

Test Report



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

Equipment Under Test: Nordic ID Medea

Type/ Model: 815-1A

Manufacturer /
Customer: Nordic ID Oy

Myllyojankatu 2 A
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:

Niko Kotsalo
Testing Engineer

Date: February 27, 2015

Checked by:

Rauno Repo
Testing Engineer

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Equipment Under Test (EUT)

Nordic ID Medea with 802.11 a/b/g/n and 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-SDCSSD40NBT
IC ID (WLAN a/b/g/n + Bluetooth 2.1 module):	6616A-SDCSSD40NBT

Description of the EUT

The EUT is a battery operated portable computer with RFID and barcode reader. Nordic ID medea also includes (FCC ID: TWG-SDCSSD40NBT) 802.11 a/b/g/n WLAN and Bluetooth v2.1 + EDR module This report includes only the RFID test results.

Classification of the device

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

Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing

Ratings and declarations

RFID:

Operating Frequency Range (OFR):	902 – 928 MHz
Channels:	52
Channel separation:	500 kHz
Conducted power:	25.77 dBm
Transmission technique:	FHSS
Modulation:	ASK, PR-ASK
Maximum 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 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. All of the tests were performed in the PR-ASK modulation. The decision was based on the test results of the previous evolution of the NUR05 module, there were no major differences in the results of the other tests than the ones that were made with both modulations.

The transmit power were measured with a spectrum analyzer. Highest power was measured with data rate PR-ASK (25.77 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 (CH 1)	902.250
MID (CH 26)	914.750
HIGH (CH 52)	927.750

Test Facility

<input type="checkbox"/> Testing Location / address: FCC registration number: 90598	SGS Fimko Ltd Särkinenmentie 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

Transmitter Radiated Emissions 30 MHz to 26.5 GHz and Band Edge

Standard:	ANSI C63.10	(2009)
Tested by:	NKO	
Date:	16.2.- 23.2.2015	
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, 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.

