



Title: SAR Evaluation Considerations for Notebook/Netbook and Laptop Computers Supplement to KDB 616217

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Comments;

As informed by FCC during Oct. 2009 TCBC workshop, modular manufacturers and host integrators should consider the published KDB 616217 and KDB 447498 to minimize number of Class II permissive change and change in identification filings. In particular, **KDB 616217 page 9** "Other Consideration" Identical transmitter and antenna configurations deployed in the same display screen of different laptop computer models are covered under the same equipment certification. Additional approval is not required. When changes in material or construction are > 5 cm from any part of an antenna, new test data and permissive change filings are not required. If one or more antennas are shifted from their originally approved locations and the same or larger antenna-to- antenna and antenna-to-user separation distances are maintained, except when the previously measured SAR for either independent or simultaneous transmission is > 75% of the SAR limit and the new configurations also require testing, new test data and permissive change filings are also not required. When other test requirements and approval policies are applicable to an individual transmitter or antenna, they should be considered in conjunction with the laptop computer SAR procedures; for example, certain modular approval and unique antenna considerations relating to unlicensed transmitters. And KDB 447498 section 2)a)i): i) A device may be used in portable exposure conditions with no restrictions on host platforms when either the source-based time-averaged output power is $\leq 60/f(\text{GHz})$ mW or all measured 1-g SAR are < 0.4 W/kg.10 When SAR evaluation is required, the most conservative exposure conditions for all expected operating configurations must be tested. Section 2)a)ii): ii) A device may be approved for use in multiple host platforms, each with similar family attributes, for example, PDA, laptop and tablet computers, when each host platform is tested in the most conservative exposure conditions and the 1-g SAR is < 0.8 W/kg for all configurations.

As indicated above quoted KDB 616217 and KDB 447498, modular manufacturers and host integrators should be able to reduce number of Class II permissive change and change in identification filings but rarely above quoted procedures are been followed and utilized. By discussing with modular manufacturers and host integrators, the primary reasons are:

1. Not comfortable in exercising regulatory compliance decision without the grant of equipment authorization.
2. The liabilities in achieving continuous compliance and market surveillance consequences.



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- 38 3. Miss-informed by regulatory test lab and/or TCBs either due to lack of understanding of
39 published KDB procedures or due to commercial reasons.
- 40 4. Reduce number of label SKU
- 41 5. Establishing a regulatory compliance folder for each host integrator.
- 42 6. Prevent FCC ID number to be locked by specific configuration/host integrator due to FCC filing is
43 required.
- 44 7. Confidentiality of host configuration is maintained.
- 45 Draft KDB 616217 provides additional clarification and compliance requirements to the modular
46 manufacturers and host integrators. However, in order to provide a clear guideline for module
47 manufacturers and Host integrators, CCS prepared the following informative procedure for module
48 manufacturers and host integrator for their reference.

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Informative Procedure document for module manufactures

1. Initial / Original application planning:

a. Mobile approval condition per section 2.1091

i. Shall gather all possible antenna types and antenna gain information by providing the following information:

1. Antenna report which including antenna type, antenna gain for each of applicable frequency band, mechanical drawing to show the overall constructions of antenna element, antenna cable length used during the antenna gain measurement and its cable loss.

2. Provide photographs for each of antenna type.

ii. Define the possible host platforms (Netbook PC, Notebook PC, tablet PC) that such module will be adapted by host integrators.

iii. Identify all possible co-located radio modules that host integrator may be used.

iv. Provide antenna location diagram within each host platform with the following information

1. Antenna-to-antenna separation distance
2. Antenna-to-user separation distance (for Netbook/notebook/laptop platform)
3. Antenna-to-edge of display section in all orientation (for tablet PC)
4. Identify TX antenna and receiving only antenna on the diagram
5. Identify the antenna cable routing path within the host

v. EMC portion of evaluation

1. EMC shall be evaluated based applicable technical requirements with test configuration complies with section 15.212 to qualify as single modular approval. If one or more conditions as required in section 15.212 cannot be met, limited single modular approval shall be applied.

vi. SAR portion of evaluation

1. Netbook/Notebook/Laptop platform



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- 79 a. Netbook/notebook/laptop is classified as single platform. It is
80 not necessary to evaluation the most of conservative antenna-
81 to-user separation distance in Netbook, Notebook or Laptop
82 separately.
- 83 b. In order to provide the most conservative antenna-to-user
84 separation distance, it is suggested such separation distance
85 shall be chosen as short as possible. Based upon KDB 447498,
86 section 2)a)ii), the highest measured SAR value shall be less
87 than 0.8 W/kg. Based upon the SAR evaluation experiences, if
88 the antenna-to-user separation distance is greater than 5 cm,
89 the highest measured SAR shall be less than 0.8 W/kg. If
90 measured SAR value is above 0.8 W/kg at given separation
91 distance, it is recommended to increase separation distance
92 with 0.5 cm increment until the highest SAR value is less than
93 0.8 W/kg.
- 94 c. Antenna cable routing path shall be placed in a typical
95 configuration which will be implemented by most of host
96 integrator.
- 97 d. Material surrounding the transmitting antenna shall be typical
98 type which will be used by most of host integrator.
- 99 e. Once the highest SAR evaluation at the most conservative
100 antenna-to-user separation distance, additional enhanced
101 energy coupling investigation with 0.5 cm incremental on the
102 separation distance until the measured single point SAR value is
103 50% less than the highest measured SAR value.

