

Test Report



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

Equipment Under Test: Nordic ID Medea

Model: 815-1A

Manufacturer /
Customer: Nordic ID Oy

Myllyojankatu 2A
24100 Salo
Finland

FCC Rule Part: 15.247: 2014

IC Rule Part: RSS-210, Issue 8, 2010

RSS-GEN Issue 4, 2014

KDB: Filing and Measurement Guidelines for
Frequency Hopping Spread Spectrum Systems
DA 00-705 (March 30, 2000)

Date: February 27, 2015

Issued by:

A blue ink signature of Niko Kotsalo.

Niko Kotsalo
Testing Engineer

Date: February 27, 2015

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Rauno Repo
Testing Engineer

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Equipment Under Test (EUT)

Nordic ID Medea with 802.11 a/b/g/n + BT 2.1 + EDR module	
Brand:	Nordic ID
Model No:	815-1A
Type:	HTG00017
FCC ID (RFID radio module):	SCCNUR05WL2
IC ID (RFID radio module):	5137A-NUR05WL2
FCC ID (WLAN a/b/g/n + Bluetooth 2.1 module):	TWG-SDC SSD40NBT
IC ID (WLAN a/b/g/n + Bluetooth 2.1 module):	6616A-SDC SSD40NBT

Description of the EUT

The EUT is a battery operated portable computer with RFID radio (FCC ID: SCCNUR05WL2) and barcode reader. Nordic ID medea also includes (FCC ID: TWG-SDC SSD40NBT) 802.11 a/b/g/n WLAN and Bluetooth v2.1 + EDR module This report includes only the Bluetooth test results.

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

Operating Frequency Range (OFR):	2402 – 2480 MHz
Channels:	79
Channel separation:	1 MHz
Channel bandwidth:	1 MHz
Conducted power:	2.355 dBm
Transmission technique:	FHSS
Modulation:	GFSK, 8DPSK, $\pi/4$ -DQPSK
Antenna gain:	3 dBi

Power Supply

Battery / AC operated	3.7 VDC / 100-240 VAC, 50-60 Hz
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Disclaimer

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only. This document cannot be reproduced except in full, without prior approval of the Company.

SUMMARY OF TESTING

Test Specification	Description of Test	Result
§15.209 / RSS-GEN 8.9	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. The power of all data rates and channels low, mid and high were measured with a power meter and the data rate giving the highest power was selected for the measurements. Highest power was measured with data rate DH5 (2.355 dBm). The radiated spurious emissions tests were performed with the EUT being in three different orthogonal positions: X, Y, Z.

Following channels were used during the tests:

Channel	Frequency/ MHz
LOW	2402
MID	2440
HIGH	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

Radiated Spurious Emissions 30 to 26 500 MHz and Band Edge

Transmitter Radiated Emissions 30 – 26 500 MHz and Band Edge

Standard: ANSI C63.10 (2009)
Tested by: NKO/PKA
Date: 16.02. – 23.02.2015
Temperature: 21 – 23 °C
Humidity: 29 – 39 % 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. 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.

Measurements were done with DH5 1 Mbps data rate.

Test results

FCC Part 15 Class B Spurious Emission 30-1000MHz 3m

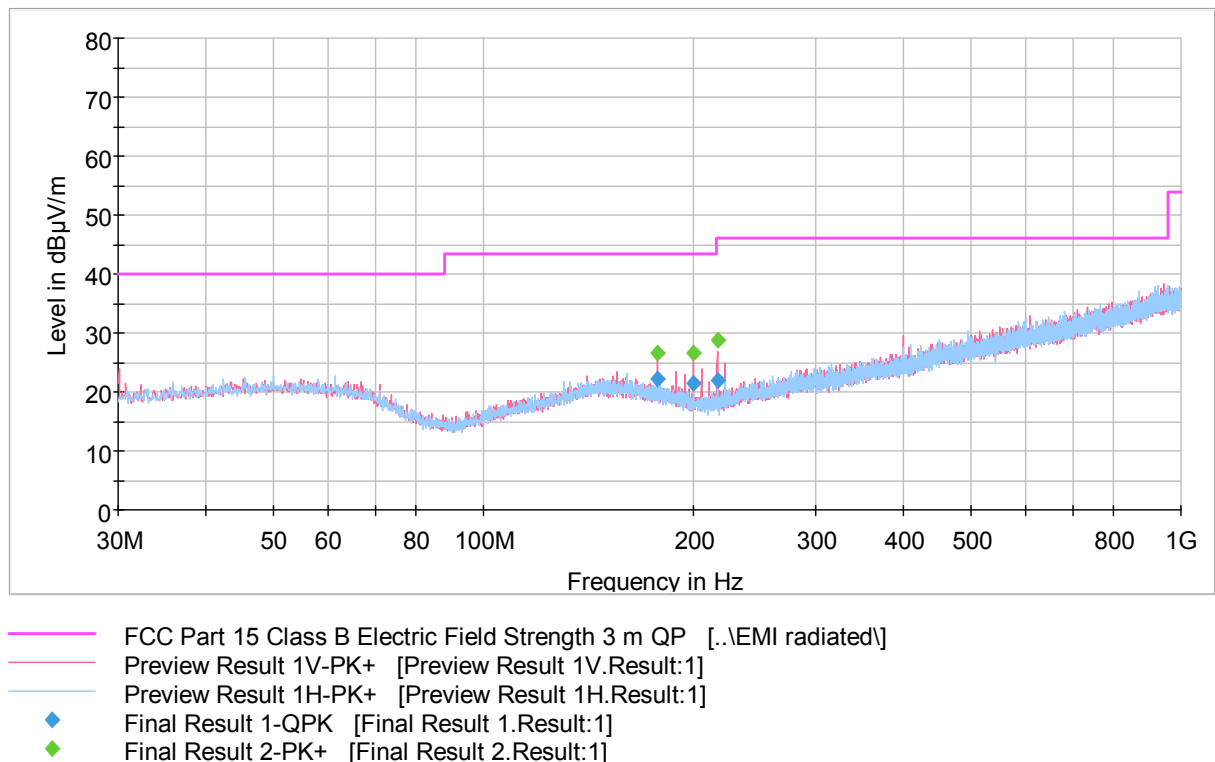


Figure 1. Measured curves with peak-detector (low channel).

Table 1. Final measurements from the worst frequencies.

