



**Federal Communications Commission  
Office of Engineering and Technology  
Laboratory Division**

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**GUIDANCE FOR MODULAR TRANSMITTER INSTRUCTION MANUALS  
AND TCB CERTIFICATION APPLICATION REVIEWS**

**1.0 INTRODUCTION**

The purpose of this document is to provide guidance to grantees (applicants) seeking to certify a modular transmitter (module) and the key elements to be reviewed by a Telecommunication Certification Body (TCB) during the certification process.<sup>1</sup> This guidance includes:

- the integration instructions to be provided by a grantee (applicant) to a host manufacturer;
- a list of key elements to be reviewed by a TCB during the certification process; and
- guidance for grant comments to be included on the grant of certification.

**2.0 INTEGRATION INSTRUCTIONS**

**2.1 General**

Sections 2.2 through 2.12 describe the items that must be provided in the integration instructions for host product manufacturers (e.g., OEM instruction manual) to use when integrating a module in a host product. Modular transmitter applicants should include information in their instructions for all these items indicating clearly when they are not applicable. For example, information on trace antenna<sup>2</sup> designs could indicate “not applicable.” This framework simplifies a TCB’s review process by providing a clear process for reviewing a modular transmitter certification application.

If the modular transmitter is only approved for use by the grantee in its own products and not intended for sale to third parties, the integration instructions may not be detailed but this must be declared in the filing. In that case, it is permitted to place the instructions in the theory-of-operation exhibit folder using long-term confidentiality. The applicant must include a statement in the filing that the module is not for sale and the user manual integration instructions are internal confidential manufacturing documents. The grant of certification for such a modular transmitter must be limited.

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<sup>1</sup> A TCB shall review the certification application, including integration instructions, for completeness. For example, a filing for a single-chip module that submits only a data sheet would not be sufficient. Also, instructions that do not clearly indicate the specific parts or items necessary for compliance to the FCC requirements would also be inadequate. If the grant conditions are such that the module cannot be sold to other manufacturers then the integration instructions can be placed in the theory of operation exhibit, which can be treated as long term confidential.

<sup>2</sup> Integration instructions for trace antenna design are required only when the module can use a trace antenna.

## **2.2 List of applicable FCC rules**

List the FCC rules that are applicable to the modular transmitter. These are the rules that specifically establish the bands of operation, the power, spurious emissions, and operating fundamental frequencies. DO NOT list compliance to unintentional-radiator rules (Part 15 Subpart B) since that is not a condition of a module grant that is extended to a host manufacturer. See Section 2.10 below concerning the need to notify host manufacturers that further testing is required.<sup>3</sup>

## **2.3 Summarize the specific operational use conditions**

Provide all the restrictions imposed by the specific rule(s), that extend to host's and any other notices or regulatory statements require in host's end-user manual. For example, the rule that restricts use to indoor operation, not operated on aircraft, etc.

Also describe conditions that are applicable to the modular transmitter, such as including for example any limits on antennas. For example, if point-to-point antennas are used that require reduction in power or compensation for cable loss, for professional installed equipment, then this information must be in the instructions. In addition, certain information may also be needed, such as peak gain per frequency band and minimum gain, specifically for master devices in 5 GHz DFS bands.

## **2.4 Limited module procedures**

The Grantee of a limited module must file with the application for certification a procedure[6] that describes the proposed method used to ensure host compliance when the limited module is installed in the host product.

If a modular transmitter is approved as a “limited module,” then the module manufacturer is responsible for approving the host environment that the limited module is used with. The manufacturer of a limited module must describe, both in the filing and in the installation instructions, the alternative means that the limited module manufacturer uses to verify that the host meets the necessary requirements to satisfy the module limiting conditions.

A limited module manufacturer has the flexibility to define its alternative method to address the conditions that limit the initial approval, such as: shielding, minimum signaling amplitude, buffered modulation/data inputs, or power supply regulation. The alternative method could include that the limited module manufacturer reviews detailed test data or host designs prior to giving the host manufacturer approval. The Grantee can devise a strategy to be approved through a Pre-Approval Guidance (KDB Publication 388624 PAG item MODLIM ) inquiry

This limited module procedure is also applicable for RF exposure evaluation when it is necessary to demonstrate compliance in a specific host. The module manufacturer must state how control of the product into which the modular transmitter will be installed and maintained such that full compliance of the product is always ensured. For additional hosts other than the specific host originally granted with a limited module, a Class II permissive change is required on the module grant to register the additional host as a specific host also approved with the module.

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<sup>3</sup> A module extends to a host manufacturer the ability to market an end product without the burden of filing a certification application for a specific transmitter that has already been certified. It does not allow a host to manufacturer the convenience to simply use the module without any further testing and evaluation.

