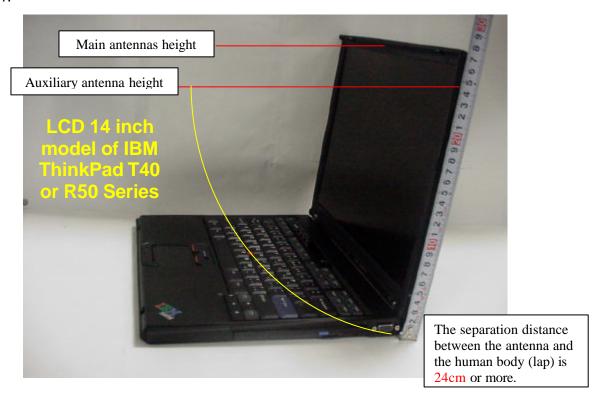
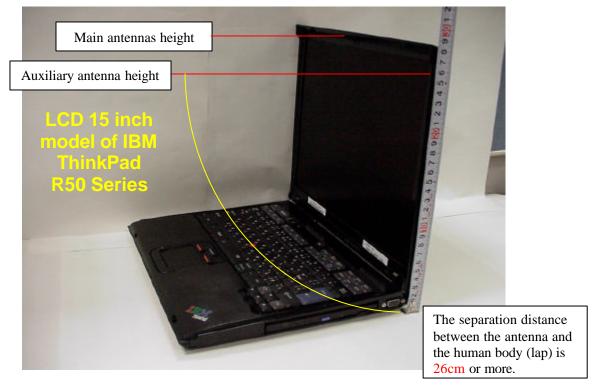
RF Exposure evaluation

Document Number: FCC 19-0264-0

1. RF Exposure evaluation for the applying LMA transmitter

As shown below, the all transmission antennas of both host PC devices (IBM ThinkPad R50 and T40 Series) are located at the upper portions of each display (LCD) section, and the separation distance between each antenna and the human body is 20cm or more. Therefore the applying LMA transmitter and each antenna system is categorized as a mobile device by FCC CFR 47 Section 2.1091.





[MPE evaluation]

The following table shows the highest conducted peak output power values of the applying modular device, and the maximum peak antenna gains of each host device.

Document Number: FCC 19-0264-0

Transmission mode	P: conducted peak output power		
2.4GHz band DSSS	R50 17.22 dBm (52.7 mW)		
	T40 17.23 dBm (52.8 mW)		
2.4GHz band OFDM	R50 16.94 dBm (49.4 mW)		
	T40 17.01 dBm (50.2 mW)		

Host PC model	G: peak antenna gain	
ThinkPad T40 Series (14")	0.99 dBi (Main antenna)	
ThinkPad R50 Series	1.84 dBi (Auxiliary antenna)	

With those results, the maximum power density at 20cm distance is calculated as follows.

IBM ThinkPad R50 Series

Transmissio n mode	EIRP = P + G (dBm)	EIRP (mW)	Max. power density $S = EIRP/(4 \times 20^2 \times \pi)$
2.4GHz band DSSS	19.06	80.6	0.0160 mW/ cm ²
2.4GHz band OFDM	18.78	75.6	0.0150 mW/ cm ²

IBM ThinkPad T40 Series

Transmissio n mode	EIRP = P + G (dBm)	EIRP (mW)	Max. power density $S = EIRP/(4 \times 20^2 \times \pi)$
2.4GHz band DSSS	18.22	66.4	0.0132 mW/ cm ²
2.4GHz band OFDM	18.00	63.1	0.0126 mW/ cm ²

Since the applying modular transmitter device does not function to emit the radio frequency from both diversity antennas simultaneously, the above results are the maximum values of RF exposure to the persons, and are far below the MPE limit (1.0 mW/cm²). Therefore the LMA transmitter meets the MPE requirements for general Population/Uncontrolled exposure.

