RADIO TEST REPORT

No. 614050

EQUIPMENT UNDER TEST

Equipment:	IEEE 802.11b/g WLAN Chipset on a reference platform
Type / model:	NRX700 Chipset
Manufacturer:	Nanoradio AB
Tested by request of:	Nanoradio AB

SUMMARY

The equipment complies with the requirements of the following standards:

FCC, Part 15, Subpart B (2005) and Subpart C (2005);

Date of issue: 2007-01-15

This report replaces previous issued test report dated 2006-10-26

Tested by: Björn Utermöhl

Approved by: Anneli Averland Johansson

Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30, www.sweden.intertek-etlsemko.com
Registered in Sweden: No SE556024059901, Registered office: As address

CONTENTS

Page

1. CLIENT INFORMATION

The EUT has been tested by request of

Company:	Nanoradio AB Torshamnsgatan 39 SE-164 40 Kista SWEDEN
Name of contact:	Tomas Blom

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT according to the manufacturer/client declaration

Equipment:	IEEE 802.11b/g WLAN Chipset on a reference platform
Type / Model:	NRX700 Chipset
Brand name:	--
Serial number:	R4A #41
Manufacturer:	Nanoradio AB
Rating/Supplying voltage:	120 VAC, 60 Hz
Rating RF output power:	24 dBm
Antenna gain:	2 dBi
External antenna connector:	Yes
Operating temperature range:	-20 to +55 °C
Frequency range:	2400 - 2483,5 MHz
Number of channels:	11
Modulation characteristics:	DSSS (OFDM and QPSK)
Stand by mode supported:	Yes
Low channel = 1	2412 MHz
Mid channel = 6	2437 MHz
High channel = 11	2462 MHz

2.2 Additional software information about the EUT

During the tests the EUT supported the following software:

Software	Version / Release	Comment
Xtest	3.0.14.	

2.3 Peripheral equipment

Peripheral equipment is defined as equipment needed to set the EUT in relevant modes but is not needed during testing and is not included as a part of the testing and evaluation of the EUT.

Equipment	Manufacturer / Type	Serial number
PC	Dell Latitude D610	--

2.4 Modifications during the test

No modifications have been made during the tests.

2.5 Additional information about the EUT

The EUT NRX700 Chipset consists of RF circuit NRX510 and BB/MAC NRX701.

3. TEST SPECIFICATIONS

3.1 Standards

FCC 47 CFR part 15 (2005) Subpart B – Unintentional radiators
FCC 47 CFR part 15 (2005) Subpart C – Intentional Radiators; §15.247 Operation within the bands 902-928 MHz, 2400 – 2483.5 MHz and 5725 – 5850 MHz.

Measurements methods according to ANSI C63.4-2003

3.2 Additions, deviations and exclusions from standards

No other additions, deviations or exclusions have been made from standards.

3.3 Test set-up

Measurement set-up radiated spurious emissions test is described in corresponding section. During other tests the EUT was connected to the spectrum analyser by cable.

3.4 Operating environment

If not additionally specified, the tests were performed under the following environmental conditions:

Air temperature:	23	°C
Relative humidity:	30	%

4. TEST SUMMARY

The results in this report apply only to the sample tested.

FCC reference	Test	Result	Note
15.247(b)	Peak output power	Pass	
15.247(a)	6 dB Bandwidth	Pass	
15.247(a)	Carrier frequency separation	NA	
15.247(a)	Number of hopping frequencies (channels)	NA	
15.247(a)	Time of occupancy (dwell time)	NA	
15.215	Band edge compliance	Pass	
15.247(e)	Power spectral density	Pass	
15.205 15.209 15.247(d) 15.109	Out of band spurious emissions, radiated	Pass	
15.209 15.247(d)	Out of band spurious emissions, conducted	Pass	
15.107 15.207	Conducted emission at AC port	Pass	

NT = Not Tested
NA = Not Applicable

5. PEAK OUTPUT POWER

5.1 Test protocol

Date of test: 2006-10-18 and 2007-01-13

Spectrum analyzer settings for QPSK:

Span: 60 MHz
RBW: 10 MHz
VBW: 10 MHz
Sweep time: Auto
Detector: Peak
Trace: Max Hold

Spectrum analyzer settings for OFDM:

Span: 40 MHz
RBW: 10 MHz
VBW: 10 MHz
Sweep time: Auto
Detector: Peak
Trace: Max Hold
Channel power function was used. The channel bandwidth was set to the 6 dB bandwidth.

QPSK modulation, 11 Mbps data rate

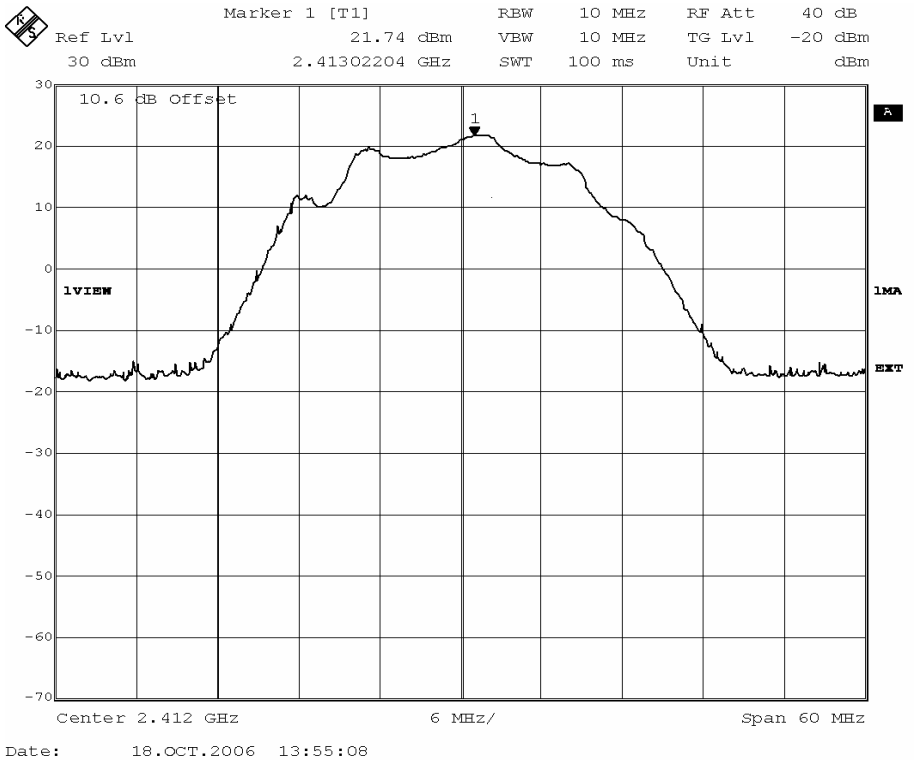
Test conditions	Peak Output Power [dBm]			Limit
	2412 MHz	2437 MHz	2462 MHz	[dBm]
V_{nom} 120 VAC	21,7	22,4	23,0	30
$V_{max,}$ 115%, 138 VAC	21,7	22,3	23,1	
$V_{min,}$ 85%, 102 VAC	21,9	22,3	23,4	

OFDM modulation, 54 Mbps data rate

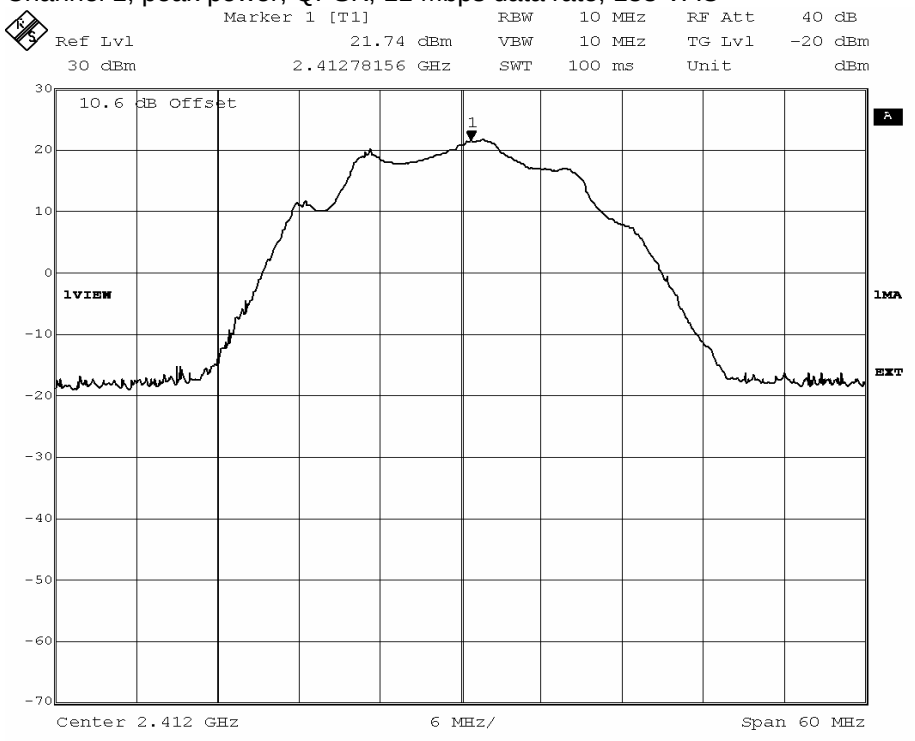
Test conditions	Peak Output Power [dBm]			Limit
	2412 MHz	2437 MHz	2462 MHz	[dBm]
V_{nom} 120 VAC	21,4	21,5	21,7	30
$V_{max,}$ 115%, 138 VAC	21,3	21,7	21,9	
$V_{min,}$ 85%, 102 VAC	21,1	21,4	21,8	

Measurement results are corrected for attenuation in the set-up configuration.

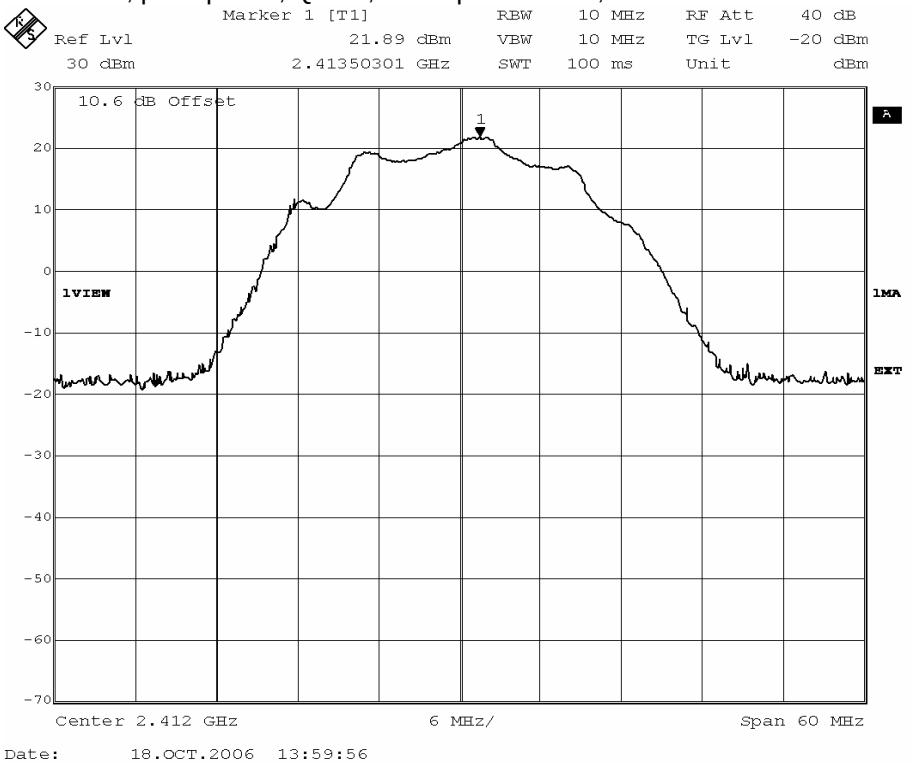
Channel 1, peak power, QPSK, 11 Mbps data rate, 120 VAC



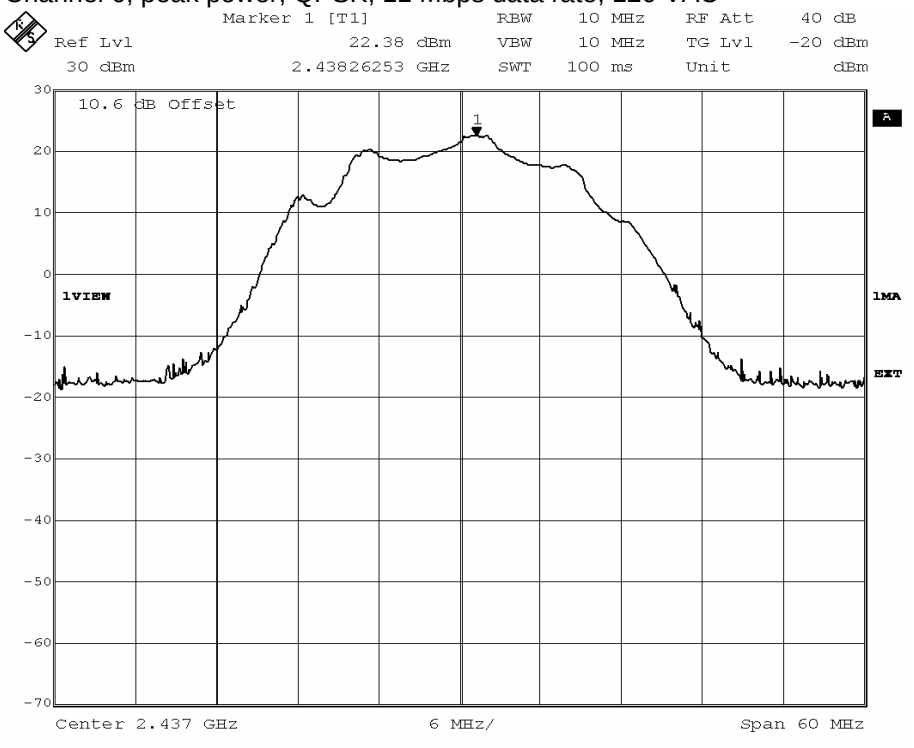
Channel 1, peak power, QPSK, 11 Mbps data rate, 138 VAC



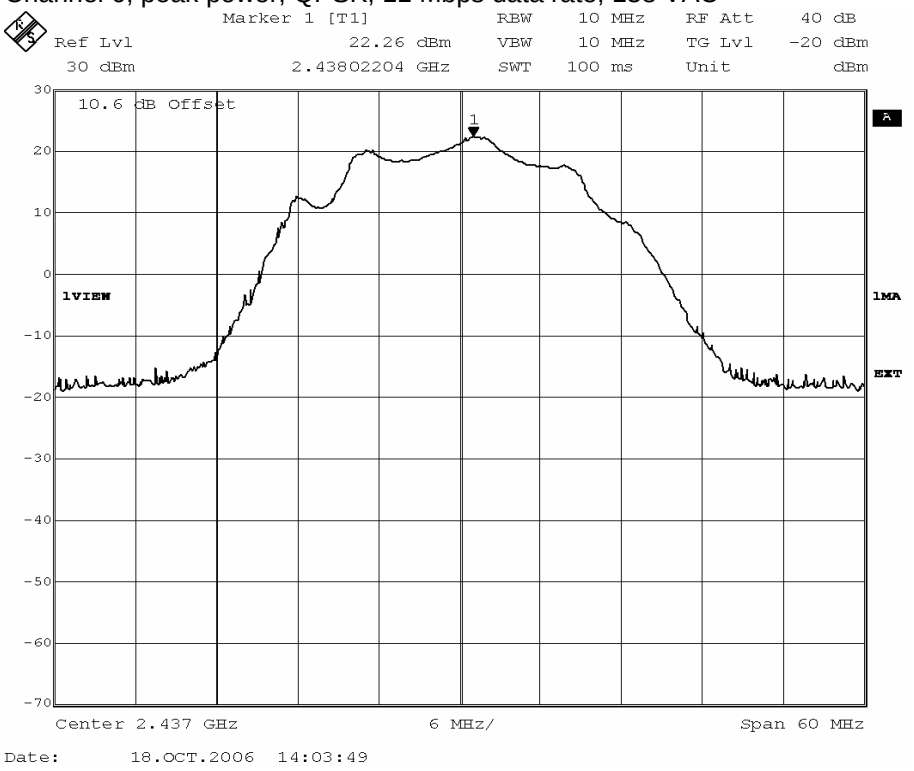
Channel 1, peak power, QPSK, 11 Mbps data rate, 102 VAC



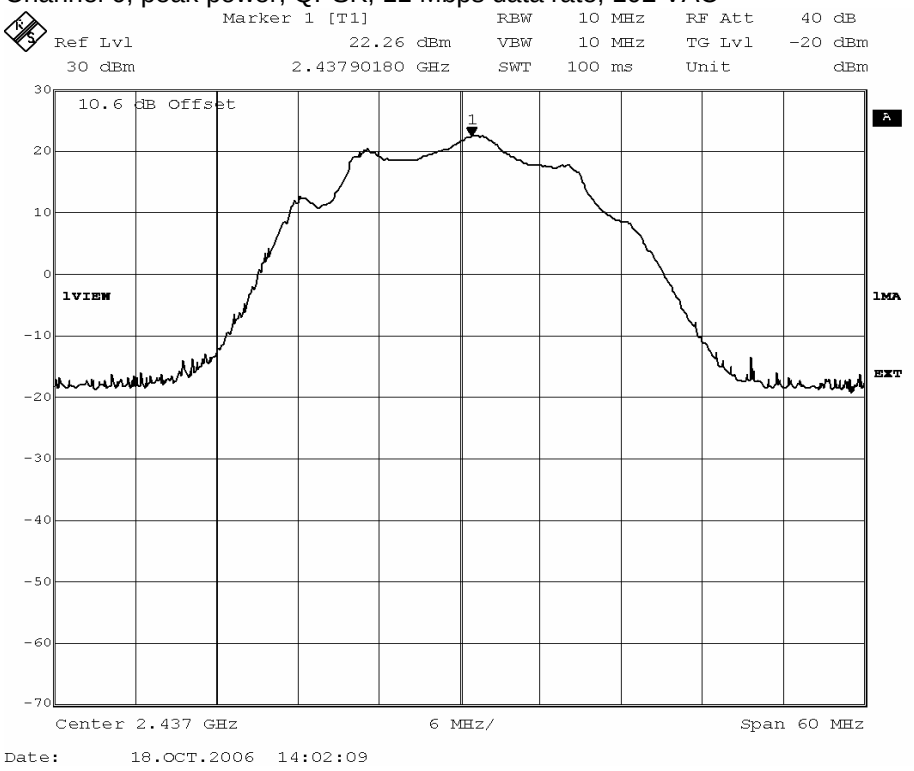
Channel 6, peak power, QPSK, 11 Mbps data rate, 120 VAC



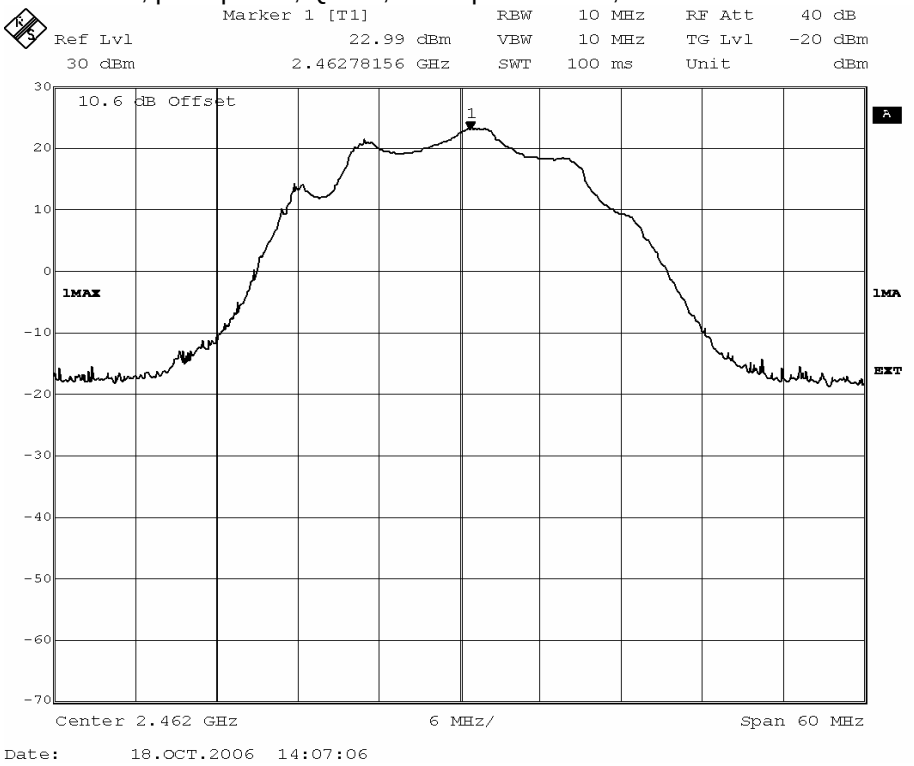
Channel 6, peak power, QPSK, 11 Mbps data rate, 138 VAC



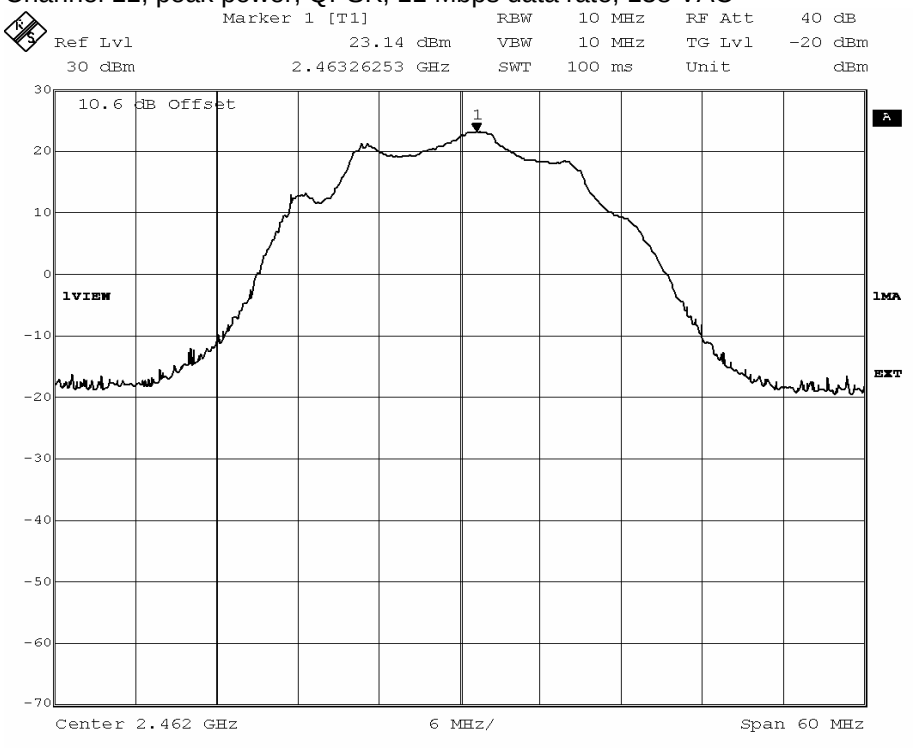
Channel 6, peak power, QPSK, 11 Mbps data rate, 102 VAC



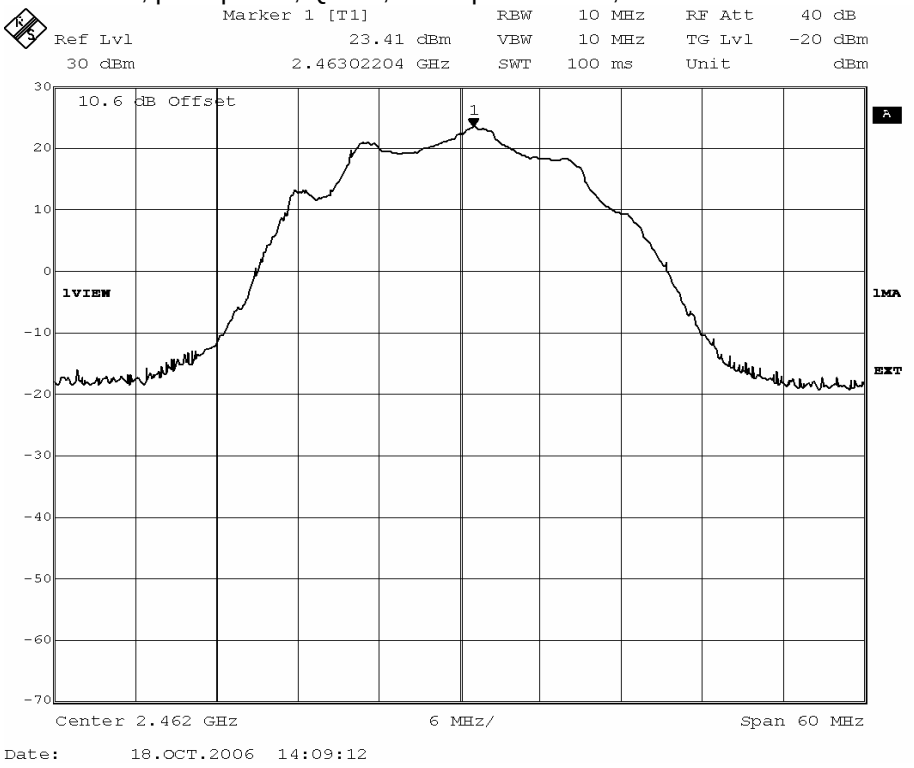
Channel 11, peak power, QPSK, 11 Mbps data rate, 120 VAC



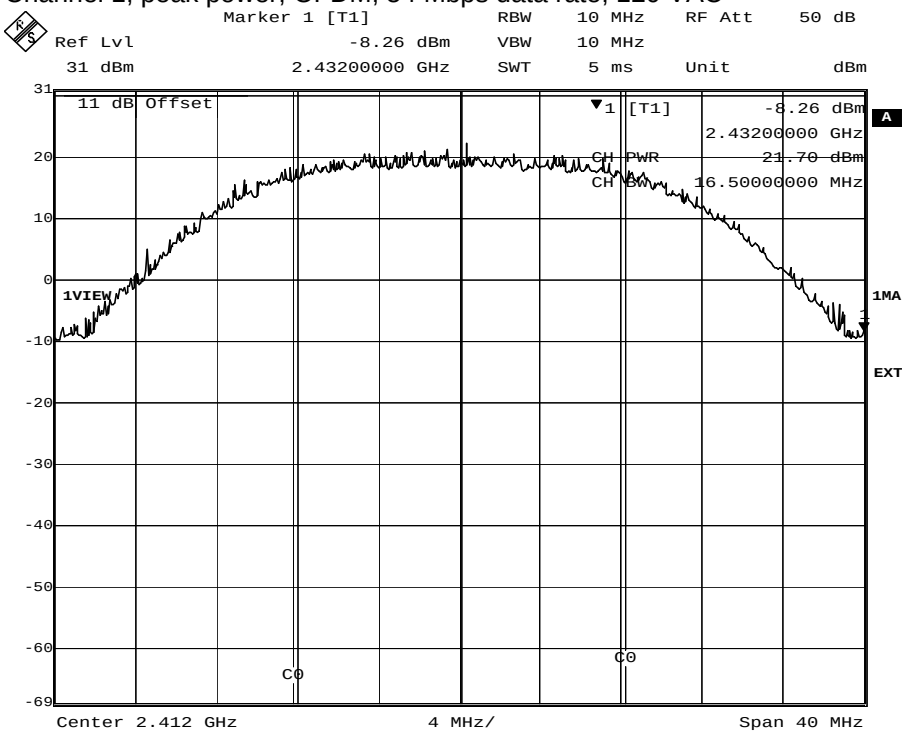
Channel 11, peak power, QPSK, 11 Mbps data rate, 138 VAC



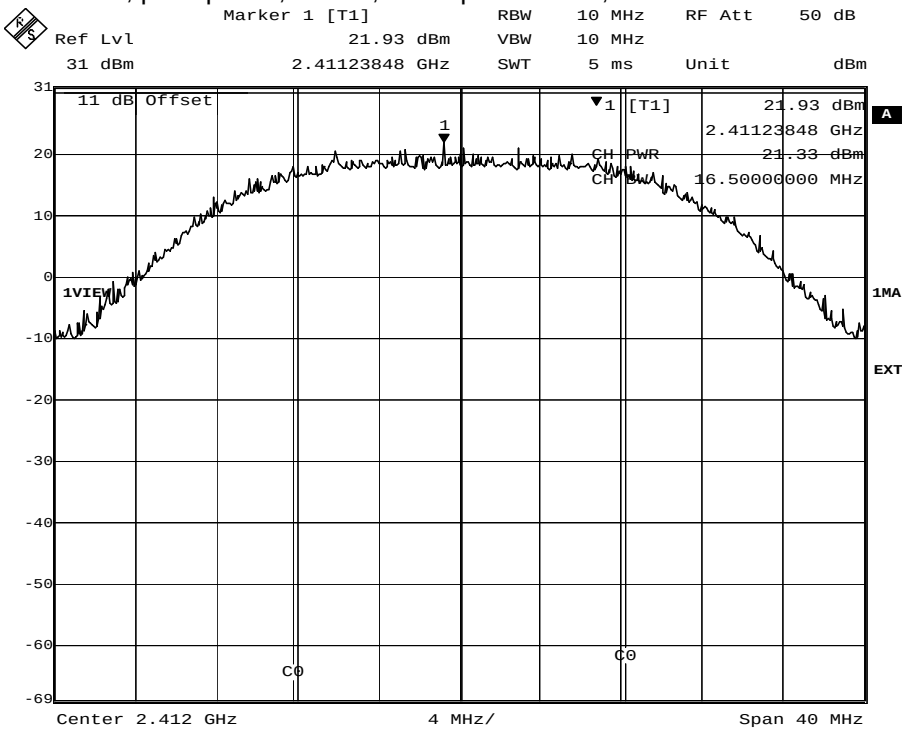
Channel 11, peak power, QPSK, 11 Mbps data rate, 102 VAC



