



FCC LISTED, REGISTRATION  
NUMBER: 905266

IC LISTED REGISTRATION  
NUMBER IC 4621A-1

**AT4 wireless, S.A.**

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Registro Mercantil de Málaga, Tomo 1169,

Libro 82, Folio 133, Hoja MA3729

**TEST REPORT**

**REFERENCE STANDARD:**

**FCC Rules and Regulations 47 CFR Chapter I Part 15 Subpart B (10-01-10 Edition) &**

**ICESS-003 ISSUE 5**

**FCC Rules and Regulations 47 CFR Chapter I Part 15 Subpart B:**

**Radio frequency devices Subpart B. Unintentional radiators**

**&**

**ICESS-003 ISSUE 5**

**NIE**..... : 38880BREM.001

Approved by  
(name / position & signature) ..... : Rafael López  
EMC Manager

Elaboration date ..... : 2013-06-14

**Identification of item tested** ..... : INTEL 3160HMW

Trademark ..... : INTEL

Model and/or type reference ..... : 3160HMW

Other identification of the product ..... : S/N : 001500BD59ED

HW Version: QS

SW Version:

Test SW: DRTU\_1\_6\_1\_628

Op SW: Wifi\_ProSet\_0340G

For OEM factory installation:

FCC ID: PD93160H

IC: 1000M-3160H

For user installation:

FCC ID: PD93160HU

IC: 1000M-3160H

Features ..... : 802.11 a/b/g/n/ac wireless LAN + BT 4.0.

Description ..... : 1x1 PCIe Half Mini-card adapter

**Applicant** ..... : INTEL MOBILE COMMUNICATIONS SAS

Address..... : 100 Center Point Circle, Suite 200, Columbia, South Carolina 29210 USA

CIF/NIF/Passport..... : Not provided data

Contact person..... : Steven Hackett

Telephone / Fax..... : Tel: 803-216-2344 / Fax: 803-216-2176

e-mail..... : steven.c.hackett@intel.com

<b>Test samples supplier</b> .....	INTEL MOBILE COMMUNICATIONS SAS
Address .....	100 Center Point Circle, Suite 200, Columbia, South Carolina 29210 USA
CIF/NIF/Passport.....	Not provided data
Contact person.....	Steven Hackett
Telephone / Fax .....	Tel: 803-216-2344 / Fax: 803-216-2176
e-mail.....	steven.c.hackett@intel.com
<b>Manufacturer</b> .....	INTEL MOBILE COMMUNICATIONS SAS
Address .....	100 Center Point Circle, Suite 200, Columbia, South Carolina 29210 USA
CIF/NIF/Passport.....	Not provided data
Contact person.....	Steven Hackett
Telephone / Fax .....	Tel: 803-216-2344 / Fax: 803-216-2176
e-mail.....	steven.c.hackett@intel.com
<b>Test method requested</b> .....	
Standard.....	FCC Rules and Regulations 47 CFR Chapter I Part 15 Subpart B (10-01-10 Edition); ICES-003 ISSUE 5 & ANSI C63.10-2009: American National standard for Testing Unlicensed Wireless Devices.
Test procedure.....	PEEM103
Report template No.....	FDT08_14
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### **Competences and guarantees**

This certificate of conformity was issued in accordance with the decision N° 3/2000 of the Joint Committee established under the Agreement on Mutual Recognition between the European Community and the United States of America. By this decision, AT4 wireless can act as Conformity Assessment Body (CAB) on Electromagnetic Compatibility. This Certificate applies to the samples listed at technical reports.

This laboratory is designed by the Federal Communications Commission (ES0004)

AT4 wireless is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, AT4 wireless has a calibration and maintenance programme for its measurement equipment.

AT4 wireless guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at AT4 wireless at the time of performance of the test.

AT4 wireless is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

### **General conditions**

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of AT4 wireless.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of AT4 wireless and the Accreditation Bodies.

### **Uncertainty**

Uncertainty (factor  $k=2$ ) was calculated according to the following AT4 wireless's internal documents:

1. PODT000: Procedure for the measure uncertainty calculation.

### Usage of samples

Samples undergoing test have been selected by: The client.

The sample S/01 is composed of the following elements:

<u>Control N°</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Serial N°</u>	<u>Date of reception</u>
38880B/01	INTEL 3160HMW	INTEL MOBILE COMMUNICATIONS SAS	3160HMW	001500BD59ED	2013-05-17

Auxiliary elements used with the sample S/01:

<u>Control N°</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Serial N°</u>	<u>Date of reception</u>
38880B/11	HMC reference antenna	Skycross Electronic	WIMAX/WLAN Antenna	---	2013-05-17
38880B/12	HMC reference antenna	Skycross Electronic	WIMAX/WLAN Antenna	---	2013-05-17
38067/06	Connection Cable	---	---	---	2013-05-17
38067/07	Cable of AC/DC Adapter	DELL	---	---	2013-01-08
38067/08	AC/DC Adapter	DELL	LA90PM111	04D958	2013-01-08
38067/28	Laptop PC	DELL	E5420	CTFQWL1	2013-01-08
38067/37	HMC/NGFF Testing board	INTEL	PCB00390	3902412-252	2013-01-11
38067/38	Adapter of the AC/DC Board Testing	SINPRO	SPU60-102	07990464 1249	2013-01-11
RFT-6322	Router Wifi	ASUS	RT-AC66U	C8IEOB008048	2013-01-15

### Testing period

The performed test started on 2013-05-26 and finished on the 2013-06-02.

The tests have been performed at AT4 wireless.

## Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 80 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 k $\Omega$
Reference resistance to earth	< 0,5 $\Omega$

In the semianechoic chamber (21 meters x 11 meters x 8 meters), the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 30 °C
Relative humidity	Min. = 45 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 k $\Omega$
Reference resistance to earth	< 0,5 $\Omega$
Normal site attenuation (NSA)	< $\pm$ 4 dB at 10 m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 1000 MHz).

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 30 °C
Relative humidity	Min. = 45 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 k $\Omega$
Reference resistance to earth	< 0,5 $\Omega$

### Summary

Considering the results of the performed test according to standard **FCC Rules and Regulations 47 CFR Chapter I Part 15 Subpart B (10-01-10 Edition) & ICES-003 ISSUE 5**, the items under test are **IN COMPLIANCE** with the requested specifications specified in the standard.

NOTE: The results presented in this Test Report apply only to the particular item under test established in page 1 of this document, as presented for test on the date(s) shown in section, "USAGE OF SAMPLES, TESTING PERIOD AND ENVIRONMENTAL CONDITIONS".

### Remarks and comments

The tests have been realized by the technical personnel: Pedro Manuel Valenzuela, Margarita Haro & Antonio Jurado.

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 150 kHz to 30 MHz is  $I = \pm 3,60$  dB for quasi-peak measurements,  $I = \pm 3,48$  dB for peak measurements ( $k = 2$ ).

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 30 MHz to 1 GHz is  $I = \pm 4,57$  dB for quasi-peak measurements,  $I = \pm 4,48$  dB for peak measurements ( $k = 2$ ) and from 1 to 12,75 GHz is  $I = \pm 3,43$  dB for average and peak measurements.

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 12,75 GHz to 26 GHz is  $I = \pm 4,09$  dB for average and peak measurements.

### Testing verdicts

Not applicable .....: NA

Pass.....: P

Fail .....: F

Not measured.....: NM

### List of equipment used during the test

CONTROL NUMBER	DESCRIPTION	MANUFACTURER	MODEL	LAST CALIBRATION	NEXT CALIBRATION
1999	EMI Receptor	ROHDE & SCHWARZ	ESIB 26	2011-11-03	2013-11-03
2942	EMI Receptor	ROHDE & SCHWARZ	ESU 40	2012-03-05	2014-03-05
1935	EMI Receptor	ROHDE & SCHWARZ	ESPI 3	2011-10-19	2013-10-19
245	Horn Antenna	HEWLETT PACKARD	11966E	2011-03-18	2014-03-18
246	Horn Antenna	HEWLETT PACKARD	11966E	2013-03-06	2015-03-06
1658	RF Amplifier	SCHAFFNER	CPA9231A	2011-06-17	2013-06-17
3541	Bilog Hybrid antenna	SUNOL SCIENCES CORPORATION	JB6	2012-06-01	2015-06-01
3556	Thermohygrograph	T&D	TR-72W	2012-11-30	2013-11-30
3545	Thermohygrograph probe	PICO TECHNOLOGY	HUMIDIPROBE	2012-11-08	2013-11-08
3822	Horn Antenna	ROHDE & SCHWARZ	HF907	2010-11-03	2013-11-03
0224	LISN	ROHDE & SCHWARZ	ESH2-Z5	2013-01-22	2015-01-22

# APPENDIX A

## Test Result

### APPENDIX A CONTENT:

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## DESCRIPTION OF THE OPERATION MODES

The operation modes described in this paragraph constitute a functionality of the sample under test for itself. Every operation mode takes a failure criteria for the immunity test that they were applying to it and a monitoring to guarantee performance of the same ones.

In the following table appears the operation modes used by the samples tested to that it refers the present test report.

<b>OPERATION MODE</b>	<b>DESCRIPTION</b>
OM#01	EUT ON. WiFi and Bluetooth in IDLE mode. Auxiliary Laptop connected to power supply: 120Vac / 60Hz.
OM#02	EUT ON. WiFi transmitting in 2.4GHz. Bluetooth in IDLE mode. Auxiliary Laptop connected to power supply: 120Vac / 60Hz.
OM#03	EUT ON. WiFi transmitting in 5GHz. Bluetooth in IDLE mode. Auxiliary Laptop connected to power supply: 120Vac / 60Hz.
OM#04	EUT ON. Bluetooth in transmission mode. Auxiliary Laptop connected to power supply: 120Vac / 60Hz.

