

9.6 Spectrum bandwidth – 6 dB

Description:

Measurement of the 6 dB bandwidth of the modulated signal.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 - 5% of the DTS BW but not exceed 100 kHz
Video bandwidth:	≥ 3 x RBW
Span:	Complete signal
Trace-Mode:	Max hold (allow trace to stabilize)

Limits:

FCC	IC
Spectrum Bandwidth – 6 dB	
Systems using digital modulation techniques may operate in the 5725 – 5825 MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz.	

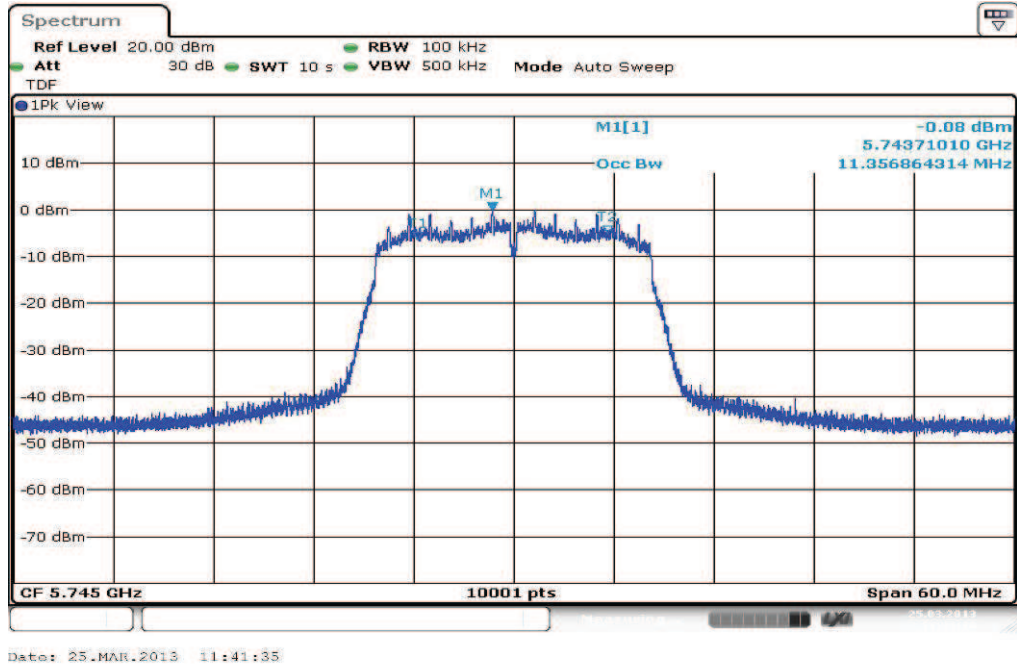
Results:

Modulation Frequency	6 dB bandwidth [MHz]		
	5725 MHz	5785 MHz	5825 MHz
OFDM / a – mode, 6 Mbps	11.36	11.33	11.34
OFDM / a – mode, 24 Mbps	11.31	11.29	11.30
OFDM / a – mode, 54 Mbps	11.30	11.31	11.33
OFDM / n – mode, MCS 0	11.94	11.91	11.93
OFDM / n – mode, MCS 4	11.87	11.87	11.89
OFDM / n – mode, MCS 7	11.90	11.89	11.89
Measurement uncertainty	± RBW		

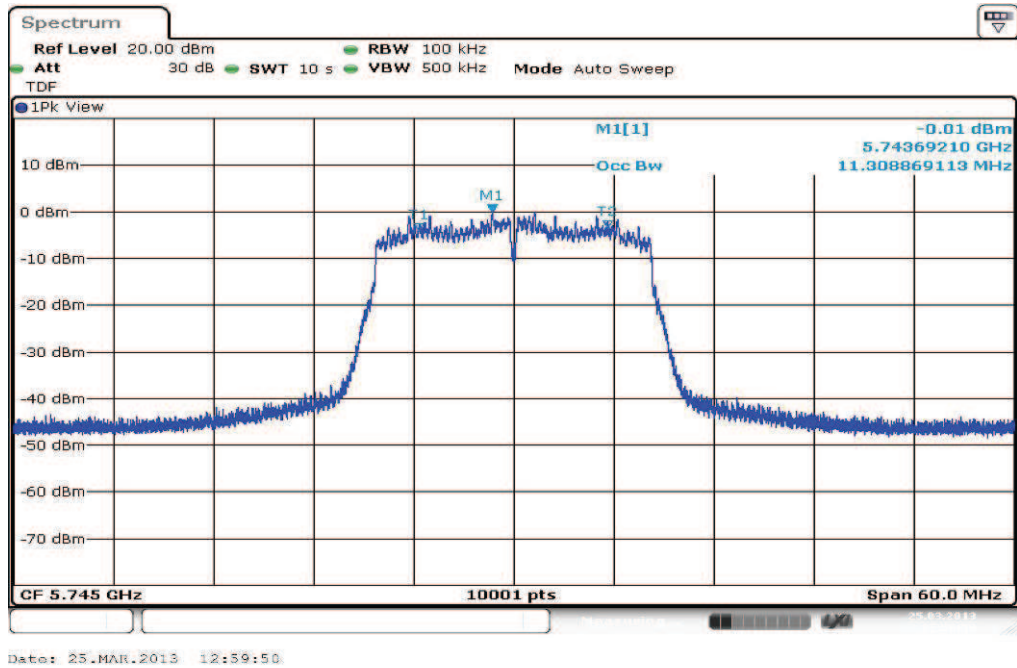
Result: Passed

Plots:

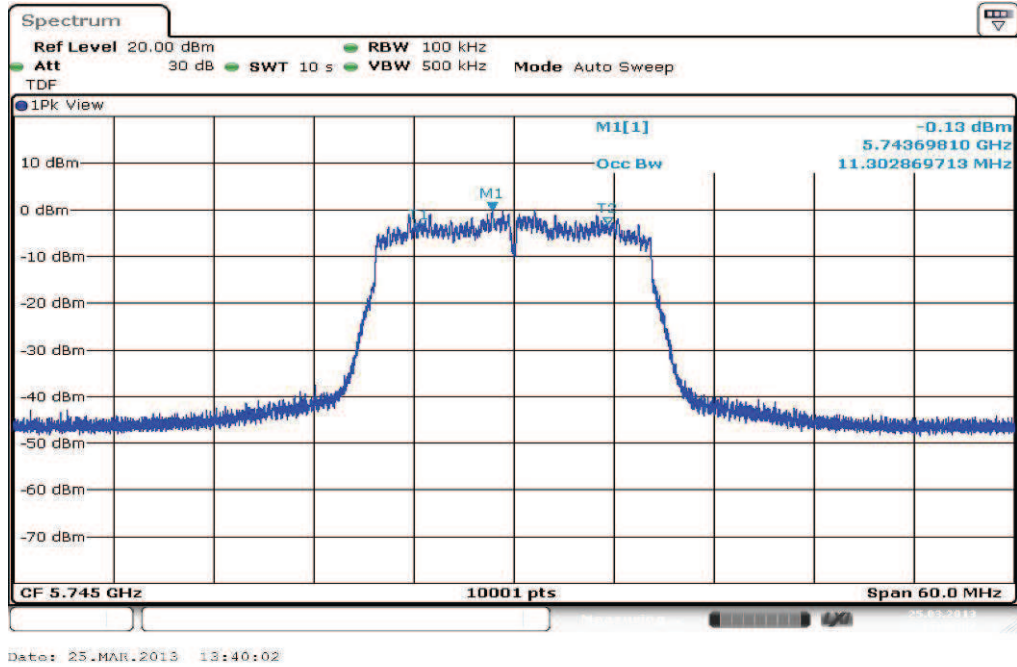
Plot 1: lowest channel, a – mode, 6 Mbps



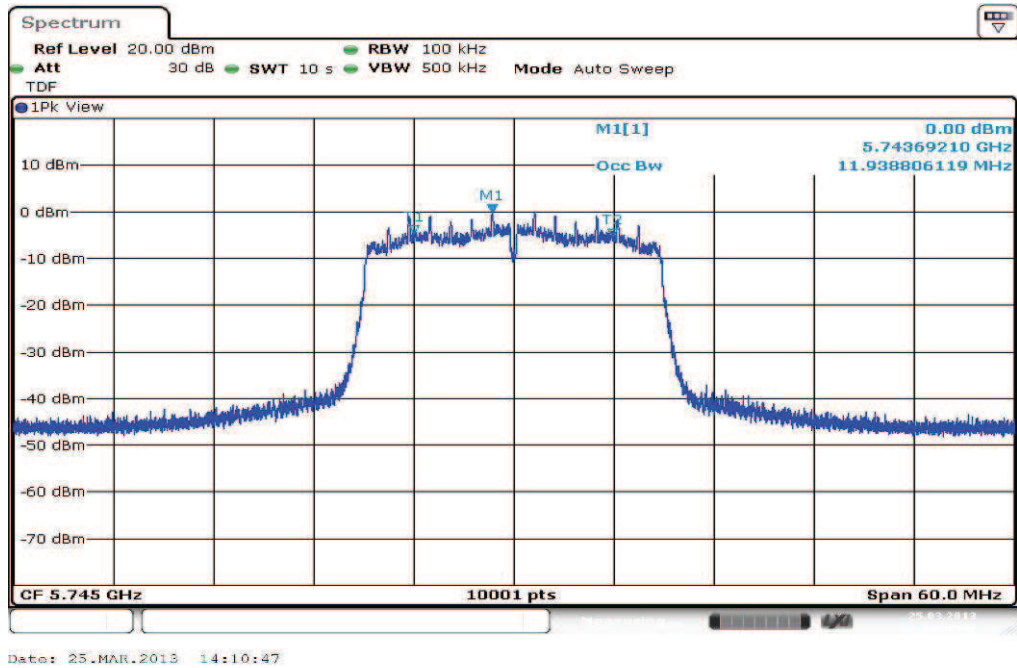
Plot 2: lowest channel, a – mode, 24 Mbps



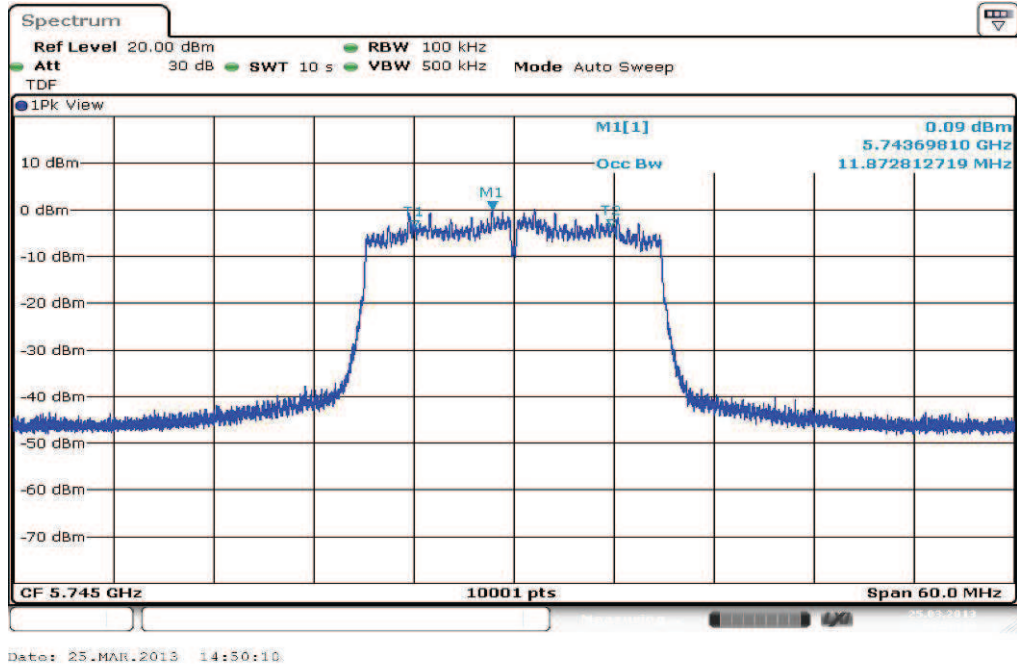
Plot 3: lowest channel, a – mode, 54 Mbps