Channel 1, peak power, OFDM, 54 Mbps data rate, 120 VAC

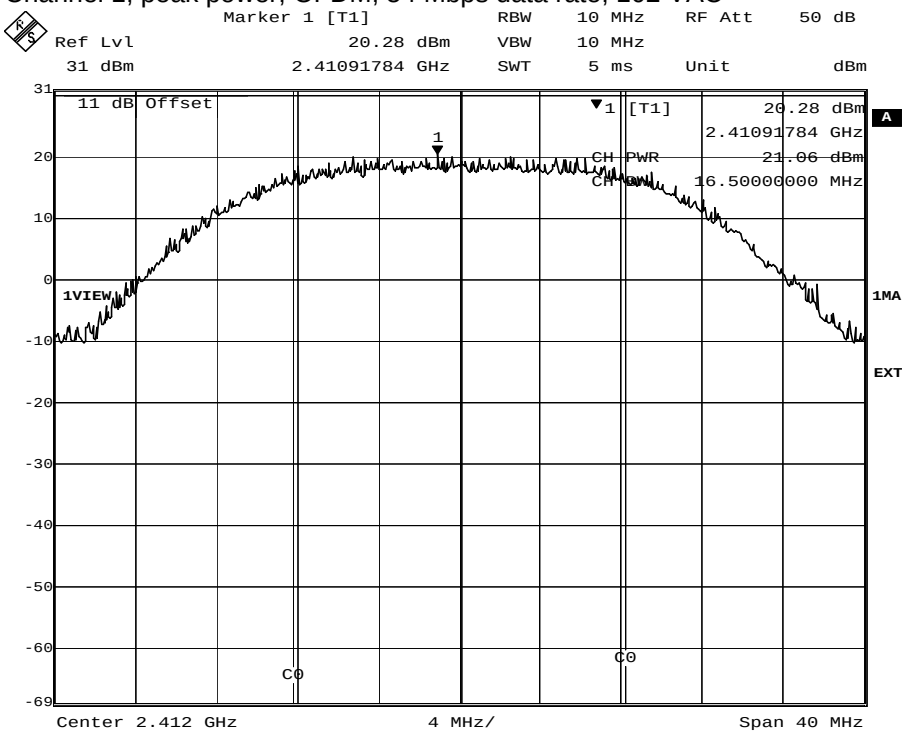


Channel 1, peak power, OFDM, 54 Mbps data rate, 138 VAC



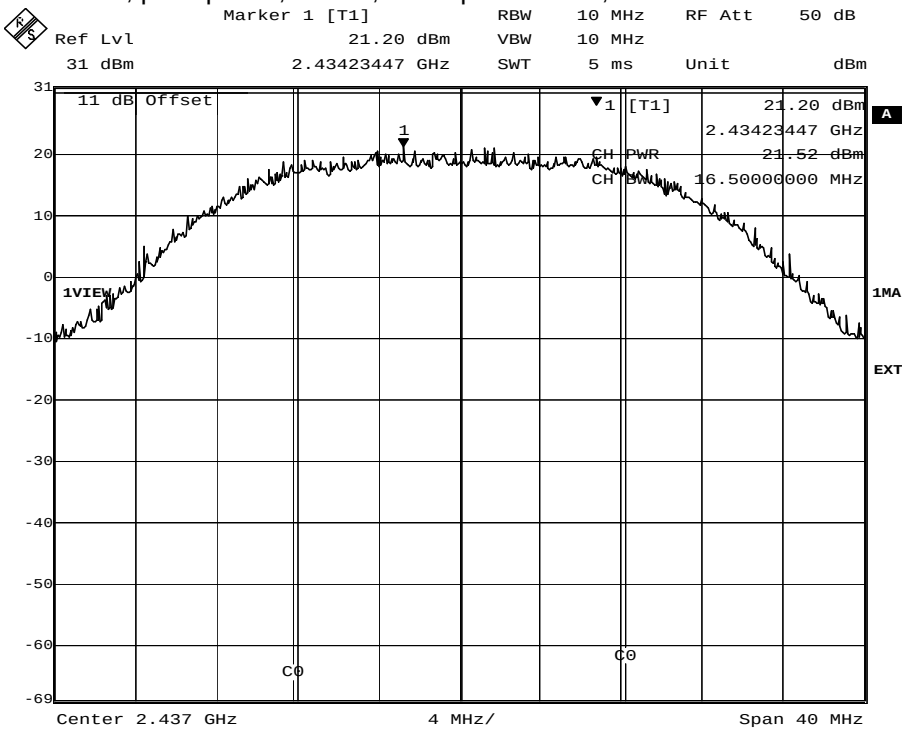
Date: 13.JAN.2007 11:18:51

Channel 1, peak power, OFDM, 54 Mbps data rate, 102 VAC



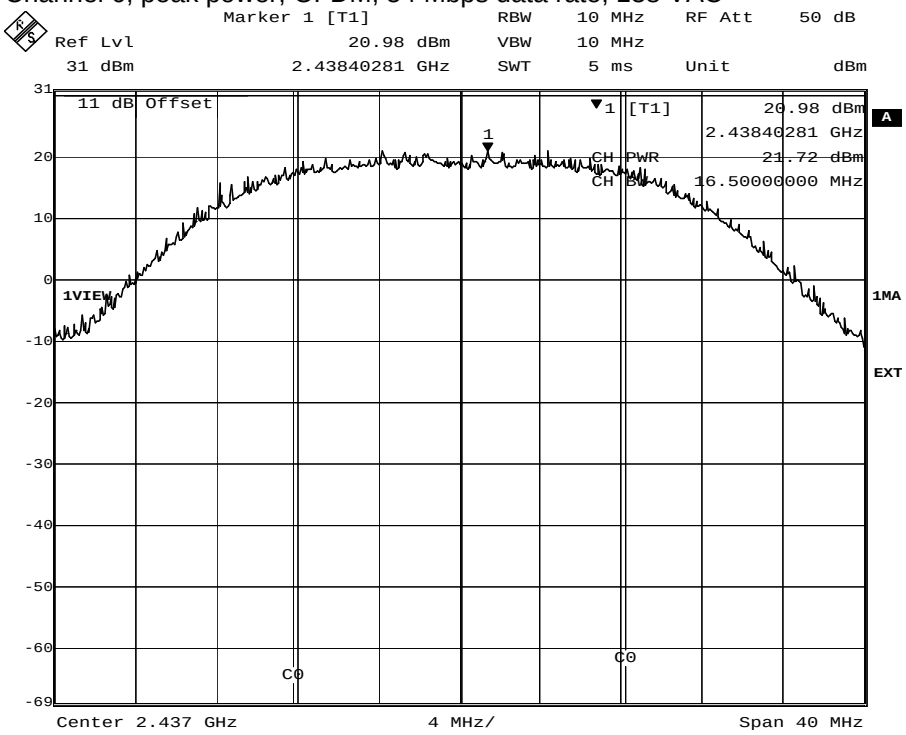
Date: 13.JAN.2007 11:28:05

Channel 6, peak power, OFDM, 54 Mbps data rate, 120 VAC



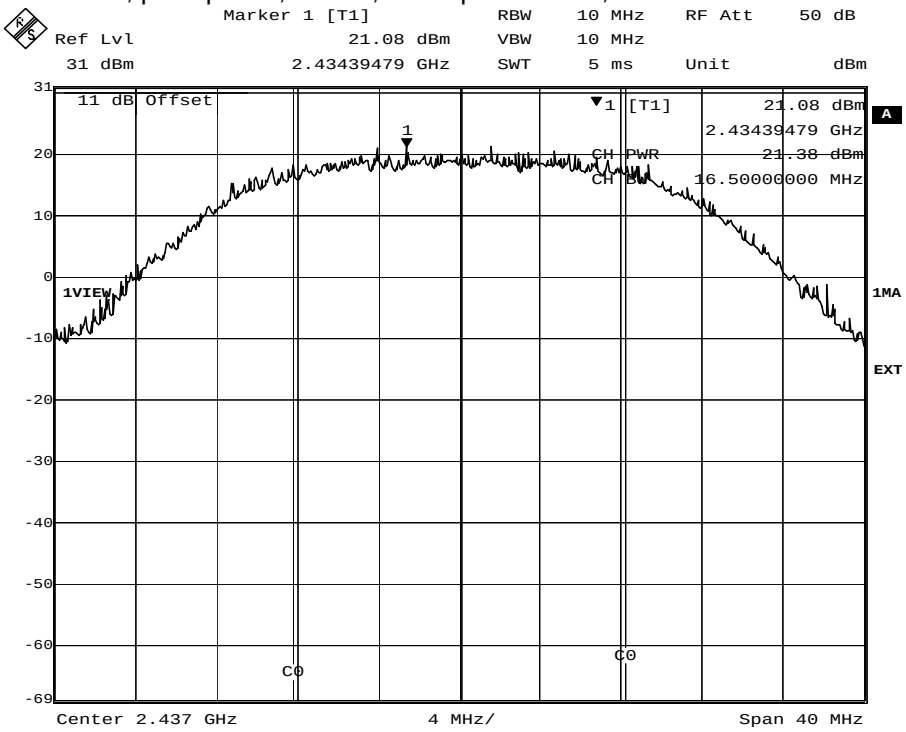
Date: 13.JAN.2007 11:14:47

Channel 6, peak power, OFDM, 54 Mbps data rate, 138 VAC



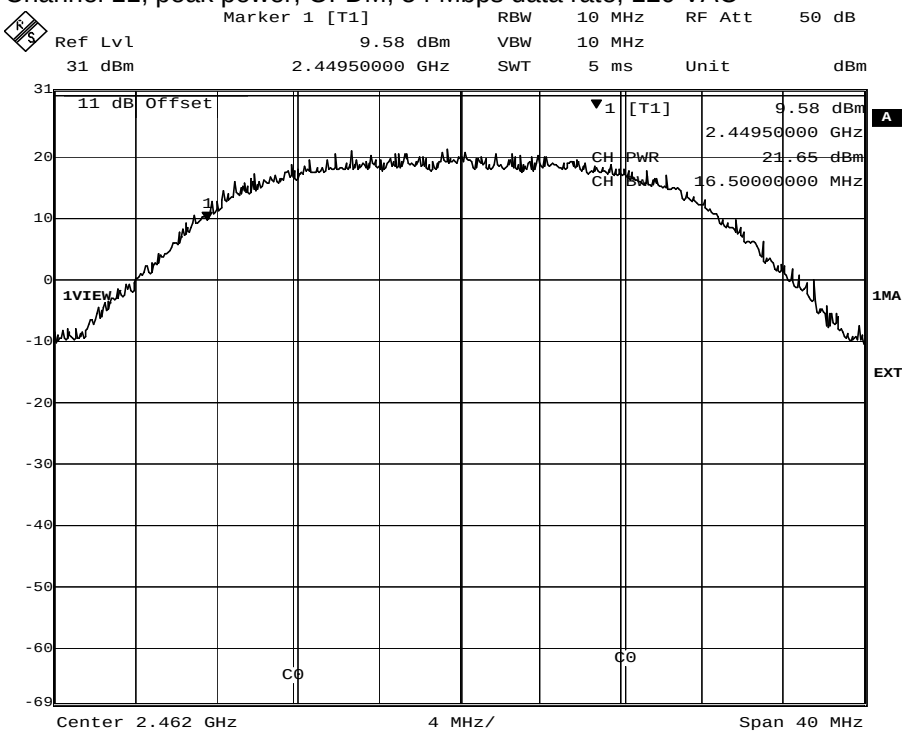
Date: 13.JAN.2007 11:21:35

Channel 6, peak power, OFDM, 54 Mbps data rate, 102 VAC



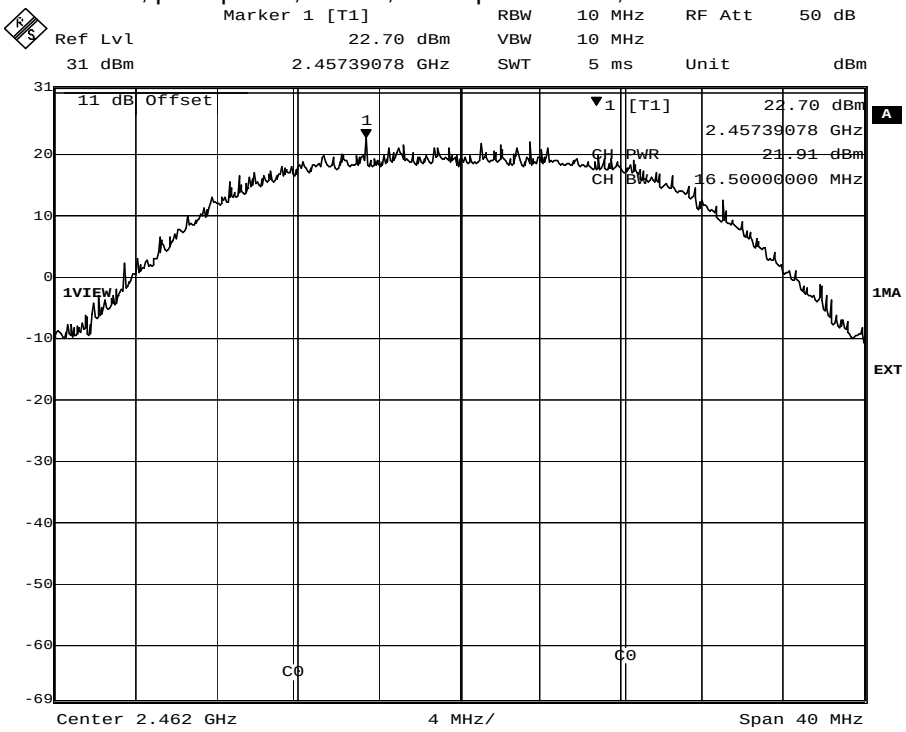
Date: 13.JAN.2007 11:27:12

Channel 11, peak power, OFDM, 54 Mbps data rate, 120 VAC



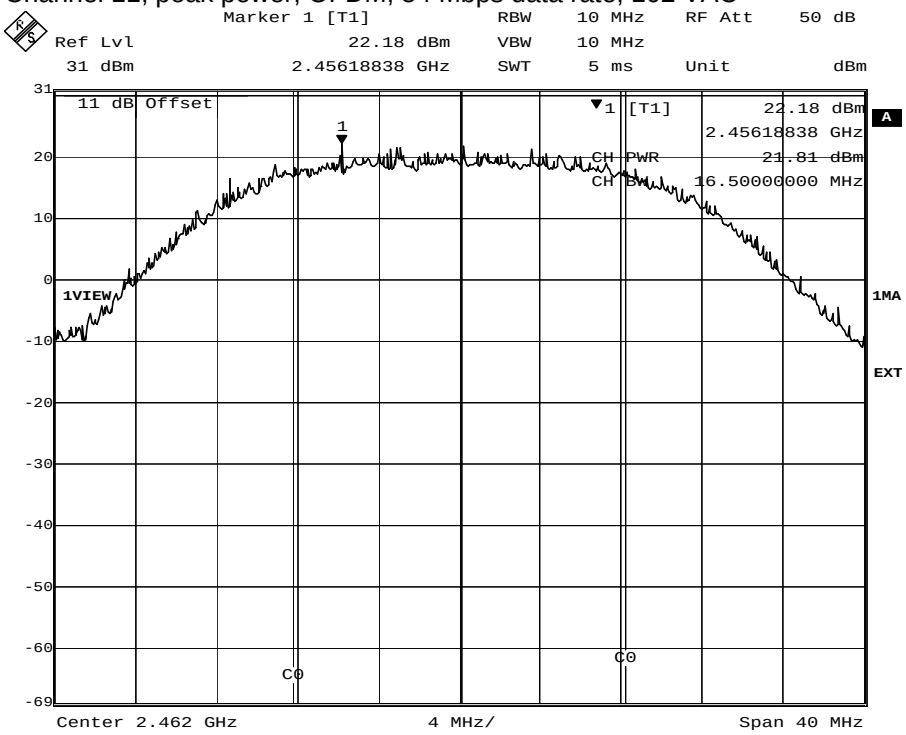
Date: 13.JAN.2007 11:13:18

Channel 11, peak power, OFDM, 54 Mbps data rate, 138 VAC



Date: 13.JAN.2007 11:24:35

Channel 11, peak power, OFDM, 54 Mbps data rate, 102 VAC



Date: 13.JAN.2007 11:25:55

6. 6 dB BANDWIDTH

6.1 Test protocol

Date of test: 2006-09-27

Spectrum analyser settings:

Span: 40 MHz
RBW: 100 kHz
VBW: 300 kHz
Sweep time: Auto
Detector: Peak
Trace: Max Hold

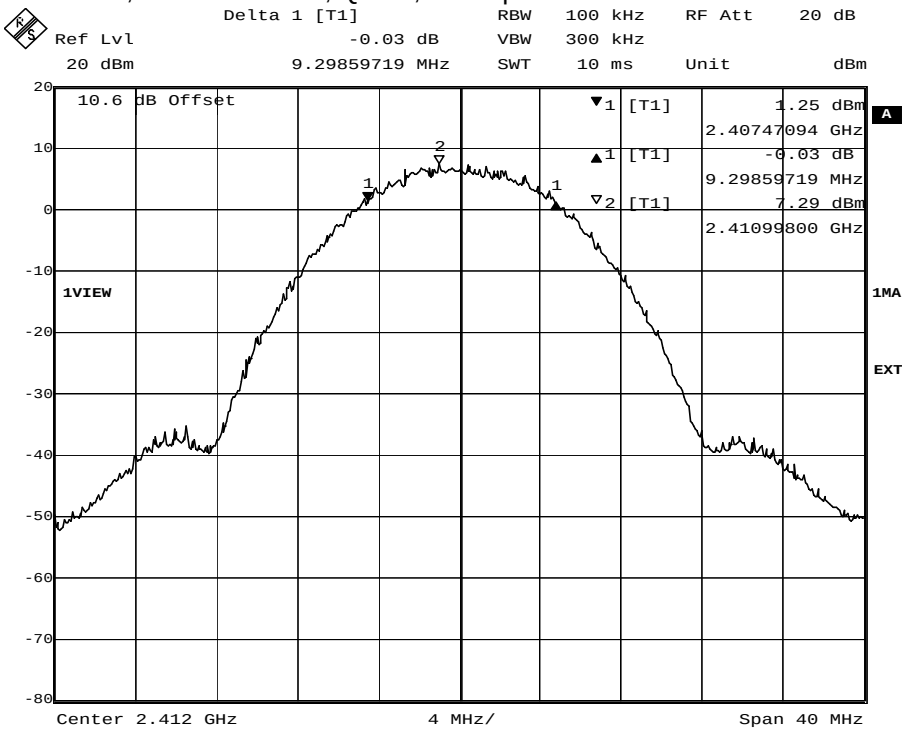
QPSK modulation, 11 Mbps data rate

Channel	6 dB Bandwidth	Limit value
(MHz)	(kHz)	(MHz)
2412	9,3	> 0,5
2437	8,4	
2462	7,9	

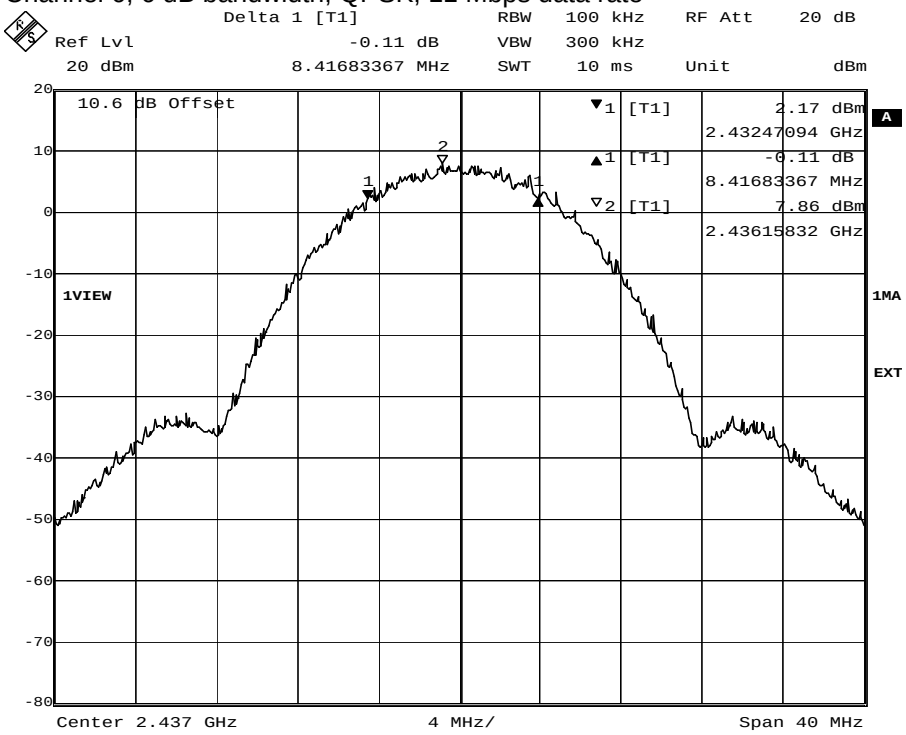
OFDM modulation, 54 Mbps data rate

Channel	6 dB Bandwidth	Limit value
(MHz)	(MHz)	(MHz)
2412	16,5	> 0,5
2437	16,5	
2462	16,5	

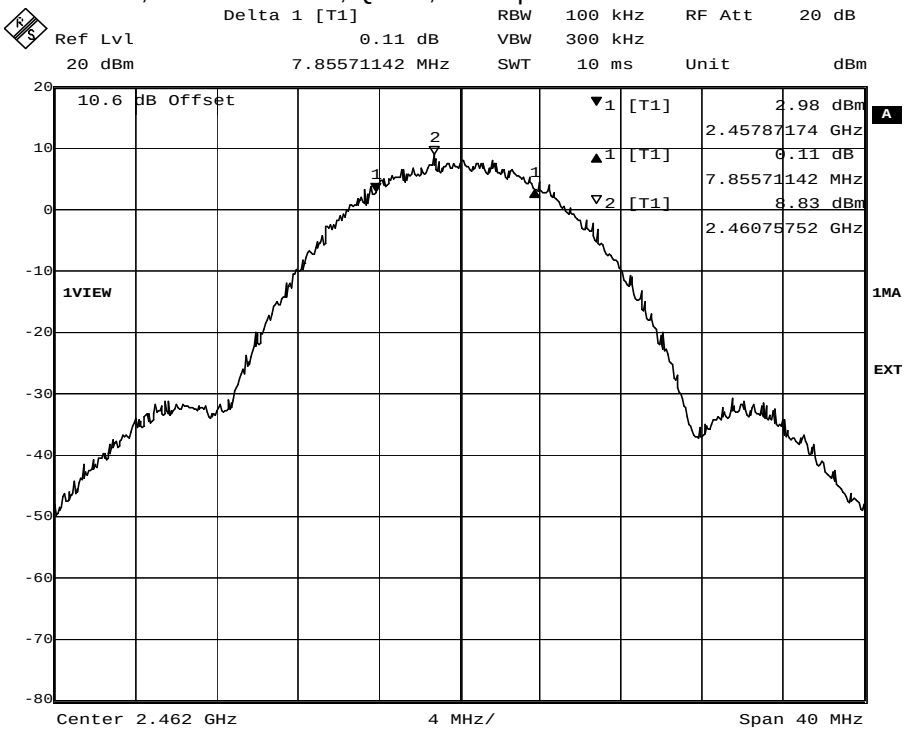
Channel 1, 6 dB bandwidth, QPSK, 11 Mbps data rate



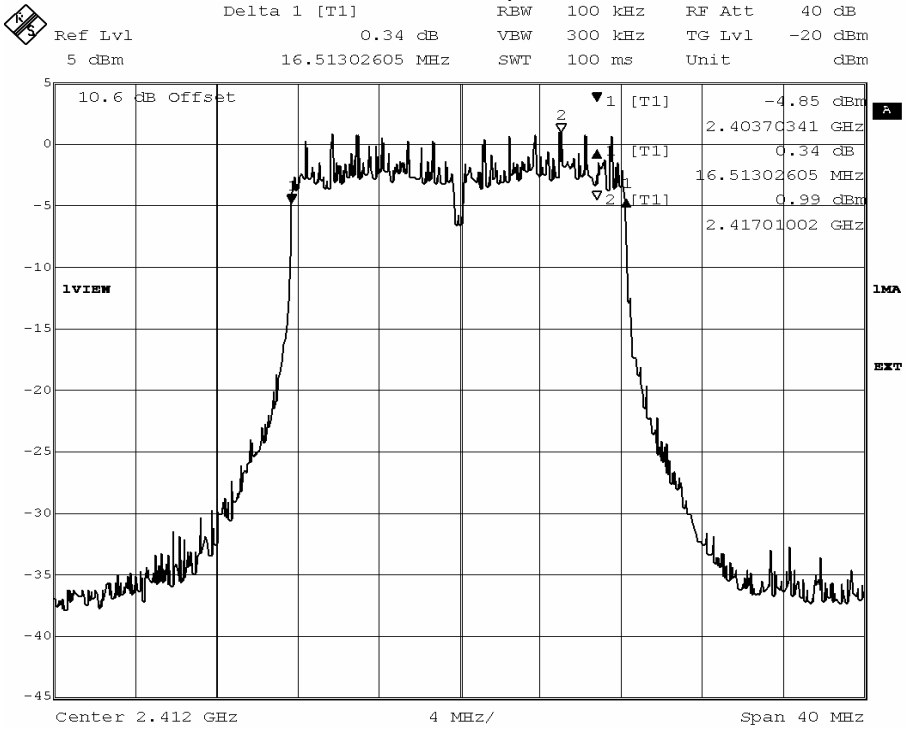
Channel 6, 6 dB bandwidth, QPSK, 11 Mbps data rate



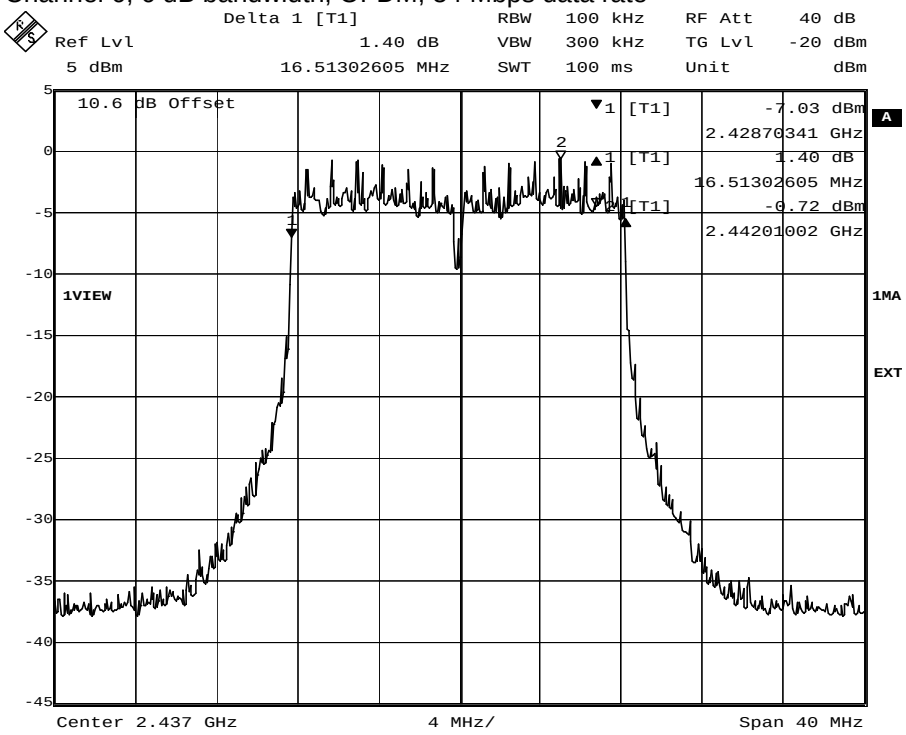
Channel 11, 6 dB bandwidth, QPSK, 11 Mbps data rate



Channel 1, 6 dB bandwidth, OFDM, 54 Mbps data rate

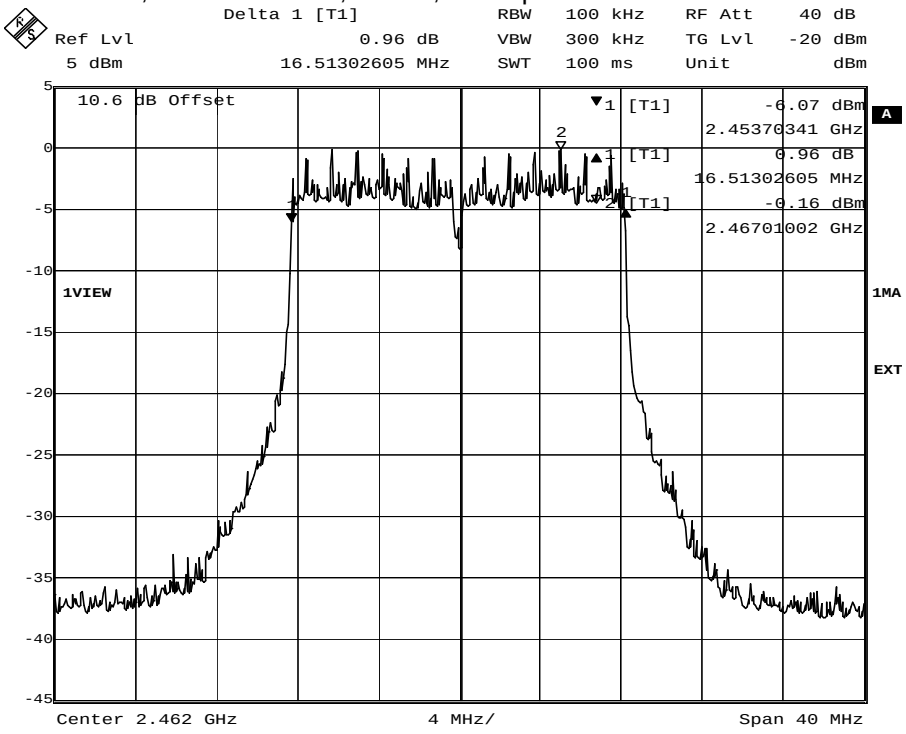


Channel 6, 6 dB bandwidth, OFDM, 54 Mbps data rate



Date: 18.OCT.2006 15:34:01

Channel 11, 6 dB bandwidth, OFDM, 54 Mbps data rate



Date: 18.OCT.2006 15:38:35

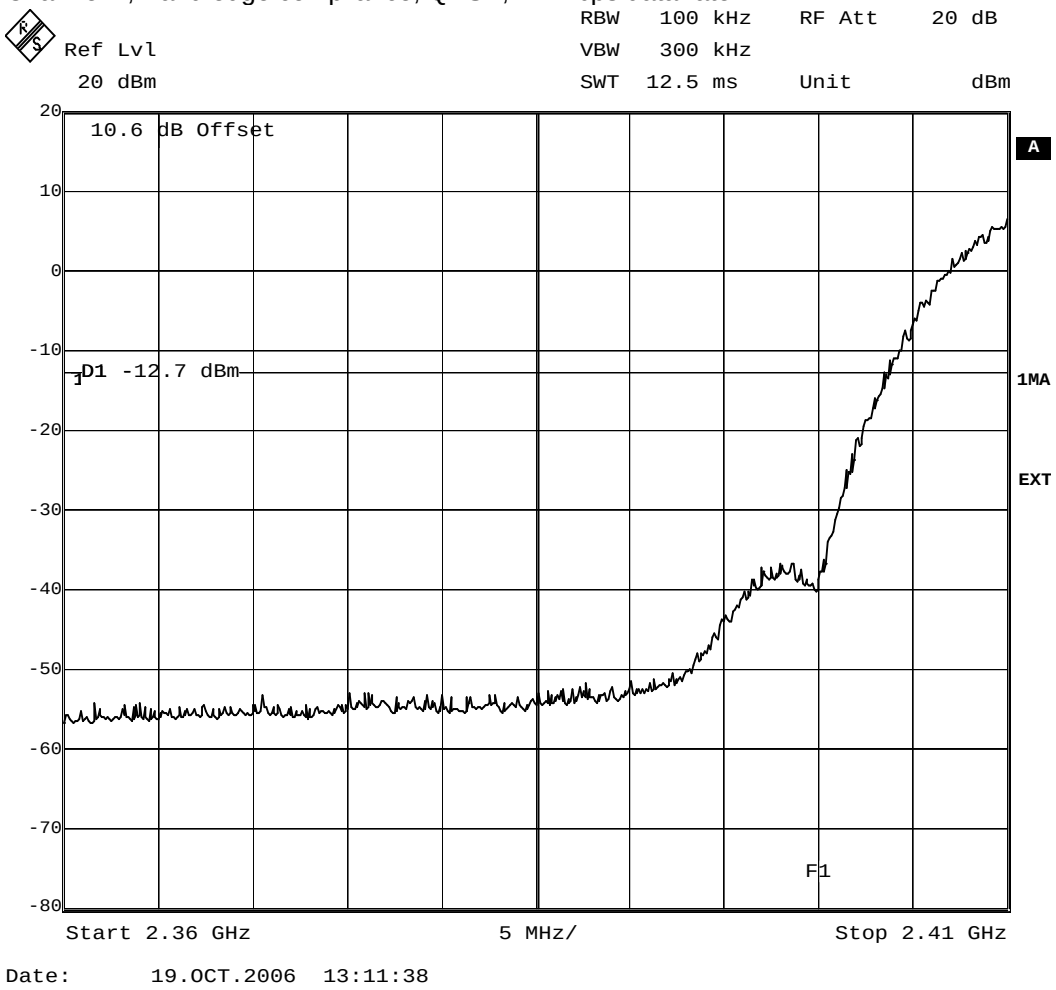
7. BAND EDGE COMPLIANCE, CONDUCTED

7.1 Test protocol

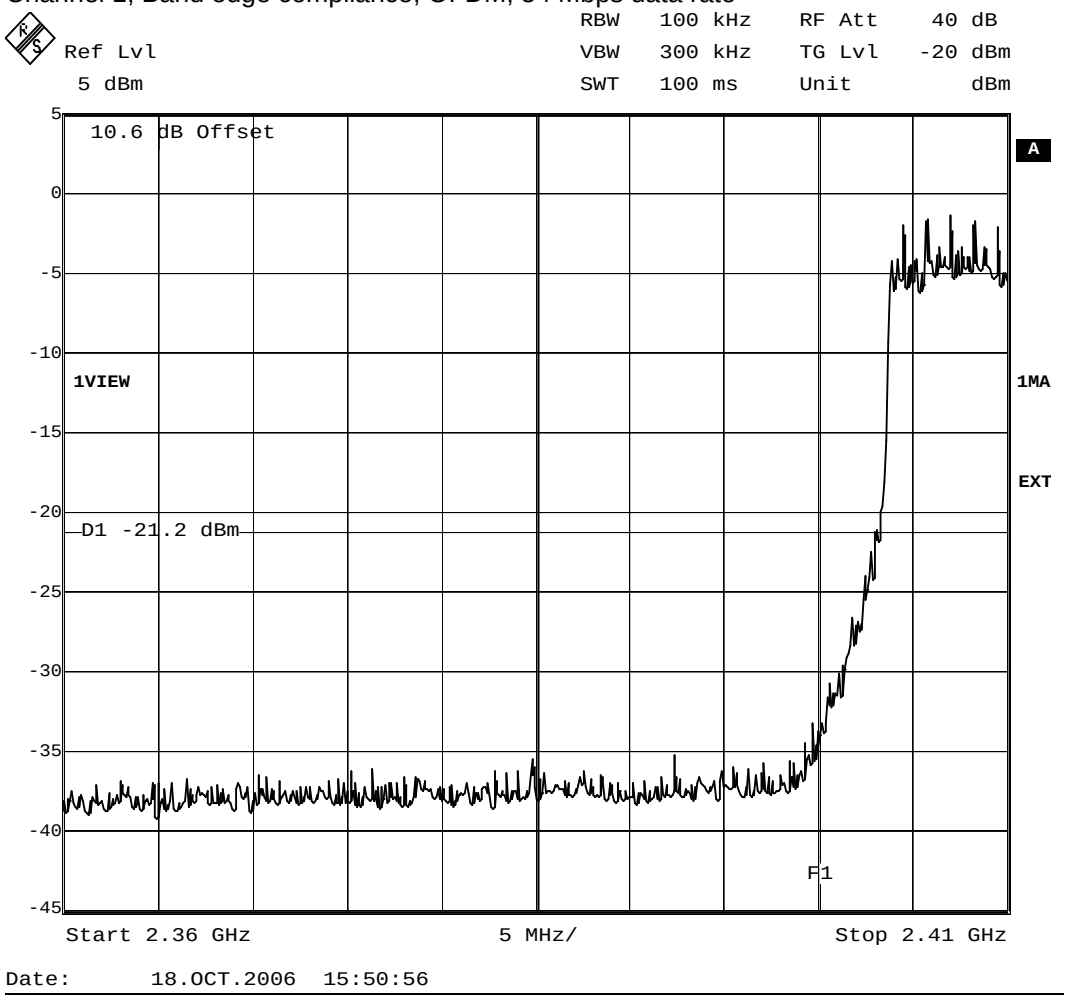
Date of test: 2006-10-19

Band edge compliance at low channel

Channel 1, Band edge compliance, QPSK, 11 Mbps data rate

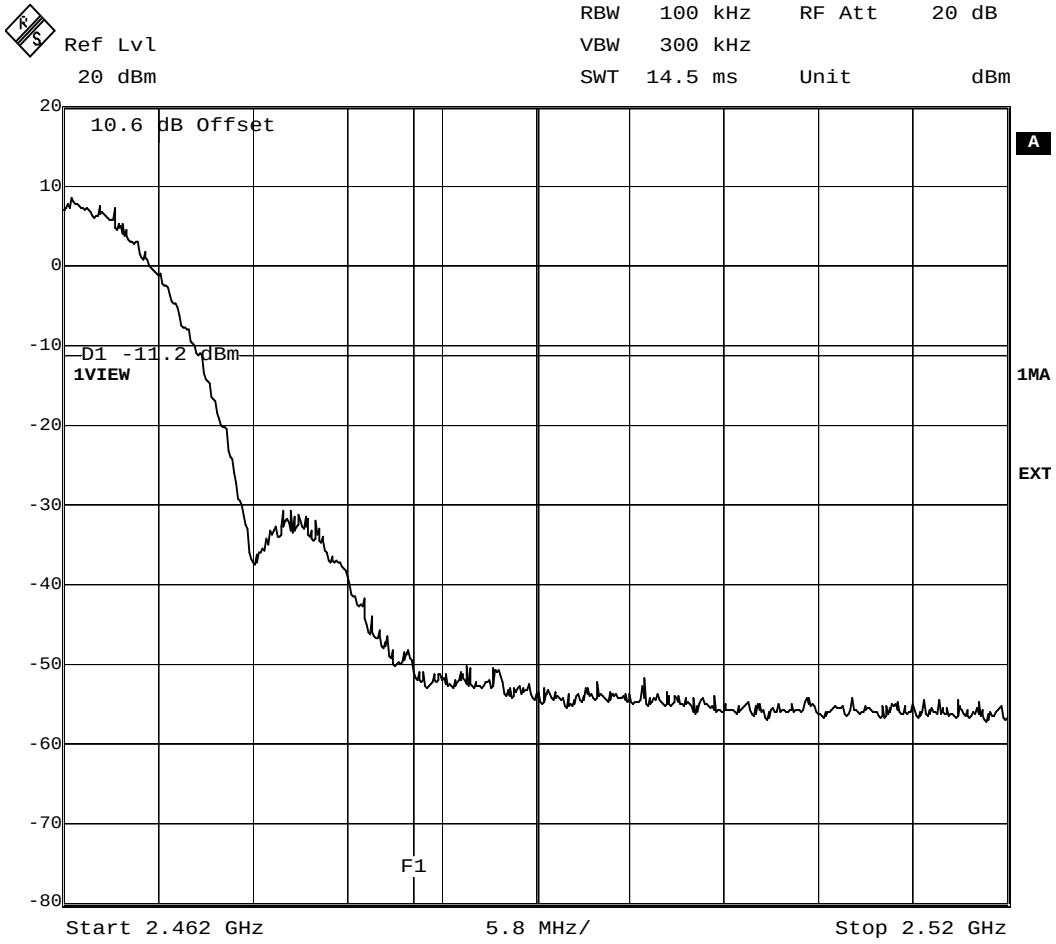


Channel 1, Band edge compliance, OFDM, 54 Mbps data rate



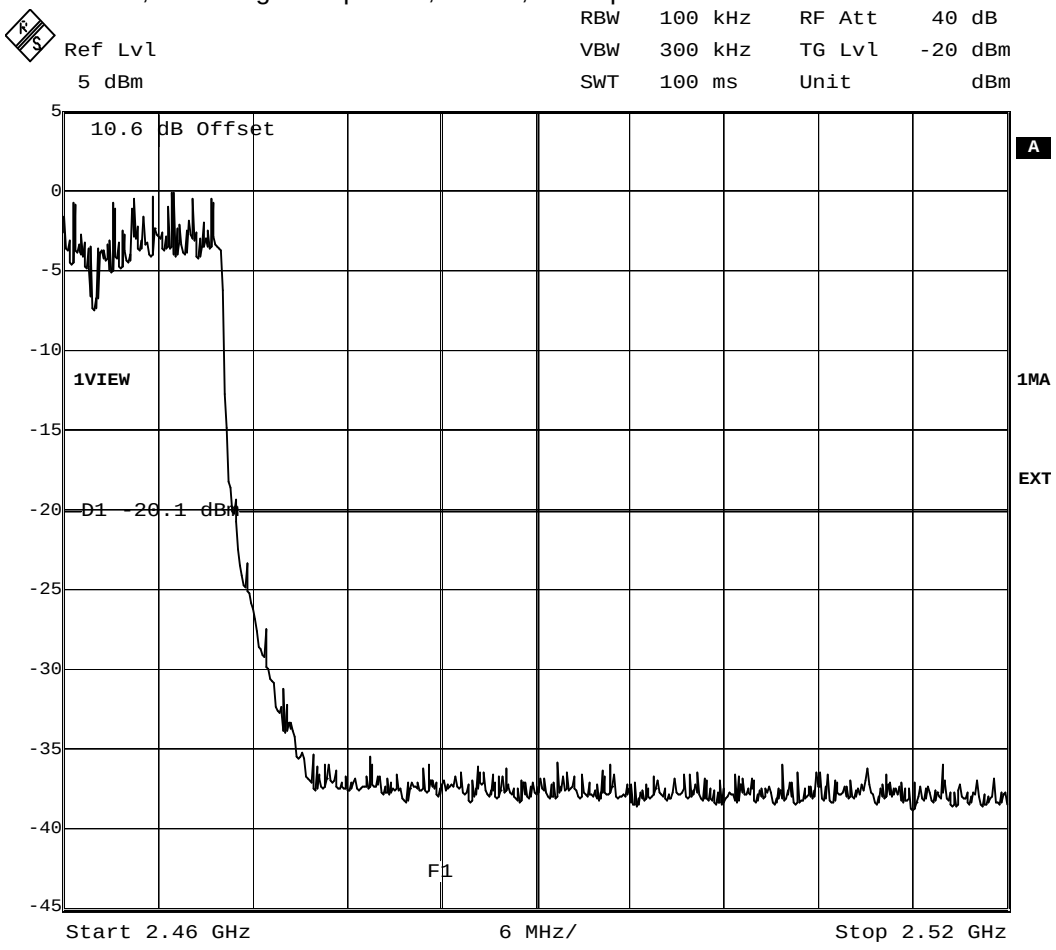
Band edge compliance at high channel

Channel 11, Band edge compliance, QPSK, 11 Mbps data rate



Date: 19.OCT.2006 13:55:03

Channel 11, Band edge compliance, OFDM, 54 Mbps data rate



8. POWER SPECTRAL DENSITY

8.1 Test protocol

Date of test: 2007-01-13 and -14

Spectrum analyzer settings:

Span: 1,5 MHz
RBW: 3 kHz
VBW: 10 kHz
Sweep time: 500 s
Detector: Peak
Trace: Max Hold

QPSK modulation, 11 Mbps data rate

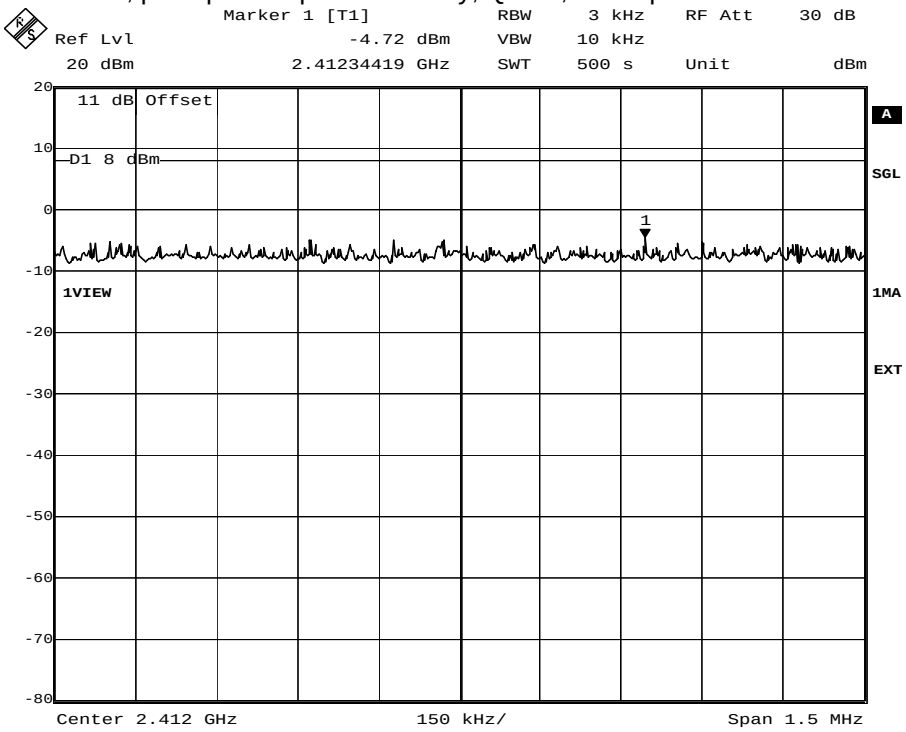
Channel	Peak Power Spectral Density	Limit value
(MHz)	(dBm)	(dBm)
2412	-4,7	< 8
2437	-3,5	
2462	-4,3	

OFDM modulation, 54 Mbps data rate

Channel	Peak Power Spectral Density	Limit value
(MHz)	(dBm)	(dBm)
2412	-14,6	< 8
2437	-14,2	
2462	-14,3	

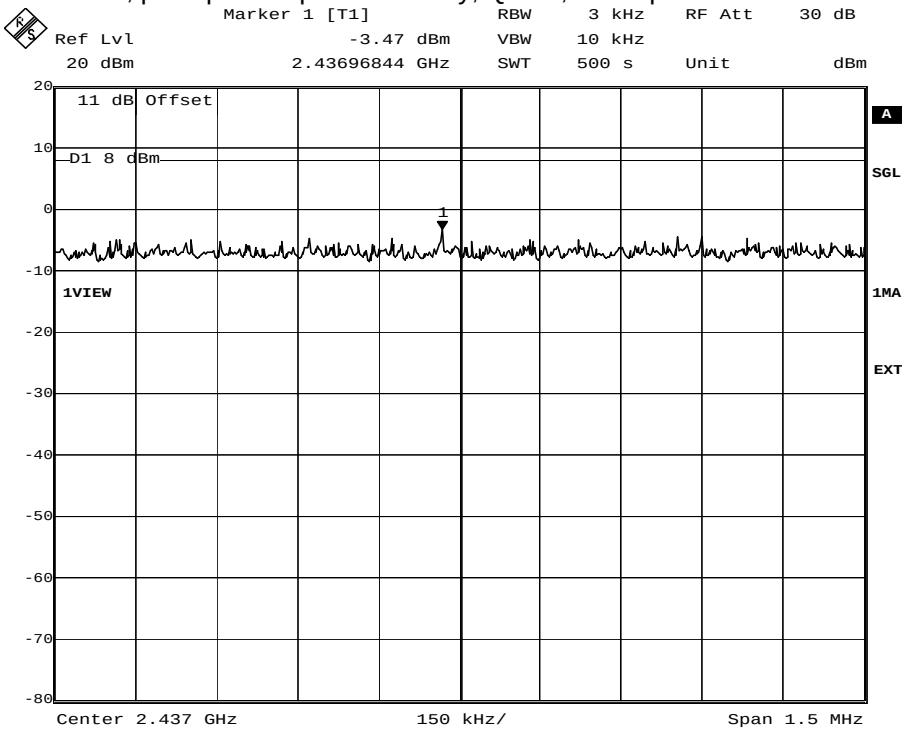
Measurement results are corrected for attenuation in the set-up configuration.

Channel 1, peak power spectral density, QPSK, 11 Mbps data rate



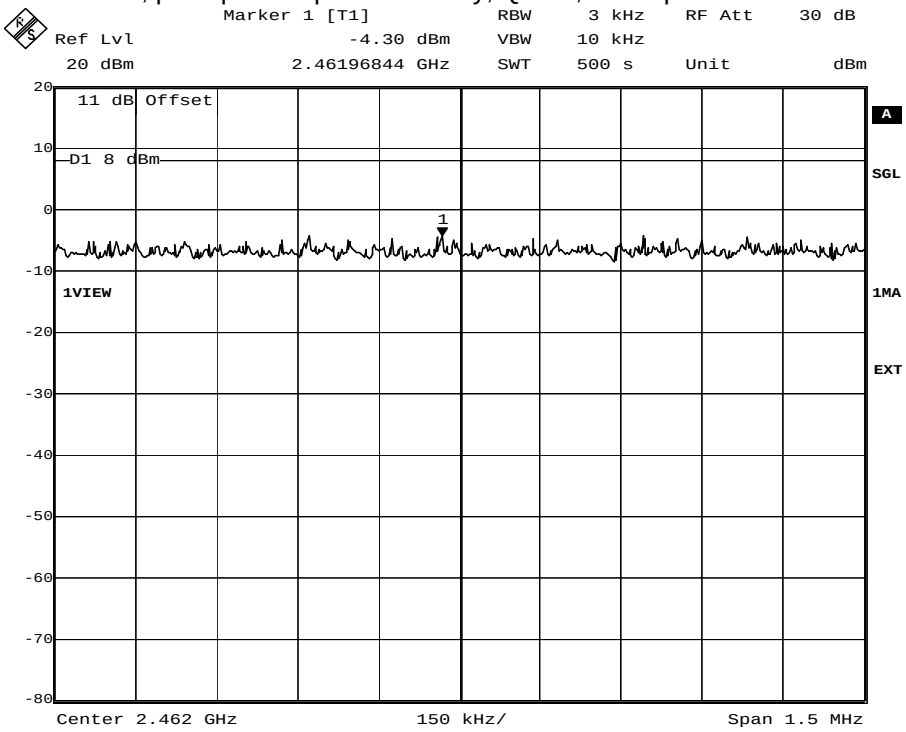
Date: 14.JAN.2007 13:19:40

Channel 6, peak power spectral density, QPSK, 11 Mbps data rate



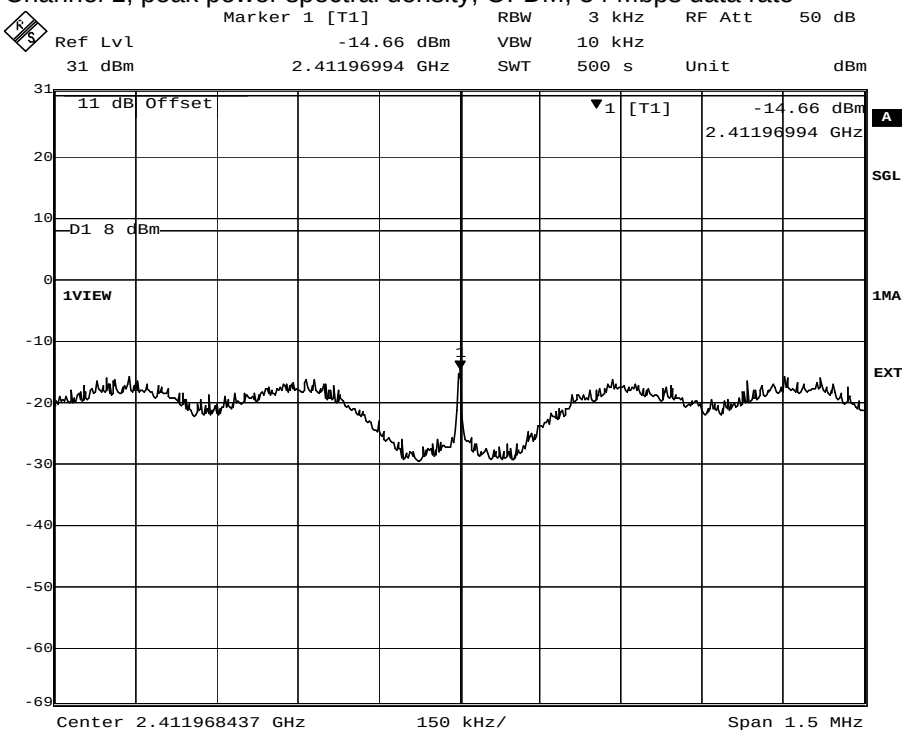
Date: 14.JAN.2007 13:29:28

Channel 11, peak power spectral density, QPSK, 11 Mbps data rate



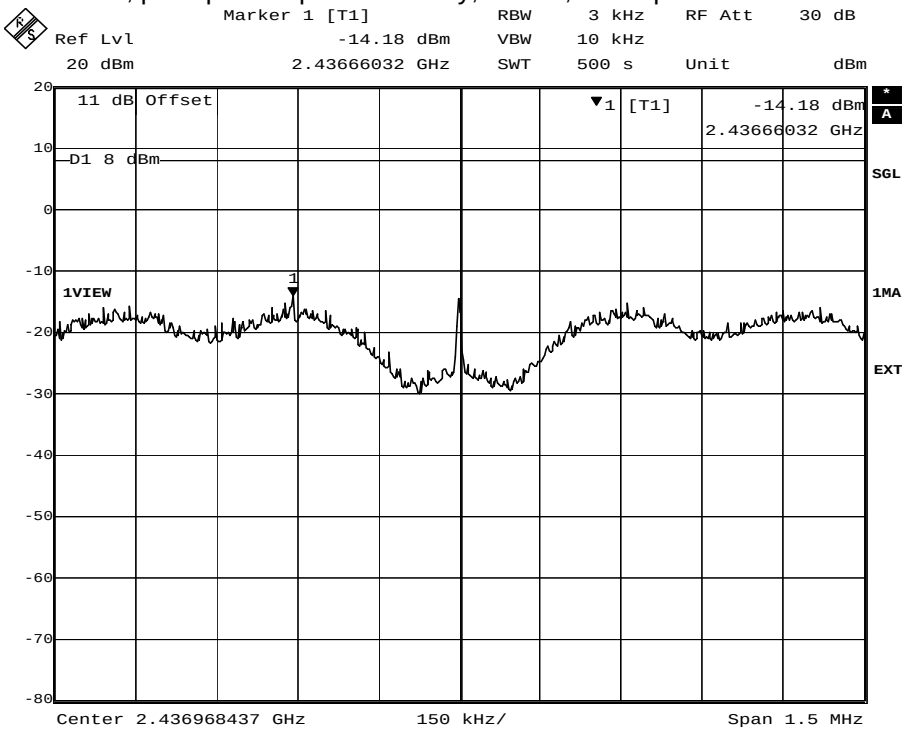
Date: 14.JAN.2007 13:38:47

Channel 1, peak power spectral density, OFDM, 54 Mbps data rate



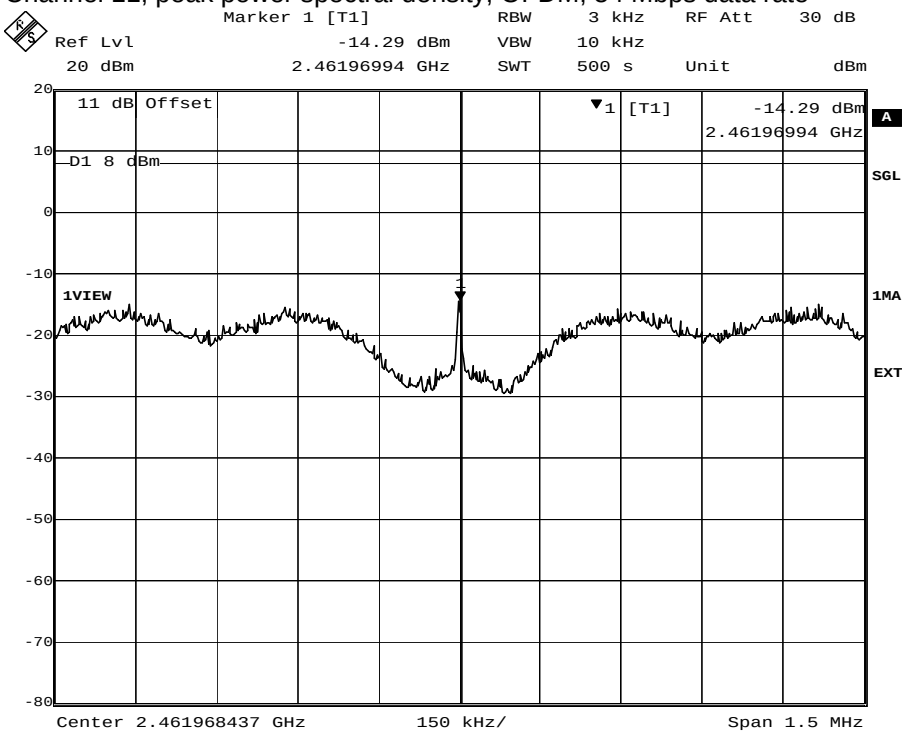
Date: 13.JAN.2007 11:49:59

Channel 6, peak power spectral density, OFDM, 54 Mbps data rate



Date: 13.JAN.2007 12:22:18

Channel 11, peak power spectral density, OFDM, 54 Mbps data rate



Date: 13.JAN.2007 12:44:06

9. RADIATED SPURIOUS EMISSIONS

9.1 Measurement uncertainty

Radiated disturbance electric field intensity, 30 – 1000 MHz: ± 4,6 dB
Radiated disturbance electric field intensity, 1000 – 25000 MHz: ± 6,0 dB

The measurement uncertainty describes the overall uncertainty of the given measured value during operation of the EUT.

Measurement uncertainty is calculated in accordance with EA-4/02-1997.
The measurement uncertainty is given with a confidence of 95%.

9.2 Test equipment

Equipment	Manufacturer	Type	SEMKO No.
Test site: Semi-anechoic shielded chamber, 5,9 x 8,9 x 6,0 m (W x L x H)			30900
Software:	Rohde & Schwarz	EMC 32	
Measurement receiver:	Rohde & Schwarz	ESCI	12798
Antenna, bilog:	Rohde & Schwarz	HL562	30711
Transformer	Tufvassons	AFM-1500	30317
Test site: Radio anechoic shielded chamber, 3,7 x 7,0 x 2,4 m (W x L x H)			12285
Software:	Rohde & Schwarz	ES-K1, V1.70	
Signal analyser:	Rohde & Schwarz	FSIQ 40	40023
Preamplifier:	MITEQ	AFS6/AFS44	12335
Antennas:			
Double Ridge Guide Horn:	EMCO	3115	4936
Horn antenna:	EMCO	3160-08	30099
Horn antenna:	EMCO	3160-09	30101
High pass filter	K & L	4410-X4500/18000-0	5133
Band rejection filter	K & L	6N45-2450/T 100-0/0	12389
Transformer	Tufvassons	AFM-1500	30317

9.3 Measurement set-up

Test site: Semi-anechoic shielded chamber (30 – 1000 MHz)

The radiated disturbance electric field intensity was measured in a semi-anechoic chamber at a distance of 3 m and the EUT was placed on a non-metallic table, 0,8 m above the reference ground plane. The specified test mode was enabled. Test set-up photos are given below.

An overview sweep with peak detection of the electric field intensity was performed with the measurement receiver in max-hold and with the antenna placed 1,5 m, 2,5 m and 3,5 m above the floor. The polarisation was horizontal and vertical. The measurements were repeated with the EUT rotated in 90-degree steps.

At the frequencies where high disturbance levels were found a search for max disturbance level was performed. With the EUT and antenna in the worst-case configuration new measurements with quasi-peak detector were carried out.

The EUT was supplied with 120 VAC, 60 Hz during the test.

Test set-up photos:

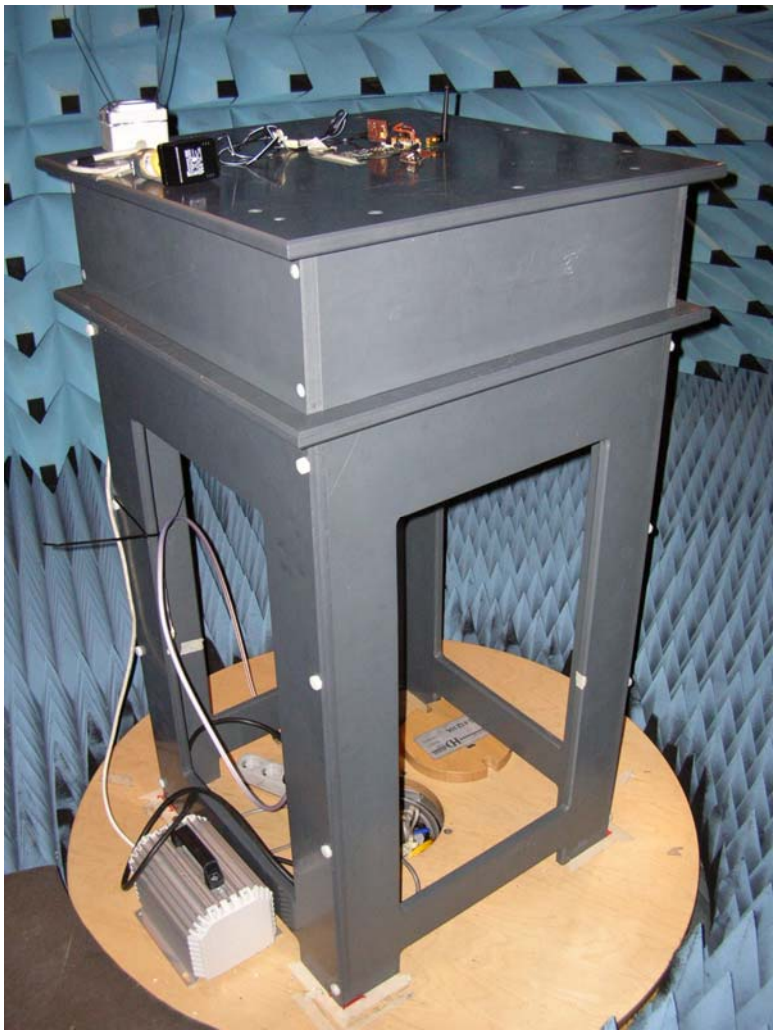
Test site: Bluetooth anechoic shielded chamber (1 – 26 GHz)

In the Bluetooth anechoic chamber the EUT was placed on a non-metallic table, 1,4 m above the floor. The radiated disturbance electric field intensity was measured at a distance of 3 m. The specified test mode was enabled.

An overview sweep with peak detection of the electric field intensity was performed with the spectrum analyser in max-hold and with the antenna height adjusted at the level of the EUT center (placed 1,4 m above the floor). The polarisation was horizontal and vertical. The measurements were repeated with the EUT rotated in 90-degree steps.

At the frequencies where high disturbance levels were found a search for max disturbance level was performed. With the EUT and antenna in the worst-case configuration new measurements with peak and average detectors were carried out.

The EUT was supplied by 120 VAC, 60 Hz during the test.

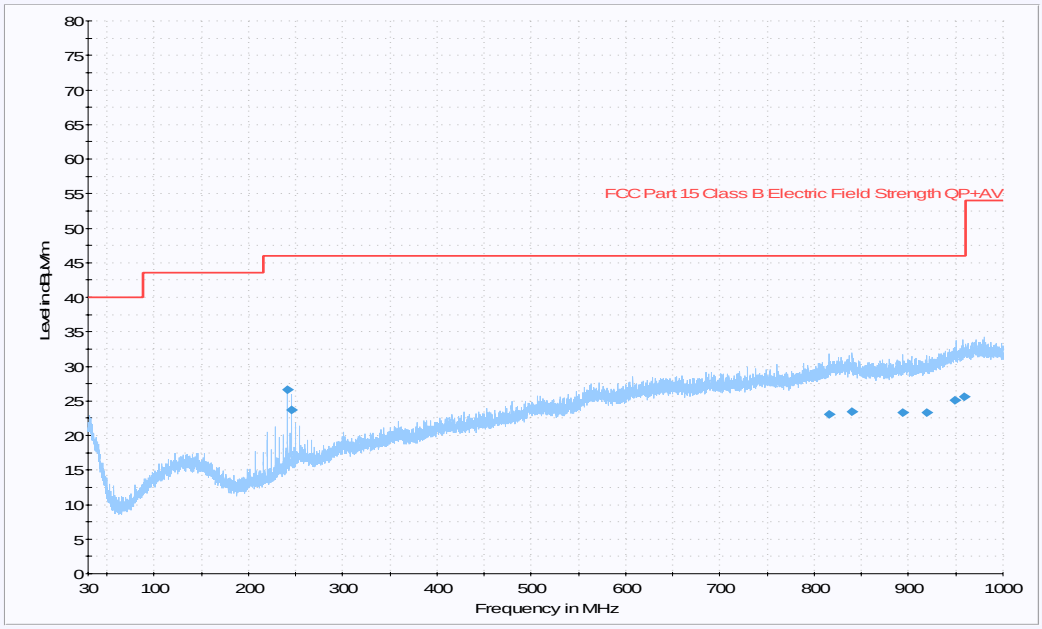


9.4 Test protocol

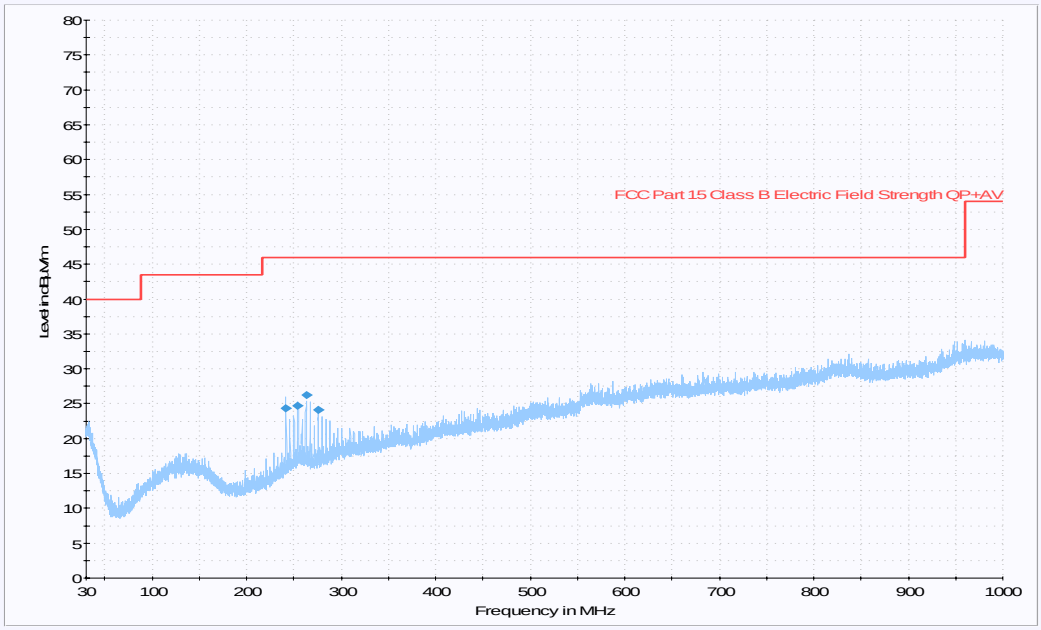
Semi-anechoic shielded chamber

Date of test: 2006-10-14 to 10-17

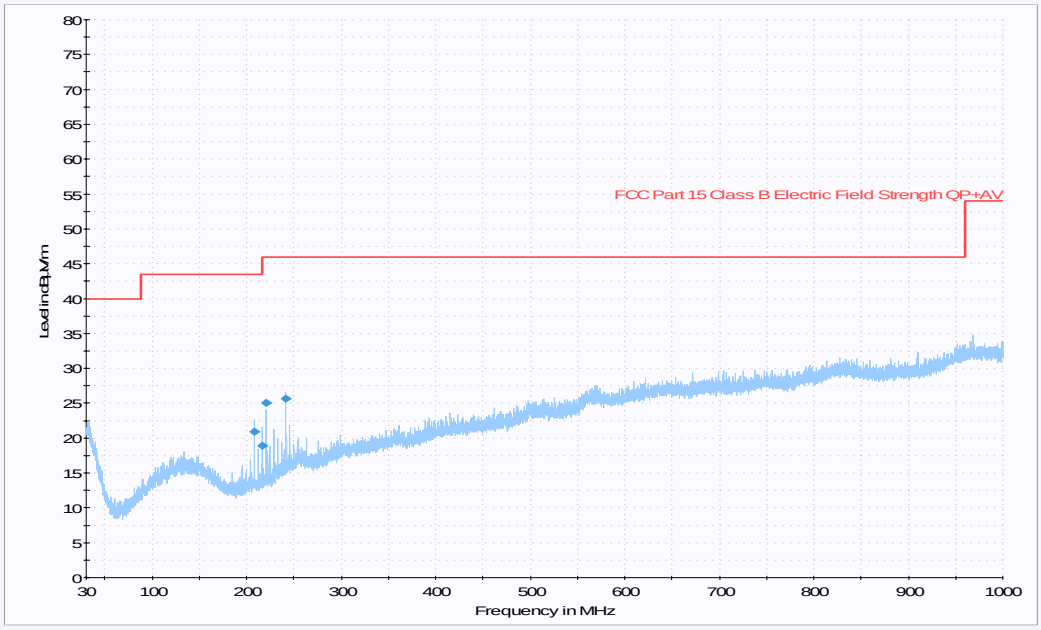
30 – 1000 MHz, max peak at a distance of 3 m on the lowest TX channel, QPSK, 11 Mbps



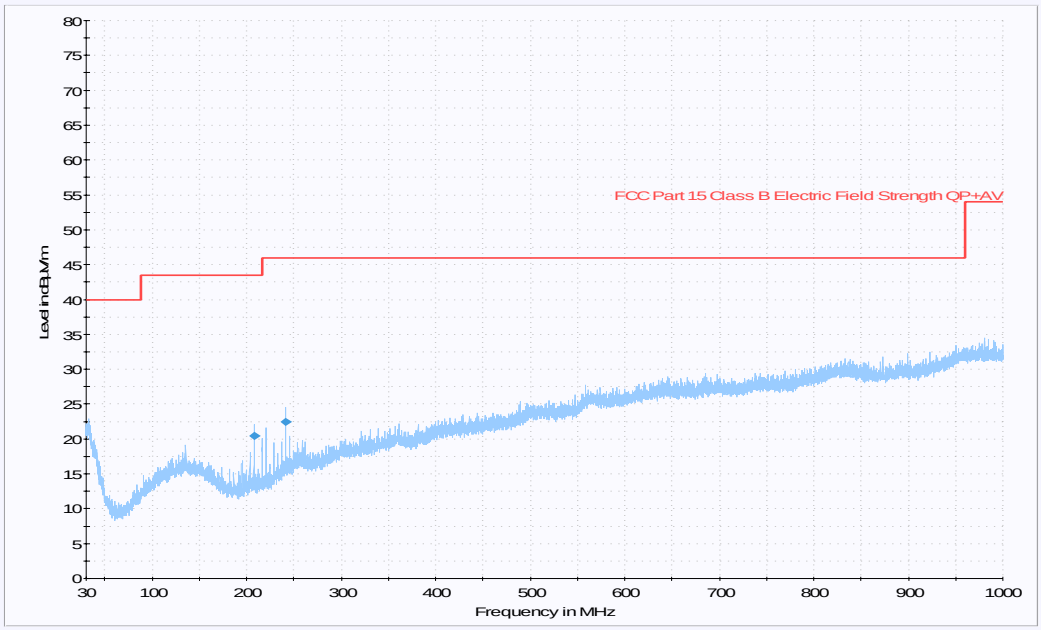
30 – 1000 MHz, max peak at a distance of 3 m on the middle TX channel, QPSK, 11 Mbps



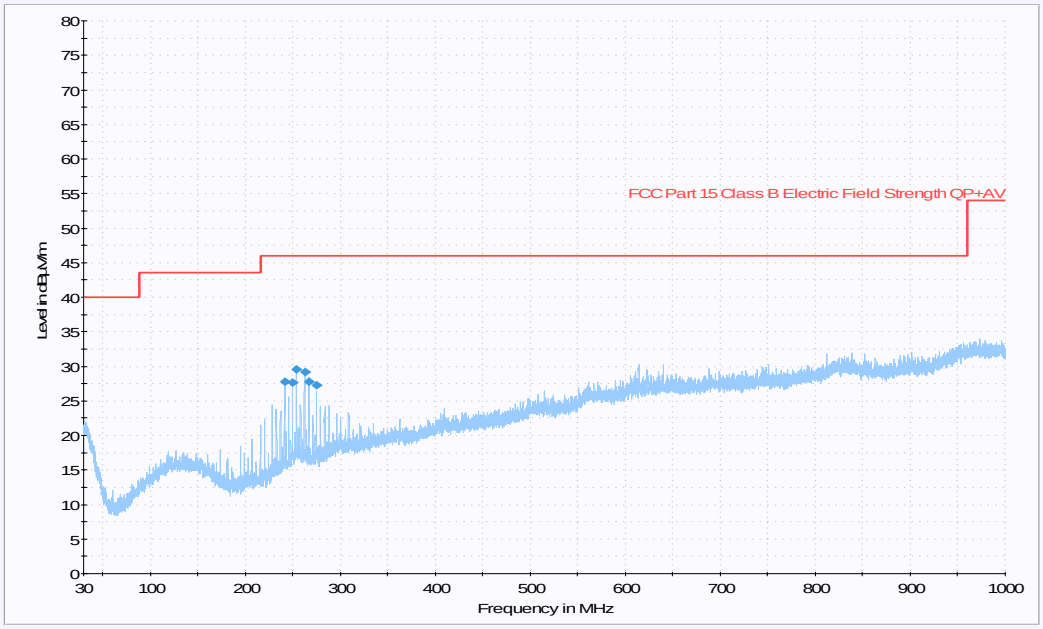
30 – 1000 MHz, max peak at a distance of 3 m on the highest TX channel, QPSK, 11 Mbps