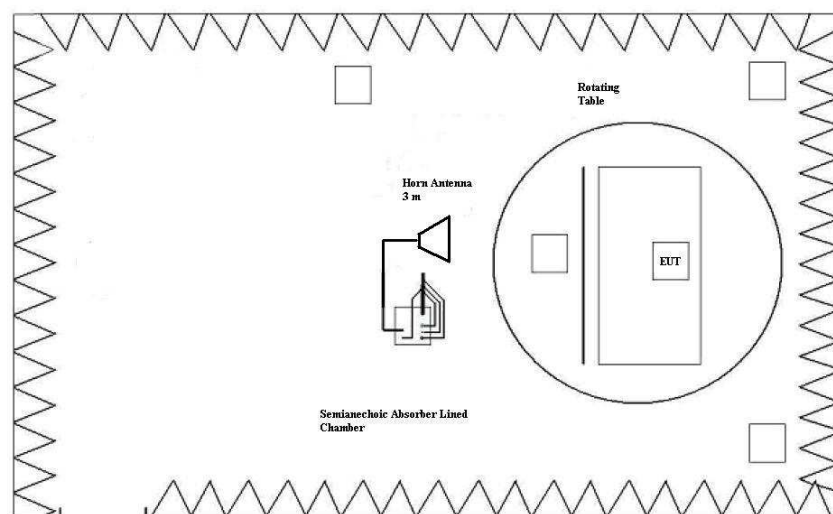
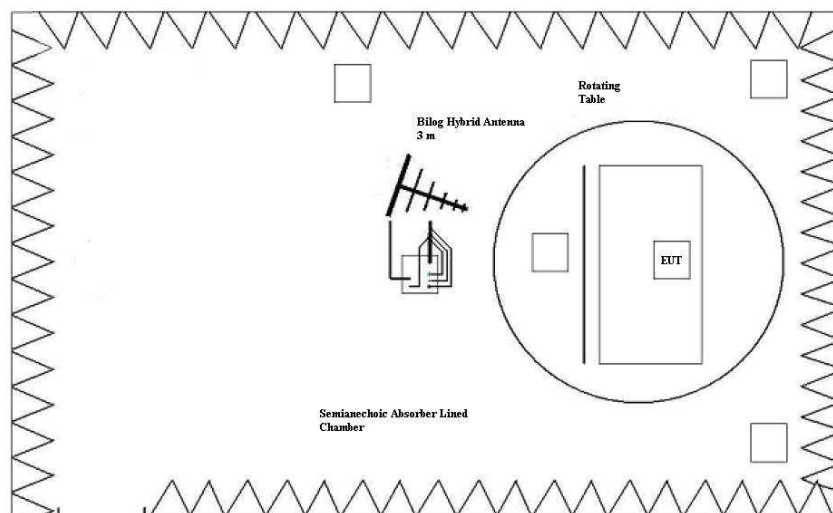
## RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE.

<b>LIMITS:</b>	Product standard:	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B & ICES-003 ISSUE 5
	Test standard:	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B; ICES-003 ISSUE 5 & ANSI C63.10-2009

### LIMITS OF INTERFERENCE CLASS B

The applied limit for radiated emissions, 3 m distance, according with the requirements of FCC Rules and Regulations 47 CFR Part 15.109, Subpart B in the frequency range 30 MHz to 25 GHz, for Class B equipment, which is a transmitter in a band over 500 MHz, was:

Frequency range (MHz)	Limit for 3 m ( $\mu\text{V/m}$ )	Limit for 3 m (dB $\mu\text{V/m}$ )
30 to 88	100	40
88 to 216	150	43,52
216 to 960	200	46,02
Above 960	500	53,98

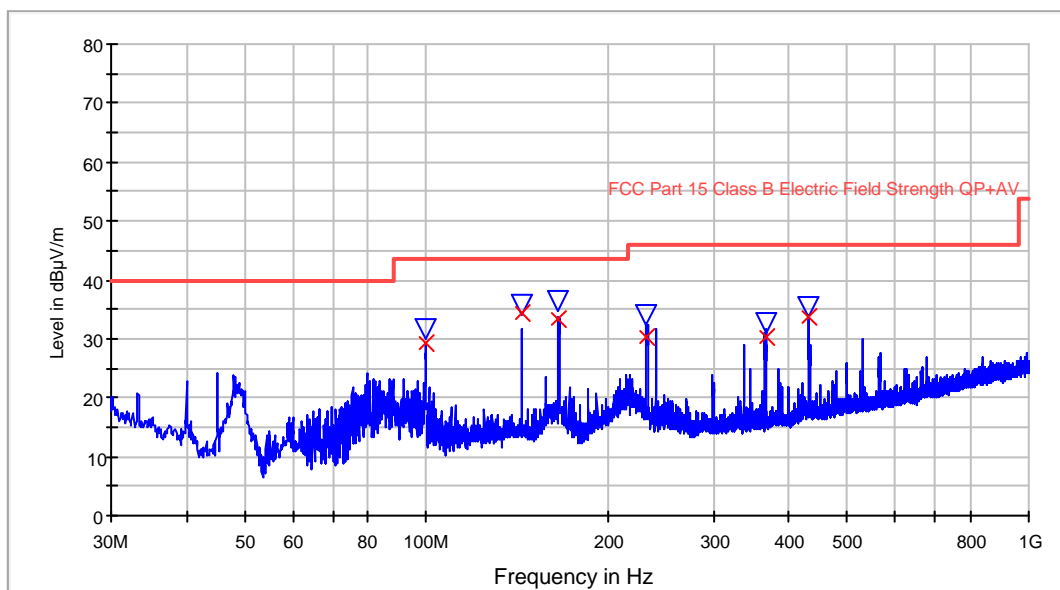


<b>TESTED SAMPLES:</b>	S/01	
<b>TESTED OPERATION MODES:</b>	OM#01	
<b>TEST RESULTS :</b>	CRmmnn: CR, Radiation Condition; mm: Sample number; nn: Operation mode, xx: Polarisation.	
<b>CRmmnn</b>	<b>Description</b>	<b>Result</b>
CR0101	EUT ON. WiFi and Bluetooth in IDLE mode. Auxiliary Laptop connected to power supply: 120Vac / 60Hz. Range 30-1000 MHz.	P
CR0101_RA1_PH	EUT ON. WiFi and Bluetooth in IDLE mode. Auxiliary Laptop connected to power supply: 120Vac / 60Hz. Range 1-18 GHz. Horizontal pol.	P
CR0101_RA1_PV	EUT ON. WiFi and Bluetooth in IDLE mode. Auxiliary Laptop connected to power supply: 120Vac / 60Hz. Range 1-18 GHz. Vertical pol.	P
CR0101_RA2_PH	EUT ON. WiFi and Bluetooth in IDLE mode. Auxiliary Laptop connected to power supply: 120Vac / 60Hz. Range 18-26 GHz. Horizontal pol.	P
CR0101_RA2_PV	EUT ON. WiFi and Bluetooth in IDLE mode. Auxiliary Laptop connected to power supply: 120Vac / 60Hz. Range 18-26 GHz. Vertical pol.	P

**Radiated Emission: CR0101 (30MHz to 1GHz)**

Project: 38880BREM.001  
 Company: INTEL MOBILE COMMUNICATIONS SAS  
 Sample: S/01  
 Operation mode: OM#01  
 Setup: EMI radiated  
 Mode: EUT ON. WiFi and Bluetooth in IDLE mode. Auxiliary Laptop connected to power supply: 120Vac / 60Hz.

