, antenna port 1

Plot 1: 2412 MHz



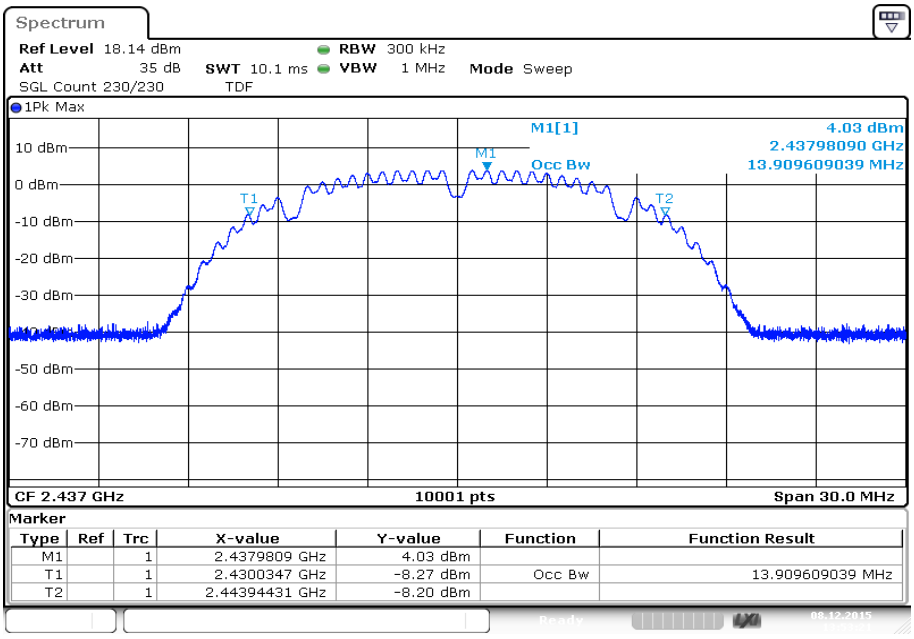
Date: 8.DEC.2015 13:17:03

Plot 2: 2422 MHz



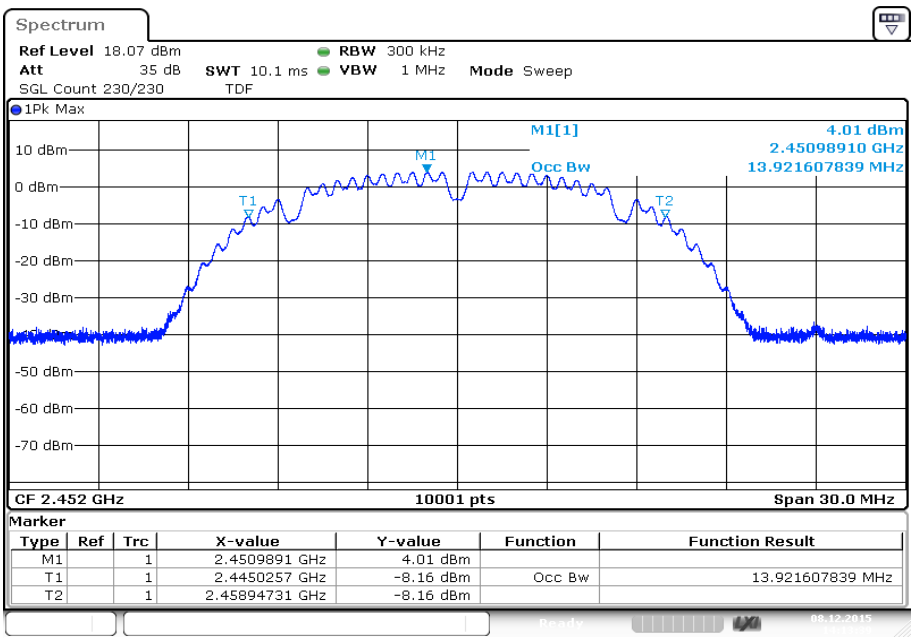
Date: 8.DEC.2015 13:31:49

Plot 3: 2437 MHz



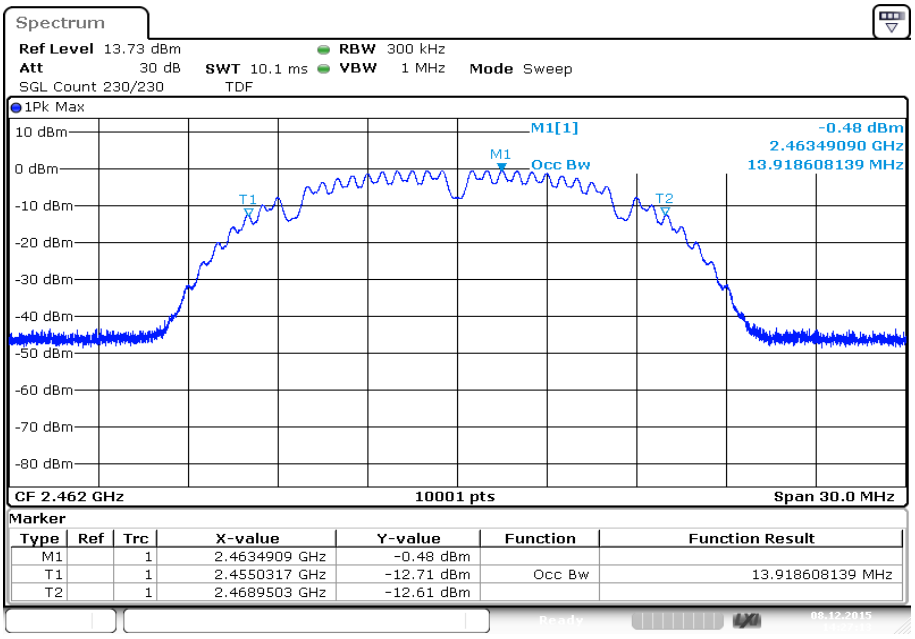
Date: 8.DEC.2015 13:53:21

Plot 4: 2452 MHz



Date: 8.DEC.2015 14:13:39

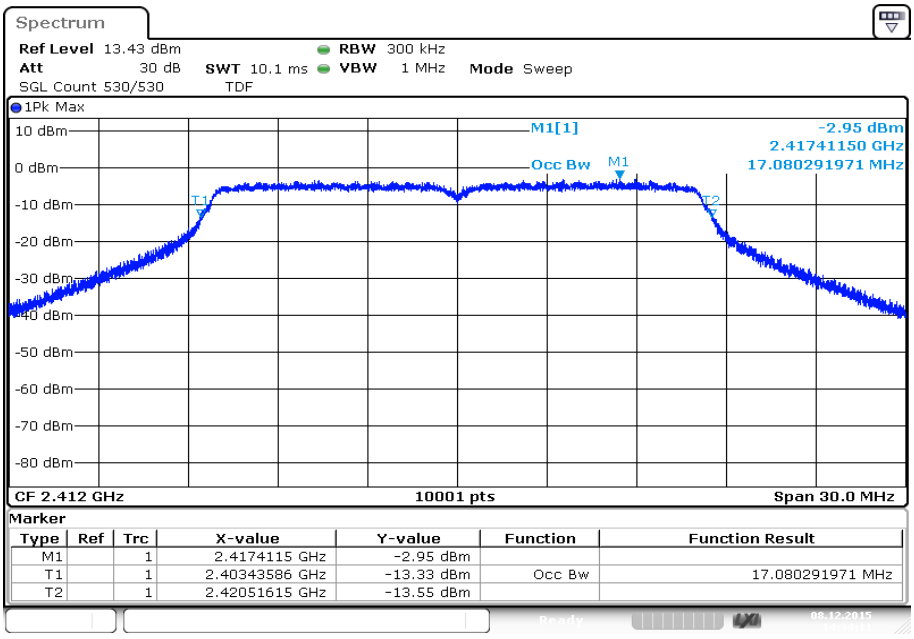
Plot 5: 2462 MHz



Date: 8.DEC.2015 14:27:14

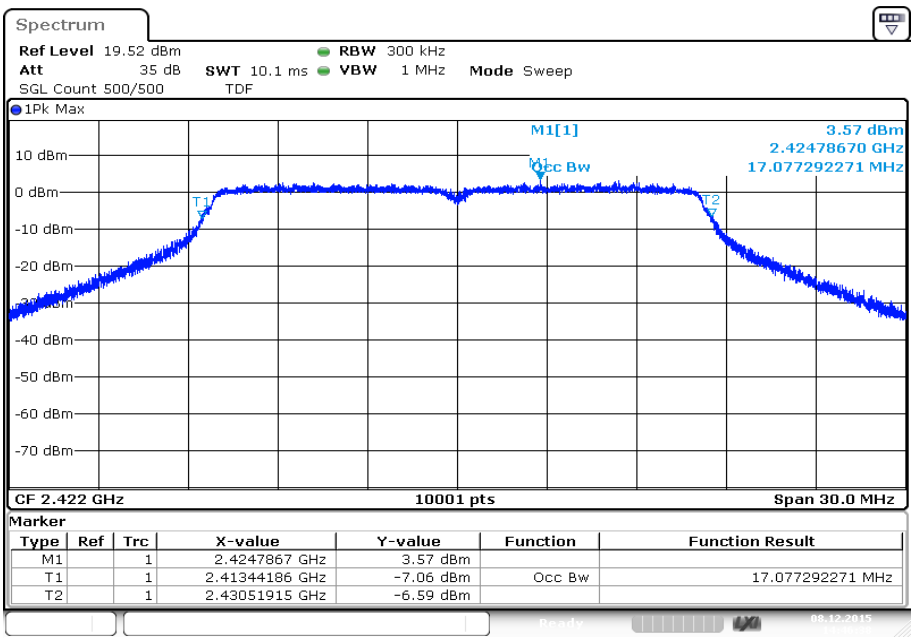
Plots: OFDM / g – mode, antenna port 1

Plot 1: 2412 MHz



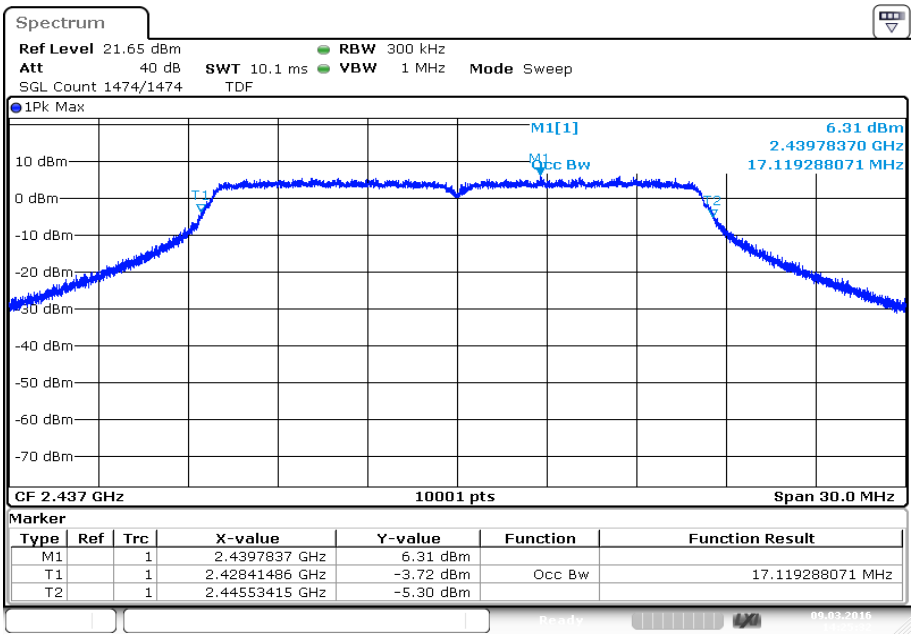
Date: 8.DEC.2015 14:34:12

Plot 2: 2422 MHz



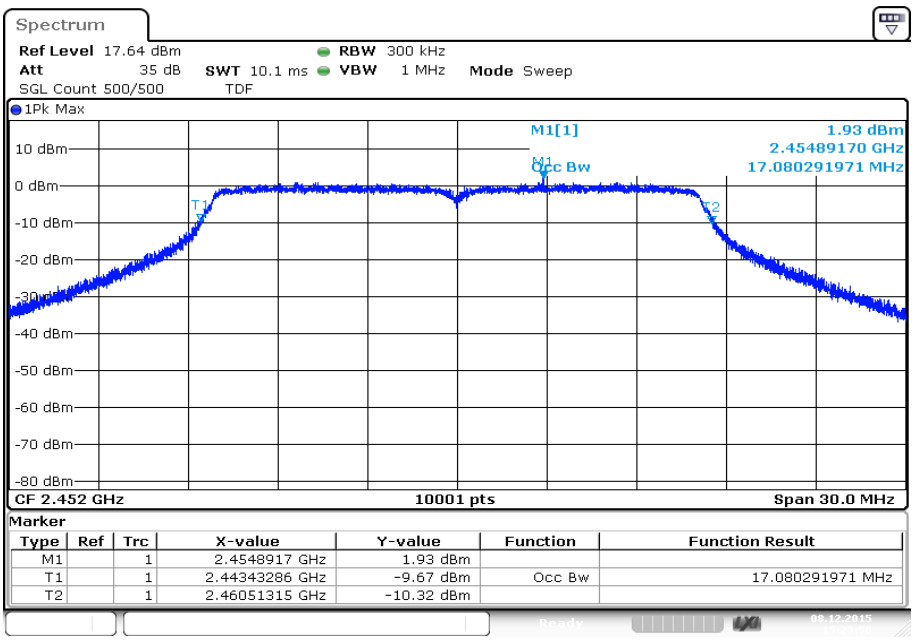
Date: 8.DEC.2015 14:46:39

Plot 3: 2437 MHz



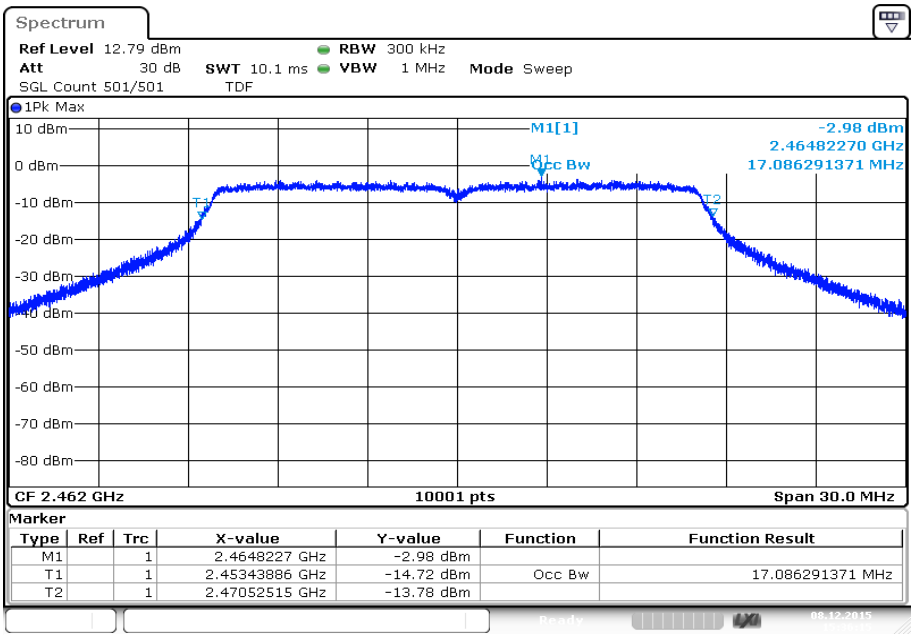
Date: 9.MAR.2016 14:25:32

Plot 4: 2452 MHz



Date: 8.DEC.2015 15:23:51

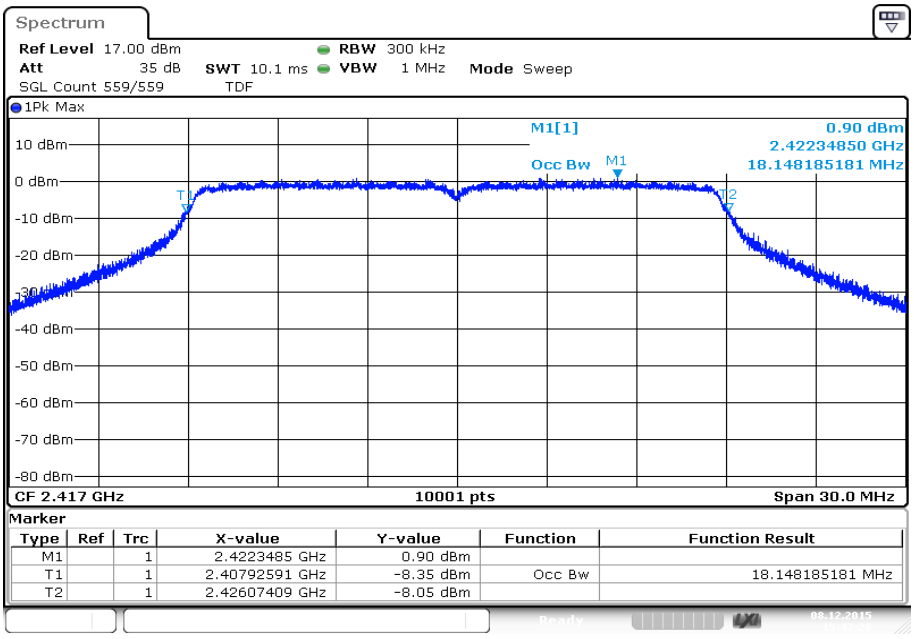
Plot 5: 2462 MHz



Date: 8.DEC.2015 15:36:16

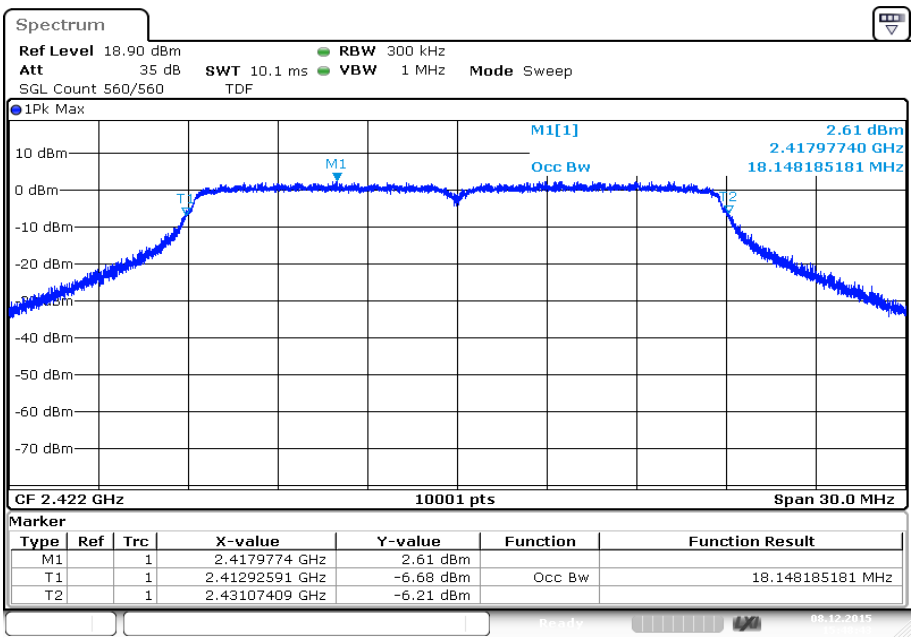
Plots: OFDM / n HT20 – mode, antenna port 1

