

F5521gw Module Installation and Collocation Guidelines for Lenovo Portable Host Devices

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Model: F5521gw™

**ERICSSON AB
Lindholmspiren 11
Gothenburg SE-417 56
Sweden**

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1 Introduction

This document provides module and antenna installation and collocation guidelines for Lenovo tablet computer model TP00019A to be authorized for use with the **F5521gw™** module in accordance with the Supplement Note to FCC KDB 616217.

The following installations for **Portable** host configurations are addressed in this document.

- 1) The **F5521gw™** module can be installed as a standalone transmitter in a Portable notebook/netbook or Tablet ([hereafter called Portable notebook](#)) meeting the following conditions:
Portable notebooks that meet the technical parameters are defined in Section 2 and Section 3. These parameters define the Portable notebook configuration used as the baseline host to evaluate SAR. Alternatively, a more conservative host approved through a Class II Permissive change can also be referenced as the conservative baseline where new Portable notebooks with **greater antenna separation distance** or **lower SAR** can be included.
- 2) Allow the host device collocated transmission with the **F5521gw™** module approved under FCC ID: **VV7-MB MF5521GW1**. The collocated transmitters must meet the technical requirements defined in Section 3.
- 3) Allow end-user installation provided module/notebook Two-Way Authentication has been addressed so that modules can only be activated in approved notebooks.

Other configurations not specifically described in this document maybe authorized through coordination with **Ericsson AB** to verify that all technical requirements defined in Supplement Note to FCC KDB 616217 or other relevant FCC specifications are adequately addressed.

The installation and collocation guidelines are applicable only for Tablet computers where WWAN and collocated antennas are located in the keyboard section or display portion of a Tablet computer where SAR evaluation is completed with the proper antenna separation distance to the keyboard or display antenna as defined in KDB 616217 and Section 4 of KDB 447498.

Any collocated transmitter or antenna that does not meet the technical requirements defined in this document requires a Class II permissive change to authorize simultaneous transmission.

2 Host Installation Guidelines

This section defines host installation limitations for Portable notebooks. Supporting RF exposure information is located in Section 4.

2.1 Label Requirements

The FCC and Industry Canada IDs must be permanently affixed on the exterior of the Portable notebook or readily accessible under a panel or battery pack of the host device that cannot be separated from the host device itself.

2.2 Portable Hosts (WLAN antenna to user separation distance <20cm)

The **F5521gw** module can be installed for use in any authenticated Portable notebook device with the WLAN antenna limitations defined in Table 1 in Section 3.

2.3 End User Installation

Two-way authentication documentation must be submitted as part of a Class II permissive change allowing end-user installation into Portable notebooks that utilize the method of authentication.

3 Collocated Installation Guidelines

Collocated transmitters can be operated simultaneously with the **F5521gw** module, provided the technical parameters listed in Table 1 are maintained and the information specified in Section 4 is on file. A Class II permissive change is required if the host device does not meet the requirements specified in Table 1 and in section 6.

Table 1 Host Device Limitations

Parameter	Requirement	RF Exposure Justification	Co-location Guide sanction in this document
Device type	Tablet		
Display size	Any		
WWAN Antenna locations	Display		
Tablet display orientation	Secondary Landscape orientation is disabled.		
Exterior Display Material	Any		
WWAN module location	Anywhere		
Maximum WWAN SAR	1.180 mW/g (1g)	Supplement to KDB 616217 D03 Section 4	Section 5
Minimum WWAN to User Distance	15 mm	Supplement to KDB 616217 D03 Section 4	Section 5
Minimum Portable Collocated Transmitter SAR	0.420mW/g (1gram)	Supplement to KDB 616217 D03 Section 4 KDB 447498 D01 Section 3	Section 6.1
Collocated Bluetooth Transmitter	<ul style="list-style-type: none"> ● $P \leq 60/f(\text{GHz})$ ● Antenna-to-antenna or antenna-to-person distance $\geq 5\text{cm}$ 	KDB 616217 D01 Table-2 KDB 447498 D01 Section 3	
Distance to external USB ports	> 5cm	Supplement to KDB 616217 D03 Section 2	

Other devices may be approved as collocated transmitters, provided the technical requirements of KDB 616217 are satisfied.

