



Review of TCB PAG Submissions

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Note: The views expressed in this presentation are those of the author and may not necessarily represent the views of the Federal Communications Commission.



Overview

- There are fewer categories on the PAG list now than at the time of the last workshop.
- However, the FCC still has an extensive number of applications to process as industry is designing more and more devices incorporating wireless technology.
- The quicker an application can be reviewed and approved, the better it is for all parties involved. (Stakeholders, Labs, TCBs, and the FCC)
- Thus, having an application with minimal (or no) mistakes or shortcomings is the goal.
- The more requests for technical information there are, the longer an application can take to conclude.
- This session, we will be looking at some items specific to PAG items UN6GHZ, MODLIM, and some general topics.



General Concerns

Copied from October 2022 presentation

- Explaining why a mistake in a report was made.
 - Even with the FCC checklists, KDBs and TCB presentations, report mistakes are still being found.
 - When asked why, it is not sufficient to just say, “report has been corrected”.
 - We want/need to know the reason for the shortcoming.
 - Depending on the structure of your particular Lab or TCB, it’s possible the PAG has passed through many different hands.
 - **LAB: Report Prepared by, Reviewed by, Approved by**
 - **TCB: Admin, Reviewer, Certifier**



General Concerns

● Data Referencing

- Data Referencing was created as a way to allow labs further test reduction while attempting to ensuring compliance for the variant or “like” models.
- KDB 484596 gives the guidelines for data referencing.
- There have been, however, a few key guidelines which have not been followed concerning data referencing.
 - Spot checks need to be in the test report for the variant model.
 - Summary table for variant models should make it very clear what is referenced data and what is tested.



UN6GHZ

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● Contention Based Protocol

- In this section of the test report, please clearly state whether or not the device uses either channel puncturing or bandwidth reduction for the purpose of incumbent avoidance.
 - **With regards to “in this section”, it means in the Contention Based Protocol section of the test report.**
 - **Even if the EUT isn’t necessarily an 802.11 device.**



UN6GHZ

Copied from April 2023 presentation

● Power and PSD EIRP Tables

- Devices which fall under the PAG category of UN6GHZ has limits in EIRP.
- This requires a power measurement plus an antenna gain.
- When summarizing the results in tabular form, **PLEASE** include both the power and antenna gain.
- This will greatly aid in reviewing the reports.
- Quantities such as duty cycle and cable loss, if applicable, need not necessarily appear in the summary table so long as it is clear they are accounted for in the measurement instrumentation.



UN6GHZ

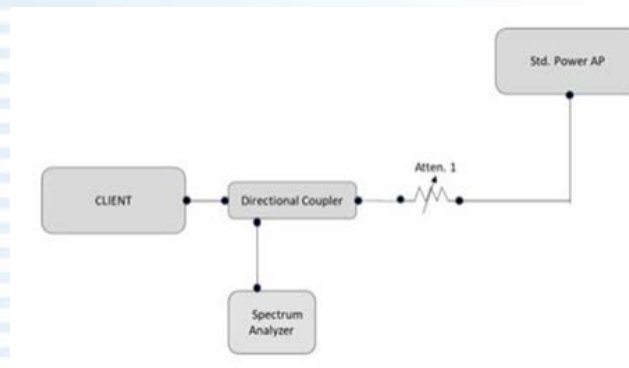
● Power and PSD EIRP Tables – cont'd

- Lack of description on how duty cycle is accounted for when operating under 98%.
 - Some labs include this information in the test table along with the antenna gain.
 - This method makes it very obvious.
 - Most labs use power meters.
 - The measurement can be adjusted as an offset in the power meter. If this is the case, then please make it known very clearly that this method was used.
 - The same goes for when a spectrum analyzer is used to make the measurement then offset.



UN6GHZ

- Power Adjustment for Clients and TPC for VLP
 - For these tests, please include a diagram of your test setup.
 - Please don't just cut-and-paste a picture from our KDB 987594. (Unless your test setup is identical.)



- Also, in this section, please clearly identify the equipment used. (EUT and companion device.)



UN6GHZ

● Antenna Reports

- Reports for which the antenna was characterized.
 - This may be a single antenna built by the applicant specifically for their device.
 - This may be an array of antennas characterized within the device to better account for effects on the antenna by the host as well as aggregate antenna gain.
 - Minimally, the report needs to be signed by the authorizing personal.
 - There needs to be calibration dates for all active devices. (Spectrum analyzers, signal generators, network analyzers, etc.)
 - It's not good enough to just report one calibration date for the "antenna measurement system".



UN6GHZ

● Antenna Reports

- Reports for which the antenna was not characterized.
 - This would be an antenna which was manufactured by a third party whose primary business is building antennas.
 - Generally speaking, the antenna datasheet furnished by the antenna manufacturer is sufficient.
 - Some grantees will reiterate the information from the antenna manufacturer in a document with their logo or letterhead.
 - This is acceptable, but please try to make it clear that this information being furnished is from an antenna manufacturer and not a test report by the grantee.



UN6GHZ

● Bandwidth Plots

- Bandwidth plots are required for all power modes.
 - As an example, a device might operate as a VLP, LPI, and SP Client.
 - Bandwidth measurements need to be performed in all three modes of operation.

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- As an example, Bandwidth plots
 - Spectrum analyzer settings change depending on the bandwidth of a plot.
 - There should minimally be plots for each different bandwidth.
- It is not necessary to include every single plot made. Just a sufficient subset to ensure that the proper spectrum analyzer setting were used.



