TEST REPORT CONCERNING THE COMPLIANCE OF WIRELESS NETWORK ADAPTOR MODULE BRAND INTEL, MODELS 7260NGW WITH 47 CFR PART 15 (10-1-12 EDITION) AND THE REQUIREMENTS OF INDUSTRY CANADA: ICES-003 (ISSUE 5, AUGUST 2012)

12121201.fcc05
March 11, 2013

FCC listed : 90828
Industry Canada : 2932G-2
VCCI Registered : R-1518, C-1598
R&TTE, LVD, EMC Notified Body : 1856

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MEASUREMENT/TECHNICAL REPORT

Intel Corporation

Brand: Intel
Model: 7260NGW
FCC ID: PD97260NG and PD97260NGU
IC: 1000M-7260NG

This report concerns: Original grant/certification ~~Class 2 change~~ ~~Verification~~ ~~Verification~~

Equipment type: JBP Class B Computing Device Peripheral

Report prepared by:

Name	: R. van der Meer
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Telephone number	: + 31 594 505 005
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The data taken for this test and report herein was done in accordance with 47 CFR Part 15 (10-1-12 Edition), RSS-GEN AND RSS-210 and the measurement procedures of ANSI C63.4-2009. TÜV Rheinland EPS B.V. at Leek, The Netherlands, certifies that the data is accurate and contains a true representation of the emission profile of the Equipment Under Test (EUT) on the date of the test as noted in the test report. I have reviewed the test report and find it to be an accurate description of the test(s) performed and the EUT so tested.

Date: March 11, 2013 Signature:

O. Hoekstra
Senior Engineer Telecom TÜV Rheinland EPS B.V.

Summary

The device under test does:

- fulfill the general approval requirements as identified in this test report
- not fulfill the general approval requirements as identified in this test report

Description of test item

Test item (EUT)	:	Wireless Network Adapter Module
Manufacturer	:	Intel Corporation
Brand	:	Intel
Model	:	7260NGW
MAC address	:	001500B6698F
FCC ID	:	PD97260NG and PD97260NGU
IC	:	1000M-7260NG
Receipt date	:	January 07, 2013

Applicant information

Applicant's representative	:	Steven Hackett
Company	:	Intel Corporation
Address	:	100 Center Point Circle Suite 200
Postal code	:	SC 29210
City	:	Columbia
Country	:	USA
Telephone number	:	803-216-2344
e-mail address	:	steven.c.hackett@intel.com

Test(s) performed

Location	:	Leek
Test(s) started	:	January 24, 2013
Test(s) completed	:	February 20,2013
Purpose of test(s)	:	Equipment Authorization (Original grant/certification)
Test specification(s)	:	47 CFR Part 15 (10-1-12 Edition) and ICES-003 ISSUE 5 AND ANSI C63.4-2009
Compliance statement	:	The test has demonstrated that this unit complies with stipulated standards.
Test engineer(s)	:	R. van der Meer
Report written by	:	R. van der Meer
Report date	:	March 11, 2013

Table of contents

1 General information.

1.1 Product description.

1.1.1 Introduction.

The brand Intel model 7260NGW, hereafter referred to as EUT, is a PCIe small form factor IEEE 802.11a/b/g/n/ac + Bluetooth wireless network adapter module. The module will support MIMO (2x2) for 802.11n/ac modes and MISO (1x2) for 802.11a/b/g modes and utilizes DSSS and OFDM modulation techniques. Bluetooth operates with basic, EDR and BLE modes as SISO (1x1). When Bluetooth is operational wifi operates as SISO (1x1).

The module is sold under two different FCC ID numbers under the same model number (see table below). The FCC ID ending in "U" is intended to allow user installation conditions and host systems must be provided with a BiOS locking feature to provide mutual authentication between module and host devices.

Brand	Model Number	Description	FCC/IC IDs
Intel	7260NGW	802.11a/b/g/n/ac + BT wireless network adapter module	PD97260NG PD97260NGU 1000M-7260NG

The content of this report and measurement results have not been changed other than the way of presenting the data.

1.2 Related submittal(s) and/or Grant(s).

1.2.1 General.

This test report supports the original grant/certification in equipment authorization files under registration number. **FCC ID: PD97260NG and PD97260NGU and IC: 1000M-7260NG.**

1.3 Tested system details.

Details and an overview of the system and all of its components, as it has been tested, may be found below.

EUT	:	Wireless Network Adapter Module
Manufacturer	:	Intel Corporation
Brand	:	Intel
Model	:	7260NGW
MAC address	:	001500B6698F
Voltage input rating	:	+3.3 V
Voltage output rating	:	--
Current input rating	:	--
Antenna	:	AUX3
Remarks	:	See photos of the EUT on the next page

The EUT was placed inside a host (laptop computer – AUX1), see photo 1c on the next page.