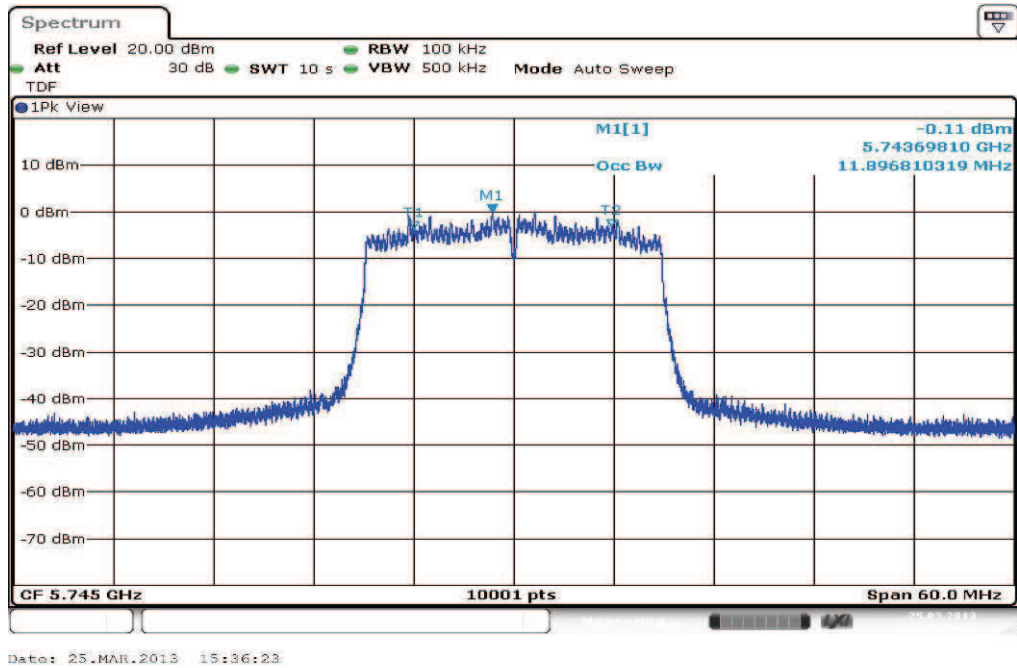
Plot 4: lowest channel, n – mode, MCS 0



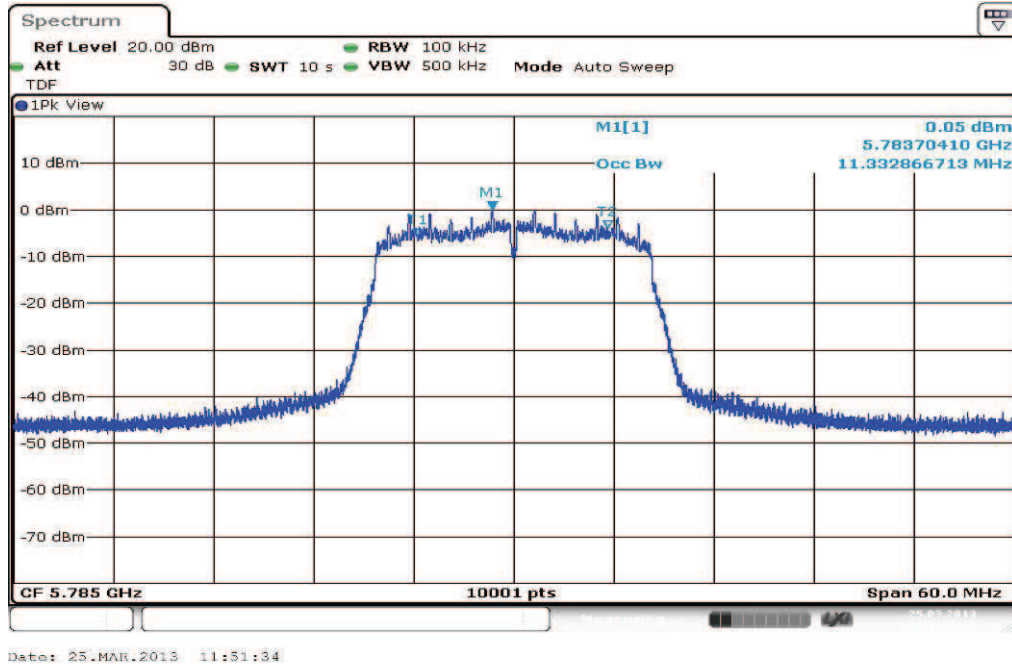
Plot 5: lowest channel, n – mode, MCS 4



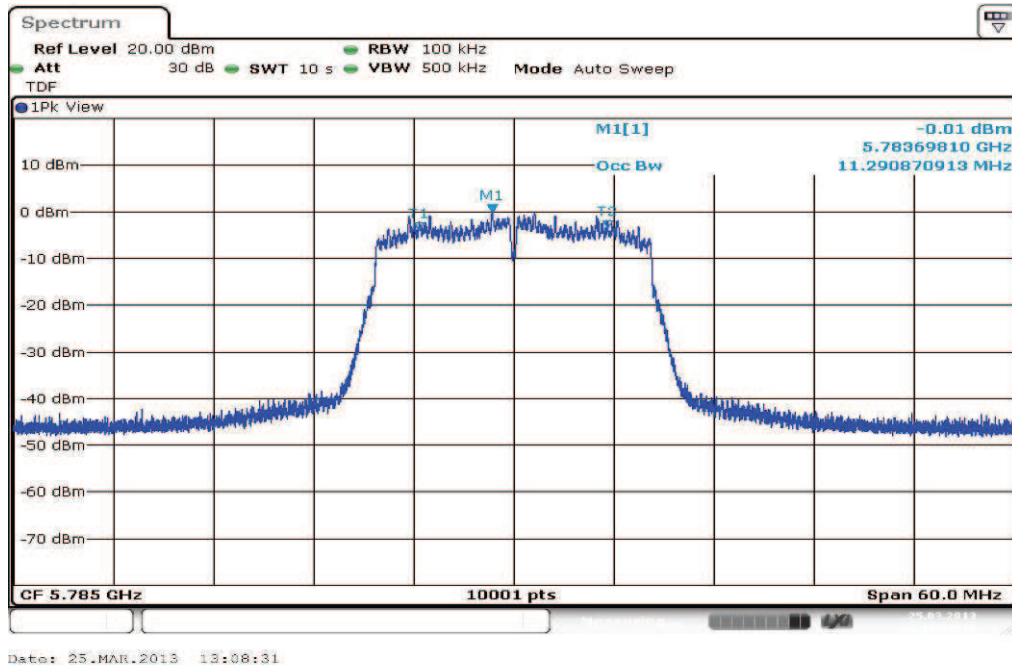
Plot 6: lowest channel, n – mode, MCS 7



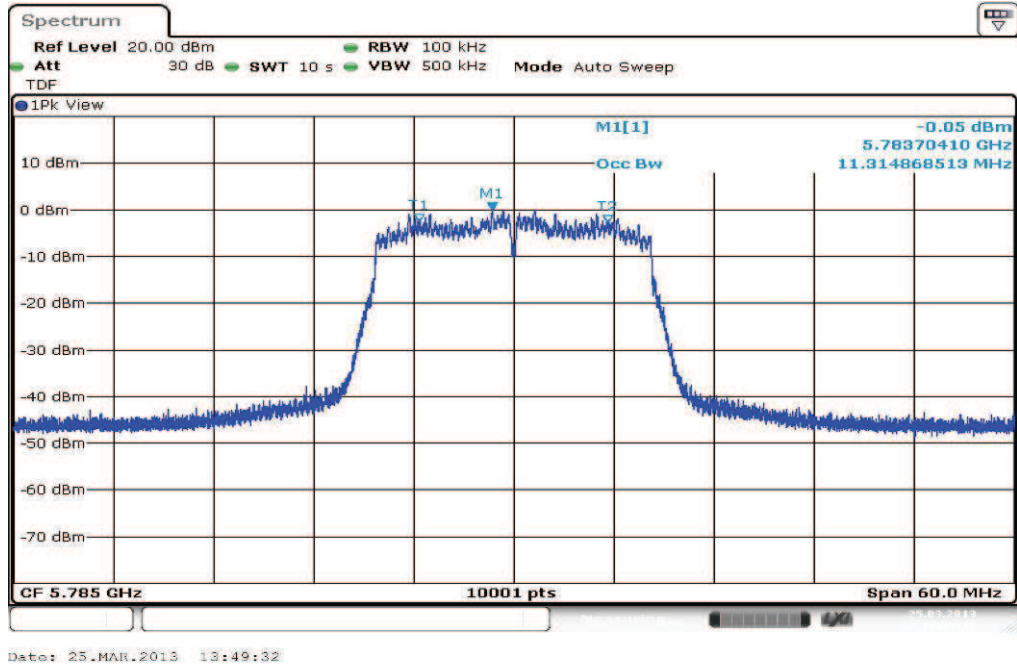
Plot 7: middle channel, a – mode, 6 Mbps



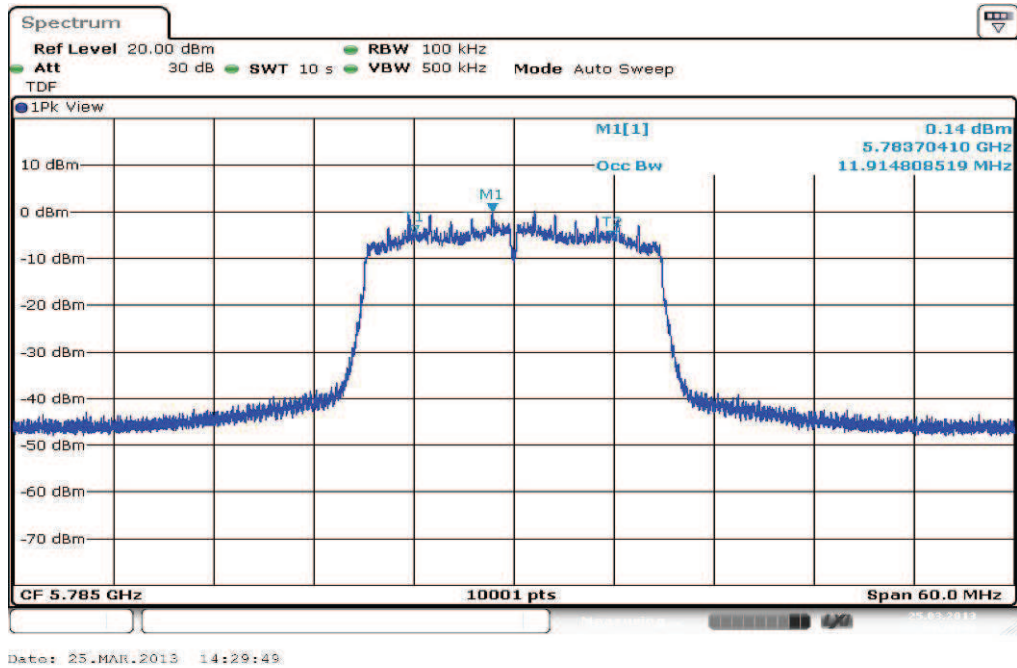
Plot 8: middle channel, a – mode, 24 Mbps



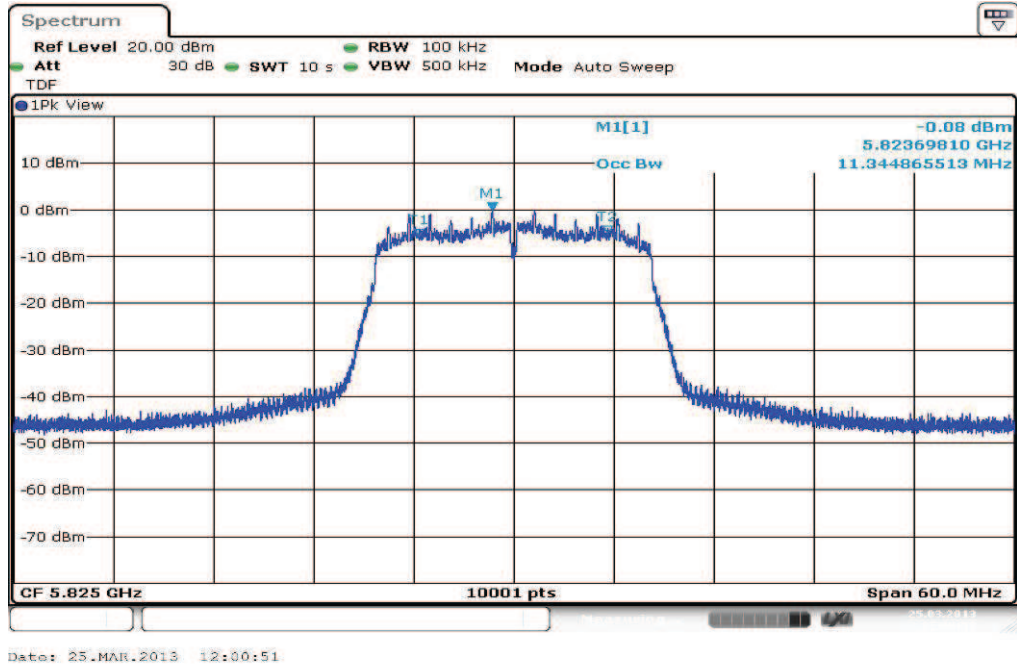
Plot 9: middle channel, a – mode, 54 Mbps