4 Documentation Requirements

The following documentation must be kept on file to allow simultaneous transmission. A Class II permissive change is required if the technical requirements of KDB 616217 cannot be met.

- List of all collocated transmitters with FCC and IC IDs
- Verification that all WWAN and WLAN antennas are >5cm from external USB, PCMCIA or other notebook I/O ports that support an external plug-in transmitter.
- Drawings showing antenna locations and separation distances
- Antenna types with respective dimensions and far field antenna gains
- Specific module to antenna RF coaxial cable losses
- RF exposure analyses demonstrating compliance with Section 4) of KDB 616217 as shown below

4) For each simultaneous transmission configuration identified in 1), if the conditions in a) or b) below are satisfied and fully documented in the SAR report or Class I permissive change documentation, simultaneous transmission SAR evaluation is not required for that configuration¹²

- a) when the $[(\sum \text{ of the highest measured 1-g SAR for each portable transmitter/antenna included in the simultaneous transmission configuration}) / 1.6 \text{ W/kg}] + \sum \text{ of } [(\text{the highest MPE for each mobile transmitter/antenna included in the simultaneous transmission configuration}) / (\text{the corresponding MPE limit})] < 1$; or
- b) for antennas included in the simultaneous transmission configuration that require SAR evaluation, when the separation distance between each antenna pair is
 - i) greater than $5 \cdot [(\text{SAR}_1 + \text{SAR}_2) / 1.6]^{1.5}$ cm, rounded to the nearest cm, and
 - ii) the $\sum \text{ of } [(\text{the highest MPE for each mobile transmitter/antenna included in the simultaneous transmission configuration}) / (\text{the corresponding MPE limit})] < 1$

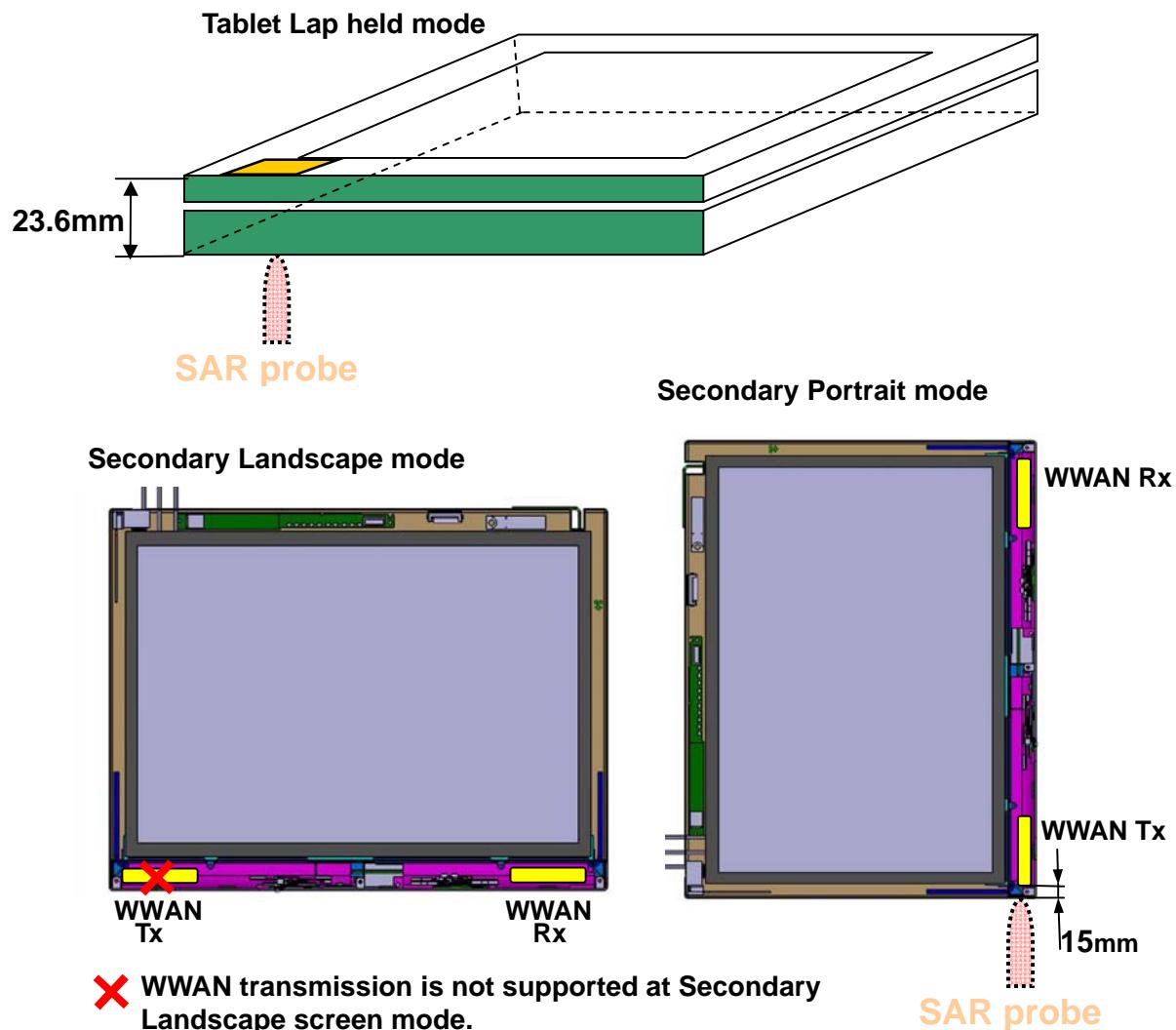
where: \sum in a) excludes antennas that do not require SAR evaluation, and
MPE does not apply to displays < 10" diagonal for both a) and b)

