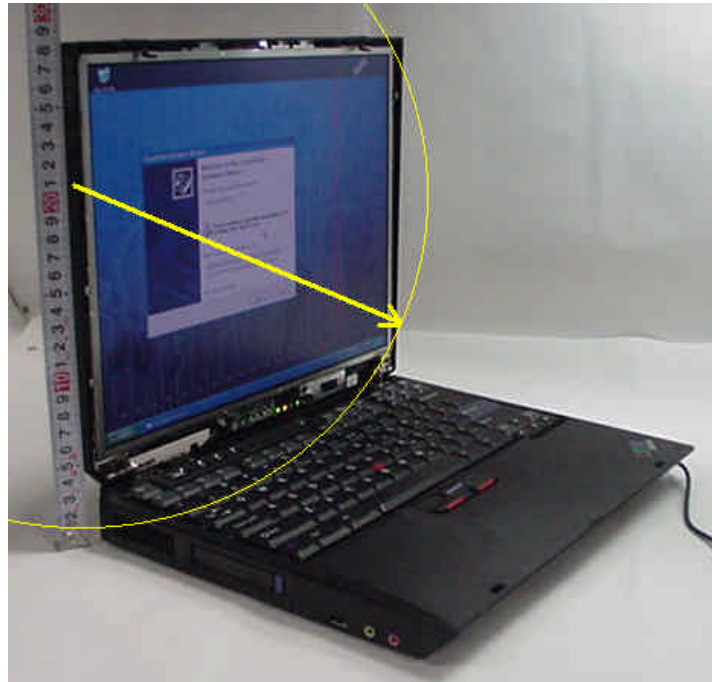


1. RF Exposure Evaluation for the built in type antennas

The separation distance between the transmission antennas located in the LCD section of each host device (ThinkPad R32, T30, or X30) and the person's body is more 20 cm. So the applying transmitter with the built in antenna systems are able to be categorized as the mobile device by FCC CFR 47 section 2.1091

Figure A. Antenna separation from human's body: ThinkPad R32 Series



The shortest distance between the antenna and human's body is 21cm , when the host is operated on the lap.

