



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

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MODULE FREQUENTLY ASKED QUESTIONS

Question 1: What options are available for parties other than the original grantee to apply for changes to an existing modular grant?

Answer 1: When using a module in a host device, the actual end-use configurations often require changes in the authorization of the device that has been granted as a module. The following options are available for certified modules for a new party other than the grantee of the original certified module:

- a) Application for a Change of the FCC ID (Section 2.933).
 - 1) A new party must obtain written permission from the original grantee before applying for a change in FCC ID. This permission must be filed as a cover letter with the change in the FCC ID application. It should be signed or endorsed by an authorized representative of the original grantee. See KDB 249634.
 - 2) After a change in FCC ID filing, the new party may subsequently file a Class II permissive change to amend the grant authorized by the Commission under § 2.1043 and expand the operating environments not covered in the original grant. However, it is essential to note that the original grantee may be willing to file the permissive change in some cases, making the change in FCC ID unnecessary.
- b) New Certification Application, i.e., approved under a new FCC ID:
 - 1) If a new party wants to use a certified module but requires changes, it has two additional options other than a Change in FCC ID: (1) obtaining a new certification with a new FCC ID for a complete product utilizing the module as a part or subassembly;¹ Alternatively, (2) the new party can obtain a separate independent module certification under a new FCC ID (not a change in ID).
 - 2) The new certification of the complete product or separate independent module must fully comply with all the applicable rules and filing procedures. In the second option, as a new module, the new party must also explain why a change in ID is not used. In either case, it is essential to note that no vested or transferable grant conditions² from the original module, certifications are conveyed to the new product or module for the new party³.
 - 3) The complete product certification shall include all required exhibits, including test reports, schematics, cover letters, affidavits, and operational descriptions as appropriate for both cases.

¹ Part or subassembly refers to when a product's original certified module is used within a product as a component, system on a chip, or subassembly, i.e., not as a module integrated into a host and using the module's FCC certification.

² Unlike § 2.933 Change in equipment identification, which does not require resubmission of all test data. A new certification with a new FCC ID, all exhibits are required under § 2.1033 Application for certification.

³ The new party is fully responsible for its new product or separate module, whichever is applicable. For any changes by the original module grantee, the new party is responsible under § 2.907 to ensure that their product or module remains identical (see § 2.908) to the sample tested for the new product or module under the new FCC ID and any permissive changes permitted by 2.1043 under that FCC ID.

- 4) When the part or subassembly in the new device or the independent module is such, the originally granted module's conducted antenna port test data⁴ (e.g., conducted power, bandwidth, frequency tolerance, conducted antenna port emissions) is unchanged. Using the original certification test data in the new report is permitted to demonstrate the new device's results. The test report must indicate the data used from the original module certification test report⁵, and indicate the associated FCC ID. The test report shall also add a statement that the data referenced accurately represents the device's operation.
- 5) The new device, which utilizes the module as a component, requires new radiated emission testing and the original RF exposure evaluation or SAR test.

Question 2: How are U-NII modules with Dynamic Frequency Selection (DFS)/radar detection capability handled?

Answer 2: U-NII modular devices with radar detection are typically filed as limited modules covering the specific receive antennas used with the device. The performance of radar detection is affected by the received antennas, and therefore, the module approval is limited to the specific host/antenna used for the DFS compliance tests. However, standalone module approval can be obtained for devices with radar detection capability on a case-by-case basis. Further, the U-NII devices must comply with the additional guidance in KDB Publication 443999.

Question 3: Can unlicensed Part 15 transmitter modules and antennas be marketed separately?

Answer 3: Yes, the radio component portion of a transmitter module and its associated antennas may be marketed separately, but only if the module and antenna incorporate an authentication protocol to ensure that only authorized modules and authorized antennas work together.

Question 4: Can Part 15 transmitter modules and associated antennas be sold separately when the host performs the certification authentication protocol?

Answer 4: It is permissible to rely on the host to provide compliance with the authentication requirement between the certified module and the associated antenna. The certified module shall transmit once the host authentication ensures the properly certified antenna is present. The grantee is responsible for providing the authentication protocol and must give clear instructions to the host manufacturer on integrating the code within the host to ensure compliance.

