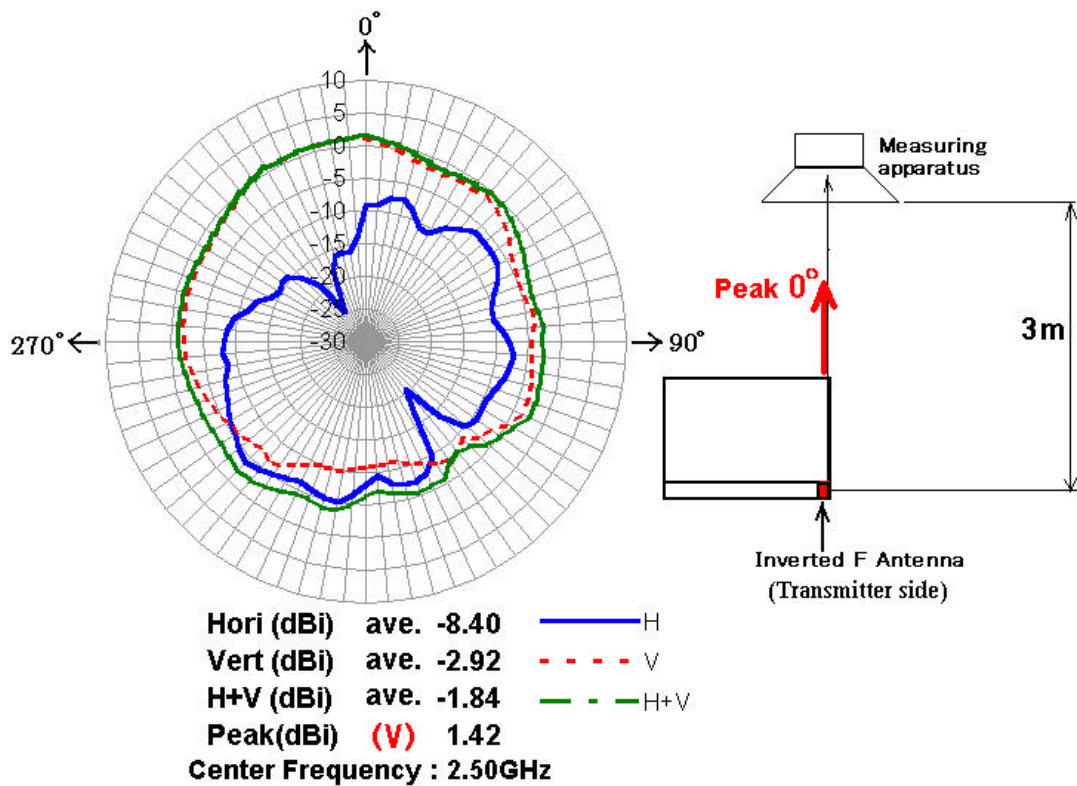
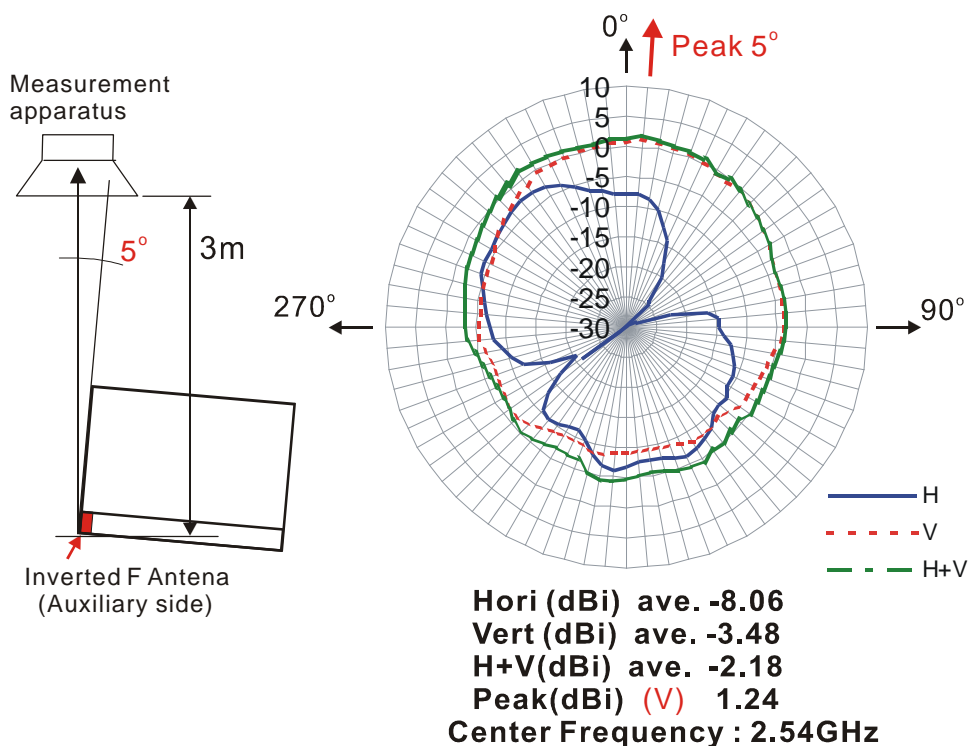