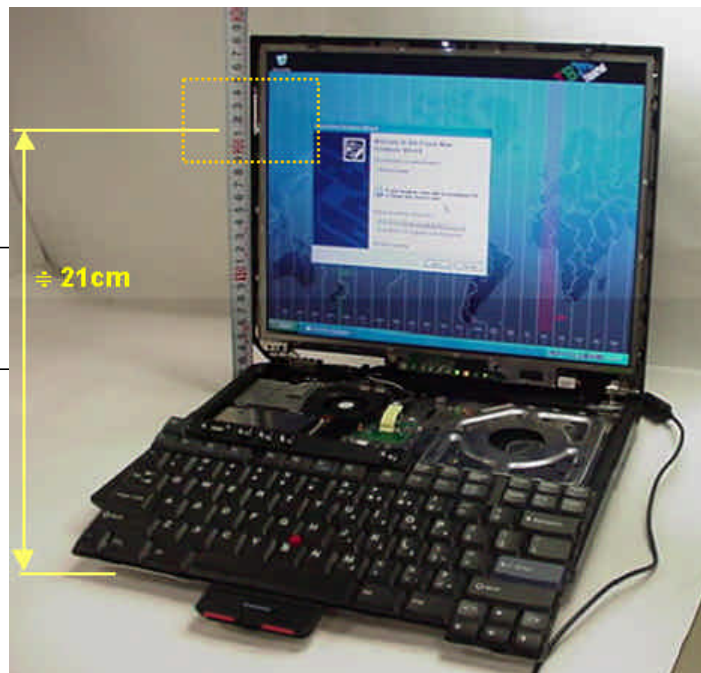


Figure B. Antenna separation from human's body: ThinkPad T30 Series

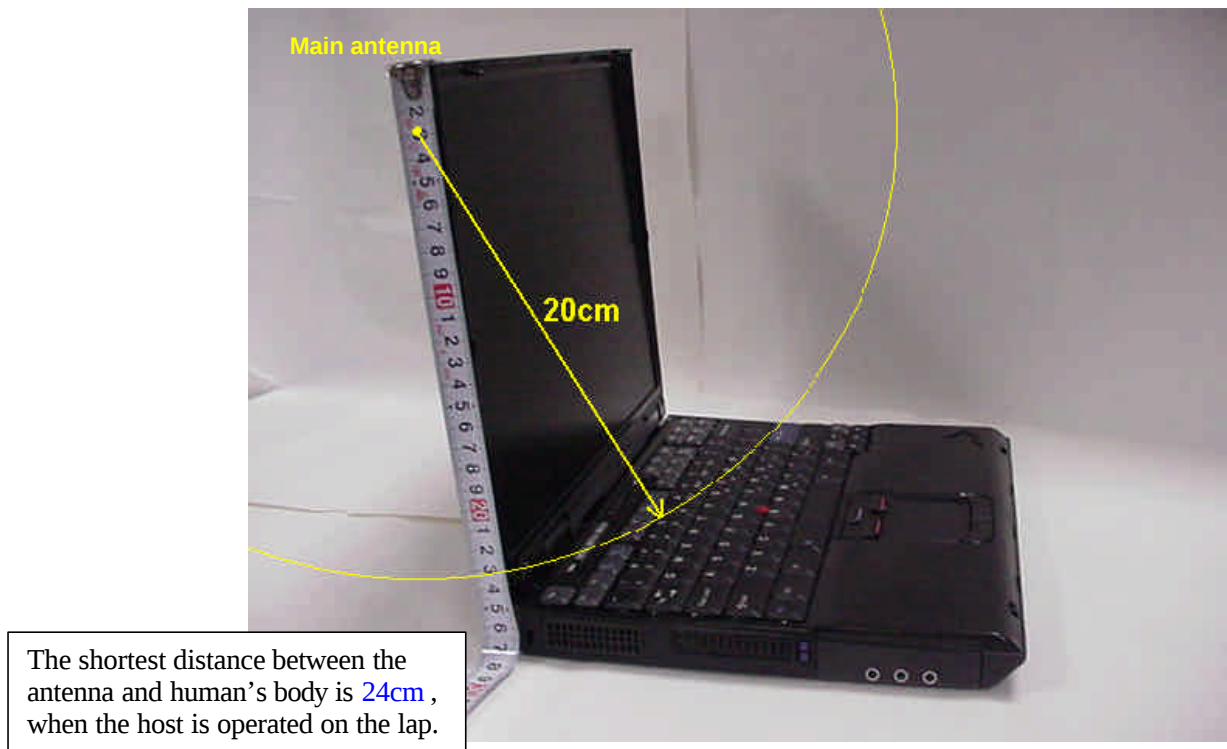
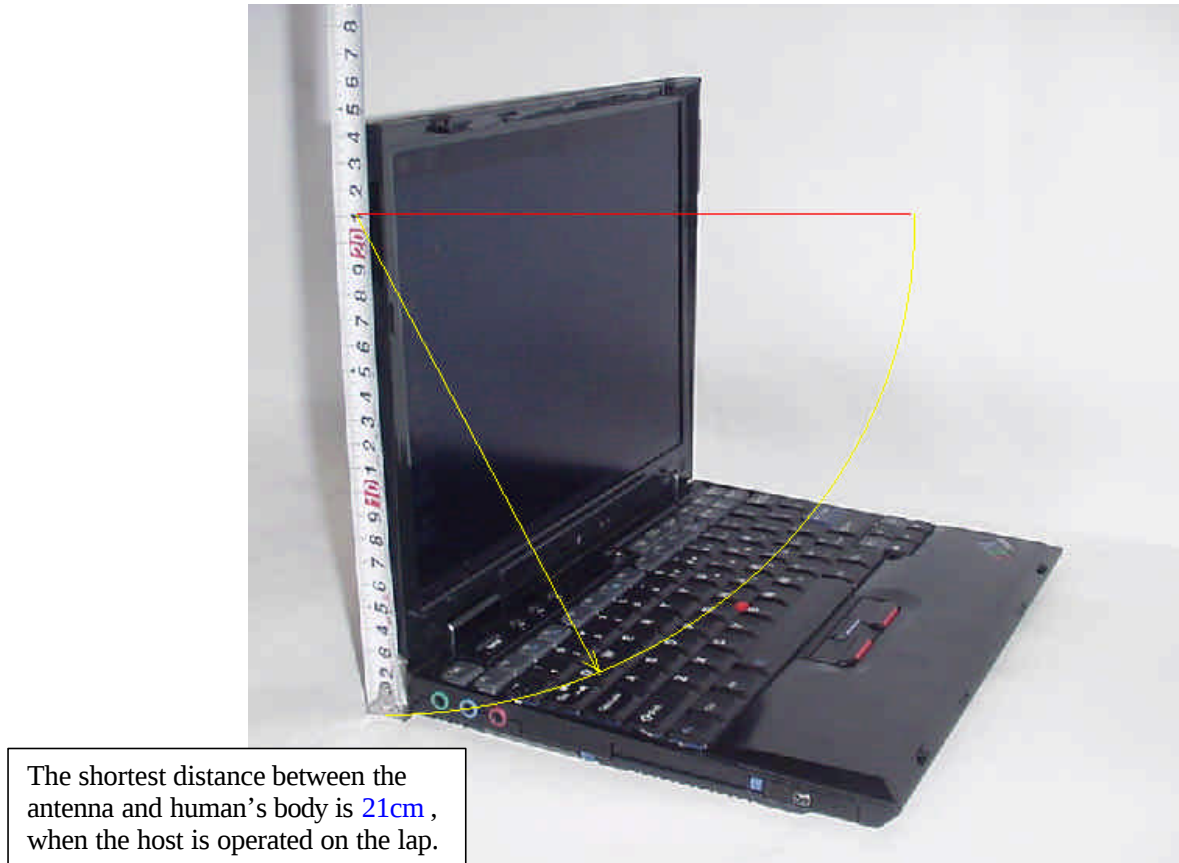


