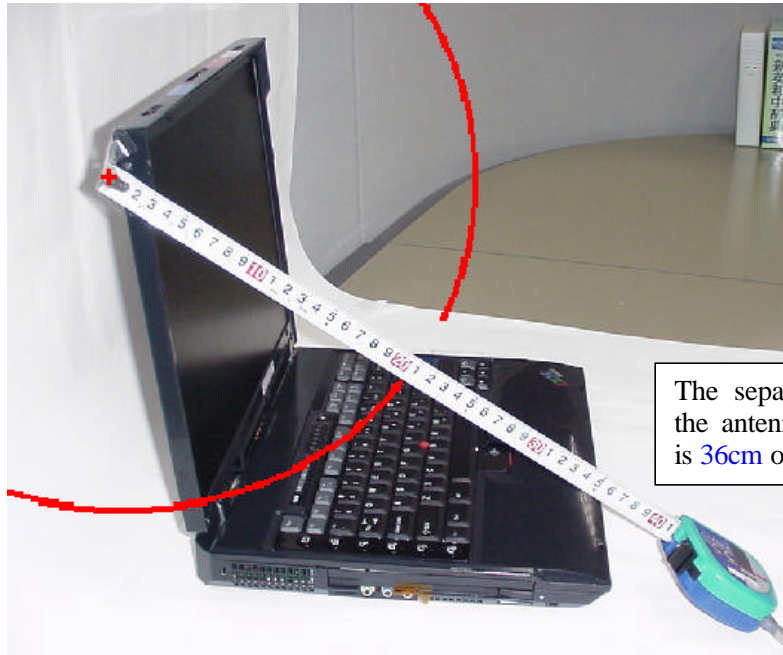


# RF Exposure

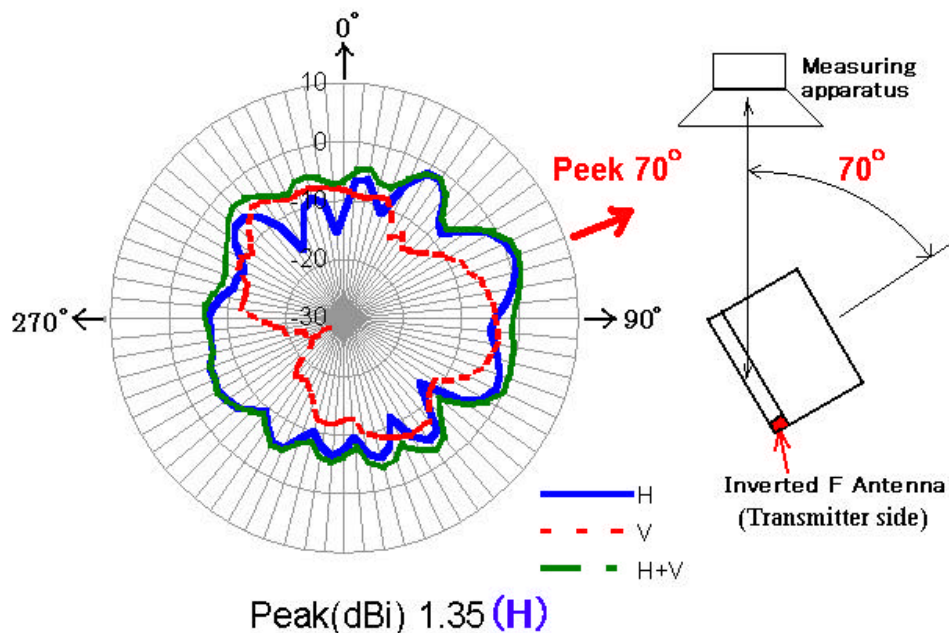
The applying equipment is a standard fullsize laptop computer which is categorized as a mobile device by FCC CFR 47 Section 2.1091. Therefore the separation distance between the antenna and the human body is 20cm or more. As shown in the following photos, the applying equipment satisfies the requirement of antenna separation.

