

Test Report



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

Equipment Under Test: Bluetooth module

Model: WT41-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: 2010
IC Rule Part: RSS-210, Issue 8, 2010
RSS-GEN Issue 3, 2010

Date: 9.9.2011

Issued by: 
Niko Tolonen
RF Testing Engineer

Date: 9.9.2011

Checked by: 
Jari Merikari
Technical Manager

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Equipment Under Test (EUT)

Bluetooth module
 Model: WT41-E
 Type: -
 Serial no: -
 HW version: -
 SW version: -
 FCC ID number: QQQWT41-E
 Industry Canada number: 5123A-BGTWT41E

Description of the EUT

WT41-E is a class 1 Bluetooth module containing all the necessary elements from Bluetooth® radio to antenna and a fully implemented protocol stack. Therefore WT41 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): 1.391 MHz
 Conducted power: 15.94 dBm (64.39mW)
 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: 5.65 mm	Width: 14.0 mm	Depth: 35.3 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: 90598	SGS Fimko Ltd Särkiniementie 3 FI-00210, HELSINKI FINLAND
<input checked="" type="checkbox"/> Testing Location / address: FCC registration number: 178986 Industry Canada registration number: 8708A-2	SGS Fimko Ltd Karakaarenkuja 4 FI-02610, ESPOO FINLAND

Maximum Peak Conducted Output Power

Standard: ANSI C63.10 (2009)
Tested by: JJM
Date: 24.5.2011
Humidity: 37 %
Temperature: 21 °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	15.34	30	14.66	PASS
Mid	15.64	30	14.36	PASS
High	15.94	30	14.06	PASS

2 Mbps

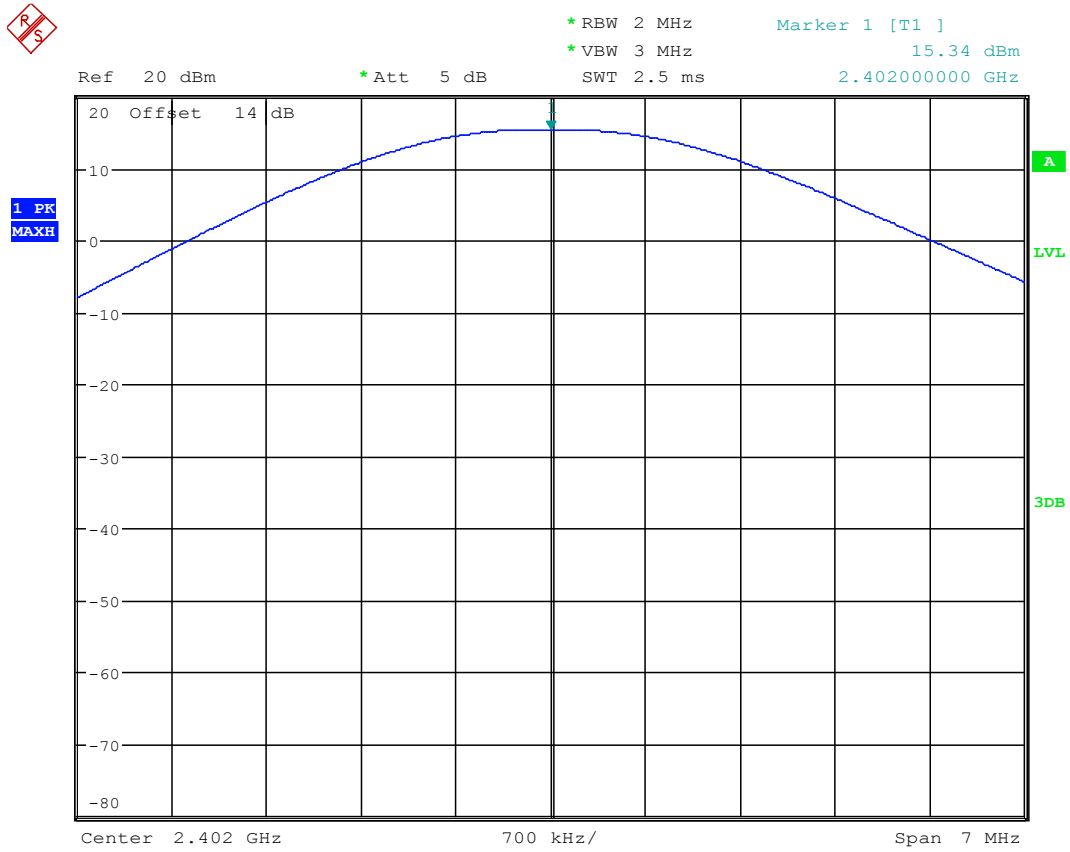
Channel	Conducted Power [dBm]	Limit [dBm]	Margin [dBm]	Result
Low	14.19	30	15.81	PASS
Mid	14.17	30	15.83	PASS
High	13.72	30	16.28	PASS

3 Mbps

Channel	Conducted Power [dBm]	Limit [dBm]	Margin [dBm]	Result
Low	14.49	30	15.51	PASS
Mid	14.49	30	15.51	PASS
High	14.05	30	15.95	PASS

The attenuation of the measurement cable and the attenuator was added as an offset 14.0 dB to correct the measurement result.

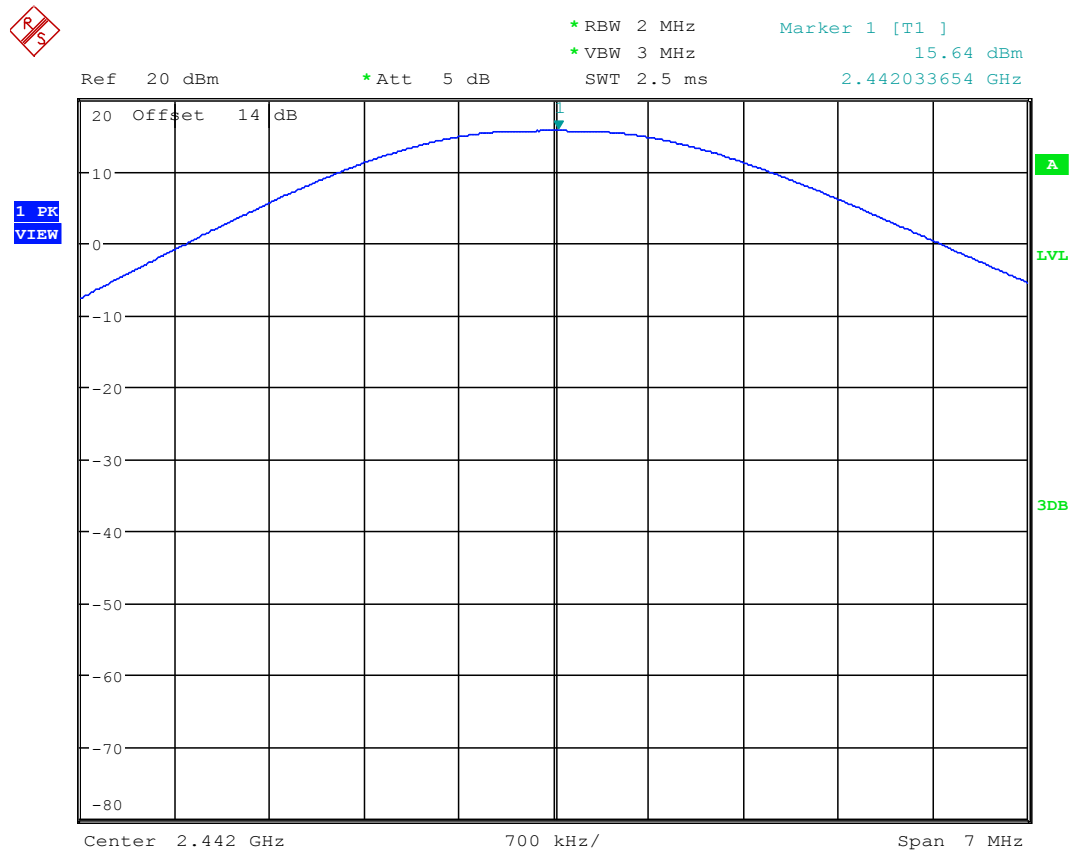
Conducted Output Power Test



Date: 24.MAY.2011 11:48:23

Figure 1. 1 Mbps Channel LOW.

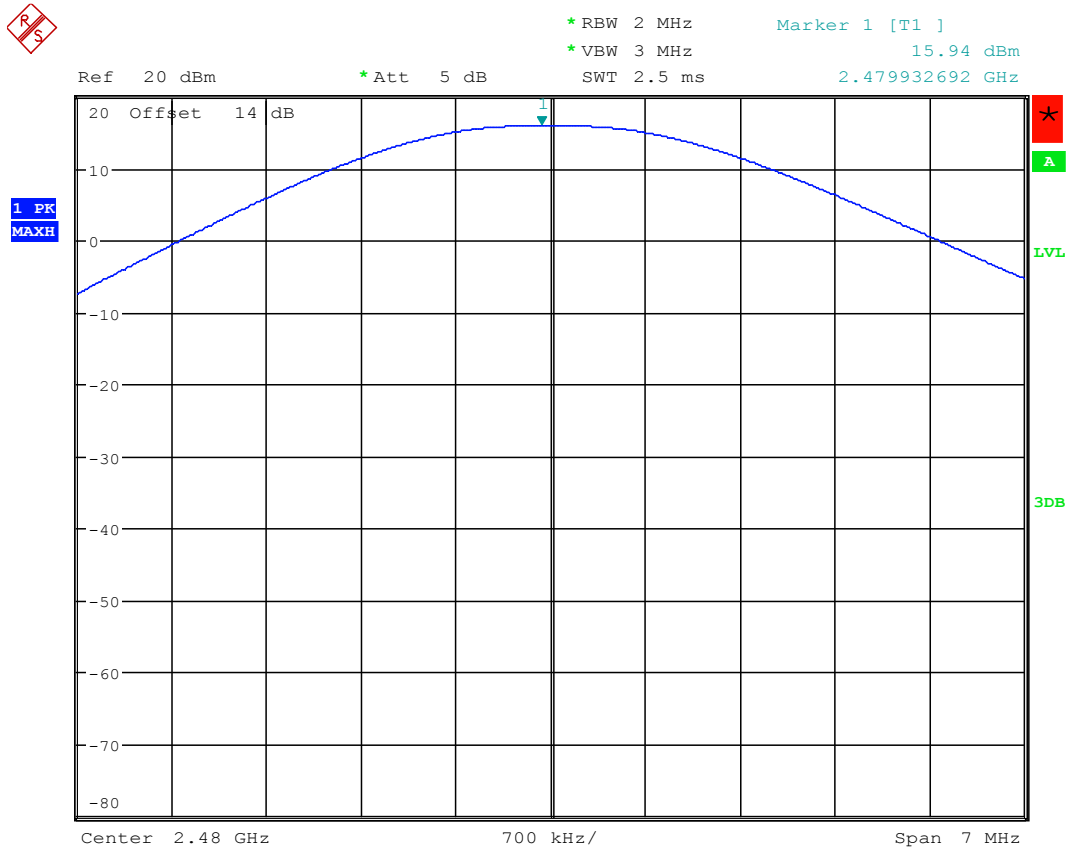
Conducted Output Power Test



Date: 24.MAY.2011 11:49:50

Figure 2. 1 Mbps Channel MID.

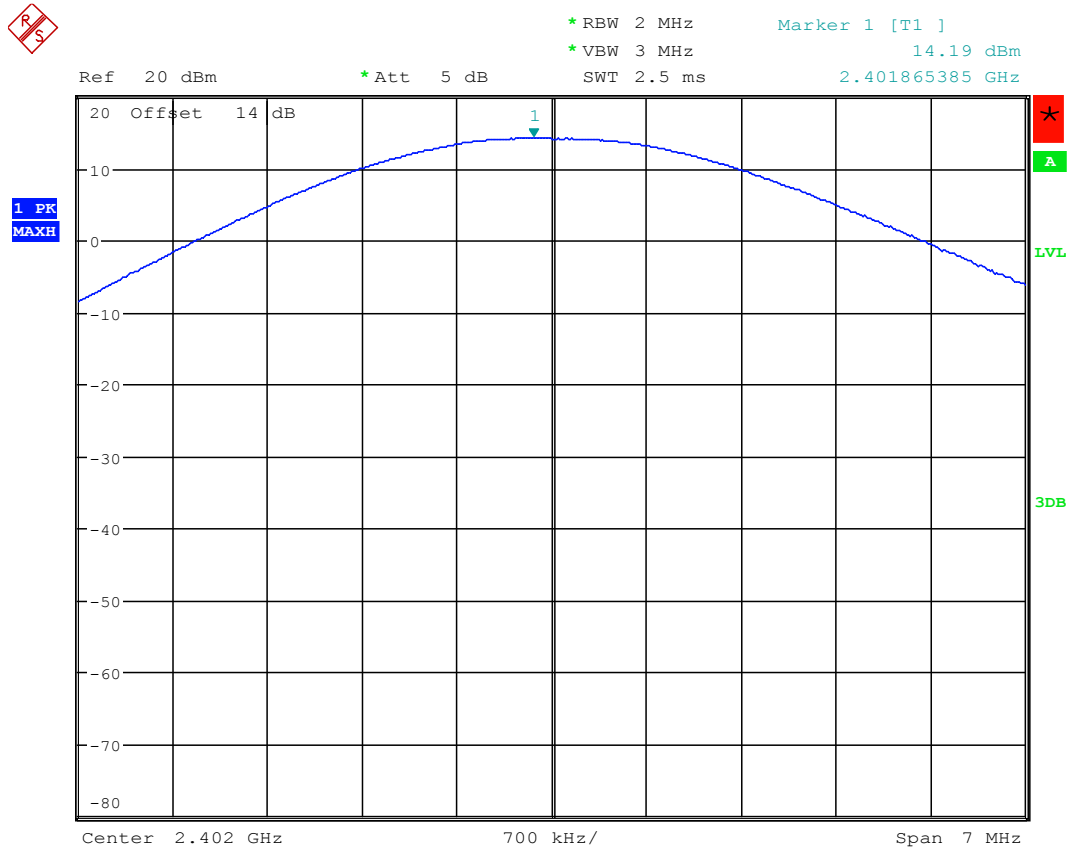
Conducted Output Power Test



Date: 24.MAY.2011 11:55:26

Figure 3. 1 Mbps Channel HIGH.

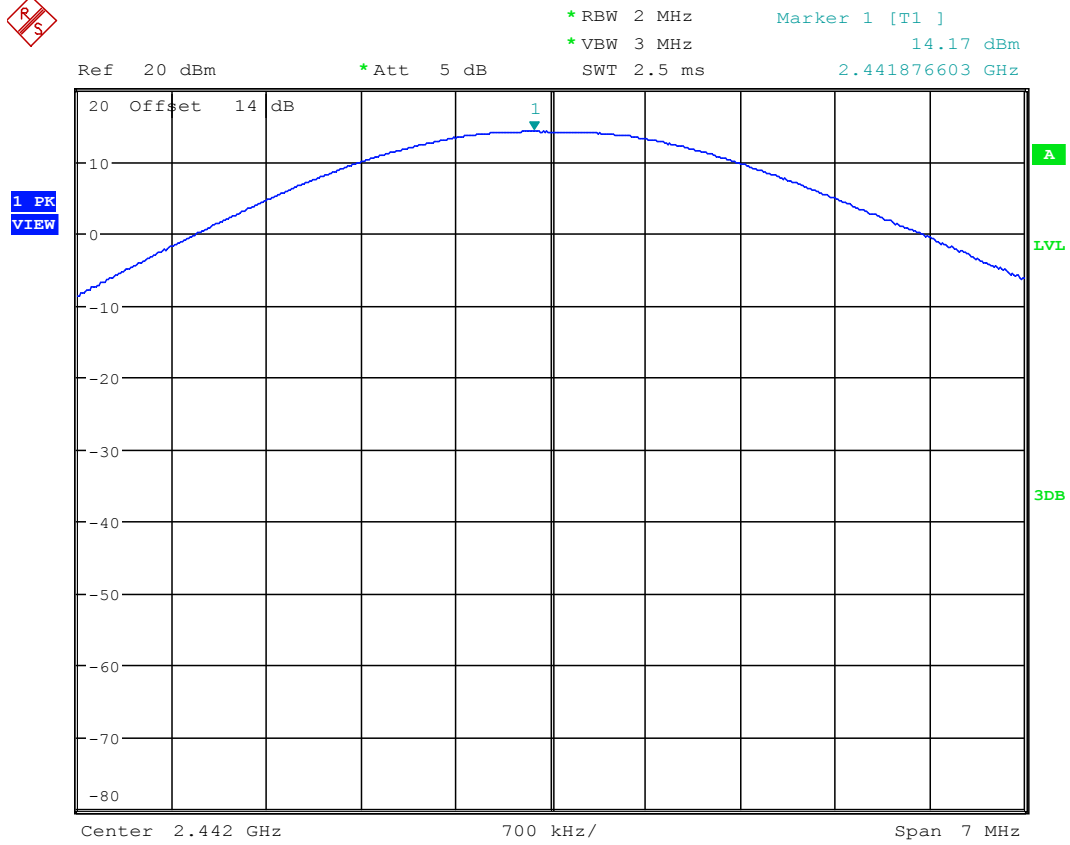
Conducted Output Power Test



Date: 24.MAY.2011 11:52:18

Figure 4. 2 Mbps Channel LOW.

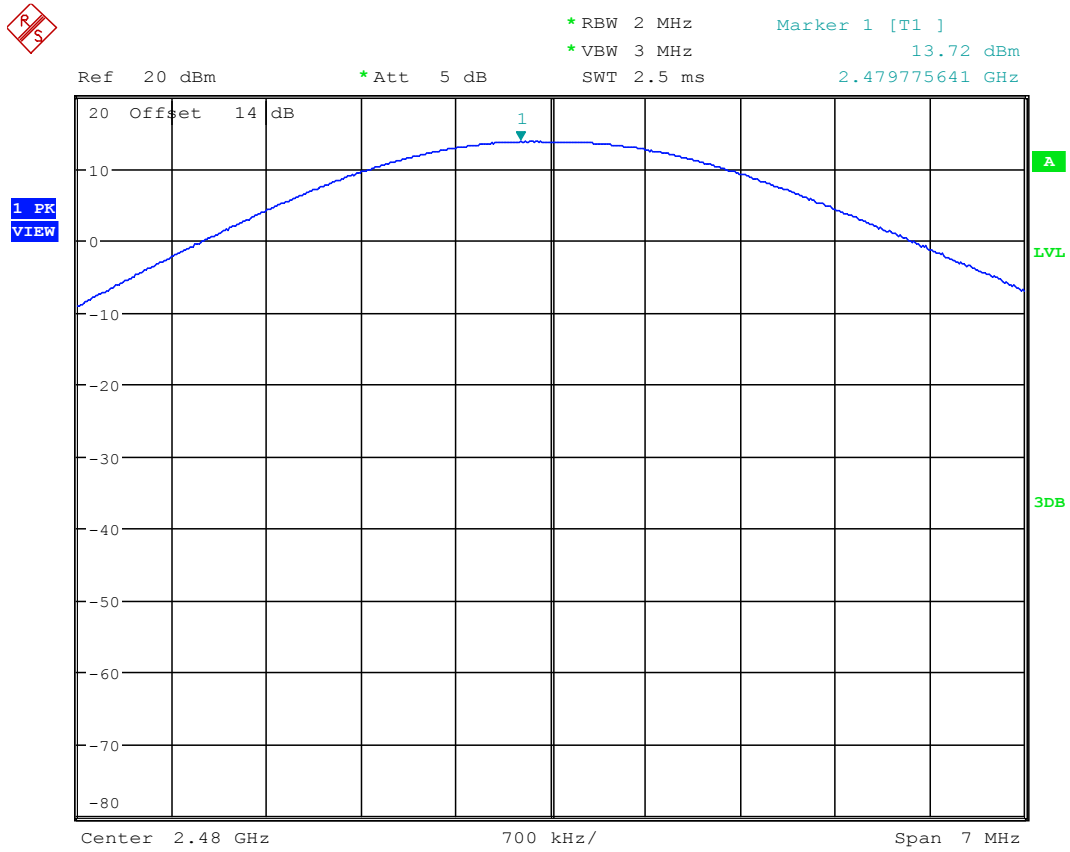
Conducted Output Power Test



Date: 24.MAY.2011 11:53:21

Figure 5. 2 Mbps Channel MID.

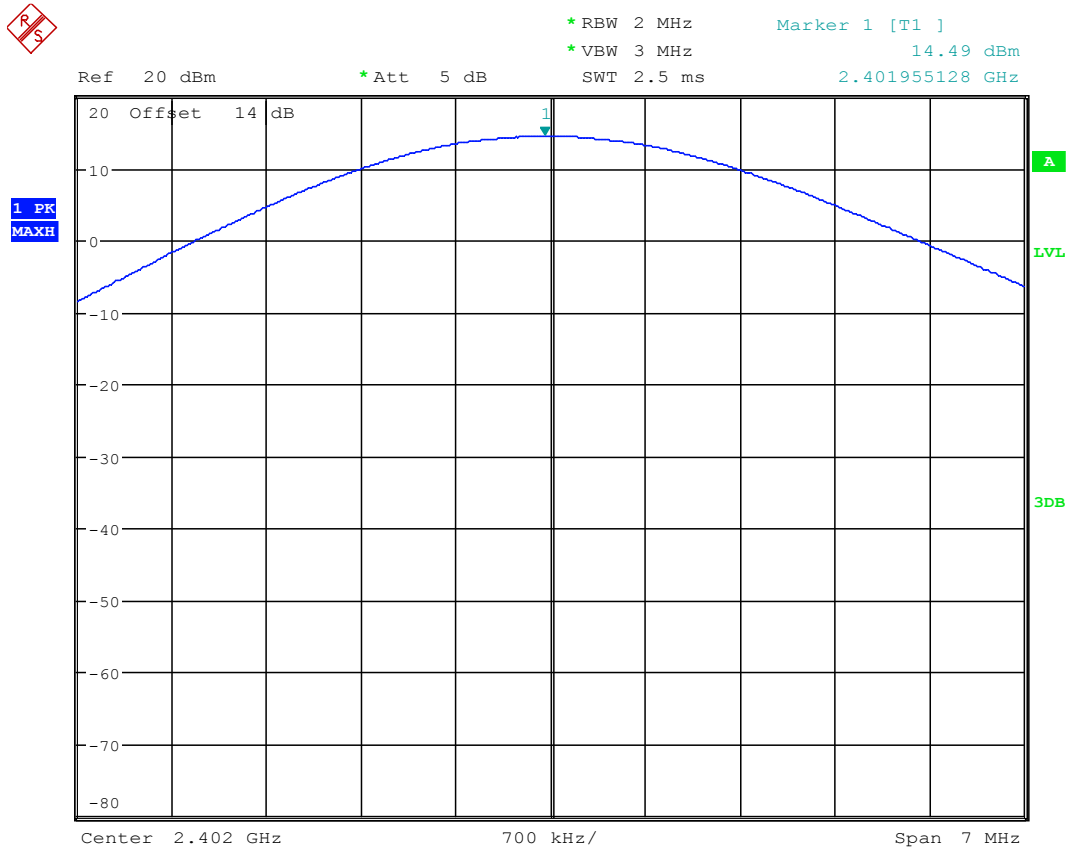
Conducted Output Power Test



Date: 24.MAY.2011 12:00:37

Figure 6. 2 Mbps Channel HIGH.

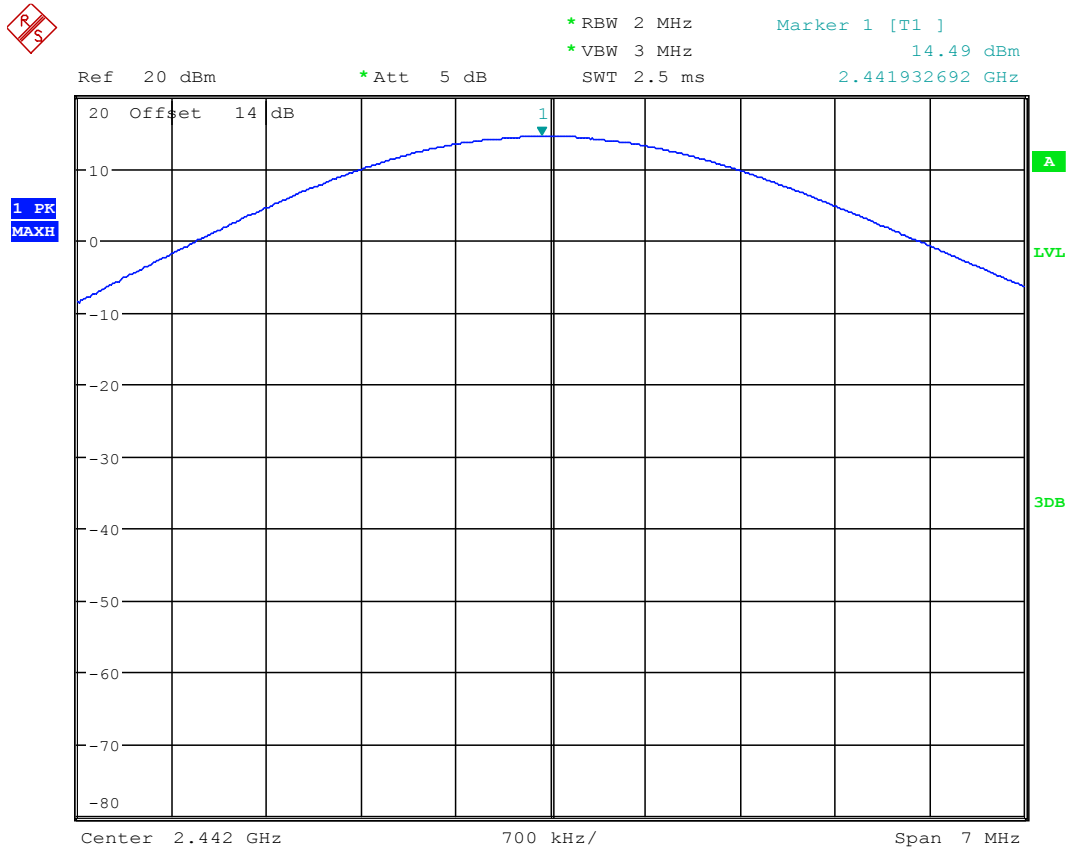
Conducted Output Power Test



Date: 24.MAY.2011 11:58:08

Figure 7. 3 Mbps Channel LOW.

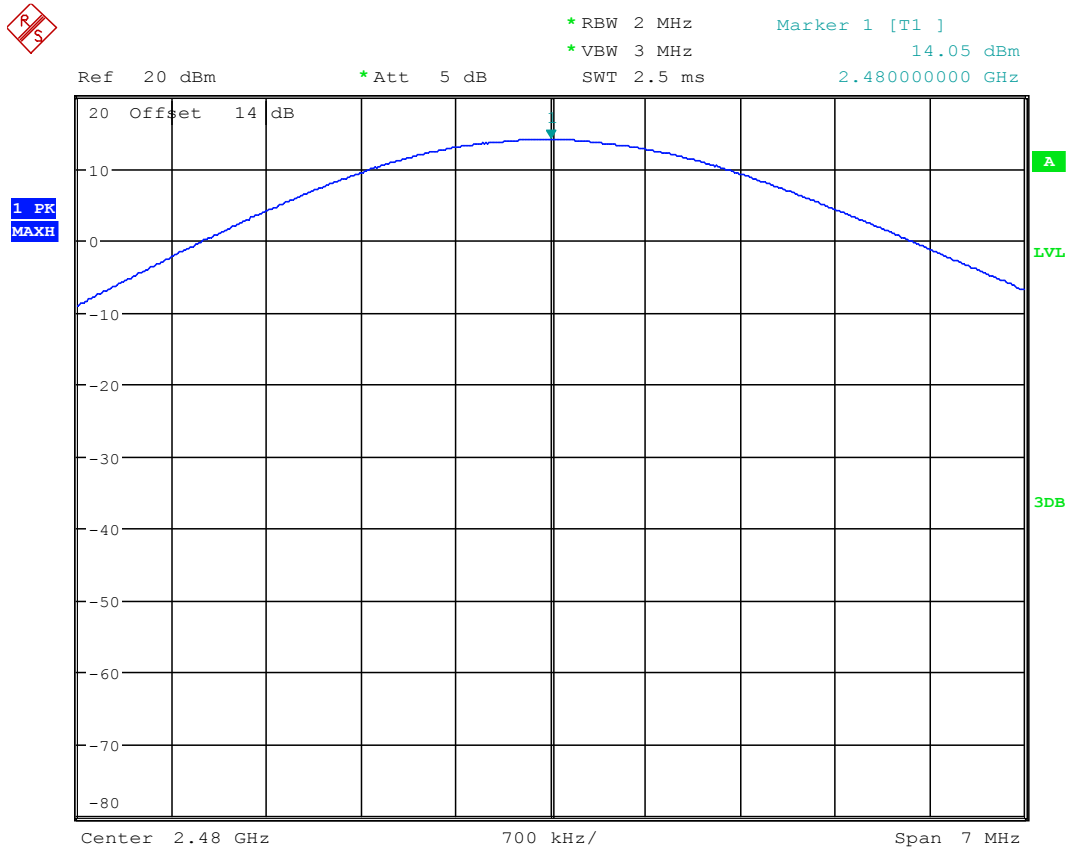
Conducted Output Power Test



Date: 24.MAY.2011 11:59:07

Figure 8. 3 Mbps Channel MID.

Conducted Output Power Test



Date: 24.MAY.2011 11:59:57

Figure 9. 3 Mbps Channel HIGH.

Transmitter Radiated Emissions 30 – 1000 MHz

Standard:	ANSI C63.10	(2009)
Tested by:	JJM	
Date:	30.5.2011	
Humidity:	37 %	
Temperature:	21.0 °C	
Measurement uncertainty	± 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

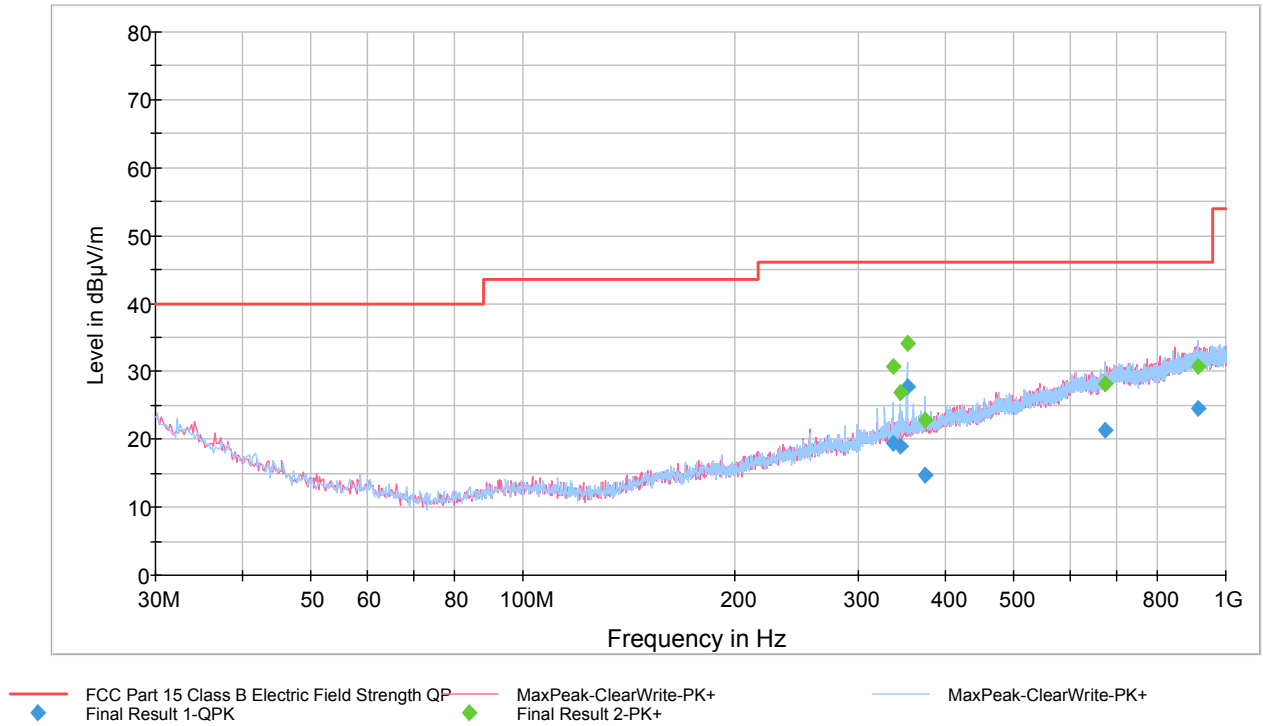


Figure 10. Measured curve with peak-detector. 1 Mbps Channel LOW.

Final measurements from the worst frequencies

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	PoI	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
336.035000	19.5	15000.0	120.000	130.0	H	285.0	17.5	26.5	46.0	
344.017500	18.9	15000.0	120.000	130.0	H	285.0	17.8	27.1	46.0	
352.020000	27.8	15000.0	120.000	100.0	H	285.0	18.3	18.2	46.0	
373.843750	14.7	15000.0	120.000	130.0	H	270.0	18.7	31.3	46.0	
675.303750	21.4	15000.0	120.000	275.0	H	182.0	24.8	24.6	46.0	
915.083750	24.6	15000.0	120.000	304.0	H	-14.0	28.1	21.4	46.0	

Table 1. Final results.

FCC Part 15 Class B Electric Field Streight

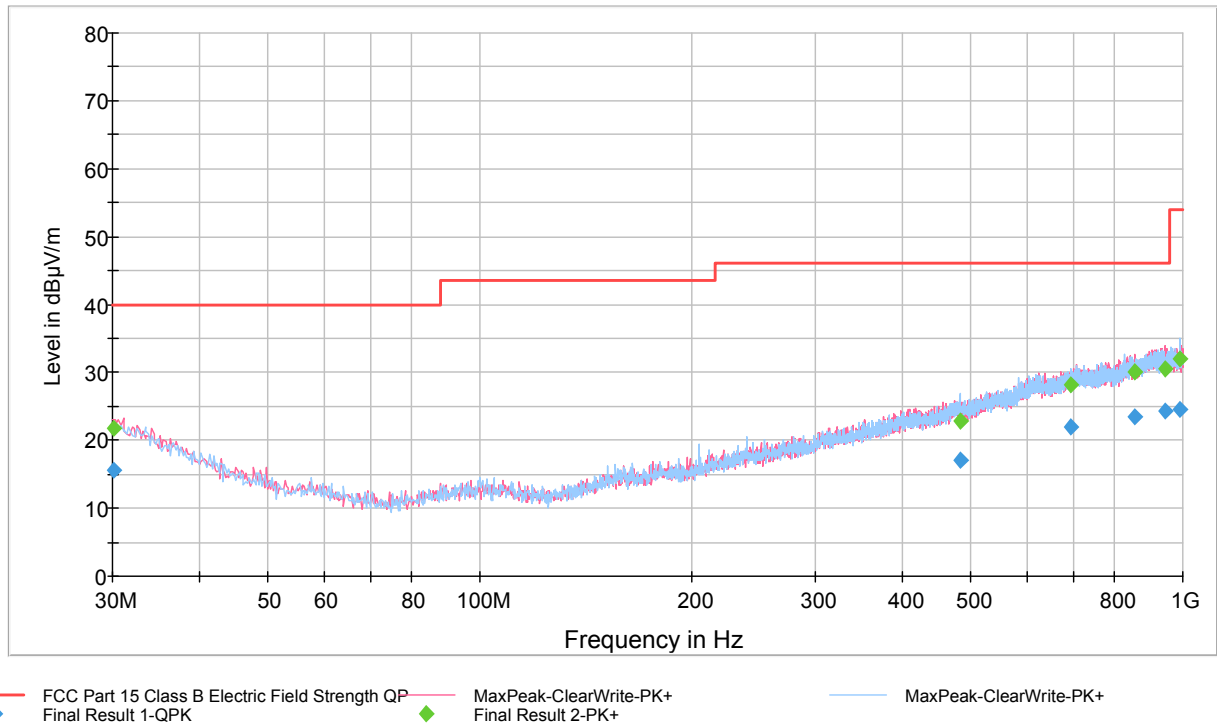


Figure 11. Measured curve with peak-detector. 1 Mbps Channel MID.

Final measurements from the worst frequencies

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
30.180000	15.7	15000.0	120.000	229.0	V	195.0	19.1	24.3	40.0	
482.518750	17.1	15000.0	120.000	150.0	H	273.0	21.7	28.9	46.0	
694.278750	22.0	15000.0	120.000	300.0	H	75.0	25.5	24.0	46.0	
856.722500	23.4	15000.0	120.000	200.0	V	181.0	26.9	22.6	46.0	
945.283750	24.3	15000.0	120.000	297.0	V	195.0	28.0	21.7	46.0	
992.836250	24.6	15000.0	120.000	100.0	H	1.0	28.2	29.4	54.0	

Table 2. Final results.

FCC Part 15 Class B Electric Field Strength

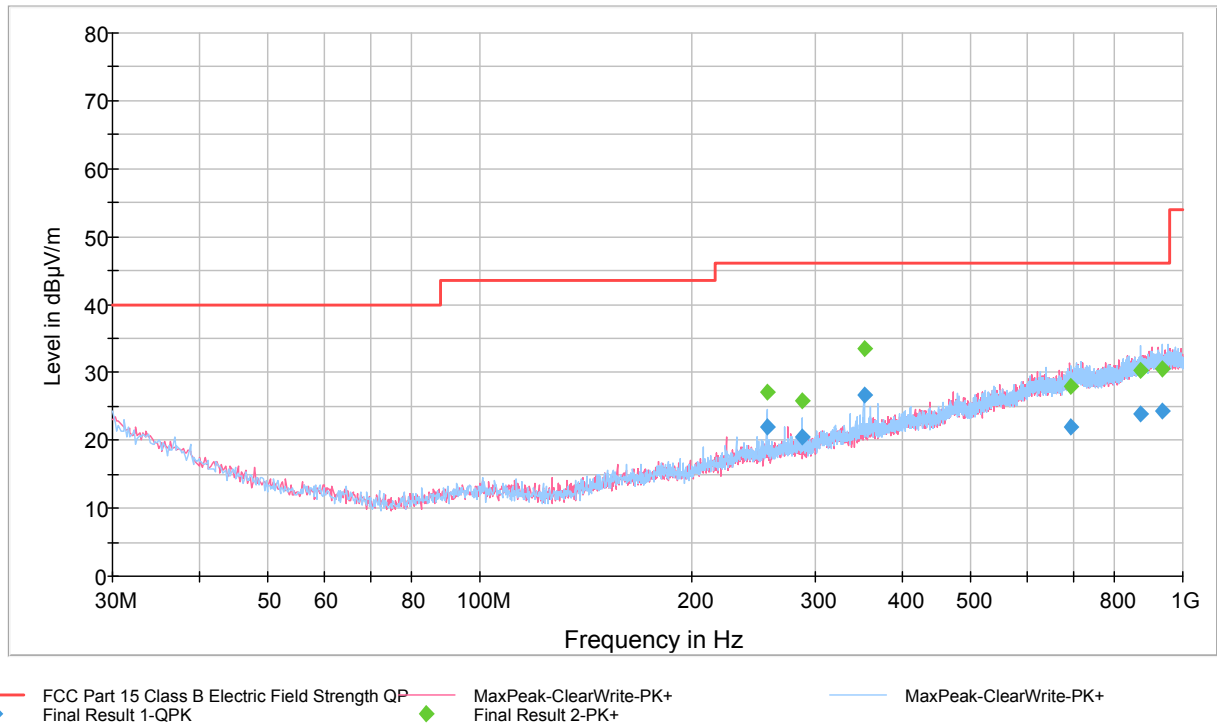


Figure 12. Measured curve with peak-detector. 1 Mbps Channel HIGH.

Final measurements from the worst frequencies

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
255.990000	21.9	15000.0	120.000	129.0	H	-14.0	14.8	24.1	46.0	
287.980000	20.4	15000.0	120.000	150.0	H	181.0	15.6	25.6	46.0	
351.980000	26.7	15000.0	120.000	100.0	H	163.0	18.3	19.3	46.0	
692.160000	21.9	15000.0	120.000	296.0	V	108.0	25.5	24.1	46.0	
872.888750	23.8	15000.0	120.000	100.0	H	285.0	27.2	22.2	46.0	
935.907500	24.3	15000.0	120.000	100.0	H	-15.0	28.0	21.7	46.0	

Table 3. Final results.

FCC Part 15 Class B Electric Field Streight

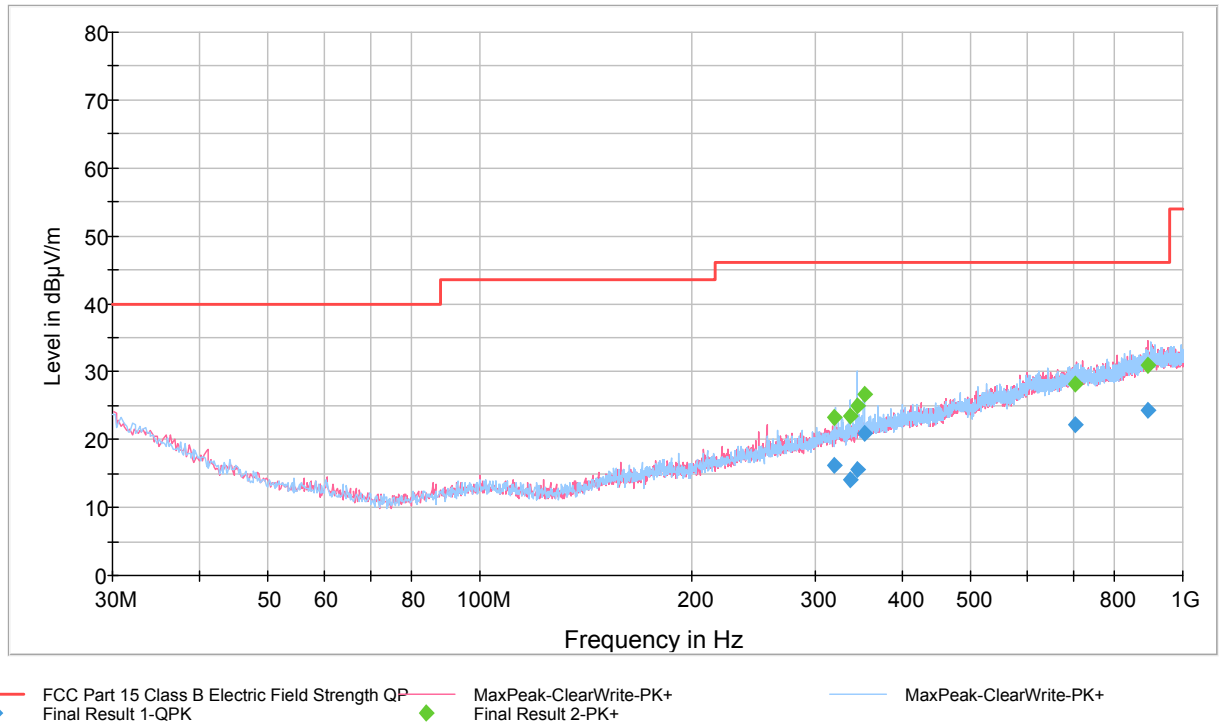


Figure 13. Measured curve with peak-detector. 2 Mbps Channel LOW.

Final measurements from the worst frequencies

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
319.950000	16.2	15000.0	120.000	100.0	H	285.0	17.4	29.8	46.0	
335.893750	14.1	15000.0	120.000	100.0	H	105.0	17.5	31.9	46.0	
343.956250	15.6	15000.0	120.000	100.0	H	285.0	17.8	30.4	46.0	
352.038750	20.8	15000.0	120.000	100.0	H	285.0	18.3	25.2	46.0	
704.286250	22.2	15000.0	120.000	350.0	H	285.0	25.7	23.8	46.0	
891.616250	24.4	15000.0	120.000	304.0	V	270.0	27.8	21.6	46.0	

Table 4. Final results.

FCC Part 15 Class B Electric Field Strength

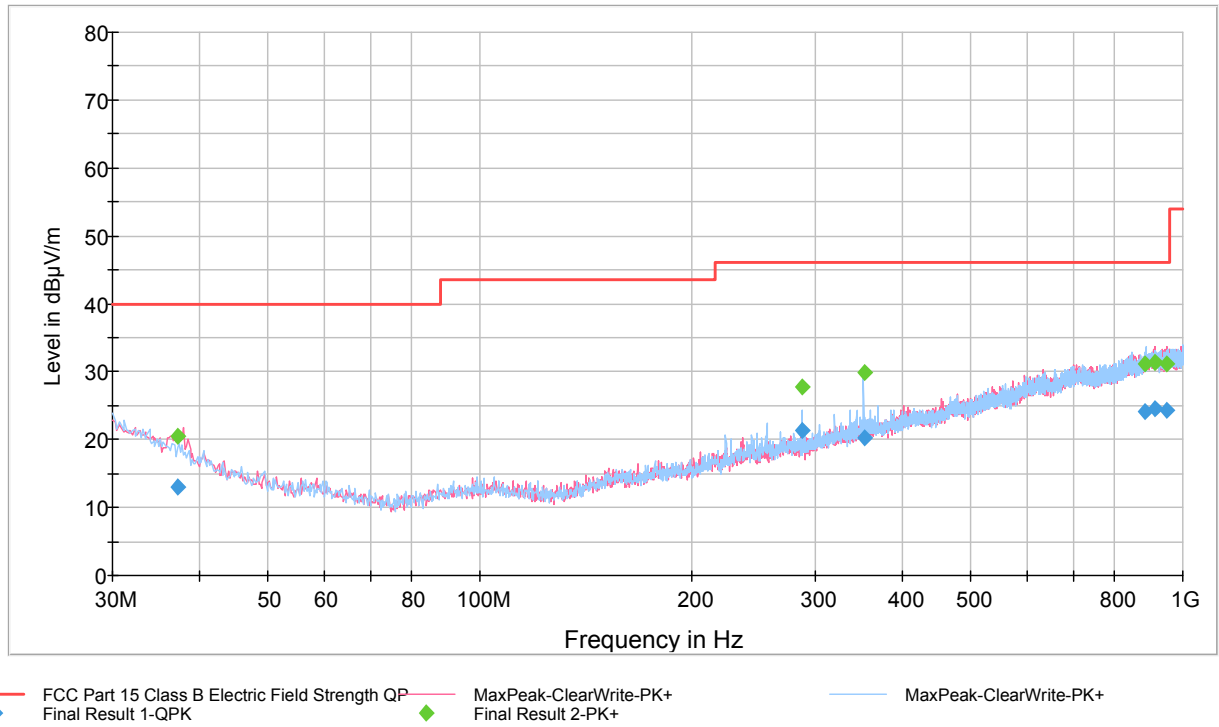


Figure 14. Measured curve with peak-detector. 2 Mbps Channel MID.

Final measurements from the worst frequencies

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
37.101250	13.1	15000.0	120.000	129.0	V	108.0	15.2	26.9	40.0	
288.000000	21.3	15000.0	120.000	150.0	H	14.0	15.6	24.7	46.0	
352.138750	20.2	15000.0	120.000	100.0	H	165.0	18.3	25.8	46.0	
885.142500	24.1	15000.0	120.000	296.0	H	-18.0	27.6	21.9	46.0	
911.828750	24.5	15000.0	120.000	300.0	V	108.0	28.2	21.5	46.0	
948.231250	24.4	15000.0	120.000	229.0	V	108.0	28.1	21.6	46.0	

Table 5. Final results.

FCC Part 15 Class B Electric Field Strength

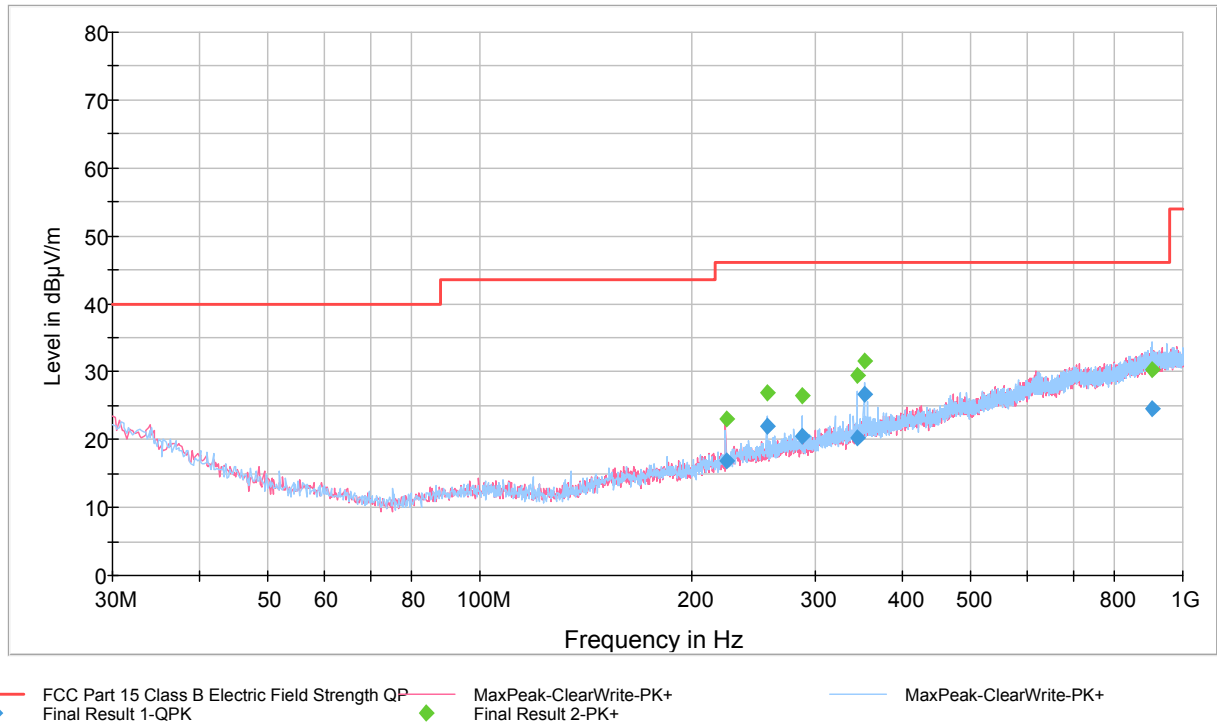


Figure 15. Measured curve with peak-detector. 2 Mbps Channel HIGH.