Test results

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

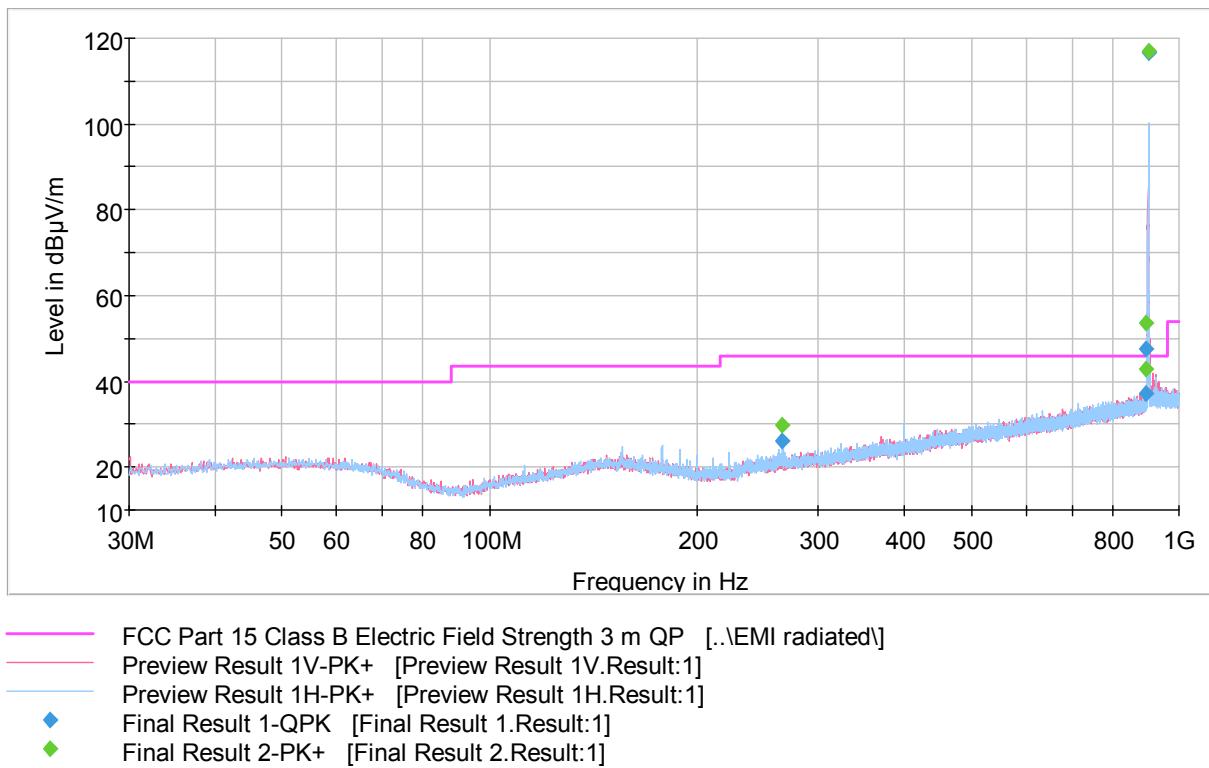


Figure 1. Measured curve with peak-detector Channel LOW.

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

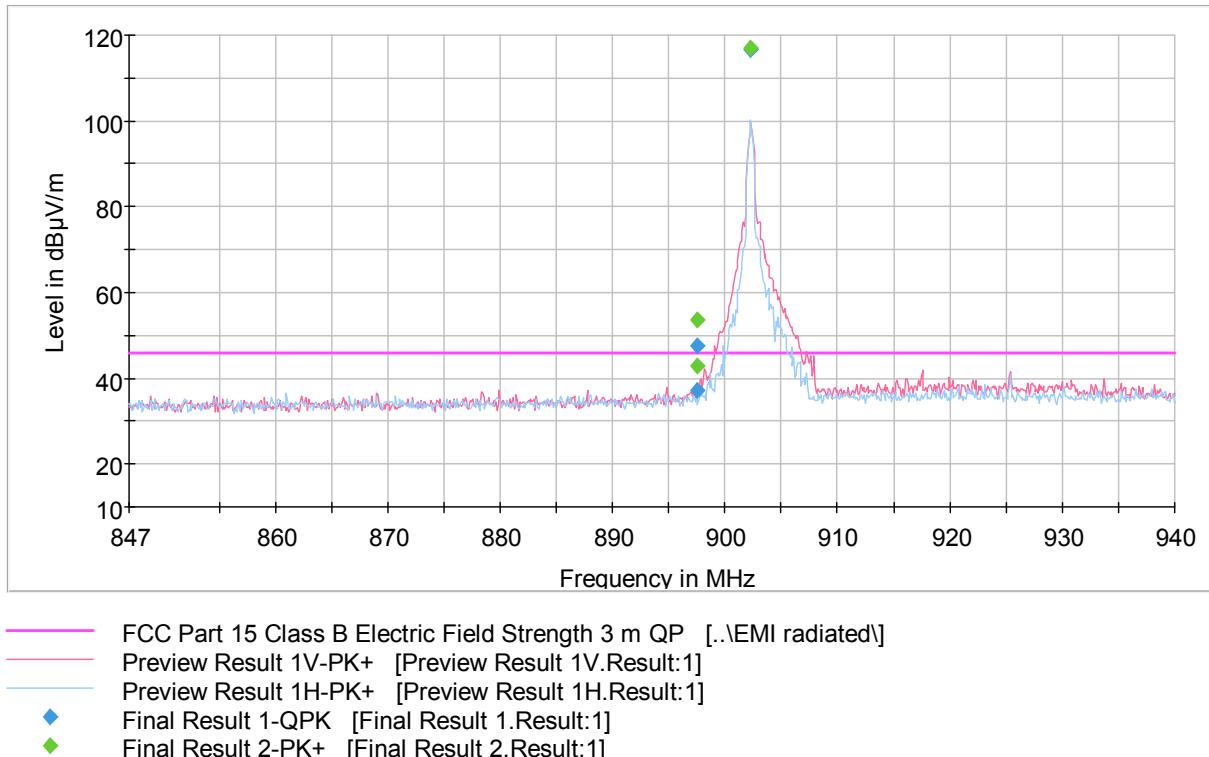


Figure 2. Low channel band edge.

