

Integration Guidelines for Generic SAR

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1 Integration Guidelines to Enable Utilization of Generic SAR Approach

The Integration Guidelines document explains the specific details of F5521gw module's integration into host device for it to meet the requirements of and to be applicable for utilization of Generic SAR Approach.

1.1 Introduction

Generic Specific Absorption Rate (SAR) Approach defines generic requirements for portable RF exposure compliance of radio transmitter modules that can be implemented in host products.

NOTE: Changes in the configurations indicated in this application and final compliance of the host device + modules composite system may violate equipment authorization.

This document provides module and antenna installation and collocation guidelines for a notebook/netbook computer to be authorized for use with the F5521gw module in accordance with the Supplement Note to FCC KDB 616217.

1.1.1 Host installation information

The following installations for Portable host configurations are addressed in this document. The F5521gw module can be installed as a standalone transmitter in a Portable notebook/netbook (hereafter called Portable notebook) meeting the following conditions:

Portable notebooks that meet the technical parameters are defined in Section 2. These parameters define the Portable notebook configuration used as the baseline to evaluate SAR.

If the installation is not equivalent or if the SAR value is higher than the value in section 2, table 1, then the installation will need to be covered by a C2PC.

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.

1.1.2 Collocated transmitter information

To allow the host device collocated transmission with the F5521gw module approved under FCC ID: VV7-MBMF5521GW1. The collocated transmitters must meet the technical requirements defined in Section 2.

The installation and collocation guidelines are applicable only for Notebook/Netbook computers where WWAN and collocated antennas are located in the display portion of a Notebook/Netbook 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.

2 Host Installation Guideline Requirements

This section defines host installation limitations for Portable notebooks. Supporting RF exposure information is located in Section 3

2.1 Portable Hosts (WWAN antenna to user separation distance 0 to 20cm)

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

If the installation is determined to be equivalent then a C1PC is enough to show compliance.

New Portable Notebooks using the exact same antennas is covered under this C2PC filing.

Table 1 Host Device Limitations

Parameter	Requirement	RF Exposure Justification	Co-location Guide sanction in this document
Device type	Notebook/Netbook		
Display size	Any		
WWAN Antenna locations	Top or Side of Display		
Exterior Display Material	Any		
WWAN module location	Anywhere		
Minimum WWAN Antenna cable loss	0.34 dB (1800/1900/2100) 0.20 dB (850/900)		
WWAN Antenna type	Type PIFA (IFA) 1) Direct feed (Normal PIFA) 2) Coupling PIFA (using two sides of a PCB)		
Maximum WWAN SAR	0.353 W/Kg (1g)	Supplement to KDB 616217 D03 Section 4	Section 2.3
Minimum WWAN Antenna to User Distance	40 mm	Supplement to KDB 616217 D03 Section 4	Section 2.3

2.2 Host with Collocated transmitter

Collocated transmitters can be operated simultaneously with the **F5521gw** module, provided the technical parameters listed in Table 2 are maintained.

Table 2 Collocated Host Device Limitations

Parameter	Requirement	RF Exposure Justification	Co-location Guide sanction in this document
Portable Collocated Transmitter SAR	1.247 W/Kg (1gram)	Supplement to KDB 616217 D03 Section 4 KDB 447498 D01 Section 3	Section 4
Collocated Bluetooth Transmitter	<ul style="list-style-type: none"> ● $P \leq 60/f(\text{GHz})$ [mW] ● Antenna-to-antenna or antenna-to-person distance $\geq 5\text{cm}$ 	KDB 616217 D01 Table-2 KDB 447498 D01 Section 3	
Distance from Antenna to external USB ports	> 5cm	Supplement to KDB 616217 D03 Section 2	

2.3 Documentation Requirements

The following documentation must be kept on file by the applicant to allow Generic SAR approach with or without simultaneous transmission. A Class II permissive change is required if the technical requirements of KDB 616217 cannot be met.

- 1) List of all collocated transmitters with FCC and IC IDs
- 2) 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.
- 3) Drawings showing antenna locations and separation distances
- 4) Antenna types with respective dimensions and far field antenna gains
- 5) Module and Antenna installation including grounding and ground plane.
- 6) Specific module to antenna RF coaxial cable losses
- 7) RF exposure analysis 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)

3 Individual WWAN SAR Evaluation

Portable RF exposure evaluation has been completed based on SAR measurements on the Portable notebook computer that provided **4 cm** of separation distance between the WWAN antenna and the end user as illustrated in the Test reports.

The measured 1-g SAR for the WWAN configuration was 0.353 mW/g (1g) as reported in the Class II Permissive Change application.

