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 (Low Energy 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:	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 (April 9, 2013)

Date: May 29, 2013
Issued by:
Rauno Repo
Testing Engineer

Date: May 29, 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 Low Energy 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

Low Energy Bluetooth:

Operating Frequency Range (OFR):	2402 – 2480 MHz
Channels:	40
Channel separation:	2 MHz
Conducted power:	+8.13 dBm
Transmission technique:	Digital transmission
Modulation:	GFSK
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

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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)(3) / RSS-210 8.4	Maximum Peak Conducted Output Power	PASS
§15.247(a)(2) / RSS-210 A8.2	6 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

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 0)	2402
MID (CH 19)	2440
HIGH (CH 39)	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.

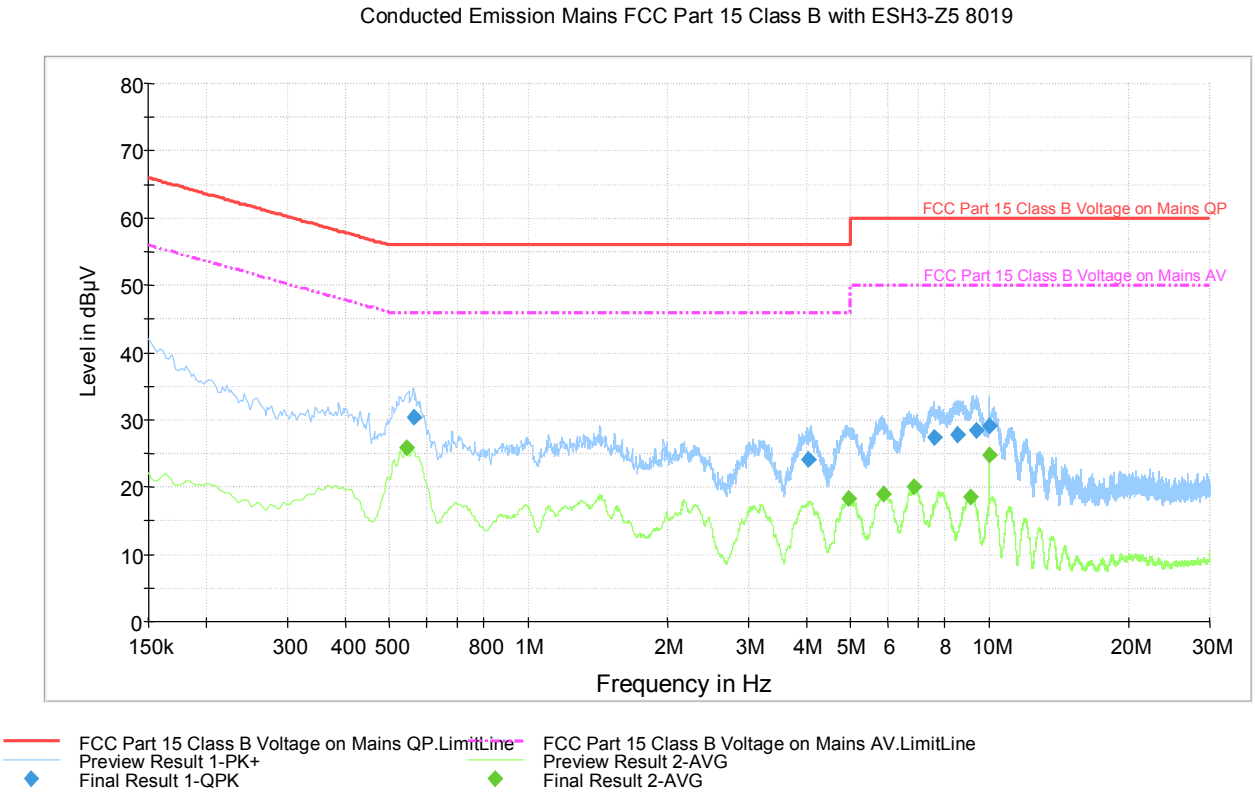

Figure 1. The measured curves with peak- and average detector.

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
0.564000	30.3	1000.0	9.000	GND	N	10.1	25.7	56.0	
4.042000	24.1	1000.0	9.000	GND	N	10.4	31.9	56.0	
7.610500	27.4	1000.0	9.000	GND	L1	10.7	32.6	60.0	
8.530750	27.8	1000.0	9.000	GND	L1	10.7	32.2	60.0	
9.345250	28.5	1000.0	9.000	GND	N	10.8	31.5	60.0	
10.002250	29.0	1000.0	9.000	GND	N	10.9	31.0	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	25.9	1000.0	9.000	GND	N	10.1	20.1	46.0	
4.933000	18.2	1000.0	9.000	GND	N	10.5	27.8	46.0	
5.869000	19.0	1000.0	9.000	GND	N	10.5	31.0	50.0	
6.865750	20.0	1000.0	9.000	GND	N	10.6	30.0	50.0	
9.086500	18.6	1000.0	9.000	GND	N	10.8	31.4	50.0	
10.000000	24.8	1000.0	9.000	GND	N	10.9	25.2	50.0	

Maximum Peak Conducted Output Power

Standard:	ANSI C63.10	(2009)
Tested by:	RRE	
Date:	27.5.2013	
Temperature:	23 °C	
Humidity:	46 % RH	
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 band employing less than 75 hopping channels the limit is 0.125 watts (=20.969 dBm). Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling 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:

Channel	Conducted Power [dBm]	Limit [dBm]	Margin [dBm]	Result
Low	5.96	20.969	15.01	PASS
Mid	7.47	20.969	13.50	PASS
High	8.13	20.969	12.84	PASS

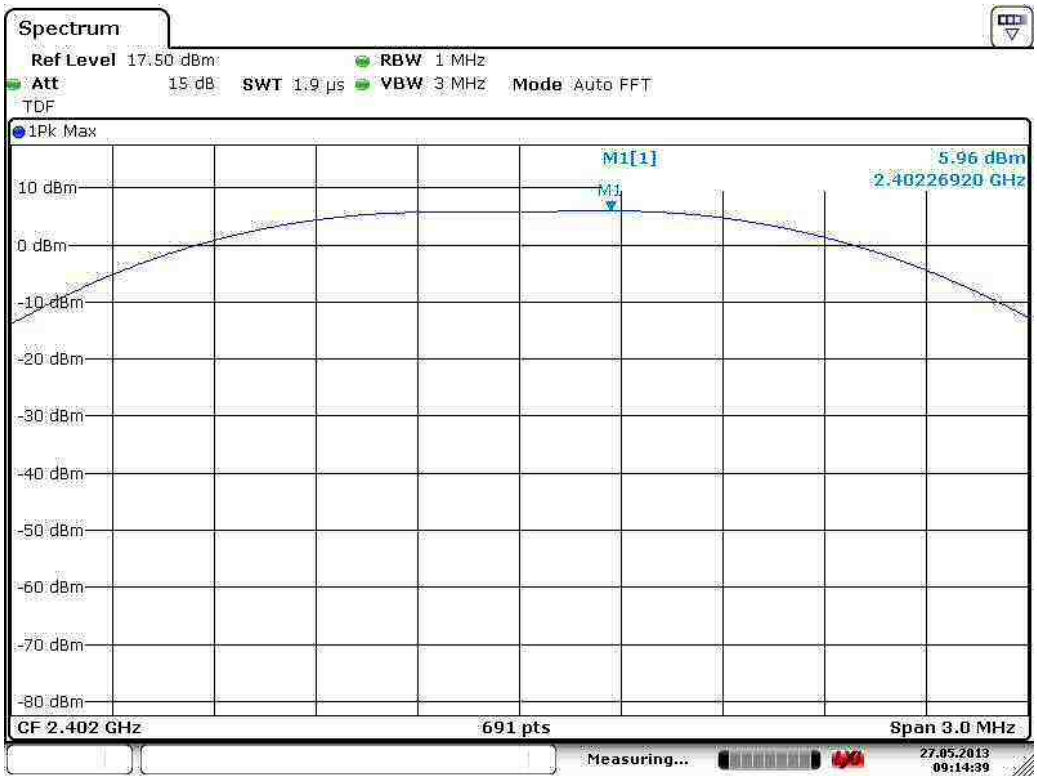

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Figure 2. Channel LOW.

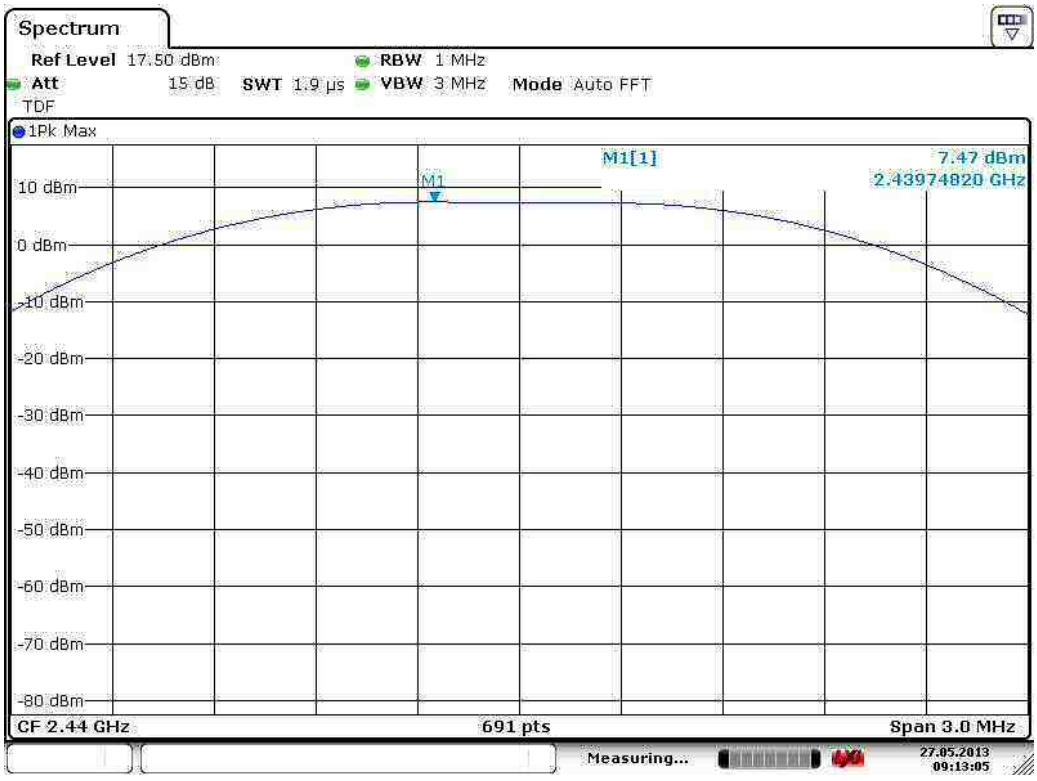

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Figure 3. Channel MID.