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
177.945000	22.2	1000.0	120.000	100.0	V	280.0	14.1	21.3	43.5	
199.984000	21.5	1000.0	120.000	100.0	V	255.0	12.5	22.0	43.5	
216.551000	21.9	1000.0	120.000	100.0	V	88.0	12.5	24.1	46.0	

Radiated Spurious Emissions 30 to 26 500 MHz and Band Edge

FCC Part 15 Class B Spurious Emission 30-1000MHz 3m

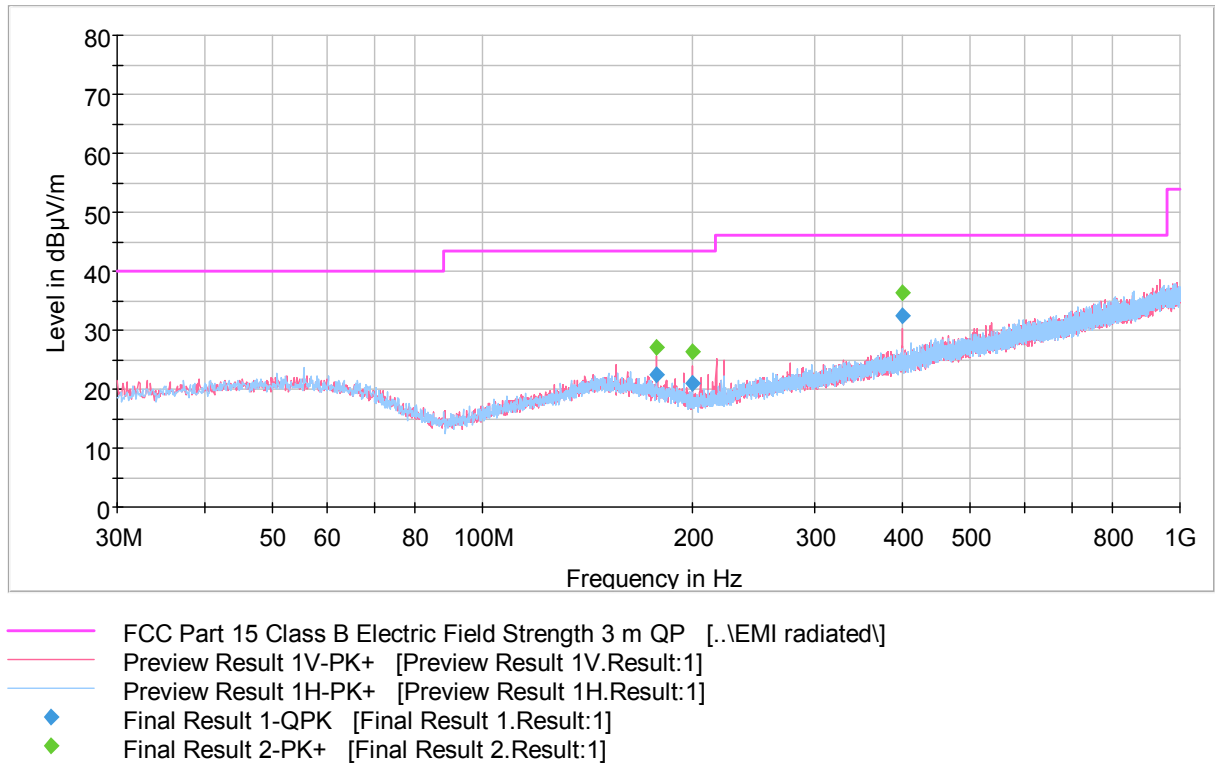


Figure 2. Measured curve with peak-detector (middle channel).

Table 2. Final measurements from the worst frequencies.

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
177.925000	22.5	1000.0	120.000	100.0	V	266.0	14.1	21.0	43.5	
200.021000	20.9	1000.0	120.000	100.0	V	259.0	12.5	22.6	43.5	
399.995000	32.4	1000.0	120.000	139.0	V	0.0	18.4	13.6	46.0	

Radiated Spurious Emissions 30 to 26 500 MHz and Band Edge

FCC Part 15 Class B Spurious Emission 30-1000MHz 3m

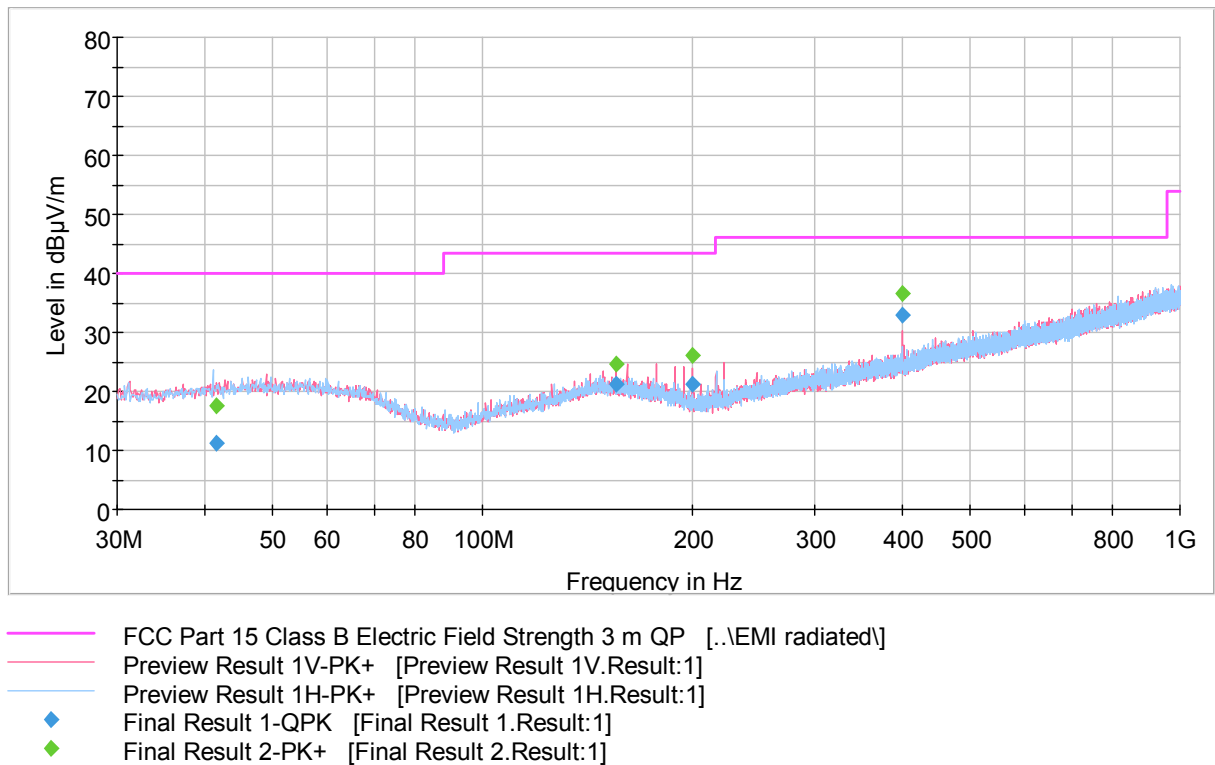


Figure 3. Measured curve with peak-detector (high channel).

