



**TEST REPORT CONCERNING THE COMPLIANCE OF
A WIRELESS BLUETOOTH MODULE
BRAND INTEL,
MODELS PBA31309
WITH 47 CFR PART 15 (10-1-12 EDITION)**

**13080601.fcc02
September 3, 2013**

FCC listed : 90828
Industry Canada : 2932G-2
R&TTE, LVD, EMC Notified Body : 1856

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MEASUREMENT/TECHNICAL REPORT

Intel Mobile Communications SA

Brand: Intel
Model: PBA31309
FCC ID: PD9PBA31309

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

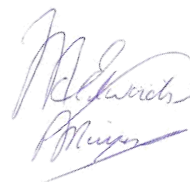
Equipment type: JBP Class B Computing Device Peripheral

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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) 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: September 4, 2013

Signature:



M.C. Edwards van Muyen
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 : Wireless Bluetooth Module
Manufacturer : Intel Mobile Communications SA
Brand mark : Intel
Model : PBA31309
Serial number(s) : ES03 075
Receipt number : ---
Receipt date : August 26, 2013

Applicant information

Applicant's representative : Mr. S. Hackett
Company : Intel Mobile Communications SA
Address : 100 Center Point Circle Suite 200
Postal code : SC 29210
City : Columbia
Country : USA
Telephone number : 803-216-2344
Email : steven.c.hackett@intel.com

Test(s) performed

Location : Leek
Test(s) started : August 28, 2013
Test(s) completed : August 29, 2013
Purpose of tests : Equipment Authorization (Original grant/certification)
Test specification(s) : 47 CFR Part 15 (10-1-12 Edition) and ANSI C63.4-2009
Compliance statement : The test has demonstrated that this unit complies with stipulated standards.

Test engineer(s) : O.H. Hoekstra



Report written by : O.H. Hoekstra

Report date : September 4, 2013

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The test results relate only to the item(s) tested.

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1 General information.

1.1 Product description.

1.1.1 Introduction.

The brand Intel model PBA31309, hereafter referred to as EUT, is a complete Bluetooth 2.1 + EDR solution. It implements a single point-to-point data link to other SPP capable Bluetooth devices. The module has an integrated antenna

Brand	Model Number	Description	FCC/IC IDs
Intel	PBA31309	Bluetooth 2.1 + EDR module with integrated antenna	PD9PBA31309

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: PD9PBA31309.

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 Bluetooth module
 Manufacturer : Intel Mobile Communications SA
 Brand : Intel
 Model(s) : PBA31309
 MAC address (BT) : --
 Voltage input rating : +2.9 – 4.1 V
 Voltage output rating : --
 Current input rating : --
 Antenna : Integrated antenna, Murata, Type LDA21xxx, 0.9 dBi
 Operating frequency : 2402 – 2480 MHz

The EUT was installed on a test-fixture that interfaced to the USB port of a laptop computer.