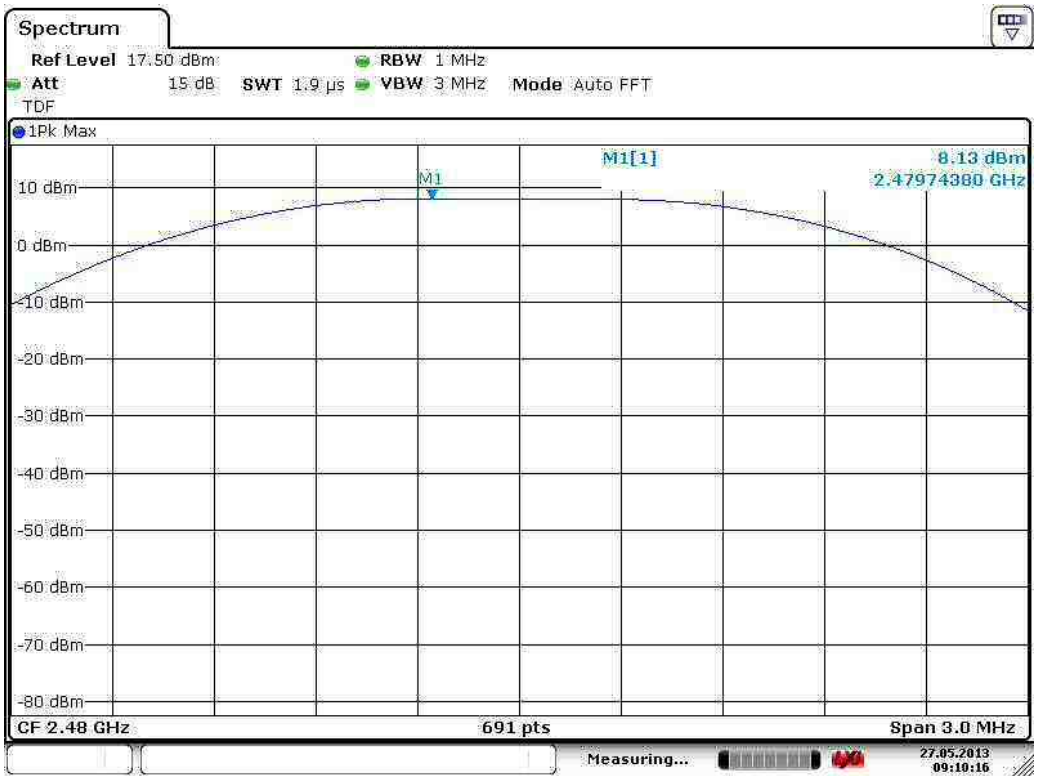

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Figure 4. Channel HIGH.

Transmitter Radiated Emissions 30 MHz to 26.5 GHz

Standard:	ANSI C63.10	(2009)
Tested by:	RRE, NKA, JJM	
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 are done with with intergated and external antenna.

Test results with integrated antenna

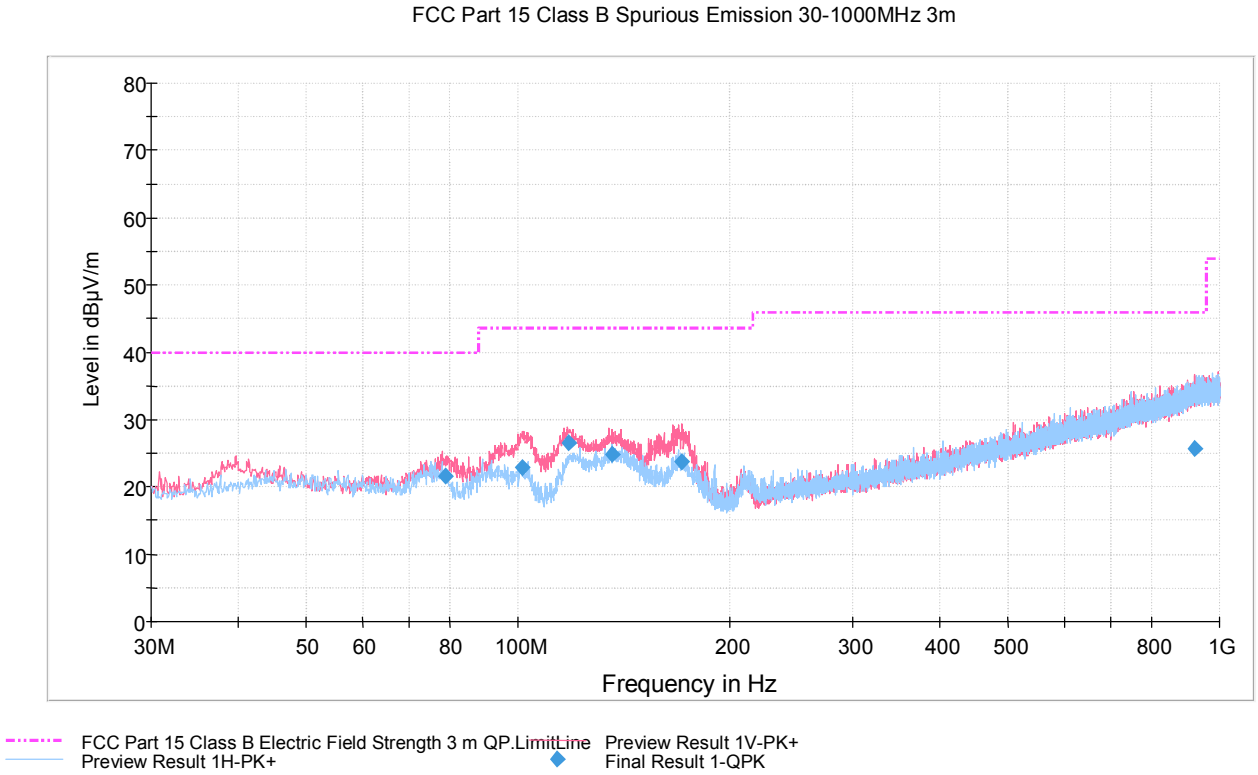

Figure 5. Measured curve with peak-detector. Channel LOW.

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
78.692000	21.6	1000.0	120.000	344.0	V	214.0	11.0	18.4	40.0	
101.403000	22.9	1000.0	120.000	100.0	V	235.0	11.0	20.6	43.5	
118.145000	26.5	1000.0	120.000	100.0	V	219.0	12.9	17.0	43.5	
136.532000	24.9	1000.0	120.000	100.0	V	249.0	14.6	18.6	43.5	
171.283000	23.8	1000.0	120.000	116.0	V	247.0	14.3	19.7	43.5	
923.033000	25.7	1000.0	120.000	371.0	V	159.0	26.9	20.3	46.0	

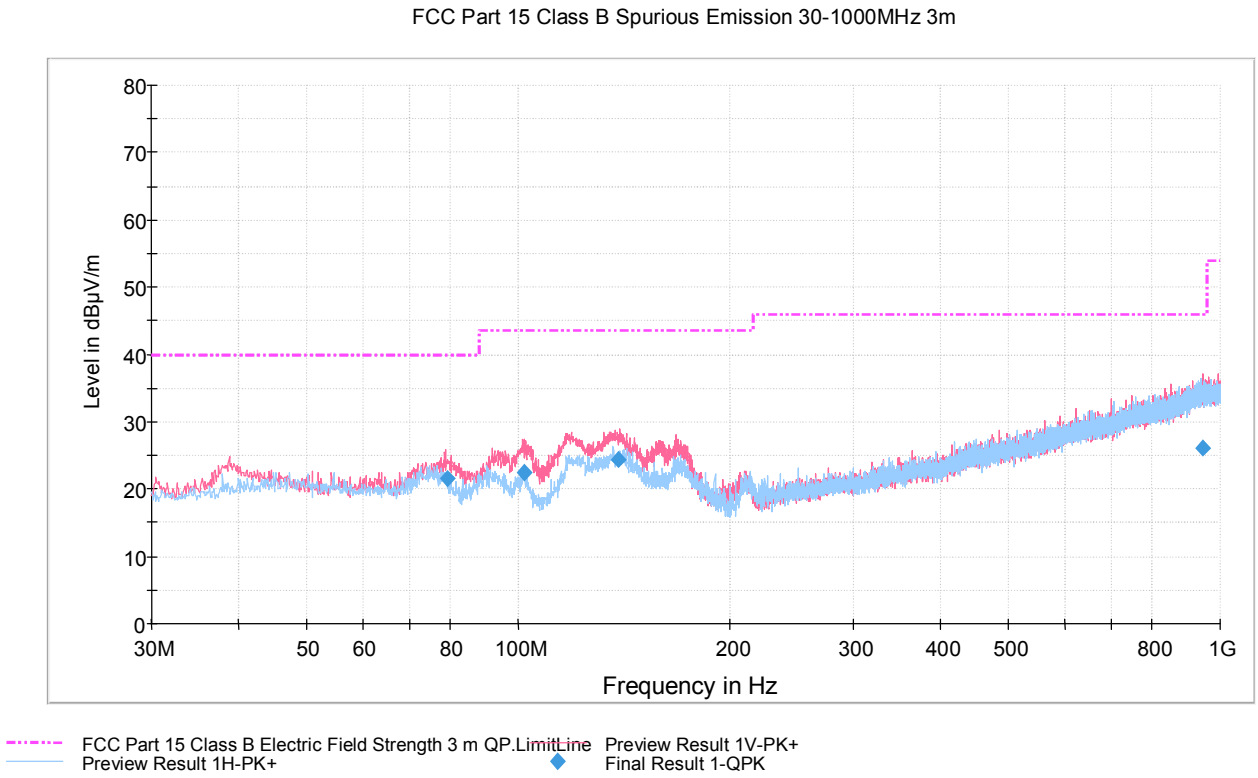

Figure 6. Measured curve with peak-detector. Channel MID.