Table 3. Final measurements from the worst frequencies.

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
41.635000	11.2	1000.0	120.000	122.0	H	63.0	14.9	28.8	40.0	
155.869000	21.3	1000.0	120.000	100.0	V	256.0	15.0	22.2	43.5	
199.984000	21.2	1000.0	120.000	100.0	V	274.0	12.5	22.3	43.5	
399.978000	32.8	1000.0	120.000	139.0	V	13.0	18.4	13.2	46.0	

Radiated Spurious Emissions 30 to 26 500 MHz and Band Edge

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

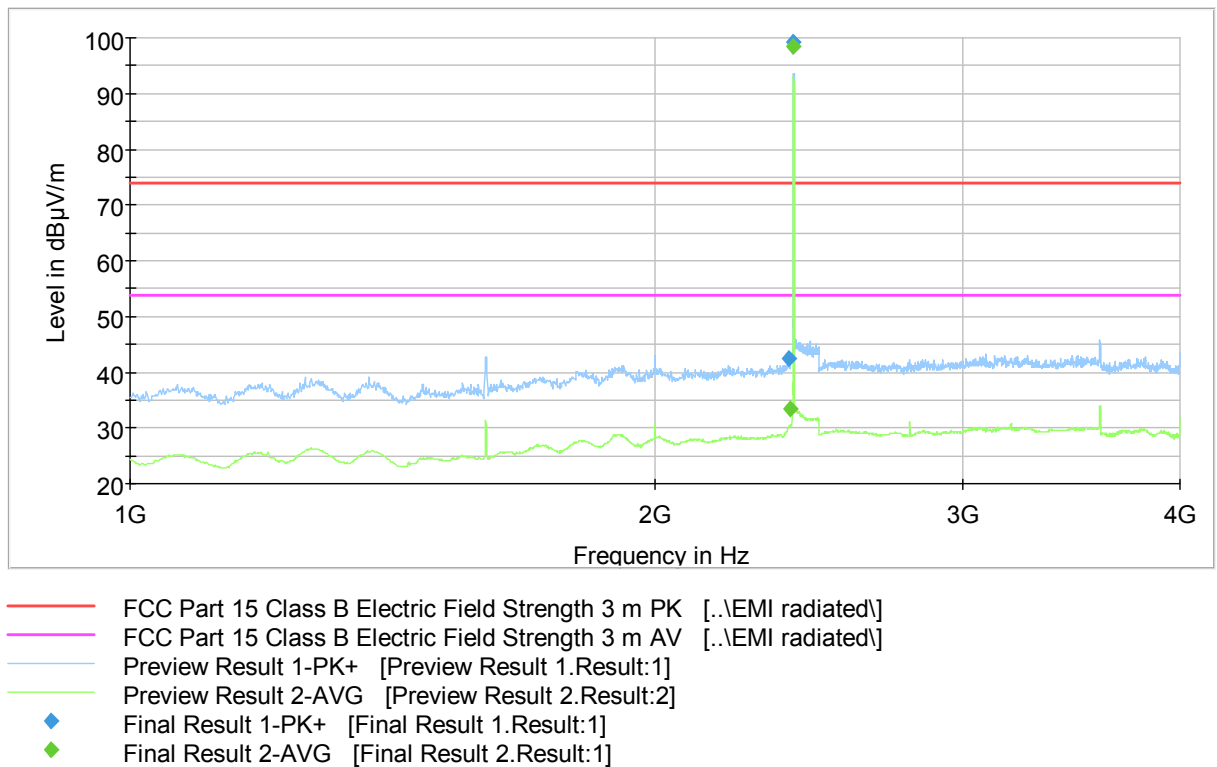


Figure 4. Measured curve with peak- and average detector (low channel).

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

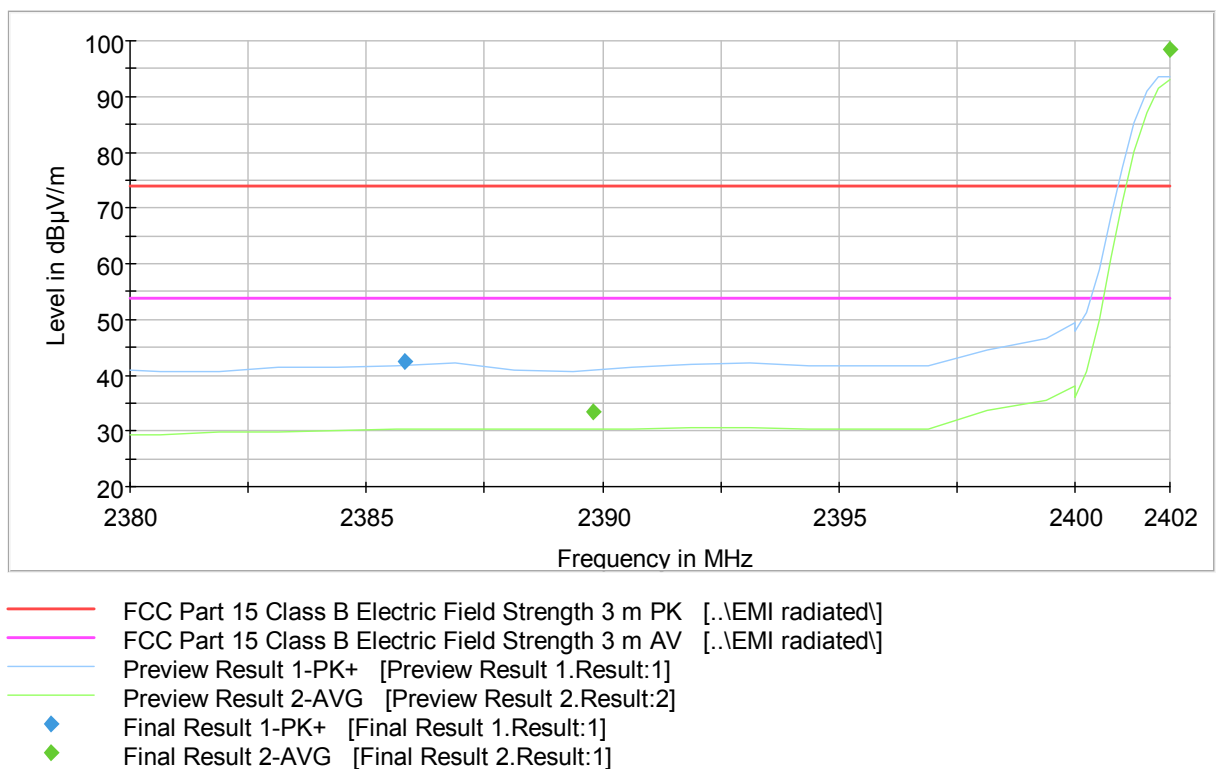


Figure 5. Low channel band edge.

