EXHIBIT C – User Manual

FCC ID O2Z-BT2

Eligibility Requirements for Regulatory Module Approval

Introduction

The Intel Personal Wireless Module(Ambler) with Bluetooth wireless technology is a radio device that transmits and receives radio signals in accordance with the spectrum regulations for the 2.4-GHz unlicensed frequency range. Regulatory approval is required for each country throughout the world where the end-user wishes to operate the Intel Personal Wireless Module(Ambler) and communicate to other Bluetooth devices.

As part of Intel's solution for Bluetooth wireless technology in mobile PCs, Intel will provide regulatory approvals for certain countries in the form of a **Modular Approval** (MA)grant, which can be utilized by PC manufacturers. A modular grant allows the OEM to insert an approved device/antenna interconnection/antenna into a laptop without the need for additional regulatory equipment certification. In the case of laptops, where many models may exist, this form of certification can represent a significant savings in terms of cost and time. The countries that can accept this form of approval include the US, Canada, and certain European counties. The conditions for approval for each of these countries is described below.

Obtaining Modular Approval is not a requirement. If an Intel customer uses a unique antenna or antenna interconnect design, that customer may file for **standard type approval** in the country or countries of interest. This method will require the testing of the entire end product, and hence may be more time consuming expensive.

The MA is only valid in countries that have accepted the MA process. For countries that have not accepted the MA process, PC manufacturers must submit the laptop for a conventional radio transmitter type-approval for each country of interest. PC manufacturers may disregard the requirements of this section if they accept the full responsibility for regulatory type-approval of the electronic device with an integrated Intel Personal Wireless Module(Ambler).

User Guide Information

PC manufacturers are required to place specific text in the user's guide for a notebook PC alongside other regulatory information. The information may be segmented by geographic world region if desired, but the exact text shown below must be maintained. The user's guide must contain the following items:

United States of America Requirements

The following text must be copied exactly into the products user's guide:

"This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution: ***Caution:*** Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment."

General ~~User Guide~~ Requirements

The following text must be copied exactly into the product's user's guide:
"This product contains a radio transmitter with Bluetooth wireless technology which has been tested and found to be compliant with the applicable regulations governing a radio transmitter in the 2.400 GHz to 2.4835 GHz frequency range. The countries where this product is authorized for sale and use by the supplier are as follows:

- ~~United States of America~~
- ~~Canada~~
- ~~Belgium~~
- ~~Denmark~~
- ~~Germany~~
- ~~Italy~~
- ~~Netherlands~~
- ~~Spain~~
- ~~Sweden~~
- ~~United Kingdom~~

US
Germany
UK
France
Canada
Italy
Netherlands
Sweden
Spain
Belgium
Denmark
Finland

- ~~United States of America~~

- ~~Canada~~
- ~~Belgium~~
- ~~Denmark~~
- ~~Germany~~
- ~~Italy~~
- ~~Netherlands~~
- ~~Spain~~
- ~~Sweden~~
- ~~United Kingdom~~
-
-

This list will be updated in future revisions bases on the grants that Intel will obtain.

Note: Japan has no form of modular approval available at this time. Regulatory certification for Japan can only be obtained through standard type approval procedures and you are responsible for obtaining that approval.

Topics Not Covered

Topics not covered in this manual include:

- Details of requirements for standard equipment certification (type approval) filing (Neither US nor other countries)
- Japan regulatory approvals
- Unintentional emissions requirements for FCC or other countries

United States Regulatory Approval

FCC Modular Approval (MA)

The requirements for FCC modular approval were released in June 2000 in the FCC's Public Notice FCC Public Notice DA 00-1407, Part 15 Unlicensed Modular Transmitter Approval.

General Conditions

To fully comply with modular approval requirements the following conditions must be met.

1. Non- modification of the module or additions to circuitry
2. Adherence to the design criteria, including antennas and transmission line interconnect
3. Testing of the final configuration to insure emissions compliance

Design Criteria for Modular Approval

The Intel Personal Wireless Module(Ambler) with Bluetooth wireless technology may not be altered or modified in any way upon receipt from Intel. Additionally, no external component can be added which changes the radio frequency (RF) characteristics of the transmitted signals. This includes all components both passive and active such as RF filters, RF amplifiers, RF switches, etc. RF components may not be placed between the output pin of the Intel Personal Wireless Module(Ambler) and the Intel enabled antennas except the RF transmission line that interconnects them.