Final measurements from the worst frequencies

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
223.978750	16.9	15000.0	120.000	130.0	V	105.0	13.6	29.1	46.0	
255.990000	22.0	15000.0	120.000	128.0	H	-15.0	14.8	24.0	46.0	
287.960000	20.4	15000.0	120.000	129.0	H	15.0	15.6	25.6	46.0	
343.936250	20.2	15000.0	120.000	100.0	H	166.0	17.8	25.8	46.0	
352.041250	26.7	15000.0	120.000	100.0	H	166.0	18.3	19.3	46.0	
905.178750	24.5	15000.0	120.000	229.0	H	-15.0	28.2	21.5	46.0	

Table 6. Final results.

FCC Part 15 Class B Electric Field Strength

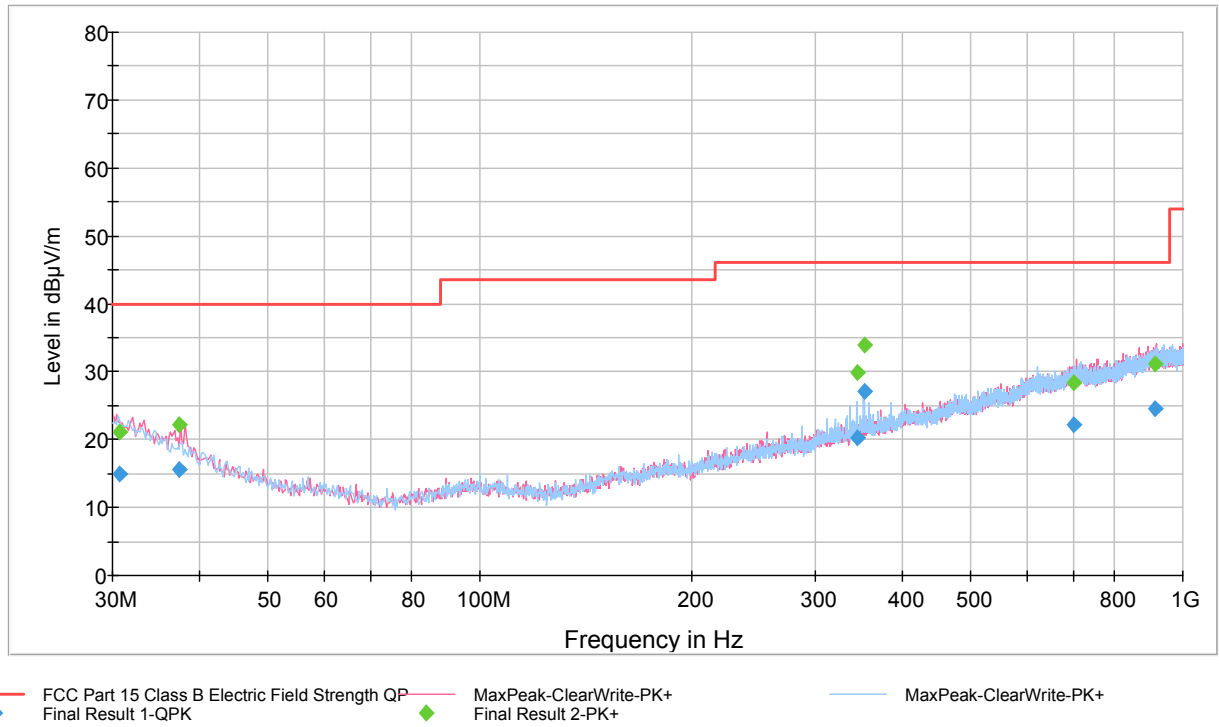


Figure 16. Measured curve with peak-detector. 3 Mbps Channel LOW.

Final measurements from the worst frequencies

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
30.780000	15.0	15000.0	120.000	205.0	V	195.0	18.7	25.0	40.0	
37.302500	15.6	15000.0	120.000	129.0	V	105.0	15.1	24.4	40.0	
343.953750	20.3	15000.0	120.000	130.0	H	285.0	17.8	25.7	46.0	
352.037500	27.2	15000.0	120.000	100.0	H	285.0	18.3	18.8	46.0	
698.483750	22.2	15000.0	120.000	305.0	H	270.0	25.5	23.8	46.0	
915.253750	24.6	15000.0	120.000	175.0	V	73.0	28.1	21.4	46.0	

Table 7. Final results.

FCC Part 15 Class B Electric Field Strength

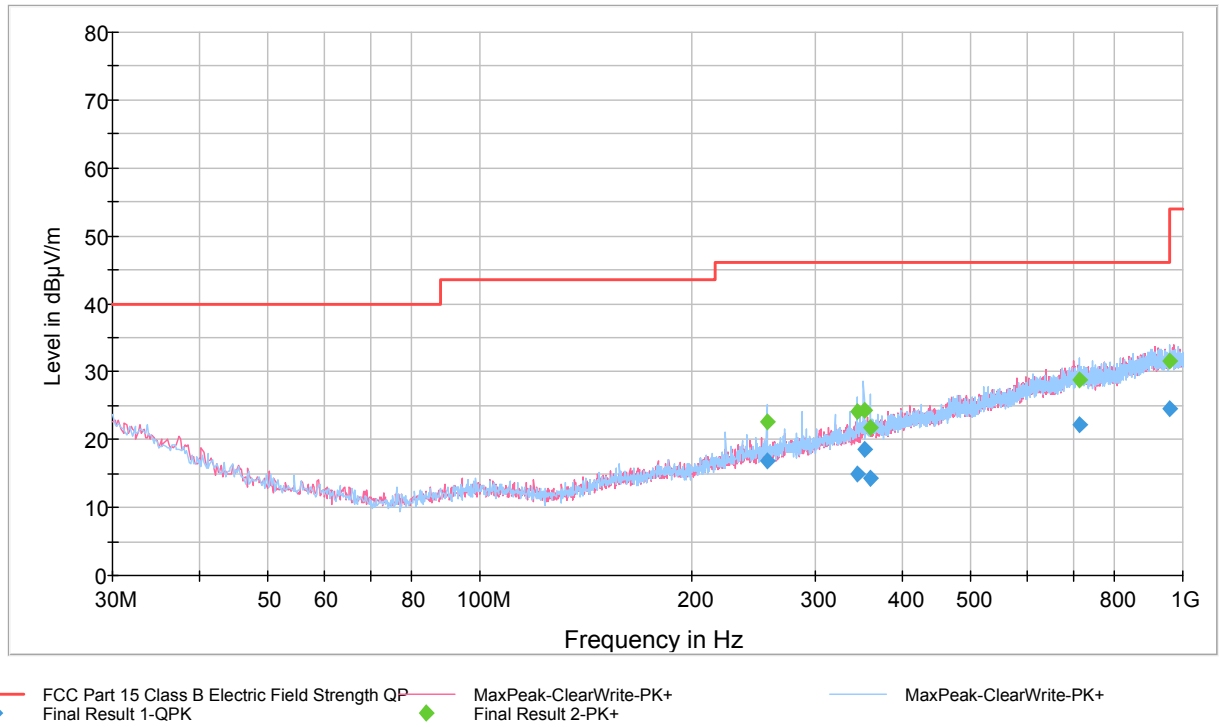


Figure 17. Measured curve with peak-detector. 3 Mbps Channel MID.

Final measurements from the worst frequencies

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
256.010000	16.8	15000.0	120.000	150.0	H	15.0	14.8	29.2	46.0	
343.956250	14.9	15000.0	120.000	100.0	H	15.0	17.8	31.1	46.0	
351.998750	18.5	15000.0	120.000	129.0	H	195.0	18.3	27.5	46.0	
360.081250	14.2	15000.0	120.000	100.0	H	195.0	18.6	31.8	46.0	
711.996250	22.3	15000.0	120.000	296.0	H	163.0	25.8	23.7	46.0	
958.300000	24.6	15000.0	120.000	200.0	H	0.0	28.3	21.4	46.0	

Table 8. Final results.

FCC Part 15 Class B Electric Field Strength

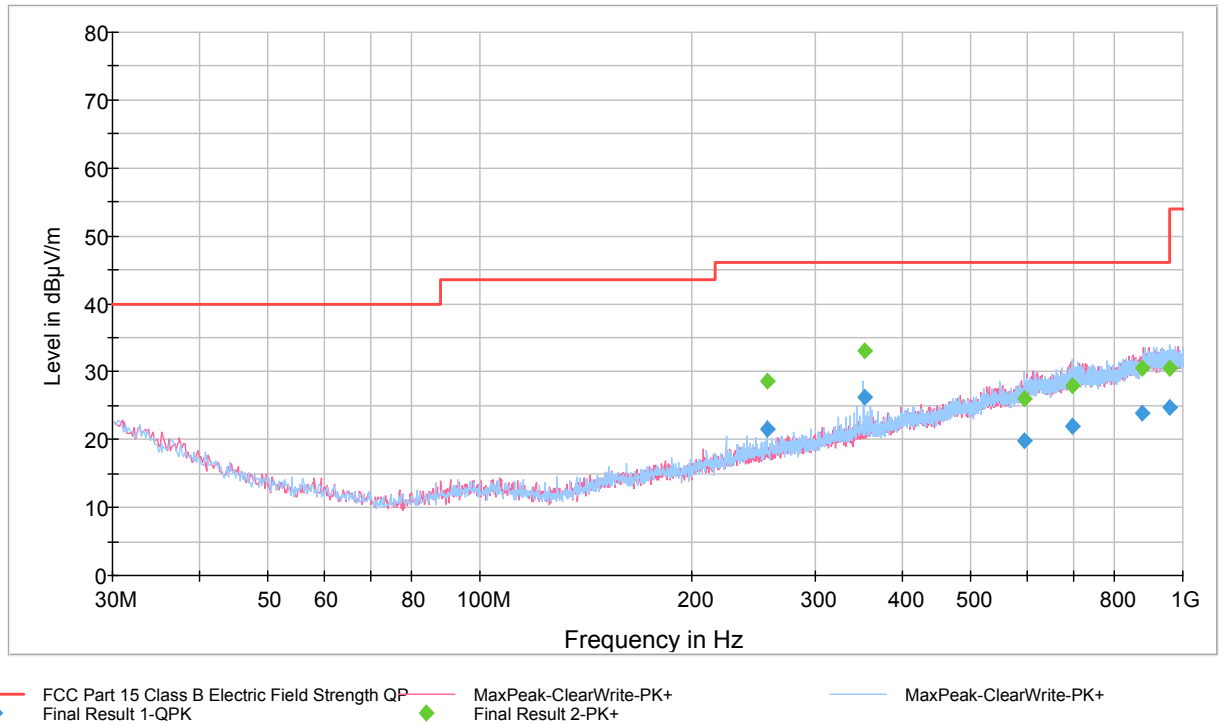


Figure 18. Measured curve with peak-detector. 3 Mbps Channel HIGH.

Final measurements from the worst frequencies

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
255.988750	21.5	15000.0	120.000	129.0	H	164.0	14.8	24.5	46.0	
351.978750	26.2	15000.0	120.000	100.0	H	-14.0	18.3	19.8	46.0	
594.905000	19.9	15000.0	120.000	300.0	H	24.0	23.7	26.1	46.0	
696.273750	21.9	15000.0	120.000	229.0	H	-18.0	25.5	24.1	46.0	
876.841250	23.9	15000.0	120.000	250.0	V	74.0	27.3	22.1	46.0	
958.720000	24.7	15000.0	120.000	297.0	H	195.0	28.4	21.3	46.0	

Table 9. Final results.

Transmitter Radiated Emissions 1 000 – 26 500 MHz

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.

Radiated Emission FCC Part 15 Class B 1-4GHz 3m

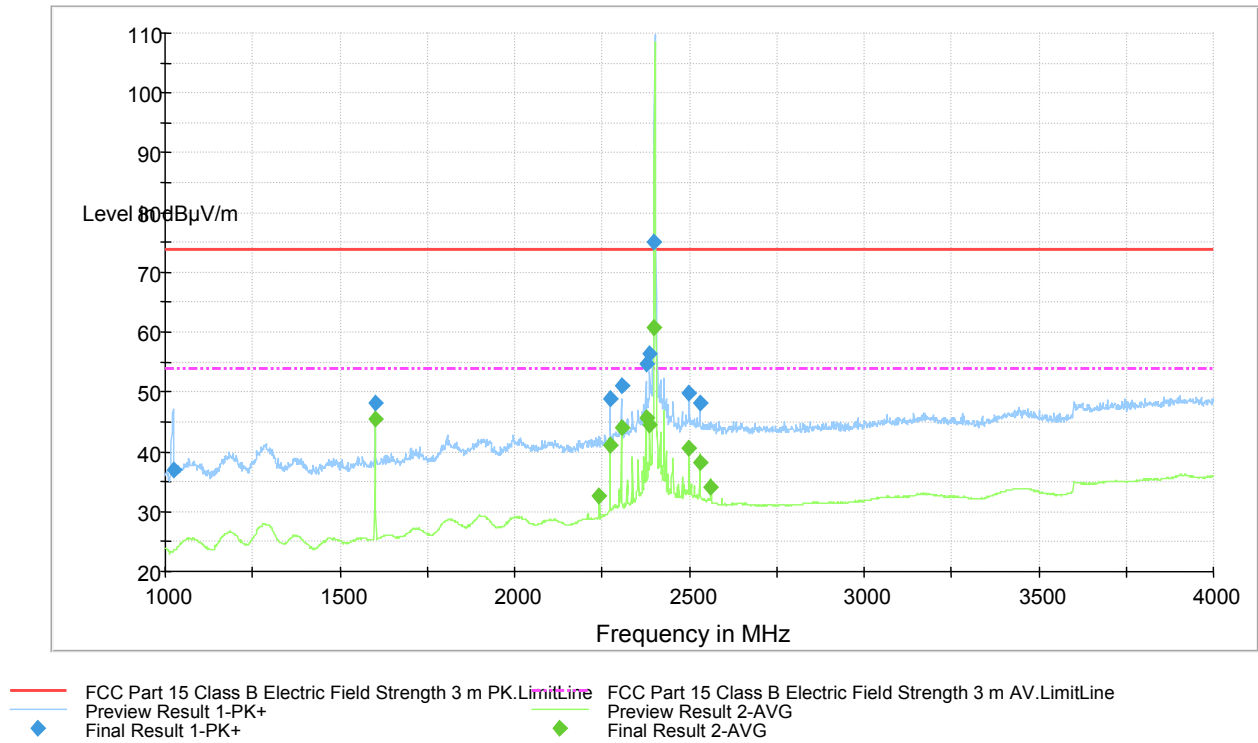


Figure 19. Measured curve with peak- and average detector. 1 Mbps Channel LOW.

Table 10. 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
1025.275000	37.0	1000.0	1000.000	140.0	H	305.0	-4.8	36.9	73.9	
1601.675000	48.1	1000.0	1000.000	100.0	H	125.0	-1.1	25.8	73.9	
2273.775000	48.8	1000.0	1000.000	232.0	V	162.0	3.6	25.1	73.9	
2306.025000	51.0	1000.0	1000.000	156.0	V	352.0	3.7	22.9	73.9	
2376.025000	54.7	1000.0	1000.000	153.0	V	190.0	4.4	19.2	73.9	
2386.200000	56.4	1000.0	1000.000	111.0	V	120.0	4.5	17.5	73.9	
2400.000000	75.0	1000.0	1000.000	175.0	V	71.0	4.6	-1.1	73.9	*
2498.075000	49.9	1000.0	1000.000	200.0	V	90.0	4.8	24.0	73.9	
2529.975000	48.2	1000.0	1000.000	205.0	V	125.0	4.9	25.7	73.9	

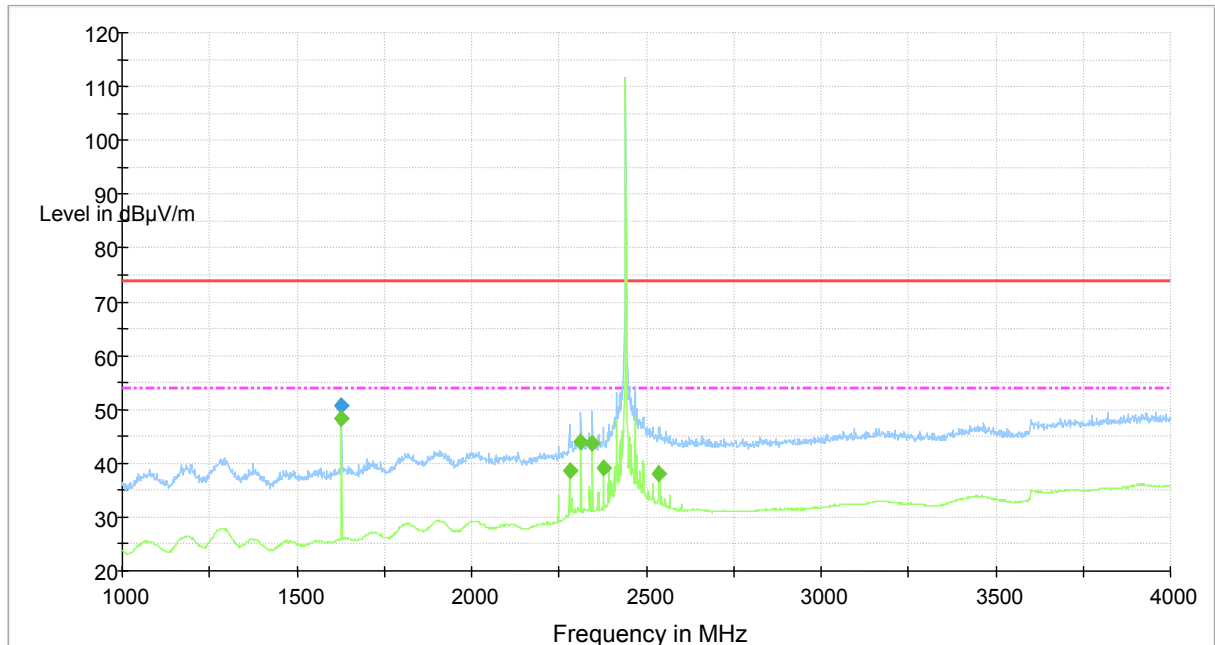
* Out of the restricted bands 15.205(a)

Table 11. 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
1601.675000	45.6	1000.0	1000.000	100.0	H	262.0	-1.1	8.3	53.9	
2242.075000	32.5	1000.0	1000.000	162.0	V	0.0	3.5	21.4	53.9	
2273.975000	41.1	1000.0	1000.000	166.0	V	225.0	3.6	12.8	53.9	
2306.025000	43.9	1000.0	1000.000	159.0	V	344.0	3.7	10.0	53.9	
2376.025000	45.8	1000.0	1000.000	173.0	V	70.0	4.4	8.1	53.9	
2386.200000	44.5	1000.0	1000.000	156.0	V	232.0	4.5	9.4	53.9	
2400.000000	60.8	1000.0	1000.000	175.0	V	71.0	4.6	-6.9	53.9	*
2498.075000	40.7	1000.0	1000.000	204.0	V	128.0	4.8	13.2	53.9	
2529.975000	38.2	1000.0	1000.000	200.0	V	40.0	4.9	15.7	53.9	
2562.025000	34.2	1000.0	1000.000	205.0	V	350.0	5.0	19.7	53.9	

* Out of the restricted bands 15.205(a)

Radiated Emission FCC Part 15 Class B 1-4GHz 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
◆ Final Result 1-PK+ ◆ Preview Result 2-AVG
◆ Final Result 2-AVG

Figure 20. Measured curve with peak- and average detector. 1 Mbps Channel MID.

Table 12. 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
1627.725000	50.7	1000.0	1000.000	100.0	H	258.0	-0.7	23.2	73.9	

Table 13. 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
1627.725000	48.2	1000.0	1000.000	100.0	H	264.0	-0.7	5.7	53.9	
2281.025000	38.5	1000.0	1000.000	194.0	V	0.0	3.6	15.4	53.9	
2312.925000	44.0	1000.0	1000.000	125.0	V	225.0	3.8	9.9	53.9	
2345.025000	43.7	1000.0	1000.000	125.0	V	228.0	4.1	10.2	53.9	
2377.075000	39.1	1000.0	1000.000	115.0	V	112.0	4.4	14.8	53.9	
2537.075000	38.1	1000.0	1000.000	195.0	V	92.0	4.9	15.8	53.9	

Radiated Emission FCC Part 15 Class B 1-4GHz 3m

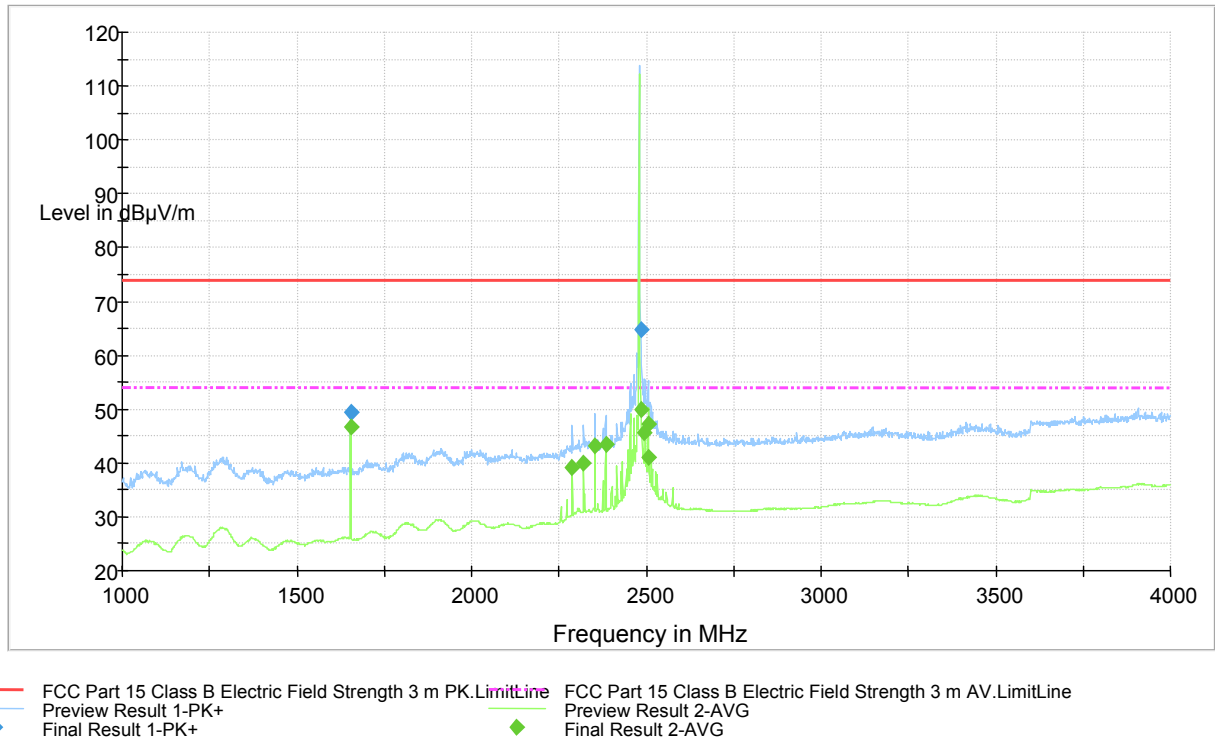


Figure 21. Measured curve with peak- and average detector. 1 Mbps Channel HIGH.

Final measurements from the worst frequencies

Table 14. 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
1653.575000	49.4	1000.0	1000.000	209.0	H	244.0	-0.3	24.5	73.9	
2483.500000	64.7	1000.0	1000.000	204.0	V	79.0	4.6	9.2	73.9	

Table 15. 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
1653.775000	46.8	1000.0	1000.000	209.0	H	249.0	-0.3	7.1	53.9	
2287.925000	39.1	1000.0	1000.000	197.0	V	203.0	3.6	14.8	53.9	
2320.025000	39.9	1000.0	1000.000	131.0	V	225.0	3.9	14.0	53.9	
2352.075000	43.3	1000.0	1000.000	122.0	V	227.0	4.2	10.6	53.9	
2483.500000	51.4	1000.0	1000.000	203.0	V	73.0	4.6	2.5	53.9	
2383.975000	43.4	1000.0	1000.000	146.0	V	122.0	4.5	10.5	53.9	
2495.775000	45.7	1000.0	1000.000	202.0	V	71.0	4.8	8.2	53.9	
2506.025000	47.2	1000.0	1000.000	199.0	V	78.0	4.8	6.7	53.9	
2506.625000	41.0	1000.0	1000.000	199.0	V	60.0	4.9	12.9	53.9	

Radiated Emission FCC Part 15 Class B 1-4GHz 3m

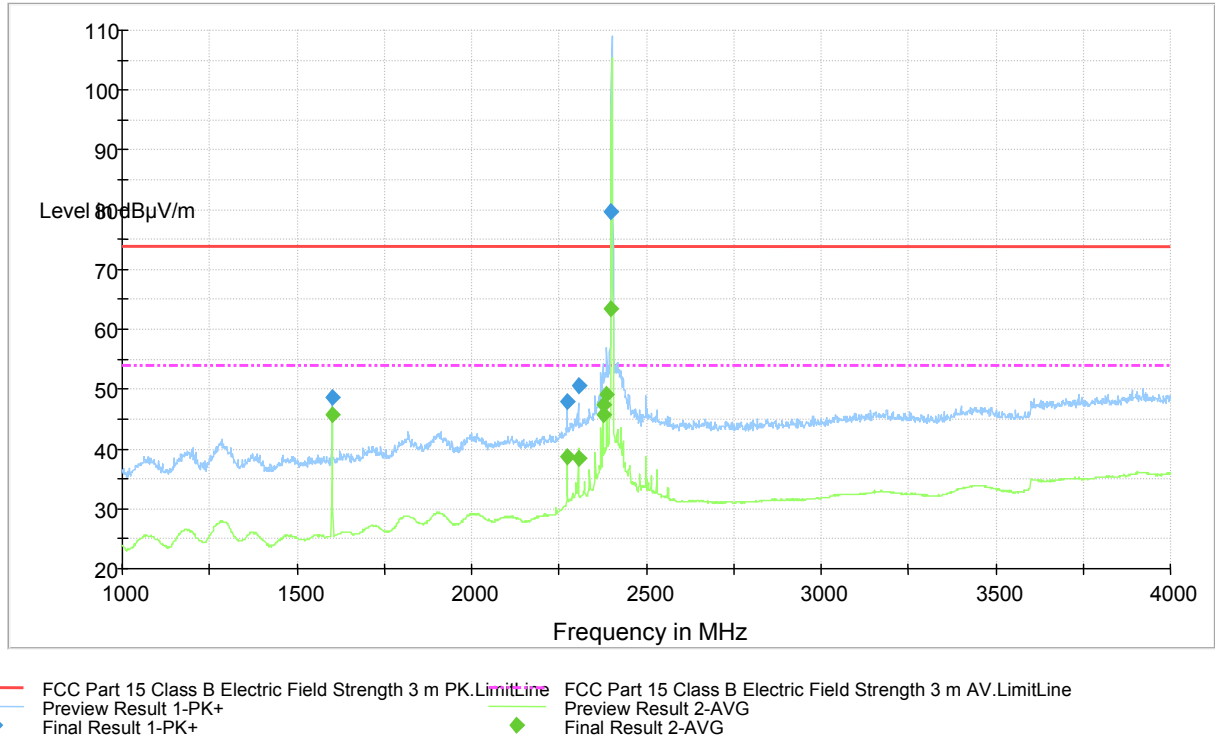


Figure 22. Measured curve with peak- and average detector. 2 Mbps Channel LOW.

Final measurements from the worst frequencies

Table 16. 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
1601.675000	48.5	1000.0	1000.000	100.0	H	270.0	-1.1	25.4	73.9	
2274.175000	48.0	1000.0	1000.000	166.0	V	234.0	3.6	25.9	73.9	
2306.225000	50.5	1000.0	1000.000	163.0	V	171.0	3.7	23.4	73.9	
2400.000000	79.6	1000.0	1000.000	175.0	V	71.0	4.6	-5.7	73.9	*

* Out of the restricted bands 15.205(a)

Table 17. 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
1601.675000	45.8	1000.0	1000.000	100.0	H	261.0	-1.1	8.1	53.9	
2273.975000	38.6	1000.0	1000.000	199.0	V	353.0	3.6	15.3	53.9	
2306.025000	38.5	1000.0	1000.000	125.0	V	219.0	3.7	15.4	53.9	
2375.625000	45.8	1000.0	1000.000	175.0	V	70.0	4.4	8.1	53.9	
2376.025000	47.5	1000.0	1000.000	175.0	V	86.0	4.4	6.4	53.9	
2386.000000	49.0	1000.0	1000.000	150.0	V	148.0	4.5	4.9	53.9	
2400.000000	63.3	1000.0	1000.000	175.0	V	71.0	4.6	-9.4	53.9	*

* Out of the restricted bands 15.205(a)

Radiated Emission FCC Part 15 Class B 1-4GHz 3m

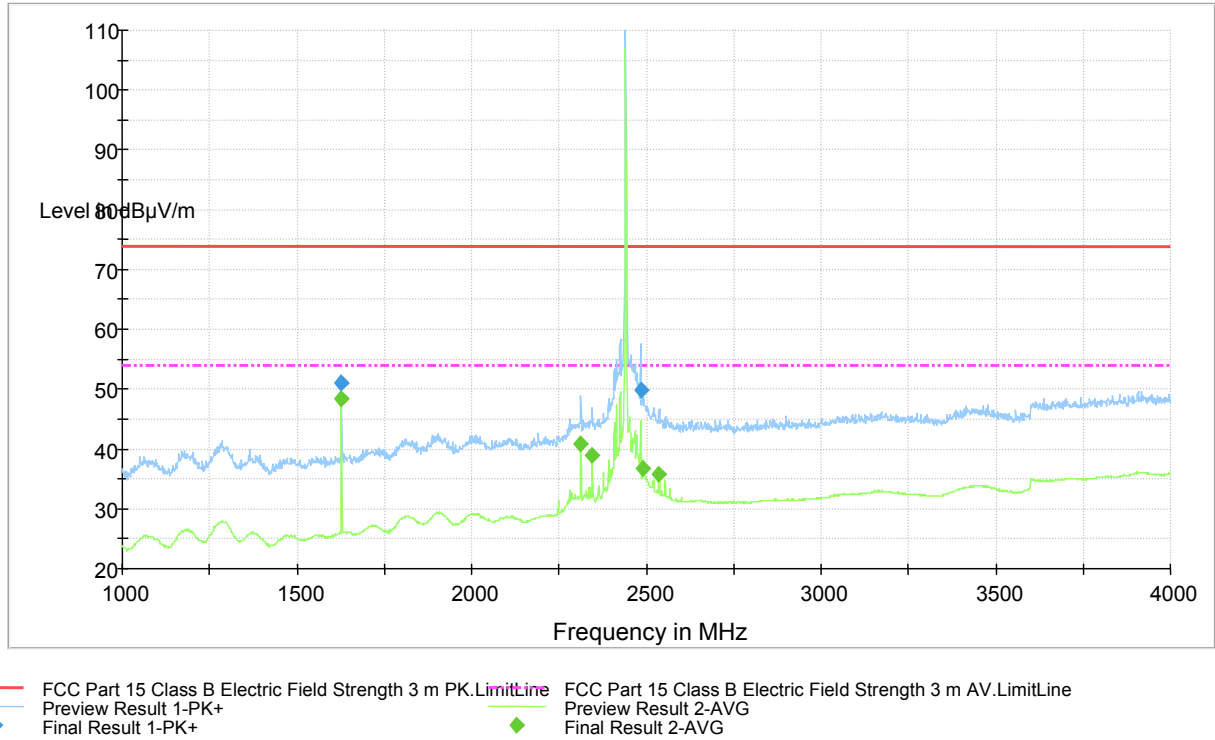


Figure 23. Measured curve with peak- and average detector. 2 Mbps Channel MID.

Final measurements from the worst frequencies

Table 18. 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
1627.725000	51.0	1000.0	1000.000	100.0	H	264.0	-0.7	22.9	73.9	
2485.300000	49.9	1000.0	1000.000	109.0	V	128.0	4.7	24.0	73.9	

Table 19. 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
1627.725000	48.3	1000.0	1000.000	100.0	H	264.0	-0.7	5.6	53.9	
2312.925000	40.9	1000.0	1000.000	160.0	V	183.0	3.8	13.0	53.9	
2344.975000	38.9	1000.0	1000.000	122.0	V	225.0	4.1	15.0	53.9	
2489.100000	36.8	1000.0	1000.000	109.0	V	135.0	4.7	17.1	53.9	
2537.025000	35.7	1000.0	1000.000	195.0	V	94.0	4.9	18.2	53.9	

Radiated Emission FCC Part 15 Class B 1-4GHz 3m

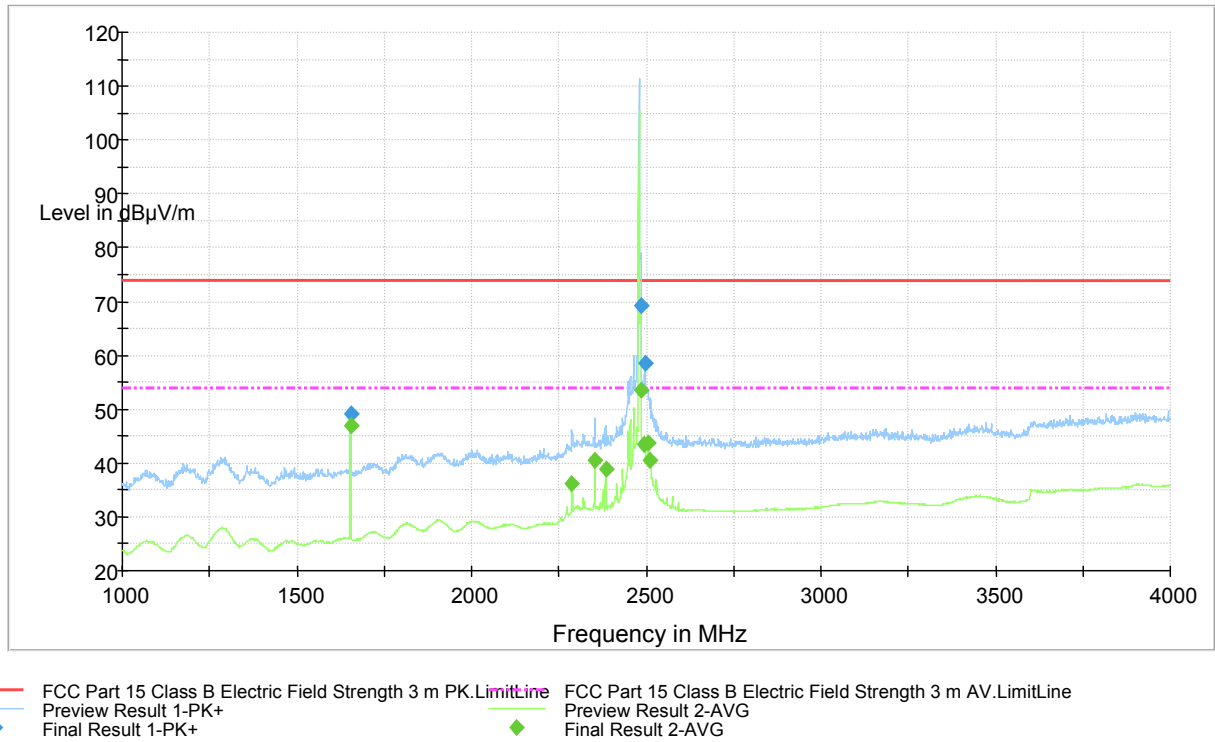


Figure 24. Measured curve with peak- and average detector. 2 Mbps Channel HIGH.

Final measurements from the worst frequencies

Table 20. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pola	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
1653.775000	49.1	1000.0	1000.000	202.0	H	240.0	-0.3	24.8	73.9	
2483.500000	68.1	1000.0	1000.000	200.0	V	81.0	4.6	5.8	73.9	
2496.025000	58.6	1000.0	1000.000	200.0	V	90.0	4.8	15.3	73.9	

Table 21. 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
1653.775000	47.0	1000.0	1000.000	208.0	H	250.0	-0.3	6.9	53.9	
2287.925000	36.1	1000.0	1000.000	194.0	V	200.0	3.6	17.8	53.9	
2352.075000	40.4	1000.0	1000.000	192.0	V	227.0	4.2	13.5	53.9	
2483.500000	52.7	1000.0	1000.000	199.0	V	73.0	4.6	1.2	53.9	
2383.975000	38.8	1000.0	1000.000	181.0	V	5.0	4.5	15.1	53.9	
2495.775000	43.6	1000.0	1000.000	200.0	V	95.0	4.8	10.3	53.9	
2505.975000	43.6	1000.0	1000.000	199.0	V	90.0	4.8	10.3	53.9	
2511.875000	40.5	1000.0	1000.000	134.0	V	93.0	4.9	13.4	53.9	

Radiated Emission FCC Part 15 Class B 1-4GHz 3m

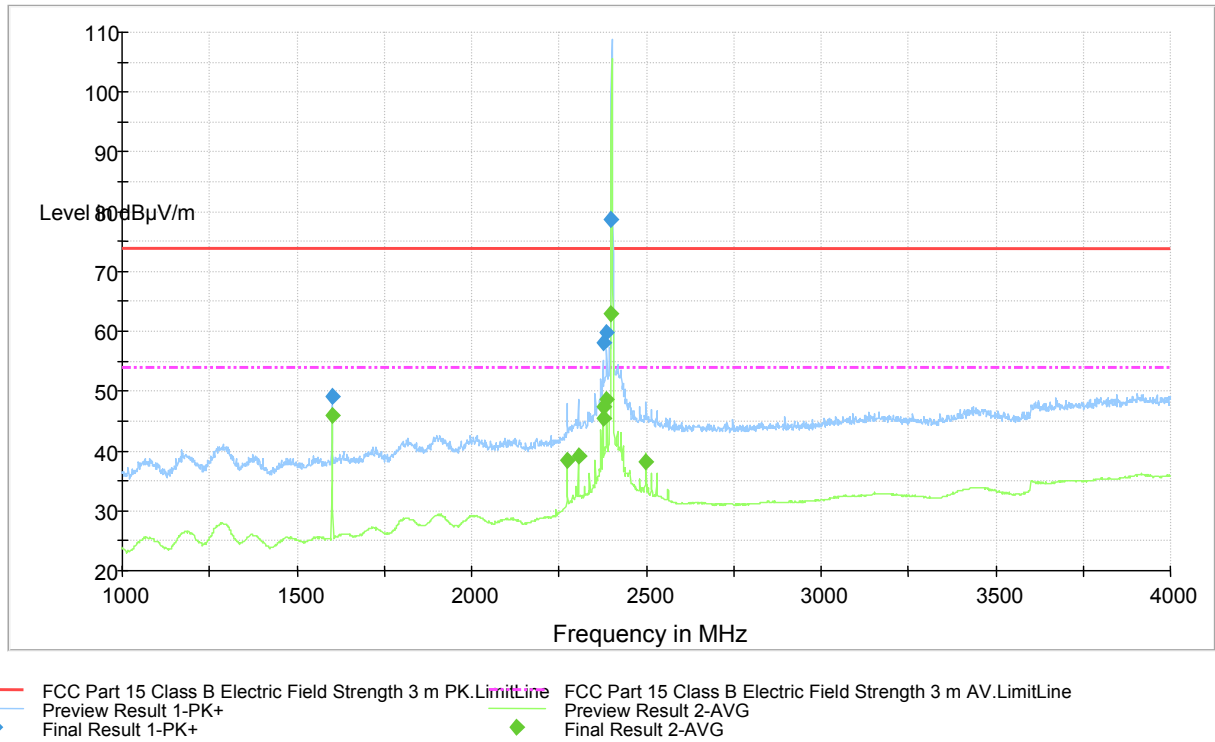


Figure 25. Measured curve with peak- and average detector. 3 Mbps Channel LOW.

Final measurements from the worst frequencies

Table 22. 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
1601.675000	49.2	1000.0	1000.000	100.0	H	260.0	-1.1	24.7	73.9	
2376.225000	58.1	1000.0	1000.000	157.0	V	180.0	4.4	15.8	73.9	
2386.000000	59.7	1000.0	1000.000	175.0	V	112.0	4.5	14.2	73.9	
2400.000000	78.8	1000.0	1000.000	175.0	V	60.0	4.6	-4.9	73.9	*

* Out of the restricted bands 15.205(a)

Table 23. 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
1601.675000	46.0	1000.0	1000.000	100.0	H	264.0	-1.1	7.9	53.9	
2273.975000	38.5	1000.0	1000.000	198.0	V	355.0	3.6	15.4	53.9	
2306.025000	39.2	1000.0	1000.000	195.0	V	206.0	3.7	14.7	53.9	
2375.625000	45.5	1000.0	1000.000	153.0	V	258.0	4.4	8.4	53.9	
2376.025000	47.5	1000.0	1000.000	175.0	V	90.0	4.4	6.4	53.9	
2386.000000	48.7	1000.0	1000.000	144.0	V	118.0	4.5	5.2	53.9	
2400.000000	63.0	1000.0	1000.000	175.0	V	73.0	4.6	-9.1	53.9	*
2498.075000	38.3	1000.0	1000.000	203.0	V	79.0	4.8	15.6	53.9	

* Out of the restricted bands 15.205(a)

Radiated Emission FCC Part 15 Class B 1-4GHz 3m

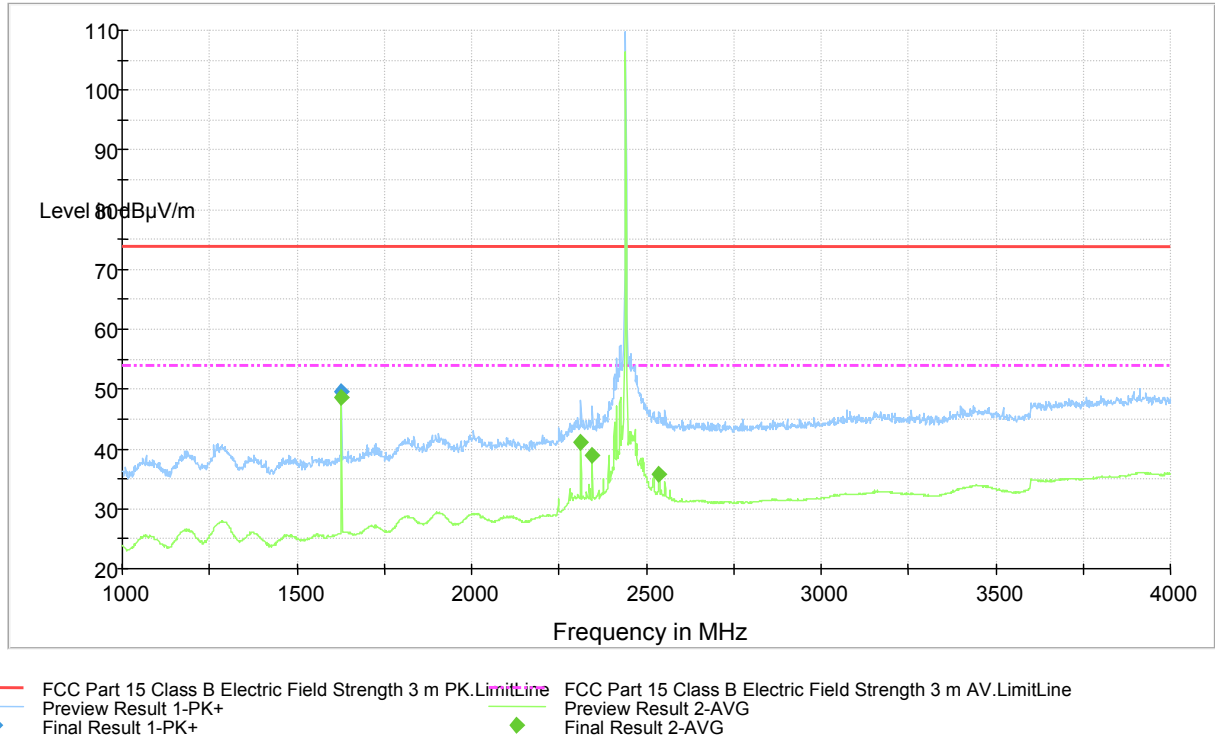


Figure 26. Measured curve with peak- and average detector. 3 Mbps Channel MID.

Final measurements from the worst frequencies

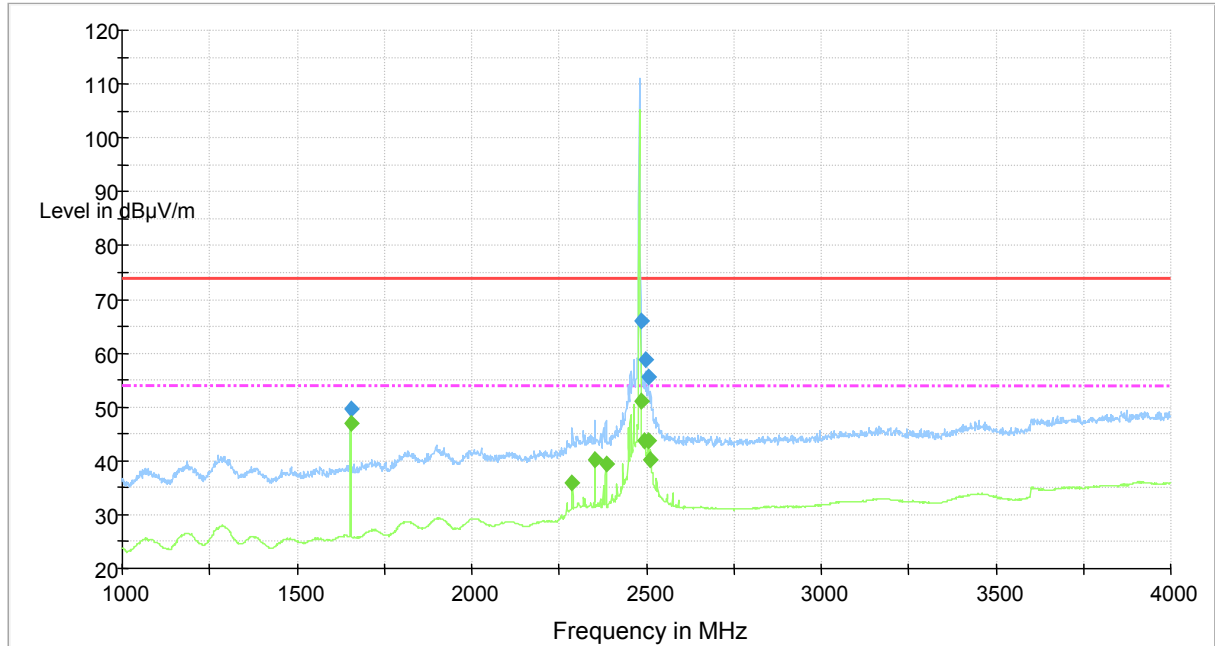
Table 24. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
1627.725000	49.6	1000.0	1000.000	115.0	H	260.0	-0.7	24.3	73.9	

Table 25. 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
1627.725000	48.5	1000.0	1000.000	114.0	H	263.0	-0.7	5.4	53.9	
2312.925000	41.0	1000.0	1000.000	162.0	V	347.0	3.8	12.9	53.9	
2345.025000	38.9	1000.0	1000.000	126.0	V	225.0	4.1	15.0	53.9	
2537.025000	35.7	1000.0	1000.000	195.0	V	90.0	4.9	18.2	53.9	

Radiated Emission FCC Part 15 Class B 1-4GHz 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
◆ Final Result 1-PK+ ◆ Preview Result 2-AVG
◆ Final Result 2-AVG

Figure 27. Measured curve with peak- and average detector. 3 Mbps Channel HIGH.

Final measurements from the worst frequencies

Table 26. Final Max Peak results.

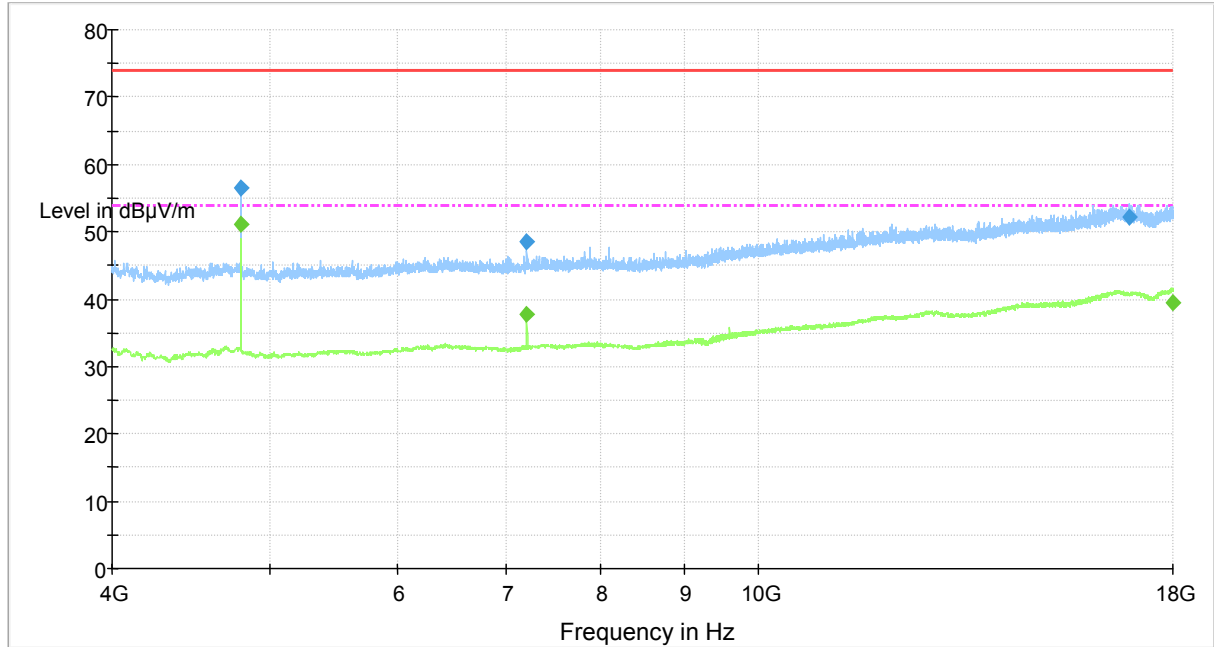
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
1653.575000	49.6	1000.0	1000.000	205.0	H	253.0	-0.3	24.3	73.9	
2483.500000	66.1	1000.0	1000.000	198.0	V	85.0	4.6	7.8	73.9	
2496.025000	58.8	1000.0	1000.000	201.0	V	83.0	4.8	15.1	73.9	
2506.225000	55.5	1000.0	1000.000	198.0	V	90.0	4.9	18.4	73.9	

Table 27. 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
1653.775000	47.0	1000.0	1000.000	209.0	H	250.0	-0.3	6.9	53.9	
2287.925000	35.8	1000.0	1000.000	125.0	V	270.0	3.6	18.1	53.9	
2352.075000	40.2	1000.0	1000.000	192.0	V	227.0	4.2	13.7	53.9	
2483.500000	51.4	1000.0	1000.000	198.0	V	83.0	4.6	2.5	53.9	
2383.975000	39.3	1000.0	1000.000	180.0	V	121.0	4.5	14.6	53.9	
2495.775000	43.6	1000.0	1000.000	204.0	V	83.0	4.8	10.3	53.9	
2506.025000	43.6	1000.0	1000.000	200.0	V	90.0	4.8	10.3	53.9	
2511.875000	40.2	1000.0	1000.000	134.0	V	89.0	4.9	13.7	53.9	

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

Radiated Emission FCC Part 15 Class B 4-18GHz 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
◆ Final Result 1-PK+ ◆ Final Result 2-AVG

Figure 28. Measured curve with peak- and average detector. 1 Mbps Channel LOW.