Plot 1: 2417 MHz



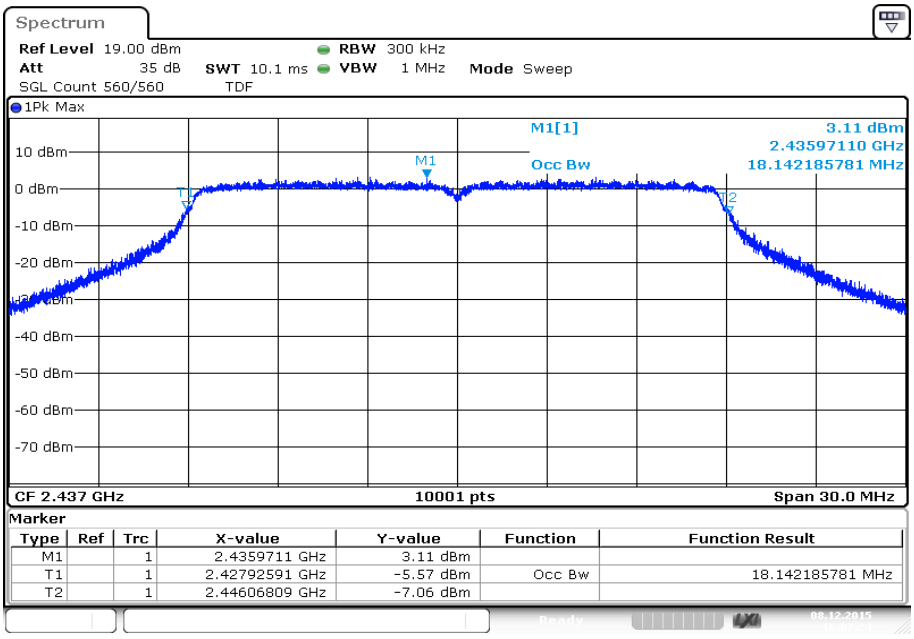
Date: 8.DEC.2015 15:42:29

Plot 2: 2422 MHz



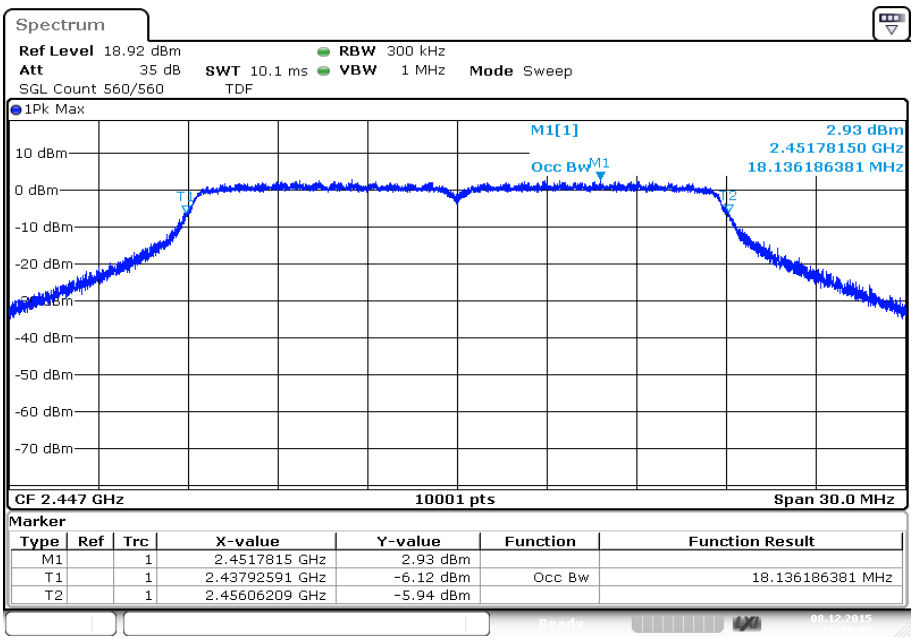
Date: 8.DEC.2015 15:48:44

Plot 3: 2437 MHz



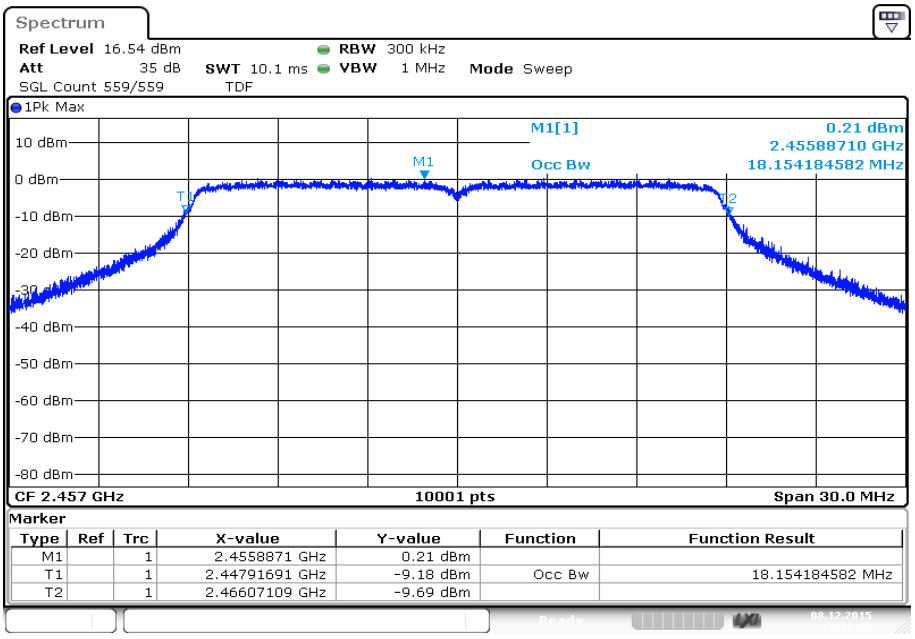
Date: 8.DEC.2015 16:07:25

Plot 4: 2447 MHz



Date: 8.DEC.2015 16:19:49

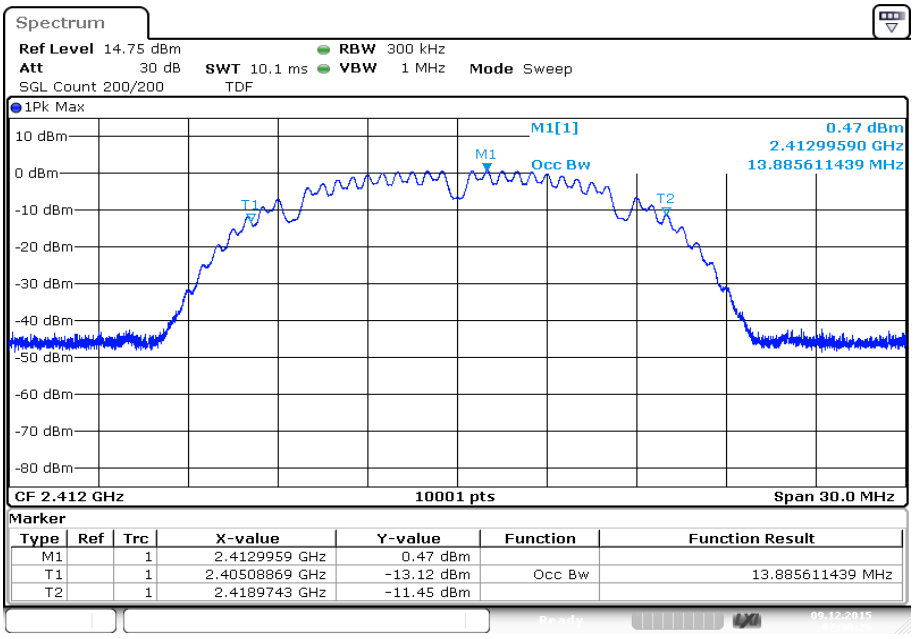
Plot 5: 2457 MHz



Date: 8.DEC.2015 16:32:16

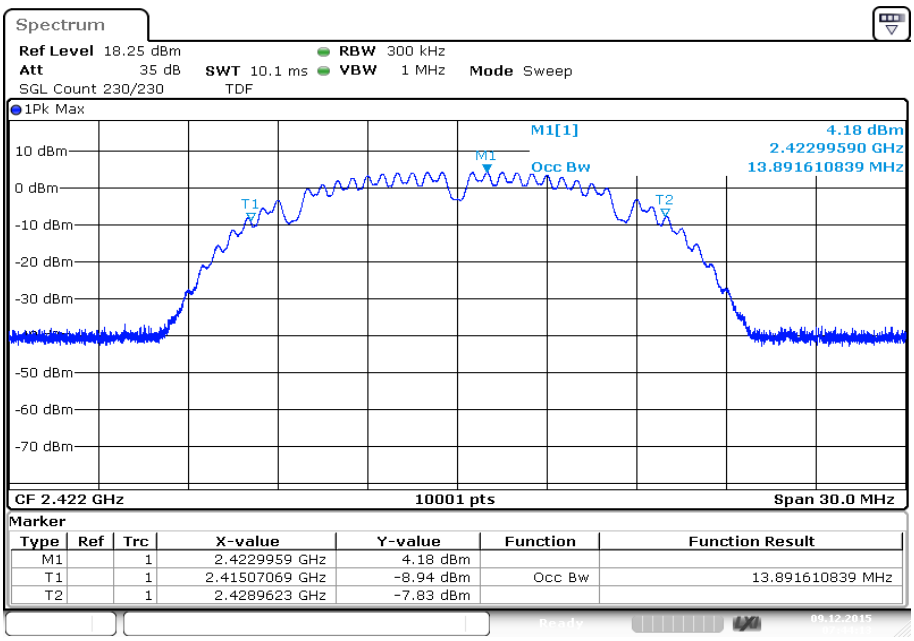
Plots: DSSS / b – mode, antenna port 2

Plot 1: 2412 MHz



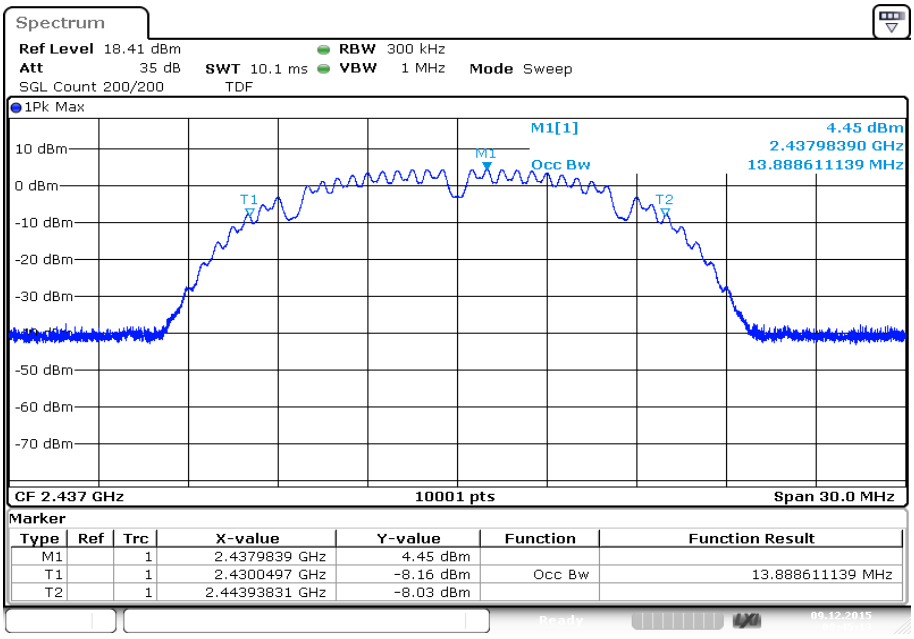
Date: 9.DEC.2015 07:30:27

Plot 2: 2422 MHz



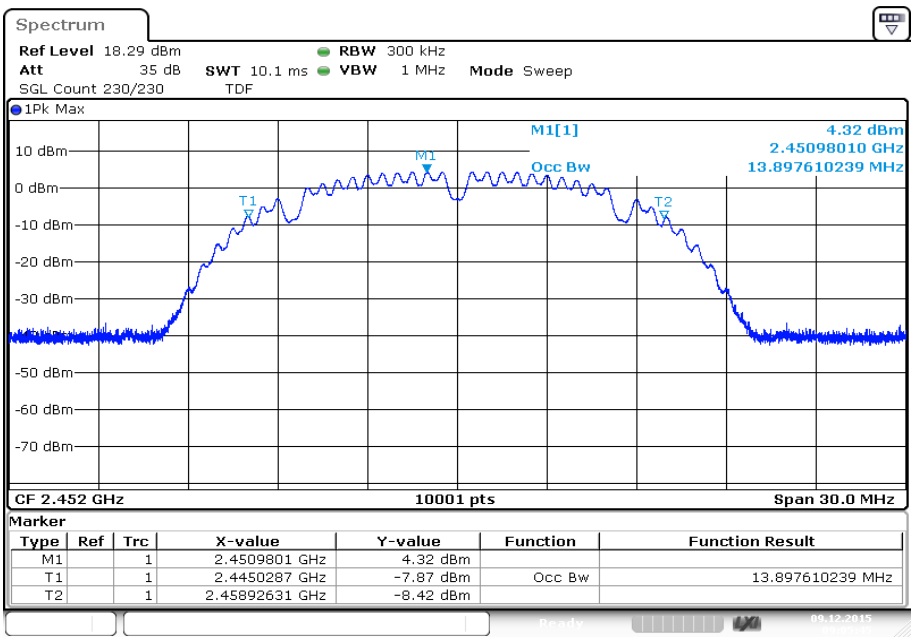
Date: 9.DEC.2015 07:44:13

Plot 3: 2437 MHz



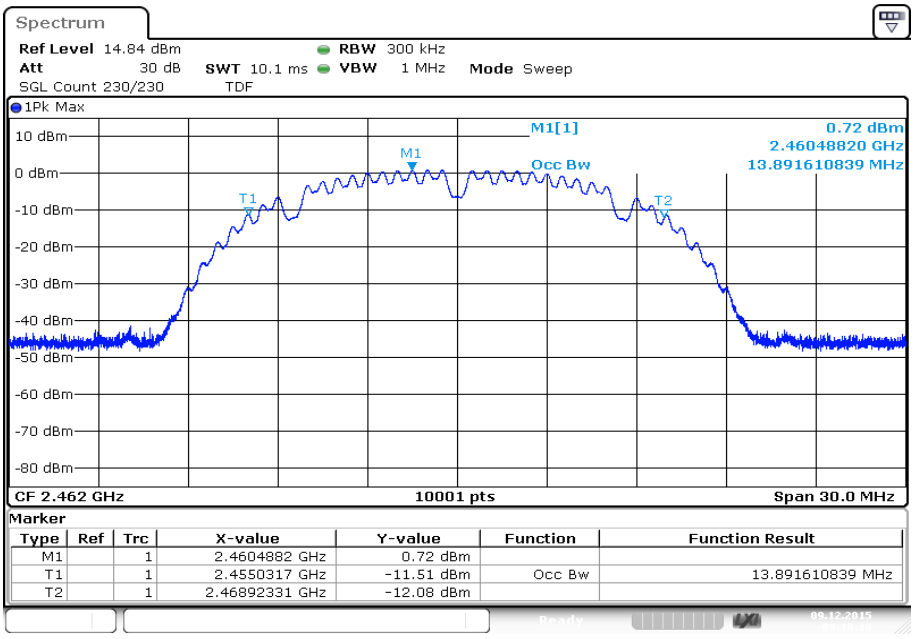
Date: 9.DEC.2015 08:45:14

Plot 4: 2452 MHz



Date: 9.DEC.2015 09:05:46

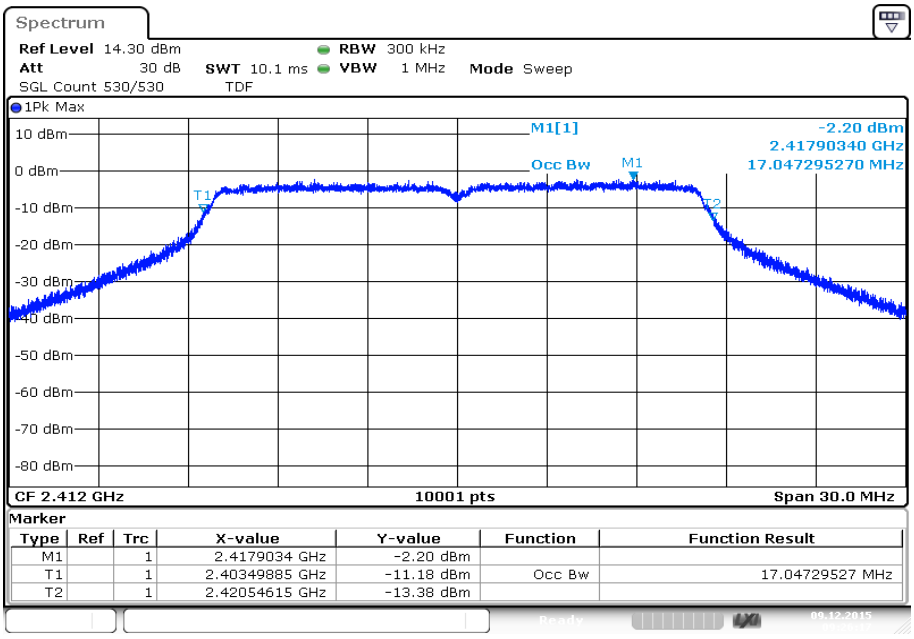
Plot 5: 2462 MHz



Date: 9.DEC.2015 09:19:19

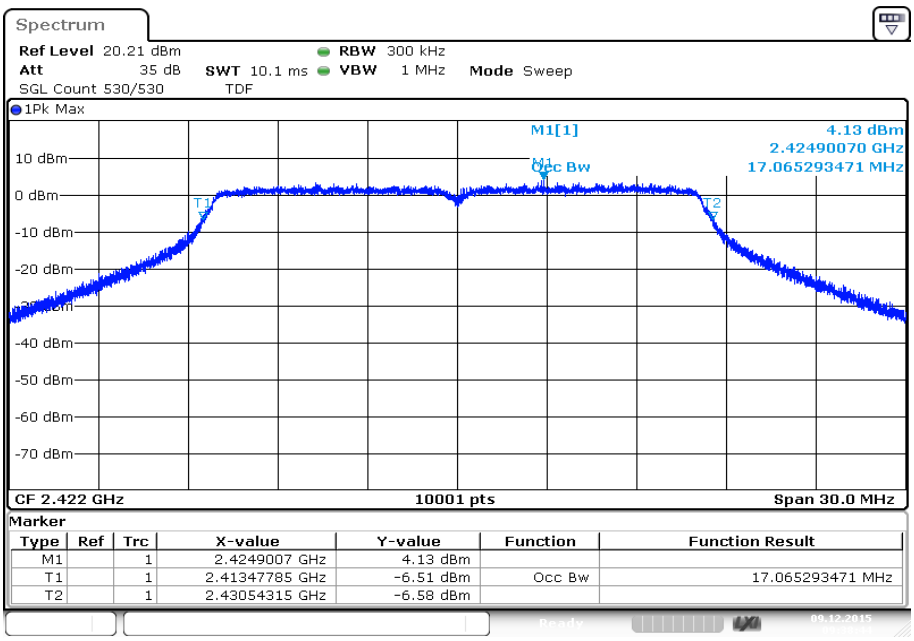
Plots: OFDM / g – mode, antenna port 2

Plot 1: 2412 MHz



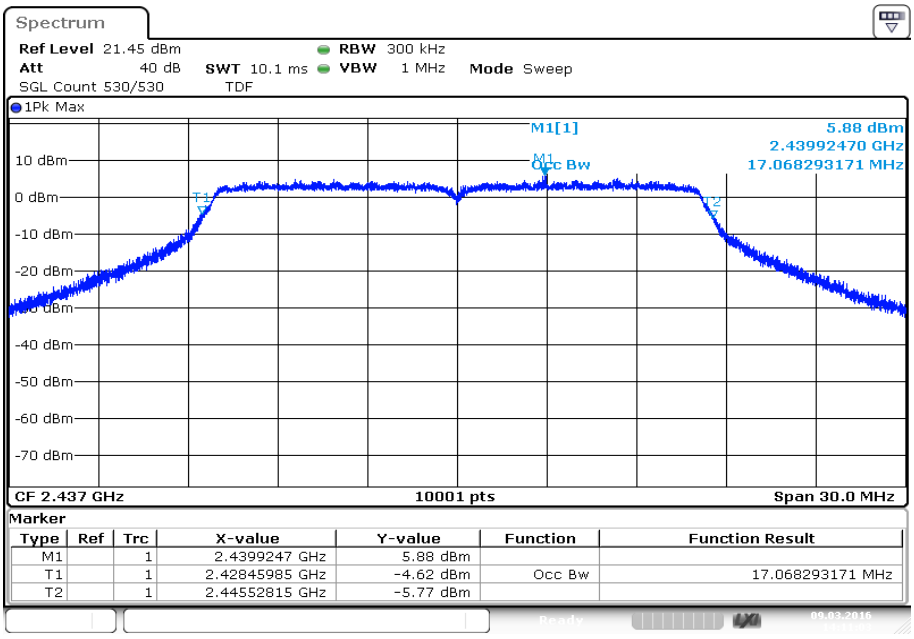
Date: 9.DEC.2015 09:26:18

Plot 2: 2422 MHz



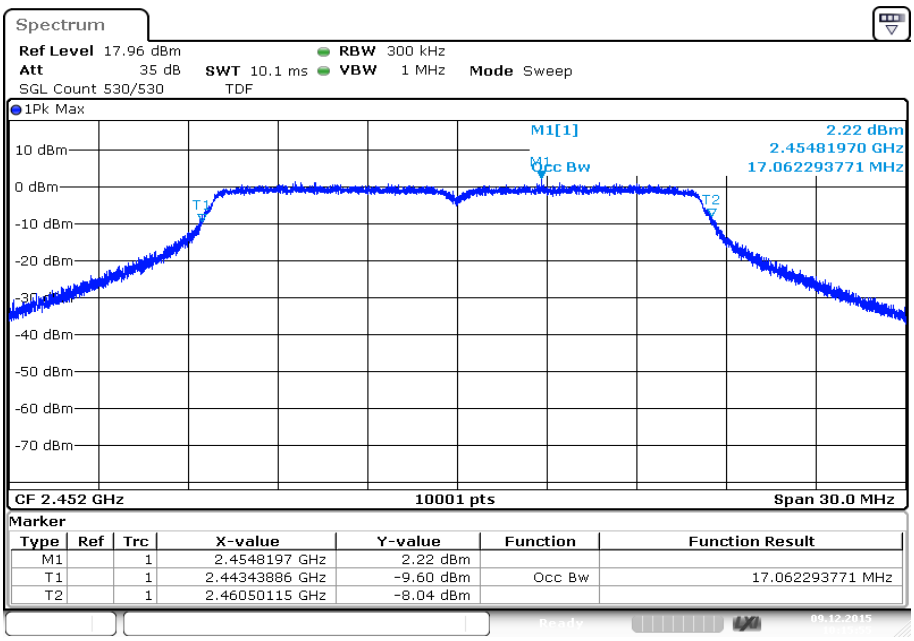
Date: 9.DEC.2015 09:38:45

Plot 3: 2437 MHz



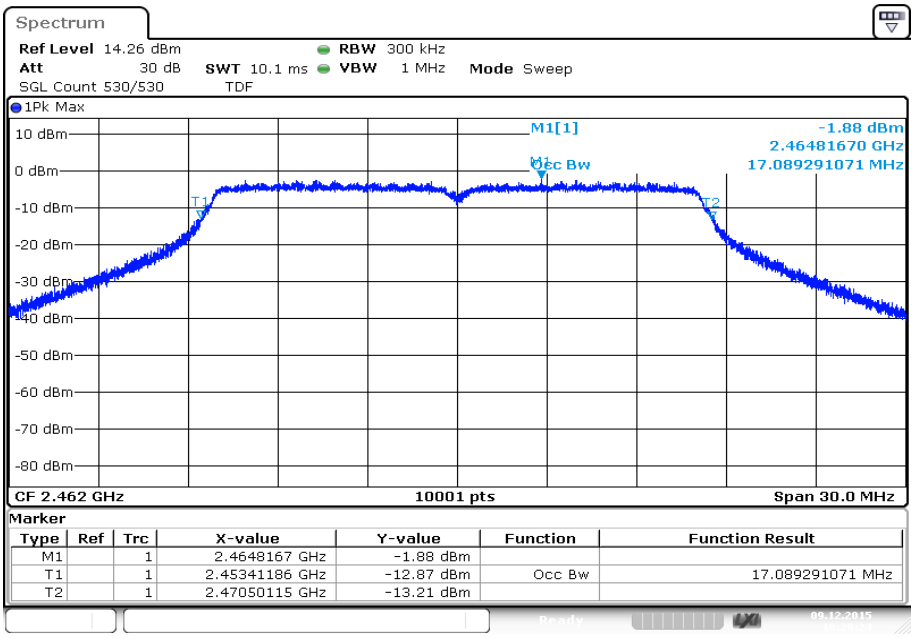
Date: 9.MAR.2016 14:11:03

Plot 4: 2452 MHz



Date: 9.DEC.2015 10:15:56

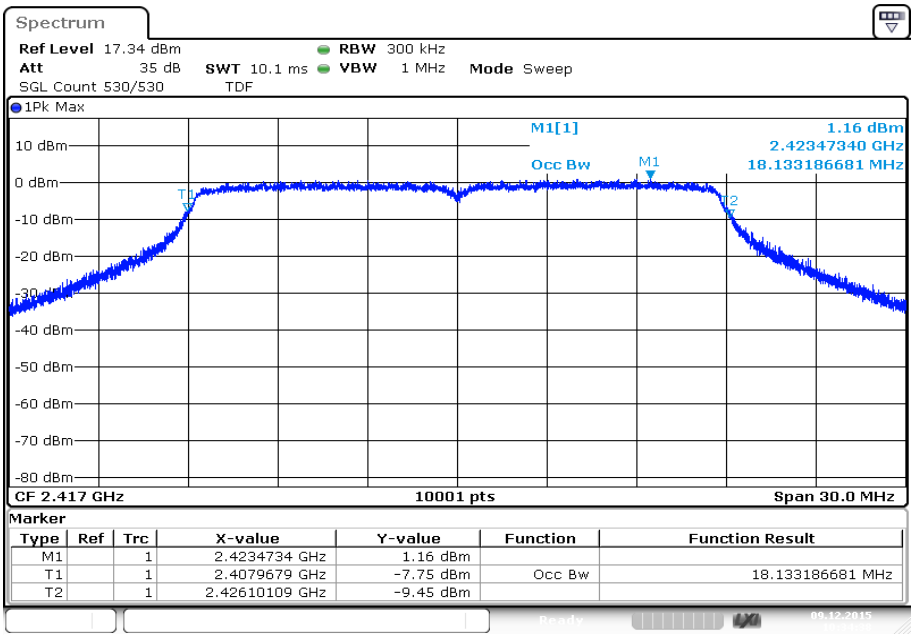
Plot 5: 2462 MHz



Date: 9.DEC.2015 10:28:25

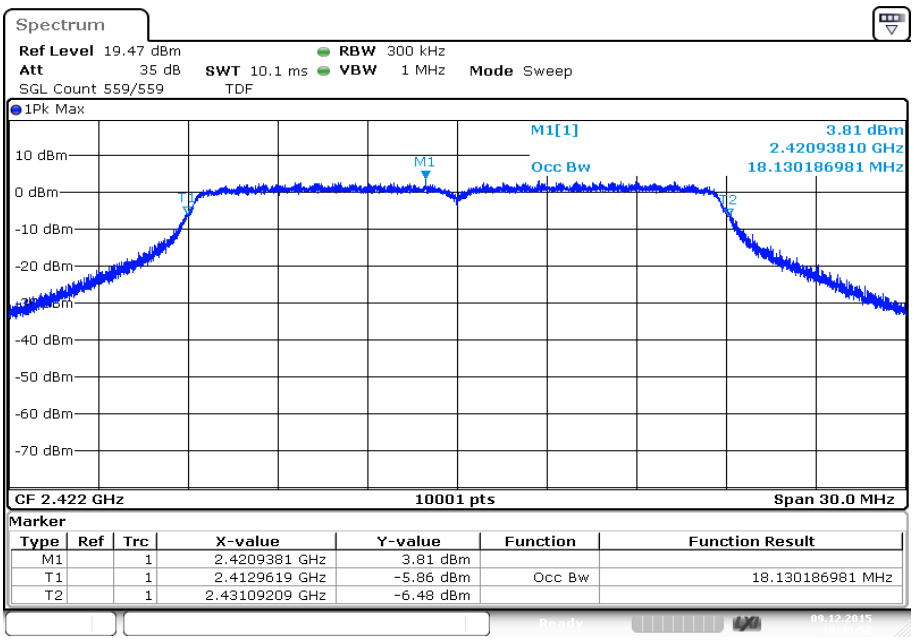
Plots: OFDM / n HT20 – mode, antenna port 2

