

# Test Report



## INTENTIONAL RADIATOR TESTS ACCORDING TO FCC PART 15 C and INDUSTRY CANADA REQUIREMENTS

Equipment Under Test: Bluetooth module

Model: WT11i-E

Type: -

Manufacturer: Bluegiga Technologies Oy  
Sinikalliontie 5 A  
FI-02630 ESPOO  
Finland

Customer: Bluegiga Technologies Oy  
Sinikalliontie 5 A  
FI-02630 ESPOO  
Finland

FCC Rule Part: 15.247: 2011  
IC Rule Part: RSS-210, Issue 8, 2010  
RSS-GEN Issue 3, 2010

Date: 2.2.2012

Issued by:

  
Niko Tolonen  
RF Testing Engineer

Date: 2.2.2012

Checked by:

  
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Technical Manager

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## Equipment Under Test (EUT)

Bluetooth module  
 Model: WT11i-E  
 Type: -  
 Serial no: -  
 HW version: E  
 SW version: -  
 FCC ID number: QQQWT11I  
 Industry Canada number: 5123A-BGTWT11I

## Description of the EUT

WT11i-E is a class 1 Bluetooth module containing all the necessary elements from Bluetooth® radio to antenna and a fully implemented protocol stack. Therefore WT11i-E provides an ideal solution for developers who want to integrate Bluetooth technology into their design. Module can be operated with batteries or DC power supply.

## Classification of the device

Fixed device	<input type="checkbox"/>
Mobile Device (Human body distance > 20cm)	<input checked="" type="checkbox"/>
Portable Device (Human body distance < 20cm)	<input type="checkbox"/>

## Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing

## Ratings and declarations

Operating Frequency Range (OFR): 2402 – 2480 MHz  
 Channels: 79  
 Channel separation: 1 MHz  
 Channel bandwidth (20dB): 1.272 MHz  
 Conducted power: 16.46 dBm (44.26 mW)  
 Transmission technique: FHSS  
 Modulation: GFSK,  $\pi/4$  DQPSK, 8DPSK  
 Antenna connector type: U.FL  
 Antenna gain: 2.14 dBi

## Power Supply

Battery or DC operated  
 Operating voltage range 2,0 – 3,6 VDC  
 Normal input voltage: 3.0 V  
 Tested by using external power supply and 3.0 VDC voltage level

**Mechanical Size of the EUT**

Height: 2.6 mm	Width: 14.5 mm	Depth: 35.8 mm
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**Peripherals****Peripheral**

DC power supply Thandar TS3021S.

**Samples**

All tests were performed to one sample. No modifications were done during the tests.

**Disclaimer**

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## SUMMARY OF TESTING

Test Specification	Description of Test	Result
15.247(a)(1) / RSS-210 A8.1	Hopping Channel Carrier Frequency Separation	PASS
§15.247(a)(1)(iii) / RSS-210 A8.1	Number of Hopping Frequencies	PASS
§15.247(a)(1)(iii) / RSS-210 A8.1	Average Time of Occupancy of Hopping Frequency	PASS
§15.247(b)(1) / RSS-210 A8.4	Maximum Peak Conducted Output Power	PASS
§15.247(a)(1) / RSS-210 A8.1	20 dB Bandwidth	PASS
RSS-GEN 4.6.1	99% Occupied Bandwidth	PASS
§15.247(d) / / RSS-210 A8.5	100 kHz Bandwidth of Frequency Band Edges and Conducted Spurious Emissions	PASS
§15.209(a) §15.247(d) / RSS-210 A8.5	Radiated Emissions Within The Restricted Bands	PASS
§15.109 RSS-GEN 7.2.3.2	Unintentional Radiated Emissions	PASS
§15.207 RSS-GEN 7.2.2	Conducted emissions	PASS

### EUT Test Conditions During Testing

The EUT was in continuous transmit mode during all the tests.

The hopping was stopped and the EUT was configured into the wanted channel. Normal modulation and duty cycle was applied in all the tests.

Following channels were used during the tests when the hopping was stopped:

Channel LOW (CH 1) = 2402 MHz

Channel MID (CH 40) = 2441 MHz

Channel HIGH (CH 79) = 2480 MHz

### Test Facility

<input type="checkbox"/> Testing Location / address: FCC registration number: <b>90598</b>	SGS Fimko Ltd Särkiniementie 3 FI-00210, HELSINKI FINLAND
<input checked="" type="checkbox"/> Testing Location / address: FCC registration number: <b>178986</b> Industry Canada registration number: <b>8708A-2</b>	SGS Fimko Ltd Karakaarenkuja 4 FI-02610, ESPOO FINLAND

## Maximum Peak Conducted Output Power

**Standard:** ANSI C63.10 (2009)  
**Tested by:** NTO  
**Date:** 20.1.2012  
**Humidity:** 35 %  
**Temperature:** 20 °C  
**Measurement uncertainty** ± 2,87dB Level of confidence 95 % (k = 2)

### FCC Rule: 15.247(b) (1)

For frequency hopping systems operating in the 2400-2483.5 MHz, employing at least 75 channels limit is 1.0 Watt. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signalling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the *maximum conducted output power* is the highest total transmit power occurring in any mode.

### Results:

#### 1 Mbps

Channel	Conducted Power [dBm]	Limit [dBm]	Margin [dBm]	Result
Low	15.93	30	14.07	PASS
Mid	15.54	30	14.46	PASS
High	16.46	30	13.56	PASS

#### 2 Mbps

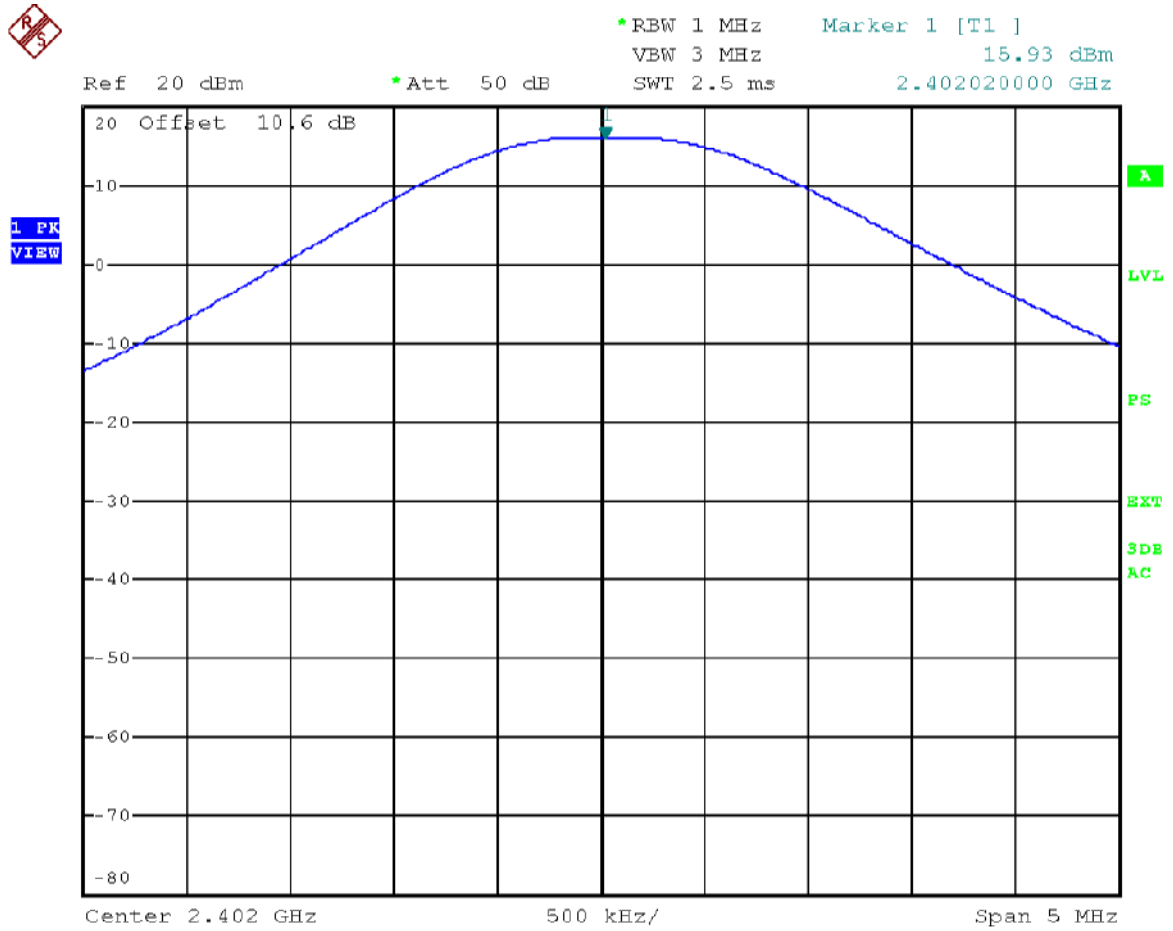
Channel	Conducted Power [dBm]	Limit [dBm]	Margin [dBm]	Result
Low	11.93	30	18.07	PASS
Mid	11.86	30	18.14	PASS
High	12.35	30	17.65	PASS

#### 3 Mbps

Channel	Conducted Power [dBm]	Limit [dBm]	Margin [dBm]	Result
Low	12.14	30	17.86	PASS
Mid	12.08	30	17.92	PASS
High	12.66	30	17.34	PASS

The attenuation of the measurement cable and the attenuator was added as an offset 10.6 dB to correct the measurement result.

## Conducted Output Power Test

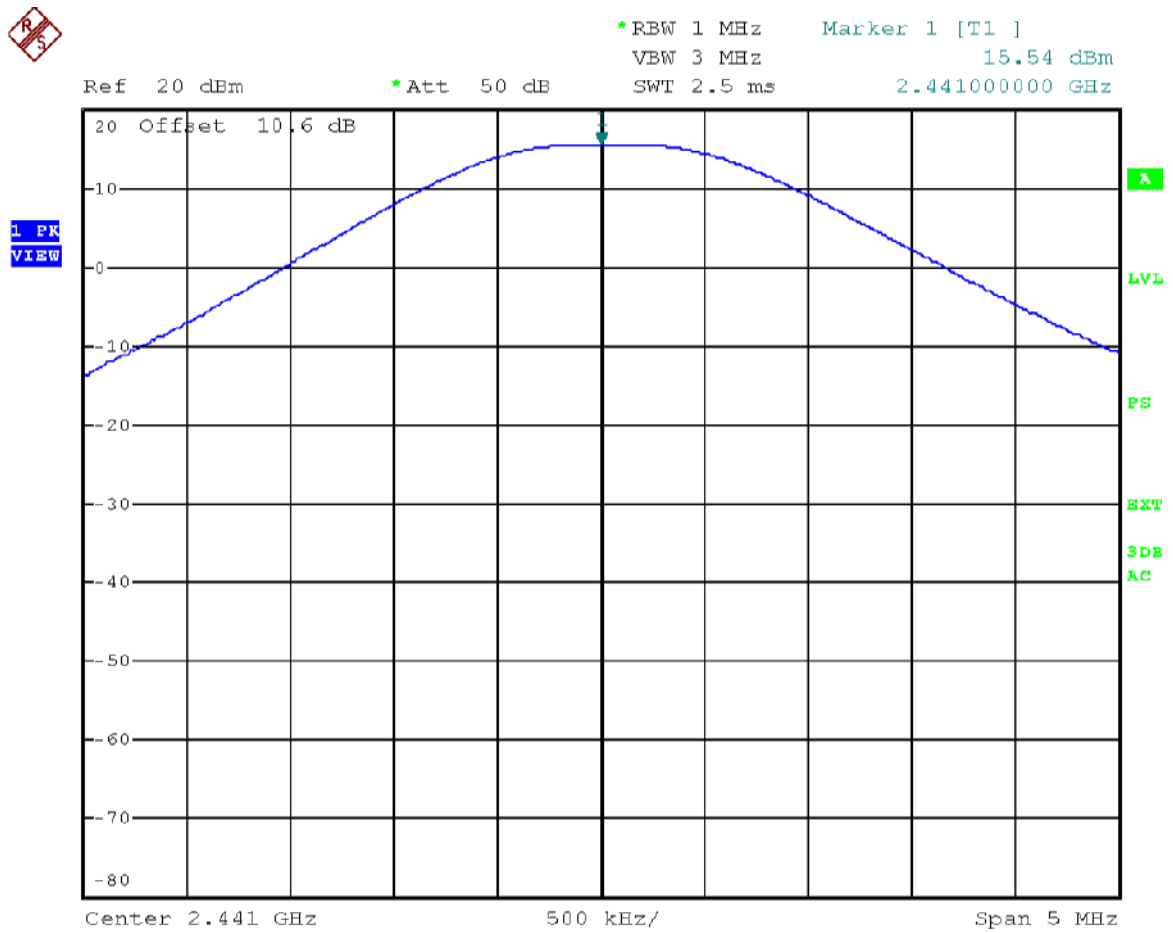


Date: 20.JAN.2012 08:24:38

Figure 1. 1 Mbps Channel LOW.



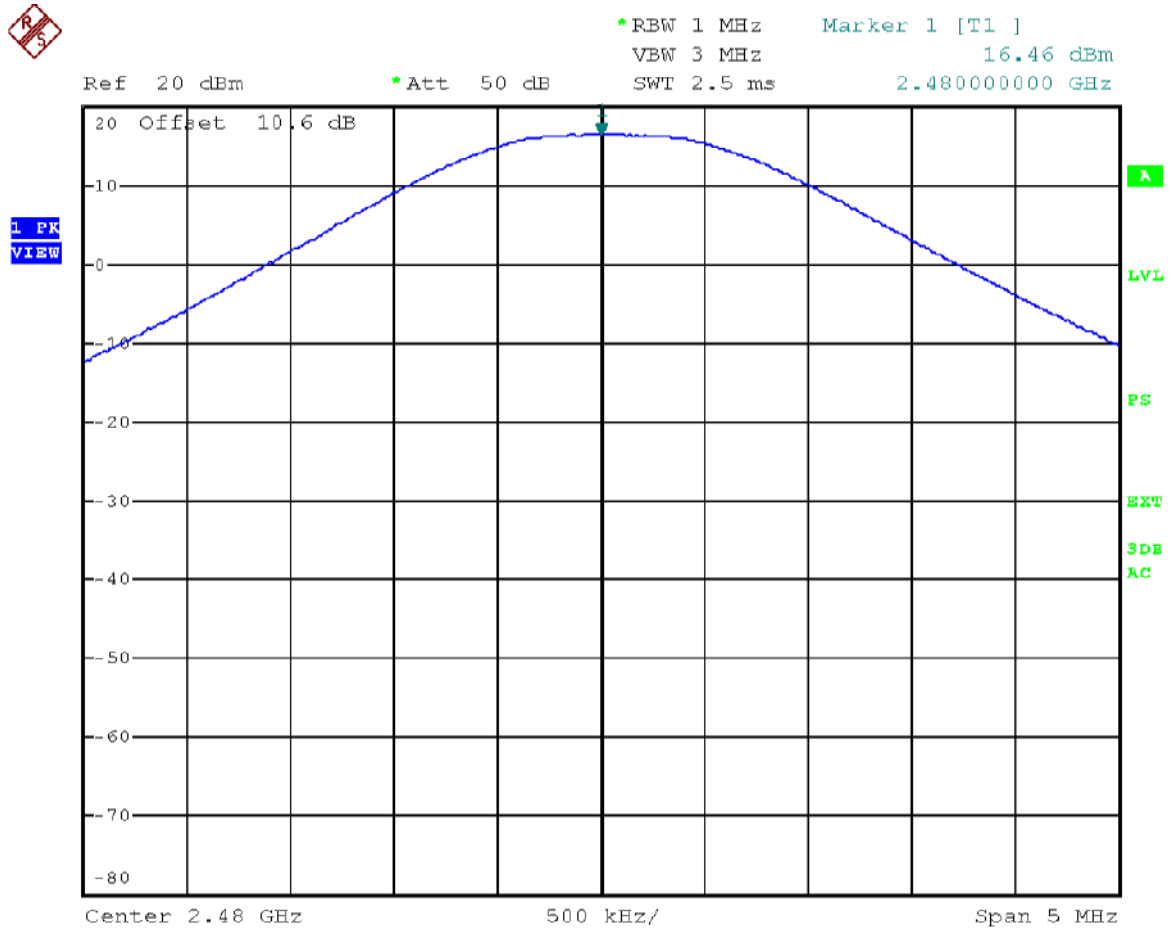
## Conducted Output Power Test



Date: 20.JAN.2012 08:25:22

Figure 2. 1 Mbps Channel MID.

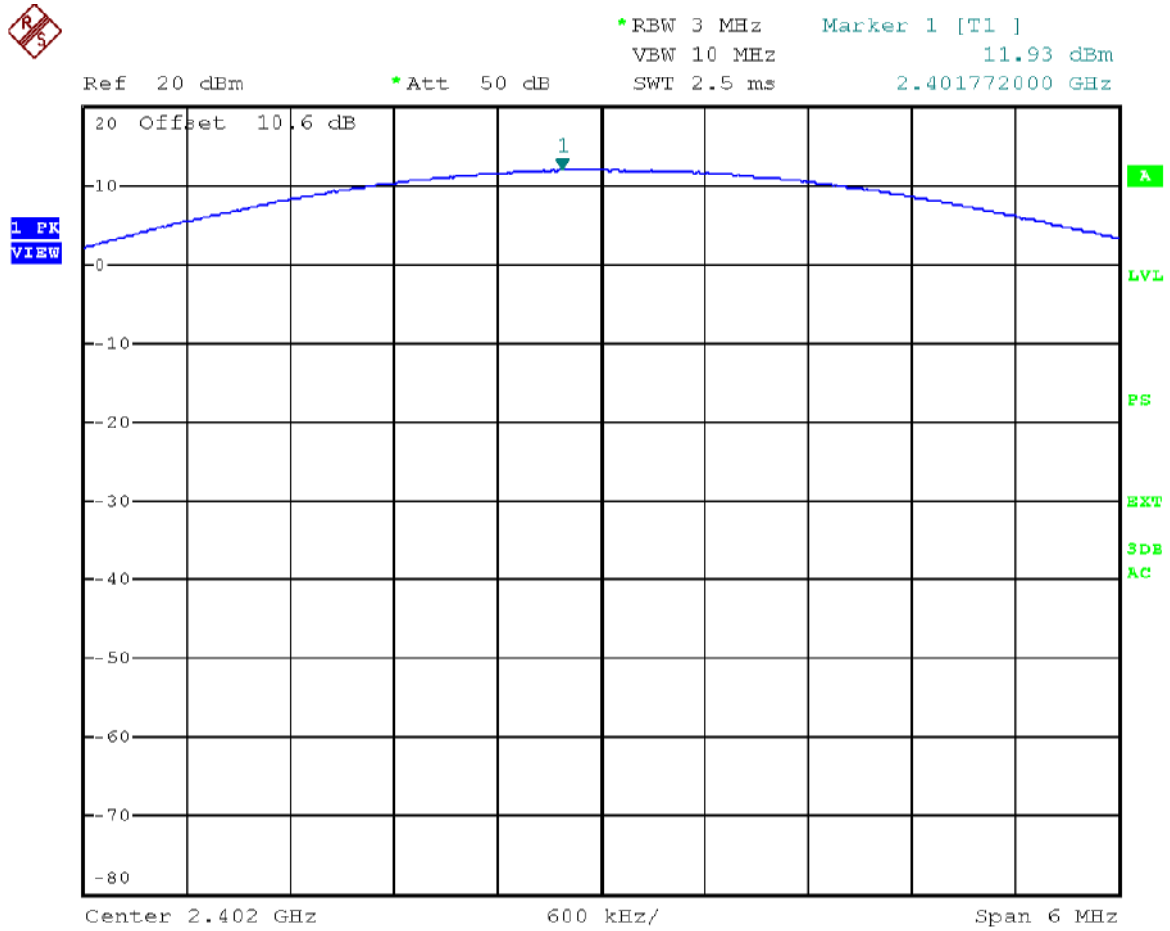
## Conducted Output Power Test



Date: 20.JAN.2012 08:26:11

Figure 3. 1 Mbps Channel HIGH.

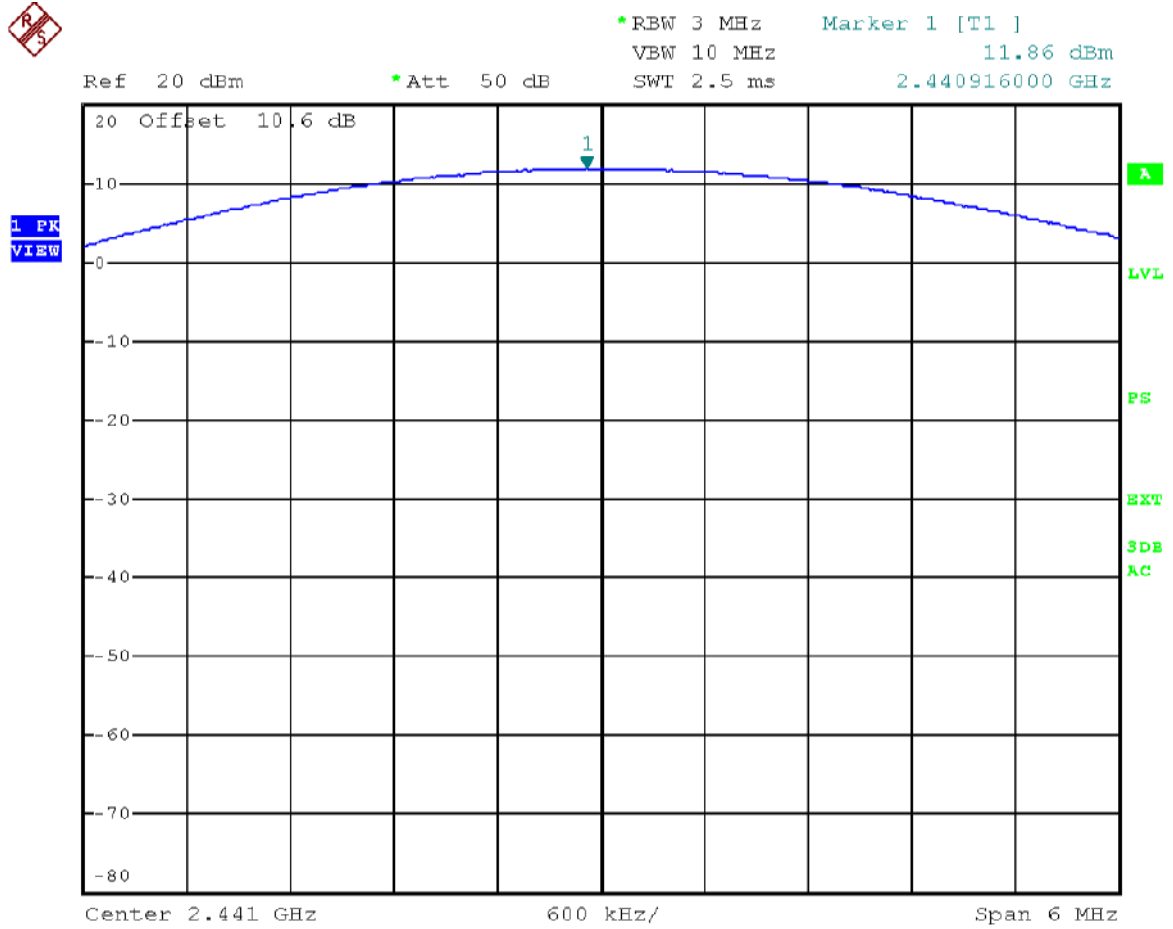
## Conducted Output Power Test



Date: 20.JAN.2012 08:31:58

Figure 4. 2 Mbps Channel LOW.

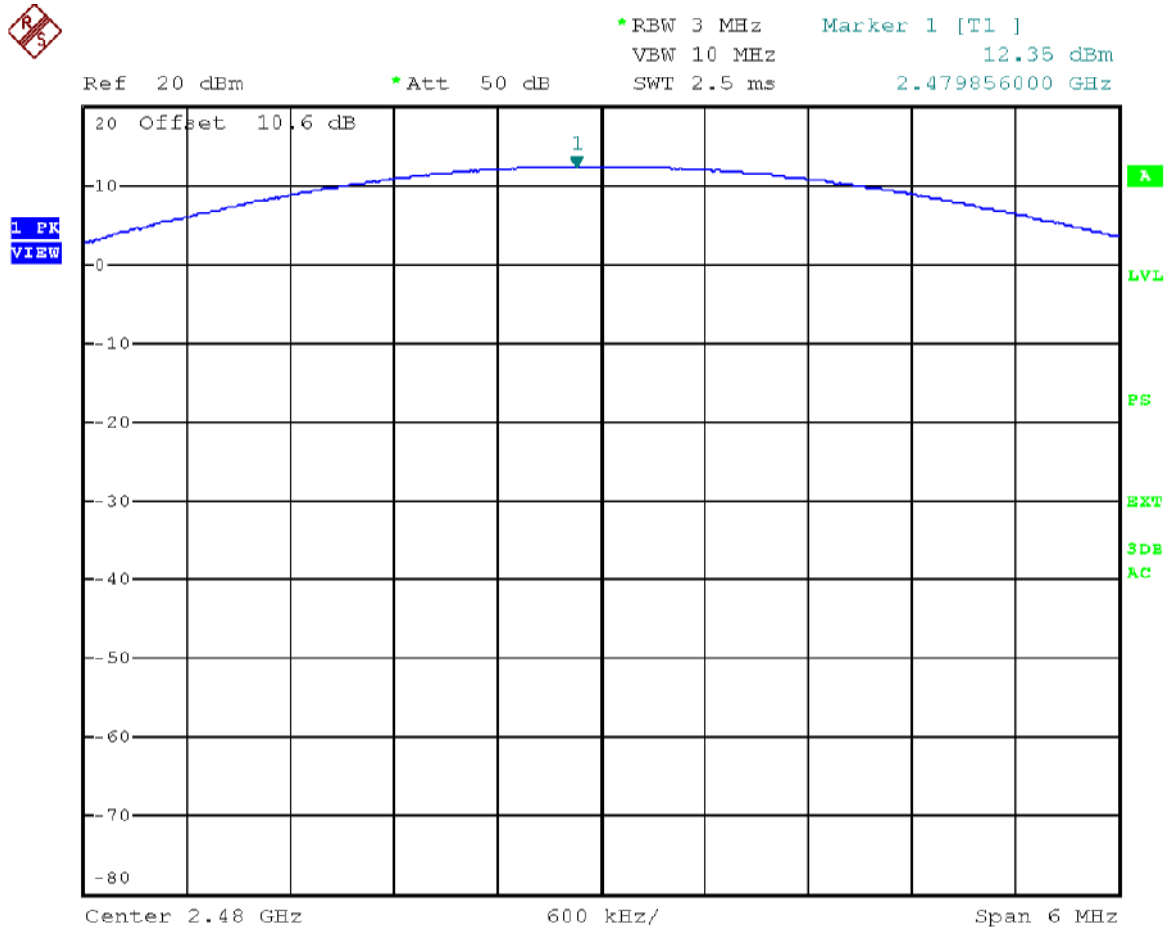
## Conducted Output Power Test



Date: 20.JAN.2012 08:33:15

Figure 5. 2 Mbps Channel MID.

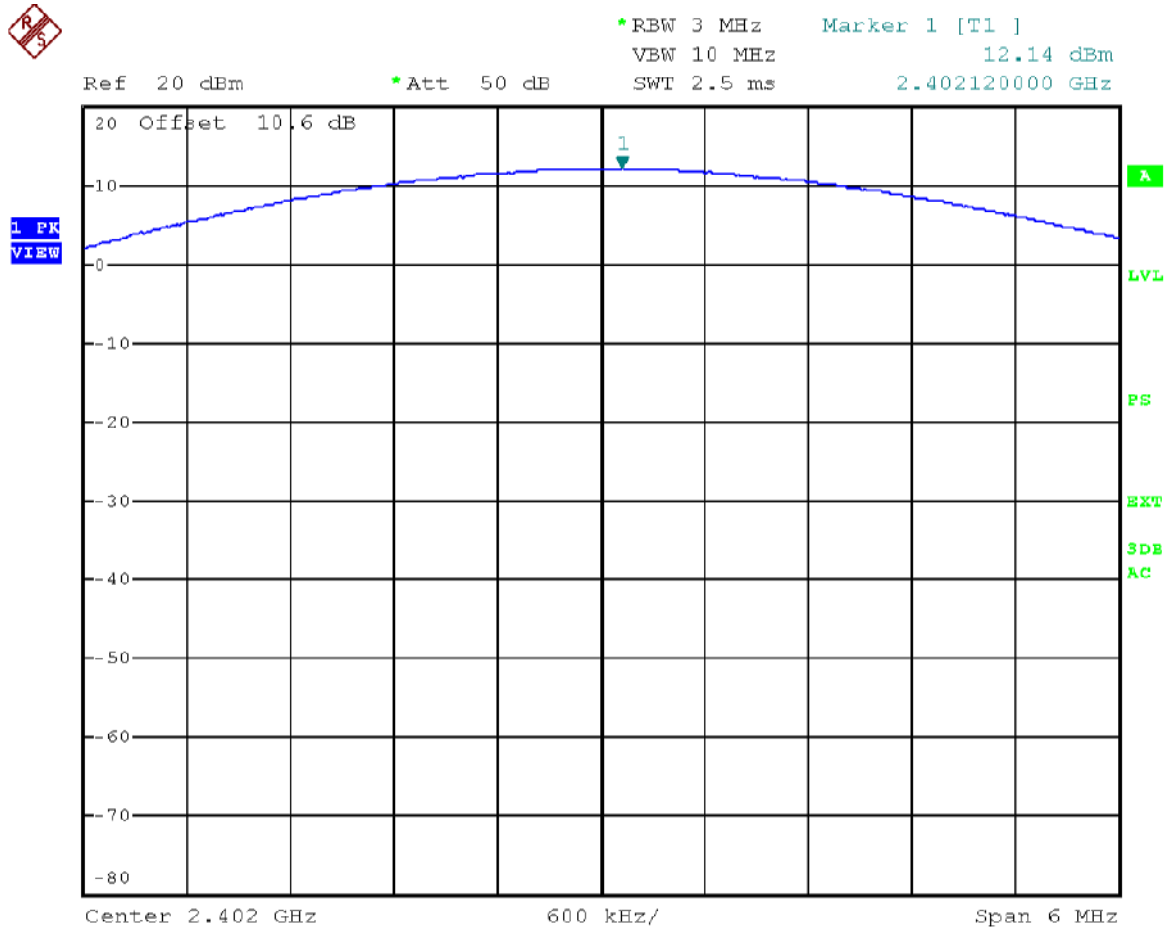
## Conducted Output Power Test



Date: 20.JAN.2012 08:33:54

Figure 6. 2 Mbps Channel HIGH.

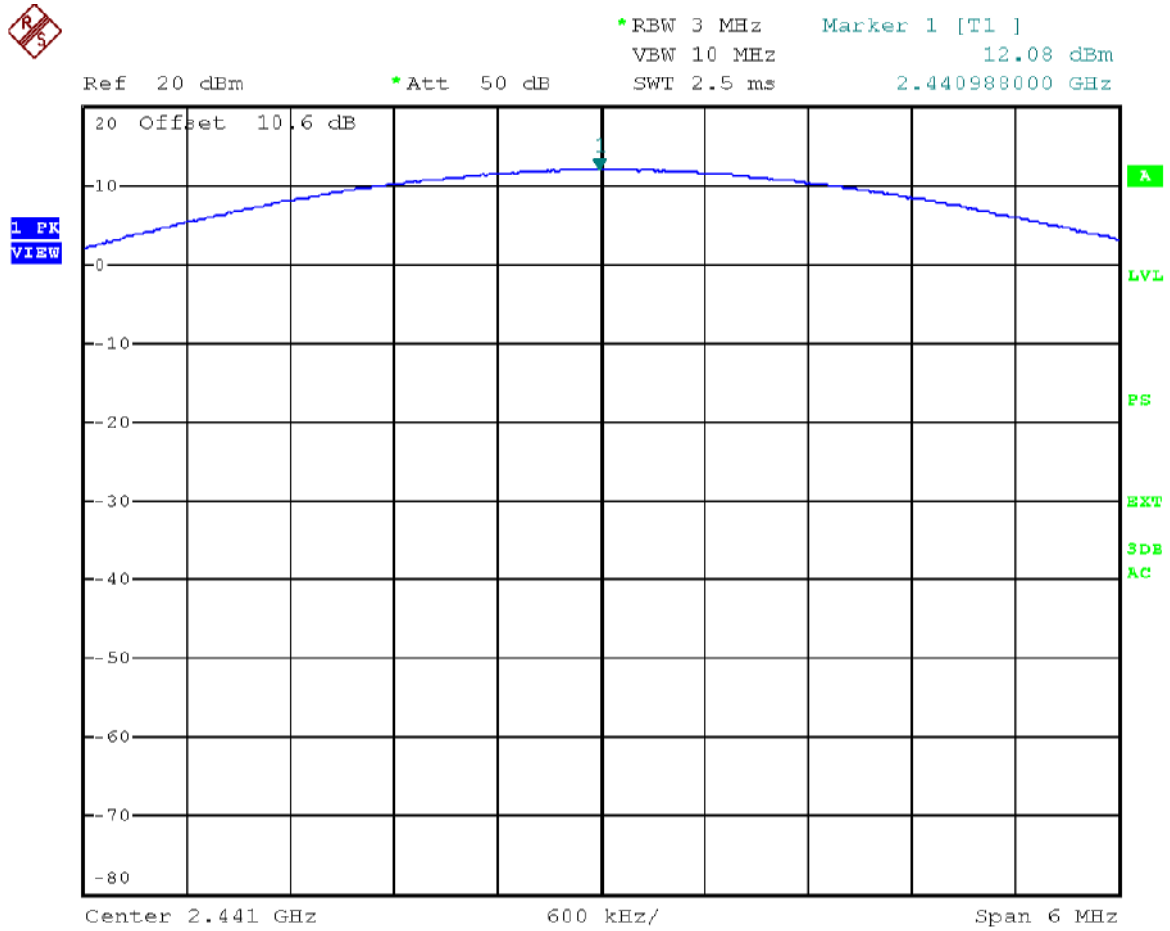
## Conducted Output Power Test



Date: 20.JAN.2012 08:35:22

Figure 7. 3 Mbps Channel LOW.

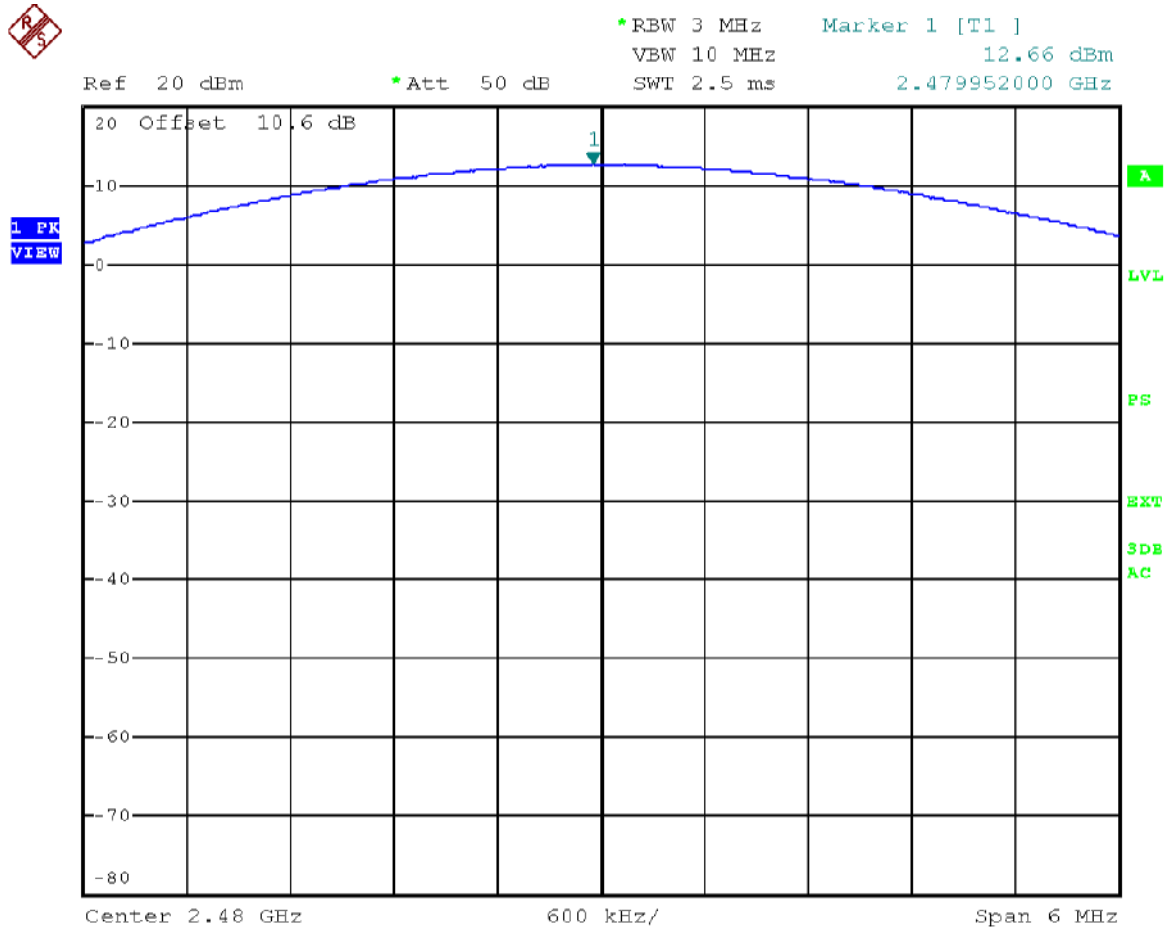
## Conducted Output Power Test



Date: 20.JAN.2012 08:36:12

**Figure 8.** 3 Mbps Channel MID.

## Conducted Output Power Test



Date: 20.JAN.2012 08:37:07

**Figure 9.** 3 Mbps Channel HIGH.



## Transmitter Radiated Emissions 30 – 26 500 MHz

<b>Standard:</b>	ANSI C63.10	(2009)
<b>Tested by:</b>	NTO	
<b>Date:</b>	28.11.2011	
<b>Humidity:</b>	40 %	
<b>Temperature:</b>	23.0 °C	
<b>Measurement uncertainty</b>	± 4.51 dB	Level of confidence 95 % (k = 2)

### FCC Rule: 15.247(d), 15.209(a)

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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. 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).

The correction factor in the final result table contains the sum of the transducers (antenna + amplifier + cables). The QuasiPeak value is the measured value corrected with the correction factor.

Measured Peak Values In The Frequency Range 30 MHz - 1000 MHz.

FCC Part 15 Class B Electric Field Strength

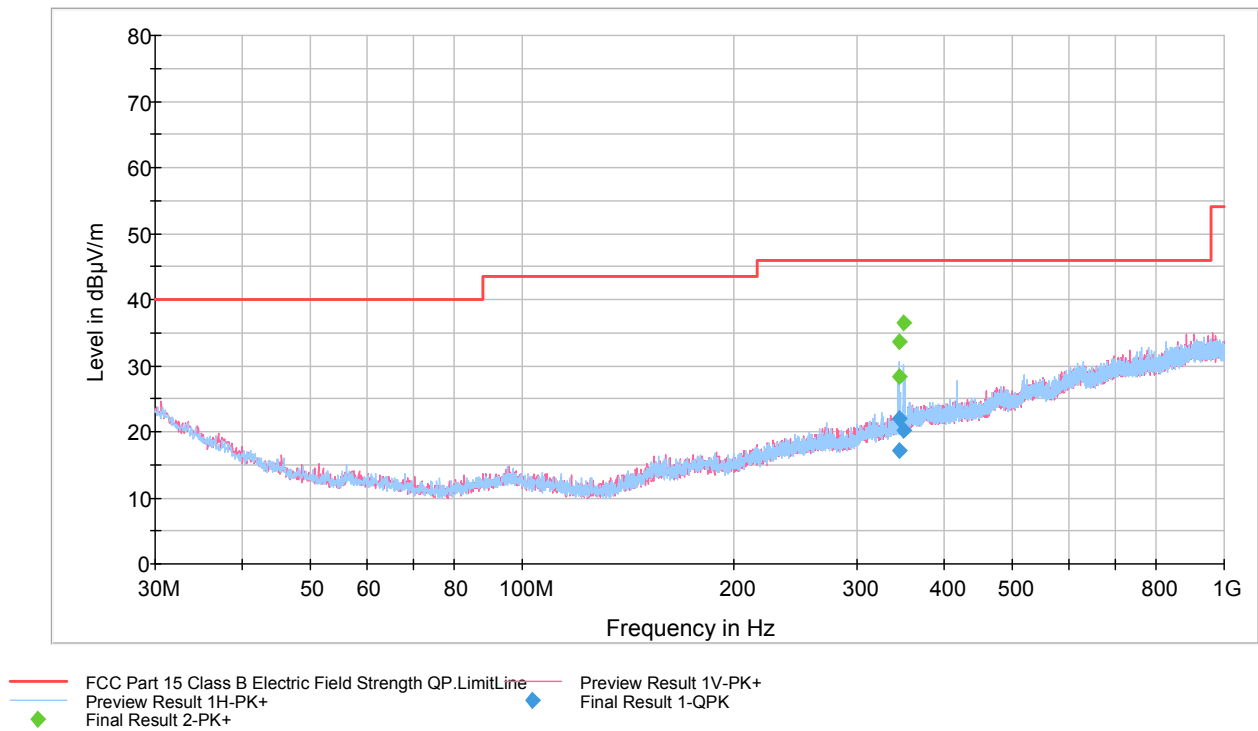


Figure 10. Measured curve with peak-detector. 1 Mbps Channel LOW.

Final measurements from the worst frequencies

Table 1. Final results.

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
343.900000	22.0	1000.0	120.000	100.0	H	180.0	18.0	24.1	46.0	
343.920000	17.1	1000.0	120.000	150.0	H	195.0	18.0	28.9	46.0	
349.380000	20.1	1000.0	120.000	100.0	H	345.0	18.6	25.9	46.0	

FCC Part 15 Class B Electric Field Strenght

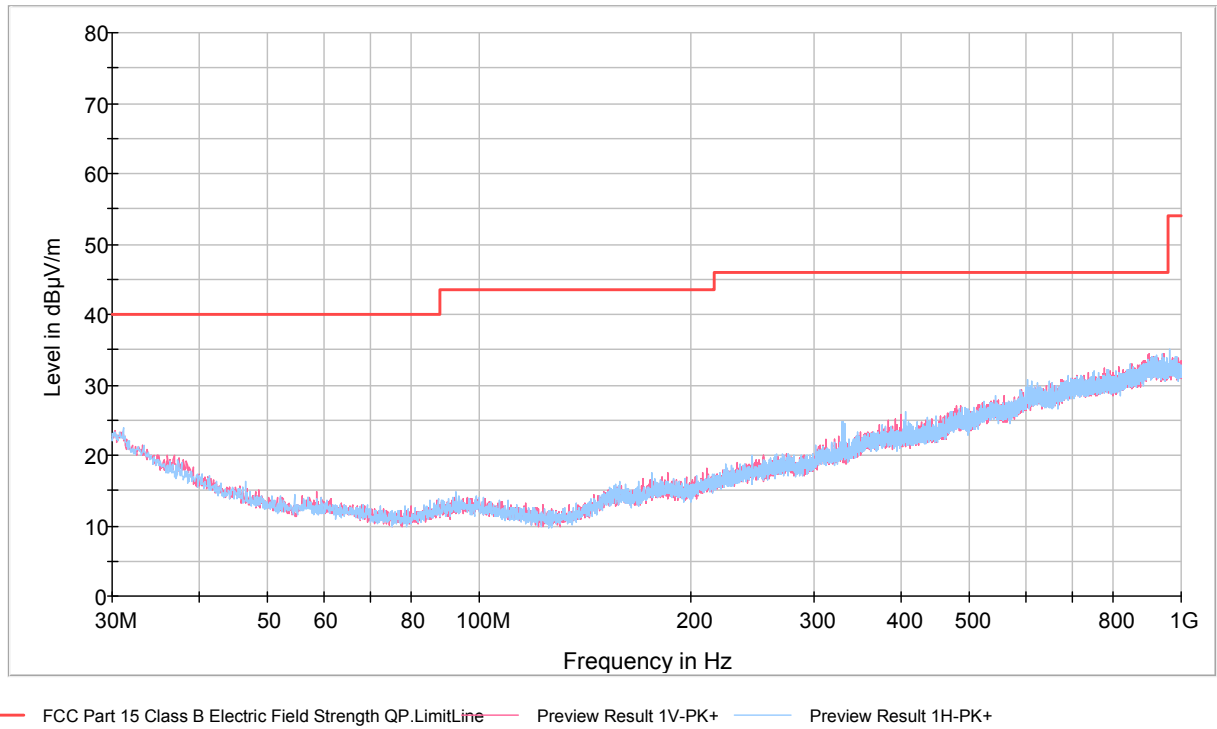
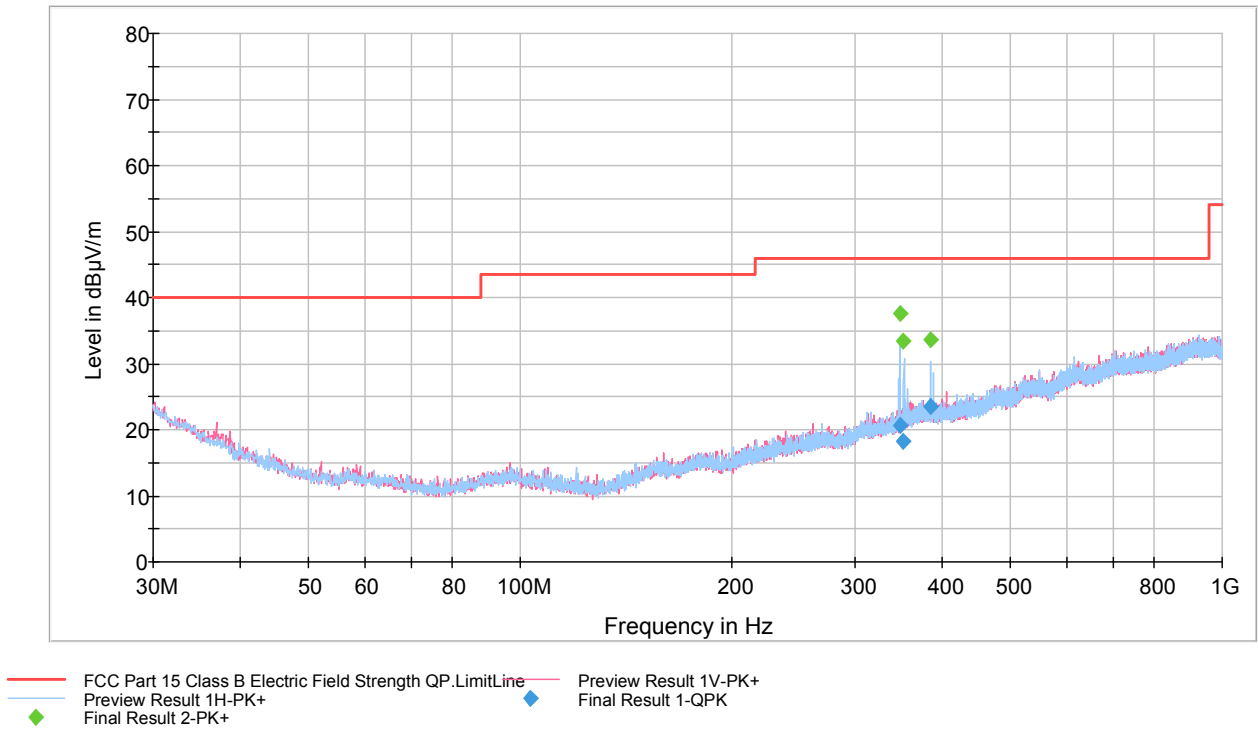


Figure 11. Measured curve with peak-detector. 1 Mbps Channel MID.

