Federal Communications Commission
Office of Engineering and Technology
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TRANSMITTER MODULE EQUIPMENT AUTHORIZATION GUIDE

1. Introduction

This guidance[1] provides grantees[2] of modules and host integrators[3] with information on certified transmitter modules and supplements the module rule §15.212. A transmitter with a modular or limited modular grant can be installed in various end products (referred to in this document as the host product or host). The host product may not require any additional certification for the transmitter provided by that module.

While the host product must still obtain other applicable equipment authorizations not covered by the module certification, significant time and cost savings can be gained. The host product must comply with all the relevant rules, including those that apply to the module.[4] Host manufacturers (referred to as host integrators) can save time and costs for equipment authorization compared to certifying the same transmitter multiple times when used in different products. A module can be certified in the following four configurations:

– **A single-modular transmitter:** a complete RF transmission assembly.[5] They are designed to be incorporated into the host. The grantee of the module must demonstrate compliance to all requirements of §15.212(a)(1) (i) through (viii) independently of any host in a standalone configuration.

– **A limited single-modular transmitter:** a single-modular transmitter that complies with some, but not all, of the §15.212(a)(1) (i) through (vii) requirements.

[1] This KDB publication is written for an audience familiar with FCC equipment authorization rules under the Code of Federal Regulations Title 47 Telecommunication and the FCC's Office of Engineer's Knowledge Data Base (KDB) procedures.

[2] Grantees of modules refer to the entity that receives an FCC certification grant for a transmitter module.

[3] Host integrators refer to the entity that uses a certified module in its product, also known as the host product.

[4] Although no additional filing may be required when the module is used according to its grant condition, the statement "including the rules that apply to the module" means that a host manufacturer is responsible for complying with all rules with the module installed. Since the rule does not require further testing, it is recommended that host manufacturers use the 996369 D04 Module Integration Guide to verify that the host and the module remain compliant with all the applicable rules when operating in a host. Host manufacturers should also note that the general regulations §§15.5 and 15.29 state that no device can cause harmful interference. Host manufacturers would still be responsible for resolving the interference and possibly cited for a violation if this happened.

[5] A module consists of a completely self-contained transmitter that needs only an input signal and power source to be functional (FCC DA 08-314).

– **A split-modular transmitter:** an RF transmission assembly separated into a radio front-end(s) and a control-element section that can demonstrate compliance for a range of "similar type" hosts, as defined in the 996369 D05 Split Module attachment.

– **A limited split-modular transmitter:** a split-modular transmitter that cannot comply with some but not all the requirements of §15.212(a)(2) (i) through (iv) and must be certified in "similar type" host(s), as defined in 996369 D05 Split Module attachment.

1. MODULE OVERVIEW

Under §15.212 rules, a certified module is only for part 15 transmitters. By policy, the procedures in this Knowledge Data Base (KDB) Publication also apply to some transmitters operating under licensed rules for equipment authorization. Therefore, this publication covers both module transmitters certified under unlicensed part 15 and licensed rules[6].

Module certifications do not apply to Part 15B[7] Unintentional radiators, Part 18 devices, and some transmitter modules may not be permitted for specific equipment classes; see Appendix A for a list.

Any host product using a module must also obtain the applicable part 15B equipment authorization for any unintentional radiator part and any additional transmitters not certified as a module with the module installed, even if the module is advertised as authorized under part 15B[8].

2. LIMITED MODULAR APPROVAL

2.1 General

Limited Modular Approval (LMA) is permitted under §15.212(b) when some, but not all, of the conditions do not comply with §15.212(a)(1) for non-split modules or §15.212(a)(2) for split modules.

Five limited conditions will require a Pre-Approval Guidance (PAG) as outlined in KDB Publication 388624 PAG, item MODLIM.[9] MODLIM applies solely to the following five items:

1. **§15.212 (a) (1)(i): No RF shielding**. A Class 2 or Class 3 Permissive Change (C2/3 PC[10]) test plan for each specific host. Guidance is provided in Appendix C.
2. **§15.212 (a) (1&2) (ii): No buffered modulation/data inputs.** The grantee must provide a test plan for the host integrator.
3. **§15.212 (a) (1&2) (iii): No voltage regulation.** The grantee must provide a test plan for the host integrator.

[6] Past KDBs and this KDB refer to modules certified under licensed rules as “licensed modules” or “licensed-service modules.”

[7] Certified modules under §15.212 Modular transmitters are modular transmitters consisting of a completely self-contained radiofrequency transmitter(s) and, by rule, do not apply to 15 Subpart B.

[8] A transmitter module, also advertised as 15B compliant, does not absolve the host from its overall FCC 15B equipment authorization requirement. This means the entire host system must undergo 15 B testing, even if a module is independently tested for 15 B. The module can be set to a non-transmit mode for the 15 B testing. Testing the host system with a radio module in transmit mode for composite operation is covered in KDB 996369 D04.

[9] This MODLIM PAG applies to the grantee’s module and not to the host that uses the limited module.

[10] A Class 2 or Class 3 Permissive Change is an equipment authorization procedure under FCC rules §2.1043 used to modify and update the FCC compliance records and information. This document indicates this procedure as a C2/3 PC.

4. **§15.212 (a) (1&2) (iv): Host professional[11] Antenna installation.** When the host requires professional antenna installation, provide clear instructions for an experienced professional installer to install it.

5. **§15.212 (a)(1)(v): The module cannot be tested in a stand-alone configuration.** Clear instructions specify that the module applies only to certain conditions the host provides, such as module host authentication and C2/3 PC requirements, which vary depending on the host. Details will differ on a case-by-case basis.