**ER FCC Class B Bilog Hybrid**



— FCC Part 15 Class B Electric Field Strength QP+AV  
▽ MaxPeak      — Preview PK  
× QuasiPeak

**Maximized**

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Polarization	Azimuth (deg)
99.600000	31.6	29.2	15000.0	V	-3.0
144.000000	35.6	34.5	15000.0	H	47.0
166.000000	36.5	33.2	15000.0	H	88.0
232.374026	33.9	30.2	15000.0	H	8.0
366.525974	32.5	30.3	15000.0	H	8.0
432.012987	35.4	33.7	15000.0	H	-3.0











**CONTINUOUS CONDUCTED EMISSION ON POWER LEADS**

<b>LIMITS:</b>	Product standard :	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B & ICESS-003 ISSUE 5
	Test standard :	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B; ICESS-003 ISSUE 5 & ANSI C63.10-2009

**CLASS B**

The applied limit for continuous conducted emissions in power leads, according with the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B & ICESS-003 ISSUE 5, in the frequency range 0,15 to 30 MHz, for Class B equipment was:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0,15 to 0,5	66-56	56-46
0,5 to 5	56	46
5 to 30	60	50

<b>TESTED SAMPLES:</b>	S/01
<b>TESTED OPERATION MODES:</b>	OM#01; 02; 03 & 04
<b>TEST RESULTS :</b>	CCmnnhh: CC, Conducted Condition; mm: Sample number; nn: Operation mode; hh: wire

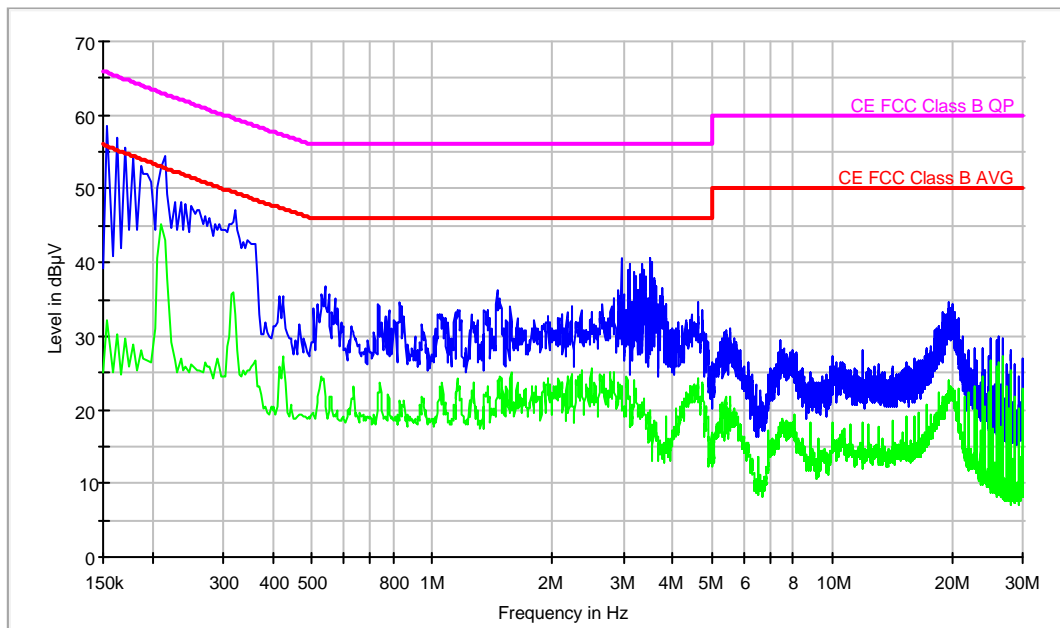
CCmnnhh	Description	Result
CC01010N	Neutral wire noise	P
CC0101L1	Phase wire noise	P
CC01020N	Neutral wire noise	P
CC0102L1	Phase wire noise	P
CC01030N	Neutral wire noise	P
CC0103L1	Phase wire noise	P
CC01040N	Neutral wire noise	P
CC0104L1	Phase wire noise	P

Continuous Conducted emission : CC01010N

Detector : Peak / Average / Cuasi-peak

Project: 38880BREM.001  
 Company: INTEL MOBILE COMMUNICATIONS SAS  
 Sample: S/01  
 Operation Mode: OM#01  
 Mode: EUT ON. WiFi and Bluetooth in IDLE mode. Auxiliary Laptop connected to power supply: 120Vac / 60Hz. Neutral noise.