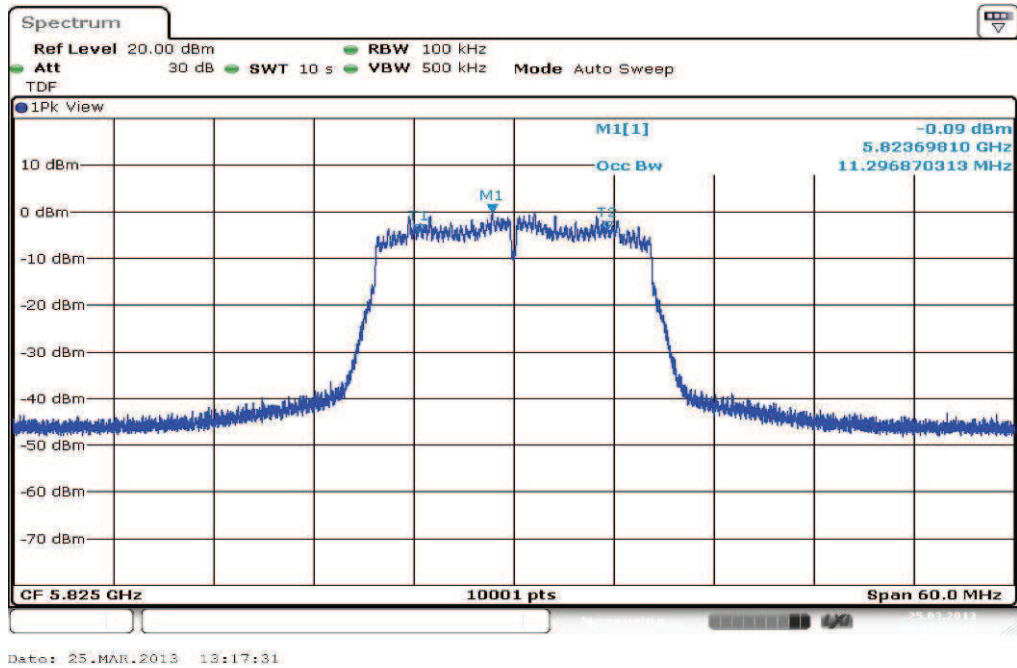
Plot 10: middle channel, n – mode, MCS 0



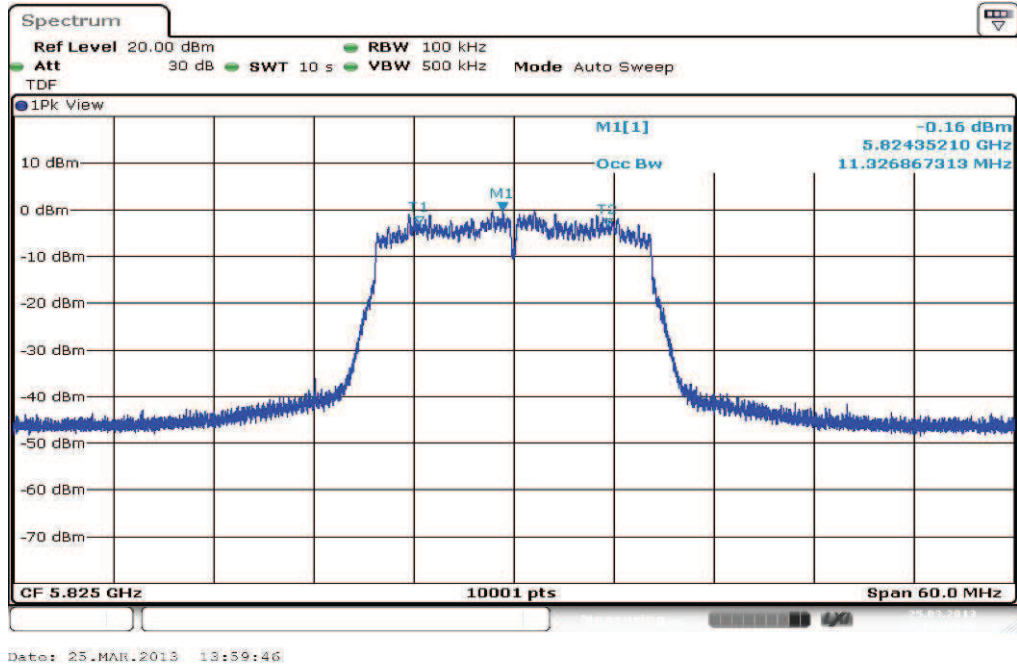
Plot 13: highest channel, a – mode, 6 Mbps



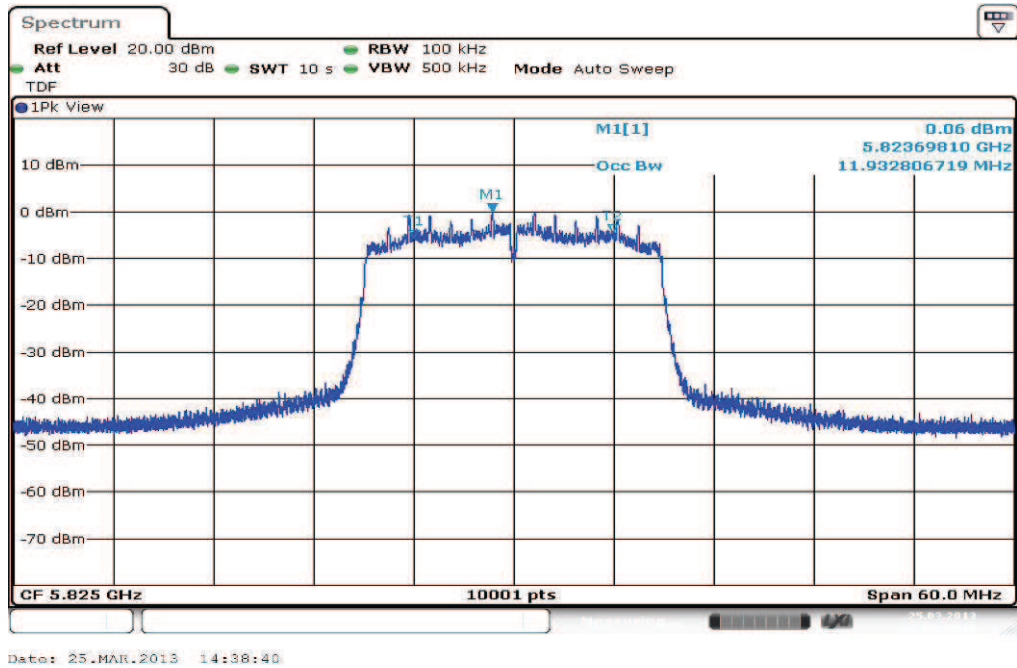
Plot 14: highest channel, a – mode, 24 Mbps



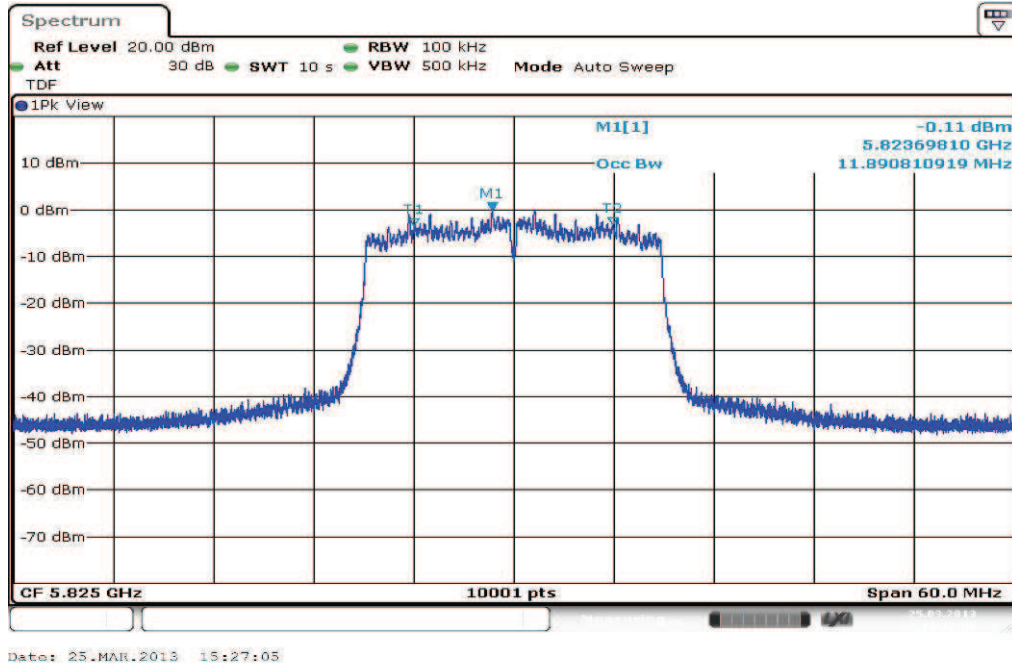
Plot 15: highest channel, a – mode, 54 Mbps



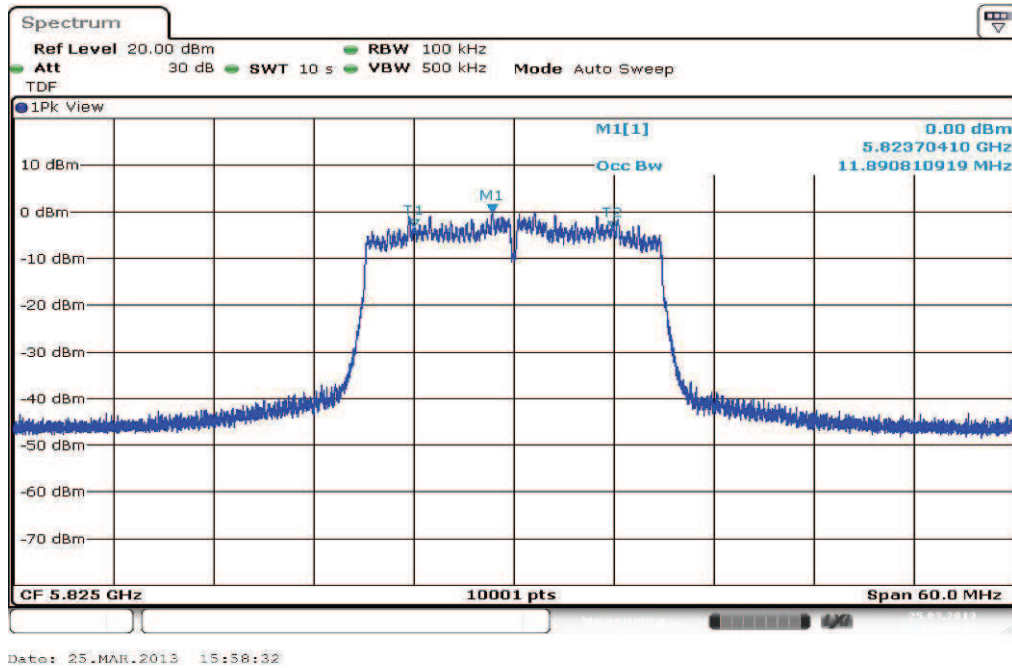
Plot 16: highest channel, n – mode, MCS 0



Plot 17: highest channel, n – mode, MCS 4



Plot 18: highest channel, n – mode, MCS 7



9.7 Spectrum bandwidth – 20 dB

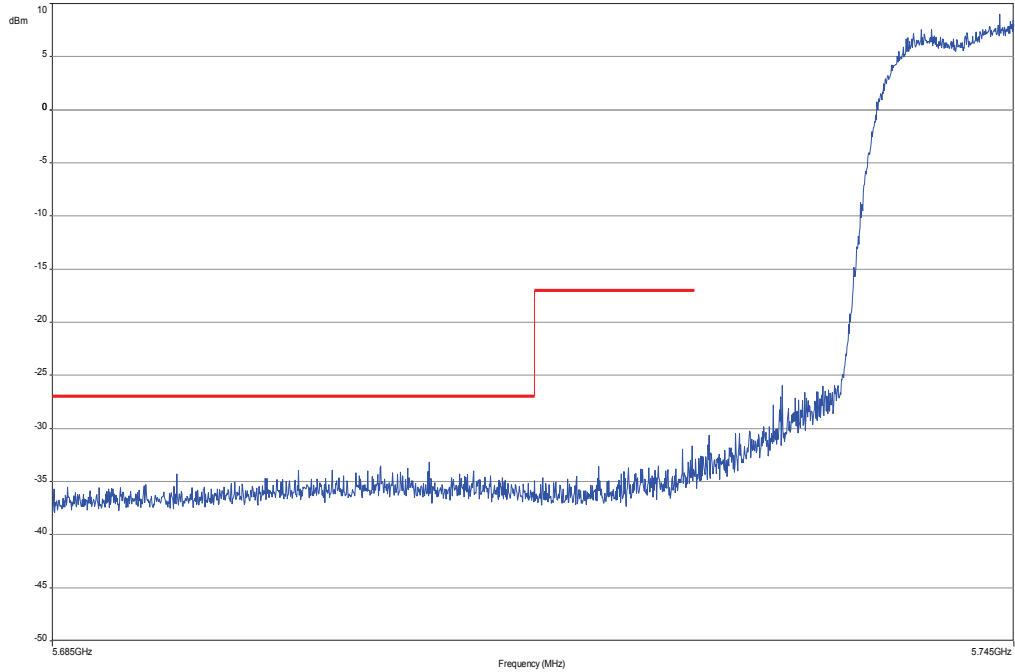
Not performed! Tests according to manufacturer test plan!

