



Modular Transmitter Basics

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Basic Terms & Definitions

- **Module-like transmitter device:**
 - Peripheral to a host and typically plugged into an externally-accessible standard bus on the host
 - Modular approval is not required but can be used
- **Single modular transmitter (modular approval, MA) device:**
 - Completely self-contained transmitter device typically incorporated into another product, host, or device
 - Per 15.101(b) the receiver portion of a transmitter module requires either Verification or no equipment authorization (unless a scanning receiver)
- **Non-modular-approval device:**
 - Stand-alone finished-product complete transmitter
 - Consult FCC in case module approval is requested
- **Multi-transmitter product:**
 - May have mix of modular-approval and non-modular-approval component devices, or only all of one or the other
 - Associated equipment – marketed or operated with other FCC IDs



15.212 Modular Transmitters

- Modular approval intent is to allow manufacturers to build new devices with same transmitter in multiple hosts without the need for re-Certification of the transmitter.
 - Part 15 Unlicensed Transmitter Modules (Small Entity Compliance Guide) (DA 08-314):
(http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-08-314A1.pdf)
- Modular approval must be requested to obtain modular approval.
 - Provide a cover letter requesting modular approval and addressing in detail compliance with the modular requirements.
 - Mark Form-731 with appropriate modular approval type.
- Part 15 limited single or split module requirements are described in 15.212(b).
- A single or split module approval is one that meets all the requirements without limits [15.212(b)].
- A **limited single or limited split modular** transmitter may be granted if it does not meet single or split modular requirements listed in 15.212(a) and if compliance can be demonstrated under the operating conditions in which the transmitter will be used (e.g. grant conditions are needed for compliance).



15.212 Limited Modular Transmitters

- For RF exposure compliance considerations, a portable modular transmitter is considered limited (single or split) if compliance must be demonstrated in a specific host such as for SAR.
 - **Mobile and fixed modular approval devices are not considered limited, unless limited to a specific host or particular product configurations.**
- For a Part 15 limited single or split module, the manufacturer must state how control of the end product into which the module will be installed will be maintained such that full compliance of the end product is always assured.



15.204 Considerations for Modules

- Only complete transmission systems (radio-frequency source and antenna at minimum) must be certificated and marketed.
 - Device must be marketed as a system to end user.
 - Exceptions:
 - BIOS lock. Radio and antenna sold separately. Radio card and laptop exchange code to ensure only authorized system works in laptop.
 - Grant condition: **"This device must utilize a BIOS lock mechanism which ensures use only with hosts as specified in the Certification filing."**
 - *** Do not grant for example user-installable plug-in mini-PCI radio cards that operate with antennas built in laptop and can be used in any laptop computer with mini-PCI plug-in slot.
 - Integrator / assembler contractual agreements – 2.929(b)
- For user-installed radios used with integrated antennas in laptops, we require a two-way BIOS lock implementation to ensure compliance with the requirements. This ensures the module verifies that the proper laptop is used and the laptop verifies that the proper module is used.



Modular Transmitter Policies

● Permissive changes

- A change from non-modular approval to modular approval does not require a new FCC identifier.
- A change from modular approval to limited modular approval does not require a new FCC identifier.

● Modular review issues

- Remove all mention of module or modular on grant if approval is for a non-modular device.
- Ensure limited modular filings specific-host filings consider undeclared and optional collocated transmitters, e.g. Bluetooth
- Do not lay antennas for cabled modules on wooden table during stand-alone module testing.
- Requirements for licensed modular transmitters are similar to those for 15.212 modules.



15E Modules

- All UNII modular approvals for devices with DFS need to be Limited Modular Approvals.
 - Typically limited to hosts with external antennas
 - For modular approvals with internal antennas, different hosts will affect DFS compliance
 - module would be limited to the specific host used for the DFS tests.
 - For different hosts a Class II permissive change with DFS tests for the new host required
- Also note, DFS testing is required when any new antenna with lower gain than the original is used.



Licensed Modular Transmitters

- Licensed modules are not subject to 15.212 rules, however applications for licensed modules are permitted under the following conditions
 - The applicant can use the guidelines for unlicensed modules for good engineering practice, except that split modular approvals or limited split modular approvals are not permitted for licensed modular devices.
 - The grantee is required to provide to other parties [e.g. Original Equipment Manufacturers (OEM)] and end users, clear documented instructions including all the conditions for installing and using the module.
 - These instructions are required in the exhibit attachments for certification approval.
 - The Grantee is responsible for compliance.
 - An electronic display of the FCC ID is acceptable for licensed modules.
- Licensed modular grant requirements:
 - The maximum antenna gain to ensure compliance with rules, such as EMC (e.g. EIRP, PPSD limits) or RF exposure requirements, shall be listed on the grant.
 - The licensed module must have a FCC ID label on the module itself.
 - The FCC ID label must be visible through a window, or
 - it must be visible on an access panel, door or cover that is easily removed.
 - If neither of the above is possible, a second label must be placed on the outside of the device that contains the following text:
 - Contains FCC ID: bzzzzzzz.