Radiated Spurious Emissions 30 to 26 500 MHz and Band Edge

Final measurements from the worst frequencies

Table 4. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
2385.800000	42.5	1000.0	1000.000	178.0	H	355.0	3.8	31.4	73.9	
2402.200000	99.3	1000.0	1000.000	193.0	H	79.0	3.9	-25.4	73.9	Carrier

Table 5. Final Average results.

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
2389.800000	33.4	1000.0	1000.000	197.0	H	76.0	3.8	20.5	53.9	
2402.000000	98.5	1000.0	1000.000	191.0	H	80.0	3.9	-44.6	53.9	Carrier

Radiated Spurious Emissions 30 to 26 500 MHz and Band Edge

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

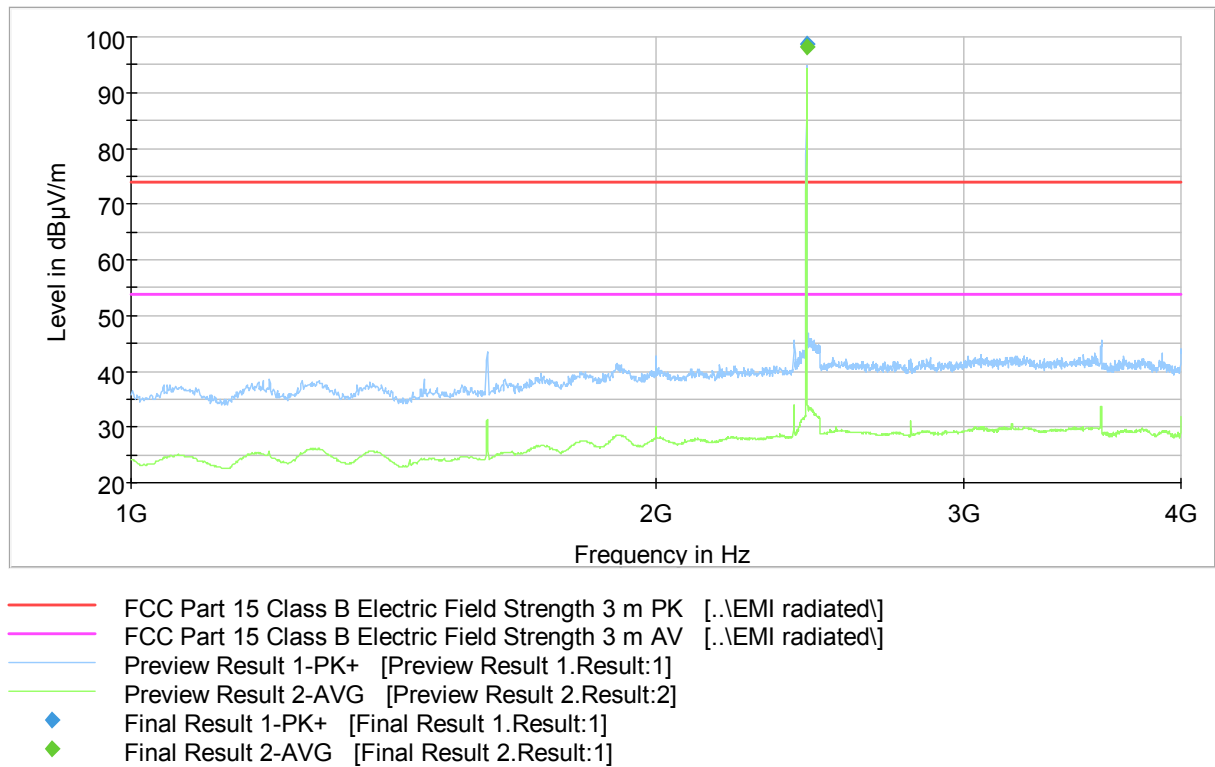


Figure 6. Measured curve with peak- and average detector (middle channel).

Final measurements from the worst frequencies

Table 6. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
2440.200000	98.7	1000.0	1000.000	186.0	H	64.0	3.9	-24.8	73.9	Carrier

Table 7. Final Average results.

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
2440.000000	98.1	1000.0	1000.000	186.0	H	67.0	3.9	-44.2	53.9	Carrier

Radiated Spurious Emissions 30 to 26 500 MHz and Band Edge

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

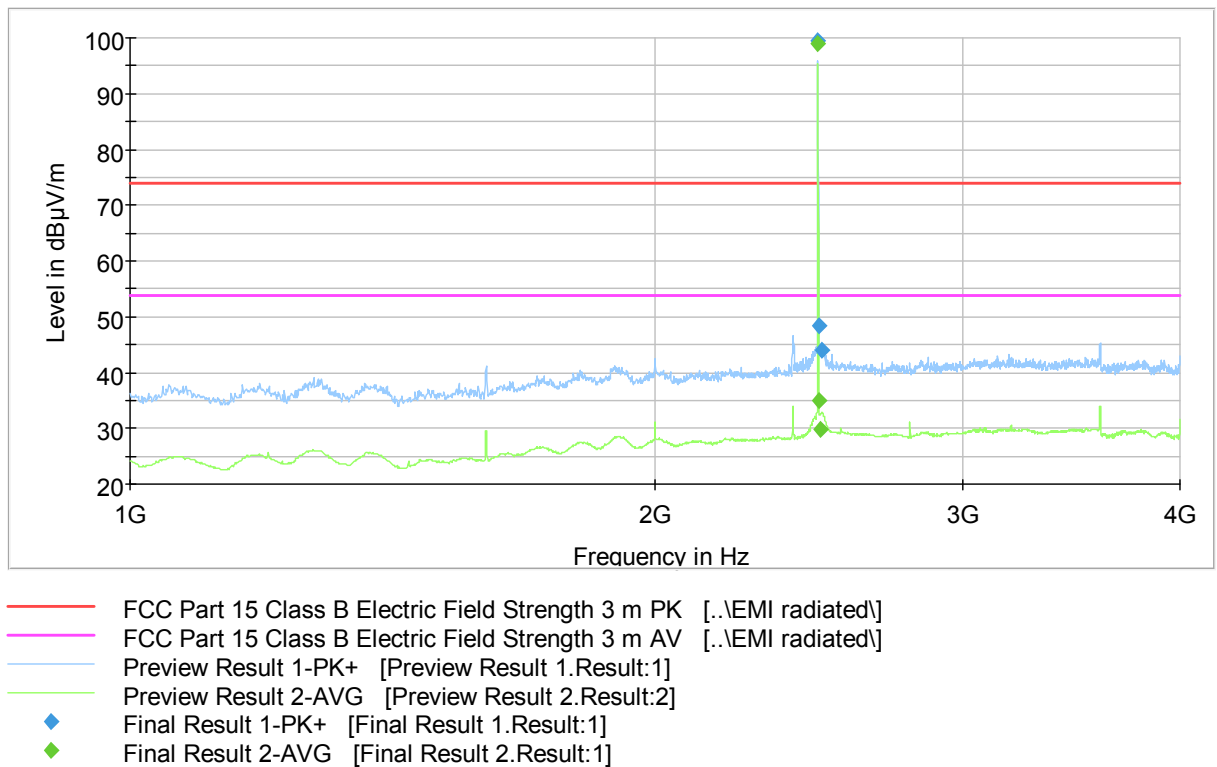


Figure 7. Measured curve with peak- and average detector (high channel).