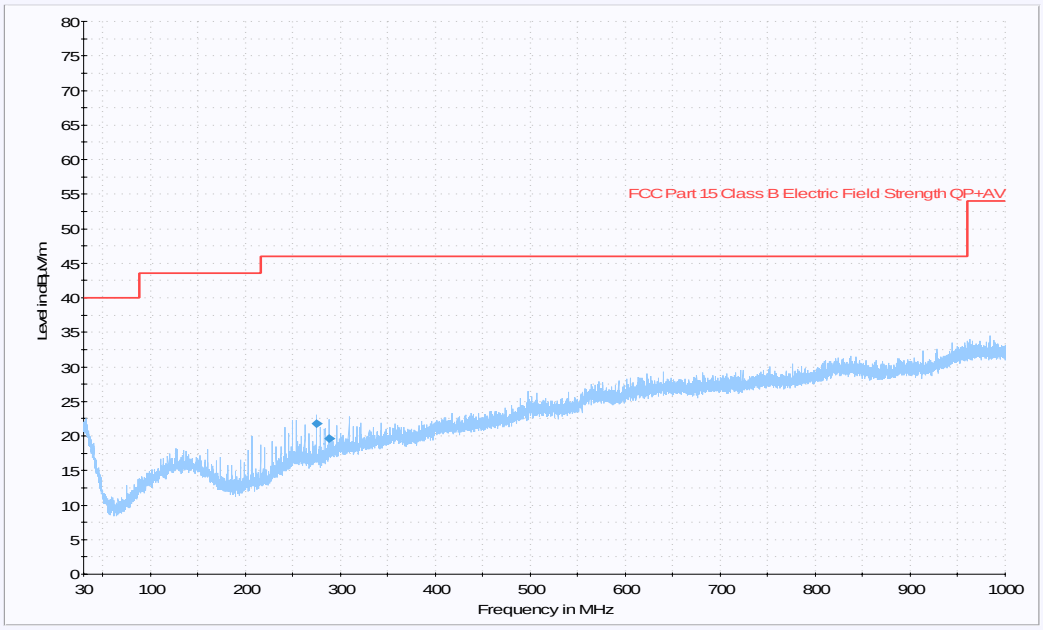
30 – 1000 MHz, max peak at a distance of 3 m on the lowest TX channel, OFDM, 54 Mbps



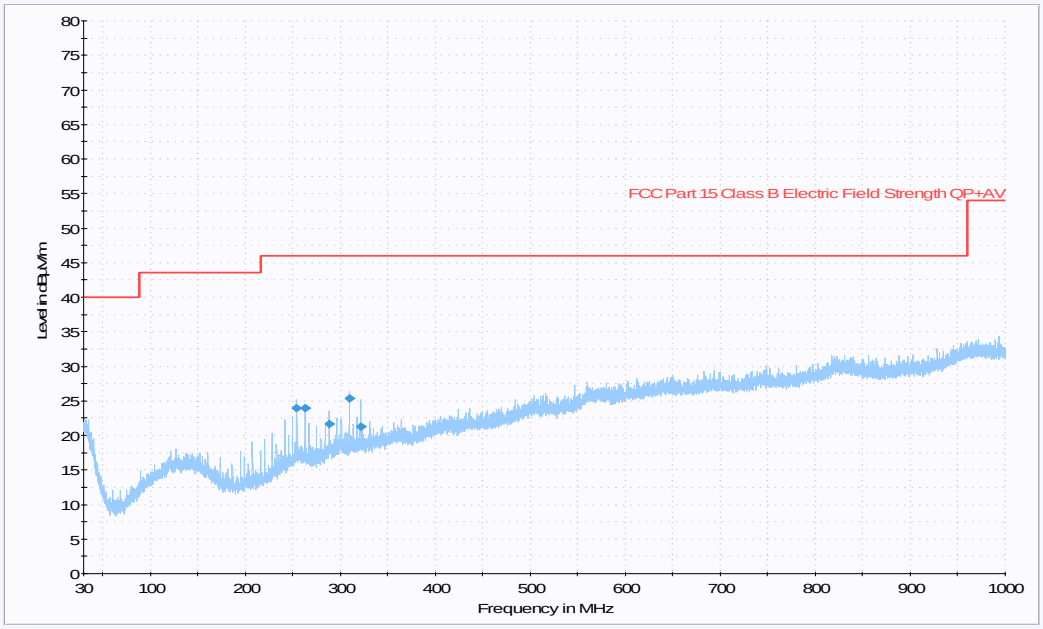
30 – 1000 MHz, max peak at a distance of 3 m on the middle TX channel, OFDM, 54 Mbps



30 – 1000 MHz, max peak at a distance of 3 m on the highest TX channel, OFDM, 54 Mbps



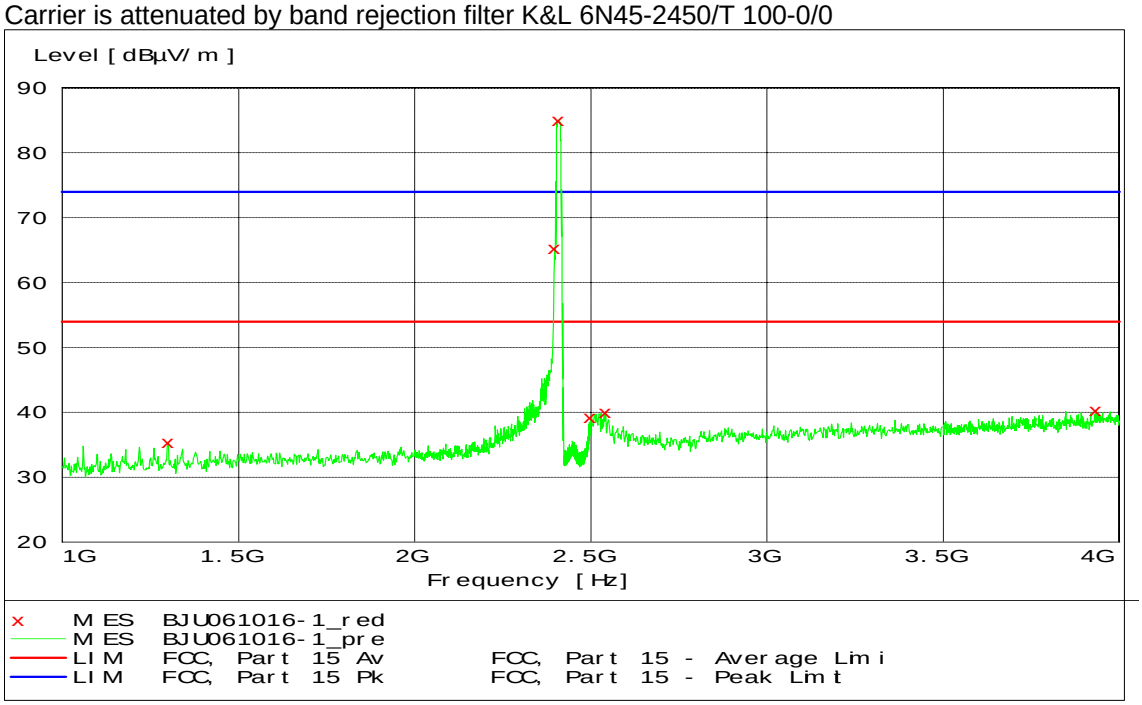
30 – 1000 MHz, max peak at a distance of 3 m in standby/Rx mode



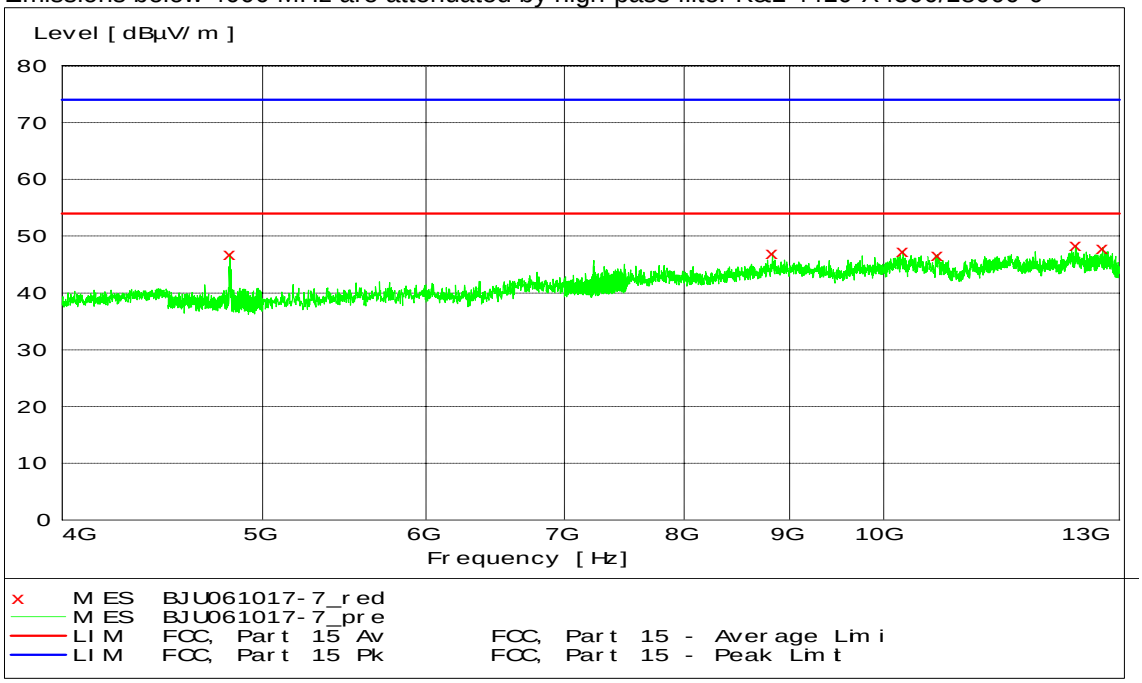
Radio anechoic shielded chamber

Date of test: 2006-10-16 to 10-18

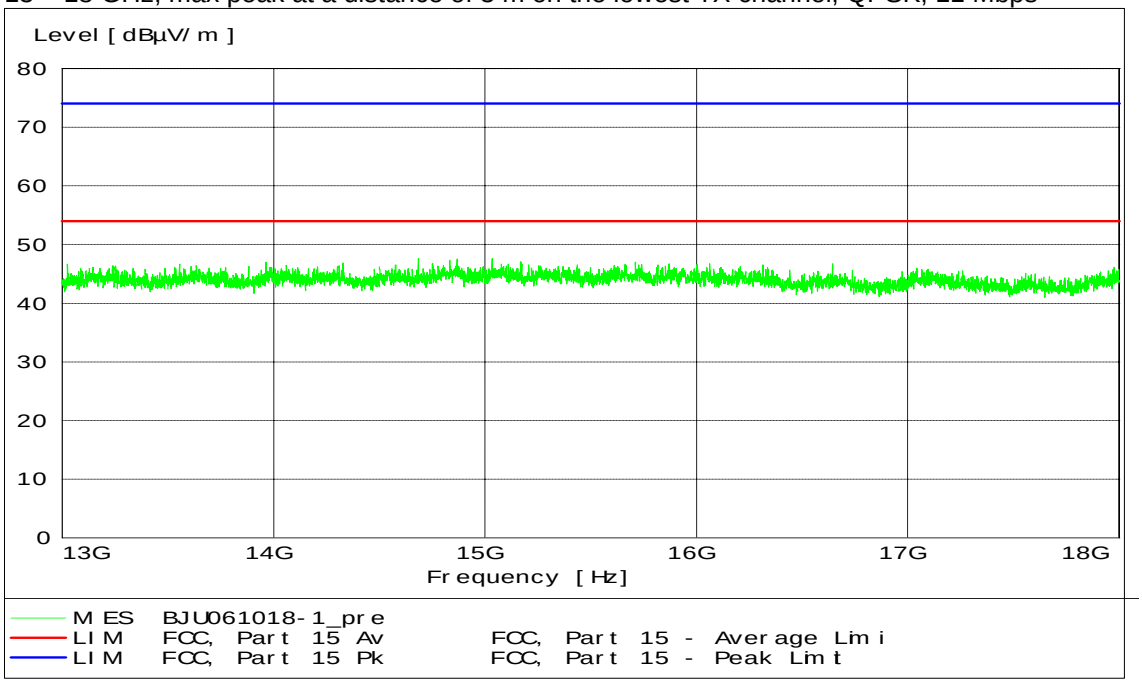
1000 – 4000 MHz, max peak at a distance of 3 m on the lowest TX channel, QPSK, 11 Mbps
Carrier is attenuated by band rejection filter K&L 6N45-2450/T 100-0/0



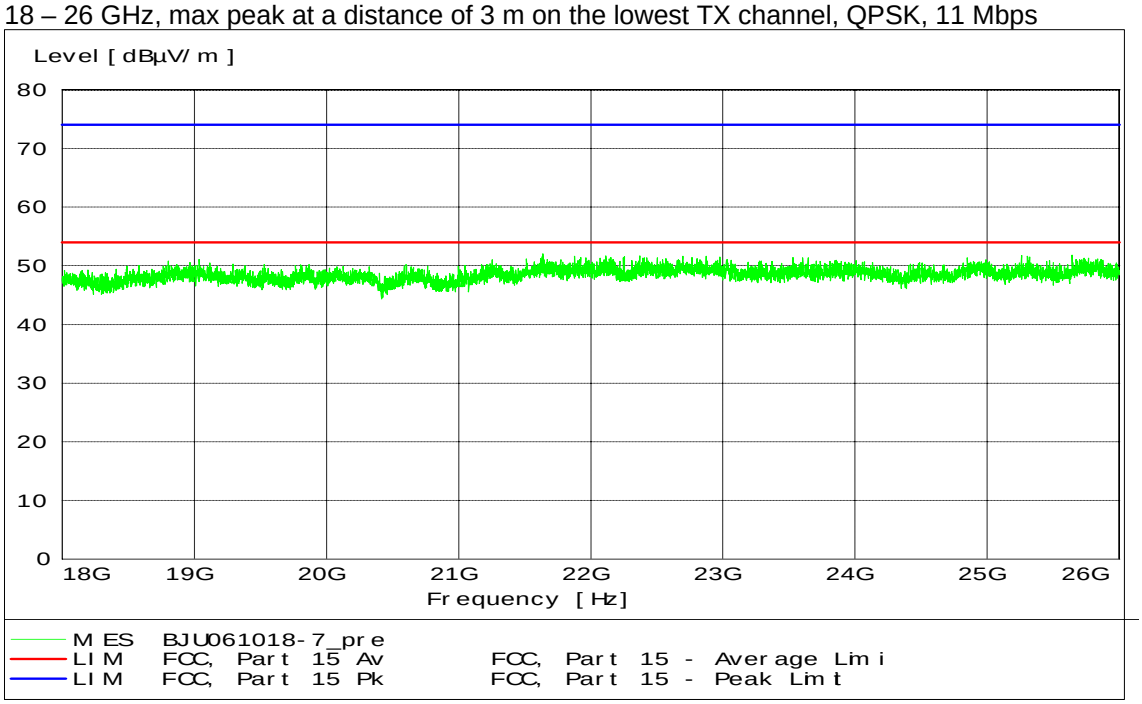
4000 – 13000 MHz, max peak at a distance of 3 m on the lowest TX channel, QPSK, 11 Mbps
Emissions below 4000 MHz are attenuated by high-pass filter K&L 4410-X4500/18000-0



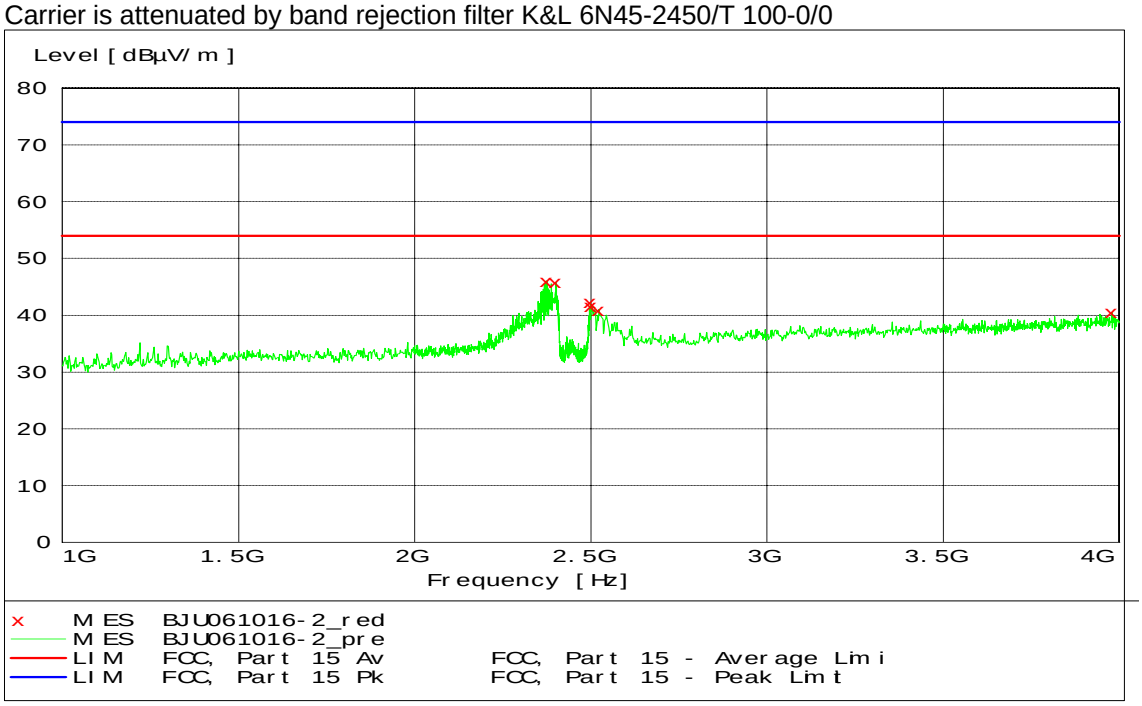
13 – 18 GHz, max peak at a distance of 3 m on the lowest TX channel, QPSK, 11 Mbps



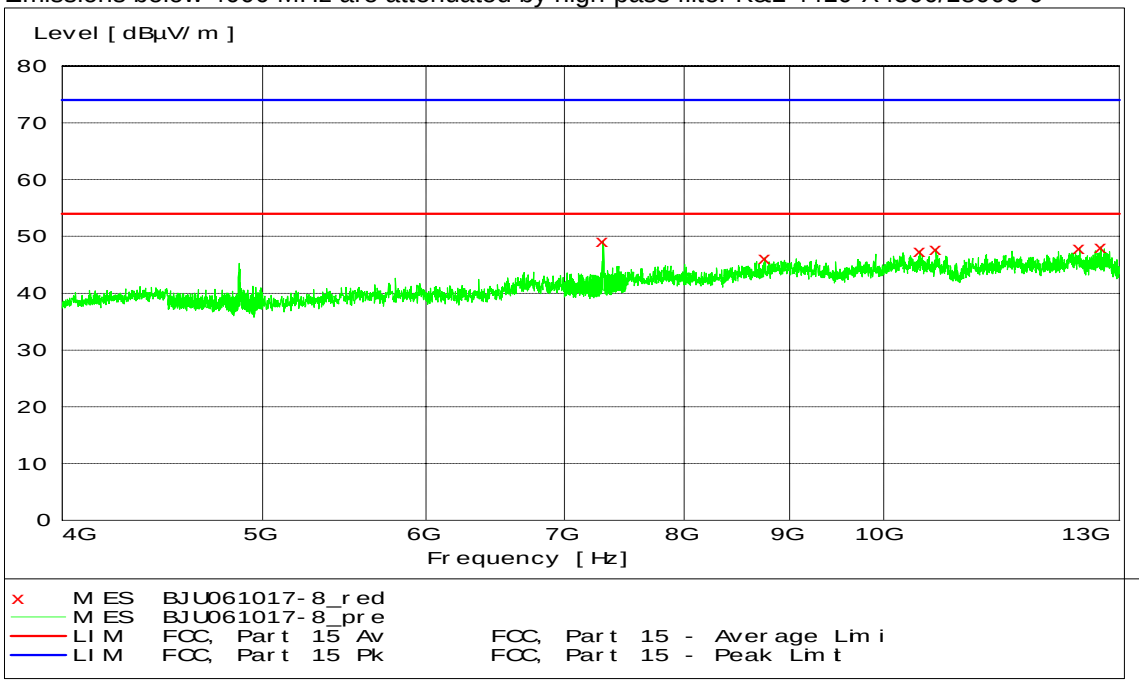
18 – 26 GHz, max peak at a distance of 3 m on the lowest TX channel, QPSK, 11 Mbps



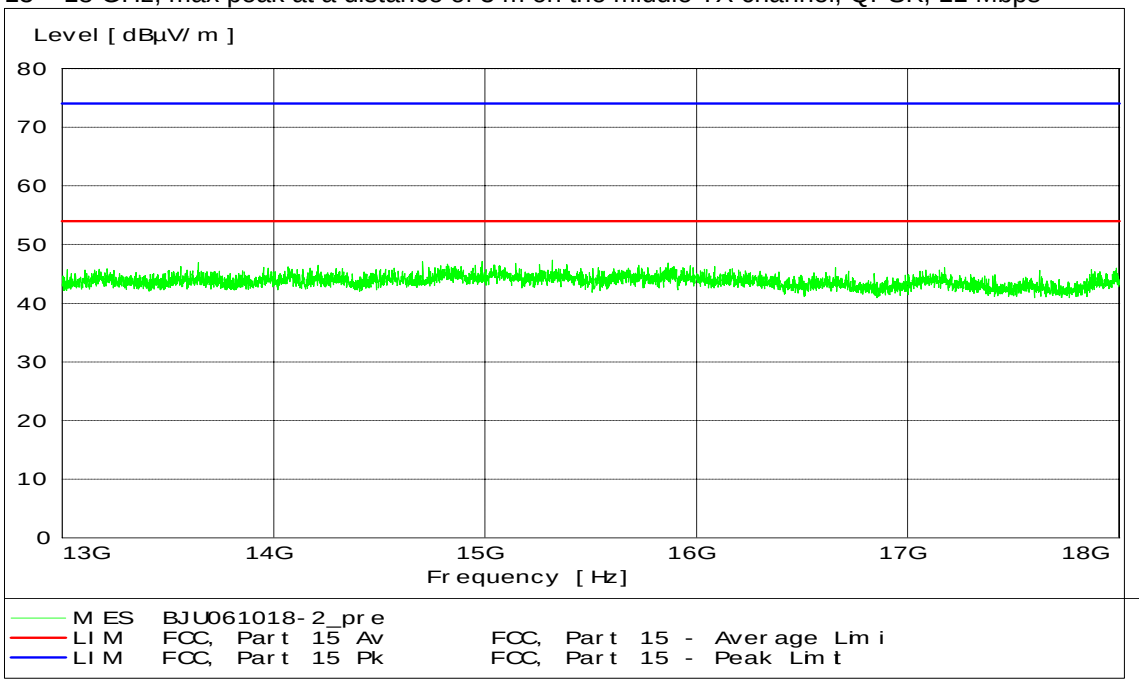
1000 – 4000 MHz, max peak at a distance of 3 m on the middle TX channel, QPSK, 11 Mbps
Carrier is attenuated by band rejection filter K&L 6N45-2450/T 100-0/0



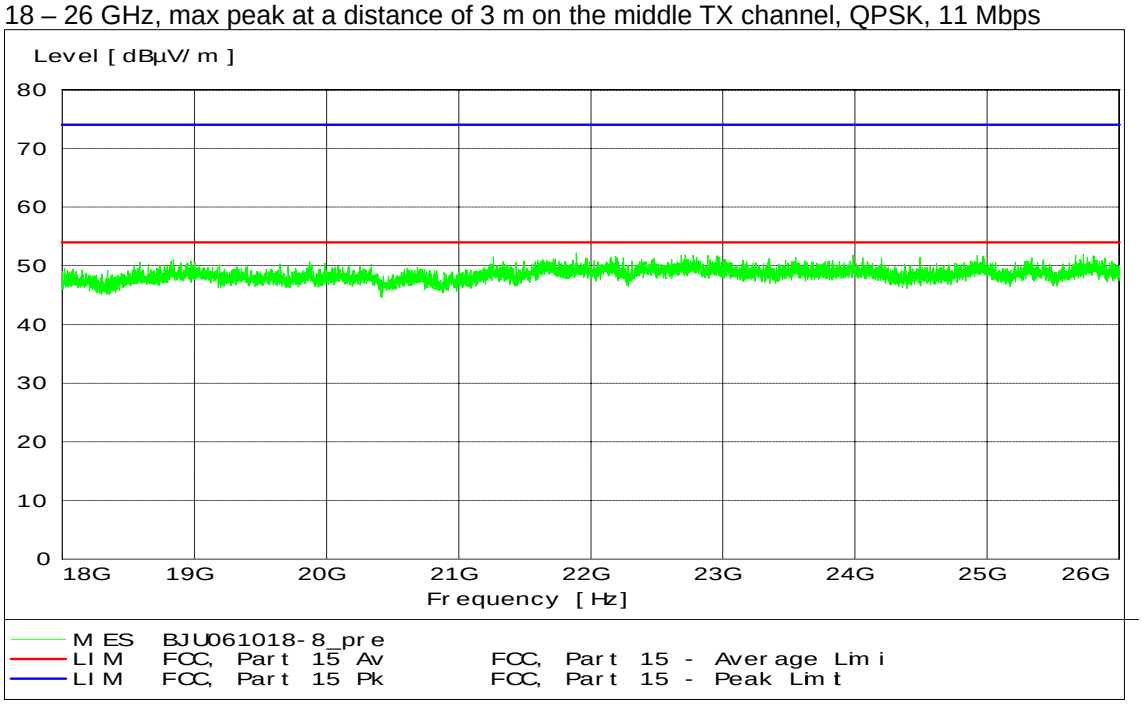
4000 – 13000 MHz, max peak at a distance of 3 m on the middle TX channel, QPSK, 11 Mbps
Emissions below 4000 MHz are attenuated by high-pass filter K&L 4410-X4500/18000-0



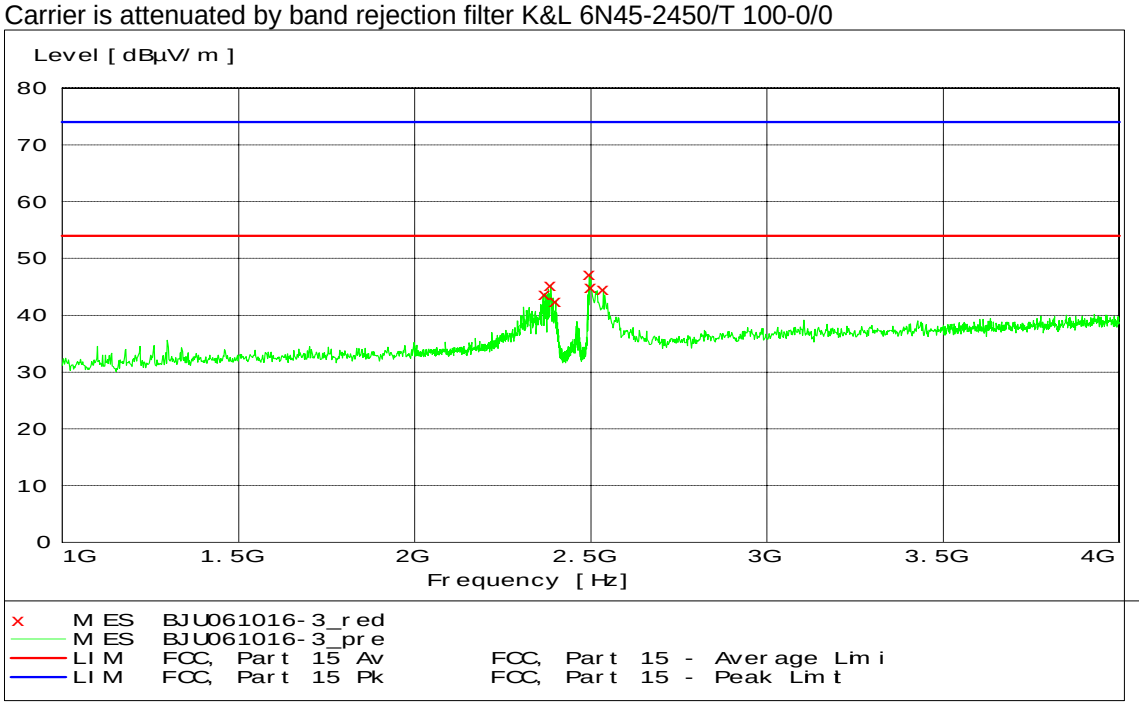
13 – 18 GHz, max peak at a distance of 3 m on the middle TX channel, QPSK, 11 Mbps



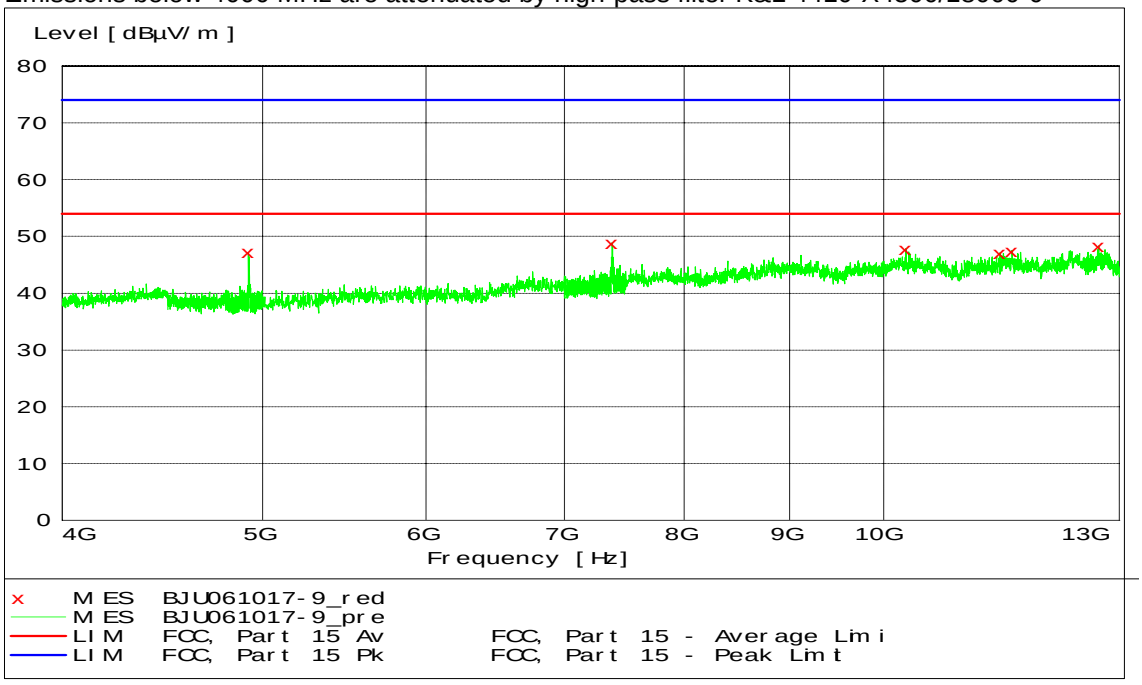
18 – 26 GHz, max peak at a distance of 3 m on the middle TX channel, QPSK, 11 Mbps



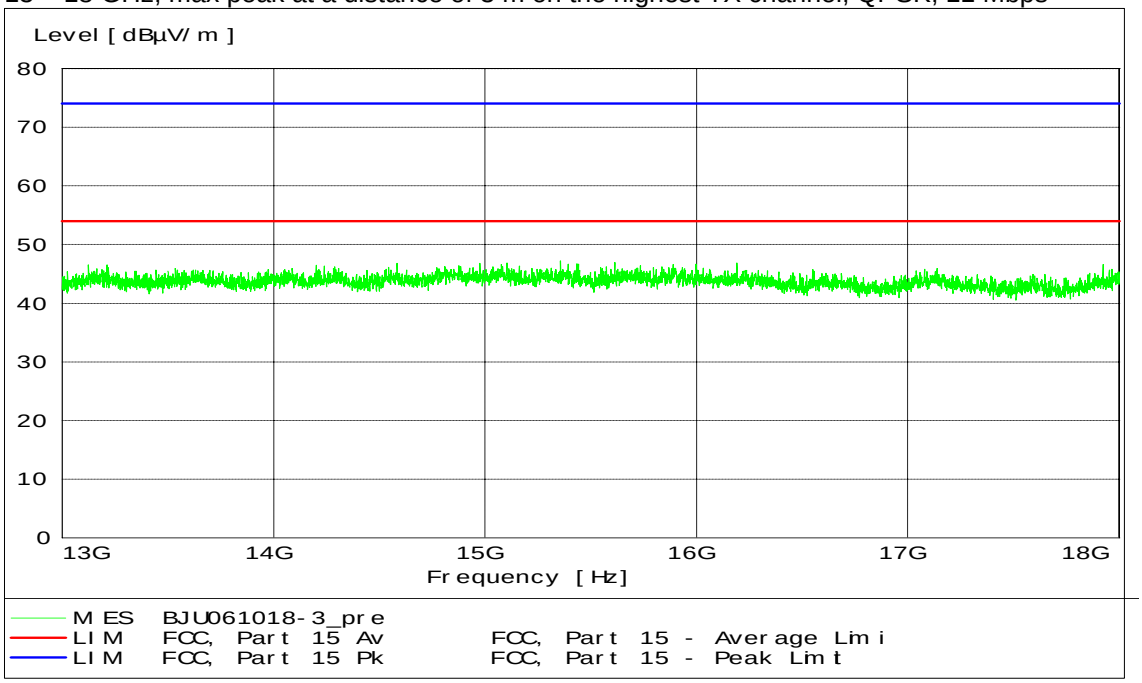
1000 – 4000 MHz, max peak at a distance of 3 m on the highest TX channel, QPSK, 11 Mbps
Carrier is attenuated by band rejection filter K&L 6N45-2450/T 100-0/0