## 1. IBM ThinkPad 802.11b Wireless LAN Mini-PCI Adapter



The peak conducted output power of the IEEE802.11b Wireless LAN Adapter is 15.7dBm and the maximum antenna gain is 1.35dBi as shown below.

Figure A: Antenna Gain of IEEE802.11b Wireless LAN Adapter



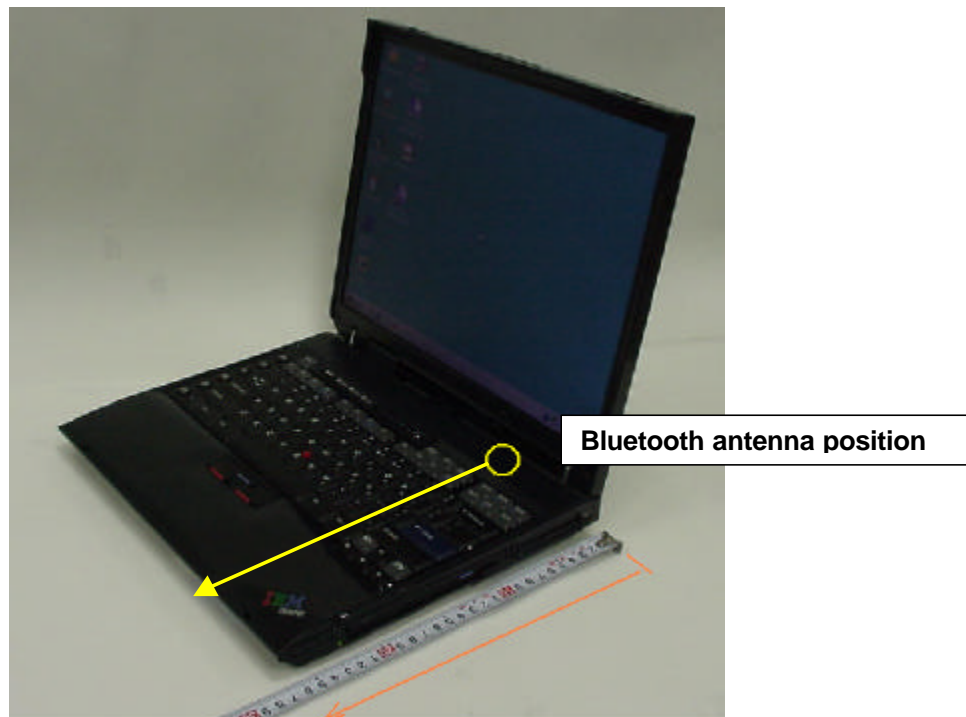
Therefore the peak radiated output power(EIRP) is calculated as follows.

$$\text{EIRP} = P + G = 15.7 \text{ dBm} + 1.35 \text{ dBi} = 17.05 \text{ dBm} (50.7 \text{ mW})$$

Then, the maximum power density at 20cm distance is calculated as :

$$S_1 = \text{EIRP}/(4 \times R^2 \times \pi) = 0.010 \text{ mW/cm}^2$$

## 2. IBM Bluetooth Daughter Card



The separation distance between the antenna and the human body is **26cm** or longer.

The peak conducted output power of the Bluetooth Daughter Card is 2.4 dBm and the maximum antenna gain is 0.28dBi as shown in the Figure B.

