



Module Integration Review

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Brief History On Modules

- The FCC issued the first modular grants in the 1990's. Once such module included the following.
 - Operation in the 2.4 GHz band
 - Module was approximately the size of a small smart phone
 - Certified antennas were anywhere from 2 ½ inches to 2 feet
- In 2020 alone, over hundreds of new Original Equipment grants were issued under various Equipment Classes.
 - Operation now in the mmWave range
 - Some modules are no bigger than a penny
 - Many have integrated antennas
 - Most are now soldered onto the main PCB
- As technology has changed and evolved, so have the FCC's polices toward Modular Approval and integration.



Integration Issues

- Modules are initially certified as stand-alone devices.
- The original working theory was if a module was certified stand-alone, without a host, then once integrated into a host, the module should (ideally) retain its compliance.
- We have, however, seen cases where the module goes out of compliance once integrated into a host.
- Because of abundance and ease of use, multi-module integration into hosts is commonplace.
- This statistically increases the potential of non-compliance issues.
- Publication 996369 was developed as guidance for both the module manufacturer and the host integrator.



Co-location Basics

- Publication 447498 RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices
- Publication 996369 Module Certification and Integration Guide
- The most need for clarification seems to occur when co-locating modules
- General rule: there needs to be a focus on traceability to show that RF exposure was addressed
- There are many different methods to this end
 - The final host has its own FCC ID
 - Class II PC to one of the modules to address co-location
 - Change in ID followed by Class II Permissive Change
 - Any combination of the aforementioned



Example 1

- A host integrator wishes to integrate multiple modules into a box where simultaneous transmission will exist.
- The RF Exposure condition for this configuration will be mobile.
- The relevant published FCC references are Question 13B of KDB 996369 D02 v06 and 7.2 of KDB 447498.
- When simultaneous transmission MPE test exclusion applies, $[\sum \text{ of MPE ratios}] \leq 1.0$ transmitter modules may be incorporated in host devices according to Class I Permissive Change requirements.
- If compliance to MPE requirements is demonstrated by measurement or computational modeling, then a Class II Permissive Change is required.
- Label end-product in accordance with KDB 784748, A.6 “Contains FCC IDs: XYZNODEL1, XYZMODEL2,”



Example 2

- A host integrator wishes to integrate multiple modules into a box and obtain their own FCC ID for the final product.
- Since the host integrator wishes to have their own FCC ID, this must be treated as a new application. Minimally, the following exhibits will be required for this new certification. (Based on §2.1033)
 - User Manual
 - Operational Description
 - Block Diagram and Schematics
 - EMC and RF Exposure Test Reports



Example 2 - Cont'd

- EMC compliance for the composite host device may be demonstrated through spot check and simultaneous transmission testing as well as data referencing in accordance with KDB 996369 D02 Question 1.
- RF Exposure compliance will need to be performed based upon guidance in KDB 447498. (Mobile versus Portable exposure conditions) along with any other technology specific guidance.
- Addressing compliance of all modules in a specific host under a new FCC ID would be considered the most meticulous approach.



Example 3

- A host integrator wishes to integrate a certified module into a box along with a new radio of the host integrator's own design.
- The intended RF Exposure condition for this end-product is mobile.
- Since the host integrator will be required to have their own FCC ID for the new radio of their own design, that part must be treated as a new application.
- The host integrator could then add the module under their own FCC ID and follow the steps outlined in Example 2.



Example 3 – Cont'd

- Otherwise, the host integrator could request a Change in ID for the module, then perform a Class II Permissive Change and add co-location as a grant condition for that specific host.
- Otherwise, the host integrator could work with the module manufacturer to have added a Class II Permissive Change to add a co-location condition to the modular grant in a specific host.
- Unless the module is incorporated under the same FCC ID as the new radio certification, the product label will have to include “Contains FCC ID: XXX-YYYYY” for the module.



Thank You!