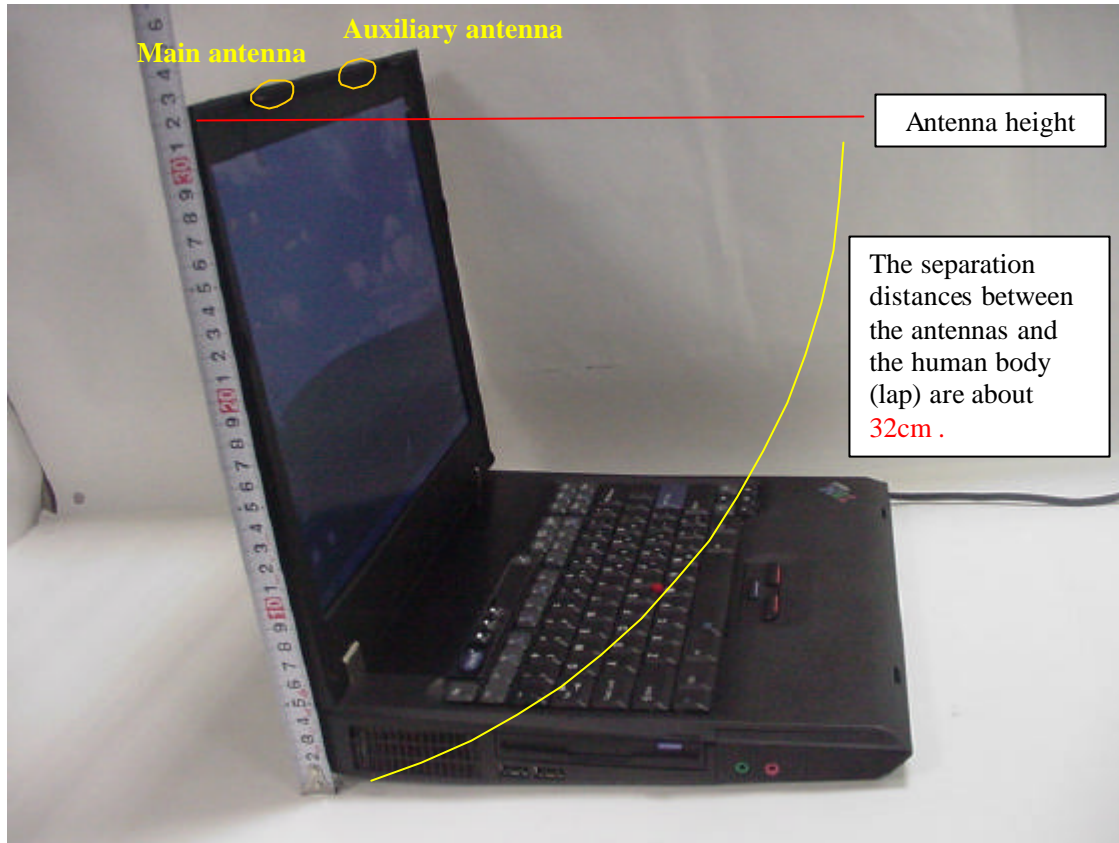


RF Exposure

1. RF Exposure evaluation for the applying transmitter

As shown in the following photo, the two inverted F-figure type antennas are built in the top LCD bezel. The separation distances between the antennas and the human body are 20cm or more. Therefore the laptop PC can be categorized as a mobile device by FCC CFR 47 Section 2.1091.



[2.4GHz band]

The highest conducted peak output power of the Test Report is 50.1 mW (17.0 dBm) and the maximum antenna gain is 0.87 dBi (See the table below "[Transmission Antenna assembly overview](#)").

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

$$\text{EIRP} = P + G = 17.0 \text{ dBm} + 0.87 \text{ dBi} = 17.87 \text{ dBm} (61.2 \text{ mW})$$

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

$$S = \text{EIRP} / (4 \pi R^2) = 0.0122 \text{ mW/cm}^2$$

[5.8GHz band]

The highest conducted peak output power of the Test Report is 45.7 mW (16.6 dBm) and the maximum antenna gain is 3.15 dBi (See the table below "[Transmission Antenna assembly overview](#)").