Antennas

Only antennas bearing specific part numbers(refer to section 5) and qualified by Intel's MA may be used with the Intel Personal Wireless Module(Ambler) with Bluetooth wireless technology. These antennas are designed to be compatible with the RF transmission line impedance and frequency range of the Intel Personal Wireless Module(Ambler) with Bluetooth wireless technology. These antennas may not be modified in any way from the design baseline as indicated by the antenna data sheets from the manufacturer.

The antennas selected by Intel have been specifically tested with the Intel Personal Wireless Module(Ambler) with Bluetooth wireless technology, and they are certified through the regulatory agencies in the US, Canada, and European Union for authorized use. Use of antennas in a platform other than the antennas selected by Intel voids the MA grant for that platform.

Antenna Interconnect

There are specific requirements that must be met when designing a transmission line interconnection between the Intel Personal Wireless Module(Ambler) with Bluetooth wireless technology and the antennas. The Intel Personal Wireless Module(Ambler) with Bluetooth wireless technology has been specifically designed as a miniature component to be integrated into portable electronic devices. As such the RF connection is not a standard connector, but a ball grid array solder connection. The module should be mounted on a PCB directly or mounted in a specially designed socket that is mounted to a PCB.

Impedance

The transmission line must be designed to be a 50-Ohm impedance.

Physical Implementation

The physical implementation of the RF transmission line must conform to the following guidelines:

Any combination of microstrip, stripline, or coaxial cable is acceptable. However, the following guidelines must be adhered to:

1. **Microstrip** (conductor above ground plane): The total length of any microstrip transmission lines should not exceed eight (8) inches. This applies whether multiple lines or a single section of line is used. The maximum width of any microstrip transmission lines should not exceed 115 mils. An impedance of 50 +/- 2 ohms must be maintained. For design formulae, the following web sites can be accessed for interactive design programs:
   Table http://www.mit.edu/~mcmahill/software/mstrip/mscalc.htm
   Table A http://www.polar.co.uk/
2. **Stripline** (conductor between ground planes on printed circuit board): Since stripline is non-radiating, any length of stripline can be used. However, lengths should be minimized to keep losses at a minimum. Conductor

width should not exceed 36 mils. Either symmetric or asymmetric stripline may be used. For design formulae visit:

Table B http://www.polar.co.uk/

3. **Coaxial Cable:** Since coaxial cable is non-radiating, any length may be used. The impedance must be 50 +/- 2 ohms.

In general, the lengths of all transmission lines should be kept at a minimum where possible. Microstrip is the most lossy, followed by stripline and then coax. These factors should be taken into account in design of the interconnect. Higher loss will reduce the range of the Bluetooth module in the final implementation.

Emissions Compliance Testing

Although the module, interconnect and antennas have been modular-approved by FCC, the final configuration must meet emissions compliance. The final configuration must be tested in an FCC certified test environment to confirm that radiated emissions are within the limits specified in the Part 15 rules. Applicable sections include:

1. **Part 15 Section 15.247**, Operation within the bands of 2400-2483 MHz
2. **Part 15 Section 15.201 to 15.209**, Intentional Emitter Restricted Bands and Radiated Emission Limits

For detailed document information, visit http://www.fcc.gov/oet/info/rules/.

Other information may be found in the following documents:

- **FCC Public Notice DA 000-705**, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems**.**
- **FCC Public Notice DA 00-1407**, Part 15 Unlicensed Modular Transmitter Approval.

Both of these documents may be found on the FCC web site.

These emissions tests can be conducted by the manufacturer if equipped with a certified test chamber or by contacting an approved test facility (See Section 9). The results of these emissions tests are not required to be submitted to the FCC or Intel, but should be kept on file by the OEM.

Co-location of Additional Transmitters

Users of this MA grant should refer to Appendix C (FCC Grant O2Z-BT2) with regard to co-located transmitters. As stated in the grant "

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This modular transmitter is approved for use in personal computers and may
operate in conjunction with other mobile and portable transmitters in the same
computer; provided, the other mobile and portable transmitters have
satisfied the appropriate RF exposure requirements contained in the
FCC rules. The grantee also must provide OEM integrators, or end users
if marketed directly to end users, with installation and operating
instructions for satisfying RF exposure requirements. The Grantee must
inform second manufacturers/installers that in order for this module
to be operated in any configuration other than that permitted in the
preceding sentences, a separate FCC equipment authorization must be
obtained for each device into which this module is installed. "
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In essence, this modular approval is granted provided that OEM's take responsibility for insuring that any other transmitters operating with Ambler comply with any RF exposure requirements associated with their use. The incorporation of one or more additional RF transmitters will require review by the FCC and possible re-certification of the entire configuration (including the Intel Personal Wireless Module(Ambler)) to insure emissions compliance and RF safety.
To re-iterate, it is the responsibility of the OEM to insure that the final configuration of any combination of RF transmitters including Bluetooth meets all regulatory requirements.