A grantee knows their LMA's design and shortcomings and is responsible for developing the host-appropriate method to overcome the limitation for the integrator[12] and, if required, a C2/3 PC test plan or the instructions to overcome the limitation. No specific format or template is required. The information will be reviewed.[13] when the MODLIM PAG is submitted, approved, or rejected. Appendix D guides the submission of an LMA PAG.

Although the test plan may be based on an FCC rule, policy, or sound engineering practices, it cannot just reference a rule or policy as a requirement. The grantee must establish a detailed test plan[14] that ensures continual compliance when the modules are integrated into a host. For example, simply stating that the host must comply with §§15.31(e) or use the KDB 996369 D04 Module Integration Guide is insufficient.

The word "limited."[15] on the module grant, if used for a specific host for RF exposure (i.e., mobile module uses when used in a portable host) or some other established KDB critical policies, is not considered a MODLIM[16] and a PAG. Technically, when a C2/3 PC is used to add RF exposure testing, the module is compliant with §15.212(a)(1)(viii) for that specific host. It is not a question of not complying with RF exposure but how it complies. For guidance on using a module for compliance with RF exposure, see publications 447498.

In addition, limited modules are not permitted for any application where end users can insert a module into any open host platform unless the module is certified and tested by the grantee with specific hosts that are authorized together to include an authentication (BIOS lock) protocol for authentication to confirm that modules inserted into the host have been approved for use with that host". See Question 5 of 996369 D02 Module Q and A.

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[11] Professional installation for MODLIM is only applicable under §15.203 Antenna requirement to allow professional installation of antennas for the host.

[12] 47 CFR 15.212(b) "manufacturer can demonstrate by alternative means in the application for equipment authorization that the modular transmitter meets all the applicable part 15 requirements under the operating conditions in which the transmitter will be used".

[13] MODLIM PAG will be in effect until most applications consistently comply with this requirement.

[14] 47 CFR 15.212(b) requires that limited modular approval can only be granted for single or split modular transmitters if the manufacturer can demonstrate by alternative means in the application for equipment authorization that the modular transmitter meets all the applicable part 15 requirements under the operating conditions in which it will be used. Therefore, a grantee, in designing a limited model, is responsible for providing a test plan for the host integrator to account for this limitation.

[15] The word "limited" on the grant has been used for other KDB policies to identify additional concerns than those listed above. Most are on a case-by-case basis and generally for RF exposure. Although these other limitations may require other PAGs or inquiries, they are not MODLIM PAGs.

[16]MODLIM PAG is for the listed five conditions.

The 731 application (s) for a limited module shall include:

- The cover letter requires a statement that the module is limited, listing the reason, based on §15.212(a)(1) (i) through (viii), or §15.212(a)(2) (i) through (iv), explaining which of these is met (Yes), or is not met (No), and therefore providing a justification as to why the modular approval is limited.
- The grantee's test plan for the host integrator or in the integration instructions and appropriate grant comments to address the limitation (see Section 4.2 below).

The equipment authorization of the module is based on the condition that the modular transmitter, when installed in a host, meets all the applicable FCC requirements under the operating conditions in which the transmitter will be used.

2. 2 MODLIM LMA. The following provides further guidance for the MODLIM LMA.

2.2.1 Limited modules with no RF shielding. It will require that the specific host demonstrate compliance with a C2/3PC. The C2/3PC test plan required by the grantee may follow the guidance under Appendix C of this attachment.

2.2.2 No buffered modulation/data inputs. The modular transmitter must have buffered modulation/data inputs[17] to ensure that the module's emissions remain compliant as granted if the data inputs exceed excessive data rates or the supply voltage is abnormal or faulty.

2.2.3 Voltage Regulation. Noncompliance to §15.212(a) (1&2) (iii) requires providing a test plan for operating voltage over an operating range. This represents the operating conditions and voltage regulation range for which the module emissions must remain compliant. The grantee can base their test on a similar test measurement to §15.31(e) test plan to exercise host voltage conditions.

2.2.4 Antenna LMA for Professional Host Installation. §15.212(a)(1&2) (iv) as LMA allows a module to be used in a host when professional installation is needed as permitted by §15.203 and a unique connector[18] on the host is not used. This is limited to carrier current devices or devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, §15.221, or §15.236, as well as perimeter protection systems and some field disturbance sensors or for other intentional radiators that, by §§15.31(d), must be measured at the installation site.[19] The integration instructions shall provide detailed instructions to the host manufacturers regarding their obligation to document the professional installer's instructions for the proper antenna arrangement in their user manual. The instructions shall be included as an exhibit in the module's host integration manual as filed for the certification.

2.2.5 Module Can Not Be Tested in a Stand-Alone Configuration. Suppose a module cannot comply (§15.212(a)(1)(v)) in a stand-alone configuration or §15.212(a)(2)(iii) for other than RF exposure conditions. In that case, the module may qualify for limited module certification by testing in various hosts but limited to these types of hosts. This LMA is not to be confused with the policy to allow a module initially granted for RF exposure conditions as a mobile device and then through a C2/3PC to

[17] The requirement for buffered modulation/data inputs is for those cases where the inputs can affect the electrical parameters of the transmitter output. (e.g., modulation index, carrier bandwidth, power, etc.) Data buffering, for the sake of data flow, timing control, or data control, is not a requisite for meeting the requirements of this rule part. The module grantee ensures that any input will not change the module's compliance and operate outside the module's granted condition.

[18] See section 7.1.3 below.

[19] This does not apply to the module itself.

demonstrate RF exposure compliance in a specific host as a portable device.[20] This LMA can be used when the grantee is the host manufacturer for a series of similar host models to allow the host and the module to share compliance responsibilities. (e.g., shielding, buffered modulation/data inputs, power supply regulation).