2. RF Exposure evaluation with co-located Bluetooth transmitters

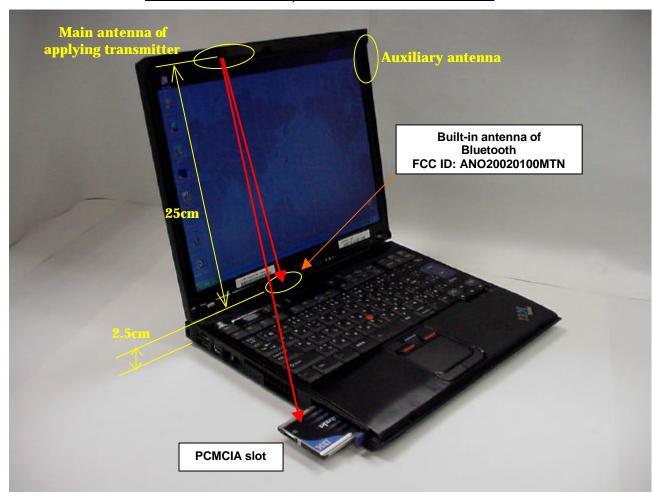
Document Number: FCC 19-0264-0

Collocated Bluetooth options for ThinkPad R50 and T40 Series

The specific laptop PC, IBM ThinkPad R50 and T40 Series support the following two kinds of Bluetooth devices.

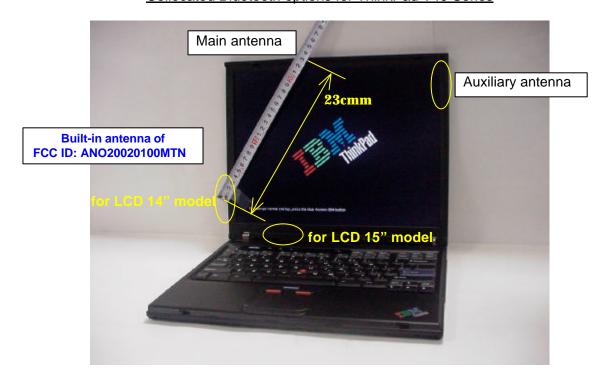
Option type	FCC ID	Grantee Name	Product Name	Granted Date	Power in Test Report
PCMCIA	PI4BT-IBM-PCII	TDK Systems Europe Ltd.	Blutooth PC Card II	August/21/2001	1.0mW
Built-in LMA Transmitter ANO20020100MTN	IBM Japan, Ltd. Blute	IBM integrated Blutooth III with 56K Modem	Feb/26/2003 (T40 14")	2.5mW	
			Sep/29/2003 (R50)		

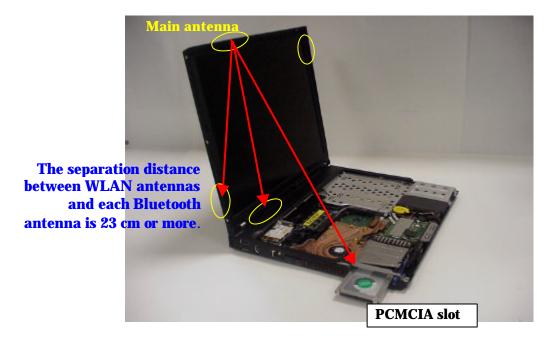
Collocated Bluetooth options for ThinkPad R50 Series



Collocated Bluetooth options for ThinkPad T40 Series

Document Number: FCC 19-0264-0





Document Number: FCC 19-0264-0

The main and auxiliary antennas located at LCD section of each host device (ThinkPad T40 Series, or R50 Series) are assembled apart from each Bluetooth antenna shown in the previous pages with 20 cm or more.

Therefore, those co-located Bluetooth transmitters are allowed to evaluate the RF exposure compliance independently of the applying modular transmitter. In other word, the SAR testing for the applying transmitter in co-locating with those Bluetooth transmitters is not required, when the Bluetooth transmitters could satisfy the RF exposure requirement with those own transmission powers.

When a customer operates the applying PC on one's lap, the sufficient separation distance (minimum 20cm) between the above Bluetooth antennas 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 total output power of the two Bluetooth transmitters in the previous table does not exceed 5mW (far below 50mW). Therefore these transmitters also satisfy the RF exposure requirement 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 provides customers the grant conditions for the co-locating use and approved co-located Bluetooth devices. See the next page.

3. IBM Web site

Note) The info for the applying LMA transmitter is not available until the product announcement.

Document Number: FCC 19-0264-0

http://www.pc.ibm.com/qtechinfo/MIGR-53286.html

