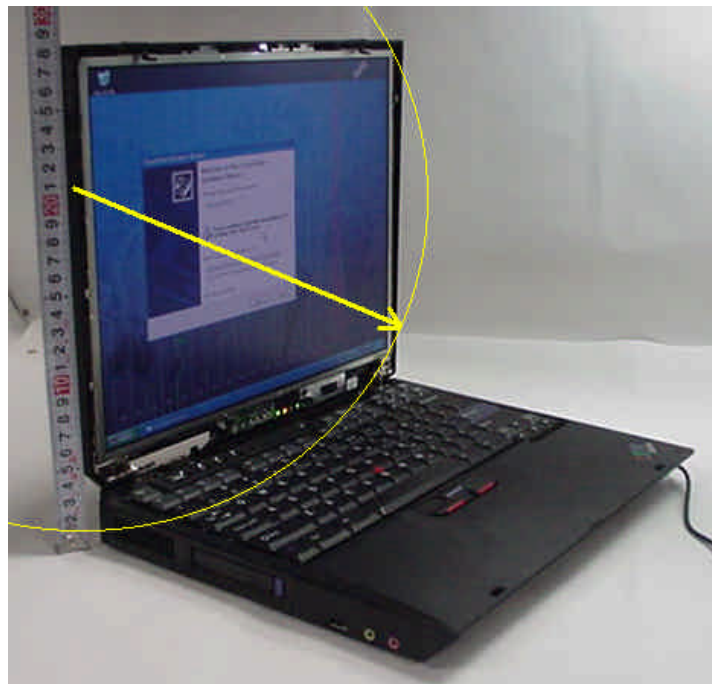


RF Exposure

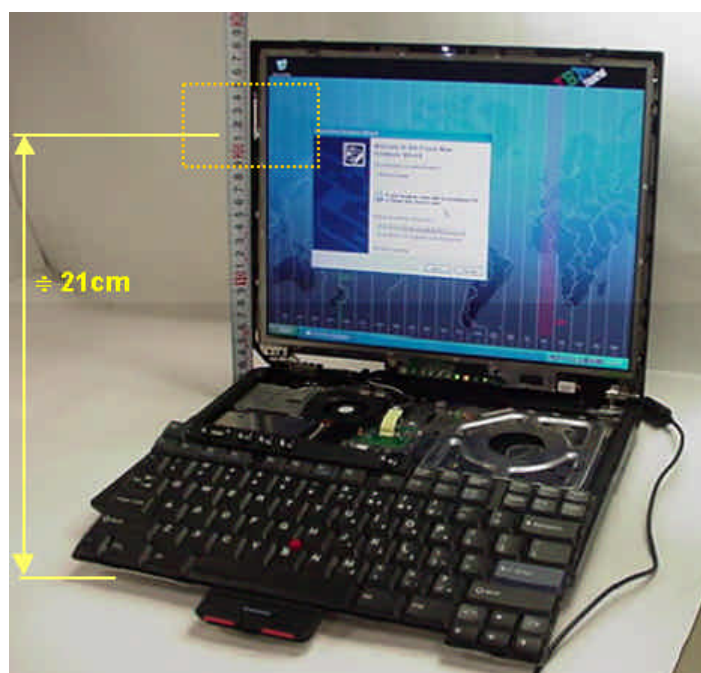
1. IBM ThinkPad 802.11b Wireless LAN Mini-PCI Adapter

The applying equipment is a standard full size 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 photo, the applying equipment satisfies the requirement of antenna separation.

Figure 1. Integrated antenna separation from human body



The separation distance between the antenna and the human body is **21cm** or more.



The peak conducted output power of the applying equipment is 16.3dBm, and the maximum antenna gain is 0.55dBi as shown in Figure 2.

