EMC: Resonant Cavity

Electromagnetic compatibility (EMC) issues represent a major challenge in the development and integration of electronic devices. EMC aims to ensure that **equipment operates correctly in its electromagnetic environment** without generating or suffering **disruptive interference.**

How it works

In resonant cavity, **electronic components** and **antennas emit waves** that are reflected on the metal walls of the cavity. These reflected waves disturb the circuit by generating **interference** that impair data transfer.

- **Internal reflections:** The metal structure amplifies certain frequencies and increases residual EM fields.
- **Stray radiation:** Reflected waves cause interference and measurement or signal disruptions.

The applicable solution is to add absorber like FILAMAG-F within the case, in order to limit internal reflections and reduce parasitic radiation.

Cavities resonate at different frequencies **depending on their size.**
For a box measuring L=6 cm, W=4 cm, h=3 cm, our cavity resonates for the first time at 2.5 GHz, which is a frequency within the Wi-Fi band.

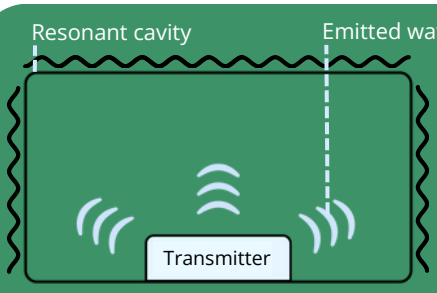

Fig. 1: Resonant cavity without absorber

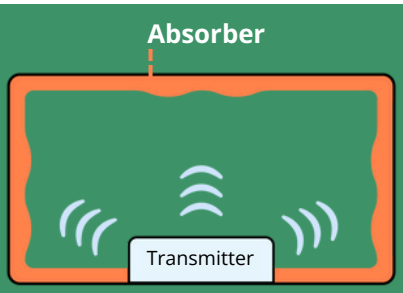

Fig. 2: Resonant cavity with absorber

Use cases

Conducted and radiated emissions

Electronic circuits emit electromagnetic waves which can disturb other nearby equipments (radiation) or propagate via power and data cables (conduction).

Insufficient immunity

Some devices are not sufficiently protected against external electromagnetic interference, resulting in operating errors.

Interference between components

Within a single system, electronic boards, antennas, cabling or connectors can generate mutual interference, which adversely affects overall performance.

What's the HYMAG'IN's point?

HYMAG'IN offers absorbing materials providing:

- **Compatibility with confined spaces**: Compact solutions adapted to restricted environments.
- **Ease of implementation**: Quick installation and easy integration into existing systems.
- **3D-printed absorbers**: Customizable designs and easy integration into resonant cavities.
- **Custom optimization**: Material geometries can be adjusted to maximize absorption in specific configurations.

For instance, our honeycomb structure showcases advanced adaptability, **with thicknesses precisely tailored to specific frequencies**, ensuring optimal absorption performance:

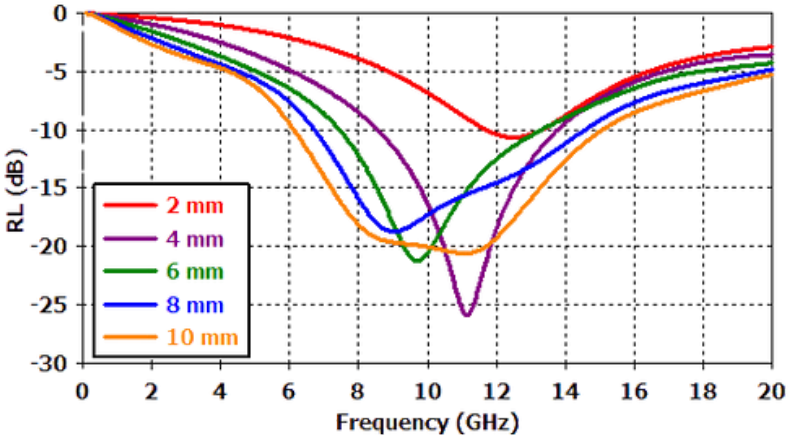

Fig. 3: Reflection loss in dB: Parametric study of honeycomb geometry thickness