RF Exposure

1. Antenna Gains of applying transmitters



[Figure A: Main Antenna Gain of IEEE802.11b Wireless LAN Adapter](#)



[Figure B: Auxiliary Antenna Gain of IEEE802.11b Wireless LAN Adapter](#)

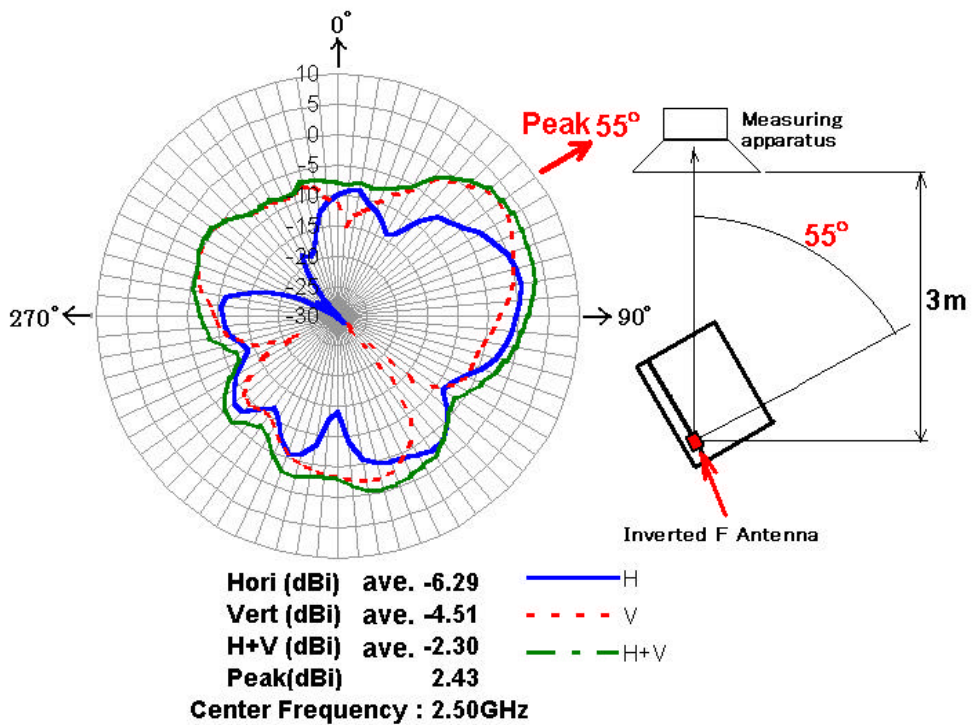
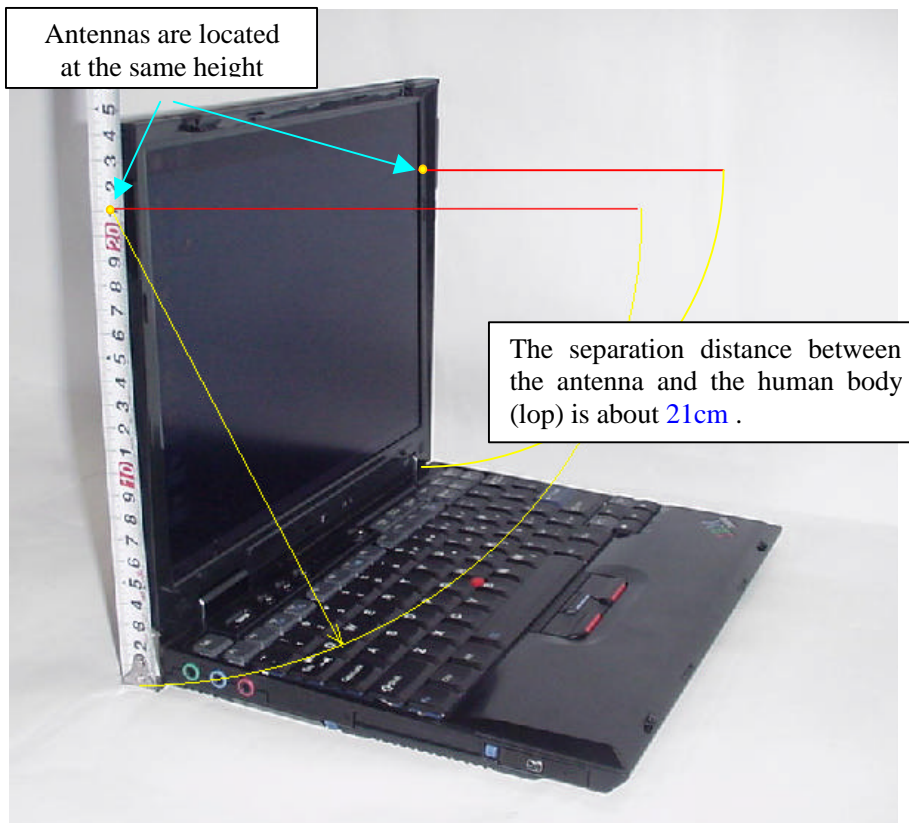


