



Equipment Authorization – Modular Devices

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TCB Workshop

Jim Szeliga

Laboratory Division
Office of Engineering and Technology
Federal Communications Commission



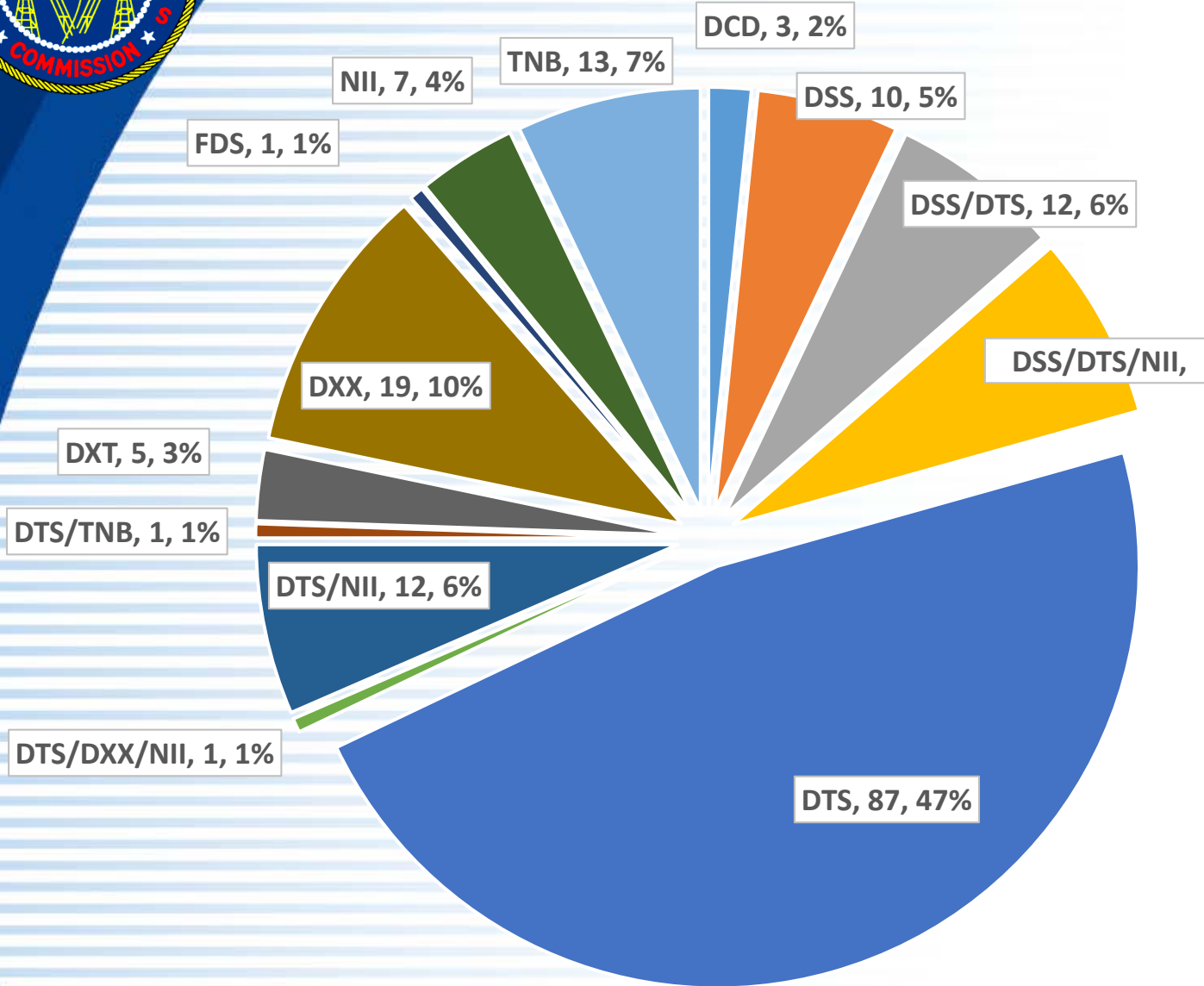
What we want to cover

- Past Presentations :
 - Host manufacturer using certified RF modules have the same compliance requirements as a standalone product. The advantage is a reduction or elimination of certification filing.
 - Oct 2015–PAG & Q&A 12: If no additional items need to be reported, host manufacturer can use an evaluation approach - Verification procedure.
- For this presentation we are going to focus on certified RF module application exhibits in two areas:
 - Identifying the Module - external photo - to help define the module and reduce confusion.
 - Grantee's host integration instructions to be included in application.



Modules Play a Key Role in Today's Products (IOT)

184 New Grants Jun-Aug 2016

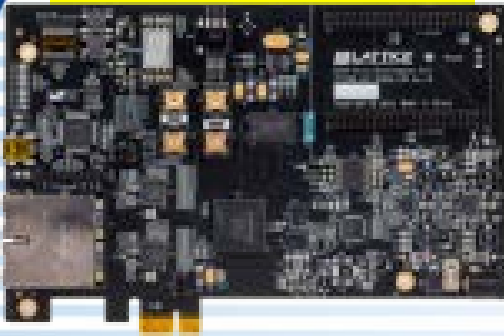




Making the Information Consistent

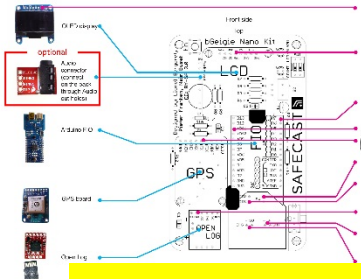


External Photo



Review of Current fillings

Large parts placement guide



Host Mfg.