Question 5: Can a grantee obtain limited modular approval for a transmitter that operates under specific host conditions and is installed by end users?

Answer 5: Yes, for user-installed limited module transmitters in a host (e.g., tablet and laptop computers), a two-way certification authentication protocol or BIOS lock implementation is required to

⁴ The test report for the new filing must be complete and contain all the test data representing that device including the data being used from the original certification test report and referencing the original FCC ID. Just referencing that the conducted test data is contained in the other FCC ID test report is not permitted.

⁵ The referenced data can only be from the original FCC ID's certified test report.

ensure compliance. This ensures that the module verifies that the proper host is used and that the host verifies that the appropriate module is used.

The Grant condition must state: “This device must use a BIOS lock mechanism which ensures that it only operates with hosts as specified in the certification filing.” This ensures that the module verifies that the proper host is used, and the host verifies that the appropriate module is used. For guidance on RF Exposure considerations, see KDB Publication 996369 D01.

Other options for a BIOS lock mechanism may be considered, but the FCC must agree to the method before TCB approval.

Question 6: Can end users install transmitter modules into a laptop computer with an integrated antenna built into the laptop screen or on the motherboard?

Answer 6: Yes. However, since the antenna is built into the laptop screen or on the motherboard and the module cannot be tested as a stand-alone module, it can only be approved as a limited module. Further, the approval requires a two-way certification authentication protocol between the host and the module. See answer five above.

Question 7: Can a module be a reference design layout intended as a portion of a host and integrated onto the host board during assembly?

Answer 7: No, this is considered a reference design, not a physical discrete component, and is not permitted.

Question 8: Can a module be approved as a Software Defined Radio (SDR)?

Answer 8: A physically delineated, tangible module may be approved as an SDR if it meets all the security requirements imposed by Section 2.944 and the requirements for a modular transmitter. The host manufacturer or the OEM integrator must not be able to modify the module's RF parameters or configuration options through software. See KDB Publication 442812 and the attachment for additional information.

Question 9: What are the requirements for using a certified device inside another enclosure or another device without having to re-certify the device in the new enclosure or device under a new FCC ID?

Answer 9: If the transmitter is certified as a module, it may be integrated or used inside another device. No further approval is required when the module is used by the FCC grant conditions and any limitations or usage conditions required by the manufacturer's instructions, as discussed in this publication and labeled as discussed in KDB Publication 784748.

For further guidance on changing the enclosure or permitting the use of a certified device not approved as a module, see KDB Publication 178919.

In both cases above, compliance with all grant conditions must be observed. For example, adherence to the grant condition states this transmitter cannot be co-located with other transmitters or used within a certain distance from a user's body or nearby persons. In addition, other electronic functions not associated with the certified module or certified transmitter may require additional equipment authorization.

Question 10: To qualify as a module, must the shielding enclose the entire module or just the RF circuitry? Is it acceptable if the module can meet the technical standards in a standalone configuration without shielding?

Answer 10: To qualify as a module, the RF circuitry must be shielded even if the module meets the limits in a standalone configuration without any shielding. The shielding design must fully encompass the RF circuitry, including shielding the top, all sides, and the bottom of the RF section. The bottom may be a shielding ground plane. It must be expressly designed as an effective shield made of sheet metal, metal mesh, or metallic ink-coated material. Any holes in the shield must be significantly smaller than the wavelength of the radiation being blocked to effectively approximate an unbroken conducting surface.

The shielding of the RF section helps prevent RF coupling when installed in a host. Other circuitry, such as flash memory, a temperature sensor, input voltage regulators, input data buffering circuits, etc., may not be RF and, therefore, need not be shielded. However, the grantee must use good engineering judgment to reduce any possible RF coupling that might affect a host.

Question 11: Can a module be certified where the host device uses a microstrip trace on the host's printed circuit board to an antenna connector or a trace antenna on the host circuit board?

Answer 11: The following provisions apply to unlicensed and licensed device modular approvals.