5 Individual WLAN SAR Evaluation

Portable RF exposure evaluation has been completed based on SAR measurements on the Portable notebook computer (Lenovo Model: TP00019A) that provided **1.5 cm** of separation distance between the WWAN antenna and the end user as illustrated in Figure 1. The measured 1-g SAR for the WWAN configuration was **1.180 mW/g** (1g) as reported in the Class II Permissive Change application.

New Portable notebooks with **greater antenna separation distance or lower SAR** are covered under this C2PC filing.

Figure 1 Antenna Locations



6 Simultaneous RF Exposure Evaluation Guidelines For Collocated Transmitters

6.1 Portable Hosts: Sum of Total SAR < SAR Limit

A portable collocated transmitter can be operated simultaneously with the **F5521gwTM** WWAN transmitter provided the individual SAR results for the portable collocated transmitter are less than the value specified below based on Section 4)a) of the Supplement to KDB 616217. The maximum individual SAR value is calculated based on the WWAN 1-g SAR of **1.180** mW/g.

$$\frac{\text{SAR}_{\text{WWAN}}}{1.6} + \frac{\text{SAR}_{\text{collocated}}}{1.6} < 1$$

$$\text{SAR}_{\text{collocated}} < 1.6 - \text{SAR}_{\text{WWAN}}$$

$$\text{SAR}_{\text{collocated}} < 1.6 - 1.180$$

$$\text{SAR}_{\text{collocated}} < 0.420 \text{ mW/g}$$

6.2 Portable Hosts Max Collocated SAR vs. Distance

If the summation of SAR exceeds the FCC limit, collocation is permitted provided the minimum allowable separation distance derived from the equation below is satisfied. An alternate equation provides the maximum collocated SAR based on a specified separation distance as defined in section 4. b) ii) of the Supplemental note of KDB 616217.

$$5 \times \left(\frac{\text{SAR}_{\text{WWAN}}}{1.6} + \frac{\text{SAR}_{\text{collocated}}}{1.6} \right)^{1.5} < \text{antenna-to-antenna distance (cm)}$$

$$\text{SAR}_{\text{collocated}} = 1.6 \times \left(\frac{\text{antenna-to-antenna distance}}{5} \right)^{2/3} - \text{SAR}_{\text{WWAN}}$$