CSA.10

Antenna Feasibility Study

Outcomes and Deliverables

- Test results of various antennas in various locations, positions and configurations within your device.
- Selection of the best solution based on overall performance and project targets (price, certification, performance etc.)
- An integration plan for each antenna highlighted in your product.
- Report and/or Interactive Technical Support.

Duration

3 weeks (this is a typical estimated duration – actual duration on quote may differ)

What We Need

- 3D CAD files – preferably STEP files.
- Mechanical drawings.
- PCB files and circuit schematics – preferably native Altium files.
- 2 samples of your device/PCB.

What is the problem or concern we are addressing?

You have a product that requires one or more radio technologies, each of which require one or more antennas, but you don't know what kind of antennas, where to put the antennas, or if antennas are even feasible within your device.

Taoglas can evaluate your device and provide you with an optimal solution for all your antenna needs.

The Process

Part 1 – Feasibility Study

Taoglas will review your product details with you to understand your design priorities. Taoglas engineers will evaluate any design files you have shared. Once the files are reviewed, we'll need to meet with your engineering team and project manager to discuss any remaining uncertainties.

Our engineers will help you define clear performance requirements for the antennas in your system. For some radio technologies, performance is the main driving factor in order to meet performance or certification requirements. For other radio technologies, performance expectations are not high and factors like cost and size are the drivers.

Examples of performance requirements include:

- Antenna efficiency per cellular frequency band to meet carrier/network operator requirements.
- Peak gain of Wi-Fi antennas as defined by module.
- RF isolation required between antennas of different radios to maintain functionality.
- A workable solution within a small space.
- General performance criteria, as defined by Taoglas engineers and their relevant experience.

Once the design priorities and requirements are set forth, our engineers will integrate antennas into your device and test their performance. The testing and integration will be repeated as required, in different locations and with different antennas. Alternatively, we may choose to use electromagnetic simulation to estimate performance of a custom or off-the shelf antenna integrated into your device. Both simulation and testing may be used, depending on requirements and difficulty in integration and testing.

If our engineers deem that any matching or fine-tuning is required, these options will be explored and

implemented as part of the feasibility study. The process of matching antennas will include changing the elements of the matching circuit, while further matching and fine-tuning can be achieved by small changes to the antennas, the PCB ground plane, other device components or the device enclosure.

Because of the wide variety of devices, use cases, and markets, Taoglas cannot advise on every aspect of design or development.

In particular, this service does not cover the following:

- Review of electrical schematics.
- PCB stack-up details.
- RF filtering requirements.
- Emissions or issue mitigation details.
- Detailed electrical, RF, or antenna design.

What does Taoglas need?

This depends on which stage of the design process you are in. You may only have mechanical concept files at this point, either as industrial design drawings or 3D solid models. We need these documents to understand your desired project direction and to interactively work with you on various options.

If prototypes are available, we require two samples of your device, including as many of the components present in the final design as possible. Components like batteries, LCD displays, peripherals, cables, etc., all mounted in some sort of enclosure to approximate the final design.

The board does not need to be a functioning device, as we will be performing passive testing. We will be modifying the device and as such it will not be suitable for use after.

If no prototypes are available, our engineers will consult with you and your design team on how best to approach building a representative mock-up in our lab. These results will be indicative only, and we will always recommend testing with a device prototype.

In all cases, we require any 3D CAD and 2D design files you may have. We require these files to do cross sections, hide components and make accurate measurements. We accept a variety of 3D files formats, but STEP files are preferred.

We also require any documents you have relating to the PCB of the device. These documents should define the PCB stack-up, later thicknesses, materials and finishes for the PCB. A bill of materials for each PCB is also recommended. Ideally these files should be native Altium files.

Circuit schematics of all the PCBs in your device are also required. This is to better understand the RF paths in your design. Once again, these files should ideally be native Altium files.

Part 2 – Reporting and Technical Support

After testing and/or simulation is complete, a report will be compiled detailing the results, integration details (such as matching networks, antenna position, antenna mounting, or cable routing), and recommendations.

Taoglas engineering, in consultation with the your design team on the final report, will determine if the measured performance factors are sufficient for the product to meet its performance and certification requirements. This effort is typically interactive, either a web meeting or an in- person meeting.

After this meeting, Taoglas will provide an email of our understanding of the specifics and our recommendations. From this email your engineering team will have a direction for the antenna selections as well as an integration plan for each antenna in your product.

Taoglas assumes your engineering team will then develop design files to implement the entire product. After the initial product design, Taoglas engineering will review the antenna layout to verify proper implementation. Taoglas will be available for further questions on the antenna integration as needed until the initial design files are done.

Part 3 – Next Steps

Taoglas offers a number of services which would typically follow on from this service. These services are intended to optimize the RF performance and maximize likelihood of certification for your design.

These services include:

- **ISA.12:** PCB & Gerber Design RF Review
- **CSA.50**: Custom Antenna Design
- **GSA.30:** GPS Acquisition & Tracking Sensitivity
- **GSA.40**: GNSS Field Testing
- **CSA.30**: Cellular OTA TRP Testing
- **CSA.31**: Cellular OTA TIS Testing

Visit Taoglas Website or contact Taoglas sales for further information.

Please note - devices, systems and equipment falling within the scope of Annex I of the EU Dual Use Regulation 821/2021 are not eligible for this service. For queries, please consult your legal department or contact exportcompliance@taoglas.com.