SGS

Test Report

FINAS
Finnish Accreditation Service
T004 (EN ISO/IEC 17025)

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

Equipment Under Test:	Wireless System-on-Module (Classic Bluetooth)
Type/ Model:	APx4
Manufacturer:	BlueGiga Technologies Oy PO. BOX 120 FI-02631 ESPOO FINLAND
Customer:	BlueGiga Technologies Oy PO. BOX 120 FI-02631 ESPOO FINLAND
FCC Rule Part:	15.247: 2012
IC Rule Part:	RSS-210, Issue 8, 2010 RSS-GEN Issue 3, 2010
KDB:	Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems DA 00-705 (March 30, 2000)

Date: May 24, 2013

Issued by:

Rauno Repo
Testing Engineer

Date: May 27, 2013

Checked by:

Jari Merikari
Technical Manager

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Equipment Under Test (EUT)

Wireless System-on-Module

Type/ Model:	APx4
Serial Number:	-

APx4 is a Wireless System-on-Module that supports Wi-Fi, Classic Bluetooth and Low Energy Bluetooth. This report contains the Classic Bluetooth test results.

Two samples were used in tests. The first sample had an integrated antenna and the other sample had an external antenna. Both modules were connected to their own evaluation boards.

Conducted measurements were made with the sample having an external antenna. Measurements were made from the antenna connector (SMA).

Classification of the device

Fixed device	☐
Mobile Device (Human body distance > 20cm)	☒
Portable Device (Human body distance < 20cm)	☐

Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing

Ratings and declarations

Bluetooth:

Operating Frequency Range (OFR):	2402 – 2480 MHz
Channels:	79
Channel separation:	1 MHz
Conducted power:	+8.77 dBm
Transmission technique:	FHSS
Modulation:	GFSK, π/4 DQPSK, 8DPSK
Integrated antenna gain:	4 dBi max
External antenna gain:	2.14 dBi

Power Supply

The following wall charger was used during the tests (supplied with 115 V/ 60 Hz).

Charger:

Manufacturer:	PHIHONG
Model:	PSMR11R-120
Serial number:	P73206336A1
Input voltage:	100-240 VAC
Rated current:	0.3A max
Rated frequency:	50-60 Hz
Output voltage:	12 V DC
Output current:	0.84A MAX

Disclaimer

SUMMARY OF TESTING

Test Specification	Description of Test	Result
§15.207(a) / RSS-GEN 7.2.2	Conducted Emissions on Power Supply Lines	**PASS**
§15.247(b)(1) / RSS-210 8.4	Maximum Peak Conducted Output Power	**PASS**
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(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**
§15.209 / RSS-GEN 7.2.3.2	Unintentional Radiated Emissions	**PASS**

EUT Test Conditions during Testing

The EUT was configured into the wanted channel and was in continuous transmit mode during all the tests.

Following channels were used during the tests:

Channel	Frequency/ MHz
LOW (CH 1)	2402
MID (CH 40)	2441
HIGH (CH 79)	2480

Test Facility

☐	Testing Location / address: FCC registration number: **90598**	SGS Fimko Ltd Särkiniementie 3 FI-00210, HELSINKI FINLAND
☒	Testing Location / address: FCC registration number: **178986** Industry Canada registration number: **8708A-2**	SGS Fimko Ltd Karakaarenkuja 4 FI-02610, ESPOO FINLAND

Conducted Emissions In The Frequency Range 150 kHz - 30 MHz.

Standard:	ANSI C63.10	(2009)
Tested by:	JJM	
Date:	23.4.2013	
Temperature:	20 °C	
Humidity:	21 % RH	
Barometric pressure:	1004 hPa	
Measurement uncertainty:	± 2.9 dB	Level of confidence 95 % (k = 2)

FCC Rule: 15.207 (a)

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 power supply (115VAC / 60 Hz) through the LISN.

Frequency of emission (MHz)	**Conducted limit (dBµV)**	
	Quasi-peak	**Average**
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

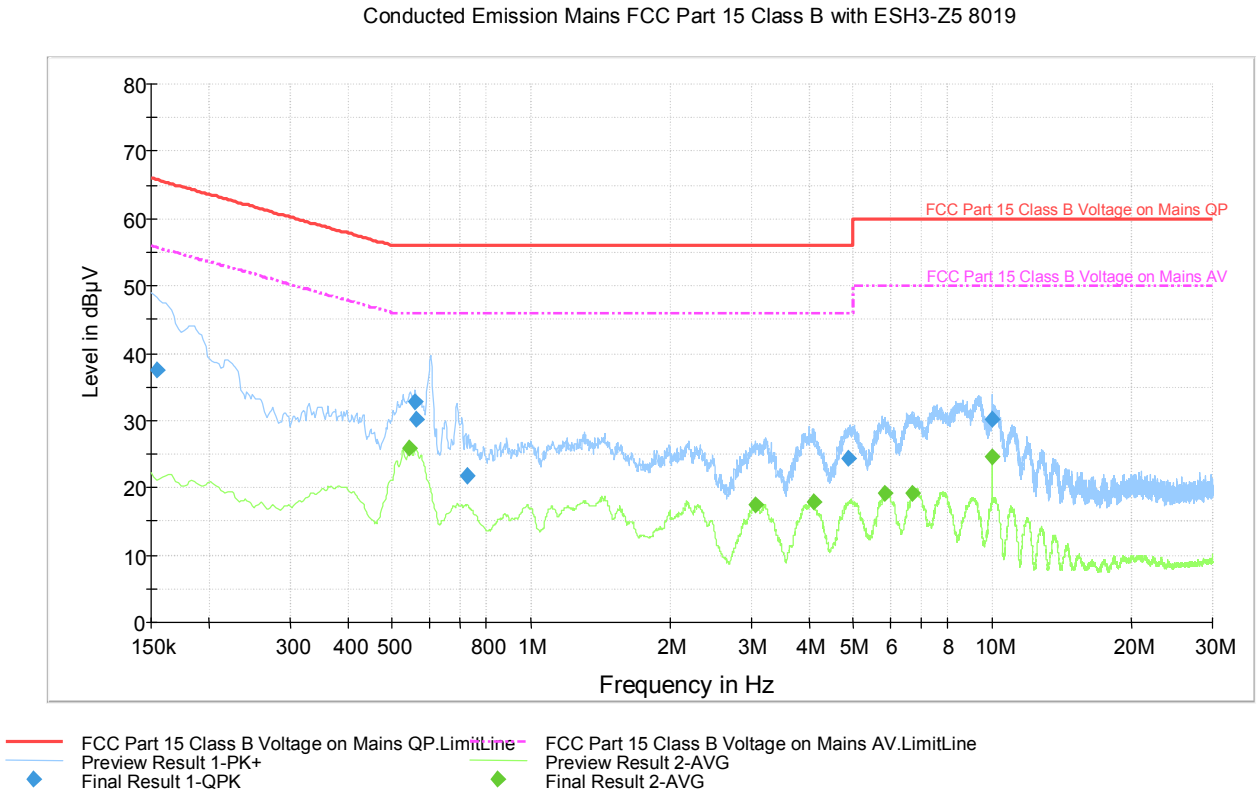

Figure 1. The measured curves with peak- and average detector.

Table 1. Final measurement results with Quasi peak detector.

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time 15x(ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.154500	37.5	1000.0	9.000	GND	L1	10.7	28.2	65.8	
0.561750	32.7	1000.0	9.000	GND	N	10.1	23.3	56.0	
0.564000	30.2	1000.0	9.000	GND	N	10.1	25.8	56.0	
0.726000	21.8	1000.0	9.000	GND	N	10.1	34.2	56.0	
4.881250	24.3	1000.0	9.000	GND	N	10.5	31.7	56.0	
10.000000	30.2	1000.0	9.000	GND	N	10.9	29.8	60.0	

Table 2. Final measurement results with Average detector.

Frequency (MHz)	Average (dBµV)	Meas. Time 15x(ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.543750	26.0	1000.0	9.000	GND	N	10.1	20.0	46.0	
3.076750	17.4	1000.0	9.000	GND	N	10.3	28.6	46.0	
4.089250	18.0	1000.0	9.000	GND	N	10.4	28.0	46.0	
5.855500	19.1	1000.0	9.000	GND	N	10.5	30.9	50.0	
6.701500	19.3	1000.0	9.000	GND	N	10.6	30.7	50.0	
10.000000	24.7	1000.0	9.000	GND	N	10.9	25.3	50.0	

Maximum Peak Conducted Output Power

Standard:	ANSI C63.10	(2009)
Tested by:	RRE	
Date:	3.5.2013	
Humidity:	13 % RH	
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	6.45	30	23.55	PASS
Mid	8.16	30	21.84	PASS
High	8.77	30	21.23	PASS

2 Mbps

Channel	Conducted Power [dBm]	Limit [dBm]	Margin [dBm]	Result
Low	4.81	30	25.19	PASS
Mid	7.13	30	22.87	PASS
High	7.97	30	22.03	PASS

3 Mbps

Channel	Conducted Power [dBm]	Limit [dBm]	Margin [dBm]	Result
Low	5.16	30	24.84	PASS
Mid	7.34	30	22.66	PASS
High	8.17	30	21.83	PASS

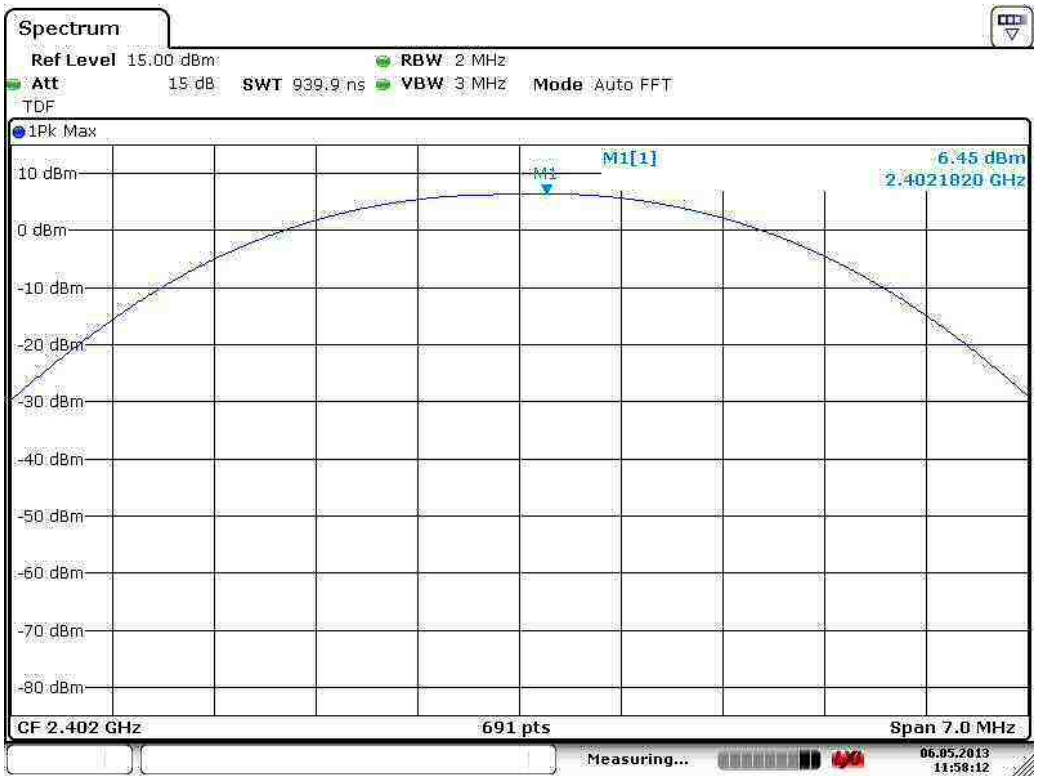

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Figure 2. 1 Mbps Channel LOW.

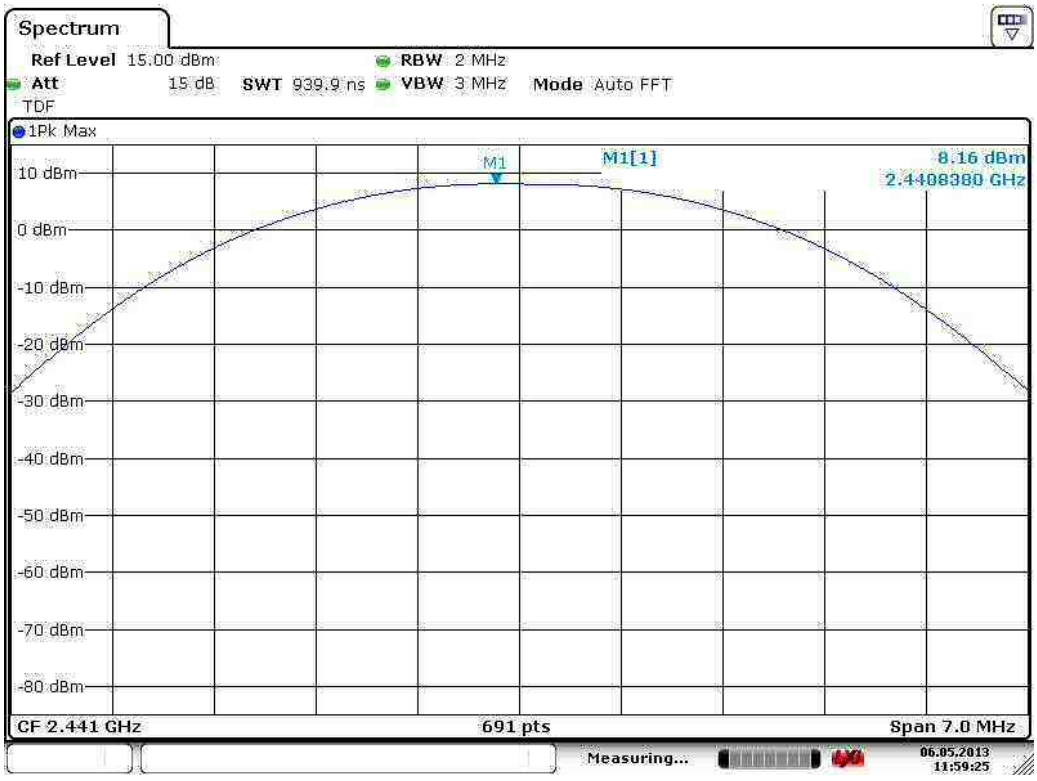

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Figure 3. 1 Mbps Channel MID.