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

$$\text{EIRP} = P + G = 16.6 \text{ dBm} + 3.15 \text{ dBi} = 19.75 \text{ dBm} (94.4 \text{ mW})$$

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

$$S = EIRP / (4 \pi R^2) = 0.0188 \text{ mW/cm}^2$$

Since the applying laptop PC's WLAN transmitter does not function to emit the radio frequency from both diversity antennas simultaneously, the above value is the maximum RF exposure to the persons and is below the MPE limit (1.0 mW/ cm²). Therefore the laptop PC meets the MPE requirements for general Population/Uncontrolled exposure.

Transmission Antenna assembly overview

Designator	Manufacture	Antenna type	Cable type and length	Gain (dBi) Note 1)
R0222-099 Main antenna	SmartAnt Telecom Co., Ltd. (R.O.C.)	Dual Band Inverted F type Antenna	coax 570mm	2.4G Band -0.25 dBi (peak)
				5.8 G Band 3.15 dBi (peak)
R0222-100 Auxiliary antenna	SmartAnt Telecom Co., Ltd. (R.O.C.)	Dual Band Inverted F type Antenna	coax 610mm	2.4G Band 0.87 dBi (peak)
				5.8 G Band 2.11 dBi (peak)

Notes:

1a. Includes all cable losses.

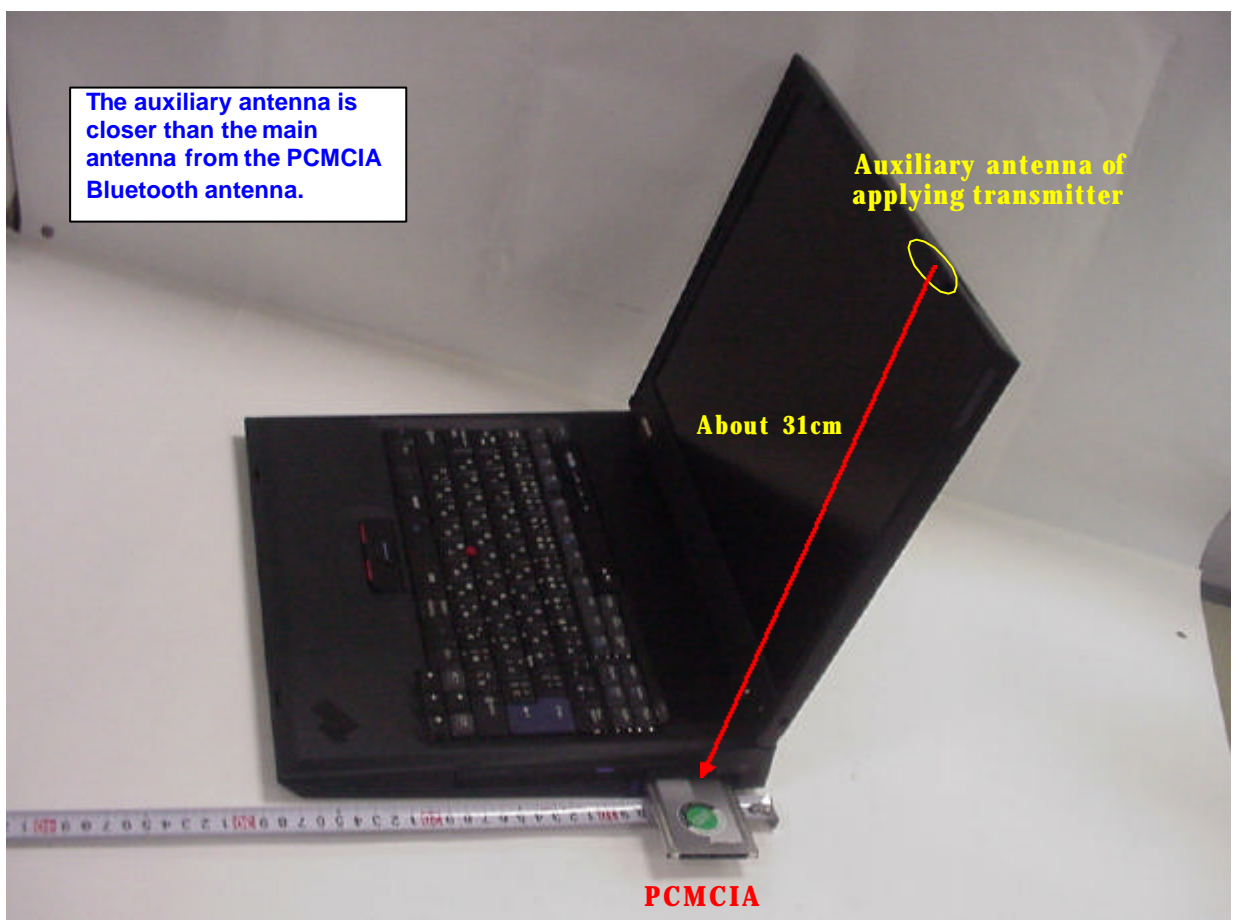
1b. Antenna type should be Omni Directional.