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
79.351000	21.7	1000.0	120.000	390.0	V	202.0	10.9	18.3	40.0	
101.717000	22.4	1000.0	120.000	100.0	V	217.0	11.0	21.1	43.5	
138.899000	24.3	1000.0	120.000	100.0	V	166.0	14.9	19.2	43.5	
943.330000	26.0	1000.0	120.000	203.0	V	76.0	27.1	20.0	46.0	

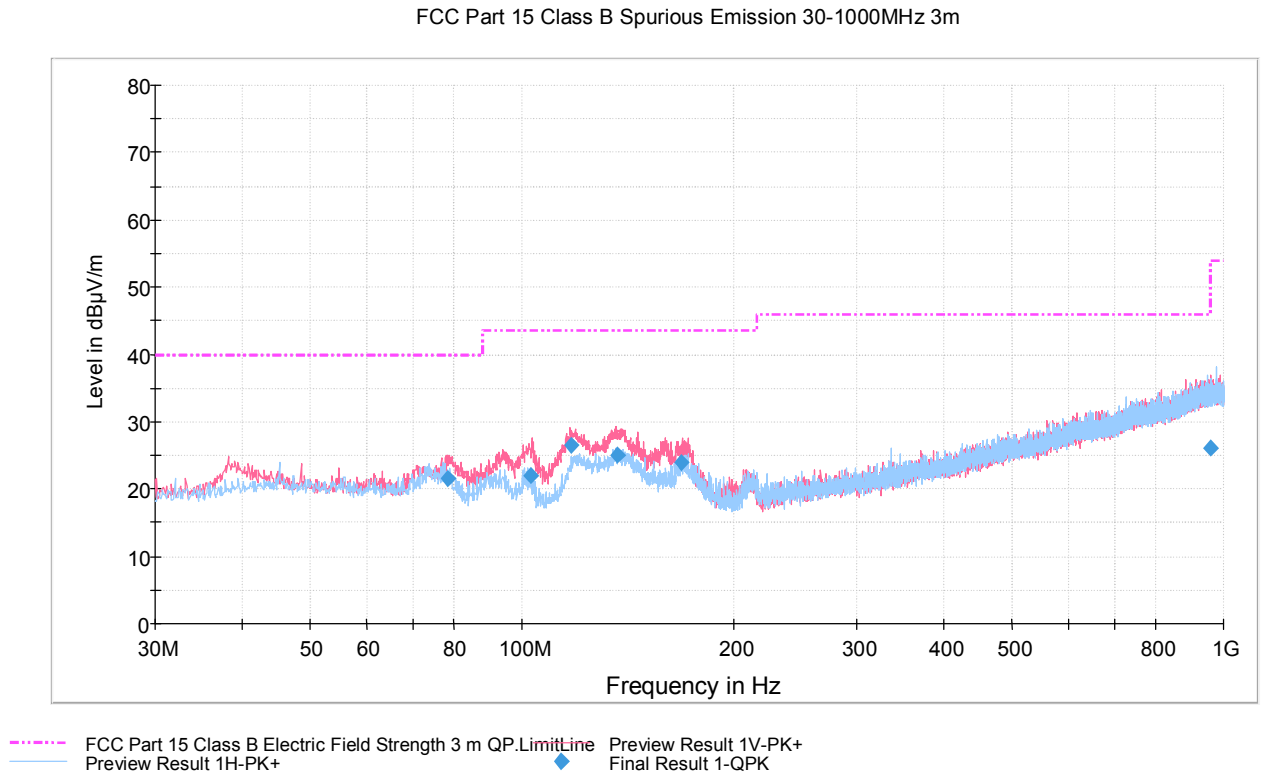

Figure 7. Measured curve with peak-detector. Channel HIGH.

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
78.278000	21.5	1000.0	120.000	338.0	V	198.0	11.1	18.5	40.0	
102.832000	22.1	1000.0	120.000	100.0	V	234.0	11.2	21.4	43.5	
117.646000	26.4	1000.0	120.000	100.0	V	220.0	12.9	17.1	43.5	
136.678000	25.1	1000.0	120.000	100.0	V	171.0	14.6	18.4	43.5	
168.675000	24.0	1000.0	120.000	100.0	V	232.0	14.6	19.5	43.5	
957.095000	26.0	1000.0	120.000	201.0	V	260.0	27.1	20.0	46.0	

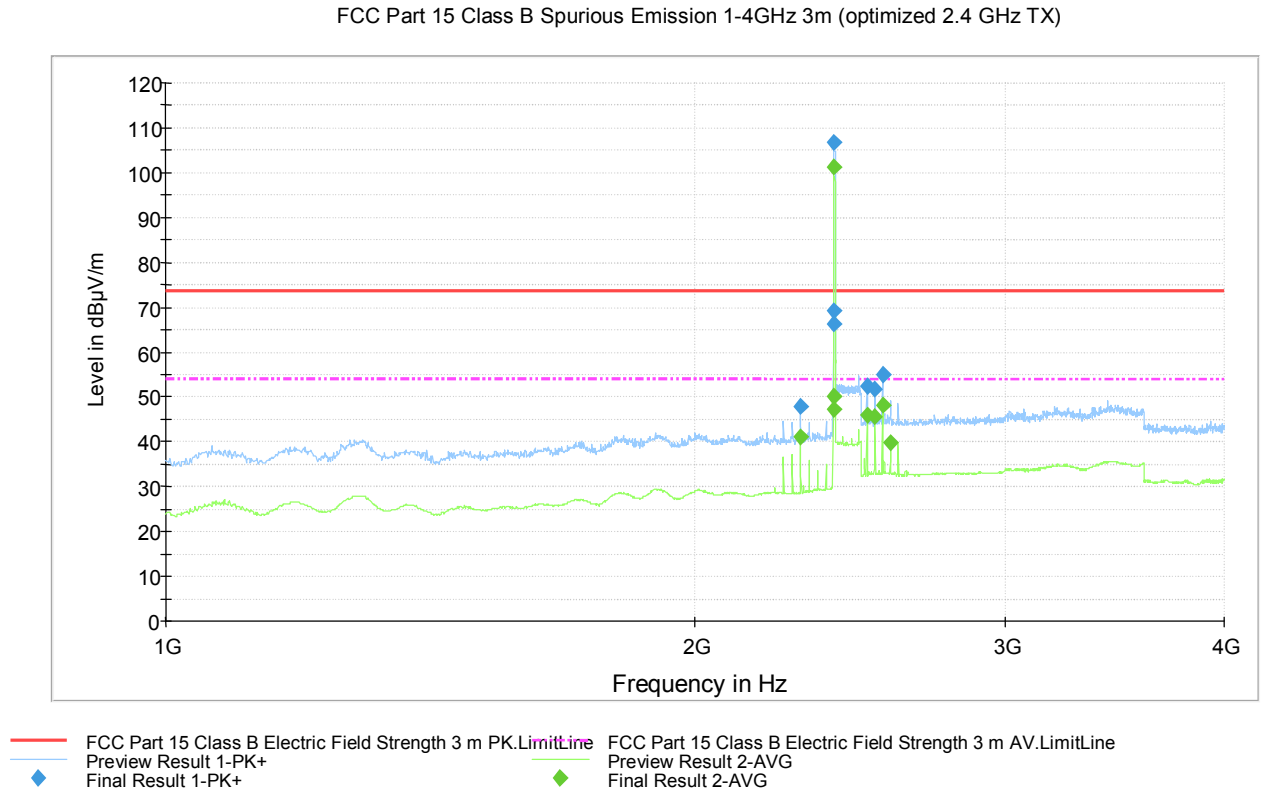

Figure 8. Measured curve with peak- and average detector. Channel LOW.

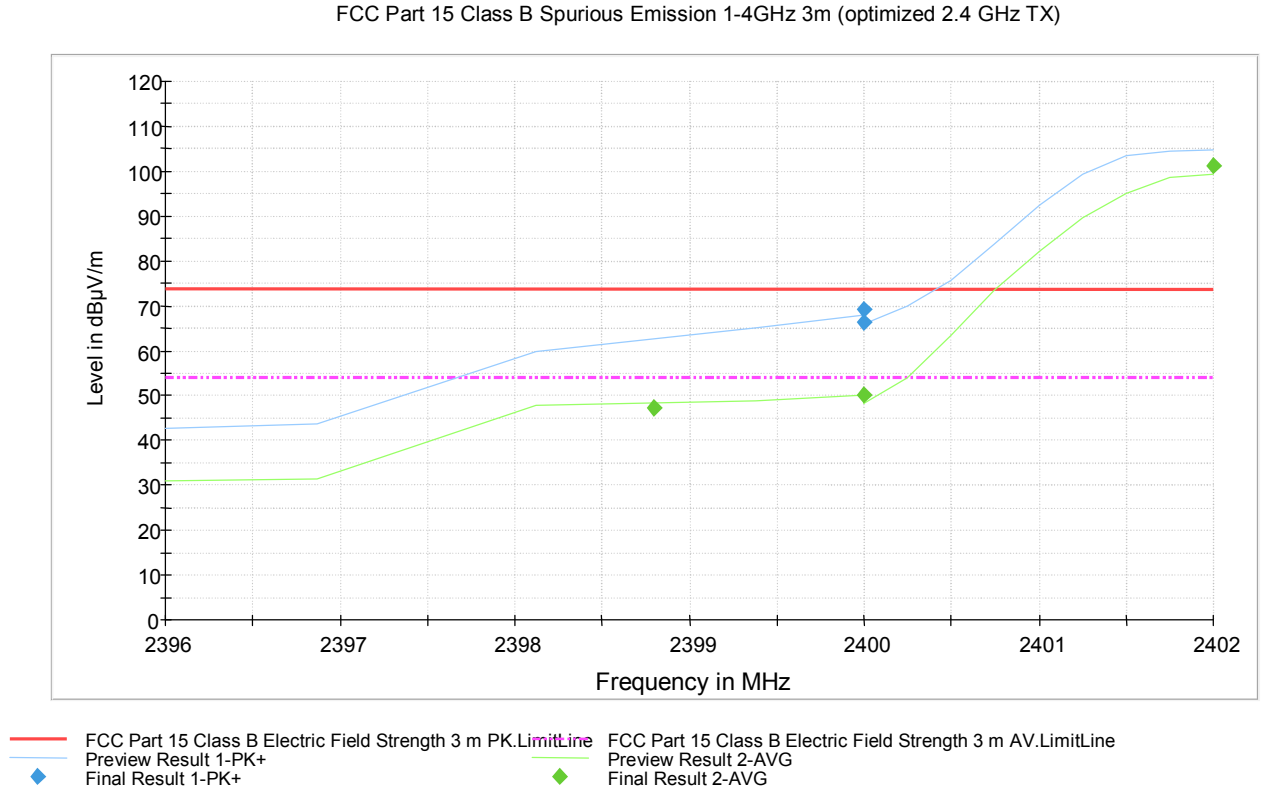

Figure 9. Low channel band edge.