### EC FCC Class B ESPI CC



— MaxPeak — Average — CE FCC Class B AVG — CE FCC Class B QP

### Max Peak-AVG

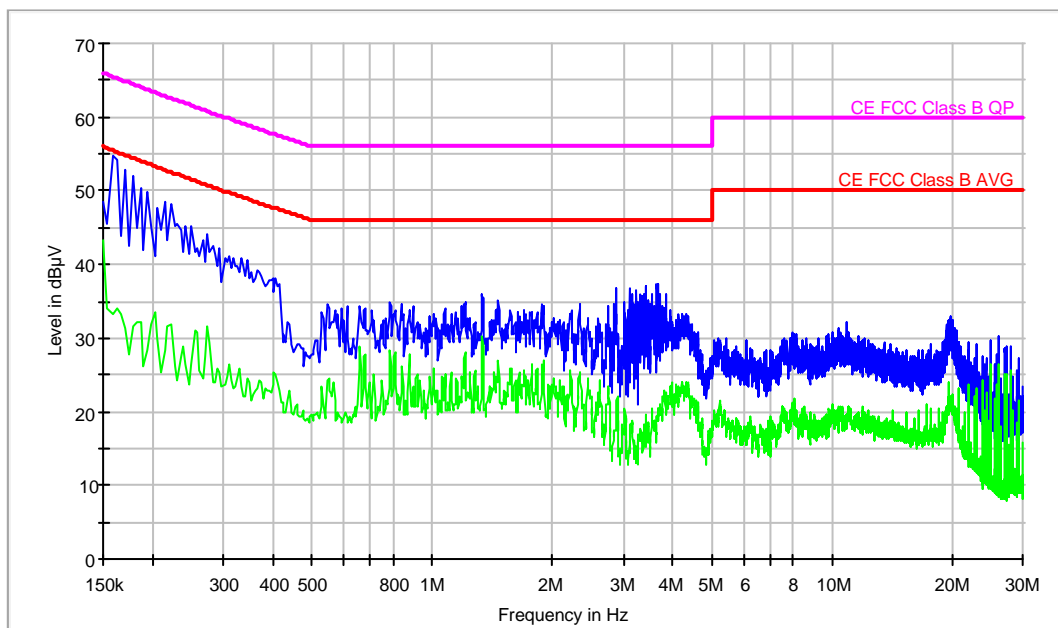
Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.154000	58.5	32.1
3.514000	40.5	19.9
7.386000	29.4	17.9
11.894000	27.9	18.3
13.054000	26.2	14.5
18.018000	30.7	17.7
19.482000	34.6	21.8
21.230000	29.9	15.7
26.102000	30.0	26.3
28.026000	27.9	25.3

Continuous Conducted emission : CC0101L1

Detector : Peak / Average / Cuasi-peak

Project: 38880BREM.001  
 Company: INTEL MOBILE COMMUNICATIONS SAS  
 Sample: S/01  
 Operation Mode: OM#01  
 Mode: EUT ON. WiFi and Bluetooth in IDLE mode. Auxiliary Laptop connected to power supply: 120Vac / 60Hz. Phase noise.

### EC FCC Class B ESPI CC



— MaxPeak — Average — CE FCC Class B AVG — CE FCC Class B QP

### Max PeaK-AVG

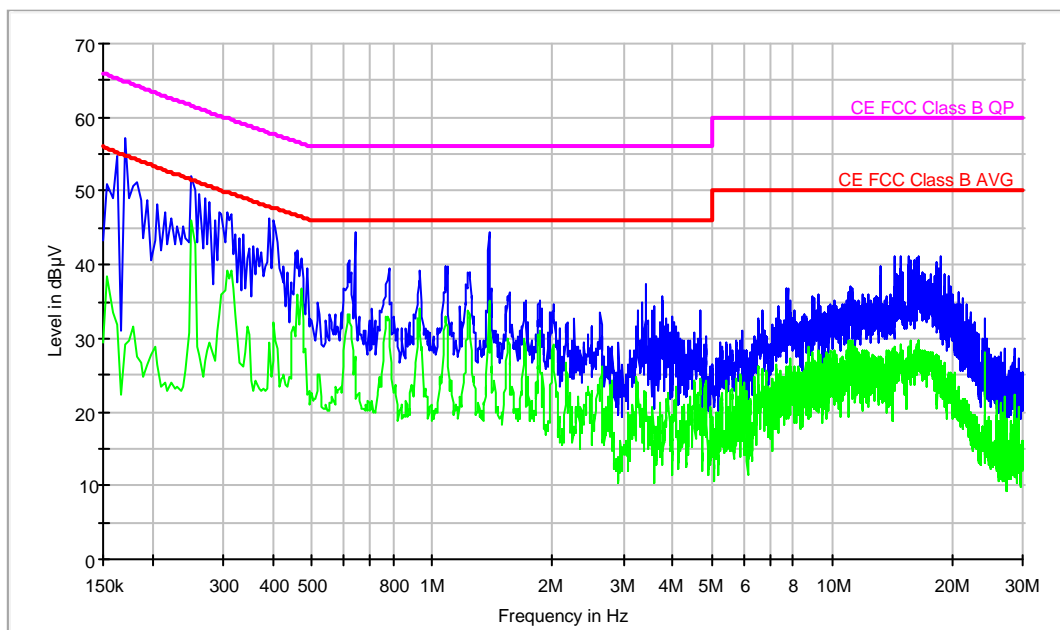
Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.158000	54.8	33.3
3.666000	37.4	20.4
7.910000	30.8	21.4
10.870000	32.2	19.7
12.094000	30.0	18.4
17.698000	29.2	19.3
19.726000	33.0	21.3
21.930000	29.3	23.6
26.158000	30.2	26.4
27.314000	28.8	25.0

Continuous Conducted emission : CC01020N

Detector : Peak / Average / Cuasi-peak

Project: 38880BREM.001  
 Company: INTEL MOBILE COMMUNICATIONS SAS  
 Sample: S/01  
 Operation Mode: OM#02  
 Mode: EUT ON. WiFi transmitting at 2.4GHz. Bluetooth in IDLE mode.  
 Auxiliary Laptop connected to power supply: 120Vac / 60Hz.  
 Neutral noise.