Photo 1a: EUT (front)

Photo 1b: EUT (back)

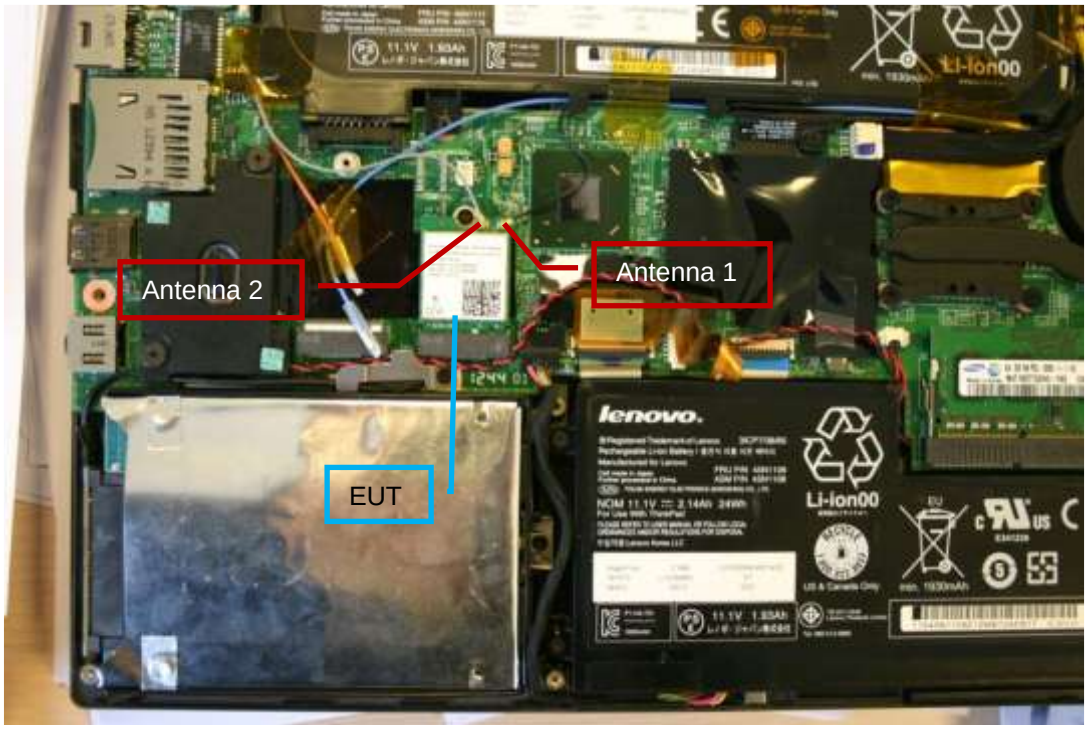


Photo 1c: EUT as placed in host (AUX1) (bottom cover of AUX1 removed)

1.3.1 Description of input and output ports.

Number	Terminal	From	To	Remarks
1	Mains	Mains	AUX1	--
2	Charging adapter	AUX1	AUX2 (Host holding EUT)	--
3	usb	Printer	AUX1	--
4	usb	mouse	AUX1	--

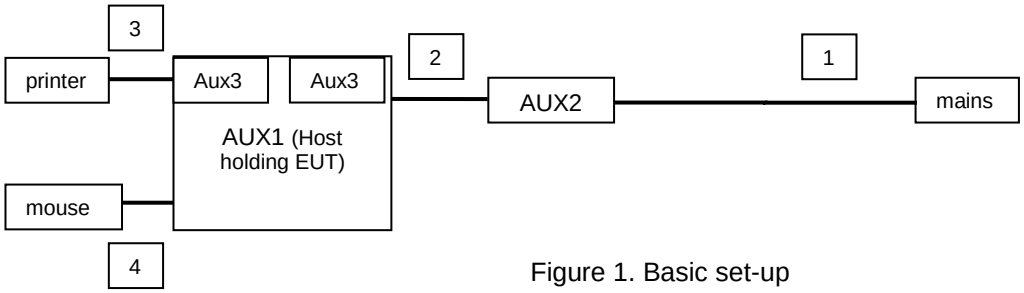
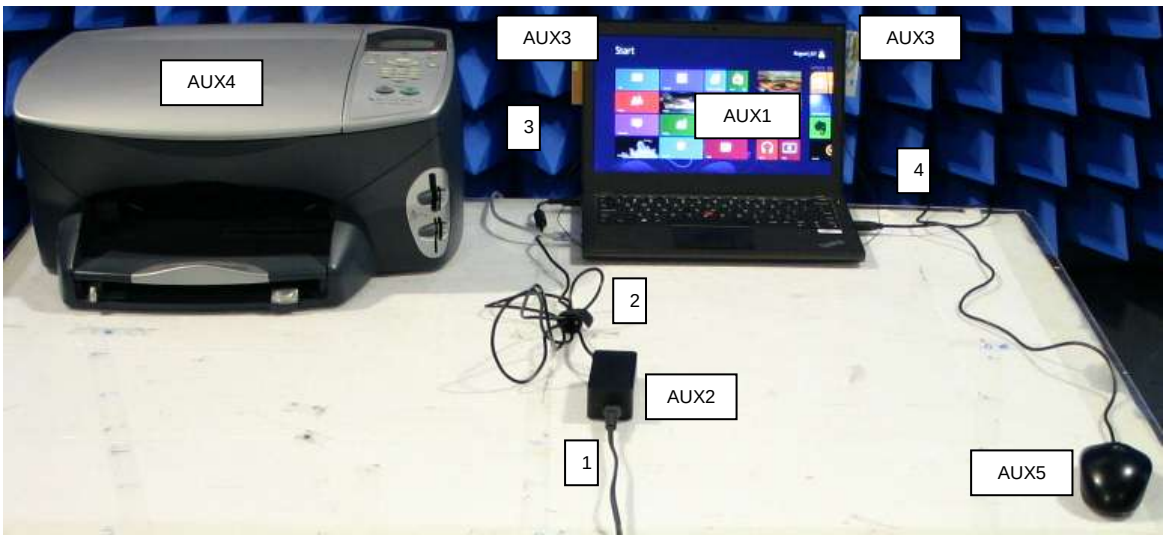