No final measurements were since the emission level was more that 10 dB below the limit line.

FCC Part 15 Class B Electric Field Strength



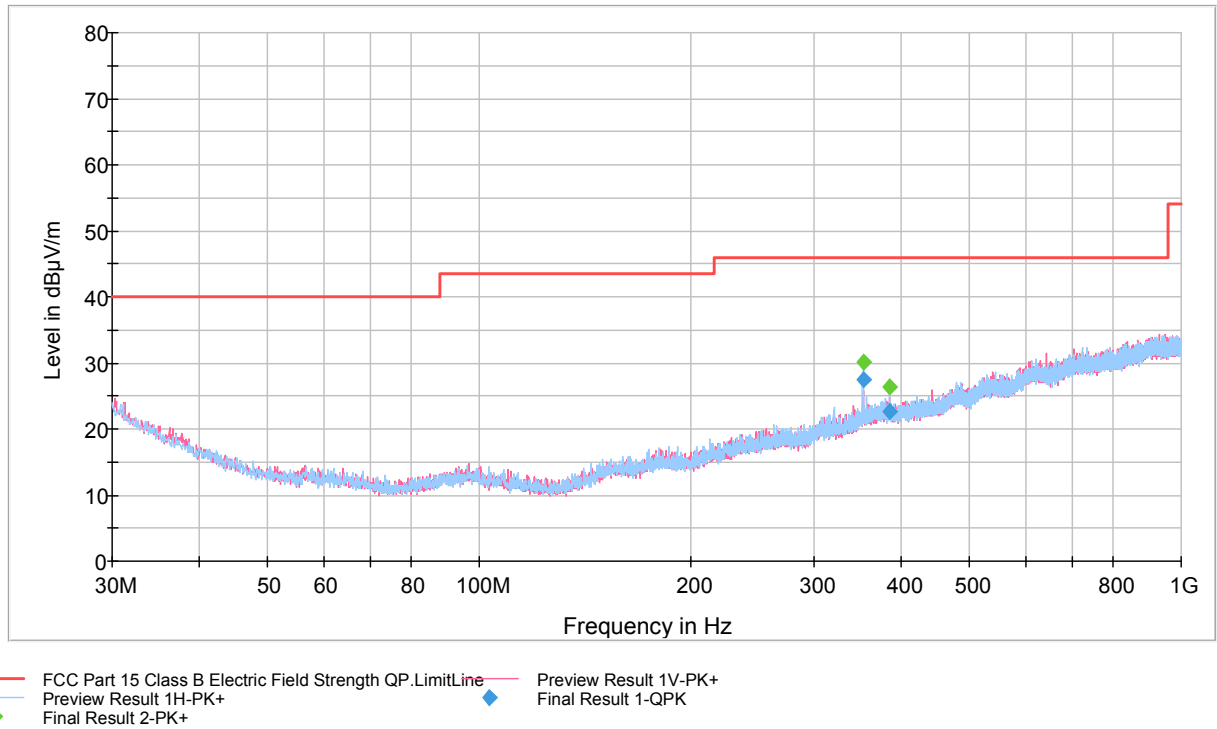
**Figure 12.** Measured curve with peak-detector. 1 Mbps Channel HIGH.

**Final measurements from the worst frequencies**

**Table 2.** Final results.

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
348.280000	20.8	1000.0	120.000	100.0	H	345.0	18.5	25.3	46.0	
351.880000	18.1	1000.0	120.000	300.0	H	342.0	18.7	27.9	46.0	
384.000000	23.6	1000.0	120.000	100.0	H	255.0	19.5	22.4	46.0	

FCC Part 15 Class B Electric Field Streight



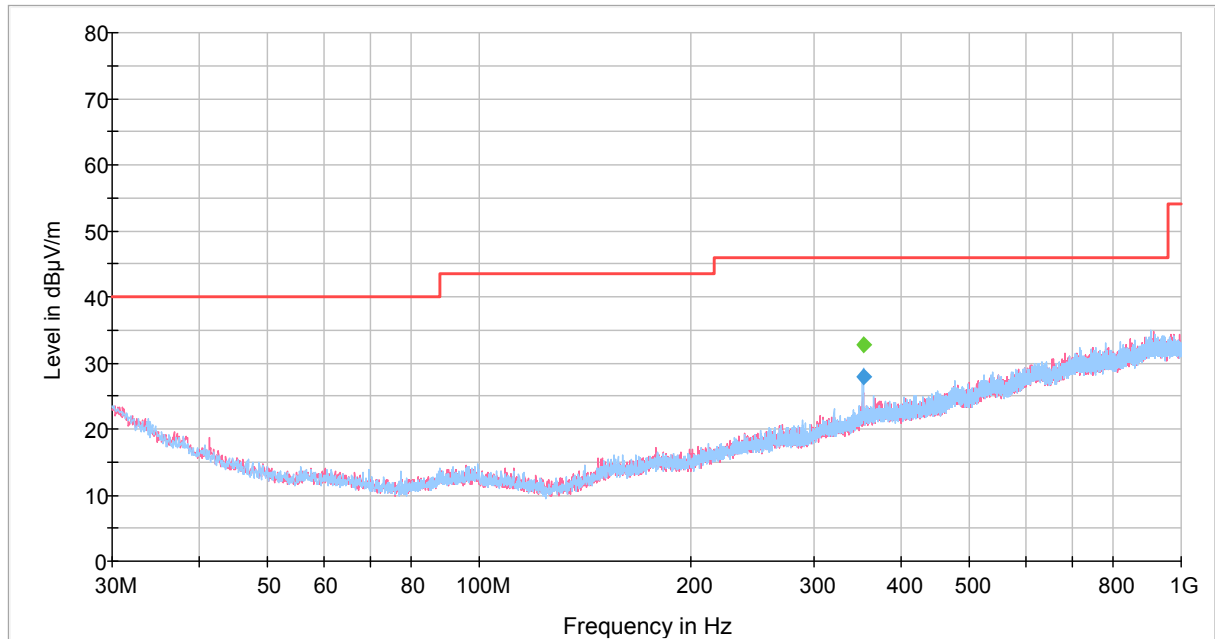
**Figure 13.** Measured curve with peak-detector. 2 Mbps Channel LOW.

**Final measurements from the worst frequencies**

**Table 3.** Final results.

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
352.060000	27.4	1000.0	120.000	100.0	H	165.0	18.7	18.6	46.0	
384.000000	22.5	1000.0	120.000	100.0	H	255.0	19.5	23.5	46.0	

FCC Part 15 Class B Electric Field Streight



— FCC Part 15 Class B Electric Field Strength QP.LimitLine  
— Preview Result 1H-PK+  
◆ Final Result 2-PK+  
◆ Preview Result 1V-PK+  
◆ Final Result 1-QPK

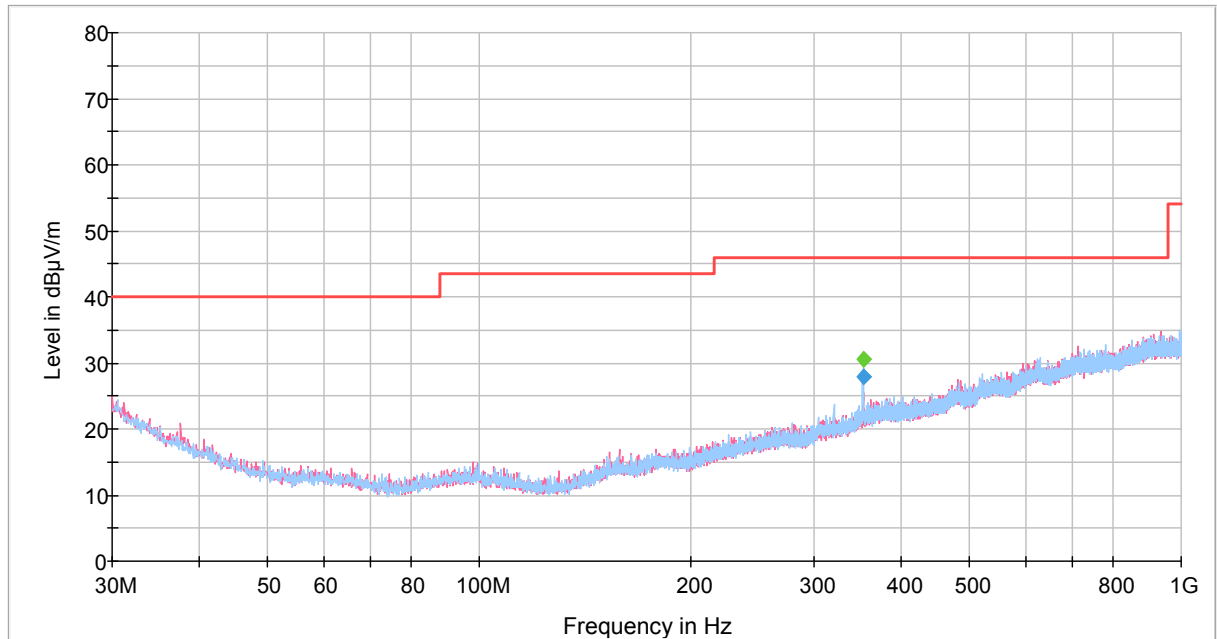
**Figure 14.** Measured curve with peak-detector. 2 Mbps Channel MID.

**Final measurements from the worst frequencies**

**Table 4.** Final results.

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
352.040000	27.8	1000.0	120.000	100.0	H	165.0	18.7	18.2	46.0	

FCC Part 15 Class B Electric Field Strength



— FCC Part 15 Class B Electric Field Strength QP.LimitLine  
— Preview Result 1H-PK+  
◆ Final Result 2-PK+  
◆ Preview Result 1V-PK+  
◆ Final Result 1-QPK

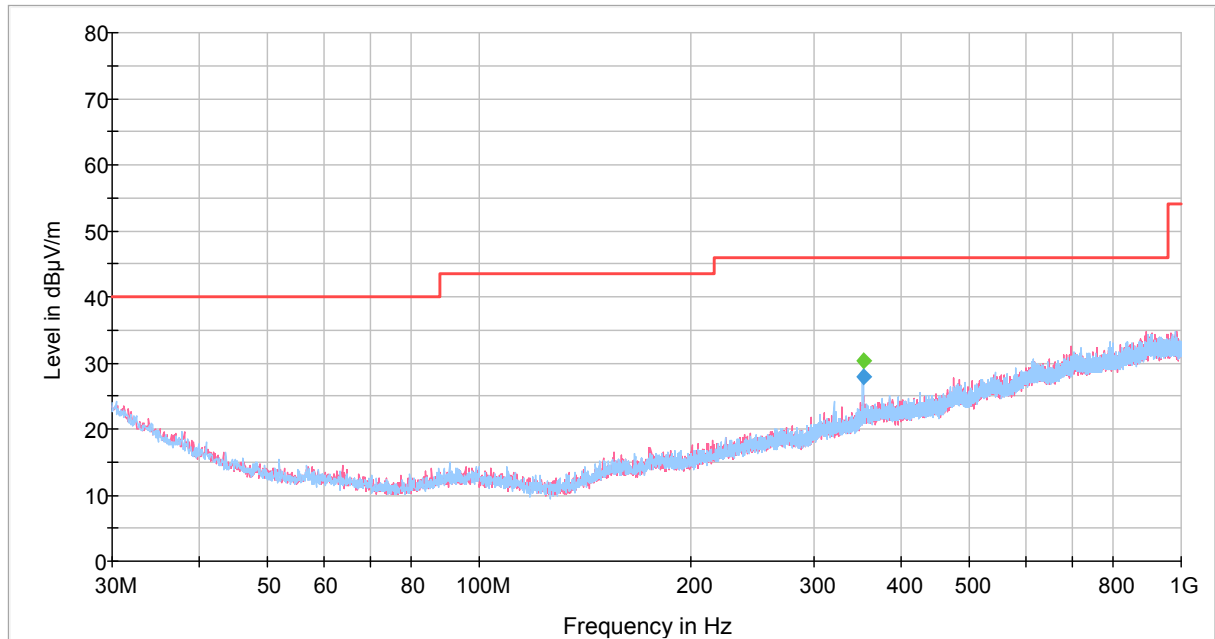
**Figure 15.** Measured curve with peak-detector. 2 Mbps Channel HIGH.

**Final measurements from the worst frequencies**

**Table 5.** Final results.

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
352.000000	28.0	1000.0	120.000	100.0	H	165.0	18.7	18.0	46.0	

FCC Part 15 Class B Electric Field Streight



— FCC Part 15 Class B Electric Field Strength QP.LimitLine  
— Preview Result 1H-PK+  
◆ Final Result 2-PK+  
◆ Preview Result 1V-PK+  
◆ Final Result 1-QPK

**Figure 16.** Measured curve with peak-detector. 3 Mbps Channel LOW.

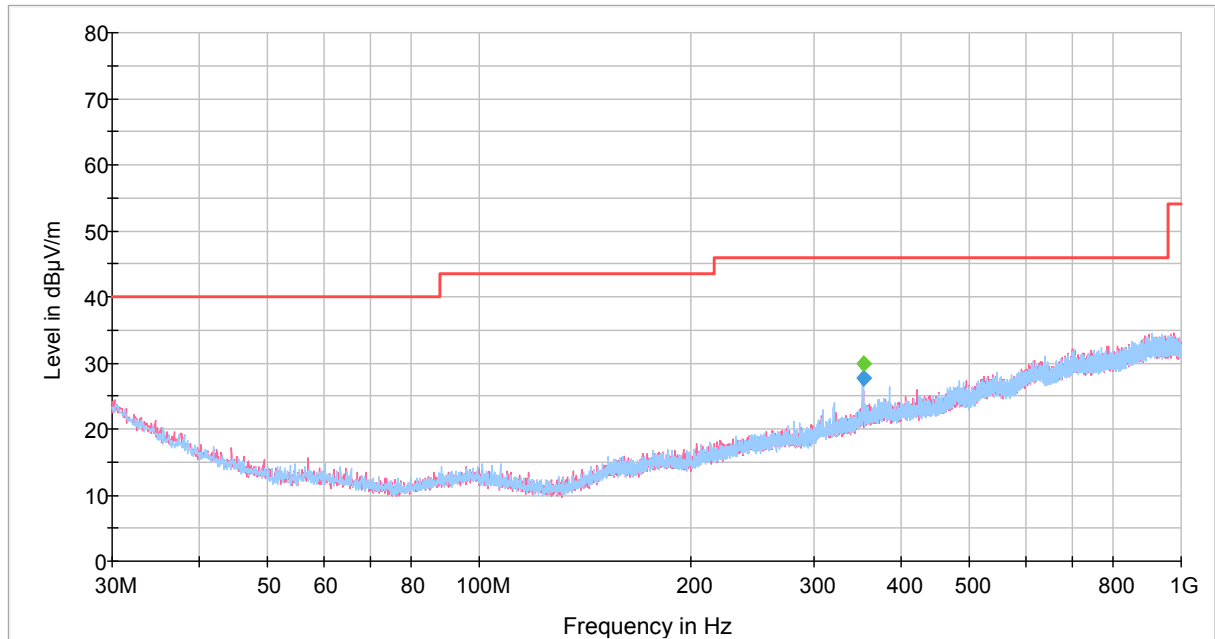
**Final measurements from the worst frequencies**

**Table 6.** Final results.

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
352.020000	28.0	1000.0	120.000	100.0	H	165.0	18.7	18.0	46.0	



FCC Part 15 Class B Electric Field Streight



— FCC Part 15 Class B Electric Field Strength QP.LimitLine  
— Preview Result 1H-PK+  
◆ Final Result 2-PK+  
◆ Preview Result 1V-PK+  
◆ Final Result 1-QPK

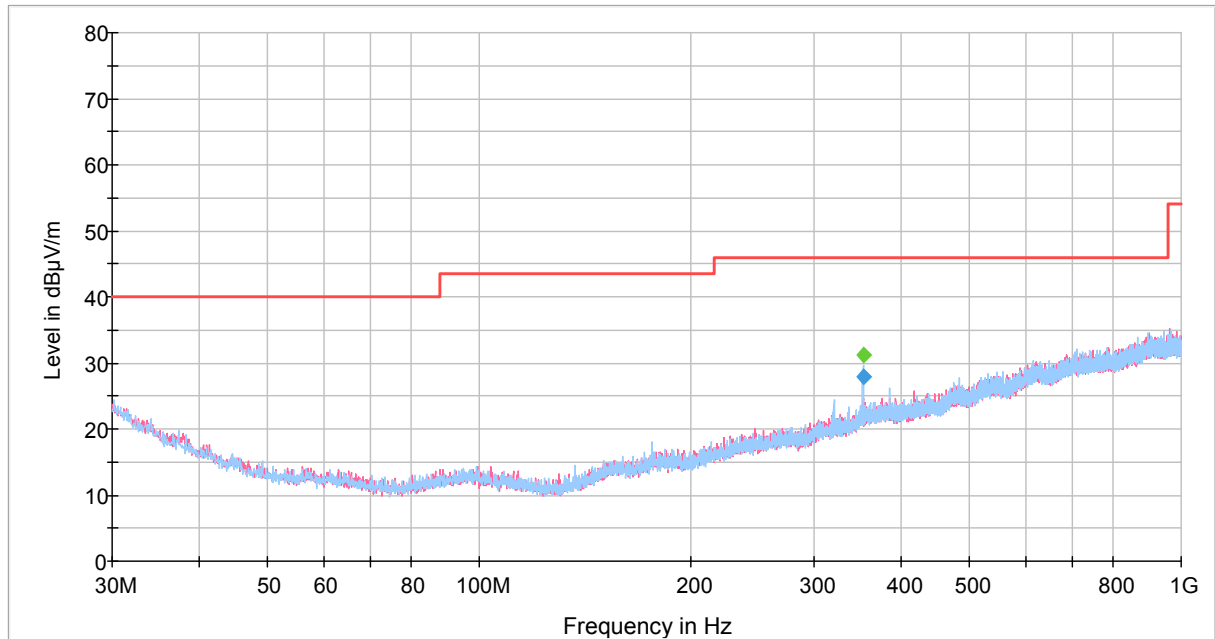
**Figure 17.** Measured curve with peak-detector. 3 Mbps Channel MID.

**Final measurements from the worst frequencies**

**Table 7.** Final results.

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	PoI	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
352.040000	27.7	1000.0	120.000	100.0	H	165.0	18.7	18.3	46.0	

FCC Part 15 Class B Electric Field Strength



— FCC Part 15 Class B Electric Field Strength QP.LimitLine  
— Preview Result 1H-PK+  
◆ Final Result 2-PK+  
◆ Preview Result 1V-PK+  
◆ Final Result 1-QPK

**Figure 18.** Measured curve with peak-detector. 3 Mbps Channel HIGH.

**Final measurements from the worst frequencies**

**Table 8.** Final results.

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	PoI	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
351.980000	27.9	1000.0	120.000	100.0	H	164.0	18.7	18.1	46.0	

### Measured Peak and Average Values In The Frequency Range 1 000 MHz – 4 000 MHz.

The correction factor in the final result tables contains the sum of the transducers (antenna + amplifier + cables). The Max Peak and Average values are measured values corrected with the correction factor.

FCC Part 15 Class B Spurious Emission 1-4GHz 3m (optimized 2.4 GHz TX)

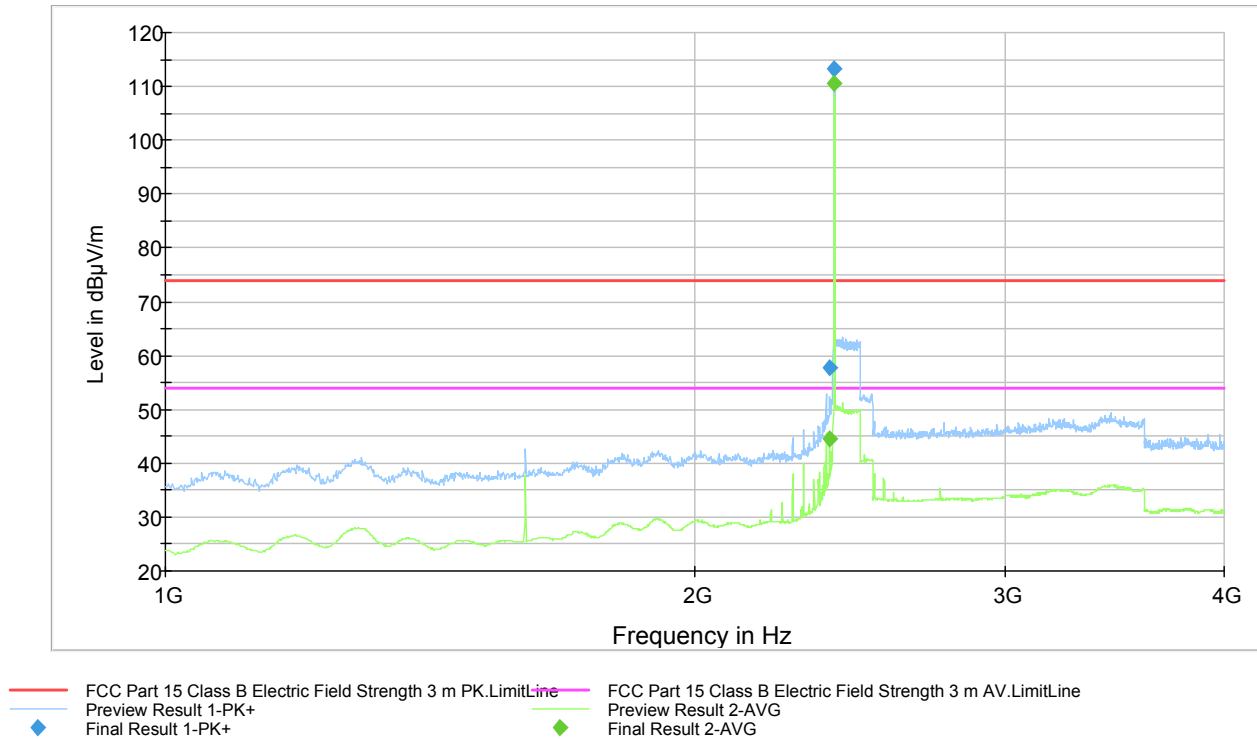
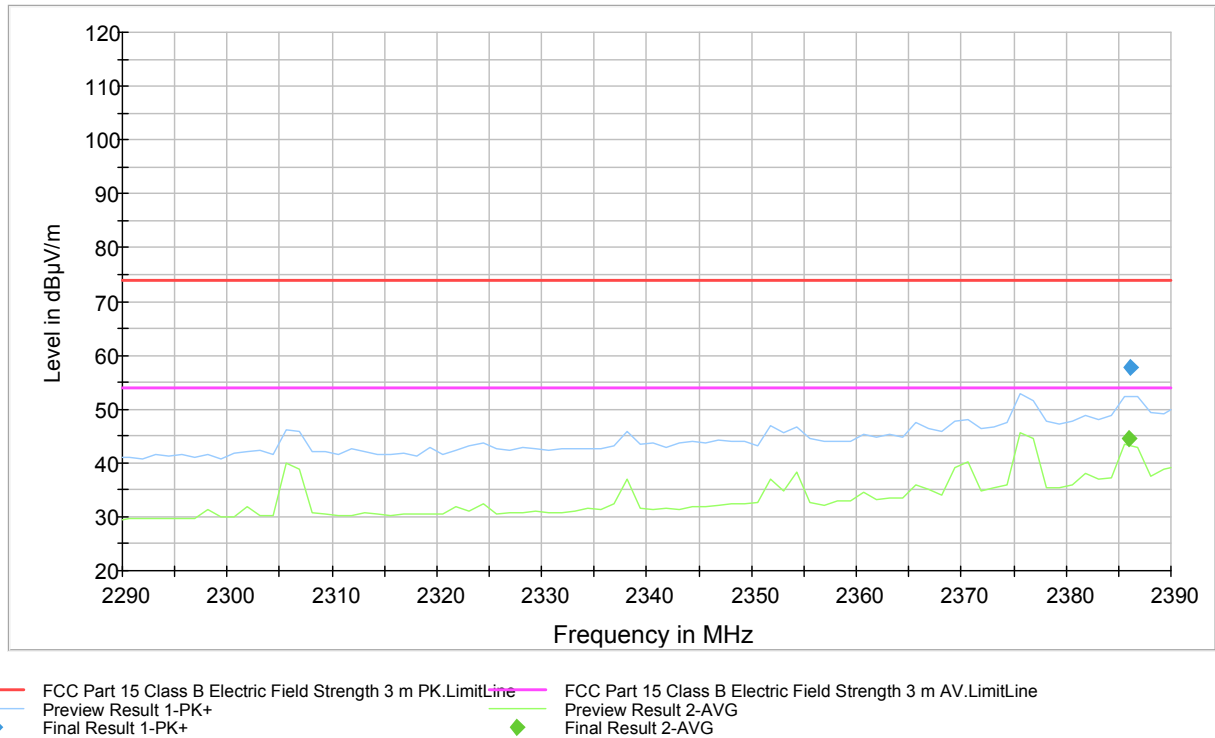


Figure 19. Measured curve with peak- and average detector. 1 Mbps Channel LOW.

FCC Part 15 Class B Spurious Emission 1-4GHz 3m (optimized 2.4 GHz TX)



**Figure 20.** Measured curve with peak- and average detector. 1 Mbps Lower Band Edge.

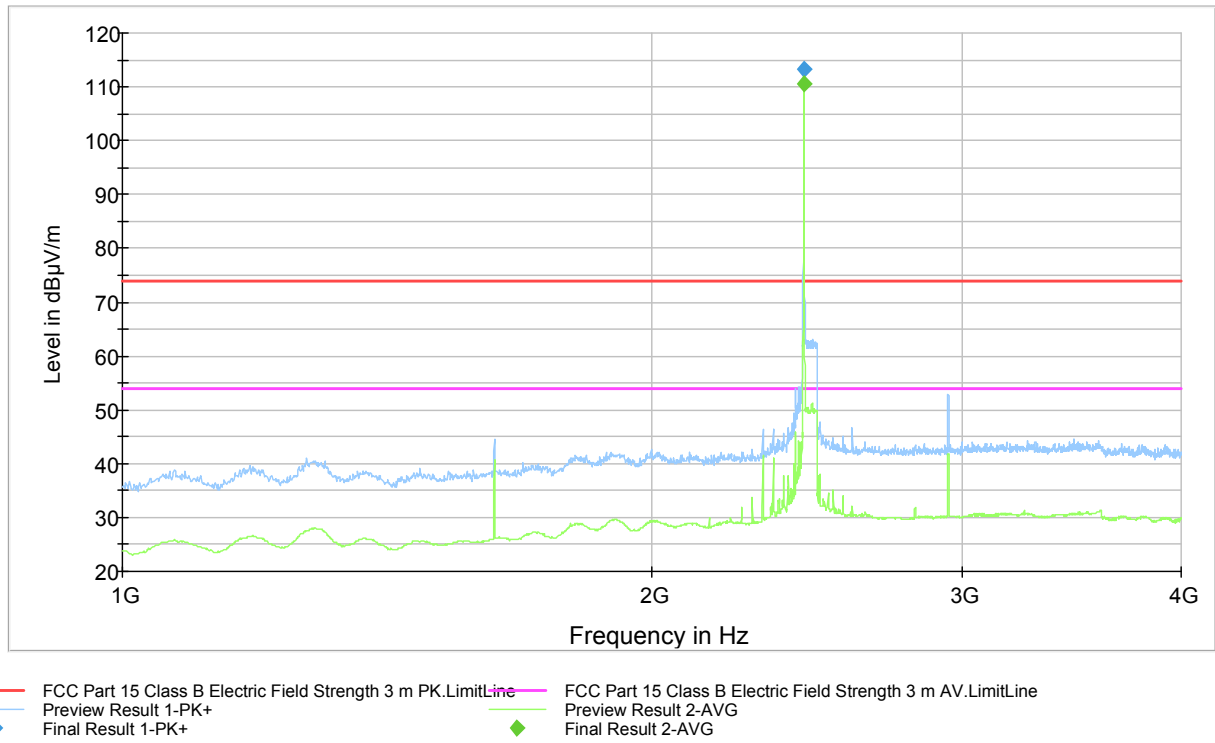
**Table 9.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2386.121795	57.7	1000.0	1000.000	179.0	V	204.0	4.6	16.2	73.9	
2402.000000	113.4	1000.0	1000.000	210.0	V	177.0	4.7	-39.5	73.9	Carrier

**Table 10.** Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2386.000000	44.5	1000.0	1000.000	179.0	V	204.0	4.6	9.4	53.9	
2402.000000	110.6	1000.0	1000.000	211.0	V	176.0	4.7	-56.7	53.9	Carrier

FCC Part 15 Class B Spurious Emission 1-4GHz 3m (optimized 2.4 GHz TX)



**Figure 21.** Measured curve with peak- and average detector. 1 Mbps Channel MID.

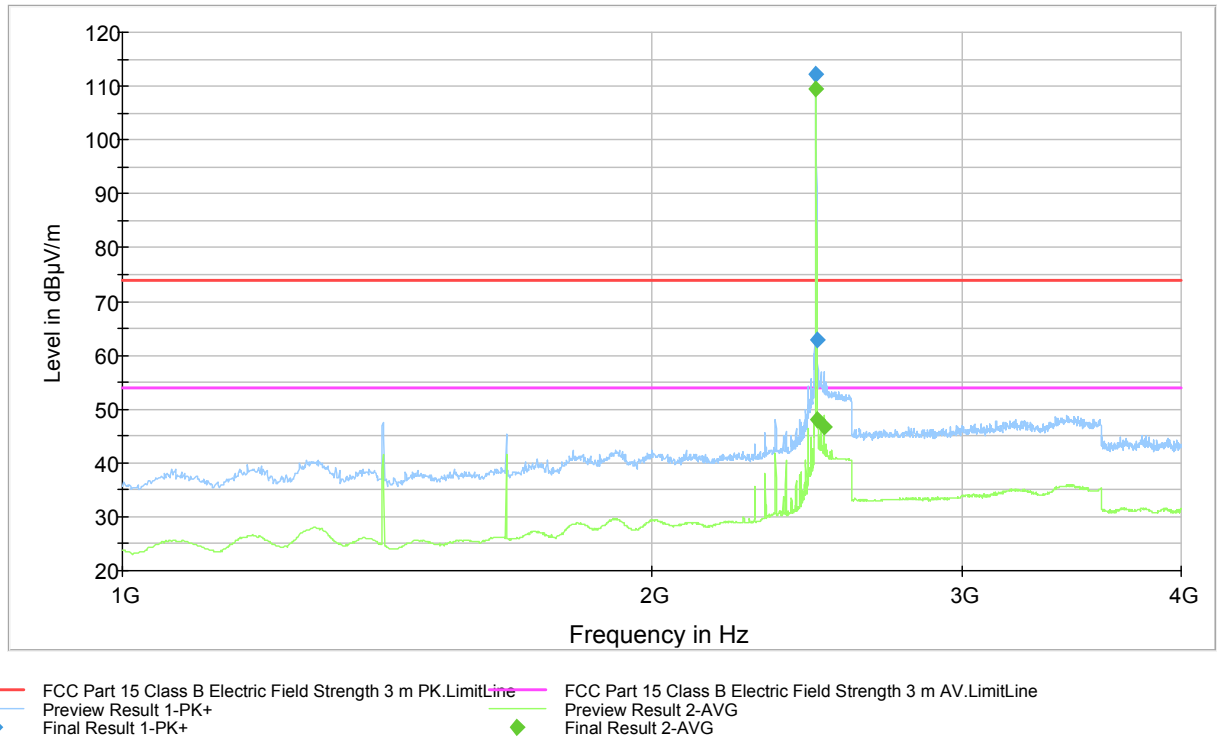
**Table 11.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2441.000000	113.3	1000.0	1000.000	205.0	V	197.0	4.4	-39.4	73.9	

**Table 12.** Final Average results.

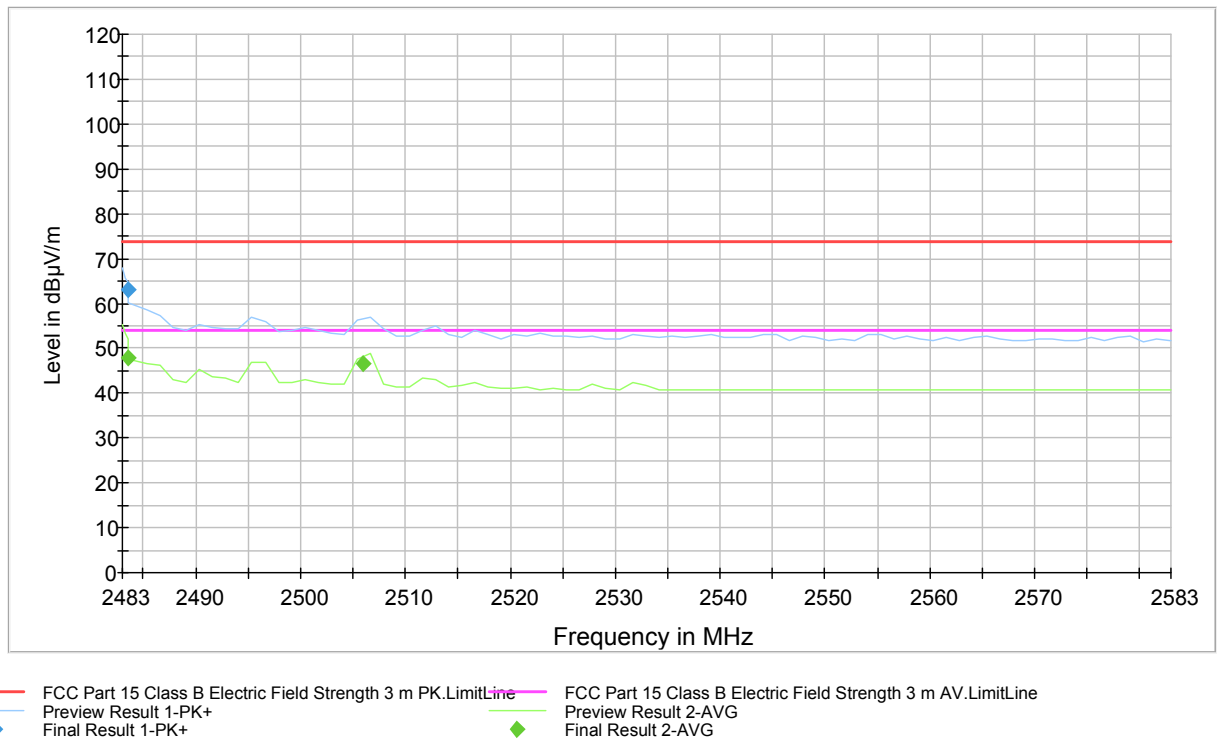
Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2441.000000	110.6	1000.0	1000.000	205.0	V	196.0	4.4	-56.7	53.9	

FCC Part 15 Class B Spurious Emission 1-4GHz 3m (optimized 2.4 GHz TX)



**Figure 22.** Measured curve with peak- and average detector. 1 Mbps Channel HIGH.

Copy of FCC Part 15 Class B Spurious Emission 1-4GHz 3m (optimized 2.4 GHz TX)



**Figure 23.** Measured curve with peak- and average detector. 1 Mbps Upper Band Edge.

**Final measurements from the worst frequencies**

**Table 13.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)	Comment
2480.000000	112.3	1000.0	1000.000	200.0	V	156.0	4.7	-38.4	73.9	Carrier
2483.500000	62.9	1000.0	1000.000	203.0	V	158.0	4.7	11.0	73.9	

**Table 14.** Final Average results.

Frequency (MHz)	Average (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)	Comment
2480.000000	109.5	1000.0	1000.000	167.0	V	153.0	4.7	-55.6	53.9	Carrier
2483.500000	48.0	1000.0	1000.000	201.0	V	148.0	4.7	5.9	53.9	
2506.025000	46.6	1000.0	1000.000	201.0	V	197.0	4.9	7.3	53.9	

FCC Part 15 Class B Spurious Emission 1-4GHz 3m (optimized 2.4 GHz TX)

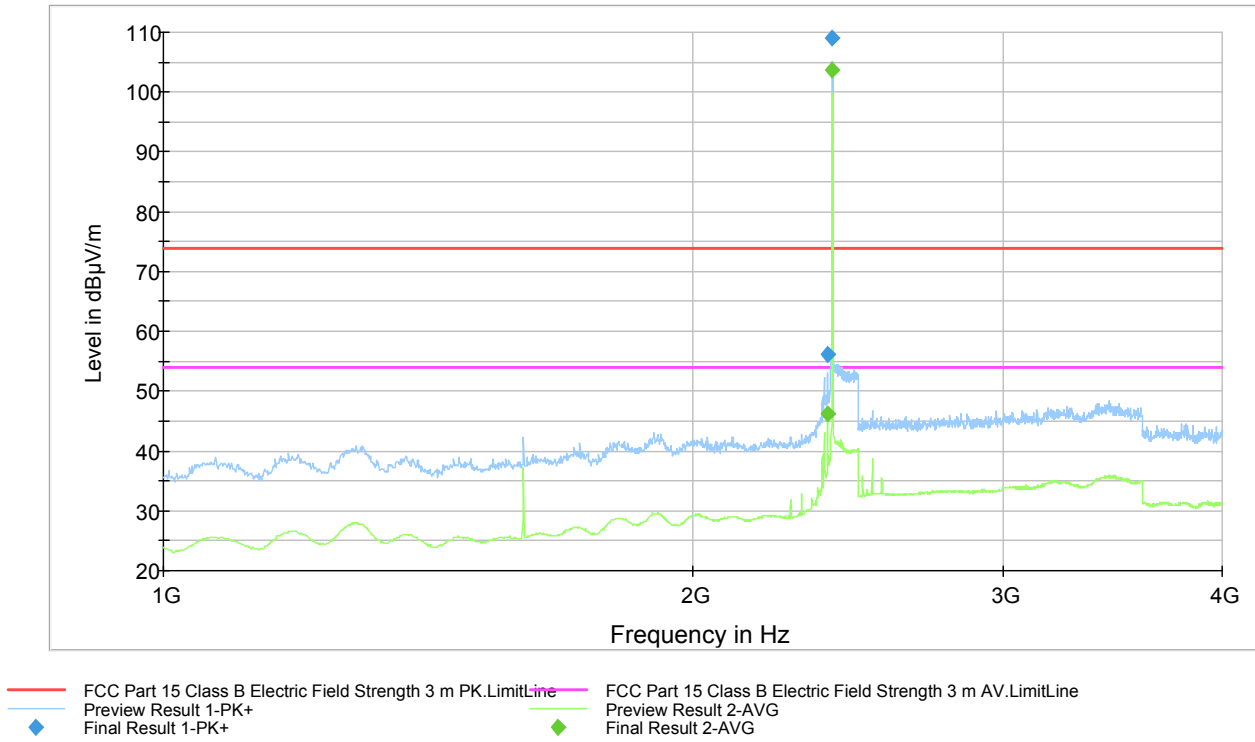


Figure 24. Measured curve with peak- and average detector. 2 Mbps Channel LOW.

FCC Part 15 Class B Spurious Emission 1-4GHz 3m (optimized 2.4 GHz TX)

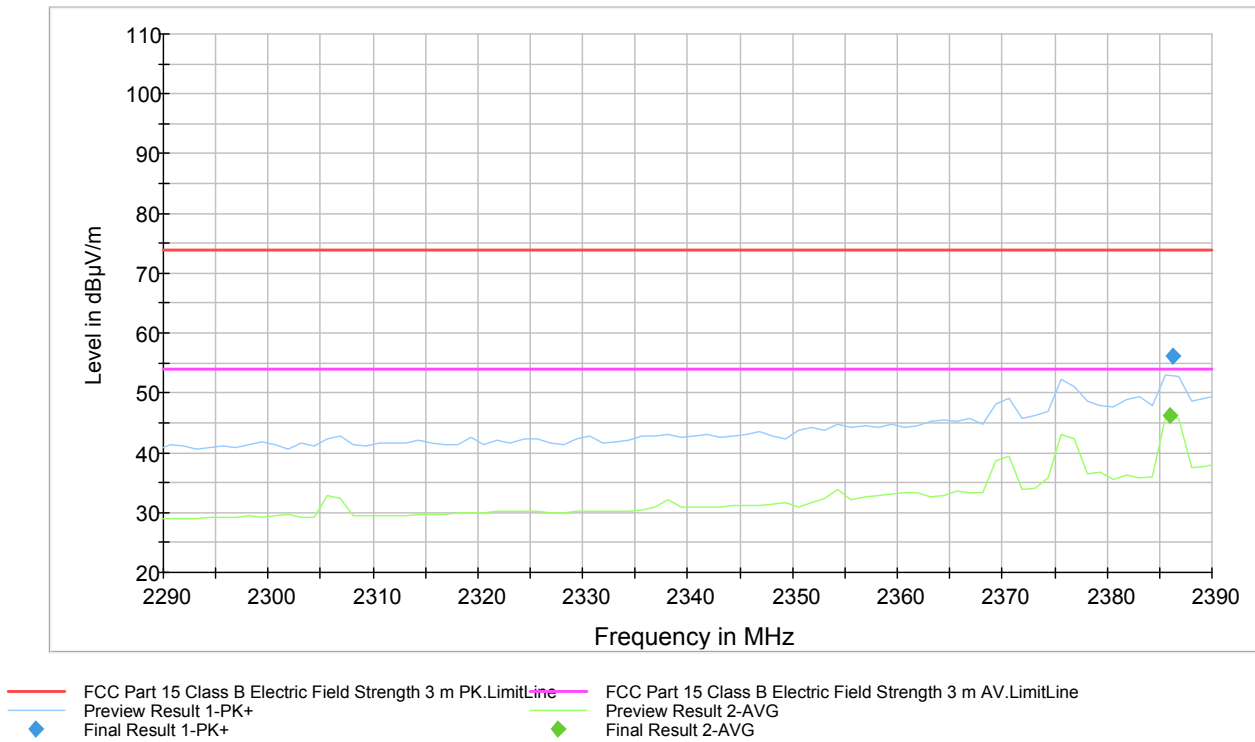


Figure 25. Measured curve with peak- and average detector. 2 Mbps Lower Band Edge.