A modular transmitter may be certified when the connection to the antenna is made through a host's printed board microstrip trace layout to an external connector, trace antenna, or component (chip) antenna on a printed circuit board (herein referenced as "trace design"). This can include passive parts for antenna attenuation padding, impedance matching, or providing test ports. Other components, such as amplifiers and active drivers, are not considered a trace layout and must be contained in the module.

The certification application shall include detailed engineering reference dimensions for the trace design and the required OEM instructions (see KDB Publication 996369 D01) for all trace designs approved with the module. In particular, the integration instructions shall include the following:

- a) Trace layout and dimensions, including specific designs for each design:
 - 1) Layout of trace design, parts, antenna, connectors, and isolation requirements.
 - 2) Each type of antenna must clearly describe the Boundary limits of size, thickness, length, width, shape(s), dielectric constant, and impedance.
 - 3) Different antenna lengths and shapes affect radiated emissions, and each design shall be considered a different type; e.g., antenna length in multiple(s) of frequency wavelength and antenna shape (traces in phase) can affect antenna gain and must be considered.
 - 4) A Gerber file (or equivalent) for PC layout should provide the above data.
- b) Test procedures for design verification.
- c) Production test procedures are used to ensure compliance.

Only trace designs approved with an original grant or through permissive change can be used by an OEM. PCB circuit designs have an increased potential for design mishandling and are susceptible to cross-talk and increased unintentional radiation. The applicant must provide compliance test data for all marketed or used antenna circuit trace designs. Different antenna lengths and trace layouts can affect radiated emissions, and each design shall be considered a different type.

To demonstrate compliance, when not limited to a specific host, each trace design (type) shall use a standalone reference PCB test board design representative of the worst-case boundary limits (as constrained by the design rules documented in the integration instructions).

The most recent test procedures and guidance must be followed for SAR consideration, as discussed in KDB Publication 996369 D01 and all the relevant KDB publications, particularly the conditions defined in KDB Publication 447498.

It is recommended that the grantee agree with the host manufacturer to build the device according to any necessary instructions to ensure compliance.

Grant comment: “This module can only be used when installed in a host device that follows the required instructions for using a trace reference design.”

The integration instructions must state that this module’s FCC certification is only valid when the manufacturer/integrator adheres to the trace reference design guidance provided in this integration instruction.

Suppose the trace reference design information in the operational description is confidential. In that case, the grantee must provide a procedure for integrators to access sufficient information, even if adequately redacted, to protect intellectual property and sensitive content.

Question 12: Aside from RF exposure evaluation considerations (which are covered in, e.g., Question 13), is there guidance for multiple certified *transmitters with a modular grant of certification (hereafter referred to as Modules) when integrated into a host and transmitting simultaneously in the same or different bands?*

Answer 12: The host manufacturer or integrator (hereafter referred to as the host responsible party for compliance with the Equipment Authorization rules applicable to the host device by Clause IX in KDB Publication 996369 D01) is responsible for compliance with the appropriate FCC rules and Equipment Authorization published procedures for all the transmitters in the host, both operating individually and simultaneously. This includes compliance for summing all emissions from all outputs occupying the same or overlapping frequency ranges, as defined by the applicable rules.

For EMC/radio-parameter compliance purposes, an evaluation may be done by the grantee *host responsible party*.

The *host responsible party* integrator must perform EMC testing of the Module in simultaneous transmission operations while integrated into the host. It is unnecessary to file the result of these simultaneous transmission test data if no emissions with increased amplitude and/or on different frequencies are detected compared to what is reported in the modular grant (that refers to single-transmitter operations testing). This comparison is considered acceptable if:

- any detected variations are within the overall tolerance of the test equipment used by the *host responsible party*,

and

- compliance would still be demonstrated for the overall tolerance of the test equipment used by the host responsible party (this is to prevent purposely the use of an excessively high tolerance test equipment).

For instance, if the *Module* EMC emissions, as reported in the grant of certification, are 0.5% below the compliance limit (or equivalent value in dB) for a particular frequency, and the *host responsible party instrumentation tolerance is shown to be 1%*, then the *host responsible party cannot claim that the*

module's operation in the host is compliant.