Figure 1. Basic set-up



1.3.2 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

1. AUX1
   Product: Laptop Computer
   Brand: Lenovo
   Model: ThinkPad X231s
   Serial Number: MP-27LMO 12/1i
   Remark: property applicant, host for testsoftware and EUT

2. AUX2
   Product: AC Adapter
   Brand: Lenovo
   Model: ADLX45NCC2A
   Rated input Voltage: 100-240Vac 1.3A 50-60Hz
   Rated output Voltage: 20Vdc 2.25A
   Remarks: connects AUX1 to mains

3. AUX3
   Product: Reference antennas
   Manufacturer: SkyCross Electronics (Shenzen) Co.,Ltd
   Brand: SkyCross Electronics (Shenzen) Co.,Ltd
   Gain at 2G4: 3.0 dBi (declared by applicant)
   Gain at 5G: 5.0 dBi (declared by applicant)
   Remarks: connected to EUT and physically placed on lid of AUX1

4. AUX4
   Product: Printer
   Manufacturer: HP
   Brand: HP
   Remarks: connected to EUT and physically placed on lid of AUX1

5. AUX5
   Product: Mouse
   Manufacturer: Logitech
   Brand: Logitech
   Remarks: connected to EUT and physically placed on lid of AUX1

1.4 Test Summary

The EUT was tested in accordance with the specifications given in Table 1 below.

Test Standard		Description	Page	Pass / Fail
47 CFR Part 15 (10-1-12 Edition)	**ICES-0003 Issue 5 (AUGUST 2012)**			
15.107(a) Class B	Section 5 Class B	Conducted emissions	13-15	Pass
15.109(a) Class B	Section 6 Class B	Radiated emissions	12	Pass

Table 1: Test specifications

Testmethods: ANSI C63.4:2009

1.5 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15 (10-1-12 Edition), sections 15.31, 15.35, 15.205, 15.107, 15.109 and ICES-003 Issue 5.

The test methods, which have been used, are based on ANSI C63.4: 2009.

Radiated emission tests above 30 MHz were performed at a measurement distance of 3 meters.

The receivers are switching automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. The antenna factors are programmed in the test receiver. The receiver automatically calculates the appropriate correction factor for the utilized antenna and also the appropriate antenna factor for the cable loss. The total correction is automatically added to the measured value.

1.6 Test facility.

The Federal Communications Commission and Industry Canada has reviewed the technical characteristics of the test facilities at TÜV Rheinland EPS B.V., located at Eiberkamp 10, 9351 VT Leek, The Netherlands, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948.

The description of the test facilities has been filed at the Office of the Federal Communications Commission under registration number 90828. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

The description of the test facilities has been filed to Industry Canada under registration number 2932G-2. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

1.7 Test conditions.

Normal test conditions:

Temperature (*) : +15°C to +35°C
Relative humidity(*) : 20 % to 75 %
Supply voltage : internal accu battery operated (fully charged)
Air pressure : 950 – 1050 hPa

When it was impracticable to carry out the tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests are stated separately.

2 System test configuration.

2.1 Justification.

The system was configured for testing in a typical situation as a customer would normally use it. The test sample was configured by software as described in section 2.3 to enable continuous transmit in various modes (described in section 2.2).

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.10: 2009.

2.2 EUT mode of operation.

The EUT has been tested in the modes as described in table below

Operation Mode	EUT Status	Description
Mode 1	On	Wifi transmitting in 2.4GHz band. Bluetooth in IDLE mode.
Mode 2	On	Wifi transmitting in 5GHz band. Bluetooth in IDLE mode.
Mode 3	On	Wifi tin IDLE mode Bluetooth in transmission mode.
Mode 4	On	Wifi tin IDLE mode Bluetooth in IDLE mode

2.3 Test Software

A continuous transmit or receive mode could be initiated by using test software as supplied by Intel Corporation. The test software was used to define various different operational modes of the EUT for the purpose of compliance testing. The version of the test software, as supplied by Intel Corporation and used during all tests is:

Test software : DRTU 1.6.0-0510
Driver : 16.0.0.17

This software was running on a laptop computer (AUX1). It was used to enable the test operation modes listed in section 2.2 as appropriate.