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
2297.725000	47.9	1000.0	1000.000	165.0	H	211.0	3.4	26.0	73.9	
2400.000000	66.3	1000.0	1000.000	190.0	V	180.0	4.4	7.6	73.9	
2400.000000	69.1	1000.0	1000.000	156.0	H	218.0	4.4	4.8	73.9	
2402.200000	106.7	1000.0	1000.000	155.0	H	218.0	4.4	-	-	Carrier
2505.775000	52.2	1000.0	1000.000	170.0	H	150.0	4.6	21.7	73.9	
2532.225000	51.9	1000.0	1000.000	149.0	H	152.0	4.7	22.0	73.9	
2557.675000	55.0	1000.0	1000.000	113.0	H	152.0	4.7	18.9	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
2297.925000	41.2	1000.0	1000.000	170.0	H	218.0	3.5	12.7	53.9	
2398.800000	47.2	1000.0	1000.000	190.0	V	180.0	4.4	6.7	53.9	
2400.000000	50.2	1000.0	1000.000	156.0	H	219.0	4.4	3.7	53.9	
2402.000000	101.3	1000.0	1000.000	162.0	H	215.0	4.4	-	-	Carrier
2506.025000	46.0	1000.0	1000.000	179.0	H	150.0	4.6	7.9	53.9	
2532.025000	45.8	1000.0	1000.000	146.0	H	218.0	4.7	8.1	53.9	
2557.875000	48.2	1000.0	1000.000	114.0	H	152.0	4.7	5.7	53.9	
2583.925000	39.7	1000.0	1000.000	124.0	H	152.0	4.9	14.2	53.9	

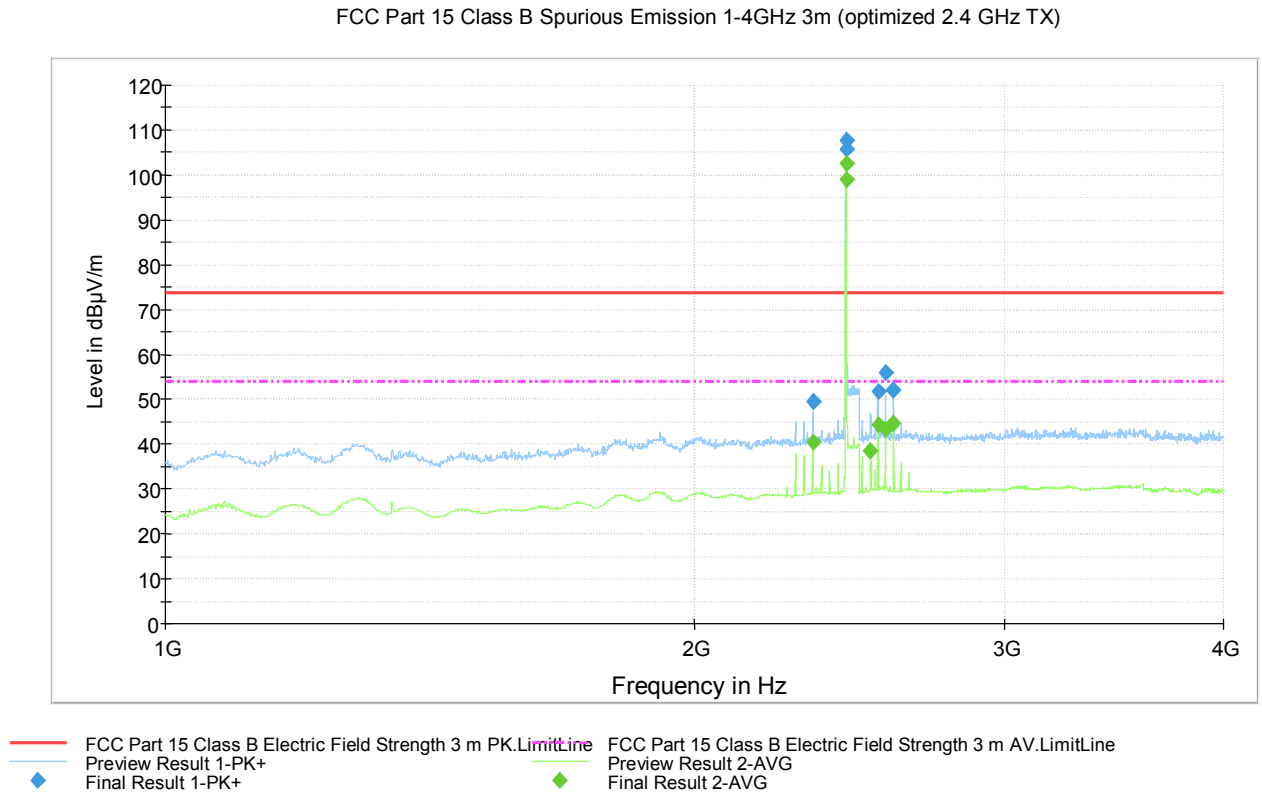

Figure 10. Measured curve with peak- and average detector. Channel MID.

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
2335.825000	49.6	1000.0	1000.000	170.0	H	223.0	3.8	24.3	73.9	
2439.750000	105.9	1000.0	1000.000	216.0	V	181.0	4.1	-	-	Carrier
2440.000000	107.6	1000.0	1000.000	149.0	H	151.0	4.1	-	-	Carrier
2544.125000	51.6	1000.0	1000.000	138.0	H	154.0	4.7	22.3	73.9	
2569.575000	56.0	1000.0	1000.000	122.0	H	146.0	4.8	17.9	73.9	
2596.225000	51.9	1000.0	1000.000	138.0	H	155.0	5.0	22.0	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
2336.025000	40.4	1000.0	1000.000	164.0	H	218.0	3.8	13.5	53.9	
2440.000000	102.7	1000.0	1000.000	154.0	H	152.0	4.1	-	-	Carrier
2440.000000	99.0	1000.0	1000.000	211.0	V	181.0	4.1	-	-	Carrier
2517.875000	38.3	1000.0	1000.000	138.0	H	152.0	4.6	15.6	53.9	
2543.925000	44.3	1000.0	1000.000	138.0	H	152.0	4.7	9.6	53.9	
2569.975000	43.2	1000.0	1000.000	139.0	H	152.0	4.8	10.7	53.9	
2596.025000	44.6	1000.0	1000.000	138.0	H	156.0	5.0	9.3	53.9	

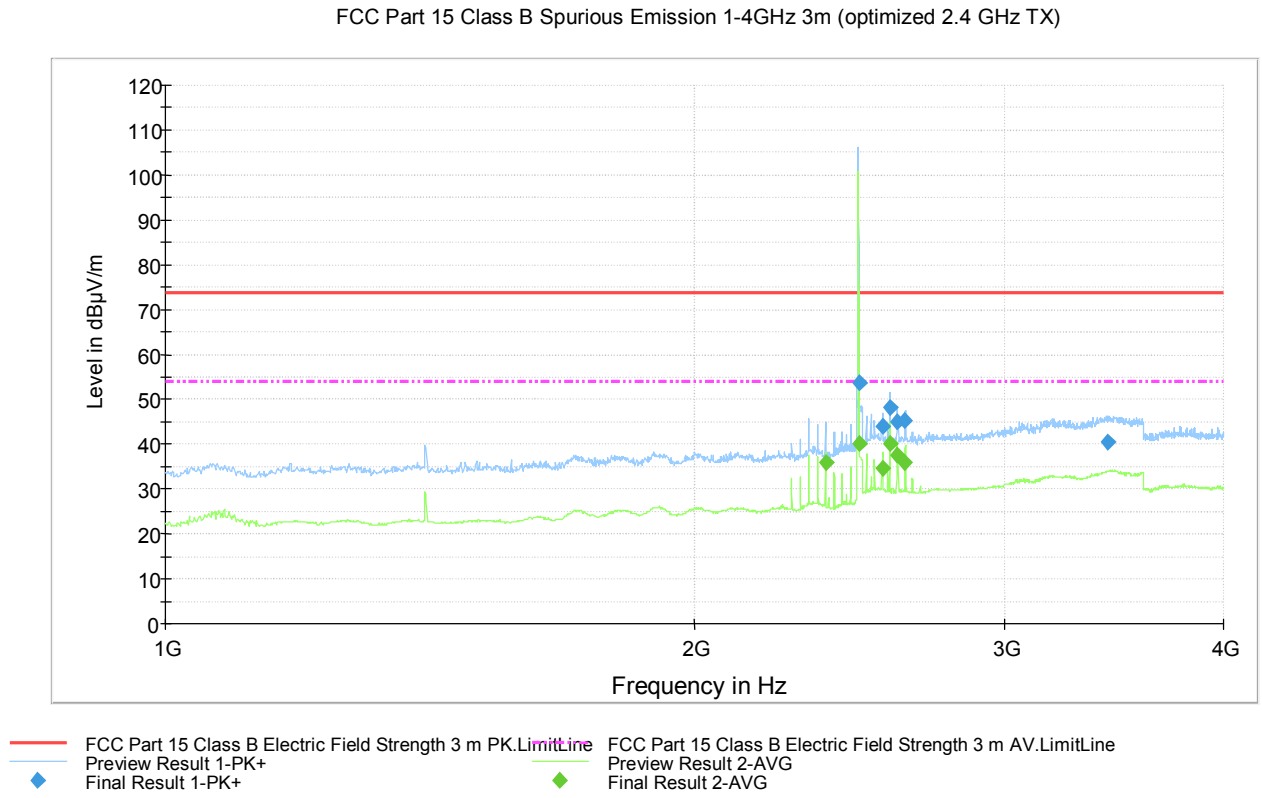

Figure 11. Measured curve with peak- and average detector. Channel HIGH.