Suppose additional emissions from the simultaneous transmission operations are present (within the provision discussed above). In that case, the *host responsible party must account for those emissions in the equipment authorization documentation. In the case of a host authorized via SDoC, the pertinent document of record shall include the additional compliance data and be retained according to 47 CFR §2.906.*

For hosts that utilize the certification Equipment Authorization procedure, the proper test report exhibit(s) shall be updated following a Class II permissive change related to the host certification filing. An exception to this requirement is for hosts certified as Unintentional Radiators under Part 15 B. For these cases, per KDB 447498, the certification of the unintentional radiator does not require filing an RF exposure report. Therefore, since no change in the RF exposure exhibits is made, the Class 2 Permissive Change is unnecessary.

Question 13: As described in the following three questions, what are the RF exposure procedures to be followed when integrating transmitters with a modular grant of Equipment Authorization via the certification procedure (hereafter referred to as *Modules*) in hosts that lead to conditions of operation different from those for which the *Module* was certified?

More specifically, three cases are being considered:

QUESTION 13A). A transmitter *Module* certified as a 2.1091-mobile configuration is integrated into a host, and by its design, the host will continuously operate the *Module* in stand-alone conditions, i.e., without any other transmitter in the host (if any) operating while the *Module* is transmitting. What are the *Module* integration requirements if the host design and operations require that the host be classified as a 2.1093 portable device?

ANSWER 13A): The *module's* 2.1091 mobile configuration implies less restrictive conditions than those for the 2.1093 portable case. Therefore, in this case, additional testing, modifications, and/or evaluation are needed to allow the *Module* to operate in a host device under the more restrictive 2.1093 portable configuration conditions.

This may be accomplished through a *Module* Class II permissive change filing, demonstrating that the *Module* meets the 2.1093-portable requirements as integrated into the host. In some cases, the *Module* as designed may meet the 2.1093-portable requirements, even if it was certified as 2.1091-mobile. For instance, this could be the case when the RF power is sufficiently low. In other cases, the *Module* may need modifications (hardware and/or firmware), typically to reduce the RF power, and/or inserted within the host layout so that the 2.1093-portable requirements are met, for example, due to a sufficient distance from the host outer enclosure.

Permissive changes for the *Module* can be filed only by the *Module* grantee. In the alternative, the *host responsible party* may first request to obtain a change of FCC ID for the *Module* and subsequently file for the appropriate Class II permissive change that pertains to the specific host installation for the module with the newly obtained FCC ID.

Finally, another option for the host responsible party is to consider certification for the entire host device. In contrast, the modular transmitters are just considered “components,” thus, without referring to the modular certification that was previously obtained. Accordingly, as for any other component present in the host, equipment authorization compliance is to be determined about the testing of the entire host device, per all applicable rule parts.

QUESTION 13B): For a single host certified as a 2.1091-mobile device, what are the procedures for integrating Modules that may transmit simultaneously with other RF devices (regardless of whether they are modular transmitters) present in the host?

ANSWER 13B):

The *host responsible party* needs to perform a new RF Exposure MPE evaluation (which may also include determining test exemption conditions, as applicable) for all the combinations of simultaneous transmissions allowed by design or for a demonstrated worst-case scenario.

Consistently with this evaluation, a minimum compliance boundary (i.e., a minimum distance required between a person's body and the radiating structures in the host) will be established. Generally, the compliance boundary may not be isotropic, i.e., larger than 20 cm in some directions. For this reason, the MPE evaluation is required along the three principal axes of each radiating structure integrated into the host. Symmetry considerations may be used to reduce the amount of testing.

If the compliance boundary resulting from the evaluation just described is less or equal to each established for the *Module* certifications and all directions, the review shall be reported in the RF exposure exhibit of the host certification filings.

When *Modules* are operated in simultaneous transmission within a host, and the host is certified via SDoC, the documents of record retained by the manufacturer and subject to FCC inspection upon request per 47 CRF 2.906 shall contain the details of the evaluations performed to ensure compliance with *Modules* operating in simultaneous transmission.