Exterior Labeling Requirements

To satisfy FCC exterior labeling requirements, an FCC label, along with specific text, must be placed on the notebook PC that contains an Intel Personal Wireless Module(Ambler) with Bluetooth wireless technology. The following text must be placed beneath the FCC label on the exterior of the laptop.

"Contains Transmitter Module FCC ID: TBD"

Any similar wording that expresses the same meaning may be used.

Canadian Regulatory Approval

Conditions of Grant

In general, Industry Canada follows the FCC in terms of emission levels and other regulatory requirements. Although Industry Canada's position is that the OEM has the first level of responsibility for insuring compliance for the end user configuration, Intel as grantee is responsible as supplier of the module, and associated modular approved design.

Design Criteria

The same design criteria as described in Section 6.4 should be followed for Canadian modular approval.

Emissions Compliance testing

To ensure emissions compliance, testing of the final configuration must be conducted per Industry Canada RSS-210 (Low Power License-Exempt Radio communication Devices). For detailed document information, visit:

http://strategis.ic.gc.ca/SSG/sf01375e.html - RadioStandardsSpecifications

These emissions tests can be conducted by the manufacturer if equipped with a test chamber or by contacting an approved test facility (See Section 9). The results of these tests are not required to be submitted to Industry Canada or Intel, but should be kept on file by the OEM.

Note: Industry Canada generally follows the guidelines of the FCC for its emissions level requirements. Previous FCC data taken for the final configuration may be utilized to satisfy this requirement. However, emissions level requirements should be confirmed by referring to a current version of RSS-210. If no data of this type is available then testing to a current version of RSS 210 will be required.

Exterior Labeling Requirements

To satisfy Industry Canada exterior labeling requirements, the following text must be placed on the backside of the notebook PC that contains the Intel Personal Wireless Module(Ambler):

"This product contains Intel Bluetooth module Canadian Cert No TBD"

This same information should be included in the product user manual.

European Union

Conditions

Regulatory requirements for marketing in the EU are covered in the R&TTE Directive of April 8, 2000. This directive simplifies marketing by allowing self certification for "harmonized" bands by conducting testing at their own manufacturing facility or test house. In the case of Bluetooth, standards have recently become harmonized (although frequencies are not). To meet the requirements of the R&TTE directive a Technical Construction File is no longer required; only frequency notification to countries in the EU is. Article 6 of the R&TTE directive states that "the manufacturer or the person responsible for placing the apparatus on the market provides information for the user on the intended use of the apparatus, together with the declaration of conformity to the essential requirements. " Although this implies that the OEM has the responsibility for insuring compliance of the end user configuration, Intel does have a responsibility of supplier of the module and antenna interconnect design, having made its own declaration of conformity and frequency use notifications. ~~Although the R&TTE directive considers the first level should be reviewed by a "Notified Body" before the product is marketed. (This is not absolutely required, but reduces the risk of the product being challenged for non-compliance.) Although not specifically stated in the R&TTE Directive, any non-compliance issues are considered the responsibility of the manufacturer of the end product to correct.~~

Design Criteria

The same design criteria as described in 6.4 should be followed to be covered by CE approval of this module configuration.

Emissions Compliance Testing

In the European community regulatory compliance is based on the European standards ETSI 300-328 (Emissions) and ETSI 300-826 (Electromagnetic Compatibility). To insure compliance, radiated emissions testing of the final configuration must be conducted to insure that emissions meet the requirements of ETSI 300-328 (European Telecommunications Standard for 2.4 GHz ISM band). For detailed documents visit:

http://europa.eu.int/comm/enterprise/rtte/infor.htm

These emissions tests can be conducted by the manufacturer if equipped with a test chamber or by contacting an approved test facility (See Section 9). The results of these tests are not required to be submitted to the regulatory authorities (within each country) or Intel, but should be kept on file by the OEM.