In some cases, when receiver threshold detection is required (i.e., DFS, CBP), the certified antenna(s) must be unrestricted by the host and, when used in a host and based on current policy, requires the module to be reviewed on a case-by-case base by submitting an equipment compliance review inquiry (publication KDB 951290) to confirm that the integration instructions will include strict guidance for antenna location for receiver detection.

3 INTEGRATION INSTRUCTIONS

Section §15.212(a)(1)(vii) requires the module grantee to provide clear integration instructions for host manufacturers to use the module in the host legally. Attachment 996369 D03 OEM Manual v01 guides what must be included in the application for equipment authorization. The integration instructions must be written in a plain, professional style.[21] The conditions for a host manufacturer to use the module without requiring additional testing or filing and the grantee's integration instructions must be clear. If the integration instructions are unclear, the host manufacturer shall refrain from using the module and contact the grantee for clarification.

The instructions shall describe all the applicable rule restrictions plus the RF exposure requirements for portable, mobile, and fixed-mount operation. The integration instructions must prohibit a host from utilizing a module to violate operating conditions, labeling, or notifications (e.g., indoor use, not used on aircraft, etc.).

4 FILING REQUIREMENTS

In addition to requirements in §2.1033, modules require:

4.1 All Modules

i) Select Form 731, the appropriate modular approval type.

ii) A cover letter requesting modular approval that includes an itemized list documenting compliance to the appropriate section §15.212(a)(1) for non-split modules or §15.212(a)(2) for split modules.

iii) Provide detailed integration instructions (manual) describing host manufacturers' conditions, limitations, and procedures (see 996369 D03 OEM Manual for guidance).

iv) For split modular transmitters, details are provided in D05 Split Module guidance.

v) All modules shall exhibit the appropriate RF exposure as required by §2.1033(f). Publication 447498 guides the proper RF exposure exhibit.

4.2 Additional requirements or LMA under PAG MODLIM:

i) In the cover letter (4.1, ii), state why the module is limited and the conditions that cannot be complied with (see Section 2 above).

[20] It's important to note that the guidance on using a module for different RF exposure conditions than initially granted is detailed in 447498, not in this publication.

[21] The quality of professional technical writing is of the utmost importance. It should include necessary diagrams, reference supporting documents, and rules to communicate to the host manufacturer in an appropriate format for manufacturing and ensuring host compliance with FCC rules.

ii) Provide the limited module test plan or the specific LMA instruction in the integration instructions.

iii) MODLIM PAG, inquiry tracking number in the 731 related to a KDB inquiry tracking number field.

iv) Grant comments.

1. "This Module is limited, requiring the host integrator to perform additional testing as provided by the manufacturer's integration instructions for: <provided reason>." Or.
2. "This Module is limited, requiring the grantee[22] to file a Class II or Class III permissive change for each specific host per the test plan defined in the module integration instructions."

5 RF EXPOSURE

All host manufacturers are responsible for using modules, multiple modules, or modules with embedded transmitters to comply with the FCC's radiofrequency radiation exposure rules, § 2.1091 and § 2.1093. KDB Publication 447498 guides RF exposure requirements for module certification and host compliance. A hosted product using a module, multiple modules, or modules and embedded (non-modular) transmitters must maintain a separation distance or greater between all the host's RF source's radiating structure(s) and any user's body or nearby persons, as required by the RF exposure assessment.[23] This requirement does not differ from any product that contains certified transmitters that are not certified modules.[24]

When a host integrates one module or modules certified together, the grantee's integration instructions shall clearly state the required separation distance.[25] This allows the host integrator to use the module without additional evaluation, testing, or filing, given that all other imposed conditions or restrictions are also followed.

A host integrator using a module closer than the granted separation distance invalidates using the module's certification for that host. In this case, the host integrator must request that the module grantee amend the grant, if feasible[26], through a C2/C3 PC. Alternatively, the grantee may allow the host integrator to take responsibility for the module as a Change in ID[27] and do the C2/C3 PC themselves.

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[22] Most integrators cannot file permissive changes unless they take responsibility for the module filing a Change in ID.

[23] Assessed means evaluated for RF exposure compliance, tested, documented, and granted, with appropriately filed certification exhibits as required by KDB 447498.

[24] All RF devices (products) must adhere to the environmental RF exposure conditions outlined in CFR Title 47 part 1, subpart I, and particularly § 1.1307(b) and part 2, subpart J, particularly § 2.1091 and § 2.1093. This requirement applies to all devices, whether they are authorized products, not using certified modules, or using certified modules. Compliance with these conditions is a legal obligation for importing, marking, and selling RF devices in the US to ensure users' compliance with RF exposure conditions.

[25] The separation distance is stated in the integration instructions and the grant comments. If not provided in the integration instructions, the host integrator must contact the grantee or obtain the official grant and grant comments by searching the FCC ID at https://www.fcc.gov/oet/ea/fccid.

[26] In some cases, the module may not be used or is impractical at the separation distance desired by the host integrator.

[27] See KDB 249634 for Change in

Using the module closer to the granted separation distance than what the integration instructions allow without amending the filing is a violation.[28]

Using a module in a host operating simultaneously with other modules or transmitters not originally certified together requires addressing this new RF exposure situation. What the host or grantee needs to address will depend on the specific situation and the types of modules and transmitters involved. The guidance for addressing this situation is in KDB 447498 and attachment 996369 D02 Module Q and A, questions 13, a, b, and c.

6 EMC CONSIDERATIONS

When the module is used as one module or modules certified together without other transmitters operating simultaneously and used in a host for the conditions initially granted, the host manufacturer may use attachment D04 Module Integration Guide[29] to confirm EMC compliance.

However, for simultaneous transmissions[30] with any other transmitters in a mobile host not certified together, the policy requires an EMC evaluation test by the host integrator or the grantee (see D02 Module Q&A Question 12); an EMC evaluation by the host integrator is sufficient to confirm compliance.