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

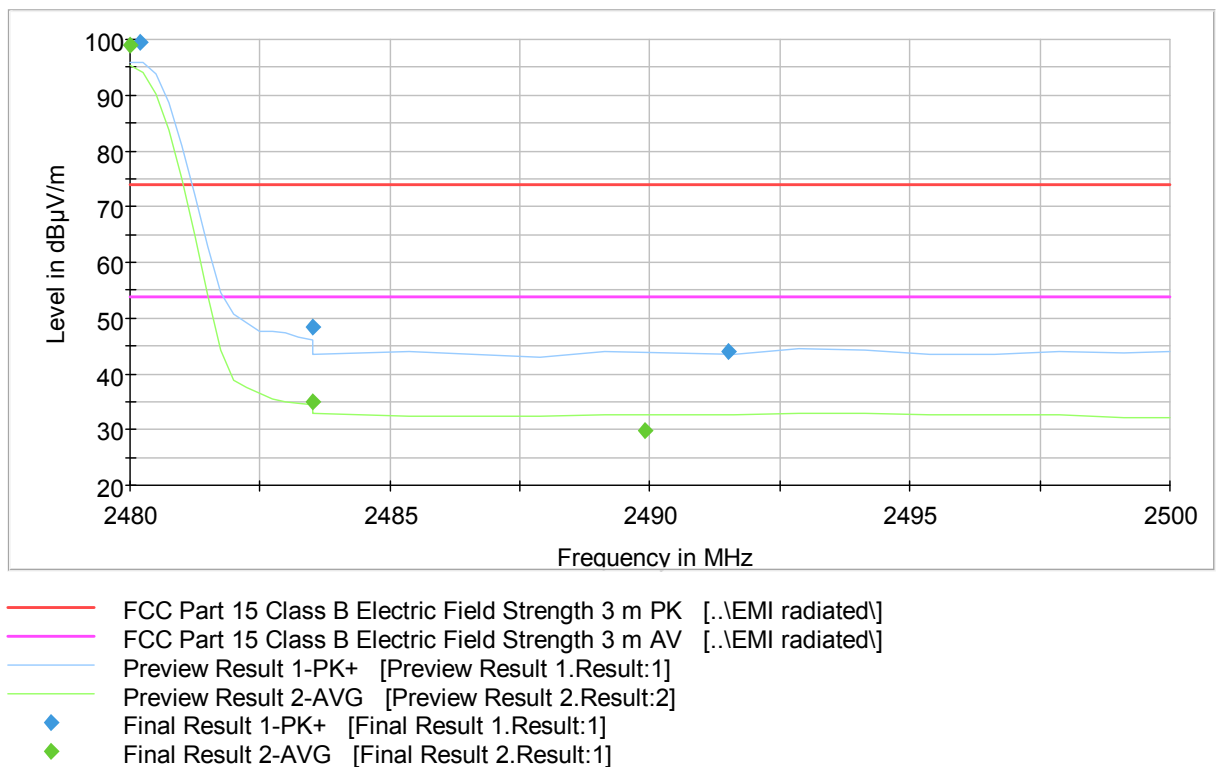


Figure 8. High channel band edge.

Radiated Spurious Emissions 30 to 26 500 MHz and Band Edge

Final measurements from the worst frequencies

Table 8. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
2480.200000	99.4	1000.0	1000.000	182.0	H	68.0	4.2	-25.5	73.9	Carrier
2483.500000	48.4	1000.0	1000.000	219.0	H	32.0	4.2	25.5	73.9	
2491.500000	44.1	1000.0	1000.000	224.0	V	130.0	4.3	29.8	73.9	

Table 9. Final Average results.

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
2480.000000	99.0	1000.0	1000.000	183.0	H	69.0	4.2	-45.1	53.9	Carrier
2483.500000	35.0	1000.0	1000.000	191.0	H	71.0	4.2	18.9	53.9	
2489.900000	29.8	1000.0	1000.000	213.0	V	62.0	4.3	24.1	53.9	