Note: In many cases, data taken for FCC emissions testing can be utilized (substitution method) to confirm compliance to EU emissions requirements. Where emissions data on the final configuration

has been taken this is an option. If no data is available then testing to ETSI 300-328 will be required. In addition we will strongly recommend testing to ETSI 300-826 (immunity testing) although this will not be Intel's responsibility for compliance of the end user configuration.

Exterior Labeling Requirements

The laptop that has an embedded Bluetooth module must on its exterior be labeled "CE xxxx !" where xxxx is the notified body number TBD) and an exclamation mark '!' with a circle around it. The exclamation mark designates a non-harmonized frequency band. (See http://europa.eu.int/comm/enterprise/rtte/decision/classif.htm for text of this decision. For further details on labeling refer to the R&TTE Directive .See Web Site, above.)

User documentation: The packaging and instructions may bear the same CE marking as described above although it is not mandatory. Additionally, the packaging and instructions MUST indicate any restrictions on the use of the product (i.e. countries where the operating frequency of a transmitting device is not allowed).

US and International Type Approval (Standard Regulatory Equipment Certification)

Some cases may arise where the OEM wishes to obtain standard equipment regulatory certification. Examples are implementations with a unique antenna or antenna connection scheme or countries where modular approval has not been approved. Details of standard type equipment certification are out of the scope of this user guide. The OEM should contact a local certified test house to obtain the requirements for the region of interest.

The following is a partial list of test houses that may be able to assist in both US and International approvals. This list is by no means complete or preferential, but test houses that Intel has worked with in the regulatory approval process:

1. Cetecom GmbH, Essen, Germany +49 20 54 95 19 36
2. 7layers AG*, Ratingen, Germany +49 (0) 2102 749 490
3. Northwest EMC*, Hillsboro, Oregon (503) 844-4066
4. Compliance International*, Pleasanton, California (925) 417-5571
5. Intertek Testing Services*, Menlo Park, California (650) 463-2900
6.

Filing with any test house usually requires the submittal of block diagrams, schematics and other technical information pertinent to the radio portions of the Personal Wireless Module(Ambler). Intel will provide assistance in obtaining such documents when required by the OEM.

Overview of Bluetooth Qualification

Responsible Entity

The manufacturer of a Bluetooth™ "end-product" is ultimately responsible for qualification of the product. An OEM who uses the Intel Personal Wireless Module(Ambler) component in their end-product must follow the steps defined in the Qualification Program Reference Document (PRD) to fulfill the qualification requirements. Since the Intel Personal Wireless Module(Ambler) component is pre-tested and qualified for a specific covered functionality, it may be used to fulfill most of the testing requirements of the qualification program simply by reference to the Intel Personal Wireless Module(Ambler) component. You will not be required to perform conformance testing since you are using a pre-qualified Intel Personal Wireless Module(Ambler) how ever you must perform the Interopertability tests specified for the profiles supported.

Steps to Qualification - Overview

The steps to qualify a product incorporating Bluetooth™ technology are listed below for reference. It is encouraged for an OEM to review Section 5.0 of the Bluetooth™ Qualification Program Reference Document (PRD), which outlines these steps in detail. All of the required documentation and forms can be found on the Bluetooth Member web site: http://www.opengroup.org/bluetooth/ .

Overview of Steps for qualification

1. Join the Bluetooth Special Interest Group through the process described on the Bluetooth public WEB site http://www.bluetooth.com/. Intel should be listed as the Sponsor if necessary.
2. Establish a relationship with a Bluetooth Qualification Body (BQB). These individuals and their contact information can be found on the Bluetooth public WEB site. This is a requirement of the qualification program. BQB list can be found on the Bluetooth public Website http://qualweb.opengroup.org/Template.cfm?LinkQualified=ListBQB .
3. Fill out a Declaration of Compliance for the end product that is to be qualified. This form can be found on the Bluetooth Member Web Site.
4. Prepare a test plan for submission to the BQB. The test plan should indicate that the end product will utilize a pre-tested Bluetooth Integrated Component (Intel Personal Wireless Module(Ambler) component) to satisfy the conformance testing associated with the covered functionality inherent in the Intel Personal Wireless Module(Ambler) component. Intel will provide a template to assist you in creating this document.
5. Perform Profile Interoperability tests. . Below are listed the required interoperability tests for the Intel Personal Wireless Module(Ambler) supported functionality (subjected to change based on final software release). Intel will provide the required information to perform interoperability tests for the system integrating Personal Wireless Module(Ambler). Please engage with your BQB now and start planning (resources and time) for the interoperability tests to get your platform qualified and listed.
   Table CSDAP
   Table DDUN
   Table EFAX