Plot 1: 2417 MHz



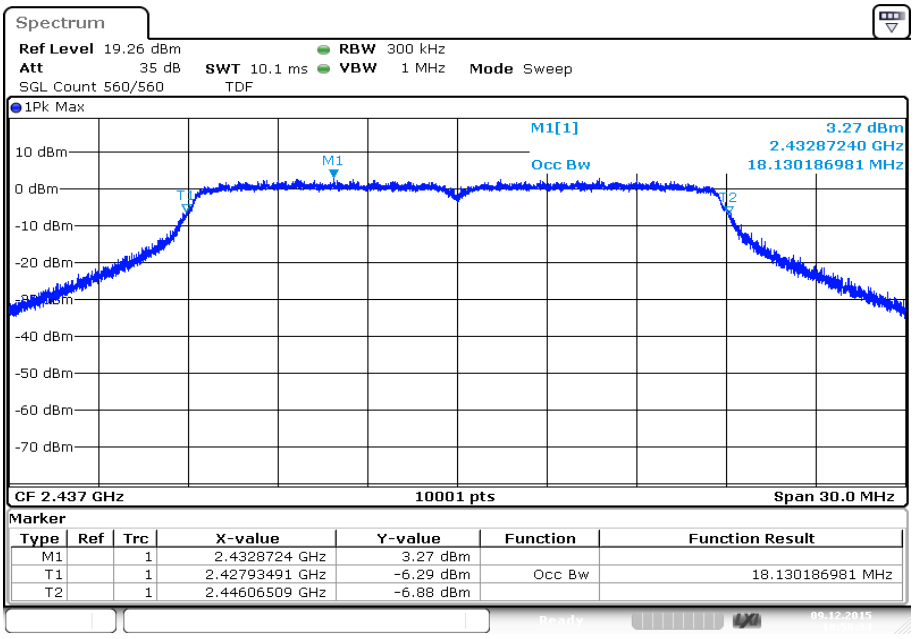
Date: 9.DEC.2015 10:34:39

Plot 2: 2422 MHz



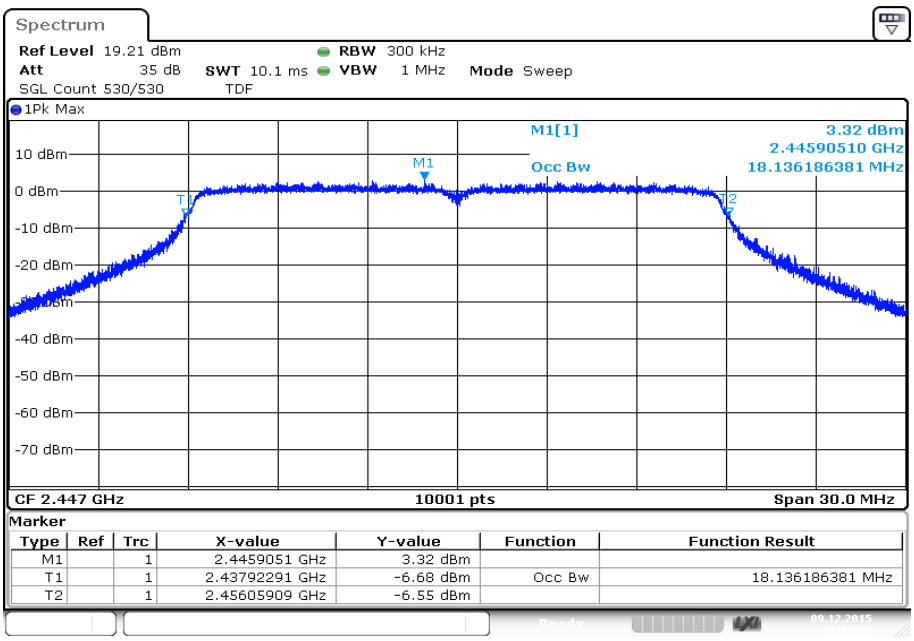
Date: 9.DEC.2015 10:40:53

Plot 3: 2437 MHz



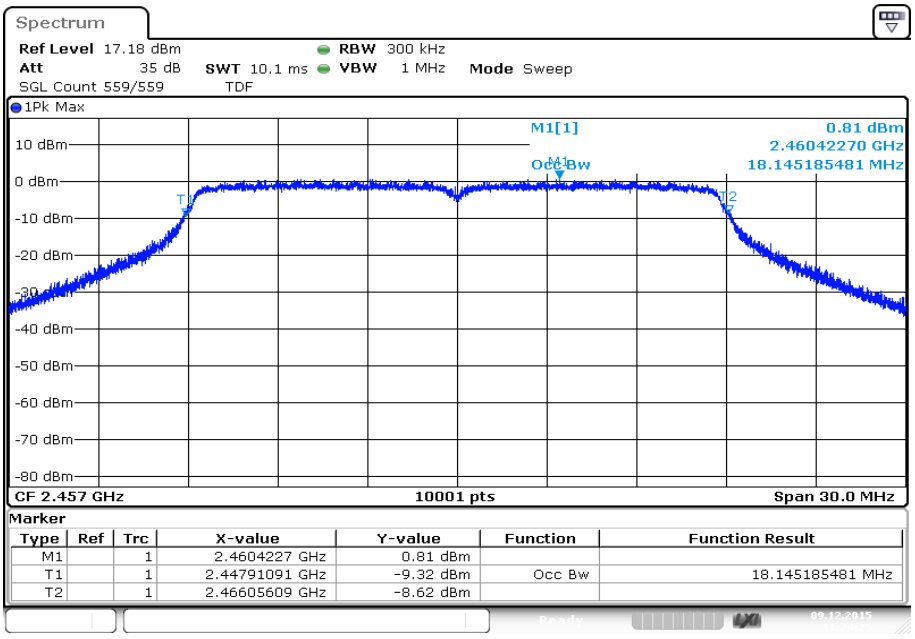
Date: 9.DEC.2015 10:59:34

Plot 4: 2447 MHz



Date: 9.DEC.2015 11:12:00

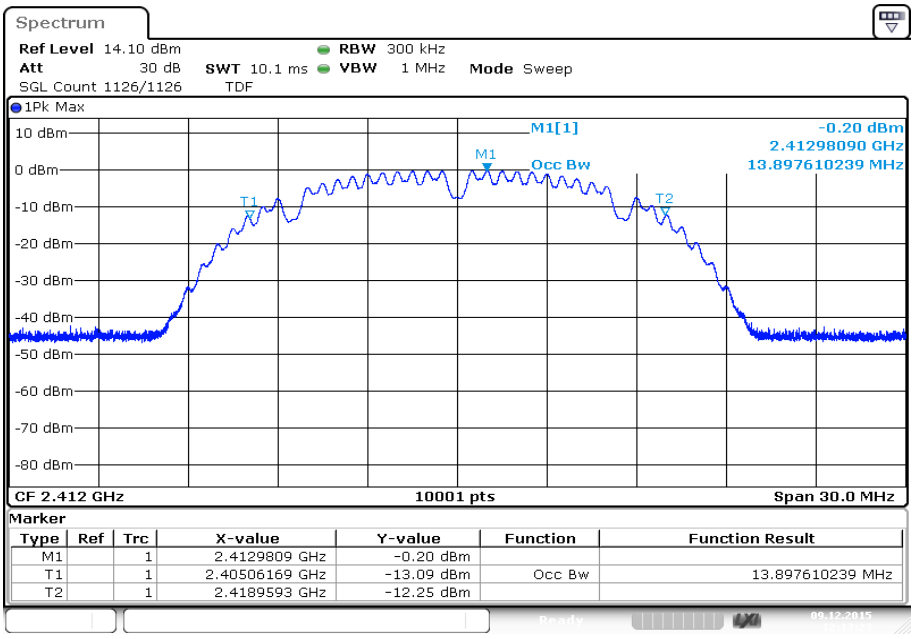
Plot 5: 2457 MHz



Date: 9.DEC.2015 11:24:26

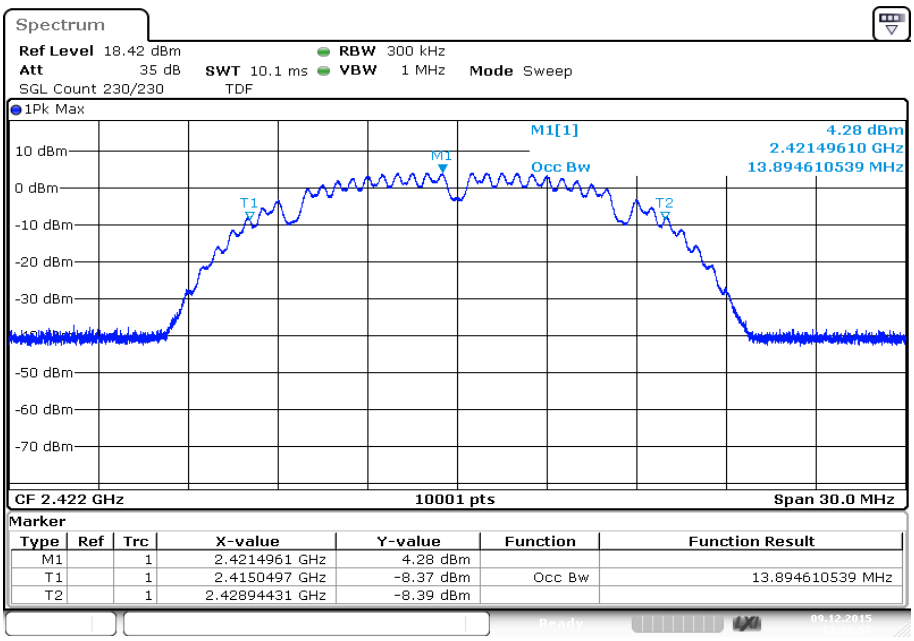
Plots: DSSS / b – mode, antenna port 3

Plot 1: 2412 MHz



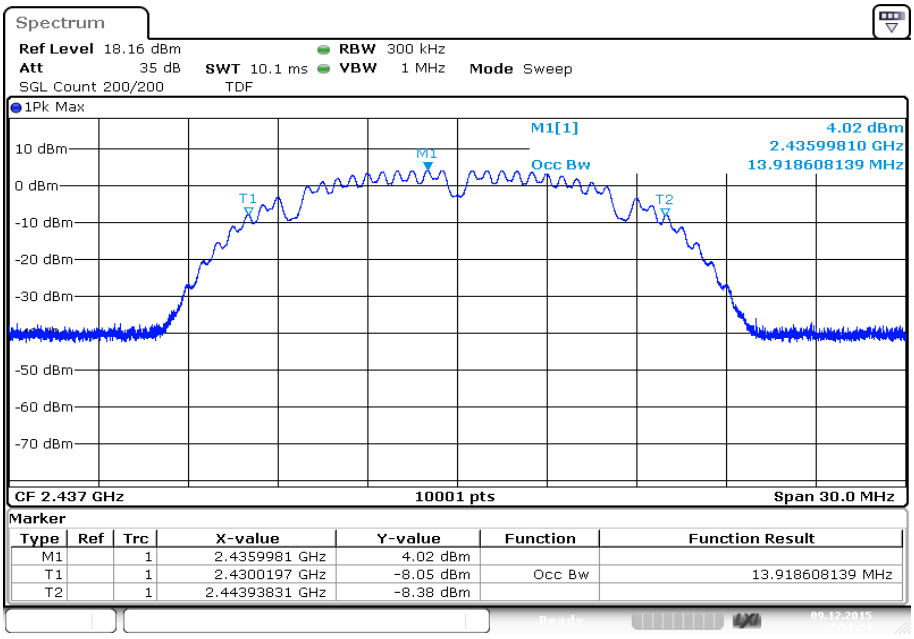
Date: 9.DEC.2015 12:13:24

Plot 2: 2422 MHz



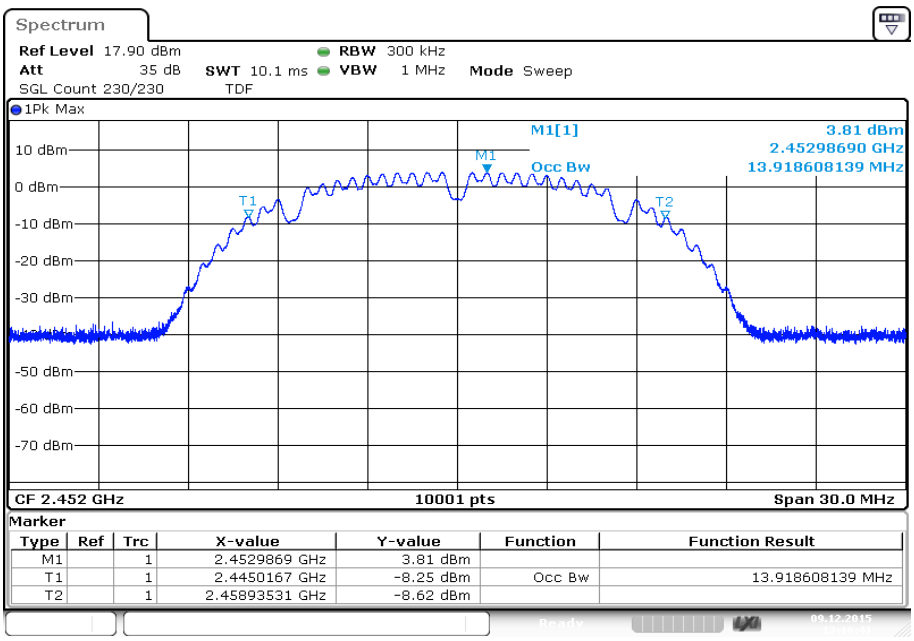
Date: 9.DEC.2015 12:28:58

Plot 3: 2437 MHz



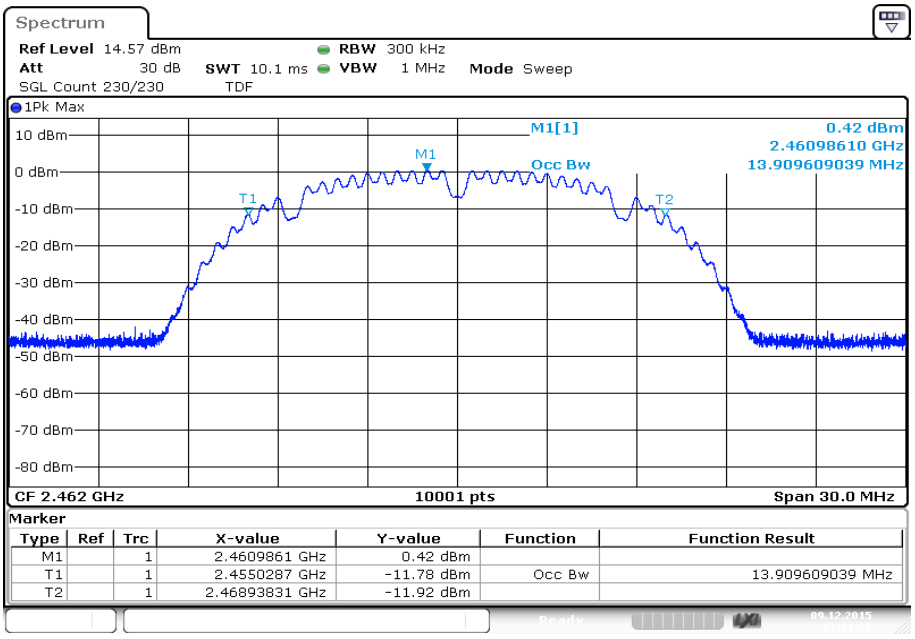
Date: 9.DEC.2015 12:51:25

Plot 4: 2452 MHz



Date: 9.DEC.2015 13:16:42

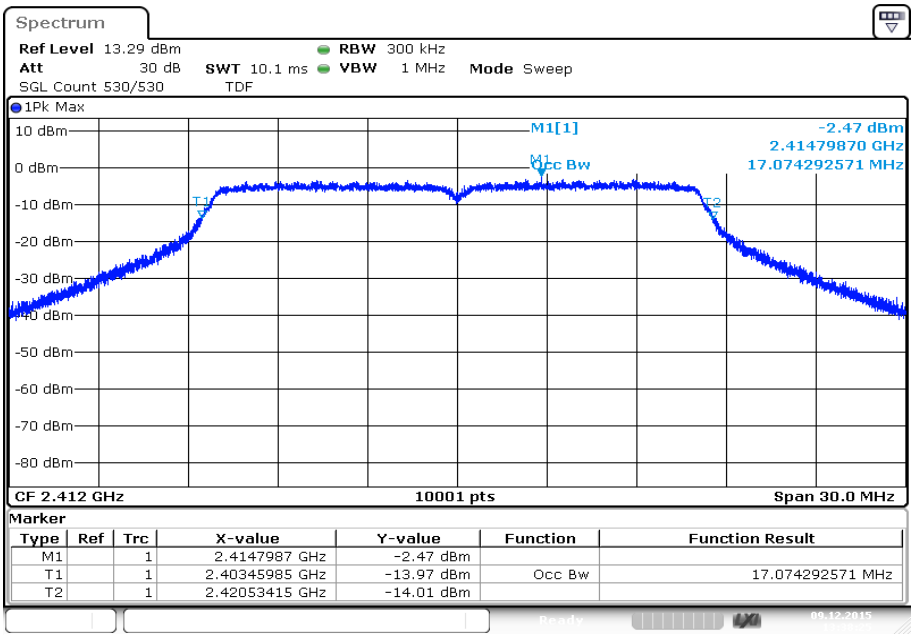
Plot 5: 2462 MHz



Date: 9.DEC.2015 13:31:28

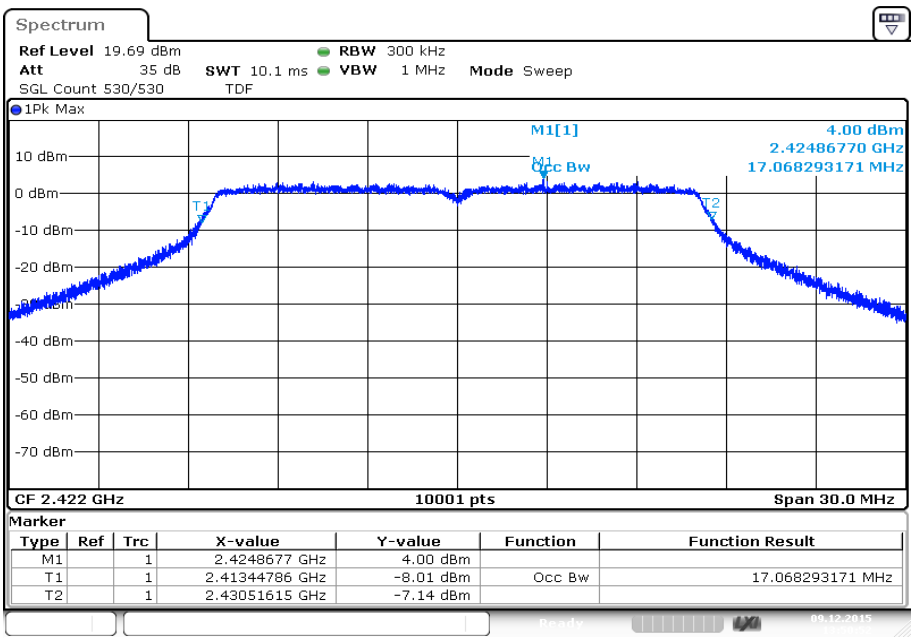
Plots: OFDM / g – mode, antenna port 3

Plot 1: 2412 MHz



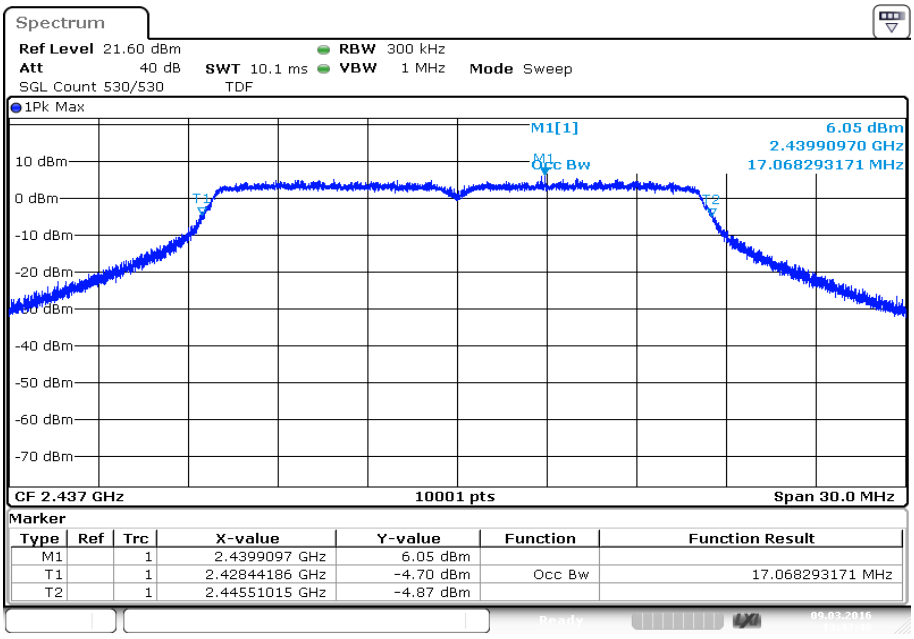
Date: 9.DEC.2015 13:38:26

Plot 2: 2422 MHz



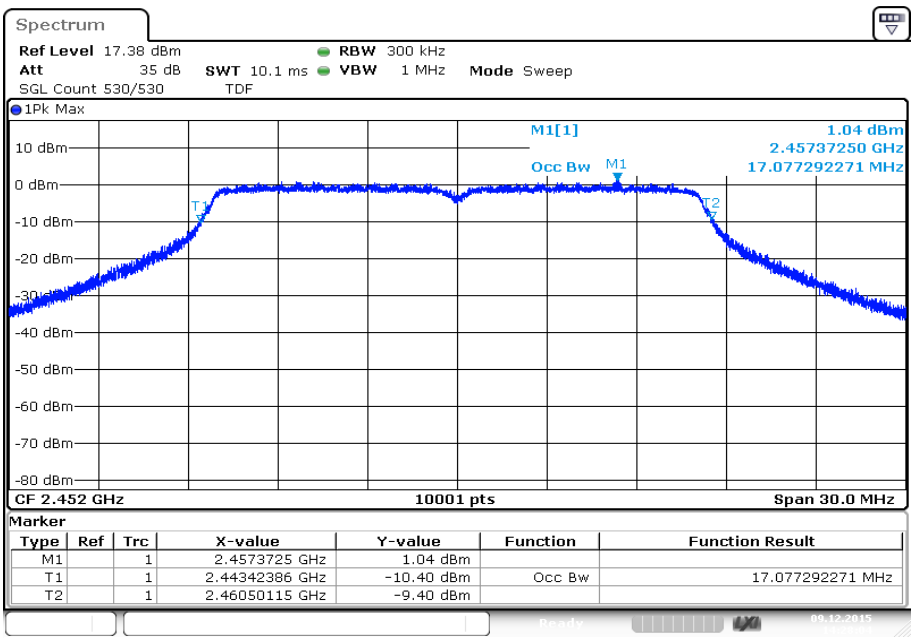
Date: 9.DEC.2015 13:50:53

Plot 3: 2437 MHz



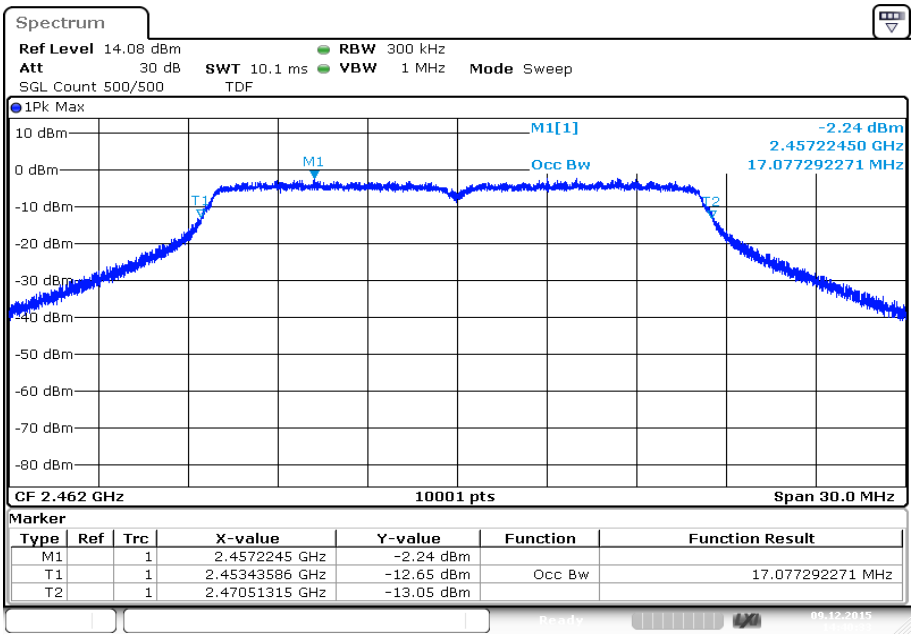
Date: 9.MAR.2016 13:43:49

Plot 4: 2452 MHz



Date: 9.DEC.2015 14:28:05

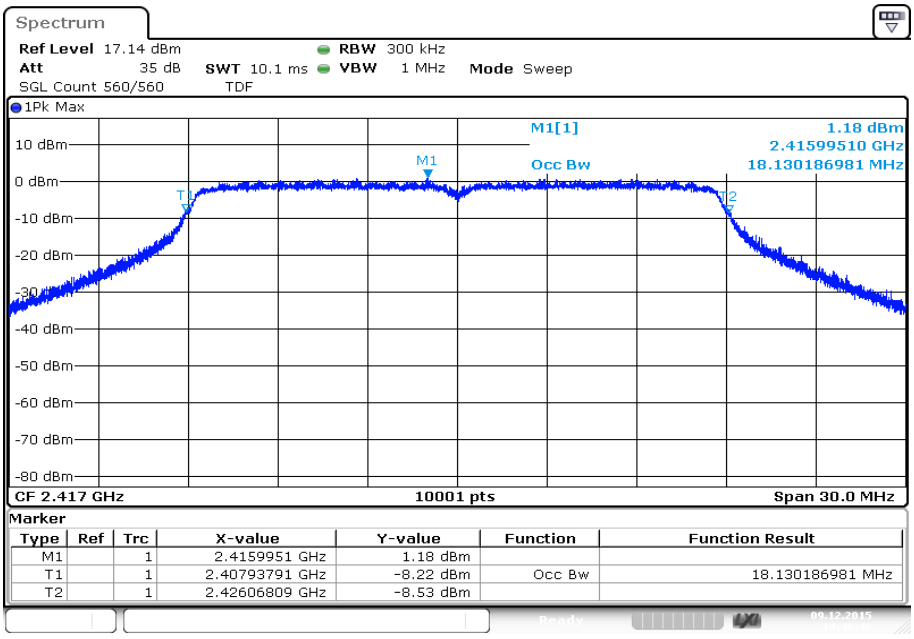
Plot 5: 2462 MHz



Date: 9.DEC.2015 14:40:33

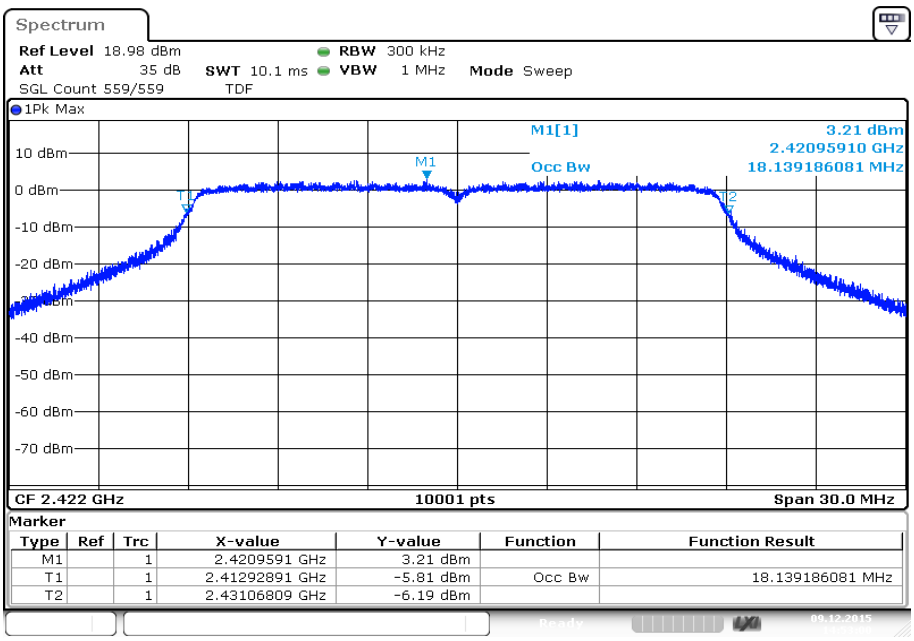
Plots: OFDM / n HT20 – mode, antenna port 3

Plot 1: 2417 MHz



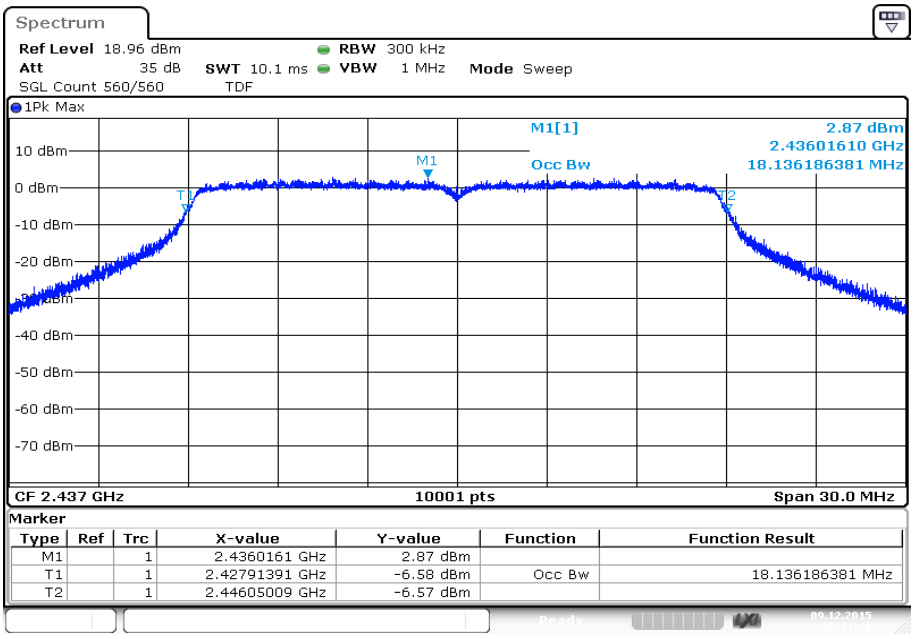
Date: 9.DEC.2015 14:46:46

Plot 2: 2422 MHz



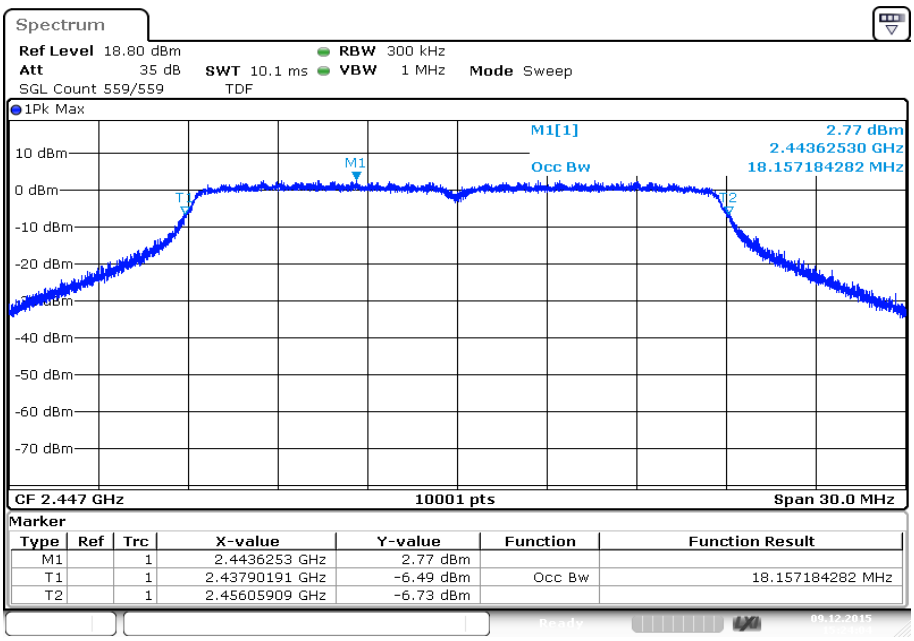
Date: 9.DEC.2015 14:53:00

Plot 3: 2437 MHz



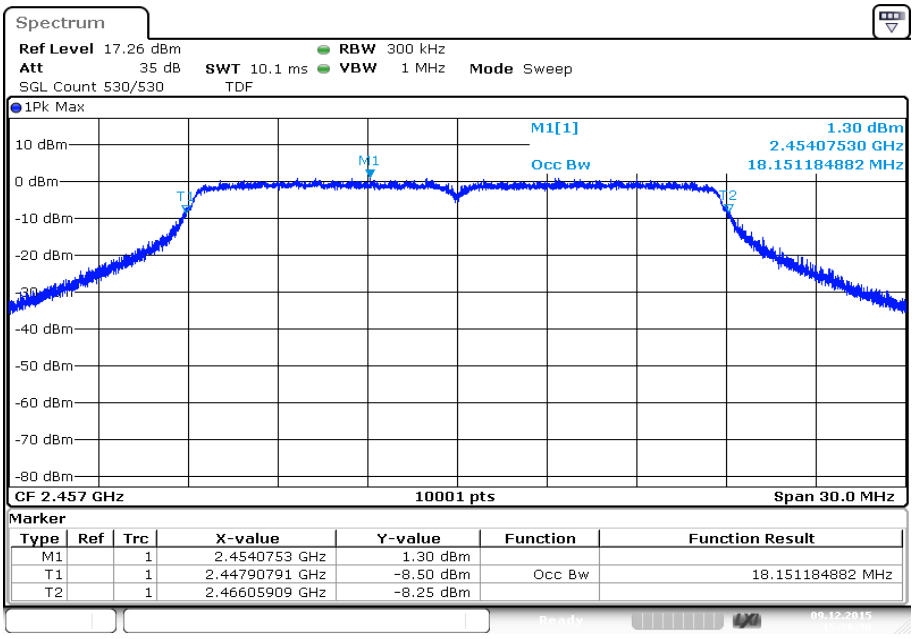
Date: 9.DEC.2015 15:11:39

Plot 4: 2447 MHz



Date: 9.DEC.2015 15:24:05

Plot 5: 2457 MHz



Date: 9.DEC.2015 15:36:31

12.7 Band edge compliance radiated

Description:

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

Measurement:

Measurement parameter for peak measurements	
Detector:	Peak / RMS
Sweep time:	Auto
Resolution bandwidth:	1 MHz
Video bandwidth:	1 MHz
Span:	See plot!
Trace mode:	Max Hold
Test setup:	See sub clause 7.2 – D
Measurement uncertainty	See sub clause 9

Measurement parameter for average measurements	
According to DTS clause: 13.3.2	
Detector:	RMS
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Span:	2 MHz
Trace mode:	RMS Average over 101 sweeps
Test setup:	See sub clause 7.2 – D
Measurement uncertainty	See sub clause 9

Limits:

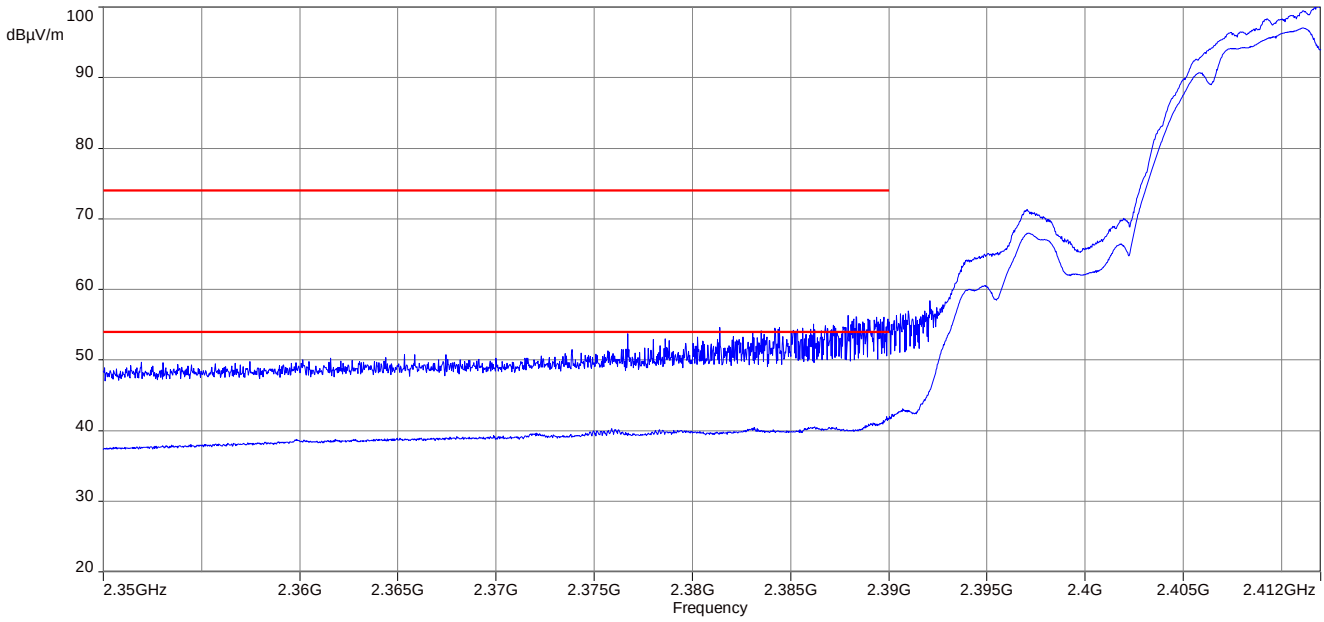
FCC	IC
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains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

Results:

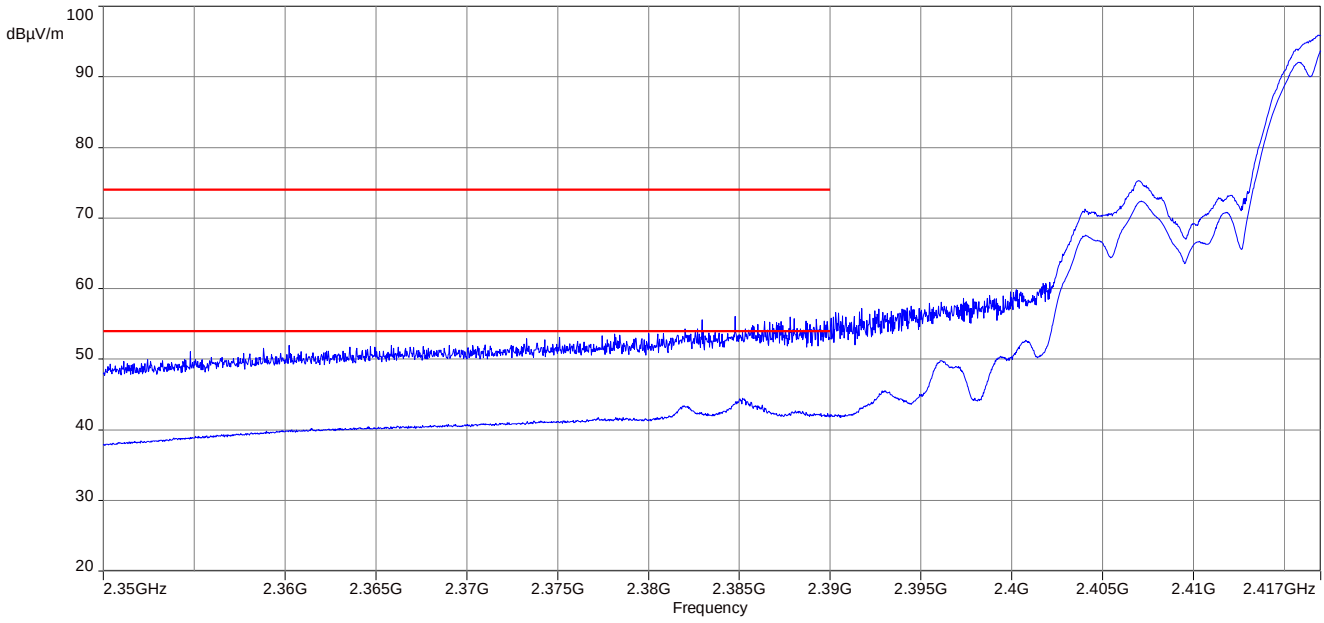
Scenario		Band edge compliance radiated [dBµV/m @ 3m]		
	TX frequency	DSSS / b – mode	OFDM / g – mode	OFDM / n HT20 – mode
Lower band edge	2412 MHz	56 dBµV/m (Peak) 42 dBµV/m (AVG)	67 dBµV/m (Peak) 50 dBµV/m (AVG)	
	2417 MHz			71 dBµV/m (Peak) 49 dBµV/m (AVG)
	2422 MHz	56 dBµV/m (Peak) 44 dBµV/m (AVG)	62 dBµV/m (Peak) 44 dBµV/m (AVG)	66 dBµV/m (Peak) 47 dBµV/m (AVG)
Upper band edge	2447 MHz		68 dBµV/m (Peak) 48 dBµV/m (AVG)	66 dBµV/m (Peak) 45 dBµV/m (AVG)
	2452 MHz	55 dBµV/m (Peak) 47 dBµV/m (AVG)		
	2457 MHz		72 dBµV/m (Peak) 53 dBµV/m (AVG)	68 dBµV/m (Peak) 50 dBµV/m (AVG)
	2462 MHz	68 dBµV/m (Peak) 42 dBµV/m (AVG)		

Plots: DSSS/ b – mode peak / average

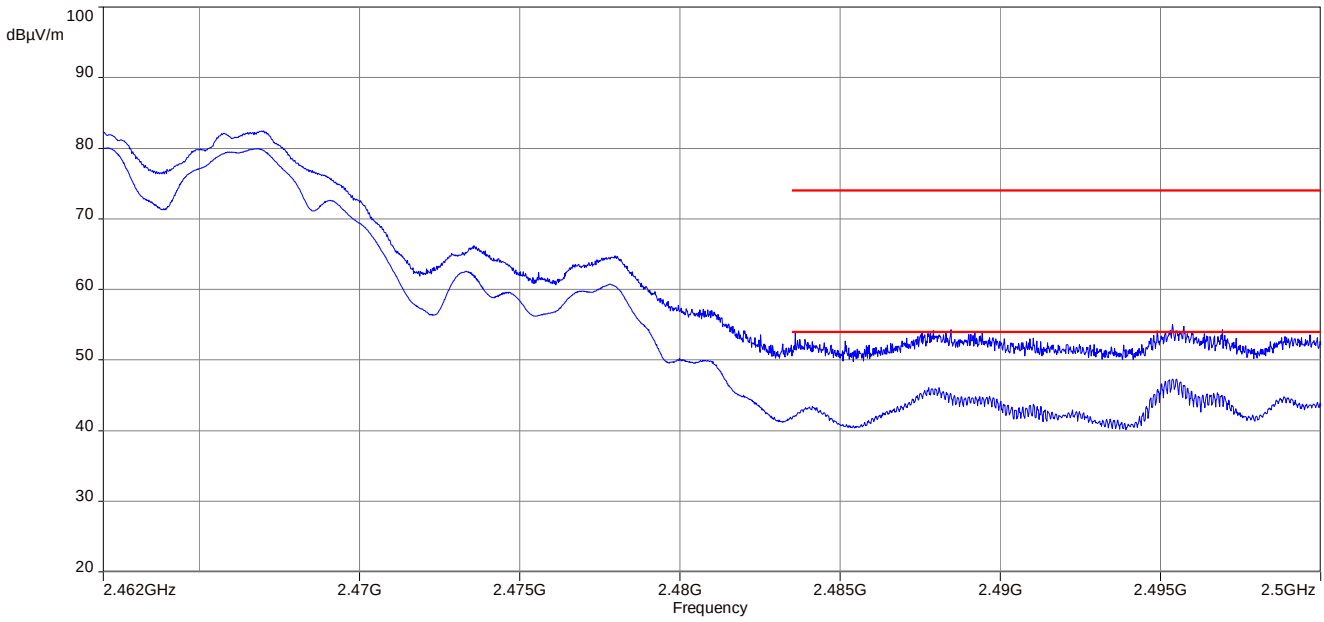
Plot 1: lower band edge, vertical & horizontal polarization, 2412 MHz, power setting 10 dBm



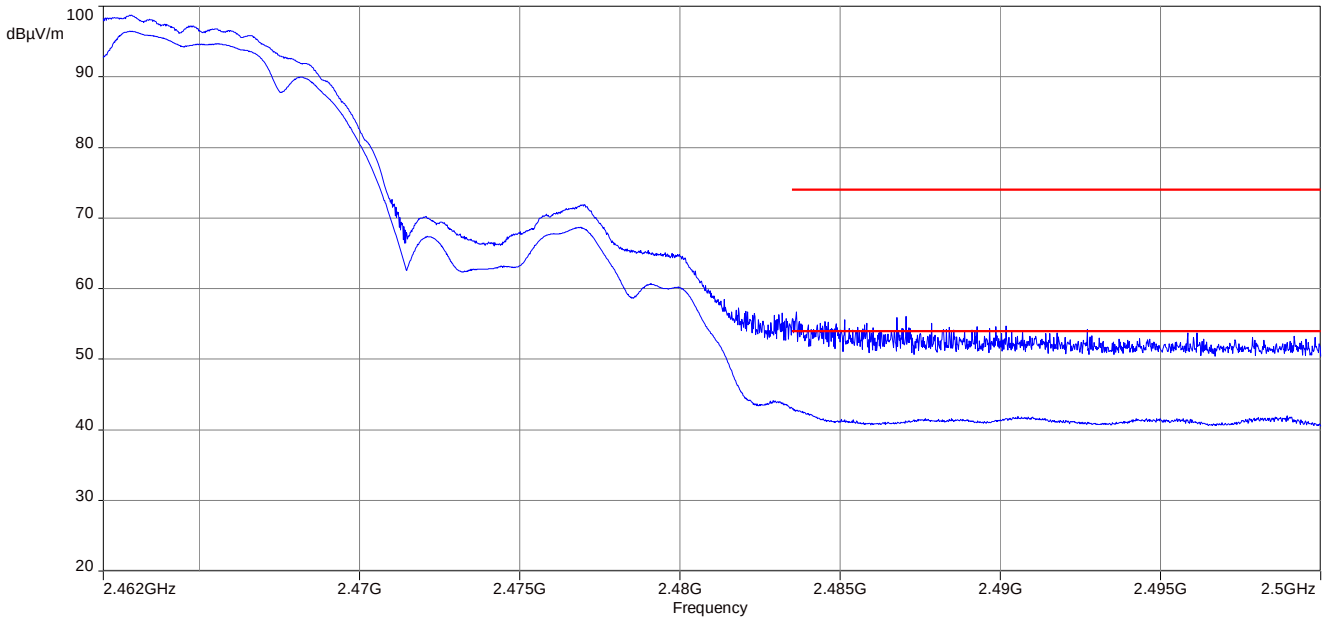
Plot 2: lower band edge, vertical & horizontal polarization, 2422 MHz, power setting 14 dBm



Plot 3: upper band edge, vertical & horizontal polarization, 2452 MHz, power setting 14 dBm