**Final measurements from the worst frequencies**

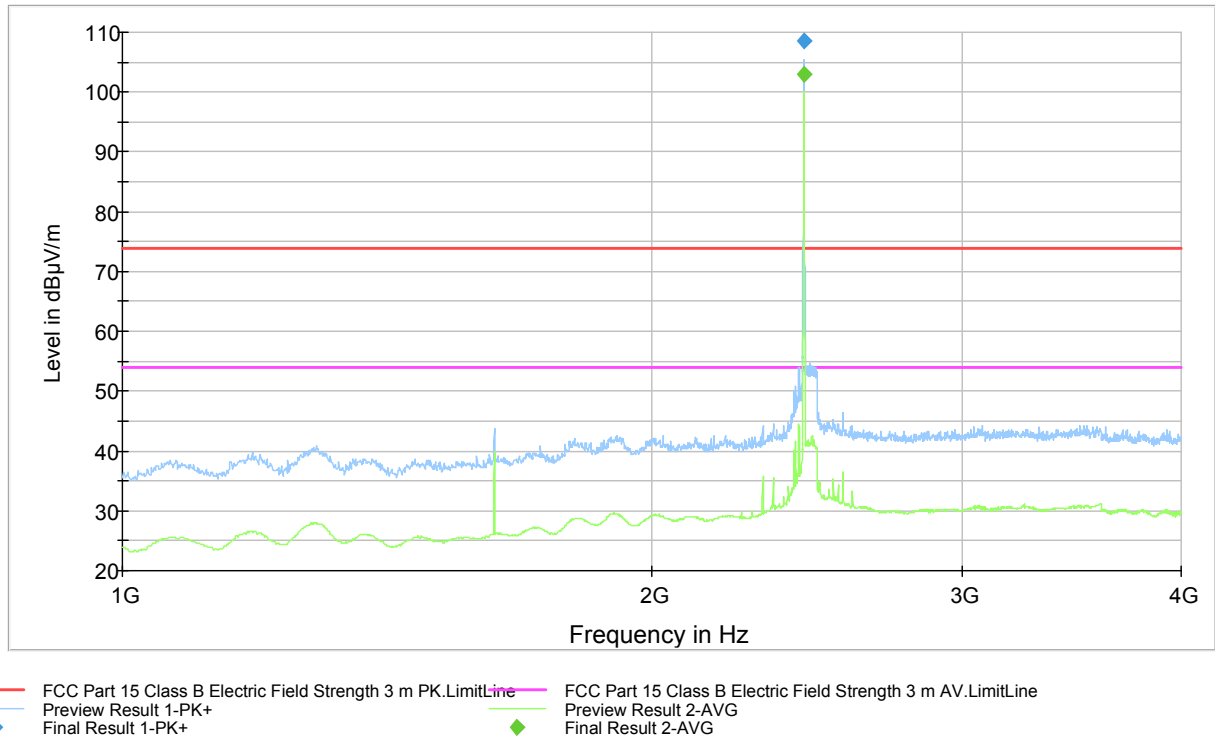
**Table 15.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2386.200000	56.1	1000.0	1000.000	224.0	V	18.0	4.6	17.8	73.9	
2402.000000	108.9	1000.0	1000.000	190.0	V	318.0	4.7	-35.0	73.9	Carrier

**Table 16.** Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2386.000000	46.2	1000.0	1000.000	189.0	V	0.0	4.6	7.7	53.9	
2402.000000	103.8	1000.0	1000.000	191.0	V	315.0	4.7	-49.9	53.9	Carrier

FCC Part 15 Class B Spurious Emission 1-4GHz 3m (optimized 2.4 GHz TX)



**Figure 26.** Measured curve with peak- and average detector. 2 Mbps Channel MID.

**Final measurements from the worst frequencies**

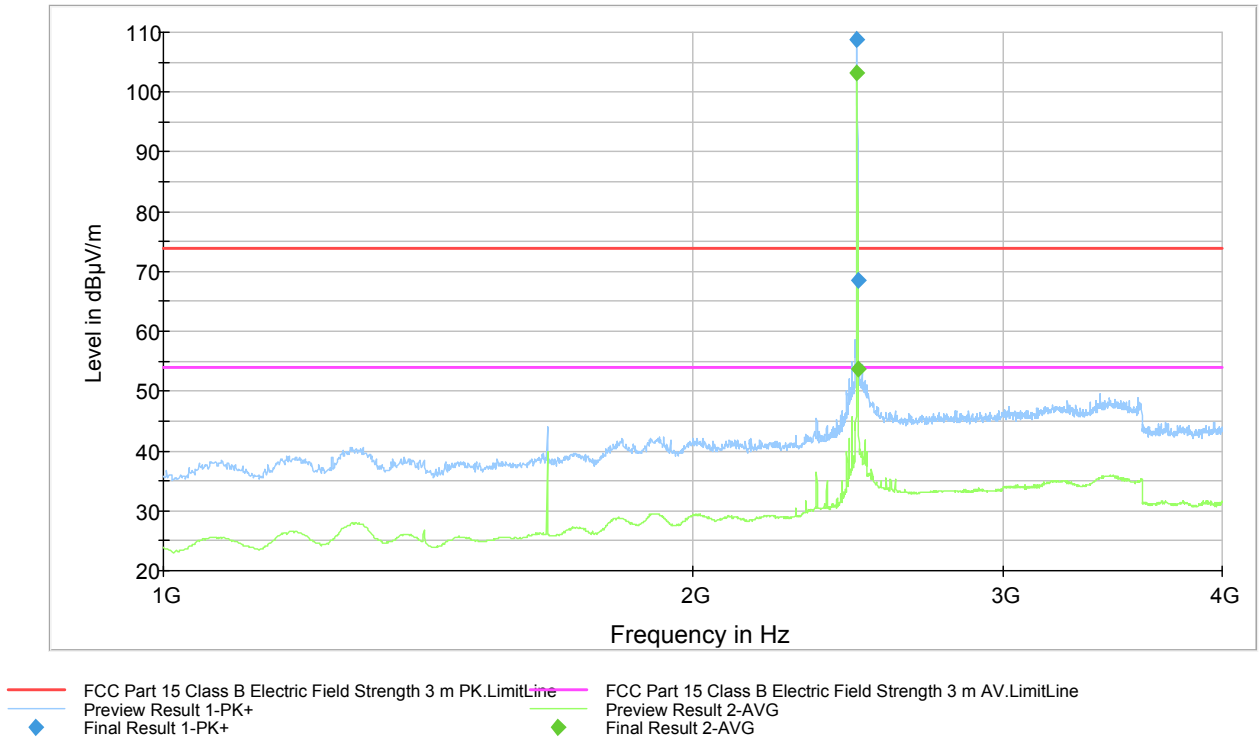
**Table 17.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2441.000000	108.5	1000.0	1000.000	182.0	V	191.0	4.4	-34.6	73.9	Carrier

**Table 18.** Final Average results.

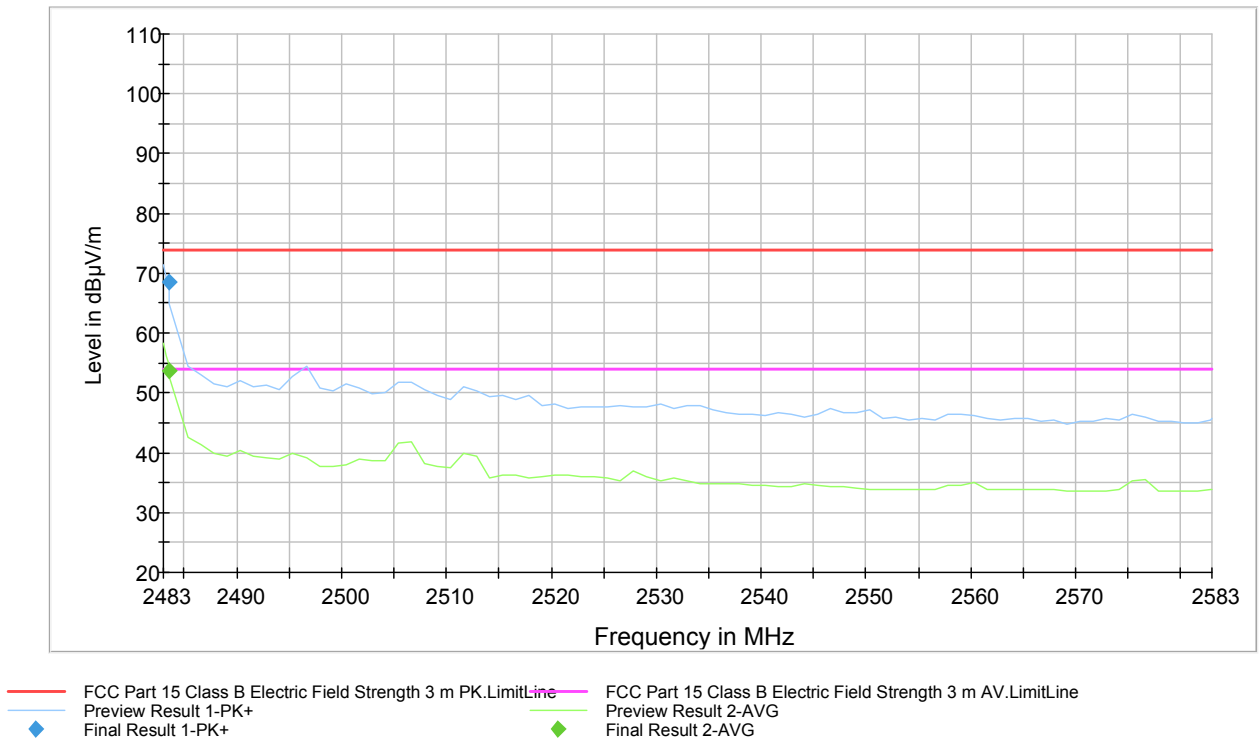
Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2441.000000	102.9	1000.0	1000.000	183.0	V	193.0	4.4	-49.0	53.9	Carrier

FCC Part 15 Class B Spurious Emission 1-4GHz 3m (optimized 2.4 GHz TX)



**Figure 27.** Measured curve with peak- and average detector. 2 Mbps Channel HIGH

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**Figure 28.** Measured curve with peak- and average detector. 2 Mbps Upper Band Edge.

**Final measurements from the worst frequencies**

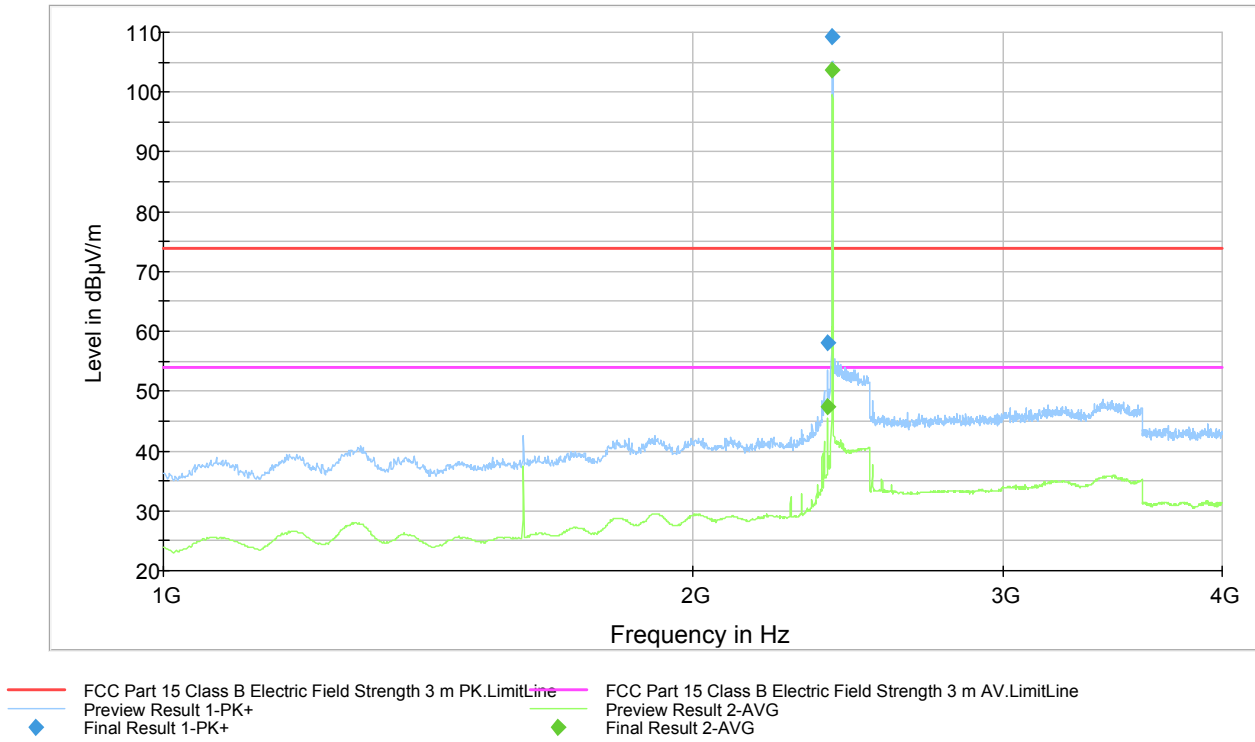
**Table 19.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2480.000000	108.9	1000.0	1000.000	208.0	V	129.0	4.6	-35.0	73.9	Carrier
2483.500000	68.6	1000.0	1000.000	207.0	V	132.0	4.7	5.3	73.9	

**Table 20.** Final Average results.

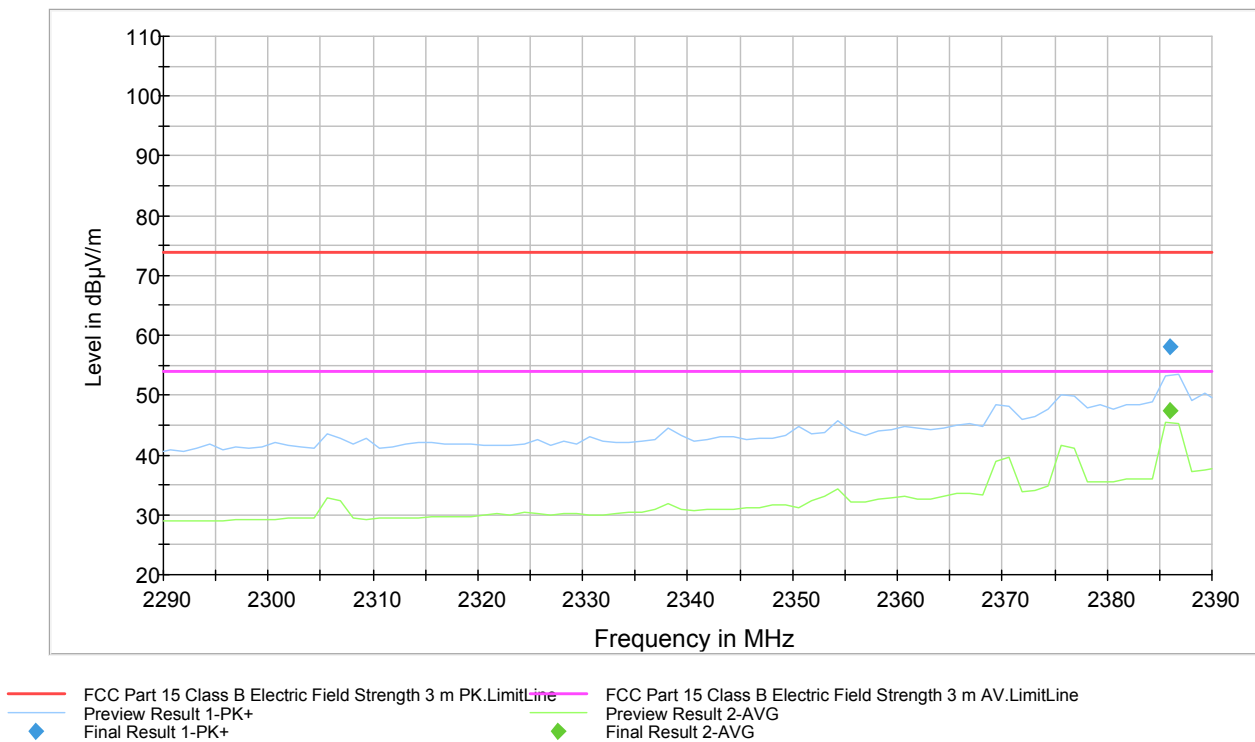
Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2480.000000	103.3	1000.0	1000.000	208.0	V	131.0	4.7	-49.4	53.9	Carrier
2483.500000	53.6	1000.0	1000.000	208.0	V	252.0	4.7	0.3	53.9	

FCC Part 15 Class B Spurious Emission 1-4GHz 3m (optimized 2.4 GHz TX)



**Figure 29.** Measured curve with peak- and average detector. 3 Mbps Channel LOW.

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**Figure 30.** Measured curve with peak- and average detector. 3 Mbps Lower Band Edge.

**Final measurements from the worst frequencies**

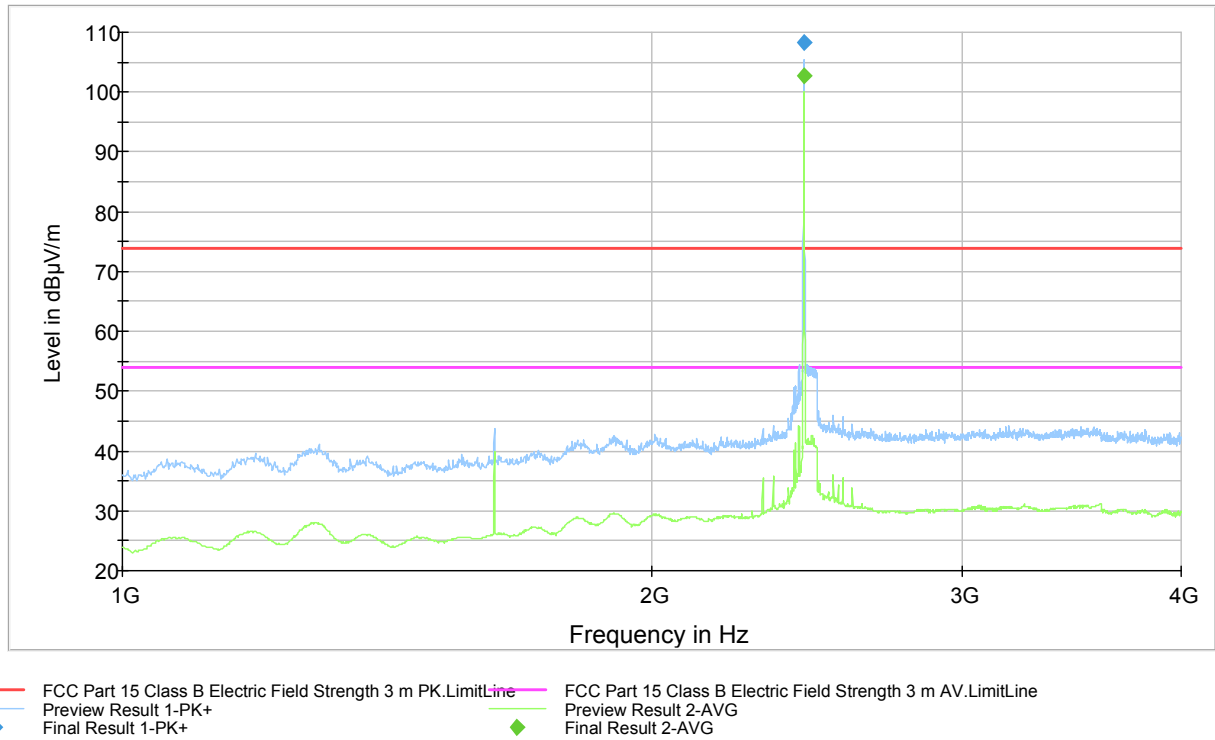
**Table 21.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)	Comment
2386.000000	58.1	1000.0	1000.000	192.0	V	311.0	4.6	15.8	73.9	
2401.800000	109.2	1000.0	1000.000	190.0	V	318.0	4.7	-35.3	73.9	Carrier

**Table 22.** Final Average results.

Frequency (MHz)	Average (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)	Comment
2386.000000	47.3	1000.0	1000.000	193.0	V	311.0	4.6	6.6	53.9	
2402.000000	103.7	1000.0	1000.000	191.0	V	320.0	4.7	-49.8	53.9	Carrier

FCC Part 15 Class B Spurious Emission 1-4GHz 3m (optimized 2.4 GHz TX)



**Figure 31.** Measured curve with peak- and average detector. 3 Mbps Channel MID.

**Final measurements from the worst frequencies**

**Table 23.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2441.000000	108.3	1000.0	1000.000	181.0	V	193.0	4.4	-34.4	73.9	Carrier

**Table 24.** Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2441.000000	102.8	1000.0	1000.000	180.0	V	189.0	4.4	-48.9	53.9	Carrier

FCC Part 15 Class B Spurious Emission 1-4GHz 3m (optimized 2.4 GHz TX)

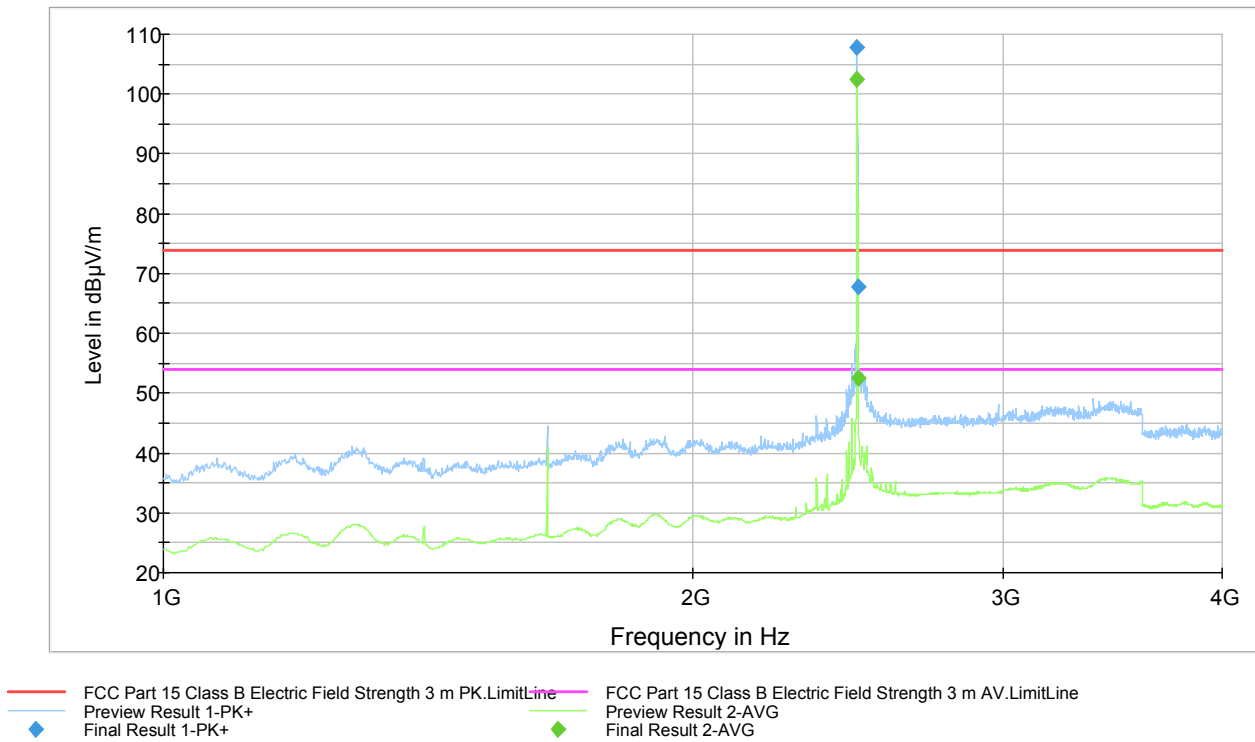


Figure 32. Measured curve with peak- and average detector. 3 Mbps Channel HIGH.

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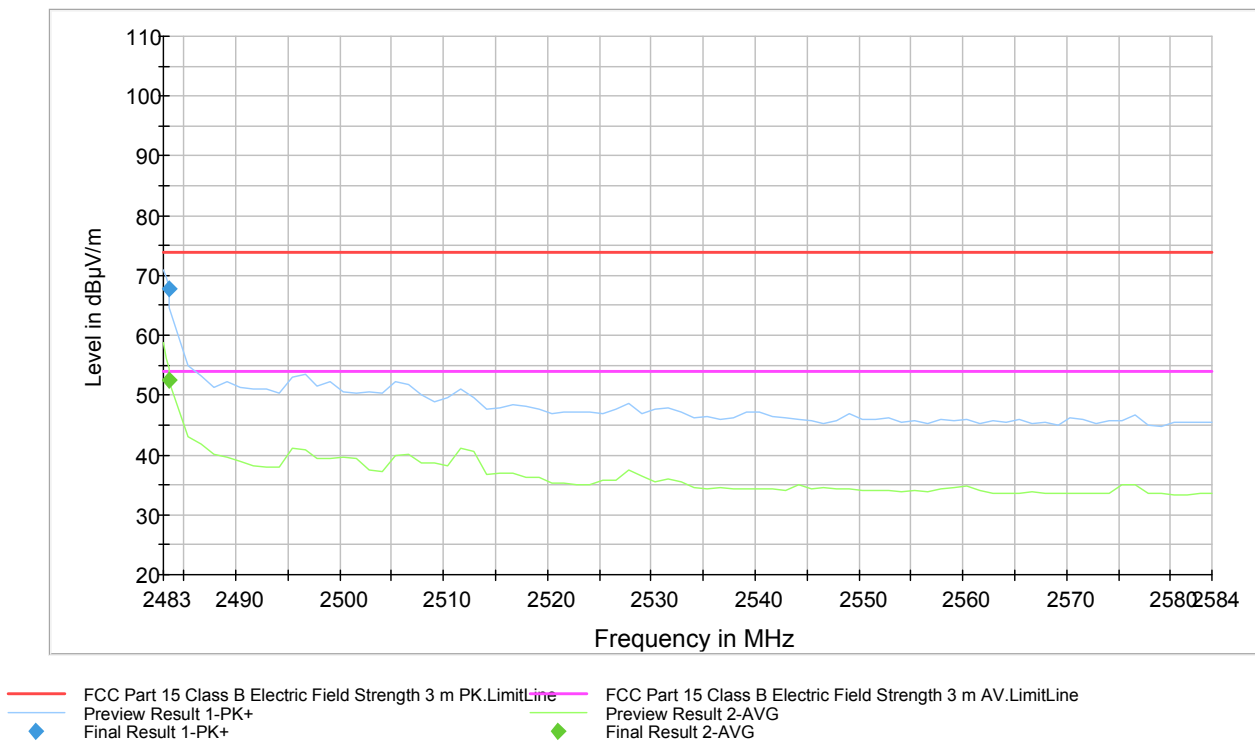


Figure 33. Measured curve with peak- and average detector. 3 Mbps Upper Band Edge.



**Final measurements from the worst frequencies**

**Table 25.** Final Max Peak results.

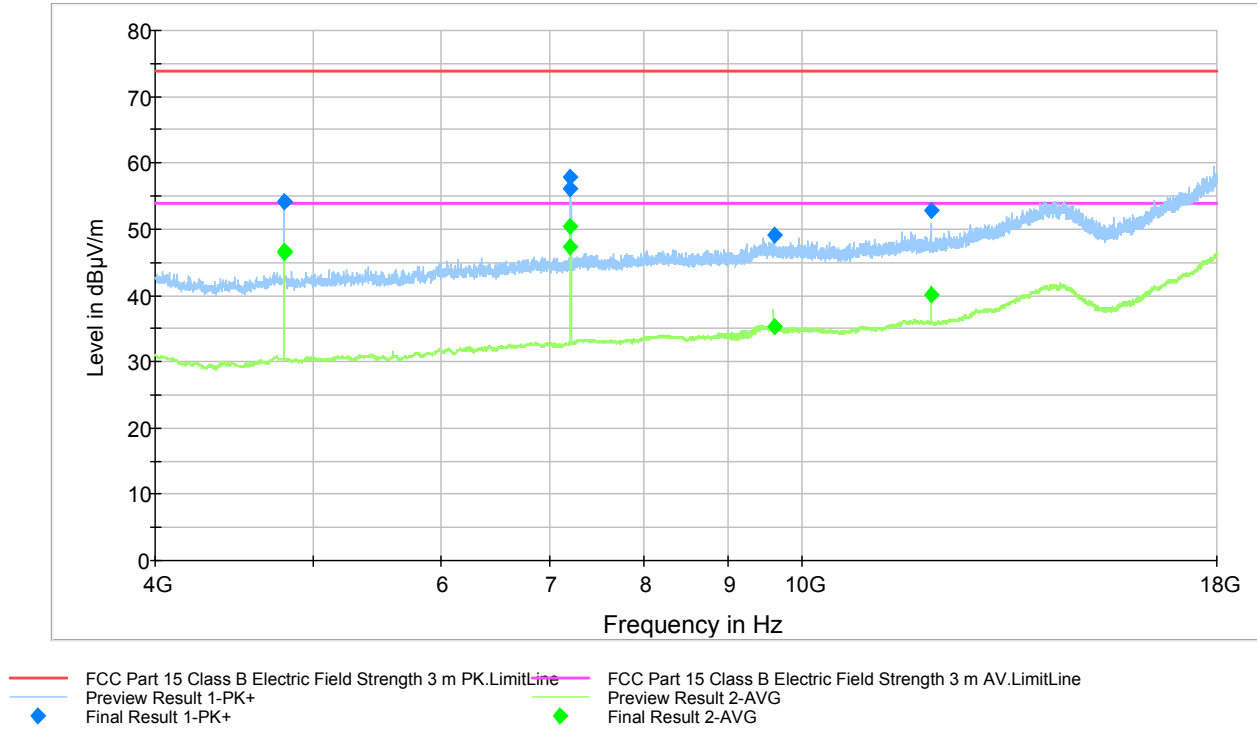
Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)	Comment
2480.000000	107.8	1000.0	1000.000	245.0	V	250.0	4.7	-33.9	73.9	
2483.500000	67.8	1000.0	1000.000	176.0	V	249.0	4.7	6.1	73.9	

**Table 26.** Final Average results.

Frequency (MHz)	Average (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)	Comment
2480.000000	102.5	1000.0	1000.000	246.0	V	244.0	4.7	-48.6	53.9	
2483.500000	52.6	1000.0	1000.000	247.0	V	247.0	4.7	1.3	53.9	

**Measured Peak and Average Values In The Frequency Range 4 000 MHz – 18 000 MHz.**

FCC Part 15 Class B Spurious Emission 1-18GHz 3m



**Figure 34.** Measured curve with peak- and average detector. 1 Mbps Channel LOW.

**Final measurements from the worst frequencies**

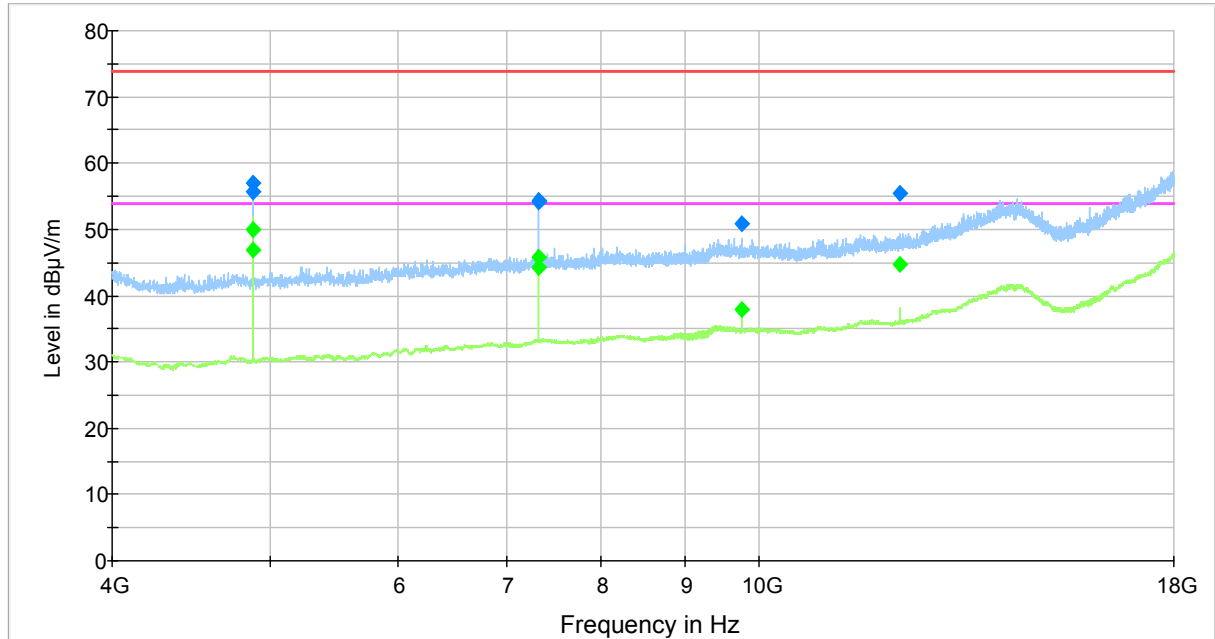
**Table 27.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4804.325000	54.2	1000.0	1000.000	110.0	H	92.0	9.2	19.7	73.9	
4804.325000	54.2	1000.0	1000.000	302.0	V	295.0	9.2	19.7	73.9	
7205.625000	56.1	1000.0	1000.000	100.0	H	205.0	13.0	17.8	73.9	
7206.225000	57.8	1000.0	1000.000	224.0	V	55.0	13.0	16.1	73.9	
9608.475000	49.1	1000.0	1000.000	199.0	V	293.0	16.0	24.8	73.9	
12009.025000	52.8	1000.0	1000.000	204.0	V	108.0	18.5	21.1	73.9	

**Table 28.** Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4804.325000	46.5	1000.0	1000.000	302.0	V	295.0	9.2	7.4	53.9	
4804.325000	46.7	1000.0	1000.000	110.0	H	92.0	9.2	7.2	53.9	
7205.625000	47.4	1000.0	1000.000	100.0	H	205.0	13.0	6.5	53.9	
7206.225000	50.4	1000.0	1000.000	224.0	V	55.0	13.0	3.5	53.9	
9608.475000	35.3	1000.0	1000.000	199.0	V	293.0	16.0	18.6	53.9	
12009.025000	40.2	1000.0	1000.000	204.0	V	108.0	18.5	13.7	53.9	

FCC Part 15 Class B Spurious Emission 1-18GHz 3m



— FCC Part 15 Class B Electric Field Strength 3 m PK.LimitLine  
— Preview Result 1-PK+  
— FCC Part 15 Class B Electric Field Strength 3 m AV.LimitLine  
— Preview Result 2-AVG  
◆ Final Result 1-PK+  
◆ Final Result 2-AVG

Figure 35. Measured curve with peak- and average detector. 1 Mbps Channel MID.

Final measurements from the worst frequencies

Table 29. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4881.675000	57.0	1000.0	1000.000	190.0	V	339.0	9.5	16.9	73.9	
4882.475000	55.7	1000.0	1000.000	109.0	H	122.0	9.5	18.2	73.9	
7323.275000	54.4	1000.0	1000.000	100.0	H	111.0	13.4	19.5	73.9	
7323.475000	54.1	1000.0	1000.000	100.0	V	202.0	13.4	19.8	73.9	
9764.775000	50.8	1000.0	1000.000	203.0	V	46.0	15.9	23.1	73.9	
12204.375000	55.4	1000.0	1000.000	212.0	V	110.0	18.9	18.5	73.9	

Table 30. Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4881.675000	49.9	1000.0	1000.000	190.0	V	339.0	9.5	4.0	53.9	
4882.475000	46.9	1000.0	1000.000	109.0	H	122.0	9.5	7.0	53.9	
7323.275000	45.9	1000.0	1000.000	100.0	H	111.0	13.4	8.0	53.9	
7323.475000	44.2	1000.0	1000.000	100.0	V	202.0	13.4	9.7	53.9	
9764.775000	37.8	1000.0	1000.000	203.0	V	46.0	15.9	16.1	53.9	
12204.375000	44.7	1000.0	1000.000	212.0	V	110.0	18.9	9.2	53.9	

FCC Part 15 Class B Spurious Emission 1-18GHz 3m

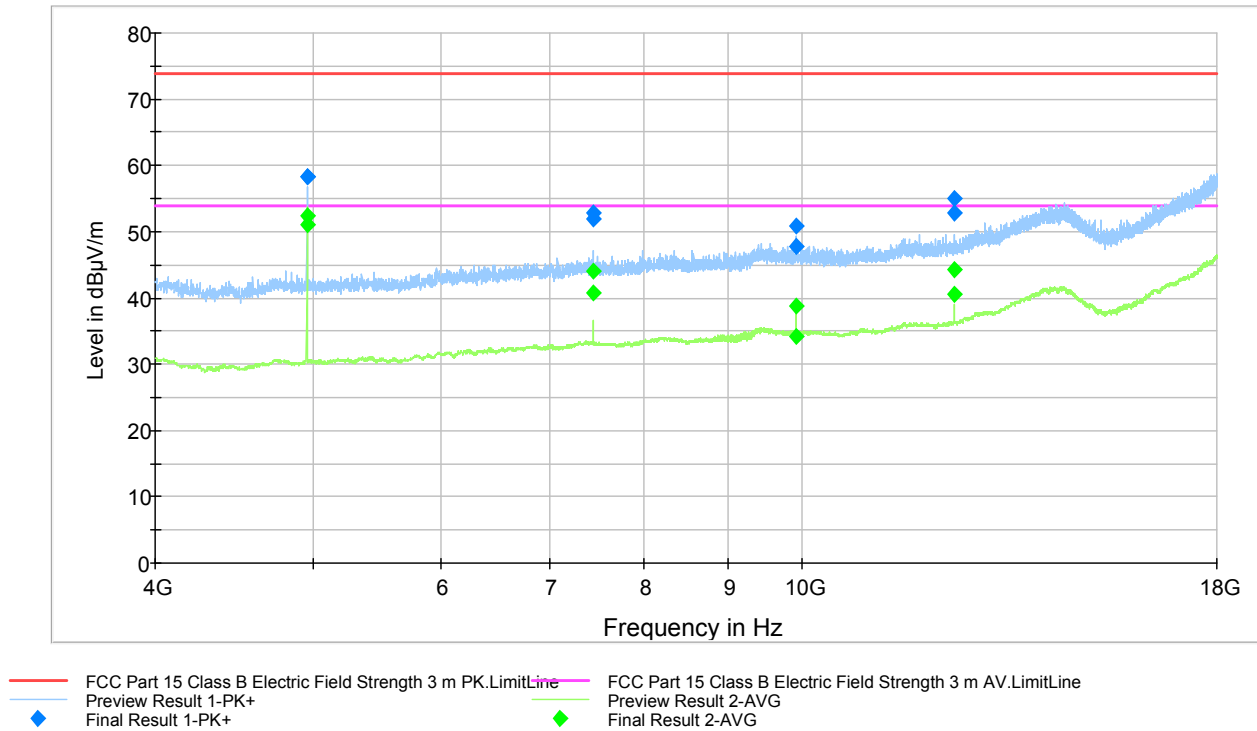


Figure 36. Measured curve with peak- and average detector. 1 Mbps Channel HIGH.

Final measurements from the worst frequencies

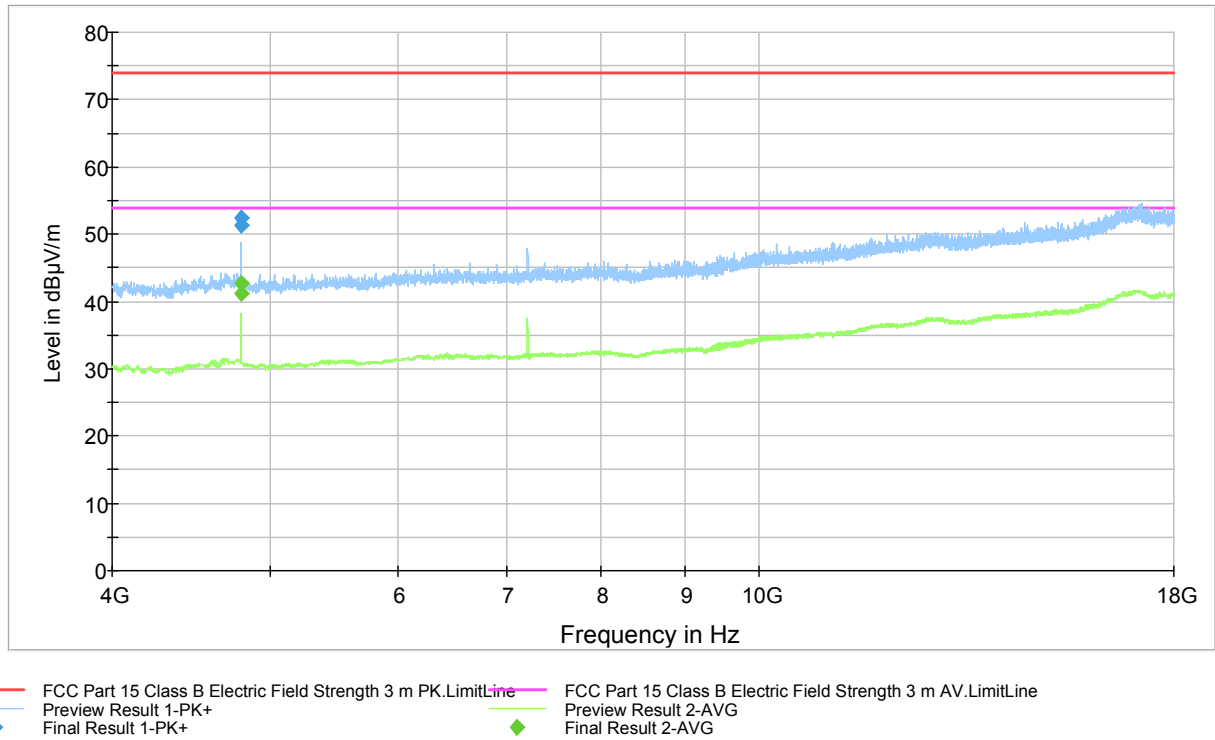
Table 31. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4959.775000	58.3	1000.0	1000.000	100.0	H	122.0	9.9	15.6	73.9	
4960.375000	58.2	1000.0	1000.000	183.0	V	340.0	9.9	15.7	73.9	
7440.175000	52.7	1000.0	1000.000	100.0	H	189.0	13.5	21.2	73.9	
7440.575000	52.1	1000.0	1000.000	209.0	V	247.0	13.5	21.9	73.9	
9919.525000	50.8	1000.0	1000.000	257.0	V	0.0	16.1	23.1	73.9	
9920.925000	47.8	1000.0	1000.000	295.0	H	105.0	16.1	26.1	73.9	
12400.375000	52.8	1000.0	1000.000	119.0	H	191.0	19.2	21.1	73.9	
12400.575000	55.0	1000.0	1000.000	144.0	V	254.0	19.2	18.9	73.9	

Table 32. Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4959.775000	52.5	1000.0	1000.000	100.0	H	122.0	9.9	1.4	53.9	
4960.375000	51.1	1000.0	1000.000	183.0	V	340.0	9.9	2.8	53.9	
7440.175000	44.0	1000.0	1000.000	100.0	H	189.0	13.5	9.9	53.9	
7440.575000	40.7	1000.0	1000.000	209.0	V	247.0	13.5	13.2	53.9	
9919.525000	38.8	1000.0	1000.000	257.0	V	0.0	16.1	15.1	53.9	
9920.925000	34.1	1000.0	1000.000	295.0	H	105.0	16.1	19.8	53.9	
12400.375000	40.6	1000.0	1000.000	119.0	H	191.0	19.2	13.3	53.9	
12400.575000	44.3	1000.0	1000.000	144.0	V	254.0	19.2	9.6	53.9	

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**Figure 37.** Measured curve with peak- and average detector. 2 Mbps Channel LOW.

**Final measurements from the worst frequencies**

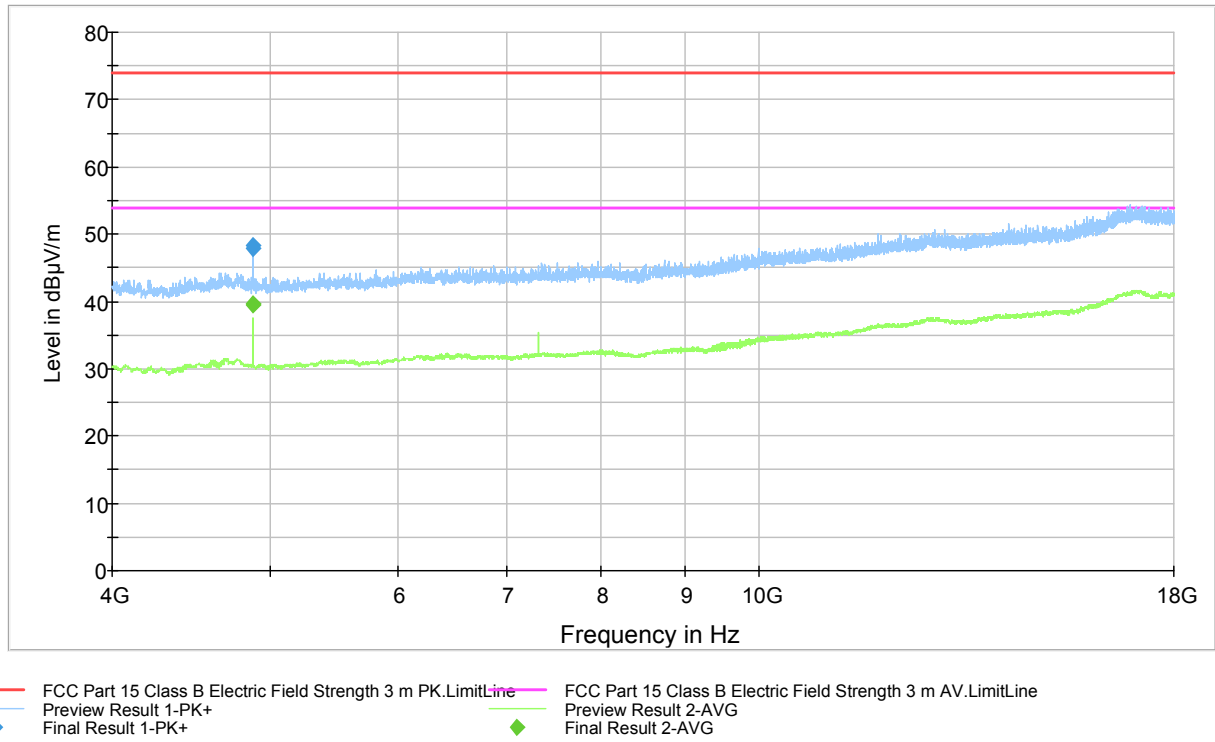
**Table 33.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4804.325000	52.3	1000.0	1000.000	100.0	H	136.0	9.9	21.6	73.9	
4804.325000	51.2	1000.0	1000.000	100.0	V	315.0	9.9	22.7	73.9	

**Table 34.** Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4803.925000	42.6	1000.0	1000.000	100.0	H	137.0	9.9	11.3	53.9	
4803.925000	41.3	1000.0	1000.000	100.0	V	318.0	9.9	12.6	53.9	

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**Figure 38.** Measured curve with peak- and average detector. 2 Mbps Channel MID.

**Final measurements from the worst frequencies**

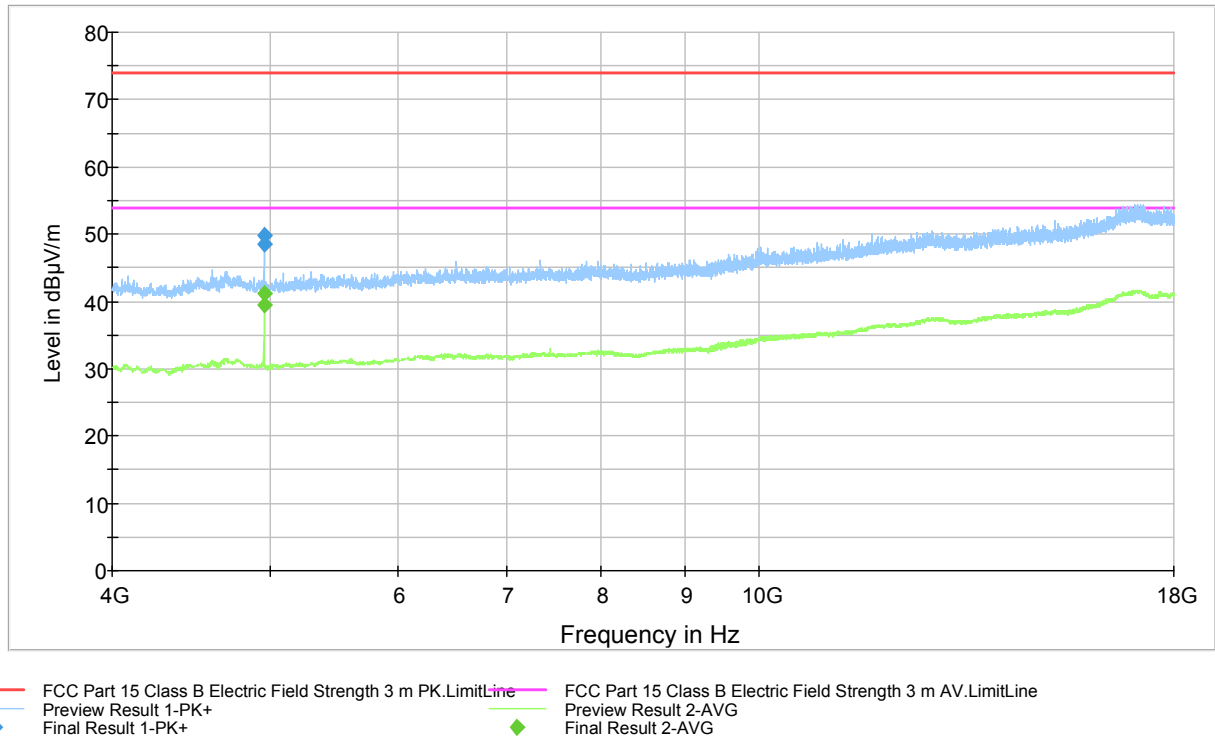
**Table 35.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4881.675000	48.2	1000.0	1000.000	197.0	V	-4.0	9.9	25.7	73.9	
4882.675000	47.9	1000.0	1000.000	100.0	H	213.0	9.9	26.0	73.9	

**Table 36.** Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4882.075000	39.4	1000.0	1000.000	100.0	H	201.0	9.9	14.5	53.9	
4882.075000	39.8	1000.0	1000.000	161.0	V	156.0	9.9	14.1	53.9	

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**Figure 39.** Measured curve with peak- and average detector. 2 Mbps Channel HIGH.