Radiated Spurious Emissions 30 to 26 500 MHz and Band Edge

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

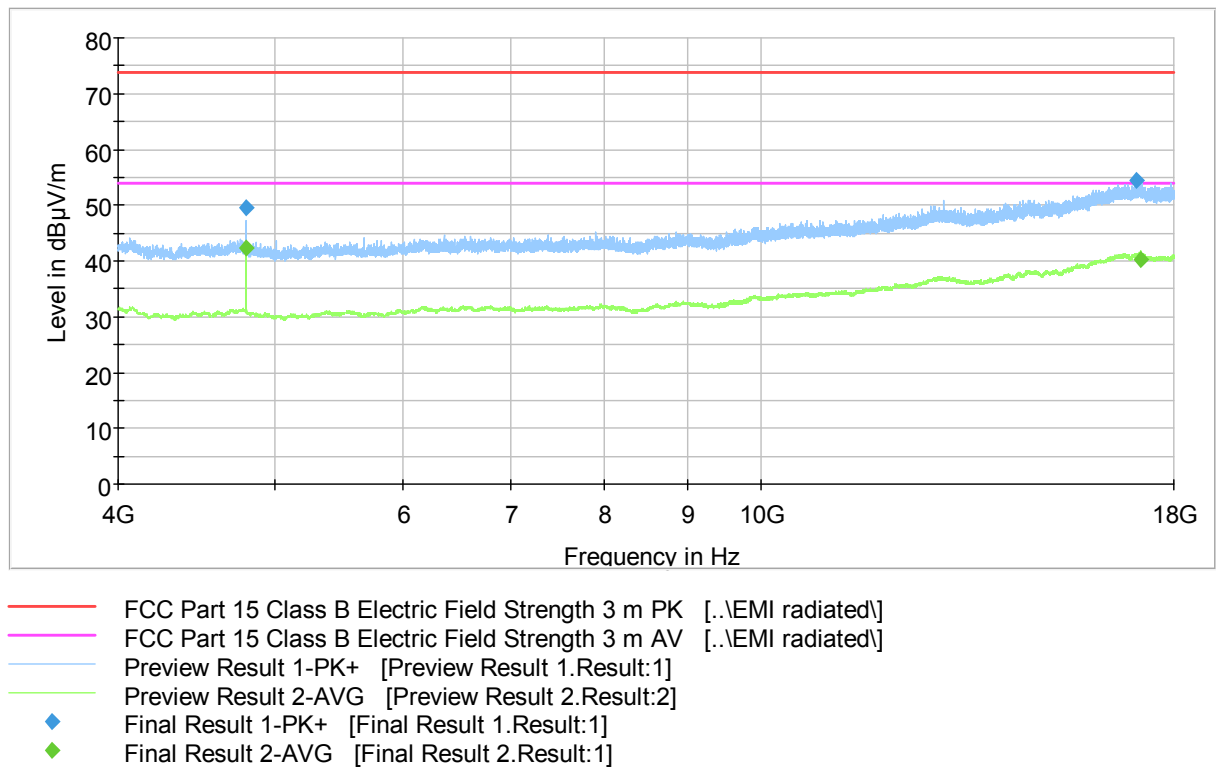


Figure 9. Measured curve with peak- and average detector (low channel).

Final measurements from the worst frequencies

Table 10. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
4803.600000	49.5	1000.0	1000.000	100.0	H	304.0	10.0	24.4	73.9	
17081.000000	54.4	1000.0	1000.000	286.0	H	37.0	25.8	19.5	73.9	

Table 11. Final Average results.

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
4804.000000	42.4	1000.0	1000.000	100.0	H	302.0	10.0	11.5	53.9	
17177.900000	40.3	1000.0	1000.000	100.0	V	115.0	25.7	13.6	53.9	

Radiated Spurious Emissions 30 to 26 500 MHz and Band Edge

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

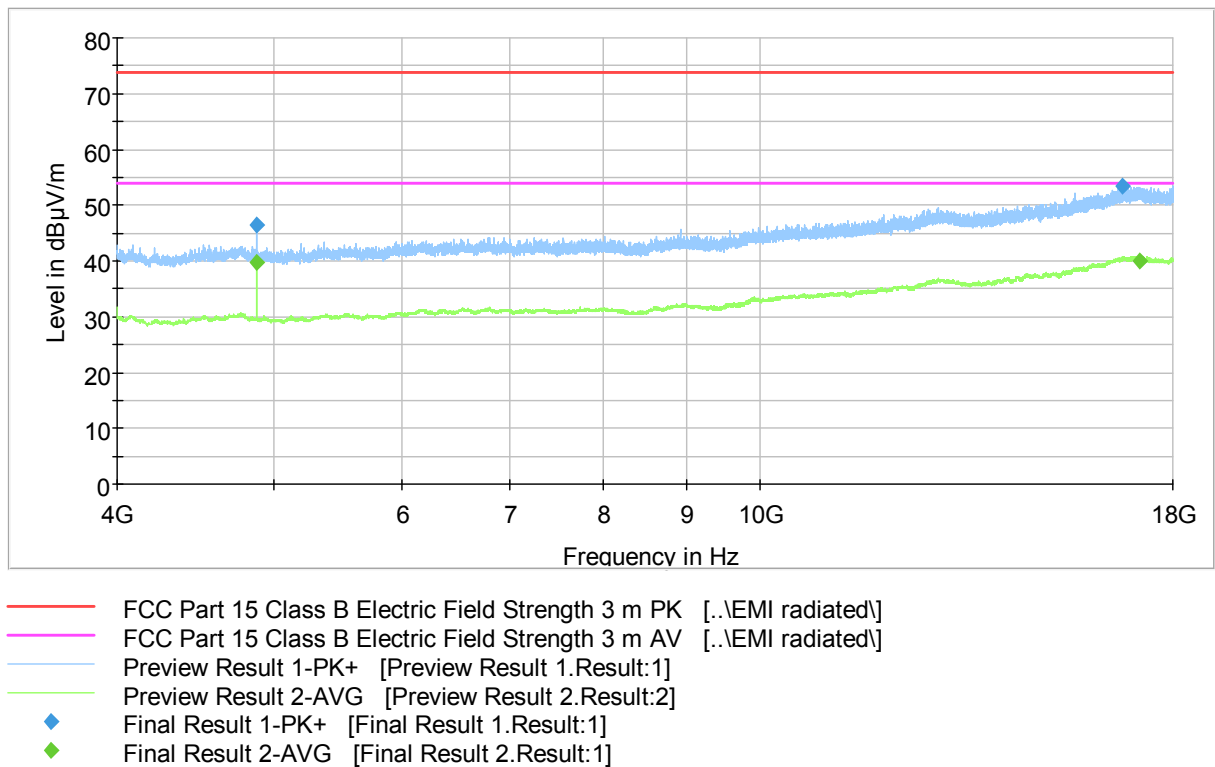


Figure 10. Measured curve with peak- and average detector (middle channel).

Final measurements from the worst frequencies

Table 12. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
4880.200000	46.4	1000.0	1000.000	100.0	H	20.0	9.3	27.5	73.9	
16765.800000	53.4	1000.0	1000.000	169.0	H	26.0	25.0	20.5	73.9	

Table 13. Final Average results.

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
4880.100000	39.6	1000.0	1000.000	105.0	H	28.0	9.3	14.3	53.9	
17174.000000	40.0	1000.0	1000.000	100.0	H	97.0	25.4	13.9	53.9	