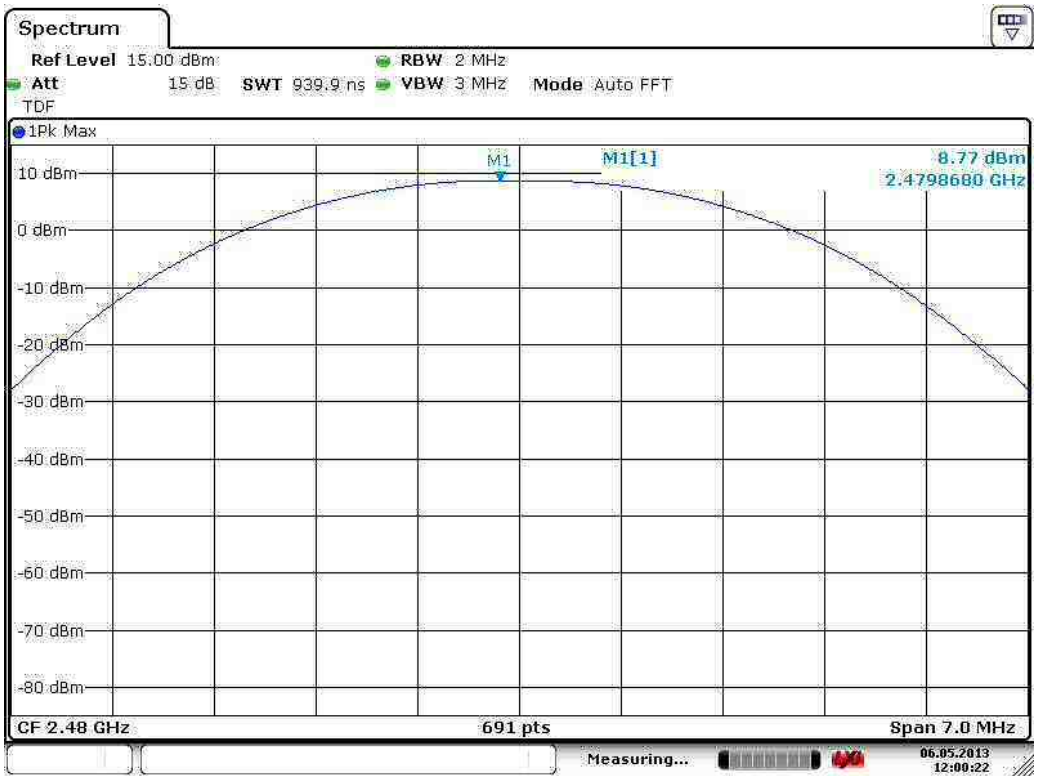

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Figure 4. 1 Mbps Channel HIGH.

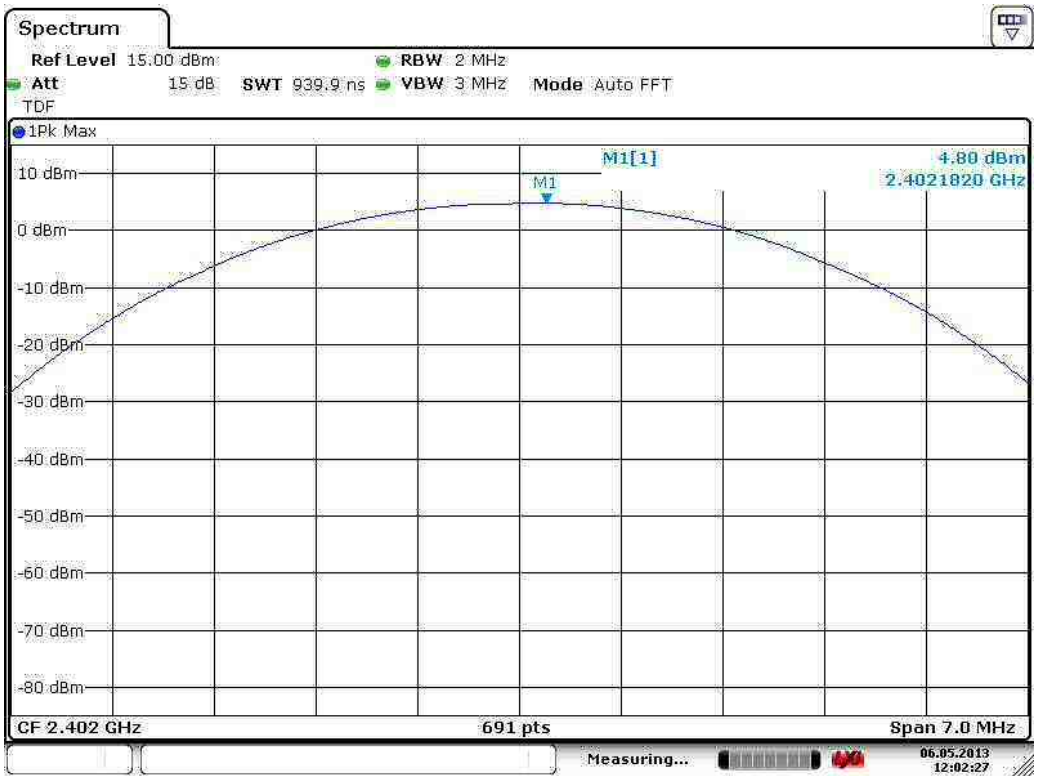

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Figure 5. 2 Mbps Channel LOW.

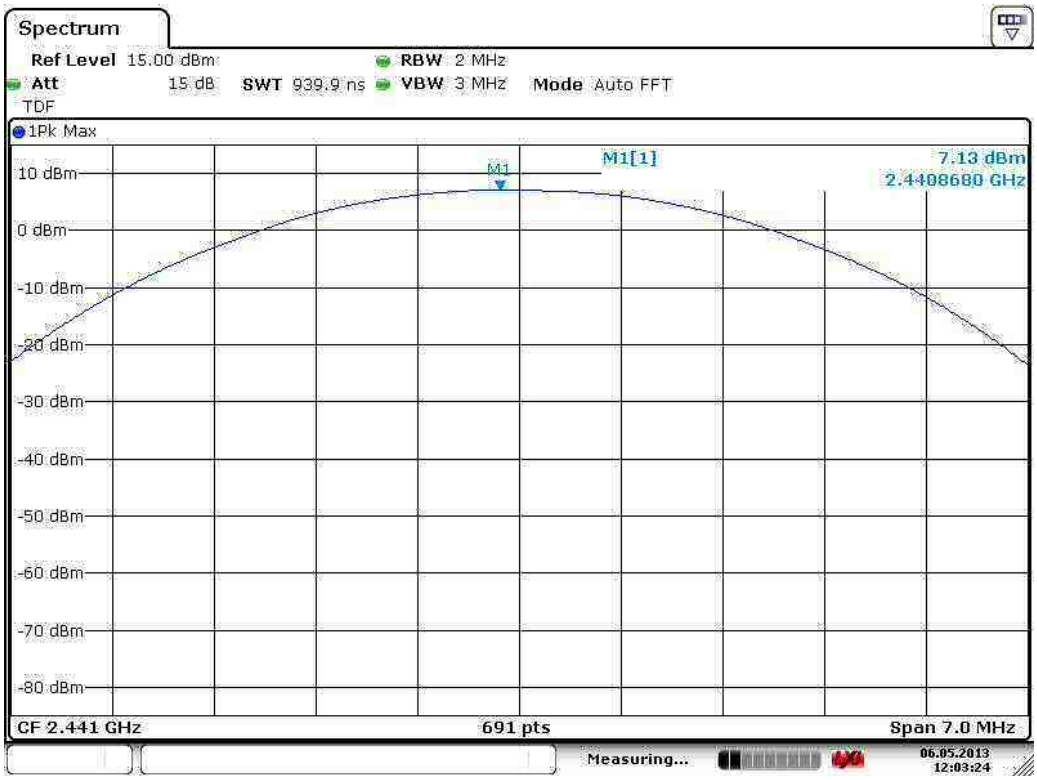

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Figure 6. 2 Mbps Channel MID.

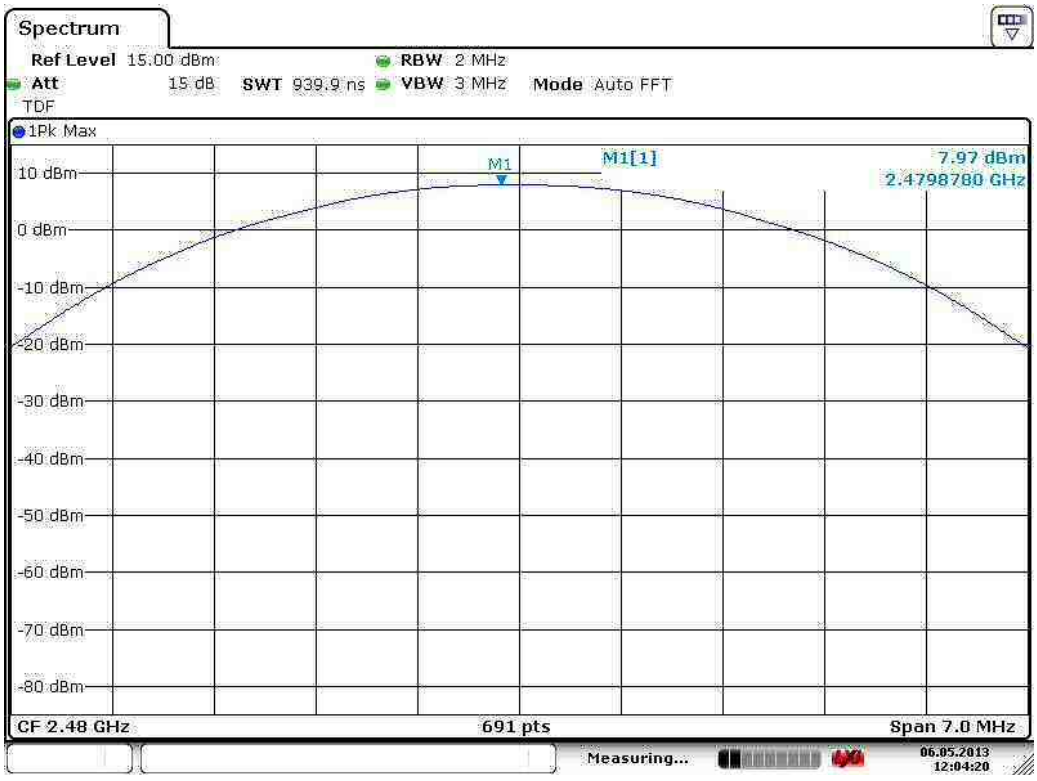

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Figure 7. 2 Mbps Channel HIGH.

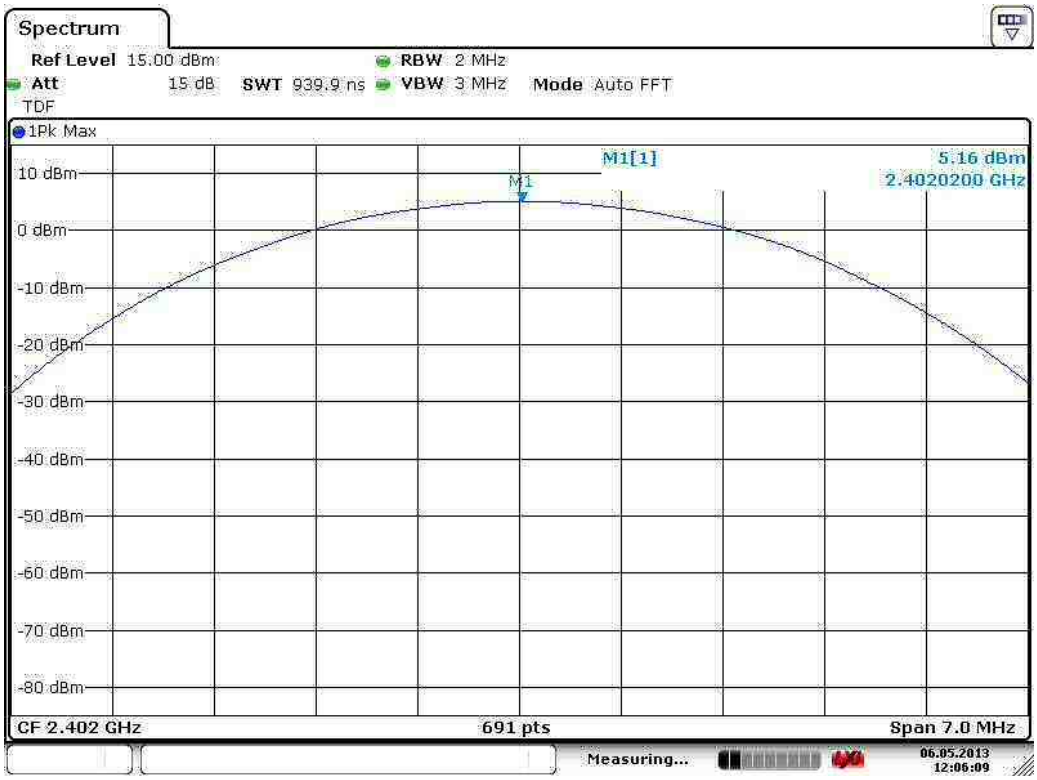

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Figure 8. 3 Mbps Channel LOW.