Figure C. Antenna separation from human's body: ThinkPad X30 Series



MPE calculation table

Host device	conducted peak output power (1)	Maximum Antenna gain (2)	EIRP (3)= (1)+(2)	Maximum Power density at 20 cm (S)
ThinkPad R32 Series	16.3 dBm (42.7 mW)	0.55 dBi	16.85 dBm	0.0096 mW/cm ²
ThinkPad T30 Series	17.0 dBm (50.1 mW)	0.53 dBi	17.53 dBm	0.0112 mW/cm ²
ThinkPad X30 Series	17.1 dBm (51.3 mW)	1.42 dBi	18.52 dBm	0.0142 mW/cm ²

The maximum power density at 20cm distance of the applying LMA transmitter is 0.0142mW/cm², which is led by the following calculation.

$$S = 10^{\text{EIRP}/10} / (4 \times R^2 \times \pi) = 10^{18.52/10} / (4 \times 20^2 \times \pi) = 0.0142$$

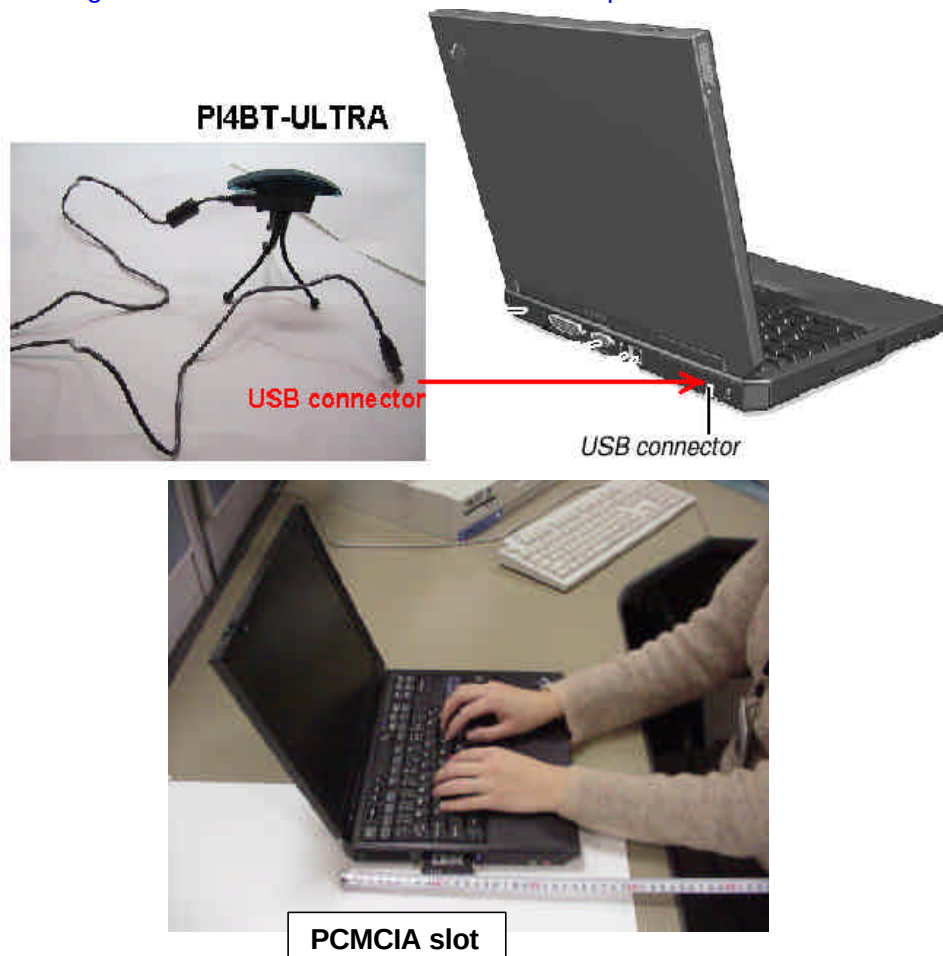
The result is far below the MPE limit (1.0 mW/ cm²) that keeps the sufficient margin for use of continuous RF exposure environment in normal operation. Therefore the LMA transmitter meets the MPE requirements for general Population/Uncontrolled exposure.