Final measurements from the worst frequencies**Table 1.** Final results.

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
266.175000	26.0	1000.0	120.000	100.0	H	101.0	14.7	20.0	46.0	
897.540000	37.3	1000.0	120.000	175.0	H	117.0	27.3	8.7	46.0	
897.540000	47.6	1000.0	120.000	124.0	V	354.0	27.3	-1.6	46.0	
902.261000	116.7	1000.0	120.000	100.0	H	101.0	27.4	-70.7	46.0	Carrier

Note 2: The measurement result at band edge is not on a restricted frequency and it complies with the 20 dB limit described in FCC Rule 15.247(d).

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

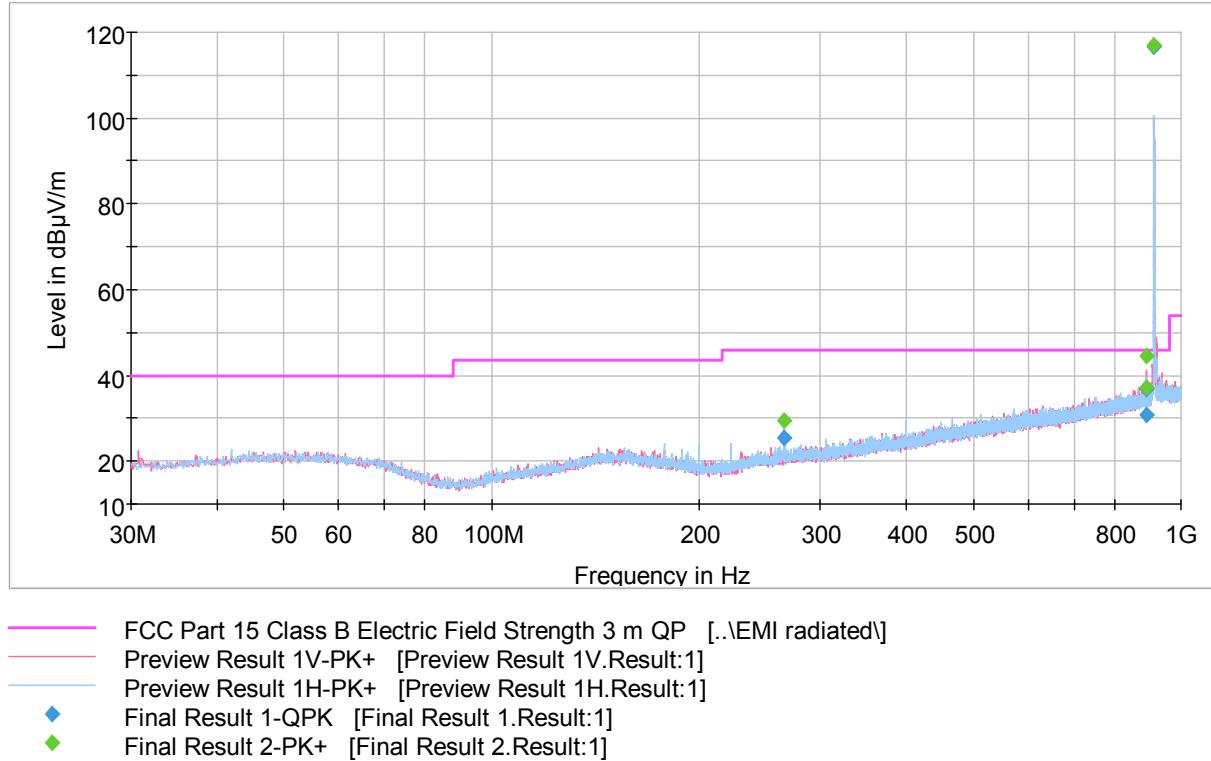


Figure 3. Measured curve with peak-detector Channel MID.

