

# RF Exposure Evaluation

## 1. RF Exposure evaluation for the applying LMA transmitter

The transmission antennas of the new host PC devices (ThinkPad Z60m Series) are located at the upper portions of LCD screen section, and the separation distance between each antenna and the human body is 20cm or more. Therefore the applying LMA transmitter and the 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 the new host device.

| Transmission mode | <b>P</b> : conducted peak output power |
|-------------------|----------------------------------------|
| 2.4GHz band DSSS  | 21.96 dBm (157.0 mW)                   |
| 2.4GHz band OFDM  | 21.27 dBm (134.0 mW)                   |
| 5.8GHz band OFDM  | 24.20 dBm (263.0 mW)                   |

| Host PC model        | <b>G</b> : peak antenna gain                 |
|----------------------|----------------------------------------------|
| ThinkPad Z60m Series | 2.4GHz band 0.73 dBi (ABS Auxiliary antenna) |
|                      | 5.8GHz band 2.37 dBi (ABS Main antenna)      |

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

| Transmission mode | EIRP = P + G (dBm) | EIRP (mW) | Max. power density<br>$S = \text{EIRP} / (4 \times \pi \times 20^2)$ |
|-------------------|--------------------|-----------|----------------------------------------------------------------------|
| 2.4GHz band DSSS  | 22.69              | 185.8     | <b>0.0370</b> mW/ cm <sup>2</sup>                                    |
| 2.4GHz band OFDM  | 22.00              | 158.5     | <b>0.0315</b> mW/ cm <sup>2</sup>                                    |
| 5.8GHz band OFDM  | 26.57              | 454.0     | <b>0.0904</b> mW/ cm <sup>2</sup>                                    |

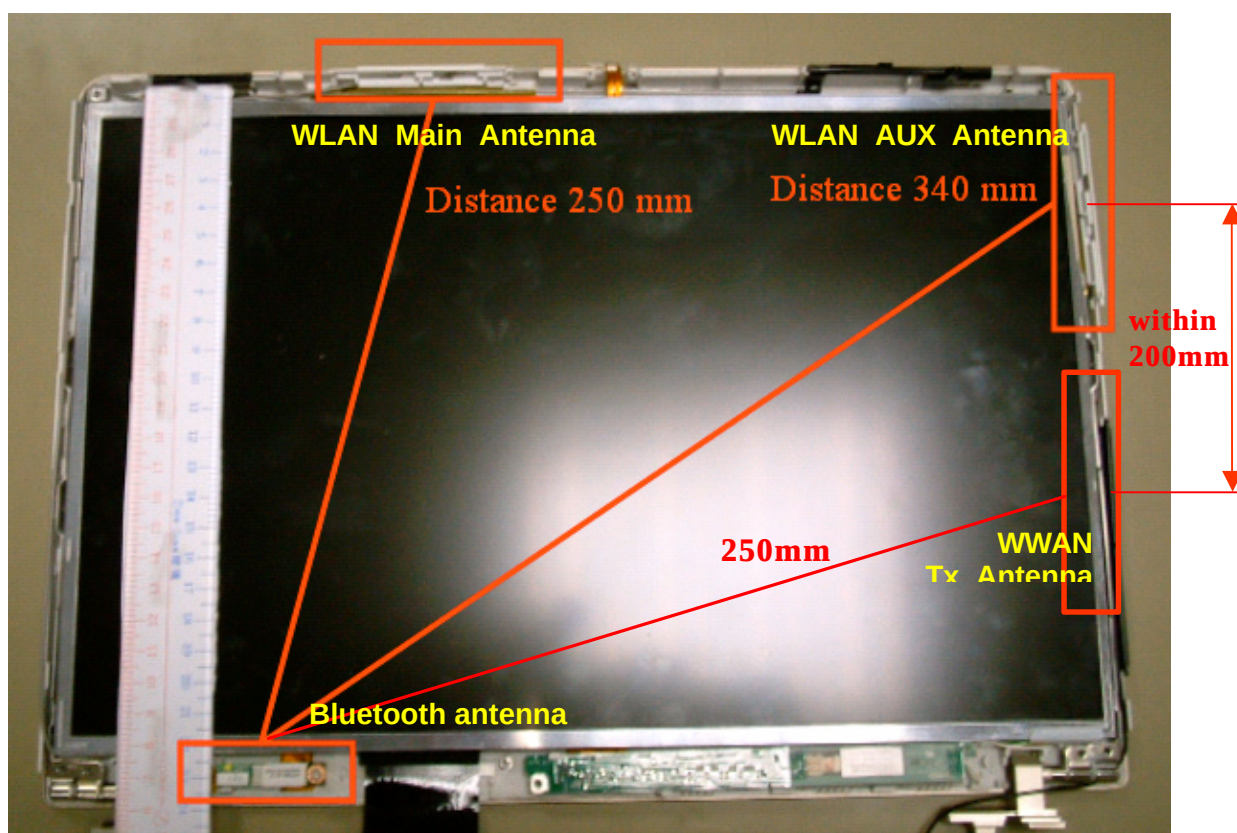
Since the applying modular transmitter device does not function to emit the radio frequency from both diversity antennas simultaneously, the above results are the maximum values of RF exposure to the persons, and are far below the MPE limit (1.0 mW/cm<sup>2</sup> ). Therefore the LMA transmitter meets the MPE requirements for general Population/Uncontrolled exposure.

## 2. RF Exposure evaluation with co-located transmitters

The applying LMA device (FCC ID: S2L20040601CX2) can co-locate with the following two transmitters in the Lenovo laptop PC, ThinkPad Z60m Series.

| Option type                  | FCC ID     | Grantee Name                     | Product Name                               | Granted Date     | Conducted Tx power |
|------------------------------|------------|----------------------------------|--------------------------------------------|------------------|--------------------|
| Modular Approval Transmitter | MCLJ07H081 | HON HAI Precision Ind. Co., Ltd. | ThinkPad Bluetooth with Enhanced Data Rate | June/ 23 / 2005  | 0.003W             |
|                              | N7N-NC5720 | Sierra Wireless Inc.             | WWAN EVDO Adapter                          | August/ 18/ 2005 | 0.964W             |

The photo shows the separation distances between each antenna.



Since the Bluetooth antenna is assembled apart from the other WWAN and WLAN antennas with 25 cm or more, the co-located Bluetooth transmitter is allowed to evaluate the RF exposure compliance independently of other transmitter devices.

The output power of the Bluetooth transmitter is 3mW, so it satisfies the RF exposure requirement regarding CFR 47 Part 15.247(b)(4) without a SAR compliance test report, pursuant to the footnote 14 of the Section 3 in Supplement C to OET Bulletin 65.

Also, the WWAN transmitter was already certified as a “Portable device” with SAR testing in co-locating with the applying transmitter.

Therefore the all three transmitters satisfy the RF exposure requirement, and can operate simultaneously.