If the compliance boundary exceeds those established in the *Module* certifications, a Class II permissive change for the pertinent *Module* (s) will be required. The applicable permissive change options, consistent with the rules, are the same as described in ANSWER 13A above. The host manufacturer always has the option to apply for their own FCC ID either for a *Module* or for the entire host.

QUESTION 13C). What are the procedures for integrating *Modules* that may transmit simultaneously into a single host certified as a 2.1093 portable device?

ANSWER 13C). As discussed in ANSWER 13B, when *Modules* are operated in simultaneous transmission within a host and the host is certified via SDoC, the documents of record retained by the manufacturer and subject to FCC inspection upon request per 47 CRF 2.906 shall contain the details of the evaluations performed to ensure compliance with *Modules* operating in simultaneous transmissions.

The *host responsible party* needs to perform a new RF Exposure evaluation to establish compliance with all the combinations of simultaneous transmissions that are allowed by design or for a demonstrated worst-case scenario. This may also include the determination of test exemption conditions, as applicable.

In some cases, this compliance evaluation may be accomplished through a simplified procedure (as opposed to a complete RF exposure testing of the host device) that requires only the knowledge of the maximum Total Exposure Ratio (TER, based on SAR or power density, as applicable) for each *Module*, and the relative distances between the radiating structures of each *Module* and every other transmitter (*Module* or not) installed in the host. This procedure is illustrated in KDB Publication 447498 and is based on the "SAR to Peak Location Separation Ratio" (SPLSR) test exemption formula.

In summary, the SPLSR condition is evaluated for each *Module* integrated into the host. So long as the *Module* and its distance from any other transmitter meet the SPLSR formula requirements, no further testing is required (however, the details of this evaluation shall be reported as an exhibit in the RF

exposure section of the host certification filings).

If the SPLSR condition is not met for any particular module, the installation position in the host may need to be changed so that a larger distance is imposed from other transmitters. If that is not possible or sufficient, the *Module* may require modifications to reduce the RF power (and therefore the maximum SAR or TER). These modifications shall be reported via a Class II permissive change, and the related discussion in ANSWER 13A) also applies here. When more than one *Module* is integrated into a host, each *Module* and any related permissive change is considered and filed separately.

Finally, if the SPLSR procedure (including any *Module* modification) is not sufficient to demonstrate compliance, the *host responsible party* is required to certify the host by providing a complete RF exposure evaluation without relying on the information obtained from the individual certification of the *Modules* that are being integrated into the host.

Question 14: Can a host manufacturer integrate a non-modular transmitter (e.g., a USB dongle) into a non-accessible enclosure and label the device with the FCC identifier, such as “This product contains transmitter FCC ID XXXYYZZZ?”

Answer 14: This is acceptable under the following conditions:

- a) The host manufacturer must adhere to all guidance provided in KDB Publication 996369, including RF exposure requirements,
- b) The transmitter is also approved as a computer peripheral under DoC or certification and must use a standard computer peripheral connector (e.g., USB),
- c) No modifications are made to the transmitter (i.e., the device integrated is identical to what is approved),
- d) Only antennas already approved with the device are used, and by all grant conditions and installation requirements,
- e) The host manufacturer performs verification testing to ensure that the device still complies (See Clause IX in KDB Publication 996369 D01),
- f) The host manufacturer provides appropriate Part 15 user information, including any applicable RF exposure warnings.

Note that the host manufacturer requires a new certification and filing if any of the preceding conditions cannot be met.

Change Notice:

10/23/2023: 996369 D02 Module Q and A v01 has been changed to 996369 D02 Module Q and A v02. The overall document has undergone editorial changes. Q&A 11 has been modified to clarify the procedures, and Q12 and Q13 have been rewritten.

10/11/2024: 96369 D02 Module Q and A v02 has been changed to 996369 D02 Module Q and A v02r01. Question 1 has been clarified to be more specific. The overall document has undergone some general grammatical changes.

11/15/2024: 96369 D02 Module Q and A v02r01 has been changed to 996369 D02 Module Q and A v02r02. v02r02 corrected the document title and made minor grammatical changes.