**Final measurements from the worst frequencies**

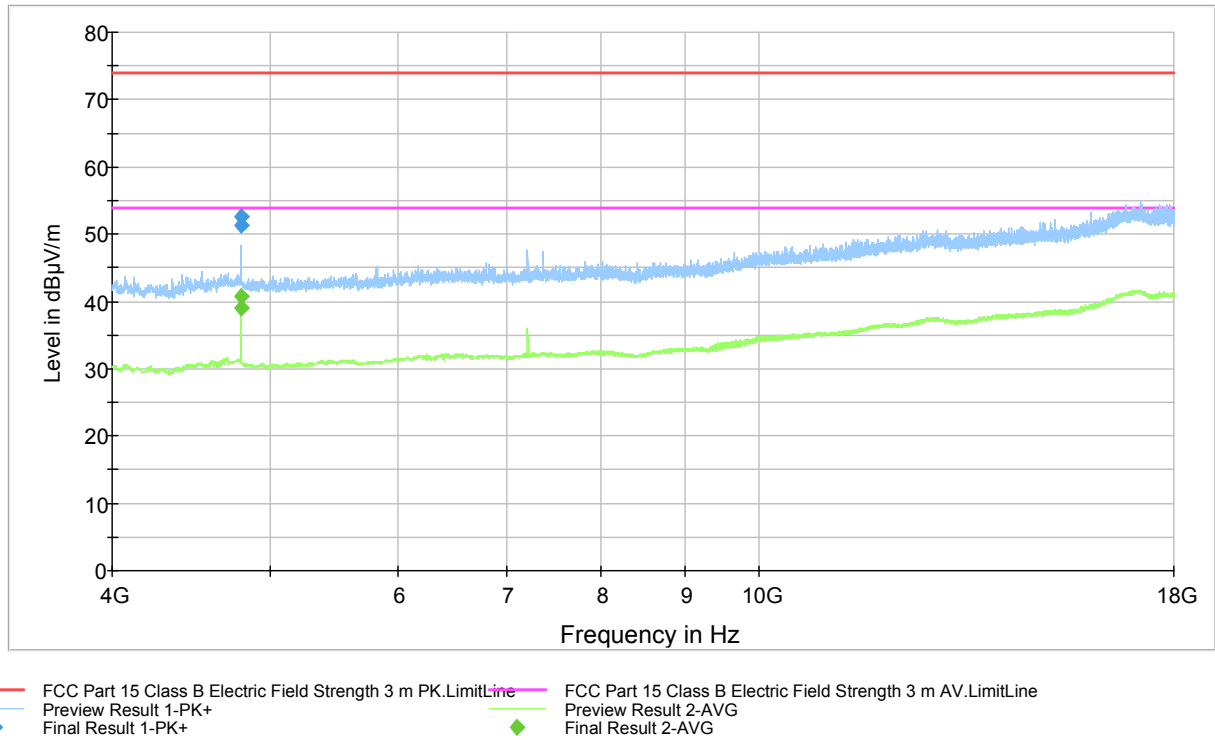
**Table 37.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit - PK+ (dBµV/m)	Comment
4959.775000	48.5	1000.0	1000.000	100.0	H	193.0	9.9	25.4	73.9	
4960.375000	49.7	1000.0	1000.000	200.0	V	89.0	9.9	24.2	73.9	

**Table 38.** Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit - AVG (dBµV/m)	Comment
4959.975000	39.5	1000.0	1000.000	100.0	H	207.0	9.9	14.4	53.9	
4959.975000	41.1	1000.0	1000.000	100.0	V	153.0	9.9	12.8	53.9	

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**Figure 40.** Measured curve with peak- and average detector. 3 Mbps Channel LOW.

**Final measurements from the worst frequencies**

**Table 39.** Final Max Peak results.

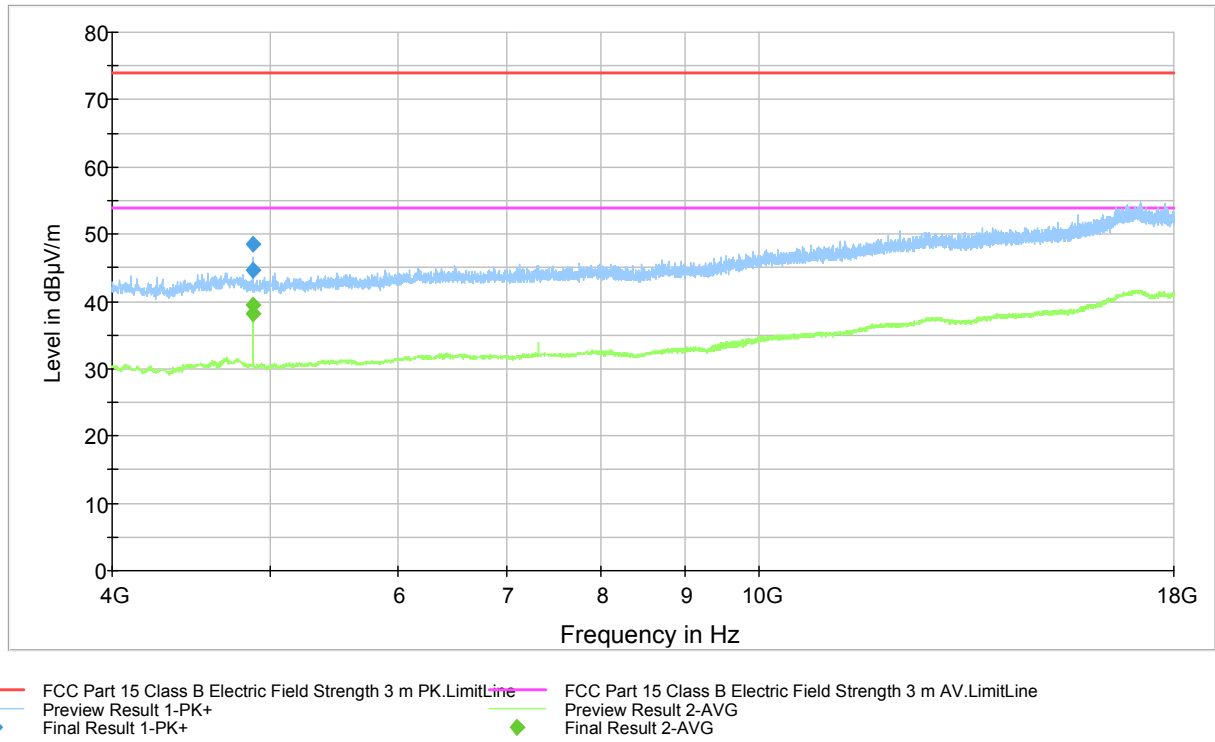
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4803.975000	52.6	1000.0	1000.000	100.0	H	138.0	9.9	21.3	73.9	
4804.175000	51.2	1000.0	1000.000	100.0	V	316.0	9.9	22.7	73.9	

**Table 40.** Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4803.925000	40.7	1000.0	1000.000	100.0	H	213.0	9.9	13.2	53.9	
4803.925000	39.0	1000.0	1000.000	199.0	V	187.0	9.9	14.9	53.9	



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**Figure 41.** Measured curve with peak- and average detector. 3 Mbps Channel MID.

**Final measurements from the worst frequencies**

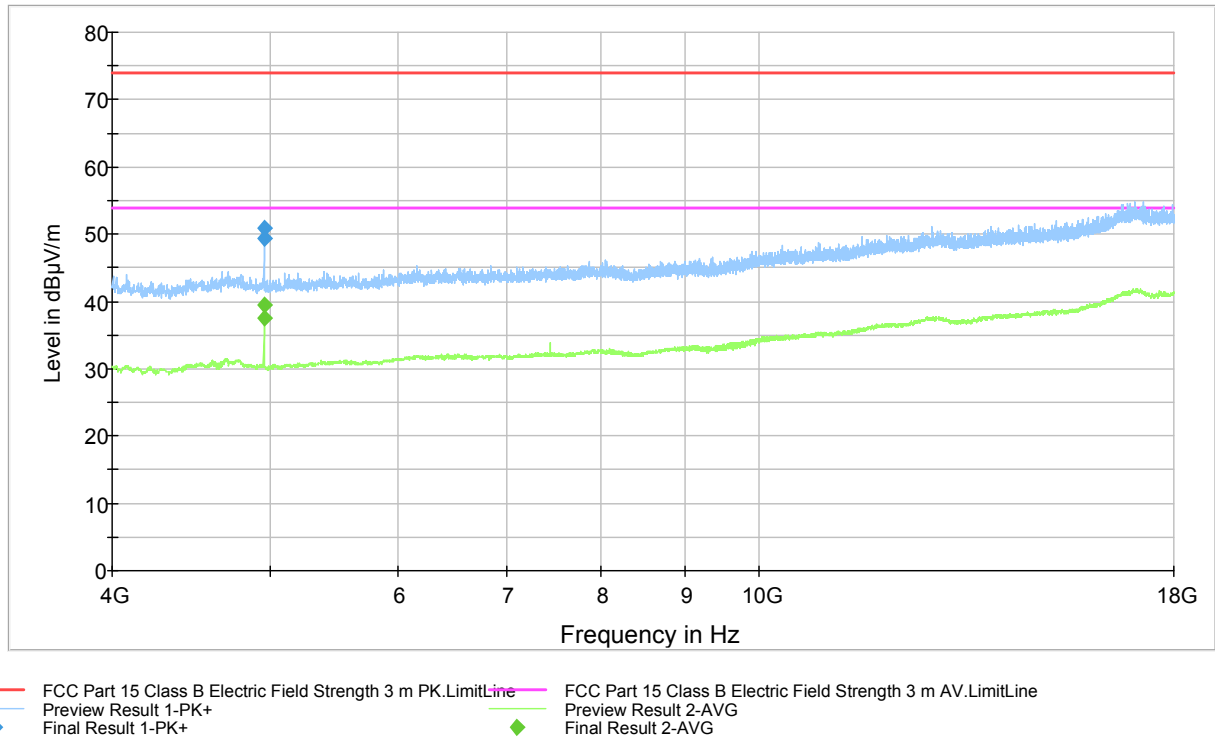
**Table 41.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4880.825000	44.7	1000.0	1000.000	100.0	H	220.0	9.9	29.2	73.9	
4882.225000	48.5	1000.0	1000.000	126.0	V	156.0	9.9	25.4	73.9	

**Table 42.** Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4882.075000	38.1	1000.0	1000.000	100.0	H	196.0	9.9	15.8	53.9	
4882.075000	39.5	1000.0	1000.000	164.0	V	157.0	9.9	14.4	53.9	

Copy of FCC Part 15 Class B Spurious Emission 4-18GHz 3m



**Figure 42.** Measured curve with peak- and average detector. 3 Mbps Channel HIGH.

**Final measurements from the worst frequencies**

**Table 43.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4959.775000	50.8	1000.0	1000.000	100.0	V	149.0	9.9	23.1	73.9	
4960.175000	49.4	1000.0	1000.000	100.0	H	209.0	9.9	24.5	73.9	

**Table 44.** Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4959.975000	37.5	1000.0	1000.000	100.0	H	189.0	9.9	16.4	53.9	
4959.975000	39.5	1000.0	1000.000	164.0	V	86.0	9.9	14.4	53.9	

Measured Peak and Average Values In The Frequency Range 18 000 MHz – 26 500 MHz.

Radiated Emission FCC Part 15 Class B 18-26.5GHz at 3m

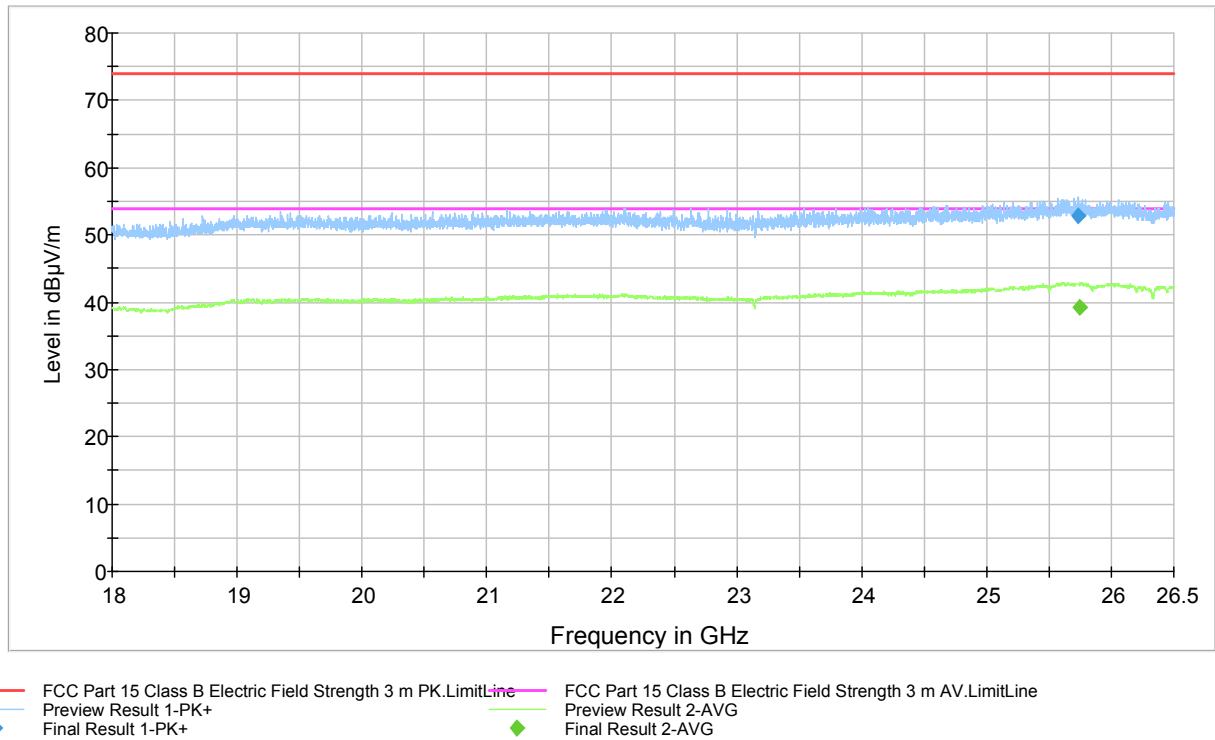


Figure 43. Measured curve with peak- and average detector. 1 Mbps Channel LOW.

Final measurements from the worst frequencies

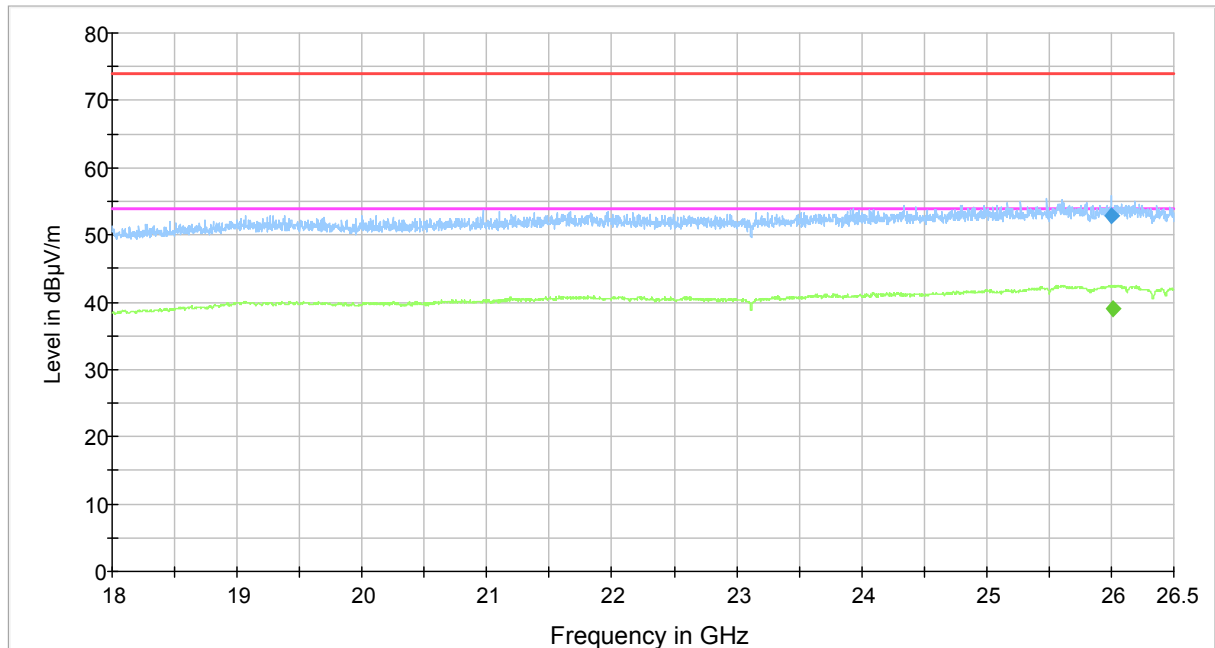
Table 45. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
25736.175000	52.9	1000.0	1000.000	150.0	V	5.0	28.6	21.0	73.9	

Table 46. Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
25744.375000	39.3	1000.0	1000.000	125.0	V	8.0	28.6	14.6	53.9	

Copy of Radiated Emission FCC Part 15 Class B 18-26.5GHz at 3m



— FCC Part 15 Class B Electric Field Strength 3 m PK.LimitLine     — FCC Part 15 Class B Electric Field Strength 3 m AV.LimitLine  
— Preview Result 1-PK+     — Preview Result 2-AVG  
◆ Final Result 1-PK+     ◆ Final Result 2-AVG

**Figure 44.** Measured curve with peak- and average detector. 1 Mbps Channel MID.

**Final measurements from the worst frequencies**

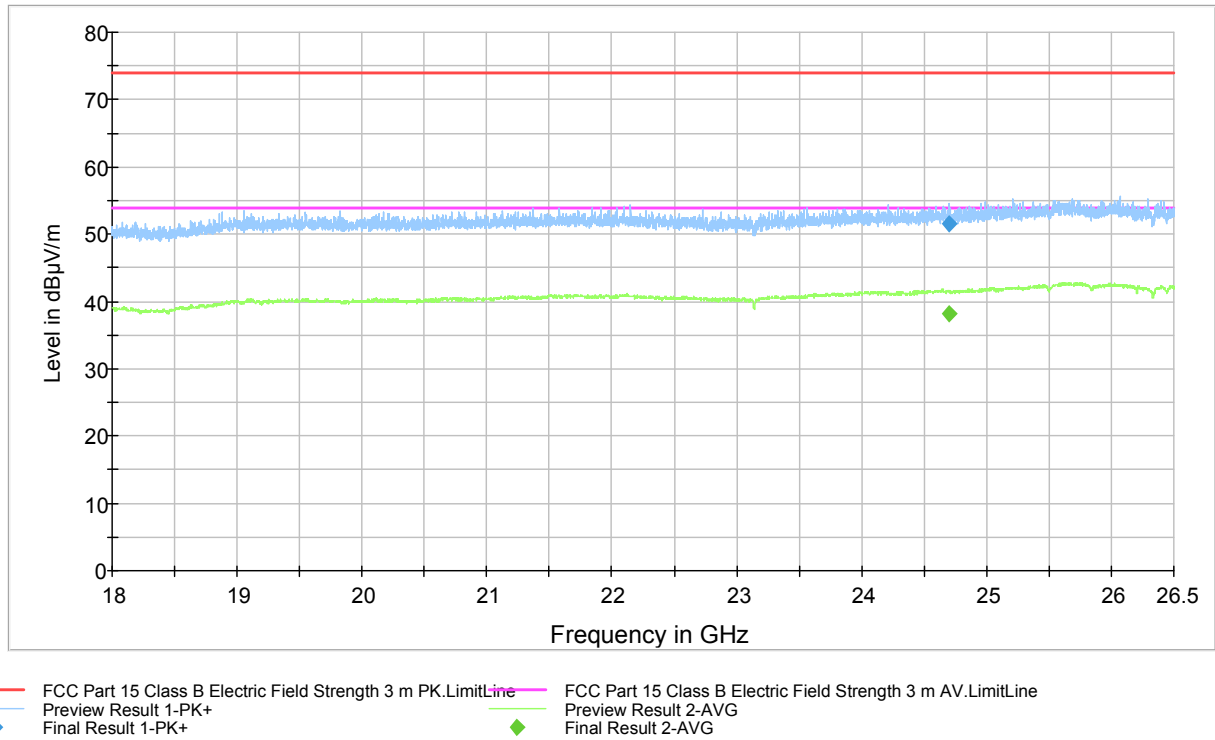
**Table 47.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
25995.950000	52.7	1000.0	1000.000	124.0	V	22.0	28.0	21.2	73.9	

**Table 48.** Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
26008.050000	39.0	1000.0	1000.000	100.0	V	22.0	28.0	14.9	53.9	

Radiated Emission FCC Part 15 Class B 18-26.5GHz at 3m



**Figure 45.** Measured curve with peak- and average detector. 1 Mbps Channel HIGH.

**Final measurements from the worst frequencies**

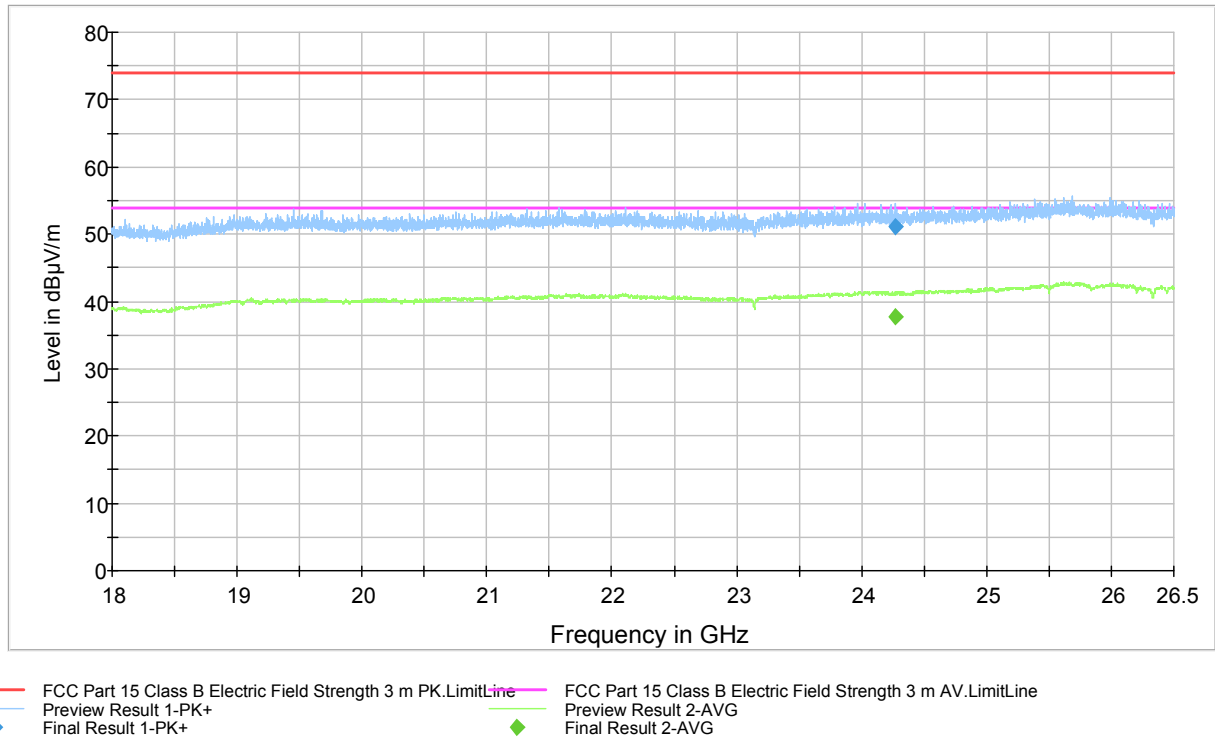
**Table 49.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
24701.525000	51.6	1000.0	1000.000	100.0	V	12.0	27.5	22.3	73.9	

**Table 50.** Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
24697.725000	38.1	1000.0	1000.000	100.0	V	8.0	27.5	15.8	53.9	

Radiated Emission FCC Part 15 Class B 18-26.5GHz at 3m



**Figure 46.** Measured curve with peak- and average detector. 2 Mbps Channel LOW.

**Final measurements from the worst frequencies**

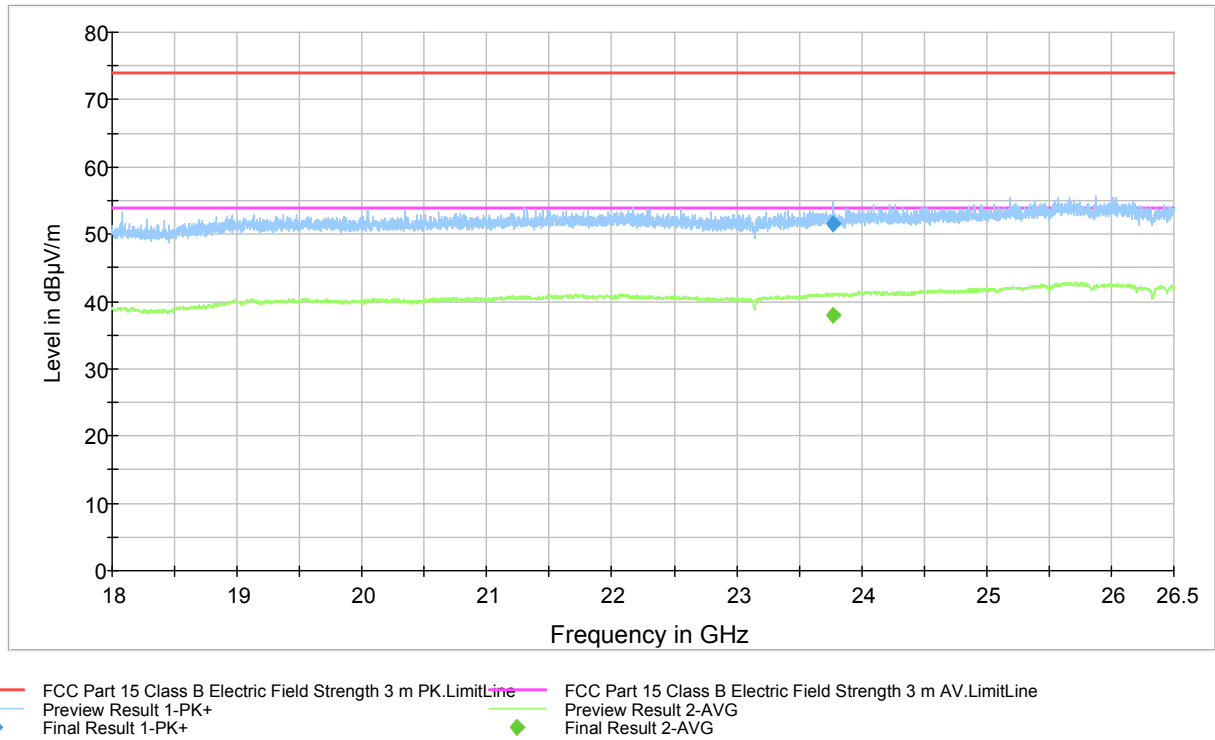
**Table 51.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
24268.575000	51.0	1000.0	1000.000	100.0	V	15.0	27.3	22.9	73.9	

**Table 52.** Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
24273.575000	37.8	1000.0	1000.000	150.0	V	0.0	27.3	16.1	53.9	

Radiated Emission FCC Part 15 Class B 18-26.5GHz at 3m



**Figure 47.** Measured curve with peak- and average detector. 2 Mbps Channel MID.

**Final measurements from the worst frequencies**

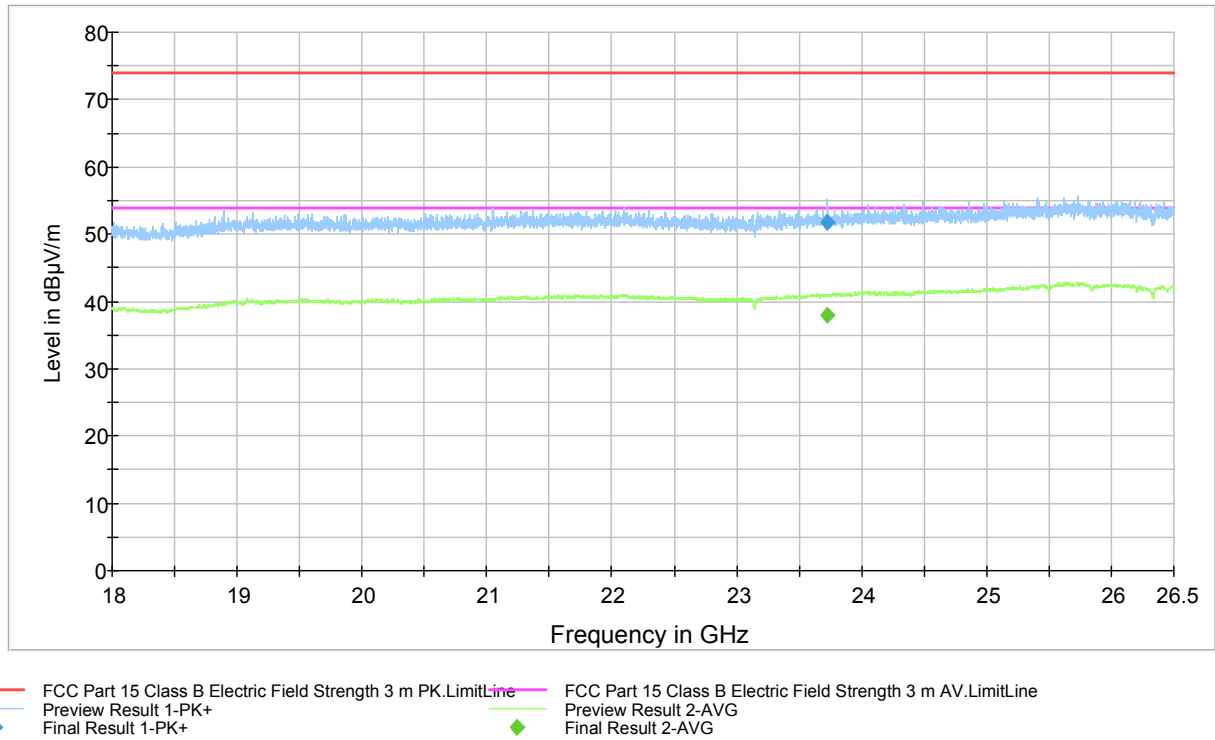
**Table 53.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
23772.125000	51.5	1000.0	1000.000	100.0	V	7.0	27.1	22.4	73.9	

**Table 54.** Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
23774.325000	37.9	1000.0	1000.000	100.0	V	3.0	27.1	16.0	53.9	

Radiated Emission FCC Part 15 Class B 18-26.5GHz at 3m



**Figure 48.** Measured curve with peak- and average detector. 2 Mbps Channel HIGH.

**Final measurements from the worst frequencies**

**Table 55.** Final Max Peak results.

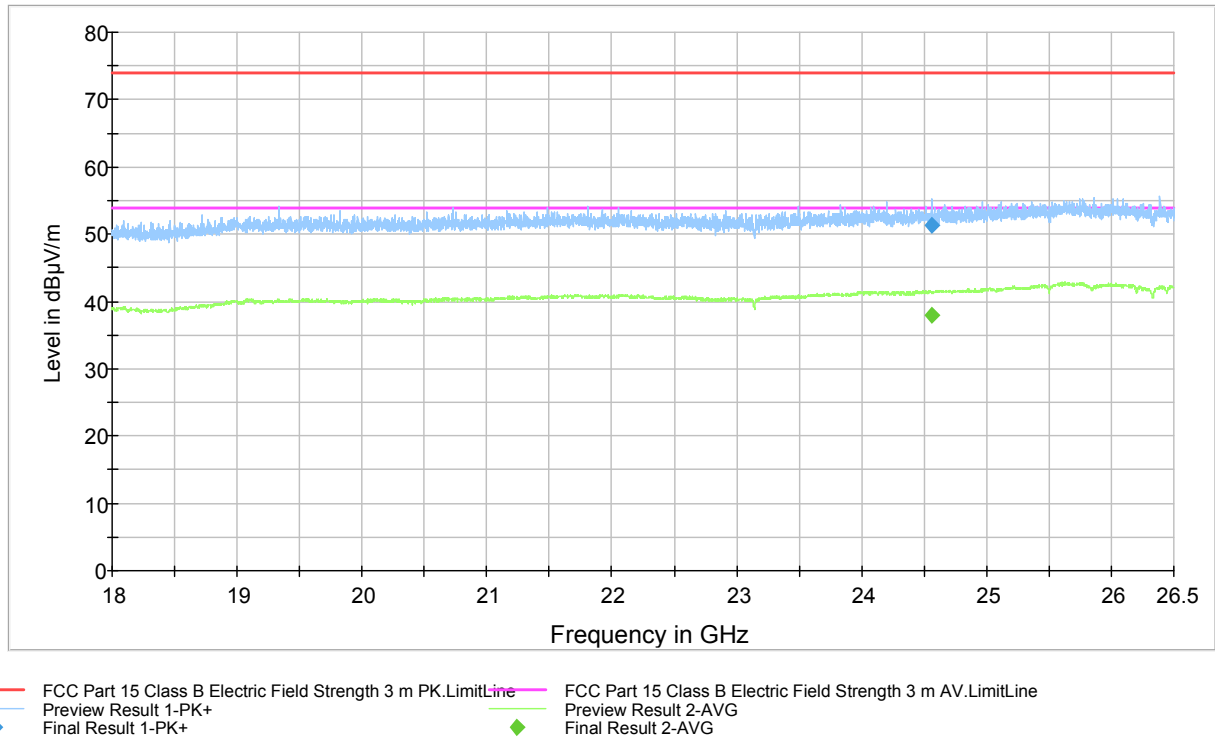
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
23729.175000	51.8	1000.0	1000.000	137.0	V	1.0	27.0	22.1	73.9	

**Table 56.** Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
23724.375000	38.0	1000.0	1000.000	100.0	V	-5.0	27.0	15.9	53.9	



Radiated Emission FCC Part 15 Class B 18-26.5GHz at 3m



**Figure 49.** Measured curve with peak- and average detector. 3 Mbps Channel LOW.

**Final measurements from the worst frequencies**

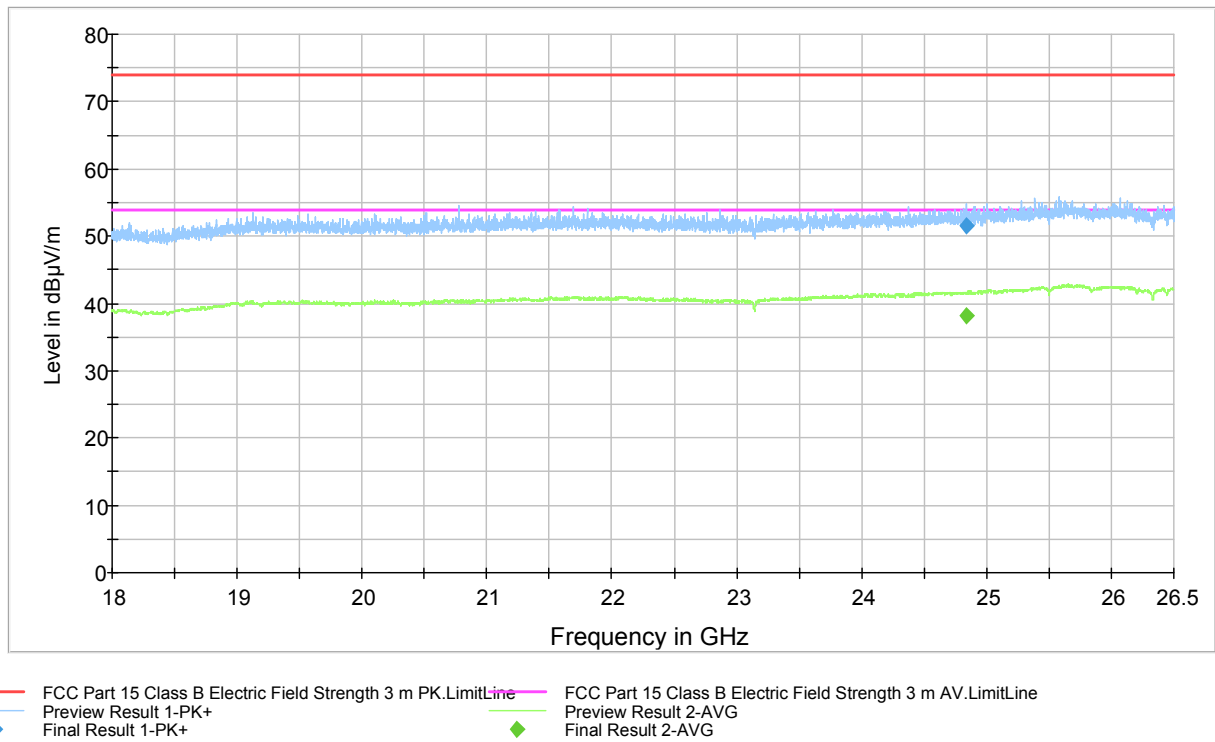
**Table 57.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
24561.875000	51.4	1000.0	1000.000	109.0	V	11.0	27.4	22.5	73.9	

**Table 58.** Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
24558.075000	38.0	1000.0	1000.000	100.0	V	3.0	27.4	15.9	53.9	

Radiated Emission FCC Part 15 Class B 18-26.5GHz at 3m



**Figure 50.** Measured curve with peak- and average detector. 3 Mbps Channel MID.

**Final measurements from the worst frequencies**

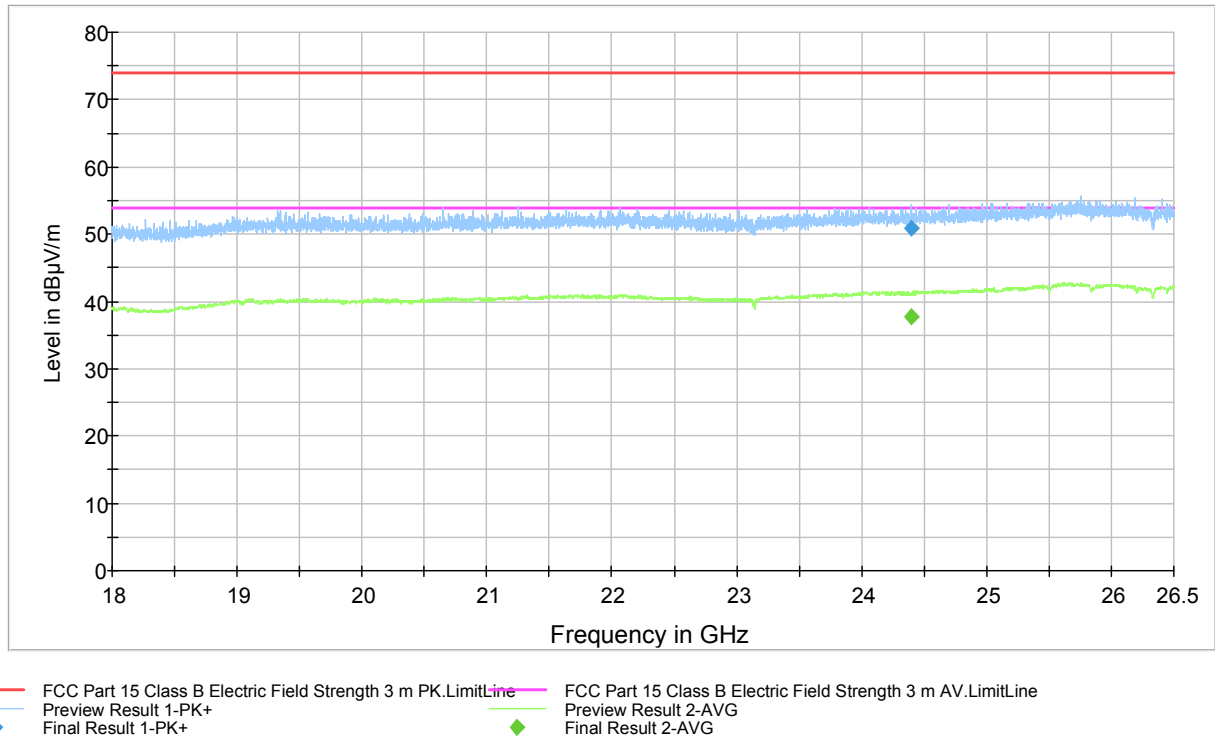
**Table 59.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
24840.875000	51.6	1000.0	1000.000	124.0	V	5.0	27.6	22.3	73.9	

**Table 60.** Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
24844.875000	38.2	1000.0	1000.000	100.0	V	14.0	27.7	15.7	53.9	

Radiated Emission FCC Part 15 Class B 18-26.5GHz at 3m



**Figure 51.** Measured curve with peak- and average detector. 3 Mbps Channel HIGH.

**Final measurements from the worst frequencies**

**Table 61.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
24397.575000	51.0	1000.0	1000.000	115.0	V	3.0	27.2	22.9	73.9	

**Table 62.** Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
24394.775000	37.7	1000.0	1000.000	119.0	V	0.0	27.2	16.2	53.9	

**Transmitter Band Edge Measurement and Conducted Spurious Emissions**

**Standard:** ANSI C63.10 (2009)  
**Tested by:** NTO  
**Date:** 29.11.2011 and 27.1.2012  
**Humidity:** 35 %  
**Temperature:** 20 °C  
**Measurement uncertainty** ± 2.87 dB Level of confidence 95 % (k = 2)

**FCC Rule: 15.247(d), 15.209(a)**

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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. 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 15.205(c)).

**Table 63.** Band edge attenuation.

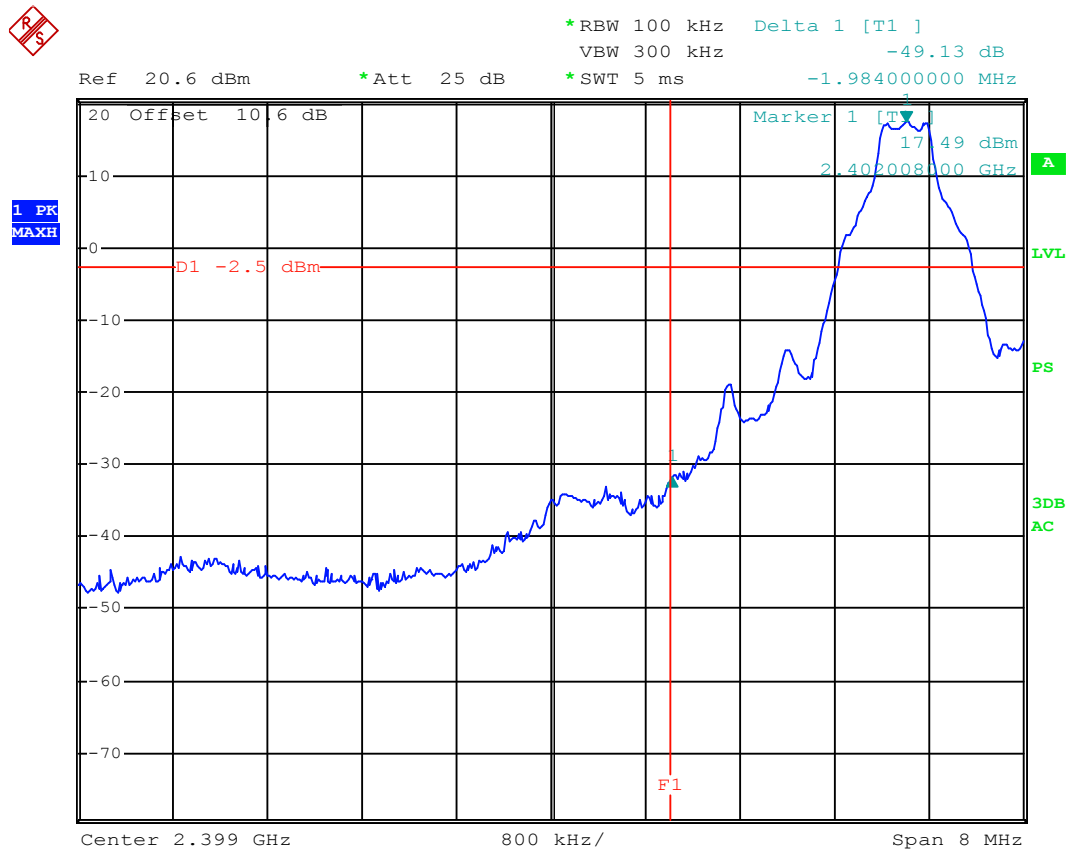
Data rate	Band Edge Attenuation	
	Lower Band Edge	Upper Band Edge
1Mbps	-49.13 dBc	-60.13 dBc
2Mbps	-46.20 dBc	-46.55 dBc
3Mbps	-45.50 dBc	-50.56 dBc
<b>Limit: -20dBc</b>		

**Table 64.** Conducted spurious emissions 1Mbps, 2Mbps and 3Mbps.

Conducted Spurious Emissions				
Channel	Measured Attenuation [dB]	Limit [dBc]	Margin [dB]	Result
Low	-	-20.0	-	-
Mid	-	-20.0	-	-
High	-	-20.0	-	-

**No significant emissions were detected close to the limit.**

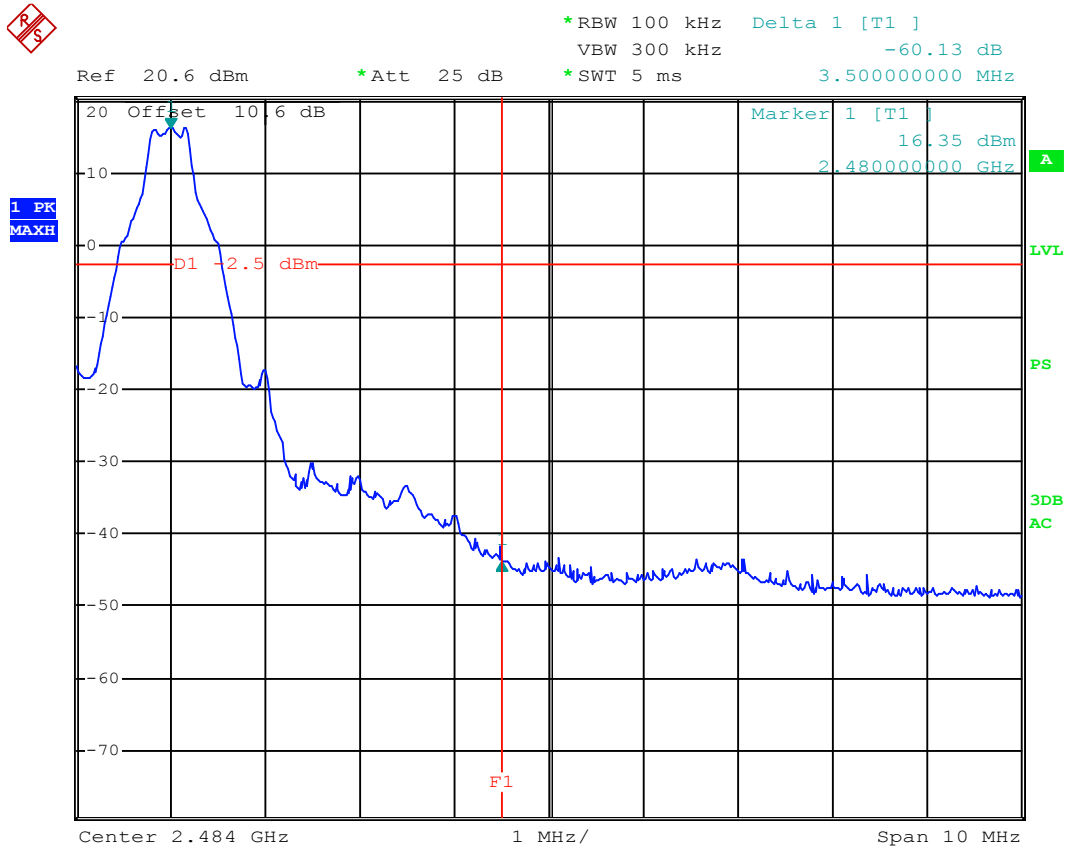
**Transmitter Band Edge Measurement and Conducted Spurious Emissions**



Date: 29.NOV.2011 15:15:12

**Figure 52.** Lower Band Edge 1Mbps.

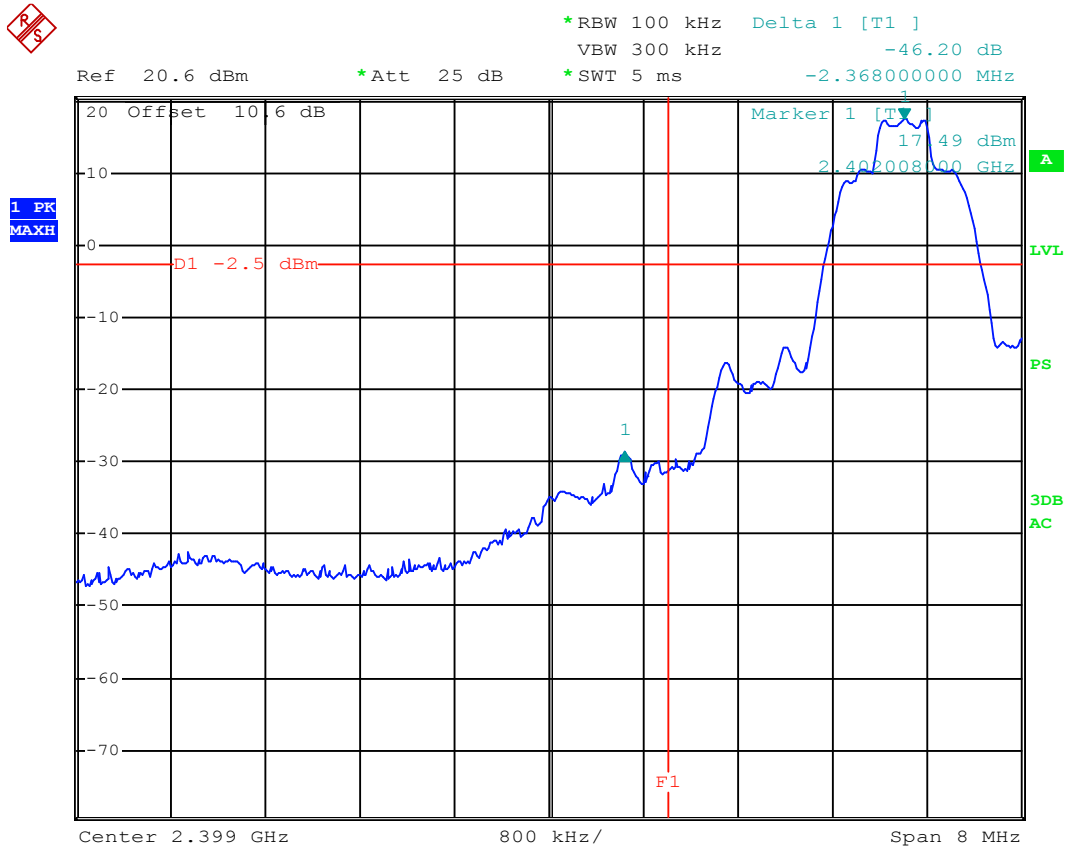
**Transmitter Band Edge Measurement and Conducted Spurious Emissions**



Date: 29.NOV.2011 15:13:12

**Figure 53.** Upper Band Edge 1Mbps.

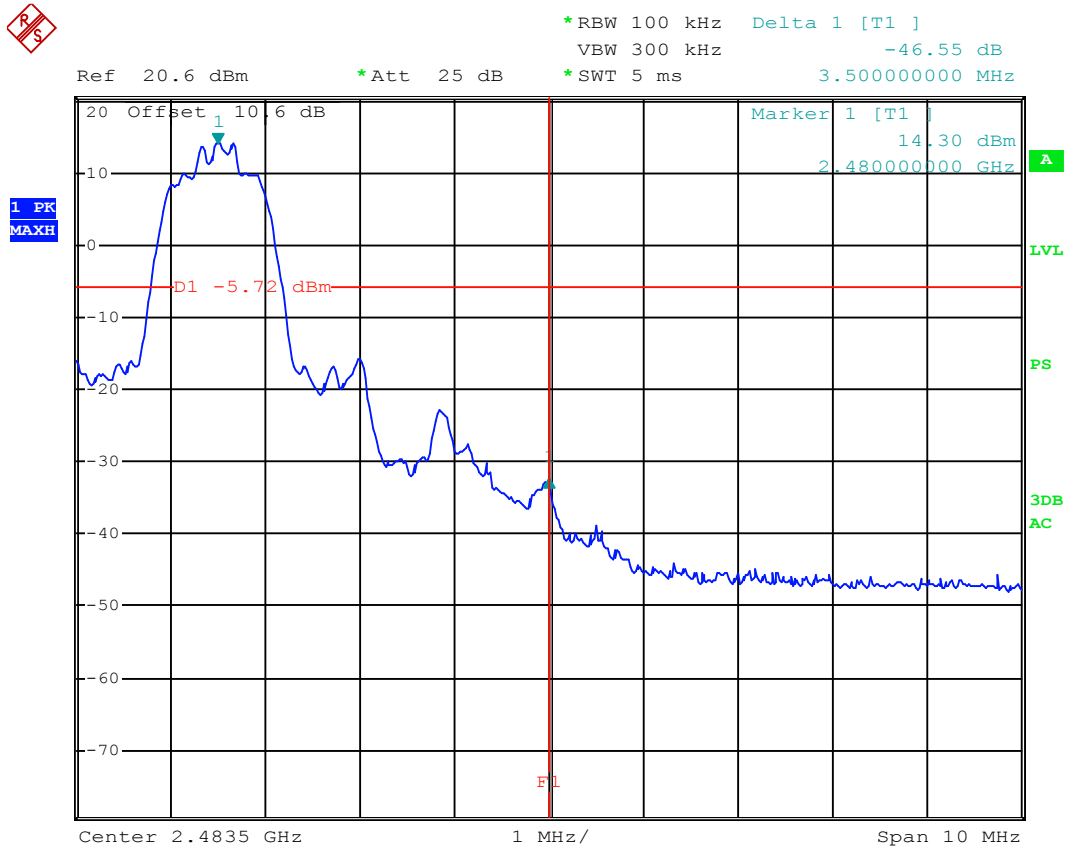
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 29.NOV.2011 15:16:40

Figure 54. Lower Band Edge 2Mbps.