Licensed Modular Transmitters

- A license modular approval is designated as “limited” when compliance is demonstrated in a particular product configuration.
 - For example, it may be installed in a specific host for demonstrating compliance for EMC, SAR or HAC requirements.
 - For a licensed limited single module, the manufacturer must state how control of the end product into which the module will be installed will be maintained such that full compliance of the end product is always assured.
- A single licensed modular approval is one that is not limited (similar to unlicensed modular approvals).
- Mark Form-731 with appropriate modular approval type.



Licensed Modular Transmitters

- Licensed modules with specific antennas may be certified for use in final products operating in portable RF exposure conditions for configurations and procedures described KDB 447498
- Licensed modules for end-user installation in host products with pre-installed antennas to operate in portable RF exposure conditions must utilize some type of bidirectional authentication function
 - To ensure that only combinations for which SAR routine evaluation has been performed are used together
 - Applications using a BIOS-lock function, similar to as used for some Part 15 modules, have been allowed for TCBs
 - Applications using other authentication techniques must consult with FCC before filing



Multi-transmitter Products

- A single FCC ID can be used for products marketed and operated ALWAYS containing two or more separate transmitter components
 - Components may be either integrated transmitter(s) (i.e. always built-in and marketed with the product enclosure, sometimes informally called “system approval”), or pre-existing modular approval device(s) integrated by grantee in the new FCC ID combined product
- Such application for new FCC ID final product with multiple component transmitter(s) must contain test data for RF exposure and EMC/radio tests evaluated for:
 - A fully-populated product test-sample (i.e. all modules / components installed)
 - Any applicable subset combinations and permutations thereof, i.e. if marketed / operated for configurations with modules de-populated & de-labeled
- If new FCC ID final product is:
 - labeled with module component FCC ID, complete 2.1033 info for the module component not needed
 - NOT labeled with module component FCC ID, this means new FCC ID supersedes component module FCC ID(s), and complete 2.1033 info is required for all integral and module components



Modules for Laptops

- Use KDB 616217 procedures to determine conditions for a module to be used in various laptop configurations with minimal subsequent evaluations for use in other hosts
 - For example, initial application with WWAN single-transmit SAR evaluated for antenna installed in one laptop at minimum 5 cm from bottom
 - In addition WWAN filing also including installation instructions defining hypothetical typical antenna configurations and power levels for simultaneous-transmit WLAN to preclude additional evaluations
 - Similar approach should be followed for WLAN module initial filings
- Consider "synthesis approach" not just "analysis approach"
 - Synthesis approach:
 - Strategic selection of most conservative installation configurations evaluated in initial filings thereby minimizing later permissive changes
 - Analysis approach:
 - Specific KDB 616217 analysis done for each specific multi-antenna laptop configuration
- All antenna and laptop configurations for a specific module FCC ID should be categorized and considered



Reuse of modular transmitters

● QUESTION

- What are equipment authorization requirements when an already Certified transmitter or module (generic or modular approved) is integrated for operating and marketing within another final product enclosure?

● Two scenarios:

- I. Transmitter or module has modular approval or limited modular approval
- II. Transmitter or module does not have modular or limited modular approval (i.e., non-modular-approval device)



Module Re-use (cont'd)

- I. If transmitter or module device has modular approval or limited modular approval:
 - If FCC ID for the modular-approval device will be labeled on the final product:
 - Except for RF exposure and radiated power and/or radiated emissions, additional equip. auth. not needed if:
 - Final product complies with module device usage and grant conditions
 - Final antenna configuration(s) and use conditions meet applicable rules (e.g., ERP / EIRP for some licensed, 15.204 antenna types for part 15)
 - Original module test data represents same characteristics in final product
 - Final product has module FCC ID label per applicable module policy
 - For limited modular approval, evaluate radiated emissions to determine whether Class I or Class II permissive change is applicable



Module Re-use (cont'd)

- I. If transmitter or module device has modular approval or limited modular approval (continued):
 - If FCC ID for the modular-approval device will NOT be labeled on the final product:
 - Product FCC ID supersedes the FCC ID of the modular-approval device integrated within final product enclosure
 - Complete 2.1033 info and product-specific test results for all final product components (including the modular-approval device) included in the application
 - Strictly speaking test results from original modular-approval device cannot be re-used within the new FCC ID filing (module FCC ID is superseded)
 - Modular-approval device FCC ID not shown on final product



Module Re-use (cont'd)

- II. If transmitter or module (-like) device does not have modular or limited modular approval (i.e., non-modular-approval device)
 - New FCC ID is required for the combined device (i.e. the already certified transmitter or module integrated within final product enclosure)
 - Complete 2.1033 info and product-specific test results for all final product components contained in the application
 - Test results from non-modular-approval component original filing cannot be re-used within the new FCC ID filing
 - New product cannot be labeled with the non-modular device original FCC ID



Questions and Answers

Thanks!