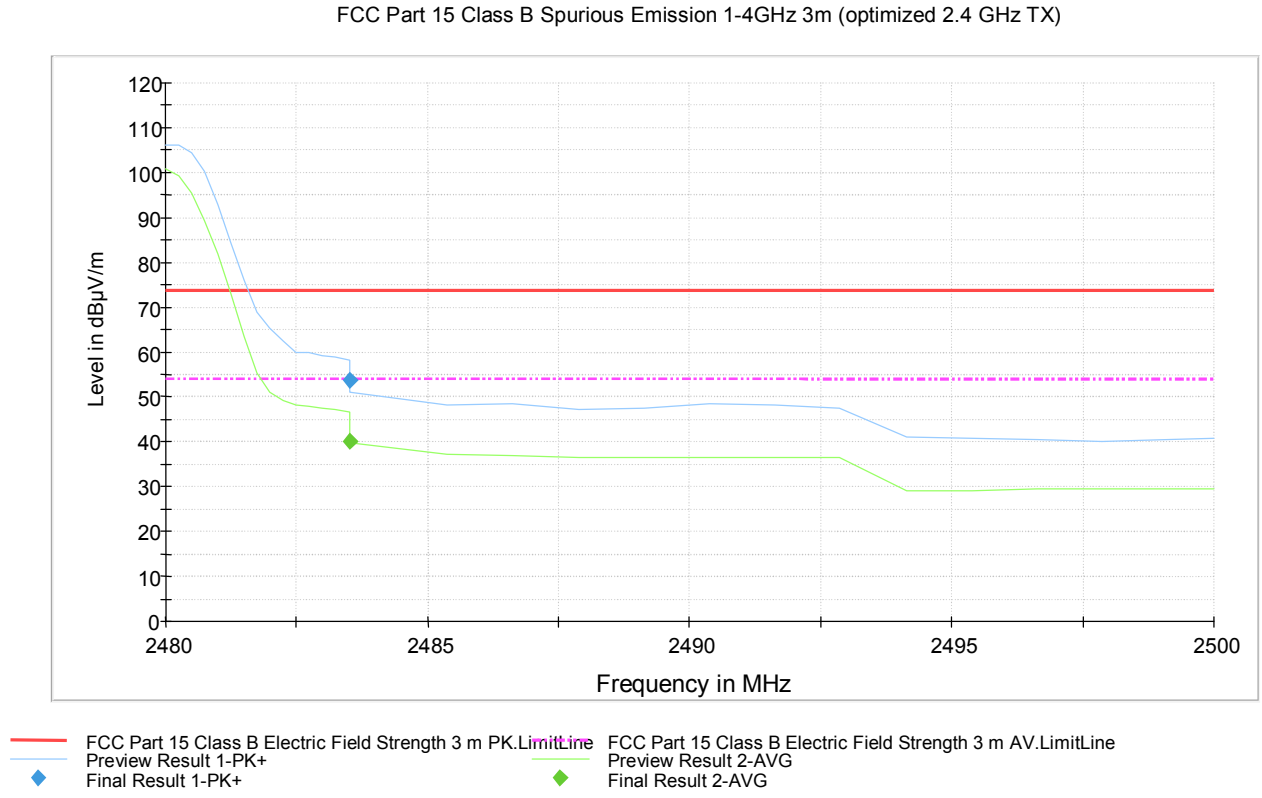

Figure 12. High channel band edge.

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
2483.500000	53.6	1000.0	1000.000	100.0	H	57.0	1.0	20.3	73.9	
2557.875000	43.9	1000.0	1000.000	162.0	H	120.0	1.4	30.0	73.9	
2583.725000	48.3	1000.0	1000.000	195.0	H	128.0	1.5	25.6	73.9	
2610.375000	45.0	1000.0	1000.000	162.0	H	56.0	1.5	28.9	73.9	
2635.825000	45.4	1000.0	1000.000	162.0	H	62.0	1.4	28.5	73.9	
3439.425000	40.5	1000.0	1000.000	195.0	H	211.0	4.7	33.4	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
2376.025000	35.8	1000.0	1000.000	100.0	V	89.0	0.6	18.1	53.9	
2483.500000	40.2	1000.0	1000.000	150.0	H	56.0	1.0	13.7	53.9	
2557.875000	34.5	1000.0	1000.000	100.0	V	89.0	1.4	19.4	53.9	
2583.925000	40.1	1000.0	1000.000	167.0	H	68.0	1.5	13.8	53.9	
2609.975000	37.5	1000.0	1000.000	162.0	H	64.0	1.5	16.4	53.9	
2635.825000	35.9	1000.0	1000.000	162.0	V	74.0	1.4	18.0	53.9	

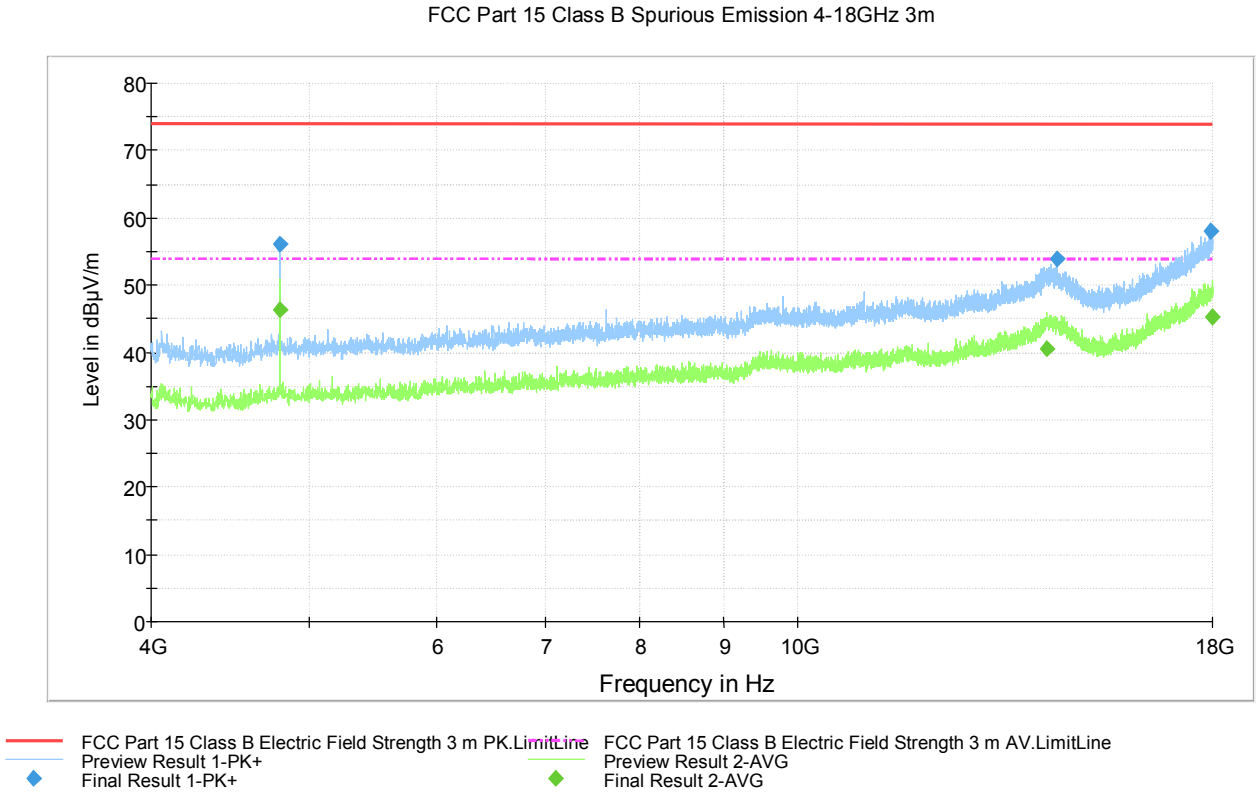

Figure 13. Measured curve with peak- and average detector. Channel LOW.

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
4804.600000	56.0	1000.0	1000.000	100.0	H	334.0	9.3	17.9	73.9	
14442.800000	53.9	1000.0	1000.000	331.0	H	80.0	24.5	20.0	73.9	
17951.000000	57.9	1000.0	1000.000	386.0	H	38.0	30.3	16.0	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	46.5	1000.0	1000.000	122.0	H	334.0	9.3	7.4	53.9	
14236.200000	40.5	1000.0	1000.000	100.0	H	50.0	24.5	13.4	53.9	
17995.000000	45.3	1000.0	1000.000	105.0	V	326.0	30.6	8.6	53.9	

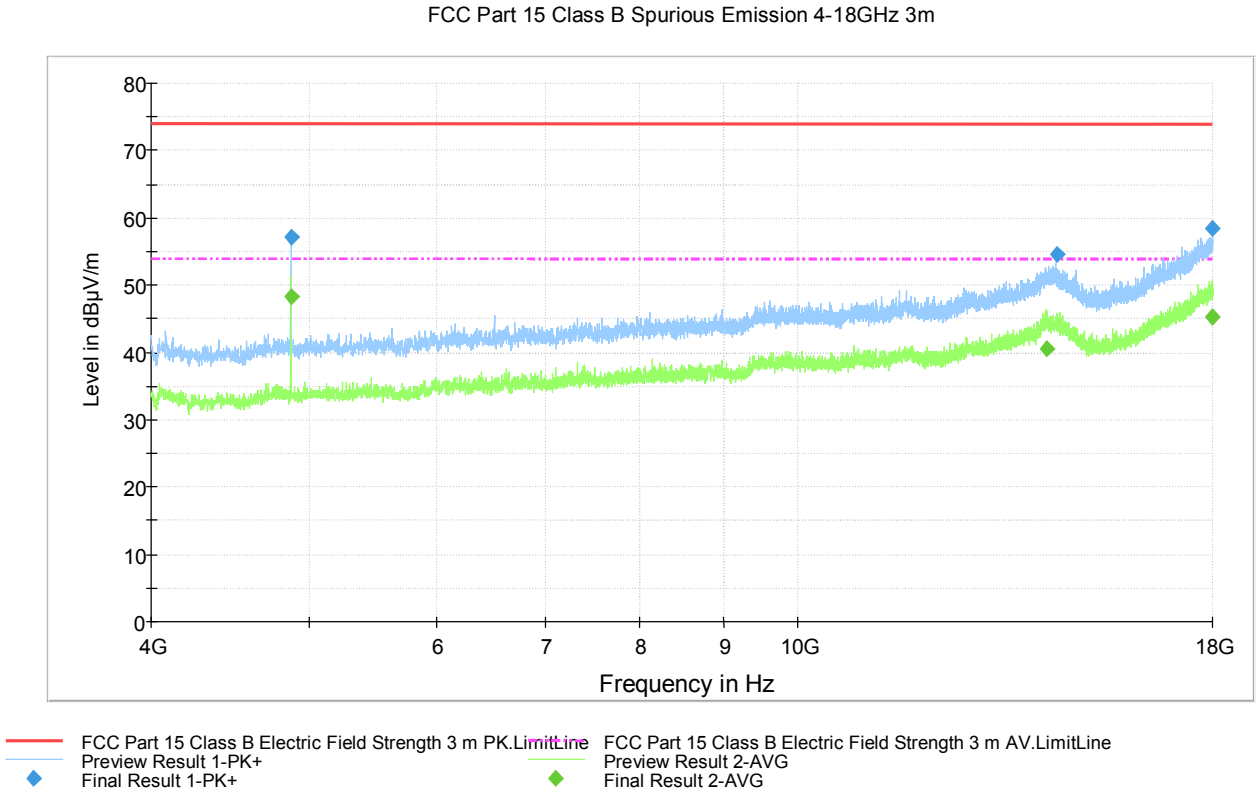

Figure 14. Measured curve with peak- and average detector. Channel MID.