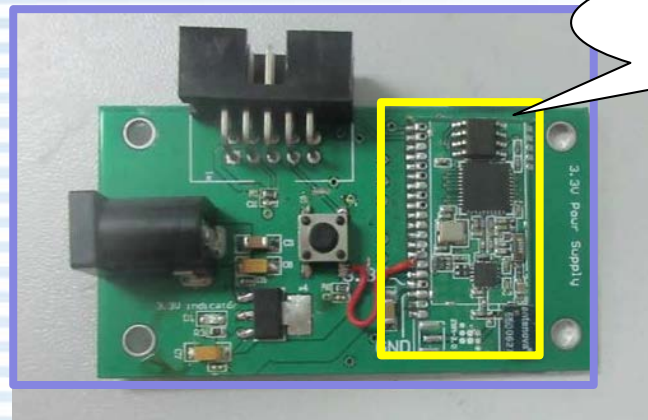
Integration Instructions

Review	Example <u>XTE-NODE103</u>	Some Others
Module Approval Request Simple Y/N	A	C
External Pictures of the module	A	D
Block Diagram	B	C
Schematics	A	D
Integration instructions for Host Mfg.	A-	D
Overall Grade	A	D



External Photo –in the Filing

- Clearly identify the module
- Clearly identify the stand alone host board used for testing



Module

- ✓ Module exhibits must differentiate between the module that is being certified and any test board or any supporting evaluation kit.
- ✓ Any certified transmitter module (under 15.212) can be marketed to developers to include an optional or ancillary evaluation /developing Kit under 2.803.
- ✓ The evaluation board can be exempt from an equipment authorization.



Module Integration and Evaluation

- Grantee's integration instructions need to provide the guidance for additional testing to verify compliance as a composite system.
- As such, when they are tested for 15B, the host manufacturer is required to show compliance with 15B while the module(s) are installed and operating.
- Modules should be transmitting and the evaluation should confirm that the module's intentional emissions are compliant (fundamental/out of band).
- Verify that there are no additional unintentional emissions other than what is permitted in 15B or emissions compliant with the transmitter(s) rule(s). Any additional non-compliant emissions are unintentional which means the host is not compliant.
- Refer to Sections 15.31(h) and 15.31(k)



Module Integration -

Rules for composite System:

- 15.31 (h)** For a composite system that incorporates devices contained either in a single enclosure or in separate enclosures connected by wire or cable, testing for compliance with the standards in this part shall be performed with all of the devices in the system functioning....
- 15.31 (k)** A composite system is a system that incorporates different devices contained either in a single enclosure or in separate enclosures connected by wire or cable. If the individual devices in a composite system are subject to different technical standards, each such device must comply with its specific standards. In no event may the measured emissions of the composite system exceed the highest level permitted for an individual component.....



Module Shielding

- Intended to prevent (near field) coupling between the RF circuitry of the module and any wires or circuits (traces) on the host. This includes egress and ingress.
- Many shields incorporate apertures (holes) in their structure to allow air to flow through to reduce thermal buildup.
- The size and number of opening, thickness, and material and frequency effect how well a shield works.
- A shield is engineered (not guessed at) and can range from simple to very complex.



Module Shielding (cont'd)

- Shielding is a fundamental engineering design task that must be considered by the host manufacturer when integrating a module.
- Proposed Module Guidance
 - Module Manufacturer is responsible for documenting and providing design engineering guidance criteria for limiting in-host RF coupling.
- Question 10 Shielding
 - The shielding design must fully enfold the RF circuitry - that includes shielding the top, all sides, and the bottom. The bottom may be a shielding ground plane,
 - Must be expressly designed as an effective shield made of materials such as sheet metal, metal mesh, or a metallic ink coated material.



Module Shielding (cont'd)

● Question 10 Shielding – Proposed Modification

- Any holes in the shield must be significantly smaller than the wavelength of the radiation (typically 20 times) that is being blocked, to effectively approximate an unbroken conducting surface.
 - To have a cutoff frequency 10X the highest frequency expected by the fundamental or expected host clocking frequencies, whichever is highest.
 - Provide engineering guidance to the integrator (in the instruction manual) defining the effective shielding design and any recommended (in host) evaluation testing that may be applicable.
 - Providing guidance to the host manufacturer for verification testing.



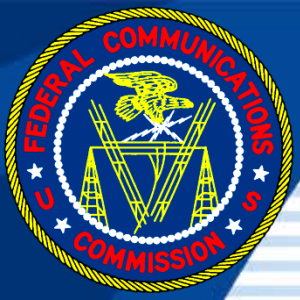
Antenna Traces

- Change Q11-Trace antenna designs
- Provide detail trace designs
 - Such as Gerber file
 - Detail layout diagrams
- Adding guidance for verification testing in specific host design.
 - Standing wave testing, impedance testing
 - Evaluation testing-like a standalone product.



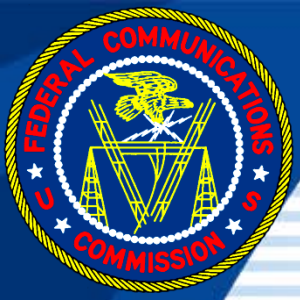
Other Responsibilities

- The responsible party must demonstrate how it will retain control over the final installation of the device such that compliance of the product is ensured.
- The following procedures need to be spelled out in the integration instructions.
 - This includes the requirements for limited modules such as no shielding, buffered modulation/data inputs, and power supply regulation.
 - Provide detail guidance for the host manufacturer to test and record as a verification procedure for each specific host.



Other Responsibilities (cont'd)

- Provide additional guidance procedure for situations that require filling grantee to file permissive changes, or have host provider do a change in ID for conditions such as RF exposure and HAC.
- Host selects regulatory domains:
 - Require PAG for documented security method between host mfg. and grantee.
 - Business arrangement - joint responsibility



Questions and Answers

Thanks!