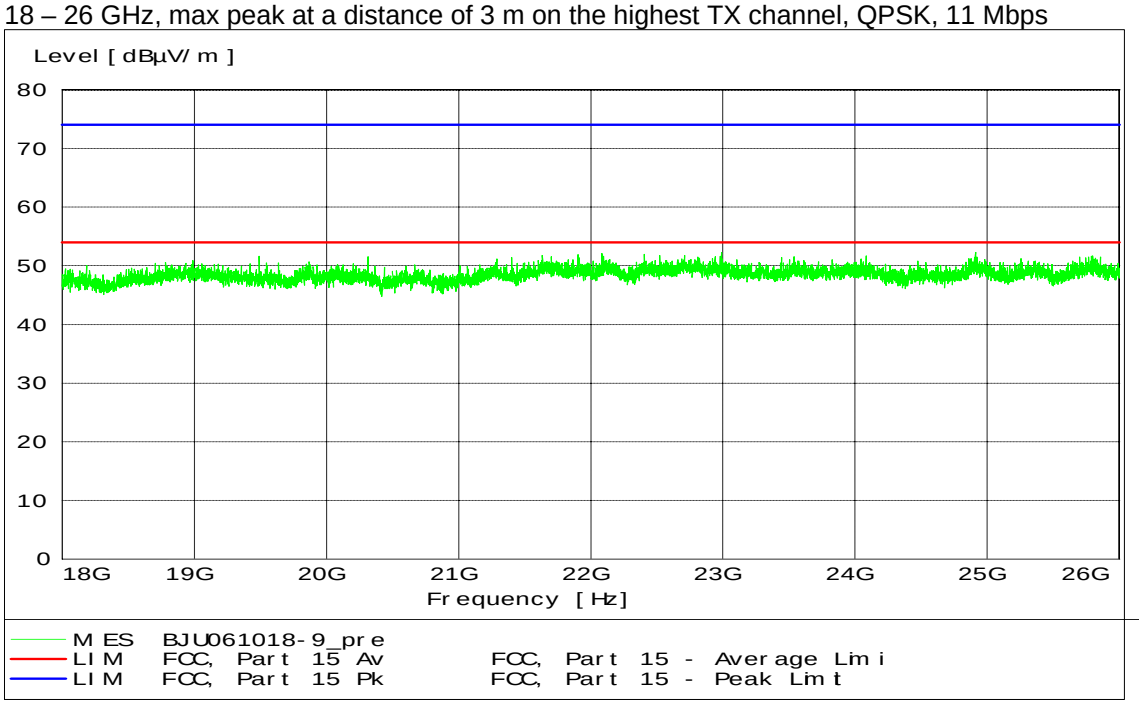
4000 – 13000 MHz, max peak at a distance of 3 m on the highest TX channel, QPSK, 11 Mbps
Emissions below 4000 MHz are attenuated by high-pass filter K&L 4410-X4500/18000-0



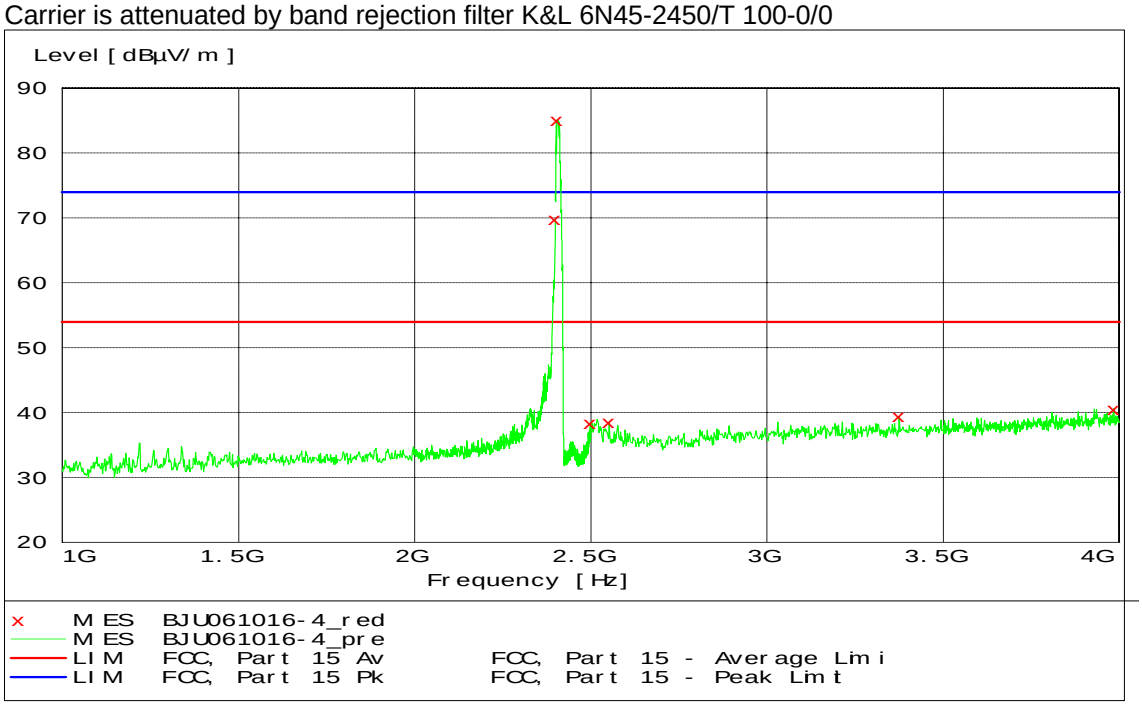
13 – 18 GHz, max peak at a distance of 3 m on the highest TX channel, QPSK, 11 Mbps



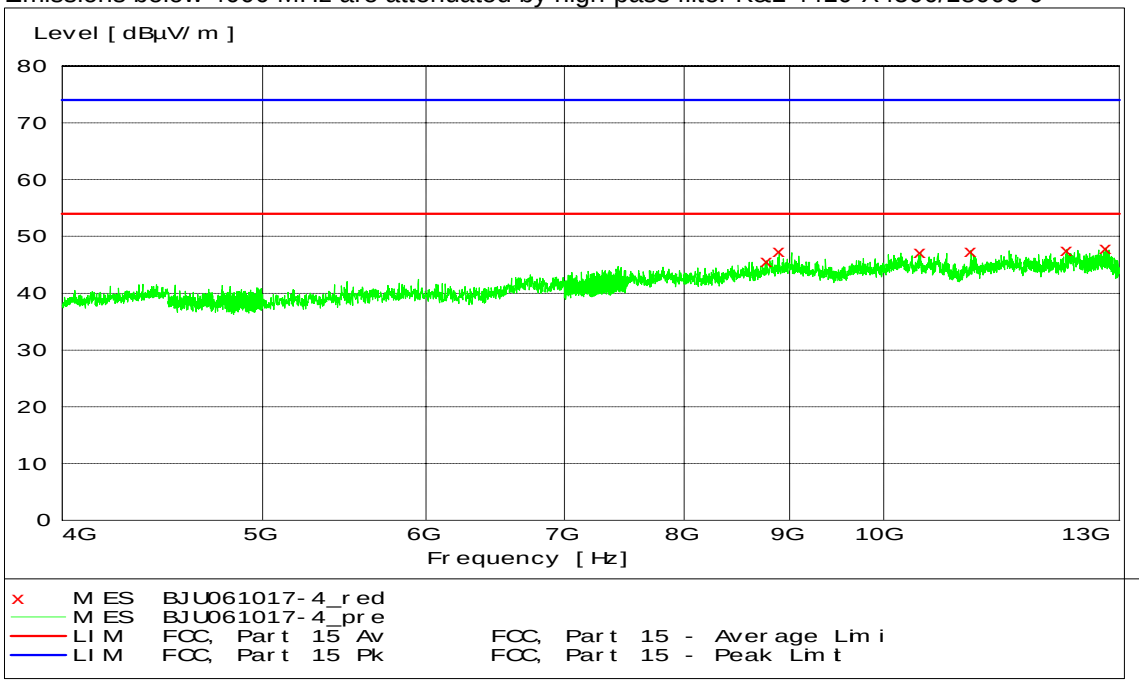
18 – 26 GHz, max peak at a distance of 3 m on the highest TX channel, QPSK, 11 Mbps



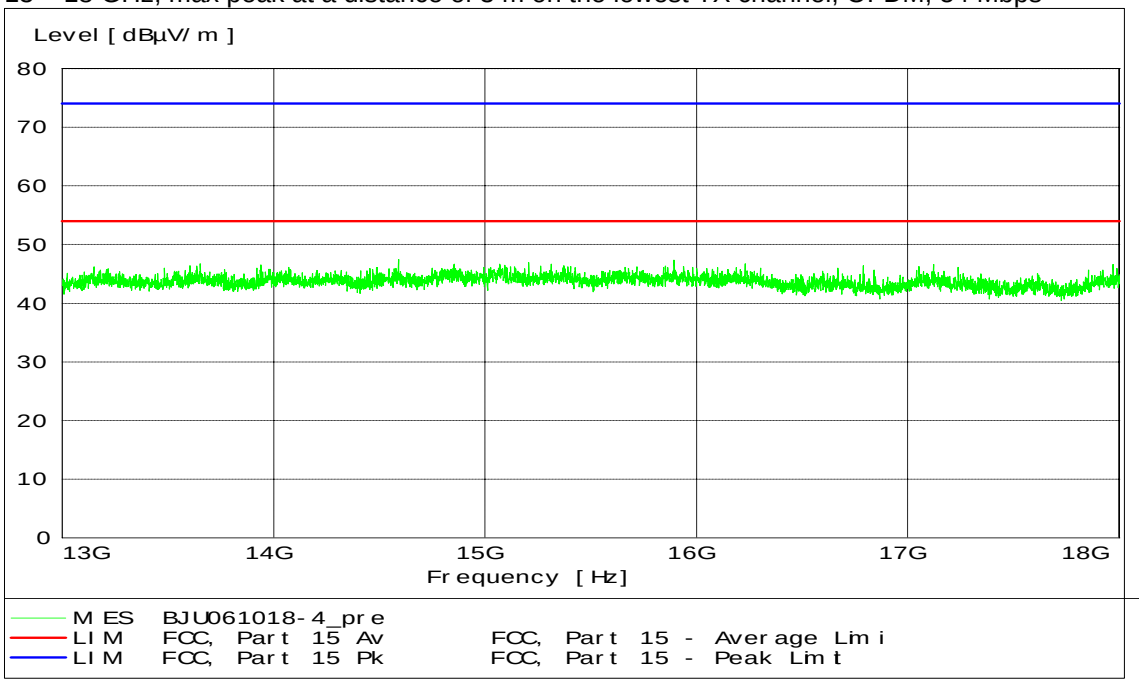
1000 – 4000 MHz, max peak at a distance of 3 m on the lowest TX channel, OFDM, 54 Mbps
Carrier is attenuated by band rejection filter K&L 6N45-2450/T 100-0/0



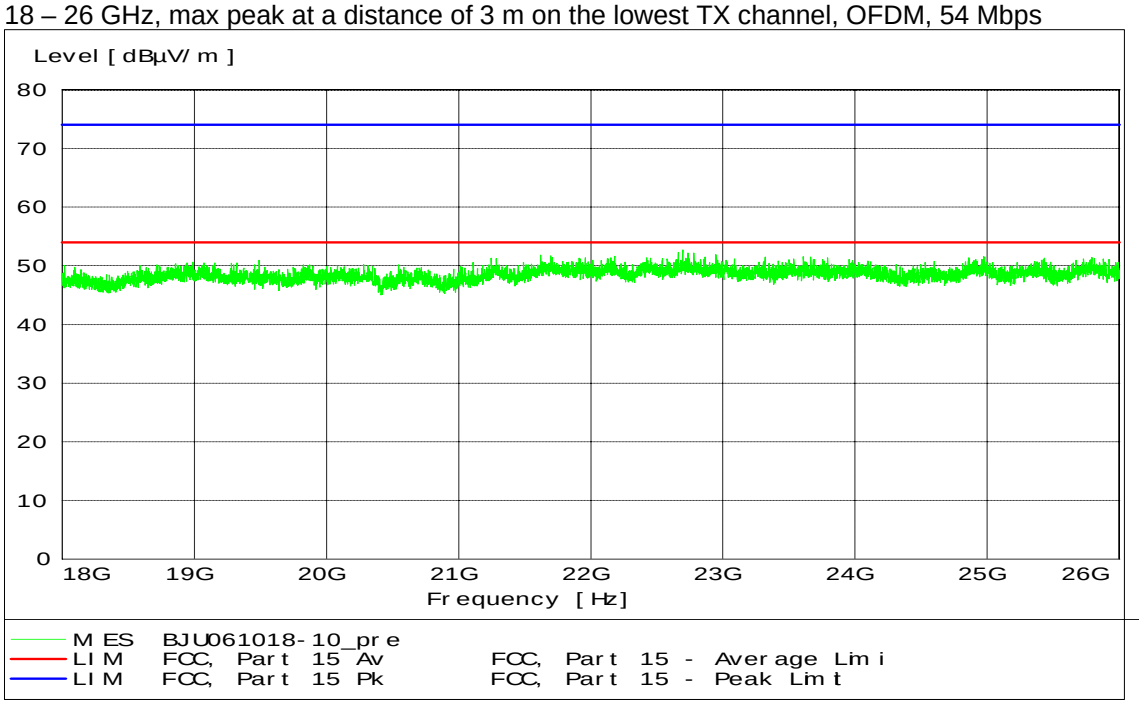
4000 – 13000 MHz, max peak at a distance of 3 m on the lowest TX channel, OFDM, 54 Mbps
Emissions below 4000 MHz are attenuated by high-pass filter K&L 4410-X4500/18000-0



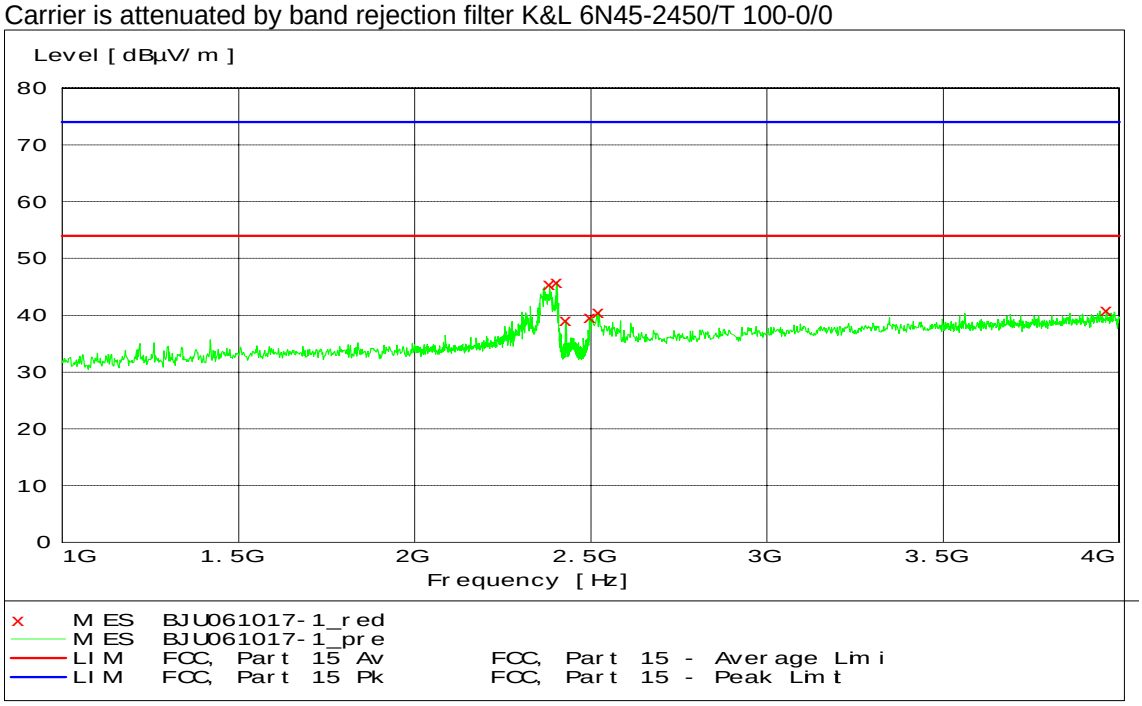
13 – 18 GHz, max peak at a distance of 3 m on the lowest TX channel, OFDM, 54 Mbps



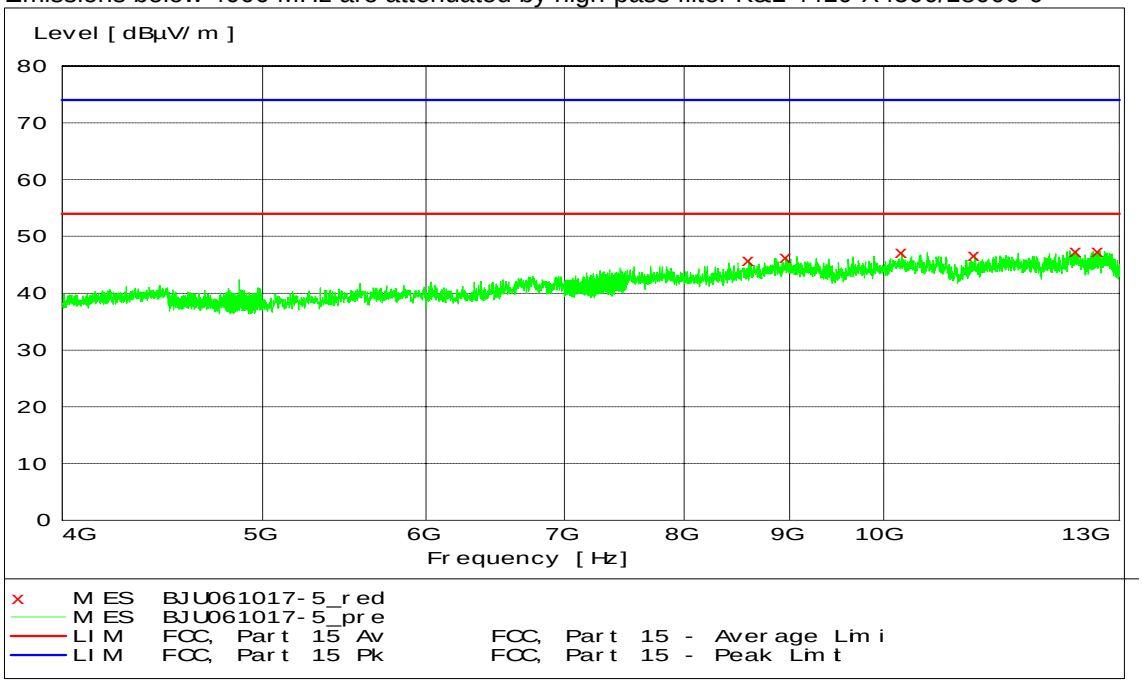
18 – 26 GHz, max peak at a distance of 3 m on the lowest TX channel, OFDM, 54 Mbps



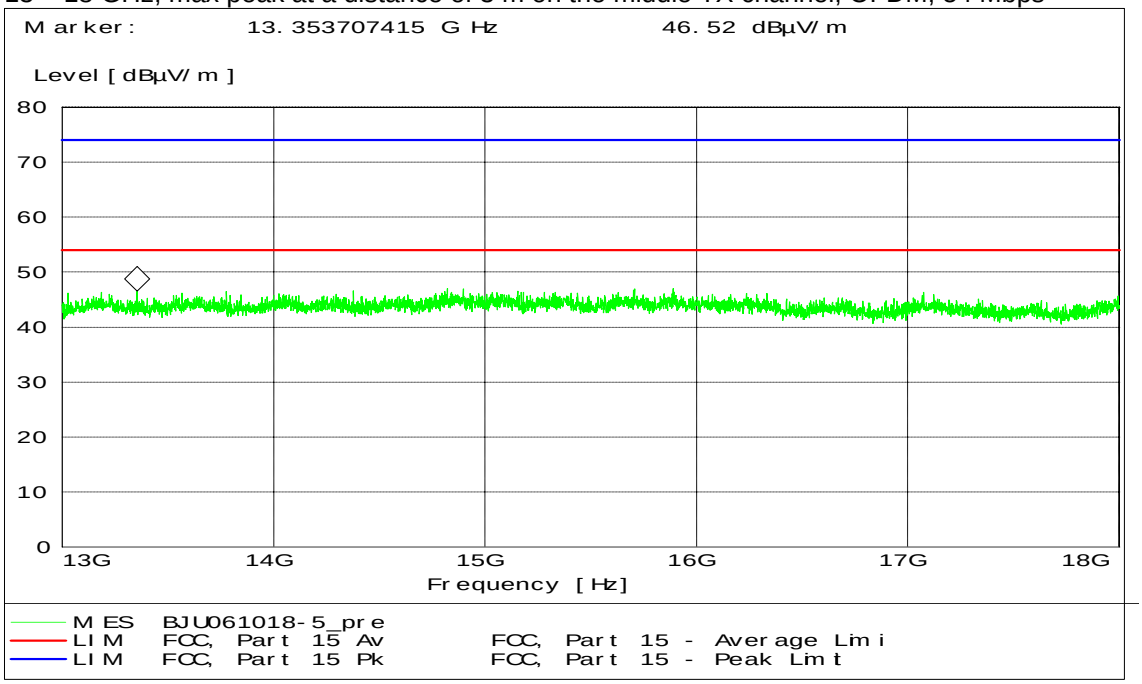
1000 – 4000 MHz, max peak at a distance of 3 m on the middle TX channel, OFDM, 54 Mbps
Carrier is attenuated by band rejection filter K&L 6N45-2450/T 100-0/0



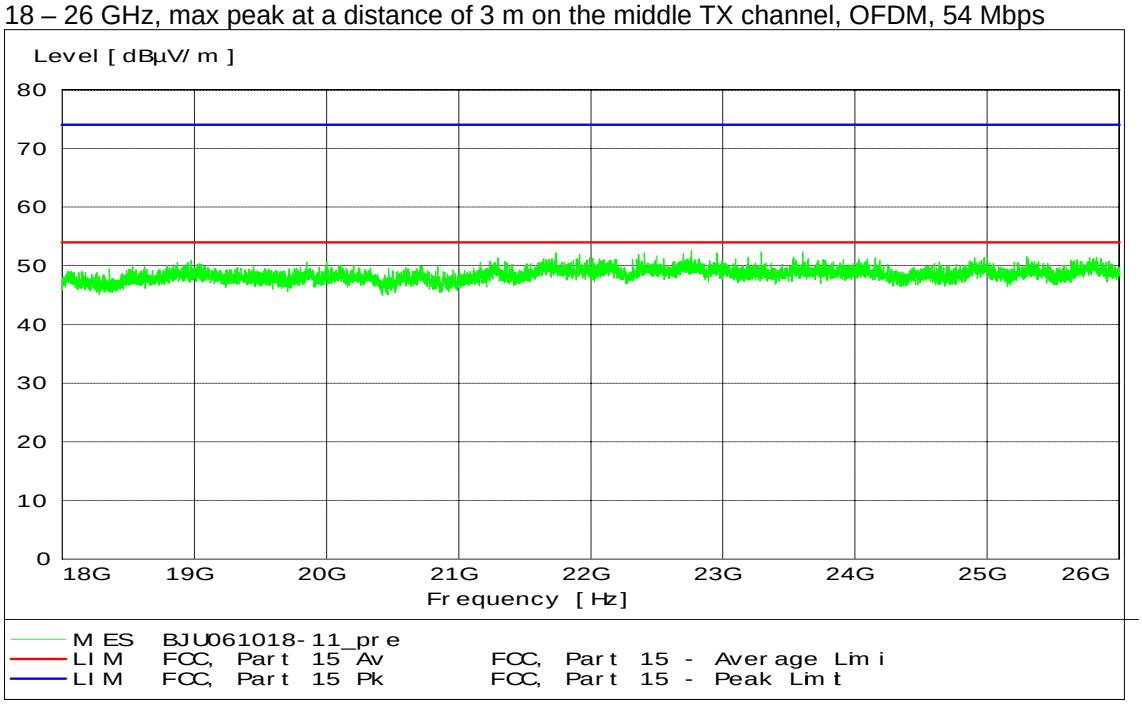
4000 – 13000 MHz, max peak at a distance of 3 m on the middle TX channel, OFDM, 54 Mbps
Emissions below 4000 MHz are attenuated by high-pass filter K&L 4410-X4500/18000-0



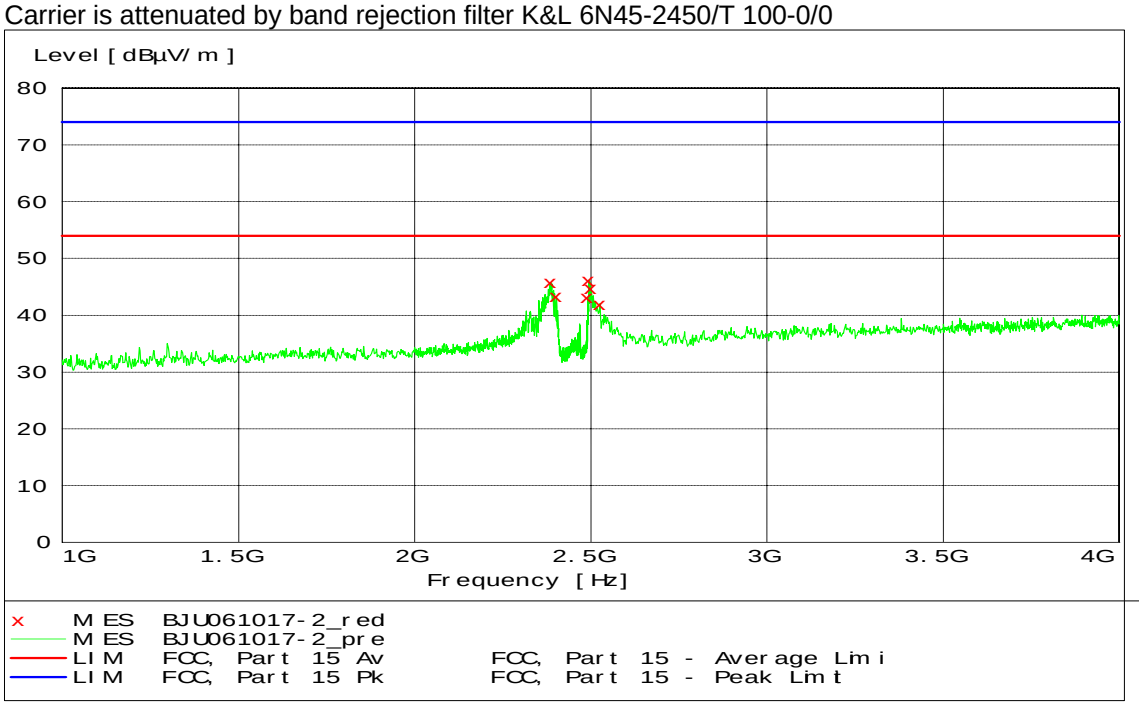
13 – 18 GHz, max peak at a distance of 3 m on the middle TX channel, OFDM, 54 Mbps



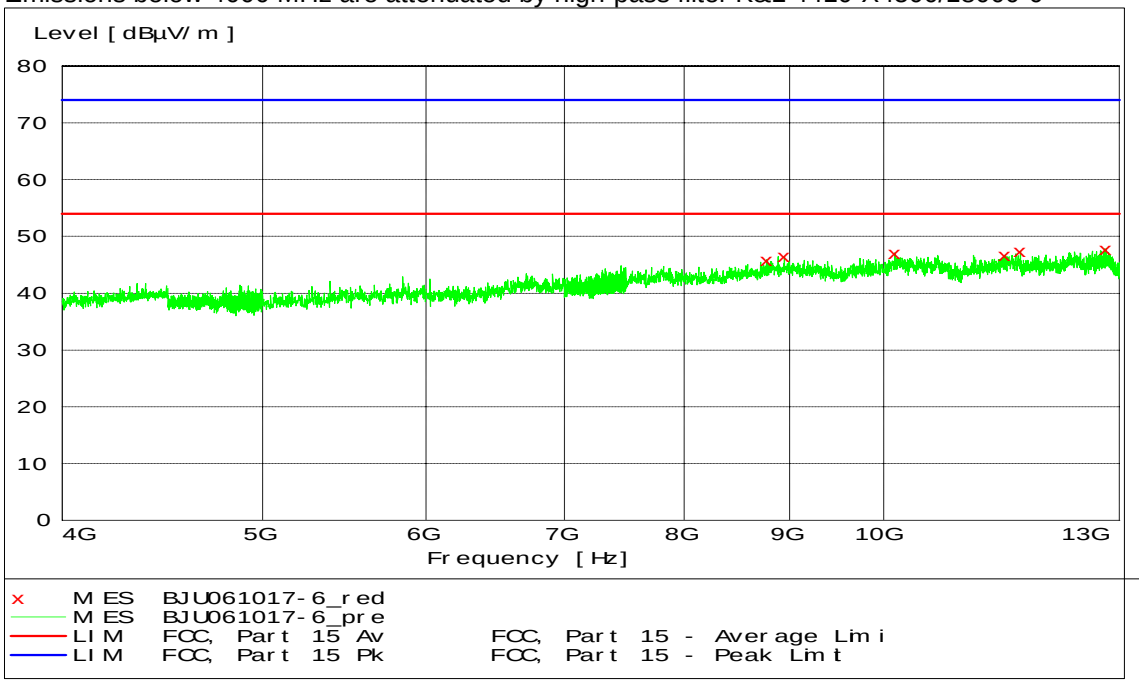
18 – 26 GHz, max peak at a distance of 3 m on the middle TX channel, OFDM, 54 Mbps



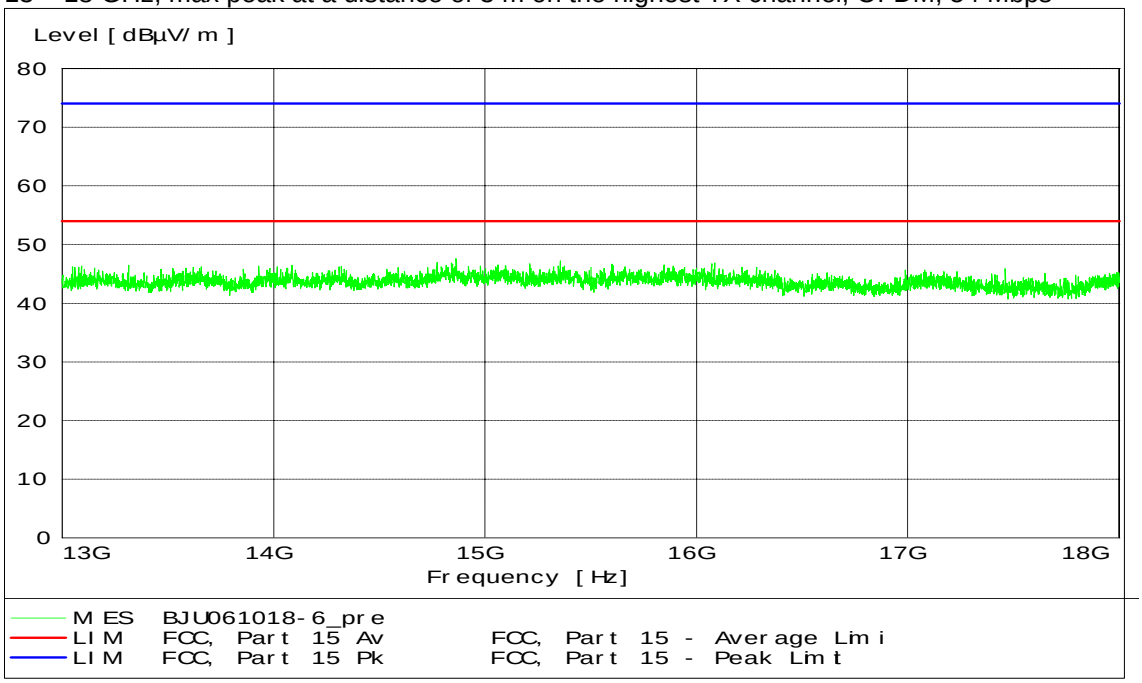
1000 – 4000 MHz, max peak at a distance of 3 m on the highest TX channel, OFDM, 54 Mbps
Carrier is attenuated by band rejection filter K&L 6N45-2450/T 100-0/0



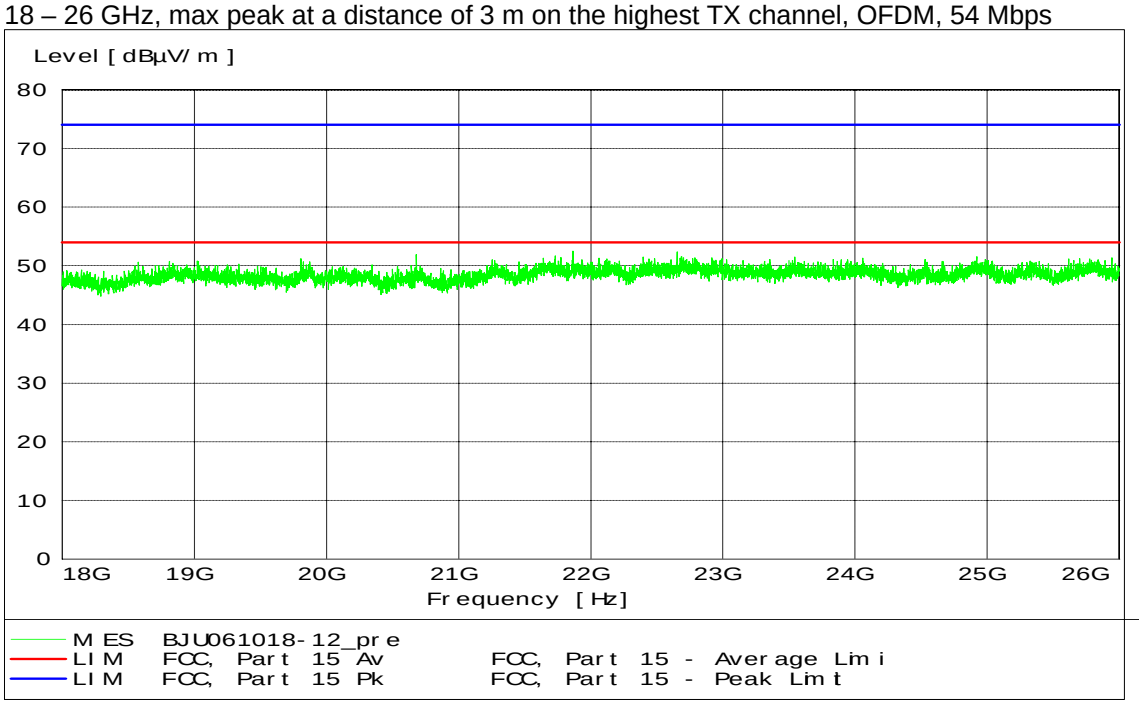
4000 – 13000 MHz, max peak at a distance of 3 m on the highest TX channel, OFDM, 54 Mbps
Emissions below 4000 MHz are attenuated by high-pass filter K&L 4410-X4500/18000-0