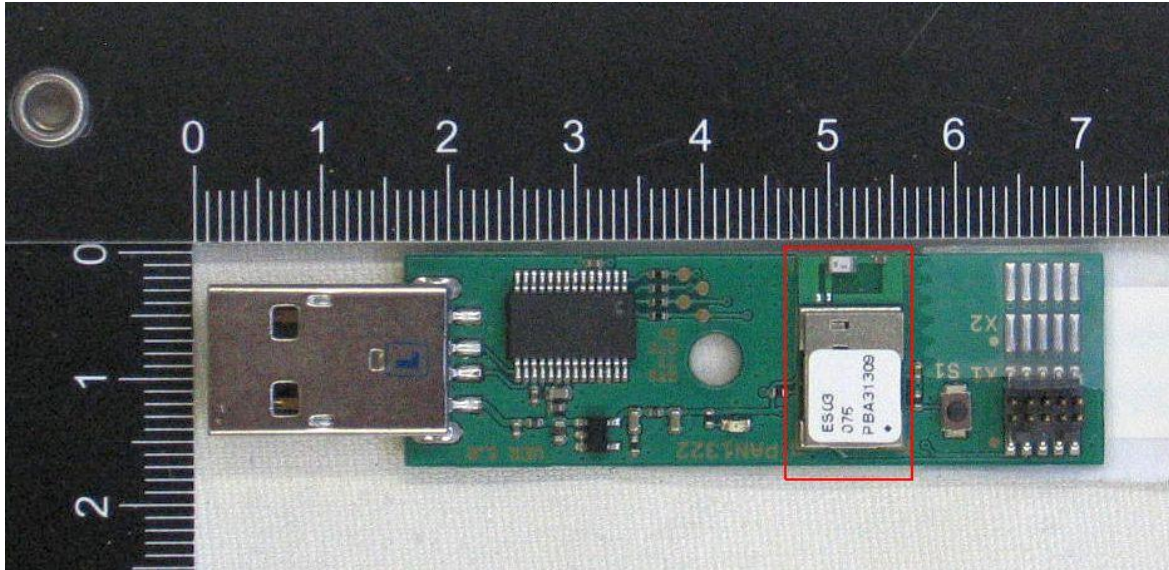
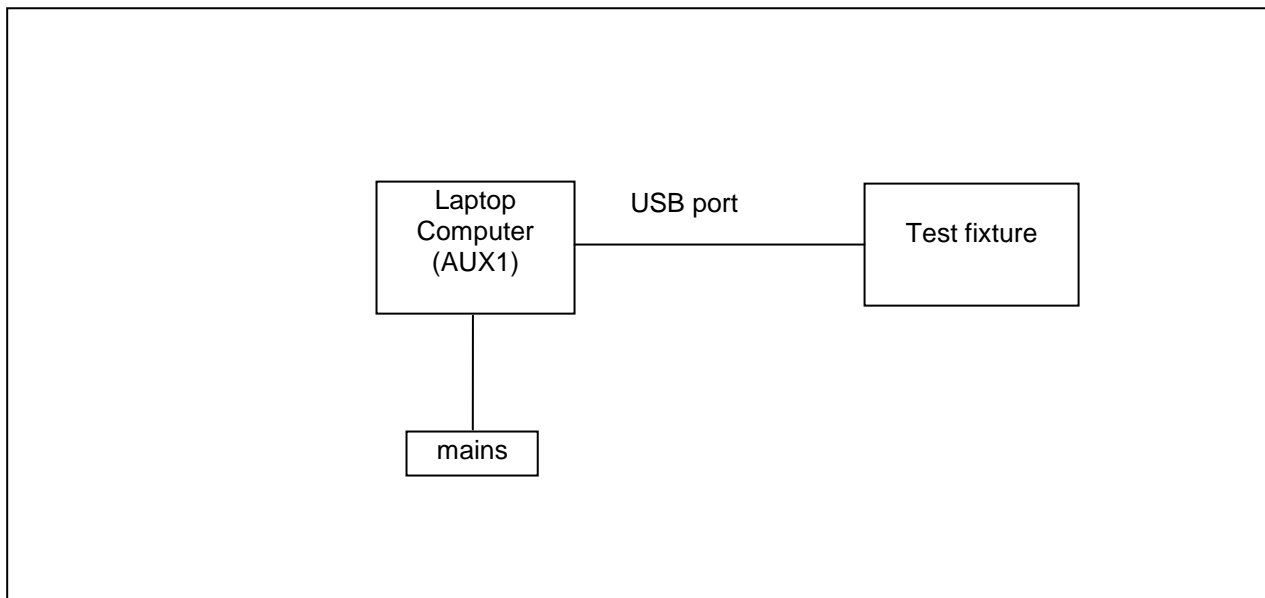


Photo 1a: EUT (indicated with red rectangle) on a test-fixtue that interfaced to the USB port of a laptop computer.

1.3.1 Description of input and output ports.

No.	Port	From	To	Remarks
1.	Mains	Mains	Laptop (AUX1)	Through a AC/DC power supply
2.	USB	Laptop	Test jig	--



1.3.2 Special Accessories and Auxiliary Equipment

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

- AUX1
 Product: Notebook PC (Intel property)
 Brand: Dell
 Model: Latitude E5420
 Serial Number: CN-OD80Y4-75900-155-0580-A00
 Remark: property of applicant

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.

1.7 Test conditions.

Normal test conditions:

Temperature (*) : +15°C to +35°C
Relative humidity(*) : 20 % to 75 %
Supply voltage : 120 Vac
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	Transmitting and receiving 2.4GHz band. Bluetooth mode.

2.3 Test Software

The operation modes could be initiated by using test software as supplied by Intel Mobile Communications SA. 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 Mobile Communications SA and used during all tests is:

Test software : HCI_Lite_v3.04

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 [dB μ V]	Factor [dB(1/m)]	Level QP [dB μ V/m]	Limit [dB μ V/m]	Margin QP [dB]
41.4	Vertical	16.7	12.9	29.6	40.0	10.4
75.3	Vertical	18.2	6.6	24.8	40.0	15.2
181.4	Horizontal	16.6	9.8	26.4	43.5	17.1
336.0	Vertical	14.1	15.6	29.7	46.0	16.3
432.0	Vertical	12.3	18.7	31.0	46.0	15.0
494.0	Vertical	4.0	20.7	24.7	46.0	21.3
648.0	Vertical	-1.3	22.6	21.0	46.0	25.0

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) are depicted in Table 2.

Notes:

- Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.
- Measurement uncertainty is ± 5.0 dB.
- The EUT was varied in three positions, the measuring antenna was varied in horizontal and vertical orientations and also around its axis and height. The reported value is the worst case found at the reported frequency.
- Tested with EUT in operation modes as described in section 2.2, worst case values noted.
- A Quasi-peak detector was used with a bandwidth of 120 kHz.
- None of the emission components could be related to the EUT.