2. RF Exposure evaluation for Bluetooth transmitter

The applying laptop PC (ThinkPad G40 Series) supports one Bluetooth devices as follows.

	FCC ID	Grantee Name	Product Name	Granted Date	ERP in FCC Test Report
User's option	PI4BT-IBM-PCII	TDK Systems Europe Ltd.	Bluetooth PC Card II	August/21/2001	1.0mW

Interface to connect Wireless option



The main and auxiliary antennas of the applying transmitter in the LCD section are assembled apart from the Bluetooth antenna shown in the previous page with 20 cm or more distance. Therefore the RF exposure evaluation for the Bluetooth transmitter is able to be done independently of the applying antennas. In other word, a collocated SAR testing is not required.

When a customer operates the applying PC on one's lap, the sufficient separation distance (minimum 20cm) between the above Bluetooth antenna 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 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 output power of the Bluetooth transmitter in the previous table does not exceed 5mW. Therefore the transmitter also satisfy the RF exposure evaluation regarding CFR 47 Part 15.247(b)(4) without a SAR compliance test report, and can operate with the applying transmitter simultaneously.

IBM Web site guides customers about the **grant condition** related to those collaborating transmitter devices. See page 5 of this exhibit.

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

Note) The contents will be available after the product announcement.

<http://www.pc.ibm.com/qtechinfo/MIGR-44156.html>

The screenshot shows the IBM PC support website. The main heading is "TP Wireless Systems – Additional RF Option devices receive FCC certification". Below this, there are sections for "Applicable countries/regions" (United States) and "Service hints & tips". A table titled "Affected configurations" lists additional RF Option devices that receive FCC certification for use on various IBM models. The table has columns for "Pre-installed Models of IBM Dual-Band 11a/b Wi-Fi Wireless Mini PCI Adapter", "FCC IDs", and "PC options allowed multiple transmission" (with sub-columns #1, #2, and #3). The table lists four models: ThinkPad G40 Series, ThinkPad R40 Series, ThinkPad T40 Series, and ThinkPad X30 Series. The FCC ID for all listed models is ANO20020306A1L. The table also includes a link for "Other wireless pre-installed type or wireless upgradable models".

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:

Pre-installed Models of IBM Dual-Band 11a/b Wi-Fi Wireless Mini PCI Adapter	FCC IDs	PC options allowed multiple transmission		
		#1	#2	#3
ThinkPad G40 Series wireless models	ANO20020306A1L	NG	NG	○
ThinkPad R40 Series wireless models	ANO20020300D3L	○	○	○
ThinkPad T40 Series wireless models	ANO20020302R1L	○	○	○
ThinkPad X30 Series wireless models (X31, X32)	ANO20020304T2L	○	○	○

[Other wireless pre-installed type or wireless upgradable models](#)

NG: Not authorized to use by the FCC rule, nor recognized by BIOS.

FCC ID: Option card name

#1: ANO20020100MTN [IBM Integrated Bluetooth with 56K Modem](#)

#2: PI4BT-ULTRA [Bluetooth UltraPort Module from IBM](#)

#3: PI4BT-IBM-PCII [Bluetooth PC Card II](#)

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

Please make sure of the following when you use a Bluetooth option or wireless option PC Card in your ThinkPad computer.

1. Visit the IBM site at www.pc.ibm.com/qtechinfo/MIGR-44156.html 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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