Figure C: Antenna Gain of Bluetooth Daughter Card

2. RF Exposure evaluation of Cisco Aironet Wireless 802.11b

The applying equipment is a compact size laptop computer. The built_in antenna for the integrated mini-PCI wireless LAN transmitter is categorized as a mobile device by FCC CFR 47 section 2.1091, because two antenna are located at the same height hence the separation distance between the antennas and the human body is 20cm or more. As shown in the following photos, the applying equipment satisfies the requirement of antenna separation.



The conducted peak output power of the IEEE802.11b Wireless LAN Adapter is 19.9dBm and the maximum antenna gain is 1.42dBi as shown the previous Figure A.

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

$$EIRP = P + G = 19.9 \text{ dBm} + 1.42 \text{ dBi} = 21.32 \text{ dBm} (135.5 \text{ mW})$$

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

$$S_1 = EIRP / (4 \times R^2 \times \pi) = 0.0270 \text{ mW/cm}^2$$

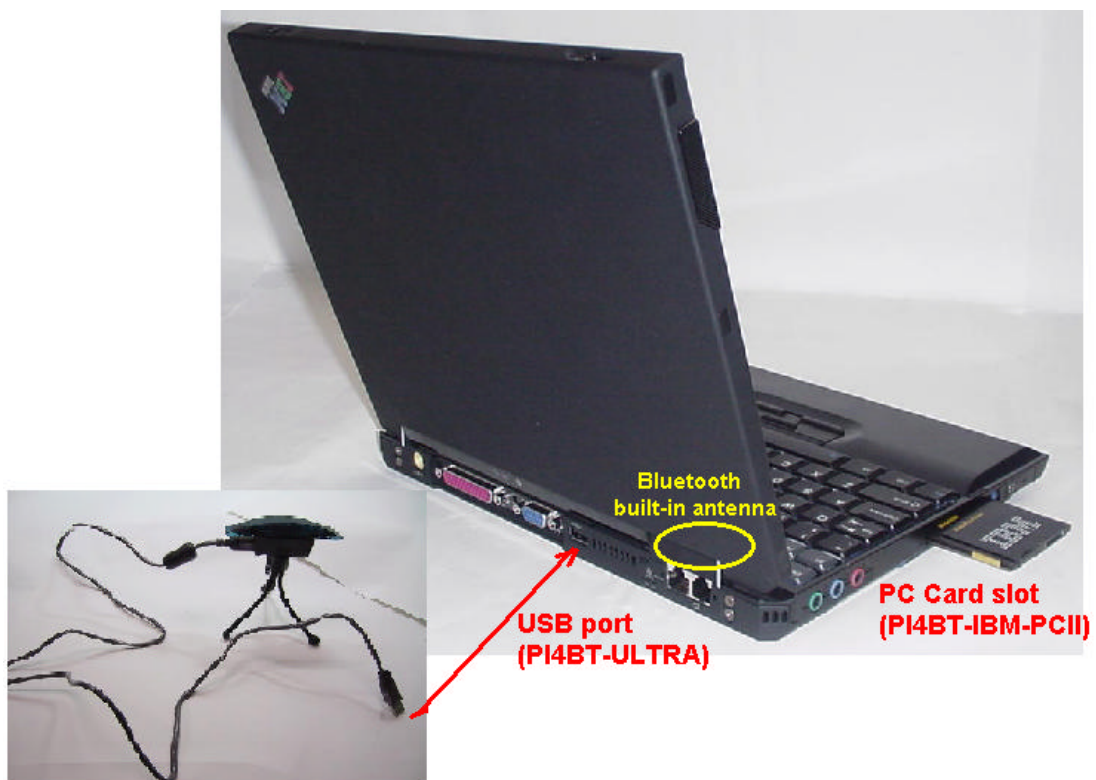
When an operator will use the transmitter during 30 minutes continuously in normal operation, the time-averaging of exposure is : $S_1 \times 30 = 0.809 < (1\text{mW/cm}^2) \times 30$

So the source-based time-averaging duty factor is considered as 100% duty. Therefore the WLAN transmitter meets the MPE requirements for general Population/Uncontrolled exposure.