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
4880.400000	57.2	1000.0	1000.000	114.0	V	218.0	9.4	16.7	73.9	
14433.600000	54.5	1000.0	1000.000	195.0	H	139.0	24.5	19.4	73.9	
17982.000000	58.4	1000.0	1000.000	100.0	H	207.0	30.5	15.5	73.9	

Table 15. 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
4880.000000	48.3	1000.0	1000.000	114.0	V	218.0	9.4	5.6	53.9	
14236.200000	40.6	1000.0	1000.000	100.0	H	29.0	24.5	13.3	53.9	
17986.600000	45.2	1000.0	1000.000	100.0	H	187.0	30.5	8.7	53.9	

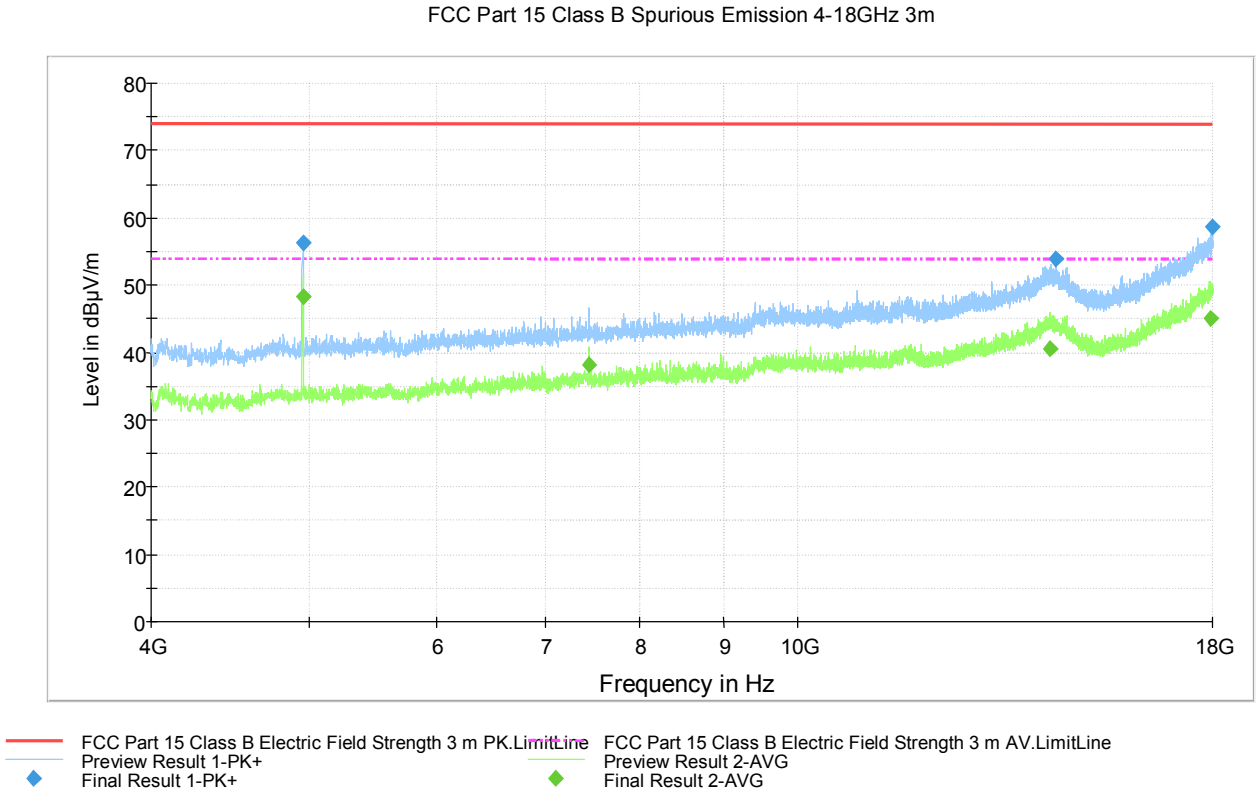

Figure 15. Measured curve with peak- and average detector. Channel HIGH.

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
4960.000000	56.3	1000.0	1000.000	114.0	V	204.0	9.5	17.6	73.9	
14415.600000	53.8	1000.0	1000.000	244.0	V	122.0	24.5	20.1	73.9	
17984.400000	58.6	1000.0	1000.000	203.0	V	167.0	30.5	15.3	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	48.4	1000.0	1000.000	100.0	V	204.0	9.5	5.5	53.9	
7439.400000	38.3	1000.0	1000.000	100.0	H	32.0	13.2	15.6	53.9	
14295.200000	40.6	1000.0	1000.000	105.0	V	278.0	24.8	13.3	53.9	
17977.400000	45.0	1000.0	1000.000	105.0	V	123.0	30.5	8.9	53.9	

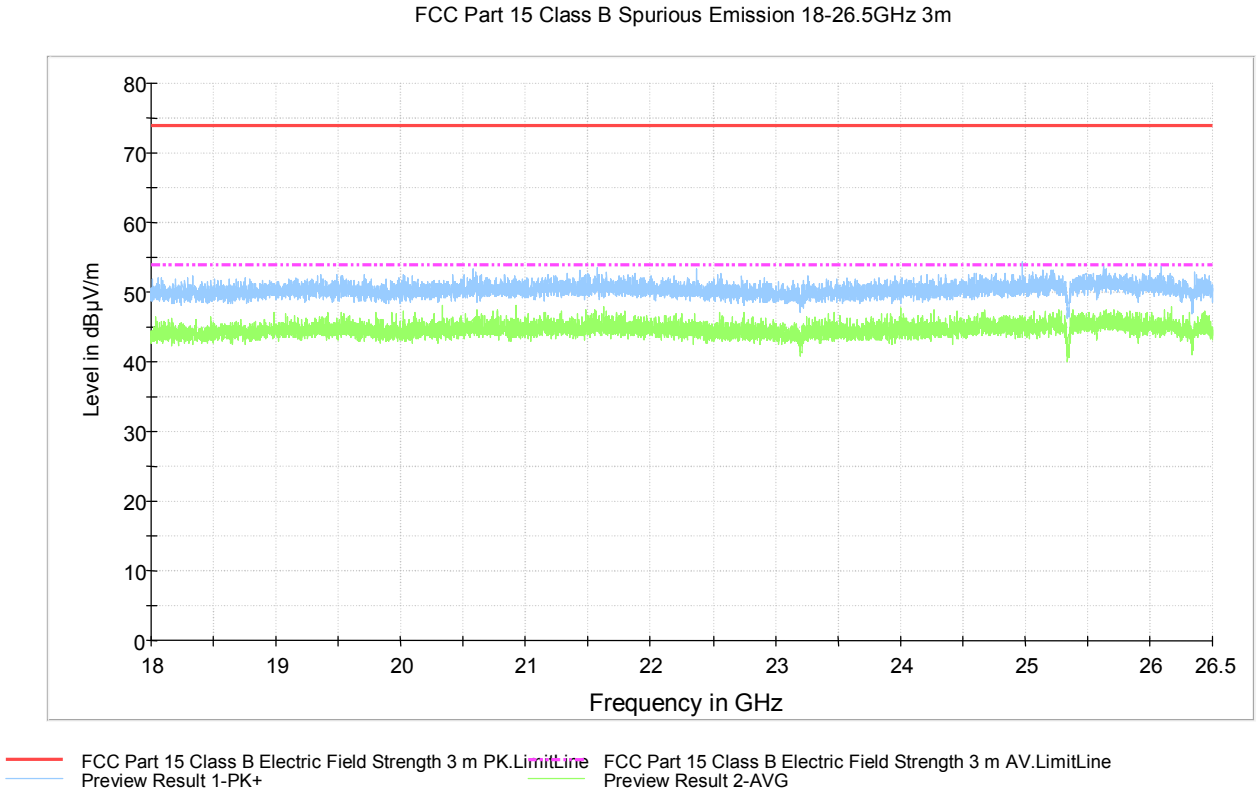

Figure 16. Measured curve with peak- and average detector. Channel LOW.

Final measurements from the worst frequencies

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

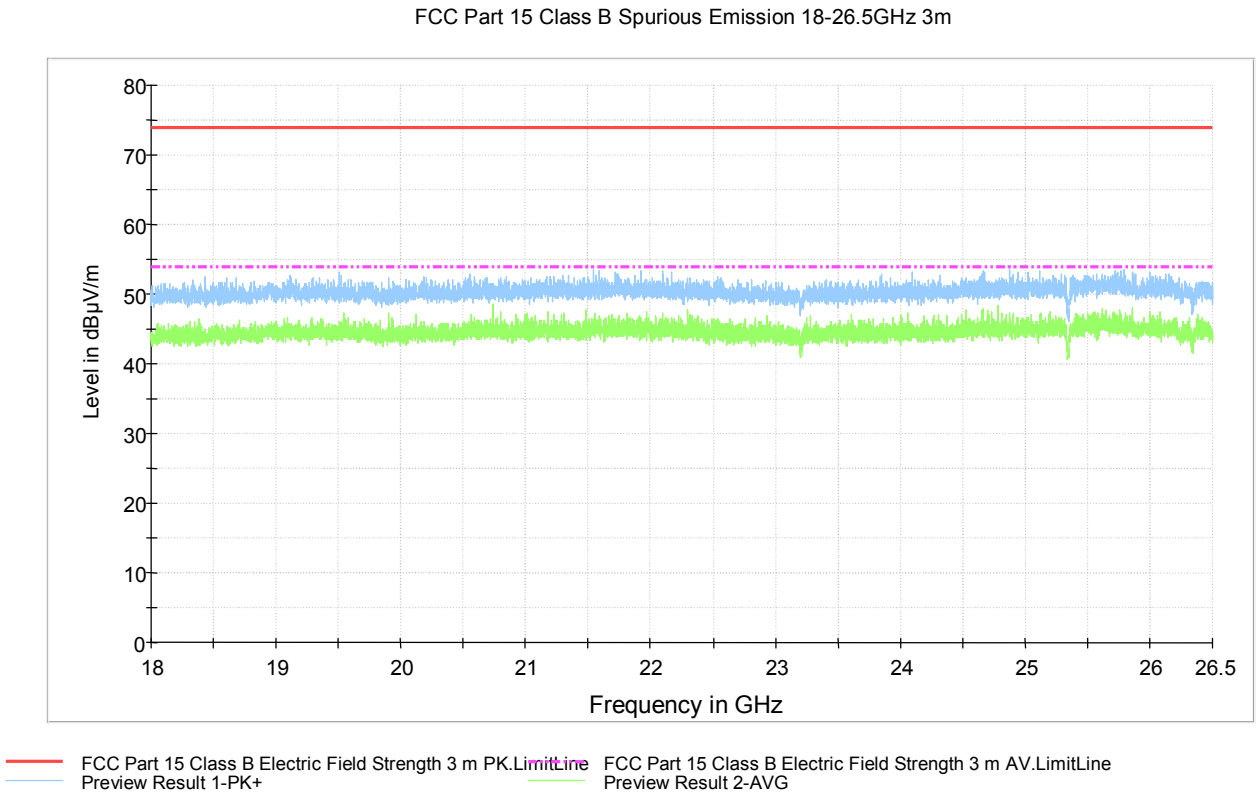

Figure 17. Measured curve with peak- and average detector. Channel MID.