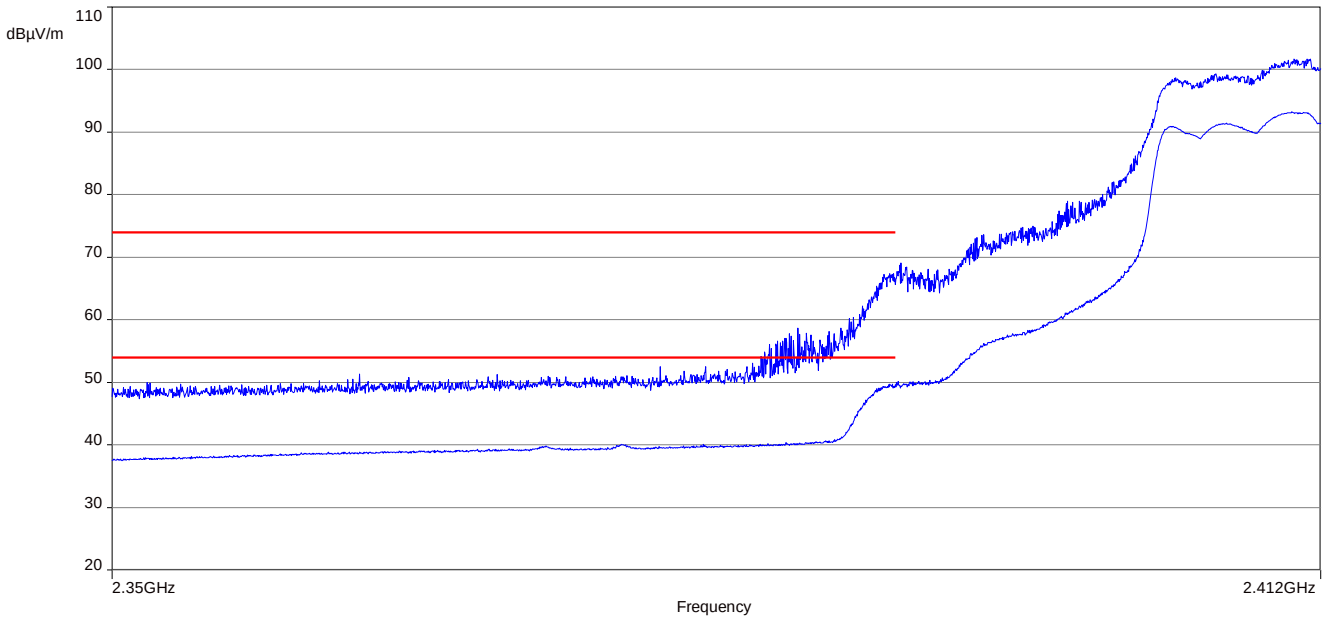


Plot 4: upper band edge, vertical & horizontal polarization, 2462 MHz, power setting 10 dBm

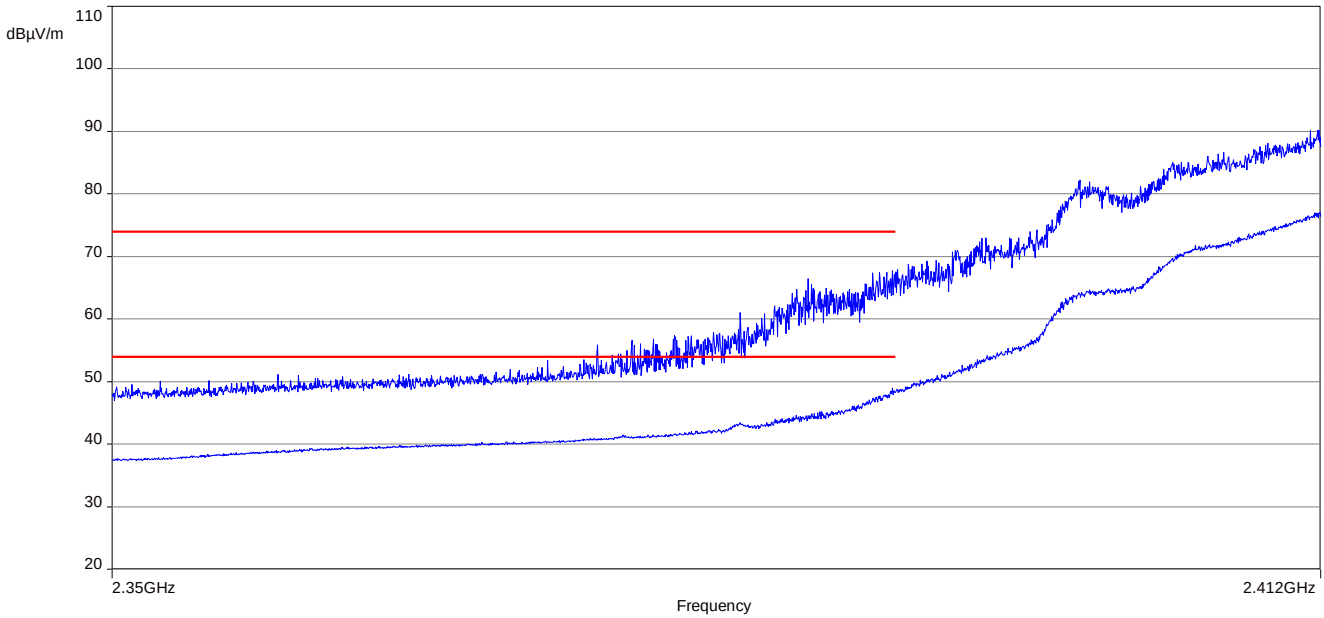


Plots: OFDM / g – mode peak / average

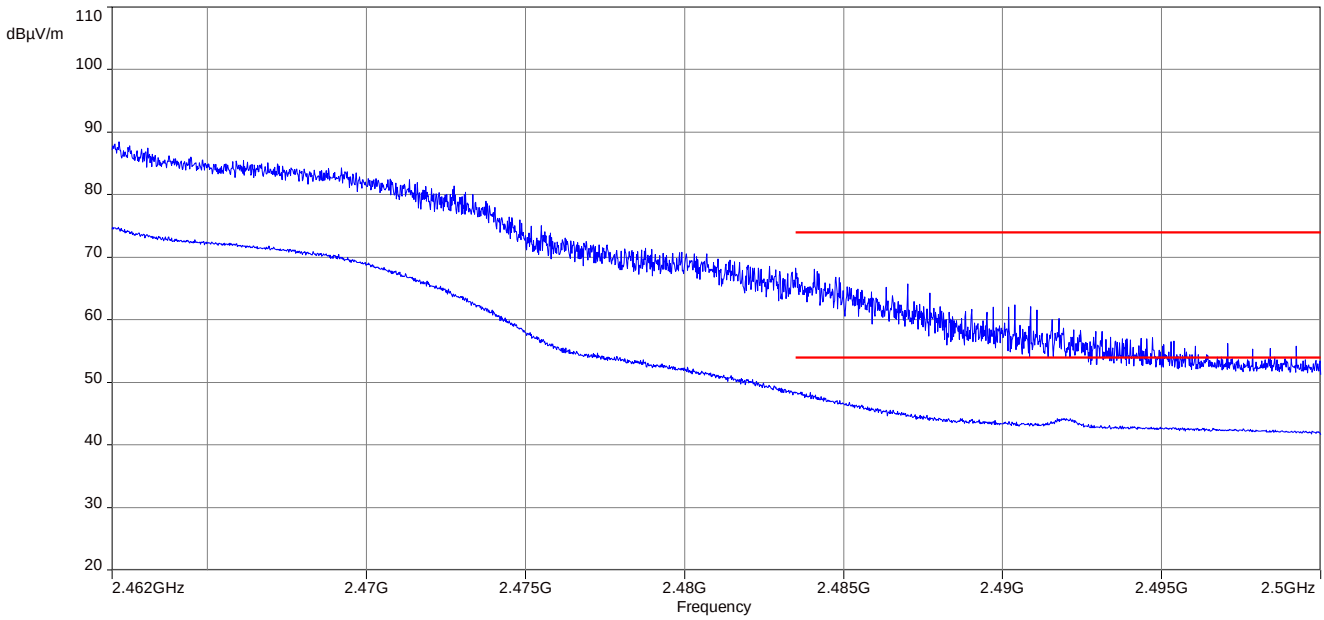
Plot 1: lower band edge, vertical & horizontal polarization, 2412 MHz, power setting 6 dBm



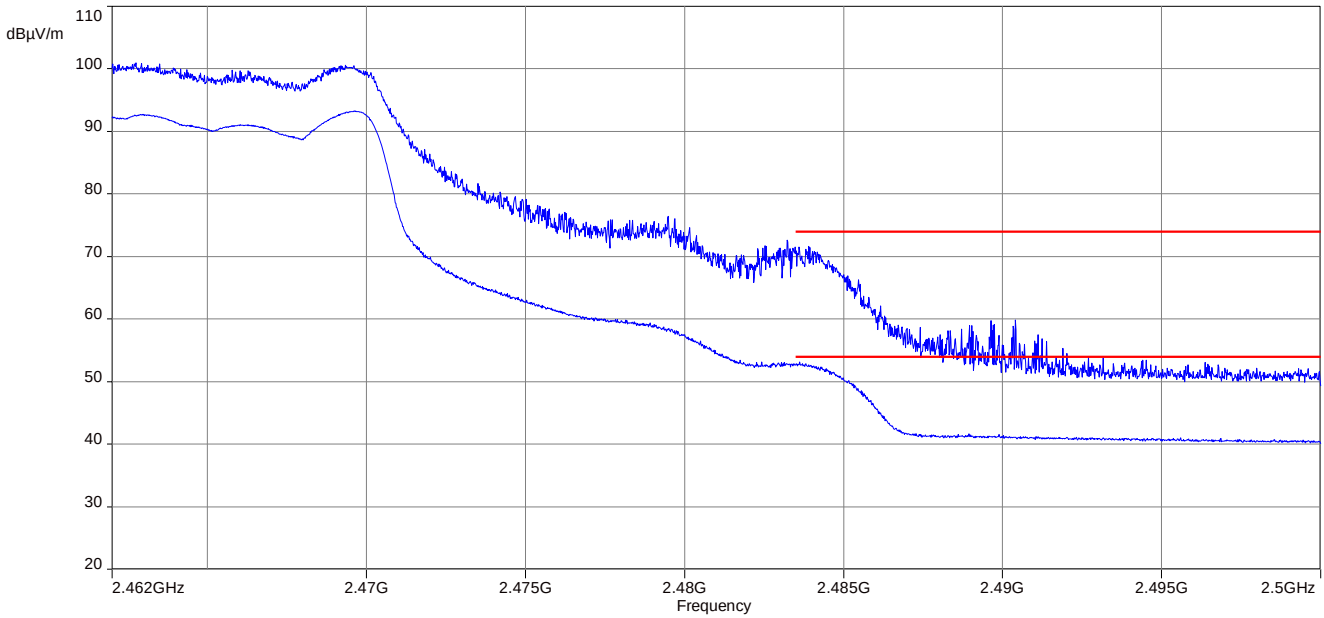
Plot 2: lower band edge, vertical & horizontal polarization, 2422 MHz, power setting 16 dBm



Plot 3: upper band edge, vertical & horizontal polarization, 2452 MHz, power setting 10 dBm

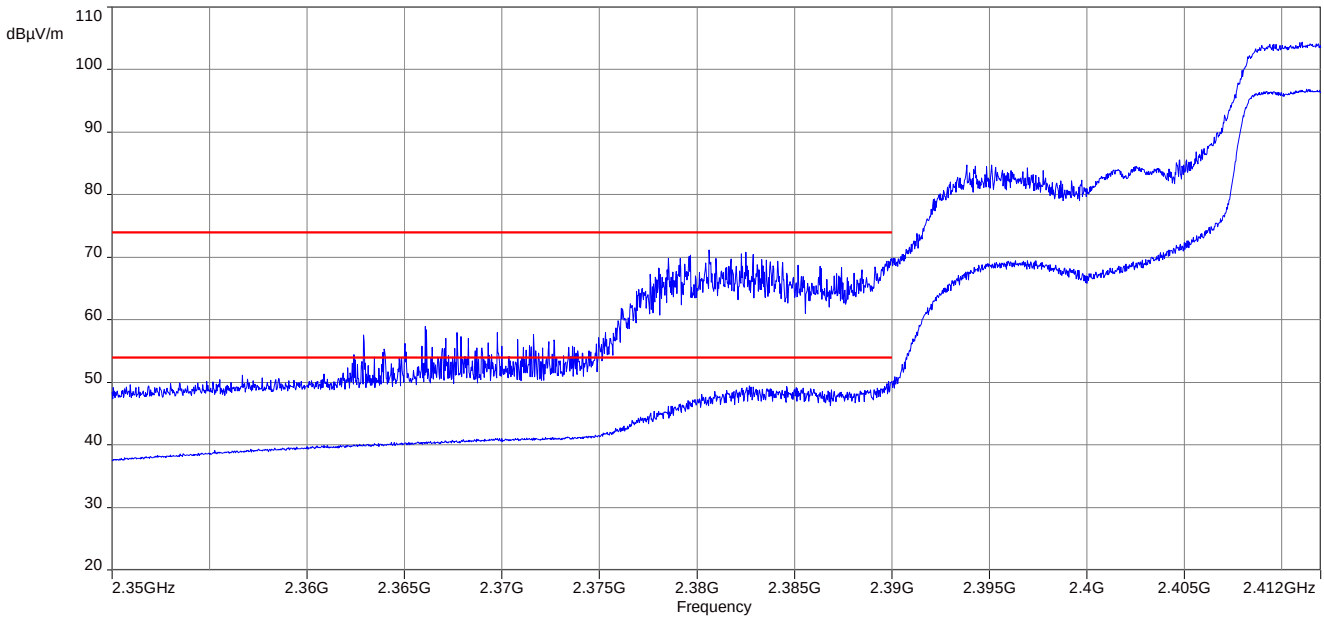


Plot 4: upper band edge, vertical & horizontal polarization, 2462 MHz, power setting 6 dBm

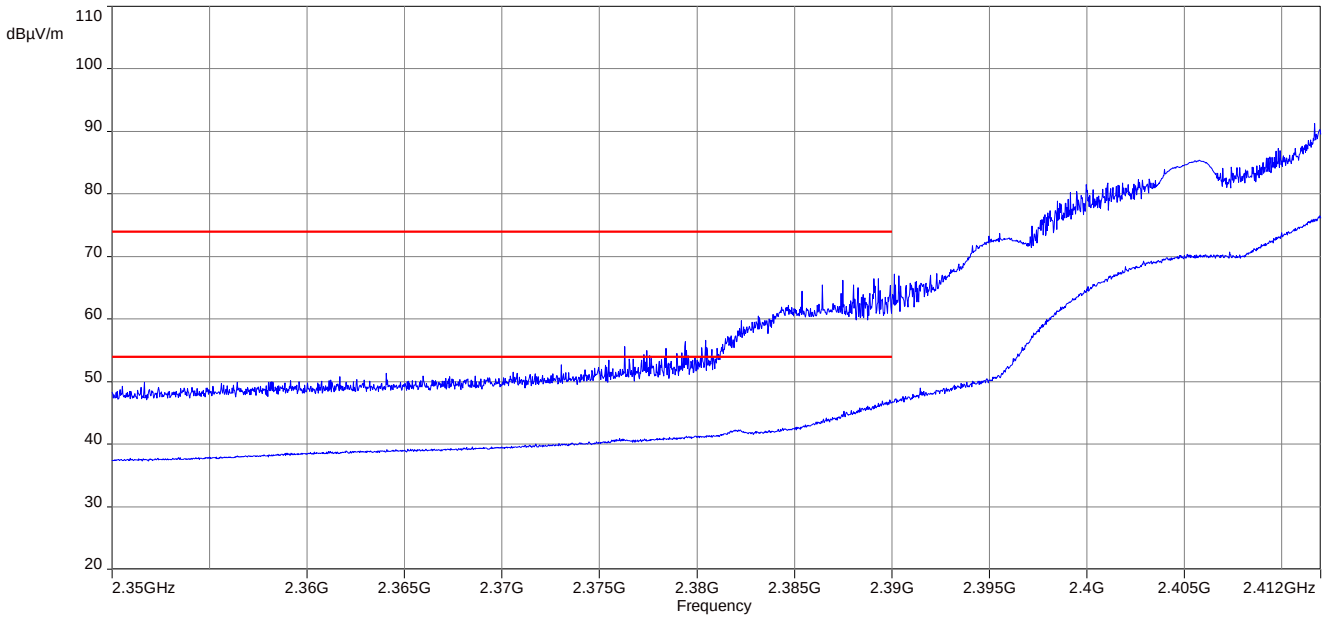


Plots: OFDM / n HT20 – mode peak / average

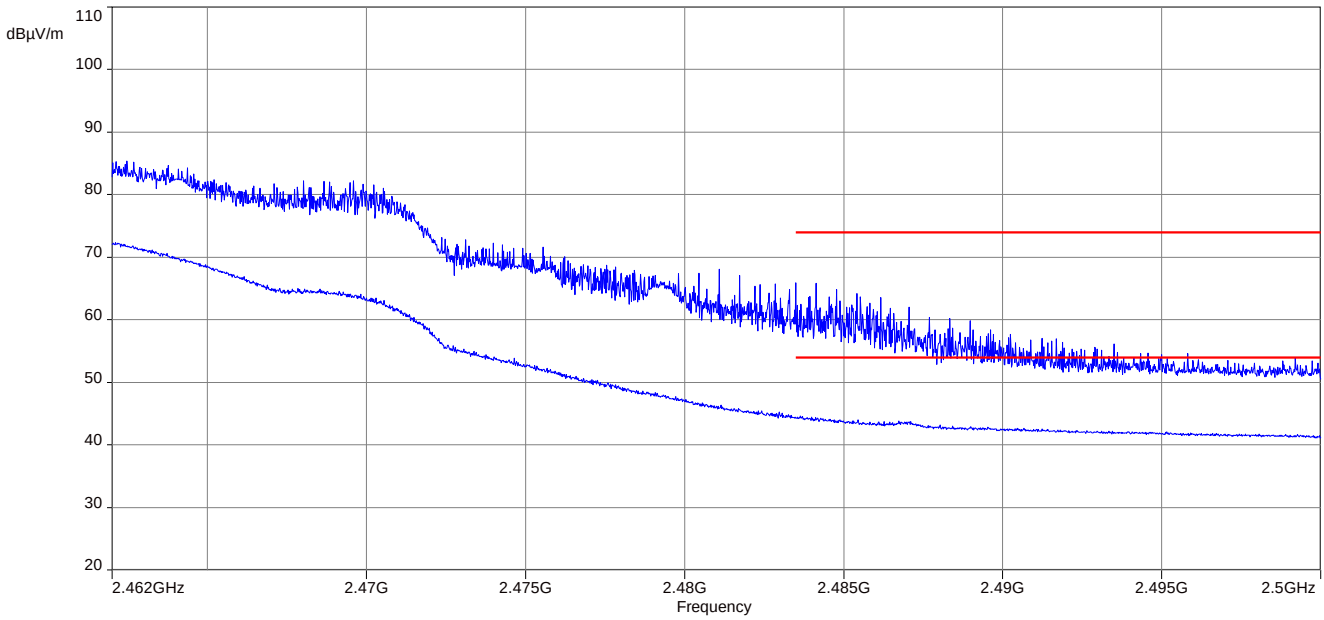
Plot 1: lower band edge, vertical & horizontal polarization, 2417 MHz, power setting 10 dBm



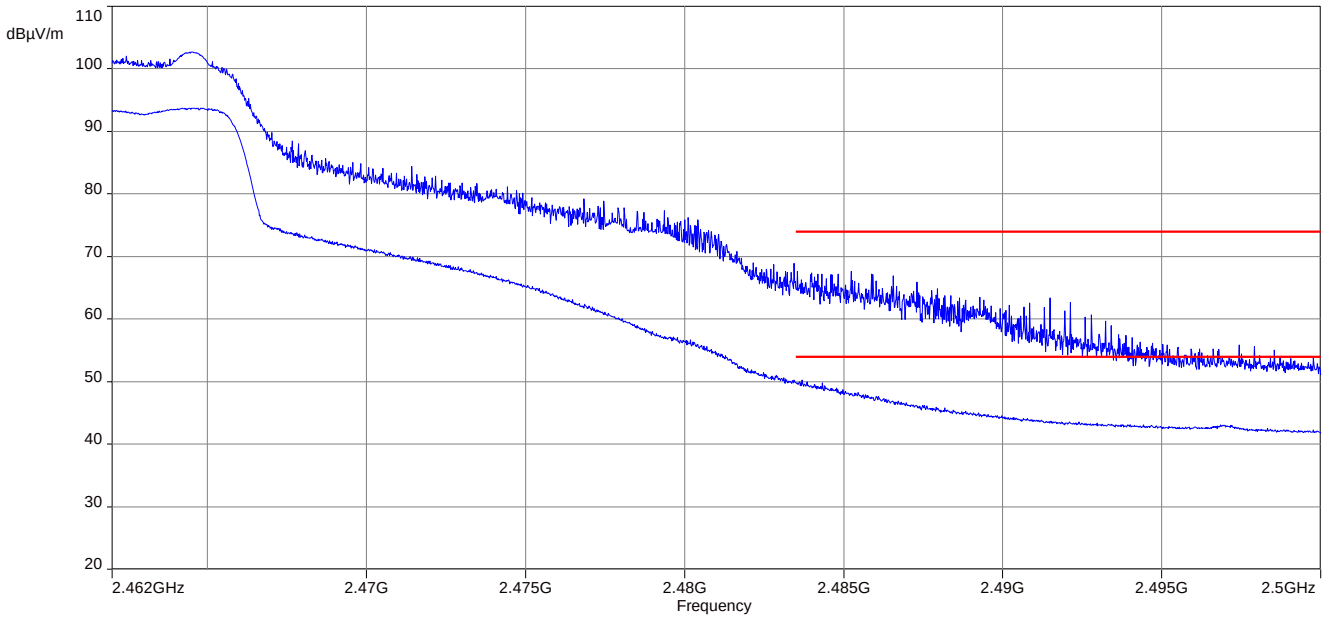
Plot 2: lower band edge, vertical & horizontal polarization, 2422 MHz, power setting 12 dBm



Plot 3: upper band edge, vertical & horizontal polarization, 2447 MHz, power setting 12 dBm



Plot 4: upper band edge, vertical & horizontal polarization, 2457 MHz, power setting 10 dBm



12.8 Band edge compliance conducted

Description:

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

Measurement:

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

Limits:

FCC	IC
-41.26 dBm	

Results: antenna port 1

Scenario	Band edge compliance [dBm] (conducted)	
	DSSS / b – mode	OFDM / g – mode
Max. lower band edge power – 2412 MHz	-59.03	-58.96
Max. lower band edge power – 2422 MHz	-55.09	-55.30
Max. upper band edge power – 2452 MHz	-55.20	-55.25
Max. upper band edge power – 2462 MHz	-59.17	-58.86
	OFDM / n HT20 – mode	-/-
Max. lower band edge power – 2417 MHz	-55.29	-/-
Max. lower band edge power – 2422 MHz	-55.31	
Max. upper band edge power – 2447 MHz	-55.04	-/-
Max. upper band edge power – 2457 MHz	-55.14	

Scenario	Band edge compliance [dBm] (included antenna gain of 4.5 dBi)	
	DSSS / b – mode	OFDM / g – mode
Max. lower band edge power – 2412 MHz	-54.53	-54.46
Max. lower band edge power – 2422 MHz	-50.59	-50.80
Max. upper band edge power – 2452 MHz	-50.70	-50.75
Max. upper band edge power – 2462 MHz	-54.67	-54.36
	OFDM / n HT20 – mode	-/-
Max. lower band edge power – 2417 MHz	-50.79	-/-
Max. lower band edge power – 2422 MHz	-50.81	
Max. upper band edge power – 2447 MHz	-50.54	-/-
Max. upper band edge power – 2457 MHz	-50.64	

Results: antenna port 2

Scenario	Band edge compliance [dBm] (conducted)	
	DSSS / b – mode	OFDM / g – mode
Max. lower band edge power – 2412 MHz	-60.30	-60.00
Max. lower band edge power – 2422 MHz	-56.98	-56.80
Max. upper band edge power – 2452 MHz	-56.63	-55.81
Max. upper band edge power – 2462 MHz	-59.35	-58.83
	OFDM / n HT20 – mode	-/-
Max. lower band edge power – 2417 MHz	-56.88	-/-
Max. lower band edge power – 2422 MHz	-57.19	
Max. upper band edge power – 2447 MHz	-55.72	-/-
Max. upper band edge power – 2457 MHz	-55.71	

Scenario	Band edge compliance [dBm] (included antenna gain of 4.5 dBi)	
	DSSS / b – mode	OFDM / g – mode
Max. lower band edge power – 2412 MHz	-55.80	-55.50
Max. lower band edge power – 2422 MHz	-52.48	-52.30
Max. upper band edge power – 2452 MHz	-52.13	-51.31
Max. upper band edge power – 2462 MHz	-54.85	-54.33
	OFDM / n HT20 – mode	-/-
Max. lower band edge power – 2417 MHz	-52.38	-/-
Max. lower band edge power – 2422 MHz	-52.69	
Max. upper band edge power – 2447 MHz	-51.22	-/-
Max. upper band edge power – 2457 MHz	-51.21	