3. RF Exposure evaluation of Bluetooth transmitters

The applying laptop PC (ThinkPad X30 Series) supports three kinds of Bluetooth devices as follows.

| | FCC ID | Grantee Name | Product Name | Granted Date | EIRP in FCC test report |
|----------------------|----------------|-------------------------|----------------------------|----------------|-------------------------|
| User's option | PI4BT-ULTRA | TDK Systems Europe Ltd. | Bluetooth Ultraport Module | May/22/2001 | 1.4 mW |
| | PI4BT-IBM-PCII | | Bluetooth PC Card II | August/21/2001 | 1.0mW |
| Applying transmitter | ANOTK1TP10SHR | IBM Japan, Ltd. | Bluetooth Daughter Card | | 2.29mW |



When a customer operates the applying PC on his lap, the sufficient separation distance (min. 20cm) between the antennas of above transmitters and the person's body (lap) can not be maintained.

But the footnote of the Section 3 in Supplement C to OET Bulletin 65 states ¹⁴ Both conducted and radiated output power should be considered in near-field exposure conditions. The output indicated in the above (500 mW) is appropriate when the device and its antenna are both operating at more than 2.5 – 3.0 cm from a person's body, such as certain hand-held terminals. If a device, its antenna or other radiating structures are operating at closer than 2.5 cm from a person's body or in contact with the body, SAR evaluation may be necessary when the output is more than 50 – 100 mW, depending on the device operating configurations and exposure conditions.”

Also the latest conditions for co-located transmitters of Web guidance (http://hraunfoss.fcc.gov/eas_public/LSI_GET/37) states “SAR compliance for co- located transmitters in standalone independently operated product

– when SAR evaluation is required for TCB approval, except for the transmitter(s) with the highest output (non- simultaneously transmitting dominant transmitters – AMPS/ TDMA/ CDMA), the output of other co-located transmitters should be less than 2% of the source- based time-averaged conducted and radiated output power levels of the dominant transmitter or 5 mW, whichever is higher.”

When the antenna separation from a person's body is closer than 2.5 cm, the near field estimation, which is used for the calculation of EIRP to estimate the source- based time-averaged MPE limit, is not proper method for the RF exposure evaluation. So 5 mW should be considered as the criteria of SAR evaluation for the co-location of transmitters.

The total output power of the three Bluetooth transmitters in the above table is 4.69mW. Therefore those transmitters can co-locate with the dominant transmitter(WLAN) without SAR evaluation.

4. Other supported PCMCIA cards with SAR compliance

The applying equipment supports the following option wireless PCMCIA card plugged in the PC card slot, which complies to the SAR requirement.

| | | | | | |
|--|---|--|---------------------|----------------------------|----------------------------|
| COPY | <p>FEDERAL COMMUNICATIONS COMMISSION WASHINGTON, D.C. 20554</p> <p>GRANT OF EQUIPMENT AUTHORIZATION Certification</p> <p>Xircom 2300 Corporate Center Drive Thousand Oaks, CA 91320</p> | COPY | | | |
| <p>Attention: Robert Paxman</p> <p>NOT TRANSFERABLE</p> <p>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.</p> | | | | | |
| | <p>FCC IDENTIFIER</p> | <p>J30WCB5000A</p> | | | |
| | <p>Name of Grantee</p> | <p>Xircom</p> | | | |
| | <p>Equipment Class:</p> | <p>Unlicensed National Information Infrastructure TX</p> | | | |
| | <p>Notes:</p> | <p>Intel PRO/ Wireless 5000 Cardbus Adapter</p> | | | |
| <u>Grant Notes</u> | <u>FCC Rule Parts</u> | <u>Frequency Range (MHZ)</u> | <u>Output Watts</u> | <u>Frequency Tolerance</u> | <u>Emission Designator</u> |
| | 15 | 5180 - 5320 | 0.1 | | |
| <p>Output power is conducted. Device is approved for mobile and laptop computer use with similar installation and operating configurations as tested in this filing only. Device with specific antenna has been tested stand-alone for SAR compliance in a typical laptop computer with side PCMCIA slot, as described in this filing. Device has not been tested in a host product for RF exposure compliance in combination with other transmitters. Users and installers must be informed of the installation and operating requirements and configurations for satisfying RF exposure compliance. The highest reported SAR value is 0.67 W/kg.</p> | | | | | |