9.8 Band edge compliance conducted

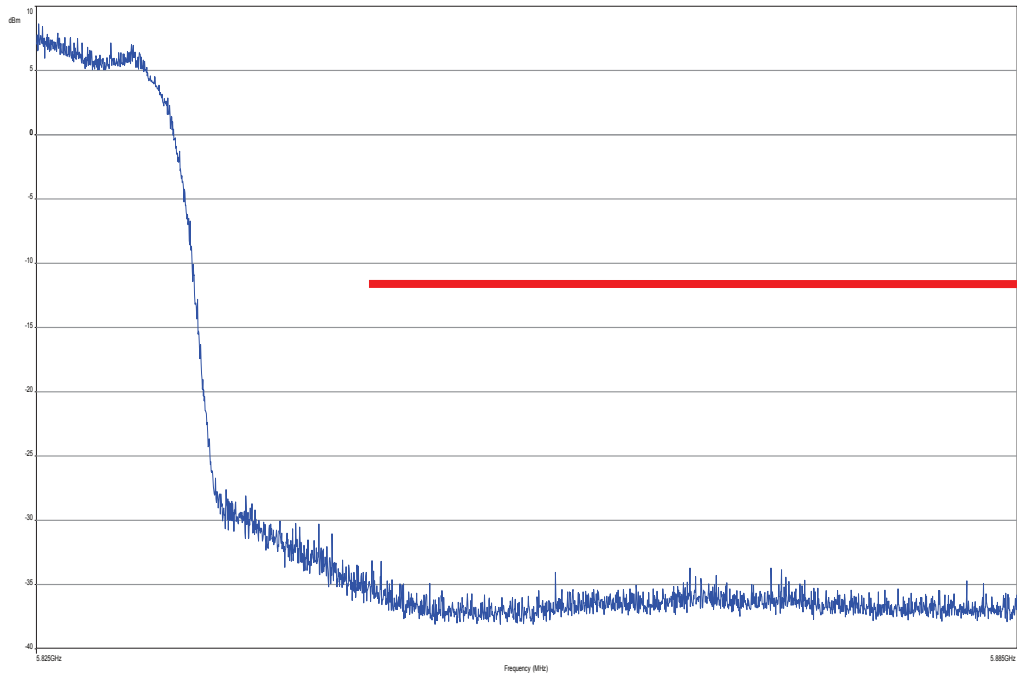
Not performed! Tests according to manufacturer test plan!

9.9 Band edge compliance radiated

Plot 1: Lower band edge, OFDM / a – mode, Limit acc. customer demand Part 15.407

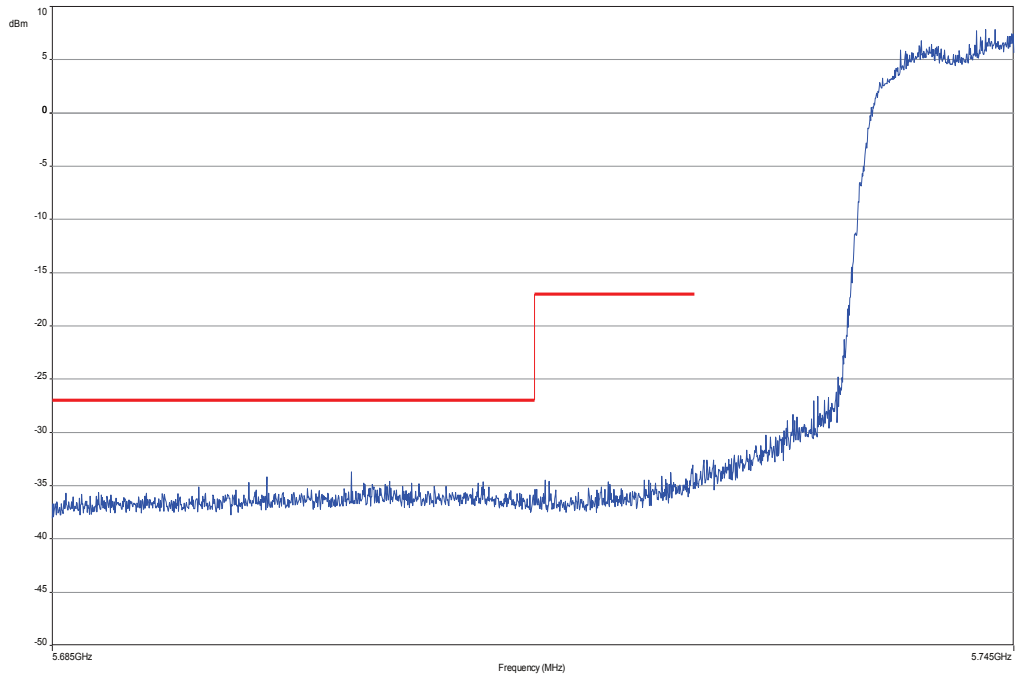


Plot 2: Upper band edge, OFDM / a – mode, Limit acc. customer demand Part 15.247 (d) (conducted limit)

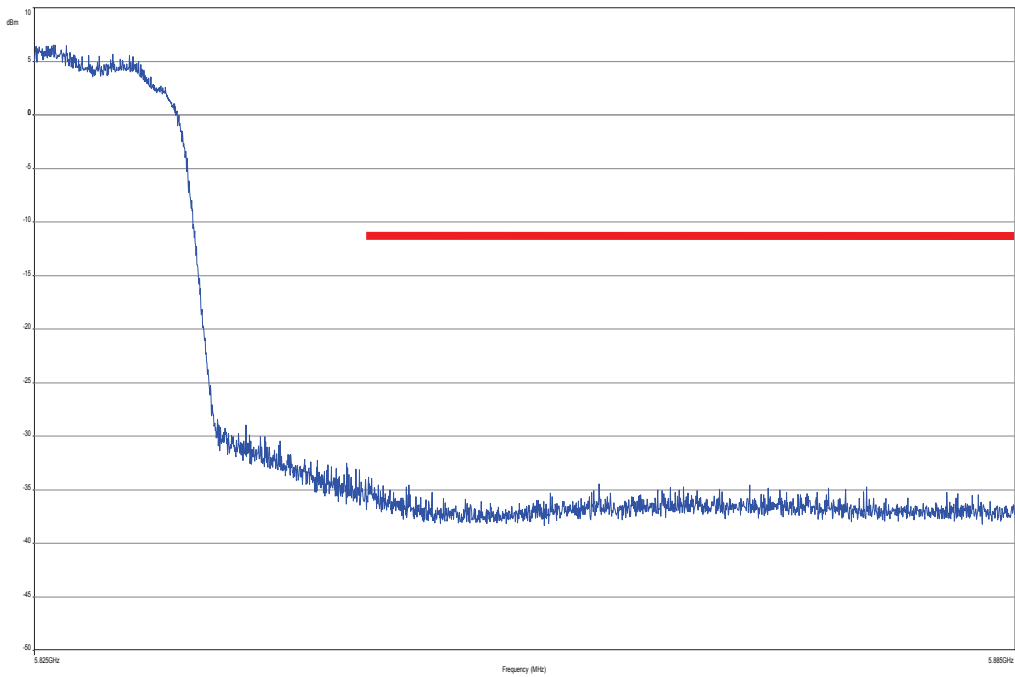


All out of band emissions on the bandedge are below 20 dBc

Plot 3: Lower band edge, OFDM / n – mode HT20, Limit acc. costumer demand Part 15.407



Plot 4: Upper band edge, OFDM / n – mode HT20, Limit acc. costumer demand Part 15.247 (d) (conducted limit)



All out of band emissions on the bandedge are below 20 dBc

Result: Not rated

9.10 TX spurious emissions conducted

Description:

Measurement of the conducted spurious emissions in transmit mode. The measurement is performed at the lowest, middle and highest channel. The measurement is repeated for all modulations.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	1s / 100 MHz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 100 kHz
Video bandwidth:	F < 1 GHz: 500 kHz F > 1 GHz: 500 kHz
Span:	9 kHz to 25 GHz
Trace-Mode:	Max Hold

Limits:

FCC	IC
TX Spurious Emissions Conducted	
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.	

Results: OFDM / a – mode

TX Spurious Emissions Conducted					
OFDM / a – mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
5745		See plots!	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5785		See plots!	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5825		See plots!	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: Passed

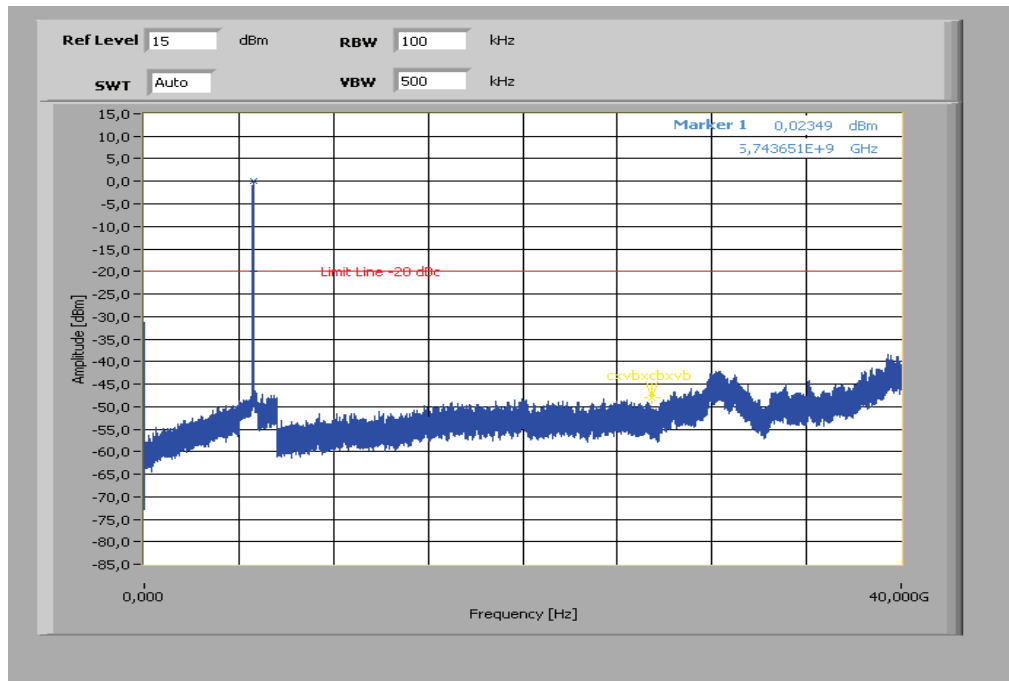
Results: OFDM / n – mode HT20

TX Spurious Emissions Conducted					
OFDM / n – mode HT20					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
5745		See plots!	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5785		See plots!	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5825		See plots!	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

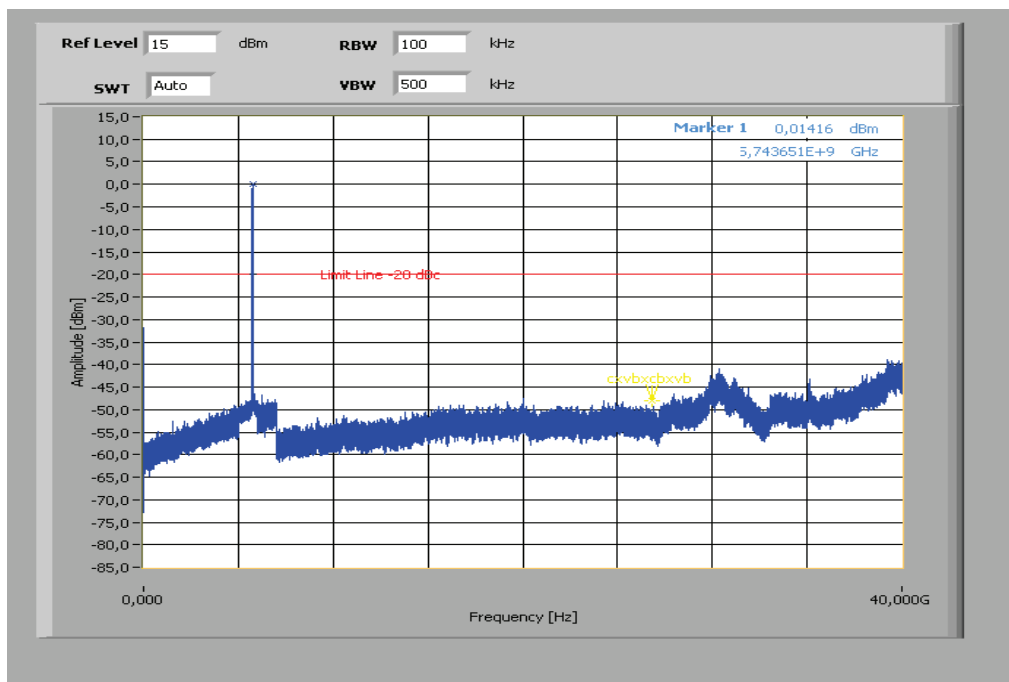
Result: Passed

Plots:

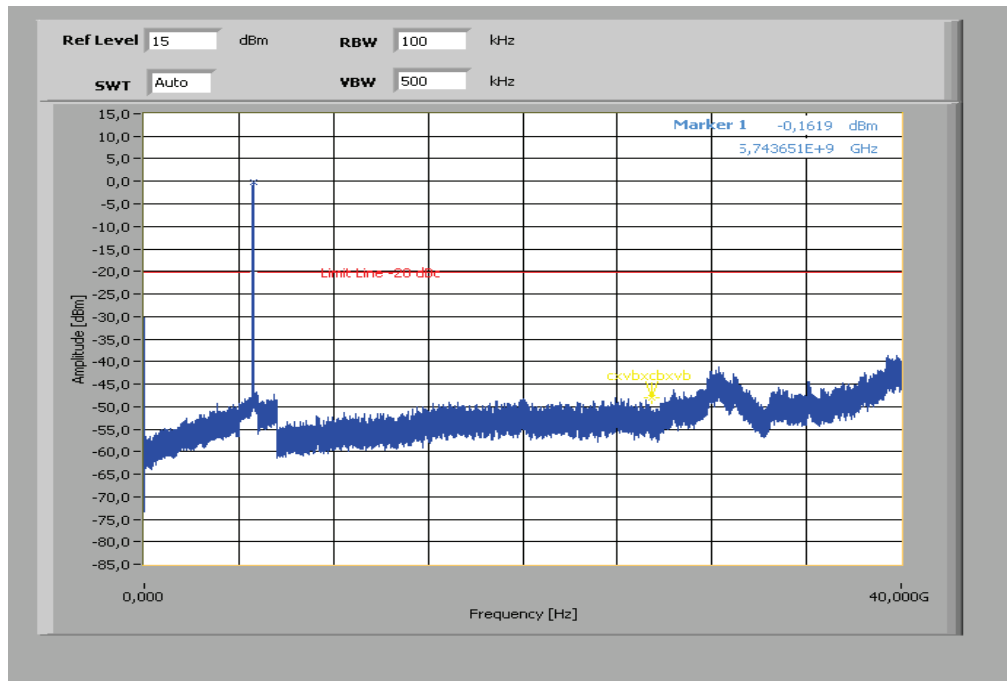
Plot 1: lowest channel, a – mode, 6 Mbps



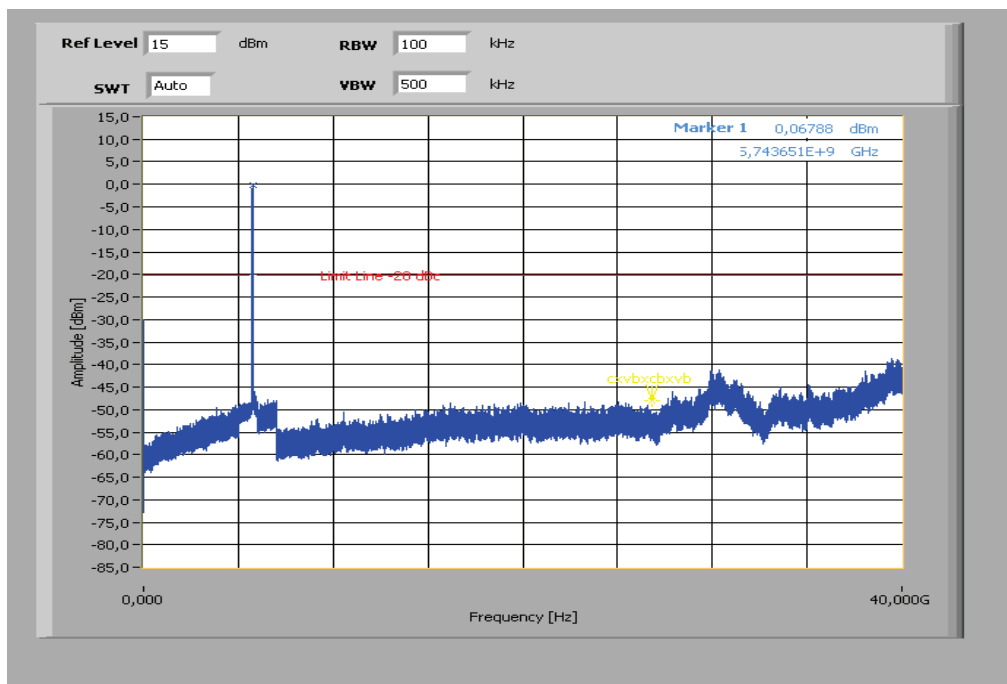
Plot 2: lowest channel, a – mode, 24 Mbps



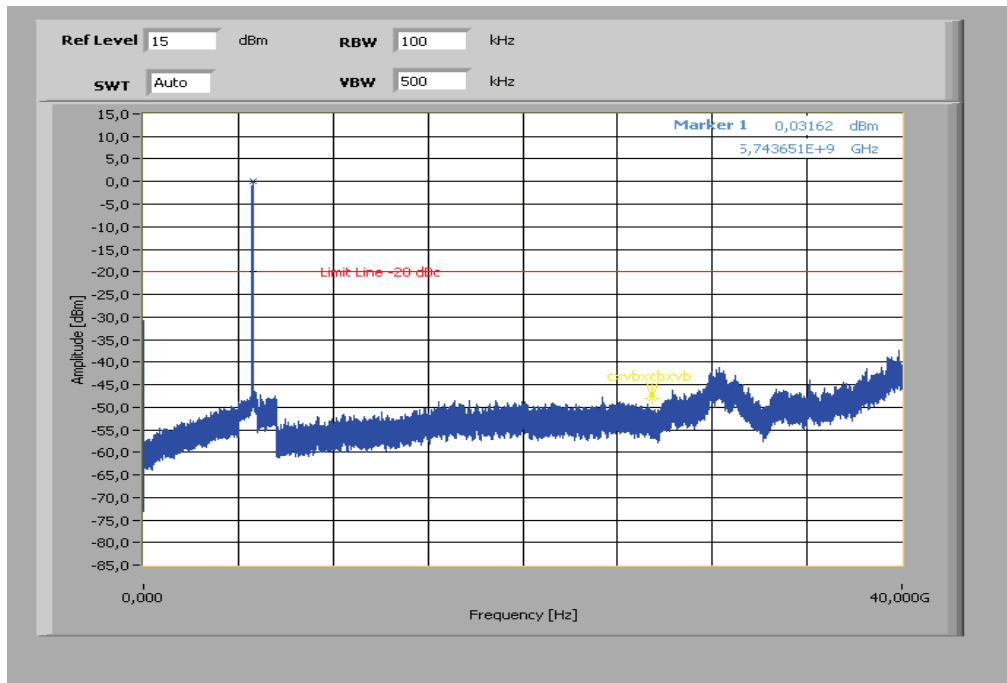
Plot 3: lowest channel, a – mode, 54 Mbps