MODLIM

● Change In ID

- Many applicants are getting Change In IDs to earlier certified modules which had LMA.
- As the applicant getting a Change In ID, you are the responsible party for your new ID.
- This means that you are responsible for the accuracy of the entire application.
- We are noticing, however, many applications which are missing key elements necessary for any modular approval and not just the requirements for MODLIM for LMA.
- Labs and TCBCs should thoroughly review the MODLIM PAG to ensure that all elements for modular approval are correct and not just those additional requirements for LMA for the MODLIM PAG.



MODLIM

● Grant Comments

- If a module is intended to be used **ONLY** in the grantee's equipment and is not for sale to the public or OEMs other than the grantee, then this should be **CLEARLY** stated.
- If the module does not have voltage regulation:
 - "This module does not contain voltage regulation and therefore is limited."
- Then how to overcome the voltage regulation limitation:
 - "Each host installation will require the host integrator to perform additional testing in accordance with the test plan provided in the integration instructions."

OR

- "Each host installation will require the host to provide the module with regulated power in accordance with integration instructions. "



MODLIM

● Test Plan

- General Concerns

- The test plan should be **CLEARLY MARKED** in the installation instructions.
 - Please do not just “lump them in” with the recommended post installation testing from KDB 996369 D04 Module Integration.
 - There should be a clear demarcation.

Examples

- This module does not contain a shield and therefore is limited. The host integrator will be required to file a Class II Permissive Change for each host specific installation. The following testing should be performed to demonstrate continued compliance.
- This module does not contain voltage regulation and therefore is limited. The host integrator will be required to supply regulated voltage to the module through the host based upon the following operating range.



MODLIM

● Test Plan – cont'd

- General Concerns

- The test plan should be specific down to the test.

Examples

- §15.207(a) AC Power Line Conducted Emissions Voltage
 - §15.247(e) Power Spectral Density
 - §15.205, §15.209 Band Edge Measurements
- The test plan should also be specific, when applicable, with regards to references to worst case PSD, OFDM subcarrier, widest bandwidth, etc.
 - Actually identify these channels in the test plan.
 - The integrator shouldn't have to try to dig through the original filing trying to identify these test conditions.



MODLIM

● Test Plan – cont'd

- General Concerns

- Conducted Power

- Some user test plans recommend antenna port conducted output power.
 - Where this can be useful, the integrator should be advised exactly what to look for.
 - Some test plans, for example, will state that the device needs to meet the 30 dBm conducted limit of §15.247(a)(3).
 - However, the module may have only been granted for 15 dBm.
 - So hypothetically, after installation, if the module is operating at 29 dBm, it may be in compliance with §15.247(a)(3), but something is wrong if it's that far off from the original grant.
 - What might be more useful would be to state the highest conducted power from the original grant followed by an in-host measurement to be made showing that the conducted powers are within a reasonable margin of one another.



MODLIM

● Test Plan - cont'd

- § 15.212 Modular transmitters (a)(1)(iv)

- The modular transmitter must comply with the antenna and transmission system requirements of §§ 15.203.
 - Noticing that a number of the Change In ID modules are not meeting the requirements for §15.203.
 - ***An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.***
- Some grantees have been trying to claim that this is covered by the fact that it is considered professional installation.
 - ***Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site.***



MODLIM

● Test Plan - cont'd

- § 15.212 Modular transmitters (a)(1)(iv) – cont'd
 - KDB 353028 D01 Antennas Part 15 Transmitters gives recommendations which can be used to meet §15.203 in the case where the module has a standard connector.
 - Installation instructions clearly state that the antenna shall be secured by way of a permanent, industrial epoxy.
 - Installation instructions clearly state that the module shall be installed within an enclosure which will not allow access by the end user.



MODLIM

● Test Plan - cont'd

- § 15.212 Modular transmitters (a)(1)(iii)

- The modular transmitter must have its own power supply regulation.
- There are two general strategies which can be used to help ensure that the module without power supply regulation maintains compliance after installation.

- The host supplies regulated power to the module.

OR

- Testing is performed to show that the system has stability over voltage and temperature variation.



MODLIM

● Test Plan - cont'd

- § 15.212 Modular transmitters (a)(1)(iii) – cont'd

- The host supplies regulated power to the module.

- When this is the case, there should be a voltage operation range supplied for the module.

Example

- Minimum Operating Voltage: 3.6 VDC
- Maximum Operating Voltage: 5.5 VDC

- You can't just declare a nominal operating voltage of 12 VDC.

- Voltage regulation isn't that exacting precise.
- What happens to the module at 11.999 VDC?
- What happens to the module at 12.001 VDC?



MODLIM

● Test Plan - cont'd

- § 15.212 Modular transmitters (a)(1)(iii) – cont'd
 - Testing is performed to show that the system has stability over voltage and temperature variation.
 - General guidance from §15.31(e) can be followed for voltage variation.
 - Be sure to specify what voltage is being varied.
 - Is it voltage to the host or is it voltage to the module?
 - Temperature variation can be performed using the general guidance of C63.10 over the rated and expected temperature range of the module.
 - Keep in mind that if a module, under or over voltage, or under or over heated, just ceases to work, that would be considered acceptable.
 - So long as it is not an interference risk.



Questions?

Thank You!