Final measurements from the worst frequencies

Table 28. 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	56.5	1000.0	1000.000	140.0	V	45.0	10.7	17.4	73.9	
7205.625000	48.5	1000.0	1000.000	174.0	V	61.0	12.4	25.4	73.9	
16916.675000	52.1	1000.0	1000.000	127.0	V	11.0	24.1	21.8	73.9	

Table 29. 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
4804.125000	51.0	1000.0	1000.000	159.0	V	42.0	10.7	2.9	53.9	
7206.025000	37.7	1000.0	1000.000	184.0	V	67.0	12.4	16.2	53.9	
18000.000000	39.5	1000.0	1000.000	109.0	V	19.0	25.2	14.4	53.9	

Radiated Emission FCC Part 15 Class B 4-18GHz 3m B

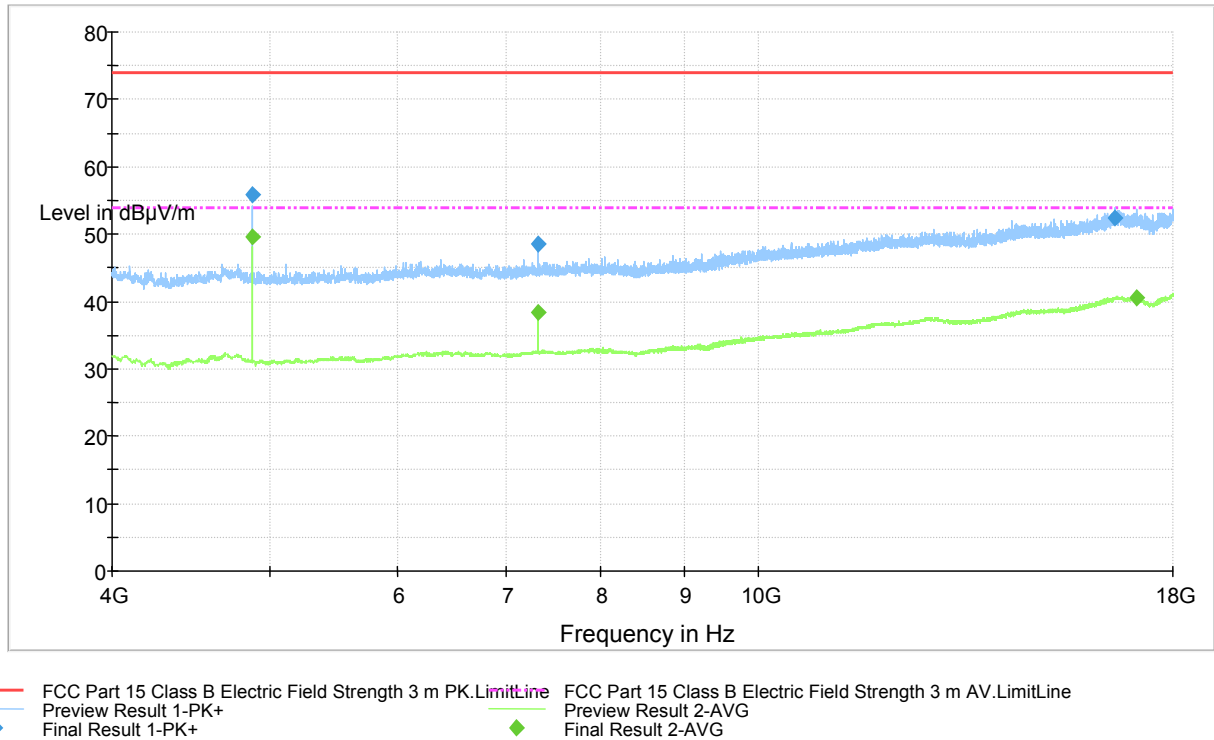


Figure 29. Measured curve with peak- and average detector. 1 Mbps Channel MID.

Final measurements from the worst frequencies

Table 30. 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
4881.825000	55.9	1000.0	1000.000	100.0	V	338.0	10.5	18.0	73.9	
7323.125000	48.6	1000.0	1000.000	100.0	V	141.0	12.5	25.3	73.9	
16593.625000	52.5	1000.0	1000.000	125.0	V	30.0	24.0	21.4	73.9	

Table 31. 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	49.6	1000.0	1000.000	171.0	V	67.0	10.5	4.3	53.9	
7323.125000	38.4	1000.0	1000.000	124.0	V	147.0	12.5	15.5	53.9	
17086.025000	40.6	1000.0	1000.000	105.0	V	240.0	24.1	13.3	53.9	

Radiated Emission FCC Part 15 Class B 4-18GHz 3m

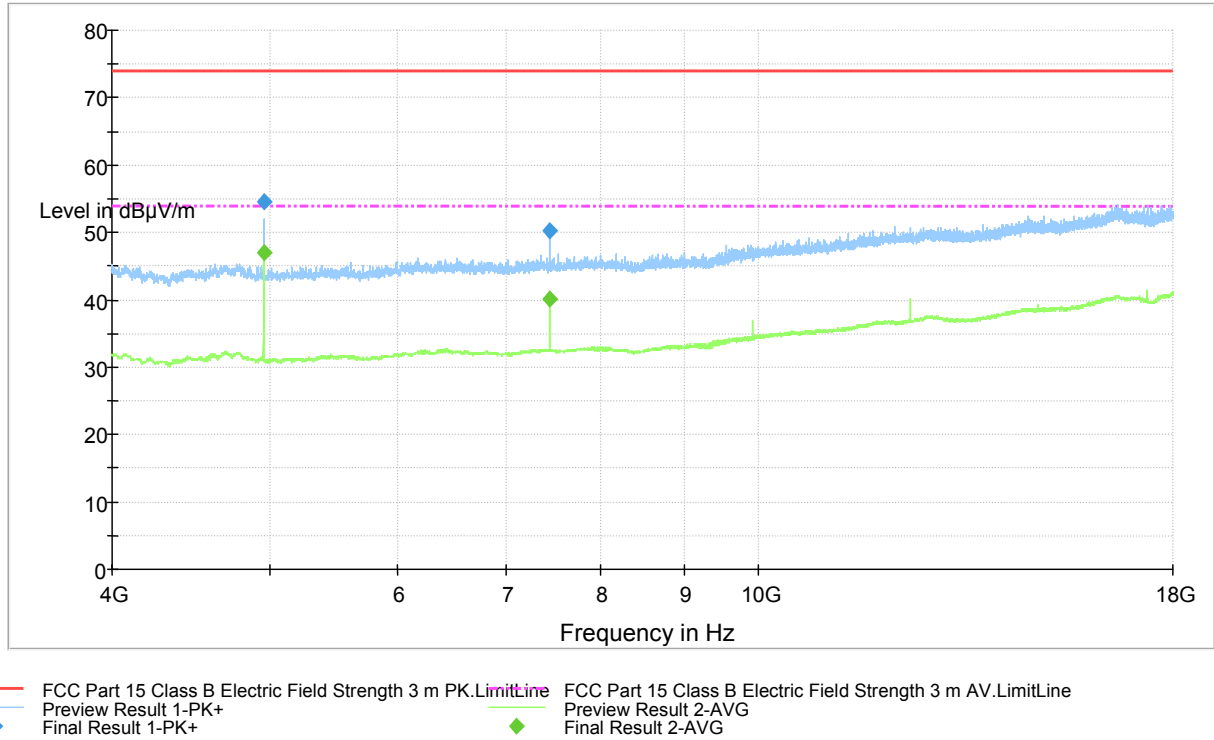


Figure 30. Measured curve with peak- and average detector. 1 Mbps Channel HIGH.

Final measurements from the worst frequencies

Table 32. 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
4960.175000	54.6	1000.0	1000.000	160.0	V	333.0	10.5	19.3	73.9	
7440.375000	50.3	1000.0	1000.000	100.0	V	208.0	12.7	23.6	73.9	

Table 33. 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	47.0	1000.0	1000.000	204.0	V	103.0	10.5	6.9	53.9	
7440.175000	40.0	1000.0	1000.000	100.0	V	208.0	12.7	13.9	53.9	

Radiated Emission FCC Part 15 Class B 4-18GHz 3m B

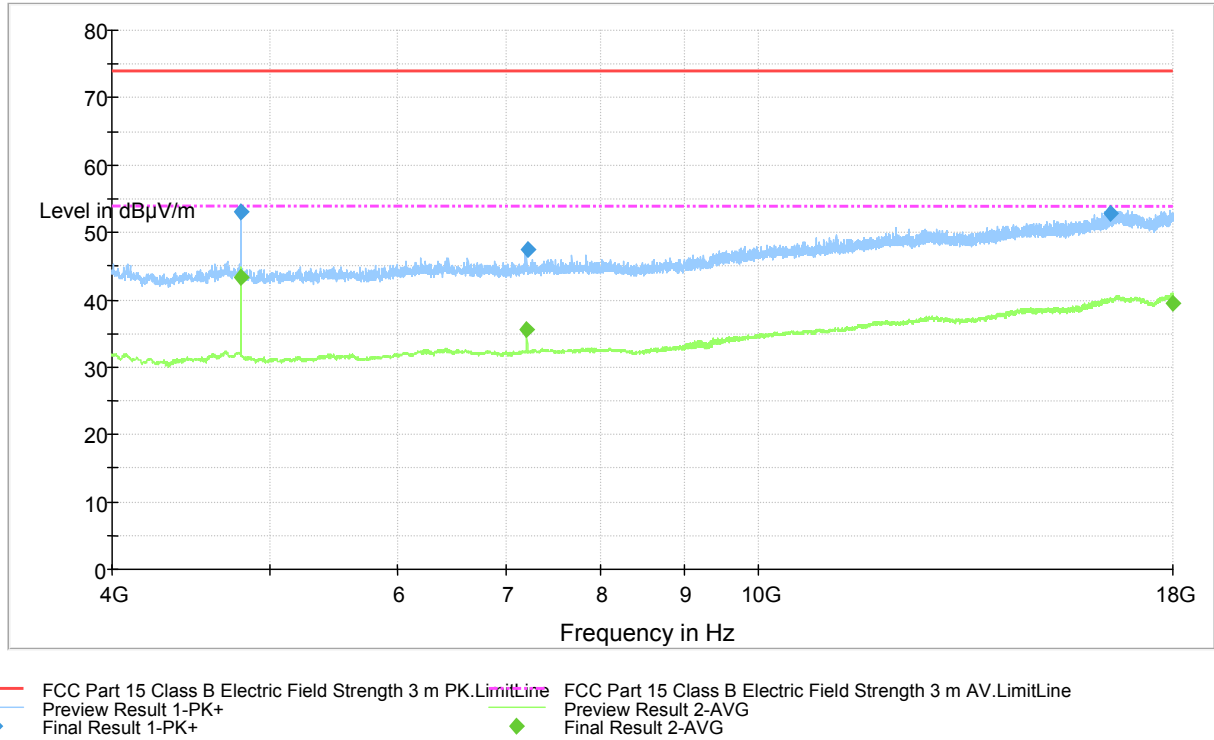


Figure 31. Measured curve with peak- and average detector. 2 Mbps Channel LOW.

Final measurements from the worst frequencies

Table 34. 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
4804.375000	53.1	1000.0	1000.000	100.0	V	93.0	10.7	20.8	73.9	
7206.825000	47.5	1000.0	1000.000	100.0	V	171.0	12.4	26.4	73.9	
16479.525000	52.9	1000.0	1000.000	100.0	V	275.0	23.6	21.0	73.9	

Table 35. 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
4804.125000	43.2	1000.0	1000.000	100.0	V	149.0	10.7	10.7	53.9	
7206.025000	35.6	1000.0	1000.000	109.0	V	147.0	12.4	18.3	53.9	
18000.000000	39.5	1000.0	1000.000	194.0	V	0.0	25.2	14.4	53.9	

Radiated Emission FCC Part 15 Class B 4-18GHz 3m B

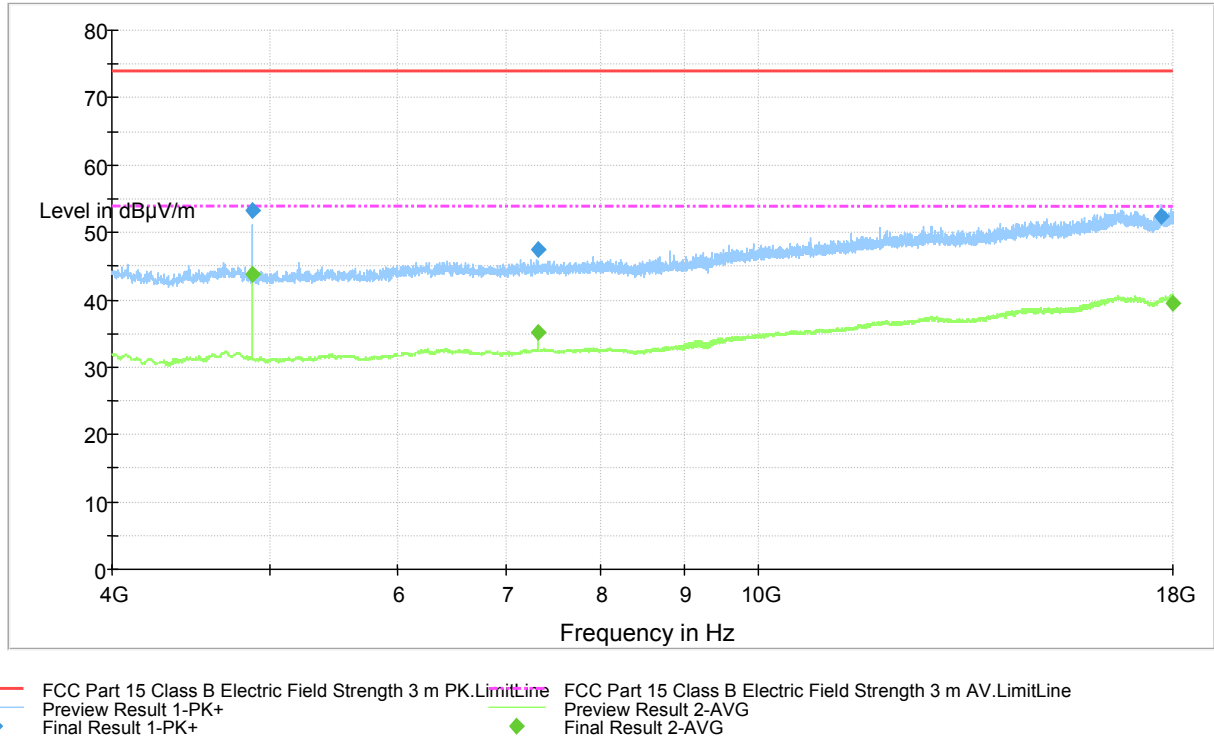


Figure 32. Measured curve with peak- and average detector. 2 Mbps Channel MID.

Final measurements from the worst frequencies

Table 36. 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
4882.075000	53.4	1000.0	1000.000	100.0	V	92.0	10.5	20.5	73.9	
7322.475000	47.5	1000.0	1000.000	119.0	V	150.0	12.5	26.4	73.9	
17705.675000	52.4	1000.0	1000.000	140.0	V	245.0	24.4	21.5	73.9	

Table 37. 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	43.9	1000.0	1000.000	100.0	V	96.0	10.5	10.0	53.9	
7323.075000	35.2	1000.0	1000.000	135.0	V	120.0	12.5	18.7	53.9	
17999.800000	39.5	1000.0	1000.000	115.0	V	23.0	25.2	14.4	53.9	

Radiated Emission FCC Part 15 Class B 4-18GHz 3m B

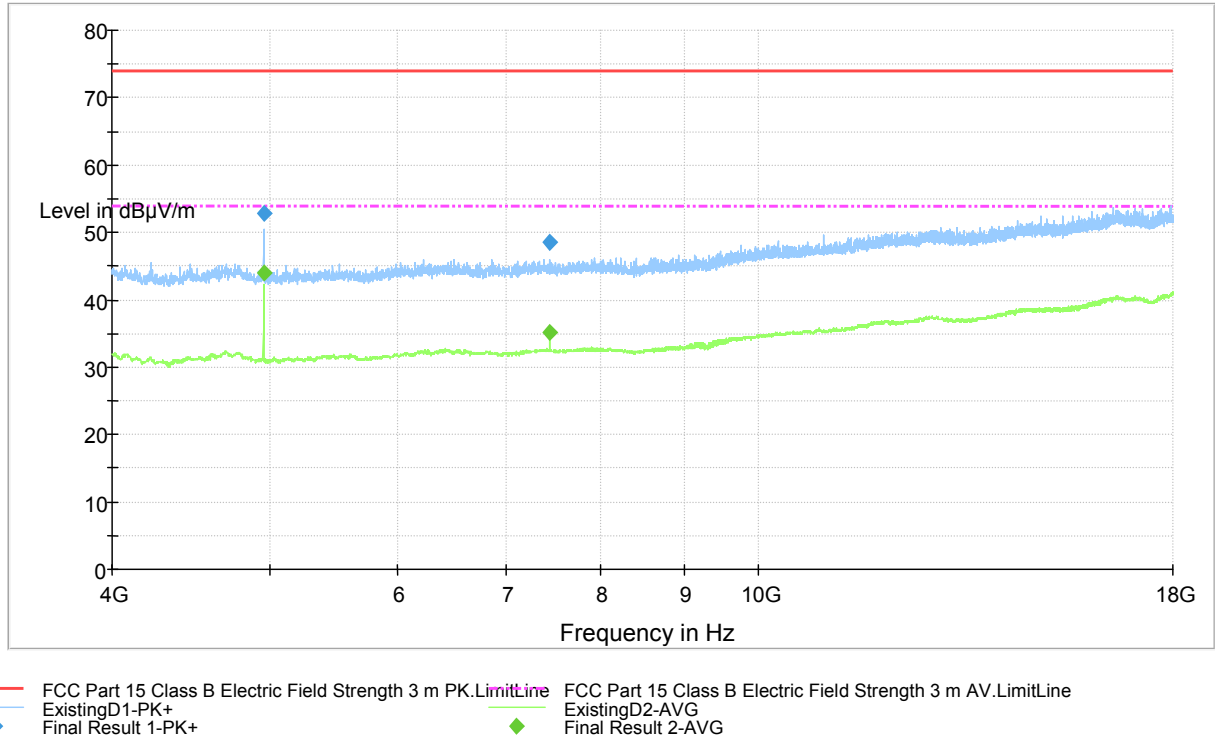


Figure 33. Measured curve with peak- and average detector. 2 Mbps Channel HIGH.

Final measurements from the worst frequencies

Table 38. 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
4959.975000	52.8	1000.0	1000.000	150.0	V	89.0	10.5	21.1	73.9	
7439.775000	48.5	1000.0	1000.000	103.0	V	209.0	12.7	25.4	73.9	

Table 39. 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	43.9	1000.0	1000.000	168.0	V	87.0	10.5	10.0	53.9	
7440.175000	35.2	1000.0	1000.000	100.0	V	209.0	12.7	18.7	53.9	

Radiated Emission FCC Part 15 Class B 4-18GHz 3m B

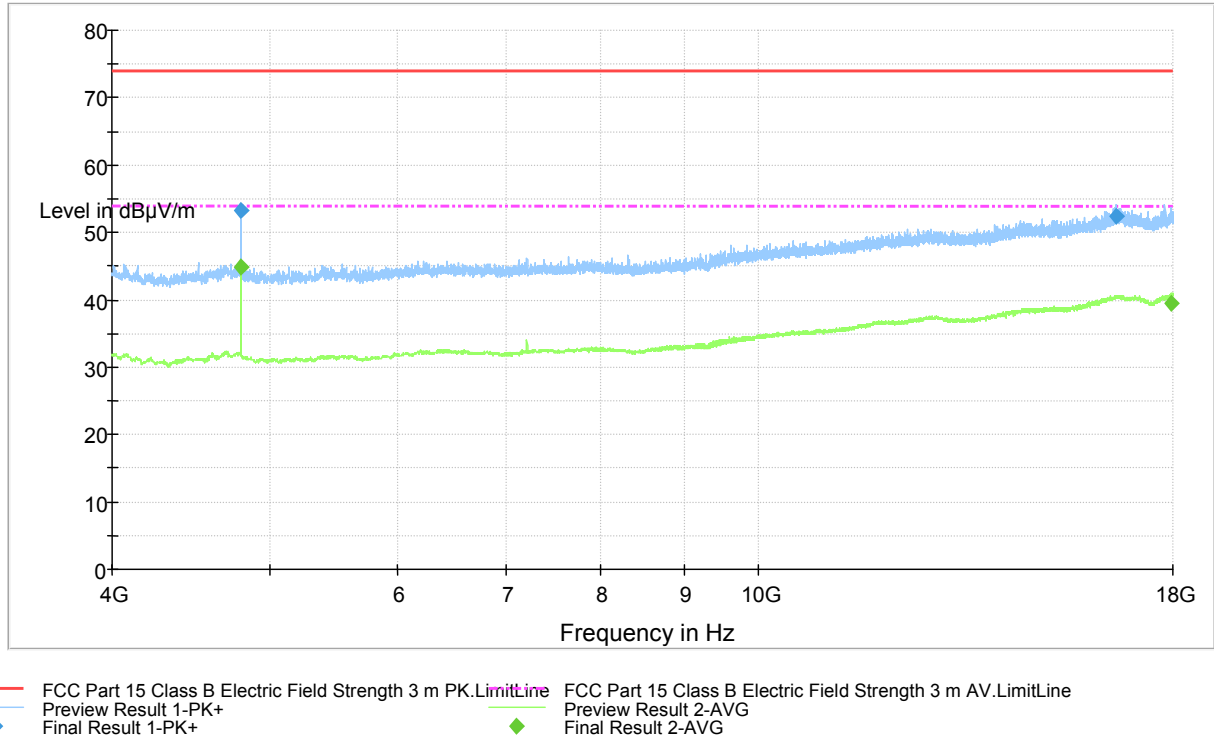


Figure 34. Measured curve with peak- and average detector. 3 Mbps Channel LOW.

Final measurements from the worst frequencies

Table 40. 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	53.3	1000.0	1000.000	159.0	V	98.0	10.7	20.6	73.9	
16602.125000	52.4	1000.0	1000.000	125.0	V	17.0	24.0	21.5	73.9	

Table 41. 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	44.9	1000.0	1000.000	158.0	V	43.0	10.7	9.0	53.9	
17965.225000	39.5	1000.0	1000.000	205.0	V	30.0	25.1	14.4	53.9	

Radiated Emission FCC Part 15 Class B 4-18GHz 3m

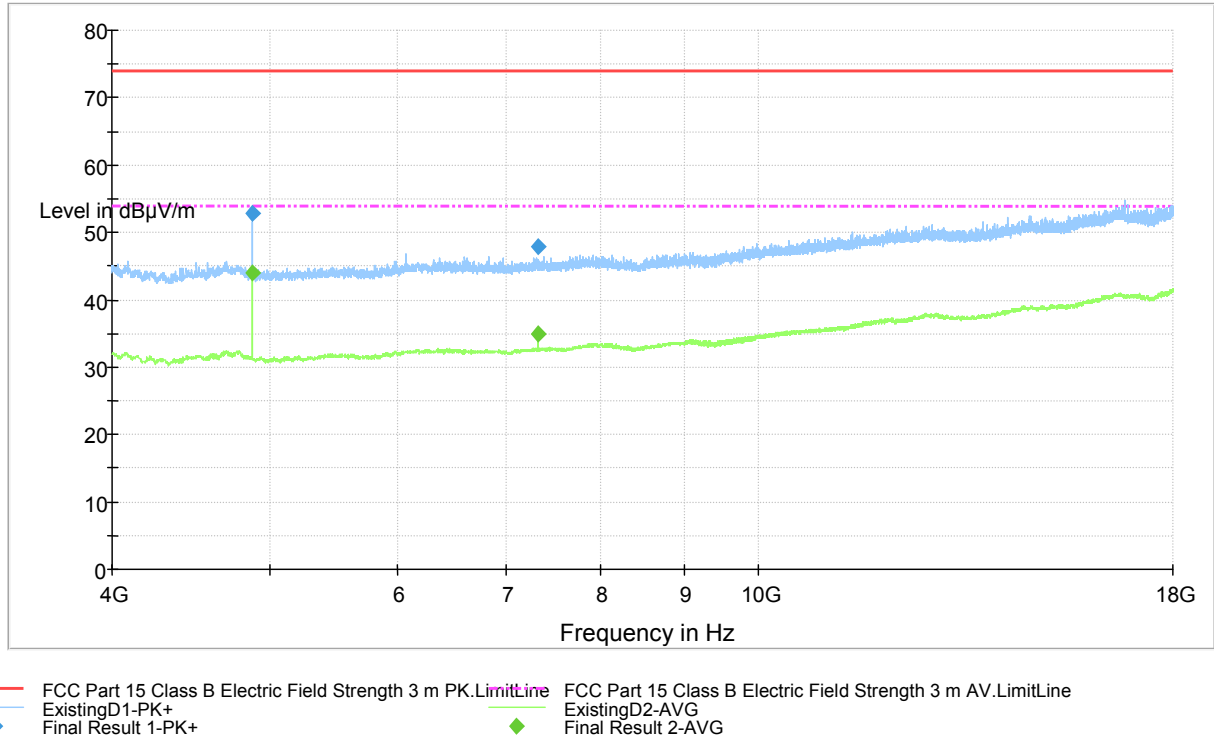


Figure 35. Measured curve with peak- and average detector. 3 Mbps Channel MID.

Final measurements from the worst frequencies

Table 42. 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
4882.475000	52.9	1000.0	1000.000	118.0	V	83.0	10.5	21.0	73.9	
7322.475000	47.9	1000.0	1000.000	189.0	V	0.0	12.5	26.0	73.9	

Table 43. 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	44.0	1000.0	1000.000	100.0	V	80.0	10.5	9.9	53.9	
7323.075000	34.9	1000.0	1000.000	178.0	V	2.0	12.5	19.0	53.9	

Radiated Emission FCC Part 15 Class B 4-18GHz 3m B

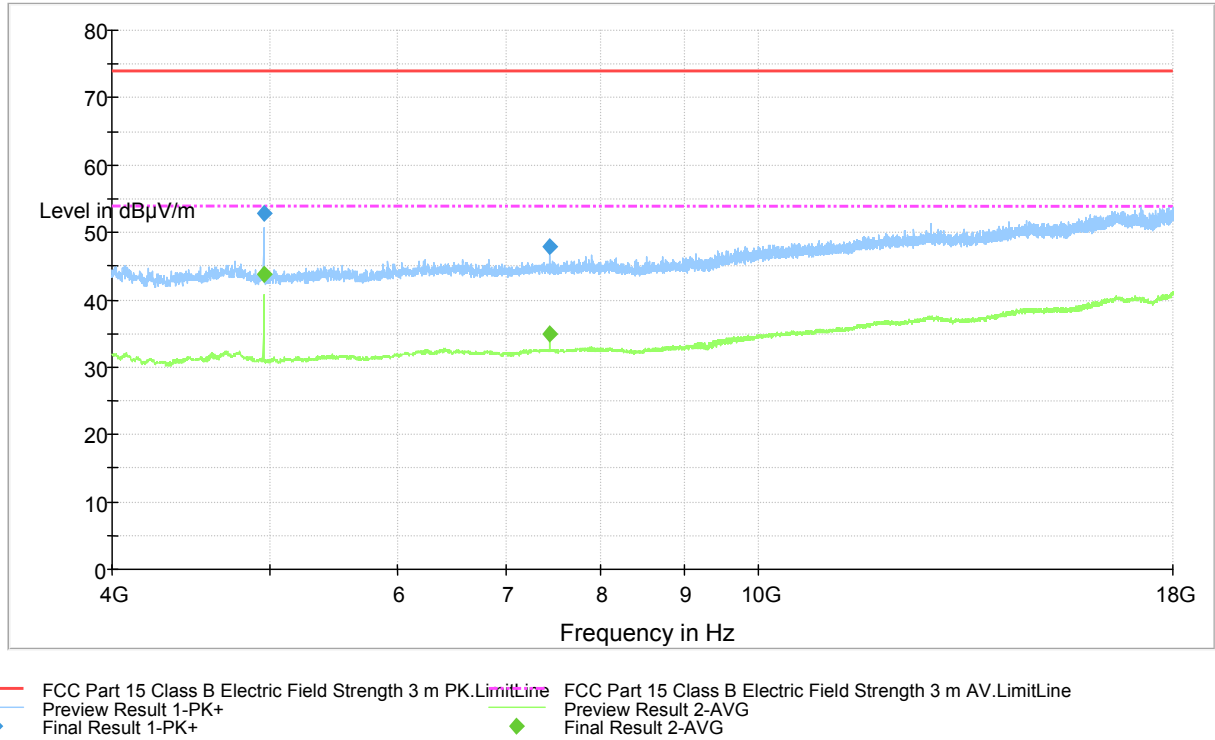


Figure 36. Measured curve with peak- and average detector. 3 Mbps Channel HIGH.

Final measurements from the worst frequencies

Table 44. Final Max Peak results.

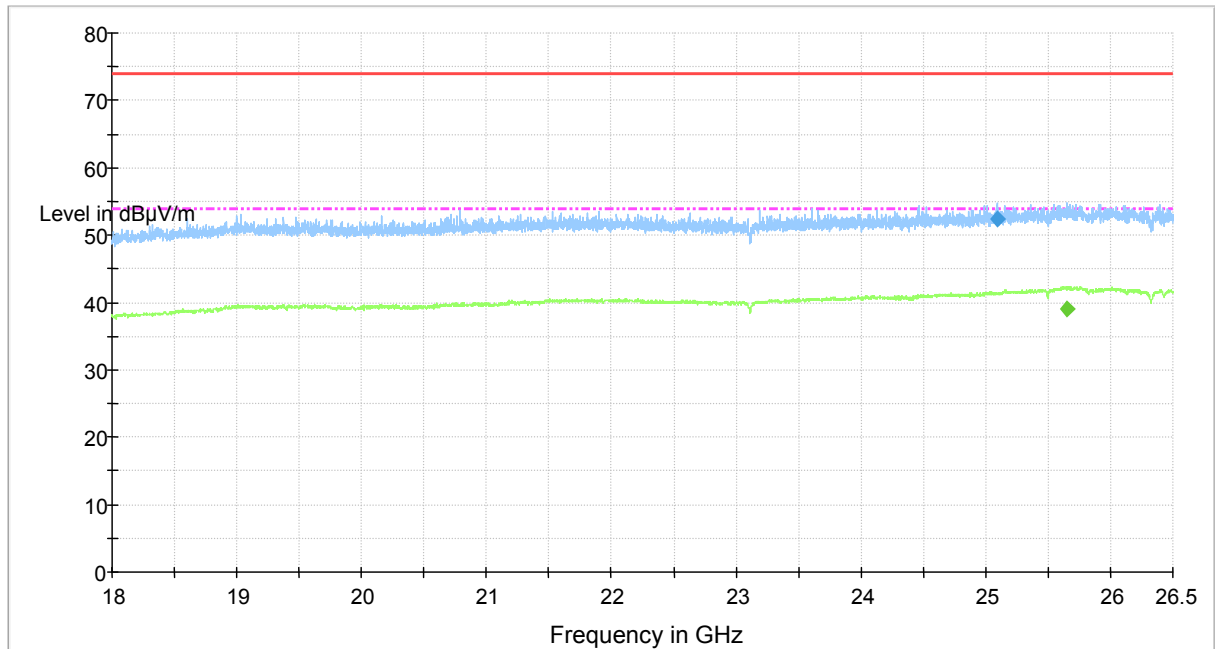
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4960.375000	52.9	1000.0	1000.000	185.0	V	86.0	10.5	21.0	73.9	
7440.575000	47.9	1000.0	1000.000	100.0	V	209.0	12.7	26.0	73.9	

Table 45. 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	43.7	1000.0	1000.000	150.0	V	86.0	10.5	10.2	53.9	
7439.975000	34.9	1000.0	1000.000	100.0	V	209.0	12.7	19.0	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



— 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
◆ Final Result 1-PK+ ◆ Preview Result 2-AVG
◆ Final Result 2-AVG

Figure 37. Measured curve with peak- and average detector. 1 Mbps Channel LOW.

Final measurements from the worst frequencies

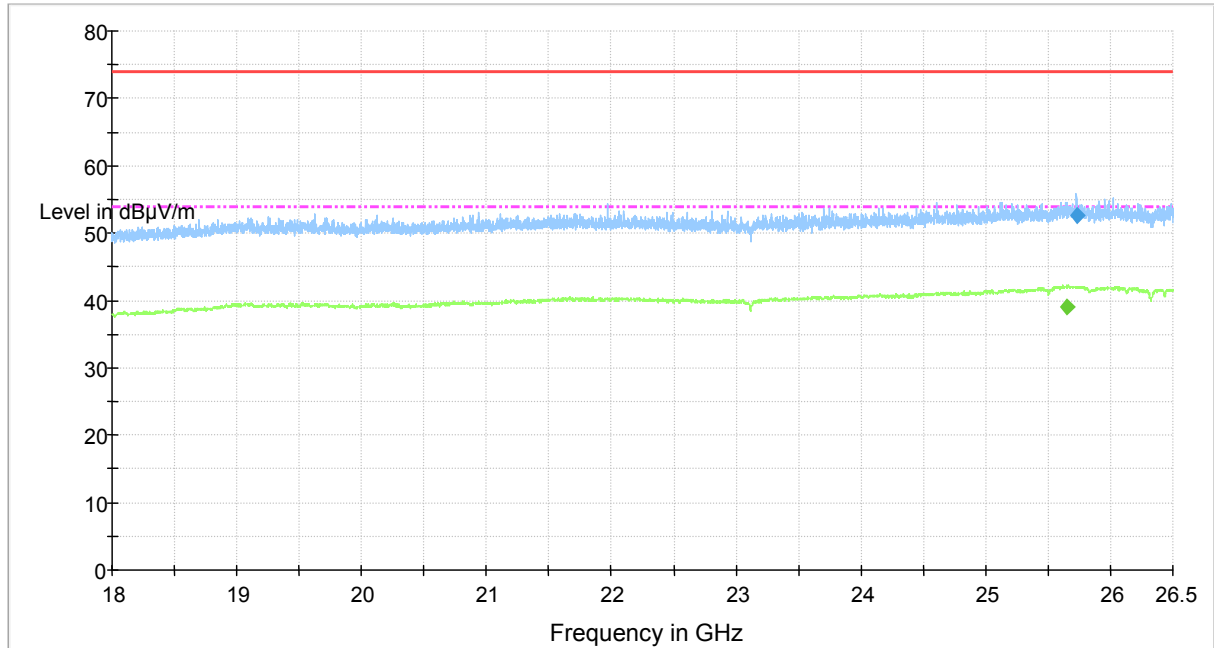
Table 46. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
25089.175000	52.3	1000.0	1000.000	159.0	V	13.0	27.1	21.6	73.9	

Table 47. 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
25653.775000	39.1	1000.0	1000.000	116.0	V	5.0	27.9	14.8	53.9	

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

Final measurements from the worst frequencies

Table 48. 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
25729.075000	52.6	1000.0	1000.000	105.0	V	5.0	28.0	21.3	73.9	

Table 49. 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
25653.975000	39.0	1000.0	1000.000	100.0	V	15.0	27.9	14.9	53.9	

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

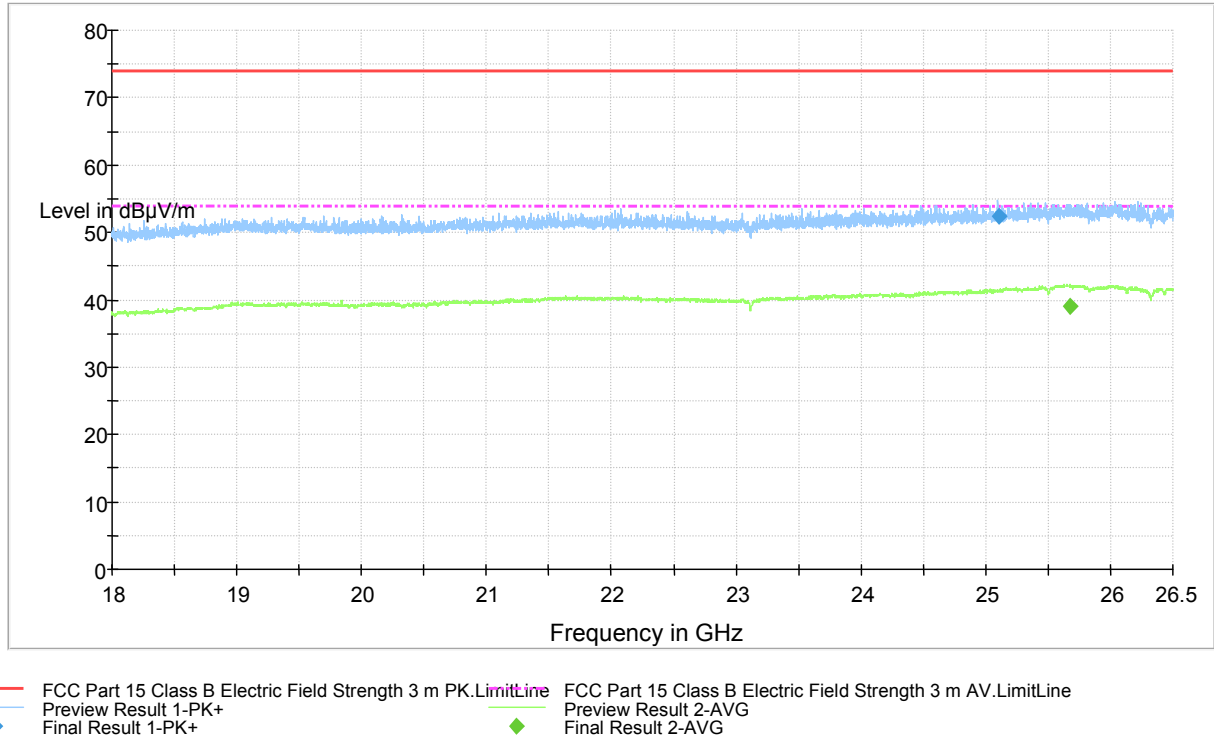


Figure 39. Measured curve with peak- and average detector. 1 Mbps Channel HIGH.

Final measurements from the worst frequencies

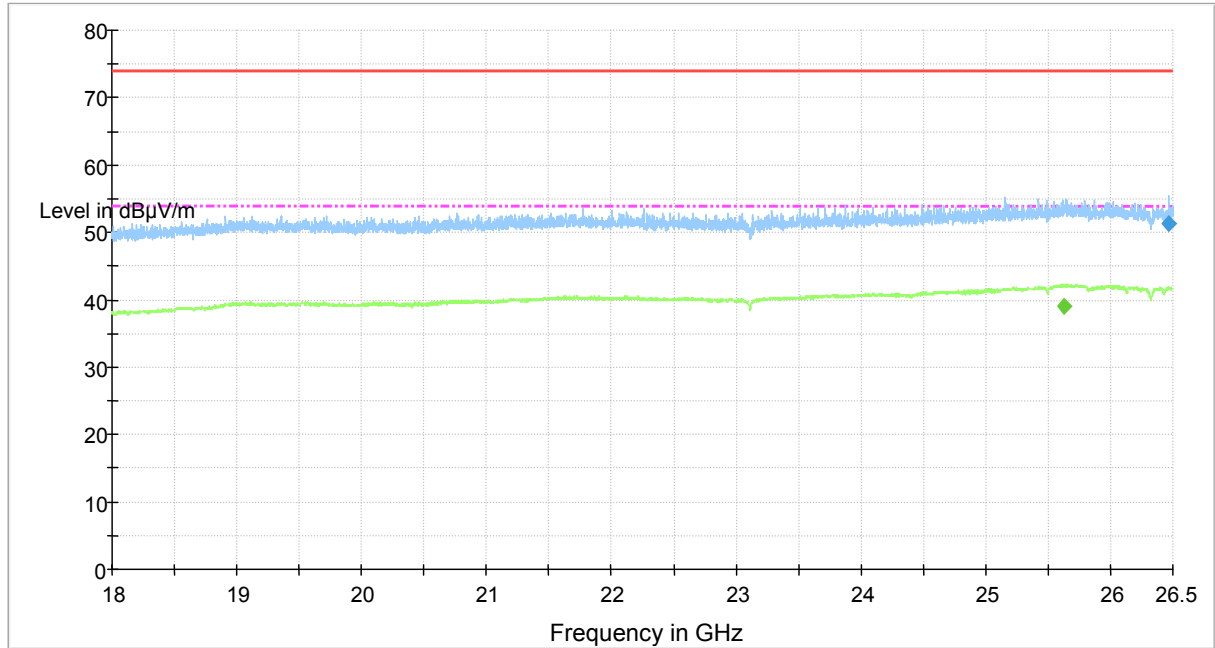
Table 50. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
25105.225000	52.4	1000.0	1000.000	106.0	V	10.0	27.1	21.5	73.9	

Table 51. 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
25674.575000	39.0	1000.0	1000.000	100.0	V	3.0	27.9	14.9	53.9	

Radiated Emission FCC Part 15 Class B 18-26.5GHz at 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
◆ Final Result 1-PK+ ◆ Preview Result 2-AVG
◆ Final Result 2-AVG

Figure 40. Measured curve with peak- and average detector. 2 Mbps Channel LOW.

Final measurements from the worst frequencies

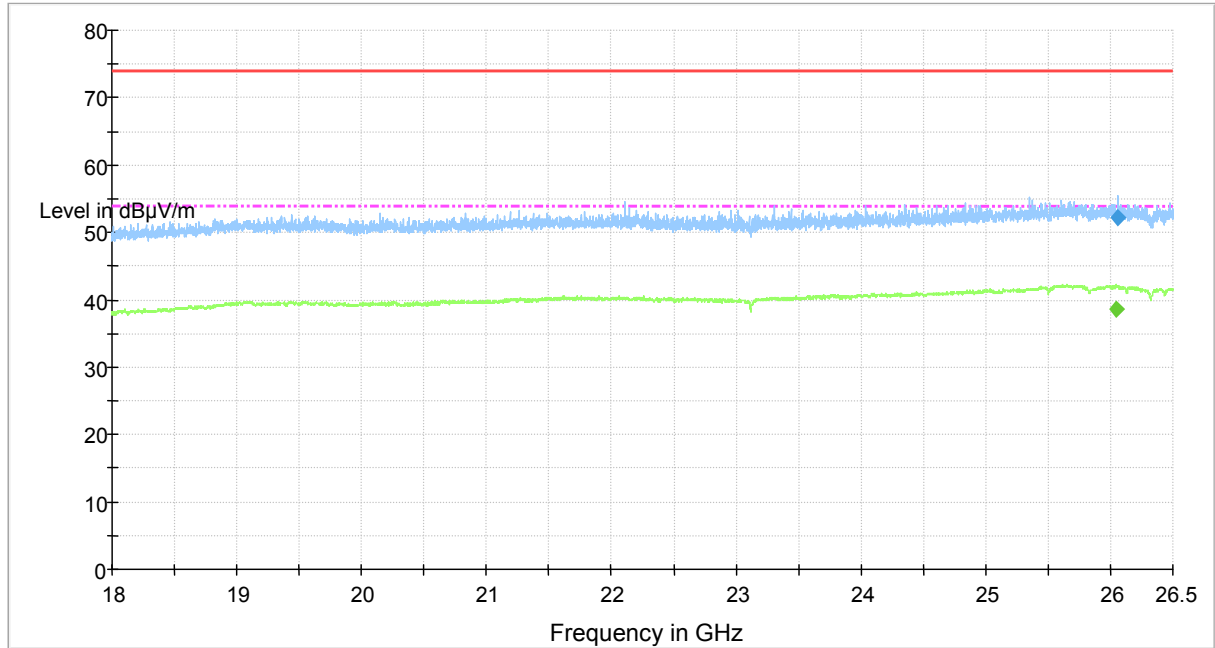
Table 52. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
26461.875000	51.3	1000.0	1000.000	128.0	V	6.0	28.2	22.6	73.9	

Table 53. 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
25628.675000	38.9	1000.0	1000.000	105.0	V	-4.0	27.9	15.0	53.9	

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 41. Measured curve with peak- and average detector. 2 Mbps Channel MID.

Final measurements from the worst frequencies

Table 54. 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
26058.575000	52.1	1000.0	1000.000	154.0	V	0.0	28.0	21.8	73.9	

Table 55. 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
26048.175000	38.5	1000.0	1000.000	100.0	V	6.0	28.0	15.4	53.9	

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

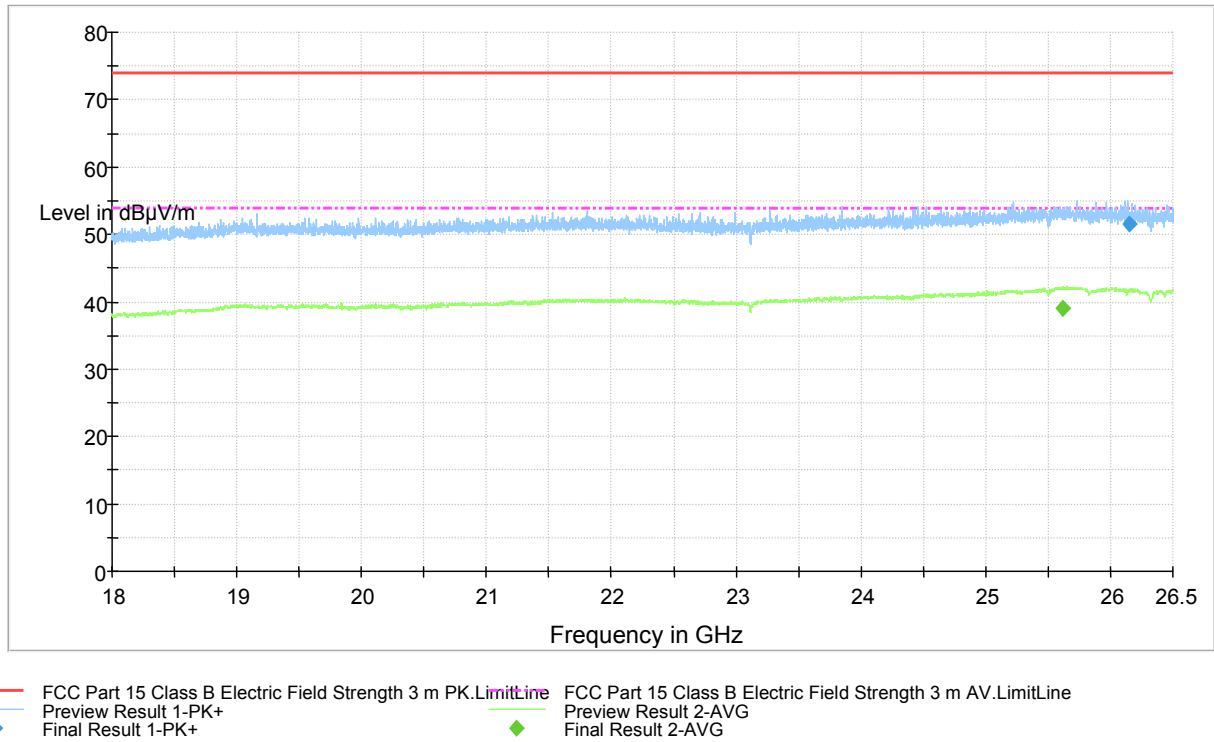


Figure 42. Measured curve with peak- and average detector. 2 Mbps Channel HIGH.

Final measurements from the worst frequencies

Table 56. 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
26146.925000	51.6	1000.0	1000.000	135.0	V	12.0	28.1	22.3	73.9	

Table 57. 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
25619.925000	38.9	1000.0	1000.000	100.0	V	10.0	27.9	15.0	53.9	

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

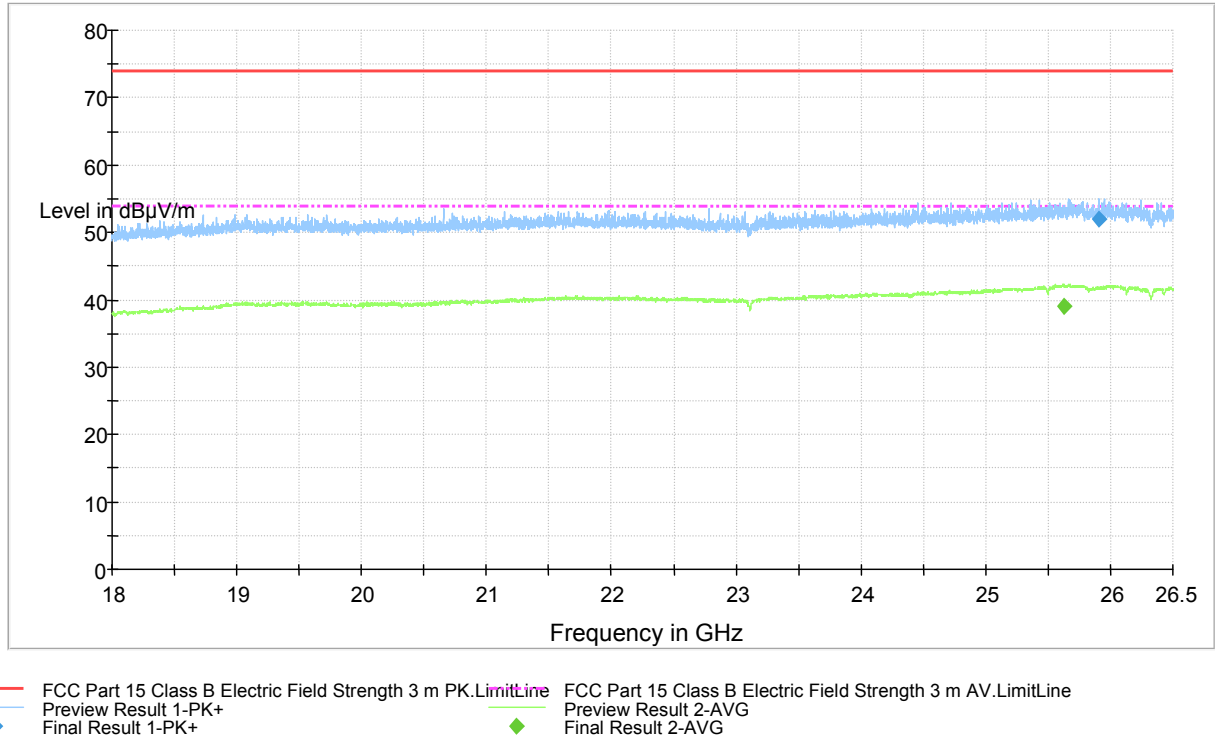


Figure 43. Measured curve with peak- and average detector. 3 Mbps Channel LOW.