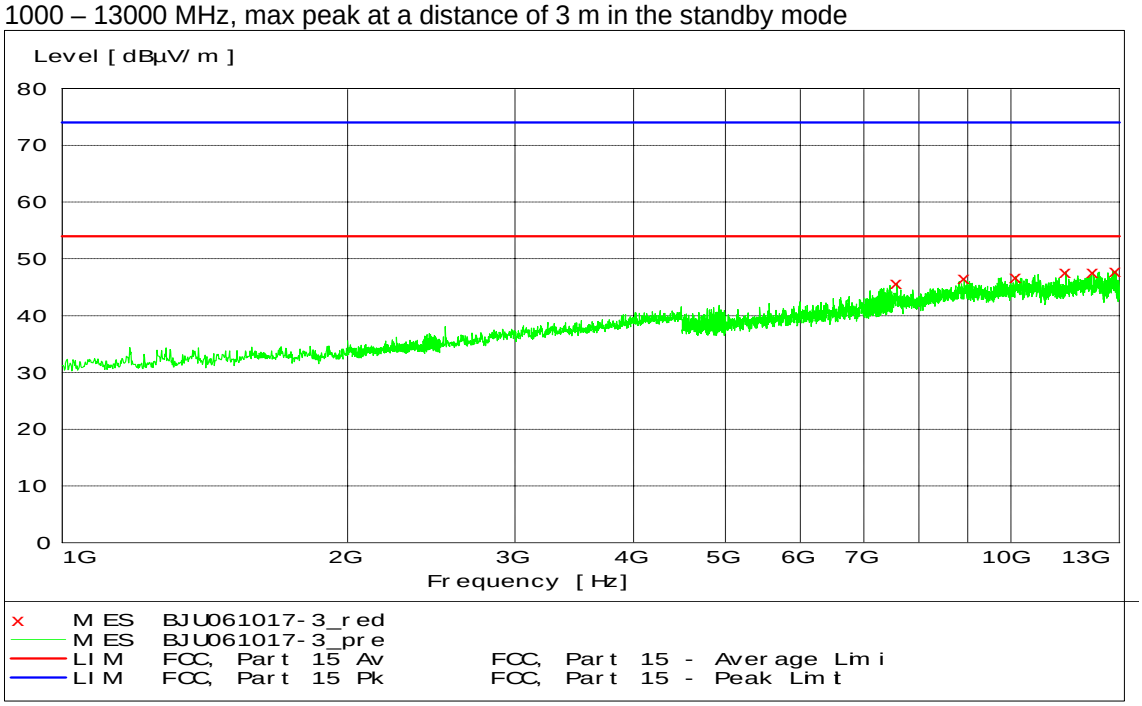
13 – 18 GHz, max peak at a distance of 3 m on the highest TX channel, OFDM, 54 Mbps



18 – 26 GHz, max peak at a distance of 3 m on the highest TX channel, OFDM, 54 Mbps



1000 – 13000 MHz, max peak at a distance of 3 m in the standby mode



Data summary

Low channel, 1, QPSK, 11 Mbps data rate

Detector Type	Frequency MHz	Measured level dBuV/m	Limit dBuV/m	Bandwidth kHz	Note
QP	241,6	26,6	46	120	
QP	245,8	23,7	46	120	
Pk	1300,6	40,7	74 (54)	1000	
Pk	2398,4	69,3	74	1000	
Avg	2398,4	46,2	54	1000	
Pk	2499,5	43,2	74 (54)	1000	
Pk	2541,8	42,8	74 (54)	1000	
Pk	4824,0	54,5	74	1000	
Avg	4824,0	40,6	54	1000	
Pk	7236,0	52,9	74 (54)	1000	
Pk	2412,0	110,6	--	1000	Band edge compliance
Avg	2412,0	75,4	--	1000	Band edge compliance

Middle channel, 6, QPSK, 11 Mbps data rate

Detector Type	Frequency MHz	Measured level dBuV/m	Limit dBuV/m	Bandwidth kHz	Note
QP	241,5	24,3	46	120	
QP	254,2	24,7	46	120	
QP	262,8	26,2	46	120	
QP	275,6	24,1	46	120	
Pk	2376,1	49,6	74 (54)	1000	
Pk	2499,3	44,5	74 (54)	1000	
Pk	2524,1	43,9	74 (54)	1000	
Pk	4873,9	52,3	74 (54)	1000	
Pk	7311,1	56,5	74	1000	
Avg	7311,1	36,5	54	1000	

High channel, 11, QPSK, 11 Mbps data rate

Detector Type	Frequency MHz	Measured level dBuV/m	Limit dBuV/m	Bandwidth kHz	Note
QP	207,7	20,9	46	120	
QP	216,0	19,0	46	120	
QP	220,2	25,0	46	120	
QP	241,4	25,6	46	120	
Pk	2371,4	49,7	74 (54)	1000	
Pk	2387,3	50,3	74 (54)	1000	
Pk	2497,9	50,1	74 (54)	1000	
Pk	2536,1	44,8	74 (54)	1000	
Pk	4924,1	50,2	74 (54)	1000	
Pk	7386,1	59,1	74	1000	
Avg	7386,1	37,6	54	1000	
Pk	2462,0	112,7	--	1000	Band edge compliance
Avg	2462,0	76,6	--	1000	Band edge compliance

Low channel, 1, OFDM, 54 Mbps data rate

Detector Type	Frequency MHz	Measured level dBuV/m	Limit dBuV/m	Bandwidth kHz	Note
QP	207,6	20,4	46	120	
QP	241,4	22,5	46	120	
Pk	2395,2	67,5	74 (54)	1000	
Pk	2499,5	42,9	74 (54)	1000	
Pk	2552,1	41,9	74 (54)	1000	
Pk	2412,0	102,9	--	1000	Band edge compliance
Avg	2412,0	57,6	--	1000	Band edge compliance

Middle channel, 6, OFDM, 54 Mbps data rate

Detector Type	Frequency MHz	Measured level dBuV/m	Limit dBuV/m	Bandwidth kHz	Note
QP	241,5	27,7	46	120	
QP	249,9	27,6	46	120	
QP	254,2	29,6	46	120	
QP	262,6	29,1	46	120	
QP	266,8	27,8	46	120	
QP	275,2	27,2	46	120	
Pk	2384,1	49,8	74 (54)	1000	
Pk	2499,6	43,4	74 (54)	1000	
Pk	2524,5	43,0	74 (54)	1000	

High channel, 11, OFDM, 54 Mbps data rate

Detector Type	Frequency MHz	Measured level dBuV/m	Limit dBuV/m	Bandwidth kHz	Note
QP	275,4	21,7	46	120	
QP	288,2	19,6	46	120	
Pk	2386,8	50,2	74 (54)	1000	
Pk	2491,1	46,0	74 (54)	1000	
Pk	2493,5	49,3	74 (54)	1000	
Pk	2500,0	48,0	74 (54)	1000	
Pk	2526,1	44,6	74 (54)	1000	
Pk	2462,0	103,7	--	1000	Band edge compliance
Avg	2462,0	58,0	--	1000	Band edge compliance

Standby/Rx

Detector Type	Frequency MHz	Measured level dBuV/m	Limit dBuV/m	Bandwidth kHz	Note
QP	254,3	23,9	46	120	
QP	262,7	24,0	46	120	
QP	288,1	21,7	46	120	
QP	309,3	25,4	46	120	
QP	322,1	21,3	46	120	
Pk	1000 - 13000	Noise floor	74 (54)	1000	

Example calculation:
Measured level [dBμV/m] = Analyser reading [dBμV] + cable loss [dB] – preamplifier gain [dB] + antenna factor [1/m]

10. CONDUCTED SPURIOUS EMISSIONS AT ANTENNA PORT

10.1 Measurement uncertainty

Measurement uncertainty for conducted disturbances at the antenna port: ± 3,6 dB

The measurement uncertainty describes the overall uncertainty of the given measured value during operation of the EUT. Measurement uncertainty is calculated in accordance with EA-4/02-1997. The uncertainty is given with a level of confidence of approximately 95% (k=2).

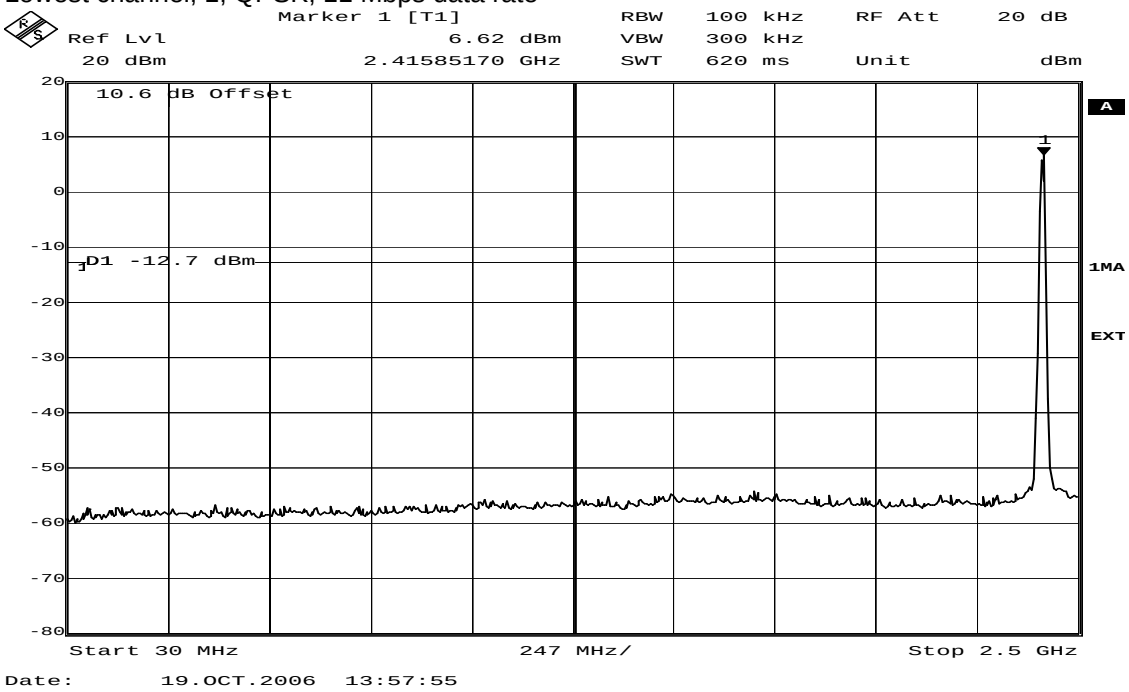
10.2 Test protocol

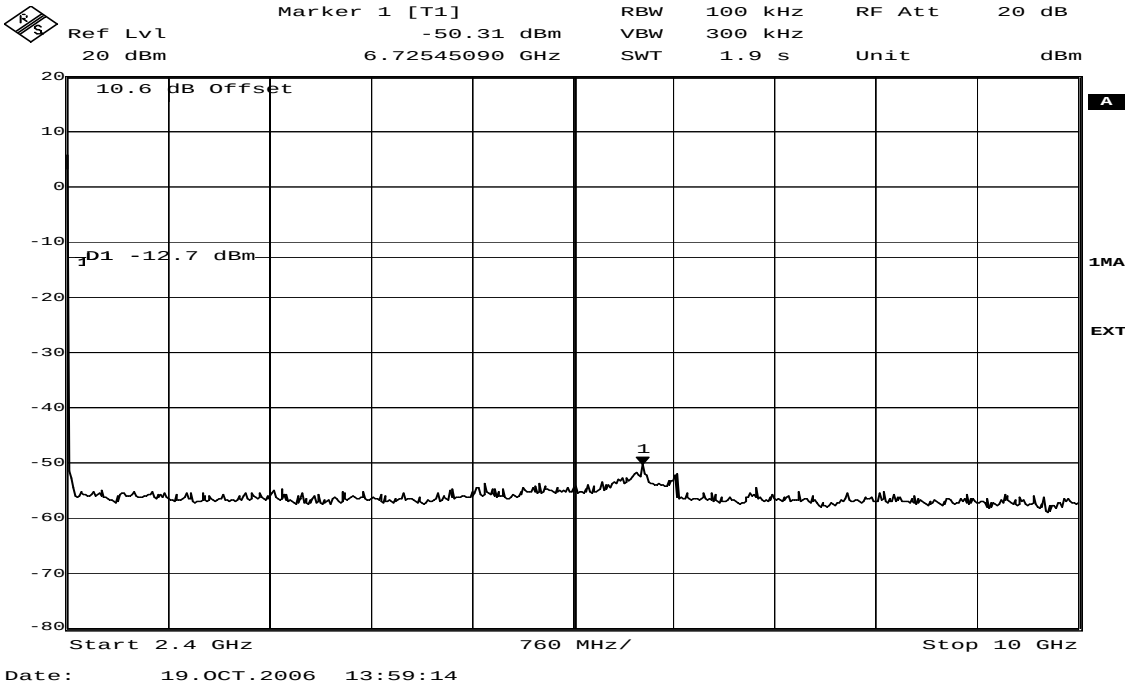
Date of test: 2006-10-19

Limit: In any 100 kHz bandwidth outside the operating frequency band (2400 – 2483,5 MHz), 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.

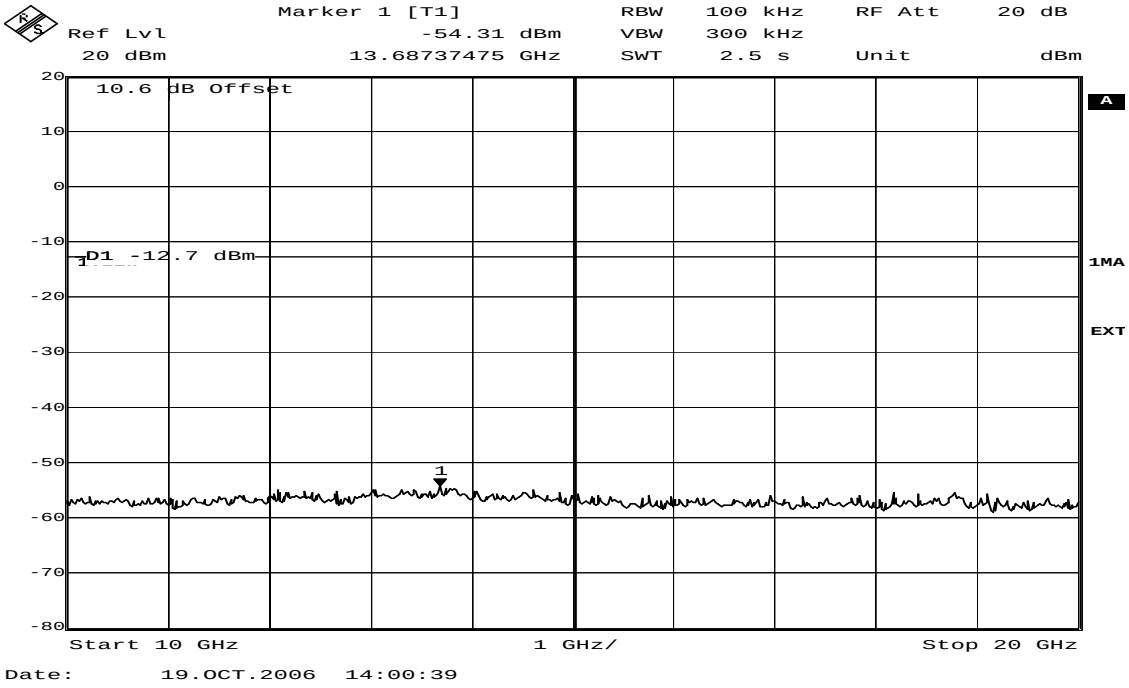
Measurement results are corrected for attenuation in the set-up configuration.

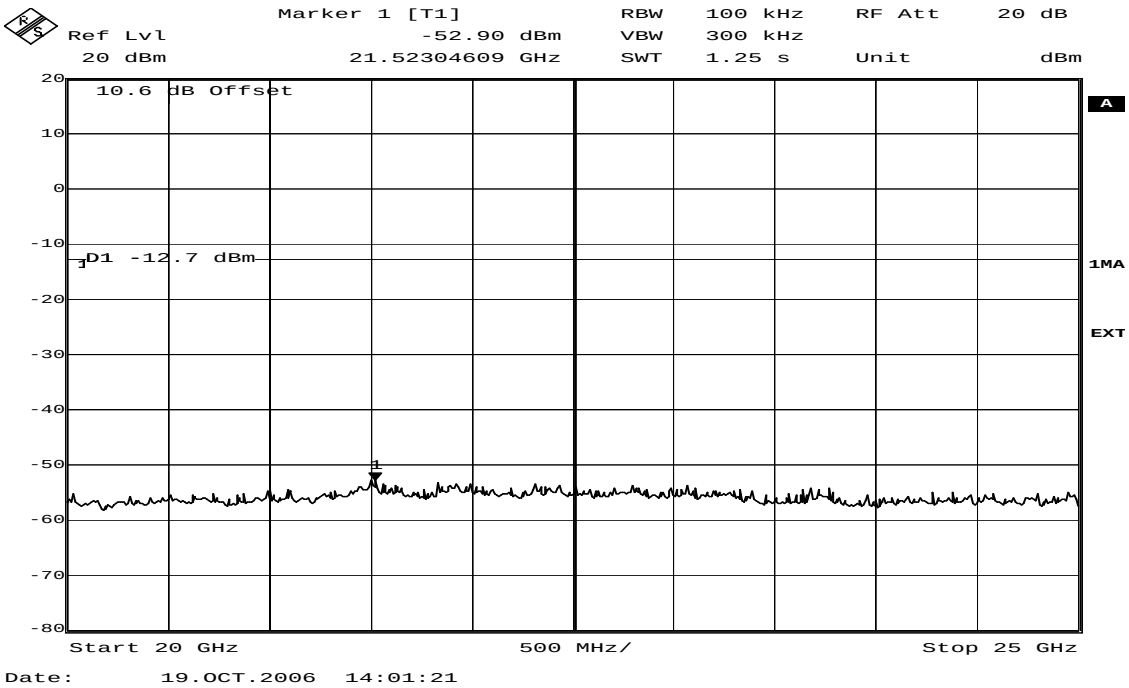
Lowest channel, 1, QPSK, 11 Mbps data rate



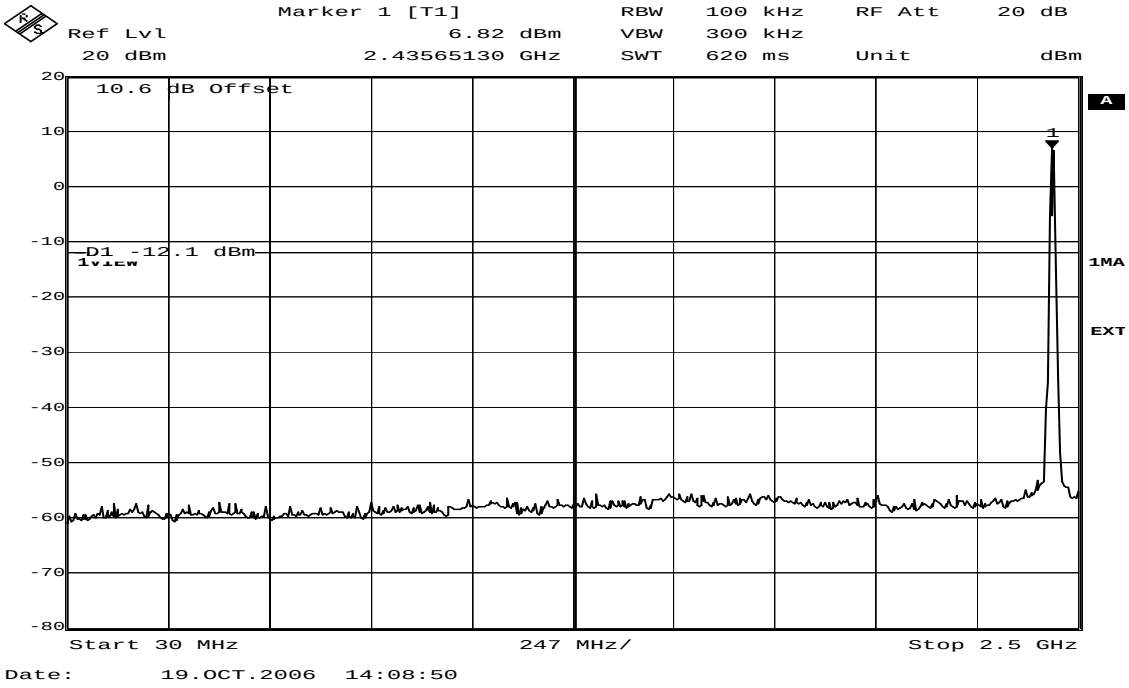


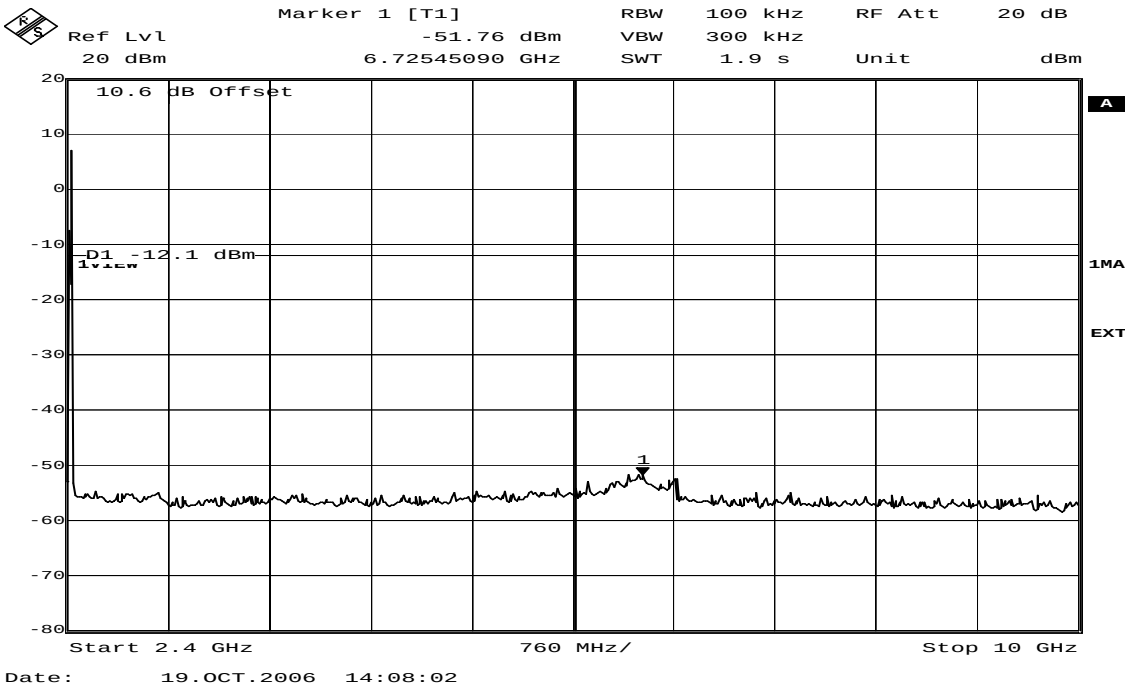
Lowest channel, 1, QPSK, 11 Mbps data rate



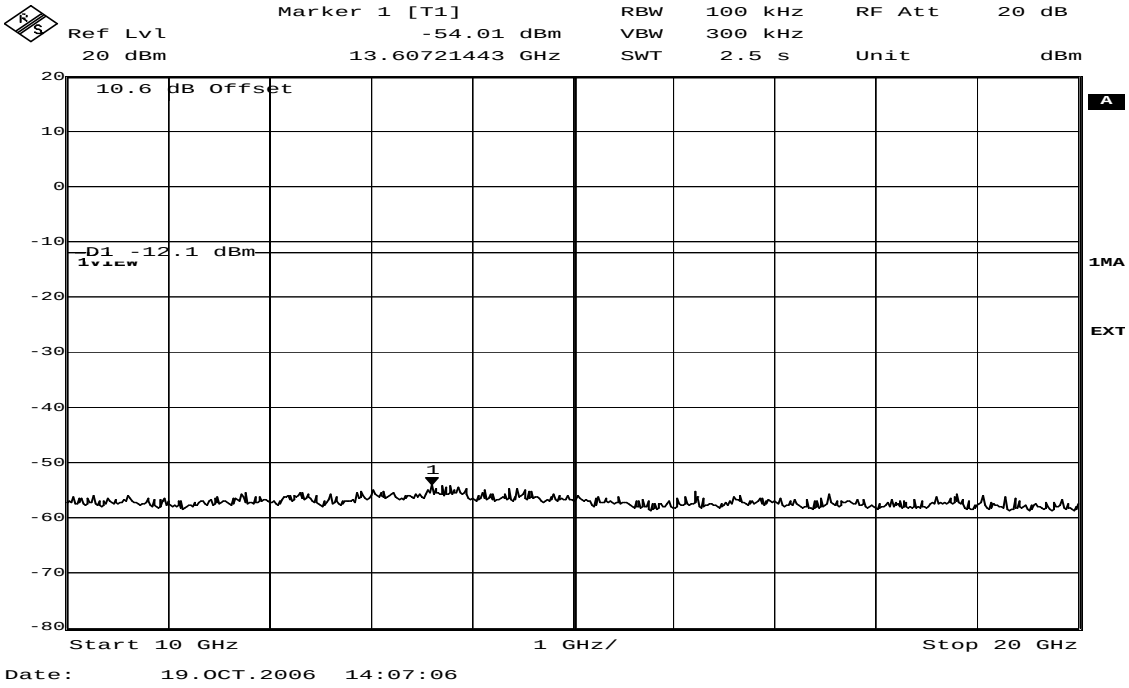


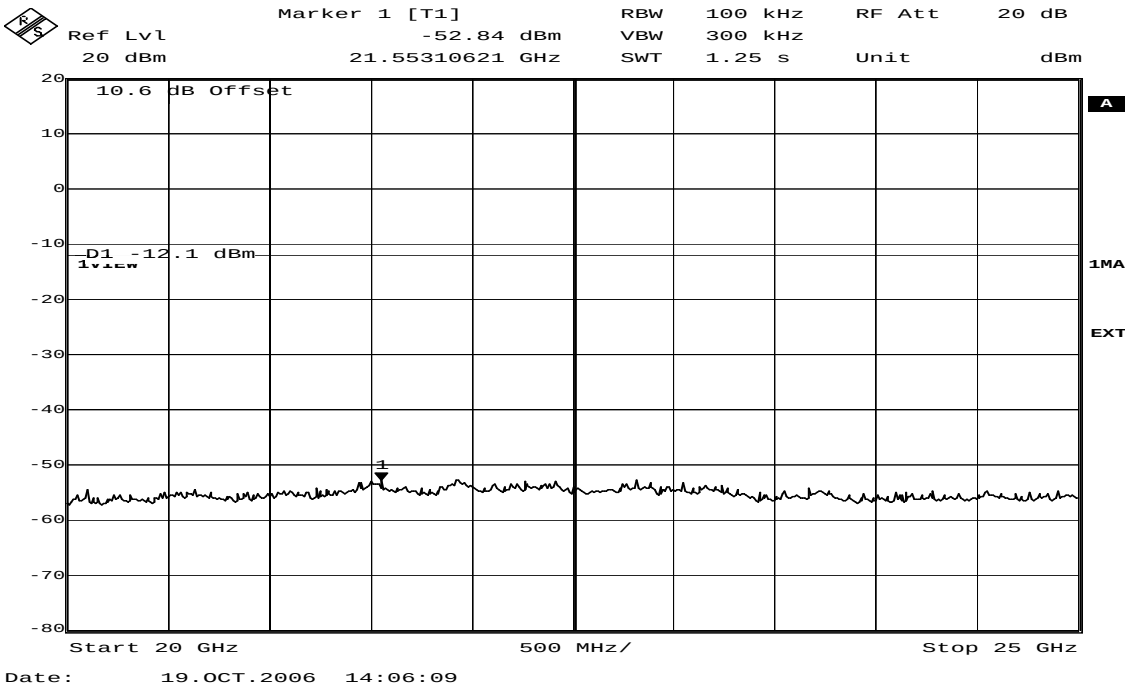
Mid channel, 6, QPSK, 11 Mbps data rate



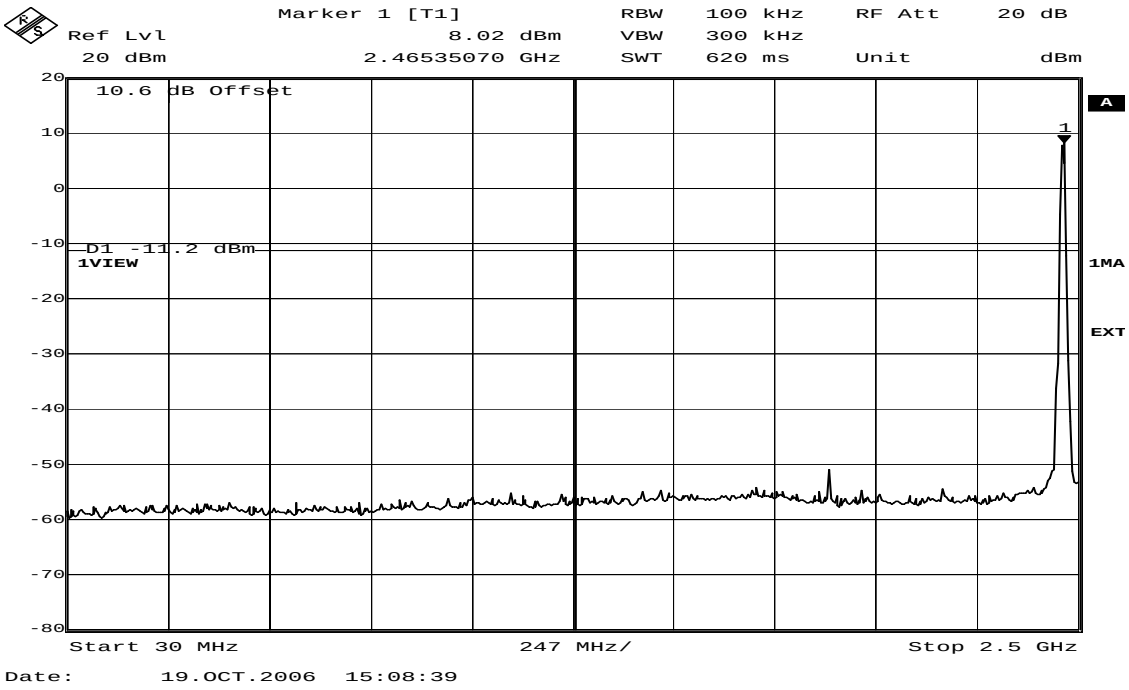


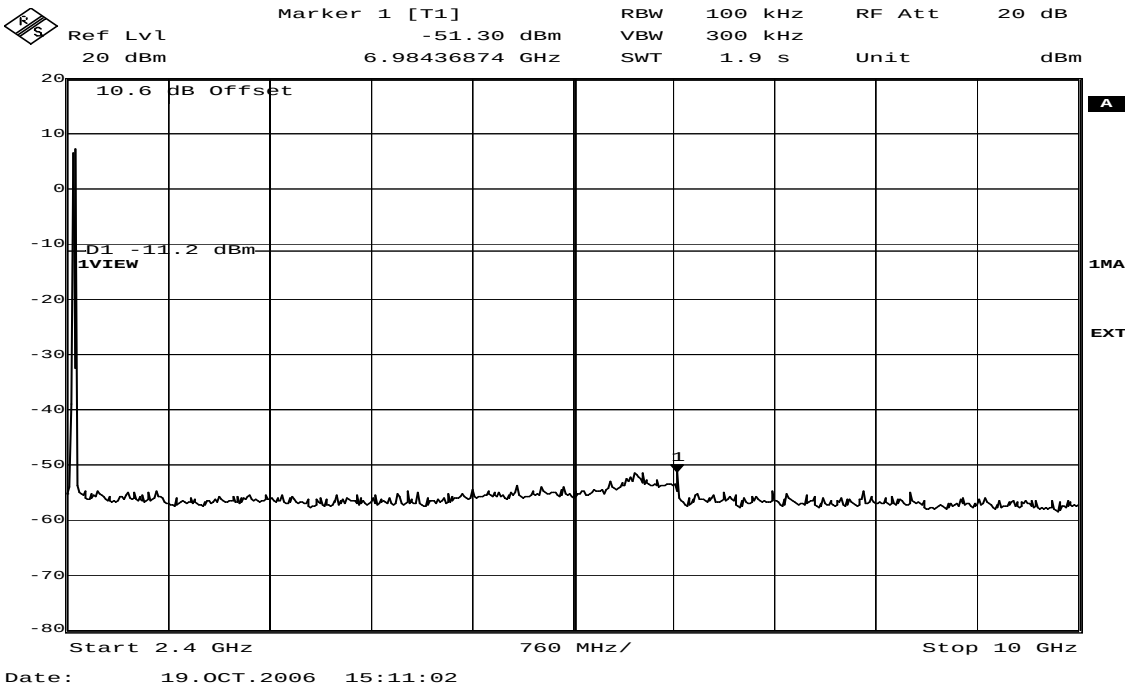
Mid channel, 6, QPSK, 11 Mbps data rate



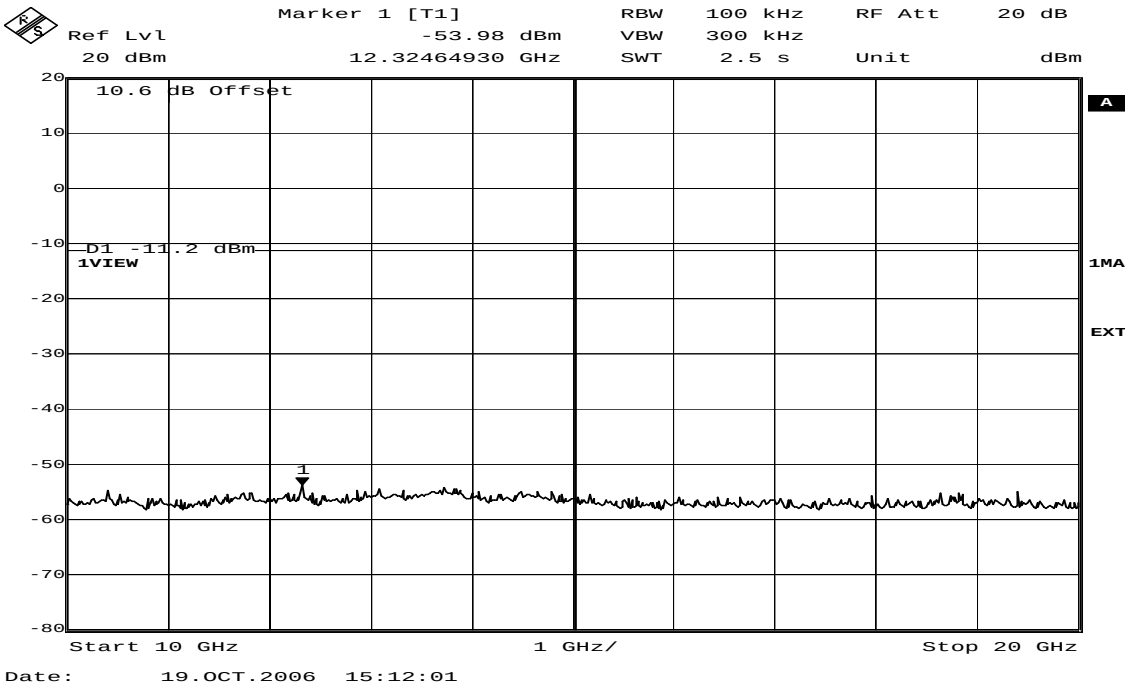


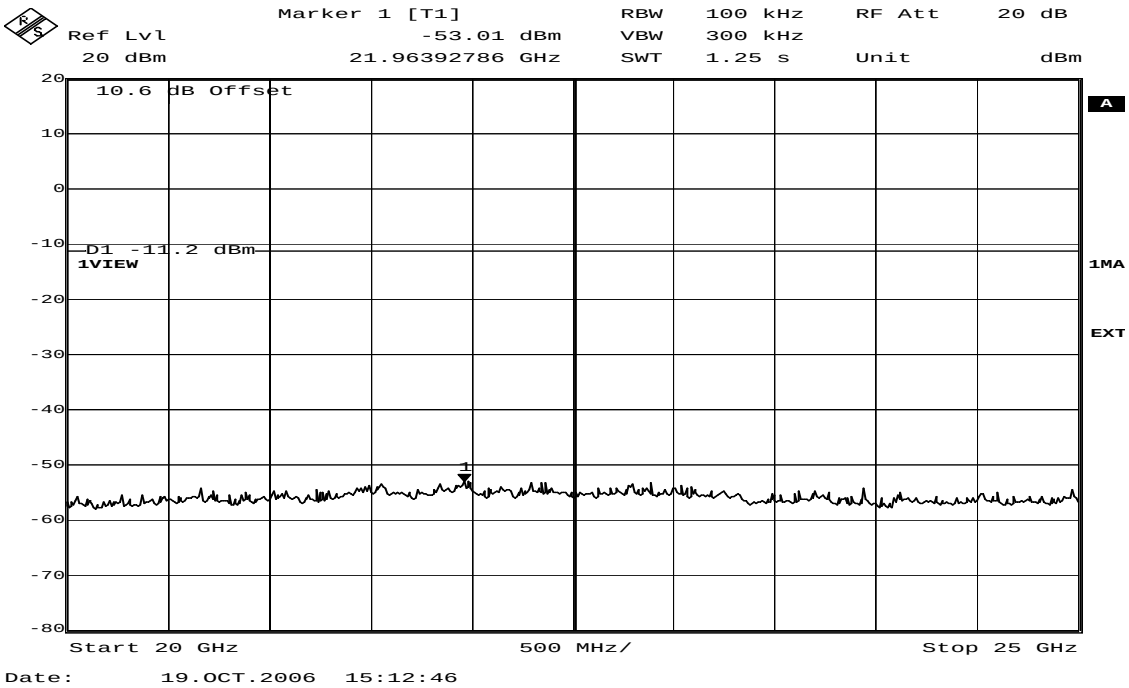
Highest channel, 11, QPSK, 11 Mbps data rate