7. ANTENNAS

7.1 Part 15 Modules:

Testing for part 15 modules shall use ANSI C63.10-2020,[31] as incorporated by reference in § 15.38 for testing guidance.

7.1.1 Part 15 Modules with Antennas on the Module.

For Part 15 Modules, when the antenna is provided on the module, the module must meet the requirements of § 15.212(a)(1)(iv) for compliance with §§ 15.203, 15.204 (b), and (c) for each variant of

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ID guidance.

[28] A typical example is an imported product with a label stating Contains FCC ID XXX-YYY. Customs inspectors cannot confirm through https://www.fcc.gov/oet/ea/fccid that the device is authorized since the record only demonstrates the module, not the imported product. After conferring with the FCC and finding that the module is certified as a mobile module and the product is portable, the product will be denied entry into the US and returned, destroyed, or seized.

[29] The D04 Module Integration Guide is recommended since the current rules do not require additional evaluation and rely on sound engineering practice by host integrators. D04 Module Integration Guide is essentially a guide for sound engineering practice.

[30] Since the module was not certified with other transmitters for simultaneous transmission, the grantee would typically require a C2/3PC or new FCC ID. However, the current KDB policy permits, by D02 Q&A Q12, that the host manufacturer only needs to do an evaluation (i.e., no C2/3PC 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. This KDB policy may be subject to change in the future. The evaluation test shall be performed with all devices operating, including unintentional (15B) radiators, for both the standalone and simultaneous cases. If the evaluation testing confirms that no emissions exceed the limit of any individual transmitter or unintentional radiator (i.e., §2.947), no additional C2/3PC is required. If any emission exceeds an applicable limit, the host manufacturer must take corrective actions to bring the device into compliance.

[31] 47 CFR 15.37(s): Before October 30, 2025, ANSI C63.10-2013 or ANSI C63.10-2020 is required. However, after this date, ANSI C63.10-2020 becomes mandated.

the module if different antennas are used. Each variant must be tested for the specific Part 15 transmitter rules. After certification, if a need arises to change the antenna type, a C2/3 PC is required.

7.1.2 Part 15 Modules that include a list of antennas.

When a physical antenna is not integrated with the module, the module must undergo testing and meet the requirements of § 15.212(a)(1)(iv) for compliance with §§ 15.203, 15.204 (b), and (c) and be certified for the highest gain antenna for each type of antenna to be used. When relying on the module's certification for installation/integration into another product, these are the only antennas that can be used with that module. For some rule parts, the lowest gain antenna must be defined accurately when threshold detection is demonstrated as part of the application filing, such as DFS[32] and CBP[33]. After certification, changing to a different antenna type requires a C2/3 PC.

The grantee shall specify a list of the antennas that can be used with the host by manufacturer, model designation, or part number and specifications that include the mechanical and electrical characteristics, including type, form factor, frequency, bandwidth, impedance, directivity, gain, and polarization, based upon testing performed during original certification. After certification, adding a different antenna type requires a C2/3 PC.

The guidance of KDB Publication Number 996369 D02 question 11 for trace antenna designs shall be followed.

7.1.3 Host End User Unique connector.

A unique connector[34] is required for Part 15 transmitter modules when the end user can replace the antenna, except for limited modules where the host qualifies for professional[35] antenna installation under § 15.203.

7.1.3.1 If the module is used in the host, a unique connector must be used if the end users can access it to replace a broken antenna.

7.1.3.2 If the module is integrated into the host and the end users can replace the host antenna, the integration instructions shall clearly state to the host integrator that the host antenna connector must be unique. The instructions should also state that the FCC certification is invalid if a non-unique connector is used on the host.

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[32] DFS: Dynamic Frequency Selection is required for devices operating in the 5.25-5.35 GHz and 5.47-5.725 GHz bands. *See* Publication Number: 905462 Rule Part 15.401 U-NII, U-NII, DFS Test Procedures.

[33] CBP: A contention-based protocol for specific devices operating in the 6 GHz U-NII 5-8 bands is required. See 47 CFR § 15.403. Also, see KDB Publication Number: 987594.

[34] The term "unique connector" used for this guidance refers to the requirements of § 15.203, which is required for all Part 15 transmitters that allow broken antennas to be replaced. This publication does not change or provide additional guidance on what is and is not considered a unique connector for Part 15 transmitters.

[35] Professional installation is permitted under § 15.203 for host products that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or for other intentional radiators, which must be measured by § 15.31(d) at the time of installation. When this applies to host integration, the module is limited, and it is noted that the current PAG policy requires a PAG, as seen above 2.2.4 Antenna LMA for Professional Host Installation. The measurements and instructions for the professional installation must be clearly described and filed in the Integration instructions.

The only exception would be for the module to qualify and be granted under PAG as a limited module for professional installation[36] under § 15.203, the module must be granted as limited: see section 2.2.4 above, "Host professional antenna installation requires a PAG with justification."

7.1.3.3 In all cases above (7.1.3.1 -7.1.3.3), host end-products must only use approved antennas.

7.2 Licensed-service modules KDB Publication Number 996369 policy permits licensed-service modules[37] to obtain a certification. By policy, antenna requirements[38] for the filing differ depending on whether the module is a licensed[39] client module or licensed base station module/master module.

A client module is a device that operates in a master/client network and does not initiate a transmission unless controlled by a base or master device. Base stations or master devices can initiate transmissions.