Final measurements from the worst frequencies

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

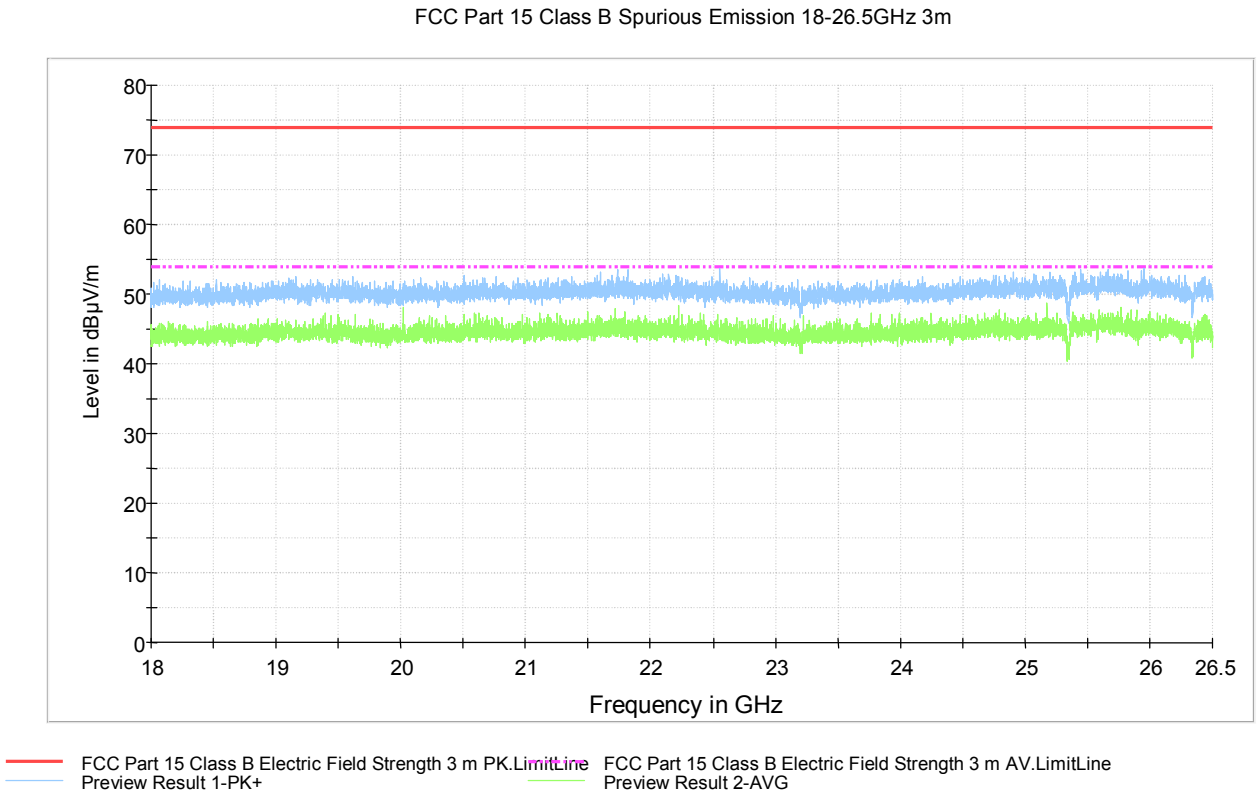

Figure 18. Measured curve with peak- and average detector. Channel HIGH.

Final measurements from the worst frequencies

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

Test results with external antenna

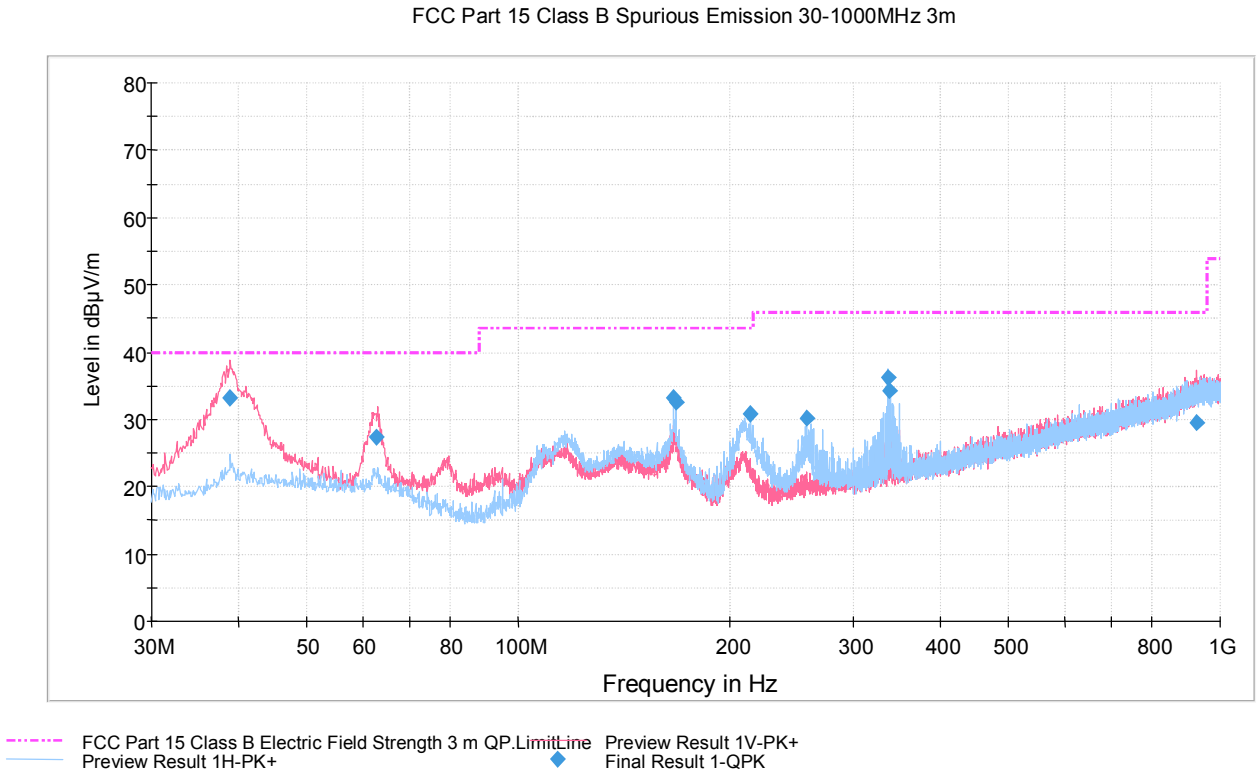

Figure 19. Measured curve with peak-detector. Channel LOW.

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	

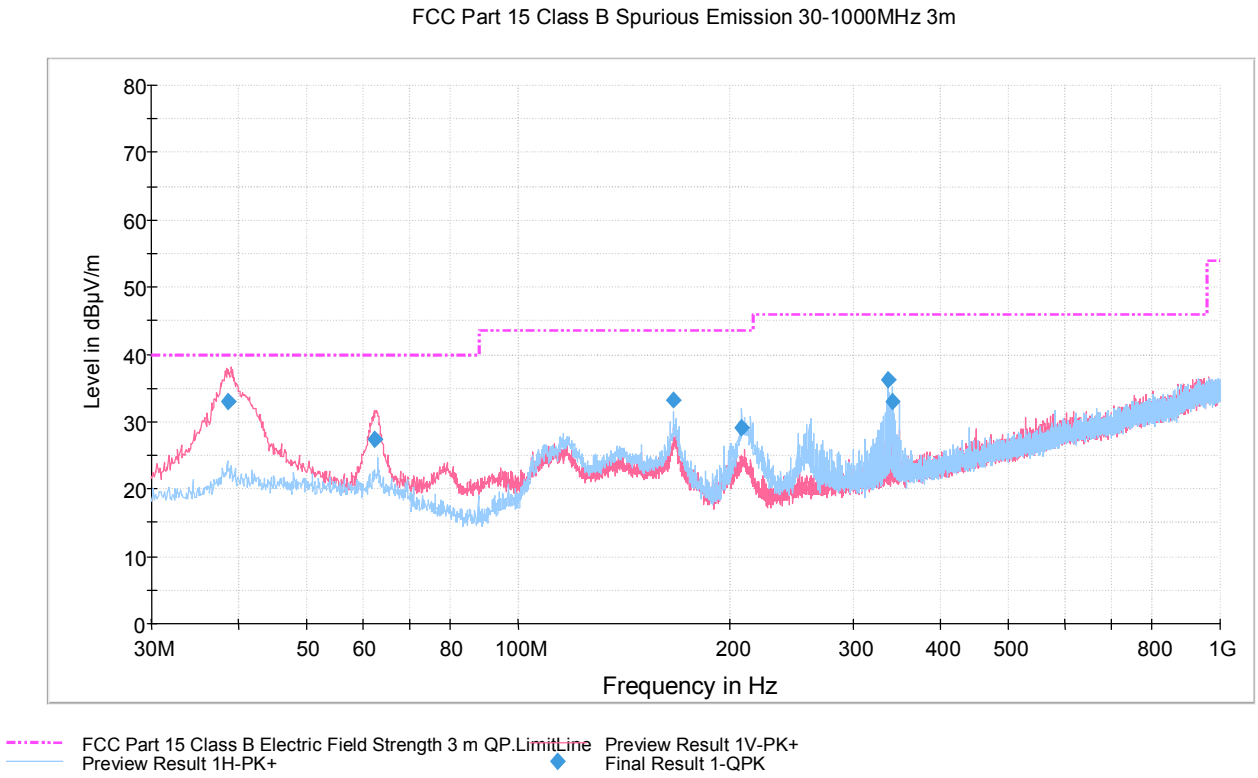

Figure 20. Measured curve with peak-detector. Channel MID.