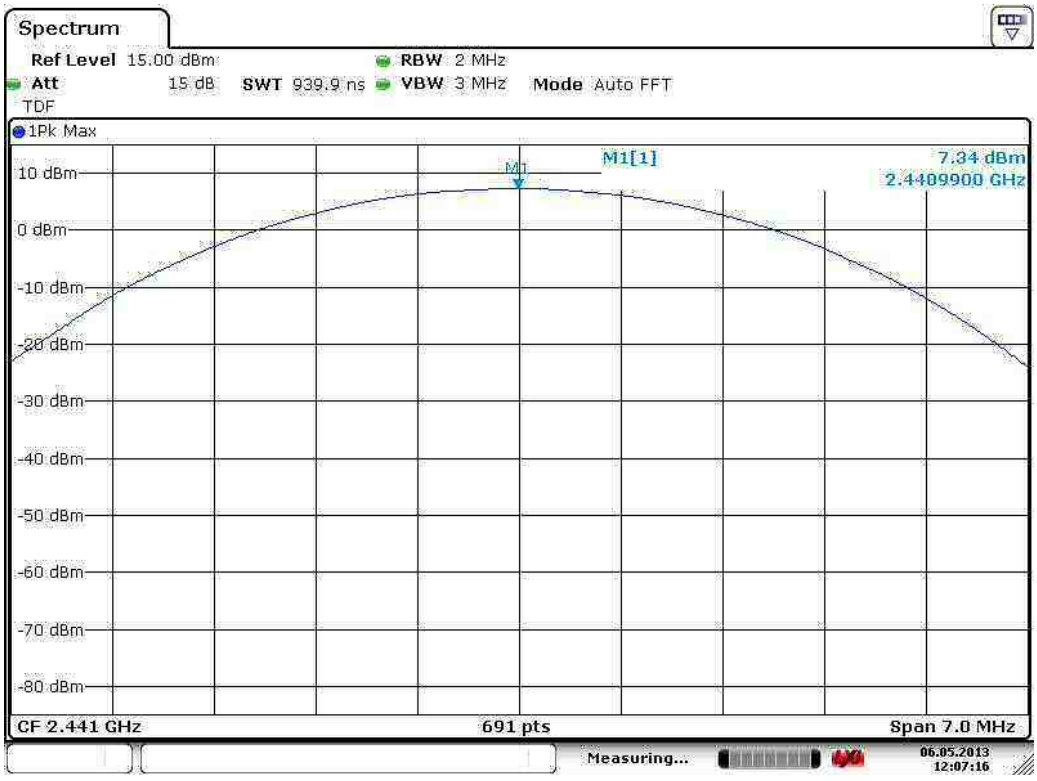

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Figure 9. 3 Mbps Channel MID.

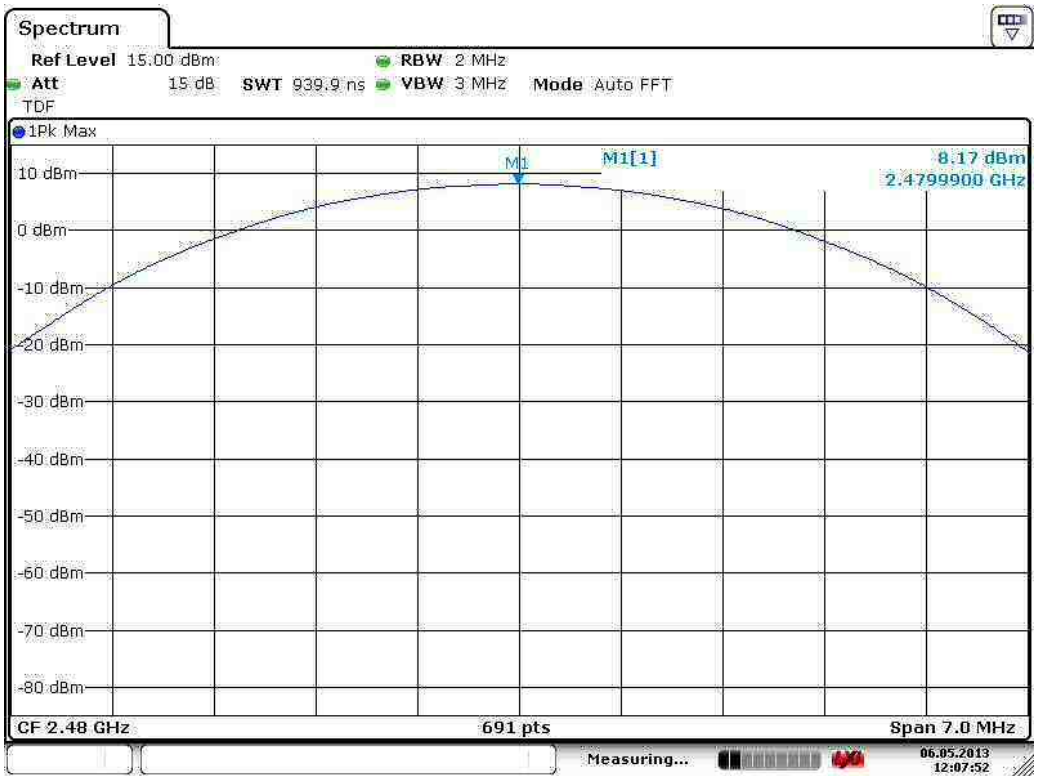

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Figure 10. 3 Mbps Channel HIGH.

Transmitter Radiated Emissions 30 MHz to 26.5 GHz

Standard:	ANSI C63.10	(2009)
Tested by:	RRE	
Date:	6.2.- 24.4.2013	
Temperature:	18 - 20 °C	
Humidity:	20 - 30 % RH	
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 result value is the measured value corrected with the correction factor.

Measurements were done with 1 Mbps (worst case) with intergated and external antenna.

Test results with integrated antenna

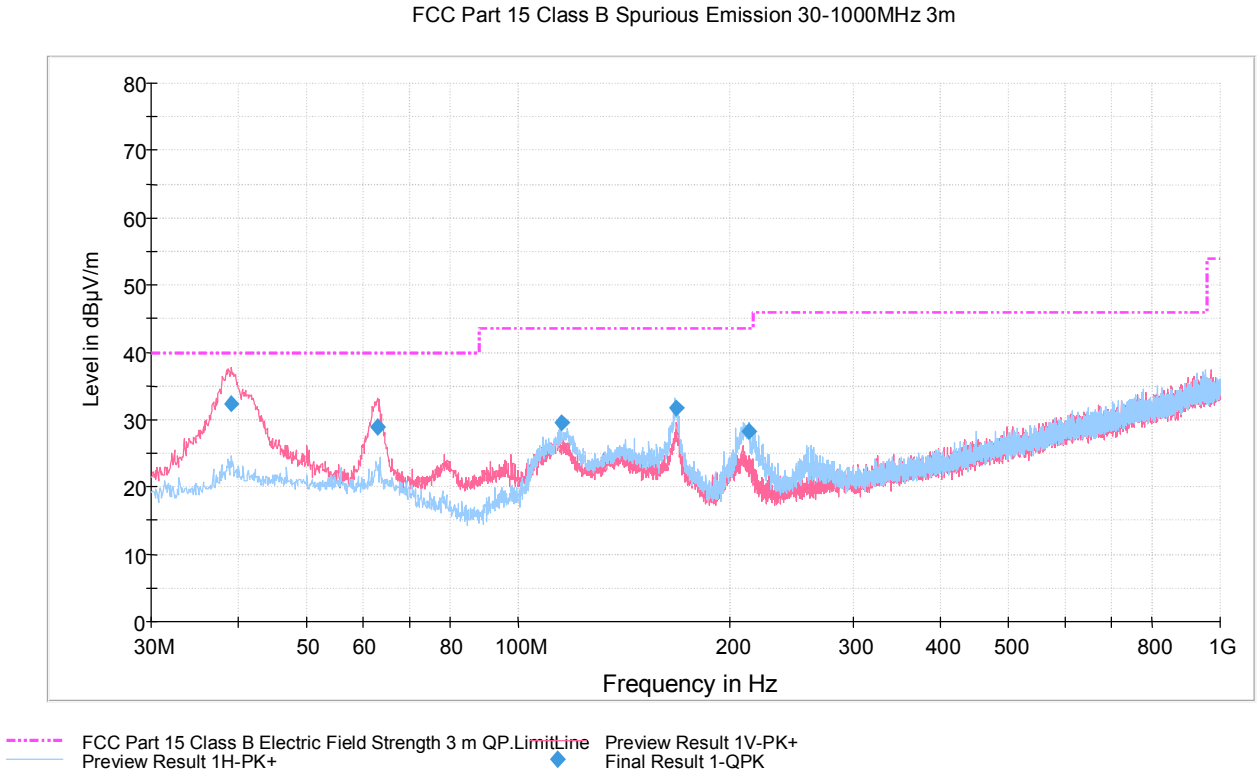

Figure 11. Measured curve with peak-detector. 1 Mbps Channel LOW.

Final measurements from the worst frequencies

Table 3. Final results.

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
38.981000	32.3	1000.0	120.000	100.0	V	293.0	15.1	7.7	40.0	
63.023000	28.9	1000.0	120.000	100.0	V	214.0	14.1	11.1	40.0	
115.109000	29.5	1000.0	120.000	166.0	H	162.0	12.6	14.0	43.5	
167.855000	31.7	1000.0	120.000	184.0	H	80.0	14.6	11.8	43.5	
213.002000	28.3	1000.0	120.000	168.0	H	82.0	11.7	15.2	43.5	

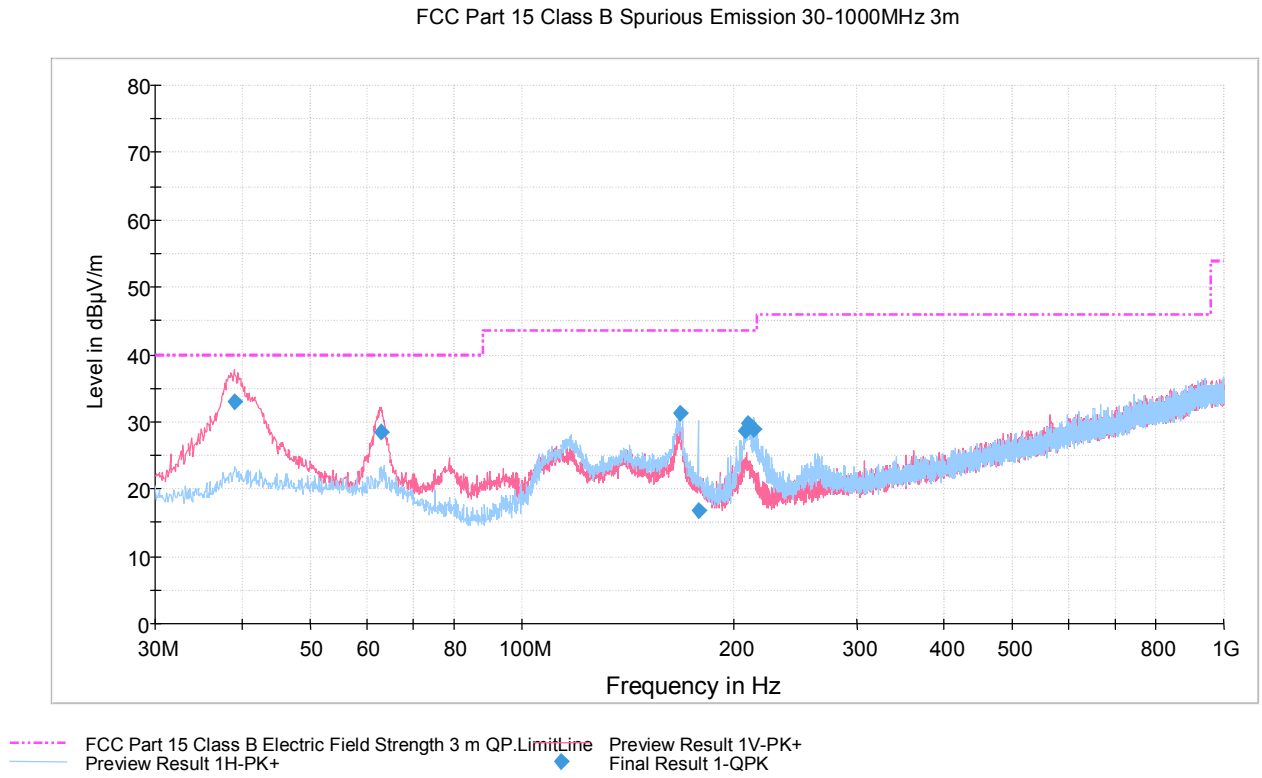

Figure 12. Measured curve with peak-detector. 1 Mbps Channel MID.

Final measurements from the worst frequencies

Table 4. Final results.

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
38.944000	33.1	1000.0	120.000	100.0	V	85.0	15.1	6.9	40.0	
63.012000	28.5	1000.0	120.000	100.0	V	275.0	14.1	11.5	40.0	
168.026000	31.2	1000.0	120.000	183.0	H	78.0	14.6	12.3	43.5	
178.693000	16.8	1000.0	120.000	143.0	H	226.0	13.6	26.7	43.5	
208.480000	28.7	1000.0	120.000	166.0	H	102.0	11.6	14.8	43.5	
210.015000	29.7	1000.0	120.000	144.0	H	99.0	11.7	13.8	43.5	
214.454000	28.9	1000.0	120.000	158.0	H	87.0	11.8	14.6	43.5	

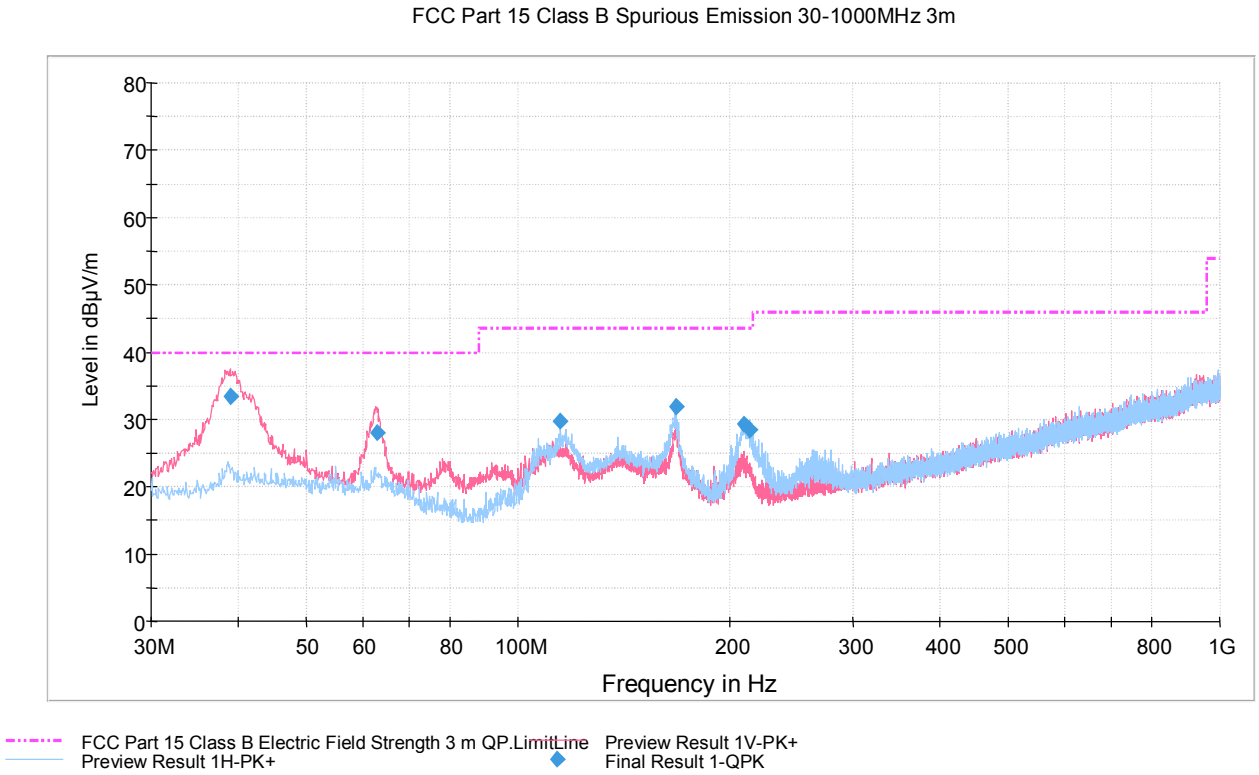

Figure 13. Measured curve with peak-detector. 1 Mbps Channel HIGH.