7.2.1 Base Station or Master Module

For base stations or master modules, the integration instructions are not required to provide detailed antenna information because licensees are responsible for using an appropriate antenna such that all emissions comply with the terms of the license[40] and with § 1.1310 radiofrequency radiation exposure limits. Module testing for compliance shall follow the test methods of C63.26-2015, the American National Standard for Compliance Testing of transmitters used in Licensed Radio Services.[41] These standards guide testing RF power, out-of-band emissions, frequency stability, and other regulatory requirements as the rules require. Radiated emissions testing can be limited to measurement requirements specified by § 2.1053 (i.e., cabinet or case radiation) for measurements utilizing the appropriate policy. All other pertinent technical data (i.e., OBW, fundamental emission power, unwanted emissions) may be

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[36] The grantee for the module shall provide clear instructions that professional installation is required and information for the installer to ensure that the proper antenna is employed so that rule requirements are not exceeded. These modules are limited to carrier current devices or devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236 and intentional radiators that justify that it must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, by § 15.31(d), must be measured at the installation site.

[37] KDBs issued or revised before 996369 D01 Module Certification Guide v04r01 may refer to "Licensed-service modules" as "Licensed-service modules." Comment: wouldn't this be clearer if we said: *KDBs issued or revised before version 996369 D01 Module Certification Guide v04r01 may use the term 'Licensed-service modules' in its older form. This terminology may differ from the updated version in the latest guide.*

[38] Licensed service modules differ from licensed end products, and the responsibility for compliance in a host product depends on the quality of the grantee's adequate integration instructions.

[39] A client device cannot initiate or be configured to initiate a transmission. A base station or master station can initiate a transmission. As a condition of certification, a base station or master device must be approved as a master device on the bands for operation in the U.S. It must operate under the grant conditions. Client devices associated with base or master stations and approved as client devices that operate under the control of an approved master device can be operated without an individual operator's license under authorization as subscribers per 47 CFR 1.903(c). They may also have the capability, under FCC policy, to function in other regulatory domains under FCC geolocation policies (see Publication Number: 594280).

[40] The FCC license grants the use of a specific portion of the radio frequency spectrum in a geographical area. This process, distinct from equipment authorization, is a critical regulatory step. Equipment authorization is the permission to market and sell a device after it has been tested. It is important to note that equipment authorization is not always a prerequisite for using the device unless it falls under the category of unlicensed or, in some cases, licensed by rule devices. *See* 47 CFR § 2.805.

[41] C63.26-2015 does not consider test methods for requirements specific to ground-based maritime and aviation transmitters, whether they are radars, satellite equipment, fixed microwave equipment, or broadcast transmitters. Modules for those services must strictly adhere to the essential applicable rule parts and the underlying regulatory requirements.

collected via conducted testing when justified. However, it is the responsibility of the module manufacturer to determine the appropriate methods from C63.26-2015 for testing the application method, such as radiated, conducted, substitution, or combination.

7.2.2 Client-licensed-service modules

There are two categories of client-licensed service modules: Modules that utilize an integrated antenna and modules without an antenna.

7.2.2.1 Client-licensed-service modules with integrated antennas on the module

When conducted measurements cannot be performed by the module manufacturer that utilizes integrated antennas, a radiated test configuration is performed to measure all the rule part compliance-related technical parameters, including the required testing or documentation necessary for compliance with RF exposure under 47 CFR § 2.1091 and 47 CFR § 2.1093. Testing and compliance shall follow C63.26-2015 subclause 5.5.2 and related subclauses. This shall include all the module variants if different antenna types are used when initially granted. If test reports include conducted measurements[42] with integrated antennas, the test report shall document any special modifications or necessities warranted that justify performing the conducted testing. After certification, integrating a different antenna type requires a C1 or C2/3 PC. The grantee can use their engineering judgment to evaluate under 2.1043 if a C1 or C2/C3 is required.

7.2.2.2 Client-licensed service modules without antennas when the host integrator provides the antenna.

Antenna information in the integration instructions is required for licensed client devices when the module grantee does not provide the antenna(s). The grantee must provide antenna information to ensure the host complies with the initially granted RF exposure separation distance and the relevant rule part for maximum ERP/EIRP. This shall include the highest antenna gain.[43] for any antenna or series of antennas and any additional information particular to the applicable rule. Also, if applicable, the lowest gain may need to be specified.[44]

When trace antennas are used, a complete board trace antenna design specification from the module guarantee is required.

Unlike the procedures for devices operating under Part 15, the application does not require a list of specific antenna types, specifications, and part numbers. In addition, a unique connector is not needed for a user-replaceable antenna unless required by the applicable licensed rule (e.g., GMRS, FRS transmitters, etc.).

The module grantee is responsible for ensuring the level of technical detail in the grantee's integration instructions for the antenna information[45] is adequate to meet all the applicable rules, including RF exposure under the operating conditions in which the module will be granted and permitted to be used.

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[42] The significant proliferation of portable and mobile devices, which utilize integrated/embedded transmit and receive antenna configurations, has extended the need for radiated testing for licensed devices. This expansion is crucial as it demonstrates compliance to all technical requirements, no longer limited to just cabinet/case radiation, thereby emphasizing the importance of your role in this process.

[43] The gain at the fundamental frequencies and no higher at any other frequencies.

[44] This applies to any current or future rule requiring contention-based protocol. See, for example, 47 CFR Part 90 Subpart Z and 47 CFR § 15.407.

[45] KDB policy until such time new rules for modules and host integrators may be proposed.

8. PERMISSIVE CHANGES

Only grantees are permitted to make permissive changes. See KDB 178919 permissive changes.

A host manufacturer that wants to make permissive changes must have the grantee make the changes or request permission from the original grantee to file a change-in-ID (see KDB 249634). After a TCB approves the change-in-ID, the host manufacturer can make permissive changes.

Changes from a non-modular to modular certification and from a full-modular to a limited-modular certificate are permitted if the changes meet the requirements in §2.1043 (also see KDB Publication 178919) and the modular approval requirements discussed above.