## Transmitter Band Edge Measurement and Conducted Spurious Emissions

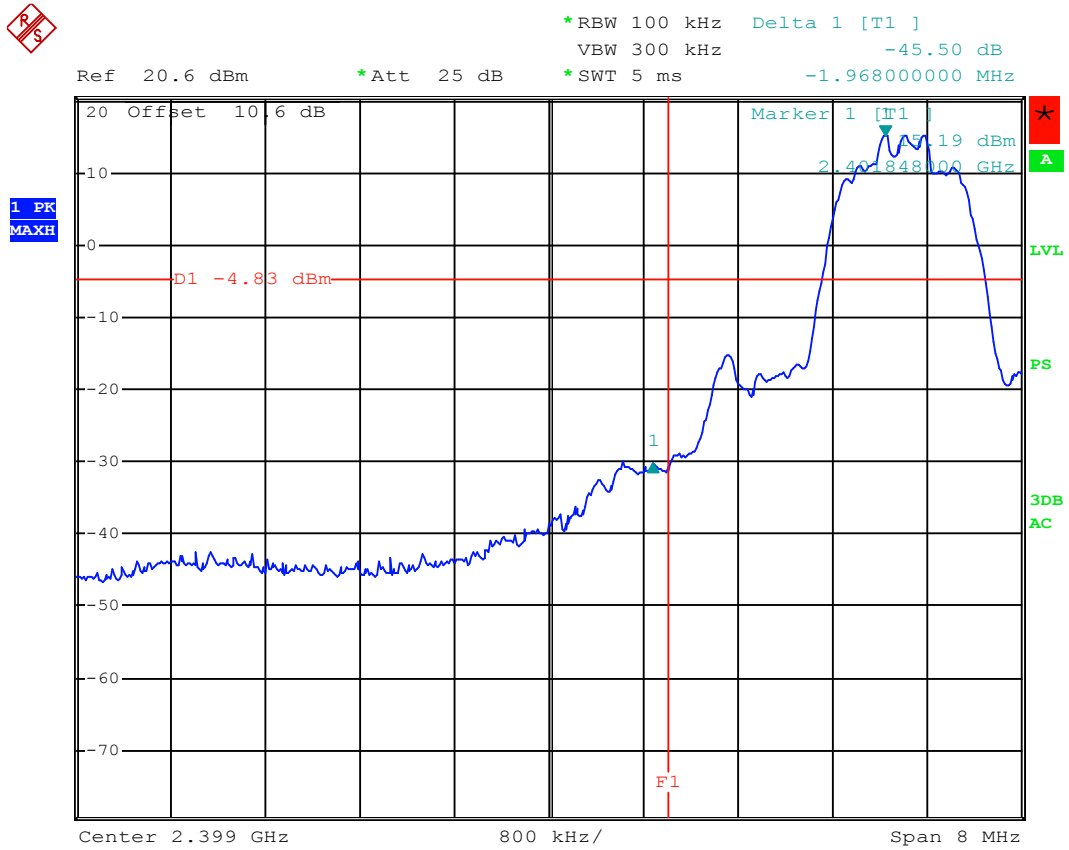


Date: 29.NOV.2011 15:19:12

**Figure 55.** Upper Band Edge 2Mbps.



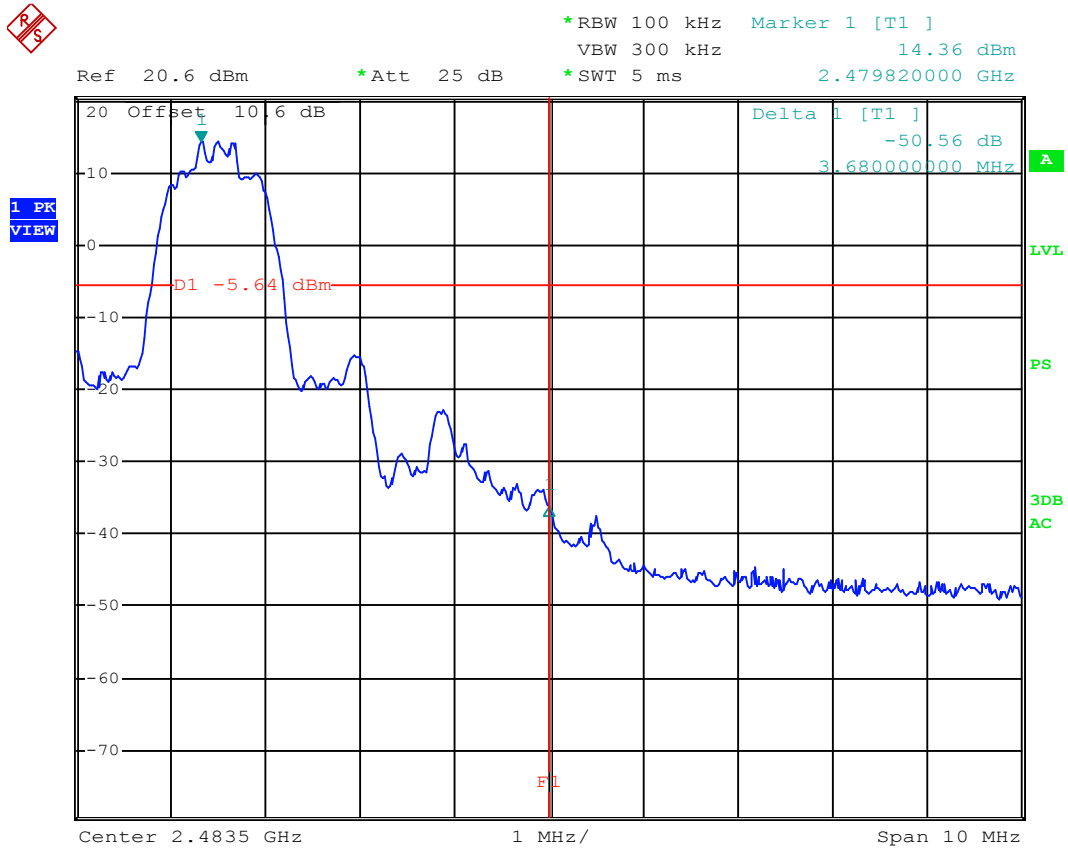
**Transmitter Band Edge Measurement and Conducted Spurious Emissions**



Date: 29.NOV.2011 15:24:54

**Figure 56.** Lower Band Edge 3Mbps.

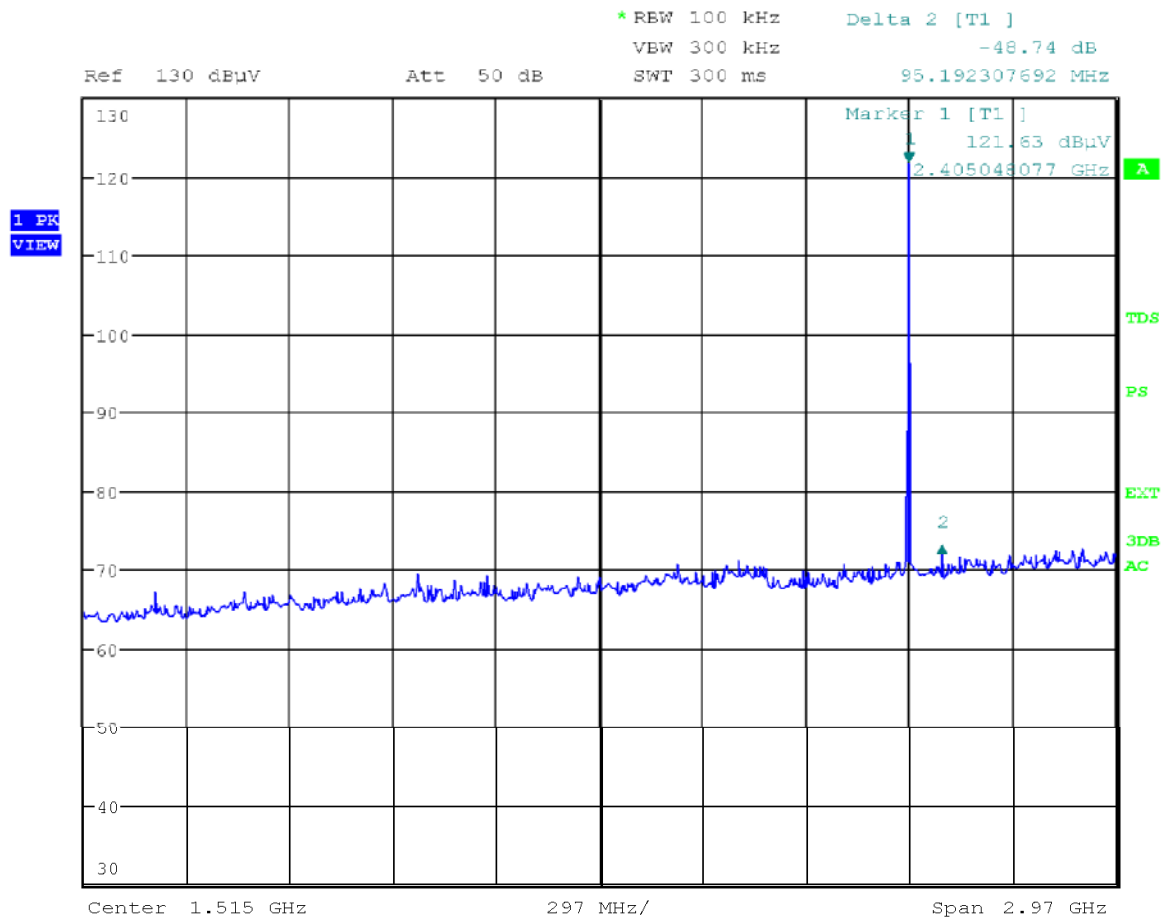
## Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 29.NOV.2011 15:21:18

**Figure 57.** Upper Band Edge 3Mbps.

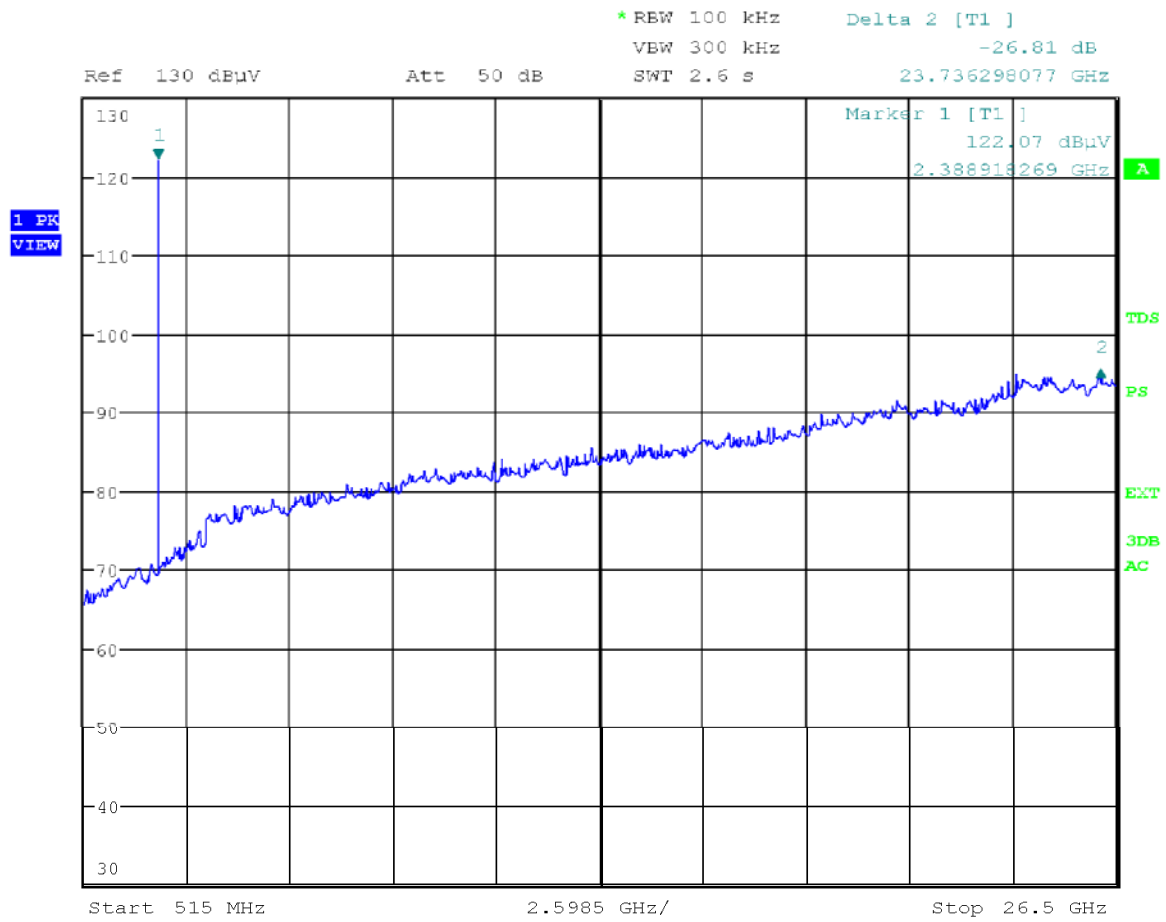
## Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 27.JAN.2012 14:17:17

**Figure 58.** Conducted Spurious Emissions 30 – 3 000 MHz. 1 Mbps Channel LOW.

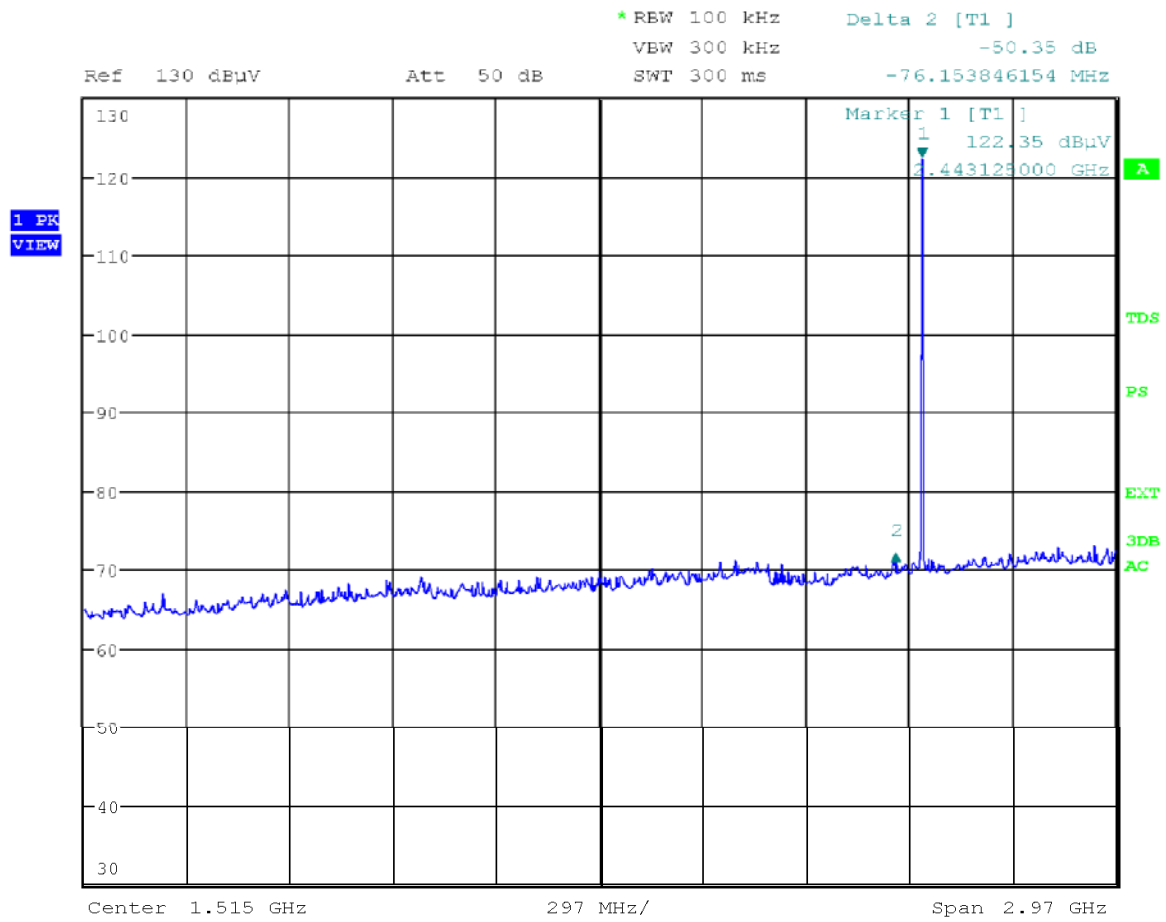
## Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 27.JAN.2012 14:16:09

**Figure 59.** Conducted Spurious Emissions 3 000 – 26 500 MHz. 1 Mbps Channel LOW.

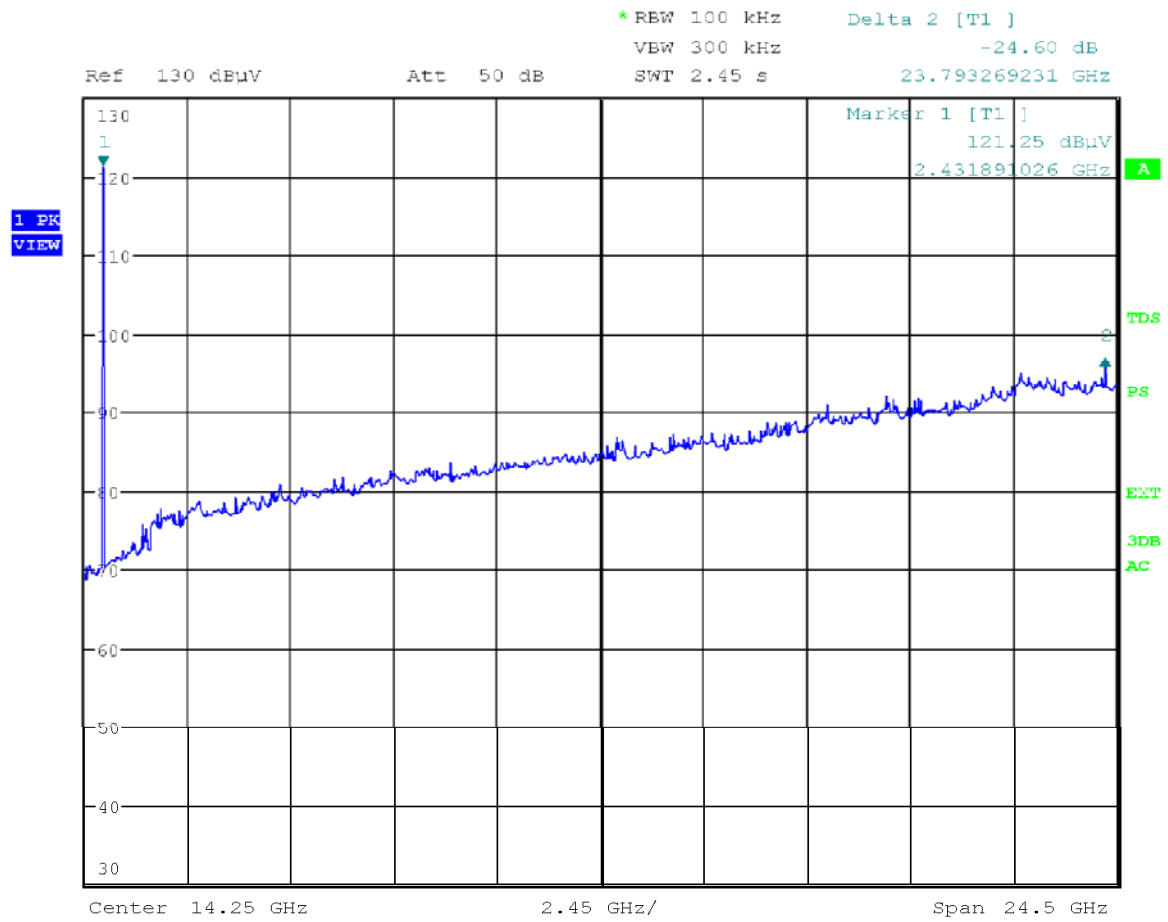
**Transmitter Band Edge Measurement and Conducted Spurious Emissions**



Date: 27.JAN.2012 14:19:49

**Figure 60.** Conducted Spurious Emissions 30 – 3 000 MHz. 1 Mbps Channel MID.

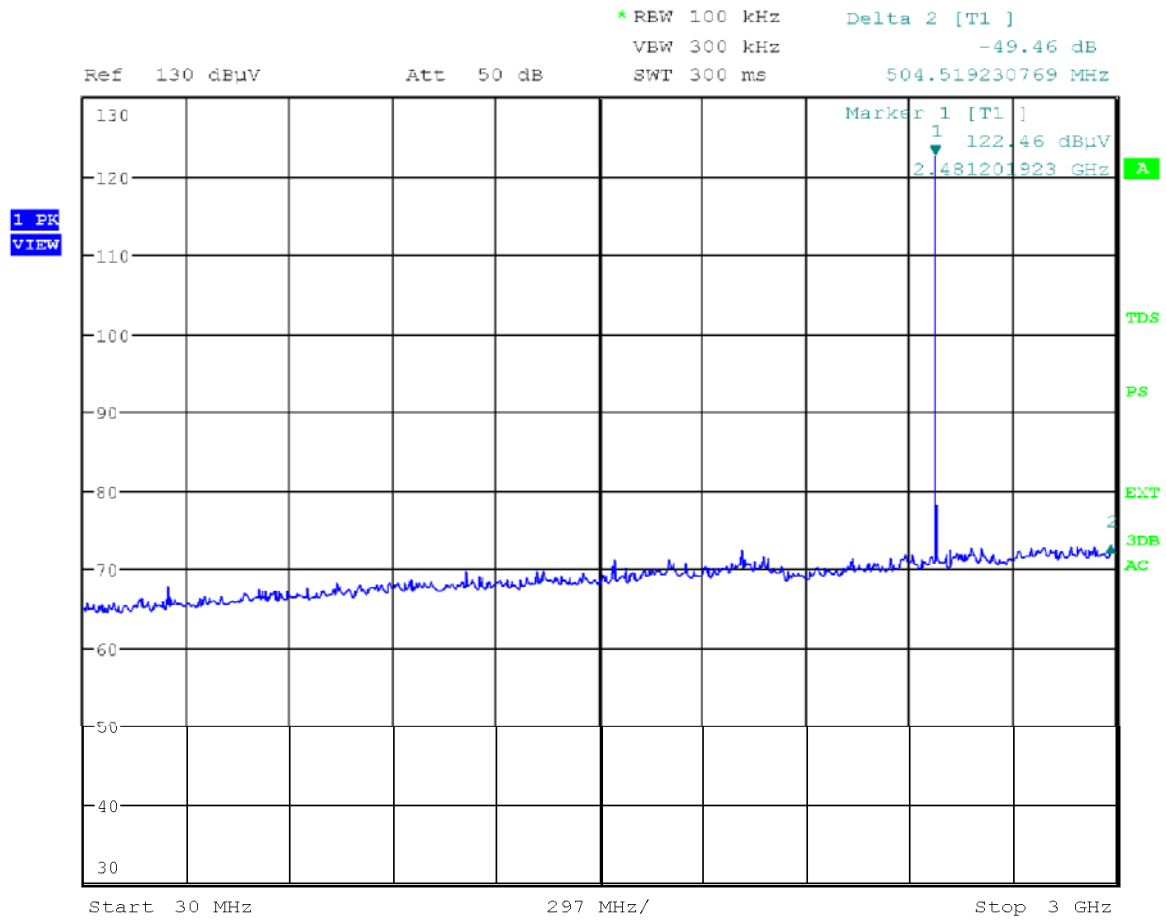
## Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 27.JAN.2012 14:21:13

Spurious Emissions 3 000 – 26 500 MHz. 1Mbps Channel MID.

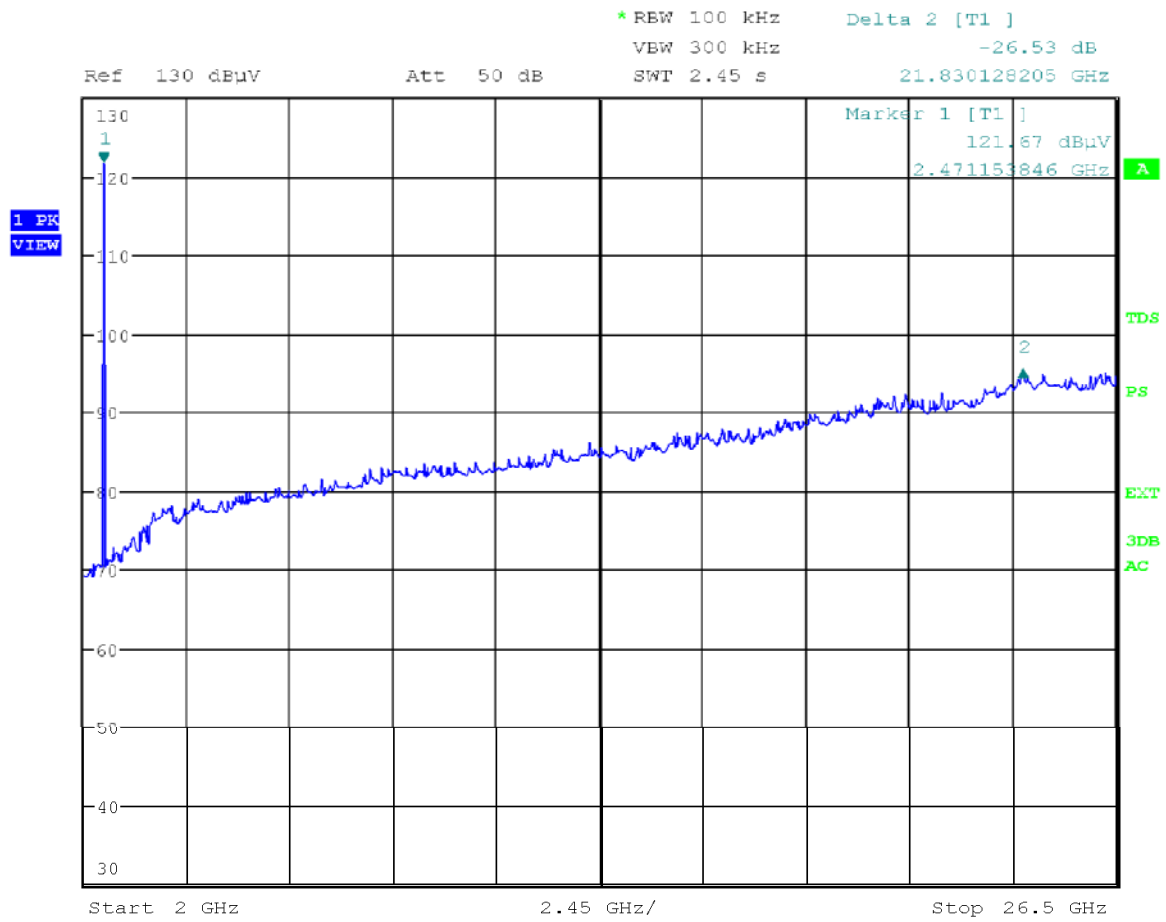
## Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 27.JAN.2012 14:25:16

**Figure 61.** Conducted Spurious Emissions 30 – 3 000 MHz. 1Mbps Channel HIGH.

## Transmitter Band Edge Measurement and Conducted Spurious Emissions

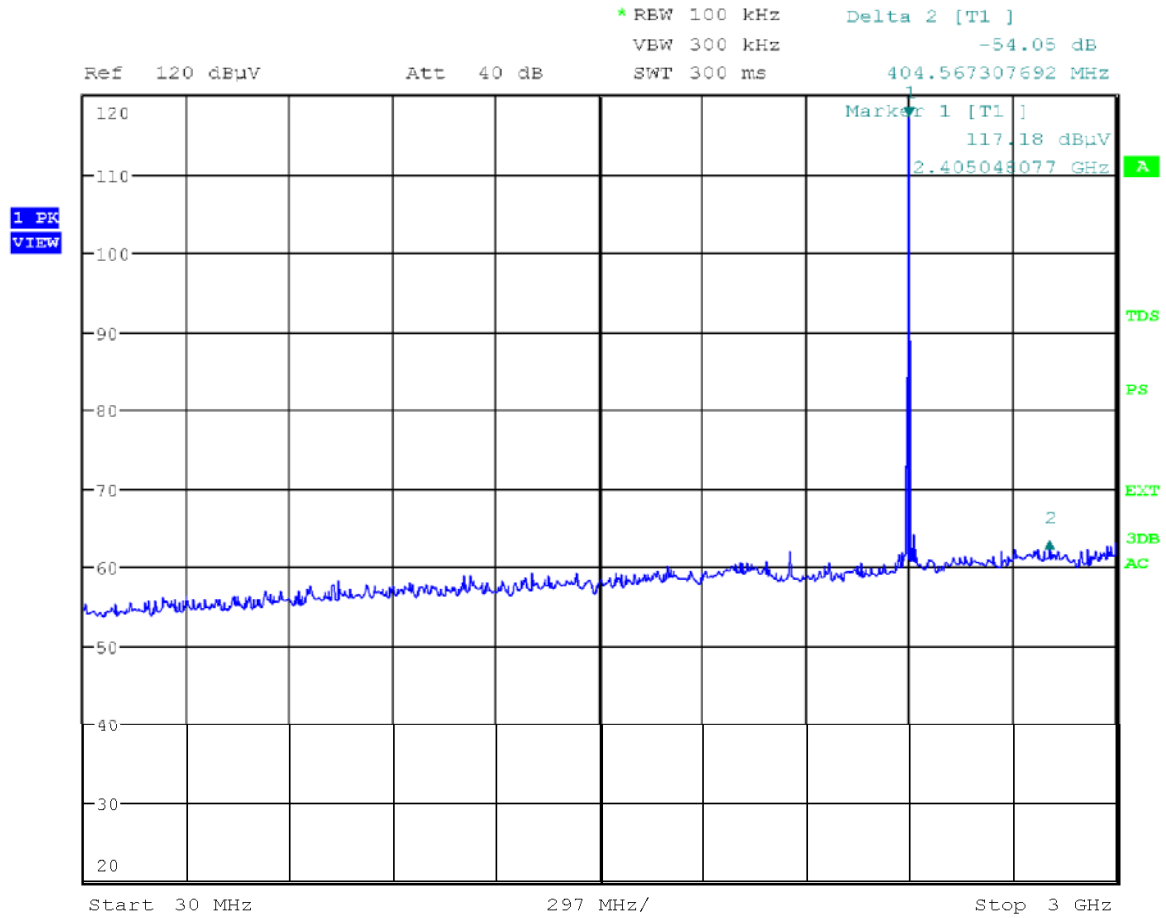


Date: 27.JAN.2012 14:26:54

**Figure 62.** Conducted Spurious Emissions 3 000 – 26 500 MHz. 1 Mbps Channel HIGH.



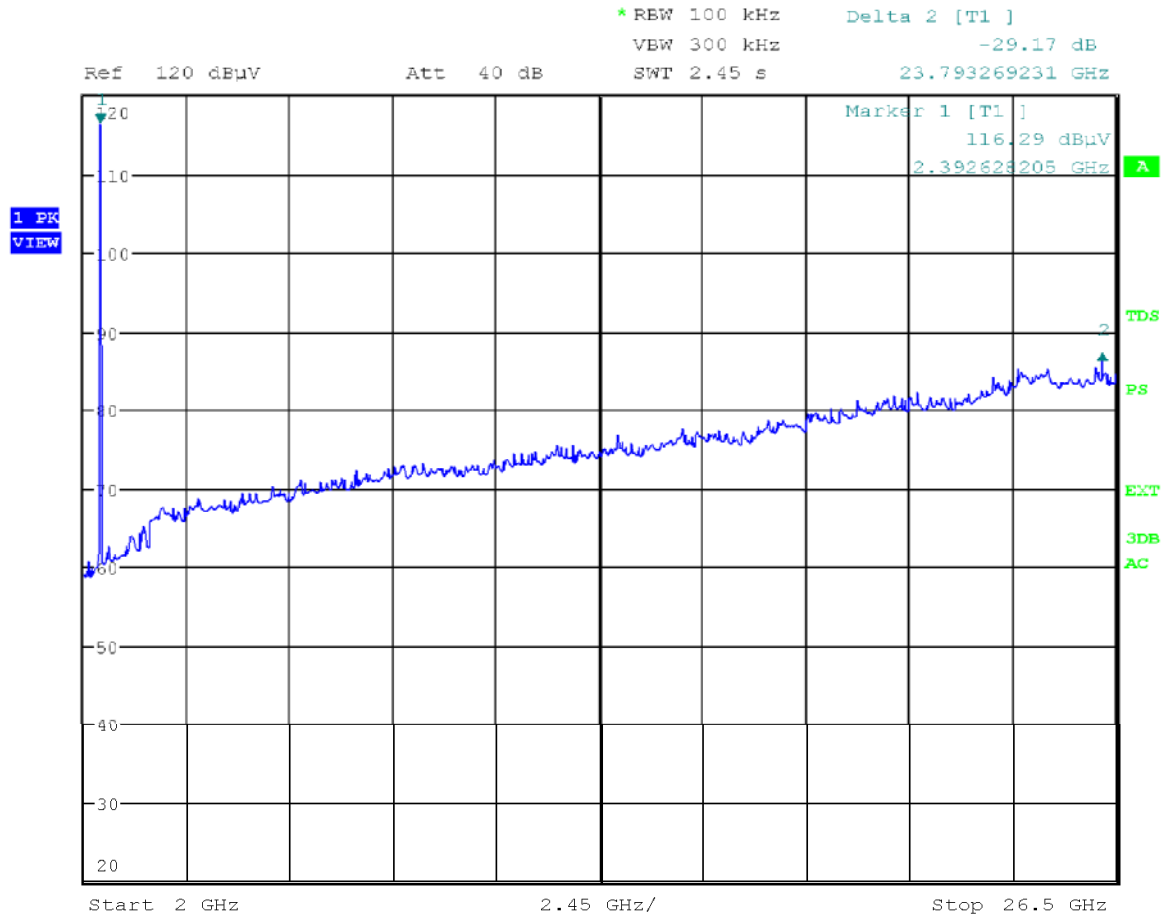
## Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 27.JAN.2012 14:35:39

**Figure 63.** Conducted Spurious Emissions 30 – 3 000 MHz. 2 Mbps Channel LOW.

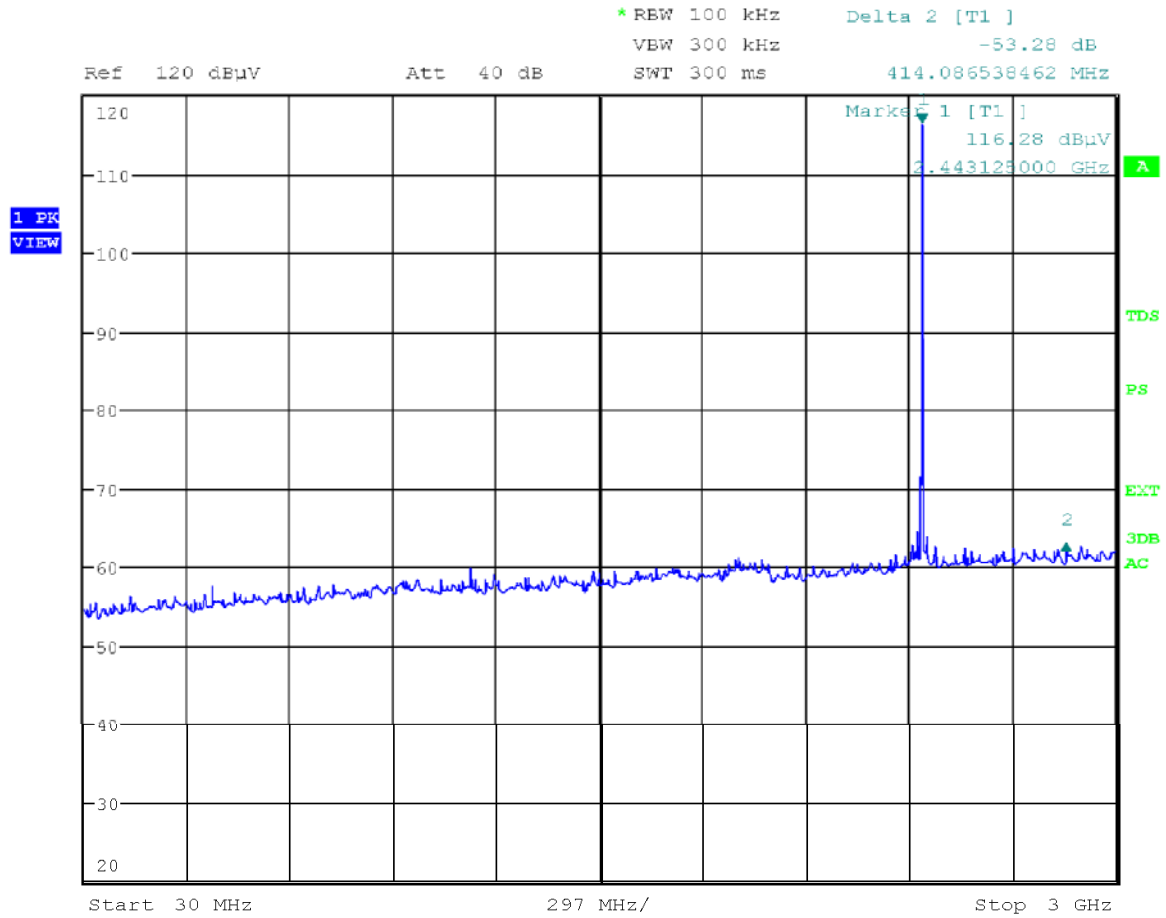
## Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 27.JAN.2012 14:36:51

**Figure 64.** Conducted Spurious Emissions 3 000 – 26 500 MHz. 2 Mbps Channel LOW.

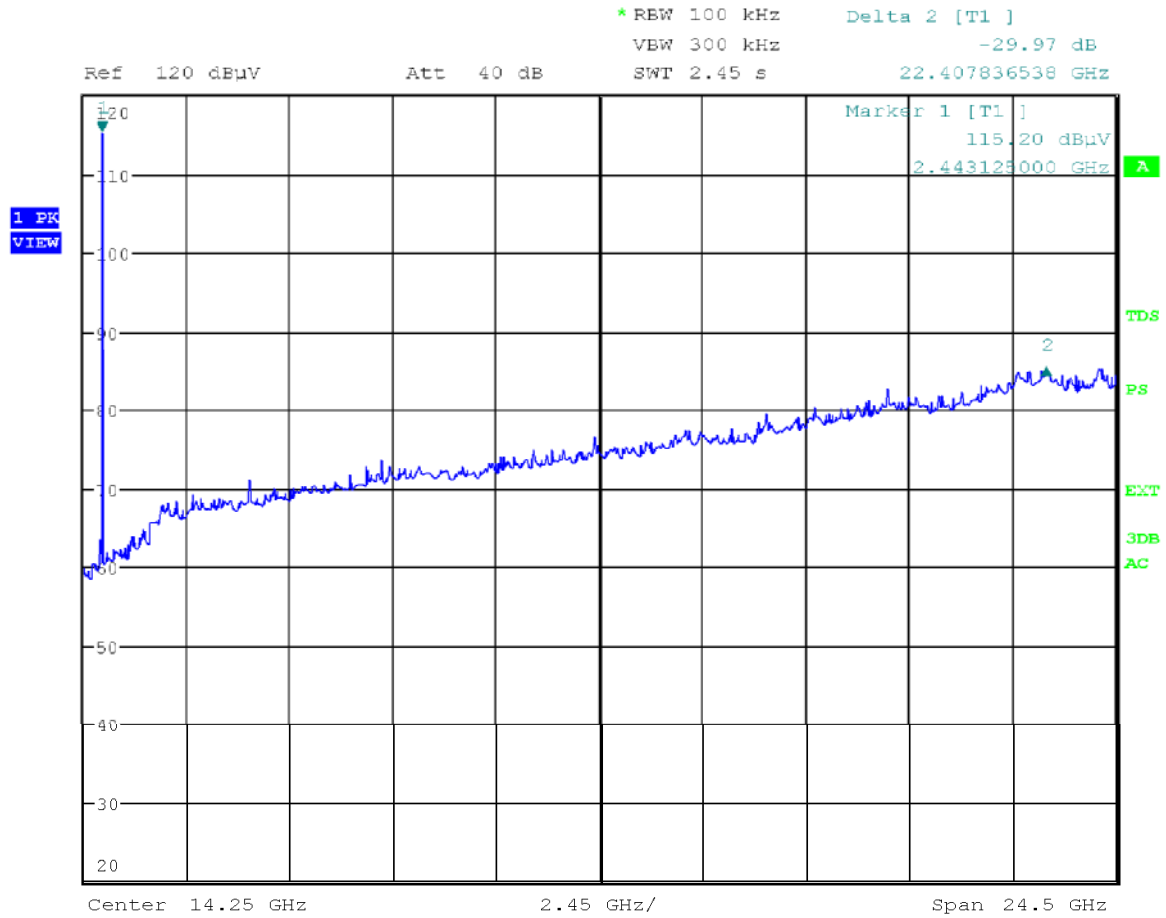
## Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 27.JAN.2012 14:34:20