2.4 Special accessories.

No special accessories are used and/or needed to achieve compliance.

2.5 Equipment modifications.

No modifications have been made to the equipment.

2.6 Product Labeling

The product labeling information is available in the technical documentation package.

2.7 Block diagram of the EUT.

The block diagram is available in the technical documentation package.

2.8 Schematics of the EUT.

The schematics are available in the technical documentation package.

2.9 Part list of the EUT.

The part list is available in the technical documentation package.

3 Radiated emission data.

3.1 Radiated field strength measurements (30 MHz – 1 GHz, E-field)

Freq. [MHz]	Antenna Orientation	Reading QP [dBµV]	Factor [dB(1/m)]	Level QP [dBµV/m]	Limit [dBµV/m]	Margin QP [dB]
66.86	Vertical	15.1	5.4	20.5	40.0	19.5
111.48	Vertical	13.6	11.4	25.0	43.5	18.5
253.10	Vertical	13.7	14.2	27.9	46.0	18.1
774.96	Vertical	14.7	24.8	39.5	46.0	6.5
844.80	Vertical	15.3	26.1	41.4	46.0	4.6
922.40	Vertical	15.4	27.6	43.0	46.0	3.0

Table 2 Radiated emissions of the EUT

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.205, 15.109(a) and ICES-003 are depicted in Table 2.

Notes:

1. Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.
2. Measurement uncertainty is ±5.0dB.
3. The EUT was varied in three positions, the measuring antenna was varied in horizontal and vertical orientations and also around it's axis and height. The reported value is the worst case found at the reported frequency.
4. Tested with EUT in operation modes as described in section 2.2, worst case values noted.
5. A Quasi-peak detector was used with a bandwidth of 120 kHz.

3.1.1 Test equipment used (for reference see test equipment listing).

15633	99580	99609	99855	99699		

Test engineer

Signature : 

Name : R. van der Meer
Date : 24-01-2013

4 Conducted emission data.

4.1 Conducted emission data of the EUT.

4.2 Conducted emission data of the EUT

Frequency (MHz)	Measurement results dB(µV) Neutral/L2		Measurement results dB(µV) Line 1		Limits dB(µV)		Result
	QP	AV	QP	AV	QP	AV	
0.150	<40	<30	65.1	37.3	66.0	56.0	PASS
0.160	58.0	39.1	50.0	40.1	65.0	55.0	PASS
0.175	<40	<30	62.0	36.4	64.5	54.5	PASS
0.265	<40	<30	52.1	35.1	61.1	51.1	PASS
0.285	<40	<30	47.3	38.1	60.5	50.5	PASS
0.310	47.1	44.0	43.3	41.1	56.0	46.0	PASS
0.690	39.1	23.3	35.7	25.6	56.0	46.0	PASS
0.860	38.3	25.5	36.2	27.1	56.0	46.0	PASS
15.535	28.3	22.2	36.7	24.3	60.0	50.0	PASS
23.810	40.7	40.6	43.1	42.6	60.0	50.0	PASS

Table 3 Conducted emission measurements of the EUT

The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15 section 15.107(a) and ICES-003, at the 120 Volts/ 60 Hz AC mains connection terminals of the AC/DC adapter which was connected to the AUX1 which hosts the EUT, are depicted in Table 3. The system is tested as in whole, so with all equipment as shown in Figure 1 in place and functioning. Being the worst case situation.

Notes:

1. Tests were performed with the, from pre/tests being the worst case sample.
2. Measurement uncertainty is ±3.5dB
3. The resolution bandwidth used was 9 kHz.
4. Tested with EUT in continuous transmit mode on 802.11 operation modes and Bluetooth mode and receive modes, worst case values noted.
5. Some plots are provided in section 5.

Used test equipment and ancillaries:

13313	99161	12512	15667	99852	99855	

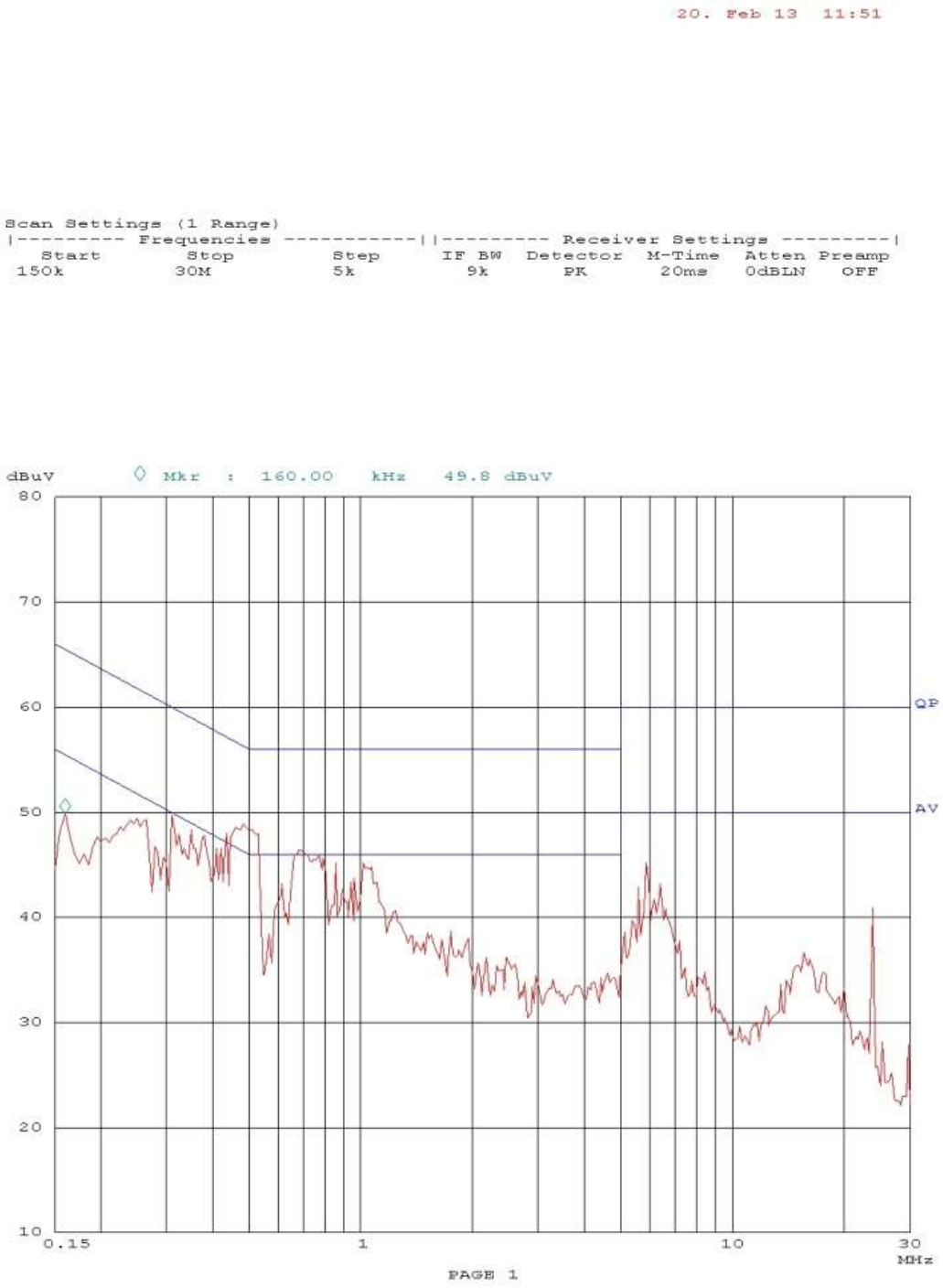
Test engineer

Signature :