Results: antenna port 3

Scenario	Band edge compliance [dBm] (conducted)	
	DSSS / b – mode	OFDM / g – mode
Max. lower band edge power – 2412 MHz	-58.96	-59.39
Max. lower band edge power – 2422 MHz	-55.67	-55.74
Max. upper band edge power – 2452 MHz	-55.23	-55.27
Max. upper band edge power – 2462 MHz	-59.14	-58.51
	OFDM / n HT20 – mode	-/-
Max. lower band edge power – 2417 MHz	-55.78	-/-
Max. lower band edge power – 2422 MHz	-55.72	
Max. upper band edge power – 2447 MHz	-55.25	-/-
Max. upper band edge power – 2457 MHz	-55.17	

Scenario	Band edge compliance [dBm] (included antenna gain of 4.5 dBi)	
	DSSS / b – mode	OFDM / g – mode
Max. lower band edge power – 2412 MHz	-54.46	-54.89
Max. lower band edge power – 2422 MHz	-51.17	-51.24
Max. upper band edge power – 2452 MHz	-50.73	-50.77
Max. upper band edge power – 2462 MHz	-54.64	-54.01
	OFDM / n HT20 – mode	-/-
Max. lower band edge power – 2417 MHz	-51.28	-/-
Max. lower band edge power – 2422 MHz	-51.22	
Max. upper band edge power – 2447 MHz	-50.75	-/-
Max. upper band edge power – 2457 MHz	-50.67	

Results: antenna port 1 + antenna port 2 (calculated)

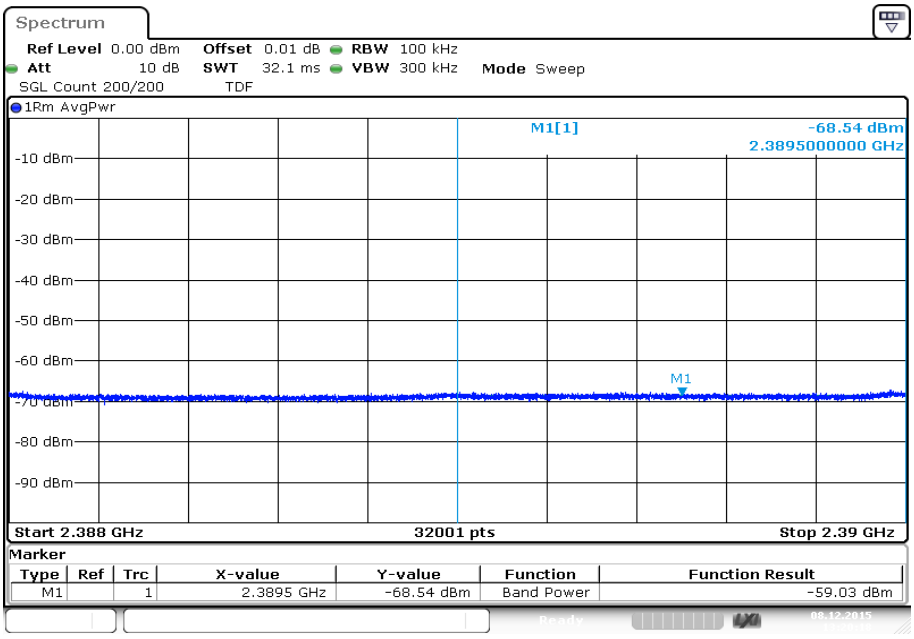
Scenario	Band edge compliance [dBm] (included antenna gain of 4.5 dBi)	
	DSSS / b – mode	OFDM / g – mode
Max. lower band edge power – 2412 MHz	-52.11	-51.94
Max. lower band edge power – 2422 MHz	-48.42	-48.48
Max. upper band edge power – 2452 MHz	-48.35	-48.01
Max. upper band edge power – 2462 MHz	-51.75	-51.33
	OFDM / n HT20 – mode	-/-
Max. lower band edge power – 2417 MHz	-48.50	-/-
Max. lower band edge power – 2422 MHz	-48.64	
Max. upper band edge power – 2447 MHz	-47.86	-/-
Max. upper band edge power – 2457 MHz	-47.91	

Results: antenna port 1 + antenna port 2 + antenna port 3 (calculated)

Scenario	Band edge compliance [dBm] (included antenna gain of 4.5 dBi)	
	DSSS / b – mode	OFDM / g – mode
Max. lower band edge power – 2412 MHz	-50.12	-50.16
Max. lower band edge power – 2422 MHz	-46.57	-46.63
Max. upper band edge power – 2452 MHz	-46.37	-46.16
Max. upper band edge power – 2462 MHz	-49.95	-49.46
	OFDM / n HT20 – mode	-/-
Max. lower band edge power – 2417 MHz	-46.66	-/-
Max. lower band edge power – 2422 MHz	-46.73	
Max. upper band edge power – 2447 MHz	-46.06	-/-
Max. upper band edge power – 2457 MHz	-46.06	

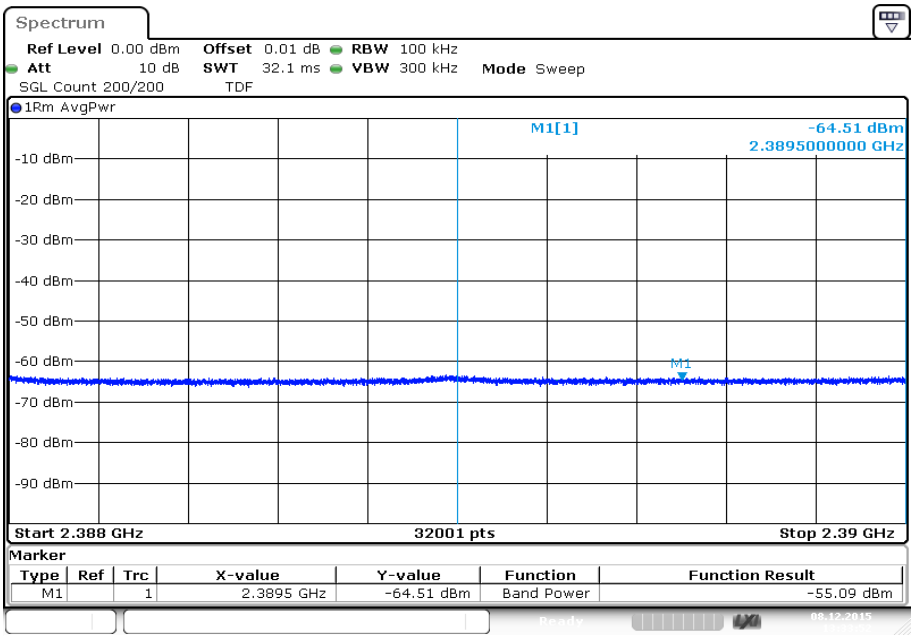
Plots: DSSS / b – mode, antenna port 1

Plot 1: Lower band edge, 2412 MHz



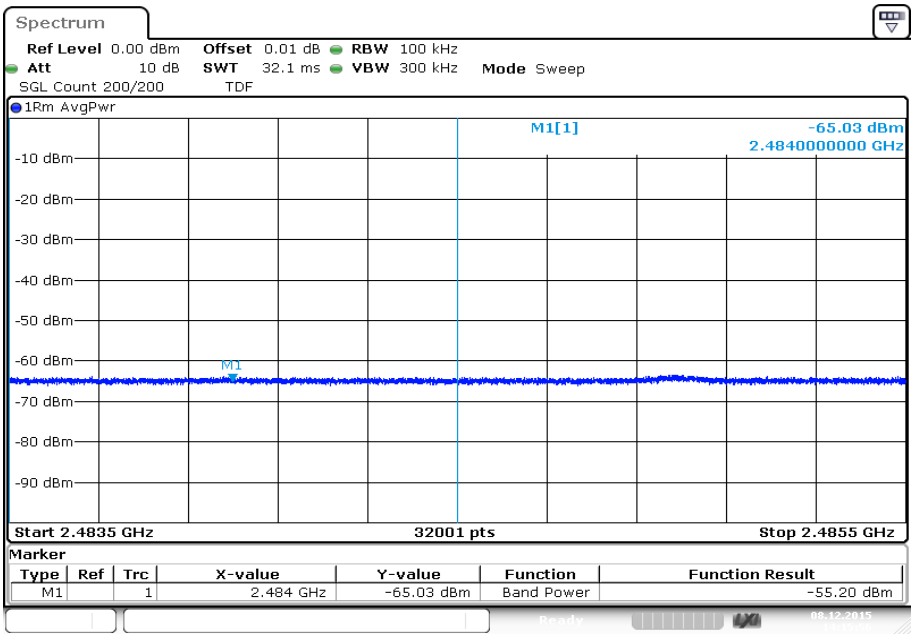
Date: 8.DEC.2015 13:20:19

Plot 2: Lower band edge, 2422 MHz



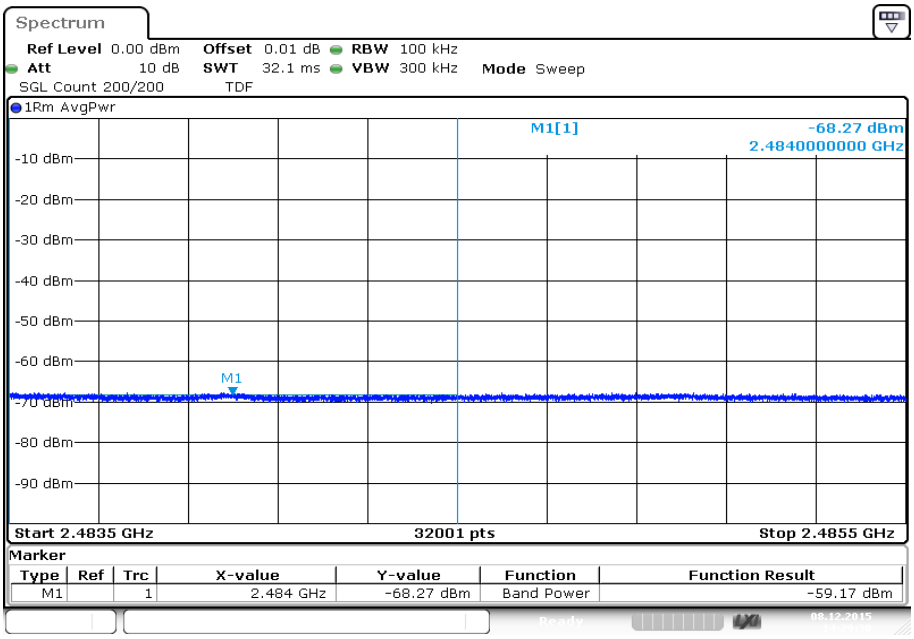
Date: 8.DEC.2015 13:33:52

Plot 3: Upper band edge, 2452 MHz



Date: 8.DEC.2015 14:15:56

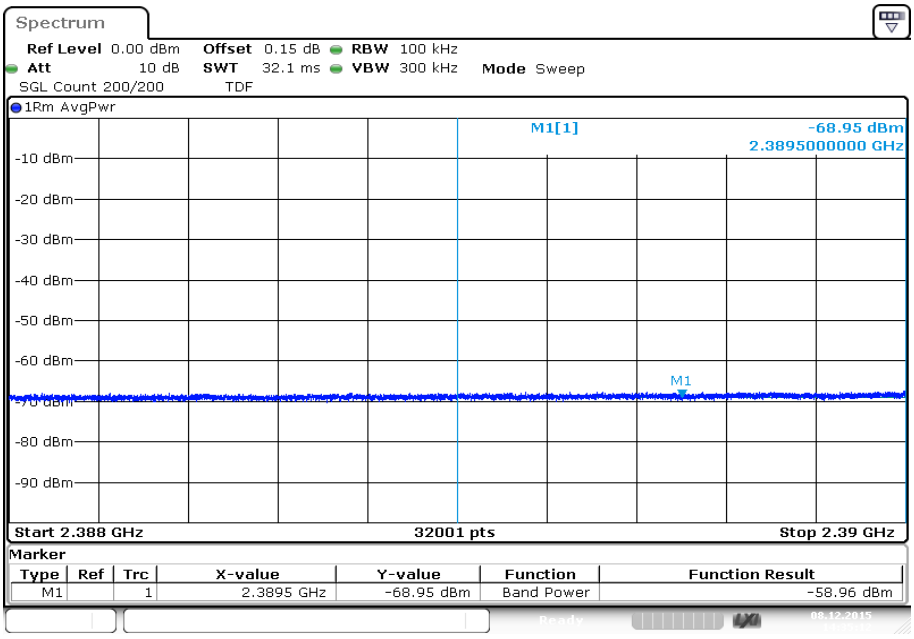
Plot 4: Upper band edge, 2462 MHz



Date: 8.DEC.2015 14:29:31

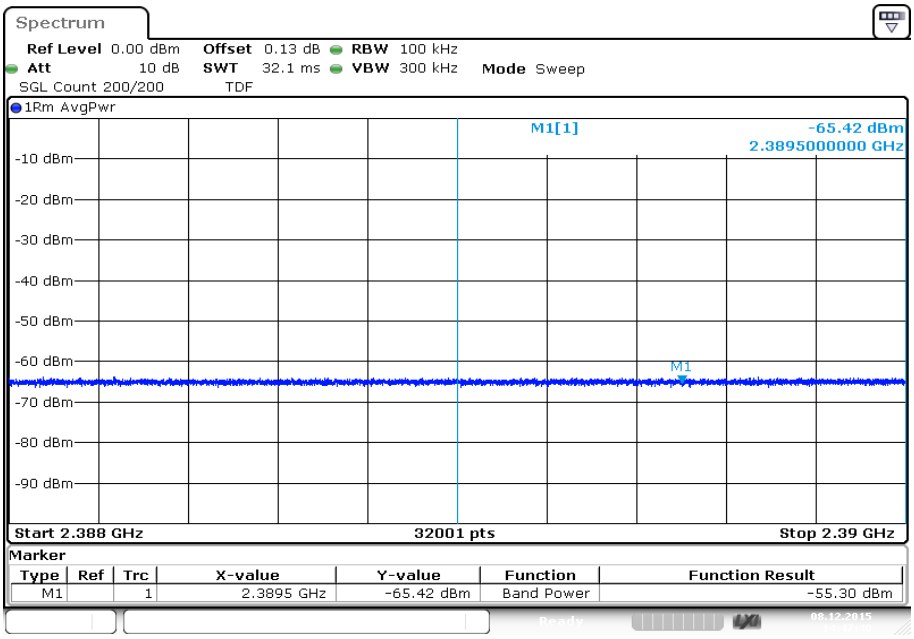
Plots: OFDM / g – mode, antenna port 1

Plot 1: Lower band edge, 2412 MHz



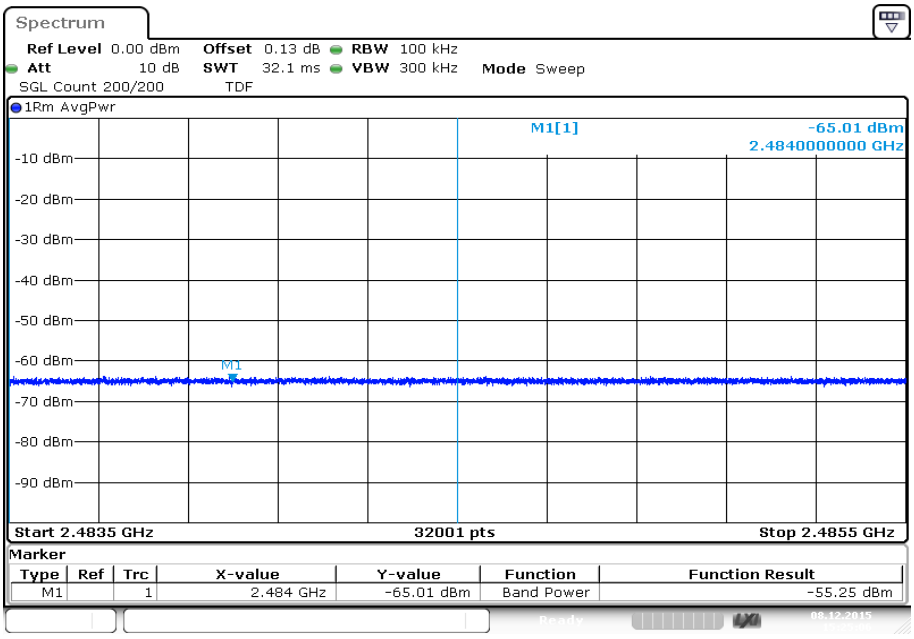
Date: 8.DEC.2015 14:35:13

Plot 2: Lower band edge, 2422 MHz



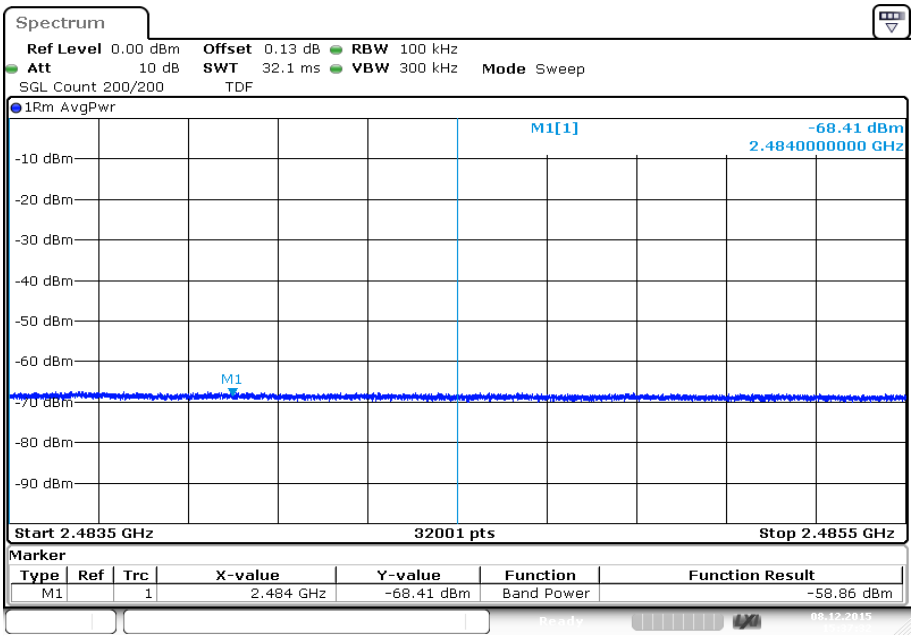
Date: 8.DEC.2015 14:47:41

Plot 3: Upper band edge, 2452 MHz



Date: 8.DEC.2015 15:25:07

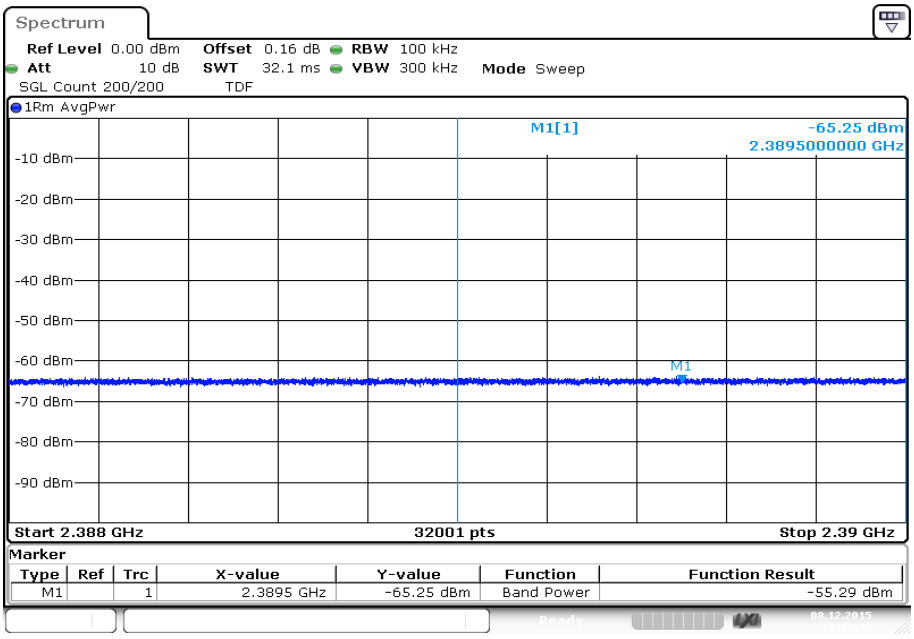
Plot 4: Upper band edge, 2462 MHz



Date: 8.DEC.2015 15:37:33

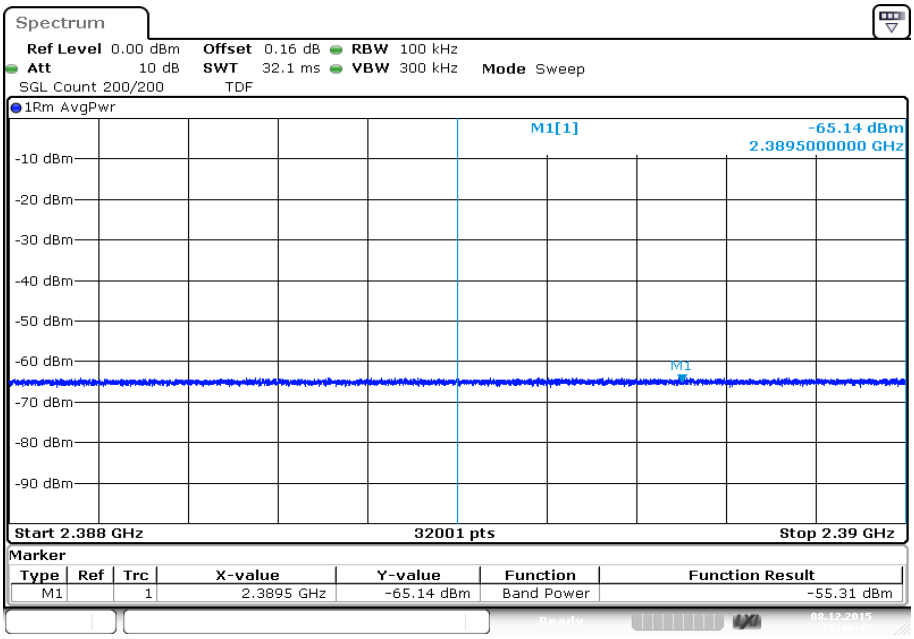
Plots: OFDM / n HT20 – mode, antenna port 1