## 2.5 Trace antenna designs

If trace antenna designs are applicable, full-detail design specifications are required per D02 Module Q&A Question 11.

For a modular transmitter with trace antenna designs, see the guidance in Question 11 of KDB Publication 996369 D02 FAQ – Modules for Micro-Strip Antennas and traces. The integration information shall include for the TCB review the integration instructions for the following aspects: layout of trace design, parts list (BOM), antenna, connectors, and isolation requirements.<sup>4</sup>

- a) Information that includes permitted variances (e.g., trace boundary limits, thickness, length, width, shape(s), dielectric constant, and impedance as applicable for each type of antenna);
- b) Each design shall be considered a different type (e.g., antenna length in multiple(s) of frequency, the wavelength, and antenna shape (traces in phase) can affect antenna gain and must be considered);
- c) The parameters shall be provided in a manner permitting host manufacturers to design the printed circuit (PC) board layout;
- d) Appropriate parts by manufacturer and specifications;
- e) Test procedures for design verification; and
- f) Production test procedures for ensuring compliance.

The module grantee shall provide a notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify the module grantee that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the grantee, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

## 2.6 RF exposure considerations

It is essential for module grantees to clearly and explicitly state the RF exposure conditions that permit a host product manufacturer to use the module. Two types of instructions are required for RF exposure information: (1) to the host product manufacturer, to define the application conditions (mobile, portable – xx cm from a person's body); and (2) additional text needed for the host product manufacturer to provide to end users in their end-product manuals. If RF exposure statements and use conditions are not provided, then the host product manufacturer is required to take responsibility of the module through a change in FCC ID (new application).

Module Grantees are required to provide an RF exposure ( RFX) exhibit for CoU related to fixed, mobile or portable configurations, as defined §2.1091 and §2.1093, as well as per further specification in by KDB Publication 447498. This exhibit shall include an RF exposure compliance statement, as well as references to Maximum Permissible Exposure (MPE) or Specific Absorption Rate (SAR) test reports, as required per KDB 447498.

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<sup>4</sup> If the information qualifies for confidentiality, describe the method used (such as NDA) to keep the information confidential.

Modules can only be used in a host for the conditions that it was granted for . To be used in any other way than granted, such as mobile to portable or with other transmitters simultaneously, requires additional evaluation, testing, or testing and Class 2 permissive change.

## **2.7 Antennas:**

For Part 15 and licensed CMRS Client devices a list of antennas included in the application for certification must be provided in the instructions. For modular transmitters approved as limited modules, all applicable professional installer instructions must be included as part of the information to the host product manufacturer. The antenna list shall also identify the antenna types (monopole, PIFA, dipole, etc. (note that for example an “omni-directional antenna” is not considered to be a specific “antenna type”)).

For situations where the host product manufacturer is responsible for an external connector, for example with an RF pin and antenna trace design, the integration instructions shall inform the installer that unique antenna connector must be used on the Part 15 authorized transmitters used in the host product. The module manufacturers shall provide a list of acceptable unique connectors.

Licensed (non-client station) Modules for a base, fixed station can be stated as conducted, and antenna data is not required when it is clear that the licensee is responsible for the applicable limits under the rules and or license.

## **2.8 Label and compliance information**

Grantees are responsible for the continued compliance of their modules to the FCC rules. This includes advising host product manufacturers that they need to provide a physical or e-label stating “Contains FCC ID” with their finished product. See [Guidelines for Labeling and User Information for RF Devices – KDB Publication 784748](#).

## **2.9 Information on test modes and additional testing requirements<sup>5</sup>**

Additional guidance for testing host products is given in KDB Publication 996369 D04 Module Integration Guide. Test modes should take into consideration different operational conditions for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

The grantee should provide information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, versus with multiple, simultaneously transmitting modules or other transmitters in a host.

Grantees can increase the utility of their modular transmitters by providing special means, modes, or instructions that simulates or characterizes a connection by enabling a transmitter. This can greatly simplify a host manufacturer’s determination that a module as installed in a host complies with FCC requirements.

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<sup>5</sup> Section 2.9 addresses instructions for additional testing by a host manufacturer to evaluate the final product with the module installed in a host to ensure FCC compliance, as based on KDB Publication 996369 D04 Module Integration Guide. Section 2.10 addresses the additional testing needed for an equipment authorization for the host’s unintentional radiator portions (digital circuitry, etc.) under Part 15 Subpart B.

## 2.10 Additional testing, Part 15 Subpart B disclaimer

The grantee should include a statement that the modular transmitter is **only** FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.<sup>6</sup>

## 2.11 Note EMI Considerations

Note that a host manufacture is recommended to use D04 Module Integration Guide recommending as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties

For standalone mode, reference the guidance in D04 Module Integration Guide and for simultaneous mode<sup>7</sup>; see D02 Module Q&A Question 12, which permits the host manufacturer to confirm compliance.