Final measurements from the worst frequencies**Table 2.** Final results.

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
266.235000	25.4	1000.0	120.000	100.0	H	99.0	14.7	20.6	46.0	
891.708000	30.9	1000.0	120.000	100.0	H	125.0	27.1	15.1	46.0	
892.250000	37.0	1000.0	120.000	200.0	V	0.0	27.1	9.0	46.0	
914.754000	116.8	1000.0	120.000	171.0	H	90.0	27.8	-70.8	46.0	Carrier

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

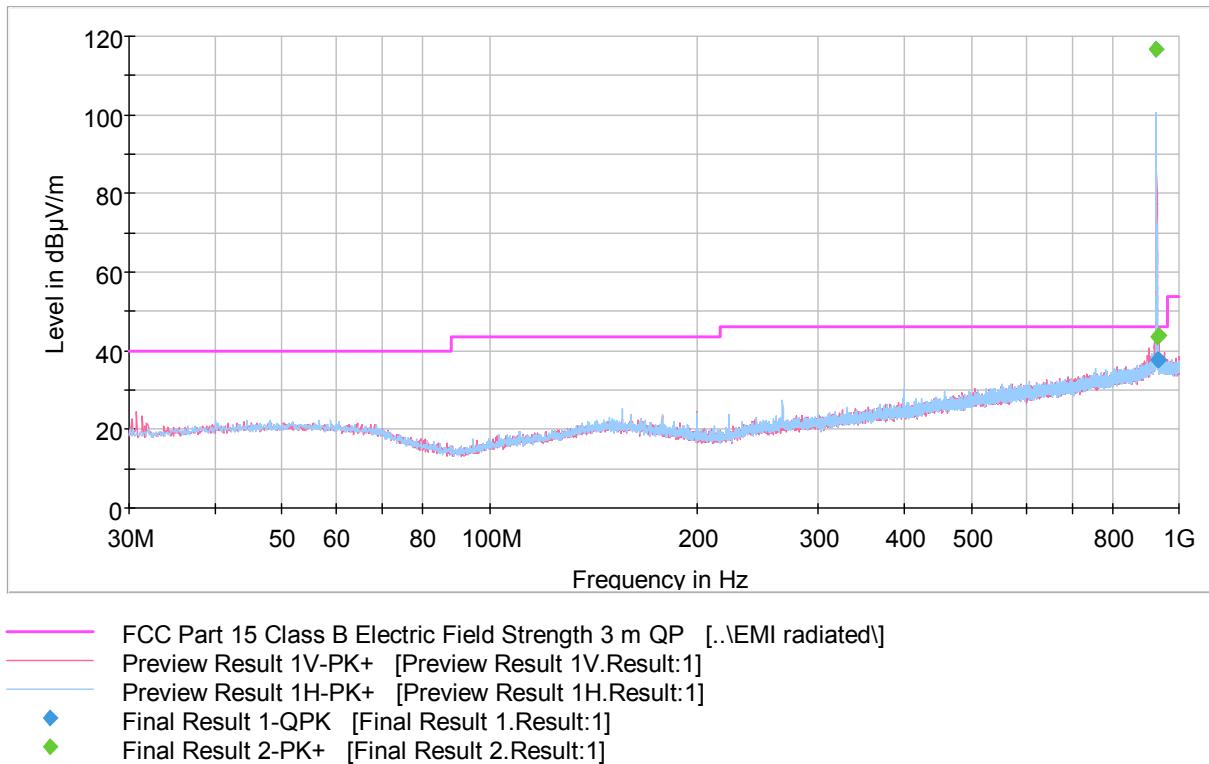


Figure 4. Measured curve with peak-detector Channel HIGH.