Plot 1: Lower band edge, 2417 MHz



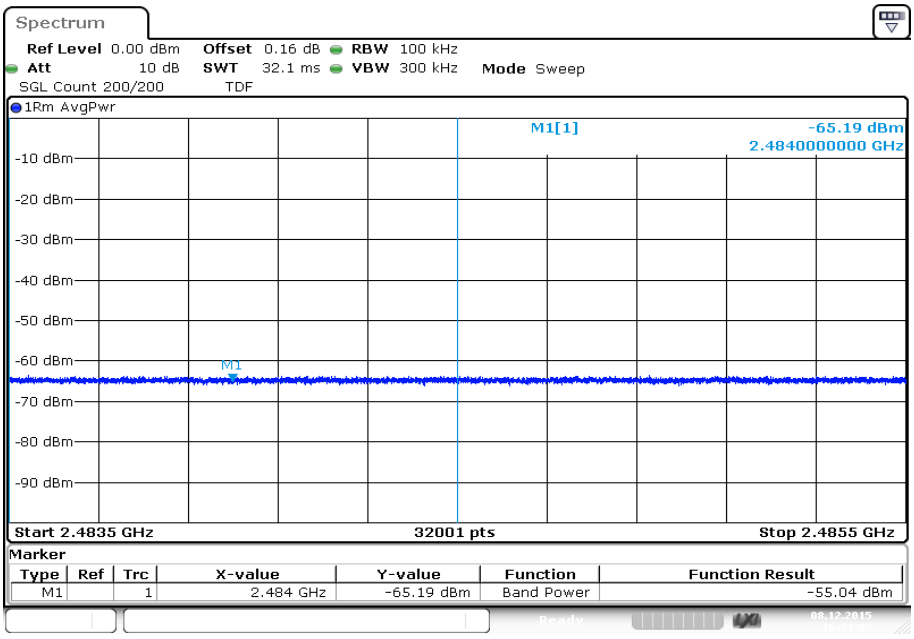
Date: 8.DEC.2015 15:43:31

Plot 2: Lower band edge, 2422 MHz



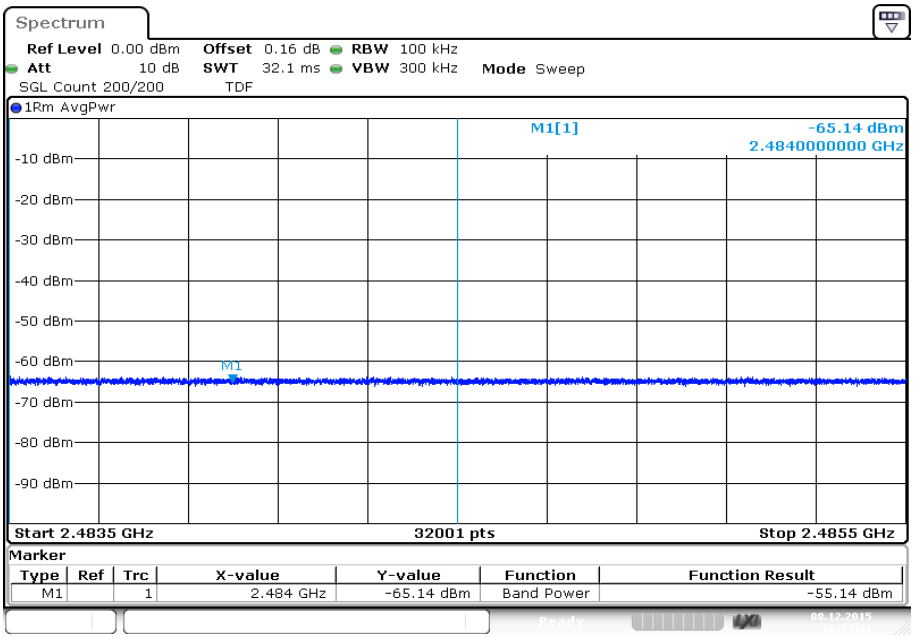
Date: 8.DEC.2015 15:49:46

Plot 3: Upper band edge, 2447 MHz



Date: 8.DEC.2015 16:21:04

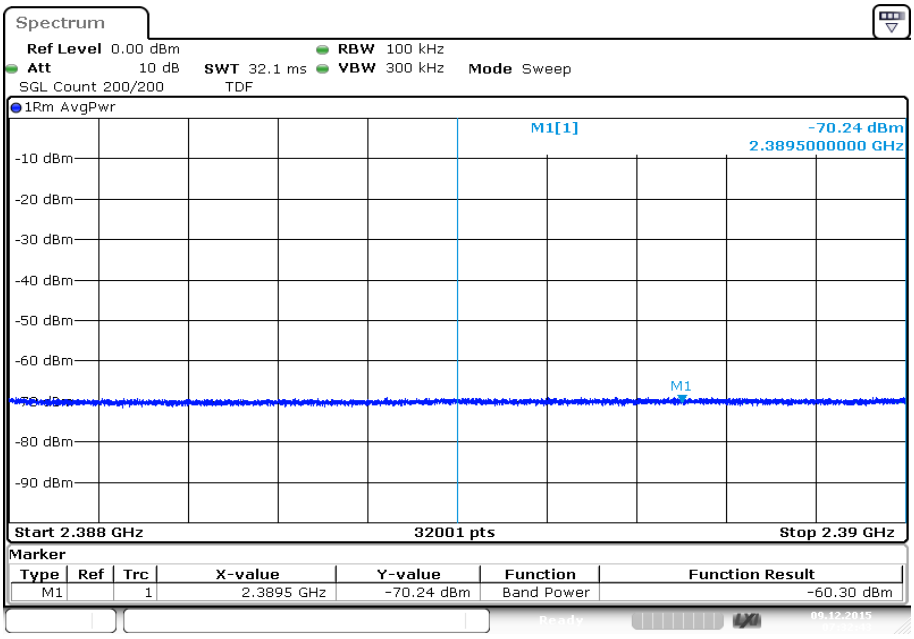
Plot 4: Upper band edge, 2457 MHz



Date: 8.DEC.2015 16:33:32

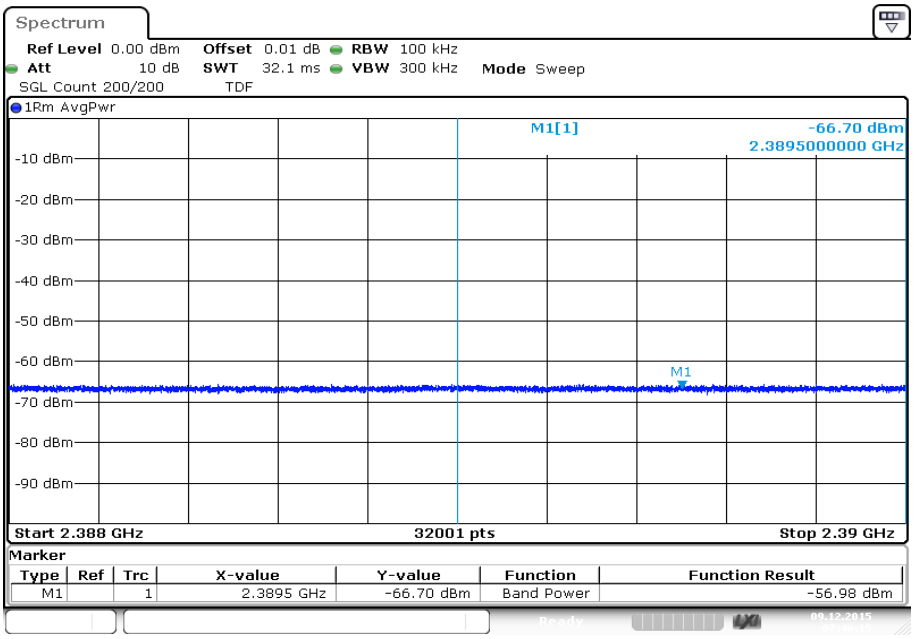
Plots: DSSS / b – mode, antenna port 2

Plot 1: Lower band edge, 2412 MHz



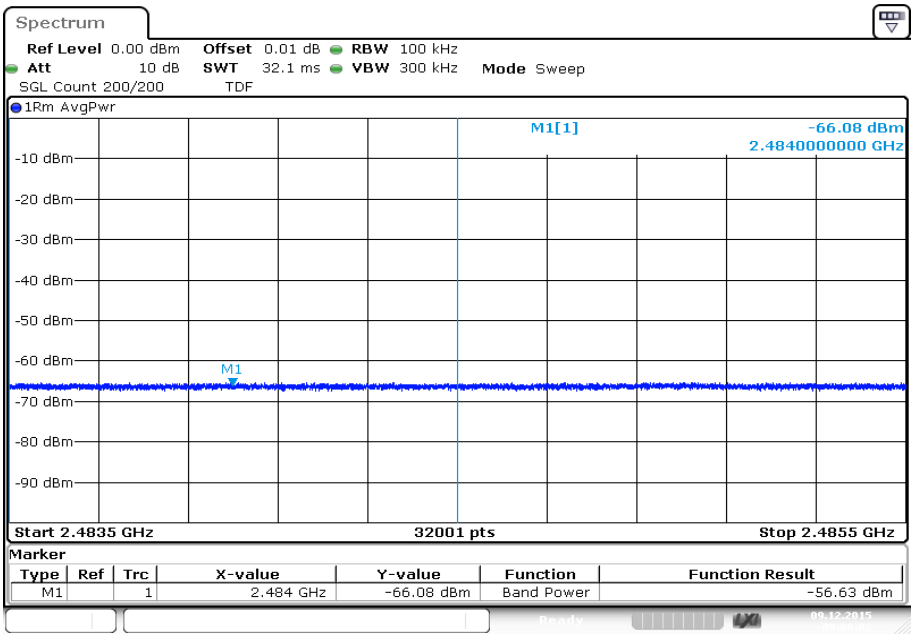
Date: 9.DEC.2015 07:32:44

Plot 2: Lower band edge, 2422 MHz



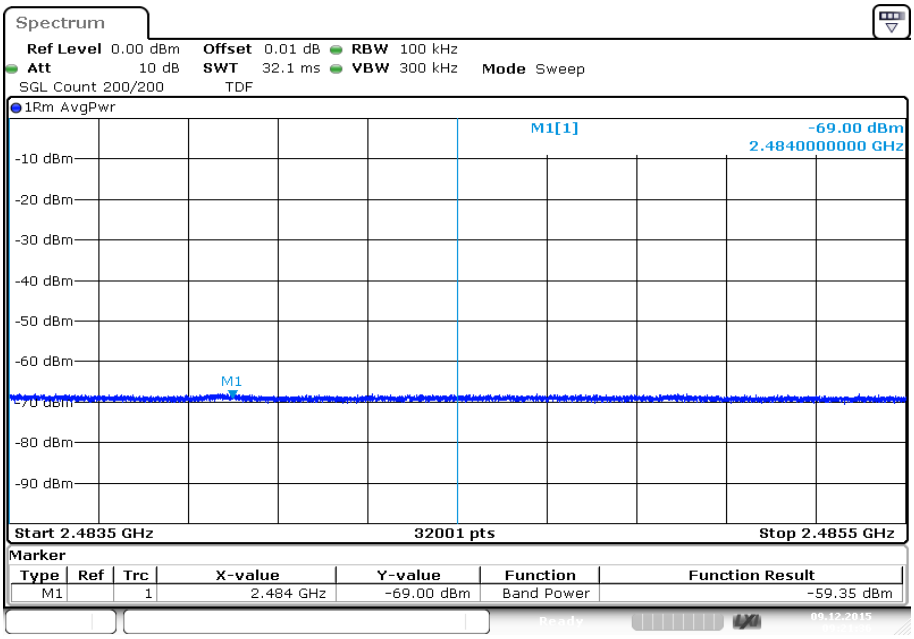
Date: 9.DEC.2015 07:46:16

Plot 3: Upper band edge, 2452 MHz



Date: 9.DEC.2015 09:08:03

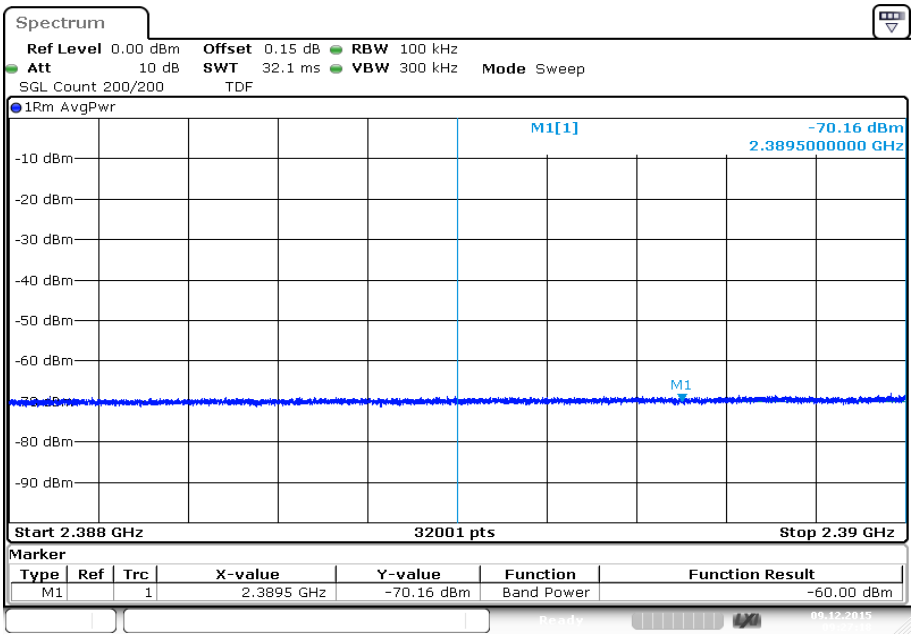
Plot 4: Upper band edge, 2462 MHz



Date: 9.DEC.2015 09:21:37

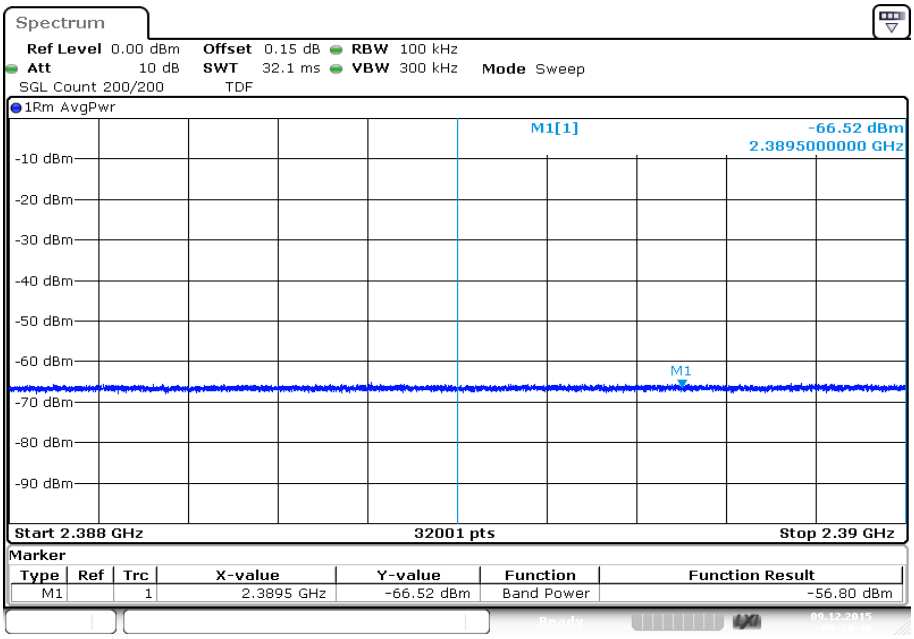
Plots: OFDM / g – mode, antenna port 2

Plot 1: Lower band edge, 2412 MHz



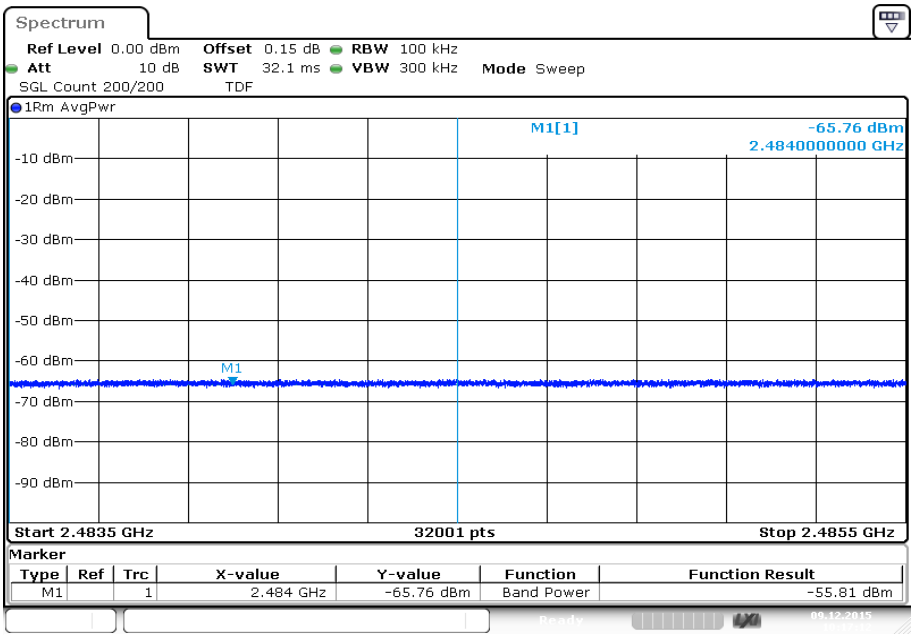
Date: 9.DEC.2015 09:27:19

Plot 2: Lower band edge, 2422 MHz



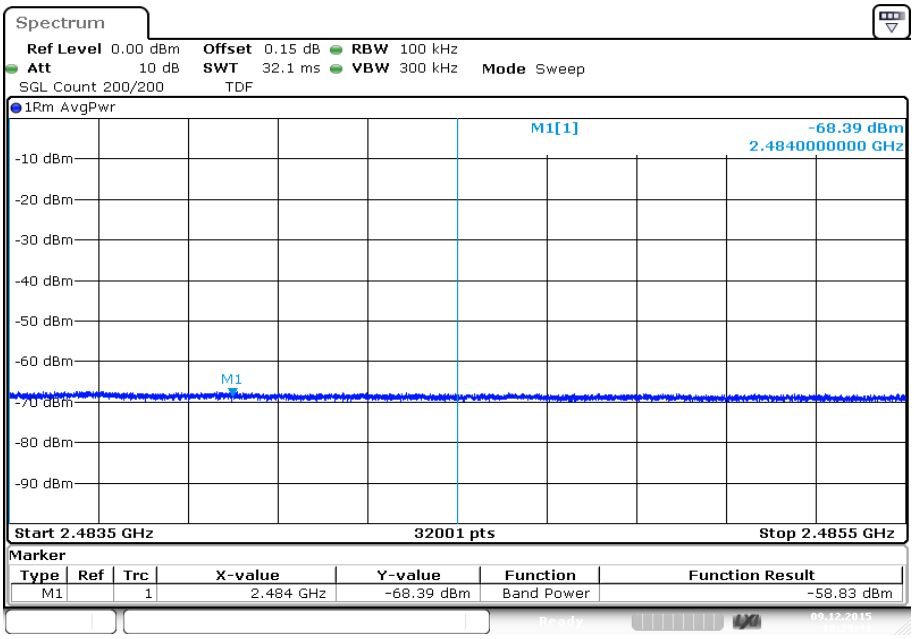
Date: 9.DEC.2015 09:39:47

Plot 3: Upper band edge, 2452 MHz



Date: 9.DEC.2015 10:17:13

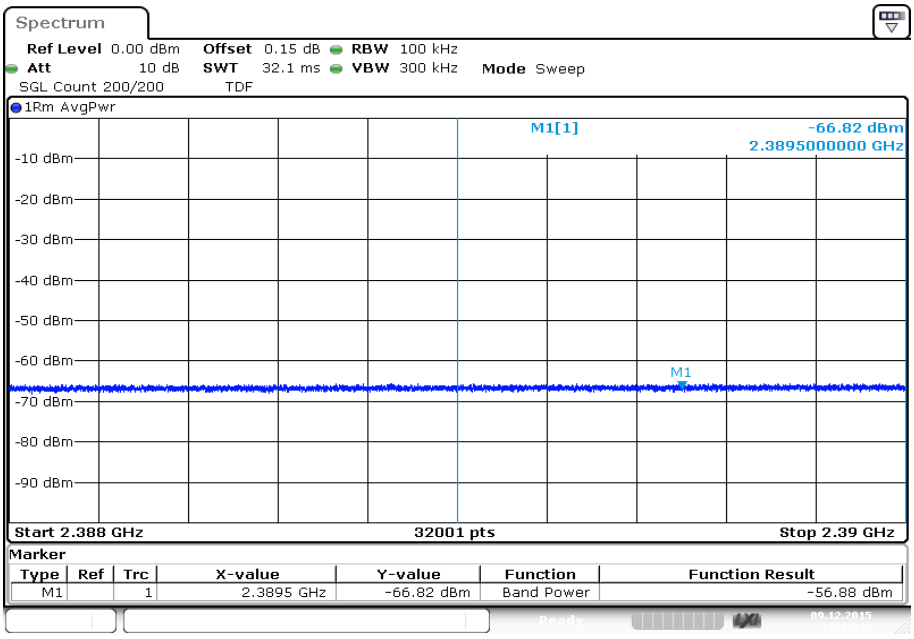
Plot 4: Upper band edge, 2462 MHz



Date: 9.DEC.2015 10:29:42

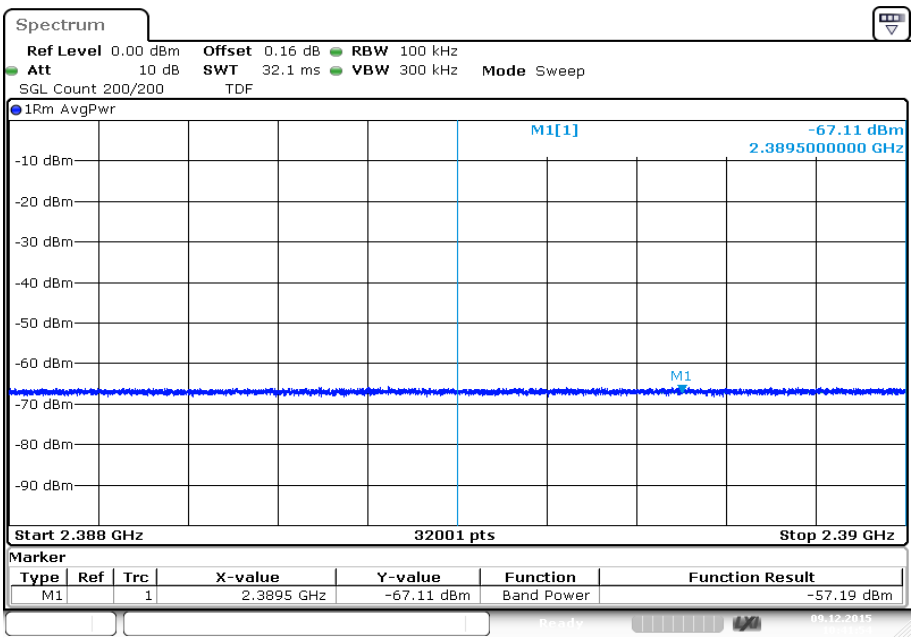
Plots: OFDM / n HT20 – mode, antenna port 2