**Figure 65.** Conducted Spurious Emissions 30 – 3 000 MHz. 2 Mbps Channel MID.

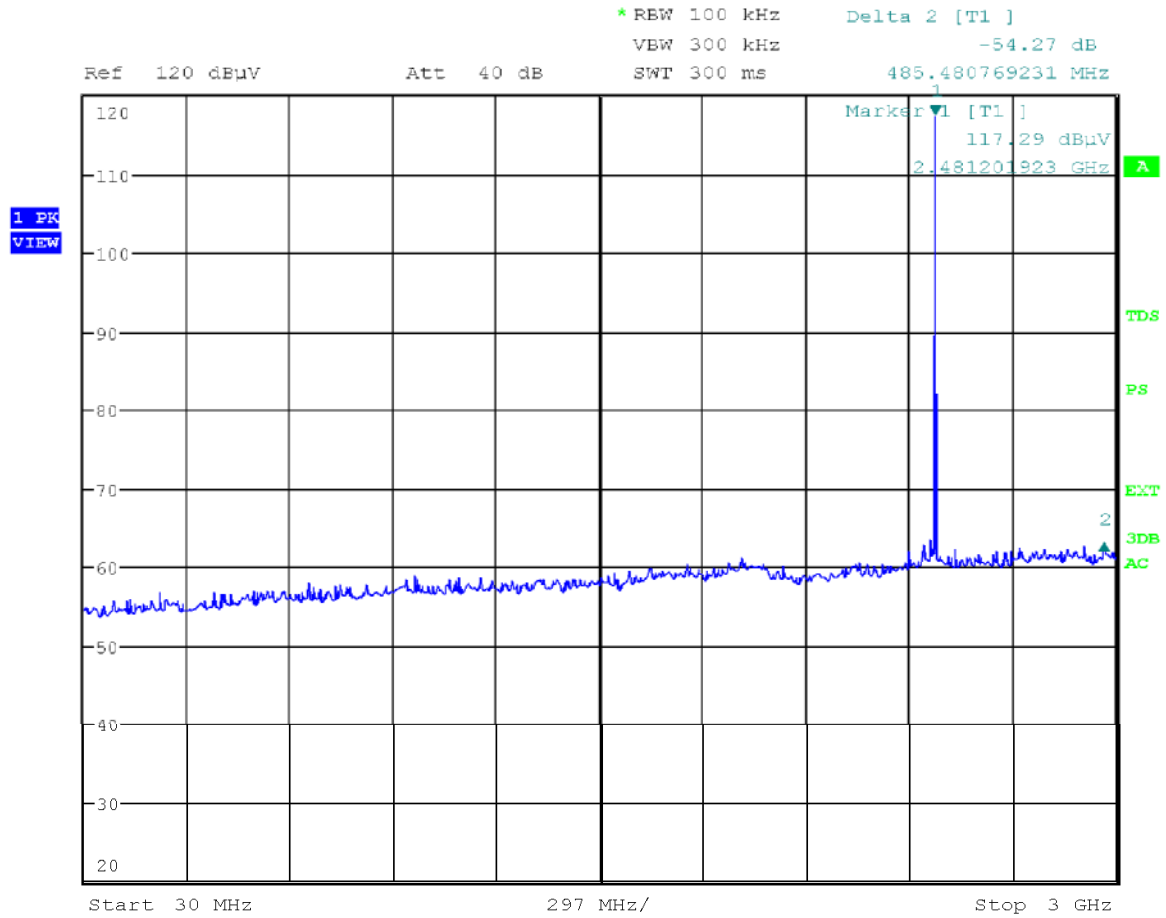
## Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 27.JAN.2012 14:33:11

**Figure 66.** Conducted Spurious Emissions 3 000 – 26 500 MHz. 2Mbps Channel MID.

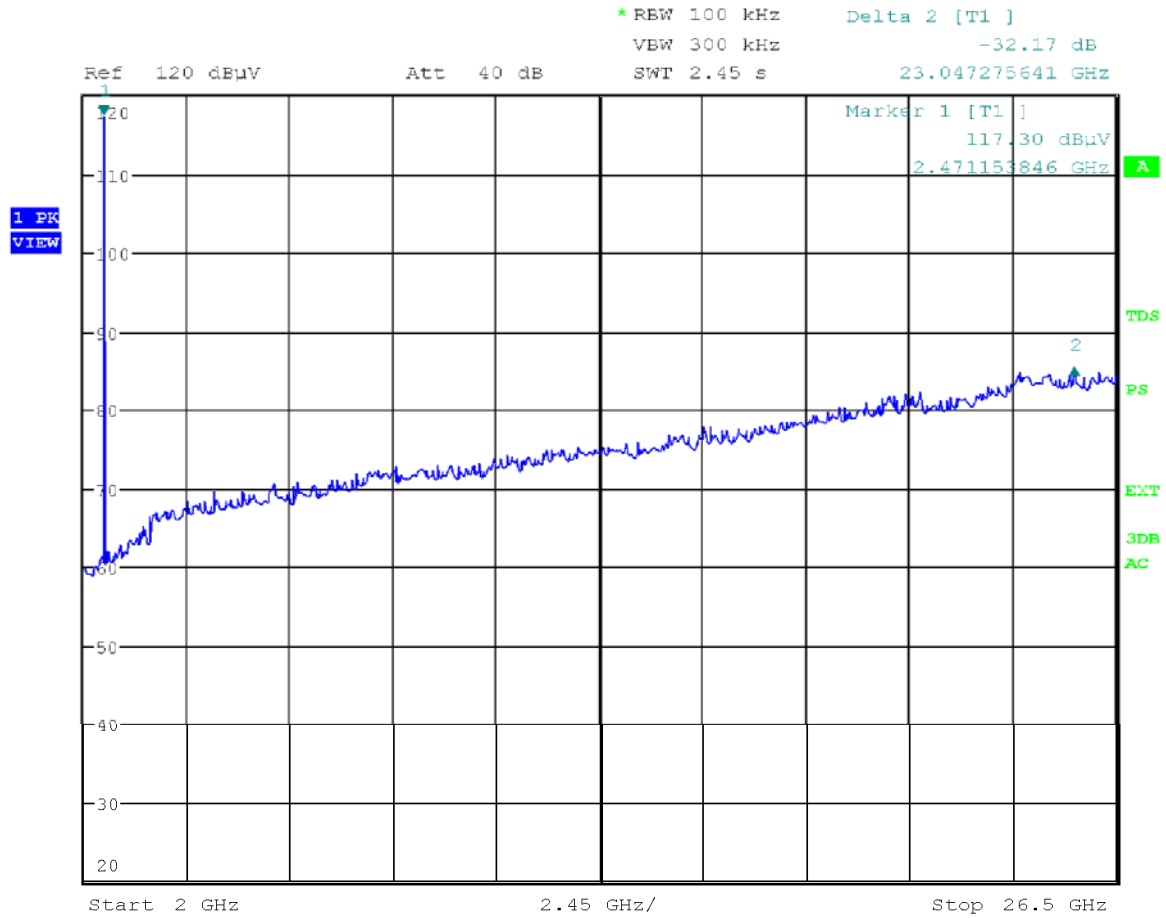
## Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 27.JAN.2012 14:41:11

**Figure 67.** Conducted Spurious Emissions 30 – 3 000 MHz. 2 Mbps Channel HIGH.

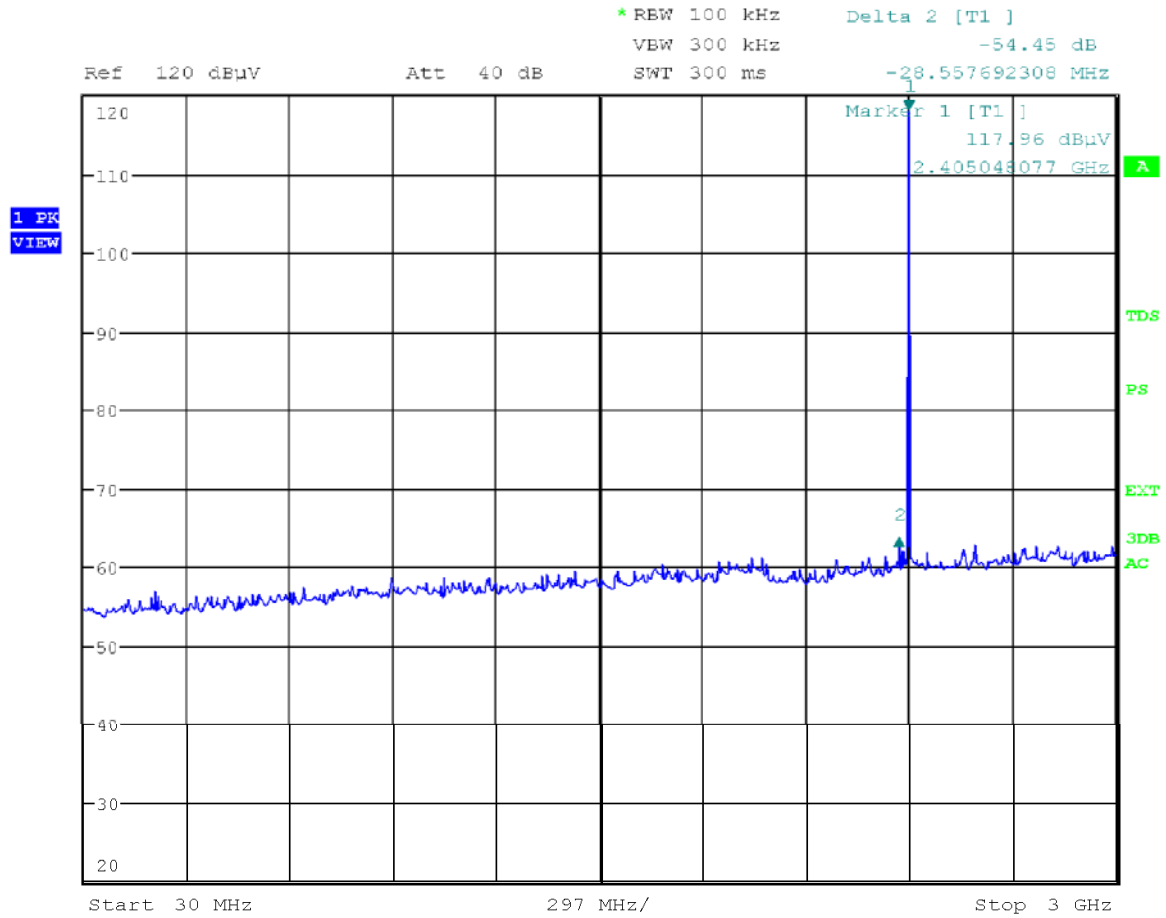
## Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 27.JAN.2012 14:42:29

**Figure 68.** Conducted Spurious Emissions 3 000 – 26 500 MHz. 2 Mbps Channel HIGH.

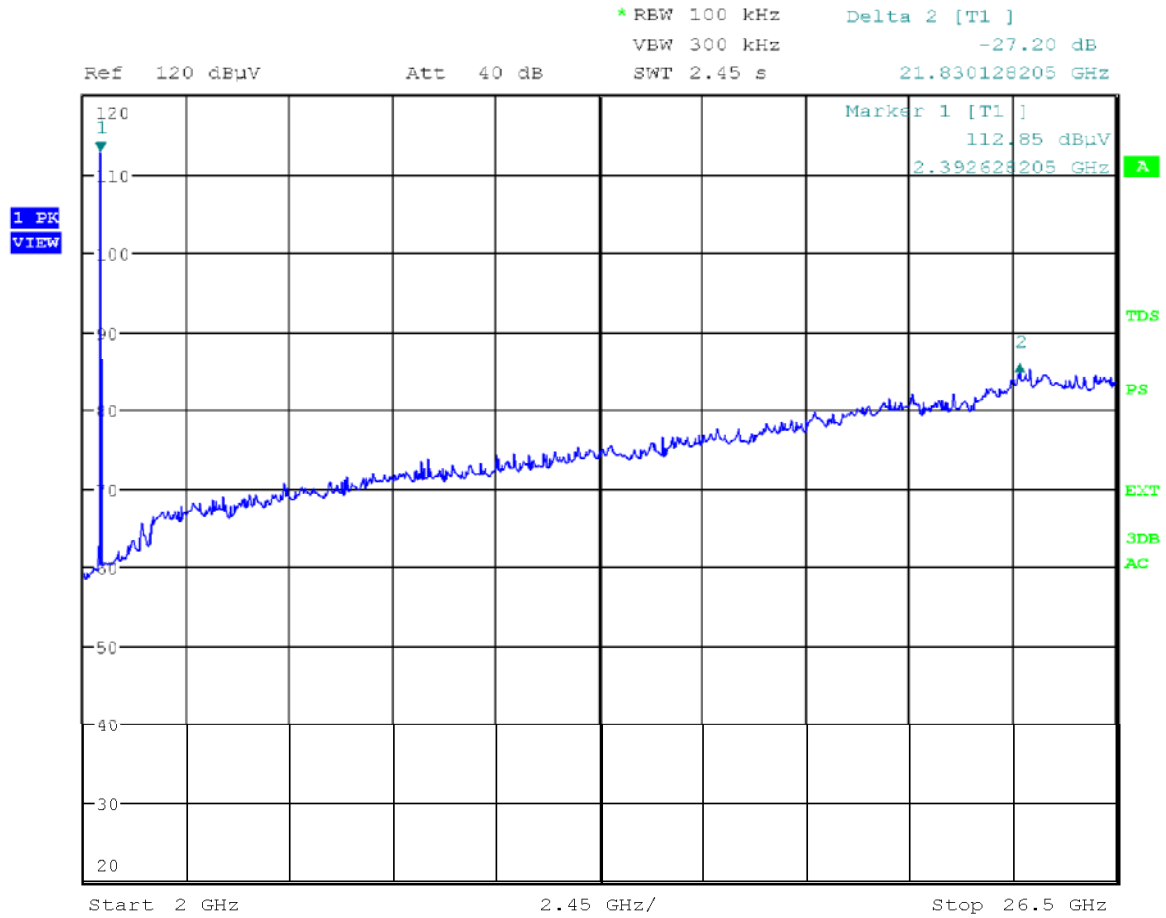
## Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 27.JAN.2012 14:45:09

**Figure 69.** Conducted Spurious Emissions 30 – 3 000 MHz. 3 Mbps Channel LOW.

## Transmitter Band Edge Measurement and Conducted Spurious Emissions

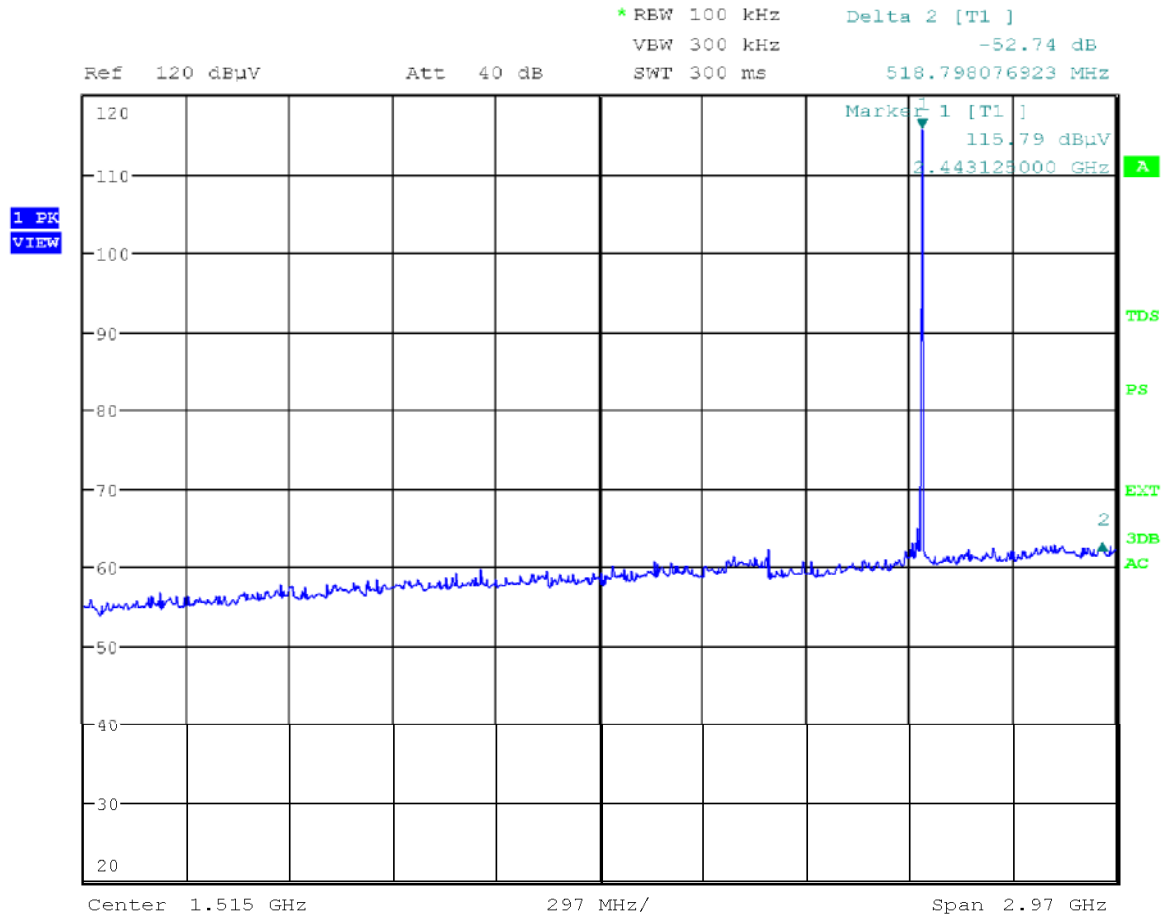


Date: 27.JAN.2012 14:46:07

**Figure 70.** Conducted Spurious Emissions 3 000 – 26 500 MHz. 3 Mbps Channel LOW.



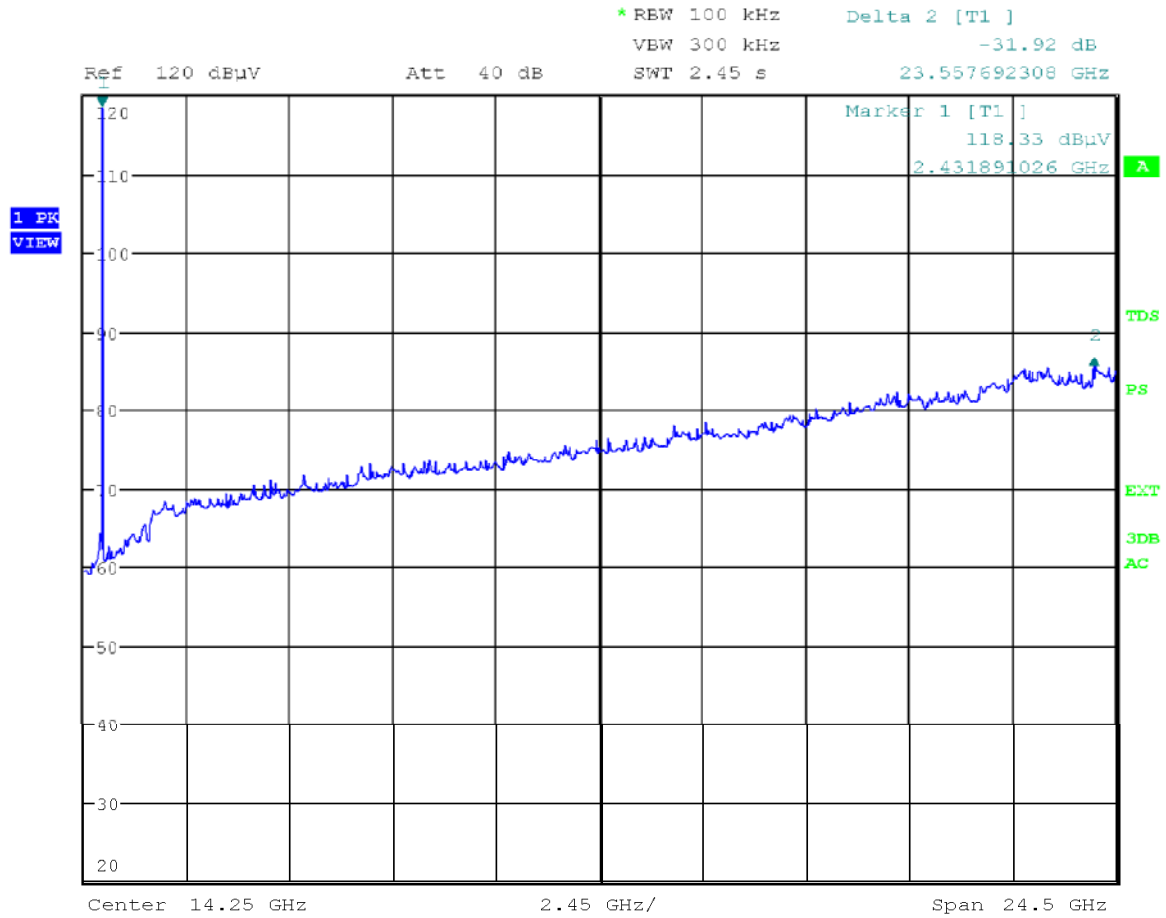
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 27.JAN.2012 14:50:27

Figure 71. Conducted Spurious Emissions 30 – 3 000 MHz. 3 Mbps Channel MID.

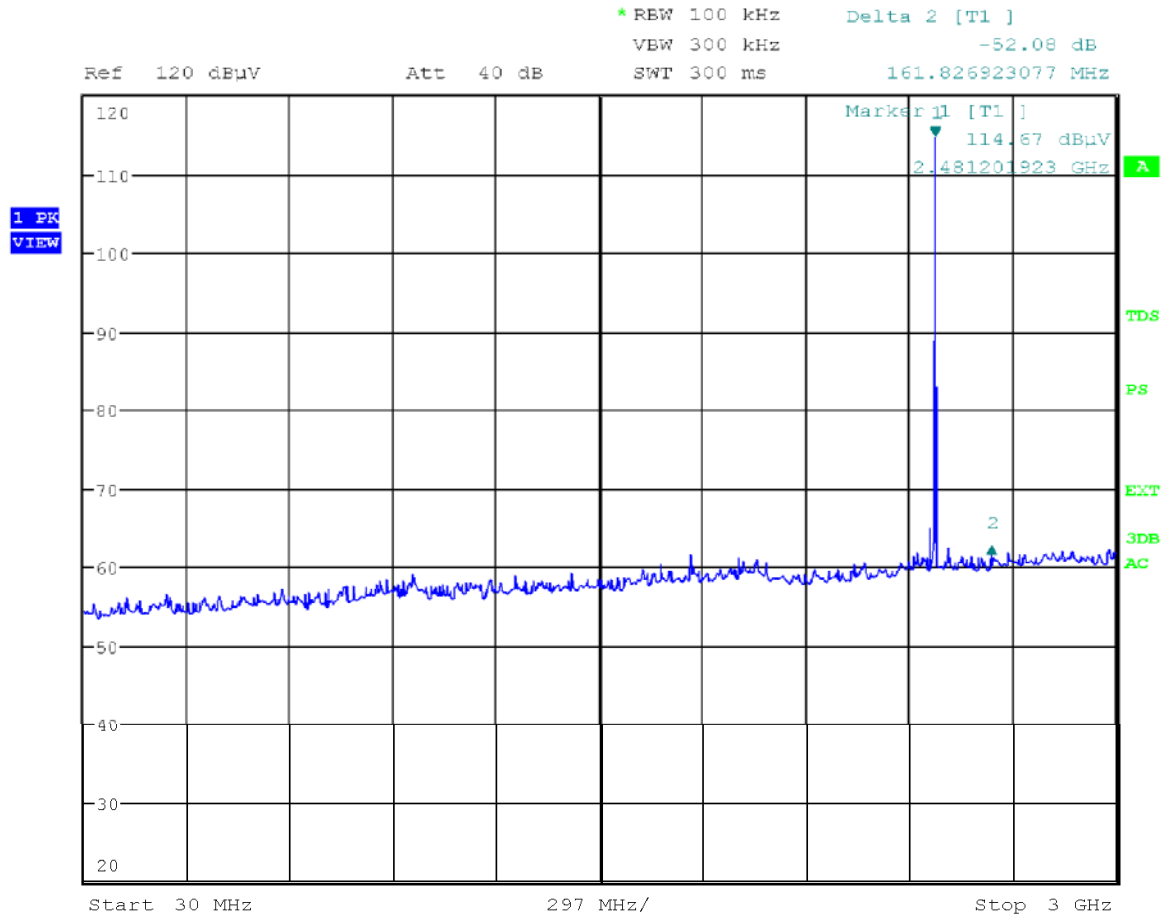
## Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 27.JAN.2012 14:55:11

**Figure 72.** Conducted Spurious Emissions 3 000 – 26 500 MHz. 3 Mbps Channel MID.

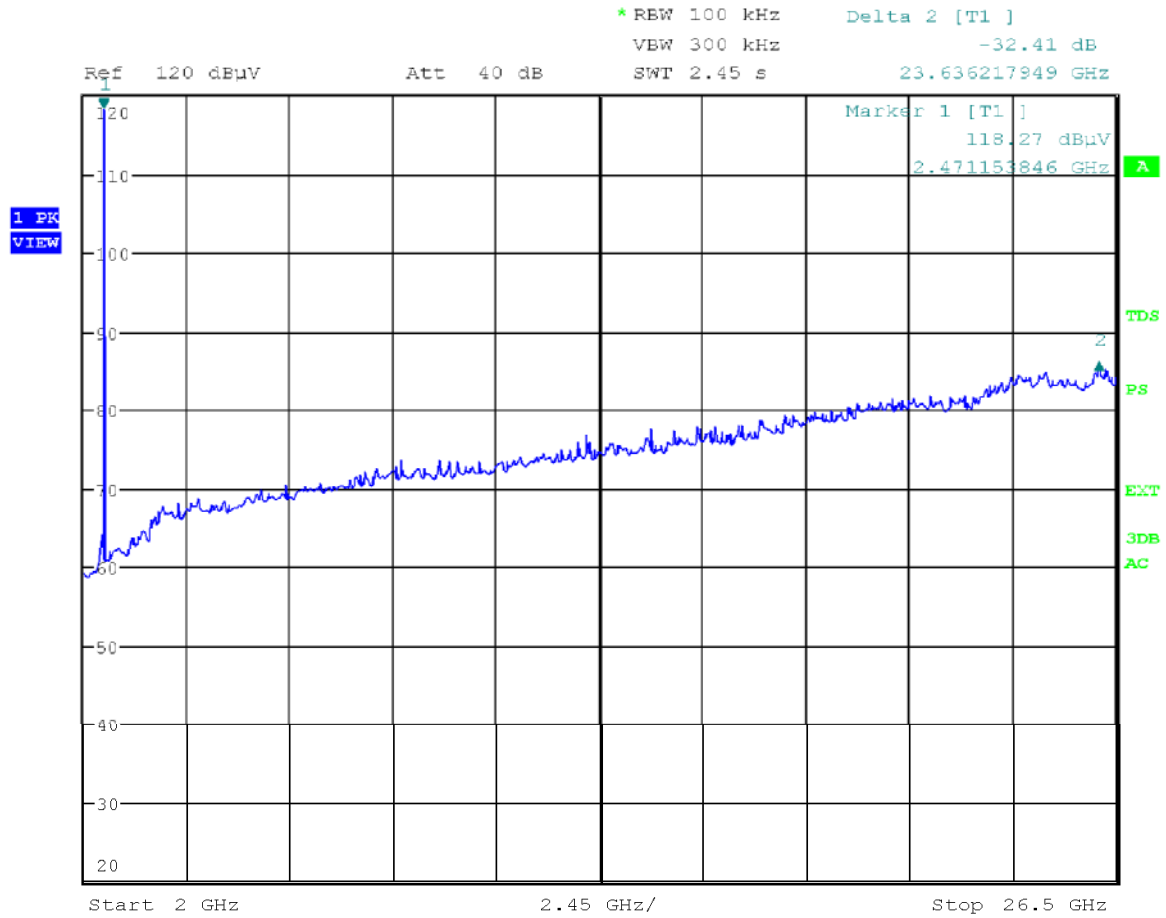
**Transmitter Band Edge Measurement and Conducted Spurious Emissions**



Date: 27.JAN.2012 14:56:30

**Figure 73.** Conducted Spurious Emissions 30 – 3 000 MHz. 3 Mbps Channel HIGH.

## Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 27.JAN.2012 14:58:00

**Figure 74.** Conducted Spurious Emissions 3 000 – 26 500 MHz. 3 Mbps Channel HIGH.

## 20 dB Bandwidth of the Hopping Channel

**Standard:** ANSI C63.10 (2009)  
**Tested by:** NTO  
**Date:** 9.1.2012  
**Humidity:** 35 %  
**Temperature:** 20°C

**FCC Rule: 15.247(a)(1)**

### Results:

#### 1 Mbps

**Table 65.** 20 dB bandwidth test results 1 Mbps.

Channel	20 dB BW [kHz]
Low	952
Mid	952
High	952

#### 2 Mbps

**Table 66.** 20 dB bandwidth test results 2 Mbps

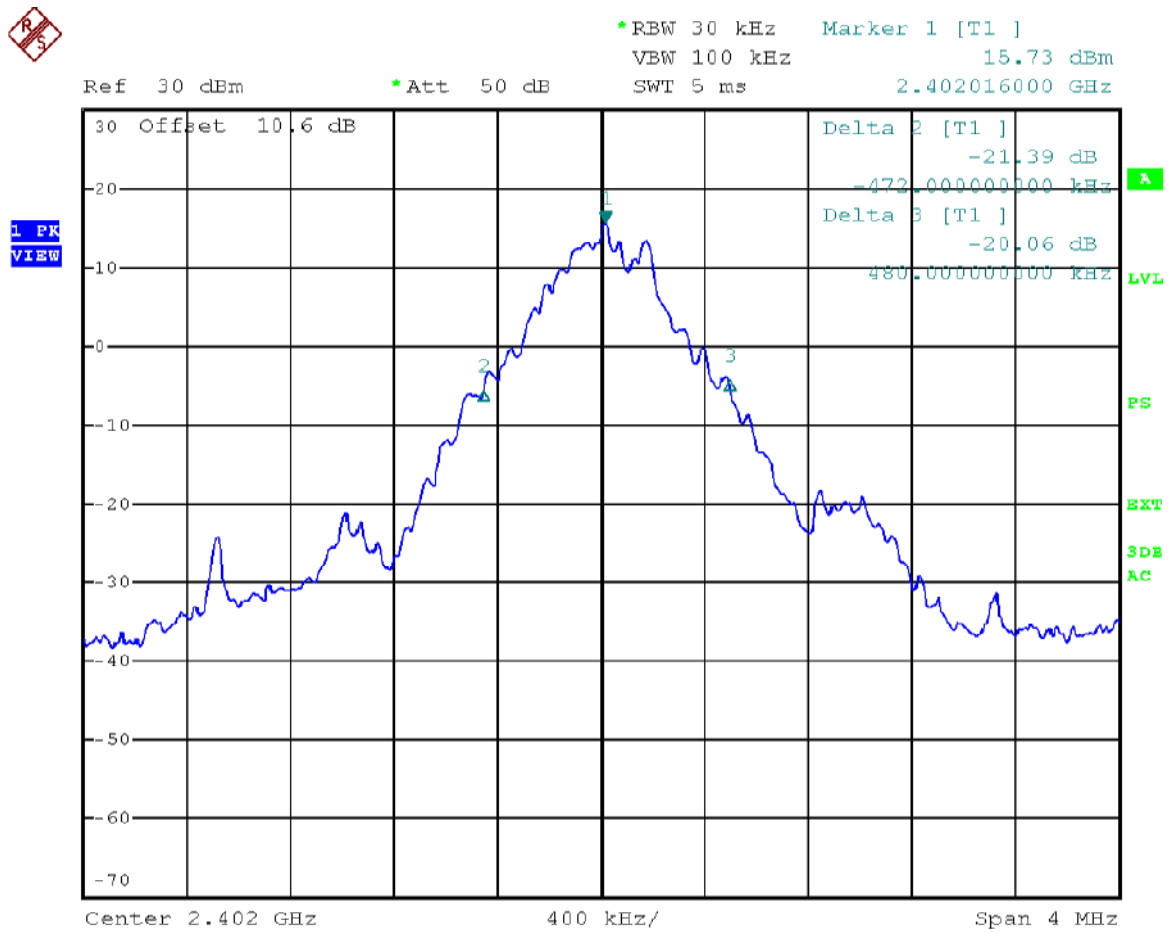
Channel	20 dB BW [kHz]
Low	1 240
Mid	1 240
High	1 232

#### 3 Mbps

**Table 67.** 20 dB bandwidth test results 3 Mbps

Channel	20 dB BW [kHz]
Low	1 272
Mid	1 272
High	1 272

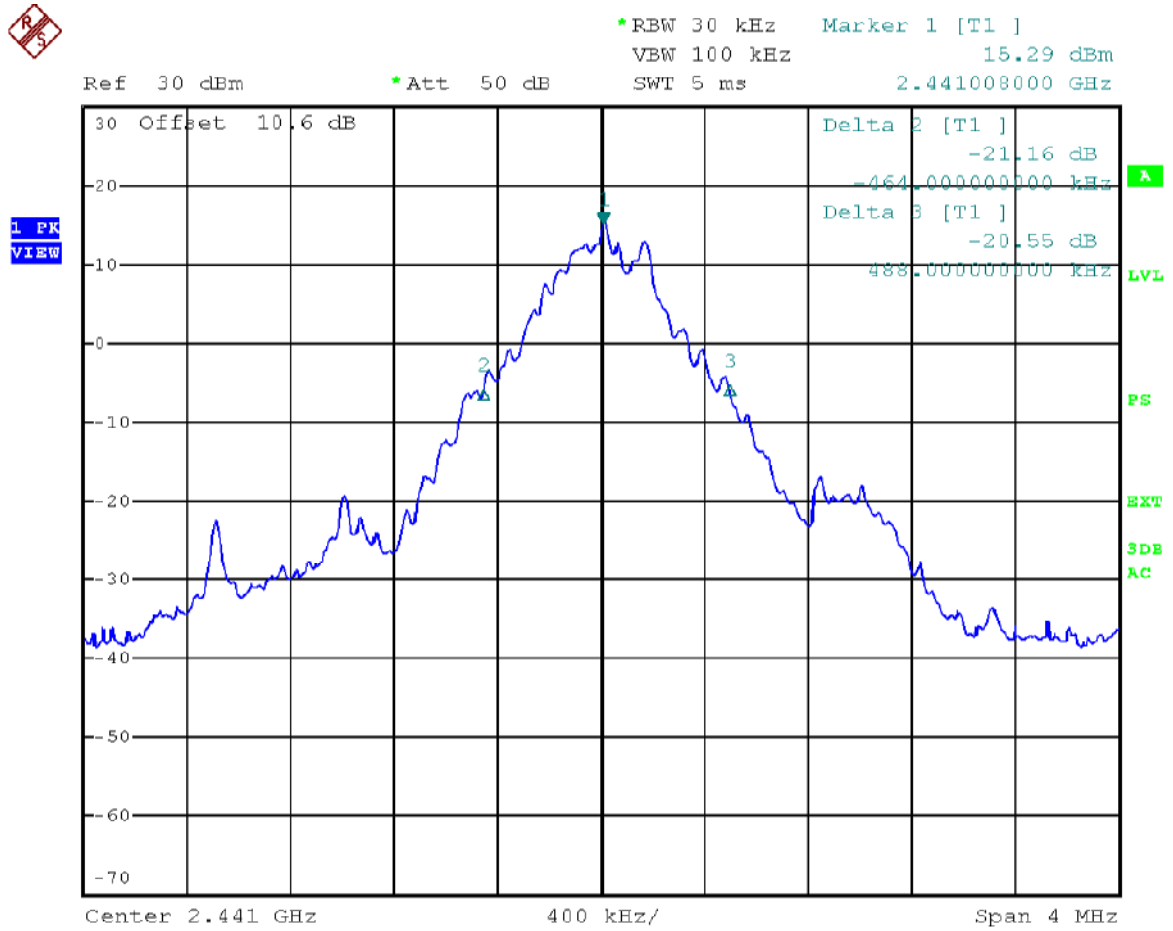
## 20dB Bandwidth of the Hopping Channel



Date: 19.JAN.2012 14:46:39

**Figure 75.** 20 dB channel BW. 1 Mbps Channel LOW.

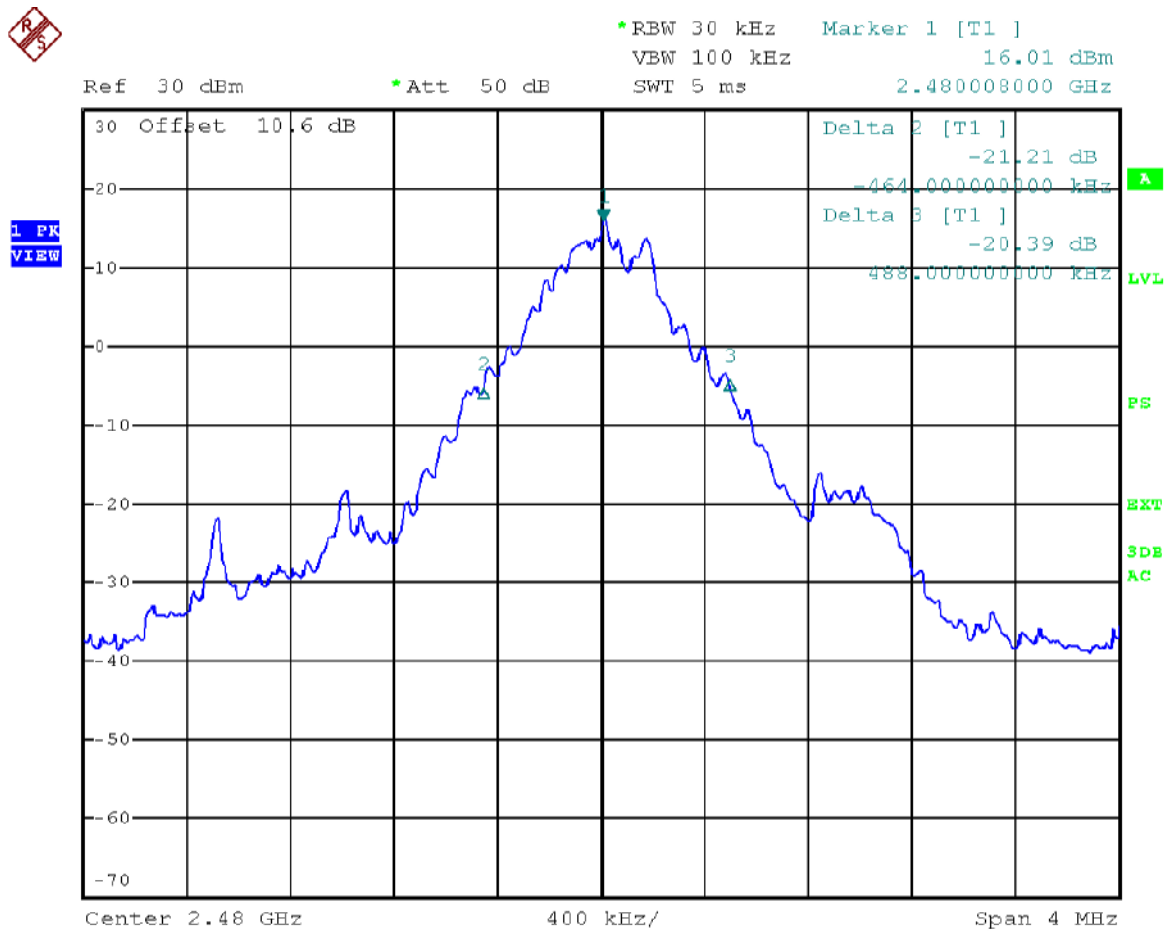
## 20dB Bandwidth of the Hopping Channel



Date: 19.JAN.2012 15:06:10

**Figure 76.** 20 dB channel BW. 1 Mbps Channel MID.

## 20dB Bandwidth of the Hopping Channel

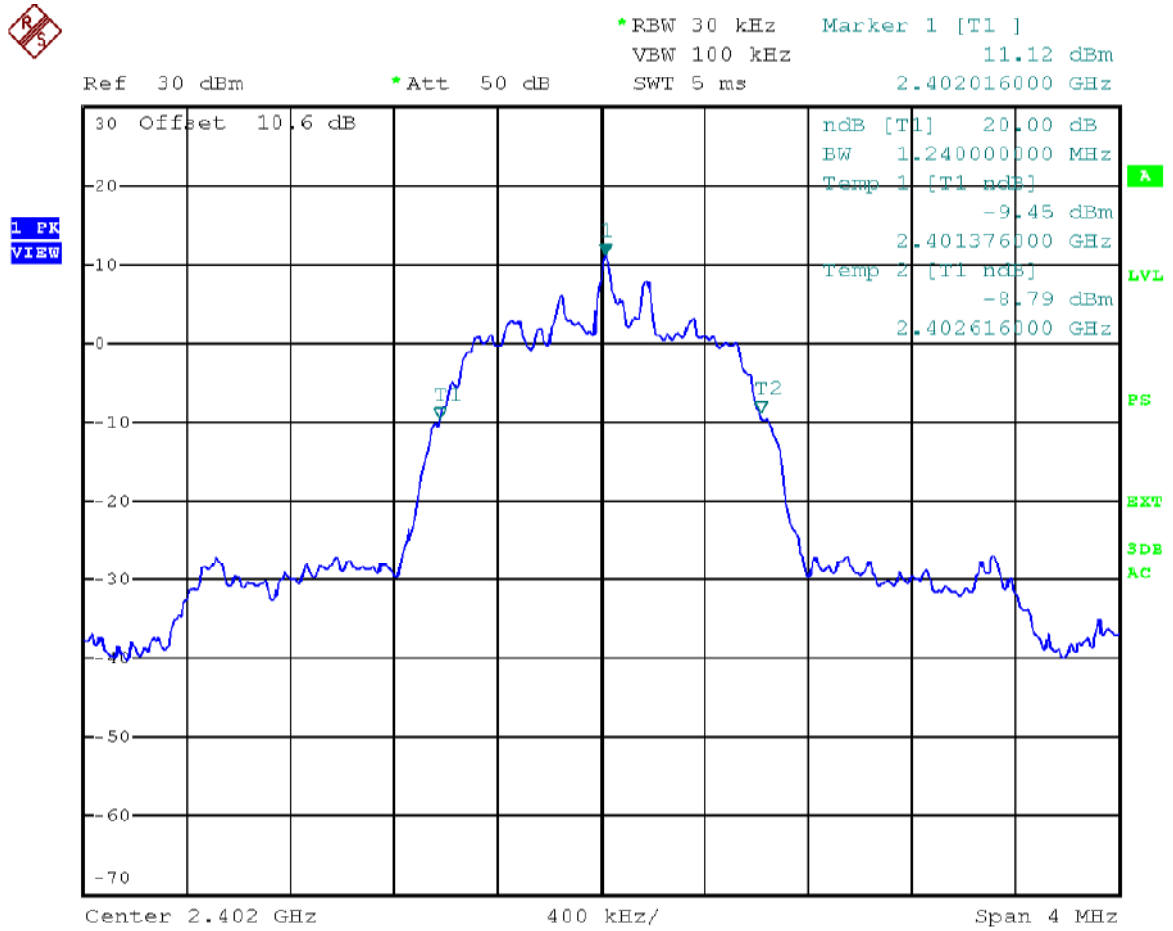


Date: 19.JAN.2012 15:08:24

**Figure 77.** 20 dB channel BW. 1 Mbps Channel HIGH.



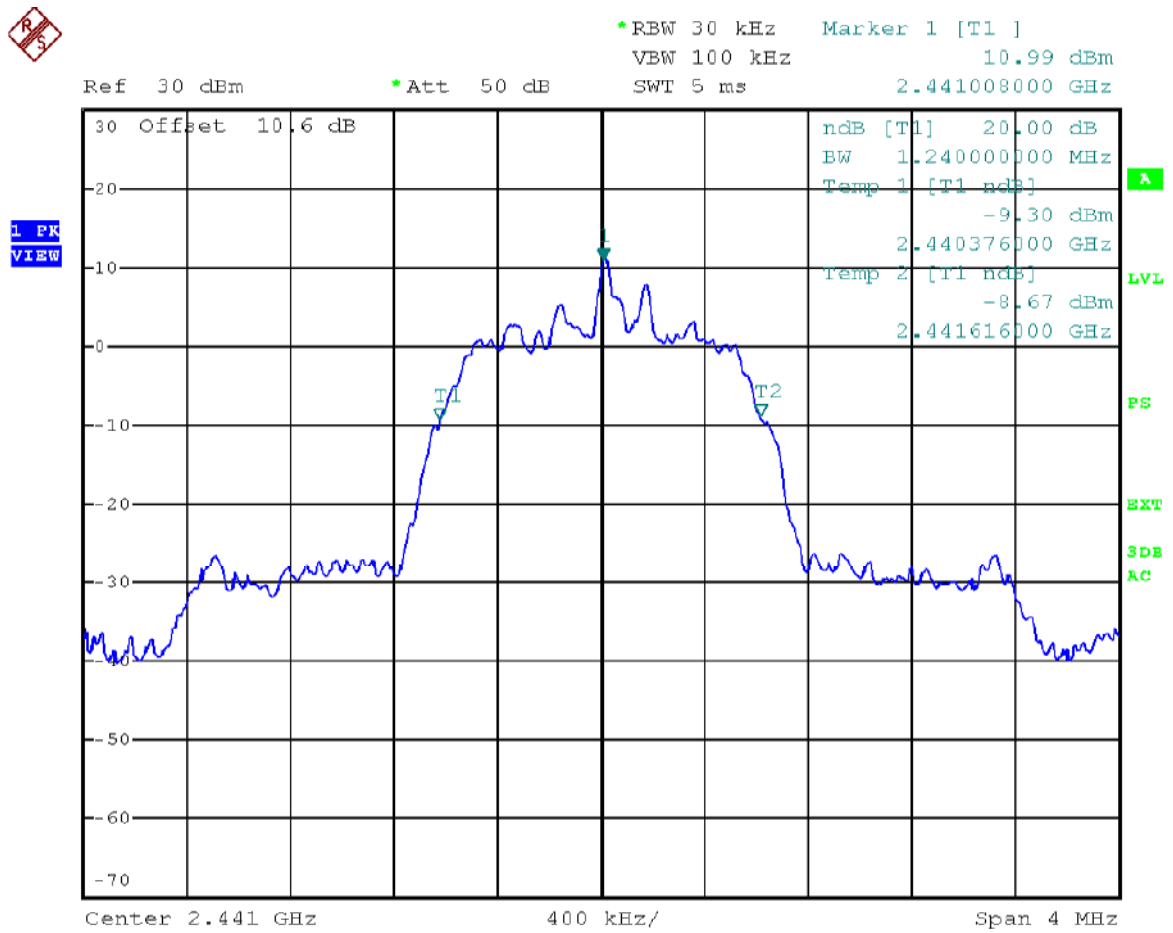
## 20dB Bandwidth of the Hopping Channel