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

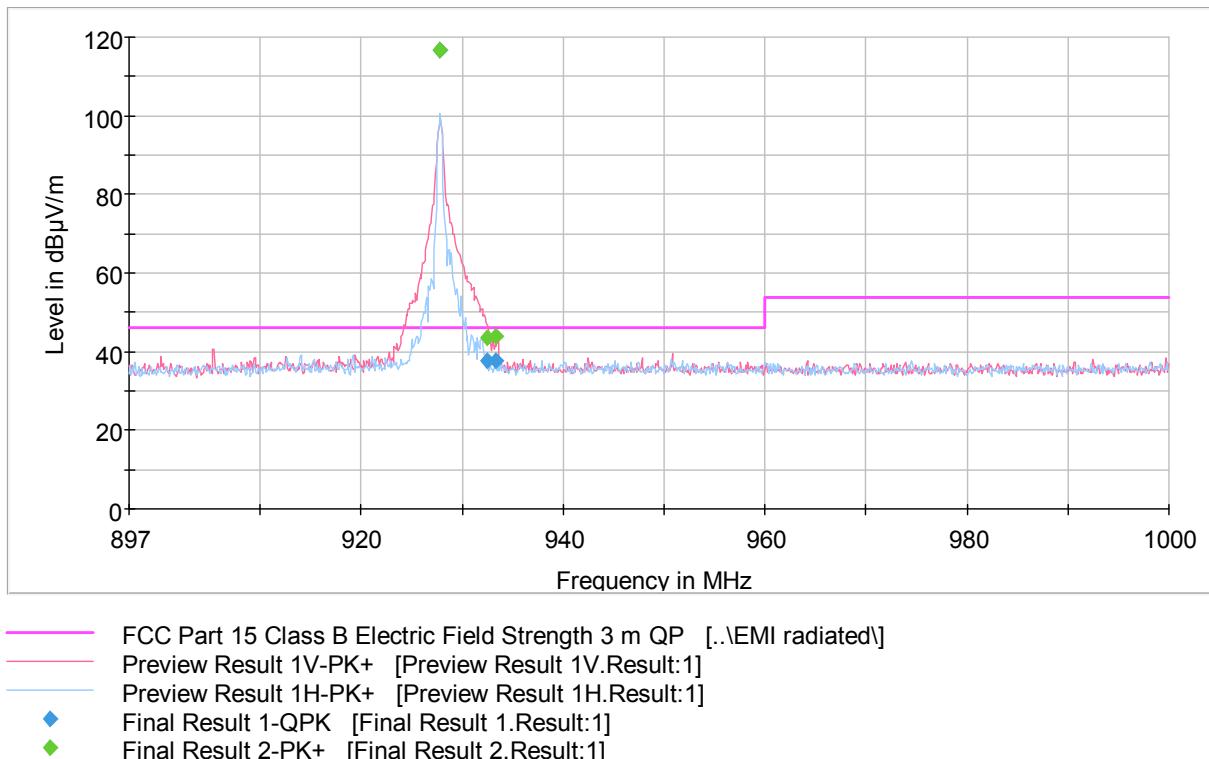


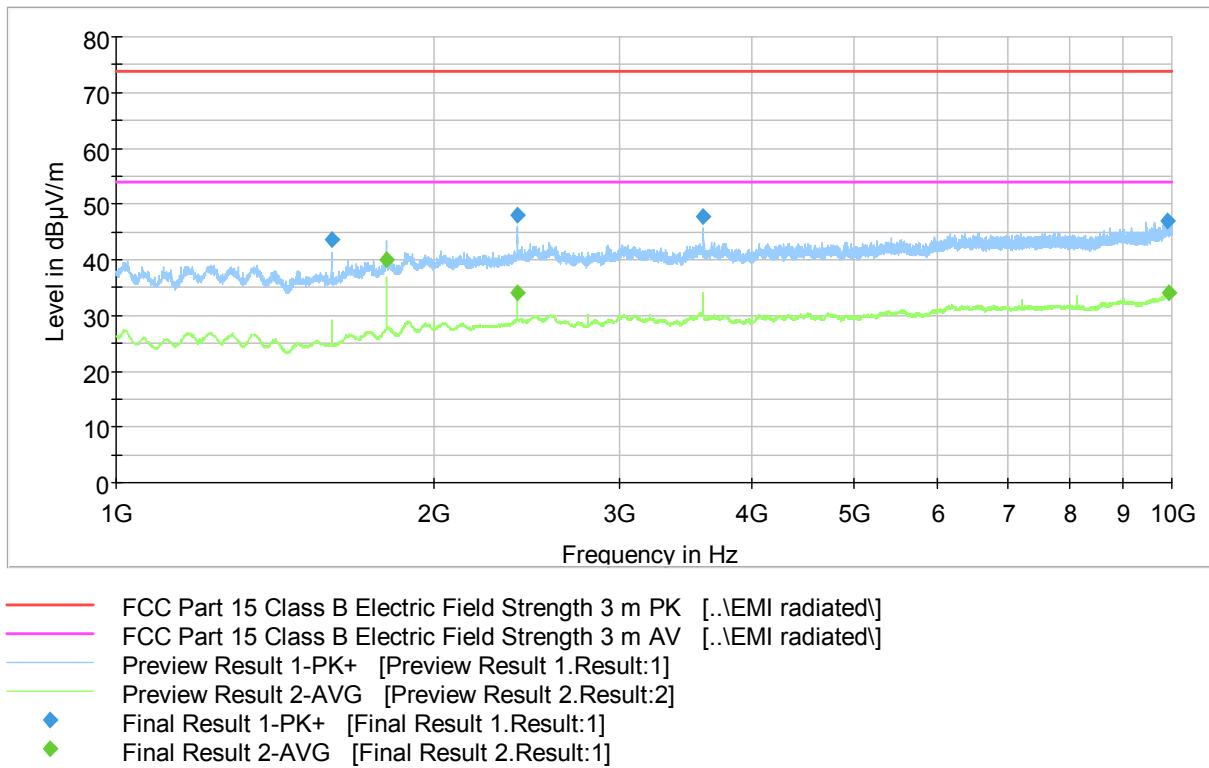
Figure 5. High channel band edge.

Final measurements from the worst frequencies**Table 3.** Final results.

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
927.752000	116.6	1000.0	120.000	173.0	H	113.0	27.9	-70.6	46.0	Carrier
932.500000	37.6	1000.0	120.000	100.0	H	13.0	27.9	8.4	46.0	
933.360000	37.9	1000.0	120.000	149.0	V	0.0	27.9	8.1	46.0	

Note 3: The measurement result at band edge is not on a restricted frequency and it complies with the 20 dB limit described in FCC Rule 15.247(d).

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

**Figure 6.** Measured curve with peak- and average detector channel LOW.**Final measurements from the worst frequencies****Table 4.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
1599.750000	43.6	1000.0	1000.000	194.0	H	64.0	-1.8	30.3	73.9	
2399.600000	48.1	1000.0	1000.000	100.0	V	189.0	4.3	25.8	73.9	
3600.250000	47.7	1000.0	1000.000	114.0	V	202.0	6.6	26.2	73.9	
9914.850000	47.0	1000.0	1000.000	280.0	H	308.0	15.8	26.9	73.9	

Table 5. Final Average results.