Table FGEOP
Table GObject Push
Table HFile Transfer
Table ISynchronization

1. Prepare a test report to include the interoperability test data. Intel will provide sample test report for reference.
2. Fill out Bluetooth PIC/ICXs Summary template. This template will be provided by Intel and will be filled out in advance for the functionality supported by the Intel Personal Wireless Module(Ambler) Component. The OEM will only be required to fill in their end-product information.
3. Fill out Bluetooth PIC/ICXs templates for each profile and protocol. These templates will be provided by Intel and will be filled out in advance for the functionality supported by the Intel Personal Wireless Module(Ambler) Component. The OEM will only be required to fill in their end-product information.
4. Combine all of the submission data into a folder for review by the BQB. This folder is called the compliance folder.

Upon successful completion of all applicable steps and approval by the BQB, the BQB will list the OEM end-product on the Bluetooth qualified products list.

Appendix A: Antenna and Test Equipment

Antennas

- ACE-2400 Half Wavelength Sleeve Dipole (Reference Antenna)
- X PIFA 10 mm x 42 mm x 8 mm
- X Dielectric Antenna
- X Stub Antenna Model # PSTG0-2400S

Test Equipment

- HP 8572A Spectrum Analyzer
- Rhode & Schwarz RF Generator SMT03
- Electro-Metrics Horn Antenna EM-6961
- PC Vendor A Laptop
- PC Vendor B Laptop
- PC Vendor C Laptop

Test Location

Underwriters Laboratories Inc.
1655 Scott Boulevard
Santa Clara, CA 95050

Appendix B: Sample Connector and Cable to the Antenna

Figure 1. Sample Connector/Cable to the Antenna

Appendix C:

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

GRANT OF EQUIPMENT AUTHORIZATION
Certification

Intel Corporation
2200 Mission College Blvd.

Santa Clara,CAUSA95052-8119

Date of Grant: 02/20/2001

Application Dated: 06/06/2000

Attention: Rick Jessop

NOT TRANSFERABLE
EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER O2Z-BT1

Name of Grantee Intel Corporation

Equipment Class: **Part 15 Spread Spectrum Transmitter**

Notes: **Ambler Bluetooth Module**

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	15	2402 - 2480	0.00233		

This application was originally granted on 11/22/2000. This modular transmitter is approved for use in personal computers and may operate in conjunction with other mobile and portable transmitters in the same computer; provided, the other mobile and portable transmitters have satisfied the appropriate RF exposure requirements contained in the FCC rules. The grantee also must provide OEM integrators, or end users if marketed directly to end users, with installation and operating instructions for satisfying RF exposure requirements. The Grantee must inform second manufacturers/installers that in order for this module to be operated in any configuration other than that permitted in the preceding sentences, a separate FCC equipment authorization must be obtained for each device into which this module is installed. The only antennas approved for use with this module are those documented in the filing, and must be installed in the manner specified therein. If

the Grantee does not provide an antenna with this module, it may not be sold to the end- user, but may be sold to a second manufacturer/installer. Instructions must be provided by the Grantee to the second manufacturer/installer that describe how this module must be installed into a final product in such a manner that only the authorized antenna(s) is (are) used, and it complies with the requirements of Section 15.203 (i.e., has either a permanently attached antenna or utilizes a unique connector). Compliance of this module in its final configuration is the responsibility of the Grantee. If the second manufacturer/installer desires to use an antenna with this module that has not been previously approved for use with it, then the Grantee must file a Class II permissive change to approve the new antenna with the module. Alternatively, the second manufacturer/installer may obtain a separate FCC equipment authorization for the module and the new antenna. If the second manufacturer/installer markets a device that does not comply with the Grantee's instructions for antenna configuration without having obtained a separate FCC equipment authorization for the module and new antenna configuration, that device will be considered unauthorized equipment. Marketing of unauthorized equipment is prohibited by Section 2.803 of the FCC Rules.

Mail To: ~~Grant will be added in the next document revision.~~

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EA97806

Appendix D:

Grant will be added in the next document revision.

Appendix E:

Declaration of Conformity (CE Approval)

Grant will be added in the next document revision.

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tests either need to be done at a similar approved facility or verified using
test data from an approved facility.
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