Plot 1: Lower band edge, 2417 MHz



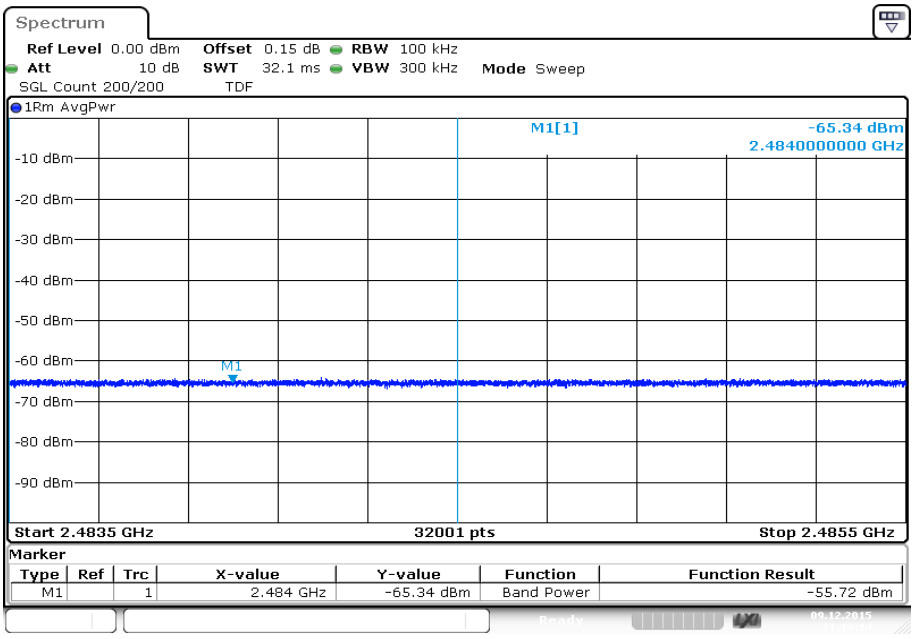
Date: 9.DEC.2015 10:35:40

Plot 2: Lower band edge, 2422 MHz



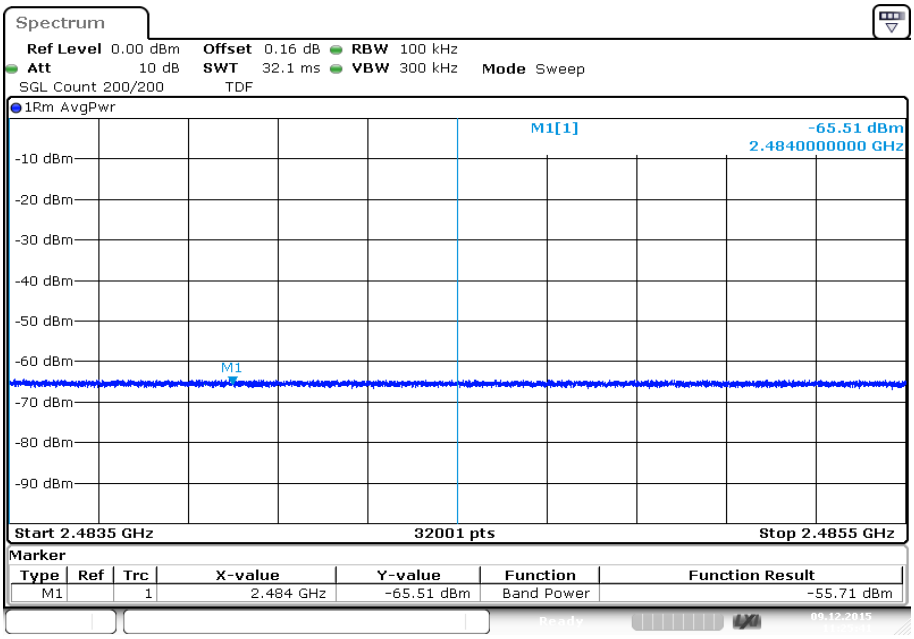
Date: 9.DEC.2015 10:41:55

Plot 3: Upper band edge, 2447 MHz



Date: 9.DEC.2015 11:13:15

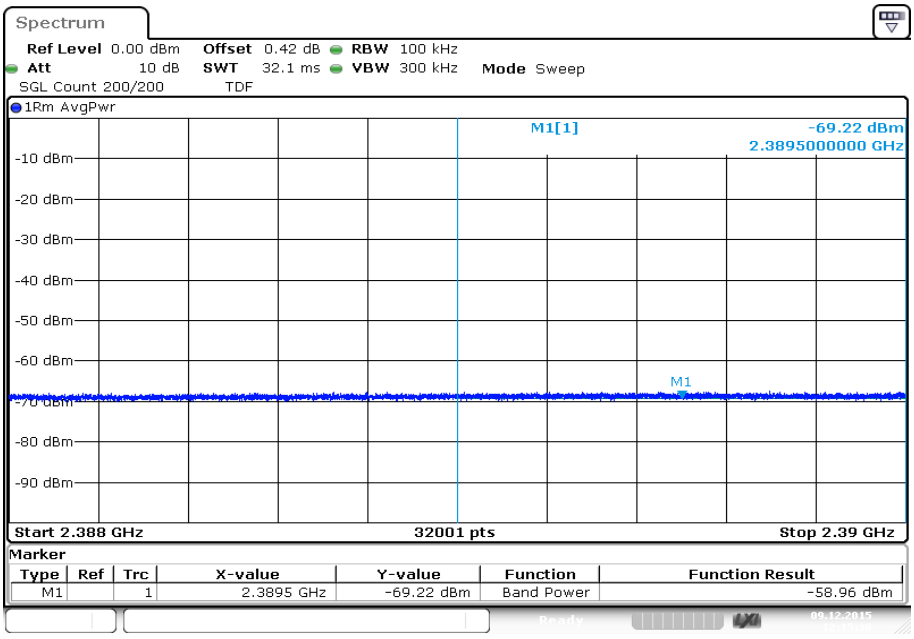
Plot 4: Upper band edge, 2457 MHz



Date: 9.DEC.2015 11:25:42

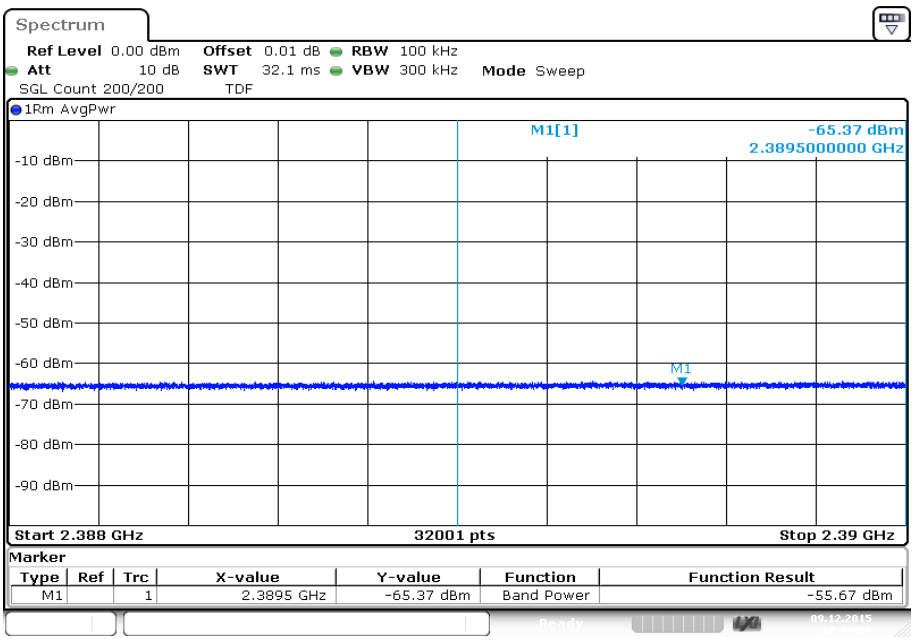
Plots: DSSS / b – mode, antenna port 3

Plot 1: Lower band edge, 2412 MHz



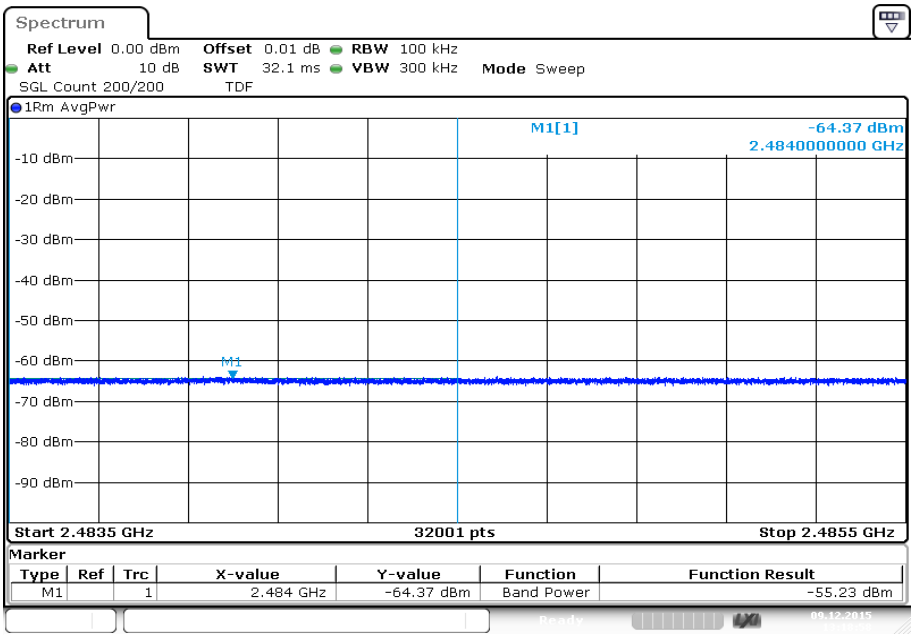
Date: 9.DEC.2015 12:15:30

Plot 2: Lower band edge, 2422 MHz



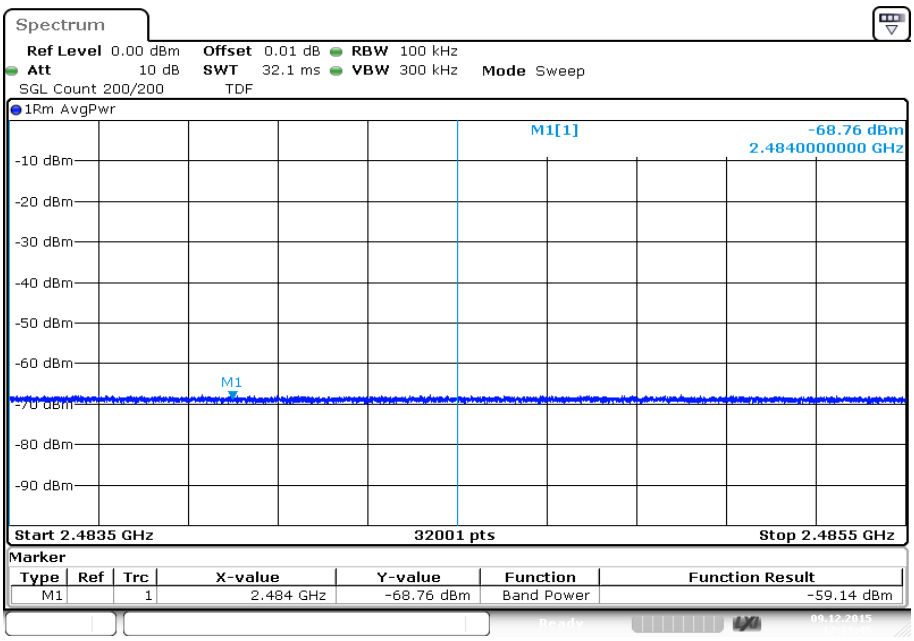
Date: 9.DEC.2015 12:31:00

Plot 3: Upper band edge, 2452 MHz



Date: 9.DEC.2015 13:18:59

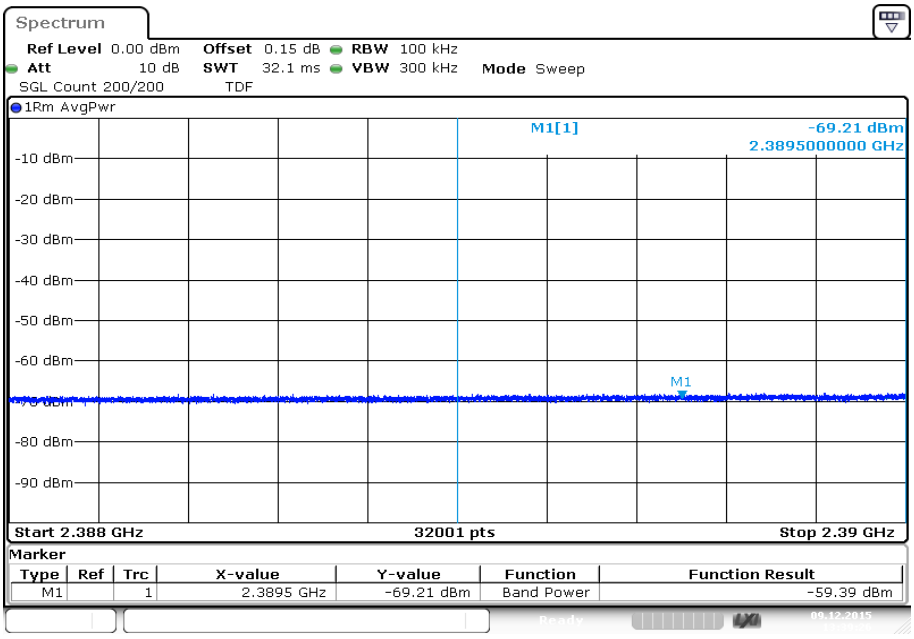
Plot 4: Upper band edge, 2462 MHz



Date: 9.DEC.2015 13:33:45

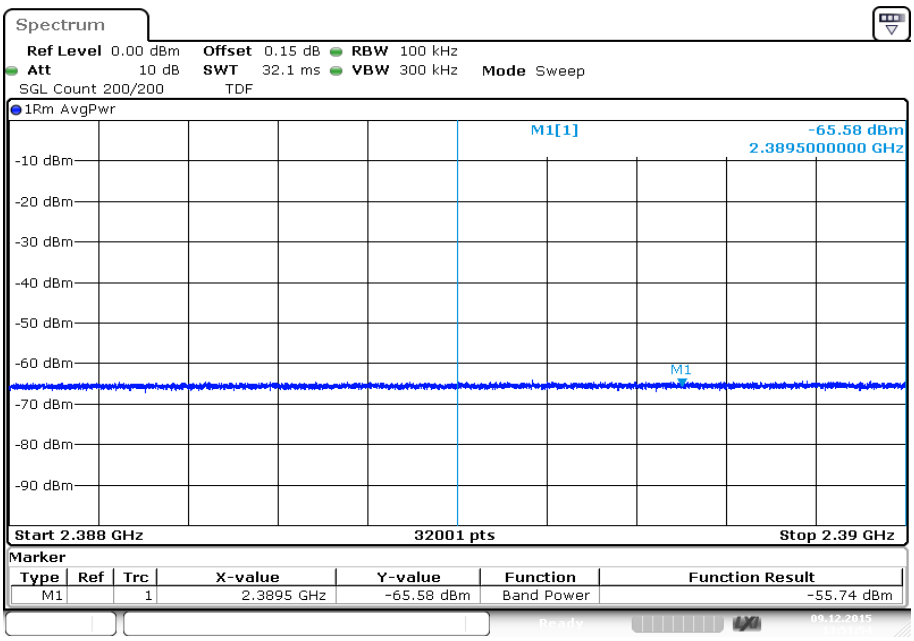
Plots: OFDM / g – mode, antenna port 3

Plot 1: Lower band edge, 2412 MHz



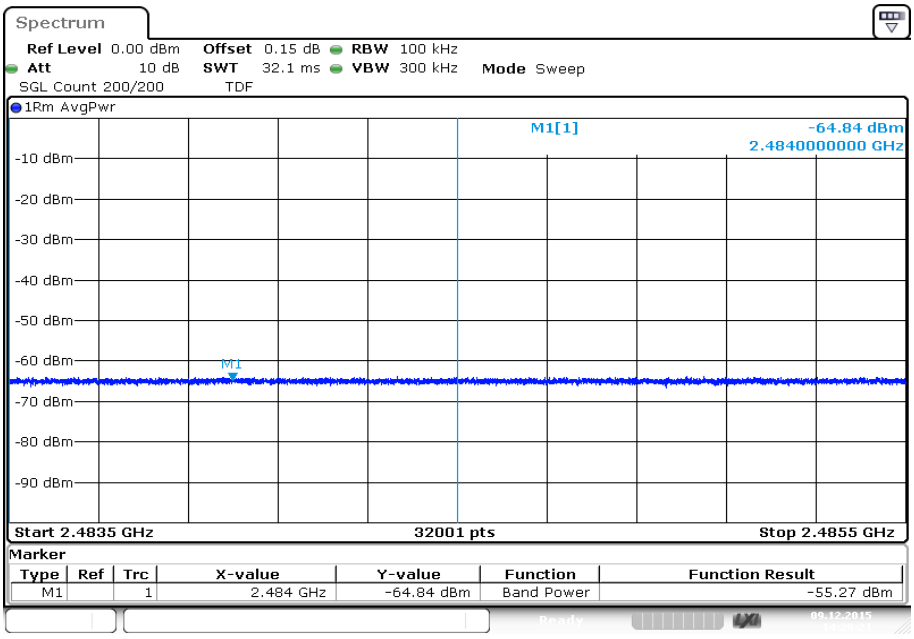
Date: 9.DEC.2015 13:39:27

Plot 2: Lower band edge, 2422 MHz



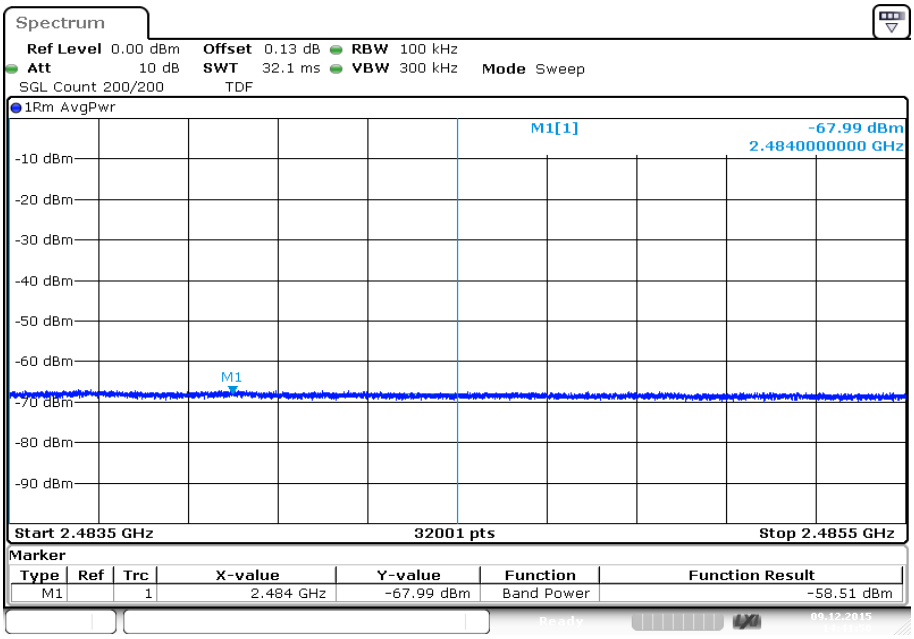
Date: 9.DEC.2015 13:51:55

Plot 3: Upper band edge, 2452 MHz



Date: 9.DEC.2015 14:29:22

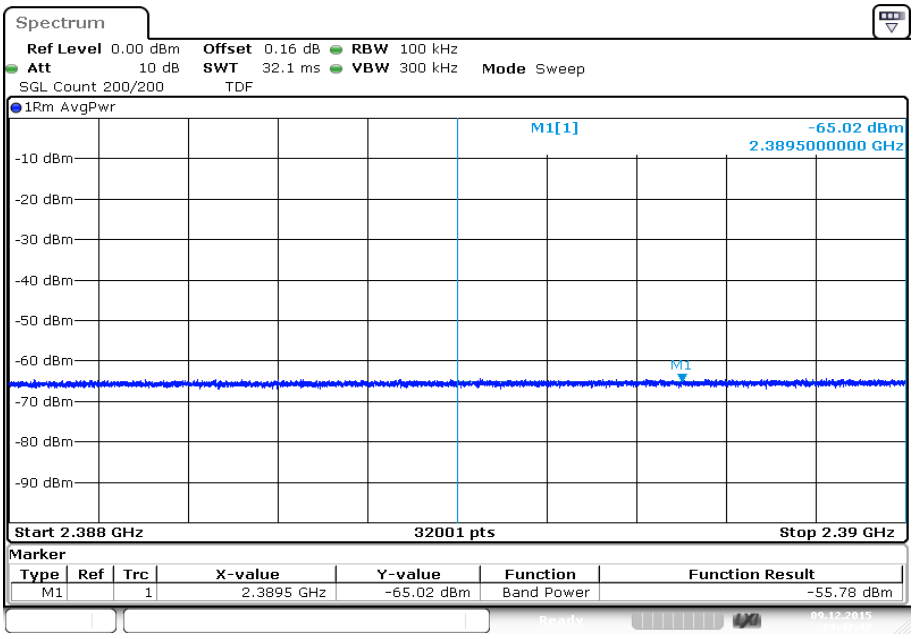
Plot 4: Upper band edge, 2462 MHz



Date: 9.DEC.2015 14:41:50

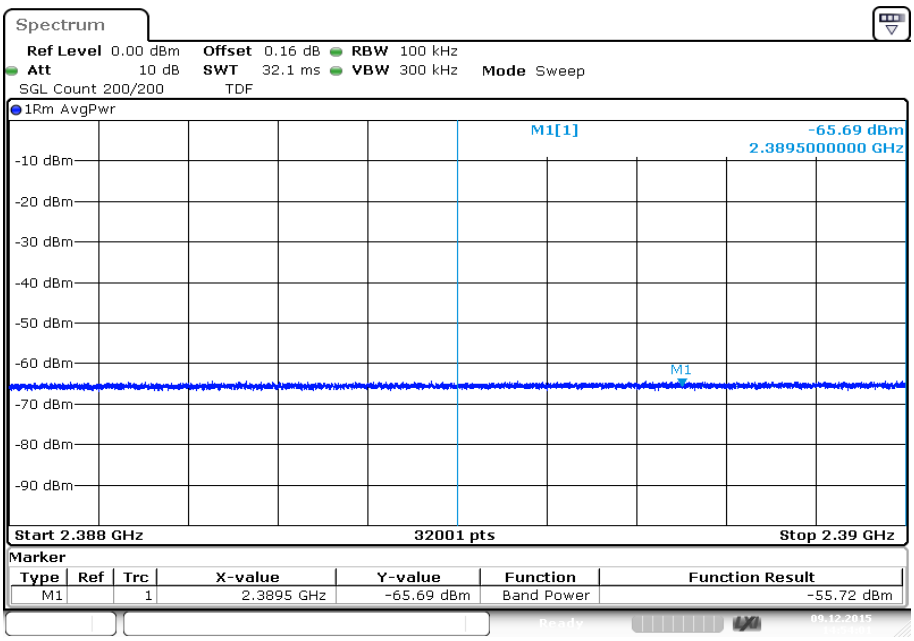
Plots: OFDM / n HT20 – mode, antenna port 3

Plot 1: Lower band edge, 2417 MHz



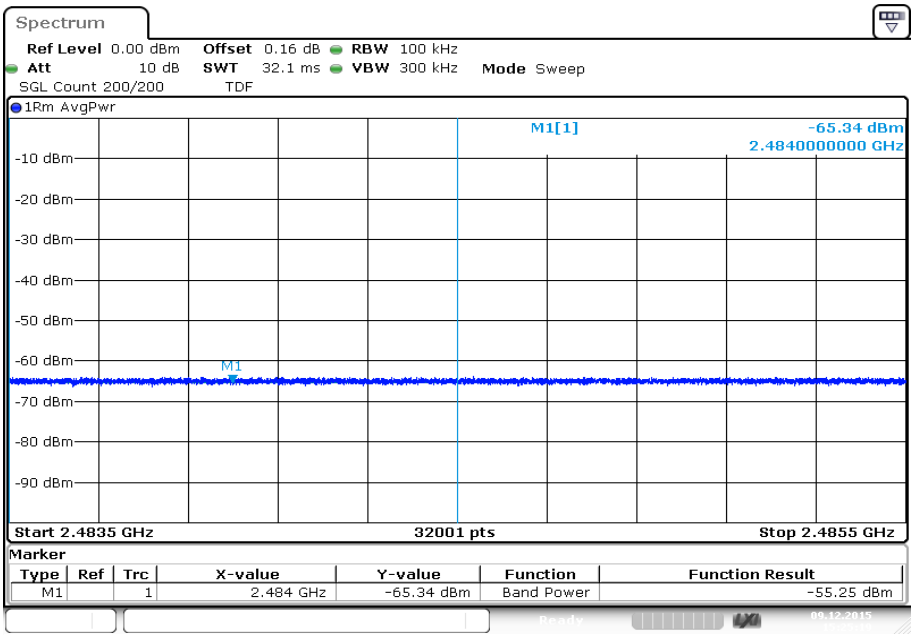
Date: 9.DEC.2015 14:47:48

Plot 2: Lower band edge, 2422 MHz



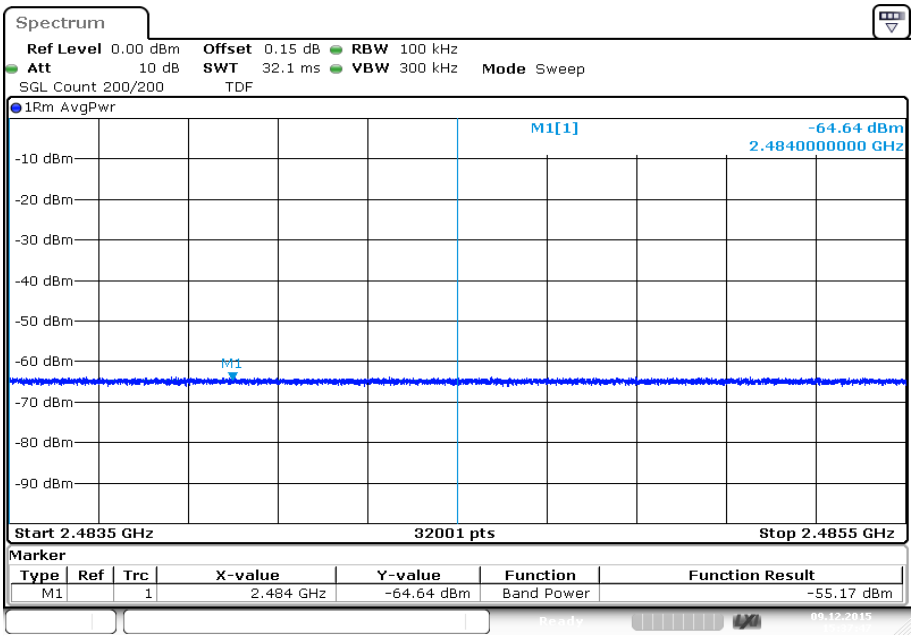
Date: 9.DEC.2015 14:54:02

Plot 3: Upper band edge, 2447 MHz



Date: 9.DEC.2015 15:25:20

Plot 4: Upper band edge, 2457 MHz



Date: 9.DEC.2015 15:37:47