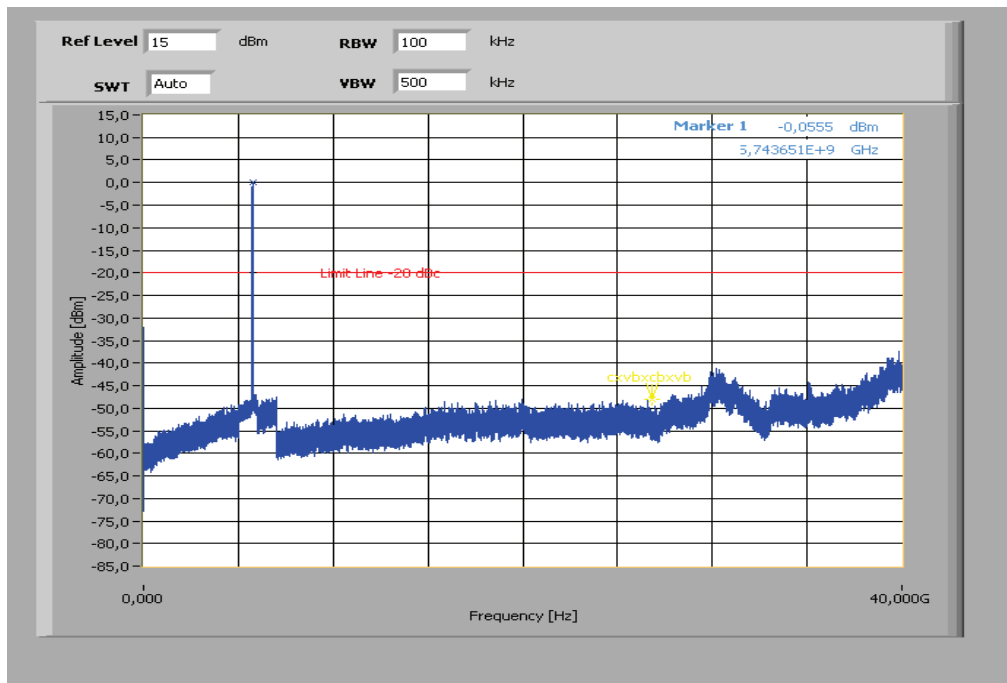
Plot 4: lowest channel, n – mode, MCS 0



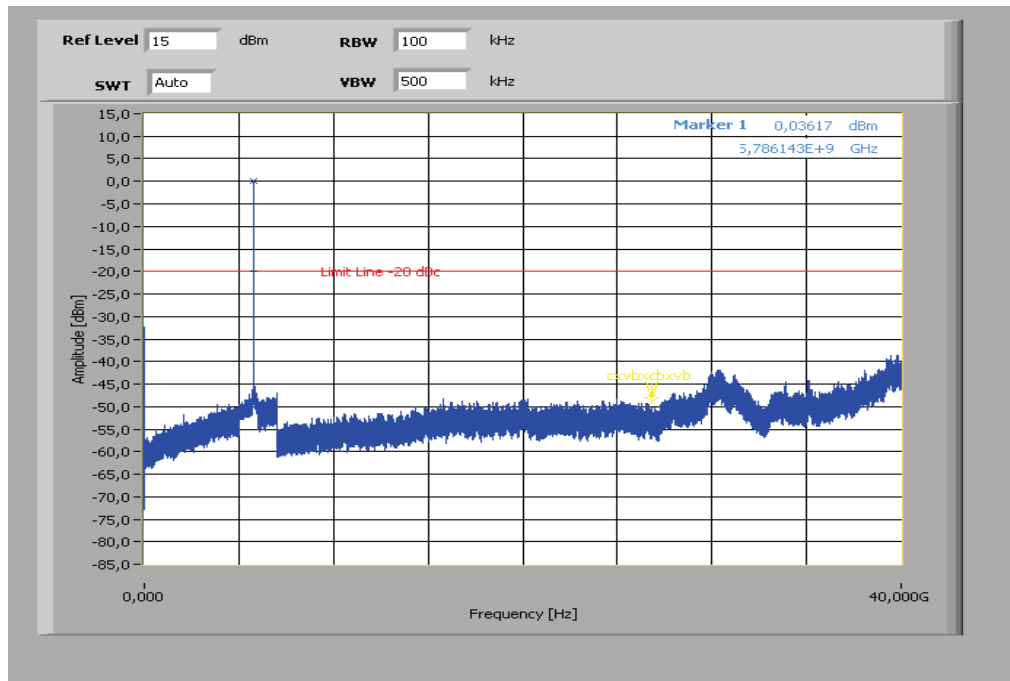
Plot 5: lowest channel, n – mode, MCS 4



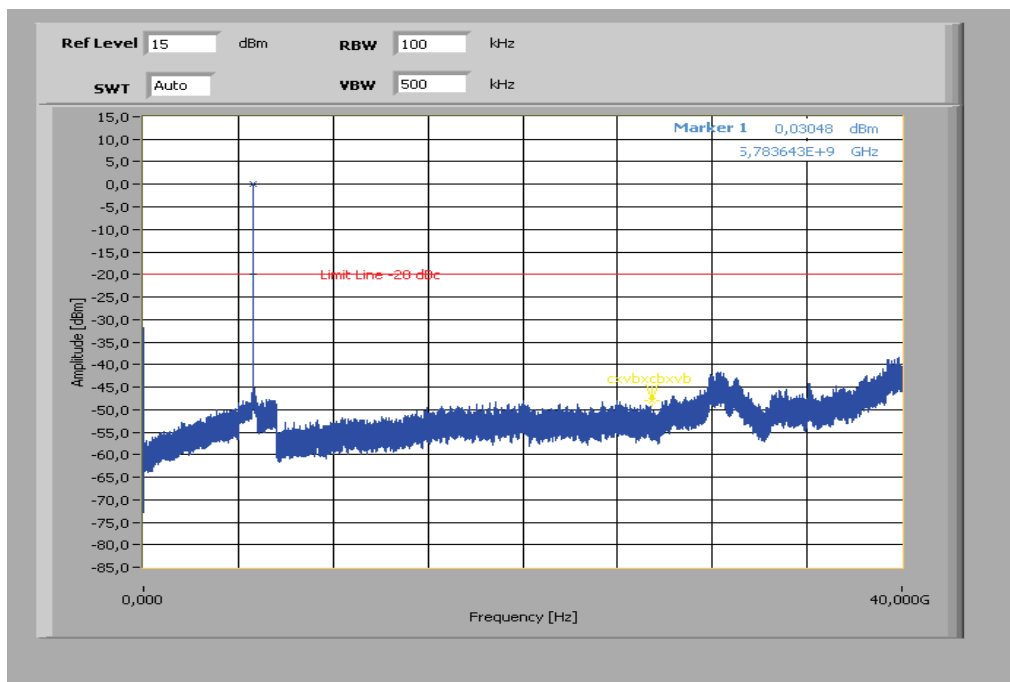
Plot 6: lowest channel, n – mode, MCS 7



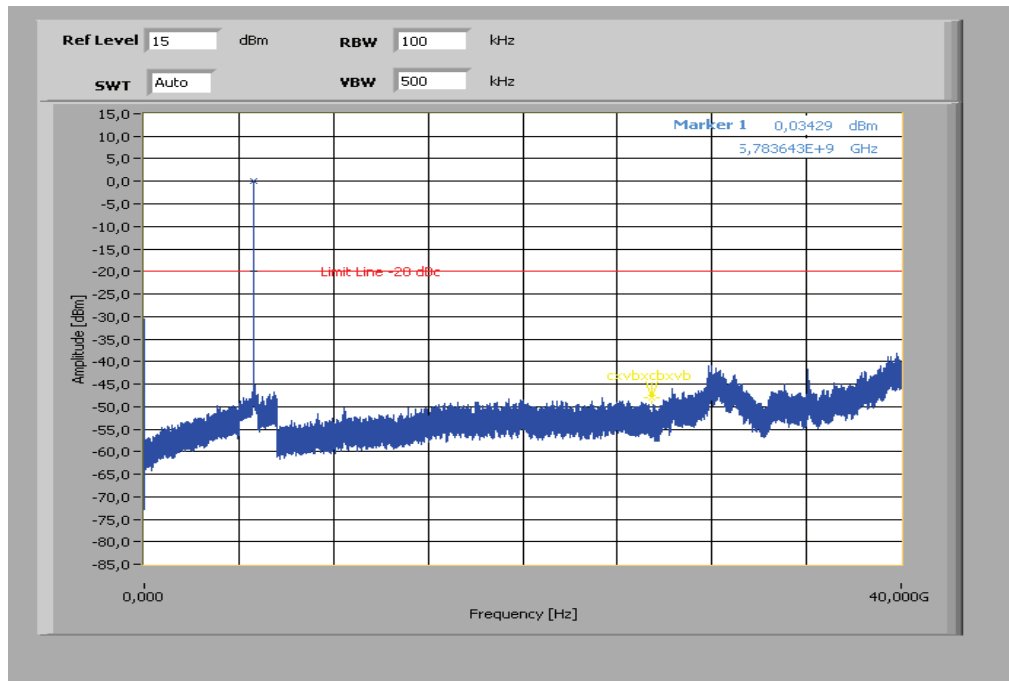
Plot 7: middle channel, a – mode, 6 Mbps



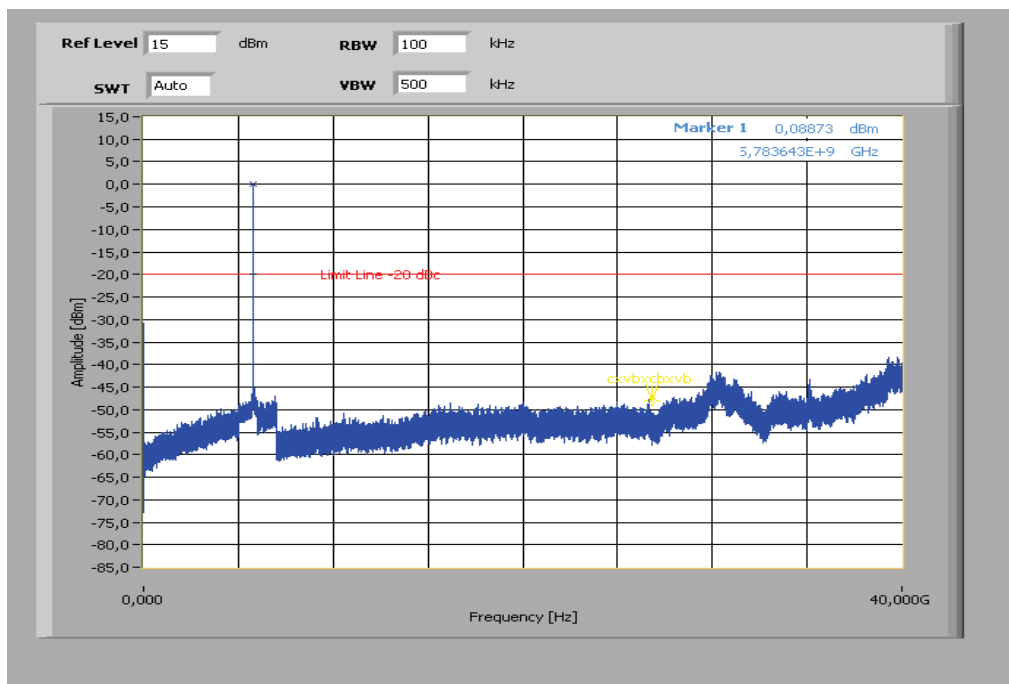
Plot 8: middle channel, a – mode, 24 Mbps



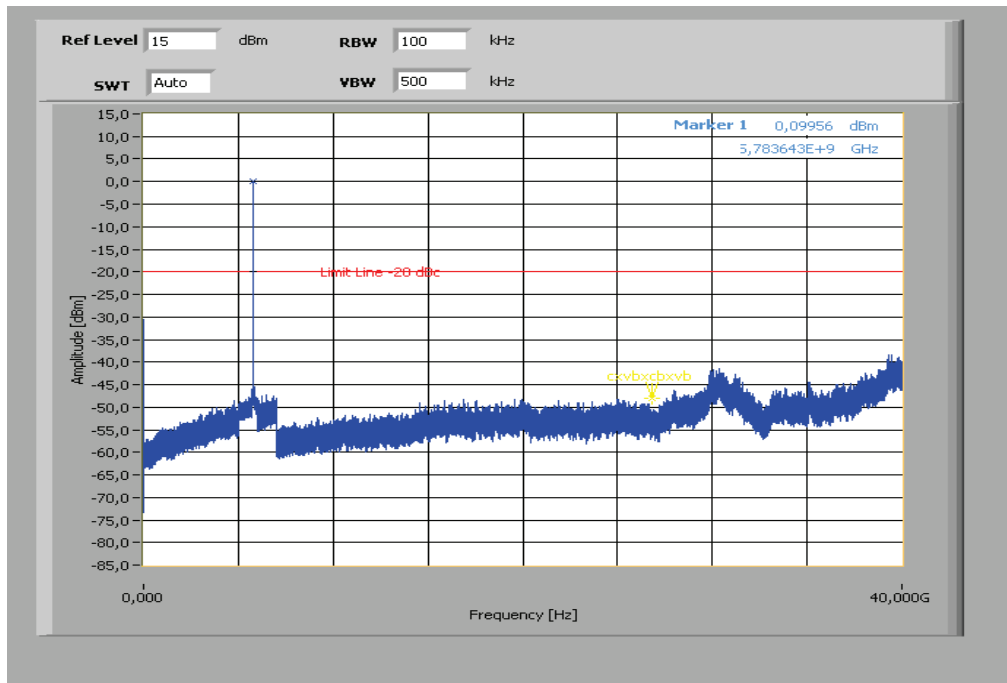
Plot 9: middle channel, a – mode, 54 Mbps



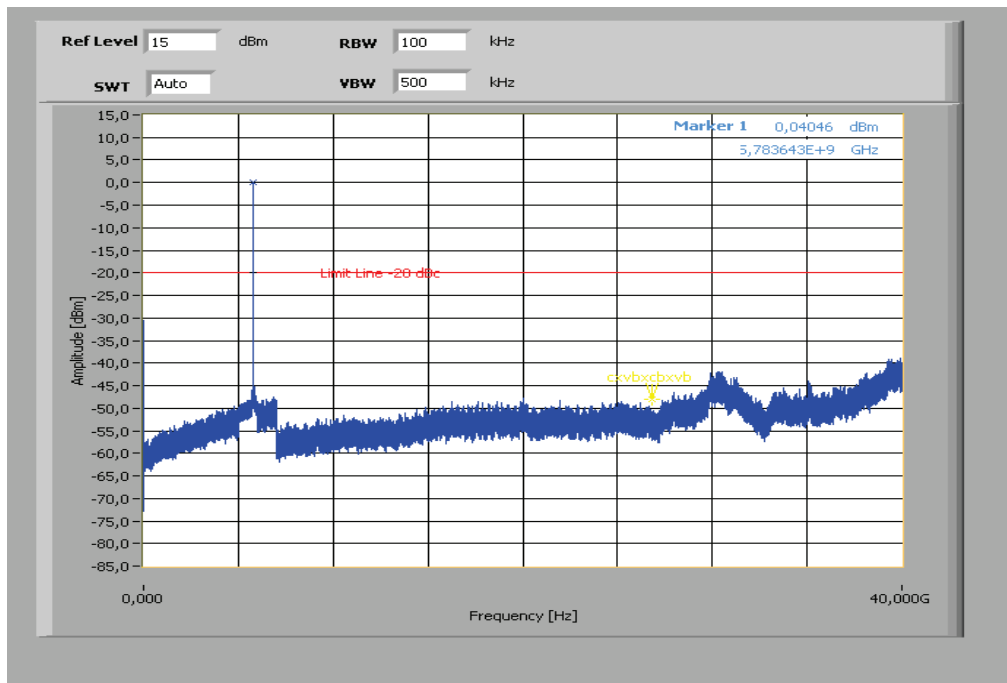
Plot 10: middle channel, n – mode, MCS 0



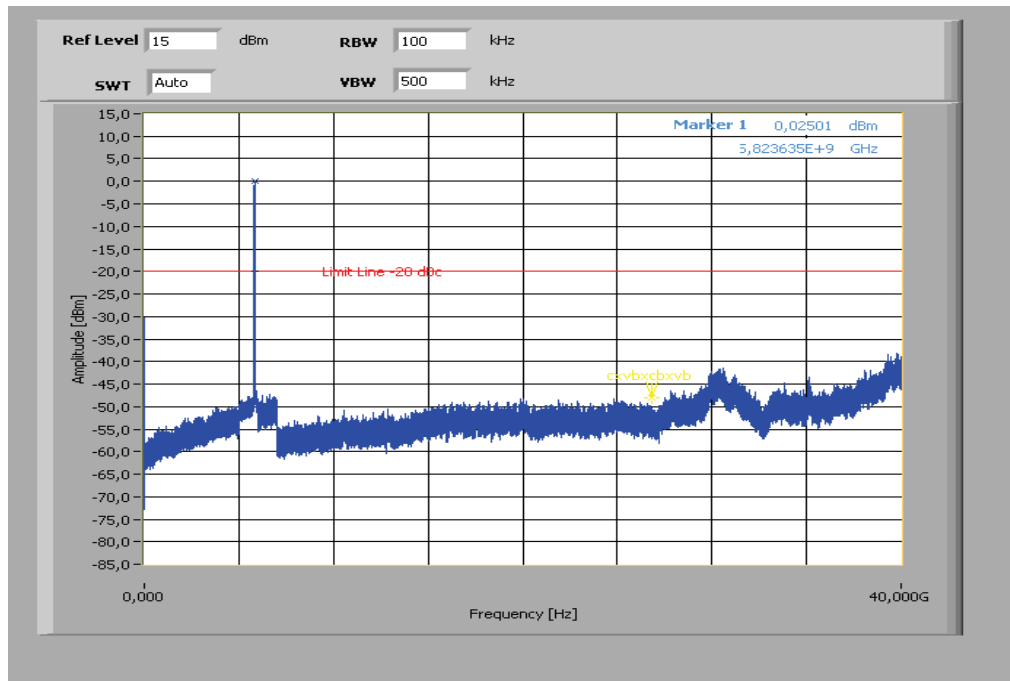
Plot 11: middle channel, n – mode, MCS 4



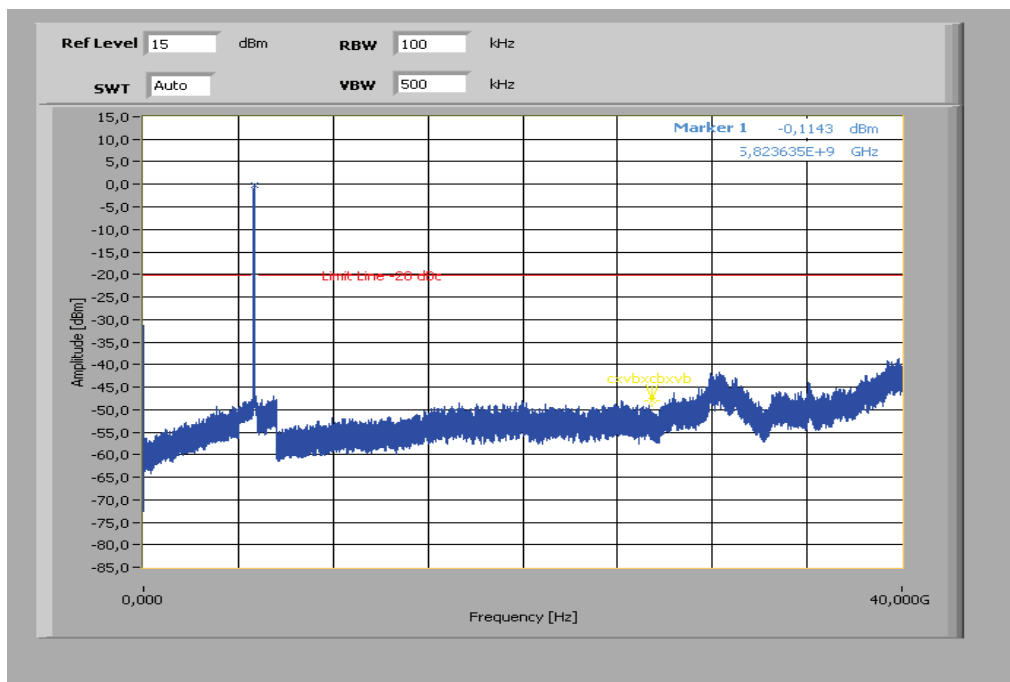
Plot 12: middle channel, n – mode, MCS 7