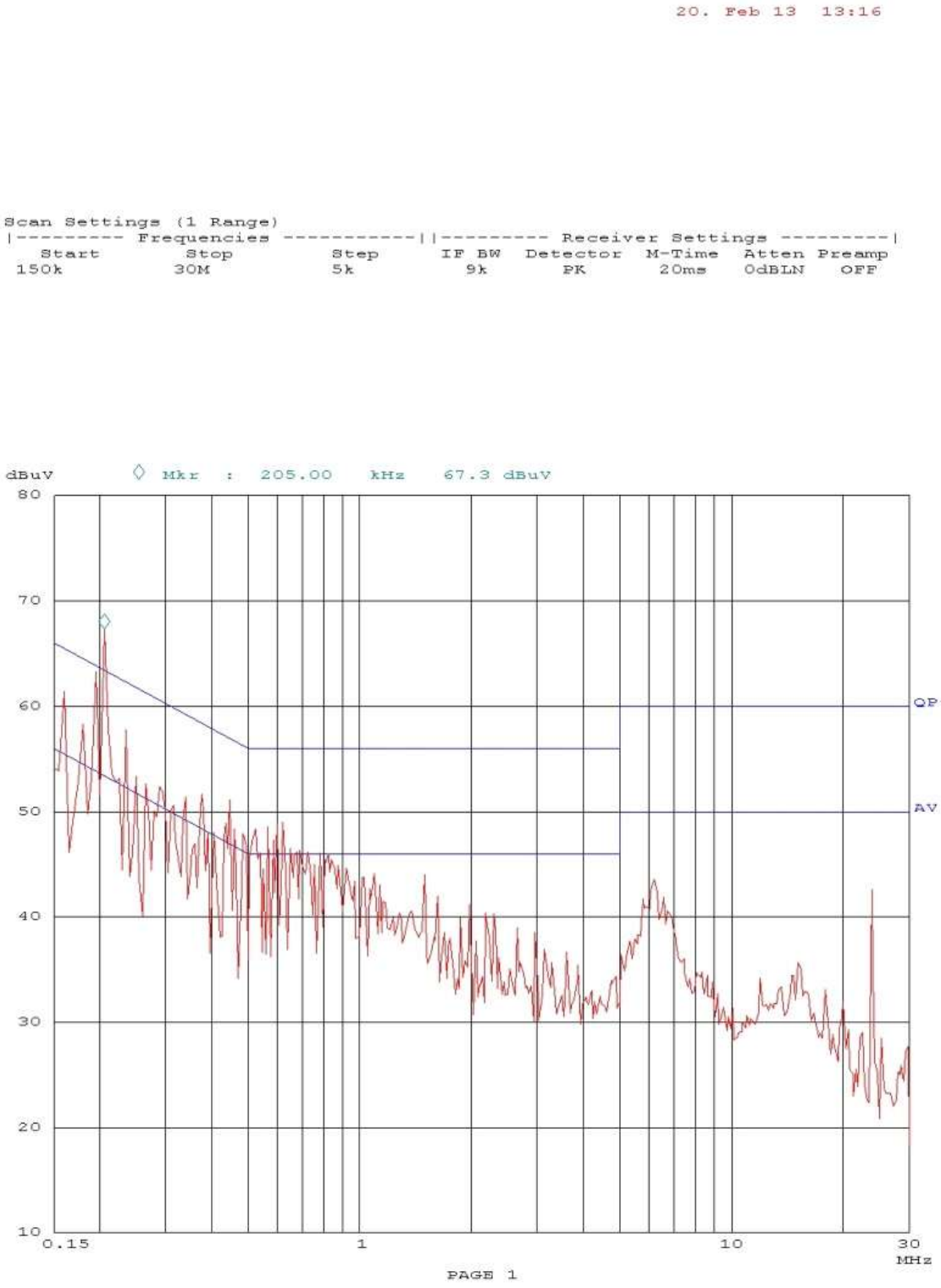
Name : R. van der Meer
Date : 20-02-2013

