

Dual-band Filter for Software Defined Radio and 5G

(thrust sponsored by Elliptika, booth A050)



This contest tries to motivate the students for the design and implementation of a multi-band filter able to get outstanding performance, where different implementation technologies, such as microstrip, coplanar, multilayer microstrip, substrate integrated waveguide SIW (and its variations) and some others can be effectively employed.

The winner will be determined by considering a figure of merit (FoM) defined by the insertion loss level, selectivity, spurious-free response and size.

Context

By considering the specifications of the forthcoming 5G and together with specifications stemming from the Hands-On activities proposed by Pr. David Ricketts during EuMW 2019, we propose to work toward the design of a bi-band filter.

Design specifications and rules:

- Passband 1: 900 MHz to 1000MHz,
- Passband 2: 1427 MHz to 1518 MHz
- Passive designs only will be considered (*i.e.* no biasing voltage or current allowed)
- Acoustic-Wave-based filters are not allowed
- The implemented filter should be suitable for visual inspection. No sealed casing is allowed.
- 3.5 mm SMA female connector at input/output.
- Before the competition day, a detailed report including measured data and a photograph of the implemented filter should be submitted to the organization committee.
- Testing and judging of the implemented filter will be performed at the European Microwave Week 2019. A member of the design group must be present at the testing to assist with the evaluation.

Evaluation criteria

The FoM that will determine the winner (the lower, the better) is defined as follows:

$$FoM = \frac{A \times |S_{21}(900MHz)| \times |S_{21}(1000MHz)| \times |S_{21}(1427MHz)| \times |S_{21}(1518MHz)|}{|S_{21}(500-850)| \times |S_{21}(1050-1350)| \times |S_{21}(1600-2000MHz)|}$$

where $|S_{21}(XXX MHz)|$ is the absolute value of the measured S_{21} parameter (in dB) at XXX MHz, A is the surface area in mm², which will be defined by an imaginary rectangle covering the filter (excluding connectors). The maximum allowed height of the filter is 3 cm.

Filter Passbands:

Any frequency within one of the passbands exhibiting higher insertion losses than the edges frequencies will replace the lower S21 value.

Filter Low-side Rejection:

The filter is required to reject all frequencies from 500 to 850 MHz. The rejection is defined as the maximum value of S21 for frequencies within this band.

Filter inter-band Rejection

The filter is required to reject all frequencies from 1050 to 1350 MHz. The rejection is defined as the maximum value of S21 for frequencies within this band.

Filter High-side Rejection:

The filter is required to reject all frequencies from 1600 to 2000 MHz. The rejection is defined as the maximum value of S21 for frequencies within this band.

Filter Size:

Surface of the filter is calculated by considering its two larger dimensions.

How to participate:

- Submit an entry form by giving names and affiliations.
- Provide a support letter by your advisor/professor stating that you are working on this project and that at least one person will be able to join EuMW 2019.
- A short description of the devices is to be provided with the application.
- All devices shall be accessible for inspection on-site.
- Participants are required to attend EuMW: The presentation of the winning team will be on Thursday in the closing session.