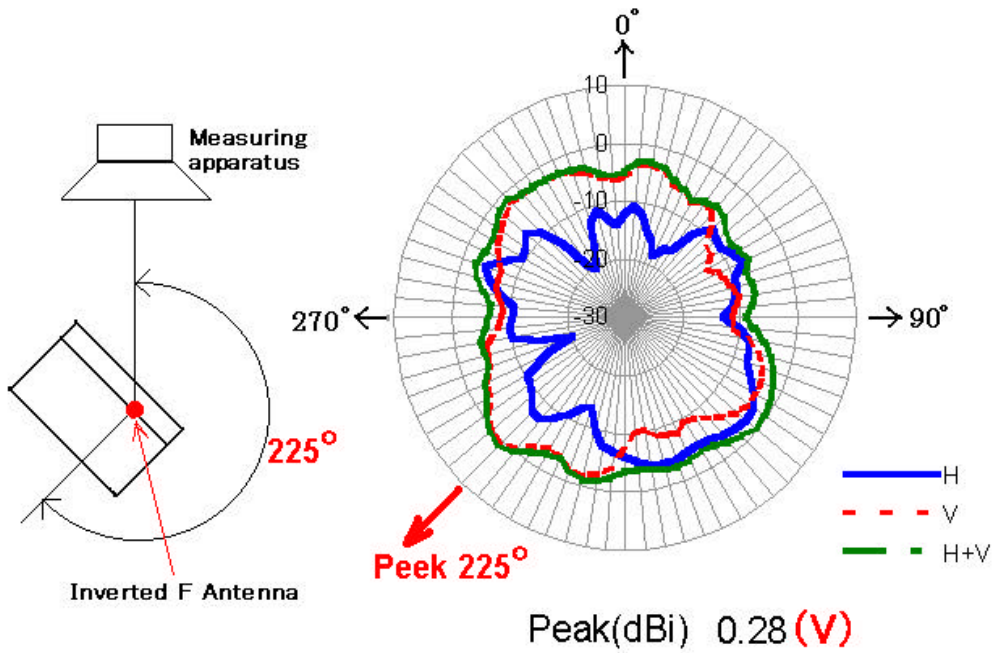
Therefore the peak radiated output power(EIRP) is calculated as follows.

$$\text{EIRP} = P + G = 2.4 \text{ dBm} + 0.28 \text{ dBi} = 2.68 \text{ dBm} (1.86 \text{ mW})$$

Then, the maximum power density at 20cm distance is calculated as :

$$S_2 = \text{EIRP}/(4 \times R^2 \times \pi) = 0.00037 \text{ mW/cm}^2$$

Figure B: Antenna Gain of Bluetooth Daughter Card



### 3. User option Wireless cards

The applying equipment has two interfaces to connect user's option wireless cards. The following wireless cards are used in the PC slot or USB port of the equipment.

FCC ID : PI4BT-ULTRA  
 Grantee Name : TDK Systems Europe Ltd.  
 Product Name : Bluetooth Ultraport Module  
 EIRP in FCC test report : 1.4 mW  
 Granted Date : May/22/2001

FCC ID : O2OBTPCM101  
 Grantee Name : Deigianswer A/S  
 Product Name : Motorola Bluetooth 0dBm PC-Card  
 (type no.: BTPCM100)  
 EIRP in FCC test report : 2.7mW  
 Granted Date : October/18/2000



The separation distance between the antenna and the human body is longer than 20cm.

The minimum antenna separation to satisfy the MPE limits (1mW/cm<sup>2</sup>) and the maximum power density at 20cm distance of each card are :

FCC ID	EIRP	Min. separation to satisfy the MPE limits *1	Max. power density at 20cm *2
<b>PI4BT-ULTRA</b>	1.4mW	0.34cm	$S_3 = 0.00028 \text{ mW/cm}^2$
<b>O2OBTPCM101</b>	2.7mW	0.47cm	$S_4 = 0.00054 \text{ mW/cm}^2$

$$*1 = \sqrt{EIRP / (1\text{mW/cm}^2 \times 4 \times \pi)}$$

$$*2 = EIRP / (4 \times 20\text{cm}^2 \times \pi)$$

When an operator will use the four transmitters simultaneously during 30 minutes continuously in normal operation, the time-averaging exposure is :  $(S_1 + S_2 + S_3 + S_4) \times 30 = 0.34$   
 So the source-based time-averaging duty factor is considered as 100% duty.

Therefore the applying equipment meets the MPE requirements for general Population/Uncontrolled exposure.