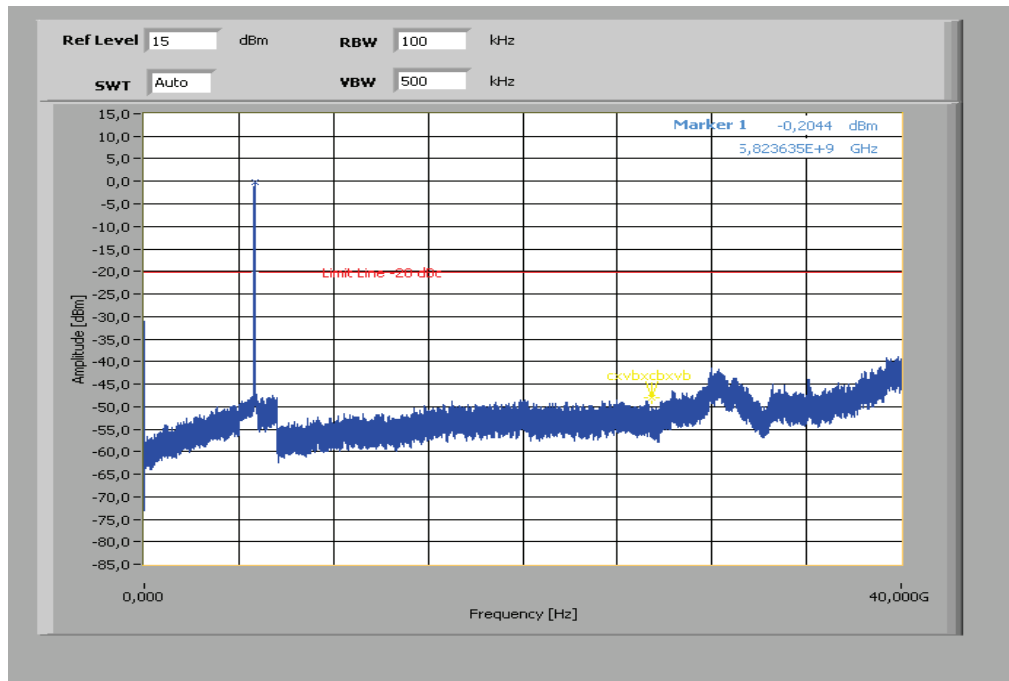
Plot 13: highest channel, a – mode, 6 Mbps



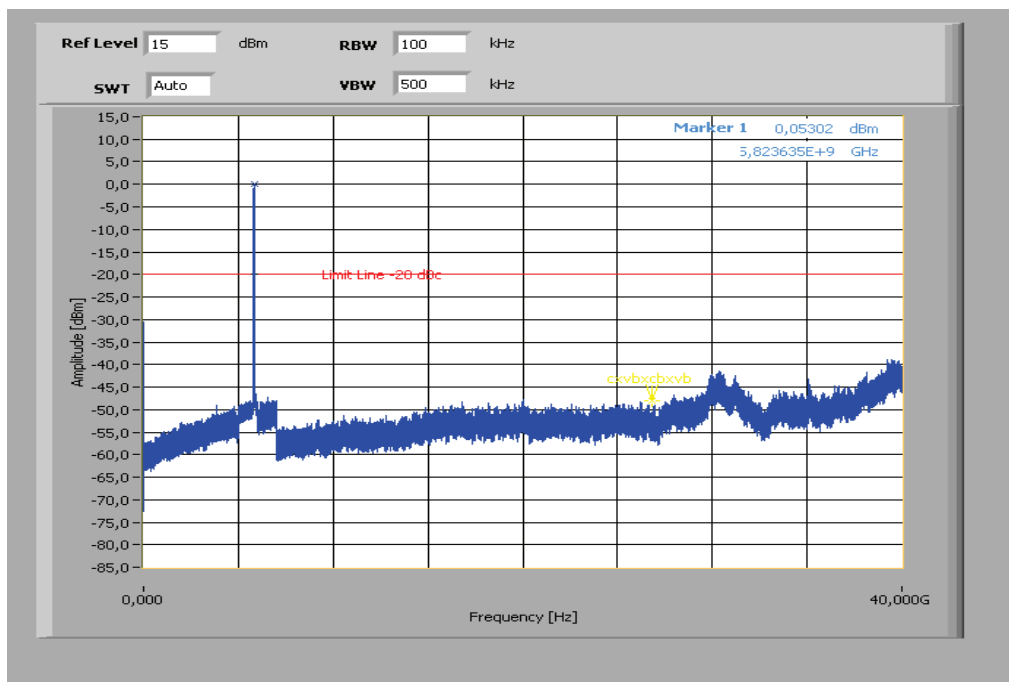
Plot 14: highest channel, a – mode, 24 Mbps



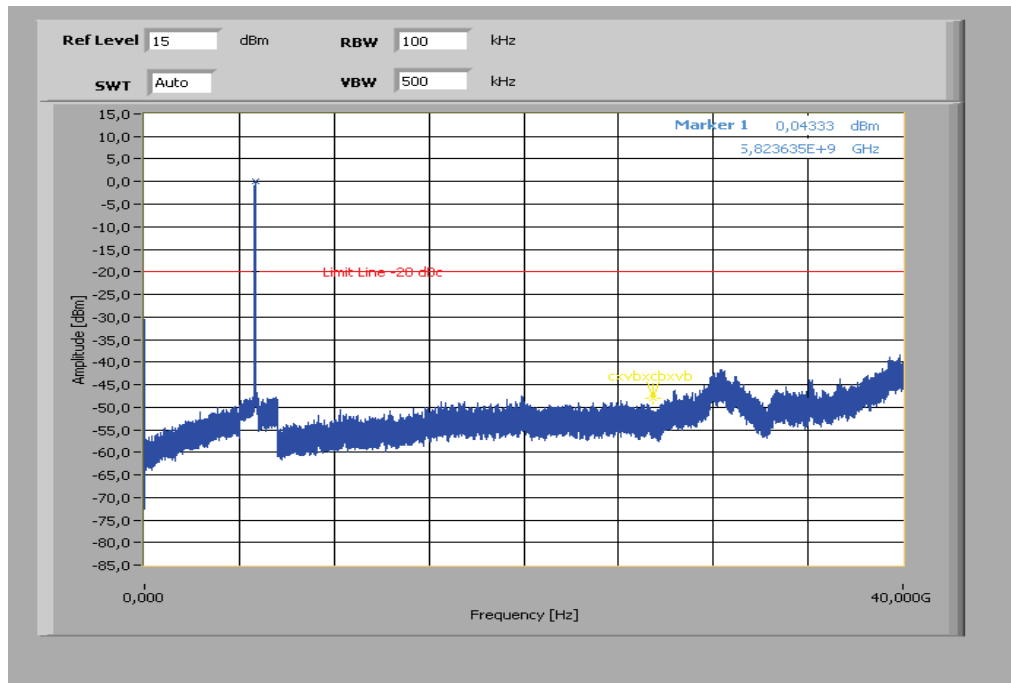
Plot 15: highest channel, a – mode, 54 Mbps



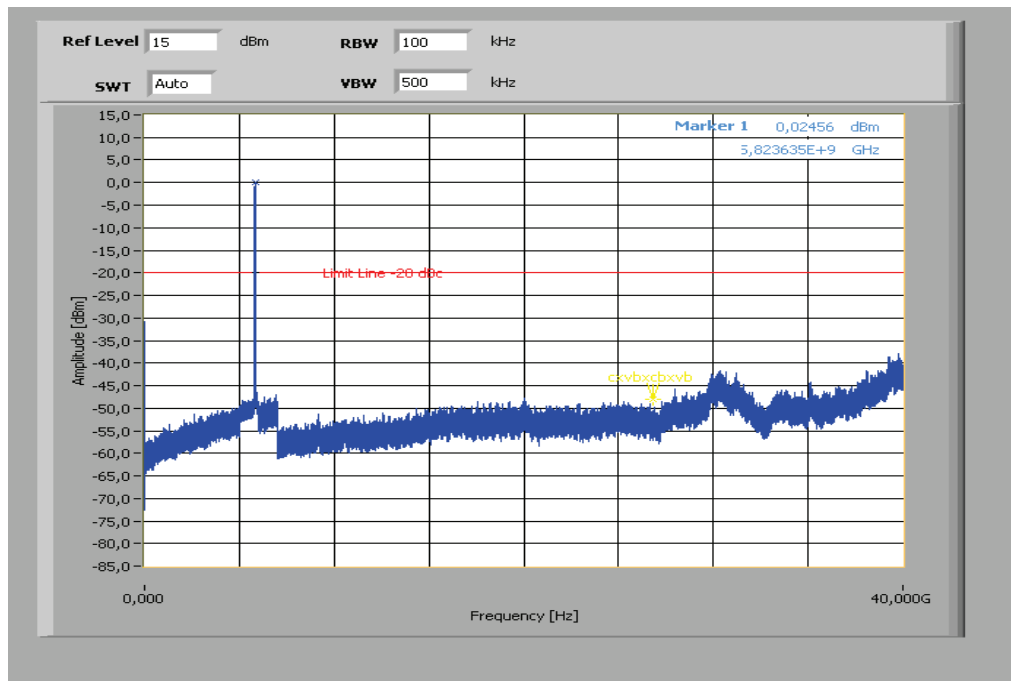
Plot 16: highest channel, n – mode, MCS 0



Plot 17: highest channel, n – mode, MCS 4



Plot 18: highest channel, n – mode, MCS 7



9.11 TX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in transmit mode. The measurement is performed at the lowest, middle and highest channel. 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:	Sweep: 100 kHz Remeasurement: 10 Hz / 3 MHz
Span:	30 MHz to 25 GHz
Trace-Mode:	Max Hold
Measured Modulation	<input checked="" type="checkbox"/> OFDM a – mode <input checked="" type="checkbox"/> OFDM n – mode HT20 <input checked="" type="checkbox"/> OFDM n – mode HT40

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: OFDM / a – mode

TX Spurious Emissions Radiated [dB μ V/m]								
OFDM / a – mode								
5745 MHz			5785 MHz			5825 MHz		
F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/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 above 1 GHz are below the average limit!			All detected peak emissions above 1 GHz are below the average limit!			All detected peak emissions above 1 GHz are below the average limit!		
Measurement uncertainty			± 3 dB					

Result: Passed

Results: OFDM / n – mode HT20

TX Spurious Emissions Radiated [dB μ V/m]								
OFDM / n – mode HT20								
5745 MHz			5785 MHz			5825 MHz		
F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/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 above 1 GHz are below the average limit!			All detected peak emissions above 1 GHz are below the average limit!			All detected peak emissions above 1 GHz are below the average limit!		
Measurement uncertainty			± 3 dB					

Result: Passed

Plots: OFDM / a – mode

Plot 1: Channel 149, 30 MHz to 1 GHz, vertical & horizontal polarization

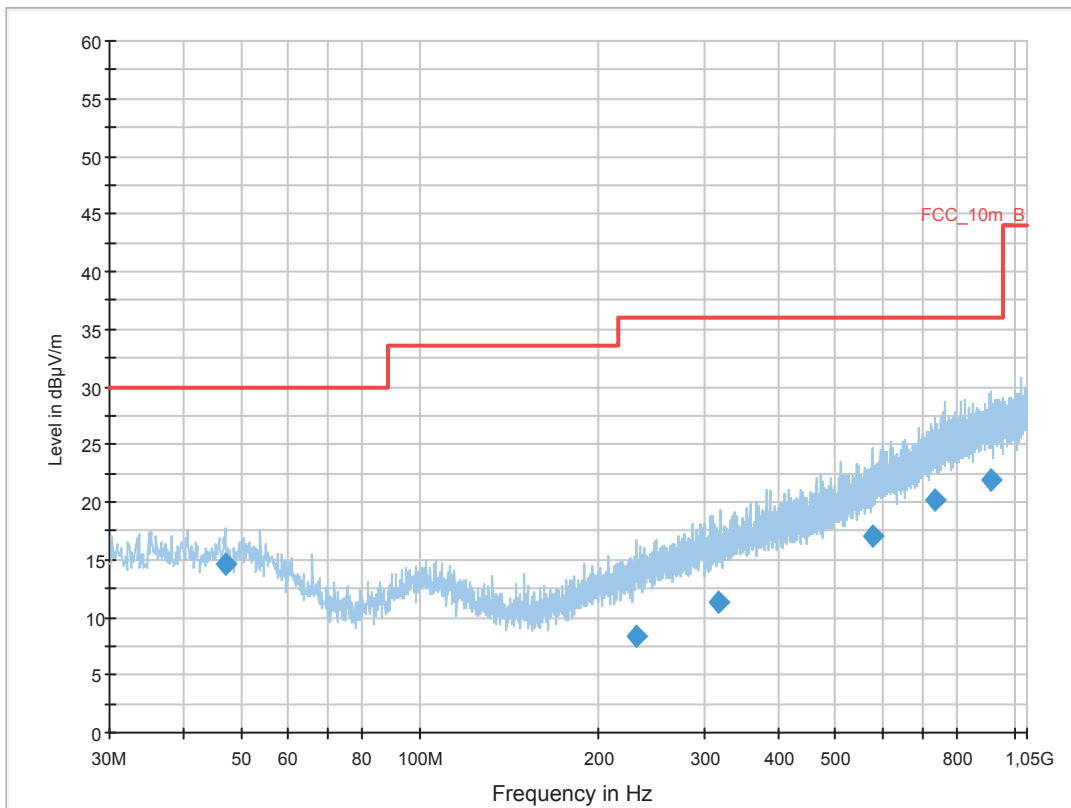
Common Information

EUT: RFM121LW
 Serial Number: lmei:990002430036317
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: w-lan a mode CH149 6Mbps
 Operator Name: Wolsdorfer
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dBµV/m