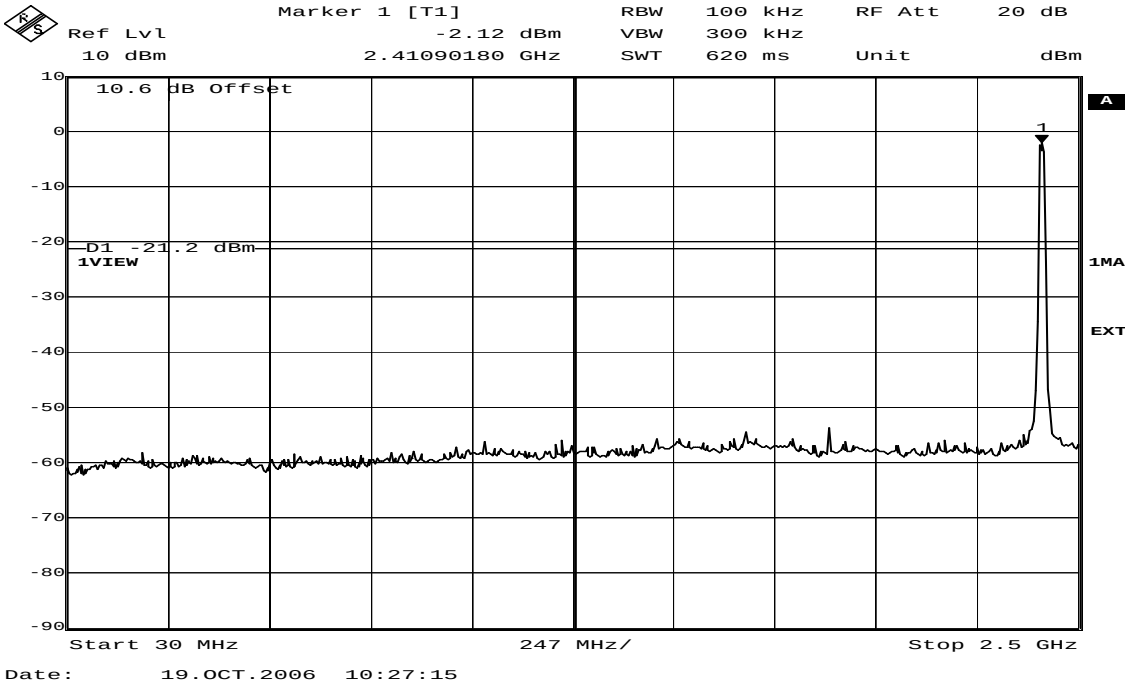


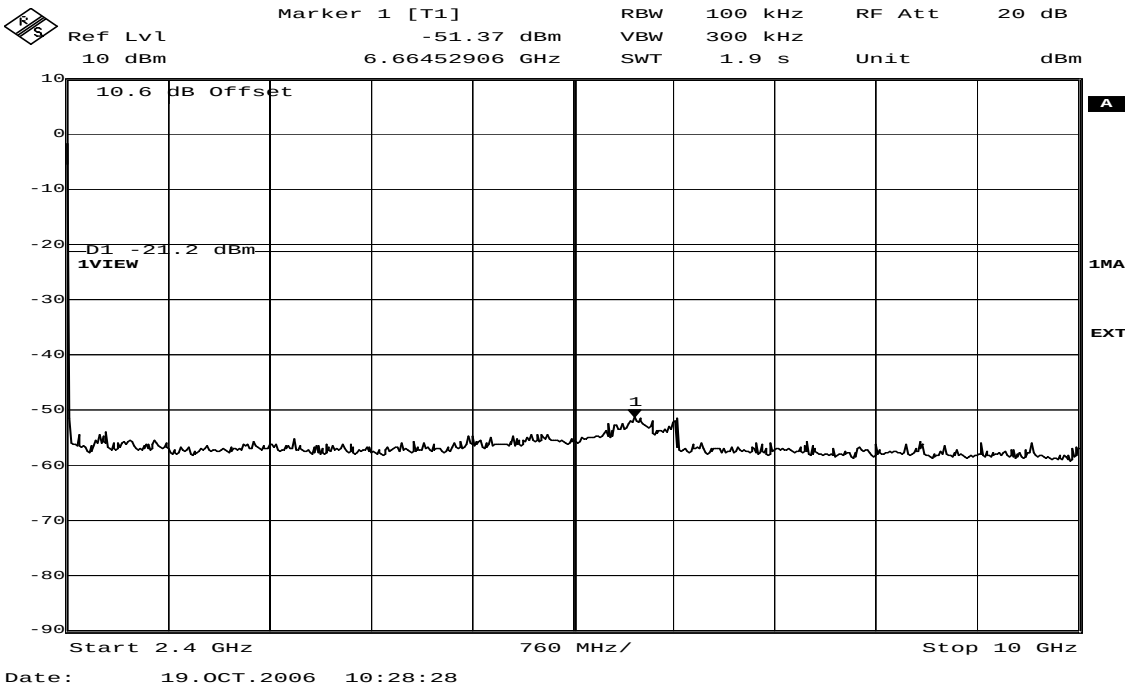
Highest channel, 11, QPSK, 11 Mbps data rate



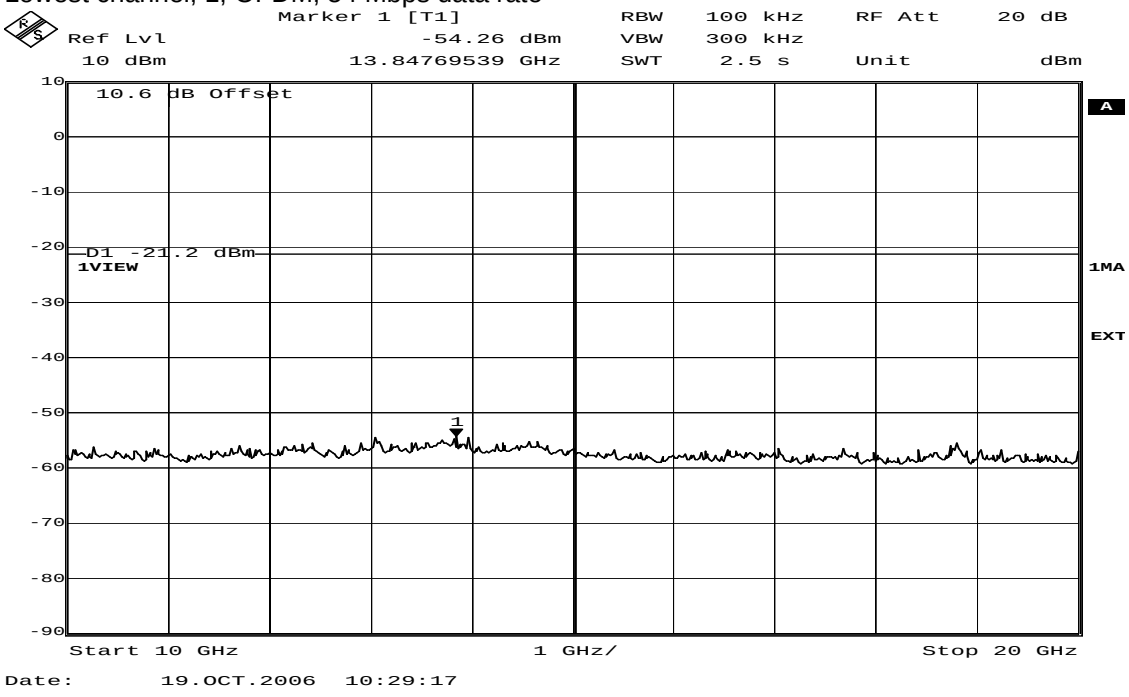


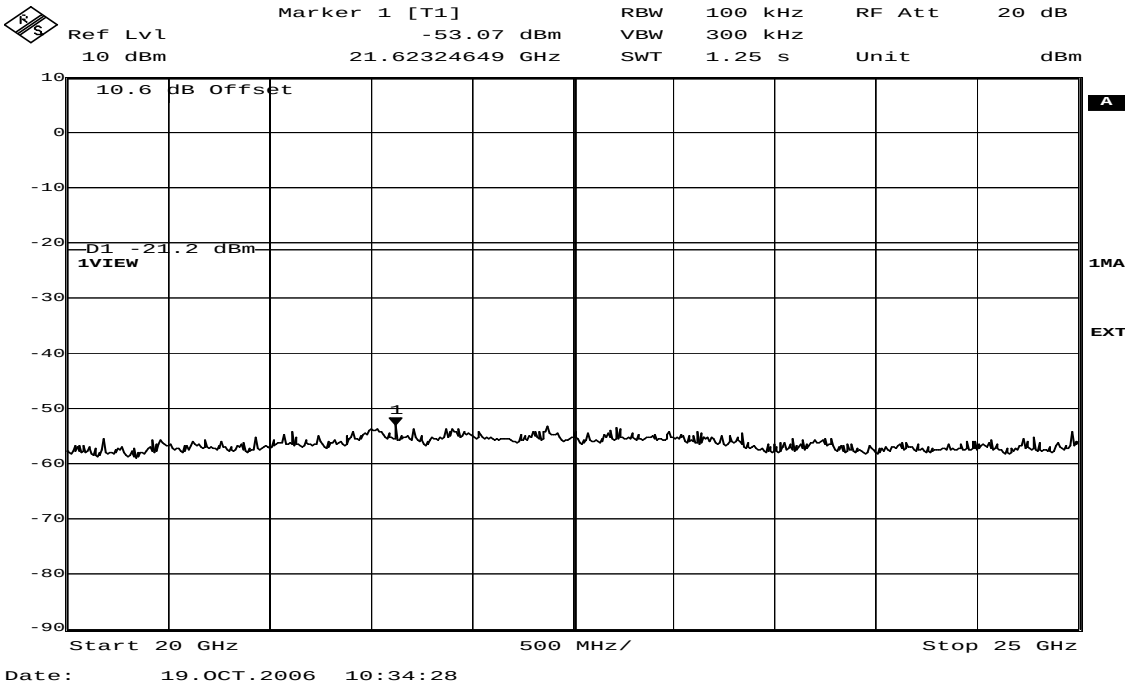
Lowest channel, 1, OFDM, 54 Mbps data rate



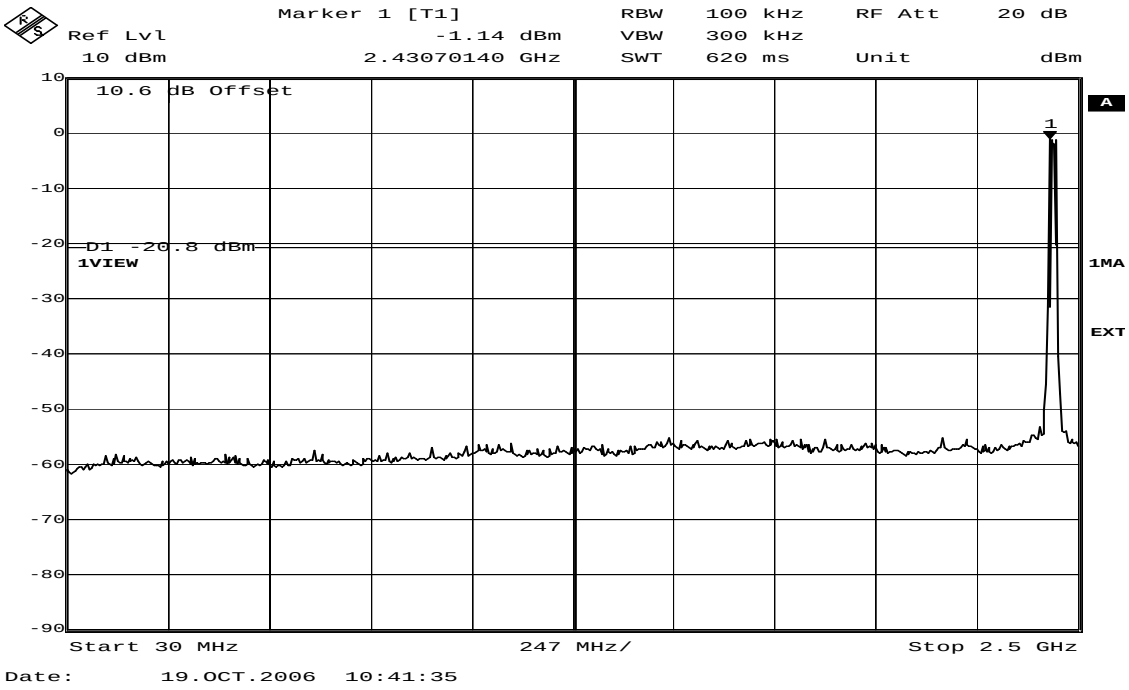


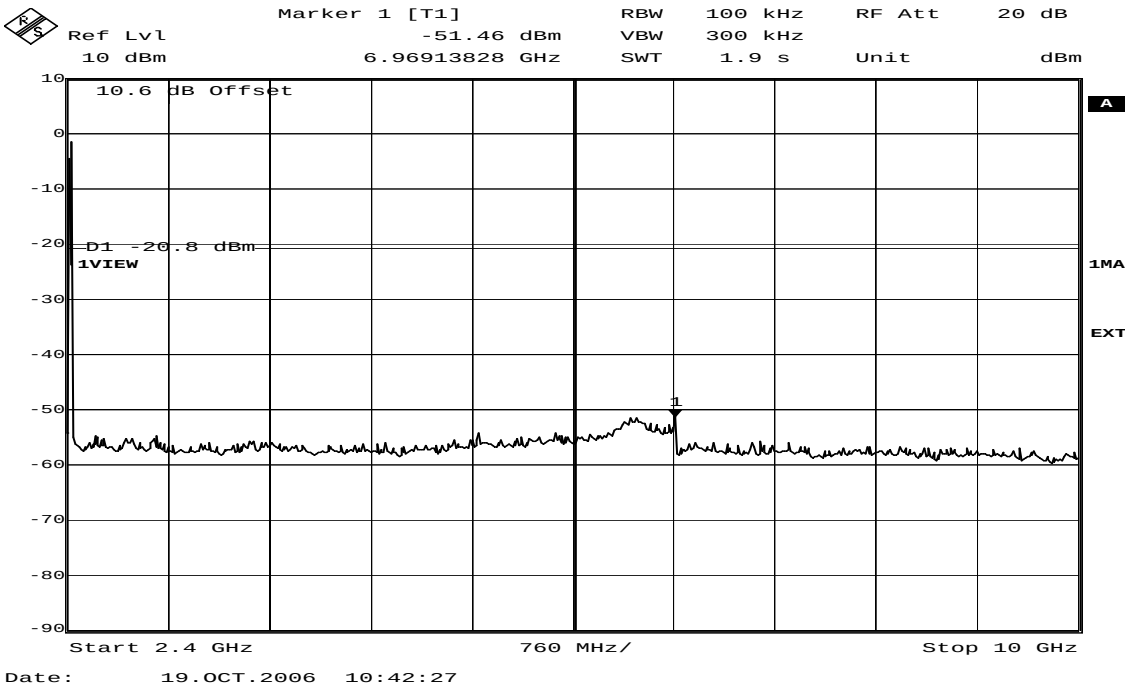
Lowest channel, 1, OFDM, 54 Mbps data rate



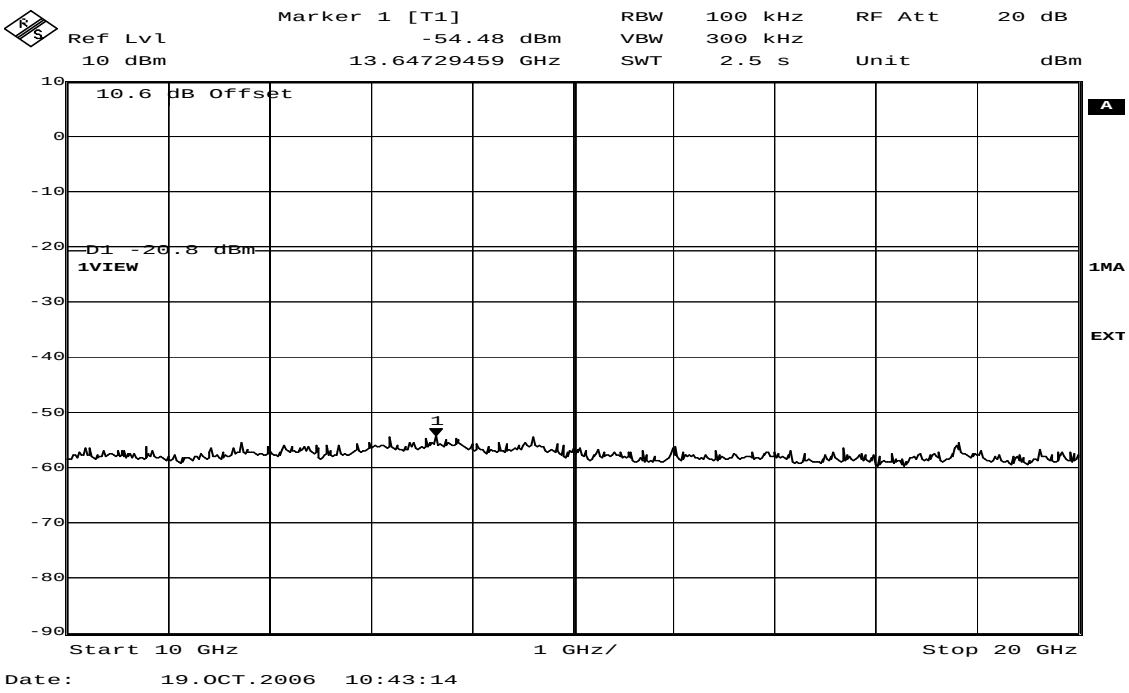


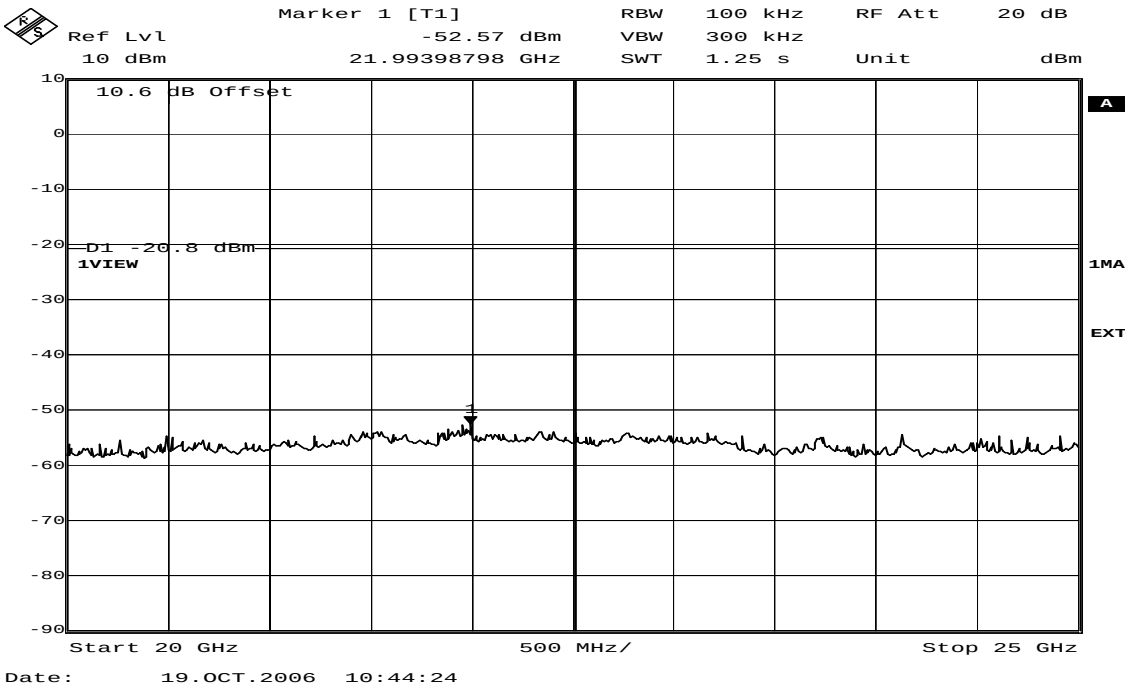
Mid channel, 6, OFDM, 54 Mbps data rate



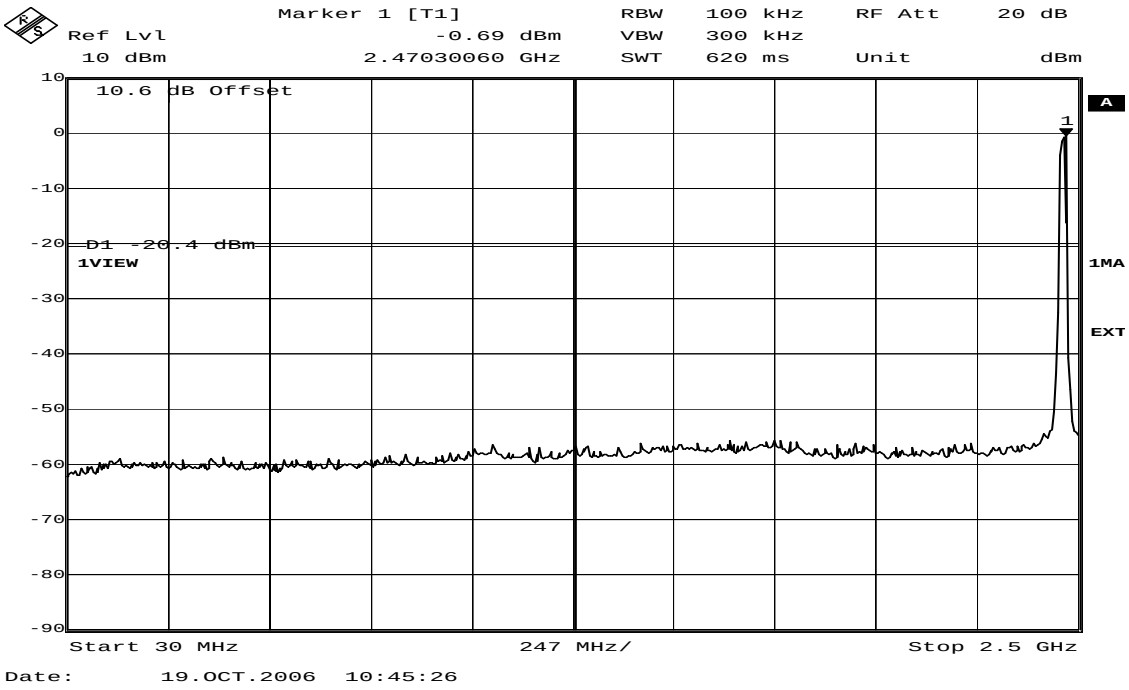


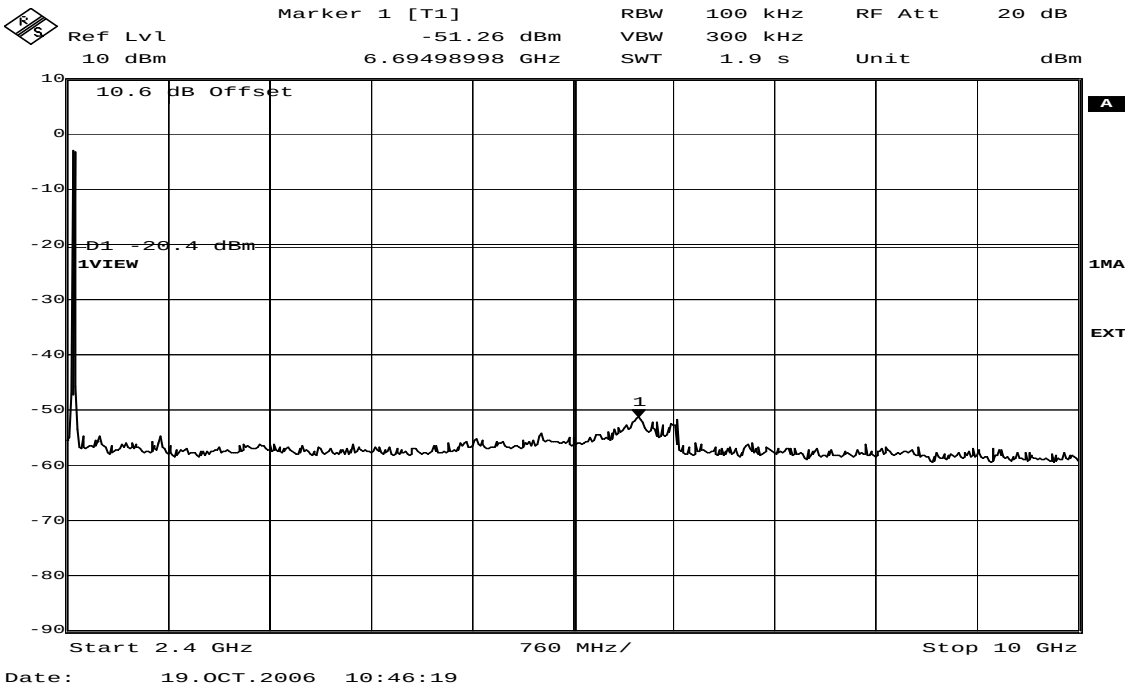
Mid channel, 6, OFDM, 54 Mbps data rate



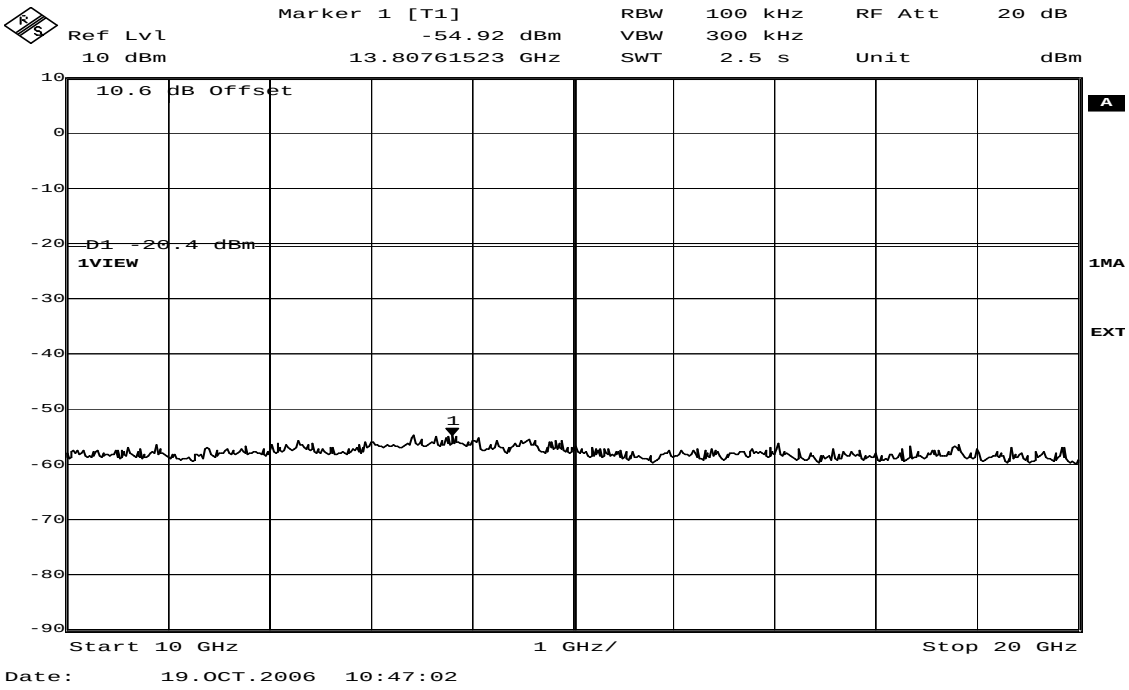


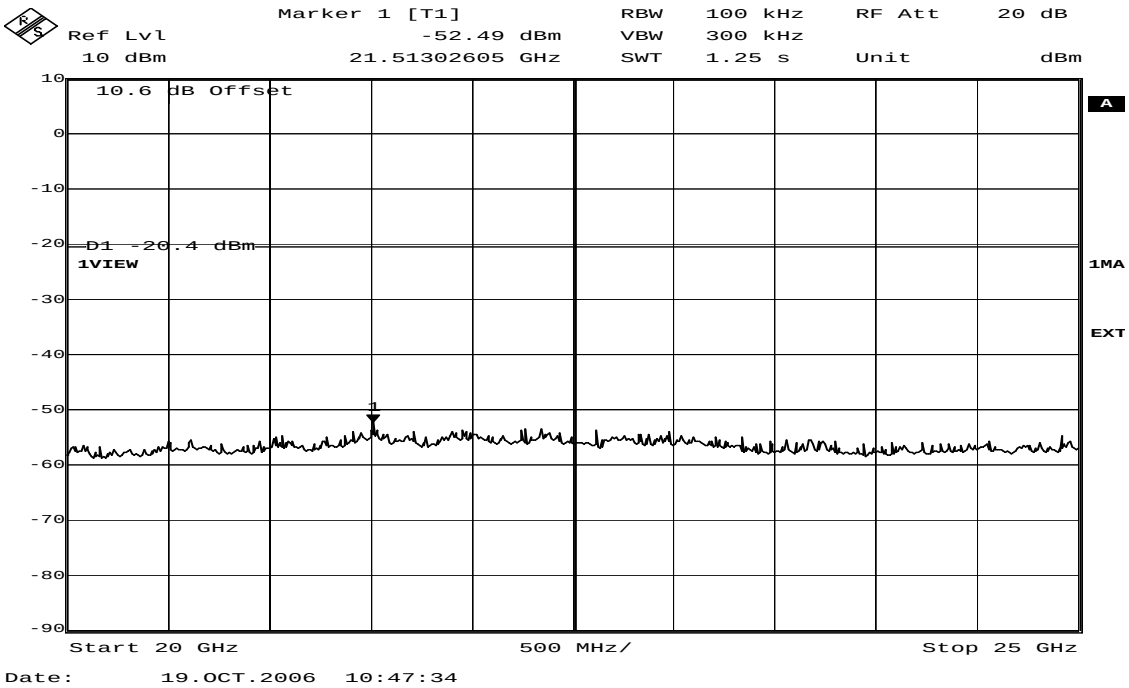
Highest channel, 11, OFDM, 54 Mbps data rate