Final measurements from the worst frequencies

Table 58. 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
25907.425000	52.0	1000.0	1000.000	122.0	V	12.0	28.0	21.9	73.9	

Table 59. 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
25627.275000	39.0	1000.0	1000.000	100.0	V	15.0	27.9	14.9	53.9	

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

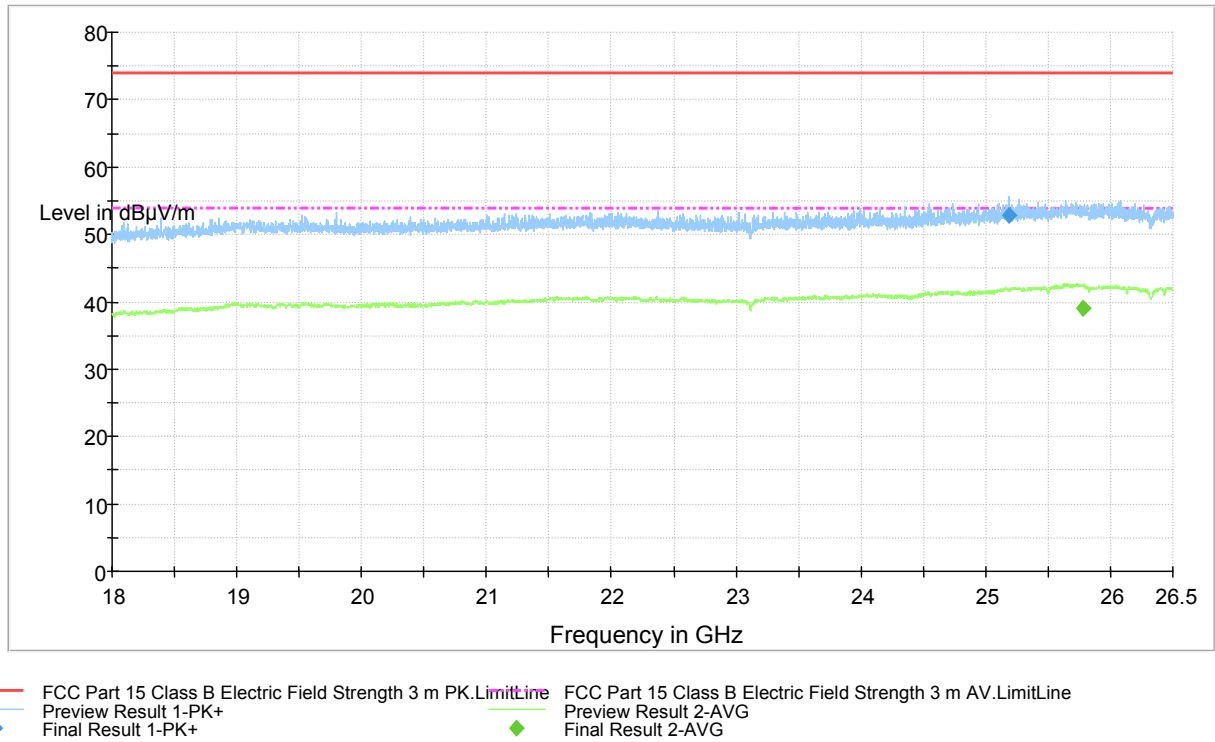


Figure 44. Measured curve with peak- and average detector. 3 Mbps Channel MID.

Final measurements from the worst frequencies

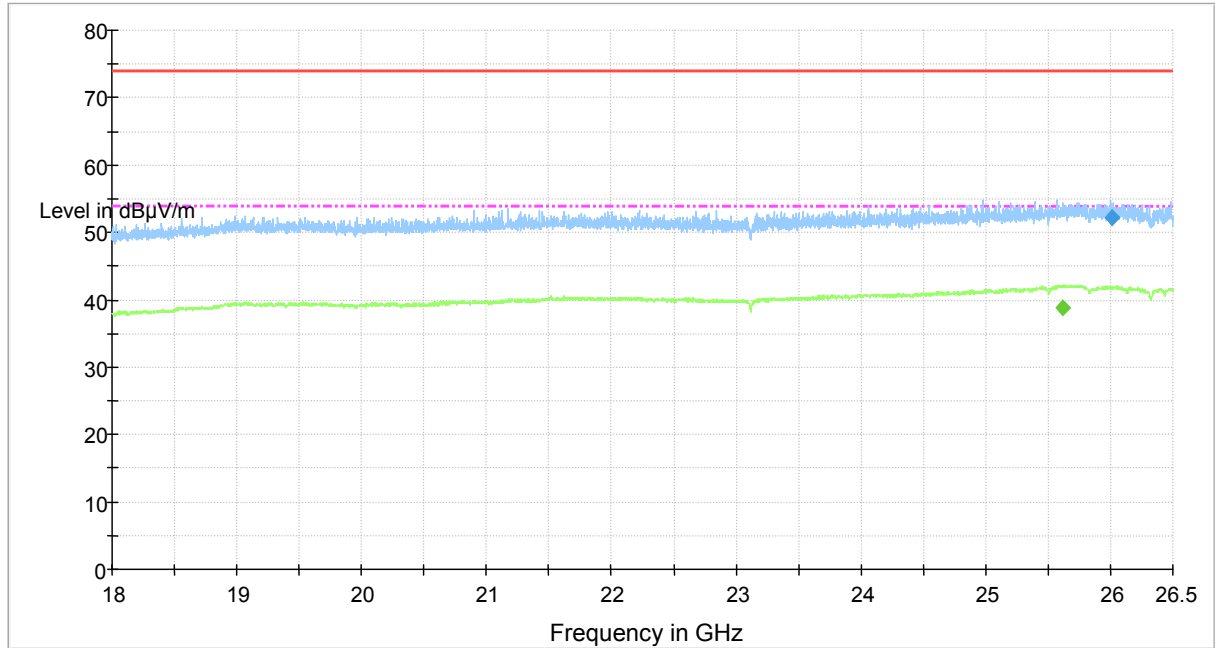
Table 60. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
25187.325000	52.8	1000.0	1000.000	115.0	V	16.0	27.3	21.1	73.9	

Table 61. 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
25783.525000	39.1	1000.0	1000.000	100.0	V	1.0	28.0	14.8	53.9	

Radiated Emission FCC Part 15 Class B 18-26.5GHz at 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
◆ Final Result 1-PK+ ◆ Preview Result 2-AVG
◆ Final Result 2-AVG

Figure 45. Measured curve with peak- and average detector. 3 Mbps Channel HIGH.

Final measurements from the worst frequencies

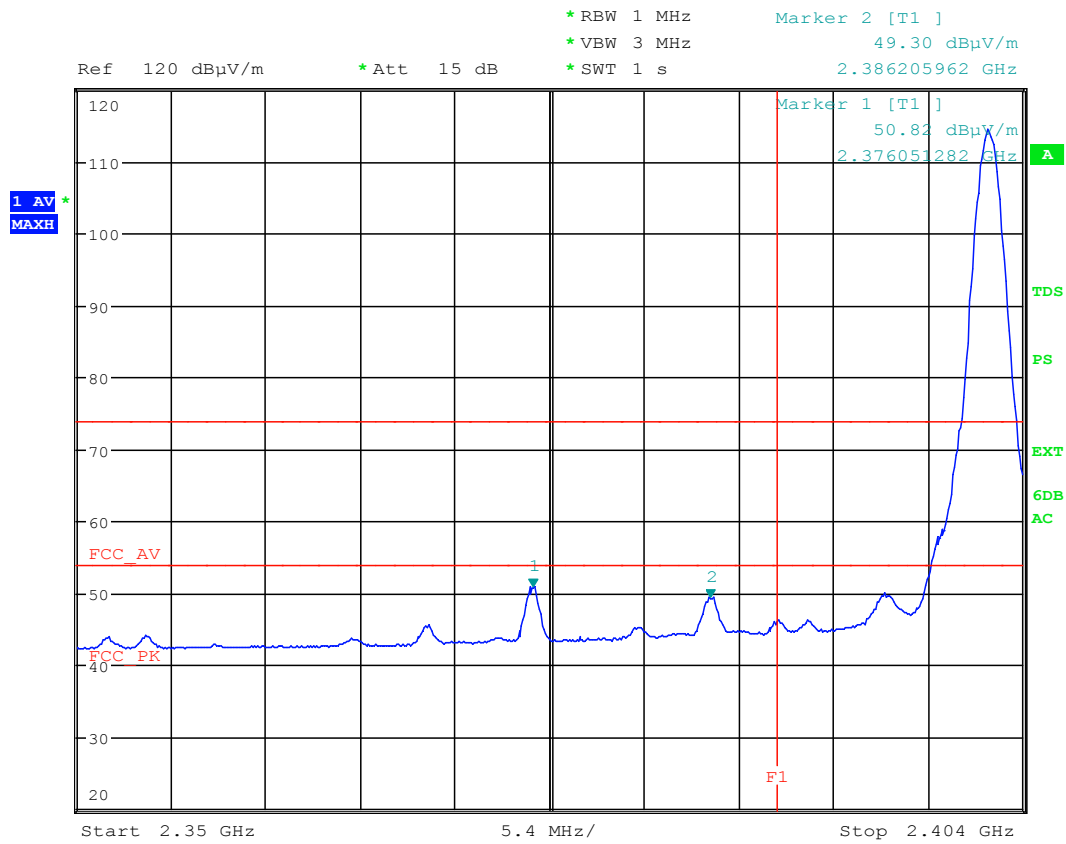
Table 62. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
26008.425000	52.2	1000.0	1000.000	180.0	V	15.0	28.0	21.7	73.9	

Table 63. Final Average results.

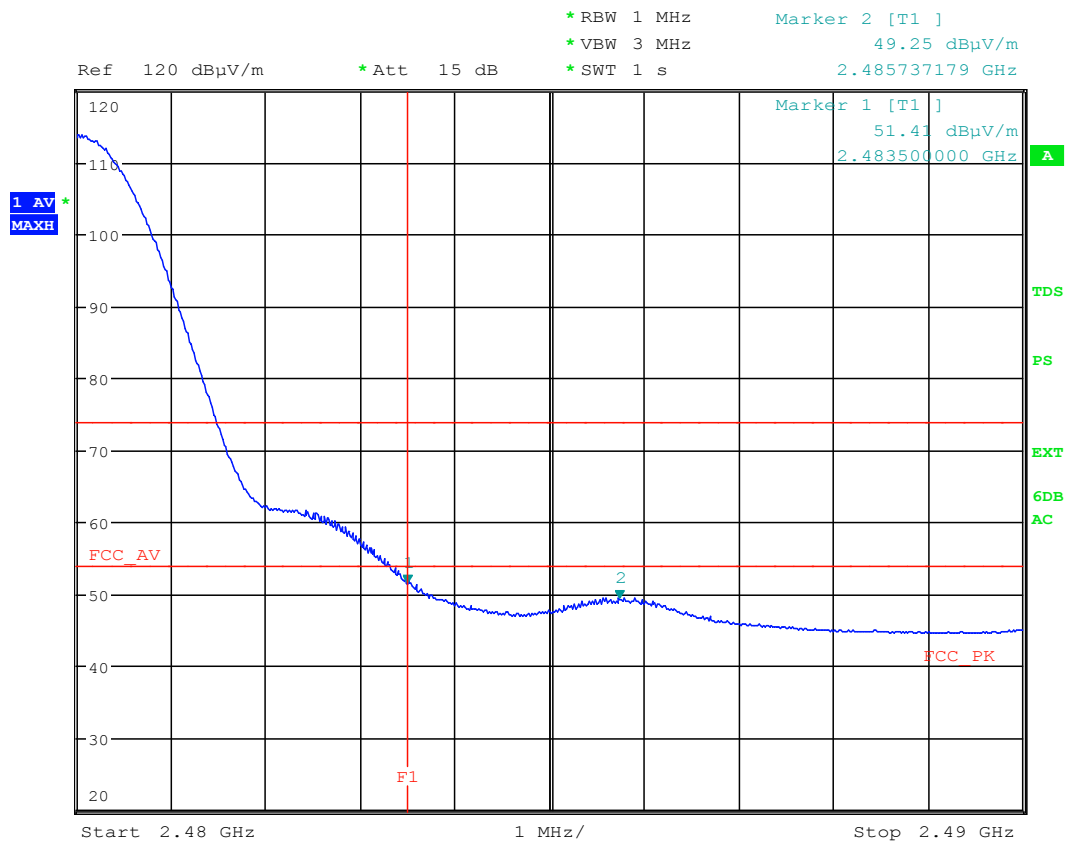
Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
25620.625000	38.9	1000.0	1000.000	100.0	V	8.0	27.9	15.0	53.9	

Radiated Band Edge Measurement results



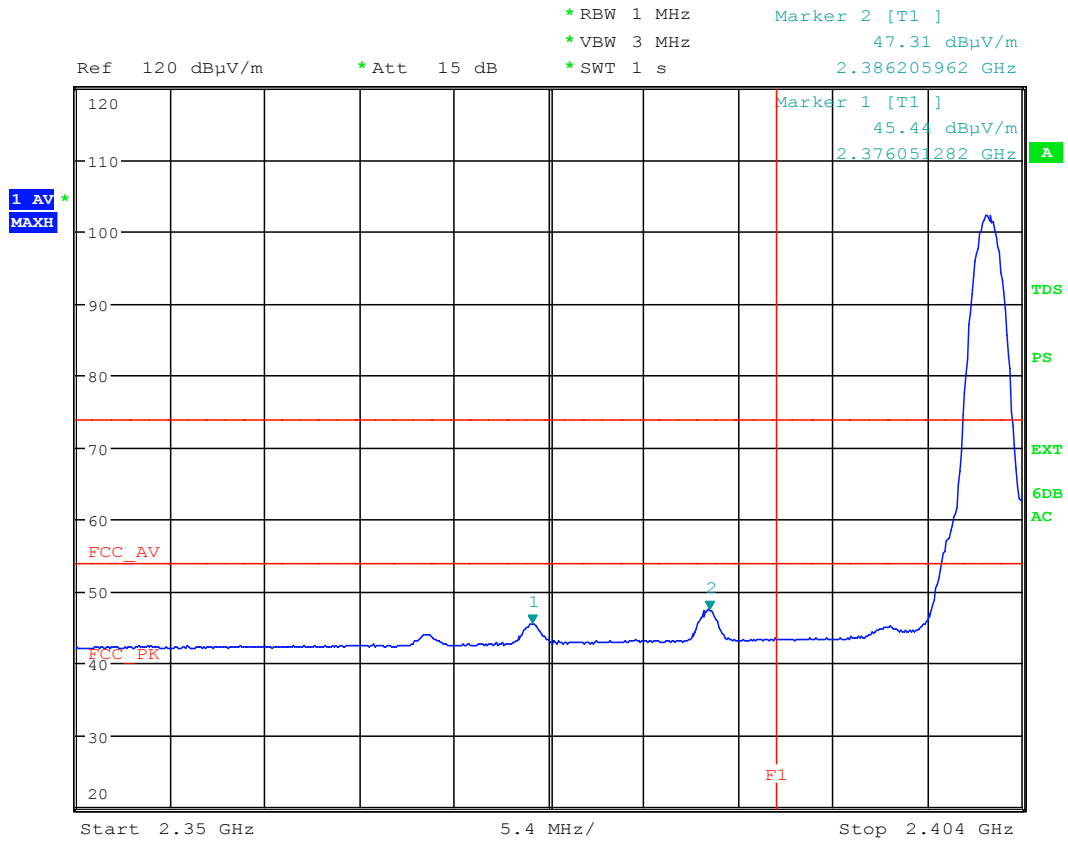
Date: 12.AUG.2011 14:35:26

Figure 46. Measured curve with average detector. 1 Mbps Lower band edge.



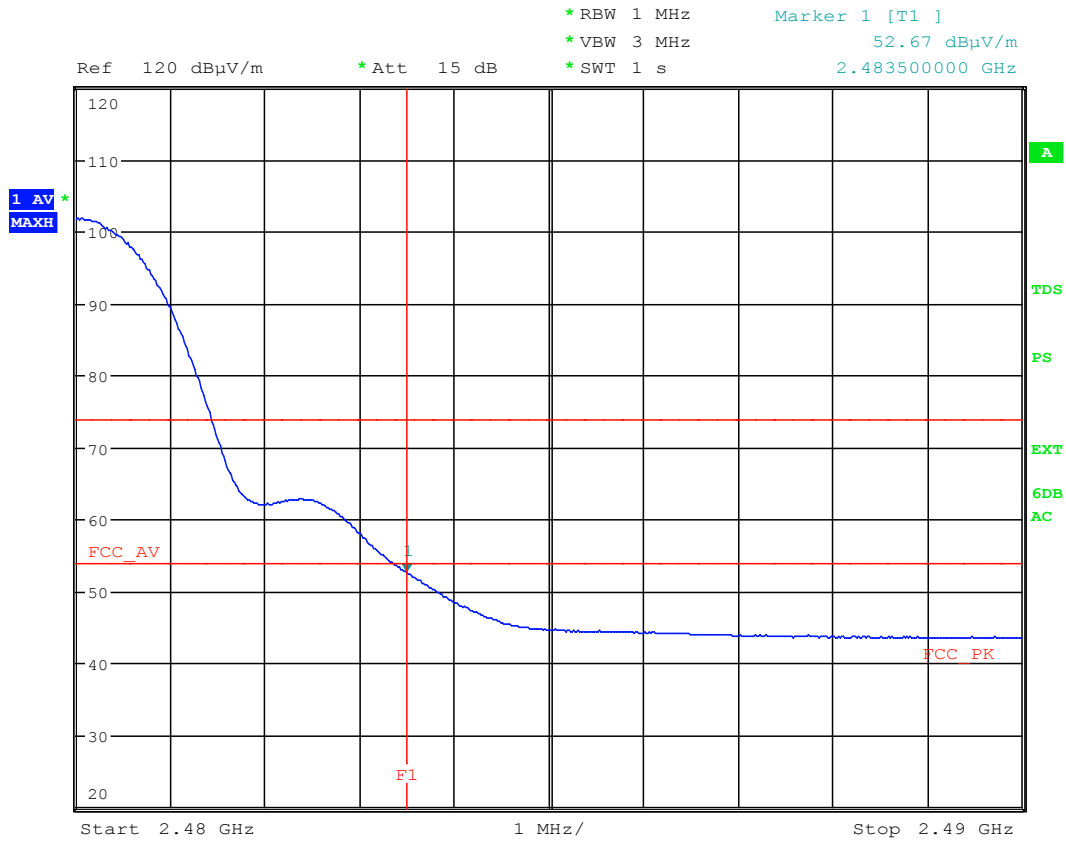
Date: 12.AUG.2011 14:51:19

Figure 47. Measured curve with peak- and average detector. 1 Mbps Upper band edge.



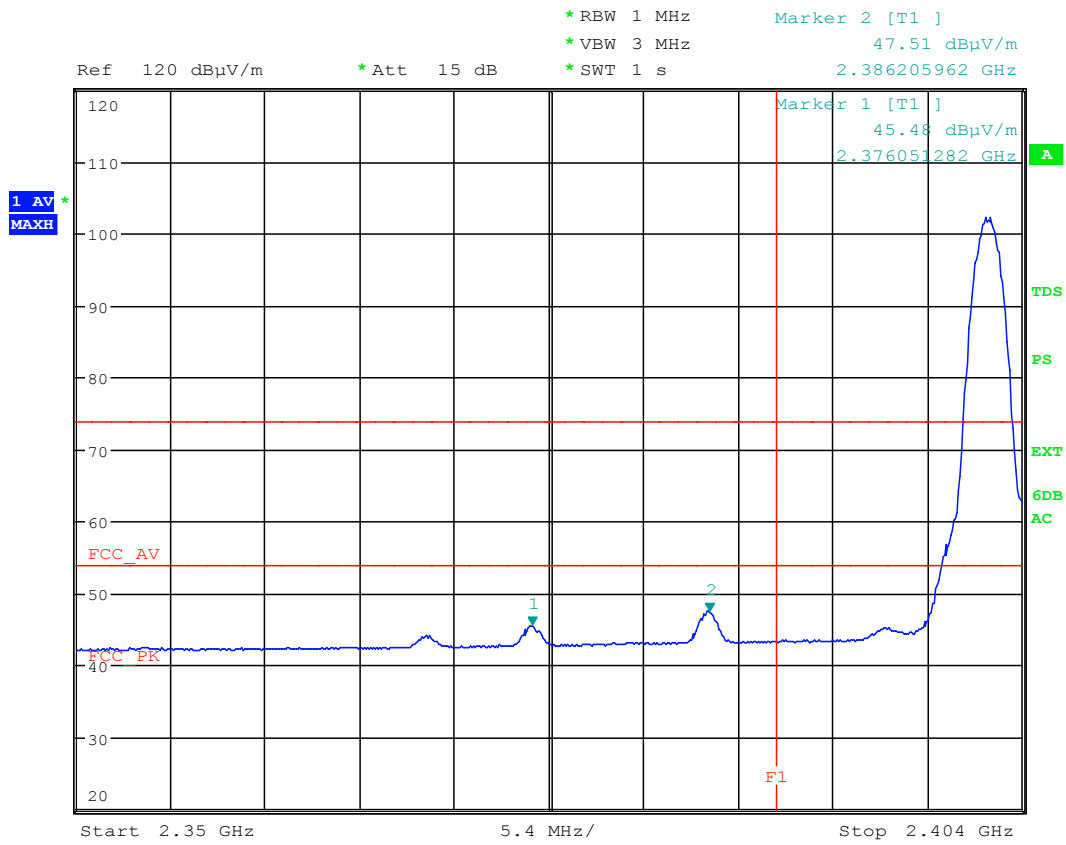
Date: 12.AUG.2011 14:41:45

Figure 48. Measured curve with peak- and average detector. 2 Mbps Lower band edge.



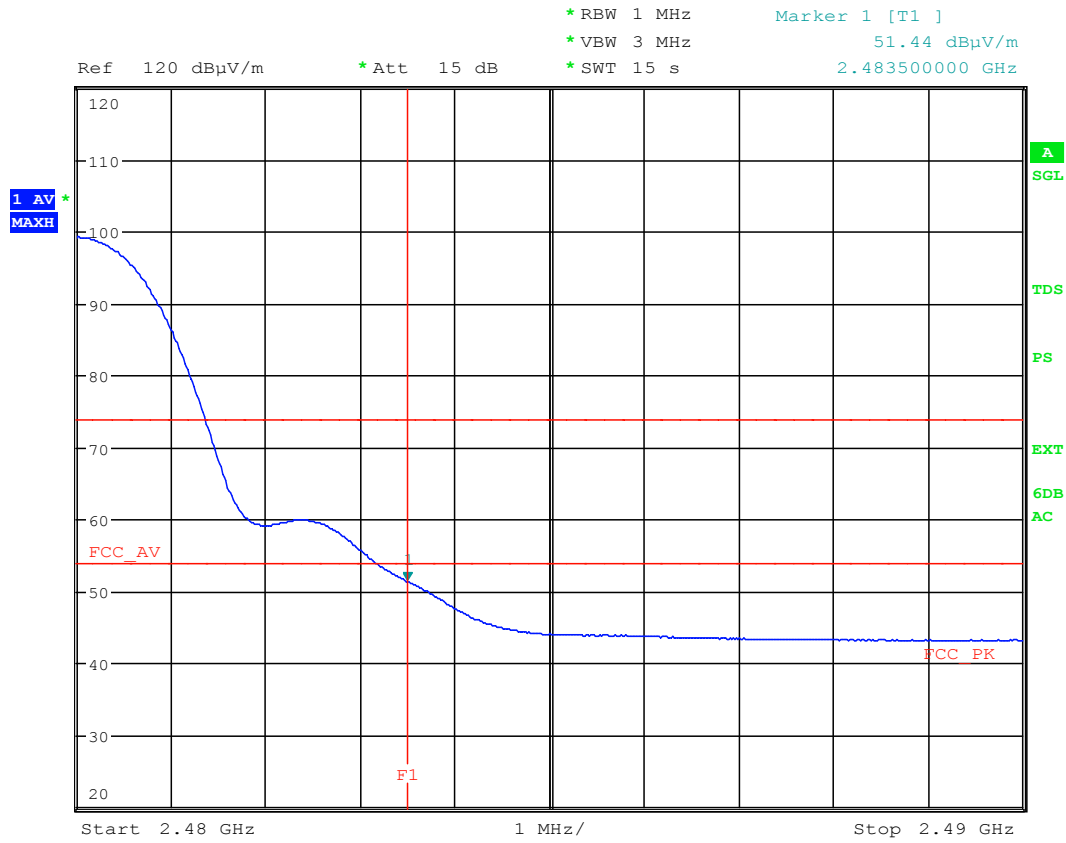
Date: 12.AUG.2011 14:23:08

Figure 49. Measured curve with peak- and average detector. 2 Mbps Upper band edge.



Date: 12.AUG.2011 14:45:51

Figure 50. Measured curve with peak- and average detector. 3 Mbps Lower band edge.



Date: 12.AUG.2011 14:15:39

Figure 51. Measured curve with peak- and average detector. 3 Mbps Upper band edge.

Transmitter Band Edge Measurement and Conducted Spurious Emissions

Standard:	ANSI C63.10	(2009)
Tested by:	JJM	
Date:	26.5.2011	
Humidity:	29 %	
Temperature:	24 °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)).

Data rate	Band Edge Attenuation	
	Lower Band Edge	Upper Band Edge
1Mbps	-50.20 dBc	-55.74 dBc
2Mbps	-43.31 dBc	-49.73 dBc
3Mbps	-44.18 dBc	-47.32 dBc
Limit: -20dBc		

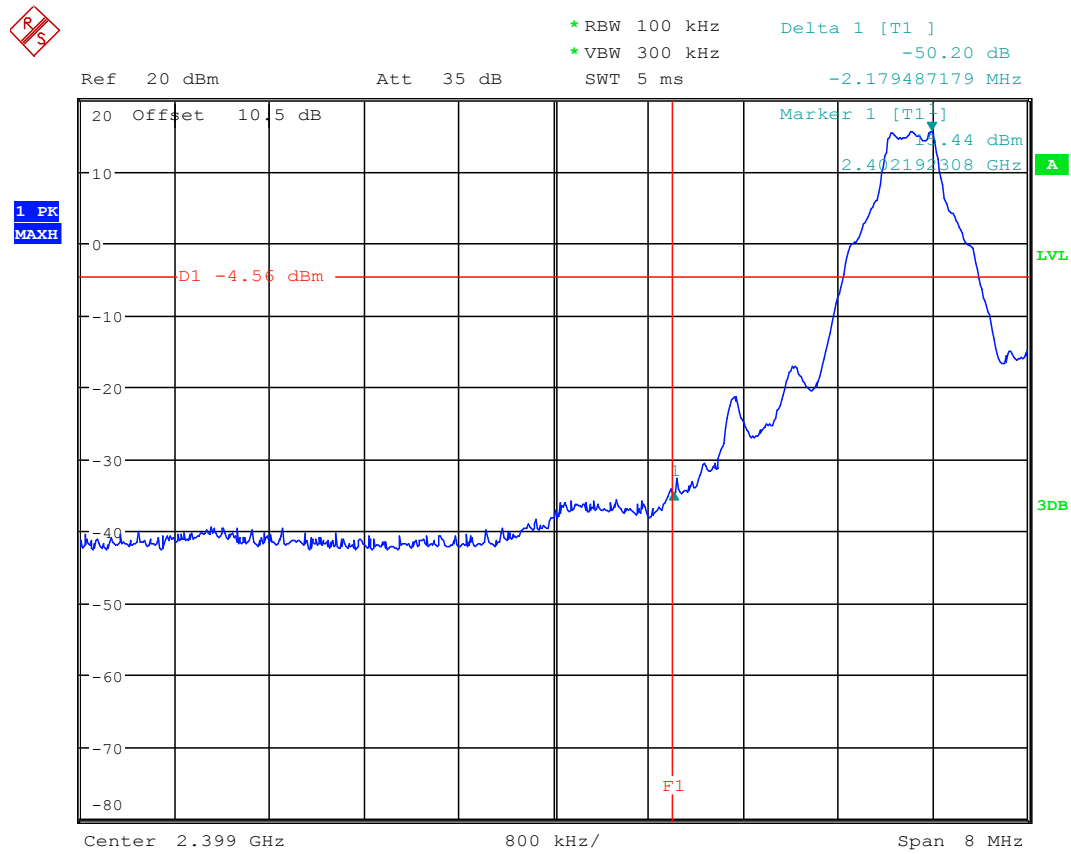
Table 64. Band edge attenuation.

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

Table 65. Conducted spurious emissions 1Mbps, 2Mbps and 3Mbps.

No significant emissions were detected close to the limit.

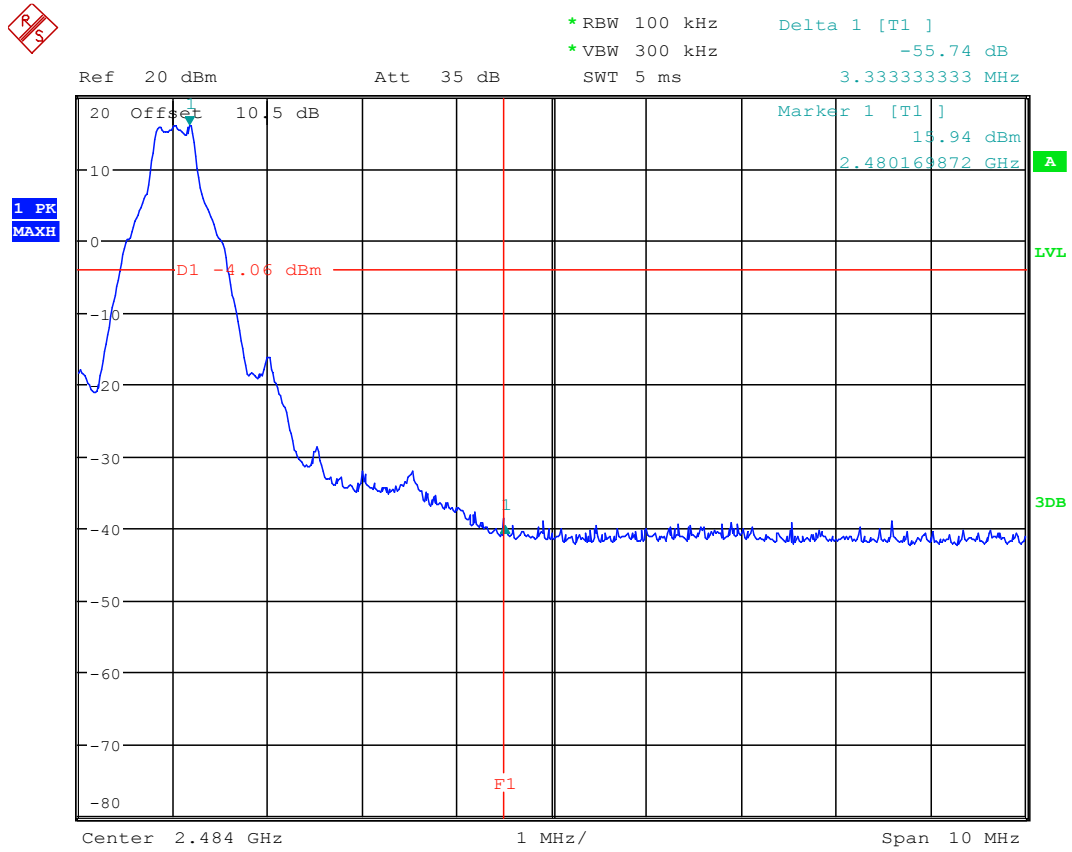
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 12:10:11

Figure 52. Lower Band Edge 1Mbps.

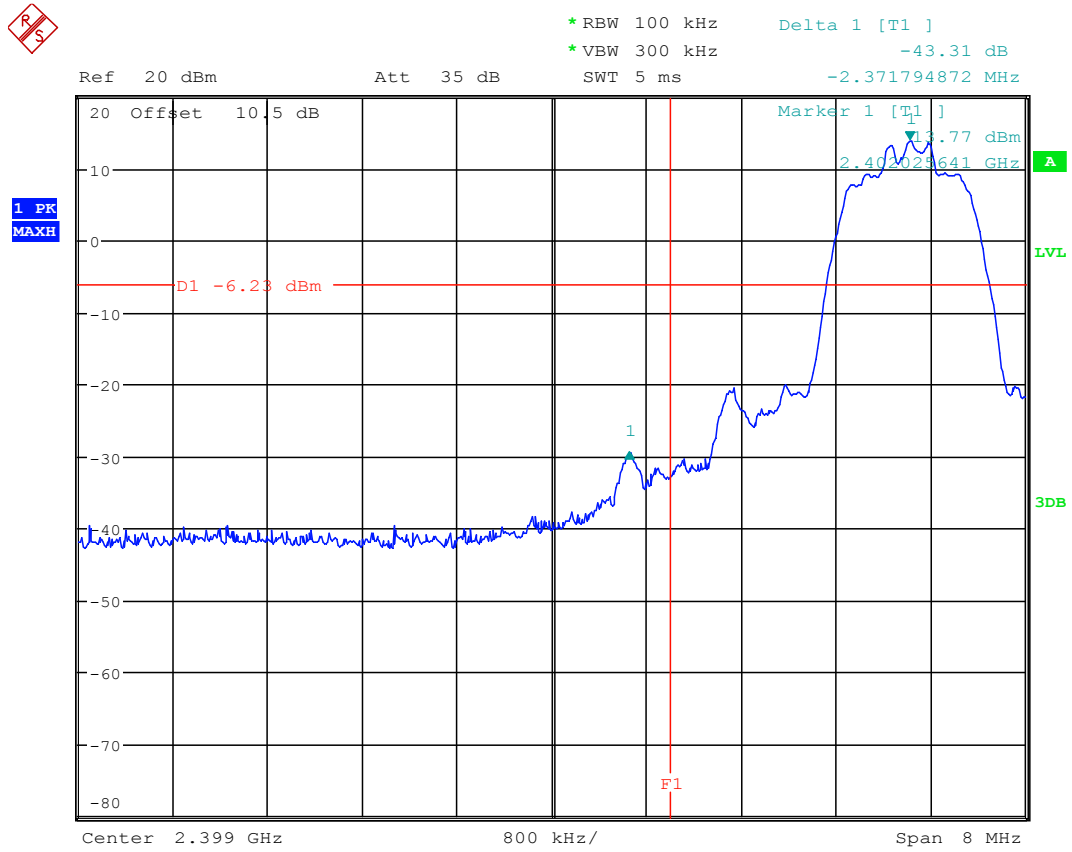
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 12:15:34

Figure 53. Upper Band Edge 1Mbps.

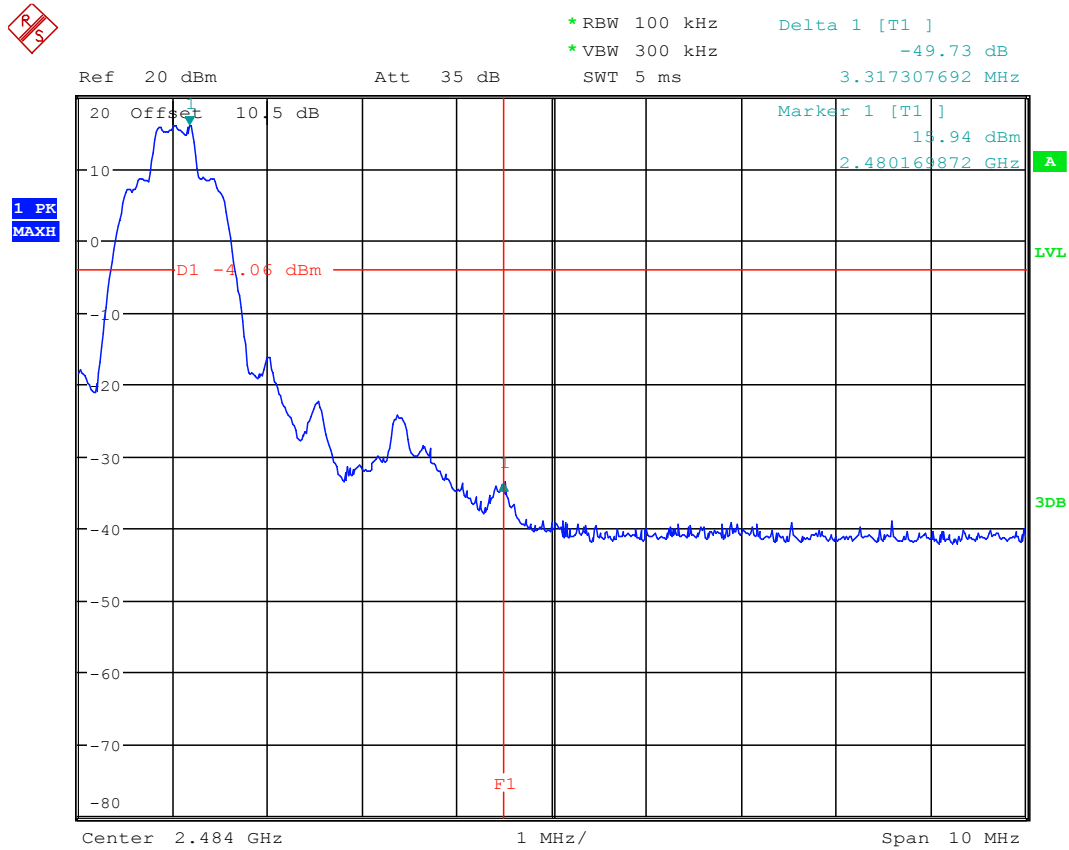
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 12:11:31

Figure 54. Lower Band Edge 2Mbps.

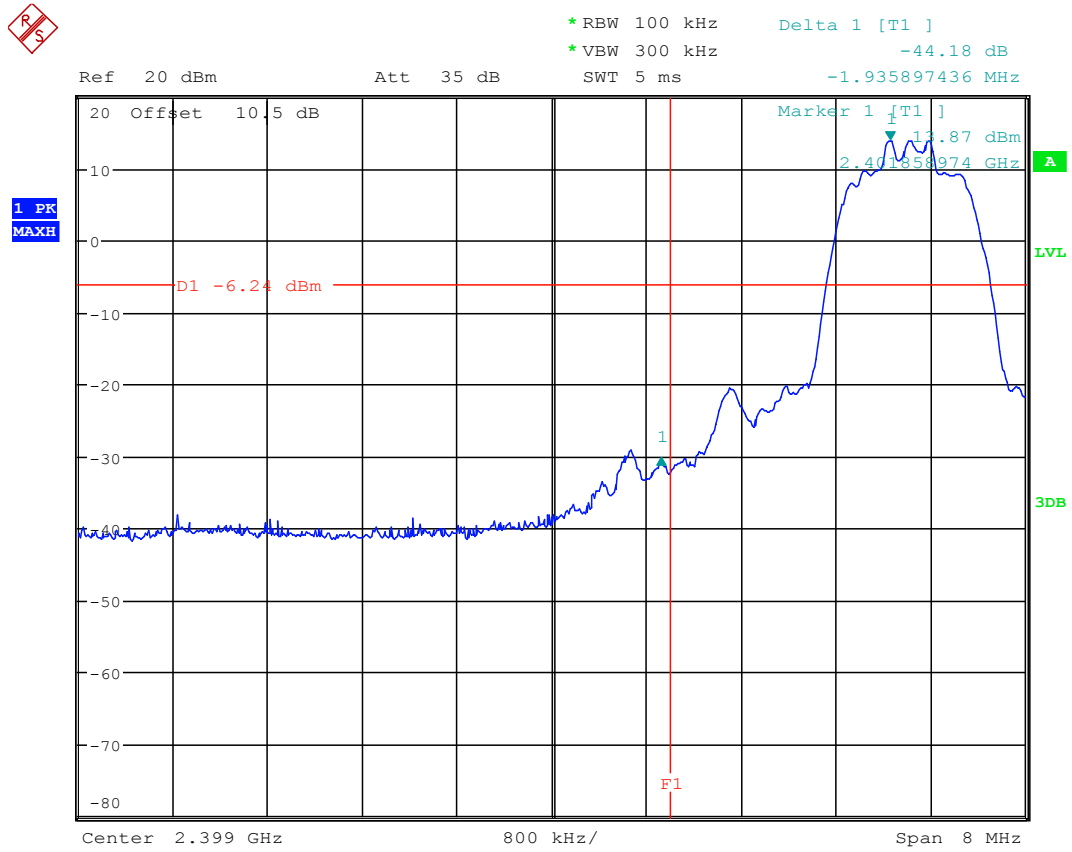
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 12:16:53

Figure 55. Upper Band Edge 2Mbps.

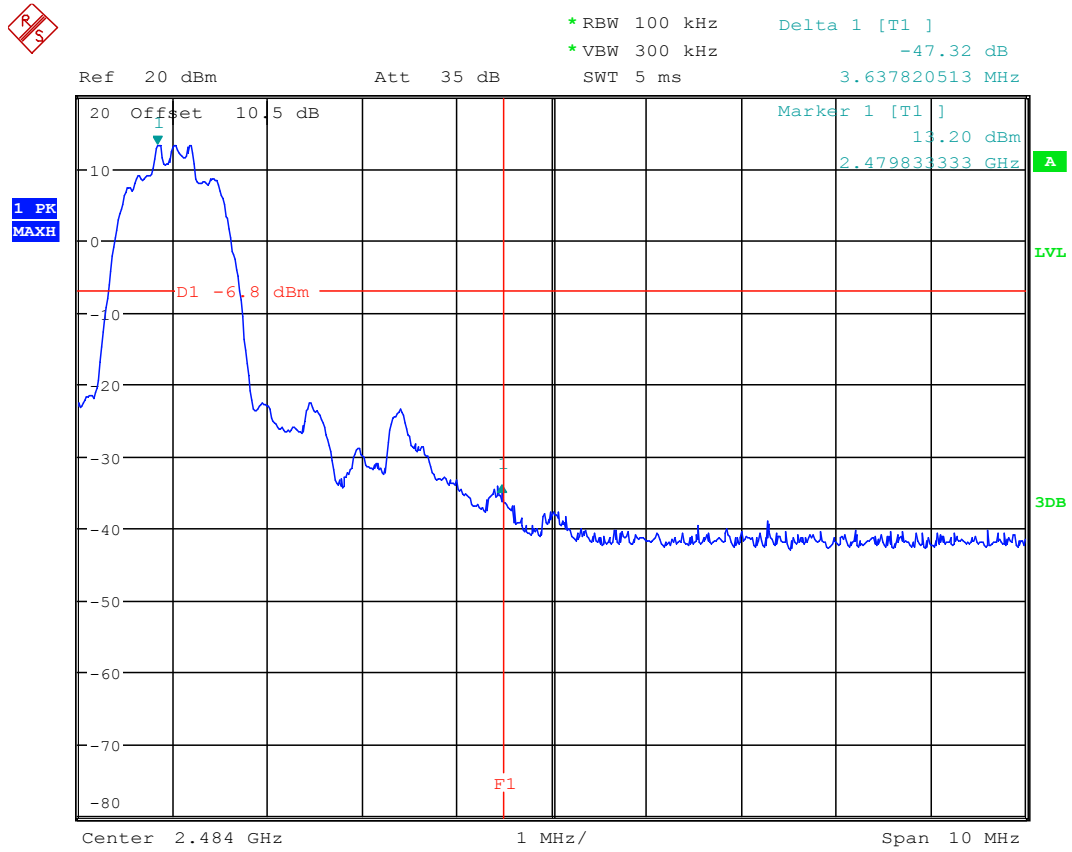
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 12:03:59

Figure 56. Lower Band Edge 3Mbps.

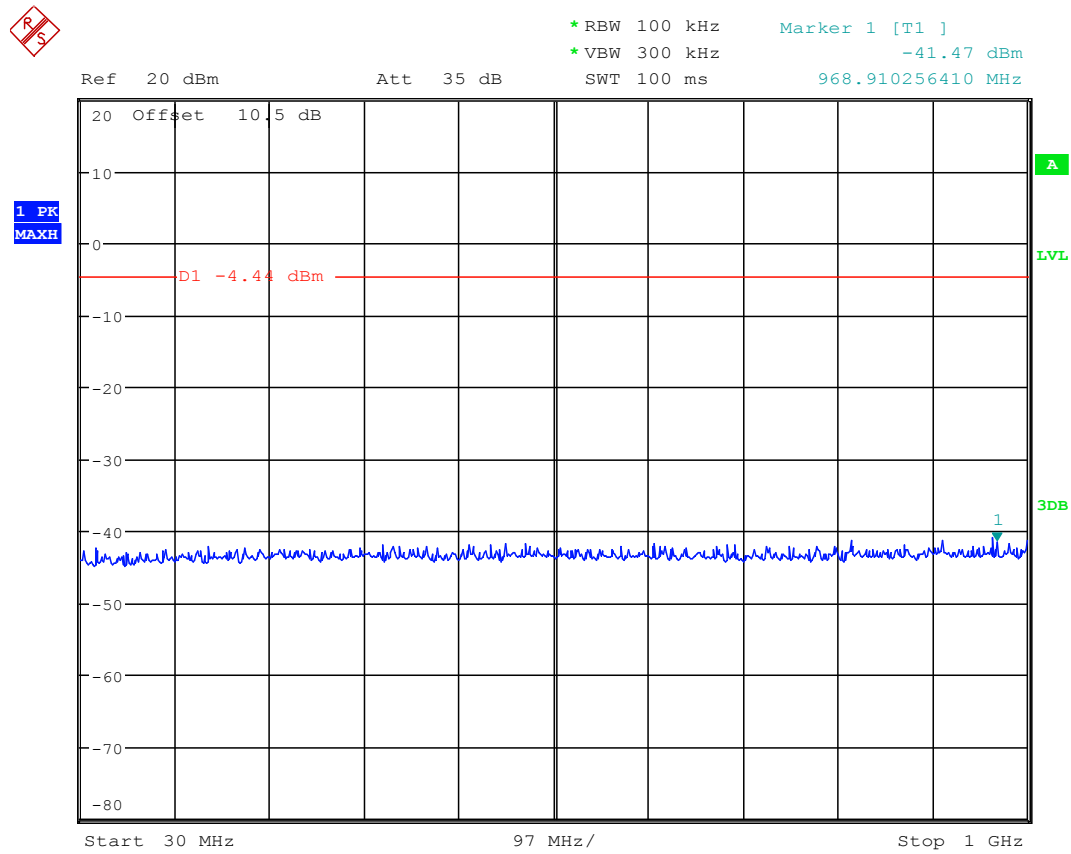
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 12:18:34

Figure 57. Upper Band Edge 3Mbps.

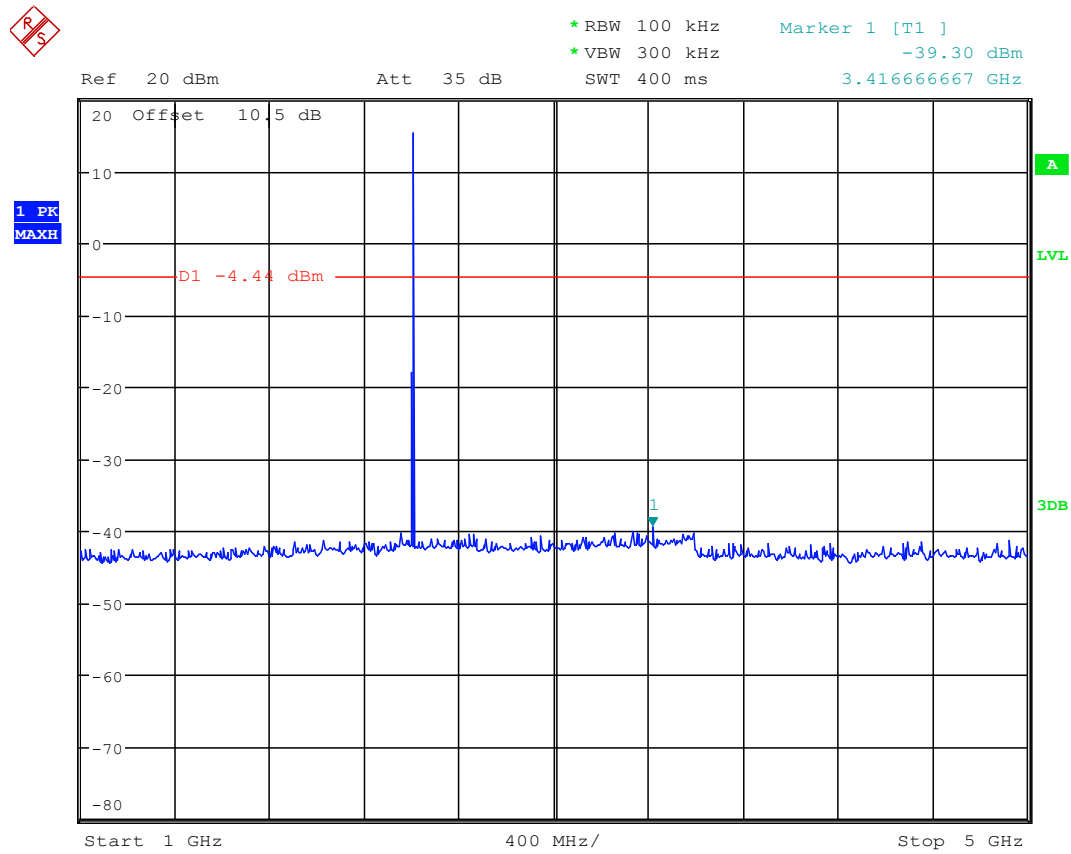
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 09:34:04

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

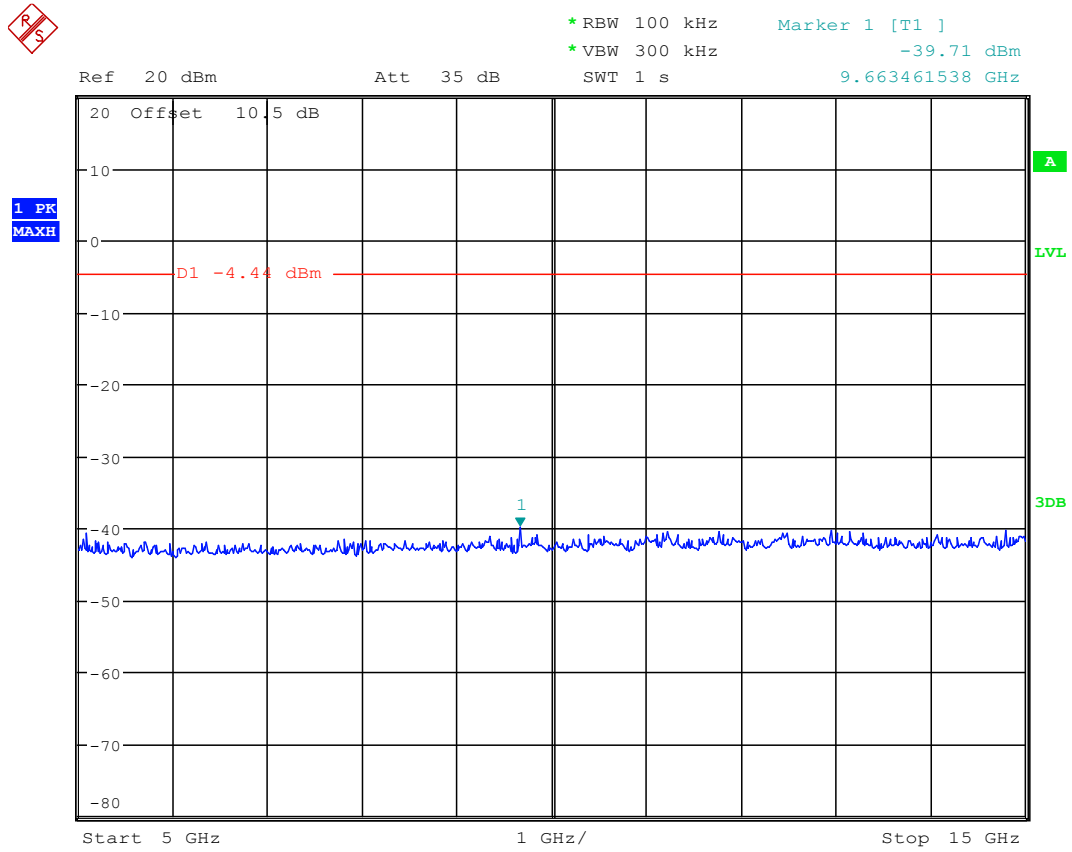
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 09:35:11

Figure 59. Conducted Spurious Emissions 1 000 – 5 000 MHz. 1 Mbps Channel LOW.