### EC FCC Class B ESPI CC



— MaxPeak — Average — CE FCC Class B AVG — CE FCC Class B QP

### Max PK-AVG

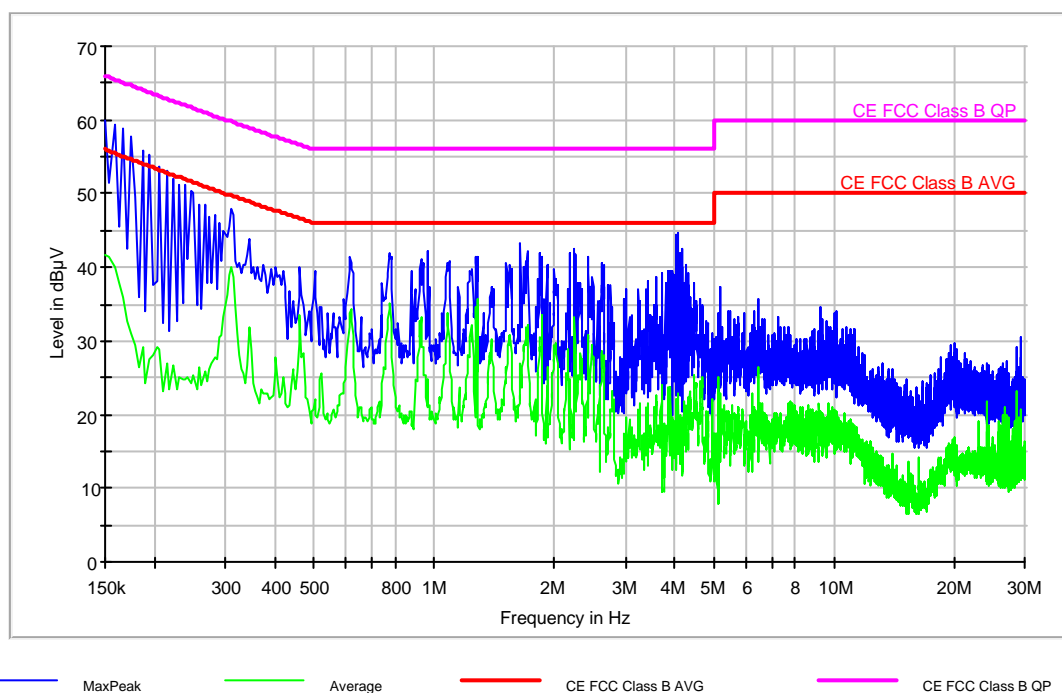
Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.170000	57.1	29.0
0.262000	49.6	27.7
0.642000	44.3	27.5
1.090000	39.7	31.5
1.386000	44.3	35.1
3.430000	37.3	21.3
3.746000	35.7	18.0
7.658000	36.7	23.2
14.902000	41.2	29.1
18.586000	41.1	27.0

Continuous Conducted emission : CC0102L1

Detector : Peak / Average / Cuasi-peak

Project: 38880BREM.001  
 Company: INTEL MOBILE COMMUNICATIONS SAS  
 Sample: S/01  
 Operation Mode: OM#02  
 Mode: EUT ON. WiFi transmitting at 2.4GHz. Bluetooth in IDLE mode.  
 Auxiliary Laptop connected to power supply: 120Vac / 60Hz.  
 Phase noise.

### EC FCC Class B ESPI CC



### Max PK-AVG

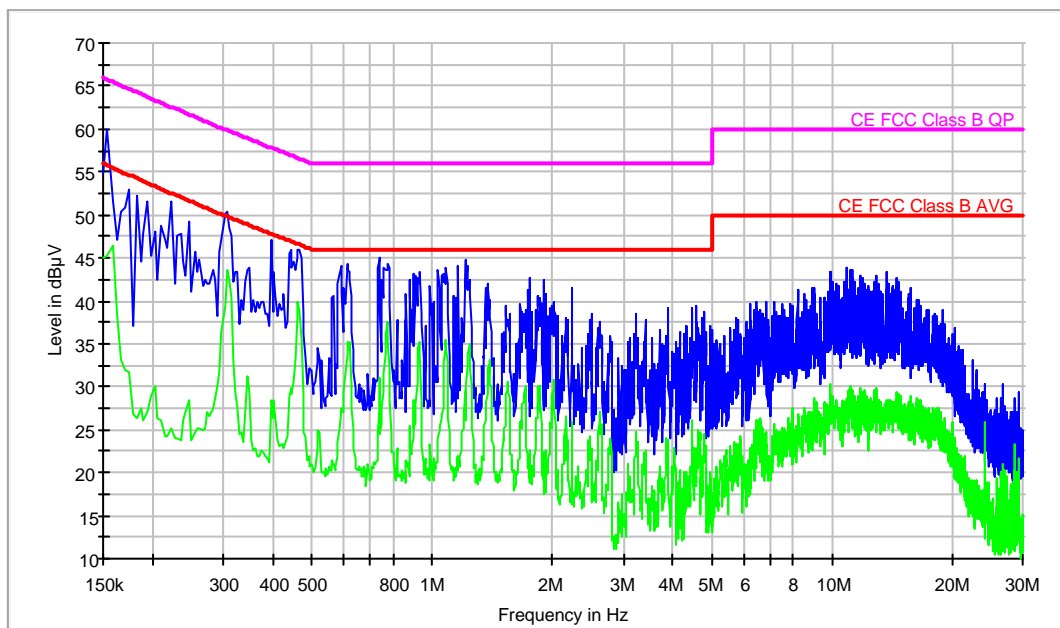
Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.150000	59.9	41.6
0.266000	48.5	25.9
0.614000	41.5	33.8
0.962000	42.2	24.8
1.642000	43.3	27.1
2.238000	42.4	30.3
4.090000	44.8	21.2
6.474000	35.7	26.5
10.690000	31.9	18.6
29.322000	30.6	13.3