2. RF Exposure evaluation of option Bluetooth transmitters

The host devices used with the applying LMA transmitter support the following two Bluetooth PC options which function with the applying transmitter simultaneously.

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
PC card slot	PI4BT-IBM-PCII		Bluetooth PC Card II	August/21/2001	1.0mW

[Figure D. Interfaces to connect Wireless options](#)



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. (note: approximately 1.5 cm from the PC Card slot)

But the footnote of the Section 3 in Supplement C to OET Bulletin 65 states ¹⁴ 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.”

The total output power of the two Bluetooth transmitters in the above table is 2.4mW. Therefore these transmitters also satisfy the RF exposure evaluation regarding CFR 47 Part 15.247(b)(4) without a SAR compliance test report.

3. IBM Web site for user's guidance concerning the co-located transmitters

Note1) **Draft version** including unannounced products being under FCC certification process.

Note2) The current service level is available on the following Web URL.

<http://www.pc.ibm.com/qtechinfo/MIGR-39377.html>

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TP Wireless Systems – Additional RF Option devices receive FCC certification

Applicable countries/regions

United States

Service hints & tips

Affected configurations

Additional RF Option devices receive FCC certification for use on:

System Unit approved products	FCC IDs	PC options allowed multiple transmission		
		#1	#2	#3
ThinkPad A22 wireless models	ANOM380211B	☐	☐	☐
ThinkPad A30 Series (A30, A31) wireless models	ANOVNCBDC80211B	☐	☐	☐
ThinkPad R30 Series wireless models (R30, R31)	AN0CH126P8056	☐	☐	☐
ThinkPad R32 Series wireless models	AN0DS1WLIV	NG	☐	☐
ThinkPad T23 wireless models	ANOTR4WGA1BAN	☐	☐	☐
ThinkPad T30 Series wireless models	ANOCORN1TASUHOP ANOCORN1SHR	NG	☐	☐
ThinkPad X22 wireless models	ANOSY3W26629DX	☐	☐	☐
ThinkPad X23, X24 wireless models	ANOSY4W2662DFJ	☐	☐	☐
ThinkPad X30 Series wireless models	ANOTK1TP10HOP ANOTK1TP10SHR	NG	☐	☐

NG: not permitted to emit RF frequency with other transmitters simultaneously

#1: FCC ID: O20BTPCM101 Option Name: [Bluetooth PC Card](#)

#2: FCC ID: P14BT-ULTRA Option Name: [Bluetooth UltraPort Module from IBM](#)

#3: FCC ID: P14BT-IBM-PCII Option Name: [Bluetooth PC Card II](#)

Solution

The ThinkPad's "Service and Troubleshooting Guide" has the following information in "Wireless regulatory Information – USA Federal Communications Commission (FCC)" section:

When you use a Bluetooth option or wireless PCMCIA card in your ThinkPad xxx computer, please make sure of the following:

1. Please visit the IBM site at www.ibm.com/pc/support and confirm the updated list of RF option devices that have been approved to cooperate with the integrated wireless feature.
2. When you use any other RF option device that is not listed on the IBM site, all other wireless features including the integrated transmitter in your ThinkPad computer are required to be turned off.
3. Users are requested to follow the RF Safety instructions on wireless option devices that are included in the RF option device's user's manual.

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[TP Wireless Systems – Approved wireless mini-PCI Options & Additional RF Option devices receive FCC certification](#)

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Additional RF Option devices receive FCC certification for use on:

LMA (Limited Modular Approval) adapters	FCC IDs	Approved ThinkPad models	PC options allowed multiple transmission:	
			Option 1	Option 2
Cisco Aironet Wireless 802.11b	ANOU58H004	ThinkPad R32, T30, X30		
IBM High Rate Wireless LAN Mini-PCI Adapter	ANOM3AWEB56GA		O	O

Option 1: FCC ID: PI4BT-ULTRA Option Name : [Bluetooth UltraPort Module from IBM](#)

Option 2: FCC ID: PI4BT-IBM-PCII Option Name: [Bluetooth PC Card II](#)

[Solution](#)

The User's Guide of each LMA adapter in the above table has the following information in "Wireless regulatory Notice – USA Federal Communications Commission (FCC)" section:

Use of other Wireless options in your ThinkPad

This adapter is approved for simultaneous use with one or more wireless option PC Cards in the PC Card slot and USB port of your ThinkPad computer.

Please make sure of the following conditions on use of other option wireless cards.

1. Visit the IBM site at www.ibm.com/pc/qtechinfo/MIGR-43693.html and confirm the updated list of RF option devices that have been approved to cooperate with this adapter.
2. When you use any other RF option device that is not listed on the IBM site, all other wireless features including this adapter in your ThinkPad computer are required to be turned off.
3. Users are requested to follow the RF Safety instructions on other RF option devices that are included in the user's manual of each RF option device.

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