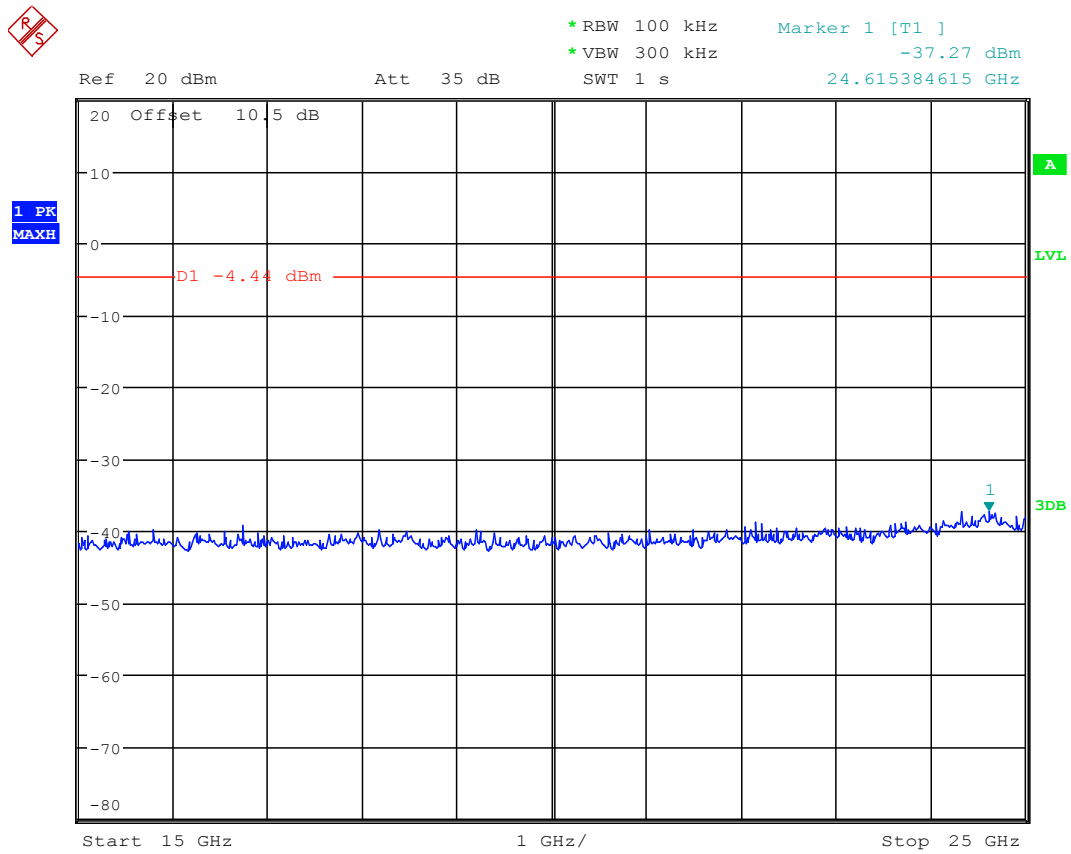
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 09:36:17

Figure 60. Conducted Spurious Emissions 5 000 – 15 000 MHz. 1 Mbps Channel LOW.

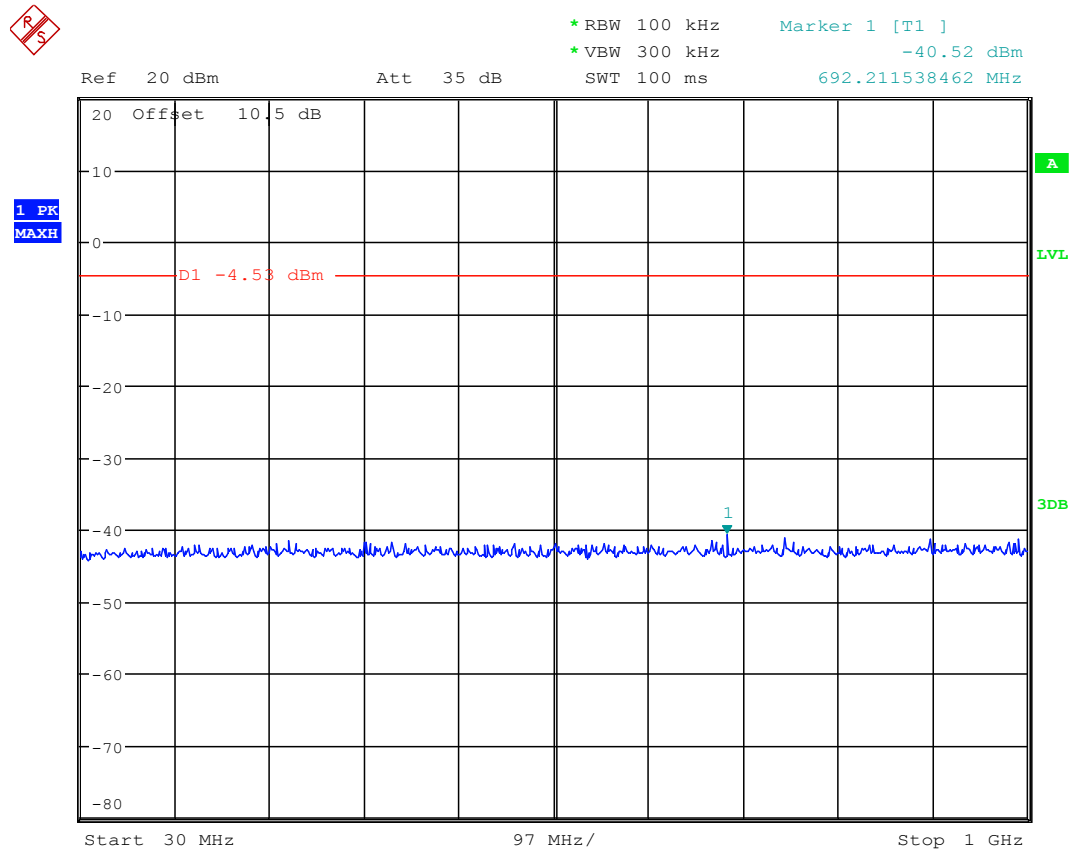
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 09:37:16

Figure 61. Conducted Spurious Emissions 15 000 – 25 000 MHz. 1 Mbps Channel LOW.

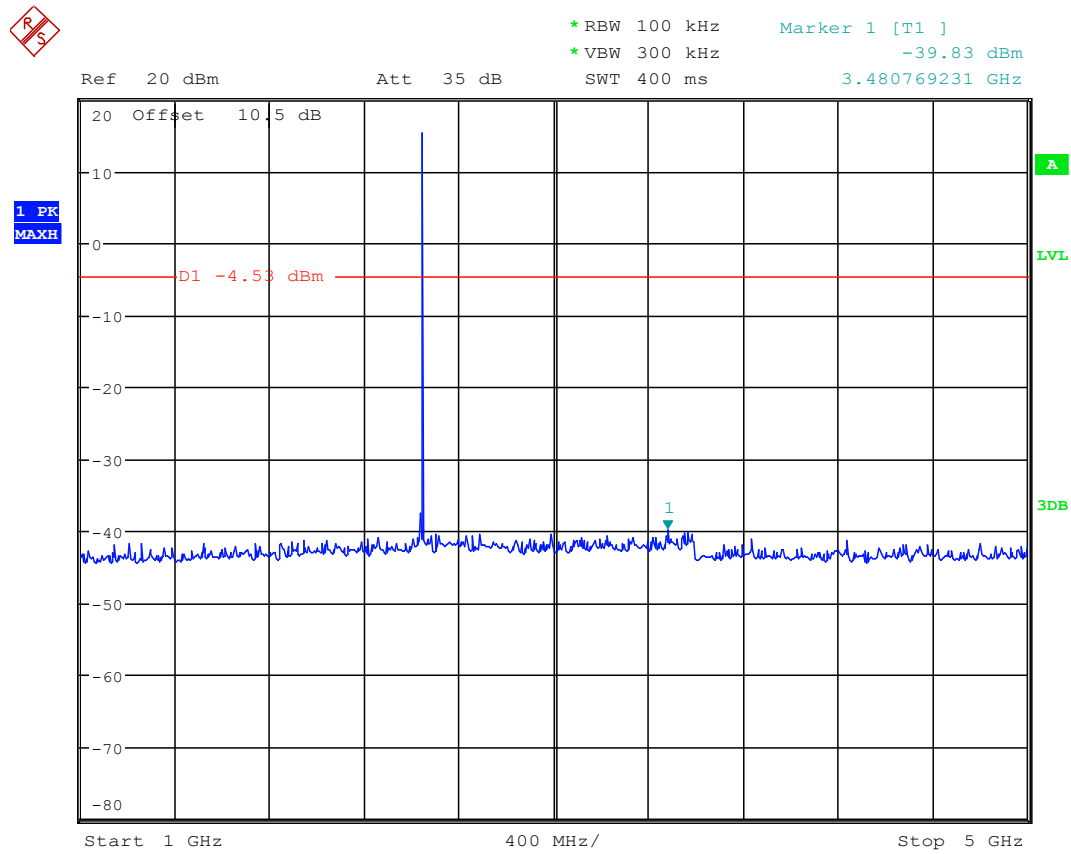
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 09:41:36

Figure 62. Conducted Spurious Emissions 30 – 1 000 MHz. 1 Mbps Channel MID.

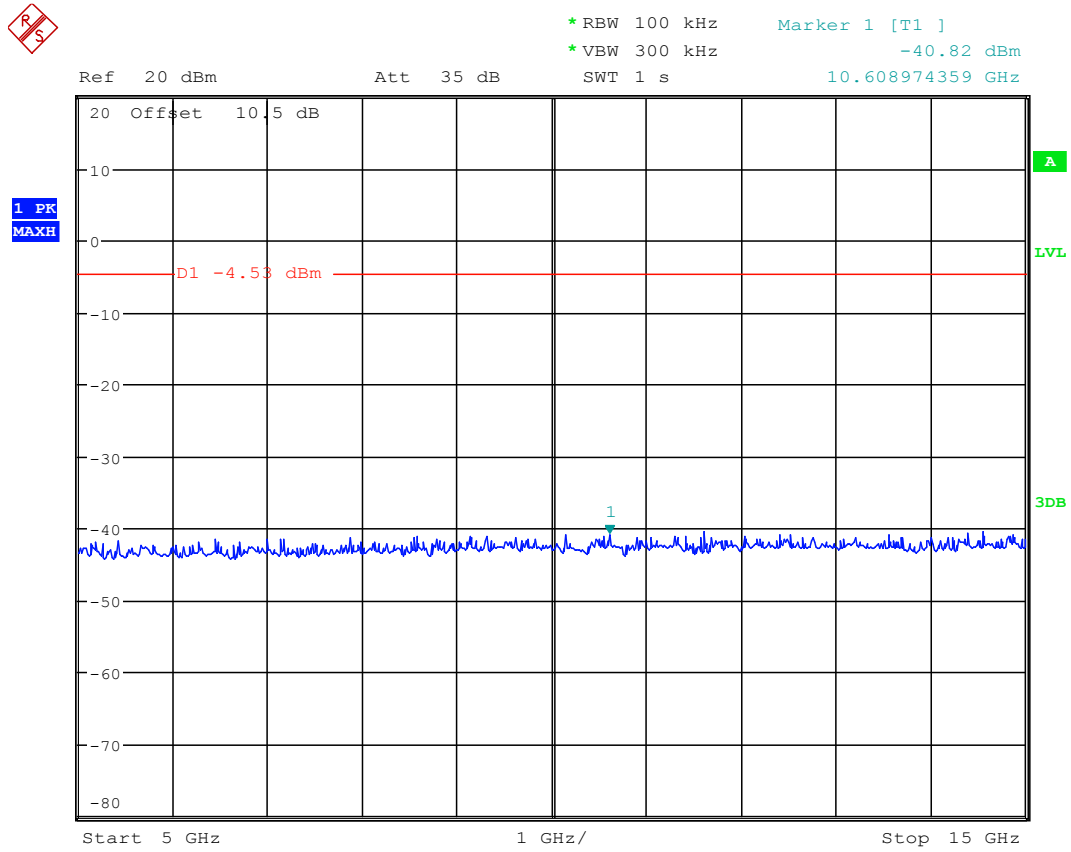
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 09:42:22

Figure 63. Conducted Spurious Emissions 1 000 – 5 000 MHz. 1Mbps Channel MID.

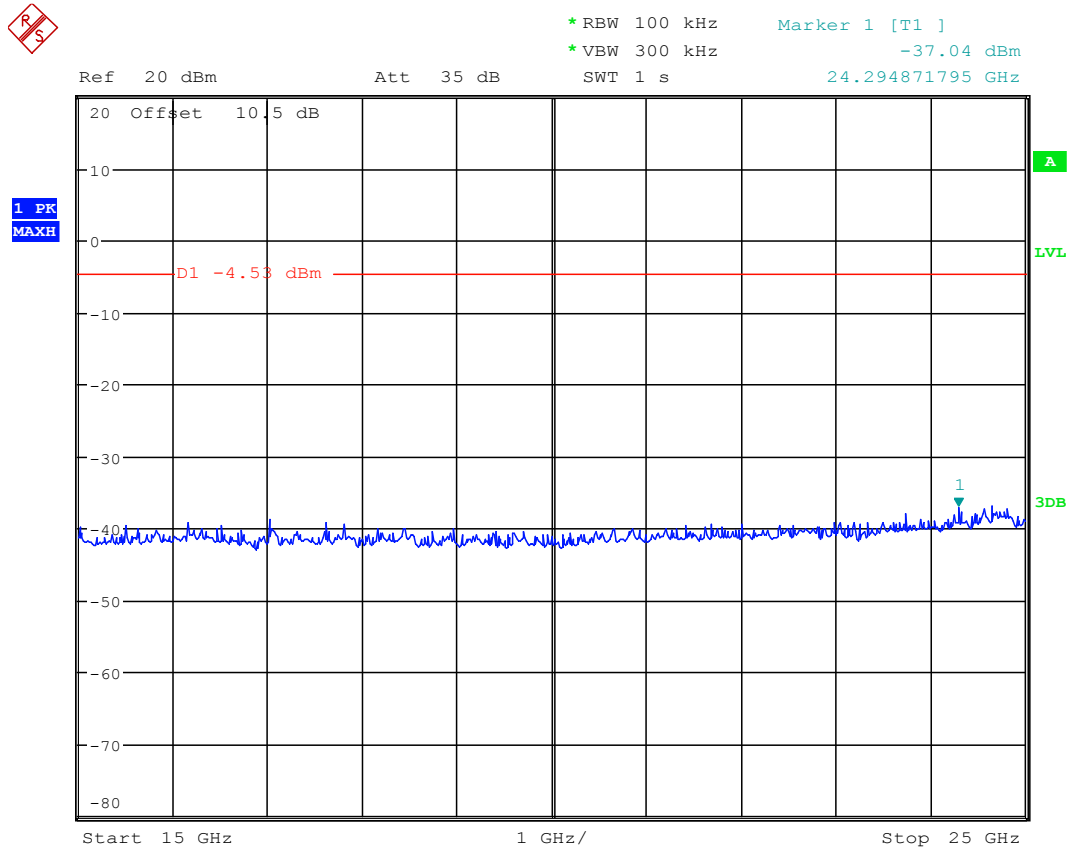
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 09:43:00

Figure 64. Conducted Spurious Emissions 5 000 – 15 000 MHz. 1Mbps Channel MID.

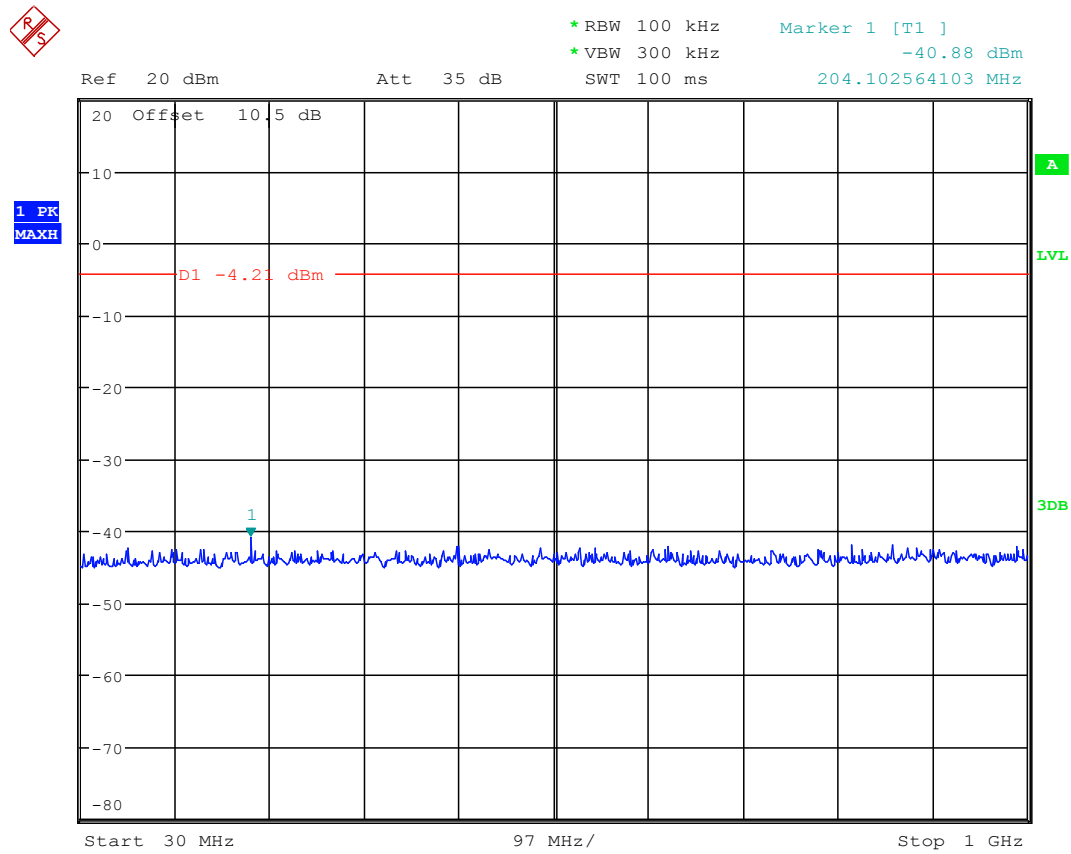
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 09:43:28

Figure 65. Conducted Spurious Emissions 15 000 – 25 000 MHz. 1 Mbps Channel MID.

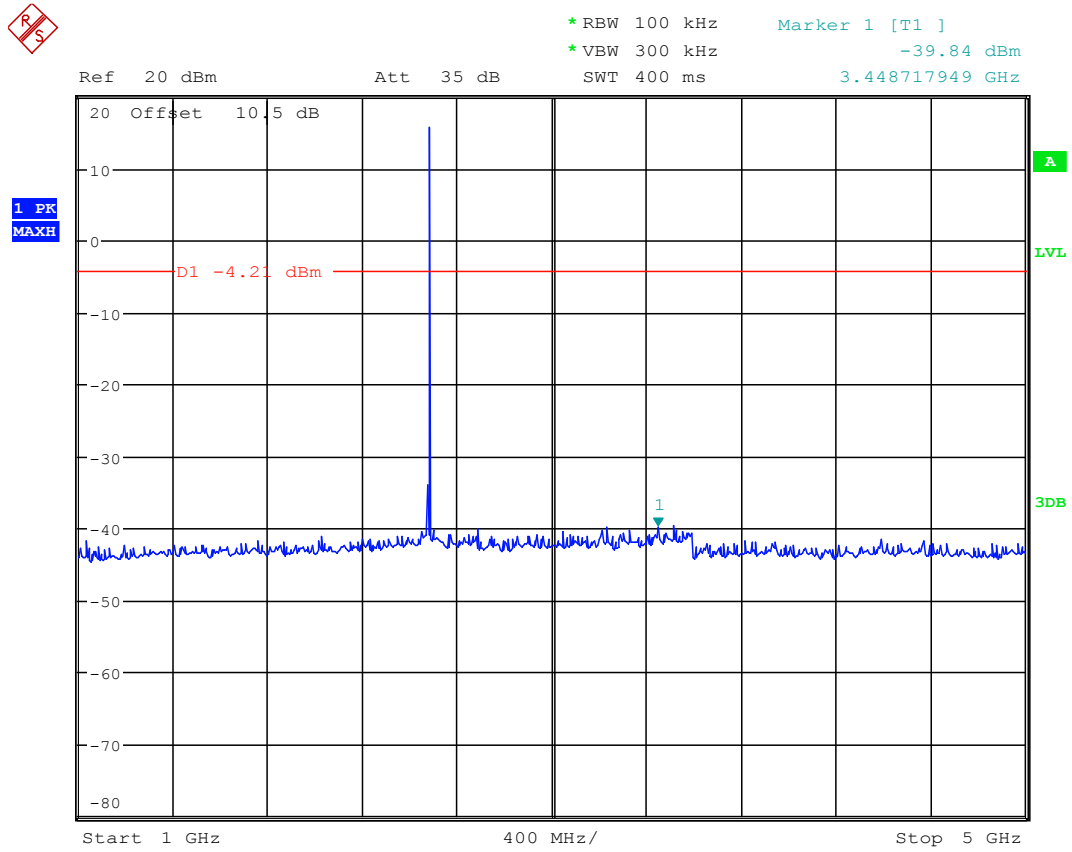
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 09:45:42

Figure 66. Conducted Spurious Emissions 30 – 1 000 MHz. 1 Mbps Channel HIGH.

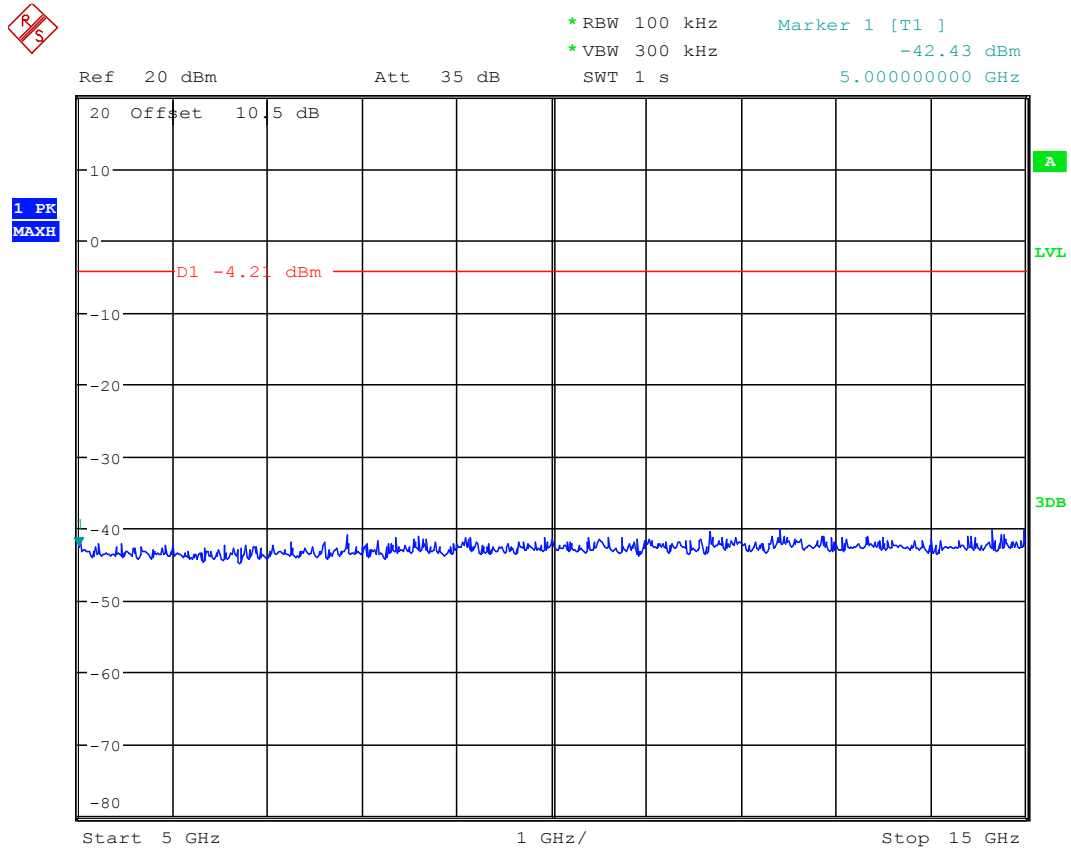
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 09:46:18

Figure 67. Conducted Spurious Emissions 1 000 – 5 000 MHz. 1 Mbps Channel HIGH.

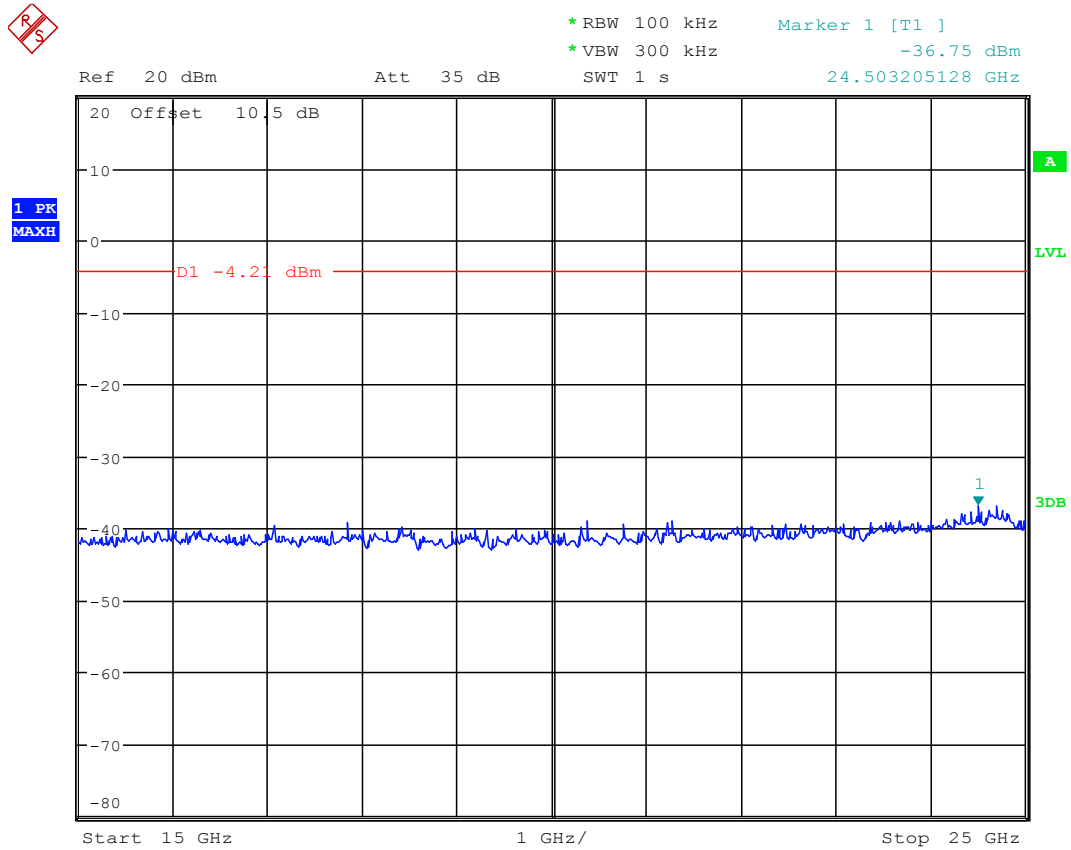
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 09:46:44

Figure 68. Conducted Spurious Emissions 5 000 – 15 000 MHz. 1Mbps Channel HIGH.

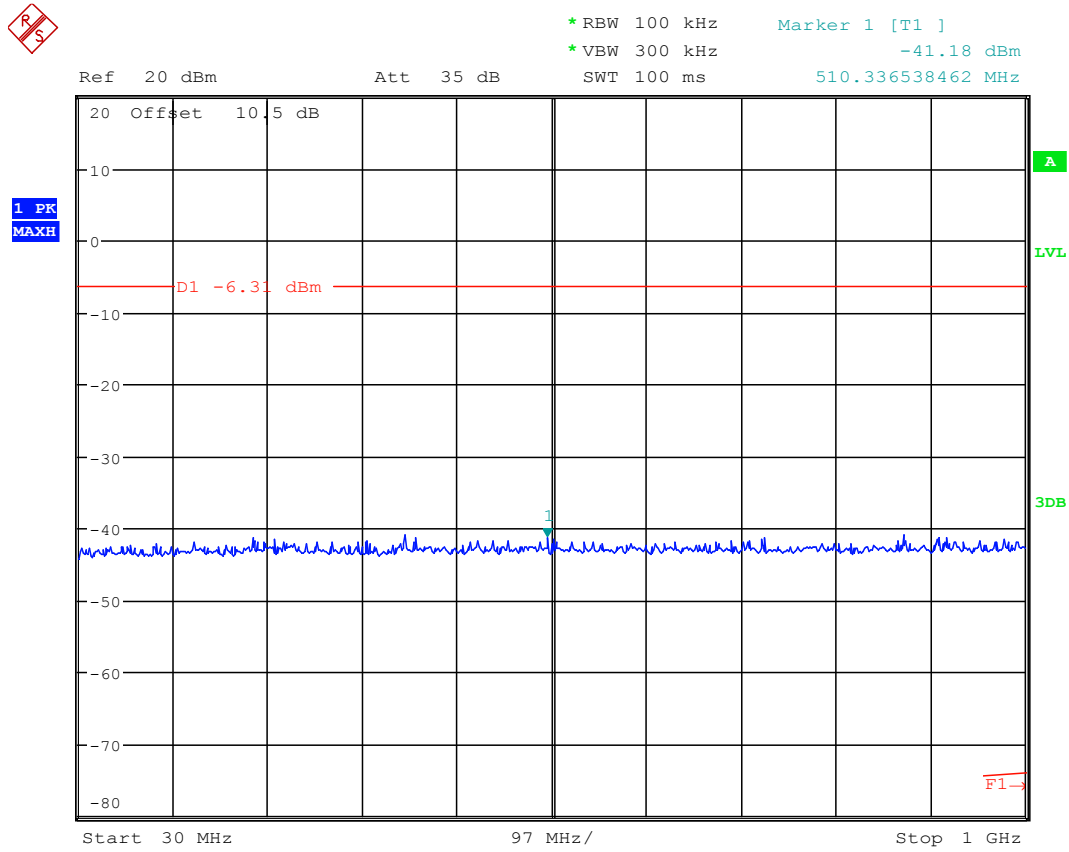
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 09:47:14

Figure 69. Conducted Spurious Emissions 15 000 – 25 000 MHz. 1 Mbps Channel HIGH.

Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 10:49:13

Figure 70. Conducted Spurious Emissions 30 – 1 000 MHz. 2 Mbps Channel LOW.

Transmitter Band Edge Measurement and Conducted Spurious Emissions

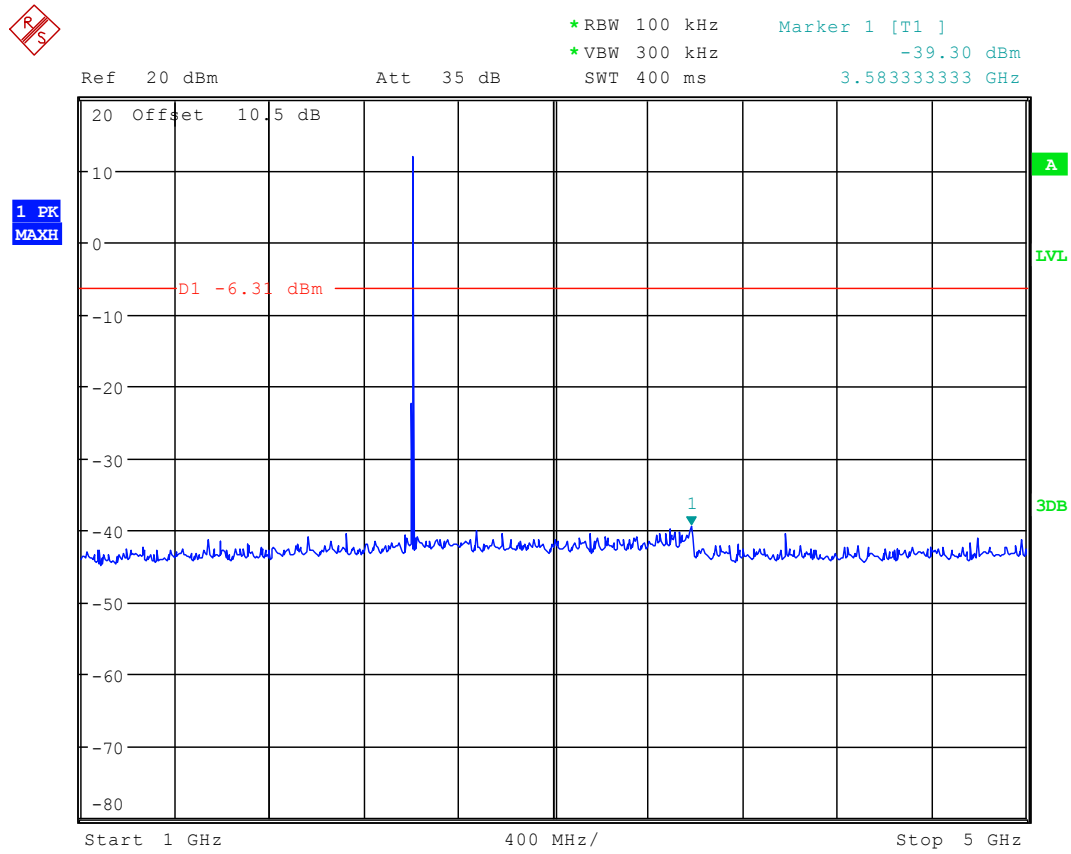
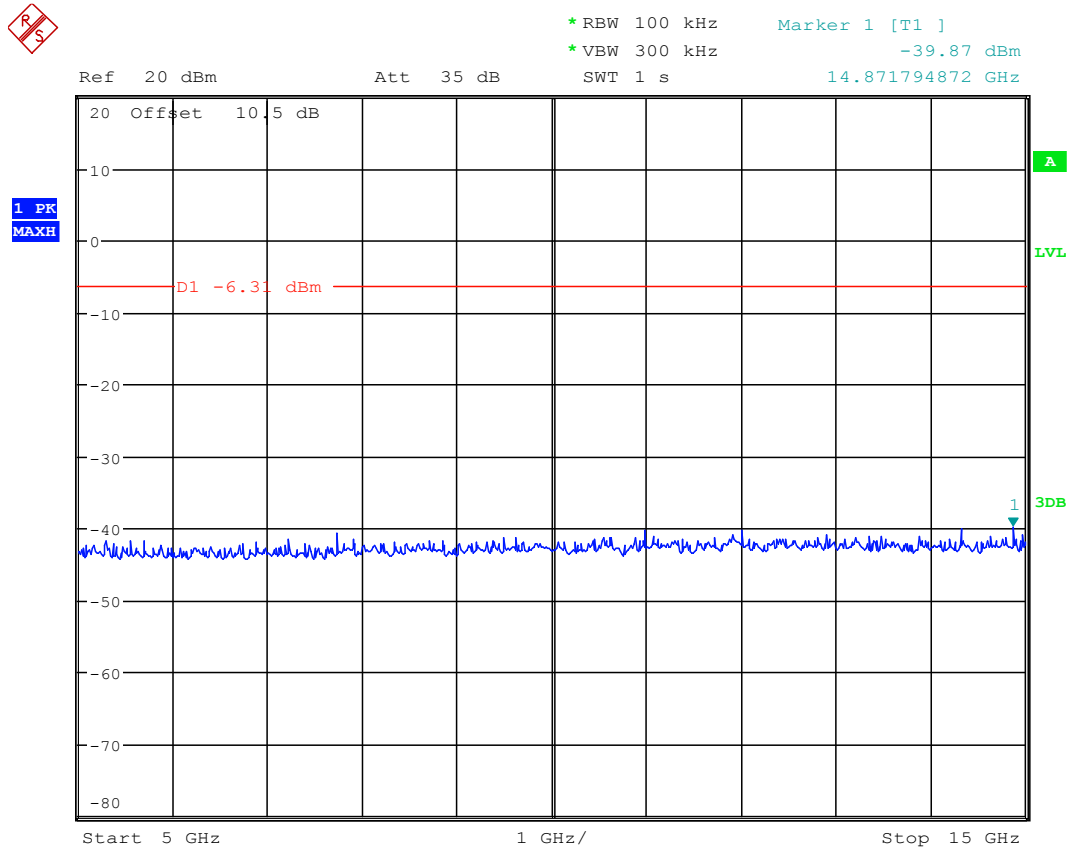


Figure 71. Conducted Spurious Emissions 1 000 – 5 000 MHz. 2 Mbps Channel LOW.

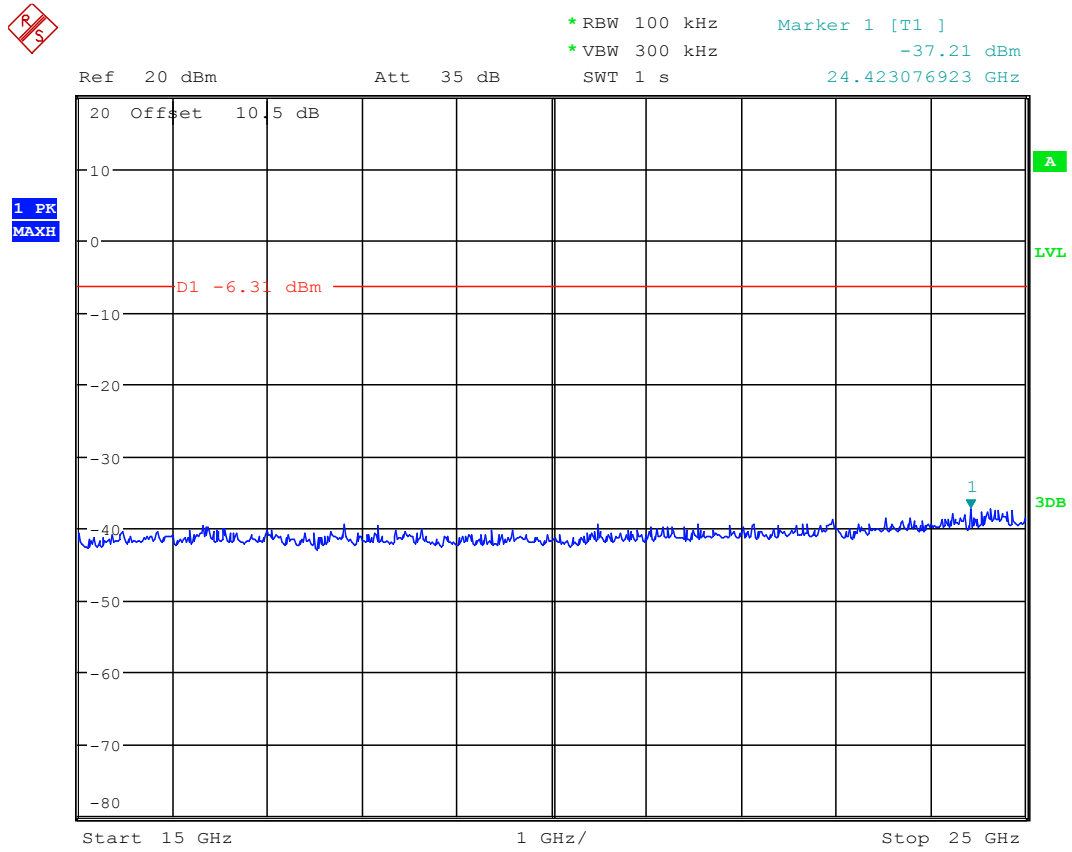
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 10:50:25

Figure 72. Conducted Spurious Emissions 5 000 – 15 000 MHz. 2Mbps Channel LOW.

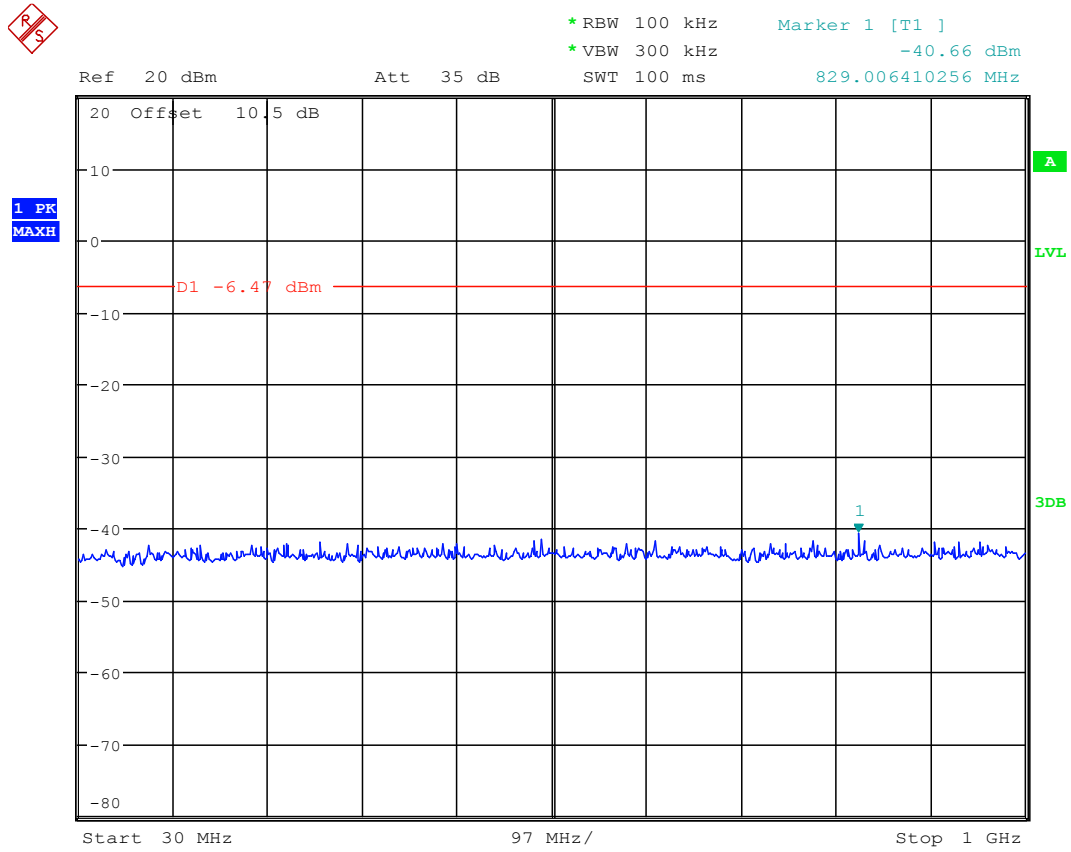
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 10:50:52

Figure 73. Conducted Spurious Emissions 15 000 – 25 000 MHz. 2 Mbps Channel LOW.

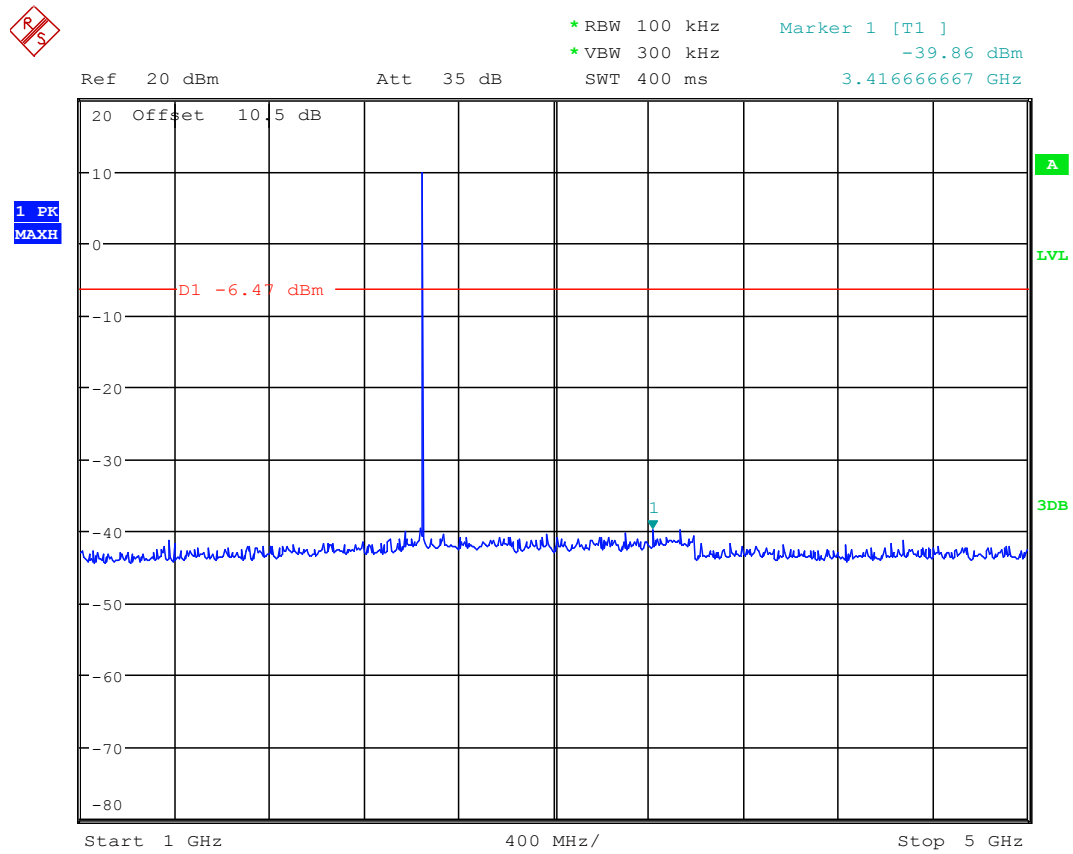
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 10:53:03

Figure 74. Conducted Spurious Emissions 30 – 1 000 MHz. 2 Mbps Channel MID.

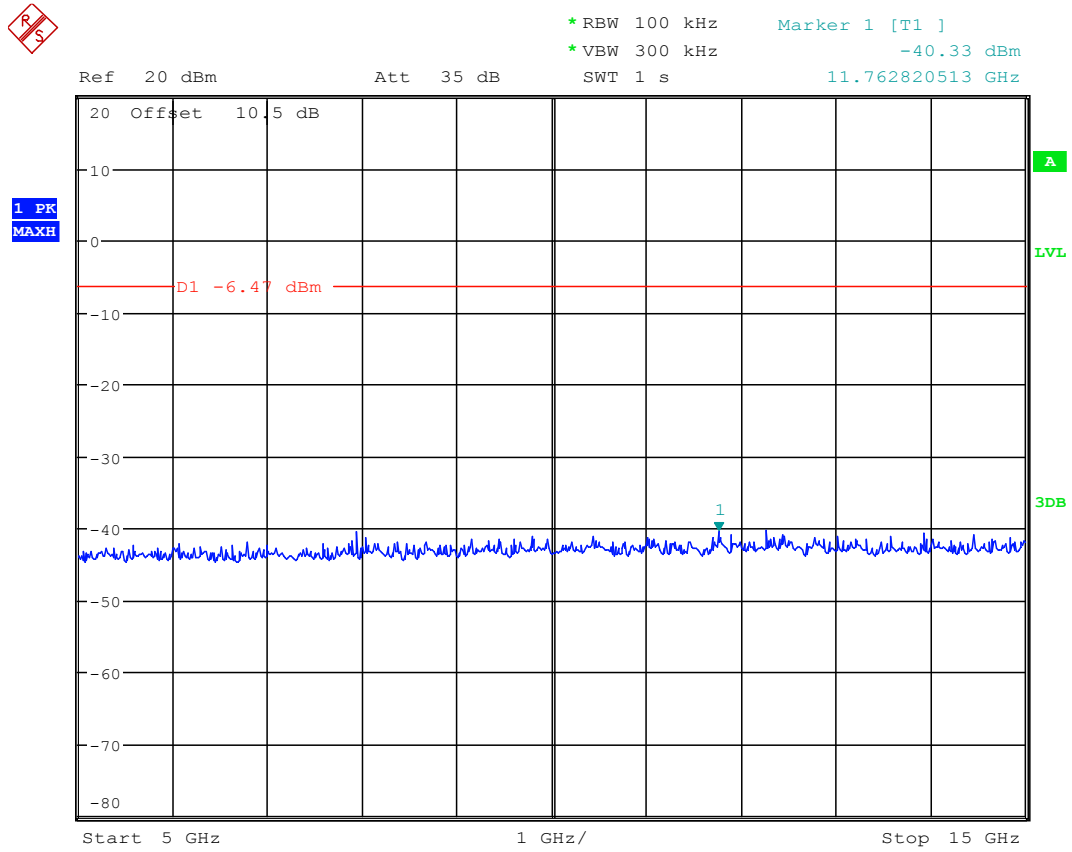
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 10:53:45

Figure 75. Conducted Spurious Emissions 1 000 – 5 000 MHz. 2Mbps Channel MID.