5 Plots of measurement data

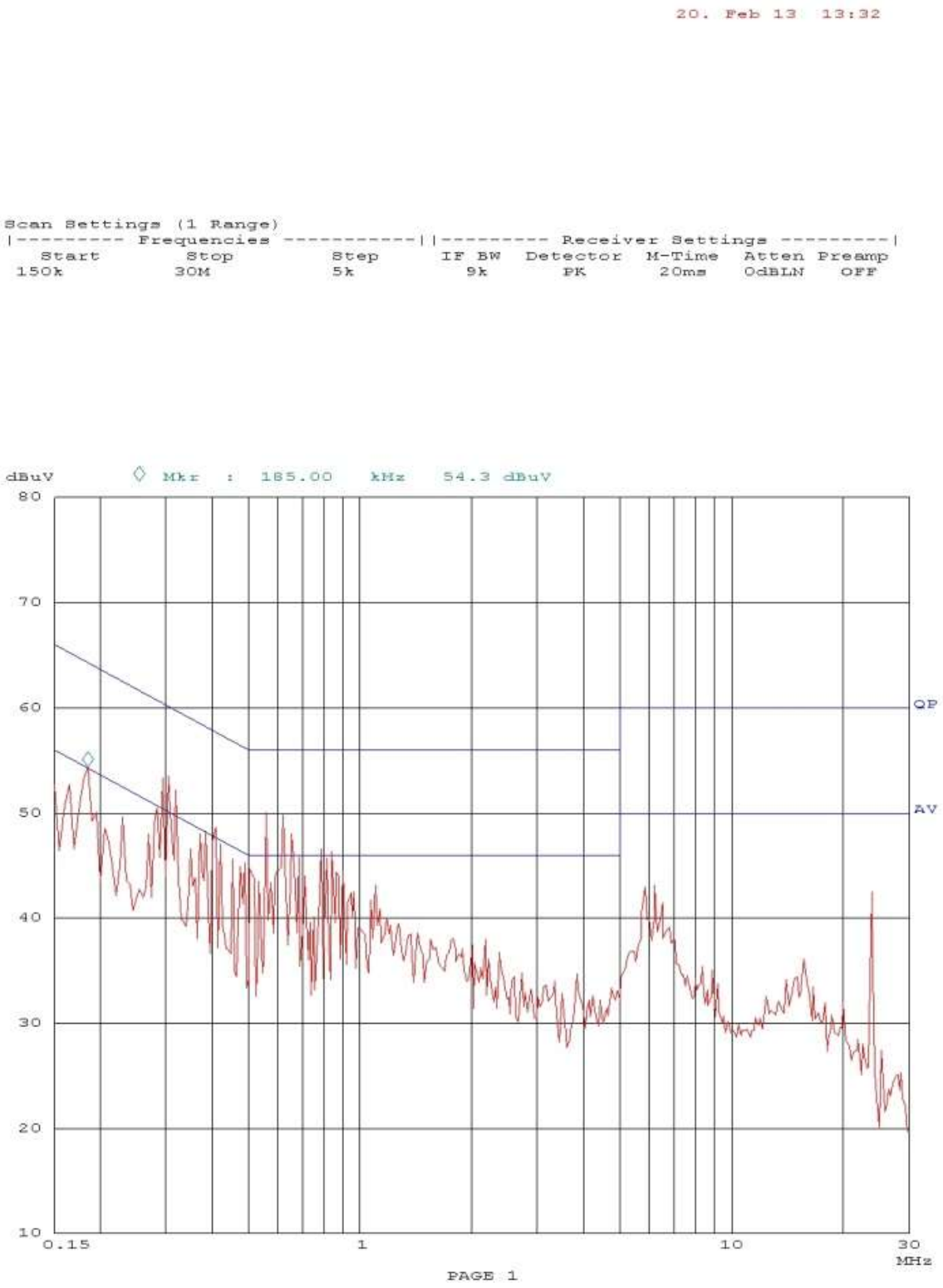
5.1 Conducted emissions



Plot1 Conducted emissions on L1 at 2G4 1Mb DSSS mode



Plot 2 Conducted emissions on L2 at 2G4 54Mb OFDM

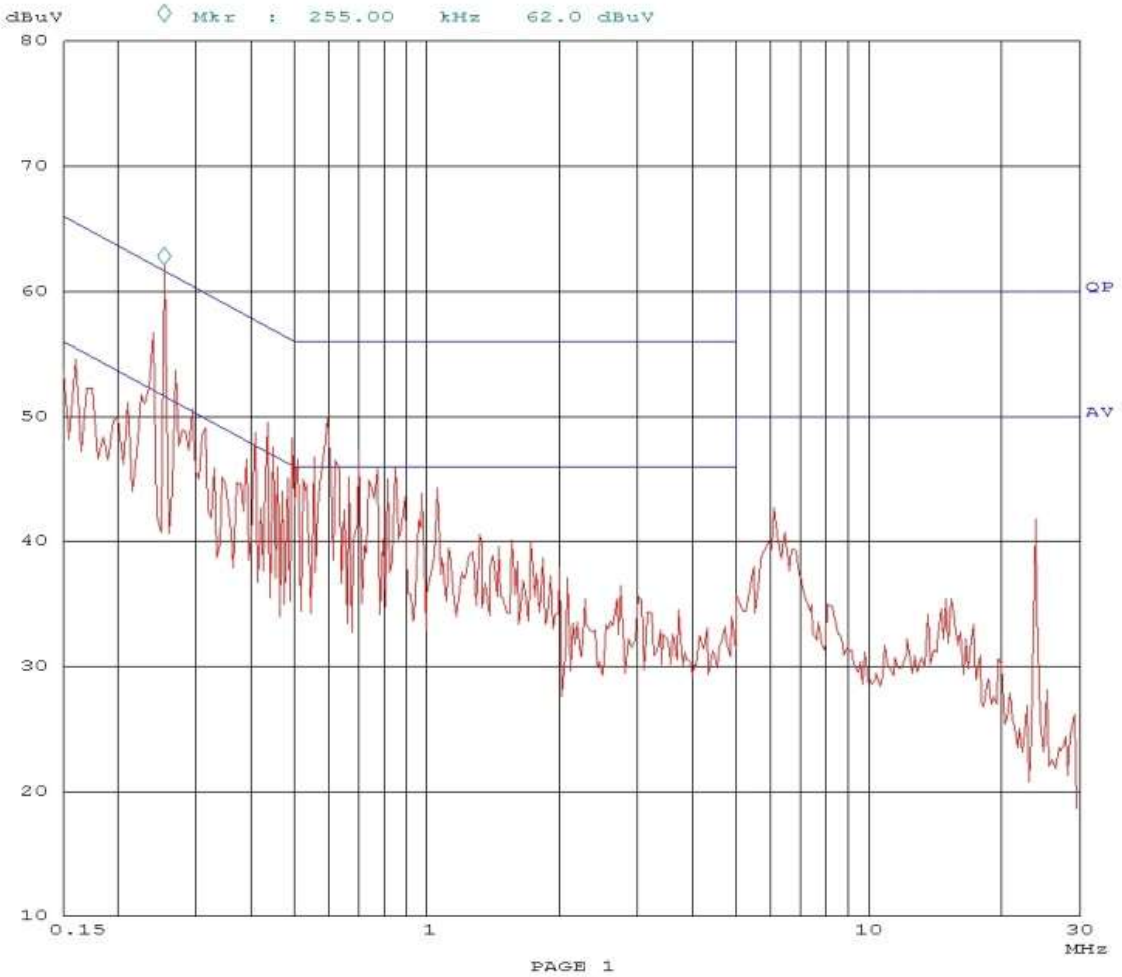


Plot3 Conducted emissions on L2 at 5G7 VHT6 80MHz mode

20. Feb 13 13:26

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	30M	5k	9k	PK	20ms	0dBLN	OFF