Appendix C provides some additional guidance for when permissive changes are required.

10. REFERENCES

- KDB Publication 178919 Permissive Change Policy
- KDB Publication 388624 Pre-Approval Guidance procedures and list
- KDB Publication 442812 SDR Apps (Application) Guide
- KDB Publication 447498 RF exposure in equipment authorizations
- KDB Publication 594280 Software Configuration control
- KDB Publication 616217 RF exposure for laptop and tablet computers
- KDB Publication 784748 Labeling requirements

APPENDIX A

MODULES PERMITTED (Y) OR NOT PERMITTED (N) BY EQUIPMENT CLASS CODE

The following list is subject to change; for questions, submit an inquiry at http://www.fcc.gov/labhelp.

- * Devices that are not transmitters and cannot qualify as modules.
- ** Can only be granted with an accepted PIA for geolocation accuracy.
- N^{NA} indicates that this device is not a transmitter.
- N– is prohibited by rule.
- N+ is not permitted by policy. In some cases, N+ has no history of grants as modules, and an inquiry review with justification may be considered.

Code	Description	Module Permitted
5GM	Part 30 Mobile Transmitter	Y
5GB	Part 30 Fixed Transmitter	Y
5GT	Part 30 Transportable Transmitter	Y
6CD	15E 6 GHz Low Power Dual Client	Y
6ID	15E 6 GHz Low Power Indoor Access Point	Y
6PP	15E 6 GHz Subordinate Indoor Device (not permitted by rule)	N^{-}
6XD	15E 6 GHz Low Power Indoor Client	Y
6SD	Standard Power Access Point. It can only be granted with an acted PIA for geolocation accuracy.	Y
6FX	Standard Client	Y
6FC	Fixed Client Can only be granted with an acted PIA for geolocation accuracy.	Y
6VL	Very Low Power 6 GHz device	Y
8CC	Part 18 Consumer Device *	N^{NA}
AIS	Automatic Identification Systems*	N^{NA}
AMP	Amplifier *	N^{NA}
B2I	Part 20 Industrial Booster (CMRS)	N^{+}
B2P	Part 20 Provider-Specific Consumer Booster (CMRS)	N^{+}
B2W	Part 20 Wideband Consumer Booster (CMRS)	N^{+}
B9A	Part 90 Class A Industrial Booster (non-SMR)	N^{+}
B9B	Part 90 Class B Industrial Booster (non-SMR)	N^{+}
BOS	All other signal boosters other than 20.21/90.219	N^{+}
BPL	Access Broadband Over Powerline System*	N^{+}
CBD	Citizens Band Category A and B Devices	Y
CBE	Citizens Band End User Devices	Y
CRD	Part 15 Radar Detector*	N^{NA}
CRR	Super-regenerative Receiver*	N^{NA}
CSR	Scanning Receiver*	N^{NA}

Code	Description	Module Permitted
CXX	Communications RCVR for use w/ licensed Tx and CBs*	N^{NA}
CYY	Communications Receiver used w/Pt 15 Transmitter*	N^{NA}
DCD	Part 15 Low Power Transmitter Below 1705 kHz	Y
DSC	Part 15 Security/Remote Control Transmitter	Y
DSR	Part 15 Remote Control/Security Device Transceiver	Y
DSS	Part 15 Spread Spectrum Transmitter	Y
DTS	Digital Transmission System	Y
DWM	Part 15 Wireless Microphone	N^{+}
DXX	Part 15 Low Power Communication Device Transmitter	Y
EID	Part 11 Emergency Alert Devices*	N^{NA}
EAV	Part 15 Automatic Vehicle Identification System	N+
ETB	Part 15 Cordless Telephone Base Transceiver	N+
ETR	Part 15 Cordless Telephone Remote Transceiver	N+
ETS	Part 15 Cordless Telephone System	N^{+}
FAP	Part 15 Anti-Pilferage Device	N^{+}
FDS	Part 15 Field Disturbance Sensor	Y
FRB	Part 95 Family Radio Base Transmitter	N^{+}
FRE	Part 95 Family Radio Ear Held Transmitter	N^{+}
FRI	Part 95 Family Radio Face-Held Transmitter	N^{+}
FRT	Part 95 Family Radio Body Worn Transmitter	N^{+}
GAT	Part 15 Auditory Assistance Device (Transmitter)	N^{+}
GEP	406 MHz EPIRB	N^{+}
GHF	Part 80 HF Transmitter (GMDSS)	N^{+}
GHH	Part 80 VHF Handheld Transmitter (GMDSS)	N^{+}
GMF	Part 80 MF Transmitter (GMDSS)	N^{+}
GVH	Part 80 VHF Transmitter (GMDSS)	N^{+}
HID	Part 15 TV Interface Device*	N^{NA}
JAB	Part 15 Class B Digital Device*	N^{NA}
JAD	Part 15 Class A Digital Device*	N^{NA}
JAV	Non-Digital SDoC Devises*	N^{NA}
JBC	Part 15 Class B Computing Device/Personal Computer*	N^{NA}
JBP	Part 15 Class B Computing Device Peripheral*	N^{NA}
LMS	Part 90 Location & Monitoring Transmitter	N^{+}
LPR	Level Probing Radar	Y
MRD	Marine Radar	N^{+}
MWR	Part 80 Marine Watch Receiver	N^{NA}
NII	Unlicensed National Information Infrastructure TX	Y