Frequency (MHz)	Average (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
1804.600000	40.1	1000.0	1000.000	121.0	V	0.0	1.3	13.8	53.9	
2399.900000	34.1	1000.0	1000.000	138.0	V	189.0	4.3	19.8	53.9	
9924.700000	34.1	1000.0	1000.000	100.0	H	15.0	15.8	19.8	53.9	

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

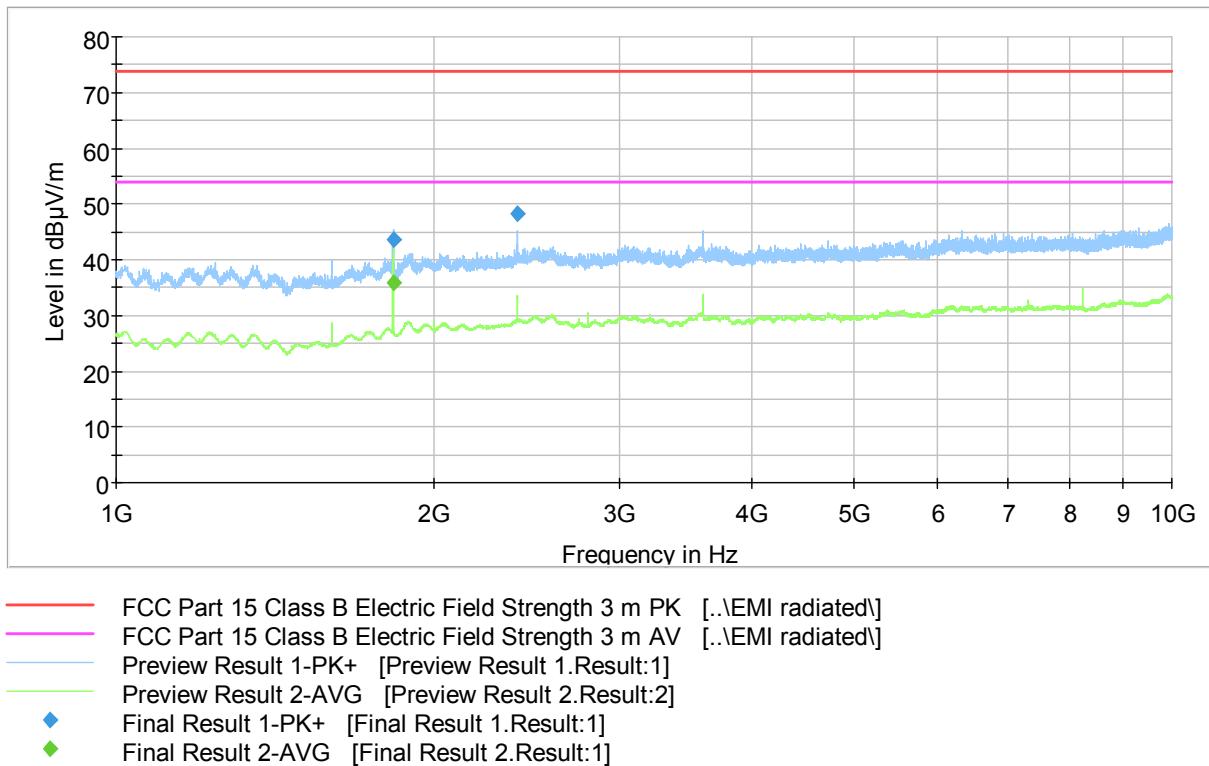


Figure 7. Measured curve with peak- and average detector channel MID.