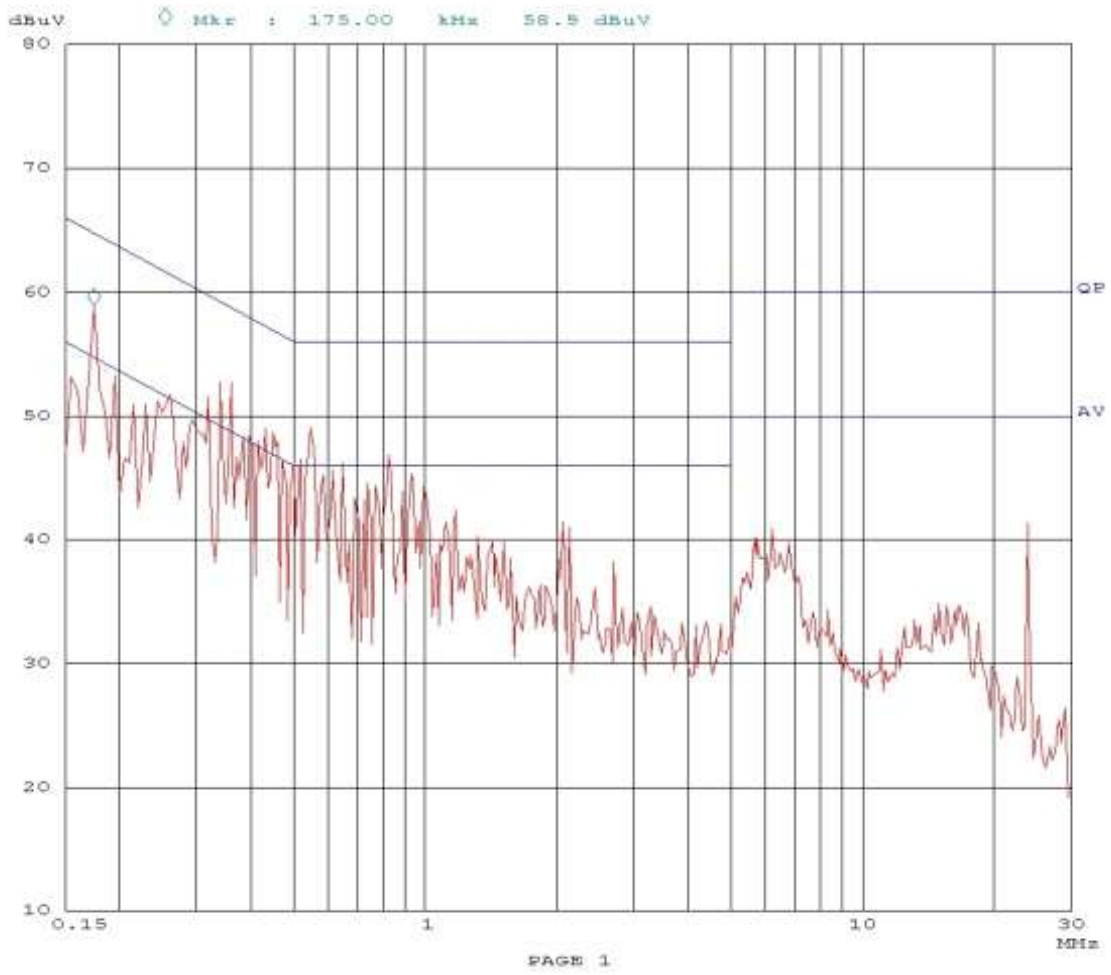


Plot 4 Conducted emissions on L2 at 5G7 HT4

20. Feb 13 13:37

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	30M	5k	9k	PK	20ms	0dBLN	OFF



Plot5 Conducted emissions on L2 at Bluetooth DH5 mode

6 List of utilized test equipment.

Inventory number	Description	Brand	Model	Last cal.	Next cal.
12512	LISN	EMCO	3625/2	01/2012	01/2014
13313	Pulse limiter	R&S	ESH3-Z2	01/2013	01/2014
15633	Biconilog Test antenna	Chase	CBL 6111B	03-2012	03-2013
99161	Variac 250V 6A	RFT	LTS006	NA	NA
99580	Semi Anechoïc Room	Siepel	FCC listed: 90828	12-2011	12-2014
99609	Antenna mast	EMCS	AP-4702C	NA	NA
99848	Shielded room	--	--	NA	NA
99852/ 99855	Temperature-Humiditymeter	Extech	SD500	02-2012	02-2014
99623	Power Supply	EA	PS 2016-050	12-2012	12-2013
99699	Measuring receiver	R&S	ESCI	03-26-2012	03-26-2013

NA= Not Applicable