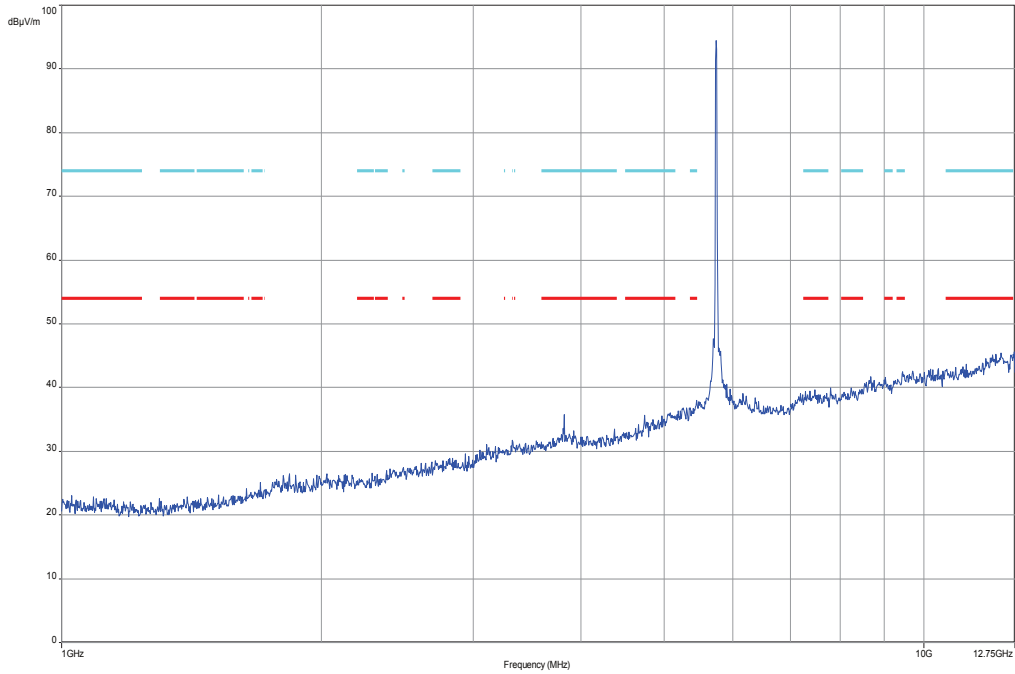
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



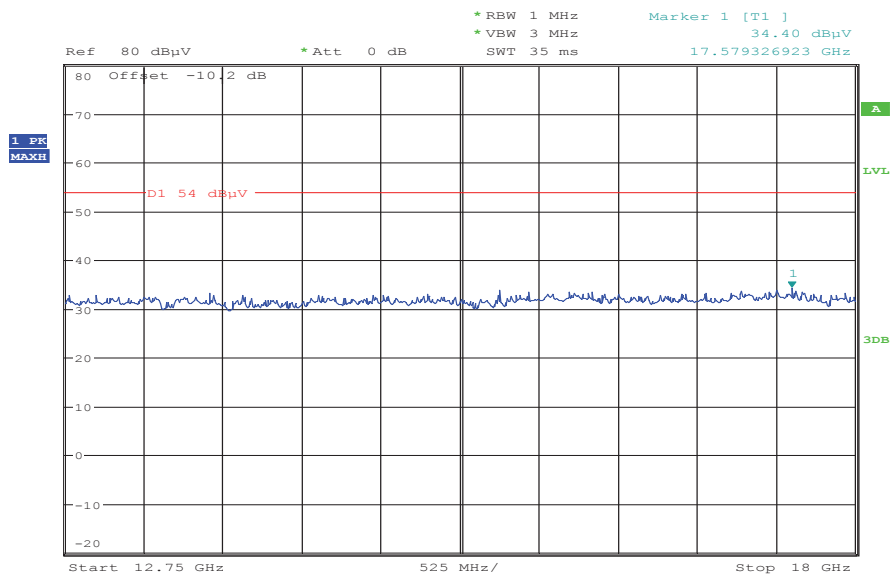
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
47.026050	14.6	1000.0	120.000	98.0	V	88.0	13.3	15.4	30.0	
231.219300	8.3	1000.0	120.000	170.0	H	280.0	12.7	27.7	36.0	
318.788100	11.3	1000.0	120.000	170.0	V	0.0	15.1	24.7	36.0	
578.797650	17.0	1000.0	120.000	98.0	H	280.0	20.2	19.0	36.0	
734.597700	20.1	1000.0	120.000	132.0	H	10.0	23.3	15.9	36.0	
912.604200	22.0	1000.0	120.000	170.0	H	260.0	25.2	14.0	36.0	

Plot 2: Channel 149, 1 GHz to 12.75 GHz, vertical & horizontal polarization

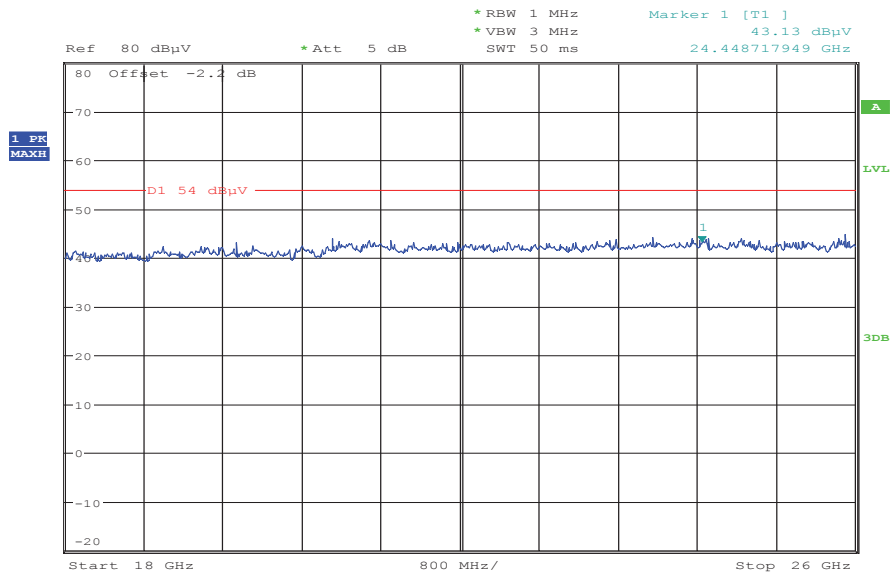


Plot 3: Channel 149, 12.75 GHz to 18 GHz, vertical & horizontal polarization



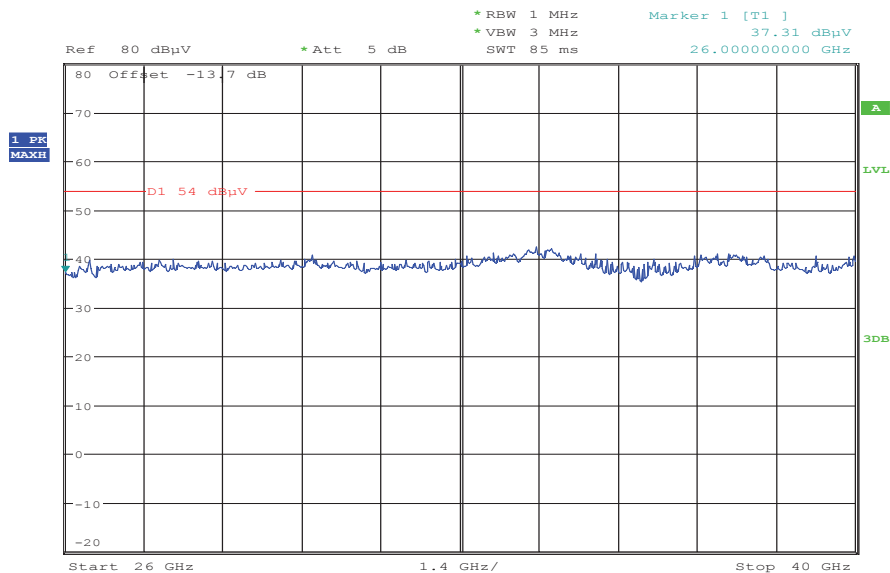
Date: 25.MAR.2013 13:34:32

Plot 4: Channel 149, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 13:52:53

Plot 5: Channel 149, 26 GHz to 40 GHz, vertical & horizontal polarization



Date: 25.MAR.2013 14:00:17

Plot 6: Channel 157, 30 MHz to 1 GHz, vertical & horizontal polarization

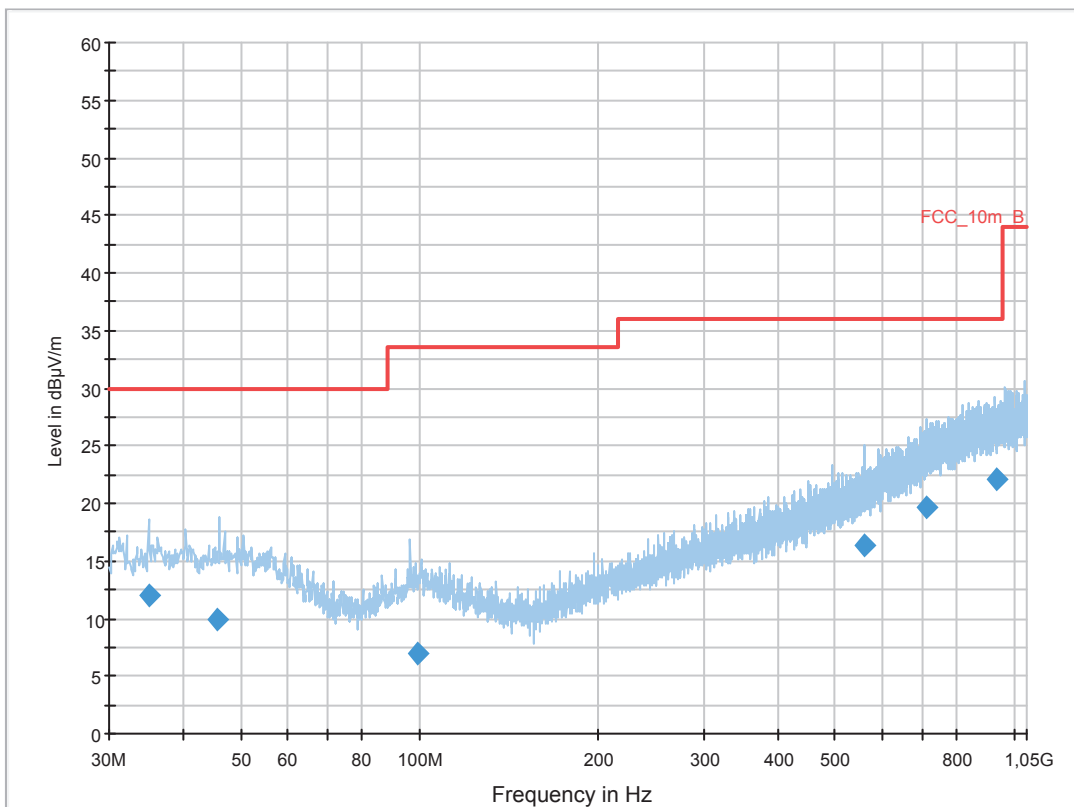
Common Information

EUT: RFM121LW
 Serial Number: lmei:990002430036317
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: w-lan a mode CH157 6Mbps
 Operator Name: Wolsdorfer
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dBµV/m

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.047200	12.0	1000.0	120.000	161.0	V	260.0	13.0	18.0	30.0	
45.593550	10.0	1000.0	120.000	120.0	V	180.0	13.3	20.0	30.0	
99.085950	7.0	1000.0	120.000	170.0	H	100.0	11.8	26.5	33.5	
560.092800	16.4	1000.0	120.000	170.0	V	190.0	19.7	19.6	36.0	
713.886450	19.7	1000.0	120.000	170.0	H	268.0	22.8	16.3	36.0	
931.351650	22.1	1000.0	120.000	105.0	H	260.0	25.3	13.9	36.0	