Final measurements from the worst frequencies

Table 5. Final results.

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
38.944000	33.3	1000.0	120.000	100.0	V	31.0	15.1	6.7	40.0	
63.032000	28.1	1000.0	120.000	100.0	V	292.0	14.1	11.9	40.0	
114.892000	29.7	1000.0	120.000	159.0	H	145.0	12.6	13.8	43.5	
167.969000	31.9	1000.0	120.000	171.0	H	94.0	14.6	11.6	43.5	
210.030000	29.4	1000.0	120.000	167.0	H	89.0	11.7	14.1	43.5	
214.474000	28.4	1000.0	120.000	166.0	H	109.0	11.8	15.1	43.5	

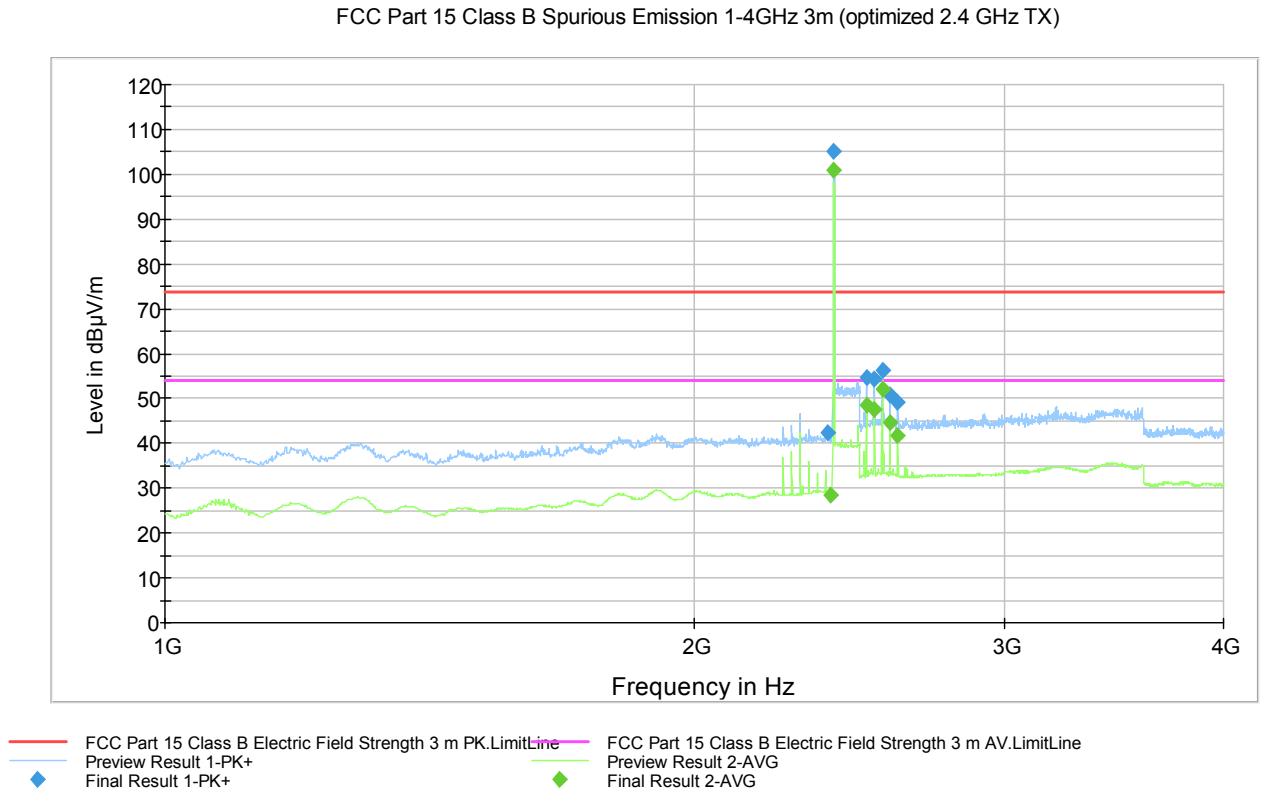

Figure 14. Measured curve with peak- and average detector. 1 Mbps Channel LOW.

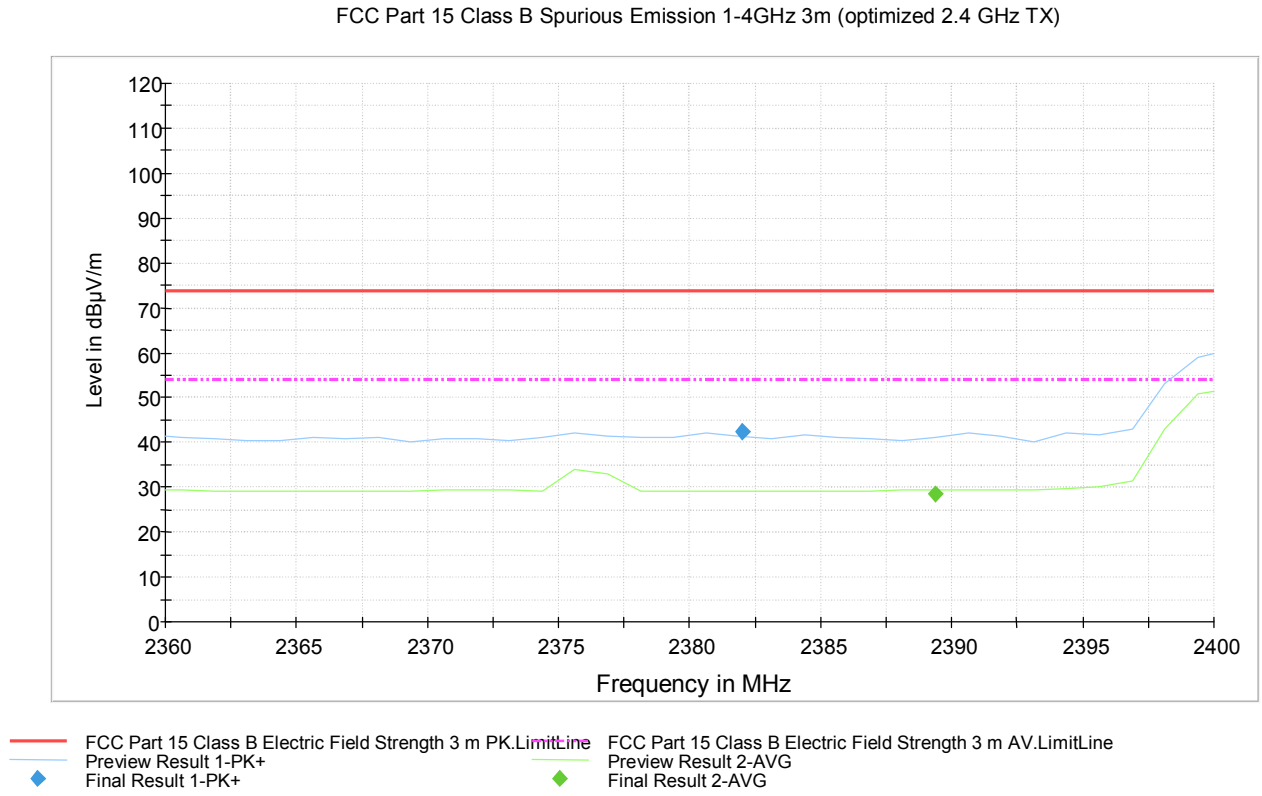

Figure 15. Low channel band edge.

Final measurements from the worst frequencies

Table 6. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2382.000000	42.3	1000.0	1000.000	219.0	H	168.0	4.2	31.6	73.9	Edge
2402.200000	105.0	1000.0	1000.000	154.0	H	146.0	4.4	-	-	Carrier
2506.225000	54.8	1000.0	1000.000	138.0	H	212.0	4.6	19.1	73.9	
2532.075000	54.4	1000.0	1000.000	138.0	H	214.0	4.6	19.5	73.9	
2558.075000	56.2	1000.0	1000.000	131.0	H	218.0	4.7	17.7	73.9	
2584.125000	50.9	1000.0	1000.000	138.0	H	214.0	4.9	23.0	73.9	
2609.975000	49.1	1000.0	1000.000	138.0	H	152.0	5.0	24.8	73.9	

Table 7. Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2389.400000	28.6	1000.0	1000.000	192.0	H	240.0	4.3	25.3	53.9	Edge
2402.000000	100.8	1000.0	1000.000	146.0	H	216.0	4.4	-	-	Carrier
2506.025000	48.4	1000.0	1000.000	227.0	V	199.0	4.6	5.5	53.9	
2532.025000	47.7	1000.0	1000.000	152.0	H	151.0	4.6	6.2	53.9	
2558.075000	52.1	1000.0	1000.000	138.0	H	218.0	4.7	1.8	53.9	
2583.925000	44.5	1000.0	1000.000	138.0	H	187.0	4.9	9.4	53.9	
2609.975000	41.6	1000.0	1000.000	138.0	H	152.0	5.0	12.3	53.9	

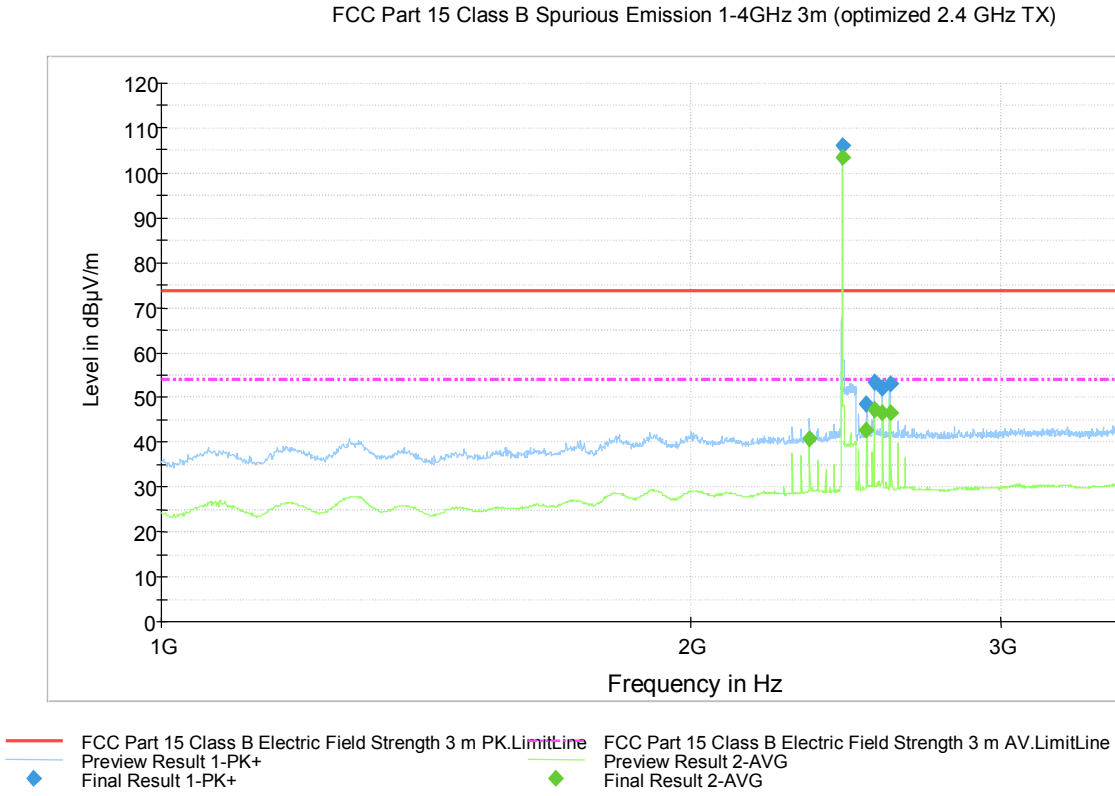

Figure 16. Measured curve with peak- and average detector. 1 Mbps Channel MID.