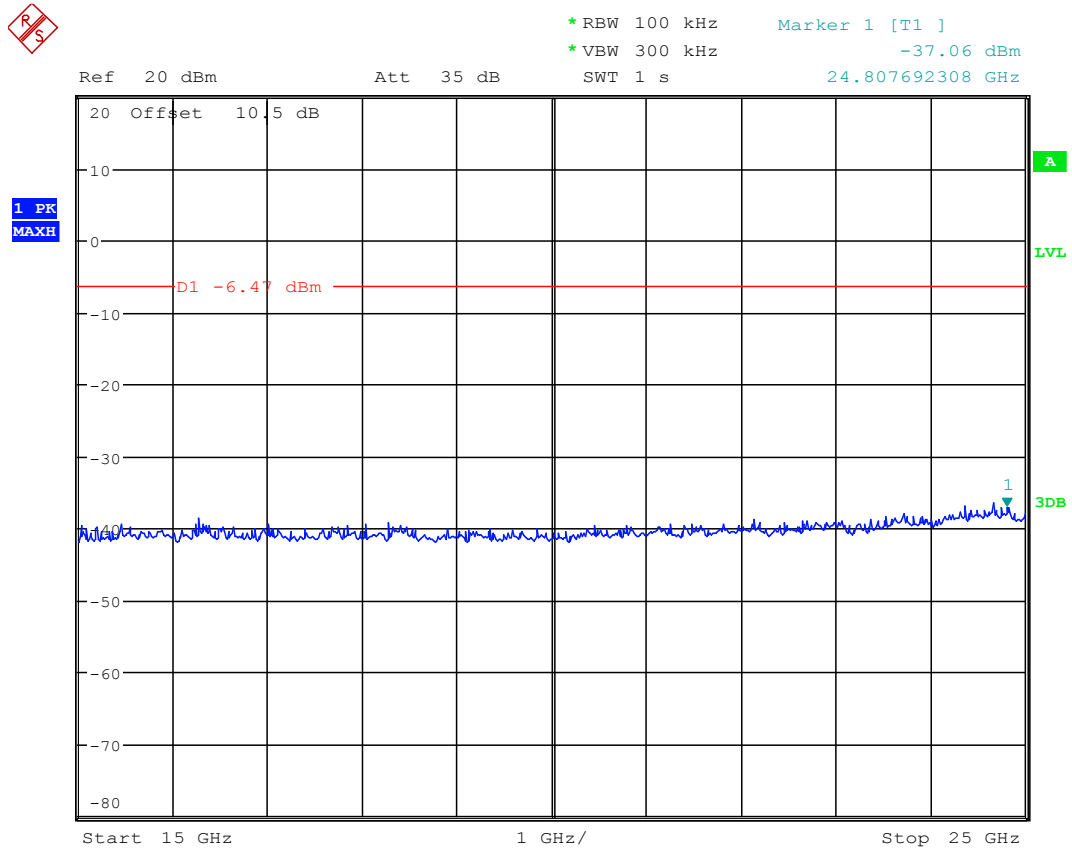
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 10:54:11

Figure 76. Conducted Spurious Emissions 5 000 – 15 000 MHz. 2Mbps Channel MID.

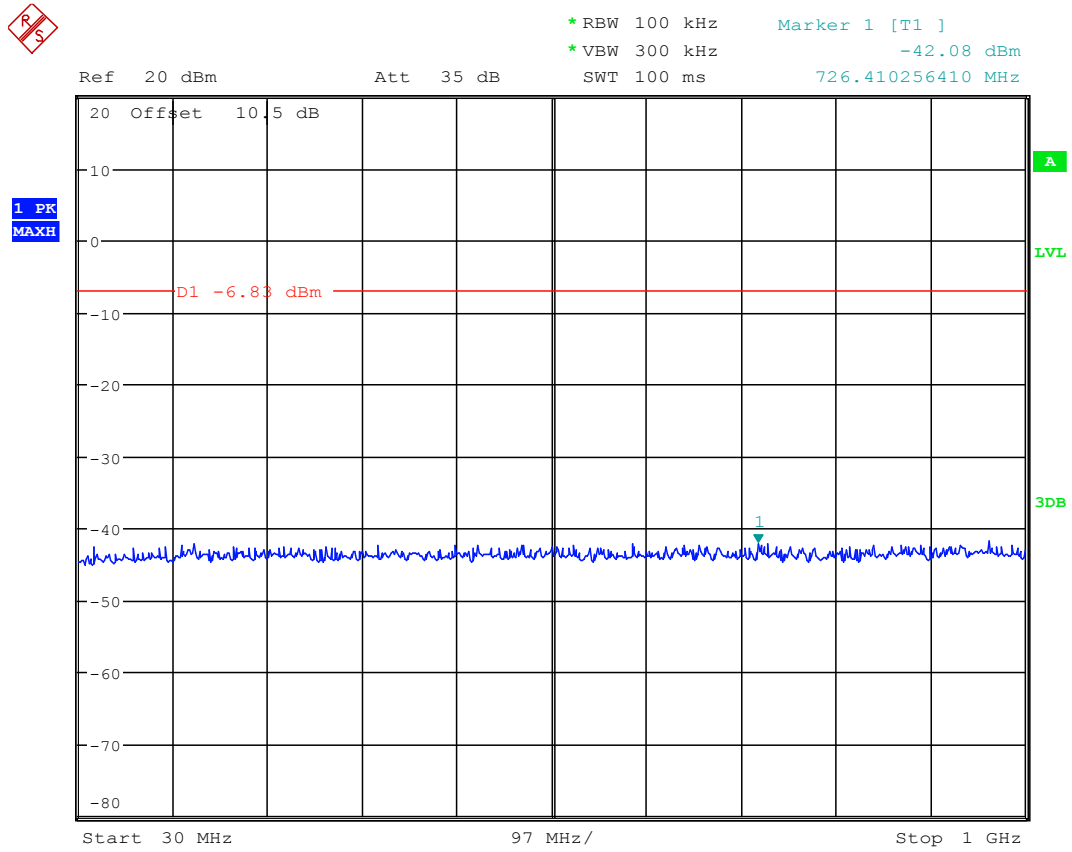
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 10:55:34

Figure 77. Conducted Spurious Emissions 15 000 – 25 000 MHz. 2 Mbps Channel MID.

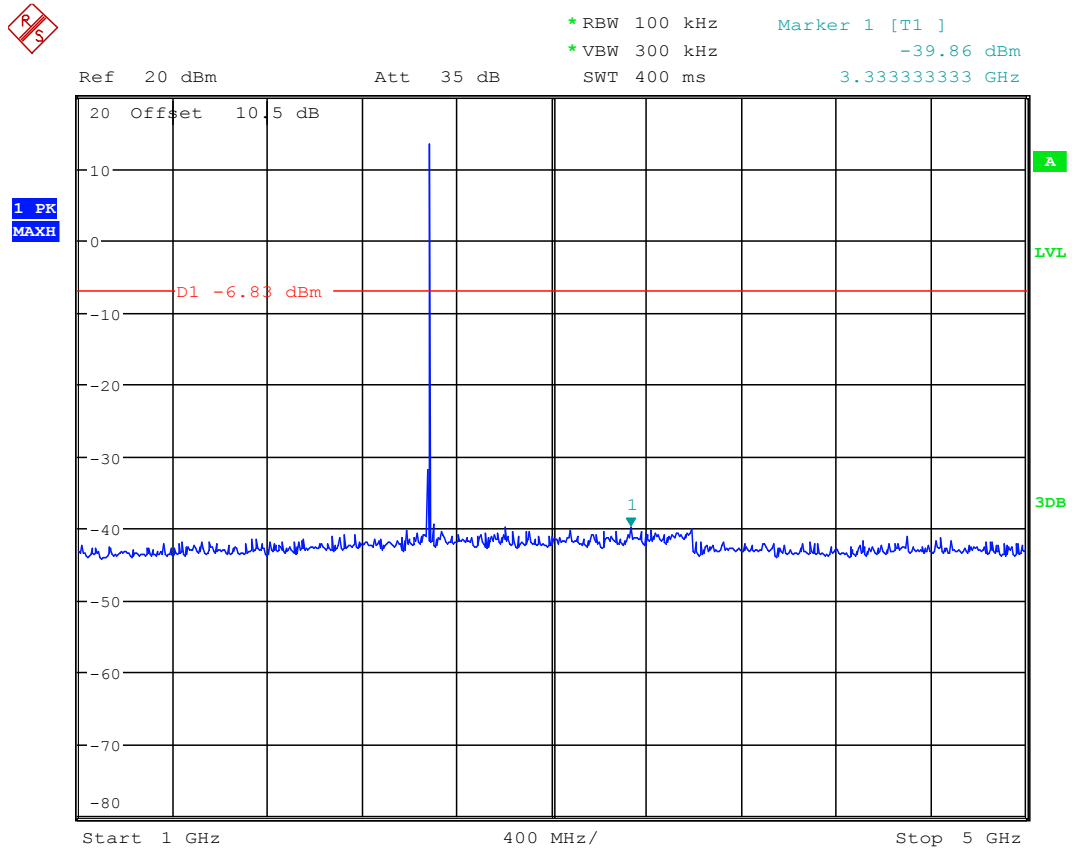
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 10:57:21

Figure 78. Conducted Spurious Emissions 30 – 1 000 MHz. 2 Mbps Channel HIGH.

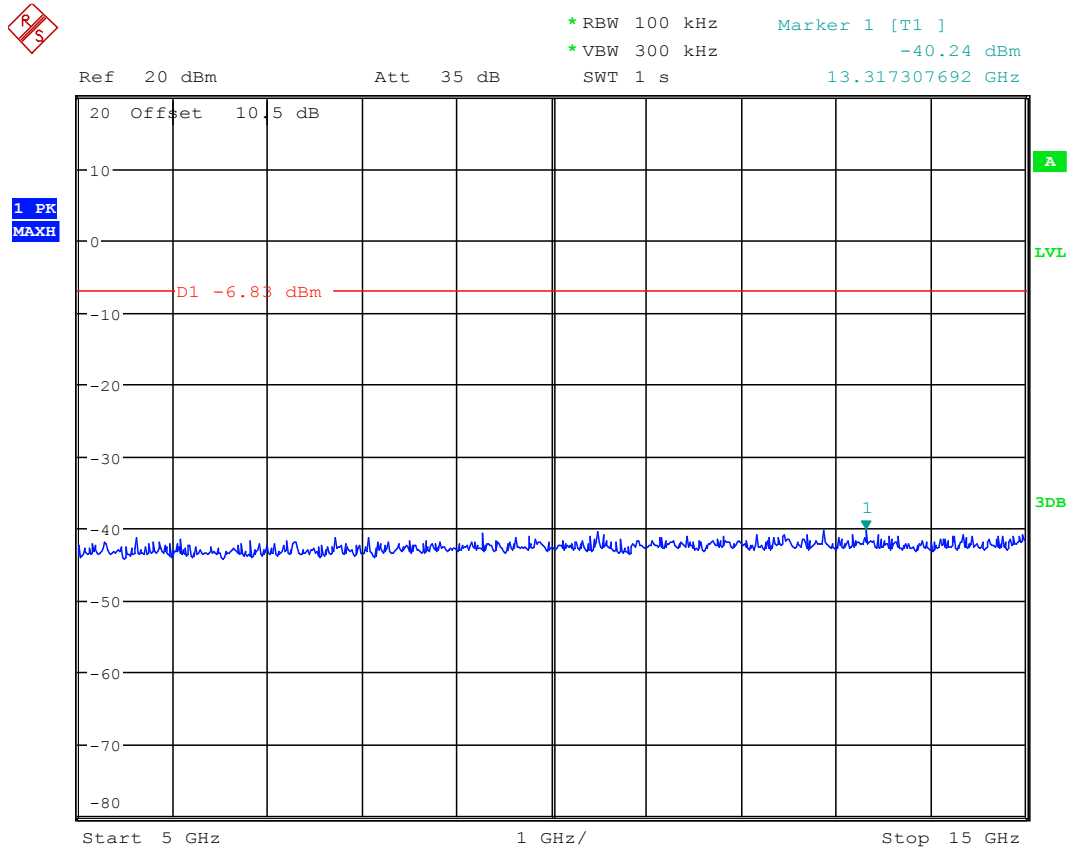
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 10:58:15

Figure 79. Conducted Spurious Emissions 1 000 – 5 000 MHz. 2 Mbps Channel HIGH.

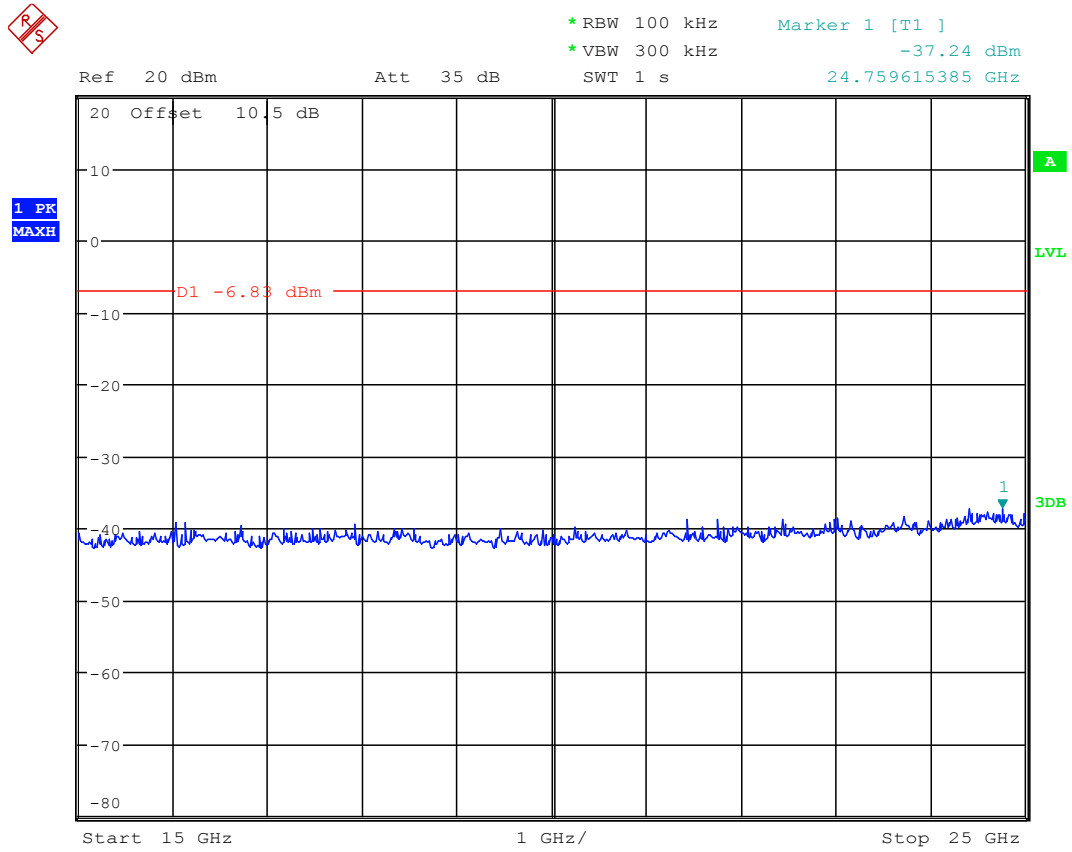
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 10:59:03

Figure 80. Conducted Spurious Emissions 5 000 – 15 000 MHz. 2 Mbps Channel HIGH.

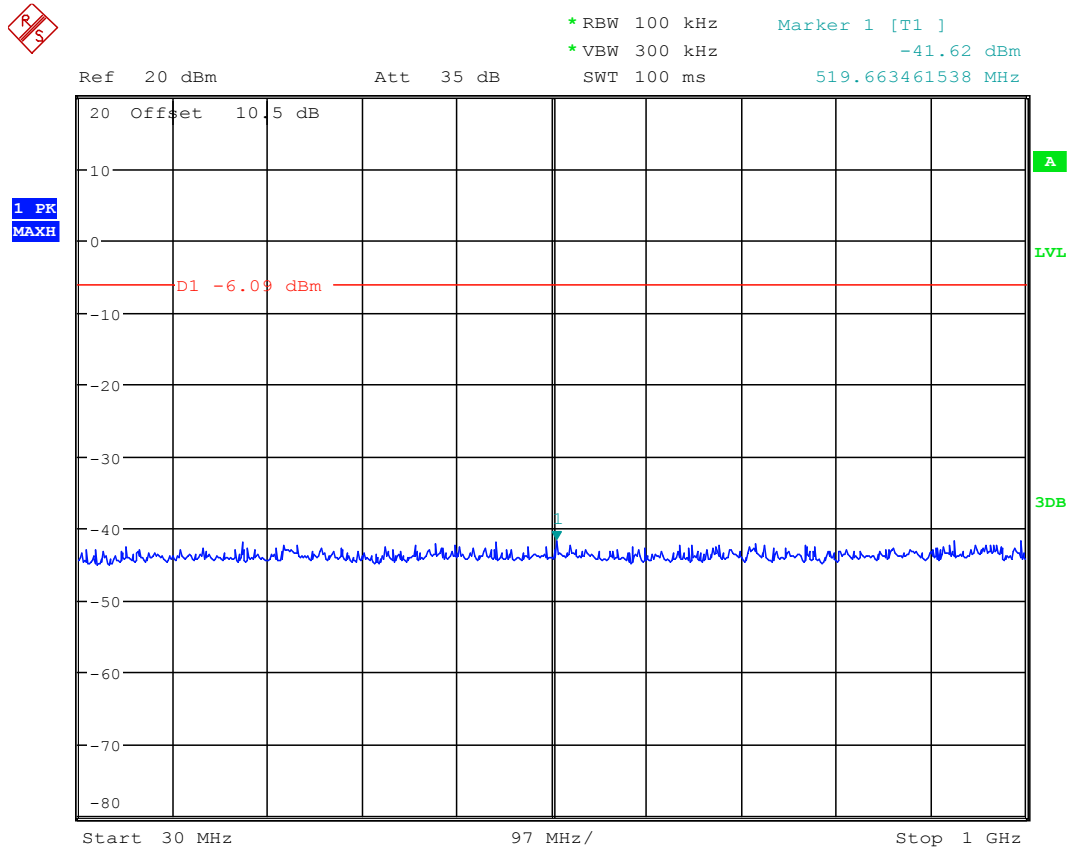
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 10:59:31

Figure 81. Conducted Spurious Emissions 15 000 – 25 000 MHz. 2 Mbps Channel HIGH.

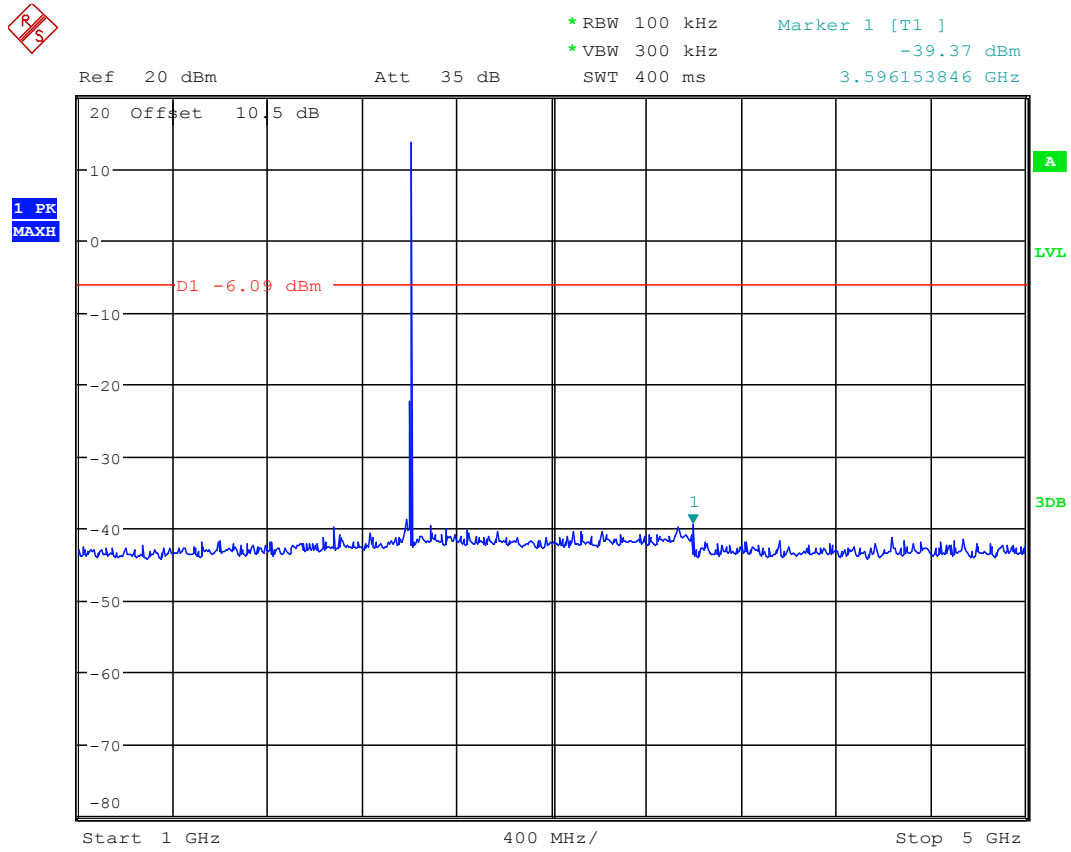
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 11:02:56

Figure 82. Conducted Spurious Emissions 30 – 1 000 MHz. 3 Mbps Channel LOW.

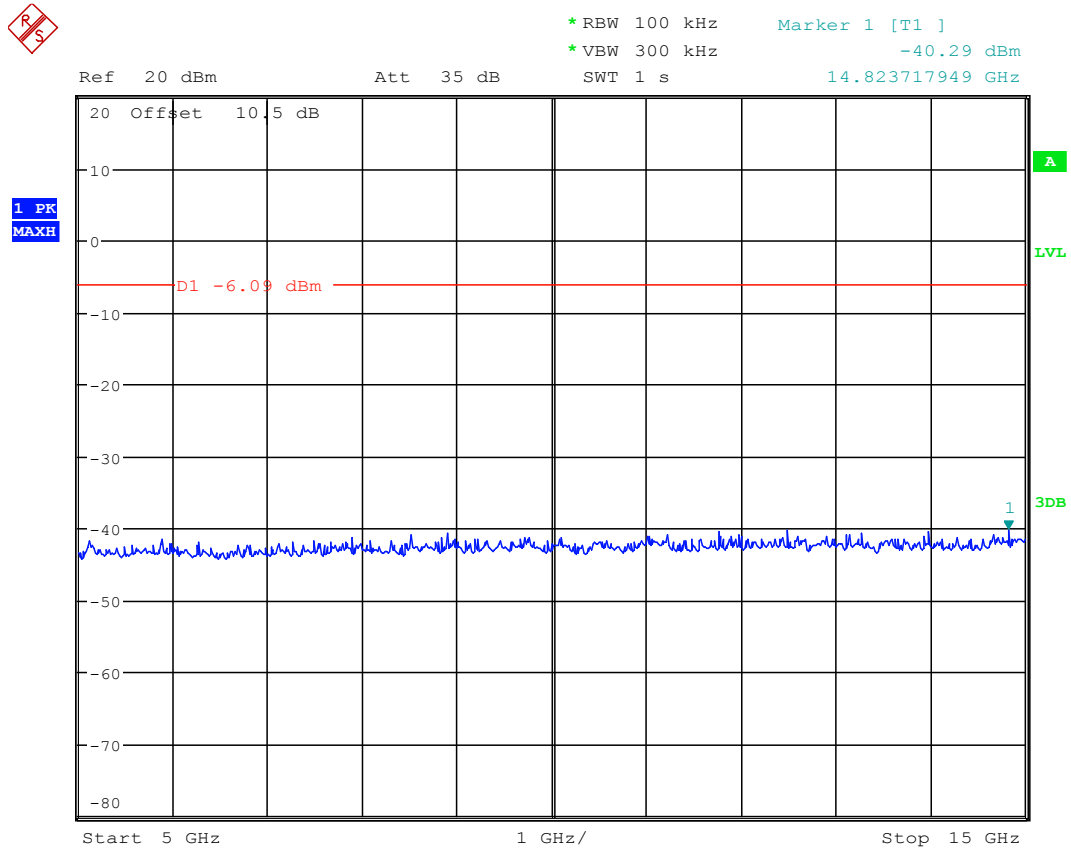
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 11:03:43

Figure 83. Conducted Spurious Emissions 1 000 – 5 000 MHz. 3 Mbps Channel LOW.

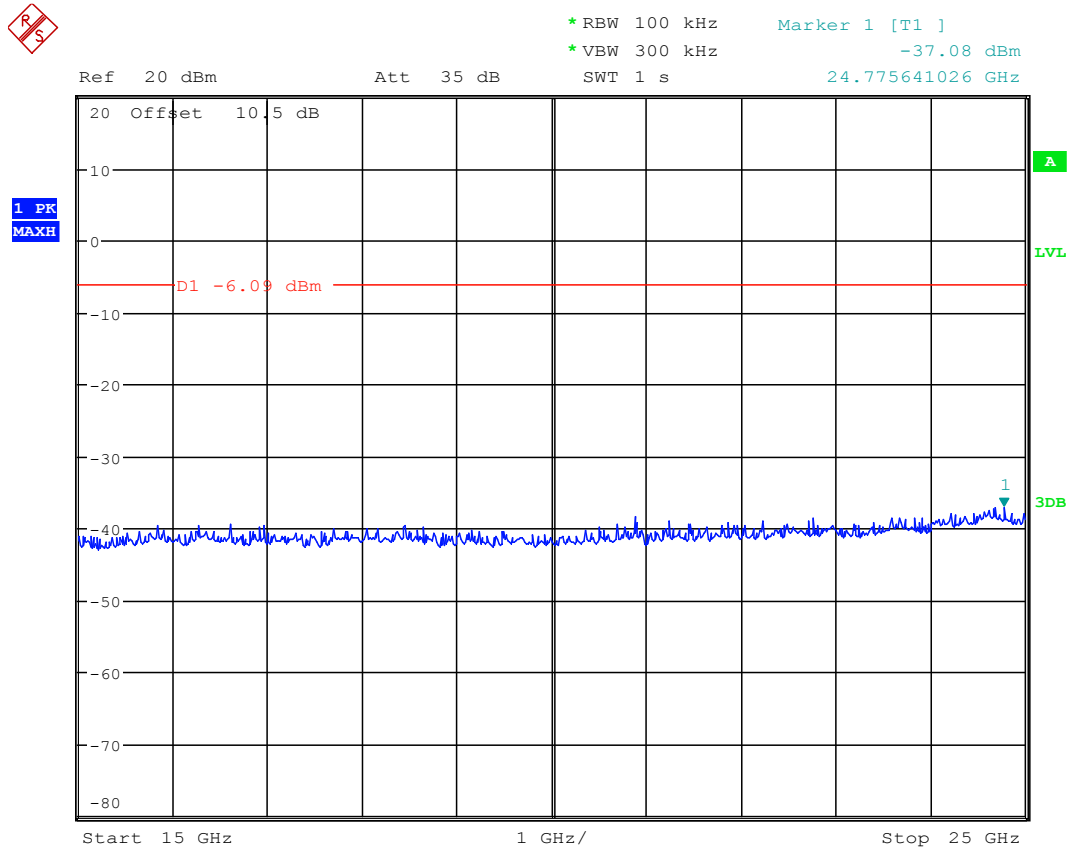
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 11:04:19

Figure 84. Conducted Spurious Emissions 5 000 – 15 000 MHz. 3 Mbps Channel LOW.

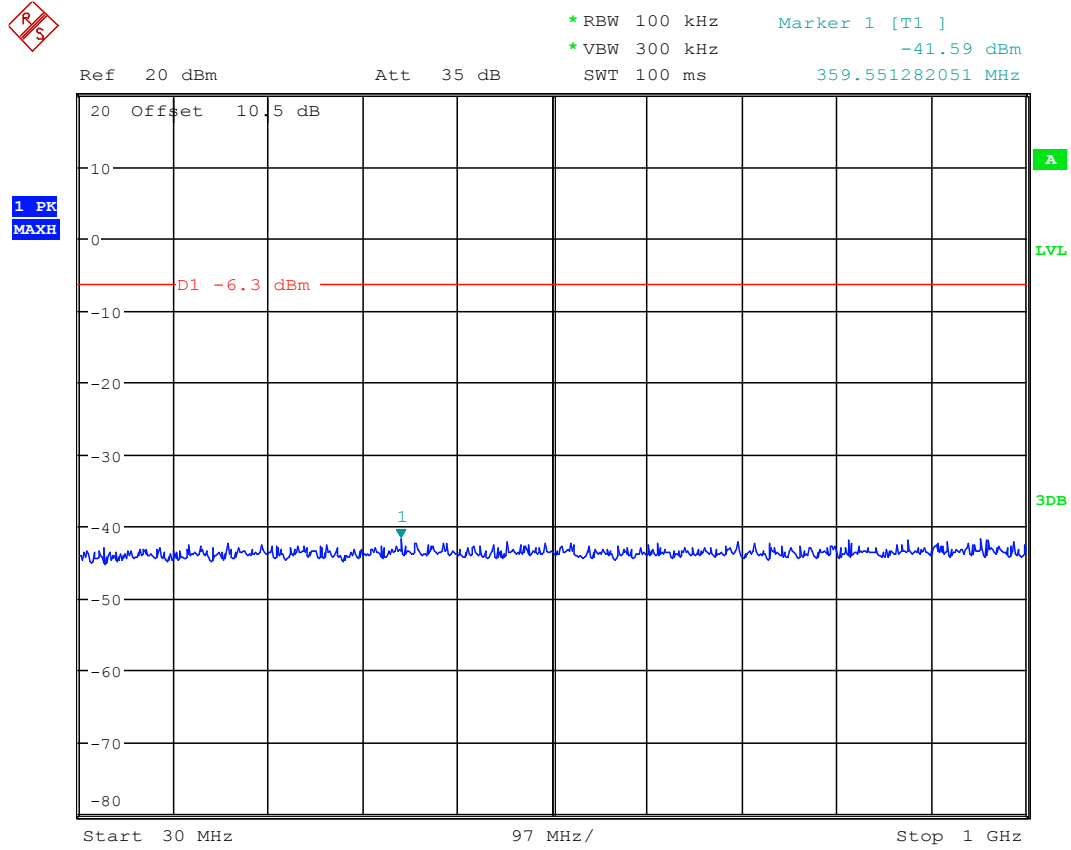
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 11:04:55

Figure 85. Conducted Spurious Emissions 15 000 – 25 000 MHz. 3 Mbps Channel LOW.

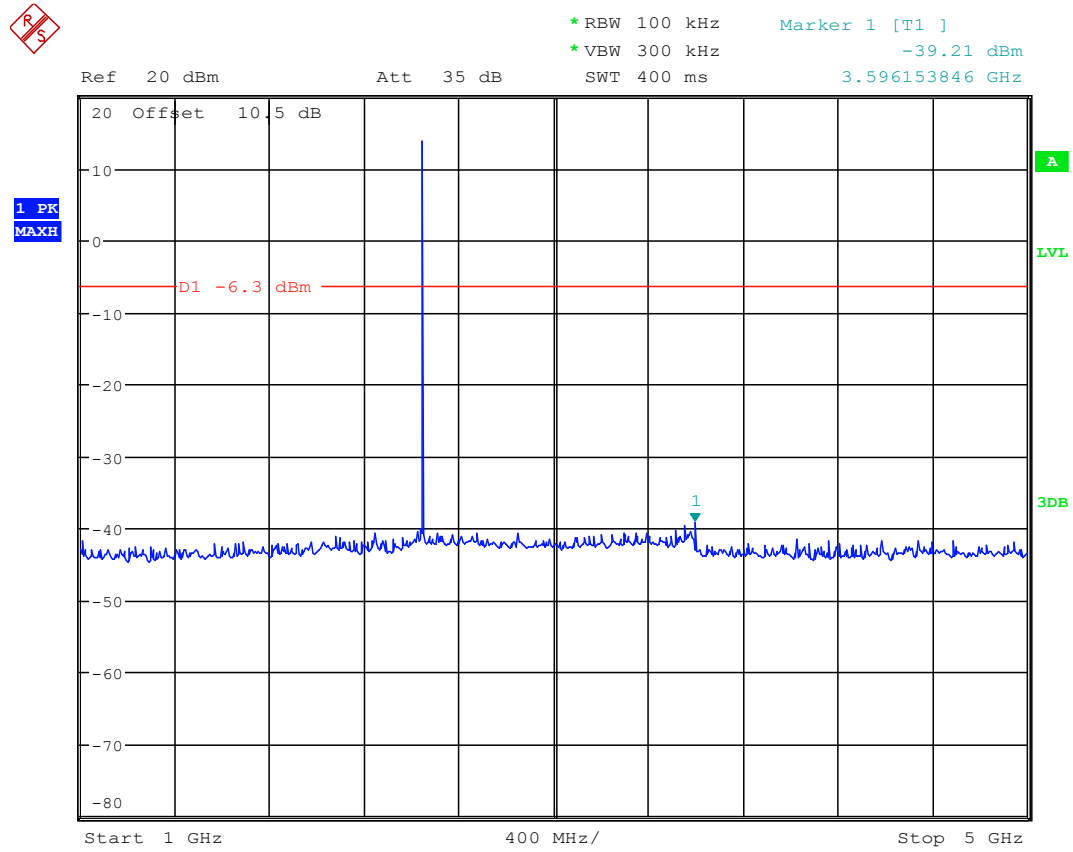
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 11:06:59

Figure 86. Conducted Spurious Emissions 30 – 1 000 MHz. 3 Mbps Channel MID.

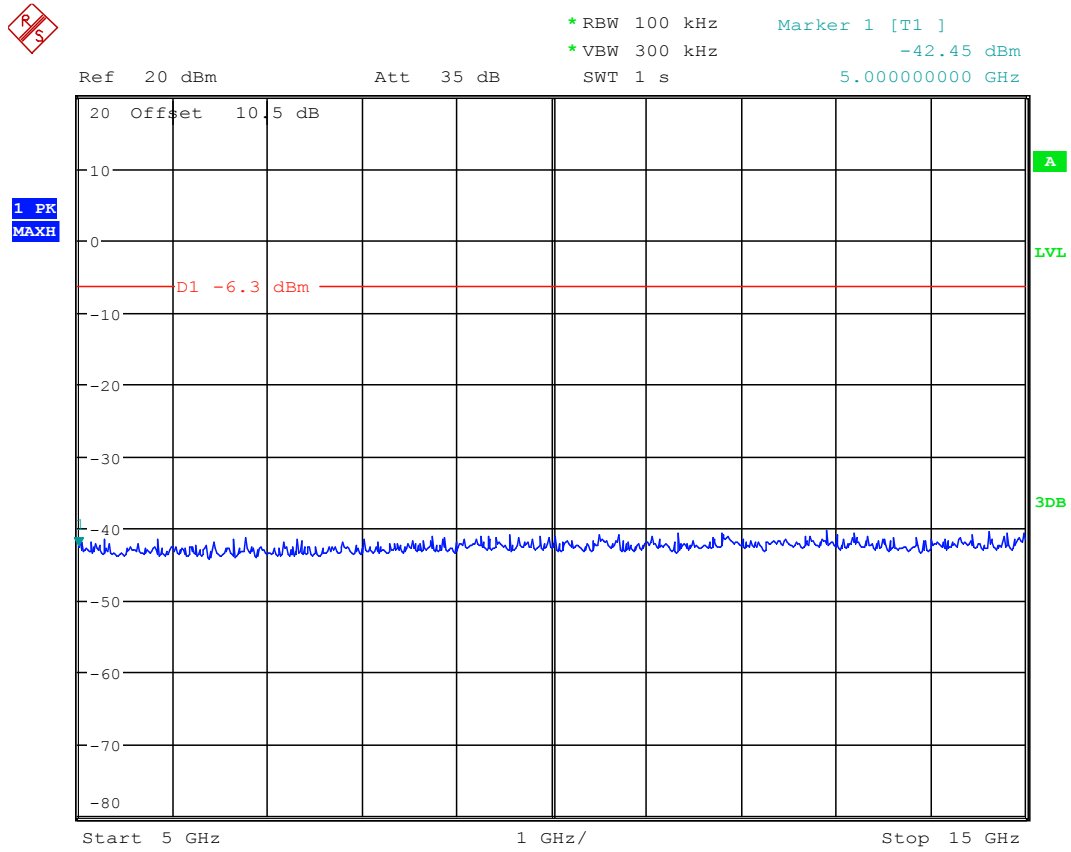
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 11:09:57

Figure 87. Conducted Spurious Emissions 1 000 – 5 000 MHz. 3 Mbps Channel MID.

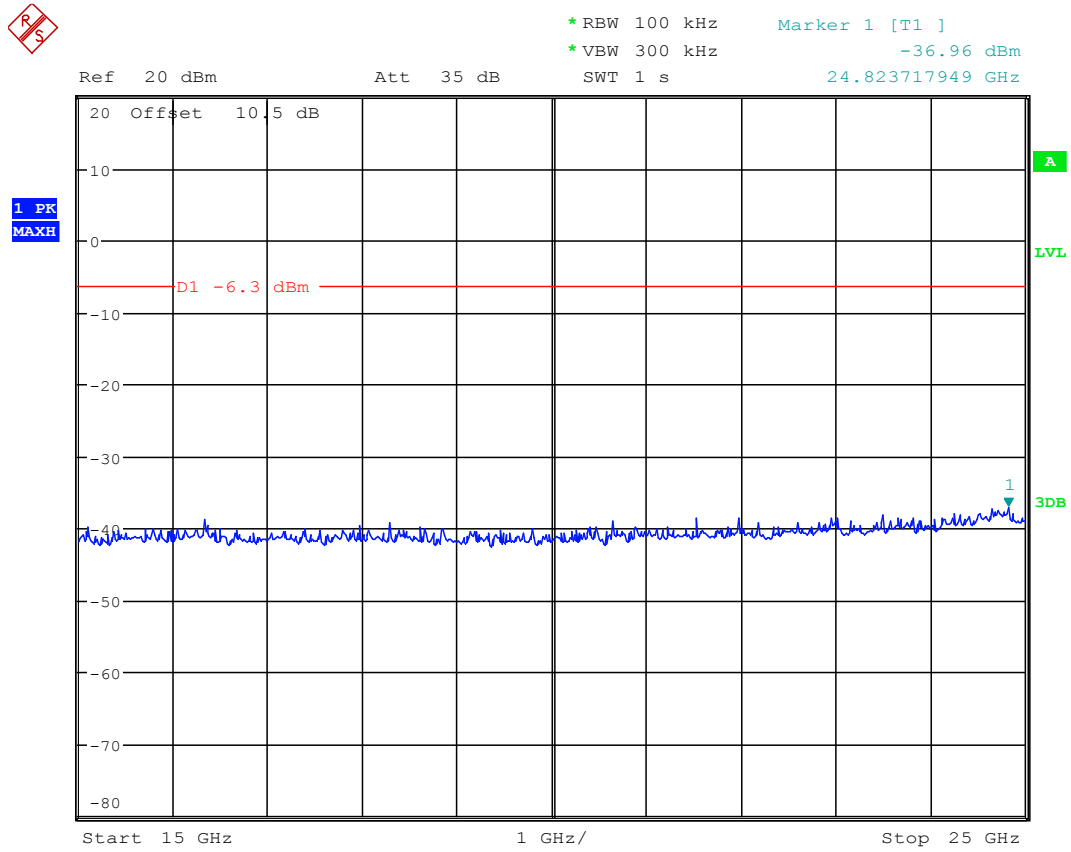
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 11:10:34

Figure 88. Conducted Spurious Emissions 5 000 – 15 000 MHz. 3 Mbps Channel MID.

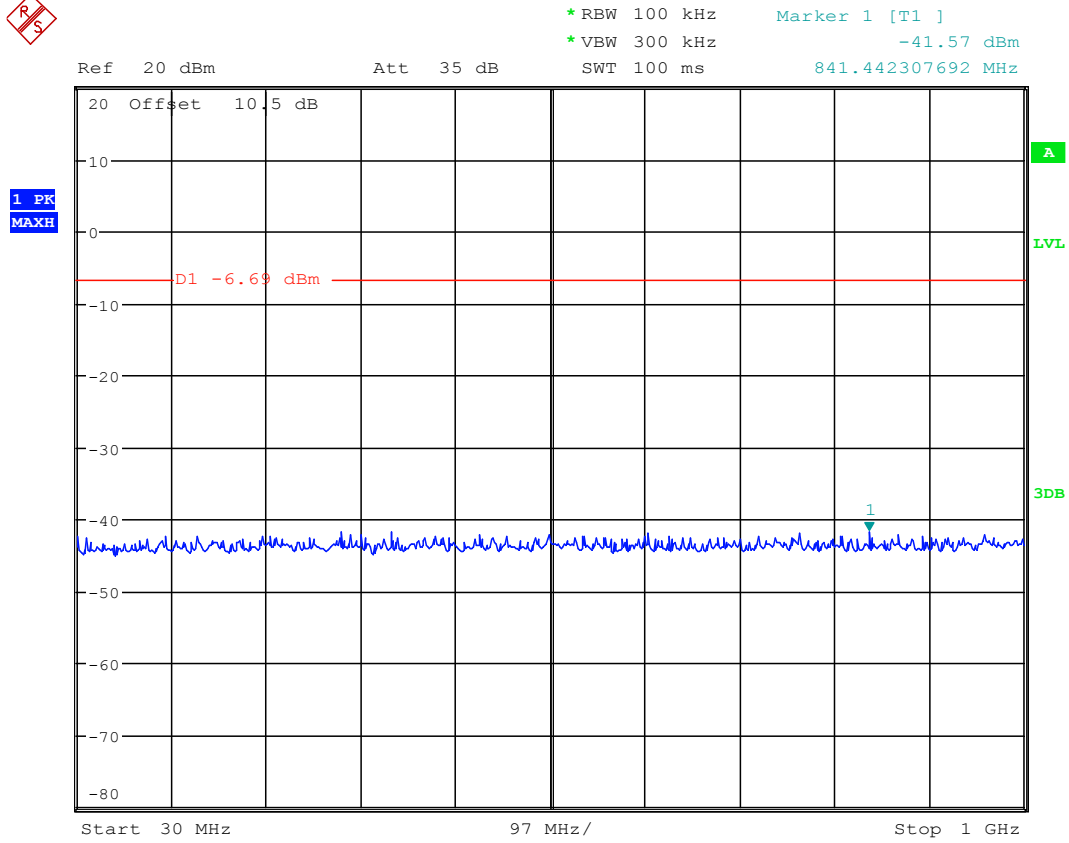
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 11:11:23

Figure 89. Conducted Spurious Emissions 15 000 – 25 000 MHz. 3 Mbps Channel MID.

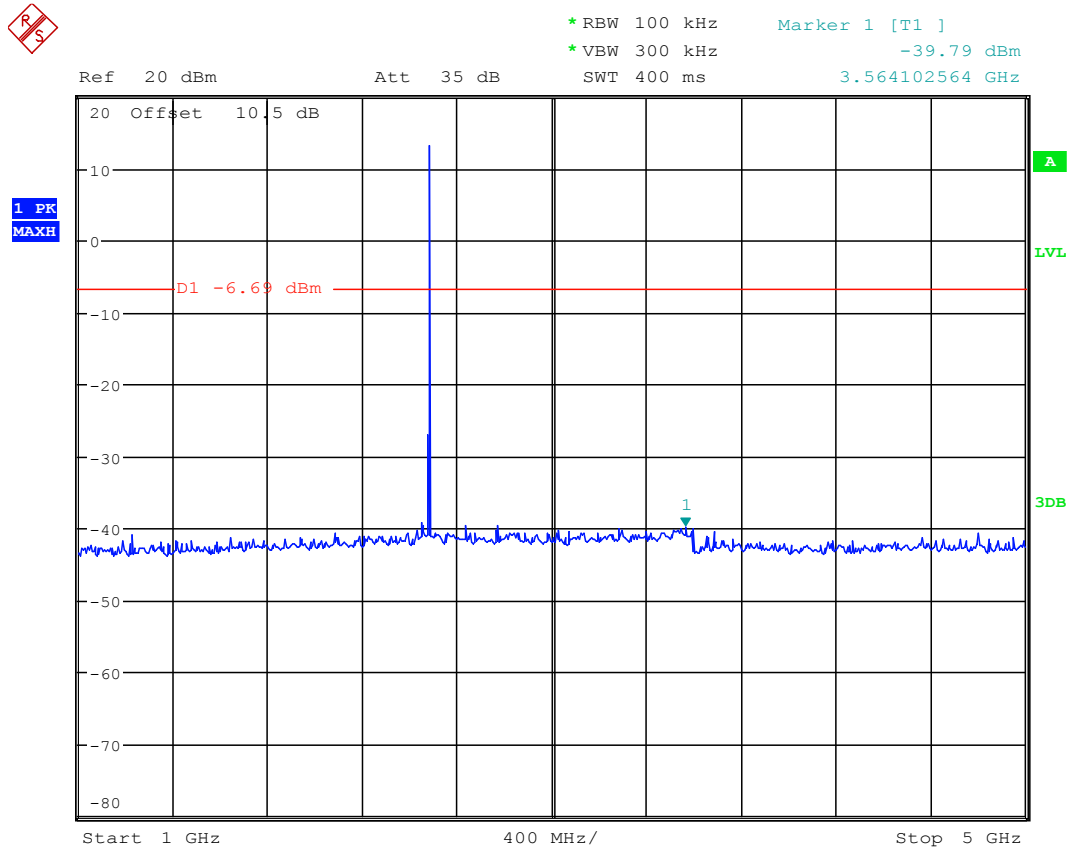
Transmitter Band Edge Measurement and Conducted Spurious Emissions



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Figure 90. Conducted Spurious Emissions 30 – 1 000 MHz. 3 Mbps Channel HIGH.

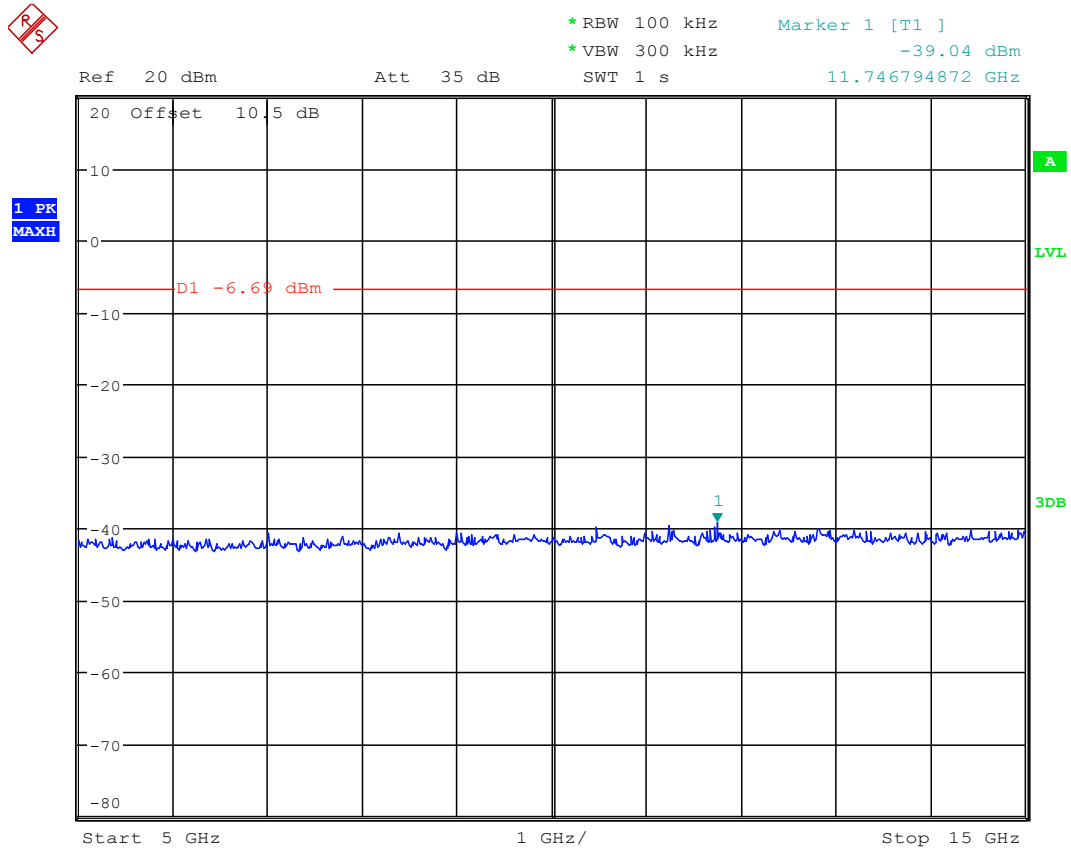
Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 11:42:31

Figure 91. Conducted Spurious Emissions 1 000 – 5 000 MHz. 3 Mbps Channel HIGH.

