RRI-EEG Internal

Technical Report :

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Design of standard loads for calibrating the receiver at the antenna port

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Abstract：

Generally receiver systems are calibrated for their gain and phase characteristics using standard loads such as Short, Open and 50 ohms. In all these modules, connecting ports have two terminals – centre conductor and the ground. So connecting them to receiver modules having similar port types do not create any problem. However, to connect them to antenna port which has only centre conductor, we normally face difficulties due to port mismatch. To solve this problem, a microstrip transmission line based standard loads are designed which can be used to calibrate at the antenna port. This report presents the methodology of designing loads for the antenna port.

1. Introduction

Normally radio receivers will be calibrated using standard open, short and broadband loads to compensate for its gain and phase characteristics. However, if calibration is required to be done at antenna port which has only one terminal, then the above mentioned loads can not be connected directly. They require certain modification. Present report reports the modifications carried out to develop loads for calibrating the receivers from antenna port.

2. Motivation for doing the work

The main modification is to include as much as possible, the RF path till antenna while calibrating the receiver so that uncalibrated receiver part is minimized significantly.

3. Description of the work

A small RF network is built on a printed circuit board containing either an open or a short or a 50 ohm load or an RLC network. The components of the circuit are all interconnected by 50 ohm transmission lines. At the input an SMA pin is soldered to the pcb. This pin is designed to make an electrical contact with the SMA Jack at the

receiver input. The metal plate attached to load acts as a ground and gets placed on the antenna reflector as shown in Fig. 1.

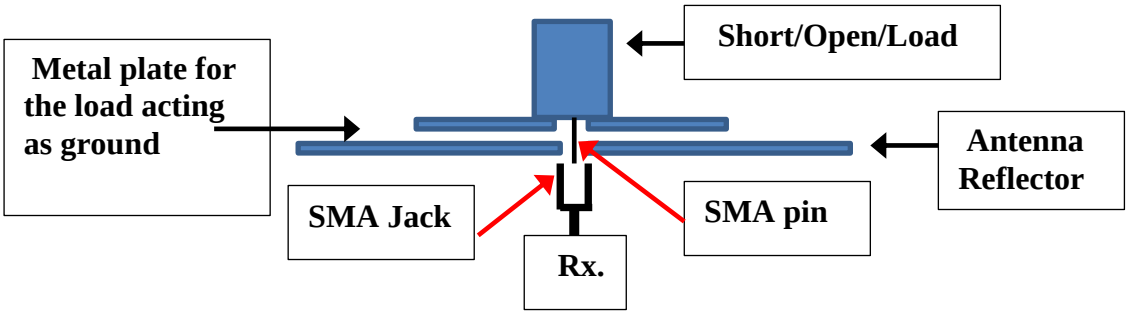

Fig. 1 Schematic indicating the interconnection of the load designed to calibrate the receiver at the antenna port.

4. Fabrication details

The microstrip transmission line based load for the antenna port is fabricated on a Teflon board having an enclosure in an aluminium box as shown in Fig. 2. It clearly shows the pin projecting out of the box for inserting into the jack of the receiver system. Fig. 3 shows the box kept over the circular aluminium plate acting as ground for the load. The box is fixed to the plate using screws as shown.

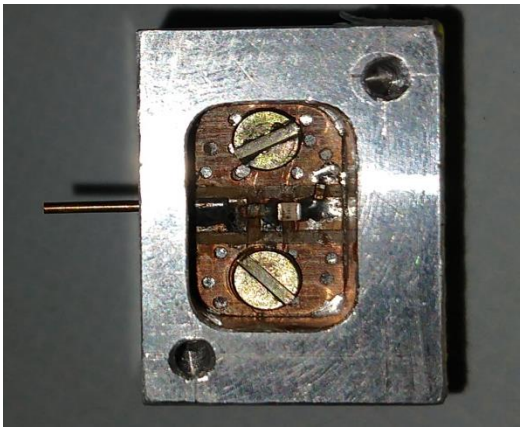

Fig. 2 Top view of the RLC load with jack extending out of box.

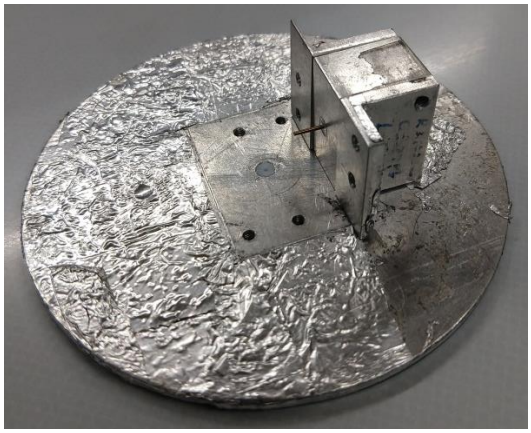

Fig. 3. RLC load kept over the reflector for extablishing ground

5. Measurement Results

The load designed for calibrating the receiver at the antenna port was tested using network analyser in the laboratory. The loads behaved as expected with the new arrangement suitable for calibrating the receiver at the antenna port over the frequency range of 50-300 MHz.

Fig. 4. Experimental setup for characterizing the load designed for calibrating the receiver at the antenna port.

6. **Conclusions**

A load for calibrating the receiver system at the antenna port is designed using microstrip transmission line based RF circuit. It is expected to include all the RF path between the antenna and the receiver electronics during the process of calibration so that the uncalibrated part of the receiver is minimized to a large extent.

Measurements and Results

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Conclusions

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References

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1. **Aaa**
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