Date: 19.JAN.2012 14:34:23

**Figure 78.** 20 dB channel BW. 2 Mbps Channel LOW.

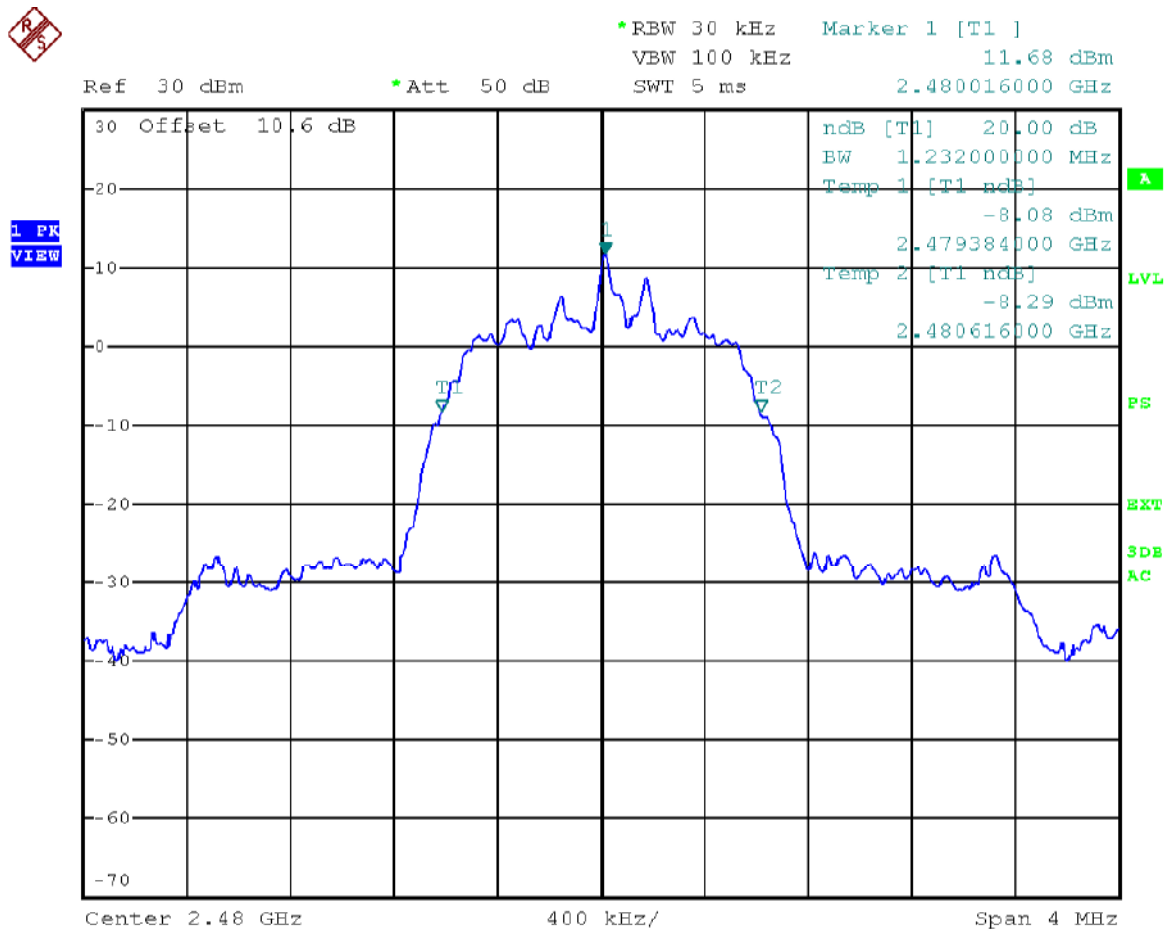
## 20dB Bandwidth of the Hopping Channel



Date: 19.JAN.2012 14:38:26

**Figure 79.** 20 dB channel BW. 2 Mbps Channel MID.

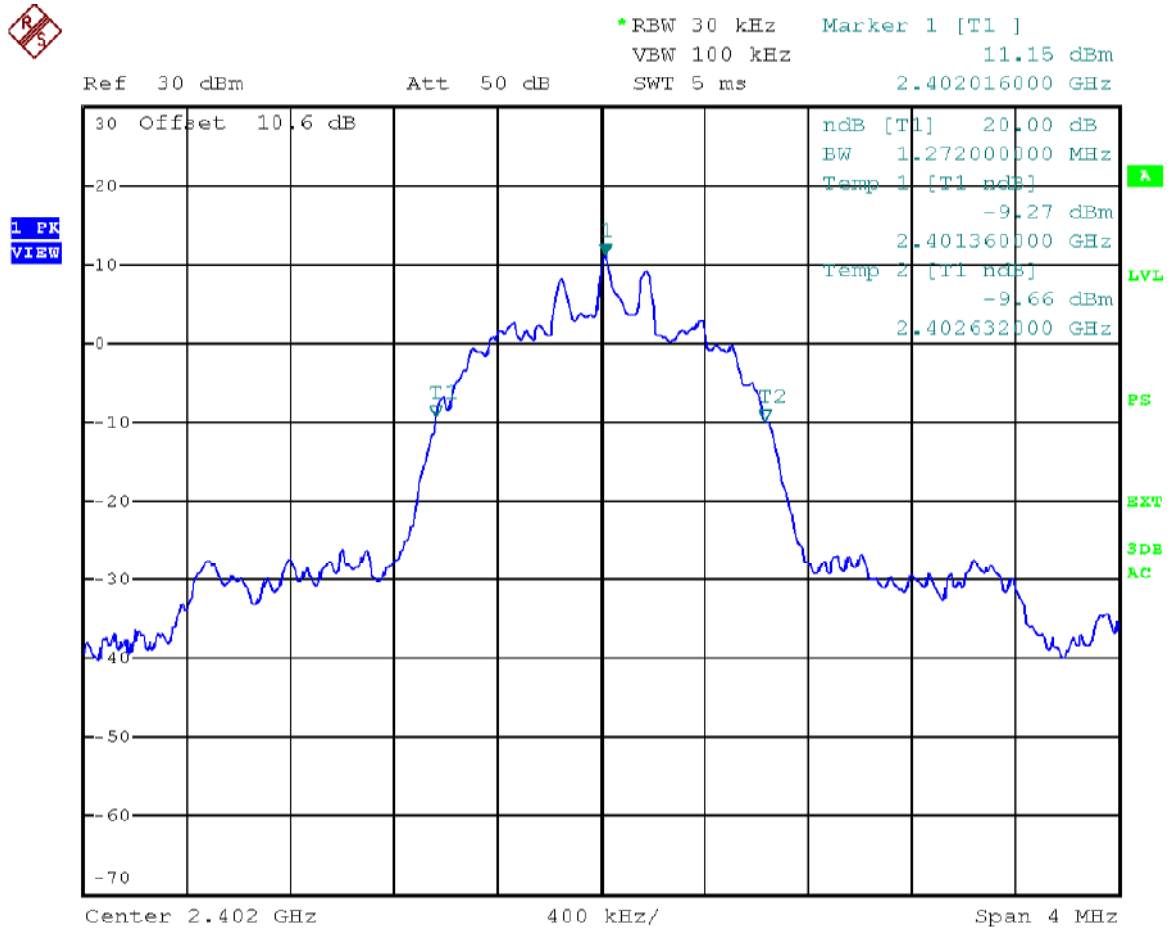
## 20dB Bandwidth of the Hopping Channel



Date: 19.JAN.2012 14:39:46

**Figure 80.** 20 dB channel BW. 2 Mbps Channel HIGH.

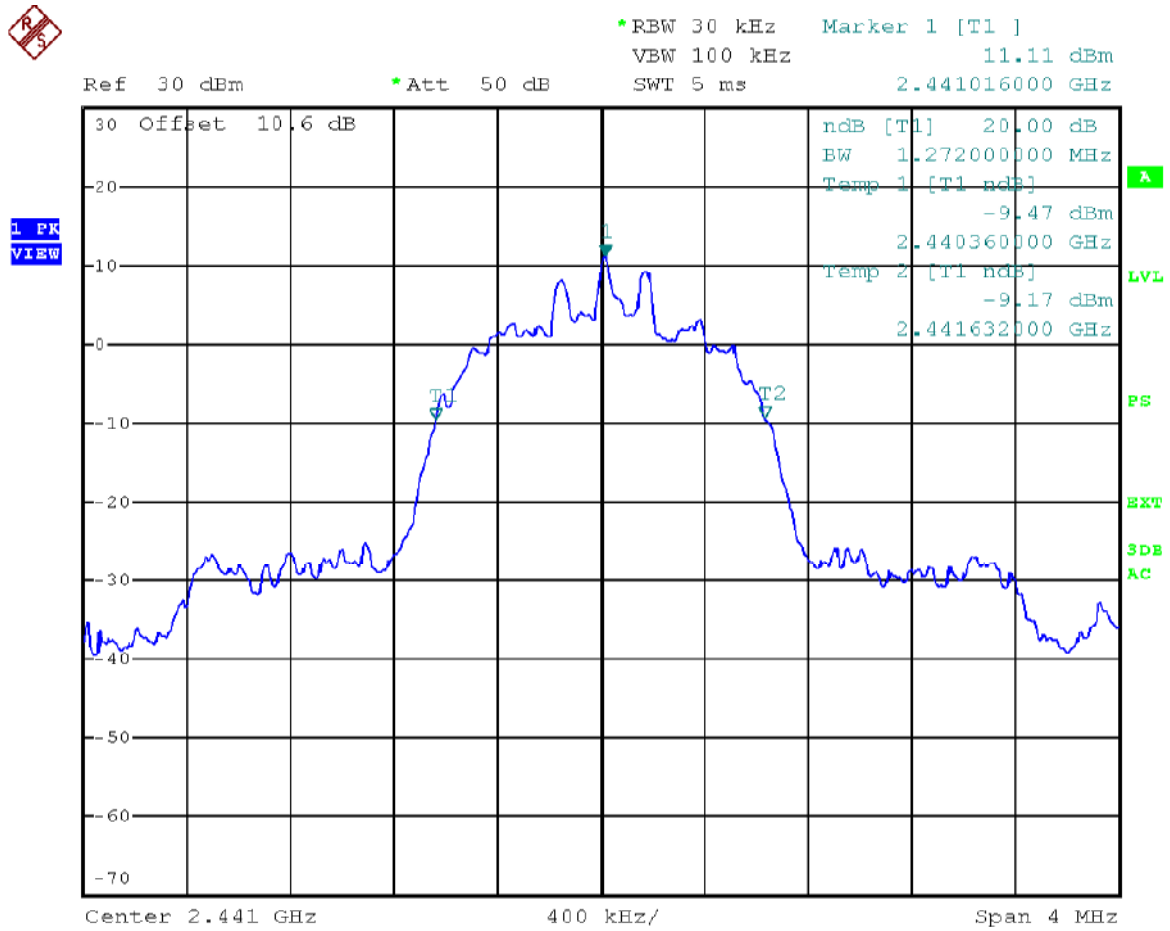
## 20dB Bandwidth of the Hopping Channel



Date: 19.JAN.2012 13:40:16

**Figure 81.** 20 dB channel BW. 3 Mbps Channel LOW.

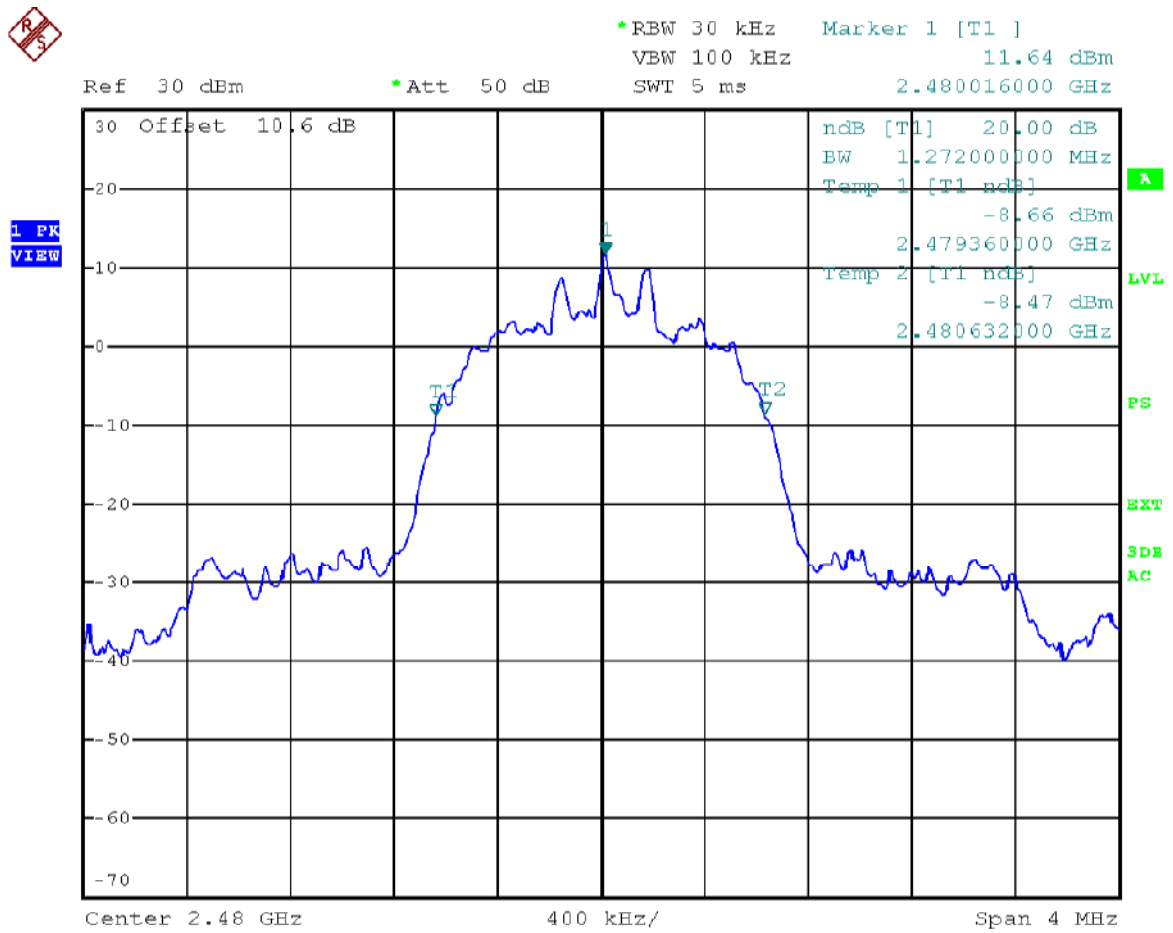
## 20dB Bandwidth of the Hopping Channel



Date: 19.JAN.2012 13:47:01

**Figure 82.** 20 dB channel BW. 3 Mbps Channel MID.

## 20dB Bandwidth of the Hopping Channel



Date: 19.JAN.2012 13:48:33

**Figure 83.** 20 dB channel BW. 3 Mbps Channel HIGH.

## Hopping Channel Carrier Frequencies Separation

**Standard:** ANSI C63.10 (2009)  
**Tested by:** NTO  
**Date:** 9.1.2012  
**Humidity:** 35 %  
**Temperature:** 20 °C

### FCC Rule: 15.247(a)(1)

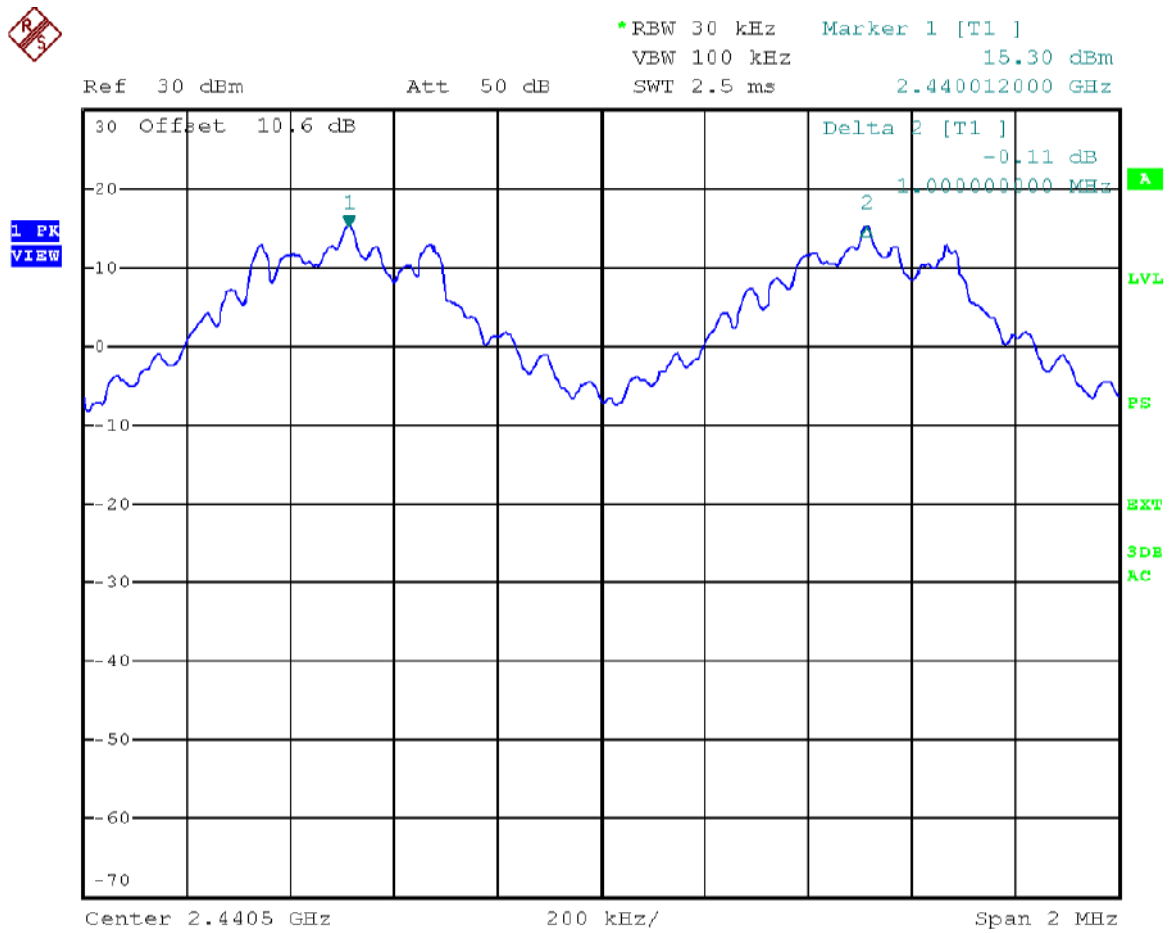
Frequency hopping systems with an output power less than 125mW shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or 2/3 of the 20 dB bandwidth of the hopping channel, whichever is greater.

### Test result

**Table 68.** Hopping channel carrier frequencies separation test result.

Data rate	Measured separation	Measured 20 dB BW	Limit	Result
1 Mbps	1 000 kHz	952	635 kHz	PASS
2 Mbps	996 kHz	1 240	827 kHz	PASS
3 Mbps	984 kHz	1 272	848 kHz	PASS
Limit:	2/3 or the 20 dB bandwidth of the hopping channel which ever is greater			

## Hopping Channel Carrier Frequencies Separation

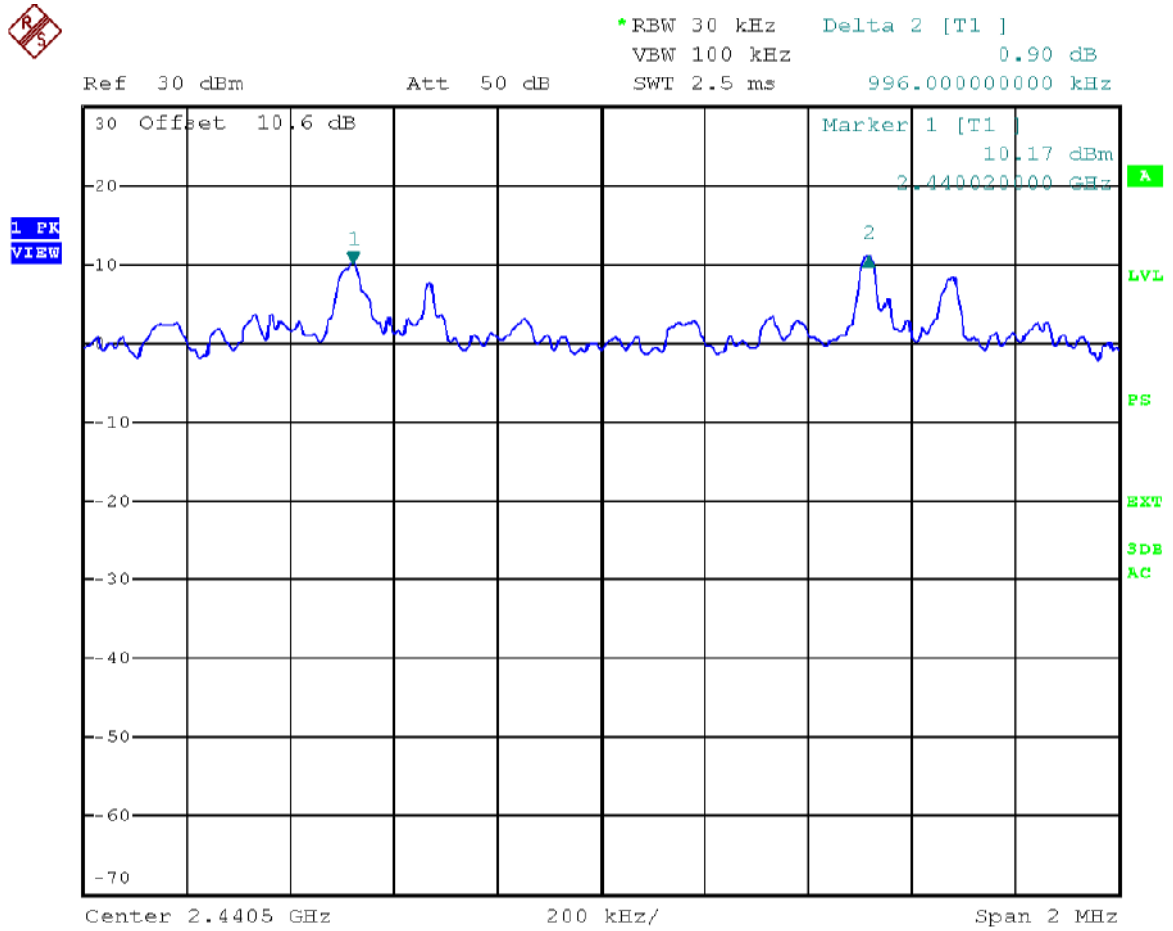


Date: 19.JAN.2012 13:14:27

**Figure 84.** Measured hopping channels carrier frequency separation 1 Mbps.



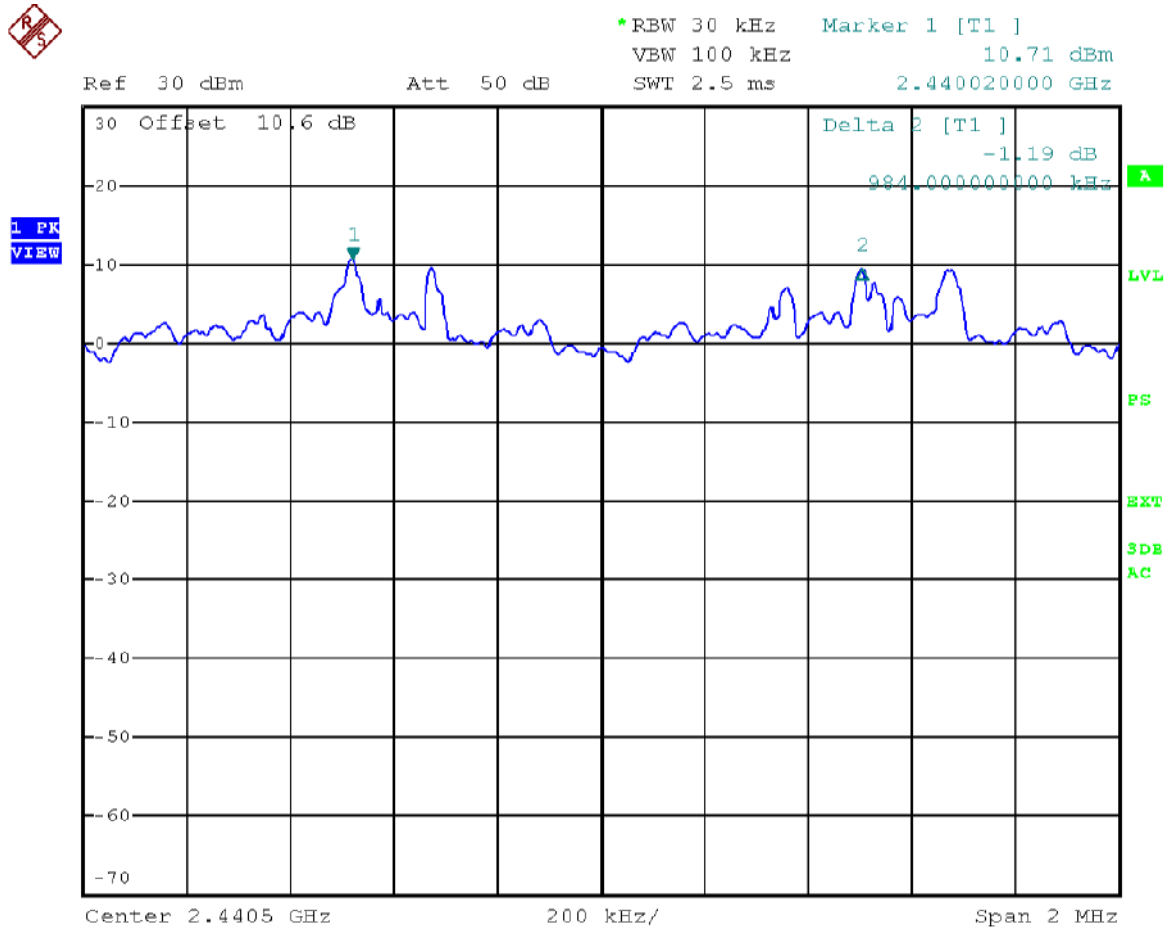
## Hopping Channel Carrier Frequencies Separation



Date: 19.JAN.2012 13:20:55

**Figure 85.** Measured hopping channels carrier frequency separation 2 Mbps.

## Hopping Channel Carrier Frequencies Separation



Date: 19.JAN.2012 13:31:19

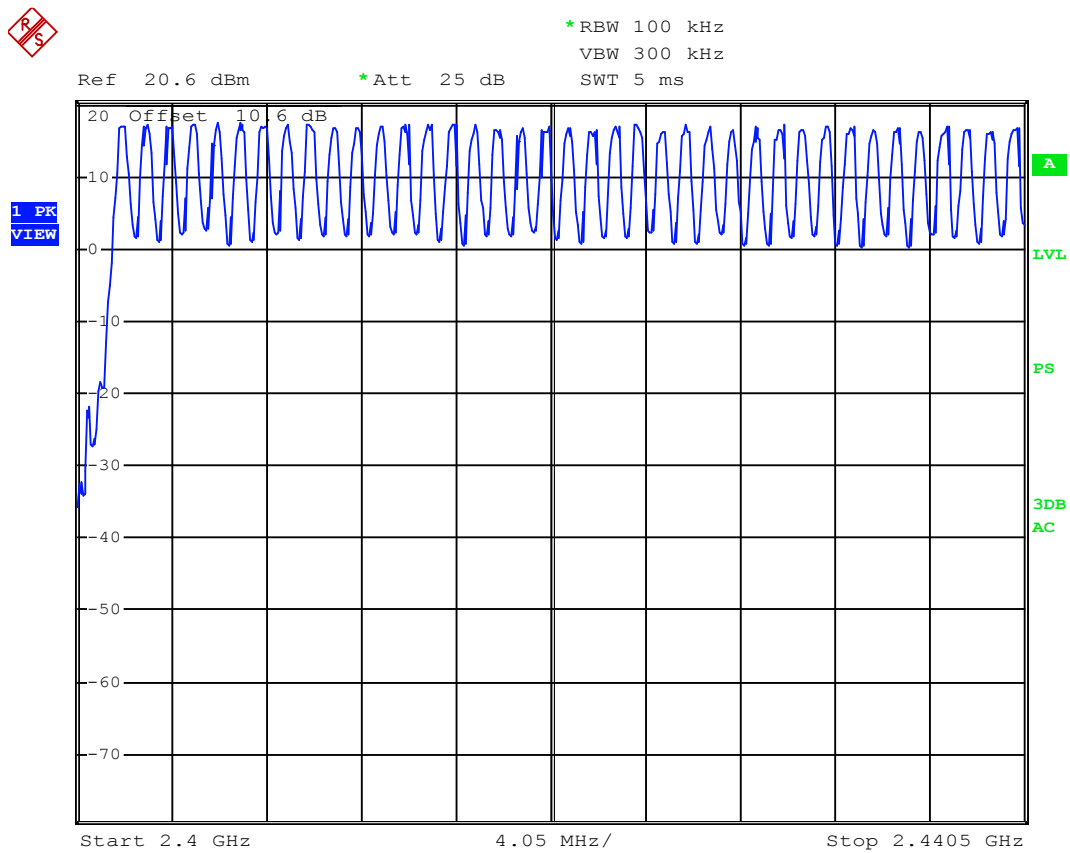
**Figure 86.** Measured hopping channels carrier frequency separation 3 Mbps.

## Number of Hopping Channels

**Standard:** ANSI C63.10 (2009)  
**Tested by:** NTO  
**Date:** 29.11.2012  
**Humidity:** 26 %  
**Temperature:** 22 °C

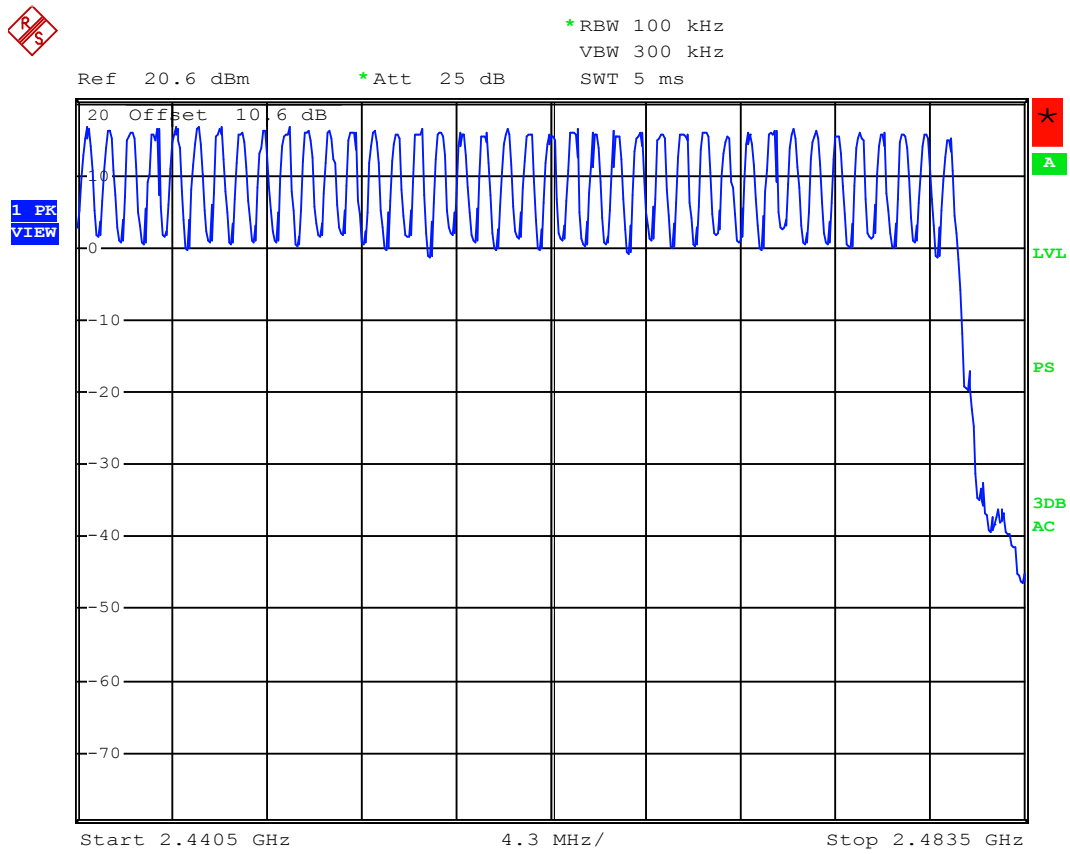
### FCC Rule: 15.247(a)(1)(iii)

For frequency hopping systems operating in the 2400 – 2483.5 MHz band shall use at least 15 channels.



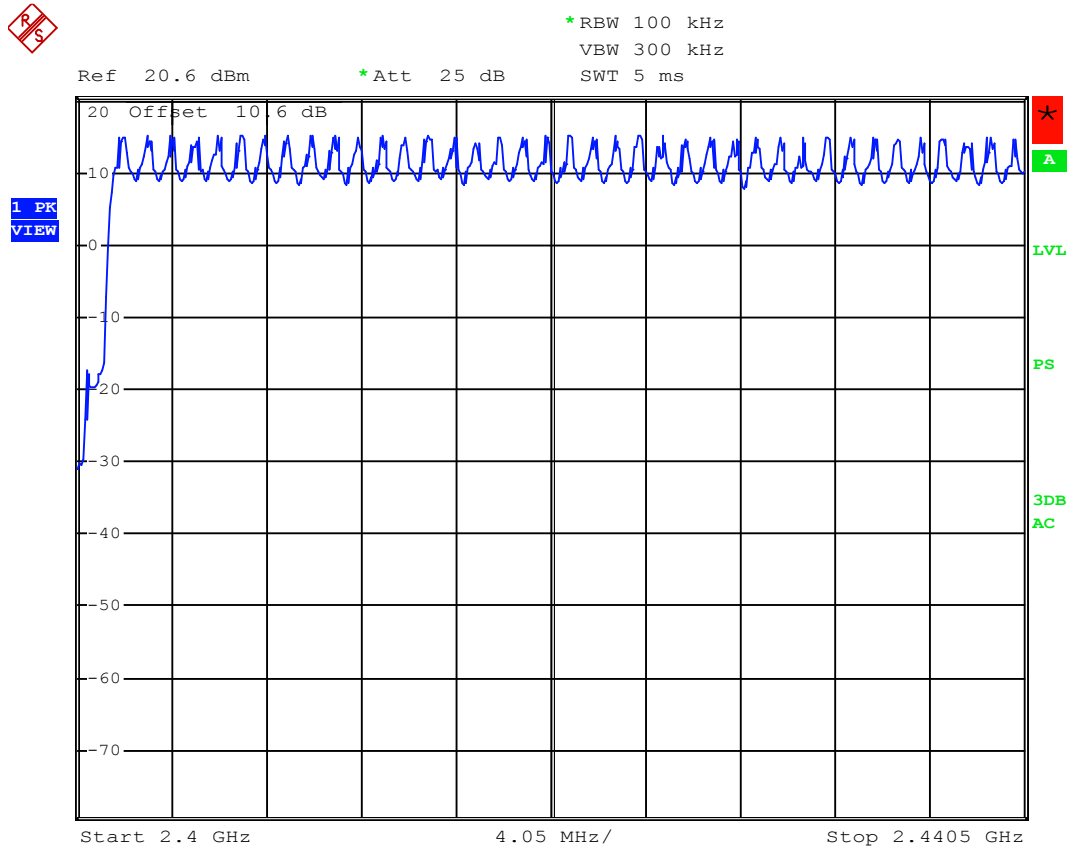
Date: 29.NOV.2011 15:42:15

**Figure 87.** First 39 channels 1 Mbps.



Date: 29.NOV.2011 15:44:09

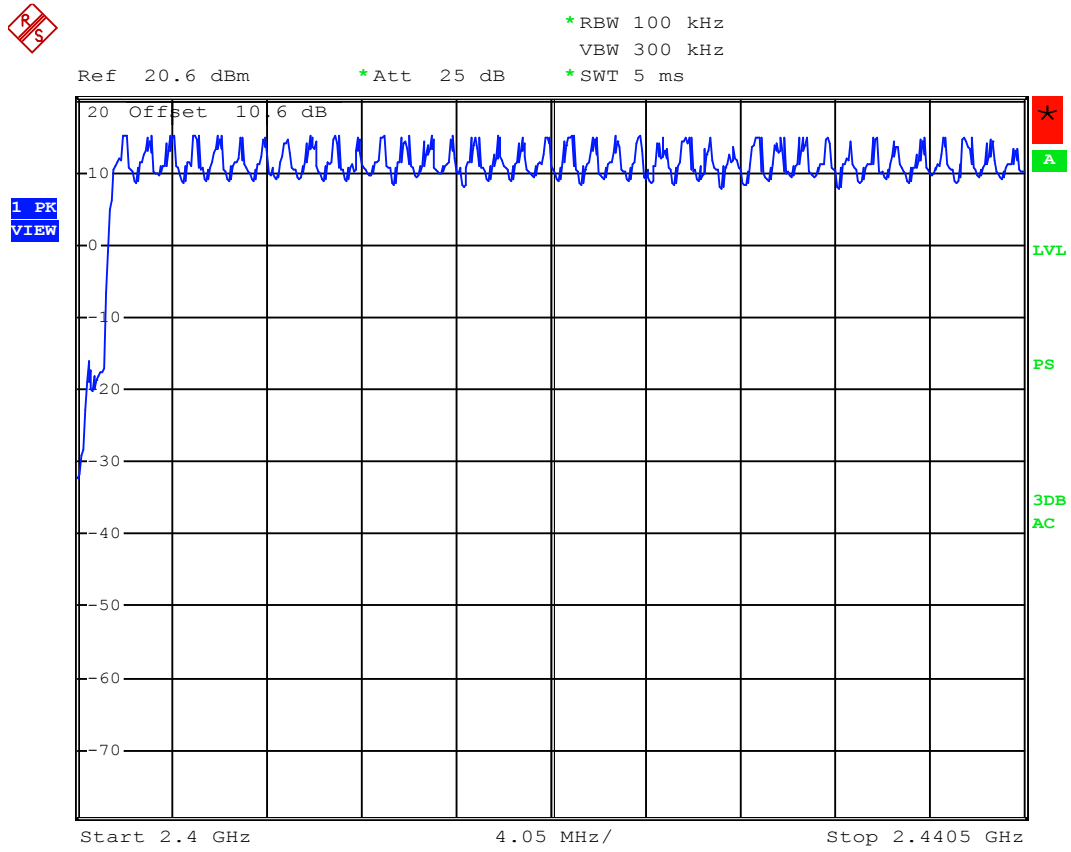
**Figure 88.** Second 40 channels 1 Mbps.



Date: 29.NOV.2011 15:54:00

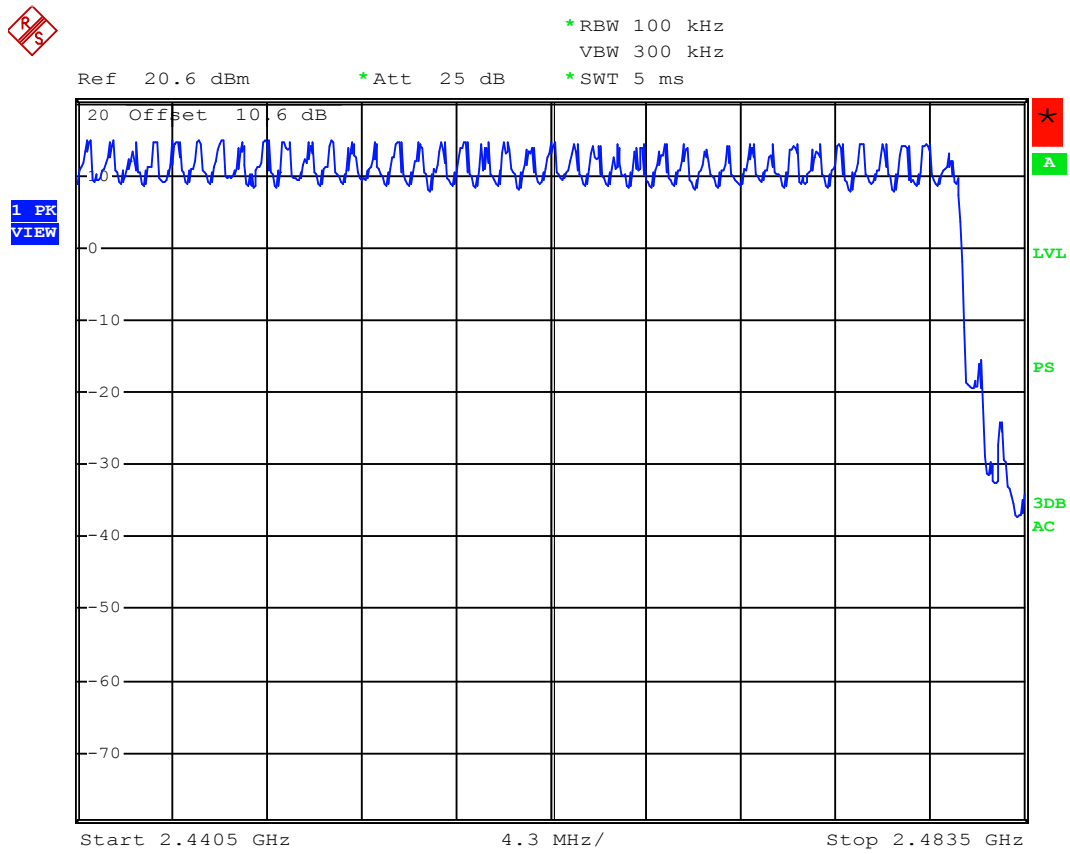
**Figure 89.** First 39 channels 2 Mbps.





Date: 29.NOV.2011 16:13:46

**Figure 91.** First 39 channels 3 Mbps.



Date: 29.NOV.2011 16:07:09

**Figure 92.** Second 40 channels 3 Mbps.



**Average Time of Occupancy of Hopping Frequency**

**Standard:** ANSI C63.10 (2009)  
**Tested by:** NTO  
**Date:** 29.11.2011  
**Humidity:** 26 %  
**Temperature:** 22 °C

**FCC Rule: 15.247(a)(1)(iii)**

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Test was performed in each data rate mode to insure that the all modes are identical.