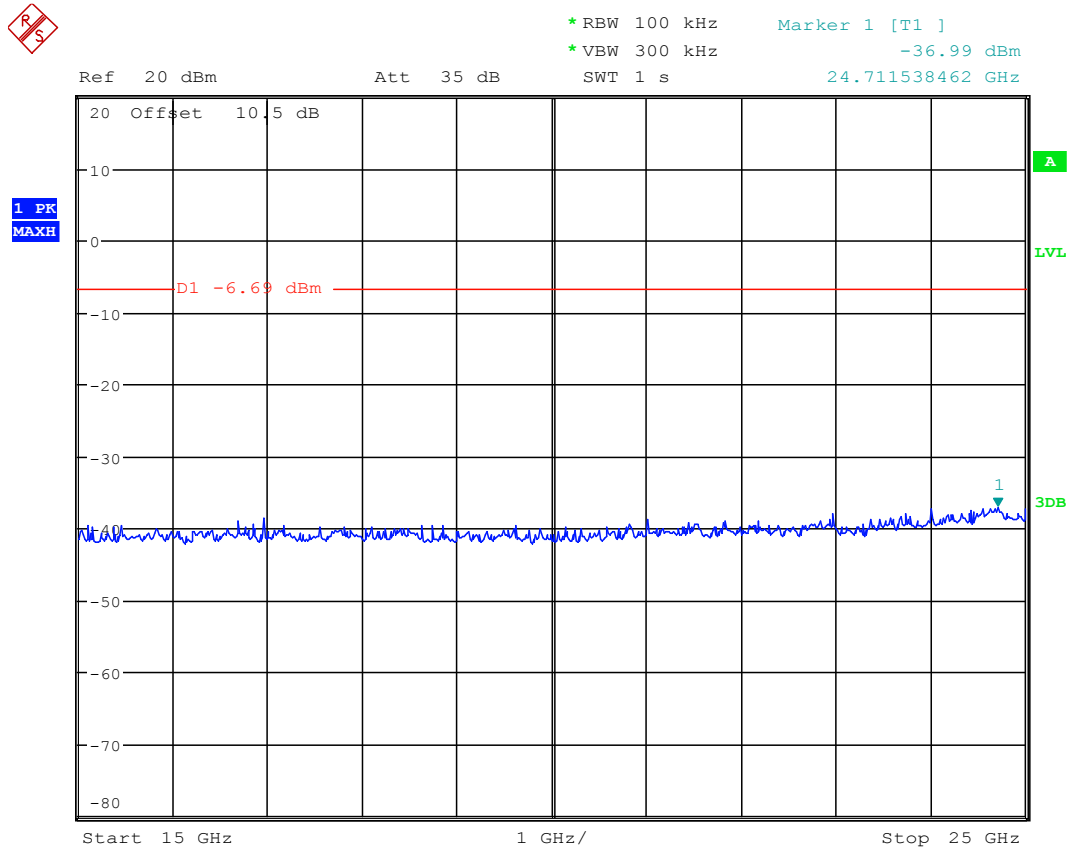
Transmitter Band Edge Measurement and Conducted Spurious Emissions



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Figure 92. Conducted Spurious Emissions 5 000 – 15 000 MHz. 3 Mbps Channel HIGH.

Transmitter Band Edge Measurement and Conducted Spurious Emissions



Date: 26.MAY.2011 11:47:03

Figure 93. Conducted Spurious Emissions 15 000 – 25 000 MHz. 3 Mbps Channel HIGH.

20 dB Bandwidth of the Hopping Channel

Standard: ANSI C63.10 (2009)
Tested by: JJM
Date: 24.5.2011
Humidity: 38 %
Temperature: 21 °C

FCC Rule: 15.247(a)(1)

Results:

1 Mbps

Channel	20 dB BW [kHz]
Low	1 141
Mid	1 141
High	1 135

Table 66. 20 dB bandwidth test results 1 Mbps.

2 Mbps

Channel	20 dB BW [kHz]
Low	1 391
Mid	1 378
High	1 391

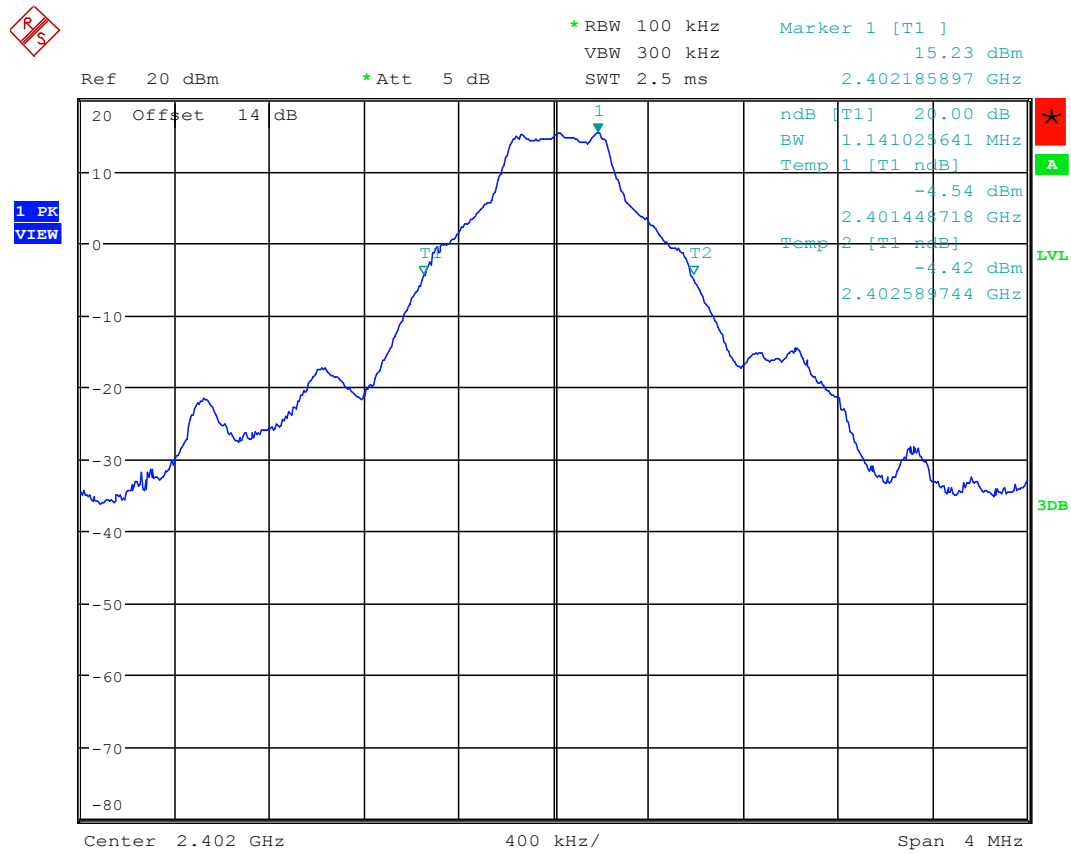
Table 67. 20 dB bandwidth test results 2 Mbps

3 Mbps

Channel	20 dB BW [kHz]
Low	1 385
Mid	1 385
High	1 391

Table 68. 20 dB bandwidth test results 3 Mbps

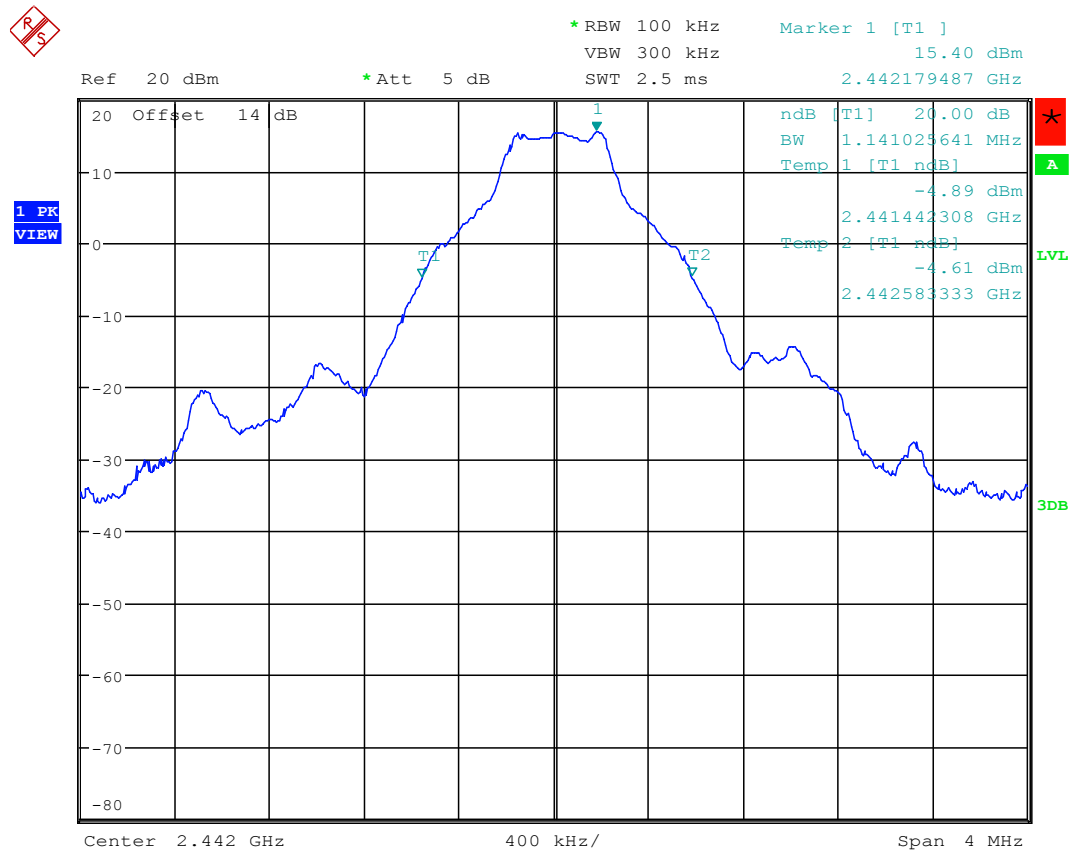
20dB Bandwidth of the Hopping Channel



Date: 24.MAY.2011 11:42:42

Figure 94. 20 dB channel BW. 1 Mbps Channel LOW.

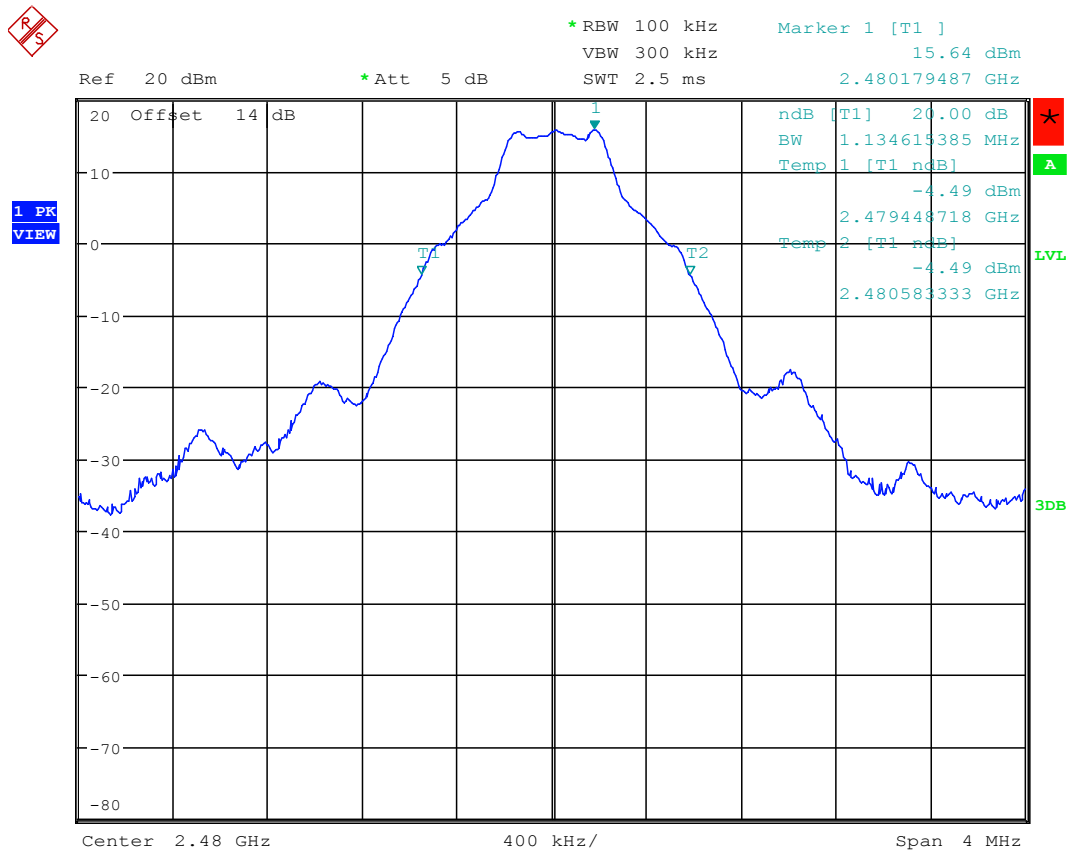
20dB Bandwidth of the Hopping Channel



Date: 24.MAY.2011 11:43:47

Figure 95. 20 dB channel BW. 1 Mbps Channel MID.

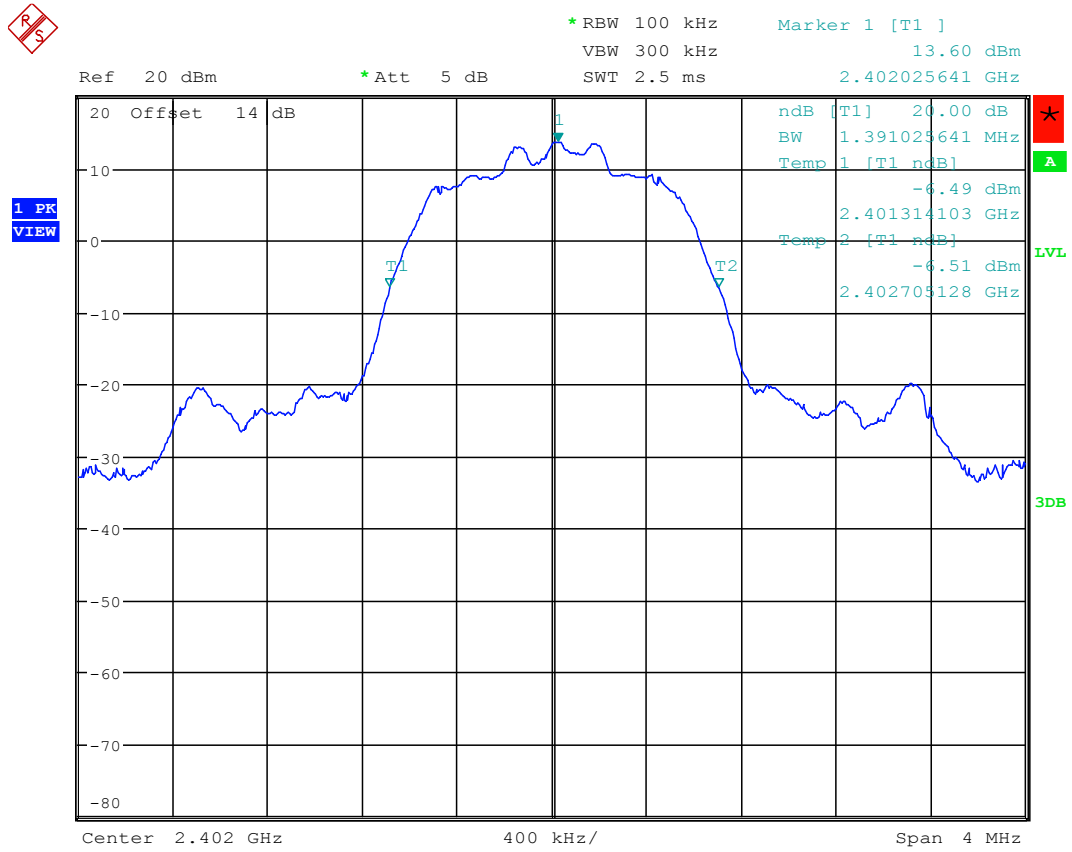
20dB Bandwidth of the Hopping Channel



Date: 24.MAY.2011 11:45:27

Figure 96. 20 dB channel BW. 1 Mbps Channel HIGH.

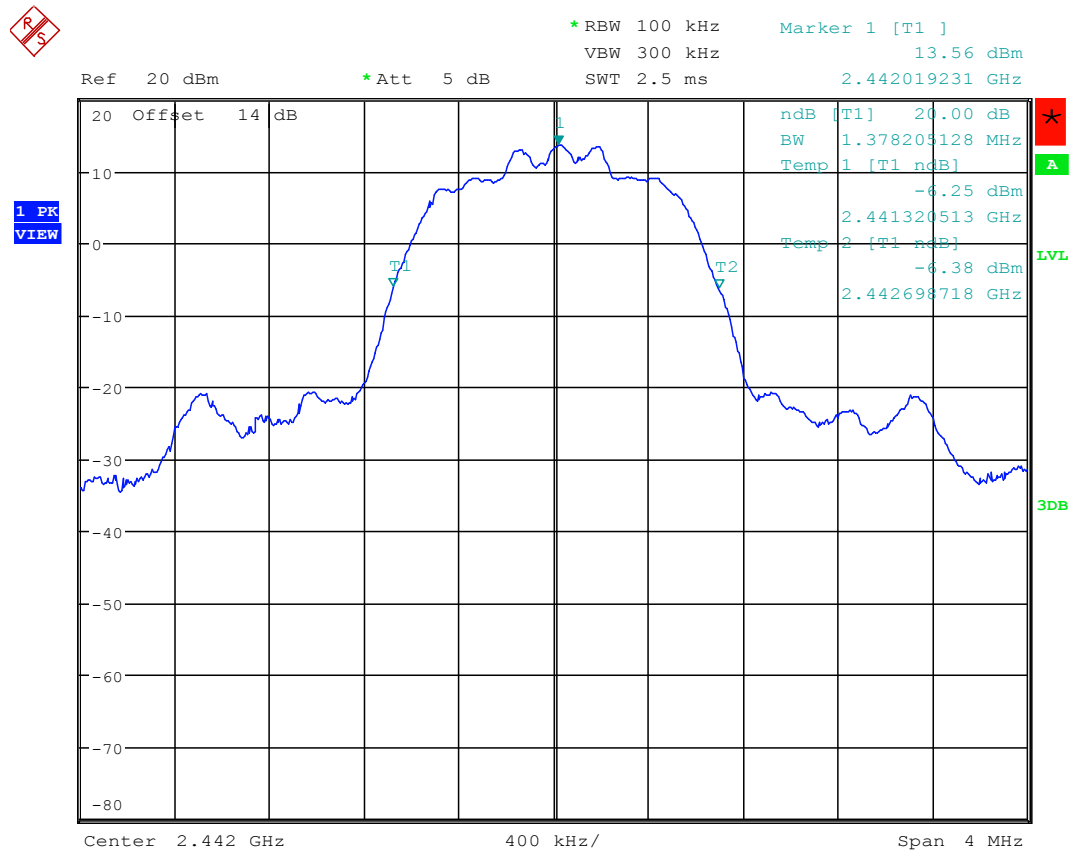
20dB Bandwidth of the Hopping Channel



Date: 24.MAY.2011 11:36:02

Figure 97. 20 dB channel BW. 2 Mbps Channel LOW.

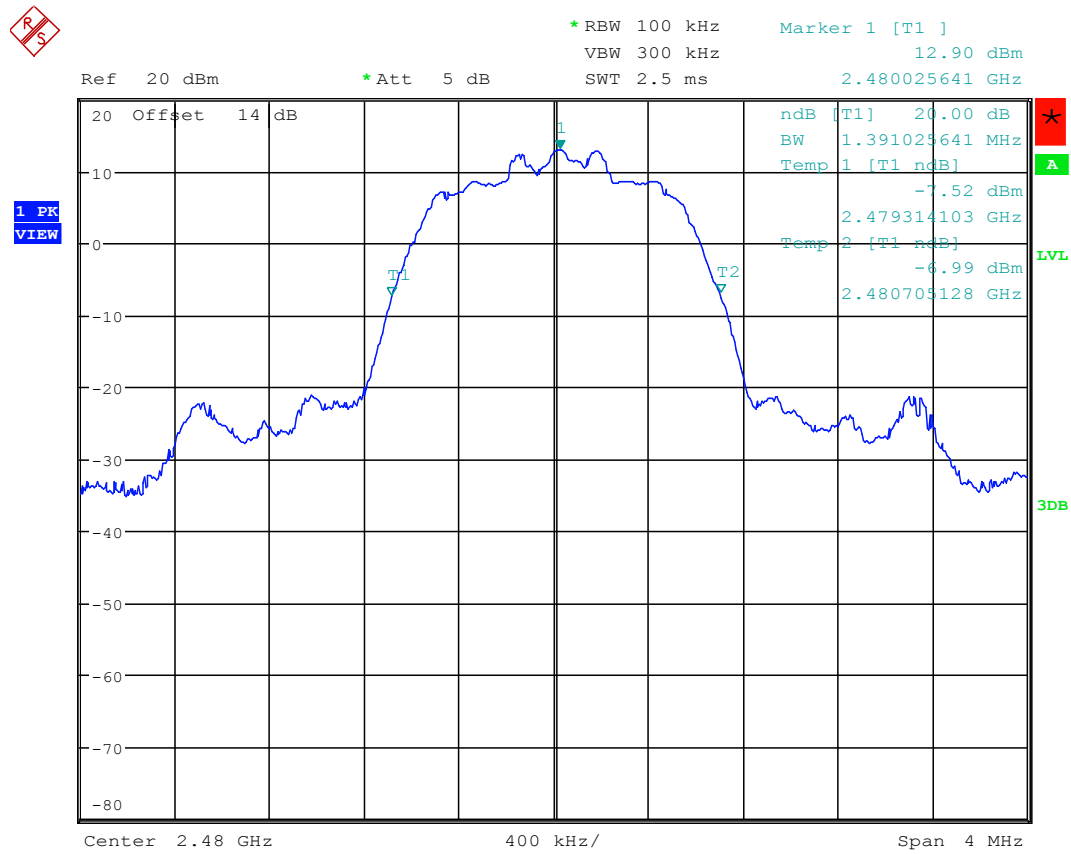
20dB Bandwidth of the Hopping Channel



Date: 24.MAY.2011 11:37:24

Figure 98. 20 dB channel BW. 2 Mbps Channel MID.

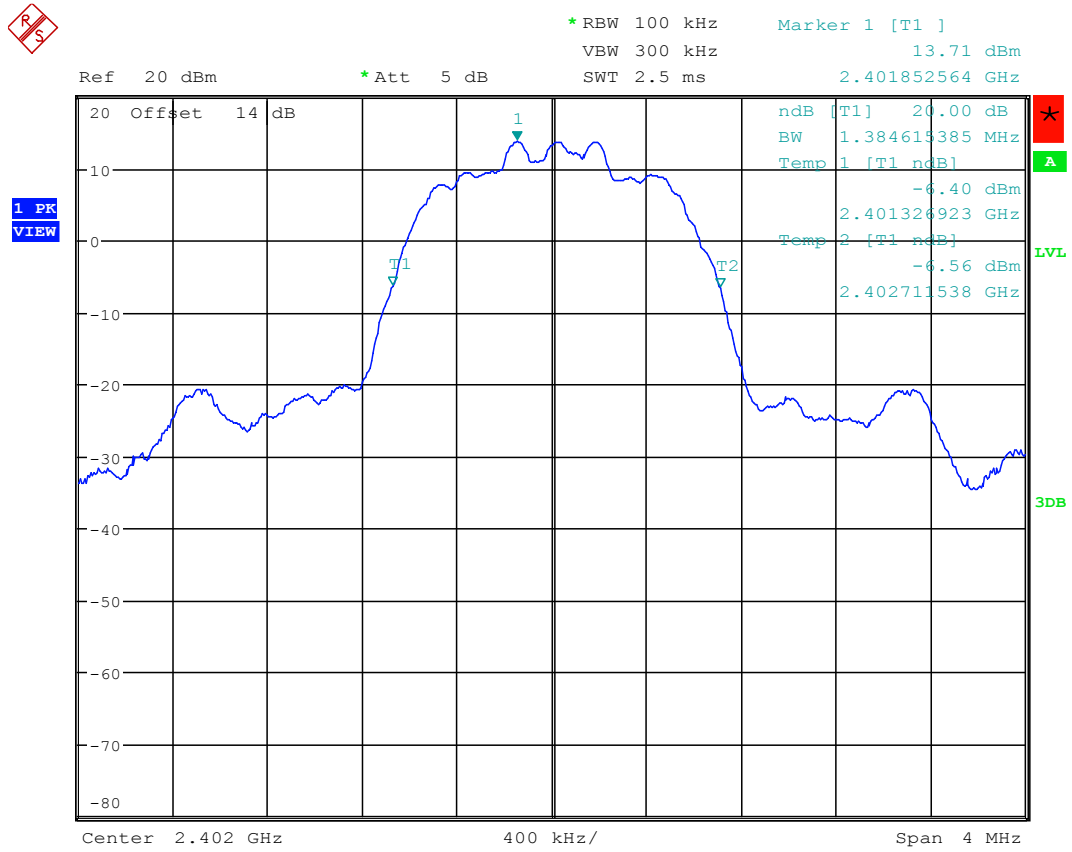
20dB Bandwidth of the Hopping Channel



Date: 24.MAY.2011 11:38:46

Figure 99. 20 dB channel BW. 2 Mbps Channel HIGH.

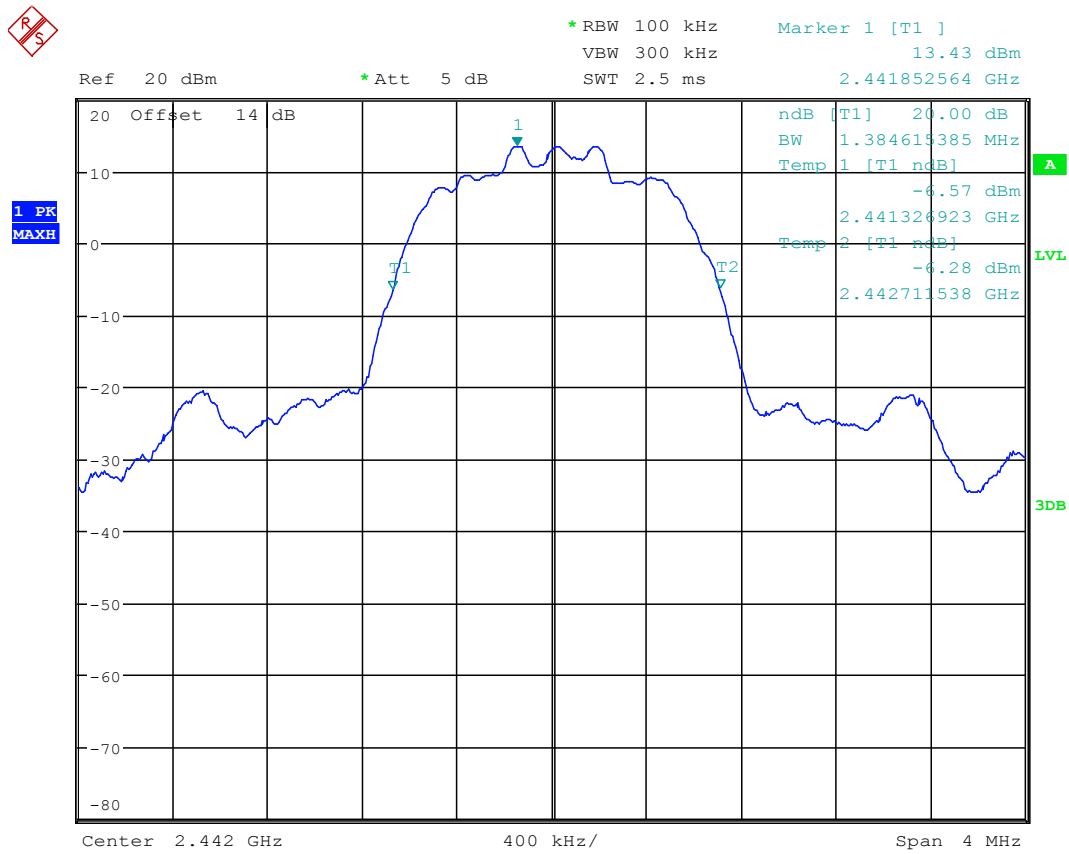
20dB Bandwidth of the Hopping Channel



Date: 24.MAY.2011 11:34:00

Figure 100. 20 dB channel BW. 3 Mbps Channel LOW.

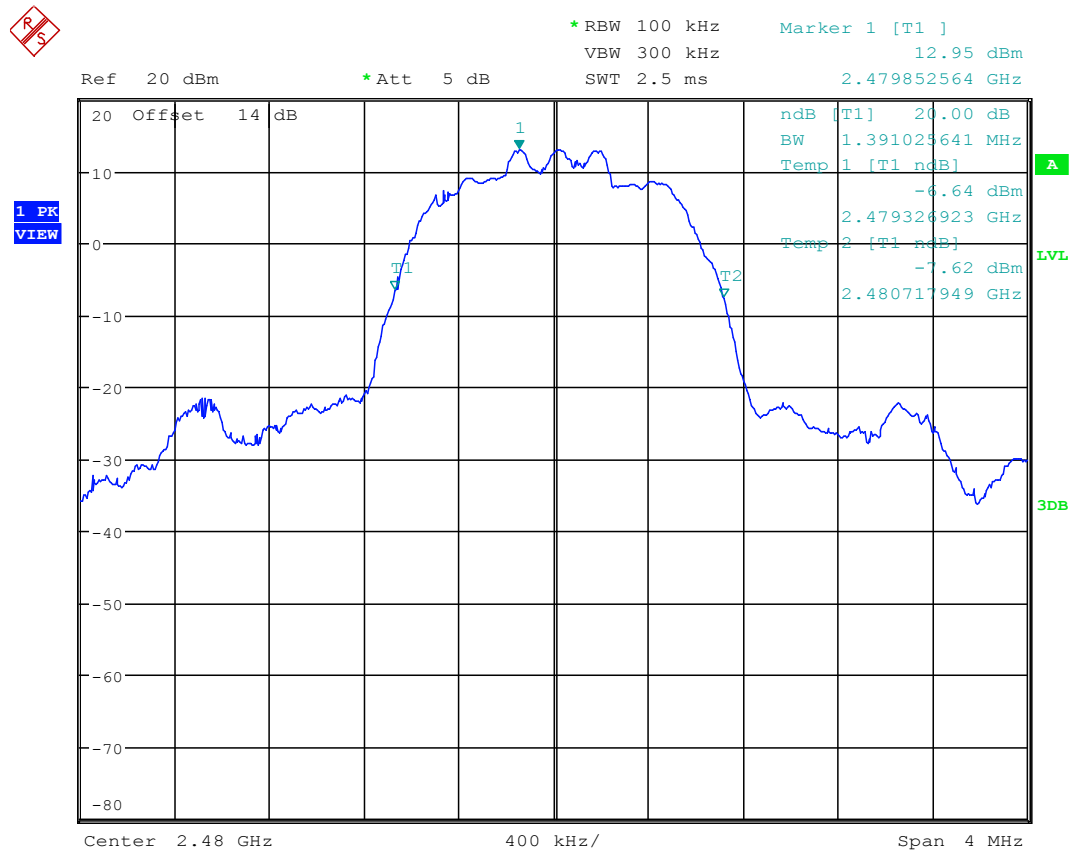
20dB Bandwidth of the Hopping Channel



Date: 24.MAY.2011 11:30:58

Figure 101. 20 dB channel BW. 3 Mbps Channel MID.

20dB Bandwidth of the Hopping Channel



Date: 24.MAY.2011 11:32:02

Figure 102. 20 dB channel BW. 3 Mbps Channel HIGH.

Hopping Channel Carrier Frequencies Separation

Standard: ANSI C63.10 (2009)
Tested by: JJM
Date: 26.5.2011
Humidity: 39 %
Temperature: 24 °C

FCC Rule: 15.247(a)(1)

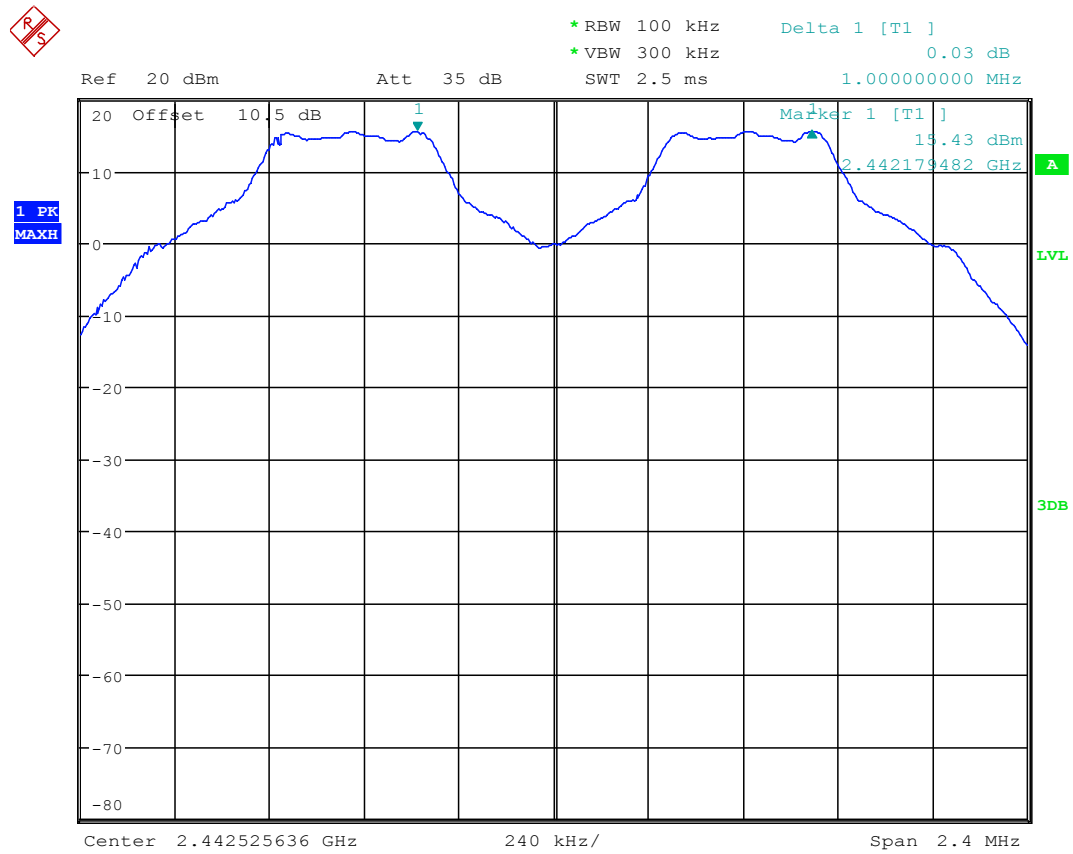
Frequency hopping systems with an output power less than 125mW shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or 2/3 of the 20 dB bandwidth of the hopping channel, whichever is greater.

Test result

Data rate	Measured separation	Measured 20 dB BW	Limit	Result
1 Mbps	1 000 kHz	1 141	761 kHz	PASS
2 Mbps	1 004 kHz	1 379	919 kHz	PASS
3 Mbps	1 004 kHz	1 385	923 kHz	PASS
Limit:	25 kHz or 2/3 or the 20 dB bandwidth of the hopping channel which ever is greater			

Table 69. Hopping channel carrier frequencies separation test result.

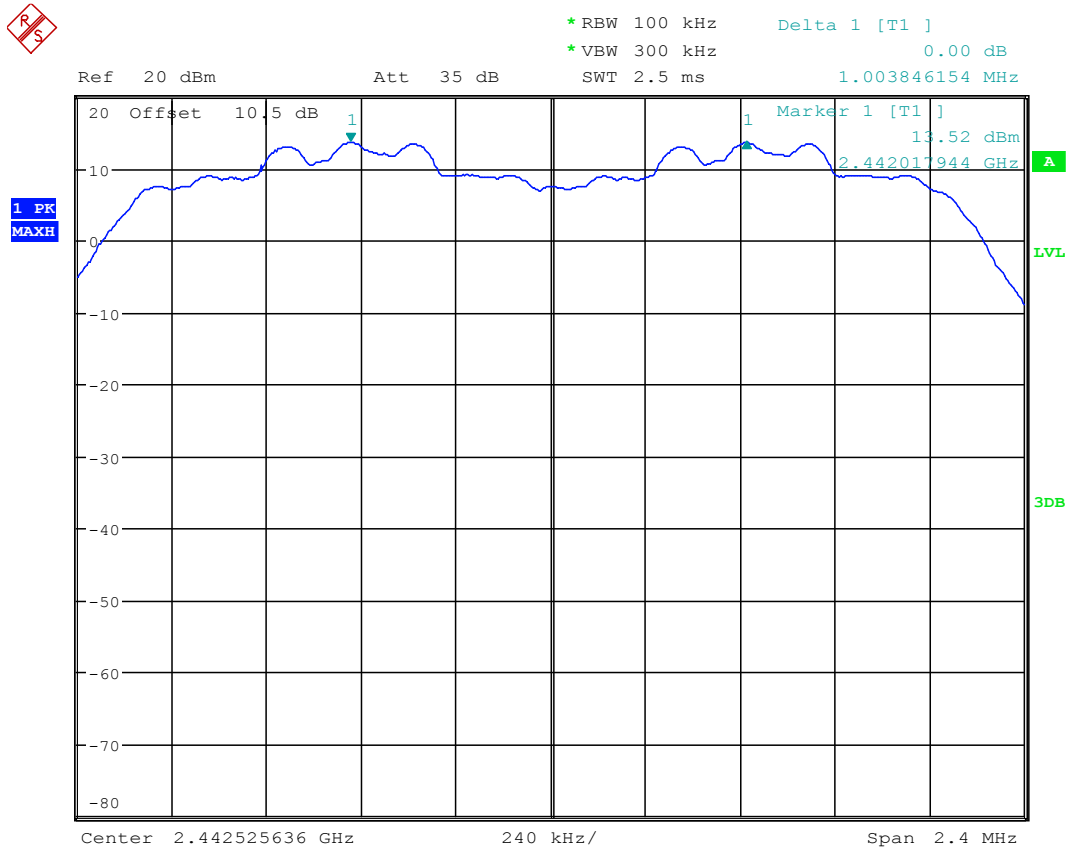
Hopping Channel Carrier Frequencies Separation



Date: 26.MAY.2011 12:33:17

Figure 103. Measured hopping channels carrier frequency separation 1 Mbps.

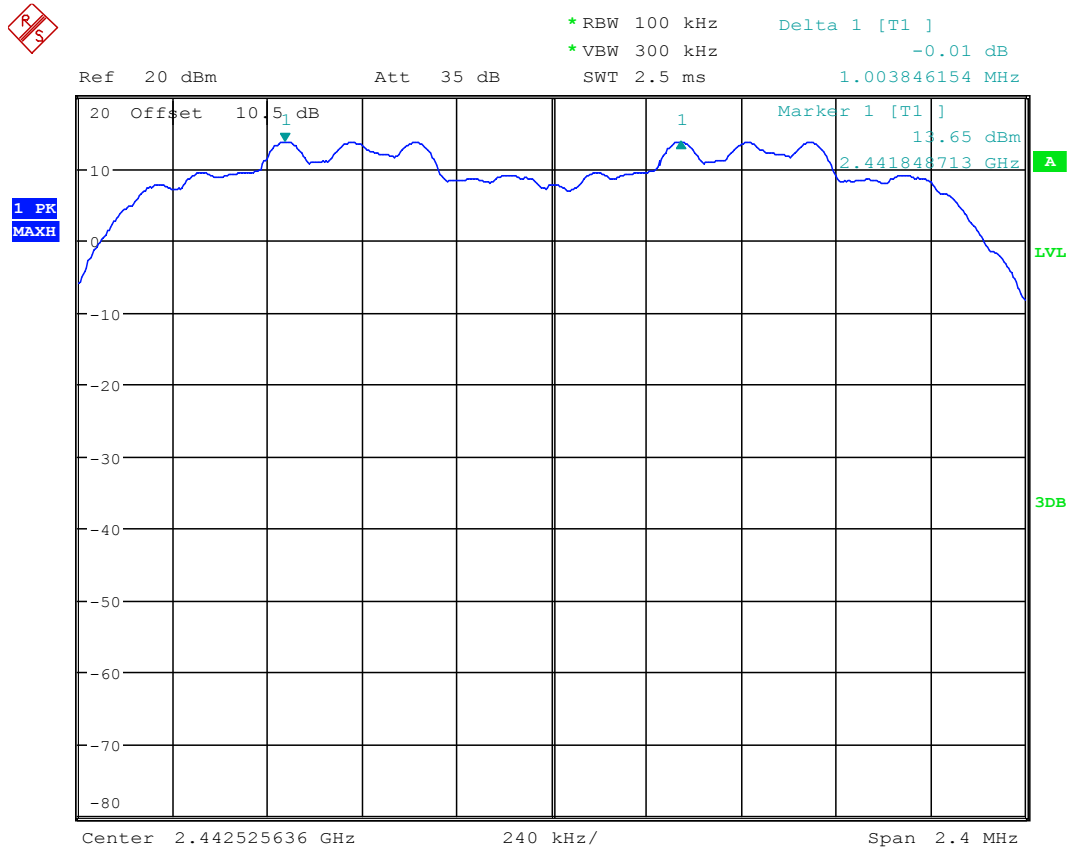
Hopping Channel Carrier Frequencies Separation



Date: 26.MAY.2011 12:38:32

Figure 104. Measured hopping channels carrier frequency separation 2 Mbps.

Hopping Channel Carrier Frequencies Separation



Date: 26.MAY.2011 12:42:20

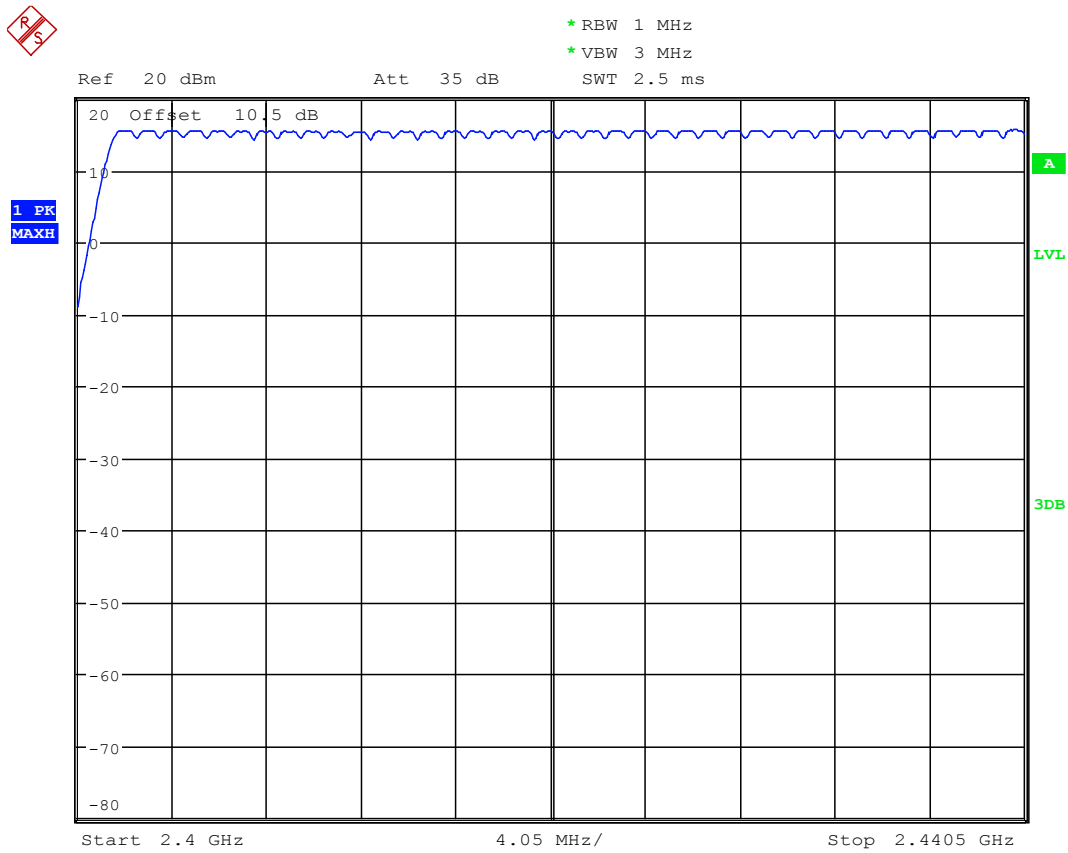
Figure 105. Measured hopping channels carrier frequency separation 3 Mbps.

Number of Hopping Channels

Standard: ANSI C63.10 (2009)
Tested by: JJM
Date: 26.5.2011
Humidity: 29 %
Temperature: 23 °C

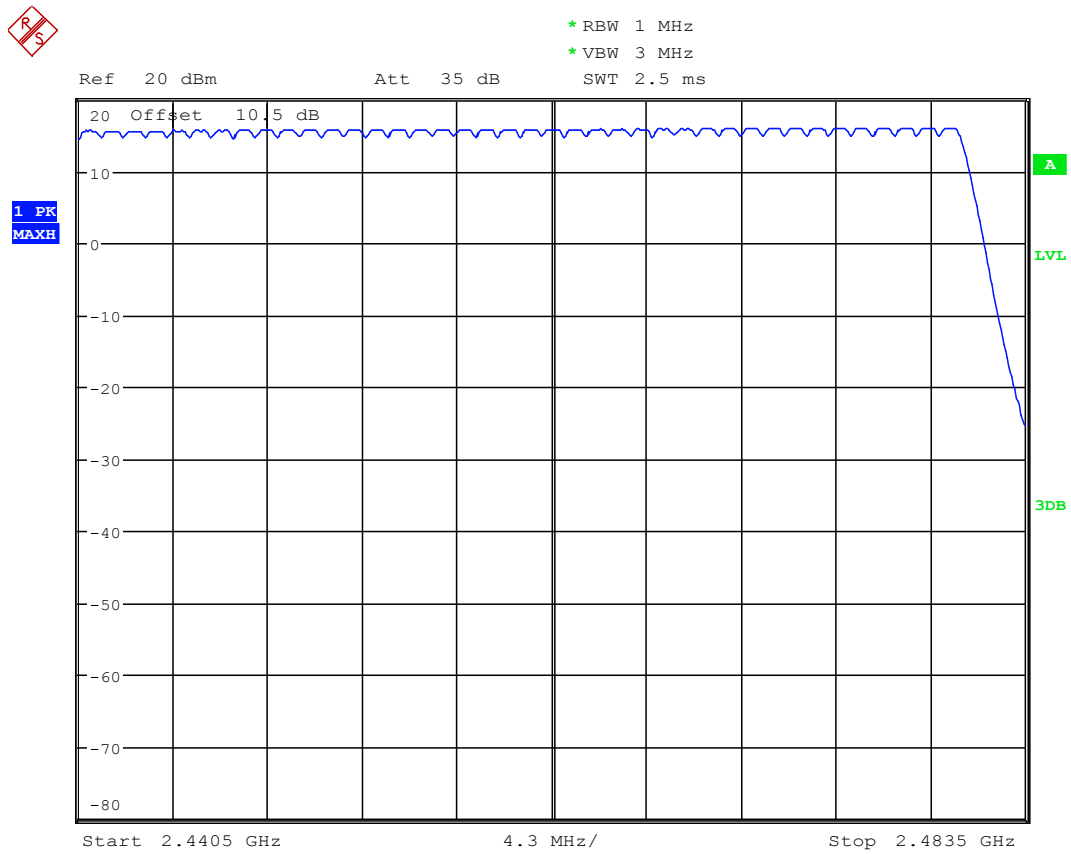
FCC Rule: 15.247(a)(1)(iii)

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



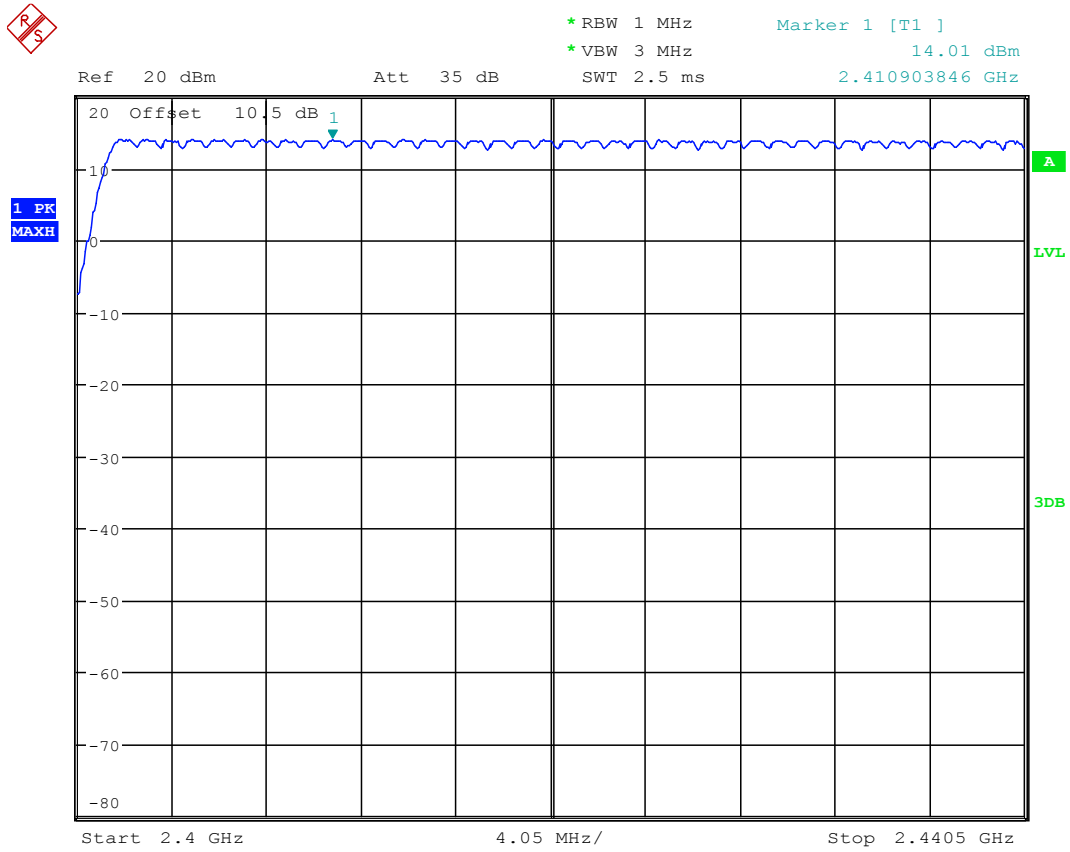
Date: 26.MAY.2011 12:57:52

Figure 106. First 39 channels 1 Mbps.