Final measurements from the worst frequencies

Table 8. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2440.800000	106.2	1000.0	1000.000	146.0	H	218.0	4.1	-	-	Carrier
2518.725000	48.6	1000.0	1000.000	130.0	H	212.0	4.6	25.3	73.9	
2545.175000	53.2	1000.0	1000.000	138.0	H	212.0	4.7	20.7	73.9	
2570.825000	52.1	1000.0	1000.000	130.0	H	214.0	4.8	21.8	73.9	
2597.025000	52.9	1000.0	1000.000	130.0	H	218.0	5.0	21.0	73.9	

Table 9. Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2337.075000	40.8	1000.0	1000.000	163.0	H	140.0	3.8	13.1	53.9	
2441.000000	103.4	1000.0	1000.000	147.0	H	218.0	4.1	-	-	Carrier
2518.925000	42.7	1000.0	1000.000	138.0	H	218.0	4.6	11.2	53.9	
2544.975000	47.2	1000.0	1000.000	224.0	V	195.0	4.7	6.7	53.9	
2571.025000	46.5	1000.0	1000.000	130.0	H	212.0	4.8	7.4	53.9	
2597.025000	46.7	1000.0	1000.000	162.0	H	146.0	5.0	7.2	53.9	

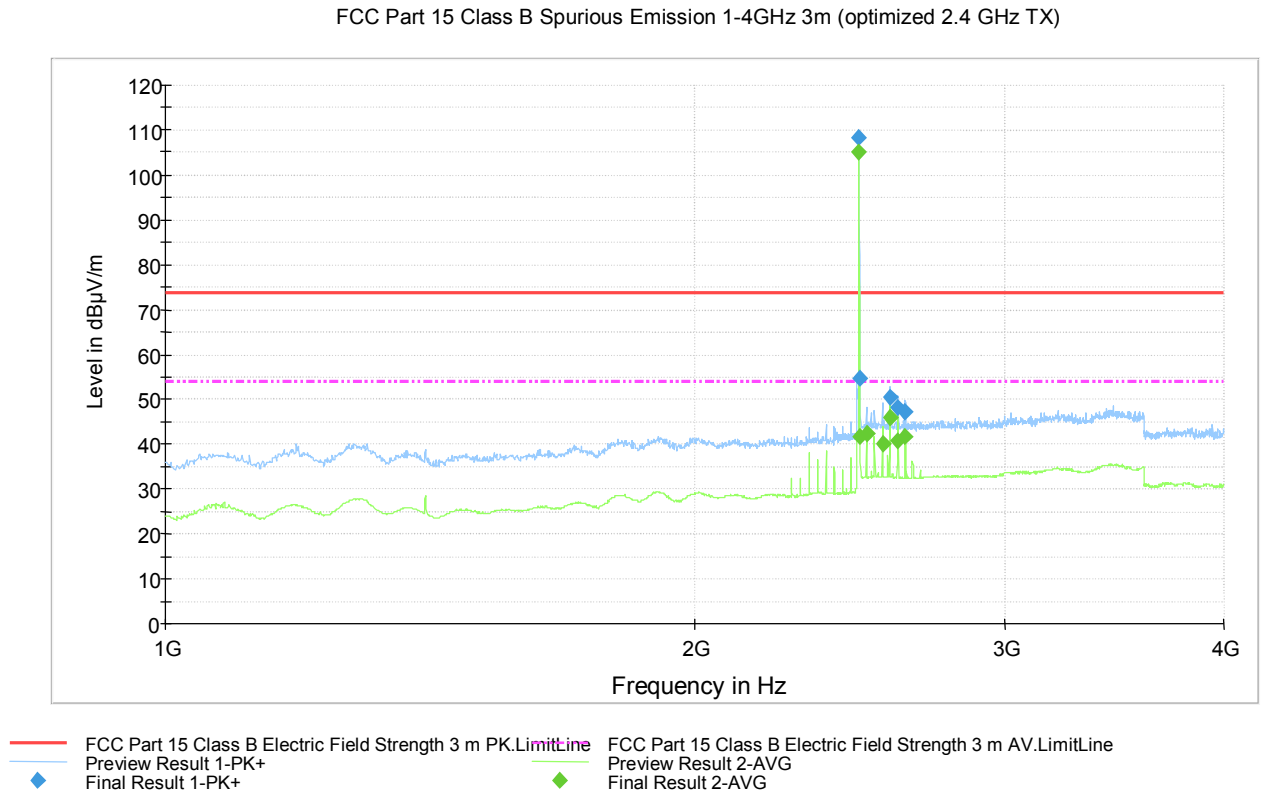

Figure 17. Measured curve with peak- and average detector. 1 Mbps Channel HIGH.

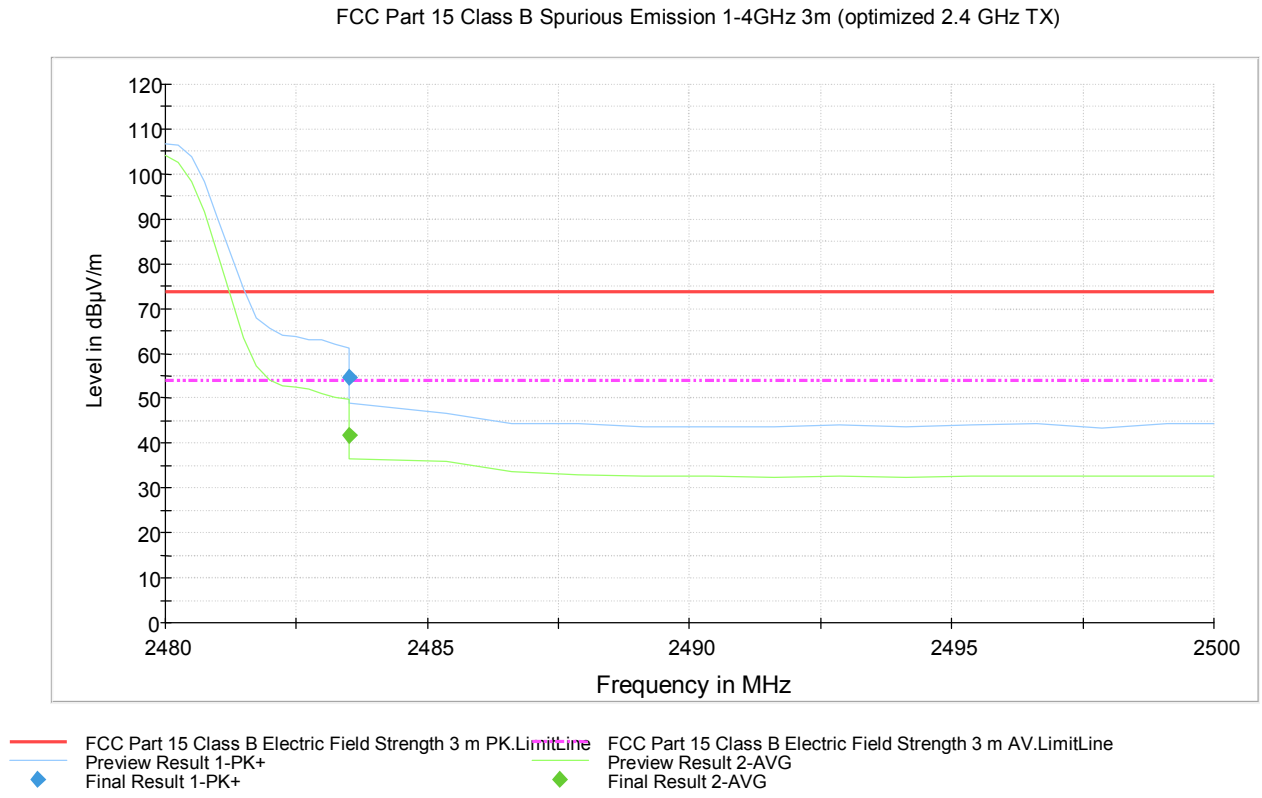

Figure 18. High channel band edge.

Final measurements from the worst frequencies

Table 10. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2479.800000	108.4	1000.0	1000.000	146.0	H	218.0	4.3	-	-	Carrier
2483.500000	54.8	1000.0	1000.000	167.0	H	218.0	4.4	19.1	73.9	Edge
2583.925000	50.5	1000.0	1000.000	155.0	H	212.0	4.9	23.4	73.9	
2609.975000	48.3	1000.0	1000.000	154.0	H	212.0	5.0	25.6	73.9	
2635.775000	47.2	1000.0	1000.000	122.0	H	218.0	4.9	26.7	73.9	

Table 11. Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2480.000000	105.2	1000.0	1000.000	138.0	H	212.0	4.3	-	-	Carrier
2483.500000	41.8	1000.0	1000.000	142.0	H	218.0	4.4	12.1	53.9	Edge
2506.025000	42.4	1000.0	1000.000	139.0	H	218.0	4.6	11.5	53.9	
2558.075000	40.0	1000.0	1000.000	162.0	H	218.0	4.7	13.9	53.9	
2583.925000	45.8	1000.0	1000.000	162.0	H	215.0	4.9	8.1	53.9	
2609.975000	40.7	1000.0	1000.000	143.0	H	219.0	5.0	13.2	53.9	
2636.025000	41.7	1000.0	1000.000	159.0	H	218.0	4.9	12.2	53.9	

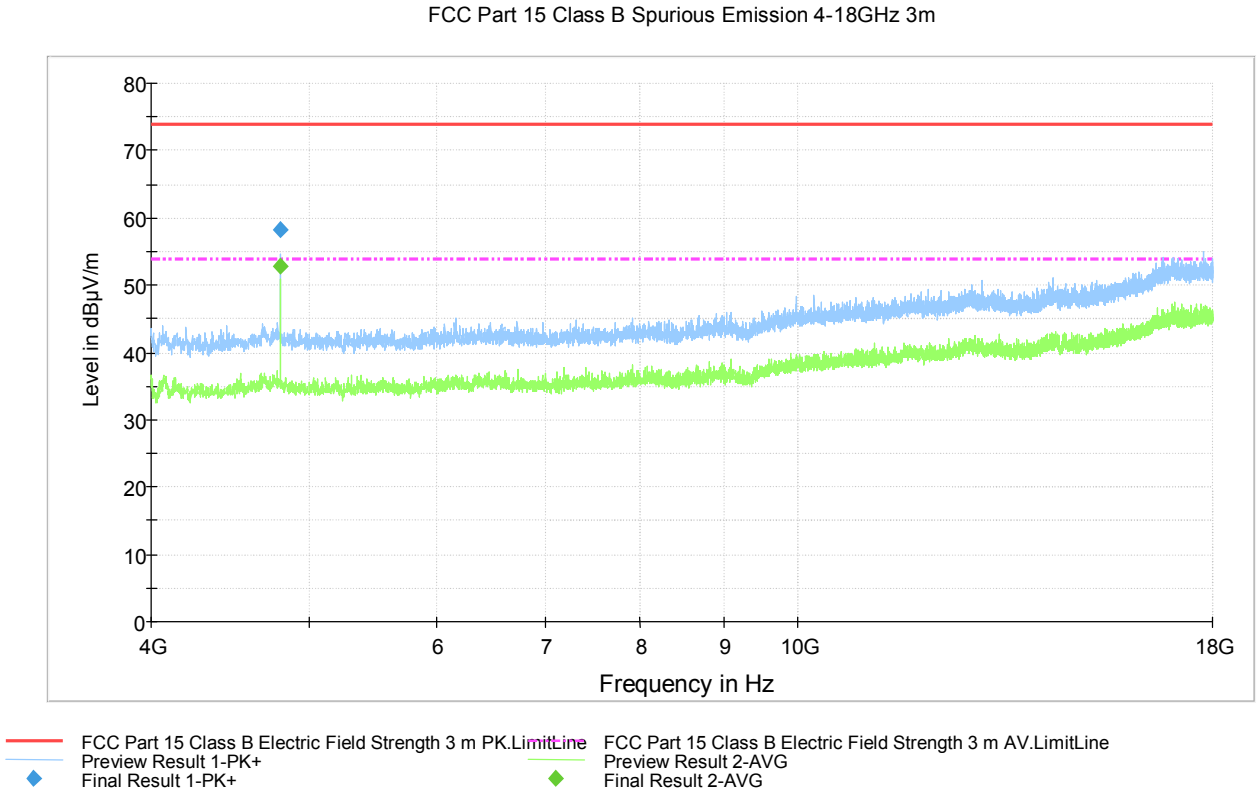

Figure 19. Measured curve with peak- and average detector. 1 Mbps Channel LOW.

Final measurements from the worst frequencies

Table 12. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4804.400000	58.3	1000.0	1000.000	129.0	H	164.0	10.6	15.6	73.9	

Table 13. Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4804.000000	52.8	1000.0	1000.000	130.0	H	162.0	10.6	1.1	53.9	

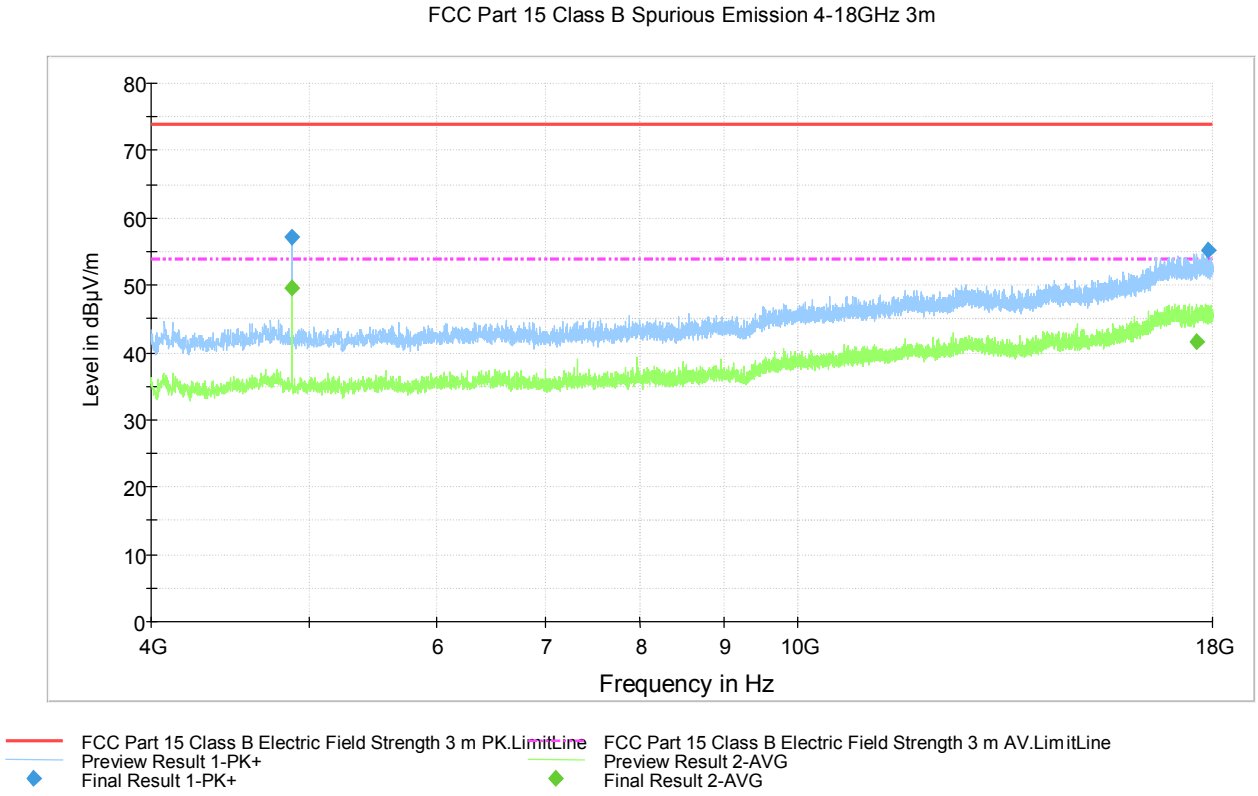

Figure 20. Measured curve with peak- and average detector. 1 Mbps Channel MID.