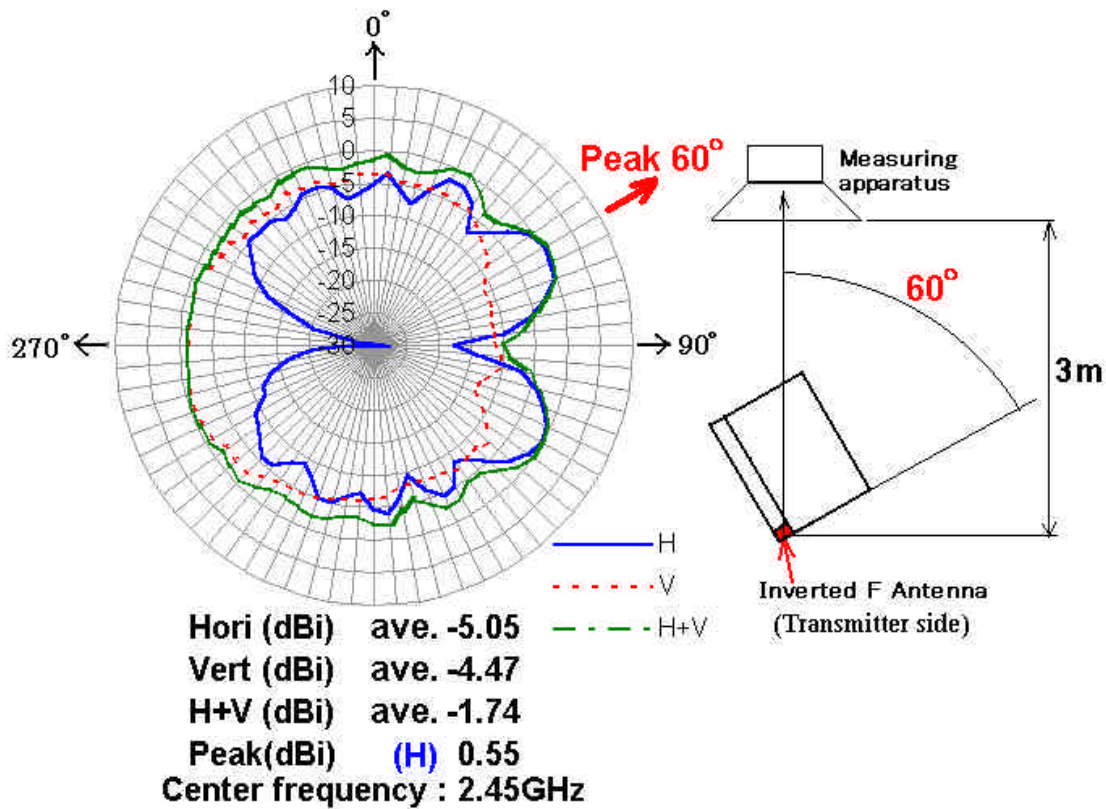
Therefore the maximum peak radiated output power (EIRP) is calculated as follows.

$$\text{EIRP} = P + G = 16.3 \text{ dBm} + 0.55 \text{ dBi} = 16.85 \text{ dBm} (48.42 \text{ mW})$$

Then, the maximum power density at 20cm distance is determined as follows.