Code	Description	Module Permitted
PCB	PCS Licensed Transmitter	Y
PCE	PCS Licensed Transmitter held to ear see 447498 Policy	N+
PCF	PCS Licensed Transmitter held to face	Y
PCT	PCS Licensed Transmitter worn on body	Y
PLB	Personal Locator Beacons	N^{+}
PUB	Part 15 Unlicensed PCS Base Station	Y
PUE	Part 15 Unlicensed PCS portable TX held to the ear	Y
PUF	Part 15 Unlicensed PCS portable TX held to face	Y
PUT	Part 15 Unlicensed PCS portable TX worn on the body	Y
RNV	Part 80 NAVTEX Receiver*	N^{NA}
SRT	Radar Transponder	N^{+}
SSA	Ship Security Alert Systems (SSAS)	N^{NA}
TBC	Licensed Broadcast Station Transmitter	Y
TBF	Licensed Broadcast Transmitter Held to Face	Y
TBT	Licensed Broadcast Transmitter Worn on Body	Y
TDC	Part 80 DSC Controller	N^{NA}
TLD	Licensed LPAS Device	N^{NA}
TNB	Licensed Non-Broadcast Station Transmitter	Y
TNE	Licensed Non-Broadcast Transmitter Held to Ear	N+
TNF	Licensed Non-Broadcast Transmitter Held to Face	Y
TNT	Licensed Non-Broadcast Transmitter Worn on Body	Y
UWB	Ultra-Wideband Transmitter	Y
VRD	Part 95 Vehicular Radar Systems	Y
WBT	Wideband Transmitter	Y
WG1	White Space Device with Geo-location- Mode 1	Y
WG2	White Space Device with Geo-location- Mode 2	Y
WGF	White Space Device with Geo-location- Fixed	Y

Appendix B

The Host Environment Chart

Host Environment Chart This section has been removed. Detailed RF exposure guidance relies entirely on KDB 447498 and Q12 and Q13 in KDB 996369-D02.

Appendix C

Module with no shield which requires a Class II or Class III Permissive Change (C2/3 PC) Guidance

A Module with no shield is limited and requires a PAG "MODLIM" before it can be granted. The grantee's[46] Integration Instructions must provide a test plan (required by rule 47 CFR 15.212(b)) for a Class II or Class III.[47] filing[48] (herein referenced as C2/C3 PC), whichever is appropriate. The C2/C3 PC is required for every different specific host using the module. A particular host is the same series or similar models having the same form factor, physical size, and component layout and construction.

This C2/C3 PC aims to confirm that all hosts' emissions comply with applicable FCC rules. One main concern is ensuring stray host signals do not ingress the module's RF section and unintentionally reradiate.

If the transmitter's power is measured as conducted or as field strength, and if the C2/C3 PC investigation indicates that the module's power has increased from the original filing test report, the manufacturer, lab, and TCB must investigate to determine if the initial module tested in a standalone module was improperly granted. The module may require a new FCC ID. An inquiry can be submitted to review a specific case, but the C2/C3 PC can only be given once the issue is resolved.

An increase in measured field strength or EIRP over the module's tested field strength is the result of host installation, such as signal reflections, and this increased field strength or EIRP value remains compliant with the rules. In that case, a statement is required in the test report, such as "An increase in measured field strength over the original tested field strength has been investigated and determined to be due to host installation."

Any radiated emission that does not comply with regulations must be corrected, and the C2/3PC can only be granted once the issue is resolved.

The test plan is permitted to allow for test reduction based on "worst-case scenario." The manufacturer can use sound engineering judgment and justification to identify a 'worst-case' data rate and bandwidth setting for test reduction.

The test plan shall confirm and demonstrate compliance with the following:

- ✓ Confirm and document the continued compliance for the fundamentals for each band under each specific rule part granted for the module.
- ✓ The test shall demonstrate each band's worst-case modulation mode(s).
- ✓ Test band edge compliance for the widest and narrowest bandwidths per modulation type.
- ✓ Include radiated spurious emissions with the antenna connected. Testing shall be performed for each supported modulation testing 15.31(m). In all cases, a test of each modulation is required for channels over the frequency range defined in 15.33(a) for unlicensed transmitters and 2.1057(a) for licensed transmitters.
- ✓ Confirm and demonstrate with the radiated test that no additional parasitic, non-compliant emissions exist due to ingress (parasitic oscillations, radiation of stray signals within a host, etc.) are present.
- ✓ These tests can be based on C63.10 and C63.26 as guidance:

[46] A host integrator can file a change in ID to become the grantee for previously certified modules and then file PC for each host.

[47] Modules, if granted as SDR, can use this test plan under a Class 3 filing procedure,

[48] Currently, the PC is not a PAG.

Examples: Wi-Fi devices that support 802.11 (Wi-Fi 6 or Wi-Fi 7 modes) all support a plethora of OFDM, bandwidths, and data rates. Testing may be documented for a limited selection of 802.11 (g, n, or ax) modes for worst-case OFDM subcarrier or tone arrangements. The worst-case modes can be selected from the radio module's initial test report.

The widest bandwidth, highest aggregate power, and highest power spectral density should be tested. If these conditions do not all combine in the same mode, then multiple modes require testing until the modes with these three parameters have been tested and confirmed.

Compliance testing is necessary if the manufacturer does not identify the worst-case settings for each modulation and data rate.

