

Category B. Flexible Antenna Design

Goal

Design an antenna to receive broadcast waves (FM radio) that satisfies the following specifications.

Specifications

- A part or all of the radiating elements of the designed antenna should be flexible in shape.
- The design frequency of the antenna is 90.0MHz.
- The antenna should fit into two different sized acrylic cases: Type ① 150mm × 150mm × 20mm and Type ② 300mm × 50mm × 20mm.
- Figure 1 shows the structure of the two types of acrylic cases. Each case has a cutout for the SMA cable (characteristic impedance of 50Ω).
- The antenna consists of passive materials only. Do not use active components such as amplifiers.
- Only one type of antenna will be designed. Also, there will be only one feeding point.
- The antenna shape needs to be changed to fit into each size case.
- A SMA female connector should be attached to the antenna for feeding. The connector is included with the antenna size specified above.
- Measured and simulated results of the designed antenna must be included in the submitted application form. The document should include the following information:
 - Description of the antenna design
 - Geometry
 - Simulated reflection coefficient (S11)
 - Simulated Efficiency
 - Simulated Gain

Final submission

- In addition to the above indices, the final design submission requires the following figures and explanations:
 - Photographs of the fabricated antenna including the front, the top, and the side views with a ruler
 - Measured reflection coefficient (S11)
 - Measured gain
 - Radiation mechanism of the designed antenna

- Point you have worked out the most

Evaluation

- The designed antenna will be evaluated comprehensively based on the following items through the submitted documents and the results of receiving FM radio broadcast waves using an FM transmitter on the day of the conference:

- Antenna performance (Evaluated based on the received signal strength of FM waves (90.0 MHz) measured using a software defined radio (RTL-SDR) (average value of types ① and ②))

- Quality of the final submitted documents

- The team with the highest score based on the above evaluations will be awarded the prize.

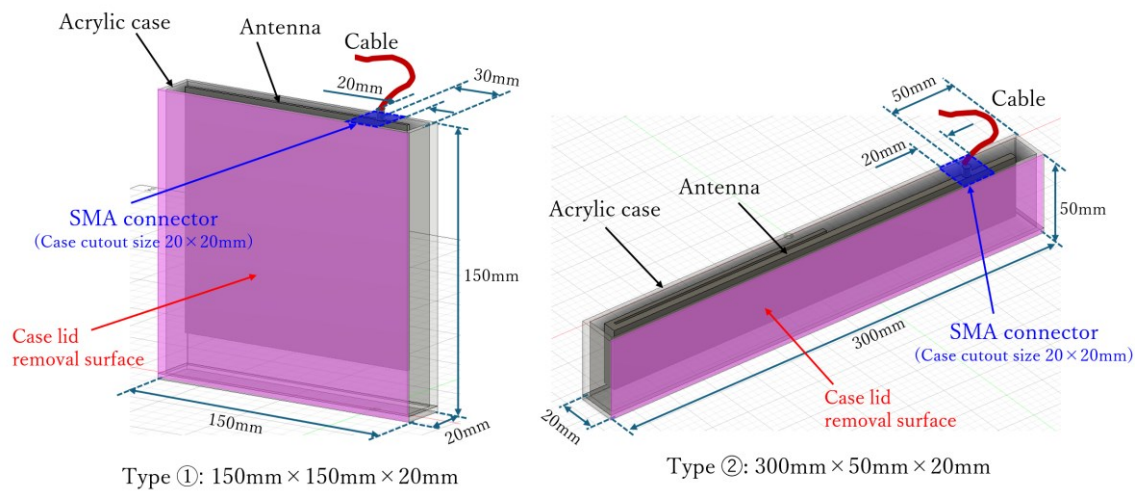


Fig 1. Structure of acrylic cases