

## Microwave Bandpass Filter Tuning Competition: Evaluation Criteria

Total: 100 points

### 1. Final Filter Performance – Post-Tuning (30 points)

- **Min. Insertion Loss in Passband & at Band-edges (5 pts):**  
*Measured at both band-edge frequencies (per specification). Lower is better.*
- **Passband Return Loss (10 pts):**  
*S11/S22 in the passband. Higher return loss (i.e., better matching) scores higher.*
- **Out-of-band Rejection (10 pts):**  
*Attenuation outside passband at key frequencies.*
- **Meets All Specs (5 pts, required):**  
*Filter must satisfy all defined electrical specifications.*

### 2. Tuning Efficiency (30 points)

- **Total Tuning Time (20 pts):**  
*Shorter total tuning time from start to finish scores higher. Use a formula or a tiered system (e.g., fastest = 20, next = 17, etc.).*
- **Number of Tuning Steps (10 pts):**  
*Fewer tuning actions/iterations to reach target; efficiency of adjustment process.*

### 3. Tuning Process/Technique (25 points)

- **Innovative Tuning Approach (20 pts):**  
*Use of effective algorithms, rational model-based extraction, neural modeling, or creative human intuition; alignment with trends like CAT/RAT.*
- **Instrumentation and Setup (5 pts):**  
*Efficient choice and use of tuning tools/automation and measurement system.*

### 4. Presentation and CAT Tool (15 points)

- **User Friendliness of CAT Software (10 pts):**  
*Quality of CAT software and industrial features.*
- **Oral Explanation (5 pts):**  
*Ability to explain tuning methods, difficulties, and challenges in front of judges.*

---

#### Additional Rules/Details:

- **Disqualification criteria:**  
Filter does not meet any defining specifications, or tuning time exceeds 30 min.
- **Bonus (+5):**  
Exceptional demonstration of future-ready CAT/RAT approaches, or breakthrough reduction in required tuning steps.