



overcame through a 5<sup>th</sup> order quarter wavelength Chebyshev transformer [8].

Simulations were conducted using the software CST Microwave Studio. Additional optimization of the circuit was conducted to improve its performance. Table II summarizes the dimension values of the proposed design.

TABLE II: Dimensions of the transition in mm.

| L0  | L1   | L2   | L3   | L4   | L5   | Ll   | ta   | tr    |
|-----|------|------|------|------|------|------|------|-------|
| 3   | 0.91 | 0.86 | 0.78 | 0.82 | 0.92 | 1.94 | 2.1  | 0.4   |
| tw  | p    | bH   | b1   | b2   | b3   | b4   | b5   | b6    |
| 2.1 | 1    | 0.58 | 1.21 | 0.97 | 0.68 | 0.48 | 0.38 | 0.324 |

### III. RESULTS

Figure 2 shows the results obtained after the optimization process. The  $S_{12}$  and  $S_{21}$  are flat in the complete W-band with a value above -0.4 dB. In the same range of frequencies, the  $S_{11}$  and  $S_{22}$  remain below -17 dB.

In addition, the results show that it is possible to use the designed transition in a frequency range outside the W-band (65-75 and 110 to 122 GHz). This means that the transition can handle an amplitude shift keying signal (ASK) of up to 30 Gbps.

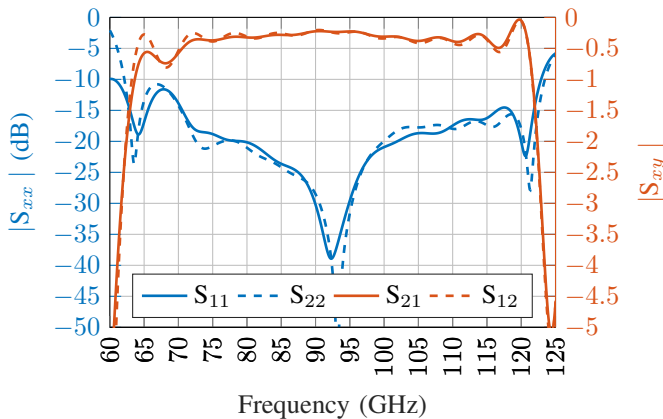


Fig. 2: S Parameters from the transition.

Currently, a back to back hollow waveguide to microstrip transition is fabricated in order to prove the simulation results.

### IV. CONCLUSION

This work proposes a remarkable hollow waveguide to microstrip transition which operates in the W-Band. The simulation outstanding results show flat  $S_{12}$  and  $S_{21}$ , while keeping the  $S_{11}$  and  $S_{22}$  below -17 dB in the complete W-band. Moreover, along 70% of the band, the  $S_{11}$  and  $S_{21}$  remain below -20 dB and above -0.25 dB respectively. These results represent a break through in the current state of the art. Furthermore, the transition reaches an operational bandwidth of 170 % of the W-band.

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