Radiated Spurious Emissions 30 to 26 500 MHz and Band Edge

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

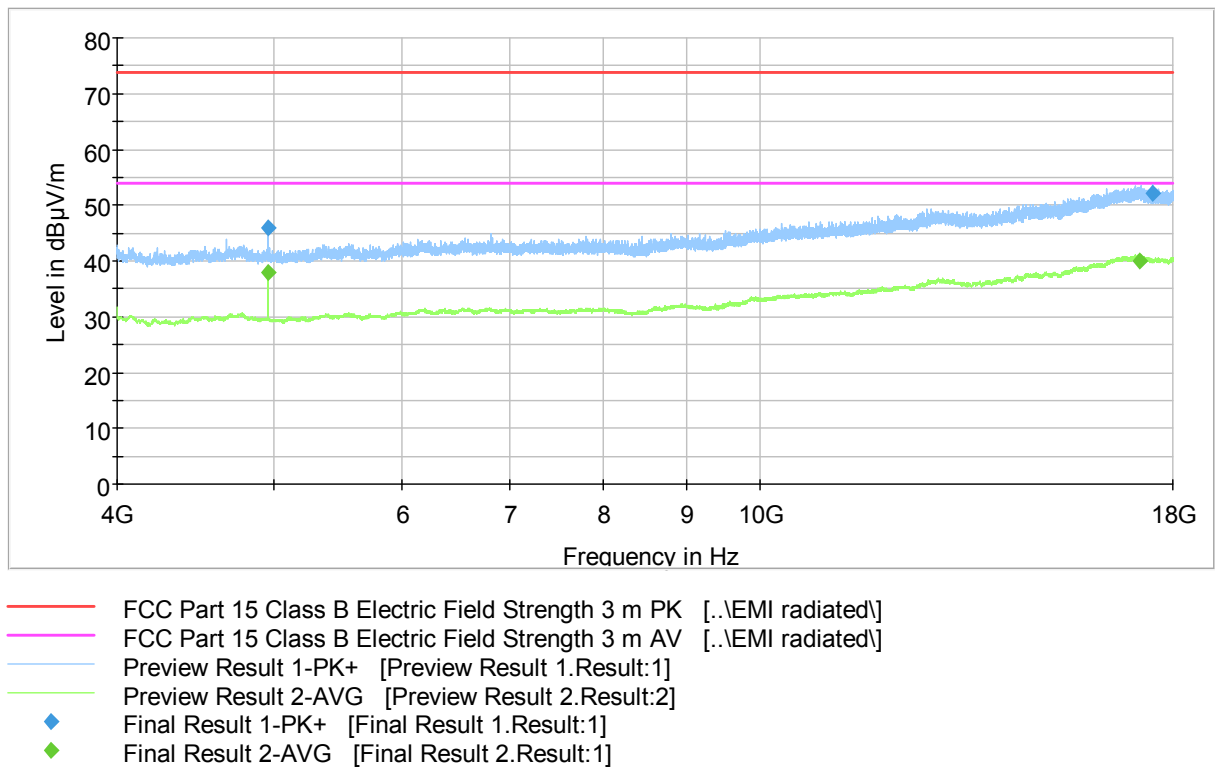


Figure 11. Measured curve with peak- and average detector (high channel).

Final measurements from the worst frequencies

Table 14. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
4960.500000	46.1	1000.0	1000.000	100.0	H	65.0	9.3	27.9	73.9	
17490.300000	52.2	1000.0	1000.000	400.0	V	178.0	25.1	21.7	73.9	

Table 15. Final Average results.

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
4960.100000	38.0	1000.0	1000.000	100.0	H	70.0	9.3	15.9	53.9	
17172.700000	40.1	1000.0	1000.000	100.0	H	3.0	25.4	13.8	53.9	

Radiated Spurious Emissions 30 to 26 500 MHz and Band Edge

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

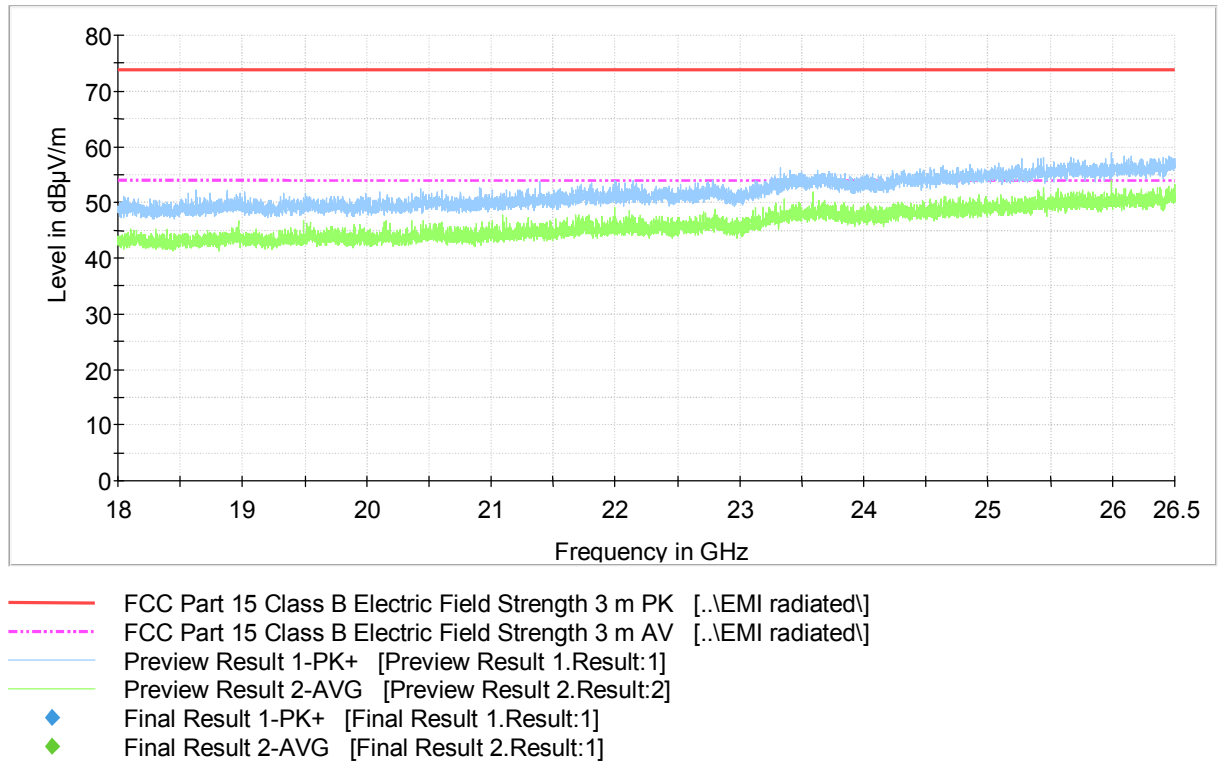


Figure 12. Measured curve with peak- and average detector (low channel).

No final measurements were made due to the low emissions level.