Final measurements from the worst frequencies

Table 14. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4881.600000	57.1	1000.0	1000.00	122.0	V	295.0	10.5	16.8	73.9	
17873.200000	55.2	1000.0	1000.00	306.0	V	232.0	26.3	18.7	73.9	

Table 15. Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time 15x(m	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4882.000000	49.6	1000.0	1000.000	100.0	V	300.0	10.5	4.3	53.9	
17585.000000	41.5	1000.0	1000.000	100.0	H	295.0	26.0	12.4	53.9	

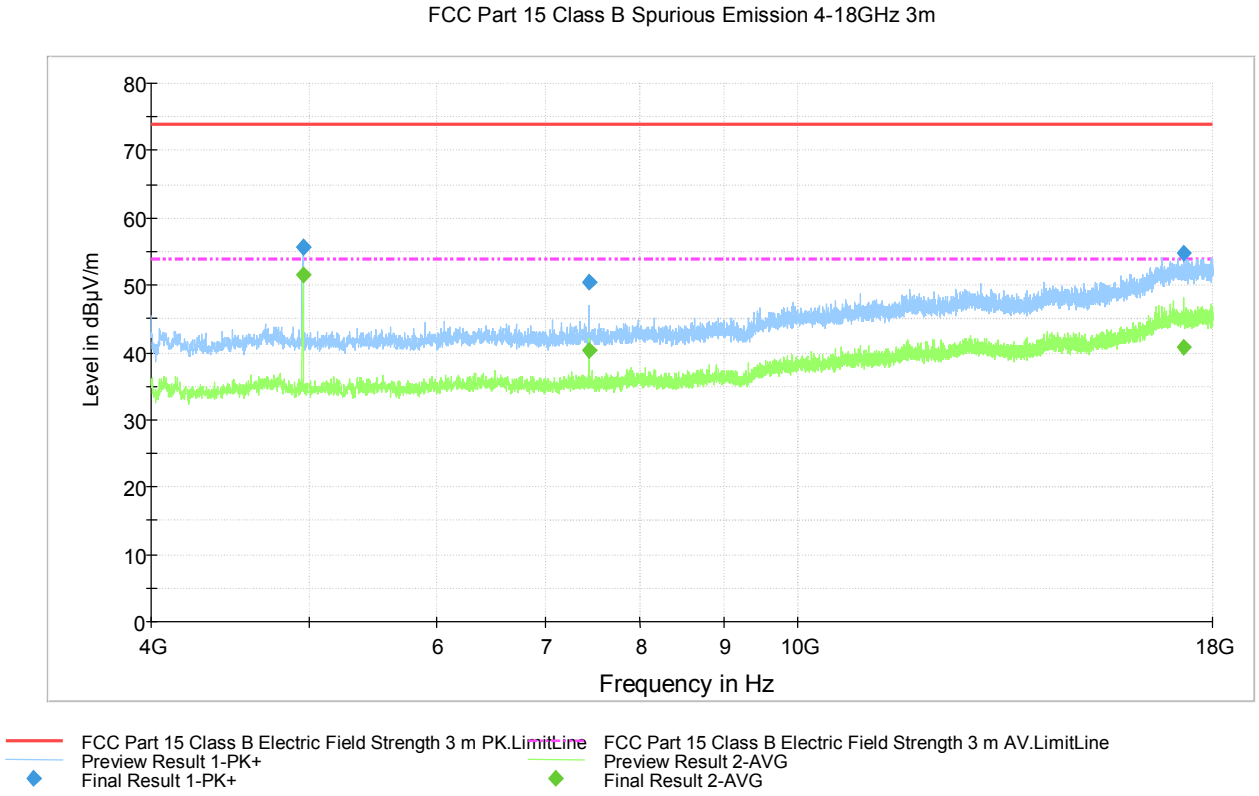

Figure 21. Measured curve with peak- and average detector. 1 Mbps Channel HIGH.

Final measurements from the worst frequencies

Table 16. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4960.400000	55.7	1000.0	1000.000	130.0	V	291.0	10.4	18.2	73.9	
7440.400000	50.5	1000.0	1000.000	122.0	H	48.0	12.5	23.4	73.9	
17265.200000	54.8	1000.0	1000.000	269.0	H	199.0	25.5	19.1	73.9	

Table 17. Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4960.000000	51.6	1000.0	1000.000	122.0	H	67.0	10.4	2.3	53.9	
7440.000000	40.2	1000.0	1000.000	114.0	H	48.0	12.5	13.7	53.9	
17265.400000	40.8	1000.0	1000.000	100.0	H	212.0	25.5	13.1	53.9	

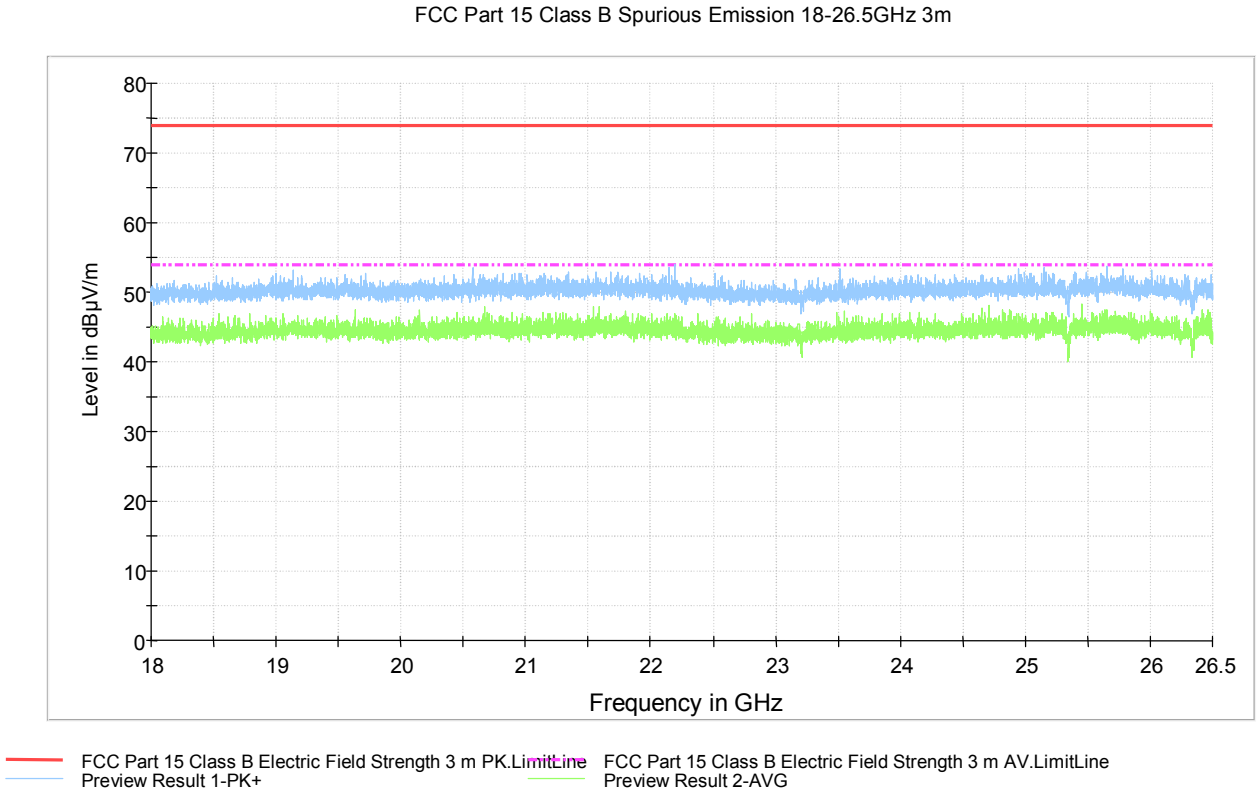

Figure 22. Measured curve with peak- and average detector. 1 Mbps Channel LOW.

Final measurements from the worst frequencies

Due to the low emission level no final measurements were made.

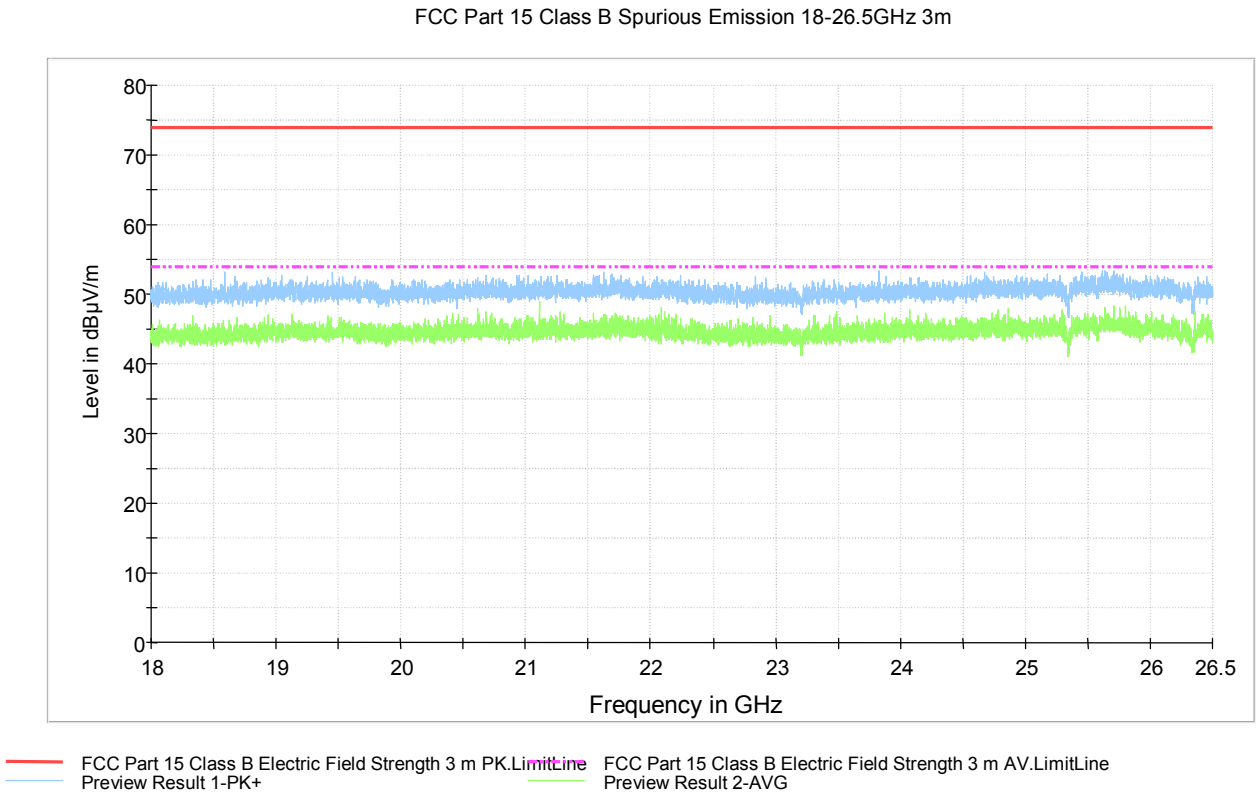

Figure 23. Measured curve with peak- and average detector. 1 Mbps Channel MID.

Final measurements from the worst frequencies

Due to the low emission level no final measurements were made.

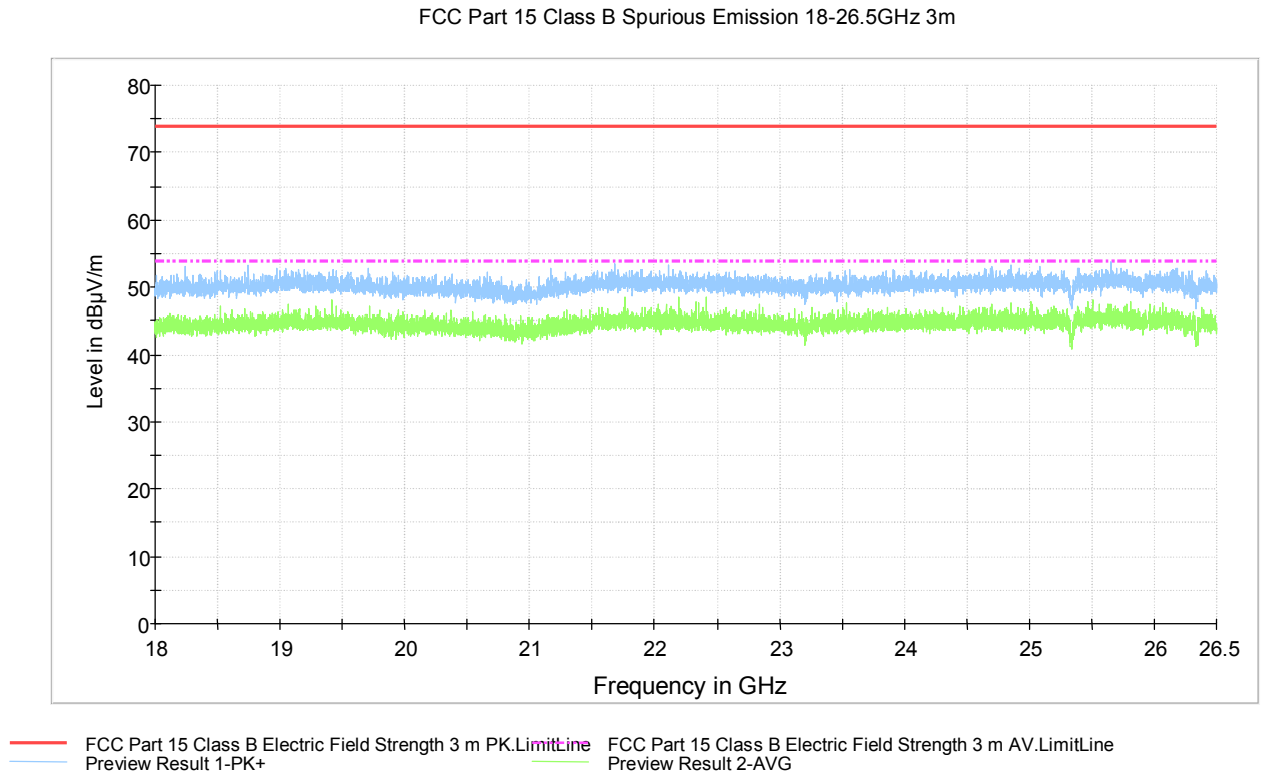

Figure 24. Measured curve with peak- and average detector. 1 Mbps Channel HIGH.

Final measurements from the worst frequencies

Due to the low emission level no final measurements were made.