3.1 Description of test setup.

Two antenna types, PIFA direct feed and PIFA Coupling feed was tested in to positions on a ground plane that simulate a 10" netbook display. (Picture 1)

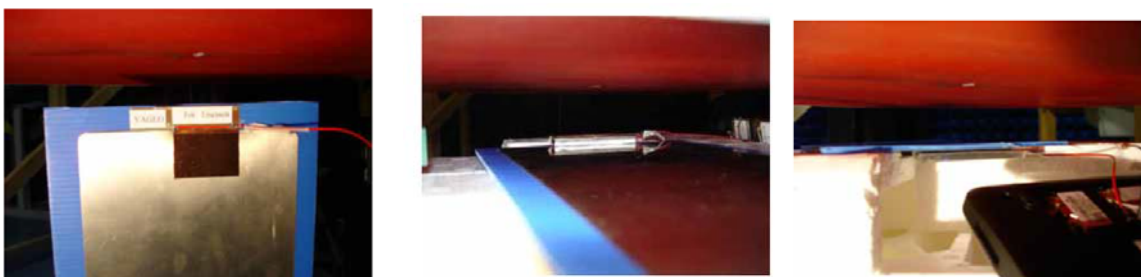
The antennas are assumed to be mounted on the long side or the short side of the display. The antennas are tuned to the position were it is mounted.

The antennas were measured in three different directions, Front, Top and Rear for both long side and short side mounted antennas. (Picture 2 and 3)

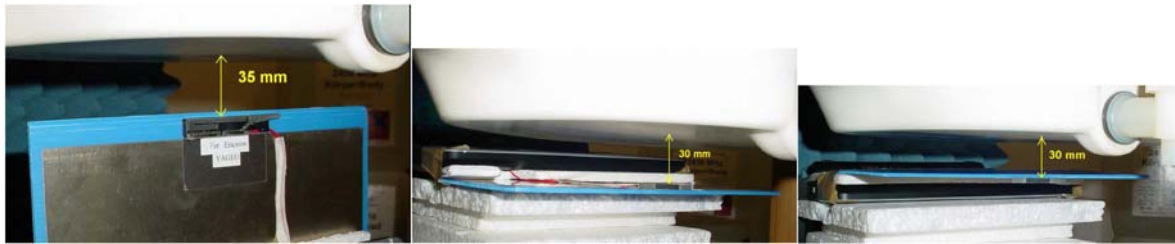
The Test reports are available at FCC (Ref. 3)



Picture 1 Test objects 1,2,3,4



Picture 2 Test direction showed for test object 3



Picture 3 Test direction showed for test object 2

4 Simultaneous RF Exposure Evaluation Guidelines For Transmitters

Portable Hosts: Sum of Total SAR < SAR Limit

A portable collocated transmitter can be operated simultaneously with the **F5521gw** 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 **0.353** mW/g.

$$\frac{SAR_{WWAN}}{1.6} + \frac{SAR_{collocated}}{1.6} < 1$$

$$SAR_{collocated} < 1.6 - SAR_{WWAN}$$

$$SAR_{collocated} < 1.6 - 0.353$$

$$SAR_{collocated} < 1.247 \text{ mW/g}$$

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 alternative 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.

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

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

5 Other Host configurations

Other configurations not specifically described in this document may be 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.

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.



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

6 Additional Regulatory Information

The Mobile Broadband module must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product. The device manufacturer is not responsible for any radio or television interference caused by unauthorized modification of the devices included with the Mobile Broadband, or the substitution or attachment of connecting cables and equipment other than that specified by the device manufacturer. The correction of interference caused by such unauthorized modification, substitution or attachment is the responsibility of the user. The device manufacturer and its authorized resellers or distributors are not liable for any damage or violation of government regulations that may arise from the user failing to comply with these guidelines.

6.1 European Union, EU Declaration of Conformity

European Union, R&TTE Compliance Statement

Hereby, the device manufacturer declares that this Mobile Broadband device is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

6.2 United States, FCC Notices

Instructions to the user:

If using a permanently affixed label, the modular transmitter must be labeled with its own FCC identification number, and, if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: VV7-MBMF5521GW1" or "Contains FCC ID: VV7-MBMF5521GW1." Any similar wording that expresses the same meaning may be used.

End user installation

If end user installation shall be used then 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. In case of end user installation the FCC ID must be on the module but does not necessarily need to be readily visible when installed because it is assumed that the FCC ID is viewable when the user installs it or is viewable when the end user takes it out. In such a case, the PC integrator needs to supply the end user with a specific Integration guide for the user installation.

Interference Statement:

This device complies with Part 15 of the Federal Communications Commission (FCC) Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested to, and found to be within the acceptable limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates radio frequency energy and is designed for use in accordance with the manufacturer's user manual. However, there is no guarantee that interference will not occur in any particular installation. If this equipment causes harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and the receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/television technician for help

Note: This Mobile Broadband device must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product. Any other installation or use will violate FCC Part 15 regulations. Modifications not expressly approved by the device manufacturer could void your authority to operate the equipment.

7 References

1) FCC supplement to KDB 616217

<https://apps.fcc.gov/kdb/GetAttachment.html?id=35720>

2) KDB 447498 D01

<https://www.pctesttcb.com/pctest/Mobile%20and%20Portable%20Devices%20Dec%202007.pdf>

3) FCC test reports of WWAN SAR evaluation

https://fjallfoss.fcc.gov/oetcf/eas/reports/ViewExhibitReport.cfm?mode=Exhibits&RequestTimeout=500&calledFromFrame=N&application_id=982261&fcc_id=VV7-MBMF5521GWI

4) FCC KDB 616217

<https://apps.fcc.gov/oetcf/kdb/forms/FTSSearchResultPage.cfm?switch=P&id=33240>

8 Terminology and Abbreviations

C2PC

Class two permissive change
Application to FCC under
modular grant