104 2. Tablet Computer platform

- 105 a. The procedure for evaluating tablet computer is documented in
106 KDB 447498, section 4.
- 107 b. Tablet computer is typically capable of five user-selectable
108 positions. 1) Primary landscape /laptop mode, 2) primary
109 portrait mode, 3) secondary landscape mode, 4) secondary
110 portrait mode, 5) tablet lap-held mode. Assume the antenna is
111 located on the top edge of LCD screen; secondary landscape
112 mode will be representing the worst SAR condition.



c. Typically, if the antenna to the edge of screen is less than 1 cm thus it is very difficult to comply with 0.8 W/kg platform requirements. Most of tablet computer manufacturers will disable certain screen orientations to comply SAR requirements. Thus, any special firmware controlled screen orientation shall be taken into consideration when selecting tablet platform.

vii. OEM/ODM instructions to utilize the most conservative SAR assessment without additional EMC/SAR evaluation and permissive change filing

USA-Federal Communications Commission (FCC)

FCC Radio-Frequency Exposure & Approval Conditions:

1. Antennas must be installed in the display section of Netbook/notebook/laptop computer to provide at least XX cm separation distance from the transmitting antenna to the body of user during normal operating condition.
2. Transmitting antenna(s) can only be installed at the display section of computer. When this device is installed other than notebook computers, at least 20 cm separation distance shall be maintained between the transmitting antenna(s) to the body of user or nearby person.
3. The antenna(s) used for this transmitter must not be collocated or operating in conjunction with any other antenna or transmitter within a host device, except in accordance with FCC multi-transmitter product procedures.
4. Only those antennas with same type and lesser gain filed under this FCC ID number can be used with this device.
5. The Host user manual must include an FCC user guide statement detailing that the antenna position is in the screen and at an antenna-to-body position of YY cm during normal operation.
6. The regulatory label on the final system must include the statement: "Contains FCC ID: XXXXXX "or using electronic labeling method as documented in KDB 784748.
7. The final system integrator must ensure there is no instruction provided in the user manual or customer documentation indicating how to install or remove the transmitter module except such device has implemented two-ways authentication between module and the host system.
8. The final host manual shall include the following regulatory statement:
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instructions, it may cause harmful interference to radio communications. However, there is no guarantee that



interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by tuning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

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

This device complies with Part 15 of the 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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

viii. Grant Conditions:

1. Power output listed is conducted. The antenna(s) used for mobile exposure conditions of this device must be installed to provide a separation distance of at least 20 cm from all persons. This device has been evaluated with most conservative antenna-to-body separation distance XX cm to simulate the antenna positioned in the display section of Netbook/notebook/laptop computer. When this module is installed in the tablet computer, antenna-to-user separation distance must be at least QQ cm and antenna-to-edge must be separated by more than ZZ cm. Secondary landscape display orientation must be disabled by firmware. This module can be used with Netbook/notebook/laptop/tablet computers with substantially similar physical dimensions, construction, and electrical and RF characteristics. Compliance of this device in all final host configurations is the responsibility of the Grantee. This device must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures.. End-users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance. Highest measured near-body @ XX cm SAR value as documented in this filing is 0.XX W/kg for Netbook/notebook/laptop platform. Highest measured near-body @ QQ cm from user and ZZ cm from the edge of tablet screen is 0.YY W/kg.

2. Module has made Class II permissive change filings based upon multiple specific hosts



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- 192 a. Module manufacturer shall file additional Class II permissive change filing to document
193 the most of conservative SAR evaluation for each of platform
194 (Netbook/notebook/laptop and tablet PC).
- 195 b. Module manufacturer shall assess all the previous SAR evaluation performed and
196 provide a list of summary based upon host platform, antenna-to-user separation
197 distance and highest measured SAR evaluation in individual host.
- 198 c. Module manufacturer shall provide a revised OEM/ODM instructions based upon the
199 most conservative RF exposure evaluation.
- 200 d. Module manufacturer shall provide a Class II permissive change cover letter by quoting
201 the applicable KDB sections to justify platform approval.
- 202 e. Submit the SAR test report which is used to show the most conservative antenna-to-
203 user separation distance.
- 204 f. Perform additional enhanced energy coupling tests with 0.5 cm increment.
- 205 g. Submit antenna location diagram
- 206 h. Submit internal photos to show the mechanical design around the transmitting antenna.
- 207 i. If there is no other changes have been made based upon permissive change KDB 178919,
208 no additional EMC or SAR evaluation is required for this Class II permissive change filing.