Test results with external antenna

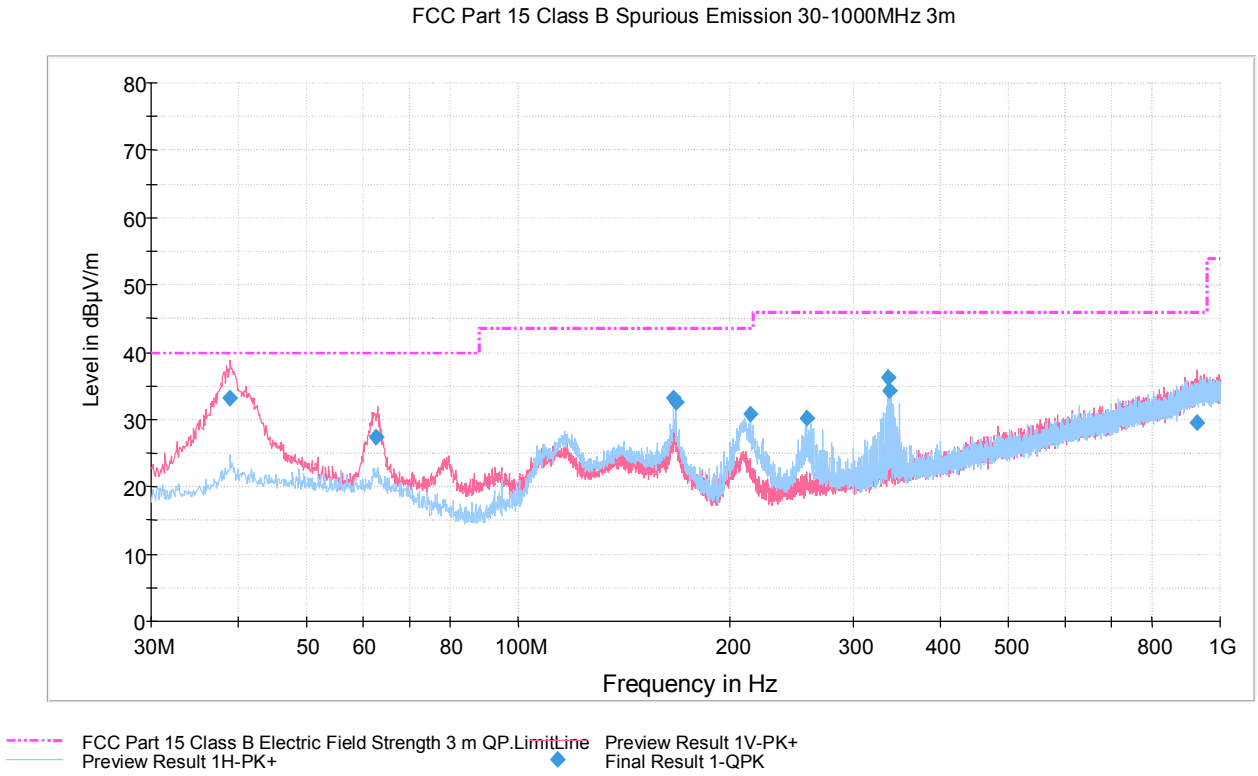

Figure 25. Measured curve with peak-detector. 1 Mbps Channel LOW.

Final measurements from the worst frequencies

Table 18. Final results.

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
38.767000	33.2	1000.0	120.000	100.0	V	62.0	15.1	6.8	40.0	
62.840000	27.5	1000.0	120.000	100.0	V	248.0	14.1	12.5	40.0	
166.499000	33.2	1000.0	120.000	166.0	H	94.0	14.7	10.3	43.5	
167.994000	32.5	1000.0	120.000	177.0	H	87.0	14.6	11.0	43.5	
214.457000	30.9	1000.0	120.000	163.0	H	96.0	11.8	12.6	43.5	
257.990000	30.2	1000.0	120.000	115.0	H	100.0	13.8	15.8	46.0	
335.995000	36.2	1000.0	120.000	100.0	H	140.0	16.1	9.8	46.0	
337.490000	34.4	1000.0	120.000	100.0	H	140.0	16.1	11.6	46.0	
926.240000	29.6	1000.0	120.000	100.0	V	207.0	26.9	16.4	46.0	

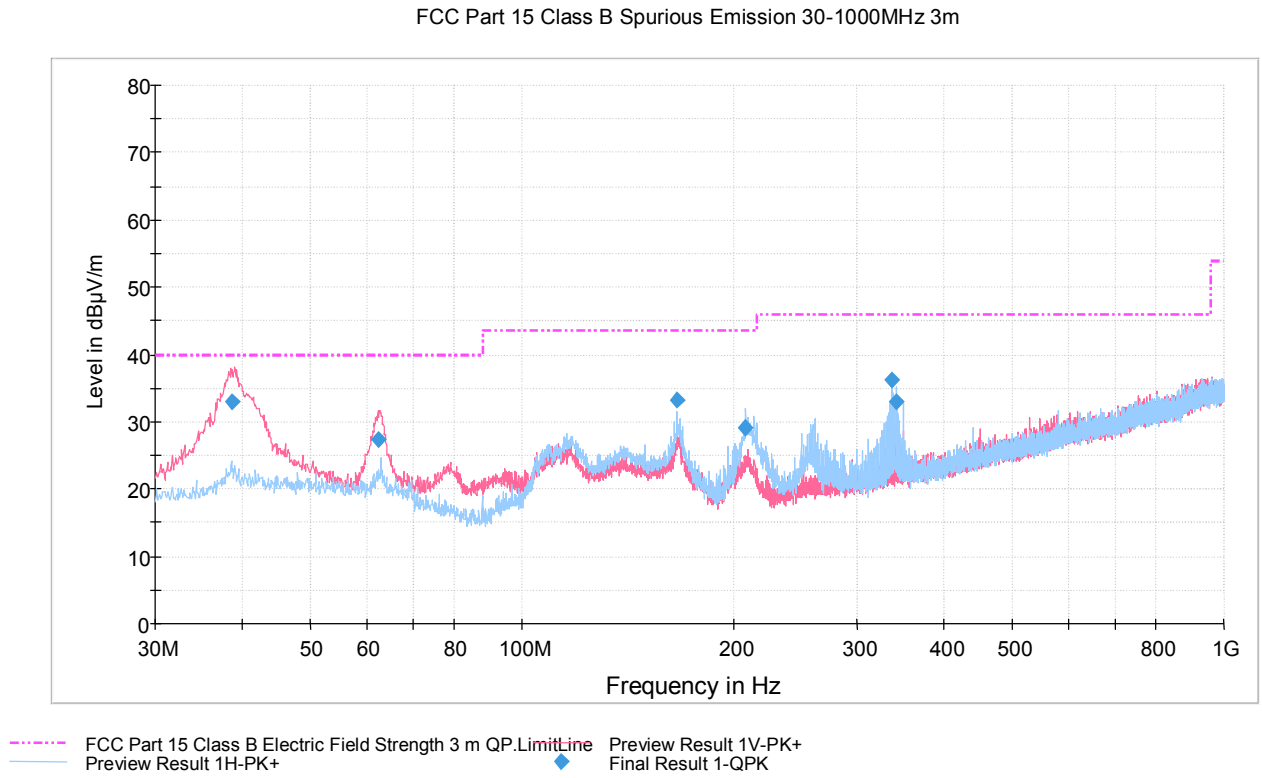

Figure 26. Measured curve with peak-detector. 1 Mbps Channel MID.

Final measurements from the worst frequencies

Table 19. Final results.

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
38.661000	33.0	1000.0	120.000	100.0	V	84.0	15.0	7.0	40.0	
62.461000	27.5	1000.0	120.000	100.0	V	220.0	14.1	12.5	40.0	
166.499000	33.3	1000.0	120.000	165.0	H	88.0	14.7	10.2	43.5	
208.480000	29.1	1000.0	120.000	116.0	H	100.0	11.6	14.4	43.5	
335.995000	36.2	1000.0	120.000	100.0	H	143.0	16.1	9.8	46.0	
340.477000	33.1	1000.0	120.000	100.0	H	139.0	16.1	12.9	46.0	

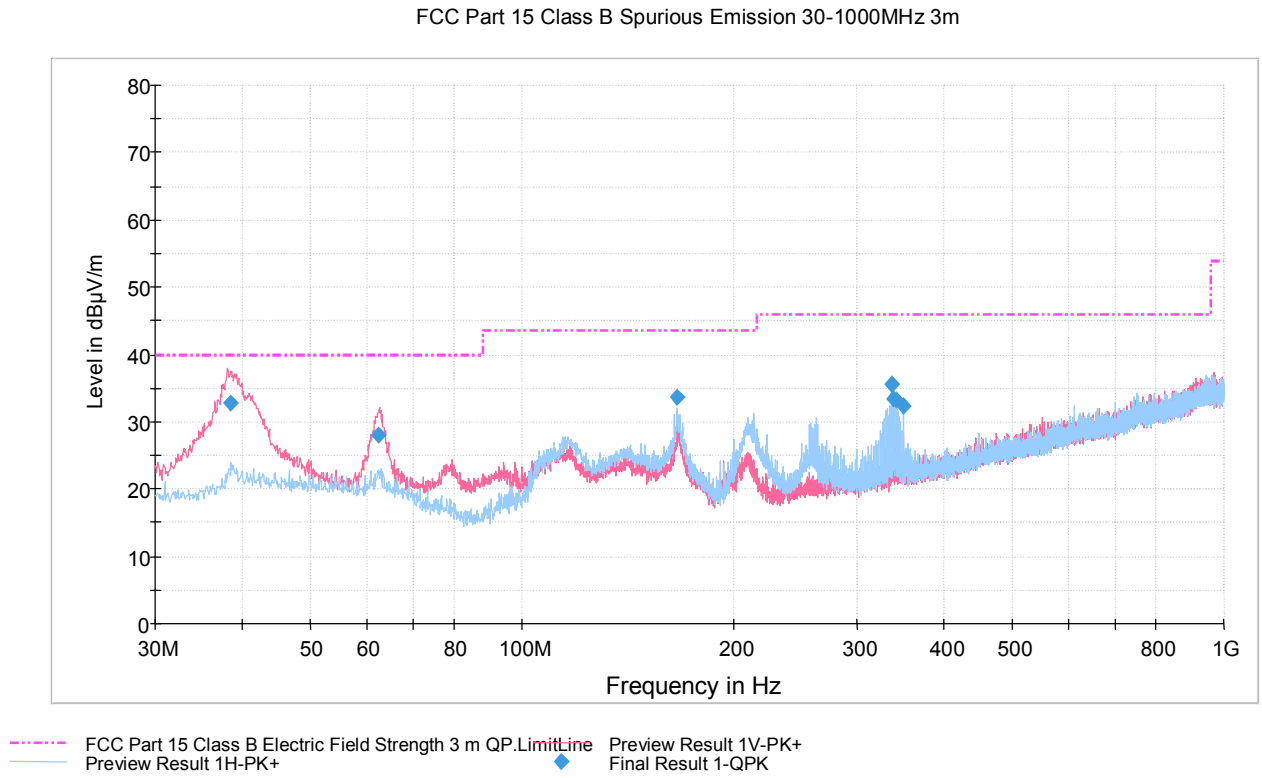

Figure 27. Measured curve with peak-detector. 1 Mbps Channel HIGH.

Final measurements from the worst frequencies

Table 20. Final results.

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
38.331000	32.9	1000.0	120.000	100.0	V	63.0	15.0	7.1	40.0	
62.472000	28.0	1000.0	120.000	100.0	V	256.0	14.1	12.0	40.0	
166.499000	33.6	1000.0	120.000	171.0	H	87.0	14.7	9.9	43.5	
335.975000	35.6	1000.0	120.000	100.0	H	142.0	16.1	10.4	46.0	
337.490000	33.3	1000.0	120.000	100.0	H	330.0	16.1	12.7	46.0	
340.497000	33.2	1000.0	120.000	100.0	H	136.0	16.1	12.8	46.0	
350.003000	32.3	1000.0	120.000	110.0	H	321.0	16.3	13.7	46.0	

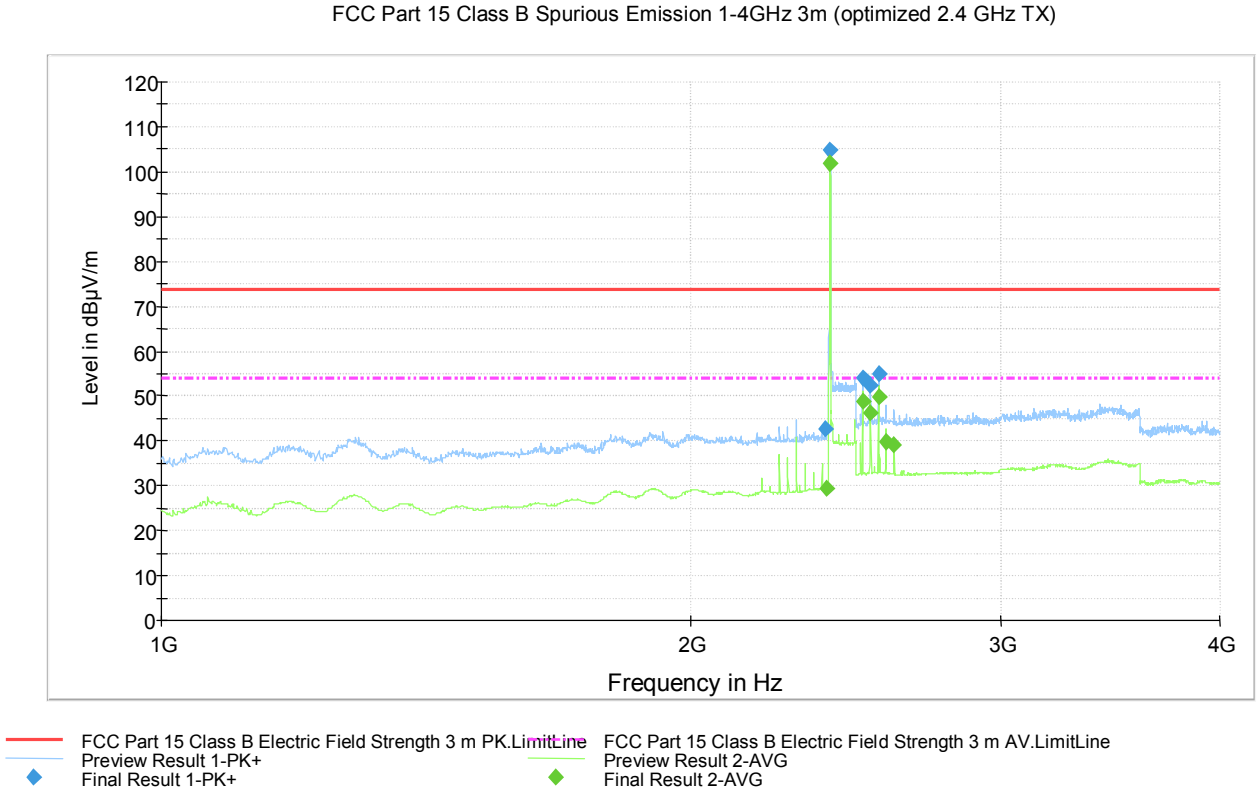

Figure 28. Measured curve with peak- and average detector. 1 Mbps Channel LOW.