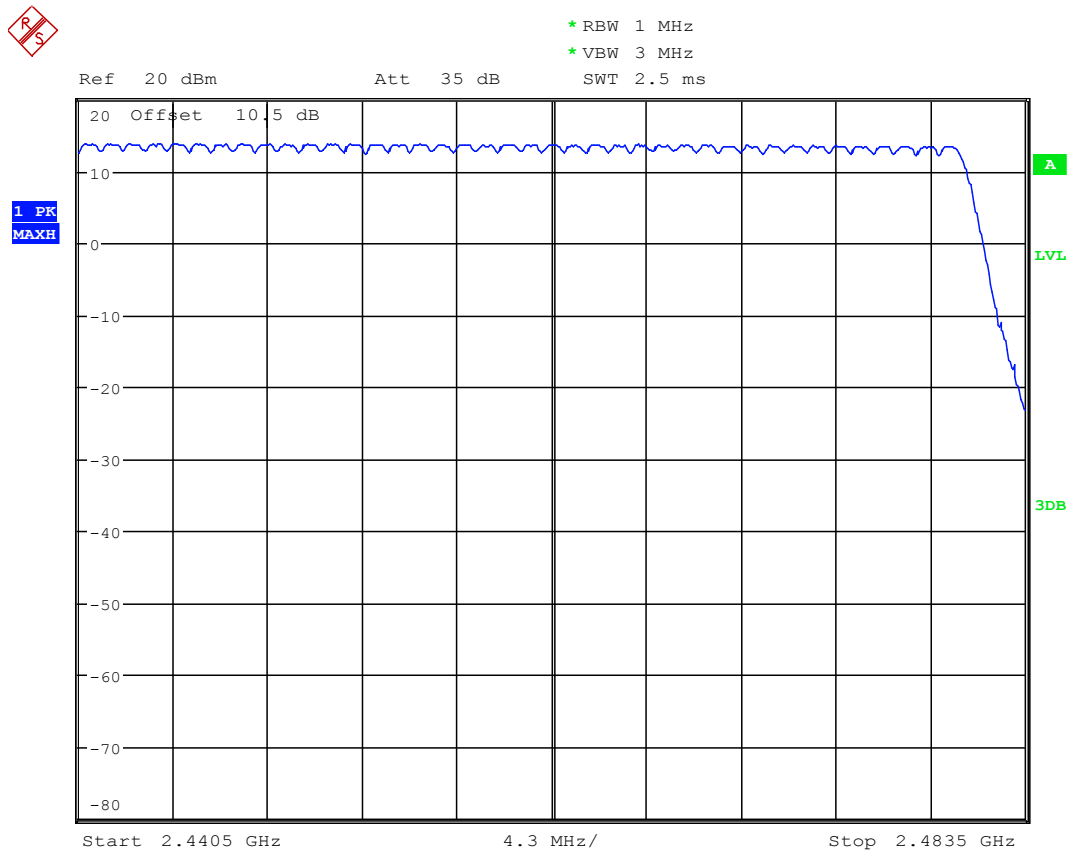
Date: 26.MAY.2011 12:59:08

Figure 107. Second 40 channels 1 Mbps.



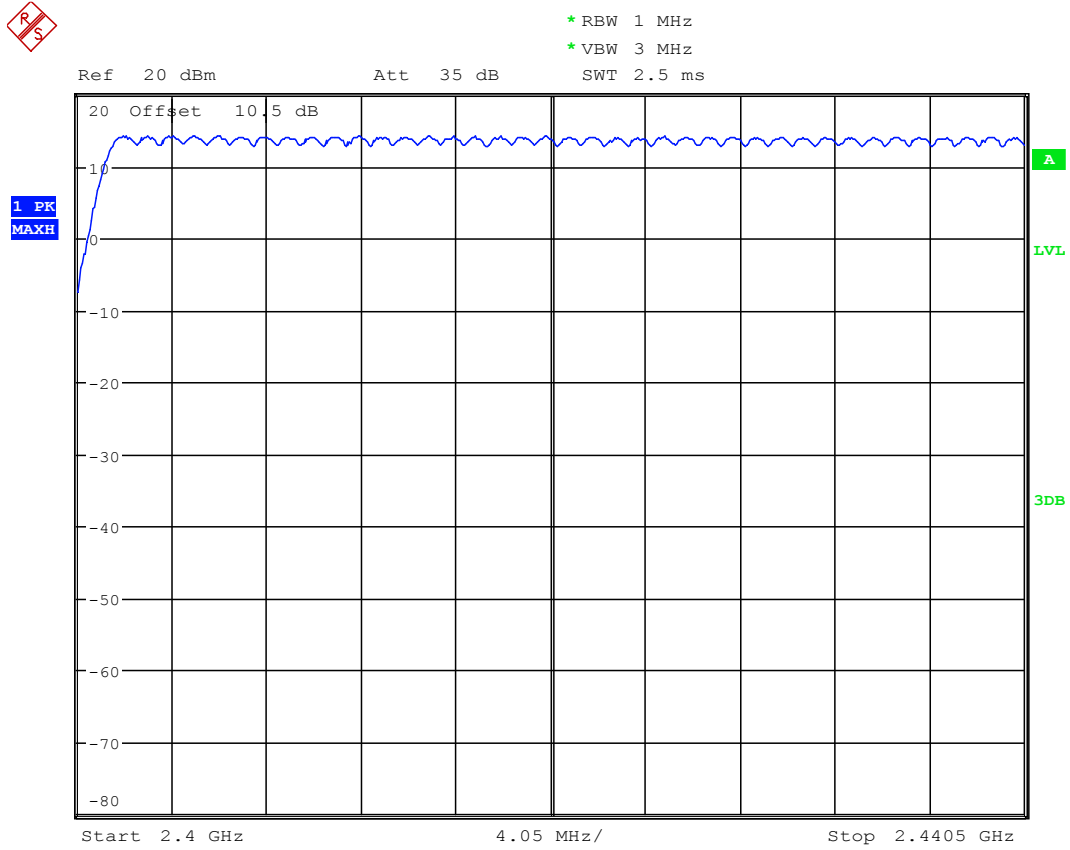
Date: 26.MAY.2011 13:02:47

Figure 108. First 39 channels 2 Mbps.



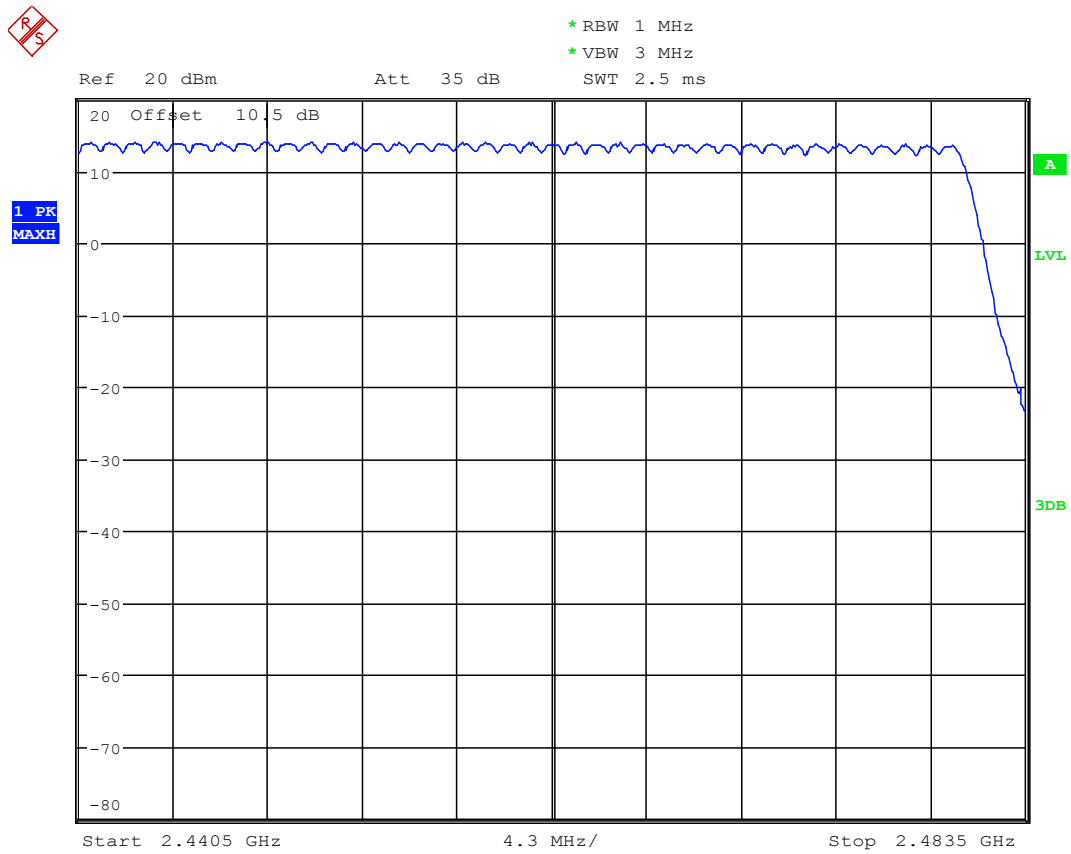
Date: 26.MAY.2011 13:01:05

Figure 109. Second 40 channels 2 Mbps.



Date: 26.MAY.2011 13:05:44

Figure 110. First 39 channels 3 Mbps.



Date: 26.MAY.2011 13:07:28

Figure 111. Second 40 channels 3 Mbps.

Average Time of Occupancy of Hopping Frequency

Standard: ANSI C63.10 (2009)
Tested by: JJM
Date: 26.5.2011
Humidity: 29 %
Temperature: 23 °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

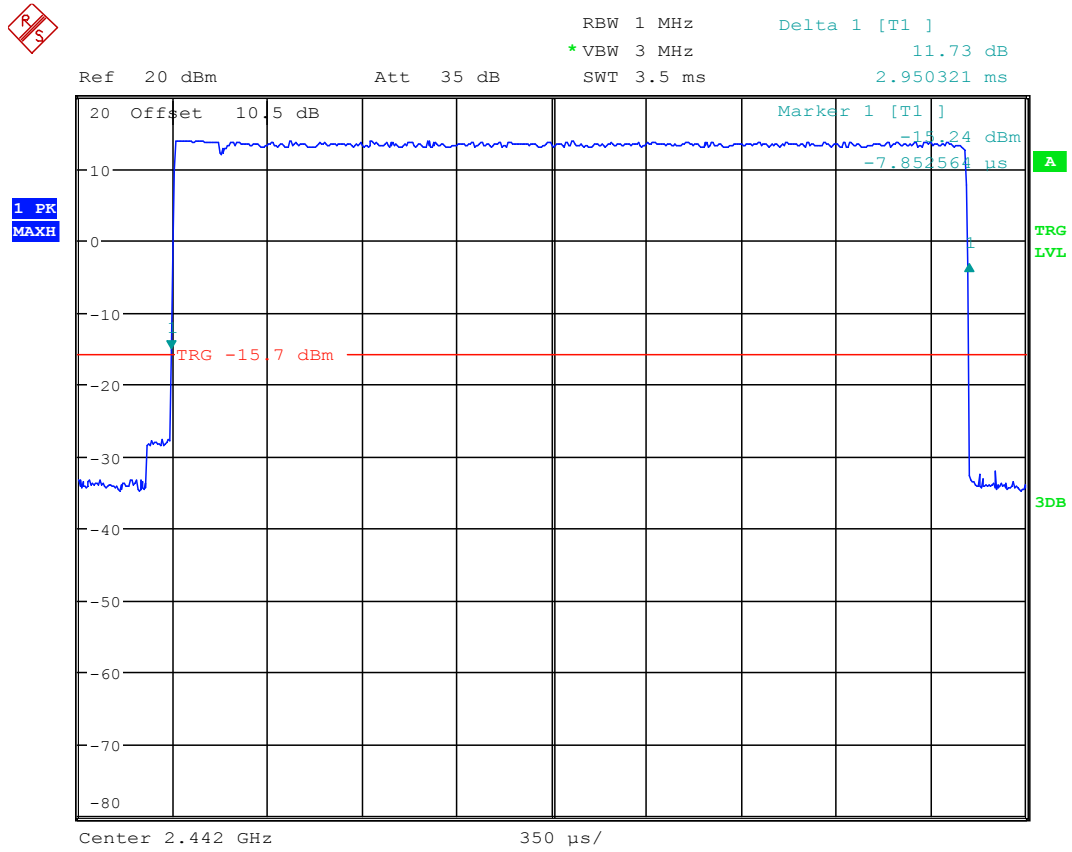
Measurement period = 0.4 sec x 79 = 31.6 seconds

One channel occupancy time = 296.7 ms

Number of transmission cycles in measurement period = 31.6 / 0.2967 = 106

Time of occupancy = (single duration) x (repetition) = 2.95 ms x 106 times = 312.7 ms

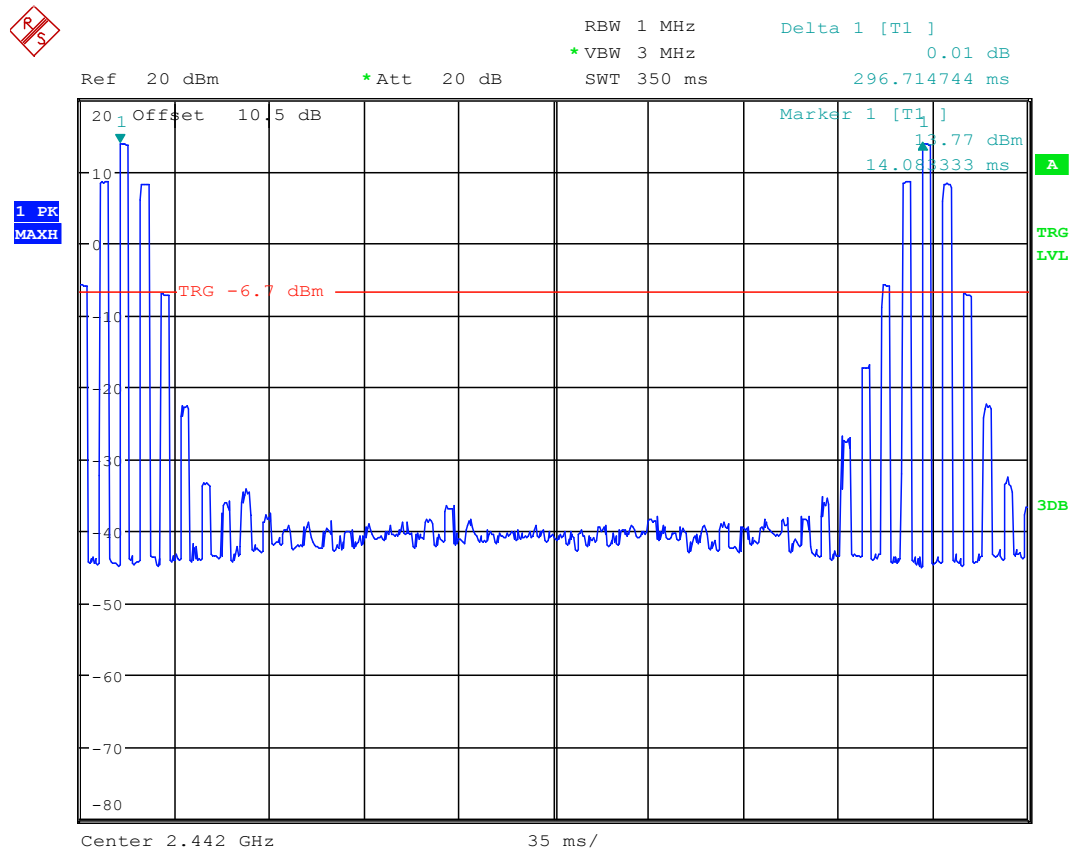
Average Time of Occupancy of Hopping Frequency



Date: 26.MAY.2011 13:14:39

Figure 112. One channel dwell time.

Average Time of Occupancy of Hopping Frequency



Date: 26.MAY.2011 13:24:35

Figure 113. Measured repetition of the channel occupancy

99% Occupied Bandwidth

Standard: RSS-GEN (2010)
Tested by: JJM
Date: 30.6.2011
Humidity: 51 %
Temperature: 20 °C

RSS-GEN 4.7

1 Mbps

Channel	Limit	99 % BW [MHz]	Result
Low	-	1.00125	PASS
Mid	-	1.00625	PASS
High	-	0.99125	PASS

Table 70. 99 % OBW test results 1 Mbps mode.

2 Mbps

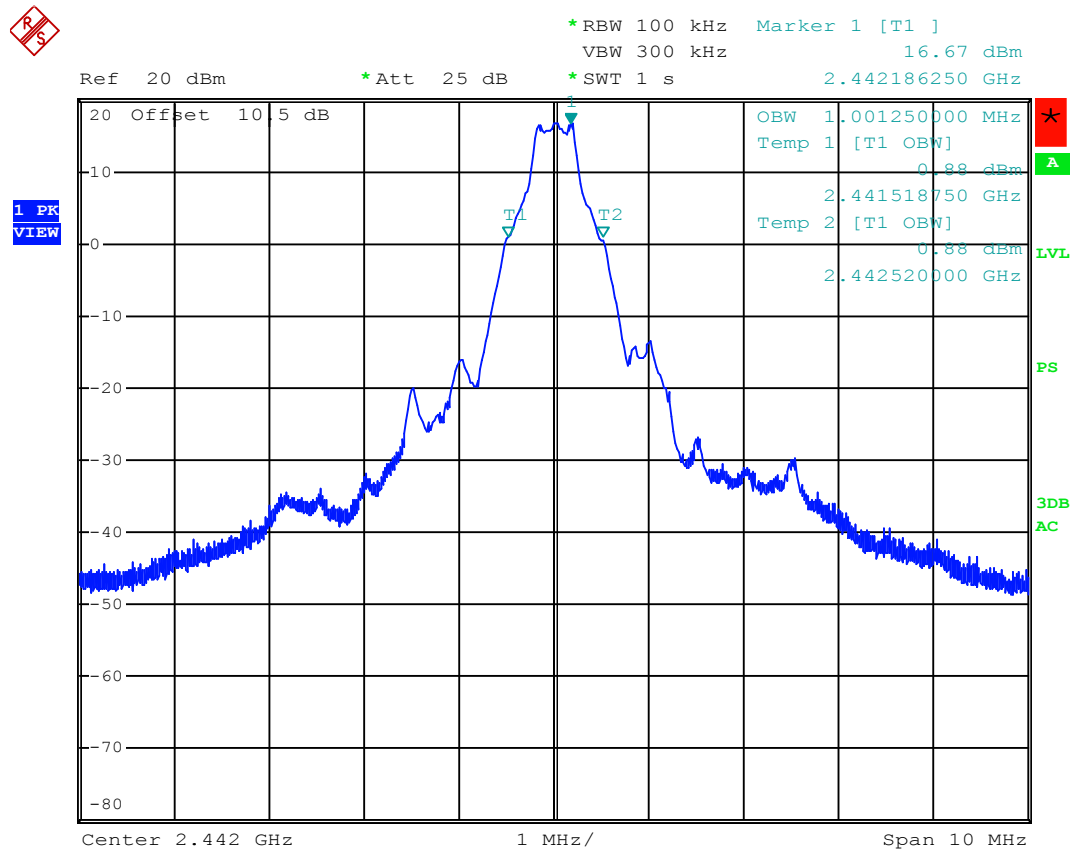
Channel	Limit	99 % BW [MHz]	Result
Low	-	1.22000	PASS
Mid	-	1.22000	PASS
High	-	1.23974	PASS

Table 71. 99 % OBW test results 2 Mbps mode.

3 Mbps

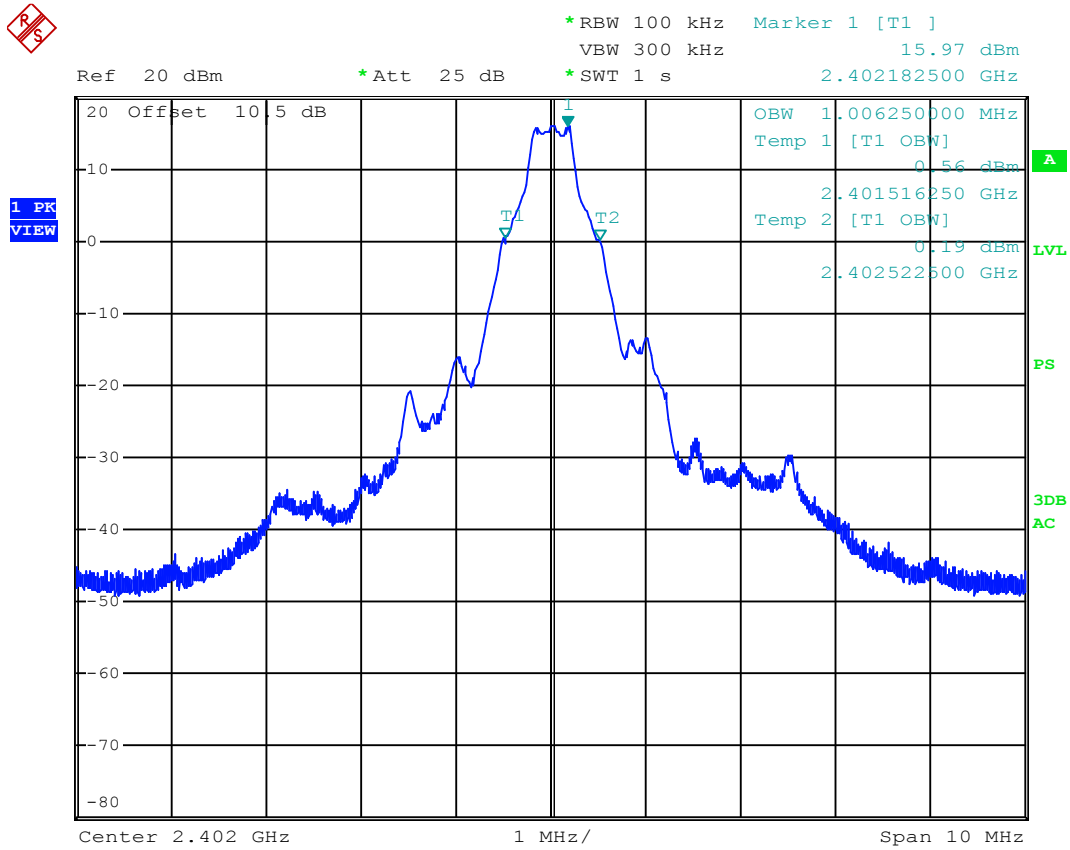
Channel	Limit	99 % BW [MHz]	Result
Low	-	1.22250	PASS
Mid	-	1.22750	PASS
High	-	1.22750	PASS

Table 72. 99 % OBW test results 3 Mbps mode.



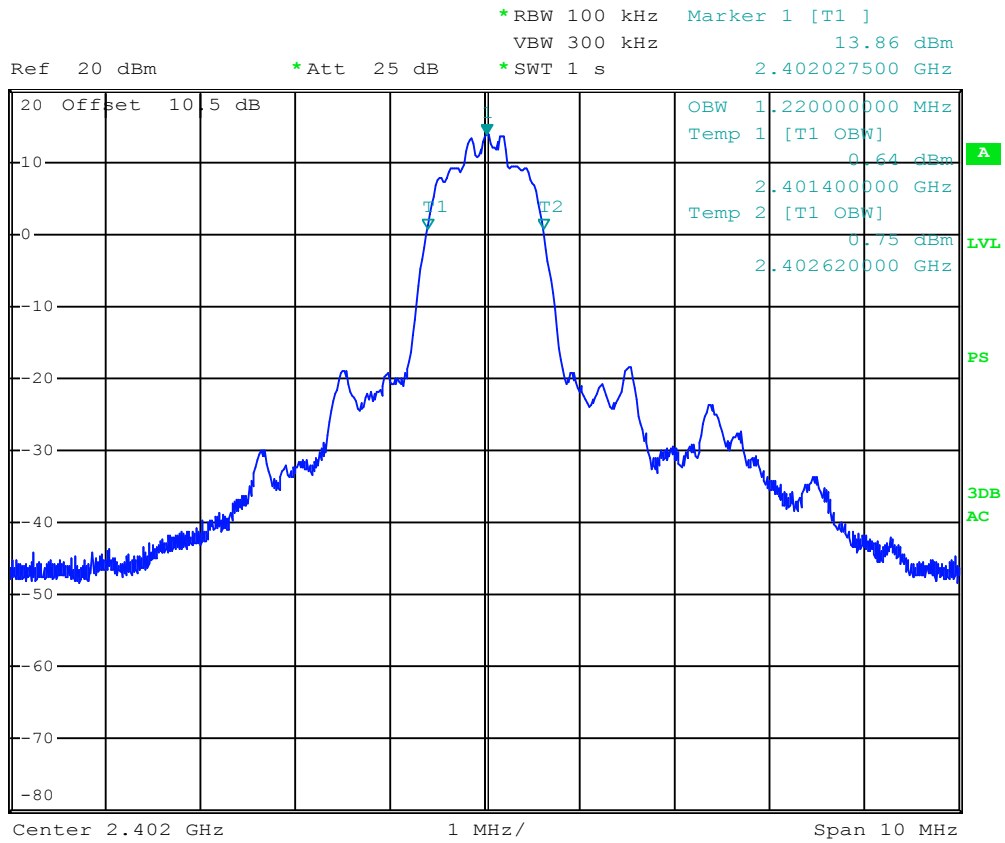
Date: 30.JUN.2011 14:56:38

Figure 114. 99 % OBW. Channel low 1 Mbps.



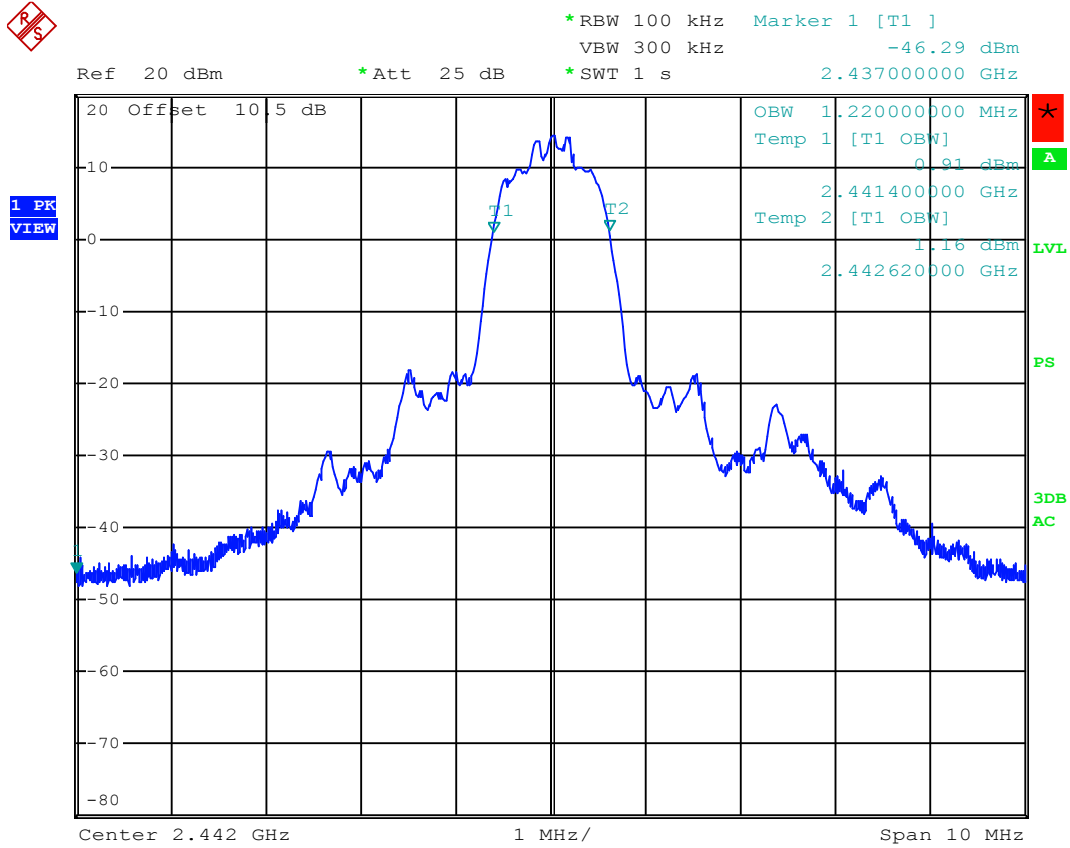
Date: 30.JUN.2011 14:59:10

Figure 115. 99 % OBW. Channel mid 1 Mbps.



Date: 30.JUN.2011 15:06:18

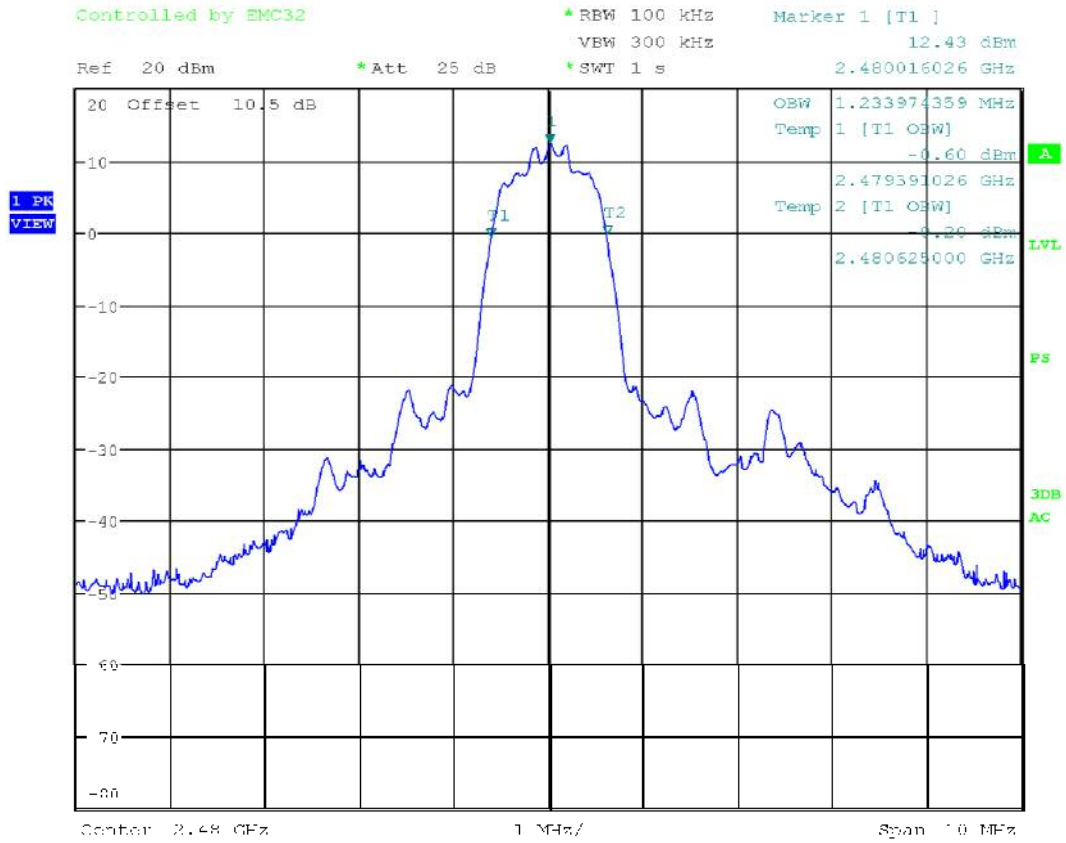
Figure 117. 99 % OBW. Channel low 2 Mbps.



Date: 30.JUN.2011 15:08:56

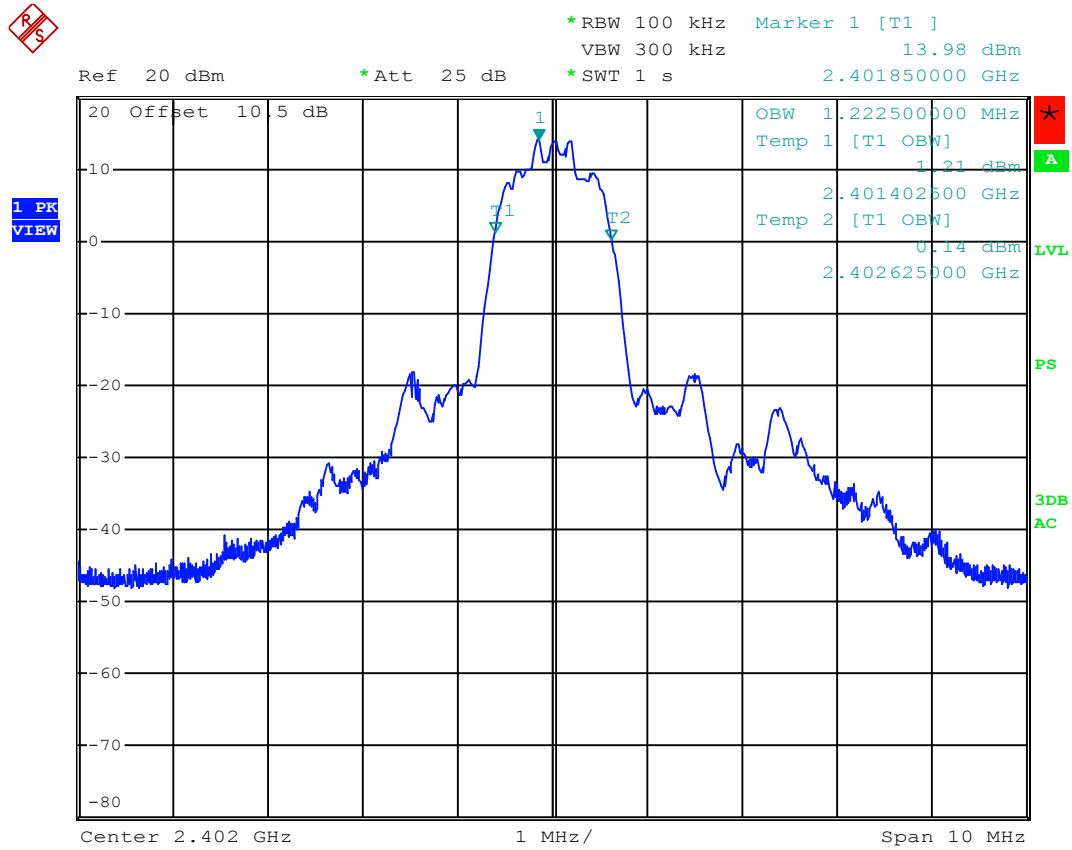
Figure 118. 99 % OBW. Channel mid 2 Mbps.

99 % Occupied Bandwidth



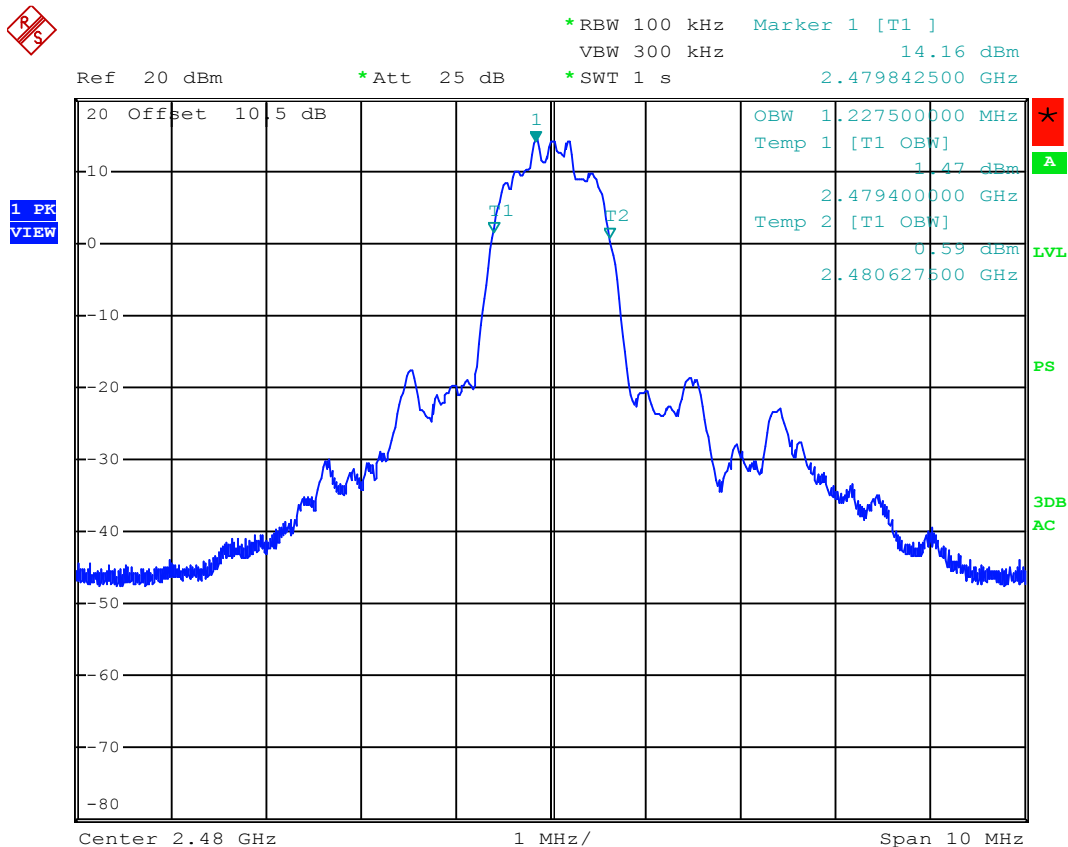
Date: 18.OCT.2011 09:02:51

Figure 119. 99 % OBW. Channel high 2 Mbps.



Date: 30.JUN.2011 15:12:27

Figure 120. 99 % OBW. Channel low 3 Mbps.



Date: 30.JUN.2011 15:16:15

Figure 122. 99 % OBW. Channel high 3 Mbps.

Receiver Radiated Emissions 30 – 26 500 MHz

Standard: ANSI C63.10 (2009)
Tested by: JJM
Date: 30.5.2011
Humidity: 37 %
Temperature: 21.0 °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

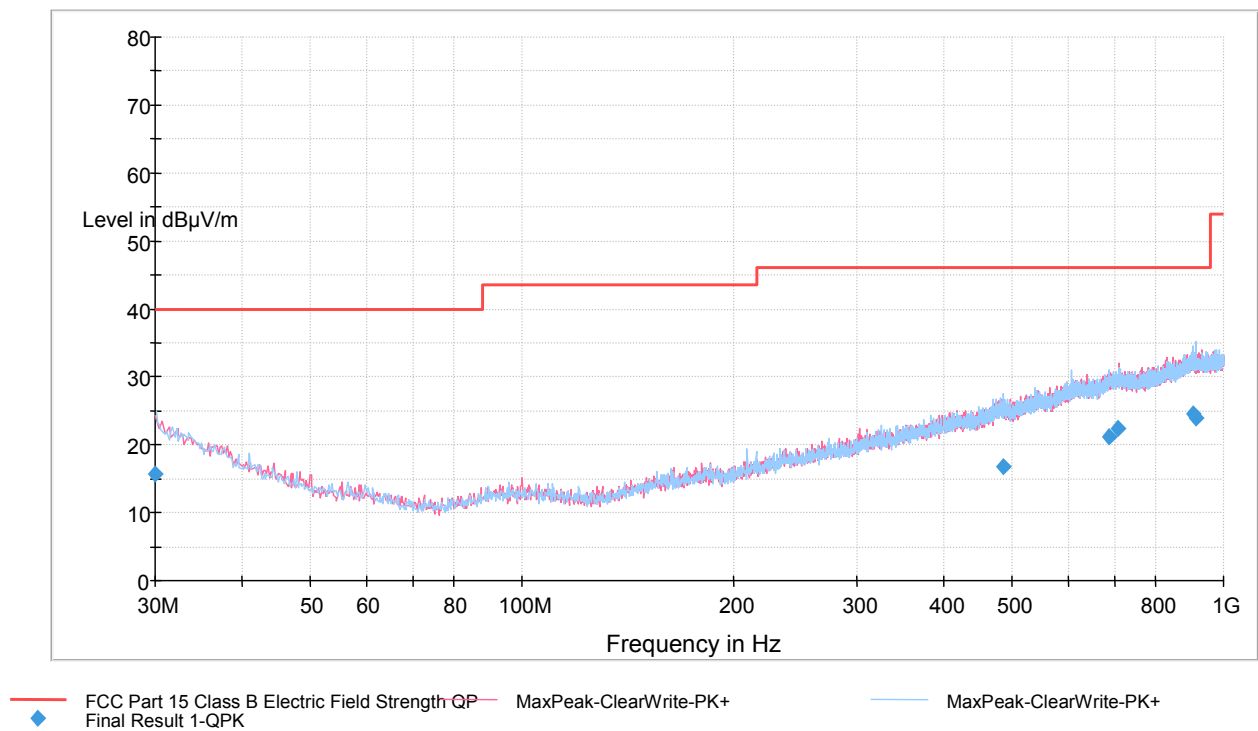


Figure 123. Measured curve with peak-detector.

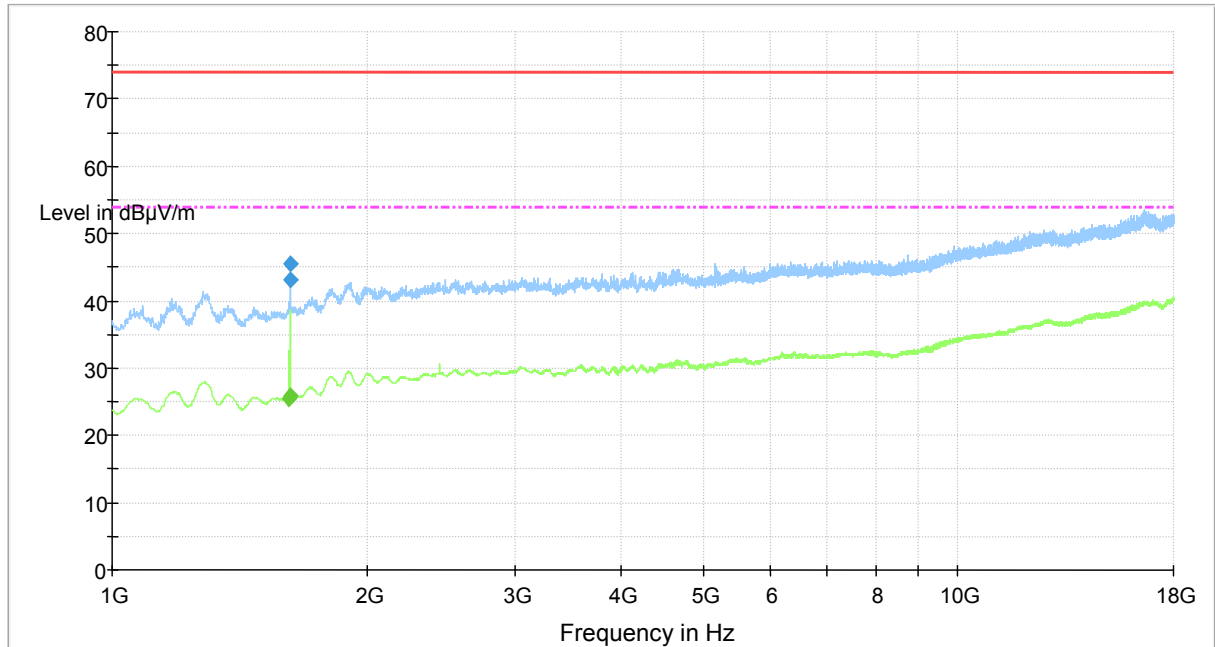
Final measurements from the worst frequencies

Table 73. Final results with Averagre detector.

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
30.110000	15.7	15000.0	120.000	112.0	H	63.0	19.1	24.1	40.0	
484.025200	16.9	15000.0	120.000	310.0	H	54.0	21.7	28.9	46.0	
686.378550	20.9	15000.0	120.000	102.0	H	286.0	25.2	24.2	46.0	
710.032400	22.1	15000.0	120.000	103.0	V	298.0	25.7	23.7	46.0	
904.210000	23.7	15000.0	120.000	102.0	H	98.0	28.2	21.4	46.0	
914.543550	23.6	15000.0	120.000	212.0	H	5.0	28.2	21.4	46.0	

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

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



— FCC Part 15 Class B Electric Field Strength 3 m PK.LimitLine
— ExistingD1-PK+
◆ Final Result 1-PK+
— FCC Part 15 Class B Electric Field Strength 3 m AV.LimitLine
— ExistingD2-AVG
◆ Final Result 2-AVG

Figure 124. Measured curve with peak-and average detector.

Final measurements from the worst frequencies

Table 74. Final MaxPeak results.

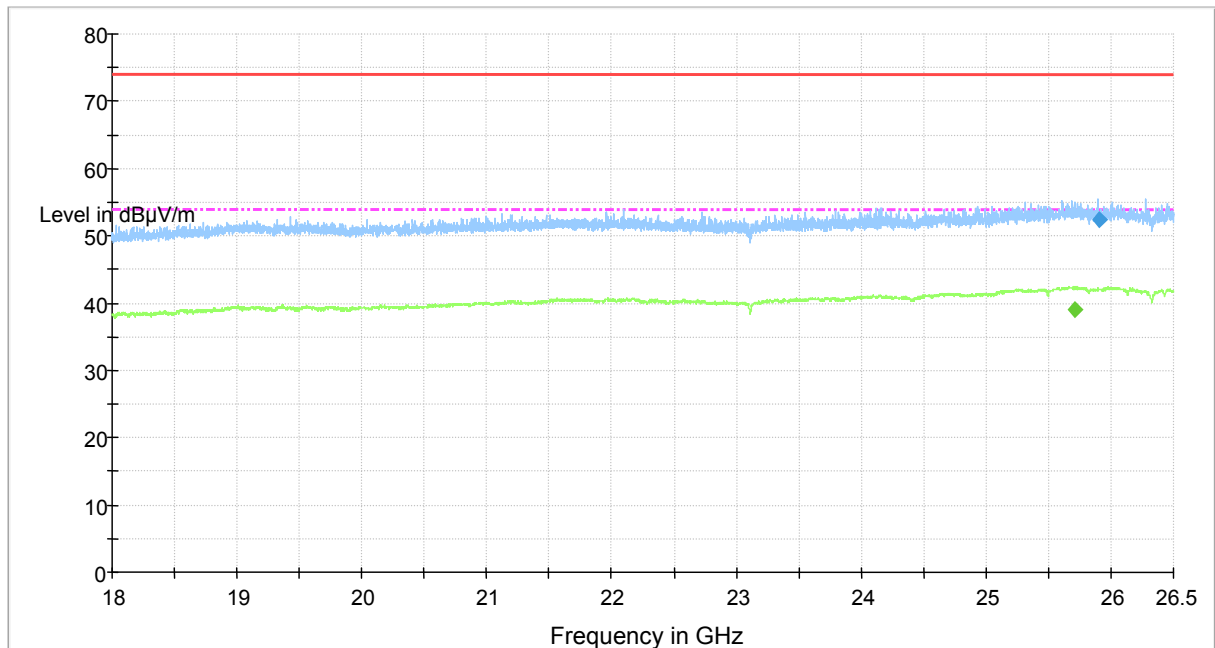
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
1622.125000	43.1	1000.0	1000.000	157.0	H	223.0	-0.8	30.8	73.9	
1626.275000	45.5	1000.0	1000.000	266.0	H	-2.0	-0.7	28.4	73.9	

Table 75. 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
1617.725000	25.5	1000.0	1000.000	164.0	H	236.0	-0.9	28.4	53.9	
1626.275000	25.9	1000.0	1000.000	100.0	V	3.0	-0.7	28.0	53.9	

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

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



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

Figure 125. Measured curve with peak-and average detector.

Final measurements from the worst frequencies

Table 76. 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
25902.725000	52.4	1000.0	1000.000	186.0	V	-2.0	28.0	21.5	73.9	

Table 77. 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
25712.025000	39.1	1000.0	1000.000	105.0	V	11.0	28.0	14.8	53.9	

Conducted emissions

Standard: ANSI C63.10 (2009)
Tested by: JJM
Date: 19.8.2011
Humidity: 42 %
Temperature: 23 °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

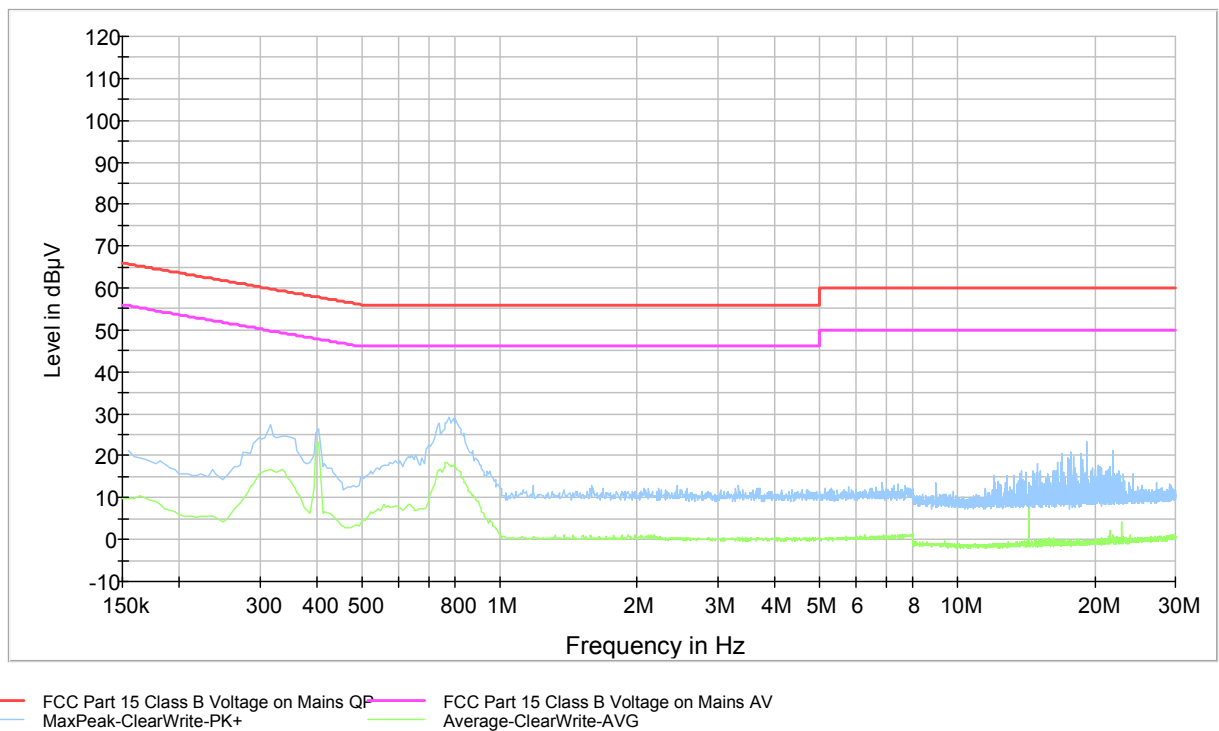


Figure 126. The measured curves with peak- and average-detectors

Final measurements from the worst frequencies

No final measurements were made since the emissions were more than 20dB below the limits.

List of test equipments

Manufacturer	Type	Serial no	Inv. no
ROHDE & SCHWARZ			
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	-	-
DAVIS			
Weather station	Vantage Pro	-	5297
EMCO			
Antenna (1 - 18 GHz)	3117	29617	7293
CHASE			
Antenna (30 MHz - 1 GHz)	6141A	4102	7895
HEWLETT- PACKARD			
Microwave amplifier	83017A	-	5226
HUBER-+ SUHNER			
Attenuator 10dB	6810.17B	-	-
DEISEL			
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
WAINWRIGHT			
High Pass Filter	WHKX	10	8267