Final measurements from the worst frequencies

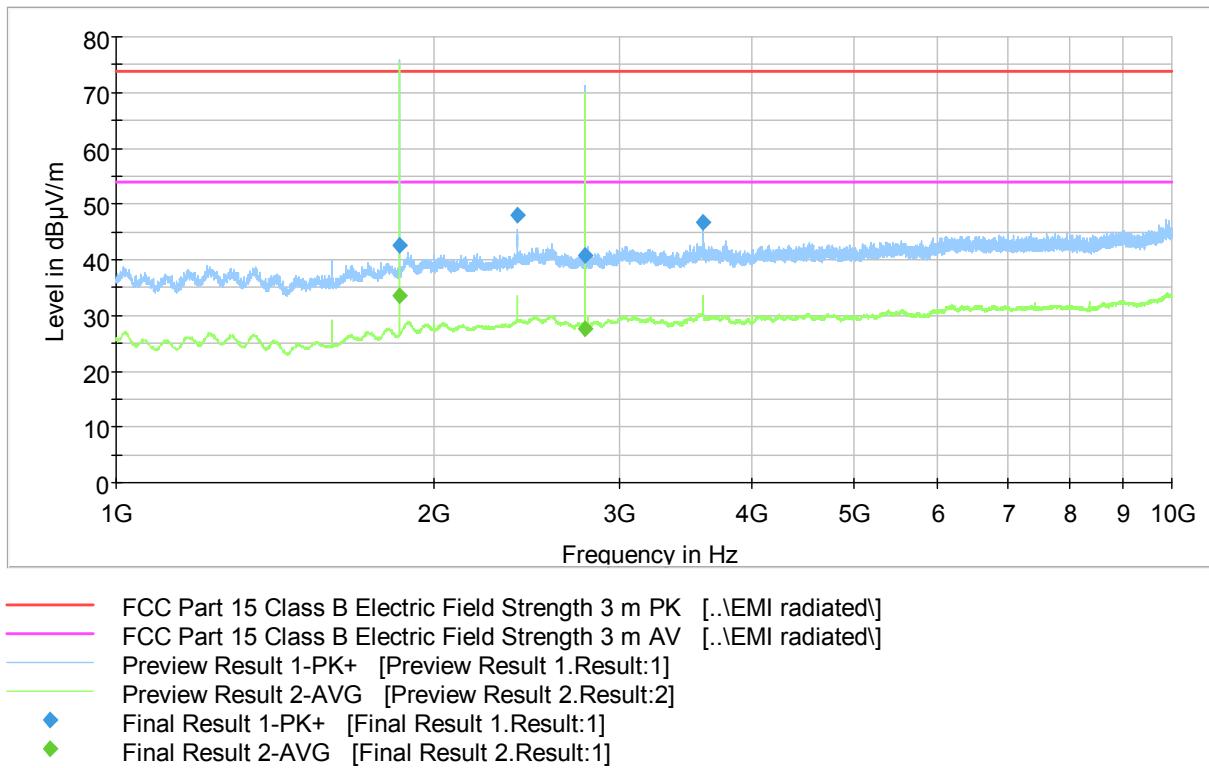
Table 6. Final Max Peak results.

Frequency (MHz)	MaxPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
1829.550000	43.7	1000.0	1000.000	121.0	V	-4.0	1.6	30.2	73.9	
2399.900000	48.2	1000.0	1000.000	130.0	V	187.0	4.3	25.7	73.9	

Table 7. Final Average results.

Frequency (MHz)	Average (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
1829.550000	35.8	1000.0	1000.000	122.0	V	-5.0	1.6	18.1	53.9	

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

**Figure 8.** Measured curve with peak- and average detector channel HIGH.**Final measurements from the worst frequencies****Table 8.** Final Max Peak results.

Frequency (MHz)	MaxPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
1855.450000	42.6	1000.0	1000.000	202.0	V	0.0	1.9	31.3	73.9	
2400.950000	47.9	1000.0	1000.000	138.0	V	191.0	4.3	26.0	73.9	
2784.950000	40.8	1000.0	1000.000	122.0	V	9.0	4.7	33.1	73.9	
3600.000000	46.8	1000.0	1000.000	138.0	V	190.0	6.6	27.1	73.9	

Table 9. Final Average results.

Frequency (MHz)	Average (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
1855.450000	33.6	1000.0	1000.000	202.0	V	-4.0	1.9	20.3	53.9	
2780.750000	27.5	1000.0	1000.000	100.0	V	17.0	4.7	26.4	53.9	

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

All used measurement equipment was calibrated (if required).