Final measurements from the worst frequencies

Table 21. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2387.400000	42.8	1000.0	1000.000	187.0	V	140.0	4.3	31.1	73.9	
2401.800000	104.8	1000.0	1000.000	146.0	V	146.0	4.4	-	-	Carrier
2505.775000	54.1	1000.0	1000.000	100.0	V	151.0	4.6	19.8	73.9	
2532.225000	52.5	1000.0	1000.000	170.0	V	146.0	4.6	21.4	73.9	
2557.875000	54.8	1000.0	1000.000	138.0	V	152.0	4.7	19.1	73.9	

Table 22. Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2389.600000	29.5	1000.0	1000.000	123.0	V	142.0	4.3	24.4	53.9	
2402.000000	101.8	1000.0	1000.000	146.0	V	146.0	4.4	-	-	Carrier
2506.025000	48.9	1000.0	1000.000	162.0	V	30.0	4.6	5.0	53.9	
2532.025000	46.1	1000.0	1000.000	195.0	V	23.0	4.6	7.8	53.9	
2558.075000	49.9	1000.0	1000.000	137.0	V	152.0	4.7	4.0	53.9	
2583.925000	39.6	1000.0	1000.000	154.0	V	22.0	4.9	14.3	53.9	
2609.975000	39.1	1000.0	1000.000	130.0	V	21.0	5.0	14.8	53.9	

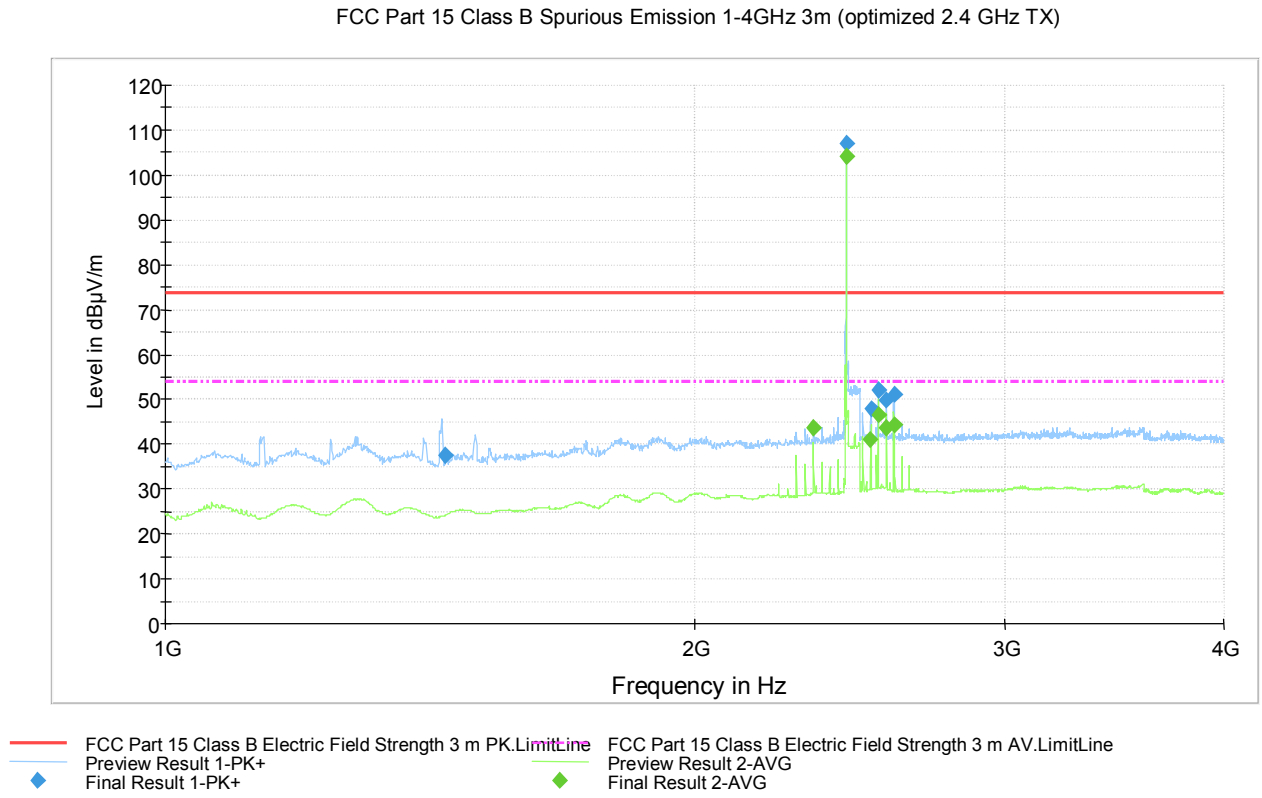

Figure 29. Measured curve with peak- and average detector. 1 Mbps Channel MID.

Final measurements from the worst frequencies

Table 23. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
1441.475000	37.4	1000.0	1000.000	105.0	V	32.0	-2.5	36.5	73.9	
2440.800000	106.9	1000.0	1000.000	146.0	V	146.0	4.1	-	-	Carrier
2519.125000	47.8	1000.0	1000.000	130.0	V	154.0	4.6	26.1	73.9	
2544.975000	52.2	1000.0	1000.000	100.0	V	152.0	4.7	21.7	73.9	
2571.225000	49.7	1000.0	1000.000	100.0	V	154.0	4.8	24.2	73.9	
2597.025000	50.9	1000.0	1000.000	100.0	V	152.0	5.0	23.0	73.9	

Table 24. Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2337.075000	43.6	1000.0	1000.000	189.0	V	140.0	3.8	10.3	53.9	
2441.000000	104.1	1000.0	1000.000	146.0	V	146.0	4.1	-	-	Carrier
2518.925000	41.1	1000.0	1000.000	114.0	V	152.0	4.6	12.8	53.9	
2544.975000	46.7	1000.0	1000.000	100.0	V	149.0	4.7	7.2	53.9	
2571.025000	43.8	1000.0	1000.000	100.0	V	152.0	4.8	10.1	53.9	
2597.025000	44.4	1000.0	1000.000	100.0	V	32.0	5.0	9.5	53.9	

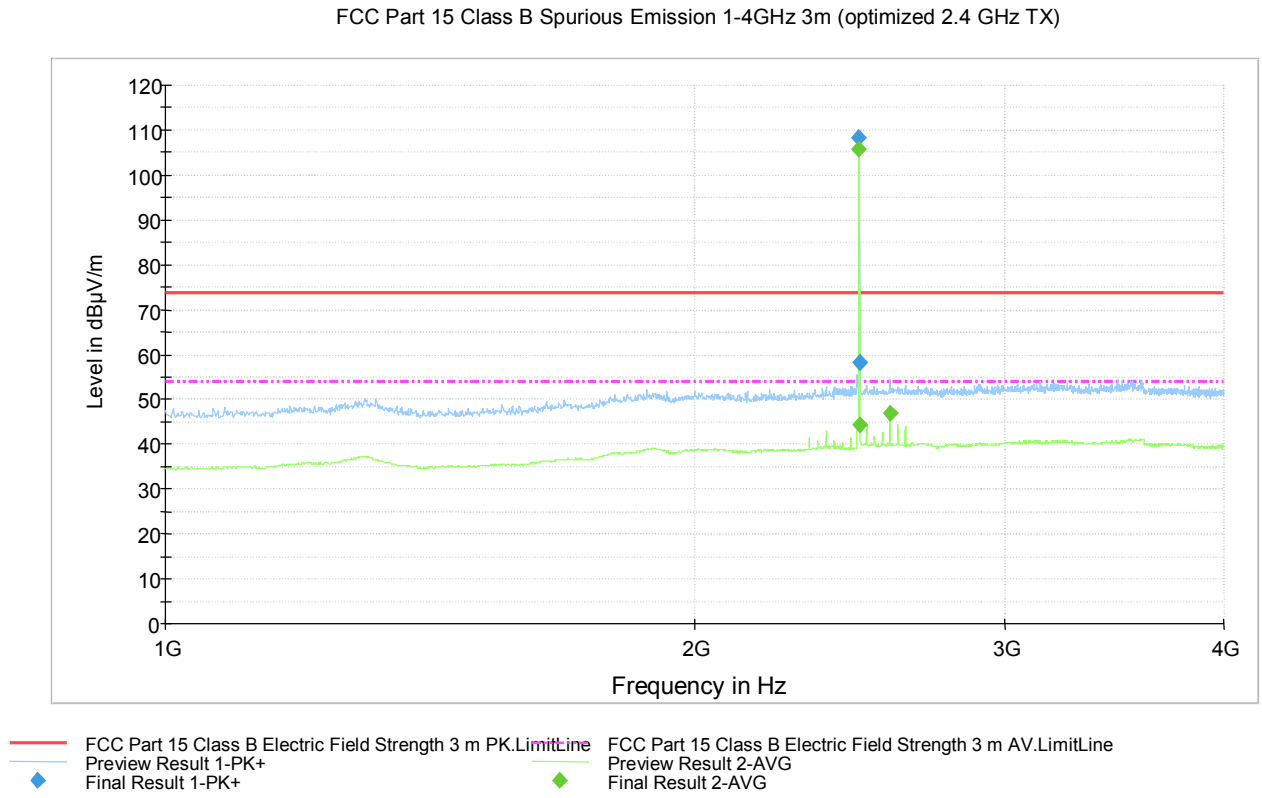

Figure 30. Measured curve with peak- and average detector. 1 Mbps Channel HIGH.

Final measurements from the worst frequencies

Table 25. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2480.000000	108.4	1000.0	1000.000	114.0	V	140.0	14.4	-	-	Carrier
2483.500000	58.3	1000.0	1000.000	114.0	V	150.0	14.5	15.6	73.9	

Table 26. 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	105.7	1000.0	1000.000	114.0	V	140.0	14.4	-	-	Carrier
2483.500000	44.5	1000.0	1000.000	114.0	V	140.0	14.5	9.4	53.9	
2583.925000	46.9	1000.0	1000.000	138.0	V	158.0	14.9	7.0	53.9	

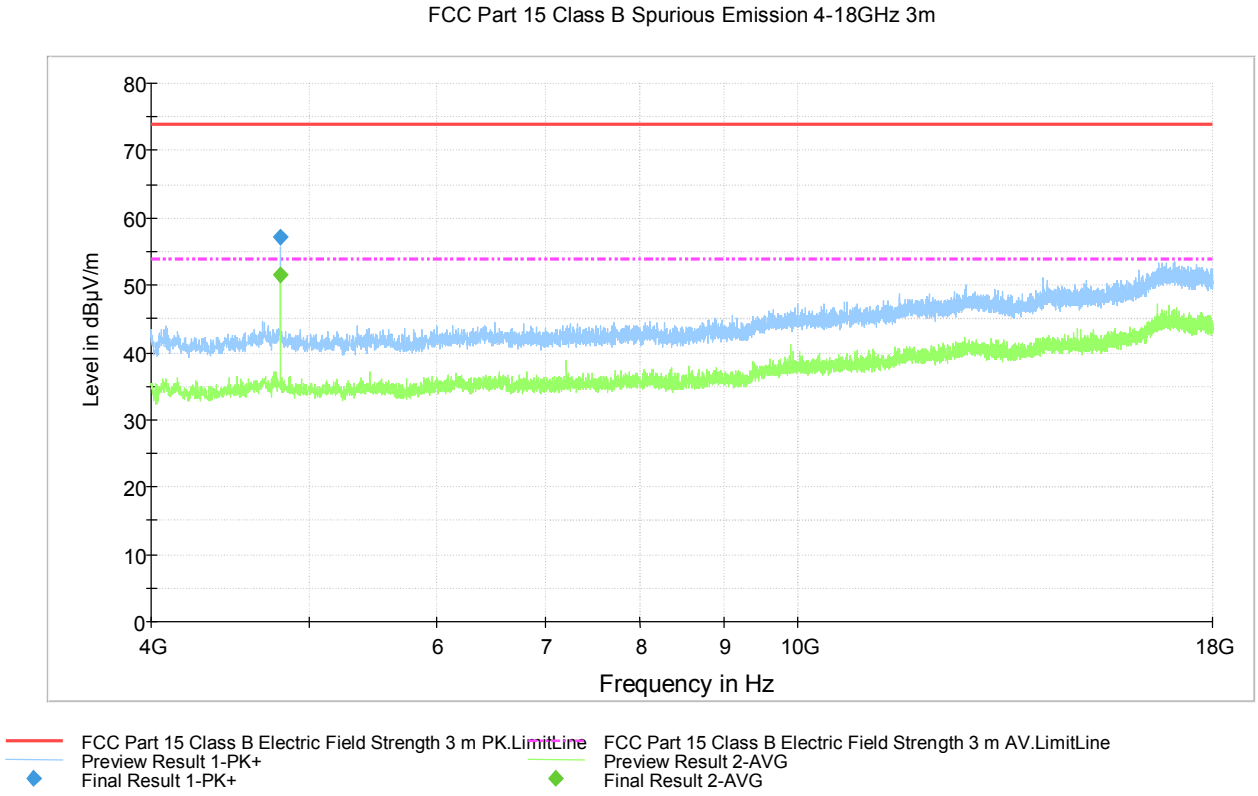

Figure 31. Measured curve with peak- and average detector. 1 Mbps Channel LOW.

Final measurements from the worst frequencies

Table 27. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4804.400000	57.2	1000.0	1000.000	122.0	H	28.0	10.5	16.7	73.9	

Table 28. Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time 15x(ms)	Bandwidth (kHz)	Height (cm)	Pol.	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4804.000000	51.4	1000.0	1000.000	122.0	H	28.0	10.5	2.5	53.9	