Continuous Conducted emission : CC01030N

Detector : Peak / Average / Cuasi-peak

Project: 38880BREM.001  
 Company: INTEL MOBILE COMMUNICATIONS SAS  
 Sample: S/01  
 Operation Mode: OM#03  
 Mode: EUT ON. WiFi transmitting at 5GHz. Bluetooth in IDLE mode.  
 Auxiliary Laptop connected to power supply: 120Vac / 60Hz.  
 Neutral wire noise.

### EC FCC Class B ESPI CC



— MaxPeak — Average — CE FCC Class B AVG — CE FCC Class B QP

### Max PK-AVG

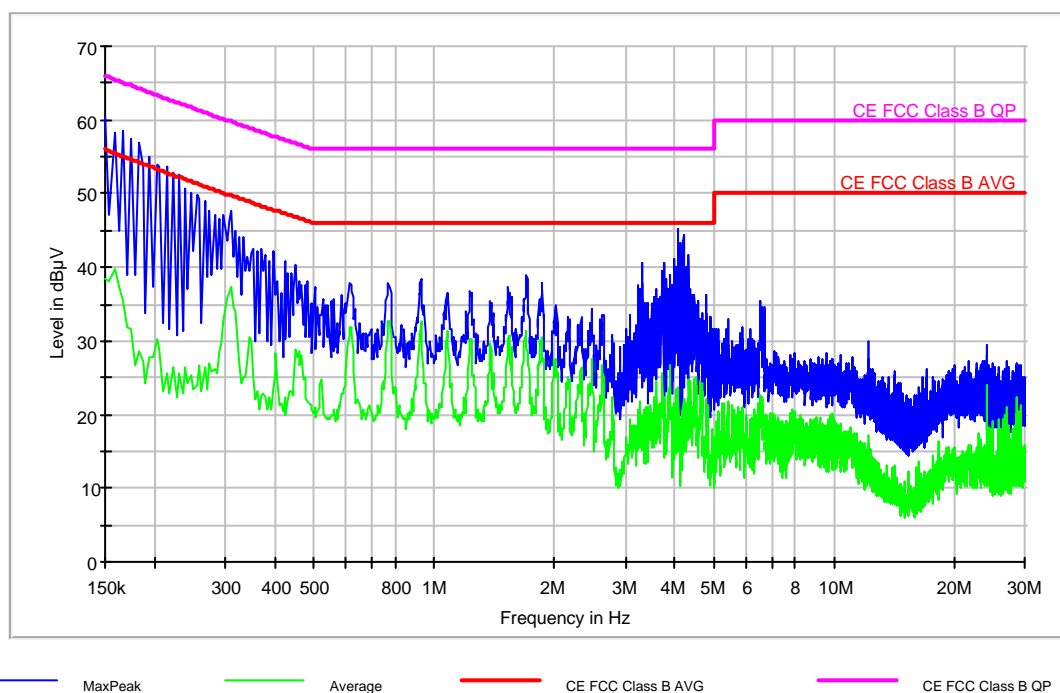
Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.154000	60.1	45.2
0.306000	50.5	43.5
0.442000	46.0	29.9
0.738000	45.0	30.9
1.758000	42.7	22.5
2.234000	41.4	25.2
4.570000	39.4	22.5
9.918000	43.5	27.8
10.810000	43.8	27.9
18.814000	38.9	24.3

Continuous Conducted emission : CC0103L1

Detector : Peak / Average / Cuasi-peak

Project: 38880BREM.001  
 Company: INTEL MOBILE COMMUNICATIONS SAS  
 Sample: S/01  
 Operation Mode: OM#03  
 Mode: EUT ON. WiFi transmitting at 5GHz. Bluetooth in IDLE mode.  
 Auxiliary Laptop connected to power supply: 120Vac / 60Hz.  
 Phase wire noise.