Time of occupancy calculation:

Number of channels = 79

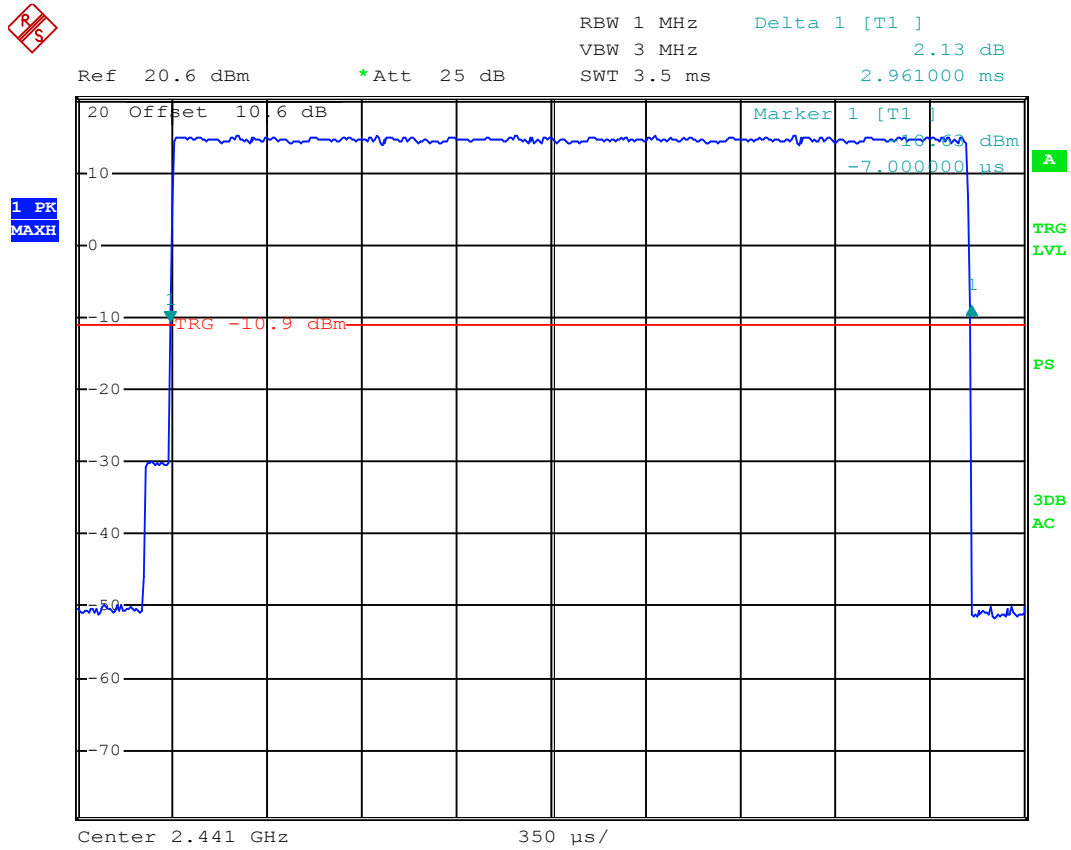
Measurement period = 0.4 sec x 79 = 31.6 seconds

One channel occupancy time = 297.5 ms

Number of transmission cycles in measurement period = 31.6 / 0.2975 = 106

Time of occupancy = (single duration) x (repetition) = 2.96 ms x 106 times = 313.8 ms

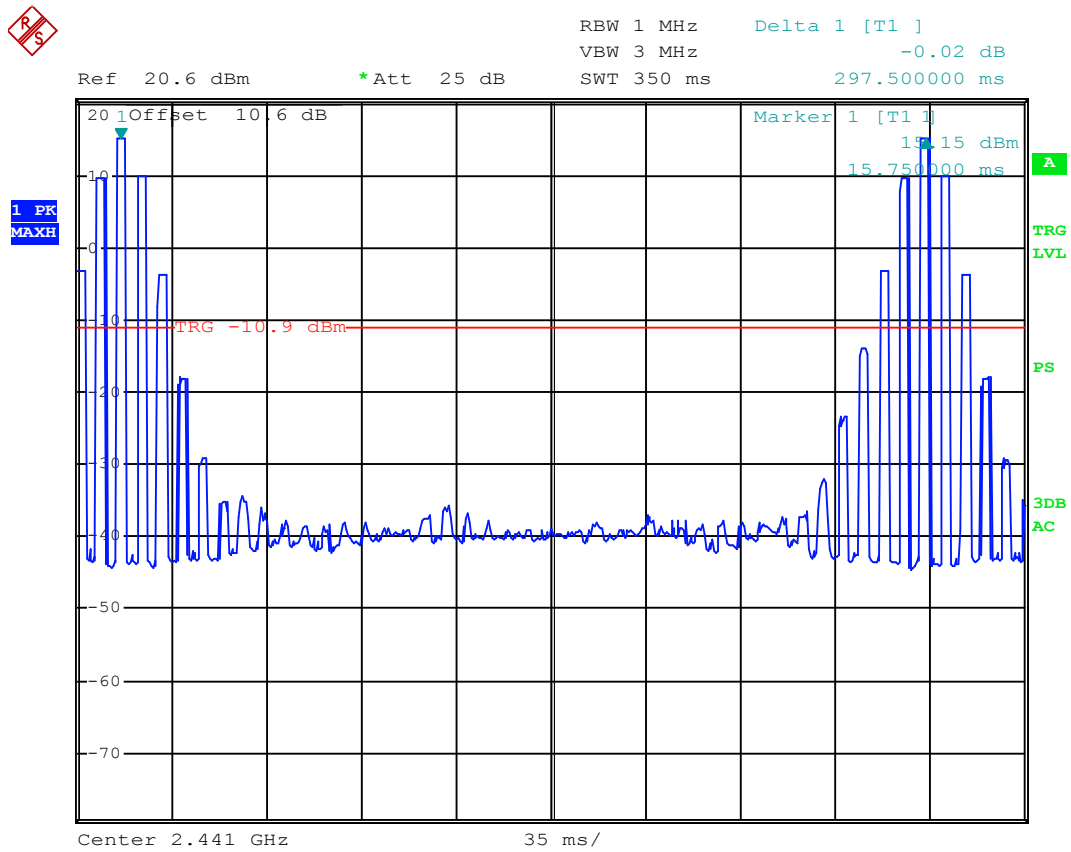
## Average Time of Occupancy of Hopping Frequency



Date: 29.NOV.2011 16:22:33

**Figure 93.** One channel dwell time.

Average Time of Occupancy of Hopping Frequency



Date: 29.NOV.2011 16:25:18

Figure 94. Measured repetition of the channel occupancy

## 99% Occupied Bandwidth

**Standard:** RSS-GEN (2010)  
**Tested by:** NTO  
**Date:** 19.1.2012  
**Humidity:** 35 %  
**Temperature:** 20 °C

### RSS-GEN 4.7

#### 1 Mbps

**Table 69.** 99 % OBW test results 1 Mbps mode.

Channel	Limit	99 % BW [kHz]	Result
Low	-	960	PASS
Mid	-	968	PASS
High	-	968	PASS

#### 2 Mbps

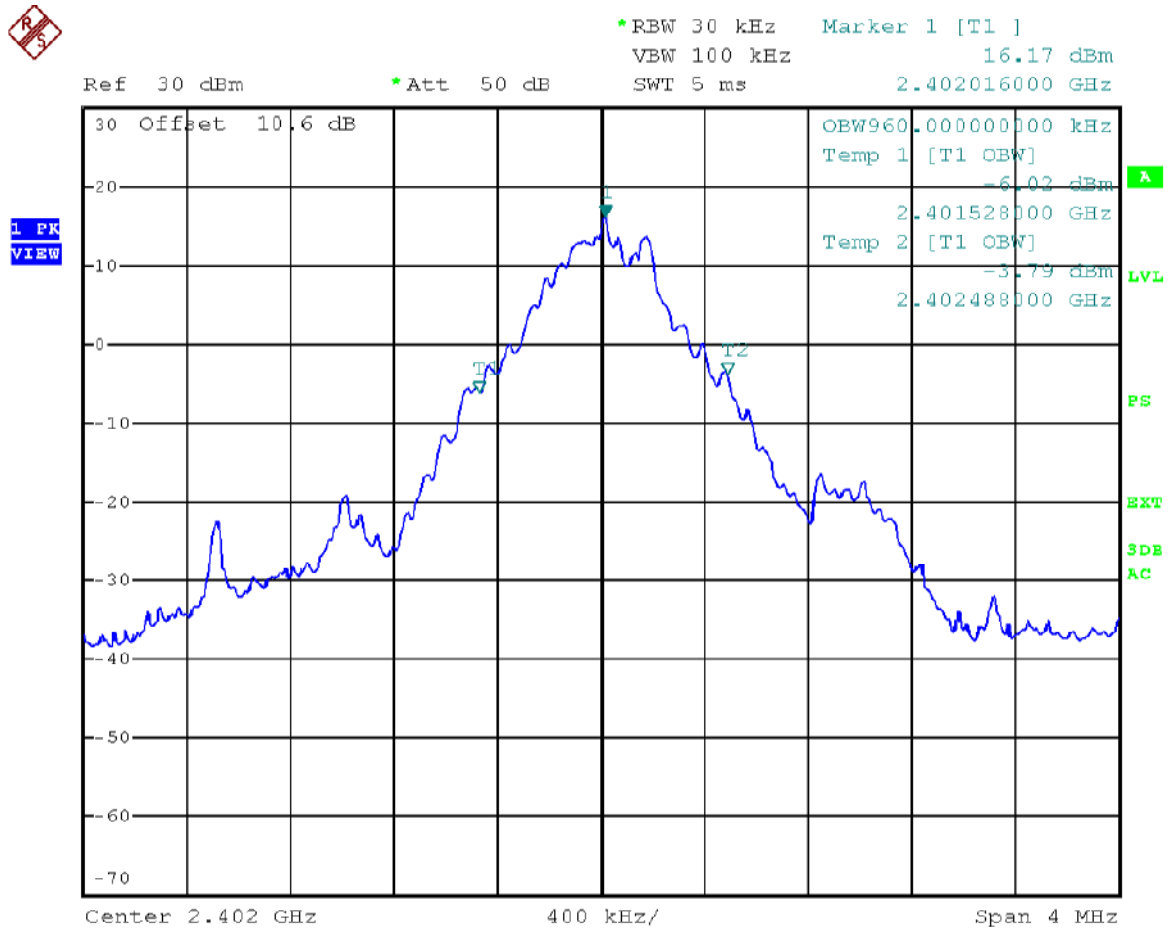
**Table 70.** 99 % OBW test results 2 Mbps mode.

Channel	Limit	99 % BW [kHz]	Result
Low	-	1 176	PASS
Mid	-	1 192	PASS
High	-	1 192	PASS

#### 3 Mbps

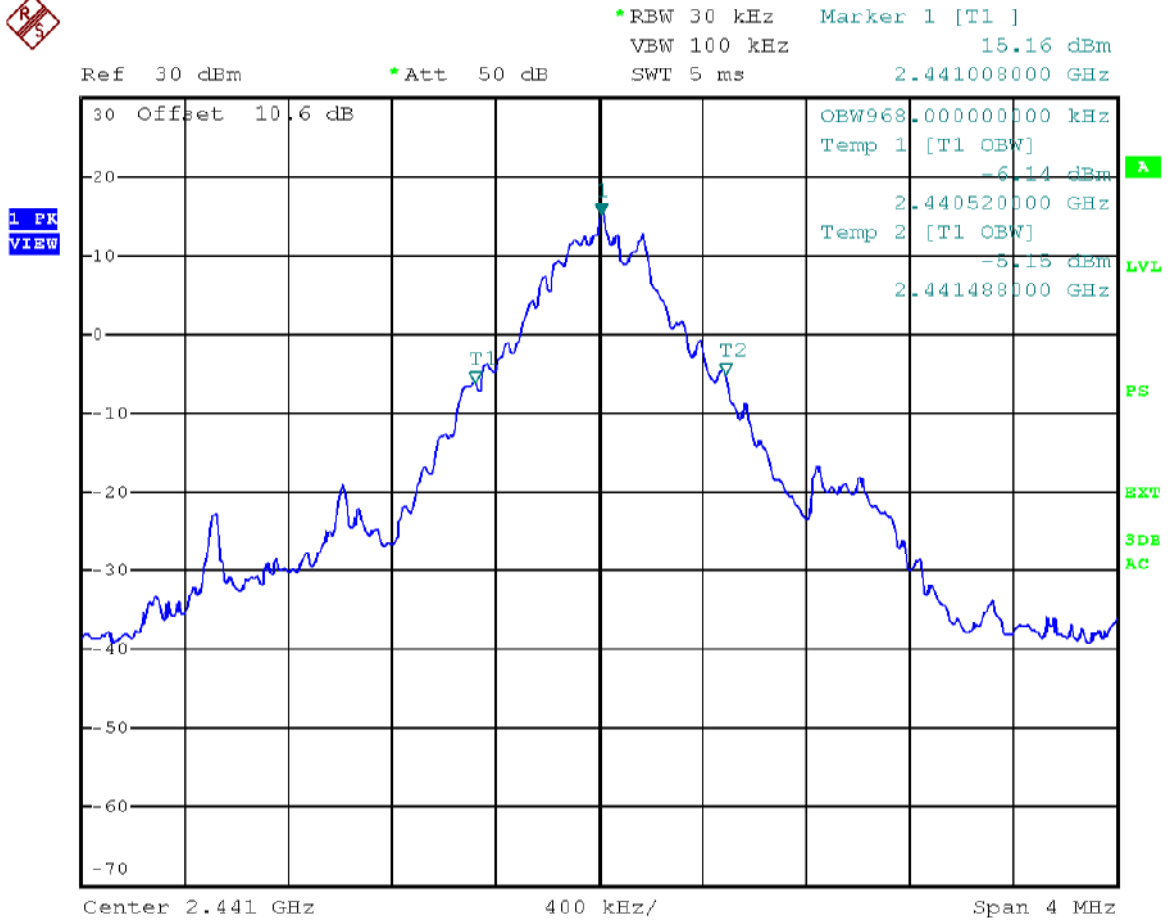
**Table 71.** 99 % OBW test results 3 Mbps mode.

Channel	Limit	99 % BW [kHz]	Result
Low	-	1 184	PASS
Mid	-	1 272	PASS
High	-	1 192	PASS



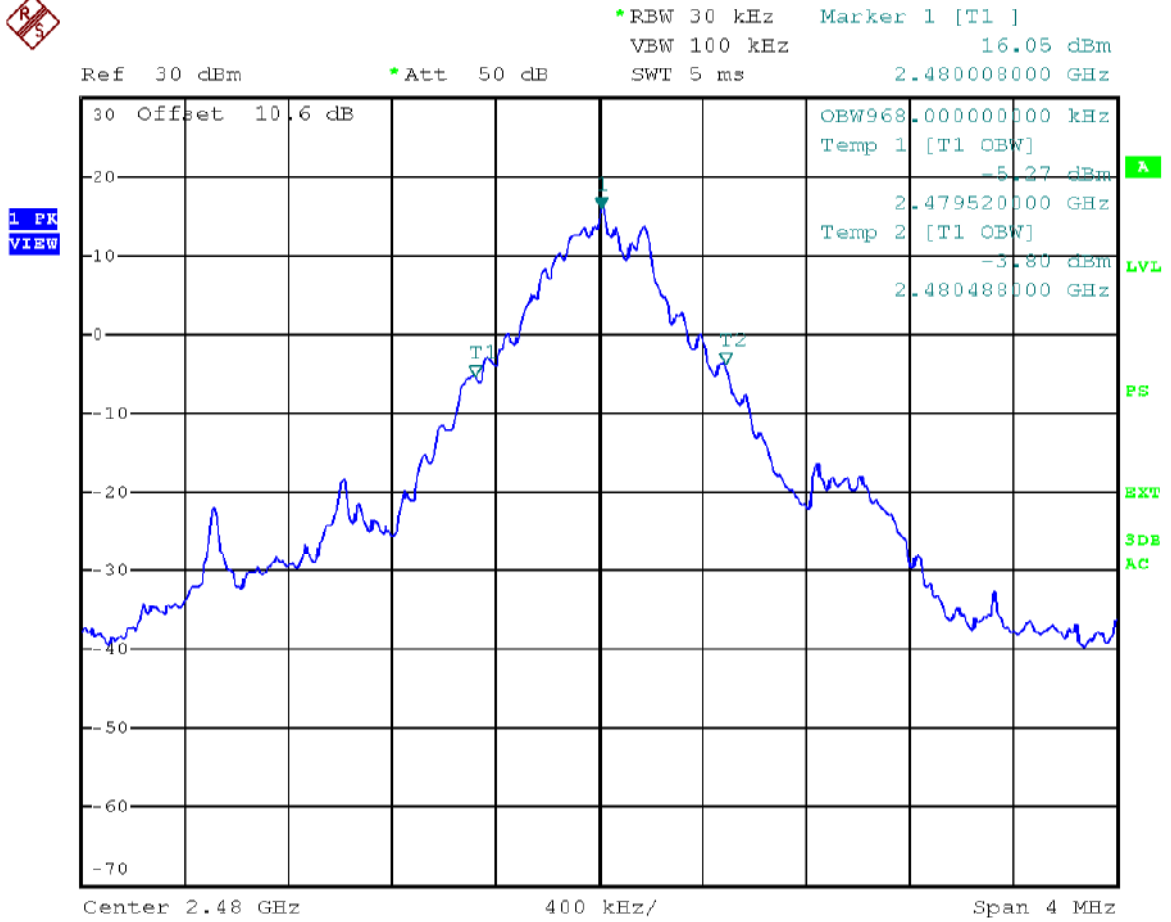
Date: 19.JAN.2012 15:04:34

**Figure 95.** 99 % OBW. Channel low 1 Mbps.



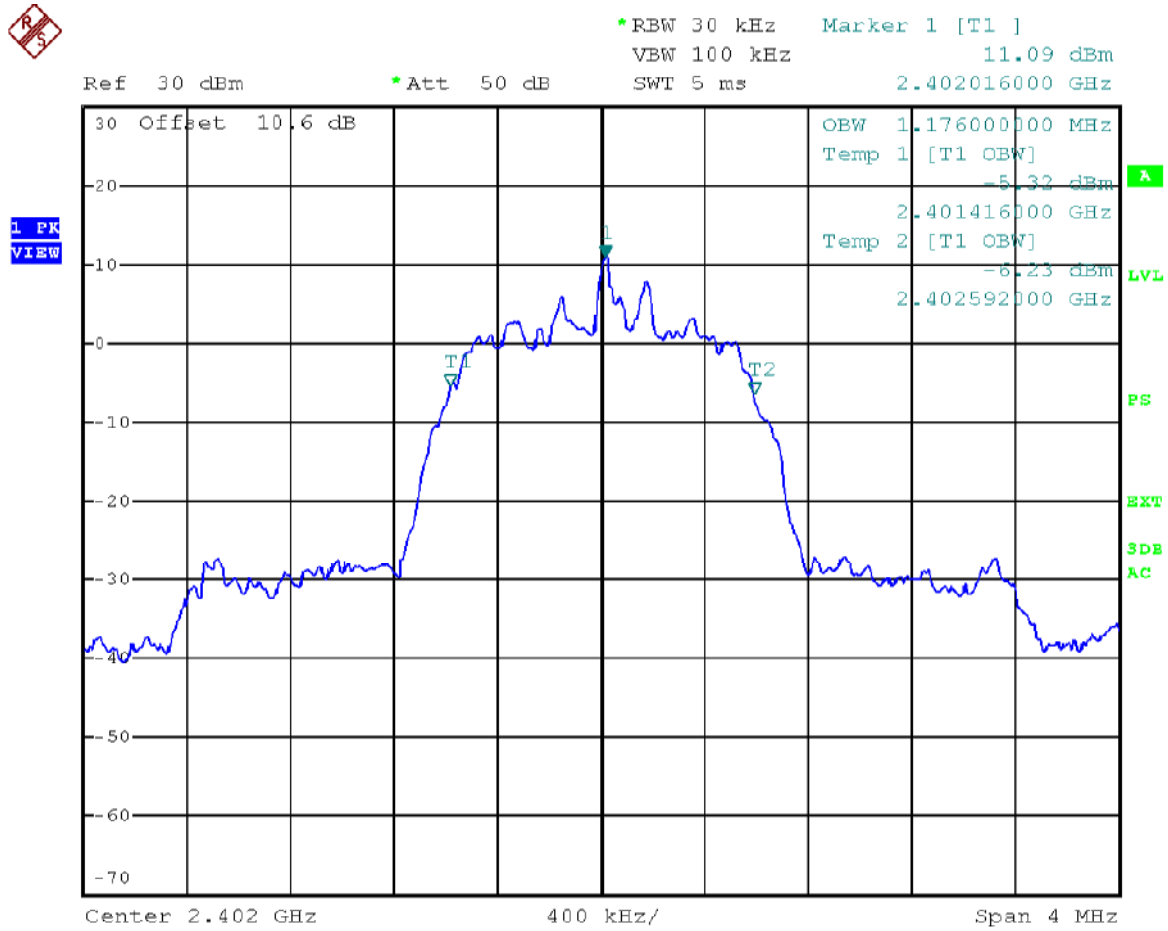
Date: 19.JAN.2012 15:02:55

**Figure 96.** 99 % OBW. Channel mid 1 Mbps.



Date: 19.JAN.2012 15:09:22

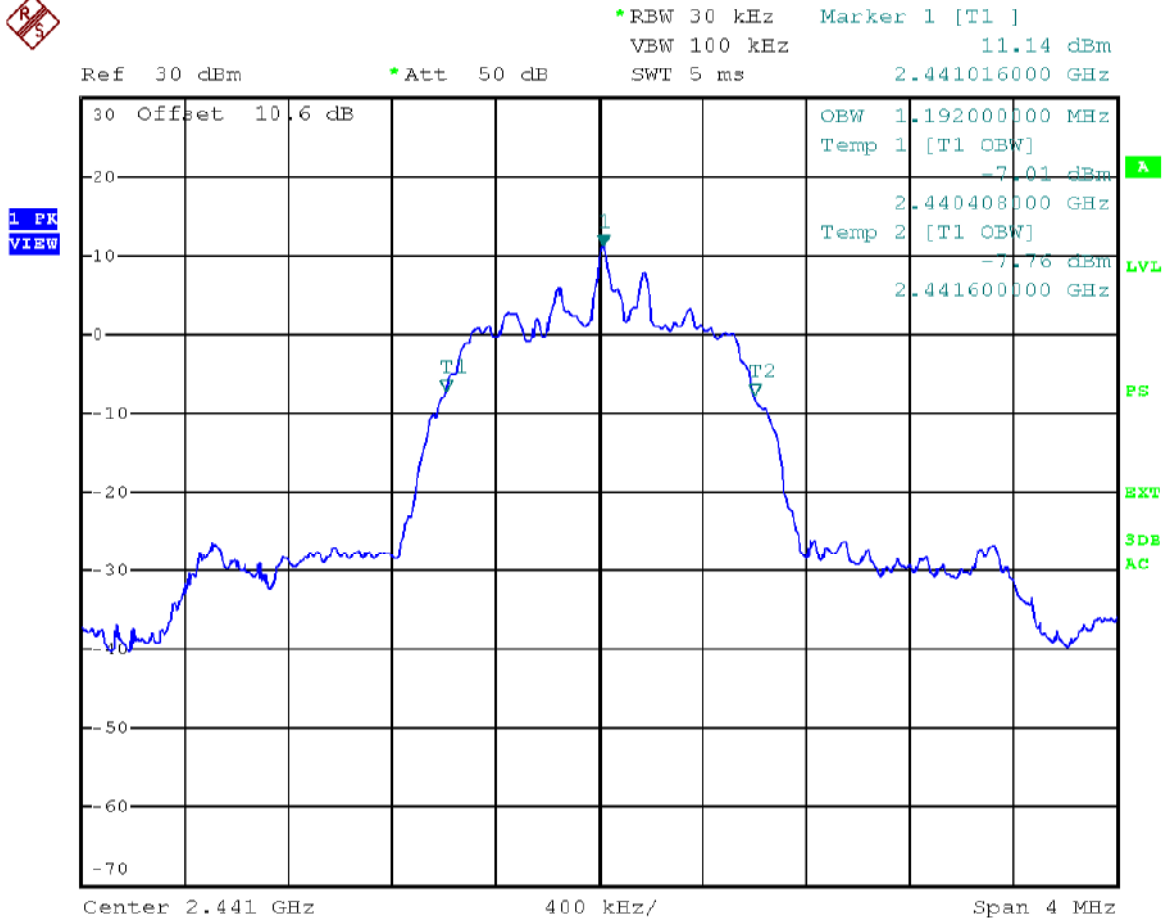
**Figure 97.** 99 % OBW. Channel high 1 Mbps.



Date: 19.JAN.2012 14:35:33

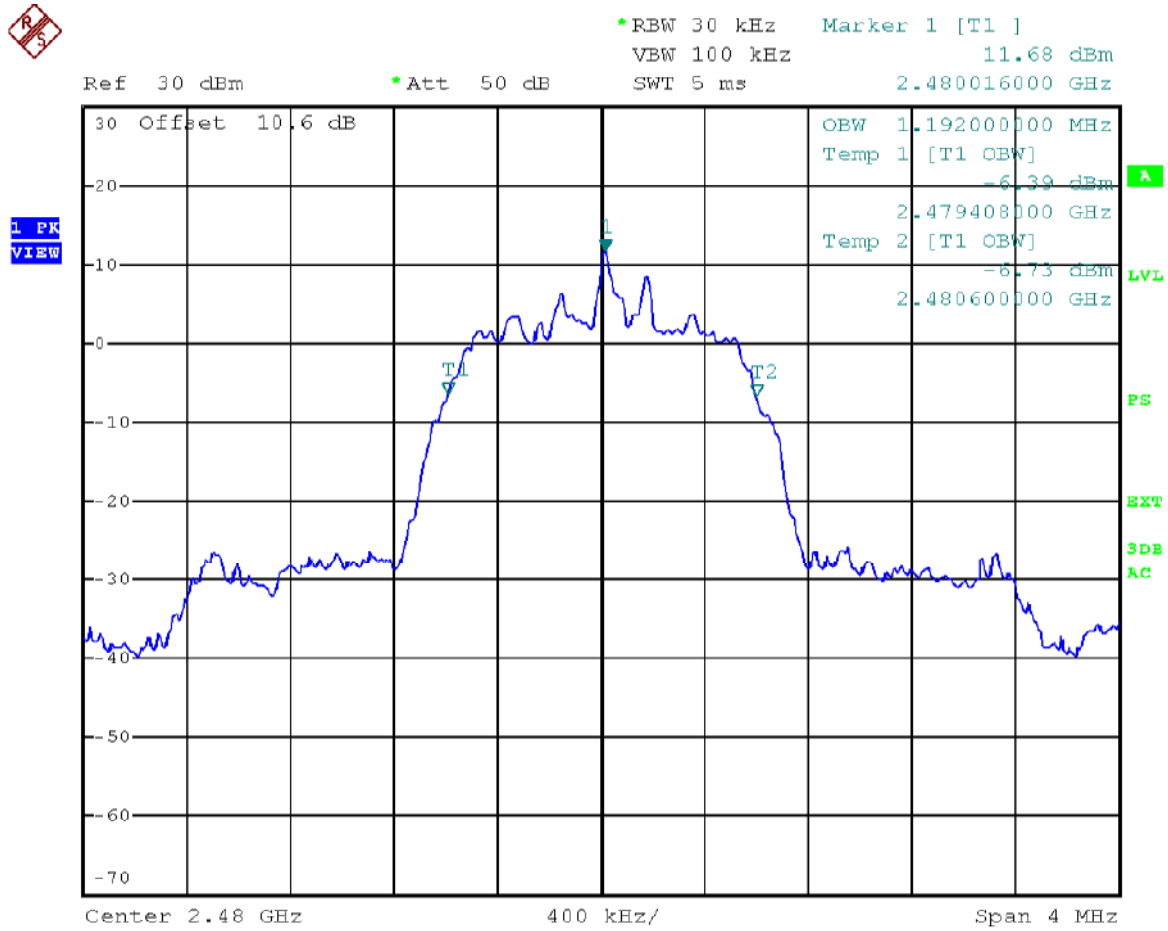
**Figure 98.** 99 % OBW. Channel low 2 Mbps.





Date: 19.JAN.2012 14:36:55

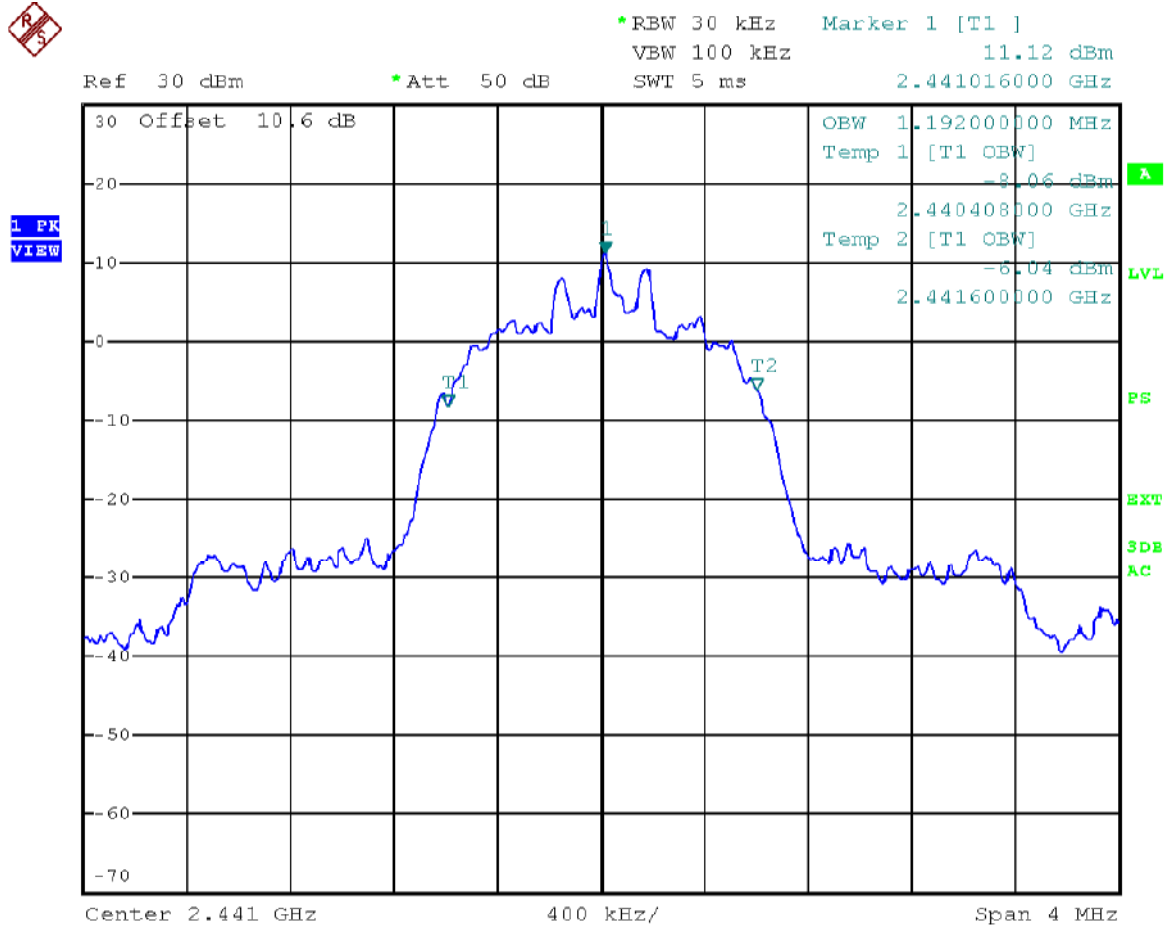
**Figure 99.** 99 % OBW. Channel mid 2 Mbps.



Date: 19.JAN.2012 14:40:42

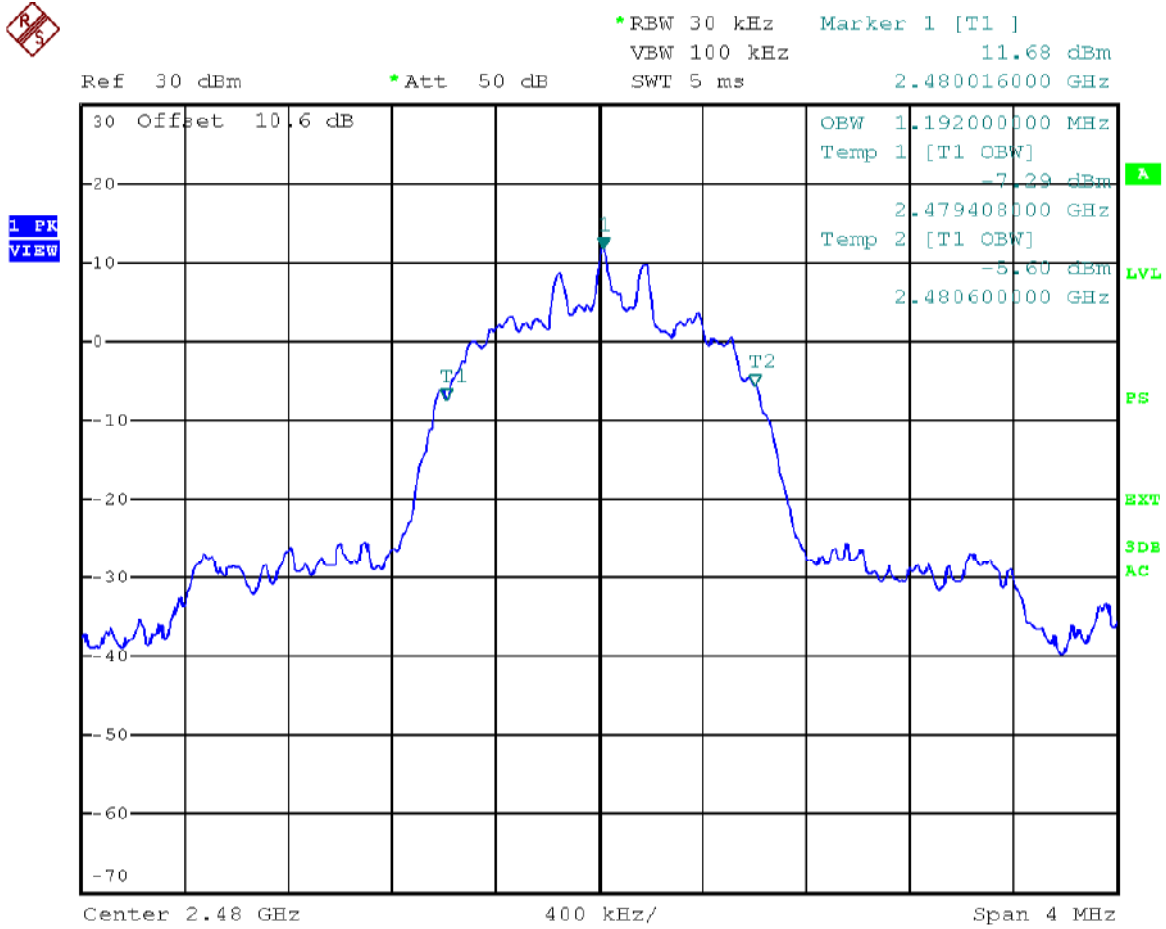
**Figure 100.** 99 % OBW. Channel high 2 Mbps.





Date: 19.JAN.2012 13:44:54

**Figure 102.** 99 % OBW. Channel mid 3 Mbps.



Date: 19.JAN.2012 13:49:56

**Figure 103.** 99 % OBW. Channel high 3 Mbps.

## Receiver Radiated Emissions 30 – 26 500 MHz

**Standard:** ANSI C63.10 (2009)  
**Tested by:** NTO  
**Date:** 28.11.2011  
**Humidity:** 40 %  
**Temperature:** 23 °C  
**Measurement uncertainty** ± 4.51 dB Level of confidence 95 % (k = 2)

### FCC Rule: 15.109

The EUT was in a receiving mode and measurement was performed on middle channel only.  
 The correction factor in the final result table contains the sum of the transducers (antenna + amplifier + cables).  
 The QuasiPeak value is the measured value corrected with the correction factor.

### Measured Peak Values In The Frequency Range 30 MHz - 1000 MHz.

FCC Part 15 Class B Electric Field Strength

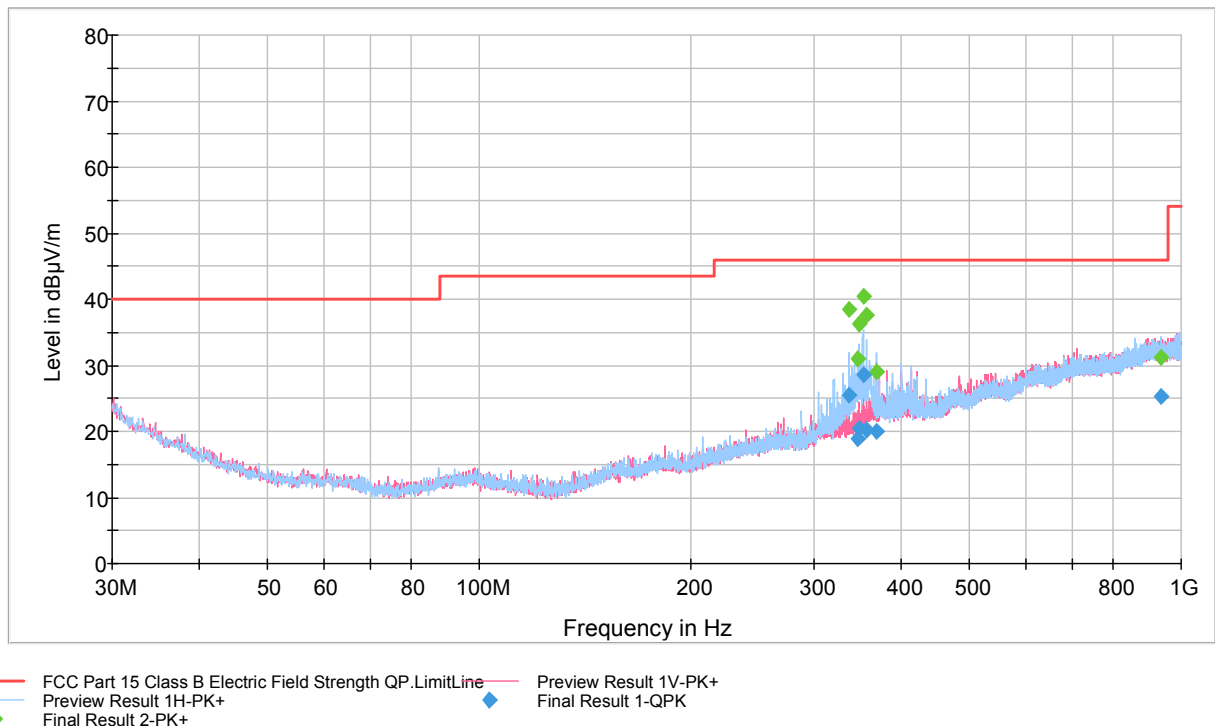


Figure 104. Measured curve with peak-detector.

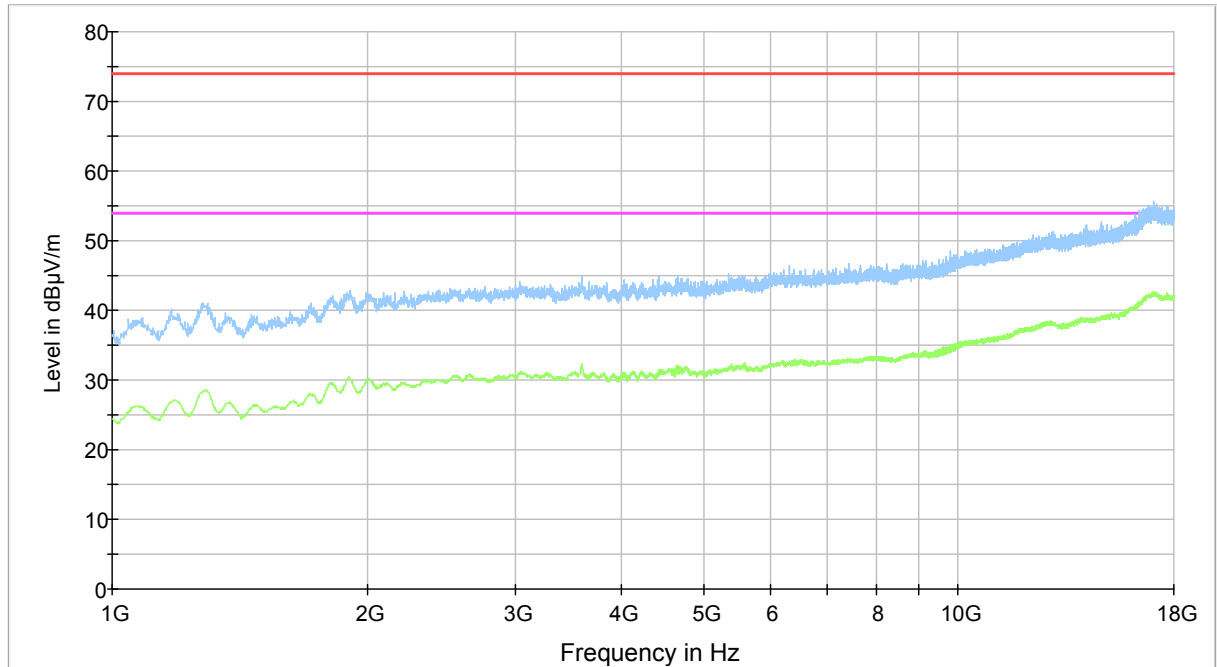
### Final measurements from the worst frequencies

Table 72. Final results with QuasiPeak detector.

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
335.940000	25.4	1000.0	120.000	100.0	H	-15.0	17.5	20.6	46.0	
346.520000	18.8	1000.0	120.000	100.0	H	-15.0	18.3	27.2	46.0	
348.260000	20.4	1000.0	120.000	100.0	H	-15.0	18.5	25.6	46.0	
351.940000	28.5	1000.0	120.000	100.0	H	-15.0	18.7	17.5	46.0	
356.160000	20.2	1000.0	120.000	100.0	H	-15.0	18.9	25.9	46.0	
367.940000	19.9	1000.0	120.000	150.0	H	-15.0	19.3	26.1	46.0	
937.045000	25.3	1000.0	120.000	250.0	H	75.0	28.5	20.7	46.0	

**Measured Peak Values In The Frequency Range 1 000 MHz – 18 000 MHz.**

Copy of FCC Part 15 Class B Spurious Emission 1-18GHz 3m

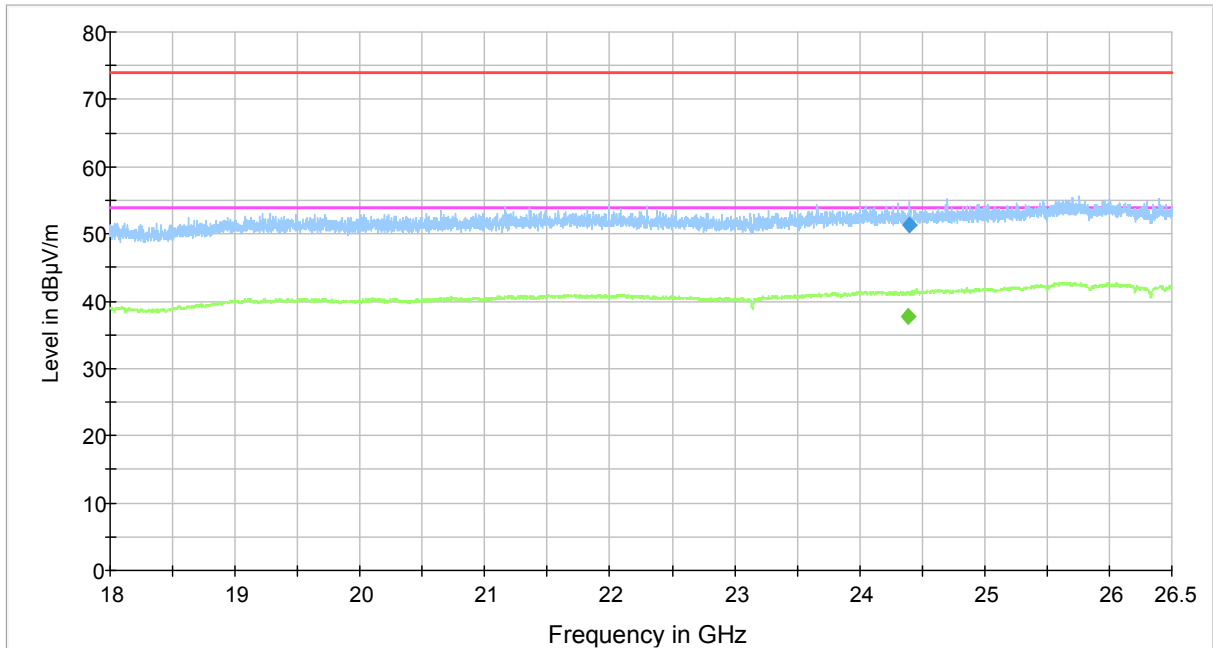


— FCC Part 15 Class B Electric Field Strength 3 m PK.LimitLine  
— FCC Part 15 Class B Electric Field Strength 3 m AV.LimitLine  
— Preview Result 1-PK+  
— Preview Result 2-AVG

**Figure 105.** Measured curve with peak-and average detector.

No final measurements were made since the margin was more than 10 dB to the limit.

Radiated Emission FCC Part 15 Class B 18-26.5GHz at 3m



— FCC Part 15 Class B Electric Field Strength 3 m PK.LimitLine     — FCC Part 15 Class B Electric Field Strength 3 m AV.LimitLine  
— Preview Result 1-PK+     — Preview Result 2-AVG  
◆ Final Result 1-PK+     ◆ Final Result 2-AVG

**Measured Peak Values In The Frequency Range 18 000 MHz – 26 500 MHz.**

**Figure 106.** Measured curve with peak-and average detector.

**Final measurements from the worst frequencies**

**Table 73.** Final MaxPeak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
24399.425000	51.3	1000.0	1000.000	106.0	V	0.0	27.2	22.6	73.9	

**Table 74.** Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
24391.425000	37.7	1000.0	1000.000	100.0	V	6.0	27.2	16.2	53.9	



## Conducted emissions

**Standard:** ANSI C63.10 (2009)  
**Tested by:** NTO  
**Date:** 29.11.2011  
**Humidity:** 26 %  
**Temperature:** 22 °C  
**Measurement uncertainty** ± 2,87 dB Level of confidence 95 % (k = 2)

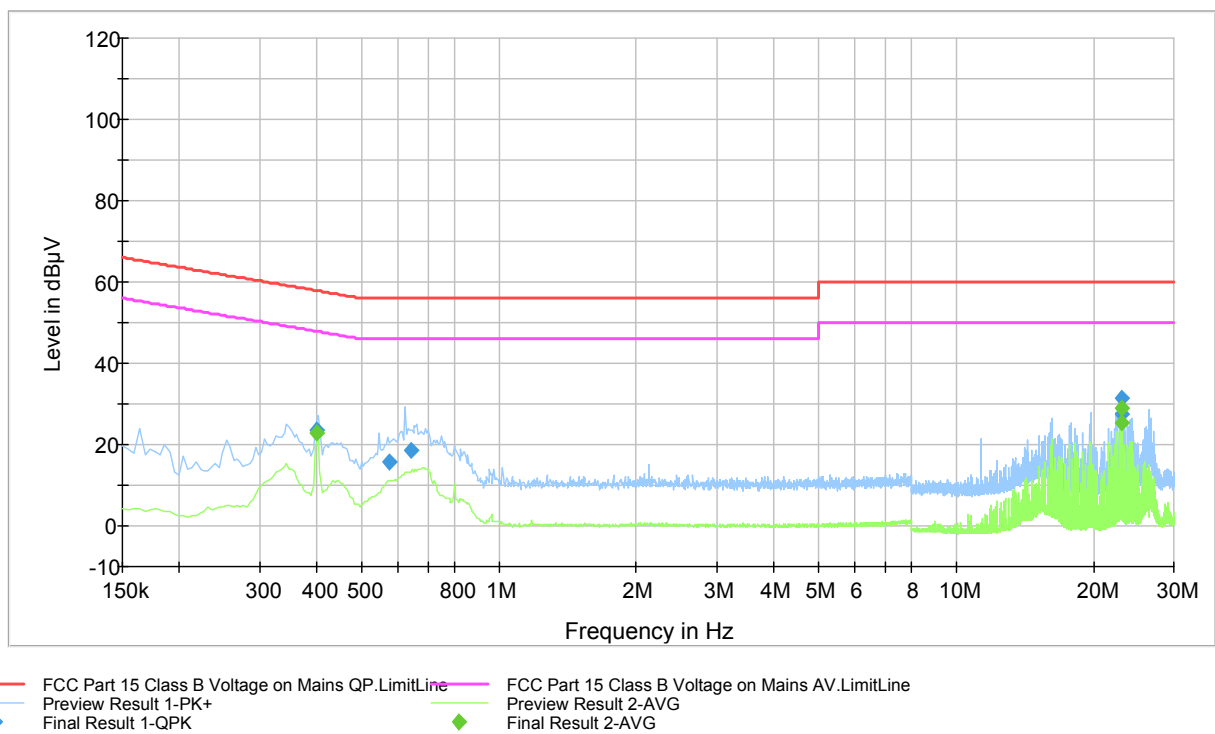
### FCC Rule: 15.207

Conducted disturbance voltage was measured with an artificial main network from 150 kHz to 30 MHz with 4.5 kHz steps and a resolution bandwidth of 9 kHz. Measurements were carried out with peak and average detectors.

During the test the EUT was powered from the separate AC / DC power supply which was connected to the LISN. The supply voltage through the LISN to the power supply was 115 VAC / 60 Hz.

### Test results

FCC Part 15 Class B Voltage on Mains 2-Line-LISN



**Figure 107.** The measured curves with peak- and average-detectors

**Final measurements from the worst frequencies**

**Table 75.** Final QuasiPeak results.

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.400501	23.7	1000.0	9.000	GN	L1	10.2	34.1	57.8	
0.574501	15.7	1000.0	9.000	GN	N	10.1	40.3	56.0	
0.642001	18.5	1000.0	9.000	GN	L1	10.2	37.5	56.0	
23.068501	27.5	1000.0	9.000	GN	L1	11.7	32.5	60.0	
23.128501	31.6	1000.0	9.000	GN	L1	11.7	28.4	60.0	

**Table 76.** Final Average results.

Frequency (MHz)	Average (dB $\mu$ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.400501	22.7	1000.0	9.000	GN	N	10.1	25.1	47.8	
23.067001	25.3	1000.0	9.000	GN	L1	11.7	24.7	50.0	
23.128501	29.1	1000.0	9.000	GN	L1	11.7	20.9	50.0	

**List of test equipments**

<b>Manufacturer</b>	<b>Type</b>	<b>Serial no</b>	<b>Inv. no</b>
<b>ROHDE &amp; SCHWARZ</b>			
EMI Test receiver	ESCI 3	100885	8264
EMI Test receiver	ESU 26	100185	8453
Test software	EMC32	-	-
LISN	ESH2-Z5	-	4126
Transient limiter	ESH3-Z2	-	-
<b>DAVIS</b>			
Weather station	Vantage Pro	-	5297
<b>EMCO</b>			
Antenna (1 - 18 GHz)	3117	29617	7293
Antenna (18 – 26.5 GHz)	3160-9	28535	7294
<b>CHASE</b>			
Antenna (30 MHz - 1 GHz)	6141A	4102	7895
<b>HEWLETT- PACKARD</b>			
Microwave amplifier	83017A	-	5226
<b>HUBER-+ SUHNER</b>			
Attenuator 10dB	6810.17B	-	-
<b>DEISEL</b>			
Antenna mast	MA 240 T	240/394/96	5017
Tilt option	KE 220	220/307/96	-
Controller	HD 100	100/413/96	5018
Turntable	DS 420	420/420/96	5015
<b>WAINWRIGHT</b>			
High Pass Filter	WHKX	10	8267

Calibration was valid to all test equipment which are listed above.