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	

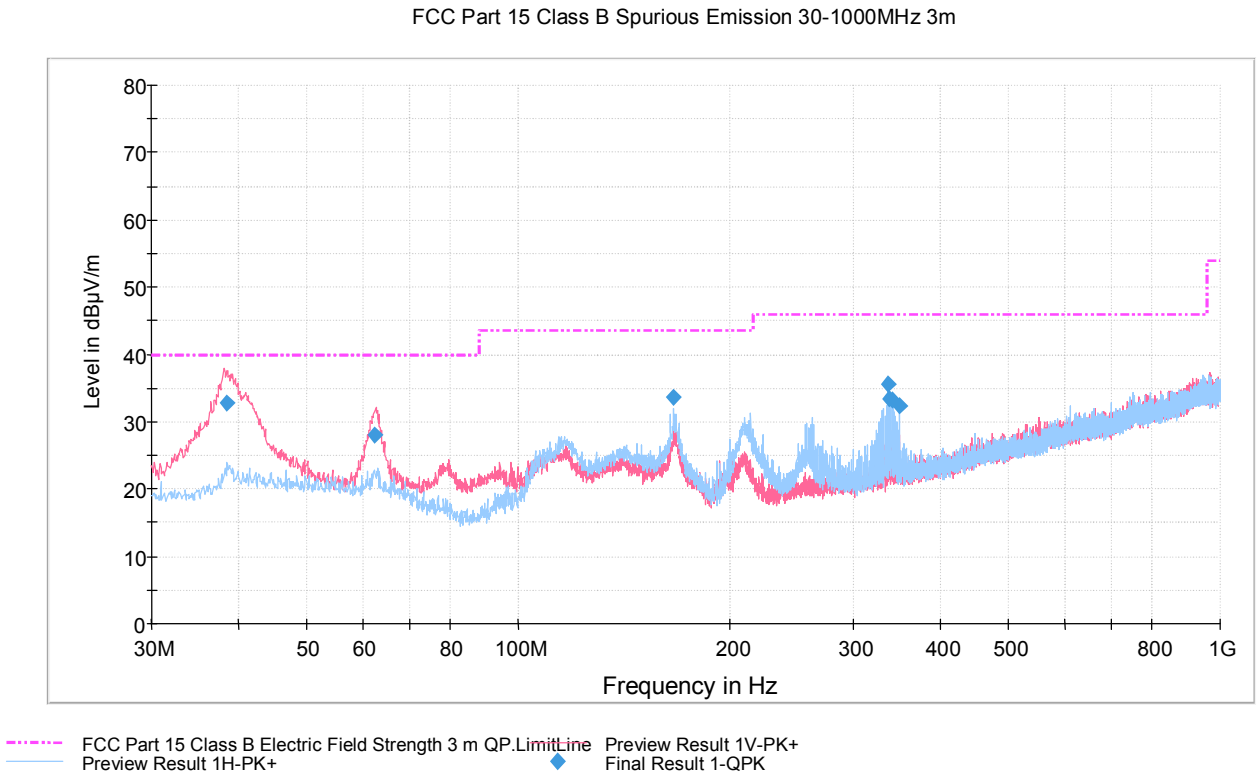

Figure 21. Measured curve with peak-detector. Channel HIGH.

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	

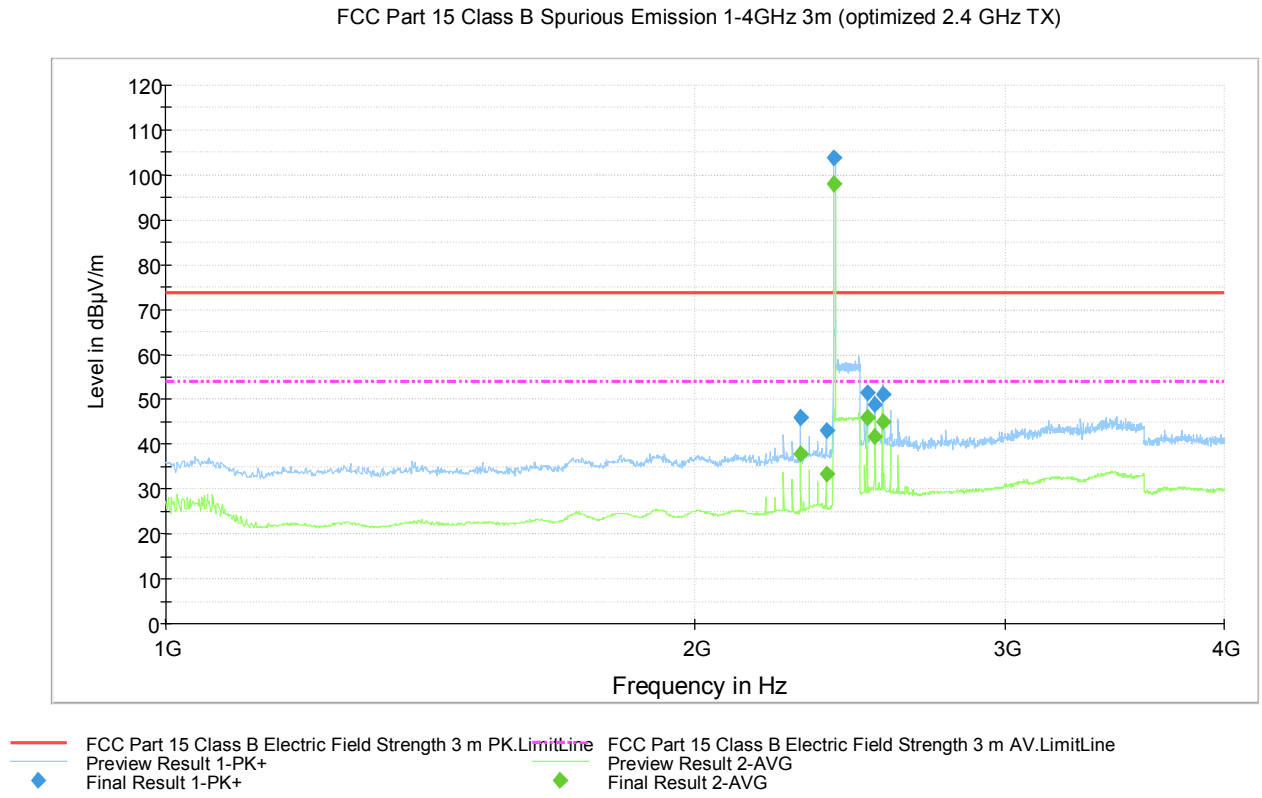

Figure 22. Measured curve with peak- and average detector. Channel LOW.

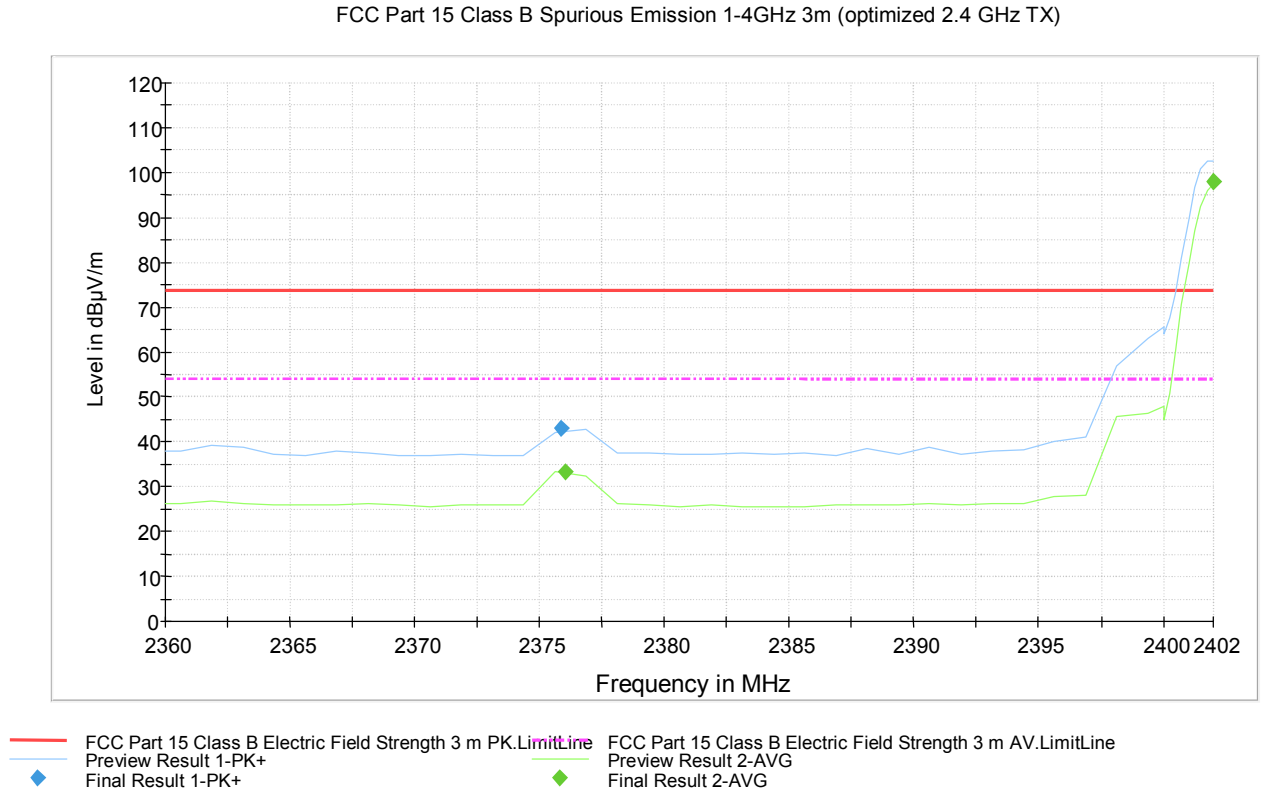

Figure 23. Low channel band edge.

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
2298.325000	46.1	1000.0	1000.000	163.0	V	26.0	-0.2	27.8	73.9	
2375.875000	43.0	1000.0	1000.000	114.0	V	326.0	0.6	30.9	73.9	
2402.200000	103.8	1000.0	1000.000	149.0	V	314.0	0.6	-	-	Carrier
2505.625000	51.5	1000.0	1000.000	138.0	V	322.0	1.2	22.4	73.9	
2531.675000	49.0	1000.0	1000.000	100.0	V	338.0	1.3	24.9	73.9	
2558.075000	51.2	1000.0	1000.000	100.0	V	-5.0	1.4	22.7	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
2297.925000	37.7	1000.0	1000.000	163.0	V	30.0	-0.2	16.2	53.9	
2376.025000	33.2	1000.0	1000.000	122.0	V	347.0	0.6	20.7	53.9	
2402.000000	98.1	1000.0	1000.000	146.0	V	350.0	0.6	-	-	Carrier
2506.025000	45.9	1000.0	1000.000	138.0	V	236.0	1.2	8.0	53.9	
2532.025000	41.9	1000.0	1000.000	100.0	V	337.0	1.3	12.0	53.9	
2558.075000	45.0	1000.0	1000.000	105.0	V	326.0	1.4	8.9	53.9	