### EC FCC Class B ESPI CC



### Max PK-AVG

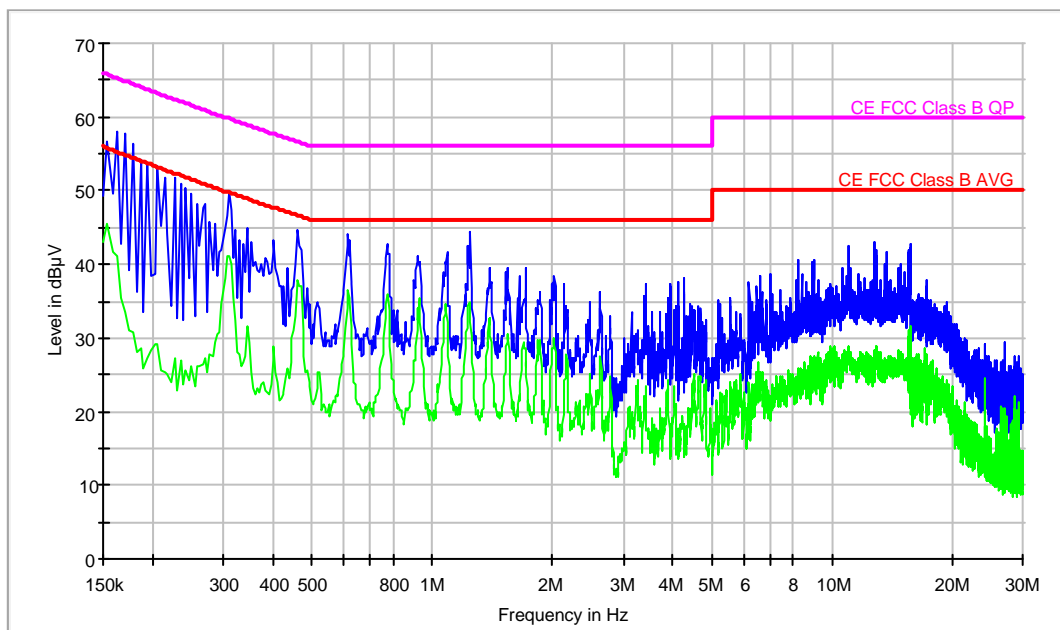
Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.150000	60.4	38.4
0.258000	49.4	26.7
0.450000	40.3	28.9
0.926000	38.5	32.7
1.702000	39.1	29.3
3.322000	40.6	18.8
4.082000	45.2	21.3
6.542000	35.5	22.5
12.138000	29.9	17.1
23.986000	29.3	23.9

Continuous Conducted emission : CC01040N

Detector : Peak / Average / Cuasi-peak

Project: 38880BREM.001  
 Company: INTEL MOBILE COMMUNICATIONS SAS  
 Sample: S/01  
 Operation Mode: OM#04  
 Mode: EUT ON. Bluetooth in transmission mode mode. Auxiliary Laptop connected to power supply: 120Vac / 60Hz. Neutral noise.

### EC FCC Class B ESPI CC



— MaxPeak — Average — CE FCC Class B AVG — CE FCC Class B QP

### Max PK-AVG

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.162000	58.0	41.2
0.310000	49.8	41.2
0.462000	44.7	37.8
1.246000	44.4	32.1
1.542000	39.6	30.6
2.134000	37.3	22.8
4.278000	38.1	16.7
8.262000	40.6	25.3
12.838000	43.1	27.8
17.738000	35.0	25.5

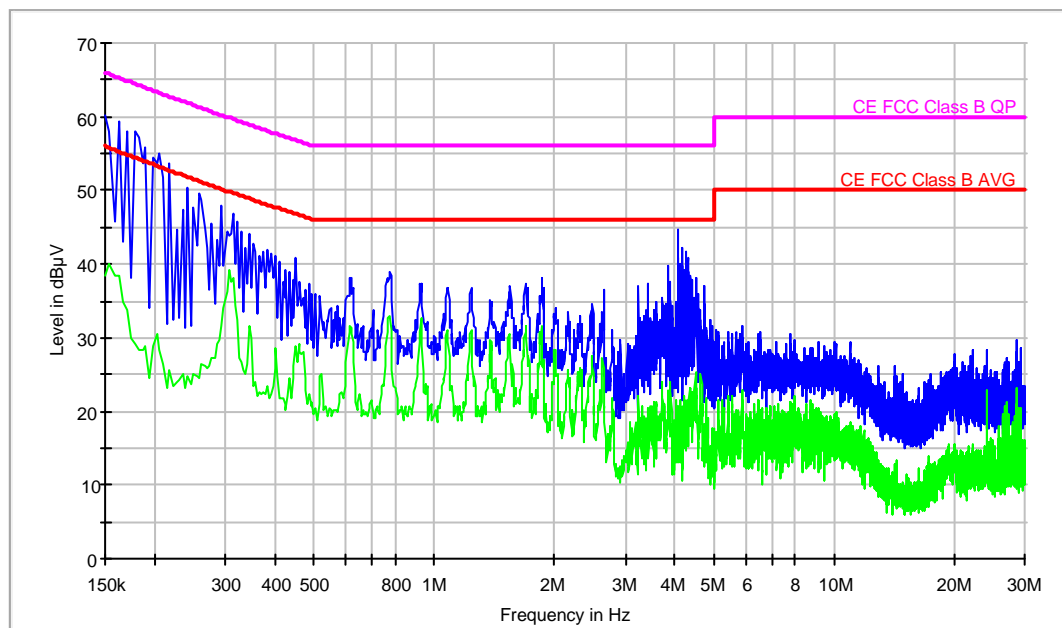


Continuous Conducted emission : CC0104L1

Detector : Peak / Average / Cuasi-peak

Project: 38880BREM.001  
 Company: INTEL MOBILE COMMUNICATIONS SAS  
 Sample: S/01  
 Operation Mode: OM#04  
 Mode: EUT ON. Bluetooth in transmission mode mode. Auxiliary Laptop connected to power supply: 120Vac / 60Hz. Phase noise.

### EC FCC Class B ESPI CC



— MaxPeak — Average — CE FCC Class B AVG — CE FCC Class B QP

### Max PK-AVG

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.150000	60.2	38.5
0.258000	49.4	24.5
0.450000	40.7	28.9
0.774000	38.9	32.8
1.858000	38.1	30.3
3.410000	37.4	18.4
4.082000	44.6	20.2
6.534000	30.7	19.8
10.930000	29.4	17.0
28.686000	29.6	23.1