$$S_1 = \text{EIRP} / (4 \times R^2 \times \pi) = 0.0097 \text{ mW/cm}^2$$

Figure 2. Transmitter Antenna Gain and Radiation Pattern



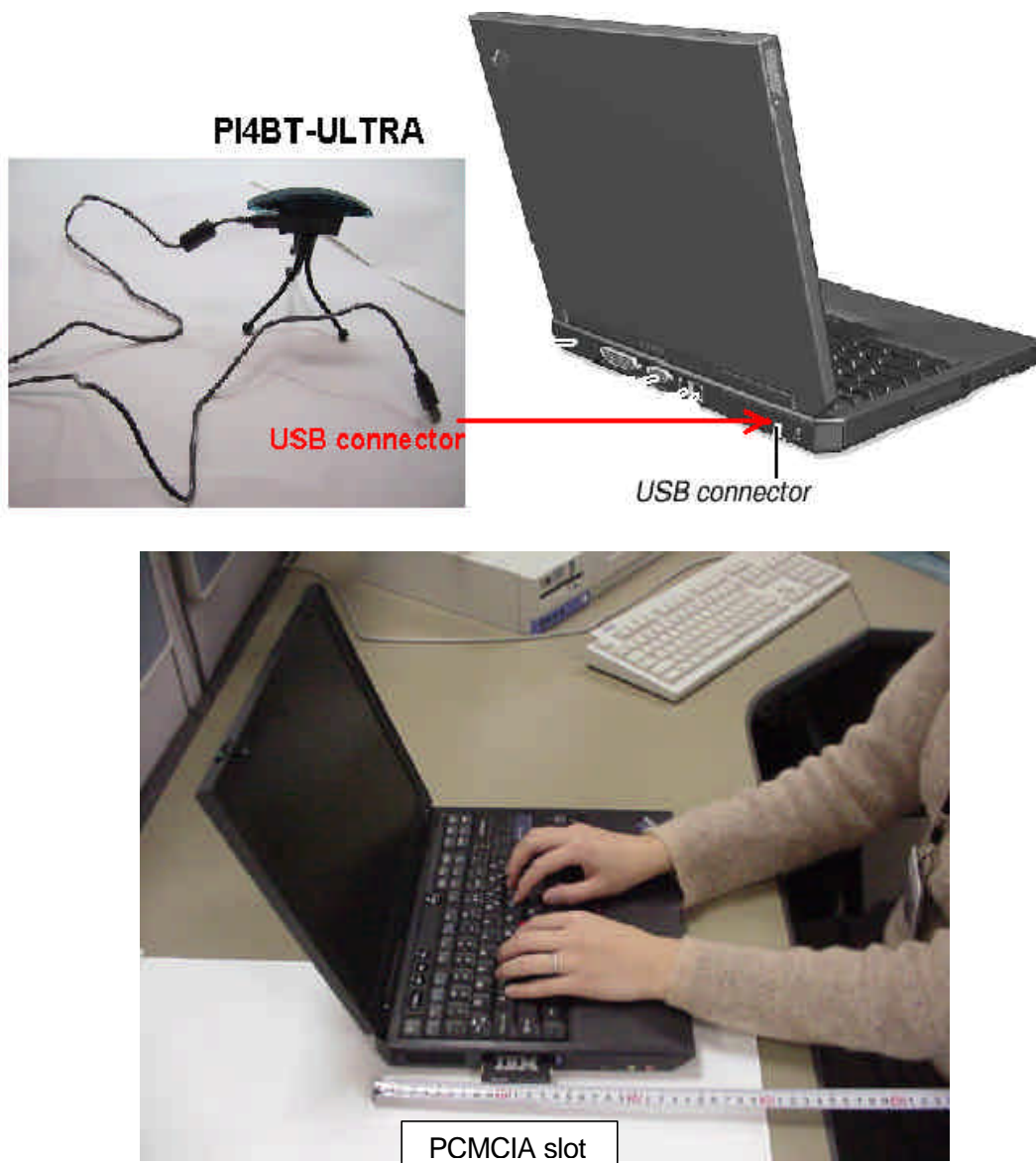
2. User option PCMCIA Wireless cards

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

Interface	FCC ID	Grantee Name	Product Name	Granted Date	EIRP in FCC test report
USB port	PI4BT-ULTRA	TDK Systems Europe Ltd.	Bluetooth Ultraport Module	May/22/2001	1.4 mW
PCMCIA slot	O2OBTPCM101	Degianswer A/S	Motorola Bluetooth 0dBm PC-Card (type no.: BTPCM100)	October/18/2000	2.7mW
	PI4BT-IBM-PCII	TDK Systems Europe Ltd.	Bluetooth PC Card II	August/21/2001	1.0mW

Figure 3 shows the locations of each interfaces and demonstrates that operators can maintain the necessary distance of antenna separation from the human body while normal operation.

Figure 3. Interfaces to connect Wireless options



The minimum antenna separation to satisfy the MPE limits ($1\text{mW}/\text{cm}^2$), and the maximum power density at 20cm distance of each card are :

Interface	FCC ID	EIRP	Min. separation to satisfy the MPE limits *1	Max. power density at 20cm *2
USB port	PI4BT-ULTRA	1.4mW	0.34cm	$S_2 = 0.00028 \text{ mW}/\text{cm}^2$
PCMCIA slot	O2OBTPCM101	2.7mW	0.47cm	$S_3 = 0.00054 \text{ mW}/\text{cm}^2$
	PI4BT-IBM-PCII	1.0mW	0.28cm	$S_4 = 0.00020 \text{ mW}/\text{cm}^2$

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

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

When an operator will use the tree transmitters simultaneously during 30 minutes continuously in normal operation, the time-averaging exposure is : $(S_1 + S_2 + S_3) \times 30 = 0.316$
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.