## 2.12 How to make changes

Since . only Grantees are permitted to make permissive changes, it is recommended that module manufactures provide contact information and some guidance to host providers in the integration instructions if they expect their module will be used differently than granted.

## 3.0 MODULAR TRANSMITTER TCB APPLICATION REVIEW

The following is a list of items a TCB must review for an application for certification of a modular transmitter. The applicant must provide justifications where any of this information is not included.

- a) *Cover Letter Request for Module Certification.* Provides a request cover letter identifying the conditions that are met or not met as required in Section 15.212. The cover letter must clearly indicate that the modular transmitter will be a single, limited, split, or limited-split module.

Note: Split modules are subject to the Pre-Approval Guidance (PAG) procedure.<sup>8</sup> It is recommended that applicants check using a KDB inquiry prior to a TCB PAG to determine if the

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<sup>6</sup> Even if a module is marketed as being tested for compliance with Part 15 Subpart B, the unintentional radiator functions of the module itself are considered as a subassembly under Section 15.101(e). Therefore, the resulting host system must be tested and shown to comply with the appropriate equipment authorization procedure with the subassemblies (i.e., digital logic part of the module) included in the host and operating. Also, the module is to be considered by the installer when calculating the highest frequency within their product, to establish the upper frequency for emissions testing.

<sup>7</sup> Since the module was not certified with any other transmitters for simultaneous transmission, a C2PC or new FCC ID would typically be required by the Grantee. However, KDB policy permits, by D02 Q&A Q12, that a host manufacture only needs to do an evaluation (i.e., no C2PC required when no emission exceeds the limit of any individual device (including unintentional radiators) as a composite (i.e., § 2.947). The host manufacturer must fix any failure.

<sup>8</sup> 47 CFR § 2.964 and KDB Publication 388624.

Split Module approach is appropriate. Split modules require approval for authentication and software approved on case-by-case bases.

- b) *RF Exposure Information.* Provides the RF exposure justifications as required in KDB Publication 447498. For example, this can be either MPE calculations with associated separation distances, or specific host SAR reports.
- c) *Internal Photos.* Provides photos clearly delineating the module. For example, an exhibit showing only a host evaluation board containing the module and any associated components without clearly delineating the module is not acceptable.
- d) *User Manual—Integration Instructions.* Provides the necessary integration instructions for a host product manufacturer. TCB review must determine that each individual item from Section 2.0 (INTEGRATION INSTRUCTIONS) is adequately provided in the manual with the integration instructions.

Note: TCBs shall review and decide on the completeness of the integration instructions. For example, a filing for a single chip modular transmitter that only includes a data sheet is not considered as adequate. Also, instructions that do not clearly indicate the specific parts or items necessary for FCC compliance would be considered inadequate.

- e) *Test Set-Up Photos.* Provides test set-up photos which must be consistent with the description of the device.
- f) *Test Reports.* Provides test report which must clearly identify the physical test set-up, test board details, and conditions that the module is being tested under; and whether the module was tested as a stand-alone device or in a specific host device or end product.
- g) *External photos.* Provides external photos that clearly show the module.
- h) *Label.* Provide required information about the placement and content of the label.

#### 4.0 GRANT COMMENTS

The following are some examples of grant notes that specify whether the application is for a full modular approval or a limited modular approval and other appropriate restrictions (e.g., separation distances, co-transmission restrictions, if reference antenna trace requirements exist, etc.).

Example grant comments:

- Co-location of this module with other transmitters that operate simultaneously are required to be evaluated using the FCC multi-transmitter procedures.

Note: The grant comment phrase “must not be co-located” should not be used because it unnecessarily connotes that a module cannot be co-located with other transmitters under any circumstances.<sup>9</sup>

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<sup>9</sup> Module grantees should provide guidance on how to apply for end products the multi-transmitter provisions of KDB Publications 447498 and 996369 for RF exposure, and KDB Publication 996369 D04 for EMC.

- The host integrator must follow the integration instructions provided by the module manufacturer and ensure that the composite-system end product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules and to KDB Publication 996369.
- The module antenna(s) must be installed to meet the RF exposure compliance separation distance of “xx cm” and any additional testing and authorization process as required.
- The module grantee is responsible for providing the documentation to the system integrator on restrictions of use, for continuing compliance of the module.
- The host integrator installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation and should refer to guidance in KDB 996369.

**Change Notice:**

**10/25/2022:** 996369 D03 OEM Manual v01r01 replaces 996369 D03 OEM Manual v01. Clarification has been mainly for section 2.4 Limited module procedures (PAG MODLIM), section 2.7 Antennas: for licensed basic and fixed devices, and sections 2.11 \* EMC considerations, and 2.12 recommendation for contact information as to How to make changes.