#### 4. RF Exposure Info of User’s Manual :

The attachment in the next page is the RF exposure user’s information described in the page 67 and 68 of the user’s manual.

- The IEEE 802.11 Standard on Wireless LANs (Revision B), as defined and approved by the Institute of Electrical and Electronics Engineers.
- The Wireless Fidelity (WiFi) certification as defined by the WECA (Wireless Ethernet Compatibility Alliance).

## **Usage environment and your Health**

Wireless LAN Mini-PCI Adapter emits radio frequency electromagnetic energy like other radio devices. However, the level of energy emitted is far much less than the electromagnetic energy emitted by wireless devices like for example mobile phones.

Because Wireless LAN Mini-PCI Adapter operates within the guidelines found in radio frequency safety standards and recommendations, IBM believes High Rate Wireless LAN is safe for use by consumers. These standards and recommendations reflect the consensus of the scientific community and result from deliberations of panels and committees of scientists who continually review and interpret the extensive research literature.

In some situation or environment, the use of High Rate Wireless LAN may be restricted by the proprietor of the building or responsible representatives of the organization. These situations may for example include:

- Using High Rate Wireless LAN on board of airplanes, or
- In any other environment where the risk of interference to other devices or services is perceived or identified as harmful.

If you are uncertain of the policy that applies on the use of wireless devices in a specific organization (e.g. airport), you are encouraged to ask for authorization to use Wireless LAN Mini-PCI Adapter prior to turning on the ThinkPad A30.

## **Wireless Regulatory Information**

The ThinkPad A30 must be installed and used in strict accordance with the instructions as described hereafter. This product complies with the following radio frequency and safety standards.

### **USA - Federal Communications Commission (FCC)**

This product complies with FCC Part 15. The operation of Wireless LAN Mini-PCI Adapter integrated in the product is subject to the following two conditions:

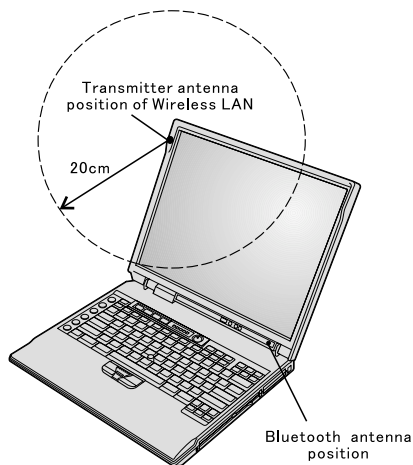
- It may not cause harmful interference.
- It accepts any interference that may cause undesired operation.

### **Exposure to Radio Frequency Radiation**

The radiated output power of Wireless LAN Mini-PCI Adapter is far below the FCC radio frequency exposure limits. Nevertheless, the ThinkPad A30

shall be used in such a manner that the potential for human contact during normal operation is minimized as follows:

- **CAUTION:** To comply with FCC RF exposure compliance requirements, a separation distance of at least 20 cm (8 inches) must be maintained between the antenna of IEEE802.11b Wireless LAN and all persons.



- When you will use a Bluetooth option or wireless PCMCIA card in your ThinkPad, please be careful of the followings.
  1. If you want to use an option device(s) while the integrated wireless feature is enabled, please visit the IBM site at [www.ibm.com/pc/support](http://www.ibm.com/pc/support) for an updated list of RF devices that have been allowed to cooperate with the integrated wireless feature.
  2. If you wish to use any other options that were not introduced in the IBM site, the FCC certification requires that you disable the integrated wireless LAN feature before you use the options.

#### **Interference Statement**

An improper installation or unauthorized use may cause harmful interference to radio communications. Also any tampering of the internal antenna will void the FCC certification and your warranty. Refer to the “Electronic emission notices” on page 60 for more detail.

#### **Canada - Industry Canada (IC)**

##### **Low Power License-Exempt Radiocommunication Devices (RSS-210)**

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.