Request for Modular/Limited Modular Approval

Date: October 8, 2021

Subject: Manufacturer's Declaration for ☒ - Modular Approval ☐ - Split Modular Approval
☐ - Limited Modular Approval ☐ - Limited Split Modular Approval

Confidentiality Request for: 2AFC3ESPSM001

8 Basic Requirements – FCC Part 15.212(a)(1) **For Items Marked "NO(*)", the Limited Module Description Must be Filled Out on the Following Pages**		
Modular Approval Requirement	**Requirement Met**	
1. The modular transmitter must have its own RF shielding. This is intended to ensure that the module does not have to rely upon the shielding provided by the device into which it is installed in order for all modular transmitter emissions to comply with FCC limits. It is also intended to prevent coupling between the RF circuitry of the module and any wires or circuits in the device into which the module is installed. Such coupling may result in non-compliant operation. The physical crystal and tuning capacitors may be located external to the shielded radio elements. 15.212(a)(1)(i)	☒ - YES	☐ - NO(*)
The radio portion of this module is shielded, please see External Photos exhibit.		
2. The modular transmitter must have buffered modulation/data inputs (if such inputs are provided) to ensure that the module will comply with FCC requirements under conditions of excessive data rates or over-modulation. 15.212(a)(1)(ii)	☒ - YES	☐ - NO(*)
The EUT has buffered data inputs integrated in chip ESP32		
3. The modular transmitter must have its own power supply regulation on the module. This is intended to ensure that the module will comply with FCC requirements regardless of the design of the power supplying circuitry in the device into which the module is installed. 15.212(a)(1)(iii)	☒ - YES	☐ - NO(*)
The EUT power is inherently regulated in the ESP32 radio chip, operating range from 2.3 to 3.6 VDC. Below this voltage the EUT does not operate. Above this voltage the EUT fails to function.		
4. The modular transmitter must comply with the antenna and transmission system requirements of §§ 15.203, 15.204(b), 15.204(c), 15.212(a), and 2.929(b). The antenna must either be permanently attached or employ a ''unique'' antenna coupler (at all connections between the module and the antenna, including the cable). The ''professional installation'' provision of § 15.203 is not applicable to modules but can apply to limited modular approvals under paragraph 15.212(b). 15.212(a)(1)(iv)	☒ - YES	☐ - NO(*)
The EUT meets the antenna requirements. The spurious emission, unique antenna connector and photos of both its on-board antenna or the optional external antenna via unique u.fl. connector are included in filing exhibits.		
5. The modular transmitter must be tested in a stand-alone configuration, i.e., the module must not be inside another device during testing. This is intended to demonstrate that the module is capable of complying with Part 15 emission limits regardless of the device into which it is eventually installed. Unless the transmitter module will be battery powered, it must comply with the AC line conducted requirements found in Section 15.207. AC or DC power lines and data input/output lines connected to the module must not contain ferrites, unless they will be marketed with the module (see Section 15.27(a)). The length of these lines shall be length typical of actual use or, if that length is unknown, at least 10 centimeters to insure that there is no coupling between the case of the module and supporting equipment. Any accessories, peripherals, or support equipment connected to the module during testing shall be unmodified or commercially available (see Section 15.31(i)). 15.212(a)(1)(v)	☒ - YES	☐ - NO(*)
The EUT was tested in a stand-alone configuration, mounted on a development interface allowing UART commands to be sent to the chipset. Please see test setup photographs and block diagram in the test report, where the EUT was plugged into a development board for testing.		

Modular Approval Requirement	Requirement Met	
6. The modular transmitter must be labeled with its own FCC ID number, or use an electron display (see KDB Publication 784748). If using a permanently affixed label with its own FCC ID number, if the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: XYZMODEL1" or "Contains FCC ID: XYZMODEL1." Any similar wording that expresses the same meaning may be used. The Grantee may either provide such a label, an example of which must be included in the application for equipment authorization, or, must provide adequate instructions along with the module which explain this requirement. In the latter case, a copy of these instructions must be included in the application for equipment authorization. If the modular transmitter uses an electronic display of the FCC identification number, the information must be readily accessible and visible on the modular transmitter or on the device in which it is installed. If the module is installed inside another device, then the outside of the device into which the module is installed must display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains FCC certified transmitter module(s)." Any similar wording that expresses the same meaning may be used. The user manual must include instructions on how to access the electronic display. A copy of these instructions must be included in the application for equipment authorization. 15.212(a)(1)(vi)	☒ - YES	☐ - NO(*)
Please see labeling exhibit demonstrating where the FCC ID is applied to this module. In the User's Manual exhibit there are instructions to the OEM on how to label the end product.		
7. The modular transmitter must comply with all specific rule or operating requirements applicable to the transmitter, including all the conditions provided in the integration instructions by the grantee. A copy of these instructions must be included in the application for equipment authorization. For example, there are very strict operational and timing requirements that must be met before a transmitter is authorized for operation under Section 15.231. For instance, data transmission is prohibited, except for operation under Section 15.231(e), in which case there are separate field strength level and timing requirements. Compliance with these requirements must be assured. 15.212(a)(1)(vii)	☒ - YES	☐ - NO(*)
The EUT is compliant with all applicable FCC rules. Detailed instructions for maintaining compliance are given in the User's Manual.		
8. The modular transmitter must comply with any applicable RF exposure requirements. For example, FCC Rules in Sections 2.1091, 2.1093 and specific Sections of Part 15, including 15.319(i), 15.407(f), 15.253(f) and 15.255(g), require that Unlicensed PCS, UNII and millimeter wave devices perform routine environmental evaluation for RF Exposure to demonstrate compliance. In addition, spread spectrum transmitters operating under Section 15.247 are required to address RF Exposure compliance in accordance with Section 15.247(b)(4). Modular transmitters approved under other Sections of Part 15, when necessary, may also need to address certain RF Exposure concerns, typically by providing specific installation and operating instructions for users, installers and other interested parties to ensure compliance. 15.212(a)(1)(viii)	☒ - YES	☐ - NO(*)
The EUT is compliant with all applicable RF exposure requirements. RF Exposure is addressed in the RF exposure exhibit and required end user separation requirements are detailed in the user's manual exhibit.		