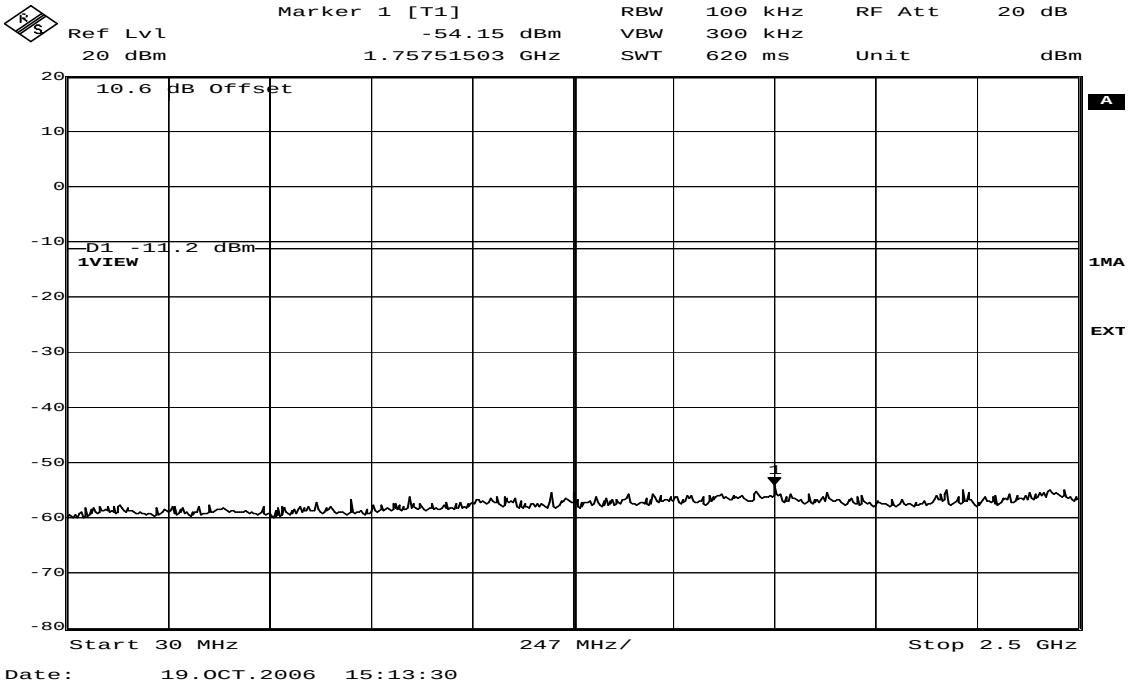


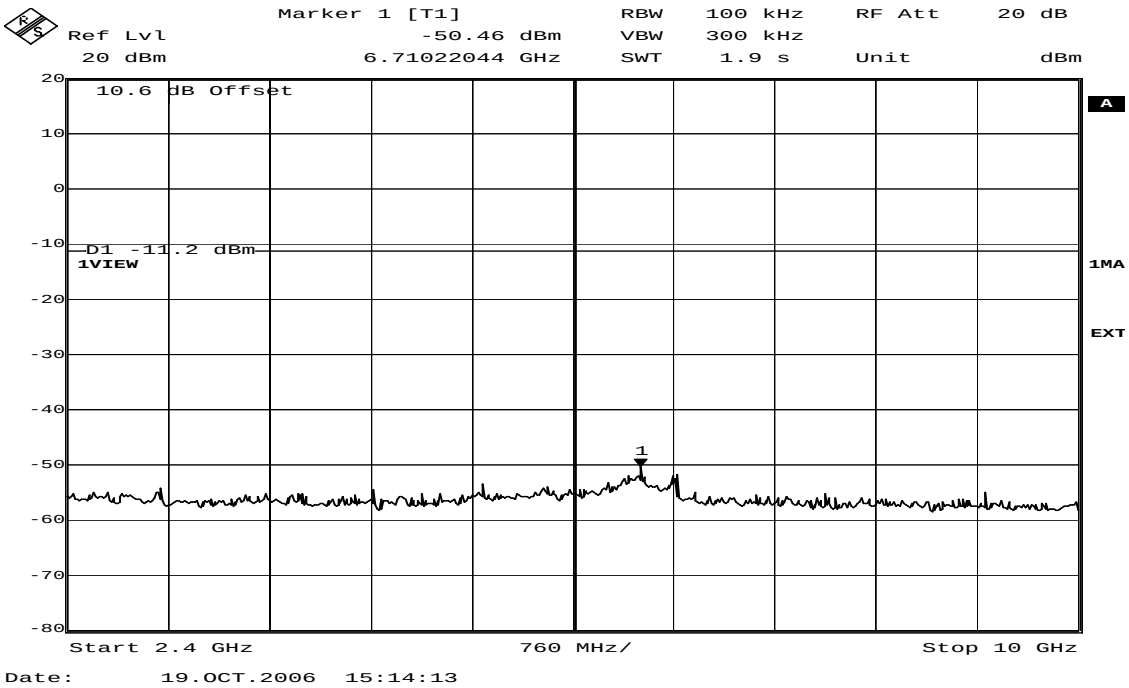
Highest channel, 11, OFDM, 54 Mbps data rate

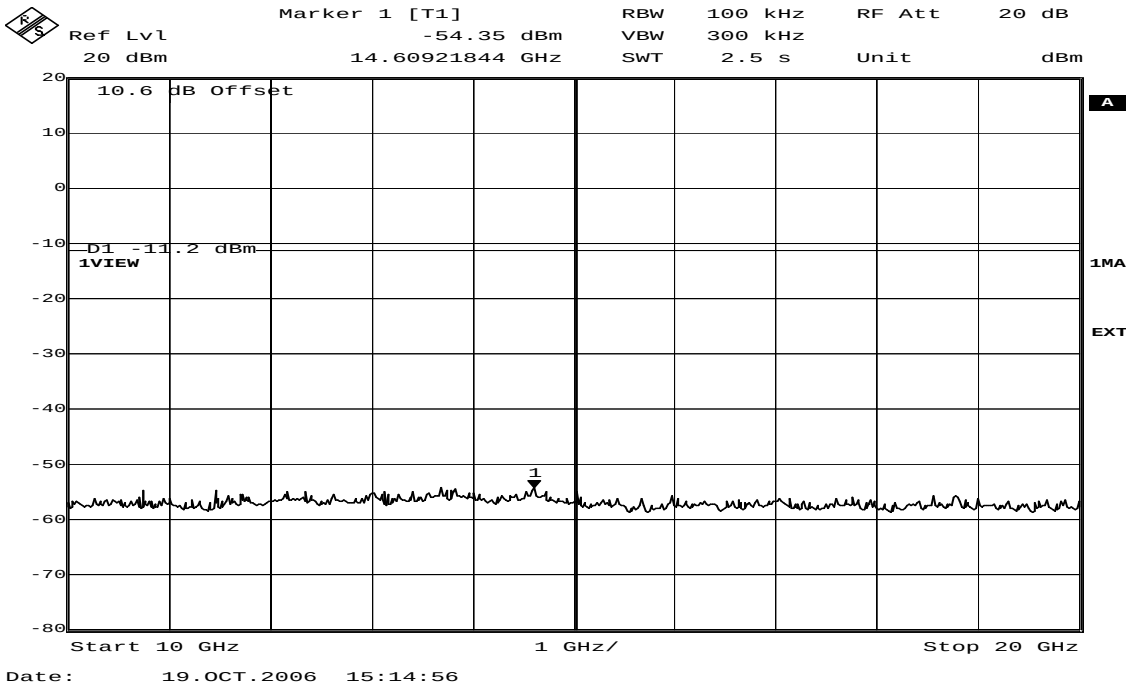


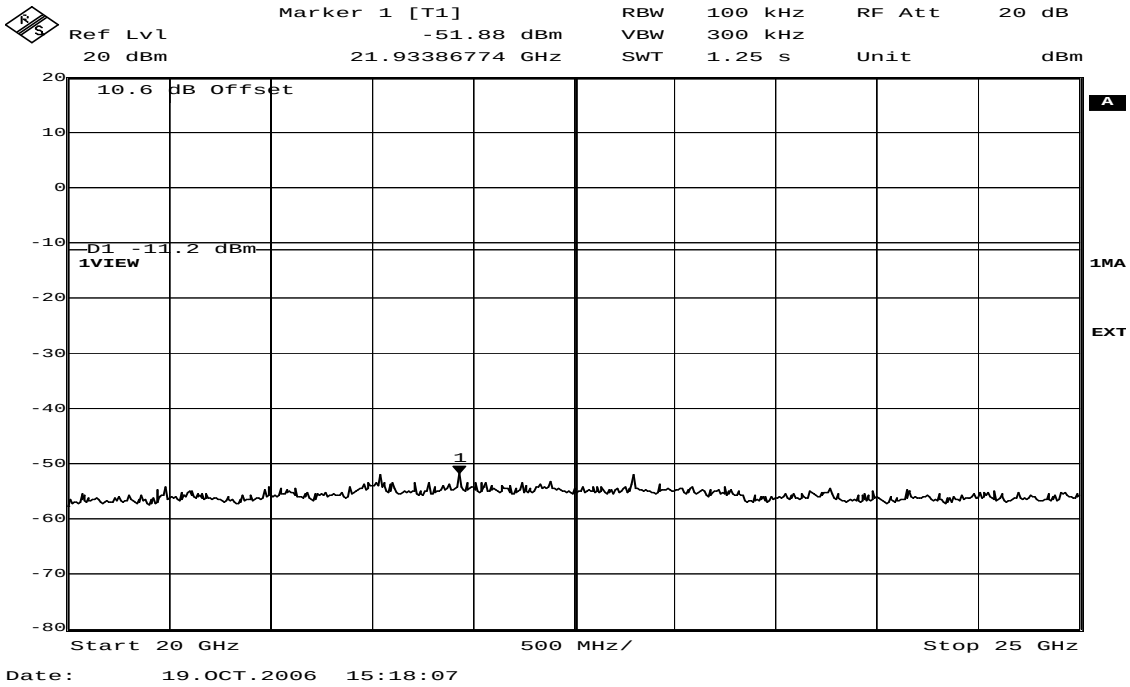


Standby/Rx


Marker 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
-54.15 dBm
VBW 300 kHz
20 dBm
1.75751503 GHz
SWT 620 ms
Unit dBm
10.6 dB Offset
D1 -11.2 dBm
1VIEW
A
1MA
EXT
Start 30 MHz
247 MHz/
Stop 2.5 GHz
Date: 19.OCT.2006 15:13:30


Marker 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
-50.46 dBm
VBW 300 kHz
20 dBm
6.71022044 GHz
SWT 1.9 s
Unit dBm
10.6 dB Offset
D1 -11.2 dBm
1VIEW
A
1MA
EXT
Start 2.4 GHz
760 MHz/
Stop 10 GHz
Date: 19.OCT.2006 15:14:13


Marker 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
-54.35 dBm
VBW 300 kHz
20 dBm
14.60921844 GHz
SWT 2.5 s
Unit dBm
10.6 dB Offset
A
D1 -11.2 dBm
1VIEW
1MA
EXT
Start 10 GHz
1 GHz/
Stop 20 GHz
Date: 19.OCT.2006 15:14:56


Marker 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
-51.88 dBm
VBW 300 kHz
20 dBm
21.93386774 GHz
SWT 1.25 s
Unit dBm
10.6 dB Offset
A
D1 -11.2 dBm
1VIEW
1MA
EXT
Start 20 GHz
500 MHz/
Stop 25 GHz
Date: 19.OCT.2006 15:18:07

11. CONDUCTED DISTURBANCE VOLTAGE IN THE FREQUENCY RANGE 0,15 - 30 MHZ

11.1 Measurement uncertainty

Conducted disturbance voltage, quasi-peak detection: ±2,0 dB

The measurement uncertainty describes the overall uncertainty of the given measured value during operation of the EUT.

Measurement uncertainty is calculated in accordance with EA-4/02-1997.
The measurement uncertainty is given with a confidence of 95%.

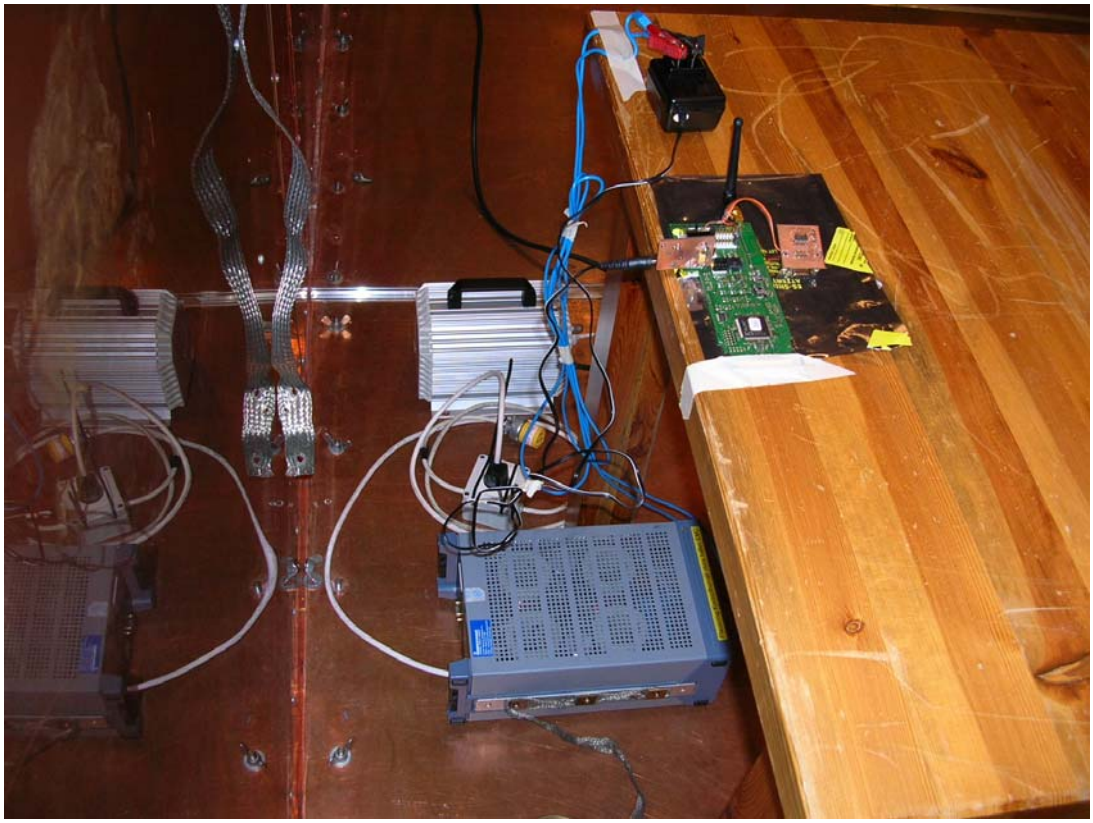
11.2 Test equipment

Test site:	FCC		
Equipment	Manufacturer	Type	SEMKO No.
Software:	Rohde & Schwarz	ES-K1 V1.60	
Measurement receiver:	Rohde & Schwarz	ESHS 30	4946
Artificial mains network:	Rohde & Schwarz	ESH3-Z5	2727
Transformer	Tufvassons	AFM-1500	30317

11.3 Measurement set-up

The mains terminal disturbance voltage was measured with the EUT located 0,8 m above the ground plane and 0,4 m from the vertical ground plane. The EUT was connected to an artificial mains network (AMN). The AMN was placed on the ground plane. Amplitude measurements were performed with a quasi-peak detector. The EUT was supplied by 120 VAC (60 Hz) during the standby test.

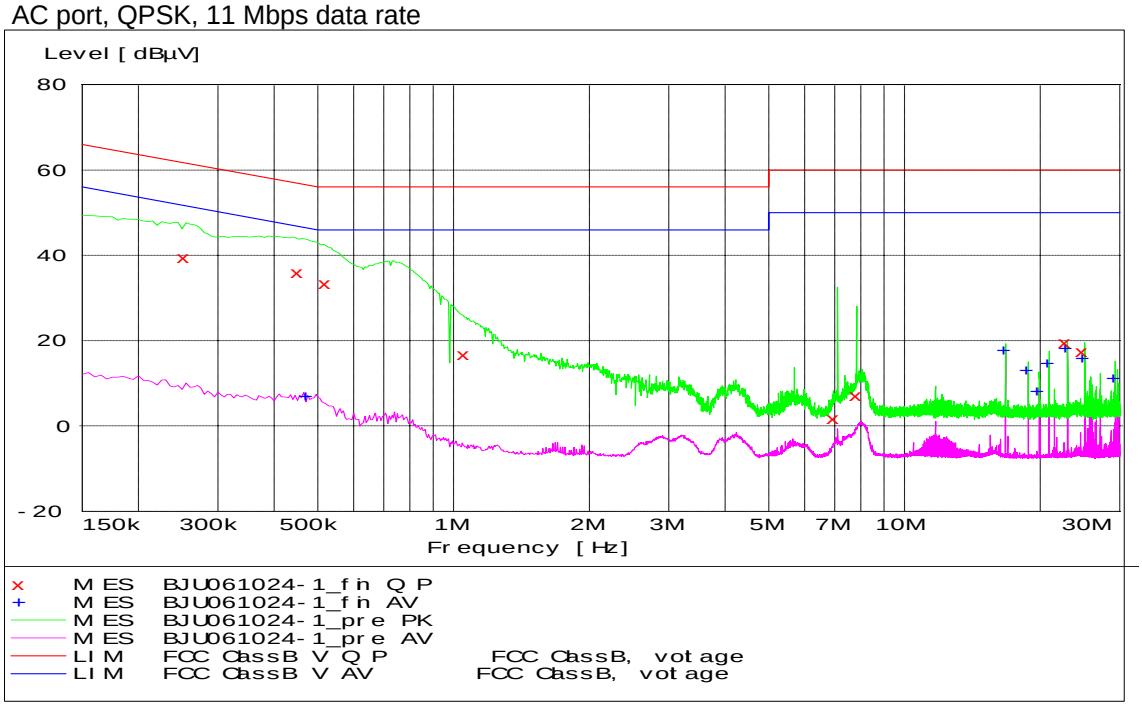
Test set-up photo:



11.4 Test protocol

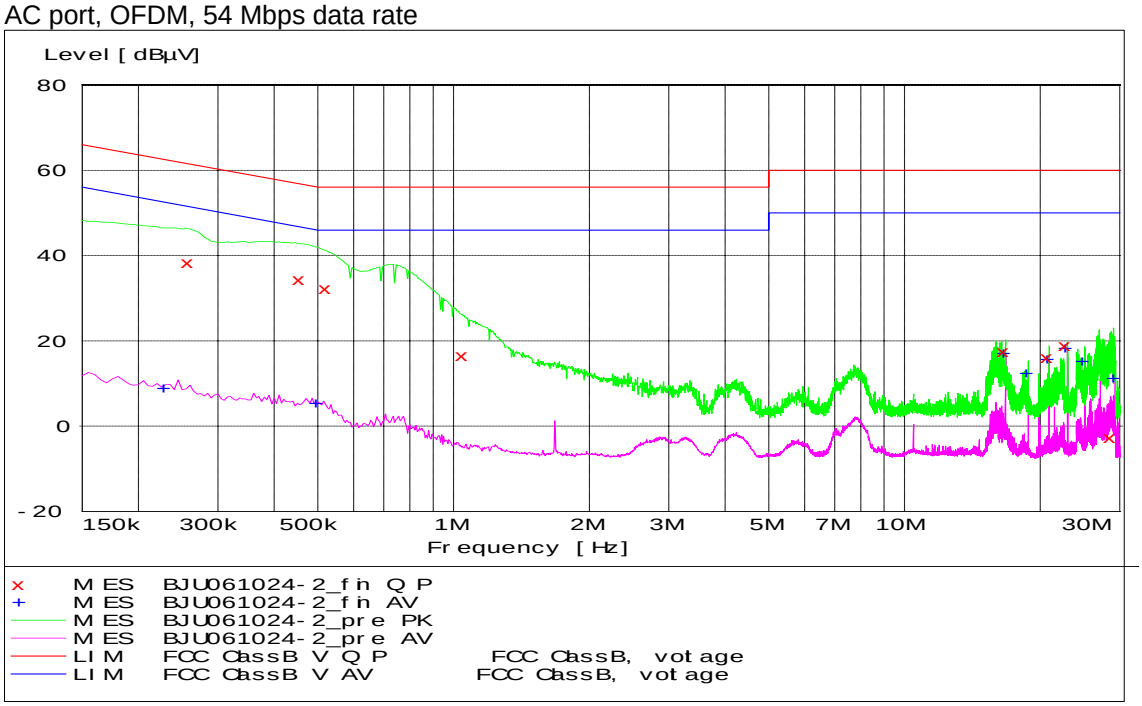
Date of test: 2006-10-24

AC port, QPSK, 11 Mbps data rate



Overview sweeps performed with peak and average detectors

AC port, OFDM, 54 Mbps data rate



Overview sweeps performed with peak and average detectors

AC port, QPSK, 11 Mbps data rate

Frequency /MHz	Quasi-Peak Disturbance Level /dB(µV)	Quasi-Peak Permitted limit /dB(µV)
0,26	39,5	62
0,46	36,1	57
0,53	33,5	56
1,07	16,8	56
23,01	19,6	60
25,10	17,5	60

AC port, QPSK, 11 Mbps data rate

Frequency /MHz	Average Disturbance Level /dB(µV)	Average Permitted limit /dB(µV)
16,73	17,8	50
18,82	13,1	50
20,92	14,6	50
23,01	18,3	50
25,10	15,9	50
29,28	11,2	50

AC port, OFDM, 54 Mbps data rate

Frequency /MHz	Quasi-Peak Disturbance Level /dB(µV)	Quasi-Peak Permitted limit /dB(µV)
0,26	38,3	61
0,46	34,5	57
0,53	32,4	56
1,06	16,6	56
16,73	17,5	60
20,92	16,1	60
23,01	18,9	60

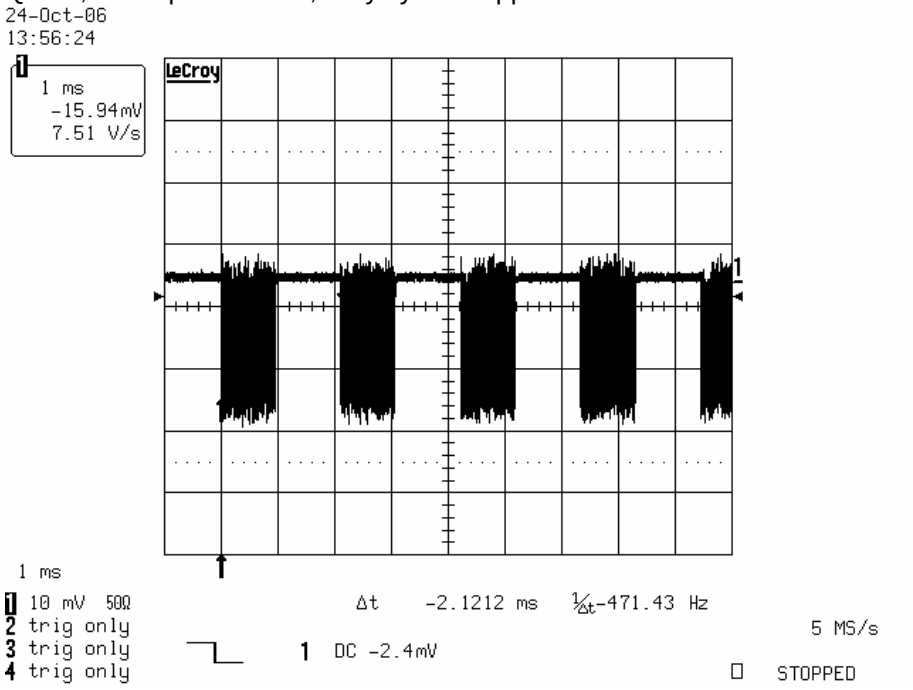
AC port, OFDM, 54 Mbps data rate

Frequency /MHz	Average Disturbance Level /dB(µV)	Average Permitted limit /dB(µV)
16,73	17,4	50
18,82	12,4	50
20,92	15,7	50
23,01	18,3	50
25,10	15,3	50
29,28	11,2	50

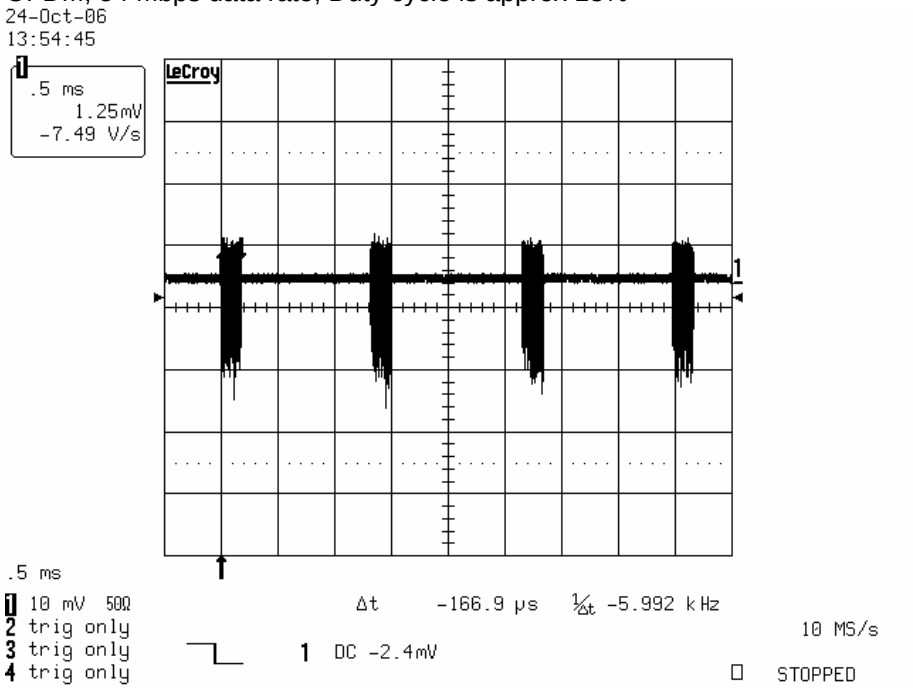
12. DUTY CYCLE

Date of test: 2006-10-24

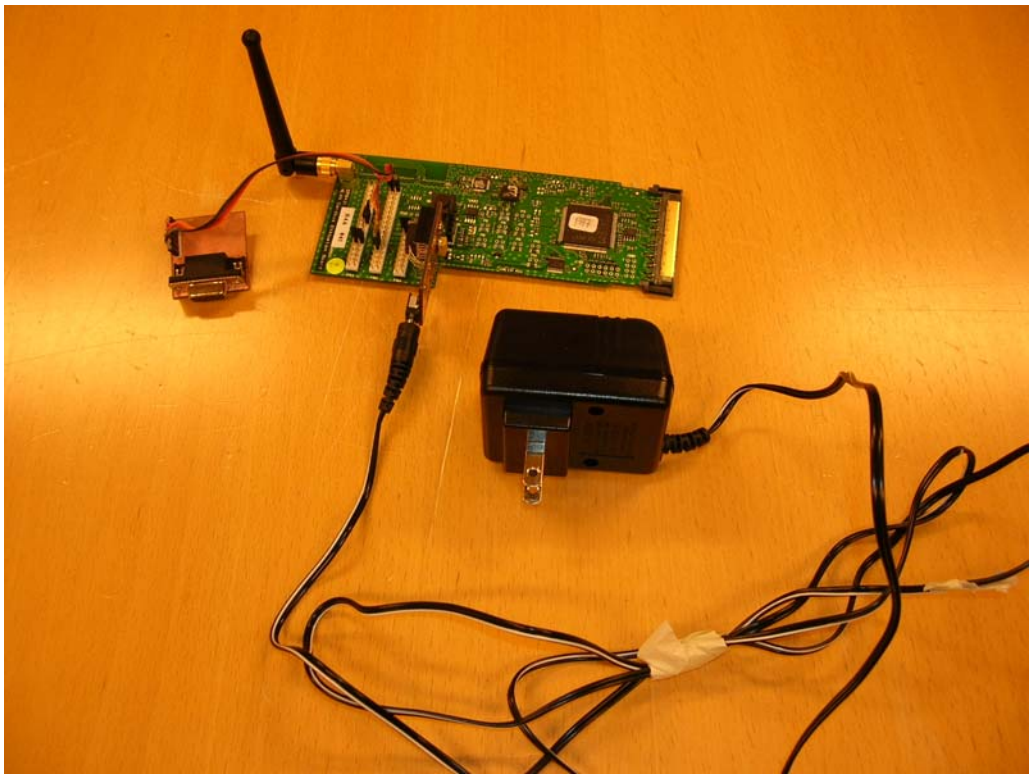
QPSK, 11 Mbps data rate, Duty cycle is approx 48%

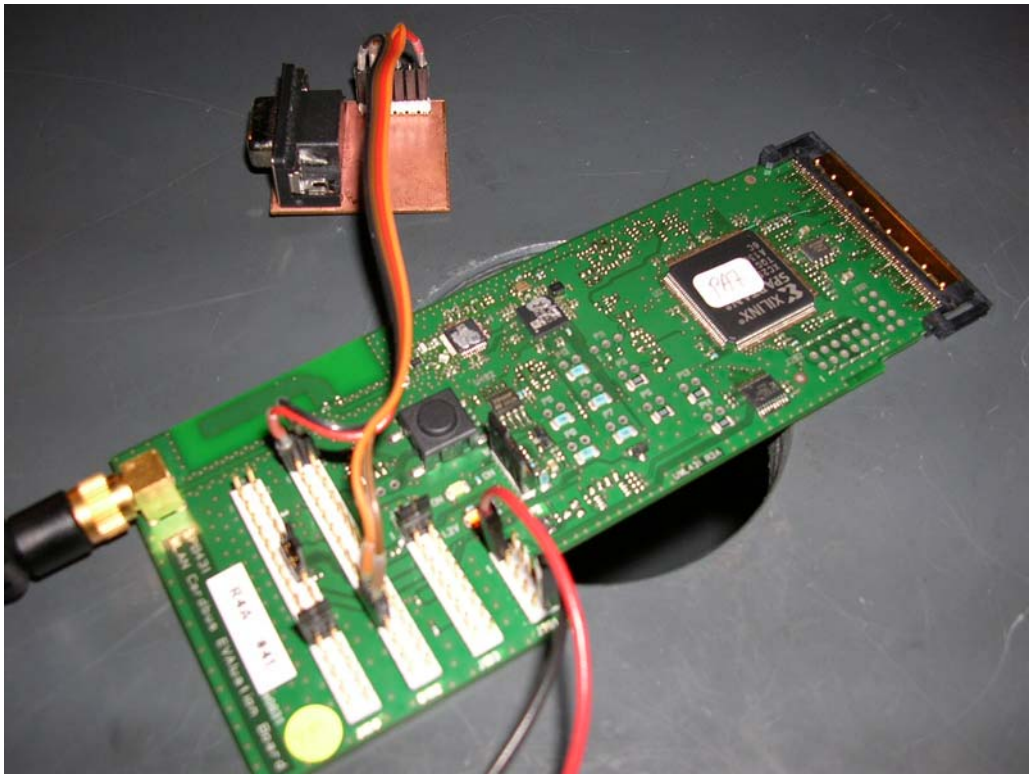


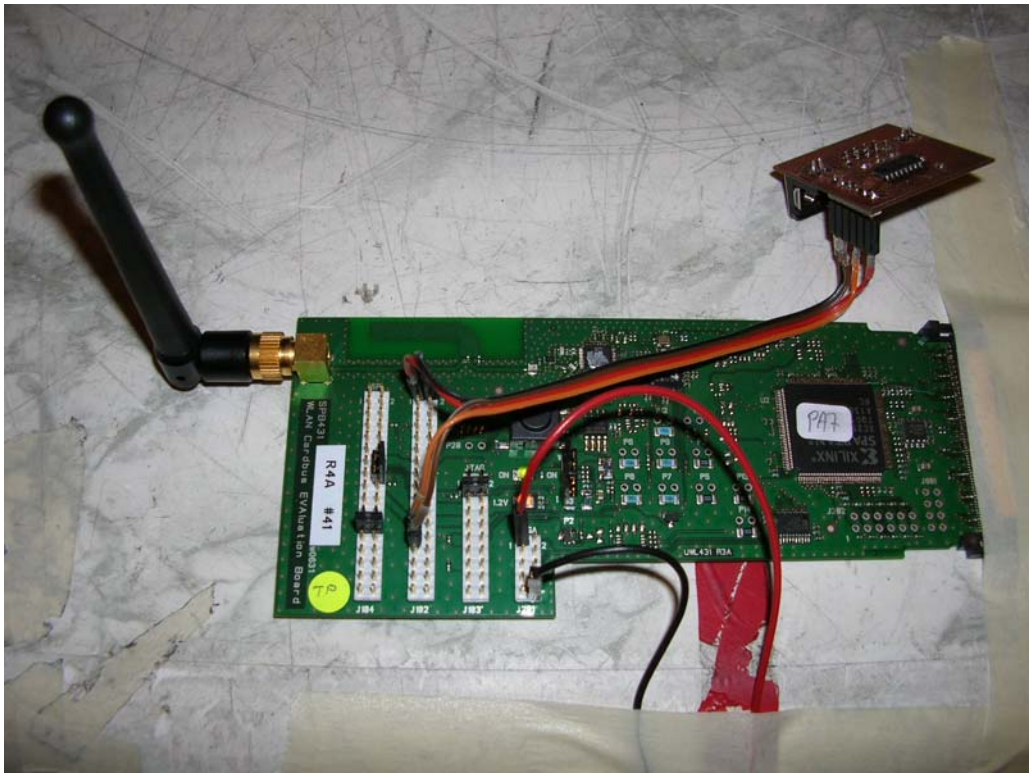
OFDM, 54 Mbps data rate, Duty cycle is approx 13%

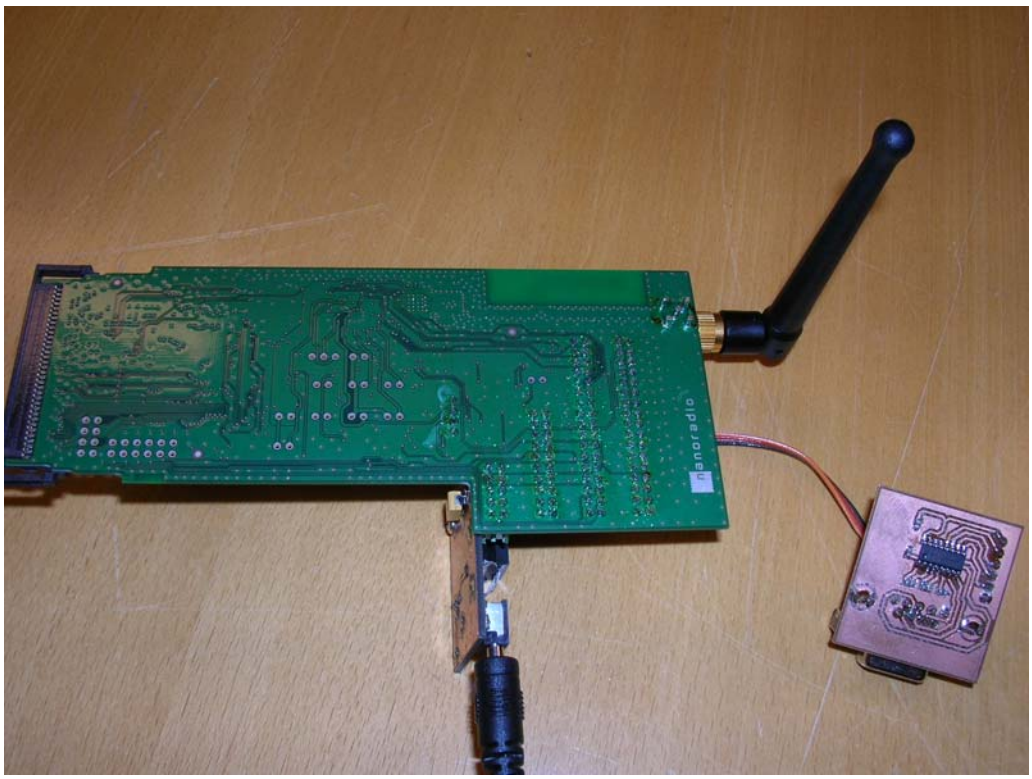


APPENDIX I – PHOTOS OF THE EUT






R4A #41
WLAN Cardbus EVAluation Board


Sanoradio


TUFVASSONS
SIGTUNA
SWEDEN
PLUG IN CLASS 2 TRANSFORMER
Art. nr: 8512-0039
Typ: PFLF6
LISTED
3H33
E144991
LR103915
INPUT: AC~120V 60Hz 10.5W
OUTPUT: DC 12V 500mA
MODEL: D41-12-500
12 00A
MADE IN CHINA