Appendix D

1. PAG requirements for LMA

a) The MODLIM PAG is for a limited module under §15.212(b) when shielding, buffered modulation/data inputs, and power supply regulation cannot comply.
b) Shielding of radio elements is required under §15.212(a)(1)(i), and if the module cannot comply, the module can qualify as a limited module, and a PAG MODLIM is required. The integration instructions must specify that a C2/3PC is needed.
c) The module must have buffered modulation/data inputs §15.212 (a)(1)(ii), and if the module cannot comply, the module can qualify as a limited module, and a PAG MODLIM is required.
d) If voltage regulation is required under §15.212(a)(1)(iii), and if the module cannot comply, the module can qualify as a limited module, and a PAG MODLIM is required.
e) Antenna and transmission system requirements of §15.212(a)(1)(iv) for §15.203, §15.204(b) and §15.204(c). Professional installation procedures can be extended to host professional installers. Modules used in host professional installation can qualify as an LMA when the details are defined in the filing and integration instructions 996369 D03 OEM Manual v01 as a PAG item MODLIM.
f) Tested in a stand-alone configuration under §15.212(a)(1)(v). If the module cannot comply with a stand-alone configuration, the module can qualify for limited module certification by testing in the Host under LMA under PAG item MODLIM.
g) The modular transmitter must be equipped with either a permanently affixed label §15.212(a)(1)(vi) or if the small size meets §2.925(f) and capable of electronically displaying its FCC identification. All modules must comply with this condition and cannot be used as a condition for obtaining LMA.
h) The modular transmitter must comply with all the specific rules or operating requirements §15.212(a)(1)(vii), and this requirement cannot be used as a condition for obtaining limited module certification.
i) §15.212(a)(1)(viii) subject to the radio frequency radiation exposure requirements. All modules must comply with this condition and cannot be used as a condition for obtaining LMA.

2. Limited Split Module (996369 D05 Split Module)

a) Only the front end of the radio must be shielded. §15.212(2)(2)(i).. If the split module cannot comply, it can qualify as a limited split module, and a PAG MODLIM is required, the same as 2.2.1 Limited modules with no RF shielding).
b) The module must have buffered modulation/data inputs. §15.212 (a)(1)(ii).. If the split module cannot comply, it can qualify as a limited split module, and a PAG MODLIM is required, the same as 2.2.2 No buffered modulation/data inputs).
c) Voltage regulation is required under §15.212(a)(1)(iii). If the split module cannot comply, the module can qualify as a limited split module, and a PAG MODLIM is required, the same as 3.2c).
d) Antenna and transmission system requirements §15.212(a)(1)(iv) can qualify for the Limited Split module the same as 2.2.3 Voltage Regulation.).
e) The sections of a split modular transmitter must be tested and installed in hosts that can be considered representative of the ones intended for use. §15.212(a)(2)(iii).. See 996369 D05 Split Module for guidance on the definition of similar hosts. If the module cannot comply with a representative host configuration, it may qualify for limited split module certification for a specific host.
f) The modular transmitter must have a permanently affixed label, etc. §15.212(a)(1)(vi).

g) The modular transmitter must comply with all the specific rules or operating requirements) §15.212(a)(1)(vii).
h) Radiofrequency radiation exposure requirements. §15.212(a)(1)(viii)).
i) Additional Split module requirements:
    1) Control information and other data may be exchanged between the transmitter control elements and the radio front end. §15.212(a)(2)(ii). Control information is not a requirement but permitted, i.e., for authentication to comply with §15.212(a)(2)(iv), ensure that only transmitter control elements and radio front-end components have been approved together.

Manufacturers must ensure that only approved transmitter control elements and radio front-end components can operate together. §15.212(a)(2)(iv). requires that all modules comply with this condition[49].

[49] The filing must include a description explaining that the control element and radio front end(s) approved together can operate together when used as a certified module.

Change notices:

10/23/2015: 996369 D01 Module Equip Auth Guide v01r04 has been changed to 996369 D01 Module Equip Auth Guide v02.

1. The module Q&A section of 996369 D01 Module Equip Auth Guide v01r04 has been moved to a separate attachment 996369 D02 Module Q&A.
2. Questions 12 and 13 are added to 996369 D02 Module Q&A about misc.—multi-transmitter operations.
3. Question 14 added USB dongles as an example integrated within end products.
4. Clause: I modified it by moving the first bulleted list to the end of the clause.
5. Footnote 1 amended to remind that DA-00-1407 is obsolete because it is superseded by §15.212.
6. Change notation from PBA to PAG.
7. Misc. basic editorial cleanups.
8. Clause numbering was adjusted after adding a number for the integration instructions clause.
9. Clause IX added about host product considerations.

04/24/2023, 996369 D01 Module Equip Auth Guide v02 has been changed to 996369 D01 Module Equip Auth Guide v03. v03. changes allow Split modules allowed for licensed devices, added PAG approval procedure for limited modules, List of Equipment Classes as Appendix A for modules not permitted, additional clarification on RF exposure referencing for publication 447498 D01 General RF Exposure Guidance for Equipment Authorization or when the draft is published as 447498 D01 General RF Exposure Guidance v07. Appendices B, C, and D were added for clarification and guidance.

04/16/2024: The 996369 D01 Module Equip Auth Guide v04 replaces 996369 D01 Module Equip Auth Guide v03. Version V04 corrects multiple typos, clarifies items, replaces section 6 Guidance for RF exposure, and removes Appendix B. Guidance for Grantees and Host's integrators related to RF exposure. RF exposure guidance is provided in KDB Guidance of 447498.

10/11//2024: The 996369 D01 Module Equip Auth Guide v04r01 replaces 996369 D01 Module Equip Auth Guide v04. Version V04r01 revised section 8 for guidance on Antennas specifically for licensed client modules. The previous version, V04, was revised and required licensed client modules to be treated like Part 15 Modules. After considering comments from the TCB module committee, version V04 was revised to version V04r01. This aligns with how limited client modules have been certified in the past—Additional clarification for LMA 2.2.4 Antenna LMA for Professional Host Installation was added.

11/15/2024 The 996369 D01 Module Equip Auth Guide v04r02 replaces 996369 D01 Module Equip Auth Guide v04r01. Version v04r02 corrects grammatical errors and simple edits. No changes have been made to affect or change interpretations or add or delete any guidance form v04r01.