Limited Module Description – When Applicable
* If a module does NOT meet one or more of the above 8 requirements, the applicant may request Limited Modular Approval (LMA). This Limited Modular Approval (LMA) is applied with the understanding that the applicant will demonstrate and will retain control over the final installation of the device, such that compliance of the end product is always assured. The operating condition(s) for the LMA; the module is only approved for use when installed in devices produced by grantee. A description regarding how control of the end product, into which the module will be installed, will be maintained by the applicant/manufacturer, such that full compliance of the end product is always ensured should be provided here. ***Details: <example - N/A>***

Software Considerations – KDB 594280 / KDB 442812 (One of the following 2 items must be applied)		
Requirement	**Requirement Met**	
1. For non-Software Defined Radio transmitter modules where software is used to ensure compliance of the device, technical description must be provided about how such control is implemented to ensure prevention of third-party modification; see KDB Publication 594280.	☒ - Provided in Separate Cover Letter	☐ - N/A
The firmware of the device is fixed by the manufacturer and may not be modified or adjusted by the end user as described in a separate cover letter filed with this application.		
2. For Software Defined Radio (SDR) devices, transmitter module applications must provide a software security description; see KDB Publication 442812.	☐ - Provided in Separate Cover Letter	☒ - N/A
Details: <example –N/A>		

Split Modular Requirements		
Requirement	**Provided in Manual**	
1. For split modular transmitters, specific descriptions for secure communications between front-end and control sections, including authentication and restrictions on third-party modifications; also, instructions to third-party integrators on how control is maintained.	☐ - Provided in Separate Cover Letter	☒ - N/A
Details: <example – N/A >		

OEM Integration Manual Guidance – KDB 996369 D03 Section 2

Clear and Specific Instructions Describing the Conditions, Limitations, and Procedures for third-parties to use and/or integrate the module into a host device.

Requirement		
Is this module intended for sale to third parties?	☒ - YES	☐ - No, If No, and LMA applies, the applicant can optionally choose to not make the following detailed info public. However there still needs to be basic integration instructions for a users manual and the information below must still be included in the operational description. If the applicant wishes to keep this info confidential, this will require a separate statement cover letter explaining the module is not for sale to third parties and that integration instructions are internal confidential documents.

Items required to be in the manual – See KDB 996369 D03, Section 2

As of May 1, 2019, the FCC requires ALL the following information to be in the installation manual. Modular transmitter applicants should include information in their instructions for all these items indicating clearly when they are not applicable. For example information on trace antenna design could indicate "Not Applicable". Also if a module is limited to only a grantees own products and not intended for sale to third parties, the user instructions may not need to be detailed and the following items can be placed in the operational description, but this should include a cover letter as cited above.

1. List of applicable FCC rules. KDB 996369 D03, Section 2.2 a. Only list rules related to the transmitter.	☒ - All Items shown to the left are provided in the Modular Integration Guide (or UM) for Full Modular Approval (MA) or LMA. ☐ - An LMA applies and is approved ONLY for use by the grantee in their own products, and not intended for sale to 3rd parties as provided in a separate cover letter. Therefore the information shown to the left is found in the theory of operation.
2. Summarize the specific operational use conditions. KDB 996369 D03, Section 2.3 a. Conditions such as limits on antennas, cable loss, reduction of power for point to point systems, professional installation info	
3. Limited Module Procedures. KDB 996369 D03, Section 2.4 a. Describe alternative means that the grantee uses to verify the host meets the necessary limiting conditions b. When RF exposure evaluation is necessary, state how control will be maintained such that compliance is ensured, such as Class II for new hosts, etc.	
4. Trace antenna designs. KDB 996369 D03, Section 2.5 a. Layout of trace design, parts list, antenna, connectors, isolation requirements, tests for design verification, and production test procedures for ensuring compliance. If confidential, the method used to keep confidential must be identified and information provided in the operational description.	
5. RF exposure considerations. KDB 996369 D03, Section 2.6 a. Clearly and explicitly state conditions that allow host manufacturers to use the module. Two types of instructions are necessary: first to the host manufacturer to define conditions (mobile, portable – xx cm from body) and second additional text needed to be provided to the end user in the host product manuals.	
6. Antennas. KDB 996369 D03, Section 2.7 a. List of antennas included in the application and all applicable professional installer instructions when applicable. The antenna list shall also identify the antenna types (monopole, PIFA, dipole, etc – note that "omni-directional" is not considered a type)	
7. Label and compliance information. KDB 996369 D03, Section 2.8 a. Advice to host integrators that they need to provide a physical or e-label stating "Contains FCC ID: " with their finished product	
8. Information on test modes and additional testing requirements. KDB 996369 D03, Section 2.9 a. Test modes that should be taken into consideration by host integrators including clarifications necessary for stand-alone and simultaneous configurations. b. Provide information on how to configure test modes for evaluation	
9. Additional testing, Part 15 Subpart B disclaimer. KDB 996369 D03, Section 2.10	

Sincerely,

By: _____ (Signature/Title[1]) ____Joseph D. Brunett_____ (Print name)

[1] - Must be signed by applicant contact given for applicant on the FCC site, or by the authorized agent if an appropriate authorized agent letter has been provided. Letters should be placed on appropriate letterhead.