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

15633	99580	99609	99855	99699		
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Test engineer

Signature :



Name : O.H. Hoekstra

Date : 29-08-2013

4 Conducted emission data.

4.1 Conducted emission data of the EUT

Frequency (MHz)	Measurement results dB(μV) Neutral/L1		Measurement results dB(μV) Line 2		Limits dB(μV)		Result
	QP	AV	QP	AV	QP	AV	
0.32	43.3	36.5	43.6	40.4	59.7	49.7	PASS
0.43	24.6	19.4	25.4	20.8	57.3	47.3	PASS
0.46	23.6	18.4	25.2	19.4	56.7	46.7	PASS
0.82	21.4	16.0	22.2	16.3	56.0	46.0	PASS
4.10	13.8	11.1	14.1	6.2	56.0	46.0	PASS
7.37	10.1	3.5	8.1	2.2	60.0	50.0	PASS
21.00	9.0	0.8	16.2	3.8	60.0	50.0	PASS
23.82	7.9	1.0	13.9	1.1	60.0	50.0	PASS
25.31	4.8	0.4	9.3	1.2	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), 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 ± 3.5 dB
3. The resolution bandwidth used was 9 kHz.
4. Tested with EUT in continuous transmit and receive mode, Bluetooth, worst case values noted.
5. Some plots are provided in section 5.
6. None of the emission components could be related to the EUT.

Used test equipment and ancillaries:

13313	99161	12512	15667	99852	99855	

Test engineer

Signature :



Name : O.H. Hoekstra

Date : 29-08-2013

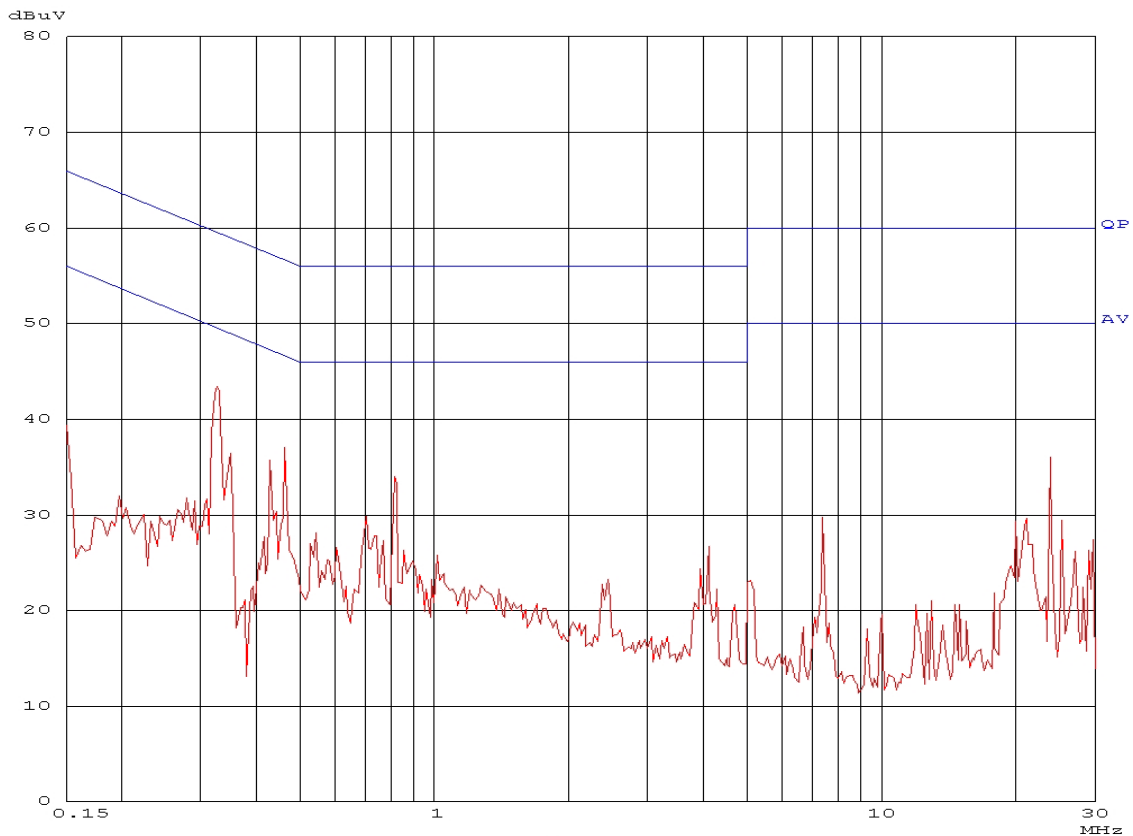
5 Plots of measurement data

5.1 Conducted emissions

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Overview Scan Settings (1 Range)
|----- Frequencies -----|----- Receiver Settings -----|
  Start      Stop      Step      IF BW  Detector  M-Time  Atten  Preamp
  150k       30M       3.9k     9k     PK        0.10ms  0dB  OFF
  
```



Plot 1 Conducted emissions, maximum values on L1 and L2

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	03-2013	03-2014
99161	Variac 250V 6A	RFT	LTS006	NA	NA
99580	Semi Anechoic 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	03-2013	03-2014

NA= Not Applicable