Radiated Spurious Emissions 30 to 26 500 MHz and Band Edge

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

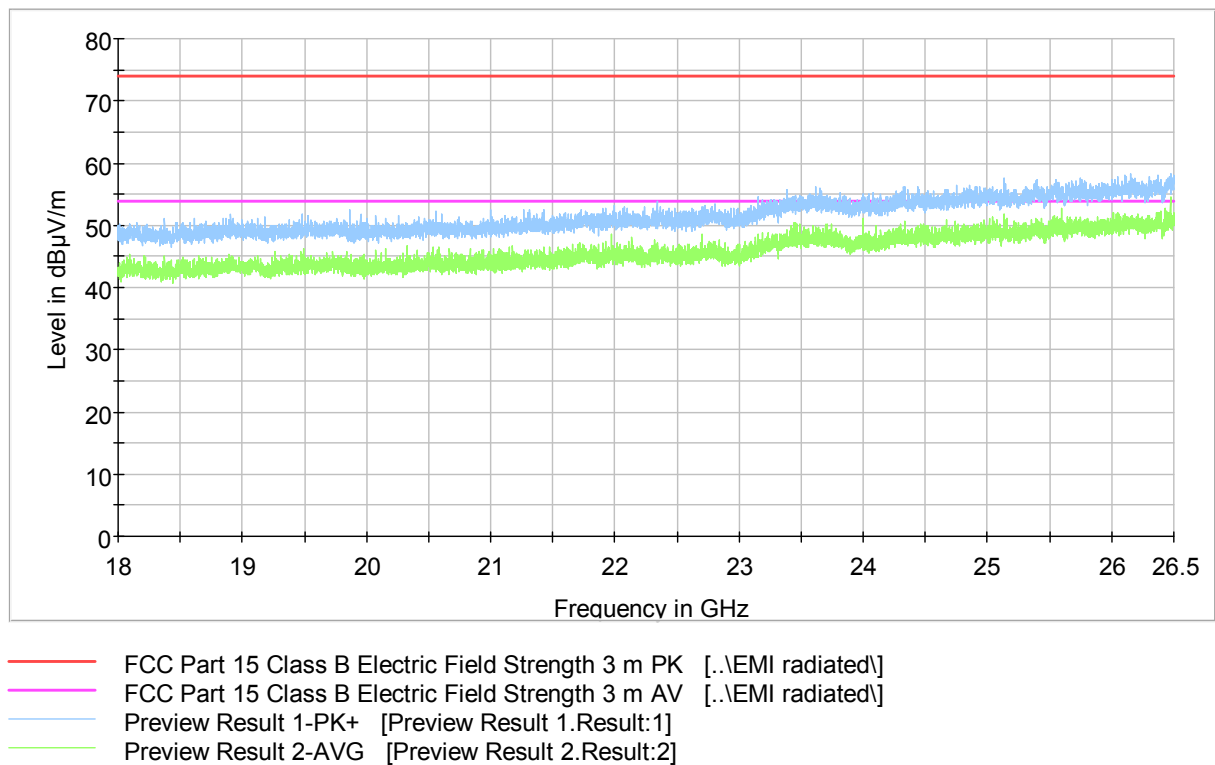


Figure 13. Measured curve with peak- and average detector (middle channel).

No final measurements were made due to the low emissions level.

Radiated Spurious Emissions 30 to 26 500 MHz and Band Edge

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

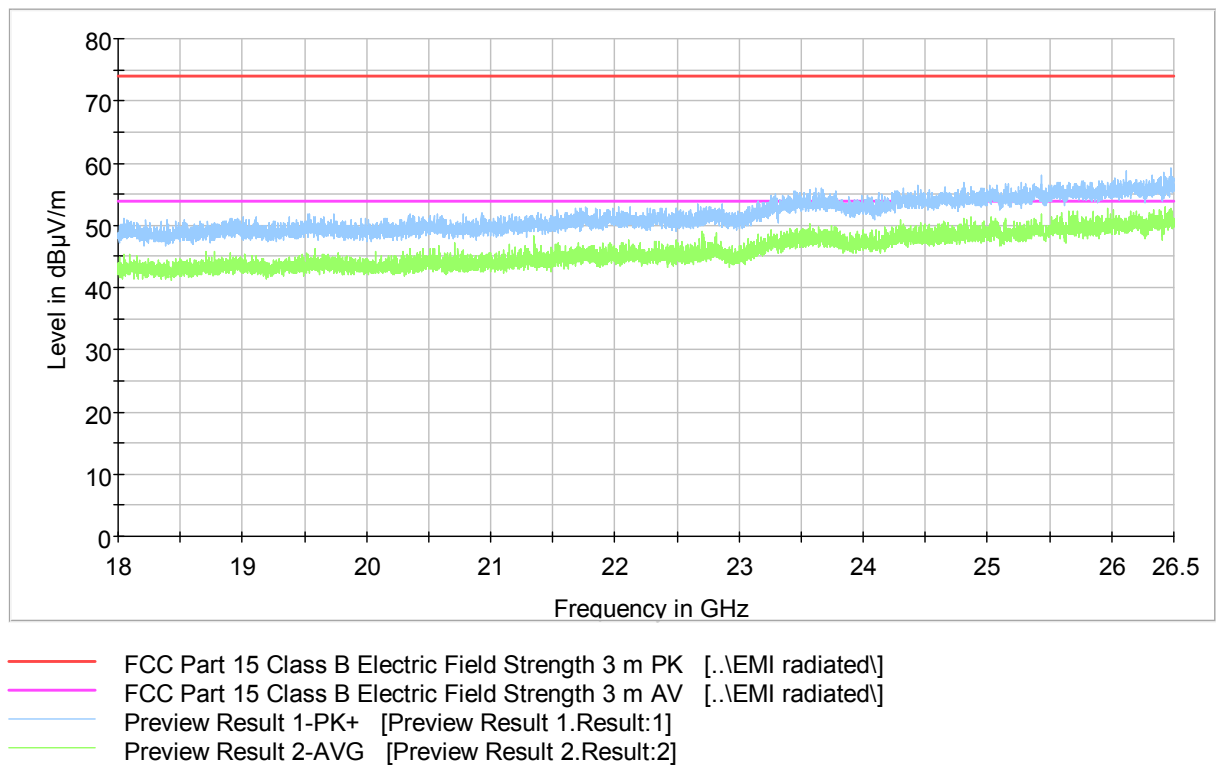


Figure 14. Measured curve with peak- and average detector (high channel).

No final measurements were made due to the low emissions level.

TEST EQUIPMENT

Radiated Emissions

Equipment	Manufacturer	Type	Serial no	Inv.no
TEST RECEIVER	ROHDE & SCHWARZ	ESU 26	100185	8453
TEST SOFTWARE	ROHDE & SCHWARZ	EMC-32	-	-
ANTENNA (30-1000 MHz)	SCHWARZBECK	VULB 9168	8168-503	8911
ANTENNA MAST	DEISEL	MA240	240/455	5017
TURNTABLE	DEISEL	DS420	-	5015
CONTROLLER	COMTEST	HD100	100/457	5018
ANTENNA (1-18 GHz)	EMCO	3117	29617	7293
PREAMPLIFIER (0.5-26GHz)	HP	83017A	3950M00102	5226
ATTENUATOR 10 dB	HUBER & SUHNER	6810.17B	-	-
HIGH PASS FILTER	WAINWRIGHT	WHKX	10	8267
ANTENNA (18-26.5 GHz)	EMCO	3160- 09	030232-022	7294

All used measurement equipment was calibrated (if required).